UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

GEOCHEMICAL DATA FROM THE WEST NEEDLE AND WEST NEEDLE CONTIGUOUS WILDERNESS STUDY AREAS, SAN JUAN AND LA PLATA COUNTIES, COLORADO

By

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STUDIES RELATED TO WILDERNESS

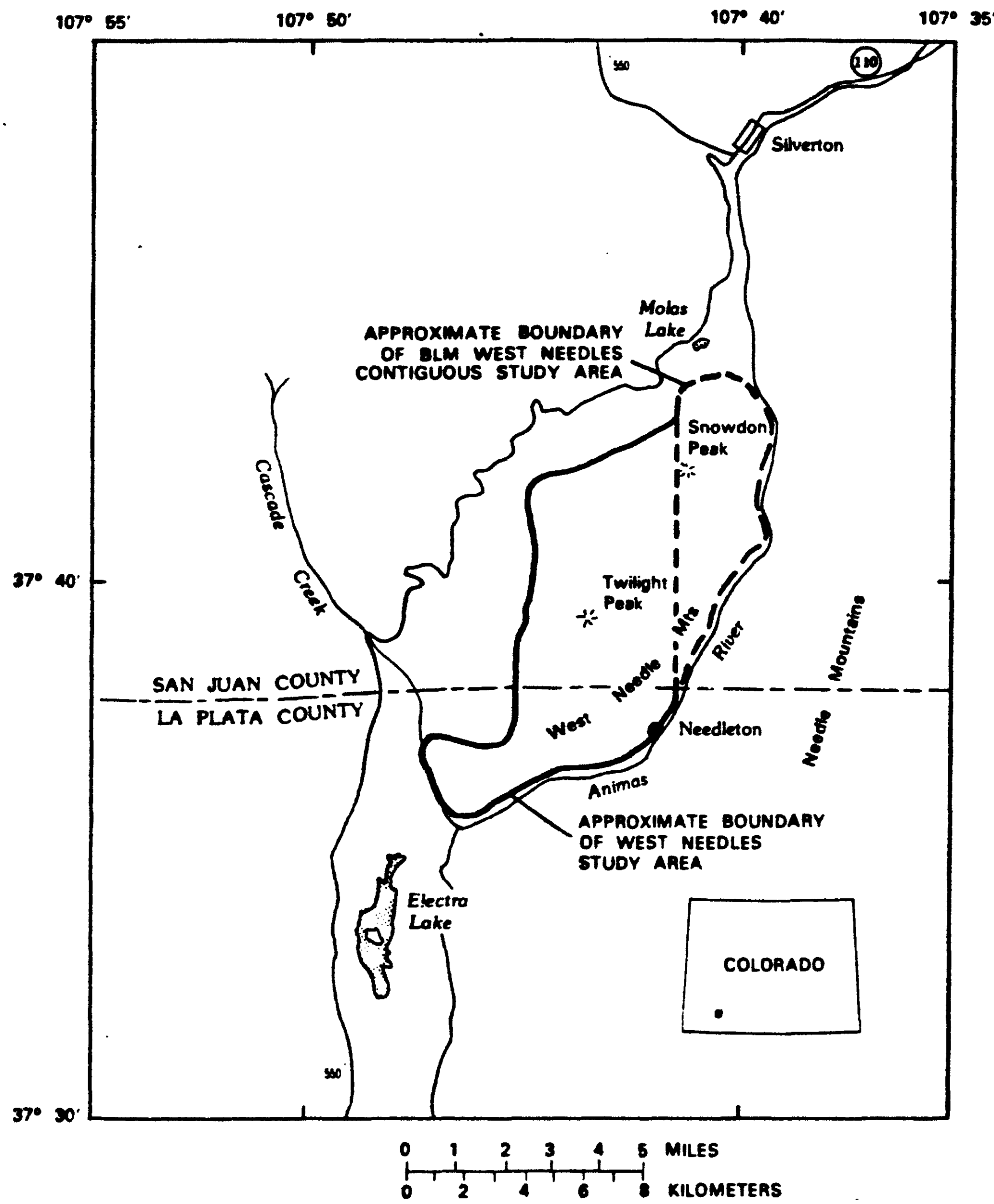
The Wilderness Act (Public Law 88-577, September 3, 1964), the Federal Land Policy and Management Act (Public Law 94-597, October 21, 1976) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and Congress. This report presents the results of a geochemical survey of the West Needle Wilderness Study Area in the San Juan National Forest and the U.S. Bureau of Land Management's West Needle Contiguous Wilderness Study Area, San Juan and La Plata Counties, Colorado. The West Needle Wilderness Study Area was established by Public Law 96-560, known as the Colorado Wilderness Act of 1980.

INTRODUCTION

A geologic and geochemical study was conducted in the summer of 1982 on about 15,800 acres of land within the San Juan National Forest designated as the West Needle Wilderness Study Area, also studied were approximately 5,780 acres of land administered by the U.S. Bureau of Land Management known as the West Needle Contiguous Wilderness Study Area. These lands, located in San Juan and La Plata Counties in southwestern Colorado, are currently being studied by the U.S. Geological Survey and the U.S. Bureau of Mines to provide an evaluation of the mineral and energy resource potential of the areas, which is one consideration in determining their suitability for inclusion into the National Wilderness Preservation System. The conclusions of the mineral resource potential evaluation by Van Loenen and Scott (1983), are based on several complimentary geologic studies. The results of the geochemical sampling of the area presented in this report, are one aspect of this evaluation. Other reports pertinent to the West Needle and West Needle Contiguous Wilderness Study Areas are a geologic and geochemical map by Van Loenen (1983), and a mine and prospect map by Scott (1983).

The study areas lie within the small, but rugged West Needle Mountains which have been dissected from the more extensive Needle Mountains to the east by the Animas River. Easy access to the area is from trails leaving at various points along U.S. Highway 550 which runs close to the northwestern side of the West Needle's on its course between Durango and Silverton (fig. 1). Part of the western boundary may be reached by the Lime Creek Road (U.S. Forest Service Road No. 591), which joins U.S. Highway 550 on both sides of Molas Pass. The eastern and southern parts of the area approximately parallel the Animas River and the route of the Durango and Silverton Narrow Gauge Railroad, which provides the only access to the eastern side.

Figure 1.--Index map showing the location of the West Needle and West Needle Contiguous Wilderness Study Areas.



ANALYTICAL PROCEDURE

A total of 128 rock, stream-sediment, and panned-concentrate sample were collected from the West Needle and West Needle Contiguous Wilderness Study Areas and analyzed in the laboratories of the U.S. Geological Survey. The result of these analyses are tabulated in three tables on the following pages, which are also keyed by sample number to the accompanying sample locality map (pl. 1). All of the samples were analyzed by the six-step spectrographic method for 31 different elements by analyst B. Adrian using the procedure outlined in Grimes and Marranzino (1968). Several samples suspected of having significant concentration of elements not detected by the six-step spectrographic method were selected for additional analyses for gold and zinc by atomic absorption, and for uranium and thorium by neutron activation techniques (Ward and others, 1969). Atomic absorption analyses were conducted by A. Gruzensky and J. Sharkey ; neutron activation determinations were done by J. Storey, S. Danahey, B. Vaughn, and M. Coughlin.

REFERENCES CITED

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

Scott, D. C., 1983, Mine and prospect map of the West Needle Wilderness Study Area and the BLM West Needle Contiguous Wilderness Study Area, La Plata and San Juan Counties, Colorado: U.S. Geological Survey Mineral Investigations Field Studies Map MF-1632-C, scale 1:50,000.

Van Loenen, R. E., 1983, Geologic and geochemical map of the West Needle Wilderness Study Area, La Plata and San Juan Counties, Colorado: U.S. Geological Survey Mineral Investigaitons Field Studies Map MF-1632-B, scale 1:50,000.

Van Loenen, R. E., and Scott, D. C., 1983, Mineral resource potential map of the West Needle Wilderness Study Area, San Juan and La Plata Counties, Colorado: U.S. Geological Survey Mineral Investigations Field Studies Map MF-1632-A, scale 1:50,000.

Ward, F. N., Nakagawa, H. M., Harms, T. F., and Van Sickle, G. H., 1969, Atomic absorption methods of analysis useful in geochemical exploration: U.S. Geological Survey Bulletin 1289, 45 p.

Table 1.--Analyses of stream-sediment samples from the West Needle and West Needle Contiguous Wilderness Study Areas

[See pl. 1 for sample locations. Numbers in parentheses indicate lower levels of determination. N, indicates not detected at limit of detection or value shown; L, indicates detected but below limits of determination. Leaders (----) indicate no data. Other elements looked for but not determined, except as footnoted, at their respective sensitivity limits include: As (200), Bi (10), Cd (20), Mo (5), Nb (20), Sb (100), Sn (10), and W (50)]

	Percent				Parts per million (ppm)																			
Sample No.	Fe (0.05)	Mg (0.02)	Ca (0.05)	Ti (0.002)	Mn (10)	Ag (0.5)	B (10)	Ba (20)	Be (1)	Co (5)	Cr (10)	Cu (5)	La (20)	Ni (5)	Pb (10)	Sc (5)	Sr (100)	V (10)	Y (10)	Zr (10)	Au (0.05)	Th (0.5)	U (0.2)	Zn (5)
1S[1,3]	2	0.7	0.5	0.3	1000	L	30	700	1	10	70	15	70	10	30	7	200	70	50	200	----	----	----	40
3S	3	1	.7	.15	700	N	10	300	1	20	200	30	50	50	30	15	L	100	50	50	----	----	----	100
4S	5	1.5	1	.2	700	N	10	300	1	20	150	70	50	15	50	20	150	100	30	50	----	----	----	95
5S	3	1	.7	.2	700	N	20	500	1	20	100	30	50	20	70	15	150	70	20	70	----	----	----	100
6S	3	1.5	.7	.2	700	N	15	500	1	20	100	20	50	15	30	15	150	70	50	70	----	----	----	70
7S	2	.5	.2	.15	300	N	70	500	1.5	7	50	15	70	10	30	10	150	15	50	150	----	----	----	75
8S	3	1.5	1.5	.2	1000	N	20	300	L	20	150	50	50	20	30	15	150	100	30	70	----	----	----	80
9S	2	1	1	.15	500	N	20	300	1	15	70	30	50	10	20	15	150	70	50	100	----	----	----	40
10S	3	1	1.5	.3	500	N	20	300	L	20	100	10	N	15	10	15	150	100	30	300	----	----	----	35
11S	1.5	.3	.7	.1	500	N	20	150	1	5	15	30	70	10	30	7	N	50	70	30	----	----	----	75
12S	3	1	1	.3	500	N	30	300	1	15	50	70	100	15	30	15	L	100	100	100	----	----	----	60
13S	2	.3	.7	.15	500	L	50	300	1	7	15	50	L	10	30	10	L	70	50	50	----	----	----	70
14S[3]	3	1	.7	.5	1000	N	50	70	1	15	70	10	L	15	70	10	150	100	20	100	N	7.65	2.75	120
15S[3]	3	1	.1	.7	500	N	150	500	1.5	30	150	50	70	70	100	15	150	100	50	500	N	18.1	5.72	150
16S[3]	5	1	.1	.7	700	N	100	2000	2	70	100	70	70	70	70	15	150	100	50	150	N	12.5	4.44	---
17S[1,3]	3	1	.1	.5	500	0.7	70	500	1	50	100	30	50	70	100	10	150	50	20	300	N	<13	72.2	130
18S	2	1	.3	.15	700	N	20	300	2	20	100	30	50	30	70	20	N	70	70	70	N	59	57.4	130
19S	3	1	.7	.15	500	N	50	300	1.5	20	150	20	50	30	50	15	L	70	30	50	N	<3.9	10.6	---
20S[3]	3	1	.3	.15	500	N	20	500	1.5	15	50	10	50	20	50	15	L	50	30	70	----	----	----	70
21S	2	1	1	.2	700	N	10	300	1	15	15	10	50	15	30	15	150	70	50	70	----	----	----	80
22S	3	1	1.5	.2	500	N	20	500	1	15	50	20	100	10	50	20	150	70	50	100	----	----	----	90
23S	2	.7	.5	.15	500	N	30	500	1.5	10	10	15	200	10	70	10	L	50	50	70	----	----	----	80
24S	2	.7	.5	.15	300	N	30	300	1	10	15	20	50	10	70	10	150	50	50	150	----	----	----	75
25S	2	.7	.7	.15	300	N	30	300	1	15	10	20	50	15	100	10	L	50	50	150	----	----	----	80
26S[3]	3	1	.7	.2	500	N	30	500	1.5	15	50	30	70	15	100	10	L	50	50	150	----	----	----	100
27S	3	1	.7	.2	700	N	50	500	1	15	50	30	50	15	100	10	L	70	30	150	----	----	----	130
28S	3	1	.3	.2	700	N	20	500	1.5	20	200	20	70	100	70	10	L	50	50	200	----	----	----	110
29S	3	1.5	1.5	.2	700	N	30	300	1	20	70	20	L	15	50	20	150	100	50	100	----	----	----	70
30S	5	2	2	.2	700	N	10	200	1	30	20	30	L	10	20	30	200	150	30	20	----	----	----	50
31S	5	1.5	1.5	.3	700	N	10	500	1	30	30	15	N	15	30	20	150	100	50	300	----	----	----	70
32S	5	2	2	.5	700	N	15	300	L	30	100	70	N	30	30	20	150	150	30	70	----	----	----	80
33S	5	2	2	.5	1500	N	20	500	1.5	30	100	50	L	30	100	20	150	200	20	100	----	----	----	190
34S[3]	3	.7	.5	.5	1500	N	100	500	1.5	30	50	50	70	20	70	10	150	50	70	300	N	12.9	4.91	130
35S	3	.3	.3	.2	5000	N	50	700	1.5	50	15	15	50	15	50	7	L	50	30	200	N(.10)	----	----	270
36S	2	.7	.5	.2	700	N	70	300	1	10	30	20	50	15	50	10	L	50	30	100	N	----	----	110
37S	2	.5	.3	.2	500	.5	70	300	1.5	10	15	30	50	15	100	10	L	50	50	100	N	<5.0	7.71	150
38S[3]	3	.7	.15	.3	2000	N	200	500	2	30	100	20	70	70	70	15	L	70	50	200	N	22.4	3.96	230

Table 1. Continued

Sample No.	Percent				Parts per million (ppm)																			
	Fe (0.05)	Mg (0.02)	Ca (0.05)	Ti (0.002)	Mn (10)	Ag (0.5)	B (10)	Ba (20)	Be (1)	Co (5)	Cr (10)	Cu (5)	La (20)	Ni (5)	Pb (10)	Sc (5)	Sr (100)	V (10)	Y (10)	Zr (10)	Au (0.05)	Th (0.5)	U (0.2)	Zn (5)
39S	2	.5	.2	.2	700	N	50	300	1.5	10	15	15	50	10	30	7	L	50	30	150	N	11.1	3.41	75
40S	2	.7	.5	.2	500	N	70	300	1	10	15	15	50	15	50	10	L	50	30	100	----	----	----	85
41S	2	.7	.5	.3	700	N	100	500	1	15	50	15	50	15	50	10	L	50	30	200	----	----	----	85
42S	5	1.5	1	.3	1000	N	70	300	1	20	150	30	50	20	50	20	150	70	50	70	----	----	----	90
43S	5	2	1.5	.3	700	N	20	300	1	20	100	50	L	15	50	30	150	100	50	70	----	----	----	90
44S	3	1.5	1	.2	2000	N	30	500	1.5	20	70	70	50	30	70	15	150	70	50	70	----	----	----	140
45S	3	2	2	.2	1000	N	15	300	L	20	150	20	50	20	15	30	200	70	50	70	N	----	----	30
46S	5	2	3	.3	1000	N	10	300	1	20	150	20	N	20	100	20	200	200	30	70	----	----	----	150
47S	7	1.5	1.5	.2	1500	N	10	300	1.5	30	150	50	L	20	30	20	150	100	50	70	----	----	----	85
48S[2]	1.5	.3	1	.15	1000	L	50	500	1	7	10	70	50	10	50	7	L	50	70	70	N(.20)	----	----	60
49S	7	2	1	.3	1000	N	30	500	1	30	150	70	L	20	70	30	L	100	70	70	----	----	----	100
50S[2,3]	7	1	.5	.3	1000	N	150	700	2	50	50	70	50	150	70	15	L	50	50	200	N	12	7.18	190
51S[1,3]	3	1	.5	.3	1000	N	50	700	1.5	10	100	30	50	15	70	15	150	70	50	300	----	----	----	100
52S	5	1.5	.3	.5	1000	N	50	500	1.5	20	150	30	50	20	50	15	150	100	30	200	N	9.67	5.50	110
53S[3]	2	1	.5	.5	1500	N	50	700	1	10	70	20	50	10	50	10	150	70	30	300	----	----	----	85
54S[3]	3	.7	.15	.3	1000	N	100	500	1.5	30	50	50	50	15	70	10	L	70	30	150	N	----	----	140
55S[3]	2	.5	.15	.3	700	N	50	300	1	10	20	20	50	15	50	7	L	50	30	300	N	----	----	100
56S	5	1.5	1	.3	1000	N	20	500	1.5	10	20	20	50	10	50	15	150	100	50	150	----	----	----	130
57S	3	1	.5	.3	700	N	50	700	1	10	50	30	50	10	70	15	L	70	30	200	----	----	----	130
58S[1,3]	5	1.5	.7	.3	1000	N	100	500	1	20	50	30	L	20	50	20	L	150	50	200	----	----	----	80
59S	5	2	2	.3	1000	N	50	500	1	20	200	50	L	20	50	20	150	150	30	70	----	----	----	85
60S	5	3	3	.3	700	N	50	300	1	30	500	30	L	100	50	30	100	200	20	70	----	----	----	80
61S[1]	2	.5	.5	.15	700	N	50	300	1.5	10	20	20	50	10	50	10	L	100	30	50	N(.20)	----	----	130
62S	5	1	.5	.2	700	N	30	500	1.5	20	100	30	L	15	30	15	L	100	30	200	N	----	----	75
63S	5	1.5	1.5	.3	700	N	30	300	1	30	100	50	L	15	50	20	150	100	50	70	----	----	----	100
64S	3	2	2	.15	3000	N	20	500	1	30	200	50	50	20	100	20	L	100	30	50	----	----	----	160
65S	7	2	2	.3	1500	N	20	300	1	30	100	50	L	20	50	30	L	200	30	300	N	----	----	95
66S[1]	5	2	1.5	.2	2000	N	30	300	1.5	20	150	30	70	20	50	20	L	100	30	50	N	----	----	110
67S	3	1.5	1	.2	1000	N	50	300	1.5	20	150	30	100	15	70	15	L	100	50	100	L	----	----	100
68S	5	1.5	1	.3	1000	N	50	300	1.5	20	100	30	50	15	70	15	L	100	50	100	N	----	----	120
69S	3	1	.7	.2	1500	N	50	300	1.5	20	50	50	70	15	70	15	L	100	50	70	N	----	----	170
70S[3]	3	1	1.5	.3	2000	.5	50	700	1.5	20	70	20	50	15	100	10	100	100	30	150	N	11.5	4.62	310
71S[3]	3	.7	.7	.3	700	N	70	500	1.5	15	70	7	50	10	50	10	L	70	50	300	L	14.6	5.80	95
77S	3	1.5	2	.2	700	N	10	300	1	20	100	50	L	20	30	20	150	100	30	100	----	----	----	L
78S	2	1	.7	.2	500	N	20	200	1.5	15	70	50	L	15	50	15	150	70	20	70	----	----	----	5
79S	3	1.5	1.5	.3	700	N	30	300	1.5	20	150	100	50	20	100	20	150	100	30	100	----	----	----	10
80S[4]	5	1.5	1.5	.3	1000	N	50	300	1.5	30	150	70	50	30	70	20	150	100	50	100	----	----	----	10
81S[4]	5	2	2	.3	1000	N	20	300	1.5	30	150	50	N	30	100	30	150	150	50	50	----	----	----	5
82S	3	1.5	1	.3	700	N	20	200	1	30	150	70	50	20	50	20	100	100	30	50	----	----	----	5

[1]Mo detected but below limit of determination.

[2]Samples contain as much as 7 ppm Mo.

[3]Nb detected but below limit of determination.

[4]Samples contain as much as 30 ppm Sn.

Table 2.--Analyses of panned-concentrates from the West Needle and West Needle contiguous Wilderness Study Areas

[See pl. 1 for sample locations. Numbers in parentheses indicate lower levels of determination. N, indicates not detected at limits of detection or value shown; L, indicates detected but below limits of determination or value shown. G indicates greater than the value shown. Leaders (----) indicate no data. Other elements looked for but not detected, except as footnoted, at their respective sensitivity limits include: Bi (20), Cd (50), Sb (100), and Sn (20). Analyses of Fe, Mg, Ca, and Ti are reported in percent; all other analyses are reported in parts per million]

Sample No.	Percent				Parts per million (ppm)																					
	Fe (0.05)	Mg (0.02)	Ca (0.05)	Ti (0.002)	Mn (10)	Ag (1)	As (200)	B (10)	Ba (20)	Be (1)	Co (5)	Cr (20)	Cu (5)	La (50)	Mo (10)	Nb (50)	Ni (10)	Pb (10)	Sc (5)	Sr (100)	V (10)	W (50)	Y (10)	Zn[3] (5)	Zr (10)	Au (0.05)
2C	15	0.3	0.5	0.7	700	N(.5)	N	L	1500	1	20	150	7	200	N(5)	20	15	50	7	L	200	N(50)	300	N(200)	G(1000)	0.25
72C[2]	2	.2	5	G(2)	200	N	N	50	G(10000)	7	10	20	200	300	N	100	10	300	70	2000	100	N	1500	500	G(2000)	----
73C	10	.3	7	G(2)	200	10	5000	20	G(10000)	5	50	L	50	300	N	70	50	300	50	1000	70	N	1000	L	G(2000)	----
74C	2	.7	10	2	500	N	1000	70	1500	L(2)	200	30	50	N	100	N	10	50	15	300	100	2000	300	N	G(2000)	----
75C[1]	1	.3	7	G(2)	200	N	N	70	10000	7	15	L	L(10)	500	20	70	L	100	70	700	100	300	1500	N	G(2000)	----
76C	2	.5	10	.3	700	N	N	70	700	2	50	L	20	N	N	N	L	20	15	300	70	N	300	N	G(2000)	----

[1]Sample contains 200 ppm Bi.

[2]Cd detected in sample but below 50 ppm.

[3]Determined by semiquantitative spectrographic analysis.

Table 3.--Analyses of rock samples from the West Needle and West Needle Contiguous Wilderness Study Areas

[See pl. 1 for sample locations. Leaders (----) indicate no data. Numbers in parentheses indicate lower levels of determination. N, indicates not detected at limits of detection or value shown; L indicates detected but below limits of determination or value shown; G indicates greater than value shown. Other elements looked for but not determined except as footnoted, at their respective sensitivity limits include: Bi (10), Sb (100), Sn (10), and W (50). All analyses except those for Au, Zn, U, and Th were analyzed by the six-step semiquantitative spectrographic method by B. Adrian. Atomic absorption analyses of Zn and Au by A. Gruzensky and J. Sharkey, respectively. Values determined by neutron activation for U and Th were done by J. Storey, S. Donahey, B. Vaughn, and M. Coughlin]

Sample No.	Percent				Parts per million (ppm)																							
	Fe (0.05)	Mg (0.02)	Ca (0.05)	Ti (0.002)	Mn (10)	Ag (0.5)	As (200)	B (10)	Ba (20)	Be (1)	Cd (20)	Co (5)	Cr (10)	Cu (5)	La (20)	Mo (5)	Nb (20)	Ni (5)	Pb (10)	Sc (5)	Sr (100)	V (10)	Y (10)	Zr (10)	Au (0.05)	Th (0.5)	U (0.2)	Zn (5)
Common rocks from Twilight Gneiss																												
8	1.5	0.3	0.5	0.05	200	N	N	20	150	1	N	5	N	N	L	N	N	5	L	5	150	L	50	100	----	----	----	10
21	2	.5	1.5	.1	500	N	N	10	150	1	N	L	N	L	50	N	N	L	L	20	200	10	70	100	----	----	----	15
30	3	1	1	.2	700	N	N	30	1000	1	N	10	N	N	N	N	N	L	20	15	200	30	50	200	----	----	----	75
35	2	.3	.2	.1	300	N	L	50	700	1	N	L	N	100	70	N	N	5	50	7	L	15	30	100	----	----	----	40
36[1]	2	.5	1	.07	300	N	N	30	1000	1	N	L	N	L	50	N	N	5	10	10	L	50	30	70	----	----	----	10
38	5	2	2	.5	700	N	N	20	2000	1	N	20	N	30	100	N	L	50	50	20	1000	150	50	200	----	----	----	40

Table 3.--Analyses of rock samples from the West Needle and West Needle Contiguous Wilderness Study Areas

[See pl. 1 for sample locations. Leaders (----) indicate no data. Numbers in parentheses indicate lower levels of determination. N, indicates not detected at limits of detection or value shown; L indicates detected but below limits of determination or value shown; G indicates greater than value shown. Other elements looked for but not determined except as footnoted, at their respective sensitivity limits include: Bi (10), Sb (100), Sn (10), and W (50). All analyses except those for Au, Zn, U, and Th were analyzed by the six-step semiquantitative spectrographic method by B. Adrian. Atomic absorption analyses of Zn and Au by A. Gruzensky and J. Sharkey, respectively. Values determined by neutron activation for U and Th were done by J. Storey, S. Donahey, B. Vaughn, and M. Coughlin]

Sample No.	Percent				Parts per million (ppm)																							
	Fe (0.05)	Mg (0.02)	Ca (0.05)	Ti (0.002)	Mn (10)	Ag (0.5)	As (200)	B (10)	Ba (20)	Be (1)	Cd (20)	Co (5)	Cr (10)	Cu (5)	La (20)	Mo (5)	Nb (20)	Ni (5)	Pb (10)	Sc (5)	Sr (100)	V (10)	Y (10)	Zr (10)	Au (0.05)	Th (0.5)	U (0.2)	Zn (5)
														Common rocks from Twilight Gneiss														
6	1.5	0.3	0.5	0.05	200	N	N	20	150	1	N	5	N	N	L	N	N	5	L	5	150	L	50	100	----	----	----	10
21	2	.5	1.5	.1	500	N	N	10	150	1	N	L	N	L	50	N	N	L	L	20	200	10	70	100	----	----	----	15
30	3	1	1	.2	700	N	N	30	1000	1	N	10	N	N	N	N	N	L	20	15	200	30	50	200	----	----	----	75
35	2	.3	.2	.1	300	N	L	50	700	1	N	L	N	100	70	N	N	5	50	7	L	15	30	100	----	----	----	40
36[1]	2	.5	1	.07	300	N	N	30	1000	1	N	L	N	L	50	N	N	5	10	10	L	50	30	70	----	----	----	10
38	5	2	2	.5	700	N	N	20	2000	1	N	20	N	30	100	N	L	50	50	20	1000	150	50	200	----	----	----	40
														Mafic dikes and sills														
2	15	3	5	.7	1000	N	N	10	50	N	N	70	70	70	N	N	N	50	N	50	150	300	70	70	----	----	---	5
3	7	3	5	.5	1000	N	N	10	70	N	N	50	50	70	N	N	N	30	10	50	150	200	50	50	----	----	----	15
4	5	5	5	.2	1000	N	N	10	700	L	N	50	100	30	N	N	N	30	15	50	700	200	15	20	----	----	----	20
9	3	5	2	.5	700	N	N	L	2000	2	N	50	700	50	70	N	20	300	100	20	700	70	50	300	----	----	----	40
20	10	3	5	1	1000	N	N	L	150	L	N	50	70	50	N	N	N	20	10	50	150	200	70	70	----	----	----	15
24	5	3	5	.5	1500	N	N	L	1500	N	N	50	150	70	N	N	N	50	20	50	200	200	50	50	----	----	----	35
26	5	5	3	.5	1000	N	N	L	2000	1	N	50	500	50	100	N	L	200	100	20	1000	150	30	300	N	----	----	40
27	3	5	1.5	.3	700	N	N	10	3000	1.5	N	30	200	50	150	N	N	150	70	15	700	100	30	200	----	----	----	85
31	5	5	5	.5	1000	N	N	L	70	L	N	50	500	70	N	N	N	70	N	50	150	200	30	30	----	----	----	5
3[illegible]	5	5	2	.5	700	N	N	10	3000	1	N	50	1000	5	100	N	N	200	30	20	700	100	30	100	----	----	----	70
44	10	3	3	G(1)	1000	N	N	20	500	L	N	70	20	100	L	N	L	30	L	30	300	300	70	100	----	----	----	25
47	10	5	3	.3	1500	N	N	L	300	N	N	70	300	500	N	N	N	30	L	50	200	300	30	30	----	----	----	30
														Slates from the Uncompahgre Formation														
6	7	1.5	L	.3	500	N	N	200	500	1.5	N	30	150	50	50	N	L	20	10	20	L	50	50	100	N	14.1	3.35	12[illegible]
7	1	.7	.1	.3	70	L	N	150	500	1	N	5	20	20	50	50	L	15	30	15	N	300	70	150	N	<5.0	20.5	10
50	7	1	L	.7	200	N	N	150	500	1.5	N	20	100	5	70	N	L	20	20	20	N	100	30	100	----	----	----	----
51	7	1	L	.7	200	N	N	100	500	2	N	15	150	70	70	L	L	20	50	20	L	150	50	100	----	----	----	----
51A	5	.7	L	.7	150	N	N	100	500	1.5	N	15	150	15	100	10	L	5	70	20	L	200	70	150	----	----	----	----
52	7	1.5	L	1	200	N	N	100	500	1.5	N	15	150	20	50	N	L	30	10	20	L	100	30	300	----	----	----	----
53	2	1	L	1	700	N	N	200	500	2	N	15	100	30	50	30	L	15	10	20	L	300	50	150	----	----	----	----
53A	1	.15	.2	.2	70	N	N	70	500	1	N	5	10	15	70	5	L	15	20	5	L	100	50	70	----	----	----	----
														Quartzite from the Uncompahgre Formation														
5	1	.07	L	.3	L	N	N	100	70	L	N	N	15	N	L	N	N	5	N	N	N	20	30	G(1000)	N	5.0	3.82	L
10	2	.2	L	.3	30	N	N	100	200	2	N	70	15	N	70	N	L	10	30	7	150	20	70	500	N	16.2	5.57	5
15	1.5	.03	L	.2	200	N	N	20	20	L	N	5	L	L	L	N	N	5	N	L	L	20	30	300	N	9.01	5.51	20
17	.5	.03	L	.03	30	N	N	300	L	N	N	L	L	L	N	N	N	5	N	N	N	10	10	70	----	----	----	N
														Ten Mile Granite														
13	1.5	.3	.5	.1	200	1	N	20	1000	1	N	5	N	7	50	5	N	5	100	7	L	20	20	150	----	----	----	25

Table 3. Continued

Sample No.	Fe (0.05)	Mg (0.02)	Ca (0.05)	Ti (0.002)	Mn (10)	Ag (0.5)	As (200)	B (10)	Ba (20)	Be (1)	Cd (20)	Co (5)	Cr (10)	Cu (5)	La (20)	Mo (5)	Nb (20)	Ni (5)	Pb (10)	Sc (5)	Sr (100)	V (10)	Y (10)	Zr (10)	Au (0.05)	Th (0.5)	U (0.2)	Zn (5)
	Percent				Parts per million (ppm)																							
Ten Mile Granite																												
13	1.5	.3	.5	.1	200	1	N	20	1000	1	N	5	N	7	50	5	N	5	100	7	L	20	20	150	----	----	----	25
Mineralized rock from Elk Park (Uncompahgre Formation)																												
11[2,3]	.2	.05	L	.15	50	200	3000	150	150	5	200	150	L	5000	L	1000	N	700	200	L	150	70	70	500	.10	<5800	25000	700
Silicified fault breccia																												
25	1.5	.05	L	.1	L	N	N	50	300	1	N	L	N	N	70	N	L	7	N	10	L	15	20	100	----	12.4	2.13	10
28[1]	1	.5	.5	.07	700	N	N	20	700	2	N	5	N	L	N	N	L	5	50	5	L	15	30	100	----	----	----	25
34	.7	.3	.2	.02	150	N	N	30	700	1	N	L	N	L	N	N	N	L	L	L	L	10	15	30	----	----	----	L
42	5	3	5	.2	1000	N	N	100	100	1	N	20	300	L	N	N	N	20	10	15	N	50	50	30	N	----	----	200
48	1	.2	.3	.1	150	N	N	10	150	L	N	L	N	L	N	N	N	5	L	5	L	15	20	50	N	----	----	10
Sample from the Sally Bowman mine dump																												
19	2	7	10	.03	2000	30	2000	N	L	L	N	20	20	50	N	L	N	20	100	10	N	20	20	10	1.5	----	----	120
Samples from the Silver Star Extension mine dump																												
22	3	1	2	.3	1500	20	N	30	300	1.5	300	20	50	50	L	N	N	10	15000	20	L	100	20	50	.95	----	----	20000
23	3	2	5	.07	1000	N	N	10	300	L	N	10	N	10	N	N	N	7	150	10	N	50	20	30	N	----	----	170

[1] Sn detected but below limit of determination.

[2] Bi detected but below limit of determination.

[3] Sample contains 3000 ppm Sb, and 200 ppm W.