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, SCODIES ROADLESS AREA, KERN COUNTY, CALIFORNIA

by

S. J. Sutley, M. A. Chaffee, D. L. Fey, and

R. H. Hill

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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 Scodies Roadless Area in the Sequoia National Forest, Kern County, California. The Scodies Roadless Area (5212) 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 Scodies Roadless Area, Kern County, California, during 1980 and 1982. 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 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 determined for a total of 24 rock samples, 35 stream-sediment samples, and 35 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/3 mi^2 (1 sample/8 km^2) for the rock samples and 1 sample/2 mi^2 (1 sample/5.5 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 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 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 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, the 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
Zn	3.4-30.2	Ward and others, 1969, p. 21
Au	0.0-22.8	Meier, 1980
U	6.8-14.2	O'Leary and 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 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 of the sample sites in degrees, minutes, and seconds. Column headings showing the letter "s" below the element symbol indicate emission 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, 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 the extra zeroes. The last column in table 2 gives the rock names for the rock samples. These names are taken from the units shown on the geologic map of the Scodies Roadless Area (Harner 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. To obtain more useful analytical data, these elements were also determined by using other, more sensitive methods on the rock and stream-sediment samples. 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 As, Bi, Cd, Mo, Sb, Sn, W, and Th in the rock samples; for As, Bi, Cd, Sb, and W in the stream-sediment samples; and for As, Cd, Sb, and Zn in the concentrate samples were in every case below the respective lower limits 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, Scodies 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	0.002	--
U-inst	0.05	--

Table 2.--Data for rock samples, Scodies 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	Co-ppm s
SC001RK	35 42 15	118 3 59	.70	.07	.50	.070	300	N	N	50	1.5	N
SC003RK	35 41 10	118 3 8	.30	.05	.50	.050	300	N	N	300	1.5	N
SC004RK	35 40 11	118 3 50	.50	.05	.50	.030	150	N	N	2,000	3.0	N
SC007RK	35 33 27	118 1 19	.70	.10	.70	.050	200	N	N	70	1.0	N
SC008RK	35 36 54	118 1 30	1.00	.30	1.50	.150	300	N	N	3,000	1.0	5
SC009RK	35 35 2	118 1 57	1.50	.15	.70	.150	300	N	N	2,000	1.0	N
SC011RK	35 35 23	118 3 58	1.00	.20	.70	.150	200	N	N	1,000	2.0	N
SC013RK	35 35 37	118 4 53	1.00	.20	1.00	.150	500	N	N	1,000	2.0	N
SC015RK	35 34 4	118 4 46	.70	.20	.70	.200	500	N	N	1,500	1.5	<5
SC017RK	35 34 5	118 6 16	1.00	.10	1.00	.050	200	N	N	5,000	1.0	<5
SC018RK	35 34 53	118 7 41	.07	.05	.05	.020	100	N	N	150	<1.0	N
SC019RK	35 33 41	118 9 31	3.00	.70	2.00	.300	1,000	N	N	500	1.5	7
SC020RK	35 35 12	118 11 39	1.00	.20	1.50	.200	200	N	N	1,000	1.0	5
SC025RK	35 37 54	118 10 34	3.00	.70	1.00	.500	300	N	<10	700	1.0	15
SC030RK	35 42 20	118 9 27	.70	.15	.50	.100	500	<.5	N	700	1.5	N
SC031RK	35 42 32	118 6 13	1.00	.15	.70	.100	150	N	N	500	1.5	N
SC032RK	35 42 32	118 6 2	1.50	.30	1.00	.200	200	N	<10	700	1.5	N
SC034RK	35 40 52	118 10 45	5.00	1.00	1.00	.500	500	N	<10	700	1.5	15
SC049RK	35 36 15	118 13 39	2.00	.50	1.00	.200	300	N	<10	700	1.5	10
SC058RK	35 35 50	118 6 58	5.00	1.00	1.50	.700	500	N	10	500	<1.0	20
SC073RK	35 36 19	118 3 24	N	<.02	<.05	.005	30	N	N	30	N	N
SC101RK	35 39 15	118 8 48	2.00	1.00	1.50	.200	500	N	10	1,000	<1.0	10
SC103RK	35 35 6	118 8 4	5.00	1.50	2.00	.500	700	N	15	300	N	20
SC105RK	35 34 49	118 10 15	1.50	.70	1.00	.200	300	N	10	500	<1.0	10

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

Sample	Cr-ppm s	Cu-ppm s	La-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sr-ppm s	V-ppm s	Y-ppm s	Zr-ppm s	Zn-ppm aa	Au-ppm aa
SC001RK	<10	N	N	N	<5	70	<5	100	10	N	20	15	N
SC003RK	N	5	N	N	<5	100	<5	200	10	N	10	5	N
SC004RK	N	<5	<20	N	N	50	<5	500	20	N	70	<5	N
SC007RK	<10	5	N	N	15	70	<5	100	10	N	50	60	N
SC008RK	N	5	50	N	N	50	<5	500	50	<10	150	35	N
SC009RK	N	N	200	<20	N	50	5	300	15	20	150	30	N
SC011RK	N	5	20	N	<5	30	5	500	20	<10	100	30	N
SC013RK	<10	N	50	<20	<5	70	5	500	15	15	100	35	N
SC015RK	N	<5	200	<20	N	50	N	300	15	50	100	40	N
SC017RK	N	7	<20	N	<5	30	N	500	15	<10	<10	10	N
SC018RK	N	N	N	N	N	N	N	N	<10	N	10	<5	N
SC019RK	<10	<5	<20	20	N	20	10	500	30	50	150	65	N
SC020RK	<10	<5	50	N	N	50	<5	500	20	<10	70	40	N
SC025RK	10	5	30	N	<5	20	15	500	100	15	100	50	N
SC030RK	N	5	20	<20	N	30	5	150	10	10	50	25	N
SC031RK	N	<5	20	N	<5	30	N	500	20	N	150	30	N
SC032RK	10	<5	20	N	<5	50	5	700	50	10	150	35	.005
SC034RK	15	<5	20	<20	5	15	10	700	100	20	70	45	N
SC049RK	15	5	50	N	<5	30	7	500	70	15	100	40	N
SC058RK	20	20	30	N	<5	15	30	500	150	30	200	40	N
SC073RK	N	N	N	N	N	N	N	N	<10	N	N	<5	N
SC101RK	10	N	50	<20	5	30	7	700	50	20	70	40	.004
SC103RK	20	<5	30	N	5	<10	20	300	100	30	70	30	N
SC105RK	<10	<5	50	<20	5	30	5	500	50	10	50	40	N

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

Sample	U-ppm inst	FORMATION NAME
SC001RK	.90	ISABELLA GRANODIORITE OF MILLER (1931)
SC003RK	1.30	ISABELLA GRANODIORITE OF MILLER (1931)
SC004RK	1.00	ISABELLA GRANODIORITE OF MILLER (1931)
SC007RK	4.90	ISABELLA GRANODIORITE OF MILLER (1931)
SC008RK	1.00	ISABELLA GRANODIORITE OF MILLER (1931)
SC009RK	5.50	ISABELLA GRANODIORITE OF MILLER (1931)
SC011RK	2.90	ISABELLA GRANODIORITE OF MILLER (1931)
SC013RK	2.70	ISABELLA GRANODIORITE OF MILLER (1931)
SC015RK	3.40	ISABELLA GRANODIORITE OF MILLER (1931)
SC017RK	1.50	ISABELLA GRANODIORITE OF MILLER (1931)
SC018RK	6.70	ISABELLA GRANODIORITE OF MILLER (1931)
SC019RK	9.00	ISABELLA GRANODIORITE OF MILLER (1931)
SC020RK	1.80	ISABELLA GRANODIORITE OF MILLER (1931)
SC025RK	5.50	ISABELLA GRANODIORITE OF MILLER (1931)
SC030RK	1.40	ISABELLA GRANODIORITE OF MILLER (1931)
SC031RK	2.70	ISABELLA GRANODIORITE OF MILLER (1931)
SC032RK	1.20	ISABELLA GRANODIORITE OF MILLER (1931)
SC034RK	5.20	ISABELLA GRANODIORITE OF MILLER (1931)
SC049RK	4.50	ISABELLA GRANODIORITE OF MILLER (1931)
SC058RK	3.50	ISABELLA GRANODIORITE OF MILLER (1931)
SC073RK	.30	ISABELLA GRANODIORITE OF MILLER (1931)
SC101RK	.55	ISABELLA GRANODIORITE OF MILLER (1931)
SC103RK	.70	ISABELLA GRANODIORITE OF MILLER (1931)
SC105RK	.15	ISABELLA GRANODIORITE OF MILLER (1931)

Table 3.--Data for stream-sediment samples, Scodies 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
SC001SS	35 42 15	118 3 59	3	1.0	1.5	.5	1,000	N	10	700
SC003SS	35 41 10	118 3 8	3	.7	1.5	.7	1,000	N	<10	500
SC004SS	35 40 11	118 3 50	15	.5	1.0	1.0	1,000	N	N	300
SC005SS	35 40 2	118 3 47	3	.5	1.0	.3	500	N	<10	500
SC006SS	35 39 52	118 2 20	3	1.0	2.0	.5	1,500	N	10	1,000
SC007SS	35 38 27	118 1 19	2	.7	1.5	.3	1,000	N	10	700
SC008SS	35 36 54	118 1 30	2	.7	1.5	.5	1,000	N	<10	1,000
SC009SS	35 35 2	118 1 57	3	.7	1.5	.5	700	N	<10	1,000
SC011SS	35 35 23	118 3 58	1	.1	.7	.5	500	N	N	1,000
SC012SS	35 35 30	118 4 53	7	1.0	1.0	1.0	1,500	N	<10	1,000
SC013SS	35 35 37	118 4 53	10	.7	1.0	.7	1,000	N	<10	500
SC015SS	35 34 4	118 4 46	15	.5	1.0	1.0	1,500	N	<10	700
SC016SS	35 34 15	118 6 9	5	1.5	1.5	.7	1,000	<.5	10	1,000
SC017SS	35 34 5	118 6 16	5	1.0	1.5	.7	1,000	N	10	700
SC019SS	35 33 41	118 9 31	5	1.0	1.5	.5	700	N	<10	500
SC020SS	35 35 12	118 11 39	7	1.5	1.5	1.0	700	N	<10	500
SC023SS	35 37 58	118 10 53	5	1.5	2.0	.7	700	N	10	300
SC024SS	35 38 1	118 10 30	15	1.0	1.5	1.0	1,000	N	10	300
SC025SS	35 37 54	118 10 34	7	2.0	2.0	1.0	1,000	N	<10	300
SC028SS	35 41 37	118 9 31	5	.7	1.5	1.0	1,000	N	10	700
SC030SS	35 42 20	118 9 27	15	.5	1.0	1.0	1,500	N	N	300
SC031SS	35 42 32	118 6 13	3	.5	3.0	.5	700	N	<10	300
SC032SS	35 42 32	118 6 2	5	.5	7.0	.5	700	<.5	N	500
SC034SS	35 40 52	118 10 45	5	.7	.7	.5	500	N	<10	500
SC048SS	35 38 45	118 13 36	10	1.5	2.0	1.0	1,000	N	<10	500
SC101SS	35 39 15	118 8 48	5	.7	1.0	.3	500	N	10	300
SC102SS	35 39 10	118 8 50	10	.7	1.0	.3	300	N	10	500
SC103SS	35 35 6	118 8 4	7	1.5	2.0	.5	700	N	10	300
SC104SS	35 35 10	118 8 5	7	1.5	3.0	.7	500	N	15	300
SC105SS	35 34 49	118 10 15	7	1.5	1.5	.5	300	N	15	500
SC106SS	35 34 52	118 10 13	5	1.5	1.0	.5	300	N	15	300
SC201SS	35 40 6	118 9 21	7	1.0	3.0	.5	300	N	<10	300
SC202SS	35 40 1	118 9 24	10	1.0	1.0	.5	500	N	10	300
SC203SS	35 37 22	118 10 7	3	1.0	1.0	.3	500	N	10	300
SC204SS	35 37 24	118 10 12	5	1.5	3.0	.5	500	N	10	300

Table 3.--Data for stream-sediment samples, Scodies 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
SC001SS	2.0	10	20	20	50	N	<20	N	30	15
SC003SS	1.5	10	20	15	50	N	<20	N	30	10
SC004SS	<1.0	15	20	10	100	N	<20	N	20	7
SC005SS	1.0	7	20	7	20	N	N	N	20	5
SC006SS	1.5	15	20	30	50	N	20	N	30	15
SC007SS	1.0	10	10	30	30	N	N	N	20	10
SC008SS	2.0	10	20	15	50	N	<20	<5	30	10
SC009SS	1.0	10	20	20	100	N	<20	5	20	10
SC011SS	2.0	N	15	<5	100	N	20	N	30	5
SC012SS	<1.0	15	30	10	100	N	<20	<5	30	15
SC013SS	1.0	15	30	10	150	N	20	N	20	10
SC015SS	<1.0	10	15	7	100	N	20	<5	20	7
SC016SS	<1.0	15	30	7	50	N	<20	10	20	10
SC017SS	1.0	15	20	7	50	N	20	<5	20	10
SC019SS	1.0	15	20	10	50	N	<20	10	30	10
SC020SS	1.0	15	20	10	70	N	20	5	20	15
SC023SS	1.0	20	20	30	50	N	<20	5	20	20
SC024SS	<1.0	20	30	30	150	N	20	5	20	20
SC025SS	1.0	15	20	7	100	5	20	10	20	10
SC028SS	1.5	15	30	10	100	N	20	N	30	15
SC030SS	<1.0	10	30	10	150	N	20	N	30	7
SC031SS	1.0	5	<10	5	70	N	<20	N	20	5
SC032SS	1.0	7	10	5	50	N	<20	N	30	7
SC034SS	2.0	20	20	10	100	N	30	10	20	20
SC048SS	<1.0	15	50	15	70	N	20	5	10	10
SC101SS	<1.0	20	70	7	150	N	20	5	20	10
SC102SS	<1.0	20	50	7	70	N	20	<5	30	10
SC103SS	<1.0	30	70	10	50	N	<20	10	20	20
SC104SS	<1.0	30	50	10	70	<5	<20	10	20	20
SC105SS	<1.0	30	50	10	50	N	20	10	20	20
SC106SS	<1.0	20	50	10	70	<5	20	15	30	15
SC201SS	<1.0	20	30	7	70	<5	30	<5	20	15
SC202SS	<1.0	20	70	7	70	N	20	<5	20	15
SC203SS	1.0	15	20	7	70	<5	20	<5	30	10
SC204SS	<1.0	20	20	10	100	<5	<20	5	20	15

Table 3.--Data for stream-sediment samples, Scodies 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
SC001SS	N	500	150	50	150	N	35	.003	4.9
SC003SS	N	500	150	50	300	N	50	N	7.7
SC004SS	N	300	200	30	500	N	45	.002	13.0
SC005SS	N	500	150	10	150	N	45	.042	5.5
SC006SS	N	500	150	50	200	N	60	.003	3.6
SC007SS	N	500	100	20	200	N	65	.002	4.1
SC008SS	N	500	100	20	150	N	65	N	3.0
SC009SS	N	500	150	30	150	N	35	<.002	4.4
SC011SS	N	500	50	15	150	N	35	N	1.0
SC012SS	N	500	100	50	200	N	55	N	10.6
SC013SS	N	300	200	50	500	N	35	.002	5.0
SC015SS	N	500	100	50	500	N	35	N	13.0
SC016SS	N	500	100	30	150	N	35	<.002	5.2
SC017SS	N	500	150	30	300	N	45	N	5.0
SC019SS	N	500	100	20	70	N	75	.002	8.5
SC020SS	N	500	100	50	200	N	85	N	10.6
SC023SS	N	500	150	20	500	N	100	.008	10.4
SC024SS	<10	300	200	50	300	N	90	.005	7.7
SC025SS	N	700	100	50	150	N	70	N	13.0
SC028SS	N	500	200	70	1,000	N	45	N	13.0
SC030SS	N	300	200	50	200	N	35	N	13.0
SC031SS	N	500	100	15	200	N	60	N	7.3
SC032SS	N	500	100	20	200	N	55	N	18.7
SC034SS	50	200	150	50	100	N	25	<.002	6.9
SC048SS	N	500	150	50	300	N	80	N	15.5
SC101SS	10	300	100	70	70	N	50	N	5.9
SC102SS	<10	300	150	70	200	N	45	N	6.6
SC103SS	N	300	100	50	150	N	50	N	4.2
SC104SS	N	500	100	50	200	N	50	N	12.0
SC105SS	N	500	70	30	100	N	35	N	2.2
SC106SS	N	500	70	30	70	N	90	N	5.0
SC201SS	10	500	100	70	500	N	70	N	10.0
SC202SS	10	300	150	50	300	N	50	N	6.1
SC203SS	N	300	70	50	300	<100	120	N	6.3
SC204SS	N	500	70	50	150	N	100	N	5.0

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

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	Au-ppm s	B-ppm s
SC001KN	35 42 15	118 3 59	.3	.10	7	>2	1,000	N	N	N
SC003KN	35 41 10	118 3 8	.5	.30	10	>2	1,500	N	N	N
SC004KN	35 40 11	118 3 50	.3	.20	10	>2	700	N	N	N
SC005KN	35 40 2	118 3 47	.5	.15	10	>2	1,000	N	N	N
SC006KN	35 39 52	118 2 20	.5	.10	10	>2	1,500	N	N	N
SC007KN	35 38 27	118 1 19	.5	.07	10	>2	1,500	N	N	N
SC008KN	35 36 54	118 1 30	.3	.15	7	>2	1,500	N	N	N
SC009KN	35 35 2	118 1 57	.2	.10	10	>2	700	N	N	N
SC011KN	35 35 23	118 3 58	.7	.20	10	>2	700	N	N	N
SC012KN	35 35 30	118 4 53	.5	.15	5	>2	1,000	N	N	N
SC013KN	35 35 37	118 4 53	.5	.15	7	>2	700	N	N	N
SC015KN	35 34 4	118 4 46	.2	.10	5	>2	700	N	N	N
SC016KN	35 34 15	118 6 9	.5	.10	7	>2	1,000	N	N	N
SC017KN	35 34 5	118 6 16	.3	.10	5	>2	700	N	N	N
SC019KN	35 33 41	118 9 31	.5	.07	7	>2	700	N	N	N
SC020KN	35 35 12	118 11 39	.2	.10	5	>2	700	N	N	N
SC023KN	35 37 58	118 10 53	.3	.07	10	>2	1,000	N	N	N
SC024KN	35 38 1	118 10 30	.3	.10	10	>2	1,000	N	N	N
SC025KN	35 37 54	118 10 34	.3	.10	5	>2	700	N	N	N
SC028KN	35 41 37	118 9 31	.3	.07	10	>2	1,000	N	N	N
SC030KN	35 42 20	118 9 27	.5	.07	7	>2	700	N	N	N
SC031KN	35 42 32	118 6 13	.5	.07	15	>2	1,500	N	N	N
SC032KN	35 42 32	118 6 2	.2	.05	15	>2	1,500	N	N	N
SC034KN	35 40 52	118 10 45	.2	.10	3	>2	500	N	N	N
SC048KN	35 36 45	118 13 36	.2	.07	7	>2	500	N	N	N
SC101KN	35 39 15	118 8 48	.5	.10	5	>2	500	N	N	<20
SC102KN	35 39 10	118 8 50	.5	.07	3	>2	200	N	N	20
SC103KN	35 35 6	118 8 4	.5	.10	5	>2	200	N	N	20
SC104KN	35 35 10	118 8 5	.5	.10	5	>2	200	N	N	20
SC105KN	35 34 49	118 10 15	.5	.10	5	>2	200	N	N	30
SC106KN	35 34 52	118 10 13	.7	.07	5	>2	300	<1	N	20
SC201KN	35 40 6	118 9 21	.5	.07	7	>2	500	N	N	20
SC202KN	35 40 1	118 9 24	.5	.07	5	>2	300	N	N	20
SC203KN	35 37 22	118 10 7	.5	.07	5	>2	500	N	N	20
SC204KN	35 37 24	118 10 12	.7	.10	7	>2	300	N	<20	20

Table 4.--Data for concentrate samples, Scodies 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
SC001KN	70	N	N	10	20	N	300	10	100	N
SC003KN	70	N	N	10	20	N	300	N	100	N
SC004KN	70	<2	N	15	20	N	300	N	70	N
SC005KN	100	N	N	10	<20	N	500	N	50	N
SC006KN	70	N	N	10	<20	N	200	<10	100	N
SC007KN	70	N	N	10	N	N	300	N	100	N
SC008KN	100	N	N	10	20	N	700	N	70	N
SC009KN	500	N	N	15	20	N	1,000	N	50	N
SC011KN	100	7	N	20	20	<10	>2,000	N	50	10
SC012KN	300	N	N	10	20	N	300	<10	100	N
SC013KN	100	N	N	10	30	N	500	<10	100	N
SC015KN	100	N	N	20	<20	N	>2,000	10	50	N
SC016KN	100	N	N	10	20	N	200	10	50	N
SC017KN	70	N	N	10	20	N	300	N	50	N
SC019KN	50	N	N	10	20	N	300	20	100	N
SC020KN	70	N	N	15	20	N	300	15	100	N
SC023KN	<50	N	N	N	20	N	500	50	150	N
SC024KN	50	N	N	N	20	N	700	50	150	N
SC025KN	70	N	N	15	30	N	200	20	70	N
SC028KN	100	N	N	10	30	N	500	20	150	N
SC030KN	70	N	N	15	20	N	1,500	<10	100	<10
SC031KN	50	2	N	N	<20	<10	300	N	150	N
SC032KN	<50	N	N	N	<20	10	500	N	150	N
SC034KN	70	N	N	N	<20	<10	1,000	20	150	N
SC043KN	50	N	N	10	20	N	300	20	100	N
SC101KN	300	N	N	<10	20	<10	500	20	100	N
SC102KN	200	N	150	N	20	N	500	15	70	N
SC103KN	150	N	N	N	30	N	500	10	50	N
SC104KN	100	N	N	N	20	N	500	10	50	N
SC105KN	3,000	N	N	10	20	<10	700	20	70	N
SC106KN	<50	N	N	N	20	N	1,000	15	100	N
SC201KN	<50	N	N	N	20	N	1,000	15	70	N
SC202KN	100	N	30	N	20	N	500	15	50	N
SC203KN	<50	N	N	N	20	N	1,000	20	70	N
SC204KN	<50	N	N	N	30	N	1,000	50	100	N

Table 4.--Data for concentrate samples, Scodies Roadless 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
SC001KN	30	30	30	N	200	N	500	>2,000	300
SC003KN	70	30	30	N	200	N	500	2,000	300
SC004KN	50	20	30	N	200	<100	200	>2,000	1,500
SC005KN	50	20	20	N	200	N	200	>2,000	1,000
SC006KN	30	20	30	N	300	N	500	>2,000	300
SC007KN	20	20	30	N	300	N	500	>2,000	200
SC008KN	2,000	30	20	N	200	N	300	>2,000	300
SC009KN	50	30	20	N	300	N	500	>2,000	300
SC011KN	1,000	30	20	N	150	<100	700	>2,000	5,000
SC012KN	50	20	30	N	300	N	500	>2,000	500
SC013KN	150	20	20	N	200	100	500	>2,000	1,000
SC015KN	200	20	20	N	200	100	700	>2,000	3,000
SC016KN	50	20	30	N	200	N	500	>2,000	<200
SC017KN	300	20	30	N	150	N	500	>2,000	500
SC019KN	30	20	30	N	300	N	300	>2,000	500
SC020KN	70	15	30	N	200	N	200	>2,000	1,500
SC023KN	N	20	70	N	300	N	500	2,000	1,000
SC024KN	N	20	70	N	200	N	500	2,000	1,000
SC025KN	30	15	30	N	200	N	200	>2,000	500
SC028KN	100	20	30	N	300	N	300	>2,000	200
SC030KN	300	30	30	N	200	100	500	>2,000	3,000
SC031KN	N	30	30	200	200	N	500	2,000	5,000
SC032KN	N	30	50	<200	200	N	300	2,000	3,000
SC034KN	50	20	100	N	150	N	700	>2,000	200
SC048KN	50	15	30	N	300	N	200	2,000	700
SC101KN	30	20	100	<200	150	200	500	>2,000	200
SC102KN	20	15	70	<200	150	<100	500	>2,000	300
SC103KN	30	20	70	N	150	<100	700	>2,000	<200
SC104KN	50	15	50	N	100	<100	500	>2,000	200
SC105KN	70	15	70	N	150	<100	500	>2,000	1,500
SC106KN	<20	20	100	N	150	N	700	500	200
SC201KN	20	30	100	N	150	N	1,000	>2,000	<200
SC202KN	20	30	100	<200	100	<100	500	>2,000	300
SC203KN	<20	20	100	N	150	N	700	>2,000	<200
SC204KN	<20	20	100	N	150	N	700	>2,000	200

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 24 rock samples in table 2, Scodies 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 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	N(0.05) - 5	1	2	5	5	5
Mg	<0.02 - 1.5	0.2	0.7	1	1	1.5
Ca	<0.05 - 2	1	1	1.5	2	2
Ti	0.005 - 0.7	0.15	0.2	0.5	0.5	0.7
Mn	30 - 1000	300	500	500	700	1000
Ag	N(0.5) - <0.5	N(0.5)	N(0.5)	N(0.5)	N(0.5)	<0.5
B	N(10) - 15	N(10)	<10	10	10	15
Ba	30 - 5000	700	1000	2000	3000	5000
Be	N(1) - 3	1	1.5	2	2	3
Co	N(5) - 20	N(5)	10	15	20	20
Cr	N(10) - 20	<10	10	15	20	20
Cu	N(5) - 20	<5	5	5	7	20
La	N(20) - 200	20	50	50	200	200
Nb	N(20) - 20	N(20)	<20	<20	<20	20
Ni	N(5) - 15	<5	<5	5	5	15
Pb	N(10) - 100	30	50	70	70	100
Sc	N(5) - 30	5	7	15	20	30
Sr	N(100) - 700	500	500	700	700	700
V	<10 - 150	20	50	100	100	150
Y	N(10) - 50	10	20	30	50	50
Zr	N(10) - 200	70	100	150	150	200
Zn-aa	<5 - 65	35	40	50	60	65
Au-aa	N(0.002)- 0.005	N(0.002)	N(0.002)	N(0.002)	0.004	0.005
U-inst	0.15 - 9.0	2.7	4.5	5.5	6.7	9.0

Table 6.--Summary statistics for the analytical values determined for the 35 minus-60-mesh (0.25-mm) stream-sediment samples in table 3, Scodies 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 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	1 - 15	5	7	15	15	15
Mg	0.1 - 2	1	1.5	1.5	1.5	2
Ca	0.7 - 7	1.5	2	3	3	7
Ti	0.3 - 1	0.5	1	1	1	1
Mn	300 - 1500	700	1000	1500	1500	1500
Ag	N(0.5) - <0.5	N(0.5)	N(0.5)	N(0.5)	<0.5	<0.5
B	N(10) - 15	<10	10	10	15	15
Ba	300 - 1000	500	700	1000	1000	1000
Be	<1 - 2	1	1	2	2	2
Co	N(5) - 30	15	20	20	30	30
Cr	<10 - 70	20	30	50	70	70
Cu	<5 - 30	10	15	30	30	30
La	20 - 150	70	100	150	150	150
Mo	N(5) - 5	N(5)	N(5)	<5	<5	5
Nb	N(20) - 30	20	20	20	30	30
Ni	N(5) - 15	<5	5	10	10	15
Pb	10 - 30	20	30	30	30	30
Sc	5 - 20	10	15	20	20	20
Sn	N(10) - 50	N(10)	N(10)	10	10	50
Sr	200 - 700	500	500	500	500	700
V	50 - 200	100	150	200	200	200
Y	10 - 70	50	50	70	70	70
Zr	70 - 1000	200	300	500	500	1000
Th	N(100) - <100	N(100)	N(100)	N(100)	N(100)	<100
Zn-aa	25 - 120	50	70	90	100	100
Au-aa	N(0.002) - 0.042	N(0.002)	<0.002	0.003	0.005	0.008
U-inst	1 - 18.7	6.6	10.6	13.0	13.0	15.5

Table 7.--Summary statistics for the analytical values determined for the 35 nonmagnetic heavy-mineral-concentrate samples in table 4, Scodies 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	0.2 - 0.7	0.5	0.5	0.5	0.7	0.7
Mg	0.05 - 0.3	0.1	0.1	0.15	0.2	0.3
Ca	3 - 15	7	10	10	15	15
Ti	>2 - >2	>2	>2	>2	>2	>2
Mn	200 - 1500	700	1000	1500	1500	1500
Ag	N(1) - <1	N(1)	N(1)	N(1)	N(1)	<1
Au	N(20) - <20	N(20)	N(20)	N(20)	N(20)	<20
B	N(20) - 30	N(20)	20	20	20	30
Ba	<50 - 3000	70	100	300	500	3000
Be	N(2) - 7	N(2)	N(2)	N(2)	2	7
Bi	N(20) - 150	N(20)	N(20)	N(20)	30	150
Co	N(10) - 20	10	10	15	20	20
Cr	N(20) - 30	20	20	30	30	30
Cu	N(10) - 10	N(10)	N(10)	<10	<10	10
La	200 - >2000	500	1000	1000	>2000	>2000
Mo	N(10) - 50	10	20	20	50	50
Nb	50 - 150	100	100	150	150	150
Ni	N(10) - 10	N(10)	N(10)	N(10)	<10	10
Pb	N(20) - 2000	50	70	300	1000	2000
Sc	15 - 30	20	30	30	30	30
Sn	20 - 100	30	70	100	100	100
Sr	N(200) - 200	N(200)	N(200)	<200	<200	200
V	100 - 300	200	200	300	300	300
W	N(100) - 200	N(100)	<100	100	100	200
Y	200 - 1000	500	500	700	700	1000
Zr	500 - >2000	>2000	>2000	>2000	>2000	>2000
Th	<200 - 5000	300	1000	3000	5000	5000

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