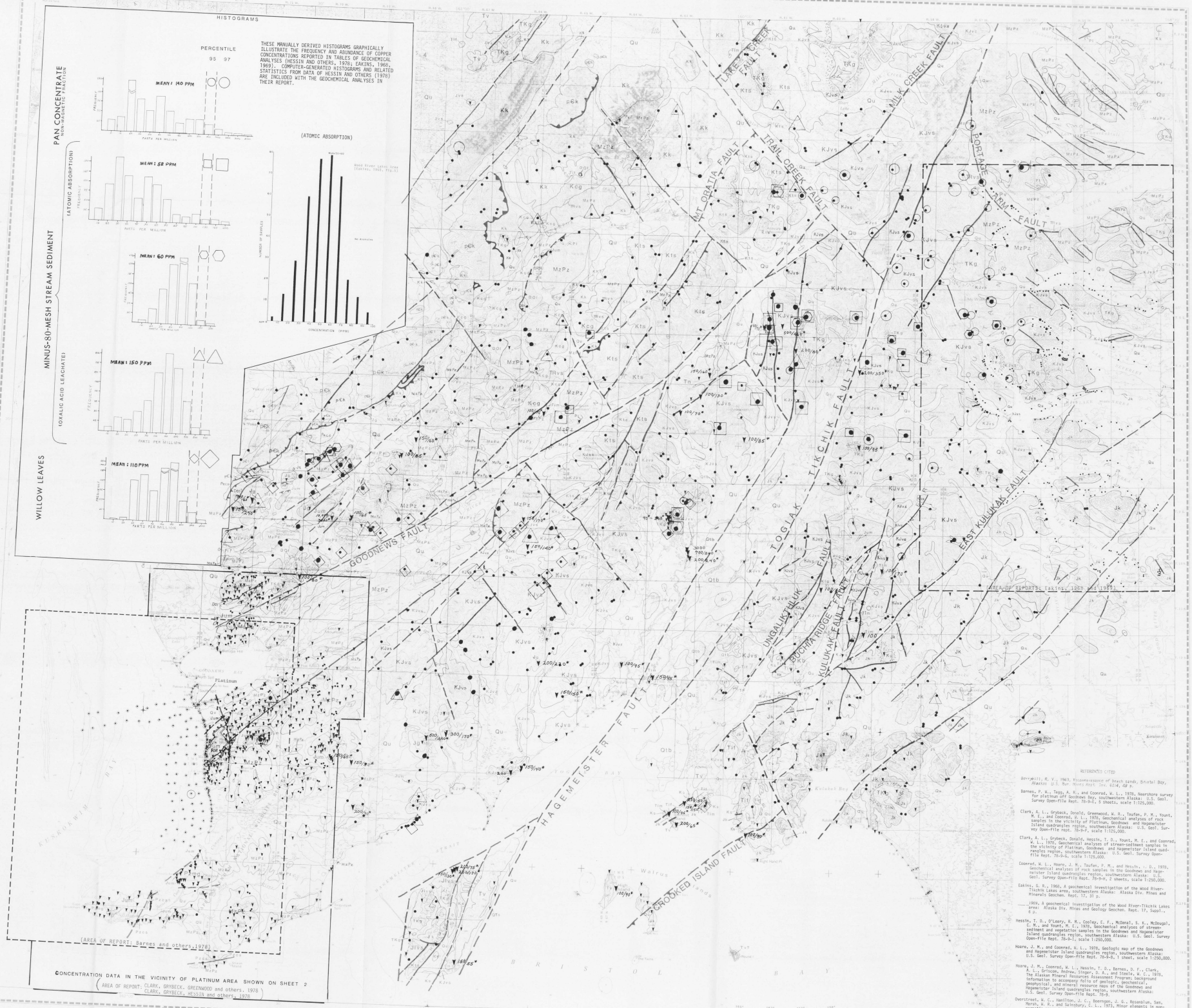
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

FOLIO OF THE
GOODNEWS AND HAGEMEISTER ISLAND QUADRANGLES REGION
OPEN FILE REPORT 78-9-M
HESSIN AND OTHERS—GEOCHEMICAL DISTRIBUTION OF COPPER
SHEET 2 OF 2



GEOCHEMICAL AND GENERALIZED GEOLOGICAL MAP SHOWING DISTRIBUTION AND ABUNDANCE OF COPPER IN THE GOODNEWS AND HAGEMEISTER ISLAND QUADRANGLES REGION, SOUTHWESTERN ALASKA

BY

T. D. HESSIN, P. M. TAUFEN, J. C. SEWARD, S. J. QUINTANA, A. L. CLARK, DONALD GRYBECK, J. M. HOARE, AND W. L. COONRAD

1978

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EXPLANATION

GEOLOGY GENERALIZED FROM HOARE AND COONRAD (1978)

CORRELATION OF MAP UNITS

SURFICIAL DEPOSITS

Qs — QUATERNARY

VOLCANIC, SEDIMENTARY, AND METAMORPHIC ROCKS

Qtb — Pleistocene — QUATERNARY
QTs — Plio-Pleistocene — QUATERNARY or TERTIARY
Tv — Early Tertiary — TERTIARY
Kk — Late Cretaceous (Maastrichtian ?)
KKL — Upper and Lower Cretaceous
Kk, Ksg, Ksu, Ksg — Lower Cretaceous — CRETACEOUS
KJsu — Lower Cretaceous to Middle Jurassic — CRETACEOUS AND JURASSIC
Jk, Jvs — Middle to Lower Upper Jurassic — JURASSIC
Jvs — Lower Jurassic
MzPz — Lower Cretaceous to Lower Ordovician ? — MESOZOIC AND PALEOZOIC
Pzcs — PALEOZOIC
p€k — PRE-CAMBRIAN
Pzmg — PALEOZOIC ?

INTRUSIVE ROCKS

Tri, Tmi, Tri — TERTIARY
TKg — TERTIARY AND CRETACEOUS
Kg, Jum, Jt — JURASSIC AND JURASSIC ?

DESCRIPTION OF MAP UNITS

SURFICIAL DEPOSITS

Qs — UNCONSOLIDATED SEDIMENTARY DEPOSITS

SEDIMENTARY, VOLCANIC, AND METAMORPHIC ROCKS

Qtb — TOGIAK BASALT
QTs — UNCONSOLIDATED MARINE BEACH SEDIMENTS
Tv — VOLCANIC ROCKS AND VOLCANICLAST SEDIMENTS - Chiefly andesitic flows and tuffs
Kss — SUMMIT ISLAND FORMATION - Nonmarine conglomerate, sandstone, shale, and carbonaceous mudstone
Ksu — KUSKOKWIM GROUP - Conglomerate overlain by interbedded graywacke, siltstone, and shale; commonly calcareous; mostly marine
Ksg — HOOKER RIDGE GRAYWACKE - Chiefly interbedded calcareous graywacke, siltstone, and conglomerate with local couches of Inoceramus shells
Ksu — LIMY GRIT AND LIMESTONE - Chiefly angular grit cemented by bioclastic limestone
Ksv — TUFFS AND SEDIMENTARY ROCKS - Varied assemblage of andesitic tuffs, graywacke, siltstone, impure limestone, and tuffaceous chert; tuff and tuffaceous sediments commonly laminated
Ksg — GRAYWACKE AND CONGLOMERATE - Marine graywacke, siltstone, and conglomerate; commonly calcareous
KJsvs — VOLCANIC AND SEDIMENTARY ROCKS - Interbedded intermediate to mafic flows, tuffs, tuffaceous sedimentary rocks, and argillites; intermediate composition tuffaceous rocks commonly laminated
Jk — KULUKAK GRAYWACKE - Chiefly very hard litic graywacke and siltstone with local conglomerate
Jvs — VOLCANIC AND SEDIMENTARY ROCKS - Andesitic, trachytic, and basaltic flows and breccias interbedded with volcanoclastic sedimentary rocks
JPvs — VOLCANIC AND SEDIMENTARY ROCKS - Mafic flows and breccias interbedded with volcanogenic sedimentary rocks; fractures commonly coated with lizardite
MzPz — MESOZOIC AND PALEOZOIC ROCKS UNDIVIDED - Widespread marine unit including mafic to intermediate volcanic rocks, tuffaceous sedimentary rocks, cherts, argillites, siltstones, graywacke, conglomerate, and limestone
Mvs — VOLCANIC AND SEDIMENTARY ROCKS (Upper Triassic) - Locally differentiated marine unit of chert, tuffaceous cherty rocks, argillite, siltstone, wacke, conglomerate, limestone, and mafic flows and breccia
Pv — VOLCANIC ROCKS (Permian) - Locally differentiated marine unit of pillow basalts, massive mafic flows, breccia, and tuff
Pl — LIMESTONE (Permian) - Locally differentiated thin unit of marine limestone; generally tuffaceous, commonly has strong fetid odor
DCl — LIMESTONE - Thin-bedded to massive limestone with minor interbedded tuff and mafic flows; locally recrystallized to marble with interbedded quartzite and quartz-chlorite schist
Pzcs — CALCAREOUS SCHIST (Permian or older)
p€K — GANETOK METAMORPHIC COMPLEX - Gneiss, schist, amphibolite, and marble; upper greenschist to lower amphibolite facies
p€Cl — MARBLEIZED LIMESTONE - Locally differentiated

INTRUSIVE ROCKS

Tri — FELSIC INTRUSIVE ROCKS - Chiefly rhyolitic to dacitic dikes and sills; locally mapped
Tmi — MAFIC INTRUSIVE ROCKS - Diabase, basalt, diorite, and gabbroic dikes and sills locally mapped
Tri — HAGUAMIUT COMPLEX - Quartz-rich porphyritic dacite intrusive-extrusive complex of dikes, sills, tuff, and breccias
TKg — ARKOSIC ROCKS - Chiefly quartz monzonite, granodiorite, and quartz diorite stocks
Jg — GABBROIC ROCKS - Commonly show compositional layering and generally associated with ultramafic rocks
Jum — ULTRAMAFIC ROCKS - Serpentinite, dunite, and websterite
Jt — TRONDHJEMITE - Associated with serpentinite and gabbro
Pzmg — METAGABBRO AND UROPIDITE - Probably dismembered ophiolite complex of mafic flows, dikes, volcaniclastic rocks, and gabbro altered by greenschist facies metamorphism and calcium metasomatism

GEOLOGIC SYMBOLS

Contact. Dashed where approximately located, gradational, and inferred. Most contacts between bedded rock units are probably faults.
Fault or fault zone. Dashed where approximately located, inferred, or concealed.
Thrust fault. Dashed where approximately located, inferred, or concealed. Teeth on upper plate
Monocline

GEOCHEMICAL SYMBOLS

RMU — RED MOUNTAIN ULTRAMAFIC BODY
RMC — RED MOUNTAIN CONTACT ZONE

GEOCHEMICAL SAMPLE SITES

▼ ROCK (CLARK, GRYBECK, GREENWOOD, AND OTHERS, 1978; COONRAD, AND OTHERS, 1978)
★ CONCENTRATE (OVERSTREET, AND OTHERS, 1973)
OFFSHORE AND ONSHORE SEDIMENTS (BARNES, AND OTHERS, 1978)
BEACH AND STREAM SEDIMENTS (BERRYHILL, 1963)
STREAM DRAINAGE SEDIMENT (HESSIN, AND OTHERS, 1978)
STREAM DRAINAGE SEDIMENT (CLARK, GRYBECK, HESSIN, AND OTHERS, 1978)
STREAM DRAINAGE SEDIMENT (EAKINS, 1968, 1969)

ABUNDANCE

▼300 NUMBER WITH SOLID ROCK SAMPLE-SITE SYMBOL REPRESENTS GEOCHEMICAL CONCENTRATION IN PARTS PER MILLION (PPM) (★ INDICATES ATOMIC-ABSORPTION)
● SOLID STREAM-DRAINAGE SAMPLE-SITE SYMBOL INDICATES GEOCHEMICAL ABUNDANCE OF 90TH PERCENTILE VALUE OR GREATER IN TWO OR MORE GEOCHEMICAL DETERMINATIONS AS SHOWN IN HISTOGRAMS (SHEET 1)
○ □ ○ □ △ ◇ ABUNDANCE SYMBOLS REPRESENTING 95TH PERCENTILE OR GREATER CONCENTRATIONS DETERMINED IN STREAM-DRAINAGE SITE SAMPLES ARE SHOWN WITH HISTOGRAMS (SHEET 1)

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DISCUSSION OF GEOCHEMISTRY

THE TWO SHEETS COMPRISING THIS REPORT SHOW THE DISTRIBUTION AND ABUNDANCE OF COPPER AS GEOCHEMICALLY DETERMINED IN VARIOUS SAMPLE MEDIA COLLECTED FROM LOCATIONS THROUGHOUT THE GOODNEWS AND HAGEMEISTER ISLAND QUADRANGLES REGION. SHEET 1 COVERS THE ENTIRE REGION AND SHEET 2 COVERS THE AREA OF ABUNDANT SAMPLE DATA IN THE VICINITY OF PLATINUM. SAMPLE LOCATION AND CONCENTRATION SYMBOLS ARE SIMILAR ON BOTH SHEETS. DATA PRESENTED HAVE BEEN COMPILED FROM ANALYSES AND LOCATIONS REPORTED BY BARNES AND OTHERS (1978); CLARK, GRYBECK, GREENWOOD, AND OTHERS (1978); CLARK, GRYBECK, HESSIN, AND OTHERS (1978); COONRAD AND OTHERS (1978); EAKINS (1968, 1969); HESSIN AND OTHERS (1978), AND OVERSTREET AND OTHERS (1973).

THE HISTOGRAMS ON SHEET 1 HAVE BEEN USED TO IDENTIFY CONCENTRATIONS OF COPPER THAT MIGHT BE ANOMALOUS. EAKINS' (1968) WOOD RIVER LAKES HISTOGRAM AND THE FIVE HISTOGRAMS, BASED ON THE ANALYSES REPORTED BY HESSIN AND OTHERS (1978) WITH RESPECTIVE SAMPLE POPULATIONS OF BETWEEN 400 AND 900 SAMPLES, APPEAR TO PROVIDE REPRESENTATIVE CONCENTRATION STATISTICS. THE GENERALIZED GEOLOGIC MAP DATA INCLUDED IN SHEET 1 AND THE MORE DETAILED GEOLOGIC MAP OF THE REGION (HOARE AND COONRAD, 1978) SHOULD BE UTILIZED IN CONSIDERING POSSIBLE SOURCE ROCKS AND SIGNIFICANCE OF THE COPPER THAT HAS BEEN DETECTED IN VARIOUS GEOCHEMICAL SAMPLES.

BACKGROUND INFORMATION RELATING TO THIS REPORT IS TO BE FILED IN
U.S. GEOLOGICAL SURVEY OPEN-FILE REPORT 78-9
AND MAY BE FOUND UNDER THE NAME MARKED ON THE MAP.

This report is preliminary and has not been edited or reviewed for conformity with Geological Survey standards and nomenclature.