STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS

This report is preliminary and has not been edited or reviewed for conformity with Alaska Geological and Geophysical Surveys Standards.

May 1974

Alaska Open File Report 39

GEOCHEMISTRY OF PARTS OF THE BENDELBEN A-6, A-5, A-4, B-5, AND B-4, QUADRANGLES, ALASKA

By
T.K. Bundtzen

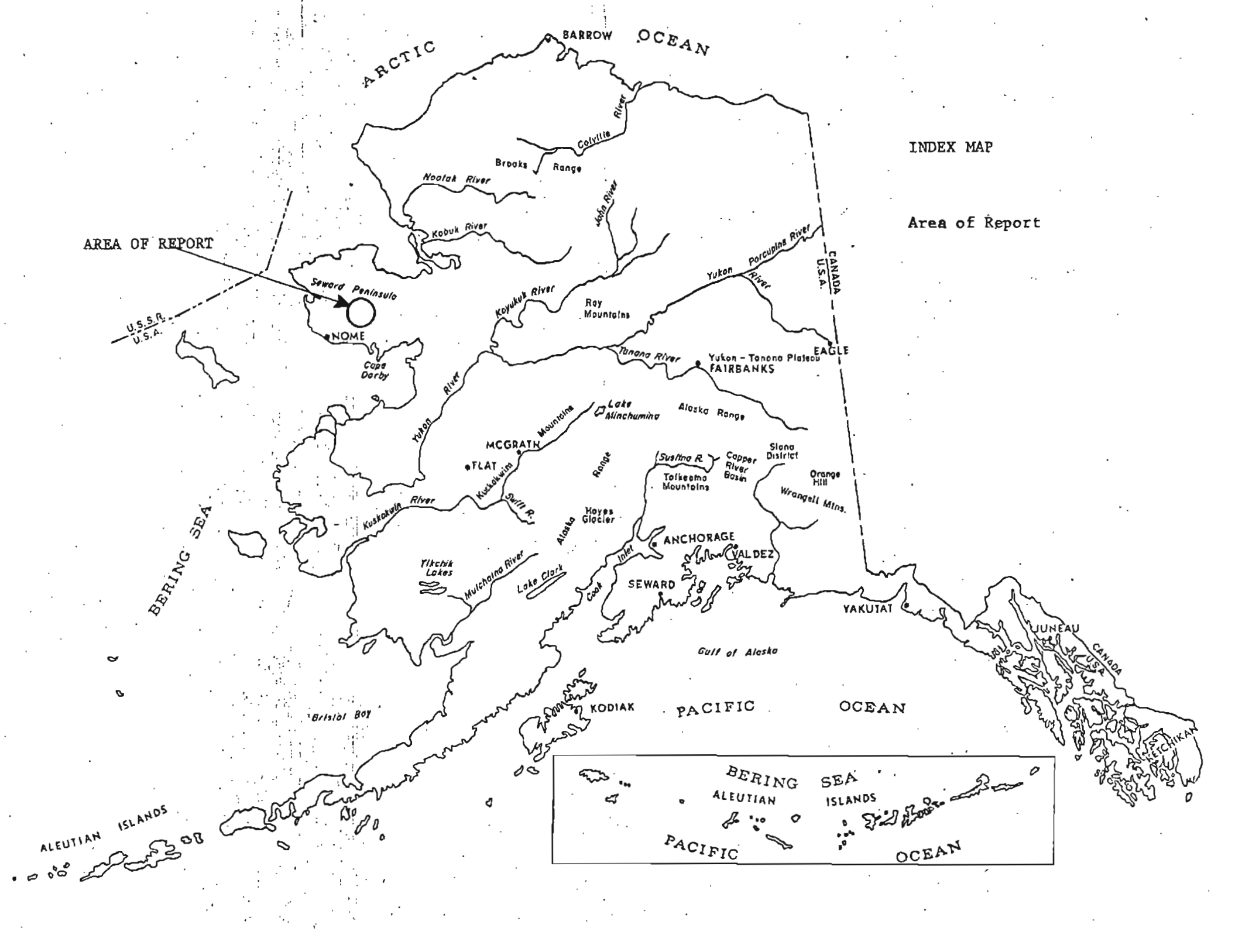

INDEX MAP
Area of Report
AREA OF REPORT
ARCTIC OCEAN
BARROW
Colville River
Brooks Range
Noatak River
Kobuk River
John River
Seward Peninsula
U.S.S.R.
U.S.A.
NOME
Cape Darby
Koyukuk River
Ray Mountains
Yukon River
Porcupine River
CANADA
U.S.A.
EAGLE
Tanana River
Yukon - Tanana Plateau
FAIRBANKS
Yukon River
Lake Minchumina
Alaska Range
MCGRATH
Mountains
FLAT
Kuskokwim
Range
Susitna R.
Copper River Basin
Slana District
Talkeetna Mountains
Orange Hill
Wrangell Mts.
Kuskokwim River
Swift R.
Alaska
Hayes Glacier
BERING SEA
ANCHORAGE
VALDEZ
Yikchik Lakes
Mulchatna River
Lake Clark
Inlet
Cook
SEWARD
YAKUTAT
JUNEAU
CANADA
U.S.A.
Gulf of Alaska
KODIAK
PACIFIC OCEAN
Bristol Bay
ALEUTIAN ISLANDS
BERING SEA
ALEUTIAN ISLANDS
PACIFIC OCEAN

TABLE OF CONTENTS

INTRODUCTION

During the months of June, July, and August of 1970 a two man party spent 61 days in the Bendeleben A-4, A-5, A-6, B-4 & B-5 Quadrangles collecting 742 stream sediment, rock samples and soil samples. Samples were collected by T.K. Bundtzen and J.T. Larsen. Labratory analysis of the 80 mesh fractions of the stream sediments revealed significant base metal anamolis.

PROCEDURES AND RESULTS

The anomalous values have been underlined in the tables and plotted on the location map. Anomalies were located by inspection of 1.) histogram plots 2.) continental crustal averages and 3.) the limitations of the analytical technique of that particular element. Only the Copper-Lead-Zinc anomalies analyzed by Atomic Absorption Spectrophotometry were plotted on the location map due to the analytical inferiority of the Copper-Lead-Zinc by Emission Spectrography in comparison to Atomic Absorption Spectrophotometry. Laboratory analysis of the Copper-Lead Zinc-Silver by Atomic Absorption was performed by Namok Veach and Donald R. Stein. Emissions Spectrography analysis was performed by T. C. Trible and T. K. Bundtzen at the Division Support Laboratories in College, Alaska.

It was felt that in addition to pointing out elemental anomalies from both the Emission Spectrograph and Atomic Absorption data, significant Base Metal concentrations should be emphasized with the use of appropriate arrows and lightly dashed-in areas. In the table of analyses, "NA" means not analyzed, and "ND" means that the element was looked for but not detected.

Key to Data Sheets

1. (numerals located on top of Data Sheets)

   The elements have been arranged into a hypothetical mineral association after Table 1. in Geologic Report #39 by Crawford E. Fritts, Division of Mines and Geology, 1970.

2. This is in reference to the active discharge of the stream.

3. Sample Location: (For application to Stream Sediments)

4. The organic content of the stream sediment is registered as: 1.) low = light gray with little organic content. 2.) medium = gray, mixed. 3.) high = black and organic rich.

5. Sediment size: F= fine sands and silt, M= medium to coarse sands, C= rock fragments and pebble sized material.

6. The sample description is shown as approximate percentages of rock types present in the stream bed (usually as Float). Underlined rock types indicate that a bedrock locality was found at or nearby the sample location. Quartz has been abbreviated to "Qtz" for convenience.

INTERVALS OF ESTIMATION AND DETECTION LIMITS SEMI QUANTITATIVE SPECTROGRAPHIC ANALYSES

Copper	Lead	Zinc	Molybedenum	Silver	Cobalt	Chromium
20,000	20,000	10,000	2,000	5,000	2,000	5,000
10,000	10,000	5,000	1,000	2,000	1,000	2,000
5,000	5,000	2,000	500	1,000	500	1,000
2,000	2,000	1,000	200	500	200	500
1,000	1,000	500	100	200	100	200
500	500	200	50	100	50	100
200	200	100	20	50	20	50
100	100		20			

Nickel	Manganese	Titanium	Iron	Magnesium	Calcium	Barium	Strontium
5,000	5,000	10,000	20%	10%	20%	5,000	5,000
2,000	2,000	5,000	10%	5%	10%	2,000	2,000
1,000	1,000	2,000	5%	2%	5%	1,000	1,000
500	500	1,000	2%	1%	2%	500	500
200	200	500	1%	0.5%	1%	200	200
100	100	200	0.5%	0.2%	0.5%	100	100
50	50	100	0.2%	0.1%	0.2%	50	50
20	20	50	0.1%	.05%	0.1%	20	
10					.05%		
5							

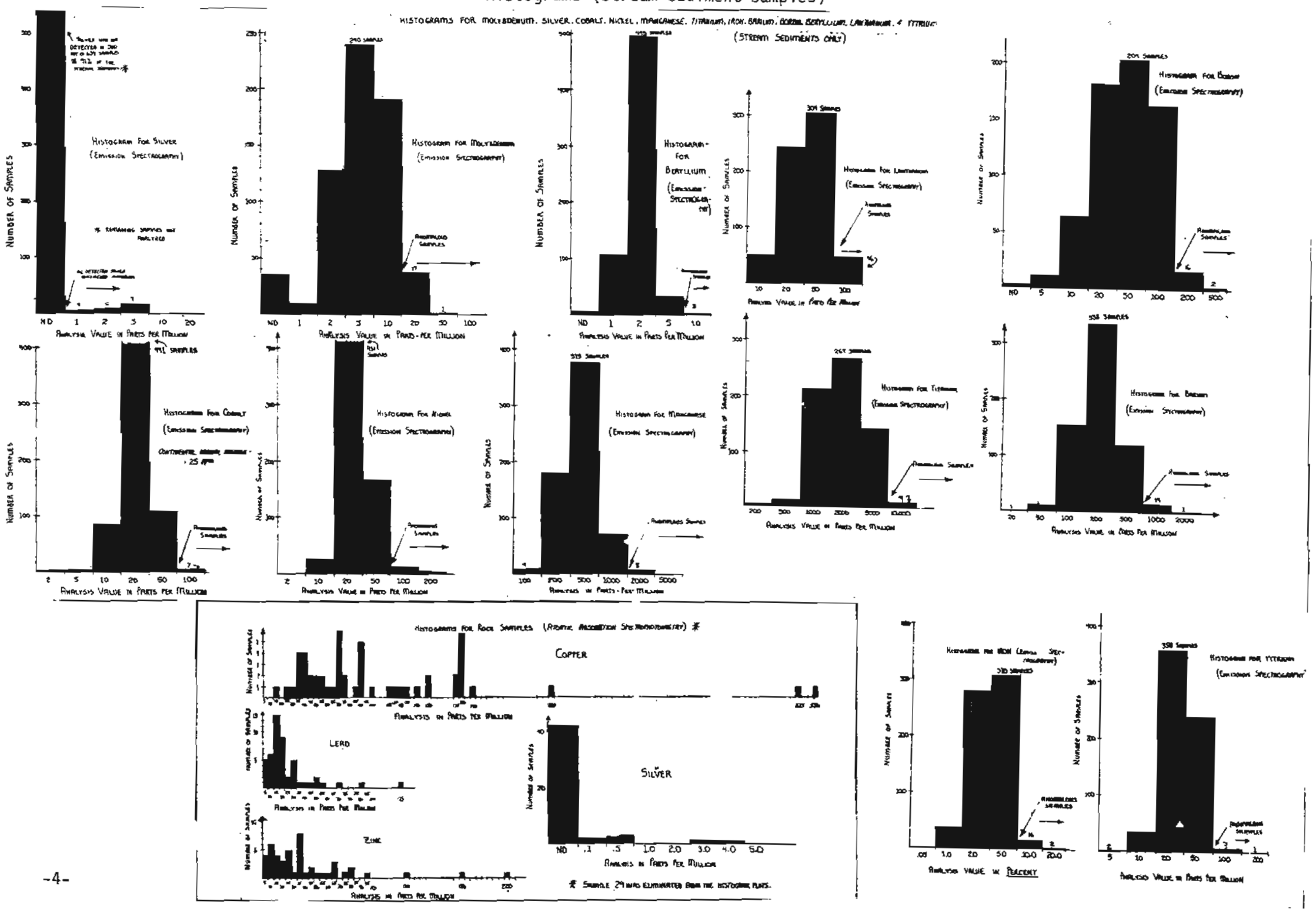
Boron	Beryllium	Tin	Tungsten	Zirconium	Lanthanum	Niobium
2,000	1,000	1,000	10,000	1,000	1,000	2,000
1,000	500	500	5,000	500	500	1,000
500	200	200	2,000	200	200	500
200	100	100	1,000	100	100	200
100	50	50	500	50	50	100
50	20	20	200	20	20	50
20	10	10	100		10	20
10	5		50			10
	2					
	1					

Scandium	Uitrium	Vanadium	Bismuth	Cadmium	Antimony	Arsenic
100	200	10,000	1,000	500	10,000	10,000
50	100	5,000	500	200	5,000	5,000
20	50	2,000	200	100	2,000	2,000
10	20	1,000	100	50	1,000	1,000
5	10	500	50	20	500	500
		200	20	10	200	200
		100	10	5	100	
		50	5		50	
		20				
		10				

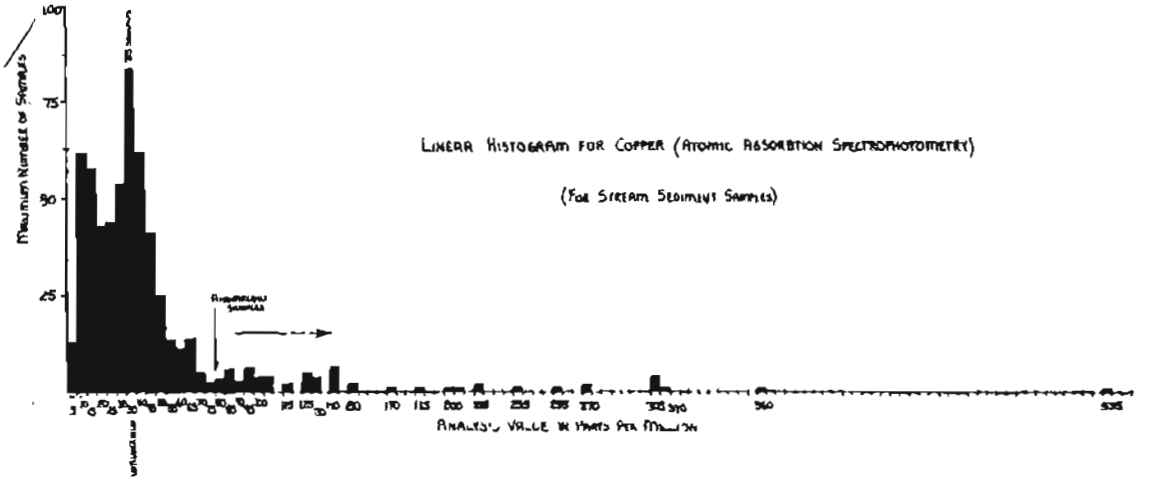
* All values are recorded in parts per million except those under Iron, Magnesium, and Calcium (which are in %).

Histograms (Stream Sediment Samples)

HISTOGRAMS FOR MOLYBDENUM, SILVER, COBALT, NICKEL, MANGANESE, TITANIUM, IRON, BARIUM, BORON, BERYLLIUM, LANTHANUM, & YTTRIUM (STREAM SEDIMENTS ONLY)

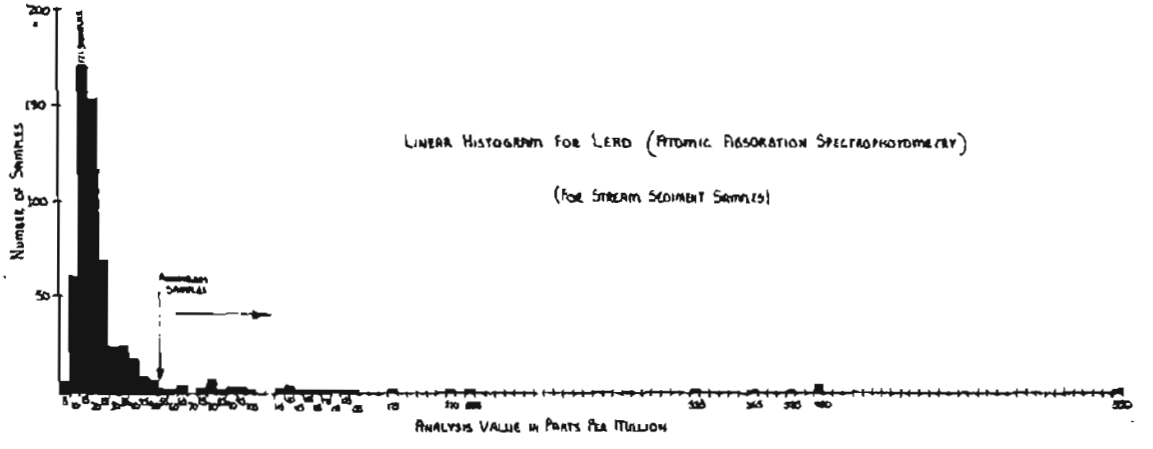


Histograms (Rock Samples)



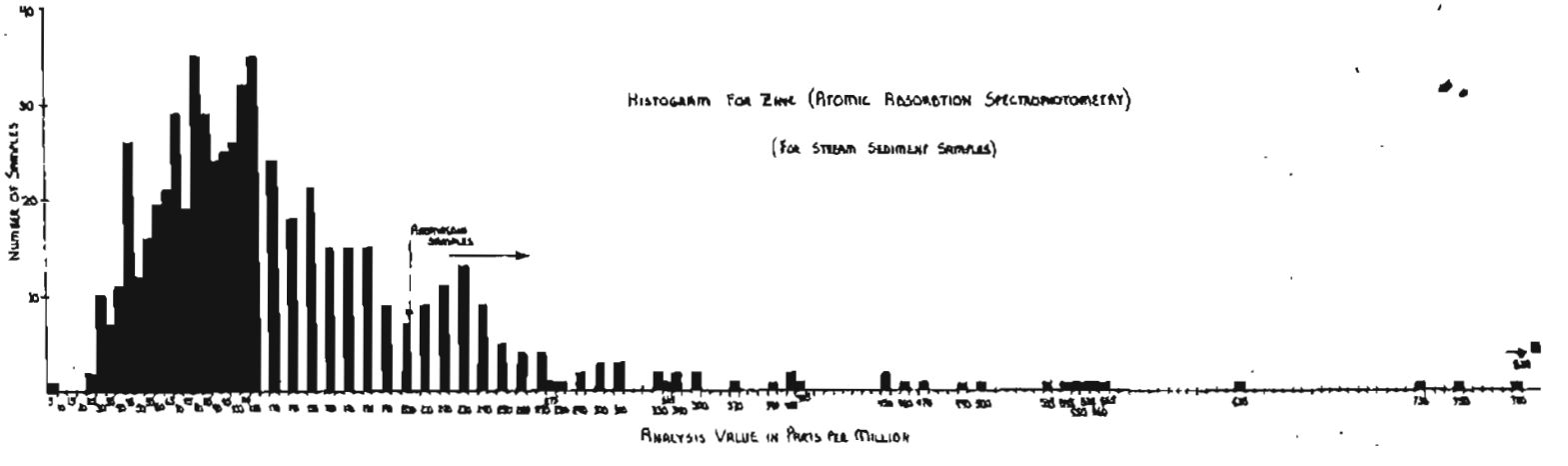
Linear Histogram for Copper (Atomic Absorption Spectrophotometry)

(For Stream Sediment Samples)



Linear Histogram for Lead (Atomic Absorption Spectrophotometry)

(For Stream Sediment Samples)



Histogram for Zinc (Atomic Absorption Spectrophotometry)

(For Stream Sediment Samples)

Plate VII

Data Sheet 6

Sample Type	Map Number	Field Number	Au (ppm)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Mo (ppm)	Ag (ppm)	Co (ppm)	Cr (ppm)	Ni (ppm)	Mn (ppm)	Ti (ppm)	Fe (%)	Mg (%)	Ca (%)	B (ppm)	Sr (ppm)	B (ppm)	Be (ppm)	Sn (ppm)	W (ppm)	Zr (ppm)	La (ppm)	Nb (ppm)	Sc (ppm)	Y (ppm)	V (ppm)	As (ppm)	Sb (ppm)	Bi (ppm)	Cd (ppm)	Au (ppm)
Soil Samples (-80 mesh fraction)	51	70J3501			15	10	15	20	15	40	10	ND	20	200	20	500	5000	2	.02	1	200	200	20	2	ND	100	50	20	10	50	20	ND	ND	ND	ND	ND
	52	70J3502			20	15	15	30	ND	58	5	ND	5	50	10	100	2000	1	.02	.05	100	100	10	2	ND	100	50	10	10	20	50	ND	ND	ND	ND	ND
	53	70J3503			20	15	25	70	20	76	20	ND	20	100	20	500	2000	2	.05	.05	100	100	20	2	ND	100	50	10	10	20	100	ND	ND	ND	ND	ND
	54	70J3504			20	20	20	ND	ND	ND	20	ND	20	100	20	200	5000	5	1	1	200	200	50	2	ND	200	200	20	20	20	50	ND	ND	ND	ND	ND
	55	70J3505			20	20	20	60	15	65	20	ND	20	50	20	200	5000	5	1	1	200	200	50	2	ND	200	200	20	20	20	50	ND	ND	ND	ND	ND
	56	70J3506			20	20	100	50	15	65	20	ND	20	100	20	500	5000	2	1	1	200	200	20	2	ND	100	200	20	20	20	50	ND	ND	ND	ND	ND
	57	70J3507			20	20	100	45	15	65	20	ND	20	50	20	200	5000	2	.05	1	100	100	20	2	ND	200	200	20	20	10	20	ND	ND	ND	ND	ND
	58	70J3508			20	20	100	20	ND	65	15	ND	20	100	20	200	5000	2	.05	.05	100	100	20	1	ND	100	200	20	20	10	20	ND	ND	ND	ND	ND
	59	70J3509			20	20	100	10	ND	58	10	ND	20	50	20	200	3000	2	.05	2	200	200	50	2	ND	100	200	20	20	5	10	ND	ND	ND	ND	ND
	510	70J3510			20	20	100	5	ND	65	20	ND	20	100	20	200	5000	5	.05	1	200	200	50	2	ND	200	200	20	20	5	20	ND	ND	ND	ND	ND
	511	70J3511			20	20	100	5	ND	65	10	ND	20	50	20	200	3000	2	.05	1	100	100	50	1	ND	100	200	20	10	10	20	ND	ND	ND	ND	ND
	512	70J3512			20	20	100	ND	ND	65	20	ND	20	200	50	500	5000	5	1	1	200	200	50	2	ND	200	200	20	20	10	20	ND	ND	ND	ND	ND
	513	70J3513			20	20	100	ND	ND	65	10	ND	20	100	50	500	5000	5	1	1	200	200	50	2	ND	200	100	20	20	20	50	100	ND	ND	ND	ND	ND
	514	70J3514			20	20	100	ND	ND	65	20	ND	20	200	50	500	5000	5	1	2	200	500	50	2	20	200	200	20	20	20	50	50	ND	ND	ND	ND	ND
	515	70J3515			20	20	70	5	ND	65	20	ND	20	100	20	500	5000	5	1	2	200	200	50	2	50	70	200	20	20	20	50	50	ND	ND	ND	ND	ND
	516	70J3516			20	20	100	5	ND	65	20	200	50	200	5000	5	2	5	200	200	20	2	10	200	200	20	20	10	20	50	50	ND	ND	ND	ND	ND
	517	70J3517			20	20	100	ND	ND	65	20	100	20	200	2000	5	1	1	200	100	20	2	50	200	200	20	20	10	20	50	50	ND	ND	ND	ND	ND
	518	70J3518			20	20	100	2	ND	65	15	100	20	200	2000	2	05	2	80	100	20	1	50	100	200	20	20	10	20	50	50	ND	ND	ND	ND	ND
	519	70J3519			20	20	100	5	ND	65	20	100	20	200	2000	2	05	2	100	200	50	2	50	100	200	20	20	10	20	50	50	ND	ND	ND	ND	ND
	520	70J3520			20	20	100	2	ND	65	15	50	20	200	2000	1	05	1	100	100	10	1	20	100	200	20	20	10	20	50	50	ND	ND	ND	ND	ND
	521	70J3521			20	20	100	2	ND	65	20	100	20	500	5000	5	2	2	200	200	50	2	50	200	200	20	20	10	20	50	50	ND	ND	ND	ND	ND
	522	70J3522			20	20	100	5	ND	65	50	200	50	500	5000	5	2	2	100	200	20	2	50	200	200	20	20	10	20	50	100	ND	ND	ND	ND	ND
	523	70J3523			20	20	100	ND	ND	65	10	100	20	100	2000	2	05	2	50	200	10	5	50	100	200	20	20	10	20	50	200	ND	ND	ND	ND	ND
	524	70J3524			20	20	100	ND	ND	65	20	100	20	500	1000	10	2	5	200	500	20	2	50	200	200	20	20	10	20	50	100	ND	ND	ND	ND	ND
	525	70J3525			20	20	100	ND	ND	65	10	50	20	100	5000	1	05	2	100	200	10	1	50	100	200	20	20	20	20	50	100	ND	ND	ND	ND	ND
	526	70J3526			20	20	100	2	ND	65	20	100	20	200	5000	5	1	1	200	200	20	2	50	200	200	20	20	20	20	50	100	ND	ND	ND	ND	ND
	527	70J3527			20	20	100	2	ND	65	10	50	20	200	5000	5	05	2	200	500	20	2	30	200	200	20	20	20	20	50	100	ND	ND	ND	ND	ND
	528	70J3528			20	20	100	5	ND	65	20	50	20	200	5000	2	05	2	200	500	20	1	50	100	200	20	20	10	20	50	100	ND	ND	ND	ND	ND
	529	70J3529			20	20	100	2	ND	65	10	50	20	200	2000	1	2	1	100	200	20	1	50	100	200	20	20	10	20	50	100	ND	ND	ND	ND	ND
	530	70J3530			20	20	200	2	ND	65	20	50	100	200	2000	2	05	1	500	100	50	1	50	100	200	20	10	5	10	20	100	ND	ND	ND	ND	ND
	531	70J3531			20	20	100	ND	ND	65	20	50	10	200	2000	2	05	1	200	100	50	ND	50	100	200	20	10	10	20	200	ND	ND	ND	ND	ND
	532	70J3532			20	20	100	ND	ND	65	50	50	50	200	5000	2	1	1	200	100	20	2	50	100	200	20	10	10	20	100	ND	ND	ND	ND	ND
	533	70J3533			20	20	100	ND	ND	65	50	100	20	100	5000	5	1	1	200	100	50	2	50	100	200	20	20	20	20	100	ND	ND	ND	ND	ND
	534	70J3534			20	20	100	5	ND	65	50	200	20	500	3000	5	2	05	500	100	500	10	50	100	200	20	20	20	20	100	ND	ND	ND	ND	ND
	535	70J3535			20	20	100	5	ND	65	50	50	20	200	2000	2	05	2	200	100	100	5	50	100	200	20	20	20	20	100	ND	ND	ND	ND	ND
	536	70J3536			20	20	100	2	ND	65	20	100	20	200	1000	2	05	2	200	100	100	5	50	100	200	20	10	10	20	50	ND	ND	ND	ND	ND	ND
	537	70J3537			20	20	100	2	ND	65	20	50	20	200	1000	5	2	05	500	100	50	5	50	100	200	20	10	10	20	50	ND	ND	ND	ND	ND	ND
	538	70J3538			20	20	100	16	ND	65	50	100	50	300	2000	5	1	1	1000	100	100	5	50	100	200	20	10	10	20	100	ND	ND	ND	ND	ND	ND
	539	70J3539			20	20	100	2	ND	65	20	100	20	200	1000	2	05	1	100	50	100	5	50	100	200	20	10	10	20	100	ND	ND	ND	ND	ND	ND
	540	70J3540			20	20	100	16	ND	65	20	100	20	300	1000	2	1	1	500	100	100	2	50	100	200	20	10	10	20	100	ND	ND	ND	ND	ND	ND
	541	70J3541			20	20	100	2	ND	65	20	50	20	200	1000	2	05	2	500	100	100	2	50	100	200	20	10	10	20	100	ND	ND	ND	ND	ND	ND
	542	70J3542			20	20	100	5	ND	65	20	100	10	500	1000	5	2	2	500	200	50	2	50	100	200	20	10	10	20	100	ND	ND	ND	ND	ND	ND
	543	70J3543			20	20	100	2	ND	65	20	50	20	300	1000	5	05	5	200	100	20	2	50	100	200	20	10	10	20	100	ND	ND	ND	ND	ND	ND
	544	70J3544			20	20	100	2	ND	65	10	100	10	300	1000	5	05	5	200	100	20	2	50	100	200	20	10	5	10	20	100	ND	ND	ND	ND	ND

Not Analyzed

Not Analyzed

Atomic Absorption Spectrophotometer

Semi-Quantitative Emission Spectrography

Important Heavy Metals

Basic and Ultrabasic Association

Carbonate Association

Granitic Association

Rare Earth Association

Gold-Antimony-Arsenic Association

Map Number	Sample Description
51	Soil Samples taken across tail of Bear Lobed Qtz. monzonite into pegmatite dikes. Tail samples were taken 6-12 inches deep in soil.
52	
53	
54	
55	
56	
57	
58	
59	
510	
511	
512	Soil Samples taken across gently defined slopes of metamorphic rocks. Limonite(?) in soil.
513	
514	
515	

Map Number	Sample Description
516	Soil Samples taken across and sampled slopes of intrusive & metamorphic rocks. Extensive Qtz. veining locally.
517	
518	
519	
520	
521	
522	
523	
524	
525	
526	Soil Samples of gently drained slope to supplement geochemical stream sediments.
527	
528	
529	
530	
531	Soil Samples primarily in dike system of felsic- to intermediate composition. Extensive Qtz. veining and fine sericite. Used to supplement rock geochem samples and stream sediment samples. Lower slopes are gently drained.
532	
533	
534	
535	
536	
537	Soil Samples taken on bedrock knobs and showing copper mineralization (float). Samples are locally limonitic.
538	
539	
540	
541	
542	
543	Soil Samples taken in limonite-rich calc-silicate terrain. Dolomite and fine sericite is prominent.
544	

Soil Samples taken 6-10-12 inches below the surface

References

Krauskopf, K. B., Introduction to Geochemistry; McGraw-Hill, 1967, p. 638 - 640.