QUATERNARY TERTIARY

PALEOZOIC

QUATERNARY TERTIARY CRETACEOUS

162°00' 163°00' 164°00' 165°00' 65°45' IMURUK LAKE 65°30' 65°15' (x30Cs) **EXPLANATION** 64°30' — Tract favorable for low-sulfide gold quartz veins Level of Favorability Moderate Moderate Low Moderate Moderate High Moderate Low-sulfide gold-quartz veins O Possible low-sulfide gold-quartz veins Mineral resource assessment by Gamble, B.G., Till, A.B., Briskey, Base from U.S. Geological Survey Bendeleben, 1950, revised 1982, J.A., Ashley, R.P., Cady, J.W., Church, S.E., and Trautwein, C.M., 1983-90 SCALE 1:250 000 Geology by T.P. Miller, 1968-71; A.B. Till, 1981-85; and Solomon, 1950, revised 1972 J.A. Dumoulin, 1982-84; P.R. Carroll, 1982-83; Universal Transverse Mercator projection B.M. Gamble, 1983-84; D. Kaufman, 1983-84 Edited by C.L. Ostergren; prepared by M.E. Coveau Manuscript approved for publication July 20, 1992 CONTOUR INTERVAL 200 FEET NATIONAL GEODETIC VERTICAL DATUM OF 1929

TRACTS FAVORABLE FOR LOW-SULFIDE GOLD-QUARTZ VEINS

MAPS SHOWING METALLIC MINERAL RESOURCES OF THE BENDELEBEN AND SOLOMON QUADRANGLES, WESTERN ALASKA

Bruce M. Gamble and Allison B. Till 1993

Intrusive rocks Volcanic rocks MESOZOIC Kog Kkms Kkg Kkgm Kkd Kwc Kd Kng Kku Kbg Kfg Kgu Kad Kpg PALEOZOIC METAMORPHIC ROCKS Rocks of High-grade rocks of the Kigluaik, Bendeleben Kugruk fault Nome(?) Group and associated rocks and Darby Mountains Metasedimentary rocks PALEOZOIC ORDOVICIAN PRECAMBRIAN DESCRIPTION OF MAP UNITS GLACIAL DEPOSITS AND SEDIMENTARY ROCKS Silt and peat deposits (Quaternary)—Predominantly found in low-lying areas that support numerous thaw lakes; minor beach deposits and barrier bars Colluvium, alluvium, glacial drift, and dune sand deposits (Quaternary)— Silt, sand, gravel, and till Kougarok Gravel (Quaternary? and Tertiary)— Oxidized, quartz-rich pebble and cobble gravel containing lenses of silt, sand, and abundant detrital plant debris TKs Sandstone (Tertiary and Cretaceous)—Tan to light- gray siltstone, sandstone, and pebbly sandstone; local abundant coal seams; deformed: contains pollen of Cretaceous and Tertiary age TKc Carbonate-clast conglomerate (Tertiary and Cretaceous)—Light-grayweathering conglomerate predominantly of poorly sorted, rounded, and subrounded marble, metalimestone, and dolostone clasts in a matrix of calcite and carbonate sand; minor sandstone and pebbly sandstone **IGNEOUS ROCKS** Intrusive Rocks Altered quartz latite (Tertiary)—Light-tan- to orange-weathering, altered porphyritic dikes, sills, and plugs of quartz latite, rhyolite, and possibly andesite; hypabyssal textures Oonatut Granite Complex (Cretaceous)—Predominantly monzogranite with lesser syenogranite; easternmost of tin granites on Seward Peninsula; placer deposits of gold and cassiterite occur on streams draining the granite; K-Ar age is 69 to 71 Ma Kachauik pluton (Cretaceous)—Consists of: Kkms Monzonite to syenite—Monzonite and syenite phase of the Kachauik pluton; cut by aplite, quartz latite porphyry, lamprophyre, and alkaline dikes; K-Ar age is 100 Ma Granodiorite—Granodiorite to quartz monzonite phase of the Kachauik pluton; cut by aplite, quartz latite porphyry, lamprophyre, and alkaline Gneissic monzonite—Gneissic monzonite of the Kachauik pluton; may be border phase to the monzonite to syenite phase (Kkms) Diorite—Hybrid diorite of the Kachauik pluton; may be border phase of the monzonite to syenite phase (Kkms) Kwc Windy Creek pluton (Cretaceous)—Quartz monzonite, locally cut by biotite granodiorite dikes; nepheline syenite boulders reported from streams on east side; pluton locally altered and contains veins with fluorite, molybdenite, galena, sphalerite, and scheelite Darby pluton (Cretaceous)—Monzogranite and local granodiorite characterized by alkali feldspars as much as 5 cm long; K-Ar ages range from 90 to 96 Ma Granitic rocks of Nimrod Hill area (Cretaceous)—Monzogranite, quartz monzonite, syenogranite, and syenite of Asses Ears, Crossfox Butte, and Nimrod Hill stocks; K-Ar ages range from 91 to 96 Ma Kugruk pluton (Cretaceous)—Quartz monzonite to quartz monzodiorite; local dioritic border phase; K-Ar age is 94 Ma Granitic rock of Bendeleben Mountains (Cretaceous)—Quartz monzonite, monzogranite, quartz monzodiorite, and granodiorite of the Pargon, Bendeleben, and Kuzitrin plutons; K-Ar ages range from Foliated granitic rocks (Cretaceous)—Foliated, lens- to sill-shaped bodies mostly of leucocratic syenogranite; contacts are conformable to surrounding metamorphic rocks Granitic rocks, undivided (Cretaceous)—Dikes, sills, and small plugs; variable accessory mineralogy Alkaline dikes (Cretaceous)—Nepheline syenite and pseudoleucite pouphyry dikes as much as 10 m wide and 900 m long; the monzonite to syenite unit (Kkms) of the Kachauik pluton is highly radioactive adjacent to dikes; K-Ar age is 96 Ma Kpg Pegmatite (Cretaceous)—Alkali-feldspar granite to quartz monzodiorite containing large variety of accessory minerals; one dike in the Kigluaik Mountains yielded a K-Ar age of 81 Ma Kdc Dry Canyon stock (Cretaceous)—Nepheline syenite; K-Ar age is 108
Ma Tonalite of Spruce Creek (Mesozoic and Paleozoic)—Light-tanto white-weathering tonalite; poorly exposed and locally altered Volcanic Rocks QTv Volcanic rocks, undivided (Quaternary and Tertiary)—Basalt lava flows and associated vent deposits; mostly alkali-olivine basalt, lesser olivine tholeiite; ages range from 29 Ma to Holocene TKv Felsic volcanic rocks (Tertiary and Cretaceous)— Limonite-stained porphyritic sanidine-quartz felsite flow or tuff and fragmental silicic flow or vent breccia METAMORPHIC ROCKS Nome(?) Group and associated rocks

CORRELATION OF MAP UNITS BY ROCK TYPE

(Age relation between rock types uncertain)

GLACIAL DEPOSITS AND SEDIMENTARY ROCKS

IGNEOUS ROCKS

Metasedimentary rocks Ddm Dolostone and marble (Devonian)—Medium- to dark-gray-weathering, black- to dark-gray dolostone and marble containing tabulate and rugose corals, stromatoporoids, brachiopods, rare bryzoans, and

D-Cbm Black metalimestone and marble (Devonian through Cambrian)—Black to dark-gray metalimestone, marble, and subordinate dolostone exposed on sea cliffs of Kotzebue Sound, and black to dark-gray marble and subordiante fissile marble, calcareous schist, and mafic schist exposed in eastern part of Solomon 1° x 3° quadrangle; contains conodonts of Cambrian, Ordovician, Silurian, and Devonian age D-Cks Calcareous schist of Kwiniuk Mountain (Devonian through Cambrian)-Medium-grained quartz-calcite-white mica-chlorite-albite-

graphite schist; relict crossbedding and graded bedding; interlayered with unit D-Cbm Dolostone (Silurian)-Light-gray-weathering, light- to dark-gray, finegrained dolostone and subordinate black dolostone and marble Dolostone (Ordovician)—Pink- to light-gray- or tan-weathering, gray to tan, fine-grained dolostone; relict sedimentary features include

color mottling (reflecting bioturbation), zebra dolomite, and fenestral Impure chlorite marble (Ordovician)—Buff- to orange-weathering, wellfoliated, impure marble to calc-schist; impurities most commonly chlorite, albite, and white mica; contains lenses and layers of chlorite and albite marking foliation and fold surfaces, especially abundant in lower parts of unit; massive light-green bodies of metabasite found at base of unit; Ordovician conodonts obtained from dolostone

boudin in upper part of unit Oc Casadepaga Schist (Ordovician)—Light-green and greenish-brown mafic schist, calc-schist, and metabasite; lithologies variable but dominated by mafic and calcareous components interlayered on a centimeter to meter scale; mafic rocks contain glaucophane, actinolite, albite, chlorite, garnet, epidote, and sphene

O-Cx Mixed rocks unit (Ordovician and Cambrian)—Interlayered pure and impure marble, quartz-graphite schist, pelite, calcareous schist, and mafic schist; gray- and orange-weathering marble and black-weathering quartz-graphite schist dominate; quartz-graphite schist known only in this unit; locally contains metabasite boudins similar to those found in the Casadepaga Schist; recrystallized radiolarians found locally; conodonts of Ordovician age obtained from upper part of

•Cd Dolostone (Cambrian)—Light- or medium-gray to pinkish-orange dolostone; contains a few percent quartz and white mica; contains Cambrian lapworthellids (a phosphatic microfossil) €p€s Solomon Schist (Cambrian(?) amd Precambrian)— Resistant, well fo-

liated, quartz-rich schist, predominantly pelite with subordinate calcschist; commonly, 1- to 2-cm-thick bands of quartz are interlayered with micaceous minerals and trace isoclinal and chevron folds that are axial planar to foliation Pzm Marble (Paleozoic)—Light-gray-weathering, white to medium-gray, medium to coarse crystalline marble

Dolostone (Paleozoic)—Light-colored, fine-grained featureless dolostone; may include rocks correlative with units Od, Sd, or Ddm Metaigneous rocks

Metagranitic rocks (Paleozoic)—Foliated metagranitic and tonalitic rocks; U-Pb age of 381±2 Ma obtained from easternmost body at Kiwalik Pzp-Cf Felsic schist (Paleozoic and Precambrian)—Light- orange to light-green, fine- to coarse-grained quartz-feldspar-white mica schist and metavol-

canic clastic rocks

High-grade rocks of the Kigluaik, Bendeleben, and Darby Mountains Pzp-Ch High-grade schist, undivided (Paleozoic and Precambrian)-Metased-

imentary and metaigneous schist above biotite grade; includes lithologies similar to those in units Oim, Oc, O-Ex, and -Ep-Es Pzp-Cm High-grade marble (Paleozoic and Precambrian)—Light-gray-weathering, coarse crystalline, pure and impure marble

Rocks of the Kugruk fault zone MzPzs Serpentinite (Mesozoic and Paleozoic)—Light-green-weathering, darkgreenish-black serpentinite

MzPzm Mylonitic metabasite (Mesozoic and Paleozoic)—Predominantly fine-grained, medium-bluish-gray, foliated metabasite with porphyroclasts of relict igneous clinopyroxene; laminar foliation imparts a millimeter-scale color banding; blue amphibole (crossite) and lawsonite present in northern part of unit, actinolite and epidote in southern part; also subordinate dark-green, dark-red, and dark-gray vesicular metabasalt with epidote, pumpellyite, and chlorite in rare fault slices

Fault—Strike slip or vertical; dashed where inferred; dotted where