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GEOCHEMICAL RECONNAISSANCE OF THE McCARTHY B-6 QUADRANGLE, ALASKA

By

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Open-file report

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This report is preliminary and has not been edited or reviewed for conformity with Geological Survey standards Geochemical reconnaissance of the McCarthy B-6 quadrangle, Alaska by G. R. Winkler, E. M. MacKevett, Jr., and James G. Smith

General summary

This report gives analyses of 10 altered zone, vein, and bedrock samples (table 1) and 15 stream-sediment samples (table 2) that have been analyzed for 30 elements by the six-step semiquantitative spectrographic method and for gold by the quantitative atomic absorption method. Locations of the samples are plotted on the accompanying generalized geological map (fig. 1). The samples were collected during 1967 in conjunction with geological mapping and related studies in the quadrangle. Despite the small number of samples, the analytical data should provide a framework for prospecting or for detailed geochemical sampling.

The McCarthy B-6 quadrangle includes part of the mountainous southern flank of the Wrangell Mountains and the lower reaches of the Kennicott Glacier in the northern one-third of its area and the extensive lowland of the Chitina Valley throughout its southern two-thirds. The physiography of the quadrangle strongly reflects glacier-related erosion and deposition. Bedrock exposures are confined to the mountainous upland and--much less extensively--to incised river valleys in the lowland. Quaternary surficial deposits, mainly of glaciofluvial and glaciolacustrine origin, mantle the lowland and are sporadically distributed in the upland.

The exposed bedrock consists of upper Paleozoic metamorphic rocks (restricted to a small area near the mouth of the Nizina River);

a thick Cretaceous sedimentary sequence, chiefly mudstone, shale, and sandstone, of shallow marine origin; upper Tertiary felsic hypabyssal rocks, mainly sills; a small stock of upper Tertiary intermediate intrusive rocks; and a few mafic dikes of Tertiary or Quaternary age. The Cretaceous rocks locally are baked and hardened near the Tertiary plutons. The generalized distribution of rock units is shown on figure 1. A detailed geological map of the McCarthy B-6 quadrangle by MacKevett and Smith is in final preparation.

Most of the altered zones are localized along steeply dipping faults in the upland, generally in or adjacent to Tertiary intrusive rocks. The altered zones range from less than a foot to about 20 feet in thickness. The quartz-rich veins, which also are proximal to Tertiary plutons, are between two and six inches thick. The bedrock samples represent Tertiary felsic or intermediate intrusive rocks from the northern part of the quadrangle. The large glaciernourished trunk streams that traverse the southern part of the quadrangle were not sampled for stream sediments for two reasons: time limitations, and the ambiguous interpretative value of analyses of sediment samples from such an environment.

Many of the altered zone, vein, and bedrock samples revealed anomalous concentrations of metals. Most of the anomalous values are minor, but several may be significant and even some of the lesser anomalous values may be useful in suggesting areas for further exploration. The most notable anomalies include: copper, 2,000 ppm (parts per million); silver, 7 ppm; arsenic, 5,000 ppm; gold, 0.4 ppm; and

molybdenum, 50 ppm. The stream-sediment samples showed only a few minor anomalies, generally in boron, copper, or zinc.

In summary, the limited analytical data indicate that the areas near Tertiary plutons in the northern part of the quadrangle may merit exploration.

Procedures and treatment of data

The analyzed altered zone samples (table 1) include leached and discolored bedrock, fault gouge, and vein material. A descriptive list of altered zone samples follows table 1.

Standard procedures were followed in the collection and preparation of stream-sediment samples. Generally the samples were collected from the active stream channel; often, however, high-water deposits immediately adjacent to the active channel were collected. The samples were dried, sieved, and only the finer than 80 mesh (Tyler) fraction was analyzed (table 2).

The analytical data is given in percent or in parts per million (ppm). The precision of any single reported value is approximately plus 100 percent or minus 50 percent.

Table 1.--Analyses of altered zone samples from the McCarthy B-6 quadrangle, Alaska

[Analyses by semiquantitative spectrographic methods, except for Au which was analyzed by quantitative atomic absorption methods. Analyses reported to the nearest number in the series 1, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, and so forth. N = not detected; L = detected but below limit of determination; - = no analysis. Semiquantitative determinations by E. L. Moiser and D. J. Grimes. Atomic absorption analyses by W. L. Campbell, M. S. Rickard, and R. B. Tripp. Looked for, but not detected: Bi, Cd, Mo, Sb, Sn, W, and Zn. Exceptions: Bi, 15 ppm, in Mk325; Mo, 50 ppm, in Mk298; Sb, 100 ppm, in Mk116, and less than 100 ppm in Mk325; W, less than 50 ppm in Mk325; Zn, 500 ppm, in Mk325. Sample locations are shown in figure 1.]

Lab. No.	<u> </u>	Per	cent		Parts per million								Field			
ACI-	Fe	Mg	Ca	Tí	Mn	Ag	As	Au	В	Ba	Be	Со	Cr	Cu	La	
066	7	7	10	0.15	1500		1500		15	200	N	15	100	30	N	Mk116
067	3	0.3	0.2	0.2	500	L	500	-	20	300	1	N	N	20	50	118
142	5	0.5	- 20	0.15	N	N	N	-	20	1000	1	10	20	100	20	264
157	3	1.5	0.3	0.5	N	Ň	N	0.02	20	1000	L	5	70	100	20	288
158	5	0.7	0.05	0.5	N	L	N	0.04	L	700	N	7	100	150	20	298
169	3	0.7	1.5	0.3	200	2	200	0.2	L	200	L	15	50	300	N	322
170	1.5	0.7	1.5	0.15	L	L	L	0.06	N	200	L	10	20	200	N	323
171	1.5	1	1.5	0.5	5000	7	5000	0.4	10	150	L	10	30	150	20	325
080	15	5	10	0.7	N	N	N		50	300	L	70	300	150	N	S1223A
081	20	3	2	0.2	N	1.5	N	. –	N	100	L	70	500	2000	N	227
	· · .		<u></u>		Limi	t of	determ	ination	l							
	0.05	0.02	0.05	0.001	10	0.5	200	0.02	10	5	1	5	5	5	20	
	Lab. No. ACI- 066 067 142 157 158 169 170 171 080 081	Lab. No. ACI- Fe 066 7 067 3 142 5 157 3 158 5 169 3 170 1.5 171 1.5 080 15 081 20 0.05	Lab. Per No. ACI- Fe Mg 066 7 7 067 3 0.3 142 5 0.5 157 3 1.5 158 5 0.7 169 3 0.7 170 1.5 0.7 171 1.5 1 080 15 5 081 20 3 0.05 0.02	Lab. Percent No. ACI- Fe Mg Ca 066 7 7 10 067 3 0.3 0.2 142 5 0.5 20 157 3 1.5 0.3 158 5 0.7 0.05 169 3 0.7 1.5 170 1.5 0.7 1.5 171 1.5 1 1.5 080 15 5 10 081 20 3 2 0.05 0.02 0.05	Lab. Percent No. ACI- Fe Mg Ca Ti 066 7 7 10 0.15 067 3 0.3 0.2 0.2 142 5 0.5 20 0.15 157 3 1.5 0.3 0.5 158 5 0.7 0.05 0.5 169 3 0.7 1.5 0.3 170 1.5 0.7 1.5 0.3 170 1.5 1 1.5 0.5 080 15 5 10 0.7 081 20 3 2 0.2 0.05 0.02 0.05 0.001	Lab. No. ACI-Percent FeMgCaTiMn06677100.15150006730.30.20.250014250.5200.15N15731.50.30.5N15850.70.050.5N16930.71.50.32001701.50.71.50.15L1711.511.50.55000080155100.7N08120320.2NLimi0.050.020.050.001	Lab. No. ACI-PercentFeMgCaTiMnAg06677100.151500L06730.30.20.2500L14250.5200.15NN15731.50.30.5NN15850.70.050.5NL16930.71.50.15LL1701.50.71.50.15LL1711.511.50.550007080155100.7NN08120320.2N1.5Limit of	Lab. No. ACI-PercentMnAgAs06677100.151500L150006730.30.20.2500L50014250.5200.15NNN15731.50.30.5NNN15850.70.050.5NLN16930.71.50.320022001701.50.71.50.15LLL1711.511.50.5500075000080155100.7NNN08120320.2N1.5NLimit of determ:	Lab. No. ACI- Percent Mn Ag As Au 066 7 7 10 0.15 1500 L 1500 - 066 7 7 10 0.15 1500 L 1500 - 067 3 0.3 0.2 0.2 500 L 500 - 142 5 0.5 20 0.15 N N N - 157 3 1.5 0.3 0.5 N N N 0.02 158 5 0.7 0.05 0.5 N L N 0.04 169 3 0.7 1.5 0.15 L L L 0.06 171 1.5 1 1.5 0.5 5000 7 5000 0.4 080 15 5 10 0.7 N N - Limit of determination 0.05<	Lab. No. ACI-PercentParts $Mcl.$ FeMgCaTiMnAgAsAuB06677100.151500L1500-1506730.30.20.2500L500-2014250.5200.15NNN-2015731.50.30.5NNN0.022015850.70.050.5NLN0.04L16930.71.50.320022000.2L1701.50.71.50.15LLL0.06N1711.511.50.55000750000.410080155100.7NNN-5008120320.2N1.5N-NLimit of determination	Lab. No. ACI- Percent Mm Ag As Au B Ba 066 7 7 10 0.15 1500 L 1500 - 15 200 066 7 7 10 0.15 1500 L 1500 - 15 200 067 3 0.3 0.2 0.2 500 L 500 - 20 300 142 5 0.5 20 0.15 N N N - 20 1000 157 3 1.5 0.3 0.5 N N N 0.02 20 1000 158 5 0.7 0.05 0.5 N L N 0.04 L 700 169 3 0.7 1.5 0.15 L L L 0.06 N 200 171 1.5 1 1.5 55 5000 7	Lab. No. ACI- Percent Parts per million Mo. ACI- Fe Mg Ca Ti Mn Ag As Au B Ba Be 066 7 7 10 0.15 1500 L 1500 - 15 200 N 066 7 7 10 0.15 1500 L 1500 - 15 200 N 066 7 7 10 0.15 1500 L 1500 - 15 200 N 066 7 7 10 0.15 N N N - 20 300 1 142 5 0.5 20 0.15 N N N - 20 1000 L 157 3 1.5 0.3 200 2 200 0.2 L 200 L 170 1.5 0.7 1.5 0.15 <td< td=""><td>Lab. No. ACI- Percent Parts per million $MCI-$ Fe Mg Ca Ti Mn Ag As Au B Ba Be Co 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 066 7 7 10 0.15 N N N - 20 100 1 N 142 5 0.5 20 0.15 N N N 0.02 1000 L 5 158 5 0.7 0.5 0.3 200 2 200 0.2 L 200 L 15<!--</td--><td>Lab. No. ACI- ACI- Percent Parts per million 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 067 3 0.3 0.2 0.2 500 L 500 - 20 300 1 N N 142 5 0.5 20 0.15 N N N - 20 1000 1 10 20 157 3 1.5 0.3 0.5 N N N 0.02 20 1000 L 5 70 158 5 0.7 1.5 0.3 200 2 200 0.2 L 200 L 15 50 170 1.5 0.7 1.5 0.5</td><td>Lab. No. ACI- Percent Parts per million MCI- ACI- Fe Mg Ca Ti Mn Ag As Au B Ba Be Co Cr Cu 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 30 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 30 066 7 7 10 0.15 N N N - 20 300 1 N N 20 142 5 0.5 20 0.15 N N N 0.02 20 1000 1 5 70 100 158 5 0.7 1.5 0.3 200 2 200 0.2 L 200 L 15 50 300</td><td>Lab. No. ACI- ACI- Percent Ti Mn Ag As Au B Ba Be Co Cr Cu La 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 30 N 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 30 N 067 3 0.3 0.2 0.2 500 L 500 - 15 200 N 15 100 30 N 067 3 0.3 0.2 0.2 500 L 500 - 20 1000 1 N N 20 20 100 20 100 20 150 20 169 3 0.7 1.5 0.3 200 2 200 0.2 L 10 20</td></td></td<>	Lab. No. ACI- Percent Parts per million $MCI-$ Fe Mg Ca Ti Mn Ag As Au B Ba Be Co 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 066 7 7 10 0.15 N N N - 20 100 1 N 142 5 0.5 20 0.15 N N N 0.02 1000 L 5 158 5 0.7 0.5 0.3 200 2 200 0.2 L 200 L 15 </td <td>Lab. No. ACI- ACI- Percent Parts per million 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 067 3 0.3 0.2 0.2 500 L 500 - 20 300 1 N N 142 5 0.5 20 0.15 N N N - 20 1000 1 10 20 157 3 1.5 0.3 0.5 N N N 0.02 20 1000 L 5 70 158 5 0.7 1.5 0.3 200 2 200 0.2 L 200 L 15 50 170 1.5 0.7 1.5 0.5</td> <td>Lab. No. ACI- Percent Parts per million MCI- ACI- Fe Mg Ca Ti Mn Ag As Au B Ba Be Co Cr Cu 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 30 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 30 066 7 7 10 0.15 N N N - 20 300 1 N N 20 142 5 0.5 20 0.15 N N N 0.02 20 1000 1 5 70 100 158 5 0.7 1.5 0.3 200 2 200 0.2 L 200 L 15 50 300</td> <td>Lab. No. ACI- ACI- Percent Ti Mn Ag As Au B Ba Be Co Cr Cu La 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 30 N 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 30 N 067 3 0.3 0.2 0.2 500 L 500 - 15 200 N 15 100 30 N 067 3 0.3 0.2 0.2 500 L 500 - 20 1000 1 N N 20 20 100 20 100 20 150 20 169 3 0.7 1.5 0.3 200 2 200 0.2 L 10 20</td>	Lab. No. ACI- ACI- Percent Parts per million 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 067 3 0.3 0.2 0.2 500 L 500 - 20 300 1 N N 142 5 0.5 20 0.15 N N N - 20 1000 1 10 20 157 3 1.5 0.3 0.5 N N N 0.02 20 1000 L 5 70 158 5 0.7 1.5 0.3 200 2 200 0.2 L 200 L 15 50 170 1.5 0.7 1.5 0.5	Lab. No. ACI- Percent Parts per million MCI- ACI- Fe Mg Ca Ti Mn Ag As Au B Ba Be Co Cr Cu 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 30 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 30 066 7 7 10 0.15 N N N - 20 300 1 N N 20 142 5 0.5 20 0.15 N N N 0.02 20 1000 1 5 70 100 158 5 0.7 1.5 0.3 200 2 200 0.2 L 200 L 15 50 300	Lab. No. ACI- ACI- Percent Ti Mn Ag As Au B Ba Be Co Cr Cu La 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 30 N 066 7 7 10 0.15 1500 L 1500 - 15 200 N 15 100 30 N 067 3 0.3 0.2 0.2 500 L 500 - 15 200 N 15 100 30 N 067 3 0.3 0.2 0.2 500 L 500 - 20 1000 1 N N 20 20 100 20 100 20 150 20 169 3 0.7 1.5 0.3 200 2 200 0.2 L 10 20

Field No.	Lab.	Parts per million									
	ACI-	Nb	Ni _.	РЪ	Sc	Sr	V	Y	Zr	NO.	
Mk116	066	L	70	10	7	1000	70	L	20	Mk116	
118	067	10	5	L	L	150	20	15	300	118	
264	142	L	20	10	10	500	70	20	30	264	
288	157	L	30	10	15	200	100	15	100	288	
298	158	\mathbf{L}	20	10	15	100	200	15	150	298	
322	169	L	20	70	7	500	70	10	100	322	
323	170	\mathbf{L}	20	N	7	100	70	10	L	323	
325	171	L	30	150	7	150	70	15	150	325	
Sj223A	080	L	150	L	20	200	200	20	50	Sj223	
227	081	L	300	L	10	150	50	10	30	227	
			Limi	t of a	deter	ninatio	n				
·······		10	2	10	5	50	10	10	20		

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Description of altered zone samples given in table 1

(All samples are grab samples of representative material unless otherwise noted. Sample locations are plotted on the accompanying map, figure 1.)

F	i	e	1	d	No.	

Description

- Mk116 Altered zone approximately 4 feet wide that parallels Tertiary felsic dikes.
- Mk118 Altered zone approximately 20 feet wide in Tertiary felsic intrusive rocks.
- Mk264 Altered fault gouge zone approximately 15 feet wide in Cretaceous shale.
- Mk288 Iron-stained fault zone in Cretaceous shale.
- Mk298 Altered fault zone approximately 1¹/₂ feet wide in Tertiary felsic porphyritic intrusive rocks.
- Mk322 Selected sample of altered Tertiary intermediate intrusive rock.
- Mk323 Selected sample of quartz vein approximately 6 inches wide within Tertiary intermediate intrusive rocks.
- Mk325 Selected sample of quartz vein approximately 2 inches wide within Tertiary intermediate rocks.
- Sj223A Selected sample of altered Tertiary felsic intrusive rock.
- Sj227 Altered zone approximately 6 inches wide in Tertiary felsic intrusive rocks.

Table 2.--Analyses of stream-sediment samples from the McCarthy B-6 quadrangle, Alaska

[Analyses by semiquantitative spectrographic methods, except for Au which was analyzed by quantitative atomic absorption methods. Analyses reported to the nearest number in the series 1, o.7, 0.5, 0.3, 0.2, 0.15, 0.1, and so forth. N = not detected; L = detected but below limit of determination. Semiquantitative determinations by K. J. Curry. Atomic absorption analyses by A. L. Meier, R. A. Miller, and T. A. Roemer. Looked for, but not detected: Ag, As, Bi, Cd, Mo, Sb, Sn, and W. Sample locations are shown in figure 1.]

Field No. Lab. No.	ab. No.	Percent			Parts per million												Field		
		Fe	Mg	Ca	Ti	Mn	Au	B	Ba	Ве	u Co	Cr	Cu	La	Nb	Ni	РЪ	MO.	
Sj248s	ACF 3	89	7	1.5	1.5	0.7	1000	L	50	1000	1.5	15	100	70	20	L	30	10	S1248s
249s	3	90	7	1.5	0.5	0.7	700	L	70	1000	1	15	100	100	L	10	50	10	ັ249ຄ
250s	3	91	7	2	1.5	0.7	700	L	70	1500	1	15	200	100	20	L	70	15	250a
251s	· 3	92	7	2	2	0.5	700	L	50	1000	L	15	100	70	L	L	30	15	251s
252s	3	93	7	2	3	0.7	700	L	30	700	L	15	150	30	\mathbf{L}	L	30	L	252s
253s	3	94	7	2	0.7	0.5	1500	L	100	700	L	20	150	70	N	L	50	20	253:
254s	3	95	5	1.5	2	0.5	700	L	30	500	L	15	150	30	L	L	30	15	2548
255s	3	96	7	3	3	1	1000	L	15	500	L	20	300	100	L	L	70	10	2558
256s	3	97	10	2	3	1	1500	L	50	700	L	20	200	70	L	L	50	15	2568
257s	3	98	1.5	1	10	0.15	150	L	70	700	N	N	100	30	N	L	30	L	257 s
258s	3	99	5	1.5	7	0.7	500	L	100	1000	1	10	150	70	20	10	50	15	258s
259s	4	00	7	1.5	1.5	0.7	700	L	100	700	L	20	200	30	L	10	50	15	2598
260s	ACI 9	51	10	1.5	0.7	0.7	700	L	70	700	L	20	200	70	L	10	70	15	260s
261s	9	52	7	1.5	0.3	0.7	700	L	70	1000	1	15	150	50	20	15	30	15	261s
262s	9	53	5	0.7	3	0.5	700	L	150	700	L	10	100	30	L	10	30	10	2628
						Limi	t of	dete	ermin	ation	*			<u> </u>				·	<u></u>
			0.05	0.02	0.05	0.001	10	0.0)2 1	.0 5	1	5	5	5	20	10	2	10	

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Field No.	ī ah	No	P	Parts per million								
	LaD.	NO.	Sc	Sr	V	Y	Zn	Zr	NO.			
Sj248s	ACF	389	15	300	150	15	L	150	Sj248:			
249s		390	15	150	150	15	L	150	249			
250s		391	15	300	150	15	L	200	250			
251s		392	15	300	150	15	L	150	251:			
252s		393	20	300	200	15	L	100	252:			
25 3 s		394	20	150	200	20	300	150	253			
254s		395	15	150	100	10	N	100	254			
255s		396	20	700	200	15	L	100	255			
256s		397	20	200	300	30	L	100	256			
257s		398	7	1500	70	20	N	30	257			
258s		399	20	700	200	20	L	150	258			
259s		400	20	150	200	15	L	150	259			
260s	ACI	951	20	150	300	15	L	150	260			
261s		952	20	150	200	15	L	150	261			
262s		953	10	300	150	15	L	200	262			
		I	Limit o	of dete	rmina	tion			······			
<u></u> ,			5	50	10	10	200	20				

Table 2.--Analyses of stream-sediment samples from the McCarthy B-6 quadrangle, Alaska--Continued

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