

DESCRIPTION OF MAP UNITS

Surficial deposits and bedrock exposures were mapped by interpreting 1:12,000-scale aerial photographs and incorporating field observations made during a two-week period in August, 1988. Most but not all deposit types were examined and described in the field. Deposits are grouped into categories based on primary mode of deposition: fluvial, glacial, colluvial, lacustrine, marine, and artificial. Road-base fill deposits were not mapped except where they coincide with larger areas of fill (Qhu). Instead, geologic units were mapped across roads to indicate the materials that probably lie beneath the road fill.

A single bedrock unit, the Kodiak Formation, named and described by Moore (1969), underlies the entire area and was not subdivided. For a complete description of bedrock lithology and structure in the study area, see Sole and Keefe-Stahl (1989). Geologic mapping by Moore (1967) shows regional structure and bedrock relationships. Brown (1969) summarizes bedrock geotechnical properties potentially affecting ground-water flow.

With exception of the youngest deposits (Qfa, Qfi, Qfb, Qfm, Qfc, and Qhu), most surficial units are certain nearly continuously by 1:25-in. of organic-rich silt, probably loess, which in turn overlies by 1:1-in. of fine- to medium-grained (0.074-0.5 mm) volcanic ash. Source of the volcanic ash was the 1912 eruption of Novarupta, near Mt. Katmai (Griggs, 1922; Curtis, 1969).

Several landslide deposits (Qcl) resulting from slumps and slides of fill or bedrock were mapped in the study area. These slides appear inactive, and may have occurred shortly after retreat of glacial ice exposed the steep valley walls.

For more information on surficial deposits and Quaternary geology, see accompanying report. A soil survey by Cox and Young (1989) provides additional data on soil attributes. Cross sections of unconsolidated overburden and results of seismic profiling studies are provided by Alby (1989). Permeability classifications are from Lamb and Whitman (1969) for characteristic deposit types: very low, 10³ to 10⁴ cm/sec; low, 10⁴ to 10⁵ cm/sec; moderate, 10⁵ to 10⁶ cm/sec; high, 10⁶ to 10⁷ cm/sec; very high, over 10⁷ cm/sec.

FLUVIAL DEPOSITS

Qfa Active-floodplain alluvium - Moderately to well-sorted loose sand and rounded pebbles and cobbles comprising non-vegetated or sparsely vegetated river bars subject to frequent flooding. Up to several feet thick. High permeability.

Qfi Inactive-floodplain alluvium - Flat-lying overbank sandy silt and silt sand up to several feet thick overlying moderately sorted, stratified sandy riverbed gravel or shallow fill beneath surfaces rarely flooded by streams. Moderate to high permeability.

Qft Terrace deposits* - Flat-lying sandy silt and silt sand up to several feet thick overlying moderately sorted, stratified riverbed gravel beneath a surface that is no higher subject to stream flooding. This surface is up to several feet higher than the adjacent flood plain and is bounded on at least one side by a scarp that slopes down away from the terrace to the younger flood plain. Moderate to high permeability.

Qff Fine-grained alluvial-fan deposits* - Silt and sand with lenses of gravel deposited where small streams flow from lower hill slopes to near-level ground. Surface of the deposited deposit has only slightly greater slope than adjacent low ground (less than 5%). Up to several feet thick. Low permeability.

Qfg Coarse-grained alluvial-fan deposits* - Poorly to moderately sorted silt, sand, pebbles, and cobbles deposited where larger streams flow from steep mountain slopes to gentle slopes on near-level ground. Surface generally smooth, cone shaped, and dissected by one or more stream channels. Surface slope less than 20° and slightly concave upward. Up to about 50 ft thick. Low to moderate permeability.

GLACIAL DEPOSITS

Qgt Till - Nearly continuous blanket of very poorly sorted, firm to very firm clay, sand, pebbles, cobbles, and rare boulders in varying proportion, deposited beneath glaciers on rounded and scoured bedrock hills. Till thickness ranges from several inches to 15 ft or more, and averages about 3 ft. Locally absent where bedrock is exposed at the surface or where volcanic ash and organic-rich silt directly overlie scoured bedrock. Small bedrock boulders up to 4 ft in long were also observed. Bedrock surface beneath till is generally smooth, striated, or grooved from glacial scouring. Till is locally friable to a depth of up to 24 in. where weathered. Permeability very low to low where unweathered; low to moderate where weathered.

Qgo Outwash deposits* - Moderately sorted, stratified gravelly sand and sandy pebble-cobble gravel deposited east of Buskin Lake by meltwater streams terminus of a retreating glacier. Up to about 20 ft thick. Moderate to high permeability.

Qqi Ice-contact stratified deposits* - Poorly sorted and crudely stratified silt, sand, and gravel deposited east of Buskin Lake by meltwater around and beneath stagnant ice near the terminus of a retreating glacier. Up to about 10 ft thick. Low to moderate permeability.

COLLUVIAL DEPOSITS

Qqst Undifferentiated colluvium and fill - This discontinuous deposit of colluvium and fill on steep bedrock slopes and ridges. In contrast to the low rounded hills covered nearly continuously by till (Qfi), these deposits occupy steeper, more rugged slopes at higher elevations on mountain sides and are thinner and less continuous. Although nearly everywhere overlain by organic-rich silt and volcanic ash, this unit appears to be any one of three stratigraphic arrangements (from bottom to top): bedrock, colluvium, and till; bedrock and colluvium; or bedrock and till. Locally both colluvium and till may be absent and organic-rich silt and volcanic ash directly overlie bedrock, or bedrock may be exposed. Till is dominant at higher elevations within this unit; colluvium is dominant at higher elevations. No ice-marginal features are visible to indicate a close upper limit to the extent of fill. Some small depressions contain water-retentive silt, sand, gravel, or volcanic ash. Up to several feet thick. Variable permeability.

Qe Undifferentiated colluvium - Very poorly sorted, loose silt, sand, pebbles, cobbles, and boulders derived from underlying bedrock by weathering and transported only short distances down slope by sheet wash and rill movement. Larger boulders are generally very angular to subangular. Thickness ranges from several inches to several feet. Moderate to high permeability.

Qct Talus - Very poorly sorted, loose angular rock rubble, locally mixed with till, deposited by debris falls on steep slopes and at the base of cliffs. Surface is generally steep (greater than 20°) and cone shaped. Up to about 20 ft thick. Very high permeability.

Qcl Landslide deposits - Highly variable accumulation of rock, fill, and soil that have moved down slope as a result of slope failure. All landslides in the study area are caused as debris slides (Varnes, 1979), and show no photographic evidence of recent activity. Thickness may be as much as 100 ft. Low to moderate permeability.

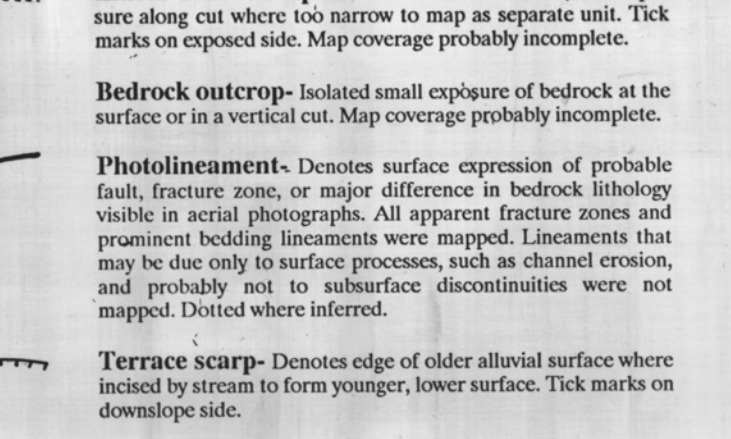
ARTIFICIAL DEPOSITS

Qhc Compacted artificial fill - Artificially emplaced or modified deposits, generally of sand and pebble-cobble gravel, that are compacted or minimally compacted. Includes protective barriers for storage tanks and fuel pumps, shelters for aircraft, roadways, and spill pits. Generally emplaced as mounds or ridges up to about 20 ft high. Moderate to high permeability.

Qhu Uncompacted artificial fill - Artificially emplaced or modified deposits, generally of sand and pebble-cobble gravel, that are uncompacted or minimally compacted. Includes protective barriers for storage tanks and fuel pumps, shelters for aircraft, roadways, and spill pits. Generally emplaced as mounds or ridges up to about 20 ft high. Moderate to high permeability.

BEDROCK

Kk Kodiak Formation - Dark gray to black mudstone, siltstone, sandstone and minor conglomerate that have undergone varying degrees of compaction and low-grade metamorphism (Sole and Reichenbach, 1989). Fine-grained rocks range from shale to slate, with a phyllite lenses locally. The ratio of sandstone to shale ranges from 10:1 to 1:1, with very fine- to fine-grained sandstone the most abundant. Sandstone and shale layers are laterally continuous at outcrop scale without changes in thickness or grain size, but generally cannot be traced between outcrops. Bedding is generally thin (1/8 to 2 in.) and parallel-bedded. Bedding orientation is consistent throughout the study area, with most strikes between N50°E and N40°E and most dips between 25°W and 50°E. Cleavage is roughly parallel to bedding. All observed outcrops contain at least one set of fractures, most contain two or more, but rarely are more than two sets well-developed. The most common fracture orientation is perpendicular to bedding/cleavage. Spacing of these fractures range from extremely close to wide (< 1 in. to > 3 ft), with generally closer spacing in finer-grained rocks.



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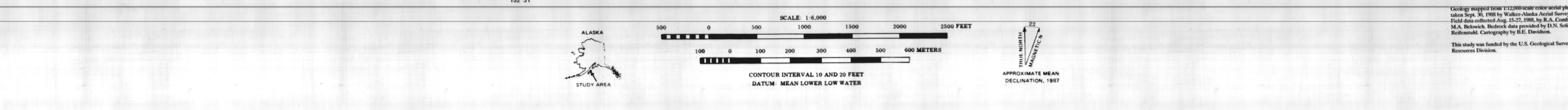
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GEOLOGIC MAP OF AREA II, U.S. COAST GUARD RESERVATION, KODIAK, ALASKA

by
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