UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical results and sample locality map of stream-sediment, heavy-mineral-concentrate, and rock samples from the Steep Creek Wilderness Study Area (UT-040-061), Garfield County, Utah

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STUDIES RELATED TO WILDERNESS

Bureau of Land Management Wilderness Study Areas

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine their mineral values, if any. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geochemical survey of the Steep Creek Wilderness Study Area (UT-040-061), Utah.

INTRODUCTION

In October, 1986, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the Steep Creek Wilderness Study Area, Utah.

The Steep Creek Wilderness Study Area comprises about 29 mi^2 (18,350 acres) in central Garfield County within south-central Utah. The study area lies about 15 mi northeast of Escalante and 2 mi east of Boulder Town. Numerous unpaved roads shown on the USGS topographic maps provide two- and four-wheel-drive access to the area. Topographic relief ranges from roughly 7,600 ft in the northeast part of the study area down to 5,000 ft where Steep Creek crosses the southern boundary of the study area. Most of the area is covered by woodland consisting of pinyon, juniper, and scrub oak, with cottonwood, sycamore, aspen, and mesquite along stream valleys. Valleys dissect the rugged mesas characteristic of this section of the Colorado Plateau physiographic province.

The Steep Creek Wilderness Study Area is underlain by continental and marginal marine sedimentary rocks of the Jurassic and Triassic (?) Navajo sandstones and the Upper Triassic (?) Kayenta formation, Wingate sandstone, and Chinle formation. The northwest plunging Circle Cliffs anticline lies to the northeast and east of the study area. The Shinarump conglomerate at the base of the Chinle formation, and exposed within the Circle Cliffs, contains a series of small uranium and vanadium rich ore bodies (Doelling, 1975).

METHODS OF STUDY

Sample Media

Analyses of the stream-sediment samples represent the chemistry of the rock material eroded from the drainage basin upstream from each sample site. Such information is useful in identifying those basins which contain concentrations of elements that may be related to mineral deposits. Heavy-mineral-concentrate samples provide information about the chemistry of certain minerals in rock material eroded from the drainage basin upstream from each sample site. The selective concentration of minerals, many of which may be ore related, permits determination of some elements that are not easily detected in stream-sediment samples.

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.

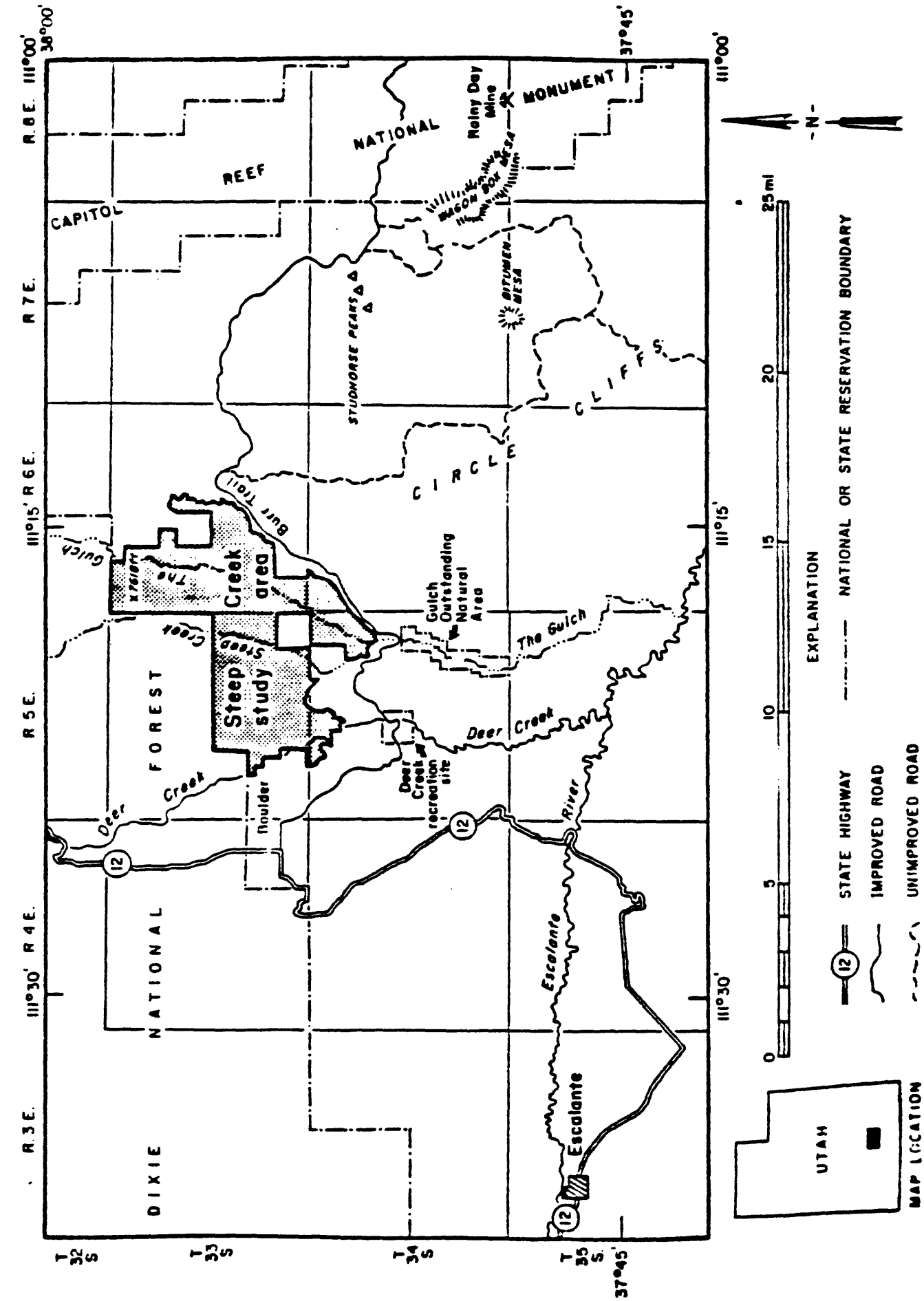

Figure 1. Location map of the Steep Creek Wilderness Study Area, Garfield County, Utah (from Kness, 1987).

Sample Collection

Heavy-mineral-concentrate and stream-sediment samples were collected at 37 sites (plate 1). Seven rock samples were collected at three sites. Sampling density was about one sample site per .77 mi^2 for the stream sediments and heavy-mineral concentrates. The area of the drainage basins sampled ranged from .25 mi^2 to 4 mi^2.

Stream-sediment samples

The stream-sediment samples consisted of active alluvium collected primarily from first-order (unbranched) and second-order (below the junction of two first-order) streams as shown on USGS topographic map (plate 2). Each sample was composited from several localities within an area that may extend as much as 20 ft from the site plotted on the map.

Heavy-mineral-concentrate samples

Heavy-mineral-concentrate samples were collected from the same active alluvium as the stream-sediment samples. Each bulk sample was screened with a 2.0-mm (10-mesh) screen to remove the coarse material. The less than 2.0-mm fraction was panned until most of the quartz, feldspar, organic material, and clay-sized material were removed.

Rock samples

Rock samples were collected from various types of occurrences in the vicinity of the plotted site location. Descriptions of rock samples are in table 6.

Sample Preparation

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

After air drying, bromoform (specific gravity 2.8) was used to remove the remaining quartz and feldspar from the heavy-mineral-concentrate samples that had been panned in the field. The resultant heavy-mineral sample was separated into three fractions using a large electromagnet (in this case a modified Frantz Isodynamic Separator). The most magnetic material, primarily magnetite, was not analyzed. The second fraction, largely ferromagnesian silicates and iron oxides, was saved for archival storage. The third fraction (the least magnetic material which may include the nonmagnetic ore minerals, zircon, sphene, etc.) was split using a Jones splitter. One split was hand ground for spectrographic analysis; the other split was saved for mineralogical analysis. These magnetic separates are the same separates that would be produced by using a Frantz Isodynamic Separator set at a slope of 15° and a tilt of 10° with a current of 0.2 ampere to remove the magnetite and ilmenite, and a current of 0.6 ampere to split the remainder of the sample into paramagnetic and nonmagnetic fractions.

Rock samples were crushed and then pulverized to minus 0.15 mm with ceramic plates.

Sample Analysis

Spectrographic method

The stream-sediment, heavy-mineral-concentrate, and rock samples were analyzed for 31 elements using a semiquantitative, direct-current arc emission spectrographic method. The analyses were performed by analysts in the Branch of Exploration Geochemistry using the method of Grimes and Marranzino (1968); The elements analyzed and their lower limits of determination are listed in table 1. Spectrographic results were obtained by visual comparison of spectra derived from the sample against spectra obtained from standards made from pure oxides and carbonates. Standard concentrations are geometrically spaced over any given order of magnitude of concentration as follows: 100, 50, 20, 10, and so forth. Samples whose concentrations are estimated to fall between those values are assigned values of 70, 30, 15, and so forth. The precision of the analytical method is approximately plus or minus one reporting interval at the 83 percent confidence level and plus or minus two reporting intervals at the 96 percent confidence level (Motooka and Grimes, 1976). Values determined for the major elements, iron, magnesium, calcium, and titanium, are given in weight percent; all others are given in parts per million (micrograms/gram). Analytical data for samples from the Steep Creek Wilderness Study Area, are listed in tables 3, 4, and 5.

Chemical methods

Other analytical methods used on samples from the Steep Creek Wilderness Study Area are summarized in table 2.

Analytical results using these methods for stream-sediment and rock samples are listed in tables 3 and 5, respectively.

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 3-5 list the results of analyses for the samples of stream sediment, 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 map (plate 1). Columns in which the element headings show the letter "s" below the element symbol are emission spectrographic analyses; "aa" indicates atomic absorption analyses; "dna" indicates delayed neutron activation analyses. A letter "N" in the tables indicates that a given element was looked for but not detected at the lower limit of determination shown for that element in table 1. If an element was observed but was below the lowest reporting value, a "less than" symbol (<) was entered in the tables in front of the lower limit of determination. If an element was observed but was above the highest reporting value, a "greater than" symbol (>) was entered

in the tables in front of the upper limit of determination. If an element was not looked for in a sample, two dashes (--) are entered in tables 3-5 in place of an analytical value. Because of the formatting used in the computer program that produced tables 3-5, 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. No detectable amounts of Ag, As, Au, Bi, Cd, Mo, Nb, Sb, Sn, W, Zn, and Th in stream-sediment samples, nor Ag, As, Au, Bi, and Sb in heavy-mineral-concentrate samples, nor As, Au, Bi, Cd, Sb, Sn, W, and Th in rock samples were found. Consequently, the spectrographic columns for these elements have been deleted from tables 3, 4, and 5, respectively.

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TABLE 1.--Limits of determination for the spectrographic analysis of rocks and stream sediments, based on a 10-mg sample

[The values shown are the lower limits of determination assigned by the Grimes and Marranzino method. The spectrographic limits of determination for heavy-mineral-concentrate samples are based on a 5-mg sample, and are therefore two reporting intervals higher than the limits given for rocks.]

Elements	Lower determination limit	Upper determination limit
	Percent	
Iron (Fe)	0.05	20
Magnesium (Mg)	.02	10
Calcium (Ca)	.05	20
Titanium (Ti)	.002	1
	Parts per million	
Manganese (Mn)	10	5,000
Silver (Ag)	0.5	5,000
Arsenic (As)	200	10,000
Gold (Au	10	500
Boron (B)	10	2,000
Barium (Ba)	20	5,000
Beryllium (Be)	1	1,000
Bismuth (Bi)	10	1,000
Cadmium (Cd	2	500
Cobalt (Co)	5	2,000
Chromium (Cr)	10	5,000
Copper (Cu)	5	20,000
Lanthanum (La)	20	1,000
Molybdenum (Mo)	5	2,000
Niobium (Nb)	20	2,000
Nickel (Ni)	5	5,000
Lead (Pb)	10	20,000
Antimony (Sb)	100	10,000
Scandium (Sc)	5	100
Tin (Sn)	10	1,000
Strontium (Sr)	100	5,000
Vanadium (V)	10	10,000
Tungsten (W)	50	10,000
Yttrium (Y)	10	2,000
Zinc (Zn)	200	10,000
Zirconium (Zr)	10	1,000
Thorium (Th)	100	2,000

TABLE 2.--Commonly used chemical methods

[AA = atomic absorption; DNA = delayed neutron activation]

Element or constituent determined	Sample type	Method	Determination limit (micrograms/ gram or ppm)	Reference
Gold (Au)	rock	AA	.1	Modification of Thompson and others, 1968.
Thorium (Th)	rock and stream sediment	DNA		Millard, 1976.
Uranium (U)	rock and stream sediment	DNA		Millard, 1976.

TABLE 3--ANALYSES OF MINUS-80-MESH STREAM SEDIMENT SAMPLES FROM THE STEEP CREEK WILDERNESS STUDY AREA, GARFIELD COUNTY, UTAH.

[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	B-ppm s	Ba-ppm s	Be-ppm s	Co-ppm s
01S	37 55 14	111 16 36	.70	1.00	1.50	.15	300	70	300	1.0	N
02S	37 55 25	111 16 20	.15	1.00	3.00	.20	500	70	1,000	<1.0	5
03S	37 56 8	111 16 11	1.50	.70	1.50	.30	300	70	1,500	<1.0	5
04S	37 56 48	111 16 21	2.00	1.00	2.00	.20	300	70	300	1.5	7
05S	37 57 27	111 15 55	3.00	.70	1.50	.50	500	100	2,000	<1.0	7
06S	37 58 2	111 16 13	1.50	1.00	2.00	.20	500	100	700	1.0	7
07S	37 58 6	111 16 0	.70	.70	1.50	.10	200	50	300	<1.0	N
08S	37 58 22	111 13 32	2.00	1.00	2.00	.20	300	70	700	1.0	7
09S	37 58 8	111 14 11	2.00	1.00	1.50	.30	500	100	700	1.0	10
10S	37 57 39	111 13 45	2.00	1.00	3.00	.30	700	70	700	1.5	10
11S	37 54 40	111 15 0	1.00	1.00	3.00	.15	500	70	500	1.0	5
12S	37 53 58	111 15 46	1.00	.70	1.50	.20	200	70	500	1.0	<5
13S	37 53 2	111 16 27	1.00	.70	1.00	.20	200	100	500	1.0	5
14S	37 51 55	111 18 3	.50	.30	.30	.15	100	100	300	<1.0	N
15S	37 52 8	111 20 18	.20	.07	.20	.07	150	30	300	<1.0	N
16S	37 54 27	111 16 42	.70	.50	1.00	.15	150	30	300	<1.0	N
17S	37 54 16	111 17 2	.15	1.00	2.00	.30	500	100	500	<1.0	<5
18S	37 53 36	111 17 18	.30	.50	.50	.07	150	20	200	<1.0	N
19S	37 53 14	111 17 49	.50	.70	1.50	.15	200	70	300	<1.0	N
20S	37 52 10	111 18 32	.70	.30	.70	.15	150	150	700	N	N
21S	37 52 12	111 18 38	.30	.20	.30	.07	150	30	300	<1.0	N
22S	37 56 43	111 18 2	.30	.07	.15	.07	100	50	300	N	N
23S	37 54 55	111 18 30	.70	.30	.50	.15	200	50	300	<1.0	N
24S	37 53 8	111 19 33	.50	.20	.30	.10	100	50	500	<1.0	N
25S	37 51 53	111 18 55	.30	.10	.15	.07	70	20	300	<1.0	N
26S	37 54 45	111 21 36	.15	.05	.10	.07	50	15	300	<1.0	N
27S	37 54 45	111 21 31	.50	.07	.70	.10	500	50	300	N	N
28S	37 53 58	111 22 5	.50	.15	.70	.07	700	30	300	<1.0	N
29S	37 54 27	111 22 39	.15	.10	.30	.07	30	20	500	<1.0	N
30S	37 55 15	111 20 44	.20	.07	.15	.10	100	150	300	<1.0	N
31S	37 54 52	111 20 45	.30	.07	.30	.15	150	50	300	<1.0	N
32S	37 54 8	111 21 20	.15	.05	.07	.07	70	20	300	<1.0	N
33S	37 53 46	111 21 31	.20	.07	.30	.10	150	20	300	N	N
34S	37 53 43	111 21 36	.20	.07	.30	.07	70	20	300	<1.0	N
35S	37 54 25	111 19 54	.30	.15	.30	.10	150	70	300	<1.0	N
36S	37 54 8	111 20 10	.20	.10	.20	.07	100	20	300	<1.0	N
37S	37 53 13	111 20 42	.50	.15	.30	.15	150	50	300	<1.0	N

TABLE 3--ANALYSES OF MINUS-80-MESH STREAM SEDIMENT SAMPLES FROM THE STEEP CREEK WILDERNESS STUDY AREA, GARFIELD COUNTY, UTAH.--Continued

Sample	Cr-ppm s	Cu-ppm s	La-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sr-ppm s	V-ppm s	Y-ppm s	Zr-ppm s	Th-ppm dna	U-ppm dna
01S	30	10	<20	10	10	<5	150	20	10	300	3.62	.994
02S	15	10	<20	7	15	5	200	30	15	150	5.66	1.650
03S	30	15	20	5	10	5	200	50	20	500	4.96	2.520
04S	30	20	20	10	15	5	150	70	15	100	5.56	1.300
05S	15	20	20	5	30	5	200	70	15	700	9.03	3.480
06S	30	10	<20	10	10	5	200	30	15	200	3.00	1.140
07S	10	10	<20	7	10	N	<100	30	10	200	2.40	.651
08S	30	20	20	7	15	5	200	70	20	700	7.04	2.130
09S	50	70	20	20	30	5	200	70	15	500	<30.00	26.600
10S	50	30	20	20	20	5	300	70	20	200	6.92	2.850
11S	30	10	20	7	10	5	200	30	15	200	3.90	2.240
12S	70	10	<20	5	10	5	100	30	10	700	3.90	1.540
13S	50	7	<20	7	10	<5	N	20	<10	500	<2.00	1.880
14S	50	7	<20	5	10	N	N	15	<10	200	1.70	.791
15S	10	7	<20	<5	<10	N	N	<10	N	300	<1.10	.372
16S	20	5	<20	5	10	<5	N	15	15	200	2.30	.964
17S	20	10	<20	10	<10	5	200	30	15	200	2.70	1.120
18S	30	5	<20	7	<10	N	N	10	N	100	<1.50	.790
19S	20	5	<20	5	10	<5	N	15	10	500	2.20	.900
20S	<10	<5	<20	<5	<10	<5	N	20	<10	500	2.10	1.390
21S	20	7	<20	<5	<10	N	N	10	N	150	1.40	.560
22S	10	<5	<20	<5	<10	N	N	10	N	500	2.00	.676
23S	150	7	<20	<5	<10	N	N	20	N	200	2.00	.841
24S	20	<5	<20	5	<10	<5	N	20	N	150	<1.50	.778
25S	15	<5	<20	<5	<10	<5	N	<10	N	150	<1.50	.603
26S	150	<5	<20	5	N	N	N	<10	N	150	<1.20	.470
27S	10	<5	<20	5	10	N	N	<10	N	30	<1.10	.350
28S	10	5	<20	5	<10	N	N	<10	N	150	1.40	.420
29S	10	<5	<20	<5	10	N	N	<10	N	50	<1.30	.324
30S	15	<5	N	<5	<10	N	N	<10	N	500	<1.20	.507
31S	200	<5	<20	<5	10	<5	N	10	N	500	<1.50	.741
32S	10	<5	<20	<5	<10	N	N	<10	N	30	<1.30	.358
33S	30	5	<20	5	<10	N	N	<10	N	100	<1.10	.335
34S	<10	<5	N	5	10	N	N	<10	N	100	<1.10	.309
35S	<10	5	<20	5	<10	N	N	10	N	300	<1.20	.692
36S	200	<5	<20	<5	10	N	N	<10	N	300	1.70	.500
37S	100	5	20	5	10	<5	N	15	<10	500	<1.50	.590

TABLE 4--ANALYSES OF NONMAGNETIC HEAVY-MINERAL CONCENTRATE SAMPLES FROM THE STEEP CREEK WILDERNESS STUDY AREA, GARFIELD COUNTY, UTAH.

[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	B-ppm s	Ba-ppm s	Be-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s
01C	37 55 14	111 16 36	.15	.15	.30	>2.00	50	200	10,000	<2	N	N	50
02C	37 55 25	111 16 20	.50	.50	1.00	1.00	200	50	>10,000	<2	N	N	300
03C	37 56 8	111 16 11	.30	.20	1.00	.30	200	30	>10,000	N	N	N	<20
04C	37 56 48	111 16 21	.30	.50	1.50	.70	200	100	>10,000	N	N	N	<20
05C	37 57 27	111 15 55	.50	.20	1.00	.20	300	20	>10,000	N	N	N	N
06C	37 58 2	111 16 13	.20	.20	.30	>2.00	100	70	>10,000	<2	N	N	30
07C	37 58 6	111 16 0	1.00	.50	2.00	.15	300	30	>10,000	N	N	10	N
08C	37 58 22	111 13 32	.50	.20	.70	.30	200	30	>10,000	N	N	N	N
09C	37 58 8	111 14 11	1.50	.30	1.50	1.00	200	70	>10,000	2	70	50	20
10C	37 57 39	111 13 45	1.00	.30	.20	.30	500	50	>10,000	N	N	<10	N
12C	37 53 58	111 15 46	.15	.50	.70	.50	100	50	>10,000	N	N	N	<20
13C	37 53 2	111 16 27	.50	.70	.50	2.00	200	150	>10,000	N	N	N	<20
14C	37 51 55	111 18 3	.50	.50	.70	1.00	200	30	>10,000	N	N	<10	200
15C	37 52 8	111 20 18	.15	.05	<.10	2.00	20	100	500	<2	N	N	<20
16C	37 54 27	111 16 42	.20	.30	.50	>2.00	70	30	>10,000	N	N	N	<20
17C	37 54 16	111 17 2	.15	.20	1.00	2.00	150	50	>10,000	<2	N	N	<20
18C	37 53 36	111 17 18	.15	.20	.20	>2.00	50	100	>10,000	<2	N	N	30
19C	37 53 14	111 17 49	.15	.15	.30	>2.00	70	70	>10,000	<2	N	N	50
20C	37 52 10	111 18 32	.20	.15	.50	.30	70	30	>10,000	N	N	N	N
21C	37 52 12	111 18 38	.10	<.05	.10	>2.00	20	150	>10,000	<2	N	N	<20
22C	37 56 43	111 18 2	.15	.10	.20	.20	50	50	2,000	N	N	N	N
23C	37 54 55	111 18 30	.10	.10	.70	.70	70	100	10,000	N	N	N	20
24C	37 53 8	111 19 33	.15	.10	1.00	1.00	70	30	>10,000	N	N	N	<20
25C	37 51 53	111 18 55	.50	.15	1.00	>2.00	200	200	10,000	<2	N	N	500
26C	37 54 45	111 21 36	.10	<.05	<.10	.10	<20	20	3,000	N	N	N	N
28C	37 53 58	111 22 5	.10	.07	.50	1.50	50	50	1,000	N	N	N	N
29C	37 54 27	111 22 39	.20	.15	5.00	.70	200	50	>10,000	N	N	<10	N
30C	37 55 15	111 20 44	.10	<.05	.10	2.00	<20	70	5,000	N	N	N	N
31C	37 54 52	111 20 45	.30	<.05	.10	2.00	70	200	2,000	<2	N	N	700
32C	37 54 8	111 21 20	.10	.05	.15	>2.00	20	50	3,000	<2	N	N	20
33C	37 53 46	111 21 31	.10	.05	.10	>2.00	20	30	1,500	<2	N	N	20
36C	37 54 8	111 20 10	.50	.20	.50	.70	100	50	>10,000	N	N	N	<20

TABLE 4--ANALYSES OF NONMAGNETIC HEAVY-MINERAL CONCENTRATE SAMPLES FROM THE STEEP CREEK WILDERNESS STUDY AREA, GARFIELD COUNTY, UTAH.--Continued

Sample	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-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
01C	N	150	N	<50	20	20	150	70	700	150	N	1,000	N	>2,000	N
02C	<10	150	N	N	<10	<20	10	N	10,000	50	N	500	N	>2,000	N
03C	10	150	N	N	<10	20	N	N	>10,000	50	N	200	N	>2,000	N
04C	<10	150	N	50	<10	<20	N	N	10,000	50	N	150	N	>2,000	N
05C	10	100	N	<50	<10	N	N	N	>10,000	20	N	100	N	>2,000	N
06C	<10	70	N	50	20	50	70	N	2,000	100	N	700	N	>2,000	N
07C	10	<50	N	N	<10	<20	N	N	>10,000	30	N	50	N	2,000	N
08C	10	150	N	N	<10	50	<10	N	>10,000	30	N	150	N	>2,000	N
09C	3,000	200	15	50	150	3,000	50	70	10,000	100	N	500	7,000	>2,000	N
10C	20	200	N	N	<10	100	N	N	>10,000	30	N	150	N	>2,000	N
12C	N	70	N	<50	10	N	N	N	5,000	50	N	150	N	>2,000	N
13C	10	500	N	<50	10	30	<10	N	5,000	100	N	300	N	>2,000	N
14C	N	N	N	N	<10	<20	N	N	700	50	N	150	N	>2,000	N
15C	N	N	N	N	20	50	150	30	200	70	N	1,500	N	>2,000	N
16C	<10	<50	N	<50	10	N	30	N	5,000	100	N	500	N	>2,000	N
17C	N	200	N	<50	<10	N	<10	<20	1,500	70	N	300	N	>2,000	N
18C	N	<50	N	50	30	<20	100	N	1,500	150	N	500	N	>2,000	N
19C	<10	100	N	<50	15	30	100	<20	500	150	N	1,500	N	>2,000	N
20C	<10	<50	N	<50	<10	N	N	N	10,000	30	N	100	N	>2,000	N
21C	<10	N	N	<50	10	30	100	N	500	150	N	1,000	N	>2,000	N
22C	<10	<50	N	N	<10	N	N	N	<200	<20	N	30	N	>2,000	N
23C	N	200	N	N	<10	N	10	20	300	30	N	300	N	>2,000	N
24C	N	70	N	<50	<10	N	N	N	500	50	N	200	N	>2,000	N
25C	<10	300	N	<50	30	N	70	N	500	100	N	1,000	N	>2,000	N
26C	N	N	N	N	<10	N	N	N	N	<20	N	--	N	2,000	N
28C	N	70	N	N	<10	N	50	N	200	30	N	500	N	>2,000	N
29C	<10	150	N	N	10	N	20	N	2,000	20	<100	200	N	>2,000	N
30C	N	N	N	N	50	N	200	N	200	70	N	1,000	N	>2,000	N
31C	<10	<50	N	N	10	50	150	N	<200	50	N	1,500	N	>2,000	N
32C	N	<50	N	N	15	N	150	N	200	70	N	700	N	>2,000	<200
33C	N	<50	N	<50	20	30	100	N	200	70	N	1,000	N	>2,000	N
36C	<10	70	N	N	10	20	50	N	500	70	<100	500	N	>2,000	N

TABLE 5--ANALYSES OF ROCK SAMPLES FROM THE STEEP CREEK WILDERNESS STUDY AREA, GARFIELD COUNTY, UTAH.
[N, not detected; <, detected but below the limit of determination shown; >, determined to be greater than the value shown.]

Sample	Latitude	Longitude	Fe-pct s	Mg-pct s	Ca-pct s	Ti-pct s	Mn-ppm s	Ag-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s
22	37 56 43	111 18 2	.07	<.02	<.05	<.002	<10	N	15	70	<1	N	15	<5
26	37 54 45	111 21 36	.05	<.02	<.05	<.002	<10	N	20	30	<1	N	10	<5
HH1	37 58 8	111 14 11	2.00	.70	.10	.500	70	N	150	300	3	50	100	5,000
HH2	37 58 8	111 14 11	.50	.50	.20	.200	300	N	30	700	1	200	20	150
HH3	37 58 8	111 14 11	2.00	.05	<.05	.300	200	N	70	1,000	2	70	150	100
HH4	37 58 8	111 14 11	.50	.20	1.00	.300	200	N	50	500	1	150	50	30
HH5	37 58 8	111 14 11	.30	.20	3.00	.007	700	5.0	100	700	<1	5	15	15

TABLE 5--ANALYSES OF ROCK SAMPLES FROM THE STEEP CREEK WILDERNESS STUDY AREA, GARFIELD COUNTY, UTAH.--Continued

Sample	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sr-ppm s	V-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm dna	U-ppm dna	Au-ppm aa
22	N	N	N	<5	<10	N	N	<10	N	N	<10	--	--	<.1
26	N	N	N	<5	<10	N	N	10	N	N	<10	--	--	<.1
HH1	30	N	<20	50	20	10	1,000	150	20	200	200	<250	198.0	--
HH2	70	N	N	200	200	5	150	20	50	2,000	150	<3,200	2,690.0	--
HH3	20	N	<20	100	70	7	200	30	50	<200	500	<26	20.4	--
HH4	20	<5	N	150	700	<5	<100	30	15	<200	500	<32	26.8	--
HH5	N	70	N	5	20	N	N	30	10	N	15	<60	45.2	--

Table 6.--Description of rock samples

22R	Chalcedony float
26R	Chalcedony float
HH1	Copper-stained shale from Horsehead prospect
HH2	Yellow-stained sandstone from Horsehead prospect
HH3	Yellow-green sandstone from Horsehead prospect
HH4	Sandstone from Horsehead prospect
HH5	Petrified wood from Horsehead prospect