

**DISCUSSION**

This map shows the distribution and abundance of cobalt in stream sediments in the Nabesna quadrangle, Alaska. The geochemical data are plotted on a base map showing the topography, generalized geology, and sample sites. Stream sediment samples were collected from active streams, then air dried and sieved. The -80 mesh (-177 microns) fractions were analyzed for cobalt and other elements by semiquantitative emission spectrographic methods. Complete analytical data for geochemical samples collected by the U.S. Geological Survey in the Nabesna quadrangle are available on a computer tape (O'Leary, Van Trump, and others, 1975) that can be obtained from National Technical Information Service, Department of Commerce, Springfield, Va. 22151.

The map was prepared on a DEC 10 computer at the U.S. Geological Survey Computer Center in Denver, Colorado. Metal values, expressed on the map in parts per million (ppm), were obtained in the following manner: The raw (analytical) data were plotted on a rectangular coordinate system with intersections (mesh points) 1.6 km (1 mile) apart on the map and 6.4 km (4 miles) apart on the perspective diagram. The original data points were transposed to grid intersections by drawing 3.2-km-diameter (map) and 12.8-km-diameter (diagram) circles centered on the intersections, then shifting the coordinates of data points within each circle to the coordinates of the intersection. With the shift of coordinates, each point was weighted according to its distance from the mesh point; as a result, nearby data points influenced the final value at the mesh point more than outlying data points. After the data were weighted and projected to a mesh point, the values at that point were averaged.

The computer-generated perspective diagram shows the distribution and abundance of cobalt in stream sediments in the quadrangle in easy-to-visualize, 3-dimensional perspective. The angle of perspective is 30° from the horizontal (H.A. = 30.0) and 30° from the vertical (V.A. = 30.0). The range of cobalt values is 40 to about 87 ppm and each contour interval is equal to one-sixth of this range or approximately 8 parts per million. The range in cobalt values on the perspective diagram is less than the range in values on the map because the original data are averaged over a larger area (12.8-km vs 3.2-km diameter circles).

The average value of cobalt in stream sediments collected and analyzed in the Nabesna quadrangle is 35 ppm. Values of 60 ppm and greater are deemed to be anomalous based mainly on analysis of the statistical data shown on the accompanying histogram. Areas where cobalt occurs in anomalous amounts are shaded on the map.

The majority of the cobalt anomalies in the Nabesna quadrangle roughly circumscribe the large middle-Cretaceous Klein Creek and Nabesna plutons (Richter, 1975) and are especially pronounced where mafic volcanic rocks are exposed. The only known cobalt mineral occurrence in the quadrangle, a small cobaltite-calcite vein (Richter and others, 1975), is within the anomalous zone peripheral to the Nabesna pluton. Beyond the Nabesna and Klein Creek plutons and their border zones significant cobalt anomalies are associated with amygdaloidal basalt flows of the Triassic Nizkolai Greenstone (T. 3 N., R. 17 E.; T. 8 N., R. 14 E.; T. 9 N., R. 12 E.) and the small mid-Cretaceous Suslota Pass hornblende diorite pluton (T. 11 and 12 N., R. 10 E.). A few small anomalies occur in the Lower Mesozoic diorite complex (T. 10 and 11 N., R. 10 and 11 E.), the Upper Mesozoic marine sedimentary rocks of the Nutzotin Mountains sequence (T. 7 and 8 N., R. 15 and 16 E.; T. 5 N., R. 20 E.), and the middle-Cretaceous Devils Mountain pluton (T. 8 N., R. 13 E.).

**REFERENCES CITED**

- O'Leary, R. H., Van Trump, George, and others, 1975, Spectrographic and chemical analyses of rock and stream-sediment samples from the Nabesna quadrangle, Alaska: Natl. Tech. Inf. Service (U.S. Dept. Commerce) Magnetic Tape No. PB240-488.
- Richter, D. H., 1975, Geologic map of the Nabesna quadrangle, Alaska: U.S. Geol. Survey Misc. Field Studies Map MF-655A, 1 sheet, scale 1:150,000.
- Richter, D. H., Sloger, D. A., and Cox, D. P., 1975, Mineral resources map of the Nabesna quadrangle, Alaska: U.S. Geol. Survey Misc. Field Studies Map MF-655K, 1 sheet, scale 1:150,000.

**EXPLANATION FOR GENERALIZED GEOLOGIC MAP**  
[Geology generalized from Richter (1975)]

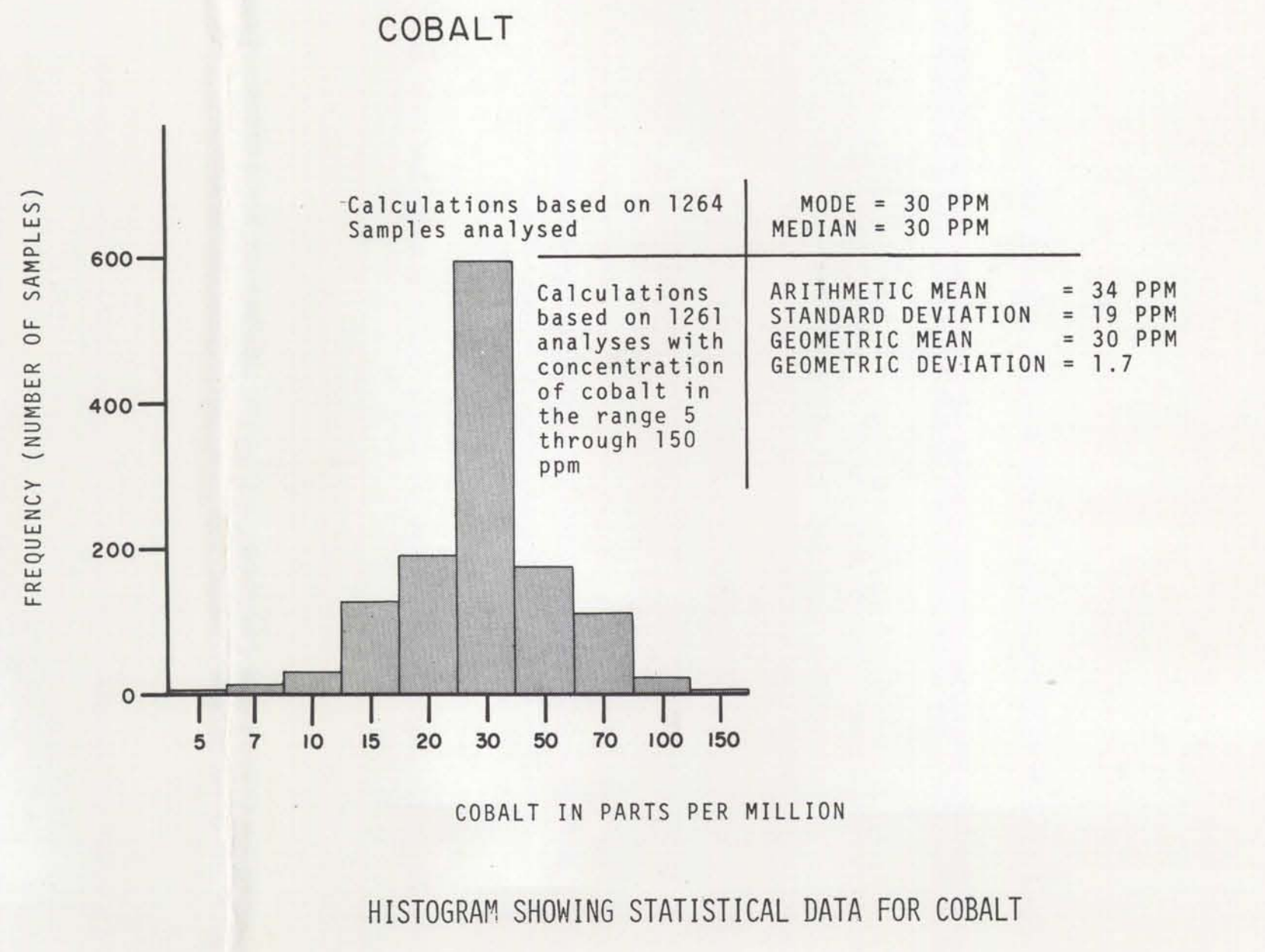
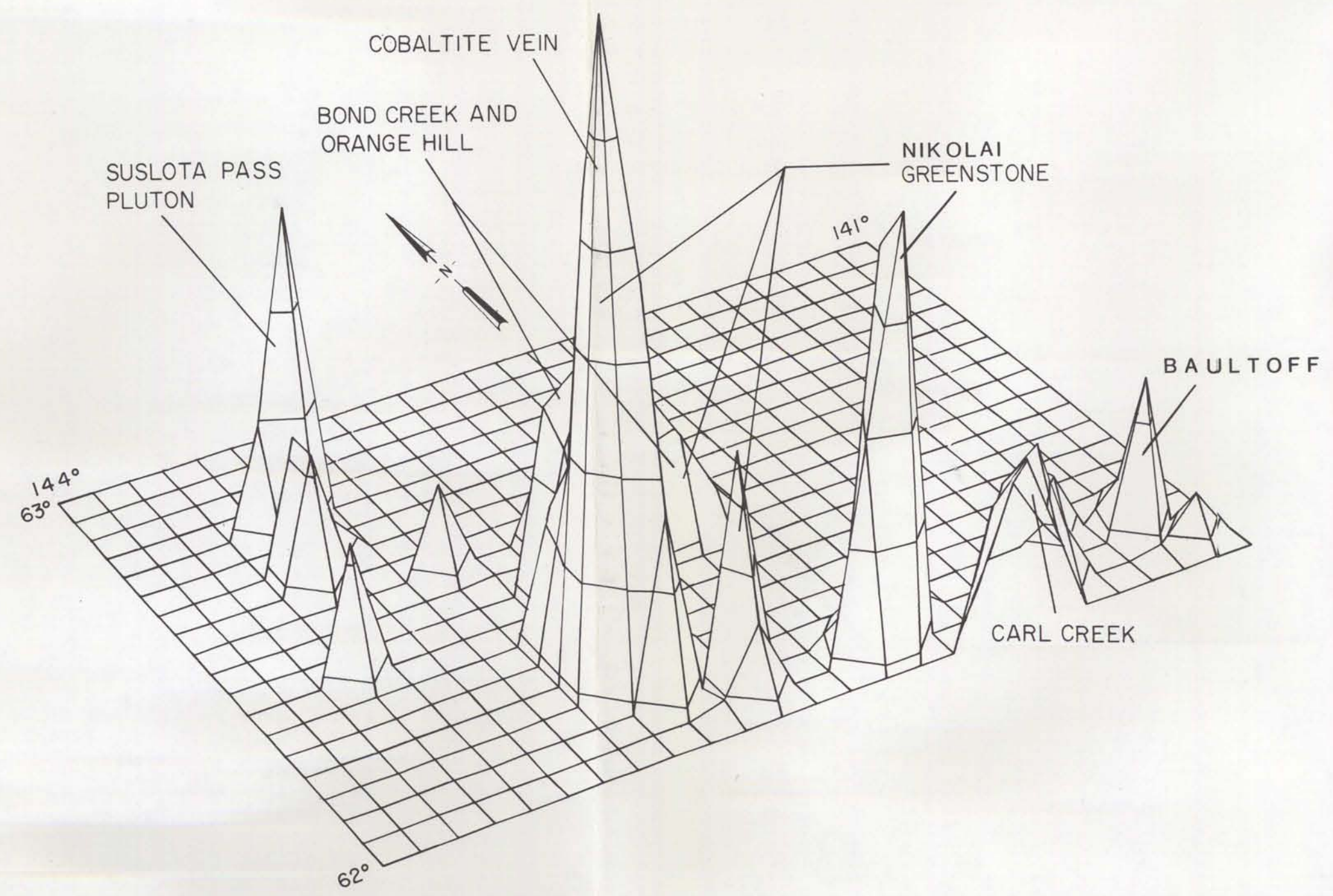
**CORRELATION OF MAP UNITS**

SURFICIAL DEPOSITS		INTRUSIVE, METAMORPHIC, AND ULTRAMAFIC ROCKS	
Qs	Quaternary	Tp	Tertiary
Qtw	WRANGELL LAVA (Quaternary and Tertiary)	Tg	Cretaceous
Ks	CONTINENTAL SEDIMENTARY ROCKS (Upper? Cretaceous)	Kg	Cretaceous
Kc	CHISANA FORMATION (Lower Cretaceous) Marine and subaerial volcanic rocks	Jhd	JURASSIC AND TRIASSIC
Rn	NIKOLAI GREENSTONE (Upper and/or Middle Triassic)	Ma	MESOZOIC
MePzsv	UNDIVIDED SEDIMENTARY AND VOLCANIC ROCKS (Mesozoic and Paleozoic)	MePms	MESOZOIC AND PALEOZOIC
		MePzms	PALEOZOIC

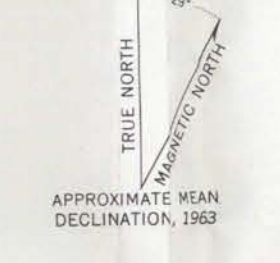
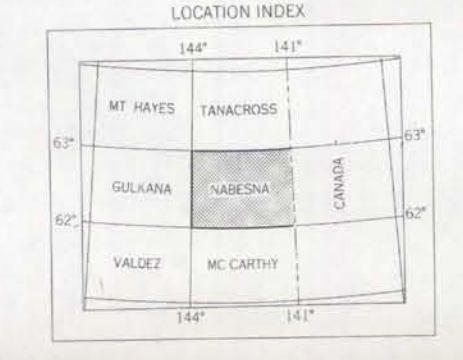
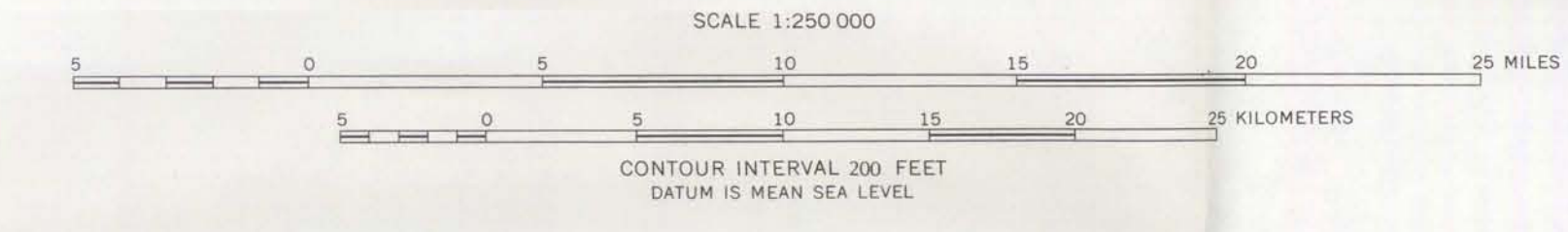
**DESCRIPTION OF MAP UNITS**

- Qs UNCONSOLIDATED SEDIMENTARY DEPOSITS (Quaternary)
- Qtw WRANGELL LAVA (Quaternary and Tertiary)
- Ks CONTINENTAL SEDIMENTARY ROCKS (Upper? Cretaceous)
- Kc CHISANA FORMATION (Lower Cretaceous) Marine and subaerial volcanic rocks
- Rn NIKOLAI GREENSTONE (Upper and/or Middle Triassic)
- MePzsv UNDIVIDED SEDIMENTARY AND VOLCANIC ROCKS (Mesozoic and Paleozoic)
- INTRUSIVE, METAMORPHIC, AND ULTRAMAFIC ROCKS
- Tp PORPHYRY (Tertiary) Porphyritic andesite to rhyodacite
- Tg UNDIVIDED GRANITIC ROCKS (Tertiary) Chiefly quartz monzonite
- Kg UNDIVIDED GRANITIC ROCKS (Cretaceous) Chiefly granodiorite and quartz monzonite
- Jhd DIORITE COMPLEX (Jurassic and Triassic)
- Ma ANORTHOSITE (Mesozoic)
- MePms UNDIVIDED METAMORPHOSED SEDIMENTARY ROCKS (Mesozoic and Paleozoic)
- MePzms UNDIVIDED ULTRAMAFIC ROCKS (Mesozoic and Paleozoic)
- MePzsv UNDIVIDED METAMORPHOSED MAFIC VOLCANIC AND INTRUSIVE ROCKS (Paleozoic)

--- Contact, Dotted where concealed  
--- Fault, Dotted where concealed  
• Geochemical sample locality  
■ Area that contains anomalous amounts of metal  
130 Mean value of samples in parts per million within grid area  
— All samples northwest of this boundary were analyzed by atomic absorption methods



BASE BY U. S. GEOLOGICAL SURVEY, 1965



V. A. = 30.0  
H. A. = 30.0  
RANGE: 40.0000 - 87.4519

**GEOCHEMICAL AND GENERALIZED GEOLOGIC MAP SHOWING DISTRIBUTION AND ABUNDANCE OF COBALT IN THE NABESNA QUADRANGLE, ALASKA**

BY SHERMAN P. MARSH  
1975

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