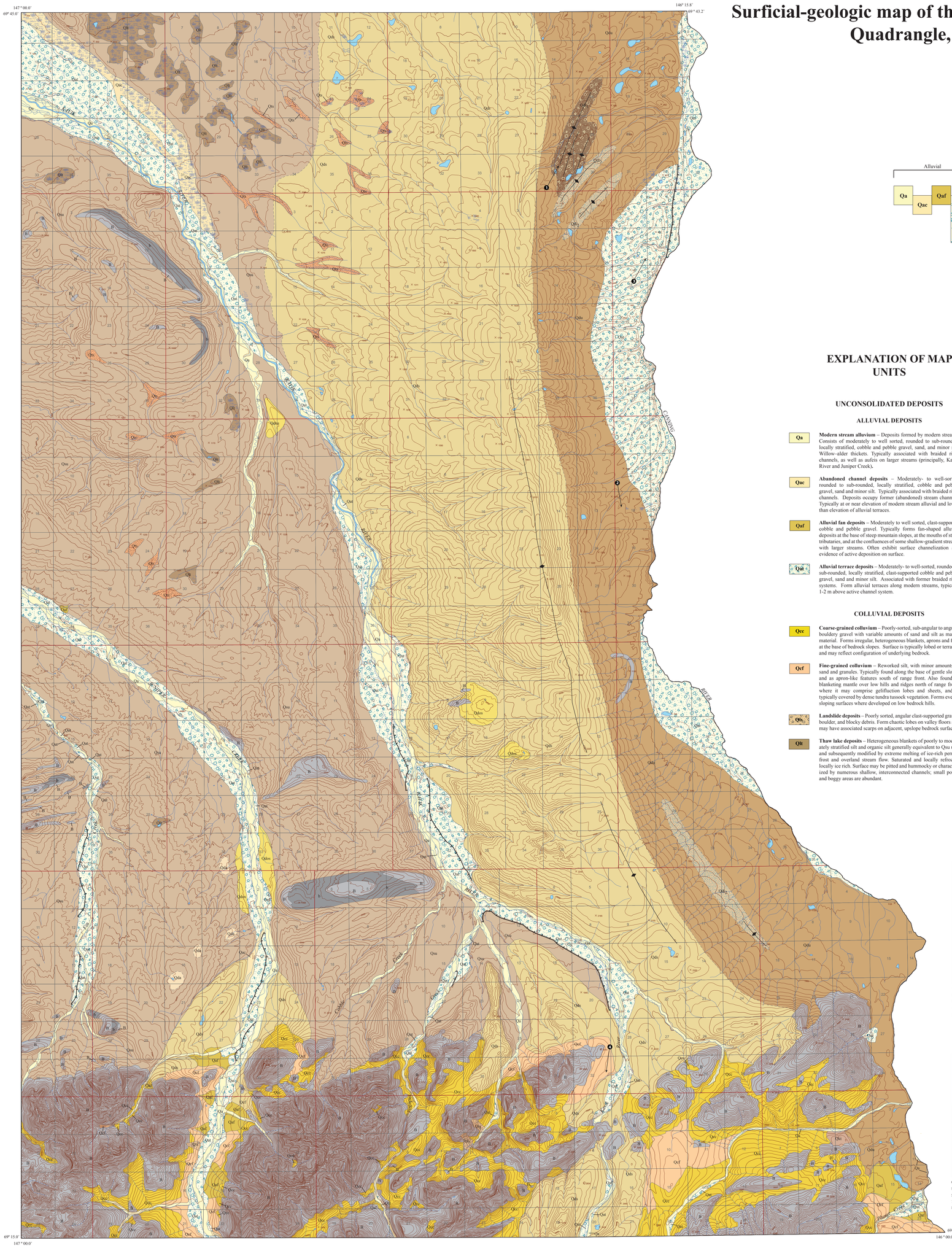
REPORT OF INVESTIGATIONS 2009-3
Carson, 2009

Surficial-geologic map of the Kavik River area, west-central Mount Michelson Quadrangle, northeastern Brooks Range, Alaska

by

Eric C. Carson [1,2]



Base vectorized from United States Geological Survey Mount Michelson B-4, B-5, C-4, and C-5 quadrangles (1971). Universal Transverse Mercator projection, zone 6. 1927 North American Datum

TRUE NORTH
MAGNETIC NORTH
22.5°
APPROXIMATE MEAN DECLINATION, 2009

SCALE 1:63,360

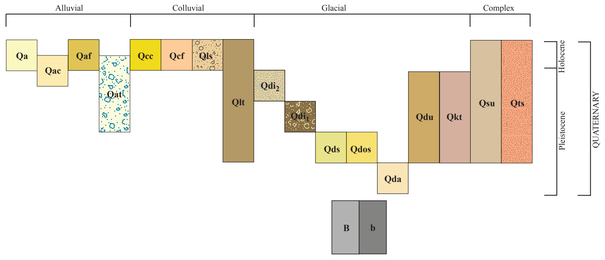
1 0.5 0 1 2 3 4 5 MILES

2 1 0 2 4 6 8 10 KILOMETERS

CONTOUR INTERVAL 50 FEET WEST OF 145° 00.0'; 100 FEET EAST OF 145° 00.0'

LOCATION INDEX

CORRELATION OF MAP UNITS



EXPLANATION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

ALLUVIAL DEPOSITS

Qa — **Modern stream alluvium** – Deposits formed by modern streams. Consists of moderately to well sorted, rounded to sub-rounded, locally stratified, cobble and pebble gravel, sand, and minor silt. Willow-alder thickets. Typically associated with braided river channels, as well as aufeis on larger streams (principally, Kavik River and Juniper Creek).

Qac — **Abandoned channel deposits** – Moderately- to well-sorted, rounded to sub-rounded, locally stratified, cobble and pebble gravel, sand and minor silt. Typically associated with braided river channels. Deposits occupy former (abandoned) stream channels. Typically at or near elevation of modern stream alluvial and lower than elevation of alluvial terraces.

Qaf — **Alluvial fan deposits** – Moderately to well sorted, clast-supported cobble and pebble gravel. Typically forms fan-shaped alluvial deposits at the base of steep mountain slopes, at the mouths of steep tributaries, and at the confluences of some shallow-gradient streams with larger streams. Often exhibit surface channelization and evidence of active deposition on surface.

Qat — **Alluvial terrace deposits** – Moderately- to well-sorted, rounded to sub-rounded, locally stratified, clast-supported cobble and pebble gravel, sand and minor silt. Associated with former braided river systems. Form alluvial terraces along modern streams, typically 1-2 m above active channel system.

COLLUVIAL DEPOSITS

Qcc — **Coarse-grained colluvium** – Poorly-sorted, sub-angular to angular bouldery gravel with variable amounts of sand and silt as matrix material. Forms irregular, heterogeneous blankets, aprons and fans at the base of bedrock slopes. Surface is typically lobed or terraced and may reflect configuration of underlying bedrock.

Qcf — **Fine-grained colluvium** – Reworked silt, with minor amounts of sand and granules. Typically found along the base of gentle slopes and as apron-like features south of range front. Also found as blanketing mantle over low hills and ridges north of range front, where it may comprise gelifluction lobes and sheets, and is typically covered by dense tundra tussock vegetation. Forms evenly sloping surfaces where developed on low bedrock hills.

Qls — **Landslide deposits** – Poorly sorted, angular clast-supported gravel, boulder, and blocky debris. Form chaotic lobes on valley floors and may have associated scarps on adjacent, upslope bedrock surfaces.

Qlt — **Thaw lake deposits** – Heterogeneous blankets of poorly to moderately stratified silt and organic silt generally equivalent to Qsu unit and subsequently modified by extreme melting of ice-rich permafrost and overland stream flow. Saturated and locally refrozen, locally ice rich. Surface may be pitted and hummocky or characterized by numerous shallow, interconnected channels; small ponds and boggy areas are abundant.

GLACIAL DEPOSITS

Itkillik II Glaciation

Qdi2 — **Drift of Itkillik II age** – Poorly sorted, non-stratified, boulder and cobble gravel, usually matrix supported. Clasts are typically sub-angular to sub-rounded, striated and faceted, although non-striated clasts are present. Differentiated from Itkillik I drift by moraine side-slope angle (steeper than Itkillik I), moraine height (higher than Itkillik I), and moraine crest width (narrower than Itkillik I).

Itkillik I Glaciation

Qdi1 — **Drift of Itkillik I age** – Poorly sorted, non-stratified, boulder and cobble gravel, usually matrix supported. Associated with broad-crested partially subdued lateral moraines, ice-stagnation topography, and partially filled or drained kettles. Differentiated from Itkillik II drift by moraine side-slope angle (shallower than Itkillik II), moraine height (lower than Itkillik II), and moraine crest width (broader than Itkillik II).

Sagavanirktok River Glaciation

Qds — **Drift of Sagavanirktok River age** – Poorly-sorted, non-stratified, boulder and cobble gravel, usually matrix supported. Clasts are typically sub-angular to sub-rounded, striated and faceted, although non-striated clasts are present. Associated with very broad, even-crested highly modified moraine ridges north of the mountain front that rise 70 m or more above modern stream level. Hummocky morainal topography is rarely expressed, and kettles tend to be absent or enlarged due to thermal erosion of permafrost. Moraine ridges are typically featureless, with smooth, low-relief flanks (less than 10° slope) that have been significantly modified by gelifluction, formation of patterned ground, and secondary drainage development. Commonly mantled by continuous tussock tundra mat.

Qdos — **Outwash of Sagavanirktok River age** – Well-sorted, clast-supported massive to weakly stratified rounded to sub-rounded cobble and pebble gravel. Typically forms outwash heads along the terminal moraines of Sagavanirktok age or as patchy, discontinuous exposures grading to the elevation of Sagavanirktok-age moraines.

Anaktuvuk River Glaciation

Qda — **Drift of Anaktuvuk River age** – Highly modified, subdued, and low-relief drift remnants, likely often mantled by fine-grained colluvial (aeolian) sediments. Where exposed, it is poorly sorted, non-stratified, boulder and cobble gravel, usually matrix supported. Clasts are typically sub-angular to sub-rounded, striated, and faceted, although non-striated clasts are present.

Undifferentiated Glacial Deposits

Qdu — **Undifferentiated drift of Sagavanirktok and Anaktuvuk River age** – Highly modified drift of Sagavanirktok age, with drift of Itkillik I and Itkillik II age. Alteration by gelifluction processes has rendered the three drift units indistinguishable. Morphology variable, although typically highly modified by alluvial, colluvial, and periglacial processes; may comprise significant gelifluction lobes and sheets.

Qkt — **Kame terrace** – Well sorted, clast-supported massive to weakly stratified rounded to sub-rounded cobble and pebble gravel. Relation to major drift units unknown or uncertain. Typically forms flat outwash surfaces at the mouths of non-glaciated tributary valleys.

COMPLEX DEPOSITS

Qsu — **Silt, undifferentiated** – Irregular blankets of massive, generally homogeneous, unconsolidated aeolian silt. Commonly ice rich and poorly drained. Slope failures, small-scale earth flows, and gelifluction lobes are observable. Almost certainly underlain by Anaktuvuk River-age drift. Almost certainly underlain by Anaktuvuk River-age drift.

Qts — **Thawed silt deposits** – Heterogeneous blankets of poorly to moderately stratified silt and organic silt generally equivalent to Qsu unit and subsequently modified by extreme melting of ice-rich permafrost and overland stream flow. Saturated and locally refrozen, locally ice rich. Surface may be pitted and hummocky or characterized by numerous shallow, interconnected channels; small ponds and boggy areas are abundant.

BEDROCK DEPOSITS

B — **Undifferentiated bedrock** – Bedrock exposed at the surface with no cover.

b — **Shallowly buried bedrock** – Bedrock that is covered by a thin veneer (typically less than 1 m) of unconsolidated sediment. Informal mapping unit.

MAP SYMBOLS

Terrace scarp – hachures point downslope

Moraine – crest queried where uncertain

Contact – dashed where inferred or approximately located

SELECTED BIBLIOGRAPHY OF KEY REFERENCES

Hamilton, T.D., 2003, Surficial geology of the Dalton Highway (Itkillik-Sagavanirktok Rivers) area, southern Arctic Foothills, Alaska; Alaska Division of Geological & Geophysical Surveys, Professional Report 121, 32 p.

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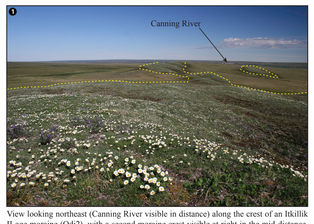
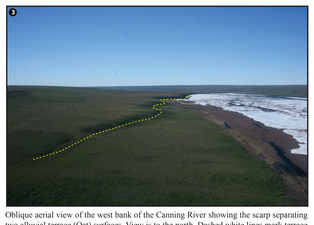


View looking northeast (Canning River visible in distance) along the crest of an Itkillik II-age moraine (Qdi2), with a second moraine crest visible at right in the mid-distance. Both moraine crests are identified by dashed white lines. Notice the slight change in vegetation that accompanies the change in slope on the moraine. Approximate location of photograph identified as arrow #1 on map.

Oblique aerial view looking south at the east side of the Sagavanirktok River-age moraine west of the Canning River. The crest of the Sagavanirktok River-age moraine is identified by a dashed white line. Gelifluction processes have reduced the original moraine morphology to a smooth surface, removing clear evidence of the extent of Itkillik I- or Itkillik II-age deposits. Approximate location of photograph identified as arrow #2 on map.



Oblique aerial view of the west bank of the Canning River showing the scarp separating two alluvial terrace (Qat) surfaces. View is to the north. Dashed white lines mark terrace scarps, separating lower terrace from higher terrace (center of image) and higher terrace from glacial drift (left of image). Approximate location of photograph identified as arrow #3 on map.

View looking south at Sagavanirktok River-age moraine (Qds) on Kavik River. Dashed white lines mark moraine crests on either side of the Kavik River. Approximate location of photograph identified as arrow #4 on map.

ACKNOWLEDGMENTS

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