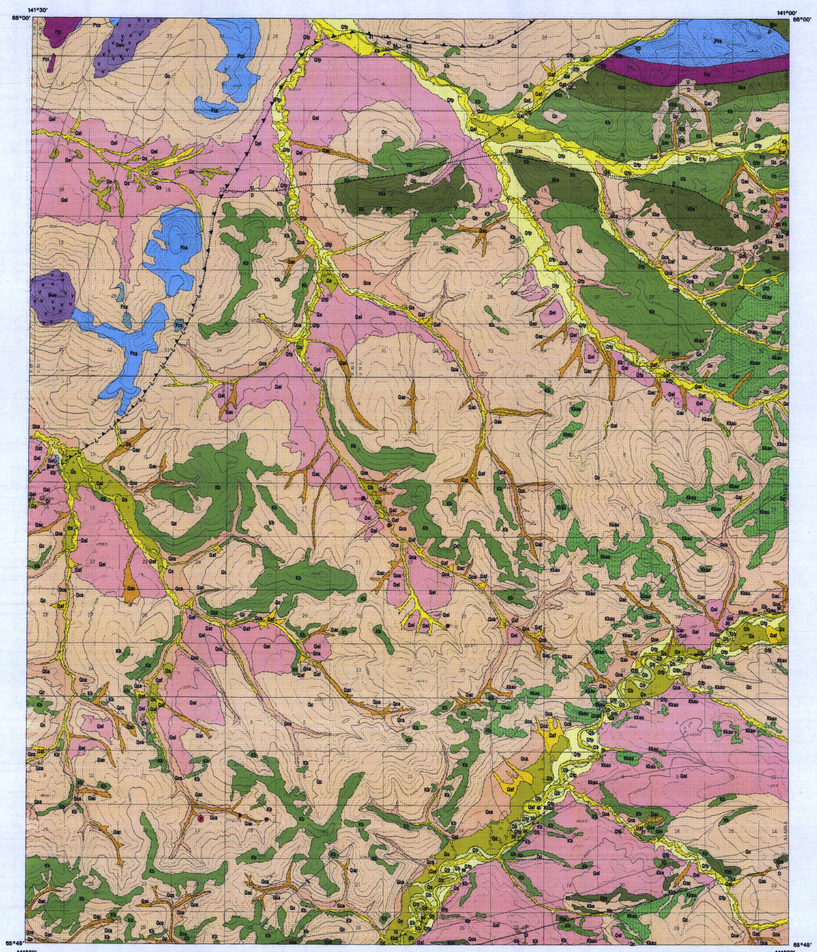


Base modified from U.S. Geological Survey D-1 (1956) 1:63,360 Quadrangles, Alaska. Universal Transverse Mercator Projection, 1927 North American Datum. Scanned and rectified for use in ARC/INFO GIS system.

LOCATION OF STUDY AREA

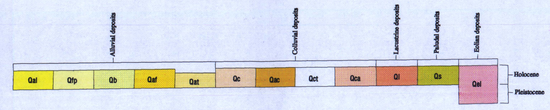
APPROXIMATE MEAN DECLINATION, 1995

SCALE 1:63,360

Based on field investigations in June 1990 and supplemented by interpretation of 1:63,360-scale false-color aerial photographs taken in 1982 and 1986 and 1:40,000-scale black and white aerial photographs taken in 1980. Geology compiled by R.R. Reifenstuhl, R.R. Reifenstuhl, G.G. Mull, S.A. Liss and J.G. Clough. 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 Halsey Hugo, Micropaleo Consultants. Digital Cartography by L. Katherine Wiley and Kristine Fogarty. Map layout by L. Katherine Wiley, edited by Glen R.G. Grohsen. We acknowledge the previous geologic mapping of Robb and Churkin (1969, 1:250,000-scale), Dover and Miyaoka (1988, 1:250,000), and Dover (1992, 1:500,000-scale). Supported by the U.S. Geological Survey, Department of the Interior, under assistance award No. 1434-94-A-1221.

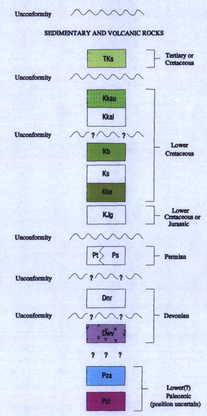
CORRELATION OF MAP UNITS

UNCONSOLIDATED DEPOSITS



Unconformity

SEDIMENTARY AND VOLCANIC ROCKS



EXPLANATION OF MAP SYMBOLS

- Contact - dashed where inferred, dotted where inferred and concealed; queried where uncertain
- High-angle fault - dashed where inferred, dotted where inferred and concealed; queried where uncertain - U on relatively upthrown block, D on relatively downthrown block
- Low-angle fault - sawteeth on upper plate; dashed where inferred, dotted where concealed; queried where uncertain
- Anticline - showing trace of axial plane
- Syncline - showing trace of axial plane
- Minor anticlinal fold axis, showing plunge
- Trace of bedding
- Line of cross section
- Strike of beds, dip given where known
- Approximate strike of beds, dip given where known
- Estimated strike of beds, dip given where known
- Strike and dip of beds, top of beds known from sedimentary features
- Strike and dip of overturned beds, top of beds known
- Strike and dip of vertical beds
- Strike of vertical beds , top of beds known
- Strike of cleavage, dip given where known
- Strike and dip of beds and plunge of lineation
- Strike of beds and intersecting clip cleavage, dip given where known
- Strike of joints, dip given where known
- Bimodal paleocurrent
- Location queried where unknown or doubtful
- Pingo

SYMBOLS FOR CROSS SECTION

- Thrust fault; arrows show relative direction of movement
- High-angle fault; arrows show relative direction of movement
- Folded beds

DESCRIPTION OF MAP UNITS [1]

UNCONSOLIDATED DEPOSITS

Alluvial Deposits

Qal — ALLUVIUM - Elongate deposits of gravel and sand with few to numerous boulders; well sorted and medium to thick bedded, locally crossbedded

Qfp — FLOODPLAIN ALLUVIUM - Elongate deposits of gravel and sand with few to numerous boulders beneath modern floodplains and associated low terraces; surface smooth except for local low scarps

Qb — POINT BAR ALLUVIUM - Arcuate deposits of gravel and sand forming point bars along margins of modern streams and tracing abandoned stream channels; surface thickly vegetated by tall stands of deciduous trees

Qat — TERRACE ALLUVIUM - Gravel and sand forming elevated benches bordering modern floodplains; surface smooth except for local low scarps

Qaf — ALLUVIAL FAN DEPOSITS - Fan-shaped, heterogeneous mixtures of gravel with some sand and silt and few to numerous, subangular to rounded boulders, especially in proximal areas, which may include debris-flow deposits

Colluvial Deposits

Qc — UNDIFFERENTIATED COLLUVIUM - Irregular, heterogeneous blankets, aprons, and fans of angular to subrounded rock fragments, gravel, sand and silt that are left on slopes or at slope bases by mass-wasting processes, including rolling, sliding, flowing, pollification, and frost creep; locally washed by meltwater and slope runoff; surface generally reflects configuration of underlying bedrock surface

Qac — UNDIFFERENTIATED COLLUVIUM AND ALLUVIUM - Fan-shaped and elongate, heterogeneous mixtures of subangular rock fragments and gravel with some silt and sand deposited in upper stream courses primarily by debris flows, pollification, and by brief, intense, summer stream flow; surface smooth, except for local low scarps and shallow, steep-sided channels

Qct — TALUS CONE DEPOSITS - Cone-shaped, heterogeneous mixtures of angular rock fragments with trace to some gravel, sand, and silt deposited on steep bedrock slopes and at mouths of steep bedrock coulkers by snow avalanches, free fall, tumbling, rolling, and sliding; surface steep, slightly irregular, and covered with numerous angular rock fragments

Qca — COLLUVIAL APRON DEPOSITS - Apron-shaped, heterogeneous mixtures of angular rock fragments with trace to some gravel, sand, and silt deposited at the bases of steep slopes bordering modern stream valleys; may include a considerable component of redeposited eolian silt in the northern part of the region; locally washed by meltwater and slope runoff; surface steep to gently sloping

Complex Deposits

Qs — UNDIFFERENTIATED SWAMP DEPOSITS - Elongate to blanket deposits of peat, organic silt, and organic sand accumulated as surface deposits in local basins, in forme stream channels, and downslope from springs and seeps; saturated and locally frozen, locally ice rich; complexly bedded; surface smooth

Ql — UNDIFFERENTIATED LACUSTRINE DEPOSITS - Arcuate or semilocular deposits of silt, sand, and organic silt along margins of local small lakes and filling basins of drained lakes; saturated and locally frozen, locally ice rich; surface smooth

Qsl — LOESS - Heterogeneous blankets of silt and organic silt laid down primarily by eolian processes, but may be considerably reworked by fluvial and colluvial processes; probably perennially frozen and ice rich; local ice wedges; surface smooth to locally rilled and gullied by melting of ice-rich permafrost; minimum ages of 38,770 +5,540-3,250 yr BP (GX-21694) and > 42,000 yr B.P. (GX-21690)

Unconformity

SEDIMENTARY AND VOLCANIC ROCKS

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

Kanelik Group

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, flasily, 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).

Khal — 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: 3 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 1000 m. Possibly correlative to nonmarine rocks with plants of probable Albian age (Brabb and Churkin, 1969).

Kb — 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-quartz 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(?).

Ks — 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 slopes. 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.

Kks — 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 30 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 8%, 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 (Buchia?). Locally contains abundant Buchia 'sublaevis' of Valanginian age (Brabb and Churkin, 1969). Thickness from 150 to 300 m. TAI = 3.0 and 3.0(?).

Kdg — 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 (Berriasian 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 impritns 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 600 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 D-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 115 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 less 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 (8-10%), 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 pendelites near intersection of Wood and Black Rivers (Brabb and Churkin, 1969). Thickness is at least 600 m.

Pzl — 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.

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

By

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1995

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

THIS REPORT HAS NOT BEEN REVIEWED FOR CONFORMITY
TO THE EDITORIAL STANDARDS OF DGGS