UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

SAMPLE LOCALITY MAP AND RESULTS OF CARRIER DISTILLATION EMISSION SPECTROGRAPHIC ANALYSIS OF STREAM-SEDIMENT SAMPLES FROM THE CHANDLER LAKE QUADRANGLE, ALASKA

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Open-File Report 87-21

1987

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STUDIES RELATED TO AMRAP

The U.S. Geological Survey is required by the Alaskan National Interests Lands Conservation Act (Public Law 96-487, 1980), to survey certain Federal lands to determine their mineral resource potential. Results from the Alaskan Mineral Resource Appraisal Program (AMRAP) must be made available to the public and be submitted to the President and the Congress. This report presents analytical results of a geochemical survey of the Chandler Lake quadrangle, Alaska.

INTRODUCTION

In June and July, 1981, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the Chandler Lake 1° x 3° quadrangle and the western and central portion of the Killik River 1° x 3° quadrangle. This report presents the results of the samples from the Chandler Lake quadrangle.

The quadrangle comprises about 3,600 mi^2 in the north-central part of the Brooks Range. The area studied, approximately the western three-fourths of the southern or mountainous half of the quadrangle, is about 1,200 mi^2 in area. The area is about 250 mi northwest of Fairbanks. Access is by means of chartered aircraft from Bettles.

The southern boundary of the quadrangle is approximately along the Brooks Range divide. The core of the Brooks Range consists mostly of metamorphic and igneous rocks. North of this core of metamorphic and igneous rocks is a belt of intensely thrust-faulted sedimentary and minor mafic igneous rocks, which are mostly unmetamorphosed and are of Late Devonian to Triassic age. This belt covers approximately the southern third of the quadrangle. North of the mountains, the foothills of the Brooks Range consist of Cretaceous to Tertiary age deltaic rocks that were derived from the Brooks Range and prograded northward and eastward. These clastic rocks are deformed into long east-west trending anticlines and synclines and comprise the northern two-thirds of the quadrangle. The individual formations have been described in more detail by Brosgé and others (1979) and Mull and others (1982).

The topographic relief in the mountainous area is about 4,000 ft with a maximum elevation of 7,610 ft. All but the steeper slopes are covered with tundra and underlain by permafrost. The climate is arctic continental.

METHODS OF STUDY

Sample Media

Analyses of the stream-sediment samples represent the chemistry of the rock material eroded from the drainage basin upstream from each sample site. Such information is useful in identifying those basins which contain concentrations of elements that may be related to mineral deposits.

Sample Collection

Samples were collected at 153 sites (plate 1). At nearly all of those sites, both a stream-sediment and a heavy-mineral-concentrate sample were collected. All heavy-mineral-concentrate samples were lost in shipment to the laboratory. Sampling density was about 1 sample site per 8 mi^2. The area of the drainage basins sampled ranged from 2 mi^2 to 20 mi^2.

The stream-sediment samples consisted of active alluvium collected primarily from first-order (unbranched) and second-order (below the junction of two first-order) streams as shown on USGS topographic maps (scale = 1:250,000). Each sample was composited from several localities within an area that may extend as much as 25 ft from the site plotted on the map.

Sample Preparation

The stream-sediment samples were air dried, then sieved using 30-mesh stainless steel sieves. The portion of the sediment passing through the sieve was saved for analysis.

Sample Analysis

Spectrographic method

The stream-sediment samples were analyzed for 9 elements using a semiquantitative, carrier distillation emission spectrographic method (Barton, 1986). The elements analyzed and their lower limits of determination in parts per million are: Sb, 5; As, 20; Bi, 0.1; Cd, 1; Cu, 1; Pb, 2; Ag, 0.1; Sn, 0.1; and Zn, 2. Spectrographic results were obtained by visual comparison of spectra derived from the sample against spectra obtained from standards made from pure oxides and carbonates. Standard concentrations are geometrically spaced over any given order of magnitude of concentration as follows: 10, 5, 2, 1, and so forth. Samples whose concentrations are estimated to fall between those values are assigned values of 7, 3, 1.5, and so forth. Values determined are given in parts per million (micrograms/gram). Analytical data for stream-sediment samples from the Chandler Lake 1° x 3° quadrangle are listed in Table 1.

Other methods

These Chandler Lake stream-sediment samples were also analyzed for 31 elements by the emission spectrographic method of Grimes and Marranzino (1968) and for Au, Cu, Zn, Sb, Cd, and As by atomic absorption (Ward and others, 1969). These data, along with data from the adjacent Killik River quadrangle, are presented by Barton and others (1982).

ROCK ANALYSIS STORAGE SYSTEM

Upon completion of all analytical work, the analytical results were entered into a computer-based file called Rock Analysis Storage System (RASS). This data base contains both descriptive geological information and analytical data. Any or all of this information may be retrieved and converted to a binary form (STATPAC) for computerized statistical analysis or publication (VanTrump and Miesch, 1977).

DESCRIPTION OF DATA TABLE

Table 1 is arranged so that column 1 contains the USGS-assigned sample numbers along with a "CL" prefix for Chandler Lake and an "S" suffix to indicate a stream sediment. These numbers correspond to the numbers shown on the site location maps (plate 1). Columns for As, Sb, and Bi are not included in the table. These elements were sought but not detected in any samples. A letter "N" in the table indicates that a given element was looked for but not detected at the lower limit of determination for that element. If an element was observed but was below the lowest reporting value, a "less than" symbol (<) was entered in the tables in front of the lower limit of determination.

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TABLE 1.--SPECTROGRAPHIC ANALYSES OF STREAM-SEDIMENT SAMPLES, CHANDLER LAKE, ALA

[N, not detected; <, detected but below the limit of determination shown; >, determined to be greater than the value shown.]

Sample	LATITUDE	LONGITUD	CD-AG	CD-CD	CD-CU	CD-PB	CD-SN	CD-ZN
CL256S	68 5 37	151 46 5	N	N	100	7	.5	100
CL257S	68 2 47	151 53 50	N	N	70	2	N	5
CL258S	68 2 2	152 0 35	N	N	30	2	N	30
CL259S	68 1 35	152 13 0	<.10	1.5	50	15	.3	200
CL260S	68 1 55	152 43 0	<.10	N	50	10	N	30
CL261S	68 2 0	152 49 40	<.10	N	70	30	.5	70
CL264S	68 2 58	152 43 55	.10	2.0	100	15	1.0	300
CL265S	68 2 56	152 32 40	N	N	50	10	.7	100
CL266S	68 4 48	152 30 28	<.10	N	30	5	N	30
CL267S	68 2 50	152 27 3	.10	15.0	70	50	.3	1,000
CL268S	68 2 58	152 14 20	<.10	1.5	30	7	<.1	200
CL269S	68 1 30	151 45 0	<.10	1.0	50	5	.3	150
CL270S	68 0 58	151 38 28	<.10	N	30	5	N	20
CL271S	68 2 40	151 42 25	<.10	N	30	6	N	100
CL272S	68 3 45	151 41 15	<.10	N	30	5	N	30
CL273S	68 6 47	151 40 35	<.10	N	100	10	<.1	70
CL274S	68 3 0	151 28 30	<.10	N	30	3	N	20
CL275S	68 2 58	151 29 0	N	5.0	30	15	N	700
CL276S	68 3 32	151 29 59	<.10	1.5	30	5	N	200
CL277S	68 2 58	151 13 55	<.10	N	50	7	<.1	50
CL278S	68 3 38	151 7 18	N	N	70	10	.3	50
CL279S	68 3 15	150 53 58	N	N	70	10	.2	70
CL280S	68 5 18	151 0 40	N	N	50	2	N	15
CL281S	68 6 5	151 8 40	N	N	70	7	.2	50
CL282S	68 9 40	151 45 15	.10	1.0	30	7	.3	100
CL283S	68 13 32	151 38 25	.10	2.0	30	5	.1	150
CL284S	68 16 35	151 37 35	.10	1.0	10	<2	N	70
CL285S	68 13 52	151 47 32	.15	<1.0	150	7	.5	150
CL286S	68 14 32	151 55 0	.10	<1.0	70	5	.5	100
CL287S	68 14 30	152 4 50	N	N	70	10	1.5	100
CL288S	68 18 52	152 8 28	<.10	<1.0	70	7	.2	100
CL289S	68 15 33	152 14 10	.10	<1.0	10	<2	N	30
CL290S	68 14 32	152 17 25	N	N	70	7	.3	30
CL291S	68 14 48	152 18 10	N	N	50	7	.3	30
CL292S	68 16 45	152 24 42	N	N	70	10	.7	50
CL293S	68 20 20	152 26 8	.15	1.5	20	<2	N	30
CL294S	68 10 18	151 55 0	.20	2.0	30	2	<.1	100
CL295S	68 7 55	152 8 40	N	N	30	5	N	10
CL296S	68 8 30	152 16 15	N	N	70	7	<.1	30
CL297S	68 10 20	152 26 5	N	N	50	5	<.1	20
CL298S	68 11 33	152 6 15	N	N	70	10	<.1	50
CL299S	68 12 32	152 39 25	<.10	N	50	3	N	30
CL307S	68 3 3	151 55 10	<.10	N	70	7	.1	300
CL308S	68 1 35	151 53 25	N	N	70	5	.5	100
CL309S	68 1 25	151 58 55	N	2.0	70	20	.5	700

TABLE 1.--SPECTROGRAPHIC ANALYSES OF STREAM-SEDIMENT SAMPLES, CHANDLER LAKE, ALA--Continued

Sample	LATITUDE	LONGITUD	CD-AG	CD-CD	CD-CU	CD-PB	CD-SN	CD-ZN
CL310S	68 1 12	152 2 47	N	N	50	5	N	10
CL311S	68 1 10	152 16 0	N	N	70	10	2.0	50
CL312S	68 1 47	152 40 45	<.10	N	70	10	<.1	150
CL313S	68 1 48	152 47 2	<.10	N	50	7	N	20
CL314S	68 1 25	152 58 20	<.10	N	50	10	<.1	50
CL317S	68 3 2	152 40 0	<.10	1.5	50	10	<.1	200
CL318S	68 6 8	152 28 32	N	N	50	5	N	20
CL319S	68 6 0	152 26 25	N	N	50	5	N	30
CL320S	68 2 20	152 19 32	<.10	7.0	50	10	N	300
CL321S	68 3 20	151 46 25	N	N	50	5	N	20
CL322S	68 1 15	151 43 5	N	N	50	5	.5	30
CL323S	68 1 30	151 36 38	N	5.0	80	30	N	700
CL324S	68 1 15	151 36 25	<.10	N	70	50	.3	150
CL325S	68 5 18	151 37 3	<.10	N	50	5	N	20
CL326S	68 6 35	151 32 15	N	N	50	7	N	50
CL327S	68 6 10	151 23 10	N	N	50	7	.1	30
CL328S	68 3 15	151 17 52	N	N	50	5	N	30
CL329S	68 3 13	151 10 35	N	N	70	7	.1	70
CL330S	68 3 38	151 11 50	N	N	50	3	N	15
CL331S	68 2 18	150 58 25	N	N	70	10	.3	70
CL332S	68 2 20	150 59 25	N	N	50	10	<.1	100
CL333S	68 5 55	151 5 30	N	N	50	2	N	20
CL334S	68 6 0	151 11 50	N	N	50	3	N	20
CL335S	68 11 43	151 41 5	1.00	1.5	50	3	.1	200
CL336S	68 14 45	151 36 50	<.10	1.0	3	<2	N	50
CL337S	68 16 12	151 41 25	.15	1.5	30	2	.1	150
CL338S	68 13 57	151 49 35	.10	N	50	10	.3	100
CL339S	68 14 45	152 2 48	.50	7.0	30	3	N	300
CL340S	68 13 20	152 3 5	<.10	N	50	10	.5	100
CL341S	68 17 28	152 10 20	1.00	7.0	50	3	<.1	300
CL342S	68 15 20	152 18 5	.50	1.5	20	<2	N	50
CL343S	68 17 45	152 20 0	<.10	<1.0	20	7	.2	50
CL344S	68 20 33	152 22 2	<.10	N	30	7	.5	50
CL345S	68 9 33	151 55 0	N	N	50	10	.7	70
CL346S	68 7 35	152 6 35	N	N	50	10	.1	50
CL347S	68 7 55	152 10 15	N	N	30	5	N	5
CL348S	68 9 12	152 22 33	N	N	50	10	N	100
CL349S	68 10 43	152 30 35	N	N	100	7	<.1	50
CL350S	68 12 2	152 36 15	N	N	30	7	N	30
CL351S	68 8 47	152 39 45	N	N	30	10	N	20
CL352S	68 8 50	152 57 50	N	N	70	7	.3	30
CL353S	68 16 35	152 49 50	N	N	50	5	N	30
CL354S	68 18 25	152 40 30	N	N	30	2	N	20
CL355S	68 20 35	152 55 58	.10	N	70	7	.2	100
CL356S	68 22 48	152 52 10	.10	1.5	70	10	.2	150

TABLE 1.--SPECTROGRAPHIC ANALYSES OF STREAM-SEDIMENT SAMPLES, CHANDLER LAKE, ALA--Continued

Sample	LATITUDE	LONGITUDE	CD-AG	CD-CD	CD-CO	CD-PB	CD-SN	CD-ZN
CL357S	68 22 15	152 49 30	.10	1.0	50	5	<.1	100
CL358S	68 9 42	152 5 50	<.10	N	50	2	N	20
CL359S	68 10 20	152 15 15	N	N	70	5	<.1	50
CL360S	68 10 55	152 21 0	N	N	50	<2	<.1	7
CL361S	68 12 3	152 28 7	N	N	20	20	<.1	30
CL362S	68 6 2	152 43 32	<.10	1.0	30	50	N	50
CL363S	68 6 55	152 55 50	N	N	50	50	.1	50
CL364S	68 12 32	152 52 0	N	N	50	20	<.1	30
CL365S	68 13 20	152 45 35	<.10	N	50	50	N	30
CL366S	68 15 20	152 35 2	<.10	N	30	20	N	20
CL367S	68 15 40	152 30 50	N	N	50	100	.5	100
CL368S	68 19 30	152 16 0	.10	2.0	30	50	<.1	200
CL369S	68 13 12	151 27 38	<.10	N	50	70	.1	70
CL370S	68 15 20	151 27 12	<.10	N	30	20	N	5
CL371S	68 17 20	151 20 35	.10	<1.0	30	50	N	50
CL372S	68 18 22	151 41 8	.10	<1.0	10	<2	N	30
CL373S	68 14 53	151 46 42	1.50	10.0	20	<2	N	500
CL374S	68 18 5	151 50 32	.10	1.5	70	30	.2	100
CL375S	68 6 48	152 11 2	N	N	30	50	N	20
CL376S	68 4 35	152 14 1	N	N	50	30	<.1	30
CL377S	68 6 23	152 18 57	N	N	50	30	N	20
CL378S	68 4 25	151 52 56	N	N	70	70	.3	50
CL379S	68 8 32	151 27 30	.20	1.5	20	<2	N	70
CL380S	68 8 10	151 11 5	.10	<1.0	50	50	.1	100
CL381S	68 9 26	150 58 33	.20	1.0	20	<2	N	50
CL382S	68 15 7	151 13 52	.10	1.0	30	70	<.1	150
CL383S	68 12 11	151 15 28	.10	1.0	20	20	<.1	30
CL384S	68 14 0	151 16 0	<.10	N	50	5	N	150
CL385S	68 15 22	151 7 23	N	N	50	5	.2	50
CL386S	68 19 41	151 12 2	<.10	N	10	2	N	50
CL387S	68 19 58	150 56 32	.10	N	20	3	N	20
CL388S	68 15 57	151 0 54	N	N	30	5	<.1	30
CL389S	68 11 8	151 7 50	.50	2.0	20	2	<.1	150
CL390S	68 11 13	151 6 50	.10	N	70	3	.5	100
CL391S	68 14 8	150 53 32	N	N	30	2	N	10
CL392S	68 13 35	150 56 40	N	N	30	2	N	15
CL393S	68 12 36	150 56 0	<.10	N	20	2	<.1	30
CL394S	68 8 33	150 58 8	<.10	N	20	2	N	30
CL401S	68 16 0	152 48 50	N	N	70	3	<.1	30
CL402S	68 15 48	152 43 30	<.10	N	70	5	N	30
CL403S	68 18 35	152 48 45	N	N	70	7	.3	50
CL404S	68 19 35	152 55 0	<.10	<1.0	50	5	.1	70
CL405S	68 22 48	152 51 0	<.10	<1.0	50	5	.1	70
CL406S	68 25 20	152 50 0	N	N	50	3	N	50
CL407S	68 7 48	152 0 40	<.10	N	50	5	N	20

TABLE 1.--SPECTROGRAPHIC ANALYSES OF STREAM-SEDIMENT SAMPLES, CHANDLER LAKE, ALA--Continued

Sample	LATITUDE	LONGITUD	CD-AG	CD-CD	CD-CU	CD-PB	CD-SN	CD-ZN
CL408S	68 9 30	152 7 50	<.10	N	50	5	N	30
CL409S	68 10 45	152 18 35	N	N	70	7	<.1	50
CL410S	68 11 25	152 24 58	N	N	70	10	<.1	30
CL411S	68 7 33	152 33 55	<.10	N	20	3	N	15
CL412S	68 5 27	152 41 5	N	1.5	30	3	N	20
CL413S	68 5 57	152 46 20	<.10	1.5	50	5	N	30
CL415S	68 12 39	152 46 55	N	N	30	2	<.1	30
CL416S	68 14 8	152 39 5	N	N	30	2	<.1	20
CL417S	68 17 35	152 34 30	N	N	20	2	N	30
CL418S	68 19 29	152 18 15	.20	2.0	30	5	<.1	100
CL419S	68 11 50	151 29 18	.10	1.0	7	N	N	30
CL420S	68 14 13	151 27 10	<.10	<1.0	30	5	N	50
CL421S	68 16 27	151 22 15	N	N	30	2	N	20
CL422S	68 19 N	151 34 55	.10	<1.0	30	2	<.1	50
CL423S	68 17 20	151 44 10	<.10	<1.0	7	<2	N	50
CL424S	68 18 0	151 47 55	.50	5.0	30	<2	<.1	150
CL425S	68 23 0	151 55 25	<.10	1.0	10	<2	N	70
CL426S	68 23 12	151 57 7	<.10	1.0	10	N	N	50