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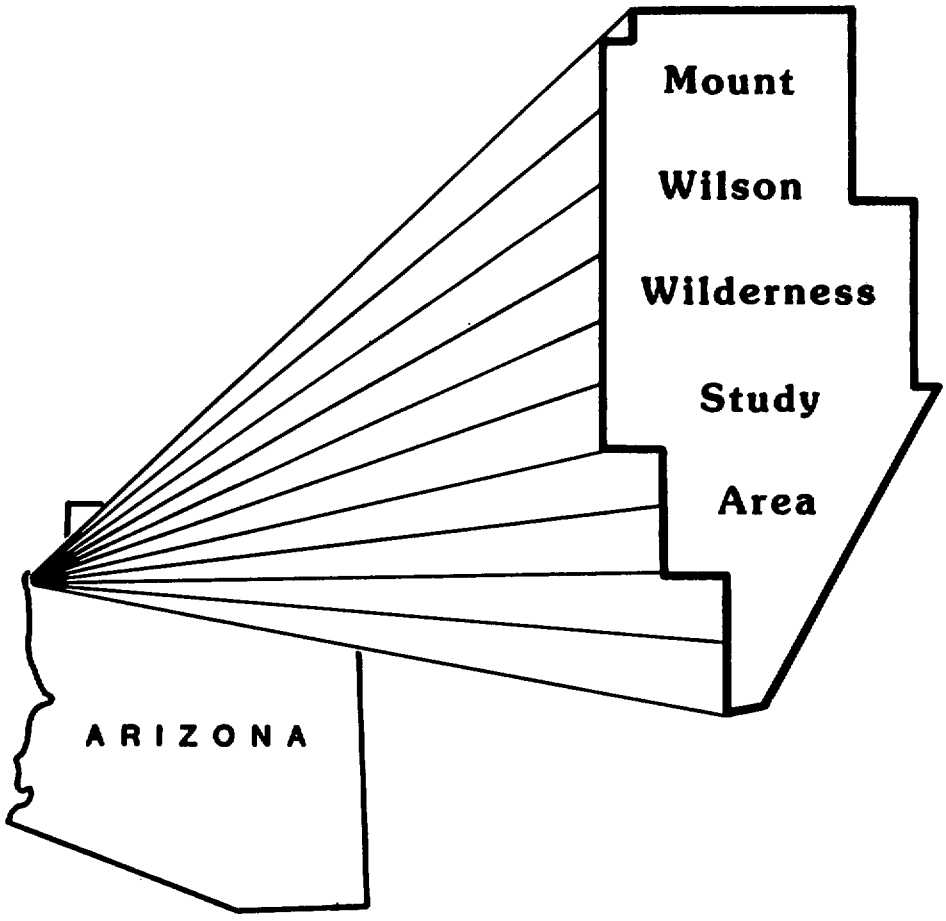
Mineral Investigation of the Mount Wilson Wilderness Study Area (AZ-020-001A), Mohave County, Arizona



BUREAU OF MINES
UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL INVESTIGATION OF THE MOUNT WILSON WILDERNESS STUDY AREA (AZ-020-001A), MOHAVE COUNTY, ARIZONA

by

George S. Ryan

MLA 66-86
1986

Intermountain Field Operations Center
Denver, Colorado

UNITED STATES DEPARTMENT OF THE INTERIOR
Donald P. Hodel, Secretary

BUREAU OF MINES
Robert C. Horton, Director

PREFACE

The Federal Land Policy and Management Act of 1976 (Public Law 94-579) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine the mineral values, if any, that may be present. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral survey of the Mount Wilson Wilderness Study Area (AZ-020-001A), Mohave County, Arizona.

This open-file report summarizes the results of a Bureau of Mines wilderness study. The report is preliminary and has not been edited or reviewed for conformity with the Bureau of Mines editorial standards. This study was conducted by personnel from the Branch of Mineral Land Assessment (MLA), Intermountain Field Operations Center, Building 20, Denver Federal Center, Denver, CO 80225.

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

ft	foot
mi	mile
oz/st	ounce per short ton
%	percent

MINERAL INVESTIGATION OF THE MOUNT WILSON WILDERNESS STUDY AREA (AZ-020-001A), MOHAVE COUNTY, ARIZONA

by

George S. Ryan, U.S. Bureau of Mines

SUMMARY

In accordance with the Federal Land Policy and Management Act of 1976 (Public Law 94-579), the Bureau of Mines conducted a mineral survey in March 1986 to appraise the resources within the Mount Wilson Wilderness Study Area which comprises 24,821 acres in Mohave County, Arizona.

No mineral production has occurred, no mineral resources were identified, and no mineral leases or mining claims exist in the study area. Assays of 38 rock samples taken during this survey indicate occurrences of barium, copper, silver, and minor amounts of other elements. The structures in which they occur are not extensive at the surface.

INTRODUCTION

In March 1986, the Bureau of Mines, in cooperation with the U.S. Geological Survey (USGS), conducted a mineral investigation of the Mount Wilson Wilderness Study Area (WSA), Mohave County, Arizona, on lands administered by the Bureau of Land Management (BLM) Phoenix District Office. The Bureau surveys and studies mines, prospects, and mineral occurrences to appraise reserves and identified resources. The USGS assesses the potential for undiscovered mineral resources based on regional geological, geochemical, and geophysical surveys. This report presents the results of the Bureau of Mines study, which was completed prior to the USGS assessment. The USGS will publish the results of their studies. A joint USGS-Bureau report, to be published by the USGS, will integrate and summarize the results of both surveys.

Geographic setting

The WSA is in the north end of the Black Mountains. The north part of the 24,821 acre study area is 6 mi east of Hoover Dam and 8 mi south of Lake Mead in Mohave County, Arizona (fig. 1). The Black Mountains end north of the WSA at the Colorado River (Lake Mead) and are east of and parallel to the Colorado River to the south. The study area contains Mount Wilson and a large part of Wilson Ridge. Topographic relief in the WSA is about 3,465 ft; the highest point is Mount Wilson at 5,445 ft.

The WSA is bounded on all but the south end by the Lake Mead National Recreation Area. Access from the east is by two unimproved roads from the Temple Bar road north of State Highway 93. Several unimproved roads, mostly following dry washes, provide proximate access to the west part of the WSA.

Previous studies

The earliest study of the area was made in 1853 during an attempt to find a suitable railroad route to the Pacific coast (Longwell, 1963, p. E4). Before and during the construction of Hoover Dam, the Bureau of Reclamation commissioned several studies concerning rock structure near the dam site (U.S. Bureau of Reclamation, 1950). Mineral studies included a regional report of the mines, prospects, and mineral occurrences (Hewett and others, 1936).

The Black Canyon Geologic Quadrangle Map (Anderson, 1978) is a recent geologic study that includes most of the WSA. The map does not show the location of some existing intrusive dikes that may have provided conduits for mineralizing solutions.

Method of investigation

The Bureau investigation included a review of literature related to the mineral resources and mining activity in or near the Mount Wilson WSA. Mining

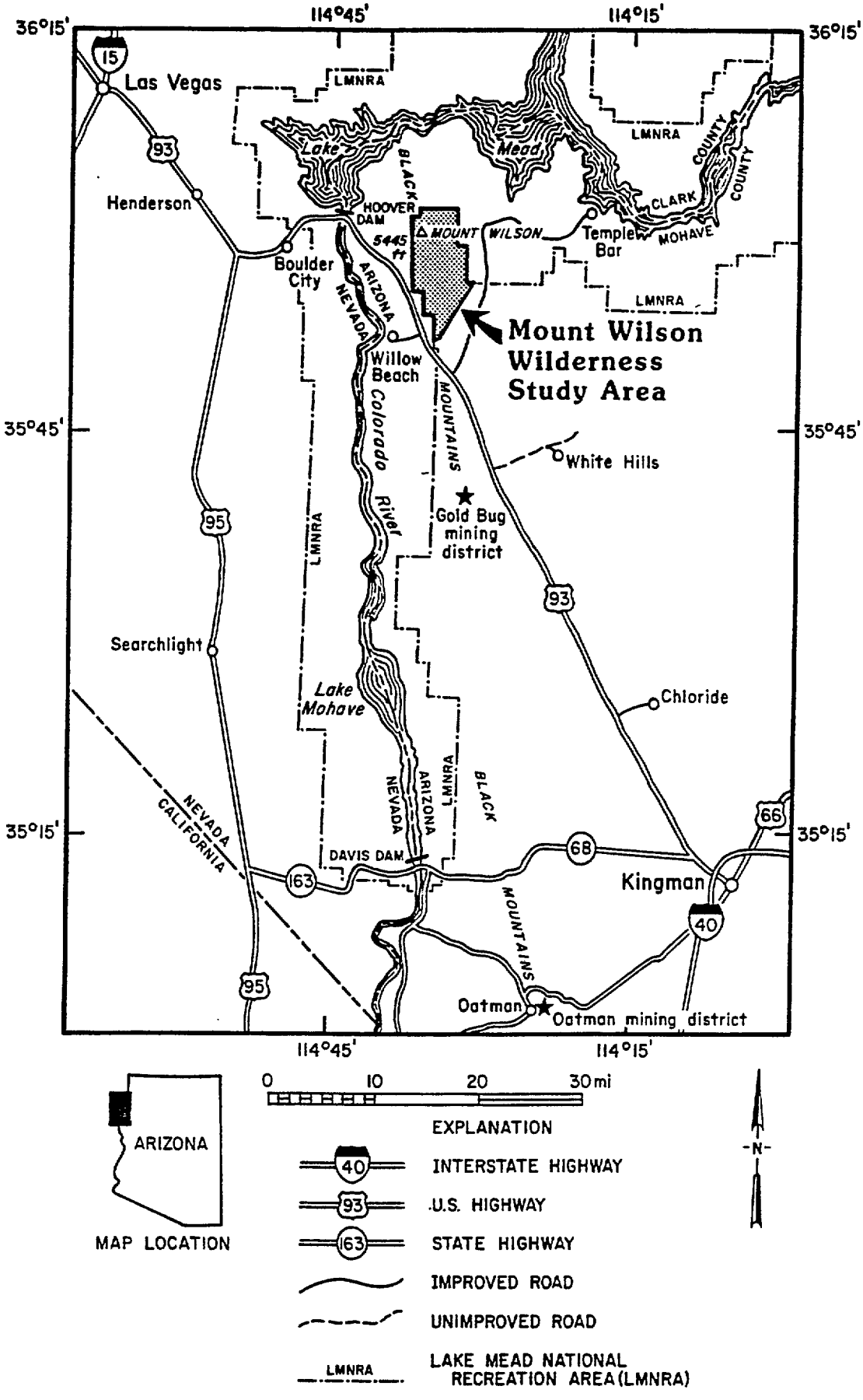

Figure 1.--Index map of the Mount Wilson Wilderness Study Area and vicinity, Mohave County, Arizona.

claim information was checked in the BLM claim recordation files; no claims exist within the study area. Land status plats were obtained from the BLM State Office in Phoenix, Arizona.

Two Bureau personnel conducted an eight-day field examination in the study area and vicinity. The examination included reconnaissance by fixed-wing aircraft, four-wheel-drive vehicle, and foot traverses. Prospects and workings within and up to 1/2 mi outside of the WSA were surveyed and sampled.

Thirty-eight chip and grab samples were collected. Twenty-four samples were fire assayed for gold and silver; twenty-seven samples were analyzed for barium, beryllium, and copper by inductively coupled plasma-atomic emission spectroscopy or X-ray fluorescence methods. Twenty-one samples were analyzed for 40 elements by the semiquantitative optical emission spectrographic method (appendix A). Appendix B shows the approximate spectrographic analysis detection limits. All testing was done by the Bureau of Mines Research Center, Reno, Nevada.

Mining history

Gold has been produced from Tertiary quartz-sulfide-gold veins in the Precambrian metamorphic rocks 10-30 mi south of the WSA in the Gold Bug mining district (USGS, 1968, p. A4). The highly productive Oatman mining district is near the southern end of the Black Mountains, 50 mi south of the WSA. At Oatman, quartz-adularia-gold veins are found in the extrusive Tertiary volcanics overlying the core metamorphic rocks (Bateman, 1951, p. 431). Although the Tertiary volcanics have been eroded from the WSA, Tertiary dikes are common.

Several prospect pits were found within or near the WSA; most are along the western boundary paralleling the Kingman Road Fault (fig. 2). The

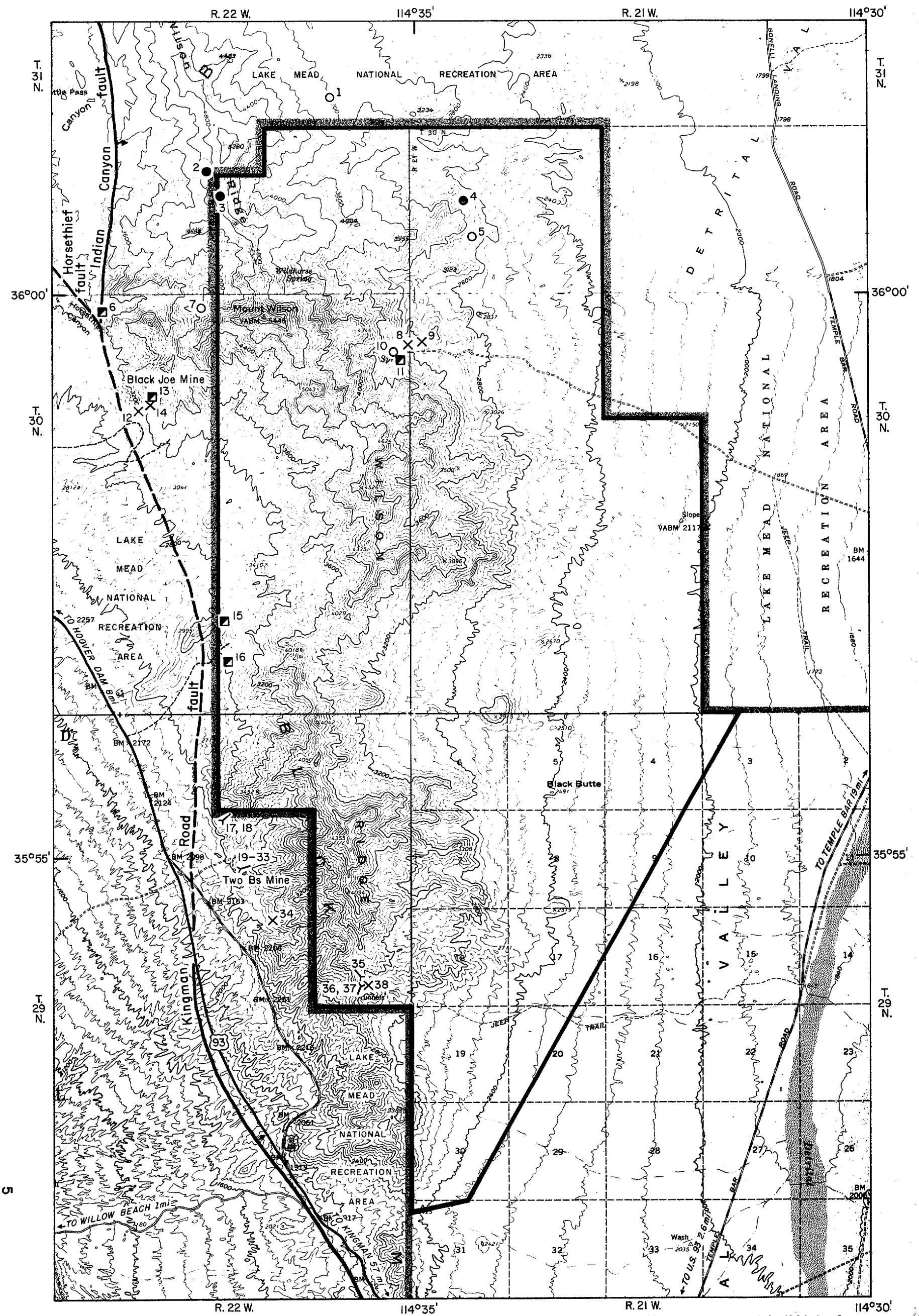

Figure 2.--Sample locality map of the Mount Wilson Wilderness Study Area, Mohave County, Arizona.

prospects are in the Mount Wilson granite in the northern part of the WSA and in the Precambrian metamorphic rocks in the southern part. Except for the Two Bs Mine, the workings consist of small pits, shafts, and adits. Although no record of mineral production was found in the literature search, unpublished Bureau of Reclamation records show that the Two Bs Mine was started in the 1930's and work continued in the 1950's.

There has been no large-scale geophysical prospecting in the study area because of the restrictive exploration policies imposed by the administration of the National Recreation Area.

GEOLOGIC SETTING

Precambrian metamorphic and igneous rocks, (Longwell, 1963, p. E5 and E16), Late Cretaceous intrusives and extrusives (USGS, 1971, p. A44), and Tertiary volcanics and dikes (Anderson, 1978) characterize the Black Mountains. Most of the WSA is underlain by banded gneiss, commonly of granitic composition, and lesser amounts of schist. The Wilson granite underlies the north end of the WSA and Wilson Ridge (Anderson, 1978). Late Tertiary intrusives in the form of dikes and sills are found intermittently throughout the length of the Black Mountains.

ENERGY RESOURCES

The hydrocarbon potential of the region, which includes the WSA, is rated low to zero because of the presence of metamorphic and intrusive rocks and the lack of sedimentary source rocks (Ryder, 1983, p. C19).

There is no hot spring activity, past or present, in the area that would suggest the existence of geothermal resources.

APPRAISAL OF MINERAL SITES EXAMINED

Samples were taken at all of the small pits, shafts, and adits found in and adjacent to the study area. Occurrences of malachite and chrysocolla were

found in shear zones exposed in prospects. Although copper minerals are readily apparent in the prospects, gold was probably the target of the early prospectors. Minor amounts of gold or silver were found in five of the samples. The highest values were in sample 6 taken from a shaft on the Indian Canyon fault 1-1/2 mi west of Mount Wilson, outside the WSA boundary (fig. 2); the amounts were 0.13 oz gold/st, 0.3 oz silver/st, 2.13% barium, and 1.6% copper. Anomalously high values of barium, copper, gold, manganese, and silver were present in many of the samples, and beryllium, chromium, nickel, strontium, tin, vanadium, and zirconium contents (table 1) were higher than average crustal concentrations (Levinson, 1974, p. 43).

A 360-ft-long crosscut adit with a 184-ft-long drift is present at the Two Bs Mine, 1/2 mi west of the WSA (fig. 2). The crosscut was evidently driven to intercept, at a depth of about 150 ft, a mineralized vein of variable width (2-10 ft) observed on the surface. The 184-ft-long, south-trending drift at the end of the crosscut follows the structure that correlates up dip with the surface outcrop. Samples 19 to 22 were taken in the crosscut adit; sample 20 contained 0.2 oz silver/st. Samples 23 to 31 were taken along the structure exposed in the drift. Sample 26 contained 0.12 oz gold/st and 0.2 oz silver/st, and sample 30 contained 0.19 oz gold/st and 0.1 oz silver/st. Sample descriptions and assay results are shown on table 1. A heavy coating of copper sulfate on the walls, especially near the structure, represents the effects of the leaching of minerals in the structure and subsequent redeposition.

A 20-ft-deep shaft was found 1 1/2 mi east-southeast of Mount Wilson (fig. 2). The shaft is in a highly magnetic, fine-grained xenolith of igneous origin within the surrounding gneiss. Samples 10 and 11, taken from the

xenolith contained 10% to 29.9% iron and 0.2 oz silver/st (table 1). Sample 9, taken from a 2-ft-wide vein that cropped out over a distance of 35 ft, contained 22.3% barium, 0.01 oz gold/st, and 0.1 oz silver/st.

The alignment of mineral occurrences along the trend of the Kingman Road Fault, immediately west of the WSA (fig. 2), suggests that the mineralization was controlled by that structure. An apparent extension of the fault bounds the eastern side of the Gold Bug mining district 20 mi south of the WSA (Anderson, 1978). Nearly all mineral deposits exploited within the Black Mountains have been in igneous rocks, either plutonic or volcanic, or in closely associated metamorphic rocks (Longwell, 1963, p. E43). Although most of the extrusive rocks have been eroded from the northern part of the Black Mountains, the underlying Precambrian metamorphic rocks and younger intrusives are similar to those found in the Gold Bug and Oatman mining districts. The Bureaus' sampling verifies the existence of precious- and base-metal minerals including gold and silver in limited assemblages along the west side of the WSA. The presence of recent intrusives, including dike swarms, indicates there could have been possible ground preparation for subsurface mineralization.

CONCLUSIONS

No mineral resources were identified on the surface of the Mount Wilson Wilderness Study Area. The mineral occurrences present are discontinuous, small, and low grade.

RECOMMENDATIONS FOR FURTHER STUDY

Because geological conditions are similar to those in the Gold Bug and Oatman districts, advanced exploration techniques such as gravimeter, induced polarization, and Very-Low-Frequency Electromagnetic (VLF) surveys should be

used to identify any near-surface veins or deep massive- or disseminated-mineral deposits.

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Table 1.--Assay data and descriptions of samples from the Mount Wilson Wilderness Study Area, Mohave County, Arizona.

[ICP, Inductively coupled plasma-atomic emission spectroscopy; Spec, Semiquantitative optical emission spectrographic analysis; X-ray, X-ray fluorescence; nd, run but not detected; -, below average crustal concentrations or not run; --, not applicable; Tr, trace; Au, gold; Ag, silver; Ba, barium; Be, beryllium; Cr, chromium; Cu, copper; Fe, iron; Mn, manganese; Ni, nickel; Sn, tin; Sr, strontium; V, vanadium; Zr, zirconium.]

Sample			Fire Assay		X-Ray	ICP	
No.	Type	Length (ft)	Au oz/ton	Ag oz/ton	Ba %	Cu %	Sample locality description
1	grab	--	nd	nd	-	-	Bright red float (hematitic rocks).
2	chip	2	nd	0.2	-	-	A 2-ft-wide quartz vein, chlorite and limonite; strike N. 65° W., dip 51° E.
3	grab	--	nd	.1	-	1.0	Pegmatitic granite float with quartz stringers. Chrysocolla and limonite.
4	do.	--	-	-	1.98	.0036	Red altered rock in schist; silicified, hematite filled vugs and minor barite and calcite.
5	chip	3	nd	.1	-	-	A 3-ft-wide quartz vein in biotite schist; limonite staining and botryoidal chalcedony; strike N. 32° W., dip vertical.
6	grab	--	0.13	.3	2.13	1.6	Shear zone in gneiss; with drusy quartz, barite, and chrysocolla; strike N. 24° E., dip 63° W.
7	chip	2	nd	.1	-	-	Brecciated granite with black matrix.
8	do.	1	nd	nd	-	.059	Brown jasperoid vein in granite; strike N. 8° E., dip 59° E.
9	do.	2	.01	.1	22.3	.068	A 2-ft-wide chalcedony vein with barite; strike N. 2° E., dip 65° E.
10	grab	--	nd	.2	-	.059	Representative rocks from toe of dump. Fe 29.9%, Mn 1.2%, Sr 0.052%; all by ICP.
11	chip	6	-	-	-	-	Xenolith in granite-gneiss; 20-ft-deep shaft.
12	do.	2	-	-	.021	.2	Shear zone at Black Joe Mine; gneiss containing chrysocolla and hematite.
13	do.	2	-	-	.009	.91	Shear zone in gneiss from 18-ft-deep shaft at Black Joe Mine; chrysocolla, malachite, and hematite; strike N. 56° W., dip vertical.
14	do.	3	nd	.2	.41	.91	Prospect pit at Black Joe Mine; same description as No. 13.
15	do.	3	-	-	-	-	Hematite pod in bank at entry of 8-ft-long adit.
16	do.	5	nd	nd	-	.0063	A 5-ft-wide shear zone in hematite-stained gneiss; strike N. 47° E., dip vertical.
17	do.	2	nd	nd	-	.008	A 2-in.-wide gouge zone, red-green, fissile shale; strike N. 78° W., dip 80° N.
18	do.	1.5	-	-	-	-	A 6-in.-wide pod of specularite; black coating on slippage planes.

Table 1.--Assay data and descriptions of samples from the Mount Wilson Wilderness Study Area, Mohave County, Arizona--Continued

No.	Sample Type	Length (ft)	Fire Assay Au oz/ton	Fire Assay Ag oz/ton	X-Ray Ba %	ICP Cu %	Sample locality description
Two Bs Mine, Underground samples (wall rock, banded gneiss)							
19	chip	1	-	-	-	0.0059	A 1-ft-wide vein; hematite.
20	do.	1	nd	0.2	-	.014	A 2-ft-wide vein; hematite.
21	do.	5	-	-	-	.0035	Face of 5-ft-long drift, hematite.
22	do.	3	nd	nd	-	.023	Entry to 24-ft-long drift; 30-in.-wide shear zone; hematite.
23	do.	2	-	-	-	.065	North end of 24-ft-long drift; 2-ft-wide fracture zone; hematite.
24	do.	2	-	-	-	.026	Minor fracture; hematite.
25	do.	2.5	-	-	-	.049	Northwest end of overhand stope on 30-in.-wide shear zone.
26	do.	2.5	0.12	.2	-	.25	Southeast end of overhand stope on 30-in.-wide shear zone.
27	do.	3	-	-	-	.94	Heavy hematite staining and Cu sulfates.
28	do.	2.5	-	-	1.0	-	Do.
29	do.	2.5	nd	.1	-	.26	Hematite and specularite.
30	do.	3	.19	.1	-	.78	East rib near end of adit, barren appearance.
31	do.	3	nd	nd	-	.41	West rib, minor chrysocolla, Cu sulfates, and hematite on fractures.
Two Bs Mine area, surface samples							
32	do.	1	.01	.1	-	.7	Small glory hole above Two Bs workings; minor chrysocolla on fractures.
33	do.	2	.03	.4	-	.78	Adit below glory hole; 2-ft-wide shear zone; chrysocolla, malachite, and hematite.
34	do.	2	nd	.2	-	-	Prospect pit south of Two Bs Mine; shear zone in gneiss; quartz, specularite, and a trace of limonite; strike N. 25° E., dip 33° E.
35	do.	3.5	nd	nd	-	-	A 6-ft-deep prospect pit in shear zone in gneiss; quartz and hematite.
36	do.	2	nd	.1	-	-	Altered breccia and hematite in shear zone in gneiss 10 ft from portal; strike N. 10° E., dip 52° E.
37	do.	3	-	-	-	-	Breccia at portal of No. 36 adit.
38	do.	2	Tr	.1	-	-	Shear zone in brecciated gneiss; specularite; strike N. 37° W., dip 38° W.

APPENDIX A--Selected results of semiquantitative optical emission spectrographic analysis of samples from the Mount Wilson Wilderness Study Area, Mohave County, Arizona. Elements below detection limits have been omitted.

Sample Number

(Results in percent)

Element	1	2	3	4	5	6	7	8
Ba	0.08	0.2	0.1	>6.0	0.03	>8.0	0.009	0.2
Be	<.0001	<.0001	<.0001	.003	<.0001	<.0001	<.0002	<.0002
Cr	<.0007	.005	<.0008	.004	.002	<.0003	<.0003	.003
Cu	<.0006	.003	.7	<.0006	<.0006	.5	<.0006	.004
Fe	5.0	3.0	2.0	7.0	.3	4.0	10.0	8.0
K	5.0	5.0	>10.0	9.0	<1.0	>10.0	>10.0	4.0
Mn	.6	.1	.02	>2.0	.01	>6.0	.02	<4.0
Ni	<.0002	.002	<.0006	<.0003	<.0005	<.0008	<.002	<.0002
Pb	<.002	<.002	<.002	.02	<.002	<.002	<.002	<.002
Si	>10.0	>10.0	>10.0	>10.0	>10.0	>10.0	>10.0	>10.0
Sn	<.0008	.004	<.001	.007	<.0006	<.002	<.007	<.006
Sr	<.0001	<.0001	<.0001	.006	<.0001	.03	.0003	<.0001
V	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.007
Zr	<.003	<.003	2.003	<.003	<.003	<.003	<.003	<.003
Zn	<.0001	<.0001	.001	.07	<.0001	.001	<.0008	<.0001

Element	11	13	15	16	17	18	19	20
Ba	>6.0	0.01	0.08	0.03	0.05	0.03	0.2	0.06
Be	0.002	<.0001	<.0001	>.0002	<.0001	<.0001	.0005	<.0001
Cr	<.0003	<.0004	<.0005	.002	.08	.002	.007	<.0003
Cu	.03	.6	.005	.0007	.0008	<.0006	.005	.003
Fe	10.0	4.0	2.0	7.0	10.0	10.0	6.0	2.0
K	<2.0	>10.0	>10.0	>10.0	9.0	<.6	>10.0	10.0
Mn	>10.0	.02	.08	.03	.5	.09	.1	.09
Ni	<.008	<.0005	<.0007	>.0006	.02	<.002	.003	<.0005
Pb	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Si	>10.0	>10.0	>10.0	>10.0	>10.0	>10.0	>10.0	>10.0
Sn	<.06	<.003	<.0006	<.003	<.0006	<.0007	<.005	<.0006
Sr	.01	.002	.0001	.007	<.0001	<.0001	.002	<.0001
V	<.009	<.005	<.005	<.005	<.008	<.01	<.009	<.005
Zr	.005	<.003	<.003	<.003	<.003	.008	.004	<.003
Zn	<.001	<.0003	.002	<.0001	<.0001	<.0001	.001	<.0001

APPENDIX A--Selected results of semiquantitative optical emission spectrographic analysis of samples from the Mount Wilson Wilderness Study Area, Mohave County, Arizona. Elements below detection limits have been omitted--Continued

Sample Number

(Results in percent)

Element	23	27	30	34	37
Ba	0.9	0.02	0.08	0.02	0.07
Be	<.0001	<.0002	<.0001	<.0001	<.0002
Cr	.002	<.0003	<.0008	.002	.002
Cu	.03	.3	.2	<.0006	<.0006
Fe	6.0	3.0	2.0	4.0	5.0
K	>10.0	6.0	6.0	10.0	>10.0
Mn	.02	.02	.01	.1	.02
Ni	.003	.001	.001	<.0004	.001
Pb	<.002	<.002	<.002	<.002	<.002
Si	>10.0	>10.0	>10.0	>10.0	>10.0
Sn	<.007	<.001	<.002	<.001	<.005
Sr	.001	.0005	.0002	.0004	.0008
V	<.005	<.005	<.02	<.005	<.005
Zr	<.003	.02	<.003	<.003	<.003
Zn	<.0002	<.0005	<.0001	<.0001	<.0004

APPENDIX B--Semiquantitative optical emission spectrographic analysis detection limits. U.S. Bureau of Mines, Reno Research Center.

Element	Detection limit (percent)	Element	Detection limit (percent)
Ag	0.002	Mo	0.0001
Al	.001	Na	.3
As	.01	Nb	.007
Au	.002	Ni	.0005
B	.003	P	.7
Ba	.002	Pb	.001
Be	.0001	Pt	.0001
Bi	.01	Re	.0006
Ca	.05	Sb	.06
Cd	.0005	Sc	.0004
Co	.001	Si	.0006
Cr	.0003	Sn	.001
Cu	.0006	Sr	.0001
Fe	.0006	Ta	.02
Ga	.0002	Te	.04
K	2.0	Ti	.03
La	.01	V	.005
Li	.002	Zn	.0001
Mg	.0001	Zr	.003
Mn	.001	Y	.0009

These detection limits represent an ideal situation. In actual analysis, the detection limits vary with the composition of the material analyzed. These numbers are to be used only as a guide.