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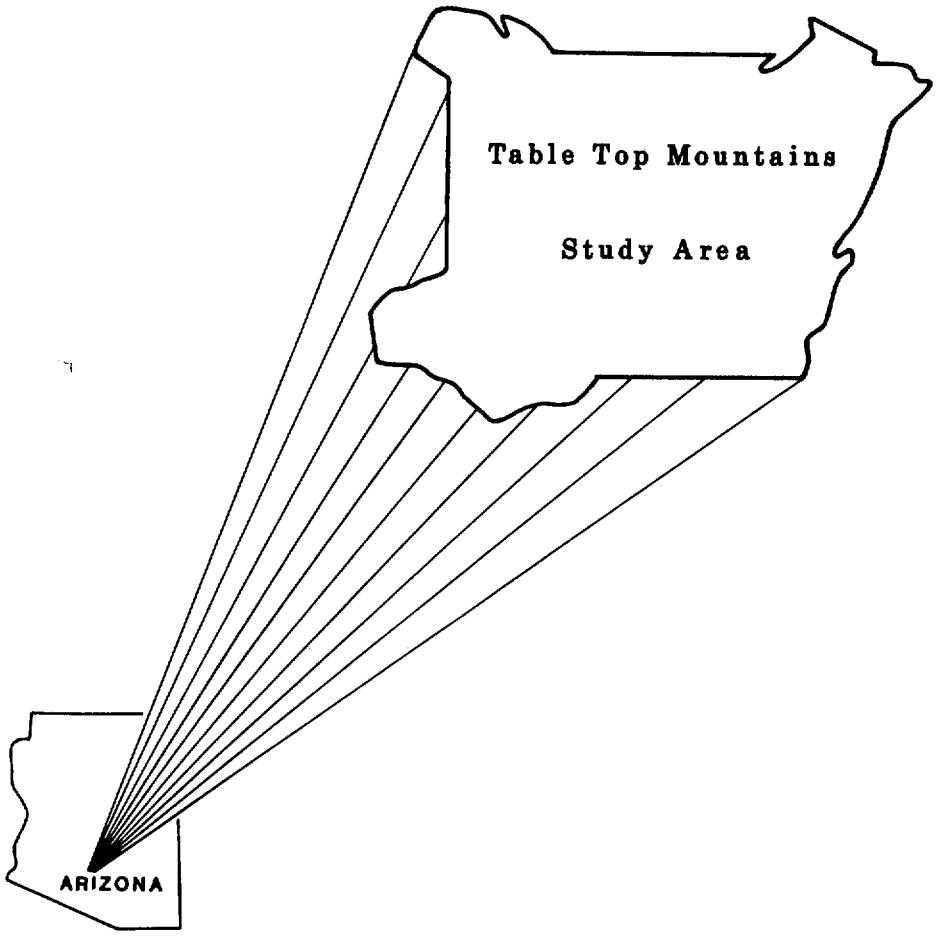
Mineral Land Assessment
Open File Report/1986

Mineral Investigation of a Part of the Table Top Mountains Wilderness Study Area (AZ-020-172), Pinal and Maricopa Counties, Arizona



BUREAU OF MINES
UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL INVESTIGATION OF A PART OF THE TABLE TOP MOUNTAINS WILDERNESS STUDY AREA (AZ-020-172), PINAL AND MARICOPA COUNTIES, ARIZONA

by

John R. McDonnell, Jr.

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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 a part of the Table Top Mountains Wilderness Study Area (AZ-020-172), Pinal and Maricopa Counties, 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

^{o}C	degree Celsius	ppb	part per billion
ft	foot	ppm	part per million
mi	mile	%	percent
oz/st	troy ounce per short ton (2000 pounds)		

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SUMMARY

In March and April 1985, the Bureau of Mines conducted a mineral investigation of a part of the Table Top Mountains Wilderness Study Area in southwestern Pinal and southeastern Maricopa Counties, Arizona, as required by Public Law 94-579. The wilderness study area comprises 37,968 acres, of which the Bureau studied 34,400 acres designated preliminarily suitable for inclusion in the National Wilderness Preservation System by the Bureau of Land Management. The investigation included a review of literature concerning mineral resources and mining activity, and a field examination of mines, prospects, and mineral occurrences inside and within 2 mi of the study area.

Unpatented placer and lode mining claims cover land within and along the western and northern boundaries of the study area, but no active mining operations were found in the area. In 1985, American Rockwool, Inc. was mining a basalt about 1/2 mi north of the study area for use in their insulation manufacturing process. Basalt caps the higher peaks of the study area and could have the same properties as the mined basalt, but detailed sampling and testing would be necessary to determine this.

Prospecting has exposed occurrences of gold, silver, and copper in veins associated with fractures and faults in Precambrian schist and granite within the study area. Poor exposures limited the examination of the veins and a detailed survey, followed by exploratory drilling would be necessary to determine their economic significance.

Sand and gravel occur in drainages and valleys throughout the region. Economic constraints limit usage to local demand and a sufficient supply of material is present outside the study area to satisfy this demand.

No geothermal, oil, or gas resources are known inside the study area and the area is not considered favorable for their discovery and development.

INTRODUCTION

In March and April 1985, the Bureau of Mines, in cooperation with the U.S. Geological Survey (USGS), conducted a mineral investigation of a part of the Table Top Mountains Wilderness Study Area (WSA), in southwestern Pinal and southeastern Maricopa Counties, Arizona, on lands administered by the Bureau of Land Management (BLM) Phoenix District Office. The WSA comprises 37,968 acres; the Bureau of Mines study focused on 34,400 acres designated preliminarily suitable for inclusion in the National Wilderness Preservation System by the BLM. "Study area" (SA) as used in this report refers only to the smaller acreage studied by the Bureau. 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 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 studies.

Methods of investigation

This investigation included a review of literature related to the mineral resources and mining activity in the Table Top Mountains SA and vicinity. Mining claim information and land status plats were obtained from the BLM

State Office in Phoenix, Arizona. Minerals information and production data were compiled from Bureau of Mines files and other sources.

Two Bureau geologists conducted a six-day field examination of mines, prospects, and known mineral occurrences inside and within 2 mi of the SA boundary. The examination included reconnaissance by fixed-wing aircraft, four-wheel-drive vehicle, and foot traverses. Reported mining claim locations were examined and prospects within the study area were surveyed by tape and compass, mapped, and sampled.

Fifteen samples, including chip, select, and grab samples, were collected from workings and mineralized areas. Samples were analyzed by the Bureau of Mines Research Center, Reno, Nevada, for gold and silver by fire assay combined with inductively coupled plasma-atomic emission spectrometry, and for copper, lead, and zinc by atomic absorption spectrophotometry. One grab sample was also submitted for special whole rock mineralogical and chemical analysis. A 40-element analysis by semiquantitative optical emission spectrography was performed on all samples to disclose any unsuspected element concentrations. Sample data are summarized in this report; complete data for samples are available for public inspection at the Bureau of Mines, Intermountain Field Operations Center, Building 20, Denver Federal Center, Denver, Colorado 80225.

Geographic and geologic setting

The Table Top Mountains SA, which includes the rugged Table Top Mountains and flanking bajadas, is 47 mi east of Gila Bend and 23 mi west of Casa Grande (fig. 1). The area is bounded by the Papago Indian Reservation on the south-southeast and by unimproved roads, the county line, and surveyed lines on other sides. Elevations range from about 1,620 ft in the northeastern

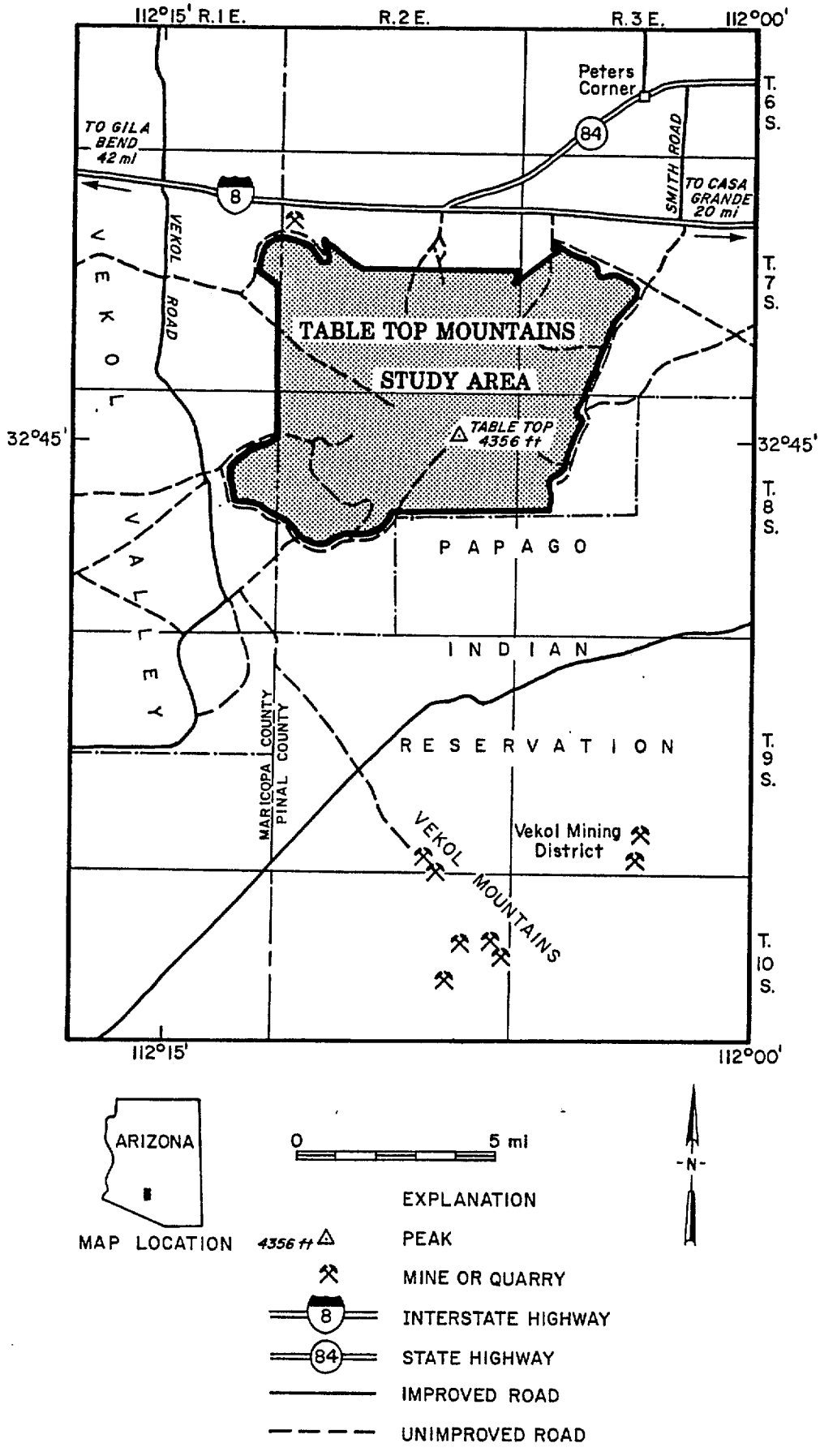


Figure 1.--Index map of the Table Top Mountains study area, Pinal and Maricopa Counties, Arizona.

corner to 4,356 ft on Table Top. Access is by Vekol Road from Interstate Highway 8 and by Smith Road from State Highway 84 near Peters Corner (fig. 1); four-wheel-drive roads and foot trails provide access within the study area.

The region is in the Basin and Range physiographic province. Rocks within the study area have been mapped as Precambrian schist and granite, Tertiary basalt flows, and sediments (Wilson and Moore, 1959; Krason and others, 1982).

MINING HISTORY

The Table Top Mountains SA is not within an organized mining district and no mineral production has been recorded from within it. The study area is 10-15 mi north of the Vekol mining district (fig. 1), which has recorded production of gold, silver, copper, lead, and zinc. Mineral deposits in the district occurred along faults as replacements in Paleozoic limestone, dolomite, and shale (Denton and Haury, 1946, p. 5-6; Arizona Department of Mineral Resources file data). These host rocks and mineralized faults are not known to extend into the study area.

Unpatented placer and lode claims are within and along the western and northern part of the SA (fig. 2); the placer claims cover most of the Vekol Valley to the west. No active mining operations were noted within the SA during the Bureau's field investigation, but past mining activity was examined on the IC claims and in the southeastern part of the area (fig. 2).

American Rockwool, Inc., Casa Grande, Arizona, was mining a basalt about 1/2 mi north of the SA (fig. 2) for use in their insulation manufacturing process. The rock was crushed and mixed with steel slag and coke in a furnace, melted at about 2,000^{o}C, and then blown and spun into fibers. The loose fibers were used as blowing wool insulation or combined with resin to

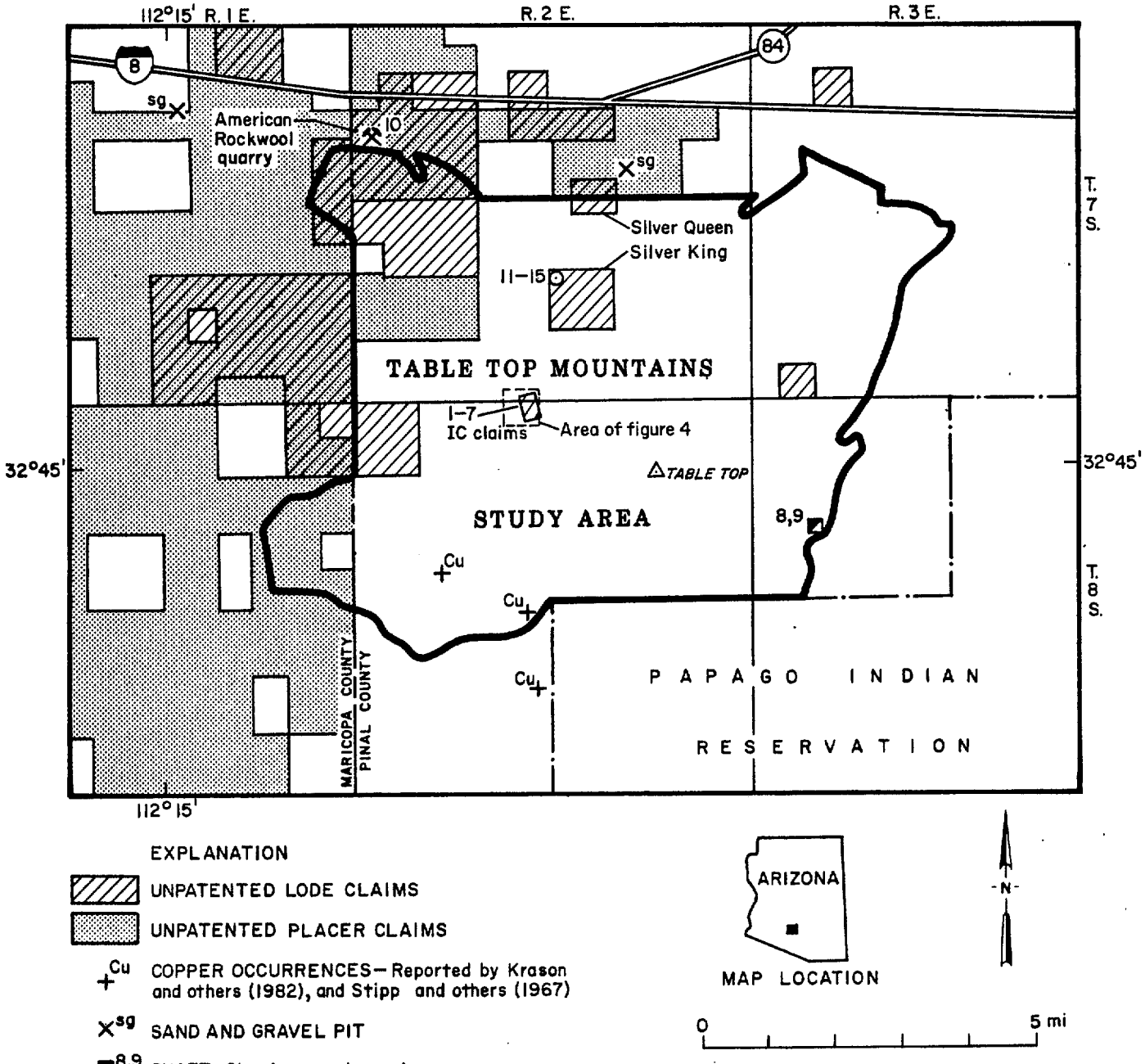


Figure 2.--Mining activity, including mineral occurrences and sample localities, in and near the Table Top Mountains study area, Pinal and Maricopa Counties, Arizona (claim information from Bureau of Land Management files as of November 1985).

form insulating batts. Robert Corsentino (Plant Superintendent, American Rockwool, Inc., 1985, oral commun.) said that the company had about a 10-year reserve of the basalt at its quarry. He also indicated that the company empirically tested the rock used in their manufacturing process and a detailed investigation of basalts in the surrounding area had not been made. As of March 10, 1986, the plant had stopped production and the company had no future start-up plans.

Two sand and gravel pits are near the SA, one 1/2 mi north and the other 2 1/2 mi northwest (fig. 2), and several smaller borrow pits are scattered near the northern SA boundary along Interstate Highway 8. The material was used primarily in the construction of interchanges and overpasses for the highway; some may also have been used in local building projects.

ENERGY RESOURCES

There have been no reported oil or gas discoveries, but scattered parcels of Federal land are leased for oil and gas in and around the Table Top Mountains (fig. 3). Ryder (1983) evaluated the petroleum potential of wilderness lands in Arizona on the basis of geologic framework and petroleum geology derived from published literature. He included the study area in a zone that was rated at "low to zero" potential and concluded that the only part of the zone where hydrocarbons could accumulate was in the sediment-filled basins, which are generally shallow. The study area primarily consists of igneous, metamorphic, and volcanic rocks, which are not conducive to hydrocarbon accumulation, and any hydrocarbons in nearby sediments would have been subject to migration or destruction by tectonic and magmatic activity.

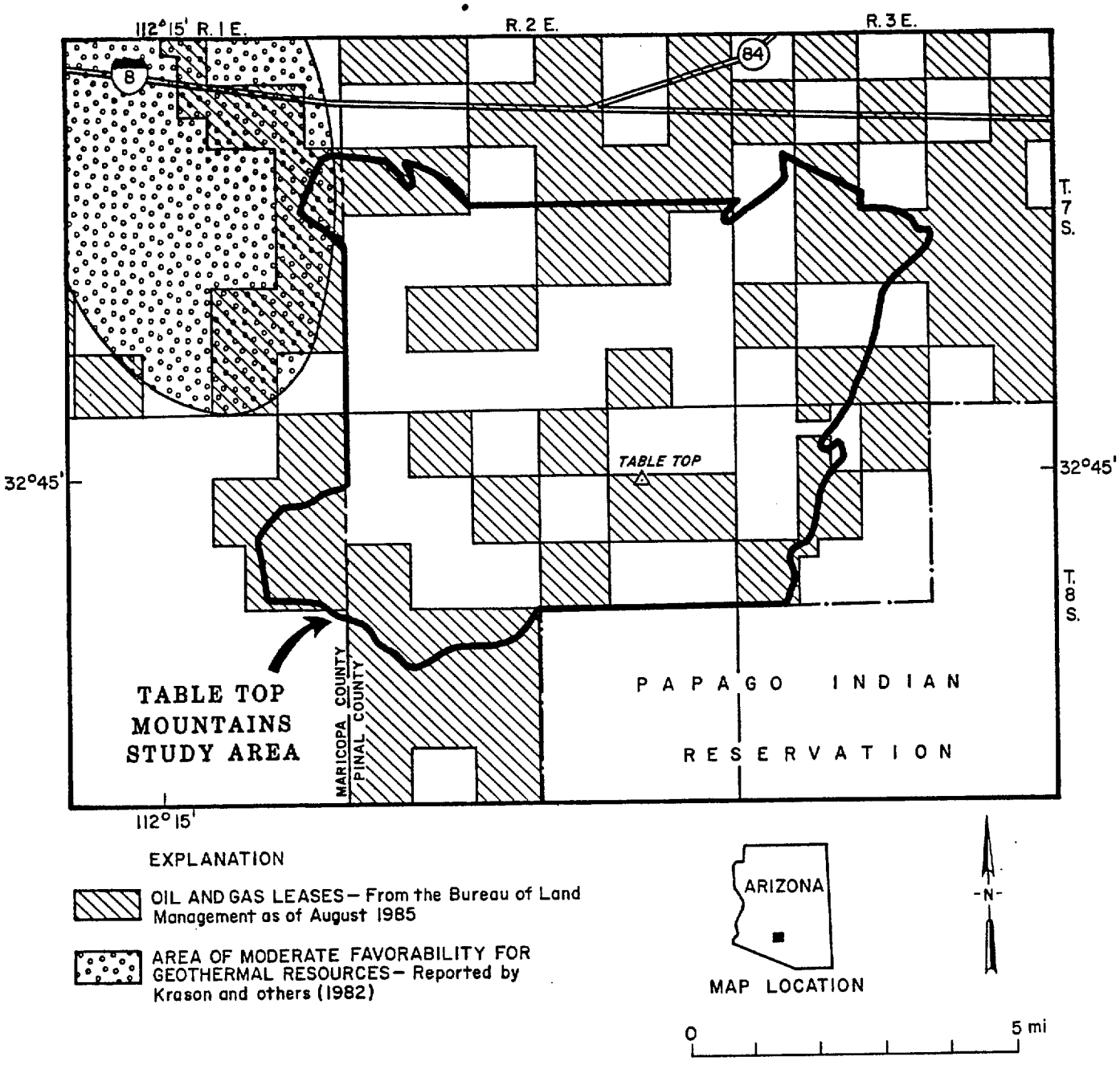


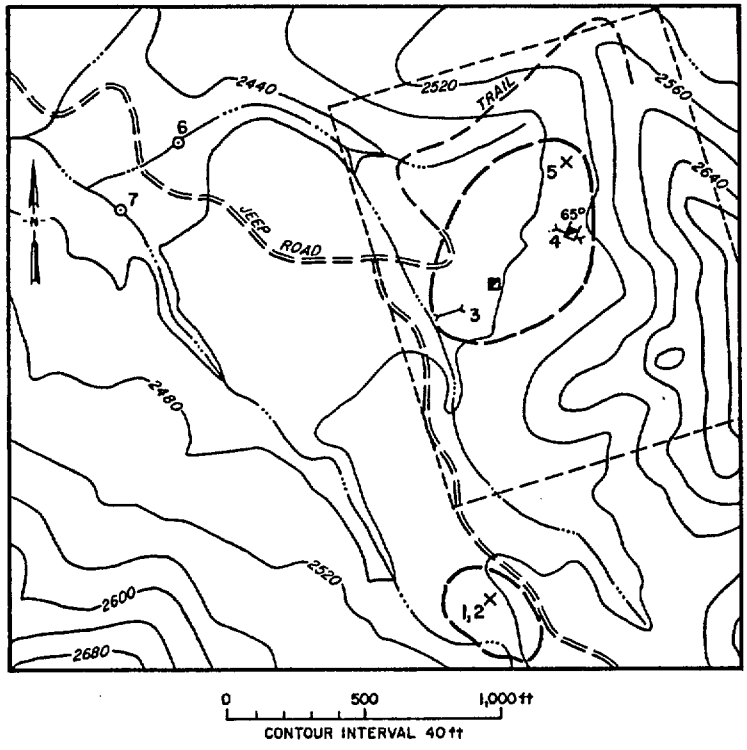
Figure 3.--Oil and gas leases and geothermal favorability in and near the Table Top Mountains study area, Pinal and Maricopa Counties, Arizona.

No geothermal waters or leasing activity are known within the SA. A statewide inventory and evaluation of Arizona's geothermal resources by the Arizona Bureau of Geology and Mineral Technology (1982) showed no thermal springs or wells in or near the study area; the area was not defined as favorable for the discovery and development of geothermal resources. A resource evaluation by Krason and others (1982, p. 88) considered the northwestern corner of the SA to have a moderate favorability for geothermal resources (fig. 3). Their conclusion was based on published information suggesting that warm geothermal waters (greater than 25°C) are present in the basin-fill sediments northwest of the study area.

MINERAL APPRAISAL

Three prospected localities within the Table Top Mountains SA were sampled during the Bureau's field investigation; the IC claim area (fig. 2, 4, samples 1-7), a shaft in the southeast part of the study area (fig. 2; table 1, samples 8, 9), and the Silver King claims (fig. 2; table 1, samples 11-15). Copper occurrences reported by Krason and others (1982, fig. 13) and Stipp and others (1967) were searched for, but not found. A sample of the basalt mined by American Rockwool was also collected (table 1, sample 10).

At the IC claims, quartz veins as thick as 3 ft and fault zones as wide as 6 ft contain visible chrysocolla and are exposed in pits, trenches, and shafts in Precambrian Pinal(?) Schist (fig. 4). Bulldozer cuts disrupt much of the claim surface and the extent of the veins and faults could not be determined; additional mineralized rock may have been either removed or covered. Five samples were taken from workings where the mineralized rock was known to be in place, and two stream sediment samples were taken from drainages below the mineralized area (fig. 4). The sample analyses indicate



EXPLANATION

Surface opening, showing sample number

- Trench
- Shaft
- Inclined shaft, showing inclination
- Pit
- Stream sediment sample, showing sample number
- Approximate area disrupted by bulldozer cuts
- Approximate claim boundary

Sample No.	Type	Length (ft)	Assay data Au	Ag (ppm)	Zn	Cu (%)	Remarks
1	select	xx	1.000	1.983	37	1.00	Pit; siliceous schist, quartz veinlets, chrysocolla and hematite.
2	chip	2.0	6.350	12.53	15.6	.085	Pit, 6x4x5 ft; 2- to 3-ft-wide quartz vein in schist, N. 10° E. strike, vertical dip; chrysocolla along fractures in vein.
3	do.	3.0	---	---	46	.57	Trench, 65x32x12 ft; siliceous pod in schist, chrysocolla coatings.
4	do.	3.0	---	---	42	1.35	Inclined shaft, 65° NE., 20 ft deep; 3- to 6-ft-wide gouge zone in schist, N. 70° W. strike, 65° NE. dip; chrysocolla coatings.
5	do.	2.0	---	---	52	.88	Pit, 6x6x8 ft; fault in schist, N. 68° W. strike, 85° NE. dip; chrysocolla along fractures.
6	stream sediment	xx	---	---	39	na	Bulk sediment from drainage below mineralized area.
7	do.	xx	---	---	31	na	Do.

[na, not analyzed; xx, not applicable; ---, not detected; lower detection limits: gold (Au), 0.01 ppm; silver (Ag), 0.7 ppm; zinc (Zn), 5 ppm; copper (Cu), 0.0005%; samples were also analyzed for lead, but were all less than 30 ppm]

Figure 4.--Localities and data for samples 1-7 taken from the IC claims.

that gold, silver, copper, and minor zinc occur in this area (fig.4), but resource estimates could not be calculated from the scattered field and analytical data.

A decomposed, iron-oxide-stained, granite is exposed in an 18-ft-deep shaft in the southeast corner of the SA (fig. 2). The iron-oxide stain is dispersed throughout the granite and is probably due to the weathering of mafic minerals. No mineralized rock was apparent, but gold, copper, and zinc were detected in a chip sample from the granite (table 1, sample 8). The granite exposed here is similar to granite exposed on the Silver King and Silver Queen claims in the northern part of the SA, where occurrences of gold and silver in quartz-calcite veinlets have been reported by claimant Charles

Table 1.--Data for samples 8-9 from near a shaft in the southeast corner of the Table Top Mountains study area, sample 10 from the American Rockwool quarry, and samples 11-15 from the Silver King claims.

[na, not analyzed; xx, not applicable; ---, not detected; lower detection limits: gold (Au), 0.01 ppm (* denotes less than 5 ppb); copper (Cu), 5 ppm; zinc (Zn), 5 ppm; silver (Ag), 0.7 ppm; lead (Pb), 30 ppm]

Sample No.	Type	Length (ft)	Assay data Au (ppm, unless otherwise noted)	Ag	Cu	Pb	Zn	Remarks
8	chip	2.0	1.000	---	23.0	---	17.0	Outcrop near 18-ft-deep shaft; iron-oxide-stained, decomposed granite.
9	stream sediment	xx	---	---	na	---	17.0	Bulk sediment taken 100 ft down drainage from shaft.
10	grab	xx	.860	---	38.0	---	.023%	Random fragments of blasted basalt from American Rockwool quarry.
11	chip	.2	---*	0.2	na	11	21	Outcrop of quartz-calcite veinlets in decomposed granite.
12	do.	random	---*	.2	na	14	51	Do.
13	do.	.3	---*	.2	na	9	13	Do.
14	do.	random	---*	.3	na	15	13	Do.
15	do.	.8	---*	.2	na	9	12	Do.

Results of special whole rock analysis for sample 10

Al_2O_3	CaO	Fe_2O_3	K_2O	MgO	MnO	Na_2O	P_2O_5	SiO_2	TiO_2	Loss on ignition
%										
15.7	8.1	7.7	1.4	3.3	0.13	3.4	0.54	50.4	1.00	2.92

Irwin (1986, oral and written commun.). Bureau personnel took five samples across veinlets that crop out on the Silver King claims; no gold and only minor silver, lead, and zinc were detected (table 1, samples 11-15).

Krason and others (1982, fig. 13, p. 4), and Stipp and others (1967) reported two to three copper occurrences in or near the southwestern part of the SA (fig. 2). Bureau personnel searched the reported localities, which are in Tertiary basalt and alluvium, and did not find the occurrences.

A sample of the basalt mined by American Rockwool was collected and analyzed for both whole rock composition and metal content. Because American Rockwool did no formal analysis of the basalt, the whole rock analysis was an attempt to determine why this basalt was useful in their insulation manufacturing process while others are not. If a special characteristic, other than the rocks 2,000° to 2,500°C melting range, could be identified, then basalt within the SA could be analyzed to determine if it also has resource value. Mineralogical and chemical studies of the basalt by the Bureau's Reno Research Center did not identify any special characteristic to indicate why this basalt is more suitable for making insulation. Table 1 (sample 10) shows the analytical results; minor amounts of gold, copper, and zinc were detected.

Sand and gravel occur in drainages and low-lying areas throughout the study area and nearby material has been used in the construction of Interstate Highway 8 and probably for other local building projects. Transportation costs and a low unit value restrict the market to local use and sufficient material exists outside the SA to satisfy this demand.

CONCLUSIONS AND RECOMMENDATIONS

Minor gold, silver, and copper occur in veins and veinlets in fractures and fault zones within the study area, but no mineral resources were identified. Mineralized exposures are only visible in a few workings, and more detailed geological, geochemical, and geophysical surveys, followed by exploratory drilling would be necessary to determine any economic significance of the veins and veinlets in the study area.

In 1985, American Rockwool, Inc. was mining basalt near the study area for use in their insulation manufacturing process, and a sample of the mined basalt was analyzed for mineral and chemical constituents. No special characteristic, other than melting point, could be identified to indicate why the mined basalt has value as an insulation constituent. Detailed mapping, sampling, and testing would be necessary to determine if basalt that caps the higher peaks within the study area has resource value as an insulation constituent.

Sand and gravel occur in drainages and valleys throughout the region. Economic constraints limit usage to local demand and a sufficient supply of material is present outside the study area to satisfy this demand.

There have been no reported oil or gas discoveries in the study area. The area primarily consists of igneous and metamorphic rocks, which are not conducive to hydrocarbon accumulation, and any hydrocarbons in the nearby sediments would have been subject to migration or destruction by tectonic and magmatic activity.

No geothermal waters or leasing activity are known inside the SA, and the area is not considered favorable for the discovery and development of geothermal resources.

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