



MAP SHOWING DISTRIBUTION OF PERMAFROST IN THE FAIRBANKS D-2 NE QUADRANGLE, ALASKA

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USGS science for a changing world

**EXPLANATION**

Permafrost is classified below in five categories arranged in order of increasing ice content. Local variations in extent, thickness, and ice content of permafrost occur. Permafrost is defined here as any material that remains at or below 32° F continuously for more than two years; ice may or may not be present.

Ice content is defined as follows:

- (1) Low-ice generally restricted to pore spaces between particles and to thin seams less than 1/16 inch thick in silt and clay
- (2) Moderate-ice generally restricted to pore spaces between particles and to thin seams greater than 1/16 inch and less than 1/4 inch thick in silt and clay
- (3) High-ice generally in seams greater than 1/4 inch thick and (or) large ice masses. As much as 50 percent of the ground may be ice (confined to upper 30 feet).

**FREE OF PERMAFROST**

**TAILINGS**

Permafrost with low ice content

Sand and gravel are generally unfrozen but may be frozen locally. If frozen, ice content very low and mainly restricted to pore spaces. No seasonal frost action and no subsidence upon thawing.

**BEDROCK**

Permafrost with low ice content

Fresh and decayed bedrock are perennially frozen on slopes facing directly north; permafrost probably discontinuous on northeast- and north-west-facing slopes. Contains little or no ice; ice content may be high in fractured or decayed bedrock. Ice is mainly restricted to pore spaces. Depth to permafrost 1-4 feet. Thickness of permafrost 1-100 feet. Seasonal frost action absent in fresh bedrock but may be moderate in decayed material. No subsidence upon thawing of fresh bedrock but moderate subsidence may occur upon thawing of decayed material. Locally, frozen bedrock may be overlain by loess that may also be perennially frozen and contain little or no ice.

**VALLEY-BOTTOM MUCK**

Permafrost with high ice content

Silt on lower slopes and in valley bottoms is perennially frozen. Top layer (3-30 feet thick) has moderate to high ice content in the form of seams and lenses; lower layer contains abundant ice as seams, horizontal sheets, vertical sheets, wedges, and saucer-shaped and irregular masses 1-50 feet in diameter. Near the contact with the unfrozen silt zone upslope, ice content may be low and permafrost sporadic. Depth to permafrost 1 1/2-3 feet on lower slopes and valley bottoms; 5-20 feet near contact with unfrozen silt zone; 10-25 feet under cleared areas. Seasonal frost layer 1 1/2-3 feet thick. Thickness of permafrost 3-175 feet. Seasonal frost action intense. Great subsidence upon thawing of permafrost. Average temperature of permafrost 31-32° F.

**VALLEY-BOTTOM PEAT-MUCK**

Permafrost with high ice content

Organic silt containing peat beds in valley bottoms and low, flat areas is perennially frozen. Ground ice is abundant as seams, horizontal sheets, vertical sheets, wedges, and saucer-shaped and irregular masses, all of which range from 1-50 feet in diameter. Native ice close to the surface results in large (25-100 feet in diameter) polygonal pattern on the surface. Depth to permafrost 1 1/2-3 feet. Seasonal frost layer 1 1/2-3 feet thick. Thickness of permafrost 1-160 feet. Seasonal frost action intense. Great subsidence upon thawing.

**SYMBOLS**

Contacts generally indistinct or gradational

Contact

Borehole location

First number indicates depth to top of permafrost; second number indicates depth to bottom of permafrost or to bottom of hole if bottomed in permafrost. The notation "Pw" indicates permafrost present but depth unknown. \* indicates that hole bottomed in permafrost.

Detailed subsurface information may be obtained from the geologic map of the Fairbanks D-2 NE quadrangle, Alaska (Pewe and others, in press), and from the map showing foundation conditions in the Fairbanks D-2 NE quadrangle, Alaska (Pewe and Bell, 1975).

Thermokarst pit

Collapse pit 2-30 ft in diameter and 5-10 ft deep caused by thawing of large mass of ground ice

Pingo

Ice-cored mound formed as result of water trapped under permafrost developing hydraulic head, forcing its way to surface, and freezing

