UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical results and sample locality maps of stream-sediment, heavy-mineral-concentrate, and rock samples from the Tabeguache Creek Wilderness Study Area (CO-030-300), Montrose County, Colorado

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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 Tabeguache Creek Wilderness Study Area (WSA), Montrose County, Colorado.

INTRODUCTION

In September 1988, the U.S. Geological Survey conducted a reconnaissance geochemical survey of Tabeguache Creek Wilderness Study Area (CO-030-300) in Montrose County, Colorado.

The Tabeguache Creek Wilderness Study Area comprises about 12.4 square miles (7,908 acres) of canyon and mesa country on the southwestern flank of the Uncompahgre Plateau (fig. 1), approximately 3.5 miles north of Nucla. Tabeguache Creek has eroded a deep canyon into the sedimentary rocks of the plateau. Sandstones and shales of the Chinle Formation, Wingate Sandstone, Entrada Sandstone, Wanakah Formation, and Salt Wash Member of the Morrison Formation crop out in the canyon while the Brushy Basin Member of the Morrison Formation and the Burro Canyon/Dakota Sandstone comprise the surrounding mesas.

Access to the area is from a maintained dirt road to the west.

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 that 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.

Analyses of unaltered or unmineralized rock samples provide background geochemical data for individual rock units. 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

Samples were collected at a total of 16 sites (plate 1). At all sites, both a stream-sediment sample and a heavy-mineral-concentrate sample were collected. Sampling density was about one sample site per 0.77 square miles. The area of the drainage basins sampled ranged from 0.2 to 5 square miles. Sufficient heavy-mineral-concentrate for spectrographic analysis (5 mg) was recovered from all sample sites. Four rock samples were collected.

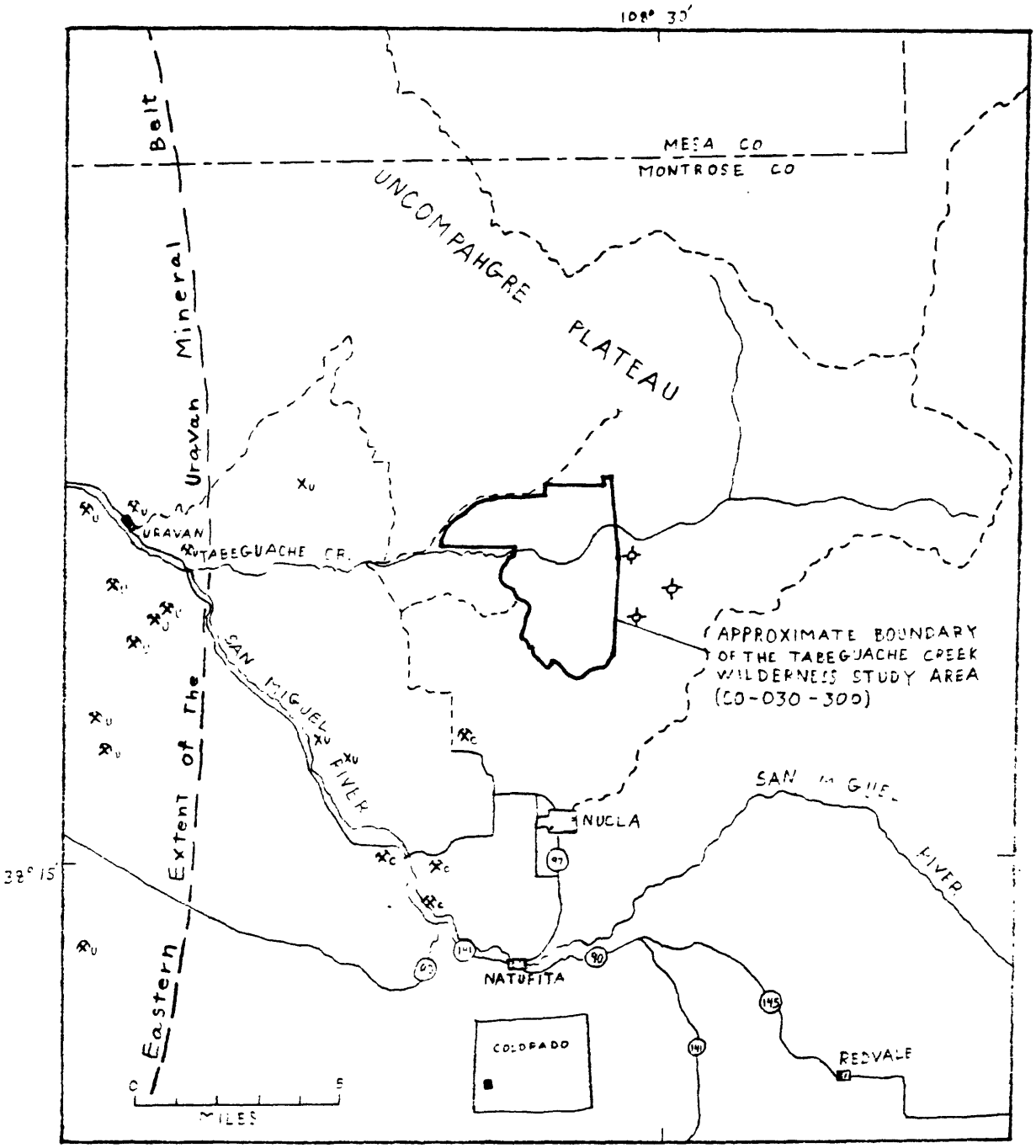

FIG. 1

Figure 1. Index map showing location of the Tabeguache Creek Wilderness Study Area, Montrose County, Colorado. Subscript next to mine symbol (⚒) or prospect (x) indicates commodity mined: u = uranium, c = coal. Oil and gas exploration holes denoted by ⌖.

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 maps (scale = 1:24,000). Each sample was composited from several localities within an area that may extend as much as 50 feet 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 was removed.

Rock samples

Rock samples were collected from outcrop of unmineralized rock. A description of the rock type collected is given in table 5.

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.

Samples that had been panned in the field were air dried and sieved to -35 mesh; bromoform (specific gravity 2.85) was used to remove the remaining quartz and feldspar. The resultant heavy-mineral sample was separated into three fractions using a large electromagnet by placing the sample in contact with the face of the magnet (in this case a modified Frantz Isodynamic Separator). The most magnetic material (removed at a setting of 0.25 ampere), primarily magnetite, was not analyzed. The second fraction (removed at a setting of 1.75 ampere), largely ferromagnesium silicates and iron oxides, was saved for archival storage. The third fraction (the nonmagnetic 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 degrees and a tilt of 10 degrees 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

Stream-sediment and rock samples were analyzed for 35 elements using a semiquantitative, direct-current arc emission spectrographic method (Grimes and Marranzino, 1968). Heavy-mineral-concentrate samples were analyzed for the same elements plus platinum and palladium by the same method. 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, sodium, phosporus, and titanium) are given in weight percent; all others are given in parts per million (micrograms/gram). Analytical data are listed in tables 3, 4, and 5 for stream-sediment, heavy-mineral-concentrate, and rock samples respectively.

Other Methods

The stream sediment and rock samples from the WSA were also analyzed by inductively coupled plasma emission spectroscopy (ICP), atomic absorption spectroscopy (AA), and delayed neutron analysis (DNA). Arsenic (As), bismuth (Bi), cadmium (Cd), antimony (Sb), and zinc (Zn) were analyzed by ICP, gold (Au) was analyzed by flame AA, and uranium (U) and thorium (Th) by DNA. Limits of determination and references are listed in table 2.

Analytical results using these methods are listed in tables 3 and 5.

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 results of 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 plate 1. Columns in which the element headings show the letter "s" following the element symbol are emission spectrographic analyses, "icp" indicates inductively couple plasma analyses, "aa" indicates atomic absorption analyses, and "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 (LLD) shown for that element in table 1. For emission spectrographic analyses, a "less than" symbol (<) entered in the tables in front of the LLD indicates that an element was observed but was below the lowest reporting value. For ICP and AA analyses, a "less than" symbol (<) entered in the tables in front of the LLD 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" 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 the tables in place of the analytical value. Because of the formatting used in the computer program that produced the data tables, some of the elements listed in these tables (Fe, Mg, Ca, Ti, Ag, and Be) may carry one or more nonsignificant digits to the right of the significant digits. The analysts did not determine these elements to the accuracy suggested by the extra zeros.

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TABLE 1.--Limits of determination for the spectrographic analysis of rocks and 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 listed, except as noted]

Elements	Lower determination limit	Upper determination limit
	Weight percent	
Calcium (Ca)	0.05	20
Iron (Fe)	.05	20
Magnesium (Mg)	.02	10
Sodium (Na)	.2	5
Phosphorus (P)	.2	10
Titanium (Ti)	.002	1
	Parts per million	
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)	10	2,000
Chromium (Cr)	10	5,000
Copper (Cu)	5	20,000
Gallium (Ga)	5	500
Germanium (Ge)	10	100
Lanthanum (La)	50	1,000
Manganese (Mn)	10	5,000
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
Thorium (Th)	100	2,000
Vanadium (V)	10	10,000
Tungsten (W)	20	10,000
Yttrium (Y)	10	2,000
Zinc (Zn)	200	10,000
Zirconium (Zr)	10	1,000
Palladium (Pd)*	5	1,000
Platinum (Pt)*	20	1,000

*Determined in heavy-mineral-concentrate samples only. Limits are for heavy-mineral-concentrate samples.

TABLE 2.--Other Methods Used

(AA, atomic absorption spectroscopy; ICP, inductively coupled plasma emission spectroscopy; DNA, delayed neutron analysis)

Element determined	Sample type	Method	LLD (PPM)	References
Arsenic (As)	Rock/Str-sed	ICP	5	Crock and others, 1987.
Bismuth (Bi)	"	"	2	
Cadmium (Cd)	"	"	0.1	
Antimony (Sb)	"	"	2	
Zinc (Zn)	"	"	2	
Gold (Au)	"	AA	0.05	Thompson and others, 1968; O'Leary and Meier, 1986.
Thorium (Th)	"	DNA	--	McKown, 1987.
Uranium (U)	"	"	--	

TABLE 3--ANALYTICAL RESULTS OF STREAM-SEDIMENT SAMPLES FROM THE TABAGUACHE CREEK WILDERNESS STUDY AREA, MONTROSE COUNTY, COLORADO.

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

Sample	Latitude	Longtude	Ca-pct. s	Fe-pct. s	Mg-pct. s	Na-pct. s	P-pct. s	Ti-pct. s	Ag-ppm s	As-ppm s
TB 001 S	38 22 14	108 31 6	1.5	.5	.30	N	N	.07	N	N
TB 002 S	38 22 10	108 31 0	3.0	2.0	1.00	1.0	N	.30	N	N
TB 003 S	38 22 7	108 31 19	.7	1.0	.50	1.5	N	.15	N	N
TB 004 S	38 22 2	108 31 31	2.0	.7	.30	N	N	.10	N	N
TB 005 S	38 21 24	108 31 59	1.5	1.0	.30	<.2	N	.15	N	N
TB 006 S	38 21 29	108 32 7	3.0	1.0	.70	<.2	N	.15	N	N
TB 007 S	38 21 42	108 33 26	2.0	1.0	.50	<.2	N	.15	N	N
TB 008 S	38 21 40	108 34 0	1.5	.7	.30	<.2	N	.10	N	N
TB 009 S	38 21 32	108 34 26	2.0	.7	.50	1.0	N	.15	N	N
TB 010 S	38 21 46	108 35 0	1.5	1.0	.50	.3	N	.20	N	N
TB 011 S	38 21 49	108 35 30	3.0	1.0	.70	.3	N	.15	N	N
TB 012 S	38 19 43	108 33 42	1.0	1.0	.30	.5	N	.15	N	N
TB 013 S	38 19 13	108 31 51	2.0	1.0	.20	.2	N	.20	<.5	N
TB 014 S	38 19 17	108 31 34	3.0	1.0	.50	N	N	.15	N	N
TB 015 S	38 19 10	108 32 0	.2	.7	.15	N	N	.07	N	N
TB 016 S	38 19 21	108 32 49	.5	.5	.10	N	N	.10	N	N

TABLE 3--ANALYTICAL RESULTS OF STREAM-SEDIMENT SAMPLES FROM THE TABAGUACHE CREEK WILDERNESS STUDY AREA, MONTROSE COUNTY, COLORADO.--Continued

Sample	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	Ga-ppm s	Ge-ppm s	La-ppm s
TB 001 S	N	20	1,000	N	N	N	N	N	<5	N	N	N
TB 002 S	N	30	700	1	N	N	<10	20	10	10	N	<50
TB 003 S	N	50	200	N	N	N	N	15	10	5	N	N
TB 004 S	N	15	500	N	N	N	N	N	<5	N	N	N
TB 005 S	N	15	1,000	N	N	N	N	N	<5	N	N	N
TB 006 S	N	20	300	N	N	N	N	<10	5	<5	N	N
TB 007 S	N	15	1,500	N	N	N	N	<10	<5	N	N	N
TB 008 S	N	20	1,000	N	N	N	N	10	<5	N	N	N
TB 009 S	N	10	2,000	N	N	N	N	<10	<5	5	N	N
TB 010 S	N	15	3,000	N	N	N	N	10	<5	5	N	N
TB 011 S	N	15	1,000	N	N	N	N	N	<5	<5	N	N
TB 012 S	N	15	5,000	N	N	N	N	30	<5	<5	N	N
TB 013 S	N	30	1,000	N	N	N	N	<10	<5	5	N	N
TB 014 S	N	10	1,500	N	N	N	N	<10	<5	<5	N	N
TB 015 S	N	15	1,000	N	N	N	N	N	N	N	N	N
TB 016 S	N	50	200	N	N	N	N	300	N	N	N	N

TABLE 3--ANALYTICAL RESULTS OF STREAM-SEDIMENT SAMPLES FROM THE TABAGUACHE CREEK WILDERNESS STUDY AREA, MONTROSE COUNTY, COLORADO.--Continued

Sample	Mn-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	Th-ppm s	V-ppm s
TB 001 S	50	N	N	<5	N	N	N	N	N	N	15
TB 002 S	300	N	<20	10	10	N	5	N	100	N	50
TB 003 S	100	<5	N	10	<10	N	<5	N	N	N	30
TB 004 S	70	N	N	<5	N	N	N	N	N	N	20
TB 005 S	100	N	N	<5	N	N	N	N	N	N	20
TB 006 S	150	N	N	5	<10	N	N	N	N	N	30
TB 007 S	150	N	N	5	N	N	N	N	N	N	30
TB 008 S	100	N	N	<5	<10	N	N	N	N	N	20
TB 009 S	100	N	N	<5	<10	N	N	N	100	N	20
TB 010 S	150	N	N	5	N	N	N	N	<100	N	30
TB 011 S	200	N	N	<5	<10	N	<5	N	<100	N	15
TB 012 S	70	N	N	<5	N	N	<5	N	200	N	20
TB 013 S	100	N	<20	5	<10	N	N	N	<100	N	20
TB 014 S	150	N	N	5	N	N	N	N	<100	N	20
TB 015 S	15	N	N	<5	N	N	N	N	N	N	10
TB 016 S	20	N	N	<5	N	N	N	N	N	N	15

TABLE 3--ANALYTICAL RESULTS OF STREAM-SEDIMENT SAMPLES FROM THE TABAGUACHE CREEK WILDERNESS STUDY AREA, MONTROSE COUNTY, COLORADO.--Continued

Sample	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp	Au-ppm aa	Th-ppm dna	U-ppm dna
TB 001 S	N	N	N	100	6	<2	<.1	<2	9	<.05	5.75	1.520
TB 002 S	N	10	N	70	14	<2	.3	<2	24	<.05	9.19	3.410
TB 003 S	N	N	N	150	19	<2	<.1	<2	11	<.05	5.10	1.700
TB 004 S	N	N	N	150	<5	<2	.1	<2	8	<.05	3.00	.999
TB 005 S	N	N	N	150	<5	<2	.2	<2	12	<.05	5.26	1.720
TB 006 S	N	N	N	150	<5	<2	.2	<2	15	<.05	5.82	2.310
TB 007 S	N	N	N	200	<5	<2	.1	<2	12	<.05	4.90	1.860
TB 008 S	N	N	N	150	<5	<2	.2	<2	9	<.05	4.10	1.700
TB 009 S	N	N	N	100	<5	<2	.1	<2	13	<.05	6.20	2.170
TB 010 S	N	N	N	700	<5	<2	.2	<2	13	<.05	6.09	2.490
TB 011 S	N	<10	N	70	<5	<2	.2	<2	11	<.10	6.82	2.100
TB 012 S	N	<10	N	700	<5	<2	.2	<2	14	<.05	6.60	2.560
TB 013 S	N	N	N	500	<5	<2	.1	<2	11	<.05	4.90	1.970
TB 014 S	N	N	N	100	<5	<2	.2	<2	13	<.10	5.28	1.830
TB 015 S	N	N	N	200	<5	<2	<.1	<2	8	<.05	4.50	1.790
TB 016 S	N	N	N	1,000	<5	<2	.1	<2	5	<.05	3.60	1.060

TABLE 4--ANALYTICAL RESULTS OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE TABAGUACHE CREEK WILDERNESS STUDY AREA, MONTROSE COUNTY, COLORADO.

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

Sample	Latitude	Longtude	Ca-pct. s	Fe-pct. s	Mg-pct. s	Na-pct. s	P-pct. s	Ti-pct. s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s
TB 001 C	38 22 14	108 31 6	<.10	<.10	<.05	N	N	.15	2	N	N	N
TB 002 C	38 22 10	108 31 0	<.10	<.10	<.05	N	N	.10	N	N	N	N
TB 003 C	38 22 7	108 31 19	.50	.20	.07	N	<.5	1.00	N	N	N	30
TB 004 C	38 22 2	108 31 31	.10	.20	<.05	N	N	.70	N	N	N	50
TB 005 C	38 21 24	108 31 59	.15	.10	.05	N	N	.30	N	N	N	N
TB 006 C	38 21 29	108 32 7	.30	.30	.15	N	N	.70	N	N	N	30
TB 007 C	38 21 42	108 33 26	.10	<.10	<.05	N	N	.20	N	N	N	<20
TB 008 C	38 21 40	108 34 0	<.10	.10	.05	N	N	.50	N	N	N	N
TB 009 C	38 21 32	108 34 26	.10	.10	.10	N	N	.01	N	N	N	N
TB 010 C	38 21 46	108 35 0	<.10	<.10	<.05	N	N	.05	N	N	N	N
TB 011 C	38 21 49	108 35 30	.10	.10	.10	N	N	.07	N	N	N	N
TB 012 C	38 19 43	108 33 42	<.10	.15	.05	N	N	.10	N	N	N	20
TB 013 C	38 19 13	108 31 51	.15	.15	.05	N	N	.70	N	N	N	<20
TB 014 C	38 19 17	108 31 34	<.10	<.10	<.05	N	N	.30	N	N	N	N
TB 015 C	38 19 10	108 32 0	.10	.15	.05	N	N	1.00	N	N	N	<20
TB 016 C	38 19 21	108 32 49	<.10	.10	<.05	N	N	.50	N	N	N	20

TABLE 4--ANALYTICAL RESULTS OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE TABAGUACHE CREEK WILDERNESS STUDY AREA, MONTROSE COUNTY, COLORADO.--Continued

Sample	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	Ga-ppm s	Ge-ppm s	La-ppm s	Mn-ppm s	Mo-ppm s	Nb-ppm s
TB 001 C	>10,000	N	N	N	N	N	N	N	N	N	N	N	N
TB 002 C	>10,000	N	N	N	N	N	N	N	N	N	N	N	N
TB 003 C	>10,000	N	N	N	N	N	<10	N	N	100	70	N	<50
TB 004 C	>10,000	N	N	N	N	70	N	N	N	N	30	N	N
TB 005 C	>10,000	N	N	N	N	N	N	N	N	N	<20	N	N
TB 006 C	>10,000	N	N	N	N	70	10	N	N	<100	50	N	N
TB 007 C	>10,000	N	N	N	N	N	N	N	N	N	N	N	N
TB 008 C	>10,000	N	N	N	N	N	N	N	N	N	<20	N	N
TB 009 C	>10,000	N	N	N	N	N	N	N	N	N	<20	N	N
TB 010 C	>10,000	N	N	N	N	N	N	N	N	N	N	N	N
TB 011 C	>10,000	N	N	N	N	N	<10	N	N	N	20	N	N
TB 012 C	>10,000	N	N	N	N	N	<10	N	N	N	N	N	N
TB 013 C	>10,000	N	N	N	N	N	<10	N	N	N	<20	N	N
TB 014 C	>10,000	N	N	N	N	N	<10	N	N	N	<20	N	N
TB 015 C	>10,000	N	N	N	N	N	N	N	N	<100	20	N	N
TB 016 C	>10,000	N	N	N	N	N	N	N	N	N	<20	N	N

TABLE 4--ANALYTICAL RESULTS OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE TABAGUACHE CREEK WILDERNESS STUDY AREA, MONTROSE COUNTY, COLORADO.--Continued

Sample	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	Th-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Pd-ppm s	Pt-ppm s
TB 001 C	N	N	N	N	N	3,000	N	N	N	30	N	>2,000	N	N
TB 002 C	N	N	N	N	N	2,000	N	N	N	<20	N	2,000	N	N
TB 003 C	N	<20	N	N	N	3,000	N	20	N	100	N	>2,000	N	N
TB 004 C	N	N	N	N	N	1,500	N	20	N	70	N	>2,000	N	N
TB 005 C	N	N	N	N	N	5,000	N	N	N	20	N	>2,000	N	N
TB 006 C	N	<20	N	N	20	5,000	N	30	N	150	N	>2,000	N	N
TB 007 C	N	N	N	N	N	1,500	N	N	N	<20	N	>2,000	N	N
TB 008 C	N	N	N	N	N	2,000	N	N	N	30	N	>2,000	N	N
TB 009 C	N	N	N	N	N	7,000	N	N	N	N	N	<20	N	N
TB 010 C	N	N	N	N	N	2,000	N	N	N	N	N	2,000	N	N
TB 011 C	N	N	N	N	N	3,000	N	N	N	N	N	2,000	N	N
TB 012 C	N	N	N	N	N	10,000	N	N	N	20	N	>2,000	N	N
TB 013 C	N	N	N	N	N	5,000	N	<20	N	70	N	>2,000	N	N
TB 014 C	N	N	N	N	N	2,000	N	N	N	50	N	>2,000	N	N
TB 015 C	N	<20	N	<10	N	>10,000	N	20	N	200	N	>2,000	N	N
TB 016 C	N	<20	N	N	N	7,000	N	20	N	100	N	>2,000	N	N

TABLE 5--ANALYTICAL RESULTS OF ROCK SAMPLES FROM THE TABAGUACHE CREEK WILDERNESS STUDY AREA, MONTROSE COUNTY, COLORADO.

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

Sample	Latitude	Longtude	Ca-pct. s	Fe-pct. s	Mg-pct. s	Na-pct. s	P-pct. s	Ti-pct. s	Ag-ppm s	As-ppm s
TB 004 R	38 22 2	108 31 31	10.00	.50	.15	N	N	<.002	<.5	N
TB 016 R	38 19 21	108 32 49	1.50	5.00	.10	N	N	.050	.7	N
TB 016 X	38 19 21	108 32 49	3.00	.70	.10	N	N	.050	N	N
TB 016 A	38 19 21	108 32 49	<.05	.05	.02	N	N	.005	N	N

TABLE 5--ANALYTICAL RESULTS OF ROCK SAMPLES FROM THE TABAGUACHE CREEK WILDERNESS STUDY AREA, MONTROSE COUNTY, COLORADO.--Continued

Sample	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	Ga-ppm s	Ge-ppm s	La-ppm s
TB 004 R	N	10	>5,000	N	N	N	N	10	10	N	N	N
TB 016 R	N	30	2,000	N	N	N	10	N	50	15	N	<50
TB 016 X	N	15	150	N	N	N	N	N	5	N	N	N
TB 016 A	N	20	100	N	N	N	N	N	N	N	N	N

TABLE 5--ANALYTICAL RESULTS OF ROCK SAMPLES FROM THE TABAGUACHE CREEK WILDERNESS STUDY AREA, MONTROSE COUNTY, COLORADO.--Continued

Sample	Mn-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	Th-ppm s	V-ppm s
TB 004 R	1,000	<5	N	N	N	N	N	N	700	N	30
TB 016 R	500	<5	N	20	<10	N	<5	N	100	N	70
TB 016 X	300	N	N	<5	N	N	N	N	N	N	30
TB 016 A	10	N	N	N	N	N	N	N	N	N	15

TABLE 5--ANALYTICAL RESULTS OF ROCK SAMPLES FROM THE TABAGUACHE CREEK WILDERNESS STUDY AREA, MONTROSE COUNTY, COLORADO.--Continued

Sample	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp	Au-ppm aa	Th-ppm dna	U-ppm dna
TB 004 R	N	N	N	N	<5	<2	.2	<2	<2	<.05	<1.5	.350
TB 016 R	N	10	N	150	64	<2	1.3	<2	19	<.05	3.9	1.960
TB 016 X	N	N	N	30	<5	<2	.3	<2	10	<.05	2.1	.472
TB 016 A	N	N	N	N	<5	<2	<.1	<2	<2	<.05	<2.7	3.790

TABLE 6. Rock Descriptions

Sample	Description
TB004R	Calcite and sandstone
TB016R	Conglomerate
TB016X	Sandstone
TB016A	Chert