DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

FOLIO OF THE
GOODNEWS AND HAGEMEISTER ISLAND QUADRANGLES REGION

OPEN FILE REPORT 78-9-J

HESSIN AND OTHERS--GEOCHEMICAL DISTRIBUTION OF CHROMIUM

SHEET 1 OF 2

HISTOGRAMS

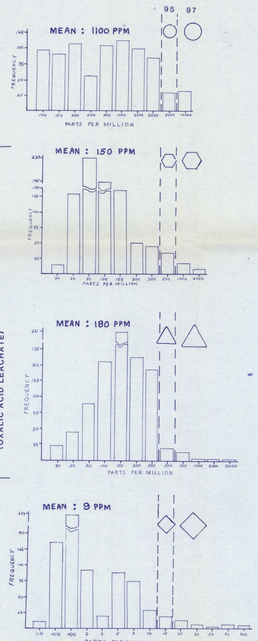
THESE MANUALLY DERIVED HISTOGRAMS GRAPHICALLY ILLUSTRATE THE FREQUENCY AND ABUNDANCE OF CHROMIUM CONCENTRATION REPORTED IN TABLES OF GEOCHEMICAL ANALYSES (HESSIN AND OTHERS, 1978). COMPUTER-GENERATED HISTOGRAMS AND RELATED STATISTICS FROM THE SAME DATA ARE INCLUDED IN OTHER TABLES WITH THE GEOCHEMICAL ANALYSES.

WILLOW LEAVES

PAN CONCENTRATE
NON-MAGNETIC FRACTION

MINUS-80-MESH STREAM SEDIMENT
(OXALIC ACID LEACHATE)

PERCENTILE



EXPLANATION

GEOLOGY GENERALIZED FROM HOARE AND CONRAD (1978)

CORRELATION OF MAP UNITS

SURFICIAL DEPOSITS

Qv	QUATERNARY	

VOLCANIC, SEDIMENTARY, AND METAMORPHIC ROCKS

INTRUSIVE ROCKS

QTs	Pleistocene	QUATERNARY	
QTs	Plio-Pleistocene	QUATERNARY or TERTIARY	
Tv	Early Tertiary	TERTIARY	Tti Tmn Tv → TERTIARY
			TKg → TERTIARY AND CRETACEOUS
Ks	Late Cretaceous Maastrichtian ?	CRETACEOUS	
Ks	Upper and Lower Cretaceous		
Ks Ksg Kls Kcg	Lower Cretaceous		
KJvs	Lower Cretaceous to Middle Jurassic	CRETACEOUS AND JURASSIC	
Jk Jvs	Middle to Lower Upper Jurassic	JURASSIC	Jg Jum Jl → JURASSIC AND JURASSIC ?
Jlss	Lower Jurassic		
MzPz	Lower Cretaceous to Lower Ordovician ?	MESOZOIC AND PALEOZOIC	
Pzss		PALEOZOIC	Pzmg → PALEOZOIC ?
pCk pGk		PRE-CAMBRIAN	

DESCRIPTION OF MAP UNITS

SURFICIAL DEPOSITS

Q — UNCONSOLIDATED SEDIMENTARY DEPOSITS

SEDIMENTARY, VOLCANIC, AND METAMORPHIC ROCKS

Qtb — TOGIAK BASALT

QTs — SEMICONSOLIDATED MARINE BEACH SEDIMENTS

Tv — VOLCANIC ROCKS AND VOLCANOGENIC SEDIMENTS - Chiefly andesitic flows and tuffs

Ks — SUMMIT ISLAND FORMATION - Nonmarine conglomerate, sandstone, shale, and carbonaceous mudstone

Kk — KUSKOKWIM GROUP - Conglomerate overlain by interbedded graywacke, siltstone, and shale; commonly micaceous; mostly marine

Ks — BOCHIA RIDGE GRAYWACKE - Chiefly interbedded calcareous graywacke, siltstone, and conglomerate with local coquinas of Aucella shells

Kls — LIME GRIT AND LIMESTONE - Chiefly angular grit cemented by bioclastic limestone

Kts — TUFFS AND SEDIMENTARY ROCKS - Varied assemblage of andesitic tuffs, graywacke, siltstone, impure limestone, and tuffaceous cherts; tuff and tuffaceous sediments commonly laminated

Kcg — GRAYWACKE AND CONGLOMERATE - Marine graywacke, siltstone, and conglomerate; commonly calcareous

KJvs — VOLCANIC AND SEDIMENTARY ROCKS - Interbedded intermediate to mafic flows, tuffs, tuffaceous sedimentary rocks, and argillites; intermediate composition tuffaceous rocks commonly laminated

Jk — KUSKOKWIM GRAYWACKE - Chiefly very hard lithic graywacke and siltstone with local conglomerate

JVS — VOLCANIC AND SEDIMENTARY ROCKS - Andesitic, trachytic, and basaltic flows and breccias interbedded with volcanogenic sedimentary rocks

JUVS — VOLCANIC AND SEDIMENTARY ROCKS - Mafic flows and breccias interbedded with volcanogenic sedimentary rocks; fractures commonly coated with laumontite

MzPz — MESOZOIC AND PALEOZOIC ROCKS UNDIVIDED - Widespread marine unit including mafic to intermediate volcanic rocks, tuffaceous sedimentary rocks, chert, argillite, siltstone, graywacke, conglomerate, and limestone

TRVS — VOLCANIC AND SEDIMENTARY ROCKS (Upper Triassic) - Locally differentiated marine unit of chert, tuffaceous cherty rocks, argillite, siltstone, wackes, conglomerate, limestone, and mafic flows and breccia

PV — VOLCANIC ROCKS (Permian) - Locally differentiated marine unit of pillow basalts, massive mafic flows, breccia, and tuff

PI — LIMESTONE (Permian) - Locally differentiated thin unit of marine limestone; generally tuffaceous, commonly has strong fetid odor

DOI — 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)

pGk — KANAYUT METAMORPHIC COMPLEX - Gneiss, schist, amphibolite, and marble; upper greenschist to lower amphibolite facies

pGl — MARBLELIKE LIMESTONE - Locally differentiated

INTRUSIVE ROCKS

Tti — FELSIC INTRUSIVE ROCKS - Chiefly rhyolitic to dacitic dikes and sills; locally mapped

Tmn — MAFIC INTRUSIVE ROCKS - Diabase, basalt, dioritic, and gabbroic dikes and sills locally mapped

Tv — WARGAMON COMPLEX - Quartz-rich porphyritic felsite intrusive-extrusive complex of dikes, sills, tuff, and breccias

TKg — GRANITIC ROCKS - Chiefly quartz monzonite, granodiorite, and quartz diorite stocks

Jg — GABBROIC ROCKS - Commonly shows compositional layering and generally associated with ultramafic rocks

Jum — ULTRAMAFIC ROCKS - Serpentinite, dunite, and websterite

Jl — TRONDHJEMITE - Associated with serpentinite and gabbro

Pzmg — METAGABBRO AND GREENSTONE - Probable dismembered ophiolite complex of mafic flows, dikes, volcaniclastic rocks, and gabbro altered by greenschist facies metamorphism and calcium metasomatism

GEOLOGIC SYMBOLS

Contact. Dashed, 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. Sawtooth on upper plate

Hornfels

GEOCHEMICAL SYMBOLS

RM — 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

▼1000 — NUMBER WITH SOLID ROCK SAMPLE-SITE SYMBOL REPRESENTS GEOCHEMICAL CONCENTRATION IN PARTS PER MILLION (PPM)

● 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 CHROMIUM 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); BERRYHILL (1963): CLARK, GRYBECK, GREENWOOD, AND OTHERS (1978); CLARK, GRYBECK, HESSIN, AND OTHERS (1978); COONRAD AND OTHERS (1978); HESSIN AND OTHERS (1978); AND OVERSTREET AND OTHERS (1973).

THE HISTOGRAMS ON SHEET 1 HAVE BEEN USED TO IDENTIFY CONCENTRATIONS OF CHROMIUM THAT MIGHT BE ANOMALOUS. ALTHOUGH THE HISTOGRAMS ARE BASED SOLELY ON THE ANALYSES REPORTED BY HESSIN AND OTHERS (1978), THE RESPECTIVE SAMPLE POPULATIONS (BETWEEN 800 AND 900 SAMPLES) APPEAR TO PROVIDE REPRESENTATIVE CONCENTRATION STATISTICS. MANY OF THE HIGHER VALUES OF CONCENTRATION OF CHROMIUM SHOWN ON THE MAPS ARE FROM SAMPLE SITES WHERE ULTRAMAFIC ROCK IS KNOWN TO CROP OUT WITHIN THE IMMEDIATE SOURCE AREA AND SUCH VALUES ARE NOT NECESSARILY ANOMALOUS (SEE HISTOGRAM OF ROCK ANALYSES DATA FROM RED MOUNTAIN ULTRAMAFIC BODY ON SHEET 2). ANALYSES OF OLIVINE CHROMITITES AND THE OCCURRENCE OF PLATINUM IN THE RED MOUNTAIN ULTRAMAFIC COMPLEX ARE DISCUSSED BY BIRD AND CLARK (1976). THE GENERALIZED GEOLOGIC MAP DATA INCLUDED IN SHEET 1, THE MORE DETAILED GEOLOGIC MAP OF THE REGION (HOARE AND COONRAD, 1978), AND MERTIE'S REPORTS (1940, 1969, 1976) SHOULD BE UTILIZED IN CONSIDERING POSSIBLE SOURCE ROCKS FOR THE CHROMIUM THAT HAS BEEN DETECTED IN VARIOUS GEOCHEMICAL SAMPLES.

CONCENTRATION DATA IN THE VICINITY OF PLATINUM AREA SHOWN ON SHEET 2
AREA OF REPORT: CLARK, GRYBECK. GREENWOOD and others. 1978
CLARK, GRYBECK, HESSIN and others, 1978

(AREA OF REPORT: Barnes and others,1978)

BASE MAP INDEX
Compiled from U.S. Geological Survey

GEOCHEMICAL AND GENERALIZED GEOLOGICAL MAP SHOWING DISTRIBUTION AND ABUNDANCE OF CHROMIUM