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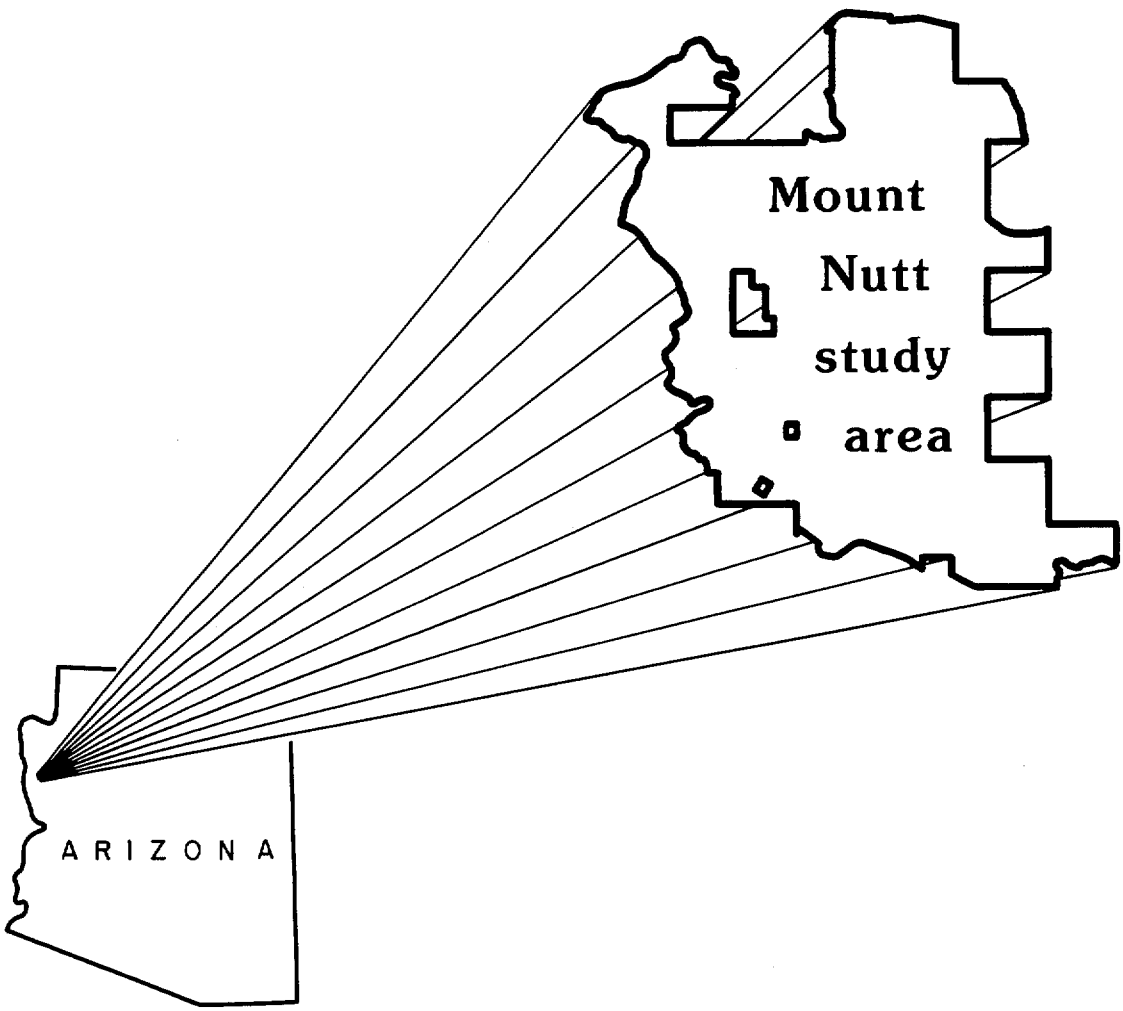
Mineral Investigation of a Part of the Mount Nutt Wilderness Study Area (AZ-020-024), Mohave County, Arizona



BUREAU OF MINES
UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL INVESTIGATION OF A PART OF THE MOUNT NUTT WILDERNESS STUDY AREA (AZ-020-024), MOHAVE COUNTY, ARIZONA

by

Carl L. Almquist

MLA 35-88
1988

Intermountain Field Operations Center
Denver, Colorado

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

BUREAU OF MINES
T S Ary, 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 a part of the Mount Nutt Wilderness Study Area (AZ-020-024), 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 Resource Evaluation, Intermountain Field Operations Center, P. O. Box 25086, Denver Federal Center, Denver, CO 80225.

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ILLUSTRATIONS

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

ft	foot
in.	inch
mi	mile
ppb	part per billion
ppm	part per million
lb	pound
st	short ton
oz	troy ounce

MINERAL INVESTIGATION OF A PART OF THE MOUNT NUTT WILDERNESS STUDY AREA (AZ-020-024), MOHAVE COUNTY, ARIZONA

by

Carl L. Almquist, Bureau of Mines

SUMMARY

In March 1987, the Bureau of Mines conducted a mineral investigation of 27,210 acres designated preliminarily suitable for wilderness within the Mount Nutt Wilderness Study Area, a 29,200 acre tract of public land administered by the Bureau of Land Management in Mohave County, Arizona. This investigation was requested by the Bureau of Land Management and authorized by the Federal Land Policy and Management Act of 1976 (Public Law 94-579).

Precambrian-age crystalline rocks and a sequence of Tertiary-age volcanic and intrusive rocks predominate in the part of the Black Mountains where the study area is located. Rock units in the Tertiary sequence host gold deposits in the Union Pass and Oatman mining districts, which include the northern and southern parts of the study area, respectively.

No metallic mineral resources were identified inside the study area, but a gold resource totalling about 56,000 oz has been identified by Fischer-Watt Gold Co., Inc. at two sites in Secret Pass that are less than 1/2 mi from the northern boundary. This resource was identified by drilling on a fault that is traceable more than 1 mi into the study area. All 26 samples collected by the Bureau from mine and prospect workings in the Secret Pass vicinity contained gold, with concentrations as high as 0.880 oz/st, but deposit dimension data necessary for resource determinations could not be obtained by surface work.

A block of mining claims near the center of the study area was located for fire agate, a gem stone. Hand-sorted specimens, valued at $30-$100 per lb, are back-packed out from the remote site and sold in small quantities. Exceptional individual specimens reportedly sell for $1,000 or more. Based on a rough size estimate, current production methods, and site accessibility, this deposit will be a fire agate resource for the foreseeable future.

The study area is rated by the USGS as having zero to low potential for the occurrence of petroleum, based on the prevalence of crystalline and volcanic rocks.

Inferred subeconomic resources of sand and gravel in the study area have no apparent superior qualities and represent only a small fraction of abundant supplies available from established sources located elsewhere, which makes development unlikely. No other industrial mineral commodities were identified.

INTRODUCTION

In March 1987, the Bureau of Mines, in cooperation with the U.S. Geological Survey (USGS), conducted a mineral investigation of 27,210 acres designated preliminarily suitable for wilderness by the U.S. Bureau of Land Management (BLM) within the Mount Nutt Wilderness Study Area (WSA), Mohave County, Arizona. The WSA comprises 29,200 acres of public land administered by the BLM, Phoenix District Office. "Study area" as used in this report, refers to the smaller acreage. The Bureau surveys and studies mines, prospects, and mineral occurrences to appraise reserves and identified subeconomic 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's study, which was completed prior to the 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 these studies.

Location and access

The study area is in the Black Mountains 15 mi west-southwest of Kingman, Arizona, between State Highway 68 and old U.S. Highway 66 (fig. 1). Maintained and unimproved roads connecting with these highways provide access to the study area boundary, and foot trails provide interior access. Oatman, the nearest community, is about 1 1/2 mi south of the southern boundary.

Previous studies

Studies by Schrader (1909), Ransome (1923), and Lausen (1931) of mineral deposits and mining districts in the Black Mountains included the study area locality. A technical report, prepared by the Great Basin GEM Joint Venture (1983) under contract to the BLM, qualitatively assessed the favorability of the study area for the occurrence of leasable, locatable, and salable mineral commodities.

Method of investigation

The Bureau's investigation included a review of literature, unpublished Bureau and BLM files, mining claim, and land status records; contact with mineral interest holders; a field examination of the study area and vicinity; and an evaluation of sample analyses. Two Bureau geologists spent nine days in the study area and collected 92 chip, grab, and select samples and 1 panned concentrate sample. The samples were analyzed by Chemex Labs, Inc., Sparks, Nevada. Gold was determined by fire assay and neutron activation. Silver, arsenic, antimony, bismuth, cadmium, gallium, tellurium, copper, lead, zinc, and molybdenum were determined by inductively coupled plasma/atomic emission spectrometry.

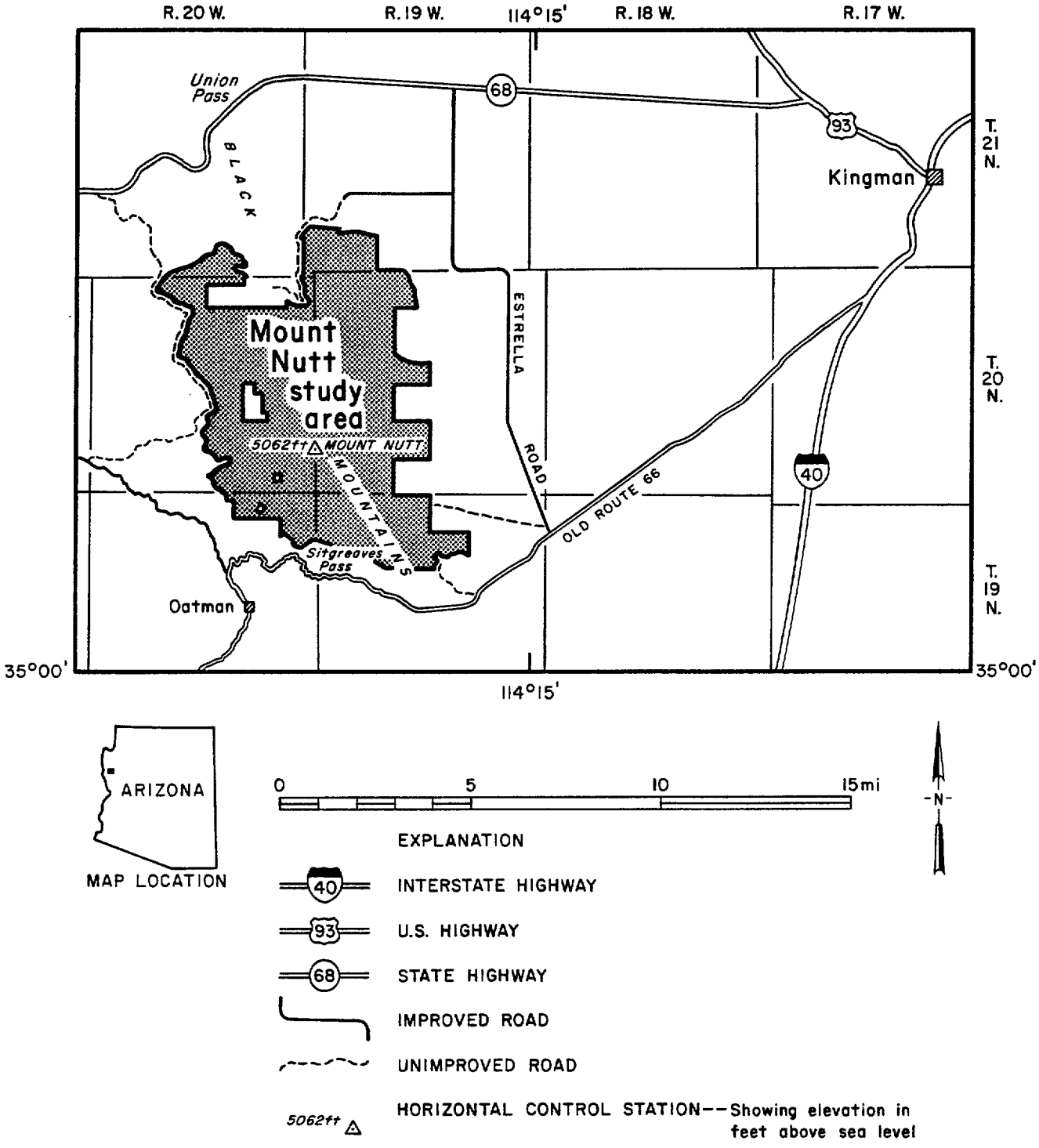

Figure 1.--Index map of the Mount Nutt study area, Mohave County, Arizona.

Geographic and geologic setting

The study area is located in the Black Mountains, a narrow, rugged, northwest-trending, east-tilted fault-block range in the Mohave Block of the Basin and Range physiographic province. Two peaks in the study area, Nutt Mountain (5,216 ft) and Mount Nutt (5,062 ft), are the highest points in the range. These peaks are surrounded by benches and precipitous cliffs, crags, small mesas, rough slopes, and steep-walled canyons, which merge with gentler slopes and rounded hills at lower elevations in the study area. The lowest elevation is approximately 2,260 ft at a point on the northwest border.

Basement rocks in the study area are an assemblage of Precambrian-age granite gneiss and schist. These rocks are unconformably overlain by a thick sequence of Tertiary-age rhyolitic to andesitic flows, tuffs, breccias, and volcaniclastic sediments. Intrusive rocks include a quartz monzonite porphyry and rhyolite dikes cutting both the Precambrian and older Tertiary assemblages. A remnant of a late-Tertiary olivine basalt flow caps rocks along the southern boundary. (See Ransome, 1923; and Lausen, 1931.)

Northwest-trending Tertiary faults are the dominant structural features in the part of the Black Mountains where the study area is located. Along the southwest boundary, faulting is related to a circular caldera system 5 mi in diameter that extends into the study area (Clifton and others, 1980). At the north end, two major detachment fault structures, the Union Pass and the Frisco Mine faults, are traceable into the study area and converge about 1 mi inside the boundary (F. L. Hillemeyer, Fischer-Watt Gold Co. Inc., Kingman, AZ, written commun., 1988). In both areas, gold-bearing veins are associated with these structures.

Mining history

The Oatman mining district, Arizona's third largest gold producer, extends into the southwest part of the study area. In the early 1860's, a gold-bearing ore shoot was discovered in a prominent quartz vein outcrop 2 1/2 mi west of the study area at the Moss Mine (pl. 1). Shortly after this discovery, other gold-bearing veins were located nearby to the east and southeast, but nearly 30 years passed before the major gold mines of the Oatman district were opened. In the early 1900's, development work was started at the Tom Reed, United Eastern, and Gold Road Mines, which were by far the most productive in the district. Ore production peaked in 1920 and then sharply declined in 1924 as gold ore grades decreased. Mining activity stagnated in the late 1920's, was revived in 1933 when the gold price increased to $35 per oz, and ceased in 1942. (See Ransome, 1923; Lausen, 1931; and Durning and Buchanan, 1984.) Recorded production, from 1870 to 1980, is 1,966,000 oz of gold, 1,147,000 oz of silver, and 60,000 lbs of copper from 4,073,000 st of ore (Keith and others, 1983, p. 38-39). All of the past-producing mines in the Oatman district are outside of the study area.

Another concentration of gold-bearing veins occurs in the Union Pass mining district, which extends into the northern part of the study area at Secret Pass. Discoveries in the district followed the Moss Mine discovery at Oatman by about ten years, and mining activity coincided with the main period of activity at Oatman, but on a smaller scale. Recorded production for the district, from 1868 to 1943, is 128,000 oz of gold and 313,000 oz of silver from 704,000 st of ore (Keith and others, 1983, p. 52-53). The major past-producing mines in the district all are north and west of the study area, but there are numerous prospect pits, adits, and shallow shafts near the northern boundary.

An unknown tonnage of gold ore, reportedly containing from 0.43-0.57 oz/st, was produced from the Tin Cup Mine, which is less than 1/2 mi from the northern boundary (pl. 1)(Westervelt, 1987). Recent exploration work (1984-1988) by Santa Fe Pacific Mining, Inc. and Fischer-Watt Gold Company, Inc., that included drilling in the Secret Pass area, resulted in the identification of gold deposits at two localities: approximately 460,000 st of ore with a grade of 0.110 oz gold/st at the Tin Cup Mine site and approximately 108,000 st of ore with a grade of 0.053 oz gold/st at the FM site (pl. 1), a total resource of about 56,000 oz gold (F.L. Hillemeyer, Fischer-Watt Gold Company, Inc., Kingman, AZ, oral commun., 1988). A recent mineral property evaluation of the Secret Pass area (Westervelt, 1987) concludes that exploration targets for additional gold deposits exist along both the Frisco Mine and Union Pass faults (pl. 1). As of early 1988, Fischer-Watt Gold Company was continuing their exploration efforts in the Secret Pass area.

Large blocks of unpatented mining claims, located on gold-bearing vein deposits in the Oatman and Union Pass mining districts, extend from the north, west, and south into the study area. Mining claims have also been located on a gem stone occurrence northeast of Mount Nutt, where fire agate was being mined at the time of the Bureau's investigation.

Oil and gas

Ryder (1983, p. C19) rated the study area as having zero to low potential for the occurrence of petroleum, based on the prevalence of Precambrian crystalline rocks and Tertiary volcanic rocks. Parts of the study area under lease for oil and gas at the time of the Bureau's investigation are shown on plate 1.

APPRAISAL OF SITES EXAMINED

Host rocks, structures, and some of the types of alteration associated with gold deposits in the Oatman mining district are present in the southern and western parts of the study area. These features inspired prospecting activity inside the boundary, but have not led to the discovery of any ore deposits. Element concentrations that would indicate the presence of metallic mineral resources were not detected in Bureau samples from prospect workings and altered outcrops inside the study area (table 1 and appendix), but these findings are not conclusive. In the Oatman mining district, most of the past productive ore shoots show no outcropping ore or vein material; their only surface expression is subtly altered volcanic rocks that give no distinct geochemical anomaly (Durning and Buchanan, 1984).

Deposits that were mined on the Mossback, Gold Ore, and Gold Trail Mine veins (pl. 1) are not traceable at the surface into the study area. The northwest-trending Mossback vein dips about 80° to the southwest, and appears to be fault-terminated at a point near the boundary (pl. 1, sample no. 69). The Gold Ore and Gold Trail Mine veins trend toward the study area, but their trace is obscured by volcanic cover.

Gold deposits identified by Fischer-Watt Gold Company, Inc. at the FM and Tin Cup Mine sites are approximately 1/2 mi and 1 mi, respectively, along strike from where the Frisco Mine fault enters the study area. The Union Pass fault is mineralized as well (table 1, sample nos. 24-26), but no deposits have been delineated along it near Secret Pass. These structures have been traced for more than 1 mi into the north end of the study area (pl. 1). Although gold was detected in all samples collected from workings in the Secret Pass area, with concentrations as high as 0.880 and 0.354 oz/st

(table 1, sample nos. 23 and 11), no gold-bearing deposits were identified inside the study area.

Two gem stone mining operations were active at the time of the Bureau's investigation on contiguous mining claims less than 1 mi northeast of Mount Nutt, roughly in the center of the study area (pl. 1, sample localities 27-28). Claimants are removing fire agate from small open cuts primarily by hand, although a gas-powered portable drill was in use at one of the sites for drilling blast holes, and back-packing the agate out to vehicle-access points. Hand-sorted "mine run" specimens reportedly sell for $30-$100 per lb and large, high quality individual specimens can sell for $1000 or more when cut and polished (Tom Dodge, claimant, oral commun., 1987). No production or sales figures are available; most of the fire agate apparently is sold either in small quantities by weight or piecemeal to individual dealers and at gem and mineral shows. Deposit dimensions cannot be determined from exposures in open cuts, but based on a rough size estimate, current production methods, and site accessibility, this deposit will be a fire agate resource for the foreseeable future.

Inferred subeconomic resources of sand and gravel in the study area have no apparent superior qualities and represent only a small fraction of abundant supplies available from established sources located elsewhere, which makes development unlikely. No other industrial mineral resources were identified.

CONCLUSIONS

No metallic mineral resources were identified in the study area, but it includes part of a major fault structure on which a gold resource of about 56,000 oz has been identified at two sites less than 1/2 mi from the northern boundary. Also in the study area are host rocks, structures, and some of the

types of alteration directly associated with gold-bearing veins in the Oatman mining district, Arizona's third largest gold-producing district. Surface sampling of mines, prospects, and alteration assemblages alone is not an adequate means of evaluating the study area for the occurrence of metallic mineral resources.

The fire agate deposit located near the center of the study area will be a gem stone resource for the foreseeable future, based on a rough size estimate, current production methods, and site accessibility.

No leasable or salable mineral resources were identified in the study area.

RECOMMENDATIONS FOR FURTHER STUDY

Host rocks, structures and alteration patterns in the study area, particularly at the north end and east of the Mossback vein, should be mapped in detail (1 in. = 100 ft) for comparison with surface expressions of known gold-bearing veins in the region. Areas in the study area that compare favorably should be investigated by subsurface methods.

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Table 1.--Data for samples from the Mount Nutt study area, Mohave County, Arizona.

[na, not applicable; <, less than; ppb, part per billion; ppm, part per million; oz/st, troy ounce per short ton. All samples are from Tertiary-age volcanic rocks, predominately rhyolites and andesites, unless otherwise noted.]

Sample no.	Sample type	Sample ft	Au ppb or oz/st	Ag ppm	Remarks
1	grab	na	45	0.1	Dump material, 75-ft-deep timbered shaft; propylitic alteration, silicification.
2	do.	na	342	1.3	Dump material, inclined shaft; propylitic alteration, limonite.
3	chip	2.0	58	.1	Prospect adit, northwest-trending shear zone; limonite, minor calcite.
4	do.	3.5	19	.1	Do.
5	do.	1.8	111	.3	Do.
6	do.	1.0	1,230	.4	Tin Cup Mine open pit on Frisco Mine fault; sericite, propylitic alteration, silicification.
7	do.	7.0	496	.3	Do.
8	do.	3.0	3,520	1.6	Do.
9	do.	1.9	88	.1	Prospect shaft, northwest-trending shear zone; silicification, limonite.
10	grab	na	190	1.0	Prospect shaft in Precambrian granitic rock; limonite.
11	chip	3.9	0.354 oz/st	5.0	Prospect shaft, northwest-trending shear zone in Precambrian granitic rock; sericite, limonite.
12	grab	na	249	.5	Dump material, shaft; silicification, limonite.
13	grab	na	70	.1	Dump material, 54-ft-deep shaft, Union Pass fault; limonite.
14	chip	1.0	110	1.0	55-ft-long adit, Precambrian quartz monzonite-Tertiary rhyolite(?) dike contact; silicification, limonite.

Table 1.--Data for samples from the Mount Nutt study area, Mohave County, Arizona--Continued

Sample no.	Sample type	Sample ft	Au ppb or oz/st	Ag ppm	Remarks
15	chip	3.2	52	0.3	55-ft-long adit, Precambrian quartz monzonite-Tertiary rhyolite(?) dike contact; silicification, limonite.
16	do.	1.0	37	3.6	Do.
17	do.	1.0	87	2.8	Do.
18	do.	2.9	12	.1	Prospect adit, northwest-trending shear zone; propylitic alteration.
19	do.	3.0	28	.1	Do.
20	do.	2.0	2,730	1.8	Do.
21	grab	na	528	.5	Dump material, rubble-filled shaft, northwest-trending shear zone; propylitic alteration.
22	do.	na	1,395	.1	Dump material, 45-ft-deep shaft, northwest-trending shear zone; propylitic alteration.
23	do.	na	0.880 oz/st	6.8	Dump material, prospect pit, northwest-trending shear zone; propylitic alteration.
24	chip	1.5	1,125	.1	Prospect pit, Union Pass fault, silicification, limonite.
25	do.	3.3	828	2.4	Do.
26	grab	na	4,200	1.0	Dump material, 75-ft-deep shaft, Union Pass fault; propylitic alteration, sericite.
27	select	na	4	.1	Open-pit gem stone mining operation; claimants report gold concentrations in their samples.
28	select	na	3	.1	Do.
29	chip	4.6	26	.1	Prospect pit; no obvious alteration.
30	do.	4.2	7	.1	Prospect pit, northwest-trending shear zone; weak propylitic alteration.

Table 1.--Data for samples from the Mount Nutt study area, Mohave County, Arizona--Continued

Sample no.	Sample type	Sample ft	Au ppb or oz/st	Ag ppm	Remarks
31	chip	1.1	1	10.2	Prospect pit, Gold Trail Mine vein; silicified breccia, limonite.
32	do.	2.1	0.642 oz/st	15.3	Gold Trail Mine vein outcrop at shaft; silicified breccia, minor specular hematite, limonite.
33	do.	2.6	24	.1	Prospect adit; bleached zone, minor pyrite.
34	do.	3.2	11	.1	Do.
35	do.	3.0	0.372 oz/st	39.0	Inclined shaft, Gold Ore vein; quartz and calcite, minor sulfides in altered material on dump.
36	select	na	7,930	10.1	Dump material, shaft on Gold Ore vein; quartz and calcite fragments, minor sulfides (pyrite?).
37	grab	na	5	.1	Dump material, prospect pit; propylitic alteration.
38	chip	3.5	2,700	7.8	Gold Road vein outcrop at large open stope; white quartz.
39	do.	1.5	18	.1	Prospect pit; silicified breccia.
40	grab	na	3	.1	Dump material, 25-ft-deep shaft near vein outcrop; white quartz, limonite.
41	do.	na	3	.1	Dump material, shaft; quartz and gypsum fragments.
42	do.	na	1	.1	Do.
43	chip	4.0	3	.1	Vein outcrop; silicification, limonite.
44	do.	3.8	10	.1	Rubble-filled shaft, outcrop; propylitic alteration.
45	grab	na	<1	.1	Dump material, 27-ft-deep shaft; propylitic alteration, limonite.
46	chip	2.7	2	.1	Prospect adit; silicified breccia, limonite.

Table 1.--Data for samples from the Mount Nutt study area, Mohave County, Arizona--Continued

Sample no.	Sample type	Sample ft	Au ppb or oz/st	Ag ppm	Remarks
47	chip	5.0	<1	0.1	Prospect pit; silicification, propylitic alteration, limonite.
48	select	na	3	.1	Dump material; quartz fragments, minor pyrite.
49	do.	na	28	.1	Dump material, prospect pit; quartz fragments, minor pyrite, limonite.
50	chip	4.2	1	.1	Outcrop, northwest-trending fault; silicified breccia.
51	do.	2.3	<1	.1	Prospect adit; propylitic alteration, limonite.
52	grab	na	<1	.1	Dump material, prospect pit; propylitic alteration, limonite.
53	chip	2.7	3	.1	Prospect pit; illite alteration, limonite, quartz fragments in float.
54	do.	3.2	1	.1	Prospect pit; illite alteration, limonite.
55	grab	na	156	2.2	Dump material, shaft greater than 100 ft deep; monzonite, rhyolite dike contact (?), minor quartz, limonite.
56	do.	na	23	1.3	Dump material, 80-ft-deep shaft; white quartz, calcite, limonite.
57	select	na	517	7.9	Do.
58	chip	2.2	84	2.3	Adit, Mossback Mine group of workings; breccia in northwest-trending fault; quartz, calcite.
59	grab	na	26	.5	Dump material, prospect pit; quartz fragments.
60	chip	4.0	209	.1	Prospect pit on Mossback vein; quartz stringers, illite alteration.

Table 1.--Data for samples from the Mount Nutt study area, Mohave County, Arizona--Continued

Sample no.	Sample type	Sample ft	Au ppb or oz/st	Ag ppm	Remarks
61	select	na	379	4.6	Dump material, Mossback Mine; white quartz, calcite, minor pyrite.
62	grab	na	893	1.9	Do.
63	do.	na	74	1.8	Do.
64	do.	na	540	1.0	Mill tailings, Mossback Mine.
65	chip	3.0	<1	.1	Prospect adit; minor quartz, gypsum, illite alteration.
66	do.	5.0	32	.1	Silicified outcrop; limonite.
67	grab	na	61	.8	Dump material, prospect pit, Mossback vein; quartz, calcite, gypsum, limonite.
68	chip	3.2	201	1.0	Prospect adit; calcite stringers.
69	grab	na	273	1.5	Dump material, prospect pit; east-trending fault; quartz, calcite, limonite.
70	do.	na	61	.8	Do.
71	do.	na	2	.1	Dump material, 30-ft-deep shaft; quartz, calcite, illite (?) alteration.
72	chip	2.2	4	.1	Prospect pit; quartz, calcite; illite (?) alteration.
73	do.	1.0	2	.1	Prospect pit; quartz stringers.
74	select	na	2	.1	Prospect pit; 3-in.-thick quartz vein.
75	grab	na	2	.1	Dump material, prospect pit; calcite fragments.
76	chip	1.3	<1	.1	Prospect adit; calcite stringers.
77	do.	1.3	1	.1	Prospect pit; calcite, gypsum in breccia.
78	do.	2.8	<1	.1	Prospect pit; limonite.
79	do.	1.7	<1	.1	Prospect adit; calcite, gypsum stringers; illite (?) alteration.

Table 1.--Data for samples from the Mount Nutt study area, Mohave County, Arizona--Continued

Sample no.	Sample type	ft	Au ppb or oz/st	Ag ppm	Remarks
80	grab	na	<1	0.1	Dump material, prospect pit; gypsum fragments; illite (?) alteration.
81	do.	na	2	.1	Dump material, 25-ft-deep prospect shaft; quartz, calcite, gypsum fragments; illite (?) alteration.
82	panned concen-trate	na	<1	.1	Grapevine Canyon stream sediment.
83	chip	1.7	2	.1	Prospect pit; illite alteration.
84	do.	2.0	58	.1	Prospect pit; limonite.
85	do.	4.2	1	.1	Prospect pit; calcite stringers, limonite.
86	grab	na	<1	.1	Dump material, flooded shaft; calcite fragments, limonite; propylitic (?) alteration.
87	chip	2.0	2	.1	Prospect pit; quartz stringers, minor pyrite; propylitic alteration.
88	do.	.5	<1	.1	Prospect pit; 6-in.-thick quartz vein.
89	grab	na	<1	.1	Dump material, prospect pit; propylitic alteration.
90	do.	na	<1	.1	Float; quartz fragments; propylitic alteration.
91	chip	3.7	2	.1	Prospect adit; calcite.
92	do.	2.2	38	.1	Do.
93	do.	3.3	3,510	3.0	Prospect shaft; calcite in breccia.

Appendix--Selected element concentrations in samples from the Mount Nutt study area, Mohave County, Arizona.

Sample no.	Analytical data									
	As	Bi	Cd	Cu	Ga	Mo	Pb	Sb	Tl	Zn
	part per million									
1	17	0.1	0.1	2	14	1	16	1.3	0.6	34
2	12	.2	.1	4	17	33	50	1.5	1.4	77
3	14	.2	.1	30	16	2	49	.9	3.8	80
4	3	.1	.1	3	13	1	21	1.2	.2	42
5	2	.1	.1	5	13	1	41	.9	.1	52
6	6	.1	.1	14	15	19	19	1.2	1.0	61
7	5	.2	.1	4	16	27	27	1.6	.2	54
8	12	.1	.1	16	25	33	33	1.2	.2	91
9	11	.1	.1	4	12	4	4	.4	.3	53
10	46	.2	.1	12	16	9	9	1.4	.6	86
11	110	.1	.1	14	15	14	14	.9	.8	85
12	7	.1	.1	26	16	23	12	.7	.4	105
13	6	.1	.1	8	12	1	33	2.0	1.4	47
14	320	.9	.1	27	9	6	45	.2	1.2	44
15	12	.1	.3	11	16	1	27	1.4	.4	161
16	120	4.7	.1	55	12	6	214	.4	3.2	42
17	100	1.4	2.2	32	12	15	145	.7	.4	730
18	3	.4	.1	2	23	1	43	1.2	.4	37
19	3	.1	.1	1	14	1	24	1.6	.1	31
20	9	.1	.1	3	19	5	34	1.8	.4	59
21	14	.1	.1	13	19	48	25	1.5	.6	59
22	4	.1	.1	7	14	2	24	1.2	.4	44
23	15	.1	.1	17	12	25	29	1.3	.6	52
24	22	.1	.1	15	17	10	10	.6	.2	64
25	46	.2	.1	12	16	9	9	1.4	.6	86
26	19	.1	.1	6	15	41	41	2.1	1.4	49
27	5	.1	.2	30	1	11	11	14.0	1.0	28
28	9	.2	.2	25	7	6	9	11.0	1.2	30
29	1	.1	.1	11	12	1	3	.5	.2	33
30	2	.1	.1	8	13	1	8	.4	.2	33
31	6	.1	.1	14	9	1	20	1.2	1.8	23
32	3	.2	.1	19	11	1	14	1.1	2.0	42
33	12	.1	.1	2	12	1	14	1.2	2.4	43
34	7	.1	.1	2	14	1	12	.3	6.2	22
35	250	.1	.1	60	7	16	15	11.1	6.8	34
36	29	.1	.1	20	5	3	11	.5	2.4	23
37	3	.1	.1	7	14	1	6	.2	.2	45
38	2	.1	.1	6	4	1	4	.4	1.0	6
39	2	.1	.1	2	15	1	11	.6	.3	16
40	14	.1	.1	21	12	1	18	.4	.4	59
41	9	.1	.1	20	13	2	15	.3	.2	57
42	6	.1	.1	22	13	2	16	.3	.3	80
43	15	.1	.1	4	13	1	3	.1	.1	24

Appendix--Selected element concentrations in samples from the Mount Nutt study area, Mohave County, Arizona--Continued

Sample no.	Analytical data									
	As	Bi	Cd	Cu	Ga	Mo	Pb	Sb	Tl	Zn
	part per million									
44	35	0.1	0.1	36	25	1	6	0.2	0.1	31
45	2	.1	.1	17	12	4	4	.1	.2	64
46	6	.1	.1	13	15	3	3	.1	.6	30
47	29	.5	.1	13	13	7	7	.4	.6	15
48	10	.4	.1	7	4	2	2	.4	1.1	10
49	20	.1	.1	8	11	5	5	7.6	2.3	21
50	5	.1	.1	10	11	5	5	.1	.2	30
51	30	.1	.1	7	14	14	14	.1	.2	14
52	6	.1	.1	13	15	20	20	.2	1.1	7
53	7	.2	.1	9	23	7	7	.4	.1	55
54	9	.1	.1	12	13	1	11	.2	.6	4
55	23	2.7	.1	14	11	7	30	1.2	2.3	56
56	6	2.1	.1	16	12	6	38	.2	1.7	143
57	6	1.7	.1	14	1	1	11	.5	.6	11
58	15	1.7	.9	21	11	4	24	.2	1.9	179
59	17	1.1	.1	11	12	1	14	.8	1.1	65
60	4	.1	.1	17	7	1	5	.2	.7	31
61	14	.9	.1	28	2	8	25	1.6	.8	27
62	12	.5	.8	20	7	7	15	1.0	.7	369
63	20	.6	.1	16	12	5	21	1.6	.7	65
64	6	.2	.1	22	2	5	11	.4	.4	41
65	1	.1	.1	12	10	1	4	.1	.2	13
66	2	.1	.1	4	2	6	4	.1	.1	8
67	27	.5	.1	12	13	10	16	1.2	.9	48
68	4	.1	.1	11	3	1	8	.1	.4	50
69	14	.3	.1	32	13	4	10	.8	.8	96
70	12	.2	.1	28	11	1	6	.2	.8	73
71	4	.1	.1	14	9	1	26	.1	.2	29
72	2	.1	.1	22	3	2	2	.1	.1	36
73	6	.2	.2	24	12	1	12	.2	.9	26
74	24	.1	.1	12	1	5	3	.2	.2	27
75	5	.1	.2	6	2	1	3	.1	.1	17
76	11	.1	.1	22	14	1	20	.3	.9	54
77	3	2.1	10.3	36	1	9	13	.1	.6	144
78	3	2.8	.1	13	13	2	13	.1	3.7	29
79	32	.2	.1	11	17	1	14	1.6	.5	25
80	4	.1	.1	40	8	1	10	.1	.3	52
81	6	.1	.1	30	12	1	11	.2	.2	77
82	1	.3	.1	31	15	33	33	.3	.1	510
83	5	.2	.1	20	12	1	8	.8	.2	70
84	4	.1	.1	10	12	1	3	.1	.3	25
85	70	.1	.1	34	16	10	1	.1	.1	24
86	3	.1	.1	32	17	2	5	.2	.1	14

Appendix--Selected element concentrations in samples from the Mount Nutt study area, Mohave County, Arizona--Continued

Sample no.	Analytical data									
	As	Bi	Cd	Cu	Ga	Mo	Pb	Sb	Tl	Zn
	part per million									
87	2	0.1	0.1	12	16	1	7	0.1	0.1	16
88	3	.1	.1	14	6	1	4	.1	.1	9
89	2	.1	.1	11	9	1	9	.2	.1	25
90	2	.1	.1	3	1	1	4	.1	.1	8
91	4	.1	.1	6	1	5	4	.1	.1	17
92	3	.1	.1	10	2	5	3	.2	.6	28
93	9	.2	.1	9	2	3	10	.2	1.0	34

DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

OPEN FILE REPORT
MLA 35-88
PLATE 1

EXPLANATION

- APPROXIMATE BOUNDARY OF THE MOUNT NUTT STUDY AREA
- UNPATENTED MINING CLAIMS--Shown only within the study area
- OIL AND GAS LEASES--Shown only within the study area; information from the Bureau of Land Management; current as of 1987
- FAULT--Showing strike and dip; dashed where approximate; dotted where concealed; bar and ball on downthrown side
- FISSURE VEIN--Showing strike and dip; dashed where approximate
- LOCALITY OF SAMPLED OUTCROP--Showing sample number
- LOCALITY OF PANNED-CONCENTRATE SAMPLE--Showing sample number
- SURFACE OPENINGS--Showing sample number(s)
  - Prospect
  - Adit
  - Inaccessible adit
  - Shaft
  - Open pit

Base from the U.S. Geological Survey, 1:24,000
Mount Nutt, 1967; Oatman, 1967; Secret Pass, 1967; and Union Pass, 1967.

Structure adapted from Ransome, 1923; and F.L. Hillemeyer, Fischer-Watt Gold Co., Inc., written communication, 1988.

SCALE 1:24,000

CONTOUR INTERVAL 40ft

Field work completed in 1987 by Carl L. Almquist; assisted by Terry J. Kreidler.

MINE AND PROSPECT MAP OF THE MOUNT NUTT STUDY AREA, MOHAVE COUNTY, ARIZONA

BY

CARL L. ALMQUIST, U.S. BUREAU OF MINES

1988