UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical results and sample locality map of stream-sediment and heavy-mineral-concentrate samples from the Golden Valley Wilderness Study Area (CDCA-170), San Bernardino County, California

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STUDIES RELATED TO WILDERNESS

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 mineral survey of the Golden Valley Wilderness Study Area, California Desert Conservation Area (CDCA-170), San Bernardino County, California.

INTRODUCTION

In the spring of 1982, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the Golden Valley Wilderness Study Area, San Bernardino County, California.

The Golden Valley Wilderness Study Area, comprises about 31 mi^2 (80 km^2, 25,400 acres) in southeastern California. The study area is located some 15 mi (24 km) southeast of Ridgecrest (fig. 1). Access to the study area is provided by the Trona Road from the west and unimproved dirt roads in other directions.

The Golden Valley Wilderness Study Area is located in the Basin and Range Province north of the Garlock Fault in the Lava Mountains. The elevation ranges from 4,562 ft (1,390 m) on Dome Mountain down to approximately 2,600 ft (792 m) in the valley floor. The main portion of the study area is mountainous. The mountains grade into pediments near the basin floor. The climate is arid to semiarid; Creosote bush and associated flora are the dominant vegetation in the study area.

The Atolia quartz monzonite of Jurassic age crops out along the northern boundary of the study area. Miocene non-marine sediments of the Rosamond Series underlie most of the study area. These sedimentary rocks are unconformably capped by Pliocene andesite flows of the Red Mountain formation. The basins and low valleys are filled with recent alluvium.

The study area lies between the heavily mined Spangler Hills to the north and the Red Mountain-Randsburg mining area to the southwest. Mining activity in the area has produced precious and base metals.

METHODS OF STUDY

Sample Media

Analyses of the stream-sediment samples represent the chemistry of the rock material eroded from the drainage basin upstream from each sample site. Such information is useful in identifying those basins which contain concentrations of elements that may be related to mineral deposits. 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.

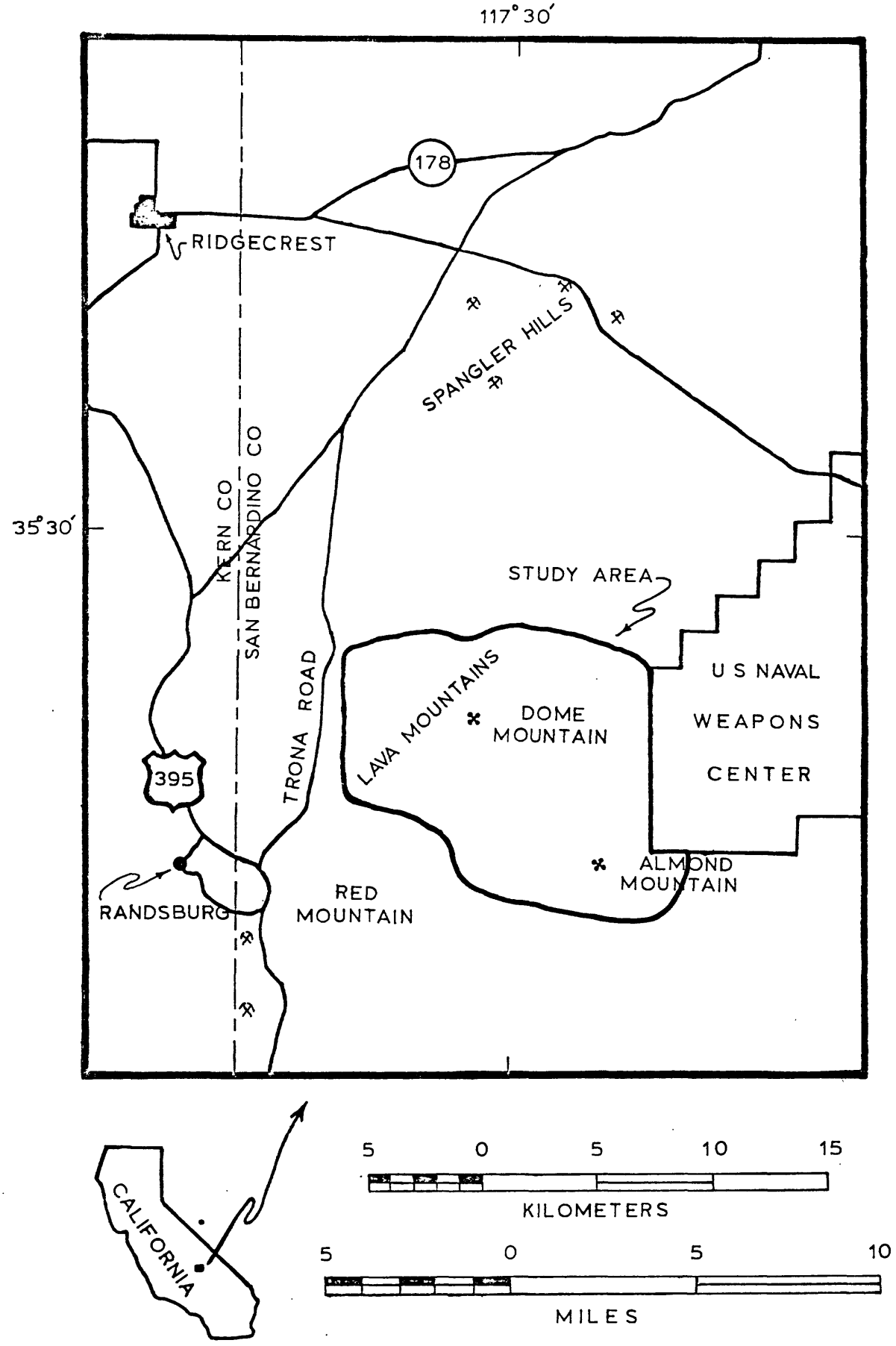

Figure 1. Location map of the Golden Valley Wilderness Study Area, San Bernardino County, California.

Sample Collection

Samples were collected at 48 sites (fig. 2). At nearly all of those sites, both a stream-sediment sample and a heavy-mineral-concentrate sample were collected. Sampling density was about 1 sample site per .6 mi^2 for the stream sediments and heavy-mineral concentrates. The area of the drainage basins sampled ranged from .2 mi^2 to 4 mi^2.

The sampling was conducted on a low-level unbalanced hierarchial design utilizing 1-sq-mi cells (fig. 3). The sediment from a randomly selected first-order drainage basin, with an areal extent of approximately 0.2 to 0.4 sq mi (0.5 to 1 sq km), was collected from each cell. The cells represent level 1 of the sampling design, and variance among cells represents the regional variance. Level 2 of the sampling design represents variance between basins within cells. A duplicate basin sample was collected from each of five randomly selected cells in a basin adjacent to the original cell basin. Level 3 of the sampling design represents variance within a basin and is based on sampling of duplicate sites (30 m apart) within the duplicate basins. Level 4 of the sampling design represents duplicate analyses of the duplicate samples. Table 1 lists the duplicate samples collected during the survey.

Stream-sediment samples

The stream-sediment samples consisted of active alluvium collected primarily from first-order (unbranched) and second-order (below the junction of two first-order) streams as shown on figure 2. Each sample was composited from at least 5 areas within a length of about 50 ft (17 m) and screened to minus-2 mm (10-mesh). Ten to 15 pounds (4.5-7.0 kg) of screened material were collected at each site and hand mixed.

Heavy-mineral-concentrate samples

Heavy-mineral-concentrate samples were collected from the same active alluvium as the stream-sediment samples. 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.

Sample Preparation

The stream sediment samples were air dried, then sieved using 80 mesh (0.17 mm) stainless steel sieves. The portion of the sediment passing through the sieve was saved for analysis.

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.

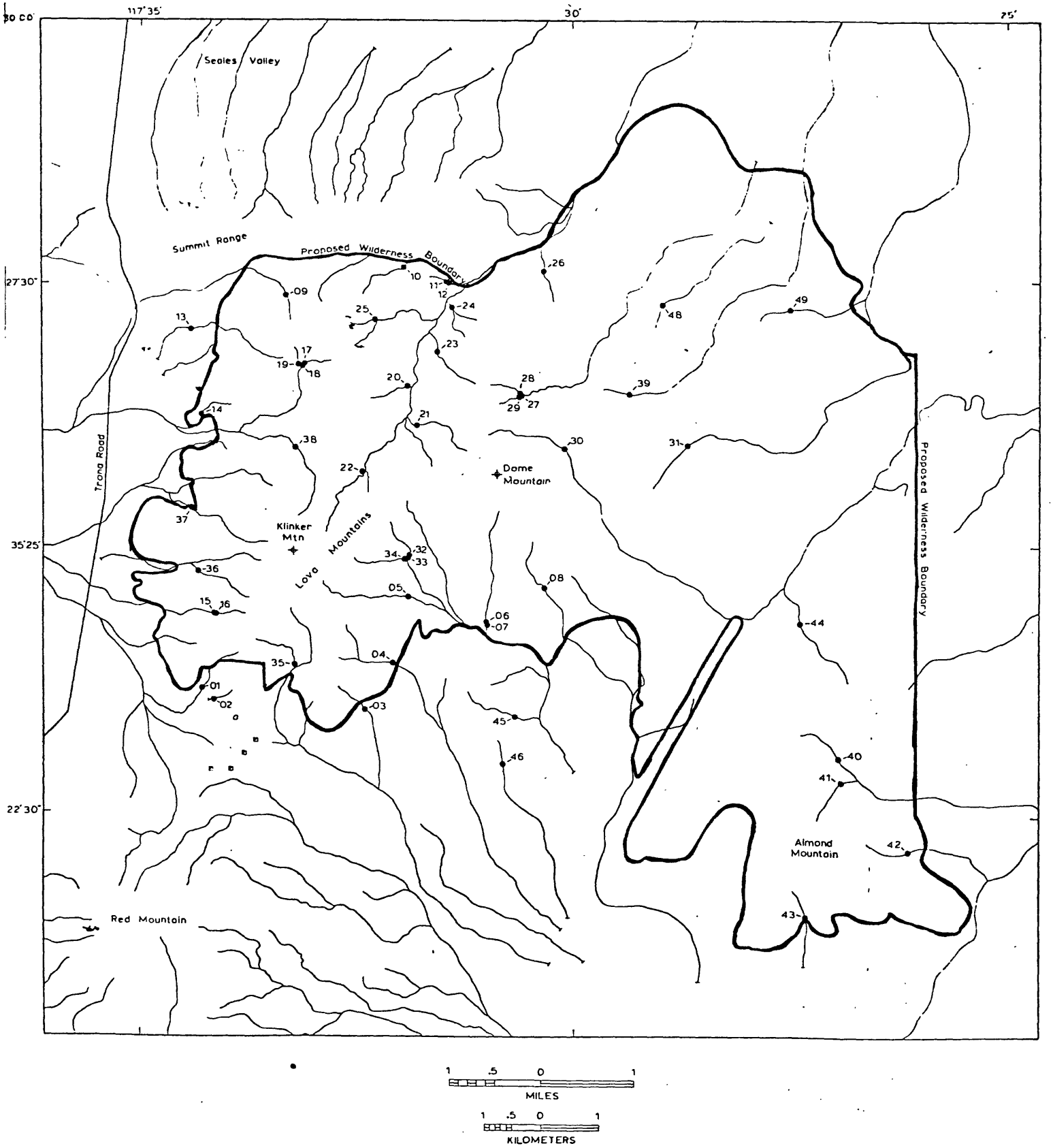

Figure 2. Site location map for the Golden Valley Wilderness Study Area, San Bernardino County, California

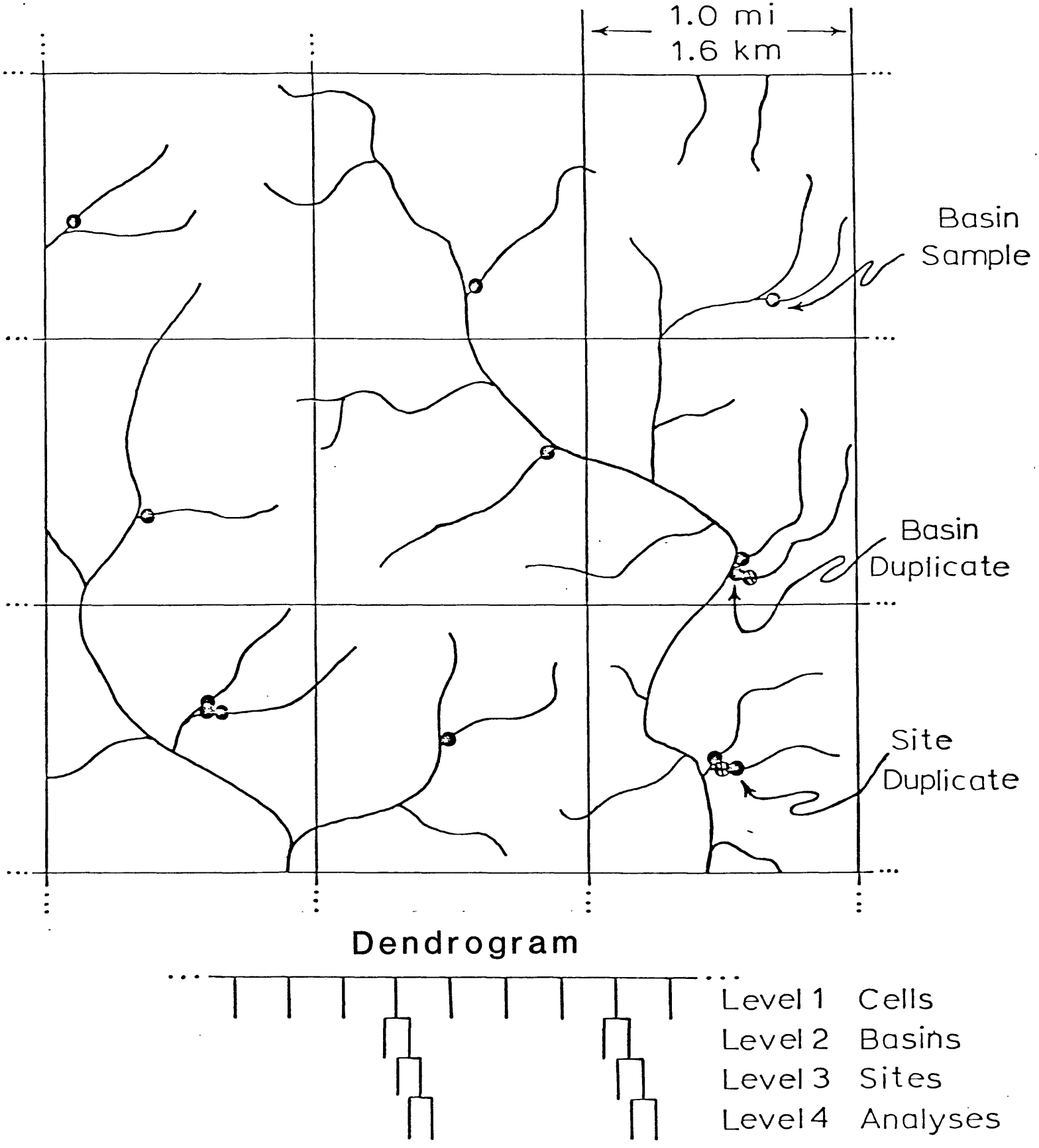

Figure 3.--Graphical representation of the sampling design.

TABLE 1.--List of duplicate samples collected in the Golden Valley Wilderness Study Area, southeastern California

Cell	Duplicate Cell	Site Duplicate	Analytical Duplicate
8	7	6	6D
10	12	11	11D
17	18	19	19D
28	27	29	29D
34	33	32	32D
36	15	16	16D

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.

Sample Analysis

Spectrographic method

The stream-sediment, heavy-mineral-concentrate, and rock samples were analyzed for 31 elements using a semiquantitative, direct-current arc emission spectrographic method (Grimes and Marranzino, 1968). The elements analyzed and their lower limits of determination are listed in Table 2. Spectrographic results were obtained by visual comparison of spectra 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 Golden Valley Wilderness Study Area are listed in Tables 3 and 4.

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, 1976).

DESCRIPTION OF DATA TABLES

Tables 3 and 4 list the analyses for the samples of stream sediment and heavy-mineral concentrate. 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 (fig. 2). Columns in which the element headings show the letter "s" below the element symbol are emission spectrographic analyses. 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 2. 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.

REFERENCES CITED

Grimes, D. J., and Marranzino, A. P., 1968, Direct-current arc and alternating-current spark emission spectrographic field methods for the semiquantitative analysis of geologic materials: U.S. Geological Survey Circular 591, 6 p.

Motooka, J. M., and Grimes, D. J., 1976, Analytical precision of one-sixth order semiquantitative spectrographic analyses: U.S. Geological Survey Circular 738, 25 p.

VanTrump, George, Jr., and Miesch, A. T., 1976, The U.S. Geological Survey RASS-STATPAC system for management and statistical reduction of geochemical data: Computers and Geosciences, v. 3, p. 475-488.

TABLE 2.--Limits of determination for the spectrographic analysis of rocks and stream sediments, based on a 10-mg sample

[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 and stream sediments]

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	10,000
Gold (Au)	10	500
Boron (B)	10	2,000
Barium (Ba)	20	5,000
Beryllium (Be)	1	1,000
Bismuth (Bi)	10	1,000
Cadmium (Cd)	20	500
Cobalt (Co)	5	2,000
Chromium (Cr)	10	5,000
Copper (Cu)	5	20,000
Lanthanum (La)	20	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	2,000

TABLE 3. ANALYTICAL RESULTS FOR THE MINUS-80-MESH STREAM-SEDIMENT SAMPLES FROM THE GOLDEN VALLEY 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	B-ppm s	Ba-ppm s	Be-ppm s
GV001	35 23 40	117 34 17	7	5.0	5	.7	1,500	N	50	1,500	<5.0
GV002	35 23 34	117 34 8	7	2.0	5	1.0	1,000	N	20	1,500	N
GV003	35 23 29	117 32 24	10	2.0	7	1.0	1,500	<.5	70	2,000	N
GV004	35 23 55	117 32 5	7	3.0	5	1.0	1,500	N	70	1,500	N
GV005	35 24 33	117 31 54	10	3.0	7	1.0	1,500	N	50	2,000	<5.0
GV008	35 24 38	117 30 20	5	2.0	5	1.0	1,000	N	50	1,500	<5.0
GV007	35 24 18	117 30 59	10	3.0	7	>1.0	1,500	N	70	2,000	<5.0
GV006	35 24 19	117 31 0	7	2.0	5	1.0	1,000	N	30	1,000	N
GV006D	35 24 19	117 31 0	5	1.5	2	1.0	1,000	N	50	1,500	1.5
GV009	35 27 24	117 33 18	7	1.0	5	1.0	1,500	<.5	70	3,000	<5.0
GV010	35 27 40	117 31 57	7	1.5	5	1.0	1,000	N	70	1,500	N
GV012	35 27 31	117 31 26	10	2.0	7	>1.0	2,000	N	100	2,000	<5.0
GV011	35 27 31	117 31 27	15	1.5	7	>1.0	1,500	.5	150	5,000	<5.0
GV011D	35 27 31	117 31 27	15	.7	2	>1.0	1,500	1.5	150	5,000	2.0
GV013	35 27 4	117 34 25	7	.7	7	1.0	1,500	N	50	2,000	N
GV014	35 26 16	117 34 17	7	1.5	5	1.0	1,000	N	50	1,500	<5.0
GV036	35 24 46	117 34 19	10	2.0	7	>1.0	1,500	N	30	1,500	N
GV015	35 24 22	117 34 8	7	2.0	3	1.0	700	N	30	1,500	N
GV016	35 24 22	117 34 6	5	2.0	5	1.0	1,000	N	50	1,500	N
GV016D	35 24 22	117 34 6	5	1.5	3	.7	700	N	50	1,500	1.5
GV017	35 26 45	117 33 6	10	1.0	5	1.0	700	N	50	1,500	N
GV018	35 26 44	117 33 7	7	1.0	5	1.0	700	N	50	1,000	N
GV019	35 26 44	117 33 9	7	.5	7	1.0	1,000	.7	50	2,000	<5.0
GV019D	35 26 44	117 33 9	5	.3	2	1.0	700	N	50	2,000	2.0
GV020	35 26 33	117 31 55	7	1.5	7	1.0	1,000	N	70	1,500	N
GV021	35 26 10	117 31 48	5	1.5	5	.7	700	N	70	1,500	N
GV022	35 25 44	117 32 26	10	3.0	5	>1.0	1,000	N	20	1,000	N
GV023	35 26 52	117 31 34	5	1.0	10	1.0	1,000	N	100	3,000	<5.0
GV024	35 27 17	117 31 24	5	1.5	3	.7	700	<.5	70	2,000	<5.0
GV025	35 27 10	117 32 17	5	1.0	5	1.0	1,000	N	50	2,000	<5.0
GV026	35 27 38	117 30 20	7	1.0	5	1.0	1,500	N	20	1,000	N
GV028	35 26 27	117 30 36	3	.5	5	1.0	700	N	70	2,000	<5.0
GV027	35 26 27	117 30 37	10	.3	3	.7	500	N	20	2,000	N
GV029	35 26 29	117 30 36	10	.3	3	.7	500	N	20	1,500	N
GV029D	35 26 29	117 30 36	10	.2	1	.5	300	N	10	1,000	2.0
GV030	35 26 27	117 30 37	10	1.0	7	>1.0	1,500	<.5	50	2,000	N
GV031	35 25 57	117 30 6	7	2.0	5	1.0	1,000	N	20	1,000	N
GV034	35 24 54	117 31 55	7	3.0	10	>1.0	1,500	N	20	1,500	N
GV033	35 24 55	117 31 54	5	3.0	7	1.0	1,500	N	20	1,500	N
GV032	35 24 54	117 31 57	15	3.0	10	>1.0	2,000	N	20	2,000	N
GV032D	35 24 54	117 31 57	10	1.5	3	>1.0	2,000	N	20	1,500	1.5
GV035	35 23 54	117 33 12	7	3.0	7	>1.0	1,000	N	50	2,000	N
GV037	35 25 23	117 34 24	10	2.0	5	>1.0	700	N	30	2,000	N
GV038	35 25 57	117 33 12	15	1.5	3	>1.0	700	N	20	1,500	<5.0
GV039	35 26 28	117 29 21	7	.5	7	>1.0	1,000	N	20	2,000	N

TABLE 3. ANALYTICAL RESULTS FOR THE MINUS-80-MESH STREAM-SEDIMENT SAMPLES FROM THE GOLDEN VALLEY WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sr-ppm s	V-ppm s	Y-ppm s
GV001	15	70	20	100	N	20	50	1,000	150	50
GV002	15	70	15	100	N	30	50	1,000	100	30
GV003	20	50	20	70	N	20	70	700	150	50
GV004	20	100	20	100	N	30	70	1,000	200	30
GV005	20	70	15	100	N	20	30	1,000	200	50
GV008	15	70	20	70	N	20	20	1,000	100	20
GV007	30	150	30	100	N	50	70	1,000	300	50
GV006	15	70	15	50	N	20	30	1,000	150	20
GV006D	15	100	20	50	N	30	30	1,000	100	20
GV009	15	20	15	150	N	7	50	1,000	150	30
GV010	10	20	10	150	N	10	50	500	150	20
GV012	30	20	30	100	<20	15	50	700	150	70
GV011	20	30	30	150	N	20	50	700	300	50
GV011D	15	50	30	70	<20	10	50	300	200	50
GV013	10	20	15	100	N	10	70	700	150	20
GV014	15	50	15	100	N	20	50	700	200	50
GV036	20	100	20	70	N	30	50	1,000	200	30
GV015	15	70	15	50	N	15	50	700	70	20
GV016	15	50	20	70	N	20	30	1,000	100	20
GV016D	15	70	20	50	N	20	70	700	70	20
GV017	10	50	7	100	N	7	70	1,000	200	20
GV018	10	20	5	70	N	5	200	1,000	100	30
GV019	10	15	10	150	<20	5	50	1,500	200	50
GV019D	10	20	10	100	N	5	30	1,500	100	30
GV020	10	50	10	50	N	15	50	1,000	100	30
GV021	10	20	10	100	N	5	50	1,000	100	30
GV022	20	100	20	50	N	30	50	700	200	20
GV023	10	20	15	100	N	10	50	1,500	100	30
GV024	10	10	7	100	N	5	70	700	100	20
GV025	10	50	10	70	N	10	50	700	100	50
GV026	10	30	10	150	<20	5	30	1,000	100	30
GV028	10	10	10	50	N	5	50	700	70	20
GV027	5	20	<5	50	N	5	50	700	150	20
GV029	10	50	5	50	N	10	70	500	200	20
GV029D	7	30	<5	150	N	5	20	500	150	20
GV030	10	30	7	150	20	10	70	1,000	200	70
GV031	10	70	15	100	N	30	30	700	100	30
GV034	20	70	15	70	N	30	30	2,000	200	30
GV033	20	70	15	70	N	30	50	1,000	150	20
GV032	30	150	30	200	<20	50	30	1,500	300	50
GV032D	20	150	15	70	<20	50	20	1,000	200	30
GV035	20	70	15	70	N	20	50	700	150	20
GV037	15	50	20	100	N	10	50	1,000	200	50
GV038	10	70	10	100	N	10	50	1,000	200	30
GV039	7	20	<5	100	N	7	50	1,000	150	20

TABLE 3. ANALYTICAL RESULTS FOR THE MINUS-80-MESH STREAM-SEDIMENT SAMPLES FROM THE GOLDEN VALLEY 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	B-ppm s	Ba-ppm s	Be-ppm s
GV040	35 23 1	117 26 59	5	2.0	5	.7	1,000	.5	50	1,000	<5.0
GV041	35 22 48	117 26 57	10	3.0	5	>1.0	1,500	N	70	1,500	N
GV042	35 22 8	117 26 10	10	2.0	7	>1.0	1,000	N	70	1,500	N
GV043	35 21 31	117 27 21	7	2.0	5	1.0	1,000	N	50	1,500	N
GV044	35 24 18	117 27 24	10	1.5	3	1.0	1,500	N	70	1,000	<5.0
GV045	35 23 25	117 30 40	7	2.0	7	>1.0	1,000	N	50	1,500	N
GV046	35 22 58	117 30 49	7	2.0	7	1.0	1,500	N	50	2,000	<5.0
GV047	35 25 18	117 29 41	15	3.0	7	>1.0	2,000	N	30	2,000	N
GV048	35 27 19	117 28 58	15	1.0	7	>1.0	3,000	N	50	1,000	N
GV049	35 27 16	117 27 31	5	1.5	3	1.0	1,000	N	30	1,000	N

TABLE 3. ANALYTICAL RESULTS FOR THE MINUS-80-MESH STREAM-SEDIMENT SAMPLES FROM THE GOLDEN VALLEY WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sr-ppm s	V-ppm s	Y-ppm s
GV040	20	50	10	50	N	10	30	1,000	100	20
GV041	30	100	10	150	<20	30	50	1,000	200	50
GV042	15	70	20	100	N	30	50	1,000	200	50
GV043	15	70	20	50	N	30	30	700	150	50
GV044	15	50	20	70	N	20	30	1,000	200	50
GV045	15	70	20	70	N	20	30	1,500	200	30
GV046	20	50	20	70	N	20	50	1,500	100	50
GV047	20	150	20	50	<20	50	50	1,000	300	50
GV048	15	30	50	200	70	10	50	1,000	100	100
GV049	10	20	7	100	<20	7	30	700	50	30

TABLE 4. ANALYTICAL RESULTS FOR THE NONMAGNETIC HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE GOLDEN VALLEY 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	Fe0.1%	Mg0.05%	Ca0.1%	Ti0.005%	Mn20ppm	B20ppm	Ba50ppm	Be2ppm	Co10ppm	Cr20ppm	Cu10ppm
GV001	35 23 40	117 34 17	5.0	2.00	15.0	>2.0	1,000	70	>10,000	2	<10	200	20
GV002	35 23 34	117 34 8	3.0	1.00	10.0	>2.0	1,000	30	10,000	<2	<10	150	N
GV003	35 23 29	117 32 24	2.0	.50	10.0	>2.0	500	30	10,000	<2	<10	70	N
GV004	35 23 55	117 32 5	2.0	.10	15.0	>2.0	1,000	20	5,000	<2	<10	20	N
GV005	35 24 33	117 31 54	5.0	1.50	10.0	>2.0	1,000	50	>10,000	2	<10	150	N
GV008	35 24 38	117 30 20	3.0	.70	10.0	>2.0	700	70	>10,000	<2	N	150	N
GV007	35 24 18	117 30 59	3.0	1.50	10.0	>2.0	1,000	50	2,000	N	<10	200	N
GV006	35 24 19	117 31 0	3.0	.70	30.0	>2.0	1,500	20	7,000	N	10	50	20
GV006D	35 24 19	117 31 0	2.0	.70	7.0	>2.0	300	20	1,000	N	N	100	N
GV009	35 27 24	117 33 18	1.5	.05	2.0	>2.0	200	30	>10,000	2	N	20	N
GV010	35 27 40	117 31 57	3.0	.50	7.0	>2.0	700	100	>10,000	3	N	50	N
GV012	35 27 31	117 31 26	3.0	.50	2.0	>2.0	700	50	>10,000	2	N	N	N
GV011	35 27 31	117 31 27	3.0	.15	1.0	1.0	200	20	>10,000	<2	N	<20	10
GV011D	35 27 31	117 31 27	1.0	N	.2	.7	50	N	>10,000	N	N	N	10
GV013	35 27 4	117 34 25	5.0	.70	7.0	>2.0	1,500	100	>10,000	2	N	100	N
GV014	35 26 16	117 34 17	2.0	.50	20.0	>2.0	700	20	10,000	<2	<10	50	N
GV036	35 24 46	117 34 19	5.0	1.00	15.0	>2.0	1,000	50	2,000	<2	10	100	N
GV015	35 24 22	117 34 8	10.0	1.50	10.0	>2.0	1,500	50	10,000	3	<10	150	15
GV016	78 18 17	778 18 17	2.0	9.00	9.0	9.0	9	9	9	9	9	9	9
GV017	35 26 45	117 33 6	2.0	.50	15.0	>2.0	700	20	>10,000	<2	N	100	N
GV018	35 26 44	117 33 7	3.0	1.00	15.0	>2.0	1,000	50	>10,000	<2	N	150	N
GV019	35 26 44	117 33 9	1.5	.10	5.0	>2.0	700	50	>10,000	2	N	<20	N
GV019D	35 26 44	117 33 9	.7	N	1.5	>2.0	70	<20	>10,000	N	N	N	N
GV020	35 26 33	117 31 55	3.0	1.50	10.0	>2.0	1,000	50	>10,000	<2	10	150	N
GV021	35 26 10	117 31 48	3.0	.30	10.0	>2.0	1,000	20	>10,000	2	<10	50	15
GV022	35 25 44	117 32 26	2.0	.30	10.0	>2.0	700	20	>10,000	2	N	50	N
GV023	35 26 52	117 31 34	3.0	.20	2.0	2.0	500	30	>10,000	2	N	20	10
GV024	35 27 17	117 31 24	15.0	.10	1.5	>2.0	200	20	>10,000	2	70	<20	20
GV025	35 27 10	117 32 17	.5	.50	2.0	>2.0	300	<20	>10,000	<2	N	100	N
GV026	35 27 38	117 30 20	3.0	.50	20.0	>2.0	1,500	30	7,000	<2	10	50	N
GV028	35 26 27	117 30 36	7.0	.10	1.0	1.0	300	30	>10,000	2	N	<20	30
GV027	35 26 27	117 30 37	7.0	.50	10.0	>2.0	1,000	20	>10,000	2	30	100	15
GV029	35 26 29	117 30 36	3.0	.15	5.0	>2.0	700	30	>10,000	3	<10	<20	10
GV029D	35 26 29	117 30 36	2.0	.05	7.0	>2.0	500	20	>10,000	N	20	<20	15
GV030	35 26 27	117 30 37	5.0	.20	15.0	>2.0	1,000	20	>10,000	<2	<10	50	N
GV031	35 25 57	117 30 6	3.0	.20	10.0	>2.0	700	50	700	<2	N	70	N
GV034	35 24 54	117 31 55	3.0	1.50	5.0	>2.0	1,000	50	>10,000	2	N	70	N
GV033	35 24 55	117 31 54	3.0	1.50	5.0	1.0	1,500	20	7,000	3	<10	50	<10
GV032	35 24 54	117 31 57	2.0	.50	5.0	>2.0	500	30	>10,000	<2	N	100	N
GV032D	35 24 54	117 31 57	1.5	.15	5.0	>2.0	300	<20	>10,000	N	N	70	N
GV035	35 23 54	117 33 12	2.0	.50	5.0	>2.0	500	30	>10,000	3	N	50	N
GV037	35 25 23	117 34 24	3.0	.50	10.0	>2.0	1,000	20	2,000	<2	N	20	10
GV038	35 25 57	117 33 12	5.0	.50	15.0	>2.0	1,000	20	1,500	<2	10	70	20
GV039	35 26 28	117 29 21	5.0	.30	15.0	>2.0	1,500	20	>10,000	<2	<10	50	N
GV040	35 23 1	117 26 59	3.0	1.00	5.0	>2.0	700	20	5,000	3	N	50	10

TABLE 4. ANALYTICAL RESULTS FOR THE NONMAGNETIC HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE GOLDEN VALLEY WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	La50ppm	Mo10ppm	Nb50ppm	Ni10ppm	Pb20ppm	Sn20ppm	Sr200ppm	V20ppm	Y20ppm	Zr20ppm	Th200ppm
GV001	500	10	100	20	300	100	1,000	200	500	>2,000	200
GV002	700	15	70	20	2,000	150	700	200	500	>2,000	<200
GV003	700	15	100	20	2,000	50	700	200	500	>2,000	200
GV004	700	30	150	10	<20	70	300	150	700	>2,000	<200
GV005	300	20	150	20	20	20	2,000	200	500	>2,000	<200
GV008	300	20	100	20	30	50	1,000	200	500	>2,000	<200
GV007	1,000	20	150	20	150	70	1,000	200	700	>2,000	500
GV006	1,500	50	100	15	30	200	500	200	1,500	2,000	200
GV006D	300	10	100	30	N	20	500	300	300	>2,000	<200
GV009	200	<10	100	15	<20	N	3,000	100	500	>2,000	500
GV010	2,000	10	100	15	100	50	1,000	200	300	>2,000	<200
GV012	200	N	70	10	50	20	>10,000	70	50	500	N
GV011	70	<10	N	<10	20	<20	>10,000	20	20	1,000	N
GV011D	N	N	N	N	N	--	--	--	--	--	--
GV013	500	30	300	20	50	50	1,500	200	500	2,000	<200
GV014	1,000	20	150	20	1,000	100	500	200	1,000	>2,000	1,000
GV036	500	10	50	30	50	70	1,500	200	700	>2,000	<200
GV015	300	N	<50	30	10,000	20	2,000	200	500	>2,000	<200
GV016	9	9	9	9	9	9	9	9	9	9	9
GV017	500	20	100	20	20	70	>10,000	150	700	>2,000	700
GV018	700	20	200	30	30	70	10,000	200	1,000	>2,000	500
GV019	200	20	200	10	20	30	10,000	70	200	>2,000	200
GV019D	150	<10	100	N	N	N	7,000	100	150	>2,000	N
GV020	1,000	30	150	20	50	50	1,000	150	700	>2,000	500
GV021	1,000	10	150	<10	30	50	1,000	200	700	>2,000	1,500
GV022	700	20	150	20	20	70	1,500	200	500	>2,000	300
GV023	150	<10	<50	<10	50	N	10,000	70	100	>2,000	N
GV024	200	N	100	10	1,000	N	>10,000	70	50	>2,000	200
GV025	700	<10	50	10	<20	N	10,000	70	200	>2,000	300
GV026	1,500	30	100	10	30	150	300	100	1,000	>2,000	<200
GV028	100	N	<50	10	30	N	>10,000	20	50	>2,000	N
GV027	1,000	30	150	15	70	50	700	150	700	2,000	1,000
GV029	2,000	<10	70	20	30	30	1,000	150	1,000	>2,000	1,500
GV029D	1,000	N	300	15	N	20	700	500	1,500	>2,000	3,000
GV030	2,000	30	100	20	30	70	2,000	300	1,000	>2,000	500
GV031	700	30	100	20	20	50	500	100	700	>2,000	200
GV034	150	10	50	20	20	N	2,000	100	200	>2,000	N
GV033	70	N	N	20	<20	N	1,500	150	30	150	N
GV032	200	N	70	10	30	30	3,000	100	300	>2,000	<200
GV032D	300	<10	150	10	N	N	3,000	150	300	>2,000	N
GV035	200	10	50	10	500	N	2,000	100	500	>2,000	N
GV037	1,000	30	300	10	30	70	500	150	700	>2,000	1,000
GV038	1,500	20	100	20	20	70	200	300	1,000	>2,000	1,500
GV039	2,000	15	70	10	30	50	2,000	200	700	>2,000	700
GV040	100	N	100	20	20	N	1,000	100	150	500	N

TABLE 4. ANALYTICAL RESULTS FOR THE NONMAGNETIC HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE GOLDEN VALLEY WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	Latitude	Longitude	Fe0.1%	Mg0.05%	Ca0.1%	Ti0.005%	Mn20ppm	B20ppm	Ba50ppm	Be2ppm	Co10ppm	Cr20ppm	Cu10ppm
GV041	35 22 48	117 26 57	3.0	1.00	10.0	>2.0	1,000	30	500	N	N	100	N
GV042	35 22 8	117 26 10	2.0	.50	10.0	>2.0	700	30	10,000	<2	N	30	N
GV043	35 21 31	117 27 21	2.0	.50	10.0	>2.0	700	30	1,500	<2	N	50	N
GV044	35 24 18	117 27 24	3.0	.70	10.0	>2.0	1,000	50	3,000	<2	<10	100	N
GV045	35 23 25	117 30 40	10.0	1.00	10.0	>2.0	1,500	30	10,000	2	10	150	20
GV046	35 22 58	117 30 49	3.0	1.00	7.0	>2.0	700	100	500	2	N	100	N
GV047	35 25 18	117 29 41	2.0	.70	10.0	>2.0	1,500	20	2,000	<2	<10	100	N
GV048	35 27 19	117 28 58	2.0	.05	15.0	>2.0	1,000	20	>10,000	<2	10	20	N
GV049	35 27 16	117 27 31	1.5	.07	10.0	>2.0	1,000	20	2,000	2	N	20	N

TABLE 4. ANALYTICAL RESULTS FOR THE NONMAGNETIC HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE GOLDEN VALLEY WILDERNESS STUDY AREA, SAN BERNARDINO COUNTY, CALIFORNIA.--Continued

Sample	La50ppm	Mo10ppm	Nb50ppm	Ni10ppm	Pb20ppm	Sn20ppm	Sr200ppm	V20ppm	Y20ppm	Zr20ppm	Th200ppm
GV041	500	30	150	20	50	50	1,000	200	500	>2,000	<200
GV042	500	50	200	15	20	70	500	200	500	>2,000	<200
GV043	700	30	100	10	<20	50	300	300	700	>2,000	200
GV044	500	30	100	10	30	70	500	100	1,000	>2,000	<200
GV045	300	20	100	<10	20	50	700	300	700	>2,000	<200
GV046	500	20	150	15	30	30	1,000	150	500	>2,000	<200
GV047	1,000	20	100	15	20	70	500	200	700	>2,000	1,000
GV048	1,000	30	100	10	20	100	1,000	100	1,000	>2,000	<200
GV049	1,000	30	100	10	20	70	200	100	700	>2,000	<200