



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

ALASKA

MAP E

Adapted from the USGS 1 inch equals approximately 80 miles
Alaska Map E 1973 edition
Modified Transverse Mercator Projection

0 50 100 150 Miles
0 50 100 150 200 Kilometers

Scale
1983

LEGEND

Terrane	Type of deposit ^{1/2/}	Mineral terrane units ^{3/}	Geology of terrane and associated metals
A	Magmatic	IMA, IUM, ± VOP	Gabbro and peridotite intrusives, favorable for deposits of Ni and Cu with byproduct Co.
B	Contact metamorphic and hydrothermal	SGS, SLU, SCG	Mafic-ultramafic rocks intensely weathered in a humid, tropical climate. Paleosol horizons may or may not be present. Byproduct Co is associated with Ni, Fe, and Cr. Limestone and dolomite, interbedded graywacke and shale, conglomerate, and sandstone, favorable for primary or byproduct Co associated with Pb-Zn, As-Co-Ni, and Ag-Ni-Co-Ag-Bi-U deposits. Terrane D also favorable for hydrothermal and contact metamorphic deposits.
C	Metamorphosed massive sulfide	VSM, SBS, SCH	Mafic volcanic rocks associated with sediments, black shale, siliceous shale, and carbonates associated with chert. Byproduct Co associated with Cu-Pb-Zn-Ag-Sb deposits.
D	Strata-bound	SLS, SCH, SBS, ±SLU	Limestone and shale, chert and siliceous shale, black carbonaceous shale, associated with dolomite and limestone. Favorable for byproduct Co associated with Cu, Pb, or Zn. Distribution of units SLU and SBS graphically shown with terranes B and C respectively, and not in terrane D.

Map No.	Name of occurrence	Type of deposit	Mineral terrane units	Comments ^{4/}
1	Rabbit Creek	Hydrothermal	---	Up to 0.15% Co associated with high grade Cu and Fe sulfides hosted by white quartz (float) (4).
2	Omar	Hydrothermal	SLS	Up to 0.054% Co in rock samples associated with base metal values (10). Similar geologic setting to Borinite. Carrollite (Cu ₂ CoS ₄) and cobaltiferous pyrite occur in pyrite-rich zones marginal to high grade stratiform hydrothermal Cu deposit. Selected samples run from 0.08 to 29% Co (3).
3	Borinite	Hydrothermal(?)	SLU	Shear zones near contact. Erythrite has been identified (9).
4	Hot Springs Dome	Contact (?)	IGF	Au and Ni bearing vein sample with cobalt bloom (9).
5	Eagle Bluff	Hydrothermal	VSM	Erythrite with pyrrhotite and chalcopyrite in skarn zone (9).
6	Unnamed occurrence	Contact	---	Massive sulfides in diorite-metasedimentary contact zone (18).
7	Chip Loy	Hydrothermal	SLS	Calcite vein contains Au and cobaltite (9).
8	Unnamed occurrence	Hydrothermal	VMU	Up to 0.11% Co associated with Cu and Ni sulfides in a mafic dike (9).
9	Unnamed occurrence	Magmatic	IMA	Massive sulfides in layered gabbro (float) contain 0.11% Co (9).
10	Nelchina Glacier	Magmatic	---	Massive sulfides (primarily sphalerite, pyrite, and barite) with anomalous Co in a geologic setting similar to Windy Craggy Cu-Co deposit, British Columbia (17).
11	Spirit Mountain	Magmatic	VSM	Ni-Co prospect with up to 0.18% Co (5).
12	Jarvis Glacier	Magmatic	---	Massive sulfides (primarily sphalerite, pyrite, and barite) with anomalous Co in a geologic setting similar to Windy Craggy Cu-Co deposit, British Columbia (17).
13	South Crillon Glacier	Magmatic	VSM	Small pod of pyrrhotite, chalcopyrite, and pentlandite in layered gabbro with 0.07% Co (9).
14	Brady Glacier	Magmatic	IMA	An estimated 54 million lbs. of Co in 100 million tons of proven reserves averaging 0.53% Ni and 0.35% Cu. An additional inferred reserve of 54 million lbs. of cobalt is also indicated (7). Recovery rates of Co from commercial beneficiation circuits are poorly known. Chalcopyrite and other sulfides in hornblende dikes in gneissic diorite contain up to 0.07% Co (9).
15	Dundas Bay, West	Magmatic	VSM	Gabbro pipe with 0.56 million tons with 0.34% Ni, 0.35% Cu, and 0.15% Co (8).
16	Funter Bay	Magmatic	VSM	About 20 million tons in gabbro has an average of 0.3% Ni, 0.18% Cu, and 0.02% Co. Metallurgical tests indicate about a 50% recovery of cobalt (12).
17	Yakobi Island	Magmatic	VMU	Gabbro with Ni and Cu sulfides. Minimum estimated resource of 1 million tons averaging 0.32% Ni, 0.12% Cu, and a trace of Co (19).
18	Mirror Harbor	Magmatic	VMU	Fault in hornblende, pyrrhotite and chalcopyrite present with up to 0.09% Co (9).
19	Haley and Hanlon	Hydrothermal	---	Two deposits containing Cu, Au, and Ag. Sample from vein not part of either workings contained 0.07% Co (9).
20	Rush and Brown	Contact and hydrothermal	SGS	Contact metamorphic deposit with as much as 0.05% Co (9).
21	Mr. Andrew	Contact	SGS	Contact metamorphic deposit with as much as 0.05% Co (9).

--- Indicates mineral terrane not mapped in area of deposit.
^{1/} Classification after Vhay, et al. (20). See text for discussion.
^{2/} Chemical precipitate-type deposits not differentiated on primary reference. Deep sea nodules and crusts are associated with deep water turbidites, fine-grained limestones, marls and shales. Byproduct Co is associated with Mn, Fe, Cu, Ni and Zn. Unit SLS (included in terrane D) and other unnamed areas, may be favorable for ancient deep sea floor deposits.
^{3/} Mineral terrane distribution and units from Mineral Terranes of Alaska: 1982 (2). See appendix for description of units.
^{4/} Numbers in parentheses correspond to list of references in text.
 Sources: Listed in decreasing order of importance: (2), (20), (14), (15).

FIGURE 1.- Mineral terranes map with areas favorable for hosting cobalt-bearing deposits. Also shown are the locations of known occurrences with identified cobalt minerals or anomalous cobalt concentrations associated with sulfides.