Significant Metalliferous Lode Deposits and Placer Districts of Alaska

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Mill buildings at Kennecott, Alaska. The Kennecott district Cu-Ag mines in the Wrangell Mountains were some of the principal sources of copper in North America from 1913 to 1938. See deposit description for Kennecott district (number 30 for southern Alaska). Copyrighted drawing used by permission of Gail Niebrugge, artist, Glennallen, Alaska.

PREFACE

This report is a compilation of the significant metalliferous lode deposits and placer districts of Alaska, and is a comprehensive data base for a companion article on the metallogenesis and major mineral deposits of Alaska that will be published in the volume on Alaskan geology for the Decade of North American Geology (DNAG) by the Geological Society of America. This report is based on recent unpublished data on metalliferous mineral deposits of Alaska, and on recent and older published articles and summaries of Alaskan mineral deposits and regional geology. The unpublished data were contributed by mineral deposit and regional geologists in private industry, universities, the U.S. Geological Survey, the Alaska Division of Geological and Geophysical Surveys, the U.S. Bureau of Mines, and the authors. Data were also obtained for classification of metalliferous mineral deposits from mineral deposit geologists in the U.S. Geological Survey. The 54 contributors who gave freely of their data, with affiliations at the time of contribution, are:

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PLATES
[In pocket]

1. Map showing locations of significant metalliferous lode deposits of Alaska.
2. Map showing locations of significant metalliferous placer districts of Alaska.

Significant Metalliferous Lode Deposits and Placer Districts of Alaska

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INTRODUCTION

Alaska is commonly regarded as one of the new frontiers in North America for discovering metalliferous mineral deposits. A major theme in the history of the State has been repeated "rushes" or "stampedes" to sites of newly discovered metalliferous lode or placer deposits. During the last two decades, there has been extensive exploration for lode and placer mineral deposits by private mining exploration companies. During the same period, because of the considerable interest in Federal lands in Alaska, and the establishment of new national parks, wildlife refuges, and Native corporations, substantial studies of mineral deposits and of the mineral resource potential of Alaska have been conducted by the U.S. Geological Survey, the U.S. Bureau of Mines, and the Alaska Division of Geological and Geophysical Surveys. These studies have resulted in abundant new information on Alaskan mineral deposits. In the same period, substantial geologic mapping has been completed with the advent of modern logistical and technical tools. One result of the bedrock studies has been the recognition of numerous fault-bounded packages designated as tectonostratigraphic terranes, each with a distinctive stratigraphy, structure, metamorphism, and suite(s) of mineral deposits. Proponents of this concept suggest that most of Alaska consists of a collage of tectonostratigraphic terranes (Jones and others, 1984b; Monger and Berg, 1984).

This report provides new and timely, detailed tabular summaries of the 262 significant metalliferous lode deposits and districts, and the 43 placer districts of Alaska as of early 1986. The term "significant deposits" is defined as all metalliferous mines, prospects, deposits, or occurrences that the authors and contributors judged to be important, on the basis of size, geological importance, or interest, for an in-depth survey. For each deposit, the report also states for each deposit a precise location, common names, major metals or commodities, a mineral deposit type, the host-rock geology, data on tonnage, grade, and production, if known, and sources of information. The location of metalliferous lode deposits is shown on plate 1; the location of placer districts is shown on plate 2.

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PREVIOUS STUDIES

Within the last 23 years, a few statewide summaries and several regional summaries of Alaskan metalliferous lode and placer deposits have been published by the U.S. Geological Survey (USGS), and the Alaska Division of Geological and Geophysical Surveys (ADGGS). In 1964, the USGS published a map of placer gold occurrences (Cobb, 1964). In 1967, the USGS published a statewide summary of metalliferous lode deposits (Berg and Cobb, 1967). In 1973, the USGS published a summary of Alaskan placer deposits (Cobb, 1973). In 1976 and 1977, the USGS published a series of regional tables, maps, and references for metalliferous deposits as part of the Regional Mineral Resource Assessment Program

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(RAMRAP). These RAMRAP reports cover the Brooks Range (Grybeck, 1977), the Seward Peninsula (Hudson and others, 1977), central Alaska (Eberlein and others, 1977), the eastern part of southern Alaska (MacKevett and Holloway, 1977a), and the western part of southern Alaska (MacKevett and Holloway, 1977b). In 1981, the USGS published a report on all known mines, prospects, deposits, and occurrences for southeastern Alaska (Berg and others, 1981). In 1982, the Arctic Environmental Information and Data Center (AEIDC) published a series of regional mineral terrane maps of Alaska, prepared by C. C. Hawley and Associates, showing the location, size, and type of major metalliferous mineral deposits (AEIDC, 1982). In 1984, the USGS published a report summarizing the regional geology, metallogeny, and mineral resources of southeastern Alaska (Berg, 1984). In recent years, a yearly listing of Alaskan lode and placer deposits has been published by the ADGGS; the most recent publication is by Eakins and others (1985). Also during the last two decades, many commodity studies have been published by the USGS, the U.S. Bureau of Mines, and the ADGGS; these commodity studies are cited below in the descriptions of specific deposits. One important recent commodity study was published by Orris and Bliss (1985) on placer deposits of the United States.

CLASSIFICATION OF MINERAL DEPOSITS

Metalliferous lode deposits in this report are classified into 29 types, and placer deposits are classified into 4 types, described below. This classification of mineral deposits was mainly derived from the mineral deposit models of specialists as compiled in Cox and Singer (1986), and to a lesser degree from earlier studies of Erickson (1982) and Cox (1983a, b). Four mineral deposit models for metalliferous deposits common in Alaska were formulated for this study. These additional models are for metamorphosed sulfide, Cu-Ag quartz vein, felsic-plutonic U lode, and placer Sn deposits. The lode deposit types are listed in order from those formed at or near the surface, such as various stratiform deposits, to those formed at deeper levels, such as zoned mafic-ultramafic and podiform chromite deposits. Placer deposit types are listed last. Some lode deposit types that share a common origin, such as contact metasomatic or porphyry deposits, are grouped together under a single heading. For a few lode deposits, lack of data precludes classification into a specific mineral deposit type. For these deposits, a brief description of the deposit is enclosed in parentheses under the "Type" heading in table 1.

The mineral deposit models used in this report and as described in Cox and Singer (1986) consist of both descriptive and genetic information that is systematically arranged to describe the essential properties of a class of mineral deposits. Some models are descriptive (empirical), in which instance the various attributes are recognized as essential, even though their relationships are unknown. An example of a descriptive mineral deposit model is the basaltic Cu model, as adapted for this study, in which the empirical datum of a geologic association of Cu sulfides with relatively Cu-rich metabasalt or greenstone is the essential attribute. Other models are genetic (theoretical), in which case the attributes are related through some fundamental concept. An example is the W or Fe skarn (contact metasomatic) deposit model in which case the genetic process of contact metasomatism is the essential attribute. For additional information on the methodology of mineral deposit models, the reader is referred to the discussion by Cox and Singer (1986).

Lode Deposit Types

Kuroko massive sulfide deposit (Donald A. Singer in Cox and Singer, 1986). This deposit type consists of volcanogenic, massive to disseminated sulfides that occur in felsic to intermediate marine volcanic, pyroclastic, and bedded sedimentary rocks. The volcanic rocks are mainly rhyolite and dacite with subordinate basalt and andesite. The depositional environment is mainly hot springs related to marine volcanism in island arcs or in extensional regimes. The deposit minerals include pyrite, chalcopyrite, sphalerite, and lesser galena, tetrahedrite, tennantite, and magnetite. Local alteration to zeolites, montmorillonite, silica, chlorite, and sericite may occur. Notable examples are the Arctic, Smucker, and Sun deposits in the Brooks Range, the WTF, Red Mountain deposits, and Delta district deposits in east-central Alaska, and the Greens Creek, Glacier Creek, Khayyam, and Orange Point deposits in southeastern Alaska.

Besshi massive sulfide deposit (Dennis P. Cox in Cox and Singer, 1986). This deposit type consists of thin, sheetlike bodies of massive to well-laminated pyrite, pyrrhotite, and chalcopyrite, and lesser sulfide minerals, within thinly laminated clastic sedimentary rocks and mafic tuffs. The rock types are mainly marine clastic sedimentary rocks, basaltic and less commonly andesitic tuff and breccia, and local black shale and red chert. The depositional environment is uncertain, but may possibly be submarine hot springs related to submarine basaltic volcanism. Associated minerals include sphalerite, and lesser magnetite, galena, bornite, and tetrahedrite, with gangue quartz, carbonates, albite, white mica, and chlorite. Alteration is sometimes difficult to recognize because of metamorphism. Notable examples are the Midas, Latouche, Beatson, Ellamar, and Fidalgo-Alaska mines in the Prince William Sound region of southern Alaska.

Cyprus massive sulfide deposit (Donald A. Singer in Cox and Singer, 1986). This deposit type consists of massive sulfides in pillow basalt. The depositional environment consists of submarine hot springs along an axial graben in oceanic or back-arc spreading ridges, or hot springs related to submarine volcanoes in seamounts. The deposit minerals consist mainly of pyrite, chalcopyrite, sphalerite, and lesser marcasite and pyrrhotite. The sulfides occur in pillow basalt that is associated with tectonized dunite, harzburgite, gabbro, sheeted diabase dikes, and fine-grained sedimentary rocks, all part of an ophiolite assemblage. Beneath the massive sulfides is sometimes stringer or stockwork pyrite, pyrrhotite, minor chalcopyrite, and spalerite. The sulfide minerals are sometimes brecciated and recemented. Alteration in the stringer zone consists of abundant quartz, chalcedony, chlorite, and some illite and calcite. Some deposits are overlain by Fe-rich and Mn-poor ochre. Notable examples are the Knight Island and Threeman mines, and the Copper Bullion deposit, all in coastal southern Alaska.

Sedimentary exhalative Zn-Pb deposit (Joseph A. Briskey in Cox and Singer, 1986). This deposit type consists of stratiform, massive to disseminated sulfides occurring in sheetlike or lenslike tabular bodies that are interbedded with euxinic marine sedimentary rocks including dark shale, siltstone, limestone, chert, and sandstone. The depositional environment consists mainly of marine epicratonic embayments and intracratonic basins, with smaller local restricted basins. The deposit minerals include pyrite, pyrrhotite, sphalerite, galena, barite, and chalcopyrite. Extensive alteration may occur, including stockwork and disseminated sulfides, silica, albite, and chlorite. Notable examples are the Lik and Red Dog Creek deposits in the northwestern Brooks Range.

Kipushi Cu-Pb-Zn (carbonate-hosted Cu) deposit (Dennis P. Cox in Cox and Singer, 1986). This deposit type consists of stratabound, massive sulfides hosted mainly in dolomitic breccia. The depositional environment consists mainly of high fluid flow along faults or karst(?)-breccia zones. Generally no rocks of unequivocal igneous origin are related to the deposit. The deposit minerals include pyrite, bornite, chalcocite, chalcopyrite, carrollite, sphalerite, and tennantite with minor reinerite and germanite. Local alteration to dolomite, siderite, and silica may occur. Notable examples are the Ruby Creek and Omar deposits in the Brooks Range.

Metamorphosed sulfide deposit (this study). This deposit type consists of stratabound, massive to disseminated sulfides hosted in moderately to highly metamorphosed and deformed metavolcanic or metasedimentary rocks. Metamorphism and deformation have obscured protoliths of host rocks and deposits so as to preclude classification into more specific deposit types. The interpreted host rocks for these deposits are mainly felsic to mafic metavolcanic rocks, and metasedimentary or metavolcanic schist and gneiss. The deposit minerals include chalcopyrite, sphalerite, galena, bornite, sometimes with pyrite, magnetite, and hematite. Alteration is usually difficult to recognize because of metamorphism. These deposits occur mainly in the regional metamorphic rocks in southeastern Alaska in either the Coast plutonic-metamorphic complex or the Alexander belt. Notable examples are the Sweetheart Ridge, Sumdum, Groundhog Basin, and Moth Bay deposits, all in southeastern Alaska.

Bedded barite deposit (Greta J. Orris in Cox and Singer, 1986). This deposit type consists of stratiform, massive barite interbedded with marine cherty and calcareous sedimentary rocks, mainly dark chert, shale, mudstone, and dolomite. The depositional environment consists of epicratonic marine basins or embayments, often with smaller local restricted basins. Bedded barite deposits are often associated with sedimentary exhalative Zn-Pb (not described here) or Kuroko massive sulfide deposits (described above). Alteration consists of secondary barite veining and local, weak to moderate sericite replacement. Associated minerals include minor witherite, pyrite, galena, and sphalerite. Notable examples are the Nimiuktuk deposit in the northwestern Brooks Range and the Castle Island mine in southeastern Alaska.

Sandstone U deposit (Christine Turner Peterson and Carroll A. Hodges in Cox and Singer, 1986). This deposit type consists of concentrations of uranium oxides and related minerals in localized, reduced environments in medium- to coarse-grained feldspathic or tuffaceous sandstone, arkose, mudstone, and conglomerate. The depositional environment is continental basin margins, fluvial channels, fluvial fans, or stable coastal plain, sometimes with nearby felsic plutons or felsic volcanic rocks. The deposit minerals include pitchblende, coffinite, carnotite, and pyrite. A notable example is the Death Valley deposit in the eastern part of the Seward Peninsula region.

Basaltic Cu deposit (adapted from Dennis P. Cox in Cox and Singer, 1986). This deposit type consists of copper sulfides in large pipes and lenses in carbonate rocks within a few tens of meters of disconformably underlying subaerial basalt. The depositional environment consists of subaerial basalt overlain by mixed shallow marine and nearshore carbonate sedimentary rocks, including sabkha-facies carbonate rocks; subsequent subaerial erosion, ground-water leaching and (or) low-grade regional metamorphism may concentrate copper sulfides into pipes and lenses. The deposit minerals consist of chalcocite and lesser bornite, chalcopyrite, and other Cu sulfides, and oxidized Cu minerals. Alteration minerals are sometimes obscured by, or may include, malachite, azurite, metamorphic chlorite, actinolite, epidote, albite, quartz, zeolites, and secondary dolomite. Notable examples are in the Kennecott district and at the Westover, Nelson, and Erickson mines, all in southern Alaska.

Hot-spring Hg deposit (James J. Rytuba in Cox and Singer, 1986). This deposit type consists of cinnabar, antimony, pyrite, and minor marcasite and native mercury in veins and in disseminations in graywacke, shale, andesite and basalt flows, andesite tuff and tuff breccia, and diabase dikes. The depositional environment is near paleo-groundwater table in areas of former hot springs. Various alteration minerals such as kaolinite, alunite, Fe oxides, and native sulfur occur above the paleo-groundwater table; pyrite, zeolites, potassium feldspar, chlorite, and quartz occur below the paleo-groundwater table. Notable examples are the Red Devil, DeCoursey Mountain, and Cinnabar Creek mines in west-central Alaska.

Epithermal vein deposit (Dan L. Mosier, Takeo Sato, Norman J Page, Donald A. Singer, and Byron R. Berger in Cox and Singer, 1986). This deposit type consists of quartz-carbonate-pyrite veins with a wide variety of minerals, including gold, silver sulfosalts, chalcopyrite, argentite, galena, sphalerite, and arsenopyrite. The veins occur in felsic to intermediate volcanic rocks, sometimes overlying older volcanic sequences or igneous intrusions. One class of epithermal vein deposits, such as those at Creede, Colorado, has high concentrations of Pb, Zn, and Ag, sometimes high Cu, and low Au; another class, such as those at Sado, Japan, has high Au, moderate to low Ag, sometimes high Cu, and generally low Pb and Zn concentrations. For both groups, the host volcanic rock composition ranges from andesite to rhyolite. The depositional environment is intermediate to felsic volcanic arcs and centers. Associated minerals include electrum, chalcopyrite, copper and silver sulfosalts, with lesser tellurides and bornite. Alteration minerals include quartz, kaolinite, montmorillonite, illite, and zeolites. Notable examples are the Aquila and Shumagin deposits, and the Apollo-Sitka mine on the Alaska Peninsula.

Low-sulfide Au quartz vein deposit (Byron R. Berger in Cox and Singer, 1986). This deposit type, abbreviated to "Au quartz vein" in the descriptions below, consists of gold in massive, persistent quartz veins in regionally metamorphosed volcanic rocks, metamorphosed graywacke, chert, and shale. The depositional environment is low-grade metamorphic belts. The veins are generally late synmetamorphic to postmetamorphic and locally cut granitic rocks. Associated minerals are minor pyrite, galena, sphalerite, chalcopyrite, arsenopyrite, and pyrrhotite. Alteration minerals include quartz, siderite, albite, and carbonate. Notable examples are the Big Hurrah mine on the Seward Peninsula, the Chandalar district mines in the southern Brooks Range, the Willow Creek district mines, the Nuka Bay, Monarch, Jewel, Granite, and Cliff mines in southern Alaska, and the Alaska-Juneau, Jualin, Kensington, Sumdum Chief, Treadwell, Nido, and Chichagoff mines in southeastern Alaska.

Cu-Ag quartz vein deposit (this study). This deposit type consists of Cu sulfides and accessory silver in quartz veins and disseminations in weakly regionally metamorphosed mafic igneous rocks, mainly basalt and gabbro, and lesser andesite and dacite. The depositional environment is low-grade metamorphic belts. The veins are generally late-stage metamorphic. The deposit minerals include chalcopyrite, bornite, lesser chalcocite, and rare native copper. Alteration minerals include epidote, chlorite, actinolite, albite, quartz, and zeolites. Notable examples are the Kathleen-Margaret and Nikolai mines in southern Alaska.

Polymetallic vein deposit (Dennis P. Cox in Cox and Singer, 1986). This deposit type consists of quartz-carbonate veins often with silver, gold, and associated base-metal sulfides. The veins are related to hypabyssal intrusions in sedimentary and metamorphic terranes, or to metamorphic fluids forming during waning regional metamorphism. The associated intrusions range in composition from calcalkaline to alkaline and occur in dike swarms, hypabyssal intrusions, small to moderate-size intermediate to felsic plutons, locally associated with andesite to rhyolite flows. The depositional environment is near-surface fractures and breccias within thermal aureoles of small to moderate-size intrusions, including within the intrusions. The deposit minerals include native gold, electrum, pyrite, and sphalerite, sometimes with chalcopyrite, galena, arsenopyrite, tetrahedrite, Ag sulfosalts, and argentite. Alteration consists of wide propylitic zones and narrow sericitic and argillic zones. Notable examples are the Independence and Golden Horn mines, and the Broken Shovel and Beaver Creek deposits in west-central Alaska, the Quigley Ridge, Banjo, Spruce Creek, and Stampede deposits in the Kantishna district of east-central Alaska, the Cleary Summit and Ester Dome mines in the Fairbanks district of east-central Alaska, the Sedanka and Bonanza Hills deposits of the Alaska Peninsula, and the Golden Zone deposit of southern Alaska.

Sb-Au vein deposit (Adapted from simple Sb deposit of James D. Bliss and Greta J. Orris in Cox and Singer, 1986). This deposit type consists of massive to disseminated stibnite and lesser gold in quartz-carbonate veins, pods, and stockworks that occur in or adjacent to brecciated or sheared fault zones, in sedimentary, volcanic, and metamorphic rocks adjacent to granitic plutons, in contact aureoles around granitic plutons, and peripheries of granodiorite, granite, and monzonite plutons. Some Sb-Au vein deposits are transitional into polymetallic vein deposits. The depositional environment is faults and shear zones, epizonal fractures adjacent to or within the margins of epizonal granitic plutons. Associated minerals include arsenopyrite, chalcopyrite, and tetrahedrite, and sometimes cinnabar and galena. This deposit type is locally associated with polymetallic vein deposits. Alteration consists mainly of silica, sericite, and argillite. Notable examples are the Slate Creek, Eagles Den, and Caribou Creek deposits in the Kantishna district of east-central Alaska, and the Scrafford mine in east-central Alaska.

Sn greisen, Sn vein, and Sn skarn deposits (Bruce L. Reed and Dennis P. Cox in Cox and Singer, 1986). These three deposit types commonly occur in the same area, and some grade into one another. The Sn greisen deposit type consists of disseminated cassiterite, cassiterite-bearing veinlets, and Sn sulfosalts in stockworks, lenses, pipes, and breccia in greisenized granite, mainly biotite and (or) muscovite leucogranite emplaced in a mesozonal to deep volcanic environment. Sn greisens are generally postmagmatic and are associated with late-stage, fractionated granitic magmas. Associated minerals include molybdenite, arsenopyrite, beryl, scheelite, and wolframite. Alteration minerals consist of incipient to massive replacement quartz, muscovite, tourmaline, and fluorite. Notable examples are the Kougarok deposit on the Seward Peninsula and the Coal Creek deposit in southern Alaska.

The Sn vein deposit type consists of simple to complex fissure fillings or replacement lodes in or near felsic plutonic rocks, mainly mesozonal to hypabyssal plutons, commonly with dike swarms. The deposits tend to occur within or above the apices of granitic cusps and ridges. The deposit minerals are extremely varied and include cassiterite, wolframite, arsenopyrite, molybdenite, scheelite, and beryl. Alteration minerals consist of sericite, tourmaline, quartz, chlorite, and hematite. A possible example is the Lime Peak deposit in east-central Alaska.

The Sn skarn deposit type consists of Sn, W, and Be minerals in skarns, veins, stockworks, and greisen near intrusive contacts between epizonal(?) granitic plutons and limestone. The deposit minerals include cassiterite, sometimes with scheelite, sphalerite, chalcopyrite, pyrrhotite, magnetite, and fluorite. Alteration consists of greisen near granite margins, and metasomatic development of andradite, idocrase, amphibole, chlorite, chrysoberyl, and mica in skarn. A notable example is the Lost River mine on the Seward Peninsula.

Cu-Zn-Pb (± Au, Ag) skarn, W skarn, and Fe (± Au) skarn (contact metasomatic) deposits (Dennis P. Cox and Theodore G. Theodore in Cox and Singer, 1986). Cu-Zn-Pb skarn deposit type consists of chalcopyrite, sphalerite, and galena in calc-silicate skarns that replace carbonate rocks along intrusive contacts with plutons of quartz diorite to granite and diorite to syenite. Zn-Pb-rich skarns tend to occur farther from the intrusion; Cu- and Au-rich skarns tend to occur closer to the intrusion. The depositional environment is mainly calcareous sedimentary sequences intruded by felsic to intermediate granitic plutons. Associated minerals include pyrite, hematite, magnetite, bornite, arsenopyrite, and pyrrhotite. Metasomatic replacements consist of a wide variety of calc-silicate and related minerals. Notable examples of Cu-Zn-Pb skarn deposits are the Bowser Creek, Rat Fork, Sheep Creek, and Tin Creek deposits. Notable examples of Cu-Au and Au skarn deposits are the Nixon Fork-Medfra mine in west-central Alaska and the Jumbo mine in southeastern Alaska.

The W skarn deposit type consists of scheelite in calc-silicate skarns that replace carbonate rocks along or near intrusive contacts with quartz diorite to granite plutons. The depositional environment is along contacts and in roof pendants of batholiths and thermal aureoles of stocks that intrude carbonate rocks. Associated minerals are molybdenite, pyrrhotite, sphalerite, chalcopyrite, bornite, pyrite, and magnetite. Metasomatic replacements consist of a wide variety of calc-silicate and related minerals. Notable examples are the deposits and mines in the Gilmore Dome area of the Fairbanks district in east-central Alaska.

The Fe skarn deposit type consists of magnetite and (or) Fe sulfides in calc-silicate skarns that replace carbonate rocks or calcareous clastic rocks along intrusive contacts with diorite, granodiorite, granite, and coeval volcanic rocks. The depositional environment is along intrusive contacts. The chief associated mineral is chalcopyrite. Metasomatic replacements consist of a wide variety of calc-silicate and related minerals. Notable examples are the Medfra deposit in west-central Alaska, the Nabesna and Rambler mines in southern Alaska, and the Kasaan Peninsula mine in southeastern Alaska.

Porphyry Cu-Mo, porphyry Cu, and porphyry Mo deposit (Dennis P. Cox and Theodore G. Theodore in Cox and Singer, 1986). The porphyry Cu-Mo deposit type consists of stockwork veinlets of quartz, chalcopyrite, and molybdenite in or near porphyritic intermediate to felsic intrusions. The intrusions occur mainly in stocks and breccia pipes that intrude batholithic, volcanic, or sedimentary rocks. The depositional environment is high-level intrusive porphyries that are contemporaneous with abundant dikes, faults, and breccia pipes. Associated minerals include pyrite and peripheral sphalerite, galena, and gold. Alteration minerals consist of quartz, K-feldspar, and biotite or chlorite. Notable examples are the Taurus deposit in east-central Alaska, the Orange Hill, Bond Creek, Baultoff, Horsfeld, Carl Creek deposits in southern Alaska, and the Pyramid deposit in the Alaska Peninsula.

The porphyry Cu deposit type consists of chalcopyrite in stockwork veinlets in hydrothermally altered porphyry and adjacent country rock. The porphyries range in composition from tonalite to monzogranite to syenitic porphyry. The depositional environment is epizonal intrusive rocks with abundant dikes, breccia pipes, cupolas of batholiths, and faults. Associated minerals are pyrite, molybdenite, magnetite, and bornite. Alteration consists of sodic, potassic, phyllic, argillic, and propylitic types. An example is the Margerie deposit in southeastern Alaska.

The porphyry Mo deposit type consists of quartz-molybdenite stockwork veinlets in granitic porphyry and adjacent country rock. The porphyries range in composition from tonalite to granodiorite to monzogranite. The depositional environment is epizonal. Associated minerals are pyrite, scheelite, chalcopyrite, and tetrahedrite. Alteration consists of potassic grading outward to propylitic, sometimes with phyllic and argillic overprint. Notable examples are the Bear Mountain deposit in the northeastern Brooks Range and the Quartz Hill deposit in southeastern Alaska.

Felsic plutonic U deposit (this study). This deposit type consists of disseminated uranium minerals, thorium minerals, and REE-minerals in fissure veins and alkalic granite dikes in or along the margins of alkalic and peralkalic granitic plutons, or in granitic plutons, including granite, alkalic granite, granodiorite, syenite, and monzonite. The depositional environment is mainly the margins of epizonal to mesozonal granitic plutons. The deposit minerals include allanite, thorite, uraninite, bastnaesite, monazite, uranothorianite, and xenotime, sometimes with galena and fluorite. Notable examples are the Roy Creek (Mount Prindle) deposit in east-central Alaska, and the Bokan Mountain deposits in southeastern Alaska.

Gabbroic Ni-Cu deposit (adapted from synorogenic-synvolcanic Ni-Cu deposit of Norman J Page in Cox and Singer, 1986). This deposit type consists of massive lenses, matrix, and disseminated sulfides in small to medium-size composite mafic and ultramafic intrusions in metamorphic belts of metasedimentary and metavolcanic rocks. In most areas of Alaska, the depositional environment consists of post-metamorphic and post-deformational, intermediate-level intrusion of norite, gabbro-norite, and ultramafic rocks. The deposit minerals include pyrrhotite, pentlandite, and chalcopyrite, sometimes with pyrite, Ti- or Cr-magnetite, and PGE minerals and alloys. Accessory cobalt minerals also occur in some deposits. Notable examples are the Funter Bay, Brady Glacier, Bohemia Basin, and Mirror Harbor deposits, all in southeastern Alaska.

Zoned mafic-ultramafic Cr-Pt (± Cu, Ni, Co, Pd, Au, Ti or Fe) (Alaskan-type) deposit (Alaskan PGE deposit type of Norman J Page and Floyd Gray in Cox and Singer, 1986). This deposit type consists of crosscutting ultramafic to mafic plutons with approximately concentric zoning that contain chromite, native PGE, PGE minerals and alloys, and Ti-V magnetite. In most areas of Alaska, the depositional environment consists of postmetamorphic and postdeformational, intermediate-level intrusion of mafic and (or) ultramafic plutons. The deposit minerals include combinations of chromite, PGE minerals and alloys, pentlandite, pyrrhotite, Ti-V magnetite, bornite, and chalcopyrite. Notable examples are the Kemuk Mountain deposit in west-central Alaska, the Union Bay, Duke Island, and Klukwan deposits, and the Salt Chuck mine, all in southeastern Alaska.

Podiform chromite deposit (John P. Albers in Cox and Singer, 1986). This deposit type consists of podlike masses of chromite in the ultramafic parts of ophiolite complexes, locally intensely faulted and dismembered. The host rock types are mainly dunite and harzburgite, commonly serpentinized. The depositional environment consists of magmatic cumulates in elongate magma pockets. Associated minerals are magnetite and PGE minerals and alloys. Notable examples are the Iyikrok Mountain, Misheguk Mountain, and Avan deposits in the northwestern Brooks Range, the Kaiyuh River deposit in west-central Alaska, and the Halibut Bay, Claim Point, and Red Mountain deposits in southern Alaska.

Serpentine-hosted asbestos deposit (Norman J Page in Cox and Singer, 1986). This deposit type consists of chrysotile asbestos developed in stockworks in serpentinized ultramafic rocks. The depositional environment is usually an ophiolite sequence, sometimes with later deformation or igneous intrusion. Associated minerals are magnetite, brucite, talc, and tremolite. A notable example is the Fortymile deposit in east-central Alaska.

Placer Deposits

In this study and in the compilations of mineral deposit models by Cox and Singer (1986), placer deposits are classified primarily by metals and secondarily by sedimentary processes. The principal sedimentary processes are fluvial and glaciofluvial, shoreline, and eluvial or residual. Fluvial and glaciofluvial deposits form where river velocities lessen at hydraulic flexures, on the inside of meanders, below rapids and falls, and beneath boulders. Shoreline deposits form in areas of strandline accumulations that are caused by shoreline drift, beach storms, wind, and wave action. Eluvial or residual deposits form by the mechanical and (or) chemical disintegration of bedrock in the general absence of the concentrating force of water.

Placer Au deposit (Warren Yeend in Cox and Singer, 1986). This deposit type consists of elemental gold as grains and rarely as nuggets in gravel, sand, silt, and clay, and their consolidated equivalents in alluvial, beach, eolian, and rarely in glacial deposits. The depositional environment is high-energy alluvial where gradients flatten and river velocities lessen as at the inside of meanders, below rapids and falls, beneath boulders, and in shoreline areas where the winnowing action of surf causes gold concentrations found in raised, present, or submerged beaches. The major deposit minerals are gold, sometimes with attached quartz, magnetite or ilmenite. Notable examples are in the Wiseman district in the southern Brooks Range, the Nome, Council, and Fairhaven districts on the Seward Peninsula, the Marshall, Aniak, Iditarod, Innoko, McGrath, Ruby, Hughes, Hot Springs, and Tolovana districts in west-central Alaska, the Fairbanks, Circle, Fortymile, and Kantishna placer districts in east-central Alaska, the Valdez, Chistochina, Nizina, Hope, and Willow Creek districts in southern Alaska, and the Porcupine Creek and Juneau districts in southeastern Alaska.

Placer Sn deposit (this study). This deposit type consists of mainly cassiterite and elemental gold in grains in gravel, sand, silt, and clay, and their consolidated equivalents, mainly in alluvial deposits. The depositional environment is similar to that of placer Au deposits. Notable examples are deposits derived from Sn granites, such as in the Kougarok district on the Seward Peninsula, and the Hot Springs district in west-central Alaska.

Placer PGE-Au deposit (Warren Yeend and Norman J Page in Cox and Singer, 1986). This deposit type consists of PGE minerals and alloys in grains in gravel, sand, silt, and clay, and their consolidated equivalents in alluvial, beach, eolian, and rarely in glacial deposits. In some areas, placer Au and placer PGE deposits occur together. The depositional environment is high-energy alluvial where gradients flatten and river velocities lessen as at the inside of meanders, below rapids and falls, beneath boulders, and in shoreline areas where the winnowing action of surf causes PGE and gold concentrations in raised, present, or submerged beaches. The major deposit minerals are Pt-group alloys, Os-Ir alloys, magnetite, chromite, and ilmenite. A notable example is the Goodnews Bay placer district.

Shoreline placer Ti deposit (Eric R. Force in Cox and Singer, 1986). This deposit type consists of ilmenite and other heavy minerals concentrated by beach processes and enriched by weathering. The hosting sediment types are medium- to fine-grained sand in dune, beach, and inlet deposits. The depositional environment is stable coastal region receiving sediment from bedrock regions. The major deposit minerals are low-Fe ilmenite, sometimes with rutile, zircon, and gold. Notable examples are the Yakutat and Lituya Bay placer districts.

EXPLANATION OF TABULAR HEADINGS

Lode Deposits

Map Number, Latitude, and Longitude

Map number refers to a specific deposit in a given region. In this report, Alaska is divided into seven geographic regions for the tabular descriptions of metalliferous lode deposits, each identified by a two-letter prefix that is part of the deposit number. The regions and abbreviations are the Brooks Range (BR), the Seward Peninsula (SP), west-central Alaska (WC), east-central Alaska (EC), the Aleutian Islands and Alaska Peninsula (AP), southern Alaska (SO), and southeastern Alaska (SE). The prefix for all placer districts is PL. Lode deposits are numbered separately for each region. Locations for all deposits or districts are given in north latitude and west longitude in degrees and minutes to the nearest minute. For groups of deposits or districts, the latitude and longitude are stated for the center of the area.

Name, Commodities

Names of lode deposits are derived from published sources or common usage. In some cases, two deposits are grouped together and both names are given. In other cases, an alternate name is given in parentheses. Commodities are the known potentially valuable metals reported for each deposit. Commodities are listed in order of decreasing abundance and(or) value, and are shown by standard chemical symbols.

Type, Geologic Host Unit

Type of lode deposit is an interpretation that was made by examining the description of the deposit and then classifying the deposit using the mineral deposit types previously described. The type is queried where insufficient description precludes precise determination. For a few deposits, either the closest two mineral deposit types are listed, or else a short description is given in parentheses. Geologic host unit refers to the lithology and general age of the wallrocks enclosing a lode mineral deposit. The I.U.G.S. classification was used for plutonic rock names.

Tonnage and Grade; Production, If Known

Where known, estimates of tonnage and grade are listed. Tonnages are listed in tonnes (metric tons). Grades are stated either in percent (%), for abundant metals, or in grams per tonne (g/t) for scarce and precious metals. In many deposits, the only available information is on the grade(s) of grab samples. The metric system (SI) is used for all volume and weight measurements.

Description and Sources

The description summarizes the major features of the deposit. Where known, the major economic minerals, gangue minerals, and the deposit form are stated. Form of deposit denotes the physical aspect of a deposit, whether, for example, a vein, disseminated mineral grains, or masses of minerals. Form is descriptive, and is distinct from genetic terms such as "contact metasomatic" or "volcanogenic," which imply origin or history. Because lode deposits may be geologically complex, a deposit may contain more than one form, and certain forms may be gradational. If publicly known, the length, width, and depth of the deposit are stated. Additional information on the host rocks and their relation to the deposit are also stated. Information on extent of underground or surface workings and on the period of mining or development is given, if known. Sources of information, stated at the end of each description, are the references and oral or written communications used to compile the data for each deposit. Unpublished data gathered expressly for this report are indicated by the terms "written communication" or "oral communication" for the period of 1984 through 1986. Older unpublished, nonconfidential data were obtained from the files of the U.S. Geological Survey and the Alaska Division of Geological and Geophysical Surveys.

Placer Districts

Table headings for deposits in placer districts are described only for headings differing from those for lode deposits. Data are compiled for only those important districts with over 31,300 g (1,000 oz) gold production.

District refers to the name of a group of geologically and geographically related placer deposits, as derived from published sources or from general usage. In some cases, two or more districts are grouped together and both names are given. In other cases, an alternate name is given in parentheses. Economic and significant heavy metals are reported for each district, listed in order of decreasing abundance. Metals, shown by standard chemical symbols, represent metals or minerals recovered, but usually not in economic quantities. Type refers to the placer deposit type as determined by examining the description of the district and then classifying using one of the deposit types described above. Local bedrock describes the known or nearest outcrops of bedrock at or surrounding the placer district. Gold production, where known, is stated in grams (g). Production figures are from Cobb (1973) and Robinson and Bundtzen (1980). Gold concentration, where known, is stated in grams per cubic meter (g/m^3). Gold concentrations represent local values at specific mines or creeks, and are probably not typical of each district as a whole. Production values are queried (?) where uncertain.

Abbreviations

Standard chemical symbols: for example, Au, gold; Cu, copper; Fe, iron; U, uranium

PGE: Platinum-group elements—minerals and alloys

REE: Rare-earth elements

mm, cm, m, km: millimeter, centimeter, meter, kilometer

g, kg, t: gram, kilogram, metric ton

g/t, g/m^3: grams per metric ton, grams per cubic meter

tonne: metric ton

%: percent

sq: square

Conversion Factors

The following conversion factors were used to convert weight and volume from U.S. Customary to metric quantities:

1 cubic yard = 0.765 cubic meter

1 troy ounce per short ton = 34.29 grams per metric ton

1 part per million = 1 gram per metric ton

1 pound = 0.454 kilogram

1 troy ounce = 31.10 grams

1 short ton = 0.907 metric ton

1 flask (76.0 pounds mercury) = 34.7 kilograms

SIGNIFICANT METALLIFEROUS LODE DEPOSITS, BROOKS RANGE

By Donald Grybeck and Warren J. Nokleberg, with contributions from James C. Barker, William P. Brosgé, Dennis P. Cox, John T. Dillon, Jeffrey Y. Foley, Murray W. Hitzman, Christopher D. Maars, Janet S. Modene, David W. Moore, Rainer J. Newberry, Joseph T. Plahuta, Charles M. Rubin, Jeanine M. Schmidt, and Loren E. Young

MAP NUMBER. LATITUDE LONGITUDE	NAME. COMMODITIES	TYPE. GEOLOGIC HOST UNIT	TONNAGE AND GRADE. PRODUCTION, IF KNOWN

SEDIMENTARY EXHALATIVE Zn-Pb, KUROKO MASSIVE SULFIDE, AND BEDDED BARITE DEPOSITS, NORTHWESTERN BROOKS RANGE

BR1. 68 12 163 07	Lik. Zn, Pb, Ag	Sedimentary exhalative Zn-Pb. Mississippian and Pennsylvanian shale and chert	25 million tonnes grading 8.8% Zn, 3.0% Pb, 34 g/t Ag

DESCRIPTION: Disseminated and massive sphalerite, galena, pyrite, marcasite, and sparse barite in Mississippian and Pennsylvanian shale, chert, and quartz-exhalite of Kuna Formation. Main deposit in zone about 2,000 m long and up to 500 m downdip; additional sulfides along strike to north and south. Sulfide horizon varies from tabular to complexly folded. Long and sinuous zone of complex and brecciated textures, possibly a line of vents, occurs within center of deposit, parallel to strike. Host rocks and deposit extensively structurally imbricated with many subhorizontal thrust faults. SOURCES: Forrest, 1983; Forrest and others, 1984.

BR2. 68 04 162 50	Red Dog Creek. Zn, Pb, Ag, Ba	Sedimentary exhalative Zn-Pb. Mississippian and Pennsylvanian shale and chert	85 million tonnes grading 17.1% Zn, 5% Pb, 82 g/t Ag

DESCRIPTION: Disseminated and massive sphalerite, galena, pyrite, and barite in Mississippian and Pennsylvanian shale, chert, and silica exhalite of the Kuna Formation. Deposit is 1,600 m long and up to 150 m thick. Occurs near base of formation, locally subdivided into upper ore-bearing Ikalukrok unit and lower calcareous Kivalina unit (this study). Latter forms stratigraphic footwall for deposits. Barite-rich lenses up to 50 m thick locally cap deposit. Main occurrences are disseminated sulfides in organic-rich siliceous shale, coarse-grained sulfide veins, fine-grained fragmental-textured to indistinctly bedded sulfides, and silica exhalite lenses. Minor hydrothermal alteration: silicification and decarbonatization of shale. Small propylitically altered dioritic plug or hydrothermally altered pyroxene andesite flow occurs at north end of deposit. Host rocks and deposit extensively structurally imbricated with many subhorizontal thrust faults. Graywacke of the Cretaceous Okpikruak Formation structurally underlies deposit. SOURCES: Tailleur, 1970; Plahuta, 1978; Booth, 1983; Joseph T. Plahuta, L. E. Young, J. S. Modene, and David W. Moore, written commun., 1984; Lange and others, 1985; Moore and others, 1986.

BR3. 68 24 159 54	Nimiuktuk. Barite	Bedded barite.	About 1.5 million tonnes barite

DESCRIPTION: Massive, nearly pure barite in small isolated hill about 7 to 10 m high, 40 m wide, and 60 m long. Stratigraphic contacts not exposed; nearest units are dark shale and chert of the Mississippian and Pennsylvanian Kuna Formation and shale and graywacke of the Lower Cretaceous Okpikruak Formation. Altered Mississippian(?) andesite crops out about 180 m from barite. Volume determined by gravity survey and model. SOURCES: Mayfield and others, 1979; Barnes and others, 1982.

BR4. 68 34 158 41	Drenchwater. Zn, Pb, Ag	Sedimentary exhalative Zn-Pb and (or) Kuroko massive sulfide. Mississippian shale, chert, tuff	Grab samples with >1% Zn, >2% Pb, 150 g/t Ag

DESCRIPTION: Disseminated and massive sphalerite, galena, pyrite, and barite in Mississippian shale, chert, tuff, and quartz-exhalite of the Kagvik sequence. Locally abundant volcanic sandstone and keratophyre. Sulfides occur as disseminations in chert, disseminations and massive aggregates in quartz-exhalite, and as sparse, remobilized disseminations in sulfide-quartz veins crosscutting cleavage in shale and chert. Local extensive hydrothermal alteration of chert and shale with extensive replacement by kaolinite, montmorillonite, sericite, prehnite, fluorite, actinolite, chlorite, calcite, and quartz. Deposit up to 1,800 m long and up to 50 m thick. Host rocks and deposit extensively faulted and structurally imbricated with many thrust faults dipping moderately south. SOURCES: Tailleur and others, 1977; Nokleberg and Winkler, 1982; Lange and others, 1985.

PODIFORM CHROMITE DEPOSITS, NORTHWESTERN BROOKS RANGE

BR5. 67 54 163 40	Iyikrok Mountain Cr	Podiform chromite. Dunite and peridotite	Grab samples with up to 33% Cr, 0.2 g/t PGE. Estimated 130,000 to 350,000 tonnes chromite

DESCRIPTION: Disseminated fine- to medium-grained chromite in Jurassic or older dunite and peridotite tectonite, locally serpentinized. Platinum observed in one sample Zones of chromite up to 90 m wide and 305 m long in dunite. Host rocks part of the Misheguk igneous sequence. Mafic and ultramafic rocks floored by major thrust fault. SOURCES: Mayfield and others, 1983; Foley and others, 1985, in press.

BR6. 68 20 161 52	Avan, Cr, PGE	Podiform chromite. Dunite and harzburgite	Grab samples with up to 43% Cr, 0.48 g/t PGE. Estimated 290,000 to 600,000 tonnes chromite

DESCRIPTION: Disseminated fine- to medium-grained chromite in Jurassic or older dunite and harzburgite tectonite, locally serpentinized. Part of dismembered ophiolite. Zones of chromite up to a few meters wide and a few hundred meters long in dunite. Intense minor folding of dunite and harzburgite layers. Host rocks part of the Misheguk igneous sequence. Mafic and ultramafic rocks floored by major thrust fault. SOURCES: Roeder and Mull, 1978; Degenhart and others, 1978; Zimmerman and Soustek, 1979; Mayfield and others, 1983; Foley and others, 1985, in press.

BR7. 68 15 161 05	Misheguk Mountain. Cr, PGE	Podiform chromite. Dunite and peridotite	Grab samples with up to 27.5% Cr, <0.31 g/t PGE. Estimated 110,000 to 320,000 tonnes chromite

DESCRIPTION: Disseminated fine- to medium-grained chromite in Jurassic or older dunite and peridotite tectonite, locally serpentinized. Part of dismembered ophiolite. Zones of chromite up to 31 by 107 m. Intense minor folding of dunite and harzburgite layers. SOURCES: Roeder and Mull, 1978; Degenhart and others, 1978; Zimmerman and Soustek, 1979; Foley and others, 1985, in press.

BR8. 68 20 158 30	Siniktanneyak Mountain. Cr, Ni, PGE	Podiform chromite. Dunite and harzburgite	Grab samples with up to 21% Cr, 0.2% Ni, 0.07 g/t Pt, 0.1 g/t Pd.

DESCRIPTION: Disseminated fine-grained chromite in discontinuous layers, pods, and wispy layers in Jurassic or older dunite and peridotite tectonite, locally serpentinized. Intense minor folding of dunite and peridotite layers. Host rocks part of the Misheguk igneous sequence. Mafic and ultramafic rocks floored by major thrust fault. SOURCES: Jansons and Baggs, 1980; Nelson and Nelson, 1982; Mayfield and others, 1983.

UNCLASSIFIED VEIN AND KIPUSHI Cu-Pb-Zn DEPOSITS, NORTHWESTERN BROOKS RANGE

BR9. 68 22 157 56	Story Creek. Pb, Zn, Ag, Au	(Pb-Zn-Au-Ag vein). Mississippian sandstone, siltstone, and shale	Grab samples with up to 1.5 to 34% Pb, 1.5 to 50% Zn, 35 to 940 g/t Ag, and 1.2 g/t Au.

DESCRIPTION: Crustified sphalerite and galena in crosscuting quartz veins occurring in tightly folded and faulted sandstone, siltstone, and shale of the Mississippian Kayak Shale; part of Brooks Range allochthon. Maximum width of float zone about 30 to 40 m. Discontinuous float and outcrops along a linear trend about 3,000 m long across tightly folded strata, indicating replacement origin in Late Jurassic or younger time. SOURCES: Ellersieck and others, 1982; Mayfield and others, 1983; Jeanine M. Schmidt and Inyo F. Ellersieck, written commun., 1985.

BR10. 68 14 157 51	Whoopee Creek. Zn, Ag, Au	(Zn-Ag-Au vein). Mississippian sandstone, siltstone, and shale	Grab samples with up to 44% Zn, 458 g/t Ag, 4.4 g/t Au

DESCRIPTION: Fracture zones containing siltstone breccia with matrix of galena, sphalerite, quartz and minor carbonate hosted in tightly folded and faulted sandstone, siltstone, and shale of the Mississippian Kayak Shale. Fracture zone about 6 m long. Discontinuous float or outcrops along a linear trend with minimum length of 1,500 m across tightly folded strata, indicating replacement origin in Late Jurassic or younger time. SOURCES: Ellersieck and others, 1982; I. F. Ellersieck, written commun., 1985.

BR11. 67 30 161 50	Omar. Cu, Pb, Zn, Ag, Co	Kipushi Cu-Pb-Zn. Ordovician to Devonian dolomite and limestone	Grab samples with 15.3% Cu, 0.144% Pb, 0.95% Zn, 20 g/t Ag

DESCRIPTION: Disseminated to massive chalcopyrite, bornite, lesser chalcocite, minor tennantite-tetrahedrite, very minor galena, supergene copper carbonates, and iron-oxide minerals occurring in veinlets, irregular stringers, or as blebs in brecciated host dolomite. Gangue of dolomite, calcite, and quartz with anomalously high Zn and Co. Sulfide zone about 3 km long occurs along northnorthwest-southsoutheast-trending fractures and veins. Local solution breccia. Local remobilization of sulfides into fractures. Local faulted and brecciated gossan. Host rocks of Ordovician to Devonian dolomite and limestone of the Baird Group; part of Kelly River allochthon. Host rocks strike northnortheast to southsoutheast; dips vary from gentle to vertical. Local isoclinal minor folds. SOURCES: Degenhart and others, 1978; Jansons, 1982; Mayfield and others, 1983; Inyo F. Ellersieck, written commun., 1985; Folger and Schmidt, 1986.

BR12. 67 28 161 35	Frost Cu, Zn, Pb, barite	(Cu-Zn-Pb-Ba vein). Ordovician to Devonian dolomite and limestone	Up to 0.9 million tonnes barite; possible nine million tonnes. One vein with 13.2% Zn, 0.5% Cu, 21% barite

DESCRIPTION: Chalcopyrite and galena in wavy quartz-calcite-barite veins, and lenses and pods of barite at least 30 m long by 10 m thick. Veins, lenses, and pods crosscut Ordovician to Devonian dolomite and limestone for minimum distance of 1.6 km. Calcite-barite veins locally enclose barite lenses. Host rocks part of the Baird Group. SOURCES: Degenhart and others, 1978; I. F. Ellersieck and J. M. Schmidt, written commun., 1985.

KUROKO MASSIVE SULFIDE, KIPUSHI Cu-Pb-Zn, AND STRATABOUND SULFIDE DEPOSITS, SOUTHERN BROOKS RANGE

BR13. 67 18 157 12	Smucker (Ambler District). Cu, Zn, Pb, Ag, Au	Kuroko massive sulfide. Devonian and Mississippian metavolcanic and metasedimentary rocks	Grades of significant massive sulfides average 1 to 5% Pb, 5 to 10% Zn, 103 to 343 g/t Ag, minor Au

DESCRIPTION: Stratiform disseminated fine- to medium-grained pyrite, sphalerite, galena, chalcopyrite, and owyheeite in a quartz-calcite-pyrite matrix. Strike length of 1,000 m and widths of up to 60 m. Deposit occurs on limb of recumbent, asymmetric antiform. Host rocks: a mafic and felsic metavolcanic sequence composed of quartz-muscovite-feldspar schist, quartz-chlorite-calcite phyllite, and porphyroclastic quartz-feldspar-muscovite schist; and an interlayered metasedimentary sequence composed of quartz-muscovite-chlorite phyllite, calc-schist, and marble. Host rocks derived from bimodal calcic and calc-alkaline volcanic rocks and impure clastic and calcareous sedimentary rocks. Host rocks part of the Devonian and Mississippian Ambler sequence. Greenschist-facies metamorphism of deposit and host rocks. Host rocks strike west-northwest, dip moderately south, and contain abundant south-dipping, tight to isoclinal folds. SOURCES: Charles M. Rubin, written commun., 1984; Rubin, 1984.

BR14. 67 11 156 22	Arctic (Ambler District). Zn, Cu, Pb, Ag, Au	Kuroko massive sulfide. Devonian and Mississippian metavolcanic and metasedimentary rocks	32 million tonnes grading 4.0% Cu, 5.5% Zn, 1.0% Pb, 51.4 g/t Ag, 0.65 g/t Au

DESCRIPTION: Stratiform semimassive to massive chalcopyrite and sphalerite with lesser pyrite, minor pyrrhotite, galena, tetrahedrite, arsenopyrite, and traces of bornite, magnetite, and hematite. Deposit occurs in thick horizon with areal extent of about 900 by 1,050 m, and in two thinner horizons above main horizon. Sulfides occur in multiple lenses up to 15 m thick over vertical interval of 6 to 80 m. Main horizon hosted in mainly graphitic pelitic schist and metarhyolite porphyry derived from submarine ash-flow tuff. Host rocks part of the Devonian and Mississippian Ambler sequence. Gangue of mainly calcite, dolomite, barite, quartz, and mica. Local abundant chlorite, phlogopite-talc-barite, and pyrite-calcite-white mica alterations. SOURCES: Wiltse, 1975; Sichermann and others, 1976; Hitzman and others, 1982; Schmidt, 1983; Jeanine Schmidt, written commun., 1984; Schmidt, 1986.

BR15. 67 08 155 52	BT, Jerri Creek (Ambler District). Cu, Zn, Pb, Ag	Kuroko massive sulfide. Devonian and Mississippian metavolcanic and metasedimentary rocks	No data

DESCRIPTION: BT deposit: disseminated to massive pyrite, chalcopyrite, sphalerite, galena, and gossan in layers 5 to 12 cm thick. Sparse tennantite and possible enargite. Gangue quartz, muscovite, and barium feldspar in massive sulfide zones. No vertical zonation. Hosted in Devonian and Mississipian pelitic schist, calc-schist, and metarhyolite ("button") schist, part of the Ambler sequence. Strike length of 2,000 m; average width of 1.5 m. *Layering strikes east-west and dips* 50° to 70° south. Similar occurrences in zone up to 10 km long to west, along same stratigraphic horizon. Jerri Creek deposit: Mainly disseminated and sparse massive pyrite, sphalerite, and minor chalcopyrite in layers up to 2 cm thick. Hosted in muscovite-quartz schist, actinolite-garnet-quartz schist, and marble adjacent to metarhyolite, all part of the Devonian and Mississippian Ambler sequence. Strike length of 20 km. SOURCES: Hitzman, 1978, 1981.

BR16. 67 04 156 59	Ruby Creek (Bornite - Ambler District). Cu, Co, Zn, Ag	Kipushi Cu-Pb-Zn. Devonian dolomite and phyllite	91 million tonnes grading 1.2% Cu; 4.2 million tonnes grading up to 4% Cu

DESCRIPTION: Stratabound disseminated to massive chalcopyrite, bornite, chalcocite, pyrite, and local sphalerite occurring in brecciated dolomite and metamorphosed calcareous sedimentary rocks, part of the Devonian Bornite Marble (Hitzman and others, 1982). Local sparse carrolite, chalcopyrite, reinerite, galena, pyrrhotite, and marcasite. Large masses of dolomite breccia in matrix of dolomite, calcite, or fine-grained pyrite. Pyrite breccia matrix locally replaced by Cu-, Zn-, and Co-sulfides. Individual zoned sulfide bodies with interior bornite, chalcocite, and carrollite, middle bornite, and chalcopyrite, and exterior chalcopyrite, pyrite, and peripheral pyrite. Broadly folded. Greenschist-facies metamorphism. Extensively mineralized hydrothermal dolostone bodies with biohermal and backreef facies. Local extensive clasts of hydrothermal dolostone in breccias, possibly synsedimentary, indicating possible coeval mineralization and sedimentation. Three major hydrothermal dolomite formation events. Subsequent intense polymetamorphism and deformation. SOURCES: Runnels, 1969; Sichermann and others, 1976; Hitzman and others, 1982; Hitzman, 1983; M. W. Hitzman, written commun., 1984; Bernstein and Cox, 1986; Hitzman, 1986.

BR17. 67 04 155 01	Sun (Picnic Creek - Ambler District). Cu, Zn, Pb, Ag, Au	Kuroko massive sulfide. Devonian and Mississippian metavolcanic and metasedimentary rocks	Average grades of 1 to 4% Pb, 6 to 12% Zn, 0.5 to 7% Cu, 103 to 343 g/t Ag. Single quartz-barite beds with 685 to 1,029 g/t Ag

DESCRIPTION: Stratiform, disseminated to massive sphalerite, chalcopyrite, galena, and argentiferous tetrahedrite in gangue pyrite, arsenopyrite, and barite. Deposit occurs in at least three zoned horizons. Upper horizon is Zn-Pb-Ag rich; middle is mainly Cu-rich; lower is Cu-Zn rich. Hosted in metarhyolite, muscovite-quartz-feldspar schist, micaceous calc-schist, marble, and greenstone, all part of the Devonian and Mississippian Ambler sequence. Host rocks generally strike northeast-southwest and dip moderately southeast. Locally well-developed layering in metarhyolite may represent original bedding in tuff protolith. Bulk of sulfides in felsic schist; thin concordant beds of sulfides in metarhyolite. Small- and large-scale isoclinal folds in host rocks and sulfide layers. SOURCES: Zdepski, 1980; Christopher D. Maars, written commun., 1984.

BR18. 67 25 152 50	Ann. (Ernie Lake). Pb, Zn, Ag	Polymetallic vein or metamorphosed sulfide. Late Proterozoic(?) metasedimentary rocks	No data

DESCRIPTION: Vein and stratabound massive galena with lesser sphalerite, bornite, chalcopyrite, and alteration malachite and azurite in marble, calc-schist, and pelitic schist. Hosted in Late Proterozoic(?) banded schist and paragneiss. Deposit occurs adjacent to the granite pluton of Ernie Lake, along with nearby smaller occurrences around periphery of pluton. Deposit may be polymetallic vein, or remobilized stratabound deposit. SOURCES: Grybeck, 1977; John T. Dillon, oral commun., 1986.

BR19. 67 10 152 30	Roosevelt Creek. Cu, Zn, Pb, Ag, Au	Kuroko massive sulfide. Devonian metavolcanic rocks and pelitic schist	No data

DESCRIPTION: Disseminated(?) and massive sulfides, probably mainly chalcopyrite, sphalerite, and galena, in metavolcanic rocks and pelitic schist and marble of the Devonian and Mississippian Ambler sequence. SOURCES: Grybeck, 1977; William P. Brosge and John T. Dillon, oral commun., 1986.

BR20. 67 19 151 14	Michigan Creek. As, Au, Ag, Cu, Zn, Pb	Kuroko massive sulfide. Devonian felsic schist, marble, and phyllite	Grab samples with up to 8.2% As, 8.3 g/t Au, 3.9 g/t Ag, 0.14% Cu, 0.03% Zn, 0.014% Pb

DESCRIPTION: Disseminated to massive chalcopyrite and argentiferous galena up to 0.1 m thick in felsic schist and crosscutting pyrite veins. Hosted in felsic schist, marble, and phyllite of the Devonian and Mississippian Ambler sequence. SOURCES: Dillon and others, 1981; William P. Brosge and John T. Dillon, oral commun., 1986.

POLYMETALLIC VEIN, Au QUARTZ VEIN, Sb-Au VEIN, Cu-Pb-Zn AND Sn SKARN, PORPHYRY Cu AND Mo DEPOSITS, CENTRAL BROOKS RANGE

BR21. 67 15 to 37 154 00 to 15	Mount Igikpak and Arrigetch Peaks. Cu, Pb, Zn, Ag, Au, Sn, W, As	Polymetallic vein, Au quartz vein, Sn skarn, Cu-Pb-Zn skarn. Silur- and Devonian or older pelitic schist, calc- schist and marble	Grab samples with up to 55 g/t Au, 150 g/t Ag, 0.6% Pb, 0.8 % Zn, >0.18% Sn, 0.03% W, 0.03% Cu, 0.5% As

DESCRIPTION: Numerous polymetallic vein, Au quartz vein, and skarn deposits in Silurian and Devonian or older metasedimentary rocks adjacent to schistose Devonian granitic plutons. Most common deposits are: (1) quartz veins with varying amounts of galena, sphalerite, and chalcopyrite; (2) Sn skarns with disseminated cassiterite, magnetite, chalcopyrite, arsenopyrite, and gangue of garnet, diopside, hornblende, clinozoisite, and idocrase; (3) Cu-Pb-Zn skarns with vein or sparse disseminated pyrrhotite, pyrite, chalcopyrite, galena, sphalerite, arsenopyrite, and fluorite with similar gangue as Sn skarns; and (4) areas of Fe-stained wall rocks with molybdenite and fluorite. Wallrocks mainly Silurian and Devonian Skajit Limestone or older metasedimentary rocks. SOURCES: Grybeck and Nelson, 1981; Newberry and others, 1986.

BR22. 67 36 149 50	Sukakpak Mountain. Au, Sb, Hg, Mo	Sb-Au vein. Devonian marble, dolomite, and quartz schist	Grab samples with up to 560 g/t Au, 4.5 g/t Ag, 54% Sb, 1.7% Mo, 0.50% Hg

DESCRIPTION: Sparse disseminated stibnite, cinnabar, gold, and molybdenite(?) in three stibnite quartz veins occurring along high-angle fault in Devonian marble, dolomite, graphitic and calcareous quartz schist. Stibnite forms 30 to 60 percent of vein. Quartz gangue contains about 10 percent calcite. Length of veins about 1 km. Maximum width of zone of veins about 100 m. Local slickenslides and boudins in veins suggest possible emplacement during movement on fault. SOURCE: Dillon, 1982.

BR23. 67 38 149 20	Victor, Venus, Evelyn Lee, and Ebo. Cu, Ag, Mo	Porphyry Cu and Cu skarn. Devonian schistose granodiorite. Silurian and Devonian or older marble, calc-schist, and pelitic schist	Zones in granitic rocks up to 30 m wide with up to 0.4% Cu. Grab samples of skarn with up to 5.5% Cu, 0.41 g/t Au, 0.29 g/t Ag

DESCRIPTION: Veinlet and disseminated chalcopyrite, bornite, molybdenite, and pyrite in schistose Devonian granodiorite porphyry intruding Silurian and Devonian or older marble, calc-schist, and pelitic schist. Skarn in marble adjacent to plutons with vugs and interstitial bornite, chalcopyrite, bornite, chalcocite, pyrite, magnetite, and some digenite in skarn of mainly garnet, magnetite, diopside, and retrograde vein and replacement epidote, amphibole, chlorite, calcite, and quartz. Skarns regionally metamorphosed. Wall rocks mainly the Silurian and Devonian Skajit Limestone or older calcareous metasedimentary rocks. SOURCES: DeYoung, 1978; Donald Grybeck, written commun., 1984; Newberry and others, in press.

BR24. 67 45 149 05	Jim-Montana. Cu, Zn, Ag, Pb	Cu-Zn skarn. Silurian and Devonian marble and calc-schist	No data

DESCRIPTION: Disseminated chalcopyrite, sphalerite, and minor galena, tennantite, and malachite stain in skarn in the Silurian and Devonian Skajit Limestone, mainly marble. SOURCES: Grybeck, 1977; DeYoung, 1978.

BR25. 67 41 148 49	Geroe Creek. Cu, Mo	Porphyry Cu-Mo. Devonian granodiorite plutons	Zones in plutons up to several m thick with up to 0.6% Cu, 0.02% Mo, and 0.1 g/t Au.

DESCRIPTION: Veinlet, stockwork, and disseminated molybdenite, chalcopyrite, and pyrite with gangue of quartz, sericite, and chlorite in the Devonian Horace Mountain and Baby Creek plutons composed of metaluminous biotite-hornblende granite with local porphyritic phases. Wallrocks mainly the Silurian and Devonian Skajit Limestone and older calcareous metasedimentary rocks. SOURCES: DeYoung, 1978; Newberry and others, in press.

BR26. 67 32 148 15	Chandalar district (Mikado, Little Squaw. Au	Au quartz vein. Devonian or older pelitic schist, phyllite, quartzite, and schistose Devonian granitic plutons	12,000 tonnes grading 75 g/t Au at Mikado and Little mine. Estimated 45,000 tonnes grading 80 g/t Au for distict

DESCRIPTION: Sparse gold and disseminated arsenopyrite, galena, sphalerite, stibnite, and pyrite in several quartz veins up to 3 m thick in a zone about 4.0 km long and 1.6 km wide. Veins occur along steeply dipping normal faults in quartz-muscovite schist, phyllite, and quartzite. Veins interpreted to have been emplaced during fault movement. Late Proterozoic age, intruded by Devonian(?) schistose plutonic rocks. More than 1,000 m of underground workings at Little Squaw and Mikado mines. SOURCES: Chipp, 1970; DeYoung, 1978; Dillon, 1982; Ashworth, 1983; John T. Dillon, oral commun., 1986.

Pb-Zn AND Sn-SKARN, POLYMETALLIC VEIN, AND PORPHYRY Cu-Mo DEPOSITS, NORTHEASTERN BROOKS RANGE

BR27. 69 18 145 15	Esotuk Glacier. Pb, Zn, Sn, Cu, W	Pb-Zn skarn and fluorite vein. Devonian or older marble and calc-schist	Grab samples with up to 0.03% Sn, 0.15% W

DESCRIPTION: Disseminated galena, sphalerite, malachite, cassiterite, and axinite in skarn in Devonian or older marble and calc-schist intruded by Devonian gneissose granite. Sparse quartz-tourmaline veins. SOURCES: Grybeck, 1977; W. P. Brosgé, oral commun., 1984; Rainer Newberry, written commun., 1985.

BR28. 68 48 146 27	Porcupine Lake. Cu, Zn, Ag, F	Polymetallic vein(?). Mississippian and Pennsylvanian tuffaceous limestone	Grab samples with up to 4.8% Cu, 0.6% Zn, 0.2% Ag

DESCRIPTION: Tetrahedrite, enargite, and fluorite in a silica gangue in veins and replacements. Hosted in tuffaceous silicified limestone and minor chert breccia of the Mississippian and Pennsylvanian Lisburne Group, about 80 m below contact with the overlying Sadlerochit Group. Distribution of veins and replacements in breccias highly variable. Area of most intense veins and replacement occurs intermittently along strike for nearly 1.6 km, and up to about 2.4 m thick. Veins crosscut bedding at low angles. About 3 to 5 km to north, stratabound, disseminated fluorite occurs in veins and replacements along strike for several kilometers. Veins up to 0.9 m thick. Fluorite content ranges from 1% to >90%. Fluorite veins and replacements occur within a few meters of top of the Lisburne Group, near contact with the overlying Sadlerochit Group. SOURCES: Barker, 1978, 1981.

BR29. 69 18 143 50	Romanzof Mountains. Cu, Zn, Pb, Mo, Sn, Ag, U, F	Polymetallic vein, Pb-Zn and possible Sn skarn. Devonian(?) granite and older marble	Grab samples with up to 0.15% Sn

DESCRIPTION: Numerous disseminated polymetallic sulfides in Devonian(?) granite, Pb-Zn skarns, and quartz veins. Local fluorite greisen. Skarn and quartz veins hosted in Precambrian marble and calc-schist of the Neruokpuk Quartzite intruded by the Silurian or Early Devonian Okpilak (granite) batholith. Most common occurrences are: (1) disseminated galena, sphalerite, chalcopyrite and pyrite zones, locally with Au and Ag, in granite; (2) skarn in marble with disseminated magnetite, pyrite, pyrrhotite, sphalerite, and galena in gangue of carbonate, clinopyroxene, epidote, amphibole, beryl, tourmaline, and fluorite; (3) disseminated galena, sphalerite, chalcopyrite, and (or) molybdenite in quartz veins along sheared contact in granite; and (4) fluorite greisen in granite. SOURCES: Brosge and Reiser, 1968; Grybeck, 1977; Sable, 1977; W. P. Brosgé, oral commun., 1984; Newberry and others, in press.

BR30. 68 23 142 11	Bear Mountain. Mo, W	Porphyry Mo. Tertiary rhyolite porphyry	Grab samples with up to 0.8% Mo and 0.6% W

DESCRIPTION: Molybdenite-wolframite-bearing Tertiary rhyolite porphyry stock with pipe-shaped core of intrusive breccia intrudes Mississippian and older metasedimentary rocks. Stock located near perimeter of the early Tertiary granite pluton of Bear Mountain. Local rhyolite porphyry dikes and quartz porphyry. Local gossan with molybdenite and galena. Zonal alteration pattern with core of sericitic and argillic alteration and outer zone of silicification. Local halo of pyrite and propylitic alteration along margin of porphyry. Exposed area approximately 1 km in diameter. Igneous rocks near Bear Mountain intrude Devonian and Mississippian sedimentary rocks, and Devonian or older metasedimentary rocks of the Neruokpuk(?) Quartzite. SOURCE: Barker and Swainbank, 1985, 1986.

BR31. 68 23 142 02	Galena Creek. Cu, Zn, Pb, Ag	Polymetallic vein. Devonian or older quartzite and marble	Grab samples with up to 21% Cu, 3.5% Zn, 1.3% Pb, 170 g/t Ag

DESCRIPTION: Disseminated galena, sphalerite, malachite, and barite in quartz veinlets and replacements. Hosted in phyllite, siltstone, and greenstone of Neruokpuk(?) Quartzite of Devonian or older age. Area of veinlets and replacements on ridge west of creek about 760 by 1,060 m. Vein system on east side of creek up to about 2 m wide and 454 m long. Local alteration of phyllite to chlorite, epidote, and calcite. Local malachite staining in greenstone. Local abundant early Tertiary rhyolite dikes. Local hematite and rare kaolinite alteration of granite pluton and rhyolite breccia to east. SOURCES: Brosgé and Reiser, 1968; R. C. Swainbank, in Barker, 1981.

SIGNIFICANT METALLIFEROUS LODE DEPOSITS, SEWARD PENINSULA

By Bruce M. Gamble, Warren J. Nokleberg, and Donald Grybeck, with contributions from Roger P. Ashley, Joseph A. Briskey, Christopher C. Puchner, and Alison B. Till

MAP NUMBER, LATITUDE LONGITUDE	NAME, COMMODITIES	TYPE, GEOLOGIC HOST UNIT	TONNAGE AND GRADE, PRODUCTION, IF KNOWN

Sn VEIN, SKARN, AND GREISEN DEPOSITS

SP1. 65 35 168 00	Cape Mountain. Sn, W	Sn vein. Margin and dikes of granitic pluton intruding Mississippian limestone and shale	Produced several hundred tonnes Sn

DESCRIPTION: Cassiterite, tourmaline, pyrite, pyrrhotite, fluorite, scapolite, sphalerite, and scheelite along margin of Cretaceous granite. Deposits occur in periphery of pluton, dikes, contact-metamorphosed and contact-metasomatized wall rocks, and quartz veins in pluton. Cassiterite also occurs as replacement of limestone near intrusive contact. Granite intrudes Mississippian limestone, dolomitic limestone, and shale. Age of granite 78.8 m.y. Several small prospects and one small mine. Main production from 1903 to 1909. About 9 tonnes cassiterite concentrate shipped in 1906. About 1 to 2 tonnes ore produced in 1983. Probable source for Goodwin Gulch and Tin City cassiterite placer deposits. SOURCES: Knopf, 1908; Steidtman and Cathcart, 1922; Mulligan, 1966; Hudson and Arth, 1983; J. Dean Warner, written commun., 1987.

SP2. 63 38 167 35	Potato Mountain. Sn	Sn vein. Precambrian or early Paleozoic phyllite	Up to a few percent Sn

DESCRIPTION: Irregular stockwork of veins and veinlets of quartz, clay, cassiterite, pyrite, and arsenopyrite associated with altered tin- and tourmaline-bearing Precambrian or lower Paleozoic carbonaceous phyllite, metasiltstone, and slate, all part of slate of the York region. Gravity data indicate an intrusive body lying within 0.5 km of surface. One granitic dike exposed. Placer cassiterite mined from streams draining area. SOURCES: Steidtman and Cathcart, 1922; Sainsbury, 1969; Hudson and others, 1977; Bruce M. Gamble, written commun., 1986.

SP5. 65 28 167 10	Lost River. Sn, W, F, Be, Zn Cu, Pb, Ag	Sn-W skarn, Sn greisen. Ordovician limestone intruded by Late Cretaceous granite	Estimated 25 million tonnes grading 0.15% Sn, 0.03% WO_3, 16.3% CaF2. Produced 320 tonnes Sn

DESCRIPTION: Several deposits and one mine in vein skarn, greisen, and intrusion breccia formed near and along margin of shallow Late Cretaceous granite stock intruding thick sequence of Lower Ordovician limestone and argillaceous limestone. Early-stage andradite-idocrase skarn and later fluorite-magnetite-idocrase vein skarns altered to chlorite-carbonate assemblages that are contemporaneous with greisen formation and cassiterite deposition. Locally abundant beryllium deposits hosted in fluorite-white mica veins that contain diaspore, chrysoberyl, and tourmaline; probably associated with early stages of granite intrusion. Major ore minerals in skarns and greisen are cassiterite and wolframite along with lesser stannite, galena, sphalerite, pyrite, chalcopyrite, arsenopyrite, and molybdenite and a wide variety of other contact metamorphic and alteration minerals. Age of granite 80.2 m.y. Production mostly from 1952 to 1955 from underground workings a few hundred meters deep. Most of ore from the Cassiterite dike, a near-vertical granite dike extensively altered to greisen. Similar smaller deposits nearby include tin-greisen and veins near the Tin Creek Granite and various polymetallic veins and skarns near the Brooks Mountain Granite. SOURCES: Steidtman and Cathcart, 1922;

Sainsbury, 1963, 1964, 1965, 1969; WGM, Incorporated, Anchorage, written commun., 1973; Dobson, 1982; Hudson and Arth, 1983.

SP4. 65 56 166 12	Ear Mountain area. (Winfield) Sn, Cu, Ag, Pb, Zn	Sn skarn. Argillaceous limestone intruded by Late Cretaceous granite	Produced several hundred tonnes Sn

DESCRIPTION: Cassiterite, stannite, and chalcopyrite in skarn and sparse cassiterite-quartz veins along margin of Late Cretaceous multistage biotite granite stock intruded into argillaceous limestone. Highly variable contact metamorphic silicate and sulfide mineral assemblages. Tourmaline-quartz greisen veins in upper part of granite. Local occurrence of U in oxidized tourmalinized mafic dike and adjacent biotite granite. Deposit associated with with late-magmatic stage of Late Cretaceous granite. Age of granite about 76.7 m.y. SOURCES: Killeen and Ordway, 1955; Mulligan, 1959; Sainsbury, 1972; Hudson and others, 1977; Bond, 1983; Hudson and Arth, 1983.

SP5. 65 41 165 14	Kougarok. Sn, Ta, Nb	Sn greisen with Ta and Nb. Cretaceous dikes, sills, plugs	Grades range from 0.1 to 15% Sn; average about 0.5% Sn; 0.01% Ta and Nb each

DESCRIPTION: Disseminated cassiterite in quartz-tourmaline-topaz greisen, and subjacent or adjacent disseminated tantalite-columbite in quartz-white mica greisen. Sn deposits occur in steep cylindrical pipes of greisenized granite, greisensized dikes, in greisen along roof zone of subhorizontal granite sills, and as stockwork veinlets in schist. Hosted in Late Cretaceous granite dikes, sills, and plugs intruding poly-deformed graphitic and calcareous quartz schist. Wallrocks part of the undifferentiated Nome Group (Sainsbury, 1972), probably equivalent to the pelitic schist unit of Till (1984). Nearby Cretaceous Sn-bearing granitic plutons. SOURCES: Hudson and Arth, 1983; Christopher C. Puchner, written commun., 1984; Puchner, 1985, 1986.

POLYMETALLIC VEIN AND PORPHYRY Mo DEPOSITS

SP6. 65 48 164 32	Serpentine Hot Springs. Pb, Zn, As, Ag, Au, Sn	Polymetallic vein. Veins and stringers in Paleozoic(?) quartz-mica schist near Cretaceous granitic pluton	No data

DESCRIPTION: Veins, stringers, and disseminations of limonite, generally pyrite and possibly minor chalcopyrite, and argentiferous galena in quartz in Paleozoic(?) schist composed of varying proportions of quartz, muscovite, chlorite, chloritoid, graphite, pyrite, pyrrhotite, and albite at Midnight, Humboldt, and Ferndale Creeks. Schist part of the mixed unit of Till (1984). Local sparse granitic to rhyolitic dikes containing disseminated pyrite and fluorite. Deposit within 5 km of southeast margin of the Sn-bearing Cretaceous Oonatut Granite Complex. Deposit exposed in trenches cut along northwest- or east-trending faults. SOURCES: Hudson and others, 1977; Joseph A. Briskey, written commun., 1985.

SP7. 65 02 162 41	Omilak area. Pb, Zn, Ag, Sb, Au, Cu, Sn, As	Polymetallic vein. Paleozoic(?) marble, feldspathic schist	About 300 tonnes Au-Pb ore averaging about 73% Pb and 5,000 g/t Ag produced from Omilak mine

DESCRIPTION: The Omilak area contains the Omilak mine and two prospects at Foster and Omilak East. Deposits in the area consist of lenses of argentiferous galena at the Omilak mine, and veins and gossans containing argentiferous galena, cerrusite, anglesite, pyrite, arsenopyrite, and traces of chalcopyrite, together with highly variable amounts of calcite, dolomite, tremolite, wollastonite, and other calc-silicate minerals. Veinlets and flat lenses of stibnite also occur at the Omilak mine. Veins and gossan occur along axes and limbs of northwest-plunging folds in marble, and in graphitic, pyrite-feldspar schist, and micaceous schist. Bleaching and silicification associated with veins and gossan. Small occurrences are found in an area extending about 12.6 km north from Omilak to the Windy Creek pluton. Workings at Omilak mine consist of 55-m-deep shaft, 150-m-long adit, and two working levels. Limited underground exploration prior to 1930. Production between 1881 and 1890. SOURCES: Smith and Eakin, 1911; Herreid, 1965b; Mulligan, 1962; Hudson and others, 1977; Joseph A. Briskey, written commun., 1985; Bruce M. Gamble and Alison B. Till, written commun., 1986.

SP8. 65 10 162 37	Windy Creek. Mo, Pb, Zn	Porphyry Mo. Dikes and quartz vein in and near granitic pluton intruding pelitic schist, sparse marble	Grab samples with up to 0.15% Mo, 0.05% Sn, 0.05% W, 0.15% Pb

DESCRIPTION: Veins and stringers of quartz, pyrrhotite, pyrite, fluorite, molybdenite, galena, and spalerite in hornblende granite of the Cretaceous(?) Windy Creek pluton. Molybdenite reported in skarn along pluton margin. Sporadic stringers and veinlets of quartz containing pyrrhotite, pyrite, and fluorite occur near dikes of altered biotite granodiorite intruding granite. Wallrocks part of the lower Paleozoic mafic schist, and schist and marble of the mixed unit of Till (1984). SOURCES: Miller and others, 1971; Hudson and others, 1977; Joseph A. Briskey, written commun., 1984.

SP9. 65 41 162 28	Independence. Pb, Ag, Zn	Polymetallic vein. Paleozoic micaceous marble	Up to 30% Pb, 5,145 g/t Ag, 3.4 g/t Au. Dump specimens average 20% Pb and 686 g/t Ag. Produced a few hundred tonnes ore

DESCRIPTION: Mainly oxidized pyrite, galena, sphalerite, and minor tetradedrite in a vein composed primarily of limonite and sheared calcite. Vein localized in a fault zone trending nearly north-south. Host rocks are sheared and schistose, micaceous and banded, Paleozoic marble and Cretaceous granitic pluton crop out about 4 km to the northwest. Deposit exposed in open cuts with a width of 2 to 4 m and length of 600 m. Production in 1921 and 1922. A few hundred meters of underground workings. SOURCES: Hudson and others, 1977; Joseph A. Briskey, written commun., 1985.

Au QUARTZ VEIN DEPOSITS

SP10. 64 40 165 28	Nome district. Au	Au quartz vein. Paleozoic metasedimentary rocks and mafic schist	Grab samples with up to 120 g/t Au, 10 g/t Ag, >0.2% As, >0.1% Sb

DESCRIPTION: Quartz veins along high-angle faults with disseminated gold, arsenopyrite, and sparse pyrite in gangue of quartz, minor carbonate, and plagioclase. Minor chalcopyrite, sphalerite, galena, stibnite, tetrahedrite, and scheelite. Veins range from 2 cm to 1 m wide, most less than 10 cm wide. Local veins contain up to 50 percent stibnite and minor pyrite. District includes MacDuffie, Sliscovitch, California Gulch, and Stipec, and Kotovic deposits. Faults in two regional sets trending northeast and northwest. Veins and faults occur in the mixed unit of Till (1984) and Gamble and others (1985) (metasedimentary rocks) and mafic schist of the Nome Group. Late Jurassic or Early Cretaceous age estimated for regional metamorphism and vein formation in waning stages of metamorphism. SOURCES: Smith, 1910; Cathcart, 1922; Gamble and others, 1985.

SP11. 64 39 164 14	Big Hurrah. Au	Au quartz vein. Paleozoic metasedimentary rocks	Ore averaging 34.3 g/t Au. Recent assays of 25 to 65 g/t Au. Produced about 155,500 g gold

DESCRIPTION: Four major quartz veins, and zones of ribbon quartz 1 to 5 m thick and a few hundred meters long with gold, pyrite, and arsenopyrite, minor scheelite, chalcopyrite, and sphalerite in gangue of quartz, carbonate, and feldspar. Older, concordant, non-Au-bearing metamorphic quartz veins. Au-bearing veins range from discordant tension veins to discontinuous quartz lodes that occur in shear zones crossing foliation. Au-bearing veins range from 0.5 to 5 m wide, with minimum depth of 90 m. Most veins are less than 1 m wide. Veins and zones occur in quartz-rich graphitic quartz-mica schist or quartzite of the Nome Group (mixed unit of Till, 1984). Up to 15 percent arsenopyrite occurs in one vein. Late Jurassic or Early Cretaceous age estimated for regional metamorphism. Veins intepreted to have formed during shearing and uplift associated with metamorphic dehydration. Production from from 1903 to 1909, and 1953-1954. Shaft workings to 75 m deep; about 550 m of underground workings. SOURCES: Collier and others, 1908; Cathcart, 1922; Asher, 1969; Mullen, 1984; Gamble and others, 1985; Read, 1985; Read and Meinert, 1986.

SP12. 64 34 163 44	Daniels Creek (Bluff). Au	Au quartz vein. Paleozoic metasedimentary rocks	Grab samples with 4 to 40 g/t Au, 10 g/t Ag, 4.8% As, >0.1% Sb

DESCRIPTION: Discontinuous arsenopyrite-pyrite quartz pods and veins in zone up to 1.6 km long in series of faults in Paleozoic marble and interfoliated quartz-mica-feldspar schists of the Nome Group (mixed unit of Till, 1984). Veins up to 75 cm wide. Interstitial native gold in arsenopyrite-rich fractions. Two quartz veins contain up to 60 percent arsenopyrite. Late Jurassic or Early Cretaceous age estimated for regional metamorphism and vein formation in waning stages of metamorphism. Minor underground workings; negligible production. Probable source of gold for nearby Daniels Creek placer deposit and marine placers. SOURCES: Herreid, 1965a; Mulligan, 1971; Hudson and others, 1977; Gamble and others, 1985.

U AND METAMORPHOSED SULFIDE DEPOSITS

SP13. 64 42 162 46	Eagle Creek. U, Th, REE	Felsic plutonic U. Cretaceous granitic rocks	Grab samples of float with up to 0.15% U_3O_8, 1.05% Th, and 2% REE

DESCRIPTION: U-, Th-, and REE-minerals disseminated along margins of alkaline (pulaskite) dikes intruded into Cretaceous Kachauik granitic pluton, marble, and schist. Idocrase principal U-, Th-, and REE-bearing mineral. Local numerous occurrences of U- and Th-minerals in stream-sediment samples underlain by the nearby Darby pluton (granite). SOURCES: West, 1953; Miller and others, 1976; Miller and Bunker, 1976.

SP14. 65 03 162 15	Death Valley. U	Sandstone U. Cenozoic flysch	Average grade of 0.27% U_3O_8. Estimated 450,000 kg uranium oxide

DESCRIPTION: Mainly meta-autunite in Paleocene continental sandstone. Sandstone occurs in marginal facies of a Tertiary sedimentary basin where nearshore coarse arkosic clasts are interbedded with coal and lacustrine deposits. Interpreted as probably forming when uranium-bearing oxidized groundwater moved down gradient from Cretaceous granitic plutons to west. U precipitated in reducing environment of coal layers. Age of deposit estimated at middle or late Tertiary. SOURCE: Dickinson and Cunningham, 1984.

SP15. 65 56 163 21	Hannum Creek Pb, Zn, Ag	Metamorphosed sulfide. Paleozoic marble and quartzite	Up to 10% Pb, 2.2% Zn, 1.4 g/t Au, 60.4 g/t Ag

DESCRIPTION: Blebs, stringers, massive boulders, and disseminations of galena, pyrite, sphalerite, and barite with gangue of quartz, calcite, and limonite in Paleozoic micaceous quartzite, marble, and quartz-mica-graphitic schist, all within or near exposures of crudely banded micaceous quartzite enclosed in an isolated lens of marble. Marble contained with early Paleozoic quartz-mica-graphite schist, part of mixed unit of Till (1984). Deposit is highly oxidized; exposure is poor. Zones of blebs, stringers, and disseminations appear conformable with bedding and banding in quartzite. Zones up to 90 m wide and extend for about 2 km along northwest-southeast trend. On strike about 2 km farther southeast are oxidized stringer zones or lenses of pervasive limonite, quartz, and chlorite that are cut by veins and stockworks of quartz and chlorite. Stringer zones and lenses composed of interlayered marble and calcareous quartz-muscovite schist. Quartzite is interpreted as metamorphosed laminated exhalite, possibly a sedimentary exhalative Zn-Pb deposit. Local lenses of marble interpreted as former limestone mounds that formed near exhalative vents. SOURCES: Herreid, 1965b; Joseph A. Briskey, written commun., 1985.

SIGNIFICANT METALLIFEROUS LODE DEPOSITS, WEST-CENTRAL ALASKA

By Thomas K. Bundtzen and Warren J. Nokleberg, with contributions from Jeffery Y. Foley, Brian K. Jones, William Morgan, Harold Noyes, William W. Patton, Jr., Mark S. Robinson, and Thomas E. Smith

MAP NUMBER. LATITUDE LONGITUDE	NAME. COMMODITIES	TYPE. GEOLOGIC HOST UNIT	TONNAGE AND GRADE. PRODUCTION, IF KNOWN

Sb-Hg VEIN, ZONED MAFIC-ULTRAMAFIC, AND HOTSPRING Hg DEPOSITS, SOUTHWESTERN KUSKOKWIM MOUNTAINS REGION

WC1. 59 52 159 54	Kagati Lake. Sb, Hg	(Sb-Hg vein). Cretaceous monzonite and granodiorite stock	No data; minor production

DESCRIPTION: Stibnite, cinnabar, and quartz veinlets along joint surfaces in Late Cretaceous monzonite and granodiorite stock. Zone of veinlets from 10 to 600 cm thick, traceable for 15 m, zone strikes northwest-southeast. Stock intrudes Lower Cretaceous volcaniclastic rocks of the Gemuk Group. Local trenches and limited underground workings. Sporadic development from 1927 through 1981. Unusual occurrence of Hg-Sb stockwork deposit. SOURCE: Sainsbury and MacKevett, 1965.

WC2. 59 44 157 45	Kemuk Mountain. Fe, Ti, PGE	Zoned mafic-ultramafic. Cretaceous pyroxenite	Estimated 2,200 million tonnes grading 15 to 17% Fe, 2 to 3% TiO_2, 0.016% P_2O_5

DESCRIPTION: Buried titaniferous magnetite deposit hosted crudely zoned pyroxenite. High-angle, high-temperature contact zone with adjacent Permian quartzite and limestone. Pyroxenite interpreted as part of zoned "Alaskan-type" ultramafic pluton. Aeromagnetic survey indicates pluton about 1,500 m thick, and underlying about 6 sq km area. SOURCES: Humble Oil and Refining Company, written commun., 1958; Eberlein and others, 1977; Charles C. Hawley, written commun., 1980.

WC3. 60 46 158 46	Cinnabar Creek. Sb, Hg	Hot-spring Hg. Cretaceous basalt dikes and argillite	Produced about 525 flasks from selected high-grade ore

DESCRIPTION: Stibnite and cinnabar in shear zones, disseminations, irregular veinlets, and breccias in or near silica-carbonate dikes interpreted as hydrothermally altered basalt dikes. Most sulfides in altered sedimentary rocks. Sulfide bodies generally small. Deposit includes Cinnabar Creek shear zone, Lucky Day, and Landau areas. Ore chutes at Cinnabar exceed 40 m long and 0.5 m wide. Dikes intrude argillite and other clastic rocks of the late Paleozoic to Cretaceous Gemuk Group. SOURCES: Cady and others, 1955; Sainsbury and MacKevett, 1965.

WC4. 61 07 158 15	Fortyseven Creek. Au, W	Polymetallic vein(?) or Au quartz vein(?). Cretaceous sandstone	Grab samples with up to 17.2 g/t Au.

DESCRIPTION: Pyrite, arsenopyrite, gold, wolframite, jamesonite, Au-Ag tellurides, and scheelite in numerous, discontinuous quartz veins and pods in mineralized zone about 1.6 km long and 153 to 256 m wide. Veins trend northeast and dip from 50° west to 70° east. Several stockwork zones. Mineralized zone locally sheared and intruded by altered rhyolite dikes. K-Ar age of 57 m.y. for white mica in veins. Subsurface drilling shows zone in lithic sandstone about 300 m wide by 4,000 m long east of Holitna fault. Veins occur in contact metamorphosed siltstone and sandstone of the Kuskokwim Group. SOURCES: Cady and others, 1955; Thomas E. Smith, written commun., 1985.

WC5. 60 52 157 40	Taylor Mountains. Au, As, Ag, Hg	Epithermal vein(?). Late Cretaceous rhyolite	No data

DESCRIPTION: Disseminated arsenopyrite, cinnabar, pyrite, and minor gold in Late Cretaceous rhyolite. Area of sulfides at least 200 by 300 m. Sparse sulfide concentrations in quartz-tourmaline veinlets in rhyolite. Sparse massive pyrite along contacts between lithic sandstone and rhyolite. Pyrite, cinnabar, and stibnite in nearby placer deposits in Taylor Creek. SOURCES: Cady and others, 1955; Thomas K. Bundtzen, written commun., 1984.

WC6. 61 45 157 23	Red Devil. Hg, Sb	Hot-spring Hg. Early Tertiary basalt(?)	Produced 34,745 flasks from 68,000 tonnes through 1963. Produced 4,000 flasks, 1970 to 1972. Average grade of 1.5% Hg and 2% Sb

DESCRIPTION: Cinnabar and stibnite in about 20 plunging chimney-like bodies located along intersections of two silica-carbonate veins in a wrench fault zone. Ore bodies are crudely prismatic and range from a few centimeters to about 0.2 m in thickness and from 0.1 to 10 m in strike length. Ore bodies plunge along and near intersections between northeast-southwest-trending altered dikes and northwest-southeast-trending faults. Vertical zonation in deposit with pure cinnabar at surface, and increasing stibnite to cinnabar ratios at depth. At 200 m below surface, mainly stibnite and quartz with trace cinnabar. Largest and best exposed of 15 deposits in Kuskokwim mercury belt. Produced about 80 percent of Alaska mercury from 1942 to 1974. Silica-carbonate dikes composed of fine-grained calcite, chalcedony, limonite, and sericite, and subordinate quartz, hematite, and clay minerals. Relict phenocrysts replaced by calcite. Relict diabasic textures in Parks and Willis deposits to northwest. Silica-carbonate veins are interpreted as altered basalt dikes that intrude graywackes and argillite of the Cretaceous Kuskokwim Group. Approximately 3,000 m of underground workings on five levels as of 1963. SOURCES: Herreid, 1962; MacKevett and Berg, 1963; H. R. Beckwith, written commun., 1965; Thomas K. Bundtzen, written commun., 1985.

WC7. 61 46 158 32	Mission Creek, Owhat (Crooked Creek District). Au, Ag, Cu, As, Sb	Polymetallic vein. Late Cretaceous monzonite	Average of 21 surface samples: 6.4 g/t Au, 53 g/t Ag, 2.5% Cu, 3.0% As, 0.03% Sb, 0.1% Sn, 106 ppm U

DESCRIPTION: Sheetlike greisen veins with tourmaline, chalcopyrite, arsenopyrite, metazeunerite, scheelite, axinite. Veins occur in zones in cupola of Late Cretaceous porphyritic quartz monzonite stock. Zones up to 20 m wide. About 300 m of drifts. Local numerous euhedral gangue minerals. Nearby similar Cobalt Creek deposit contains 1.2 to 1.5% Sn. SOURCES: Thomas K. Bundtzen and Mark S. Robinson, written commun., 1984.

WC8. 62 15 158 30	DeCoursey Mountain (Crooked Creek District). Hg, Sb, As	Hot-spring Hg. Late Cretaceous basalt dikes	Produced 1,200 flasks. Grab samples with 6.5% Hg

DESCRIPTION: Cinnabar, minor stibnite, and traces of arsenopyrite in gangue of quartz, carbonate, and clay minerals. Hosted in silica-carbonate veins in sandstone and shale of Cretaceous Kuskokwim Group, and in olivine basalt dated at 76 m.y. Sulfides occur usually in breccia zones, or along intrusive contact. Discrete sulfide bodies, from 0.2 to 2.0 m thick in zone 600 by 100 m in area with vertical relief of 20 m. Individual sulfide bodies rarely longer than 20 m, with common pinching and swelling. Cinnabar-silica veins apparently associated with basalt dikes. Veins intepreted as altered basalt dikes. SOURCES: Cady and others, 1955; Sainsbury and MacKevett, 1965; Thomas K. Bundtzen, written commun., 1985.

WC9. 62 13 158 15	Snow Gulch (Crooked Creek District) Sb, Au	Sb-Au vein. Early(?) Tertiary granite porphyry dikes, sills	Surface samples with 30.9 to 61.7 g/t Au, and up to 40% stibnite

DESCRIPTION: Stibnite blades and crystals, arsenopyrite, and gold in stockworks in brecciated granite porphyry dike, and in veinlets in adjacent sandstone. One surface area, 200 by 40 m, contains at least eight stockwork pods and veins. Local trenches totaling 200 m length. Granite porphyry dikes and sills intrude calcareous sandstone of Cretaceous Kuskokwim Group. SOURCE: Thomas K. Bundtzen, written commun., 1984.

WC10. 62 30 158 00	Chicken Mountain (Flat District). Au, As, W, Sb, Hg	Polymetallic vein(?). Cretaceous monzonite and gabbro	Stockwork with 7 m of 0.89 g/t Au; altered monzonite with 0.6 g/t Au

DESCRIPTION: Veinlets with arsenopyrite, scheelite, cinnabar, gold, and stibnite. Hosted in intensely altered southern part of the Chicken pluton (monzonite and gabbro). Pervasive sericite alteration and bleaching in area 250 by 600 m, with veinlet and fractures densities of 2 to 10 per square meter. Plutonic-hosted stockwork Au-Ag deposit. Chicken pluton intrudes sedimentary rocks of Cretaceous Kuskokwim Group. SOURCES: Gaylord Cleaveland, written commun., 1979; Jason Bressler, written commun., 1980; Bundtzen and Gilbert, 1983; Bundtzen and Laird, 1983a, c; Bundtzen and others, 1985.

WC11. 62 31 157 55	Golden Horn, Malemute, Granite (Flat District). Au, Ag, Sb, Hg, W	Polymetallic vein or Sb-Au vein. Cretaceous monzonite or altered basalt	Golden Horn: produced 479 tonnes grading 174 g/t Au, 171 g/t Ag, up to 20% WO_3. Zones with 1 m of 50% stibnite, 60 m of 0.82 g/t Au. Malemute and Granite, 69 g/t Au

DESCRIPTION: Golden Horn: Veins of stibnite, cinnabar, scheelite, sphalerite, Pb-Sb sulfosalts, and chalcopyrite in gangue of quartz, tourmaline, and calcite. Stibnite and cinnabar crosscut other sulfides. Veins occur in irregularly distributed quartz-filled shear zones in the Otter Creek pluton (monzonite), or near intrusive contacts. Vein system from 3 to 30 m wide for at least 1 km length; occurs along 3-km-long fault zone on eastern side of pluton. Pluton intrudes clastic rocks of Cretaceous Kuskokwim Group. Malemute and Granite: Cinnabar, arsenopyrite, pyrite, and gold in quartz-calcite zones. Zones strike north-south to northeast; hosted in altered basalt west of Otter Creek pluton. SOURCES: Bundtzen and Gilbert, 1983; Bundtzen and Laird, 1983a; Bundtzen and others, 1985.

WC12. 62 37 157 10	Broken Shovel. (Flat District) Ag, Pb, Sb	Polymetallic vein. Cretaceous monzonite(?)	Estimated 14,000 tonnes with 178 g/t Ag, 0.15% Pb, 0.15% Sb. Zone 60 m long with 175 g/t Ag

DESCRIPTION: Tourmaline, quartz, tetrahedrite, arsenopyrite, and undetermined sulfosalts in veins hosted in central part of the Cretaceous Moose Creek pluton (monzonite). Veins from 1 to 3 m wide; occur in sericite and tourmaline altered area about 300 by 400 m. SOURCES: Bundtzen and Gilbert, 1983; Bundtzen and Laird, 1983a, c; Bundtzen and others, 1985.

WC13. 62 53 156 59	Cirque, Tolstoi (Innoko District). Cu, Ag, Sn, W	Polymetallic vein and porphyry Cu. Cretaceous monzonite stock	Grab samples with up to 20% Cu, 1,340 g/t Ag, 0.5% Sn; locally to to 0.1% Nb

DESCRIPTION: Chalcopyrite, tetrahedrite, pyrite, arsenopyrite, and scheelite in gangue of tourmaline, axinite, and quartz occurring in structurally high-level tourmaline greisen. Greisen usually along faults, or in tourmaline breccia pipes. Faults and pipes in cupolas of the Late Cretaceous Beaver Mountains (monzonite) stock. Monzonite capped by altered olivine basalt. SOURCE: Bundtzen and Laird, 1982.

WC14. 62 57 156 59	Independence (Innoko District). Au	Polymetallic vein. Cretaceous dacite to rhyolite dike	Produced 1,770 g gold from 113 tonnes ore grading 16 g/t Au

DESCRIPTION: Quartz-fissure fillings with gold, pyrite, and arsenopyrite in altered dacite to rhyolite dike. Dike occurs in 60-km-long by 3-km-wide Yankee Creek dike swarms that intrude clastic rocks of the Cretaceous Kuskokwim Group. Several hundred meters of underground workings. SOURCE: Bundtzen and Laird, 1983a.

WC15. 62 51 155 48	Candle. (Innoko District) Cu, Pb, Ag	Polymetallic vein. Cretaceous monzonite and basalt	Grab samples averaging 280 g/t Cu, 185 g/t Pb, 6.8 g/t Ag

DESCRIPTION: Cinnabar, arsenopyrite, and quartz in stockworks in sericite-altered monzonite near intrusive contact with overlying altered olivine basalt. Local quartz-chalcopyrite disseminations in a Late Cretaceous monzonite and basalt complex. Central part of basalt field contains 300 by 500 m zone of disseminated sulfides. SOURCES: Bundtzen and Laird, 1982; Thomas K. Bundtzen, written commun., 1984.

WC16. 63 13 156 04	Win-Won or Cloudy Mountain (Innoko district). Sn, Ag, Cu	Sn polymetallic vein. Cretaceous(?) monzonite	Grab samples with up to 2% Sn and 1,720 g/t Ag

DESCRIPTION: Chalcopyrite, tetrahedrite, and cassiterite in en-echelon quartz stockwork. Hosted in hornfels on northeast margin of Cloudy Mountains volcanic field and related plutonic complex. About 4 veinlets per meter over a 100-m-wide area. SOURCE: Thomas K. Bundtzen, written commun., 1984.

WC17. 62 10 154 51	White Mountain. Hg	Hot-spring Hg(?). Middle Paleozoic dolomite, limestone, shale	Chip samples grading 5 to 30% cinnabar. Produced about 3,500 flasks

DESCRIPTION: Cinnabar in fault zones between Ordovician limestone and shale. Zones in belt about 1 km wide and 3 km long on northwest side of Farewell fault. In south zone, cinnabar occurs as small crystalline coatings in brecciated dolomite, as coatings on breccia surfaces, and as irregular veinlets. In central zone, cinnabar zones more irregular and occur in silicified limestone and dolomite. In north zone, rich cinnabar lodes occur on both sides of major fault between middle Paleozoic shale and limestone. One area in north zone with massive cinnabar up to 350 m long and 10 to 15 cm thick. Local cinnabar zones in dolomitized limestone with small karst-like caverns. Gangue minerals of dolomite, chalcedony, calcite, dickite, and limonite. Main production from 1964 to 1974. SOURCES: Sainsbury and MacKevett, 1965; Brian K. Jones, written commun., 1984; Thomas K. Bundtzen, written commun., 1984.

WC18. 63 14 154 47	Nixon Fork-Medfra (Nixon Fork District). Au, Cu, Ag, Bi, Sn, W, Th	Cu-Au skarn. Paleozoic limestone intruded by Late Cretaceous monzonite pluton	Produced about 1.24 to 1.87 million g Au, and undisclosed Cu, Ag. Individual deposits with up to 113 g/t Au, 1.5 to 2% Cu

DESCRIPTION: Chalcopyrite, pyrite, bornite, and native bismuth in skarns occurring as irregular replacement bodies in recrystallized Ordovician limestone of the Telsitna Formation. Gangue minerals of diopside, garnet, plagioclase, epidote, and apatite. Oxidized actinolite skarn with limonite, quartz, malachite, pyrite, and gold. Skarns mainly in fractures; up to 1 to 4 m wide, up to 50 m long, and usually within 40 m of intrusive contact with Late Cretaceous monzonite. A few skarns in roof pendants overlying pluton. Pluton about 10 square km, and occurs near Nixon-Iditarod fault. Additional smaller skarn veinlets in fault controlled areas away from main skarn bodies. Local extensive sericitic alteration. Most of ore from zone of secondary enrichment that formed during alteration of primary skarn by groundwater. Lower grade sulfide-rich ore at depths greater than 60 m. About 1,300 m of workings extending to 170 m depth. District includes Crystal, Garnet, High Grade, Main, Mespelt, Recreation, and Whalen deposits. SOURCES: Martin, 1921; Brown, 1926; Jasper, 1961; Herreid, 1966; Bundtzen and Gilbert, 1983b.

WC19. 63 29 154 10	Reef Ridge. Zn, Pb	(Carbonate-hosted sulfide). Silurian and Devonian carbonate rocks	Grab samples with up to 20% Zn, 5% Pb, minor Ag. Estimated 181,400 tonnes of 15% combined Zn, Pb

DESCRIPTION: Stringers of brown sphalerite and minor galena in hydrothermal breccia in carbonate rocks of the Silurian and Devonian Whirlwind Creek Formation. Minimum strike length of 2,000 m and up to 15 m thick. Sulfides pinch and swell along strike. Best known of ten similar nearby occurrences. Deposit similar to Mississippi Valley Pb-Zn deposit of Cox and Singer (1986). SOURCE: Harold Noyes, written commun., 1984.

WC20. 63 40 154 04	Medfra (Nixon Fork District). Fe, Cu, Zn	Fe skarn. Lower Paleozoic limestone intruded by Cretaceous granite	Estimated 12,000 cubic meters grading 85% Fe_2O_3 with traces of Cu, Au

DESCRIPTION: Magnetite, very minor chalcopyrite and sphalerite in epidote and garnet skarn. Irregular elliptical shape to skarn body. Hosted in Ordovician dolomitized limestone of the Telsitna Formation adjacent to Late Cretaceous granite stock. Computer modeling of magnetic survey suggests 40,000 to 50,000 tonnes of magnetite. SOURCES: Patton and others, 1980, 1984.

WC21. 63 58 153 17	Sischu Creek. U, Th	Felsic plutonic U. Late Cretaceous and early Tertiary volcanic and plutonic rocks	Grab samples with 0.002 to 0.007% U and 0.011 to 0.013% Th

DESCRIPTION: Strongly radioactive U- and Th-rich porphyritic sanidine rhyolite and quartz porphyry flows in two belts, each about 1.5 to 3 km wide, 6 km long. Rhyolite flows exhibit 400 to 600 cps on hand-held scintillometer. Associated mafic and intermediate volcanic piles, volcanic-plutonic complexes, silicic dikes, sills, domes, and flows, and numerous granitic stocks and plugs with K-Ar ages of 60 to 70 m.y. SOURCES: Miller and others, 1980; Patton and Moll, 1980.

PODIFORM CHROMITE DEPOSITS IN DEFORMED ULTRAMAFIC ROCKS IN THRUST SLICES, TOZITNA AND INNOKO AREAS, NORTHEASTERN KUSKOKWIM MOUNTAINS

WC22. 63 14 156 55	Mount Hurst. Cr, PGE	Podiform chromite. Jurassic(?) serpentin-ized dunite	Grab samples with 22.0 to 61.2% Cr_2O_3

DESCRIPTION: Coalescent or banded chromian spinel in dunite layers in wehrlite tectonite. Largest of 16 chromite bands strikes north-south; pinches and swells from 10 to 800 cm over strike length of 10 m. Within bands, chromian spinel varies from 30% to 80% by volume. Deposit truncated on north by fault. Cr:Fe ratios for six samples average 1.0. Probable source of Pt placer on Boob Creek 10 km to north. Dunite and wehrlite tectonite faulted at base; interpreted as part of intensely deformed and dismembered ophiolite occurring in klippe. SOURCES: Chapman and others, 1982; Loney and Himmelberg, 1984; Roberts, 1984.

WC23. 64 10 156 40	Kaiyuh Hills (Yuki River). Cr	Podiform chromite. Jurassic(?) serpentin-ized dunite and harz-burgite tectonite	Estimated 15,000 to 34,0(0 tonnes Cr_2O_3 in one deposit. Largest deposit averages 60% Cr_2O_3 on surface

DESCRIPTION: Bands and disseminations of chromite ranging from 1 cm to 1 m thick. Hosted in fresh and serpentinized dunite of Kaiyuh Hills ultramafic belt. Dunite interlayered with harzburgite tectonite. Largest deposit, 1 m by 100 m, consists of massive chromite with estimated 5,000 tonnes Cr_2O_3. Lesser occurrences of banded nodular pods of chromite. Metallurgical grade chromite present with 46% Cr_2O_3. Dunite and harzburgite tectonite faulted at base; interpreted as part of complexly deformed and dismembered ophiolite, part of Rampart ophiolite belt. SOURCES: Loney and Himmelberg, 1984; Foley and others, 1984.

POLYMETALLIC AND EPITHERMAL VEIN, PORPHYRY Mo, AND PORPHYRY Cu DEPOSITS, WEST-CENTRAL YUKON-KOYUKUK BASIN

WC24. 63 16 159 16	McLeod. Mo	Porphyry Mo. Late Cretaceous to early Tertiary granite porphyry	Extensive chip samples grade 0.09% MoS_2 over a 350 by 30 m surface area

DESCRIPTION: Platy aggregates of molybdenite in quartz veinlets in sericite-rich core of altered quartz-feldspar (granite) porphyry stock. High-grade quartz-molybdenite fissure veins up to 15 cm thick associated with nearby latite dikes in sedimentary host rocks. Pyrite-pyrrhotite-chlorite veinlets, up to 10 percent by volume, in contact metamorphosed country rock. Quartz-feldspar porphyry, and to lesser extent, biotite latite dikes exhibit intense silicic, phyllic, and hydrothermal alteration in a 300 by 1,100 m area of southern and western part of stock. Low-grade stockwork molybdenite occurs in northern part of biotite latite dike system over a 30 by 350 m area. Area of deposit underlain by 3-square-kilometer granite stock and associated biotite latite dikes intruding mid-Cretaceous graywackes. SOURCES: Mertie, 1937a, b; West, 1954; Jason Bressler, written commun., 1979; Harold Noyes, written commun., 1984.

WC25. 64 05 158 00	Illinois Creek. Cu, Ag, Au, Pb, Zn	Polymetallic vein and porphyry Cu. Cretaceous porphyritic granitic plutons	No data

DESCRIPTION: High-grade galena-sphalerite veins near contact between altered granite porphyry, and massive, pipe-like gossan in marble. Abundant sericite alteration in nearby granitic plutons which contain stockwork veinlets with chalcopyrite, galena, and detectable precious metals. Local chalcocite supergene(?) enrichment may possibly overlie a buried porphyry Cu deposit. Other areas with epigenetic replacement, veins, and skarn with base-metal sulfides. Area is poorly exposed. Cretaceous plutonic rocks intrude early Paleozoic and older greenschist, quartzite, and orthogneiss. SOURCES: Thomas K. Bundtzen, written commun., 1984; William W. Patton, Jr., written commun., 1985.

WC26. 64 45 157 30	Perseverance. Pb, Ag, Sb	Polymetallic vein(?). Paleozoic(?) mica schist	Average ore grade of 73% Pb, and 124 g/t Ag. Produced 231 tonnes ore

DESCRIPTION: Coarse-grained galena, tetrahedrite, and traces of fibrous jamesonite in veins crosscutting bedding and schistosity in Paleozoic(?) chlorite-mica schist. Gangue of dolomite and minor quartz. Vein strikes northeast-southwest and dips south. Oxidized zones in vein contain cerussite, azurite, malachite, and stibiconite(?). Mined from 1920 to 1927, and 1981. Age of deposit unknown. SOURCE: Brian K. Jones, written commun., 1984.

WC27. 64 45 155 30	Beaver Creek. Ag, Pb, Zn	Polymetallic vein. Paleozoic(?) mica schist, marble, and quartzite	Estimated 14,000 tonnes grading 103 g/t Ag, 0.8% Zn, 0.5% Cu; additional 19,000 tonnes grading 26.1 g/t Ag, 4.2% Pb, 0.16% Zn, 0.2% Cu

DESCRIPTION: Highly oxidized zones of limonite, goethite, argentiferous galena, quartz, and sphalerite. Surface occurrences of massive galena and limonite-cerussite gossan. Eastern and western zones occur for 300 m along strike, range from 2.5 to 5 m thick. Zone separated by fractured schist and marble. Hosted in early Paleozoic(?) muscovite schist trending northeast-southwest and dipping steeply northwest. Deposition of sulfides controlled by structures in metamorphic host rocks. Age of deposit unknown. SOURCES: Brown, 1926; Thomas, 1963; Brian K. Jones, written commun., 1984.

WC28. 65 30 161 26	Quartz Creek Pb, Zn, As, Ag	Polymetallic vein. Jurassic or Cretaceous andesite and granite	Up to 15% combined Pb and Zn, and 340 g/t Ag

DESCRIPTION: Disseminated sulfides occurring in zone 3.2 to 8 km wide and over 29 km long in altered andesite and granite of Jurassic or Cretaceous age. Mainly argentiferous galena, sphalerite, pyrite, and arsenopyrite. Local realgar, orpiment, and tourmaline also present. SOURCES: Miller and Elliott, 1969; Bundtzen and others, 1984b.

FELSIC PLUTONIC U DEPOSITS, PURCELL DISTRICT, NORTHERN YUKON-KOYUKUK BASIN

WC29. 66 16 157 20	Wheeler Creek. (Purcell District). U	Felsic plutonic U. Cretaceous alaskite	Grab samples with up to 0.0125% U

DESCRIPTION: Uranothorianite and gummite in small, altered, smoky quartz-rich veinlets, and in altered areas in Late Cretaceous alaskite. Deposit about 500 m long and 50 m wide. SOURCES: Eakins and Forbes, 1976; Miller, 1976; Jones, 1977.

WC30. 66 16 155 50	Clear Creek (Purcell District). U	Felsic plutonic U. Late Cretaceous syenite and bostonite dikes	Grab samples with up to 0.04% U, and 0.055% Th

DESCRIPTION: Uraniferous nepheline syenite and bostonite dikes in Late Cretaceous andesite. Dikes within contact aureole of Late Cretaceous monzonite to granodiorite pluton of Zane Hills. SOURCES: Eakin and Forbes, 1976; Miller, 1976; Jones, 1977.

WC31. 66 10 155 55	Zane Hills (Purcell District). U, Th	Felsic plutonic U. Cretaceous monzonite to granodiorite	Grab samples with up to 0.027% Th

DESCRIPTION: Uranothorianite, betafite, uraninite, thorite, and allanite in veinlets in foliated monzonite border phase of the Late Cretaceous Zane Hills pluton. Border phase grades to syenite. Biotite-hornblende granodiorite in core of pluton. *SOURCES: Eakin and* Forbes, 1976; Miller, 1976; Jones, 1977; Miller and Elliott, 1977.

SERPENTINE-HOSTED ASBESTOS AND PODIFORM CHROMITE DEPOSITS, NORTHERN AND EASTERN YUKON-KOYUKUK BASIN

WC32. 67 01 156 50	Asbestos Mountain. Asbestos, jade, talc	Serpentine-hosted asbestos. Jurassic or older ultramafic rocks	No data

DESCRIPTION: Serpentinite with veins of cross- and slip-fiber tremolite and chrysotile. Small deposits of talc, soapstone, and nephrite. About 35 tonnes tremolite mined in 1940 to 1945. Probably source of nephrite jade boulders in Dahl Creek. Part of dismembered ophiolite exposed discontinuously in klippe in the Jade Mountains-Cosmos Hills area, along the northern flank of Yukon-Koyukuk basin. SOURCES: Coats, 1944; Heide and others, 1949; Roeder and Mull, 1978; Loney and Himmelberg, 1985b.

WC33. 66 05 150 55	Caribou Mountain, Lower Kanuti River, Holonada. Cr	Podiform chromite. Jurassic or older dunite and peridotite tectonite	Estimated 2,300 tonnes Cr_2O_3 at Caribou Mountain, 730 tonnes at Lower Kanuti River, up to 25,000 tonnes at Holonada

DESCRIPTION: Elongate belt of podiform chromite deposits, over 100 km long. Larger deposits at Caribou Mountain, lower Kanuti River, and Holonada. Caribou Mountain: ten chromite occurrences with three containing bands of massive and coalescent chromite, and magnesian chromohercynite in layers up to 3 m thick and 20 m long. Lower Kanuti River: one layer of high-chromium chromite, about 1.5 m wide and at least 25 m long containing 7.5% Cr_2O_3. Holonada: ten occurrences of bands of disseminated to massive chromite several meters thick and long. One occurrence 1.5 to 3 m thick with exposed strike length of 130 m, with average grade of 20% Cr_2O_3. Four other occurrences with about 1,000 tonnes averaging 4% to 8% Cr_2O_3. Deposits at all three areas interpreted as part of complexly deformed and disrupted ophiolite, part of Yukon-Koyukuk ophiolite belt. *SOURCES:* Patton and others, 1977; Foley and McDermott, 1983; Foley and others, 1985; Loney and Himmelberg, 1985a.

POLYMETALLIC OR EPITHERMAL VEIN, AND W SKARN DEPOSITS, EASTERN YUKON-KOYUKUK BASIN

WC34. 66 30 150 10	Upper Kanuti River. Pb, Zn, Ag	Polymetallic or epithermal vein. Early Tertiary rhyolite porphyry	Grab samples with up to 2% Pb, 0.3% Zn, and 30 g/t Ag

DESCRIPTION: Disseminated pyrite, galena, and sphalerite occur as grains up to 5 mm long in extensive altered gossan zone about 100 m long in silicified rhyolite, locally brecciated. Rhyolite sits on and probably intrudes the Cretaceous pluton of the Kanuti batholith. SOURCE: Patton and Miller, 1970.

WC35. 66 37 150 01	Bonanza Creek. W, Ag, Cu	W skarn. Early Paleozoic or older pelitic schist and marble	Grab samples with up to 0.89% W, 300 g/t Ag, 0.65% Cu

DESCRIPTION: Scheelite, chalcopyrite, and pyrrhotite in skarn adjacent to intrusive contact with biotite granite pluton. Scheelite occurs mainly as sparse disseminated grains, along with very sparse sulfides in garnet-pyroxene skarn and on fracture surfaces in calc-silicate schist. Local limonite staining. Local quartz-scheelite veins in calc-silicate schist, and quartz-molybdenite veins in biotite granite. Granite pluton part of the Kanuti batholith with K-Ar age of 90.6 m.y. Other wallrocks include early Paleozoic or older pelitic schist, quartz-mica schist, quartz-feldspar schist, quartzite, and calcareous quartz-mica schist. Marble layer, about 15 m thick, interlayered with pelitic schist. Local trenches. SOURCE: Clautice, 1980.

SIGNIFICANT METALLIFEROUS LODE DEPOSITS, EAST-CENTRAL ALASKA

By Thomas E. Smith, Mark S. Robinson, and Warren J. Nokleberg, with contributions from Thomas K. Bundtzen, P. Jeffery Burton, Robert M. Chapman, Edward R. Chipp, Helen L. Foster, Curtis J. Freeman, David R. Gaard, Wyatt G. Gilbert, Ian M. Lange, W. David Menzie, Paul A. Metz, Clint R. Nauman, Steven R. Newkirk, and Robert K. Rogers

MAP NUMBER. LATITUDE LONGITUDE	NAME. COMMODITIES	TYPE. GEOLOGIC HOST UNIT	TONNAGE AND GRADE. PRODUCTION, IF KNOWN

POLYMETALLIC, Au QUARTZ, Sb-Au, Mn-Ag, Hg QUARTZ VEIN, FELSIC PLUTONIC U, AND Sn GREISEN AND VEIN DEPOSITS, MANLEY AND LIVENGOOD REGION, NORTHWESTERN YUKON-TANANA UPLAND

EC1. 65 02 150 45	Hot Springs Dome. Pb, Ag, Zn, Au, Cu	Polymetallic vein. Jurassic and Cretaceous metasedimentary rocks	Grab samples with about 5.8 g/t Au, up to 274 g/t Ag, 3.7% Pb, 0.32% Zn

DESCRIPTION: Six east-west-striking veins, possibly in shear zones, in contact-metamorphosed argillite, graywacke, conglomerate, and minor conglomerate, part of Jurassic and Cretaceous flysch. Veins at surface contain galena coated with anglesite and limonite pockets. At depth, veins also contain siderite, copper carbonates, chalcopyrite, pyrrhotite, pyrite, and erythrite. Zone up to 600 m long and 9 m wide. Numerous quartz veinlets. Deposit at contact with early Tertiary biotite granite. Three shallow shafts. SOURCE: Maloney, 1971.

EC2. 65 16 150 25	Avnet (Buzby). Mn, Ag	(Mn-Ag vein). Lower and middle Paleozoic chert, quartzite	Grab samples with 0.6 to 34% Mn and up to 9.6 g/t Ag

DESCRIPTION: Irregular masses of psilomelane up to 7.6 cm long in latticework of thin seams of vein quartz, and as thin surface coating on fractured lower and middle Paleozoic chert, quartzite, limestone, dolomite, and greenstone. One trench and two pits. SOURCE: Thomas, 1965.

EC3. 65 23 149 30	Sawtooth Mountain. Sb, Au, Ag	Sb-Au vein. Jurassic or Cretaceous clastic sedimentary rocks	Grab samples from dump with up to 46.2% Sb, 0.7 g/t Au, 15.1 g/t Ag. Produced about 590 tonnes with 58% Sb_2S_3 through 1970

DESCRIPTION: Massive stibnite in a vertical cylinder about 3 m wide. Hosted in argillite of Jurassic or Cretaceous flysch near contact with Cretaceous granite with K-Ar age of 88.3 m.y. One shaft about 30 m deep. Minor production in 1984 and 1985. SOURCE: R. M. Chapman, written commun., 1985.

EC4. 65 31 148 30	Gertrude Creek, Griffen, Ruth Creek. Au, Ag, Pb, Sb	Sb-Au vein. Middle Paleozoic greenstone, slate, calc-schist, and Cretaceous monzonite	Grab samples with up to 15% Sb, 3.9 g/t Au, 0.1% Ni

DESCRIPTION: Quartz stringers up to 8 cm wide with pyrite, arsenopyrite, stibnite, and gold in altered diorite and dolomite-calcite-quartz silica-carbonate rock. Stringers also in shear zone adjacent to serpentinite. Short adit and a few pits scattered across Amy Dome area. SOURCES: Foster, 1968a, b; Allegro, 1984a.

EC5. 65 30 148 22	Hudson Cinnabar. Hg	(Hg quartz vein). Late Cretaceous to early Tertiary granite	No data

DESCRIPTION: Cinnabar in disseminations and quartz veins in altered granite dikes and plutons intruding Ordovician to Devonian siltstone and argillite. SOURCE: Robinson and others, 1982.

EC6. 65 29 147 05	Roy Creek (former Mount Prindle) U, Th	Felsic plutonic U. Cretaceous alkalic granitic rocks	Drill core with up to 5 to 10% REE by volume

DESCRIPTION: Fissure veins with allanite, bastnaesite, monazite, thorianite, thorite, uraninite, and xenotime in Cretaceous porphyrytic biotite syenite and alkali granite. Deposit contains significant La, Ce, Nd, Pr, Yt, and fluorite. Hematitic alteration of wall rocks and leaching of magnetite in host rocks. Deposit and granitic rocks occur about 25 km west of Mount Prindle and intrude Cambrian(?) sandstone, quartzite, argillite, and chert. SOURCE: Burton, 1981.

EC7. 65 37 146 43	Lime Peak. Sn, Ag, Zn, U W	Sn greisen and Sn vein. Early Tertiary granite	Grab samples with up to 0.16% Sn, 0.5% Cu, 0.2% Pb, 1.8% Zn, 14 g/t Ag

DESCRIPTION: Areas of veinlets, breccia zones, and pods of black tourmaline, and areas of chlorite, sericite, green tourmaline, and quartz alteration in early Tertiary hypabyssal, peraluminous, biotite granite pluton. Granite pluton cut by numerous felsic and minor intermediate dikes. Veins up to 0.5 m wide. Areas of veinlets, breccia zones, and tourmaline pods interpreted as deuteric alteration; areas of chlorite, sericite, and quartz interpreted as hydrothermal alteration. Anomalous high values of Sn and associated pathfinder elements (Ag, B, Bi, Mo, Pb, Zn) found in rock samples from and around pluton. Rare fluorite, topaz, pyrite, chalcopyrite, and molybdenite in altered areas. Placer cassiterite in surrounding area. Two main phases to pluton: older coarse-grained equigranular biotite granite; younger porphyritic biotite granite with fine-grained groundmass. Local miarolitic cavities in pluton. K-Ar age of 56.7 m.y. for granite which intrudes Cambrian(?) sandstone, shale, slate. SOURCES: Menzie and others, 1983; Burton and others, 1985; W. David Menzie, written commun., 1985.

Au QUARTZ, Sb-Au, AND Au-As VEIN, W SKARN, AND Sn-GREISEN DEPOSITS, NORTHERN AND CENTRAL YUKON-TANANA UPLAND

EC8. 65 21 146 33	Dempsey Pup. Sb, Au(?)	Sb-Au vein. Middle Paleozoic or older metasedimentary rocks	Grab samples with up to 28% Sb. Produced a few hundred tonnes of low-grade ore

DESCRIPTION: Quartz vein with small lenses and stringers of stibnite and possibly gold. Hosted in middle Paleozoic or older quartz schist, mica schist, and marble of Yukon Crystalline terrane. Several short tunnels. SOURCE: Killeen and Mertie, 1951.

EC9. 65 29 145 53	Table Mountain. Au, Sn, Be, W	Au quartz vein(?). Early Tertiary granite pluton, dikes, and adjacent schist	Grab samples with up to 140 g/t Au, 0.007% Sn, 0.15% Be

DESCRIPTION: Pyrrhotite, arsenopyrite, minor chalcopyrite, rare enargite and sphalerite, and high Au values in black biotite schist and in quartz veins adjacent to fault zone intruded by a hypabyssal felsic dike. About 5 km northeast, low Au values in country rocks adjacent to granite pluton, felsic dikes in granite, and in felsic dikes. Granite pluton crops out over 2 sq km area. Granite and adjacent biotite schist with high Be values. Small skarns with high W values. Similar nearby plutons exhibit early Tertiary K-Ar ages.

SOURCES: Burack, 1983; Foster and others, 1983; W. David Menzie, written commun., 1985.

EC10. 65 27 144 50	Bedrock Creek. Cu, W, Th	Porphyry Cu(?). Early Tertiary granitic pluton	No data

DESCRIPTION: Disseminated monazite and minor scheelite, pyrrhotite, garnet, ilmenite, zircon, biotite, topaz, and malachite. Hosted in early Tertiary granite of the Circle pluton with K-Ar age of 60.5 m.y. Pluton intrudes middle Paleozoic or older schist of Yukon Crystalline terrane. SOURCE: Nelson and others, 1954.

EC11. 65 33 145 15	Miller House. Au	(Au-As vein). Middle Paleozoic or older metasedimentary rocks	Grab samples with up to 3.9 g/t Au

DESCRIPTION: Massive to disseminated arsenopyrite in four large and four small iron-stained shear zones. Zones over 150 m long occur in middle Paleozoic or older schist of Yukon Crystalline terrane. Intense alteration along zones. Early Tertiary age interpreted for deposit. SOURCES: Tripp and others, 1980; Menzie and others, 1983.

EC12. 65 29 144 41	Ketchem Dome. Sn	Sn greisen. Early Tertiary granitic pluton	Grab samples with up to 0.51% Sn

DESCRIPTION: Greisen zones, up to 4 cm wide, and quartz veins. Hosted in intensely chlorite-altered breccia along northern margin of the composite early Tertiary Circle (granite) pluton with K-Ar age of 60.5 m.y. Pluton intrudes middle Paleozoic or older schist of the Yukon Crystalline terrane. Limited exploration in 1978 and 1981. SOURCES: Foster and others, 1983; Menzie and others, 1983; W. David Menzie, written commun., 1984.

EC13. 65 07 144 38	Salcha River. W	W skarn. Middle Paleozoic or older marble	No data

DESCRIPTION: Scheelite in discontinuous idocrase-garnet skarn in layered calc-silicate schist and impure marble along contact with early Tertiary granite pluton. Schist and marble part of middle Paleozoic or older Yukon Crystalline terrane. SOURCES: Foster and others, 1983; Menzie and others, 1983; W. David Menzie, written commun., 1984.

Sb-Au, Au QUARTZ, AND POLYMETALLIC VEIN, AND W SKARN DEPOSITS, FAIRBANKS DISTRICT, NORTHERN YUKON-TANANA UPLAND

EC14. 65 00 147 49	Scrafford. Sb, Au	Sb-Au vein. Middle Paleozoic or older metasedimentary and metavolcanic rocks	Average grade of about 36% Sb. Footwall chip samples with 1.4 to 5.7 g/t Au. Produced 906,000 kg Sb from 2,500 tonnes ore

DESCRIPTION: Massive stibnite along east-west-striking shear zone. Disseminated quartz stockwork and veinlets with arsenopyrite and stibnite in feldspathic quartzite and quartz mica schist in shear footwall. Barren pelitic schist and quartzite in hanging wall. Host rocks part of the upper Precambrian(?) Cleary sequence, part of the middle Paleozoic or older Yukon Crystalline terrane. SOURCES: Chapin, 1914, 1919; Robinson and Bundtzen, 1982; Thomas E. Smith and Paul A. Metz, written commun., 1984.

EC15. 65 04 147 25	Cleary Summit (Fairbanks District). Au, Ag	Polymetallic vein(?). Middle Paleozoic or older metasedimentary rocks	Estimated 145,000 tonnes production grading 10 to 55 g/t Au

DESCRIPTION: Quartz fissure veins from a few centimeters to a few meters thick with gold, boulangerite, jamesonite, tetrahedrite, galena, stibnite, scheelite, pyrite, and arsenopyrite. Most productive veins strike northwest-southeast and dip variably to south. District includes 78 known lode occurrences, 30 with production. Veins in interlayered mica quartzite, graphitic schist, pelitic schist, chlorite-actinolite greenschist, calc-schist, and marble of the upper Precambrian(?) Cleary sequence, part of the middle Paleozoic or older Yukon Crystalline terrane. SOURCES: Chapman and Foster, 1969; Smith and others, 1981; Thomas E. Smith and Paul A. Metz, written commun., 1984.

EC16. 64 59 147 21	Gilmore Dome Area (Fairbanks District). W, Au	W skarn. Middle Paleozoic or older metasedimentary and metavolcanic rocks	Estimated 20,000 tonnes grading 0.5 to 3.6% WO_3. Produced about 4,000 units WO_3.

DESCRIPTION: Scheelite skarn in layers, or locally in zoned veins crosscutting layers. Major skarn types are scheelite-amphibole-quartz-calcite, pyroxene-garnet-scheelite, and quartz-amphibole-calcite-scheelite skarn. District includes 15 known lode tungsten prospects, four with significant production. Hosted in calc-schist and marble of the Cleary sequence with interlayered amphibolite, all part of the middle Paleozoic or older Yukon Crystalline terrane. Skarns form discontinuous bodies near, and at contact with the Gilmore Dome (granite) pluton of Late Cretaceous age. Includes Spruce Hen, Yellow Pup, and Stepovitch mines. Production between 1916-1919, 1941-1945, and 1951-1955. SOURCES: Byers, 1957; Robinson, 1981; Allegro, 1984b; Thomas E. Smith and Paul A. Metz, written commun., 1984.

EC17. 64 52 148 05	Ester Dome (Fairbanks District) Au, Ag	Polymetallic vein(?). Middle Paleozoic or older metasedimentary and metavolcanic rocks	Produced about 90,700 tonnes grading 6.8 to 78.9 g/t Au

DESCRIPTION: Quartz fissure veins from a few centimeters to 5.5 m thick and up to 1,200 m long with gold, pyrite, arsenopyrite, and stibnite, and minor jamesonite, argentite, chalcocite, and covellite. Area includes 58 known lode occurrences, 27 with production. Steeply dipping quartz veins up to a few meters thick most common; local sheared veins up to 22 m thick. Multiple episodes of quartz deposition. Veins occur in micaceous quartzite, graphitic schist, calc-schist, and marble of middle Paleozoic or older Yukon Crystalline terrane. About 26 producing vein deposits in area. Grant deposit has estimated 910,000 tonnes grading 6.9 to 27 g/t Au. Ryan Lode deposit has estimated 9.1 million tonnes ranging from 2.0 to 15.0 g/t Au. SOURCES: Hill, 1933; Thomas, 1973; Thomas E. Smith and Paul A. Metz, written commun., 1984.

EC18. 64 20 146 22	Democrat (Fairbanks District). Au	Au quartz vein. Tertiary rhyolite porphyry	No data

DESCRIPTION: Stockwork of quartz-sulfide veins with disseminated gold in Tertiary rhyolite porphyry. Gold commonly associated with galena and tetrahedrite. Moderate production from 1918 to 1922. SOURCES: Bundtzen and Reger, 1977; Menzie and Foster, 1978.

EC19. 64 20 144 14	Blue Lead, Tibbs Creek, Gray Lead. Au, Ag, Sb	Polymetallic vein or Sb-Au vein. Creta-ceous(?) granitic rocks	Produced 905 g Au and 707 g Ag from 136 tonnes

DESCRIPTION: Group of quartz veins with gold, pyrite, arsenopyrite, and stibnite. Veins pinch and swell, width ranges from 1 cm to 2.4 m with average of 1 m. Masses of nearly pure stibnite up to 0.6 m thick and 30 m long. Veins occur in Cretaceous(?) granitic rocks intruding middle Paleozoic or older metasedimentary rocks of the Yukon Crystalline terrane. Abundant faults and shears. About 240 m underground workings. Developed from about 1935 to 1941. Minor production in 1970's. SOURCES: Thomas, 1970; Menzie and Foster, 1978; Robinson and others, 1982.

EC20. 63 53 143 28	Mosquito. Cu, Mo	Porphyry Cu-Mo. Late Cretaceous to early Ter-tiary quartz monzonite	No data

DESCRIPTION: Disseminated chalcopyrite, molybdenite, and pyrite in hydrothermally altered Late Cretaceous to early Tertiary quartz monzonite and quartz monzonite porphyry. Granitic rocks intrude middle Paleozoic or older schist of the Yukon Crystalline terrane. SOURCES: Singer and others, 1976.

EC21. 64 07 141 55	Purdy. Au	Au quartz vein. Middle Paleozoic or older metasedimentary rocks.	Minor production

DESCRIPTION: Large quartz-calcite fissure vein and veinlets with "lace" gold. Large vein extends about 2 m; terminated at one end by fault. Large vein completely mined by 1960. Vein and veinlets occur in middle Paleozoic or older metasedimentary schists of Yukon Crystalline terrane. Small veins and veinlets mined in 1969 and early 1970's. SOURCES: Helen L. Foster, written commun., 1984; W. David Menzie, written commun., 1985.

EC22. 63 22 142 30	Asarco. Cu, Mo	Porphyry Cu-Mo. Tertiary quartz porphyry	No data

DESCRIPTION: Disseminated molybdenite and Cu-sulfides in silicified and leached Tertiary quartz porphyry hypabyssal pluton that intrudes middle Paleozoic or older Yukon Crystalline terrane. SOURCES: Singer and others, 1976; Helen L. Foster, written commun., 1977, in Eberlein and others, 1977.

EC23. 63 38 141 29	Bluff. Cu, Mo	Porphyry Cu-Mo. Late Cretaceous or early Ter-tiary granitic rocks	No data

DESCRIPTION: Disseminated pyrite, chalcopyrite, molybdenite, and magnetite. Hosted in hypabyssal porphyritic granite, granodiorite, and quartz porphryry. Intense hydrothermal alteration. Numerous faults and dikes. Granitic rocks intrude middle Paleozoic or older schist of the Yukon Crystalline terrane. SOURCES: Singer and others, 1976; Eberlein and others, 1977.

EC24. 63 39 141 19	Taurus. Cu, Mo	Porphyry Cu-Mo. Early Tertiary granite	Estimated 450 million tonnes grading 0.5% Cu and 0.07% Mo

DESCRIPTION: At least three areas of hypabyssal plutons with intense potassic, propylitic, and sericitic alteration. Chalcopyrite, molybdenite, and pyrite in disseminations and veinlets of quartz-orthoclase-sericite, quartz-magnetite-anhydrite, quartz-sericite-pyrite-clay-fluorite, quartz-orthoclase-biotite, and solid chalcopyrite. Magnetite-rich core of potassic altered granite porphyry with sparse sulfides, and higher concentrations of Cu and Mo sulfides occur with periphery with phyllic alteration. Sequence of alteration, oldest to youngest, from propylitic, hydrothermal potassic and propylitic, phyllic, and argillic. Potassic alteration in core of plutons, propylitic and sericite alteration in periphery and adjacent wallrocks. Local tourmaline, fluorite, and replacement of chalcopyrite by chalcocite. Hosted in granite porphyry, granodiorite, and quartz latite porphyry intruding early Paleozoic or older quartz-sericite schist and gneiss of Yukon Crystalline terrane. Numerous faults and shears. Zone of hypabyssal plutons about 13 km long and 1.6 km wide. SOURCE: Edward R. Chipp, written commun., 1984.

SERPENTINE-HOSTED ASBESTOS AND PODIFORM CHROMITE DEPOSITS IN THRUST SLICES OF MAFIC AND ULTRAMAFIC ROCKS, EASTERN YUKON-TANANA UPLAND

EC25. 64 31 142 30	Slate Creek (Fortymile). Asbestos	Serpentine-hosted asbestos. Serpentinized ultramafic rocks	Estimated 58 million tonnes grading 6.4% fiber

DESCRIPTION: Antigorite with minor clinochrysotile, chrysotile, magnetite, brucite, and magnesite in serpentinized harzburgite. Chrysotile asbestos occurs in zones of fracturing near centers of thicker serpentinite, primarily as cross-fiber asbestos in randomly oriented veins about 0.5 to 1 cm thick. Veins contain alternating zones of chrysotile and magnetite, and commonly exhibit magnetite selvages. Some chrysotile altered to antigorite. Harzburgite occurs as tabular tectonic lenses, generally from 60 to 150 m thick and up to 800 m long. Ultramafic rocks part of deformed ophiolite. SOURCES: Foster and Keith, 1974; Robert K. Rogers, written commun., 1984.

EC26. 64 34 142 11	Eagle C3. PGE	Podiform chromite. Biotite pyroxenite	Grab samples with 3 g/t Pt, 1.5 g/t Pd, and 0.03 g/t Rh

DESCRIPTION: Biotite pyroxenite in small ultramafic body. Locally serpentinized. Only one of 32 separate ultramafic bodies in area that exhibits significant values of PGE. Ultramafic rocks may be part of deformed ophiolite. SOURCES: Foster and Keith, 1974; Foster, 1975.

Sb-Au AND POLYMETALLIC VEIN, AND KUROKO MASSIVE SULFIDE DEPOSITS, NORTHERN ALASKA RANGE REGION

EC27. 63 25 151 12	Slate Creek, Eagles Den, Caribou Creek (Kantishna District) Sb, Ag, Zn	Sb-Au vein. Middle Paleozoic or older metavolcanic and metasedimentary rocks	Estimated 64,000 tonnes grading 12.0% Sb, minor Ag, Zn

DESCRIPTION: Quartz-carbonate fissure veins with mainly stibnite. Mostly free of other sulfides common to district. Veins occur along northeast-southwest-striking, steeply dipping fault zones crossing middle Paleozoic or older Yukon Crystalline terrane. SOURCES: Bundtzen, 1981; Thomas K. Bundtzen, written commun., 1984.

EC28. 63 33 150 45	Quigley Ridge (Kantishna District). Ag, Au, Pb, Zn	Polymetallic vein. Middle Paleozoic or older metavolcanic and metasedimentary rocks	Estimated 380,000 tonnes grading 1,300 g/t Ag, 4.8 g/t Au, 6.4% Pb, 2.3% Zn

DESCRIPTION: Quartz-carbonate fissure veins with galena, sphalerite, tetrahedrite, pyrite, chalcopyrite, and siderite. Paragenetic sequence, from older to younger, of arsenopyrite, pyrite, base-metal sulfides, Ag sulfosalts, stibnite, and covellite. Locally contain Ag and Pb sulfosalts. Veins occur along northeast-southwest-striking, steeply dipping fault zones in the Spruce Creek sequence. SOURCES: Bundtzen, 1981, 1983a; Thomas K. Bundtzen, written commun., 1984.

EC29. 63 34 150 44	Banjo (Kantishna District). Au, Ag, Pb, Zn, Sb	Polymetallic vein. Middle Paleozoic or older metavolcanic and metasedimentary rocks	Estimated 160,000 tonnes grading 13.4 g/t Au, 123 g/t Ag, 1.5% combined Pb, Zn, Sb

DESCRIPTION: Quartz-carbonate fissure veins with arsenopyrite, pyrite, gold, and minor scheelite. Veins occur along northeast-southwest-striking, steeply dipping fault zones within the Spruce Creek sequence. SOURCES: Bundtzen, 1981, 1983a; Thomas K. Bundtzen, written commun., 1984.

EC30. 63 35 151 35	Spruce Creek (Kantishna District). Au, Ag, Pb, Zn, Sb	Polymetallic vein. Middle Paleozoic or older metavolcanic and metasedimentary rocks	Estimated 77,000 tonnes grading 2.4 g/t Au, 276 g/t Ag, 2.5% combined Pb, Zn, Sb

DESCRIPTION: Quartz-carbonate fissure veins with galena, sphalerite, arsenopyrite, and gold. Veins occur along northeast-southwest-striking, steeply dipping fault zones in the Spruce Creek sequence. SOURCES: Bundtzen, 1981, 1983a; Thomas K. Bundtzen, written commun., 1984.

EC31. 63 45 150 25	Stampede (Kantish- District). Sb	Polymetallic or Sb-Au vein. Middle Paleozoic or older metavolcanic and metasedimentary rocks	Estimated 410,000 tonnes grading 10.5% Sb, with minor Ag, Zn, Au. Produced 1,570 tonnes

DESCRIPTION: Quartz-carbonate fissure veins with stibnite, and minor pyrite and sphalerite in pods and kidneys. Massive stibnite zones from 1 cm to 5 m wide. Extensive vein system localized in a 5 km long, northeast-southwest-trending fault system. Veins formed before, during, and after several periods of movement on fault. Paragenetic sequence, from older to younger, of pyrite, sphalerite, and stibnite. Fault system in the middle Paleozoic or older Spruce Creek sequence. Production from 1937 to 1970. About 1,000 m of underground workings on two levels. SOURCES: Barker, 1963a; Bundtzen, 1981, 1983a; Thomas K. Bundtzen, written commun., 1984.

EC32. 64 37 148 51	Liberty Bell. Au, Ag, Cu, Bi	Kuroko massive sulfide(?). Mississippian(?) Totatlanika Schist	Estimated 91,000 tonnes grading 34.3 g/t Au, 10% As, 2.0% Cu

DESCRIPTION: Fine-grained arsenopyrite, chalcopyrite, pyrrhotite, and bismuthite stringers and laminations that occur parallel to foliation. The sulfide zone reaches a maximum thickness of 10 m and is 200 m long. The laminations vary from a few centimeters to 1 m thick. Lenses and laminations parallel foliation in enclosing siliceous metavolcanic phyllite of the California Creek Member of the Mississippian(?) Totatlanika Schist, but are locally folded. Quartz-tourmaline-sulfide veins from 10 cm to 1 m thick crosscut sulfide zones and adjacent schist, locally with symmetrical wallrock alteration. The sulfides occur immediately adjacent to a metamorphosed porphry interpreted as a Paleozoic igneous plug that was contemporaneous with the volcanic rock protoliths of the Totatlanika Schist. Quartz veins may represent either remobilized stratiform sulfides, or polymetallic veins associated with nearby Tertiary(?) mafic dikes. Gold produced in 1930's. SOURCES: Hawley, 1976; E. R. Pilgram, written commun., 1976; Gilbert and Bundtzen, 1979; Bundtzen and Gilbert, 1983; Thomas K. Bundtzen, written commun., 1985; Bundtzen and Smith, 1986.

EC33. 63 54 148 17	Sheep Creek. Zn, Pb, Sn	Kuroko massive sulfide. Precambrian or Paleozoic Keevy Peak Formation	Grab samples with up to 15% combined Pb and Zn, 102 g/t Ag; zones up to 1 m wide with 1% Sn

DESCRIPTION: Fine-grained sphalerite, galena, and pyrite in massive lenses in siliceous phyllite and metaconglomerate of the Precambrian or Paleozoic Keevy Peak Formation. Sulfide zone extends along strike for 300 m, and vertically for 200 m. Sulfide lenses isoclinally folded and possibly associated with tuffaceous chlorite schist. SOURCE: Thomas K. Bundtzen, written commun., 1985.

EC34. 63 48 147 57	Anderson Mountain. Cu, Pb, Zn, Ag	Kuroko massive sulfide. Mississippian(?) Totatlanika Schist	Grades from 0.5 to 19% Cu, up to 5% Pb, 28% Zn, and 171 g/t Ag

DESCRIPTION: Massive sulfide layers with pyrite, chalcopyrite, galena, sphalerite, enargite, and arsenopyrite with gangue of quartz, sericite, chlorite, calcite, barite and siderite. Hosted in metamorphosed marine tuffaceous rhyolite and metamorphosed calcareous clastic rocks correlated with the Moose Creek Member of the Totatlanika Schist. Numerous high-angle faults. Sulfide beds appear to lie on irregular paleosurface in footwall. Domal sulfide accumulations at top of layers. Absence of footwall alteration and stringer mineralization suggests off-vent deposition. High trace values of As, Sb, Hg, and W may be derived from schist basement. SOURCES: Gilbert and Bundtzen, 1979; Curtis J. Freeman, written commun., 1984; Thomas K. Bundtzen, written commun., 1984.

EC35. 63 45 147 22	WTF, Red Mountain. Cu, Pb, Zn, Ag, Au	Kuroko massive sulfide. Mississippian(?) Totatlanika Schist	Estimated 1.10 million tonnes grading 0.15% Cu, 2.5% Pb, 7.9% Zn, 270 g/t Ag, and 1.9 g/t Au at WTF

DESCRIPTION: Massive pyrite, sphalerite, galena, and chalcopyrite with quartz-rich gangue in felsic metavolcanic rocks derived from crystal and lapilli tuff, minor flows, and in metasedimentary rocks. Massive sulfide layers on both sides of large east-west trending syncline. Proximal setting for Red Mountain deposit on south limb with sulfide-silica exhalite up to 130 m thick hosting massive sulfide layers. An older, southern horizon hosts sphalerite and coarse pyrite in black chlorite schist. Distal setting for WTF deposit on north limb with thin blanket of fine-grained sulfides. Deposits occur immediately below the Sheep Creek Member and above the Mystic Creek Member of the Totatlanika Schist. SOURCE: David R. Gaard, written commun., 1984.

EC36. 63 41 146 39	Miyaoka, Hayes Glacier. Cu, Pb, Zn, Au, Ag	Kuroko massive sulfide. Devonian metavolcanic and metasedimentary rocks	Grab samples with up to 0.92% Cu, 0.72% Pb, 0.5% Zn, 50 g/t Au, 50 g/t Ag

DESCRIPTION: Zone of massive sulfide lenses, pods, and disseminations with pyrrhotite, chalcopyrite, sparse pyrite, and sphalerite. Zone about 13 km long and up to 0.5 km wide. Individual lenses and pods up to 5 m long and 1 m thick. Sulfides occur in interfoliated former marine sequence of quartz mica, muscovite-chlorite-quartz, quartz-feldspar augen schist, chlorite schist, calc-schist, and marble. Host rocks derived from Devonian felsic to intermediate volcanic rocks, mainly andesite, dacite, and quartz keratophyre flows and tuffs, and Devonian or older shale, marl, and marble. Metavolcanic and metasedimentary rocks part of Yukon Crystalline terrane. Two periods of metamorphism and deformation, older lower of amphibolite facies, and younger of lower greenschist facies. Intensely deformed with local abundant mylonite schist. SOURCES: Lange and Nokleberg, 1984; Nokleberg and Lange, 1985.

EC37. 63 36 146 14	McGinnis Glacier. Zn, Cu, Pb, Ag	Kuroko massive sulfide. Devonian metavolcanic and metasedimentary rocks	Grab samples with up to 2.3% Zn, 0.26% Cu, 0.25% Pb, 50 g/t Ag

DESCRIPTION: Disseminated to massive pyrite, chalcopyrite, and sphalerite in two or three layers exposed discontinuously in a zone up to about 15 m thick and 2 km long. Individual massive pods up to 1 m thick. Gangue of quartz, chlorite, epidote, biotite, and actinolite. Sulfides occur in interfoliated marine sequence of metasedimentary rocks, mainly quartz schist, chlorite-quartz schist and marble, and lesser amounts of metamorphosed Devonian andesite, dacite, and keratophyre flows, tuff, and volcanic graywacke. Metavolcanic and metasedimentary rocks part of Yukon Crystalline terrane. Two periods of metamorphism and deformation, older lower of amphibolite facies, and younger of lower greenschist facies. Intensely deformed with local abundant mylonite schist. SOURCES: Lange and Nokleberg, 1984; Nokleberg and Lange, 1985.

EC38. 63 14 144 10	Delta District. Pb, Zn, Cu, Ag, Au	Kuroko massive sulfide. Devonian metavolcanic and metasedimentary rocks	Largest deposit of 18 million tonnes grading 0.3 to 0.7% Cu, 1 to 3% Pb, 3 to 6% Zn, 34 to 100 g/t Ag, 1 to 3.4 g/t Au

DESCRIPTION: Large massive sulfide district of about 1,000 sq km, with about 26 stratiform, transposed, and lesser replacement deposits occurring along four regional trends. Consist of varying amounts of pyrite, chalcopyrite, galena, sphalerite, and lesser malachite and bornite. Gangue of mainly quartz, carbonate, and white mica. Associated hydrothermal alteration with formation of chlorite, quartz, sericite, pyrite, and lead-silver-gold sulfides. Massive sulfides and adjacent layers with disseminated sulfides occur in zones typically 500 m long, 200 m wide, and 15 m thick. Hosted in metamorphosed Devonian spilite and keratophyre suite of flows, tuffs, and breccia, and metamorphosed shallow- and deep-marine sedimentary rocks, mainly quartz schist, quartz-chlorite-feldspar schist, calc-schist, and marble. Metavolcanic and metasedimentary rocks part of Yukon Crystalline terrane. Abundant numerous tholeiitic greenstone sills with spatial relationship to massive sulfide bodies, and possible genetic relationship to metavolcanic suite. SOURCES: Nauman and others, 1980; Lange and Nokleberg, 1984; Clint R. Nauman and Steven R. Newkirk, written commun., 1984; Ian M. Lange and Warren J. Nokleberg, written commun., 1984.

SIGNIFICANT METALLIFEROUS LODE DEPOSITS, ALEUTIAN ISLANDS AND ALASKA PENINSULA

By Frederic H. Wilson, Gary L. Anderson, Thomas K. Bundtzen, and Warren J. Nokleberg, with contributions from Dennis P. Cox, Robert L. Detterman, and Carl I. Steefel

MAP NUMBER. LATITUDE LONGITUDE	NAME. COMMODITIES	TYPE. GEOLOGIC HOST UNIT	TONNAGE AND GRADE. PRODUCTION, IF KNOWN

POLYMETALLIC AND EPITHERMAL VEIN, PORPHYRY Cu, Mo AND Cu-Mo DEPOSITS, ALEUTIAN ISLANDS AND SOUTHWESTERN ALASKA PENINSULA

AP1. 53 45 166 10	Sedanka (Biorka). Zn, Pb, Cu	Polymetallic vein. Tertiary diorite	Average grade of 6.8% Zn, 0.45% Cu, 0.29% Pb, 1.37 g/t Au, 48 g/t Ag

DESCRIPTION: Sphalerite and pyrite, and minor galena and chalcopyrite in disseminations in fault zone striking east-northeast and dipping moderately south. Quartz and ankerite gangue. Fault zone with sulfides at least 1,000 m long, and up to 80 m thick. Hanging wall of Tertiary diorite and footwall of greenstone. NOTE: Plate 1 does not contain area of this deposit (Sedanka Island). SOURCE: Webber and others, 1946.

AP2. 55 35 161 16	Canoe Bay. Au, Ag, Hg, As, Pb, Zn	Epithermal vein. Late Tertiary or Quaternary felsic igneous rocks	No data

DESCRIPTION: Quartz-cemented breccia with gold in altered late Tertiary or Quaternary felsic intrusive and extrusive rocks consisting of rhyolite to rhyodacite porphyry, and vent, explosion, and lithic breccia. Associated crystal tuff, and andesite to dacite dikes. Core area with sericite, pyrite, argillite, and silica alteration grading outward into weak propylitic alteration. Anomalous soil and rock values of Au, Ag, Hg, As, Pb, and Zn. Intrusive rocks intrude shale, sandstone, and conglomerate of the Cretaceous Hoodoo(?) Formation. SOURCES: Gary L. Andersen, written commun., 1984; Frederic H. Wilson, written commun., 1985.

AP3. 55 11 160 40	Aquila. Au, Ag	Epithermal vein. Tertiary andesite flows and tuffs	Grab samples with up to 7.8 g/t Au, 27 g/t Ag

DESCRIPTION: Quartz fissure vein system with gold. Veins extend up to 2,700 m and occur along northeast-southwest-striking regional fractures, a few kilometers apart, and parallel to similar fractures that host Apollo-Sitka deposit (AP4, below). Deposit restricted to small shoots occurring at intersections of veins or where veins abruptly change strike. Argillic and silicic alteration generally restricted to narrow envelopes around individual quartz veins. Veins hosted in Tertiary andesite flows and tuffs. SOURCE: Gary L. Andersen, written commun., 1984.

AP4. 55 12 160 37	Apollo-Sitka. Au, Ag, Pb, Zn, Cu	Epithermal vein. Tertiary intermediate volcanic rocks	Produced about 3.3 million g Au from 435,000 tonnes ore grading 7.7 g/t Au. Estimated 163,000 tonnes remaining. Portions of drill core with up to 7.3 g/t Au, 240 g/t Ag

DESCRIPTION: Quartz-calcite-orthoclase veins and silicified zones with gold, galena, sphalerite, chalcopyrite, and native copper. Veins and zones in intensely developed northeast-southwest-striking fracture systems. Veins extend to at least 420 m below surface. At least eight major vein-fracture systems. Veins range from a few centimeters to 7 m wide. Higher grade parts of deposit occur in tensional flexures in the vein-fracture system. Abundant comb structure and euhedral crystal druses indicate vein formation at shallow depths. Hosted in extensively propyliticallly altered Tertiary tuff and intermediate volcanic rocks. Main production from 1894 to 1906. About 5,100 m of underground workings. SOURCES: Martin, 1905, Brown, 1947; Alaska Mines and Geology, 1983.

AP5. 55 12 160 35	Shumagin. Au, Ag	Epithermal vein. Middle Tertiary volcanic rocks.	Estimated 540,000 tonnes grading 10.3 g/t Au, 34.3 g/t Ag; includes 256,000 tonnes grading 14.6 g/t Au and 54.9 g/t Ag

DESCRIPTION: Quartz fissure system with gold hosted in Tertiary (Miocene?) andesitic volcanic rocks. Estimated tonnage in area 2,700 m long, 610 m wide, and 120 m deep. Fissure system occurs on same northeast-southwest-trending structure as Aquila deposit (AP3, above). Extensive drilling in 1982 and 1983. SOURCE: Gary L. Anderson, written commun., 1985.

AP6. 55 37 160 41	Pyramid. Cu, Au	Porphyry Cu. Late Tertiary dacite porphyry stock	Estimated 110 million tonnes grading 0.4% Cu, 0.05% Mo, and trace of Au

DESCRIPTION: Disseminated molybdenite and chalcopyrite(?) in iron-stained dacite porphyry stocks and dikes of late Tertiary age. Zonal alteration pattern with core of secondary biotite and about 3 to 10% magnetite, grading outward to envelope of quartz-sericite alteration. Peripheral sericite filled fractures adjacent to stock. Local oxidation and supergene enrichment blanket up to 100 m thick with mainly secondary chalcocite and covellite. Deposit centered on 3 sq km area within stock. Stock intrudes fine-grained clastic rocks of the Upper Cretaceous Hoodoo Formation, and Paleocene or Eocene to Oligocene Stepovak(?) or Tolstoi(?) Formation. Sedimentary rocks contact metamorphosed adjacent to stock. Local smaller stocks. SOURCES: Armstong and others, 1976; Hollister, 1978; Wilson and Cox, 1983; Gary L. Anderson, written commun., 1984; Robert L. Detterman, oral commun., 1986.

AP7. 56 38 160 31	San Diego Bay. Ag, Au, Cu, Pb, Zn	Epithermal vein(?). Middle Tertiary dacite	No data.

DESCRIPTION: Area of propylitic, and local argillite or silicic alteraton in Tertiary dacite flows. Fe-stained 61 sq km area. Rock samples from altered area contain 0.5% to 5.0% pyrite. Numerous small quartz veins with anomalous Ag and Cu, and lesser Cu-, Pb-, and Zn-sulfides. Quartz veins in altered middle Tertiary dacite. Veins and altered area may be upper level part of porphyry Cu deposit. SOURCE: Gary L. Andersen, written commun., 1984.

AP8. 55 57 159 24	Kawisgag (Ivanof). Cu, Mo, Au	Porphyry Cu and (or) polymetallic vein. Late Tertiary intrusive complex	Grab samples with 0.2 to 1.0% Cu, up to 0.024% Mo, and 0.23 to 0.4 g/t Au. Small tonnage

DESCRIPTION: Area of intense sericitic and less well developed potassic alteration in nonmarine fluvial volcanic sandstone and conglomerate of the lower Tertiary Tolstoi Formation and black siltstone of the Upper Cretaceous Hoodoo(?) Formation. Minor propylitic alteration on periphery. Sedimentary rocks intruded by number of small stocks and dikes. Alteration overprinted on contact-metamorphic auroles around stocks. Iron-stained area of about 2.5 sq km. Area of hydrothermal alteration about 200 by 700 m. SOURCES: R. F. Robinson, written commun., 1975; Frederic H. Wilson and Robert L. Detterman, written commun., 1985.

AP9. 56 10 158 20	Warner Bay (Prospect Bay). Cu, Mo, Pb, Zn	Polymetallic vein. Late Tertiary granodiorite	Average grade of 0.3% Cu; up to 0.7% Cu. Unknown Mo grade

DESCRIPTION: Disseminated molybdenite and chalcopyrite along joint surfaces in closely jointed granodiorite. Galena and sphalerite in veins parallel to main set of joints, or in distinct hematite-rich breccia zones. Hosted in several square kilometer area in the late Tertiary Devils batholith grading from quartz diorite to granodiorite. Little to no sericite or argillite alteration. Diatreme or breccia pipe at north end of deposit contains clasts of propylitically altered granodiorite cemented by galena, sphalerite, pyrite, calcite, and zeolites. SOURCES: Atwood, 1911; Wilson and Cox, 1983; Thomas K. Bundtzen, written commun., 1984.

AP10. 56 30 158 44	Cathedral Creek, Braided Creek. Cu, As, Zn, Pb	Polymetallic vein. Late Tertiary andesite to dacite stocks	No data

DESCRIPTION: Quartz, arsenopyrite, sphalerite, chalcopyrite, and galena in veins adjacent to various late Tertiary stocks of pyroxene andesite, hornblende andesite, and biotite dacite. Textures and field relations indicate shallow emplacement of stocks. Minor chalcopyrite and pyrite in zones of sericite alteration in stocks and adjacent sedimentary rocks. Stocks intruded into the Chignik, Hoodoo, Tolstoi, and Meshik Formations. Stock at Cathedral, at Bee Creek (AP12, below), and others in area aligned along 65 km east-west-trending lineament that ends at Black Peak, a Holocene volcanic center. SOURCES: R. F. Robinson, written commun., 1975; Cox and others, 1981; Wilson and Cox, 1983; Frederic H. Wilson, written commun., 1985.

AP11. 56 14 158 30	Mallard Duck Bay. Cu, Mo	Porphyry Cu-Mo and (or) polymetallic vein(?). Oligocene andesite flows, breccias, lahars	No data

DESCRIPTION: Pyrite, chalcopyrite, and molybdenite veinlets in swarms concentrated along intersection joint systems. Cut by numerous diorite dikes. Intense sericitic alteration over several square kilometers with weak propylitic alteration to northwest. SOURCE: Wilson and Cox, 1983.

AP12. 56 31 158 24	Bee Creek. Cu, Au	Porphyry Cu. Late Tertiary dacite stock	Grab samples grading up to 0.25% Cu, 0.01% Mo, 0.06 g/t Au. Estimated 4.5 to 9.1 million tonnes grading 0.25% Cu, 0.01% Mo, and trace Au

DESCRIPTION: Disseminated chalcopyrite in arkosic sandstone near late Tertiary hypabyssal dacite stock. Zonal alteration pattern with a potassic-altered core, and a propylitically altered periphery. Sericite alteration superposed on both core and periphery. Altered part of dacite stock about 3 sq km in area. Stock intruded into the Upper Jurassic Naknek Formation. SOURCES: E. D. Fields, written commun., 1977; Cox and others, 1981; Wilson and Cox, 1983; Robert L. Detterman, oral commun., 1986.

AP13. 57 12 157 00	Rex. Cu, Au	Porphyry Cu. Early Tertiary andesite stocks	No data

DESCRIPTION: Stockwork of chalcopyrite, pyrite, and molybdenite in disseminations and on coatings on joint surfaces in series of closely fractured, small hypabyssal andesite stocks. Hematite zones in brecciated hornfels in contact metamorphic aureole. Stock about 3 sq km in area. Stocks intrudes the lower Tertiary Tolstoi Formation and overlying volcanic rocks of the Meshik Formation. K-Ar ages of stocks and hydrothermal alteration range from 34 to 39 m.y. Drilling in 1977. SOURCES: Thomas K. Bundtzen, written commun., 1984; Frederic H. Wilson, written commun., 1985.

AP14. 57 03 157 13	Mike. Mo, Au, Ag, Pb, Zn	Porphyry Mo. Pliocene dacite and rhyodacite stock	Grab samples with >20 g/t Mo

DESCRIPTION: Area of intense silicic alteration, and weak propylitic and potassic alteration, and disseminated molybdenite, pyrite, and chalcopyrite on joint surfaces with local pyrite zones in fractured Pliocene dacite and rhyodacite stock intruding sandstone, conglomerate, and siltstone of the Jurassic Naknek Formation. Samples with anomalous Au, Ag, and Mo from center of altered zone, and with anomalous Pb and Zn on periphery of altered zone. K-Ar age of 3.65 m.y. for stock. Drilling in 1977. SOURCES: Frederic H. Wilson and Dennis P. Cox, written commun., 1985; Robert L. Detterman, oral commun., 1986.

AP15. 57 11 156 24	Kilokak Creek. Pb, Zn	Polymetallic vein(?). Late Cretaceous Hoodoo Formation and younger volcanic rocks	No data

DESCRIPTION: Zone of alteration and sparse veins with anomalous Pb and Zn values in black siltstone of the Upper Cretaceous Hoodoo Formation, and shallow-water to nonmarine sandstone, shale, and conglomerate of the Chignik Formation, and in Eocene(?) volcanic and hornblende andesite plug. Little aleration in andesite plug; extensive disseminated pyrite in country rock surrounding plug. Zone of alteration and sparse veins on periphery of, and predating the Pliocene Agripina Bay (granodiorite) batholith. SOURCE: Frederic H. Wilson, written commun., 1985.

AP16. 59 16 154 38	Kuy. Au, Ag, Cu	Epithermal vein. Tertiary andesite to dacite flows	No data

DESCRIPTION: Quartz veins and quartz vein breccia with gold-silver tellurides and chalcopyrite. Veins occur in gash fractures striking west-northwest and dipping steeply southeast. Fracture zone about 300 m wide and 900 m long. Veins exposed for about 90 m along strike. Abundant vugs and comb quartz. Flattened rod shape and steep southeast plunge for individual quartz bodies. Veins and fracture system hosted in dacite tuff breccia unit that is part of upper levels of dissected Tertiary summit caldera. Fracture zone exhibits intense argillite and pyrite alteration; silicic alteration occurs in narrow envelope surrounding quartz veins. Older basement of Mesozoic(?) sedimentary rocks. SOURCE: Gary L. Andersen, written commun., 1984.

AP17. 59 31 154 23	Fog Lake (Pond). Au, Cu, Ag	Epithermal vein. Tertiary dacite tuffs, lahars, and breccias	Grab samples with up to 37 g/t Au, 5 g/t Ag, >0.5% Cu

DESCRIPTION: Zone of pyrite and chalcopyrite in swarms of veinlets in altered quartz porphyry intruding Tertiary dacite tuffs, lahars, and breccias. Zone about 550 by 305 m; best developed at intersections of northwest-, northeast-, and east-northeast-trending structures. Argillic alteration in envelopes about 7 cm wide adjacent to veinlets. Outer, weaker propylitic alteration. Deposit grades to sphalerite and minor galena with anomalous Ag and Au toward northwest. Quartz porphry altered to sericite and pyrite; propylitic alteration in adjacent volcanic rocks. Dacite tuffs, lahars, and breccia, and associated agglomerate and conglomerate unconformably overlie Late Cretaceous to Paleocene(?) quartz diorite to granodiorite pluton. Andesite to dacite dikes crosscut volcanic rocks. SOURCES: Reed, 1967; Gary L. Andersen, written commun., 1984.

AP18. 59 08 154 40	Crevice Creek (McNeil). Au, Ag, Cu, Fe	Cu-Au skarn. Upper Triassic limestone, chert, and argillite	Produced 11 tonnes grading 4.5 g/t Au, 514 g/t Ag, and and 17.5% Cu from high grade zones

DESCRIPTION: At least ten epidote-garnet skarn bodies occurring in limestone in a 2 sq km area adjacent to southwest part of the Jurassic(?) granodiorite stock of Pilot Knob. Skarn bodies 3 to 800 m long and a few centimeters to 60 m wide. Magnetite-rich skarn in isolated pods in nearby metavolcanic rocks. Skarn bodies hosted in limestone, chert, and argillite of the Upper Triassic Kamishak Formation and in overlying metavolcanic rocks of the Jurassic Talkeetna Formation. Local disseminated magnetite zones in epidote-garnet skarns. Largest skarn body at Sargent Creek contains epidote, garnet, actinolite, quartz, pyrite, and chalcopyrite. Lenses up to 1 m wide and 10 m long average 7% Cu. Numerous magnetic anomalies in area surrounding granodiorite stock. SOURCES: Martin and Katz, 1912; Richter and Herreid, 1965.

AP19. 60 13 154 05	Kasna Creek (Kontrashibuna). Cu, Au, Ag, Fe	Fe skarn. Upper Triassic dolomite	Chip samples averaging 0.95% Cu, 27% Fe, traces of Au, Ag. Grab samples with up to 0.25% Zn. Estimated 9.1 million tonnes grading 1% Cu

DESCRIPTION: Skarn bodies with specular hematite and lesser magnetite and chalcopyrite with gangue amphibole, chlorite, calcite, and quartz replacing Upper Triassic dolomite and limestone. Replacement occurs parallel to bedding. Skarn bodies occur in zone about 320 m long and 700 m wide adjacent to Jurassic tonalite. Tuffs, mafic volcanic rocks, and agglomerate occur with limestone. SOURCES: Warfield and Tutledge, 1951; Reed and Lanphere, 1969; Eakins, 1970.

AP20. 60 14 152 51	Magnetite Island. (Tuxedni Bay). Fe, Ti	Fe skarn. Upper Triassic marble	Zones with 20 to 75% magnetite. Up to several thousand tonnes magnetite

DESCRIPTION: Two skarn bodies with magnetite replacing upper Paleozoic to lower Mesozoic marble. Skarn bodies occur in northeast-southwest-striking faults in Upper Triassic marble and associated sedimentary and volcanic rocks adjacent to Jurassic quartz diorite pluton. Disseminated magnetite in hornfels in eastern deposit. Massive magnetite and garnet between marble hanging wall and hornfels footwall in western deposit. SOURCES: Grantz, 1956; Detterman and Hartsock, 1966.

AP21. 60 07 152 57	Johnson Prospect. Au, Zn, Cu, Pb	Epithermal vein(?). Lower Jurassic Talkeetna Formation	Average grade of 21 to 41.2 g/t Au, 9.4 to 24.8% Zn, 2.8% Pb, and 1.7% Cu

DESCRIPTION: Quartz-sulfide vein stockwork with chalcopyrite, pyrite, sphalerite, galena, and gold. Stockwork occurs in a discordant, pipelike body of silicified volcanic rocks. Veins also contain chlorite, sericite, anhydrite, and barite alteration. Deposit occurs in volcaniclastic, pyroclastic, and volcanic rocks, part of the Portage Creek Agglomerate Member of the Lower Jurassic Talkeetna Formation. Nearby Late Jurassic quartz diorite and quartz monzonite. SOURCES: R. L. Detterman, oral commun., 1984; Carl I. Steefel, written commun., 1984.

AP22. 60 17 154 15	Kijik River. Cu, Mo	Polymetallic vein and porphyry Cu. Early Tertiary dacite porphyry	Grab samples with up to 0.25% Cu, and 0.17% Mo in a 3 square km area. Estimated 91 million tonnes

DESCRIPTION: Large area of low-grade, disseminated sulfides in, and adjacent to early Tertiary dacite porphyry. Distinctive orange gossan over a 3 sq km area with extensive stockwork, and zones of sericite and sulfides. Extensive propylitic and silicic alteration of dacite porphyry. Early Tertiary dacite porphyry intrudes older volcanic rocks. SOURCES: Eakins and others, 1978; Nelson and others, 1985; Thomas K. Bundtzen, written commun., 1984.

AP23. 60 45 154 30	Bonanza Hills. Ag, Cu, Pb, Au	Polymetallic vein and porphyry Cu. Late Cretaceous granite and associated volcanic rocks	At Main Saddle estimated 45,000 tonnes grading 81 g/t Ag, 0.15% Cu, 0.67% Pb, and 0.15 g/t Au

DESCRIPTION: Main Saddle: tetrahedrite, arsenopyrite, galena, and chalcopyrite in quartz-limonite vein up to 3 m wide and 150 m long. Vein hosted in contact-metamorphosed dacite flow and sandstone sequence near two-mica hypabyssal granite pluton. VABM Trail and Bonanza: stibnite, arsenopyrite, and gold in en-echelon veinlets adjacent to dacite porphyry and quartz monzonite plutons. Extensive sericite and silicic alteration of pluton rocks. Plutons intrude Lower Cretaceous shale and sandstone, part of extensive Upper Jurassic and Lower Cretaceous flysch in region. SOURCES: Eakins and others, 1978; Thomas K. Bundtzen, written commun., 1984; Nelson and others, 1985.

AP24. 60 51 153 12	Glacier Fork. Cu, Zn, Au, Ag	Cu-Zn skarn.	Chip samples grading 0.76% Cu, 3.4% Zn, 0.38 g/t Au, 20 g/t Ag

DESCRIPTION: Layers and veinlets of disseminated and massive pyrrhotite, chalcopyrite, arsenopyrite, and sphalerite in iron-poor, garnet-rich skarn. Skarn occurs in large roof pendant in granitic rocks. SOURCE: Nelson and others, 1985.

SIGNIFICANT METALLIFEROUS LODE DEPOSITS, SOUTHERN ALASKA

By Warren J. Nokleberg, with contributions from Thomas K. Bundtzen, Ian M. Lange, Clint R. Nauman, Steven W. Nelson, Rainer J. Newberry, Donald H. Richter, Richard C. Swainbank, and Gregory Thurow

MAP NUMBER. LATITUDE LONGITUDE	NAME. COMMODITIES	TYPE. GEOLOGIC HOST UNIT	TONNAGE AND GRADE. PRODUCTION, IF KNOWN

POLYMETALLIC AND Cu-Au QUARTZ VEIN, Sn GREISEN AND VEIN, Cu-Pb-Zn SKARN, PORPHYRY Mo AND Cu-Mo, GABBROIC Ni-Cu, BESSHI MASSIVE SULFIDE, AND Sn GREISEN DEPOSITS, SOUTHWESTERN AND WESTERN ALASKA RANGE

S01. 62 11 153 40	Bowser Creek (Farewell District). Ag, Pb, Zn	Pb-Zn skarn. Felsic dike in early Tertiary granitic pluton	Estimated 14,000 tonnes grading 1,300 g/t Ag, and up to 10% combined Pb and Zn. Estimated 272,000 tonnes with 20% Pb and Zn, and 100 g/t Ag

DESCRIPTION: Pyrrhotite, sphalerite, galena, and chalcopyrite in a hedenbergite-johannsenite endoskarn occurring in marble adjacent to felsic dike. Local fissures with Ag-rich galena and pyrrhotite occur within marble adjacent to skarn. Nearby small Zn- and Cu-rich stockwork veinlets in plutons, and disseminated sulfides in plutons and endoskarn. SOURCES: Bundtzen and others, 1984b; Szumigala, 1984.

S02. 62 14 154 20	Chip-Loy (Farewell District). Ni, Co, Cu	Gabbroic Ni-Cu(?). Ordovician shale	Estimated 9,100 tonnes grading 1% Ni, 0.1% Co

DESCRIPTION: Massive to disseminated pyrrhotite, bravoite, and chalcopyrite in irregular, steeply dipping layer. Occurs along contact between diabase and Ordovician shale. Other nearby Ni-Co massive sulfide deposits occur along contacts between diabase dikes. SOURCES: Herreid, 1968; Gilbert and Solie, 1983; Bundtzen and others, 1985.

S03. 62 14 153 48	Rat Fork, Sheep Creek (Farewell district. Cu, Zn, Pb	Cu-Pb-Zn skarn. Lower Paleozoic marble	Grab samples with up to 3% Cu and 10% combined Zn, Pb

DESCRIPTION: Large slivers of Cu- and Zn-rich skarn between Tertiary granodiorite dikes in a 3-km-wide dike swarm. Johannsenite-sphalerite skarn in marble, and chalcopyrite-rich garnet endoskarn in dikes. Local Ag-rich galena vein in marble about 0.5 km north of dike swarm. Dikes trend east-west; skarn up to 25 m wide. SOURCES: Herreid, 1968; Reed and Elliott, 1968a, b; Bundtzen and others, 1984b, 1985; Szumigala, 1984.

S04. 62 23 153 38	Tin Creek. Pb, Zn, Cu	Cu-Pb-Zn skarn. Lower Paleozoic marble and Tertiary granodiorite	Estimated 230,000 tonnes with 16% combined Pb and Zn

DESCRIPTION: Pyroxene-rich skarn with abundant sphalerite and minor chalcopyrite, and garnet skarn with chalcopyrite and minor sphalerite. Local abundant epidote and amphibole. Pyroxene skarn distal, and garnet skarn proximal to extensive Tertiary granodiorite dike swarm. SOURCES: Herreid, 1966; Reed and Elliott, 1968a, b; Bundtzen and others, 1984b, 1985; Szumigala, 1985.

S05. 62 40 152 30	Shellebarger Pass. Cu, Ag, Fe, Zn	Besshi massive sulfide. Mesozoic pillow basalt	Estimated several hundred thousand tonnes of unknown grade. Up to 5% Cu, average of 2% Cu, 1% Zn

DESCRIPTION: Very fine grained mixture of mainly pyrite and marcasite with lesser sphalerite, chalcopyrite, galena, and pyrrhotite in a gangue of siderite, calcite, quartz, and dolomite. Sulfides and gangue occur in lenticular massive sulfide bodies, as replacements of carbonate-rich beds, and as fracture fillings, mainly in chert and siltstone. Host rocks of Triassic and (or) Jurassic age consist of lower sequence of chert, dolomite, siltstone, shale, volcanic graywacke, conglomerate, aquagene tuff, and upper sequence of pillow basalt, agglomerate, and breccia. At least six individual sulfide bodies. Highest chalcopyrite concentrations in basal parts of deposits. Minor sphalerite in or near hanging wall zones. Main sulfide bodies may be proximal to basaltic flow fronts. Extensive hydrothermal alteration in footwall; rare to absent in hanging wall. High background Cu values of 250 to 300 g/t. SOURCES: Reed and Eberlein, 1972; Bundtzen and Gilbert, 1983.

S06. 62 53 152 08	Boulder Creek (Purkeypile). Sn	Sn greisen(?). Tertiary granite	Estimated 136,000 kg Sn. Grab samples with up to 18% Sn, 7,900 g/t Ag

DESCRIPTION: Disseminated cassiterite and sulfides in clusters of narrow open-space fracture fillings, suggestive of stockwork deposit. Deposit occurs in lime silicate rock, quartzite, and argillite approximately 100 to 200 m north of Tertiary biotite granite, part of the lower Tertiary McKinley sequence. SOURCES: Maloney and Thomas, 1966; Conwell, 1977; Reed and others, 1978; Warner, 1985.

S07. 60 51 151 48	Miss Molly (Hayes Glacier). Mo	Porphyry Mo. Tertiary(?) granite	Grab and chip samples with up to 0.38% Mo, 0.16% Zn

DESCRIPTION: Quartz veins with medium- to coarse-grained molybdenite, pyrite, and local fluorite. Veins are regularly spaced, subparallel, vary from 2 to 10 cm wide, and are spaced 2 to 10 m apart. Veins occur in two zones about 545 m long and up to 150 m wide in leucocratic, equigranular biotite Tertiary(?) granite stock. Veins locally fill joints and less commonly shears. Hydrothermal alteration of sericite and pyrite, up to 0.3 m wide, occurs adjacent to veins. Granite stock intrudes siltstone, part of Upper Jurassic and Lower Cretaeous flysch. Nearby granitic plutons with K-Ar ages of 56 to 59 m.y. SOURCE: Fernette and Cleveland, 1984.

S08. 63 04 149 57	Partin Creek. Cu, Au, Ag	Polymetallic vein or Cu-Ag quartz vein. Triassic(?) metabasalt and limestone	Grab samples with up to 0.7% Cu, 63 g/t Au, 300 g/t Ag

DESCRIPTION: Zone of pyrite, arsenopyrite, pyrrhotite, and chalcopyrite in veinlets, disseminations, or vesicle fillings. Zone at least 3,000 m long and 1,000 m wide in Triassic(?) metamorphosed pillow basalt and strongly limonite-stained marble. SOURCE: Hawley and Clark, 1974.

S09. 63 00 149 51	Coal Creek. Sn, Ag, W, Zn	Sn greisen(?) and Sn vein. Tertiary granite	Estimated 5 million tonnes grading 0.28% Sn and about 0.5% Cu. Grab samples with up to 1.5% Sn, 148 g/t Ag

DESCRIPTION: Cassiterite in sporadic grains and locally high concentrations in sheeted vein system, and in minor disseminations within and above apical dome of early Tertiary granite intruding older, related granite, and in thin quartz topaz-sulfide veinlets, 1 to 3 mm wide, that postdate alteration and stockwork veinlets. Veins vary from hairline to 1 cm width, are nearly vertical, and reach a density of 10 veins per m in most intensely fractured zones. Veins form stockwork along fracture(?) zone in granite in area about

4,000 m^2. Veinlet sulfides include arsenopyrite, pyrite, pyrrhotite, and sphalerite. Granite adjacent to veinlets pervasively altered to quartz, tourmaline, topaz, sericite, and minor fluorite. Granite intrudes contact-metamorphosed Devonian argillite, graywacke, and minor limestone of Chulitna area. Granite probably part of the McKinley sequence with K-Ar ages of 55 m.y. SOURCES: Reed, 1977; Warner, 1985; Gregory Thurow, written commun., 1984.

S010. 63 09 149 52	Ready Cash. Cu, Pb, Ag, Sn, Zn	Polymetallic vein(?). Triassic(?) metabasalt	Chip sample with 1.4 g/t Au, 857 g/t Ag, 1.5% Cu, and 5% Pb

DESCRIPTION: Zone of arsenopyrite, chalcopyrite, and galena in quartz-arsenopyrite-sulfide veins, massive sulfide veins, and disseminations. Zone at least 1.6 km long; occurs in Triassic(?) limestone and pillow basalt of Chulitna region. SOURCE: Hawley and Clark, 1974.

S011. 63 13 149 38	Golden Zone. Au, Cu, Ag, Pb, Zn, As, Sb	Polymetallic vein and associated Au-Ag breccia pipe. Tertiary diorite porphyry	Average values up to 20.6 g/t Au. Up to 172 g/t Ag and 1% Cu. Produced 49,169 g Au, 267,990 g Ag, 19 tonnes Cu

DESCRIPTION: Zone of disseminated to small masses of gold and arsenopyrite, and minor chalcopyrite, sphalerite, and pyrite in quartz gangue. Sulfides and quartz gangue fills open spaces of breccia pipe in center of early Tertiary quartz diorite porphyry, and fractures in porphyry adjacent to breccia pipe. Zone about 125 m in diameter; high-grade ore occurs in breccia pipe approximately 75 m in diameter at surface. Abundant veins adjacent to porphyry. Porphyry, dated at 68 m.y., intrudes Permian to Jurassic sedimentary rocks of Chulitna area. SOURCES: Hawley and Clark, 1974; Swainbank and others, 1977; Charles C. Hawley, written commun., 1985.

S012. 63 17 149 27	Nim and Nimbus (Silver King). Au, Ag, Cu, Zn, Mo, As	Polymetallic vein. Early Tertiary granitic porphyry and felsic dike	Nimbus: grab samples with up to 2% Cu, 137 g/t Ag, 13 g/t Au

DESCRIPTION: Nim: Deposit of veins, veinlets, and disseminations of arsenopyrite, chalcopyrite, molybdenite, and chalcocite, with some pyrite, bornite, and pyrrhotite in breccia pipes and in dikes of rhyolite porphyry and quartz porphry within a body of granite porphyry. Igneous rocks intrude Triassic(?) and Jurassic(?) clastic sedimentary rocks. Deposit occurs in area about 1 km by 2 km. Nimbus (Silver King): Prospect composed of lens of massive arsenopyrite, pyrite, and sphalerite 1 to 2 m thick and 10 m long occurring in brecciated quartz diorite porphyry dike that occurs in strand of Upper Chulitna fault. SOURCES: Hawley and Clark, 1974; Swainbank and others, 1977; Richard C. Swainbank, written commun., 1985.

S013. 63 11 149 55	Ohio Creek Sn, Ag, As	Sn greisen and Sn vein. Tertiary granite stock	Grab samples with up to 0.1% Sn, and minor Ag, As, Cu, Zn

DESCRIPTION: Zone of muscovite-tourmaline greisen and quartz arsenopyrite veins in tourmaline-bearing Tertiary granite stock. Zone about 1.6 km long and 0.8 km wide. Greisen zone about 4 m thick and 45 m long occurs along contact with biotite-rich inclusion. Stock part of the lower Tertiary McKinley sequence and intrudes argillite, graywacke, and conglomerate, part of Upper Jurassic(?), Cretaceous, and lower Tertiary(?) flysch in region. SOURCE: Hawley and Clark, 1974.

S014. 62 53 149 18	Treasure Creek. Mo, Cu, Au, Zn	Porphyry Cu-Mo. Tertiary quartz monzonite	No data

DESCRIPTION: Disseminated molybdenite, chalcopyrite, arsenopyrite, sphalerite, fluorite, and epidote in silicified and sheared Tertiary granite stock, and in bordering argillite and metagraywacke intruded by granite. Local intense argillic alteration and limonite staining adjacent to fault, extending irregularly up to 100 m into granite stock. Argillite and metagraywacke part of extensive Lower Cretaceous flysch in region. Granite stock part of the lower Tertiary McKinley sequence. SOURCES: Richter, 1963; Csejtey and Miller, 1978.

BASALTIC Cu, Cu-Ag QUARTZ AND POLYMETALLIC VEIN, Cu-Au-Ag SKARN, Fe SKARN, BESSHI MASSIVE SULFIDE, PORPHYRY Cu AND Cu-Mo, AND DUNITIC Ni-Cu DEPOSITS, CENTRAL AND EASTERN ALASKA RANGE AND WRANGELL MOUNTAINS

S015. 63 09 147 08	Denali (Pass Creek). Cu, Ag	Besshi massive sulfide(?). Upper Triassic argillite	Massive sulfide layers with abundant Cu and up to 13 g/t Ag

DESCRIPTION: Stratiform masses and bodies of very fine grained and thin-layered chalcopyrite and pyrite in thin-bedded, shaly, carbonaceous, and limy argillite enclosed in the Upper Triassic Nikolai Greenstone. Zone up to 166 m long and 9 m wide. Zone extends at least 212 m below surface. Rhythmic layering of sulfides. Locally moderately folded. Sulfides and host rocks metamorphosed at lower greenschist facies. Several hundred meters of underground workings. Mine developed from 1964 to 1969. Interpreted to have formed in reducing or euxinic marine basin created by abundant organic matter and sulfate reducing bacteria, in a submarine volcanic environment. SOURCES: Stevens, 1971; Seraphim, 1975; Smith, 1981.

S016. 63 13 146 42	Zackly. Au, Cu, Ag	Cu-Au skarn. Cretaceous quartz monzodiorite	Grab samples with up to 6.6% Cu, 4.4 g/t Au, 30 g/t Ag. Estimated 1.25 million million tonnes grading 2.6% Cu and >6 g/t Au

DESCRIPTION: Disseminated chalcopyrite, bornite, pyrite, and gold in zone of andradite garnet-pyroxene skarn and adjacent sulfide bodies in marble. Hosted in Upper Triassic marble along east-west-striking contact adjacent to albitized Cretaceous quartz monzodiorite. Zone about 650 m long and about 30 m wide. Marble and diorite locally intensely faulted. Higher Au grades mainly associated with supergene(?) assemblage of malachite, limonite, chalcedony, and native copper. Gold occurs only in skarn; granitic pluton and wallrocks barren of gold. General zoning from granitic pluton to skarn with (1) brown garnet with chalcopyrite, (2) green garnet with bornite and chalcopyrite, (3) clinopyroxene and wollastonite, to marble with magnetite and bornite. SOURCES: Rose, 1965b; Ian M. Lange and Warren J. Nokleberg, written commun., 1984; Nokleberg and others, 1984; Rainier Newberry, written commun., 1985; Clint R. Nauman, written commun., 1985.

S017. 63 17 146 33	Kathleen-Margaret. Cu, Ag, Au	Cu-Ag quartz vein. Upper Triassic Nikolai Greenstone	Grab samples with up to 13% Cu, 3.2 g/t Au, 300 g/t Ag, and 0.07% Sn. About 1.8 tonnes ore produced

DESCRIPTION: Quartz veins up to 140 m long and 3 m wide with disseminated to locally massive chalcopyrite, bornite, and malachite. East-west striking vein system. Veins intruded along shear zones in the Upper Triassic Nikolai Greenstone. SOURCES: MacKevett, 1965; Nokleberg and others, 1984.

S018. 63 20 146 02	Rainy Creek District. Cu, Ag, Au	Cu-Ag skarn. Upper Paleozoic marble	Grab samples with up to 5.6% Cu, 300 g/t Ag, 1.2 g/t Au, 0.07% Zn

DESCRIPTION: Zone of disseminated to small masses of chalcopyrite, bornite, and minor sphalerite, galena, magnetite, secondary Cu-minerals, and sparse gold in several localities of garnet-pyroxene skarn. Deposits occur in faulted lenses of marble of the Pennsylvanian and Permian Slana Spur Formation adjacent to late Paleozoic(?) metagabbro, metadiabase, and meta-andesite hypabyssal intrusive rocks. Local disseminated sulfides in metaandesite. Zone of skarns up to about 10 km long and up to 5 km wide. Sulfide zones and adjacent wallrocks locally intensely faulted. SOURCES: Rose, 1966; Lange and others, 1981; Nokleberg and others, 1984; Ian M. Lange and Warren J. Nokleberg, written commun., 1984.

S019. 63 20 145 41	Rainbow Mountain. Cu, Ag	Porphyry Cu. Upper Paleozoic meta-andesite to metadacite porphyries	Grab samples with up to 10% Cu, 44 g/t Ag, trace Au

DESCRIPTION: Zone of disseminated to small masses of chalcopyrite and pyrite, and minor sphalerite and galena in Permian meta-andesite and metadacite hypabyssal subvolcanic porphyries. Zone up to 6 km long along strike and up to 1 km wide. Local disseminated sulfides in adjacent metavolcanic and metasedimentary rocks. SOURCES: Lange and others, 1981; Nokleberg and others, 1984; Ian M. Lange and Warren J. Nokleberg, written commun., 1985.

S020. 63 13 146 48	Fish Lake. Cr, Ni	(Dunitic Ni-Cu). Upper Triassic ultramafic rocks	Grab samples with >0.5% Cr and 0.3% Ni

DESCRIPTION: Strike zone with disseminated chromite and wispy layers in serpentinized olivine cumulate. Zone up to 15 km long along strike and up to 2 km wide. Local anomalous Cu and Ni in stream-sediment and rock samples. Olivine cumulate interpreted as comagmatic with mafic magmas forming metamorphosed basalt in the Upper Triassic Nikolai Greenstone. SOURCES: Nokleberg and others, 1984; Ian M. Lange and Warren J. Nokleberg, written commun., 1985.

S021. 63 09 144 48	Slate Creek. Cu, Ag, Au, Zn	Porphyry Cu(?). Late Permian(?) meta-andesite to metadacite porphyries	Grab samples with up to 2% Cu, 70 g/t Ag, 2 g/t Au

DESCRIPTION: Zone of disseminated to small masses of chalcopyrite and pyrite, and minor sphalerite and galena in Permian(?) meta-andesite to metadacite hypabyssal porphyries. Zone about 2 km wide and up to 9 km long along strike. Local disseminated sulfides in adjacent metavolcanic and metasedimentary rocks of the Pennsylvanian and Permian Slana Spur Formation. SOURCES: Lange and others, 1981; Ian M. Lange and Warren J. Nokleberg, written commun., 1984; Nokleberg and others, 1984.

S022. 62 49 144 10	Chistochina District. Pb, Cu, Ag, Au	Porphyry Cu and polymetallic vein. Late Paleozoic Ahtell pluton	Grab samples with up to 20% Pb, 1.4% Cu, 21 g/t Ag, 1.4 g/t Au

DESCRIPTION: Several areas with galena, pyrite, chalcopyrite, tetrahedrite, or gold in quartz veins, small masses, and (or) disseminations in margins of the quartz diorite Pennsylvanian and Permian Ahtell pluton and in adjacent volcanic and sedimentary rocks of the Pennsylvanian and Permian Slana Spur Formation. Quartz veins up to 10 m wide and locally with massive barite, calcite, and cerussite. Zone of occurrences about 5 km long and 3 km wide. Local small Cu-Au and Pb-Zn skarns. SOURCES: Richter, 1966; Rainier J. Newberry, written commun., 1985.

S023. 62 23 143 00	Nabesna, Rambler. Au	Fe skarn. Upper Triassic Chitistone or Nizina Limestone	Produced about 1.66 million g Au, minor Ag and Cu (Nabesna mine). Estimated 18,000 tonnes grading 34.3 g/t Au (Rambler mine)

DESCRIPTION: Nabesna Mine: massive oxide-sulfide bodies, quartz-pyrite veins, and pyrite veins all with disseminated gold in Upper Triassic limestone near contact with Cretaceous monzodiorite pluton. Massive oxide-sulfide bodies chiefly pyrite and magnetite with minor chalcopyrite, galena, sphalerite, arsenopyrite, stibnite, and gold. Pyrite veins formed by replacement of limestone along pre-existing fractures; contain disseminated to small masses of chalcopyrite, galena, sphalerite, magnetite, pyrrhotite, arsenopyrite, stibnite, and gold. Major body of massive auriferous pyrrhotite and pyrite at Rambler Mine. Monzodiorite pluton has K-Ar ages of 109 and 114 m.y. Principal mining at Nabesna from about 1930 to 1941. Several hundred meters of workings. SOURCES: Wayland, 1943; Richter and others, 1975; Donald H. Richter, written commun., 1985; Rainer Newberry, written commun., 1985.

S024. 62 12 142 45	Orange Hill, Bond Creek. Cu, Mo	Porphyry Cu-Mo and Cu-Au skarn. Cretaceous Nabesna pluton	Estimated 320 million tonnes grading 0.35% Cu and 0.02% Mo (Orange Hill). 500 million tonnes grading 0.30% Cu and 0.02% Mo (Bond Creek)

DESCRIPTION: Two areas with pyrite, chalcopyrite, and minor molybdenite in quartz veinlets in the Cretaceous Nabesna pluton, a complex intrusion of granodiorite and quartz diorite intruded by granite porphyry. Abundant biotite-quartz, quartz sericite, and chlorite-sericite-epidote alteration. Late anhydrite veins. Altered areas of 1,000 by 3,000 m for Orange Hill and 2,000 by 3,000 m for Bond Creek. Associated skarns with pyrite, chalcopyrite, bornite, and magnetite (Orange Hill), and sphalerite, pyrite, pyrrhotite, and chalcopyrite in adjacent areas. Plutons intrude upper Paleozoic metavolcanic rocks and marble, and the Upper Triassic limestone and Nikolai Greenstone. SOURCES: Van Alstine and Black, 1946; Richter and others, 1975.

S025. 62 07 142 50	Nabesna Glacier and adjacent areas. Cu, Zn, Au	Polymetallic vein(?). Late Paleozoic Tetelna Volcanics	No data.

DESCRIPTION: Three adjacent areas with: (1) quartz veins and veinlets with pyrite and minor chalcopyrite and sphalerite; (2) a zone of disseminated malachite and azurite; (3) a zone of intense alteration with breccia cemented by quartz, pyrite, chalcopyrite, and galena. Deposits occur in late Paleozoic metavolcanic porphyry and metabasalt flows of the Tetelna Volcanics; may be related to nearby Cretaceous and Tertiary granitic plutons and dikes. SOURCE: Richter and others, 1975.

S026. 62 05 141 13	Baultoff, Horsfeld, Carl Creek. Cu, Mo	Porphyry Cu. Cretaceous Klein Creek batholith	Estimated 240 million tonnes grading 0.2% Cu and <0.01% Mo. Trace Au

DESCRIPTION: Three separate areas with pyrite and chalcopyrite in veinlets and disseminations in altered Cretaceous granitic plutons. Plutons composed of quartz diorite, quartz diorite porphyry, or granite porphyry. Altered areas up to 1,000 by 2,000 m with chlorite, sericite, albite, and pyrite. Local actinolite veins and disseminations. Host rocks part of the Cretaceous Klein Creek batholith and associated granitic rocks. Intrude Upper Jurassic and Lower Cretaceous flysch of Gravina-Nutzotin belt. SOURCE: Richter and others, 1975.

S027. 61 33 143 47	Midas (Berg Creek). Au, Cu, Ag	Cu-Au skarn. Triassic Nizina Limestone	Grab samples with up to 8 g/t Au, 10 g/t Ag, and 20% Cu

DESCRIPTION: Disseminated to small masses of magnetite, pyrite, and chalcopyrite in quartz veins and skarns hosted in metamorphosed limestone adjacent to Jurassic granodiorite to quartz monzodiorite pluton. Skarn composed of magnetite and epidote with local pyrite, chalcopyrite, and gold. Two short adits. SOURCE: MacKevett, 1976.

S028. 61 34 143 43	London and Cape. Cu, Mo, Ag	Porphyry Cu-Mo. Jurassic(?) granodiorite and quartz diorite	Grab samples with up to 10% Cu, 0.007% Mo, 1.5 g/t Ag. Average grade of 0.1% Cu

DESCRIPTION: Pyrite and chalcopyrite in veinlets and disseminations in locally altered Jurassic(?) granodiorite and quartz diorite. Small adit. Granitic rocks intrude Lower Cretaceous sedimentary rocks. SOURCES: Moffitt and Mertie, 1923; MacKevett, 1976.

S029. 61 39 143 43	Nugget Creek. Cu, Ag	Cu-Ag quartz vein. Middle and (or) Upper Triassic Nikolai Greenstone	Grab sample with >200 g/t Ag, and >2% Cu. Produced 145 tonnes ore and concentrate

DESCRIPTION: Quartz vein more than 1 m thick with bornite, chalcopyrite, and pyrite. Vein occurs along fault in the Nikolai Greenstone. Slablike copper nugget of several tonnes in float in Nugget Creek. Development and production from 1916 to 1919. More than 1,200 m workings. Lower grades at depth. SOURCE: MacKevett, 1976.

S030. 61 31 142 50	Kennecott District. Cu, Ag	Basaltic Cu. Upper Triassic Chitistone or Nizina Limestone	Produced about 544 million kg Cu and 280 million g Ag from 4.3 million tonnes ore

DESCRIPTION: Mainly chalcocite and covellite, with lesser enargite, bornite, chalcopyrite, luzonite, and pyrite. Tennantite, sphalerite, and galena extremely rare. Local secondary malachite and azurite also occur. Sulfides occur in mainly irregular massive bodies, mainly in dolomitic parts of the Upper Triassic Chitistone or Nizina Limestone, and generally less than 100 m above the underlying Middle and (or) Upper Triassic Nikolai Greenstone. Largest ore body (Jumbo) about 110 m high, up to 18.5 m wide, and extended 460 m along plunge. Main production from 1913 to 1938. More than 96 km of underground workings. Major mines in district are Jumbo, Bonanza, Erie, Mother Lode, and Green Butte. Deposits interpreted by Armstrong and MacKevett (1982) as having formed through derivation of Cu from the underlying Nikolai Greenstone and deposited by oxygenated groundwater in dolomitic sabkha interface in open-space fillngs in fossil karsts in overlying limestone. Age of deposition interpreted as Late Triassic with possible subsequent remobilization. SOURCES: Bateman and McLaughlin, 1920; MacKevett, 1976; Armstrong and MacKevett, 1982; Edward M. MacKevett, Jr., written commun., 1986.

S031. 62 28 142 41	Nikolai. Cu, Ag	Cu-Ag quartz vein. Middle and (or) Upper Triassic Nikolai Greenstone	Grab sample with 1% Cu

DESCRIPTION: Two quartz veins, each less than 1 m thick, with bornite, chalcopyrite, bornite, pyrrhotite, and secondary copper, and iron minerals. Quartz-calcite gangue. Veins in shear zone near top of the Middle and (or) Upper Triassic Nikolai Greenstone. Deposit known to natives in late 1800's. More than 100 m of underground workings. Developed in 1899. SOURCES: Moffit and Capps, 1911; Miller, 1946; MacKevett and Smith, 1968.

S032. 61 24 142 30	Westover. Cu, Ag	Basaltic Cu. Upper Triassic Chitistone Limestone	Channel samples with abundant Cu, 50 g/t Ag, 0.2% As. Grab sample with >2% Cu, 50 g/t Ag, 0.2% As

DESCRIPTION: Wedge-shaped pods and fissures of disseminated to massive bornite-rich lenses with minor chalcocite, malachite, and chalcopyrite in lower part of the Upper Triassic Chitistone Limestone. Largest pod 10 m long and 3 m wide. Limestone locally silicified near ore. More than 400 m of underground workings. Development and minor production from 1911 to 1920. Similar to Kennecott deposit. SOURCES: Moffit and Capps, 1911; Moffit, 1918; Miller, 1946; MacKevett and Smith, 1968; MacKevett, 1976.

S033. 61 27 142 23	Nelson (Glacier Creek). Cu, Ag	Basaltic Cu. Upper Triassic Chitistone Limestone	Abundant Cu; grab samples with >2% Cu, 50 g/t Ag, 0.3% As

DESCRIPTION: Stringers and discontinuous masses of disseminated to massive chalcocite and covellite with minor enargite, bornite, malachite, chalcopyrite, native copper, and pyrite in basal parts of fault block of the Upper Triassic Chitistone Limestone. Local faulting and shearing. A few hundred meters of underground workings. Minor production from 1929 to 1930. Several pits and five short adits. Similar to Kennecott deposit. SOURCES: Miller, 1946; Sainsbury, 1951; MacKevett and Smith, 1968; MacKevett, 1976.

S034. 61 25 142 15	Erickson. Cu, Ag	Basaltic Cu. Middle and (or) Upper Triassic Nikolai Greenstone	Grab samples with >2% Cu, 70 g/t Ag

DESCRIPTION: Massive to disseminated native copper, tenorite, cuprite, and minor amounts of other Cu minerals in irregular masses, thin veins, and stringers in rubbly upper parts of flows, and to lesser extent, in amygdules and quartz-epidote veins in the Middle and (or) Upper Triassic Nikolai Greenstone. Most of copper fine-grained; masses to 27 kg. Minor production in 1917. About 100 m of underground workings. SOURCES: Miller, 1946; MacKevett and Smith, 1968; MacKevett, 1976.

Au QUARTZ VEIN, PODIFORM CHROMITE, AND GABBROIC Ni-Cu DEPOSITS, TALKEETNA MOUNTAINS, KODIAK ISLAND, NORTHWESTERN KENAI PENINSULA, AND NORTHERN CHUGACH MOUNTAINS

S035. 61 45 149 30	Willow Creek District (Gold Cord, Independence, Thope and others Au	Polymetallic vein. Jurassic, Cretaceous, and early Tertiary granitic rocks	Produced about 18.4 million g Au from 1909 to 1950. Average grades from about 17 to 69 g/t Au

DESCRIPTION: Quartz veins with pyrite, chalcopyrite, magnetite, and gold, and minor arsenopyrite, sphalerite, tetrahedrite, and galena. Veins average 0.3 to 1 m thick, locally up to 2 m thick. Veins occupy east-northeast and north-south-striking shear zones up to 7 m wide. Considerable alteration of wall rocks to sericite, pyrite, carbonate, and chlorite. Local abundant clay-rich fault gouge along shear zones. Zone of veins hosted in and along southern margin of Jurassic quartz diorite and younger Cretaceous and early Tertiary granitic rocks of the Talkeetna Mountains batholith, and in mica schist in Thorpe mine. Several mines and many prospects, mainly in area about 12.8 km long and 6.2 km wide along southern margin of batholith. Total of several thousand meters of underground workings. Nearly continuous mining and development from 1909 through 1942; sporadic activity from 1951 through present. SOURCE: Ray, 1954.

S036. 57 22 154 36	Halibut Bay. Cr	Podiform chromite. Early Jurassic or older dunite tectonite	Eight low-grade deposits with estimated 180,000 tonnes Cr_2O_3

DESCRIPTION: Sparse layers and lenses of chromite in dunite and sparse clinopyroxenite tectonite in areas up to 300 m long and about 100 m wide. Ultramafic rocks part of the Early Jurassic or older, informally named Border Ranges ultramafic and mafic complex of Burns (1985), faulted at base. SOURCES: Foley and Barker, 1984; Burns, 1985.

S037. 59 12 151 49	Claim Point. Cr	Podiform chromite. Early Jurassic or older dunite tectonite	Estimated 82,000 tonnes Cr_2O_3. Produced 2,000 tonnes

DESCRIPTION: Layers and lenses of chromite up to 60 m long and 14 m wide in dunite tectonite in area about 500 by 500 m. About 14 separate deposits. Hosted in Early Jurassic or older layered dunite tectonite. Sparse olivine-pyroxene dikes. Local abundant serpentinite. Ultramafic rocks part of Early Jurassic or older, informally named Border Ranges ultramafic and mafic complex of Burns (1985), faulted at base. Explored and developed from about 1909 to 1919. Mining from 1917 to 1918. Several hundred meters of underground workings and trenches. SOURCES: Guild, 1942; Burns, 1985; Foley and Barker, 1985.

S038. 59 22 151 30	Red Mountain. Cr	Podiform chromite. Early Jurassic or older dunite tectonite	For two major deposits estimated 87,000 tonnes grading about 25 to 43% Cr_2O_3. One additional low-grade deposit with 1.13 million tonnes Cr_2O_3.

DESCRIPTION: Layers and lenses of chromite up to a few hundred meters long and 60 m wide in dunite tectonite in areas up to several hundred meters long. Major chromite layer about 190 m long and up to 0.3 m wide. More than 10 smaller ore bodies. Hosted in Early Jurassic or older layered dunite tectonite with minor pyroxenite in zones about 60 m thick. Local abundant serpentinite. Ultramafic rocks part of the Early Jurassic or older, informally named Border Ranges ultramafic and mafic complex of Burns (1985), faulted at base. Sporadic exploration and development from about 1919 to present. Several hundred meters of underground workings and trenches. About 26,000 tonnes ranging from 38 to 42% Cr_2O_3 produced from 1943 to 1957. Downstream of Red Mountain is nearby Windy River chromite placer deposit in glaciofluvial sand and gravel deposits with estimated 15.6 million cu m grading 1.33% Cr_2O_3. SOURCES: Guild, 1942; Bundtzen, 1983b; Burns, 1985; Foley and Barker, 1985; Foley and others, 1985..

S039. 61 32 145 09	Bernard Mountain, Dust Mountain. Cr, PGE	Podiform chromite. Early Jurassic or older dunite tectonite	Four large low-grade deposits with 330,000 tonnes Cr_2O_3

DESCRIPTION: Disseminations and sparse layers and lenses of chromite up to a few tens of meters long and 15 m wide in dunite tectonite. Largest chromite occurrence about 3.5 km long and 2.0 km wide, contains about 300,000 tonnes Cr_2O_3 grading 5% chromite. Sample of high-Fe chromian spinel from Dust Mountain contains up to 21 g/t PGE. Hosted in Early Jurassic or older layered dunite tectonite. Local abundant serpentinite. Structural sequence from south to north composed of dunite, harzburgite, wehrlite, garnet gabbro, norite, and hornblende norite. Ultramafic rocks part of the Early Jurassic or older, informally named Border Ranges ultramafic and mafic complex of Burns (1985), faulted at base. Sporadic exploration and trenching from about 1940 to present. SOURCES: Foley and others, 1984; Coleman and Burns, 1985; Burns, 1985; Newberry, 1986.

S040. 61 18 144 16	Spirit Mountain. Ni, Cu	Gabbroic Ni-Cu(?). Jurassic or older mafic and ultramafic rocks	Estimated 5,900 tonnes grading 0.22 to 0.88% Ni and 0.12 to 0.89% Cu. Up to 68.6 g/t Ag

DESCRIPTION: Pyrrhotite, pyrite, pentlandite, chalcopyrite, and minor bravoite and sphalerite in small massive sulfide lenses and disseminations in serpentinized peridotite and pyroxenite. Ultramafic rocks associated with gabbroic sills intruding upper Paleozoic limestones and older rocks. Ultramafic and mafic rocks may be part of the Early Jurassic or older, informally named Border Ranges ultramafic and mafic complex of Burns (1985), faulted at base. SOURCES: Kingston and Miller, 1945; Herreid, 1970.

Au QUARTZ VEIN DEPOSITS, KODIAK ISLAND, SOUTHEASTERN KENAI PENINSULA, AND SOUTHERN CHUGACH MOUNTAINS

S041. 57 48 152 20	Chalet Mountain (Cornelius Creek). W, Au, Ag	Au quartz vein. Late Cretaceous metagraywacke and granodiorite	Grab samples with up to 1.75% WO_3, 9.6 g/t Au, 120 g/t Ag

DESCRIPTION: Silicified zones and quartz veins with disseminated scheelite and gold(?). Zones and veins occur within a 100 by 500 m area of silicified metagraywacke of the Upper Cretaceous Kodiak Formation at Chalet Mountain, and in nearby granodiorite pluton at Anton Larsen Bay. Scheelite in silicified zones localized in calçareous-rich part of metagraywacke. SOURCES: Seitz, 1963; Rose and Richter, 1967.

S042. 59 33 150 35	Nuka Bay District (Nualaska, Lost Creek, Alaska Hills). Au	Au quartz vein. Upper Cretaceous metagraywacke and phyllite	Produced about 258,000 g Au; channel samples range from 1 to 300 g/t Au

DESCRIPTION: Quartz veins up to 1.0 m wide and 100 m long with gold, arsenopyrite, pyrite, chalcopyrite, and galena. Irregular shape with local pinch and swell. Veins generally strike east-west, normal to regional structure. Veins mainly fissure fillings in metagraywacke and to lesser extent in phyllite of the Upper Cretaceous Valdez Group. Veins probably fill tensional cross joints formed during late stages of regional folding of host rocks. Sparse Tertiary quartz diorite dikes cut by quartz veins. Several mines and prospects. About 1,300 m underground workings. Explored and developed from about 1909 to 1940. Sparse subsequent mining. SOURCE: Richter, 1970.

S043. 60 37 149 34	Alaska Oracle, Gilpatrick. Au	Au quartz vein. Upper Cretaceous metagraywacke and phyllite	Produced about 106,000 g Au. Estimated 1,800 tonnes ore

DESCRIPTION: Quartz veins up to 2 m thick with gold, arsenopyrite, galena, and sphalerite, and some chalcopyrite, molybdenite, and pyrrhotite. Veins in fault zones mainly in phyllite of the Upper Cretaceous Valdez Group. Wallrocks locally altered near veins. Highest grade ore in veins in altered areas. Extensive development; over 200 m of underground workings. Production mainly about 1933 to 1940. SOURCES: Tuck, 1933; Tysdal, 1978; Jansons and others, 1984.

S044. 60 46 149 33	Lucky Strike (Palmer Creek). Au, Cu, Pb, Ag	Au quartz vein. Upper Cretaceous phyllite	Grab sample with 7 g/t Ag and 0.15% Pb. Produced about 172,450 g Au. Estimated 1,800 tonnes ore

DESCRIPTION: Quartz vein up to 1.7 m thick with gold, pyrite, chalcopyrite, sphalerite, and galena in brecciated and fractured phyllite of the Upper Cretaceous Valdez Group. Fractures normal to cleavage. Extensive development; production mainly between 1916 and 1940. SOURCES: Tysdal, 1978; Jansons and others, 1984.

S045. 60 27 149 18	Crown-Point, Kenai-Alaska. Au	Au quartz vein. Upper Cretaceous metagray- wacke and phyllite	Produced about 97,200 g Au. Estimated 13,600 tonnes ore

DESCRIPTION: Shear zone up to 900 m long and 12 cm wide filled with brecciated phyllite cemented by vuggy quartz with gold, arsenopyrite, galena, sphalerite, and calcite in phyllite of the Upper Cretaceous Valdez Group. Local quartz lenses and stringers up to 0.75 m wide. Extensive development mainly from about 1909 to 1940; over 500 m of underground workings. SOURCES: Martin and others, 1915; Tysdal, 1978; Jansons and others, 1984.

S046. 61 05 149 06	Monarch, Jewel. Au	Au quartz vein. Upper Cretaceous metagray- wacke and phyllite	Produced about 154,000 g Au. Average of chip samples about 10.6 to 36.7 g/t Au and 10.6 g/t Ag

DESCRIPTION: Two or more quartz veins up to 0.3 m long with calcite, galena, chalcopyrite, sphalerite, arsenopyrite, molybdenite, gold, and silver in metagraywacke and phyllite of the Upper Cretaceous Valdez Group. Local Tertiary felsic dikes and granodiorite. Over 380 m of underground workings. SOURCES: Johnson, 1915; Jansons and others, 1984.

S047. 60 57 148 21	Mineral King (Herman and Eaton). Au	Au quartz vein. Upper Cretaceous metagray- wacke and phyllite	Produced about 87,000 g Au. Grab samples with up to 5.1 g/t Au and 4.5 g/t Ag. Esti- mated 450 tonnes ore

DESCRIPTION: Quartz vein up to 2 m wide in lenses up to 22 m long with calcite, sphalerite, pyrite, galena, chalcopyrite, gold, pyrrhotite, and arsenopyrite in metagraywacke and phyllite of the Upper Cretaceous Valdez Group and in Tertiary granite. About 450 m of underground workings. SOURCES: Tysdal, 1978; Jansons and others, 1984.

S048. 60 58 148 13	Granite. Au	Au quartz vein. Upper Cretaceous metagray- wacke and phyllite	Produced about 776,000 g Au. Estimated 1,700 tonnes ore

DESCRIPTION: Fissure up to 4 m wide with brecciated phyllite and metagraywacke cemented by quartz with gold, pyrite, arsenopyrite, chalcopyrite, galena, stibnite, and sphalerite in the Upper Cretaceous Valdez Group and in Tertiary granite. Extensive development from about 1914 to about 1940. SOURCES: Tysdal, 1978; Jansons and others, 1984.

S049. 61 12 146 44	Gold King. Au	Au quartz vein. Upper Cretaceous metagray- wacke	Produced about 62,000 g Au. Chip samples with up to 3.4 g/t Au and 1.3 g/t Ag

DESCRIPTION: Two or more quartz fissure veins up 1.5 m thick with gold, pyrite, galena, sphalerite, chalcopyrite, and stibnite in mainly metagraywacke of the Upper Cretaceous Valdez Group. Sulfides compose about 3% of ore. Mineralized vein cuts small granite pluton. Graywacke locally shattered and sheared near veins. About 600 m of underground workings. Production principally between 1911 to 1924. SOURCES: Johnson, 1915; Jansons and others, 1984.

S050. 61 07 146 33	Cliff (Port Valdez). Au	Au quartz vein. Upper Cretaceous metagray- wacke and phyllite	Average grade from 34 to to 69 g/t Au. Produced about 1,610,000 g Au

DESCRIPTION: Quartz veins up to 3 m thick and 515 m long with gold, pyrite, galena, sphalerite, arsenopyrite, and stibnite in metagraywacke and minor phyllite of the Upper Cretaceous Valdez Group. Veins in complicated system of intersecting faults. Sulfides compose about 3 to 5% percent or ore. A few thousand meters of underground workings. Production mainly from 1906 to 1940. SOURCES: Johnson, 1915; Jansons and others, 1984.

S051. 61 12 146 06	Ramsay-Rutherford. Au	Au quartz vein. Upper Cretaceous metagraywacke	Produced about 172,000 g Au. Grab samples with up to 28 g/t Au

DESCRIPTION: Two main quartz fissure veins up to 2 m thick and 136 m long with gold, silver, pyrrhotite, pyrite, chalcopyrite, sphalerite, galena, and arsenopyrite(?) in metagraywacke of the Upper Cretaceous Valdez Group. Gangue of quartz, carbonates, and crushed country rock. More than 450 m of underground workings. Mined from about 1914 to 1935. SOURCES: Johnson, 1915; Jansons and others, 1984.

BESSHI AND CYPRUS MASSIVE SULFIDE DEPOSITS, PRINCE WILLIAM SOUND DISTRICT, CHUGACH MOUNTAINS

S052. 61 01 146 16	Midas. Cu, Ag, Au, Zn	Besshi massive sulfide(?). Upper Cretaceous phyllite, graywacke, and greenstone	Average grades of about 3.2% Cu, 13.7 g/t Ag, 2.1 g/t Au. Produced 1.54 million kg Cu, 471,000 g Ag, 79,000 g Au. Estimated 56,200 tonnes ore grading 1.6% Cu remain

DESCRIPTION: Disseminated to massive stratiform chalcopyrite, pyrite, pyrrhotite, sphalerite, and minor galena in ore body up to 7 m thick and 300 m long. Sulfide layering and folding parallels beds and folds in host sedimentary rocks. Weak to unmineralized quartz stockwork in footwall may be feeder system for main ore body. Ore bodies in phyllite and metagraywacke of the Upper Cretaceous Valdez Group. Extensive underground workings with production between 1911 and 1919. Estimated 44,800 tonnes ore mined. Earlier workers interpreted deposit as epigenetic replacement in shear zones. SOURCES: Johnson, 1915; Moffit and Fellows, 1950; Rose, 1965b; Winkler and others, 1981; Jansons and others, 1984; Steven W. Nelson, written commun., 1986.

S053. 63 02 147 51	Latouche, Beatson. Cu, Ag, Au, Pb, Zn	Besshi massive sulfide(?). Lower Tertiary argillite and graywacke	Produced more than 84.4 million kg Cu from 4.5 million tonnes ore. Average grade about 1.7% Cu, 9.3 g/t Ag

DESCRIPTION: Two major deposits and several smaller ones consisting of a zone of massive sulfide lenses and disseminations composed mainly of pyrite and pyrrhotite with minor chalcopyrite, cubanite, sphalerite, galena, silver, and gold. Gangue of quartz, sericite, and ankerite. Zone adjacent to major fault in graywacke and argillite of the lower Tertiary Orca Group. Zone up to 120 m thick and 300 long along strike. Developed and produced mainly from about 1903 to 1934. SOURCES: Johnson, 1915; Tysdal, 1978; Jansons and others, 1984.

S054. 60 20 147 42	Knight Island, Pandora. Cu	Cyprus massive sulfide. Lower Tertiary pillow basalt	Produced up to a few thousand tonnes ore

DESCRIPTION: Two major deposits and several smaller deposits with pyrite, pyrrhotite, chalcopyrite, cubanite, sphalerite, and quartz in massive sulfide lenses and disseminations. Lenses up to 9 m thick, average 1.5 m thick. Lenses mainly at sheared contacts with host rocks. Deposits occur in pillow basalt of the lower Tertiary Orca Group. A few hundred meters of underground workings. Minor production. SOURCES: Moffit and Fellows, 1950; Tysdal, 1978; Jansons and others, 1984.

SIGNIFICANT METALLIFEROUS LODE DEPOSITS, SOUTHEASTERN ALASKA

By Henry C. Berg, David A. Brew, and Warren J. Nokleberg, with contributions from J. Dunbier, Donald Grybeck, D. Scherkenbach, P. R. Smith, and J. E. Stephens

MAP NUMBER, LATITUDE LONGITUDE	NAME, COMMODITIES	TYPE, GEOLOGIC HOST UNIT	TONNAGE AND GRADE, PRODUCTION, IF KNOWN

METAMORPHOSED SULFIDE, BESSHI MASSIVE SULFIDE, POLYMETALLIC AND Au QUARTZ VEIN, Fe SKARN, PORPHYRY Mo, AND ZONED MAFIC-ULTRAMAFIC DEPOSITS, COAST MOUNTAINS REGION

SE1. 58 50 135 03	Jualin. Au, Cu, Pb, Zn	Au quartz vein. Cretaceous quartz diorite	Average grade of 17.2 g/t Au. 51.5 g/t Au in one vein. Produced about 1.5 million g Au

DESCRIPTION: Four or five major quartz fissure veins and pipelike stockwork with minor gold, and considerable pyrite, chalcopyrite, galena, minor sphalerite, and secondary copper minerals in Cretaceous quartz diorite. Pyrite is dominant sulfide. Gold associated with pyrite as minute blebs in goethite rims and fracture fillings in corroded crystals. Gangue of quartz with lesser ankerite, chlorite, and sericite. Quartz diorite adjacent to veins exibit proximal ankerite, quartz, and sericite alteration, and more widespread propylitic alteration. Quartz diorite intrudes Upper Triassic greenstone, graywacke, and argillite of Alexander belt. More than 5,500 m of horizontal workings. Principal mining from 1895 to 1920. SOURCES: Knopf, 1911; Jones and others, 1984a.

SE2. 58 52 135 05	Kensington. Au, Ag, Pb	Au quartz vein. Cretaceous quartz diorite	Produced 10,900 tonnes grading about 5.8 g/t Au. Esti- 450,000 tonnes of similar grade remaining

DESCRIPTION: Stockworks of quartz veins in high-angle zones of sheared and chloritized Cretaceous quartz diorite. Veins contain mainly pyrite with some chalcopyrite and rare galena. Pyrite varies from disseminated euhedral crystals to massive veins up to 0.1 m wide. Alteration varies with intensity of veining, and includes chlorite, epidote, sericite, and locally K-feldspar. Gangue dominantly quartz with lesser amounts of carbonate and albite. Veins are irregular and vary from 2 to 10 cm wide. Veins generally parallel stockwork boundaries. Vein system trends generally north-south with an areal extent of 24 by 48 m and a vertical extent of 300 m. Cretaceous diorite intrudes Upper Triassic greenstone, graywacke, and argillite of western part of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). About 1,800 m of workings. Mined from 1886 to 1924. SOURCES: Wright and Wright, 1908; Knopf, 1911; Eakins, 1918.

SE3. 58 18 134 21	Alaska-Juneau. Au, Ag, Pb, Zn	Au quartz vein. Upper(?) Mesozoic metaflysch and mafic metaigneous rocks	Produced 108 million g Au, 59.1 million g Ag, and 21.8 million kg Pb from 80.3 million tonnes ore

DESCRIPTION: Network of quartz veins a few centimeters to 1 m thick containing sparse gold, pyrite, pyrrhotite, arsenopyrite, galena, sphalerite, chalcopyrite, and silver. Vein lode system about 5.6 km long and 600 m wide and consists of a series of parallel quartz stringers in phyllite and schist near the contact between the Upper Triassic Perseverance Slate, in amphibolite derived from late(?) Mesozoic gabbro dikes and sills, and in the informally named Gastineau volcanics of Permian and (or) Upper Triassic age, in western metamorphic belt of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Most of ore occurs in quartz veins; some in adjacent altered metamorphic rocks. Metagabbro forms irregular dikes and sills. Large-volume, low-grade mine. A few hundred kilometers of underground workings. Production from about 1893 to 1944. SOURCES: Spencer, 1906; Twenhofel, 1952; Wayland, 1960; Herreid, 1962; Goldfarb and others, 1986.

SE4. 58 15 134 43	Yakima. Au, Pb, Zn	Besshi massive sulfide. Upper Jurassic and Lower Cretaceous greenstone and slate	Production not recorded

DESCRIPTION: Disseminated pyrite and minor galena and sphalerite in zone 1,600 m long and 91 m wide in Upper Jurassic and Lower Cretaceous greenstone and quartz-calcite-sericite schist, part of the Treadwell(?) Slate in the Gravina-Nutzotin belt. Local extensive hydrothermal alteration. A few hundred meters of underground workings completed by 1904. SOURCE: Spencer, 1906.

SE5. 58 15 134 21	Treadwell. Au, Ag, Pb	Au quartz vein. Jurassic(?) and Lower Cretaceous(?) slate and greenstone	Produced about 90.1 million g Au from 25 million tonnes ore

DESCRIPTION: Extensive system of disseminated sulfides and quartz and quartz-calcite veins with gold, pyrite, magnetite, molybdenite, chalcopyrite, galena, sphalerite, and tetrahedrite in shattered albite diorite dikes and sills in the Jurassic(?) and Lower Cretaceous(?) slate and greenstone derived from basaltic tuff or agglomerate, part of the Treadwell Slate in the Gravina-Nutzotin belt. Some ore in zone at least 1,100 m long in slate inclusions and in adjacent wallrock. Best ore associated with abundant quartz and calcite veinlets. Deposit extends from above sea level to 790 m beneath Gastineau Channel. Four major mines connected underground. Principal mining from 1885 to 1922. SOURCES: Spencer, 1905; Buddington and Chapin, 1929.

SE6. 57 55 133 37	Sweetheart Ridge. Ag, Au, Cu, Pb, Zn	Metamorphosed sulfide. Upper Paleozoic or Mesozoic schist and gneiss	Estimated 6,600 tonnes grading 7.9 g/t Au, 10.6 g/t Ag, 0.7% Cu

DESCRIPTION: Disseminations and thin, semimassive layers of chalcopyrite, pyrite, subordinate sphalerite, and sparse galena. Layers in zones up to 2 m thick in cataclastic upper Paleozoic or Mesozoic quartz-rich paragneiss and to a lesser extent in schist in the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Sulfides locally in veins that may represent remobilized portions of stratabound deposit. SOURCES: Brew and Grybeck, 1984; Kimball and others, 1984.

SE7. 57 47 133 28	Sumdum Ag, Cu, Zn	Metamorphosed sulfide. Paleozoic or Mesozoic paragneiss and schist	Estimated 24 million tonnes grading 0.57% Cu, 0.37% Zn and 10.3 to 103 g/t Ag, assuming deposit continues beneath Sumdum Glacier

DESCRIPTION: Massive lenses and disseminated pyrrhotite, pyrite, chalcopyrite, sphalerite, and lesser bornite, malachite, azurite, and galena in zones up to 15 m wide. Zones occur parallel to layering along crest and flanks of isoclinal fold in metasedimentary schist and gneiss of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984), and in part in veins(?) and fault breccia that may postdate stratabound deposit. SOURCES: MacKevett and Blake, 1963; Brew and Grybeck, 1984; Kimball and others, 1984.

SE8. 57 39 133 27	Sumdum Chief. Au, Ag, Cu, Pb, Zn	Au quartz vein. Upper Paleozoic or Mesozoic graphitic slate and marble	Produced about 750,000 g Ag and Au each. Average grade about 13.7 g/t Au

DESCRIPTION: Two quartz-calcite fissure veins with gold, auriferous pyrite, galena, sphalerite, chalcopyrite, and arsenopyrite. Uneven gold distribution, mainly in pockets where small veins intersect main veins. Veins, up to 6 m thick, occur in upper Paleozoic(?) or Mesozoic graphitic slate and marble of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Minimum of 1,820 m horizontal workings. SOURCES: Spencer, 1906; Brew and Grybeck, 1984; Kimball and others, 1984.

SE9. 56 31 132 04	Groundhog Basin. Ag, Pb, Zn	Metamorphosed sulfide. Upper Paleozoic or Mesozoic schist and gneiss	Estimated several hundred thousand tonnes massive sulfide ore grading 8% Zn, 1.5% Pb, and 51.5 g/t Ag; equal amounts of disseminated sulfide ore grading 2.5% Zn and 1% Pb

DESCRIPTION: Disseminated to massive pyrrhotite, sphalerite, subordinate magnetite, galena, pyrite, and traces of chalcopyrite. Sulfides occur in several tabular or lenticular zones up to 1 m thick in upper Paleozoic or Mesozoic calc-silicate, quartz-feldspar, and hornblende-rich gneiss and schist of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Deposits and host rocks intruded by quartz diorite and by numerous younger quartz porphyry sills and dikes. SOURCES: Buddington, 1923; Gault and others, 1953; Grybeck and others, 1984.

SE10. 56 23 131 24	North Bradfield. Canal. Fe, Cu	Fe skarn. Upper Paleozoic paragneiss	Drill core averaging 50 to 65% Fe and 0.1 to 0.5% Cu.

DESCRIPTION: Eleven magnetite-chalcopyrite skarn bodies that form crude stratabound lenses in upper Paleozoic(?) marble and paragneiss of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984) intruded by Tertiary granite. Bodies range from 15 to 106 m long and 0.6 to 12 m thick. Sparse pyrrhotite. SOURCES: MacKevett and Blake, 1963; Sonnevil, 1981.

SE11. 56 00 130 04	Riverside. Ag, Au, Cu, Pb, W, Zn	Au quartz vein or polymetallic vein. Triassic Texas Creek Granodiorite	Produced about 27,200 tonnes, 1925 to 1952, yielding 93,300 g Au, 3.1 million g Ag, 45,400 kg Cu, 113,500 kg Pb, 9,080 kg Zn, and 3,500 units WO_3

DESCRIPTION: Disseminated galena, pyrite, tetrahedrite, pyrrhotite, chalcopyrite, sphalerite, gold, and scheelite in two large quartz veins and in the Lindeberg lode, a combined quartz vein and epigenetic replacement deposit. Veins occur either in shear zone in schist inclusion, or in mylonitic gneiss derived from the Triassic Texas Creek Granodiorite of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). More than 1,820 m of underground workings. SOURCES: Buddington, 1929; Byers and Sainsbury, 1956; Smith, 1977.

SE12. 55 45 130 45	Alamo. Ag, Au, Cu, Zn	Metamorphosed sulfide. Paleozoic(?) paragneiss	Grab samples and drill core with up to 0.2 to 0.7% Cu, 0.2 g/t Au, 50 g/t Ag, and minor Zn

DESCRIPTION: Disseminated and veinlike(?) masses of chalcopyrite, pyrite, pyrrhotite, and sphalerite in zone up to 25 m wide in Paleozoic(?) paragneiss of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984) near foliated granodiorite. SOURCES: Berg and others, 1977.

SE13. 55 46 132 06	Union Bay (Mount Burnett). Fe, Ti, Cr, PGE	Zoned mafic-ultramafic. Cretaceous zoned ultramafic pluton	Estimated 1,000 million tonnes grading 18 to 20% Fe and possible V. Grab samples grading 0.093 g/t Pt, 0.20 g/t Pd

DESCRIPTION: Disseminated magnetite and chromite in dunite and small, discontinuous stringers of chromite up to a few centimeters long in dunite. Dunite occurs in pipe and lopolith in center of the zoned Union Bay ultramafic pluton that intrudes Upper Jurassic and Lower Cretaceous flysch of Gravina-Nutzotin belt. Peridotite also occurs with dunite; pyroxenite and hornblende pyroxenite on periphery. SOURCE: Ruckmick and Noble, 1959.

SE14. 55 39 132 00	Gold Standard (Helm Bay). Au	Au quartz vein. Upper(?) Mesozoic metamorphosed flysch	Probably produced a few ten thousand g Au

DESCRIPTION: Two sets of quartz veins with sparse gold, pyrite, lesser galena, and tetradymite. Principal vein about 300 m long and up to 2 m thick in metamorphosed upper Mesozoic phyllitic flysch and andesite tuff of Gravina-Nutzotin belt. Most ore came from older set of veins that are parallel to foliation of host rocks. Younger veins with parallel strike, but dipping in opposite direction contain little gold. SOURCE: Wright and Wright, 1908.

SE15. 55 26 131 31	Mahoney. Ag, Pb, Zn	Metamorphosed sulfide. Upper Paleozoic or Mesozoic flysch	Estimated 2,200 tonnes ore grading 6 to 7% Pb, and about 28% Zn. Produced several hundred tonnes Zn concentrate

DESCRIPTION: Sphalerite and galena in discontinuous tabular to lenticular layers up to 40 cm thick in fine-grained, dark-silver gray, upper Paleozoic or Mesozoic micaceous phyllite of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Originally described as a steeply dipping vein; reinterpreted here as stratabound deposit with partial remobilization during subsequent metamorphism and deformation. Several open cuts and 100 m of underground workings. Minor production from 1947 to 1949. SOURCE: Robinson and Twenhofel, 1953; Henry C. Berg, written commun., 1984.

SE16. 55 22 131 12	Sea Level. Au, Ag	Au quartz vein. Upper Paleozoic or Mesozoic schistose metatuff	Unknown amount of gold produced in early 1900's

DESCRIPTION: Quartz fissure veins with pyrite, galena, sphalerite and sparse gold in upper Paleozoic or Mesozoic schistose metatuff of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Local disseminated sulfides in wallrocks. Sulfide and gold concentrations higher where quartz vein crosscuts altered feldspar porphyry dikes. Minimum strike length of 600 m. One 36-m-deep shaft, and 363 m of horizontal workings. SOURCE: Wright and Wright, 1908.

SE17. 55 18 131 39	Goldstream. Au, Cu, Pb, Zn	Au quartz vein. Upper Jurassic and Lower Cretaceous greenschist and pelitic schist	Produced several thousand tonnes ore

DESCRIPTION: Quartz veins in greenschist and quartz-sericite schist with gold, pyrite, chalcopyrite, galena, sphalerite, and arsenopyrite in Upper Jurassic and Lower Cretaceous greenschist and pelitic schist of Gravina-Nutzotin belt. Principal vein about 1 to 2.5 m wide. Several hundred meters of workings. SOURCE: Wright and Wright, 1908.

SE18. 55 18 131 21	Moth Bay. Cu, Zn	Metamorphosed sulfide. Upper Paleozoic or Mesozoic metaflysch	Estimated 91,000 tonnes grading 7.5% Zn and 1% Cu. Additional 181,000 tonnes grading 4.5% Zn, 0.75% Cu

DESCRIPTION: Discontinuous lenses and layers of massive pyrite, pyrrhotite, and minor chalcopyrite and galena. Local disseminated pyrite. Host rocks are light brown-gray, upper Paleozoic or Mesozoic muscovite-quartz-calcite schist, minor pelitic schist and quartz-feldspar schist, possibly metachert. Layers and lenses of massive sulfides up to 1 m thick parallel to compositional layering of schist. Host rocks part of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). Several open cuts and about 230 m of underground workings. SOURCES: Robinson and Twenhofel, 1953; Berg and others, 1978; Henry C. Berg, written commun., 1984.

SE19. 55 25 130 28	Quartz Hill. Mo	Porphyry Mo. Oligocene or Miocene granite porphyry	Up to 1,700 million tonnes grading 0.136% Mo. Near surface estimate of 444 million tonnes grading 0.219% Mo

DESCRIPTION: Stockwork of molybdenite-bearing, randomly oriented quartz veins, fractures, and disseminated grains distributed throughout a multiply altered hypabyssal stock with an outcrop area of several square kilometers. Stock consists of shallow-level composite granite porphyry, quartz porphyry, micrograinte, and aplite of late Oligocene or early Miocene age, and intrudes central granitic belt of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). K-Ar age of granitic rocks about 27 m.y. SOURCES: Hudson and others, 1979; P. R. Smith and J. E. Stephens, written commun., 1985.

SE20. 55 17 130 57	Reliance (Roe Point). Cu, Zn	Metamorphosed sulfide. Paleozoic(?) schist	No data

DESCRIPTION: Massive layers and disseminated pyrite, pyrrhotite, chalcopyrite, and sphalerite in rust-weathering Paleozoic(?) schist of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). About 30 m of underground workings. SOURCE: Wright and Wright, 1908.

SE21. 55 04 130 31	Red River. Cu, Mo	Metamorphosed sulfide. Paleozoic(?) paragneiss	No data

DESCRIPTION: Disseminated grains and small masses of pyrite, pyrrhotite, magnetite, and molybdenite occurring along layering in Paleozoic(?) paragneiss of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984) intruded by pegmatite and gneissic granodiorite. Layers range from a few centimeters to 30 m thick. SOURCE: Berg and others, 1978.

KUROKO MASSIVE SULFIDE, METAMORPHOSED SULFIDE, BEDDED BARITE, SANDSTONE U, POLYMETALLIC AND Au QUARTZ VEIN, Cu-Zn-Au AND Fe SKARN, PORPHYRY Cu AND Cu-Mo, FELSIC PLUTONIC U, ZONED MAFIC-ULTRAMAFIC, AND GABBROIC Ni-Cu DEPOSITS, CENTRAL SOUTHEASTERN ALASKA

SE22. 59 26 135 54	Klukwan. Fe, Ti, V, Ni	Zoned mafic-ultramafic. Cretaceous pyroxenite	Estimated 12 billion tonnes grading 0.2% V_2O_5, 13% magnetite, 1.5 to 4.4% TiO_2

DESCRIPTION: Titaniferous magnetite and minor chalcopyrite, hematite, pyrite, pyrrhotite, spinel, and leucoxene either uniformly disseminated or in tabular zones in pyroxenite surrounded by diorite. Magnetite interstitial to pyroxene and idiomorphic against hornblende. Cretaceous pyroxene and diorite intrude Triassic or older rocks of Alexander belt. No production. Nearby Klukwan fan (Takshanuk Mountain) magnetite placer deposit with estimated 453 million tonnes grading 10% titaniferous magnetite; deposit occurs in alluvial fan at foot of mountain slope below Klukwan lode deposit. SOURCES: Wells and Thorne, 1953; Robertson, 1956; MacKevett and others, 1974; Wells and others, 1986.

SE23. 59 24 136 23	Glacier Creek. Ag, Au, Ba, Cu, Pb, Zn	Kuroko massive sulfide. Paleozoic and lower Mesozoic metavolcanic and metasedimentary rocks	At least 680,000 tonnes grading 45% $BaSO_4$ and up to 3% combined Cu and Zn

DESCRIPTION: Fine-grained sphalerite, galena, chalcopyrite as disseminations, and in massive layers and lenses in metamorphosed Paleozic and lower Mesozoic mafic pillow flows, highly altered and metamorphosed quartz-feldspar porphyry, thin phyllitic siltstone and limestone. Sparse disseminated pyrite, magnetite, and tetrahedrite. Main sulfide layers and lenses associated with lenses of sericite-talc-quartz schist as much as 180 m thick in mafic extrusive rocks. Schist formed partly from alteration of mafic extrusive rocks, and partly from quartz-feldspar porphyry. Deposits up to 9 m thick and 600 m long. Sulfide layers and lenses interfoliated with beds of nearly pure barite up to 20 m thick. Sedimentary origin indicated by conformable relations between sulfide layers and bedding. Host rocks part of Alexander belt; age of host rocks uncertain. SOURCES: MacKevett and others, 1971; Hawley, 1976; Still, 1984.

SE24. 59 01 137 05	Margerie Glacier. Cu, Ag, Au	Porphyry Cu and lesser polymetallic vein. Tertiary granite stock	Estimated 145 million tonnes grading 0.02% Cu, 0.27 g/t Au, 4.5 g/t Ag

DESCRIPTION: Chalcopyrite, pyrite, arsenopyrite, sphalerite, molybdenite, and minor scheelite in quartz veins in shear zones, massive sulfide bodies, and as disseminations in propylitically altered porphyritic granite stock and in adjacent hornfels. Granite intrudes Permian(?) metamorphosed pelitic and volcanic rocks, and sparse marble of Alexander belt. SOURCE: Brew and others, 1978.

SE25. 58 55 137 00	Orange Point. Zn, Cu, Ag, Au	Kuroko massive sulfide. Permian(?) metavolcanic rocks	Samples with up to 19% Zn, 5.2% Cu, 0.5% Ba, 0.16% Pb, 3.5 g/t Au, and 70 g/t Ag

DESCRIPTION: Disseminated to massive pyrite, pyrrhotite, sphalerite, and chalcopyrite in zones up to 24 m wide and 169 m long in Permian(?) metaandesite flows and volcaniclastic rocks of Alexander belt. SOURCE: Brew and others, 1978.

SE26. 58 52 136 52	Reid Inlet. Au, Pb	Au quartz vein. Cretaceous granodiorite	Produced 220,000 to 250,000 g Au

DESCRIPTION: Zone of narrow, discontinuous, steeply dipping quartz veins up to a few hundred meters long and 1.1 m thick in altered Cretaceous granodiorite and contact-metamorphosed Permian(?) metamorphosed pelitic and volcanic rocks, and sparse marble of Alexander belt. Veins trend north-south, northeast-southwest, and east-west. SOURCES: MacKevett and others, 1971; Brew and others, 1978.

SE27. 58 59 136 06	Nunatak. Ag, Au, Cu, Mo	Polymetallic vein and porphyry Cu-Mo. Tertiary(?) granite porphyry	For closely-spaced vein stockwork, 2.03 million tonnes grading 0.067% Mo and 0.16% Cu; remaining stockwork with 117.5 million tonnes grading 0.026% Mo and 0.18% Cu

DESCRIPTION: Numerous closely spaced molybdenite-bearing quartz veins, and minor disseminated molybdenite in hornfels, skarn, and a mineralized fault zone around a Tertiary(?) granite porphyry stock. Local disseminated sulfides in Tertiary(?) granite porphyry. Varying amounts of pyrite, pyrrhotite, chalcopyrite, and sparse tetrahedrite and bornite. Granite porphyry intrudes tightly folded Paleozoic metasedimentary rocks of Alexander belt. SOURCES: MacKevett and others, 1971; Brew and others, 1978.

SE28. 58 46 135 15	William Henry Bay. U, Th, REE, Nb	Felsic plutonic U. Tertiary(?) granite	Grab sample with 0.20% U

DESCRIPTION: Veinlets with pyrite, chalcopyrite, galena, thorianite, and euxenite in small Tertiary(?) granite and syenite pluton intruding Silurian(?) metavolcanic and metasedimentary rocks of Alexander belt. Several small exploration pits. SOURCES: Lathram and others, 1959; Eakins, 1975.

SE29. 58 14 134 52	Funter Bay. Cu, Ni, Co	Gabbroic Ni-Cu. Late(?) Mesozoic gabbro-norite	Estimated 450 to 540 thousand tonnes grading 0.33 to 1% each of Cu and Ni, and 0.05 to 0.32% Co

DESCRIPTION: Disseminated pyrrhotite, pentlandite, and chalcopyrite in olivine-hornblende gabbro at base of gabbro-norite pipe. Remainder of pipe contains much less sulfide. Pipe intrudes upper Paleozoic or Triassic quartz-mica schist of Alexander belt. SOURCES: Barker, 1963b; Noel, 1966.

SE30. 58 04 134 37	Greens Creek (Big Sore). Zn, Pb, Cu, Ag, Au	Kuroko massive sulfide. Upper Paleozoic or Triassic metasedimentary and metavolcanic rocks	Estimated 3.6 million tonnes grading 8% Zn, 2.7% Pb, 0.4% Cu, 360 g/t Ag, and 3.4 g/t Au

DESCRIPTION: Sphalerite, galena, chalcopyrite, and tetrahedrite in a pyrite-rich matrix in massive pods, bands, laminations, and disseminations. Hanging wall of chlorite and sericite sedimentary rocks and pyrite-carbonate-chert exhalite. Footwall of black graphitic argillite. "Black ore" forms an extensive blanket deposit, and is composed of fine-grained pyrite, sphalerite, galena, and Ag-rich sulfosalts in laminations in black carbonaceous exhalite and argillite; "white ore" occurs along edges of massive pods, and is composed of minor tetrahedrite, pyrite, galena, and sphalerite in laminations, stringers, or disseminations in massive chert, carbonate rocks, or sulfate-rich exhalite. Local veins with bornite, chalcopyrite, and gold below massive sulfides. Veins may be brine conduits. Sulfides and host rocks underlain by serpentinized mafic volcanic flows and tuffs. Host rocks part of Alexander belt and apparently overlain structurally several kilometers away by fossiliferous Permian black carbonaceous metasedimentary rocks. Host rocks tightly folded into southeast-plunging, overturned antiform. Workings consist of a 1,300-m exploration adit. Interpreted to be an exhalative marine massive sulfide deposit formed in a late Paleozoic or Triassic back-arc or wrench fault extensional basin during deposition of arc- or continent-derived clastic and volcaniclastic sediments intermixed with mafic flows and tuffs. SOURCES: Dunbier and others, 1979; Drechsler and Dunbier, 1981; J. Dunbier and D. Sherkenbach, written commun., 1984; Henry C. Berg, written commun., 1984.

SE31. 57 58 134 32	Pyrola. Ag, Au, Ba, Pb, Zn	Kuroko massive sulfide. Upper Triassic(?) flows and tuffs	No data

DESCRIPTION: Massive pyrite, sphalerite, galena, and minor chalcopyrite, jamesonite, and boulangerite in interbedded Upper Triassic(?) felsic to intermediate flows and tuff, carbonaceous siltstone, argillite, limestone, and dolomite of Alexander belt. Interlayered massive sulfide layers, barite layers, and a siliceous disseminated pyrite stockwork zone. Zone beneath massive sulfides with chlorite-carbonate alteration overprinted by intense sericite-pyrite-quartz alteration. SOURCE: Van Nieuwenhuyse, 1984.

SE32. 56 54 133 22	Kupreanof Mountain. Ag, Au, Cu, Zn	Cu-Zn-Au skarn. Devonian(?) marble, greenschist, and phyllite	Low values of Au and Ag

DESCRIPTION: Local massive pods, lenses, and disseminations of pyrrhotite, magnetite, chalcopyrite, and minor sphalerite and pyrite in skarn consisting of equigranular pyroxene-garnet groundmass and local large pyroxene porphyroclasts or porphyroblasts. Skarn may be in part highly altered mafic igneous rock. Skarn and marble in fault contact with Mesozoic(?) phyllite. Deposit may be related to volcanogenic massive sulfide deposits in area. Host rocks part of Alexander belt. Explored in early 1900's. Several hundred meters of underground workings on Kupreanof Island. SOURCES: Buddington, 1923; Henry C. Berg, oral commun., 1984; Grybeck and others, 1984.

SE33. 56 55 134 12	Cornwallis Peninsula. Zn, Pb, Ag, Cu, Ba	Metamorphosed sulfide. Carboniferous marble and Upper Triassic metavolcanic rocks	No data

DESCRIPTION: Metamorphosed sulfide deposit: Finely disseminated sphalerite and probably galena and chalcopyrite in Carboniferous limestone breccia. Bedded barite deposit: Aggregates, pods, veins, and layers of barite up to 2 m wide and 60 m long in Upper Triassic felsic metavolcanic rocks of Alexander belt. SOURCES: Berg and others, 1981; Grybeck and others, 1984; Henry C. Berg, written commun., 1985.

SE34. 56 48 133 57	Port Camden. U	Sandstone U. Tertiary Kootznahoo Formation	Grab samples with 0.13 to 0.24% U

DESCRIPTION: Traces of U-minerals in light-brown, poorly sorted dolomitic sandstone with clay clasts, carbonized plant fragments, and dolomitic concretions. All carbonized fragments exhibit radioactivity. Sparse magnetite, pyrite, and apatite. Dolomitic sandstone is part of the Tertiary Kootznahoo Formation which contains detritus derived from Tertiary or older granitic rocks. SOURCE: Grybeck and others, 1984.

SE35. 56 39 133 12	Castle Island, Kupreanof Island. Ba, Pb, Zn, Ag	Bedded barite in limestone. Kuroko massive sulfide in metavolcanic and metasedimentary rocks	Produced 680,000 tonnes ore grading 90% $BaSO_4$. Massive sulfide samples with up to 5% galena and sphalerite and 100 g/t Ag

DESCRIPTION: Castle Island: Lenses of massive barite interlayered with metamorphosed Devonian or Triassic limestone, calcareous and tuffaceous clastic rocks. Trace amounts of sphalerite, galena, pyrite, pyrrhotite, bornite, tetrahedrite, and chalcopyrite. Mined by surface and underwater stripping. Kupreanof Island: Lenses of massive pyrite and lesser galena and sphalerite in Upper Triassic metamorphosed felsic volcanic and volcaniclastic rocks, chert, slate, and marble. Lenses up to 30 m long and 3 m wide. Complexly folded and faulted. Host rocks in both areas part of Alexander belt. SOURCES: Berg and Grybeck, 1980; Grybeck and others, 1984.

SE36. 56 34 133 04	Helen S. Ag, Au, Pb, Zn	Kuroko massive sulfide. Upper Triassic(?) metavolcanic rocks	Small volume grading 6.1 g/t Au

DESCRIPTION: Disseminated to massive pyrite, pyrrhotite, arsenopyrite, sphalerite, and galena in veins and lenses. Interlayered with Upper Triassic(?) black slate, felsic metatuff, greenstone, limestone, and mafic intrusive rocks of Alexander belt. Massive sulfide layers up to 10 cm thick. SOURCES: Berg and Grybeck, 1980; Grybeck and others, 1984.

SE37. 56 24 132 54	Zarembo Island (Frenchie). Ag, Pb, Zn	Kuroko massive sulfide. Upper Triassic metatuff	Grab samples with up to 5.5 g/t Au and 30 g/t Ag

DESCRIPTION: Massive pyrite, pyrrhotite, sphalerite, chalcopyrite, and galena in layers and lenses up to 2 m thick in metamorphosed felsic tuff interlayered with Upper Triassic limestone and calcareous sedimentary rocks. Intruded by Tertiary(?) andesite dikes. About 30 m of underground workings developed in early 1900's. Host rocks in both areas part of Alexander belt. SOURCES: Buddington, 1923; Berg and Grybeck, 1980; Grybeck and others, 1984.

SE38. 56 18 133 07	Salmon Bay. U, Th, REE, Nb	Felsic plutonic U. Silurian metagraywacke intruded by Tertiary felsic dikes	Grab samples with up to 0.3% U, 0.79% REE, >0.1% La, and 0.1% Mo, 0.28% Nb, 0.21% Th

DESCRIPTION: Carbonate fissure veins containing wide variety of minerals, including fluorite, hematite, magnetite, pyrite, chalcopyrite, thorite, monazite, zircon, parisite, and bastnaesite. Major gangue minerals are dolomite-ankerite, alkali feldspar, chalcedony, chlorite, epidote, and sericite. Veins dip steeply, are at least a few hundred meters long, and up to 1.4 m thick. Associated lamprophyre dikes. Occur in contact-metamorphosed Silurian metagraywacke of Alexander belt. Veins probably related to deformed and sheared Tertiary felsic dikes intruding metagraywacke. Similar dikes on nearby Zarembo Island contain fluorite veins. SOURCES: Grybeck and others, 1984; Henry C. Berg, written commun., 1984.

SE39. 55 55 134 21	Coronation Island. Pb, Zn	Polymetallic vein(?). Silurian(?) marble intruded by Tertiary(?) diorite	Produced more than 90 tonnes ore

DESCRIPTION: Lenses of galena, sphalerite, tetrahedrite, and secondary Fe-, Pb- and Zn-minerals in clay-carbonate gangue. Lenses occur in fault zones up to 1.2 m wide in Silurian(?) marble of Alexander belt intruded by Tertiary(?) diorite. SOURCE: Twenhofel and others, 1949.

SE40. 55 38 132 34	Salt Chuck. Ag, Au, Cu, PGE	Zoned mafic-ultramafic. Late Paleozoic or Mesozoic mafic-ultramafic pluton	Produced about 300,000 tonnes grading 0.95% Cu, 1.2 g/t Au, 5.8 g/t Ag, 2.2 g/t PGE. Produced 610,400 g PGE. Grab samples with up to to 0.57 g/t Pt, 1 g/t Pd

DESCRIPTION: Irregularly and randomly distributed veinlets of bornite, minor chalcopyrite, and secondary chalcocite, covellite, native copper, and magnetite. Sulfides and oxides occur along cracks and fractures in pipelike late Paleozoic or Mesozoic gabbro-pyroxenite stock intruding Silurian metagraywacke of Alexander belt. Possible local supergene enrichment. SOURCES: Howard, 1935; Gault, 1945; Donald Grybeck and David A. Brew, written commun., 1985.

SE41. 55 31 132 17	Kasaan Peninsula. Cu, Au, Ag	Fe skarn. Lower Lower Paleozoic calcareous metasedimentary rocks	Produced about 245,000 tonnes ore containing 5.81 million kg Cu, 215,800 g Au, 1.74 million g Ag. Estimated 2.7 million tonnes ore remaining

DESCRIPTION: Contorted tabular masses of magnetite, chalcopyrite, and pyrite with gangue of calcite and calc-silicate minerals. About 30 masses occur along a 20-km-long belt. Masses occur mainly along contacts between conformable lower Paleozoic calcareous metasedimentary rocks and mafic metavolcanic rocks that are adjacent to irregular dikes, sills, and plugs of Ordovician or Silurian diorite, quartz monzodiorite, and mafic dikes. Skarns to north contain epidote-quartz endoskarn and pyroxene-garnet-epidote exoskarn with chalcopyrite, magnetite, and calcite. Skarns to south contain hornblende, magnetite, chalcopyrite, and pyrite with low Ag and Au. Host rocks part of Alexander belt. Extensive underground workings. SOURCES: Warner and others, 1961; Myers, 1984.

SE42. 55 28 132 42	Dawson. Au, Cu, Pb, Zn	Au quartz vein or polymetallic vein. Black graphitic slate	Probably produced several ten thousand g Au and Ag each, and minor Pb. Estimated 40,000 tonnes grading 34.3 g/t Au

DESCRIPTION: Quartz stringers and veins in zone 0.6 to 1.8 m wide. Most gold concentrated along contacts of stringers and lower(?) Paleozoic black graphitic slate of Alexander belt. Scattered pyrite, sphalerite, chalcopyrite, and galena in stringers, veins, and wallrocks. Mined from 1900 to 1948. Workings to minimum depth of 181 m. Recent drilling and development. SOURCES: Wright and Wright, 1908; Harris, 1985.

SE43. 55 18 132 23	Khayyam. Ag, Au, Cu, Zn	Kuroko massive sulfide. Lower Paleozoic metavolcanic rocks	Produced about 6.4 million kg Cu, 40,120 g Au, 53,200 200 g Ag from 205,000 tonnes ore. Channel samples with up to 5.25% Cu, 6.9 g/t Au, 106 g/t Ag

DESCRIPTION: Irregular, elongate, nearly vertical lenses of massive pyrite, chalcopyrite, sphalerite, pyrrhotite, hematite, gahnite, and magnetite. Gangue of quartz, calcite, epidote, garnet, and chlorite. About seven stacked sulfide lenses up to 70 m long and 6 m thick. Lenses conformable to enclosing felsic to mafic metavolcanic host rocks of the pre-Middle Ordovician Wales Group in the Alexander belt. Coarse fragmental textures in metavolcanic host rocks. Intense chlorite alteration in footwall below sulfide lenses. Lateral gradation between sulfide lenses and enclosing schist. Several hundred meters of underground workings. Principal mining from 1901 to 1907. SOURCES: Fosse, 1946; Barrie, 1984a, b.

SE44. 55 15 132 37	Jumbo district. Fe, Ag, Au, Cu	Cu-Au skarn. Lower Paleozoic marble and metasedimentary rocks	Jumbo: Estimated 280,000 tonnes grading 45% Fe, 0.73% Cu. Produced 4.6 million kg Cu, 220,000 g Au, and 2.73 million g Ag from 111,503 tonnes ore

DESCRIPTION: District includes major deposit at Jumbo, moderate deposits at Magnetite Cliff, Copper Mountain, and Corbin, and lesser deposits at Upper Magnetite, Gonnason, Houghton, Green Monster, Hetta, and Corbin. Deposits all within a few kilometers of Jumbo deposit. Jumbo deposit: chalcopyrite, magnetite, sphalerite, and molybdenite in skarn at contact between marble and Early Cretaceous granodiorite stock. Gangue is mainly diopside and garnet. More than 3.2 km of underground workings. Magnetite Cliff: 25-m-thick shell of magnetite that mantles Early Cretaceous granodiorite in contact with garnet-diopside skarn. Skarn contains 2% to 3% chalcopyrite and 335,600 tonnes grading 46% Fe and 0.77% Cu. Production from 1902 to 1922. Copper Mountain: Scattered chalcopyrite and copper carbonate in diopside endoskarn in granodiorite with veins and masses of epidote, garnet, magnetite, and scapolite. Produced 101,800 kg Cu, 321,300 g Ag, and 4,510 g Au between 1902 and 1907. About 410 m of tunnels and shafts. Deposits occur in or adjacent to lower Paleozoic marble and pelitic metasedimentary rocks intruded by mid-Cretaceous hornblende-biotite granodiorite with concordant hornblende and biotite K-Ar ages of 103 m.y. Wallrocks part of the Wales Group in Alexander belt. SOURCES: Kennedy, 1953; Herreid and others, 1978.

SE45. 55 08 132 37	Copper City. Cu, Zn, Ag, Au	Metamorphosed sul-fide(?). Lower Paleozoic metavolcanic and meta-sedimentary rocks	Chip sample with 8.5% Cu, 7.3% Zn, 85.8 g/t Ag, 1.7 g/t Au, 0.06% Pb

DESCRIPTON: Massive chalcopyrite, pyrite, sphalerite, and rarely hematite with gangue quartz, calcite, and epidote occurring in zone up to 1.2 m thick in layers parallel to enclosing metakeratophyre, metaspilite, and quartz-mica schist. Local crosscutting quartz veins and diabase dike. Host rocks part of the pre-Middle Ordovician Wales Group in Alexander belt. Produced about 1,450 tonnes ore between 1898 and 1910. Deposit remobilized during regional metamorphism. SOURCES: Wright and Wright, 1906; Herreid and others, 1978.

SE46. 55 11 132 23	Moonshine. Ag, Pb, Zn, Cu	Metamorphosed sulfide. Lower Paleozoic meta-sedimentary rocks	Produced up to 46,500 g Ag. Grab samples with 20 to 83% Pb, 411 to 1,030 g/t Ag

DESCRIPTION: Galena, sphalerite, minor chalcopyrite, and accessory pyrite and siderite in well-defined fissure veins or reniform pods up to a few meters wide in a dolomitized vein breccia cutting obliquely across marble and metasedimentary rocks. Gangue of quartz, siderite, and calcite. Local diabase dikes crossing fissure and wallrocks. Several tunnels and shafts. Minor production between 1900 and 1909. Wallrocks part of the pre-Middle Ordovician Wales Group in Alexander belt. SOURCES: Wright, 1909; Herreid and others, 1978.

SE47. 55 03 132 38	Lime Point. Ba	Bedded barite. Lower Paleozoic metasedimen-tary rocks	Estimated 4,500 tonnes gra-ding 91% barite

DESCRIPTION: Interlayered lenses of barite and dolomite up to 2 m thick in lower Paleozoic marble of the pre-Middle Ordovician Wales Group in Alexander belt. Local faulting and folding and andesite dikes intruded along faults. One short adit. Test shipments; no production. SOURCES: Twenhofel and others, 1949; Herreid and others, 1978.

SE48. 55 09 132 03	Golden Fleece. Ag, Au	Au quartz vein. Lower Paleozoic marble and schist	Considerable production; no records. Assays with 81 to 341 g/t Ag and 1.7 to 143 g/t Au

DESCRIPTION: Irregular quartz fissure veins up to 3 m thick with pyrite, tetrahedrite, and gold in silicified and dolomitized marble cut by postmineralization diabase dikes. Local solution caverns along vein system. Veins localized along conjugate(?) system of Cenozoic(?) faults subsidiary to Clarence Strait fault zone. Host rocks part of the pre-Middle Ordovician Wales Group in Alexander belt. Several hundred meters of workings. Principal mining during 1900 to 1930. SOURCES: Herreid, 1967; Henry C. Berg, written commun., 1984.

SE49. 55 04 132 09	Niblack. Cu, Au, Ag	Kuroko massive sulfide. Lower Paleozoic meta-volcanic rocks	Produced about 636,000 kg Cu, 34,200 g Au, 466,500 g Ag

DESCRIPTION: Lenticular masses and disseminations of chalcopyrite, pyrite, and lesser sphalerite, galena, hematite, and magnetite in mainly quartz-sericite schist derived from pre-Ordovician(?) felsic volcanic or volcaniclastic rocks. Felsic metavolcanic rocks interlayered with intermediate to mafic metavolcanic rocks and lesser slate. Host rocks part of the pre-Middle Ordovician Paleozoic Wales Group in Alexander belt. Workings consist of a 100-m shaft and about 1.6 km of underground workings. Main mining from 1902 to 1909. Recent development. SOURCE: Herreid, 1964.

SE50. 55 11 131 44	Bay View. Au, Cu	Polymetallic vein(?). Silurian trondhjemite	Grab samples with up to 10 g/t Ag, 0.1 g/t Au, >2% Cu, 0.015% Sn, and 0.020% As. Small smelter shipment; no recorded production

DESCRIPTION: Quartz- and calcite-cemented fault breccia with disseminations and small masses of pyrite, chalcopyrite, and minor sphalerite and bornite mainly in brecciated basalt dike in fault-bounded block of trondhjemite. Upper Triassic metarhyolite tuff adjacent to fault block. Colloform calcite and other textures indicate deposition at relatively shallow depth and low temperature. Host rocks part of Alexander belt. Workings include open cuts, adit, and 30-m drift. SOURCES: Berg, 1973, Elliott and others, 1978; Henry C. Berg, written commun., 1984.

SE51. 54 56 132 08	Bokan Mountain. U, Th, REE, Nb	Felsic plutonic U. Jurassic peralkaline granite	Produced about 109,000 tonnes grading about 1% U_3O_8; Th not recovered

DESCRIPTION: Disseminated U, Th, REE, and niobate minerals, including uranothorite, uranoan thorianite, uraninite, xenotime, allanite, monazite, pyrite, galena, zircon, and fluorite in irregular, steeply dipping pipe of Jurassic peralkaline granite. Most of ore produced from crudely cigar-shaped upper part of pluton. Central zone grades outward into normal granite. Associated pegmatite and vein REE, Nb, Th, and U deposits in outer parts of granite or adjacent country rock that consists of early Paleozoic metamorphosed granitic and sedimentary rocks of Alexander belt. Intermittent mining from 1955 to about 1971. SOURCES: MacKevett, 1963; Thompson and others, 1982; Lancelot and de Saint-Andre, 1982; Armstrong, 1985; Edward M. MacKevett, Jr., written commun., 1986; J. Dean Warner, written comun., 1987.

SE52. 54 48 132 27	Barrier Islands. Ag, Au, Cu, Pb, Zn, Ba	Kuroko massive sulfide. Lower Paleozoic metavolcanic rocks	Grab samples with up to 10% Zn, 0.15% Pb, 30 g/t Ag, and 0.25 g/t Au

DESCRIPTION: Disseminated to massive pyrite and minor sphalerite, galena, and arsenopyrite in zones up to a few meters long and 3 m thick. Sulfides also form rinds of pillows in metavolcanic rocks. Hosted in Ordovician and Silurian felsic to intermediate metavolcanic rocks and metagraywacke of Alexander belt. SOURCE: Gehrels and others, 1983.

SE53. 55 11 131 36	Driest Point and nearby area on Gravina Island Cu, Pb, Ba	Kuroko massive sulfide(?). Triassic(?) metavolcanic and metasedimentary rocks	No data

DESCRIPTION: Disseminated to massive pyrrhotite, pyrite, and possibly sphalerite in zones up to a few meters thick in carbonaceous sedimentary rocks and chert at contact between Upper Triassic metarhyolite, and slate and limestone. Vein deposits with disseminated galena, chalcopyrite, and pyrite in veins in shear zones up to 3 m wide. Gangue of quartz, calcite, and barite in Triassic(?) metarhyolite. Host rocks part of Alexander belt. Vein deposits probably formed during Cenozoic remobilization of older massive sulfide deposit. SOURCE: Berg and others, 1981.

SE54. 54 55 131 21	Duke Island. Cr, PGE	Zoned mafic-ultramafic. Cretaceous(?) ultramafic pluton	Grab samples averaging 0.037 g/t Pt and 0.033 g/t Pd

DESCRIPTION: Disseminated to locally massive titaniferous magnetite and sparse chromite in hornblende-clinopyroxene zones in zoned ultramafic pluton of Cretaceous(?) age. Zoned ultramafic pluton intrudes early Paleozoic felsic metavolcanic rocks, early Paleozoic diorite, and Triassic gabbro of Alexander belt. SOURCES: Clark and Greenwood, 1972; Irvine, 1974; Berg and others, 1981.

SE55. 58 33 136 56	Brady Glacier. Cu, Ni, PGE	Gabbroic Ni-Cu. Tertiary stratiform mafic-ultramafic pluton	Estimated 82 to 91 million tonnes grading 0.53% Ni, 0.33% Cu, 0.03% Co, minor PGE. Grab samples grading 0.18 to 1.30 g/t PGE

DESCRIPTION: Disseminations and a few small masses of pentlandite, chalcopyrite, and rare pyrite near eastern edge and probable base of large layered mafic-ultramafic pluton consisting mainly of gabbro with sparse peridotite; part of La Perouse gabbro pluton. Locally up to 10% disseminated sulfides. Deposit mainly beneath Brady Glacier, but exposed in small nunataks. Pluton intrudes metagraywacke and phyllite of the Cretaceous Sitka Graywacke. SOURCE: Brew and others, 1978; Czamanske and Calk, 1981; Himmelberg and Loney, 1981.

SE56. 57 58 136 25	Bohemia Basin. Ni, Cu	Gabbroic Ni-Cu. Tertiary norite stock	Estimated 19 million tonnes grading 0.33% Ni 0.21% Cu, 0.01% Co

DESCRIPTION: Magmatic segregations chiefly of pyrrhotite, pentlandite, and chalcopyrite. Occur in troughlike body about 45 m thick near base of basin-shaped, composite norite stock of Tertiary age. Norite locally grades into gabbro and diorite. Norite stock intrudes metagraywacke, phyllite, and greenschist of the Cretaceous and Cretaceous(?) Kelp Bay Group. SOURCES: Kennedy and Walton, 1946; Johnson and others, 1982.

SE57. 57 57 137 16	Apex and El Nido. Au, Ag, Cu, Pb, W, Zn	Au quartz vein(?). Mesozoic diorite	Produced about 622,000 g Au and 93,300 g Ag

DESCRIPTION: Quartz fissure veins up to 2 m thick and wider stockwork with pyrite, arsenopyrite, chalcopyrite, galena, sphalerite, tetrahedrite, and gold. Minor sulfides in wallrocks of altered diorite. Deposit also contains disseminations, veinlets, and small masses of scheelite. Host rocks are diorite pluton and amphibolite mass in pluton. Vein system symmetrical around vertical fault that bisects deposit. Pluton intrudes upper Paleozoic low-grade pelitic and intermediate volcanic rocks. About 1.6 km of workings. Production from 1912 to 1939. SOURCES: Reed and Coats, 1941; Still and Weir, 1981; Johnson and others, 1982.

SE58. 57 51 136 13	Cobol. Au, Cu, Pb, Zn	Au quartz vein(?). Cretaceous(?) quartz diorite	Produced about 3,100 g Au from about 120 tonnes ore

DESCRIPTION: Quartz fissure vein up to 0.6 m wide with arsenopyrite, sphalerite, galena, pyrite, and chalcopyrite in Cretaceous(?) quartz diorite, and upper Paleozoic greenstone, quartzite, and siliceous limestone. Quartz diorite locally altered near veins. SOURCES: Reed and Coats, 1941; Johnson and others, 1982.

SE59. 57 47 136 19	Mirror Harbor. Ni, Cu, Co	Gabbroic Ni-Cu. Tertiary norite stock	Largest ore body contains about 7,300 tonnes grading about 1.57% Ni, 0.88% Cu, and 0.04% Co

DESCRIPTION: Disseminated, intergrown pyrrhotite, pentlandite, and chalcopyrite in Tertiary composite norite stock. Local sulfide pods. Stock intrudes contact-metamorphosed metagraywacke and phyllite of the Cretaceous Sitka Graywacke. SOURCES: Pecora, 1942; Kennedy and Walton, 1946; Johnson and others, 1982.

SE60. 57 49 136 14	Baker Peak. Cu	Basaltic Cu(?). Triassic(?) Goon Dip Greenstone	Grab samples with 2.0 to 7.5% Cu, and minor Au and Ag

DESCRIPTION: Small masses and disseminations of chalcopyrite and pyrite in zones up to 4 m wide and 120 m long in massive, amygdaloidal, subaerial metabasalt flows of the Triassic(?) Goon Dip Greenstone. Zones strike northwest-southeast, dip vertically. Greenschist-facies metamorphism of metabasalt. Local aplite dikes. Several trenches and minor underground workings. SOURCE: Johnson and others, 1982.

SE61. 57 40 136 07	Chichagoff, Hirst- Chichagof. Au, Ag, Pb, Cu	Au quartz vein. Cretaceous metagray- wacke and phyllite	Produced about 24.6 million g Au, 1.24 million g Ag, and minor Pb and Cu. Estimated 91,000 tonnes grading 41.2 g/t Au

DESCRIPTION: Tabular to lenticular bodies of quartz a few meters thick, a few hundred meters long horizontally, and up to a few thousand meters in length along plunge. Mainly ribbon quartz with minor massive sulfide with pyrite, arsenopyrite, galena, sphalerite, chalcopyrite, and local scheelite and tetrahedrite. Ore shoots localized within shear and gouge zones in Hirst and Chichagof faults, and probably along warps in the faults. Quartz bodies occur in metagraywacke and argillite of the Cretaceous Sitka Graywacke. Production from about 1905 to 1940. Extensive underground workings on 12 levels up to 1,200 m deep and 1,440 m long. Recent drilling and development. SOURCES: Reed and Coats, 1941; Still and Weir, 1981; Johnson and others, 1982; Alaska Mines and Geology, 1985.

SIGNIFICANT PLACER DISTRICTS OF ALASKA

By Warren Yeend, Thomas K. Bundtzen, and Warren J. Nokleberg

MAP NUMBER. LATITUDE LONGITUDE	DISTRICT. METALS	TYPE. LOCAL BEDROCK	GOLD PRODUCTION, GRAMS. GOLD CONCENTRATION, GRAMS/CUBIC METER

BROOKS RANGE

PL1. 67 10 160 15	Kiana. Au, nephrite	Placer Au. Marble, schist	217,700 g Au

DESCRIPTION: Gold mined principally from tributaries of Squirrel River. Coarse gold, some nuggets with quartz attached. Magnetite common in concentrates. Gold and magnetite probably derived from Au quartz vein lode deposits. SOURCES: I. M. Reed, written commun., 1937; Cobb, 1973.

PL2. 67 00 157 00	Shungnak. Au, Cu, Ag, Cr, Cd	Placer Au. Metasedimentary and metavolcanic rocks	466,500 g Au

DESCRIPTION: Placer deposits on streams draining Cosmos Hills. Gold source mostly Au quartz veins in metasedimentary and metavolcanic rocks. Most of production from Dahl Creek. Heavy minerals include gold, magnetite, chromite, native copper, and silver. Nephrite and serpentinite boulders collected from creek gravels and tailings piles. Large numbers of quartz crystals recovered from placer operations. SOURCES: Smith, 1913b; Anderson, 1945; Cobb, 1973.

PL3. 68 00 156 00	Noatak. Au	Placer Au. Schist, marble, metasedimentary and metavolcanic rocks	280,000 g Au

DESCRIPTION: Gold mined from Lucky Six Creek; nearby lode deposit contains sulfides and gold. Gold probably derived from Au quartz or polymetallic vein lode deposits. SOURCES: Smith, 1913b; Cobb, 1973.

PL4. 67 15 150 45	Wiseman (Koyukuk). Au, Bi, Cu, W, Pb	Placer Au. Metasedimentary rocks, granitic plutons, Cretaceous sedimentary rocks	9.02 million g Au

DESCRIPTION: Glaciation in parts of area has caused derangements of drainage, resulting in complex placer deposits. Gold-rich gravels in modern streams and bench deposits on bedrock. Large nuggets more common than elsewhere in Alaska. Heavy minerals include gold, stibnite, native silver, native copper, native bismuth, scheelite, pyrite, chalcopyrite, cinnabar, rutile, cassiterite, monazite, andalusite, and kyanite. Larger deposits at Hammond River and Nolan Creek. Hammond River: estimated 210,000 m^3 grading 5.1 g/m^3 Au and 0.32 g/m^3 Ag; total production of up to 1.84 million g Au; estimated production of 3.1 million g Ag; drift and sluice mining; placer deposit mostly occurs within lower 5 km of mouth of Koyukuk River; placer mining from 1900 until 1942. Nolan Creek: estimated 146,000 m^3 grading 12 g/m^3 Au; drift mining; local stibnite veins in metamorphic and granitic rocks. Deposits in district probably derived from Au quartz vein and Sb-Au vein lode deposits. SOURCES: Maddren, 1913; I. M. Reed, written commun., 1938; Brosgé and Reiser, 1960; Cobb, 1973; Dillon, 1982.

PL5. 67 50 148 00	Chandalar. Au, Sb, Hg, Cu, Ag, W, Pb, Mo	Placer Au. Metasedimentary and metavolcanic rocks	964,100 g Au

DESCRIPTION: Complicated placer deposits resulting from complicated glacial history. Two generations of placer deposits on Little Squaw Creek, one preglacial, one postglacial. Placers located in streams draining Au quartz vein lode deposits. Heavy minerals include gold, monazite, magnetite, hematite, rutile, pyrite, arsenopyrite, chalcopyrite, galena, stibnite, molybdenite, scheelite, and uranothorianite. Largest deposit at Little Squaw Creek: both preglacial and postglacial placer deposits; significant production; local Au quartz veins in schist; associated with Little Squaw Au gold quartz deposit. SOURCES: Mertie, 1925; Cobb, 1973; Dillon, 1982.

SEWARD PENINSULA AND WESTERN YUKON-KOYUKUK BASIN

PL6. 64 30 165 30	Nome. Au, Cu, Pb, Zn, Bi, W, Sn, Sb	Placer Au. Felsic and mafic schist, Au quartz veins	109 to 140 million g Au. 10.2 g/m^3, Anvil Creek. 2.0 to 8.1 g/m^3 for submarine deposits

DESCRIPTION: Bulk of gold from ancient beach gravels developed in till. Up to five separate elevated beaches and several submerged beaches. Modern stream gravels, and low and high alluvial benches also contain gold. Estimated 700 million m^3 grading 0.14 g/m^3. Gold in district probably derived from Au quartz vein lode deposits in the Nome district. SOURCES: Collier and others, 1908; Moffit, 1913; Nelson and others, 1969; Cobb, 1973; Eakins, 1981.

PL7. 65 40 166 30	Port Clarence. Sn, Au, REE, W, Cr, Pb, Ag, Hg, Pt	Placer Au and Sn. Slate, schist, granitic plutons	870,800 g Au

DESCRIPTION: Gold recovered from creeks and benches as much as 60 m above present-day streams. Dredges produced bulk of gold. Gold in district probably derived from Sn lode deposits associated with Cretaceous granitic plutons. Sn province occurs in western part of the district; total tin production about 1,814 tonnes Sn concentrate from both lode and placer deposits. Cape Creek placer deposit in Cape Prince of Wales area has produced about 68,100 to 90,800 kg cassiterite concentrate per year. Tin placers on streams draining contact zones around Cretaceous Sn-bearing granitic rocks and associated vein lode deposits. Heavy minerals in both gold and tin placers of gold, cassiterite, scheelite, cinnabar, monazite, xenotime, zircon, columbite, tantalite, wolframite, chromite, powellite. SOURCES: Brooks, 1901; Collier and others, 1908; Mulligan, 1959; Cobb and Sainsbury, 1972.

PL8. 65 45 164 50	Kougarok. Au, Sn, Pb, Ag, W, Hg	Placer Au and Sn. Schist, slate, marble, granitic rocks	46.7 million g. 0.14 Au g/m^3, Kougarok Gravels

DESCRIPTION: Large gold resources in Quaternary(?) glacial outwash gravels of the Tertiary and Quaternary(?) Kougarok Gravels, estimated 93.3 million g in 671.4 million m^3 of gravel. Buried Tertiary gravels and conglomerates may be gold source. Most mining by dredging. Heavy minerals include gold, pyrite, magnetite, hematite, cassiterite, scheelite, cinnabar, and lead sulfides. Richest areas in Iron Creek and Kougarok valley. Derived mainly from polymetallic vein and Sn lode deposits associated with Cretaceous granitic plutons. SOURCES: Collier and others, 1908; Cobb, 1973; Eakins, 1981.

PL9.	Council.	Placer Au. Schist,	31.1 million g Au.
64 45	Au, W, Hg, Cu	marble, dolomite, thin	0.4 to 0.7 g/m^3,
163 30		quartz veins	Spruce Creek

DESCRIPTION: Beach, modern stream, and rare bench gold placers. Mined mainly by dredging and sluicing. Gold in district probably derived from Au quartz vein lode deposits in metamorphic rocks of the Nome Group. SOURCES: Collier and others, 1908; Smith, 1910; Smith and Eakin, 1911; Cobb, 1973.

PL10.	Koyuk.	Placer Au. Schist,	1.62 million g Au
65 00	Au, Sb, W, Bi	marble, granitic plu-	
161 20		tons, Cretaceous sedi-	
		mentary rocks	

DESCRIPTION: Mining in creek and bench placers on Bonanza, Dime, and Sweepstakes Creeks areas; nuggets with vein quartz attached have been recovered. Mining by sluicing, dredging, and drifting. Heavy minerals include gold, magnetite, ilmenite, scheelite, stibnite, bismuthinite, wolframite, platinum, chromite, rutile, garnet, uranothorianite, hydrothorite, hematite, chrome spinel, iron and copper sulfides, galena, sphalerite, and molybdenite. Gold probably derived from polymetallic vein and other lode deposits associated with Cretaceous granitic plutons. SOURCES: Smith and Eakin, 1911; Harrington, 1919; Cobb, 1973.

PL11.	Fairhaven.	Placer Au. Schist, mar-	14.2 million g Au.
65 45	Au, Pb, Hg, Cu	ble, granitic plutons,	0.12 to 0.75 g/m^3,
161 41	W, Pt, REE, Bi,	Tertiary basalt	Mud Creek
	Cr, Mo, Ag		

DESCRIPTION: Rich placer gold areas on Candle Creek and Inmachuk River. Buried gold-rich channel gravel in vicinity of Mud Creek. Major streams extensively dredged; substantial resources remain unmined in buried drainages in northern part of district. Gold probably derived from polymetallic vein lode deposits associated with Cretaceous granitic plutons. SOURCES: Henshaw, 1909; Cobb, 1973.

WEST-CENTRAL ALASKA

PL12.	Goodnews Bay.	Placer PGE-Au.	Over 20.2 million g PGE,
59 00	Pt, Cr, Au	Mafic and ultramafic	933,000 g Au
161 10		plutons	

DESCRIPTION: Most extensive deposits on the Salmon River. Platinum and gold mined by dredging. Production mainly from 1934 to 1976, a major portion of the primary U.S. production. Average percentages in placer concentrates are 73.6% Pt, 9.9% Ir, 1.9% Os, 0.15% Rh, 1.2% Ru, 0.34% Pd, 2.1% Au, and 10.9% impurities. Pt and Cr, and some Au are apparently derived from the nearby informally named Middle Jurassic Goodnews Bay ultramafic complex of Southworth and Foley (1986), composed of dunite, pyroxenite, and hornblendite, with sparse anomalous PGE concentrations associated with sparse chromite segregations. Most of gold probably derived from reworking of glacial deposits which are probably derived from the Goodnews Bay ultramafic complex. SOURCES: Mertie, 1940, 1969; 1976; Berryhill, 1963; Cobb, 1973; Southworth and Foley, 1986.

PL13.	Marshall.	Placer Au and PGE. Cre-	2.99 million g Au
61 55	Au, Pt, Ag, W,	taceous sedimentary and	
161 30	Hg	volcanic rocks, granitic	
		plutons	

DESCRIPTION: Productive placers on Wilson Creek and tributaries. Most of area nonglaciated. Heavy minerals include gold, platinum, magnetite, hematite, ilmenite, scheelite, and cinnabar. Possibly derived from vein lode deposits associated with Cretaceous hypabyssal granitic and volcanic rocks. SOURCES: Harrington, 1918; Hoare and

Cobb, 1972.

PL14. 61 00 158 00	Aniak. Au, W, Cr, Hg, Pt, Ag	Placer Au and Hg. Cretaceous sedimentary and volcanic rocks, granitic plutons	7.62 million g Au

DESCRIPTION: Placer gold mined from modern streams and benches; Nyac area and Crooked Creek basin most productive. Heavy minerals include gold, magnetite, garnet, scheelite, cassiterite, pyrite, cinnabar, stibnite, and monazite. Placer cinnabar mined from Cinnabar Creek. Gold probably derived from polymetallic vein lode deposits in contact zones in graywacke of the Cretaceous Kuskokwim Group intruded by Cretaceous hypabyssal granitic plutons. SOURCES: Cady and others, 1955; Cobb, 1973.

PL15. 62 30 158 30	Iditarod. Au, Hg, Sb, Sn, W, Cr, REE, Ag	Placer Au. Paleozoic schist, Mesozoic clastic and volcanic rocks, Cretaceous granitic plutons	41.1 million g Au

DESCRIPTION: Gold placer deposits in modern stream gravels, residual concentrations, and benches. All mining within 14 km of Flat. Extensive dredging. Nonglaciated highlands are mantled by residual material, colluvium, and silt; lowlands are covered by thick masses of alluvium. Gold derived from polymetallic vein lode deposits in Cretaceous monzonite stocks, from auriferous Golden Horn deposit, and from other mineralized contact zones in sedimentary and volcanic rocks of the Cretaceous Kuskokwim Group. SOURCES: Cobb, 1973; Bundtzen and others, 1985b.

PL16. 63 30 156 30	Innoko. Au, Hg, Pt, Sn, W	Placer Au. Cretaceous metasedimentary and metavolcanic rocks, chert, basalt, felsic dikes	16.8 million g Au. 0.41 to to 0.83 g/m^3

DESCRIPTION: Bulk of gold from placers on bedrock benches that have no surface expression. Minor platinum, about 1% of gold content, recovered from Boob Creek. Some dredging. Most of district nonglaciated. Gold derived from mineralized rhyolite and basalt dike swarms in the Kuskokwim Group in the Yankee Creek, Ophir Creek, and Spruce Creek areas. SOURCES: Harrington, 1919; Mertie, 1936; Cobb, 1973; Bundtzen and Laird, 1980; Bundtzen and others, 1985.

PL17. 62 45 155 00	McGrath. Au, Sn, W, Bi, REE, Hg, Cu, Pb	Placer Au. Paleozoic limestone, Cretaceous sandstone, shale, and granitic rocks	4.01 million g Au, accessory Hg, Ag

DESCRIPTION: Stream and bench placers mined by hydraulic methods and one dredge. Candle Creek area most productive and contained 62-g gold nuggets. Heavy minerals include gold, cinnabar, chromite, zircon, magnetite, pyrite, and scheelite. Gold in district probably derived from polymetallic vein, and related lode deposits in and near Cretaceous hypabyssal monzonite plutons, and sedimentary and volcanic rocks of the Cretaceous Kuskokwim Group. SOURCES: Mertie, 1936; Cobb, 1973; Bundtzen and Laird, 1983b.

PL18. 64 25 154 20	Ruby. Au, Sn, Bi, REE, Pb, W, Pt	Placer Au. Limestone, schist, volcanic rocks, chert, granitic plutons	12.1 million g Au

DESCRIPTION: Complex geomorphic history. Vein quartz, chert, and other resistant rocks common in placers. Several cycles of erosion and deposition. Placers generally buried; mined with shafts and drifts. Region nonglaciated. Heavy minerals include gold, cassiterite, platinum, scheelite, allanite, and native bismuth. Largest deposit at Midnight Creek: estimated 88,000 m^3 grading 1.3 g/m^3; produced about 114,000 g Au, from

1940 to 1942; bedrock of local quartz veins in schist in or near granite; minor Sn placer deposits. Gold in district probably derived from polymetallic vein and skarn lode deposits associated with Cretaceous hypabyssal granitic plutons. SOURCE: Eakin, 1918; Mertie and Harrington, 1924; Cass, 1959; Chapman and others, 1963; Cobb, 1973.

PL19. 65 50 155 00	Hughes. Au, Cu, Pb, Ag, Sn, Pt, Zn	Placer Au. Jurassic and Cretaceous clastic and volcanic rocks, granitic plutons	6.25 million g Au

DESCRIPTION: Gold derived from streams draining contact zones around Cretaceous granitic plutons near Indian Mountain and in southern Zane Hills. Recent dredging on Bear Creek. Most of area nonglaciated. Gold probably derived from polymetallic vein and other lode deposits associated with Cretaceous granitic plutons. SOURCES: Eakin, 1916; Miller and Ferrians, 1968; Cobb, 1973.

PL20. 65 30 152 30	Melozitna. Au, Sn, Pb, Ag, Zn, Cu	Placer Au. Metasedimentary and metavolcanic rocks, Cretaceous clastic and granitic rocks	31,000 to 156,500(?) g Au

DESCRIPTION: Gold occurs in thin bench deposits and shallow-stream gravels. Heavy minerals include gold, cassiterite, magnetite, ilmenite, hematite, garnet, and tourmaline. Placers within a few kilometers of known or inferred granitic plutons. No known lode deposits. Gold in district probably derived from polymetallic vein and skarn lode deposits associated with Cretaceous hypabyssal granitic plutons. SOURCES: Eakin, 1912; Chapman and others, 1963; Cobb, 1973.

EAST-CENTRAL ALASKA

PL21. 65 10 151 00	Hot Springs. Au, Sn, Cr, REE, Cu, Pb, Ag, Ni, Hg, W, Bi, Nb	Placer Au and Sn. Sedimentary rocks, Tertiary, granitic plutons and gravels	14 million g Au

DESCRIPTION: Nearly all placer deposits consist of buried bench gravels on old terraces or buried stream deposits derived from older bench gravels. Thick deposits of frozen silt conceal deposits and make exploration difficult. Area nonglaciated. Production of about 213,000 kg Sn from placer deposits in Tofty tin belt; source unknown. Larger gold deposits at Glen Creek and American Creek. Glen Creek: estimated 600,000 m^3 grading 2.5 g/m^3; over 1.50 million g produced by 1931; gravels derived from local slate and quartzite with quartz veinlets. American Creek: estimated 410,000 m^3 grading 5.3 g per m^3; total production at least 2.18 million g Au; gold occurs in lower 1.1 m of gravels and upper 1 m of bedrock; gold in quartz-carbonate veins associated with east-west-trending shear zone. Gold in district possibly related to granitic plutons in area. Niobium-bearing columbite and aeschynite occurs in tailings of drift placer mines near Tofty; concentrates of tailings contain between 0.2 and 4.5% Nb. Estimated 45,400 kg recoverable Nb_2O_5 in placer deposits near Tofty. SOURCES: Mertie, 1934; Wayland, 1961; Heiner and Wolff, 1968; Cobb, 1973; Southworth, 1984; Warner, 1985; Warner and Southworth, 1985; Warner and others, 1986.

PL22. 65 30 150 00	Rampart. Au, Cu, Ag, Bi, Hg, W, Pb, Cr, Sn	Placer Au. Tertiary granitic plutons, Paleozoic sedimentary and volcanic rocks	2.71 million g Au

DESCRIPTION: Bulk of gold production from drainages of Minook and Troublesome Creeks. Area nonglaciated. At least 4 prominent terraces in Minook Creek, about 3 to 900 m above sea level. Pliocene(?) gravel in highest terrace is up to 20 m thick and auriferous, but not generally commercial. More than half of produced gold in district from Little Minook

Creek. Heavy minerals include gold, garnet, barite, chrome spinel, pyrite, cinnabar, native bismuth, and tetrahedrite. Larger deposits at Ruby Creek, Hunter-Dawson Creek, Morelock Creek, Hoosier Creek, and Little Minook Creek. Ruby Creek: estimated 290,000 m^3 grading 0.67 g/m^3; mined mainly by open-cut and drift methods. Hunter-Dawson Creek: estimated 250,000 m^3 grading 2.6 g/m^3; hydraulic and drift mining; gold found in lower 1 m of gravel and upper 1.1 m of bedrock; local bedrock of shear zone with sulfide minerals and quartz-calcite veins. Morelock Creek: estimated 150,000 m^3 grading 3.6 g/m^3; sluice mining; gold occurs in lower few centimeters of gravel and upper few centimeters of irregular bedrock surface. Little Minook Creek: estimated 120,000 m^3 grading 13 g/m^3 Au, 1.1 g/m^3 Ag; estimated total production of 2.02 million g Au; gravels vary from 2 to 4 m thick with gold at base and in upper 0.2 m of bedrock. Gold in district probably derived from polymetallic vein lode deposits associated with Tertiary granitic rocks. SOURCES: Mertie, 1934; Waters, 1934; Chapman and others, 1963; Heiner and Wolff, 1968; Cobb, 1973.

PL23. 65 30 148 10	Tolovana. Au, Sn, Cu, Pb, Hg, W, Cr, Sb, REE, Bi	Placer Au. Schist and sedimentary rocks, Cretaceous granitic plutons	11.7 million g Au. 1.22 g/m^3, Livengood Creek

DESCRIPTION: Auriferous stream and bench placers. Mature erosion surface largely buried by later sediments. Steam capture common. Rich buried bedrock benches, not completely exhumed. One of most recently discovered placer districts. Heavy minerals include gold, magnetite, hematite, ilmenite, limonite, chromite, spinel, cinnabar, stibnite, scheelite, cassiterite, monazite, and REE-minerals. Largest deposit at Livengood: may contain 30 million m^3 grading 1.44 g/m^3 Au. Gold possibly derived from polymetallic vein lode deposits associated with Cretaceous granitic plutons. SOURCES: Foster, 1966, 1969; Mertie, 1937b; Cobb, 1973; Eakins, 1981.

PL24. 64 55 146 30	Fairbanks. Au, Sb, W, Sn, Bi	Placer Au. Lower Paleozoic metavolcanic rocks, Cretaceous granitic plutons	238 million g Au. 10.2 g/m^3

DESCRIPTION: Placers spatially associated with lower Paleozoic metavolcanic rocks. Area nonglaciated. Placers overlain by thick sections of frozen loess and muck. Larger deposits at Mud Creek, Cleary Creek, and Goldstream Creek. Mud Creek: estimated 4.6 million m^3 grading 0.15 g/m^3; produced about 65,583 g Au through 1981. Cleary Creek: estimated 2.9 million m^3 grading 14 g/m^3 Au and 2.5 g/m^3 Ag; produced about 35.1 million g Au from drift mines; mined by underground drift and dredging methods. Goldstream: estimated 900,000 m^3 grading 6.9 g/m^3 Au; estimated 6.2 million g produced by drift, open cut, and dredging methods. Gold in district derived from Cretaceous or early Tertiary Au quartz vein, polymetallic vein, and W skarn lode deposits, and partly from early Paleozoic or older volcanogenic massive sulfide deposits in Cleary sequence, part of early Paleozoic or older metamorphic rocks of Yukon Crystalline terrane. SOURCES: Smith, 1913a; Prindle and Katz, 1913; Mertie, 1918; Heiner and Wolff, 1968; Cobb, 1973.

PL25. 65 30 144 45	Circle. Au, Sn, Sb, W, Pb, REE, Mo, Hg	Placer Au. Early Paleozoic or older metasedimentary rocks, granitic plutons	22.7 million g Au. 0.30 to 0.61 g/m^3

DESCRIPTION: Gold concentrated in alluvial and colluvial deposits (2 to 5 m thick), frequently overlain by 1 to 2 m of muck. Nonglaciated; broad upland of nearly accordant ridge crests. Large gold resource may be present in lower reaches of Crooked and Birch Creeks, and in the topographic trough south of Crazy Mountains. Larger deposits at Mammoth Creek, Deadwood Creek, Eagle Creek, and Coal Creek. Mammoth Creek: estimated 4.0 million m^3 grading 1.9 g/m^3 Au, 0.45 g/m^3 Ag; estimated production of up to 4.7 million g Au through 1926; mining by hydraulic and dredge methods; local quartz veins in bedrock; Deadwood Creek: estimated 1.44 million m^3 grading 2.3 g/m^3 Au and 0.49 g/m^3 Ag; estimated total production of over 93.3 million g Au; mined by dredge and hydraulic methods. Coal Creek: estimated 810,000 m^3 grading 0.38 g/m^3 Au, 0.041 g/m^3 Ag; estimated 311,000 g Au produced; dredge mining. Eagle Creek: estimated 760,000 m^3 grading 1.2 g/m^3 Au, 0.16 g/m^3 Ag; about 0.9 million Au g produced through 1906; recent production in 1985. Gold in district probably derived from Cretaceous or early Tertiary Au quartz vein, polymetallic vein, skarn, and porphyry lode deposits in region in early Paleozoic or older metamorphic rocks of Yukon Crystalline terrane with recycling through Tertiary conglomerate. Alluvial diamond found in placer concentrate in 1982. SOURCES: Prindle, 1913; Mertie, 1938; Heiner and Wolff, 1968; Cobb, 1973; Yeend, 1982; Menzie and others, 1983; Lasley, 1985.

PL26. 65 00 142 00	Eagle. Au, Pt, Sn, Pb, Hg, Ag, Cr	Placer Au. Early Paleozoic or older metavolcanic and metasedimentary rocks, granitic plutons	1.24 million g Au

DESCRIPTION: Gold recycled in part through Cretaceous and Tertiary conglomerates. Heavy minerals include gold, platinum, cinnabar, cassiterite, chromite, and native silver. Most of area nonglaciated during Pleistocene time. Gold in district probably derived from combination of Au quartz and polymetallic vein, skarn, and porphyry Cu lode deposits associated with Cretaceous or Tertiary plutons intruding early Paleozoic or older metamorphic rocks of Yukon Crystalline terrane. SOURCES: Mertie, 1938; Cobb, 1973.

PL27. 64 20 142 00	Fortymile. Au, REE, Pb, Sn, W, Hg	Placer Au. Early Paleozoic or older metasedimentary rocks, granitic plutons, mafic stocks, Tertiary clastic rocks	13.0 million g Au

DESCRIPTION: Stream and bench placer deposits common. Most of production from dredging. Most of area nonglaciated during Pleistocene time. Loess mantles much of area. Only gold recovered commercially. One 778-g nugget recovered from Wade Creek deposit. Largest deposit at Wade Creek: estimated 650,000 m^3 grading 0.57 g/m^3 Au and 0.11 g/m^3 Ag; bedrock source of Au quartz-pyrite veins; mined by hydraulic, drift, dredge, and open cut methods. Gold in district derived from a combination of Au quartz and polymetallic vein lode deposits in metamorphic rocks near contacts with Cretaceous or early Tertiary felsic plutons intruding early Paleozoic or older metamorphic rocks of Yukon Crystalline terrane. SOURCES: Mertie, 1938, Cobb, 1973.

PL28. 63 40 150 50	Kantishna. Au, Sb, Pb, W, Mn	Placer Au. Early Paleozoic or older metasedimentary and metavolcanic rocks. Cretaceous granitic plutons	2.80 million g Au; minor Sb, Ag

DESCRIPTION: Placer deposits in modern streams and benches. Highlands glaciated. Lowlands covered by glaciofluvial and eolian deposits. Most mining on streams near Kantishna. Scheelite and nuggets of native silver recovered. Gold in district probably derived from polymetallic or Au quartz vein lode deposits that formed during Cretaceous regional metamorphism and or plutonism in Yukon Crystalline terrane. SOURCES: Capps, 1919; Cobb, 1973; Bundtzen, 1981.

PL29. 64 00 148 30	Bonnifield. Au, Hg, Pt, Sn, W	Placer Au. Early Paleozoic or older metasedimentary and metavolcanic rocks. Cretaceous granitic plutons	1.40 million g Au

DESCRIPTION: Gold from streams and a few benches. Thick glaciofluvial deposits and loess cover much of district. Heavy minerals include various sulfides, scheelite, cassiterite, cinnabar, and PGE. Gold in district probably derived from Cretaceous or early Tertiary Au quartz or polymetallic vein lode and early Paleozoic or older Kuroko massive sulfide deposits in Yukon Crystalline terrane, with probable recycling through Tertiary gravels. SOURCES: Capps, 1912; Cobb, 1973; Gilbert and Bundtzen, 1979; Bundtzen and Gilbert, 1983.

PL30. 62 20 151 00	Yentna. Au, Cu, Ag, Pt	Placer Au. Jurassic and Cretaceous graywacke and granitic plutons, Tertiary conglomerate	3.58 million g Au

DESCRIPTION: Placers consist of stream and bench deposits, Pleistocene glaciofluvial deposits, and Tertiary conglomerates. Glacial and alluvial deposits blanket much of area. Most production in Cache Creek area from dredging operations. Heavy minerals include gold, platinum, cassiterite, scheelite, native copper, sulfides, and uranium and thorium minerals. Gold in district probably derived from Au quartz and polymetallic vein lode deposits associated with granitic plutons and dikes, and Upper Jurassic and Lower Cretaceous clastic rocks. SOURCES: Capps, 1913; Mertie, 1919; Cobb, 1973.

PL31. 63 00 143 30	Valdez Creek. Au, Cu, Pb	Placer Au. Metasedimentary rocks, Mesozoic graywacke, granitic plutons	1.2 million g Au. 0.51 to 2.0 g/m^3

DESCRIPTION: Complex Pleistocene history. Gold produced from modern stream gravels and from channels buried by glacial drift. Estimated 2.1 million g Au delineated. Mined by open pit and sluice methods. Heavy minerals include gold, magnetite, pyrite, zircon, sphene, sillimanite, kyanite, galena, realgar, orpiment, hessite, and silver telluride. Gold in district probably derived from polymetallic vein deposits associated with Cretaceous granitic rocks. Extensive recent mining; one of largest placer mines in state. SOURCES: Chapin, 1918; Capps, 1919; Tuck, 1938; Smith, 1970; Cobb, 1973; Mining Journal, 1984; Bressler and others (1985).

PL32. 63 20 146 00	Delta River. Au	Placer Au. Upper Paleozoic volcanic rocks, ultramafic sills, granitic plutons	31,100 to 77,750 g Au

DESCRIPTION: Gold probably derived from numerous occurrences and prospects of polymetallic vein and porphyry Cu deposits associated with late Paleozoic porphyries and Mesozoic granitic plutons intruding upper Paleozoic sedimentary and submarine volcanic rocks of the Slana Spur and Eagle Creek Formations. Glacial and glaciofluvial deposits cover most of district. SOURCES: Rose, 1965a; Cobb, 1973; Ian M. Lange and Warren J. Nokleberg, written commun., 1984.

PL33. 63 00 144 30	Chistochina. Au, Pt, W, Cr, Zn, Hg, Pb	Placer Au. Tertiary conglomerate, unknown source	4.39 million g Au. 0.51 g/m^3, Round Wash; 1.12 g/m^3, Quartz Creek

DESCRIPTION: Most placer mining in the extreme headwaters of Chistochina River on Miller Gulch and Slate Creek. Gold occurs in Tertiary conglomerate named "Round Wash". Unknown source for lode gold and rock clasts in Tertiary conglomerate; source presumably offset along nearby Denali fault. Placer gold also produced from glacial drift in valleys in area. Heavy minerals include gold, platinum, magnetite, pyrite, chromite, native copper, native silver, galena, cinnabar, garnet, and scheelite. SOURCES: Rose, 1967; Cobb, 1973; Yeend, 1981a, b.

PL34. 62 15 142 00	Chisana. Au, Ag	Placer Au. Tertiary conglomerate, Cretaceous volcanic rocks	1.40 million g Au

DESCRIPTION: Placer deposits generally within a few kilometers of Bonanza Creek area. Most gold derived from Tertiary gravel. Heavy minerals of native copper, native silver, galena, cinnabar, and molybdenite. Most of placer deposits in Tertiary conglomerate near or deposited on volcanic and sedimentary rocks of the Lower Cretaceous Chisana Formation. Unconsolidated glacial and fluvial deposits cover most lowlands. SOURCES: Capps, 1916; Richter and Matson, 1972.

PL35. 61 20 142 45	Nizina. Au, Sb, Cu, Pb, Ag, Mo	Placer Au. Jurassic and Cretaceous graywacke, Cretaceous and early Tertiary granitic plutons	4.48 million g Au

DESCRIPTION: Placer deposits in Quaternary sediments in valley fills and on benches. Native copper produced from some placers. One 3-tonne native copper nugget recovered. Heavy minerals include gold, native copper, native silver, and galena. Gold probably derived from vein lode deposits in Cretaceous or early Tertiary granitic plutons. Some gold possibly derived from Cu-Ag vein lode deposits in the Nikolai Greenstone. SOURCES: Moffit, 1914; Cobb and Matson, 1972; Cobb and MacKevett, 1980.

PL36. 57 45 153 30	Kodiak. Au, Cr, Pt	Placer Au. Upper Cretaceous graywacke, granitic plutons, Tertiary sandstone	31,100 to 62,200 g Au

DESCRIPTION: Gold concentrated in beach deposits and in sand dunes that are derived from glacial outwash and tills. Preglacial placers removed during Pleistocene glaciation. Heavy minerals include magnetite, pyrite, chromite, and platinum. Gold probably derived from Au quartz vein deposits in graywacke and argillite of the Upper Cretaceous Kodiak Formation. Platinum probably derived from the Jurassic or older, informally named Border Ranges ultramafic and mafic complex of Burns (1985). SOURCES: Capps, 1937; Cobb, 1973.

PL37. 61 10 149 30	Hope. Au, Cu, Sb, Hg, Pb	Placer Au. Upper Cretaceous graywacke and phyllite	3.1(?) million g Au

DESCRIPTION: Gold occurs in streams and bench gravels; recycled in part from glacial and glaciofluvial deposits. Mills and Canyon Creeks are most productive streams. Mining with small dredges and hydraulic systems. Heavy minerals include gold, native silver, native copper, sulfides, scheelite, and cinnabar. Largest deposit at Crow Creek placer: estimated 1,200,000 m^3 grading 1.1 g/m^3; gold in blue or yellow clays near false bedrock; most production from bench gravels. Gold in district mostly derived from Au quartz vein lode deposits in metagraywacke and phyllite of the Upper Cretaceous Valdez Group. SOURCES: Moffit, 1906; Martin and others, 1915; Cobb and Richter, 1972; Jansons and others, 1984; Winkler and others, 1984.

PL38. 61 40 149 00	Willow Creek. Au, Cu, W, Pt	Placer Au. Jurassic granitic and volcanic rocks, Tertiary conglomerate	2.8 million g Au

DESCRIPTION: Bulk of placer gold produced from Grubstake Gulch, Alfred Creek, and Willow Creek. Heavy minerals include gold, chalcopyrite, and platinum. Derived from polymetallic vein lode or Au quartz vein deposits in the Jurassic Talkeetna Mountains batholith, adjacent schist. In part, recycled in Tertiary conglomerate. SOURCES: Capps, 1915; Jasper, 1967b; Cobb, 1973.

PL39. 61 40 145 00	Nelchina. Au, Pt, W	Placer Au. Upper Cretaceous metagraywacke and phyllite	90,200 g Au. 15.2 to 20.3 g/m^3, Albert Creek

DESCRIPTION: Gold occurs in stream gravels and low benches, probably derived from Tertiary continental deposits. Fine gold occurs in glacial and glaciofluvial deposits. Much of gold within 1 m of bedrock and on bedrock surface. Scheelite and platinum in some samples. Gold probably derived from Au quartz vein deposits in metagraywacke and phyllite of the Upper Cretaceous Valdez Group. SOURCES: Moffit and Capps, 1911; Chapin, 1918; Jasper, 1967b; Cobb and Matson, 1972.

PL40. 60 05 142 00	Yakataga. Au, Cr, Cu	Placer Au. Varied bedrock units	500,000 g Au

DESCRIPTION: Gold occurs in beach deposits along coastal plain extending east-southeast from mouth of Copper River. Gold also occurs in bench and streams of White River. Heavy minerals include gold, magnetite, zircon, chromite, rutile, native copper. Derived from variety of bedrock sources drained by Copper River, including: (1) graywacke and argillite of lower Tertiary Orca Group and associated mafic extrusive rocks and mafic and granitic plutons, and (2) metagraywacke and phyllite of the Upper Cretaceous Valdez Group, and associated mafic extrusive rocks and granitic plutons. Possible recycling in glacial deposits in region. SOURCES: Maddren, 1914; Cobb, 1973.

PL41. 59 00 138 00	Yakutat, (Lituya Bay). Au, Pt, Fe, Ti	Placer Au and Ti. Varied bedrock units	115,000 g Au. Estimated 4.6 million m^3 grading 1.0% ilmenite

DESCRIPTION: Beach sands with gold and other heavy minerals at Yakutat. Fine platinum and ilmenite present in low concentrations in Lituya Bay. Placer deposits derived from same varied bedrock sources as for Yakataga district. SOURCES: Tarr and Butler, 1909; Mertie, 1933; Brew and others, 1978; Thomas and Berryhill, 1962.

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PL42. 59 20 136 08	Porcupine Creek. Au, Pb, Cu, Zn	Placer Au. Paleozoic limestone, clastic and younger granitic rocks	1.90 million g Au

DESCRIPTION: Placer deposits in streams incised in bedrock, various bench gravels, and glacial till. Heavy minerals include gold, galena, magnetite, scheelite, chalcopyrite, pyrite, and arsenopyrite. Gold probably derived from Cretaceous or early Tertiary Au quartz and polymetallic vein lode deposits in Paleozoic slate of Alexander belt. SOURCES: Eakin, 1919; Beatty, 1937; Wright, 1940; Bundtzen, 1986.

PL43. 58 18 134 22	Juneau. Au	Placer Au. Paleozoic and Mesozoic slate, quartzite, schist, gneiss, amphibolite	1.88 million g Au

DESCRIPTION: Placer deposits occur mainly in Gold Creek. Deposits consist of: hill placers, broken lode material; gulch placers, derived from lode material by mass wasting on steep slopes; and creek placers. Alluvial gravels contain most of placer gold. Much of placer material eroded and transported by glaciers; now partly in submerged glacial deposits. Possible submerged gold placer deposits along Gastineau Channel. Gold in district probably derived from Cretaceous or early Tertiary Au quartz and polymetallic vein lode deposits in western belt of the informally named Coast plutonic-metamorphic complex of Brew and Ford (1984). SOURCES: Spencer, 1906; Cobb, 1973.

REFERENCES

AEIDC (Arctic Environmental Information and Data Center), 1982, Mineral terranes of Alaska: AEIDC, Anchorage, Alaska, 1 p., 6 sheets, scale 1:1,000,000.

Alaska Mines and Geology, 1983, Shumagin Island gold mine shows promise of good returns, October, p. 13.

-----1985, Firm wants to develop new gold mine at old (Chichagof Mine) site, April, p. 7-8.

Allegro, G.L., 1984a, Geology of the Old Smoky Prospect, Livengood C-4 quadrangle, Alaska: Alaska Division of Geological and Geophysical Surveys Report of Investigation ROT 84-1, 10 p.

-----1984b, The Gilmore Dome "stratiform" tungsten occurrences, Fairbanks mining District, Alaska [abs.]: Geological Society of America Abstracts with Programs, v. 16, p. 266.

Anderson, Eskil, 1945, Asbestos and jade occurrences in the Kobuk River region, Alaska: Alaska Department of Mines Pamphlet 3-R, 26 p.

Armstrong, A.K., and MacKevett, E.M., Jr., 1982, Stratigraphy and diagenetic history of the lower part of the Triassic Chitistone Limestone, Alaska: U.S. Geological Survey Professional Paper 1212-A, 26 p.

Armstrong, R.L., 1985, Rb-Sr dating of the Bokan Mountain granite complex and its country rocks: Canadian Journal of Earth Sciences, v. 22, no. 8, p. 1233-1236.

Armstrong, R.L., Harakal, J.E., and Hollister, V.F., 1976, Age determinations of late Cenozoic Copper deposits of the North American Cordillera: Institute of Mining and Metallurgical Transactions, Section B, v. 85, p. 239-244.

Asher, R.R., 1969, Geologic and geochemical study, Solomon C-5 quadrangle, Seward Peninsula, Alaska: Alaska Division of Mines and Geology Report 33, 64 p.

Ashworth, Kate, 1983, Genesis of gold deposits of Little Squaw Mine, Chandalar District, Alaska: Bellingham, Washington, Western Washington University, M.S. thesis, 64 p.

Atwood, W.W., 1911, Geology and mineral resources of parts of the Alaskan Peninsula: U.S. Geological Survey Bulletin 467, 137 p.

Barker, Fred, 1963a, Exploration for antimony deposits at the Stampede mine, Kantishna district, Alaska: U.S. Geological Survey Bulletin 1155, p. 10-17.

-----1963b, The Funter Bay nickel-copper deposit, Admiralty Island, Alaska: U.S. Geological Survey Bulletin 1155, p. 1-10.

Barker, J.C., 1978, Mineral investigations of certain lands in the eastern Brooks Range: A summary report: U.S. Bureau of Mines Open-File Report 63-78, 25 p.

-----1981, Mineral investigations in the Porcupine River drainage, Alaska: U.S. Bureau of Mines Open-File Report 27-81, 189 p.

Barker, J.C., and Swainbank, R.C., 1985, A tungsten-rich porphyry molybdenum occurrence at Bear Mountain, northeast Alaska: U.S. Bureau of Mines Open-File Report 8-85, 64 p.

-----1986, A tungsten-rich porphyry molybdenum occurrence at Bear Mountain, northeast Alaska: Economic Geology, v. 81, p. 1753-1759.

Barnes, D.F., Mayfield, C.F., Morin, R.L., and Brynn, Sean, 1982, Gravity measurements useful in the preliminary evaluation of the Nimiuktuk barite deposit, Alaska: Economic Geology, v. 77, p. 185-189.

Barrie, T.C.P., 1984a, The geology of the Khayyam and Stumble-On deposits, Prince of Wales Island, Alaska: Austin, Texas, University of Texas, M.A. thesis, 172 p.

-----1984b, Geology of the Khayyam and Stumble-On massive sulfide deposits, Prince of Wales Island, Alaska [abs.]: Geological Society of America Abstracts with Programs, v. 16, p. 268.

Bateman, A.M., and McLaughlin, D.H., 1920, Geology of the ore deposits of Kennecott, Alaska: Economic Geology, v. 15, p. 1-80.

Beatty, W.B., 1937, Geology of the placer deposits of Porcupine Alaska: Pullman, Washington, Washington State University, M.S. thesis, 97 p.

Berg, H.C., 1973, Geology of Gravina Island, Alaska: U.S. Geological Survey Bulletin 1373, 41 p.

-----1984, Regional geologic summary, metallogenesis, and mineral resources of southeastern Alaska: U.S. Geological Survey Open-File Report 84-572, 298 p., scale 1:600,000.

Berg, H.C., and Cobb, E.H., 1967, Metalliferous lode deposits of Alaska: U.S. Geological Survey Bulletin 1256, 254 p.

Berg, H.C., Decker, J.E., and Abramson, B.S., 1981, Metallic mineral deposits of southeastern Alaska: U.S. Geological Survey Open-File Report 81-122, 136 p., 1 sheet, scale 1:1,000,000.

Berg, H.C., Elliott, R.L., and Koch, R.D., 1978, Map and tables describing areas of metalliferous mineral resource potential in the Ketchikan and Prince Rupert quadrangles, Alaska: U.S. Geological Survey Open-File Report 78-73M, 48 p., 1 sheet, scale 1:250,000.

Berg, H.C., Elliott, R.L., Smith, J.G., Pittman, T.L., and Kimball, A.L., 1977, Mineral resources of the Granite Fiords wilderness study area, Alaska, with a section on aeromagnetic data by Andrew Griscom: U.S. Geological Survey Bulletin 1403, 151 p.

Berg, H.C., and Grybeck, Donald, 1980, Upper Triassic volcanogenic Zn-Pb-Ag (Cu-Au)-barite mineral deposits near Petersburg, Alaska: U.S. Geological Survey Open-File Report 80-527, 9 p.

Bernstein, L.R., and Cox, D.P.,1986, Geology and sulfide mineralogy of the Number One orebody, Ruby Creek copper deposit, Alaska:

Economic Geology, v. 81, p. 1675-1689.
Berryhill, R.V., 1963, Reconnaissance of beach sands, Bristol Bay, Alaska: U.S. Bureau of Mines Report of Investigations 6214, 48 p.
Bond, J., 1983, Geology of the Tin Granite and associated skarn at Ear Mountain, Seward Peninsula, Alaska: Fairbanks, Alaska, University of Alaska, M.S. thesis, 89 p.
Booth, G.G., 1983, Geology of the Red Dog lead-zinc deposit, DeLong Mountains, Alaska [abs.]: Northwest Mining Association Annual Meeting Abstracts with Program, p. 15-16.
Bressler, J.R., Jones, W.C. and Cleveland, Gaylord, 1985, Geology of a buried channel system of the Denali Placer Gold Mine: Alaska Miner, January 1985, p. 9.
Brew, D.A., and Ford, A.B., 1984, Tectonostratigraphic terrane analysis in the Coast plutonic-metamorphic complex, southeastern Alaska, in Reed, K. M., and Bartsch-Winkler, Susan, eds., The U.S. Geological Survey in Alaska: Accomplishments during 1982: U.S. Geological Survey Circular 939, p. 90-93.
Brew, D.A., and Grybeck, Donald, 1984, Geology of the Tracy Arm-Fords Terror Wilderness Study Area and Vicinity, Alaska: U.S. Geological Survey Bulletin 1525-A, 52 p.
Brew, D.A., Johnson, B.R., Grybeck, Donald, Griscom, Andrew, and Barnes, D.F., 1978, Mineral resources of the Glacier Bay National Monument wilderness study area, Alaska: U.S. Geological Survey Open-File Report 78-494, 670 p.
Brooks, A.H., 1901, A reconnaissance of the Cape Nome and adjacent gold fields of Seward Peninsula, Alaska, in 1900: U.S. Geological Survey Special Publication, p. 1-180.
Brosgé, W.P., and Reiser, H.N., 1960, Progress map of the geology of the Wiseman quadrangle, Alaska: U.S. Geological Survey Open-File Map.
-----1968, Preliminary geologic and mineral resource maps (excluding petroleum), Arctic National Wildlife Range, Alaska: U.S. Geological Survey Open-File Report 76-539, scale 1:500,000, 4 sheets.
Brown, F.R., 1947, Apollo Mine, Unga Island, Alaska: Alaska Division of Geological and Geophysical Surveys (Territorial Department of Mines) Report of Mineral Investigations MR-138-1, 33 p.
Brown, J.S., 1926, The Nixon Fork country: U.S. Geological Survey Bulletin 783-D, p. 97-144.
Buddington, A.F., 1923, Mineral deposits of the Wrangell district: U.S. Geological Survey Bulletin 739, p. 51-75.
-----1929, Geology of Hyder and vicinity, southeastern Alaska, with a reconnaissance of Chickamin River: U.S. Geological Survey Bulletin 807, 124 p.
Buddington, A. F., and Chapin, Theodore, 1929, Geology and mineral deposits of southeastern Alaska: U.S. Geological Survey Bulletin 800, 398 p.
Bundtzen, T.K., 1981, Geology and mineral deposits of the Kantishna Hills, Mt. McKinley quadrangle, Alaska: Fairbanks, Alaska, University of Alaska, M.S. thesis, 237 p, 4 sheets, scale 1:63,360.
-----1983a, Mineral resource modeling Kantishna-Dunkle Mine Study, Alaska: Alaska Division of Geological and Geophysical Surveys Report of Investigations 83-12, 51 p.
-----1983b, Overview of Alaska's strategic minerals, in Agnew, A.F., ed., International minerals, a national perspective: American Association of Advancement of Science Selected Symposium 90, Westview Press, Boulder, Colorado, p. 37-70.
-----1986, Placer geology of the Porcupine District, Skagway B-4 quadrangle, Alaska: Alaska Division of Geological and Geophysical Surveys Report 86-27, 26 p.
Bundtzen, T.K., Eakins, G.R., Clough, J.G., Lueck, L.L., Green, C.B., Robinson, M.S., and Coleman, D.A., 1984a, Alaska's mineral industry, 1983: Alaska Division of Geological and Geophysical Surveys Special Report 33, 45 p.
Bundtzen, T.K., and Gilbert, W.G., 1983, Outline of geology and mineral resource of upper Kuskokwim region, Alaska: Alaska Geological Society 1982 Symposium on Western Alaska, v. 3, p. 101-117.
Bundtzen, T.K., Kline, J.T., and Albanese, M.A., 1984b, Geology of the McGrath A-2 quadrangle, Alaska: Alaska Division of Geological and Geophysical Surveys Public Data File 84-3, 1 sheet, scale 1:63,360
Bundtzen, T.K., and Laird, G.M., 1980, Preliminary geology of the McGrath-Upper Innoko River area, western interior Alaska: Alaska Division of Mines and Geology Open-File Report 134, 36 p.
-----1982, Geologic map of the Iditarod D-2 and eastern D-3 quadrangle, Alaska: Alaska Division of Geological and Geophysical Surveys Geologic Report 72, 26 p., 1 sheet, scale 1:63,360.
-----1983a, Geologic map of the Iditarod D-1 quadrangle, Alaska: Alaska Division of Geological and Geophysical Surveys Geologic Report 78, 17 p., 1 sheet, scale 1:63,360.
-----1983b, Geologic map of the McGrath D-6 quadrangle, Alaska: Alaska Division of Geological and Geophysical Surveys Geologic Report 79, 13 p., 1 sheet, scale 1:63,360.
-----1983c, Preliminary geologic map of the northeastern Iditarod C-3 quadrangle, Alaska: Alaska Division of Geological and Geophysical Surveys Report of Investigations 83-13, 6 p., 1 sheet, scale 1:63,360
Bundtzen, T.K., Miller, M.L., Laird, G.M., and Kline, J.T., 1985, Geology of heavy mineral placer deposits in the Iditarod and Innoko precincts, western Alaska, in Madonna, J.A., ed., Seventh Annual Conference on Alaskan Placer Mining: Alaska Prospectors Publication Company, p. 35-41.
Bundtzen, T.K., and Reger, R.D., 1977, The Rich-

ardson lineament - a structural control for gold deposits in the Richardson mining district, interior Alaska, in Short Notes on Alaska Geology - 1977: Alaska Division of Geological and Geophysical Surveys Geologic Report 55, p. 29-34.
Burack, A.C., 1983, Geology along the Pinnel Mountain Trail, Circle quadrangle, Alaska: Durham, New Hampshire, University of New Hampshire, M.S. thesis, 98 p.
Burns, L.E., 1985, The Border Ranges ultramafic and mafic complex, south-central Alaska: cumulate fractionates of island-arc volcanics: Canadian Journal of Earth Sciences, v. 22, p. 1020-1038.
Burton, P.J., 1981, Radioactive mineral occurrences, Mt. Prindle area, Yukon-Tanana Uplands, Alaska: Fairbanks, Alaska, University of Alaska, M.S. thesis, 72 p.
Burton, P.J., Warner, J.D., and Barker, J.C., 1985, Reconnaissance investigation of tin occurrences at Rocky Mountain (Lime Peak), east-central Alaska: U.S. Bureau of Mines Open-File Report 31-85, 44 p.
Byers, F.M., Jr., 1957, Tungsten deposits in the Fairbanks district, Alaska: U.S. Geological Survey Bulletin 1024-E, p. 179-216.
Byers, F.M., Jr., and Sainsbury, C.L., 1956, Tungsten deposits of the Hyder district, Alaska: U.S. Geological Survey Bulletin 1024-F, p. 123-140.
Cady, W.M., Wallace, R.E., Hoare, J.M., and Webber, E.J., 1955, The central Kuskokwim region, Alaska: U.S. Geological Survey Professional Paper 268, 132 p.
Capps, S.R., 1912, The Bonnifield region, Alaska: U.S. Geological Survey Bulletin 501, 64 p.
-----1913, The Yentna district, Alaska: U.S. Geological Survey Bulletin 534, 75 p.
-----1915, The Willow Creek district, Alaska: U.S. Geological Survey Bulletin 607, 86 p.
-----1916, The Chisana-White River district, Alaska: U.S. Geological Survey Bulletin 630, 130 p.
-----1919, The Kantishna region, Alaska: U.S. Geological Survey Bulletin 687, 116 p.
-----1937, Kodiak and adjacent islands, Alaska: U.S. Geological Survey Bulletin 880-C, p.111-184.
Capps, S.R., and Johnson, B.L., 1915, The Ellamar district, Alaska: U.S. Geological Survey Bulletin 605, 125 p.
Cass, J.T., 1959, Reconnaissance geologic map of the Ruby quadrangle, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-289, scale 1:250,000.
Cathcart, S.H., 1922, Metalliferous lodes in southern Seward Peninsula: U.S. Geological Survey Bulletin 722, p. 163-261.
Chapin, Theodore, 1914, Lode mining near Fairbanks: U.S. Geological Survey Bulletin 592-J, p. 321-355.
-----1918, The Nelchina-Susitna region, Alaska: U.S. Geological Survey Bulletin 668, 67 p.
-----1919, Mining in the Fairbanks district: U.S. Geological Survey Bulletin 692-F, p. 321-327.
Chapman, R.M., Coats, R.R., and Payne, T.G., 1963, Placer tin deposits in central Alaska: U.S. Geological Survey Open-File Report 675, 53 p.
Chapman, R.M., and Foster, R.L., 1969, Lode mines and prospects in the Fairbanks district, Alaska: U.S. Geological Survey Professional Paper 625-D, p. D1-D25.
Chapman, R.M., Patton, W.W., Jr., and Moll, E.J., 1982, Preliminary summary of the geology of the eastern part of the Ophir quadrangle, Alaska: U.S. Geological Survey Circular 844, p. 70-73.
Chipp, E.R., 1970, Geology and geochemistry of the Chandalar area, Brooks Range, Alaska: Alaska Division of Mines and Geology Geologic Report 42, 39 p.
Clark, A.L., and Greenwood, W.R., 1972, Geochemistry and distribution of platinum-group metals in mafic to ultramafic complexes of southern and southeastern Alaska: U.S. Geological Survey Professional Paper 800-C, p. C157-160.
Clautice, K.H., 1980, Geological Sampling and magnetic surveys of a tungsten occurrence, Bonanza Creek area, Hodzana Highlands, Alaska: U.S. Bureau of Mines Open-File Report 80-83, 80 p.
Coats, R.R., 1944, Asbestos deposits of the Dahl Creek area, Kobuk River district, Alaska: U.S. Geological Survey Open-File Report 7, 5 p.
Cobb, E.H., 1964, Placer gold occurrences in Alaska: U.S. Geological Survey Mineral Investigations Resources Map MR-38, scale 1:2,500,000.
-----1973, Placer deposits of Alaska: U.S. Geological Survey Bulletin 1374, 213 p.
Cobb, E.H., and MacKevett, E.M., Jr., 1980, Summaries of data on and lists of references to metallic and selected nonmetallic mineral deposits in the McCarthy quadrangle, Alaska: U.S. Geological Survey Open-File Report 80-885, 156 p.
Cobb, E.H., and Matson, N.A., 1972, Metallic mineral resources map of the Valdez quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-438.
Cobb, E.H., and Richter, D.H., 1972, Metallic mineral resource map of the Seward quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-466.
Cobb, E.H., and Sainsbury, C.L., 1972, Metallic mineral resource map of the Teller quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-466.
Cobb, E.H., and Tysdal, R.G., 1980, Summaries of data on and lists of references to metallic and selected nonmetallic mineral deposits in the Blying Sound and Seward quadrangles, Alaska: U.S. Geological Survey Open-File Report 80-621, 284 p.
Coleman, R.G., and Burns, L.E., 1985, The Tonsina complex, Chugach Mountains, a high-

pressure mafic-ultramafic cumulate sequence [abs.]: Geological Society of America Abstracts with Programs, v. 17, no. 6, p. 248.
Collier, A.J., Hess, F.L., Smith, P.S., and Brooks, A.H., 1908, The gold placers of parts of Seward Peninsula, Alaska, including the Nome, Council, Kougarok, Port Clarence, and Goodhope precincts: U.S. Geological Survey Bulletin 328, 343 p.
Conwell, C.N., 1973, Boulder Creek Tin Lode Deposits: Alaska Divison of Geological and Geophysical Surveys Report 55, p. 35-38.
Cox, Dennis, 1983a, U.S. Geological Survey-INGEOMINAS Mineral Resource Assessment of Colombia: Ore deposit models: U.S. Geological Survey Open-File Report 83-423, 64 p.
-----1983b, U.S. Geological Survey-INGEOMINAS Mineral Resource Assessment of Colombia: Additional ore deposit models: U.S. Geological Survey Open-File Report 83-901, 32 p.
Cox, D.P., Detra, D.E., and Detterman, D.L., 1981, Mineral resource maps of the Chignik and Sutwik Island quadrangles, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-1053-K, 2 sheets, scale 1:250,000.
Cox, D.P., and Singer, D.A., eds., 1986, Mineral deposit models: U.S. Geological Survey Bulletin 1693, 379 p.
Csejtey, Béla, and Miller, R.J., 1978, Map and table describing metalliferous and selected nonmetalliferous mineral deposits, Talkeetna Mountains quadrangle, Alaska: U.S. Geological Survey Open-File Report 78-558B, 20 p., 1 sheet, scale 1:250,000.
Czamanske, G.K., and Calk, L.C., 1981, Mineralogical records of cumulus processes, Brady Galcier Ni-Cu Deposits, Southeastern Alaska: Mining Geology, v. 31, no. 168, p. 213-233.
Degenhart, C.E., Griffith, R.J., McOuat, J.F., and Bigelow, C.G., 1978, Mineral studies of the western Brooks Range, performed under contract J0155089 to the U.S. Bureau of Mines: U.S. Bureau of Mines Open-File Report 103-78, 529 p.
Detterman, R.L., and Hartsock, J.K., 1966, Geology of the Iniskin-Tuxedni region, Alaska: U.S. Geological Survey Professional Paper 512, 78 p.
DeYoung, J.H., Jr., 1978, Mineral resources map of the Chandalar quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-878-B, scale 1:250,000, 2 sheets.
Dickinson, K.A., and Cunningham, Kenneth, 1984, Death Valley, Alaska, uranium deposit [abs.]: Geological Society of America Abstracts with Programs, v 16, p. 278.
Dillon, J.T., 1982, Source of lode- and placer-gold deposits of the Chandalar and upper Koyukuk districts, Alaska: Alaska Division of Geological and Geophysical Surveys Open-file Report 158, 22 p.
Dillon, J.T., Moorman, M.A., and Lueck, Larry, 1981, Geochemical reconnaissance of the southwest Wiseman quadrangle; summary of data on rock samples: Alaska Division of Geological and Geophysical Surveys Open-file report 133B, 164 p, 1 sheet, scale 1:250,000.
Dobson, D.D., 1982, Geology and alteration of the Lost River tin-tungsten-fluorite deposit, Alaska: Economic Geology, v. 77, p. 1033-1052.
Drechsler, J.S., Jr., and Dunbier, J., 1981, The Greens Creek ore deposit, Admiralty Island, Alaska [abs.]: Canadian Mining and Metallurgical Bulletin, v. 74, no. 833, p. 57.
Dunbier, John, Snow, G.G., and Butler, T.A., 1979, The Greens Creek project, Admiralty Island, Alaska [abs.], in Alaska's mineral and energy resources, economics and land status: Alaska Geological Society Symposium Program and Abstracts, p. 40.
Eakin, H.M., 1912, The Rampart and Hot Springs regions, U.S. Geological Survey Bulletin 520, p. 271-286.
-----1916, The Yukon-Koyukuk region, Alaska: U.S. Geological Survey Bulletin 631, 88 p.
-----1918, Lode mining in the Juneau gold belt: U.S. Geological Survey Bulletin 662, p. 77-92.
-----1919, The Porcupine gold placer district, Alaska: U.S. Geological Survey Bulletin, 699, 29 p.
Eakins, G.R., 1970, Geology and geochemistry of Kontrashibuna Lake, Lake Clark region, southwestern Alaska: Alaska Division of Mines and Geology Geochemical Report 20, 34 p., 2 plates, scale 1:63,360.
-----1975, Uranium investigations in southeastern Alaska: Alaska Division of Geological and Geophysical Surveys Geologic Report 44, 62 p.
-----1981, High level placer mining: Western Miner, v. 54, no. 2, p. 73-77.
Eakins, G.R., Bundtzen, T.K., Robinson, M.S., Lueck, L.L., Green, C.B., Clautice, K.H., Gallagher, J.L., and Robinson, M.S., 1985, Alaska's mineral industry, 1984: Alaska Division of Geological and Geophysical Surveys Special Report 38, 57 p.
Eakins, G.R., and Forbes, R.B., 1976, Investigation of Alaska's uranium potential: Alaska Division of Geological and Geophysical Surveys Special Report 12, p. 91-110.
Eakins, G.R., Gilbert, W.G., and Bundtzen, T.K., 1978, Preliminary bedrock geology and mineral resource potential of west-central Lake Clark quadrangle, Alaska: Alaska Division of Geological and Geophysical Surveys Open-File Report 118, 15 p., 2 sheets, scale 1:63,360.
Eberlein, G.D., Chapman, R.M., Foster, H.L., and Gassaway, J.S., 1977, Map and table describing known metalliferous and selected nonmetalliferous mineral deposits in central Alaska: U.S. Geological Survey Open-File Report 77-1168D, 132 p., scale 1:1,000,000.
Ellersieck, I.F., Jansons, Uldis, Mayfield,

C.F., and Tailleur, I.L., 1982, The Story Creek and Whoopee Creek lead-zinc-silver occurrences, western Brooks Range, Alaska, in Coonrad. W.L., ed., The United States Geological Survey in Alaska: Accomplishments during 1980: U.S. Geological Survey Circular 844, p. 35-38.

Elliott, R.L., Berg, H.C., and Karl, Susan, 1978, Metalliferous and selected nonmetalliferous mineral deposits in the Ketchikan and Prince Rupert quadrangles, Alaska: U.S. Geological Survey Open-File Report 78-73B, 17 p.

Erickson, R.L., 1982, Characteristics of mineral deposit occurrences: U.S. Geological Survey Open-File Report 82-795, 248 p.

Fernette, Gregory, and Cleveland, Gaylord, 1984, Geology of the Miss Molly molybdenum prospect, Tyonek C-6 quadrangle, Alaska: Alaska Division of Geological and Geophysical Surveys Professional Report 86, p. 35-41.

Foley, J.Y., and Barker, J.C., 1985, Chromite deposits along the Border Ranges fault, southern Alaska: U.S. Bureau of Mines Information Circular IC-8990, 58 p.

Foley, J.Y., Barker, J.C., and Brown, L.L., 1985, Critical and strategic minerals investigations in Alaska: Chromite: U.S. Bureau of Mines Open-File Report 97-85, 54 p., 1 plate, scale 1:2,500,000.

Foley, J.Y., Dahlin, D.C., Barker, J.C., and Mardock, C.L., in press, Chromite deposits in the western Brooks Range, Alaska: U.S. Bureau of Mines Information Circular.

Foley, J.Y., Hinderman, Toni, Kirby, D.E., and Mardock, C.L., 1984, Chromite occurrences in the Kaiyuh Hills, west-central Alaska: U.S. Bureau of Mines Open-File Report 178-84, 20 p.

Foley, J.Y., and McDermott, M.M., 1983, Podiform chromite occurrences in the Caribou Mountain and lower Kanuti River areas, central Alaska: U.S. Bureau of Mines Information Circular IC-8915, 27 p.

Folger, P.F., and Schmidt, J.M., 1986, Geology of the carbonate-hosted Omar copper prospect, Baird Mountains, Alaska: Economic Geology, v. 81, p. 1690-1695.

Forrest, Kimball, 1983, Geologic and isotopic studies of the Lik deposit and the surrounding mineral district, Delong Mountains, western Brooks Range, Alaska: Minneapolis, Minnesota, University of Minnesota, Ph.D. dissertation, 161 p.

Forrest, Kimball, Sawkins, F.J., and Rye, R.L., 1984, The Lik deposit, western Brooks Range, Alaska [abs.]: SEDEX mineralization along axial vents sites in a structural basin [abs.]: Geological Society of America Abstracts with Programs, v. 16, p. 511.

Fosse, E.L., 1946, Exploration of the copper-sulfur deposit, Khayyam and Stumble-On properties, Prince of Wales Island, Alaska: U.S. Bureau of Mines Report of Investigations 3942, 8 p.

Foster, H.L., 1968a, Potential for lode deposits in the Livengood gold placer district, east-central Alaska: U.S. Geological Survey Circular 590, 18 p.

——1968b, Descriptions of the Ruth Creek, Lillian Creek, Griffin, Old Smoky, Sunshine No. 2 and Olive Creek lode prospects, Livengood district, Alaska: U.S. Geological Survey Open-File Report OF-322, 21 p.

——1969, Nickeliferous serpentinites near Beaver Creek, east-central Alaska, in Some shorter mineral resource investigations in Alaska: U.S. Geological Survey Circular 615, p. 2-4.

——1975, Significant platinum values confirmed in ultramafic rock of the Eagle C-3 quadrangle, in Yount, M.E., ed., The United States Geological Survey Alaska Program, 1975: U.S. Geological Survey Circular 722, p. 42-43.

Foster, H.L., and Keith, T.E.C., 1974, Ultramafic rocks of the Eagle quadrangle, east-central Alaska: U.S. Geological Survey Journal of Research, v. 2, no. 6, p. 657-669.

Foster, H.L., Laird, J., Keith, T.E.C., Cushing, G.W., and Menzie, W.D., 1983, Preliminary geologic map of the Circle quadrangle, Alaska: U.S. Geological Survey Open-File Report 83-170A, 32 p., 1 sheet, scale 1:250,000.

Foster, R.L., 1966, The petrology and structure of the Amy Dome area, Tolovana mining district, east-central Alaska: Columbia, Missouri, Ph.D. dissertation, University of Missouri, 227 p.

Gamble, B.M., Ashley, R.P., and Pickthorn, W.J., 1985, Preliminary study of lode gold deposits, Seward Peninsula, in, Bartsch-Winkler, Susan, ed., The United States Geological Survey in Alaska: Accomplishments during 1984: U.S. Geological Survey Circular 967, p. 27-29.

Gault, H.R., 1945, The Salt Chuck copper-palladium mine, Prince of Wales Island, southeastern Alaska: U.S. Geological Survey Open-File Report 45-25, 18 p.

Gault, H.R., Rossman, D.L., Flint, G.M., Jr., and Ray, R.G., 1953, Some lead-zinc deposits of the Wrangell district, Alaska: U.S. Geological Survey Bulletin 9998-B, p. 15-58.

Gehrels, G.E., Berg, H.C., and Saleeby, J.B., 1983, Ordovician-Silurian volcanogenic massive sulfide deposits on southern Prince of Wales Island and the Barrier Islands, southeastern Alaska: U.S. Geological Survey Open-File Report 83-318, 9 p.

Gilbert, W.G., and Bundtzen, T.K., 1979, Mid-Paleozoic tectonics, volcanism, and mineralization in north-central Alaska Range, in Sisson, A., ed., The relationship of plate tectonics to Alaskan geology and resources: Alaska Geological Society, Symposium, 1977, p. F1-F21.

Gilbert, W.G., and Solie, D.N., 1983, Geologic map of McGrath A-3 quadrangle: Alaska Division of Geological and Geophysical Surveys Report of Investigations 83-7, 1 sheet, scale 1:40,000.

Goldfarb, R.J., Light, T.D., and Leach, D.L., 1986, Nature of the ore fluids at the Alaska-Juneau gold deposit, in Bartsch-Winkler, Susan, and Reed, K.M., eds., Geologic Studies in Alaska by the U.S. Geological Survey during 1985: U.S. Geological Survey Circular 978, p. 92-95.

Grantz, Arthur, 1956, Magnetite Island deposit at Tuxedni Bay, Alaska: U.S. Geological Survey Bulletin 1024-D, p. 95-106.

Grybeck, Donald, 1977, Known mineral deposits of the Brooks Range, Alaska: U.S. Geological Survey Open-File Report 77-166C, 45 p., 1 sheet, scale 1:1,000,000.

Grybeck, Donald, Berg, H.C., and Karl, S.M., 1984, Map and description of the mineral deposits in the Petersburg and eastern Port Alexander quadrangles, southeastern Alaska: U.S. Geological Survey Open-File Report 84-837, 86 p., 1 sheet, scale 1:250,000.

Grybeck, Donald, and Nelson, S.W., 1981, Mineral deposit map of the Survey Pass quadrangle, Brooks Range, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-1176-F, scale 1:250,000.

Guild, P.W., 1942, Chromite deposits of Kenai Peninsula, Alaska: U.S. Geological Survey Bulletin 931-G, p. 139-175.

Harrington, G.L., 1918, The Anvik-Andreafski region, Alaska (including the Marshall district): U.S. Geological Survey Bulletin 683, 70 p.

-----1919, The gold and platinum placers of the Tolstoi district: U.S. Geological Survey Bulletin 692, p. 339-351.

Harris, Mark, 1985, Old Dawson gold mine holds surprises: Alaska Construction and Oil, p. 28-30.

Hawley, C.C., 1976, Exploration and distribution of stratiform sulfide deposits in Alaska [abs.], in Miller, T.P., ed., Symposium on recent and ancient sedimentary environments in Alaska [abs.]: Alaska Geological Society Program with Abstracts, p. T1-T28.

Hawley, C.C., and Clark, A.L., 1974, Geology and mineral deposits of the upper Chulitna district, Alaska: U.S. Geological Survey Professional Paper 758-B, 47 p.

Heide, H.E., Wright, W.S., and Rudledge, F.A., 1949, Investigation of the Kobuk River asbestos deposits, Kobuk district, northwestern Alaska: U.S. Bureau of Mines Report of Investigation 4414, 25 p.

Heiner, L.E., and Wolff, E.N., 1968, Mineral resources of northern Alaska: University of Alaska, Fairbanks, Mineral Industry Research Laboratory Report 16, 306 p.

Henshaw, F.F., 1909, Mining in the Fairhaven precinct: U.S. Geological Survey Bulletin 379, p. 355-369.

Herreid, Gordon, 1962, Preliminary report on geologic mapping in the Coast Range mineral belt, in Alaska Division of Mines and Minerals Report for the year 1962, p. 44-59.

-----1964, Geology of the Niblack Anchorage area, southeastern Alaska: Alaska Division of Mines and Minerals Geologic Report 5, 10 p.

-----1965a, Geology of the Bluff area, Solomon quadrangle, Seward Peninsular, Alaska: Alaska Division of Mines and Minerals Geologic Report 10, 21 p.

-----1965b, Geology of the Omalik-Otter Creek area, Bendeleben quadrangle, Seward Peninsula, Alaska: Alaska Division of Mines and Minerals Geologic Report 11, 12 p.

-----1966, Geology and geochemistry of the Nixon Fork area, Medfra quadrangle, Alaska. Alaska Division of Mines and Minerals Geologic Report 22, 34 p.

-----1967, Geology and mineral deposits of the Dolomi area, Prince of Wales Island, Alaska: Alaska Division of Mines and Minerals Geologic Report 27, 25 p.

-----1968, Geological and geochemical investigations south of Farewell, Alaska: Alaska Division of Mines and Minerals Geology Report 26, 19 p.

-----1970, Geology of the Spirit Mountain nickel-copper prospect and surrounding area: Alaska Division of Mines and Geology Geologic Report 40, 19 p.

Herreid, Gordon, Bundtzen, T.K., and Turner, D.L., 1978, Geology and geochemistry of the Craig A-2 quadrangle and vicinity, Prince of Wales Island, southeastern Alaska: Alaska Division of Geological and Geophysical Surveys Geologic Report 48, 49 p., 2 plates, scale 1:40,000.

Hill, J.M., 1933, Lode deposits of the Fairbanks district, Alaska: U.S. Geological Survey Bulletin 849-B, p. 63-159.

Himmelberg, G.R., and Loney, R.A., 1981, Petrology of the ultramafic and gabbroic rocks of the Brady Glacier nickel-copper deposit, Fairweather Range, southeastern Alaska: U.S. Geological Survey Professional Paper 1195, 26 p.

Hitzman, M.W., 1978, Geology of the BT claim group, southwestern Brooks Range, Alaska: Seattle, Washington, University of Washington, M.S. thesis, 80 p.

-----1981, Geology of the BT Claim Group, southwestern Brooks Range, Alaska, in Silberman, M.L., Field, C.W., and Berry, A.L., eds., Proceedings on the symposium on mineral deposits of the Pacific Northwest - 1980: U.S. Geological Survey Open-File Report 81-355, p. 2-28.

-----1983, Geology of the Cosmos Hills and its relationship to the Ruby Creek copper-cobalt deposit: Stanford, California, Stanford University, Ph.D. dissertation, 266 p.

-----1986, Geology of the Ruby Creek copper deposit, southwestern Brooks Range, Alaska: Economic Geology, v. 81, p. 1644-1674.

Hitzman, M.W., Smith, T.E., and Proffett, J.M., 1982, Bedrock geology of the Ambler district, southwestern Brooks Range, Alaska:

Alaska Division of Geological and Geophysical Surveys Geologic Report 75, 2 sheets, scale 1:125,000.
Hoare, J.M., and Cobb, E.H., 1972, Metallic mineral resource map of the Russian Mission quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-444.
Hollister, V.F., 1978, Geology of the porphyry copper deposits of the Western Hemisphere: Society of Mining Engineering, American Institute of Mining, Metallurgy, and Petroleum Engineers Incorporated, New York, 218 p.
Howard, W.R., 1935, Salt Chuck copper-palladium mine: Alaska Territory Department of Mines Report MR119-4, 22 p.
Hudson, Travis, and Arth, J.G., 1983, Tin granites of the Seward Peninsula, Alaska: Geological Society of America Bulletin, v. 94, no. 6, p. 768-790.
Hudson, Travis, Miller, M.L., and Pickthorn, W.J., 1977, Map showing metalliferous and selected nonmetalliferous mineral deposits, Seward Peninsula, Alaska: U.S. Geological Survey Open-File Report 77-796B, 46 p., 1 sheet, scale 1:1,000,000.
Hudson, Travis, Smith, J.G., and Elliott, R.L., 1979, Petrology, composition, and age of intrusive rocks associated with the Quartz Hill molybdenite deposit, southeastern Alaska: Canadian Journal of Earth Sciences, v. 16, p. 1805-1822.
Irvine, T.N., 1974, Petrology of the Duke Island ultramafic complex, southeastern Alaska: Geological Society of America Memoir 138, 240 p.
Jansons, Uldis, 1982, Cobalt content in samples from the Omar Copper prospect, Baird Mountains, Alaska: U.S. Bureau of Mines Open-File Report MLA 109-82 16 p.
Jansons, Uldis, and Baggs, D.W., 1980, Mineral investigations of the Misheguk Mountain and Howard Pass quadrangles, National Petroleum Reserve, Alaska: U.S. Bureau of Mines Open-File Report 26-81, 195 p.
Jansons, Uldis, Hoekzema, R.B., Kurtak, J.M., and Fechner, S.A., 1984, Mineral occurrences in the Chugach National Forest, south-central, Alaska: U.S. Bureau of Mines Open-File Report MLA 5-84, 43 p., 2 sheets, scale 1:125,000.
Jasper, M.W., 1961, Mespelt mine, Medfra quadrangle: Alaska Division of Mines and Minerals 1961 Annual Report, p. 49-58.
-----1967a, Geochemical investigations, Willow Creek southerly to Kenai Lake region, south central Alaska: Alaska Division of Mines and Minerals Geochemical Report 14, 47 p.
-----1967b, Geochemical investigations along the Valdez to Chitina highway in south central Alaska, 1966: Alaska Division of Mines and Minerals Geochemical Report 15, 19 p.
Johnson, B.L., 1915, The gold and copper deposits of the Port Valdez district: U.S. Geological Survey Bulletin 622, p. 140-148.
-----1918, Mining on Prince William Sound: U.S. Geological Survey Bulletin 662, p. 183-192.
Johnson, B.R., Kimball, A.L., and Still, J.C., 1982, Mineral resource potential of the Western Chichagof and Yakobi Islands wilderness study area, southeastern Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-1476-B, 10 p., scale 1:125,000.
Jones, Brian, 1977, Uranium-thorium bearing rocks of western Alaska: Fairbanks, Alaska, University of Alaska, M.S. thesis, 80 p.
Jones, B.K., Leveille, R.A., and Redman, Earl, 1984a, Geology and mineralization of the Jualin gold mine: Alaska Miner, p. 18.
Jones, D.L., Silberling, N.J., Coney, P.J., and Plafker, George, 1984b, Lithotectonic terrane map of Alaska, in Silberling, N.J., and Jones, D.L., eds., Lithotectonic terrane maps of the North American Cordillera: U.S. Geological Survey Open-File Report 84-523, p. A1-A12, 1 sheet, scale 1:2,500,000.
Kennedy, G.C., 1953, Geology and mineral deposits of Jumbo basin, southeastern Alaska: U.S. Geological Survey Professional Paper 251, 46 p.
Kennedy, G.C., and Walton, M.S., Jr., 1946, Geology and associated mineral deposits of some ultrabasic rock bodies in southeastern Alaska: U.S. Geological Survey Bulletin 947-D, p. 65-84.
Killeen, P.L., and Mertie, J.B., Jr., 1951, Antimony ore in the Fairbanks district, Alaska: U.S. Geological Survey Open-File Report 42, 43 p.
Killeen, P.L., and Ordway, P.J., 1955, Radioactivity investigations at Ear Mountain, Seward Peninsula, Alaska, 1945: U.S. Geological Survey Bulletin 1024-C, p. 59-94.
Kimball, A.L., Still, J.C., and Tataj, J.L., 1984, Mineral deposits and occurrences in the Tracy Arm-Fords Terror wilderness study area and vicinity, Alaska: U.S. Geological Survey Bulletin 1525, p. 105-210.
Kingston, Jack, and Miller, D.J., 1945, Nickel-copper prospect near Spirit Mountain, Copper River region, U.S. Geological Survey Bulletin 943-C, p. 49-57.
Knopf, Adolph, 1908, Geology of the Seward Peninsula tin deposits, Alaska: U.S. Geological Survey Bulletin 358, 71 p.
-----1911, Geology of the Berners Bay region, Alaska: U.S. Geological Survey Bulletin 446, 58 p.
Lancelot, J.R., and de Saint-Andre, B., 1982, U-Pb systematics and genesis of U deposits [abs.]: Bokan Mountain (Alaska) and Lodeve (France), 5th International Conference on Geochronology, Cosmochronology, and Isotope Geology, Nikko National Park, Japan, June 27-July 2, Abstracts, p. 206-207.
Lange, I.M., and Nokleberg, W.J., 1984, Massive sulfide deposits of the Jarvis Creek terrane, Mt. Hayes quadrangle, eastern Alaska Range, Alaska [abs.]: Geological Society of America Abstracts with Programs, v. 16, p. 294.

Lange, I.M., Nokleberg, W.J., Plahuta, J.T., Krouse, H.R., and Doe, B.R., 1985, Geologic setting, petrology, and geochemistry of stratiform zinc-lead-barium deposits, Red Dog Creek and Drenchwater Creek areas, northwestern Brooks Range, Alaska: Economic Geology, v. 80, p. 1896-1926.

Lange, I.M., Nokleberg, W.J., and Zehner, R.E., 1981, Mineralization of late Paleozoic island arc rocks of Wrangellia terrane, Mount Hayes quadrangle, eastern Alaska Range, Alaska [abs.]: Geological Association of Canada National Meeting Abstracts, v. 6, p. A-33.

Lasley, J., 1985, Diamonds in Alaska: all that glitters is not gold: Alaska Flying, p. 40-41.

Lathram, E.H., Loney, R.A., Condon, W.H., and Berg, H.C., 1959, Progress map of the geology of the Juneau quadrangle, Alaska: U.S. Geological Survey Miscellaneous Geological Investigations Map I-303, scale 1:250,000.

Loney, R.A., and Himmelberg, G.R., 1984, Preliminary report on ophilites in the Yuki River and Mount Hurst areas, west-central Alaska, in Coonrad, W.L., and Elliott, R.L., eds., The United States Geological Survey in Alaska: Accomplishments during 1981: U.S. Geological Survey Circular 868, p. 27-30.

-----1985a, Distribution and character of the peridotite-layered gabbro complex of the southeastern Yukon-Koyukuk ophiolite belt, in Bartsch-Winkler, Susan, and Reed, K.M., eds., The United States Geological Survey in Alaska: Accomplishments during 1983: U.S. Geological Survey Circular 945, p. 46-48.

-----1985b, Ophiolitic ultramafic rocks of the Jade Mountains-Cosmos Hills area, southwestern Brooks Range, in Bartsch-Winkler, Susan, ed., The United States Geological Survey in Alaska: Accomplishments during 1984: U.S. Geological Survey Circular 967, p. 13-15.

MacKevett, E.M., Jr., 1963, Geology and ore deposits of the Bokan Mountain uranium-thorium area, southeastern Alaska: U.S. Geological Survey Bulletin 1154, 125 p.

-----1965, Ore controls at the Kathleen-Margaret (Maclaren River) copper deposit, Alaska: U.S. Geological Survey Professional Paper 501c, p. C116-C120.

-----1976, Mineral deposits and occurrences in the McCarthy quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-773B, 2 sheets, scale 1:250,000.

MacKevett, E.M., Jr., and Berg, H.C., 1963, Geology of the Red Devil quicksilver mine, Alaska: U.S. Geological Survey Bulletin 1142-G, 16 p.

MacKevett, E.M., Jr., and Blake, M.C., Jr., 1963, Geology of the North Bradfield River iron prospect, southeastern Alaska: U.S. Geological Survey Bulletin 1108-D, p. D1-D21.

MacKevett, E.M., Jr., Brew, D.A., Hawley, C.C., Huff, L.C., and Smith, J.G., 1971, Mineral resources of Glacier Bay National Monument, Alaska: U.S. Geological Survey Professional Paper 632, 90 p.

MacKevett, E.M., Jr., and Holloway, C.D., 1977a, Map showing metalliferous and selected nonmetalliferous mineral deposits in th eastern part of southern Alaska: U.S. Geological Survey Open-File Report 77-169A, 99 p., scale 1:1,000,000.

-----1977b, Map showing metalliferous mineral deposits in the western part of southern Alaska: U.S. Geological Survey Open-File Report 77-169F, 39 p, scale 1:1,000,000.

MacKevett, E.M., Jr., Robertson, E.C., and Winkler, G.R., 1974, Geology of the Skagway B-3 and B-4 quadrangles, southeastern Alaska: U.S. Geological Survey Professional Paper 832, 33 p., 1 sheet, scale 1:63,360.

MacKevett, E.M., Jr., and Smith, J.G., 1968, Distribution of gold, copper, and some other metals in the McCarthy B-4 and B-5 quadrangles, Alaska: U.S. Geological Survey Circular 604, 25 p.

Maddren, A.G., 1913, The Koyukuk-Chandalar region, Alaska: U.S. Geological Survey Bulletin 532, 119 p.

----- 1914, Mineral deposits of the Yakataga district, Alaska: U.S. Geological Survey Bulletin 592-E, p. 119-153.

Maloney, R.P., 1971, Investigation of gossans of Hot Springs Dome, near Manley Hot Springs, Alaska: U.S. Bureau of Mines Open-File Report 8071, 28 p.

Maloney, R.P., and Thomas, B.I., 1966, Investigation of the Purkeypile prospects, Kuskokwim River Basin, Alaska: U.S. Bureau of Mines Open-File Report 5-66, 12 0.

Martin, G.C., 1905, Gold deposits of the Shumagin Islands: U.S. Geological Survey Bulletin 259, p. 100-101.

-----1921, Gold lodes of the upper Kuskokwim region, Alaska: U.S. Geological Survey Bulletin 722, p. 149.

Martin, G.C., Johnson, B. L., and Grant, U.S., 1915, Geology and mineral resources of Kenai Peininsula, Alaska: U.S. Geological Survey Bulletin 587, 243 p.

Martin, G.C., and Katz, F.J., 1912, A geologic reconnaissance of the Iliamna region, Alaska: U.S. Geological Survey Bulletin 485, 138 p.

Mayfield, C.F., Curtis, S.M., Ellersieck, I.F., and Tailleur, I.L., 1979, The Ginny Creek zinc-lead-silver and Nimiiuktuk barite deposits, northwestern Brooks Range, Alaska, in Johnson, K.M., and Williams, J.R., eds., The United States Geological Survey in Alaska: Accomplishments during 1978: U.S. Geological Survey Circular 804-B, p. B11-B13.

Mayfield, C.F., Tailleur, I.L., and Ellersieck, Inyo, 1983, Stratigraphy, structure, and palinspastic synthesis of the western Brooks Range, northwestern Alaska: U.S.

Geological Survey Open-File Report 83-779, 58 p., 5 sheets, scale 1:1,000,000.
Menzie, W.D., and Foster, H.L., 1978, Metalliferous and selected nonmetalliferous mineral resource potential in the Big Delta quadrangle, Alaska: U.S. Geological Survey Open-File Report 78-592-D, scale 1:250,000.
Menzie, W.D., Foster, H.L., Tripp, R.B., and Yeend, W.E.., 1983, Mineral resource assessment of the Circle quadrangle, Alaska: U.S. Geological Survey Open-File Report 83-170B, 57 p., 1 map.
Mertie, J.B., Jr., 1918, Lode mining in the Fairbanks district, Alaska: U.S. Geological Survey Bulletin 662-H, p. 404-424.
-----1919, Platinum-bearing placers of the Kahiltna Valley: U.S. Geological Survey Bulletin 692, p. 233-264.
-----1925, Geology and gold placers of the Chandalar district: U.S. Geological Survey Bulletin 773, p. 215-263.
-----1933, Notes on the geography and geology of Lituya Bay: U.S. Geological Survey Bulletin 836, p. 117-135.
-----1934, Mineral deposits of the Rampart and Hot Springs districts, Alaska: U.S. Geological Survey Bulletin 844-D, p. 163-226.
-----1936, Mineral deposits of the Ruby-Kuskokwim region, Alaska: U.S. Geological Survey Bulletin 864-C, p. 115-255.
-----1937a, The Kaiyuh Hills, Alaska: U.S. Geological Survey Bulletin 868-D, p. 145-177.
-----1937b, The Yukon-Tanana region, Alaska: U.S. Geological Survey Bulletin 872, 276 p.
-----1938, Gold placers of the Fortymile, Eagle, and Circle districts, Alaska: U.S. Geological Survey Bulletin 897-C, p. 133-261.
-----1940, The Goodnews platinum deposits, Alaska: U.S. Geological Survey Bulletin 918, 97 p.
-----1969, Economic geology of the platinum minerals: U.S. Geological Survey Professional Paper 630, 120 p.
-----1976, Platinum deposits of the Goodnews Bay district, Alaska: U.S. Geological Survey Professional Paper 938, 42 p.
Mertie, J.B., Jr., and Harrington, G.L., 1924, The Ruby-Koskokwim region, Alaska: U.S. Geological Survey Bulletin 754, 129 p.
Miller, D.J., 1946, Copper deposits of the Nizina district, Alaska: U.S. Geological Survey Bulletin 947-F, p. 93-140.
Miller, T.P., 1976, Hardrock uranium potential in Alaska: U.S. Geological Survey Open-File Report 76-246, 7 p.
Miller, T.P., and Bunker, C.M., 1976, A reconnaissance study of the uranium and thorium contents of plutonic rocks of the southeastern Seward Peninsula, Alaska: U. S. Geological Survey Journal of Geologic Research, v. 4, p. 367-377.
Miller, T.P., and Elliott, R.L., 1969, Metalliferous deposits near Granite Mountain, eastern Seward Peninsula, Alaska: U.S. Geological Survey Circular 614, 19 p.
-----1977, Progress report on uranium investigations in the Zane Hills area, west-central Alaska: U.S. Geological Survey Open-File Report 77-428, 12 p.
Miller, T.P., Elliott, R.L., Finch, W.I., and Brooks, R.A., 1976, Preliminary report on uranium-, thorium-, and rare-earth-bearing rocks near Golovin, Alaska: U.S. Geological Survey Open-File Report 76-710, 13 p.
Miller, T.P., Elliott, R.L., Grybeck, Donald, and Hudson, T.L., 1971, Results of geochemical sampling in the northern Darby Mountains, Seward Peninsula, Alaska: U.S. Geological Survey Open-File Report, 12 p.
Miller, T.P., and Ferrians, O.J., Jr., 1968, Suggested areas for prospecting in the central Koyukuk River region, Alaska: U.S. Geological Survey Circular 570, 12 p.
Miller, T.P., Moll, E.J., and Patton, W.W., Jr., 1980, Uranium- and Thorium-rich volcanic rocks of the Sischu Creek area, Medfra quadrangle, Alaska: U.S. Geological Survey Open-File Report 80-803, 8 p.
Mining Journal, 1984, v. 302, no. 7745, p. 67.
Moffit, F.H., 1906, Gold fields of the Turnagain Arm region: U.S.Geological Survey Bulletin 277, p. 7-52.
-----1913, Geology of the Nome and Grand Central quadrangles, Alaska: U.S. Geological Survey Bulletin 533, 140 p.
-----1914, Geology of the Hanagita-Bremner region, Alaska: U.S. Geological Survey Bulletin 576, 56 p.
-----1918, Mining in the lower Copper River basin: U.S. Geological Survey Bulletin 662, p. 155-182.
Moffit, F.H., and Capps, S.R., 1911, Geology and mineral resources of the Nizina district, Alaska: U.S. Geological Survey Bulletin 448, 111 p.
Moffit, F.H., and Fellows, R.E., 1950, Copper deposits of the Prince William Sound district, Alaska: U.S. Geological Survey Bulletin 963-B, p. 47-80.
Moffit, F.H., and Mertie, J.B., Jr., 1923, The Kotsina-Kuskalana district, Alaska: U.S. Geological Survey Bulletin 745, 149 p.
Monger, J.W.H., and Berg, H.C., 1984, Lithotectonic terrane map of western Canada and southeastern Alaska, in Silberling, N.J., and Jones, D.L., eds., Lithotectonic terrane maps of the North American Cordillera: U.S. Geological Survey Open-File Report 84-523, p. B1-B31, 1 sheet, scale 1:2,500,000.
Moore, D.W., Young, L.E., Modene, J.S., and Plahuta, J.T., 1986, Geologic setting and genesis of the Red Dog zinc-lead-silver deposit, western Brooks Range, Alaska: Economic Geology, v. 81, p. 1696-1727.
Mullen, A.W., 1984, Managing exploration and development programs for a variety of resource companies: Western Miner, v. 57, no. 4., p. 35-36.
Mulligan, J.J., 1959, Tin placer and lode investigations, Ear Mountain area, Seward Peninsula, Alaska: U.S. Bureau of Mines Report of Investigations 5493, 53 p.

-----1962, Lead-silver deposits in the Omilak area, Seward Peninsula, Alaska: U.S. Bureau of Mines Report of Investigations 6018, 44 p.

-----1966, Tin-lode investigation, Cape Mountain area, Seward Peninsula, Alaska, with a section on petrography by W.L. Gnagy: U.S. Bureau of Mines Report of Investigation 6737, 43 p.

-----1971, Sampling gold lode deposits, Bluff, Seward Peninsula, Alaska, with a section on petrography by W.L. Gnagy: U.S. Bureau of Mines Report of Investigations 7555, 40 p.

Myers, G.L., 1984, Geology of the Cu-Fe-Au skarns of Kasaan Peninsula, southeast Alaska [abs.]: Geological Society of America Abstracts with Programs, v. 16, p. 324.

Nauman, C.R., Blakestad, R.A., Chipp, E.R., and Hoffman, B.L., 1980, The north flank of the Alaska Range, a newly discovered volcanogenic massive sulfide belt [abs.]: Geological Association of Canada Program with Abstracts, p. 73.

Nelson, A.E., West, W.S., and Matzko, J.J., 1954, Reconnaissance for radioactive deposits in eastern Alaska, 1952: U.S. Geological Survey Circular 358, 21 p.

Nelson, S.W., and Nelson, W.H., 1982, Geology of the Siniktanneyak Mountain ophiolite, Howard Pass quadrangle, Alaska: U.S. Geological Survey Map MF-1441, 1 sheet, scale 1:63,360.

Nelson, W.H., King, H.D., Case, J.E., Tripp, R.B., Crim, W.D., and Cooley, E.F., 1985, Mineral resource assessment map of the Lake Clark quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-1114-B, 1 sheet, scale 1:250,000.

Newberry, R. J., 1986, Mineral resources of the north-central Chugach Mountains, Alaska: Alaska Division of Geological and Geophysical Surveys Report of Investigations 86-23, 44 p.

Newberry, R.J., Dillon, J.T., and Adams, D.D., 1986, Regionally metamorphosed, calc-silicate-hosted deposits of the Brooks Range, Northern Alaska: Economic Geology, v. 81, p. 1728-1752.

Noel, G.A., 1966, The productive mineral deposits of southeastern Alaska: Canadian Institute of Mining and Metallurgy, v. 8, p. 215-229.

Nokleberg, W.J., and Lange, I.M., 1985, Volcanogenic massive sulfide occurrences, Jarvis Creek Glacier terrane, western Mount Hayes quadrangle, Alaska, in Bartsch-Winkler, Susan, and Reed, K.M., eds., The United States Geological Survey in Alaska: Accomplish-ments during 1983: U.S. Geological Survey Circular 945, p.77-80.

Nokleberg, W.J., Lange, I.M., and Roback, R.C., 1984, Preliminary accretionary terrane model for metallogenesis of the Wrangellia terrane, southern Mount Hayes quadrangle, eastern Alaska Range, Alaska, in Reed, K.M., and Bartsch-Winkler, S.R., eds., The United States Geological Survey in Alaska: Accomplishments during 1982: U.S. Geological Survey Circular 939, p. 60-65.

Nokleberg, W.J., and Winkler, G.R., 1982, Stratiform zinc-lead deposits in the Drenchwater Creek area, Howard Pass quadrangle, northwestern Brooks Range, Alaska: U.S. Geological Survey Professional Paper 1209, 22 p, 2 sheets, scale 1:20,000.

Orris, G.J., and Bliss, J.D., 1985, Geologic and grade-volume data on 330 gold placer deposits: U.S. Geological Survey Open-File Report 85-213, 172 p.

Patton, W.P., Jr., and Miller, T.P., 1970, Preliminary geologic investigations in the Kanuti River region, Alaska: U.S. Geological Survey Bulletin 1312-J, p. 51-510.

Patton, W.P., Jr., Miller, T.P., Lanphere, M.A., and Brosge, W.P., 1976, Kanuti ultramafic belt, in Geological Survey Research - 1976: U.S. Geological Survey Professional Paper 1000, 53 p.

Patton, W.P., Jr., and Moll, E.J., 1983, Mineral resource assessment of the Medfra quadrangle, Alaska: U.S. Geological Survey Open-File Report 80-811G, 3 sheets, scale 1:250,000.

Patton, W.P., Jr., Moll, E.J., Dutro, J.T., Jr., Silberman, M.L., and Chapman, R.M., 1980, Geologic map of the Medfra quadrangle, Alaska: U.S. Geological Survey Open-File Report 80-811, 6 plates, scale 1:250,000.

Patton, W.W., Jr., Moll, E.J., and King, A.D., 1984, The Alaskan mineral resource assessment program: Guide to information contained in the folio of geologic and mineral resource maps of the Medfra quadrangle, Alaska: U.S. Geological Survey Circular 928, 11 p.

Pecora, W.T., 1942, Nickel-copper deposits on the west coast of Chichagof Island, Alaska: U.S. Geological Survey Bulletin 936-I, p. 221-243.

Plahuta, J.T., 1978, Geologic map and cross sections of the Red Dog prospect, DeLong Mountains, northwestern Alaska: U.S. Bureau of Mines Open-File Report 65-78, 11 p, scale 1:24,000.

Prindle, L.M., 1913, A geologic reconnaissance of the Circle quadrangle, Alaska: U.S. Geological Survey Bulletin 538, 82 p.

Prindle, L.M., and Katz, F.J., 1913, Geology of the Fairbanks district, in Prindle, L. M., A geologic reconnaissance of the Fairbanks quadrangle, Alaska: U.S. Geological Survey Bulletin 525, p. 59-152.

Puchner, C.C., 1985, Geologic setting and mineralization of the Kougarok Sn(Ta-Nb) deposit, Seward Peininsula, Alaska [abs.]: Geological Society of America Abstracts with Programs, v. 17, no. 7., p. 694.

-----1986, Geology, alteration, and mineralization of the Kougarok Sn deposit, Seward Peninsula, Alaska: Economic Geology, v. 81, p. 1775-1794.

Ray, R.G., 1954, Geology and ore deposits of the

Willow Creek mining district, Alaska: U.S. Geological Survey Bulletin 1004, 86 p.
Read, J.J., 1985, Gold-quartz mineralization at the Big Hurrah mine, Seward Peininsula, Alaska [abs.]: Geological Society of America Abstracts with Programs, v. 17, no. 6, p. 402.
Read, J.J., and Meinert, L.D., 1986, Gold-bearing quartz vein mineralization at the Big Hurrah mine, Seward Peninsula: Economic Geology, v. 81, p. 1760-1774.
Reed, B.L., 1967, Results of stream sediment sampling and bedrock analyses in the eastern part of the Iliamna quadrangle, and at Kasna Creek, Lake Clark quadrangle, Alaska: U.S. Geological Survey Open-File Report, 18 p.
-----1977, Disseminated tin occurrences near Coal Creek, Talkeetna Mountains D-6 quadrangle, Alaska: U.S. Geological Survey Open-File Report 78-77, 8 p.
Reed, B.L., and Eberlein, G.D., 1972, Massive sulfide deposits near Shellebarger Pass, southern Alaska Range: U.S. Geological Survey Bulletin 1342, 45 p.
Reed, B.L., and Elliott, R.L., 1968a, Geochemical anomalies and metalliferous deposits between Windy Fork and Post River, southern Alaska Range: U.S. Geological Survey Circular 569, 22 p.
-----1968b, Lead, zinc, and silver deposits at Bowser Creek, McGrath A-2 quadrangle, Alaska: U.S. Geological Survey Circular 559, 17 p.
Reed, B.L., and Lanphere, M.A., 1969, Age and chemistry of Mesozoic and Tertiary plutonic rocks of south-central Alaska: Geological Society of America Bulletin, v. 80, no. 1, p. 23-44.
Reed, B.L., Nelson, S.W., Curtin, G.C., and Singer, D.A., 1978, Mineral resource map of the Talkeetna quadrangle: U.S. Geological Survey Miscellaneous Field Studies Map MF-870D, 1 sheet, scale 1:250,000.
Reed, J.C., and Coats, R.R., 1941, Geology and ore deposits of the Chichagof mining district, Alaska: U.S. Geological Survey Bulletin 929, 148 p.
Richter, D.H., 1963, Geology of the Portage Creek-Susitna River area, Alaska: Alaska Division of Mines and Minerals Geologic Report 3, 2 sheets, scale 1:24,000.
-----1966, Geology of the Slana district, south central Alaska: Alaska Division of Mines and Minerals Geologic Report 21, 51 p.
-----1970, Geology and lode-gold deposits of the Nuka Bay area, Kenai Peninsula, Alaska: U.S. Geological Survey Professional Paper 625-B, p. B1-B16.
Richter, D.H., and Herreid, Gordon, 1965, Geology of the Paint River area, Iliamna quadrangle, Alaska: Alaska Division of Mines and Minerals Geologic Report 8, 8 p., 1 plate, scale 1:31,500.
Richter, D.H., and Matson, N.A., Jr., 1972, Metallic mineral resources map of the Nabesna quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-422.
Richter, D.H., Singer, D.A., and Cox, D.P., 1975, Mineral resources map of the Nabesna quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-655K, scale 1:250,000.
Roberts, W.S., 1984, Economic potential for chromium, platinum, and palladium in the Mount Hurst Ultramafics, west central area, Alaska: U.S. Bureau of Mines Open-File Report 84-22, 52 p.
Robertson, E.C., 1956, Magnetite deposits near Klukwan and Haines, Alaska: U.S. Geological Survey Open-File Report, 37 p.
Robinson, G.D., and Twenhofel, W.S., 1953, Some lead-zinc and zinc-copper deposits of the Ketchikan and Wales districts, Alaska: U.S. Geological Survey Bulletin 998-C, p. 59-84.
Robinson, M.S., 1981, *Geology and ground magnetometer survey of the Yellow Pup tungsten prospect, Gilmore Dome, Fairbanks mining district, Alaska*: Alaska Division of Geological and Geophysical Surveys Open-File Report AOF-137, 9 p.
Robinson, M.S. and Bundtzen, T.K., 1979, Historic gold production in Alaska--A minisummary: Alaska Division of Geological and Geophysical Surveys Mines and Geology Bulletin, v. 28, no. 3, p. 1-10.
-----1982, Geology of the Scrafford antimony-gold lode deposit, Fairbanks mining district, Alaska: Alaska Division of Geological and Geophysical Surveys Open-File Report AOF-173, 7 p.
Robinson, M.S., Smith, T.E., Bundtzen, T.K., and Albanese, M.D., 1982, Geology and metallogeny of the Livengood area, east-central Alaska [abs.]: Alaska Miners Association Annual Convention Program with Abstracts, p. 8.
Roeder, Dietrich, and Mull, C.G., 1978, Tectonics of Brooks Range ophiolites, Alaska: American Association of Petroleum Geologists Bulletin, v. 62, no. 9, p. 1696-1702.
Rose, A.W., 1965a, Geology and mineral deposits of the Rainy Creek area, Mt. Hayes quadrangle, Alaska: Alaska Division of Mines and Minerals Geologic Report 14, 51 p.
-----1965b, Geology and mineralization of the Midas Mine and Sulphide Gulch areas near Valdez: Alaska Division of Mines and Minerals Geologic Report 15, 21 p.
-----1966, Geological and geochemical investigations in the Eureka Creek and Rainy Creek areas, Mt. Hayes quadrangle, Alaska: Alaska Division of Mines and Minerals Geologic Report 20, 37 p.
-----1967, Geology of the upper Chistochina River area, Mt. Hayes quadrangle, Alaska: Alaska Division of Mines and Minerals Geologic Report 28, 41 p.
Rose, A.W., and Richter, D.H., 1967, Geology and stream sediment geochemistry of the Anton Larson Bay and vicinity, Kodiak Island,

Alaska: Alaska Division of Mines and Minerals Geologic Report 31, 9 p.
Rubin, C.M., 1984, Geologic setting and sulfide mineralization of the Smucker Deposit, southcentral Brooks Range, Alaska [abs.]: Geological Society of America Abstracts with Programs, v. 16, p. 640.
Ruckmick, J.C., and Noble, J.A., 1959, Origin of the ultramafic complex at Union Bay, southeastern Alaska: Geological Society of America Bulletin, v. 70, p. 981-1017.
Runnells, D.D., 1969, The mineralogy and sulfur isotopes of the Ruby Creek copper prospect, Bornite, Alaska: Economic Geology, v. 64, p. 75-90.
Sable, E.G., 1977, Geology of the western Romanzof Mountains, Brooks Range, Alaska: U.S. Geological Survey Professional Paper 897, 84 p.
Sainsbury, C.L., 1951, Geology of the Nelson and Radovan copper prospects, Glacier Creek, Alaska: U.S. Geological Survey Open-File Report, 18 p.
-----1963, Beryllium deposits of the western Seward Peninsula, Alaska: U.S. Geological Survey Circular 479, 18 p.
-----1964, Geology of the Lost River mine area, Alaska: U.S. Geological Survey Bulletin 1129, 80 p.
-----1965, Plane table maps and drill logs of fluorite and beryllium deposits, Lost River area, Alaska: U.S. Geological Survey Open-File Report 250, 38 p.
-----1969, Geology and ore deposits of the central York Mountains, western Seward Peninsula, Alaska: U.S. Geological Survey Bulletin 1287, 101 p.
-----1972, Geologic map of the Teller quadrangle, western Seward Peninsula, Alaska: U.S. Geological Survey Map I-685, 1 sheet, scale 1:250,000.
Sainsbury, C.L., and MacKevett, E.M., Jr., 1965, Quicksilver deposits of southwest Alaska: U.S. Geological Survey Bulletin 1187, 89 p.
Schmidt, J.M., 1983, Geology and geochemistry of the Arctic prospect, Ambler district, Alaska: Stanford, California, Stanford University, Ph.D. dissertation, 253 p.
-----1986, Stratigraphic setting and mineralogy of the Arctic volcanogenic massive sulfide prospect, Ambler district, Alaska: Economic Geology, v. 81, p. 1619-1643.
Seitz, J.F., 1963, Tungsten prospect on Kodiak Island: U.S. Geological Survey Bulletin 1155, p. 72-76.
Seraphim, R.H., 1975, Denali—A nonmetamorphosed stratiform sulfide deposit: Economic Geology, v. 70, p. 949-959.
Sichermann, H.A., and Russell, R.H., and Fikkan, P.R., 1976, The geology and mineralization of the Ambler district, Alaska: Spokan, Bear Creek Mining Company, 22 p.
Singer, D.A., Curtin, G.C., and Foster, H.L., 1976, Mineral resources map of the Tanacross quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-767E, scale 1:250,000.
Smith, J.G., 1977, Geology of the Ketchikan D-1 and Bradfield A-1 quadrangles, southeastern Alaska: U.S. Geological Survey Bulletin 1425, 49 p.
Smith, P.S., 1910, Geology and mineral resources of the Solomon and Casadepaga quadrangles, Seward Peninsula, Alaska: U.S. Geological Survey Bulletin 433, 234 p.
-----1913a, Lode mining near Fairbanks: U.S. Geological Survey Bulletin 542-F, p. 137-202.
-----1913b, The Noatak-Kobuk region, Alaska: U.S. Geological Survey Bulletin 536, 160 p.
Smith, P.S., and Eakin, H.M., 1911, A geologic reconnaissance in southeastern Seward Peninsula and the Norton Bay-Nulato region, Alaska: U.S. Geological Survey Bulletin 449, 146 p.
Smith, T.E., 1970, Gold resource potential of the Denali bench gravels, Valdez Creek Mining District, Alaska: U.S. Geological Survey Professional Paper 700-D, p. D146-D152.
-----1981, Geology of Clearwater Mountains, Alaska: Alaska Division of Geological and Geophysical Surveys Geologic Report 60, 71 p.
Smith, T.E., Robinson, M.S., Bundtzen, T.K., and Metz, P.A., 1981, Fairbanks mining district in 1981 [abs.]: New look at an old mineral province [abs]: Alaska Miners Association Convention Program with Abstracts, p 12.
Sonnevil, R.A., 1981, New data concerning the geology of the North Bradfield River iron prospect, southeastern Alaska, in Albert, N.R.D., and Hudson, Travis, eds., United States Geological Survey in Alaska: Accomplishments during 1979: U.S. Geological Survey Circular 823-B, p. B117-B118.
Southworth, D.D, 1984, Columbium in the gold- and tin-bearing placer deposits near Tofty, Alaska: U.S. Bureau of Mines Open-File Report 174-84, 21 p.
Southworth, D.D., and Foley, J.Y., 1986, Lode platinum-group metals potential of the Goodnews Bay ultramafic complex, Alaska: U.S. Bureau of Mines Open-File Report 51-86, 82 p.
Spencer, A.C., 1905, The Treadwell ore deposits, Douglas Island: U.S. Geological Survey Bulletin 259, p. 69-87.
-----1906, The Juneau gold belt, Alaska: U.S. Geological Survey Bulletin 287, p. 1-137.
Stafansson, Karl, and Moxham, R.M., 1946, Copper Bullion Claims, Rua Cove, Knight Island, Alaska: U.S. Geological Survey Bulletin 947-E, p. 85-92.
Steidtman, Edward, and Cathcart, S.H., 1922, Geology of the York tin deposits, Alaska: U.S. Geological Survey Bulletin 733, 130 p.
Stevens, D.L., 1971, Geology and geochemistry of the Denali prospect, Clearwater Mountains, Alaska: Ph.D. dissertation, University of Alaska, Fairbanks, Alaska, 81 p.
Still, J.C., 1984, Stratiform massive sulfide

deposits of the Mt. Henry Clay area, southeast Alaska: U.S. Bureau of Mines Open-File Report 118-84, 189 p.
Still, J.C., and Weir, K.R., 1981, Mineral land assessment of the west portion of western Chichagof Island, southeastern Alaska: U.S. Bureau of Mines Open-File Report 89-81, 168 p.
Swainbank, R.C., Smith, T.E., and Turner, D.L., 1977, Geology and K-Ar age of mineralized intrusive rocks from the Chulitna mining district, central Alaska: Alaska Division of Geological and Geophysical Surveys Geologic Report 55, p. 23-28.
Szumigala, D.J., 1984, Geology of the Tin Creek zinc-lead skarn deposits, McGrath B-2 quadrangle, Alaska: Alaska Division of Geological and Geophysical Surveys Report of Investigations 85-50, 10 p.
Tailleur, I.L., 1970, Lead, zinc, and barite-bearing samples from the western Brooks Range, Alaska, with a section on petrography and mineralogy by G. D. Eberlein and Ray Wehy: U.S. Geological Survey Open-File Report 445, 16 p.
Tailleur, I.L., Ellersieck, I.F., and Mayfield, C.F., 1977, Mineral resources of the western Brooks Range, in in Blean, K.M., ed., The United States Geological Survey in Alaska: Accomplishments during 1976: U.S. Geological Survey Circular 751-B, p. B24-B25.
Tarr, R.S., and Butler, B.S., 1909, The Yakutat Bay Region, Alaska: U.S. Geological Survey Professional Paper 64, 183 p.
Thomas, B.I., 1963, Galena-bearing gossans, Beaver Creek, Ruby district, Yukon region, west-central Alaska: U.S. Bureau of Mines Open-File Report 39, 28 p.
-----1965, Reconnaissance sampling of the Avnet manganese prospect, Tanana quadrangle, central Alaska: U.S. Bureau of Mines Open-File Report 10-65, p. 8.
-----1970, Reconnaissance of the gold-bearing quartz veins in the Tibbs Creek area, Goodpastor River, Big Delta quadrangle, central Alaska: U.S. Bureau of Mines Open-File Report 14-70, 12 p.
-----1973, Gold-lode deposits, Fairbanks mining district, central Alaska: U.S. Bureau of Mines Information Circular 8604, 16 p.
Thomas, B.I., and Berryhill, R.V., 1962, Reconnaissance studies of Alaskan beach sands, eastern Gulf of Alaska: U.S. Bureau of Mines Report of Investigations 5986, 40 p.
Thompson, T.B., Pierson, J.R., and Lyttle, T., 1982, Petrology and petrogenesis of the Bokan granite complex, southeastern Alaska: Geological Society of America Bulletin, v. 93, p. 898-908.
Till, A.B., 1984, Low-grade metamoprhic rocks of Seward Peininsula, Alaska [abs.]: Geological Society of Americas Abstracts with Programs, v. 16, no. 5, p. 337.
Tripp, R.B., Detra, D.E., and Nishi, J.M., 1982, Mineralized zones in bedrock near Miller Creek, Circle quadrangle, in Coonrad, W.L., ed., The U.S. Geological Survey in Alaska: Accomplishments during 1980: U.S. Geological Survey Circular 844, p. 62.
Tuck, Ralph, 1933, The Moose Pass-Hope district, Kenai Peninsula, Alaska: U.S. Geological Survey Bulletin 849-I, p. 469-530.
-----1938, The Valdez Creek mining district, Alaska, in 1936: U.S. Geological Survey Bulletin 897-B, p. 109-131.
Twenhofel, W.S., 1952, Geology of the Alaska-Juneau lode system, Alaska: U.S. Geological Survey Open-File Report 52-160, 170 p.
Twenhofel, W.S., Reed, J.C., and Gates, G.O., 1949, Some mineral investigations in southeastern Alaska: U.S. Geological Survey Bulletin 953-A, p. 1-45.
Tysdal, R.G., 1978, Mines, prospects and occurrences map of the Seward and Blying Sound quadrangles, Alaska: U.S. Geological Survey *Miscellaneous Field Studies Map* MF-880A, 2 sheets, scale 1:250,000.
Van Alstine, R.E., and Black, R.F., 1946, Copper deposits of the Kotsina-Kuskulana district, Alaska: U.S. Geological Survey Bulletin 947-G, p. 121-141.
Van Nienwenhuyse, R., 1984, Geology and geochemistry of the Pyrola massive sulfide deposit, Admiralty Island, Alaska: Phoenix, Arizona, University of Arizona, M.S. thesis, 300 p.
Warfield, R.S., and Rutledge, F.A., 1951, Investigation of Kasna Creek Copper prospect, Lake Kontrashibuna, Lake Clark region, Alaska: U.S. Bureau of Mines Report of Investigations 4828, 10 p.
Warner, J.D., 1985, Critical and strategic minerals in Alaska: tin, tantalum, and columbium: U.S. Bureau of Mines Report Information Circular IC 9037, 42 p.
Warner, J.D., Mardock, C.L., and Dahlin, D.C., 1986, A columbium-bearing regolith on upper Idaho Gulch, near Tofty, Alaska: U.S. Bureau of Mines Information Circular 9105, 29 p.
Warner, J.D., and Southworth, D.D., 1985, Placer and lode sources of Niobium: Tofty, Alaska: American Association of Petroleum Geologists 1985 Pacific Section Convention Programs with abstracts, p. 49.
Warner, L.A., Goddard, E.N., and others, 1961, Iron and copper deposits of Kasaan Peninsula, Prince of Wales Island, southeastern Alaska: U.S. Geological Survey Bulletin 10909, 136 p.
Waters, A.E., Jr., 1934, Placer concentrates of the Rampart and Hot Springs districts: U.S. Geological Survey Bulletin 844-D, p. 227-246.
Wayland, R.G., 1943, Gold deposits near Nabesna, Alaska: U.S. Geological Survey Bulletin 933B, p. 175-199.
-----1960, The Alaska Juneau gold body: Neues Jahrbuch fur Mineralogie Abhandlungen, v. 94, p. 267-279.
-----1961, Tofty tin belt, Manley Hot Springs

district, Alaska: U.S. Geological Survey Bulletin 1058-I, p. 363-414.
Webber, B.S., Moss, J.M., and Rutledge, F.A., 1946, Exploration of Sedanka zinc deposit, Sedanka Island, Alaska: U.S. Bureau of Mines Report of Investigations R.I. 3967, 15 p.
Wells, E.D., Pittman, T.L., Brew, D.A., and Douglass, S.L., 1986, Map and description of the mineral deposits in the Juneau, Taku River, Atlin, and part of the Skagway quadrangles, Alaska: U.S. Geological Survey Open-File Report 85-717, 332 p.
Wells, R.R., and Thorne, R.L., 1953, Concentration of Klukwan magnetite ore: U.S. Bureau of Mines Report of Investigations 4984, 15 p.
West, W.S., 1953, Reconnaissance for radioactive deposits in the Darby Mountains, Seward Peninsula, Alaska, 1948: U.S. Geological Survey Circular 300, 7 p.
-----1954, Reconnaissance for radioactive deposits in the lower Yukon-Kuskokwim region, Alaska: U.S. Geological Survey Circular 328, 10 p.
Wilson, F.H., and Cox, D.P., 1983, Geochronology, geochemistry, and tectonic environment of porphyry mineralization in the central Alaska Peninsula: U.S. Geological Survey Open-File Report 83-783, 24 p.
Wiltse, M.A., 1975, Geology of the Arctic Camp prospect, Ambler River quadrangle: Alaska Division of Geological and Geophysical Surveys Open-File Report 60, 41 p.
Winkler, G.R., Miller, M.L., Hoekzema, R.B., and Dumoulin, J.A., 1984, Guide to the bedrock geology of a traverse of the Chugach Mountains from Anchorage to Cape Resurrection: Geological Society of America 80th Annual Meeting, Cordilleran Section, Anchorage, Alaska, 1984, Guidebook, 40 p.
Winkler, G.R., Miller, R.J., MacKevett, E.M., Jr., and Holloway, C.D., 1981, Map and summary table describing mineral deposits in the Valdez quadrangle, southern Alaska: U.S. Geological Survey Open-File Report 80-892-B, 2 sheets, scale 1:250,000.
Wright, C.W., 1909, Mining in southeastern Alaska: U.S. Geological Survey Bulletin 379, p. 67-86.
-----1940, The Porcupine placer district, Alaska: U.S. Geological Survey Bulletin 236, 35 p.
Wright, F.E., and Wright, C.W., 1908, The Ketchikan and Wrangell mining districts, Aalska: U.S. Geological Survey Bulletin 347, 210 p.
Yeend, Warren, 1981a, Placer gold deposits, Mt. Hayes quadrangle, Alaska, in Silberman, Miles and others, eds., Proceedings of the Symposium of Mineral Deposits of the Pacific Northwest: U.S. Geological Survey Open-File Report 81-355, p. 74-83.
-----1981b, Placer gold deposits, Mount Hayes quadrangle, Alaska, in Albert, N.R.D., and Hudson, Travis, eds., The United States Geological Survey in Alaska: Accomplishments during 1979: U.S. Geological Survey Circular 823-B, p. B68.
-----1982, Placers and placer mining, Circle District, Alaska, in Coonrad, W.L., ed., The United States Geological Survey in Alaska: Accomplishments during 1980: U.S. Geological Survey Circular 844, p. 64.
Zdepski, J.M., 1980, Stratigraphy, mineralogy, and zonal distributions of the Sun massive sulfide deposit, Ambler district, northwest Alaska: Fairbanks, Alaska, University of Alaska, M.S. thesis, 93 p.
Zimmerman, Jay, and Soustek, P.G., 1979, The Avan Hills ultramafic complex, De Long Mountains, Alaska: U.S. Geological Survey Circular 804-B, p. B8-B11.

INDEXES TO METALLIFEROUS LODE DEPOSITS AND PLACER DISTRICTS

In this report, Alaska is divided into seven geographic regions for the tabular descriptions of metalliferous lode deposits which are numbered separately for each region. Each region is identified by a two letter prefix that is part of the deposit number. The regions and abbreviations are the Brooks Range (BR), the Seward Peninsula (SP), west-central Alaska (WC), east-central Alaska (EC), the Aleutian Islands and Alaska Peninsula (AP), southern Alaska (SO), and southeastern Alaska (SE). The prefix for all placer districts is PL. Deposits are indexed alphabetically, and by mineral deposit type.

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Ester Dome	EC17
Evelyn Lee	BR23
Fairbanks	PL24
Fairhaven	PL11
Fidalgo-Alaska	SO58
Fish Lake	SO20
Fog Lake	AP17
Fortymile (Lode)	EC25
Fortymile (Placer)	PL27
Fortyseven Creek	WC4
Frenchie	SE37
Frost	BR12
Funter Bay	SE29
Galena Creek	BR31
Geroe Creek	BR25
Gertrude Creek	EC4
Gilmore Dome	EC16
Gilpatrick	SO43
Glacier Creek (Southeastern)	SE23
Glacier Creek (Southern)	SO33
Glacier Fork	AP24
Gold Cord	SO35
Gold King	SO49
Gold Standard	SE14
Golden Fleece	SE48
Golden Horn	WC11
Golden Zone	SO11
Goldstream	SE17
Goodnews Bay	PL12
Granite (West-Central)	WC11
Granite (Southern)	SO48
Grant	EC17
Gray Lead	EC19
Greens Creek	SE30
Griffen	EC4
Groundhog Basin	SE9
Halibut Bay	SO36
Hannum Creek	SP15
Hayes Glacier (East-Central)	EC36
Hayes Glacier (Southern)	SO7
Helen S.	SP36
Helm Bay	SE14
Herman and Eaton	SO47
Hirst-Chichagof	SE61
Holonada	WC33
Hope	PL37
Horsfeld	SO26
Hot Springs	PL21
Hot Springs Dome	EC1
Hudson Cinnabar	EC5
Hughes	PL19
Iditarod	PL15
Illinois Creek	WC25
Independence (Seward Peninsula)	SP9
Independence (Southern)	SO35
Independence (West-Central)	WC14
Innoko	PL16
Ivanof	AP8
Iyikrok Mountain	BR5
Jerri Creek	BR15
Jewel	SO46
Jim-Montana	BR24
Johnson Prospect	AP21
Jualin	SE1
Jumbo (Southeastern)	SE44
Jumbo (Southern)	SO30
Juneau	PL43
Kagati Lake	WC1
Kaiyuh Hills	WC23
Kantishna	PL28
Kasaan Peninsula	SE41
Kasna Creek	AP19
Kathleen-Margaret	SO17
Kawisgag	AP8
Kemuk Mountain	WC2
Kenai-Alaska	SO45
Kennecott District	SO30
Kensington	SE2
Ketchem Dome	EC12
Khayyam	SE43
Kiana	PL1
Kijik River	AP22
Kilokak Creek	AP15
Klukwan	SE22
Knight Island	SO54
Kodiak	PL36
Kontrashibuna	AP19
Kougarok (Lode)	SP5
Kougarok (Placer)	PL8
Koyuk	PL10
Koyukuk	PL4
Kupreanof Island	SE35
Kupreanof Mountain	SE32
Kuy	AP16
Latouche	SO53
Liberty Bell	EC32
Lik	BR1
Lime Peak	EC7
Lime Point	SE47
Little Squaw	BR26
Lituya Bay	PL41
London and Cape	SO28
Lost Creek	SO42
Lost River	SP3
Lost Zarembo	SE37
Lower Kanuti River	WC33
Lucky Strike	SO44
McGinnis Glacier	EC37
McGrath	PL17
McLeod	WC24
McNeil	AP18
Magnetite Island	AP20
Mahoney	SE15
Malemute	WC11

DEPOSIT OR DISTRICT	NUMBER
Mallard Duck Bay	AP11
Margerie Glacier	SE24
Marshall	PL13
Medfra	WC20
Melozitna	PL20
Michigan Creek	BR20
Midas (Berg Creek) (Southern)	SO27
Midas (Valdez Area) (Southern)	SO52
Mikado	BR26
Mike	AP14
Miller House	EC11
Mineral King	SO47
Mirror Harbor	SE59
Misheguk Mountain	BR7
Miss Molly	SO7
Mission Creek	WC7
Miyaoka	EC36
Monarch	SO46
Moonshine	SE46
Mosquito	EC20
Moth Bay	SE18
Mount Burnett	SE13
Mount Hurst	WC22
Mount Igikpak	BR21
Mount Prindle (Roy Creek)	EC6
Nabesna	SO23
Nabesna Glacier	SO25
Nelchina	PL39
Nelson	SO33
Niblack	SE49
Nikolai	SO31
Nim	SO12
Nimbus	SO12
Nimiuktuk	BR3
Nixon Fork-Medfra	WC18
Nizina	PL35
Noatak	PL3
Nome (Lode)	SP10
Nome (Placer)	PL6
North Bradfield Canal	SE10
Nualaska	SO42
Nugget Creek	SO29
Nuka Bay	SO42
Nunatak	SE27
Ohio Creek	SO13
Omar	BR11
Omilak	SP7
Orange Hill	SO24
Orange Point	SE25
Owhat	WC7
Palmer Creek	SO44
Pandora	SO54
Partin Creek	SO8
Pass Creek	SO15
Perserverance	WC26
Picnic Creek	BR17
Pond	AP17
Porcupine Creek	PL42
Porcupine Lake	BR28
Port Camden	SE34
Port Clarence	PL7
Port Valdez	SO50
Potato Mountain	SP2
Prospect Bay	AP9
Purdy	EC21
Purkeypile	SO6
Pyramid	AP6
Pyrola	SE31
Quartz Creek	WC28
Quartz Hill	SE19
Quigley Ridge	WC28
Rainbow Mountain	SO19
Rainy Creek District	SO18
Rambler	SO24
Rampart	PL22
Ramsay-Rutherford	SO51
Rat Fork	SO3
Ready Cash	SO10
Red Devil	WC6
Red Dog Creek	BR2
Red Mountain (East-Central)	EC35
Red Mountain (Southern)	SO38
Red River	SE21
Reef Ridge	WC19
Reid Inlet	SE26
Reliance	SE20
Rex	AP13
Riverside	SE11
Roe Point	SE20
Romanzof Mountains	BR29
Roosevelt Creek	BR19
Ross Adams	SE51
Roy Creek (Mount Prindle)	EC6
Rua Cove	SO55
Ruby	PL18
Ruby Creek	BR16
Ruth Creek	EC4
Salcha River	EC12
Salmon Bay	SE38
Salt Chuck	SE40
San Diego Bay	AP7
Sawtooth Mountain	EC3
Schlosser	SO58
Scrafford	EC14
Sea Level	SE16
Sedanka	AP1
Serpentine Hot Springs	SP6
Sheep Creek	EC33
Shellebarger Pass	SO5
Shumagin	AP5
Shungnak	PL2
Silver King	SO12
Siniktanneyak Mountain	BR8
Sischu Creek	WC21
Slate Creek (Southern)	SO21
Slate Creek (Fortymile) (East-Central)	EC25
Slate Creek (Kantishna) (East-Central)	EC27
Smucker	BR13
Snow Gulch	WC9
Spirit Mountain	SO40
Spruce Creek	EC30
Stampede	EC31

DEPOSIT OR DISTRICT	NUMBER
Standard Copper	SO57
Story Creek	BR9
Sukakpak Mountain	BR22
Sumdum	SE7
Sumdum Chief	SE8
Sun	BR17
Sweetheart Ridge	SE6
Table Mountain	EC9
Taurus	EC24
Taylor Mountains	WC5
Thorpe	SO35
Threeman	SO57
Tibbs Creek	EC19
Tin Creek	SO4
Tolovana	PL23
Tolstoi	WC13
Treadwell	SE5
Treasure Creek	SO14
Tuxedni Bay	AP20
Union Bay	SE13
Upper Kanuti River	WC34
Valdez Creek	PL30
Venus	BR23
Victor	BR23
Warner Bay	AP9
Westover	SO32
Wheeler Creek	WC29
White Mountain	WC17
Whoopee Creek	BR10
William Henry Bay	SE28
Willow Creek (Lode)	SO35
Willow Creek (Placer)	PL38
Windy Creek	SP8
Winfield	SP4
Win-Won	WC16
Wiseman	PL4
WTF	EC35
Yakataga	PL40
Yakima	SE4
Yakutat	PL41
Yentna	PL30
Zackly	SO16
Zane Hills	WC31
Zarembo Island	SE37

MINERAL DEPOSIT TYPE INDEX - LODE DEPOSITS

DEPOSIT NUMBER	NAME
KUROKO MASSIVE SULFIDE	
BR4	Drenchwater
BR13	Smucker
BR14	Arctic
BR15	BT
BR15	Jerri Creek
BR17	Sun
BR19	Roosevelt Creek
BR20	Michigan Creek
EC32	Liberty Bell
EC33	Sheep Creek
EC34	Anderson Mountain
EC35	WTF, Red Mountain
EC36	Miyaoka
EC36	Hayes Glacier
EC37	McGinnis Glacier
EC38	Delta District
SE23	Glacier Creek
SE25	Orange Point
SE30	Greens Creek
SE31	Pyrola
SE35	Kupreanof Island
SE36	Helen S.
SE37	Zarembo Island
SE43	Khayyam
SE49	Niblack
SE52	Barrier Islands
SE53	Driest Point
BESSHI MASSIVE SULFIDE	
SO5	Shellebarger Pass
SO15	Denali
SO52	Midas
SO53	Latouche, Beatson
SO56	Ellamar
SO58	Fidalgo-Alaska
SO58	Schlosser
SE4	Yakima
CYPRUS MASSIVE SULFIDE	
SO54	Knight Island
SO55	Copper Bullion
SO55	Rua Cove
SO57	Threeman
SO57	Standard Copper
SEDIMENTARY EXHALATIVE Zn-Pb	
BR1	Lik
BR2	Red Dog Creek
BR4	Drenchwater
KIPUSHI Cu-Pb-Zn	
BR11	Omar
BR16	Ruby Creek

DEPOSIT NUMBER	NAME
	METAMORPHOSED SULFIDE
BR18	Ann
SP15	Hannum Creek
SE6	Sweetheart Ridge
SE7	Sumdum
SE9	Groundhog Basin
SE12	Alamo
SE15	Mahoney
SE18	Moth Bay
SE20	Reliance
SE21	Red River
SE33	Cornwallis Peninsula
SE45	Copper City
SE46	Moonshine
	BEDDED BARITE
BR3	Nimiuktuk
SE35	Castle Island
SE47	Lime Point
	SANDSTONE U
SP14	Death Valley
SE34	Port Camden
	BASALTIC Cu
SO30	Kennecott district
SO32	Westover
SO33	Nelson
SO34	Erickson
SE60	Baker Peak
	HOT SPRING Hg
WC3	Cinnabar Creek
WC6	Red Devil
WC8	DeCoursey Mountain
WC17	White Mountain
	EPITHERMAL VEIN
WC5	Taylor Mountains
WC34	Upper Kanuti River
AP2	Canoe Bay
AP3	Aquila
AP4	Apollo-Sitka
AP5	Shumagin
AP7	San Diego Bay
AP11	Mallard Duck Bay
AP16	Kuy
AP17	Fog Lake
AP21	Johnson Prospect

DEPOSIT NUMBER	NAME
	Au QUARTZ VEIN
BR21	Mount Igikpak
BR21	Arrigetch Peaks
BR26	Chandalar District
SP10	Nome district
SP11	Big Hurrah
SP12	Daniels Creek
WC4	Fortyseven Creek
EC9	Table Mountain
EC18	Democrat
E21	Purdy
SO35	Willow Creek
SO41	Chalet Mountain
SO42	Nuka Bay
SO43	Alaska Oracle
SO44	Lucky Strike
SO45	Crown-Point
SO45	Kenai-Alaska
SO46	Monarch
SO46	Jewel
SO47	Mineral King
SO48	Granite
SO49	Gold King
SO50	Cliff
SO51	Ramsay-Rutherford
SE1	Jualin
SE2	Kensington
SE3	Alaska-Juneau
SE5	Treadwell
SE8	Sumdum Chief
SE11	Riverside
SE14	Gold Standard
SE16	Sea Level
SE17	Goldstream
SE26	Reid Inlet
SE42	Dawson
SE48	Golden Fleece
SE57	Apex
SE57	El Nido
SE58	Cobol
SE61	Chichagoff
SE61	Hirst-Chichagof
	Cu-Ag QUARTZ VEIN
SO8	Partin Creek
SO17	Kathleen-Margaret
SO29	Nugget Creek
SO31	Nikolai
	POLYMETALLIC VEIN
BR18	Ann
BR21	Mount Igikpak
BR21	Arrigetch Peaks
BR28	Porcupine Lake
BR29	Romanzof Mountains
BR31	Galena Creek
SP6	Serpentine Hot Springs
SP7	Omilak area

DEPOSIT NUMBER	NAME
	POLYMETALLIC VEIN (Continued)
SP9	Independence
WC7	Mission Creek
WC7	Owhat
WC4	Fortyseven Creek
WC10	Chicken Mountain
WC11	Golden Horn
WC11	Malemute
WC11	Granite
WC12	Broken Shovel
WC13	Cirque
WC13	Tolstoi
WC14	Independence
WC15	Candle
WC16	Win-Won
WC25	Illinois Creek
WC26	Perserverance
WC27	Beaver Creek
WC28	Quartz Creek
WC34	Upper Kanuti River
EC1	Hot Springs Dome
EC15	Cleary Summit
EC17	Ester Dome
EC19	Blue Lead
EC19	Tibbs Creek
EC19	Gray Lead
EC28	Quigley Ridge
EC29	Banjo
EC30	Spruce Creek
EC31	Stampede
AP1	Sedanka
AP8	Kawisgag
AP9	Warner Bay
AP10	Cathedral Creek
AP10	Braided Creek
AP15	Kilokak Creek
AP22	Kijik River
AP23	Bonanza Hills
SO8	Partin Creek
SO10	Ready Cash
SO12	Nim and Nimbus
SO22	Chistochina
SO25	Nabesna Glacier
SE11	Riverside
SE27	Nunatak
SE39	Coronation Island
SE42	Dawson
SE50	Bay View
	Sb-Au VEIN
BR22	Sukakpak Mountain
WC9	Snow Gulch
EC3	Sawtooth Mountain
EC4	Gertrude Creek
EC4	Griffen
EC4	Ruth Creek
EC8	Dempsey Pup
EC14	Scrafford
EC19	Blue Lead

DEPOSIT NUMBER	NAME
	Sb-Au VEIN (Continued)
C27	Slate Creek
EC27	Eagles Den
EC27	Caribou Creek
EC31	Stampede
	Sn GREISEN
SP3	Lost River
SP5	Kougarok
EC7	Lime Peak
EC12	Ketchem Dome
SO6	Boulder Creek
SO9	Coal Creek
SO13	Ohio Creek
	Sn VEIN
SP1	Cape Mountain
SP2	Potato Mountain
EC7	Lime Peak
SO9	Coal Creek
SO13	Ohio Creek
	Sn SKARN
SP3	Lost River
SP4	Ear Mountain area
	Cu-Zn-Pb SKARN
BR21	Mt. Igikpak
BR21	Arrigetch Peaks
BR23	Victor
BR24	Jim-Montana
WC18	Nixon Fork-Medfra
AP18	Crevice Creek
AP24	Glacier Fork
SO1	Bowser Creek
SO3	Rat Fork
SO3	Sheep Creek
SO4	Tin Creek
SO16	Zackly
SO18	Rainy Creek
SO24	Orange Hill
SO27	Midas
SE32	Kupreanof Mountain
SE44	Jumbo district
	W SKARN
WC35	Bonanza Creek
EC13	Salcha River
EC16	Gilmore Dome
	Fe SKARN
WC20	Medfra
AP19	Kasna Creek
AP20	Magnetite Island

DEPOSIT NUMBER	NAME
	Fe SKARN (Continued)
SO23	Nabesna, Rambler
SE10	North Bradfield Canal
SE41	Kasaan Peninsula
	PORPHYRY Cu-Mo
BR25	Geroe Creek
E20	Mosquito
E22	Asarco
E23	Bluff
EC24	Taurus
AP11	Mallard Duck Bay
SO14	Treasure Creek
SO24	Orange Hill
SO24	Bond Creek
SO28	London and Cape
SE27	Nunatak
	PORPHYRY Cu
BR23	Victor
WC13	Cirque
WC25	Illinois Creek
EC10	Bedrock Creek
AP6	Pyramid
AP8	Kawisgag
AP12	Bee Creek
AP13	Rex
AP22	Kijik River
AP23	Bonanza Hills
SO11	Golden Zone
SO19	Rainbow Mountain
SO21	Slate Creek
SO22	Chistochina
SO26	Baultoff
SO26	Horsfeld
SO26	Carl Creek
SE24	Margerie Glacier
	PORPHYRY Mo
BR30	Bear Mountain
SP8	Windy Creek
WC24	McLeod
AP14	Mike
SO7	Miss Molly
SE19	Quartz Hill
	FELSIC PLUTONIC U
SP13	Eagle Creek
WC21	Sischu Creek
WC29	Wheeler Creek
WC30	Clear Creek
WC31	Zane Hills
EC6	Roy Creek
SE28	William Henry Bay
SE38	Salmon Bay
SE51	Bokan Mountain

DEPOSIT NUMBER	NAME
	GABBROIC Ni-Cu
SO2	Chip-Loy
SO40	Spirit Mountain
SE29	Funter Bay
SE55	Brady Glacier
SE56	Bohemia Basin
SE59	Mirror Harbor
	ZONED MAFIC-ULTRAMAFIC
WC2	Kemuk Mountain
SE13	Union Bay
SE22	Klukwan
SE40	Salt Chuck
SE54	Duke Island
	PODIFORM CHROMITE
BR5	Iyikrok Mountain
BR6	Avan
BR7	Misheguk Mountain
BR8	Sinitanneyak Mountain
WC22	Mount Hurst
WC23	Kaiyuh Hills
WC33	Caribou Mountain
WC33	Holonada
EC26	Eagle C3
SO36	Halibut Bay
SO37	Claim Point
SO38	Red Mountain
SO39	Bernard
SO39	Dust Mountain
	SERPENTINE-HOSTED ASBESTOS
WC32	Asbestos Mountain
EC25	Slate Creek
	UNCLASSIFIED LODE DEPOSITS
BR9	Story Creek (Pb-Zn-Au-Ag vein)
BR10	Whoopee Creek (Zn-Ag-Au vein)
BR12	Frost (Cu-Zn-Pb-Ba vein)
WC1	Katagi Lake (Sb-Hg vein)
WC19	Reef Ridge (Carbonate-hosted sulfide)
EC2	Avnet (Mn-Ag vein)
EC5	Hudson Cinnabar (Hg quartz vein)
EC11	Miller House (Au-As vein)
SO20	Fish Lake (Dunitic Ni-Cu)

DEPOSIT NUMBER	NAME
	PLACER Au
PL1	Kiana
PL2	Shungnak
PL3	Noatak
PL4	Wiseman
PL5	Chandalar
PL6	Nome
PL7	Port Clarence
PL8	Kougarok
PL9	Council
PL10	Koyuk
PL11	Fairhaven
PL12	Goodnews Bay
PL13	Marshall
PL14	Aniak
PL15	Iditarod
PL16	Innoko
PL17	McGrath
PL18	Ruby
PL19	Hughes
PL20	Melozitna
PL21	Hot Springs
PL22	Rampart
PL23	Tolovana
PL24	Fairbanks
PL25	Circle
PL26	Eagle
PL27	Fortymile
PL28	Kantishna
PL29	Bonnifield
PL30	Yentna
PL31	Valdez Creek
PL32	Delta River
PL33	Chistochina
PL34	Chisana
PL35	Nizina
PL36	Kodiak
PL37	Hope
PL38	Willow Creek
PL39	Nelchina
PL40	Yakataga
PL41	Yakutat
PL42	Porcupine Creek
PL43	Juneau
	PLACER Sn
PL7	Port Clarence
PL8	Kougarok
PL21	Hot Springs
	PLACER PGE-Au
PL12	Goodnews Bay
PL13	Marshall
	SHORELINE PLACER Ti
PL41	Yakutat