UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical results and sample locality map of heavy-mineral-concentrate and rock samples from the South Jackson Mountains Wilderness Study Area (NV-020-603), Humboldt County, Nevada

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CONTENTS

ILLUSTRATIONS

TABLES

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 South Jackson Wilderness Study Area, Humboldt County, Nevada.

INTRODUCTION

In May 1984, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the South Jackson Mountains Wilderness Study Area (NV-020-603), Humboldt County, Nevada.

The South Jackson Mountains Wilderness Study Area comprises 60,211 acres about 94 mi^2 (243.5 km^2) in the south central part of Humboldt County, Nevada, and lies about 55 mi (88.5 km) south of Denio Junction, Nevada, and about 80 mi (129 km) west northwest of Winnemucca, Nevada (see fig. 1). The U.S. Geological Survey was requested to study 10,300 acres, about 16 mi^2 (41 km^2) of the 60,211 acres. Throughout this report "wilderness study area" and "study area" refer to the smaller area, which the U.S. Geological Survey studied. Access to the study area is provided on the south and west by jeep trails that connect with Nevada State Highway 49, and on the north and west by jeep trails that connect with Nevada State Highway 8.

The study area contains geological units of Permian to Tertiary age. The oldest unit is the Happy Creek volcanic series which is predominantly andesite and basalt, with minor amounts of dacitic and trachytic rocks. The Happy Creek volcanic series also contains tuff and breccia. Overlying the Happy Creek volcanics is a unit that consists of graywacke, mafic volcanic rocks, silty cherty shale, pebble conglomerate, and silty and siliceous limestone. Overlying this unit is an unnamed limestone of Triassic age. Intruded into the Happy Creek volcanics is a microdacite of Tertiary age (Willden, 1963).

The topographic relief in the study area is about 5,000 ft (1,524 m), with a maximum elevation of 9,000 ft (2,744 m). The ground surface is rugged. The streams have a steep gradient and are intermittent. The climate is arid to semiarid.

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.

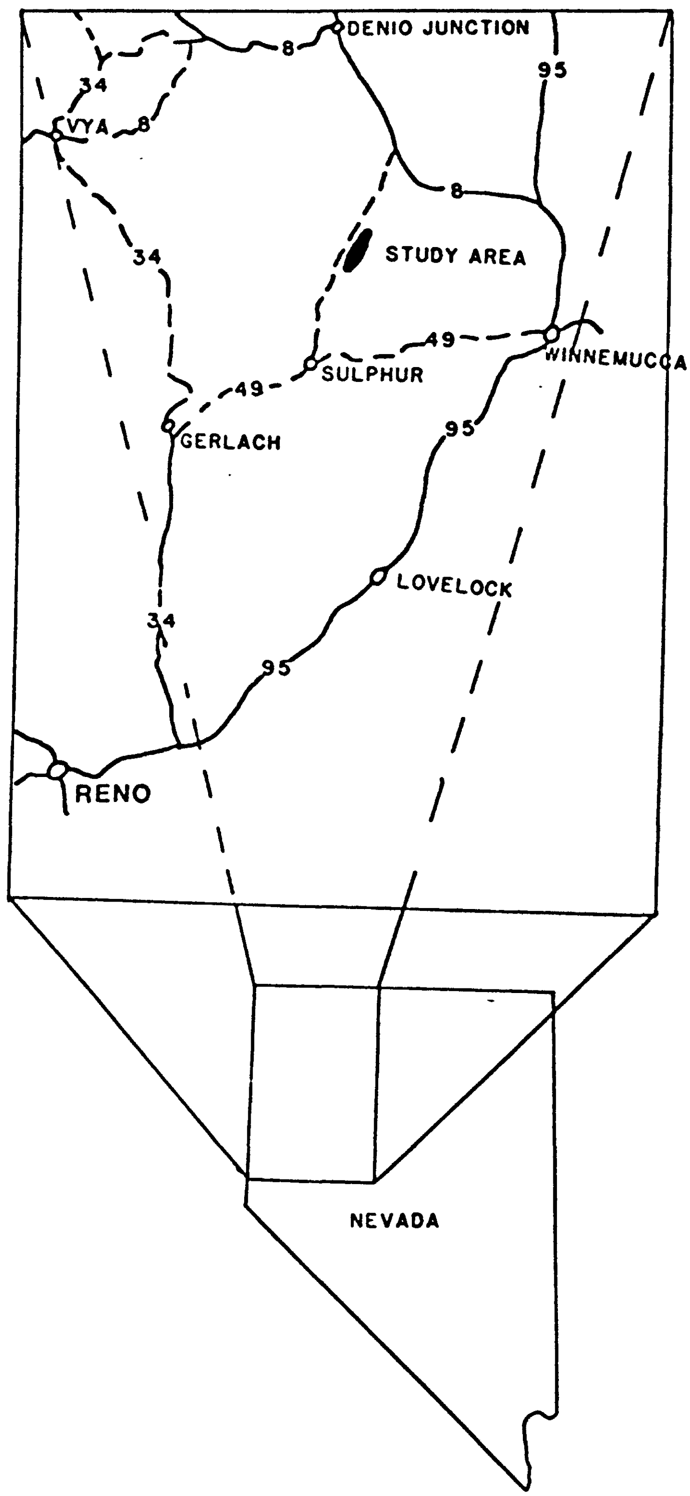

Figure 1. Location map of the South Jackson Mountains Wilderness Study Area, (NV-020-603), Humboldt County, Nevada.

Sample Collection

Samples were collected at 28 sites (plate 1) from a small area where anomalous values for arsenic had previously been found in a reconnaissance geochemical study contracted to Barringer Resources in 1981 (Barringer Resources, Inc., 1982). Seven heavy-mineral concentrates were collected from a zone approximately 1 1/2 miles long on the western flank of the Jackson Mountains, extending from just south of Hobo Canyon in the north to just north of Alaska Canyon in the south. Thirty-eight rocks were sampled from 26 sites between Hobo Canyon in the north and Navajo Peak in the south. The average sampling density was about one sample site per 0.7 mi^2 for the heavy-mineral concentrates, and about one sample site per 0.2 mi^2 for the rocks, based on the 5 mi^2 area sampled.

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 as shown on USGS topographic maps (scale = 1:24,000). Each sample was composited from several localities within an area that may extend as much as 130 ft from the site plotted on the map. 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/or altered and/or mineralized rocks.

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 analysis/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 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 1. The rock samples were analyzed for 31 elements using a semiquantitative, direct-current arc emission spectrographic method (Myers and others, 1961). The elements analyzed and their lower limits of determination are listed in table 1A. 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. 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 South Jackson Mountains Wilderness Study Area are listed in tables 3, 4 and 4A.

Chemical Methods

Other methods of analysis used on samples from the South Jackson Mountains Wilderness Study Area are summarized in table 2 (Crock and others, 1983).

Analytical results for rock samples are listed in tables 4 and 4A.

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 4/4A list the analyses for the heavy-mineral concentrate and rock, respectively. For the three 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; "icp" indicates inductively coupled plasma. A letter "N" in table 3 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 table 3 in front of the lower limit of determination. For tables 4 and 4A, the letter N is not used and a "less than" symbol (<) indicates that an element, observed or not observed, is below the detection limit in table 1A. 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. Because of the formatting used in the computer program that produced tables 3-4/4A, 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.

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Willden, R., 1963, General geology of the Jackson Mountains, Humboldt County, Nevada: U.S. Geological Survey Bulletin 1141-D.

TABLE 1.--Limits of determination for the spectrographic analysis of heavy-mineral concentrates based on a 5-mg sample

[Analyst--Gordon W. Day]

Elements	Lower determination limit	Upper determination limit
	Percent	
Iron (Fe)	.1	50
Magnesium (Mg)	.05	20
Calcium (Ca)	.1	50
Titanium (Ti)	.005	2
	Parts per million	
Manganese (Mn)	20	10,000
Silver (Ag)	1	10,000
Arsenic (As)	500	20,000
Gold (Au)	20	1,000
Boron (B)	20	5,000
Barium (Ba)	50	10,000
Beryllium (Be)	2	2,000
Bismuth (Bi)	20	2,000
Cadmium (Cd)	50	1,000
Cobalt (Co)	10	5,000
Chromium (Cr)	20	10,000
Copper (Cu)	10	50,000
Lanthanum (La)	50	2,000
Molybdenum (Mo)	10	5,000
Niobium (Nb)	50	5,000
Nickel (Ni)	10	10,000
Lead (Pb)	20	50,000
Antimony (Sb)	200	20,000
Scandium (Sc)	10	200
Tin (Sn)	20	2,000
Strontium (Sr)	200	10,000
Vanadium (V)	20	20,000
Tungsten (W)	100	20,000
Yttrium (Y)	20	5,000
Zinc (Zn)	500	20,000
Zirconium (Zr)	20	2,000
Thorium (Th)	200	5,000

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

[Analyst--Mollie J. Malcom]

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)	700	10,000
Gold (Au)	15	500
Boron (B)	10	2,000
Barium (Ba)	20	5,000
Beryllium (Be)	1	1,000
Bismuth (Bi)	10	1,000
Cadmium (Cd)	30	500
Cobalt (Co)	5	2,000
Chromium (Cr)	10	5,000
Copper (Cu)	5	20,000
Lanthanum (La)	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)	200	2,000

TABLE 2.--Commonly used chemical methods

[ICP = inductively coupled plasma]

Element or constituent determined	Sample Type	Method	Determination limit (micrograms/ gram or ppm)	Analysts	Reference
Arsenic (As)	Rock	ICP	5	Briggs, Paul H.	Crock and
Bismuth (Bi)	Rock	ICP	2	Fey, David L.	others,
Cadmium (Cd)	Rock	ICP	0.1		1983.
Antimony (Sb)	Rock	ICP	2		
Zinc (Zn)	Rock	ICP	2		

TABLE 3. ANALYSES OF THE NONMAGNETIC FRACTION OF HEAVY MINERAL CONCENTRATE SAMPLES FROM SOUTH JACKSON MOUNTAINS, HUMBOLDT 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-ppm s	Mg-ppm s	Ca-ppm s	Ti-ppm s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s
JM001	41 16 6	118 33 31	.50	2.0	5	.5	150	3	N	50	20	>10,000
JM003	41 16 33	118 33 22	.20	.1	7	.2	100	N	N	N	<20	>10,000
JM004	41 16 27	118 33 5	.20	.1	7	.2	100	N	N	N	20	>10,000
JM006	41 17 14	118 33 4	.50	.5	7	.5	200	N	N	N	50	5,000
JM022	41 16 18	118 33 22	.30	5.0	10	.5	150	N	N	N	200	>10,000
JM023	41 16 32	118 33 6	.20	.2	5	.2	70	N	N	N	50	>10,000
JM024	41 16 49	118 33 17	.15	.1	10	.1	100	7	N	N	<20	>10,000

TABLE 3.--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
JM001	N	N	N	N	N	<10	50	N	N	N	700
JM003	N	N	N	N	N	<10	50	<10	N	N	50
JM004	N	N	N	N	N	<10	50	N	N	N	N
JM006	N	N	N	N	50	<10	50	N	N	N	N
JM022	N	N	N	N	20	<10	<50	N	N	N	N
JM023	N	N	N	N	N	<10	<50	N	N	N	150
JM024	N	N	N	N	N	15	<50	200	N	N	2,000

TABLE 3.--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
JM001	N	10	N	2,000	20	N	100	2,000	>2,000	N
JM003	N	N	N	3,000	20	N	100	N	2,000	N
JM004	N	N	N	3,000	<20	N	100	N	1,500	N
JM006	N	N	N	500	50	N	50	N	700	N
JM022	N	15	N	2,000	20	N	70	<500	2,000	N
JM023	N	N	N	2,000	20	N	50	N	1,000	N
JM024	N	N	N	2,000	<20	N	50	3,000	1,000	N

TABLE 4. ANALYSES OF THE ROCK SAMPLES FROM SOUTH JACKSON MOUNTAINS WILDERNESS STUDY AREA, HUMBOLDT 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-ppm s	Mg-ppm s	Ca-ppm s	Ti-ppm s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s
JM001R1	41 16 6	118 33 31	.15	.30	>20.00	.007	100	<.5	<700	<15	<10	70	<1
JM001R2	41 16 6	118 33 31	.10	.70	15.00	.005	30	<.5	<700	<15	<10	300	<1
JM001R3	41 16 6	118 33 31	.15	.30	>20.00	.010	70	<.5	<700	<15	<10	70	<1
JM001R4	41 16 6	118 33 31	5.00	2.00	7.00	.200	1,500	<.5	<700	<15	100	300	<1
JM002R1	41 16 29	118 33 21	.70	.15	.15	.050	70	<.5	<700	<15	10	200	<1
JM002R2	41 16 29	118 33 21	2.00	1.00	7.00	.300	500	<.5	<700	<15	<10	1,000	<1
JM004R1	41 16 27	118 33 6	.20	.20	>20.00	.007	300	<.5	<700	<15	<10	100	<1
JM004R2	41 16 27	118 33 6	2.00	.15	5.00	.050	700	<.5	<700	<15	20	1,000	<1
JM004R3	41 16 27	118 33 6	.10	.30	15.00	.005	20	<.5	<700	<15	<10	150	<1
JM005R	41 16 28	118 33 0	.15	.20	>20.00	.015	150	<.5	<700	<15	<10	70	<1
JM006R1	41 17 14	118 33 4	7.00	3.00	5.00	.300	150	<.5	<700	<15	<10	300	<1
JM006R2	41 17 14	118 33 4	2.00	.70	1.50	.070	500	<.5	<700	<15	<10	1,000	<1
JM006R3	41 17 14	118 33 4	.15	.10	15.00	.010	30	<.5	<700	<15	<10	70	<1
JM021R	41 17 14	118 33 4	2.00	1.00	7.00	.200	700	<.5	<700	<15	<10	1,000	<1
JM022R1	41 16 18	118 33 22	2.00	1.00	1.50	.200	300	<.5	<700	<15	20	2,000	<1
JM022R2	41 16 18	118 33 22	.20	.20	>20.00	.005	70	<.5	<700	<15	<10	100	<1
JM024R1	41 16 48	118 33 18	2.00	.10	2.00	.200	500	<.5	<700	<15	<10	500	<1
JM024R2	41 16 48	118 33 18	3.00	1.50	10.00	.300	500	<.5	<700	<15	<10	1,000	<1

TABLE 4.--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
JM001R1	<10	<30	<5	<10	<5	<30	<5	<20	<5	<10	<100	<5	<10
JM001R2	<10	<30	<5	<10	7	<30	<5	<20	<5	<10	<100	<5	<10
JM001R3	<10	<30	<5	<10	5	<30	<5	<20	<5	<10	<100	<5	<10
JM001R4	<10	<30	15	<10	10	<30	<5	<20	<5	<10	<100	20	<10
JM002R1	<10	<30	<5	10	10	<30	<5	<20	10	<10	<100	<5	<10
JM002R2	<10	<30	7	15	20	<30	<5	<20	7	15	<100	15	<10
JM004R1	<10	<30	<5	<10	5	<30	<5	<20	<5	<10	<100	<5	<10
JM004R2	<10	<30	<5	<10	70	<30	<5	<20	<5	<10	<100	7	<10
JM004R3	<10	<30	<5	<10	7	<30	<5	<20	<5	<10	<100	<5	<10
JM005R	<10	<30	<5	<10	7	<30	5	<20	<5	<10	<100	100	<10
JM006R1	<10	<30	30	15	50	<30	<5	<20	10	<10	<100	70	<10
JM006R2	<10	<30	<5	<10	10	<30	<5	<20	<5	<10	<100	10	<10
JM006R3	<10	<30	<5	<10	7	<30	<5	<20	<5	<10	<100	<5	<10
JM021R	<10	<30	5	15	20	<30	<5	<20	5	10	<100	15	<10
JM022R1	<10	<30	<5	<10	20	<30	<5	<20	<5	20	<100	10	<10
JM022R2	<10	<30	<5	15	<5	<30	<5	<20	<5	<10	<100	<5	<10
JM024R1	<10	<30	7	10	30	<30	<5	<20	7	30	<100	10	<10
JM024R2	<10	<30	7	20	20	<30	<5	<20	10	<10	<100	15	<10

TABLE 4.--Continued

Sample	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp
JM001R1	1,000	<10	<50	<10	<200	<10	<5	8	.2	3	4
JM001R2	1,000	<10	<50	<10	<200	<10	<5	<2	.2	3	9
JM001R3	500	15	<50	<10	<200	<10	<5	<2	.2	3	9
JM001R4	700	300	<50	10	<200	30	<5	<2	<.1	2	26
JM002R1	<100	15	<50	<10	<200	30	6	<2	<.1	3	8
JM002R2	300	150	<50	15	<200	70	15	<2	.6	3	55
JM004R1	700	10	<50	<10	<200	<10	<5	<2	.2	<2	4
JM004R2	150	30	<50	10	<200	30	<5	<2	.5	2	48
JM004R3	300	<10	<50	<10	<200	<10	<5	<2	.2	3	8
JM005R	500	10	<50	<10	<200	<10	<5	<2	.2	3	8
JM006R1	150	300	<50	10	<200	15	9	<2	.2	<2	29
JM006R2	150	30	<50	30	<200	150	81	<2	<.1	<2	34
JM006R3	200	<10	<50	<10	<200	<10	<5	<2	.3	<2	8
JM021R	200	70	<50	15	<200	50	26	<2	.6	3	53
JM022R1	300	30	<50	20	<200	100	<5	<2	.4	<2	111
JM022R2	700	10	<50	<10	<200	<10	5	<2	<.1	<2	2
JM024R1	<100	70	<50	10	<200	30	91	<2	.9	7	111
JM024R2	500	150	<50	15	<200	50	23	<2	.6	4	47

TABLE 4A. ANALYSES OF ROCK SAMPLES FROM SOUTH JACKSON MOUNTAINS WILDERNESS STUDY AREA, HUMBOLDT COUNTY, NEVADA

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

Sample	Utm.x	Utm.y	Fe-ppm s	Mg-ppm s	Ca-ppm s	Ti-ppm s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s
84SN8.1	367,240	4,563,850	7.0	2.00	3.00	.300	1,500	.5	<700	<15	<10	200	<1
84SN10	366,300	4,561,370	5.0	3.00	3.00	.500	700	<.5	<700	<15	<10	500	<1
84SN2C	368,750	4,564,480	5.0	3.00	2.00	.300	1,000	<.5	<700	<15	<10	2,000	<1
84SN31A	372,396	4,567,580	.7	.10	2.00	.100	300	<.5	<700	<15	10	70	1
84SN31B	372,396	4,567,580	3.0	2.00	7.00	.070	1,500	<.5	<700	<15	<10	150	<1
84SN31C	372,396	4,567,580	3.0	2.00	2.00	.300	700	<.5	<700	<15	<10	1,500	<1
84SN35	370,880	4,563,220	.3	.05	7.00	.015	1,500	<.5	<700	<15	<10	150	<1
84SN36	371,095	4,563,020	1.5	.30	1.50	.150	500	2.0	<700	<15	10	300	1
84SN37	371,030	4,563,085	1.5	1.00	3.00	.005	1,000	<.5	<700	<15	<10	>5,000	<1
84SN38	371,125	4,565,045	3.0	1.00	1.50	.300	700	<.5	<700	<15	30	1,500	<1
84SN39	369,720	4,565,580	1.5	1.00	.15	.150	500	<.5	<700	<15	10	200	<1
84SN40	370,420	4,572,340	3.0	1.50	7.00	.300	500	<.5	<700	<15	<10	30	<1
84SN53	370,970	4,565,350	7.0	2.00	1.50	.300	300	<.5	<700	<15	<10	150	<1
84SN56	373,120	4,572,830	.7	1.00	20.00	.030	700	<.5	<700	<15	<10	70	<1
84SN57	370,060	4,568,980	3.0	1.50	10.00	.150	1,000	<.5	<700	<15	<10	2,000	<1
84SN59	369,400	4,566,050	5.0	1.50	3.00	.300	1,000	<.5	<700	<15	<10	5,000	<1
84SN61	369,300	4,566,700	5.0	3.00	.50	.300	700	10.0	<700	<15	<10	300	<1
84SN64	366,380	4,555,880	.7	1.50	2.00	.150	150	<.5	<700	<15	<10	300	<1
84SN65	366,450	4,556,500	5.0	5.00	3.00	.300	500	<.5	<700	<15	<10	1,000	<1
84SN66	366,740	4,557,470	1.0	.15	2.00	.300	200	<.5	<700	<15	<10	700	1

TABLE 4A.--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
84SN8.1	<10	<30	10	10	50	<30	<5	<20	5	700	<100	30	<10
84SN10	<10	<30	20	100	100	<30	<5	<20	30	<10	<100	30	<10
84SN20	<10	<30	15	15	50	<30	<5	<20	7	<10	<100	30	<10
84SN31A	<10	<30	7	<10	7	<30	<5	<20	<5	<10	<100	<5	<10
84SN31B	<10	<30	15	<10	7	<30	<5	<20	15	15	<100	<5	<10
84SN31C	<10	<30	15	150	10	<30	<5	<20	30	50	<100	15	<10
84SN35	<10	<30	<5	<10	<5	<30	<5	<20	<5	<10	<100	<5	<10
84SN36	<10	<30	<5	<10	<5	<30	<5	<20	<5	10	<100	<5	<10
84SN37	<10	<30	7	<10	1,000	<30	<5	<20	5	150	<100	<5	<10
84SN38	<10	<30	7	<10	7	<30	<5	<20	<5	30	<100	7	<10
84SN39	<10	<30	5	15	30	<30	<5	<20	15	10	<100	7	<10
84SN40	<10	<30	20	100	70	<30	<5	<20	20	<10	<100	20	<10
84SN53	<10	<30	30	70	50	<30	<5	<20	30	<10	<100	15	<10
84SN56	<10	<30	<5	<10	7	<30	<5	<20	<5	<10	<100	<5	<10
84SN57	<10	<30	7	<10	10	<30	<5	<20	5	<10	<100	15	<10
84SN59	<10	<30	10	15	7	<30	<5	<20	5	<10	<100	30	<10
84SN61	<10	<30	20	150	15,000	<30	<5	<20	15	<10	<100	30	<10
84SN64	<10	<30	5	15	100	<30	<5	<20	7	<10	<100	7	<10
84SN65	<10	<30	20	150	50	<30	<5	<20	30	10	<100	30	<10
84SN66	<10	<30	<5	15	7	<30	<5	<20	<5	<10	<100	7	<10

TABLE 4A.--Continued

Sample	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp
84SN8.1	700	300	<50	10	700	30	<200	<5	<2	.4	8	530
84SN10	500	300	<50	15	<200	50	<200	<5	<2	1.3	10	110
84SN20	1,000	300	<50	10	<200	50	<200	<5	<2	.8	5	70
84SN31A	150	10	<50	<10	<200	70	<200	<5	<2	1.3	<2	10
84SN31B	150	70	<50	<10	<200	100	<200	<5	<2	3.6	4	210
84SN31C	700	150	<50	15	<200	70	<200	<5	<2	1.2	4	58
84SN35	150	<10	<50	10	<200	10	<200	<5	<2	.2	<2	24
84SN36	300	15	<50	<10	<200	100	<200	<5	<2	.4	<2	88
84SN37	200	30	<50	<10	<200	<10	<200	<5	<2	1.1	3	51
84SN38	500	70	<50	10	<200	100	<200	<5	<2	<.5	2	59
84SN39	<100	50	<50	<10	<200	20	<200	11	<2	.8	5	150
84SN40	<100	150	<50	10	<200	30	<200	16	<2	.6	3	19
84SN53	300	200	<50	15	<200	70	<200	<5	<2	1.4	5	66
84SN56	150	10	<50	<10	<200	<10	<200	<5	<2	.7	<2	18
84SN57	700	150	<50	<10	<200	30	<200	<5	<2	.8	3	48
84SN59	1,000	150	<50	20	<200	100	<200	<5	<2	1.2	6	52
84SN61	200	300	<50	<10	<200	30	<200	<5	4	.5	4	67
84SN64	150	70	<50	<10	<200	30	<200	<5	<2	.3	5	9
84SN65	700	300	<50	10	<200	70	<200	<5	<2	1.5	7	26
84SN66	500	100	<50	10	<200	150	<200	6	<2	.3	<2	4

TABLE 5.--Description of rock samples from South Jackson Mountains, Humboldt County, Nevada

Sample	Rock Description
84SN8.1	felsic igneous
84SN10	intermediate igneous
84SN20	felsic igneous
84SN31A	felsic igneous
84SN31B	felsic igneous
84SN31C	felsic igneous
84SN35	felsic igneous
84SN36	felsic igneous
84SN37	intermediate igneous
84SN38	felsic igneous
84SN39	sedimentary rock
84SN40	quartzite
84SN53	intermediate igneous
84SN56	felsic igneous
84SN57	felsic igneous
84SN59	felsic igneous
84SN61	sedimentary rock
84SN64	jasperoid
84SN65	felsic igneous
84SN66	intermediate igneous
JM001R1	limestone
JM001R2	tufa
JM001R3	limestone
JM001R4	gouge material from fault zone
JM002R1	quartz vein
JM002R2	tufa
JM004R1	limestone
JM004R2	limestone
JM004R3	tufa
JM005R	limestone
JM006R1	dolomite
JM006R2	dolomite
JM006R3	tufa
JM0021R	tufa
JM0022R1	limestone
JM0022R2	limestone
JM0024R1	dolomite
JM0024R2	tufa