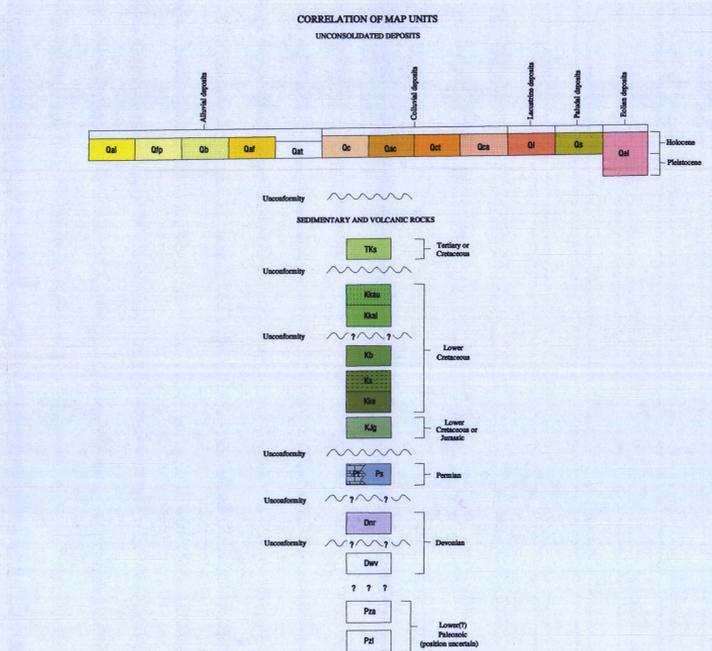
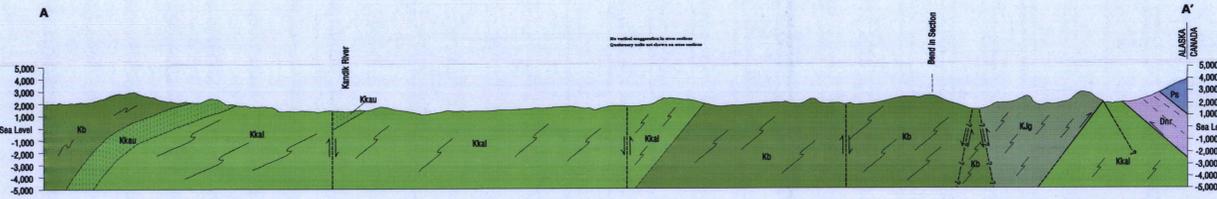


Based on field investigations in June 1995 and supplemented by interpretation of 1:50,000-scale color aerial photographs taken in 1992 and 1994 and 1:250,000-scale black and white aerial photographs taken in 1992 and 1994. The map was prepared by J.G. Clough, R.R. Reifenstahl, D.S. Pinney, G.M. Laird, C.G. Mull, and S.A. Liss. The map was prepared by J.G. Clough, R.R. Reifenstahl, D.S. Pinney, G.M. Laird, C.G. Mull, and S.A. Liss. The map was prepared by J.G. Clough, R.R. Reifenstahl, D.S. Pinney, G.M. Laird, C.G. Mull, and S.A. Liss.



- EXPLANATION OF MAP SYMBOLS**
- Contact - dashed where inferred, dotted where inferred and concealed; quartered where uncertain
  - High-angle fault - dashed where inferred, dotted where inferred and concealed; quartered where uncertain - U on relatively upthrown block, D on relatively downthrown block
  - Low-angle fault - sawtooth on upper plate; dashed where inferred, dotted where concealed; quartered 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
  - Horizontal 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<sup>1</sup>**
- UNCONSOLIDATED DEPOSITS**
- Qat** ALLUVIUM - Elongate deposits of gravel and sand with few to numerous boulders; well sorted and medium to thick bedded, locally crossbedded
  - Qtp** 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 scarps
  - Qb** POINT BAR ALLUVIUM - Arcuate deposits of gravel and sand forming point bars along margins of modern streams and tracking abandoned stream channels; surface thickly vegetated by tall stands of deciduous trees
  - Qaf** TERRACE ALLUVIUM - Gravel and sand forming elevated benches bordering modern floodplains; surface smooth except for local low scarps
  - Qc** 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
  - Qd** UNDIFFERENTIATED COLLUVIUM - Irregular, heterogeneous blankets, aprons, and fans of angular to subangular rock fragments, gravel, sand and silt that fill low slopes or sit atop slopes by residual weathering and complex mass-movement processes, including rolling, sliding, flowing, gullification, and frost creep; locally washed by meltwater and slope runoff; surface generally reflects configuration of underlying bedrock surface
  - Qe** 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, gullification, and by local, intense, summer stream flow; surface smooth, except for local low scarps and shallow, steep-sided channels
  - Qf** TALUS CONE DEPOSITS - Cone-shaped, heterogeneous mixtures of angular rock fragments with trace to some gravel, sand, and silt deposited on steeply sloping slopes and at mouths of steep bedrock canyons by snow avalanches, free fall, talus rolling, and sliding; surface steep, slightly irregular, and covered with numerous angular rock fragments
  - Qg** 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; bedrock outcrops may include a variety of lithologies; surface composed of reduplicated silt silt in the northern part of the region; locally washed by meltwater and slope runoff; surface steep to gently sloping
  - Qh** UNDIFFERENTIATED SWAMP DEPOSITS - Elongate to blanket deposits of peat, organic silt, and organic sand accumulated as surface deposits in local basins, in former stream channels, and downslope from springs and seeps; saturated and locally frozen, locally ice rich; complexly bedded; surface smooth
  - Qi** UNDIFFERENTIATED LACUSTRINE DEPOSITS - Arcuate or semicircular 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
  - Qj** LOESS - Heterogeneous blankets of silt and organic silt laid down primarily by local processes, but may be considerably reworked by fluvial and colluvial processes; probably recently frozen and ice rich; local ice wedges; surface smooth to locally pitted and gullied by melting of ice-rich permafrost; minimum ages of 36,750 ± 3,560 ± 2,250 yr BP (GS-21214) and > 42,010 yr BP (GS-21214)
- SEDIIMENTARY AND VOLCANIC ROCKS**
- TKa** SEDIMENTARY ROCKS UNDIFFERENTIATED - 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 pebbles of dominantly Helderberg Agillite, Kenosha Quartzite, and Kahl Graywacke. Here, the rocks are only 1 m thick, overlain by about 30 m of soil and tree roots with clay silt and sand, and unconformably underlain by highly fractured Helderberg Agillite. Nonmetre(?) In the southeast C-1 Quadrangle this unit is mapped by aerial photogrammetry based on its similar topographic expression to undifferentiated sedimentary rocks mapped in the Charley River B-1 Quadrangle. Thickness in the southeastern Charley River Quadrangle is 65 to at least 100 m (Brabb and Churkin, 1969).
  - Kka** KATHUL GRAYWACKE (Lower Cretaceous)(Brabb, 1969) - Medium gray to light greenish gray to dark charcoal gray, fine- to medium-grained and coarse-grained, calcite-cemented lithic graywacke, with interbedded black shale, mudstone, and conglomerate. Our informal 'upper part' of the Kahl Graywacke is mapped based on the amount of volcanic lithic content relative to the 'lower part'. The upper Kahlul contains far less volcanic components: porphyro, hornblende, plagioclase, and calcite. Calcite veins locally occur. Shale is black, basile, locally thin, gray, or with chert nodules to 50 cm, with rare mudstone. Mudstone is dark gray, tan to white, contains local mud cracks, carbonates, and locally grades to silty limestone. Conglomerate is matrix-supported, and contains subrounded pebbles 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 pebbles and gravel. Thinly bedded, contains one meter- and smaller-scale folds (with local quartz and rare muds in fold noses). Lithic scale beds. Thickness of lower and upper units combined is at least 300 m. Possibly correlative to nonmetre rocks with plants of probable Albian age (Brabb and Churkin, 1969).
  - Kb** HELDERBERG ARGILLITE (Lower Cretaceous)(Brabb, 1969) - Rhythmically interbedded argillite, siltstone and sandstone. Sandstone cobbles to dark greenish gray, weathers mottled light-brown, orange-brown or red-brown, fine- to medium-grained, hard, dense, silty and carbonate cemented, chert-pebbled argillite. Beds are locally 1 to 40 cm thick and many to 80 cm, locally graded. Argillite grades to black, silty, dense, hard, dense, with local carbonaceous veins and breccia. Cleavage is typically well developed and pervasive. Petrographic estimates of clasts include microcrystalline quartz 50%, chert 20%, calcite argillite 15 to 30%, plagioclase 1%, and trace muscovite, white mica, and zircon. Cement is dominantly carbonate, calcite, with local silica and iron oxide (to 30%). Thickness greater than 1500 m. TAI = 34(7).
  - Kc** INDIAN GRAVE SHALE (Lower Cretaceous) - Informal name for black to light-gray weathering shale and phyllite shale with pervasive dark gray to dark 2 km northeast of Indian Grave Mountain where shale forms ribbon dip slope. Two samples were taken of former Indian Grave Mountain. Petrographic estimates of clasts include microcrystalline quartz 50%, chert 20%, calcite argillite 10 to 15%, plagioclase 1%, muscovite 0 to 5%, rare zircon, and iron oxide (to 10%). On Kanik River in southern-most D-1 Quadrangle contains beds with abundant pelecypods (Burcha). Locally abundant abundant Burcha subfossils of Valanginian age (Brabb and Churkin, 1969). Thickness from 150 to 300 m. TAI = 50 and 51(7).
  - Kj** KENOSHA QUARTZITE (Lower Cretaceous)(Brabb, 1969) - Light gray to white, fine- to medium-grained quartzite-arenite quartzite, with rare argillite and siltstone. Typically massive and medium- to coarse-grained, locally locally bedding ranges from 10 to 50 cm thick, typically 15 to 25 cm, with parallel lamination. Conglomerate and rare chert. Petrographic estimates of clasts include microcrystalline quartz 60 to 70%, chert 15 to 20%, calcite argillite 10 to 15%, plagioclase 1%, muscovite 0 to 5%, rare zircon, and iron oxide (to 10%). On Kanik River in southern-most D-1 Quadrangle contains beds with abundant pelecypods (Burcha). Locally abundant abundant Burcha subfossils of Valanginian age (Brabb and Churkin, 1969). Thickness from 150 to 300 m. TAI = 50 and 51(7).
  - Dv** DEVONIAN - Unconformity(?)
  - Pza** PALEOZOIC - Unconformity(?)
  - Ptl** PALEOZOIC - Unconformity(?)
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  - Dv** DEVONIAN - Unconformity(?)
  - Pza** PALEOZOIC - Unconformity(?)
  - Ptl** PALEOZOIC - Unconformity(?)
- STRATIGRAPHIC POSITION UNCERTAIN**
- Pz** PERMIAN - Unconformity(?)
  - Dv** DEVONIAN - Unconformity(?)
  - Pz** PERMIAN - Unconformity(?)
  - Ptl** PALEOZOIC - Unconformity(?)



# GEOLOGIC MAP OF THE CHARLEY RIVER C-1 AND PART OF THE B-1 QUADRANGLES, EASTCENTRAL ALASKA

By  
J.G. Clough, R.R. Reifenstahl, D.S. Pinney, G.M. Laird, C.G. Mull, and S.A. Liss

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<sup>1</sup>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 explanation.

