UNITED STATES DEPARTMENT OF THE INTERIOR

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Analytical results and sample locality maps of stream-sediment and heavy-mineral-concentrate samples from Fifty Mile Mountain Wilderness Study Area (UT-040-080), Kane County, Utah

By

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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 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 Fifty Mile Mountain Wilderness Study Areas, Kane County, Utah.

INTRODUCTION

In June, 1986, the U.S. Geological Survey conducted a reconnaissance geochemical survey of Fifty Mile Mountain Wilderness Study Area (WSA) (UT-040-080) in Kane County, Utah.

The Fifty Mile Mountain WSA comprises about 80.5 mi^2 (51,540 acres) in western Kane County and lies about 40 mi southeast of Escalante, Utah and to the north of Glen Canyon National Recreation Area (see fig. 1). Access to the east side of the study area is provided by a dirt road southeast from State Highway 12 near Escalante and by four-wheel-drive roads off U.S. Highway 89 north of Glen Canyon City to the western side.

Fifty Mile Mountain WSA is composed primarily of sedimentary rock units that are continuous and very gently warped into broad north-south-trending folds (Hackman and Wyant,1973). Paleozoic rocks in this area are dominantly marine shelf sediments and the Mesozoic sequences are primarily continental sediments of fluvial, eolian, and alluvial origin.

This semiarid region consists of rugged mesa and canyon topography dissected by intermittent streams that flow predominantly south and west from the Fiftymile Mountain escarpment to the Lake Powell reservoir on the Colorado River.

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 may be ore related, permits determination of some elements that are not easily detected in stream-sediment samples.

Sample Collection

Samples were collected at a total of 81 sites. At all sites, both a stream-sediment sample and a heavy-mineral-concentrate sample were collected. The amount of five heavy-mineral-concentrate samples was insufficient for analysis (FM003H, FM005H, FM0045H, FM061H, and FM074H). Sampling density was about one sample site per 1.0 mi^2. The area of the drainage basins sampled ranged from 0.2 to 2.0 mi^2.

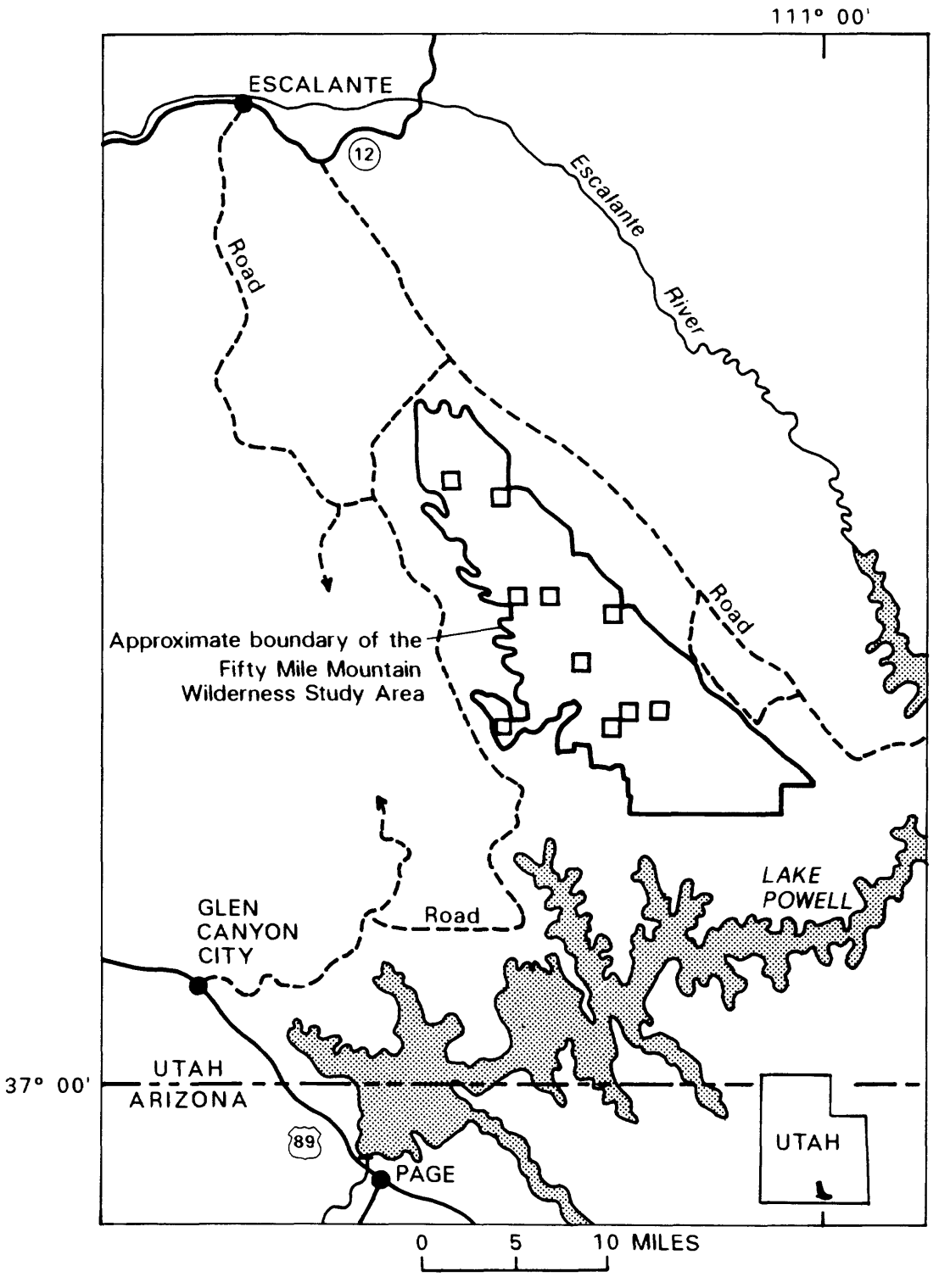

FIG.1 Index map showing location of the Fifty Mile Mountain Wilderness Study Area, Kane County, Utah

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) stream 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.

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.

Sample Preparation

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

After the samples were air dried, 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 concentrate 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 and 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 degrees and a tilt of 10 degrees 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.

Sample Analysis

Spectrographic Method

The stream-sediment and heavy-mineral-concentrate samples were analyzed for 31 elements using a semiquantitative, direct-current arc emission spectrographic method (Grimes and Marranzino, 1968). The elements analyzed and their lower limits of determination are listed in table 1. 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 are listed in tables 3 and 4 for stream-sediment and heavy-mineral-concentrate samples respectively.

Chemical Methods

Samples from the four study areas were also analyzed by inductively coupled plasma atomic emission spectroscopy (ICP), atomic absorption spectroscopy (AA), and delayed neutron analysis (DNA). Stream-sediment samples were analyzed by ICP for arsenic (As), antimony (Sb), bismuth (Bi), cadmium (Cd), and zinc (Zn), by AA for gold (Au), and by DNA for uranium (U) and thorium (Th). Limits of determination and references are listed in table 2.

Analytical results using these methods for stream-sediment samples are listed in table 3.

DATA STORAGE SYSTEM

Upon completion of all analytical work, the analytical results were entered into either the Branch of Geochemistry computer data base called PLUTO or RASS (Analysis Storage System). These data bases contain 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 (Van Trump and Miesch, 1977).

DESCRIPTION OF DATA TABLES

Tables 3 and 4 list the results of analyses for the stream-sediment and heavy-mineral concentrate samples for each of the four areas, respectively. For the 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; "icp" indicates inductively coupled plasma-atomic emission spectroscopy; "dna" indicates delayed neutron 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. For emission spectrographic analyses, a "less than" symbol (<) entered in the tables in front of the lower limit of determination indicates that an element was observed but was below the lowest reporting value. For AA and ICP analyses, a "less than" symbol (<) entered in the tables in front of the lower limit of determination indicates that an element was below the lowest reporting value. If an element was observed but was above the highest reporting value, a "greater than" (>) 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 and 4, some of the elements listed in these tables (Fe, Mg, Ca, and Ti) 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 th extra zeros.

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

[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 stream sediments]

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)	20	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.--Chemical methods used

[AA = atomic absorption; ICP = inductively coupled plasma spectroscopy; DNA = delayed neutron analysis]

Element or constituent determined	Sample type	Method	Determination limit (micrograms/ gram or ppm)	Analyst	Reference
Gold (Au)	sediments	AA	0.1	Kay Kennedy	Modification of Thompson and others, 1968.
Arsenic (As)	sediments	ICP	5	P.H. Briggs	Crock and others, 1983.
Antimony (Sb)	sediments	ICP	2		
Zinc (Zn)	sediments	ICP	2		
Bismuth (Bi)	sediments	ICP	2		
Cadmium (Cd)	sediments	ICP	0.1		
Thorium (Th)	sediments	DNA	--	R.B. Vaughn	McKown, 1987.
Uranium (U)	sediments	DNA	--	R.B. Vaughn	McKown, 1987.

TABLE 3.--SPECTROGRAPHIC, AA, DNA, & ICP ANALYSES OF STREAM-SEDIMENT SAMPLES FROM FIFTY MILE CANYON WILDERNESS STUDY AREA, KANE 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	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s
FM001S	37 12 39	111 3 37	1.5	1.5	1.0	.15	50	N	N	N	70	50	<1.0
FM002S	37 13 16	111 4 10	1.5	1.0	1.0	.15	100	N	N	N	50	150	<1.0
FM003S	37 13 18	111 5 7	3.0	2.0	3.0	.30	70	N	N	N	100	150	1.5
FM004S	37 13 14	111 5 18	.7	.5	.7	.05	30	N	N	N	30	70	N
FM005S	37 14 13	111 4 59	.7	.3	.2	.10	30	N	N	N	30	100	N
FM006S	37 11 24	111 5 18	1.5	1.0	5.0	.15	70	.5	N	N	50	200	<1.0
FM007S	37 11 43	111 8 59	1.5	2.0	7.0	.20	500	N	N	N	30	1,500	N
FM008S	37 12 13	111 11 32	1.0	1.0	5.0	.10	200	N	N	N	30	300	N
FM009S	37 12 6	111 10 40	1.0	.7	3.0	.20	200	.5	N	N	50	700	N
FM010S	37 12 9	111 9 59	.7	.5	1.0	.05	70	N	N	N	30	300	N
FM011S	37 13 19	111 9 36	.7	.7	2.0	.05	50	N	N	N	30	300	N
FM012S	37 13 38	111 9 24	2.0	1.0	5.0	.10	100	N	N	N	50	300	N
FM013S	37 13 42	111 9 29	1.0	1.0	3.0	.10	70	N	N	N	50	200	<1.0
FM014S	37 15 4	111 11 42	.5	.5	1.5	.07	50	N	N	N	50	200	N
FM015S	37 15 4	111 11 51	.7	1.0	2.0	.07	300	N	N	N	50	300	N
FM016S	37 14 2	111 12 0	.7	.7	1.5	.15	100	N	N	N	30	150	N
FM017S	37 13 51	111 12 25	.7	.5	1.5	.07	100	N	N	N	70	300	N
FM018S	37 13 50	111 10 13	.5	.5	2.0	.05	70	N	N	N	30	200	N
FM019S	37 14 25	111 10 38	.7	1.0	1.0	.10	100	N	N	N	50	300	N
FM020S	37 14 31	111 10 41	.5	.7	1.0	.07	70	N	N	N	30	500	N
FM021S	37 15 20	111 10 17	1.0	1.5	1.5	.15	50	N	N	N	50	100	N
FM022S	37 15 33	111 10 3	1.0	1.0	3.0	.10	50	N	N	N	50	150	N
FM023S	37 15 47	111 10 43	1.0	1.5	3.0	.10	150	N	N	N	70	500	<1.0
FM024S	37 15 53	111 10 47	2.0	2.0	15.0	.20	300	N	N	N	70	700	<1.0
FM025S	37 15 50	111 11 0	.7	.7	1.5	.10	50	N	N	N	30	150	N
FM026S	37 15 57	111 11 17	1.5	1.0	7.0	.15	70	N	N	N	100	200	<1.0
FM027S	37 15 57	111 11 23	1.5	.7	7.0	.15	100	N	N	N	50	300	N
FM028S	37 17 12	111 12 41	1.5	1.5	5.0	.10	100	N	N	N	50	500	<1.0
FM029S	37 17 11	111 14 12	1.5	1.5	7.0	.20	150	N	N	N	50	150	<1.0
FM030S	37 18 25	111 14 1	3.0	2.0	15.0	.20	200	N	N	N	100	150	1.0
FM031S	37 18 52	111 16 13	1.0	.7	2.0	.20	100	N	N	N	50	150	<1.0
FM032S	37 19 27	111 15 18	1.5	1.0	2.0	.15	70	N	N	N	50	150	N
FM033S	37 19 32	111 15 14	1.0	1.0	2.0	.15	70	N	N	N	50	200	N
FM034S	37 18 53	111 15 34	1.0	1.0	1.5	.10	70	N	N	N	50	150	N
FM035S	37 18 43	111 17 51	1.0	1.0	1.5	.15	70	N	N	N	50	500	N
FM036S	37 19 2	111 17 27	.7	.7	1.5	.20	70	N	N	N	50	300	N
FM037S	37 19 13	111 17 22	2.0	1.5	3.0	.15	70	N	N	N	70	150	<1.0
FM038S	37 19 32	111 17 11	.7	.5	1.0	.07	50	N	N	N	20	70	N
FM039S	37 21 11	111 15 58	1.0	1.0	1.5	.15	100	N	N	N	50	150	<1.0
FM040S	37 21 47	111 15 29	.5	.5	.5	.07	30	N	N	N	30	100	N
FM041S	37 21 43	111 15 23	.5	1.0	.7	.07	50	N	N	N	30	70	N
FM042S	37 19 30	111 18 10	1.0	1.0	2.0	.15	70	N	N	N	30	100	N
FM043S	37 19 54	111 18 12	1.5	1.5	1.5	.20	200	N	N	N	70	150	<1.0
FM044S	37 20 12	111 18 15	1.0	1.0	2.0	.15	50	N	N	N	50	150	N
FM045S	37 20 15	111 18 22	1.0	1.0	1.0	.10	70	N	N	N	30	150	N

TABLE 3.--SPECTROGRAPHIC, AA, DNA, & ICP ANALYSES OF STREAM-SEDIMENT SAMPLES FROM FIFTY MILE CANYON WILDERNESS STUDY AREA, KANE COUNTY, UTAH.--Continued

Sample	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s
FM001S	N	N	N	50	5	N	N	N	5	<10	N	N	N
FM002S	N	N	<5	10	7	<20	N	N	7	<10	N	<5	N
FM003S	N	N	5	20	15	<20	<5	N	15	15	N	7	N
FM004S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM005S	N	N	N	20	<5	N	N	N	<5	N	N	N	N
FM006S	N	N	N	<10	5	<20	N	N	5	10	N	<5	N
FM007S	N	N	N	<10	<5	N	N	N	<5	10	N	N	N
FM008S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM009S	N	N	N	100	7	N	N	N	<5	<10	N	N	N
FM010S	N	N	N	N	N	N	N	N	N	N	N	N	N
FM011S	N	N	N	10	<5	N	N	N	N	N	N	N	N
FM012S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM013S	N	N	N	<10	5	N	N	N	5	<10	N	N	N
FM014S	N	N	N	N	<5	N	N	N	N	N	N	N	N
FM015S	N	N	N	100	<5	N	N	N	N	<10	N	N	N
FM016S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM017S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM018S	N	N	N	N	<5	N	N	N	<5	<10	N	N	N
FM019S	N	N	N	150	N	N	N	N	N	N	N	N	N
FM020S	N	N	N	N	<5	N	N	N	N	N	N	N	N
FM021S	N	N	N	N	<5	N	N	N	<5	10	N	N	N
FM022S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM023S	N	N	N	N	<5	N	N	N	<5	<10	N	N	N
FM024S	N	N	<5	10	10	N	N	N	5	10	N	5	N
FM025S	N	N	<5	N	<5	N	N	N	<5	N	N	N	N
FM026S	N	N	<5	N	5	N	N	N	5	<10	N	N	N
FM027S	N	N	N	N	5	N	N	N	5	<10	N	N	N
FM028S	N	N	<5	<10	10	N	N	N	5	10	N	<5	N
FM029S	N	N	<5	10	7	20	N	N	5	10	N	<5	N
FM030S	N	N	5	30	20	30	N	N	20	15	N	7	N
FM031S	N	N	N	N	<5	N	N	N	5	N	N	N	N
FM032S	N	N	N	<10	<5	N	N	N	<5	<10	N	N	N
FM033S	N	N	N	N	<5	N	N	N	<5	<10	N	N	N
FM034S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM035S	N	N	N	<10	5	30	N	N	<5	10	N	N	N
FM036S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM037S	N	N	<5	<10	7	N	N	N	7	10	N	<5	N
FM038S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM039S	N	N	N	N	5	N	N	N	<5	N	N	N	N
FM040S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM041S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM042S	N	N	N	N	<5	N	N	N	5	N	N	N	N
FM043S	N	N	<5	150	5	30	N	N	5	N	N	N	N
FM044S	N	N	N	N	5	20	N	N	<5	<10	N	N	N
FM045S	N	N	<5	N	<5	N	N	N	5	N	N	N	N

TABLE 3.--SPECTROGRAPHIC, AA, DNA, & ICP ANALYSES OF STREAM-SEDIMENT SAMPLES FROM FIFTY MILE CANYON WILDERNESS STUDY AREA, KANE COUNTY, UTAH.--Continued

Sample	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Au-ppm aa	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp	Th-ppm dna	U-ppm dna
FM001S	N	20	N	10	N	1,000	N	<.1	<5	<2	.3	<2	29	2.70	1.280
FM002S	N	20	N	N	N	200	N	<.1	5	<2	.4	2	30	8.24	2.360
FM003S	100	100	N	15	N	150	N	<.1	7	<2	.8	<2	62	13.20	3.750
FM004S	N	10	N	N	N	150	N	<.1	<5	<2	.2	<2	20	5.38	2.150
FM005S	N	15	N	N	N	100	N	<.1	<5	<2	<.1	<2	14	2.80	1.410
FM006S	100	20	N	N	N	150	N	<.1	<5	<2	.3	<2	20	5.93	2.170
FM007S	200	30	N	N	N	300	N	<.1	<5	<2	.2	<2	9	3.89	1.570
FM008S	<100	15	N	N	N	500	N	<.1	<5	<2	.1	<2	10	2.40	1.210
FM009S	200	30	N	N	N	1,000	N	<.1	<5	<2	.1	<2	8	4.75	2.090
FM010S	<100	10	N	15	N	100	N	<.1	<5	<2	.2	<2	7	2.70	1.600
FM011S	<100	10	N	N	N	100	N	<.1	<5	<2	.2	<2	10	2.50	1.420
FM012S	N	15	N	N	N	200	N	<.1	<5	<2	.3	<2	13	5.22	1.990
FM013S	200	15	N	N	N	300	N	<.1	<5	<2	.2	<2	13	3.30	1.640
FM014S	N	10	N	N	N	100	N	<.1	<5	<2	.1	<2	8	2.30	1.110
FM015S	100	15	N	15	N	300	N	<.1	<5	<2	.2	<2	7	<1.60	1.240
FM016S	<100	15	N	N	N	300	N	<.1	<5	<2	.2	<2	7	6.49	2.260
FM017S	N	10	N	N	N	200	N	<.1	<5	<2	.2	<2	8	2.10	1.380
FM018S	200	10	N	N	N	150	N	<.1	<5	<2	.1	<2	9	2.20	1.350
FM019S	N	15	N	N	N	300	N	<.1	<5	<2	.1	<2	7	2.30	1.110
FM020S	N	<10	N	N	N	300	N	<.1	<5	<2	<.1	<2	7	2.60	1.100
FM021S	N	15	N	10	N	300	N	<.1	<5	<2	.3	<2	19	6.67	2.930
FM022S	100	15	N	N	N	500	N	<.1	<5	<2	.3	<2	21	6.40	2.000
FM023S	150	10	N	N	N	150	N	<.1	<5	<2	.2	<2	10	<1.70	1.160
FM024S	700	50	N	20	N	700	N	<.1	<5	<2	.3	<2	19	7.35	2.530
FM025S	N	15	N	15	N	700	N	<.1	<5	<2	.2	<2	10	6.17	1.940
FM026S	150	20	N	15	N	700	N	<.1	<5	<2	.3	<2	20	4.20	1.900
FM027S	300	20	N	10	N	1,000	N	<.1	<5	<2	.2	<2	19	6.42	1.980
FM028S	150	20	N	10	N	500	N	<.1	<5	<2	.3	<2	22	4.00	1.980
FM029S	200	20	N	15	N	500	N	<.1	<5	<2	.3	<2	22	5.88	2.380
FM030S	1,000	100	N	15	N	70	N	<.1	7	<2	.6	<2	53	8.61	3.570
FM031S	N	20	N	N	N	500	N	<.1	<5	<2	.2	<2	15	4.95	1.570
FM032S	N	15	N	N	N	200	N	<.1	<5	<2	.2	<2	16	7.07	2.310
FM033S	N	10	N	N	N	500	N	<.1	<5	<2	.2	<2	10	5.79	1.770
FM034S	N	15	N	N	N	300	N	<.1	<5	<2	.2	<2	13	6.07	1.700
FM035S	100	20	N	N	N	1,000	N	<.1	<5	<2	.4	<2	30	13.60	3.130
FM036S	N	10	N	20	N	1,000	N	<.1	<5	<2	.2	<2	15	16.50	3.640
FM037S	N	15	N	N	N	300	N	<.1	<5	<2	.4	<2	34	11.20	2.900
FM038S	N	<10	N	N	N	700	N	<.1	<5	<2	.2	<2	17	13.20	3.060
FM039S	N	15	N	N	N	150	N	<.1	<5	<2	.2	<2	19	6.33	1.920
FM040S	N	<10	N	N	N	500	N	<.1	<5	<2	.2	<2	13	7.84	2.380
FM041S	N	<10	N	N	N	300	N	<.1	<5	<2	.2	<2	14	6.48	1.920
FM042S	N	15	N	N	N	1,000	N	<.1	<5	<2	.2	<2	17	6.25	2.110
FM043S	N	30	N	20	N	1,000	N	<.1	<5	<2	.2	<2	19	16.50	4.100
FM044S	N	15	N	10	N	200	N	<.1	<5	<2	.2	<2	14	6.89	2.060
FM045S	<100	15	N	N	N	700	N	<.1	<5	<2	.2	<2	18	5.15	2.030

TABLE 3.--SPECTROGRAPHIC, AA, DNA, & ICP ANALYSES OF STREAM-SEDIMENT SAMPLES FROM FIFTY MILE CANYON WILDERNESS STUDY AREA, KANE COUNTY, UTAH.--Continued

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s
FM046S	37 20 32	111 18 35	.7	1.0	1.0	.07	70	N	N	N	20	100	N
FM047S	37 21 13	111 18 32	2.0	1.5	3.0	.20	150	N	N	N	100	300	<1.0
FM048S	37 21 19	111 18 31	.7	1.5	3.0	.15	100	N	N	N	50	150	N
FM049S	37 23 2	111 16 57	.5	.7	1.0	.10	20	N	N	N	30	50	N
FM050S	37 23 58	111 16 5	.7	1.0	2.0	.10	30	N	N	N	50	70	N
FM051S	37 24 18	111 15 59	1.5	2.0	5.0	.10	70	N	N	N	50	100	N
FM052S	37 24 17	111 15 53	.7	1.0	3.0	.05	50	N	N	N	50	70	N
FM053S	37 24 56	111 16 43	.7	1.5	2.0	.15	70	N	N	N	50	150	N
FM054S	37 24 54	111 16 49	2.0	1.5	5.0	.15	70	N	N	N	70	150	N
FM055S	37 26 58	111 15 53	.7	1.0	1.0	.05	50	N	N	N	30	70	N
FM056S	37 26 28	111 14 28	.7	1.0	2.0	.07	30	N	N	N	30	100	N
FM057S	37 25 32	111 13 22	1.0	1.0	2.0	.07	50	N	N	N	30	150	N
FM058S	37 25 3	111 13 18	1.0	1.5	3.0	.15	50	N	N	N	70	100	N
FM059S	37 17 25	111 10 6	3.0	1.5	2.0	.30	100	<.5	N	N	70	200	1.0
FM060S	37 17 28	111 10 28	2.0	1.5	5.0	.15	70	N	N	N	50	150	1.0
FM061S	37 18 48	111 11 48	3.0	1.5	5.0	.30	100	N	N	N	50	150	1.0
FM062S	37 24 18	111 12 13	1.5	1.5	3.0	.15	50	N	N	N	50	150	<1.0
FM063S	37 23 55	111 11 52	1.0	2.0	5.0	.15	200	N	N	N	30	150	N
FM064S	37 23 44	111 11 36	1.0	1.5	3.0	.10	50	N	N	N	50	150	N
FM065S	37 23 38	111 11 36	1.0	1.0	3.0	.10	100	N	N	N	20	200	N
FM066S	37 23 26	111 11 16	1.0	1.5	3.0	.10	50	N	N	N	50	100	N
FM067S	37 23 17	111 11 6	.7	1.0	3.0	.10	70	N	N	N	30	500	N
FM068S	37 22 40	111 10 28	1.0	1.0	1.5	.10	70	N	N	N	20	300	N
FM069S	37 22 18	111 9 46	1.5	2.0	5.0	.15	200	N	N	N	70	300	<1.0
FM070S	37 21 35	111 8 49	1.5	2.0	7.0	.20	200	N	N	N	50	300	<1.0
FM071S	37 21 23	111 8 16	1.0	.7	1.5	.15	70	N	N	N	50	700	N
FM072S	37 21 2	111 7 41	1.0	1.0	2.0	.20	100	N	N	N	30	500	N
FM073S	37 20 18	111 7 8	1.0	.7	1.5	.10	200	N	N	N	50	500	N
FM074S	37 19 45	111 6 11	1.5	1.5	7.0	.20	200	N	N	N	50	300	<1.0
FM075S	37 19 18	111 5 59	1.0	1.5	3.0	.10	50	N	N	N	50	200	N
FM076S	37 18 36	111 4 58	1.0	.7	1.5	.15	150	N	N	N	70	500	N
FM077S	37 18 3	111 3 42	1.5	1.0	2.0	.20	500	N	N	N	100	1,000	<1.0
FM078S	37 17 42	111 3 22	1.0	1.0	2.0	.10	100	N	N	N	50	1,000	N
FM079S	37 17 28	111 2 33	1.0	1.5	2.0	.15	70	N	N	N	30	150	N
FM080S	37 16 45	111 1 38	.7	1.5	5.0	.07	100	N	N	N	30	300	N
FM081S	37 15 55	111 0 32	.5	.7	1.5	.07	30	N	N	N	30	200	N

TABLE 3.--SPECTROGRAPHIC, AA, DNA, & ICP ANALYSES OF STREAM-SEDIMENT SAMPLES FROM FIFTY MILE CANYON WILDERNESS STUDY AREA, KANE COUNTY, UTAH.--Continued

Sample	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s
FM046S	N	N	N	<10	<5	N	N	N	<5	N	N	N	N
FM047S	N	N	<5	<10	5	N	N	N	10	N	N	N	N
FM048S	N	N	N	N	<5	N	N	N	5	N	N	N	N
FM049S	N	N	N	<10	<5	N	N	N	<5	N	N	N	N
FM050S	N	N	N	<10	<5	N	N	N	<5	N	N	N	N
FM051S	N	N	<5	<10	5	N	N	N	5	N	N	N	N
FM052S	N	N	N	N	<5	N	N	N	5	N	N	N	N
FM053S	N	N	N	<10	<5	N	N	N	5	N	N	N	N
FM054S	N	N	<5	N	<5	N	N	N	5	N	N	N	N
FM055S	N	N	N	N	N	N	N	N	<5	N	N	N	N
FM056S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM057S	N	N	N	10	<5	N	N	N	<5	N	N	N	N
FM058S	N	N	N	20	<5	N	N	N	<5	N	N	N	N
FM059S	N	N	<5	<10	15	30	N	N	10	10	N	5	N
FM060S	N	N	5	10	15	20	N	N	10	10	N	5	N
FM061S	N	N	5	20	15	20	N	N	10	15	N	7	N
FM062S	N	N	N	<10	5	N	N	N	5	N	N	N	N
FM063S	N	N	<5	10	5	N	N	N	5	<10	N	N	N
FM064S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM065S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM066S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM067S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM068S	N	N	N	20	<5	N	N	N	<5	N	N	N	N
FM069S	N	N	<5	10	5	N	N	N	5	<10	N	<5	N
FM070S	N	N	N	10	<5	N	N	N	<5	N	N	N	N
FM071S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM072S	N	N	N	<10	<5	50	N	N	<5	N	N	N	N
FM073S	N	N	N	<10	<5	N	N	N	5	<10	N	N	N
FM074S	N	N	<5	10	10	N	N	N	7	10	N	<5	N
FM075S	N	N	N	N	<5	N	N	N	<5	N	N	N	N
FM076S	N	N	N	<10	<5	N	N	N	<5	N	N	N	N
FM077S	N	N	N	<10	<5	N	N	N	<5	<10	N	N	N
FM078S	N	N	N	10	<5	N	N	N	<5	<10	N	N	N
FM079S	N	N	N	10	<5	N	N	N	<5	<10	N	N	N
FM080S	N	N	N	N	N	N	N	N	N	N	N	N	N
FM081S	N	N	N	N	<5	N	N	N	<5	N	N	N	N

TABLE 3.--SPECTROGRAPHIC, AA, DNA, & ICP ANALYSES OF STREAM-SEDIMENT SAMPLES FROM FIFTY MILE CANYON WILDERNESS STUDY AREA, KANE COUNTY, UTAH.--Continued

Sample	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Au-ppm aa	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp	Th-ppm dna	U-ppm dna
FM046S	N	10	N	N	N	700	N	<.1	<5	<2	.2	<2	14	6.27	1.470
FM047S	<100	50	N	15	N	700	N	<.1	<5	<2	.2	<2	20	6.07	1.680
FM048S	<100	15	N	10	N	100	N	<.1	<5	<2	.2	<2	13	4.10	1.860
FM049S	N	<10	N	N	N	1,000	N	<.1	<5	<2	.1	<2	11	6.11	1.790
FM050S	N	10	N	N	N	700	N	<.1	<5	<2	.2	<2	12	5.71	1.800
FM051S	N	20	N	10	N	300	N	<.1	<5	<2	.3	2	17	5.56	1.680
FM052S	N	15	N	N	N	500	N	<.1	<5	<2	.2	<2	10	4.40	1.970
FM053S	N	10	N	N	N	500	N	<.1	<5	<2	.2	<2	11	4.86	1.470
FM054S	N	10	N	N	N	200	N	<.1	<5	<2	.3	<2	16	5.06	1.710
FM055S	N	10	N	N	N	500	N	<.1	<5	<2	<.1	<2	11	4.30	2.690
FM056S	N	15	N	N	N	300	N	<.1	<5	<2	.2	<2	11	3.90	1.530
FM057S	100	10	N	N	N	700	N	<.1	<5	<2	.2	<2	12	6.23	2.240
FM058S	N	15	N	N	N	1,000	N	<.1	<5	<2	.2	3	12	3.20	1.260
FM059S	N	50	N	20	N	500	N	<.1	<5	<2	.3	<2	28	12.30	4.030
FM060S	200	50	N	15	N	300	N	<.1	<5	<2	.6	<2	43	10.90	3.630
FM061S	100	50	N	20	N	200	N	<.1	<5	<2	.5	<2	41	13.80	3.370
FM062S	N	15	N	N	N	500	N	<.1	<5	<2	.3	<2	23	8.18	2.640
FM063S	150	20	N	N	N	700	N	<.1	<5	<2	.2	<2	15	5.26	3.090
FM064S	<100	15	N	10	N	700	N	<.1	<5	<2	.3	<2	17	7.06	2.410
FM065S	N	10	N	N	N	300	N	<.1	<5	<2	.2	<2	12	4.50	2.090
FM066S	N	20	N	N	N	200	N	<.1	<5	<2	.2	2	18	6.82	2.240
FM067S	<100	15	N	N	N	1,000	N	<.1	<5	<2	.2	<2	10	2.80	1.610
FM068S	N	15	N	N	N	200	N	<.1	<5	<2	.2	<2	10	5.85	1.830
FM069S	150	30	N	10	N	300	N	<.1	<5	<2	.2	<2	15	6.69	2.080
FM070S	<100	30	N	20	N	1,000	N	<.1	<5	<2	.3	2	16	8.73	2.860
FM071S	<100	10	N	N	N	700	N	<.1	<5	<2	.1	<2	9	4.40	1.790
FM072S	<100	20	N	N	N	500	N	<.1	<5	<2	.2	<2	10	7.94	2.930
FM073S	N	15	N	N	N	500	N	<.1	<5	<2	.2	<2	10	4.11	1.250
FM074S	300	30	N	N	N	100	N	<.1	<5	<2	.3	<2	21	5.79	1.960
FM075S	N	10	N	N	N	500	N	<.1	<5	<2	.2	<2	11	6.05	2.140
FM076S	150	15	N	20	N	1,000	N	<.1	<5	<2	.1	<2	8	4.62	1.450
FM077S	100	20	N	20	N	1,000	N	<.1	<5	<2	.1	<2	9	<2.00	1.640
FM078S	150	15	N	N	N	700	N	<.1	<5	<2	.2	<2	15	2.70	1.870
FM079S	100	15	N	N	N	300	N	<.1	<5	<2	.2	<2	13	5.18	1.920
FM080S	N	10	N	N	N	200	N	<.1	<5	<2	.2	<2	9	3.80	1.250
FM081S	N	10	N	N	N	200	N	<.1	<5	<2	<.1	<2	6	3.55	.994

TABLE 4.--SPECTROGRAPHIC ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM FIFTY MILE CANYON WILDERNESS STUDY AREA, KANE 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	As-ppm s	Au-ppm s
FM001H	37 12 39	111 3 37	3.00	1.00	5.0	>2.0	500	N	N	N
FM002H	37 13 16	111 4 10	2.00	2.00	10.0	2.0	500	N	N	N
FM004H	37 13 14	111 5 18	.50	1.00	2.0	>2.0	100	N	N	N
FM006H	37 11 24	111 5 18	.70	.15	1.0	2.0	20	N	N	N
FM007H	37 11 43	111 8 59	.70	.70	5.0	>2.0	100	N	N	N
FM008H	37 12 13	111 11 32	1.00	.15	.5	2.0	70	<1	N	N
FM009H	37 12 6	111 10 40	2.00	.10	.2	1.0	500	<1	N	N
FM010H	37 12 9	111 9 59	.15	.05	.2	2.0	20	N	N	N
FM011H	37 13 19	111 9 36	.50	.50	2.0	.7	70	<1	N	N
FM012H	37 13 38	111 9 24	2.00	.20	1.0	2.0	300	N	N	N
FM013H	37 13 42	111 9 29	2.00	.20	.7	2.0	100	N	N	N
FM014H	37 15 4	111 11 42	2.00	.10	.2	>2.0	300	N	N	N
FM015H	37 15 4	111 11 51	3.00	.10	.1	>2.0	500	N	N	N
FM016H	37 14 2	111 12 0	2.00	.15	.2	>2.0	500	N	N	N
FM017H	37 13 51	111 12 25	.50	.07	.2	2.0	150	N	N	N
FM018H	37 13 50	111 10 13	.70	.10	.7	1.0	50	N	N	N
FM019H	37 14 25	111 10 38	3.00	.10	<.1	>2.0	500	N	N	N
FM020H	37 14 31	111 10 41	.20	.10	.5	>2.0	50	N	N	N
FM021H	37 15 20	111 10 17	2.00	1.50	5.0	>2.0	500	N	N	N
FM022H	37 15 33	111 10 3	7.00	.15	1.0	1.5	200	<1	N	N
FM023H	37 15 47	111 10 43	1.50	.07	.3	.7	100	N	N	N
FM024H	37 15 53	111 10 47	7.00	.50	2.0	2.0	200	<1	N	N
FM025H	37 15 50	111 11 0	.70	2.00	5.0	>2.0	70	N	N	N
FM026H	37 15 57	111 11 17	.70	.70	2.0	>2.0	70	<1	N	N
FM027H	37 15 57	111 11 23	1.50	.50	1.5	.7	100	<1	N	N
FM028H	37 17 12	111 12 41	7.00	.50	1.5	.5	500	<1	N	N
FM029H	37 17 11	111 14 12	1.00	1.50	7.0	>2.0	70	N	N	N
FM030H	37 18 25	111 14 1	1.50	.70	3.0	2.0	50	N	N	N
FM031H	37 18 52	111 16 13	3.00	1.00	3.0	>2.0	300	N	N	N
FM032H	37 19 27	111 15 18	1.00	1.50	7.0	>2.0	70	N	N	N
FM033H	37 19 32	111 15 14	5.00	.50	2.0	>2.0	300	N	N	N
FM034H	37 18 53	111 15 54	.70	1.50	2.0	>2.0	30	N	N	N
FM035H	37 18 43	111 17 51	1.00	.30	3.0	>2.0	50	N	N	N
FM037H	37 19 13	111 17 22	3.00	.50	2.0	>2.0	300	N	N	N
FM038H	37 19 32	111 17 11	1.00	.70	1.5	>2.0	100	N	N	N
FM039H	37 21 11	111 15 58	.70	1.00	2.0	>2.0	30	N	N	N
FM040H	37 21 47	111 15 29	.70	.30	.7	>2.0	100	N	N	N
FM041H	37 21 43	111 15 23	2.00	.50	1.0	>2.0	150	N	N	N
FM042H	37 19 30	111 18 10	1.00	.50	2.0	>2.0	200	N	N	N
FM043H	37 19 54	111 18 12	.30	.15	5.0	>2.0	50	N	N	N
FM044H	37 20 12	111 18 15	.50	.50	1.0	>2.0	50	N	N	N
FM046H	37 20 32	111 18 35	7.00	1.00	5.0	>2.0	500	N	N	N
FM047H	37 21 13	111 18 32	1.00	2.00	10.0	>2.0	70	N	N	N
FM048H	37 21 19	111 18 31	5.00	.50	2.0	>2.0	150	N	N	N
FM049H	37 23 2	111 16 57	.70	2.00	5.0	>2.0	50	N	N	N

TABLE 4.--SPECTROGRAPHIC ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM FIFTY MILE CANYON WILDERNESS STUDY AREA, KANE COUNTY, UTAH.--Continued

Sample	B-ppm s	Ba-ppm s	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
FM001H	700	>10,000	5	N	N	N	300	N	2,000	N	<50
FM002H	500	>10,000	7	N	N	N	150	N	2,000	N	<50
FM004H	150	10,000	7	N	N	N	150	N	1,000	N	<50
FM006H	30	>10,000	N	N	N	N	30	N	50	N	N
FM007H	70	>10,000	<2	N	N	N	50	N	100	N	N
FM008H	100	>10,000	N	N	N	N	50	N	<50	N	<50
FM009H	500	>10,000	N	N	N	N	1,000	10	<50	N	N
FM010H	50	>10,000	N	N	N	N	20	N	<50	N	N
FM011H	50	>10,000	N	N	N	N	<20	N	<50	<10	N
FM012H	300	>10,000	N	N	N	N	100	30	200	N	N
FM013H	70	>10,000	N	N	N	N	70	15	50	N	<50
FM014H	500	>10,000	<2	N	N	N	200	N	100	N	N
FM015H	500	>10,000	<2	N	N	N	500	N	70	N	<50
FM016H	500	>10,000	2	N	N	N	500	N	50	N	<50
FM017H	70	>10,000	N	N	N	N	50	N	<50	N	N
FM018H	70	>10,000	N	N	N	N	20	10	<50	N	N
FM019H	200	>10,000	<2	N	N	N	500	N	<50	N	<50
FM020H	100	>10,000	N	N	N	N	20	N	<50	N	N
FM021H	300	>10,000	5	N	N	N	200	<10	2,000	N	<50
FM022H	200	>10,000	N	N	N	<10	50	30	150	<10	<50
FM023H	100	>10,000	N	N	N	N	70	<10	N	N	<50
FM024H	300	>10,000	N	N	N	N	150	30	300	N	N
FM025H	50	>10,000	2	N	N	N	50	N	150	N	N
FM026H	100	>10,000	N	N	N	N	30	N	70	<10	N
FM027H	<20	>10,000	N	N	N	N	30	N	<50	<10	N
FM028H	50	1,500	N	N	N	<10	50	30	100	<10	<50
FM029H	70	>10,000	7	N	N	N	70	N	200	N	N
FM030H	20	>10,000	<2	N	N	N	50	N	50	N	<50
FM031H	500	>10,000	7	N	N	N	200	<10	>2,000	N	<50
FM032H	20	>10,000	5	N	N	N	70	N	200	N	N
FM033H	300	>10,000	7	N	N	N	200	20	>2,000	N	<50
FM034H	30	>10,000	3	N	N	N	20	N	50	N	N
FM035H	<20	>10,000	2	N	N	N	50	N	100	N	50
FM037H	300	>10,000	<2	N	N	N	150	10	1,000	N	70
FM038H	150	10,000	7	N	N	N	100	N	>2,000	N	<50
FM039H	50	10,000	5	N	N	N	50	N	100	N	N
FM040H	150	10,000	10	N	N	N	150	N	1,500	N	<50
FM041H	500	1,500	7	N	N	N	500	N	>2,000	N	<50
FM042H	100	>10,000	10	N	N	N	200	N	1,000	N	N
FM043H	20	>10,000	5	N	N	N	30	N	200	N	N
FM044H	70	>10,000	5	N	N	N	70	N	700	N	<50
FM046H	300	>10,000	2	N	N	N	300	<10	1,500	N	<50
FM047H	30	>10,000	7	N	N	N	50	N	200	N	N
FM048H	200	>10,000	2	N	N	N	150	N	2,000	N	<50
FM049H	100	10,000	7	N	N	N	70	N	200	N	N

TABLE 4.--SPECTROGRAPHIC ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM FIFTY MILE CANYON WILDERNESS STUDY AREA, KANE COUNTY, UTAH.--Continued

Sample	Ni-ppm s	Pb-ppm s	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
FM001H	<10	100	N	100	30	>10,000	150	N	1,500	N	>2,000	<200
FM002H	<10	70	N	100	N	10,000	100	N	1,000	N	>2,000	<200
FM004H	N	50	N	100	<20	>10,000	100	N	1,500	N	>2,000	<200
FM006H	N	<20	N	<10	N	>10,000	50	N	500	N	>2,000	N
FM007H	N	20	N	50	N	>10,000	70	N	700	N	>2,000	N
FM008H	<10	<20	N	30	N	>10,000	30	N	500	N	>2,000	N
FM009H	N	<20	N	N	N	>10,000	50	N	200	N	>2,000	N
FM010H	N	N	N	10	N	>10,000	30	N	500	N	>2,000	N
FM011H	<10	<20	N	<10	N	>10,000	30	N	150	N	>2,000	N
FM012H	<10	20	N	15	<20	>10,000	70	N	300	N	>2,000	N
FM013H	<10	<20	N	15	N	>10,000	30	N	300	N	>2,000	N
FM014H	N	20	N	50	20	10,000	100	N	1,000	N	>2,000	N
FM015H	<10	20	N	30	N	700	150	N	700	N	>2,000	N
FM016H	<10	20	N	30	N	>10,000	100	N	500	N	>2,000	N
FM017H	N	<20	N	10	N	3,000	30	N	500	N	>2,000	N
FM018H	N	N	N	<10	N	>10,000	30	N	150	N	>2,000	N
FM019H	<10	20	N	50	N	>10,000	100	N	1,500	N	>2,000	N
FM020H	N	<20	N	50	N	10,000	70	N	1,000	N	>2,000	N
FM021H	<10	50	N	50	N	>10,000	70	N	1,000	N	>2,000	200
FM022H	20	20	N	<10	N	>10,000	30	N	150	N	>2,000	N
FM023H	<10	<20	N	15	N	>10,000	20	N	200	N	>2,000	N
FM024H	15	<20	N	10	N	>10,000	30	N	500	N	>2,000	N
FM025H	N	20	N	50	N	7,000	50	N	1,000	N	>2,000	N
FM026H	<10	<20	N	20	N	>10,000	50	N	500	N	>2,000	N
FM027H	<10	70	N	<10	N	>10,000	50	N	150	N	>2,000	N
FM028H	50	N	N	N	N	>10,000	20	N	100	N	>2,000	N
FM029H	<10	50	N	150	N	>10,000	100	N	1,500	N	>2,000	N
FM030H	<10	<20	N	<10	N	>10,000	70	N	200	N	>2,000	N
FM031H	N	50	N	200	N	1,000	150	N	2,000	N	>2,000	200
FM032H	N	20	N	100	N	1,000	70	N	1,000	N	>2,000	N
FM033H	<10	70	N	>200	N	300	150	N	1,500	N	>2,000	200
FM034H	N	20	N	100	N	300	70	N	1,500	N	>2,000	N
FM035H	<10	70	N	20	N	>10,000	200	N	700	N	>2,000	N
FM037H	<10	70	N	10	N	>10,000	100	N	700	N	>2,000	N
FM038H	N	30	N	200	<20	1,500	100	N	1,500	N	>2,000	<200
FM039H	N	30	N	100	N	200	100	N	1,500	N	>2,000	N
FM040H	N	70	N	>200	70	300	100	N	1,500	N	>2,000	<200
FM041H	N	30	N	100	N	>10,000	100	N	1,500	N	>2,000	<200
FM042H	N	30	N	100	20	10,000	50	N	1,500	N	>2,000	N
FM043H	N	30	N	200	N	500	50	N	1,000	N	>2,000	N
FM044H	N	30	N	150	N	>10,000	100	N	1,500	N	>2,000	N
FM046H	<10	70	N	50	N	>10,000	100	N	1,000	N	>2,000	<200
FM047H	N	30	N	200	N	1,500	100	N	1,500	N	>2,000	N
FM048H	<10	50	N	70	50	1,000	150	N	1,000	N	>2,000	<200
FM049H	N	50	N	200	<20	200	150	N	1,500	N	>2,000	N

TABLE 4.--SPECTROGRAPHIC ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM FIFTY MILE CANYON WILDERNESS STUDY AREA, KANE COUNTY, UTAH.--Continued

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
FM050H	37 23 58	111 16 5	.15	3.00	10.0	>2.0	100	N	N	N
FM051H	37 24 18	111 15 59	2.00	1.00	3.0	>2.0	200	N	N	N
FM052H	37 24 17	111 15 53	1.00	1.00	1.5	>2.0	150	N	N	N
FM053H	37 24 56	111 16 43	5.00	2.00	7.0	>2.0	200	N	N	N
FM054H	37 24 54	111 16 49	1.50	.20	3.0	>2.0	500	N	N	N
FM055H	37 26 58	111 15 53	.50	.50	1.5	>2.0	50	N	N	N
FM056H	37 26 28	111 14 28	3.00	1.00	3.0	>2.0	300	N	N	N
FM057H	37 25 32	111 13 22	10.00	.70	1.0	>2.0	3,000	N	N	N
FM058H	37 25 3	111 13 18	1.00	2.00	3.0	>2.0	150	N	N	N
FM059H	37 17 25	111 10 6	2.00	.70	7.0	>2.0	50	N	N	N
FM060H	37 17 28	111 10 28	3.00	2.00	7.0	>2.0	500	N	N	N
FM062H	37 24 18	111 12 13	1.00	.70	1.5	2.0	150	N	N	N
FM063H	37 23 55	111 11 52	1.50	1.00	2.0	>2.0	200	N	N	N
FM063H	37 19 2	111 17 27	2.00	.50	1.5	>2.0	300	N	N	N
FM064H	37 23 44	111 11 36	1.50	1.50	2.0	>2.0	150	N	N	N
FM065H	37 23 38	111 11 36	.70	1.00	1.5	>2.0	100	N	N	N
FM066H	37 23 26	111 11 16	.70	1.00	2.0	>2.0	100	N	N	N
FM067H	37 23 17	111 11 6	.30	1.00	2.0	>2.0	50	N	N	N
FM068H	37 22 40	111 10 28	.70	.70	.7	2.0	100	N	N	N
FM069H	37 22 18	111 9 46	1.00	1.00	1.5	>2.0	70	N	N	N
FM070H	37 21 35	111 8 49	1.50	1.00	2.0	>2.0	500	N	N	N
FM071H	37 21 23	111 8 16	5.00	.70	1.0	2.0	500	N	N	N
FM072H	37 21 2	111 7 41	.15	.15	.5	>2.0	100	N	N	N
FM073H	37 20 18	111 7 8	2.00	.30	.5	2.0	500	N	N	N
FM075H	37 19 18	111 15 59	.70	1.00	1.5	>2.0	50	N	N	N
FM076H	37 18 36	111 4 58	3.00	.20	.5	>2.0	700	N	N	N
FM077H	37 18 3	111 3 42	.50	.10	.3	1.0	30	N	N	N
FM078H	37 17 42	111 3 22	2.00	.30	.5	>2.0	300	N	N	N
FM079H	37 17 28	111 2 33	1.50	1.00	3.0	>2.0	200	N	N	N
FM080H	37 16 45	111 1 38	1.50	.50	3.0	>2.0	150	N	N	N
FM081H	37 15 55	111 0 32	2.00	.70	1.5	>2.0	500	N	N	N

TABLE 4.--SPECTROGRAPHIC ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM FIFTY MILE CANYON WILDERNESS STUDY AREA, KANE COUNTY, UTAH.--Continued

Sample	B-ppm s	Ba-ppm s	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
FM050H	100	7,000	3	N	N	N	100	N	200	N	N
FM051H	200	>10,000	3	N	N	N	200	N	2,000	N	<50
FM052H	300	1,000	5	N	N	N	200	N	2,000	N	<50
FM053H	300	10,000	2	N	N	N	100	15	200	N	50
FM054H	300	>10,000	<2	N	N	N	300	N	2,000	N	<50
FM055H	20	>10,000	3	N	N	N	50	N	300	N	N
FM056H	300	>10,000	<2	N	N	50	150	20	500	<10	<50
FM057H	700	>10,000	2	N	N	10	1,000	50	1,000	N	<50
FM058H	50	>10,000	5	N	N	N	50	N	200	N	N
FM059H	20	>10,000	3	N	N	N	30	10	200	N	N
FM060H	700	>10,000	3	N	N	N	500	10	2,000	N	<50
FM062H	70	>10,000	N	N	N	N	70	N	150	N	N
FM063H	200	>10,000	3	N	N	N	500	<10	1,000	N	<50
FM063H	500	>10,000	7	N	N	N	200	N	>2,000	N	<50
FM064H	200	>10,000	7	N	N	N	150	N	500	N	N
FM065H	70	>10,000	5	N	N	N	100	N	300	<10	<50
FM066H	70	>10,000	2	N	N	N	70	N	150	N	N
FM067H	100	>10,000	2	N	N	N	30	N	150	N	N
FM068H	70	>10,000	N	N	N	N	50	N	150	N	<50
FM069H	30	>10,000	<2	N	N	N	20	N	70	<10	N
FM070H	200	>10,000	3	N	N	N	300	N	2,000	N	<50
FM071H	500	>10,000	<2	N	N	N	200	20	1,000	N	<50
FM072H	150	>10,000	<2	N	N	N	150	N	100	N	N
FM073H	200	>10,000	<2	N	N	N	500	10	200	N	N
FM075H	50	>10,000	7	N	N	N	30	N	500	N	N
FM076H	500	>10,000	2	N	N	N	500	N	200	N	<50
FM077H	50	>10,000	N	N	N	N	N	N	<50	<10	N
FM078H	300	>10,000	<2	N	N	N	200	<10	50	N	N
FM079H	70	>10,000	5	N	N	N	150	N	200	<10	N
FM080H	200	>10,000	2	N	N	N	100	N	200	N	<50
FM081H	500	>10,000	2	N	N	N	500	N	200	N	<50

TABLE 4.--SPECTROGRAPHIC ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM FIFTY MILE CANYON WILDERNESS STUDY AREA, KANE COUNTY, UTAH.--Continued

Sample	Ni-ppm s	Pb-ppm s	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
FM050H	N	20	N	100	N	<200	50	N	1,000	N	>2,000	N
FM051H	N	20	N	100	20	>10,000	150	N	1,500	N	>2,000	N
FM052H	N	20	N	100	N	>10,000	70	N	1,500	N	>2,000	<200
FM053H	10	30	N	30	N	700	100	N	700	N	>2,000	<200
FM054H	N	30	N	50	N	>10,000	100	N	1,000	N	>2,000	<200
FM055H	N	500	N	100	N	10,000	100	N	1,500	N	>2,000	N
FM056H	<10	30	N	20	N	>10,000	70	N	700	N	>2,000	N
FM057H	30	50	N	70	N	>10,000	200	N	1,000	N	>2,000	N
FM058H	N	50	N	70	50	10,000	70	N	1,000	N	>2,000	N
FM059H	<10	20	N	30	N	2,000	50	N	1,000	N	>2,000	N
FM060H	10	50	N	50	N	>10,000	50	N	1,000	N	>2,000	<200
FM062H	<10	20	N	<10	20	>10,000	30	N	300	N	>2,000	N
FM063H	N	50	N	150	N	>10,000	70	N	1,000	N	>2,000	<200
FM063H	N	50	N	70	N	>10,000	150	N	2,000	N	>2,000	300
FM064H	N	20	N	150	<20	10,000	50	N	1,500	N	>2,000	N
FM065H	<10	30	N	100	N	500	70	N	700	N	>2,000	N
FM066H	N	<20	N	30	N	5,000	100	N	1,000	N	>2,000	N
FM067H	N	30	N	100	N	5,000	50	N	1,000	N	>2,000	N
FM068H	N	30	N	30	N	>10,000	50	N	500	N	>2,000	N
FM069H	N	<20	N	10	N	>10,000	100	N	700	N	>2,000	N
FM070H	N	30	N	50	N	>10,000	100	N	1,000	N	>2,000	<200
FM071H	10	50	N	30	N	>10,000	70	N	500	N	>2,000	N
FM072H	N	30	N	70	N	>10,000	30	N	1,000	N	>2,000	N
FM073H	N	20	N	50	N	>10,000	70	N	500	N	>2,000	N
FM075H	N	30	N	200	30	500	70	N	2,000	N	>2,000	N
FM076H	N	20	N	70	N	7,000	100	N	1,000	N	>2,000	N
FM077H	N	N	N	<10	N	3,000	20	N	200	N	>2,000	N
FM078H	N	20	N	30	N	>10,000	70	N	700	N	>2,000	N
FM079H	N	20	N	70	N	700	100	N	1,000	N	>2,000	N
FM080H	<10	<20	N	20	50	10,000	50	N	500	N	>2,000	N
FM081H	<10	30	N	50	N	>10,000	150	N	1,000	N	>2,000	N