UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical results and sample locality map of stream-sediment, heavy-mineral-concentrate, and rock samples from the Little Rockies, Mount Pennell, and Mount Hillers Wilderness Study Areas (UT-050-247,248,249), Garfield County, Utah

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STUDIES RELATED TO WILDERNESS

Bureau of Land Management Wilderness Study Areas

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine their mineral values, if any. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geochemical and mineralogical survey of the Little Rockies, Mount Pennell, and Mount Hillers Wilderness Study Areas (UT-050-247,248,249), Garfield County, Utah.

INTRODUCTION

In April 1984 the U.S. Geological Survey conducted a reconnaissance geochemical survey of the Little Rockies, Mount Pennell, and Mount Hillers Wilderness Study Areas, Garfield County, Utah.

The Little Rockies, Mount Pennell, and Mount Hillers Wilderness Study Areas comprise about 350 mi^2 (910 km^2) in Garfield County, Utah. Access to the study areas is provided by unimproved dirt roads and jeep trails.

The study areas occupy the southern portion of the Henry Mountains and includes Mount Pennell, Mount Hillers, and Mount Ellsworth. The areas consist of a series of diorite porphyry laccoliths and their satellite bodies, all of Eocene age, which intrude the 8,000 ft (2500 m) thick Henry Basin sediments which range in age from Permian to Holocene. Only Triassic and younger rocks are exposed in the areas. The individual formations have been described in detail by Larson and others, unpublished data.

The topographic relief in the study areas is about 7,600 ft (2320 m) with a maximum elevation of 11,371 ft (3467 m). The lower elevations consist of gently sloping plateaus and are cut by intermittent streams. The higher elevations exhibit substantial relief and are cut by intermittent and permanent streams. The climate ranges from arid in the low lying plateaus to semi-arid alpine in the higher mountains.

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. Heavy-mineral-concentrate samples provide information about the chemistry of a limited number of minerals in rock material eroded from the drainage basin upstream from each sample site. The selective concentration of minerals, many of which are ore-related, permits determination of some elements that are not easily detected in stream-sediment samples.

Analyses of unaltered or unmineralized rock samples provide background geochemical data for individual rock units. On the other hand, analyses of altered or mineralized rocks, where present, may provide useful geochemical information about the major- and trace-element assemblages associated with a mineralizing system.

Sample Collection

Samples were collected at 153 sites (plate 1). At nearly all of those sites, both a stream-sediment sample and a heavy-mineral-concentrate sample were collected. Where suitable outcrop was available, rock samples were collected. Sampling density was about 1 sample site per 2 mi^2 for the stream sediments, heavy-mineral concentrates, and rocks. The area of the drainage basins sampled ranged from 5 mi^2 to 25 mi^2.

Stream-sediment samples

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 = 1:50,000). Each sample was composited from several localities within an area that may extend as much as 100 ft from the site plotted on the map.

Heavy-mineral-concentrate samples

Heavy-mineral-concentrate samples were collected from the same active alluvium as the stream-sediment samples. Each bulk sample was screened with a 2.0-mm (10-mesh) screen to remove the coarse material. The less than 2.0-mm fraction was panned until most of the quartz, feldspar, organic material, and clay-sized material were removed.

Rock samples

Rock samples were collected from outcrops or exposures in the vicinity of the plotted site location. Samples were collected from unaltered, altered, or mineralized rock outcrops.

Sample Preparation

The stream sediment samples were air dried, then sieved using 80 mesh (0.17 mm) stainless steel sieves. The portion of the sediment passing through the sieve was saved for analysis.

After air drying, bromoform (specific gravity 2.8) was used to remove the remaining quartz and feldspar from the heavy-mineral-concentrate samples that had been panned in the field. The resultant heavy mineral sample was separated into three fractions using a large electromagnet (in this case a modified Frantz Isodynamic Separator). The most magnetic material, primarily magnetite, was not analyzed. The second fraction, largely ferromagnesian silicates and iron oxides, was saved for analysis/archival storage. The third fraction (the least magnetic material including the nonmagnetic ore minerals, zircon, sphene, etc.) was split using a Jones splitter. One split was hand-ground for spectrographic analysis; the other split was saved for mineralogical analysis. These magnetic separates are the same separates that would be produced by using a Frantz Isodynamic Separator set at a slope of 15° and a tilt of 10° with a current of 0.1 ampere to remove the magnetite and ilmenite, and a current of 1.0 ampere to split the remainder of the sample into paramagnetic and nonmagnetic fractions.

Rock samples were crushed and then pulverized to minus 0.15 mm with ceramic plates.

Sample Analysis

Spectrographic method

The stream-sediment, heavy-mineral-concentrate, and rock samples were analyzed for 31 elements using a semiquantitative, direct-current arc emission spectrographic method (Grimes and Marranzino, 1968). The elements analyzed and their lower limits of determination are listed in Table 1. 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: 100, 50, 20, 10, and so forth. Samples whose concentrations are estimated to fall between those values are assigned values of 70, 30, 15, and so forth. The precision of the analytical method is approximately plus or minus one reporting interval at the 83 percent confidence level and plus or minus two reporting intervals at the 96 percent confidence level (Motooka and Grimes, 1976). Values determined for the major elements (iron, magnesium, calcium, and titanium) are given in weight percent; all others are given in parts per million (micrograms/gram). Analytical data for samples from the Little Rockies, Mount Pennell, and Mount Hillers Wilderness Study Areas are listed in Tables 2-4.

In addition to the spectrographic analysis all heavy-mineral-concentrate samples were mineralogically analyzed. Minerals reported include zircon (round and euhedral), sphene, rutile, anatase, barite, apatite, scheelite, epidote, pyrite, pyroxene, arsenopyrite, amphibole, and rock fragments. The relative abundance of these minerals was visually determined using a binocular microscope.

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, 1976).

DESCRIPTION OF DATA TABLES

Tables 2-4 list the analyses for the samples of rock, stream sediment, and heavy-mineral concentrate, respectively. For the three tables, the data are arranged so that column 1 contains the USGS-assigned sample numbers. These numbers correspond to the numbers shown on the site location maps (plate 1). Columns in which the element headings show the letter "s" below the element symbol are emission spectrographic analyses. A letter "N" in the tables indicates that a given element was looked for but not detected at the lower limit of determination shown for that element in table 1. 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. If an element was observed but was above the highest reporting value, a "greater than" symbol (>) was entered in the tables in front of the upper limit of determination. If an element was not looked for in a sample, two dashes (--) are entered in tables 2-4 in place of an analytical value. Because of the formatting used in the computer program that produced tables

3-6, some of the elements listed in these tables (Fe, Mg, Ca, Ti, Ag, and Be) carry one or more nonsignificant digits to the right of the significant digits. The analysts did not determine these elements to the accuracy suggested by the extra zeros.

Table 5 contains the mineralogical data for Little Rockies, Mount Pennell, and Mount Hillers Wilderness Study Areas. In the table, the data are arranged so that column 1 contains the USGS-assigned sample numbers. These numbers again correspond to the numbers shown on the site location map (plate 1). Columns headed with mineral names show the relative amount of that specific mineral found in a sample. Relative abundance is indicated by two dashes (--) (meaning that the mineral was not observed), or a number from 1-6, where: 1 = trace present, <1%; 2 = present, >2%; 3 = common, >5%; 4 = major, >20%; 5 = dominant, >50%; 6 = ubiquitous, >85%.

REFERENCES CITED

Grimes, D. J., and Marranzino, A. P., 1968, Direct-current arc and alternating-current spark emission spectrographic field methods for the semiquantitative analysis of geologic materials: U.S. Geological Survey Circular 591, 6 p.

Larson, M. J., Bromfield, C. S., Dubiel, R. F., Patterson, C. G., and Peterson, Fred, 1984, Geologic map of the Mount Pennell, Mount Hillers, and Little Rockies Wilderness Study Areas, Garfield County, Utah: U.S. Geological Survey Miscellaneous Field Study Map, unpublished.

Motooka, J. M., and Grimes, D. J., 1976, Analytical precision of one-sixth order semiquantitative spectrographic analyses: U.S. Geological Survey Circular 738, 25 p.

VanTrump, George, Jr., and Miesch, A. T., 1976, The U.S. Geological Survey RASS-STATPAC system for management and statistical reduction of geochemical data: Computers and Geosciences, v. 3, p. 475-488.

TABLE 1.--Limits of determination for the spectrographic analysis of rocks and stream sediments, based on a 10-mg sample

[The spectrographic limits of determination for heavy-mineral-concentrate samples are based on a 5-mg sample, and are therefore two reporting intervals higher than the limits given for rocks and stream sediments]

Elements	Lower determination limit	Upper determination limit
	Percent	
Iron (Fe)	0.05	20
Magnesium (Mg)	.02	10
Calcium (Ca)	.05	20
Titanium (Ti)	.002	1
	Parts per million	
Manganese (Mn)	10	5,000
Silver (Ag)	0.5	5,000
Arsenic (As)	200	10,000
Gold (Au)	10	500
Boron (B)	10	2,000
Barium (Ba)	20	5,000
Beryllium (Be)	1	1,000
Bismuth (Bi)	10	1,000
Cadmium (Cd)	20	500
Cobalt (Co)	5	2,000
Chromium (Cr)	10	5,000
Copper (Cu)	5	20,000
Lanthanum (La)	20	1,000
Molybdenum (Mo)	5	2,000
Niobium (Nb)	20	2,000
Nickel (Ni)	5	5,000
Lead (Pb)	10	20,000
Antimony (Sb)	100	10,000
Scandium (Sc)	5	100
Tin (Sn)	10	1,000
Strontium (Sr)	100	5,000
Vanadium (V)	10	10,000
Tungsten (W)	50	10,000
Yttrium (Y)	10	2,000
Zinc (Zn)	200	10,000
Zirconium (Zr)	10	1,000
Thorium (Th)	100	2,000

TABLE 2.--Spectrographic analysis of rock samples from Little Rockies, Mt. Pennell, and Mt. Hillers Wilderness Study Areas, Utah

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

SAMPLE	LATITUDE	LONGITUDE	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA	S-BE	S-BI	S-CD	S-CO
002	37 57 21	110 47 30	3.0	.70	20.00	.15	2,000	200.0	N	N	20	2,000	2.0	N	N	10
003	37 56 9	110 46 17	5.0	.70	2.00	.20	1,000	N	N	N	15	1,000	1.0	N	N	5
004	37 54 3	110 40 47	5.0	.70	2.00	.30	1,500	N	N	N	15	1,000	1.0	N	N	7
006	37 56 24	110 46 49	20.0	.20	10.00	.20	2,000	N	500	N	200	20	<1.0	50	N	20
012	37 54 9	110 43 41	5.0	.70	2.00	.20	1,500	N	N	N	15	1,000	1.5	N	N	5
013	37 59 41	110 47 39	2.0	.70	1.50	.15	1,000	N	N	N	<10	1,500	1.0	N	N	<5
015	37 57 42	110 47 45	5.0	.30	.50	.20	1,500	N	N	N	20	5,000	1.0	N	N	<5
017	37 58 10	110 45 53	5.0	.70	2.00	.20	1,000	N	N	N	20	1,000	1.0	N	N	15
018	37 54 32	110 37 20	5.0	.70	2.00	.20	1,500	<.5	N	N	20	1,000	1.5	N	N	10
019	37 53 13	110 41 44	7.0	.70	2.00	.20	1,000	N	N	N	10	1,000	1.5	N	N	10
020	37 51 26	110 40 34	5.0	1.00	2.00	.20	1,500	N	N	N	30	1,000	1.0	N	N	15
022	37 57 29	110 47 38	7.0	1.00	2.00	.30	1,500	N	N	N	30	3,000	1.5	N	N	15
025	37 57 11	110 47 38	2.0	.50	1.50	.20	1,500	N	N	N	30	1,500	1.5	N	N	<5
026	37 53 49	110 41 11	5.0	1.00	3.00	.30	2,000	N	N	N	20	2,000	1.0	N	N	10
028	37 53 0	110 42 35	5.0	.70	2.00	.30	1,500	N	N	N	20	2,000	1.0	N	N	10
029	37 56 55	110 47 48	20.0	.15	.05	.15	100	5.0	N	N	20	1,000	N	N	N	30
030	37 46 53	110 36 14	5.0	1.00	2.00	.30	1,000	N	N	N	15	1,500	1.0	N	N	10
031	37 48 40	110 34 47	.7	.20	.20	.10	50	N	N	N	30	700	<1.0	N	N	10
033	37 53 1	110 39 16	5.0	1.00	2.00	.30	1,000	N	N	N	20	1,000	1.0	N	N	15
034	37 56 52	110 47 45	7.0	1.00	5.00	.50	1,500	N	N	N	30	5,000	N	N	N	10
035	37 57 58	110 46 38	7.0	1.00	3.00	.50	1,000	N	N	N	20	2,000	1.0	N	N	10
039	37 44 49	110 36 59	10.0	.20	.20	.20	50	N	N	N	20	200	1.0	N	N	N
040	37 49 37	110 43 52	15.0	.05	.05	>1.00	5,000	N	N	N	20	700	3.0	N	N	5
041	37 54 31	110 35 51	5.0	1.00	2.00	.30	1,000	N	N	N	<10	500	1.0	N	N	5
042	37 54 9	110 37 31	5.0	1.00	3.00	.30	1,500	N	N	N	<10	1,000	1.0	50	N	15
043	37 56 54	110 47 13	7.0	1.00	3.00	.20	2,000	50.0	N	N	<10	5,000	N	N	N	20
045	37 57 37	110 47 41	7.0	1.00	7.00	.30	1,000	N	N	N	30	2,000	<1.0	N	N	<5
046	37 56 52	110 47 46	15.0	.20	.05	.10	100	7.0	200	N	20	1,000	<1.0	30	N	N
047	38 2 33	110 47 39	7.0	2.00	2.00	.30	700	N	N	N	<10	700	N	N	N	30
048	37 57 49	110 48 49	5.0	.70	1.50	.20	2,000	N	N	N	20	3,000	1.0	N	N	<5
050	37 55 34	110 41 17	7.0	2.00	5.00	.20	1,500	N	N	N	30	1,500	<1.0	N	N	20
051	37 46 47	110 36 19	5.0	.70	2.00	.30	1,000	N	N	N	<10	1,000	1.0	N	N	10
052	37 57 11	110 47 38	5.0	.70	2.00	.20	1,500	N	N	N	20	1,500	1.0	N	N	5
054	37 58 11	110 47 39	2.0	.70	2.00	.20	1,000	N	N	N	N	700	1.5	N	N	5
055	37 45 1	110 37 6	7.0	1.00	3.00	.20	1,000	N	N	N	<10	500	1.0	N	N	15
058	37 53 33	110 41 45	5.0	.70	2.00	.20	500	N	N	N	20	1,500	1.0	N	N	<5
062	37 52 23	110 39 27	7.0	1.00	2.00	.20	1,500	N	N	N	15	1,000	1.5	N	N	10
063	37 57 24	110 47 30	5.0	.70	1.50	.15	1,500	N	N	N	20	3,000	1.0	N	N	N
064	37 55 9	110 35 50	7.0	1.00	5.00	.50	1,500	N	N	N	20	700	1.0	N	N	10
066	38 0 8	110 47 28	3.0	.70	1.00	.10	700	N	N	N	15	2,000	1.0	N	N	N
070	37 48 25	110 34 6	3.0	.70	2.00	.30	700	N	N	N	10	1,000	1.0	N	N	5
071	37 51 27	110 40 49	7.0	1.00	2.00	.30	1,500	N	N	N	10	1,000	1.0	N	N	10
073	37 56 35	110 46 19	5.0	.70	2.00	.20	2,000	N	N	N	30	3,000	1.5	N	N	10
077	37 53 27	110 41 52	1.0	.10	7.00	.10	300	.7	N	N	15	1,000	N	N	N	N
079	37 56 58	110 47 31	3.0	1.00	2.00	.20	1,500	N	N	N	10	2,000	<1.0	N	N	15

TABLE 2.--Continued

SAMPLE	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
002	<10	2,000	100	5	N	10	300	N	5	N	1,500	1,000	N	20	N	50	N
003	10	50	50	N	N	10	15	N	5	N	1,000	70	N	20	N	150	N
004	10	10	50	N	N	10	20	N	10	N	1,000	70	N	20	N	150	N
006	<10	70	300	N	N	15	50	N	10	N	1,500	50	100	20	N	150	N
012	<10	15	50	N	N	7	50	N	7	N	1,000	70	N	20	N	150	N
013	<10	15	N	N	N	10	100	N	5	N	1,000	70	N	10	N	70	N
015	<10	100	70	N	N	10	150	N	5	N	1,000	200	N	20	N	100	N
017	50	30	30	N	N	20	50	N	10	N	1,000	100	N	20	N	100	N
018	<10	30	50	N	N	15	50	N	10	N	1,000	100	N	30	N	150	N
019	<10	1,000	50	<5	N	10	50	N	10	N	1,000	100	N	30	N	100	N
020	10	15	50	N	N	15	50	N	15	N	1,000	100	N	30	N	150	N
022	<10	200	50	N	N	15	300	N	10	N	3,000	200	N	20	N	100	N
025	<10	150	50	N	N	5	200	N	<5	N	2,000	150	N	20	N	150	N
026	<10	<5	30	N	N	7	50	N	7	N	1,000	50	N	20	N	150	N
028	<10	<5	70	N	N	5	30	N	5	N	1,000	50	N	20	N	150	N
029	<10	2,000	N	500	N	7	200	N	<5	N	500	150	N	10	N	50	N
030	20	20	20	5	N	15	50	N	5	N	1,000	100	N	20	N	150	N
031	<10	15	N	N	N	10	20	N	N	N	N	50	N	10	N	50	N
033	<10	10	20	N	N	10	15	N	10	N	500	70	N	20	N	70	N
034	<10	300	100	N	N	10	200	N	10	N	3,000	500	N	30	N	70	N
035	<10	20	20	N	N	7	50	N	10	N	1,000	100	N	20	N	70	N
039	15	200	N	20	N	5	10	N	10	N	700	100	N	15	N	100	N
040	100	70	1,000	N	50	10	70	N	100	<10	N	70	N	500	N	>1,000	200
041	10	20	30	N	N	7	20	N	10	N	700	100	N	20	N	500	N
042	10	15	20	N	N	10	30	N	10	N	1,000	100	N	20	N	150	N
043	<10	>20,000	100	N	N	5	150	N	10	N	1,500	1,500	N	20	N	100	N
045	<10	150	70	5	N	5	50	N	7	N	1,000	50	N	30	N	150	N
046	<10	1,000	N	300	N	5	300	N	<5	N	500	150	N	10	N	70	N
047	100	100	20	5	N	50	15	N	15	N	700	200	N	20	N	100	N
048	<10	100	100	N	N	5	200	N	N	N	2,000	150	N	20	N	150	N
050	150	15	70	N	N	50	50	N	15	N	1,000	150	N	30	N	150	N
051	15	15	N	N	N	10	50	N	7	N	1,000	100	N	15	N	100	N
052	<10	70	100	N	N	7	200	N	5	N	3,000	150	N	30	N	100	N
054	<10	7	30	N	N	7	15	N	7	N	700	70	N	20	N	100	N
055	15	15	N	N	N	15	70	N	10	N	1,000	100	N	20	N	100	N
058	20	7	N	N	N	10	50	N	10	N	1,000	70	N	20	N	100	N
062	10	70	20	N	N	15	50	N	10	N	1,000	100	N	30	N	100	N
063	<10	50	30	N	N	7	200	N	N	N	2,000	100	N	15	N	150	N
064	<10	30	30	N	N	10	30	N	10	N	1,000	100	N	20	N	100	N
066	<10	20	N	N	N	10	100	N	5	N	1,500	70	N	10	N	100	N
070	<10	50	N	N	N	7	50	N	5	N	700	70	N	15	N	100	N
071	<10	20	50	N	N	7	20	N	10	N	1,000	100	N	20	N	150	N
073	<10	100	70	N	N	5	100	N	5	N	2,000	150	N	20	N	100	N
077	<10	500	N	15	N	10	50	N	15	N	700	300	N	10	N	50	N
079	<10	200	70	5	N	7	150	N	7	N	3,000	300	N	20	N	100	N

TABLE 2.--Continued

SAMPLE	LATITUDE	LONGITUDE	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA	S-BE	S-BI	S-CD	S-CO
080	37 45 1	110 37 6	3.0	1.00	2.00	.20	1,500	N	N	N	10	1,000	1.0	N	N	5
081	37 56 35	110 47 20	2.0	1.00	1.50	.20	1,000	N	N	N	20	2,000	<1.0	N	N	7
082	37 47 45	110 33 21	2.0	.50	1.00	.15	700	N	N	N	15	1,500	1.0	N	N	5
083	37 57 30	110 47 34	2.0	1.00	2.00	.20	1,500	N	N	N	30	3,000	1.0	N	N	10
085	37 47 20	110 33 38	2.0	.70	1.50	.20	700	N	N	N	10	1,000	<1.0	N	N	5
088	37 58 8	110 41 33	2.0	1.00	2.00	.30	700	N	N	N	30	1,500	1.0	N	N	N
089	37 57 39	110 47 44	2.0	1.00	2.00	.30	1,000	N	N	N	30	1,500	1.0	N	N	7
090	37 57 0	110 47 42	1.0	.70	1.00	.20	200	N	N	N	15	1,000	<1.0	N	N	N
091	37 57 35	110 47 19	3.0	1.00	3.00	.30	700	N	N	N	30	1,000	<1.0	N	N	<5
095	37 54 27	110 41 8	3.0	1.00	2.00	.30	1,000	N	N	N	200	1,000	1.0	N	N	5
097	37 57 40	110 47 18	3.0	.70	2.00	.30	700	N	N	N	50	1,000	1.0	N	N	10
098	37 48 48	110 34 19	1.0	1.00	1.50	.20	300	<.5	N	N	50	500	1.5	N	N	5
099	37 48 9	110 35 16	3.0	.70	2.00	.30	1,000	N	N	N	15	1,000	1.5	N	N	10
102	37 57 51	110 47 46	7.0	1.50	15.00	.30	3,000	N	N	N	100	500	1.0	N	N	50
105	37 57 5	110 47 51	5.0	.70	1.00	.20	700	N	N	N	10	2,000	1.0	N	N	N
108	37 57 30	110 48 13	5.0	1.00	2.00	.20	1,500	N	N	N	50	1,000	1.5	N	N	7
110	37 57 59	110 46 22	7.0	1.50	3.00	.30	1,500	N	N	N	20	1,000	1.0	N	N	30
111	37 52 25	110 41 57	5.0	1.00	3.00	.30	1,000	N	N	N	20	1,500	1.0	N	N	7
112	37 48 41	110 34 4	5.0	1.00	3.00	.30	1,000	N	N	N	15	1,500	1.5	N	N	10
114	37 57 46	110 47 46	5.0	1.00	3.00	.20	1,500	N	N	N	20	3,000	1.0	N	N	5
115	37 57 25	110 47 18	2.0	.05	.50	.05	500	3.0	N	N	10	700	2.0	30	N	N
116	37 45 25	110 37 15	7.0	.50	2.00	.30	1,000	N	N	N	20	1,000	1.0	N	N	5
117	37 55 15	110 41 8	7.0	.70	3.00	.20	2,000	N	N	N	15	1,500	1.0	N	N	7
118	37 58 5	110 47 44	7.0	1.50	15.00	.20	2,000	N	N	N	20	700	1.0	N	N	15
119	37 53 0	110 41 21	7.0	1.00	3.00	.20	2,000	N	N	N	20	1,000	<1.0	N	N	10
120	37 53 35	110 41 31	2.0	.20	1.50	.10	500	N	N	N	20	1,500	1.0	N	N	N
123	37 58 0	110 47 6	7.0	.70	2.00	.30	1,000	N	N	N	20	1,000	1.0	N	N	7
125	37 52 50	110 41 58	7.0	1.00	1.00	.50	500	<.5	N	N	20	500	1.0	N	N	N
126	37 57 3	110 47 48	5.0	1.00	1.00	.50	500	N	N	N	15	1,000	1.0	N	N	N
128	37 56 30	110 47 10	3.0	.70	1.00	.15	1,000	N	N	N	15	2,000	1.0	N	N	5
129	37 56 7	110 44 39	7.0	1.00	5.00	.50	1,000	N	N	N	15	1,000	1.0	N	N	10
130	37 45 20	110 37 55	7.0	1.00	5.00	.30	1,500	N	N	N	15	1,000	1.0	N	N	7
131	37 53 23	110 41 52	7.0	1.00	1.50	1.00	300	5.0	<200	N	20	500	1.0	10	N	5
132	37 56 54	110 47 13	5.0	.50	.50	.20	500	5.0	N	N	20	3,000	<1.0	50	N	N
133	37 56 58	110 47 31	7.0	1.00	5.00	.20	2,000	50.0	N	N	15	3,000	1.0	50	N	15
135	37 56 59	110 46 21	5.0	1.00	5.00	.30	1,000	N	N	N	20	1,500	1.0	N	N	<5
137	37 52 32	110 40 52	7.0	1.00	5.00	.50	2,000	N	N	N	30	1,000	1.0	N	N	10
138	37 44 56	110 36 52	2.0	.20	.50	.20	50	N	N	N	15	500	<1.0	N	N	N
140	37 53 39	110 41 24	2.0	.30	.70	.10	300	N	N	N	20	1,500	1.0	N	N	N
141	37 57 32	110 47 6	2.0	.30	1.00	.15	500	N	N	N	20	5,000	<1.0	N	N	N
144	37 55 51	110 41 0	7.0	1.00	7.00	.50	1,500	N	N	N	20	1,000	1.0	N	N	10
147	37 44 34	110 37 22	3.0	.70	2.00	.20	500	N	N	N	20	1,000	<1.0	N	N	N
148	37 53 12	110 42 14	5.0	1.00	5.00	.30	1,500	N	N	N	20	1,500	1.5	N	N	5
150	37 53 19	110 41 35	7.0	1.50	5.00	.50	500	N	N	N	20	1,500	1.0	N	N	15
152	37 45 1	110 38 40	3.0	1.00	3.00	.30	2,000	N	N	N	15	1,500	1.0	N	N	10

TABLE 2.--Continued

SAMPLE	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
080	<10	10	50	N	N	10	50	N	10	N	1,000	70	N	20	N	100	N
081	<10	200	100	15	N	10	300	N	7	N	2,000	200	N	30	N	150	N
082	10	20	30	N	N	10	70	N	7	N	1,000	70	N	20	N	150	N
083	<10	150	70	N	N	7	200	N	10	N	2,000	200	N	30	N	100	N
085	10	15	30	N	N	10	70	N	7	N	1,000	70	N	20	N	100	N
088	50	15	30	N	N	10	70	N	15	N	1,000	100	N	30	N	100	N
089	10	15	50	N	N	10	70	N	10	N	1,000	70	N	30	N	150	N
090	<10	70	70	20	N	5	50	N	7	N	700	70	N	20	N	100	N
091	10	7	50	N	N	7	50	N	15	N	700	100	N	30	N	150	N
095	<10	7	70	N	N	7	20	N	7	N	700	100	N	30	N	150	N
097	10	20	70	N	N	7	30	N	5	N	1,000	70	N	30	N	150	N
098	50	5	N	N	N	10	15	N	<5	N	100	20	N	10	N	200	N
099	20	20	30	N	N	15	100	N	7	N	1,000	70	N	20	N	100	N
102	100	15	50	10	N	50	15	N	10	N	700	200	N	30	N	100	N
105	<10	70	50	20	N	5	70	N	7	N	500	150	N	15	N	100	N
108	15	10	50	N	N	15	100	N	10	N	1,000	50	N	20	N	100	N
110	50	50	30	N	N	20	50	N	20	N	1,000	150	N	30	N	100	N
111	15	10	50	N	N	10	20	N	10	N	700	100	N	50	N	150	N
112	15	15	20	N	N	15	70	N	7	N	100	70	N	20	N	150	N
114	<10	15	70	N	N	7	50	N	7	N	100	70	N	30	N	100	N
115	<10	500	N	200	N	10	2,000	N	N	N	500	100	N	N	N	100	N
116	10	7	50	N	N	10	50	N	10	N	500	100	N	30	N	100	N
117	10	20	70	N	N	15	50	N	10	N	1,000	100	N	30	N	150	N
118	150	20	70	15	N	70	70	N	20	N	500	300	N	50	N	100	N
119	10	20	50	N	N	10	50	N	10	N	1,000	100	N	30	N	150	N
120	<10	<5	N	7	N	10	50	N	N	N	500	50	N	10	N	100	N
123	<10	10	50	N	N	10	50	N	10	N	700	100	N	30	N	150	N
125	30	100	50	N	N	7	700	N	10	N	700	100	N	30	N	100	N
126	<10	500	100	30	N	10	50	N	15	N	1,000	100	N	30	N	50	N
128	<10	100	20	N	N	5	150	N	5	N	1,000	150	N	20	N	100	N
129	<10	15	70	N	N	7	100	N	10	N	1,000	100	N	10	N	150	N
130	<10	10	50	N	N	10	50	N	10	N	1,000	100	N	30	N	100	N
131	15	5,000	30	70	N	15	150	100	20	N	1,000	300	70	30	N	100	N
132	<10	300	50	30	N	7	700	N	N	N	500	150	70	30	N	100	N
133	<10	15,000	100	N	N	10	500	N	7	N	1,000	1,000	70	<10	N	100	N
135	<10	100	50	7	N	10	50	N	7	N	1,000	70	70	15	N	150	N
137	<10	30	30	N	N	10	100	N	N	N	1,000	70	70	15	N	150	N
138	10	15	30	5	N	5	<10	N	15	N	1,000	50	70	30	N	100	N
140	<10	10	N	N	N	7	70	N	N	N	1,000	50	70	20	N	100	N
141	<10	30	N	N	N	7	200	N	5	N	1,000	100	70	10	N	100	N
144	<10	50	50	N	N	10	50	N	10	N	500	100	70	15	N	100	N
147	<10	30	30	N	N	5	20	N	7	N	500	70	70	20	N	100	N
148	<10	10	70	N	N	5	100	N	10	N	500	70	70	30	N	150	N
150	30	70	30	5	N	20	30	N	15	N	700	100	N	30	N	150	N
152	20	10	30	N	N	15	50	N	10	N	1,000	100	N	30	N	100	N

TABLE 2.--Continued

SAMPLE	LATITUDE	LONGITUDE	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA	S-BE	S-BI	S-CD	S-CO
155	37 54 3	110 40 46	3.0	1.00	5.00	.30	1,500	N	N	N	20	1,000	1.0	N	N	10
156	37 54 17	110 45 27	2.0	1.00	2.00	.20	1,500	N	N	N	20	1,500	1.5	N	N	7
157	37 54 8	110 40 51	3.0	1.00	7.00	.30	2,000	N	N	N	15	2,000	1.0	N	N	15
159	37 41 17	110 38 23	1.5	.70	1.50	.15	1,000	N	N	N	10	700	1.5	N	N	7
164	37 53 1	110 39 19	.7	.50	1.00	.05	200	N	N	N	20	500	<1.0	N	N	N
165	37 54 16	110 37 48	1.5	.70	>20.00	.07	2,000	N	N	N	20	100	<1.0	N	N	<5
166	37 53 54	110 41 3	5.0	.70	3.00	.30	2,000	N	N	N	15	1,000	1.0	N	N	10
167	37 57 36	110 46 57	3.0	.70	3.00	.30	500	N	N	N	30	1,500	1.0	N	N	N
170	37 53 44	110 41 20	3.0	1.00	5.00	.30	1,000	N	N	N	30	1,000	1.0	N	N	7
171	37 56 57	110 47 47	2.0	.70	3.00	.30	500	N	N	N	20	1,000	1.0	N	N	N
172	37 57 37	110 47 41	3.0	.70	2.00	.30	1,000	N	N	N	30	2,000	1.0	N	N	N
174	37 57 58	110 46 38	5.0	1.00	3.00	.50	1,500	N	N	N	10	1,000	1.5	N	N	15
175	37 54 50	110 42 35	7.0	1.00	7.00	.50	2,000	N	N	N	10	1,000	1.0	N	N	15
177	37 53 9	110 42 21	5.0	1.00	3.00	.50	2,000	N	N	N	<10	1,500	1.0	N	N	5
179	37 57 16	110 47 31	7.0	.05	1.00	.05	150	.5	N	N	10	700	1.5	N	N	N
180	37 57 39	110 46 51	7.0	1.00	3.00	.30	700	N	N	N	20	1,500	1.0	N	N	<5
181	37 45 26	110 37 15	5.0	.70	2.00	.30	700	N	N	N	15	2,000	1.5	N	N	30
182	37 53 25	110 41 56	.2	1.00	2.00	.50	300	N	N	N	10	1,000	1.0	N	N	5
186	37 53 26	110 41 33	3.0	.70	7.00	.15	5,000	N	500	N	50	150	1.0	N	N	5
190	37 57 35	110 48 30	5.0	.70	2.00	.20	1,000	N	N	N	15	1,000	1.0	N	N	7
191	37 53 28	110 37 13	5.0	1.00	3.00	.20	1,500	N	N	N	10	1,000	<1.0	N	N	15
195	37 56 45	110 47 36	3.0	1.00	2.00	.15	1,500	N	N	N	50	3,000	1.0	N	N	10
198	37 44 44	110 37 7	7.0	1.00	3.00	.30	700	N	N	N	20	1,500	1.0	N	N	7
200	37 54 48	110 36 5	5.0	1.00	3.00	.30	1,500	N	N	N	50	700	1.0	N	N	10
201	37 49 32	110 43 50	20.0	.50	.15	>1.00	2,000	N	N	N	100	500	2.0	N	N	10
202	37 55 18	110 46 27	7.0	1.00	2.00	.50	1,500	N	N	N	15	1,000	1.0	N	N	<5
203	37 57 7	110 47 46	7.0	1.00	2.00	.30	1,500	N	N	N	20	3,000	1.0	N	N	<5
206	37 52 55	110 41 55	10.0	1.50	1.50	.50	1,000	N	N	N	20	1,500	<1.0	N	N	10
209	37 56 13	110 46 22	5.0	.70	2.00	.20	1,000	N	N	N	15	1,000	1.0	N	N	5
210	37 45 1	110 38 39	5.0	1.00	1.50	.20	1,000	N	N	N	15	1,500	1.0	N	N	7
211	37 56 27	110 47 1	10.0	1.00	20.00	.20	5,000	N	N	N	100	150	1.0	N	N	5
212	37 51 18	110 41 11	.2	.20	2.00	.05	200	N	N	N	10	100	N	N	N	<5
213	38 2 27	110 47 45	15.0	3.00	5.00	.50	1,500	N	N	N	10	1,000	N	N	N	50
216	37 54 11	110 40 55	5.0	1.00	2.00	.30	700	N	N	N	10	1,000	1.0	N	N	5
219	37 54 3	110 36 7	7.0	1.00	2.00	.30	1,000	N	N	N	15	1,000	1.0	N	N	10
220	37 57 3	110 47 48	5.0	.70	1.50	.15	1,000	N	N	N	30	1,500	1.0	N	N	<5
221	37 53 13	110 41 54	7.0	1.50	2.00	.30	1,000	N	N	N	10	1,000	1.0	N	N	10
222	37 44 51	110 37 17	5.0	1.00	2.00	.20	500	N	N	N	10	1,000	1.0	N	N	10
224	37 56 26	110 47 1	10.0	1.50	15.00	.30	5,000	N	N	N	50	2,000	1.0	N	N	<5
225	37 56 40	110 46 47	7.0	1.50	3.00	.30	1,500	N	N	N	20	3,000	1.0	N	N	15
227	37 53 6	110 42 31	5.0	1.00	5.00	.50	1,000	N	N	N	15	1,500	1.0	N	N	5
228	37 54 16	110 37 48	5.0	.70	2.00	.20	500	N	N	N	20	200	1.0	N	N	<5
229	37 53 13	110 41 44	7.0	.70	1.50	.50	700	<.5	N	N	<10	700	1.0	N	N	7
230	37 57 30	110 47 19	5.0	.50	1.00	.20	1,000	N	N	N	15	1,000	1.0	N	N	N
231	37 57 20	110 47 17	3.0	.30	.70	.10	700	N	N	N	20	1,500	1.0	N	N	N

TABLE 2.--Continued

SAMPLE	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
155	<10	10	30	N	N	7	30	N	10	N	1,000	100	N	50	N	150	N
156	<10	<5	50	N	N	7	50	N	7	N	1,000	70	N	30	N	150	N
157	<10	15	50	N	N	7	50	N	10	N	1,000	100	N	50	N	150	N
159	<10	10	N	N	N	7	30	N	5	N	700	100	N	20	N	100	N
164	<10	20	N	N	N	10	<10	N	N	N	100	50	N	N	N	100	N
165	20	7	N	N	N	10	20	N	5	N	200	70	N	20	N	50	N
166	<10	50	70	N	N	7	50	N	10	N	700	70	N	30	N	150	N
167	<10	15	50	N	N	7	50	N	7	N	1,000	70	N	20	N	150	N
170	10	15	30	N	N	10	30	N	10	N	1,000	70	N	30	N	150	N
171	10	20	20	10	N	7	50	N	7	N	1,000	100	N	20	N	150	N
172	<10	70	50	5	N	5	50	N	7	N	700	70	N	30	N	150	N
174	10	20	30	N	N	15	50	N	10	N	700	100	N	20	N	150	N
175	10	20	50	N	N	10	50	N	15	N	700	100	N	30	N	200	N
177	<10	15	70	N	N	7	70	N	10	N	1,000	100	N	30	N	150	N
179	<10	700	50	30	N	7	70	N	N	N	200	50	N	N	N	50	N
180	<10	20	50	N	N	10	50	N	7	N	1,000	100	N	30	N	50	N
181	10	20	50	N	N	10	50	N	7	N	700	100	N	30	N	100	N
182	50	200	50	10	N	10	50	N	N	N	700	100	N	30	N	100	N
186	50	50	N	N	N	10	100	N	5	N	300	70	N	20	N	150	N
190	<10	5	50	N	N	10	50	N	7	N	1,000	50	N	15	N	100	N
191	10	50	30	N	N	15	50	N	10	N	1,000	100	N	30	N	70	N
195	N	70	70	N	N	5	200	N	5	N	2,000	150	N	20	N	70	N
198	20	<5	30	N	N	10	50	N	15	N	1,000	70	N	20	N	150	N
200	N	20	70	N	N	5	50	N	10	N	700	70	N	30	N	150	N
201	200	100	>1,000	N	50	10	150	N	>100	70	<100	200	N	1,500	N	>1,000	150
202	10	10	50	N	N	<5	100	N	10	N	1,000	100	N	50	N	500	N
203	<10	200	100	N	N	10	500	N	<5	N	>5,000	300	N	70	N	200	N
206	30	100	30	10	N	10	20	N	20	N	1,000	200	N	50	N	200	N
209	<10	10	50	N	N	5	300	N	5	N	1,000	100	N	20	<200	150	N
210	15	5	50	N	N	10	50	N	5	N	700	100	N	30	N	150	N
211	70	10	70	N	N	30	50	N	10	N	1,500	150	N	50	N	150	N
212	<10	5	N	N	N	5	<10	N	N	N	N	20	N	N	N	100	N
213	150	100	N	N	N	50	50	N	20	N	1,500	300	N	30	N	150	N
216	10	20	50	N	N	5	50	N	10	N	1,000	100	N	30	N	150	N
219	<10	20	30	N	N	7	50	N	15	N	1,000	100	N	30	N	150	N
220	<10	100	50	N	N	5	300	N	5	N	2,000	150	N	20	N	150	N
221	<10	70	30	N	N	15	15	N	10	N	1,000	100	N	30	N	100	N
222	<10	100	30	N	N	10	50	N	10	N	700	100	N	30	N	100	N
224	70	20	20	N	<20	30	50	N	15	N	1,000	150	N	30	N	150	N
225	<10	100	70	N	N	7	70	N	15	N	1,500	200	N	30	N	100	N
227	<10	5	50	N	N	<5	30	N	7	N	1,500	100	N	30	N	200	N
228	10	10	N	N	N	10	<10	N	<5	N	N	100	N	10	N	300	N
229	<10	700	50	N	N	7	50	N	7	N	1,000	150	N	30	N	150	N
230	N	300	30	7	N	5	70	N	N	N	2,000	200	N	15	N	200	N
231	N	10	N	N	N	5	150	N	N	N	2,000	100	N	<10	N	200	N

TABLE 2.--Continued

SAMPLE	LATITUDE	LONGITUDE	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA	S-BE	S-BI	S-CD	S-CO
233	37 51 23	110 40 31	7.0	1.00	3.00	.30	1,500	N	N	N	10	1,000	<1.0	N	N	5
234	37 53 52	110 37 47	7.0	1.00	3.00	.30	1,500	N	N	N	15	1,000	<1.0	N	N	10
235	37 57 30	110 47 49	5.0	.70	3.00	.20	2,000	N	N	N	15	1,500	1.0	N	N	10
236	37 57 3	110 47 55	7.0	1.00	3.00	.30	700	N	N	N	20	500	<1.0	N	N	N
237	37 53 35	110 41 31	3.0	.10	.70	.15	700	N	N	N	15	1,500	1.0	N	N	N
239	37 51 27	110 40 49	7.0	1.00	2.00	.30	1,500	N	N	N	15	700	1.0	N	N	10
240	37 53 55	110 40 54	7.0	.70	2.00	.30	500	N	N	N	20	1,000	1.0	N	N	7
241	37 52 59	110 39 30	7.0	1.00	3.00	.20	1,500	N	N	N	10	1,000	1.0	N	N	15
242	37 57 36	110 46 57	5.0	1.00	2.00	.30	300	N	N	N	20	1,000	1.0	N	N	N
245	37 44 43	110 37 9	7.0	1.00	2.00	.20	1,000	N	N	N	20	1,000	1.0	N	N	15
248	37 46 53	110 36 15	5.0	.10	2.00	.20	1,000	N	N	N	15	1,000	1.0	N	N	7
253	37 58 10	110 45 53	5.0	1.00	3.00	.15	1,500	N	N	N	10	1,000	1.0	N	N	10
254	37 59 58	110 47 31	2.0	.70	1.50	.30	1,500	N	N	N	10	2,000	1.0	N	N	N
257	37 53 9	110 42 20	5.0	1.00	5.00	.30	3,000	N	N	N	<10	1,500	1.0	N	N	10
259	37 57 18	110 47 25	.5	.20	>20.00	.30	1,000	5.0	N	N	<10	1,500	1.5	N	N	N
262	37 52 59	110 39 31	5.0	1.00	2.00	.20	1,500	N	N	N	10	1,000	1.0	N	N	10
264	37 43 0	110 38 5	1.5	.20	.10	.50	50	N	700	N	50	500	<1.0	N	N	N
265	37 53 6	110 41 49	7.0	1.50	5.00	.20	700	N	N	N	20	1,500	1.0	N	N	10
266	37 47 19	110 33 37	5.0	1.00	2.00	.30	1,000	N	N	N	<10	1,000	1.0	N	N	5
267	37 58 16	110 47 0	7.0	1.00	2.00	.15	1,500	N	N	N	20	1,500	1.0	N	N	5
269	37 52 12	110 43 35	7.0	1.50	5.00	.30	1,500	N	N	N	<10	1,500	1.0	N	N	15
270	37 52 7	110 41 47	5.0	1.50	5.00	.20	1,000	N	N	N	50	1,500	1.0	N	N	15
274	37 54 4	110 35 51	5.0	.70	3.00	.20	1,500	N	N	N	<10	1,000	1.0	N	N	<5
275	37 47 19	110 33 26	5.0	.70	3.00	.20	1,000	N	N	N	<10	1,000	1.0	N	N	5
277	37 57 27	110 47 22	5.0	.70	2.00	.20	1,000	N	N	N	15	2,000	1.0	N	N	<5
278	37 46 49	110 35 22	7.0	1.00	2.00	.30	1,500	N	N	N	10	2,000	<1.0	N	N	7
280	37 57 23	110 47 24	5.0	.50	1.50	.20	1,000	N	N	N	10	2,000	1.0	N	N	N
283	37 53 44	110 39 2	5.0	1.00	5.00	.30	1,500	N	N	N	15	1,500	1.0	N	N	15
284	37 56 35	110 46 19	5.0	.70	3.00	.20	2,000	N	N	N	20	2,000	1.0	N	N	10
288	37 51 45	110 39 31	.3	.15	1.50	.03	70	N	N	N	15	150	1.0	N	N	N
289	37 53 13	110 41 39	7.0	1.00	3.00	.30	500	N	N	N	20	700	<1.0	N	N	20
292	37 41 18	110 38 21	5.0	1.00	3.00	.20	1,000	N	N	N	10	1,000	1.0	N	N	7
294	37 45 17	110 37 13	5.0	.70	2.00	.30	1,000	N	N	N	10	1,000	1.0	N	N	5
295	37 58 5	110 47 45	5.0	2.00	15.00	.15	2,000	N	N	N	10	1,000	1.0	N	N	5
296	37 54 57	110 41 18	7.0	1.00	3.00	.30	2,000	N	N	N	10	1,500	1.0	N	N	20
HM900A	37 55 46	110 47 2	3.0	2.00	5.00	.50	1,500	N	N	N	<10	300	<1.0	N	N	5
HM900B	37 55 46	110 47 2	2.0	.50	2.00	.30	700	N	N	N	<10	700	<1.0	N	N	5
HM906E	37 57 7	110 48 0	3.0	.70	1.50	.50	500	N	N	N	N	500	N	N	N	N
HM907A	37 57 7	110 48 0	2.0	.50	2.00	.30	1,500	N	N	N	100	500	<1.0	N	N	7
HM907B	37 57 7	110 48 0	3.0	.70	2.00	.50	700	N	N	N	10	500	N	N	N	7
HM907C	37 57 7	110 48 0	.7	.05	.30	.20	500	N	N	N	N	500	<1.0	N	N	<5
HM907D	37 57 7	110 48 0	1.5	.70	.50	.50	300	N	N	N	N	500	N	N	N	N
HM908A	37 57 5	110 47 49	5.0	.70	10.00	.50	1,500	N	N	N	20	500	1.0	N	N	<5
HM909A	37 57 0	110 47 50	3.0	1.00	2.00	.30	1,000	N	N	N	N	300	<1.0	N	N	7
HM920	37 54 34	110 39 45	3.0	.70	2.00	.30	1,000	N	N	N	N	500	N	N	N	7

TABLE 2.--Continued

TABLE 2.--Continued

SAMPLE	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
233	10	5	30	N	N	10	50	N	10	N	1,000	100	N	20	N	300	N
234	10	20	30	N	N	15	50	N	10	N	1,000	100	N	30	N	100	N
235	<10	50	50	N	N	7	50	N	5	N	1,500	50	N	30	N	100	N
236	10	30	30	10	N	10	50	N	7	N	700	100	N	20	N	100	N
237	10	<5	N	N	N	10	50	N	N	N	700	70	N	<10	N	100	N
239	<10	15	50	N	N	10	30	N	10	N	1,000	100	N	20	N	100	N
240	<10	15	30	N	N	10	30	N	7	N	1,000	70	N	20	N	150	N
241	<10	7	50	N	N	10	50	N	10	N	1,500	70	N	20	N	100	N
242	<10	15	50	N	N	7	50	N	10	N	1,000	100	N	20	N	150	N
245	20	50	N	N	N	10	50	N	10	N	1,000	100	N	20	N	150	N
248	10	20	N	N	N	7	70	N	7	N	1,000	70	N	20	N	100	N
253	20	50	N	N	N	10	50	N	10	N	1,500	150	N	15	N	200	N
254	<10	15	20	N	N	5	150	N	5	N	1,500	100	N	15	N	200	N
257	<10	20	100	N	N	15	70	N	10	N	1,000	100	N	30	N	150	N
259	N	500	150	N	N	<5	70	N	N	N	>5,000	500	N	<10	N	10	N
262	<10	10	50	N	N	7	50	N	10	N	1,500	100	N	30	N	150	N
264	10	7	N	7	N	7	15	N	N	N	200	20	N	N	N	70	N
265	20	150	50	N	N	15	30	N	15	N	1,000	100	N	50	N	150	N
266	15	15	30	N	N	10	70	N	5	N	1,500	100	N	20	N	100	N
267	10	15	50	N	N	7	70	N	7	N	1,000	100	N	20	N	150	N
269	20	15	50	N	N	15	50	N	15	N	1,000	100	N	30	N	100	N
270	10	30	70	N	N	15	30	N	10	N	1,500	100	N	30	N	150	N
274	10	20	50	N	N	7	50	N	7	N	1,000	100	N	20	N	100	N
275	15	15	20	N	N	7	100	N	5	N	1,000	100	N	15	N	100	N
277	10	100	50	10	N	10	200	N	<5	N	3,000	100	N	15	N	100	N
278	20	15	30	5	N	10	100	N	7	N	1,500	150	N	20	N	200	N
280	10	70	30	5	N	7	100	N	5	N	1,500	100	N	20	N	150	N
283	<10	20	50	N	N	10	70	N	10	N	1,000	100	N	30	N	150	N
284	<10	100	70	N	N	10	100	N	5	N	2,000	200	N	30	N	100	N
288	<10	5	N	N	N	10	<10	N	N	N	N	20	N	N	N	30	N
289	20	200	50	7	N	20	30	N	15	N	700	150	N	50	N	150	N
292	10	<5	20	N	N	10	30	N	10	N	1,000	100	N	20	N	100	N
294	10	20	30	N	N	10	70	N	10	N	1,000	100	N	20	N	100	N
295	70	15	30	5	N	50	30	N	10	N	700	150	N	20	N	50	N
296	<10	20	70	N	N	30	50	N	10	N	1,000	100	N	20	N	150	N
HM900A	100	10	20	N	<20	20	30	N	10	N	300	200	N	20	N	100	N
HM900B	N	10	20	N	N	<5	30	N	5	N	1,000	100	N	20	N	70	N
HM906E	10	20	30	10	N	<5	30	N	7	N	700	150	N	20	N	200	N
HM907A	N	50	30	N	<20	5	150	N	5	N	1,500	200	N	20	N	150	N
HM907B	10	20	30	5	N	5	30	N	7	N	700	150	N	20	N	200	N
HM907C	N	10	<20	N	N	<5	20	N	<5	N	1,000	150	N	<10	N	70	N
HM907D	<10	20	20	100	N	<5	50	N	5	N	500	150	N	20	N	150	N
HM908A	30	20	30	N	<20	7	20	N	10	N	1,000	100	N	30	N	200	N
HM909A	<10	30	50	N	N	<5	70	N	7	N	1,500	200	N	20	N	100	N
HM920	N	20	20	N	N	<5	30	N	7	N	1,000	200	N	20	N	70	N

TABLE 2.--Continued

SAMPLE	LATITUDE	LONGITUDE	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA	S-BE	S-BI	S-CD	S-CO
HM921	37 54 34	110 39 45	2.0	.70	2.00	.20	700	N	N	N	N	500	N	N	N	7

TABLE 2.--Continued

SAMPLE	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
HM921	10	20	<20	N	N	5	50	N	5	N	1,000	100	N	10	N	70	N

TABLE 3.--Spectrographic analysis of stream-sediment samples from Little Rockies, Mt. Pennell, and Mt. Hillers Wilderness Study Areas, Utah

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

SAMPLE	LATITUDE	LONGITUDE	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA	S-BE	S-BI	S-CD	S-CO	S-CR
HM001	37 41 18	110 39 25	.5	.5	1.0	.20	100	N	N	N	100	500	1.0	N	N	N	20
HM002	37 41 20	110 38 15	1.0	1.0	1.5	.30	300	<.5	N	N	150	300	1.0	N	N	N	30
HM003	37 42 58	110 39 44	.3	.5	1.0	.07	100	N	N	N	20	200	1.0	N	N	N	N
HM004	37 46 38	110 38 59	1.5	.7	1.5	.50	500	N	N	N	70	1,000	1.0	N	N	5	70
HM005	37 46 24	110 39 7	.7	.3	1.0	.15	150	N	N	N	20	700	1.0	N	N	N	10
HM006	37 49 5	110 36 59	.7	.5	1.0	.20	200	N	N	N	50	500	1.0	N	N	N	20
HM007	37 49 1	110 36 46	.7	.5	1.0	.30	200	N	N	N	50	500	1.0	N	N	N	10
HM008	37 49 15	110 36 25	.5	.5	.7	.20	150	N	N	N	50	150	1.0	N	N	N	<10
HM009	37 49 36	110 35 33	.3	.5	.5	.10	100	N	N	N	20	200	1.0	N	N	N	N
HM021	37 55 48	110 36 27	.5	.5	2.0	.07	100	N	N	N	30	200	1.0	N	N	N	10
HM022	37 56 13	110 37 58	1.0	1.0	2.0	.20	500	N	N	N	70	300	1.5	N	N	N	20
HM023	37 56 31	110 39 33	.7	.3	3.0	.20	150	N	N	N	50	200	1.0	N	N	N	20
HM024	37 56 43	110 40 35	1.0	.7	1.0	.20	100	N	N	N	50	200	1.5	N	N	5	30
HM025	37 53 54	110 43 57	.7	.3	.2	.20	100	N	N	N	70	200	1.0	N	N	N	50
HM034	37 55 33	110 55 37	1.5	1.0	3.0	.30	200	N	N	N	50	300	1.0	N	N	5	70
HM043	37 45 55	110 33 55	.3	.3	.5	.20	100	N	N	N	30	500	1.0	N	N	N	<10
HM044	37 45 45	110 33 58	1.0	1.5	1.5	.20	500	N	N	N	50	700	1.0	N	N	N	10
HM046	37 45 57	110 32 14	.5	1.0	2.0	.20	200	<.5	N	N	30	500	1.0	N	N	N	<10
HM047	37 46 13	110 32 13	.7	1.0	1.5	.20	200	N	N	N	50	700	1.0	N	N	N	10
HM048	37 47 8	110 32 17	1.0	1.0	3.0	.30	200	N	N	N	50	1,000	1.0	N	N	5	30
HM049	37 48 46	110 31 45	1.0	1.5	3.0	.20	300	N	N	N	50	500	1.0	N	N	5	100
HM053	37 49 53	110 31 55	1.0	.7	2.0	.30	200	N	N	N	30	700	1.0	N	N	5	20
HM054	37 50 7	110 31 57	.5	1.0	1.0	.07	150	<.5	N	N	20	200	1.0	N	N	N	10
HM056	37 42 30	110 33 45	.5	.5	.7	.30	100	N	N	N	200	200	1.0	N	N	N	20
HM057	37 42 43	110 33 35	1.0	.7	1.5	.50	150	N	N	N	100	300	1.0	N	N	5	70
HM058	37 44 10	110 32 57	.5	.5	.5	.15	100	N	N	N	70	300	1.0	N	N	N	10
HM059	37 44 14	110 32 48	.3	.5	.3	.10	100	N	N	N	20	200	1.0	N	N	N	<10
HM060	37 42 12	110 32 44	.5	.5	.7	.20	70	N	N	N	100	200	1.0	N	N	N	10
HM061	37 51 23	110 30 34	1.0	.3	.7	.20	500	N	N	N	100	1,500	1.0	N	N	N	15
HM063	37 49 43	110 35 18	1.0	1.0	2.0	.30	200	N	N	N	150	300	1.5	N	N	5	50
HM064	37 52 25	110 30 27	.5	.3	.5	.20	70	<.5	N	N	100	200	1.0	N	N	N	100
HM065	37 52 55	110 30 58	.5	.5	1.0	.15	100	.5	N	N	50	200	1.0	N	N	N	10
HM066	37 53 30	110 31 21	.3	.5	.7	.10	100	<.5	N	N	20	200	1.0	N	N	N	10
HM067	37 53 15	110 31 47	2.0	.7	3.0	.30	500	N	N	N	20	1,000	1.0	N	N	N	20
HM068	37 53 43	110 31 57	2.0	.7	1.5	.50	200	N	N	N	200	1,000	1.0	N	N	5	500
HM069	37 54 36	110 31 38	.2	.3	.7	.10	100	N	N	N	20	300	1.0	N	N	N	100
HM070	37 55 13	110 31 49	1.0	1.0	3.0	.50	200	N	N	N	30	1,000	1.0	N	N	5	100
HM071	37 56 40	110 32 45	.3	.2	.7	.05	70	<.5	N	N	30	150	1.0	N	N	N	N
HM072	37 56 30	110 32 55	.5	.7	2.0	.10	100	<.5	N	N	100	1,500	1.0	N	N	5	10
HM073	37 56 14	110 32 47	1.0	.7	2.0	.20	200	N	N	N	100	1,000	N	N	N	5	50
HM074	37 55 26	110 32 27	1.0	1.0	2.0	.30	200	N	N	N	100	300	1.0	N	N	5	50
HM075	37 55 29	110 32 17	1.0	1.0	2.0	.30	150	N	N	N	70	200	1.0	N	N	N	20
HM076	37 54 9	110 31 33	.3	.3	.1	.07	70	<.5	N	N	20	200	1.0	N	N	N	<10
HM100	37 56 20	110 52 37	1.5	1.0	3.0	.20	200	<.5	N	N	20	1,000	1.5	N	N	5	30
HM101	37 56 26	110 52 40	.7	.7	.7	.20	100	N	N	N	50	500	1.0	N	N	5	20

TABLE 3.--Continued

SAMPLE	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
HM001	10	N	N	N	5	10	N	--	N	N	15	N	20	N	--	N
HM002	7	50	N	N	5	10	N	--	N	100	20	N	15	N	--	N
HM003	5	N	N	N	N	10	N	--	N	N	10	N	N	N	--	N
HM004	10	20	N	N	7	20	N	--	N	100	50	N	20	N	--	N
HM005	7	N	N	N	5	15	N	--	N	100	20	N	N	N	--	N
HM006	5	N	N	N	5	10	N	--	N	100	30	N	10	N	--	N
HM007	5	N	N	N	5	15	N	--	N	N	30	N	15	N	--	N
HM008	5	N	N	N	5	15	N	--	N	N	15	N	10	N	--	N
HM009	5	N	N	N	5	10	N	--	N	N	10	N	N	N	--	N
HM021	5	N	N	N	5	10	N	--	N	100	20	N	10	N	--	N
HM022	5	20	N	N	5	15	N	--	N	100	50	N	20	N	--	N
HM023	7	100	N	N	5	15	N	--	N	200	50	N	20	N	--	N
HM024	10	N	N	N	10	15	N	--	N	150	50	N	15	N	--	N
HM025	10	50	N	N	10	30	N	--	N	N	50	N	20	N	--	N
HM034	10	50	N	N	10	15	N	--	N	200	70	N	15	N	--	N
HM043	5	N	N	N	5	10	N	--	N	100	10	N	10	N	--	N
HM044	7	150	N	N	5	10	N	--	N	150	20	N	20	N	--	N
HM046	7	N	N	N	5	10	N	--	N	100	20	N	10	N	--	N
HM047	7	N	N	N	7	15	N	--	N	100	15	N	10	N	--	N
HM048	7	N	N	N	7	10	N	--	N	150	30	N	20	N	--	N
HM049	10	20	N	N	10	10	N	--	N	200	20	N	10	N	--	N
HM053	7	20	N	N	7	15	N	--	N	100	20	N	10	N	--	N
HM054	7	N	N	N	5	10	N	--	N	100	30	N	10	N	--	N
HM056	5	N	N	N	N	15	N	--	N	N	50	N	<10	N	--	N
HM057	7	N	N	N	5	20	N	--	N	100	50	N	20	N	--	N
HM058	5	N	N	N	N	20	N	--	N	100	20	N	N	N	--	N
HM059	5	20	N	N	5	15	N	--	N	100	10	N	<10	N	--	N
HM060	7	N	N	N	5	20	N	--	N	100	15	N	10	N	--	N
HM061	7	20	N	N	5	15	N	--	N	100	20	N	10	N	--	N
HM063	10	50	N	<20	10	20	N	--	N	200	20	N	70	N	--	N
HM064	<5	N	N	N	5	10	N	--	N	N	15	N	10	N	--	N
HM065	7	N	N	N	7	15	N	--	N	100	15	N	10	N	--	N
HM066	<5	20	N	N	7	10	N	--	N	100	10	N	10	N	--	N
HM067	10	20	N	<20	10	15	N	--	N	200	50	N	15	N	--	N
HM068	10	20	N	N	10	20	N	--	N	100	50	N	20	N	--	N
HM069	5	N	N	N	5	15	N	--	N	N	10	N	N	N	--	N
HM070	10	50	N	N	5	15	N	--	N	100	50	N	20	N	--	N
HM071	5	N	N	N	N	20	N	--	N	N	10	N	N	N	--	N
HM072	5	N	N	N	5	10	N	--	N	100	20	N	N	N	--	N
HM073	5	20	N	N	5	10	N	--	N	100	30	N	15	N	--	N
HM074	7	20	N	N	5	15	N	--	N	100	50	N	15	N	--	N
HM075	7	20	N	N	5	20	N	--	N	N	30	N	15	N	--	N
HM076	<5	N	N	N	5	15	N	--	N	N	<10	N	N	N	--	N
HM100	10	100	N	N	10	20	N	--	N	100	30	N	20	N	--	N
HM101	5	20	N	N	7	20	N	--	N	N	20	N	15	N	--	N

TABLE 3.--Continued

SAMPLE	LATITUDE	LONGITUDE	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA	S-BE	S-BI	S-CD	S-CO	S-CR
HM102	37 59 30	110 51 8	1.0	1.5	5.0	.20	150	<.5	N	N	30	300	1.0	N	N	5	50
HM103	37 59 38	110 51 8	1.5	1.5	3.0	.30	200	N	N	N	30	200	1.5	N	N	7	50
HM104	37 54 53	110 51 53	1.0	1.5	3.0	.20	200	N	N	N	30	200	1.0	N	N	7	50
HM105	37 57 8	110 52 35	1.0	1.0	2.0	.50	150	<.5	N	N	20	200	1.5	N	N	5	20
HM106	37 57 3	110 52 40	1.0	1.5	2.0	.50	300	<.5	N	N	20	1,000	1.0	N	N	7	30
HM107	37 57 44	110 52 57	1.0	1.5	2.0	.30	200	<.5	N	N	20	700	1.0	N	N	10	20
HM108	37 56 40	110 53 2	1.5	1.5	2.0	.50	300	N	N	N	30	1,000	1.0	N	N	10	100
HM109	37 57 17	110 56 10	1.0	1.0	1.5	.20	150	N	N	N	20	300	1.0	N	N	10	50
HM110	37 57 23	110 55 58	1.0	1.0	2.0	.20	150	<.5	N	N	30	200	1.0	N	N	7	50
HM111	37 56 13	110 54 25	1.5	1.5	3.0	.50	500	N	N	N	50	700	1.0	N	N	5	30
HM112	37 56 14	110 54 16	2.0	2.0	5.0	1.00	700	N	N	N	100	700	1.5	N	N	10	150
HM113	37 56 13	110 54 13	1.0	1.0	2.0	1.00	200	N	N	N	70	500	1.0	N	N	5	20
HM114	37 55 50	110 55 29	1.0	1.5	2.0	.20	500	<.5	N	N	50	700	1.0	N	N	5	15
HM115	37 55 46	110 55 55	1.0	1.5	2.0	.50	500	N	N	N	70	500	1.5	N	N	7	30
HM116	37 54 39	110 55 38	1.0	1.0	2.0	.20	200	<.5	N	N	50	1,000	1.5	N	N	5	70
HM117	37 56 12	110 57 26	1.0	1.5	3.0	.70	700	N	N	N	70	1,000	1.0	N	N	5	70
HM118	37 54 12	110 58 16	.7	1.0	1.5	.30	200	<.5	N	N	70	500	1.5	N	N	5	50
HM119	37 54 9	110 58 27	1.5	2.0	2.0	.50	700	<.5	N	N	50	1,000	1.5	N	N	7	70
HM120	37 53 10	110 58 12	1.5	1.5	1.5	.70	300	N	N	N	50	1,000	1.0	N	N	7	50
HM121	37 53 14	110 58 30	1.5	1.5	2.0	.50	200	N	N	N	50	1,000	1.0	N	N	5	50
HM122	37 52 43	110 59 28	1.0	1.0	1.5	.70	200	N	N	N	50	700	1.0	N	N	5	30
HM123	37 52 31	110 59 23	.7	1.0	1.5	.30	500	<.5	N	N	50	500	1.0	N	N	5	30
HM124	37 53 50	110 54 59	1.5	2.0	3.0	.50	500	<.5	N	N	100	700	1.5	N	N	7	50
HM125	37 53 3	110 55 15	1.5	1.5	2.0	.50	300	<.5	N	N	30	300	1.5	N	N	7	50
HM126	37 52 19	110 54 20	1.0	2.0	3.0	.30	200	<.5	N	N	30	200	1.5	N	N	7	70
HM127	37 51 35	110 54 33	1.0	1.0	3.0	.20	150	N	N	N	50	200	1.0	N	N	5	20
HM128	37 51 33	110 56 26	1.5	1.5	3.0	.50	500	N	N	N	70	500	1.0	N	N	7	50
HM129	37 55 40	110 51 45	1.5	1.5	2.0	.30	200	<.5	N	N	70	300	1.0	N	N	5	20
HM130	37 58 40	110 49 45	1.5	.7	5.0	.30	200	<.5	N	N	100	200	1.0	N	N	10	100
HM131	37 58 35	110 49 50	2.0	2.0	7.0	.20	200	.5	N	N	100	200	1.0	N	N	5	100
HM132	37 57 58	110 49 57	1.5	.5	1.0	.50	300	N	N	N	50	300	1.0	N	N	5	50
HM133	37 56 45	110 50 30	1.5	1.0	5.0	.30	100	<.5	N	N	100	500	1.5	N	N	7	100
HM134	37 55 40	110 49 52	2.0	1.0	3.0	.70	500	N	N	N	100	700	1.0	N	N	5	70
HM135	37 55 32	110 49 48	1.5	1.5	5.0	.50	300	<.5	N	N	100	500	1.0	N	N	10	70
HM136	37 49 33	110 47 50	2.0	2.0	10.0	.70	150	.7	N	N	150	500	1.5	N	N	10	150
HM137	37 49 37	110 48 3	2.0	1.5	10.0	.50	200	.5	N	N	70	500	1.5	N	N	5	150
HM138	37 48 47	110 49 10	.5	.7	1.0	.10	300	<.5	N	N	50	300	N	N	N	N	30
HM139	37 48 55	110 49 58	1.5	1.0	3.0	.20	200	<.5	N	N	50	500	1.0	N	N	5	50
HM140	37 53 33	110 51 0	1.5	2.0	3.0	.30	150	N	N	N	70	300	1.0	N	N	5	100
HM141	37 53 46	110 51 35	1.0	1.0	2.0	.15	100	N	N	N	50	1,000	1.0	N	N	5	50
HM142	37 54 12	110 52 18	.7	1.0	2.0	.20	200	N	N	N	30	700	1.0	N	N	5	30
HM143	37 52 27	110 51 40	1.0	1.0	2.0	.20	150	<.5	N	N	50	200	1.5	N	N	5	50
HM144	37 51 43	110 51 33	1.5	2.0	5.0	.50	200	<.5	N	N	100	500	1.5	N	N	5	50
HM145	37 51 3	110 52 10	1.0	1.5	5.0	.30	100	N	N	N	70	300	1.5	N	N	5	50
HM146	37 51 17	110 51 32	1.5	2.0	7.0	.50	150	<.5	N	N	150	500	1.5	N	N	5	70

TABLE 3.--Continued

SAMPLE	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
HM102	10	20	5	N	10	15	N	--	N	100	50	N	20	N	--	N
HM103	10	30	<5	N	10	20	N	--	N	200	50	N	20	N	--	N
HM104	10	20	N	N	10	15	N	--	N	100	50	N	20	N	--	N
HM105	7	20	N	N	7	10	N	--	N	100	50	N	20	N	--	N
HM106	10	20	N	N	10	20	N	--	N	100	50	N	15	N	--	N
HM107	10	100	N	<20	10	20	N	--	N	200	30	N	300	N	--	N
HM108	10	20	<5	<20	10	20	N	--	N	100	50	N	20	N	--	N
HM109	10	50	N	<20	15	20	N	--	N	N	30	N	30	N	--	N
HM110	10	20	N	N	15	20	N	--	N	N	30	N	20	N	--	N
HM111	10	200	N	N	10	30	N	--	N	100	50	N	70	N	--	<100
HM112	15	200	N	<20	15	20	N	--	N	100	70	N	50	N	--	N
HM113	5	200	N	<20	10	20	N	--	N	N	50	N	30	N	--	N
HM114	5	20	N	N	10	20	N	--	N	100	30	N	20	N	--	N
HM115	10	70	N	<20	20	20	N	--	N	100	50	N	50	N	--	N
HM116	10	50	N	N	15	20	N	--	N	100	50	N	20	N	--	N
HM117	10	50	N	N	10	20	N	--	N	100	50	N	50	N	--	N
HM118	10	70	<5	N	10	20	N	--	N	N	50	N	20	N	--	N
HM119	10	20	N	<20	15	20	N	--	N	100	50	N	30	N	--	N
HM120	10	100	N	20	10	20	N	--	N	100	70	N	30	N	--	N
HM121	10	200	N	<20	10	30	N	--	N	100	30	N	50	N	--	<100
HM122	10	100	<5	<20	15	20	N	--	N	N	50	N	30	N	--	N
HM123	10	100	N	N	7	30	N	--	N	100	30	N	20	N	--	N
HM124	10	50	5	N	20	20	N	--	N	200	70	N	20	N	--	N
HM125	10	50	N	N	15	20	N	--	N	100	50	N	20	N	--	N
HM126	10	50	5	N	20	15	N	--	N	200	50	N	20	N	--	N
HM127	10	20	<5	N	10	20	N	--	N	100	50	N	15	N	--	N
HM128	15	50	N	<20	10	20	N	--	N	100	50	N	30	N	--	N
HM129	15	20	N	N	15	20	N	--	N	100	50	N	10	N	--	N
HM130	10	50	7	N	30	20	N	--	N	200	100	N	30	N	--	N
HM131	20	20	5	N	30	20	N	--	N	300	100	N	20	N	--	N
HM132	10	20	N	N	10	30	N	--	N	300	50	N	20	N	--	N
HM133	20	20	7	N	30	20	N	--	N	200	150	N	20	N	--	N
HM134	15	30	<5	<20	15	20	N	--	N	200	100	N	30	N	--	N
HM135	10	50	5	N	20	20	N	--	N	200	100	N	20	N	--	N
HM136	100	50	10	<20	50	100	N	--	70	200	200	N	30	N	--	N
HM137	30	50	7	<20	30	20	N	--	N	300	200	N	30	N	--	N
HM138	10	20	N	N	N	30	N	--	N	150	15	N	15	N	--	N
HM139	10	20	N	N	15	15	N	--	N	150	70	N	15	N	--	N
HM140	15	20	N	<20	20	10	N	--	N	100	100	N	20	N	--	N
HM141	10	20	N	N	15	10	N	--	N	150	50	N	20	N	--	N
HM142	7	20	N	N	10	15	N	--	N	100	30	N	20	N	--	N
HM143	10	20	5	N	20	15	N	--	N	100	70	N	15	N	--	N
HM144	15	20	N	<20	10	20	N	--	N	100	100	N	20	N	--	N
HM145	15	20	N	<20	15	20	N	--	N	100	100	N	20	N	--	N
HM146	20	20	5	<20	15	15	N	--	N	150	150	N	30	N	--	N

TABLE 3.--Continued

SAMPLE	LATITUDE	LONGITUDE	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA	S-BE	S-BI	S-CD	S-CO	S-CR
HM147	37 51 51	110 51 7	1.0	1.5	5.0	.20	150	<.5	N	N	100	300	1.0	N	N	5	50
HM148	37 50 48	110 50 14	2.0	2.0	7.0	.50	300	N	N	N	100	700	1.5	N	N	7	70
HM149	37 50 46	110 50 13	1.0	1.5	5.0	.20	150	.5	N	N	70	200	1.0	N	N	N	30
HM165	37 50 42	110 41 29	.5	.3	.5	.10	70	N	N	N	15	150	<1.0	N	N	N	N
HM166	37 50 48	110 42 38	1.0	1.0	3.0	.20	200	N	N	N	50	300	1.0	N	N	5	50
HM167	37 51 47	110 43 38	1.5	.5	.7	.30	700	N	N	N	30	500	1.0	N	N	10	20
HM168	37 52 44	110 49 0	2.0	1.5	5.0	.50	200	<.5	N	N	150	200	1.5	N	N	10	100
HM169	37 52 55	110 47 20	2.0	2.0	7.0	.50	300	<.5	N	N	100	500	1.5	N	N	10	100
HM170	37 53 35	110 46 23	1.5	.7	1.0	.50	200	N	N	N	50	500	1.0	N	N	5	50
HM171	37 51 59	110 45 15	2.0	1.5	5.0	.20	150	N	N	N	70	300	1.0	N	N	10	100
HM172	37 55 12	110 42 3	2.0	.5	1.0	.50	700	N	N	N	50	500	<1.0	N	N	5	50
HM173	37 56 5	110 41 33	1.0	.5	.5	.30	700	N	N	N	100	500	1.0	N	N	5	70
HM174	37 55 17	110 36 57	.7	.5	1.0	.20	150	N	N	N	70	700	<1.0	N	N	N	10
HM175	37 55 18	110 37 5	.7	.5	1.0	.20	300	N	N	N	30	500	1.0	N	N	N	10
HM176	37 54 43	110 35 48	1.0	.5	1.5	.30	200	N	N	N	70	700	<1.0	N	N	5	20
HM177	37 53 25	110 38 33	.7	.3	2.0	.20	200	N	N	N	30	1,000	<1.0	N	N	N	50
HM250	37 45 12	110 49 8	1.5	1.0	10.0	.20	200	N	N	N	100	1,000	1.0	N	N	5	30
HM251	37 46 40	110 50 25	2.0	1.0	5.0	.50	150	N	N	N	100	500	1.5	N	N	10	50
HM252	37 47 42	110 50 33	2.0	1.5	7.0	.50	100	<.5	N	N	100	700	1.5	N	N	7	70
HM253	37 48 32	110 50 25	2.0	1.0	3.0	.30	200	N	N	N	70	500	1.5	N	N	5	50
HM254	37 49 1	110 50 26	2.0	1.5	7.0	.50	150	<.5	N	N	100	700	1.5	N	N	5	100
HM370	37 56 44	110 29 34	.2	.2	.3	.02	50	N	N	N	20	150	<1.0	N	N	N	50
HM371	37 57 54	110 29 39	.5	.3	1.0	.30	100	N	N	N	30	150	1.0	N	N	N	30
HM373	37 56 47	110 28 13	1.0	1.0	1.5	.30	200	N	N	N	150	500	1.0	N	N	N	10
HM374	37 56 14	110 27 54	.5	.2	.5	.10	50	N	N	N	20	300	<1.0	N	N	N	N
HM375	37 55 52	110 27 44	.7	.3	1.0	.20	150	N	N	N	50	500	1.0	N	N	N	50
HM400	37 51 22	110 40 30	.7	.5	.5	.30	300	N	N	N	100	500	1.5	N	N	5	30
HM401	37 53 5	110 39 18	1.5	1.0	.7	.50	500	N	N	N	50	500	1.0	N	N	5	20
HM402	37 53 47	110 44 18	1.0	1.0	1.5	.20	100	<.5	N	N	50	200	1.0	N	N	N	30
HM404	37 51 55	110 34 15	1.0	.5	2.0	.20	100	N	N	N	30	700	<1.0	N	N	N	70
HM405	37 51 45	110 34 13	1.0	.7	2.0	.30	200	N	N	N	50	700	1.0	N	N	N	50
HM406	37 51 23	110 31 7	.7	.3	.5	.10	70	N	N	N	50	500	N	N	N	N	10
HM407	37 48 37	110 32 4	1.5	.7	2.0	.20	300	N	N	N	70	500	1.0	N	N	N	20
HM408	37 48 47	110 32 4	1.5	1.0	3.0	.30	500	N	N	N	50	2,000	1.0	N	N	5	50
HM409	37 47 20	110 30 50	.7	.5	.7	.15	200	N	N	N	30	500	1.0	N	N	5	10
HM410	37 52 5	110 45 20	2.0	.7	.5	.30	500	<.5	N	N	50	500	1.5	N	N	10	70
HM411	37 52 33	110 45 20	1.5	.5	.5	.50	500	N	N	N	100	500	1.0	N	N	7	100
HM426	38 1 15	110 30 20	.5	.3	.7	.10	100	N	N	N	50	200	<1.0	N	N	N	N
HM427	38 1 25	110 30 10	.5	.2	.5	.15	100	N	N	N	100	300	1.0	N	N	N	50
HM448	37 56 43	110 27 12	.5	.5	.7	.10	150	N	N	N	50	200	1.0	N	N	N	10
HM449	37 56 30	110 27 15	.7	.7	1.0	.20	200	N	N	N	70	300	1.0	N	N	N	10
HM451	37 55 35	110 25 44	1.5	2.0	5.0	.20	1,000	N	N	N	100	1,000	1.5	N	N	10	50
HM452	37 52 41	110 29 11	1.0	1.0	1.0	.30	200	N	N	N	200	500	1.0	N	N	5	100
HM453	37 52 50	110 29 19	.2	.2	.2	.05	70	N	N	N	70	200	1.0	N	N	N	N
HM454	37 52 8	110 29 31	.5	.5	.5	.10	150	N	N	N	20	200	1.0	N	N	N	300

TABLE 3.--Continued

SAMPLE	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
HM147	20	20	<5	N	10	50	N	--	N	300	100	N	20	N	--	N
HM148	20	30	7	<20	20	20	N	--	N	200	150	N	30	N	--	N
HM149	15	20	<5	N	10	30	N	--	N	200	100	N	15	N	--	N
HM165	5	N	N	N	5	10	N	--	N	N	15	N	N	N	--	N
HM166	10	50	<5	N	10	15	N	--	N	200	70	N	15	N	--	N
HM167	10	20	N	N	7	20	N	--	N	100	50	N	20	N	--	N
HM168	20	30	10	N	20	20	N	--	N	300	200	N	30	N	--	N
HM169	20	50	10	N	20	20	N	--	N	500	100	N	50	N	--	N
HM170	10	20	N	<20	10	15	N	--	N	100	50	N	15	N	--	N
HM171	15	30	15	N	30	30	N	--	N	300	100	N	20	N	--	N
HM172	15	N	N	N	7	20	N	--	N	200	100	N	15	N	--	N
HM173	20	20	N	N	10	20	N	--	N	100	50	N	20	N	--	N
HM174	7	20	N	N	5	15	N	--	N	N	50	N	10	N	--	N
HM175	7	20	N	N	5	15	N	--	N	N	20	N	10	N	--	N
HM176	10	20	N	N	7	10	N	--	N	100	50	N	20	N	--	N
HM177	5	20	N	N	5	10	N	--	N	100	50	N	15	N	--	N
HM250	10	50	N	N	15	50	N	--	N	500	50	N	20	N	--	N
HM251	20	50	<5	<20	20	20	N	--	N	200	100	N	50	N	--	N
HM252	20	50	7	<20	20	30	N	--	N	500	100	N	30	N	--	N
HM253	15	20	7	N	20	30	N	--	N	200	100	N	20	N	--	N
HM254	20	20	7	N	30	30	N	--	N	200	150	N	20	N	--	N
HM370	<5	N	N	N	5	10	N	--	N	N	10	N	N	N	--	N
HM371	5	N	N	N	7	15	N	--	N	100	20	N	15	N	--	N
HM373	5	20	N	N	5	10	N	--	N	100	30	N	10	N	--	N
HM374	<5	N	N	N	5	10	N	--	N	N	15	N	N	N	--	N
HM375	5	20	N	N	5	15	N	--	N	N	20	N	10	N	--	N
HM400	10	N	N	N	7	20	N	--	N	N	50	N	15	N	--	N
HM401	10	20	N	N	10	20	N	--	N	100	50	N	20	N	--	N
HM402	10	20	N	N	10	20	N	--	N	100	50	N	10	N	--	N
HM404	7	20	N	N	5	10	N	--	N	100	20	N	15	N	--	N
HM405	7	N	N	N	5	10	N	--	N	100	20	N	10	N	--	N
HM406	5	N	N	N	5	15	N	--	N	N	15	N	10	N	--	N
HM407	10	20	N	N	7	20	N	--	N	150	30	N	20	N	--	N
HM408	10	20	N	N	7	15	N	--	N	200	20	N	15	N	--	N
HM409	7	N	N	N	5	15	N	--	N	N	10	N	20	N	--	N
HM410	20	30	N	<20	10	30	N	--	N	150	50	N	20	N	--	N
HM411	7	20	N	N	7	20	N	--	N	100	50	N	15	N	--	N
HM426	5	N	N	N	N	15	N	--	N	N	10	N	N	N	--	N
HM427	5	N	N	N	5	15	N	--	N	N	15	N	10	N	--	N
HM448	5	N	N	N	N	10	N	--	N	N	15	N	N	N	--	N
HM449	7	20	N	N	5	15	N	--	N	100	20	N	15	N	--	N
HM451	20	30	N	N	7	20	N	--	N	500	50	N	30	N	--	N
HM452	7	20	N	N	5	15	N	--	N	100	30	N	15	N	--	N
HM453	5	20	N	N	N	15	N	--	N	N	<10	N	N	N	--	N
HM454	5	20	N	N	5	10	N	--	N	N	15	N	10	N	--	N

TABLE 3.--Continued

SAMPLE	LATITUDE	LONGITUDE	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA	S-BE	S-BI	S-CD	S-CO	S-CR
HM455	37 51 6	110 29 56	.5	.3	.5	.15	100	N	N	N	20	200	1.0	N	N	N	20
HM701	37 51 15	110 37 58	1.0	.5	.5	.20	200	N	N	N	70	300	1.5	N	N	5	20
HM702	37 51 54	110 49 0	.5	.5	1.0	.15	300	N	N	N	30	700	1.0	N	N	5	100
HM703	37 51 46	110 48 35	1.0	.7	5.0	.20	150	N	N	N	30	500	1.0	N	N	5	50
HM850	37 51 20	110 42 46	.7	1.0	5.0	.15	100	<.5	N	N	100	200	1.5	N	N	5	50
HM851	37 56 0	110 43 19	.3	.5	.5	.10	100	<.5	N	N	50	200	1.0	N	N	5	10
HM852	37 56 43	110 44 5	.3	.7	2.0	.20	100	N	N	N	50	100	1.5	N	N	5	20
HM853	37 56 55	110 45 47	1.0	.3	.5	.20	200	N	N	N	20	500	1.5	N	N	5	10
HM854	37 57 8	110 45 43	1.0	.3	.2	.20	100	N	N	N	50	500	1.5	N	N	5	10
HM855	37 58 6	110 45 15	1.0	.3	.3	.20	150	N	N	N	30	300	1.5	N	N	5	15
HM856	37 58 55	110 47 2	2.0	.5	.3	.50	300	N	N	N	100	300	1.5	N	N	7	20
HM857	37 59 42	110 47 30	1.5	.3	.5	.20	150	N	N	N	50	200	1.5	N	N	7	50
HM901	37 55 46	110 46 46	1.5	.3	.5	.30	700	N	N	N	70	300	<1.0	N	N	7	30
HM902	37 58 48	110 48 41	2.0	.5	.3	.30	500	N	N	N	150	300	<1.0	N	N	7	50
HM903	37 58 11	110 48 45	1.5	.5	1.0	.30	700	N	N	N	70	500	<1.0	N	N	7	30
HM916	37 56 58	110 45 41	2.0	.2	.5	.30	700	N	N	N	50	300	<1.0	N	N	7	20
HM917	37 56 58	110 45 48	2.0	.3	.7	.30	1,000	N	N	N	70	500	<1.0	N	N	5	15
HM918	37 56 58	110 45 55	2.0	.3	.7	.30	700	N	N	N	30	500	<1.0	N	N	5	15

TABLE 3.--Continued

SAMPLE	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
HM455	5	N	N	N	7	10	N	--	N	N	20	N	20	N	--	N
HM701	7	30	N	<20	7	30	N	--	N	100	50	N	20	N	--	N
HM702	5	20	N	N	5	20	N	--	N	100	50	N	15	N	--	N
HM703	10	30	N	N	7	20	N	--	N	150	70	N	20	N	--	N
HM850	20	30	7	N	20	20	N	--	N	200	150	N	30	N	--	N
HM851	7	20	N	N	7	10	N	--	N	100	30	N	15	N	--	N
HM852	10	20	N	N	10	15	N	--	N	100	70	N	20	N	--	N
HM853	20	N	N	N	5	20	N	--	N	500	150	N	15	N	--	N
HM854	15	300	N	N	5	15	N	--	N	200	70	N	15	N	--	N
HM855	10	20	N	N	5	15	N	--	N	100	50	N	20	N	--	N
HM856	10	20	N	<20	7	15	N	--	N	200	100	N	30	N	--	N
HM857	10	20	N	N	10	20	N	--	N	100	70	N	20	N	--	N
HM901	15	20	N	<20	15	70	N	5	N	150	70	N	15	N	200	N
HM902	20	20	<5	<20	20	50	N	5	N	150	100	N	20	N	300	N
HM903	20	20	<5	N	15	70	N	5	N	300	100	N	20	N	200	N
HM916	20	<20	N	N	10	30	N	5	N	300	100	N	15	N	200	N
HM917	30	20	N	N	10	70	N	5	N	500	150	N	20	N	150	N
HM918	50	20	<5	N	10	50	N	5	N	300	150	N	20	N	150	N

TABLE 4.--Spectrographic analysis of heavy-mineral-concentrate samples from Little Rockies, Mt. Pennell, and Mt. Hillers Wilderness Study Areas, Utah

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

SAMPLE	LATITUDE	LONGITUDE	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA	S-BE	S-BI	S-CD	S-CO
HM001C	37 41 18	110 39 25	.50	<.05	.30	>1.00	100	N	N	N	200	>10,000	2	N	N	N
HM002C	37 41 20	110 38 15	.50	.10	.30	2.00	100	N	N	N	70	>10,000	<2	N	N	N
HM003C	37 42 58	110 39 44	.30	.05	.30	>2.00	70	N	N	N	100	>10,000	2	N	N	N
HM004C	37 46 38	110 38 59	.30	.10	.20	2.00	100	N	N	N	100	>10,000	2	N	N	N
HM005C	37 46 24	110 39 7	.30	.10	.15	1.50	70	N	N	N	100	>10,000	2	N	N	N
HM006C	37 49 5	110 36 59	.50	.10	.20	.70	100	N	N	N	100	>10,000	<2	N	N	N
HM007C	37 49 1	110 36 46	.70	.07	.10	1.00	200	N	N	N	50	>10,000	<2	N	N	N
HM008C	37 49 15	110 36 25	1.00	.05	.30	>2.00	100	N	N	N	100	>10,000	<2	N	N	N
HM009C	37 49 36	110 35 33	1.00	.20	2.00	2.00	200	N	N	N	100	>10,000	2	N	N	N
HM021C	37 55 48	110 36 27	.20	<.05	.70	1.00	50	N	N	N	70	>10,000	2	N	N	N
HM022C	37 56 13	110 37 58	.50	.05	1.50	1.50	150	N	N	N	150	>10,000	2	N	N	N
HM023C	37 56 31	110 39 33	2.00	.05	3.00	1.00	150	N	N	N	50	>10,000	<2	N	N	N
HM024C	37 56 43	110 40 35	1.00	.15	2.00	2.00	100	N	N	N	50	>10,000	2	N	N	N
HM025C	37 53 54	110 43 57	.50	<.05	2.00	>2.00	150	N	N	N	70	>10,000	3	N	N	N
HM043C	37 45 55	110 33 55	.50	<.05	.50	>2.00	50	N	N	N	100	>10,000	<2	N	N	N
HM044C	37 45 45	110 33 58	.70	.20	1.50	2.00	150	N	N	N	100	>10,000	2	N	N	N
HM046C	37 45 57	110 32 14	.70	.20	2.00	>2.00	200	N	N	N	100	>10,000	2	N	N	N
HM047C	37 46 13	110 32 13	.20	.30	1.50	>2.00	100	N	N	N	70	>10,000	2	N	N	N
HM048C	37 47 8	110 32 17	.50	.30	2.00	1.50	200	N	N	N	70	>10,000	<2	N	N	N
HM049C	37 48 46	110 31 45	.20	.10	1.00	2.00	100	N	N	N	50	>10,000	2	N	N	N
HM053C	37 49 53	110 31 55	1.00	.10	1.00	>2.00	200	N	N	N	200	>10,000	2	N	N	N
HM054C	37 50 7	110 31 57	1.00	.70	3.00	2.00	500	N	N	N	100	>10,000	<2	N	N	N
HM056C	37 42 30	110 33 45	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HM057C	37 42 43	110 33 35	1.00	.30	1.50	>2.00	300	N	N	30	100	>10,000	<2	N	N	N
HM058C	37 44 10	110 32 57	2.00	.15	.50	>2.00	300	N	N	N	500	>10,000	<2	N	N	N
HM059C	37 44 14	110 32 48	3.00	.50	3.00	>2.00	700	N	N	N	700	>10,000	<2	N	N	N
HM060C	37 42 12	110 32 44	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HM061C	37 51 23	110 30 34	.15	.05	1.50	2.00	150	N	N	N	70	>10,000	N	N	N	N
HM062C	37 52 3	110 32 53	.30	.05	2.00	>2.00	200	N	N	N	150	>10,000	N	N	N	N
HM063C	37 49 43	110 35 18	.50	.20	1.50	>2.00	150	N	N	N	200	>10,000	<2	N	N	N
HM064C	37 52 25	110 30 27	.20	<.05	.30	>2.00	100	N	N	N	50	>10,000	N	N	N	N
HM065C	37 52 55	110 30 58	.20	<.05	.50	>2.00	100	N	N	N	100	>10,000	N	N	N	N
HM066C	37 53 30	110 31 21	1.00	.05	.30	>2.00	100	N	N	N	100	>10,000	N	N	N	N
HM067C	37 53 15	110 31 47	1.00	.20	3.00	>2.00	300	N	N	N	150	>10,000	N	N	N	N
HM068C	37 53 43	110 31 57	.20	<.05	.70	>2.00	150	N	N	N	100	>10,000	N	N	N	N
HM069C	37 54 36	110 31 38	.15	.10	.30	>2.00	100	N	N	N	70	>10,000	N	N	N	N
HM070C	37 55 13	110 31 49	.20	.07	1.00	>2.00	100	N	N	N	70	>10,000	N	N	N	N
HM071C	37 56 40	110 32 45	.15	<.05	.30	.70	20	N	N	N	50	>10,000	N	N	N	N
HM072C	37 56 30	110 32 55	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HM073C	37 56 14	110 32 47	.50	.15	2.00	>2.00	100	N	N	100	100	>10,000	<2	N	N	N
HM074C	37 55 26	110 32 27	.20	.10	.50	>2.00	100	N	N	N	70	>10,000	<2	N	N	N
HM075C	37 55 29	110 32 17	2.00	.20	1.50	>2.00	200	N	N	N	1,000	>10,000	2	N	N	N
HM076C	37 54 9	110 31 33	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HM100C	37 56 20	110 52 37	.70	.10	2.00	2.00	100	N	N	N	20	>10,000	<2	N	N	N
HM101C	37 56 28	110 52 40	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4.--Continued

SAMPLE	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
HM001C	100	N	50	N	N	<10	200	N	>200	<20	1,000	100	N	1,000	N	>2,000	<200
HM002C	100	<10	N	N	N	<10	20	N	200	N	2,000	70	<100	700	N	>2,000	N
HM003C	70	N	--	--	--	--	20	N	200	N	1,500	100	<100	1,000	N	>2,000	<200
HM004C	70	N	N	N	N	<10	100	N	200	N	3,000	50	N	500	N	>2,000	N
HM005C	50	N	N	N	N	<10	<20	N	100	N	5,000	50	N	200	N	>2,000	N
HM006C	100	N	N	N	N	<10	150	N	70	N	10,000	30	N	150	N	>2,000	N
HM007C	150	<10	N	N	N	<10	30	N	150	N	10,000	50	<100	500	N	>2,000	N
HM008C	200	<10	N	N	<50	<10	<20	N	>200	20	1,000	100	<100	1,000	N	>2,000	<200
HM009C	150	N	N	N	N	<10	<20	N	100	N	5,000	30	N	300	N	>2,000	N
HM021C	70	<10	N	N	N	<10	<20	N	70	N	3,000	<20	N	200	N	>2,000	N
HM022C	70	<10	100	N	N	<10	20	N	50	N	5,000	30	N	200	N	>2,000	N
HM023C	<20	10	150	N	N	<10	20	N	15	N	10,000	<20	N	150	N	>2,000	N
HM024C	20	<10	150	N	<50	<10	30	N	15	N	>10,000	30	N	200	N	>2,000	N
HM025C	100	N	150	N	50	<10	30	N	200	N	3,000	100	N	1,000	N	>2,000	N
HM043C	150	N	N	N	N	<10	50	N	>200	N	1,000	100	<100	1,000	N	>2,000	<200
HM044C	70	<10	150	N	<50	<10	50	N	100	N	10,000	50	N	500	N	>2,000	N
HM046C	100	<10	150	N	N	<10	20	N	200	N	3,000	70	N	700	N	>2,000	N
HM047C	20	<10	N	N	<50	<10	<20	N	200	N	5,000	50	N	500	N	>2,000	N
HM048C	30	30	200	N	<50	<10	<20	N	50	N	10,000	30	N	200	N	>2,000	N
HM049C	20	<10	70	N	<50	<10	<20	N	100	N	10,000	30	N	300	N	>2,000	N
HM053C	70	<10	70	N	<50	<10	20	N	>200	N	3,000	100	<100	700	N	>2,000	N
HM054C	30	<10	100	N	<50	<10	20	N	100	N	10,000	100	N	700	N	>2,000	N
HM056C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HM057C	100	15	70	N	<50	<10	150	N	>200	N	10,000	100	N	1,000	N	>2,000	N
HM058C	700	<10	50	N	50	<10	<20	N	200	20	500	100	N	700	N	>2,000	200
HM059C	1,000	20	150	N	70	<10	100	N	>200	20	10,000	100	N	1,500	N	>2,000	200
HM060C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HM061C	20	<10	70	N	N	<10	N	N	50	N	5,000	50	N	200	N	>2,000	N
HM062C	<20	<10	70	N	50	<10	<20	N	50	N	10,000	70	N	300	N	>2,000	N
HM063C	200	<10	70	N	<50	<10	20	N	150	50	5,000	70	N	700	N	>2,000	N
HM064C	100	<10	70	N	50	<10	30	N	>200	30	2,000	100	N	1,000	N	>2,000	<200
HM065C	50	10	50	N	50	<10	30	N	>200	<20	3,000	100	N	1,000	N	>2,000	<200
HM066C	50	<10	50	N	N	<10	30	N	>200	<20	1,000	100	N	1,000	N	>2,000	<200
HM067C	100	10	100	N	50	<10	50	N	>200	<20	>10,000	100	N	1,000	N	>2,000	<200
HM068C	50	<10	50	N	<50	<10	20	N	>200	N	2,000	100	N	1,000	N	>2,000	N
HM069C	<20	<10	50	N	<50	<10	20	N	>200	N	500	70	N	1,000	N	>2,000	N
HM070C	20	<10	50	N	50	<10	<20	N	>200	N	5,000	70	N	1,000	N	>2,000	N
HM071C	<20	N	50	N	N	<10	100	N	100	N	10,000	20	N	300	N	>2,000	N
HM072C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HM073C	30	<10	100	N	N	<10	20	N	>200	N	7,000	100	N	700	N	>2,000	N
HM074C	50	<10	50	N	N	<10	20	N	>200	N	7,000	100	N	1,000	N	>2,000	<200
HM075C	300	20	100	N	<50	<10	150	N	>200	<20	>10,000	100	N	3,000	N	>2,000	200
HM076C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HM100C	20	<10	150	N	<50	<10	<20	N	100	N	>10,000	50	N	500	N	>2,000	N
HM101C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4.--Continued

SAMPLE	LATITUDE	LONGITUDE	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA	S-BE	S-BI	S-CD	S-CO
HM102C	37 59 30	110 51 8	1.50	.10	2.00	)2.00	200	N	N	N	100	)10,000	2	N	N	N
HM103C	37 59 38	110 51 8	1.00	.70	7.00	2.00	200	N	N	N	100	)10,000	2	N	N	N
HM104C	37 54 53	110 51 53	5.00	.20	7.00	2.00	300	N	N	N	100	)10,000	(2	N	N	N
HM105C	37 57 8	110 52 35	2.00	.50	5.00	)2.00	200	N	N	N	70	)10,000	2	N	N	N
HM106C	37 57 3	110 52 40	1.50	.15	1.50	2.00	150	N	N	N	70	)10,000	2	N	N	N
HM107C	37 57 44	110 52 57	2.00	.70	2.00	)2.00	200	N	N	N	100	)10,000	(2	N	N	N
HM108C	37 56 40	110 53 2	1.00	.20	1.50	2.00	70	N	N	N	30	)10,000	2	N	N	N
HM109C	37 57 17	110 56 10	.70	(.05	1.50	)2.00	100	N	N	N	70	)10,000	2	N	N	N
HM110C	37 57 23	110 55 58	1.00	.20	1.50	2.00	100	N	N	N	50	)10,000	2	N	N	N
HM111C	37 56 13	110 54 25	1.50	.10	2.00	)2.00	100	N	N	N	50	)10,000	3	N	N	N
HM112C	37 56 14	110 54 16	1.50	.20	2.00	)2.00	100	N	N	N	70	)10,000	3	N	N	N
HM113C	37 56 13	110 54 13	.20	.05	1.50	)2.00	150	N	N	N	50	)10,000	2	N	N	N
HM114C	37 55 50	110 55 29	.70	.20	2.00	)2.00	150	N	N	N	70	)10,000	2	N	N	N
HM115C	37 55 46	110 55 55	.50	.07	1.50	)2.00	100	N	N	N	20	)10,000	2	N	N	N
HM116C	37 54 39	110 55 38	.70	.15	10.00	)2.00	150	N	N	N	150	)10,000	2	N	N	N
HM117C	37 56 12	110 57 26	1.00	.20	2.00	)2.00	100	N	N	N	100	)10,000	2	N	N	N
HM118C	37 54 12	110 58 16	.20	.10	2.00	)2.00	100	N	N	N	70	)10,000	2	N	N	N
HM119C	37 54 9	110 58 27	1.00	.10	2.00	)2.00	100	N	N	N	70	)10,000	3	N	N	N
HM120C	37 53 10	110 58 12	.50	.20	2.00	)2.00	100	N	N	N	50	)10,000	3	N	N	N
HM121C	37 53 14	110 58 30	.70	.30	5.00	)2.00	200	N	N	N	70	)10,000	3	N	N	N
HM122C	37 52 43	110 59 28	.30	.10	2.00	)2.00	100	N	N	N	70	)10,000	2	N	N	N
HM123C	37 52 31	110 59 23	.50	.20	2.00	)2.00	150	N	N	N	70	)10,000	2	N	N	N
HM124C	37 53 50	110 54 59	1.00	1.00	2.00	2.00	100	N	N	N	70	)10,000	(2	N	N	N
HM125C	37 53 3	110 55 15	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HM126C	37 52 19	110 54 20	1.00	.50	5.00	)2.00	150	N	N	N	50	)10,000	(2	N	N	N
HM127C	37 51 35	110 54 33	.20	.10	2.00	)2.00	100	N	N	N	50	)10,000	2	N	N	N
HM128C	37 51 33	110 56 26	.20	.10	1.50	)2.00	100	N	N	N	70	)10,000	2	N	N	N
HM129C	37 55 40	110 51 45	.50	.50	2.00	)2.00	100	N	N	N	50	)10,000	2	N	N	N
HM130C	37 58 40	110 49 45	.50	.10	15.00	.70	500	N	N	N	20	)10,000	(2	N	N	N
HM131C	37 58 35	110 49 50	.50	.20	10.00	.15	200	N	N	N	30	)10,000	N	N	N	N
HM132C	37 57 58	110 49 57	.20	.10	20.00	.70	700	N	N	N	20	)10,000	N	N	N	N
HM133C	37 56 45	110 50 30	.50	.05	2.00	.70	70	N	N	N	50	)10,000	(2	N	N	N
HM134C	37 55 40	110 49 52	.20	.10	15.00	2.00	500	N	N	N	70	)10,000	(2	N	N	N
HM135C	37 55 32	110 49 48	.20	.15	15.00	.50	500	N	N	N	30	)10,000	(2	N	N	N
HM137C	37 49 37	110 48 3	1.50	.10	2.00	.15	70	N	N	N	20	)10,000	N	N	N	N
HM139C	37 48 55	110 49 58	.70	.20	10.00	2.00	200	N	N	N	30	)10,000	(2	N	N	N
HM140C	37 53 33	110 51 0	.50	.20	2.00	.30	100	N	N	N	20	)10,000	(2	N	N	N
HM141C	37 53 46	110 51 35	.20	.10	1.50	.50	70	N	N	N	20	)10,000	(2	N	N	N
HM142C	37 54 12	110 52 18	.20	.10	1.50	)2.00	100	N	N	N	30	)10,000	3	N	N	N
HM143C	37 52 27	110 51 40	.50	.15	1.50	1.00	100	N	N	N	30	)10,000	2	N	N	N
HM144C	37 51 43	110 51 33	.50	.20	1.50	.20	50	N	N	N	30	)10,000	N	N	N	N
HM145C	37 51 3	110 52 10	.50	.20	1.50	2.00	70	N	N	N	50	)10,000	(2	N	N	N
HM146C	37 51 17	110 51 32	.30	.20	2.00	.20	20	N	N	N	30	)10,000	N	N	N	N
HM148C	37 50 48	110 50 14	.20	.05	1.00	.20	(20	N	N	N	20	)10,000	N	N	N	N
HM166C	37 50 48	110 42 38	5.00	2.00	7.00	)2.00	1,000	N	N	N	200	)10,000	N	N	N	N

TABLE 4.--Continued

SAMPLE	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
HM102C	150	<10	200	N	<50	<10	100	N	>200	<20	3,000	100	N	2,000	N	>2,000	<200
HM103C	20	10	1,000	N	50	<10	30	N	30	N	>10,000	50	N	500	N	>2,000	N
HM104C	30	20	500	N	<50	<10	20	N	200	N	5,000	70	N	500	N	>2,000	N
HM105C	50	<10	300	N	50	<10	20	N	200	N	10,000	100	N	700	N	>2,000	N
HM106C	30	<10	200	N	<50	<10	20	N	100	70	7,000	30	N	500	N	>2,000	N
HM107C	50	<10	300	N	70	<10	70	N	>200	50	>10,000	100	N	1,000	N	>2,000	N
HM108C	20	<10	N	N	N	<10	20	N	200	200	10,000	50	N	700	N	>2,000	N
HM109C	30	<10	N	N	<50	<10	20	N	>200	N	7,000	50	N	700	N	>2,000	N
HM110C	20	<10	100	N	<50	<10	20	N	150	N	3,000	30	N	500	N	>2,000	N
HM111C	30	<10	100	N	N	<10	50	N	>200	100	3,000	100	N	1,000	N	>2,000	<200
HM112C	50	<10	100	N	<50	<10	50	N	>200	20	3,000	100	N	1,000	N	>2,000	<200
HM113C	30	<10	300	N	<50	<10	50	N	>200	50	700	100	N	1,500	N	>2,000	<200
HM114C	50	<10	150	N	<50	<10	50	N	>200	<20	3,000	100	N	700	N	>2,000	N
HM115C	30	<10	100	N	<50	<10	50	N	>200	70	1,500	100	N	100	N	>2,000	N
HM116C	200	<10	700	N	50	<10	70	N	>200	<20	1,500	100	N	100	N	>2,000	<200
HM117C	30	<10	100	N	50	<10	<20	N	200	N	2,000	70	N	500	N	>2,000	N
HM118C	30	<10	100	N	50	<10	20	N	>200	<20	1,500	100	N	1,000	N	>2,000	N
HM119C	30	<10	150	N	N	<10	70	N	>200	20	7,000	100	N	1,000	N	>2,000	N
HM120C	50	<10	150	N	50	<10	50	N	>200	100	2,000	150	N	1,000	N	>2,000	N
HM121C	70	15	200	N	70	<10	100	N	>200	100	3,000	150	N	2,000	N	>2,000	N
HM122C	100	<10	100	N	N	<10	20	N	200	30	3,000	150	N	1,000	N	>2,000	N
HM123C	30	<10	70	N	<50	<10	30	N	>200	70	1,500	100	N	1,500	N	>2,000	N
HM124C	30	<10	100	N	<50	<10	20	N	100	N	>10,000	70	N	500	N	>2,000	N
HM125C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HM126C	50	<10	200	N	N	<10	50	N	150	30	>10,000	100	N	700	N	>2,000	N
HM127C	50	N	70	N	<50	<10	20	N	200	N	10,000	70	N	700	N	>2,000	N
HM128C	50	N	100	N	50	<10	30	N	200	200	3,000	100	N	700	N	>2,000	N
HM129C	70	<10	200	N	70	<10	30	N	100	N	>10,000	50	N	500	N	>2,000	N
HM130C	50	N	1,000	N	N	<10	<20	N	30	N	3,000	70	N	500	N	>2,000	N
HM131C	20	<10	500	N	N	<10	N	N	10	N	>10,000	30	N	200	N	>2,000	N
HM132C	30	<10	1,000	N	<50	<10	50	N	100	N	2,000	100	N	1,000	N	>2,000	N
HM133C	20	<10	100	N	<50	<10	N	N	10	N	>10,000	30	N	100	N	>2,000	N
HM134C	30	<10	300	N	50	<10	20	N	100	N	2,000	70	N	500	N	>2,000	N
HM135C	30	<10	1,000	N	<50	<10	<20	N	50	N	3,000	70	N	500	N	>2,000	N
HM137C	<20	10	N	N	N	<10	<20	N	N	N	>10,000	<20	N	50	N	>2,000	N
HM139C	20	<10	300	N	50	<10	20	N	70	N	10,000	70	N	500	N	>2,000	N
HM140C	<20	<10	100	N	N	<10	N	N	10	N	>10,000	20	N	100	1,000	>2,000	N
HM141C	<20	<10	N	N	N	<10	N	N	20	N	>10,000	<20	N	100	N	>2,000	N
HM142C	30	N	100	N	50	<10	20	N	200	N	>10,000	70	N	500	N	>2,000	N
HM143C	20	<10	50	N	<50	<10	20	N	150	N	>10,000	30	N	200	N	>2,000	N
HM144C	20	<10	50	N	N	<10	<20	N	10	N	>10,000	<20	N	100	N	>2,000	N
HM145C	50	<10	70	N	50	<10	20	N	100	N	>10,000	30	N	200	N	>2,000	N
HM146C	20	<10	100	N	N	<10	N	N	10	N	>10,000	<20	N	100	500	>2,000	N
HM148C	<20	<10	50	N	N	<10	N	N	10	N	>10,000	<20	N	50	N	>2,000	N
HM166C	100	10	70	N	50	<10	50	N	100	N	3,000	100	N	1,000	N	>2,000	N

TABLE 4.--Continued

SAMPLE	LATITUDE	LONGITUDE	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA	S-BE	S-BI	S-CD	S-CO
HM167C	37 51 47	110 43 38	5.00	1.00	3.00	>2.00	1,500	N	N	N	150	10,000	N	N	N	N
HM168C	37 52 44	110 49 0	7.00	.30	2.00	1.50	200	N	N	N	100	>10,000	N	N	N	N
HM169C	37 55 55	110 47 20	10.00	.20	2.00	>2.00	300	N	N	N	50	>10,000	2	N	N	N
HM170C	37 53 35	110 46 23	1.00	.10	5.00	>2.00	500	N	N	N	300	2,000	N	N	N	10
HM171C	37 51 59	110 45 15	1.00	.10	2.00	1.50	150	N	N	N	20	>10,000	N	N	N	N
HM173C	37 56 5	110 41 33	1.00	.20	5.00	>2.00	500	N	N	N	70	7,000	<2	N	N	N
HM174C	37 55 17	110 36 57	.70	.10	2.00	>2.00	200	N	N	N	100	>10,000	<2	N	N	N
HM175C	37 55 18	110 37 5	1.00	.10	2.00	>2.00	200	N	N	N	300	>10,000	N	N	N	N
HM176C	37 54 43	110 35 48	1.00	.10	2.00	2.00	300	N	N	N	100	>10,000	<2	N	N	N
HM177C	37 53 25	110 38 33	.50	.05	1.00	2.00	150	N	N	N	70	>10,000	2	N	N	N
HM250C	37 45 12	110 49 8	.30	.05	1.00	.70	30	N	N	N	<20	>10,000	2	N	N	N
HM251C	37 46 40	110 50 25	1.00	.10	1.00	.50	70	N	N	N	20	>10,000	N	N	N	N
HM252C	37 47 42	110 50 35	.70	.15	1.00	.30	50	N	N	N	20	>10,000	N	N	N	N
HM253C	37 48 32	110 50 25	.50	.10	2.00	.20	50	N	N	N	30	>10,000	<2	N	N	N
HM254C	37 49 1	110 50 26	.70	.05	1.50	.30	70	N	N	N	30	>10,000	2	N	N	N
HM370C	37 56 44	110 29 34	.50	.07	.15	>2.00	70	N	N	N	50	10,000	<2	N	N	<10
HM371C	37 57 54	110 29 39	.30	.07	.15	>2.00	70	N	N	N	50	>10,000	<2	N	N	10
HM373C	37 56 47	110 28 13	.20	.07	.20	>2.00	50	N	N	N	100	>10,000	<2	N	N	<10
HM374C	37 56 14	110 27 54	.20	.10	.30	2.00	50	N	N	N	50	>10,000	N	N	N	N
HM375C	37 55 52	110 27 44	.50	.15	.50	>2.00	70	N	N	N	70	>10,000	<2	N	N	N
HM400C	37 51 22	110 40 30	1.50	.10	2.00	>2.00	200	N	N	N	100	>10,000	N	N	N	N
HM401C	37 53 5	110 39 18	1.00	.10	5.00	>2.00	300	N	N	N	100	>10,000	N	N	N	N
HM402C	37 53 47	110 44 18	.30	.07	1.50	1.00	150	N	N	N	50	>10,000	<2	N	N	N
HM404C	37 51 55	110 34 15	1.00	.20	1.50	>2.00	500	N	N	N	100	>10,000	<2	N	N	N
HM405C	37 51 45	110 34 13	.50	.05	.50	2.00	150	N	N	N	100	>10,000	<2	N	N	N
HM406C	37 51 23	110 31 7	.50	.10	.30	>2.00	100	N	N	N	100	>10,000	<2	N	N	N
HM407C	37 48 37	110 32 4	2.00	.20	1.50	2.00	300	N	N	N	200	>10,000	<2	N	N	N
HM408C	37 48 47	110 32 4	.50	.20	1.50	1.50	150	N	N	N	70	>10,000	<2	N	N	N
HM409C	37 47 20	110 30 50	.50	.20	1.00	>2.00	150	N	N	N	100	>10,000	2	N	N	N
HM410C	37 52 5	110 45 20	1.00	.20	5.00	2.00	500	N	N	N	150	>10,000	<2	N	N	N
HM411C	37 52 33	110 45 20	1.50	.30	10.00	>2.00	700	N	N	N	100	>10,000	<2	N	N	N
HM426C	38 1 15	110 30 20	.70	.10	.20	>2.00	100	<1	N	N	100	>10,000	<2	N	N	N
HM427C	38 1 25	110 30 10	1.00	.05	.20	>2.00	200	N	N	N	150	>10,000	<2	N	N	N
HM448C	37 56 43	110 27 12	.50	.10	.50	>2.00	100	N	N	N	100	>10,000	2	N	N	N
HM449C	37 56 30	110 27 15	.70	.10	.50	>2.00	100	N	N	N	200	>10,000	2	N	N	N
HM450C	37 55 41	110 25 52	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HM451C	37 55 35	110 25 44	.50	.10	.50	.50	70	N	N	N	50	>10,000	<2	N	N	N
HM452C	37 52 41	110 29 11	.30	<.05	.30	>2.00	100	N	N	N	100	>10,000	<2	N	N	N
HM453C	37 52 50	110 29 19	.70	.10	.20	>2.00	100	N	N	N	200	>10,000	<2	N	N	N
HM454C	37 52 8	110 29 31	.30	.05	.50	>2.00	100	N	N	N	70	>10,000	2	N	N	N
HM455C	37 51 6	110 29 56	.30	.10	.50	>2.00	70	N	N	N	200	>10,000	<2	N	N	N
HM701C	37 51 15	110 37 58	.70	.07	3.00	2.00	200	N	N	N	20	>10,000	<2	N	N	N
HM702C	37 51 54	110 49 0	.15	<.05	.50	1.50	70	N	N	N	100	>10,000	<2	N	N	N
HM850C	37 51 20	110 42 46	1.50	.20	5.00	.30	150	N	N	N	30	>10,000	<2	N	N	N
HM851C	37 56 0	110 43 19	.30	.07	1.50	>2.00	150	N	N	N	50	>10,000	3	N	N	N

TABLE 4.--Continued

SAMPLE	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
HM167C	100	20	200	N	50	<10	500	N	200	20	3,000	150	N	1,000	N	>2,000	N
HM168C	70	50	150	N	<50	<10	50	N	30	N	>10,000	50	N	200	N	>2,000	N
HM169C	30	70	150	N	N	<10	70	N	50	30	>10,000	100	N	500	N	>2,000	N
HM170C	150	N	700	N	50	<10	70	N	30	30	N	200	N	700	N	>2,000	N
HM171C	<20	<10	70	N	50	<10	<20	N	50	N	>10,000	30	N	100	N	>2,000	N
HM173C	20	<10	200	N	<50	<10	<20	N	50	N	1,000	100	N	500	N	>2,000	N
HM174C	100	<10	50	N	<50	50	20	N	200	N	2,000	100	N	700	N	>2,000	N
HM175C	150	<10	100	N	N	30	30	N	>200	N	2,000	150	N	1,000	N	>2,000	N
HM176C	70	<10	N	N	N	<10	20	N	150	N	5,000	70	N	500	N	>2,000	N
HM177C	300	<10	N	N	N	<10	30	N	200	N	2,000	50	N	500	N	>2,000	N
HM250C	<20	<10	N	N	<50	<10	<20	N	20	N	>10,000	50	N	150	N	>2,000	N
HM251C	<20	10	N	N	N	<10	20	N	15	N	>10,000	30	N	100	N	>2,000	N
HM252C	20	<10	N	N	N	<10	20	N	10	N	>10,000	20	N	70	N	>2,000	N
HM253C	<20	<10	100	N	N	<10	<20	N	N	N	>10,000	<20	N	100	N	2,000	N
HM254C	<20	10	70	N	N	<10	20	N	10	N	>10,000	20	N	100	N	>2,000	N
HM370C	150	<10	<50	N	N	<10	50	N	50	50	N	70	N	700	N	>2,000	N
HM371C	100	<10	<50	N	N	<10	50	N	30	N	1,500	70	N	500	N	>2,000	N
HM373C	100	N	50	N	N	<10	50	N	20	<20	2,000	70	N	200	N	>2,000	N
HM374C	30	N	70	N	<50	<10	30	N	15	20	7,000	50	N	150	N	>2,000	N
HM375C	70	<10	100	N	<50	<10	50	N	20	30	5,000	70	N	300	N	>2,000	N
HM400C	70	N	70	N	50	<10	30	N	>200	N	700	100	N	1,000	N	>2,000	N
HM401C	30	N	100	N	50	<10	20	N	100	N	1,000	70	N	500	N	>2,000	N
HM402C	30	<10	50	N	<50	<10	<20	N	20	N	3,000	30	N	100	N	>2,000	N
HM404C	150	10	70	N	50	<10	20	N	50	N	3,000	50	N	200	N	>2,000	N
HM405C	50	N	50	N	<50	<10	20	N	100	N	5,000	50	N	200	N	>2,000	N
HM406C	50	N	100	N	50	<10	<20	N	200	N	1,000	50	N	300	N	>2,000	N
HM407C	100	10	150	N	<50	<10	20	N	200	N	5,000	70	N	300	N	>2,000	N
HM408C	50	<10	200	N	<50	<10	20	N	100	N	10,000	30	N	200	N	>2,000	N
HM409C	100	<10	200	N	<50	<10	20	N	200	N	5,000	50	N	500	N	>2,000	N
HM410C	100	10	150	N	<50	<10	500	N	100	N	1,000	50	N	300	N	>2,000	N
HM411C	70	<10	150	N	50	<10	100	N	150	N	1,000	50	N	500	N	>2,000	N
HM426C	200	N	N	N	<50	<10	<20	N	>200	N	2,000	70	N	700	N	>2,000	<200
HM427C	500	N	N	N	<50	<10	20	N	>200	20	1,000	100	N	1,000	N	>2,000	<200
HM448C	200	N	50	N	50	<10	20	N	>200	N	1,500	100	N	1,500	N	>2,000	N
HM449C	200	N	70	N	50	<10	20	N	>200	20	1,000	100	N	1,500	N	>2,000	N
HM450C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HM451C	50	<10	N	N	N	<10	N	N	30	N	10,000	30	N	100	N	>2,000	N
HM452C	100	N	N	N	<50	<10	20	N	>200	N	1,500	100	<100	700	N	>2,000	<200
HM453C	300	N	150	N	N	<10	20	N	200	N	2,000	100	<100	700	N	>2,000	<200
HM454C	200	<10	N	N	<50	<10	30	N	>200	N	2,000	100	N	1,000	N	>2,000	N
HM455C	70	<10	N	N	<50	<10	30	N	200	N	2,000	100	N	700	N	>2,000	N
HM701C	50	<10	100	N	N	<10	20	N	200	N	2,000	70	N	500	N	>2,000	N
HM702C	20	N	N	N	N	<10	<20	N	150	N	3,000	20	N	200	N	>2,000	N
HM850C	<20	15	150	N	N	<10	<20	N	20	N	>10,000	20	N	150	1,000	>2,000	N
HM851C	50	15	200	N	50	<10	20	N	>200	N	2,000	70	N	1,000	N	>2,000	N

TABLE 4.--Continued

SAMPLE	LATITUDE	LONGITUDE	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA	S-BE	S-BI	S-CD	S-CO
HM852C	37 56 43	110 44 5	.50	.10	5.00	>2.00	200	N	N	N	50	>10,000	2	N	N	N
HM853C	37 56 55	110 45 47	.50	.05	20.00	2.00	500	N	N	N	30	10,000	N	N	N	N
HM854C	37 57 8	110 45 43	.50	.07	15.00	>2.00	500	N	N	N	30	5,000	2	N	N	N
HM855C	37 58 6	110 45 15	.50	.07	30.00	1.00	700	N	N	N	<20	7,000	N	N	N	N
HM856C	37 58 55	110 47 2	.30	.05	20.00	2.00	500	N	N	N	50	10,000	<2	N	N	N
HM857C	37 59 42	110 47 30	.70	.10	15.00	>2.00	500	N	N	N	50	2,000	2	N	N	N
HM901C	37 55 46	110 46 46	.70	.15	10.00	>2.00	700	N	N	N	30	200	N	<20	N	<10
HM902C	37 58 48	110 48 41	1.50	.30	7.00	2.00	500	N	N	N	100	300	N	N	N	15
HM903C	37 58 11	110 48 45	.50	.30	15.00	2.00	700	N	N	N	30	3,000	N	N	N	N
HM916C	37 56 58	110 45 41	.70	.07	20.00	>2.00	700	20	N	50	30	3,000	N	N	N	<10
HM917C	37 56 58	110 45 48	1.00	.15	20.00	>2.00	700	70	N	200	20	300	N	N	N	N
HM918C	37 56 58	110 45 55	.50	.07	30.00	>2.00	700	N	N	N	20	150	N	30	N	N

TABLE 4.--Continued

SAMPLE	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
HM852C	30	10	300	N	<50	<10	<20	N	150	N	3,000	70	N	500	N	>2,000	N
HM853C	30	<10	1,500	N	N	<10	5,000	N	100	N	2,000	100	N	500	N	>2,000	N
HM854C	70	10	1,500	N	50	<10	70	N	150	N	2,000	150	N	700	N	>2,000	<200
HM855C	70	<10	1,500	N	N	<10	50	N	150	N	2,000	100	N	500	N	>2,000	N
HM856C	70	<10	500	N	<50	<10	<20	N	100	N	1,500	70	N	500	N	>2,000	N
HM857C	100	<10	500	N	<50	<10	<20	N	200	N	2,000	100	N	1,000	N	>2,000	N
HM901C	30	<10	700	N	<50	10	3,000	N	<10	70	500	300	N	500	N	>2,000	N
HM902C	70	10	200	N	N	15	150	N	20	50	300	200	N	500	N	>2,000	N
HM903C	30	<10	1,000	N	<50	<10	1,000	N	10	30	1,500	300	N	500	N	>2,000	N
HM916C	30	10	1,000	N	<50	<10	200	N	<10	30	2,000	500	N	500	N	>2,000	N
HM917C	20	15	1,000	N	<50	<10	70	N	<10	30	1,500	500	N	500	N	>2,000	N
HM918C	20	15	500	N	<50	10	150	N	<10	50	1,500	500	N	700	N	2,000	N

TABLE 5.--Mineralogical analysis of heavy-mineral-concentrate samples from Little Rockies, Mt. Pennell, and Mt. Hillers Wilderness Study Areas, Utah

[Abundance of minerals tentatively identified in the non-magnetic heavy-mineral fraction: - = none observed; 1 = trace present, <1%, 2 = present, >2%; 3 = common, >5%; 4 = major, >20%; 5 = dominant, >50%; 6 = ubiquitous, >85%. Observed crystal shape of zircon is denoted in column header by an R or E indicating round and euhedral, respectively.]

SAMPLE	LATITUDE	LONGITUD	ZIRCON-R	ZIRCON-E	SPHENE	RUTILE	ANATASE	BARITE	APATITE	SCHEELIT	EPIDOTE	PYRITE
HM043C	37 45 55	110 33 55	6	1	--	2	1	1	2	--	--	--
HM044C	37 45 45	110 33 58	3	2	--	2	2	--	5	--	--	2
HM046C	37 45 57	110 32 14	4	2	--	2	2	--	4	--	--	2
HM047C	37 46 13	110 32 13	3	3	1	3	1	--	4	--	--	2
HM048C	37 47 8	110 32 17	3	2	1	2	1	2	4	--	--	1
HM049C	37 48 46	110 31 45	3	3	--	3	2	--	4	--	--	--
HM053C	37 49 53	110 31 55	4	2	3	2	1	--	3	--	2	2
HM054C	37 50 7	110 31 57	3	3	--	2	1	4	3	--	--	2
HM056C	37 42 30	110 33 45	5	2	--	2	--	4	1	--	--	--
HM057C	37 42 43	110 33 35	5	2	1	2	--	3	1	--	--	2
HM058C	37 44 10	110 32 57	6	1	--	2	--	1	--	--	--	2
HM059C	37 44 14	110 32 48	5	1	--	2	--	1	2	--	--	2
HM060C	37 42 12	110 32 44	6	2	--	2	--	1	2	--	--	2
HM061C	37 51 23	110 30 34	5	1	3	1	1	2	1	--	--	2
HM062C	37 52 3	110 32 53	4	2	4	--	--	3	--	--	--	2
HM063C	37 49 43	110 35 18	5	2	--	2	1	3	3	--	--	1
HM064C	37 52 25	110 30 27	6	1	--	3	--	2	--	--	--	--
HM065C	37 52 55	110 30 58	6	1	--	2	--	2	2	--	--	--
HM066C	37 53 30	110 31 21	6	1	--	2	--	2	2	--	--	--
HM067C	37 53 15	110 31 47	4	2	2	2	--	4	3	--	1	--
HM068C	37 53 43	110 31 57	5	1	2	2	--	4	3	--	--	--
HM069C	37 54 36	110 31 38	6	1	--	2	--	--	--	--	--	--
HM070C	37 55 13	110 31 49	4	2	1	2	--	4	2	--	--	2
HM071C	37 56 40	110 32 45	4	1	1	2	--	5	1	--	--	--
HM072C	37 56 30	110 32 55	6	1	--	1	--	2	2	--	--	--
HM073C	37 56 14	110 32 47	4	1	2	2	--	3	4	--	--	2
HM074C	37 55 26	110 32 27	5	1	2	2	--	2	3	--	--	--
HM075C	37 55 29	110 32 17	5	1	2	2	--	4	--	--	--	--
HM076C	37 54 9	110 31 33	--	--	--	--	--	--	--	--	--	--
HM100C	37 56 20	110 52 37	4	2	1	2	--	5	2	--	--	2
HM101C	37 56 28	110 52 40	4	3	1	2	--	3	--	--	--	2
HM102C	37 59 30	110 51 8	3	3	1	1	--	4	1	--	--	1
HM103C	37 59 38	110 51 8	2	2	2	2	--	3	2	--	--	1
HM104C	37 54 53	110 51 53	3	2	--	--	--	4	3	--	--	3
HM105C	37 57 8	110 52 35	4	3	1	3	--	4	2	--	--	2
HM106C	37 57 3	110 52 40	4	2	--	3	--	4	--	--	--	2
HM107C	37 57 44	110 52 57	4	2	--	3	--	5	--	--	--	2
HM108C	37 56 40	110 53 2	4	2	--	3	--	4	1	--	--	2
HM109C	37 57 17	110 56 10	4	2	--	1	--	5	2	--	--	2
HM110C	37 57 23	110 55 58	4	2	--	1	--	5	1	--	--	2
HM111C	37 56 13	110 54 25	4	4	--	3	--	4	--	--	--	2
HM112C	37 56 14	110 54 16	4	3	--	3	--	4	1	--	--	2
HM113C	37 56 13	110 54 13	5	4	--	3	--	2	1	--	--	1
HM114C	37 55 50	110 55 29	5	2	--	3	--	4	1	--	--	--
HM115C	37 55 46	110 55 55	5	2	--	4	--	3	--	--	--	2

TABLE 5.--Continued

SAMPLE	PYROXENE	ARSENOPY	AMPHIBOL	ROCK FRA
HM043C	--	--	1	1
HM044C	--	--	1	2
HM046C	--	--	1	1
HM047C	--	--	--	2
HM048C	--	--	1	2
HM049C	--	--	1	1
HM053C	--	--	2	2
HM054C	--	--	--	3
HM056C	--	--	--	1
HM057C	--	--	--	1
HM058C	--	--	--	1
HM059C	--	--	--	1
HM060C	--	--	--	1
HM061C	--	--	--	1
HM062C	--	--	--	1
HM063C	--	--	--	2
HM064C	--	--	--	1
HM065C	--	--	--	1
HM066C	--	--	--	1
HM067C	--	--	1	1
HM068C	--	--	--	1
HM069C	--	--	--	2
HM070C	--	--	2	2
HM071C	--	--	--	2
HM072C	--	--	--	--
HM073C	--	--	2	2
HM074C	--	--	2	2
HM075C	1	--	--	2
HM076C	--	--	--	--
HM100C	--	--	--	3
HM101C	--	--	2	3
HM102C	--	--	2	3
HM103C	--	--	--	5
HM104C	--	--	--	4
HM105C	--	--	--	4
HM106C	--	--	--	4
HM107C	--	--	--	3
HM108C	--	--	--	3
HM109C	--	--	3	3
HM110C	--	--	2	3
HM111C	--	--	--	2
HM112C	--	--	2	2
HM113C	--	--	--	1
HM114C	--	--	--	2
HM115C	--	--	--	2

TABLE 5.--Continued

SAMPLE	LATITUDE	LONGITUD	ZIRCON-R	ZIRCON-E	SPHENE	RUTILE	ANATASE	BARITE	APATITE	SCHEELIT	EPIDOTE	PYRITE
HM116C	37 54 39	110 55 38	4	1	--	3	--	3	--	--	--	--
HM117C	37 56 12	110 57 26	4	1	--	3	--	5	--	--	--	--
HM118C	37 54 12	110 58 16	5	2	--	3	--	4	--	--	--	1
HM119C	37 54 9	110 58 27	4	2	--	3	--	5	1	--	--	1
HM120C	37 53 10	110 58 12	6	3	--	3	--	2	1	--	--	--
HM121C	37 53 14	110 58 30	6	3	--	3	--	2	1	--	--	--
HM122C	37 52 43	110 59 28	4	2	--	4	--	4	1	--	--	--
HM123C	37 52 31	110 59 23	4	2	--	4	--	3	1	--	--	--
HM124C	37 53 50	110 54 59	2	1	--	2	--	5	2	--	--	--
HM125C	37 53 3	110 55 15	--	--	--	--	--	--	--	--	--	--
HM126C	37 52 19	110 54 20	3	2	--	3	--	5	--	--	--	--
HM127C	37 51 35	110 54 33	3	3	--	2	1	3	3	--	--	2
HM128C	37 51 33	110 56 26	4	3	--	3	--	3	2	--	--	1
HM129C	37 55 40	110 51 45	4	3	--	2	--	4	1	--	--	2
HM130C	37 58 40	110 49 45	4	3	3	1	--	3	4	--	--	2
HM131C	37 58 35	110 49 50	1	--	--	--	--	5	4	--	--	1
HM132C	37 57 58	110 49 57	--	1	--	--	--	4	5	--	--	--
HM133C	37 56 45	110 50 30	1	2	--	2	--	5	3	--	--	--
HM134C	37 55 40	110 49 52	4	1	--	2	--	--	4	--	--	--
HM135C	37 55 32	110 49 48	3	1	--	--	--	3	5	--	--	--
HM137C	37 49 37	110 48 3	--	1	2	--	--	6	1	--	--	3
HM139C	37 48 55	110 49 58	2	2	4	2	--	3	4	--	2	--
HM140C	37 53 33	110 51 0	--	2	3	2	--	5	3	--	--	--
HM141C	37 53 46	110 51 35	2	--	1	2	--	5	--	--	--	--
HM142C	37 54 12	110 52 18	4	3	2	3	--	4	2	--	--	2
HM143C	37 52 27	110 51 40	3	2	--	3	--	5	--	--	--	2
HM144C	37 51 43	110 51 33	1	1	--	1	--	6	1	--	--	--
HM145C	37 51 3	110 52 10	2	2	--	2	--	5	1	--	--	--
HM146C	37 51 17	110 51 32	--	--	--	--	--	--	--	--	--	--
HM148C	37 50 48	110 50 14	2	2	--	--	--	6	2	--	--	2
HM166C	37 50 48	110 42 38	4	3	4	--	--	3	3	--	--	--
HM167C	37 51 47	110 43 38	5	2	3	--	--	--	3	--	--	1
HM168C	37 52 44	110 49 0	1	2	2	--	--	4	2	--	2	4
HM169C	37 55 55	110 47 20	2	2	3	2	--	5	1	--	--	3
HM170C	37 53 35	110 46 23	3	3	4	1	2	1	3	--	1	--
HM171C	37 51 59	110 45 15	2	2	2	3	--	5	1	--	--	1
HM173C	37 56 5	110 41 33	4	2	4	--	--	--	3	--	--	--
HM174C	37 55 17	110 36 57	5	2	3	2	--	2	4	--	--	--
HM175C	37 55 18	110 37 5	5	2	3	2	2	2	3	--	--	2
HM176C	37 54 43	110 35 48	5	2	3	2	--	3	4	--	--	--
HM177C	37 53 25	110 38 33	4	3	2	2	--	4	4	--	--	--
HM250C	37 45 12	110 49 8	2	2	--	2	2	6	1	--	--	1
HM251C	37 46 40	110 50 25	2	2	2	3	1	6	--	--	--	2
HM252C	37 47 42	110 50 35	2	2	1	3	1	6	--	--	--	2
HM253C	37 48 32	110 50 25	2	2	1	2	--	6	--	--	--	2

TABLE 5.--Continued

SAMPLE	PYROXENE	ARSENOPY	AMPHIBOL	ROCK FRA
HM116C	--	--	--	5
HM117C	--	--	2	3
HM118C	--	--	--	3
HM119C	--	--	2	2
HM120C	--	--	2	2
HM121C	--	--	2	3
HM122C	--	--	2	2
HM123C	--	--	1	2
HM124C	--	--	2	4
HM125C	--	--	--	--
HM126C	--	--	--	4
HM127C	1	--	2	3
HM128C	--	--	2	3
HM129C	--	--	2	2
HM130C	--	--	2	2
HM131C	--	--	--	3
HM132C	--	--	--	--
HM133C	--	--	--	3
HM134C	--	--	2	2
HM135C	--	--	2	2
HM137C	--	--	--	2
HM139C	--	--	2	4
HM140C	--	--	3	4
HM141C	--	--	2	4
HM142C	--	--	2	2
HM143C	--	--	3	3
HM144C	--	--	2	2
HM145C	--	--	3	2
HM146C	--	--	--	--
HM148C	--	--	2	2
HM166C	--	--	2	3
HM167C	--	--	3	3
HM168C	--	--	2	4
HM169C	--	--	--	4
HM170C	--	--	2	1
HM171C	--	--	2	4
HM173C	--	--	2	2
HM174C	--	--	2	1
HM175C	--	--	2	1
HM176C	--	--	2	--
HM177C	--	--	2	1
HM250C	--	--	--	2
HM251C	--	1	--	2
HM252C	--	--	--	2
HM253C	--	--	2	4

TABLE 5.--Continued

SAMPLE	LATITUDE	LONGITUD	ZIRCON-R	ZIRCON-E	SPHENE	RUTILE	ANATASE	BARITE	APATITE	SCHEELIT	EPIDOTE	PYRITE
HM254C	37 49 1	110 50 26	2	3	--	3	--	6	1	--	--	2
HM370C	37 56 44	110 29 34	5	--	2	2	--	2	3	--	--	1
HM371C	37 57 54	110 29 39	5	1	2	2	--	4	2	--	1	--
HM373C	37 56 47	110 28 13	4	1	2	2	--	4	2	--	--	--
HM374C	37 56 14	110 27 54	3	1	1	2	--	5	2	--	--	--
HM375C	37 55 52	110 27 44	3	1	1	3	--	5	2	--	--	--
HM400C	37 51 22	110 40 30	5	2	3	2	--	2	3	--	1	2
HM401C	37 53 5	110 39 18	5	2	3	2	--	2	3	--	--	2
HM402C	37 53 47	110 44 18	3	2	3	1	--	5	--	--	--	2
HM404C	37 51 55	110 34 15	4	2	3	--	--	3	3	--	1	1
HM405C	37 51 45	110 34 13	4	1	3	1	--	5	--	--	1	--
HM406C	37 51 23	110 31 7	5	1	--	2	--	3	--	--	--	--
HM407C	37 48 37	110 32 4	3	3	--	1	--	--	4	--	1	--
HM408C	37 48 47	110 32 4	3	2	1	1	1	5	2	--	--	--
HM409C	37 47 20	110 30 50	5	1	--	1	--	3	2	--	1	2
HM410C	37 52 5	110 45 20	5	1	--	1	--	2	3	--	--	--
HM411C	37 52 33	110 45 20	5	1	--	1	--	2	3	--	--	--
HM426C	38 1 15	110 30 20	5	2	1	2	--	4	--	--	--	--
HM427C	38 1 25	110 30 10	5	2	--	2	--	4	--	--	--	--
HM448C	37 56 43	110 27 12	5	1	--	3	--	3	--	--	--	2
HM449C	37 56 30	110 27 15	5	1	--	3	--	3	--	--	--	2
HM450C	37 55 41	110 25 52	3	1	--	3	--	5	--	--	--	3
HM451C	37 55 35	110 25 44	2	1	--	2	--	6	--	--	--	--
HM452C	37 52 41	110 29 11	5	2	--	3	--	2	--	--	--	--
HM453C	37 52 50	110 29 19	5	2	--	3	--	2	--	--	--	2
HM454C	37 52 8	110 29 31	5	--	--	3	2	3	--	--	--	--
HM455C	37 51 6	110 29 56	5	--	--	2	2	4	--	--	--	--
HM701C	37 51 15	110 37 58	4	2	--	2	--	3	3	--	--	--
HM702C	37 51 54	110 49 0	4	3	--	2	--	4	1	--	2	2
HM850C	37 51 20	110 42 46	1	--	--	1	--	5	2	--	--	1
HM851C	37 56 0	110 43 19	4	3	3	2	--	3	2	--	--	1
HM852C	37 56 43	110 44 5	3	3	3	2	2	5	3	--	--	--
HM853C	37 56 55	110 45 47	3	3	2	2	2	2	5	--	1	--
HM854C	37 57 8	110 45 43	2	2	3	2	1	1	5	--	--	2
HM855C	37 58 6	110 45 15	--	2	1	1	1	--	6	--	--	--
HM857C	37 59 42	110 47 30	4	3	2	2	1	1	3	--	--	--
HM901C	37 55 46	110 46 46	--	--	--	--	--	--	--	--	--	--
HM902C	37 58 48	110 48 41	--	--	--	--	--	--	--	--	--	--
HM903C	37 58 11	110 48 45	--	--	--	--	--	--	--	--	--	--
HM916C	37 56 58	110 45 41	--	--	--	--	--	--	--	--	--	--
HM917C	37 56 58	110 45 48	--	--	--	--	--	--	--	--	--	--
HM918C	37 56 58	110 45 55	--	--	--	--	--	--	--	--	--	--
JM856C	37 58 55	110 47 2	2	3	2	2	2	--	5	--	--	2

TABLE 5.--Continued

SAMPLE	PYROXENE	ARSENOPY	AMPHIBOL	ROCK FRA
HM254C	--	--	1	4
HM370C	--	--	1	1
HM371C	--	--	1	1
HM373C	--	--	1	--
HM374C	--	--	--	--
HM375C	--	--	1	1
HM400C	--	--	2	2
HM401C	--	--	--	2
HM402C	--	--	--	4
HM404C	--	--	2	2
HM405C	--	--	2	2
HM406C	--	--	1	--
HM407C	1	--	3	1
HM408C	1	--	1	2
HM409C	--	--	1	2
HM410C	--	--	3	--
HM411C	--	--	3	2
HM426C	--	--	1	2
HM427C	--	--	--	2
HM448C	--	--	--	2
HM449C	--	--	--	2
HM450C	--	--	--	3
HM451C	--	--	--	2
HM452C	--	--	--	2
HM453C	--	--	--	2
HM454C	--	--	--	2
HM455C	--	--	--	2
HM701C	--	--	2	2
HM702C	--	--	2	2
HM850C	1	--	1	3
HM851C	--	--	1	--
HM852C	--	--	2	3
HM853C	--	--	--	--
HM854C	--	--	--	3
HM855C	--	--	--	1
HM857C	--	--	2	2
HM901C	--	--	--	--
HM902C	--	--	--	--
HM903C	--	--	--	--
HM916C	--	--	--	--
HM917C	--	--	--	--
HM918C	--	--	--	--
JM856C	--	--	1	2