U.S. Department of the Interior

U.S. Geological Survey

Digital Release of Stream-Sediment, Heavy-Mineral-Concentrate, Soil, and Other Geochemical Data Collected in the Nabesna 1° x 3° Quadrangle, Alaska

By

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Open-File Report 95-625

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1995

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INTRODUCTION

The historic geochemical data presented here were compiled from the Rock Analysis Storage System (RASS) of the U.S. Geological Survey National Geochemical Database (NGDB). The RASS database consists of multi-element chemical and spectrographic analyses for approximately 700,000 geochemical samples collected from the mid-1960's to the late 1980's.

Reconnaissance geochemical sampling and analysis was conducted in the Nabesna quadrangle in the late 1960's and early 1970's as part of the Alaska Mineral Resource Assessment Program (AMRAP). Although collected primarily for mineral resource studies, these geochemical data may be useful for environmental or other mineral resource studies in the region. The purpose of this report is to release these data in a more modern, easy-to-use format. While compiling the data for this report, sample coding and geochemical data were inspected and gross errors were corrected. Although these geochemical data reside in the NGDB, the data for the Nabesna quadrangle were not formally published.

The Nabesna quadrangle is bounded by latitude 62° N to 63° N and by longitude 141° W to 144° W. The analytical results for 1,425 stream-sediment, 30 concentrate, 4 organic, and 3 soil samples, primarily collected in the eastern and central portions of the quadrangle, are given in this report. The data files included on this diskette are separated by sample media type. All data files are in dBase III .dbf format. The first three letters of the filename refer to the quadrangle. Letters following the underscore refer to sample media: CONC, concentrates; SED, stream sediments; SOIL, soils; ORG, organic samples.

METHODS OF STUDY

Sample Media

The chemical composition of stream-sediment samples reflects the overall chemistry of rocks contained within the drainage basins. Such information is useful in identifying those basins which contain concentrations of elements that may be related to mineral deposits. Soil samples also reflect the chemistry of underlying rocks, but are more areally restricted.

Heavy-mineral concentrates from stream sediment are selectively enriched in certain minerals, including many that may be ore-related. This concentration process permits detection of some elements that are not easily or reliably detected in bulk stream sediment.

Organic sample media generally refer to vegetation samples collected from specimens growing in the flood plains of a stream or river. These samples were usually collected at or near a corresponding stream-sediment or heavy-mineral-concentrate sample locality. Organic sample media for the Nabesna quadrangle includes needles from spruce trees.

Sample Collection

Stream sediments were obtained from active stream channels. Generally, stream-sediment samples were composited. Heavy-mineral concentrates were collected in conjunction with stream-sediment sampling at a few sites by panning sediment at the sample site. No details are available for the soil and organic samples collected.

Sample Preparation

Stream-sediment samples were air-dried and generally sieved through a stainless steel 80-mesh (0.17 mm) sieve. The minus-80-mesh fraction was saved for analysis. Sieve size fraction information is reported in the stream-sediment data file.

The heavy-mineral concentrates generally were sieved to minus-30 or minus-40 mesh. The sample was further separated with the heavy liquid bromoform into two fractions: a light-mineral fraction (specific gravity 2.86 or less) and a heavy-mineral fraction (specific gravity greater than 2.86). Following heavy liquid separation, magnetite and other strongly magnetic minerals were removed from the heavy-mineral fraction by use of a hand magnet and a Frantz isodynamic magnetic separator set at 0.2 ampere and saved for analysis. The remaining fraction was again sent through the Frantz separator at a setting of 0.6 amperes and the non-magnetic fraction was retained for analysis.

The spruce needles initially were air dried in cloth bags, then pulverized in a blender and ashed in a muffle furnace. The ash was retained for analysis.

Sample Analysis

Stream sediments were analyzed using a semiquantitative, direct-current arc emission spectrographic method (Grimes and Marranzino, 1968). Spectrographic results were determined by visually comparing spectra derived from the sample against spectra obtained from laboratory reference standards. Standard concentrations are geometrically spaced over any given order of magnitude of concentration such that values reported for each sample are reported in the geometric sequence 10, 15, 20, 30, 50, 70, 100 etc. The precision of the Grimes and Marranzino (1968) method is plus or minus one reporting interval at 83 percent, or two intervals at 96 percent confidence (Motooka and Grimes, 1976). The elements analyzed and their nominal limits of determination are listed in table 1. Selected stream-sediment samples were analyzed by atomic-absorption methods for gold, copper, lead, zinc, and tellurium (Ward and others, 1969). Mercury was determined by a mercury-vapor detector developed by Vaughn and McCarthy (1964). Selenium was determined by atomic absorption (fluorometric method). The lower limits of determination for these elements in parts per million are: gold, 0.05; copper, 5; lead, 5; zinc, 5; tellurium, 0.2; mercury, 0.02; selenium, 0.4.

Heavy-mineral concentrates were analyzed by the Grimes and Marranzino (1968) emission spectrographic procedure as described above, with the following modification: to eliminate the spectral interferences caused by high concentrations of iron, 5 mg of prepared sample was used instead of 10 mg, thus raising the lower limit of determination by two steps (Table 1). Selected heavy-mineral concentrates were analyzed for silver, bismuth, cadmium, copper, cobalt, nickel, lead, and zinc by atomic absorption (modification of Nakagawa, 1975). Gold, indium, and thallium contents were determined by atomic absorption (modification of Hubert and Lakin, 1973). The lower limits of determination for these elements in parts per million are: silver, 0.2; bismuth, 5; cadmium, 0.2; copper, 1; cobalt, 1; nickel, 1; lead, 5; zinc, 1; gold, 0.2; indium, 0.2; thallium, 0.2. Selected magnetic concentrates were measured to determine equivalent uranium. The radiation of each magnetic concentrate was reported as percent equivalent uranium and the lower limit of determination is 0.003 percent (Pan and others, 1980).

The ashed spruce needles were analyzed by a semiquantitative, direct-current arc emission spectrographic method developed by Mosier (1972) for the analysis of plant ash.

DESCRIPTION OF DATA

Sample description, geologic, and analytical data are presented in each of the sample media files. Sample site locations are given as latitude and longitude both in decimal degree and degree-minute-second formats in the tables. The following list summarizes table structure and sample description column headings. For table structures, "A6" refers to an alphanumeric format six characters wide, while "N" indicates a numeric column format. Sample description code explanations are listed in Appendix A.

Table Structure	Column Identifier	Description
A6	Jobnum	assigned laboratory job number
A7	Labnum	assigned sample laboratory number
A8	Fieldnum	sample field identification number
A8	Date_sub	date sample submitted to laboratory
A20	Submitter	submitter name
A20	Subm2	secondary submitter name
A9	Lat_dms	latitude in degree-minute-second
A11	Lon_dms	longitude in degree-minute-second
N	D_lat	latitude in decimal degrees
N	D_lon	longitude in decimal degrees
A2	LL_precis	latitude/longitude precision
A1	St	type of sample media
A1	Mc	method sample collected
A1	Sc	sample source
A1	Rt	rock type
A1	Ss	structural setting
A1	M	matrix
A1	Os	oxidation state
A1	A	alteration
A1	Om	ore minerals
A1	Mdf	mineral deposit form
A1	Ga	geologic age
A2	Ms	mesh/sieve code
A2	Sd	additional sample description information
A2	Sd3	additional sample description information
A2	Sd4	additional sample description information
A2	Sd5	additional sample description information
A2	Sp1	sample lab preparation information
A2	Sp2	sample lab preparation information
A2	Sp3	sample lab preparation information
A2	Ft	field treatment
A2	Cm	lab/submitter comments

Chemical data follows the above sample description information in the data files. The chemical data are accurate to two significant digits. Trailing zeros are nonsignificant. Columns in which the element headings contain the prefix "S" represent emission-spectrographic data and the prefix "Aa" indicates atomic absorption analyses. The results for all elements are reported in parts per million (ppm) except for iron, magnesium, calcium, sodium, phosphorus, and titanium, which are given in percent (pct). The suffix "p" indicates a partial digestion; "t" indicates a total digestion; and "sw" indicates sample weight in grams. The column heading "Ash_pct" indicates percent ash and "Equiv_u" indicates percent equivalent uranium.

Definitions of the qualifier codes used in the tables are as follows: B, sample not analyzed for this element; N, not detected at the specified level of detection; L, detected, but below the specified limit of determination; G, greater than the specified upper limit of determination; and H, values not determined due to interference.

REFERENCES CITED

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Table 1.--Limits of determination for Emission Spectrographic Analysis
Numbers in () were limits before 1988

Elements	Sediments Lower limit	Sediments Upper limit	Concentrates Lower limit	Concentrates Upper limit
		Percent		
Iron (Fe)	.05	20	.1	50
Magnesium (Mg)	.02	10	.05	20
Calcium (Ca)	.05	20	.1	50
Sodium (Na)	.2	5	.5	10
Titanium (Ti)	.002	1	.005	2
Phosphorus (P)	.2	5	.5	10
		Parts per million		
Silver (Ag)	.5	5,000	1.0	10,000
Arsenic (As)	200	10,000	500	20,000
Gold (Au)	10	500	20	1,000
Boron (B)	10	2,000	20	5,000
Barium (Ba)	20	5,000	50	10,000
Beryllium (Be)	1	1,000	2	2,000
Bismuth (Bi)	10	1,000	20	2,000
Cadmium (Cd)	20	500	50	1,000
Cobalt (Co)	(5) 10	2,000	(10) 20	5,000
Chromium (Cr)	(5) 10	5,000	(10) 20	10,000
Copper (Cu)	5	20,000	10	50,000
Gallium (Ga)	5	500	10	1,000
Germanium (Ge)	10	100	20	200
Indium (In)	2	--	--	--
Lanthanum (La)	(20) 50	1,000	(50) 100	2,000
Lithium (Li)	200	--	--	--
Manganese (Mn)	10	5,000	20	10,000
Molybdenum (Mo)	5	2,000	10	5,000
Niobium (Nb)	(10) 20	2,000	(20) 50	5,000
Nickel (Ni)	5	5,000	10	10,000
Lead (Pb)	10	20,000	20	50,000
Palladium (Pd)	--	--	5	1,000
Platinum (Pt)	--	--	20	1,000
Antimony (Sb)	100	10,000	200	20,000
Scandium (Sc)	5	100	10	200
Tin (Sn)	10	1,000	20	2,000
Strontium (Sr)	100	5,000	200	10,000
Thorium (Th)	100	2,000	200	5,000
Thallium (Tl)	2	--	--	--
Vanadium (V)	10	10,000	20	20,000
Tungsten (W)	(50) 20	10,000	(100) 50	20,000
Yttrium (Y)	10	2,000	20	5,000
Zinc (Zn)	200	10,000	500	20,000
Zirconium (Zr)	10	1,000	20	2,000

APPENDIX A
Explanation of sample description codes

Sample Type (St)

A rock
B unconsolidated sediment
C organic material
D soil
E water
F other
G gas

Method collected (Mc)

A single (grab)
B composite
C channel
D other

Sample source (Sc)

A outcrop
B mine
C dump or prospect pit
D float
E drill hole, well
F marine
G other
H stream
I spring
J lake
K aquaduct, canal, irr. ditch
L atmosphere

Rock type (Rt)

A unidentified rock
B sedimentary rock
C metamorphic rock
D igneous rock
E unconsolidated sediment
F conglomerate
G sandstone
H siltstone
I claystone
J shale
K limestone or dolomite
L carbonate
M gneiss
N schist
O quartzite
P marble
Q skarn
R phyllite or slate
S felsic igneous
T intermediate igneous
U mafic igneous
V ultramafic igneous
W feldspathoidal
X chert or jasperoid
Y other

Structural setting (Ss)

A fracture/joint
B shear or fault
C other

Matrix (M)

A silica
B Fe/Mn
C carbonate
D clay
E other

Oxidation state (Os)

A oxidized
B partially oxidized
C unoxidized

Alteration (A)

A propylitic
B argillitic
C siliceous
D sericitic
E feldspathic
F other
G zeolitic
H iron/manganese
I supergene

Ore minerals (Om)

A base metals
B precious metals
C mixed base and precious metals
D other
E radioactive
F rare earths

Mineral deposit form (Mdf)

A vein
B replacement
C disseminated
D other
E magmatic segregation
F carbonatite
G greisen
H pegmatite
I contact metamorphic
J porphyry/stockwork
K massive sulfide
L lithophile metals in volcanic rocks
M stratiform
N sandstone uranium
O chemical sediments
P hot springs
Q placer
R residual

Geologic age of sample (Ga)

A Precambrian undifferentiated
B Early Precambrian
C Middle Precambrian
D Late Precambrian
E Paleozoic undifferentiated
F Cambrian
G Ordovician
H Silurian
I Devonian
J Mississippian
K Pennsylvanian
L Permian
M Mesozoic undifferentiated
N Triassic
P Jurassic
Q Cretaceous
R Tertiary undifferentiated
S Paleocene
T Eocene
U Oligocene
V Miocene
W Pliocene
X Quaternary undifferentiated
Y Pleistocene
Z Holocene

Mesh/sieve fraction (Ms)

A unknown, assumed to be -80 mesh
B identified as -80 mesh
C identified as -100 mesh
D identified as -120 mesh
E identified as -150 mesh
F identified as -200 mesh
G identified as -60 mesh
H identified as -40 mesh
I identified as -35 mesh
J identified as -30 mesh
K identified as -24 mesh
L identified as -20 mesh
M identified as -30+80 mesh

Sample description (Sd)

AL alluvium
AS ash
CL clay
CV colluvium
C pan or artificial concentrate
C1 concentrate, high magnetic fraction
C2 concentrate, moderate magnetic fraction
C3 concentrate, low or nonmagnetic fraction
GV gravel
GT grit
HS heavy sand
LO loess
MD mud
OZ ooze
SN sand
SD stream sediment
SI silt
TI till

Sample description (Sd3)

AN animal parts
CS combined split of heavy-mineral-concentrate
DM detrital magnetites
MS split of magnetite
NS non-magnetic split from heavy-mineral-concentrate
OA oxalic acid leachate
VG vegetation

Sample description (Sd4)

GD glacial debris
MT moss-trap-sediment sample
PT peat material
SP spruce

Sample description (Sd5)

MI mill tailings
MT moose pellets
WL willow leaves

Sample preparation (Sp1)

AD ashed
BR bromoform
GR ground

Sample preparation (Sp2)

FR Frantz isodynamic separator
PV pulverized

Sample preparation (Sp3)

FS fire assay PGE
HG hand ground
HM separated by hand magnet
RT split into red tops

Field treatment (Ft)

A air-dried
B sieved
C panned concentrate
D washed
E other

Lab/submitter comments (Cm)

HG high organic content
RS rock/soil survey
VG visible gold

Lat/lon precision (LL_precis)

A apparently accurate to nearest second
B apparently accurate to nearest minute
C apparently accurate to nearest degree

Information for monthly listing of USGS publications:

OF-95-625. Digital release of stream-sediment, heavy-mineral-concentrate, soil, and other geochemical data collected in the Nabesna 1 x 3 degree quadrangle, Alaska, by S.L. George. 1995. One 3-1/2 inch diskette.

Requirements: IBM PC or compatible computer; 3-1/2 inch, 1.44 Mb floppy disk drive; PC or MS DOS; software capable of importing dBase III .DBF files.