UNITED STATES DEPARTMENT OF THE INTERIOR

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Analytical results and sample locality maps of heavy-mineral-concentrate and rock samples from the Silver Peak Range (NV-050-338) Wilderness Study Area, Esmeralda County, Nevada

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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 Silver Peak Range (NV-050-338) Wilderness Study Area, Esmeralda County, Nevada.

INTRODUCTION

In 1985, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the Silver Peak Range Wilderness Study Area, Esmeralda County, Nevada.

The Silver Peak Range Wilderness Study Area includes 17,850 acres (72 km^2) (28 mi^2) in the northwest corner of Esmeralda County, Nevada, and lies about 46 mi (74 km) southwest of Tonopah (see fig. 1). Access to the study area is provided on the northwest by U.S. Highway 95 and State Highway 3A, on the south by U.S. Highway 95 and State Highway 3, and on the east by U.S. Highway 95 and State Highway 47.

The Silver Peak Mountains consist of two parallel belts of pre-Tertiary sedimentary rocks trending N. 50-60° W. intruded by quartz monzonite plutons in the southwest and northeast parts. Between these belts of older rocks is a thick pile of Tertiary sediments and volcanic rocks that occupy what must have been a topographic low in the early Tertiary terrain. The entire sequence of Tertiary rocks in the central part of the Silver Peak Mountains is cut by a series of northeast-trending faults. The silver-bearing veins of the Red Mountain mining district, east and northeast of the study area, occur along this set of northeast-trending faults (Albers and Stewart, 1972).

The topographic relief in the study area is about 4,250 ft (1,295 m), with a maximum elevation of 9,450 ft (2,880 m). The terrain of the study area rises steeply from gently sloping valleys on the east and west to a high at Piper Peak (9,450 ft). The climate is arid to semiarid. The vegetation on the lower slopes is dominantly sagebrush. Pinon and juniper are above approximately 6,500 ft. The streams of the area are intermittent.

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.

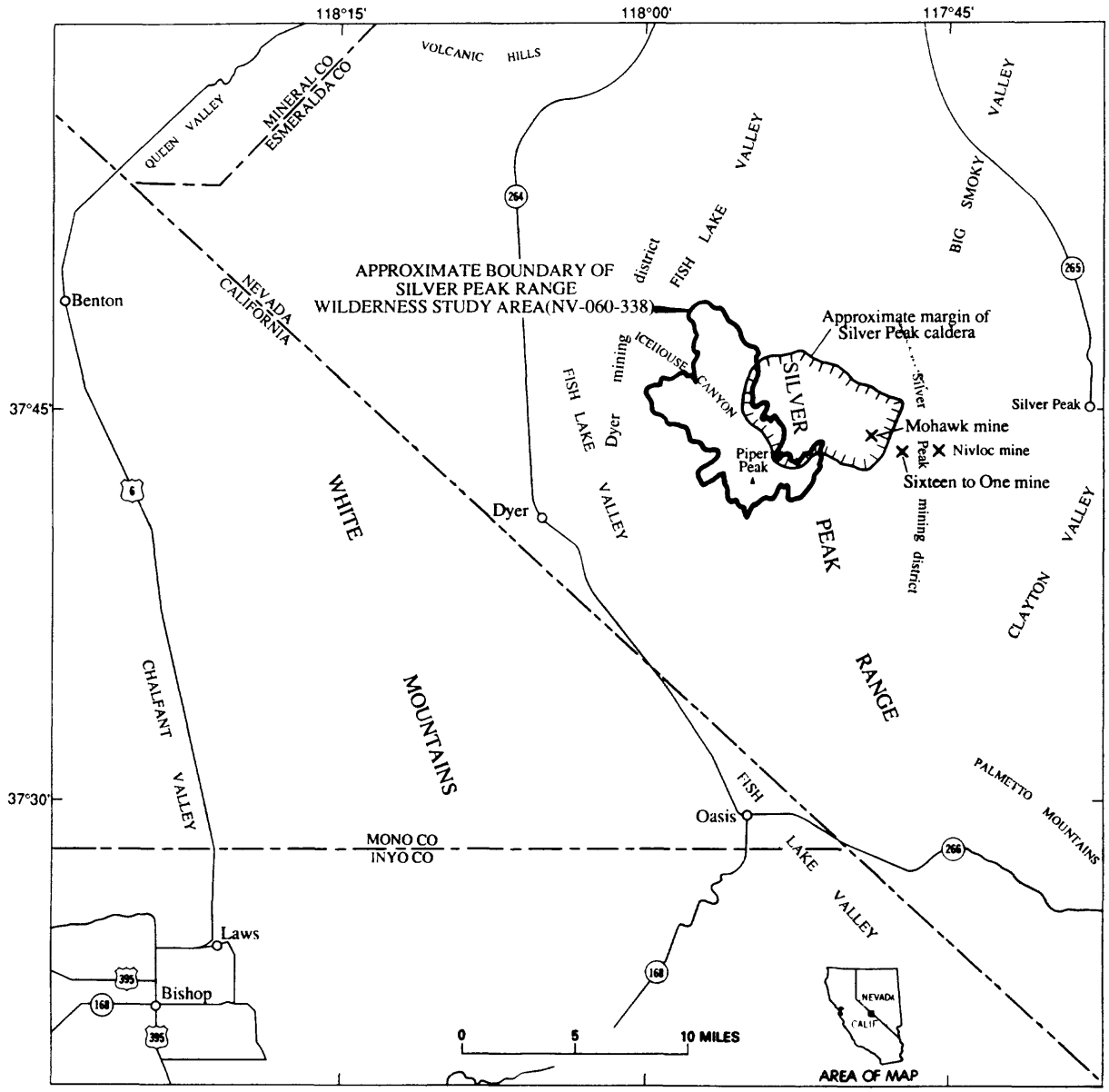

Figure 1. Location map of the Silver Peak Range (NV-050-338) Wilderness Study Area, Esmeralda County, Nevada.

Sample Collection

Heavy-mineral-concentrate samples were collected at thirty sites (plate 1). Sixty-one rock samples were collected. Average sampling density was about one sample site per 0.93 mi^2 for the heavy-mineral concentrates, and about one sample site per 0.46 mi^2 for the rocks. The area of the drainage basins sampled ranged from 0.5 mi^2 to 2 mi^2.

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 from outcrops or exposures in the vicinity of the plotted site location. Samples were collected from unaltered and altered and mineralized rocks in outcrop as well as stream float. Table 6 gives descriptions of rock samples.

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 0.2 ampere to remove the magnetite and ilmenite, and a current of 0.6 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 a modified method of Myers and others

(1961) by Crock and others (1987). The elements analyzed and their lower limits of determination are listed in table 1. For arsenic (As), gold (Au), cadmium (Cd), lanthanum (La), and thorium (Th), the lower limits of determination of the two analytical methods differ. The values in the parentheses are the limits of determination for Myers and others (1961). 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 Silver Peak Range Wilderness Study Area are listed in tables 3 and 4.

Chemical methods

Rock samples from this study area were also analyzed by atomic absorption (AA) and inductively coupled plasma-atomic emission spectrographic (ICP) methods. Gold (Au), mercury (Hg) and tellurium (Te) analyses were performed by atomic absorption spectroscopy. Arsenic (As), antimony (Sb), bismuth (Bi), cadmium (Cd), and zinc (Zn) analyses were performed by inductively coupled plasma-atomic emission spectroscopy. See table 2 for a more detailed summary of these other chemical methods used.

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

ROCK ANALYSIS STORAGE SYSTEM (RASS)

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 (plate 1). 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. 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.

ACKNOWLEDGMENTS

A number of our colleagues also participated in the collection, preparation, and analyses of these samples: collection--Randy Baker, Kim Greene, and Judy Lewis; preparation--Robin Sanchez; and analyses--J. G. Crock and Roosevelt Moore.

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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 method of Grimes and Marranzino (1968), except for those values in parentheses, which are the lower values assigned by the method of Myers and others (1961). 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; ICP = inductively coupled plasma spectroscopy]

Element determined	Sample Type	Method	Determination limit (micrograms/ gram or ppm)	Analyst	Reference
Gold (Au)	rocks	AA-partial digestion	0.1	J. G. Crock	Modification of Thompson and others, 1968, by Crock and others, 1987.
Mercury (Hg)	rocks	AA-partial digestion	0.02	Carol Gent	Koirtyohann and Khalil, 1976.
Arsenic (As)	rocks	ICP-partial digestion	5	David Fey	Crock and others, 1987.
Antimony (Sb)		ICP	2		
Zinc (Zn)		ICP	2		
Bismuth (Bi)		ICP	2		
Cadmium (Cd)		ICP	0.1		
Tellurium (Te)	rocks	AA-total digestion	0.01	Roosevelt Moore	Unpublished laboratory procedure.

TABLE 3.--RESULTS OF ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES COLLECTED FROM THE SILVER PEAK RANGE BLM WILDERNESS STUDY AREA, ESMERALDA COUNTY, NEVADA

[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
85SP01H	37 43 22	117 50 42	.20	.10	2.0	.70	150	N	N	N	30	1,000
85SP02H	37 46 3	117 53 58	.15	(.05	1.0	.20	100	N	N	N	20	1,000
85SP03H	37 45 50	117 53 25	.15	.05	1.5	2.00	150	15	N	N	20	)10,000
85SP04H	37 47 52	117 56 27	.20	.05	3.0	.15	200	N	N	N	20	)10,000
85SP05H	37 45 38	117 59 9	.20	.10	1.5	.20	100	20	N	70	20	10,000
85SP06H	37 45 44	117 57 26	.20	.05	1.0	.20	70	N	N	N	20	10,000
85SP07H	37 39 45	117 55 56	.30	.20	10.0	1.00	300	N	N	N	70	3,000
85SP08H	37 39 45	117 56 7	.30	.20	15.0	1.50	200	N	N	N	150	200
85SP09H	37 42 25	117 50 42	.20	.05	1.5	1.50	100	20	N	N	20	3,000
85SP20H	37 43 45	117 50 37	.30	.05	1.0	.07	70	N	N	N	20	1,000
85SP21H	37 44 53	117 53 37	.30	.07	1.5	.70	100	N	N	N	100	700
85SP22H	37 44 53	117 53 52	.15	(.05	.5	.15	70	N	N	N	20	1,000
85SP23H	37 47 45	117 53 20	.20	.05	.7	.15	100	N	N	N	20	)10,000
85SP24H	37 44 53	117 59 45	.20	.15	5.0	1.50	150	N	N	N	20	7,000
85SP25H	37 44 58	117 59 45	.30	.15	5.0	1.00	100	N	N	N	20	)10,000
85SP26H	37 46 44	117 57 45	.20	.15	5.0	.20	500	N	N	N	20	)10,000
85SP27H	37 42 30	117 59 20	.30	.50	7.0	1.00	500	N	N	N	30	3,000
85SP28H	37 42 56	117 58 53	.30	.07	1.0	.10	50	N	N	N	20	1,500
85SP40H	37 44 53	117 52 53	.20	.05	.5	.20	70	N	N	N	20	700
85SP41H	37 47 45	117 53 20	.30	.05	.5	.20	70	N	N	N	20	3,000
85SP42H	37 44 37	117 56 25	.30	.10	1.5	.70	100	N	N	N	20	2,000
85SP43H	37 45 45	117 57 31	.20	.07	5.0	.50	200	N	1,000	N	200	)10,000
85SP44H	37 48 27	117 56 0	.15	.07	.5	.10	70	N	N	N	20	)10,000
85SP46H	37 42 46	117 58 16	.30	.15	3.0	2.00	300	N	N	N	50	)10,000
85SP47H	37 40 3	117 58 2	.50	1.50	15.0	.50	700	N	N	N	100	3,000
85SP48H	37 40 15	117 54 25	.20	.15	2.0	1.00	100	N	N	N	20	700
85SP60H	37 46 33	117 57 47	.30	.10	2.0	.10	100	N	N	N	50	)10,000
85SP61H	37 42 55	117 58 11	1.50	(.05	1.0	.50	50	2	(500	N	(20	)10,000
85SP62H	37 41 37	117 59 7	.30	1.00	7.0	2.00	500	N	N	N	50	700
85SP63H	37 41 7	117 53 15	.20	.20	5.0	1.00	200	N	N	N	20	700

TABLE 3.--RESULTS OF ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES COLLECTED FROM THE SILVER PEAK RANGE BLM WILDERNESS STUDY AREA, ESMERALDA COUNTY, NEVADA--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
85SP01H	2	N	N	N	N	N	200	N	N	10	N
85SP02H	5	N	N	N	N	N	100	N	N	10	N
85SP03H	5	N	N	N	N	N	150	N	N	20	20
85SP04H	5	N	N	N	N	N	200	N	N	10	N
85SP05H	<2	N	N	N	N	N	100	N	N	10	N
85SP06H	<2	N	N	N	N	N	<50	N	N	<10	N
85SP07H	<2	N	N	N	<20	10	300	N	N	15	700
85SP08H	<2	N	50	<10	20	30	200	N	<50	20	200
85SP09H	3	N	N	N	N	N	150	N	N	15	N
85SP20H	<2	N	N	<10	N	N	<50	N	N	<10	<20
85SP21H	2	N	N	N	N	N	150	N	N	10	N
85SP22H	3	N	N	N	N	N	100	N	N	10	N
85SP23H	<2	N	N	N	N	N	100	N	N	<10	N
85SP24H	<2	N	N	N	N	N	200	N	N	10	N
85SP25H	<2	N	N	N	N	N	150	N	N	10	N
85SP26H	3	N	N	N	N	N	500	N	N	10	50
85SP27H	<2	N	N	<10	<20	<10	700	N	N	10	N
85SP28H	<2	N	N	N	N	N	<50	N	N	<10	20
85SP40H	2	N	N	N	N	N	100	N	N	10	N
85SP41H	N	N	N	<10	<20	N	<50	N	N	N	<20
85SP42H	2	N	N	N	N	N	150	N	N	10	N
85SP43H	N	N	N	N	<20	<10	200	N	<50	10	200
85SP44H	<2	N	N	N	N	N	150	N	N	<10	N
85SP46H	2	N	N	<10	<20	N	200	N	<50	10	N
85SP47H	N	N	N	<10	<20	15	150	N	N	20	500
85SP48H	2	N	N	N	<20	N	150	N	N	10	N
85SP60H	<2	N	N	N	N	N	150	N	N	10	N
85SP61H	N	N	N	15	<20	<10	100	N	N	20	1,500
85SP62H	<2	N	N	N	<20	<10	300	N	<50	<10	30
85SP63H	2	N	N	N	<20	N	300	N	N	10	N

TABLE 3.--RESULTS OF ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES COLLECTED FROM THE SILVER PEAK RANGE BLM WILDERNESS STUDY AREA, ESMERALDA COUNTY, NEVADA--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
85SP01H	N	<10	N	500	20	N	200	N	>2,000	N
85SP02H	N	20	N	200	20	N	500	N	>2,000	N
85SP03H	N	30	N	200	50	N	500	N	>2,000	N
85SP04H	N	20	N	1,500	20	N	500	N	>2,000	N
85SP05H	N	<10	N	700	20	N	200	N	>2,000	N
85SP06H	N	<10	N	700	20	N	100	N	>2,000	N
85SP07H	N	<10	N	700	150	N	200	N	>2,000	N
85SP08H	N	<10	N	500	200	N	200	1,000	>2,000	N
85SP09H	N	50	N	500	50	N	300	N	>2,000	<200
85SP20H	N	N	N	1,000	<20	N	70	N	>2,000	N
85SP21H	N	<10	N	500	30	N	200	N	>2,000	N
85SP22H	N	<10	N	500	<20	N	300	N	>2,000	N
85SP23H	N	N	N	3,000	20	N	150	N	>2,000	N
85SP24H	N	50	N	500	50	N	500	N	>2,000	N
85SP25H	N	20	N	1,000	50	N	200	N	>2,000	N
85SP26H	N	20	N	1,000	20	N	500	N	>2,000	N
85SP27H	N	20	N	700	70	N	500	N	>2,000	N
85SP28H	N	N	N	500	<20	N	20	N	2,000	N
85SP40H	N	N	N	500	<20	N	300	N	>2,000	N
85SP41H	N	N	N	1,000	<20	N	20	N	>2,000	N
85SP42H	N	N	N	700	30	N	150	N	>2,000	N
85SP43H	N	N	200	2,000	70	N	150	N	>2,000	N
85SP44H	N	N	N	5,000	<20	N	200	N	>2,000	N
85SP46H	N	<10	N	1,000	70	N	150	N	>2,000	N
85SP47H	N	N	<20	500	200	N	100	3,000	2,000	N
85SP48H	N	<10	N	500	50	N	150	N	>2,000	N
85SP60H	N	N	N	1,000	20	N	100	N	>2,000	N
85SP61H	N	<10	N	7,000	20	N	50	N	>2,000	N
85SP62H	N	<10	N	700	70	N	300	N	>2,000	300
85SP63H	N	N	N	500	50	N	150	N	>2,000	N

TABLE 4 -- RESULTS OF ANALYSES OF ROCK SAMPLES COLLECTED FROM THE SILVER PEAK RANGE BLM WILDERNESS STUDY AREA, ESMERELDA COUNTY, NEVADA

[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
85SP02R	37 46 3	117 53 58	7.00	3.00	7.00	.700	700	N	N	N	<10	2,000
85SP03R	37 45 50	117 53 25	3.00	.30	2.00	.300	300	N	N	N	<10	2,000
85SP04R	37 47 52	117 56 27	1.50	.70	2.00	.150	500	N	N	N	15	1,500
85SP05R	37 45 38	117 59 2	5.00	1.50	3.00	.300	300	N	N	N	10	3,000
85SP06R	37 45 44	117 57 26	7.00	1.50	3.00	.500	700	N	N	N	<10	2,000
85SP06R2	37 45 44	117 57 26	3.00	1.50	7.00	.500	300	N	N	N	N	1,500
85SP07R	37 39 45	117 55 56	7.00	1.50	.30	.500	300	N	N	N	70	700
85SP08R	37 39 45	117 56 7	.20	.05	1.50	.020	50	2.0	N	N	20	70
85SP20R	37 43 45	117 50 37	5.00	1.00	3.00	.300	500	N	N	N	10	2,000
85SP23R	37 46 40	117 54 10	7.00	1.00	5.00	1.000	500	N	N	N	20	2,000
85SP24R	37 44 53	117 59 45	.70	.10	.50	.100	150	N	N	N	20	100
85SP25R1	37 44 58	117 59 45	3.00	.70	7.00	.200	300	N	N	N	<10	700
85SP26R	37 46 44	117 57 45	7.00	1.00	7.00	.700	1,500	N	N	N	<10	150
85SP27R	37 42 30	117 59 20	2.00	.70	2.00	.300	500	N	N	N	15	1,500
85SP28R	37 42 56	117 58 53	7.00	7.00	7.00	.700	700	N	N	N	N	1,000
85SP40R1	37 44 53	117 52 53	.70	.10	.70	.050	100	N	N	N	<10	700
85SP40R2	37 44 53	117 52 53	3.00	.30	3.00	.500	200	N	N	N	N	2,000
85SP41R	37 47 45	117 53 20	3.00	.50	3.00	.300	300	.5	N	N	N	3,000
85SP42R	37 44 37	117 56 25	3.00	1.00	3.00	.500	300	N	N	N	<10	1,000
85SP43R	37 45 45	117 57 31	3.00	.70	1.50	.300	300	N	N	N	<10	1,500
85SP44R1	37 48 27	117 56 0	2.00	.70	15.00	.070	1,000	N	N	N	<10	700
85SP44R2	37 48 27	117 56 0	5.00	.50	7.00	.300	700	N	N	N	<10	300
85SP45R1	37 48 33	117 56 32	1.50	.70	20.00	.100	2,000	N	N	N	N	700
85SP45R2	37 48 33	117 56 32	5.00	.70	2.00	.500	300	N	N	N	N	1,500
85SP46R1	37 42 46	117 58 16	10.00	5.00	7.00	.700	700	N	N	N	N	1,500
85SP46R2	37 42 46	117 58 16	.15	<.02	.07	<.002	15	N	N	N	N	50
85SP47R1	37 40 3	117 58 2	.30	3.00	15.00	.010	150	N	N	N	N	<20
85SP47R2	37 40 3	117 58 2	2.00	7.00	15.00	.010	200	N	N	N	N	20
85SP47R3	37 40 3	117 58 2	10.00	.70	2.00	.100	100	2.0	N	N	20	300
85SP48R	37 40 15	117 54 25	1.50	.70	.15	.150	100	N	N	N	100	300
85SP60R1	37 46 33	117 57 47	10.00	2.00	.30	>1.000	300	N	N	N	10	300
85SP60R2	37 46 33	117 57 47	7.00	3.00	7.00	1.000	1,000	N	N	N	10	2,000
85SP60R3	37 46 33	117 57 47	2.00	.15	5.00	.100	150	N	N	N	20	3,000
85SP61R	37 42 55	117 58 11	2.00	.30	1.50	.200	300	N	N	N	50	1,000
85SP62R1	37 41 37	117 59 7	.15	.20	>20.00	<.002	50	N	N	N	N	<20
85SP62R2	37 41 37	117 59 7	7.00	2.00	1.00	.700	300	N	N	N	10	100
85SP63R	37 41 7	117 53 15	.70	.10	.70	.100	500	N	N	N	30	150

TABLE 4 -- RESULTS OF ANALYSES OF ROCK SAMPLES COLLECTED FROM THE SILVER PEAK RANGE BLM WILDERNESS STUDY AREA, ESMERELDA COUNTY, NEVADA--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	Sb-ppm s	Sc-ppm s	Sn-ppm s
85SP02R	1.5	N	N	20	30	30	70	N	<20	30	15	N	30	N
85SP03R	2.0	N	N	5	<10	<5	70	N	20	<5	20	N	7	N
85SP04R	1.5	N	N	<5	<10	7	70	N	<20	<5	30	N	7	N
85SP05R	1.5	N	N	15	20	30	70	N	<20	10	20	N	10	N
85SP06R	1.5	N	N	15	30	20	30	N	<20	15	15	N	15	N
85SP06R2	1.0	N	N	15	70	20	50	N	<20	20	10	N	20	N
85SP07R	1.5	N	N	15	150	50	70	N	<20	30	15	N	30	N
85SP08R	N	N	N	N	30	50	N	<5	N	7	N	N	N	N
85SP20R	1.5	N	N	7	30	10	70	N	<20	10	50	N	10	N
85SP23R	1.5	N	N	20	70	30	70	N	<20	30	15	N	30	N
85SP24R	2.0	N	N	N	<10	<5	50	N	20	<5	20	N	N	N
85SP25R1	1.0	N	N	7	15	7	50	N	<20	5	10	N	7	N
85SP26R	1.0	N	N	15	50	50	N	N	<20	20	15	N	20	N
85SP27R	2.0	N	N	<5	10	5	100	<5	20	<5	20	N	7	N
85SP28R	1.0	N	N	30	300	50	50	N	<20	150	10	N	30	N
85SP40R1	N	N	N	N	<10	<5	N	N	N	<5	15	N	N	N
85SP40R2	2.0	N	N	7	30	10	100	N	20	15	15	N	10	N
85SP41R	1.5	N	N	<5	<10	<5	100	N	<20	<5	15	N	7	N
85SP42R	1.5	N	N	7	20	15	70	N	20	5	15	N	10	N
85SP43R	1.5	N	N	7	10	10	30	N	<20	<5	15	N	7	N
85SP44R1	N	N	N	<5	20	20	N	10	N	15	N	N	7	N
85SP44R2	N	N	N	15	15	15	50	N	<20	10	15	N	10	N
85SP45R1	N	N	N	5	<10	7	N	N	N	<5	50	N	5	N
85SP45R2	1.0	N	N	15	20	15	50	N	<20	7	15	N	10	N
85SP46R1	1.0	N	N	30	300	70	50	N	<20	150	10	N	50	N
85SP46R2	N	N	N	N	<10	7	N	N	N	<5	N	N	N	N
85SP47R1	N	N	N	N	10	5	N	N	N	<5	N	N	N	N
85SP47R2	N	N	N	<5	<10	7	N	N	N	10	10	N	N	N
85SP47R3	1.0	10	N	5	50	700	N	30	<20	15	3,000	N	7	N
85SP48R	N	N	N	7	30	30	N	N	<20	15	15	N	7	N
85SP60R1	1.5	N	N	30	70	100	50	N	30	50	15	N	30	N
85SP60R2	1.5	N	N	20	150	70	70	N	<20	50	15	N	30	N
85SP60R3	1.5	N	N	N	<10	<5	100	N	<20	<5	30	N	7	N
85SP61R	2.0	N	N	<5	<10	7	70	5	20	<5	20	N	5	N
85SP62R1	N	N	N	N	<10	<5	N	N	N	<5	N	N	N	N
85SP62R2	2.0	N	N	50	100	1,500	150	N	20	70	150	N	30	N
85SP63R	2.0	N	N	N	<10	<5	30	N	20	<5	30	N	<5	N

TABLE 4 -- RESULTS OF ANALYSES OF ROCK SAMPLES COLLECTED FROM THE SILVER PEAK RANGE BLM WILDERNESS STUDY AREA, ESMERELDA COUNTY, NEVADA--Continued

Sample	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Au-ppm aa	Hg-ppm inst	As-ppm aa	Zn-ppm aa	Cd-ppm aa	Bi-ppm aa	Sb-ppm aa
85SP02R	1,500	200	N	20	N	150	N	<.1	.02	<5	53	.6	<2	<2
85SP03R	700	70	N	30	N	300	N	<.1	.04	<5	42	.3	<2	4
85SP04R	500	30	N	15	N	150	N	<.1	.02	<5	36	.2	<2	<2
85SP05R	700	150	N	20	N	150	N	<.1	.02	<5	63	.4	<2	<2
85SP06R	1,000	150	N	15	N	150	N	<.1	<.02	<5	68	.8	<2	<2
85SP06R2	700	150	N	20	N	150	N	<.1	<.02	<5	54	.2	<2	<2
85SP07R	150	150	N	30	N	150	N	<.1	<.02	12	92	.5	<2	<2
85SP08R	<100	150	N	20	N	20	N	<.1	.02	<5	15	.3	<2	2
85SP20R	1,000	150	N	20	N	200	N	<.1	.02	<5	42	.3	<2	<2
85SP23R	2,000	300	N	30	N	150	N	<.1	<.02	15	94	.4	<2	<2
85SP24R	<100	<10	N	15	N	150	N	<.1	.04	5	12	<.1	<2	2
85SP25R1	300	70	N	15	N	150	N	<.1	<.02	<5	16	.5	<2	<2
85SP26R	150	100	N	50	N	150	N	<.1	.02	<5	120	1.3	<2	<2
85SP27R	700	50	N	20	N	200	N	<.1	<.02	<5	16	.1	<2	<2
85SP28R	1,000	150	N	20	N	150	N	<.1	<.02	<5	58	.7	<2	4
85SP40R1	200	10	N	<10	N	70	N	<.1	.14	<5	6	<.1	<2	<2
85SP40R2	1,000	100	N	30	N	150	N	<.1	.82	58	41	.2	<2	9
85SP41R	700	150	N	70	N	300	N	<.1	.02	11	36	.3	<2	<2
85SP42R	1,000	100	N	20	N	150	N	<.1	<.02	<5	32	.3	<2	<2
85SP43R	500	70	N	15	N	150	N	<.1	.02	14	34	.2	<2	<2
85SP44R1	150	70	N	10	N	50	N	.1	.30	63	46	1.3	<2	11
85SP44R2	300	150	N	15	N	150	N	<.1	<.02	5	36	.6	<2	<2
85SP45R1	1,000	30	N	10	N	50	N	<.1	.02	<5	22	.9	<2	<2
85SP45R2	1,000	150	N	20	N	150	N	<.1	<.02	<5	51	.4	<2	<2
85SP46R1	700	200	N	30	N	150	N	<.1	<.02	<5	55	.7	<2	<2
85SP46R2	N	N	N	N	N	10	N	<.1	<.02	<5	4	<.1	<2	<2
85SP47R1	<100	10	N	N	N	N	N	<.1	<.02	8	<2	.2	<2	9
85SP47R2	<100	20	N	N	N	N	N	<.1	.02	12	7	1.0	<2	8
85SP47R3	200	500	N	10	500	30	N	<.1	.70	230	740	3.1	9	11
85SP48R	<100	30	N	15	N	70	N	<.1	<.02	8	43	.1	<2	<2
85SP60R1	<100	200	N	70	N	300	N	<.1	.03	22	110	.6	<2	<2
85SP60R2	1,000	200	N	30	N	150	N	<.1	.02	<5	73	.8	<2	<2
85SP60R3	500	30	N	30	N	200	N	<.1	<.02	<5	9	.3	<2	<2
85SP61R	500	30	N	15	N	150	N	<.1	<.02	<5	34	.1	<2	<2
85SP62R1	300	N	N	10	N	10	N	<.1	<.02	<5	8	.1	<2	<2
85SP62R2	150	150	N	30	N	150	N	<.1	.04	5	89	.6	<2	3
85SP63R	<100	<10	N	<10	N	100	N	<.1	<.02	<5	19	<.1	<2	<2

TABLE 4 -- RESULTS OF ANALYSES OF ROCK SAMPLES COLLECTED FROM THE SILVER PEAK RANGE BLM WILDERNESS STUDY AREA, ESMERELDA COUNTY, NEVADA --continued

[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	Be-ppm s
85SK01	37 46 16	117 57 40	.5	.15	2.00	.070	300	N	N	N	20	500	1.5
85SK02	37 46 16	117 57 35	2.0	.70	7.00	.150	150	N	N	N	N	300	<1.0
85SK03	37 46 12	117 57 25	2.0	.20	.30	.070	70	N	N	N	<10	500	N
85SK04	37 46 4	117 57 2	1.5	.15	15.00	.015	1,500	N	N	N	N	300	N
85SK05	37 46 12	117 56 37	2.0	.70	1.50	.150	300	N	N	N	10	1,500	1.5
85SK06	37 46 14	117 55 33	7.0	5.00	7.00	.700	700	N	N	N	N	1,500	1.5
85SK07	37 45 15	117 55 24	3.0	1.00	3.00	.300	500	N	N	N	10	2,000	2.0
85SK08	37 43 43	117 56 15	.7	<.02	.15	.030	150	N	N	N	<10	70	N
85SK09	37 43 36	117 56 18	.7	.10	.70	.050	300	N	N	N	20	150	2.0
85SK10	37 42 15	117 54 18	7.0	2.00	7.00	.500	500	N	N	N	<10	2,000	1.5
85SK11	37 44 28	117 56 35	7.0	1.00	.50	.300	300	N	N	N	100	300	1.5
85SK12	37 44 28	117 56 39	3.0	.70	7.00	.030	1,500	N	N	N	N	30	N
85SK13	37 44 20	117 56 39	3.0	.70	10.00	.150	300	N	N	N	30	300	1.5
85SK14	37 44 28	117 56 25	7.0	.50	.15	.300	200	N	N	N	70	500	1.5
85SK15	37 44 57	117 56 31	.3	.05	.30	.015	50	N	N	N	10	150	N
85SK16	37 45 44	117 57 13	5.0	1.50	5.00	.300	700	N	N	N	<10	2,000	1.5
85SK17	37 45 30	117 53 10	1.5	.30	.70	.300	70	N	N	N	<10	3,000	1.5
85SK18	37 45 25	117 53 13	15.0	.15	.20	.150	300	N	<700	N	15	1,000	50.0
85SK19	37 45 38	117 53 25	3.0	.30	2.00	.300	300	N	N	N	<10	3,000	2.0
85SK20	37 48 35	117 57 40	10.0	.30	.15	.700	150	N	<700	N	200	700	2.0
85SK21	37 48 35	117 57 40	.3	.02	2.00	.010	700	N	N	N	10	50	N
85SK22	37 47 55	117 57 55	3.0	.20	.70	.500	50	N	N	N	50	3,000	1.5
85SK23	37 46 12	117 57 40	.2	.10	>20.00	.015	5,000	N	N	N	N	50	1.0
85SK24	37 46 12	117 57 40	1.0	.15	3.00	.100	300	N	N	N	20	300	3.0

TABLE 4 -- RESULTS OF ANALYSES OF ROCK SAMPLES COLLECTED FROM THE SILVER PEAK RANGE BLM WILDERNESS STUDY AREA, ESMERELDA COUNTY, NEVADA--Continued

Sample	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	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s
85SK01	N	N	N	<10	<5	30	N	20	<5	15	N	5	N	300
85SK02	N	N	7	100	7	N	N	N	30	N	N	7	N	200
85SK03	N	N	5	<10	30	N	N	N	10	10	N	N	N	<100
85SK04	N	N	<5	<10	5	N	N	N	<5	N	N	N	N	150
85SK05	N	N	5	10	10	70	N	20	5	20	N	7	N	700
85SK06	N	N	30	200	30	50	N	<20	70	15	N	30	N	1,500
85SK07	N	N	10	20	10	70	N	20	10	20	N	10	N	1,500
85SK08	N	N	<5	<10	30	N	<5	N	5	50	N	N	N	<100
85SK09	N	N	N	<10	<5	30	N	20	<5	20	N	N	N	<100
85SK10	N	N	15	70	30	50	N	<20	15	15	N	30	N	1,500
85SK11	N	N	15	100	50	30	N	<20	30	10	N	30	N	100
85SK12	N	N	5	15	15	N	N	N	5	70	N	5	N	<100
85SK13	N	N	10	70	15	50	N	<20	20	15	N	15	N	<100
85SK14	N	N	15	100	50	50	N	<20	30	10	N	30	N	150
85SK15	N	N	N	<10	5	N	N	N	<5	N	N	N	N	<100
85SK16	N	N	15	30	10	50	N	<20	10	15	N	15	N	2,000
85SK17	N	N	N	<10	<5	70	<5	30	N	15	N	7	N	300
85SK18	N	N	7	<10	7	70	N	<20	<5	50	500	7	N	300
85SK19	N	N	5	<10	<5	100	N	20	<5	20	N	10	N	1,000
85SK20	N	N	10	150	70	50	15	<20	15	20	N	30	N	150
85SK21	N	N	N	<10	<5	N	N	N	<5	N	N	N	N	<100
85SK22	N	N	<5	30	15	70	30	<20	5	10	N	15	N	2,000
85SK23	N	N	N	<10	N	N	N	N	<5	50	N	N	N	1,500
85SK24	N	N	<5	30	<5	50	N	20	<5	20	N	7	N	150

TABLE 4 -- RESULTS OF ANALYSES OF ROCK SAMPLES COLLECTED FROM THE SILVER PEAK RANGE BLM WILDERNESS STUDY AREA, ESMERELDA COUNTY, NEVADA--Continued

Sample	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Au-ppm aa	Hg-ppm aa	Te-ppm aa	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp
85SK01	15	N	15	N	70	N	<.1	<.02	<.010	<5	<2	<.1	<2	4
85SK02	70	N	<10	N	50	N	<.1	<.02	<.010	<5	<2	<.1	<2	24
85SK03	<10	N	<10	N	15	N	<.1	.04	<.010	<5	<2	.1	<2	30
85SK04	15	N	<10	N	15	N	<.1	.02	<.010	<5	<2	.6	<2	9
85SK05	30	N	15	N	150	N	<.1	.02	.050	<5	<2	.1	<2	41
85SK06	300	N	20	N	150	N	<.1	<.02	<.010	<5	<2	1.0	2	61
85SK07	150	N	30	N	200	N	<.1	<.02	<.010	<5	<2	.3	<2	37
85SK08	N	N	<10	N	70	N	<.1	<.02	<.010	<5	<2	<.1	<2	28
85SK09	<10	N	<10	N	70	N	<.1	<.02	<.010	<5	<2	<.1	<2	17
85SK10	150	N	20	N	200	N	<.1	<.02	<.010	<5	<2	.5	<2	39
85SK11	150	N	15	N	100	N	<.1	.04	<.010	60	<2	.7	<2	65
85SK12	20	N	50	N	20	N	<.1	.04	.036	<5	<2	.8	3	17
85SK13	70	N	20	N	70	N	<.1	<.02	.026	<5	<2	1.2	<2	88
85SK14	150	N	20	N	100	N	<.1	.02	<.010	24	<2	.6	<2	110
85SK15	<10	N	N	N	15	N	<.1	<.02	<.010	<5	<2	<.1	<2	3
85SK16	150	N	15	N	150	N	<.1	<.02	<.010	<5	<2	.5	<2	63
85SK17	70	N	15	N	300	N	<.1	.18	<.010	6	<2	.1	<2	7
85SK18	300	150	15	N	150	N	<.1	.56	<.010	390	<2	2.2	690	190
85SK19	70	N	30	N	300	N	<.1	<.02	<.010	<5	<2	.2	12	45
85SK20	150	N	20	N	150	N	<.1	.05	<.010	1,100	<2	1.1	21	62
85SK21	N	N	20	N	N	N	<.1	.02	<.010	16	<2	<.1	<2	9
85SK22	150	N	15	N	150	N	<.1	.14	<.010	33	<2	.2	3	35
85SK23	N	N	10	N	30	N	<.1	<.02	<.010	<5	<2	.1	<2	4
85SK24	<10	N	20	N	100	N	<.1	<.02	<.010	<5	<2	<.1	<2	7

TABLE 5.--Descriptions of rock samples

Sample No.	Rock type or unit and description
85SP02	Rhyolite
3	Diorite
4	Volcanic breccia
5	Rhyolite
6R1	Rhyolite
6R2	Basalt
7	Quartz mica schist
20	Latite
23	Basalt
24	Quartzite
25	Pegmatite
26	Quartzite
27	Basalt
28	Andesite
29	Andesite
40R1	Rhyolite
40R2	Rhyolite
41	Rhyolite
42	Rhyolite
43	Rhyolite
44R1	Tuff
44R2	Latite
45R1	Brecciated latite
45R2	Brecciated latite
46R1	Basalt
46R2	Quartz vein
47R1	Tufa
47R2	Dolomite
47R3	Rhyolite

TABLE 5.--Descriptions of rock samples--Continued

Sample No.	Rock type or unit and description
48	Rhyolite
60R1	Latite
60R2	Basalt
60R3	Quartz monzonite
61	Rhyolite
62R1	Rhyolite tuff
62R2	Phyllite
63	Rhyolite tuff
64	Rhyolite tuff
85SK01	Rhyolitic ash-flow tuff
85SK02	Quartz
85SK03	Quartz
85SK04	Quartz/carbonate veins
85SK05	Latitic ash-flow tuff
85SK06	Trachybasalt
85SK07	Latite
85SK08	Quartz vein
85SK09	Rhyolite
85SK10	Trachyandesite
85SK11	Siltstone
85SK12	Quartz
85SK13	Conglomerate
85SK14	Shear zone
85SK15	Quartz vein
85SK16	Andesitic flows
85SK17	Shear zone
85SK18	Latite
85SK19	Latite

TABLE 5.--Descriptions of rock samples--Continued

Sample No.	Rock type or unit and description
85SK20	Quartz vein
85SK21	Quartz vein
85SK22	Andesite
85SK23	Calcite vein
85SK24	Breccia(?)
85SK25	Volcanic rock