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RECONNAISSANCE SURFICIAL GEOLOGIC MAP OF THE HEALY A-6 QUADRANGLE, SOUTHCENTRAL ALASKA

by
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INTRODUCTION

This map illustrates the distribution of a variety of unconsolidated deposits and undifferentiated bedrock in the Chulitna mining district. It was prepared by the interpretation of 1:63,360-scale, false-color, infrared aerial photographs taken from July 1980 through July 1982 and is only locally verified by ground observations during brief field visits. The results should be considered reconnaissance in nature.

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.

DESCRIPTION OF MAP UNITS

Unconsolidated Deposits

Alluvial Deposits

Qa UNDIFFERENTIATED STREAM ALLUVIUM — Elongate deposits of moderately to well sorted, well stratified, fluvial pebble-cobble gravel, sand, and silt, with few to numerous boulders, deposited in active stream channels, floodplains, and associated low terraces. Deposit is medium to thick bedded, locally crossbedded, and shows fining-upward cycles. Cobbles generally rounded and reach a maximum diameter of 1 m. Extensive willow-alder thickets grow on many Qa deposits in mature valley fills. Surface smooth except for local low scarps.

Qac ABANDONED-CHANNEL DEPOSITS — Elongate variable deposits in channels of former meltwater streams not related to modern stream regimens and subsequent underfit streams. Composition ranges from slightly washed drift with thin, local surface lags of cobbles and boulders to well-sorted, clean pebble-cobble gravel and gravelly medium to coarse sand with rare to numerous boulders; thin to thick bedded, locally crossbedded. Surface smooth with local low scarps and bogs.

Qaf ALLUVIAL FAN DEPOSITS — Fan-shaped, heterogeneous mixtures of poorly to moderately sorted, partially stratified, channelized gravel with some sand and silt and scattered to numerous, subangular to rounded boulders, especially in proximal areas. Clasts locally derived. May include torrential fluvial deposits and debris-flow deposits. Thick to thin bedded. Generally localized at intersection between first and second order (tributary and trunk) streams. Surface smooth except for numerous shallow, interconnected channels.

Qat TERRACE ALLUVIUM — Elongate deposits of well-sorted, well-rounded to subrounded pebble-cobble gravel and sand with trace to some silt and rare to numerous boulders up to 50 cm diameter comprising stream terraces bordering modern floodplains and clearly related to modern drainage; includes strath terraces. Surface smooth except for local low scarps.

Qfp FLOODPLAIN ALLUVIUM — Elongate deposits of moderately to well sorted, well stratified, fluvial gravel, sand, and silt with few to numerous boulders forming modern floodplains and associated low terraces. Typically mantled by thin layer of silty overbank deposits. Generally finer grained than similar deposits in Qa unit because of deposition during flood-stage events. May locally include Wisconsin to Holocene terrace alluvium. Lower surfaces may be flooded during periods of maximum stream discharge. Highly variable thickness difficult to estimate due to poor exposure. Surface smooth to hummocky with local low scarps and bogs.

Colluvial Deposits

Qc UNDIFFERENTIATED COLLUVIUM — 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 mass-movement processes, including rolling, sliding, flowing, gelifluction, and frost creep. May include greatly modified drift of older glaciations. Locally washed by meltwater and slope runoff. Medium to thick bedded; thickness highly variable. Surface smooth, lobed or terraced and generally reflects configuration of underlying bedrock surface.

Qcl LANDSLIDE DEPOSITS — Oval- to tongue-shaped heterogeneous mixtures of fractured bedrock and pebble-cobble gravel with trace to some sand and silt deposited by near-surface to deep creep, flowing, and sliding due to instability of failed bedrock and unconsolidated surficial deposits. May be block-supported, especially in the upper parts. Surface ranges from slightly irregular and broken by arcuate ground cracks and low ridges, to hummocky and covered with jumbled, openwork rubble with individual blocks up to 15 m diameter.

Qct TALUS AND RUBBLE DEPOSITS — Irregular cones, drapes, and sheets of coarse (1 m diameter and larger blocks are common), heterogeneous, angular rock fragments and rubble with minor silt, sand, and gravel deposited more-or-less in place on steep upper slopes and at the mouths of steep bedrock couloirs by block weathering, frost riving, snow avalanches, free fall, tumbling, rolling, and sliding. Deposits are widely subjected to secondary reworking by cryoturbation, including frost heave and frost jacking of rock fragments. Surface steep, irregular, generally unvegetated, covered with numerous angular rock fragments, and characterized by openwork rubble mounds many meters thick.

Qrg ROCK-GLACIER DEPOSITS — Tongue- and fan-shaped heterogeneous mixtures of angular to subangular blocks of local bedrock and ice with trace to some gravel, sand, and silt at depth that accumulates on floors and lower walls of cirques by flow of rock glaciers derived from shrinking of former glaciers (ice cored) or from deposition and cementation of precipitation-derived ground ice (ice cemented). Perennially frozen where active. Probably generally clast-supported. Surface furrowed, concentrically ridged, pitted, or hummocky and covered with angular to subangular blocks up to 2 m in diameter; generally unvegetated, but locally overgrown with moss, lichen, and some grass on inactive and less active rock glaciers.

Paludal Deposits

Qs SWAMP DEPOSITS — Elongate to blanket deposits of complexly bedded peat, organic silt, and organic sand accumulated as surface deposits in local basins and in former stream channels. Saturated and locally frozen, locally ice rich. Thickness highly variable. Surface smooth, hummocky, or pitted. May have standing water.

Glacial Deposits

Qao OUTWASH ALLUVIUM — Elongate to fan-shaped heterogeneous mixture of washed, rounded to subrounded pebble-cobble gravel with some sand and silt and scattered to numerous subangular to rounded boulders deposited by meltwater streams draining margins of former glaciers. Thin to thick bedded, locally crossbedded. Surface generally smooth and gently sloping, except for local low scarps.

Qt2 TILL OF LATEST HOLOCENE AGE — Heterogeneous mounds and ridges of pebble-cobble gravel, sand, silt, and clay in varying proportions deposited at or near the margins of modern glacial ice or where glacial ice has existed until very recently; contains rare to numerous large (2 m diameter and greater) boulders. May be ice cored. Surface hummocky with numerous scattered boulders and generally retains primary morainal morphology; little or no vegetative cover or soil development.

Qt1 TILL OF EARLY TO MIDDLE HOLOCENE AGE — Heterogeneous mounds and ridges of pebble-cobble gravel, sand, silt, and clay in varying proportions deposited directly from glacial ice; contains rare to numerous large (2 m diameter and greater) boulders. Surface hummocky with numerous scattered boulders and generally retains primary morainal morphology; nominal soil development with well-established vegetation consisting primarily of lichen, moss, and herbs.

Qd DRIFT OF LATE WISCONSIN AGE — Heterogeneous blanket of pebble-cobble gravel, sand, silt, and clay in varying proportions deposited by glaciers; contains rare to numerous large (2 m diameter and greater) boulders deposited directly from glacial ice. Sorting, bedding, and clast roundness highly variable, depending on degree of water reworking. Deposit locally includes or is gradational with outwash. Clay-rich diamictons may form high, steep slopes where incised by streams and are subject to earthflows when saturated. Locally forms steep-sided, sinuous ridges (eskers) up to 12 m high and 4-5 m wide at the crest. Thickness ranges from a thin and patchy veneer over ice-scoured bedrock to more than 25 meters thick. Typically overlain by up to 1 m windblown silt. Surface smooth to highly irregular with local bogs and ponds. Based on geomorphological relationships, deposit is probably correlative with deposits of the last part of the Riley Creek glaciation in the Nenana River valley on the north side of the Alaska Range (Wahrhaftig, 1958), and deposits of the Elmendorf stade of the Naptowne glaciation in the Cook Inlet region (Reger and Pinney, 1996). The latter part of the Riley Creek glaciation has been dated to approximately 9,500 – 12,800 yr. B.P. (Ten Brink, 1983), and the Elmendorf stade dates to approximately 9,500 – 14,000 yr B.P. (Reger and Pinney, 1996).

Complex Deposits

Qcf COLLUVIAL-ALLUVIAL VALLEY FILL, FAN AND APRON DEPOSITS — Elongate, apron- and fan-shaped, heterogeneous mixtures of poorly to moderately sorted angular rock fragments with trace to some gravel, sand and silt of alluvial and colluvial origin deposited at the bases of steep slopes bordering modern stream valley courses and at the mouths of bedrock couloirs and gullies. Deposited primarily by debris flows and brief, intense (torrential) summer stream flows. May include snow-avalanche deposits. Commonly forms alternating stratified and unstratified zones and lenses in gullies and steep tributary valleys with intermittent or ephemeral streams. Locally washed by meltwater and slope runoff. Youthful alluvial-colluvial fan deposits are actively being formed or modified when seasonal snowpack is melting. Surface steep to gently sloping, with local low scarps.

Bedrock

UNDIFFERENTIATED BEDROCK — Undifferentiated bedrock with essentially no cover.

THINLY COVERED BEDROCK — Undifferentiated bedrock that is covered by a thin (generally 1 m thick or less) veneer of colluvium, drift, undifferentiated glacial or glaciofluvial deposits, or combinations of these deposits. Cover is sufficiently thin that planar bedrock structures, like 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 hydrophyllic vegetation.

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