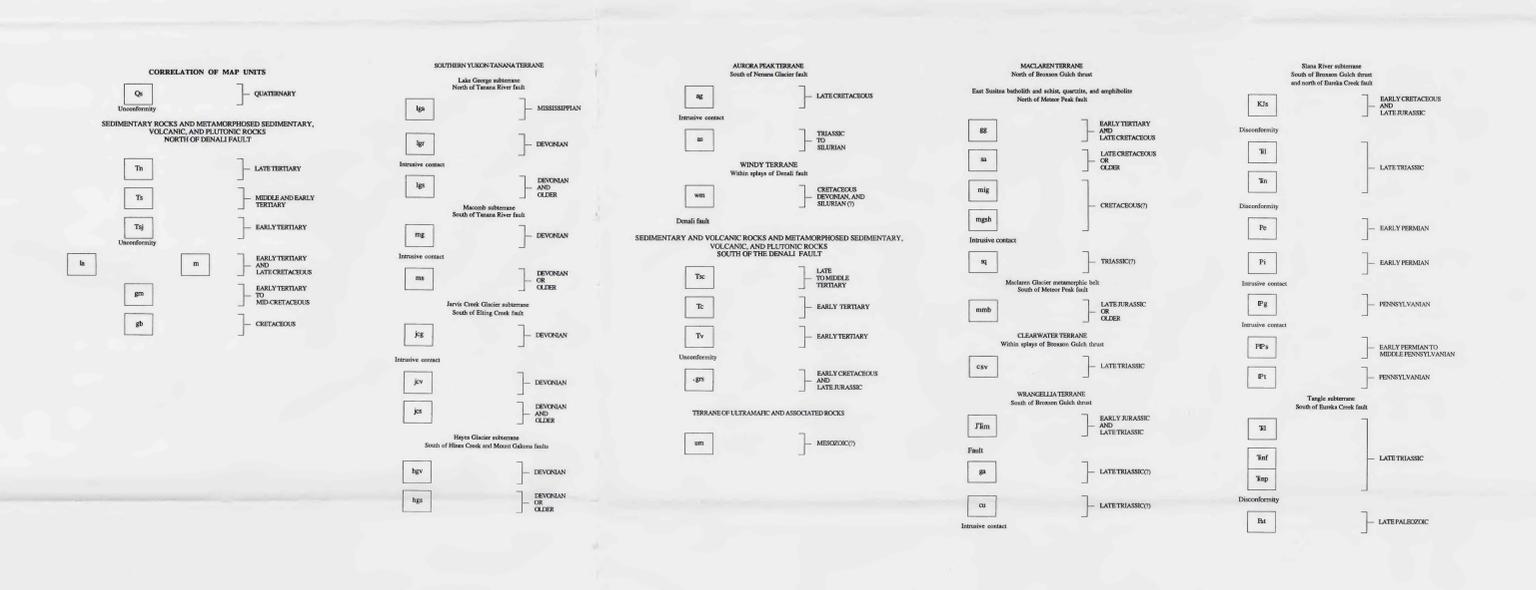
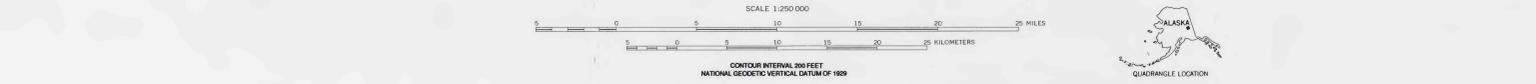


Base from U.S. Geological Survey, 1955
United States National Map Series
United States National Map Series

Geological features shown on this map were compiled by Warren J. Nokleberg, Ian M. Lange, John A. Alshoff, Barry J. Mackay, and Robert C. Roback, 1977-85. (Scale by John T. Harlan; prepared by John Mackay; map design by John T. Harlan; map design approved by publication September 22, 1987)



EXPLANATION
Mineral deposit and occurrence symbols—Numbers refer to Tables (see accompanying pamphlet)
● Gold and (or) platinum placer deposit type
▲ Kuroko massive sulfide deposit type
▲ Copper-silver quartz vein deposit type
▲ Polymetallic vein deposit type
▲ Tungsten-molybdenum or copper-lead-zinc skarn deposit type
○ Porphyry copper deposit type
● Porphyry copper-molybdenum deposit type
● Porphyry iron deposit type
○ Ophiolite nickel-copper deposit type
● Podiform chromite deposit type
+ Uncategorized occurrence, deposit, or prospect

DEFINITIONS
The term "mineral occurrence" is defined as a concentration of potentially valuable minerals on which no visible exploration has occurred or for which no grade and tonnage estimates have been made. Mineral occurrences were identified mainly during geologic mapping in the course of studying hydrothermally altered and (or) Fe-stained areas. The term "mineral deposit" is defined as those concentrations of potentially valuable minerals for which grade and tonnage estimates have been made. The term "prospect" is defined as a site of potentially valuable minerals in which excavation has occurred. The term "mine" is defined as a site where valuable minerals have been extracted. The term "deposit" is defined as any individual or group of beds or placer mineral occurrences, mineral deposits, prospect, and (or) mine.

DESCRIPTION OF MAP UNITS
Qs Surficial deposits (Quaternary)—Alluvium, colluvial deposits, glacial deposits, fluviolacustrine deposits, rock glacier deposits, snow and ice

SEDIMENTARY ROCKS AND METAMORPHOSED SEDIMENTARY, VOLCANIC, AND PLUTONIC ROCKS NORTH OF DENALI FAULT
Tn Nenana Gavel (late Tertiary)—Chiefly thick bedded to massive, poorly-sorted conglomerate with lesser sandstone and siltstone. Unconformably overlain by Pleistocene glacial deposits. Locally unconformably overlies the sandstone (T5) of Oligocene to Pliocene age, and locally overlies the coal-bearing sandstone of Jarvis Creek coal field of early Tertiary age (T5)

Ts Sandstone (middle and early Tertiary)—Chiefly sandstone, graywacke, poorly consolidated siltstone, and mudstone. Occurs mainly in fault-bounded basins along north edge of Alaska Range. Locally overlies by the Nenana Gavel and locally overlies the sedimentary rocks of the Jarvis Creek coal field (T5)

Tj Sedimentary rocks of Jarvis Creek coal field (early Tertiary)—Chiefly conglomerate, sandstone, and coal beds. Locally overlies by the sandstone (Ts) and the Nenana Gavel (Tn)
la Lampyryne, alkalic gabbro, and alkalic diorite (early Tertiary and Late Cretaceous)—Chiefly fine grained to medium-grained, panidiomorphic granular aggregates of olivine, orthopyroxene, clinopyroxene, hornblende, biotite, plagioclase, and potassium-feldspar with varying amounts of groundmass. Groundmass consists of fine-grained hornblende, biotite, plagioclase, and opaque and interstitial or replacement carbonate. Local embayed phenocrysts. Occur in locally abundant dikes and sills, local small plutons, and in the igneous complex of Mount Hasklovich in north-central part of quadrangle

m Monzonite and monodiorite (early Tertiary and Late Cretaceous)—Chiefly fine grained to medium-grained, hypocrystalline granular aggregates of clinopyroxene, biotite, potassium-feldspar, and plagioclase. Local with mica and carbonate alteration. Occur in moderate-size plutons in the igneous complex of Mount Hasklovich in north-central part of quadrangle

gzn Granitic plutons north of Denali fault (early Tertiary to mid-Cretaceous)—Chiefly medium grained to coarse-grained biotite-hornblende granite and hornblende-biotite granodiorite, with lesser quartz diorite and diorite. Predominant igneous rather than metamorphic textures. Occur in small dikes, stocks, and locally large plutons in the southern Yukon-Tanana, Aurora Peak, and Windy terranes. Locally weakly to moderately deformed and metamorphosed at lower greenschist facies in Macomb Pluton area. Local intense hydrothermal alteration

gb Gabbro and mafic plutonic rocks and dikes and sills (Cretaceous)—Chiefly gabbro and metagabbro with lesser hornblende diorite and diorite. Intrude the Jarvis Creek Glacier and Hays River Glacier subterrane (of the southern Yukon-Tanana terrane) and the Windy terrane. Textures in gabbro, diorite, and diorite mainly hypocrystalline-granular or ophiolite aggregates of hornblende, plagioclase, and lesser biotite. Textures in metagabbro mainly schistose aggregates of actinolite, chlorite, hornblende or actinolite, chlorite, biotite, epidote, and albite. In some areas, may be late Paleozoic in age and part of igneous suite in the Siana Spur Formation and the Tetona Volcanics

cu Cumulate mafic and ultramafic rocks (Late Triassic)—Moderate-size to large sills of olivine, olivine-clinopyroxene, and clinopyroxene-plagioclase cumulate. Partly to mostly serpentinized. Locally intensely deformed into schistose and mylonitic textures. Occur in large sills in the Tangle subterrane, and as fault-bounded lenses in the Siana Spur subterrane

sv Schistose metasedimentary and metavolcanic rocks (Late Triassic)—Chlorite schist, muscovite schist, and marble. Lesser schistose metapelites and metabasalts, and gneissites derived from pillow basalts. Weakly deformed and metamorphosed at greenschist facies. Locally deformed at fault between units in some areas

Wankella Terrane
Jm McCarty Formation (Early Jurassic and Late Triassic)—Thin- to medium-bedded calcareous argillite and impure limestone with abundant Moscovite. Occurs in branches of Brooks Gulch thrust

ga Gabbro, diorite, and metagabbro (Late Triassic)—Small, irregular bodies, dikes, and sills of medium- to coarse-grained gabbro and fine- to medium-grained diorite and locally schistose metagabbro that occur throughout the Wankella terrane. Gabbro and diorite range from hypocrystalline-granular or ophiolite aggregates of clinopyroxene, plagioclase, and lesser biotite, to regionally metamorphosed metagabbro composed of schistose aggregates of hornblende or actinolite, chlorite, biotite, epidote, and albite. In some areas, may be late Paleozoic in age and part of igneous suite in the Siana Spur Formation and the Tetona Volcanics

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MAP SHOWING LOCATIONS OF METALLIFEROUS LODGE AND PLACER MINERAL OCCURRENCES, MINERAL DEPOSITS, PROSPECTS, AND MINES, MOUNT HAYES QUADRANGLE, EASTERN ALASKA RANGE, ALASKA

By
Warren J. Nokleberg, Ian M. Lange, Robert C. Roback, Warren Yeend, and Steven R. Silva