UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

CHEMICAL ANALYSES AND STATISTICAL SUMMARIES FOR SAMPLES OF ROCK, MINUS-60-MESH (0.25-mm) STREAM SEDIMENT, AND NONMAGNETIC HEAVY-MINERAL CONCENTRATE, LINCOLN CREEK ROADLESS AREA, DOUGLAS COUNTY, NEVADA

by

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OPEN-FILE REPORT 83-666

1983

STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. 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 Lincoln Creek Roadless Area in the Lake Tahoe Basin Management Unit in Toiyabe National Forest, Douglas County, Nevada. The Lincoln Creek Roadless Area (5983) was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

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INTRODUCTION

Geochemical sampling was conducted in the Lincoln Creek Roadless Area, Douglas County, Nevada, during the summer of 1982 (fig. 1). This report includes a map showing the locations of all sites sampled in this program (fig. 2), a tabulation of the lower limits of determination used in the various analytical methods (table 1), a tabulation of chemical analyses for samples of rock, minus-60-mesh (0.25-mm) stream sediment, and nonmagnetic heavy-mineral concentrate from stream-sediment (tables 2, 3, and 4, respectively), and summary statistics for the elements listed in tables 2-4 (tables 5-7). Tables 2-4 and 5-7 list selected data provided by computer programs in the U.S. Geological Survey RASS-STATPAC system (VanTrump and Miesch, 1977).

SAMPLE COLLECTION AND PREPARATION

A set of samples was collected at most sites shown on plate 1; a complete set consisted of a rock sample, a stream-sediment sample, and a bulk stream-sediment sample used for panning. Analyses for a total of 21 rock samples, 27 stream-sediment samples, and 27 nonmagnetic heavy-mineral-concentrate samples are listed in this report (tables 2-4). The number of samples analyzed for each medium yields an approximate sample density of 1 sample/0.5 mi^2 (1 sample/1.3 km^2) for the rock samples and 1 sample/0.3 mi^2 (1 sample/0.8 km^2) for the other two media.

Most of the rock samples are of unaltered material. These samples provide background information on element abundances in rocks that have not been affected by hydrothermal alteration or mineralization. In addition, some rocks were collected to test for ore-related elements that might not be identified by a visual examination. Although each sample was selected to be representative of the rocks exposed in the vicinity of the sample site, the actual areal extent of influence of the chemical information provided by a specific sample is not known; the sampling program was designed only to provide some general information on the geochemical nature of the rock units present.

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

Concentrate samples were processed from the same active alluvium used to make minus-60-mesh (0.25-mm) stream-sediment samples. The analyses of the concentrate samples provide information about the chemistry of a limited number of minerals present in rock material eroded from the drainage basin upstream from each sample site. Wet panning and a heavy-liquid gravity separation technique were used to remove most of the common rock-forming minerals, such as quartz, feldspars, and clay minerals, and a magnetic separation technique was used to remove the more highly magnetic minerals, leaving a concentrate that commonly contains minerals associated with many types of mineral deposits. The selective concentration of ore-related minerals permits determination of some elements that are not easily detected in stream-sediment samples. The chemical composition of a concentrate may also indicate specific minerals. For example, the barium content in a stream-sediment

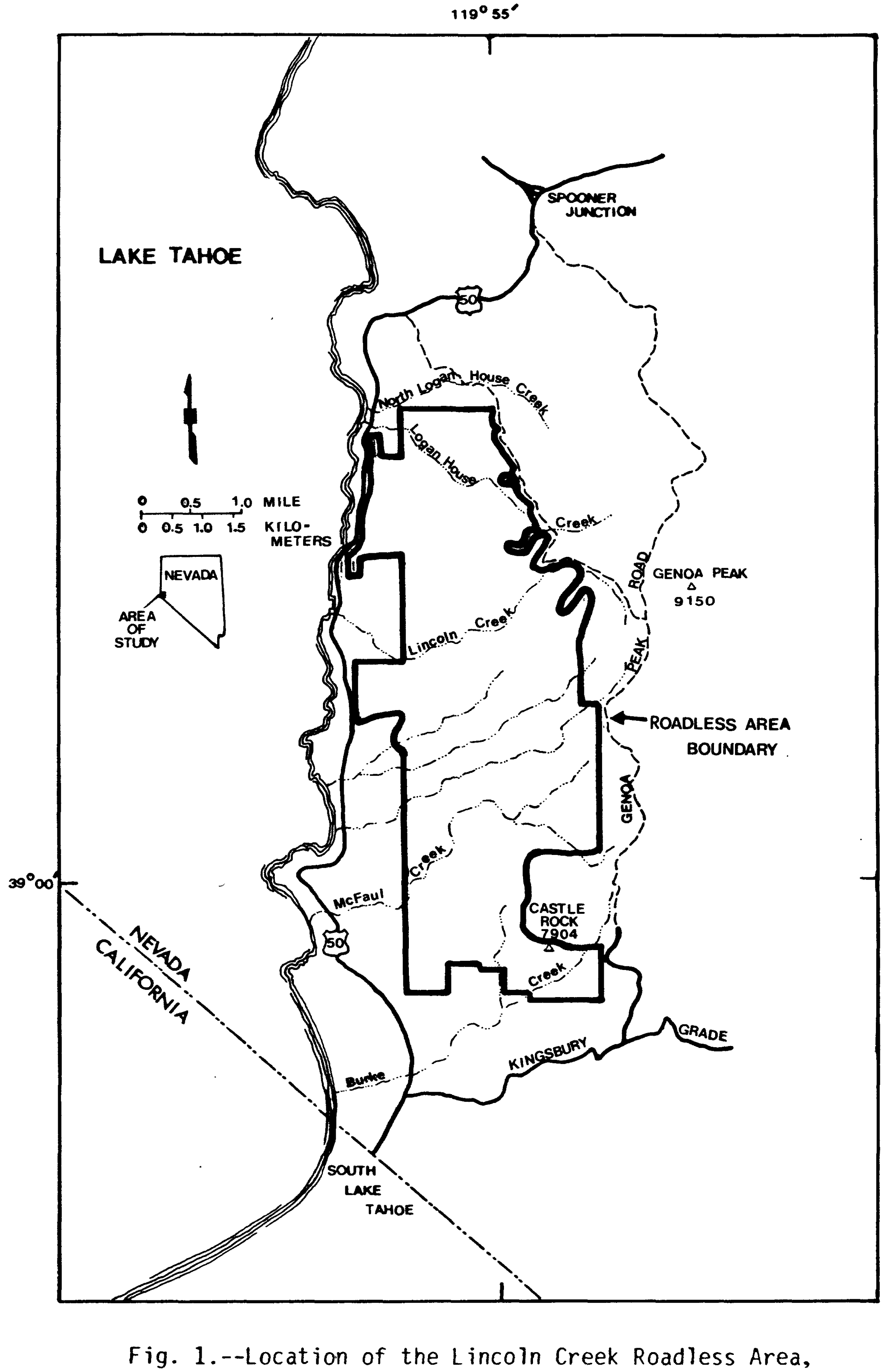
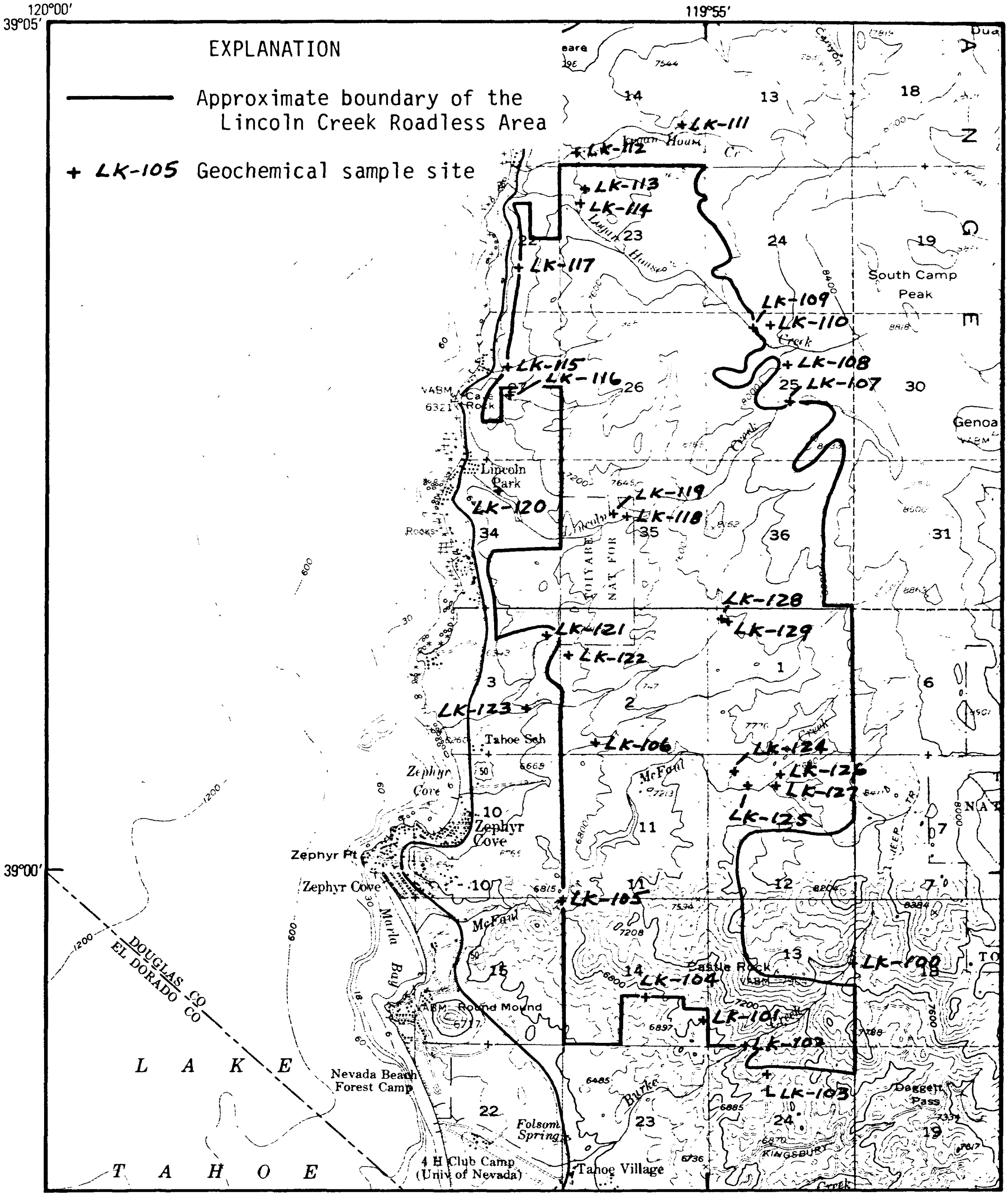


Fig. 1.--Location of the Lincoln Creek Roadless Area, Douglas County, Nevada



Base from U.S. Geological Survey
1:62,500 quadrangles: Carson
City, Freel Peak, 1956

SCALE 1:62 500

1 ½ 0 1 2 3 4 MILES

1 .5 0 1 2 3 4 KILOMETERS

CONTOUR INTERVAL 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Fig. 2.--Map showing locations of geochemical sample sites, Lincoln Creek Roadless Area, Douglas County, Nevada

sample is predominantly the sum of barium in the mineral barite plus barium substituted in feldspars, clay minerals, and possibly other minerals, whereas the barium in a concentrate sample is essentially all in barite.

Rock samples

All rock samples were collected from outcrops that were considered to be representative of exposures in the vicinity of the plotted site location. Whenever possible the samples were hand cobbed to remove any obviously weathered material. All samples were crushed and pulverized to at least minus-100-mesh (0.15-mm) material before analysis.

Minus-60-mesh (0.25-mm) stream-sediment samples

The material for the stream-sediment samples was active alluvium collected primarily from first-order (unbranched) and second-order (below the junction of two first-order) streams as shown on 1:62,500-scale topographic maps. Each sample was composited from active alluvium collected from several locations within an area that may extend as much as 50 ft (15 m) from the site plotted on the map. The resulting sample was air dried and the portion that passed through a screen with 0.25-mm openings (a 60-mesh screen) was saved and pulverized to at least minus-100-mesh (0.15-mm) material before analysis.

Nonmagnetic heavy-mineral-concentrate samples

The bulk sample of active stream-sediment material was collected and composited in a manner similar to that used for the minus-60-mesh stream-sediment samples. Each bulk sample was passed through a 10-mesh (2.0-mm) screen to remove the coarse material. The sediment passing through the screen was wet-panned until most of the quartz, feldspar, organic material, and clay-sized material was removed. The sample was air dried and passed through an 18-mesh (1.0-mm) sieve; the minus-18-mesh material was saved. Any light material remaining in the concentrate was then removed by allowing the heavier fraction of the sample to settle through bromoform (specific gravity 2.86). The heavier fraction was cleaned in acetone and air dried. The highly magnetic material was next removed from the rest of the heavy-mineral sample using a Frantz Isodynamic Magnetic Separator set at 0.2 amperes and oriented so that the magnetic coil, covered with a mylar sheet, was in a horizontal plane. The weaker magnetic material was then separated from the nonmagnetic material using the same procedure with the Frantz instrument but using a 1.8-ampere setting. The resulting nonmagnetic sample was split into two fractions. One fraction was ground for the analysis and the other fraction was saved for mineralogical studies.

CHEMICAL ANALYSIS

All three types of samples were analyzed for 31 elements (Ag, As, Au, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, La, Mg, Mn, Mo, Nb, Ni, Pb, Sb, Sc, Sn, Sr, Th, Ti, V, W, Y, Zn, and Zr) using a six-step semiquantitative emission spectrographic method (Grimes and Marranzino, 1968). Because of the limited amount of sample material, the nonmagnetic heavy-mineral concentrates were only analyzed spectrographically. The rock and stream-sediment samples were also analyzed for As, Zn, Cd, Sb, and Bi by a modification of the atomic-absorption spectrometric method of Viets (1978). Analysis for all three sample types was done in the field.

The spectrographic analytical values are reported as the approximate geometric midpoints (0.15, 0.2, 0.3, 0.5, 0.7, and 1.0 or appropriate powers of ten of these values) of concentration ranges whose respective boundaries are 0.12, 0.18, 0.26, 0.38, 0.56, 0.83, and 1.2 (or appropriate powers of ten of these values). In general, the precision of the spectrographic method is plus or minus one reporting value of the value given by the analyst approximately 83 percent of the time and plus or minus two reporting values of the value given by the analyst 96 percent of the time (Motooka and Grimes, 1976). Because all of the samples for this report were analyzed by the same analyst using the same spectrographic instrument, our experience indicates that better precision can be expected in this study.

Each spectrographic film includes analytical spectra for up to 22 field samples and one reference standard sample. The reference standard sample is included with each set of field samples to monitor the quality of the analyses from film to film.

For the five elements analyzed by atomic absorption spectrometry the reporting values vary with the element and with the concentration level for any given element. Precision for these analytical methods is commonly reported as a percent relative standard deviation (% RSD), and is based on replicate analyses of samples selected to provide information at different concentration levels. In general, the precision for each method tends to be lowest for those samples containing a given element at or near its lower limit of determination. For the five elements discussed here, the reported ranges of percent relative standard deviation, as determined by replicate analysis of limited sample sets, are as follows:

Element	Range of % RSD	Source of data
As	4.4-49	J. D. Sharkey, written commun., 1983
Zn	3.7-42	J. D Sharkey, written commun., 1983
Cd	0-154	J. D. Sharkey, written commun., 1983
Sb	0- 72	J. D. Sharkey, written commun., 1983
Bi	4.8- 5.2	J. D. Sharkey, written commun., 1983

As an example to use in interpreting these ranges one might consider zinc, whose range is shown as 3.7-42% RSD. This range indicates that a reported zinc value listed in tables 2 or 3 should be within ± 42% (usually much less) of the mean value for that sample. As was the case for the spectrographic analyses, a reference standard sample was analyzed with each batch of field samples to monitor the quality of the analyses.

DESCRIPTION OF TABLES 1-4

Table 1 lists the lower limits of analytical determination for the three types of samples collected for this report. Because of matrix interference problems, the spectrographic technique was modified for the analysis of nonmagnetic heavy-mineral-concentrate samples. As a result, the lower limits of determination for the elements analyzed for this type of sample are all raised two reporting values above the normal lower-limit value.

Tables 2-4 list the chemical analyses for the samples of rock, minus-60-mesh (0.25-mm) stream sediment, and nonmagnetic heavy-mineral concentrate, respectively. For the three sample sets the data are arranged so that column 1 contains the USGS-assigned sample numbers. These numbers coincide with the numbers on the site location map (plate 1). In tables 2-4, rock samples are suffixed by RK, stream-sediment samples by SS, and concentrate samples by KN. Columns 2 and 3 list the latitude (north) and longitude (west), respectively, for each sample site in degrees, minutes, and seconds. Column headings showing the letter "s" below the element symbol are emission spectrographic analyses. Column headings showing the letters "aa" below the element symbol are atomic absorption analyses. All element concentrations are given in parts per million (ppm), except those for Fe, Mg, Ca, and Ti, which are given in percent (pct).

If a given element was looked for but not detected in a sample, then the letter "N" was entered in the tables in place of an analytical value. If an element was observed but was below the lowest reporting value, then 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, then 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 2-4, some of the elements listed in these tables (Fe, Mg, Ca, Ti, and Be) carry one or more nonsignificant zeroes to the right of the significant digits. The analysts did not determine these elements to the accuracy suggested by the extra zeroes. The last column in table 2 gives the formation name for each rock sample. These names are taken from the units shown on the geologic map of the Lincoln Creek Roadless Area (John and others, 1983).

For the semiquantitative spectrographic method used, the elements As, Bi, Cd, Sb, and Zn have lower limits of analytical determination that are usually above normal concentrations for these elements in the selected sample media. To obtain more useful analyses, these elements were anaylzed using other, more sensitive methods on the rock and stream-sediment samples, and the spectrographic analyses for these five elements have been deleted from the rock and stream-sediment data sets (tables 2 and 3). The spectrographic analyses for Ag, Au, Nb, Sn, W, and Th in the rock samples; for Ag, Au, Mo, Nb, Sn, and W in the stream-sediment samples; and for Ag, As, Au, Be, Cd, Sb, and Zn in the concentrate samples were, in every case, below their respective lower limits of determination. Consequently, these elements have also been deleted from tables 2,3, and 4, respectively. For the same reason the atomic absorption analyses for As, Cd, and Bi in the rock samples and for Bi in the stream-sediment samples have been deleted.

Table 1.--Lower limits of analytical determination for samples of rock, minus-60-mesh (0.25-mm) stream sediment, and nonmagnetic heavy-mineral concentrate, Lincoln Creek Roadless Area, Nevada

[(--) indicates not analyzed. "aa" following the element symbol indicates atomic absorption analysis; no suffix indicates spectrographic analysis. The values listed for Fe, Mg, Ca, and Ti are in percent; all others are in parts per million]

Element	Lower limit of determination	
	Rock and stream sediment	Heavy-mineral concentrate
Fe	0.05	0.1
Mg	0.02	0.05
Ca	0.05	0.1
Ti	0.002	0.005
Mn	10	20
Ag	0.5	1.0
As	200	500
Au	10	20
B	10	20
Ba	20	50
Be	1	2
Bi	10	20
Cd	20	50
Co	5	10
Cr	10	20
Cu	5	10
La	20	50
Mo	5	10
Nb	20	50
Ni	5	10
Pb	10	20
Sb	100	200
Sc	5	10
Sn	10	20
Sr	100	200
V	10	20
W	50	100
Y	10	20
Zn	200	500
Zr	10	20
Th	200	500
As-aa	10	--
Zn-aa	5	--
Cd-aa	0.1	--
Sb-aa	1.0	--
Bi-aa	2	--

Table 2.--Data for rock samples, Lincoln Creek Roadless Area, Nevada

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Co-ppm s	Cr-ppm s
LK101RK	38 59 7	119 55 2	5	2.0	3.0	.5	700	50	700	1.0	30	15
LK103RK	38 58 48	119 54 33	3	1.0	2.0	.3	700	50	500	1.5	10	<10
LK104RK	38 59 15	119 55 28	5	1.5	3.0	.5	1,000	70	1,000	1.0	20	10
LK105RK	38 59 49	119 56 6	5	1.5	3.0	.5	700	100	500	1.0	20	20
LK106RK	39 0 45	119 55 51	5	2.0	3.0	.5	700	70	700	<1.0	30	15
LK107RK	39 2 46	119 54 23	5	1.5	3.0	.5	700	70	700	1.0	20	20
LK108RK	39 2 59	119 54 24	7	2.0	7.0	.7	1,000	15	500	<1.0	50	50
LK109RK	39 3 12	119 54 40	2	.3	1.0	.3	500	50	1,500	1.0	5	<10
LK110RK	39 3 13	119 54 32	7	2.0	7.0	.7	1,000	15	300	<1.0	30	50
LK111RK	39 4 24	119 55 12	3	1.0	1.5	.5	700	30	1,000	1.5	15	10
LK112RK	39 4 14	119 56 0	3	1.5	3.0	.5	700	70	700	<1.0	30	15
LK113RK	39 4 1	119 55 56	5	2.0	3.0	.5	700	100	500	1.0	30	20
LK116RK	39 2 48	119 56 30	5	1.5	3.0	.5	1,000	100	500	1.0	20	15
LK117RK	39 3 33	119 56 26	5	2.0	5.0	.5	700	100	500	1.0	20	20
LK118RK	39 2 5	119 55 37	5	2.0	5.0	.5	1,000	100	500	<1.0	30	20
LK120RK	39 2 14	119 56 35	5	2.0	3.0	.5	1,000	100	700	<1.0	30	20
LK121RK	39 1 23	119 56 13	7	2.0	5.0	.7	1,000	70	500	<1.0	30	20
LK123RK	39 0 57	119 56 22	5	1.5	3.0	.5	700	100	700	1.0	20	15
LK124RK	39 0 35	119 54 48	5	1.5	5.0	.5	700	100	700	1.0	30	15
LK127RK	39 0 30	119 54 29	5	1.5	3.0	.5	700	100	500	1.0	20	20
LK129RK	39 1 28	119 54 51	5	2.0	5.0	.5	1,000	100	700	<1.0	30	30

Table 2.--Data for rock samples, Lincoln Creek Roadless Area, Nevada

Sample	Cu-ppm s	La-ppm s	Mo-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sr-ppm s	V-ppm s	Y-ppm s	Zr-ppm s	Zn-ppm aa	Sb-ppm aa
LK101RK	30	20	N	7	15	10	300	100	10	70	55	N
LK103RK	50	30	N	5	15	7	200	70	10	100	40	N
LK104RK	15	30	N	7	20	10	300	100	20	150	30	N
LK105RK	20	30	N	10	15	10	200	100	15	150	40	N
LK106RK	50	20	N	10	15	15	200	100	20	200	30	N
LK107RK	30	20	N	15	10	15	200	100	20	200	40	N
LK108RK	50	20	N	15	10	30	500	200	20	100	40	N
LK109RK	<5	30	N	<5	20	7	150	30	50	300	35	N
LK110RK	100	<20	N	20	<10	20	700	200	20	100	45	N
LK111RK	<5	30	N	5	15	7	200	70	20	200	30	1
LK112RK	30	20	N	15	15	10	200	100	20	70	40	N
LK113RK	50	<20	<5	15	15	20	200	150	20	70	35	N
LK116RK	50	<20	N	10	10	15	300	150	20	200	40	N
LK117RK	30	20	N	15	15	15	300	150	20	200	35	N
LK118RK	50	20	N	15	15	15	300	150	20	150	40	N
LK120RK	70	20	N	15	15	15	200	200	30	100	40	N
LK121RK	30	20	N	15	15	20	200	150	20	300	40	N
LK123RK	30	20	N	15	15	15	200	150	20	300	50	N
LK124RK	50	20	N	10	20	15	200	150	20	100	35	N
LK127RK	20	20	N	15	10	15	200	100	20	200	40	N
LK129RK	70	30	N	15	15	20	300	150	20	200	40	8

Table 2.--Data for rock samples, Lincoln Creek Roadless Area, Nevada

Sample	ROCK UNIT NAME
LK101RK	GRANODIORITE OF EAST PEAK
LK103RK	GRANODIORITE OF EAST PEAK
LK104RK	GRANODIORITE OF EAST PEAK
LK105RK	GRANODIORITE OF EAST PEAK
LK106RK	GRANODIORITE OF DAGGETT PASS
LK107RK	GRANODIORITE OF DAGGETT PASS
LK108RK	METAVOLCANIC ROCKS
LK109RK	GRANODIORITE OF DAGGETT PASS
LK110RK	METAVOLCANIC ROCKS
LK111RK	GRANODIORITE OF NORTH LOGAN HOUSE CREEK
LK112RK	GRANODIORITE OF DAGGETT PASS
LK113RK	GRANODIORITE OF DAGGETT PASS
LK116RK	GRANODIORITE OF DAGGETT PASS
LK117RK	GRANODIORITE OF DAGGETT PASS
LK118RK	GRANODIORITE OF DAGGETT PASS
LK120RK	GRANODIORITE OF DAGGETT PASS
LK121RK	GRANODIORITE OF DAGGETT PASS
LK123RK	GRANODIORITE OF DAGGETT PASS
LK124RK	GRANODIORITE OF DAGGETT PASS
LK127RK	GRANODIORITE OF DAGGETT PASS
LK129RK	GRANODIORITE OF DAGGETT PASS

Table 3.--Data for stream-sediment samples, Lincoln Creek Roadless Area, California

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	B-ppm s	Ba-ppm s
LK100SS	38 59 27	119 53 54	5.0	2.0	3	.5	1,000	100	500
LK101SS	38 59 7	119 55 2	3.0	1.0	2	.3	700	70	1,000
LK102SS	38 58 58	119 54 43	7.0	2.0	3	.7	1,000	100	500
LK103SS	38 58 48	119 54 33	5.0	2.0	3	.5	1,000	50	700
LK104SS	38 59 15	119 55 28	5.0	2.0	3	.7	1,000	50	700
LK105SS	38 59 49	119 56 6	5.0	1.5	3	.5	1,000	100	500
LK106SS	39 0 45	119 55 51	5.0	2.0	5	.5	1,000	200	300
LK107SS	39 2 46	119 54 23	5.0	1.5	2	.5	1,500	100	500
LK109SS	39 3 12	119 54 40	7.0	2.0	3	.7	1,500	70	500
LK111SS	39 4 24	119 55 12	5.0	.7	2	.7	700	150	500
LK112SS	39 4 14	119 56 0	7.0	.7	2	.5	700	70	500
LK113SS	39 4 1	119 55 56	7.0	1.5	3	.5	1,000	100	500
LK114SS	39 3 56	119 55 58	5.0	2.0	5	.5	1,000	200	300
LK115SS	39 2 58	119 56 31	5.0	1.5	3	.5	1,000	150	300
LK116SS	39 2 48	119 56 30	7.0	2.0	3	.5	2,000	150	500
LK118SS	39 2 5	119 55 37	5.0	1.5	2	.5	700	100	300
LK119SS	39 2 6	119 55 43	5.0	1.0	3	.5	1,000	150	300
LK120SS	39 2 14	119 56 35	7.0	2.0	2	.5	1,000	100	300
LK121SS	39 1 23	119 56 13	3.0	2.0	3	.5	700	150	300
LK122SS	39 1 16	119 56 3	5.0	1.5	2	.5	1,500	100	500
LK123SS	39 0 57	119 56 22	5.0	1.5	5	.5	1,000	100	300
LK124SS	39 0 35	119 54 48	1.5	.5	3	.2	1,000	70	200
LK125SS	39 0 30	119 54 42	5.0	1.5	3	.5	1,000	100	500
LK126SS	39 0 34	119 54 27	2.0	1.0	2	.5	500	70	200
LK127SS	39 0 30	119 54 29	5.0	1.5	2	.5	700	70	500
LK128SS	39 1 29	119 54 54	7.0	1.5	5	.5	1,000	150	300
LK129SS	39 1 28	119 54 51	5.0	1.5	3	.5	1,000	100	300

Table 3.--Data for stream-sediment samples, Lincoln Creek Roadless Area, California

Sample	Be-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sr-ppm s
LK100SS	1.0	30	100	50	20	30	15	20	200
LK101SS	1.5	10	15	15	30	7	20	7	200
LK102SS	1.0	30	70	50	30	20	20	20	200
LK103SS	1.0	30	20	30	30	10	15	10	300
LK104SS	1.0	30	15	30	30	15	20	20	300
LK105SS	1.0	30	30	50	20	15	20	15	200
LK106SS	1.0	20	30	20	20	15	10	30	200
LK107SS	1.0	20	50	50	30	15	10	15	200
LK109SS	1.0	50	70	50	20	20	10	20	200
LK111SS	1.0	7	20	15	20	7	15	10	200
LK112SS	1.0	10	30	15	20	7	10	10	200
LK113SS	<1.0	20	30	30	20	10	20	15	200
LK114SS	1.0	30	30	30	20	15	10	30	200
LK115SS	1.0	30	20	50	30	15	20	15	200
LK116SS	<1.0	30	70	70	30	15	20	20	200
LK118SS	<1.0	30	50	50	20	15	10	20	150
LK119SS	1.0	30	30	70	20	15	10	10	150
LK120SS	<1.0	30	70	50	20	15	10	20	200
LK121SS	1.0	30	15	15	<20	10	10	30	200
LK122SS	<1.0	30	50	100	30	15	10	20	200
LK123SS	1.0	20	30	15	20	10	10	50	200
LK124SS	1.0	10	15	15	<20	7	N	7	150
LK125SS	1.0	30	50	50	20	15	<10	20	150
LK126SS	<1.0	15	15	20	<20	10	<10	10	150
LK127SS	1.0	20	50	50	20	15	15	15	150
LK128SS	1.0	30	50	20	20	10	<10	50	200
LK129SS	<1.0	15	50	70	20	15	15	15	200

Table 3.--Data for stream-sediment samples, Lincoln Creek Roadless Area, California

Sample	V-ppm s	Y-ppm s	Zr-ppm s	Th-ppm s	As-ppm aa	Zn-ppm aa	Cd-ppm aa	Sb-ppm aa
LK100SS	150	30	300	N	N	50	N	N
LK101SS	70	20	200	N	N	45	N	N
LK102SS	200	30	500	N	N	75	.3	N
LK103SS	150	15	200	N	N	55	N	N
LK104SS	100	50	500	N	N	55	N	N
LK105SS	150	50	150	N	N	45	N	2
LK106SS	150	50	>1,000	N	N	20	N	N
LK107SS	150	20	200	N	10	95	N	N
LK109SS	300	30	200	N	30	55	N	4
LK111SS	100	30	500	N	N	25	N	3
LK112SS	150	30	1,000	N	N	40	N	6
LK113SS	150	20	300	N	20	40	N	N
LK114SS	200	50	700	N	N	30	N	N
LK115SS	150	20	150	N	N	60	N	N
LK116SS	200	30	700	N	N	80	N	N
LK118SS	150	30	500	N	10	65	N	N
LK119SS	200	20	150	N	N	50	N	8
LK120SS	200	30	500	N	N	50	N	N
LK121SS	100	50	500	N	N	15	N	N
LK122SS	200	30	300	N	10	80	N	4
LK123SS	200	50	>1,000	N	N	15	N	N
LK124SS	150	20	500	N	N	35	.4	5
LK125SS	200	30	1,000	N	N	45	N	2
LK126SS	100	15	300	N	N	30	.4	N
LK127SS	150	20	300	N	N	65	N	N
LK128SS	200	70	>1,000	N	10	20	N	N
LK129SS	200	20	1,000	200	N	55	N	N

Table 4.--Data for concentrate samples, Lincoln Creek Roadless Area, California

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	B-ppm s	Ba-ppm s
LK100KN	38 59 27	119 53 54	.5	.15	10.0	>2	300	30	200
LK101KN	38 59 7	119 55 2	.7	.10	7.0	>2	700	30	500
LK102KN	38 58 58	119 54 43	.7	.15	15.0	>2	700	20	200
LK103KN	38 58 48	119 54 33	.7	.15	15.0	>2	700	20	200
LK104KN	38 59 15	119 55 28	.5	.10	15.0	>2	700	20	150
LK105KN	38 59 49	119 56 6	.7	.15	15.0	>2	500	30	150
LK106KN	39 0 45	119 55 51	.7	.10	5.0	>2	300	50	150
LK107KN	39 2 46	119 54 23	.7	.20	7.0	>2	500	30	500
LK109KN	39 3 12	119 54 40	1.5	.70	3.0	>2	500	200	500
LK111KN	39 4 24	119 55 12	.7	.10	10.0	>2	500	100	300
LK112KN	39 4 14	119 56 0	.7	.10	10.0	>2	500	30	300
LK113KN	39 4 1	119 55 56	.7	.30	7.0	>2	700	150	200
LK114KN	39 3 56	119 55 58	.7	.30	5.0	>2	500	30	300
LK115KN	39 2 58	119 56 31	.5	.15	10.0	>2	500	100	150
LK116KN	39 2 48	119 56 30	.7	.10	1.5	>2	200	30	300
LK118KN	39 2 5	119 55 37	.5	.15	3.0	>2	300	30	100
LK119KN	39 2 6	119 55 43	.7	.15	3.0	>2	200	50	500
LK120KN	39 2 14	119 56 35	.7	.10	5.0	>2	200	50	200
LK121KN	39 1 23	119 56 13	.7	.20	10.0	>2	700	50	150
LK122KN	39 1 16	119 56 3	1.0	.20	15.0	>2	500	100	200
LK123KN	39 0 57	119 56 22	.7	.10	2.0	>2	200	30	300
LK124KN	39 0 35	119 54 48	.5	.10	5.0	>2	300	70	500
LK125KN	39 0 30	119 54 42	.7	.10	10.0	>2	500	30	200
LK126KN	39 0 34	119 54 27	.5	.15	7.0	>2	300	20	500
LK127KN	39 0 30	119 54 29	.5	.10	10.0	>2	300	30	300
LK128KN	39 1 29	119 54 54	.7	.20	3.0	>2	300	50	200
LK129KN	39 1 28	119 54 51	.5	.15	5.0	>2	200	20	300

Table 4.--Data for concentrate samples, Lincoln Creek Roadless Area, California

Sample	Bi-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
LK100KN	N	10	20	N	500	N	N	N	<20
LK101KN	N	15	20	10	700	15	70	N	20
LK102KN	N	15	30	10	1,000	15	<50	N	20
LK103KN	N	15	20	15	700	20	50	N	30
LK104KN	N	15	<20	N	700	15	100	N	20
LK105KN	N	10	20	N	500	<10	50	N	<20
LK106KN	N	10	20	10	200	N	<50	N	N
LK107KN	N	10	20	<10	300	N	<50	10	<20
LK109KN	N	10	<20	N	70	N	N	N	N
LK111KN	1,500	<10	20	30	500	70	<50	N	<20
LK112KN	70	<10	30	<10	200	15	70	N	N
LK113KN	N	10	<20	10	200	10	<50	N	N
LK114KN	N	<10	<20	<10	300	<10	<50	10	N
LK115KN	50	10	<20	10	300	10	<50	<10	N
LK116KN	N	10	<20	<10	50	<10	<50	10	N
LK118KN	N	10	<20	10	150	N	N	10	<20
LK119KN	N	<10	<20	N	100	N	N	<10	N
LK120KN	N	10	<20	10	150	N	N	10	N
LK121KN	N	10	20	N	500	N	N	N	N
LK122KN	N	15	20	N	500	10	<50	N	20
LK123KN	N	10	<20	<10	70	N	N	15	N
LK124KN	N	<10	20	N	200	10	50	N	N
LK125KN	N	15	20	<10	500	<10	50	<10	N
LK126KN	N	10	<20	<10	300	10	<50	N	<20
LK127KN	N	10	20	10	300	N	<50	N	20
LK128KN	N	<10	<20	<10	200	N	N	<10	N
LK129KN	N	<10	<20	<10	150	N	N	10	<20

Table 4.--Data for concentrate samples, Lincoln Creek Roadless Area, California

Sample	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zr-ppm s	Th-ppm s
LK100KN	30	20	<200	300	N	700	>2,000	1,000
LK101KN	30	70	N	300	N	700	>2,000	1,500
LK102KN	20	70	N	300	N	1,000	>2,000	3,000
LK103KN	15	50	N	500	N	700	>2,000	5,000
LK104KN	30	100	N	300	N	1,000	>2,000	1,500
LK105KN	30	70	N	500	N	700	>2,000	700
LK106KN	70	30	N	300	N	700	>2,000	2,000
LK107KN	30	30	N	200	N	700	>2,000	1,500
LK109KN	15	<20	200	150	<100	300	>2,000	1,000
LK111KN	50	100	N	200	300	1,000	>2,000	300
LK112KN	30	50	N	200	200	700	>2,000	300
LK113KN	50	30	N	150	<100	700	>2,000	700
LK114KN	70	20	N	200	N	700	>2,000	1,000
LK115KN	50	30	N	200	<100	700	>2,000	1,500
LK116KN	70	<20	N	100	N	700	>2,000	1,000
LK118KN	70	<20	N	200	N	700	>2,000	500
LK119KN	50	30	200	150	N	500	>2,000	300
LK120KN	50	<20	N	200	N	700	>2,000	1,000
LK121KN	50	30	N	300	N	500	>2,000	700
LK122KN	20	70	N	500	<100	700	>2,000	700
LK123KN	100	20	N	150	N	1,000	>2,000	1,500
LK124KN	20	20	N	200	100	500	>2,000	300
LK125KN	50	70	N	200	N	700	>2,000	2,000
LK126KN	30	30	N	200	100	500	>2,000	1,500
LK127KN	30	20	N	200	N	700	>2,000	2,000
LK128KN	70	20	N	200	N	500	>2,000	700
LK129KN	50	20	N	150	N	700	>2,000	1,500

DESCRIPTION OF TABLES 5-7

Tables 5, 6, and 7 give summary statistics for the analyses of the samples of rock, minus-60-mesh (0.25-mm) stream sediment, and nonmagnetic heavy-mineral concentrate listed in tables 2, 3, and 4, respectively. All values in the Range of values and Percentiles columns are significant to the number of digits shown.

Table 5.--Summary statistics for the analytical values determined for the 21 rock samples in table 2, Lincoln Creek Roadless Area, Nevada

[All concentrations are in parts per million except those for Fe, Mg, Ca, and Ti, which are in percent. "aa" following the element symbol indicates atomic absorption analysis; no element prefix indicates emission spectrographic analysis. "N" means not detected at the lower limit of determination shown in parentheses]

Element	Range of values	Percentiles				
		50	75	90	95	98
Fe	2 - 7	5	5	7	7	7
Mg	0.3 - 2	1.5	2	2	2	2
Ca	1 - 7	3	5	5	7	7
Ti	0.3 - 0.7	0.5	0.5	0.7	0.7	0.7
Mn	500 -1000	700	1000	1000	1000	1000
B	15 - 100	70	100	100	100	100
Ba	300 -1500	700	700	1000	1000	1500
Be	<1 - 1.5	1	1	1	1.5	1.5
Co	5 - 50	30	30	30	30	50
Cr	<10 - 50	20	20	30	50	50
Cu	<5 - 100	30	50	70	70	100
La	<20 - 30	20	30	30	30	30
Mo	N(5)- <5	N(5)	N(5)	N(5)	N(5)	<5
Ni	<5 - 20	15	15	15	15	20
Pb	<10 - 20	15	15	20	20	20
Sc	7 - 30	15	15	20	20	30
Sr	150 - 700	200	300	300	500	700
V	30 - 200	150	150	200	200	200
Y	10 - 50	20	20	20	30	50
Zr	70 - 300	150	200	300	300	300
Zn-aa	30 - 55	40	40	45	50	55
Sb-aa	N(1) - 8	N(1)	N(1)	N(1)	1	8

Table 6.--Summary statistics for the analytical values determined for the 27 minus-60-mesh (0.25-mm) stream-sediment samples in table 3, Lincoln Creek Roadless Area, Nevada

[All concentrations are in parts per million except those for Fe, Mg, Ca, and Ti, which are in percent. "aa" following the element symbol indicates atomic absorption anaysis; no element prefix indicates emission spectrography analysis. "N" means not detected at the lower limit of determination shown in parentheses]

		Percentiles				
Element	Range of values	50	75	90	95	98
Fe	1.5 - 7	5	7	7	7	7
Mg	0.5 - 2	1.5	2	2	2	2
Ca	2 - 5	3	3	5	5	5
Ti	0.2 - 0.7	0.5	0.5	0.7	0.7	0.7
Mn	500 - 2000	1000	1000	1500	1500	2000
B	50 - 200	100	150	150	200	200
Ba	200 - 1000	500	500	700	700	1000
Be	<1 - 1.5	1	1	1	1	1.5
Co	7 - 50	30	30	30	30	50
Cr	15 - 100	30	50	70	70	100
Cu	15 - 100	50	50	70	70	100
La	<20 - 30	20	30	30	30	30
Ni	7 - 30	15	15	20	20	30
Pb	N(10) - 20	10	20	20	20	20
Sc	7 - 50	20	20	30	50	50
Sr	150 - 300	200	200	200	300	300
V	70 - 300	150	200	200	200	300
Y	15 - 70	30	50	50	50	70
Zr	150 ->1000	500	700	>1000	>1000	>1000
Th	N(100) - 200	N(100)	N(100)	N(100)	N(100)	200
As-aa	N(10) - 30	N(10)	N(10)	10	20	30
Zn-aa	15 - 95	50	55	75	80	95
Cd-aa	N(0.1) - 0.4	N(0.1)	N(0.1)	N(0.1)	0.4	0.4
Sb-aa	N(1) - 8	N(1)	2	4	6	8

Table 7.--Summary statistics for the analytical values determined for the 27 nonmagnetic heavy-mineral-concentrate samples in table 4, Lincoln Creek Roadless Area, Nevada

[All concentrations are in parts per million except those for Fe, Mg, Ca, and Ti, which are in percent. All analyses are by emission spectroscopy. "N" means not detected at the lower limit of determination shown in parentheses]

Element	Range of values	Percentiles				
		50	75	90	95	98
Fe	0.5 - 1.5	0.7	0.7	0.7	1.0	1.5
Mg	0.1 - 0.7	0.15	0.2	0.3	0.3	0.7
Ca	1.5 - 15	7	10	15	15	15
Ti	>2 - >2	>2	>2	>2	>2	>2
Mn	200 - 700	500	500	700	700	700
B	20 - 200	30	50	100	150	200
Ba	100 - 500	200	300	500	500	500
Bi	N(20) - 1500	N(20)	N(20)	50	70	1500
Co	<10 - 15	10	10	15	15	15
Cr	>20 - 30	20	20	20	30	30
Cu	N(10) - 30	<10	10	10	15	30
La	50 - 1000	300	500	700	700	1000
Mo	N(10) - 70	<10	10	15	20	70
Nb	N(50) - 100	<50	50	70	70	100
Ni	N(10) - 15	N(10)	10	10	10	15
Pb	N(20) - 30	N(20)	<20	20	20	30
Sc	15 - 100	50	50	70	70	100
Sn	<20 - 100	30	70	70	100	100
Sr	N(200) - 200	N(200)	N(200)	<200	200	200
V	100 - 500	200	300	500	500	500
W	N(100) - 300	N(100)	<100	100	200	300
Y	300 - 1000	700	700	1000	1000	1000
Zr	>2000 - >2000	>2000	>2000	>2000	>2000	>2000
Th	300 - 5000	1000	1500	2000	3000	5000

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