UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

CHEMICAL ANALYSES AND STATISTICAL SUMMARIES FOR SAMPLES OF ROCK, MINUS-60-MESH (0.25-mm) STREAM SEDIMENT, AND NONMAGNETIC HEAVY-MINERAL CONCENTRATE, MOUNT RAYMOND ROADLESS AREA, MADERA COUNTY, CALIFORNIA

by

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STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. 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 survey of the Mount Raymond Roadless Area in the Sierra National Forest, Madera County, California. The Mount Raymond Roadless Area (5242) was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

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INTRODUCTION

Geochemical sampling was conducted in the Mount Raymond Roadless Area, Madera County, California, during the summer of 1981. This report includes a map showing the locations of all sites sampled in this program (plate 1), a tabulation of the lower limits of determination used in the various analytical methods (table 1), a tabulation of chemical analyses for samples of rock, minus-60-mesh (0.25-mm) stream sediment, and nonmagnetic heavy-mineral concentrate from stream sediment (tables 2, 3, and 4, respectively), and summary statistics for the elements listed in tables 2-4 (tables 5-7). Tables 2-4 and 5-7 list selected data provided by computer programs in the U.S. Geological Survey RASS-STATPAC System (VanTrump and Miesch, 1977).

SAMPLE COLLECTION AND PREPARATION

Chemical analyses for a total of 59 rock samples, 32 stream-sediment samples, and 32 nonmagnetic heavy-mineral-concentrate samples are tabulated in this report (tables 2-4). The number of samples analyzed for each medium yields an approximate sample density of 1 sample/0.2 mi^2 (1 sample/0.5 km^2) for the rock samples and 1 sample/0.3 mi^2 (1 sample/0.9 km^2) for the other two sample media.

Most of the rock samples are of unaltered material. The analyses of these samples provide background information for elements in rocks that have not been affected by hydrothermal alteration or mineralization. In addition, some altered and(or) mineralized rocks were collected to characterize mineralogically anomalous areas. Although each rock sample was selected to represent the rocks exposed in the vicinity of the sample site, the actual areal extent of influence of the chemical information provided by a specific sample is not known; the sampling program was designed only to provide some general information on the geochemical nature of the rock units present.

The chemical analyses of the stream-sediment samples reflect the chemistry of rock material eroded from the drainage basin upstream from each sample site and may reveal unusually high concentrations of elements that may be related to mineral deposits.

Concentrate samples were processed from the same active alluvium used to make minus-60-mesh (0.25-mm) stream-sediment samples. The heavy-mineral-concentrate samples provide information about the chemistry of a limited number of minerals present in rock material eroded from the drainage basin upstream from each sample site. Wet panning and a heavy-liquid gravity separation technique were used to remove most of the common rock-forming minerals, such as quartz, feldspars, and clay minerals; and a magnetic separation technique was used to remove the more magnetic minerals leaving a mineral assemblage potentially rich in minerals commonly associated with many types of mineral deposits. The selective concentration of ore-related minerals permits determination of some elements that are not easily detected in stream-sediment samples. The chemical composition of a nonmagnetic heavy-mineral concentrate may also indicate specific minerals. For example, the barium content in a stream-sediment sample is predominantly the sum of barium in the mineral barite plus barium substituted in feldspars, clay minerals, and possibly other minerals, whereas the barium in a concentrate sample is essentially all in barite.

Rock samples

All rock samples were collected from outcrops that were considered to be representative of exposures in the vicinity of the plotted site location. Wherever possible the samples were hand cobbed to remove any obviously weathered material. All samples were crushed and pulverized to at least minus-100-mesh (0.15-mm) material before analysis.

Minus-60-mesh (0.25-mm) stream-sediment samples

The material for the stream-sediment samples was collected primarily in first-order (unbranched) and second-order (below the junction of two first-order) streams as shown on 1:62,500-scale topographic maps. Each sample was composited from active alluvium collected from several locations within an area that may extend as much as 50 ft (15 m) from the site plotted on the map. The resulting sample was air dried and that portion passing through a screen with 0.25-mm openings (a 60-mesh screen) was saved and pulverized to at least minus-100-mesh (0.15-mm) material before analysis.

Nonmagnetic heavy-mineral-concentrate samples

The bulk sample of active stream-sediment material was collected and composited in a manner similar to that used for the minus-60-mesh (0.25-mm) stream-sediment samples. Each bulk sample was passed through a 10-mesh (2.0-mm) screen to remove the coarse material. The sediment passing through the screen was wet-panned until most of the quartz, feldspar, organic material, and clay-sized material was removed. The sample was air dried and passed through a 18-mesh (1.0-mm) sieve; the minus-18-mesh material was saved. Any light material remaining in the concentrate was then removed by allowing the heavier fraction of the sample to settle through bromoform (specific gravity 2.86). The highly magnetic material was next removed with a hand magnet from the cleaned and dried heavy-mineral fraction. The remaining heavy-mineral material was then separated into a magnetic and a relatively nonmagnetic fraction using a Frantz Isodynamic Magnetic Separator set at 0.6 amperes, with a 15° forward setting and a 15° side setting. The resulting nonmagnetic sample was split into two fractions; one fraction was ground in an agate mortar for the analysis and the other fraction was saved for mineralogical studies.

CHEMICAL ANALYSIS

All three types of samples were analyzed for 31 elements (Ag, As, Au, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, La, Mg, Mn, Mo, Nb, Ni, Pb, Sb, Sc, Sn, Sr, Th, Ti, V, W, Y, Zn, and Zr) using a six-step semiquantitative emission spectrographic method (Grimes and Marranzino, 1968). Because of the limited amount of sample material, the nonmagnetic heavy-mineral concentrates were only analyzed spectrographically. The rock and stream-sediment samples were also analyzed for arsenic using a colorimetric method (Welsch, 1979), for zinc and gold by atomic absorption spectrometry (Ward and others, 1969; Meier, 1980), and for uranium using a modification of the fluorometric method of Centanni and others (1956). Analysis for all three sample types was done partly in the field and partly in U.S. Geological Survey laboratories near Golden, Colorado.

The spectrographic analytical values are reported as the approximate geometric midpoints (0.15, 0.2, 0.3, 0.5, 0.7, and 1.0 or appropriate powers of ten of these values) of concentration ranges whose respective boundaries are 0.12, 0.18, 0.26, 0.38, 0.56, 0.83, and 1.2 (or appropriate powers of ten of these values). In general, the precision of the spectrographic method is plus or minus one reporting value of the value given by the analyst approximately 83 percent of the time and plus or minus two reporting values of the value given by the analyst 96 percent of the time (Motooka and Grimes, 1976). Because all of the samples for this report were analyzed by the same analyst using the same spectrographic instrument, our experience indicates that better precision can be expected in the study.

Each spectrographic film includes analytical spectra for up to 22 field samples and one reference standard sample. The reference standard sample is included with each set of field samples to monitor the quality of the analyses from film to film.

For the four elements analyzed by other than spectrographic methods the reporting values vary with the element and with the concentration level for each given element. Precision for these analytical methods is commonly reported as a percent relative standard deviation (% RSD), and is based on replicate analyses of samples selected to provide information at different concentration levels. In general, the precision for each method tends to be lowest for those samples containing a given element at or near its lower limit of determination. For the four elements discussed here, typical reported ranges of percent relative standard deviation, as determined by replicate analysis of a limited sample set, are as follows:

Element	Range of % RSD	Source of data
As	2 -13	Welsch, 1979
Zn	3.4-30.2	Ward and others, 1969, p. 21
Au	0.0-22.8	Meier, 1980
U	6.8-14.2	R. M. O'Leary and A. L. Meier, written commun., 1982

As an example to use in interpreting these ranges one might consider zinc, whose range is shown as 3.4-30.2% RSD. This range indicates that a reported zinc value listed in tables 2 or 3 should be within $\pm$ 30.2% (usually much less) of the mean value for that sample. As was the case for the spectrographic analyses, a reference standard sample was analyzed with each batch of field samples to monitor the quality of the analyses.

DESCRIPTION OF TABLES 1-4

Table 1 lists the lower limits of analytical determination for the three types of samples collected for this report. Because of matrix interference problems, the spectrographic technique was modified for the analysis of nonmagnetic heavy-mineral-concentrate samples. As a result, the lower limits of determination for the elements analyzed for this type of sample are all raised two reporting values above the normal lower-limit value.

Tables 2-4 list the analytical values for the samples of rock, minus-60-mesh (0.25-mm) stream sediment, and nonmagnetic heavy-mineral concentrate, respectively. For the three sample sets the data are arranged so that column 1 contains the USGS-assigned sample numbers. These numbers coincide with the numbers on the site location map (plate 1). In tables 2-4, rock samples are suffixed by RK, stream-sediment samples by SS, and concentrate samples by KN. Columns 2 and 3 list latitude (north) and longitude (west), respectively, for each sample site in degrees, minutes, and seconds. Column headings showing the letter "s" below the element symbol indicate emission spectrographic analyses. In a similar manner, the letters "aa" below the element symbol indicate atomic absorption analyses. The letters "cm" indicate colorimetric determinations for arsenic, and "inst" indicates fluorometric determinations for uranium. All element concentrations are given in parts per million (ppm), except those for Fe, Mg, Ca, and Ti, which are given in percent (pct).

If a given element was looked for in a sample but not detected, then the letter "N" was entered in the tables in place of an analytical value. If an element was observed but was below the lowest reporting value, then 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, then a "greater than" symbol (>) was entered in the tables in front of the upper limit of determination.

Because of the formatting used in the computer program that produced tables 2-4, some of the elements listed in these tables (Fe, Mg, Ca, Ti, Ag, Be, and U) carry one or more nonsignificant zeroes to the right of the significant digits. The analysts did not determine these elements to the accuracy suggested by these extra zeroes. The last column in table 2 gives the formation name for each rock sample. These names are taken from the units shown on the geologic map of the Mount Raymond Roadless Area (Huber, 1982).

For the semiquantitative spectrographic method used, the elements As, Au, and Zn have lower limits of analytical determination that are usually above normal concentrations for these elements in the selected sample media. To obtain more useful analytical values, these elements were also analyzed by using other, more sensitive methods on the rock and stream-sediment samples, and the spectrographic analyses for these three elements have been deleted from the rock and stream-sediment data sets (tables 2 and 3). The spectrographic values for W and Th in the rock samples; for Bi, Sb, and W in the stream-sediment samples; and for Cd, Sb, and Sr in the concentrate samples were in every case below the respective lower limits of determination for these elements. Consequently, these elements have been deleted from tables 2, 3, and 4, respectively.

Table 1.--Lower limits of analytical determination for samples of rock, minus-60-mesh (0.25-mm) stream sediment, and nonmagnetic heavy-mineral concentrate, Mount Raymond Roadless Area, California

[(--) indicates not analyzed. "aa" following the element symbol indicates atomic absorption analysis; "cm" indicates colorimetric analysis; "inst" indicates fluorometric analysis; no suffix indicates spectrographic analysis. The values listed for Fe, Mg, Ca, and Ti are in percent; all others are in parts per million]

Element	Lower limit of determination	
	Rock and stream sediment	Nonmagnetic heavy-mineral concentrate
Fe	0.05	0.1
Mg	0.02	0.05
Ca	0.05	0.1
Ti	0.002	0.005
Mn	10	20
Ag	0.5	1.0
As	200	500
Au	10	20
B	10	20
Ba	20	50
Be	1	2
Bi	10	20
Cd	20	50
Co	5	10
Cr	10	20
Cu	5	10
La	20	50
Mo	5	10
Nb	20	50
Ni	5	10
Pb	10	20
Sb	100	200
Sc	5	10
Sn	10	20
Sr	100	200
V	10	20
W	50	100
Y	10	20
Zn	200	500
Zr	10	20
Th	100	200
As-cm	1	--
Zn-aa	5	--
Au-aa	0.002	--
U-inst	0.05	--

Table 2.--Data for rock samples, Mount Raymond Roadless Area, California

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s
MR001RK	37 31 30	119 29 34	3.0	1.00	3.0	.50	1,500	.5	50	1,500	1.0	N
MR002RK	37 30 57	119 29 7	10.0	2.00	3.0	.50	5,000	1.5	30	2,000	1.0	N
MR003RK	37 30 52	119 29 20	3.0	1.00	1.0	.30	1,500	2.0	50	2,000	1.0	N
MR004RK	37 31 46	119 28 16	.2	.05	.3	.05	100	N	10	500	5.0	N
MR006RK	37 32 28	119 28 53	3.0	1.00	2.0	.50	500	N	15	500	1.0	N
MR008RK	37 32 40	119 29 10	3.0	1.00	2.0	.50	700	N	15	1,000	1.0	N
MR009RK	37 32 11	119 30 18	2.0	.50	1.5	.20	700	N	15	1,000	1.5	N
MR010RK	37 32 8	119 31 5	1.5	.50	1.0	.20	700	N	10	500	1.5	N
MR011RK	37 31 59	119 31 33	1.0	.50	1.0	.20	700	N	<10	1,000	1.0	N
MR012RK	37 32 8	119 33 3	2.0	.30	.7	.15	500	N	15	700	1.5	N
MR013RK	37 32 20	119 33 12	2.0	.30	1.0	.15	500	N	10	700	1.5	N
MR014RK	37 32 0	119 34 55	3.0	.70	3.0	.50	700	N	10	1,000	1.0	N
MR015RK	37 31 51	119 35 2	3.0	1.00	2.0	.50	500	N	20	1,500	1.0	N
MR016RK	37 30 10	119 33 35	3.0	1.50	2.0	.50	500	.5	70	700	1.0	N
MR017RK	37 29 27	119 35 36	3.0	1.00	2.0	.50	700	N	15	1,000	<1.0	N
MR018RK	37 29 34	119 33 46	5.0	2.00	3.0	.50	1,000	<.5	15	300	1.0	N
MR019RK	37 29 7	119 33 21	2.0	1.00	2.0	.50	500	1.0	15	1,000	1.0	N
MR020RK	37 28 24	119 33 11	2.0	.70	2.0	.30	500	N	10	1,000	1.0	N
MR022RK	37 27 40	119 32 15	3.0	1.00	2.0	.30	1,000	N	10	1,000	1.0	N
MR023RK	37 26 47	119 31 8	1.5	.20	1.0	.15	300	N	10	1,500	1.5	N
MR024RK	37 26 49	119 31 47	2.0	.70	1.5	.50	500	N	<10	1,000	1.0	N
MR025RK	37 29 33	119 30 5	.7	.10	.2	.10	200	.5	15	1,000	1.5	N
MR026RK	37 30 6	119 31 3	.7	.20	1.0	.10	200	.5	10	700	1.5	N
MR027RK	37 30 4	119 31 12	1.0	.50	1.5	.15	200	<.5	<10	700	1.0	N
MR029RK	37 30 22	119 31 2	2.0	.70	1.0	.30	700	N	10	700	1.0	N
MR032RK	37 31 10	119 31 30	2.0	.70	1.5	.30	700	N	<10	700	1.0	N
MR033RK	37 30 5	119 29 55	1.0	.15	.1	.07	150	.7	50	1,000	1.0	N
MR034RK	37 29 15	119 28 55	3.0	1.00	2.0	.50	1,000	.5	10	1,500	1.0	N
MR035RK	37 29 55	119 28 13	3.0	1.00	1.5	.30	700	N	15	1,000	1.0	N
MR036RK	37 29 8	119 28 12	1.5	.50	1.5	.20	1,000	N	10	1,000	1.5	N
MR037RK	37 28 35	119 29 12	3.0	1.00	1.5	.30	700	N	15	1,000	1.0	N
MR038RK	37 28 50	119 30 8	5.0	1.50	3.0	.50	700	N	10	500	1.0	N
MR039RK	37 28 4	119 30 31	5.0	1.00	2.0	.50	1,000	N	10	1,000	1.0	N
MR040RK	37 30 8	119 35 34	2.0	1.00	2.0	.30	700	N	10	1,000	1.0	N
MR200RK	37 31 48	119 29 14	1.0	1.00	.5	.20	700	<.5	70	1,000	1.0	N
MR201RK	37 31 39	119 29 41	2.0	1.50	5.0	.70	700	.7	50	500	1.0	N
MR202RK	37 31 27	119 29 45	1.0	1.00	2.0	.30	1,500	1.0	30	1,000	1.0	N
MR203RK	37 30 26	119 33 15	1.5	.20	1.0	.15	500	<.5	15	1,500	1.5	N
MR204RK	37 30 23	119 34 5	3.0	2.00	5.0	.20	3,000	<.5	10	30	1.0	N
MR205RK	37 30 18	119 32 36	2.0	1.00	1.5	.30	700	N	10	1,000	1.0	N
MR206RK	37 30 40	119 33 4	.7	.15	.5	.10	200	.7	10	1,000	1.5	N
MR207RK	37 30 41	119 33 17	.5	.15	.7	.15	200	1.0	20	1,500	1.0	N
MR208RK	37 30 7	119 32 20	2.0	1.50	2.0	.30	700	.5	15	1,000	1.0	N
MR209RK	37 29 29	119 30 28	5.0	1.50	5.0	.50	1,000	N	10	500	<1.0	N
MR210RK	37 29 56	119 30 40	2.0	.70	1.5	.30	500	.5	20	1,000	1.0	N

Table 2.--Data for rock samples, Mount Raymond Roadless Area, California

Sample	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s
MR001RK	N	7	20	5	20	N	N	5	50	N	30	N	500
MR002RK	50	30	20	70	<20	N	N	7	150	N	30	N	200
MR003RK	N	15	20	7	N	N	N	10	70	N	30	N	200
MR004RK	N	N	N	<5	50	N	N	<5	20	N	7	N	150
MR006RK	N	20	30	5	30	N	N	7	30	N	10	N	300
MR008RK	N	20	20	7	20	N	N	7	30	N	10	N	300
MR009RK	N	5	<10	N	70	N	N	5	30	N	7	N	300
MR010RK	N	5	N	N	20	N	N	<5	20	N	7	N	200
MR011RK	N	<5	N	N	20	N	N	N	30	N	7	N	200
MR012RK	N	5	N	<5	<20	N	N	5	20	N	10	N	300
MR013RK	N	7	N	15	30	5	N	<5	30	N	7	N	300
MR014RK	N	15	10	<5	50	N	N	<5	20	N	15	N	300
MR015RK	N	15	15	<5	30	N	N	<5	20	N	10	N	500
MR016RK	N	50	70	150	30	N	N	100	10	N	20	N	200
MR017RK	N	15	20	<5	50	<5	N	5	20	N	10	N	500
MR018RK	N	20	100	300	20	N	N	10	15	N	50	10	200
MR019RK	N	10	15	70	50	N	N	<5	20	N	7	N	500
MR020RK	N	15	15	10	30	N	N	5	20	N	10	N	500
MR022RK	N	15	15	<5	20	N	N	N	20	N	10	N	500
MR023RK	N	5	N	N	50	N	N	<5	30	N	5	N	200
MR024RK	N	10	N	15	50	N	N	N	20	N	7	N	300
MR025RK	N	N	N	<5	<20	N	N	<5	20	N	7	N	150
MR026RK	N	<5	N	20	100	30	N	N	20	N	<5	N	100
MR027RK	N	7	N	10	30	N	N	<5	30	N	7	N	200
MR029RK	N	10	10	20	20	N	N	<5	30	N	7	N	200
MR032RK	N	10	15	5	50	<5	N	<5	20	N	10	N	200
MR033RK	N	N	N	7	70	7	N	5	30	N	5	N	150
MR034RK	N	20	15	7	30	N	N	<5	20	N	15	N	300
MR035RK	N	15	<10	<5	30	5	N	5	20	N	20	N	500
MR036RK	N	5	<10	N	30	N	N	<5	15	N	7	N	200
MR037RK	N	15	10	5	20	N	N	<5	20	N	15	N	500
MR038RK	N	15	10	<5	30	N	N	7	20	N	15	N	500
MR039RK	N	15	10	<5	30	N	N	<5	20	N	15	N	300
MR040RK	N	15	10	<5	<20	N	N	<5	20	N	7	N	500
MR200RK	N	<5	N	<5	50	7	N	<5	50	N	15	N	150
MR201RK	N	5	15	30	20	N	N	5	50	N	30	<10	700
MR202RK	N	<5	70	5	30	20	N	<5	50	N	15	N	300
MR203RK	N	5	N	<5	30	N	N	N	30	N	7	N	200
MR204RK	<20	N	70	30	N	7	N	20	15	N	10	30	100
MR205RK	N	10	20	10	50	N	N	10	20	N	10	N	200
MR206RK	N	N	N	<5	30	N	N	N	50	N	5	N	200
MR207RK	N	N	N	<5	100	10	N	N	50	N	7	N	300
MR208RK	N	15	30	20	20	N	N	15	50	N	20	N	500
MR209RK	N	20	50	5	20	N	N	15	20	N	20	N	500
MR210RK	N	7	15	5	30	<5	N	<5	50	N	7	N	300

Table 2.--Data for rock samples, Mount Raymond Roadless Area, California

Sample	V-ppm s	Y-ppm s	Zr-ppm s	Zn-ppm aa	Au-ppm aa	As-ppm cm	U-ppm inst	FORMATION NAMES
MR001RK	150	20	100	25	N	4	.29	METASEDIMENTARY ROCKS, UNDIVIDED
MR002RK	150	20	70	2,000	.002	3	.11	METASEDIMENTARY ROCKS, UNDIVIDED
MR003RK	150	15	100	110	.002	3	.48	METASEDIMENTARY ROCKS, UNDIVIDED
MR004RK	<10	20	100	10	N	2	2.70	GRANITE OF SHUTEYE PEAK
MR006RK	100	15	100	50	N	N	5.10	GRANODIORITE OF ILLILOUETTE CREEK
MR008RK	100	15	100	55	N	3	2.90	GRANODIORITE OF ILLILOUETTE CREEK
MR009RK	50	15	70	40	N	N	1.90	EL CAPITAN GRANITE
MR010RK	30	15	70	40	N	N	2.90	EL CAPITAN GRANITE
MR011RK	20	10	70	35	N	N	2.10	EL CAPITAN GRANITE
MR012RK	50	15	100	35	N	N	1.60	EL CAPITAN GRANITE
MR013RK	50	15	100	30	N	N	4.50	EL CAPITAN GRANITE
MR014RK	100	20	150	40	N	N	.59	EL CAPITAN GRANITE
MR015RK	70	20	200	55	N	N	1.10	EL CAPITAN GRANITE
MR016RK	200	20	150	45	N	150	2.70	METASEDIMENTARY ROCKS, UNDIVIDED
MR017RK	70	10	200	60	N	N	.67	TONALITE OF BLUE CANYON
MR018RK	150	30	150	25	N	1	.96	TONALITE OF BLUE CANYON
MR019RK	70	10	100	65	N	3	1.00	TONALITE OF BLUE CANYON
MR020RK	100	10	150	45	N	N	2.10	TONALITE OF BLUE CANYON
MR022RK	100	15	100	50	.002	N	.83	GRANODIORITE OF GRIZZLY CREEK
MR023RK	30	10	100	40	N	N	2.40	GRANITE OF SHUTEYE PEAK
MR024RK	50	10	300	35	N	N	2.90	GRANITE OF SHUTEYE PEAK
MR025RK	20	10	100	5	N	3	.55	METAVOLCANIC ROCKS, UNDIVIDED
MR026RK	15	15	100	15	N	3	1.60	GRANITE PORPHYRY OF STAR LAKES
MR027RK	50	10	50	35	N	N	1.20	GRANITE PORPHYRY OF STAR LAKES
MR029RK	50	15	100	30	.006	N	2.90	GRANITE PORPHYRY OF STAR LAKES
MR032RK	50	15	100	45	N	N	1.30	GRANITE PORPHYRY OF STAR LAKES
MR033RK	<10	10	100	35	.002	6	1.40	METASEDIMENTARY ROCKS, UNDIVIDED
MR034RK	100	30	200	80	N	3	1.30	METAVOLCANIC ROCKS, UNDIVIDED
MR035RK	100	20	150	55	N	N	1.10	GRANODIORITE OF GRIZZLY CREEK
MR036RK	50	15	50	55	N	N	2.80	GRANITE OF SHUTEYE PEAK
MR037RK	70	30	300	35	N	4	.53	GRANODIORITE OF GRIZZLY CREEK
MR038RK	100	20	100	75	N	8	.13	METARHYOLITE
MR039RK	70	20	200	40	N	N	1.10	GRANODIORITE OF GRIZZLY CREEK
MR040RK	70	10	150	55	N	N	.53	TONALITE OF BLUE CANYON
MR200RK	30	50	200	130	.002	6	.29	METASEDIMENTARY ROCKS, UNDIVIDED
MR201RK	200	20	100	30	N	6	.27	GRANITE PORPHYRY OF STAR LAKES
MR202RK	200	15	100	10	N	4	.44	METASEDIMENTARY ROCKS, UNDIVIDED
MR203RK	30	15	100	30	N	1	.72	GRANITE PORPHYRY OF STAR LAKES
MR204RK	100	20	100	300	N	45	.91	METASEDIMENTARY ROCKS, UNDIVIDED
MR205RK	70	20	100	35	N	2	1.60	GRANITE PORPHYRY OF STAR LAKES
MR206RK	20	15	100	20	N	4	1.10	GRANITE PORPHYRY OF STAR LAKES
MR207RK	20	15	150	15	N	3	.44	METAVOLCANIC ROCKS, UNDIVIDED
MR208RK	100	20	150	45	N	4	1.00	GRANITE PORPHYRY OF STAR LAKES
MR209RK	150	20	150	55	N	7	.06	METAVOLCANIC ROCKS, UNDIVIDED
MR210RK	70	20	200	55	N	3	1.10	GRANITE PORPHYRY OF STAR LAKES

Table 2.--Data for rock samples, Mount Raymond Roadless Area, California--continued

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s
MR211RK	37 29 10	119 30 5	.7	.10	.3	.05	150	<.5	30	1,000	1.5	N
MR212RK	37 29 28	119 30 7	3.0	1.50	2.0	.50	1,000	N	50	500	1.0	N
MR213RK	37 29 33	119 30 59	2.0	1.00	2.0	.30	500	N	10	700	<1.0	N
MR214RK	37 30 43	119 33 46	1.0	.30	1.0	.15	300	.7	10	1,000	1.0	N
MR215RK	37 30 43	119 33 52	7.0	5.00	5.0	.70	1,500	N	15	100	1.0	N
MR216RK	37 30 42	119 34 0	5.0	2.00	3.0	.50	700	N	10	500	N	N
MR217RK	37 30 42	119 34 7	.2	.10	.1	.03	100	.5	10	150	N	N
MR218RK	37 31 15	119 32 40	1.0	.20	1.0	.10	500	N	15	1,000	1.0	N
MR219RK	37 30 52	119 32 4	1.0	.20	1.0	.10	500	.7	10	1,000	<1.0	N
MR220RK	37 30 54	119 32 58	1.5	.30	1.5	.15	700	N	10	1,000	1.0	N
MR221RK	37 30 50	119 34 29	1.5	.50	1.0	.20	700	<.5	10	700	1.0	N
MR222RK	37 30 45	119 34 19	1.5	1.50	2.0	.20	700	1.0	10	1,000	<1.0	<10
MR223RK	37 30 43	119 34 14	7.0	3.00	5.0	.30	1,000	N	<10	100	N	N
MR224RK	37 30 48	119 32 57	1.5	.10	1.5	.07	700	300.0	15	5,000	N	N

Table 2.--Data for rock samples, Mount Raymond Roadless Area, California--continued

Sample	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s
MR211RK	N	N	N	10	50	<5	N	<5	30	N	5	N	200
MR212RK	N	15	50	15	20	N	N	7	20	N	15	N	300
MR213RK	N	15	15	5	50	5	N	5	15	N	10	N	200
MR214RK	N	<5	<10	<5	20	N	N	N	70	N	7	N	300
MR215RK	N	10	150	20	N	N	N	<5	<10	N	15	30	N
MR216RK	N	30	70	10	30	N	N	10	20	N	20	N	500
MR217RK	N	N	15	<5	N	N	N	<5	50	N	<5	N	N
MR218RK	N	N	<10	<5	50	N	<20	N	50	N	7	N	200
MR219RK	N	N	10	15	70	7	N	N	50	N	5	N	200
MR220RK	N	<5	10	<5	70	5	N	<5	50	N	7	<10	300
MR221RK	N	5	10	10	50	5	<20	<5	150	N	10	<10	300
MR222RK	N	5	150	5	50	N	N	10	100	N	10	<10	200
MR223RK	N	30	700	30	N	N	N	150	50	N	30	N	300
MR224RK	300	N	<10	50	100	N	N	<5	>20,000	150	10	20	500

Table 2.--Data for rock samples, Mount Raymond Roadless Area, California--continued

Sample	V-ppm s	Y-ppm s	Zr-ppm s	Zn-ppm aa	Au-ppm aa	As-ppm cm	U-ppm inst	FORMATION NAMES
MR211RK	<10	10	100	15	N	20	1.40	METARHYOLITE
MR212RK	100	15	150	50	N	1	.27	METAVOLCANIC ROCKS, UNDIVIDED
MR213RK	50	15	100	40	N	5	2.20	GRANITE PORPHYRY OF STAR LAKES
MR214RK	50	20	100	50	N	2	.74	GRANITE PORPHYRY OF STAR LAKES
MR215RK	100	50	150	200	.009	60	1.80	METASEDIMENTARY ROCKS, UNDIVIDED
MR216RK	150	30	70	50	.003	5	.29	METAVOLCANIC ROCKS, UNDIVIDED
MR217RK	10	N	20	20	N	20	.06	METASEDIMENTARY ROCKS, UNDIVIDED
MR218RK	20	20	100	20	N	2	.57	GRANITE PORPHYRY OF STAR LAKES
MR219RK	30	20	50	30	.004	1	1.10	GRANITE PORPHYRY OF STAR LAKES
MR220RK	30	20	100	60	.002	2	.61	GRANITE PORPHYRY OF STAR LAKES
MR221RK	50	30	100	150	.002	10	.59	METAVOLCANIC ROCKS, UNDIVIDED
MR222RK	70	20	70	80	.002	2	.48	METASEDIMENTARY ROCKS, UNDIVIDED
MR223RK	100	20	50	25	.002	100	.06	METASEDIMENTARY ROCKS, UNDIVIDED
MR224RK	15	20	30	40,000	.040	500	.72	MINERALIZED DIKE IN GRANITE PORPHYRY OF STAR LAKES

Table 3.--Data for stream-sediment samples, Mount Raymond Roadless Area, California

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	B-ppm s	Ba-ppm s
MR003SS	37 30 52	119 29 20	3.0	1.0	.7	.50	1,500	.7	150	700
MR004SS	37 31 46	119 28 16	3.0	.7	1.0	.50	1,000	N	100	1,000
MR005SS	37 31 48	119 28 35	5.0	.7	1.5	.30	1,500	.5	200	700
MR006SS	37 32 28	119 28 53	5.0	.7	1.5	.70	1,500	N	100	1,000
MR007SS	37 32 34	119 28 53	1.5	.5	1.5	.30	700	N	15	500
MR008SS	37 32 40	119 29 10	5.0	.7	1.0	.50	1,000	N	20	500
MR009SS	37 32 11	119 30 18	5.0	.7	1.5	.30	1,500	.5	150	700
MR010SS	37 32 8	119 31 5	3.0	.7	1.0	.20	1,000	<.5	50	700
MR011SS	37 31 59	119 31 33	3.0	.5	1.0	.50	1,000	.5	70	500
MR012SS	37 32 8	119 33 3	2.0	.5	1.0	.30	700	N	30	1,000
MR013SS	37 32 20	119 33 12	1.0	.3	.7	.15	500	N	10	700
MR014SS	37 32 0	119 34 55	3.0	.7	1.0	.30	1,000	N	50	700
MR015SS	37 31 51	119 35 2	2.0	.7	1.0	.20	700	<.5	30	1,000
MR016SS	37 30 10	119 33 35	2.0	.7	.5	.30	1,000	1.0	30	1,000
MR017SS	37 29 27	119 35 36	2.0	.5	1.5	.30	1,000	2.0	50	700
MR018SS	37 29 34	119 33 46	2.0	.7	.5	.30	1,000	.7	30	700
MR019SS	37 29 7	119 33 21	3.0	.7	2.0	.30	1,500	1.0	30	700
MR020SS	37 28 24	119 33 11	5.0	1.5	2.0	.30	2,000	N	20	1,000
MR021SS	37 27 54	119 32 25	2.0	.7	1.0	.30	500	<.5	50	1,000
MR022SS	37 27 40	119 32 15	5.0	1.0	1.0	.50	1,000	N	50	1,000
MR023SS	37 26 47	119 31 8	5.0	1.0	1.5	.30	1,000	N	15	1,000
MR024SS	37 26 49	119 31 47	5.0	1.5	2.0	.50	1,000	N	50	700
MR027SS	37 30 4	119 31 12	2.0	.7	.7	.30	500	<.5	70	1,000
MR028SS	37 30 7	119 31 20	2.0	.5	1.5	.20	1,000	1.0	20	700
MR029SS	37 30 22	119 31 2	2.0	.7	.7	.20	700	<.5	70	500
MR030SS	37 30 21	119 31 9	2.0	.7	1.5	.20	700	.5	50	700
MR031SS	37 31 12	119 31 40	2.0	.5	.7	.20	1,000	N	10	700
MR032SS	37 31 10	119 31 30	3.0	.5	1.5	.50	700	<.5	70	700
MR034SS	37 29 15	119 28 55	2.0	1.0	1.0	.30	1,000	.5	50	700
MR035SS	37 29 55	119 28 13	5.0	1.0	1.0	.50	1,000	N	100	700
MR039SS	37 28 4	119 30 31	7.0	1.0	2.0	.70	1,000	N	70	700
MR040SS	37 30 8	119 35 34	3.0	.7	1.5	.50	1,000	N	15	700

Table 3.--Data for stream-sediment samples, Mount Raymond Roadless Area, California

Sample	Be-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s
MR003SS	1.0	<20	20	70	20	50	5	N	30	30
MR004SS	1.0	N	15	50	15	50	<5	<20	15	30
MR005SS	1.0	N	20	100	20	30	N	N	20	50
MR006SS	1.0	N	10	100	10	50	5	<20	10	20
MR007SS	1.5	N	10	10	<5	70	5	N	<5	30
MR008SS	1.0	N	10	30	5	100	N	<20	<5	20
MR009SS	1.0	N	15	30	50	20	<5	N	10	50
MR010SS	1.5	N	10	20	20	50	N	<20	7	50
MR011SS	1.0	N	10	30	20	100	5	<20	N	30
MR012SS	1.5	N	10	20	7	30	<5	N	5	30
MR013SS	1.5	N	5	<10	<5	30	5	N	N	30
MR014SS	1.0	N	10	50	5	20	N	N	5	20
MR015SS	1.5	N	7	15	15	20	N	N	5	20
MR016SS	1.0	N	10	50	20	20	N	N	20	70
MR017SS	1.0	N	15	30	20	20	7	N	10	500
MR018SS	1.5	N	70	100	150	50	5	N	70	30
MR019SS	1.0	N	15	50	30	50	<5	N	7	150
MR020SS	1.0	N	15	70	10	20	<5	N	7	20
MR021SS	1.0	N	10	20	15	50	N	<20	5	20
MR022SS	1.5	N	20	30	10	30	N	N	5	30
MR023SS	1.5	N	10	20	5	20	N	N	7	20
MR024SS	1.0	N	20	50	10	50	N	N	10	30
MR027SS	1.0	N	10	20	.10	30	5	N	N	20
MR028SS	1.0	<20	15	20	100	50	N	N	<5	70
MR029SS	1.0	N	15	50	20	30	7	N	10	30
MR030SS	1.0	N	10	15	100	20	5	N	5	30
MR031SS	1.0	N	7	10	20	70	5	N	<5	30
MR032SS	1.0	N	10	20	30	50	5	N	5	30
MR034SS	1.0	N	10	50	7	30	N	<20	15	50
MR035SS	1.0	N	15	70	10	30	N	<20	15	30
MR039SS	1.5	N	20	70	15	30	N	<20	10	30
MR040SS	1.0	N	15	30	50	50	7	<20	10	50

Table 3.--Data for stream-sediment samples, Mount Raymond Roadless Area, California

Sample	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	Y-ppm s	Zr-ppm s	Th-ppm s	Zn-ppm aa	Au-ppm aa	As-ppm cm	U-ppm inst
MR003SS	20	N	200	100	20	100	N	750	.002	6	.78
MR004SS	15	N	200	100	20	200	N	65	N	5	20.90
MR005SS	20	10	300	100	30	150	N	400	N	15	.57
MR006SS	20	N	200	100	30	300	N	90	N	80	10.40
MR007SS	10	N	300	70	20	150	N	30	N	5	10.00
MR008SS	20	N	200	100	30	700	<100	35	N	2	3.50
MR009SS	15	<10	200	100	15	100	N	500	.004	20	1.80
MR010SS	20	<10	300	70	30	300	N	100	.003	5	2.40
MR011SS	15	N	200	100	30	500	N	250	N	25	5.40
MR012SS	10	N	200	70	20	150	N	45	N	2	2.00
MR013SS	10	N	300	50	20	500	<100	30	N	3	6.80
MR014SS	10	N	300	70	20	200	N	55	N	5	6.20
MR015SS	10	N	200	50	15	100	N	60	.003	3	1.60
MR016SS	15	N	100	70	15	100	N	210	.080	25	1.40
MR017SS	10	N	200	100	15	200	N	300	.004	300	1.40
MR018SS	15	N	100	100	20	100	N	85	.007	20	1.80
MR019SS	20	N	200	100	20	500	N	250	N	25	2.00
MR020SS	30	N	500	150	15	150	N	60	N	5	2.20
MR021SS	10	N	300	50	15	100	N	80	.004	4	1.10
MR022SS	20	N	300	100	30	500	N	90	N	4	1.60
MR023SS	30	N	200	100	30	200	N	65	N	N	4.30
MR024SS	30	N	200	100	30	150	N	55	N	20	1.10
MR027SS	15	N	200	70	15	500	N	40	.004	4	1.10
MR028SS	10	20	200	50	20	300	N	750	.040	120	1.60
MR029SS	15	N	300	100	20	200	N	65	N	3	2.00
MR030SS	10	<10	200	50	20	100	N	170	.005	40	1.60
MR031SS	10	N	200	50	20	200	N	70	.004	6	1.60
MR032SS	15	10	200	100	30	200	N	140	N	20	1.80
MR034SS	20	N	200	70	30	100	N	90	N	2	1.10
MR035SS	15	N	200	100	30	150	N	85	N	4	1.80
MR039SS	20	N	300	150	50	200	N	70	N	5	1.40
MR040SS	20	N	300	100	30	200	N	110	.002	8	.84

Table 4.--Data for concentrate samples, Mount Raymond Roadless Area, California

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s
MR003KN	37 30 52	119 29 20	1.5	.70	5.0	>2	1,000	N	N	N	700
MR004KN	37 31 46	119 28 16	.5	.10	5.0	>2	500	N	N	N	200
MR005KN	37 31 48	119 28 35	1.5	.70	5.0	>2	700	500	N	500	200
MR006KN	37 32 28	119 29 53	.7	.10	3.0	>2	500	N	N	N	50
MR007KN	37 32 34	119 28 53	1.0	.07	7.0	>2	500	N	N	N	20
MR008KN	37 32 40	119 29 10	.5	.05	5.0	>2	500	N	N	N	30
MR009KN	37 32 11	119 30 18	5.0	.20	3.0	>2	1,000	N	5,000	N	70
MR010KN	37 32 8	119 31 5	1.5	.50	5.0	>2	1,000	N	N	N	150
MR011KN	37 31 59	119 31 33	1.0	.70	3.0	>2	700	200	500	>1,000	50
MR012KN	37 32 8	119 33 3	.5	.10	2.0	>2	500	N	N	N	100
MR013KN	37 32 20	119 33 12	1.0	.20	2.0	>2	300	N	N	N	30
MR014KN	37 32 0	119 34 55	1.0	.30	5.0	>2	700	N	N	N	70
MR015KN	37 31 51	119 35 2	1.0	.50	3.0	>2	700	N	N	N	200
MR016KN	37 30 10	119 33 35	1.0	.50	3.0	>2	2,000	N	N	N	300
MR017KN	37 29 27	119 35 36	1.0	.07	5.0	>2	700	70	20,000	N	70
MR018KN	37 29 34	119 33 46	.7	.50	1.5	>2	200	N	N	N	500
MR019KN	37 29 7	119 33 21	1.0	2.00	3.0	2	1,000	N	N	N	50
MR020KN	37 28 24	119 33 11	1.0	.10	5.0	>2	700	N	N	N	50
MR021KN	37 27 54	119 32 25	.7	.10	5.0	>2	700	N	N	N	70
MR022KN	37 27 40	119 32 15	.5	.05	1.0	>2	200	N	N	N	50
MR023KN	37 26 47	119 31 8	.5	.10	2.0	>2	300	N	N	N	100
MR024KN	37 26 49	119 31 47	.5	.10	3.0	>2	500	N	N	N	100
MR027KN	37 30 4	119 31 12	.3	.07	2.0	>2	200	N	N	N	30
MR028KN	37 30 7	119 31 20	.7	2.00	3.0	>2	1,000	N	N	N	70
MR029KN	37 30 22	119 31 2	1.0	.50	5.0	>2	500	50	N	N	300
MR030KN	37 30 21	119 31 9	.5	.50	1.5	>2	500	5	N	N	70
MR031KN	37 31 12	119 31 40	.5	.05	.2	2	200	N	N	N	20
MR032KN	37 31 10	119 31 30	.7	.70	3.0	>2	500	7	N	N	50
MR034KN	37 29 15	119 28 55	.7	.50	3.0	>2	500	N	N	N	100
MR035KN	37 29 55	119 28 13	.5	.20	3.0	>2	700	N	N	N	100
MR039KN	37 28 4	119 30 31	.7	.10	5.0	>2	500	N	N	N	50
MR040KN	37 30 8	119 35 34	.5	.10	5.0	>2	700	N	N	N	20

Table 4.--Data for concentrate samples, Mount Raymond Roadless Area, California

Sample	Ba-ppm s	Be-ppm s	Bi-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s
MR003KN	500	N	100	100	100	<10	150	15	150	N
MR004KN	300	<2	200	10	100	<10	500	15	100	N
MR005KN	300	<2	500	15	100	N	100	<10	100	N
MR006KN	500	N	N	10	70	<10	150	20	50	N
MR007KN	200	N	100	15	50	<10	700	30	150	N
MR008KN	200	N	30	<10	70	<10	700	20	70	N
MR009KN	200	N	500	500	70	100	100	30	70	N
MR010KN	300	N	N	10	100	30	300	15	100	N
MR011KN	500	N	50	50	50	150	200	100	50	N
MR012KN	700	N	N	<10	70	<10	300	70	100	N
MR013KN	500	N	N	20	100	10	200	500	70	N
MR014KN	200	N	50	15	50	150	500	70	100	N
MR015KN	500	N	300	N	50	N	300	10	150	N
MR016KN	300	2	70	N	100	<10	150	10	70	50
MR017KN	300	2	300	100	70	1,000	200	50	100	N
MR018KN	300	N	700	10	200	15	150	15	100	N
MR019KN	500	N	500	20	100	150	100	20	70	N
MR020KN	300	N	20	N	70	<10	100	30	50	N
MR021KN	300	2	70	15	70	N	1,000	15	150	N
MR022KN	300	N	500	N	70	N	<50	10	50	N
MR023KN	200	<2	N	10	50	<10	>2,000	10	<50	N
MR024KN	300	2	100	<10	70	N	500	N	100	N
MR027KN	200	N	20	N	50	N	200	10	50	N
MR028KN	300	N	150	N	50	<10	100	15	<50	N
MR029KN	300	N	700	70	100	15	150	20	50	N
MR030KN	500	N	200	10	70	20	200	30	50	N
MR031KN	500	N	500	N	70	N	100	<10	<50	N
MR032KN	200	N	50	50	70	N	200	70	50	N
MR034KN	500	N	50	N	70	N	200	10	70	N
MR035KN	200	N	150	<10	50	50	200	15	70	N
MR039KN	200	N	<20	<10	50	N	700	10	150	N
MR040KN	300	N	500	N	70	N	150	15	100	N

Table 4.--Data for concentrate samples, Mount Raymond Roadless Area, California

Sample	Pb-ppm s	Sc-ppm s	Sn-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s
MR003KN	100	30	70	300	200	500	500	>2,000	<200
MR004KN	300	30	30	200	<100	500	N	>2,000	500
MR005KN	50	20	30	200	100	300	N	>2,000	N
MR006KN	100	50	50	150	100	500	N	>2,000	700
MR007KN	50	50	100	200	<100	1,000	N	>2,000	1,000
MR008KN	50	30	50	200	N	700	N	>2,000	1,000
MR009KN	70	50	70	300	1,000	500	N	>2,000	2,000
MR010KN	20	50	70	300	300	500	N	>2,000	300
MR011KN	20	70	1,500	200	300	500	N	>2,000	200
MR012KN	30	50	70	200	150	700	N	>2,000	1,000
MR013KN	200	50	30	150	300	700	N	>2,000	2,000
MR014KN	100	50	200	200	150	700	N	>2,000	1,000
MR015KN	70	50	100	200	N	500	N	>2,000	<200
MR016KN	700	50	150	300	100	700	N	>2,000	<200
MR017KN	15,000	50	70	200	300	500	N	>2,000	<200
MR018KN	70	100	70	300	300	500	N	>2,000	200
MR019KN	2,000	50	20	1,000	200	200	N	>2,000	N
MR020KN	200	30	50	300	300	300	N	>2,000	N
MR021KN	50	50	100	200	N	500	N	>2,000	N
MR022KN	30	30	20	150	<100	300	N	>2,000	<200
MR023KN	20	70	30	150	N	700	N	>2,000	500
MR024KN	50	50	100	200	N	500	N	>2,000	<200
MR027KN	20	70	30	150	<100	700	N	>2,000	N
MR028KN	50	70	>2,000	200	150	500	N	>2,000	<200
MR029KN	100	70	200	300	300	700	N	>2,000	N
MR030KN	200	70	>2,000	150	200	700	N	>2,000	<200
MR031KN	50	70	100	100	100	500	N	>2,000	300
MR032KN	300	50	2,000	200	300	500	N	>2,000	N
MR034KN	30	50	100	200	200	500	N	>2,000	200
MR035KN	30	50	70	200	N	500	N	>2,000	300
MR039KN	20	50	50	300	N	500	N	>2,000	300
MR040KN	200	50	50	300	200	500	N	>2,000	N

DESCRIPTION OF TABLES 5-7

Tables 5, 6, and 7 give summary statistics for the analyses of the samples of rock, minus-60-mesh (0.25-mm) stream sediment, and nonmagnetic heavy-mineral concentrate listed in tables 2, 3, and 4, respectively. All values in the Range of values and Percentiles columns are significant to the number of digits shown.

Table 5.--Summary statistics for the analytical values determined for the 59 rock samples in table 2, Mount Raymond Roadless Area, California

[All concentrations are in parts per million except those for Fe, Mg, Ca, and Ti, which are in percent. The symbol "aa" following the element symbol indicates atomic absorption analysis; "cm" indicates colorimetric analysis; "inst" indicates fluorometric analysis; no element suffix indicates emission spectrographic analysis. "N" means not detected at the lower limit of determination shown in parentheses]

Element	Range of values	Percentiles				
		50	75	90	95	98
Fe	0.2 - 10	2	3	5	7	7
Mg	0.05 - 5	1	1	2	2	3
Ca	0.1 - 5	1.5	2	3	5	5
Ti	0.03 - 0.7	0.3	0.5	0.5	0.5	0.7
Mn	100 -5000	700	700	1500	1500	3000
Ag	N(0.5)- 300	N(0.5)	0.5	1	1.5	2
B	<10 - 70	10	15	50	50	70
Ba	30 -5000	1000	1000	1500	2000	2000
Be	N(1) - 5	1	1	1.5	1.5	1.5
Bi	N(10)- <10	N(10)	N(10)	N(10)	N(10)	N(10)
Cd	N(20)- 300	N(20)	N(20)	N(20)	<20	50
Co	N(5) - 50	7	15	20	30	30
Cr	N(10)- 700	10	20	70	150	150
Cu	N(5) - 300	5	15	30	70	150
La	N(20)- 100	30	50	70	100	100
Mo	N(5) - 30	N(5)	<5	7	10	20
Nb	N(20)- <20	N(20)	N(20)	N(20)	N(20)	<20
Ni	N(5) - 150	<5	7	10	20	100
Pb	<10 >20,000	30	50	70	150	150
Sb	N(100)- 150	N(100)	N(100)	N(100)	N(100)	N(100)
Sc	<5 - 50	10	15	30	30	30
Sn	N(10) - 30	N(10)	N(10)	<10	20	30
Sr	N(100) - 700	300	500	500	500	500
V	<10 - 200	70	100	150	200	200
Y	<10 - 50	15	20	30	30	50
Zr	20 - 300	100	150	200	200	300
Zn-aa	5 -40,000	40	55	110	200	2000
Au-aa	N(0.002)- 0.040	N(0.002)	N(0.002)	0.002	0.004	0.009
As-cm	N(1)- 500	2	4	20	60	150
U-inst	0.06 - 5.1	1.0	1.6	2.8	2.9	4.5

Table 6.--Summary statistics for the analytical values determined for the 32 minus-60-mesh (0.25-mm) stream-sediment samples in table 3, Mount Raymond Roadless Area, California

[All concentrations are in parts per million except those for Fe, Mg, Ca, and Ti, which are in percent. The symbol "aa" following the element symbol indicates atomic absorption analysis; "cm" indicates colorimetric analysis; "inst" indicates fluorometric analysis; no element suffix indicates emission spectrography analysis. "N" means not detected at the lower limit of determination shown in parentheses]

Element	Range of values	Percentiles				
		50	75	90	95	98
Fe	1 - 7	3	5	5	5	7
Mg	0.3 - 1.5	0.7	0.7	1	1.5	1.5
Ca	0.5 - 2	1	1.5	2	2	2
Ti	0.15- 0.7	0.3	0.5	0.5	0.7	0.7
Mn	500 - 2000	1000	1000	1500	1500	2000
Ag	N(0.5) - 2	<0.5	0.5	1	1	2
B	10 - 200	50	70	100	150	200
Ba	500 - 1000	700	1000	1000	1000	1000
Be	1 - 1.5	1	1.5	1.5	1.5	1.5
Cd	N(20) - <20	N(20)	N(20)	N(20)	<20	<20
Co	5 - 70	10	15	20	20	70
Cr	<10 - 100	30	50	70	100	100
Cu	<5 - 150	15	20	50	100	150
La	20 - 100	30	50	70	100	100
Mo	N(5) - 7	<5	5	5	7	7
Nb	N(20)- <20	N(20)	<20	<20	<20	<20
Ni	N(5)- 70	7	10	20	30	70
Pb	20 - 500	30	50	70	150	500
Sc	10 - 30	15	20	20	30	30
Sn	N(10)- 20	N(10)	N(10)	<10	10	20
Sr	100 - 500	200	300	300	300	500
V	50 - 150	100	100	100	150	150
Y	15 - 50	20	30	30	30	50
Zr	100 - 700	200	300	500	500	700
Th	N(100)- <100	N(100)	N(100)	N(100)	<100	<100
Zn-aa	30 - 750	85	170	400	500	750
Au-aa	N(0.002)- 0.080	N(0.002)	0.004	0.005	0.007	0.040
As-cm	N(1) - 300	5	20	40	80	120
U-inst	0.57 - 20.9	1.8	2.4	6.8	10.0	10.4

Table 7.--Summary statistics for the analytical values determined for the 32 nonmagnetic heavy-mineral-concentrate samples in table 4, Mount Raymond Roadless Area, California

[All concentrations are in parts per million except those for Fe, Mg, Ca, and Ti, which are in percent. All analyses are by emission spectroscopy. "N" means not detected at the lower limit of determination shown in parentheses]

Element	Range of values	Percentiles				
		50	75	90	95	98
Fe	0.3 - 5	0.7	1	1.5	1.5	5
Mg	0.05- 2	0.2	0.5	0.7	2	2
Ca	0.2 - 7	3	5	5	5	7
Ti	2 - >2	>2	>2	>2	>2	>2
Mn	200 - 2000	500	700	1000	1000	2000
Ag	N(1) - 500	N(1)	N(1)	50	200	500
As	N(500) - 20,000	N(500)	N(500)	N(500)	5000	20,000
Au	N(20) - >1000	N(20)	N(20)	N(20)	500	>1000
B	20 - 700	70	100	300	500	700
Ba	200 - 700	300	500	500	500	700
Be	N(2) - 2	N(2)	N(2)	2	2	2
Bi	N(20) - 700	100	300	500	700	700
Co	N(10) - 500	10	15	70	100	500
Cr	50 - 200	70	100	100	100	200
Cu	N(10) - 1000	<10	15	150	150	1000
La	<50 - >2000	200	300	700	1000	>2000
Mo	N(10) - 500	15	30	70	100	500
Nb	<50 - 150	70	100	150	150	150
Ni	N(10) - 50	N(10)	N(10)	N(10)	N(10)	50
Pb	20 - 15,000	50	200	300	2000	15,000
Sc	20 - 100	50	50	70	70	100
Sn	20 - >2000	70	100	1500	>2000	>2000
V	100 - 1000	200	300	300	300	1000
W	N(100)- 1000	150	300	300	300	1000
Y	200 - 1000	500	700	700	700	1000
Zn	N(500) - 500	N(500)	N(500)	N(500)	N(500)	500
Zr	>2000 - >2000	>2000	>2000	>2000	>2000	>2000
Th	N(200) - 2000	200	500	1000	2000	2000

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