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, HORSE MEADOW, LOG CABIN-SADDLEBAG, AND TIOGA LAKE ROADLESS AREAS, AND HALL NATURAL AREA, MONO COUNTY, CALIFORNIA

by

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This report has not been reviewed for conformity with U.S. Geological Survey editorial standards. The use of trade names in this report is for descriptive purposes only and does not constitute endorsement by the U.S. Geological Survey.

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 Horse Meadow (5049), Log Cabin-Saddlebag (5052), and Tioga Lake (5050) Roadless Areas and Hall Natural Area in the Inyo National Forest, Mono County, California. These areas were classified as further planning areas 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 Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and in the Hall Natural Area, Mono County, California, during the summers of 1978 and 1979. This report includes a map showing the locations of all sites sampled for this report (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 27 rock samples, 47 stream-sediment samples, and 33 nonmagnetic heavy-mineral-concentrate samples are tabulated in this report (tables 2-4). Included in the rock and stream-sediment data sets are the results of the analyses of 11 rock samples and 13 stream-sediment samples that were collected in or near the present study areas in 1978 for a report on the Minarets Wilderness and adjacent areas, Madera and Mono Counties, California (Huber, 1982). The total number of analyzed samples collected in or near the study areas yields an approximate sample density of 1 sample/1.5 mi^2 (1 sample/3.9 km^2) for the rock samples, 1 sample/1.3 mi^2 (1 sample/3.2 km^2) for the stream-sediment samples, and 1 sample/1.8 mi^2 (1 sample/4.6 km^2) for the nonmagnetic heavy-mineral-concentrate samples.

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 from 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 an 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 (Ward and others, 1963; and for zinc, antimony, cadmium, and bismuth by atomic absorption spectrometry (Ward and others, 1969; Welsch and Chao, 1975; Viets, 1978). A limited number of the rock and stream-sediment samples were also analyzed by atomic absorption spectrometry for gold (Au-T) by the method of Meier (1980) or for gold (Au-P) by the method of Thompson and others (1968). Only the Minarets Wilderness samples were analyzed for gold by the Thompson method. Of the rock and stream-sediment samples collected specifically for the present report, those samples that showed a silver value above the lower limit of determination of the emission spectrographic method were also analyzed for gold. Analysis for Au-P was done on the Minarets Wilderness samples prior to the development of Meier's gold method. Analysis for all three sample types was done 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 this 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 six elements analyzed by other than spectrographic methods the reporting values vary with the element and with the concentration level for each given element. 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. 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 six 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	0.0-48.9	Unpublished analyses by R. H. Hill, 1981
Zn	3.4-30.2	Ward and others, 1969, p. 21
Sb	3.7-10.7	Welsch and Chao, 1975
Cd	3.3-18.8	Viets, 1978
Bi	1.4- 4.0	Viets, 1978
Au-P	6.5-31.6	From analyses in Thompson and others, 1968
Au-T	0.0-22.8	Meier, 1980

As an example to use in interpreting these ranges one might consider antimony, whose range is shown as 3.7-10.7% RSD. This range indicates that a reported antimony value listed in table 2 or 3 should be within ± 10.7% (usually much less) of the mean value for that sample.

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 chemical analyses 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. Field numbers in tables 2, 3, and 4 beginning with "HV" were originally collected for a study of the Hoover Wilderness and adjacent study areas (Chaffee, Banister, and others, 1980). Field numbers beginning with "WL" were originally collected for a study of the Walker Lake 1° x 2° quadrangle (Chaffee, Hill, and others, 1980). Field numbers beginning with "LC" were collected specifically for the present study. All other samples were originally collected for the study of the Minarets Wilderness and adjacent areas (Huber, 1982). These sample 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 spectrographic analyses. In a similar manner the letters "aa" below the element symbol indicate atomic absorption analyses and "cm" indicates colorimetric analysis for arsenic. 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 but not detected in a sample, 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. If an element was not looked for in a sample, then 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 2-4, some of the elements listed in these tables (Fe, Mg, Ca, Ti, Ag and Be) 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 the 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 Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural Area (Seitz and others, 1983) and of the Bodie quadrangle (Chesterman and Gray, 1975).

For the semiquantitative spectrographic method used, the elements As, Bi,Cd, Sb, 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 determined by other, more sensitive methods on all of the rock and stream-sediment samples (except those from the Minarets study), and the spectrographic values for these five elements have been deleted from the rock and stream-sediment data sets (tables 2 and 3). The spectrographic values for Au, Sn, and Th in the rock samples; for Au in the stream-sediment samples; and for Cd, Sb, and Zn in the concentrate samples were all below the respective lower limits of determination of these elements. Consequently, these elements have been deleted from tables 2, 3, and 4, respectively. In addition, the atomic absorption analyses for Au-P in the rock and stream-sediment samples were deleted for the same reason.

Table 1.--Lower limits of analytical determination for samples of rock, minus-60-mesh (-0.25-mm) stream sediment, and nonmagnetic heavy-mineral concentrate, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural Area, California

[(--) indicates not analyzed. "aa" following the element symbol indicates atomic absorption analysis; "cm" indicates colorimetric 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	200	500
Zn-aa	5	--
Cd-aa	0.05	--
Bi-aa	0.5	--
Sb-aa	1.0	--
Au-P-aa	0.02	--
Au-T-aa	0.005	--
As-cm	10	--

Table 2.--Data for rock samples, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural 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	Co-ppm s
3K137RK	37 54 0	119 11 27	1.0	.20	.70	.05	500	N	<10	1,500	1.0	5
3K142RK	37 53 58	119 11 48	5.0	2.00	3.00	.50	700	N	<10	1,500	<1.0	5
3K143RK	37 51 16	119 10 51	2.0	.30	2.00	.10	500	N	<10	1,500	2.0	5
3K144RK	37 51 41	119 10 50	1.0	.10	.50	.05	200	N	<10	2,000	1.0	5
3K149RK	37 52 24	119 10 55	5.0	3.00	.70	.30	500	N	<10	300	1.0	5
3K152RK	37 50 38	119 11 39	3.0	2.00	.10	.20	200	N	50	1,000	2.0	10
3K157RK	37 52 38	119 12 38	3.0	.50	2.00	.30	500	N	<10	1,000	2.0	5
3K160RK	37 54 24	119 13 26	15.0	3.00	1.00	.50	1,000	N	<10	1,000	<1.0	10
3K183RK	37 51 22	119 12 23	3.0	2.00	.10	.30	300	N	30	1,000	1.0	10
3K185RK	37 51 50	119 11 59	1.0	.30	.20	.10	200	N	10	700	1.0	<5
3K186RK	37 54 52	119 13 22	1.5	.30	.70	.07	300	N	10	1,000	1.0	<5
HV9108RK	37 57 36	119 16 46	5.0	1.00	.50	.70	300	<.5	100	1,000	2.0	15
HV9109RK	37 57 14	119 15 36	1.0	1.00	2.00	.10	300	.5	50	1,000	N	<5
HV9111RK	37 58 55	119 17 27	7.0	1.00	5.00	.70	1,500	N	20	2,000	2.0	10
HV9112RK	37 58 40	119 17 39	3.0	1.50	3.00	.50	700	N	30	700	3.0	10
HV9156RK	37 57 49	119 14 18	1.5	2.00	2.00	.20	700	<.5	20	1,500	1.5	7
HV9174RK	37 56 24	119 15 6	1.0	.50	<.05	.20	200	<.5	70	1,000	<1.0	5
HV9183RK	37 59 0	119 17 5	3.0	1.50	1.50	.30	700	1.0	50	700	1.5	10
LC005RK	37 56 47	119 10 55	1.0	.50	.70	.30	300	N	N	500	1.0	7
LC006RK	37 59 24	119 8 38	3.0	1.00	2.00	.30	700	N	10	700	<1.0	15
LC010RK	37 56 17	119 15 20	1.0	3.00	7.00	.20	700	N	N	1,000	N	N
LC011RK	37 56 12	119 15 20	1.5	1.00	.50	.20	500	N	50	500	<1.0	15
LC014RK	37 56 34	119 15 59	.3	.10	.70	.05	20	2.0	<10	150	N	N
LC015RK	37 56 51	119 16 25	1.0	.30	3.00	.15	1,500	N	10	200	1.5	5
LC017RK	37 54 35	119 8 8	.5	.15	.50	.10	200	N	N	500	2.0	N
WL0286RK	38 1 31	119 14 36	3.0	1.50	3.00	.50	500	N	10	200	2.0	N
WL0289RK	38 2 0	119 11 41	2.0	1.00	2.00	.30	700	N	10	2,000	3.0	10

Table 2.--Data for rock samples, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural Area, California

Sample	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zr-ppm s
3K137RK	N	N	N	N	N	<5	30	5	100	20	N	<10	30
3K142RK	10	15	30	N	N	5	15	15	700	70	N	15	100
3K143RK	N	10	20	N	N	<5	20	5	200	30	N	10	70
3K144RK	N	<5	20	N	N	<5	20	N	150	10	N	10	70
3K149RK	50	<5	30	N	N	50	N	20	N	100	N	20	70
3K152RK	30	30	30	N	N	30	10	20	N	50	N	15	100
3K157RK	<10	<5	20	N	N	5	20	10	150	30	N	15	100
3K160RK	10	<5	20	N	N	5	15	30	300	200	N	20	100
3K183RK	70	30	30	N	<20	30	<10	15	<100	100	N	10	100
3K185RK	<10	<5	50	N	<20	<5	10	<5	200	10	N	15	100
3K186RK	<10	20	30	N	<20	<5	30	<5	200	10	N	10	70
HV9108RK	50	30	50	10	<20	30	20	15	150	200	N	30	200
HV9109RK	20	20	20	5	N	20	15	5	N	300	<50	10	100
HV9111RK	<10	<5	50	N	N	<5	20	20	700	500	N	50	100
HV9112RK	10	<5	30	N	N	5	20	7	500	100	N	15	150
HV9156RK	30	15	<20	<5	N	50	10	10	200	100	N	20	70
HV9174RK	30	10	20	N	N	10	N	5	N	100	N	<10	100
HV9183RK	100	70	30	N	N	50	70	20	200	200	N	20	100
LC005RK	<10	5	70	N	N	7	20	5	200	30	N	15	150
LC006RK	10	10	30	N	N	7	20	10	500	100	N	10	50
LC010RK	15	7	30	N	N	<5	100	<5	100	30	N	10	500
LC011RK	20	15	30	N	N	20	<10	7	N	70	N	10	30
LC014RK	30	20	20	10	N	30	15	N	N	300	N	20	30
LC015RK	<10	<5	50	N	N	5	15	5	100	30	N	15	50
LC017RK	<10	<5	20	N	N	<5	50	5	150	20	N	<10	100
WL0286RK	15	<5	50	N	<20	<5	<10	10	500	200	N	30	150
WL0289RK	20	5	50	N	<20	7	30	7	500	100	N	10	200

Table 2.--Data for rock samples, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural Area, California

Sample	Zn-ppm aa	Cd-ppm aa	Bi-ppm aa	Sb-ppm aa	Au-T-ppm aa	As-ppm cm	FORMATION NAMES
3K137RK	35	--	--	--	--	--	QUARTZ MONZONITE AND GRANODIORITE, UNDIVIDED
3K142RK	80	--	--	--	--	--	QUARTZ MONZONITE AND GRANODIORITE, UNDIVIDED
3K143RK	50	--	--	--	--	--	QUARTZ MONZONITE AND GRANODIORITE, UNDIVIDED
3K144RK	25	--	--	--	--	--	QUARTZ MONZONITE AND GRANODIORITE, UNDIVIDED
3K149RK	110	--	--	--	--	--	METASEDIMENTARY ROCKS
3K152RK	90	--	--	--	--	--	METASEDIMENTARY ROCKS
3K157RK	90	--	--	--	--	--	METASEDIMENTARY ROCKS
3K160RK	95	--	--	--	--	--	METAVOLCANIC ROCKS
3K183RK	75	--	--	--	--	--	METASEDIMENTARY ROCKS
3K185RK	25	--	--	--	--	--	QUARTZ MONZONITE AND GRANODIORITE, UNDIVIDED
3K186RK	30	--	--	--	--	--	QUARTZ MONZONITE AND GRANODIORITE, UNDIVIDED
HV9108RK	70	.20	<.5	3	.007	N	METACONGLOMERATE OF EAST LAKE
HV9109RK	130	2.50	<.5	2	<.005	40	METASEDIMENTARY ROCKS OF DUNDERBERG PEAK
HV9111RK	55	.20	.5	2	--	N	METAVOLCANIC BRECCIA OF BLACK MOUNTAIN
HV9112RK	45	.20	<.5	1	--	N	HALF DOME GRANODIORITE
HV9156RK	10	.30	<.5	2	--	N	METASEDIMENTARY ROCKS OF TIOGA CREST
HV9174RK	40	.30	<.5	2	--	20	METASEDIMENTARY ROCKS OF DUNDERBERG PEAK
HV9183RK	110	.30	<.5	1	--	10	METASEDIMENTARY ROCKS OF DUNDERBERG PEAK
LC005RK	55	.15	<.5	N	--	N	QUARTZ MONZONITE OF WILLIAMS BUTTE
LC006RK	40	.05	<.5	<1	--	N	QUARTZ MONZONITE OF MONO LAKE
LC010RK	10	.05	<.5	1	--	20	METASEDIMENTARY ROCKS OF DUNDERBERG PEAK
LC011RK	50	.05	.5	<1	--	<10	METASEDIMENTARY ROCKS OF DUNDERBERG PEAK
LC014RK	200	1.55	<.5	5	N	N	METASEDIMENTARY ROCKS OF DUNDERBERG PEAK
LC015RK	30	.05	1.0	<1	--	N	METARHYODACITE OF COONEY LAKE
LC017RK	15	N	<.5	<1	--	N	ALASKITE OF WILLIAMS BUTTE
WL0286RK	10	.10	.5	2	--	N	GRANODIORITE OF MONO DOME
WL0289RK	40	.15	N	2	--	N	GRANODIORITE OF MONO DOME

Table 3.--Data for stream-sediment samples, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural 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	Co-ppm s
3K119SS	37 55 46	119 10 52	1.0	.50	.5	.15	500	N	15	200	3.0	5
3K124SS	37 54 4	119 11 17	1.5	.30	1.0	.15	500	N	20	200	5.0	<5
3K127SS	37 54 9	119 10 49	1.0	3.00	.7	.20	500	N	20	200	3.0	<5
3L074SS	37 49 57	119 9 52	3.0	1.00	1.5	.30	1,500	.7	30	1,000	2.0	15
3L075SS	37 50 30	119 8 50	1.5	.50	1.0	.20	700	N	20	300	3.0	7
3L077SS	37 51 8	119 8 35	2.0	.30	1.0	.30	1,000	N	15	200	3.0	7
3L078SS	37 51 30	119 12 3	1.0	.20	.5	.10	300	N	20	150	3.0	<5
3L080SS	37 51 48	119 11 30	1.5	.20	.7	.15	500	<.5	20	150	5.0	<5
3L103SS	37 56 45	119 12 32	1.5	.50	1.0	.30	300	N	15	300	2.0	5
3L111SS	37 55 3	119 14 4	1.5	.50	1.0	.15	500	N	10	150	3.0	7
3L112SS	37 55 3	119 14 15	1.5	.50	1.0	.20	500	N	20	150	5.0	5
3L115SS	37 55 56	119 13 48	1.5	.50	1.0	.20	300	N	15	200	5.0	7
4K095SS	37 54 44	119 13 25	5.0	1.00	1.0	.15	700	N	20	500	3.0	15
HV9108SS	37 57 36	119 16 46	2.0	1.00	2.0	.50	700	N	100	1,000	5.0	10
HV9109SS	37 57 14	119 15 36	2.0	1.50	.7	.20	1,000	.7	200	1,500	3.0	5
HV9111SS	37 58 55	119 17 27	3.0	1.00	.7	.30	1,500	<.5	150	1,000	5.0	15
HV9112SS	37 58 40	119 17 39	2.0	1.00	2.0	.50	700	N	50	500	5.0	5
HV9128SS	37 59 15	119 17 12	5.0	2.00	5.0	1.00	1,000	N	50	1,000	3.0	30
HV9154SS	37 57 15	119 13 30	7.0	1.50	1.5	1.00	1,000	N	20	500	1.0	15
HV9155SS	37 57 14	119 13 38	1.0	.70	.7	.30	700	.5	30	700	2.0	5
HV9156SS	37 57 49	119 14 18	1.5	1.00	.5	.15	700	.5	70	1,000	1.5	7
HV9157SS	37 57 46	119 14 7	1.0	.70	.5	.30	500	.5	50	700	2.0	N
HV9158SS	37 57 36	119 14 9	1.5	1.00	.5	.20	700	.5	30	700	1.0	10
HV9174SS	37 56 24	119 15 6	1.5	.50	.7	.30	1,000	N	100	1,500	2.0	7
HV9183SS	37 59 0	119 17 5	2.0	1.00	.5	.30	1,000	.7	50	700	2.0	10
LC001SS	37 57 51	119 9 36	3.0	1.00	1.0	.30	500	N	15	200	1.0	20
LC003SS	37 54 0	119 8 2	2.0	.50	.7	.20	700	N	10	300	1.0	5
LC004SS	37 52 17	119 10 16	1.5	.30	.7	.15	500	N	15	200	1.0	7
LC005SS	37 56 47	119 10 55	5.0	.50	.7	.30	500	N	15	200	<1.0	15
LC006SS	37 59 24	119 8 38	3.0	1.00	1.0	.50	700	.5	15	500	1.0	20
LC007SS	37 59 47	119 8 57	3.0	.70	.7	.20	500	N	20	300	1.0	15
LC008SS	37 52 18	119 9 42	1.5	.20	.5	.10	700	N	20	200	1.5	5
LC009SS	37 55 15	119 15 0	1.5	.20	.5	.20	300	N	15	200	1.5	5
LC010SS	37 56 17	119 15 20	1.0	.20	.5	.15	500	<.5	30	100	1.5	7
LC011SS	37 56 12	119 15 20	2.0	.50	.5	.15	500	.5	50	300	1.5	10
LC012SS	37 52 2	119 9 3	1.5	.20	.7	.20	500	N	20	200	1.5	5
LC013SS	37 51 13	119 8 21	1.5	.20	.5	.15	500	N	20	300	1.0	7
LC014SS	37 56 34	119 15 59	1.5	.30	.5	.10	200	N	20	150	1.5	7
LC015SS	37 56 51	119 16 25	2.0	.50	1.0	.30	300	<.5	70	700	1.0	10
LC016SS	37 55 38	119 9 34	2.0	.15	.5	.15	200	N	10	200	1.0	5
LC017SS	37 54 35	119 8 8	2.0	.50	.2	.30	300	N	10	700	1.0	7
LC018SS	37 55 9	119 15 9	1.5	.30	.7	.30	700	N	20	500	1.5	7
WL0285SS	38 1 12	119 9 36	2.0	1.00	1.5	.30	1,000	N	50	1,000	3.0	10
WL0286SS	38 1 31	119 14 36	3.0	1.50	1.5	.50	1,000	.5	100	2,000	5.0	10
WL0287SS	38 1 25	119 14 33	3.0	1.00	2.0	.30	1,000	3.0	50	1,000	3.0	10

Table 3.--Data for stream-sediment samples, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural Area, California

Sample	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s
3K119SS	<10	50	30	N	<20	<5	20	5	N	150	10
3K124SS	<10	70	30	15	<20	<5	20	5	N	100	15
3K127SS	<10	70	50	5	<20	<5	15	5	N	100	10
3L074SS	50	150	30	15	N	10	30	10	N	150	200
3L075SS	15	50	50	10	<20	10	30	7	<10	150	100
3L077SS	10	20	50	N	<20	<5	15	5	N	200	70
3L078SS	<10	50	30	5	<20	<5	20	5	N	<100	15
3L080SS	10	50	70	10	<20	<5	20	5	N	100	15
3L103SS	15	7	50	N	<20	<5	15	5	N	200	30
3L111SS	10	50	70	N	N	5	10	7	N	150	50
3L112SS	10	30	30	5	<20	<5	20	7	N	150	50
3L115SS	15	30	50	N	N	7	20	5	N	200	50
4K095SS	10	20	70	N	<20	10	70	10	N	200	50
HV9108SS	10	7	50	5	<20	<5	30	5	N	300	100
HV9109SS	20	30	50	10	<20	20	50	5	N	N	300
HV9111SS	10	20	50	5	<20	5	70	7	N	150	150
HV9112SS	<10	7	50	7	20	N	50	7	N	500	100
HV9126SS	200	50	30	N	<20	30	20	15	N	1,000	500
HV9154SS	500	10	30	N	N	50	30	15	N	500	500
HV9155SS	30	20	50	5	N	30	30	10	N	150	200
HV9156SS	30	15	100	5	N	20	30	7	N	100	200
HV9157SS	30	15	50	5	N	30	50	7	N	100	200
HV9158SS	100	30	50	10	N	50	30	10	N	200	200
HV9174SS	15	10	50	5	N	10	50	7	N	300	150
HV9183SS	50	100	50	<5	N	20	100	15	N	100	200
LC001SS	30	15	30	N	N	20	30	15	N	200	100
LC003SS	10	7	50	5	N	5	30	7	N	150	70
LC004SS	10	15	30	7	N	10	50	5	N	150	70
LC005SS	50	20	30	N	N	20	30	10	N	150	200
LC006SS	70	20	50	<5	<20	20	30	10	N	200	200
LC007SS	50	20	100	5	N	30	30	10	N	200	200
LC008SS	10	7	30	5	N	5	50	5	N	100	50
LC009SS	<10	7	50	5	N	5	50	5	N	100	50
LC010SS	10	15	100	5	N	15	50	5	N	N	70
LC011SS	15	20	30	5	N	30	50	7	N	100	100
LC012SS	<10	5	150	<5	N	5	50	5	N	150	50
LC013SS	15	7	30	5	N	10	50	5	50	100	70
LC014SS	10	10	20	7	N	10	50	5	N	N	70
LC015SS	15	20	50	5	<20	<5	50	10	N	150	100
LC016SS	10	15	30	7	N	7	30	5	N	100	70
LC017SS	50	15	70	5	N	15	20	5	N	<100	70
LC018SS	15	10	50	10	N	10	50	7	<10	150	70
WL0285SS	30	10	50	N	<20	5	30	7	N	300	150
WL0286SS	30	20	50	10	<20	20	70	10	N	200	500
WL0287SS	15	20	30	5	<20	5	300	10	N	300	200

Table 3.--Data for stream-sediment samples, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural Area, California

Sample	W-ppm s	Y-ppm s	Zr-ppm s	Th-ppm s	Zn-ppm aa	Cd-ppm aa	Bi-ppm aa	Sb-ppm aa	Au-T-ppm aa	As-ppm cm
3K119SS	N	10	150	--	15	--	--	--	--	--
3K124SS	N	20	150	--	70	--	--	--	--	--
3K127SS	N	20	200	--	35	--	--	--	--	--
3L074SS	N	30	70	--	270	--	--	--	--	--
3L075SS	N	15	100	--	85	--	--	--	--	--
3L077SS	<50	20	500	--	40	--	--	--	--	--
3L078SS	N	20	150	--	15	--	--	--	--	--
3L080SS	N	30	100	--	45	--	--	--	--	--
3L103SS	N	15	150	--	40	--	--	--	--	--
3L111SS	N	15	200	--	85	--	--	--	--	--
3L112SS	N	20	150	--	40	--	--	--	--	--
3L115SS	N	10	50	--	50	--	--	--	--	--
4K095SS	N	30	150	--	45	--	--	--	--	--
HV9108SS	N	20	500	N	35	.25	<.5	1	--	N
HV9109SS	N	30	300	N	170	1.50	.5	1	.012	10
HV9111SS	N	20	150	N	55	.10	<.5	2	<.005	10
HV9112SS	<50	30	1,000	N	35	.15	<.5	1	--	N
HV9128SS	N	20	300	N	55	.20	<.5	2	--	N
HV9154SS	N	30	500	N	45	.35	<.5	1	--	N
HV9155SS	N	20	100	N	80	.70	<.5	2	.008	10
HV9156SS	N	20	100	N	150	2.00	<.5	3	.007	10
HV9157SS	N	30	100	N	95	.90	<.5	2	.025	N
HV9158SS	N	30	100	N	120	.10	<.5	2	.010	10
HV9174SS	N	20	70	N	75	.45	<.5	2	--	10
HV9183SS	N	30	100	N	120	.85	1.0	2	.005	80
LC001SS	N	15	100	N	55	.25	<.5	<1	--	N
LC003SS	N	20	100	N	30	.25	.5	1	--	N
LC004SS	N	15	100	N	70	.55	<.5	1	--	<10
LC005SS	N	15	200	N	100	.60	<.5	1	--	N
LC006SS	N	20	150	<200	110	1.25	1.0	1	.027	<10
LC007SS	N	15	100	N	80	.75	<.5	1	--	N
LC008SS	N	15	150	N	35	.30	<.5	<1	--	N
LC009SS	N	10	100	N	80	.70	<.5	<1	--	N
LC010SS	N	15	100	N	85	.80	.5	<1	N	80
LC011SS	N	15	100	N	180	.45	1.0	1	<.005	20
LC012SS	N	20	150	N	35	.25	1.0	1	--	N
LC013SS	N	10	100	N	50	.60	.5	1	--	<10
LC014SS	N	10	100	<200	50	.35	.5	1	--	N
LC015SS	N	20	100	N	55	.10	1.0	N	--	10
LC016SS	N	20	100	N	80	1.20	.5	1	--	N
LC017SS	N	10	300	N	50	.10	N	<1	--	N
LC018SS	<50	20	150	N	55	.20	<.5	N	--	N
WL0285SS	N	20	300	N	35	.30	.5	2	--	N
WL0286SS	N	20	150	N	110	.55	<.5	2	.060	60
WL0287SS	N	20	200	N	130	2.15	2.0	2	3.500	400

Table 3.--Data for stream-sediment samples, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural 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	Co-ppm s
WL0288SS	38 1 43	119 12 59	2.0	1.00	2.0	.30	700	.7	70	1,500	5.0	N
WL0289SS	38 2 0	119 11 41	2.0	.50	1.5	.20	700	N	70	1,000	3.0	N

Table 3.--Data for stream-sediment samples, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural Area, California--continued

Sample	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s
WL0288SS	20	10	50	7	N	20	20	10	N	200	300
WL0289SS	20	7	50	N	N	5	20	7	N	200	150

Table 3.--Data for stream-sediment samples, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural Area, California--continued

Sample	W-ppm s	Y-ppm s	Zr-ppm s	Th-ppm s	Zn-ppm aa	Cd-ppm aa	Bi-ppm aa	Sb-ppm aa	Au-T-ppm aa	As-ppm cm
WL0288SS	N	20	150	N	95	1.20	1.0	2	<.005	<10
WL0289SS	N	20	200	N	50	.30	<.5	2	--	N

Table 4.--Data for concentrate samples, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural 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
HV9108KN	37 57 36	119 16 46	.3	.50	10.0	>2.0	2,000	1	N	N	500
HV9109KN	37 57 14	119 15 36	5.0	5.00	5.0	.7	2,000	1	N	N	2,000
HV9111KN	37 58 55	119 17 27	3.0	.50	7.0	1.0	3,000	N	N	N	1,000
HV9112KN	37 58 40	119 17 39	.5	.10	10.0	>2.0	2,000	N	N	N	N
HV9128KN	37 59 15	119 17 12	3.0	5.00	10.0	.7	1,500	N	N	N	200
HV9154KN	37 57 15	119 13 30	.7	1.00	3.0	2.0	1,000	N	N	N	20
HV9155KN	37 57 14	119 13 38	1.0	1.00	3.0	1.5	1,000	N	N	N	70
HV9156KN	37 57 49	119 14 18	1.5	5.00	7.0	1.5	3,000	N	N	N	100
HV9157KN	37 57 46	119 14 7	3.0	3.00	7.0	2.0	2,000	N	N	N	100
HV9158KN	37 57 36	119 14 9	2.0	2.00	10.0	1.5	2,000	1	N	N	100
HV9174KN	37 56 24	119 15 6	1.0	1.50	7.0	>2.0	2,000	N	N	N	2,000
HV9183KN	37 59 0	119 17 5	3.0	1.50	5.0	1.5	2,000	7	N	N	1,000
LC001KN	37 57 51	119 9 36	.2	.20	10.0	2.0	500	N	N	N	20
LC003KN	37 54 0	119 8 2	.2	.50	10.0	>2.0	1,000	N	N	N	20
LC004KN	37 52 17	119 10 16	.5	1.00	10.0	>2.0	5,000	N	N	N	100
LC005KN	37 56 47	119 10 55	.5	.50	10.0	>2.0	500	N	N	N	<20
LC006KN	37 59 24	119 8 38	1.0	1.00	7.0	2.0	1,000	N	N	N	70
LC007KN	37 59 47	119 8 57	.7	2.00	15.0	2.0	2,000	N	N	N	100
LC008KN	37 52 18	119 9 42	1.0	.70	7.0	>2.0	1,000	N	N	N	30
LC009KN	37 55 15	119 15 0	1.0	.70	15.0	>2.0	1,500	N	N	N	150
LC010KN	37 56 17	119 15 20	1.5	2.00	15.0	>2.0	3,000	N	1,000	N	200
LC011KN	37 56 12	119 15 20	1.5	2.00	20.0	1.0	5,000	N	N	N	200
LC012KN	37 52 2	119 9 3	.2	.50	10.0	>2.0	1,000	N	N	N	50
LC013KN	37 51 13	119 8 21	2.0	2.00	15.0	>2.0	5,000	N	N	N	100
LC014KN	37 56 34	119 15 59	1.5	2.00	5.0	2.0	1,000	N	N	N	200
LC015KN	37 56 51	119 16 25	1.0	.20	3.0	>2.0	700	N	N	N	300
LC016KN	37 55 38	119 9 34	.7	.30	10.0	>2.0	700	N	N	N	100
LC017KN	37 54 35	119 8 8	.2	.15	.7	1.0	200	N	N	N	150
LC018KN	37 55 9	119 15 9	2.0	.70	10.0	2.0	1,500	N	N	N	200
WL0285KN	38 1 12	119 9 36	1.0	.50	10.0	>2.0	1,500	N	N	N	200
WL0286KN	38 1 31	119 14 36	1.5	2.00	5.0	1.5	2,000	2	N	N	500
WL0287KN	38 1 25	119 14 33	2.0	.20	5.0	1.0	1,500	10	N	30	200
WL0289KN	38 2 0	119 11 41	2.0	1.00	7.0	1.5	2,000	N	N	N	300

Table 4.--Data for concentrate samples, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural 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
HV9108KN	500	<2	N	10	20	<10	1,000	30	150	20
HV9109KN	1,500	5	N	<10	150	70	700	20	<50	70
HV9111KN	2,000	5	N	<10	<20	10	300	10	<50	N
HV9112KN	<50	<2	N	N	N	20	700	50	100	N
HV9128KN	100	<2	N	20	1,500	50	<50	<10	N	150
HV9154KN	500	<2	N	10	100	<10	300	N	100	N
HV9155KN	500	<2	N	<10	100	30	300	N	<50	N
HV9156KN	5,000	<2	N	N	100	20	700	<10	50	N
HV9157KN	3,000	<2	N	N	70	20	500	<10	<50	N
HV9158KN	1,500	2	N	10	150	70	500	N	50	<10
HV9174KN	500	<2	N	N	30	<10	500	10	<50	<10
HV9183KN	1,000	2	N	15	100	100	500	<10	50	N
LC001KN	200	N	N	N	20	<10	500	N	<50	N
LC003KN	100	N	N	<10	30	<10	2,000	50	100	<10
LC004KN	150	N	N	<10	70	N	1,000	20	100	N
LC005KN	300	2	20	10	30	<10	500	15	100	N
LC006KN	300	<2	N	N	30	15	500	10	100	<10
LC007KN	300	3	N	N	70	<10	700	15	70	N
LC008KN	200	2	100	10	70	<10	>2,000	<10	<50	10
LC009KN	200	N	N	10	30	<10	1,000	20	100	N
LC010KN	300	3	N	15	100	15	700	15	70	<10
LC011KN	300	5	N	N	70	15	500	15	<50	N
LC012KN	150	N	N	10	50	<10	1,500	20	150	N
LC013KN	1,000	3	20	10	100	<10	1,000	20	100	<10
LC014KN	300	3	N	15	100	50	300	15	70	N
LC015KN	500	N	N	20	20	200	300	20	70	N
LC016KN	100	N	N	30	30	<10	1,500	20	100	<10
LC017KN	1,500	N	N	20	20	15	>2,000	N	<50	10
LC018KN	200	<2	N	10	20	N	700	15	50	N
WL0285KN	500	N	N	<10	30	N	1,000	10	70	<10
WL0286KN	1,000	<2	N	10	100	20	500	100	50	<10
WL0287KN	700	<2	N	N	20	20	300	50	<50	N
WL0289KN	1,500	<2	N	N	30	15	500	N	<50	N

Table 4.--Data for concentrate samples, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural Area, California

Sample	Pb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zr-ppm s	Th-ppm s
HV9108KN	30	20	30	200	500	100	300	>2,000	1,000
HV9109KN	200	20	N	N	700	<100	150	500	N
HV9111KN	50	20	<20	500	300	150	100	2,000	<500
HV9112KN	50	20	100	N	500	100	500	2,000	700
HV9128KN	<20	100	70	200	500	N	50	1,000	N
HV9154KN	20	20	<20	700	300	N	150	2,000	N
HV9155KN	100	30	20	500	500	N	100	1,000	N
HV9156KN	50	50	<20	700	700	N	150	1,000	N
HV9157KN	70	50	<20	700	1,000	N	150	1,000	N
HV9158KN	50	50	<20	700	500	100	200	1,500	N
HV9174KN	20	20	20	200	500	<100	150	2,000	<500
HV9183KN	300	50	100	1,000	700	<100	150	1,000	<500
LC001KN	N	20	N	200	200	N	300	>2,000	1,000
LC003KN	30	30	100	N	300	N	2,000	>2,000	2,000
LC004KN	20	20	50	<200	700	200	700	>2,000	500
LC005KN	50	20	20	200	200	N	200	>2,000	500
LC006KN	200	10	<20	200	200	100	200	>2,000	<500
LC007KN	50	15	20	200	300	N	200	>2,000	<500
LC008KN	50	100	20	N	200	<100	700	>2,000	1,000
LC009KN	50	20	50	200	200	<100	300	>2,000	1,000
LC010KN	50	30	<20	<200	500	<100	200	2,000	<500
LC011KN	200	20	<20	N	500	N	150	1,000	N
LC012KN	50	70	100	N	200	N	1,000	>2,000	1,500
LC013KN	30	50	20	200	500	<100	300	>2,000	<500
LC014KN	20	10	N	<200	500	<100	150	1,500	<500
LC015KN	50	20	30	N	200	700	200	>2,000	<500
LC016KN	20	50	70	N	150	100	1,000	>2,000	500
LC017KN	50	150	<20	N	100	N	1,000	>2,000	5,000
LC018KN	20	10	20	<200	200	<100	200	2,000	N
WL0285KN	50	30	50	700	300	N	200	>2,000	<500
WL0286KN	500	50	200	1,000	500	N	200	2,000	<500
WL0287KN	1,500	50	N	1,000	300	200	100	1,000	N
WL0289KN	100	20	20	1,000	500	<100	100	2,000	500

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 27 rock samples in table 2, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas and Hall Natural Area, California

[All concentrations are in parts per million except those for Fe, Mg, Ca, and Ti, which are in percent. "aa" following the element symbol indicates atomic absorption analysis; the symbol "cm" indicates colorimetric analysis; no element suffix indicates emission spectrographic analysis. "N" means not detected at the lower limit of determination shown in parentheses. Dashes (--) indicate insufficient unqualified values to derive meaningful statistical information]

Element	Range of values	Percentiles				
		50	75	90	95	98
Fe	0.3 - 15	2	3	5	7	15
Mg	0.1 - 3	1	2	3	3	3
Ca	0.1 - 7	1	2	3	5	7
Ti	0.05 - 0.7	0.2	0.3	0.5	0.7	0.7
Mn	20 -1500	500	700	1000	1500	1500
Ag	N(0.5) - 2	N(0.5)	N(0.5)	(0.5)	1.0	2
B	N(10) - 100	10	30	50	70	100
Ba	150 -2000	1000	1500	2000	2000	2000
Be	N(1) - 3	1	2	2	3	3
Co	N(5) - 15	5	10	15	15	15
Cr	N(10) - 100	10	30	50	70	100
Cu	N(5) - 70	7	20	30	30	70
La	N(20) - 70	30	50	50	50	70
Mo	N(5) - 10	N(5)	N(5)	5	10	10
Nb	N(20) - <20	N(20)	N(20)	<20	<20	<20
Ni	<5 - 50	5	30	50	50	50
Pb	N(10) - 100	20	20	50	70	100
Sc	N(5) - 30	7	15	20	20	30
Sr	N(100) - 700	150	300	500	700	700
V	10 - 500	100	200	300	300	500
W	N(50) - <50	N(50)	N(50)	N(50)	N(50)	N(50)
Y	<10 - 50	15	20	30	30	50
Zr	30 - 500	100	100	200	200	500
Zn-aa	10 - 200	50	80	110	130	200
Cd-aa	N(0.05)- 2.5	0.15	0.30	0.30	1.55	2.55
Bi-aa	N(0.5) - 1.0	<0.5	0.5	0.5	1.0	1.0
Sb-aa	N(1.0) - 5.0	1.0	2.0	3.0	5.0	5.0
Au-T-aa	N(0.005)- 0.007	--	--	--	--	--
As-cm	N(10) - 40	N(10)	<10	20	20	40

Table 6.--Summary statistics for the analytical values determined for the 47 minus-60-mesh (0.25-mm) stream-sediment samples in table 3, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas, and Hall Natural 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 and "cm" indicates colorimetric analysis; no element suffix indicates emission spectrographic analysis. "N" means not detected at the lower limit of determination shown in parentheses. [Dashes (--) indicate insufficient unqualified values to derive meaningful statistical information]

Element	Range of values	Percentiles 50	75	90	95	98
Fe	1 - 7	2	2	3	5	7
Mg	0.15- 3.0	0.5	1.0	1.5	1.5	3.0
Ca	0.2 - 5.0	0.7	1.0	2.0	2.0	5.0
Ti	0.1 - 1.0	0.2	0.3	0.5	0.5	1.0
Mn	200 - 1500	700	700	1000	1000	1500
Ag	N(0.5) - 3	N(0.5)	0.5	0.7	0.7	3
B	10 - 200	20	50	100	100	200
Ba	100 - 2000	300	1000	1000	1500	2000
Be	<1 - 5	2	3	5	5	5
Co	N(5) - 30	7	10	15	20	30
Cr	<10 - 500	15	30	50	100	500
Cu	5 - 150	20	30	50	70	150
La	20 - 150	50	50	70	100	150
Mo	N(5) - 15	5	7	10	10	15
Nb	N(20) - 20	N(20)	<20	<20	<20	20
Ni	N(5) - 50	10	20	30	30	50
Pb	10 - 300	30	50	70	70	300
Sc	5 - 15	7	10	10	15	15
Sn	N(10) - 50	N(10)	N(10)	N(10)	<10	50
Sr	N(100) - 1000	150	200	300	500	1000
V	10 - 500	100	200	300	500	500
W	N(50) - <50	N(50)	N(50)	N(50)	<50	<50
Y	10 - 30	20	20	30	30	30
Zr	50 - 1000	150	200	300	500	1000
Th	N(200) - <200	N(200)	N(200)	N(200)	<200	<200
Zn-aa	15 - 270	55	85	130	170	180
Cd-aa	0.10 - 2.15	0.45	0.80	1.25	1.50	2.00
Bi-aa	N(0.5)- 2.0	<0.5	0.5	1.0	1.0	2.0
Sb-aa	N(1) - 3	1	2	2	2	3
Au-T-aa	N(0.005)- 3.5	--	--	--	--	--
As-cm	N(10)- 400	N(10)	10	60	80	80

Table 7.--Summary statistics for the analytical values determined for the 33 nonmagnetic heavy-mineral-concentrate samples in table 4, Horse Meadow, Log Cabin-Saddlebag, and Tioga Lake Roadless Areas, and Hall Natural 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	0.2 - 5	1	2	3	3	5
Mg	0.1 - 5	1	2	3	5	5
Ca	0.7 - 20	10	10	15	15	20
Ti	0.7 - >2	2	>2	>2	>2	>2
Mn	200 - 5000	1500	2000	3000	5000	5000
Ag	N(1) - 10	N(1)	N(1)	1	7	10
As	N(500) - 1000	N(500)	N(500)	N(500)	N(500)	1000
Au	N(20) - 30	N(20)	N(20)	N(20)	N(20)	30
B	N(20) - 2000	150	200	1000	2000	2000
Ba	<50 - 5000	500	1000	1500	3000	5000
Be	N(2) - 5	<2	2	3	5	5
Bi	N(20) - 100	N(20)	N(20)	N(20)	20	100
Co	N(10) - 30	10	10	20	20	30
Cr	N(20) - 1500	50	100	100	150	1500
Cu	N(10) - 200	15	20	70	100	200
La	<50 - >2000	500	1000	1500	>2000	>2000
Mo	N(10) - 100	15	20	50	50	100
Nb	N(50) - 150	50	100	100	150	150
Ni	N(10) - 150	N(10)	<10	10	70	150
Pb	N(20) - 1500	50	70	200	500	1500
Sc	10 - 150	20	50	70	100	150
Sn	N(20) - 200	20	50	100	100	200
Sr	N(200) - 1000	200	700	1000	1000	1000
V	100 - 1000	500	500	700	700	1000
W	N(100) - 700	<100	100	150	200	700
Y	50 - 2000	200	300	1000	1000	2000
Zr	500 - >2000	2000	>2000	>2000	>2000	>2000
Th	N(500) - 5000	<500	500	1000	2000	5000

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