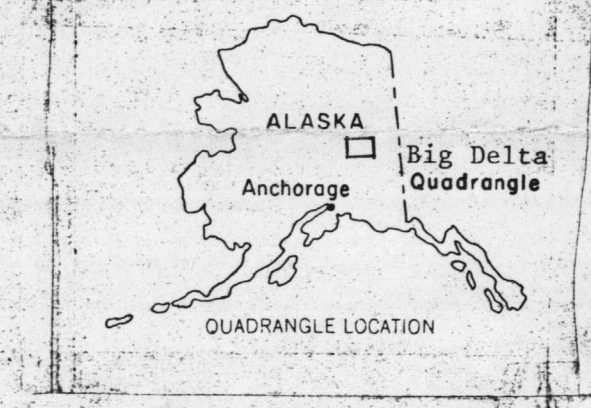


BASE FROM U.S. GEOLOGICAL SURVEY, 1961



SCALE 1:250,000

CONTOUR INTERVAL, 100 FEET  
DISTANCE BETWEEN NEAREST CONTOURS  
GIVEN IN METERS ON LEFT

GEOCHEMICAL MAP SHOWING THE DISTRIBUTION AND ABUNDANCE OF COBALT, CHROMIUM,  
AND NICKEL IN THE NONMAGNETIC HEAVY-MINERAL CONCENTRATE SAMPLES IN THE  
BIG DELTA QUADRANGLE, ALASKA

BY T. D. HESSIN, P. M. TAUFEN, E. F. COOLEY, D. F. SIEMS, AND S. K. McDANAL  
1978

EXPLANATION

GEOLOGY GENERALIZED FROM MEASUREMENTS

CORRELATION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

QUATERNARY

SEDIMENTARY ROCKS  
TERTIARY  
MESOZOIC

IGNEOUS ROCKS  
TERTIARY  
TERTIARY OR MESOZOIC  
CRETACEOUS

METAMORPHIC ROCKS

PERMIAN  
PALEOZOIC  
PALEOZOIC AND LOWER  
PRECAMBRIAN

DESCRIPTION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

ALLUVIUM, COLLUVIUM, AND MINOR GLACIAL AND EOLIAN DEPOSITS  
ALLUVIAL FAN AND GLACIAL OUTWASH DEPOSITS  
DUNE SAND  
MORAINAL DEPOSITS

SEDIMENTARY ROCKS  
NEARLY GRAVEL AND COAL-BEARING FORMATION  
DETRIENTAL ROCKS

IGNEOUS ROCKS  
FELSIC TUFF AND LAVA  
GRANITE AND QUARTZ MONZONITE  
UNDIVIDED GRANITIC AND DIORITIC ROCKS  
UNDIVIDED GRANITIC AND MINOR DIORITIC ROCKS

METAMORPHIC ROCKS  
GREENSTONE AND CHERT  
ULTRAMAFIC ROCKS  
CATACLASTIC SCHIST AND GNEISS  
GREENSCHIST, QUARTZITE, MARBLE, COARSE META-ARENITE  
GREENSTONE AND META-TUFF  
QUARTZITE, SLATE, CALC-PHYLLITE, AND MARBLE  
AUGEN GNEISS AND MINOR AMOUNTS OF OTHER DIORETIC ROCKS  
GNEISS, SCHIST, AUGEN GNEISS, AMPHIBOLITE, AND MARBLE

GEOLOGIC SYMBOLS

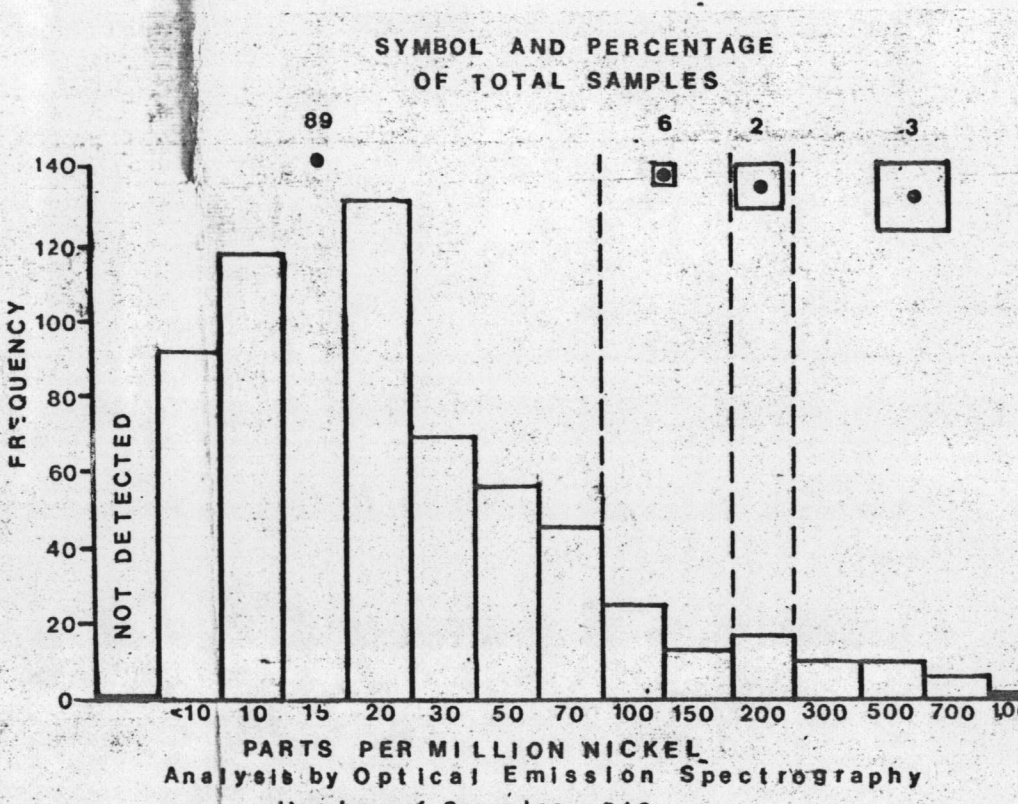
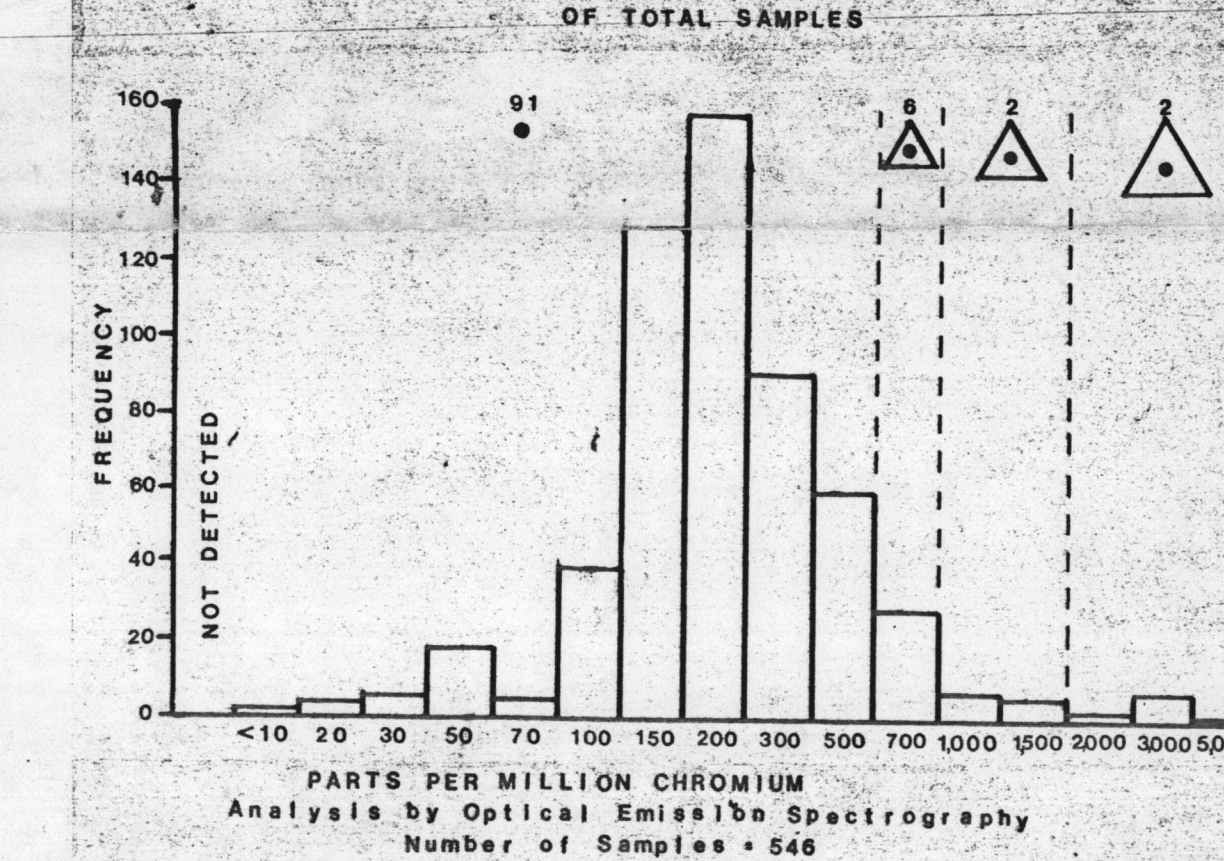
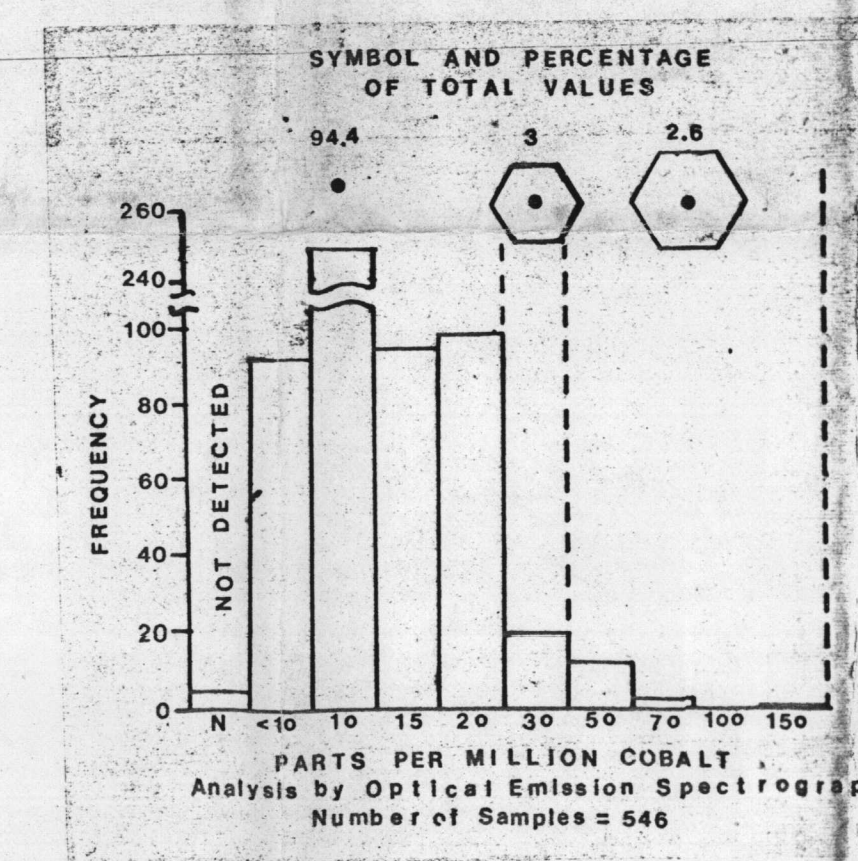
CONTACT, APPROXIMATELY LOCATED  
FAULT OR PROBABLE FAULT, DOTTED WHERE CONCEALED

GEOCHEMICAL SYMBOLS

SAMPLE SITE--Represents background values at sites where there are no anomalous values  
ANOMALOUS VALUES--Explained on histograms

COBALT  
CHROMIUM  
NICKEL

BACKGROUND INFORMATION RELATING TO THIS MAP IS PUBLISHED  
AS U.S. GEOLOGICAL SURVEY CIRCULAR 783 AVAILABLE FREE  
OF CHARGE FROM THE U.S. GEOLOGICAL SURVEY, RESTON, VA 22092



DISCUSSION

This map shows the distribution and abundance of cobalt, chromium, and nickel in 546 heavy-mineral concentrate samples collected in the Big Delta quadrangle in 1975 and 1977. This sampling was a part of geochemical studies made for the Alaska Mineral Resource Assessment Program. The heavy-mineral concentrates were separated from stream sediments collected in the active channels of streams draining areas ranging from approximately 10 to 25 mi<sup>2</sup>. The areas within the quadrangle that show a low density of sample sites, particularly along the major northeast-trending fault and in the northeastern part of the quadrangle, were areas where dense brush and trees prevented helicopter landings. Areas in the southwestern and south-central parts of the quadrangle were not sampled because they are covered by thick unconsolidated deposits of Quaternary material, which limits effective geochemical sampling within the scope of the present geochemical studies.

The heavy-mineral concentrates were panned in the field to remove most of the low-density minerals. The panned samples were sieved through a 20 mesh (0.8 mm) screen in the laboratory and the -20 mesh fraction was further separated with bromoform (specific gravity, 2.88) to remove the remaining low-density mineral grains. Magnetite and other strongly magnetic heavy minerals were removed from the heavy-mineral fraction by the use of a hand magnet. The remaining heavy minerals were passed through a Franz Isodynamic Separator and a nonmagnetic fraction was obtained at a setting of 0.6 amperes. A split of this fraction was pulverized and analyzed by semiquantitative emission spectrography (Grimes and Marranzino, 1968). Map plots and histograms were produced from the analytical results. The range of anomalous values for each element was determined from the histograms and was subdivided into two or more plotting intervals represented by the symbols shown on the map and histograms.

Complete analytical data for all of the sample sites shown on this map are available in a U.S. Geological Survey Open-File Report by R. M. O'Leary and others (1978).

The use of trade names is for descriptive purposes only and does not constitute endorsement of these products by the U.S. Geological Survey.

REFERENCES CITED

Grimes, D. J., and Marranzino, A. P., 1968, Direct-current arc and alternating-current spark emission spectrographic field methods for the semiquantitative analysis of geologic materials: U.S. Geological Survey Circular 591, 9 p.  
O'Leary, R. M., Cooley, E. F., Day, G. W., Hessin, T. D., McDougal, C. M., and McDanal, S. K., 1978, Spectrographic and chemical analyses of geochemical samples from the Big Delta quadrangle, Alaska: U.S. Geological Survey Open-File Report 78-571, 127 p.  
Heber, F. R., Foster, H. D., Keith, T. E. C., and Duxel-Bacon, Cynthia, 1978, Preliminary geologic map of the Big Delta quadrangle, Alaska: U.S. Geological Survey Open-File Report 78-529A, scale 1:250,000.