

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

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

**Explanatory Material for Permafrost Map**

**Introduction**

Permafrost, or perennially frozen ground, is rock or soil that remains continuously colder than 0°C for 2 yrs or longer (Muller, 1947; Ferrians and others, 1969; Pewé, 1966, 1982). Based on the interpretation of ~1:65,000-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 the Robertson River and Tetlin Junction in the Tanacross Quadrangle on the dates of the aerial photographs taken in July 1978, August 1980, and July 1983. The presence of 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 primarily 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field experience in the Tanana River valley and during our interpretation referred to available published and unpublished reports.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 (Ferrians, 1965; Kreig and Reger, 1982; Brown and others, 1998).

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 yr 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

**MAP SYMBOLS**

-----	PHOTOINTERPRETIVE BOUNDARY—All boundaries are inferred or approximately located
?	QUESTIONABLE IDENTIFICATION
⊛	INTACT OR BREACHED OPEN-SYSTEM PINGO
● A	LOCALITY DISCUSSED IN REPORT

**References cited**

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Ferrians, O.J., Jr., 1965, Permafrost map of Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-445, 1 map sheet, scale 1:2,500,000.

Ferrians, O.J., Jr., Kachadorian, Reuben, and Greene, G.W., 1969, Permafrost and related engineering problems in Alaska: U.S. Geological Survey Professional Paper 678, 37 p.

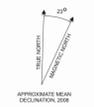
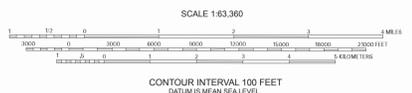
Kreig, R.A., and Reger, R.D., 1982, Air-photo analysis and summary of landform soil properties along the route of the Trans-Alaska Pipeline System: Alaska Division of Geological & Geophysical Surveys Geologic Report 66, 149 p.

Muller, S.W., 1947, Permafrost or permanently frozen ground and related engineering problems: Ann Arbor, Michigan, J.W. Edwards, Inc., 231 p.

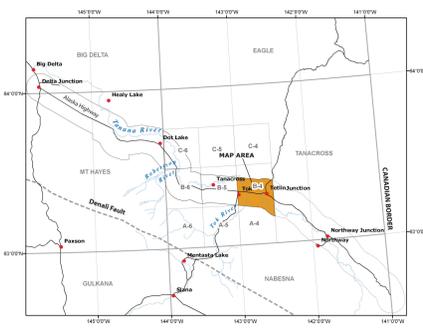
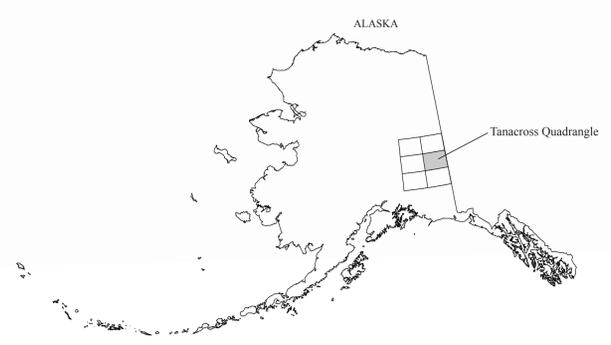
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—1982, Geologic hazards of the Fairbanks area, Alaska: Alaska Division of Geological & Geophysical Surveys Special Report 15, 109 p.

Topographic base map from:  
Tanacross A-4 and B-4 quadrangles,  
U.S. Geological Survey digital  
vector graphic images, 1997  
Map projection: UTM zone 7  
Datum: NAD 27



Interpreted permafrost field verification by:  
R.D. Reger, D.N. Solie, T.D. Hubbard (2008)  
Air photo interpretation by:  
R.D. Reger (2007)  
GIS layers digitized by:  
G. Davidson, T.D. Hubbard, S. Panda (2008, 2009)  
Digital cartography by:  
P. Gallagher and G. Speiser (2009)



Maps Showing Location of Study Area

**RECONNAISSANCE INTERPRETATION OF 1978-1983 PERMAFROST, ALASKA HIGHWAY CORRIDOR,  
PARTS OF THE TANACROSS A-4 AND B-4 QUADRANGLES, ALASKA**

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