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Analyses of Selected Rock Samples from the  
Lime Peak Area, Circle C-6 Quadrangle, Alaska

BY

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Introduction

Analytical data for 270 rock samples from the Lime Peak area, Circle C-6 quadrangle, Alaska, are presented in Table 1 and the sample locations are shown on plate 1. The samples were collected primarily by W.D. Menzie, B.L. Reed, H.L. Foster and G.W. Cushing during June 1984 as part of an investigation of the geology of tin occurrences near Lime Peak.

The Lime Peak area is mostly underlain by granitic rocks that intrude the grit, quartzite and argillite unit (PzpCgq) of Foster and others (1983). As described by Menzie and others (1986) the main rock types present in the area are (1) coarse-grained equigranular biotite granite, (2) porphyritic biotite granite with a fine-grained groundmass, (3) quartz-feldspar porphyry, (4) intermediate dike rocks, (5) quartzose country rocks which are hornfelsed adjacent to the pluton and (6) rocks which have been intensely hydrothermally altered. Table 1 of this report presents analyses of samples of these six rock types and for miscellaneous samples including intrusive breccia, limestone and veins. Assignment of rocks to one of the six types was based upon hand-specimen identification and field relationships. Table 2 presents the number of samples and summary statistics, the median, lower quartile and upper quartile, for selected elements for each rock type. The rock samples analyzed were mostly 5-kg grab samples. Analytical results of other rock samples from the Lime Peak area are presented in Foster and others (1984) and Burton and others (1985).

Preparation and methods of analyses

The rock samples were crushed to -6.35 mm using a chipmunk crusher. The crushed rock was split with a Jones splitter and ground to -150 mesh using a vertical pulverizer with ceramic plates. Samples were analyzed by a six-step, DC-arc semiquantative emission spectrographic method described by Grimes and Marranzino (1968) and 31 elements were determined. All samples were analyzed in the laboratories of the Branch of Exploration Geochemistry, U.S. Geological Survey. The analysts was S.J. Sutley.

Reporting of data

Iron, magnesium, calcium and titanium values are reported in percent; all others are reported in parts per million (ppm).

Semiquantitative spectrographic analyses are reported as the approximate midpoints of geometric class intervals whose boundaries are 1, 0.7, 0.5, 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc. The corresponding midpoints are 1, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of a reported value is approximately plus or minus one reporting step or interval at 68 percent confidence and two reporting steps or intervals at 95 percent confidence (Motooka and Grimes, 1976). The approximate lower limits of determination for those elements reported in percentage are iron, 0.05; magnesium, 0.02; calcium, 0.05; and titanium, 0.002; for those elements reported in parts per million, manganese, 10; silver, 0.5; arsenic, 200; gold, 10; boron, 10; barium, 20; beryllium, 1; bismuth, 10; cadmium, 20; cobalt, 5; chromium, 10; copper, 5; lanthanum, 20; molybdenum, 5; niobium, 20; nickel, 5; lead, 10; antimony, 100; scandium, 5; tin, 10; strontium, 100; thorium, 100; vanadium, 10; tungsten, 50; yttrium, 10; zinc, 200; and zirconium, 10.

Samples in table 1 are grouped by rock type. Each sample is listed by sample number which can be used to locate the sample on plate 1.

#### Discussion of results

The samples in the present report provide a basis for interpretation of results of stream sediment surveys and of geologic mapping. Because the data are based upon hand specimen identification of grab samples, caution should be exercised in the interpretation of results. For example, it is evident from the data in table 1 that some of the samples of porphyritic biotite granite and quartz-feldspar porphyry are mineralized and therefore are probably hydrothermally altered. Such samples might be more appropriately grouped with the intensely altered rocks. Nevertheless the median values of the elements (see table 2) are unlikely to be influenced by such samples and therefore provide a basis for interpretation. As described by Menzie and others (1986) the Lime Peak pluton is composed of two main phases: (1) an early coarse-grained equigranular biotite granite, and (2) a later chiefly porphyritic biotite granite with a fine-grained groundmass. The quartz-feldspar porphyries may represent a minor third phase. The data presented in this report support this interpretation. The three types of granitic rocks show a progressive enrichment in B, Be, Nb and Sn. The intermediate dikes show an enrichment in a number of major (Mg, Ca, Ti, and Mn) and trace elements (Co, Cr, Sc, Sr, and V) which reflect their more mafic composition. The hornfels are enriched in B, Bi, Co, Cu, Ni, and V. The enrichment of the hornfels and country rocks in boron suggests that some of the volatiles associated with the granitic rocks escaped into the surrounding country rocks. The intensely altered rocks are enriched in Fe, Mn, Ag, B, Be, Cu, Pb, Sn, and Zn.

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Table 1.--Analyses of selected rock samples from the Lime Peak area, Circle C-6 quadrangle, Alaska. Analyses given in parts per million for all elements except Fe, Mg, Ca, and Ti which are given in percent. Zeros to the right of the decimal point may or may not be significant. N, element not detected; G, element detected at a level greater than the amount indicated; L, element detected at a level less than the amount indicated at the top of the table.

Coarse-grained Equigranular Biotite Granite

	(.85)	(.82)	(.81)	(.85)	(.887)	(19)	(.5)	(288)	(18)	Au	(16)	(20)	(1)	(10)	(28)	(5)	(12)	(5)	(28)	(5)	(28)	La	(5)	(28)	Mo	(28)	(5)	(18)	(18)	Pb	(18)	Sb	(5)	(18)	(10)	(100)	Sr
	Fe Z	Hg Y	Ca Y	Ca Y	Ti Y	Mn	Ag	As	Au	B	Ba	Be	Bi	Cd	Co	Cr	Cu	(5)	(28)	La	(5)	(28)	Nb	(5)	(28)	Ni	(5)	(18)	Pb	(18)	Sb	(5)	(18)	(10)	(100)	Sr	
4FR0016A	0.7	0.47	0.85	0.85	0.85	200	N	N	N	10	70	5	N	N	N	N	N	N	100	N	L	L	L	N	N	N	20	20	N	N	N	5	L	L	L	L	
4FR0031D	2	0.1	0.1	0.15	0.15	300	N	N	N	10	300	2	N	N	N	N	N	N	100	N	20	20	20	N	N	N	20	20	N	N	N	10	15	15	N	N	
4FR0032A	1.5	0.07	0.3	0.07	0.07	180	N	N	N	700	L	30	N	N	N	N	N	N	300	N	L	L	L	N	N	N	20	20	N	N	N	5	10	10	N	N	
4FR0043A	1	0.05	0.1	0.03	0.03	200	N	N	N	20	70	3	N	N	N	N	N	N	70	N	L	L	L	N	N	N	15	15	N	N	N	5	10	10	N	N	
4FR0043B	1	0.03	0.07	0.1	0.1	200	N	N	N	15	100	3	N	N	N	N	N	N	100	N	L	L	L	N	N	N	20	20	N	N	N	5	10	10	N	N	
4FR0044A	0.2	0.05	L	0.07	0.07	300	N	N	N	10	500	2	N	N	N	N	N	N	100	N	L	L	L	N	N	N	70	70	N	N	N	5	L	L	L	L	
4FR0060	3	0.3	2	0.2	0.2	1000	N	N	N	15	100	1	N	N	N	N	N	N	500	N	30	30	30	N	N	N	15	15	N	N	N	10	N	N	N	N	
4FR0064A	1.5	0.15	L	0.3	0.3	150	L	N	N	10	500	1	N	N	N	N	N	N	100	N	L	L	L	N	N	N	15	15	N	N	N	10	N	N	N	N	
4FR00641A	1	0.07	0.2	0.03	0.03	700	N	N	N	L	150	10	N	N	N	N	N	N	100	N	L	L	L	N	N	N	30	30	N	N	N	5	L	L	L	L	
4W20016A	2	0.05	0.1	0.1	0.1	200	N	N	N	10	L	5	N	N	N	N	N	N	100	N	L	L	L	N	N	N	20	20	N	N	N	7	L	L	L	L	
4W20025A	0.5	0.05	0.1	0.05	0.05	100	N	N	N	15	20	1.5	N	N	N	N	N	N	70	N	L	L	L	N	N	N	30	30	N	N	N	L	L	L	L	L	

V	(1951)	M	(1953)	Y	(1962)	Z	(1972)	(1981)	Y	(1990)	En
1		N	70	83	N	N	58	27	N	N	N
2		N	70	83	N	N	70	27	N	N	N
3		N	202	83	N	N	70	27	N	N	N
4		N	54	83	N	N	70	27	N	N	N
5		N	27	83	N	N	101	27	N	N	N
6		N	22	83	N	N	81	27	N	N	N
7		N	301	83	N	N	601	27	N	N	N
8		N	76	83	N	N	81	27	N	N	N
9		N	87	83	N	N	81	27	N	N	N
10		N	88	83	N	N	81	27	N	N	N

7





(10)	(50)	(10)	(200)	(10)	(200)	(10)	(100)	(100)	Th
Y	M	Y	Zn	Y	Zn	Y	Zr	Th	
L	100	100	K	100	K	100	100	K	K
N	150	150	K	150	K	150	150	K	K
L	150	150	K	150	K	150	150	K	K
N	50	50	K	50	K	50	50	K	K
L	100	100	K	100	K	100	100	K	K
L	50	50	K	50	K	50	50	K	K
L	10	10	K	10	K	10	10	K	K
L	50	50	K	50	K	50	50	K	K
15	50	50	K	50	K	50	50	K	K
L	200	200	K	200	K	200	200	K	K
N	100	100	K	100	K	100	100	K	K
10	70	70	K	70	K	70	70	K	K
M	100	100	K	100	K	100	100	K	K
M	150	150	K	150	K	150	150	K	K
L	150	150	K	150	K	150	150	K	K
L	100	100	K	100	K	100	100	K	K
L	70	70	K	70	K	70	70	K	K
L	200	200	K	200	K	200	200	K	K
L	50	50	K	50	K	50	50	K	K
N	30	30	K	30	K	30	30	K	K
N	100	100	K	100	K	100	100	K	K
C	30	30	K	30	K	30	30	K	K
L	70	70	K	70	K	70	70	K	K
10	70	70	K	70	K	70	70	K	K
L	50	50	K	50	K	50	50	K	K
10	50	50	K	50	K	50	50	K	K
N	70	70	K	70	K	70	70	K	K
N	200	200	K	200	K	200	200	K	K
N	150	150	K	150	K	150	150	K	K
N	100	100	K	100	K	100	100	K	K
L	200	200	K	200	K	200	200	K	K
10	100	100	K	100	K	100	100	K	K
10	100	100	K	100	K	100	100	K	K
L	70	70	K	70	K	70	70	K	K
L	50	50	K	50	K	50	50	K	K
12	50	50	K	50	K	50	50	K	K
N	50	50	K	50	K	50	50	K	K
N	50	50	K	50	K	50	50	K	K
N	150	150	K	150	K	150	150	K	K
N	15	15	K	15	K	15	15	K	K
N	15	15	K	15	K	15	15	K	K
N	15	15	K	15	K	15	15	K	K
N	150	150	K	150	K	150	150	K	K
N	70	70	K	70	K	70	70	K	K
N	20	20	K	20	K	20	20	K	K
N	150	150	K	150	K	150	150	K	K
N	100	100	K	100	K	100	100	K	K
N	100	100	K	100	K	100	100	K	K



(10)	(50)	(10)	(200)	(10)	(101)	(101)	(100)	(101)	(100)
1	N	30	N	70	N	70	N	70	N
2	N	70	35Z	100	N	100	N	100	N
3	N	70	N	100	N	100	N	100	N
4	N	100	N	100	N	100	N	100	N
5	N	100	N	70	N	70	N	70	N
6	N	100	200	100	N	100	N	100	N
7	N	100	N	100	N	100	N	100	N
8	N	100	N	300	N	300	N	300	N
9	N	100	N	70	N	70	N	70	N
10	N	100	N	42	N	42	N	42	N
11	N	100	N	100	N	100	N	100	N
12	N	100	N	100	N	100	N	100	N
13	N	100	N	100	N	100	N	100	N
14	N	100	N	100	N	100	N	100	N
15	N	100	N	100	N	100	N	100	N
16	N	100	N	100	N	100	N	100	N
17	N	100	N	100	N	100	N	100	N
18	N	100	N	100	N	100	N	100	N
19	N	100	N	100	N	100	N	100	N
20	N	100	N	100	N	100	N	100	N
21	N	100	N	100	N	100	N	100	N
22	N	100	N	100	N	100	N	100	N
23	N	100	N	100	N	100	N	100	N
24	N	100	N	100	N	100	N	100	N
25	N	100	N	100	N	100	N	100	N
26	N	100	N	100	N	100	N	100	N
27	N	100	N	100	N	100	N	100	N
28	N	100	N	100	N	100	N	100	N
29	N	100	N	100	N	100	N	100	N
30	N	100	N	100	N	100	N	100	N
31	N	100	N	100	N	100	N	100	N
32	N	100	N	100	N	100	N	100	N
33	N	100	N	100	N	100	N	100	N
34	N	100	N	100	N	100	N	100	N
35	N	100	N	100	N	100	N	100	N
36	N	100	N	100	N	100	N	100	N
37	N	100	N	100	N	100	N	100	N
38	N	100	N	100	N	100	N	100	N
39	N	100	N	100	N	100	N	100	N
40	N	100	N	100	N	100	N	100	N
41	N	100	N	100	N	100	N	100	N
42	N	100	N	100	N	100	N	100	N
43	N	100	N	100	N	100	N	100	N
44	N	100	N	100	N	100	N	100	N
45	N	100	N	100	N	100	N	100	N
46	N	100	N	100	N	100	N	100	N
47	N	100	N	100	N	100	N	100	N
48	N	100	N	100	N	100	N	100	N
49	N	100	N	100	N	100	N	100	N
50	N	100	N	100	N	100	N	100	N

(.05) Fe Z	(.02) Hg Z	(.05) Ca Z	(.002) Ti I	(10) Mn	(.5) Ag	(200) As	(10) Au	(10) B	(20) Ba	(1) Be	(10) Bi	(20) Cd	(5) Co	(20) Cu	(20) La	(5) Mo	(20) Nb	(5) Ni	(10) Pb	(100) Sb	(5) Se	(10) Sn	(100) Sr
4FR0039E	5	6.07	1.5	0.5	1000	N	N	L	200	L	N	N	30	30	N	N	N	20	15	N	20	N	200
4FR0052A	5	3	1	0.3	1500	N	N	10	500	N	N	N	10	10	100	S	30	100	50	N	10	70	1500
4FR0062	3	2	2	0.5	1500	N	N	50	500	L	N	N	L	L	30	R	N	20	N	N	20	N	300
4FR0063B	3	2	1	0.3	500	N	N	L	500	L	N	N	L	L	200	N	N	10	10	N	N	N	200
4FR0064C	3	2	1.5	0.3	1500	N	N	N	300	1	N	N	7	7	N	N	N	15	L	N	20	N	5
4FR0064B	3	1.5	1	0.2	1000	N	N	15	300	3	N	N	10	10	N	N	N	10	L	N	15	N	200
4FR015E	3	0.7	1.5	0.3	300	N	N	L	100	1	N	N	50	50	100	N	N	15	15	N	20	N	300
4FR016C	3	0.05	1	0.3	300	N	N	L	300	L	N	N	10	10	N	N	N	15	20	N	20	N	300
4FR017B	3	3	2	0.5	200	N	N	N	500	L	N	N	7	7	50	N	N	20	20	N	20	N	500
4FR0037B	5	2	2	0.5	1000	N	N	L	150	1.5	N	N	7	7	N	N	N	N	50	N	20	20	300

(18)	(55)	(131)	(782)	(131)	(181)	(181)	(181)
Y	N	Y	U	Z	U	Z	U
70	N	38	N	100	N	100	N
58	N	29	385	70	N	70	N
100	N	50	N	100	N	100	N
100	N	38	N	70	N	70	N
100	N	50	N	70	N	70	N
100	N	70	N	70	N	70	N
100	N	33	L	70	N	70	N
100	N	50	L	100	N	100	N
100	N	70	N	70	N	70	N
100	N	15	N	100	N	100	N



(10)	(9)	(8)	(7)	(6)	(5)	(4)	(3)	(2)	(1)
Y	N	Y	L	N	L	N	L	N	L
100	L	30	L	100	L	100	L	100	L
100	N	50	N	100	N	100	N	100	N
150	N	50	L	150	L	150	L	150	L
100	N	30	N	100	N	100	N	100	N
100	N	30	L	100	L	100	L	100	L
20	N	10	L	300	L	300	L	300	L
50	N	20	N	200	N	200	N	200	N
70	N	30	N	200	N	200	N	200	N
50	N	10	N	100	N	100	N	100	N
L	N	100	N	70	N	70	N	70	N
70	N	15	N	70	N	70	N	70	N
20	N	20	N	200	N	200	N	200	N
100	N	30	N	200	N	200	N	200	N
70	N	30	L	70	L	70	L	70	L
70	N	30	N	150	N	150	N	150	N
100	N	30	N	100	N	100	N	100	N
100	N	30	N	100	N	100	N	100	N
50	N	10	N	300	N	300	N	300	N
N	N	L	N	100	N	100	N	100	N
100	N	20	N	100	N	100	N	100	N
50	N	L	N	100	N	100	N	100	N
1000	N	15	N	150	N	150	N	150	N

## Intensely Altered Rocks

Sample ID	Fe I	Fe II	Ca 2	Ti 2	Mn	Ag	Zn	Au	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Zn	Mo	Ni	Pb	Sb	Sc	Sr
4AR0001A	3	0.07	L	0.07	1900	1.5	H	N	1600	50	2	10	N	N	N	5	100	K	M	100	K	10	70
4AR0001B	5	0.07	L	0.05	1500	3	H	N	10	70	10	10	N	N	N	200	150	M	N	500	N	10	700
4AR0001C	5	0.05	L	0.15	1600	N	N	N	10	100	5	100	N	N	N	L	100	M	N	20	N	10	70
4AR0001D	2	0.1	L	0.07	500	1	N	N	50	100	7	L	L	N	N	100	150	M	N	100	N	7	50
4AR0001E	3	0.15	L	0.05	700	2	N	N	70	50	7	10	L	N	N	150	200	M	N	100	N	5	100
4AR0001F	5	0.1	L	0.1	1000	10	N	N	10	150	5	30	L	N	N	300	100	M	N	300	N	3	50
4AR0001G	5	0.15	L	0.05	1500	3	N	N	50	30	7	10	L	N	N	150	150	M	N	100	N	7	100
4AR0001H	7	0.1	L	0.15	2000	L	N	N	10	100	3	N	L	N	N	150	150	M	N	200	N	7	100
4AR0001I	2	0.05	L	0.2	700	0.5	N	N	10	100	7	N	L	N	N	L	30	M	N	20	N	5	20
4AR0001J	2	0.05	L	0.1	1500	L	N	N	50	L	5	10	N	N	N	100	100	M	N	100	N	7	50
4AR0001K	1.5	0.07	L	0.05	500	0.7	N	N	10	70	1.5	50	L	N	N	L	100	M	N	150	N	5	15
4AR0001L	3	0.1	L	0.07	1500	5	N	N	30	L	10	50	N	N	N	150	200	M	N	100	N	7	100
4AR0001M	3	0.1	L	0.05	2000	1.5	700	N	30	L	3	15	N	N	N	100	100	M	N	100	N	5	100
4AR0001N	3	0.05	L	0.05	1000	30	N	N	200	L	1	50	N	N	N	70	100	M	N	200	N	5	150
4AR0001O	3	0.07	L	0.07	2000	1.0	N	N	50	L	1	300	N	N	N	500	30	M	N	300	N	5	100
4AR0001P	3	0.07	L	0.07	3000	30	N	N	20	L	2	1000	N	N	N	700	20	M	N	1500	N	7	100
4AR0001Q	5	0.1	L	0.05	3000	5	700	N	50	L	1.5	70	L	N	N	150	150	M	N	200	N	7	100
4AR0001R	5	0.03	L	0.015	1500	5	L	N	15	50	5	30	L	N	N	100	100	M	N	200	N	L	5000
4AR0001S	7	0.02	N	0.015	300	L	L	N	10	L	2	N	N	N	N	50	50	M	N	200	N	L	500
4AR0001T	10	0.05	L	0.1	2000	3	N	N	20	100	3	15	L	N	N	100	100	M	N	150	N	10	70
4AR0001U	5	0.07	L	0.02	5000	20	N	N	20	L	3	300	L	N	N	100	100	M	N	200	N	15	100
4AR0001V	5	0.07	L	0.1	1500	0.7	N	N	50	20	5	10	L	N	N	30	100	M	N	100	N	7	50
4AR0001W	5	0.07	L	0.1	5000	10	N	N	50	20	7	10	L	N	N	100	150	M	N	200	N	7	100
4AR0001X	5	0.07	L	0.1	5000	7	N	N	50	L	7	10	L	N	N	50	100	M	N	200	N	7	100
4AR0001Y	5	0.05	N	0.07	5000	30	N	N	70	50	5	20	L	N	N	50	150	M	N	300	N	10	150
4AR0001Z	5	0.05	L	0.02	5000	0.7	N	N	15	20	5	15	L	N	N	30	100	M	N	150	N	5	50
4AR00020	2	0.07	L	0.05	3000	20	N	N	30	30	5	10	L	N	N	50	100	M	N	200	N	5	50
4AR00021	1.5	0.05	L	0.05	3000	3	N	N	30	200	3	10	L	N	N	50	100	M	N	200	N	7	100
4AR00022	5	0.07	L	0.05	2000	7	N	N	30	70	5	15	L	N	N	20	100	M	N	200	N	5	100
4AR00023	5	0.07	L	0.05	2000	5	N	N	30	70	5	15	L	N	N	20	100	M	N	200	N	5	100
4AR00024	5	0.07	L	0.05	2000	10	N	N	70	70	5	15	L	N	N	20	100	M	N	200	N	5	100
4AR00025	3	0.05	L	0.05	3000	3	N	N	50	L	5	15	L	N	N	50	150	M	N	200	N	7	100
4AR00026	2	0.07	L	0.05	2000	2	N	N	20	20	5	10	L	N	N	20	100	M	N	200	N	5	100
4AR00027	3	0.05	L	0.02	1000	2	N	N	15	20	5	15	L	N	N	30	100	M	N	150	N	5	50
4AR00028	2	0.07	L	0.05	3000	0.7	N	N	30	200	5	10	L	N	N	50	100	M	N	200	N	5	50
4AR00029	1.5	0.05	L	0.05	2000	3	N	N	30	200	7	10	L	N	N	20	100	M	N	200	N	7	100
4AR00030	5	0.07	L	0.05	2000	5	N	N	30	70	5	15	L	N	N	20	100	M	N	200	N	5	100
4AR00031	5	0.07	L	0.05	2000	5	N	N	30	70	5	15	L	N	N	20	100	M	N	200	N	5	100
4AR00032	5	0.07	L	0.05	2000	10	N	N	70	L	5	15	L	N	N	50	100	M	N	200	N	5	100
4AR00033	5	0.07	L	0.05	2000	3	N	N	50	L	5	15	L	N	N	50	150	M	N	200	N	7	100
4AR00034	5	0.07	L	0.05	2000	5	N	N	50	L	5	15	L	N	N	50	150	M	N	200	N	7	100
4AR00035	3	0.07	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	7	100
4AR00036	3	0.07	L	0.05	2000	2	N	N	20	20	5	10	L	N	N	50	150	M	N	200	N	5	100
4AR00037	3	0.05	L	0.07	2000	7	N	N	30	70	5	15	L	N	N	20	100	M	N	200	N	5	100
4AR00038	3	0.05	L	0.05	2000	5	N	N	50	L	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00039	2	0.07	L	0.05	2000	5	N	N	50	L	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00040	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00041	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00042	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00043	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00044	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00045	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00046	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00047	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00048	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00049	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00050	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00051	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00052	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00053	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00054	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00055	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00056	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00057	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00058	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00059	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00060	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00061	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00062	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00063	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00064	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00065	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00066	3	0.05	L	0.05	2000	5	N	N	50	150	5	15	L	N	N	50	150	M	N	200	N	5	100
4AR00067	3	0.05	L	0.05	2000																		



(10)	(54)	(10)	(200)	(12)	(100)
Y	N	Y	Zn	Tr	Tb
L	N	70	200	100	N
L	N	70	500	100	N
L	N	100	200	150	N
L	N	70	1500	150	N
L	N	150	2000	70	N
L	N	50	1500	70	N
L	N	100	3000	100	N
L	N	50	1000	100	N
L	N	70	1000	100	N
L	N	70	700	100	N
L	N	70	700	100	N
L	N	50	500	100	N
L	N	70	200	150	N
L	N	70	200	150	N
L	N	50	300	100	N
L	N	100	500	100	N
L	N	5	200	30	N
L	N	70	1000	70	N
L	N	15	2000	10	N
L	N	100	1000	20	N
L	N	30	500	70	N
L	N	50	300	200	N
L	N	70	700	200	N
L	N	50	500	100	N
L	N	50	1000	70	N
L	N	70	300	70	N
L	N	100	500	200	N
L	N	50	500	70	N
L	N	20	150	150	N
L	N	100	700	150	N
L	N	50	200	100	N
L	N	50	700	300	N
L	N	50	500	70	N
L	N	70	700	70	N
L	N	100	300	100	N
L	N	50	500	100	N
L	N	30	500	100	N
L	N	70	700	100	N
L	N	20	100	100	N
L	N	50	100	100	N
L	N	50	500	100	N
L	N	30	300	100	N
L	N	30	500	100	N
L	N	70	500	200	N
L	N	50	500	30	N
L	N	100	300	100	N

Intensely Altered Rocks

(.85) Fe Z	(.82) Mg Z	(.85) Ca Z	(.86Z) Si Z	(.88) Th	(.83) Ag	(288) As	(.88) Au	(.88) B	(28) Ba	(.88) Be	(.88) Bi	(28) Cd	(.85) Co	(.88) Cr	(.85) Cu	(28) La	(.85) Mo	(28) Nb	(.85) Ni	(.88) Pb	(188) Sb	(.85) Se	(.88) Sn	(108) Sr	
44R0013P	0.1	L	0.07	2666	50	N	N	38	28	2	56	L	N	N	188	188	18	L	N	504	N	5	364	N	
44R0013B	0.07	0.5	0.015	2666	28	N	N	28	L	2	56	L	N	N	188	34	28	L	N	504	N	5	164	N	
44R0013R	7	0.1	0.1	2666	2	N	N	N	N	1	L	L	N	N	164	158	K	L	N	364	N	5	154	N	
44R0013S	0.5	N	L	766	0.7	N	N	N	N	L	N	N	N	N	38	N	N	N	N	104	N	N	N	74	N
44R0013T	16	0.07	0.07	3666	1	N	N	18	N	2	K	K	N	N	154	168	N	N	N	104	N	5	1004	N	
44R0013A	5	0.07	0.15	1506	1.5	N	N	15	78	1.5	L	58	N	N	589	288	K	L	N	504	N	5	504	N	
44R0016A	3	0.05	0.01	1666	L	N	N	L	158	5	N	N	N	N	15	N	7	L	N	15	N	7	50	L	
44R0016B	5	0.07	0.07	2666	2	N	N	L	58	5	N	N	N	N	58	188	N	L	N	766	N	18	188	N	
44R0016C	5	0.02	0.015	2666	N	N	N	18	58	5	N	N	N	N	7	N	N	L	N	14	N	18	50	N	
44R0016D	5	0.05	0.01	2666	N	N	N	78	38	18	N	N	N	N	7	58	N	L	N	14	N	18	76	N	
44R0017C	1.5	0.05	0.05	506	0.5	N	N	38	158	5	N	N	N	N	58	188	N	L	N	766	N	18	188	N	
44R0018B	5	0.07	0.05	1506	3	N	N	38	26	1.5	N	N	N	N	58	158	N	L	N	L	N	5	15	L	
44R0019A	1.5	0.3	L	366	0.7	L	N	589	28	1	N	N	N	N	158	158	N	38	N	L	N	38	288	N	
44R0027A	3	0.05	N	1506	7	N	N	38	L	28	N	N	N	N	34	58	N	38	N	366	N	5	15	L	
44R0027B	5	0.03	L	1664	0.5	N	N	58	78	28	N	N	N	N	5	K	N	38	N	158	N	5	188	N	
44R0027C	1	0.02	0.1	288	N	N	N	366	N	3	N	N	N	N	L	N	N	28	N	58	N	5	28	N	
44R0032C	3	0.03	0.01	188	N	N	N	58	26	3	N	N	N	N	K	N	N	L	N	38	N	5	19	N	
44R0032D	3	0.05	0.07	206	L	N	N	6188	N	15	15	N	N	N	58	158	N	L	N	28	N	18	34	N	
44R0036A	5	0.07	N	2666	1.5	N	N	L	589	5	N	N	N	N	15	162	N	L	N	766	N	5	188	N	
44R0039B	5	2	2	1688	N	N	N	L	388	L	N	N	N	N	28	78	N	L	N	L	N	28	N	366	
44R0046C	5	0.05	L	566	N	N	N	L	78	18	N	N	N	N	58	188	N	28	N	188	N	18	38	L	
44R0046D	5	0.03	L	588	N	N	N	L	266	15	N	L	N	N	18	288	N	28	N	266	N	7	158	N	
44R0042	3	0.05	0.1	1506	0.7	N	N	28	78	28	N	N	N	N	15	288	N	28	N	158	N	7	188	N	
44R0044B	3	0.1	0.05	1548	0.5	N	N	58	58	5	N	N	N	N	18	188	N	L	N	288	N	5	154	N	
44R0059A	2	0.7	0.1	504	N	N	N	158	366	5	N	N	N	N	7	56	N	L	N	28	N	18	N	76	
44R0051B	5	0.5	0.2	1664	L	N	N	L	158	3	N	N	N	N	18	58	N	L	N	18	N	18	58	L	
44R0061A	3	0.1	1.5	2666	0.5	N	N	58	38	3	N	N	N	N	78	188	N	L	N	366	N	5	158	N	
44R0061B	3	0.15	0.1	288	0.7	N	N	78	58	18	N	N	N	N	78	158	N	L	N	366	N	7	268	N	
44R0061C	3	0.1	0.15	2666	3	N	N	58	188	15	N	N	N	N	188	158	N	L	N	788	N	7	268	N	
44R0074A	2	0.05	L	188	0.5	N	N	28	288	7	N	N	N	N	5	158	N	L	N	158	N	5	188	N	
44R0076B	5	0.05	N	2666	0.7	N	N	58	58	2	N	N	N	N	158	158	N	28	N	58	N	7	768	N	
44R0077C	5	0.03	N	188	15	N	N	15	L	2	N	N	N	N	188	58	N	28	N	58	N	7	78	N	
44R0082A	3	0.02	0.7	188	15	N	N	58	78	2	N	N	N	N	188	58	N	L	N	188	N	7	188	N	
44R0085	1	0.07	0.1	158	N	N	N	188	268	3	N	N	N	N	N	78	N	L	N	188	N	7	188	N	
44R0091C	5	0.05	L	584	2	188	N	L	188	15	58	N	N	N	158	288	N	L	N	38	N	7	15	N	
44R0097A	5	0.07	L	2666	N	N	N	L	58	38	N	N	N	N	L	58	N	L	N	58	N	5	288	N	
44R0097B	3	0.05	L	288	N	N	N	78	L	3	N	N	N	N	18	58	N	L	N	58	N	5	188	N	
44R0099A	3	0.07	0.1	288	N	N	N	58	78	3	N	N	N	N	18	188	N	L	N	58	N	7	188	N	
44R0099B	3	0.07	0.07	288	N	N	N	58	58	3	N	N	N	N	18	188	N	L	N	58	N	7	188	N	
44R0099C	1	0.03	L	366	N	N	N	15	388	3	N	N	N	N	158	78	N	L	N	158	N	7	188	N	
44R0099D	2	0.03	0.2	788	L	N	N	188	28	18	N	N	N	N	78	58	N	L	N	158	N	7	188	N	
44R0099E	5	0.05	0.15	2666	3	N	N	158	366	15	L	L	N	N	58	158	N	L	N	158	N	18	188	N	
44R0099F	7	0.05	0.7	1588	0.7	N	N	58	288	18	N	N	N	N	5	78	N	L	N	78	N	7	78	N	
44R0099G	18	0.03	1.5	588	N	N	N	18	L	15	N	N	N	N	5	188	N	L	N	158	N	7	188	N	
44R0099H	18	0.03	N	588	1	N	N	L	L	18	N	N	N	N	158	38	N	L	N	158	N	7	188	N	
44R0099I	3	0.03	0.2	588	1	N	N	L	L	18	N	N	N	N	158	38	N	L	N	158	N	7	188	N	
44R0099J	5	0.05	5	588	1	N	N	L	L	28	N	N	N	N	7	158	N	L	N	158	N	7	188	N	
44R0099K	1.5	0.07	L	866	1.5	N	N	18	38	18	N	N	N	N	15	78	N	L	N	188	N	18	78	N	
44R0099L	5	0.05	0.15	588	0.7	N	N	15	158	15	N	N	N	N	28	288	N	L	N	588	N	7	188	N	
44R0099M	5	0.07	L	1566	N	N	N	15	168	18	N	N	N	N	18	288	N	L	N	188	N	7	158	N	

(14)	(15)	(16)	(20)	(17)	(18)
Y	Z	Y	Z	Z	Z
18	L	78	722	180	N
L	L	180	1600	50	R
L	H	180	1800	100	M
L	H	N	N	10	N
L	N	50	1000	100	N
M	N	70	1500	200	N
M	N	70	L	30	N
19	N	100	700	70	N
L	R	70	L	50	N
L	R	100	L	50	N
L	N	70	N	300	N
L	N	300	L	70	N
L	N	10	N	50	N
15	R	100	500	150	N
R	R	150	500	100	N
R	R	100	500	100	N
R	R	100	500	100	N
L	N	100	N	20	N
L	L	100	N	100	N
19	N	50	1000	150	N
100	N	70	R	150	N
10	N	50	1000	100	N
10	N	100	1000	100	N
N	N	150	500	70	N
L	N	50	200	100	N
70	N	30	L	200	N
50	R	30	1000	200	N
10	N	50	200	300	N
10	N	70	200	200	N
15	L	100	200	200	N
L	N	100	200	200	N
L	N	150	700	100	N
N	N	100	L	100	N
N	N	150	500	50	N
N	N	200	N	150	N
L	N	150	500	70	N
10	N	100	500	70	N
10	N	70	500	100	N
15	N	30	N	300	N
R	N	100	500	100	N
10	R	100	500	150	N
L	N	70	L	50	N
10	N	100	700	70	N
L	N	150	500	100	N
L	N	100	1500	70	N
L	N	70	7	100	N
L	N	100	1000	70	N
10	N	50	500	50	N
L	N	200	2000	70	N
L	N	70	700	500	N
10	N	100	500	100	N



(10)	(15)	(16)	(20)	(17)	(18)	(19)
Y	M	Y	Zh	Zr	Th	
L	M	76	205	199	K	
L	R	79	500	100	K	
L	M	180	200	150	K	
15	M	70	1500	150	K	
10	L	150	2000	70	N	
L	L	50	1500	30	K	
10	M	180	3000	100	K	
L	L	50	1000	100	K	
10	R	70	700	100	N	
L	L	70	N	100	M	
L	L	50	500	100	M	
10	L	70	200	150	K	
10	L	70	300	200	K	
10	L	50	300	100	M	
10	N	100	500	100	M	
10	L	5	200	30	N	
10	L	70	1000	70	K	
10	L	15	2000	10	M	
10	M	100	1000	20	N	
L	M	30	500	70	K	
L	L	50	300	200	K	
10	L	70	700	10	L	
10	L	50	500	100	M	
10	L	50	1000	70	K	
10	M	70	300	70	K	
L	L	100	500	200	N	
L	M	50	500	70	M	
10	70	20	L	150	K	
L	L	100	700	150	M	
L	M	50	200	100	M	
L	L	20	200	150	M	
L	L	100	300	100	K	
L	K	50	500	100	M	
10	M	50	700	300	M	
10	M	50	500	70	M	
L	N	70	700	200	M	
L	N	100	300	100	N	
10	M	50	500	100	M	
10	M	30	500	100	M	
10	K	70	700	100	M	
L	L	20	N	100	M	
10	N	50	L	100	N	
10	L	30	500	200	M	
10	K	30	L	70	M	
10	R	70	700	70	K	
L	S0	100	300	100	M	
L	K	30	500	70	M	
L	L	30	500	200	M	
L	M	50	500	30	M	
L	M	50	500	100	M	

Intensely Altered Rocks

	(.05)	(.07)	(.05)	(.092)	(18)	(10)	(20)	(1)	(18)	(5)	(21)	(5)	(20)	(5)	(18)	(10)	(5)	(18)	(10)	(10)	(18)	(5)	(18)	(10)	(10)	(18)
	Fe	Mg	Ca	Ti	Al	K	Ba	Be	Br	Ed	Co	Cr	Co	La	Pb	Pt	Ni	Sb	Se	Sn	Sr					
4AR0013P	0.1	0.07	L	0.07	2000	30	20	2	50	L	N	H	100	10	500	N	H	N	5	300	N	N	5	N	500	N
4AR0013Q	0.07	0.05	0.5	0.05	2000	20	L	2	50	L	N	H	100	20	500	N	H	N	5	100	N	N	5	N	500	N
4AR0013R	0.1	0.1	L	0.1	2000	20	L	2	50	L	N	H	100	20	500	N	H	N	5	100	N	N	5	N	500	N
4AR0013S	0.5	0.07	N	L	100	0.7	N	L	N	N	N	N	30	N	300	N	N	N	5	1000	N	N	5	N	1000	N
4AR0013T	0.07	0.07	N	0.07	3000	1	N	2	N	N	N	N	150	N	500	N	N	N	5	500	N	N	5	N	500	N
4AR0013A	0.07	0.15	0.5	0.15	1000	1.5	70	1.5	L	50	N	N	200	7	500	N	N	N	5	500	N	N	5	N	500	N
4FR0016A	0.05	0.01	N	0.01	1000	L	150	5	N	L	N	N	20	7	700	N	N	N	5	500	N	N	5	N	500	N
4FR0016B	0.07	0.07	N	0.07	2000	2	50	5	N	N	N	N	50	N	700	N	N	N	5	100	N	N	5	N	100	N
4FR0016C	0.07	0.15	N	0.15	2000	0.7	50	5	N	N	N	N	7	7	700	N	N	N	5	100	N	N	5	N	100	N
4FR0016D	0.05	0.01	N	0.01	2000	0.5	30	10	N	N	N	N	7	7	700	N	N	N	5	100	N	N	5	N	100	N
4FR0017C	0.05	0.05	0.05	0.05	500	0.5	150	5	N	N	N	N	50	N	30	N	N	N	5	15	N	N	5	N	15	N
4FR0018	0.07	0.05	0.5	0.05	1500	3	20	1.5	N	N	N	N	50	N	30	N	N	N	5	200	N	N	5	N	200	N
4FR0019A	0.3	0.05	L	0.05	300	0.7	20	1	N	N	N	N	150	N	100	N	N	N	5	15	N	N	5	N	15	N
4FR0027A	0.05	0.015	N	0.015	1500	7	L	20	N	N	N	N	30	N	30	N	N	N	5	100	N	N	5	N	100	N
4FR0027B	0.03	0.01	L	0.01	1000	0.5	70	20	N	N	N	N	30	N	30	N	N	N	5	100	N	N	5	N	100	N
4FR0027C	0.03	0.01	L	0.01	200	0.5	30	3	N	N	N	N	30	N	30	N	N	N	5	100	N	N	5	N	100	N
4FR0032C	0.03	0.01	L	0.01	100	0.5	50	3	N	N	N	N	30	N	30	N	N	N	5	100	N	N	5	N	100	N
4FR0032B	0.05	0.07	L	0.07	200	L	500	5	15	N	N	N	50	N	150	N	N	N	5	150	N	N	5	N	150	N
4FR0033A	0.07	0.1	N	0.1	2000	1.5	300	5	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0033B	0.05	0.15	L	0.15	1000	0.5	300	2	N	N	N	N	200	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0043C	0.05	0.05	L	0.05	5000	0.5	70	10	N	N	N	N	50	N	50	N	N	N	5	100	N	N	5	N	100	N
4FR0043D	0.03	0.1	L	0.1	5000	0.5	70	10	N	N	N	N	50	N	50	N	N	N	5	100	N	N	5	N	100	N
4FR0042	0.05	0.1	0.1	0.1	1500	0.7	70	20	N	N	N	N	10	10	200	N	N	N	5	100	N	N	5	N	100	N
4FR0043B	0.05	0.05	0.05	0.05	1500	0.5	50	5	N	N	N	N	10	10	200	N	N	N	5	100	N	N	5	N	100	N
4FR0050A	0.7	0.3	0.1	0.3	500	1.5	300	5	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0051B	0.05	0.2	0.2	0.2	1000	0.5	150	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0051A	0.1	0.1	1.5	0.1	2000	0.5	50	7	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0061B	0.15	0.1	0.3	0.1	2000	0.7	70	10	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0061C	0.1	0.15	0.5	0.15	2000	0.7	70	10	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0061E	0.1	0.15	0.5	0.15	2000	0.7	70	10	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0074A	0.05	0.05	L	0.05	1000	0.5	50	20	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0074B	0.05	0.05	N	0.05	2000	0.7	70	20	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0077C	0.03	0.02	N	0.02	1000	0.5	50	2	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0082A	0.02	0.02	0.7	0.02	1000	0.5	70	2	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0085	0.07	0.05	0.1	0.05	150	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087A	0.05	0.05	L	0.05	500	0.5	200	15	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087B	0.07	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087C	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087D	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087E	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087F	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087G	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087H	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087I	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087J	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087K	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087L	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087M	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087N	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087O	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087P	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087Q	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087R	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087S	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087T	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N	N	5	N	100	N
4FR0087U	0.05	0.05	L	0.05	2000	0.5	200	3	N	N	N	N	100	10	700	N	N	N	5	100	N					

(10)	(15)	(10)	(20)	(10)	(10)	(10)
V	M	Y	Zn	Zr	Th	
10	L	70	700	100	K	
L	L	100	1000	50	X	
L	K	100	1000	100	K	
L	K	K	K	10	K	
L	N	50	1000	100	N	
10	N	70	1500	200	N	
N	N	70	L	30	N	
10	N	100	700	70	N	
L	K	70	L	50	K	
L	K	100	L	50	K	
L	K	70	K	500	K	
L	K	300	L	70	K	
L	K	10	N	50	K	
15	N	10	N	150	N	
30	N	100	500	150	N	
N	N	150	500	100	N	
N	N	100	N	50	N	
L	N	100	N	20	N	
L	L	100	K	100	N	
10	K	50	1000	150	K	
100	K	70	K	150	K	
10	N	50	1000	100	K	
10	N	100	1000	100	K	
N	N	150	500	70	N	
L	N	50	200	100	N	
70	N	30	L	200	N	
50	N	30	1000	200	N	
10	N	50	200	300	N	
10	N	70	200	200	N	
15	L	100	200	200	N	
L	K	100	700	200	N	
L	K	100	L	100	N	
N	N	100	500	50	K	
N	N	200	N	150	N	
L	N	150	N	50	N	
K	K	150	500	70	K	
10	K	70	500	100	K	
15	K	30	K	300	K	
10	K	100	L	700	K	
10	K	70	500	100	K	
15	N	100	500	100	N	
10	N	100	500	150	N	
L	N	70	L	50	N	
L	N	100	700	70	N	
L	N	150	500	100	N	
L	K	100	1500	70	K	
L	K	70	7	100	K	
L	K	100	1000	70	K	
10	K	50	500	30	N	
L	K	200	2000	70	N	
L	N	70	700	500	N	
10	N	100	500	100	N	

Intensely Altered Rocks

(.85) Fe Z	(.82) Hg Z	(.85) Ca X	(.802) Ti Z	(.81) Mn	(.5) Ag	(.788) As	(.81) Au	(.81) B	(.28) Ba	(.11) Be	(.18) Bi	(.28) Cd	(.5) Co	(.18) Cr	(.5) Cu	(.28) La	(.5) Ho	(.28) Nb	(.5) Ni	(.18) Pb	(.188) Sb	(.5) Se	(.81) Sn	(.84) Sr
4FR4613B	0.07	L	0.07	2000	2	N	N	10	50	7	N	N	20	N	70	150	N	L	N	300	N	7	150	N
4FR4615A	0.05	L	0.05	2000	3	N	N	L	30	1.5	20	20	20	N	1000	200	N	L	N	500	N	L	150	N
4FR4615B	0.07	0.3	0.1	100	2	N	N	30	L	1	N	10	20	N	1000	150	N	L	N	500	N	7	70	N
4RZ00106	0.02	L	0.02	300	7	2000	N	100	L	5	70	N	N	N	200	200	7	L	N	1000	N	L	5	N
4RZ00120	0.03	N	0.03	2000	1	N	N	L	100	2	N	N	N	N	200	300	N	L	N	200	N	5	5	N
4RZ00130	0.05	N	0.05	500	N	N	N	10	50	2	N	N	N	N	100	100	N	L	N	15	N	5	5	N
4RZ00160	0.02	N	0.02	1000	0.7	N	N	10	L	7	L	N	N	N	50	50	N	L	N	50	N	5	5	N
4RZ00170	0.03	N	0.03	5000	0.7	N	N	L	L	5	L	20	N	N	100	50	N	L	N	1500	N	5	5	N
4RZ00180	0.05	L	0.05	1000	L	L	N	200	200	5	N	N	N	N	100	100	N	100	N	N	N	7	200	N
4RZ0018C	0.02	L	0.02	200	1.5	1000	N	61000	L	10	300	N	N	N	150	100	N	100	N	N	N	5	200	N
4RZ00190	0.05	L	0.05	1500	2	N	N	150	L	10	L	N	N	N	30	200	N	L	N	100	N	L	30	N
4RZ00200	0.05	L	0.05	1500	10	N	N	L	200	10	10	N	N	N	50	200	N	L	N	100	N	7	30	N
4RZ0020H	0.05	L	0.05	1500	10	N	N	50	50	15	20	L	10	N	200	150	N	L	N	300	N	7	70	N
4RZ0020I	0.05	L	0.05	1000	1	N	N	L	50	7	N	L	10	N	200	100	N	L	N	300	N	7	150	N
4RZ0020J	0.05	L	0.05	5000	0.7	N	N	10	150	10	N	L	N	N	100	100	N	L	N	1000	N	7	50	N
4RZ0020K	0.05	L	0.05	5000	0.7	N	N	10	200	10	N	20	N	N	100	100	N	L	N	1000	N	10	10	N
4RZ0020L	0.05	N	0.05	5000	5	N	N	L	L	5	50	L	7	N	500	150	N	N	N	1000	N	7	500	N
4RZ0020M	0.02	N	0.02	2000	0.5	N	N	150	20	5	N	N	N	N	300	N	N	L	N	200	N	5	30	N
4RZ0020N	0.05	N	0.05	2000	L	N	N	10	50	10	N	N	N	N	50	70	N	30	N	150	N	7	70	N
4RZ0020P	0.05	N	0.05	2000	L	N	N	10	50	10	N	N	N	N	50	70	N	30	N	150	N	7	70	N
4RZ0020R	0.05	L	0.05	2000	0.5	N	N	15	50	10	N	N	N	N	30	100	N	L	N	100	N	7	20	N
4RZ0020S	0.03	N	0.03	1000	1	N	N	150	L	15	N	N	N	N	100	50	N	20	N	150	N	7	70	N
4RZ0020U	0.05	L	0.05	1500	2	N	N	15	50	15	N	N	N	N	150	70	N	20	N	100	N	7	70	N
4RZ0020V	0.05	L	0.05	1500	0.5	N	N	20	30	20	N	N	N	N	70	100	N	20	N	100	N	7	70	N
4RZ0020Y	0.05	L	0.05	2000	0.7	N	N	20	70	15	L	N	N	N	70	100	N	30	N	1000	N	7	70	N
4RZ0020Z	0.05	L	0.05	2000	L	N	N	20	30	20	L	N	N	N	20	100	N	20	N	700	N	7	70	N
4RZ0032A	0.05	L	0.05	700	1	N	N	N	100	7	N	N	N	N	L	N	N	N	N	100	N	L	L	N
4RZ0032B	0.05	1.5	0.05	5000	N	N	N	50	70	5	N	N	N	N	N	100	N	L	N	100	N	5	700	N
4RZ0033A	0.05	L	0.05	1000	N	N	N	20	200	10	N	N	L	N	L	100	N	20	N	10	N	5	100	N
4RZ0033B	0.1	L	0.1	2000	L	N	N	10	500	15	N	N	N	N	100	100	N	L	N	50	N	7	100	N
4RZ0037C	0.1	N	0.1	2000	1	N	N	50	30	2	N	N	N	N	10	100	N	L	N	100	N	5	50	N
4RZ0045A	0.05	N	0.05	5000	L	N	N	10	150	1.5	N	N	30	N	150	70	N	5	N	700	N	5	50	N
4RZ00480	0.05	N	0.05	5000	L	N	N	50	20	20	N	N	N	N	100	70	N	30	N	300	N	5	30	N
4RZ0050A	0.05	0.5	0.1	500	N	N	N	61000	20	7	N	N	N	N	7	N	N	30	N	70	N	N	150	N
4RZ0050B	0.07	N	0.07	2000	5	700	N	10	100	15	10	N	N	N	150	N	5	L	N	L	N	5	200	N
4RZ0050C	0.05	L	0.05	5000	15	N	N	L	50	7	15	N	N	N	20	30	N	L	N	150	N	5	500	N
4RZ0057	0.03	L	0.03	300	L	N	N	20	150	3	N	N	N	N	20	50	N	20	N	1500	N	5	20	N
4RZ0050	0.1	L	0.1	3000	7	N	N	50	30	10	50	N	5	N	70	50	N	50	N	700	N	5	100	N



(10)	(50)	(10)	(200)	(10)	(100)	(100)	(100)
A	B	Y	Zn	Zr	Tb		
10	N	100	1000	100	N		
L		70	2000	100	N		
L		100	L	100	N		
N		150	700	70	N		
N		150	1500	100	N		
N		100	L	50	N		
N		70	500	15	N		
N		70	2000	100	N		
N		100	200	150	N		
N		100	N	200	N		
N		100	500	700	N		
N		100	2000	50	N		
N		150	2000	100	N		
N		100	1500	70	N		
N		100	1500	100	N		
N		100	2000	200	N		
N		100	2000	300	N		
N		100	2000	70	N		
N		15	2000	100	N		
N		100	L	150	N		
N		300	500	70	N		
N		150	1000	50	N		
N		150	N	150	N		
N		50	1000	100	N		
N		70	1500	50	N		
N		15	2000	100	N		
N		100	L	150	N		
N		300	500	70	N		
N		150	1000	50	N		
N		150	N	150	N		
N		50	1000	100	N		
N		70	1500	100	N		
N		1500	1500	100	N		

Intrusive Breccia

	(.03)	(.02)	(.05)	(.002)	(.01)	(.5)	(200)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(5)	(20)	(5)	(20)	(5)	(10)	(100)	(5)	(10)	(100)	Sr
	Fe Z	Si Z	Ca Z	Ti Z	Mn	Ag	As	Au	B	Ba	Be	Bi	Cd	Co	Cr	Du	La	Mo	Nb	Ni	Pb	Sb	Sc	Sn	(100)
4F80050E	2	0.1	L	0.01	150	0.7	N	N	15	200	5	N	N	N	N	N	N	200	20	N	50	N	5	L	N
4F80052B	1	0.3	L	0.07	300	W	N	N	10	30	1	N	N	5	10	L	N	N	N	L	L	N	N	N	N
4E700015D	1	0.07	L	0.02	500	0.5	N	N	30	300	7	N	N	N	N	L	50	N	L	N	70	N	7	N	N

(10)	(50)	(10)	(200)	(10)	(100)
Y	M	Y	Zo	Zc	Tb
N	N	50	N	50	N
15	15	L	N	100	N
N	N	150	N	70	N

Limestone

	(.05)	(.02)	(.05)	(.002)	(10)	(.5)	(200)	(10)	(10)	(8)	(10)	(1)	(10)	(10)	(10)	(10)	(10)	(20)	(5)	(10)	(100)	(5)	(10)	(10)	Sr
	Fe Z	Mg X	Ca Z	Ti X	Mn	Ag	As	Au	B	Ba	Be	Bi	Bd	Co	Cr	Cu	La	Hb	Mb	Ni	Pb	Sb	Sc	Sn	
4FR055C	0.2	0.5	20	0.02	100	N	N	N	20	20	N	N	N	N	N	L	N	N	N	N	50	N	N	N	N
4FR055D	3	2	5	0.5	2000	L	N	N	15	150	I	N	N	20	N	L	30	N	L	70	30	N	20	100	1000

(10)	(50)	(10)	(200)	(10)	(100)
V	H	Y	Zn	Zr	Th
L	K	L	K	10	K
100		20	K	50	N

Veins and other rocks

(.85) Fe Z	(.121 Hg Z	(.485) Ca Z	(.0022) Ti Z	(18) Mn	(1.5) Ag	(204) As	(18) Au	(18) B	(20) Ba	(1) Be	(10) Bi	(20) Cd	(5) Co	(18) Cr	(5) Cu	(20) La	(5) Mo	(20) Nb	(5) Ni	(10) Pb	(100) Sb	(5) Sc	(10) Sn	(100) Sr
5	0.05	0.15	0.02	2000	7	N	N	20	20	50	20	20	N	N	50	100	20	30	N	300	N	10	150	N
0.5	0.1	L	0.05	100	N	N	N	L	20	N	N	N	N	L	7	N	N	N	5	N	N	L	N	N

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4FR011F

(10)	(58)	(11)	(28)	(18)	(18)
V	M	Y	Z	Z	Z
M	M	158	1664	691	M
10	M	L	M	28	M

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Table 2.-- Summary statistics of selected elements for the six main rock types from the Lime Peak area. Number of samples, n; lower quartile, lq; median, m; upper quartile uq. Units are parts per million for all elements except Fe, Mg, Ca and Ti which are percent.



Coarse-grained Equigranular Biotite Granite

n=11	Fe	Mg	Ca	Ti	Mn	Ag	B
l. q.	0.7	0.05	0.05	0.05	150	N	10
m.	1	0.07	0.1	0.07	200	N	10
u. q.	2	1	0.2	0.15	300	N	15
n=11	Ba	Be	Bi	Co	Cr	Cu	La
l. q.	20	1.5	N	N	N	N	100
m.	100	2	N	N	N	N	100
u. q.	300	5	N	10	N	5	100
n=11	Mo	Nb	Ni	Pb	Sc	Sn	Sr
l. q.	N	L	N	15	5	L	N
m.	N	L	N	20	5	L	N
u. q.	N	20	N	30	10	10	L
n=11	V	Y	Zn	Zr			
l. q.	N	50	N	70			
m.	L	70	N	70			
u. q.	10	100	N	100			

Porphyritic Biotite Granite

n=53	Fe	Mg	Ca	Ti	Mn	Ag	B
l. q.	0.7	0.02	L	0.01	100	N	10
m.	1	0.05	0.07	0.03	200	N	20
u. q.	1.5	0.07	0.1	0.05	500	L	50
n=53	Ba	Be	Bi	Co	Cr	Cu	La
l. q.	L	3	N	N	N	N	20
m.	50	5	N	N	N	L	70
u. q.	150	10	N	N	N	L	150
n=53	Mo	Nb	Ni	Pb	Sc	Sn	Sr
l. q.	N	L	N	20	L	L	N
m.	N	20	N	50	5	10	N
u. q.	N	30	N	50	7	15	N
n=53	V	Y	Zn	Zr			
l. q.	N	50	N	50			
m.	L	100	N	100			
u. q.	L	150	N	100			

Quartz Feldspar Porphyry

n=25	Fe	Mg	Ca	Ti	Mn	Ag	B
l. q.	0.7	0.03	L	0.02	150	N	15
m.	1	0.05	0.05	0.02	300	N	30
u. q.	1	0.1	0.1	0.05	500	L	50
n=25	Ba	Be	Bi	Co	Cr	Cu	La
l. q.	50	5	N	N	N	N	L
m.	70	10	N	N	N	N	50
u. q.	100	15	N	N	N	L	70
n=25	Mo	Nb	Ni	Pb	Sc	Sn	Sr
l. q.	N	20	N	20	5	15	N
m.	N	20	N	50	5	20	N
u. q.	N	30	N	70	7	50	N
n=25	V	Y	Zn	Zr			
l. q.	N	70	N	70			
m.	L	100	N	100			
u. q.	L	100	N	100			

Intermediate Dikes

n=10	Fe	Mg	Ca	Ti	Mn	Ag	B
l. q.	3	0.07	1	0.3	300	N	N
m.	3	2	1.5	0.3	1000	N	L
u. q.	3	3	2	0.5	1500	N	15
n=10	Ba	Be	Bi	Co	Cr	Cu	La
l. q.	150	L	N	N	150	7	N
m.	300	L	N	30	150-200	7-10	N
u. q.	500	1.5	N	50	200	30	100
n=10	Mo	Nb	Ni	Pb	Sc	Sn	Sr
l. q.	N	N	10	L	15	N	5
m.	N	N	15	15	20	N	200
u. q.	N	N	20	50	20	20	300
n=10	V	Y	Zn	Zr			
l. q.	70	20	N	70			
m.	100	30-50	N	70			
u. q.	100	70	L	100			

Hornfels and Quartzose Country Rocks

n=22	Fe	Mg	Ca	Ti	Mn	Ag	B
l.q.	2	0.5	L	0.15	200	N	20
m.	2	0.7	L	0.2	300	N	70
u.q.	3	1	0.05	0.3	700	N	100
n=22	Ba	Be	Bi	Co	Cr	Cu	La
l.q.	100	1	1	N	30	10	N
m.	300	1	1	5	70	30	50
u.q.	500	1.5	1.5	15	150	70	100
n=22	Mo	Nb	Ni	Pb	Sc	Sn	Sr
l.q.	N	N	10	L	5	N	N
m.	N	N	30	30	10	L	L
u.q.	N	L	50	50	20	10	L
n=22	V	Y	Zn	Zr			
l.q.	50	15	N	100			
m.	100	30	N	100			
u.q.	150	30	L	200			

Intensely Altered Rocks

n=142	Fe	Mg	Ca	Ti	Mn	Ag	B
l.q.	3	0.05	L	0.02	1000	L	10
m.	5	0.05	L	0.05	2000	1	20
u.q.	5	0.07	0.1	0.07	2000	5	50
n=142	Ba	Be	Bi	Co	Cr	Cu	La
l.q.	L	3	N	N	N	10	70
m.	30	5	N	N	N	50	100
u.q.	70	10	15	N	N	100	150
n=142	Mo	Nb	Ni	Pb	Sc	Sn	Sr
l.q.	N	L	N	100	5	50	N
m.	N	L	N	200	7	100	N
u.q.	10	20	N	500	7	150	N
n=142	V	Y	Zn	Zr			
l.q.	N	50	200	70			
m.	L	70	500	100			
u.q.	10	100	700	150			