DESCRIPTION OF SURFICIAL-GEOLOGIC MAP UNITS

These maps show the distribution of unconsolidated deposits and undifferentiated bedrock exposed at the surface in the eastern segment of the proposed natural-gas pipeline corridor, which straddles the Alaska Highway from the western margin of the Tanacross Quadrangle near Tetlin Junction to the eastern edge of the Nabesna Quadrangle at the Canada border. Units were mapped by interpretation of false-color infrared ~1:65,000-scale aerial photographs taken in July 1978 and August 1981 and verified by field checking in 2008, 2009, and 2010.

NOTE: Not all map units appear on each sheet

Question mark (?) in map unit label means questionable identification

UNCONSOLIDATED DEPOSITS[1]

ALLUVIAL DEPOSITS

Qa UNDIFFERENTIATED FLOODPLAIN ALLUVIUM—Chiefly well-sorted and well-stratified polymictic pebble gravel, sand, and silt comprising channel (bedload) and overbank (cover) deposits of generally small streams; unfrozen to discontinuously frozen with low to moderate ice content

Qaa ACTIVE-FLOODPLAIN ALLUVIUM—Chiefly well-sorted and well-stratified layers and lenses of polymictic pebble gravel, sand, and silt with rare to scattered cobbles comprising river bars and floodplain cover deposits subject to recurrent inundation by 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 and channel locations 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 in the photographs on which the deposits were mapped; active alluvium underlies banks and active stream channels and includes point-bar and meander-scroll deposits (Brakenridge, 1988); composed dominantly of gravel and sand where stream is braided and anastomosing, and sand and silt bars and cover deposits where meandering; prone to liquefaction where fine grained and unfrozen (Harp and others, 2003); 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

Qab? ABANDONED-FLOODPLAIN ALLUVIUM—Chiefly 3 to 6 m of overbank (cover) sandy silt and silty sand overlying sandy, polymictic riverbed gravel beneath surfaces with widespread cover of lowland loess and local sand dunes and subject to stream flooding about once every 500 to 1,000 years (Mann and others, 1995); may include several surfaces at different levels; overbank sequences include flood-related features such as natural levees, crevasse splays, and expansion fans near channels, and fine-grained, peaty back-levee swale deposits farther from channels (Brakenridge, 1988; Mann and others, 1995); may contain organic-silt channel fills 2.1 to 6 m thick; surface peat generally discontinuous to widespread in backwater areas away from channels; floodplain lakes are larger than lakes on younger floodplain surfaces and typically have rounded to scalloped shorelines formed by thermokarst erosion; generally frozen with low to moderate ice content

Qai INACTIVE-FLOODPLAIN ALLUVIUM—Chiefly 0.6 to 6 m of overbank (cover) silty sand and sandy silt overlying gravelly, polymictic riverbed sand and sandy gravel beneath surfaces subject to flooding as often as two to ten times per century (Mason and Begét, 1991; Yarie and others, 1998; Chapin and others, 2006); may include more than one surface at different levels; overbank sequences include flood-related features such as natural levees, crevasse-splays, and expansion fans near channels, and fine-grained back-levee swale deposits farther from channels (Brakenridge, 1988; Mann and others, 1995); scroll lakes have linear, arcuate, and coalesced outlines (Weber and Péwé, 1961, 1970; Péwé, 1970; Reger and Hubbard, 2010); surface peat generally absent; prone to liquefaction where fine grained and unfrozen (Harp and others, 2003); generally unfrozen in younger areas and discontinuously frozen in older areas, with low to moderate ice content; active channels may be underlain by 1.5 to 6 m of generally unfrozen sand and silty sand; fills of inactive channels may include 2.1 to 3.6 m of discontinuously frozen organic sand and silt with moderate to high ice content over sand and gravelly sand

Qat STREAM-TERRACE ALLUVIUM—Chiefly 1.2 to >6 m of organic sandy silt and silty sand overlying well-sorted, polymictic sand and gravel beneath stream terrace treads no longer subject to inundations by the stream that deposited the alluvium (Kreig and Reger, 1982); may include several levels and flood-related features such as natural levees, crevasse-splays, and expansion fans near channels; locally covered by ≤4.5 m of lowland loess and eolian-sand blanket and dune complexes, particularly close to active sediment sources; thaw lakes with rounded to scalloped shorelines formed by thermokarst erosion are typically present (Weber and Péwé, 1961, 1970; Péwé, 1970; Reger and Hubbard, 2010); locally subject to seasonal stream icings where buildup of aufeis in stream channels diverts subsequent drainage and spreads aufeis and meltwater across terrace treads that would not otherwise be flooded (Springer and others, 1976; Sloan and others, 1976); continuously to discontinuously frozen with low to moderate ice content

GWE ZONE OF GROUNDWATER EMERGENCE—Surface features that indicate emergence of groundwater include swampy vegetation, peat, and standing surface water, and networks of shallow drainage channels

COLLUVIAL DEPOSITS

Qc UNDIFFERENTIATED COLLUVIUM—Blankets, aprons, cones, and fans of heterogeneously mixed angular to subangular rock fragments, gravel, sand, and silt formed by complex, gravity-driven mass movements involving sliding, flowing, solifluction (or gelifluction where frozen), and frost creep of weathered bedrock; cobbles and boulders are scattered to numerous; morphologies of colluvial sheets generally reflect underlying surfaces; discontinuously to continuously frozen with low to moderate ice content

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; colluvial processes > fluvial processes; surface slightly irregular; contains angular to subangular, fresh to weathered rock fragments and grûs in weathered granitic bedrock terrain; discontinuously to continuously frozen with low to moderate ice content

Qcl LANDSLIDE DEPOSITS—Lunate to triangular or fan-shaped, heterogeneous mixtures of large, fractured bedrock blocks and pebble gravel with scattered to numerous cobbles and boulders and trace to some sand and silt deposited by near-surface to deep creeping, flowing, and sliding of failed bedrock and unconsolidated surficial deposits; surface features include gaping ground cracks where active, slight irregularities, hummocks, low longitudinal ridges, and terminal bulges; unfrozen to continuously frozen with low to moderate ice content

EOLIAN DEPOSITS

Qe UNDIFFERENTIATED EOLIAN DEPOSITS—Chiefly well-sorted, massive to finely bedded, primarily airfall eolian sand and loess forming a blanket over bedrock ridges and hills and lowlands in the southern Yukon–Tanana Upland; complex stratigraphy may include retransported sand and silt; discontinuously to continuously frozen with low to high ice content

Qer RETRANSPORTED SILT AND SAND COMPLEXLY MIXED WITH LOWLAND LOESS—Chiefly massive to well-stratified organic silt and sandy silt with lenses and tongues of locally derived gravel and scattered to numerous angular rock fragments (particularly in upper valleys of small, ephemeral streams) and organic fine sand in sand dune areas; deposited primarily by hyperconcentrated flows (Costa, 1988) draining weathered bedrock slopes thinly covered by upland silt (loess) and eolian sand and generated by thawing of ice-rich permafrost or brief, intense summer rainstorms; complexly mixed with debris-flow deposits in upper stream drainages, primary airfall loess and eolian fine sand in lowland sites, and fine-grained distal overbank sediments in slackwater flood basins; fluvial processes > colluvial processes; surface fairly smooth with scattered open-system pingos and local thermokarst pits, ponds, and lakes; may be subject to seasonal stream and slope icings; discontinuously to continuously frozen; where frozen, moisture content 21–345 percent, averaging 107 percent (n = 6)

Qes EOLIAN SAND—Chiefly blankets and dunes of fine to medium, massive to cross-bedded eolian sand with trace to some silt (Kreig and Reger, 1982, pl. 9); dunes stand 1.5 to 4.5 m in relief and ridges may extend for up to 4.8 km in the direction of dominant summer winds; mapped extents, based on the presence of dunes, should be considered minimum; discontinuous with thicknesses up to ~7.6 m; unweathered color grayish brown (2.5Y5/2); generally covered by 0.3 to 0.9 m of loess (Lindholm and others, 1959); locally being deposited along the margins of braided floodplains; average moisture content ~8 percent (Kreig and Reger, 1982); discontinuously frozen; where frozen, moisture content 17–42 percent, averaging 26 percent (n = 6)

MANMADE DEPOSITS

Qhf ARTIFICIAL FILL—Mixed coarse and fine material emplaced by human activity during land development. The entire Northway Airport, including runway, taxiways, parking areas, and building foundations, is built on fill material. Artificially compacted; discontinuously to continuously frozen with generally low ice content

LACUSTRINE DEPOSITS

Qlb LAKE-BOTTOM DEPOSITS—Chiefly silt and clay with some sand and organic material deposited in ephemeral lakes in backwater areas of inactive floodplains and behind ice-shoved ramparts in large lakes; discontinuously to continuously frozen with moderate to high ice content

Qld DELTA DEPOSITS—Chiefly sand and silt with some organic material deposited in a lake basin by a stream entering the lake; during floods of the Tanana, Chisana, and Nabesna rivers, streams normally draining the lake into the river reverse directions and carry floodwaters and sediments into the lake basin; sporadically frozen with moderate to high ice content

PALUDAL DEPOSITS

Qp SWAMP DEPOSITS—Primarily fibrous and locally woody, autochthonous peat with organic silt and sand deposited in lowland sites (Kreig and Reger, 1982); ≤2.4 m thick; discontinuously to continuously frozen with moderate to high ice content

BEDROCK

b UNDIFFERENTIATED BEDROCK—Outcrops of igneous, metamorphic, and sedimentary rocks; linear and curvilinear shallow troughs and linear changes of surface vegetation indicate the presence of planar bedrock structures

b' THINLY COVERED BEDROCK—Subcrops with <0.9 m of loess cover; bedrock structures recognizable through thin veneers of surficial debris

b+b' Complex map unit consisting of bedrock outcrops and thinly buried subcrops that cannot be mapped separately

[1] Estimated contents of sand and silt, based on field observations, are indicated by the terms 'trace' and 'some.' 'Trace' implies a general composition of 4 to 12 percent. 'Some' implies a general composition of 12 to 30 percent. Estimated compositions <4 percent are not recorded in the field. Terms used to describe the estimated percentages of cobbles and boulders are 'numerous', 'scattered', and 'rare.' 'Numerous' implies that drilling through the deposit 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; 'rare' implies that drilling would encounter two cobbles or boulders in an interval of >4.5 m.

MAP SYMBOLS

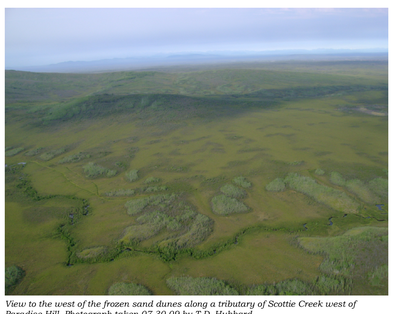
NOTE: Map symbols below might not all appear on this sheet

- PHOTOINTERPRETED CONTACT—All boundaries are inferred or approximately located
- DEPOSITIONAL WIND DIRECTION INDICATED BY DUNE MORPHOLOGY
- F-1 FOSSIL LOCALITY DISCUSSED IN REPORT
- M-1 SOIL MOISTURE LOCALITY DISCUSSED IN REPORT
- RC-14 RADIOCARBON LOCALITY DISCUSSED IN REPORT
- SP-15 SOIL PIT LOCALITY DISCUSSED IN REPORT
- V-1 VENTIFACT LOCALITY DISCUSSED IN REPORT
- T-1 TEPHRA LOCALITY DISCUSSED IN REPORT (Schaefer, 2002)

APPROXIMATE MEAN DECLINATION, 2012

Location of Map Area in Proposed Corridor

Oblique southeast view of flooded meander scroll topography along the Chisna River, Nabesna Quadrangle. Photograph taken 07-31-08 by T.D. Hubbard.



View to the west of the frozen sand dunes along a tributary of Scottie Creek west of Paradise Hill. Photograph taken 07-30-09 by T.D. Hubbard.

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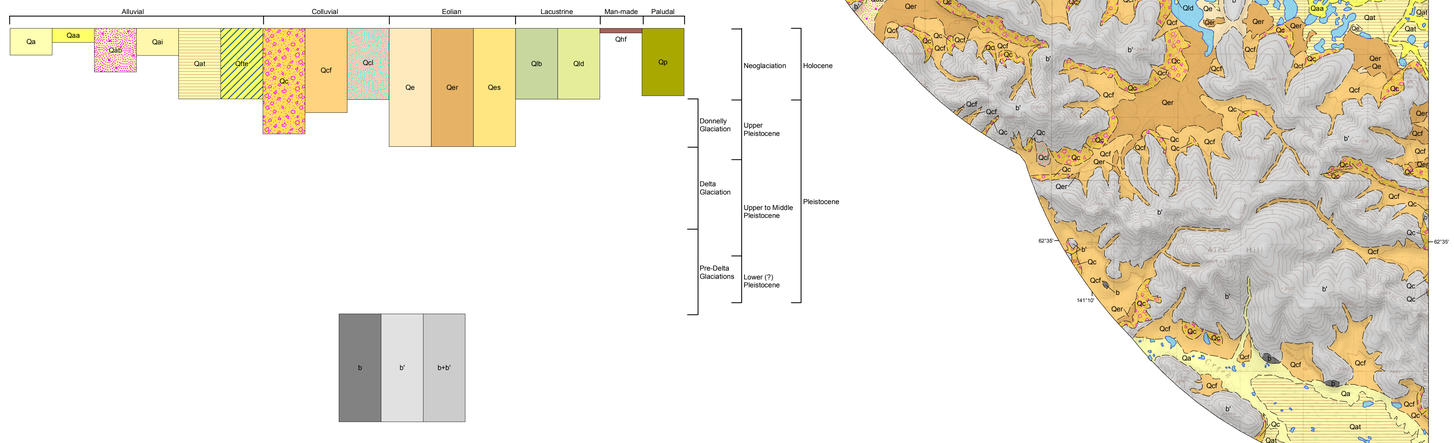
CORRELATION OF MAP UNITS

(Map units below might not all appear on this sheet)

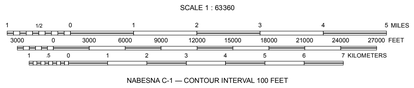


SURFICIAL-GEOLOGIC MAP, ALASKA HIGHWAY CORRIDOR, PARTS OF NABESNA C-1, D-1, D-2, AND D-3 QUADRANGLES, ALASKA

by

R.D. Reger[1], T.D. Hubbard[2], and P.E. Gallagher[2]

2012



NABESNA C-1 — CONTOUR INTERVAL 100 FEET

NABESNA D-1, D-2, AND D-3 — CONTOUR INTERVAL 50 FEET

NABESNA C-1 — SUPPLEMENTARY CONTOUR INTERVAL 50 FEET

NABESNA C-1 AND D-1 — MEAN SEA LEVEL

NABESNA D-2 AND D-3 — NATIONAL GEODETIC VERTICAL DATUM OF 1929

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Topographic base map from:
U.S. Geological Survey topographic maps
Nabesna C-1 (1955 – minor revisions 1963)
Nabesna D-1 (1952 – minor revisions 1967)
Nabesna D-2 (1955 – minor revisions 1978)
Nabesna D-3 (1954 – minor revisions 2000)
Projection:
Universal Transverse Mercator zone 7
Datum:
North American Datum of 1927
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