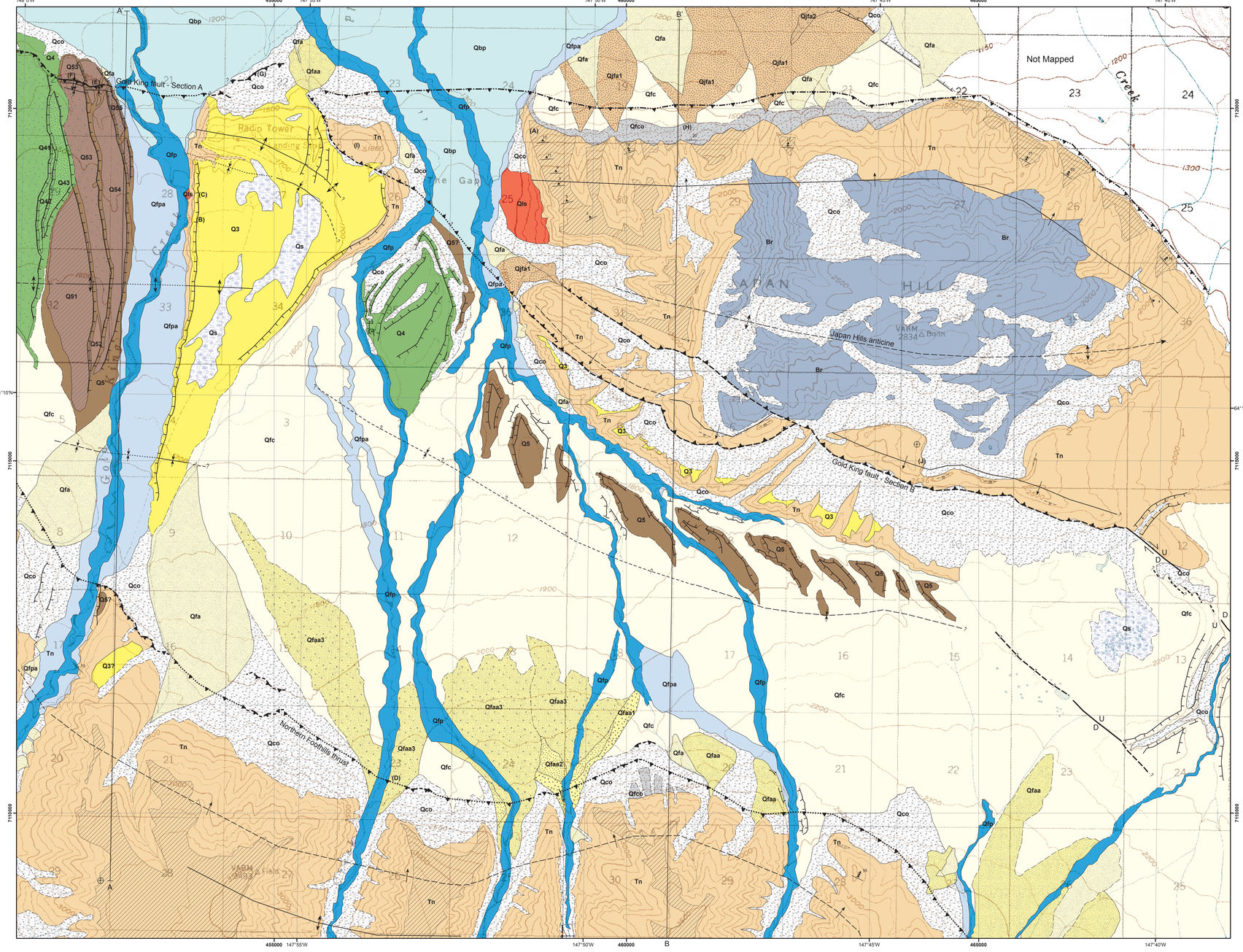


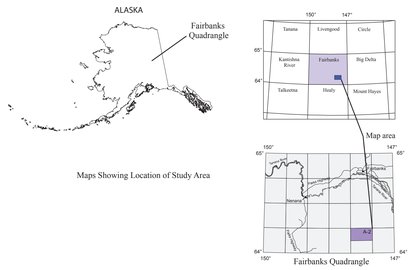
Base map from Fairbanks A-2 quadrangle
U.S. Geological Survey
Map projection: UTM zone 6
Datum: WGS 1984

SCALE 1:25,000

0.5 0.25 0 0.5 1 1.5 2 MILES

1 0.5 0 1 2 3 4 KILOMETERS

CONTOUR INTERVAL 100 FEET



Maps Showing Location of Study Area

MAP SYMBOLS

- Contact - Solid where certain, long dashes where approximately located, short dashes where inferred
- Fault - Steeply-dipping, relative motion indicated with arrows or U (up) and D (down) solid where certain, long dashes where approximately located, short dashes where inferred, queried where uncertain
- Thrust fault - Teeth on hanging-wall, solid where certain, long dashes where approximately located, short dashes where inferred, dotted where concealed, queried where uncertain
- Blind thrust fault - Denotes northern extent of surface deformation above a subsurface fault
- Syncline - Solid where certain, long dashes where approximately located, short dashes where inferred, dotted where concealed, queried where uncertain
- Anticline - Solid where certain, long dashes where approximately located, short dashes where inferred, dotted where concealed, queried where uncertain, single arrow denotes plunge
- Monocline - Solid where certain, long dashes where approximately located
- Line of cross section
- Terrace riser - hachures point downhill
- Gently inclined bedding, determined from aerial photographs--showing approx strike and direction of dip
- Moderately inclined bedding, determined from aerial photographs--showing approx strike and direction of dip
- Steeply inclined bedding, determined from aerial photographs--showing approx strike and direction of dip
- Horizontal bedding
- Inclined bedding--Showing strike and direction of dip
- Photo-interpreted bedding: Strike and dip of strata, dip 5 to 15
- Photo-interpreted bedding: Strike and dip of strata, dip 15 to 45
- Photo-interpreted bedding: Strike and dip of strata, dip greater than 45

MAP UNIT DESCRIPTIONS

Qfp – Active floodplain (Holocene) – includes the active channel and the adjacent plains intermittently occupied by high water and/or aufeis. Vegetation is dominated by white spruce (*Picea glauca*), prickly rose (*Rosa acicularis*), high-bush cranberry (*Viburnum edule*), horsetail (*Equisetum sp.*), and grasses. Willow (*Salix sp.*) and balsam poplar (*Populus balsamifera*) dominate the insides of meander bends and younger portions of the channel margins. Gold King Creek is the only perennial stream in the map area. The other large drainages emanating from the upland south of the map area are ephemeral with the potential for flash flooding during heavy rain events.

Qs – Swamp (Holocene) – Characterized by a shallow depth to permafrost, cottongrass tussocks (Eriophorum), dwarf birch (Betula nana), and similar shrubs, with stunted black spruce (Picea mariana) commonly on the fringes of the unit. This unit is only mapped where it occurs as a distinct landform. The deposits are difficult to characterize due to permafrost, but where the ground has thawed due to a surface disturbance, a peaty bog will develop up to a couple meters deep.

Qco – Colluvium, undivided (Holocene and late Pleistocene(?)) – This unit consists of both coarse-grained, unsorted material transported by mass-wasting processes, and fine-grained deposits sorted and transported through slopewash. A dominant mode of transport in for the coarse-grained deposits is gelifluction processes, particularly concentrated on north-facing slopes. The fine-grained deposits occur as colluvial aprons at the base of slopes and as a valley-fill in drainages with inactive axial streams. These deposits are commonly characterized by a shallow depth to permafrost, with thick sphagnum moss covering the floor of a black spruce (Picea mariana) dominated forest.

Qfa – Active alluvial fan (Holocene) – The alluvial fans occur as distinct landforms, both at the outlets of small tributary drainages, and the outlets of the trunk streams from the hills into the adjacent lowlands. Most of these fans are occupied by ephemeral streams, with runoff dominated by snowmelt in the spring and intense or prolonged summer rains. The surfaces of the fans are stabilized by vegetation, with the type of vegetation controlled by the drainage, age, and aspect of the fan surface. Younger, more active, and better drained portions of these fans generally are dominated by a birch (Betula papyrifera) and white spruce (Picea glauca) forest, while the older and poorly drained fan surfaces are dominated by black spruce (Picea mariana) and cottongrass tussocks (Eriophorum).

Qbp – Braidplain (Holocene and late Pleistocene(?)) – Broad, low-relief surfaces occupied by the largest streams in the map area, occurring where the drainages emanate from the young topography into the Tanana basin. These deposits could also be considered a subdivision of the coalescing alluvial fans unit.

Qfpa – Abandoned floodplain (Holocene) – This unit has two primary forms. The most common form is a swath of land adjacent to and slightly higher than the active floodplain of the modern drainages. In some locations, a small (0.5 – 2 m tall) terrace riser divides these two units, essentially making this unit Q6. This abandoned surface is typically dominated by birch trees, with a few white spruce (Picea glauca) and an understory of prickly rose (Rosa acicularis), high-bush cranberry (Viburnum edule), and patchy sphagnum moss. The other occurrence of this unit is where a stream has breached its channel and temporarily creating a new channel at an abrupt angle to the former channel, before reoccupying the pre-existing floodplain.

Qls – Landslide deposits (Holocene and late Pleistocene(?)) – We mapped two landslide deposits in the map area. One is a small collapse of the bluff above Gold King Creek which appears to have temporarily diverted the course of Gold King Creek. This landslide appears in aerial photographs from 1949, and is likely not much older than several hundred years. The headscarp is still actively raveling and vegetation is young and consists of species common to recently disturbed and unstable slopes. The other landslide is along the western flank of the Japan Hills and is characterized by hummocky and lobate terrain. This is likely a slow-moving earthflow.

Qfaa, Qfaa2, Qjfa1, Qjfa1, Qfaa3, Qjfa2 – Abandoned alluvial fans (Holocene and late Pleistocene) – Abandoned fans are well-preserved on most drainages where they emanate from the hills onto adjacent lowlands. Several streams have a sequence of abandoned fans, and these are numbered with increasing ages – 1 representing the oldest abandoned fan for that particular stream. I have also subdivided the sequences of abandoned alluvial fans into Qjfa1-2 for drainages on the north side of the Japan Hills, and Qfaa1-3 for drainages out of the hills to the south of the map area. This was done so as not to imply age correlation between similarly numbered fans. These fans have been progressively incised by the axial streams, producing successively younger fans out into the lowlands. The distal portions of these fans are difficult to morphologically distinguish from the coalescing alluvial fan deposits.

Qfc – Coalescing alluvial fan deposits (Pleistocene) – A swath of coalescing alluvial fan deposits exists both between the main range front and the Japan Hills, and on the northern flank of the Japan Hills. This unit is characterized by a broad, low-relief surface. The division between the younger abandoned alluvial fans and the coalescing fan deposits is very gradational. Most of the deposits are derived from flowing water out of the Alaska Range but the portions of this unit mapped on the north side of the Japan Hills likely is a combination of alluvial and colluvial processes. The braidplain unit could also be considered a subdivision of this unit.

Q5, Q52, Q54, Q51, Q53, Q55 – Alluvial deposits and fluvial terraces (latest Pleistocene) – The Q5 deposits are aggradational alluvial gravels that were deposited in shallow valley incised into the older Q3 and Q4 deposits. Unit Q51 represents the fill surface of this aggradational event, and Q52-Q55 are progressively younger terraces cut into the Q5 and Q4 fill. We were unable to find any natural exposures of the terrace deposits, but a small excavation made for collecting samples for in-situ terrestrial cosmogenic exposure dating exposed clast-supported gravels on the Q54 terrace. Small, isolated terrace remnants south of the Japan Hills are tentatively correlated with Q5, but this correlation is based primarily upon relative elevation of these surfaces above the modern floodplains.

Q4, Q41, Q42, Q43 – Alluvial deposits and fluvial terraces (late Pleistocene) – The Q4 sequence of units consists of the aggradational alluvial gravels mapped as Q4, with Q41 representing the fill surface atop this deposit and Q42 and Q43 are cut terraces formed during subsequent incision. Cross-cutting relations with the younger Q5 terraces indicate the Q4 terraces formed prior to the aggradation of the Q51 fill surface. The correlation of the Q4 deposits adjacent to Bonnifield Creek is based upon the relative elevation of these landforms below the Q3 terrace and above the lowest suite of terraces correlated with Q5.

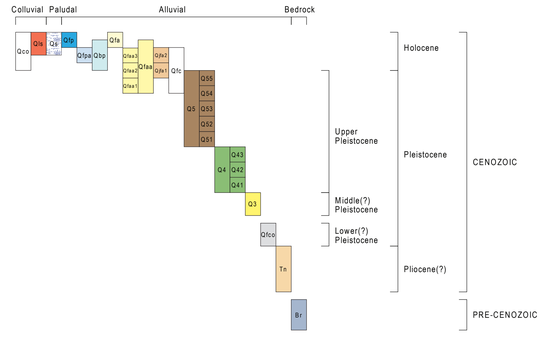
Q3 – Alluvial deposits and fluvial terraces (late to middle(?) Pleistocene) – As exposed in one location, the terrace deposits are primarily clast-supported gravels, with several moderately-sorted, laterally extensive, fine-medium sand beds. At the basal contact of the terrace gravels with the underlying Nenana Gravel, there is an approximately 2 m thick bed of clayey silt. The gravels immediately below this clayey silt show iron oxide staining and cementation, suggesting that this bed acts as a groundwater barrier. A distinct, irregular bench exists along the bluff extending both north and south from the exposure. This bench occurs at approximately the same elevation as the clayey silt bed, and has a morphology suggestive of infrequent small-scale slumping. This clayey silt bed may represent an extensive loess blanket prior to the deposition of Q3 gravels. Approximate thickness of the Q3 terrace gravels where exposed is about 20-25 m. Radiocarbon analysis of a piece of highly weathered charcoal preserved within the terrace gravels (location (B)) yield a statistically significant age of ~50 ka, so we consider this age an absolute minimum for the age of this terrace. Additionally, our preliminary results using 10Be terrestrial cosmogenic nuclide dating for surface exposure of the Q3 surface indicates a minimum age for the abandonment of Q3 of >80 ka (Appendix B).

Qfco – Older coalescing alluvial fan deposits (early Pleistocene(?)) – Poorly sorted, cobble-gravel deposits locally occurring stratigraphically above the Nenana Gravel, dipping shallower than the upper surface of the Nenana Gravel, but steeper than the adjacent alluvial fans and terraces. Only occurs on the northern flanks of young folds. Possibly correlative to the similarly named unit mapped in the Tanacross B-5 quadrangle by Carrera (2004).

Tn – Nenana Gravel (Pliocene) – This formation was originally defined by Capps (1912) who characterized it as a sequence of coalescing alluvial fan deposits. The stratigraphy is described in detail by Trop and Ridgeway (1999), Thorns (2000), and Ridgway et al. (2007). Wahrhaftig (1970) mapped the distribution and deformation of this unit at 1:63360-scale in our map area and to the west and south. In this region, the Nenana Gravel occurs as a massively-bedded, weakly to poorly consolidated, coarse-grained, clast-supported conglomerate. Clasts are rounded to well-rounded and represent a wide range of lithologies present in the Alaska Range to the south. These lithologies are dominated by fine-grained igneous rocks and quartz-rich metamorphics with distinct, albeit minor populations of volcanics and quartz-rich conglomerates derived from the Cantwell Formation (e.g Thoms (2000)). Fresh exposures show common, discontinuous lenses of moderately sorted, fine to coarse sand. Where these sand lenses are not present, bedding is faintly apparent from imbrication of clasts and broad clast size transitions. The uppermost section is characterized by a sequence of distinctive alternating recessive/resistant beds. The upper contact of this unit is locally preserved as a prominent uplifted and gently warped upland surface to the south of the map area.

Br – Bedrock (Paleozoic) – Mapped previously by Wahrhaftig (1970) as Totatlanika Schist(?). In the northern foothills of the Alaska Range, this unit typically occurs as a bimodal metaigneous unit with associated carbonaceous and metasedimentary rocks (Wahrhaftig, 1969; Dusel-Bacon et al. (2004)). Dusel-Bacon et al. (2004) report a Middle Devonian – early Mississippian age for the protolith of the Totatlanika Schist. This study does not present any new data on this unit.

CORRELATION OF MAP UNITS



RADIOCARBON AGE CONTROL

Sample Name	Lab Number	^{14}C Age (BP)	Calibrated age interval (cal BP)	Site Label on Plate 2.1	Sampled Unit	Position in Unit	Significance
06SB01	35455	50730 ± 3200	n/a	B	Q3	~15 – 20 m below terrace tread	Minimum age for surface

Notes: Sample was pretreated and combusted in the Archaeometry Facility in the Department of Anthropology, University of Oregon. Graphitization and analysis performed at UC-Irvine (UCIAMS). n/a = not applicable.

KEY FIELD LOCATIONS

Label	Coordinates	Site Type	Feature	Comment
A	458,634 E 7,119,650 N	Photo		View from northwest
B	453,829 E 7,118,374 N	14C sample		
C	453,903 E 7,118,718 N	TCN samples		
D	456,649 E 7,110,447 N	Observation	Undisturbed terrace Qfaa3 across projection of NFT	
E	452,384 E 7,120,311 N	Observation	Scarp on Q54	
F	452,030 E 7,120,422 N	Photo	Scarp on Q53	View from the east
G	454,755 E 7,120,512 N	Observation	Scarp on Qco	
H	460,786 E 7,119,663 N	Observation/Surveys	Tilted terraces	
I	456,141 E 7,119,422 N	Observation	Lisa's Knob and deflected drainage	
J	464,125 E, 7,114,922 N	Photo	Monoclinal scarp and bedrock knob	View from southeast

PLATE 2.1. QUATERNARY GEOLOGIC MAP OF THE GOLD KING - JAPAN HILLS AREA