UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical results and sample locality map of heavy-mineral-concentrate and rock samples from the Kingston Range Wilderness Study Area (CDCA-222), San Bernardino County, California

By

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STUDIES RELATED TO WILDERNESS

Bureau of Land Management Wilderness Study Areas

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine their mineral values, if any. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geochemical survey of the Kingston Range Wilderness Study Area (CDCA-222), California Desert Conservation Area, San Bernardino County, California.

INTRODUCTION

In April 1984, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the Kingston Range Wilderness Study Area, San Bernardino County, California.

The Kingston Range Wilderness Study Area is comprised of 399 mi^2 (1,037 km^2) (255,058 acres). The U.S. Geological Survey studied only 60.5 mi^2 (157 km^2) (38,713 acres) of the Kingston Range WSA. Throughout this report "study area" and "wilderness study area" only refer to the acres studied. The study area is in the northeastern corner of San Bernardino County, California, and lies about 20 mi east of Tecopa, California near the California-Nevada state line (fig. 1). A paved and, in part, improved dirt road from Tecopa traverses the Kingston Range and defines the northern boundary of the wilderness study area. The area has about 5000 ft of relief and an arid to subhumid climate.

The geology of the Kingston Range includes a thick section of sedimentary rocks of Precambrian and Cambrian age that uncomformably overlies gneiss, schist, and granite of older Precambrian age. The sedimentary rocks include the Crystal Spring Formation, Beck Spring Dolomite, and Kingston Peak Formation of the Pahrump Group unconformably overlain by the Noonday Dolomite and undifferentiated clastic deposits of Precambrian and Cambrian age. These rocks are intruded by granite porphyry of Tertiary age and are unconformably overlain by fanglomerate and alluvial deposits of Tertiary and Quaternary age (Calzia and others, unpublished report).

METHODS OF STUDY

Sample Media

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

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

Sample Collection

Heavy-mineral-concentrate samples were collected at 61 sites (figs. 2 and 3). Sampling density was about one sample site per 1 mi^2 for the heavy-mineral

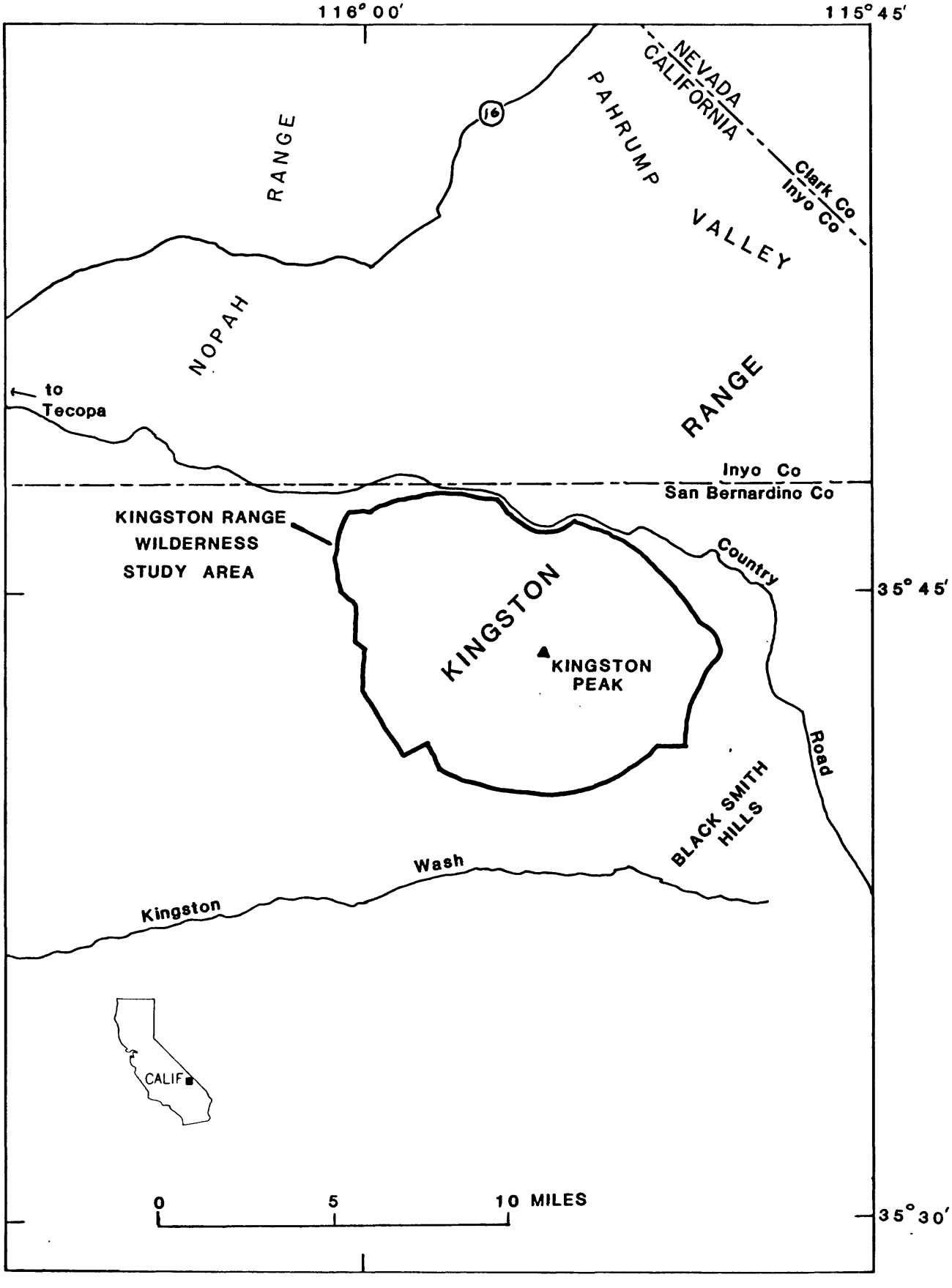

Figure 1. Location map of the Kingston Range Wilderness Study Area, San Bernardino County, California.

concentrates. The area of the drainage basins sampled ranged from approximately 0.5 mi^2 to 5 mi^2. Table 6 lists five rock samples collected in conjunction with this study. These samples are outside the map area and, consequently, do not appear on the sample locality maps (figs. 2 and 3).

Heavy-mineral-concentrate samples

Heavy-mineral-concentrate samples were collected from active alluvium primarily from first-order (unbranched) and second-order (below the junction of two first-order) streams. Each bulk sample was screened with a 2.0-mm (10-mesh) screen to remove the coarse material. The less than 2.0-mm fraction was panned until most of the quartz, feldspar, organic material, and clay-sized material were removed.

Rock samples

Rock samples were collected in the vicinity of the plotted site location. Samples were collected from unaltered, altered, or mineralized rocks. Altered and/or mineralized rocks were collected either from various types of occurrences (see table 5) or from nearby mines and prospects.

Sample Preparation

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

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

Sample Analysis

Spectrographic method

The heavy-mineral-concentrate and rock samples were analyzed for 31 elements using semiquantitative, direct-current arc emission spectrographic methods. The analyses for heavy-mineral-concentrate samples were performed by analysts in the Branch of Exploration Geochemistry using the method of Grimes and Marranzino (1968); analyses for rock samples were performed by analysts in the Branch of Analytical Chemistry using the method of Myers and others (1961). The elements analyzed and their lower limits of determination are listed in table 1. For arsenic (As), gold (Au), cadmium (Cd), and thorium (Th), the lower limits of determination of the two analytical methods varies. The values in the parentheses are the limits of determination for Myers and others (1961). Spectrographic results were obtained by visual comparison of spectra

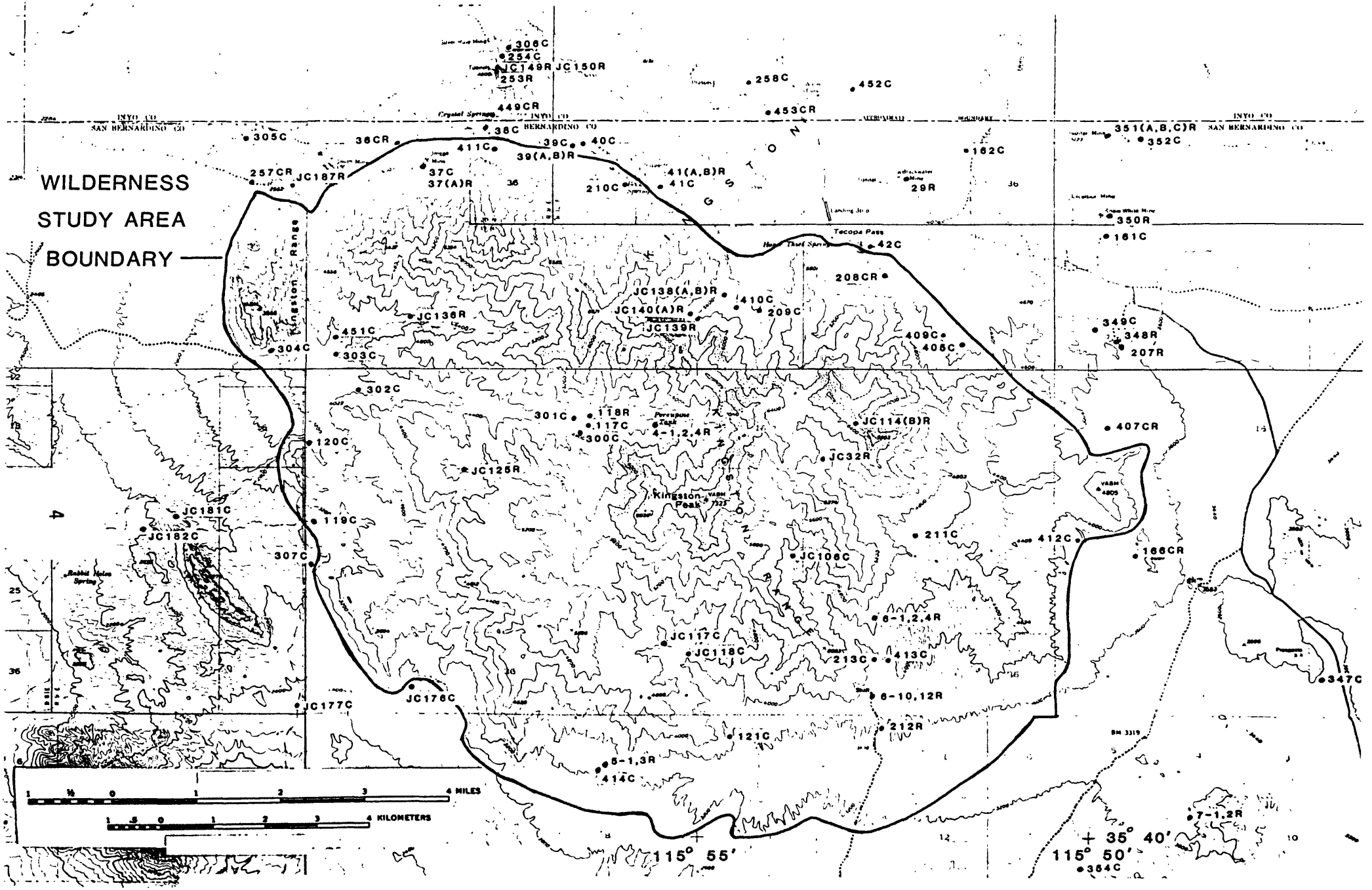

Figure 2. Localities of heavy-mineral-concentrate (C) and rock (R) samples from the Kingston Range Wilderness Study Area, San Bernardino County, California.

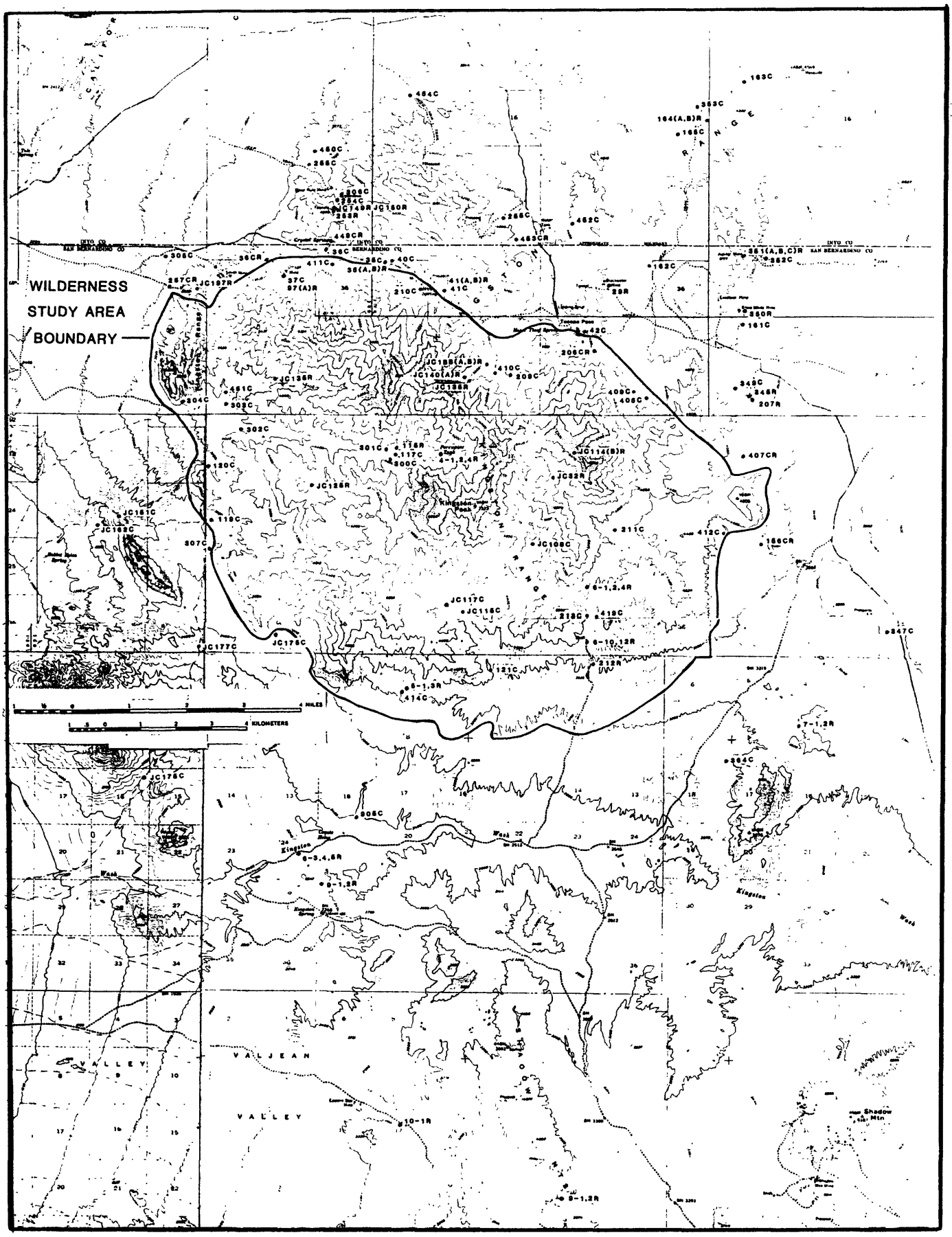

Figure 3. Localities of heavy-mineral-concentrate (C) and rock (R) samples from the Kingston Range Wilderness Study Area and vicinity, Inyo and San Bernardino Counties, California.

derived from the sample against spectra obtained from standards made from pure oxides and carbonates. Standard concentrations are geometrically spaced over any given order of magnitude of concentration as follows: 100, 50, 20, 10, and so forth. Samples whose concentrations are estimated to fall between those values are assigned values of 70, 30, 15, and so forth. The precision of the analytical method is approximately plus or minus one reporting interval at the 83 percent confidence level and plus or minus two reporting intervals at the 96 percent confidence level (Motooka and Grimes, 1976). Values determined for the major elements (iron, magnesium, calcium, and titanium) are given in weight percent; all others are given in parts per million (micrograms/gram). Analytical data for samples from the Kingston Range Wilderness Study Area are listed in tables 3 and 4.

Chemical methods

Other analytical methods used on samples from the Kingston Range Wilderness Study Area are listed in table 2. The analytical method used for determining As, Bi, Cd, Sb, and Zn is a modification and adaptation for the inductively coupled plasma method (ICP) based on the method of O'Leary and Viets (1986).

Analytical results for heavy-mineral-concentrate and rock samples are listed in tables 3 and 4, respectively.

ROCK ANALYSIS STORAGE SYSTEM

Upon completion of all analytical work, the analytical results were entered into a computer-based file called Rock Analysis Storage System (RASS). This data base contains both descriptive geological information and analytical data. Any or all of this information may be retrieved and converted to a binary form (STATPAC) for computerized statistical analysis or publication (VanTrump and Miesch, 1977).

DESCRIPTION OF DATA TABLES

Tables 3 and 4 list the results of analyses for the samples of heavy-mineral concentrate and rock, respectively. For the two tables, the data are arranged so that column 1 contains the USGS-assigned sample numbers. These numbers correspond to the numbers shown on the site location maps (figs. 2 and 3). Columns in which the element headings show the letter "s" below the element symbol are emission spectrographic analyses; "aa" indicates atomic absorption analyses; and "icp" indicates inductively coupled plasma-atomic emission spectroscopy. A letter "N" in the tables indicates that a given element was looked for but not detected at the lower limit of determination shown for that element in table 1. A letter "H" in the tables indicates that a given element was looked for but due to elemental interferences a value was not reported. If an element was observed but was below the lowest reporting value, a "less than" symbol (<) was entered in the tables in front of the lower limit of determination. If an element was observed but was above the highest reporting value, a "greater than" symbol (>) was entered in the tables in front of the upper limit of determination. If an element was not looked for in a sample, two dashes (--) are entered in tables 3 and 4 in place of an analytical value. Because of the formatting used in the computer program that produced tables 3 and 4, some of the elements listed in these tables (Fe, Mg, Ca, Ti, Ag, and Be) carry one or more nonsignificant digits to the right of the significant digits. The analysts did not determine these elements to the accuracy suggested by the extra zeros.

Descriptions of rock samples are listed in table 5. The table is arranged so that column 1 contains the USGS-assigned sample numbers. An "O" in column 2 indicates the rock was collected from an outcrop; "D" indicates a mine dump or prospect; "F" indicates float; and "S" indicates stream cobble.

ACKNOWLEDGMENTS

A number of our colleagues also participated in the collection, preparation, analyses, and data retrieval of these samples: collection, J. C. Gray, K. R. Greene, M. A. Mast, and A. D. McCollaum; preparation, W. Hyde and G. L. Thurston; analyses, N. M. Conklin, H. W. Groeneboer, S. Danahey, J. Storey, and R. B. Vaughn; and data retrieval, J. L. Jones.

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

[The values shown are the lower limits of determination assigned by the Grimes and Marranzino method, except for those values in parentheses, which are the lower values assigned by the Myers and others method. The spectrographic limits of determination for heavy-mineral-concentrate samples are based on a 5-mg sample, and are therefore two reporting intervals higher than the limits given for rocks.]

Elements	Lower determination limit	Upper determination limit
	Percent	
Iron (Fe)	0.05	20
Magnesium (Mg)	.02	10
Calcium (Ca)	.05	20
Titanium (Ti)	.002	1
	Parts per million	
Manganese (Mn)	10	5,000
Silver (Ag)	0.5	5,000
Arsenic (As)	200 (700)	10,000
Gold (Au)	10 (15)	500
Boron (B)	10	2,000
Barium (Ba)	20	5,000
Beryllium (Be)	1	1,000
Bismuth (Bi)	10	1,000
Cadmium (Cd)	20 (30)	500
Cobalt (Co)	5	2,000
Chromium (Cr)	10	5,000
Copper (Cu)	5	20,000
Lanthanum (La)	20 (30)	1,000
Molybdenum (Mo)	5	2,000
Niobium (Nb)	20	2,000
Nickel (Ni)	5	5,000
Lead (Pb)	10	20,000
Antimony (Sb)	100	10,000
Scandium (Sc)	5	100
Tin (Sn)	10	1,000
Strontium (Sr)	100	5,000
Vanadium (V)	10	10,000
Tungsten (W)	50	10,000
Yttrium (Y)	10	2,000
Zinc (Zn)	200	10,000
Zirconium (Zr)	10	1,000
Thorium (Th)	100 (200)	2,000

TABLE 2.--Chemical methods used

[AA = atomic absorption; DN = delayed neutron; and ICP = inductively coupled plasma spectroscopy]

Element or constituent determined	Sample Type	Method	Determination limit (micrograms/ gram or ppm)	Reference
Gold (Au)	rock	AA	.1	Modification of Thompson and others, 1968.
Mercury (Hg)	rock	AA	0.02	Koirtyhann and Khalil, 1976.
Arsenic (As)	rock	ICP	5	Crock and others, 1983, and modification of O'Leary and Viets, 1986.
Antimony (Sb)	rock	ICP	2	
Zinc (Zn)	rock	ICP	2	
Bismuth (Bi)	rock	ICP	2	
Cadmium (Cd)	rock	ICP	0.1	
Thorium (Th)	rock	DN		Millard, 1976.
Uranium (U)	rock	DN		Millard, 1976.

TABLE 3. RESULTS OF ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.

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

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	Ba-ppm s
JCKR108	35 43 0	115 53 50	.7	.10	2.0	>2.0	300	N	N	N	20	1,500
JCKR117	35 42 3	115 55 23	.3	.10	1.0	>2.0	150	N	N	N	20	>10,000
JCKR118	35 42 0	115 55 8	.7	.10	1.0	>2.0	200	N	N	N	20	>10,000
JCKR175	35 41 37	115 58 40	.5	.10	5.0	2.0	100	N	N	N	30	5,000
JCKR177	35 41 27	116 0 6	.7	1.00	2.0	>2.0	200	N	N	N	30	200
JCKR178	35 39 24	116 1 6	.7	2.00	5.0	>2.0	300	N	N	N	30	1,500
JCKR181	35 43 23	116 1 37	1.5	1.50	5.0	>2.0	700	N	N	N	20	700
JCKR182	35 43 16	116 2 5	1.0	3.00	5.0	>2.0	500	N	N	N	50	10,000
KR036	35 47 23	115 58 51	.5	1.00	.7	>2.0	150	N	N	N	50	>10,000
KR037	35 47 8	115 58 34	.3	.20	2.0	>2.0	200	N	N	N	30	>10,000
KR038	35 47 35	115 57 40	1.0	2.00	5.0	>2.0	700	150	500	N	70	10,000
KR039	35 47 20	115 56 40	1.0	7.00	7.0	1.5	300	5	N	N	70	1,000
KR040	35 47 20	115 56 30	.7	7.00	10.0	>2.0	200	N	N	N	70	>10,000
KR041	35 46 54	115 55 31	1.5	2.00	5.0	>2.0	500	N	N	N	70	2,000
KR042	35 46 13	115 52 52	.5	.50	5.0	>2.0	1,000	7	N	N	50	>10,000
KR117	35 44 25	115 56 25	.7	.20	5.0	>2.0	500	N	N	N	50	10,000
KR119	35 43 21	115 59 55	.7	.20	3.0	>2.0	200	N	N	N	30	5,000
KR120	35 44 11	115 59 59	.7	.70	5.0	>2.0	200	N	N	N	70	5,000
KR121	35 41 6	115 54 35	.5	.20	3.0	>2.0	300	N	N	N	50	>10,000
KR161	35 46 27	115 49 44	1.5	7.00	7.0	>2.0	500	N	N	N	200	3,000
KR162	35 47 15	115 51 30	.5	1.00	5.0	>2.0	70	N	N	N	70	>10,000
KR163	35 50 4	115 49 40	.5	.30	1.0	>2.0	50	N	N	N	70	3,000
KR165	35 49 19	115 50 59	.3	.30	1.0	>2.0	100	N	N	N	150	>10,000
KR166	35 42 56	115 49 24	1.0	10.00	15.0	>2.0	1,500	N	N	N	100	2,000
KR208	35 45 57	115 52 37	.5	.20	5.0	>2.0	500	N	N	N	50	2,000
KR209	35 45 40	115 54 10	1.0	.20	2.0	>2.0	500	N	N	N	50	500
KR210	35 46 55	115 55 54	1.0	.50	5.0	>2.0	700	N	N	N	70	500
KR211	35 43 15	115 52 9	.5	.15	2.0	>2.0	300	N	N	N	50	3,000
KR213	35 41 57	115 52 42	.5	.50	5.0	>2.0	500	N	N	N	30	>10,000
KR254	35 48 16	115 57 31	.7	2.00	7.0	>2.0	700	200	N	N	100	>10,000
KR255	35 48 49	115 58 6	1.0	10.00	15.0	>2.0	700	7	N	N	150	5,000
KR257	35 46 59	116 0 42	.7	5.00	10.0	>2.0	1,000	N	N	N	50	>10,000
KR258	35 48 0	115 54 26	.7	7.00	10.0	>2.0	1,000	N	N	N	100	2,000
KR300	35 44 21	115 56 32	.7	.50	3.0	>2.0	500	N	N	N	50	3,000
KR301	35 44 29	115 56 35	.5	.50	5.0	>2.0	500	N	N	N	50	10,000
KR302	35 44 50	115 59 27	.7	1.00	5.0	>2.0	1,000	N	N	N	50	3,000
KR303	35 45 5	115 59 40	.3	.10	3.0	>2.0	300	N	N	N	20	>10,000
KR304	35 45 13	116 0 28	1.0	2.00	5.0	>2.0	700	N	N	N	70	>10,000
KR305	35 47 26	116 0 49	.7	1.00	5.0	>2.0	200	N	N	N	50	10,000
KR306	35 48 30	115 57 37	1.0	10.00	10.0	>2.0	700	N	N	N	100	7,000
KR307	35 42 55	115 59 55	.7	1.00	7.0	>2.0	700	N	N	N	50	2,000
KR308	35 38 48	115 57 7	.5	1.50	5.0	>2.0	500	N	N	N	70	>10,000
KR347	35 41 40	115 47 5	.5	1.00	5.0	>2.0	200	N	N	N	70	1,000
KR349	35 45 30	115 49 40	.7	3.00	5.0	>2.0	500	N	N	N	100	1,500
KR352	35 47 24	115 49 18	1.0	5.00	5.0	>2.0	500	N	N	N	70	>10,000

TABLE 3. RESULTS OF ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s
JCKR108	<2	N	N	N	N	N	300	N	100	10	300
JCKR117	N	N	N	N	N	N	200	20	100	20	300
JCKR118	N	N	N	N	N	N	200	N	200	<10	1,000
JCKR175	N	N	N	<10	N	N	N	150	150	N	500
JCKR177	N	N	N	N	N	N	300	N	100	<10	150
JCKR178	3	N	N	N	N	N	200	N	100	<10	200
JCKR181	N	N	N	N	N	<10	500	N	100	<10	200
JCKR182	3	N	N	<10	N	<10	300	N	100	10	200
KR036	<2	N	N	<10	N	15	100	20	150	<10	3,000
KR037	N	N	N	10	N	N	500	100	200	20	1,000
KR038	<2	30	500	N	<20	1,000	N	2,000	N	<10	>50,000
KR039	N	N	N	10	<20	10	100	10	<50	N	1,500
KR040	10	N	N	15	20	N	200	N	N	<10	1,500
KR041	15	N	N	100	20	<10	200	N	70	70	3,000
KR042	2	N	500	20	N	150	200	N	50	20	15,000
KR117	3	N	N	N	N	N	500	N	200	<10	50
KR119	5	N	N	20	N	10	300	N	100	<10	200
KR120	<2	N	N	20	<20	10	500	100	200	10	1,000
KR121	<2	N	N	10	N	N	500	N	150	<10	500
KR161	<2	N	N	20	200	10	N	N	100	20	300
KR162	3	N	N	15	150	N	100	N	70	10	200
KR163	5	N	N	N	150	N	<50	N	N	10	20
KR165	5	N	N	<10	100	N	N	N	50	50	100
KR166	N	N	N	10	70	N	100	N	<50	10	50
KR208	3	N	N	<10	N	N	500	N	200	10	200
KR209	3	N	N	<10	N	N	500	N	150	10	20
KR210	2	N	N	<10	N	N	500	N	300	10	30
KR211	2	N	N	<10	N	N	300	N	100	10	<20
KR213	2	N	N	<10	N	N	500	N	200	<10	200
KR254	N	N	700	N	<20	1,000	N	700	N	N	>50,000
KR255	5	N	N	15	150	10	100	<10	70	10	2,000
KR257	2	N	N	10	70	15	200	100	100	N	10,000
KR258	2	N	N	10	100	N	100	N	50	10	200
KR300	<2	N	N	N	N	N	200	N	100	<10	20
KR301	2	N	N	<10	N	N	500	N	200	10	50
KR302	3	N	N	<10	N	<10	700	N	300	<10	150
KR303	2	N	N	<10	N	N	300	N	200	15	200
KR304	<2	N	N	<10	20	<10	500	N	200	<10	50
KR305	2	N	N	<10	<20	N	300	N	200	N	200
KR306	<2	N	N	15	100	20	100	<10	100	15	700
KR307	2	N	N	15	N	N	700	N	300	<10	150
KR308	<2	N	N	10	<20	N	300	N	200	<10	100
KR347	10	N	N	10	100	N	150	N	70	<10	70
KR349	2	N	N	10	150	<10	150	N	70	10	1,000
KR352	N	N	N	<10	150	N	100	N	70	N	300

TABLE 3. RESULTS OF ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s
JCKR108	N	50	50	N	100	N	1,000	N	>2,000	500
JCKR117	N	50	<20	N	100	N	1,500	N	>2,000	300
JCKR118	N	N	50	N	50	N	500	N	>2,000	<200
JCKR175	N	N	N	N	30	N	200	N	>2,000	700
JCKR177	N	10	<20	N	70	N	500	N	>2,000	1,000
JCKR178	N	20	20	N	100	N	500	N	>2,000	700
JCKR181	N	50	50	N	150	N	1,000	N	>2,000	500
JCKR182	N	50	30	N	200	N	700	N	>2,000	500
KR036	N	N	N	500	200	N	500	N	>2,000	1,000
KR037	N	100	20	700	70	N	1,500	N	>2,000	1,500
KR038	5,000	N	200	500	200	N	100	>20,000	>2,000	200
KR039	N	N	N	500	100	N	150	<500	>2,000	N
KR040	N	30	N	500	150	N	500	N	>2,000	<200
KR041	N	70	20	N	200	N	1,000	N	>2,000	<200
KR042	N	100	50	N	100	N	2,000	>20,000	>2,000	700
KR117	N	100	100	N	150	N	1,000	N	>2,000	<200
KR119	N	<10	N	N	100	N	700	N	>2,000	5,000
KR120	N	<10	N	<200	100	N	700	N	>2,000	5,000
KR121	N	<10	50	N	100	N	1,000	N	>2,000	500
KR161	N	N	N	N	300	N	100	N	>2,000	N
KR162	N	150	N	1,000	200	N	700	N	>2,000	200
KR163	N	150	N	N	300	N	1,500	N	>2,000	<200
KR165	N	150	N	500	200	N	1,500	N	>2,000	200
KR166	N	N	N	N	200	N	200	N	>2,000	N
KR208	N	100	70	N	100	N	1,500	N	>2,000	700
KR209	N	<10	50	N	30	N	700	N	>2,000	500
KR210	N	50	70	<200	150	N	700	N	>2,000	300
KR211	N	<10	N	N	50	N	500	N	>2,000	200
KR213	N	30	100	N	100	N	1,000	N	>2,000	300
KR254	1,000	N	200	500	100	N	20	>20,000	>2,000	N
KR255	N	<10	N	<200	200	N	200	1,000	>2,000	N
KR257	N	<10	50	1,000	1,000	N	1,000	N	>2,000	N
KR258	N	N	N	500	200	N	500	N	>2,000	N
KR300	N	<10	30	N	150	N	700	N	>2,000	N
KR301	N	150	100	N	150	N	1,500	N	>2,000	<200
KR302	N	70	100	N	200	N	700	N	>2,000	200
KR303	N	100	50	N	100	N	1,500	N	>2,000	700
KR304	N	N	30	<200	150	N	700	N	>2,000	1,000
KR305	N	100	50	N	150	N	1,000	N	>2,000	500
KR306	N	<10	30	500	200	N	200	3,000	>2,000	N
KR307	N	<10	50	N	150	N	500	N	>2,000	200
KR308	N	<10	30	500	200	N	700	N	>2,000	500
KR347	N	20	N	N	200	N	1,000	N	>2,000	200
KR349	N	20	<20	500	300	N	700	N	>2,000	N
KR352	N	N	N	<200	500	N	200	N	>2,000	200

TABLE 3. RESULTS OF ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

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	Ba-ppm s
KR353	35 49 43	115 50 38	.5	2.00	5.0	>2.0	500	N	N	N	100	>10,000
KR354	35 39 27	115 50 12	.3	2.00	2.0	>2.0	100	N	N	N	50	>10,000
KR407	35 44 22	115 49 47	.7	3.00	5.0	>2.0	500	N	N	N	70	10,000
KR408	35 45 4	115 51 43	.7	2.00	3.0	1.0	300	N	N	N	50	3,000
KR409	35 45 13	115 51 47	.5	.30	1.0	1.0	200	N	N	N	50	5,000
KR410	35 45 40	115 54 30	.7	.20	1.5	2.0	300	N	N	N	70	700
KR411	35 47 18	115 57 34	.5	.10	1.0	>2.0	300	N	N	N	50	5,000
KR412	35 43 11	115 50 6	1.0	7.00	5.0	>2.0	300	N	N	N	70	500
KR413	35 41 53	115 52 30	.5	1.00	5.0	>2.0	200	N	N	N	50	>10,000
KR414	35 40 45	115 56 20	.5	.50	3.0	>2.0	200	N	N	N	50	7,000
KR449	35 47 33	115 57 43	1.5	10.00	10.0	>2.0	700	10	N	N	100	>10,000
KR450	35 49 0	115 58 0	1.0	10.00	10.0	>2.0	1,000	5	N	N	100	2,000
KR451	35 45 20	115 59 40	.3	.50	10.0	>2.0	200	N	N	N	20	>10,000
KR453	35 47 40	115 54 10	1.0	7.00	10.0	>2.0	500	7	N	N	100	500
KR454	35 49 50	115 56 10	.7	10.00	7.0	>2.0	500	N	N	N	70	>10,000
KR452	35 47 56	115 53 6	1.0	1.00	1.0	>2.0	300	N	N	N	100	700

TABLE 3. RESULTS OF ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s
KR353	3	N	N	<10	100	N	<50	N	50	10	200
KR354	<2	N	N	10	100	N	<50	N	70	20	1,500
KR407	2	N	N	10	<20	N	200	N	70	10	20
KR408	2	N	N	N	N	N	100	N	N	<10	100
KR409	2	N	N	N	N	N	100	N	N	<10	N
KR410	10	N	N	N	N	N	100	N	150	<10	20
KR411	2	N	N	10	N	N	150	N	200	10	300
KR412	<2	N	N	N	N	N	<50	N	50	<10	N
KR413	<2	N	N	<10	<20	N	200	N	200	10	300
KR414	2	N	N	N	N	N	200	N	50	10	500
KR449	10	N	N	10	50	30	100	20	50	10	15,000
KR450	N	N	N	10	100	10	N	N	70	<10	5,000
KR451	<2	N	N	20	N	15	700	150	100	<10	2,000
KR453	<2	N	N	10	100	<10	150	N	50	10	5,000
KR454	<2	N	N	10	100	N	N	N	50	<10	700
KR452	10	N	N	30	300	N	N	N	70	<10	300

TABLE 3. RESULTS OF ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s
KR353	N	<10	N	700	200	N	700	N	>2,000	N
KR354	N	70	N	500	300	N	1,000	N	>2,000	1,000
KR407	N	<10	N	<200	100	N	700	N	>2,000	200
KR408	N	N	N	<200	30	N	200	N	>2,000	<200
KR409	N	N	N	<200	30	N	300	N	>2,000	N
KR410	N	<10	<20	<200	50	N	500	N	>2,000	<200
KR411	N	70	50	N	70	N	700	N	>2,000	700
KR412	N	N	N	N	70	N	300	N	>2,000	200
KR413	N	N	N	500	100	N	1,000	N	>2,000	500
KR414	N	N	N	<200	150	N	700	N	>2,000	1,000
KR449	N	N	N	500	150	N	150	2,000	>2,000	N
KR450	N	N	N	N	200	N	200	700	>2,000	N
KR451	N	50	20	<200	100	N	1,500	N	>2,000	5,000
KR453	N	20	N	500	200	N	500	500	>2,000	N
KR454	N	20	N	<200	200	N	500	N	>2,000	N
KR452	N	50	N	N	500	N	500	N	>2,000	N

TABLE 4. RESULTS OF ANALYSES OF ROCK SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.

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

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
JCKR32	35 44 3	115 53 27	.70	.03	.20	.200	30	N	N	N	N
JCKR114B	35 44 25	115 52 59	.70	.10	.15	.100	700	N	N	N	15
JCKR125	35 43 54	115 57 59	7.00	.07	.15	.150	50	N	N	N	N
JCKR136	35 45 32	115 58 44	10.00	.15	.15	.050	200	N	N	N	N
JCKR138A	35 45 47	115 54 43	.10	<.02	<.05	.007	70	15.0	N	N	<10
JCKR138B	35 45 47	115 54 42	.30	.03	.07	.007	1,500	10.0	N	N	<10
JCKR139	35 45 32	115 55 2	.07	<.02	.10	.003	5,000	10.0	N	N	10
JCKR140A	35 45 34	115 55 10	.50	.10	.07	.150	150	N	N	N	N
JCKR149	35 48 11	115 57 36	1.00	1.00	5.00	.007	700	200.0	N	N	N
JCKR150	35 48 10	115 57 38	.30	5.00	5.00	N	1,000	15.0	N	N	N
JCKR187	35 46 55	116 0 11	7.00	.15	.15	.015	150	50.0	N	N	10
KR27	35 49 35	116 5 59	7.00	2.00	3.00	<.002	700	500.0	700	N	<10
KR29	35 46 59	115 52 24	2.00	5.00	7.00	.010	1,500	70.0	N	N	N
KR36	35 47 23	115 58 51	2.00	1.00	5.00	.200	700	N	N	N	<10
KR37A	35 47 8	115 58 34	3.00	5.00	10.00	.150	1,500	N	N	N	<10
KR39A	35 47 20	115 56 40	>20.00	.50	1.50	.005	300	1.0	N	N	N
KR39B	35 47 21	115 56 40	5.00	2.00	15.00	.300	1,500	N	N	N	N
KR41A	35 46 54	115 55 31	.50	.15	.30	.100	150	N	N	N	N
KR41B	35 46 55	115 55 31	5.00	.20	.10	.300	700	N	N	N	30
KR118	35 44 30	115 56 23	3.00	.15	.70	.150	300	N	N	N	N
KR164A	35 49 30	115 50 27	5.00	.10	.05	.030	100	3.0	N	N	10
KR164B	35 49 31	115 50 27	.70	5.00	7.00	.030	500	N	N	N	N
KR166	35 42 56	115 49 24	7.00	2.00	2.00	.300	300	N	N	N	N
KR207	35 45 20	115 49 40	15.00	.50	15.00	.002	30	15.0	<700	N	N
KR208	35 45 57	115 52 37	1.50	.20	.50	.200	300	1.0	<700	N	N
KR212	35 41 14	115 52 37	15.00	.15	.20	.030	700	3.0	N	N	100
KR253	35 48 7	115 57 36	7.00	5.00	7.00	.050	700	1.0	N	N	N
KR257	35 46 59	116 0 42	.70	.30	.30	.100	150	N	N	N	N
KR348	35 45 20	115 49 40	20.00	.30	7.00	<.002	100	10.0	<700	N	N
KR350	35 46 35	115 49 44	7.00	3.00	2.00	>1.000	1,500	N	N	N	N
KR351A	35 47 27	115 49 47	1.00	.15	.20	.020	300	300.0	N	N	N
KR351B	35 47 28	115 49 47	15.00	.50	.10	.200	300	2.0	N	N	50
KR351C	35 47 26	115 49 47	5.00	.70	.07	.300	500	N	N	N	100
KR407	35 44 22	115 49 47	3.00	.30	.15	.200	70	N	N	N	N
KR449	35 47 33	115 57 43	.15	10.00	1.50	.010	50	N	N	N	N
KR453	35 47 40	115 54 10	.10	7.00	7.00	<.002	300	N	N	N	N
KR1-1	35 50 50	116 6 45	1.50	.15	1.00	.300	700	300.0	3,000	N	30
KR1-2	35 50 50	116 6 45	.70	1.50	.07	.700	20	300.0	1,500	N	70
KR1-3	35 50 35	116 7 15	>20.00	.15	<.05	<.002	50	150.0	2,000	N	N
KR1-4	35 50 35	116 7 15	>20.00	.50	.30	.005	300	150.0	3,000	N	N
KR2-3	35 46 50	116 7 30	5.00	3.00	15.00	.300	2,000	N	N	N	<10
KR3-1	35 45 30	116 13 55	1.50	.03	.15	.150	150	N	N	N	15
KR3-2	35 45 30	116 13 55	3.00	.70	1.50	.150	300	N	N	N	10
KR4-1	35 44 25	115 55 35	3.00	.03	.10	.150	100	.7	N	N	N
KR4-2	35 44 25	115 55 35	1.00	.03	.05	.300	50	N	N	N	N

TABLE 4. RESULTS OF ANALYSES OF ROCK SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s
JCKR32	150	N	N	N	N	<10	<5	100	N	20	N
JCKR114B	300	1.5	N	N	N	<10	15	N	N	<20	N
JCKR125	500	N	N	N	N	<10	5	50	N	20	N
JCKR136	30	5.0	N	N	N	<10	7	N	N	<20	N
JCKR138A	70	10.0	N	N	N	<10	15	N	N	N	N
JCKR138B	500	7.0	N	N	N	<10	70	30	N	N	N
JCKR139	1,000	150.0	N	N	N	<10	30	30	N	N	<5
JCKR140A	500	5.0	N	N	N	<10	7	50	N	<20	N
JCKR149	150	2.0	N	70	<5	<10	700	N	>2,000	N	<5
JCKR150	<20	N	N	500	N	<10	300	N	20	N	<5
JCKR187	>5,000	N	30	N	5	15	>20,000	N	30	N	5
KR27	150	N	N	200	N	<10	2,000	N	5	N	5
KR29	30	1.0	N	150	N	10	7,000	N	N	N	5
KR36	1,000	1.0	N	N	5	15	50	30	N	<20	7
KR37A	700	1.5	N	N	10	15	10	N	5	N	10
KR39A	20	N	N	N	150	<10	70	N	N	<20	100
KR39B	150	N	N	N	30	150	50	N	N	<20	70
KR41A	300	N	N	N	15	<10	150	N	N	N	5
KR41B	300	1.0	N	N	15	30	100	30	N	N	30
KR118	700	N	N	N	<5	<10	10	N	10	<20	5
KR164A	700	N	N	N	N	<10	>20,000	N	5	N	7
KR164B	70	N	N	N	N	<10	70	N	N	N	<5
KR166	150	N	N	N	<5	70	50	30	N	N	15
KR207	20	N	N	70	N	<10	200	30	N	N	5
KR208	1,500	2.0	N	N	<5	<10	7	70	N	<20	N
KR212	200	N	N	N	15	20	>20,000	N	N	N	30
KR253	70	N	N	N	15	10	200	N	30	N	30
KR257	1,500	N	N	N	N	<10	30	N	N	N	<5
KR348	30	N	N	150	N	<10	200	N	N	N	5
KR350	700	N	N	N	30	100	100	30	N	<20	50
KR351A	200	N	N	100	N	<10	3,000	N	N	N	5
KR351B	150	1.5	N	N	20	30	50	30	N	<20	50
KR351C	200	1.5	N	N	50	30	70	70	N	<20	100
KR407	1,500	2.0	N	N	N	15	7	70	N	<20	7
KR449	20	N	N	N	N	<10	5	N	N	N	<5
KR453	<20	N	N	N	N	<10	10	N	N	N	N
KR1-1	70	N	<10	300	7	15	7,000	N	N	<20	7
KR1-2	300	N	<10	N	N	70	>20,000	70	N	<20	5
KR1-3	<20	N	30	N	N	<10	1,500	N	N	<20	N
KR1-4	<20	N	30	N	N	<10	1,500	N	N	<20	7
KR2-3	300	N	N	N	20	<10	50	N	N	<20	7
KR3-1	1,000	3.0	N	N	N	<10	7	30	<5	<20	7
KR3-2	5,000	1.5	N	N	10	70	10	70	N	<20	30
KR4-1	>5,000	3.0	N	N	N	<10	50	100	5	20	<5
KR4-2	3,000	3.0	N	N	N	<10	7	150	N	30	N

TABLE 4. RESULTS OF ANALYSES OF ROCK SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s
JCKR32	15	N	<5	N	<100	15	N	10	N	200	N
JCKR114B	70	N	<5	N	<100	15	N	10	N	150	N
JCKR125	20	N	N	15	<100	30	N	<10	N	100	N
JCKR136	10	N	<5	N	<100	50	N	150	N	30	N
JCKR138A	N	N	N	N	N	N	N	N	N	30	N
JCKR138B	20	N	N	N	<100	<10	N	20	N	N	N
JCKR139	70	N	N	N	<100	<10	N	<10	700	N	N
JCKR140A	15	N	<5	N	<100	30	N	20	N	200	N
JCKR149	>20,000	500	N	100	300	<10	N	N	3,000	N	N
JCKR150	10,000	100	N	20	<100	N	N	N	>10,000	N	N
JCKR187	20,000	300	N	20	2,000	N	N	<10	5,000	20	N
KR27	>20,000	3,000	N	70	150	N	N	N	>10,000	N	N
KR29	>20,000	3,000	N	30	<100	N	N	N	>10,000	N	N
KR36	300	N	7	N	150	30	N	15	N	70	N
KR37A	150	N	7	N	<100	70	N	15	<200	70	N
KR39A	70	N	N	N	N	10	N	10	N	15	N
KR39B	50	N	10	N	<100	150	N	10	N	30	N
KR41A	100	N	N	N	<100	10	N	<10	N	30	N
KR41B	200	N	7	N	<100	50	N	15	<200	100	N
KR118	30	N	<5	N	<100	15	N	20	N	70	N
KR164A	20	N	N	N	<100	20	N	<10	N	30	N
KR164B	15	N	N	N	<100	10	N	<10	N	30	N
KR166	70	N	N	N	<100	150	N	<10	N	30	N
KR207	>20,000	N	N	N	<100	<10	N	N	>10,000	N	N
KR208	150	N	5	N	500	20	N	10	N	150	N
KR212	100	N	5	20	<100	100	N	<10	700	N	N
KR253	70	N	N	N	<100	20	N	N	300	20	N
KR257	70	N	7	N	300	15	N	30	N	100	N
KR348	200	N	N	N	<100	N	N	N	>10,000	N	N
KR350	70	N	30	N	300	300	N	30	<200	100	N
KR351A	>20,000	5,000	N	50	150	N	N	N	>10,000	N	N
KR351B	3,000	N	7	N	<100	70	N	15	N	70	N
KR351C	300	N	15	N	100	150	N	20	N	150	N
KR407	500	N	10	N	150	30	N	20	N	150	N
KR449	50	N	N	N	<100	15	N	N	N	30	N
KR453	100	N	N	N	<100	N	N	N	N	N	N
KR1-1	7,000	7,000	<5	15	<100	30	N	20	>10,000	300	N
KR1-2	10,000	1,500	15	<10	<100	70	N	20	1,000	300	N
KR1-3	1,000	700	N	N	<100	N	N	<10	N	N	N
KR1-4	1,500	2,000	N	N	<100	N	N	<10	1,500	N	N
KR2-3	30	N	7	N	700	70	N	30	N	30	N
KR3-1	10	N	5	N	<100	<10	N	30	N	70	N
KR3-2	30	N	15	<10	500	150	N	20	N	70	N
KR4-1	150	N	7	<10	500	30	N	30	N	200	N
KR4-2	70	N	<5	N	150	30	N	30	N	300	N

TABLE 4. RESULTS OF ANALYSES OF ROCK SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	Au-ppm aa	Hg-ppm aa	As-ppm icp	Zn-ppm icp	Cd-ppm icp	Bi-ppm icp	Sb-ppm icp	Th-ppm dn	U-ppm dn
JCKR32	<.1	.02	<5	9	<.1	<2	<2	17.70	2.480
JCKR114B	<.1	<.02	<5	42	<.1	<2	<2	10.00	2.180
JCKR125	<.1	.06	<5	76	.3	<2	<2	17.70	10.000
JCKR136	<.1	.02	<5	74	.5	3	<2	39.10	15.500
JCKR138A	<.1	H	<5	7	<.1	<2	<2	<1.30	.229
JCKR138B	<.1	H	<5	20	<.1	<2	<2	3.20	1.230
JCKR139	<.1	H	<5	240	1.4	<2	<2	<1.50	.853
JCKR140A	<.1	<.02	<5	10	.2	<2	<2	15.60	5.830
JCKR149	H	H	130	2,700	88.0	<2	520	<2.30	3.980
JCKR150	<.1	H	32	>40,000	460.0	<2	310	<1.60	1.470
JCKR187	.1	H	200	4,100	8.3	<2	360	<20.00	104.000
KR27	6.6	H	2,000	39,000	200.0	<2	1,800	<2.70	8.230
KR29	.1	H	450	17,000	140.0	<2	3,700	<1.70	2.290
KR36	<.1	.08	<5	130	1.2	<2	120	14.50	3.890
KR37A	<.1	.19	<5	170	1.6	<2	57	8.94	1.770
KR39A	<.1	.03	19	89	18.0	9	170	2.10	1.350
KR39B	<.1	.03	<5	100	3.1	<2	37	1.80	.665
KR41A	<.1	.03	<5	19	.3	3	10	2.90	.527
KR41B	<.1	.02	<5	150	1.3	<2	15	8.54	4.130
KR118	<.1	.03	5	150	1.1	<2	12	<3.10	7.090
KR164A	.1	.16	74	15	.9	<2	12	<5.90	18.800
KR164B	<.1	.02	6	18	.8	<2	17	2.90	1.290
KR166	<.1	.10	58	20	3.5	<2	9	31.60	2.800
KR207	.5	.0	1,300	18,000	88.0	<2	120	<1.80	1.760
KR208	<.1	.20	11	130	.8	<2	6	18.90	4.590
KR212	.2	.31	31	350	1.8	<2	<2	<19.00	94.100
KR253	<.1	.56	400	310	3.5	<2	15	<2.80	4.250
KR257	<.1	.03	<5	57	.1	<2	<2	<2.10	1.800
KR348	<.1	H	1100	14,000	130.0	<2	84	<2.10	2.580
KR350	<.1	.15	<5	170	1.7	<2	19	5.36	1.070
KR351A	H	H	390	18,000	120.0	<2	4,000	<2.80	8.610
KR351B	<.1	.26	26	64	4.4	3	190	15.90	3.480
KR351C	<.1	.17	15	39	1.2	<2	75	18.40	4.220
KR407	<.1	.10	61	37	1.3	<2	42	16.60	4.720
KR449	<.1	.02	<5	5	.1	<2	13	<3.30	2.620
KR453	<.1	.10	<5	81	1.8	<2	21	<1.80	1.550
KR1-1	.1	110.00	2,730	32,100	175.0	27	2,860	--	--
KR1-2	.1	6.30	1,070	1,380	1.6	18	442	--	--
KR1-3	.2	11.00	2,700	61	1.4	20	672	--	--
KR1-4	1.1	11.00	3,460	495	4.0	16	1,240	--	--
KR2-3	<.1	.15	75	113	1.9	2	100	--	--
KR3-1	<.1	.07	6	38	<.1	<2	38	--	--
KR3-2	<.1	.05	9	110	.2	<2	39	--	--
KR4-1	<.1	.05	24	64	2.8	6	<2	--	--
KR4-2	<.1	.07	8	5	.4	<2	7	--	--

TABLE 4. RESULTS OF ANALYSES OF ROCK SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

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
KR4-4	35 44 25	115 55 35	1.50	.03	.15	.150	70	<.5	N	N	N
KR5-1	35 40 45	115 56 5	>20.00	.15	.70	.050	300	1.5	N	N	N
KR5-3	35 40 45	115 56 5	20.00	.15	.15	.070	150	7.0	N	N	30
KR6-1	35 42 20	115 52 45	>20.00	.03	.07	.007	20	3.0	N	N	N
KR6-2	35 42 20	115 52 45	3.00	.70	15.00	.070	2,000	1.0	N	N	10
KR6-4	35 42 20	115 52 45	>20.00	.15	.70	.030	200	1.0	N	N	N
KR6-10	35 41 30	115 52 45	20.00	.15	15.00	.015	1,500	.5	N	N	N
KR6-12	35 41 30	115 52 45	7.00	.15	.70	.030	1,500	2.0	N	N	70
KR7-1	35 40 15	115 48 45	>20.00	.70	.30	.020	50	.5	3,000	N	N
KR7-2	35 40 15	115 48 45	>20.00	.30	.15	.015	15	.5	2,000	N	N
KR8-1	35 37 45	115 58 0	.30	.15	1.50	.007	30	1.5	N	N	30
KR8-2	35 37 45	115 58 0	3.00	2.00	7.00	.300	700	N	N	N	N
KR8-3	35 38 10	115 58 10	.50	1.50	>20.00	.015	>5,000	N	N	N	N
KR8-4	35 38 10	115 58 10	.30	7.00	10.00	<.002	300	N	N	N	N
KR8-5	35 38 10	115 58 10	.15	7.00	15.00	.003	150	N	N	N	N
KR9-1	35 32 55	115 53 0	7.00	.70	.15	.300	70	30.0	>10,000	N	70
KR9-2	35 32 55	115 53 0	15.00	.15	.15	.150	300	70.0	1,500	N	30
KR10-1	35 34 0	115 56 15	5.00	.70	.02	.150	70	15.0	N	N	30

TABLE 4. RESULTS OF ANALYSES OF ROCK SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s
KR4-4	200	3.0	N	N	N	<10	7	150	<5	20	<5
KR5-1	1,500	3.0	30	N	N	<10	300	N	<10	30	5
KR5-3	3,000	1.5	15	N	10	<10	7,000	30	<10	30	<5
KR6-1	100	N	15	N	N	<10	300	N	N	N	<5
KR6-2	200	7.0	N	N	30	15	300	N	7	N	20
KR6-4	70	N	N	N	70	15	150	N	<10	<20	50
KR6-10	70	N	N	N	N	<10	70	N	<10	<20	7
KR6-12	300	1.0	N	N	10	15	>20,000	N	<10	N	30
KR7-1	70	N	N	N	N	<10	300	N	<10	<20	N
KR7-2	30	N	N	N	N	<10	300	N	<10	<20	N
KR8-1	200	N	N	N	N	<10	50	N	N	<20	N
KR8-2	2,000	1.5	N	N	15	50	30	100	N	<20	30
KR8-3	2,000	N	N	N	15	<10	100	N	15	<20	30
KR8-4	50	N	N	N	N	<10	>20,000	N	N	<20	N
KR8-5	20	N	N	N	N	<10	150	N	N	<20	N
KR9-1	300	1.5	N	100	N	70	1,000	N	N	<20	15
KR9-2	150	N	N	500	7	15	1,500	N	N	<20	30
KR10-1	300	3.0	N	N	N	<10	150	70	100	20	5

TABLE 4. RESULTS OF ANALYSES OF ROCK SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s
KR4-4	10	N	<5	N	<100	15	N	30	N	300	N
KR5-1	700	N	20	N	<100	150	200	20	3,000	N	N
KR5-3	7,000	N	15	30	150	70	N	70	1,500	300	N
KR6-1	70	N	N	N	<100	10	N	N	3,000	N	N
KR6-2	70	N	7	10	150	30	N	50	500	30	N
KR6-4	70	N	N	N	<100	70	70	<10	700	15	N
KR6-10	15	N	N	N	<100	30	N	N	N	15	N
KR6-12	70	N	7	15	150	50	N	15	700	20	N
KR7-1	70	100	N	N	<100	30	N	N	N	30	N
KR7-2	150	N	N	N	<100	20	N	N	N	15	N
KR8-1	N	N	N	N	<100	<10	N	N	N	30	N
KR8-2	20	N	15	N	2,000	100	N	20	N	150	N
KR8-3	30	N	N	N	500	70	50	N	N	20	N
KR8-4	50	N	N	N	150	20	N	N	N	N	N
KR8-5	30	N	N	N	100	15	N	N	N	N	N
KR9-1	>20,000	100	30	N	150	150	N	20	7,000	100	N
KR9-2	300	N	7	N	<100	30	N	<10	7,000	30	N
KR10-1	>20,000	N	15	15	<100	20	N	50	2,000	200	N

TABLE 4. RESULTS OF ANALYSES OF ROCK SAMPLES FROM THE KINGSTON RANGE WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	Au-ppm aa	Hg-ppm aa	As-ppm icp	Zn-ppm icp	Cd-ppm icp	Bi-ppm icp	Sb-ppm icp	Th-ppm dn	U-ppm dn
KR4-4	<.1	.04	9	31	.5	<2	9	--	--
KR5-1	<.1	.15	27	2,210	8.8	11	15	--	--
KR5-3	.1	.52	173	880	3.6	14	13	--	--
KR6-1	<.1	.37	27	1,390	4.0	10	13	--	--
KR6-2	<.1	.10	31	385	3.9	<2	13	--	--
KR6-4	<.1	.07	39	197	2.2	3	16	--	--
KR6-10	<.1	.03	64	103	1.5	<2	10	--	--
KR6-12	<.1	.22	28	278	.2	14	7	--	--
KR7-1	.1	.65	3,270	16	3.2	2	57	--	--
KR7-2	.2	6.50	2,730	38	3.0	3	79	--	--
KR8-1	<.1	.30	29	4	.2	<2	6	--	--
KR8-2	<.1	.03	9	42	.2	<2	7	--	--
KR8-3	<.1	2.40	52	38	.9	<2	19	--	--
KR8-4	<.1	25.00	155	70	1.2	8	51	--	--
KR8-5	<.1	.80	6	10	.3	<2	14	--	--
KR9-1	1.0	.85	>20,000	3,740	79.8	<2	85	--	--
KR9-2	.4	.32	1,150	2,630	166.0	<2	23	--	--
KR10-1	.5	2.20	124	1,570	6.1	<2	17	--	--

TABLE 5.--Description of rock samples

[O = outcrop; D = mine dump or prospect; F = float; S = stream cobble]

JCKR	32	O	Altered granite dike
	114B	O	Quartz vein in granitic rock
	125	O	Fault breccia
	136	O	Fault gouge
	138A	O	Amethyst vein
	138B	O	Quartz vein
	139	O	Quartz vein
	140A	O	Granite
	149	D	Composite mine dump sample; Dolostone
	150	D	Composite mine dump sample; Dolostone
	187	D	Composite mine dump sample; Rogers Mine
KR	27	D	Composite mine dump sample; Columbia Mine
	29	D	Composite mine dump sample; Blackwater Mine
	36	D	Composite mine dump sample; Omega talc mine
	37A	S	Composite sample
	39A	F	Magnetite
	39B	F	Diabase
	41A	F	Quartz vein
	41B	F	Sericitic breccia
	118	F	Fe stained breccia
	164A	O	Bornite in quartz
	164B	O	Dolostone
	166	F	Limonitic quartz vein
	207	D	Limonitic quartz vein
	208	F	Quartz monzonite
	212	D	Quartz, hematite, Cu carbonates and sulfides
	253	D	Dolomite, hematite, quartz
	257	O	Quartz monzonite
	348	D	Composite mine dump sample; Jupiter Mine
	350	D	Diabase dike
	351A	D	Composite mine dump sample; Jupiter Mine
	351B	D	Composite mine dump sample; Jupiter Mine
	351C	D	Composite mine dump sample; Jupiter Mine

407	F	Fe stained breccia
449	D	Talc
453	O	Silicified dolostone
1-1	D	Carbonate rock; limonitic
1-2	D	Carbonate rock; limonitic
1-3	D	Chert or jasperoid
1-4	D	Carbonate rock; limonitic
2-3	O	Carbonate rock fractured
3-1	O	Carbonate rock; unaltered
3-2	O	Chert or jasperoid; unaltered
4-1	O	Felsic, igneous, argillic, altered
4-2	O	Felsic, igneous, argillic, altered
4-4	O	Felsic, igneous, argillic, altered
5-1	D	Sheared propylitically altered
5-3	D	Sheared propylitically altered
6-1	D	Sheared propylitically altered
6-2	D	Sheared propylitically altered
6-4	D	Sheared propylitically altered
6-10	D	Sheared propylitically altered
6-12	D	Sheared propylitically altered
7-1	D	Chert or jasperoid; propylitically altered
7-2	D	Sheared propylitically altered
8-1	O	Chert or jasperoid; propylitically altered
8-2	O	Intermediate extrusive; propylitically altered
8-3	O	Carbonate rock fractured; propylitically altered
8-4	D	Carbonate rock fractured; propylitically altered
8-5	D	Carbonate rock fractured; propylitically altered
9-1	D	Igneous rock; propylitic or argillic
9-2	D	Igneous rock, propylitic or argillic
10-1	D	Quartzite; argillic

TABLE 6.--Latitudes and longitudes of samples not appearing on figures 2 and 3

[R = rock]

Sample	Latitude	Longitude
1-1R	35 50 50	116 6 45
1-2R	35 50 50	116 6 45
3-1R	35 45 30	116 13 55
3-2R	35 45 30	116 13 55
27R	35 49 35	116 5 59