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Analytical results for 102 water samples from sites draining
the Buffalo Peaks Wilderness Study Area,
Lake, Park, and Chaffee Counties, Colorado

By

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CONTENTS

	Page
Abstract.....	1
Introduction.....	1
Sample collection and analytical methods.....	1
Results.....	3
References.....	3

TABLES

Table 1.--Analytical methods used for Buffalo Peaks Wilderness Study Area..	2
Table 2.--Results of analyses of water samples from sites draining the Buffalo Peaks Wilderness Study Area.....	4

FIGURES

Plate 1.--Index map and sample locality map, Buffalo Peaks Wilderness Study Area.....	In pocket
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Abstract

One hundred two water samples were collected in the Buffalo Peaks Wilderness Study Area as part of a mineral assessment program in that locality. Each sample was analyzed for specific conductance, alkalinity, pH, fluoride, chloride, sulfate, sodium, potassium, calcium, magnesium, and silica. Trace elements determined were copper, zinc, molybdenum, lead, arsenic, iron, manganese, aluminum, cobalt, nickel, silver, and uranium. The longitude and latitude of each sample location and a sample site map are included in the report as well as a table of the analytical results.

Studies Related to Wilderness

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral-resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents partial results of a geochemical survey of the Buffalo Peaks Wilderness Study Area, Pike and San Isabel National Forest, Lake, Park, and Chaffee Counties, Colorado. Buffalo Peaks Wilderness Study Area was established under Public Law 96-960 (96th Congress, 1980).

Introduction

Water has been shown to be an effective sample medium for geochemical exploration (Miller and Ficklin, 1976; Miller, Ficklin, and Learned, 1982). The Buffalo Peaks Wilderness Study Area is in an alpine environment similar to areas discussed by Miller and Ficklin (1976). Numerous streams and springs are available for sampling, so that a thorough coverage of the area is possible using water. The Buffalo Peaks Wilderness Study Area is a major portion of the Mosquito Range. The western two thirds of the study area is mainly Precambrian, igneous, and metamorphic rocks. The eastern third is mainly Paleozoic sediments covered in some places by Tertiary extrusive rocks. The study area is bounded by several areas of known mineralization. The geology and mineral-resource potential of the study area are presented by Hedlund and others (1983).

Sample Collection and Analytical Methods

Each sample was collected in two portions at the sample site. One portion of the water was filtered and acidified with 0.5 ml of concentrated reagent grade nitric acid for each 100 ml of sample. For this sampling program, 50 ml of water was filtered and stored in a polyethylene bottle. The water was filtered to remove particulate matter that might contain elements that could be dissolved upon the addition of the acid. The water was filtered using a 25-mm diameter, 0.45- μ m membrane filter supplied by the Millipore Corporation. A Millipore Swinnex filter holder was used to support the filter. The water was forced through the membrane using a 50-ml syringe, which attaches to the Swinnex holder. An untreated portion (about 250 ml) of water was also collected at each location.

Specific conductance, alkalinity, fluoride, chloride, sulfate, and uranium were determined using the unfiltered portion of the water. The

filtered, acidified sample was used to determine sodium, potassium, calcium, magnesium, copper, zinc, molybdenum, arsenic, lead, iron, manganese, aluminum, cobalt, nickel, and silver. Sample temperature and pH were determined at the sample site. The analytical methods used and a reference for each are listed in table 1.

Table 1.--Analytical Methods Used for Buffalo Peaks Wilderness Study Area

Constituent or property	Detection limit	Method	Reference
pH	--	pH electrode	Skougstad and others, (1979, p. 512)
Specific conductance	--	conductivity bridge	Skougstad and others (1979, p. 511)
Sodium	.1 mg/L	Atomic Absorption	Perkin-Elmer (1976)
Potassium	"	"	"
Calcium	"	"	"
Magnesium	"	"	"
Alkalinity, as bicarbonate	1. mg/L	Gran's Plot Titration with H ₂ SO ₄	Orion Research Inc. (1975)
Fluoride	.01 mg/L	Ion Chromatography	Fishman and Pyen (1975)
Chloride	.05 mg/L	"	"
Sulfate	.1 mg/L	"	"
Silica	1. mg/L	Atomic Absorption	Perkin-Elmer (1976)
Aluminum	1. µg/L	Flameless Atomic Absorption	Perkin Elmer (1976)
Arsenic	.1 ¹ µg/L	"	Aruscavage (1977)
Cobalt	.1 ¹ µg/L	"	Perkin-Elmer (1977)
Copper	.1 ¹ µg/L	"	"
Iron	1. µg/L	"	"
Manganese	.5 µg/L	"	"
Molybdenum	.2 ¹ µg/L	"	"
Nickel	.2 ¹ µg/L	"	"
Lead	.4 ¹ µg/L	"	"
Silver	.02 µg/L	"	"
Uranium	.01 µg/L	Laser-fluorescence	Scintrex Corp. (1978)
Zinc	.5 µg/L	Flameless Atomic Absorption	Perkin-Elmer (1977)

¹Values below 1 µg/L for these metals are at or near the sensitivity of the analytical method and should be interpreted accordingly.

Results

A sample locality map is presented in plate 1. The longitude and latitude for each sample locality is included as part of table 2. Table 2 is a list of sample localities, sample site numbers, sample source, pH and conductivity and all of the analytical results for each sample.

References

- Aruscavage, P., 1977, Determination of arsenic, antimony, and selenium in coal by atomic absorption spectrometry with a graphite tube atomizer: U.S. Geological Survey Journal of Research, v. 5, no. 4, p. 405-408.
- Fishman, M. J., and Pyen, G., 1979, Determination of selected anions in water by ion chromatography: U.S. Geological Survey Water Resources Investigations 79-101, 30 p.
- Hedlund, D. C., Nowlan, G. A., and Wood, R. H., 1983, Mineral resource potential of the Buffalo Peaks Wilderness Study Area, Lake, Park, and Chaffee Counties, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF- , scale 1:50,000 (in press).
- Miller, W. R., and Ficklin, W. H., 1976, Molybdenum mineralization in the White River National Forest, Colorado: U.S. Geological Survey Open-File Report 76-711, 29 p.
- Miller, W. R., Ficklin, W. H., and Learned, R. E., 1982, Hydrogeochemical prospecting for porphyry copper deposits in the tropical marine climate of Puerto Rico: Journal of Geochemical Exploration, v. 16, p. 217-223.
- Orion Research, Inc., 1973, Orion Research Analytical Methods Guide, 7th ed.: Cambridge, Massachusetts, 20 p.
- Perkin-Elmer Corporation, 1976, Analytical methods for atomic absorption spectrophotometry, using the HGA graphite furnace: Norwalk, Connecticut, 586 p.
- Scintrex Corporation, 1978, UA-3 Uranium Analyzer: Toronto, Canada, 45 p.
- Skougstad, M. W., Fishman, M. J., Friedman, L. C., Erdman, D. E., and Duncan, S. S., 1979, Methods for determination of inorganic substances in water and fluvial sediments: Techniques of Water-Resource Investigations of the United States Geological Survey, Chapter A-I.

Table 2.--Results of analyses of water samples from sites draining the Buffalo Peaks Wilderness Study Area, Colorado

[Ca, Mg, Na, K, HCO₃, SO₄, Cl, F, and SiO₂ in mg/L; Fe, Mn, Al, Ag, As, Co, Cu, Mo, Ni, Pb, U, and Zn in ug/L; specific conductance (Cond) in uS; temperature (Temp) in degrees Celsius]

Site	Latitude	Longitude	Source	Ca	Mg	Na	K	HCO ₃	SO ₄	Cl	F	SiO ₂	Fe
1	39 4 16	106 13 46	stream	6.3	2.3	3.4	.7	30.0	6.10	.58	.24	13.0	45.0
2	39 4 17	106 13 47	stream	3.8	1.5	2.0	.4	19.0	3.10	.27	.41	10.0	23.0
3	39 4 16	106 13 54	stream	12.0	3.0	6.1	.5	39.2	13.00	.80	.47	19.0	18.0
4	38 58 16	106 8 35	stream	5.0	.4	3.7	.7	30.2	5.30	.24	.17	15.0	300.0
5	38 58 18	106 8 32	stream	5.8	1.5	2.3	1.2	30.0	2.90	.22	.12	16.0	62.0
7	38 57 15	106 8 15	stream	5.0	.4	3.0	.7	29.5	4.10	.35	.17	14.0	52.0
9	38 56 48	106 8 39	stream	8.0	3.0	4.4	.6	38.8	6.70	.39	.37	14.0	14.0
10	38 57 18	106 10 22	stream	12.0	2.0	6.4	.9	38.9	20.10	.84	.32	20.0	12.0
11	38 55 22	106 6 24	stream	10.0	3.0	7.4	.8	37.2	15.40	.94	.70	21.0	110.0
13	38 54 9	106 5 8	stream	7.0	2.0	3.9	.7	31.5	8.30	.49	.35	15.0	90.0
14	38 55 26	106 5 25	stream	7.0	2.0	3.5	.5	17.4	7.20	.37	.28	13.0	410.0
15	38 55 14	106 4 46	spring	5.2	1.0	3.0	.5	12.3	5.80	.50	.28	13.0	31.0
16	38 55 15	106 4 12	stream	4.8	1.0	2.9	.4	<1.0	8.10	.57	.23	11.0	170.0
17	38 55 13	106 4 19	stream	7.5	2.0	3.9	.7	13.2	9.80	.66	.38	15.0	33.0
18	38 56 54	106 3 45	stream	3.5	1.0	2.3	.4	2.3	5.10	.31	.16	10.0	160.0
19	38 57 22	106 4 40	spring	4.8	2.0	2.2	.5	9.4	4.90	.28	.09	13.0	360.0
21	38 58 7	106 4 20	stream	10.0	3.0	2.2	1.7	47.5	4.30	.42	.06	23.0	17.0
23	38 58 22	106 4 26	stream	8.5	2.0	2.1	2.4	30.5	7.70	1.00	.19	31.0	100.0
24	38 58 3	106 3 28	spring	110.0	27.0	3.6	1.8	235.0	220.00	.94	.10	8.3	5.0
25	38 58 52	106 1 5	spring	40.0	11.0	2.8	1.6	173.0	9.30	.64	.11	17.0	2.8
26	38 59 42	106 2 18	stream	11.0	5.0	2.1	1.8	48.4	3.70	1.30	.09	25.0	19.0
27	39 0 14	106 2 3	stream	28.0	12.0	3.2	1.8	174.0	8.00	.68	.11	16.0	10.0
28	39 1 22	106 3 30	stream	31.0	14.0	2.2	1.3	202.0	10.00	1.00	.27	10.0	6.1
29	39 1 29	106 5 11	stream	29.0	147.0	1.9	1.3	182.0	30.00	.52	.09	12.0	3.0
30	39 2 0	106 6 33	spring	45.0	18.0	2.6	2.0	256.0	32.00	.77	.10	16.0	42.0
31	39 1 52	106 13 30	stream	5.0	2.0	3.1	.5	14.4	4.80	.65	.24	11.0	19.0
32	38 58 28	106 11 26	stream	5.0	1.0	3.4	.7	13.0	5.70	.36	.09	14.0	23.0
33	38 57 47	106 11 29	stream	19.0	4.0	8.5	1.1	106.0	16.00	1.50	.35	24.0	8.4
34	38 59 27	106 12 29	stream	7.0	2.0	5.9	.5	28.7	7.20	.45	.44	22.0	41.0
35	38 59 3	106 12 12	stream	7.0	1.0	5.3	.5	28.0	5.30	.41	.33	17.0	17.0
36	38 58 52	106 12 9	stream	6.0	1.0	4.5	.6	16.5	6.60	.42	.18	18.0	27.0
37	39 5 34	106 9 2	stream	2.0	.5	.8	.3	17.1	1.60	.20	.11	6.7	18.0
38	39 5 36	106 9 1	spring	9.0	6.1	1.2	.5	53.1	2.50	.29	.11	8.5	220.0
39	39 2 40	106 10 29	spring	2.5	.8	1.3	.4	20.6	1.60	.16	.04	10.0	14.0
40	39 3 23	106 10 28	stream	2.2	.5	1.3	.4	20.5	1.60	.23	.07	9.5	60.0
41	39 3 19	106 10 21	stream	2.2	.7	1.7	.2	19.0	2.00	.21	.10	9.3	130.0
42	39 3 33	106 10 19	stream	2.5	.7	1.8	.3	21.2	1.80	.20	.07	9.7	190.0
43	39 4 9	106 9 44	stream	3.0	.7	1.7	.3	10.4	2.30	.18	.23	10.0	69.0
44	39 4 7	106 9 44	stream	2.0	.7	1.6	.3	9.8	2.10	.14	.10	11.0	210.0
45	39 4 16	106 9 3	stream	3.5	.4	1.7	.6	15.0	2.10	.25	.37	10.0	18.0

Table 2.--Results of analyses of water samples from sites draining the Buffalo Peaks Wilderness Study Area, Colorado--continued

Site	Mn	Al	Ag	As	Co	Cu	Mo	Ni	Pb	U	Zn	Cond	pH	Temp
1	1.0	29.0	.2	.4	.1	1.5	1.0	.3	.6	.34	1.9	67.0	7.82	10.0
2	3.3	27.0	.2	.2	.1	1.0	.6	.7	.7	.10	3.4	40.0	7.71	8.5
3	.5	47.0	.1	.2	.2	1.3	.8	.7	.8	.12	2.6	120.0	7.34	8.0
4	36.0	50.0	.5	.3	.2	4.4	1.7	.5	.3	<.10	3.6	53.0	7.52	13.5
5	7.9	38.0	.3	.3	.3	7.2	1.4	.7	.5	<.10	3.3	54.0	7.65	10.0
7	.6	36.0	.3	.2	.3	1.9	1.1	.4	.2	<.10	2.6	48.0	7.63	9.0
9	2.0	28.0	.4	.1	1.5	.4	2.5	.4	.6	.16	12.0	86.0	7.65	5.5
10	1.9	34.0	.3	.2	.1	.3	1.6	.4	1.3	<.10	9.1	130.0	7.63	6.0
11	1.8	61.0	.2	.1	.9	1.1	1.8	1.0	.7	.38	7.2	110.0	7.28	10.0
13	1.9	17.0	.5	.1	.9	.5	2.8	1.6	1.1	.16	5.4	71.0	7.54	10.0
14	28.0	40.0	.3	.2	2.7	.7	3.4	.7	1.0	.30	8.7	62.0	6.95	11.5
15	2.3	84.0	.1	.3	.6	.7	1.2	1.0	.9	.92	5.2	48.0	6.57	10.0
16	1.0	90.0	.3	.2	.7	1.7	1.2	.4	.6	1.30	4.4	41.0	7.34	6.5
17	1.0	35.0	.3	.2	1.6	.5	1.9	.7	<.1	.76	4.1	65.0	7.28	9.0
18	7.1	15.0	<.1	.1	2.2	1.4	.8	1.2	.2	.32	4.3	31.0	7.29	8.5
19	3.9	20.0	.3	.2	1.5	.3	.8	.8	.1	.10	6.0	44.0	6.69	4.5
21	1.8	30.0	.1	.1	.7	.3	.6	.6	<.1	.10	3.2	86.0	7.99	6.0
23	6.6	190.0	.3	.3	1.9	.7	.6	.6	.2	.10	2.5	65.0	8.01	9.0
24	40.0	31.0	.7	1.6	3.2	.5	8.1	8.5	.4	6.00	2.7	780.0	8.07	8.5
25	.7	32.0	.1	1.6	2.0	3.8	1.5	.9	.2	.60	20.0	270.0	7.82	6.0
26	2.7	67.0	.4	.4	1.8	.3	2.1	.7	<.1	.20	2.0	100.0	8.13	6.0
27	13.0	4.9	.4	.3	.6	.4	1.0	1.0	.6	.64	2.5	270.0	8.49	11.0
28	5.5	6.7	.2	.3	1.1	.2	1.5	.9	.4	1.00	2.3	300.0	8.58	10.5
29	.1	4.8	.4	.8	.7	.6	2.0	1.4	.3	1.40	3.4	320.0	7.94	3.0
30	38.0	5.0	.2	1.4	1.4	.5	2.7	2.3	.3	2.80	2.9	410.0	7.77	5.0
31	2.0	10.0	.4	.2	1.2	.5	1.0	.4	.5	.10	3.1	49.0	7.57	4.5
32	.4	42.0	.1	.4	1.4	.5	1.8	.5	.5	.20	3.0	52.0	7.46	6.5
33	1.9	17.0	.4	.1	1.1	1.2	5.0	.7	.7	3.40	3.4	190.0	8.11	6.5
34	7.6	37.0	.7	.4	.8	1.0	2.8	.5	1.1	1.20	3.4	77.0	7.64	6.0
35	.9	22.0	.2	.3	1.7	1.1	4.3	.4	1.3	1.60	3.8	70.0	7.60	6.5
36	.2	53.0	.3	.4	1.9	1.8	2.1	.7	1.6	.16	2.5	57.0	7.38	7.0
37	1.4	6.5	.3	.4	.1	1.3	.4	.4	.7	<.10	17.0	20.0	7.07	4.0
38	1.3	5.4	.1	.2	.2	1.0	.3	.2	1.0	.44	4.9	110.0	8.19	2.5
39	6.7	7.5	.3	.6	.1	1.6	.3	.1	.6	<.10	6.6	22.0	6.62	3.0
40	1.5	5.1	.2	.3	.2	.9	.3	.1	.5	<.10	3.2	21.0	6.91	5.0
41	19.0	13.0	.4	.3	.2	1.1	.3	.3	.7	.10	3.7	23.0	6.96	7.5
42	6.5	8.2	.1	.3	.3	1.0	.3	.2	.5	<.10	2.6	24.0	7.28	7.0
43	2.9	14.0	.3	.2	.1	1.0	.3	.1	.6	<.10	3.5	27.0	7.31	9.0
44	13.0	13.0	.2	.2	.1	1.1	.3	.1	.9	<.10	3.2	24.0	7.29	10.0
45	1.0	8.0	.2	.3	.2	1.0	.7	.1	.3	.10	2.9	33.0	6.94	7.0

Table 2.--Results of analyses of water samples from sites draining the Buffalo Peaks Wilderness Study Area, Colorado--continued

Site	Latitude	Longitude	Source	Ca	Mg	Na	K	HCO ₃	SO ₄	Cl	F	SiO ₂	Fe
46	39 4 10	106 8 31	stream	7.1	5.0	.9	.5	43.4	2.80	.15	.03	7.0	6.0
47	39 4 5	106 8 20	stream	2.7	1.3	1.5	.4	11.0	2.00	.19	.18	7.8	7.2
48	39 0 31	106 9 35	stream	4.2	1.0	2.5	.3	13.0	5.40	.23	.18	10.0	160.0
49	39 0 31	106 9 32	stream	3.9	1.0	2.5	.3	14.0	6.50	.17	.25	9.3	94.0
50	39 1 23	106 9 20	stream	3.0	1.0	2.5	.3	12.0	4.90	.14	.23	8.5	250.0
51	39 1 21	106 9 21	stream	2.1	.7	1.9	.3	9.8	2.60	.23	.14	8.0	76.0
52	39 1 40	106 8 45	stream	2.0	.7	1.5	.4	9.3	2.00	.19	.28	6.7	120.0
53	39 2 15	106 5 31	stream	44.0	50.0	5.8	1.3	186.0	1,100.00	1.30	.28	11.0	160.0
54	39 3 11	106 5 17	stream	70.0	60.0	3.2	1.6	196.0	200.00	1.00	.10	11.0	6.5
55	39 1 0	106 6 40	stream	4.8	1.8	.8	.4	12.9	1.70	.28	.08	4.7	12.0
56	39 1 0	106 6 37	stream	17.0	5.0	1.1	1.6	101.0	7.00	.44	.05	16.0	20.0
57	39 2 48	106 6 39	stream	7.1	3.5	2.4	.6	36.2	6.40	.23	.21	9.5	53.0
58	38 59 11	106 2 24	stream	50.0	20.0	2.7	2.0	221.0	10.00	1.00	.14	13.0	22.0
59	38 58 25	106 2 16	stream	48.0	45.0	4.0	1.9	372.0	56.00	1.40	.14	10.0	28.0
62	39 5 10	106 12 7	stream	3.0	2.3	1.7	.3	24.0	2.80	.18	.26	8.0	90.0
63	39 5 5	106 11 58	stream	2.7	1.0	1.7	.4	9.3	2.60	.17	.40	7.3	23.0
64	39 5 3	106 12 0	stream	5.5	1.5	2.8	.5	22.0	5.40	.23	.63	11.0	15.0
65	39 4 44	106 12 56	spring	5.1	2.1	3.0	.4	21.7	5.00	.31	.94	11.0	18.0
66	39 4 43	106 13 9	stream	4.0	1.5	2.8	.4	16.7	4.40	.28	.46	11.0	22.0
67	39 5 22	106 11 3	stream	2.0	.5	1.1	.3	7.0	1.70	.23	.28	6.7	21.0
68	39 5 18	106 11 2	stream	3.8	.7	1.7	.4	11.8	2.60	.18	.41	9.7	23.0
70	38 58 16	106 1 59	spring	67.0	33.0	3.5	2.2	354.0	49.00	1.00	.14	10.0	19.0
71	38 58 14	106 2 26	stream	67.0	33.0	3.5	1.8	346.0	70.00	1.40	.15	8.5	21.0
72	38 58 46	106 4 51	spring	10.0	2.5	3.0	3.0	43.5	3.50	.46	.17	39.0	140.0
73	39 9 20	106 14 58	stream	5.0	1.5	2.7	.5	26.0	3.90	.30	.30	12.0	72.0
74	39 8 33	106 14 2	stream	5.2	1.3	3.4	.4	26.0	3.70	.24	.26	12.0	10.0
75	39 8 31	106 14 4	stream	4.6	1.0	2.8	.5	15.8	3.60	.20	.15	10.0	7.5
76	39 7 13	106 13 58	stream	4.3	1.2	3.3	.5	20.0	4.10	.27	.15	12.0	23.0
77	39 7 16	106 13 56	stream	5.0	1.8	3.2	.6	28.0	3.20	.26	.23	12.0	22.0
78	39 7 17	106 15 8	stream	17.0	2.5	6.0	1.0	60.4	13.00	.48	.70	17.0	48.0
79	39 7 15	106 15 9	stream	5.5	2.0	3.4	.6	27.0	4.90	.28	.22	12.0	160.0
80	39 7 24	106 14 18	stream	8.2	3.1	4.5	.7	39.1	8.00	.31	.39	15.0	35.0
81	39 1 6	106 13 28	stream	11.0	2.5	9.6	.8	55.2	8.90	.51	.48	28.0	1,900.0
82	39 2 5	106 7 42	spring	5.3	.7	3.0	.6	23.0	4.30	.30	.25	12.0	6.0
83	39 2 17	106 7 15	spring	15.0	5.0	2.2	.5	75.7	3.90	.35	.23	8.7	15.0
84	39 2 15	106 7 15	stream	4.0	.8	2.6	.4	13.0	3.40	.15	.21	9.5	150.0
85	39 2 8	106 7 0	stream	4.0	1.0	2.4	.4	15.5	3.00	.19	.24	10.0	15.0
86	38 56 50	106 5 19	stream	3.2	.5	2.7	.4	8.0	4.70	.28	.14	11.0	230.0
87	38 56 52	106 5 20	stream	4.5	.7	3.0	.5	12.1	5.30	.22	.22	11.0	150.0
88	38 56 35	106 4 4	stream	4.2	.7	2.6	.6	13.6	4.80	.31	.13	11.0	220.0

Table 2.--Results of analyses of water samples from sites draining the Buffalo Peaks Wilderness Study Area, Colorado--continued

Site	Mn	Al	Ag	As	Co	Cu	Mo	Ni	Pb	U	Zn	Cond	pH	Temp
46	2.5	8.4	.3	1.9	.1	1.0	.6	.1	.4	<.10	2.8	85.0	7.20	6.0
47	.5	14.0	.2	.5	.1	1.0	.5	.2	.3	<.10	3.0	23.0	7.35	5.5
48	18.0	19.0	.1	.6	.2	1.3	.5	.3	.4	<.10	6.2	39.0	6.86	5.0
49	13.0	21.0	.2	.2	.3	3.4	.7	.3	.2	<.10	6.1	46.0	7.03	4.0
50	12.0	17.0	.1	.3	.2	2.5	.5	.4	.4	<.10	5.8	37.0	6.90	5.0
51	14.0	14.0	.3	.2	.1	1.2	.6	.1	.8	.10	4.0	26.0	7.08	6.0
52	2.1	12.0	.1	.3	.2	2.0	.6	.2	.3	<.10	3.2	23.0	7.27	6.0
53	27.0	14.0	.7	3.3	9.9	14.0	15.0	1,500.0	1.5	3.00	4.1	1,600.0	8.15	8.0
54	6.5	10.0	.1	2.5	2.3	8.2	8.1	5.4	.4	3.10	2.0	590.0	8.63	10.5
55	.8	17.0	.3	.2	.1	.9	.8	<.1	.7	.14	1.9	41.0	7.66	6.0
56	1.2	12.0	.2	.2	.4	1.9	.7	.6	.2	.24	5.1	160.0	8.45	3.5
57	5.4	15.0	.3	.1	.3	1.1	.6	.4	.7	.16	4.5	90.0	7.98	8.5
58	.8	5.0	.2	.2	.3	4.6	.7	.8	.9	.76	2.6	360.0	7.69	5.0
59	20.0	8.5	.1	1.7	1.5	3.6	6.0	4.0	.8	6.80	3.5	590.0	8.10	11.5
62	.9	17.0	.2	.2	.2	2.3	.7	.1	.2	.10	2.5	45.0	7.77	6.5
63	1.7	10.0	.2	.1	.4	.9	.6	.1	.5	.10	3.5	31.0	7.50	7.0
64	1.1	8.0	.3	.2	.2	1.3	.6	.6	.6	.24	3.3	51.0	7.60	5.0
65	.5	50.0	.2	.1	.2	1.1	.7	.2	1.1	.10	4.4	66.0	7.25	2.5
66	.9	86.0	.1	.2	.2	1.0	.5	.3	.8	.20	3.8	55.0	7.57	6.5
67	2.1	7.5	.2	.3	.1	1.1	.4	.3	.5	.30	7.6	23.0	7.27	4.0
68	1.5	40.0	.2	.4	.1	1.1	.4	.2	.5	.40	6.6	33.0	6.82	8.5
70	8.5	6.0	.2	1.6	1.1	3.5	3.7	3.6	.3	1.60	3.6	550.0	7.61	7.0
71	31.0	14.0	.1	1.6	1.3	4.0	4.0	3.6	.2	1.60	4.1	560.0	8.42	8.5
72	1.4	190.0	.2	.2	.5	1.1	.5	1.0	.5	.20	4.0	89.0	7.55	5.0
73	23.0	15.0	.1	.3	.1	1.1	.5	.3	.6	.30	2.8	53.0	7.58	10.0
74	1.3	9.0	.4	.4	.2	2.1	1.0	.4	.2	.40	4.3	53.0	7.52	3.5
75	1.1	8.4	.4	.4	.2	8.5	.8	2.4	<.1	.40	4.6	41.0	7.48	2.5
76	.6	27.0	.4	.1	.3	3.4	.9	.7	<.1	.10	3.3	47.0	7.54	4.0
77	1.3	17.0	.7	.1	.2	3.0	1.0	.5	<.1	<.10	2.9	56.0	7.51	5.5
78	26.0	10.0	.6	.2	.5	4.4	1.9	1.0	.4	<.10	4.6	150.0	7.13	11.0
79	17.0	30.0	.7	.1	.2	5.8	1.3	.8	<.1	<.10	5.1	57.0	7.69	10.5
80	2.2	6.8	.4	.1	.3	1.7	1.2	.4	.2	<.10	7.3	99.0	7.57	8.5
81	160.0	12.0	.9	.1	1.2	2.4	4.2	2.2	.4	<.10	4.6	130.0	7.07	11.0
82	1.7	5.1	.5	.2	.1	1.4	1.3	.4	<.1	.14	60.0	49.0	6.80	3.5
83	2.8	17.0	.7	.1	.2	2.3	.9	.5	.4	.12	3.5	150.0	7.28	10.0
84	2.8	63.0	.5	.8	.2	3.6	1.1	.5	.3	.10	3.8	38.0	7.65	10.5
85	.7	25.0	.3	.6	.2	1.3	.8	.2	.4	.12	2.3	49.0	7.71	10.0
86	11.0	53.0	.2	.5	.2	1.8	1.0	.3	.1	.16	4.1	34.0	6.96	10.0
87	8.2	720.0	.2	.6	.3	3.1	1.6	.3	.3	.24	3.2	41.0	7.36	11.0
88	.8	440.0	.6	.5	.1	3.4	1.0	1.4	.3	.28	5.5	48.0	6.78	6.0

Table 2.--Results of analyses of water samples from sites draining the Buffalo Peaks Wilderness Study Area, Colorado---continued

Site	Latitude	Longitude	Source	Ca	Mg	Na	K	HCO ₃	SO ₄	Cl	F	SiO ₂	Fe
90	38 57 39	106 1 48	stream	95.0	32.0	6.5	1.8	377.0	96.00	1.00	.15	8.7	26.0
93	38 54 32	106 3 13	stream	51.0	12.0	11.0	1.2	174.0	23.00	1.70	.61	17.0	260.0
94	38 55 35	106 7 27	spring	17.0	5.0	14.0	1.0	106.0	8.70	3.00	1.20	25.0	43.0
96	38 57 56	106 8 26	spring	6.0	1.8	4.4	.5	21.6	8.90	.46	.34	14.0	60.0
97	39 3 56	106 7 29	stream	22.0	13.0	1.2	.4	154.0	6.80	.34	.18	6.5	7.9
98	39 3 58	106 7 29	stream	3.5	1.0	2.0	.3	14.7	2.30	.19	.12	8.7	1,600.0
99	39 6 15	106 9 34	stream	.5	<.1	.8	.2	2.2	1.00	.17	.02	4.5	15.0
100	39 6 45	106 10 5	stream	3.5	1.0	1.7	.4	13.0	2.30	.31	.37	6.0	33.0
101	39 7 45	106 11 33	stream	3.0	.3	.1	.2	13.9	.34	.13	.02	2.3	16.0
102	39 9 24	106 12 22	stream	3.2	.7	1.1	.3	13.0	1.60	.21	.03	6.0	14.0
104	39 8 15	106 11 44	spring	23.0	7.5	.7	.5	103.0	2.00	.62	.07	12.0	4.2
105	39 7 9	106 16 19	stream	6.5	1.8	3.6	.6	23.6	3.90	.26	.23	12.0	220.0
106	39 6 37	106 16 12	stream	14.0	2.5	9.1	.7	52.5	16.00	.82	.53	23.0	33.0
107	39 9 8	106 16 26	stream	7.0	2.0	3.4	.6	31.1	3.80	.24	.32	13.0	850.0
108	39 8 52	106 16 39	spring	33.0	7.5	15.0	.7	99.2	67.00	2.10	.67	22.0	370.0
109	39 8 20	106 16 18	stream	25.0	5.0	7.5	.6	92.6	9.70	1.00	.46	20.0	880.0
111	38 56 30	106 8 18	stream	12.0	2.5	8.1	1.0	53.4	15.00	.97	.77	31.0	43.0
112	39 5 1	106 14 59	stream	15.0	2.5	9.2	.3	66.8	14.00	1.40	.58	22.0	17.0
113	39 2 44	106 6 39	spring	46.0	18.0	7.0	.8	212.0	50.00	1.40	.72	17.0	7.1
114	39 2 16	106 6 46	stream	110.0	31.0	3.3	1.7	231.0	260.00	1.90	.17	17.0	4.1
115	39 1 56	106 6 32	stream	30.0	8.0	1.4	1.6	128.0	7.40	.58	.10	19.0	4.0
116	39 1 43	106 5 20	spring	110.0	25.0	3.1	1.2	218.0	200.00	1.90	.12	12.0	14.0

Table 2.--Results of analyses of water samples from sites draining the Buffalo Peaks Wilderness Study Area, Colorado--continued

Site	Mn	Al	Ag	As	Co	Cu	Mo	Ni	Pb	U	Zn	Cond	pH	Temp
90	33.0	16.0	.9	1.0	1.7	5.8	4.1	4.1	.1	2.60	3.2	530.0	8.07	7.0
93	52.0	25.0	.4	.7	.6	6.6	7.2	1.3	.3	1.10	2.5	330.0	7.77	13.5
94	7.0	11.0	.2	.4	.6	5.2	3.5	1.2	.2	.84	2.2	210.0	7.47	13.5
96	.6	200.0	.2	.3	.2	1.6	7.2	.3	.1	.40	2.1	76.0	7.32	5.0
97	2.7	26.0	.1	.2	.4	5.4	1.2	.5	.1	.84	2.8	250.0	8.23	5.5
98	2.8	18.0	.5	.5	.2	3.7	1.0	.5	2.0	.16	2.1	35.0	7.72	7.0
99	.7	27.0	.7	.5	.2	2.0	.8	.1	.1	.12	2.6	11.0	7.16	8.0
100	2.2	60.0	.8	.3	.2	1.5	.9	.1	<.1	.30	3.0	34.0	7.75	8.0
101	4.4	13.0	.5	.9	<.1	1.6	.8	<.1	.3	<.10	4.3	8.2	6.75	3.5
102	1.0	15.0	.3	.5	.1	2.9	1.0	.4	.4	<.10	2.3	28.0	7.63	6.0
104	.5	1.4	.3	.2	.2	2.9	1.4	.3	.4	.12	2.5	170.0	8.13	2.0
105	19.0	12.0	1.3	.3	.3	1.3	1.8	.9	.7	<.10	2.6	62.0	7.73	10.0
106	9.6	44.0	1.2	.5	.4	4.2	3.2	1.3	.9	<.10	3.6	150.0	7.21	10.0
107	190.0	17.0	.7	.3	.4	3.3	2.6	1.6	.6	<.10	9.8	79.0	7.38	15.0
108	41.0	15.0	.5	1.1	.9	13.0	2.8	3.9	.3	1.30	7.0	340.0	6.96	7.0
109	61.0	10.0	1.0	.4	.2	5.7	2.1	1.3	.3	.20	5.2	190.0	7.13	11.0
111	1.4	55.0	.9	.5	.5	2.6	1.8	1.1	.7	<.10	4.3	150.0	7.64	7.0
112	.8	3.8	.8	.7	.3	4.3	1.0	1.8	.4	<.10	3.5	170.0	7.30	9.0
113	.8	13.0	.6	.7	1.0	8.1	10.0	2.8	.5	6.80	1.9	360.0	8.12	8.0
114	.8	7.4	1.1	4.2	2.7	7.0	4.0	7.3	.4	1.60	2.9	730.0	7.88	3.5
115	1.0	3.1	.4	.4	.4	7.8	1.1	4.5	.3	.38	2.0	230.0	8.25	7.0
116	.6	3.7	.8	3.1	2.5	8.4	10.0	6.3	.3	5.00	5.1	560.0	7.64	3.5