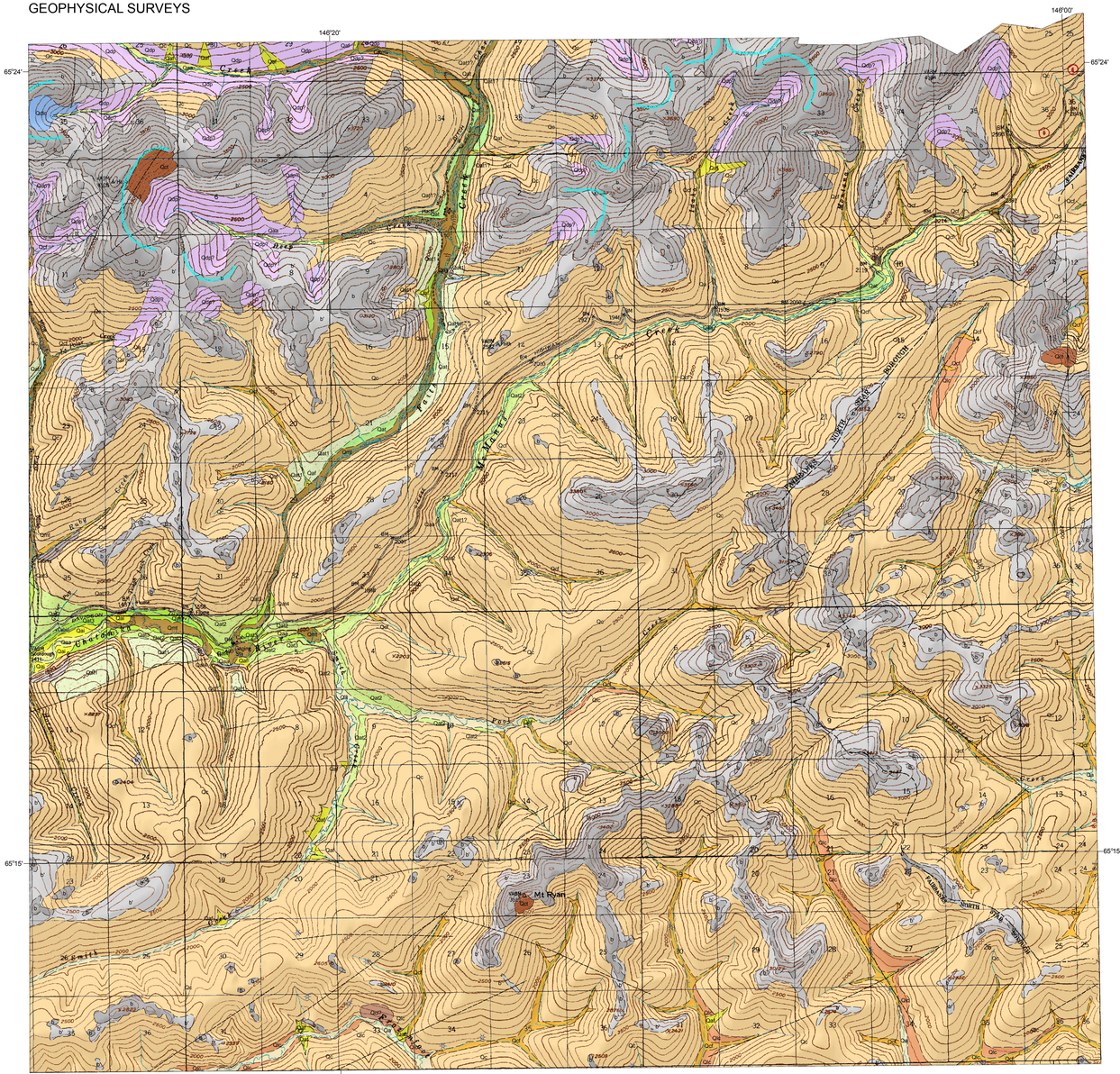


Topographic base map from:
Portions of the Circle A-4, A-5, B-4 and B-5 quadrangles
U.S. Geological Survey digital raster graphic images, 1954; limited revisions 1980
Map projection: UTM Zone 6 North
Datum: NAD 27

SCALE 1:50 000

1 0 1 2 3 4 MILES
3000 0 3000 6000 9000 12000 15000 18000 21000 FEET
1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 2011

Geologic field work by D.S.P. Stevens (2007).
Digital cartography by D.S.P. Stevens (2008, 2011).
Reviewed by R.D. Reger and T.D. Hubbard (2009).

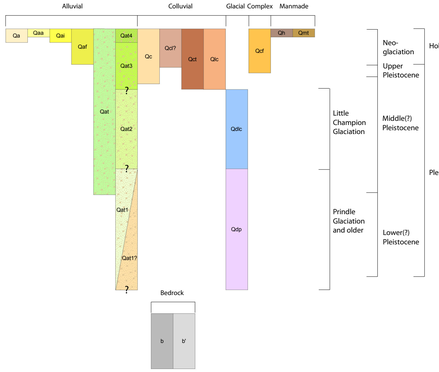
SURFICIAL-GEOLOGIC MAP OF THE NORTHERN FAIRBANKS MINING DISTRICT, CIRCLE QUADRANGLE, ALASKA

by
D.S.P. Stevens

2011

State of Alaska
Department of Natural Resources
Division of Geological & Geophysical Surveys

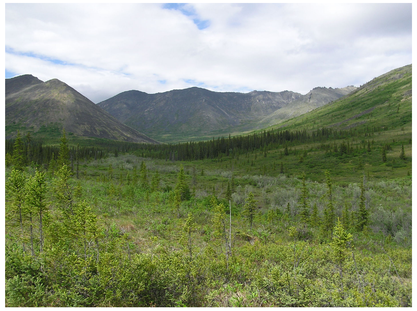
CORRELATION OF MAP UNITS



MAP SYMBOLS

- Pingo
- Photointerpreted contact - approximately located
- Possible cirque - headwall of possible former glacier; hachures are on ice side
- Photo linear - linear features visible on aerial photographs

Rounded quartzite cobble among angular bedrock rubble on subtle bench above Faith Creek. Scattered rounded cobbles like this are found at elevations exceeding 100 meters above modern stream level and are remnants of ancient stream terraces.



U-shaped valley of upper Hope Creek is a glacial trough that was last occupied by ice during the Prindle glaciation of Weber and Hamilton (1984). Prominent tors developed on granite bedrock can be seen along the ridgetops in the distance.

This surficial-geologic map shows the distribution of unconsolidated deposits and undifferentiated bedrock in the Faith Creek area in the Circle A-4, A-5, B-4, and B-5 quadrangles. This map was prepared principally by the interpretation of 1:63,360-scale, false-color, infrared aerial photographs taken in 1979 and 1981 and is locally verified by ground observations during field work in 2007.

DESCRIPTION OF MAP UNITS

UNCONSOLIDATED DEPOSITS[1]

ALLUVIAL DEPOSITS

Qa ALLUVIUM, UNDIFFERENTIATED – Elongate deposits of moderately to well sorted, well stratified, fluvial pebble–cobble gravel, sand, and silt, with scattered to numerous boulders comprising channel and overbank deposits of generally small streams; medium to thick bedded, locally crossbedded, shows fining-upward cycles, and is locally aurriferous; clasts generally rounded; extensive willow–alder thickets grow on many Qa deposits in mature valley fills; unfrozen to discontinuously frozen with low to moderate ice contents; surface smooth to hummocky, except for local low scarps

Qaa ALLUVIUM IN ACTIVE CHANNELS – Chiefly well sorted and well stratified layers and lenses of pebble gravel, sand, and silt with rare to scattered cobbles comprising river bars subject to recurrent inundation by modern streams every 5 years or less (Chapin and others, 2006); mapped extent is a function of river level (stage) and reflects the transitory extent of exposed river bars at the time the photographs were taken; in braided and anastomosing reaches, active channels typically shift positions from year to year and present channel locations may differ from locations on the 1979 and 1981 photography; active channel alluvium underlies upper stream bank and active stream channels and includes point-bar and meander-scroll deposits; composed dominantly of gravel and sand where stream is braided and anastomosing, and sand and silt bars where meandering; prone to liquefaction where fine grained, unfrozen, and saturated; where braided, subject to formation of extensive, thick, seasonal stream icings (aufeis); generally unfrozen, except seasonally frozen to depth of frost penetration; shallow water table

Qaf ALLUVIAL FAN DEPOSITS – Fan-shaped deposits of poorly to moderately sorted gravel, sand, and silt with numerous cobbles and boulders in proximal zone deposited by streams where they emerge from mountain valleys onto lower-gradient surfaces; lithologies reflect bedrock of source area; in general, size of clasts decreases and degree of sorting increases downfan; typically mixed with debris-flow deposits in proximal part of fans; unfrozen to discontinuously frozen, except in fine-grained distal deposits, where permafrost may be shallow and continuous; ice contents low to moderate

Qal ALLUVIUM IN INACTIVE CHANNELS – Elongate deposits of moderately to well sorted, well stratified, fluvial gravel, sand, and silt with scattered to numerous boulders forming modern floodplains and associated low terraces that are subject to flooding at least once or twice every century (Mason and Begét, 1991; Chapin and others, 2006); medium to thick bedded, locally crossbedded, shows fining-upward cycles, and may be locally aurriferous; clasts generally rounded; may be covered by several meters of overbank silty sand and sandy gravel; may reflect former channels and flow regimes; may include more than one channel level; overbank sequences include flood-related features, such as natural levees, crevasse-splays near channels, and fine-grained back-levee swale deposits farther from channels; lower surfaces may be flooded during periods of extremely high stream discharge; generally unfrozen in younger areas and discontinuously frozen in older areas with low to moderate ice contents; surface typically well vegetated, smooth to hummocky, with local low scarps and bogs

Qaf TERRACE ALLUVIUM, UNDIFFERENTIATED – Elongate deposits of well sorted, well rounded to subrounded pebble–cobble gravel and sand with trace to some silt and rare to numerous boulders forming stream terrace treads no longer subject to inundations by the stream that deposited the alluvium (Kreig and Reger, 1982); may include several levels and incorporate outwash alluvium; may be covered by several meters of organic sandy silt and silty sand; surface smooth, except for local low scarps; continuously to discontinuously frozen with low to moderate ice contents

Qal4 TERRACE ALLUVIUM OF YOUNGEST AGE– Elongate deposits of well sorted, well rounded to subrounded pebble–cobble gravel and sand with trace to some silt and rare to numerous boulders forming stream terrace treads no longer subject to inundations by the stream that deposited the alluvium (Kreig and Reger, 1982); may include several levels; may be covered by up to a meter of organic sandy silt and silty sand; upper surface typically only a few meters above modern stream level; surface smooth, except for local low scarps; continuously to discontinuously frozen with low to moderate ice contents

Qal3 TERRACE ALLUVIUM OF YOUNG-INTERMEDIATE AGE – Elongate deposits of well sorted, well rounded to subrounded pebble–cobble gravel and sand with trace to some silt and rare to numerous boulders forming stream terrace treads no longer subject to inundations by the stream that deposited the alluvium (Kreig and Reger, 1982); may include several levels; may be covered by several meters of organic sandy silt and silty sand; upper surface about 30-50 m above modern stream level along upper Chatanika River and lower Sourdough Creek; surface smooth, except for local low scarps; continuously to discontinuously frozen with low to moderate ice contents

Qal2 TERRACE ALLUVIUM OF INTERMEDIATE AGE – Elongate deposits of well sorted, well rounded to subrounded pebble–cobble gravel and sand with trace to some silt and rare to numerous boulders forming stream terrace treads no longer subject to inundations by the stream that deposited the alluvium (Kreig and Reger, 1982); includes several levels; distribution and elevation of deposits suggest unit may incorporate outwash alluvium of Little Champion or Prindle glaciations, or both, of Weber and Hamilton (1984); largest measured cobbles up to 54 cm in diameter; upper surfaces of some granite cobbles strongly weathered and decomposed, while undersides remain sound; may be covered by several meters of organic sandy silt and silty sand; upper surface about 90 m above modern stream level along upper Chatanika River and lower Sourdough Creek; surface smooth, except for local low scarps; continuously to discontinuously frozen with low to moderate ice contents

Qal1 TERRACE ALLUVIUM OF OLDEST AGE – Elongate deposits of well sorted, well rounded to subrounded pebble–cobble gravel and sand with trace to some silt and rare to numerous boulders forming stream terrace treads no longer subject to inundations by the stream that deposited the alluvium (Kreig and Reger, 1982); includes several levels; distribution and elevation of deposits suggest unit probably incorporates outwash alluvium of Prindle glaciation or older of Weber and Hamilton (1984); commonly preserved as a thin veneer or gravel lag; upper surfaces of some granite cobbles strongly weathered and decomposed, while undersides remain sound; may be covered by several meters of organic sandy silt and silty sand; upper surface about 90-120 m above modern stream level along Faith Creek and about 180 m above modern stream level along upper Chatanika River; surface smooth, except for local low scarps; continuously to discontinuously frozen with low to moderate ice contents

Qal1? POSSIBLE TERRACE ALLUVIUM OF OLDEST AGE – Possible upstream continuation of unit Qal1 into upper reaches of Faith Creek and upslope of unit Qat2 along the Chatanika River at the mouth s of Faith and Sourdough creeks; mapped primarily on the basis of subtle slope breaks and smooth surface morphology along valley walls; upper surface about 120-180 m above modern stream level along upper Chatanika River and 90-120 m above modern stream level along Faith Creek

COLLUVIAL DEPOSITS

Qc COLLUVIUM, UNDIFFERENTIATED – Irregular, heterogeneous blankets, aprons, and fans of angular to subrounded rock fragments, gravel, sand, and silt that are left on slopes, slope bases, or high-level surfaces by residual weathering and complex, gravity-driven mass movements involving sliding, flowing, gelifluction, and frost creep of weathered bedrock and modified glacial drift; cobbles and boulders are scattered to numerous; lower headwalls of cirques and upper walls of glaciated valleys include talus aprons and steep fans built by snow avalanches and debris flows; may include thin residual deposits and lags of highly modified drift of ancient glaciations, particularly in the northern part of the map area; medium to thick bedded; generally unsorted to very poorly sorted; thickness is highly variable, with thickest deposits at the bases of slopes; locally washed by meltwater and slope runoff; surface disturbances, such as from excavation, may result in melting of permafrost and subsequent slumping and flowing; surface smooth, lobed, or terraced and, if deposit is thin, generally reflects morphologies of underlying materials; discontinuously to continuously frozen with low to moderate ice contents

Qc? POSSIBLE LANDSLIDE DEPOSIT – Unsorted, unstratified mixture of gravel, sand, and silt derived from adjacent unconsolidated deposits and bedrock and deposited at the base of slope by near-surface to deep creeping, flowing, and sliding of failed bedrock and unconsolidated surficial deposits; surface slightly irregular to hummocky

Qcl TALUS DEPOSITS – Fans and aprons of coarse, angular, unsorted, frost-rived rock fragments downslope of bedrock outcrops with trace to some gravel, sand, and silt deposited on steep bedrock slopes by rock falls, snow avalanches, free fall, tumbling, rolling, and sliding; surface steep, slightly irregular, and covered with numerous rock fragments, particularly in distal zones; includes debris-flow tongues; unfrozen to discontinuously frozen with low ice contents

Qlc LOWLAND COLLUVIUM – Gravel, sand, and silt derived from underlying or nearby bedrock and unconsolidated deposits and deposited in lowland areas adjacent to low-slope drainages primarily by mass-wasting processes; includes a component of primary and reworked eolian silt; overlies and incorporated into terrace deposits; surface smooth to gently sloping; discontinuously to continuously frozen with moderate to high ice contents

GLACIAL DEPOSITS

LITTLE CHAMPION GLACIATION

Qdc DRIFT OF LITTLE CHAMPION AGE – Till associated with the Little Champion glaciation of Weber and Hamilton (1984); subrounded cobbles and boulders and some angular chips of schist and quartzite in a yellowish-brown matrix of silty sand (Rawlinson and Hickmott, 1987) deposited by glacial ice and reworked by meltwater streams; primary surface morphology largely obliterated due to post-depositional modification by weathering and slope processes; mapped by photointerpretation at a single site in study area, at head of Hope Creek tributary drainage

PRINDLE GLACIATION OR OLDER

Qdp DRIFT OF PRINDLE AGE OR OLDER – Till associated with the Prindle glaciation of Weber and Hamilton (1984) and possibly older glacial deposits; discontinuous to continuous sheets of heterogeneous pebble gravel with rare to numerous cobbles, boulders, and blocks up to 2 m in diameter in a brown matrix of sandy silt deposited directly from melting glacial ice and reworked by meltwater streams and mass-movement processes; generally thin, but locally up to 9.4 m thick; clasts generally subangular to subrounded; scattered angular pebbles; some small granite cobbles and pebbles are decomposing, but most are sound

COMPLEX DEPOSITS

Qcf MIXED COLLUVIUM AND ALLUVIUM—Primarily fan-shaped or elongate, massive to poorly stratified, generally inorganic silt mixed with sandy angular to subangular pebble gravels derived from weathered bedrock uplands and deposited by debris flows and hyperconcentrated flows produced during brief, intense summer storms; colluvial processes dominate slightly over fluvial processes; contains numerous cobbles in glaciated terrain and angular to subangular, fresh to weathered rock fragments in weathered bedrock terrain; surface slightly irregular; discontinuously to continuously frozen with low to moderate ice contents

MANMADE DEPOSITS

Qh CONSTRUCTION PAD – Artificial fill of pebble-cobble gravel with trace to some sand and silt forming base for DOT station; well to poorly sorted; surface smooth to irregular; extent based on distribution in August 1981 when the aerial photographs were taken

Qmt MINE TAILINGS – Water-washed pebble–cobble gravel with trace to some sand and silt piled in active or formerly active gravel pits, open-pit mines, and dredged areas; typically well sorted; surface smooth to irregular or forming symmetrical ridges and cones; unfrozen

BEDROCK

b EXPOSED BEDROCK – Undifferentiated bedrock with essentially no cover

b' THINLY COVERED BEDROCK– Undifferentiated bedrock that is covered by a thin (generally less than 1 m thick) veneer of colluvium, drift, undifferentiated glacial or glaciofluvial deposits, or combinations of these deposits; cover is sufficiently thin that planar bedrock structures, such as joints, foliation, and bedding or glacier-scoured bedrock subcrops are reflected at the ground surface by linear and curvilinear shallow troughs and bands of moist ground or hydrophilic vegetation

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[1] Terms used to describe the estimated percentages of cobbles and boulders are 'numerous', 'scattered', and 'rare.' 'Numerous' implies that drilling through the layer would encounter two cobbles or boulders in an interval of 0.6 m; 'scattered' implies that drilling would encounter two cobbles or boulders in an interval of 3 to 4.5 m; and 'rare' implies that drilling would encounter two cobbles or boulders in an interval of more than 4.5 m. Estimated content of gravel, sand, and silt, based on field observations, is indicated by the terms 'some' and 'trace.' 'Some' implies a general composition of 12 to 30 percent and 'trace' implies a general composition of 4 to 12 percent; estimated compositions of less than 4 percent were not recorded in the field. Terms used to describe the estimated amount of ice in frozen sediments are 'high', 'moderate', and 'low.' 'High' implies that ice constitutes greater than 20 percent of the deposit volume; 'moderate' implies that ice constitutes 10 to 20 percent of the deposit volume; and 'low' implies that ice constitutes 0 to 10 percent of the deposit volume.

Map Area

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