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, CYPRESS ROADLESS AREA, KERN 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 Cypress Roadless Area in the Sequoia National Forest, Kern County, California. The Cypress Roadless Area (A5213) 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 Cypress Roadless Area, Kern County, California, during 1980 and 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 analytical determinations 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

A complete set of samples was collected at most sites shown on plate 1; a complete set consisted of a rock sample, a stream-sediment sample, and a bulk stream-sediment sample used for panning. Analytical values for a total of 33 rock samples, 34 stream-sediment samples, and 33 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/0.1 mi^2 (1 sample/0.2 km^2) for each sample type.

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, 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. Whenever 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 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 coarsest 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 studyies.

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 zinc and gold by atomic absorption spectrometry (Ward and others, 1969; Meier, 1980) and for uranium by 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 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 three elements analyzed by fluorometric or atomic absorption methods the reporting values vary with the element and with the concentration level for any 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 three elements discussed here, typical reported ranges of percent relative standard deviation, as determined by replicate analysis of limited sample sets, are as follows:

Element	Range of % RSD	Source of data
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 table 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 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. 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 spectrographic analyses. Columns in which the element headings show the letters "aa" below the element symbol indicate atomic absorption analyses. The last column of analyses in tables 2 and 3 contains fluorometric determinations ("inst") 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, 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 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 Cypress Roadless Area (Kennedy and others, 1983).

For the semiquantitative spectrographic method used, the elements Au and Zn have lower limits of analytical determination that are usually above normal concentrations for these elements in the selected sample media. As a result, these elements were run by other, more sensitive methods on the rock and stream-sediment samples, and the spectrographic analyses for these two elements have been deleted from the rock and stream-sediment data sets (tables 2 and 3). The spectrographic values for Bi, Cd, Nb, W, and Th in the rock samples; for As, Bi, Cd, Sb, and W in the stream-sediment samples; and for Cd and Zn in the concentrate samples were in every case below the respective lower limits of determination for these elements. Consequently, these elements have also 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, Cypress Roadless Area, California

[(--) indicates not analyzed. "aa" following the element symbol indicates atomic absorption 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
Zn-aa	5	--
Au-aa	0.005	--
U-inst	0.02	--

Table 2.--Data for rock samples, Cypress 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	B-ppm s	Ba-ppm s	Be-ppm s
CY001RK	35 33 3	118 27 50	1.0	.20	.70	.10	500	N	N	15	70	1.0
CY005RK	35 32 59	118 26 10	1.0	.07	.50	.03	200	N	N	10	300	3.0
CY006RK	35 33 19	118 26 25	2.0	.30	1.00	.15	300	N	N	10	500	2.0
CY100RK	35 34 40	118 28 23	2.0	.50	.70	.20	500	N	N	10	70	<1.0
CY102RK	35 34 10	118 28 4	1.5	.15	.50	.15	300	N	N	20	100	N
CY104RK	35 33 38	118 27 48	3.0	1.00	.10	.50	200	N	N	70	500	2.0
CY105RK	35 33 12	118 27 56	.7	.20	.50	.10	500	N	N	15	20	<1.0
CY106RK	35 33 22	118 27 48	1.0	.20	.50	.10	700	N	N	10	70	<1.0
CY108RK	35 32 53	118 26 1	5.0	2.00	2.00	.50	700	N	N	<10	200	<1.0
CY109RK	35 32 59	118 26 7	5.0	1.00	2.00	.50	1,000	N	N	<10	300	1.0
CY110RK	35 33 28	118 26 20	1.5	.20	.30	.07	200	.5	N	50	500	3.0
CY112RK	35 33 45	118 26 48	1.0	.07	.15	.02	200	N	N	20	500	2.0
CY113RK	35 33 53	118 26 39	5.0	5.00	3.00	.15	500	N	N	<10	30	N
CY114RK	35 34 7	118 26 40	1.0	.05	.15	.07	300	N	N	<10	700	1.5
CY115RK	35 34 28	118 26 48	1.0	.10	.30	.03	200	N	N	10	500	1.5
CY117RK	35 31 27	118 29 29	1.5	.30	1.00	.15	150	N	N	15	300	1.5
CY119RK	35 31 59	118 29 30	1.5	.30	.50	.10	300	N	N	10	500	1.0
CY125RK	35 31 17	118 25 12	1.5	.20	.50	.07	200	N	N	10	700	3.0
CY126RK	35 31 34	118 25 51	2.0	.30	.70	.15	500	N	N	10	700	3.0
CY127RK	35 31 49	118 26 21	1.5	.15	.30	.07	150	N	N	15	300	1.5
CY128RK	35 32 5	118 26 31	1.5	.15	.50	.10	300	N	N	10	500	1.5
CY129RK	35 32 14	118 27 2	1.0	.07	.20	.05	150	N	N	15	500	1.5
CY130RK	35 32 7	118 27 42	3.0	.70	<.05	.30	200	N	N	30	300	2.0
CY131RK	35 32 27	118 28 10	5.0	.70	.20	.50	300	N	N	100	700	2.0
CY132RK	35 32 48	118 28 25	5.0	.70	.10	.30	300	N	N	10	500	1.0
CY133RK	35 33 15	118 28 36	5.0	5.00	5.00	.10	700	N	N	<10	50	N
CY134RK	35 34 45	118 29 30	5.0	5.00	2.00	.07	500	N	N	<10	<20	N
CY136RK	35 34 38	118 28 43	2.0	.10	.20	.10	200	N	N	15	700	2.0
CY204RK	35 31 48	118 26 1	2.0	.50	.70	.15	500	N	N	10	500	1.5
CY206RK	35 32 6	118 27 20	3.0	.50	5.00	.20	3,000	N	N	15	100	<1.0
CY207RK	35 32 5	118 27 22	2.0	.70	.15	.20	200	N	N	20	70	<1.0
CY219RK	35 32 38	118 27 10	.7	.20	<.05	.07	50	.5	<200	50	500	3.0
CY220RK	35 32 23	118 27 34	1.0	.20	.05	.10	70	1.5	<200	30	150	<1.0

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

Sample	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	Y-ppm s
CY001RK	5	10	10	N	N	15	N	N	5	N	100	30	<10
CY005RK	N	<10	<5	<20	N	5	30	N	<5	N	<100	10	20
CY006RK	N	<10	7	N	N	5	20	N	5	N	200	70	15
CY100RK	10	30	15	30	N	70	<10	N	7	N	500	50	15
CY102RK	7	20	7	N	N	10	<10	N	5	N	150	30	10
CY104RK	10	70	20	70	N	15	10	N	15	N	100	100	30
CY105RK	5	20	<5	N	N	7	<10	N	<5	N	100	20	15
CY106RK	<5	50	5	N	N	10	<10	N	5	N	100	20	10
CY108RK	30	70	20	20	N	15	10	N	30	N	500	200	70
CY109RK	20	100	5	50	N	5	10	N	20	N	500	100	30
CY110RK	<5	10	<5	30	N	5	50	N	7	N	100	20	20
CY112RK	<5	N	N	30	N	5	20	N	<5	10	N	10	20
CY113RK	50	100	20	N	N	20	N	N	30	N	300	300	<10
CY114RK	N	15	<5	70	<5	5	10	N	5	<10	<100	10	30
CY115RK	N	N	N	N	N	5	30	N	<5	N	100	10	<10
CY117RK	5	<10	<5	N	N	5	20	N	<5	N	500	30	<10
CY119RK	7	N	<5	N	N	5	20	N	<5	N	300	50	<10
CY125RK	5	N	N	N	N	<5	20	N	5	10	150	15	15
CY126RK	7	N	N	N	N	<5	15	N	5	10	150	20	20
CY127RK	<5	N	<5	20	N	<5	15	N	N	<10	100	15	15
CY128RK	5	N	N	30	N	5	20	N	<5	<10	200	10	15
CY129RK	N	N	N	50	N	5	15	N	<5	N	<100	10	50
CY130RK	10	50	15	50	N	30	10	N	10	N	N	100	30
CY131RK	30	100	50	100	N	50	30	N	20	<10	200	100	20
CY132RK	20	50	20	30	N	30	20	N	10	<10	<100	50	30
CY133RK	50	100	50	N	N	20	N	N	30	N	300	200	10
CY134RK	70	100	20	N	N	70	N	N	30	N	300	150	<10
CY136RK	<5	N	<5	50	N	5	15	N	5	N	<100	15	20
CY204RK	<5	<10	<5	20	N	<5	15	N	5	N	200	50	10
CY206RK	15	50	5	30	N	20	<10	N	10	N	150	50	15
CY207RK	7	30	15	20	N	15	15	N	7	N	<100	50	15
CY219RK	N	<10	<5	30	N	5	50	<100	5	N	N	10	10
CY220RK	5	10	10	<20	N	5	70	N	7	N	N	50	<10

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

Sample	Zr-ppm s	Zn-ppm aa	Au-ppm aa	U-ppm inst	FORMATION NAMES
CY001RK	100	20	.009	.17	ISABELLA GRANODIORITE OF MILLER (1931)
CY005RK	50	15	.009	.61	ISABELLA GRANODIORITE OF MILLER (1931)
CY006RK	150	30	.006	.63	ISABELLA GRANODIORITE OF MILLER (1931)
CY100RK	150	15	N	.34	KERNVILLE SERIES OF MILLER (1931)
CY102RK	300	15	N	.11	KERNVILLE SERIES OF MILLER (1931)
CY104RK	500	50	N	.32	KERNVILLE SERIES OF MILLER (1931)
CY105RK	200	10	N	.57	KERNVILLE SERIES OF MILLER (1931)
CY106RK	200	10	N	.32	KERNVILLE SERIES OF MILLER (1931)
CY108RK	100	30	N	.23	ISABELLA GRANODIORITE OF MILLER (1931)
CY109RK	100	60	N	1.00	ISABELLA GRANODIORITE OF MILLER (1931)
CY110RK	150	60	N	.55	ISABELLA GRANODIORITE OF MILLER (1931)
CY112RK	30	25	<.005	1.60	ISABELLA GRANODIORITE OF MILLER (1931)
CY113RK	10	25	N	.02	ISABELLA GRANODIORITE OF MILLER (1931)
CY114RK	100	20	N	.57	ISABELLA GRANODIORITE OF MILLER (1931)
CY115RK	70	15	N	1.00	ISABELLA GRANODIORITE OF MILLER (1931)
CY117RK	20	30	N	1.40	ISABELLA GRANODIORITE OF MILLER (1931)
CY119RK	50	45	N	1.60	ISABELLA GRANODIORITE OF MILLER (1931)
CY125RK	100	55	N	2.40	ISABELLA GRANODIORITE OF MILLER (1931)
CY126RK	150	75	N	2.20	ISABELLA GRANODIORITE OF MILLER (1931)
CY127RK	50	55	N	2.40	ISABELLA GRANODIORITE OF MILLER (1931)
CY128RK	150	60	N	3.50	ISABELLA GRANODIORITE OF MILLER (1931)
CY129RK	70	35	N	1.80	ISABELLA GRANODIORITE OF MILLER (1931)
CY130RK	150	85	N	.88	KERNVILLE SERIES OF MILLER (1931)
CY131RK	100	60	N	.51	KERNVILLE SERIES OF MILLER (1931)
CY132RK	300	80	N	.27	KERNVILLE SERIES OF MILLER (1931)
CY133RK	10	30	<.005	.02	SUMMIT GABBRO OF MILLER AND WEBB (1940)
CY134RK	N	20	N	.06	SUMMIT GABBRO OF MILLER AND WEBB (1940)
CY136RK	200	45	N	.37	SUMMIT GABBRO OF MILLER AND WEBB (1940)
CY204RK	100	40	.011	1.10	ISABELLA GRANODIORITE OF MILLER (1931)
CY206RK	300	10	.010	.34	KERNVILLE SERIES OF MILLER (1931)
CY207RK	200	35	.009	.15	ISABELLA GRANODIORITE OF MILLER (1931)
CY219RK	70	<5	.100	.29	ISABELLA GRANODIORITE OF MILLER (1931)
CY220RK	50	25	.013	.17	KERNVILLE SERIES OF MILLER (1931)

Table 3.--Data for stream-sediment samples, Cypress 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
CY001SS	35 33 3	118 27 50	5.0	1.5	1.0	.5	500	N	200	700
CY002SS	35 33 2	118 27 46	7.0	2.0	2.0	.5	500	N	50	700
CY003SS	35 33 28	118 28 2	10.0	2.0	1.0	.5	700	N	100	500
CY004SS	35 33 28	118 27 55	3.0	.5	.7	.2	200	.5	15	700
CY005SS	35 32 59	118 26 10	7.0	1.5	1.5	.5	500	N	300	700
CY006SS	35 33 19	118 26 25	10.0	2.0	2.0	.5	1,000	N	20	700
CY100SS	35 34 40	118 28 23	3.0	2.0	2.0	1.0	1,000	N	20	70
CY101SS	35 34 17	118 28 8	3.0	2.0	2.0	1.0	1,000	N	50	150
CY102SS	35 34 10	118 28 4	5.0	2.0	1.5	>1.0	1,000	N	50	100
CY103SS	35 34 1	118 27 58	2.0	1.5	1.5	1.0	1,000	N	150	700
CY104SS	35 33 38	118 27 48	3.0	1.0	1.0	.3	500	N	30	500
CY105SS	35 33 12	118 27 56	3.0	.7	.3	.3	500	N	200	300
CY106SS	35 33 22	118 27 48	3.0	1.0	1.0	.5	500	N	15	500
CY107SS	35 32 54	118 25 58	3.0	1.0	1.5	.7	1,000	N	20	200
CY108SS	35 32 53	118 26 1	2.0	.3	1.0	.5	700	N	20	200
CY110SS	35 33 28	118 26 20	3.0	.5	1.0	>1.0	1,500	N	20	200
CY111SS	35 33 28	118 26 23	2.0	.5	.7	.2	300	.7	20	300
CY112SS	35 33 45	118 26 48	2.0	.5	.5	.2	700	N	20	300
CY113SS	35 33 53	118 26 39	3.0	.5	.7	.2	300	N	50	200
CY114SS	35 34 7	118 26 40	2.0	.7	1.0	.3	700	<.5	50	300
CY115SS	35 34 28	118 26 48	2.0	.3	.5	.2	200	N	30	500
CY116SS	35 34 27	118 27 9	2.0	.2	.3	.1	500	N	30	300
CY117SS	35 31 27	118 29 29	3.0	.7	1.5	.3	700	N	50	200
CY118SS	35 31 24	118 29 32	2.0	.5	1.5	.5	700	N	15	200
CY119SS	35 31 59	118 29 30	2.0	.7	2.0	.3	700	N	50	300
CY120SS	35 32 1	118 29 45	2.0	.5	1.0	.5	300	N	50	200
CY121SS	35 32 17	118 30 14	2.0	.5	1.0	.2	500	N	50	200
CY122SS	35 32 49	118 30 21	2.0	.7	1.0	.3	500	N	20	100
CY123SS	35 33 2	118 30 13	3.0	2.0	1.5	.5	700	N	10	100
CY124SS	35 31 22	118 24 37	1.5	.2	.5	.2	300	N	15	300
CY134SS	35 34 45	118 29 30	5.0	5.0	2.0	.2	1,000	N	30	100
CY135SS	35 34 47	118 29 22	3.0	3.0	2.0	1.0	1,000	N	30	50
CY136SS	35 34 38	118 28 43	5.0	1.5	1.5	>1.0	1,000	N	10	50
CY137SS	35 34 5	118 27 52	2.0	.2	.5	.2	500	N	50	700

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

Sample	Be-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	Sc-ppm s
CY001SS	1.0	20	150	30	50	N	<20	70	50	20
CY002SS	<1.0	20	100	20	50	N	<20	30	30	20
CY003SS	<1.0	20	200	30	70	N	<20	100	50	30
CY004SS	1.0	N	30	<5	50	N	N	N	70	7
CY005SS	<1.0	20	70	15	70	N	<20	20	20	20
CY006SS	<1.0	15	70	15	100	15	N	<5	200	30
CY100SS	N	30	200	50	N	N	N	30	<10	30
CY101SS	N	50	300	50	N	N	N	30	<10	30
CY102SS	N	50	150	30	N	N	N	30	<10	30
CY103SS	1.0	30	150	20	50	N	<20	30	20	20
CY104SS	1.5	20	50	15	30	N	N	15	20	15
CY105SS	1.5	20	100	30	30	N	N	50	20	10
CY106SS	1.0	20	50	7	50	N	N	20	20	15
CY107SS	1.0	20	30	10	150	N	N	10	15	20
CY108SS	1.5	10	15	<5	30	N	N	<5	20	15
CY110SS	1.0	20	20	30	20	N	<20	20	10	15
CY111SS	1.5	10	15	7	N	N	N	7	20	7
CY112SS	2.0	10	20	5	200	N	N	5	20	10
CY113SS	1.0	15	10	10	N	N	N	10	<10	10
CY114SS	1.5	15	20	10	30	N	N	5	15	15
CY115SS	1.0	10	20	10	50	N	N	10	20	10
CY116SS	2.0	5	10	7	300	N	N	10	50	5
CY117SS	1.0	15	20	10	100	<5	<20	5	20	10
CY118SS	1.0	15	20	5	20	N	N	7	15	20
CY119SS	1.0	10	20	10	50	N	<20	<5	30	15
CY120SS	1.0	15	30	5	30	N	N	10	20	10
CY121SS	1.0	7	15	7	30	N	<20	7	30	10
CY122SS	1.0	15	100	10	50	N	N	10	20	10
CY123SS	<1.0	50	300	50	N	N	N	50	<10	30
CY124SS	2.0	5	N	5	N	N	N	7	20	7
CY134SS	N	100	500	70	<20	N	N	100	<10	20
CY135SS	N	50	300	50	N	N	N	50	N	30
CY136SS	N	50	200	30	N	N	N	30	<10	30
CY137SS	2.0	10	20	10	700	N	N	10	20	7

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

Sample	Sn-ppm s	Sr-ppm s	V-ppm s	Y-ppm s	Zr-ppm s	Th-ppm s	Zn-ppm aa	Au-ppm aa	U-ppm inst
CY001SS	N	100	100	30	200	N	60	<.005	.51
CY002SS	N	150	100	50	150	N	50	.015	.77
CY003SS	N	100	100	30	300	N	60	.010	.67
CY004SS	N	<100	20	20	200	N	60	.020	.57
CY005SS	N	100	100	50	300	N	65	.300	1.80
CY006SS	N	100	150	70	300	N	70	.007	4.50
CY100SS	N	500	200	<10	20	N	20	N	.17
CY101SS	N	300	300	15	100	N	25	N	.15
CY102SS	N	200	200	20	200	N	30	N	.27
CY103SS	N	300	150	70	200	N	50	.012	.57
CY104SS	N	300	100	20	200	N	50	.010	.80
CY105SS	N	150	100	20	200	N	45	N	1.00
CY106SS	N	300	100	50	200	N	40	.060	1.10
CY107SS	N	300	150	30	200	N	45	N	1.80
CY108SS	N	200	70	50	500	N	40	N	5.10
CY110SS	N	200	100	70	1,000	N	85	.060	1.80
CY111SS	N	150	70	15	200	N	65	.048	1.10
CY112SS	<10	200	70	70	300	<100	45	.050	7.70
CY113SS	N	150	100	20	200	N	45	<.005	1.00
CY114SS	N	200	100	30	300	N	65	.020	1.10
CY115SS	N	200	50	20	200	N	40	<.005	1.10
CY116SS	N	100	20	100	200	150	40	.035	3.20
CY117SS	N	500	100	50	700	<100	50	N	10.00
CY118SS	N	300	100	20	500	N	40	N	.53
CY119SS	N	500	100	50	500	100	40	.015	1.10
CY120SS	N	300	100	20	200	N	45	.010	4.50
CY121SS	N	500	100	20	500	<100	60	N	2.40
CY122SS	N	200	100	15	300	N	35	N	5.10
CY123SS	N	300	150	10	30	N	20	N	.23
CY124SS	N	200	30	70	200	N	40	N	9.10
CY134SS	N	200	150	<10	15	N	60	N	.15
CY135SS	N	300	200	<10	20	N	30	.400	.25
CY136SS	N	500	200	N	20	N	20	N	.11
CY137SS	N	200	50	100	300	200	30	.050	2.00

Table 4.--Data for concentrate samples, Cypress 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
CY001KN	35 33 3	118 27 50	2.0	.70	.5	.7	300	N	N	N	1,000
CY002KN	35 33 2	118 27 46	5.0	1.00	1.5	1.5	500	N	1,500	N	300
CY003KN	35 33 28	118 28 2	2.0	.50	1.5	.7	300	N	N	N	300
CY004KN	35 33 28	118 27 55	3.0	1.00	1.0	2.0	700	N	700	N	1,000
CY005KN	35 32 59	118 26 10	5.0	.70	1.0	2.0	2,000	300.0	2,000	500	150
CY006KN	35 33 19	118 26 25	3.0	1.00	3.0	>2.0	700	70.0	2,000	100	200
CY100KN	35 34 40	118 28 23	.7	.30	10.0	1.5	300	N	N	N	50
CY101KN	35 34 17	118 28 8	.5	.50	7.0	>2.0	300	N	N	N	70
CY102KN	35 34 0	118 28 4	.3	.30	7.0	>2.0	300	N	N	N	50
CY103KN	35 34 1	118 27 58	.5	.20	2.0	>2.0	300	N	500	N	150
CY105KN	35 33 12	118 27 56	.5	.15	.1	1.5	200	2.0	N	N	70
CY106KN	35 33 22	118 27 48	.5	.30	5.0	>2.0	500	N	N	N	50
CY107KN	35 32 54	118 25 58	.2	.10	5.0	1.0	200	N	N	N	30
CY108KN	35 32 53	118 26 1	.5	.20	10.0	>2.0	500	N	N	N	50
CY110KN	35 33 28	118 26 20	.5	.07	2.0	2.0	200	N	N	N	100
CY111KN	35 33 28	118 26 23	.2	.05	1.0	1.0	150	50.0	700	100	20
CY112KN	35 33 45	118 26 48	.5	.10	1.0	2.0	200	1.5	N	N	30
CY113KN	35 33 53	118 26 39	.3	.50	3.0	>2.0	300	N	N	N	1,000
CY114KN	35 34 7	118 26 40	.5	.20	3.0	>2.0	500	N	N	N	200
CY115KN	35 34 28	118 26 48	.5	.70	7.0	>2.0	300	100.0	N	70	150
CY116KN	35 34 27	118 27 9	.2	.10	<.1	>2.0	200	100.0	N	700	50
CY117KN	35 31 27	118 29 29	.2	.05	7.0	>2.0	500	N	N	N	30
CY118KN	35 31 24	118 29 32	.3	.10	7.0	>2.0	500	N	N	N	50
CY119KN	35 31 59	118 29 30	.2	.05	10.0	>2.0	500	N	N	N	30
CY120KN	35 32 1	118 29 45	.2	.05	7.0	>2.0	500	N	N	N	30
CY121KN	35 32 17	118 30 14	.1	.05	7.0	>2.0	300	N	<500	N	50
CY122KN	35 32 49	118 30 21	.1	.15	7.0	>2.0	300	N	N	N	30
CY123KN	35 33 2	118 30 13	.5	1.00	10.0	2.0	300	N	N	N	50
CY124KN	35 31 22	118 24 37	.1	.10	.2	>2.0	200	10.0	N	150	50
CY134KN	35 34 45	118 29 30	.5	1.00	7.0	2.0	500	N	N	N	70
CY135KN	35 34 47	118 29 22	.5	1.00	10.0	>2.0	500	N	N	N	70
CY136KN	35 34 38	118 28 43	.5	.50	10.0	>2.0	300	N	N	N	50
CY137KN	35 34 5	118 27 52	.5	.20	1.5	2.0	300	1,000.0	N	1,000	30

Table 4.--Data for concentrate samples, Cypress 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	Pb-ppm s
CY001KN	300	3	N	10	200	10	200	N	50	50	30
CY002KN	300	5	N	20	100	15	1,500	N	50	30	50
CY003KN	200	2	N	10	200	<10	150	N	N	20	30
CY004KN	300	3	N	15	150	15	1,000	N	50	30	50
CY005KN	300	N	N	20	30	50	>2,000	N	50	50	1,000
CY006KN	200	N	N	20	50	20	2,000	500	50	20	3,000
CY100KN	300	N	N	<10	70	N	70	N	N	N	300
CY101KN	300	N	N	<10	300	N	150	N	<50	N	100
CY102KN	300	N	N	<10	300	<10	200	N	<50	N	100
CY103KN	500	N	N	10	500	<10	200	30	<50	<10	30
CY105KN	500	N	N	N	500	<10	150	200	<50	15	150
CY106KN	500	N	N	<10	100	<10	300	N	N	N	50
CY107KN	500	N	N	N	20	<10	1,000	N	N	N	30
CY108KN	500	N	N	<10	50	<10	500	N	<50	N	200
CY110KN	500	<2	100	15	30	10	300	<10	N	<10	50
CY111KN	500	N	70	<10	<20	<10	500	100	N	N	1,500
CY112KN	700	N	100	15	20	<10	>2,000	N	N	50	200
CY113KN	1,000	N	50	10	150	N	200	10	<50	N	70
CY114KN	500	N	N	<10	50	10	500	50	<50	N	200
CY115KN	1,000	N	N	10	50	50	150	150	<50	N	15,000
CY116KN	200	N	N	N	20	<10	>2,000	N	N	N	100
CY117KN	300	N	N	10	50	<10	500	30	50	N	50
CY118KN	500	N	N	<10	70	N	700	10	50	N	50
CY119KN	300	N	N	10	50	<10	500	20	50	N	70
CY120KN	300	N	N	15	50	<10	300	30	50	N	70
CY121KN	300	N	N	10	50	10	300	20	50	N	1,000
CY122KN	300	N	N	10	150	<10	200	50	50	N	150
CY123KN	300	N	N	N	500	<10	N	N	N	N	<20
CY124KN	500	<2	50	15	20	<10	>2,000	N	N	N	150
CY134KN	300	N	N	15	300	10	70	30	N	30	<20
CY135KN	300	N	N	10	200	<10	100	<10	N	N	2,000
CY136KN	300	N	N	<10	150	N	N	<10	N	N	<20
CY137KN	700	<2	N	<10	100	<10	>2,000	N	N	30	100

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

Sample	Sb-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
CY001KN	N	10	N	200	200	<100	50	2,000	<200
CY002KN	300	50	<20	<200	200	N	300	>2,000	500
CY003KN	N	15	<20	<200	150	500	70	2,000	N
CY004KN	N	50	<20	<200	150	150	200	>2,000	500
CY005KN	200	200	200	N	100	100	1,000	>2,000	2,000
CY006KN	N	100	30	N	150	500	500	>2,000	1,500
CY100KN	N	10	N	500	100	N	50	>2,000	N
CY101KN	N	15	30	500	200	N	150	2,000	N
CY102KN	N	20	50	300	150	<100	2,000	>2,000	N
CY103KN	N	15	20	<200	100	500	150	>2,000	<200
CY105KN	N	10	N	N	150	<100	100	>2,000	<200
CY106KN	N	50	50	N	150	<100	500	>2,000	300
CY107KN	N	50	N	N	50	N	500	>2,000	300
CY108KN	N	50	100	200	100	N	700	>2,000	200
CY110KN	N	70	<20	N	100	150	1,000	>2,000	500
CY111KN	N	70	N	N	50	N	500	>2,000	1,000
CY112KN	N	20	50	500	50	100	2,000	>2,000	1,000
CY113KN	N	70	100	N	150	<100	500	>2,000	200
CY114KN	N	50	50	N	70	300	700	>2,000	1,000
CY115KN	<200	20	70	500	100	300	500	>2,000	700
CY116KN	200	50	20	N	20	<100	3,000	>2,000	1,000
CY117KN	N	15	100	N	100	N	500	>2,000	1,000
CY118KN	N	15	100	N	150	N	500	>2,000	500
CY119KN	N	15	150	N	150	N	700	>2,000	1,000
CY120KN	N	10	100	N	150	100	500	>2,000	1,000
CY121KN	N	20	100	N	150	N	500	>2,000	1,000
CY122KN	N	20	100	N	100	100	700	>2,000	1,000
CY123KN	N	20	N	500	200	<100	100	>2,000	<200
CY124KN	<200	50	70	500	20	N	3,000	>2,000	1,000
CY134KN	N	15	<20	500	100	3,000	100	>2,000	<200
CY135KN	N	15	<20	700	150	300	100	>2,000	<200
CY136KN	N	20	N	500	200	100	30	2,000	<200
CY137KN	N	100	30	500	70	N	1,500	>2,000	1,000

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 33 rock samples in table 2, Cypress Roadless 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; "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	0.7 - 5	1.5	3	5	5	5
Mg	0.05 - 5	0.3	0.7	2	5	5
Ca	<0.05 - 5	0.5	0.7	2	5	5
Ti	0.02 - 0.5	0.1	0.2	0.5	0.5	0.5
Mn	50 -3000	300	500	700	1000	3000
Ag	N(0.5) - 1.5	N(0.5)	N(0.5)	N(0.5)	0.5	1.5
As	N(200) -<200	N(200)	N(200)	N(200)	<200	<200
B	<10 - 100	10	20	50	70	100
Ba	<20 - 700	300	500	700	700	700
Be	N(1) - 3	1.5	2	3	3	3
Co	N(5) - 70	5	10	30	50	70
Cr	N(10) - 100	10	50	100	100	100
Cu	N(5) - 50	5	15	20	50	50
La	N(20) - 100	20	30	50	70	100
Mo	N(5) - <5	N(5)	N(5)	N(5)	N(5)	<5
Ni	<5 - 70	5	15	30	70	70
Pb	N(10) - 70	15	20	30	50	70
Sb	N(100) -<100	N(100)	N(100)	N(100)	N(100)	<100
Sc	N(5) - 30	5	10	30	30	30
Sn	N(10) - 10	N(10)	N(10)	<10	10	10
Sr	N(100) - 500	100	200	500	500	500
V	10 - 300	30	70	150	200	300
Y	<10 - 70	15	20	30	50	70
Zr	N(10) - 500	100	150	300	300	500
Zn-aa	<5 - 85	30	55	60	75	80
Au-aa	N(0.005) - 0.1	N(0.005)	<0.005	0.010	0.011	0.013
U-inst	0.02- 3.5	0.55	1.1	2.2	2.4	2.4

Table 6.--Summary statistics for the analytical values determined for the 34 minus-60-mesh (0.25-mm) stream-sediment samples in table 3, Cypress Roadless 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; "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	1.5 - 10	3	3	7	10	10
Mg	0.2 - 5	0.7	2	2	3	5
Ca	0.3 - 2	1	1.5	2	2	2
Ti	0.1 - >1	0.5	0.5	1	>1	>1
Mn	200 -1500	700	1000	1000	1000	1500
Ag	N(0.5)- 0.7	N(0.5)	N(0.5)	N(0.5)	0.5	0.7
B	10 - 300	30	50	150	200	300
Ba	50 - 700	300	500	700	700	700
Be	N(1) - 2	1	1.5	2	2	2
Co	N(5) - 100	15	20	50	50	100
Cr	N(10) - 500	30	150	300	300	500
Cu	<5 - 70	10	30	50	50	70
La	N(20) - 700	30	50	150	300	700
Mo	N(5) - 15	N(5)	N(5)	N(5)	<5	15
Nb	N(20) - <20	N(20)	<20	<20	<20	<20
Ni	N(5) - 100	10	30	50	100	100
Pb	N(10) - 200	20	20	50	70	200
Sc	5 - 30	15	20	30	30	30
Sn	N(10) - <10	N(10)	N(10)	N(10)	N(10)	<10
Sr	<100 - 500	200	300	500	500	500
V	20 - 300	100	150	200	200	300
Y	N(10) - 100	20	50	70	100	100
Zr	15 -1000	200	300	500	700	1000
Th	N(100) - 200	N(100)	N(100)	<100	150	200
Zn-aa	20 - 85	45	60	65	65	70
Au-aa	N(0.005)- 0.40	<0.005	0.020	0.060	0.060	0.30
U-inst	0.11 - 10	1.1	2.4	5.1	7.7	9.1

Table 7.--Summary statistics for the analytical values determined for the 33 nonmagnetic heavy-mineral-concentrate samples in table 4, Cypress 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	0.1 - 5	0.5	0.5	3	5	5
Mg	0.05- 1	0.2	0.7	1	1	1
Ca	<0.1 - 10	5	7	10	10	10
Ti	0.7 - >2	>2	>2	>2	>2	>2
Mn	150 - 2000	300	500	500	700	2000
Ag	N(1) - 1000	N(1)	1.5	100	300	1000
As	N(500) - 2000	N(500)	N(500)	700	2000	2000
Au	N(20) - 1000	N(20)	N(20)	150	700	1000
B	20 - 1000	50	150	300	1000	1000
Ba	200 - 1000	300	500	700	1000	1000
Be	N(2) - 5	N(2)	N(2)	2	3	5
Bi	N(20) - 100	N(20)	N(20)	50	100	100
Co	N(10) - 20	10	15	15	20	20
Cr	<20 - 500	70	200	300	500	500
Cu	N(10) - 50	<10	10	15	50	50
La	N(50) - >2000	300	1000	>2000	>2000	>2000
Mo	N(10) - 500	<10	30	100	200	500
Nb	N(50) - 50	<50	50	50	50	50
Ni	N(10) - 50	N(10)	20	30	50	50
Pb	<20 - 15000	100	200	1500	3000	15000
Sb	N(200)- 300	N(200)	N(200)	<200	200	300
Sc	10 - 200	20	50	70	100	200
Sn	N(20) - 200	30	100	100	150	200
Sr	N(200)- 700	<200	500	500	500	700
V	20 - 200	150	150	200	200	200
W	N(100)- 3000	<100	150	500	500	3000
Y	30 - 3000	500	700	2000	3000	3000
Zr	2000 - >2000	>2000	>2000	>2000	>2000	>2000
Th	N(200)- 2000	500	1000	1000	1500	2000

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