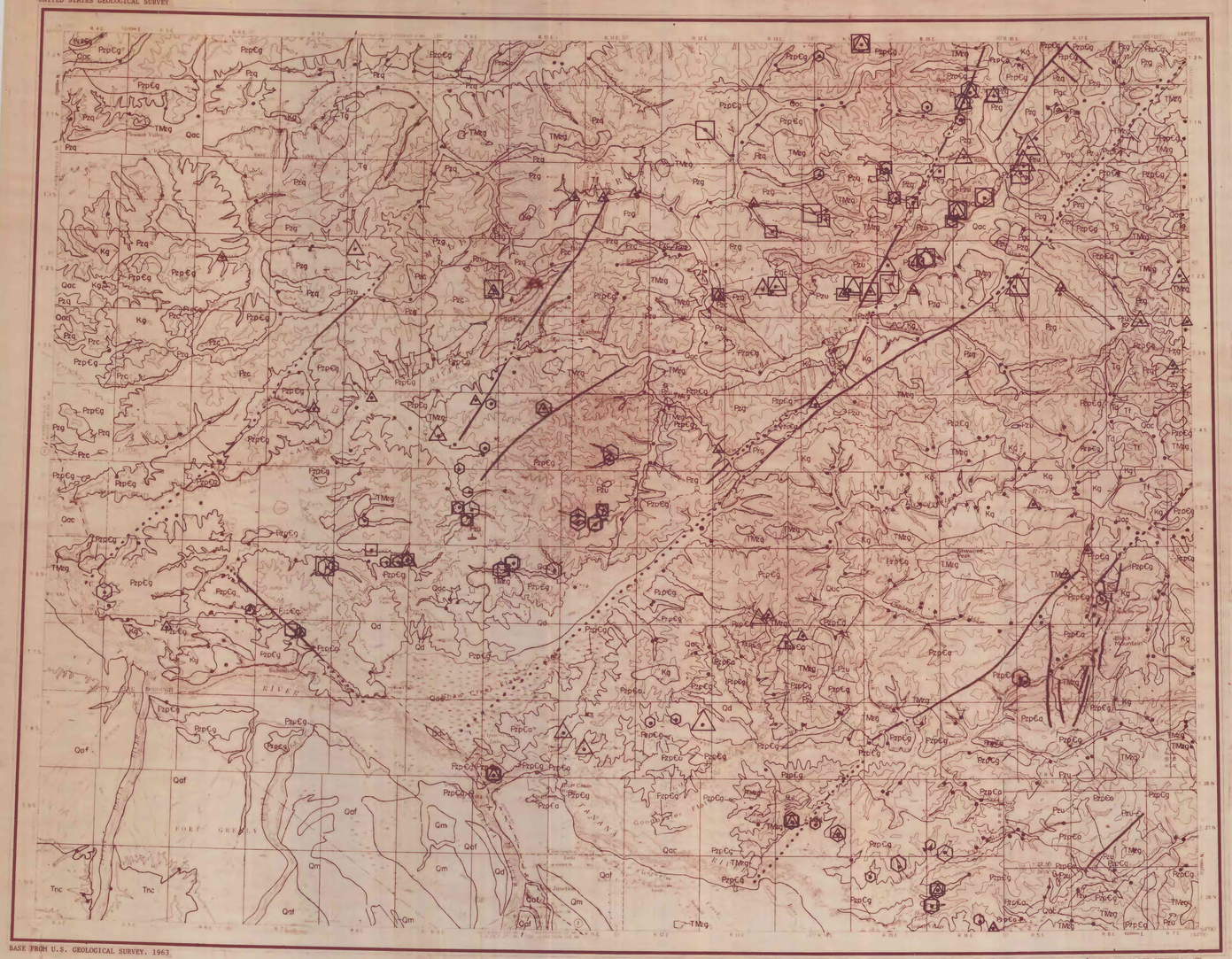
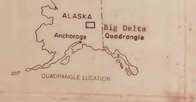
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY



BASE FROM U.S. GEOLOGICAL SURVEY, 1963

SCALE 1:250000

CONTOUR INTERVAL 250 FEET
DATUM IS MEAN SEA LEVEL




QUADRANGLE LOCATION

# GEOCHEMICAL MAP SHOWING THE DISTRIBUTION AND ABUNDANCE OF COBALT, CHROMIUM, AND NICKEL IN THE OXIDE RESIDUE OF STREAM-SEDIMENT SAMPLES IN THE BIG DELTA QUADRANGLE, ALASKA

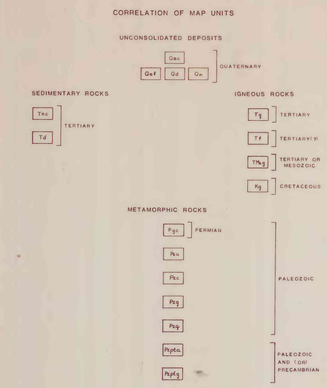
BY T. D. HESSIN, E. F. COOLEY, R. T. HOPKINS, JR., C. M. McDOUGAL, AND D. E. DETRA

1978

## EXPLANATION

GEOLOGY GENERALIZED FROM WEBER AND OTHERS (1978)

### CORRELATION OF MAP UNITS




### DESCRIPTION OF MAP UNITS

**UNCONSOLIDATED DEPOSITS**

- Qac — ALLUVIUM, COLLUVIUM, AND MINOR GLACIAL AND EOLIAN DEPOSITS
- Qaf — ALLUVIAL FAN AND GLACIAL OUTWASH DEPOSITS
- Qd — DUNE SAND
- Qm — MORAINAL DEPOSITS

**SEDIMENTARY ROCKS**

- Tnc — NENANA GRAVEL AND COAL-BEARING FORMATION
- Td — DETRITAL ROCKS

**IGNEOUS ROCKS**

- Tg — FELSIC TUFF AND LAVA
- Tf — GRANITE AND QUARTZ MONZONITE
- TMg — UNDIVIDED GRANITIC AND DIORITIC ROCKS
- Kg — UNDIVIDED GRANITIC AND MINOR DIORITIC ROCKS

**METAMORPHIC ROCKS**

- Pgc — GREENSTONE AND CHERT
- Pu — ULTRAMAFIC ROCKS
- Pzc — CATACLASTIC SCHIST AND GNEISS
- Pzg — GREENSCHIST, QUARTZITE, MARBLE, COARSE META-ARENITE GREENSTONE, AND META-TUFF
- Pzq — QUARTZITE, SLATE, CALC-PHYLLITE, AND MARBLE
- PzpCa — AUGEN GNEISS AND MINOR AMOUNTS OF OTHER GNEISSIC ROCKS
- PzpCg — GNEISS, SCHIST, AUGEN GNEISS, AMPHIBOLITE, AND MARBLE

### GEOLOGIC SYMBOLS

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

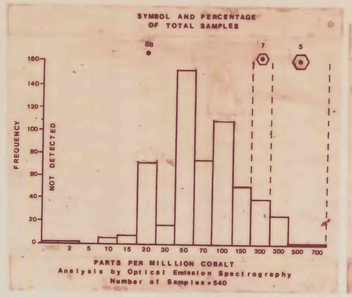
### GEOCHEMICAL SYMBOLS

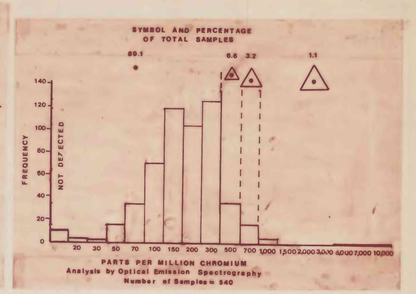
- SAMPLE SITE--Represents background values at sites where there are no anomalous values

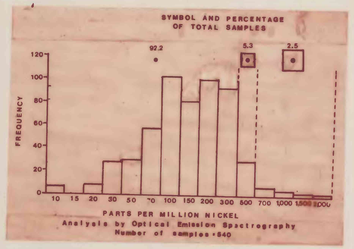
ANOMALOUS VALUES--Explained on histograms

- 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 the oxide residue (secondary iron and manganese oxide coatings) of 540 stream-sediment 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. Stream sediments were collected from the active channels of streams draining areas ranging from approximately 10 to 25 km$^2$. The areas within the quadrangle that show a low density of sample sites, particularly along the major northeast-trending fault and in the northwestern 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 secondary iron and manganese oxide coatings, cement, and particles in stream sediment (denoted as oxide residue) are considered concentrators of elements that have been leached from bedrock and colluvium and are migrating as ions in solution. The oxide residue of stream sediment contains the secondary iron and manganese oxide components of stream sediment together with adsorbed or coprecipitated trace elements and a dilutent of silica and alumina derived from clays. These components are extracted from the -80 mesh sediment using a weak oxalic-acid solution (Almínas and Mosier, 1976). The leachate residue produced by this extraction process is a derivative sample representing one material component of the total stream sediment.

The stream sediments were air-dried and sieved through an 80 mesh (0.2 mm) screen. The oxide residue of the stream sediment was obtained by leaching a 5 gram split of the -80 mesh fraction of the sediment with oxalic acid as described by Almínas and Mosier (1976). This material was analyzed for 19 elements including cobalt, chromium, and nickel 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 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).

## REFERENCES CITED

Almínas, H. V., and Mosier, E. L., 1976, Oxalic acid leaching of rock, soil, and stream-sediment samples as an anomaly accentuation technique: U.S. Geological Survey Open-File Report 76-275, 25 p.

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, 6 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.

Weber, F. R., Foster, H. D., Keith, T. E. C., and Dusel-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.