UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Chemical analyses for samples of rock, stream sediment, and nonmagnetic heavy-mineral concentrates, Marble Mountain Wilderness and vicinity, Siskiyou County, California

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STUDIES RELATED TO WILDERNESS

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and the Joint Conference Report on Senate Bill 4, 88th Congress, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness", "wild", or "canoe" when the act was passed were incorporated into the National Wilderness Preservation System, and some of them are presently being studied. The act provided that areas under consideration for wilderness designation should be studied for suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. The act directs that the results of such surveys are to be made available to the President and the Congress. This report discusses the results of a mineral survey of the Marble Mountain Wilderness, Klamath National Forest, Siskiyou County, California. The area was established as a Primitive Area in 1931, reclassified as a Wilderness in 1953, and incorporated into the Wilderness Preservation System in 1964.

INTRODUCTION

A geochemical study of the Marble Mountain Wilderness (Fig. 1) was undertaken to aid in the evaluation of its mineral resource potential. Fifty-six stream sediments, 131 panned concentrates of stream sediments, and 9 rock samples were taken throughout the study area during the summers of 1979-1981. This report describes sample collection and analytical methods used during the study and presents the analytical data. The purpose is to make the data available to the public and to provide sufficient information for users of the data to make their own interpretation.

GEOCHEMICAL SAMPLING

Heavy-mineral concentrates and stream sediments were chosen as the primary sample medium for this study because they represent a composite of rock and soil exposed in the drainage basin upstream from the sample site. Samples were collected by personnel of both the U.S. Geological Survey (USGS) and the U.S. Bureau of Mines (USBM). Plate 1 shows the sample sites visited by one or both of these groups. USGS sample sites are noted by one- or two-digit numbers; and rock samples are suffixed by R, stream-sediments by S, and concentrates by C. USBM sample sites are noted by a leading letter (B, P, W, J, or C) followed by a number. Sites sampled by both USGS and USBM show both sample numbers separated by a comma.

Samples collected by USGS

In general, two samples were collected at each sample site. Both samples consisted of a composite of at least 5 grab samples collected along a 10 m stretch of active stream channel. The samples were sieved through a 2-mm stainless-steel screen at the sample site. One sample was sieved to -80 mesh (< 0.18 mm), pulverized, and analyzed for 31 elements by a semiquantitative spectrographic method (Grimes and Marranzino, 1968). The second sample was panned at the sample site to produce a heavy-mineral concentrate. A 35-mesh (0.425 mm) stainless-steel screen was used to sieve the panned concentrates and the -35 mesh concentrate fraction was retained for further separation. The most magnetic fraction of the panned concentrate was removed using an

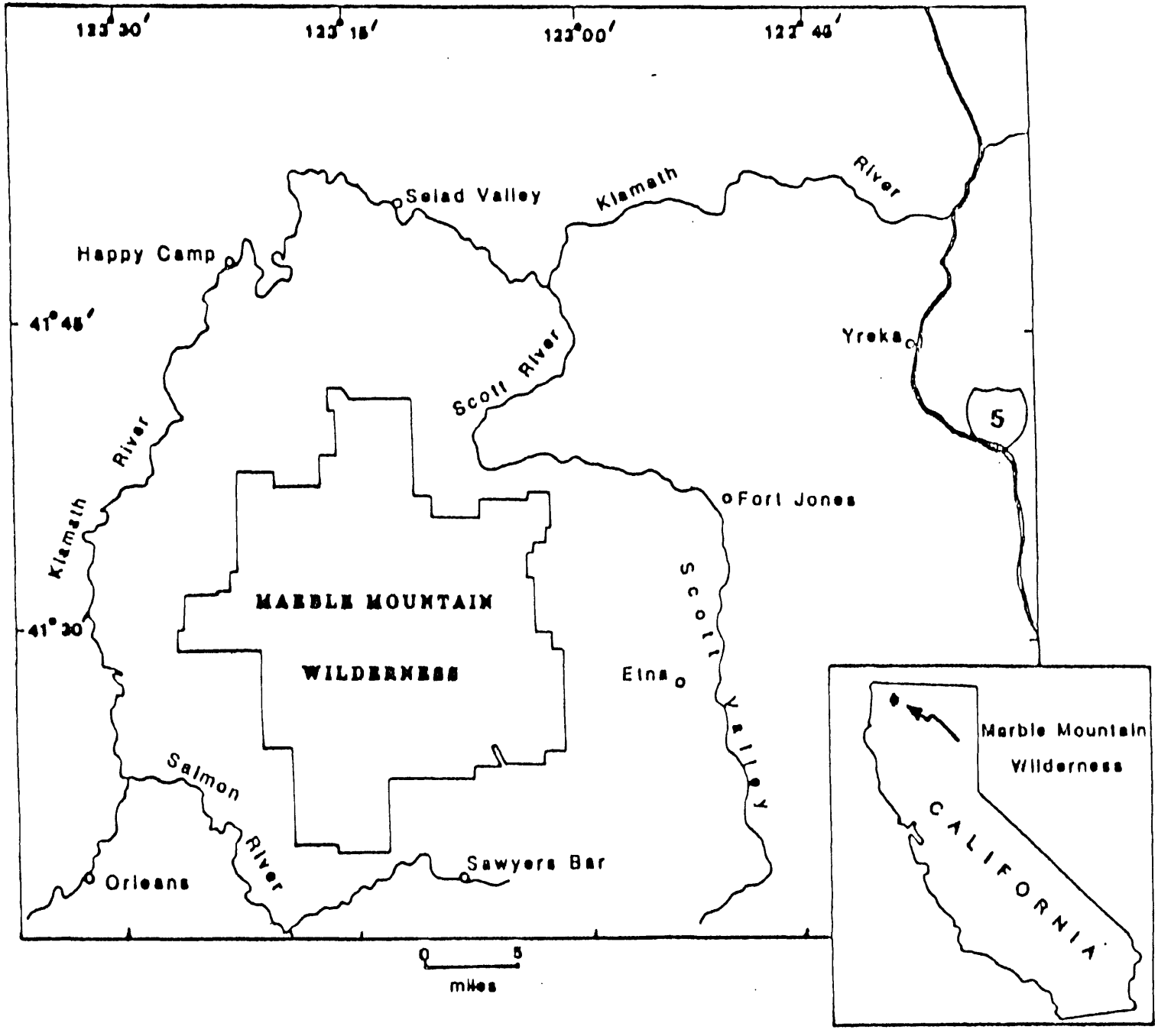

Figure 1.--Index map showing location of Marble Mountain Wilderness, California.

electromagnet, and the low-density fraction (specific gravity < 2.8) was separated from the heavy-mineral fraction by flotation in bromoform and discarded. A final magnetic separation of the heavy-mineral fraction was made on the Frantz Isodynamic Magnetic Separator set at 0.6 amperes. Under these conditions, a less magnetic, heavy-mineral fraction is separated from a more magnetic fraction. A split of the heavy, nonmagnetic fraction was ground by hand using an agate mortar and pestle, and then analyzed spectrographically. This fraction contains sulfide, nonmagnetic oxide, tungstate and sulfate minerals, tourmaline, barite, apatite, sphene, zircon, and minor trace or accessory minerals which may be indicative of mineralization. The concentrate medium generally gives a greatly enhanced anomaly pattern because the more common rock-forming minerals (quartz and feldspar) that tend to dilute the anomalies have been removed.

Nine rock samples were collected from outcrops that were considered to be representative of ultramafic rocks exposed in the vicinity of the plotted site location. All samples were crushed and pulverized to -100 mesh (< 0.15 mm), and then analyzed by emission and atomic absorption spectrographic techniques.

Samples collected by USBM

These samples were sieved to -14 mesh and a Wilfley table was used to produce a heavy-mineral-concentrate. This concentrate was pulverized and shipped to the USGS laboratories in Denver for semiquantitative spectrographic analysis as discussed above. The major difference in these samples as compared to the USGS samples is that the analyzed fraction of the USBM samples had not been subjected to heavy-liquid or magnetic separation. As a result, these samples contained minerals such as magnetite, biotite, amphiboles, and pyroxenes. Amphiboles and biotite, in particular, exhibit extensive atomic substitution within their crystal structure, and their presence in samples increases the difficulty of interpreting anomaly patterns.

CHEMICAL ANALYSIS

All four types of samples were analyzed for 31 elements (Ag, As, Au, B, Ba, Ce, 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).

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). The precision of the method is approximately plus or minus two reporting intervals at the 96-percent confidence level (Motooka and Grimes, 1976). Values determined for the major elements (Mg, Ca, Fe, and Ti) are given in weight percent; all others are given in parts per million (micrograms/gram).

Detection limits for the spectrographic analyses are listed in Table 1. The spectrographic technique was modified for the analyses of nonmagnetic heavy-mineral concentrates because of matrix interference problems. As a result, the lower detection limits for the elements analyzed for this type of sample are all raised two reporting values above the normal lower detection limit (Table 1).

Each spectrographic film includes analytical spectra for up to 23 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; however, the analyses for these samples have been omitted from Tables 2B-5.

Only the rock samples were analyzed by the A to Z atomic absorption method (modification of Viets, 1978). For the six elements discussed here, the reported lower limits of analytical determination are as follows:

Element	Lower limit of determination (ppm)
Au	.05
As	5
Zn	5
Cd	.1
Bi	2
Sb	1

DESCRIPTION OF TABLES 2B-5

Tables 2B-5 list the chemical analyses for the samples of rock, -80 mesh stream sediment, USGS nonmagnetic heavy-mineral concentrate, and USBM heavy-mineral concentrate, respectively. USGS samples are coded with a leading "MM" followed by a number corresponding to the site number on the sample locality map (Plate 1). Rock samples are suffixed by R, and nonmagnetic heavy-mineral concentrates by C, stream sediments are not suffixed. USBM heavy-mineral concentrates have a three-letter prefix followed by a number, and the last letter of the prefix plus the number corresponds to the coding on the sample locality map (Plate 1).

Columns 2 and 3 list the latitudes (north) and longitudes (west) for the sample sites in degrees, minutes, and seconds. Columns in which the element heading shows the letter "s" below the element symbol are emission spectrographic analyses. Columns in which the element heading shows "aa" are atomic absorption analyses.

The element Sb was not detected spectrographically in any of the samples. Gold, As, Cd, W, and Zn were rarely detected; where their presence was determined, the respective concentrations are noted in footnotes.

Analytical data for samples from the Marble Mountain Wilderness were entered into the USGS Rock Analysis System (RASS). These data for stream sediments, heavy-mineral concentrates, nonmagnetic heavy-mineral concentrates, and rocks are listed in Tables 2B-5.

CONCLUSIONS

A reconnaissance geochemical sampling of the Marble Mountain Wilderness was conducted using stream sediments and heavy-mineral concentrates from stream sediments. An area of high Cr and Ni values (greater than twice the average) in the nonmagnetic fraction of concentrates, was defined in the

northeast quadrant of the study area. The anomalous concentrations of these elements are the result of the presence, upstream from the sample sites, of ultramafic rocks.

ACKNOWLEDGMENTS

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REFERENCES CITED

Grimes, D. J., and Marranzino, A. P, 1968, Direct-current arc and alternating-current spark emission spectrographic field methods for the semiquantitative analysis of geologic materials: U. S. Geological Survey Circular 591, 6p.

Motooka, J. M, and Grimes, D. J., 1976, Analytical precision of one-sixth order semiquantitative spectrographic analysis: U. S. Geological Survey Circular 738, 25p.

Viets, J. G., 1978, Determination of silver, bismuth, cadmium, copper, lead, and zinc in geological materials by atomic absorption spectrometry with tricaprylymethylammonium chloride: Analytical Chemistry, v. 50, p. 1097-1101.

Table 1.--Detection limits for elements analyzed by semiquantitative emission spectrography.

Element	Lower Limits of Detection	
	Rocks and Sediments	Concentrates
Fe	0.05%	0.1%
Mg	0.02	0.05
Ca	0.05	0.1
Ti	0.002	0.005
Mn	10 ppm	20 ppm
Ag	0.5	1
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
Th	100	200
V	10	20
W	50	100
Y	10	20
Zn	200	500
Zr	10	20

Table 2A.--Description of rocks from the Marble Mountain Wilderness Area and vicinity, Siskiyou County, California

Sample No.	Description
MM 45 R	Chromite-bearing ultramafic rock
46 R	Chromite-bearing ultramafic rock
47 R	Chromite-bearing ultramafic rock
48 R	Chromite-bearing ultramafic rock
49 R	Chromite-bearing ultramafic rock
50 R	Chromite-bearing ultramafic rock
59 R	Ultramafic rock
68 R	Ultramafic rock
69 R	Chromite-bearing ultramafic rock

Table 2B. Analytical data for rocks from Marble Mountain Wilderness and vicinity, Siskiyou County, California.

[The following qualifiers are used in reporting analytical data: --, no determination made; N, element not detected; <, detected, but present at a concentration less than the value reported; and >, element present at a concentration greater than the upper detection limit.]

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
MM45R[1/]	41 42 5	123 16 32	5	2	.05	.010	200	N	N	N	1.0
MM46R	41 40 14	123 14 56	7	3	N	.015	700	N	<10	N	N
MM47R	41 38 10	123 13 0	7	5	N	<.002	700	N	50	N	N
MM48R	41 37 38	123 13 0	5	5	N	.005	700	.7	N	N	N
MM49R	41 37 49	123 14 18	7	5	.20	<.002	700	N	N	N	N
MM50R	41 36 14	123 9 52	7	5	.05	.002	700	N	10	N	N
MM59R	41 22 50	123 10 36	2	1	.70	.200	1,500	N	10	700	1.5
MM68R	41 31 32	123 7 2	15	2	7.00	1.000	2,000	N	<10	100	N
MM69R	41 31 32	123 7 2	15	5	<.05	.030	500	N	N	N	N

Sample	Co-ppm s	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 s
MM45R	>2,000	>5,000	<5	N	1,000	N	20	N	200	N	N	>2,000
MM46R	70	>5,000	30	N	1,000	N	7	N	50	N	N	N
MM47R	70	>5,000	<5	N	1,500	N	7	N	20	N	N	N
MM48R	100	>5,000	N	N	1,000	N	5	N	20	N	N	300
MM49R	70	>5,000	N	N	1,000	N	7	N	15	N	N	N
MM50R	70	>5,000	20	N	1,500	N	7	N	20	N	N	N
MM59R	10	50	10	20	30	10	5	200	50	15	100	N
MM68R	70	70	10	N	20	N	15	200	200	100	150	N
MM69R	200	>5,000	7	N	1,000	N	5	N	150	N	N	1,000

Sample	Zn-ppm aa	Cd-ppm aa	Bi-ppm aa	Sb-ppm aa
MM45R	410	N	<2	<1
MM46R	85	N	<2	<1
MM47R	55	N	<2	<1
MM48R	70	.1	<2	<1
MM49R	40	.1	<2	1
MM50R	65	.1	<2	N
MM59R	30	.1	<2	N
MM68R	100	.1	<2	1
MM69R	700	.3	<2	N

Footnote

[1/] Contains 20 ppm Cd.

Table 3. Analytical data for stream sediments from Marble Mountain Wilderness and vicinity, Siskiyou County, California.

[The following qualifiers are used in reporting analytical data: --, no determination made; N, element not detected; <, detected, but present at a concentration less than the value reported; and >, element present at a concentration greater than the upper detection limit.]

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	Bi-ppm s
MM001	41 34 58	123 9 14	5	2.0	2.0	.70	1,000	10	700	N	N
MM002	41 36 40	123 11 2	5	3.0	2.0	1.00	1,000	15	700	N	N
MM003	41 36 20	123 7 34	5	5.0	2.0	.50	1,000	20	500	N	N
MM004	41 36 20	123 7 44	3	5.0	3.0	.50	1,000	30	500	N	N
MM005	41 36 39	123 6 52	5	5.0	3.0	.50	1,000	20	500	N	N
MM006	41 37 22	123 5 57	5	5.0	2.0	.70	1,000	20	300	N	N
MM007	41 34 30	123 1 30	5	5.0	2.0	.70	1,000	10	150	N	N
MM008[2/]	41 32 33	123 5 36	5	5.0	2.0	.20	1,000	20	200	N	N
MM009	41 32 30	123 5 36	5	5.0	2.0	.30	1,000	20	300	N	N
MM010	41 33 36	123 3 40	5	5.0	2.0	.50	1,000	10	200	N	N
MM011	41 30 3	123 1 54	3	2.0	3.0	.50	1,000	10	700	N	N
MM012	41 30 47	123 5 17	2	2.0	2.0	.20	1,000	10	500	N	N
MM013	41 30 45	123 5 22	3	2.0	3.0	.20	1,000	10	300	N	N
MM014	41 30 24	123 4 49	3	3.0	2.0	.50	1,000	10	700	N	N
MM016	41 38 42	123 15 59	3	5.0	2.0	.50	1,000	10	300	N	N
MM017	41 36 25	123 18 1	5	5.0	2.0	.30	1,000	30	500	N	N
MM018	41 36 18	123 17 59	2	3.0	3.0	.30	1,000	30	300	N	N
MM019	41 36 32	123 17 7	3	2.0	5.0	.15	1,000	50	300	N	N
MM020	41 36 46	123 23 59	3	2.0	3.0	.15	700	10	300	N	N
MM021	41 32 17	123 2 44	3	2.0	3.0	.15	1,000	10	700	N	N
MM022	41 41 27	123 12 30	3	3.0	3.0	.50	1,000	10	700	N	N
MM023	41 41 29	123 12 22	3	3.0	5.0	.50	1,000	<10	700	1	N
MM024	41 22 39	123 10 54	3	3.0	2.0	.50	1,000	100	1,000	1	N
MM025	41 22 39	123 10 48	3	2.0	2.0	.50	700	70	1,000	1	N
MM026	41 20 5	123 16 30	2	2.0	2.0	.50	700	10	700	1	N
MM027	41 20 5	123 16 39	2	3.0	2.0	.20	1,000	10	700	1	N
MM028	41 23 28	123 20 29	2	3.0	1.5	.70	1,000	20	1,000	1	N
MM029	41 29 59	123 12 45	2	3.0	2.0	.50	1,000	20	700	N	N
MM030	41 30 1	123 12 46	2	3.0	1.0	.20	700	10	700	N	N
MM032[3/]	41 37 30	123 11 59	10	5.0	2.0	1.00	1,000	10	1,000	N	N
MM033	41 35 8	123 15 44	5	5.0	5.0	.70	1,000	15	1,000	N	N
MM034	41 36 32	123 17 32	5	5.0	5.0	.50	1,000	20	500	N	N
MM035	41 35 34	123 14 34	5	5.0	5.0	1.00	1,000	10	700	N	N
MM036	41 35 54	123 14 54	5	5.0	7.0	1.00	1,000	10	700	N	N
MM037	41 36 50	123 16 46	10	5.0	10.0	.50	1,000	20	700	N	N
MM038	41 29 55	123 22 43	10	5.0	10.0	.50	2,000	10	700	N	N
MM040	41 29 54	123 24 6	7	5.0	5.0	.50	1,500	10	700	N	N
MM041	41 30 0	123 23 51	7	5.0	5.0	.50	1,500	10	500	N	N
MM042	41 29 59	123 24 1	7	5.0	5.0	.50	2,000	10	500	N	N
MM043	41 30 59	123 24 14	5	5.0	5.0	.50	1,500	10	500	N	N
MM51	41 31 31	123 12 21	7	3.0	1.5	1.00	1,500	15	1,000	<1	<10
MM53	41 31 10	123 10 15	7	5.0	2.0	.30	1,500	10	700	<1	<10
MM54	41 25 47	123 16 28	7	3.0	2.0	.50	1,500	20	1,500	1	N
MM55	41 29 24	123 20 45	10	5.0	3.0	.50	2,000	20	500	<1	<10
MM56	41 30 43	123 19 58	7	2.0	2.0	.50	1,500	10	300	<1	N

See footnotes at end of table.

Table 3. Analytical data for stream sediments from Marble Mountain Wilderness and vicinity, Siskiyou County, California. (continued)

Sample	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sr-ppm s	V-ppm s	Y-ppm s	Zr-ppm s
MM001	30	700	50	<20	N	100	N	15	200	100	30	100
MM002	30	300	70	<20	<20	100	N	15	200	100	30	100
MM003	50	1,500	100	<20	N	500	N	15	150	100	30	70
MM004	30	1,500	70	<20	N	300	N	20	200	150	30	70
MM005	30	1,500	70	<20	N	300	10	20	200	100	30	70
MM006	30	1,500	50	<20	N	300	N	20	200	100	30	100
MM007	50	2,000	50	<20	N	500	N	20	150	100	20	70
MM008	30	5,000	30	<20	N	300	N	15	150	70	15	20
MM009	50	2,000	70	<20	N	700	<10	15	150	100	20	50
MM010	30	3,000	30	<20	N	500	N	15	150	70	20	50
MM011	20	200	50	<20	N	50	10	20	300	100	20	50
MM012	20	100	70	20	N	50	10	20	300	100	20	50
MM013	30	200	100	<20	N	50	15	20	500	100	20	50
MM014	30	300	100	<20	N	50	15	20	200	100	20	50
MM016	30	1,500	50	<20	N	500	<10	15	200	100	20	70
MM017	30	300	70	<20	N	70	10	50	200	150	20	70
MM018	20	200	50	<20	N	20	10	30	200	100	20	100
MM019	20	300	50	<20	N	30	10	50	200	150	20	100
MM020	15	300	30	<20	N	50	10	30	500	150	15	50
MM021	30	300	100	<20	N	100	10	30	300	150	15	30
MM022	30	1,000	70	20	N	300	10	30	500	150	30	100
MM023	30	500	50	20	N	100	10	30	700	150	20	70
MM024	30	200	50	<20	N	50	10	50	200	150	30	100
MM025	30	300	50	20	N	50	20	30	200	150	20	70
MM026	15	150	30	<20	N	20	20	30	150	100	20	70
MM027	30	100	20	<20	N	20	20	30	150	100	20	100
MM028	20	300	70	<20	N	100	20	20	200	100	20	70
MM029	20	300	70	<20	N	70	15	30	500	150	20	100
MM030	30	1,000	50	<20	N	300	N	20	150	100	20	70
MM032	50	700	100	20	<20	300	20	30	200	150	50	150
MM033	30	700	70	20	N	200	10	30	200	150	30	100
MM034	30	300	70	20	N	50	10	50	200	200	20	100
MM035	30	500	70	20	N	200	10	30	200	150	50	100
MM036	30	1,000	70	20	N	300	10	50	300	150	30	150
MM037	30	500	100	20	N	70	10	70	200	200	30	150
MM038	30	300	70	20	N	20	10	70	300	300	50	500
MM040	30	200	70	20	N	20	10	70	300	200	30	200
MM041	30	200	50	20	N	20	10	70	300	200	30	500
MM042	30	200	70	20	N	20	10	70	200	200	30	150
MM043	30	150	70	20	N	20	10	50	300	200	30	500
MM51	70	2,000	100	<20	<20	300	10	30	200	200	30	100
MM53	70	2,000	70	N	N	300	10	30	500	200	20	70
MM54	50	200	50	50	<20	150	15	50	300	300	50	500
MM55	70	300	70	N	N	70	15	70	200	500	30	700
MM56	50	200	30	N	N	50	<10	30	200	300	20	200

Table 3. Analytical data for stream sediments from Marble Mountain Wilderness and vicinity, Siskiyou County, California. (continued)

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	Bi-ppm s
MM57	41 23 3	123 10 58	7	3.0	2.0	.50	1,500	30	1,000	<1	N
MM58	41 22 59	123 11 0	7	3.0	2.0	.50	1,500	10	1,500	<1	<10
MM59	41 22 50	123 10 36	5	1.5	1.5	.50	1,500	30	1,500	1	N
MM60	41 22 45	123 12 59	7	2.0	1.5	.50	1,500	10	1,500	1	N
MM61	41 22 37	123 13 0	7	2.0	2.0	.70	1,500	15	1,000	1	<10
MM62	41 34 16	123 7 50	3	7.0	.5	.30	1,500	20	1,500	<1	N
MM63	41 34 24	123 8 38	5	3.0	2.0	.50	1,500	15	500	1	<10
MM64	41 33 45	123 21 31	7	7.0	1.0	1.00	1,500	10	500	<1	<10
MM65	41 31 53	123 22 58	7	3.0	2.0	.50	1,500	10	500	1	N
MM66	41 36 15	123 20 45	10	5.0	3.0	.70	1,500	50	500	1	<10
MM67	41 25 15	123 1 1	5	1.5	2.0	.30	1,000	<10	100	<1	N

Sample	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sr-ppm s	V-ppm s	Y-ppm s	Zr-ppm s
MM57	30	200	50	N	N	100	15	30	200	200	20	200
MM58	50	200	50	N	N	100	20	30	200	200	30	200
MM59	30	150	70	N	<20	100	<10	30	200	200	20	100
MM60	20	150	50	50	<20	30	15	30	200	200	30	1,000
MM61	50	200	70	50	<20	50	20	50	200	300	50	500
MM62	70	3,000	50	N	N	2,000	10	15	N	70	10	50
MM63	30	300	50	N	N	100	10	50	300	300	30	500
MM64	70	5,000	50	<20	<20	2,000	10	30	150	100	20	70
MM65	20	300	30	N	N	50	10	50	300	300	20	300
MM66	50	300	50	<20	N	70	15	70	300	500	30	700
MM67	20	200	50	N	N	70	<10	30	<100	200	20	50

Footnotes

2/ Contains 50 ppm W.

3/ Contains less than 200 ppm Zn.

Table 4. Analytical data for USGS heavy-mineral concentrates from Marble Mountain Wilderness and vicinity, Siskiyou County, California.

[The following qualifiers are used in reporting analytical data: --, no determination made; N, element not detected; <, detected, but present at a concentration less than the value reported; and >, element present at a concentration greater than the upper detection limit.]

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
MM001C	41 34 58	123 9 14	2.0	5.0	10	.7	1,500	N	150	1,500	N	30
MM002C	41 36 40	123 11 2	5.0	10.0	15	1.0	2,000	N	20	700	N	50
MM003C	41 36 20	123 7 34	5.0	10.0	5	.5	1,000	N	500	700	N	70
MM004C	41 36 20	123 7 44	5.0	15.0	5	.5	1,000	N	<20	500	N	100
MM005C	41 36 39	123 6 52	5.0	10.0	7	.5	1,500	N	50	500	N	70
MM006C	41 37 22	123 5 57	5.0	10.0	7	1.5	1,500	N	20	500	N	70
MM007C	41 34 30	123 1 30	5.0	10.0	5	.5	1,500	N	200	N	N	70
MM008C	41 32 33	123 5 38	5.0	7.0	5	.2	1,500	N	<20	300	N	50
MM009C	41 32 30	123 5 36	7.0	10.0	10	1.0	1,500	N	500	500	N	70
MM010C	41 33 36	123 3 40	5.0	10.0	5	.5	1,500	N	<20	200	N	70
MM011C	41 30 3	123 1 54	2.0	2.0	10	.3	1,500	N	20	700	N	20
MM012C	41 30 47	123 5 17	5.0	2.0	5	.5	1,500	N	<20	700	N	30
MM013C	41 30 45	123 5 22	5.0	2.0	7	.3	1,500	N	20	500	N	30
MM014C	41 30 24	123 4 49	5.0	5.0	5	.5	1,500	N	20	500	N	30
MM015C	41 29 58	123 1 39	5.0	5.0	5	.7	1,500	N	30	N	N	50
MM016C	41 38 42	123 15 59	7.0	20.0	2	.5	1,500	N	20	200	N	100
MM017C	41 36 25	123 18 1	2.0	1.0	2	.2	700	N	50	700	N	20
MM018C	41 36 18	123 17 59	2.0	1.0	10	.2	1,000	N	50	700	N	20
MM019C	41 36 32	123 17 7	2.0	1.5	10	.2	700	N	50	700	N	20
MM020C	41 36 46	123 23 59	2.0	1.5	5	.2	1,000	N	50	700	N	20
MM021C	41 32 17	123 2 44	5.0	5.0	5	.5	1,500	N	70	700	N	30
MM022C	41 41 27	123 12 30	5.0	5.0	5	.7	1,500	N	<20	700	N	30
MM023C	41 41 29	123 12 22	5.0	7.0	10	.5	1,500	N	<20	500	N	50
MM024C	41 22 39	123 10 54	2.0	1.5	5	1.5	700	N	500	700	N	20
MM025C	41 22 39	123 10 48	1.5	1.0	5	.3	700	N	50	700	N	10
MM026C	41 20 5	123 16 30	1.0	.2	5	1.5	300	N	20	700	N	10
MM027C	41 20 5	123 16 39	1.0	.2	5	2.0	500	N	20	700	N	20
MM028C	41 23 28	123 20 29	3.0	5.0	5	1.0	1,000	N	500	700	N	30
MM029C	41 29 59	123 12 45	5.0	1.5	7	.3	1,000	N	20	700	N	20
MM030C	41 30 1	123 12 46	5.0	5.0	5	.5	1,500	N	20	700	N	50
MM031C	41 29 26	123 14 24	5.0	5.0	5	.3	1,500	N	20	700	N	30
MM032C	41 37 30	123 11 59	5.0	5.0	5	1.5	1,000	N	20	1,000	N	30
MM033C	41 35 8	123 15 44	2.0	5.0	7	.5	1,500	N	20	1,000	N	20
MM034C	41 36 32	123 17 32	1.5	1.5	5	.2	500	N	30	700	N	10
MM035C	41 35 34	123 14 34	2.0	5.0	5	.5	1,500	N	20	1,000	N	30
MM036C	41 35 54	123 14 54	5.0	7.0	7	.5	1,500	N	20	500	N	50
MM037C	41 36 50	123 16 46	2.0	5.0	10	.2	1,000	N	50	700	N	20
MM038C	41 29 55	123 22 43	2.0	.7	10	1.0	700	N	50	700	N	10
MM039C	41 29 55	123 22 47	1.0	.5	5	.3	500	N	50	700	N	N
MM040C	41 29 54	123 24 6	1.0	.7	7	.5	700	N	50	700	N	10
MM041C	41 30 0	123 23 51	1.0	.5	5	.5	500	N	20	500	N	N
MM042C	41 29 59	123 24 1	2.0	.7	5	.5	700	N	50	700	N	10
MM043C	41 30 59	123 24 14	2.0	1.0	5	.5	700	N	50	500	N	10
MM044C 4/	41 17 26	123 7 13	5.0	.5	2	2.0	500	2,000	50	3,000	N	30
MM45C	41 34 8	123 22 48	1.5	1.0	10	.7	300	N	70	1,000	<2	15

See footnote at end of tables

Table 4. Analytical data for USGS heavy-mineral concentrates from Marble Mountain Wilderness and vicinity, Siskiyou County, California. (continued)

Sample	Cr-ppm s	Cu-ppm s	La-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	Y-ppm s	Zr-ppm s	Th-ppm s
MM001C	700	20	50	<50	150	20	30	N	700	100	50	150	N
MM002C	1,000	70	100	<50	500	N	30	N	500	150	50	150	N
MM003C	1,000	30	50	N	700	N	30	N	300	150	30	70	N
MM004C	700	30	50	N	1,500	N	30	N	200	150	30	100	N
MM005C	1,000	50	50	N	700	N	30	N	300	200	50	100	N
MM006C	1,500	500	100	50	700	N	30	N	500	150	70	150	N
MM007C	700	30	50	N	700	N	30	N	200	100	30	70	N
MM008C	700	20	50	N	200	N	30	N	300	150	20	30	N
MM009C	700	50	50	N	500	N	50	N	700	200	30	70	N
MM010C	1,000	20	100	N	700	N	30	N	300	100	30	100	N
MM011C	150	50	50	N	100	20	20	N	1,000	150	30	150	N
MM012C	200	50	50	N	70	50	30	N	700	200	30	100	N
MM013C	200	70	70	N	50	20	30	N	1,000	300	30	70	N
MM014C	700	100	50	N	100	20	30	N	500	300	30	70	N
MM015C	500	70	<50	N	100	N	30	N	300	200	50	100	N
MM016C	1,000	50	50	N	2,000	N	30	N	300	150	30	200	N
MM017C	150	50	50	N	30	50	10	N	700	100	20	2,000	N
MM018C	150	30	50	N	10	50	20	N	1,500	70	20	2,000	N
MM019C	300	30	50	N	10	20	20	N	1,000	100	30	>2,000	N
MM020C	200	30	50	N	50	20	20	N	1,000	100	20	>2,000	N
MM021C	700	30	50	N	150	20	30	N	700	200	20	100	N
MM022C	700	30	50	N	200	20	30	N	700	200	30	150	N
MM023C	1,500	50	50	N	200	N	30	N	700	200	30	150	N
MM024C	200	50	100	<50	30	20	30	N	1,000	150	100	>2,000	N
MM025C	100	20	50	N	10	30	10	N	1,000	100	20	500	N
MM026C	70	30	500	N	10	70	100	N	700	150	200	>2,000	2,000
MM027C	100	30	200	70	10	50	100	N	200	200	300	>2,000	1,500
MM028C	700	30	50	N	150	20	20	N	500	100	50	1,000	N
MM029C	150	30	50	N	50	20	30	N	1,000	200	20	150	N
MM030C	700	200	50	N	200	20	30	N	500	150	20	150	N
MM031C	700	30	50	N	200	20	30	N	500	150	20	70	N
MM032C	700	30	100	<50	200	20	30	N	500	150	70	200	N
MM033C	700	20	50	N	150	20	20	N	500	100	20	300	N
MM034C	150	70	50	N	20	30	10	N	700	100	<20	200	N
MM035C	700	30	50	N	200	N	20	N	500	150	50	100	N
MM036C	1,500	30	50	N	500	N	30	N	500	200	30	100	N
MM037C	700	15	50	N	100	30	30	N	1,000	150	30	2,000	N
MM038C	70	15	50	N	10	70	20	N	1,500	150	70	>2,000	N
MM039C	50	15	<50	N	10	50	10	N	1,000	100	30	1,500	N
MM040C	50	15	<50	N	10	50	20	N	1,000	100	70	>2,000	N
MM041C	20	15	<50	N	10	50	20	N	1,000	100	50	>2,000	N
MM042C	100	15	<50	N	10	20	20	N	1,000	150	50	>2,000	N
MM043C	100	20	<50	N	10	50	20	N	1,000	200	70	>2,000	N
MM044C	200	10,000	70	50	70	3,000	20	1,500	200	150	70	1,000	N
MM45C	300	15	50	N	30	30	20	N	500	70	50	2,000	N

See footnote at end of tables

Table 4. Analytical data for USGS heavy-mineral concentrates from Marble Mountain Wilderness and vicinity, Siskiyou County, California. (continued)

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
MM51C	41 31 31	123 12 21	10.0	3.0	15	>2.0	500	N	150	3,000	N	100
MM52C	41 28 51	123 14 2	.7	5.0	30	.7	700	N	70	1,000	N	10
MM53C	41 31 10	123 10 15	.5	1.0	20	2.0	700	N	50	2,000	<2	15
MM54C	41 25 47	123 16 28	2.0	1.5	15	2.0	500	N	70	1,500	N	20
MM55C	41 29 24	123 20 45	.1	.7	10	.5	500	N	70	700	N	20
MM56C	41 30 43	123 19 58	1.0	.7	10	1.0	700	N	70	500	2	10
MM57C	41 23 3	123 10 58	1.5	.7	15	2.0	700	N	50	700	2	15
MM58C	41 22 59	123 11 0	1.0	.7	15	2.0	500	N	70	1,000	3	20
MM59C	41 22 50	123 10 36	2.0	.7	20	.5	700	N	70	700	N	20
MM60C	41 22 45	123 12 59	.5	.5	15	>2.0	300	N	50	700	<2	20
MM61C	41 22 37	123 13 0	1.0	1.0	15	2.0	500	N	30	500	N	20
MM62C	41 34 16	123 7 50	2.0	5.0	10	>2.0	1,000	N	50	1,500	N	30
MM63C	41 34 24	123 8 38	5.0	10.0	10	2.0	1,500	N	30	700	N	70
MM64C	41 33 45	123 21 31	3.0	1.5	15	.3	700	N	70	500	2	20
MM65C	41 31 53	123 22 58	1.0	.7	15	1.0	200	N	50	700	N	15
MM66C	41 36 15	123 20 45	1.0	.7	15	.5	300	N	50	500	<2	10
MM67C	41 25 15	123 1 1	3.0	1.0	15	1.0	1,000	N	50	200	N	20

Sample	Cr-ppm s	Cu-ppm s	La-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	Y-ppm s	Zr-ppm s	Th-ppm s
MM51C	200	100	<50	100	70	3,000	20	N	300	70	100	2,000	N
MM52C	30	15	100	<50	20	100	15	N	500	70	100	1,000	N
MM53C	50	15	100	N	30	20	15	N	500	70	70	2,000	N
MM54C	150	70	70	70	20	70	30	20	700	100	100	>2,000	500
MM55C	50	<10	100	N	15	30	70	N	500	30	100	>2,000	200
MM56C	50	15	70	N	10	30	100	N	1,000	50	100	>2,000	N
MM57C	30	15	70	N	10	50	50	N	2,000	70	70	>2,000	N
MM58C	50	10	100	50	10	70	30	<20	2,000	70	100	>2,000	200
MM59C	20	10	50	N	20	70	10	N	2,000	70	30	200	N
MM60C	50	10	150	50	10	50	70	20	1,500	100	200	>2,000	500
MM61C	100	100	300	<50	15	30	100	20	700	100	300	>2,000	200
MM62C	500	10	70	100	200	20	20	N	700	150	200	1,500	N
MM63C	3,000	10	50	50	700	20	20	N	500	100	70	1,000	N
MM64C	300	15	50	N	15	50	50	N	1,000	100	50	>2,000	N
MM65C	70	10	100	<50	10	50	30	N	1,000	100	70	>2,000	N
MM66C	20	10	70	N	10	50	70	N	1,000	70	50	>2,000	N
MM67C	150	15	<50	N	30	20	20	N	500	150	30	2,000	N

Footnote

4/ Contains 1500 ppm Zn, greater than 1000 ppm Au and 500 ppm As.

Table 5. Analytical data for USBM concentrates from Marble Mountain Wilderness and vicinity, Siskiyou County, California.

[The following qualifiers are used in reporting analytical data: --, no determination made; N, element not detected; <, detected, but present at a concentration less than the value reported; and >, element present at a concentration greater than the upper detection limit.]

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
WMB127	41 25 57	123 22 48	10	3.0	5.00	.30	1,500	10	300	N
WMB128	41 26 30	123 21 24	10	3.0	5.00	.30	1,500	15	200	N
WMJ55	41 26 48	123 20 24	7	3.0	5.00	.30	1,000	20	200	N
WMJ57	41 26 33	123 20 24	10	3.0	5.00	.50	2,000	50	300	1.0
WMW28[5]	41 26 39	123 20 0	7	3.0	3.00	.30	1,000	15	300	N
WMW29	41 27 9	123 18 30	7	3.0	5.00	.30	1,500	15	200	N
WMW30	41 27 24	123 17 57	5	3.0	3.00	.20	1,000	20	300	N
WMJ58	41 27 0	123 18 24	7	2.0	3.00	.50	1,500	20	500	1.0
WMJ59[6]	41 27 15	123 18 15	10	3.0	3.00	.30	1,500	20	200	N
WMJ50[7]	41 27 31	123 17 27	10	3.0	3.00	.50	2,000	20	200	N
WMJ54[8]	41 28 15	123 16 30	10	3.0	3.00	.30	2,000	15	200	N
WMW27	41 28 13	123 16 39	7	3.0	3.00	.20	1,000	20	300	N
WMB134	41 28 12	123 16 39	10	3.0	3.00	.50	1,500	20	150	N
WMW25	41 29 18	123 14 30	7	2.0	2.00	.30	2,000	30	500	1.0
WMW26	41 29 24	123 14 27	10	3.0	3.00	.30	1,500	15	200	N
WMJ52	41 30 0	123 13 33	7	2.0	2.00	.30	5,000	20	500	N
WMJ53	41 30 3	123 13 36	7	3.0	2.00	.20	1,000	15	200	N
WMW24[9]	41 30 6	123 12 42	15	3.0	2.00	.20	1,000	10	150	N
WMJ51	41 30 3	123 12 39	7	2.0	3.00	.30	1,500	10	300	N
WMB131	41 30 21	123 16 45	10	3.0	5.00	.30	1,500	20	150	N
WMC54	41 30 24	123 16 45	5	2.0	5.00	.20	1,000	20	300	N
WMC55	41 30 24	123 16 30	10	3.0	5.00	.20	1,500	20	150	N
WMB132	41 30 57	123 16 6	10	3.0	5.00	.50	1,000	15	300	N
WMB133[10]	41 30 53	123 16 6	10	3.0	3.00	.50	1,500	10	200	N
WMC53	41 31 9	123 16 42	5	2.0	5.00	.15	1,000	20	300	N
WMC51	41 31 42	123 17 9	10	3.0	5.00	.20	1,500	30	300	N
WMB129	41 31 43	123 17 9	7	3.0	5.00	.20	1,000	30	300	N
WMC52	41 31 57	123 16 57	5	3.0	5.00	.20	1,000	20	300	N
WMB130	41 32 0	123 16 54	5	3.0	5.00	.20	1,000	20	300	N
WMC56	41 28 42	123 16 39	7	3.0	5.00	.30	1,500	20	200	N
WMB1[11]	41 27 12	123 4 39	7	3.0	7.00	.30	1,000	10	70	N
WMB9	41 26 15	123 7 57	7	2.0	5.00	.20	1,000	150	300	N
WMB20[12]	41 25 45	123 6 33	10	2.0	5.00	.30	1,500	10	300	N
WMB28	41 25 46	123 6 33	10	2.0	5.00	.30	3,000	10	200	N
WMB30	41 25 39	123 6 30	10	3.0	5.00	.50	2,000	10	200	N
WMB36	41 25 21	123 6 21	7	2.0	5.00	.20	1,000	150	300	N
WMB38	41 25 18	123 6 15	7	2.0	5.00	.20	1,500	10	300	N
WMB41	41 23 30	123 5 21	7	2.0	5.00	.30	1,500	10	300	N
WMB42	41 23 30	123 5 18	10	3.0	5.00	.20	1,000	15	300	N
WMB43	41 23 45	123 5 30	7	3.0	7.00	.20	1,000	<10	N	N
WMB44	41 23 45	123 5 21	7	3.0	7.00	.30	1,000	<10	N	N
WMB47	41 24 9	123 5 48	20	2.0	5.00	.70	5,000	<10	100	N
WMB58	41 24 59	123 6 18	7	3.0	5.00	.30	1,000	30	500	N
WMB62[13]	41 24 3	123 5 51	7	2.0	5.00	.30	2,000	30	200	N
WMB64	41 25 57	123 8 19	7	2.0	3.00	.20	1,000	15	700	1.5

See footnotes at end of table.

Table 5. Analytical data for USBM concentrates from Marble Mountain Wilderness and vicinity, Siskiyou County, California. (continued)

Sample	Co-ppm s	Cr-ppm s	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
WMB127	30	200	20	N	N	30	N	30	150	200	30	500
WMB128	50	150	30	N	N	30	<10	30	200	200	30	100
WMJ55	30	300	20	N	N	30	N	30	150	200	20	300
WMJ57	30	1,000	20	70	N	50	N	50	100	200	50	500
WMW28	30	2,000	20	N	N	100	<10	20	200	150	20	100
WMW29	30	300	20	N	N	70	N	20	150	150	30	100
WMW30	30	700	50	N	N	100	N	20	200	200	20	70
WMJ58	30	300	20	N	N	30	<10	30	150	200	30	200
WMJ59	50	5,000	30	N	N	200	N	20	150	200	20	150
WMJ50	50	>5,000	30	N	N	300	N	20	150	300	20	300
WMJ54	70	>5,000	20	N	N	500	N	20	200	300	20	70
WMW27	30	1,000	30	N	N	50	N	30	200	150	20	200
WMB134	50	1,500	30	N	N	50	N	50	100	200	30	1,000
WMW25	30	700	30	N	N	70	<10	15	150	150	30	100
WMW26	50	>5,000	30	N	N	200	N	20	150	200	20	70
WMJ52	30	500	50	N	N	70	N	30	100	150	70	100
WMJ53	50	500	30	N	N	200	N	20	150	150	15	70
WMW24	70	>5,000	20	N	N	500	N	20	100	500	15	50
WMJ51	30	700	20	N	N	70	N	20	300	200	20	70
WMB131	50	500	20	N	N	50	N	30	100	200	20	500
WMC54	30	300	20	N	N	30	N	20	200	150	15	50
WMC55	50	500	30	N	N	50	N	50	100	200	30	1,000
WMB132	50	700	20	N	N	100	N	30	150	200	30	100
WMB133	50	3,000	30	N	N	150	N	20	100	200	30	100
WMC53	30	300	20	N	N	50	N	30	200	150	20	200
WMC51	50	500	30	N	N	50	N	50	150	200	30	200
WMB129	30	700	20	N	N	50	N	30	150	200	20	100
WMC52	30	1,500	20	N	N	50	N	20	200	200	15	50
WMB130	30	500	100	N	N	50	N	30	150	150	20	150
WMC56	50	700	30	N	N	50	N	30	150	200	20	100
WMB1	30	300	30	N	5	70	N	20	200	200	20	50
WMB9	30	200	50	N	5	50	N	20	300	200	20	70
WMB20	30	200	50	N	<5	50	N	20	300	200	20	150
WMB28	50	1,500	30	N	N	50	N	20	300	200	30	150
WMB30	30	1,000	50	N	N	50	N	30	300	200	30	700
WMB36	30	200	50	N	5	50	N	20	300	200	20	100
WMB38	30	700	50	N	N	50	N	20	300	200	20	100
WMB41	30	500	30	N	N	50	N	20	300	200	20	100
WMB42	30	300	50	N	<5	70	N	20	200	200	20	70
WMB43	30	300	30	N	N	70	N	20	150	200	20	30
WMB44	30	200	30	N	N	50	N	20	200	200	20	50
WMB47	50	>5,000	50	N	N	70	10	20	200	500	50	>1,000
WMB58	30	200	70	N	N	70	N	30	300	200	20	70
WMB62	30	200	50	N	N	50	N	20	150	200	20	70
WMB64	20	150	50	N	N	50	N	15	200	150	20	100

See footnotes at end of table.

Table 5. Analytical data for USBM concentrates from Marble Mountain Wilderness and vicinity, Siskiyou County, California. (continued)

Sample	Latitude	Longitude	Fe-pct.	Mg-pct.	Ca-pct.	Ti-pct.	Mn-ppm	B-ppm	Ba-ppm	Be-ppm
			s	s	s	s	s	s	s	s
WMB65	41 26 3	123 8 6	7	2.0	5.00	.20	700	10	300	1.0
WMB66	41 26 18	123 9 30	5	2.0	2.00	.20	1,000	30	700	1.0
WMB67	41 26 15	123 9 30	5	1.5	3.00	.20	700	15	700	1.0
WMB68[14/]	41 25 36	123 11 27	5	2.0	3.00	.50	1,000	20	700	1.0
WMB69	41 25 33	123 11 21	5	1.5	5.00	.20	700	15	700	1.0
WMB70	41 26 45	123 9 15	5	1.5	3.00	.20	1,000	15	500	1.0
WMB72	41 26 39	123 9 21	5	1.5	5.00	.15	700	15	300	N
WMB73	41 26 51	123 8 39	5	2.0	3.00	.20	1,000	10	300	N
WMB74	41 26 51	123 8 51	7	2.0	5.00	.30	2,000	15	300	N
WMB75[15/]	41 25 48	123 6 54	7	2.0	3.00	.30	1,000	20	500	1.0
WMB76[16/]	41 25 6	123 5 57	5	1.5	2.00	.20	1,000	20	700	1.0
WMB77[17/]	41 27 42	123 4 45	7	2.0	2.00	.30	1,500	20	500	1.0
WMB78	41 28 3	123 4 54	5	1.0	.07	.20	1,000	50	700	1.5
WMB79	41 28 21	123 4 54	5	1.5	2.00	.20	2,000	20	500	1.0
WMB80	41 27 12	123 5 42	5	3.0	5.00	.20	1,000	15	300	<1.0
WMB81	41 26 24	123 5 57	7	2.0	3.00	.30	1,000	20	300	<1.0
WMB82	41 26 24	123 6 15	5	3.0	7.00	.20	1,000	N	100	N
WMP19	41 23 15	123 5 15	7	3.0	5.00	.20	1,500	15	300	<1.0
WMP20	41 28 30	123 5 9	7	2.0	5.00	.20	1,000	<10	200	N
WMP21	41 28 48	123 6 15	7	2.0	7.00	.30	1,000	N	150	N
WMP22	41 28 45	123 5 27	5	1.5	2.00	.20	1,000	50	500	<1.0
WMP23	41 29 15	123 5 18	5	2.0	3.00	.20	700	15	300	N
WMP24	41 29 15	123 4 54	3	1.0	.20	.15	2,000	30	700	1.0
WMC564	41 28 42	123 16 39	5	2.0	5.00	.20	1,000	20	300	N

See foonotes at end of tables.

Table 5. Analytical data for USBM concentrates from Marble Mountain Wilderness and vicinity, Siskiyou County, California. (continued)

Sample	Co-ppm s	Cr-ppm s	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
WMB65	20	150	50	N	5	50	N	20	300	200	20	100
WMB66	20	200	30	N	5	50	N	15	150	100	20	100
WMB67	15	100	20	N	5	30	<10	15	300	100	15	100
WMB68	20	200	70	20	5	70	<10	15	200	100	20	100
WMB69	15	70	20	N	5	20	<10	20	300	100	15	100
WMB70	20	150	20	N	<5	30	<10	20	300	100	20	70
WMB72	20	70	50	N	N	20	<10	20	300	150	15	30
WMB73	20	100	50	N	N	30	<10	20	200	200	15	70
WMB74	30	1,000	30	N	N	50	N	20	300	200	20	100
WMB75	30	500	70	N	7	50	<10	20	200	200	15	100
WMB76	15	70	70	N	<5	50	<10	15	100	100	15	100
WMB77	20	150	30	20	<5	50	<10	20	100	100	20	100
WMB78	10	100	30	N	<5	50	<10	10	N	100	20	100
WMB79	20	100	30	N	5	50	<10	15	150	100	20	100
WMB80	20	700	50	N	N	70	<10	20	200	150	15	70
WMB81	20	150	50	N	<5	50	<10	20	200	150	20	100
WMB82	20	700	15	N	N	50	N	30	500	200	15	50
WMP19	20	500	30	N	<5	50	N	20	300	200	20	70
WMP20	20	100	50	N	<5	30	N	20	300	200	20	50
WMP21	20	100	30	N	N	20	N	20	300	200	20	50
WMP22	15	150	50	N	N	50	<10	15	<100	100	15	100
WMP23	20	200	50	N	<5	70	N	15	150	150	15	70
WMP24	10	50	50	N	5	30	N	10	N	70	20	70
WMC564	20	150	30	N	N	30	N	20	200	150	20	70

Footnotes

5/ Contains 20 ppm Sn.
6/ Contains less than 200 ppm Zn.
7/ Contains 200 ppm Zn.
8/ Contains 300 ppm Zn.
9/ Contains 500 ppm Zn.
10/ Contains less than 200 ppm Zn.
11/ Contains 200 ppm Zn.
12/ Contains less than 200 ppm Zn.
13/ Contains 200 ppm Zn.
14/ Contains less than 200 ppm Zn.
15/ Contains less than 200 ppm Zn.
16/ Contains less than 200 ppm Zn.
17/ Contains less than 200 ppm Zn.