

MAP SYMBOLS

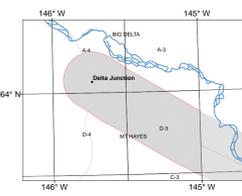
- PHOTOINTERPRETED CONTACT—All boundaries are inferred or approximately located
- ⊛ INTACT OR BREACHED OPEN-SYSTEM PINGO
- A LOCALITY DISCUSSED IN REPORT

EXPLANATION OF MAP UNITS
(All map units may not appear on this sheet)

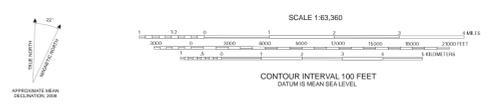
- Fr Fr? CONTINUOUSLY FROZEN, MODERATE TO HIGH ICE CONTENT
- Fm CONTINUOUSLY FROZEN, LOW TO MODERATE ICE CONTENT
- Dm DISCONTINUOUSLY FROZEN, MODERATE TO HIGH ICE CONTENT
- Dm? DISCONTINUOUSLY FROZEN, LOW TO MODERATE ICE CONTENT
- Dl Dl? DISCONTINUOUSLY FROZEN, LOW ICE CONTENT
- Sm Sm? SPORADICALLY FROZEN, LOW TO MODERATE ICE CONTENT
- Sl Sl? SPORADICALLY FROZEN, LOW ICE CONTENT
- G G? GENERALLY UNFROZEN (ISOLATED MASSES)
- U NO PERMAFROST

Topographic base map from:
Big Delta A-3 and A-4; Mount Hayes C-3, D-3,
and D-4 quadrangles;
U.S. Geological Survey digital raster graphic images, 1997.
Map projection: UTM zone 6
Datum: NAD 83

Air photo interpretation by:
R.D. Reger (2007)
GIS layers digitized by:
S.K. Paala
Digital cartography by:
K.C. Overmire
Interpreted permafrost field verification by:
R.D. Reger, D.N. Solie, D.S.P. Stevens, S.K. Paala (2007)



Maps Showing Location of Study Area



RECONNAISSANCE INTERPRETIVE MAP OF PERMAFROST, ALASKA HIGHWAY CORRIDOR, DELTA JUNCTION TO DOT LAKE, ALASKA
by
R.D. Reger¹ and D.N. Solie²

¹ Reger's Geologic Consulting, Seldovia, Alaska
² Alaska Division of Geological & Geophysical Surveys

Introduction
Permafrost, or perennially frozen ground, is rock or soil that remains continuously colder than 0°C for 2 years or longer (Muller, 1947; Ferrans and others, 1969; Pewé, 1982). Based on the interpretation of ~1:63,360-scale false-color infrared aerial photographs, this map illustrates the inferred extent and estimated ice content of permafrost between the ground surface and a depth of ~20 ft (6 m) in the proposed corridor straddling the Alaska Highway between Delta Junction and the western boundary of the Tanacross Quadrangle in August 1980, the date of the aerial photographs. The presence or former presence of permafrost and the ground-ice content are inferred from several indicators, including vegetation, slope and aspect, landform, soil type, local drainage, and terrain features, such as open-system pingos, polygonal ground, and thermokarst pits, gullies, and ponds (Kreig and Reger, 1982). Because of a lack of subsurface data, our interpretation should be considered tentative until validated by multi-year ground-temperature measurements that confirm the persistence of frozen ground. Permafrost classifications in areas that were burned just prior to August 1980 are less reliable than in unburned areas because the vegetation was destroyed or significantly altered and, in these areas, interpretation of permafrost is based only on landform and setting, which are less diagnostic than vegetation. The user is cautioned that this map has not been verified by field observations, except very locally, although we have considerable field experience in the Tanana River valley and during our interpretation referred to available published and unpublished reports. Physical properties of map units are extrapolated from similar deposits in the region and from previously published reports and data. Detailed subsurface investigations should be completed prior to development.

Description of permafrost map units
Symbols indicate the inferred continuity of permafrost in upper-case letters and the estimated ice content in lower-case letters. For example, 'Dm' indicates that discontinuous permafrost with low to moderate ice content is inferred between the ground surface and a depth of ~20 ft (6 m). Classes of permafrost continuity are consistent with classes used in previous mapping in Alaska (Ferrans, 1963; Kreig and Reger, 1982; Brown and others, 1997).

Symbol	Description
F	CONTINUOUSLY FROZEN—More than 90 percent of the area is inferred to be underlain by permafrost
D	DISCONTINUOUSLY FROZEN—Between 50 and 90 percent of the area is inferred to be underlain by permafrost
S	SPORADICALLY FROZEN—Between 10 and 50 percent of the area is inferred to be underlain by permafrost
G	GENERALLY UNFROZEN (ISOLATED MASSES)—Between 0 and 10 percent of the area is inferred to be underlain by permafrost
U	NO PERMAFROST—Seasonally frozen but the ground is inferred to be warmed to a temperature above 0°C at least once during any 2-year period
r	MODERATE TO HIGH ICE CONTENT—Estimated to typically contain 50 to >1,000 percent soil moisture relative to dry weight
m	LOW TO MODERATE ICE CONTENT—Estimated to typically contain 25 to 50 percent soil moisture relative to dry weight
l	LOW ICE CONTENT—Estimated to typically contain 6 to 25 percent soil moisture relative to dry weight
?	QUESTIONABLE IDENTIFICATION

References cited
Brown, J., Ferrans, O.J., Jr., Heginbottom, J.A., and Melnikov, E.S., 1997. Circum-arctic map of permafrost and ground-ice conditions: U.S. Geological Survey Circum-Pacific Map CP-45, 1 map sheet, scale 1:10,000,000.
Ferrans, O.J., Jr., 1963. Permafrost map of Alaska: U.S. Geological Survey Miscellaneous Investigations Map I-445, 1 map sheet, scale 1:2,500,000.
Ferrans, O.J., Jr., Kachadoorian, Reuben, and Greene, G.W., 1969. Permafrost and related engineering problems in Alaska: U.S. Geological Survey Professional Paper 678, 37 p.
Kreig, R.A., and Reger, R.D., 1982. Air-photo analysis and summary of landform soil properties along the route of the Trans-Alaska Pipeline System: Alaska Division of Geological & Geophysical Surveys Geologic Report 66, 149 p.
Muller, S.W., 1947. Permafrost or permanently frozen ground and related engineering problems: Ann Arbor, Michigan, J.W. Edwards, Inc., 231 p.
Pewé, T.L., 1966. Permafrost and its effect on life in the North: Corvallis, Oregon State University Press, 40 p.
—, 1982. Geologic hazards of the Fairbanks area, Alaska: Alaska Division of Geological & Geophysical Surveys Special Report 15, 109 p.



Oblique aerial view southwest of the Clearwater Lake-Delta River area showing contrasting permafrost conditions. Shrub vegetation and black-spruce woodlands on the abandoned floodplain of the Tanana River in the foreground are evidence that permafrost is continuous to continuous, shallow, and has low to moderate ice contents. Patches of deciduous and coniferous woodlands and cleared fields on the broad, well-drained upland surface in the midground and background indicate that permafrost is generally limited to isolated, small and deep, relict masses (photograph taken September 1976).

The State of Alaska makes no express or implied warranties (including warranties for merchantability and fitness) with respect to the character, functions, or capabilities of the electronic data or products or their appropriateness for any user's purposes. In no event will the State of Alaska be liable for any incidental, indirect, special, consequential, or other damages suffered by the user or any other person or entity whether from the use of the electronic services or products, or any failure thereof or otherwise. In no event will the State of Alaska's liability to the Requestor or anyone else exceed the fee paid for the electronic service or product.

DGGS publications can be purchased or ordered from the Fairbanks office at:
Alaska Division of Geological & Geophysical Surveys
3354 College Road
Fairbanks, AK 99709-3707
451-5000 (phone)
451-5050 (fax)
dggs@alaska.gov
http://www.dggs.state.ak.us



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