UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical results and sample locality map of heavy-mineral-concentrate and rock samples from the Little Humboldt River Wilderness Study Area (NV-010-132), Elko 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 in the Little Humboldt River Wilderness Study Area, Elko County, Nevada.

INTRODUCTION

In September 1984 and May 1985, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the Little Humboldt River Wilderness Study Area (NV-010-132), Elko County, Nevada.

The Little Humboldt River Wilderness Study Area occupies most of the headwaters of the South Fork of the Little Humboldt River. The area for which mineral surveys were requested, and on which a geochemical reconnaissance study was conducted, comprises 40,000 acres, about 62.5 mi^2 (161.9 km^2) just south of the northwest corner of Elko County, Nevada (see fig. 1). The southeast corner of the study area is two miles north of Midas, Nevada. The study area is 14 miles long in the northwest-southeast direction and eight miles wide in the northeast-southwest direction. Access to the study area is provided by dirt jeep roads on the periphery and some jeep trails give access to the interior of the study area on the southwest and west sides.

The study area is composed of predominantly silicic volcanic rocks, volcaniclastic sedimentary rocks, and minor basalt that were formed between about 16 and 9 million years ago. The oldest volcanic and volcaniclastic units underlie Snowstorm Ridge immediately to the west of the study area, and Castle Ridge in the eastern part of the area. These rocks include ash-flow tuffs, flow domes, air-fall tuffs, and tuffaceous sedimentary rocks that are complexly interlayered. The lower part of this sequence is more andesitic, whereas the upper and more voluminous part is more rhyolitic. These rocks are overlain throughout much of the study area by a widespread, massive welded tuff sequence known informally as the Little Humboldt Tuff. It was erupted approximately at 13.7 Ma, and it filled a developing structural trough in the older volcanic rocks. Lacustrine sediments were subsequently deposited in large alkaline lakes in the northeastern part of the area, and these units were covered by basalt flows just to the northeast of the study area about 9.8 million years ago.

The volcanic rocks were erupted during incipient Basin-Range faulting in this area. East-northeast-directed extension created a conjugate system of normal faults, some of which served as feeders for some of the volcanic flows. The structural basin in which the Little Humboldt Tuff was deposited formed prior to eruption, but conjugate faults in the tuff attest to continued extension.

Hydrothermal fluids invaded the older sequence of volcanic rocks prior to the eruption of the Little Humboldt Tuff. The rocks are locally altered and contain low-grade, high-tonnage gold deposits (Alan Wallace, pers. comm.).

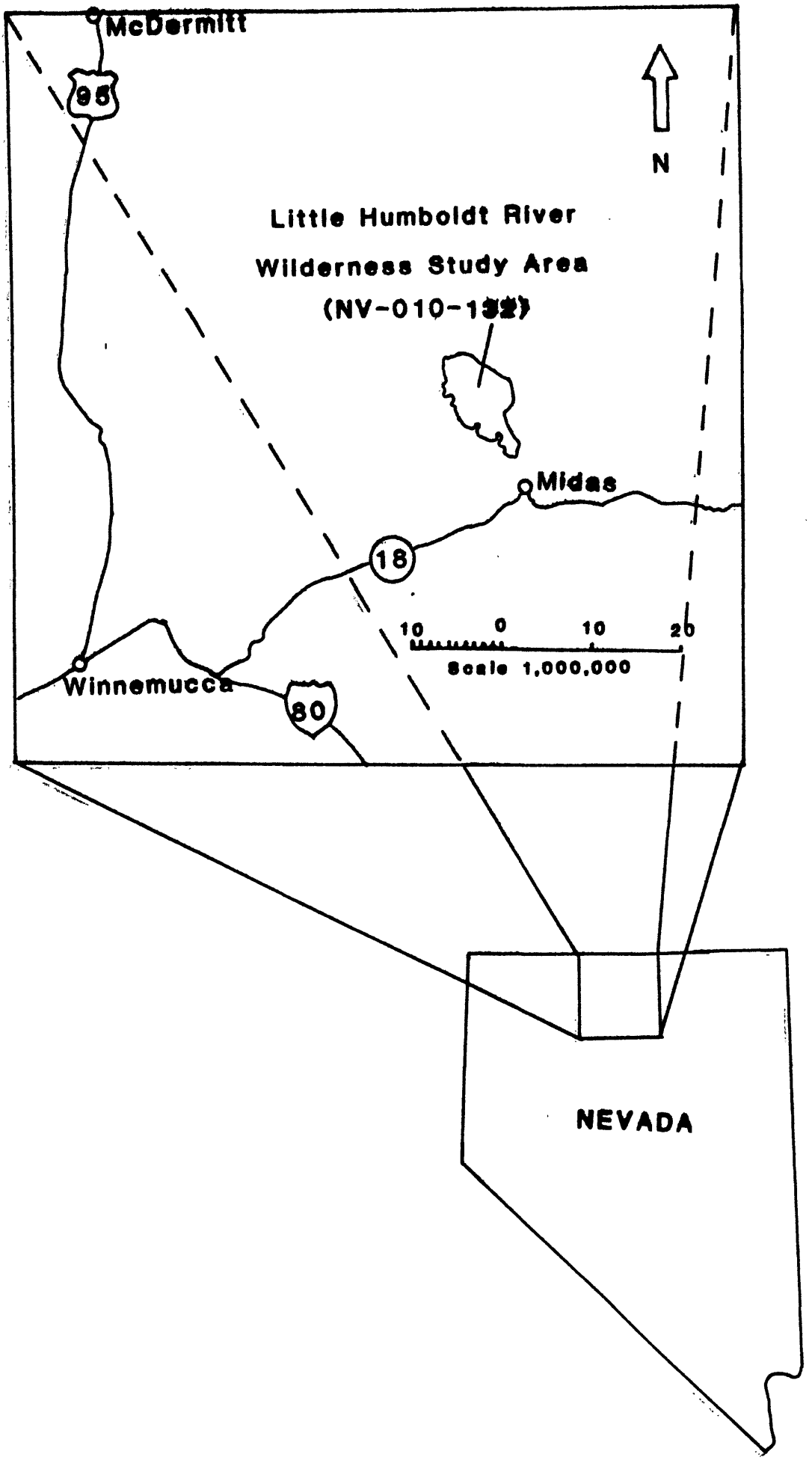

Figure 1. Location of the Little Humboldt River Wilderness Study Area (NV-010-132), Elko County, Nevada.

The topographic relief in the study area is about 2,682 ft (817 m) with a maximum elevation of 7,722 ft (2,354 m). The slope of the study area is generally moderate. The area is a typical high plains desert with grass, very few trees and some sagebrush. The South Fork of the Little Humboldt River is a perennial stream as are some of its major tributaries.

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 a limited number of minerals in rock material eroded from the drainage basin upstream from each sample site. The selective concentration of minerals, many of which are 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

Stream sediments and heavy-mineral concentrates were collected at 45 sites, and rocks were collected at 16 sites (plate 1). The average sampling density was about one sample site per 1.4 mi^2 for the stream sediments and heavy-mineral concentrates, and about one sample site per 3.9 mi^2 for the rocks. The area of the drainage basins sampled ranged from 1.5 mi^2 to 0.5 mi^2.

Heavy-mineral-concentrate samples

Heavy-mineral-concentrate samples were collected from active alluvium, primarily from first-order (unbranched) and second-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 50 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, altered, and mineralized rocks.

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 including the nonmagnetic ore-related 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 stream-sediment, heavy-mineral-concentrate, and rock samples were analyzed for 31 elements using semiquantitative, direct-current arc emission spectrographic methods. The analyses for stream-sediment and 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 limit 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 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 for stream sediment and rocks 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 the stream-sediment, heavy-mineral concentrate and rock samples from this study in the Little Humboldt River Wilderness Study Area are listed in tables 3, 4, and 5, respectively.

Chemical methods

Other methods of analysis used on samples from the Little Humboldt River Wilderness Study Area are summarized in table 2. The analytical method used for determining As, Bi, Cd, Sb, and Zn (arsenic, bismuth, cadmium, antimony, and zinc) is a modification of the method of O'Leary and Viets (1986) adapted to the inductively coupled plasma-atomic emission spectroscopy (ICP-AES) method of Crock and others (1983). Mercury (Hg) is determined by an atomic absorption spectrophotometer (AAS) employing a modification of the method of Koirtyohann and Khalil (1976). Gold (Au) is also determined by an absorption spectrophotometer using a modification of the method of Thompson and others (1968).

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, 4, and 5 list the analyses for the stream-sediment, heavy-mineral concentrate, and rock samples, 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; "AA" indicates atomic absorption spectroscopy. 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 tables 3 and 4 in front of the lower limit of determination. For table 4, the symbol (--) indicates that a given element was not analyzed for--probably because of small amounts of sample remaining after concentrating. For table 5, 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 1. 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, and 5, 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

Crock, J. G., Lichte, F. E., and Briggs, P. H., 1983, Determination of elements in National Bureau of Standards' Geological Reference Materials SRM278 Obsidian and SRM668 Basalt by Inductively Coupled Argon Plasma-Atomic Emission Spectrometry: Geostandards Newsletter, no. 7, p. 335-340.

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.

Koirtyohann, S. R., and Khalil, Moheb, 1976, Variables in the determination of mercury by cold vapor atomic absorption: Analytical Chemistry, 48, p. 136-139.

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.

Myers, A. T., Havens, R. G., and Dunton, P. J., 1961, A spectrochemical method for the semiquantitative analyses of rocks, minerals, and ores: U.S. Geological Survey Bulletin 1084-I, p. 1207-1229.

O'Leary, R. M., and Viets, J. G., 1986, Determination of antimony, arsenic, bismuth, cadmium, copper, lead, molybdenum, silver, and zinc in geological materials by atomic absorption spectrometry using a hydrochloric acid-hydrogen peroxide digestion: Atomic Spectroscopy, 7, p. 4-8.

Thompson, C. E., Nakagawa, H. M., and Van Sickle, G. H., 1968, Rapid analysis for gold in geologic materials, in Geological Survey research 1968: U.S. Geological Survey Professional Paper 600-B, p. B130-B132.

VanTrump, George, Jr., and Miesch, A. T., 1977, 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 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 (Grimes and Marranzino) are based on a 5-mg sample, and are therefore two reporting intervals higher than the limits given for rocks and stream sediment. Analysts: Mollie J. Malcolm (rocks), Gordon W. Day (heavy-mineral concentrates)]

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

[ICP = Inductively coupled plasma; AAS = Atomic absorption spectrophotometer]

Element or constituent determined	Sample Type	Method	Determination limit (micrograms/ gram or ppm)	Analyst	Reference
Arsenic (As)	rock	ICP	5	Briggs, Paul H.	Crock and others, 1983.
Bismuth (Bi)	rock	ICP	2		Modification of O'Leary and Viets, 1986.
Cadmium (Cd)	rock	ICP	0.1		
Antimony (Sb)	rock	ICP	2		
Zinc (Zn)	rock	ICP	2		
Gold (Au)	rock	AAS	0.05	Crock, James G. and Kennedy, Kay R.	Modification of Thompson and others, 1968.
Mercury (Hg)	rock	AAS	0.02	Crock, James G. and Kennedy, Kay R.	Modification of Koirtyohann and Khalil, 1976.

TABLE 3.-- ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES COLLECTED FROM THE LITTLE HUMBOLT RIVER BLM WILDERNESS STUDY AREA, ELKO 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
LH001H	41 25 9	116 55 17	.5	.05	.2	1.0	30	N	N	N	(20	1,500
LH002H	41 24 30	116 55 14	.5	.05	.2	2.0	30	N	N	N	(20	2,000
LH003H	41 24 25	116 56 31	.5	.05	.5	1.5	30	N	N	N	(20	1,000
LH004H	41 22 17	116 54 55	.5	.20	2.0	.2	50	N	N	N	(20	500
LH005H	41 21 29	116 54 38	.1	.05	.1	1.0	30	N	N	N	(20	300
LH006H	41 22 47	116 52 26	.2	.05	.2	1.0	30	N	N	N	(20	5,000
LH007H	41 23 20	116 53 54	.2	.05	.2	2.0	30	N	N	N	(20	500
LH008H	41 23 43	116 54 35	.2	.05	.2	1.0	30	N	N	N	(20	2,000
LH011H	41 21 27	116 51 7	.2	.05	.5	1.0	50	N	N	N	(20	2,000
LH012H	41 21 25	116 51 6	.2	.07	.5	1.5	100	N	N	N	(20	2,000
LH013H	41 22 8	116 52 25	.2	.07	.5	1.5	50	N	N	N	(20	1,000
LH014H	41 21 27	116 52 15	.2	.05	.5	1.5	70	N	N	N	(20	700
LH015H	41 19 53	116 52 32	.2	(.05	.2	1.5	30	N	N	N	(20	2,000

TABLE 3-- ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES COLLECTED FROM THE LITTLE HUMBOLT RIVER BLM WILDERNESS STUDY AREA, ELKO 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
LH001H	<2	N	N	N	N	<10	N	N	N	50	N
LH002H	<2	N	N	N	N	<10	N	N	50	50	N
LH003H	<2	N	N	N	N	<10	N	N	N	50	N
LH004H	N	N	N	N	N	<10	N	N	N	N	N
LH005H	2	N	N	N	N	<10	N	N	N	50	N
LH006H	<2	N	N	N	N	<10	N	N	N	50	N
LH007H	<2	N	N	N	N	<10	N	N	N	50	N
LH008H	<2	N	N	N	N	<10	N	N	N	30	20
LH011H	<2	N	N	N	N	<10	N	N	N	50	N
LH012H	2	N	N	N	N	<10	N	N	N	N	N
LH013H	2	N	N	N	N	<10	N	N	N	N	N
LH014H	2	N	N	N	N	<10	N	N	N	N	N
LH015H	2	N	N	N	50	<10	N	N	N	50	N

TABLE 3.-- ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES COLLECTED FROM THE LITTLE HUMBOLT RIVER BLM WILDERNESS STUDY AREA, ELKO 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
LH001H	N	70	100	N	50	N	1,000	N	>2,000	N
LH002H	N	70	N	N	50	N	1,000	N	>2,000	N
LH003H	N	70	100	N	50	N	1,000	N	>2,000	N
LH004H	N	20	N	300	20	N	100	N	>2,000	N
LH005H	N	50	1,000	N	30	N	1,000	N	>2,000	N
LH006H	N	50	70	N	50	N	1,000	N	>2,000	N
LH007H	N	70	200	N	50	N	1,500	N	>2,000	N
LH008H	N	30	200	N	50	N	1,000	N	>2,000	N
LH011H	N	70	100	N	50	N	1,000	N	>2,000	N
LH012H	N	30	N	N	50	N	700	N	>2,000	N
LH013H	N	20	N	200	50	N	700	N	>2,000	N
LH014H	N	20	70	N	50	N	1,000	N	>2,000	N
LH015H	N	70	20	N	70	N	1,000	N	>2,000	N

TABLE 4A. RESULTS OF ANALYSIS OF ROCK SAMPLES FROM THE LITTLE HUMBOLDT RIVER WILDERNESS STUDY AREA, ELKO 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
LH003R	41 24 24	116 56 28	2.0	.05	.70	.20	150	<.5	<700	<15	<10	3,000
LH006R	41 22 51	116 52 27	1.5	.02	.70	.15	150	<.5	<700	<15	10	700
LH009R1	41 22 22	116 52 37	.7	.03	.15	.70	70	<.5	<700	<15	100	150
LH009R2	41 22 22	116 52 37	3.0	.07	2.00	.30	200	<.5	<700	<15	70	500
LH010R	41 22 18	116 52 42	.5	.10	.50	.10	70	<.5	<700	<15	150	200
LH013R	41 22 8	116 52 26	1.5	.20	1.00	.15	200	<.5	<700	<15	10	2,000
LH014R	41 21 17	116 52 20	3.0	.15	.70	.20	150	<.5	<700	<15	<10	3,000
LH015R	41 20 0	116 52 30	3.0	.07	.70	.30	150	<.5	<700	<15	<10	3,000
LH016R	41 15 48	116 47 38	.7	<.02	.70	.03	30	1,500.0	<700	<15	<10	700

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
LH003R	3.0	<10	<30	<5	<10	<5	150	<5	30	<5	20	<100	5	<10
LH006R	3.0	<10	<30	<5	<10	<5	100	<5	50	<5	20	<100	<5	<10
LH009R1	1.5	<10	<30	<5	<10	<5	30	<5	<20	<5	10	<100	<5	<10
LH009R2	1.5	<10	<30	7	10	15	50	<5	<20	<5	10	<100	20	<10
LH010R	1.5	<10	<30	<5	<10	<5	50	<5	20	<5	<10	<100	<5	<10
LH013R	2.0	<10	<30	<5	<10	5	70	<5	20	<5	15	<100	<5	<10
LH014R	3.0	<10	<30	<5	<10	<5	150	<5	30	<5	20	<100	7	<10
LH015R	3.0	<10	<30	<5	<10	20	150	<5	30	<5	20	<100	7	<10
LH016R	7.0	<10	<30	<5	<10	70	<30	<5	<20	<5	30	<100	<5	<10

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
LH003R	<100	30	<50	70	<200	300	<200	<.1	<.02	--	--	--	<2	<2
LH006R	200	<10	<50	70	<200	300	<200	<.1	.04	--	--	--	<2	3
LH009R1	<100	15	<50	15	<200	150	<200	<.1	.17	--	--	--	<2	<2
LH009R2	<100	100	<50	70	<200	150	<200	<.1	.27	--	--	--	<2	<2
LH010R	150	<10	<50	70	<200	200	<200	<.1	.05	--	--	--	<2	<2
LH013R	<100	<10	<50	30	<200	200	<200	<.1	<.02	--	--	--	<2	<2
LH014R	150	<10	<50	70	<200	300	<200	<.1	<.02	--	--	--	<2	<2
LH015R	300	50	<50	70	<200	300	<200	<.1	<.02	--	--	--	<2	<2
LH016R	300	<10	<50	10	<200	100	<200	4.5	.05	--	--	--	<2	<2

Table 4b. Rocks from South Fork of the Little Humboldt River Wilderness Study Area

Sample	Latitude	Longitude	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-B	S-BA	S-BE
5LHW6	41 26 1	116 58 43	.05	.30	15.00	L.002	150	L.5	L10	30	3.0
5LHW7	41 26 45	116 57 13	2.00	.05	.70	.150	200	L.5	15	3,000	3.0
5LHW9	41 26 30	116 56 19	1.50	.07	.30	.150	100	L.5	15	2,000	3.0
5LHW10B	41 26 35	116 56 25	.30	L.02	.03	L.002	150	L.5	15	150	3.0
5LHW12A	41 27 30	116 56 45	.70	.30	.70	.050	70	L.5	10	3,000	3.0
5LHW12B	41 27 30	116 56 45	1.50	.03	.30	.150	150	L.5	10	2,000	3.0
5LHW13	41 24 49	116 56 24	1.50	.03	.30	.100	150	L.5	10	2,000	3.0
5LHW27	41 22 31	116 58 57	7.00	1.00	3.00	.700	500	L.5	L10	1,000	1.5
5LHW30	41 22 37	116 59 50	2.00	.07	.50	.150	200	L.5	15	2,000	3.0
5LHW36	41 27 28	116 55 29	.07	L.02	.70	.003	30	L.5	20	100	L1.0
5LHW38	41 22 38	116 54 56	1.00	.05	.30	.100	150	L.5	15	3,000	3.0
5LHW41	41 21 30	116 59 32	2.00	L.02	.15	.150	70	L.5	15	3,000	1.5
5LHW42	41 24 33	116 54 53	1.00	.20	.70	.070	100	.7	10	300	1.5
5LHW43A	41 21 0	116 58 45	1.50	L.02	.15	.070	100	L.5	L10	500	1.5
5LHW43B	41 21 0	116 58 45	2.00	L.02	.10	.070	200	L.5	L10	300	2.0
5LHW45	41 21 56	116 58 42	1.50	.03	.10	.070	150	L.5	10	300	3.0
5LHW47	41 20 52	116 58 16	.70	.02	.15	.070	70	L.5	10	300	2.0
5LHW49A	41 20 2	116 58 7	3.00	3.00	7.00	.300	300	L.5	L10	300	L1.0
5LHW50	41 20 34	116 57 47	3.00	.15	.20	.150	1,000	L.5	L10	2,000	1.5
5LHW52	41 20 10	116 58 12	1.50	.07	1.00	.150	300	L.5	L10	1,000	1.5
5LHW53	41 20 7	116 58 12	1.50	.07	1.50	.150	200	L.5	L10	700	1.5
5LHW59	41 24 23	116 52 37	1.50	.15	.70	.300	300	L.5	L10	2,000	1.5
5LHW61	41 24 29	116 52 55	3.00	.07	.30	.150	70	L.5	10	1,500	1.5
5LHW64	41 24 50	116 53 38	.70	.15	.30	.050	150	L.5	L10	300	1.5
5LHW65	41 24 37	116 52 57	1.50	.30	1.50	.100	300	L.5	L10	2,000	1.5
5LHW66	41 23 40	116 52 51	1.50	.03	.30	.150	300	L.5	L10	3,000	2.0
5LHW68	41 23 38	116 52 38	1.50	.03	.20	.150	150	L.5	L10	700	2.0
5LHW69	41 22 43	116 51 36	1.50	.07	.30	.100	150	L.5	L10	300	3.0
5LHW72	41 22 56	116 50 51	3.00	.05	.30	.200	300	L.5	L10	3,000	1.5
5LHW73	41 22 31	116 50 37	1.50	.05	.20	.150	150	L.5	L10	500	2.0
5LHW75	41 21 31	116 49 43	3.00	.15	.70	.150	300	L.5	L10	1,500	2.0
5LHW76	41 21 17	116 51 2	1.50	.07	.70	.070	150	L.5	10	1,500	3.0
5LHW77	41 20 18	116 50 7	1.50	.07	.30	.100	150	L.5	L10	700	2.0
5LHW78	41 17 59	116 49 52	1.50	.03	.15	.150	70	L.5	L10	700	2.0

Table 4b. Rocks from South Fork of the Little Humboldt River Wilderness Study Area--Continued

Sample	Latitude	Longitude	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-B	S-BA	S-BE
5LHW79	41 17 53	116 49 33	1.50	.03	.20	.150	50	L.5	L10	700	2.0
5LHW80	41 17 48	116 49 13	3.00	.05	.20	.070	70	L.5	L10	500	1.5
5LHW81	41 17 47	116 49 22	7.00	.50	.70	.700	1,500	L.5	L10	1,500	3.0
5LHW82	41 18 0	116 49 7	.30	L.02	.10	.050	30	L.5	L10	300	L1.0
5LHW83	41 18 23	116 48 12	1.50	.07	.30	.100	150	L.5	L10	300	1.5
5LHW84	41 18 30	116 48 10	2.00	.70	1.50	.300	300	L.5	L10	1,500	1.5
5LHW87	41 18 43	116 44 29	1.00	.07	.30	.100	100	L.5	L10	500	1.5
5LHW88	41 18 47	116 49 41	1.50	L.02	.03	.050	L10	L.5	L10	200	L1.0
5LHW89	41 17 33	116 48 48	5.00	.15	.50	.150	150	L.5	L10	2,000	1.5
5LHW90	41 17 6	116 57 18	2.00	.05	.70	.150	300	L.5	L10	2,000	2.0
5LHW93	41 23 30	116 57 28	2.00	.03	1.00	.150	300	L.5	L10	3,000	2.0
5LHW94	41 26 20	116 51 30	7.00	7.00	7.00	.700	700	L.5	L10	200	L1.0
5LHW96	41 21 6	116 57 25	3.00	.10	.20	.150	1,000	L.5	L10	2,000	1.5
5LHW97	41 20 18	116 57 41	2.00	.20	.30	.150	150	L.5	L10	2,000	1.5
5LHW98	41 20 20	116 56 42	1.50	.07	.15	.150	300	L.5	L10	300	1.5
5LHW99	41 20 29	116 56 31	2.00	.10	.30	.150	500	1.0	L10	1,500	1.5

Sample	S-CO	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SN	S-SR	S-V	S-Y	S-ZR
5LHW6	L5	L10	L5	L30	L5	L20	L5	L10	L5	L10	L100	L10	L10	L10
5LHW7	L5	L10	L5	70	L5	30	L5	15	7	L10	200	L10	70	300
5LHW9	L5	L10	L5	70	L5	30	L5	15	L5	L10	150	30	50	300
5LHW10B	L5	L10	L5	L30	L5	L20	L5	L10	L5	L10	L100	L10	L10	15
5LHW12A	L5	L10	L5	70	L5	30	L5	15	L5	L10	700	L10	70	200
5LHW12B	L5	L10	L5	70	L5	30	L5	15	L5	L10	150	10	70	300
5LHW13	L5	L10	L5	70	L5	30	L5	15	L5	L10	150	L10	70	300
5LHW27	15	L10	L5	70	L5	L20	L5	15	30	L10	300	150	30	150
5LHW30	L5	L10	L5	100	L5	30	L5	20	7	L10	150	30	50	200
5LHW36	L5	L10	L5	L30	L5	L20	L5	L10	L5	L10	L100	L10	L10	L10
5LHW38	L5	L10	L5	70	L5	30	L5	15	L5	L10	150	L10	50	300
5LHW41	L5	L10	L5	100	L5	30	L5	15	7	L10	150	15	30	300
5LHW42	L5	L10	L5	70	L5	30	L5	20	L5	L10	150	70	30	200
5LHW43A	L5	L10	L5	30	L5	30	L5	20	L5	L10	L100	L10	30	300
5LHW43B	L5	L10	L5	50	L5	30	L5	30	L5	L10	L100	15	50	300
5LHW45	L5	L10	L5	70	L5	30	L5	20	L5	L10	L100	L10	50	300
5LHW47	L5	L10	L5	30	L5	30	L5	15	L5	L10	L100	L10	20	300

Table 4b. Rocks from South Fork of the Little Humboldt River Wilderness Study Area--Continued

Sample	S-CO	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SN	S-SR	S-V	S-Y	S-ZR
5LHW49A	15	150	7	30	L5	L20	15	10	30	L10	300	150	15	70
5LHW50	L5	L10	L5	70	L5	30	L5	15	10	L10	150	L10	30	200
5LHW52	L5	L10	7	70	L5	20	L5	15	7	L10	150	L10	30	150
5LHW53	L5	L10	L5	70	L5	20	L5	15	7	L10	150	10	50	150
5LHW59	L5	L10	L5	70	L5	L20	L5	15	7	L10	150	30	30	200
5LHW61	L5	L10	L5	70	L5	30	L5	15	7	L10	150	70	30	200
5LHW64	L5	L10	L5	30	L5	L20	L5	15	5	L10	L100	L10	20	70
5LHW65	L5	L10	L5	70	L5	L20	L5	15	7	L10	700	L10	30	150
5LHW66	L5	L10	L5	70	L5	30	L5	15	7	L10	150	15	70	300
5LHW68	L5	L10	L5	30	L5	L20	L5	15	7	L10	L100	L10	20	150
5LHW69	L5	L10	L5	70	L5	30	L5	15	L5	L10	L100	30	70	200
5LHW72	L5	L10	L5	70	L5	30	L5	15	7	L10	150	L10	30	200
5LHW73	L5	L10	L5	70	L5	30	L5	15	L5	L10	L100	15	50	300
5LHW75	L5	L10	5	50	L5	20	10	20	10	L10	150	15	30	300
5LHW76	L5	L10	5	70	L5	20	L5	150	L5	L10	150	10	30	200
5LHW77	L5	L10	5	70	L5	30	L5	20	L5	L10	100	10	30	300
5LHW78	L5	L10	L5	50	L5	20	10	15	L5	L10	L100	L10	30	300
5LHW79	L5	L10	5	70	L5	20	L5	15	L5	L10	L100	15	30	300
5LHW80	L5	L10	L5	30	L5	20	L5	15	L5	L10	L100	L10	15	300
5LHW81	30	L10	7	50	L5	L20	20	10	30	L10	300	150	30	150
5LHW82	L5	30	L5	L30	L5	L20	L5	L10	5	L10	100	100	L10	50
5LHW83	L5	L10	L5	150	L5	20	L5	15	L5	L10	L100	L10	70	300
5LHW84	5	15	L5	50	L5	L20	L5	15	10	L10	300	70	20	200
5LHW87	L5	L10	L5	30	L5	20	L5	10	L5	L10	L100	10	30	300
5LHW88	L5	L10	15	30	L5	L20	L5	15	7	L10	L100	30	20	200
5LHW89	L5	L10	L5	50	L5	L20	L5	15	10	L10	100	15	50	300
5LHW90	L5	L10	L5	70	L5	20	L5	20	L5	L10	100	15	50	300
5LHW93	L5	L10	L5	70	L5	20	L5	15	7	L10	200	L10	50	300
5LHW94	30	300	30	L30	L5	L20	100	L10	30	L10	300	200	20	100
5LHW96	L5	L10	L5	30	L5	L20	L5	15	7	L10	150	15	30	200
5LHW97	L5	L10	7	30	L5	L20	L5	15	10	L10	100	L10	20	200
5LHW98	L5	L10	L5	50	L5	L20	L5	15	7	L10	L100	L10	30	200
5LHW99	L5	L10	5	50	L5	L20	L5	15	7	L10	150	30	30	200

Table 4b. Rocks from South Fork of the Little Humboldt River Wilderness Study Area--Continued

Sample	AA-AU-P	INST-HG	AA-TL-T	AA-AS-P	AA-BI-P	AA-CD-P	AA-SB-P	AA-ZN-P
5LHW6	L.1	.06	.032	L5	L2	1.5	L2	16
5LHW7	L.1	.03	.330	L5	L2	.4	L2	83
5LHW9	L.1	.04	.820	L5	L2	.4	L2	95
5LHW10B	L.1	.05	.100	L5	L2	L.1	L2	5
5LHW12A	L.1	.21	.380	L5	L2	.3	L2	57
5LHW12B	L.1	.04	.460	L5	L2	.6	L2	98
5LHW13	L.1	.03	.430	L5	L2	.3	L2	78
5LHW27	L.1	.19	.460	L5	L2	2.8	L2	120
5LHW30	L.1	.05	1.100	6	L2	.8	L2	85
5LHW36	L.2	.07	.027	L5	L2	.1	3	4
5LHW38	L.1	.03	.790	7	L2	.3	3	36
5LHW41	L.1	.06	.740	L5	L2	.8	L2	70
5LHW42	L.1	.04	.740	L5	L2	.5	L2	27
5LHW43A	L.1	L.02	.880	L5	L2	.5	L2	18
5LHW43B	L.1	.05	.900	L5	L2	.9	L2	63
5LHW45	L.1	.03	.900	L5	L2	.7	L2	110
5LHW47	L.1	.07	.590	L5	L2	.2	L2	35
5LHW49A	L.1	.05	.160	L5	L2	1.6	L2	45
5LHW50	L.1	.16	1.100	7	L2	1.6	L2	110
5LHW52	L.1	.06	.670	L5	L2	1.0	L2	83
5LHW53	L.1	.17	.530	17	L2	1.0	3	61
5LHW59	L.1	.22	1.200	L5	L2	.9	L2	52
5LHW61	L.1	.21	.800	32	L2	1.7	L2	28
5LHW64	L.1	.17	.400	6	L2	.5	L2	30
5LHW65	L.1	.15	.160	9	L2	.8	L2	60
5LHW66	L.1	.05	.850	L5	L2	1.0	L2	110
5LHW68	L.2	.17	.590	18	L2	.9	3	29
5LHW69	L.1	.03	.880	10	L2	.9	8	130
5LHW72	L.1	.27	.850	L5	L2	1.4	L2	110
5LHW73	L.1	.15	.980	6	L2	.9	L2	100
5LHW75	L.1	1.30	1.100	5	L2	1.0	L2	74
5LHW76	L.1	.03	1.300	L5	L2	.7	L2	65
5LHW77	L.1	.09	1.100	7	L2	.6	L2	55
5LHW78	L.1	.67	1.200	L5	L2	.6	L2	39
5LHW79	L.1	1.70	.850	L5	L2	.6	L2	15

Table 4b. Rocks from South Fork of the Little Humboldt River Wilderness Study Area--Continued

Sample	AA-AU-P	INST-HG	AA-TL-T	AA-AS-P	AA-BI-P	AA-CD-P	AA-SB-P	AA-ZN-P
5LHW80	L.1	.10	1.200	13	L2	1.1	L2	25
5LHW81	L.1	.35	2.400	16	L2	4.3	L2	330
5LHW82	L.2	.08	.100	L5	L2	.2	L2	2
5LHW83	L.1	.08	.750	L5	L2	.7	L2	110
5LHW84	L.1	.25	1.200	L5	L2	1.1	L2	48
5LHW87	L.1	.32	1.000	L5	L2	.4	L2	24
5LHW88	L.1	.22	.250	8	L2	.6	L2	19
5LHW89	L.1	.03	1.400	49	L2	1.4	L2	67
5LHW90	L.1	.02	1.000	L5	L2	1.0	L2	99
5LHW93	L.1	L.02	1.200	L5	L2	.3	L2	29
5LHW94	L.1	.03	.100	L5	L2	3.1	L2	67
5LHW96	L.1	.21	1.400	15	L2	1.0	L2	56
5LHW97	L.1	.04	1.600	57	L2	1.0	L2	43
5LHW98	L.1	L.02	.220	L5	L2	.3	L2	34
5LHW99	L.1	.22	1.900	55	L2	1.0	2	85

Sample	Latitude	Longitude	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-B	S-BA	S-BE
5LHW103	41 26 35	116 54 1	3.00	.10	.70	.200	200	L.5	L10	3,000	2.0
5LHW104	41 19 50	116 55 49	1.50	.10	.30	.100	200	L.5	L10	500	1.5
5LHW105	41 19 26	116 55 54	3.00	.03	.30	.150	700	L.5	L10	3,000	1.5
5LHW106	41 18 50	116 55 45	3.00	.20	.70	.150	700	L.5	L10	1,000	1.5
5LHW111	41 20 27	116 56 14	3.00	.02	.15	.150	150	.5	L10	1,500	1.0
5LHW113	41 24 59	116 53 41	1.50	.10	1.50	.100	150	L.5	L10	1,500	1.5
5LHW114	41 13 0	116 54 30	1.50	L.02	.50	.150	200	L.5	L10	1,500	2.0
5LHL7	41 25 50	116 59 19	.20	.15	20.00	.007	150	L.5	L10	150	1.5
5LHL9	41 26 39	116 57 45	1.50	.05	.70	.150	150	L.5	L10	3,000	2.0
5LHL11	41 26 30	116 56 16	1.50	.20	.70	.100	150	L.5	10	3,000	2.0
5LHL12	41 26 39	116 57 45	1.50	.02	.30	.100	150	L.5	15	1,500	3.0
5LHL14	41 26 8	116 57 0	2.00	.03	.50	.100	150	L.5	15	2,000	3.0
5LHL20	41 25 21	116 55 45	2.00	.07	.70	.100	700	L.5	15	3,000	3.0
5LHL21	41 24 11	116 57 39	1.50	.05	.70	.100	300	L.5	15	2,000	3.0
5LHL24	41 23 12	116 59 27	1.50	.02	.20	.070	150	L.5	10	500	3.0

Table 4b. Rocks from South Fork of the Little Humboldt River Wilderness Study Area--Continued

Sample	Latitude	Longitude	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-B	S-BA	S-BE
5LHL25B	41 23 24	116 59 6	1.00	.03	.30	.030	150	L.5	L10	700	2.0
5LHL30	41 22 45	116 58 57	1.00	.15	.20	.070	150	L.5	30	200	1.5
5LHL31	41 22 49	116 58 52	1.00	.07	.15	.150	30	L.5	L10	300	2.0
5LHL33	41 22 14	116 59 45	1.50	.07	.70	.100	300	L.5	L10	3,000	3.0
5LHL36	41 24 40	116 54 8	1.50	.10	.70	.070	150	L.5	10	3,000	3.0
5LHL38	41 23 58	116 54 5	1.50	.07	.50	.150	150	L.5	15	3,000	3.0
5LHL39	41 23 46	116 54 22	1.50	.15	.50	.050	300	L.5	L10	2,000	3.0
5LHL40	41 23 34	116 54 44	1.50	.15	.70	.100	300	L.5	15	3,000	3.0
5LHL43	41 21 21	116 59 19	1.50	.30	1.00	.100	200	L.5	L10	700	1.5
5LHL45	41 21 34	116 59 32	3.00	.70	3.00	.300	1,000	L.5	L10	700	1.5
5LHL46	41 21 34	116 59 37	1.50	.15	.70	.070	70	L.5	10	200	1.5
5LHL48	41 20 39	116 58 15	2.00	1.50	10.00	.150	700	L.5	L10	500	L1.0
5LHL49	41 20 42	116 58 10	3.00	3.00	3.00	.150	300	L.5	L10	500	L1.0
5LHL50	41 20 56	116 57 52	1.50	.07	.20	.050	150	L.5	10	300	1.5
5LHL51	41 24 21	116 52 52	2.00	.20	.70	.100	500	L.5	L10	1,000	1.5
5LHL53	41 24 24	116 53 5	1.50	.10	.50	.150	200	L.5	L10	1,000	1.5
5LHL54	41 24 26	116 53 26	2.00	.15	.70	.100	500	L.5	L10	1,000	1.5
5LHL55	41 24 16	116 53 27	1.50	.07	.70	.100	300	L.5	10	3,000	2.0
5LHL58	41 23 59	116 53 32	1.00	.15	.30	.030	300	L.5	30	200	1.5
5LHL61	41 24 2	116 52 58	3.00	.07	.30	.150	150	L.5	L10	1,500	1.5
5LHL62	41 23 57	116 53 14	1.50	.20	.50	.150	300	L.5	15	2,000	3.0
5LHL65	41 23 34	116 53 3	.70	.15	.20	.070	150	L.5	L10	500	1.5
5LHL68	41 22 58	116 52 21	3.00	.03	.20	.070	300	L.5	L10	700	3.0
5LHL70	41 22 51	116 52 16	1.50	.70	1.00	.200	300	L.5	10	300	1.5
5LHL73	41 20 7	116 51 23	3.00	.03	.50	.150	300	L.5	15	3,000	3.0
5LHL75	41 18 30	116 50 30	1.00	.03	.15	.070	150	L.5	L10	300	3.0
5LHL75A	41 18 30	116 50 30	1.50	.15	.20	.070	200	L.5	10	300	3.0
5LHL76	41 17 47	116 50 26	.70	.07	.10	.050	30	L.5	L10	300	L1.0
5LHL77	41 17 30	116 49 45	1.50	.05	.15	.100	150	L.5	L10	500	2.0
5LHL79	41 17 35	116 49 25	5.00	3.00	5.00	.300	500	L.5	L10	300	L1.0
5LHL85	41 18 53	116 51 47	1.50	.30	.70	.100	200	L.5	L10	1,500	3.0
5LHL88	41 19 12	116 51 47	1.50	.15	.30	.100	150	L.5	L10	2,000	3.0
5LHL89	41 19 25	116 51 53	1.50	.05	.30	.100	300	L.5	10	3,000	3.0
5LHL92	41 20 17	116 57 3	1.00	.02	.15	.100	70	1.5	L10	700	L1.0
5LHL93	41 20 48	116 56 57	1.50	.03	.10	.070	150	L.5	L10	700	1.5

Table 4b. Rocks from South Fork of the Little Humboldt River Wilderness Study Area--Continued

Sample	S-CO	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SN	S-SR	S-V	S-Y	S-ZR
5LHW103	L5	L10	L5	70	L5	20	L5	15	7	L10	150	15	30	300
5LHW104	L5	L10	5	100	L5	20	L5	20	L5	L10	L100	15	50	300
5LHW105	L5	L10	L5	50	L5	20	L5	15	10	L10	L100	10	30	200
5LHW106	L5	L10	L5	30	L5	L20	L5	15	7	L10	300	30	30	150
5LHW111	L5	L10	L5	50	L5	L20	L5	15	10	L10	100	20	30	150
5LHW113	L5	L10	L5	30	L5	L20	L5	10	7	L10	150	L10	30	150
5LHW114	L5	L10	L5	70	L5	20	L5	15	L5	L10	L100	L10	50	300
5LHL7	L5	L10	L5	L30	L5	L20	L5	L10	L5	L10	150	L10	10	20
5LHL9	L5	L10	L5	70	L5	20	L5	20	5	L10	200	30	70	300
5LHL11	L5	L10	5	70	L5	20	L5	15	5	L10	1,000	L10	30	200
5LHL12	L5	L10	L5	70	L5	30	L5	15	5	L10	150	L10	30	200
5LHL14	L5	L10	L5	70	L5	30	L5	20	5	L10	150	L10	50	300
5LHL20	L5	L10	L5	70	L5	30	L5	20	5	L10	150	20	50	200
5LHL21	L5	L10	5	70	L5	30	L5	15	5	L10	150	10	50	300
5LHL24	L5	L10	L5	70	L5	30	L5	20	L5	L10	L100	10	70	150
5LHL25B	L5	L10	L5	70	L5	20	L5	15	L5	L10	L100	L10	30	150
5LHL30	L5	L10	L5	50	L5	20	L5	15	L5	L10	L100	30	30	150
5LHL31	L5	L10	L5	70	L5	20	L5	15	5	L10	L100	15	50	300
5LHL33	L5	L10	L5	70	L5	30	L5	15	5	L10	150	30	50	300
5LHL36	L5	L10	L5	70	L5	20	L5	15	5	L10	300	L10	30	200
5LHL38	L5	L10	L5	70	L5	30	L5	15	7	L10	200	20	50	300
5LHL39	L5	L10	L5	50	L5	20	L5	15	L5	L10	300	10	30	200
5LHL40	L5	L10	5	70	L5	30	L5	15	5	L10	500	15	30	300
5LHL43	L5	L10	L5	70	L5	L20	L5	15	7	L10	300	15	30	150
5LHL45	10	L10	L5	30	L5	L20	L5	15	20	L10	300	50	30	100
5LHL46	L5	L10	L5	70	L5	20	L5	15	L5	L10	L100	15	30	300
5LHL48	10	150	5	L30	L5	L20	L5	L10	20	L10	300	100	15	50
5LHL49	15	150	7	L30	L5	L20	15	L10	30	L10	300	150	20	70
5LHL50	L5	L10	L5	70	L5	20	L5	15	L5	L10	L100	15	30	300
5LHL51	L5	L10	L5	50	L5	L20	L5	15	10	L10	150	15	30	300
5LHL53	L5	L10	L5	70	L5	L20	L5	15	10	L10	200	L10	30	300
5LHL54	L5	L10	L5	70	L5	L20	L5	15	10	L10	200	L10	30	200
5LHL55	L5	L10	L5	70	L5	20	L5	15	7	L10	200	30	50	300
5LHL58	L5	L10	L5	70	L5	L20	L5	15	L5	L10	L100	15	70	150
5LHL61	L5	L10	L5	70	7	L20	L5	15	10	L10	150	30	30	200

Table 4b. Rocks from South Fork of the Little Humboldt River Wilderness Study Area--Continued

Sample	S-CO	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SN	S-SR	S-V	S-Y	S-ZR
5LHL62	L5	L10	L5	70	L5	20	L5	15	7	L10	150	30	50	300
5LHL65	L5	L10	L5	70	7	L20	L5	15	L5	L10	L100	L10	30	300
5LHL68	L5	L10	5	30	L5	20	L5	15	L5	L10	L100	L10	30	200
5LHL70	L5	L10	7	50	L5	L20	L5	15	7	L10	150	30	15	150
5LHL73	L5	L10	L5	70	L5	30	L5	20	7	L10	200	30	50	300
5LHL75	L5	L10	L5	70	L5	L20	L5	15	L5	L10	L100	10	30	200
5LHL75A	L5	L10	L5	70	L5	L20	L5	15	L5	L10	L100	15	30	200
5LHL76	L5	15	L5	50	L5	L20	L5	15	L5	L10	150	30	10	100
5LHL77	L5	L10	L5	70	L5	20	L5	20	L5	L10	100	20	30	300
5LHL79	20	150	7	30	L5	L20	30	10	30	L10	300	150	20	70
5LHL85	L5	L10	L5	70	L5	20	L5	20	7	L10	700	L10	30	300
5LHL88	L5	L10	L5	30	L5	20	L5	15	7	L10	150	L10	30	300
5LHL89	L5	L10	L5	70	L5	30	L5	30	7	L10	150	15	50	300
5LHL92	L5	L10	L5	30	20	L20	L5	15	7	L10	L100	L10	15	150
5LHL93	L5	L10	L5	30	L5	L20	L5	10	7	L10	L100	L10	20	150

Sample	AA-AU-P	INST-HG	AA-TL-T	AA-AS-P	AA-BI-P	AA-CD-P	AA-SB-P	AA-ZN-P
5LHW103	L.1	.03	.600	12	L2	1.4	L2	110
5LHW104	L.1	.03	1.200	L5	L2	.6	10	85
5LHW105	L.1	.54	1.000	12	L2	1.2	L2	70
5LHW106	L.1	4.00	1.100	23	L2	1.5	L2	50
5LHW111	L.1	.06	.860	24	L2	1.4	3	16
5LHW113	L.1	.18	.360	9	L2	.6	L2	44
5LHW114	L.1	L.02	1.900	L5	L2	.7	L2	63
5LHL7	L.1	.03	.130	L5	L2	1.4	L2	9
5LHL9	L.1	L.02	.840	L5	L2	.6	L2	96
5LHL11	L.1	.07	.540	L5	L2	.7	L2	120
5LHL12	L.1	.07	.520	L5	L2	.4	L2	62
5LHL14	L.1	.03	.970	L5	L2	.6	L2	130
5LHL20	L.1	.05	.830	14	L2	.9	3	52
5LHL21	L.1	L.02	.730	L5	L2	.7	L2	97
5LHL24	L.1	L.02	.860	L5	L2	.4	L2	130
5LHL25B	L.1	.03	.730	L5	L2	.4	L2	77
5LHL30	L.1	.04	1.300	L5	L2	.5	L2	36

Table 4b. Rocks from South Fork of the Little Humboldt River Wilderness Study Area--Continued

Sample	AA-AU-P	INST-HG	AA-TL-T	AA-AS-P	AA-BI-P	AA-CD-P	AA-SB-P	AA-ZN-P
5LHL31	L.1	.05	1.100	L5	L2	.2	L2	29
5LHL33	L.1	L.02	.620	6	L2	.7	L2	95
5LHL36	L.1	.07	.600	L5	L2	.7	L2	70
5LHL38	L.1	.03	.760	L5	L2	.7	L2	82
5LHL39	L.1	.03	.700	6	L2	.6	L2	69
5LHL40	L.1	.03	.910	L5	L2	.8	L2	70
5LHL43	L.1	.03	.700	L5	L2	.4	L2	43
5LHL45	L.1	.18	.700	L5	L2	2.8	L2	120
5LHL46	L.1	.07	.620	L5	L2	.6	L2	27
5LHL48	L.1	.65	.620	L5	L2	2.1	L2	50
5LHL49	L.1	.16	.200	L5	L2	1.3	L2	51
5LHL50	L.1	.03	.890	L5	L2	.5	L2	83
5LHL51	L.1	.09	1.300	7	L2	1.1	L2	74
5LHL53	L.1	.05	.810	12	L2	.5	2	36
5LHL54	L.1	.07	.720	5	L2	.8	L2	66
5LHL55	L.1	.03	.680	L5	L2	.9	L2	95
5LHL58	L.1	.05	.520	8	L2	.5	L2	55
5LHL61	L.1	.21	.740	31	L2	1.7	3	49
5LHL62	L.1	.09	.500	7	L2	.7	L2	53
5LHL65	L.1	.28	1.400	20	L2	.5	4	31
5LHL68	L.1	.04	.700	36	L2	1.2	7	110
5LHL70	L.1	4.00	.310	9	L2	1.5	3	18
5LHL73	L.1	.05	.480	7	L2	.2	2	75
5LHL75	L.1	.55	.580	25	L2	.3	9	100
5LHL75A	L.1	.07	.530	68	L2	.5	12	70
5LHL76	L.1	.21	.093	9	L2	.1	7	7
5LHL77	L.1	.05	.710	45	L2	.2	9	24
5LHL79	L.1	.04	.140	8	L2	1.6	4	77
5LHL85	L.1	.06	.830	L5	L2	.5	3	85
5LHL88	L.1	.04	.800	L5	L2	.5	7	91
5LHL89	L.1	.06	.760	6	L2	.4	3	110
5LHL92	L.1	.12	.780	180	L2	.4	3	13
5LHL93	L.1	.11	.760	21	L2	.4	2	46

Table 4b. Rocks from South Fork of the Little Humboldt River Wilderness Study Area--Continued

Sample	Latitude	Longitude	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-B	S-BA	S-BE
5LHL94	41 20 59	116 56 55	1.00	.15	.30	.100	150	L.5	L10	700	2.0
5LHL97	41 26 21	116 54 59	1.50	.05	.50	.150	150	L.5	L10	3,000	2.0
5LHL99	41 23 25	116 53 15	1.50	.15	.50	.150	150	L.5	L10	3,000	3.0
5LHL100	41 22 59	116 34 4	2.00	.03	.50	.150	150	L.5	L10	3,000	3.0
5LHL101	41 22 34	116 54 29	1.50	.07	.30	.070	300	L.5	10	1,500	5.0
5LHL103	41 22 6	116 54 41	2.00	.03	.15	.050	300	L.5	15	1,500	1.5
5LHL104	41 22 11	116 54 56	1.50	.15	.70	.100	200	L.5	20	3,000	1.5
5LHL106	41 21 18	116 56 13	3.00	.30	.70	.150	150	L.5	L10	700	1.5
5LHL108	41 21 7	116 52 4	2.00	.70	1.50	.150	150	L.5	L10	2,000	3.0
5LHL110	41 21 19	116 52 57	2.00	.07	.50	.150	150	L.5	L10	3,000	3.0
5LHL111	41 20 12	116 52 45	2.00	.05	.50	.150	300	L.5	L10	3,000	3.0
5LHL112	41 20 30	116 55 36	2.00	.05	.50	.150	200	L.5	L10	3,000	2.0
5LHL113	41 20 31	116 53 43	1.50	.03	.50	.150	150	L.5	L10	3,000	3.0
5LHL116	41 24 52	116 48 19	1.50	.07	.30	.100	150	L.5	L10	1,000	1.5
5LHL120A	41 25 45	116 51 56	.70	.50	1.50	.070	100	L.5	30	500	1.5
5LHL121	41 26 9	116 51 19	5.00	7.00	5.00	.300	500	L.5	L10	150	L1.0
5LHL32	41 22 5	116 59 53	.07	.05	1.00	.015	200	L.5	L10	200	7.0
5LHL118	41 23 45	116 51 55	1.50	.07	.50	.070	200	L.5	L10	1,500	1.5

Table 4b. Rocks from South Fork of the Little Humboldt River Wilderness Study Area--Continued

Sample	S-CO	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SN	S-SR	S-V	S-Y	S-ZR
5LHL94	L5	L10	L5	150	L5	30	L5	20	L5	L10	L100	15	70	200
5LHL97	L5	L10	L5	70	L5	20	L5	15	7	L10	300	20	50	300
5LHL99	L5	L10	L5	70	L5	20	L5	15	7	L10	150	10	50	300
5LHL100	L5	L10	L5	70	L5	30	L5	15	7	L10	200	15	50	300
5LHL101	L5	L10	L5	70	L5	20	L5	15	7	L10	150	30	30	200
5LHL103	L5	15	7	30	L5	L20	L5	10	7	L10	L100	30	20	150
5LHL104	L5	L10	5	70	L5	20	L5	15	7	L10	1,500	20	50	200
5LHL106	L5	L10	L5	70	L5	L20	L5	15	7	L10	1,000	30	50	150
5LHL108	L5	L10	7	50	L5	L20	L5	15	10	L10	2,000	30	30	150
5LHL110	L5	L10	L5	70	L5	30	L5	15	7	L10	300	15	70	300
5LHL111	L5	L10	L5	70	L5	30	L5	30	7	L10	300	20	70	300
5LHL112	L5	L10	L5	70	L5	30	L5	20	7	L10	300	30	70	200
5LHL113	L5	L10	L5	70	L5	20	L5	15	7	L10	200	15	70	200
5LHL116	L5	L10	L5	100	L5	20	L5	15	L5	15	L100	15	70	200
5LHL120A	L5	L10	5	70	L5	L20	L5	15	5	L10	500	50	15	100
5LHL121	20	300	30	L30	L5	L20	7	L10	30	L10	150	150	15	50
5LHL32	L5	L10	L5	L30	L5	L20	L5	20	L5	L10	150	L10	15	15
5LHL118	L5	L10	L5	70	L5	L20	L5	15	L5	L10	L100	L10	30	200

Table 4b. Rocks from South Fork of the Little Humboldt River Wilderness Study Area--Continued

Sample	AA-AU-P	INST-HG	AA-TL-T	AA-AS-P	AA-BI-P	AA-CD-P	AA-SB-P	AA-ZN-P
5LHL94	L.1	.04	.800	L5	L2	.3	L2	64
5LHL97	L.1	.07	.760	L5	L2	.5	L2	120
5LHL99	L.1	.04	.740	L5	L2	.7	L2	110
5LHL100	L.1	.04	.670	5	L2	.4	L2	110
5LHL101	L.1	.04	1.700	14	L2	.5	L2	48
5LHL103	L.1	.04	1.400	26	L2	.5	2	51
5LHL104	L.1	.04	.530	L5	L2	.6	L2	54
5LHL106	L.1	.04	.620	10	L2	.8	L2	85
5LHL108	L.1	.10	.440	5	L2	.5	L2	81
5LHL110	L.1	L.02	.720	L5	L2	.6	L2	110
5LHL111	L.1	L.02	1.000	L5	L2	.7	L2	140
5LHL112	L.1	.02	.670	5	L2	.6	L2	130
5LHL113	L.1	.47	.740	10	L2	.5	L2	98
5LHL116	L.1	.16	.600	L5	L2	.5	L2	110
5LHL120A	L.1	.02	.670	L5	L2	.4	L2	41
5LHL121	L.1	.04	.012	L5	L2	1.7	5	60
5LHL32	L.1	L.02	.790	L5	L2	.1	L2	8
5LHL118	L.1	.14	.740	L5	L2	.3	L2	

[all values in parts per million (ppm), except Fe, Mg, Ca, and Ti, which are in weight percent; L , detected but below the limit of detection; G, determined to be greater than the value shown. Analyzed for but not detected or detected but below the limit given in the parentheses: Bi (10), Cd (30), for example. Elements preceded by "s" analyzed for by 6-step semiquantitative emission spectrographic analysis method; elements with "aa" prefix analyzed for by atomic absorption method; mercury analyzed for by atomic absorption spectrophometric method.]