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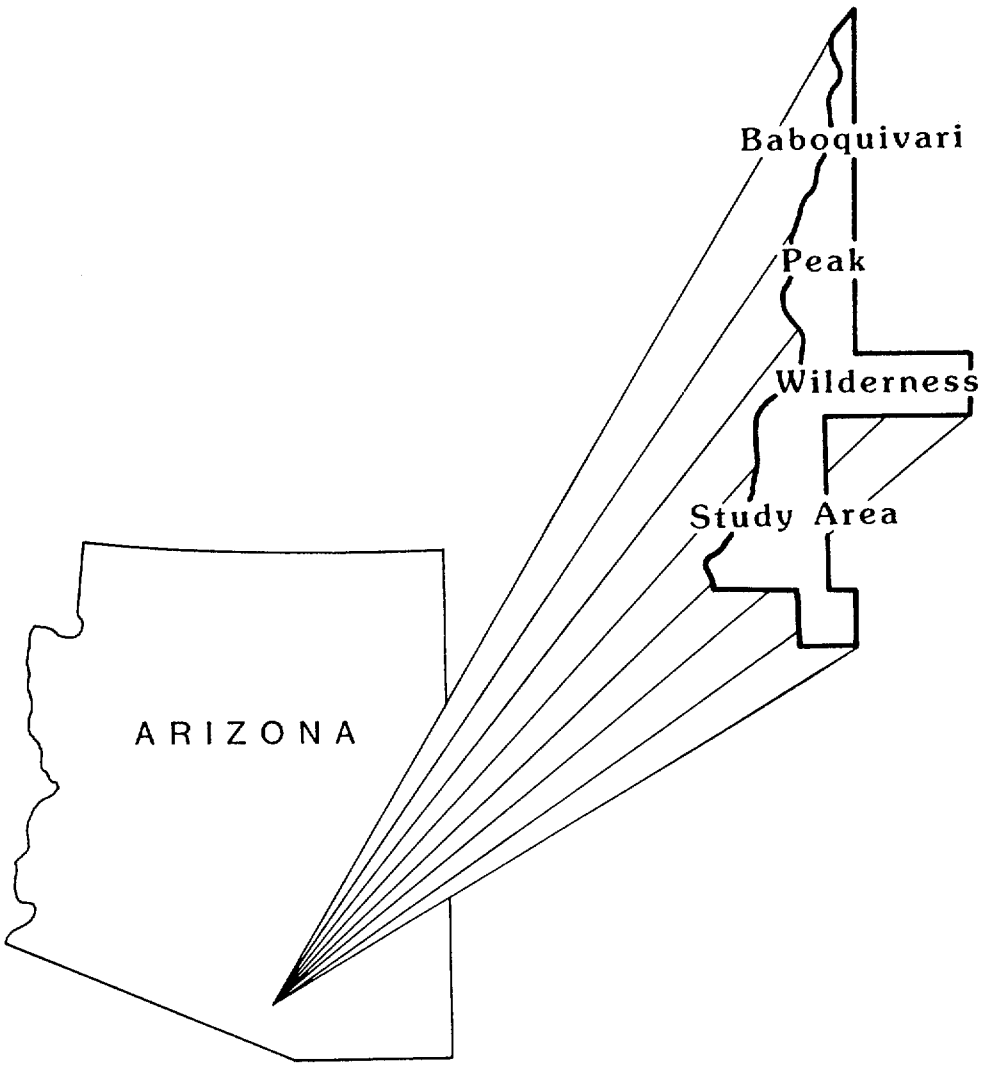
Mineral Investigation of the Baboquivari Peak Wilderness Study Area (AZ-020-203B), Pima County, Arizona



BUREAU OF MINES
UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL INVESTIGATION OF THE BABOQUIVARI PEAK WILDERNESS STUDY AREA (AZ-020-203B), PIMA COUNTY, 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 (Public Law 94-579, October 21, 1976) 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 Baboquivari Peak Wilderness Study Area (AZ-020-203B), Pima County, Arizona.

This open-file report presents 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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ILLUSTRATIONS

UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

ft	foot/feet
mi	mile(s)
ppm	part(s) per million
%	percent
lt	ton, long (2240 pounds)
st	ton, short (2000 pounds)
oz	troy ounce(s)

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SUMMARY

The Baboquivari Peak Wilderness Study Area comprises 2,065 acres in south-central Pima County, Arizona. In March and April 1985, the Bureau of Mines conducted a mineral investigation of the study area as required by Public Law 94-579 (October 21, 1976). The investigation included a review of literature concerning mineral resources and mining activity, and a field examination of mines, prospects, and mineral occurrences within 3 mi of the study area.

No exposed mineral or energy resources were found within the study area, but occurrences of gold, silver, molybdenum, beryllium, copper, lead, manganese, tungsten, and zinc have been mined and prospected within 3 mi of the study area. The mineralization has occurred in a northwest-striking fault-dike system that extends through the study area. If the mineralizing process extended throughout the system, then mineral occurrences could be present, below surface, within the study area. A detailed geological and geochemical survey of the dikes would be necessary to determine if mineralization has occurred along this system within the study area.

INTRODUCTION

In March and April 1985, the Bureau of Mines, in cooperation with the U.S. Geological Survey (USGS), conducted a mineral investigation of the Baboquivari Peak Wilderness Study Area (WSA), Pima County, Arizona, on lands administered by the Bureau of Land Management (BLM). The Bureau of Mines 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, and reconnaissance 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.

Method of Investigation

This investigation included a review of available published and unpublished material related to the mineral resources and mining activity in the Baboquivari Peak WSA 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 collected from Bureau of Mines files and other sources.

Bureau personnel conducted a 16-man-day field examination that focused on mining claim locations, accessible workings, prospects, and known mineral occurrences within and up to 3 mi outside the WSA boundary. The examination included reconnaissance by fixed-wing aircraft, four-wheel-drive vehicle, and foot traverses across the study area. No prospects or mineral occurrences were found within the WSA; two stream sediment samples were collected.

Geographic and geologic setting

The Baboquivari Peak WSA comprises 2,065 acres in south-central Pima County, Arizona, about 50 mi southwest of Tucson. The WSA is a narrow strip of land that is bounded by the Papago Indian Reservation on the west and by state and private lands on other sides. The study area lies on the eastern side of the Baboquivari Mountains and has moderate to steep relief. Elevation

ranges from 4,280 ft in Sabino Canyon to 7,734 ft on Baboquivari Peak. Access to the study area from the east is by maintained dirt roads to ranches from State Highway 286, and from the west by dirt roads across the Papago Indian Reservation from State Highway 86 (fig. 1). Hiking trails provide access within the study area.

The Baboquivari Mountains are in the Basin and Range physiographic province and are the result of block faulting. The mountains (including the WSA) are crosscut by northwest-striking faults and shear zones that are part of a regional structural pattern (Keith, 1974, p.15).

In the northern half and southeastern quarter of the WSA the rocks are interbedded conglomerate, sandstone, siltstone, wacke, mudstone, and shale with sparse dacitic or andesitic flows and flow breccias. The rocks make up the Pitoikam Formation and also are part of the Mulberry Wash Formation, and have been assigned to Early Jurassic age (Haxel, May, and others 1980; Haxel, Wright, and others, 1980). The southwestern quarter of the study area is mainly perthite granite of Baboquivari Peak (Jurassic), which has intruded the Mulberry Wash Formation. A complex Tertiary rhyolite dike network has intruded the Jurassic rocks. The dikes typically strike northwest across the study area and commonly were intruded along pre-existing faults (See Keith, 1974; Heindl and Fair, 1965; Haxel, May, and others 1980; Haxel, Wright, and others, 1980).

MINING HISTORY

The Baboquivari Peak WSA is within the Baboquivari mining district, which extends about 33 mi northward from Mexico and includes the Baboquivari Mountains. No mining activity has been recorded within the WSA, but intermittent, small-scale mining and limited prospecting have occurred in the

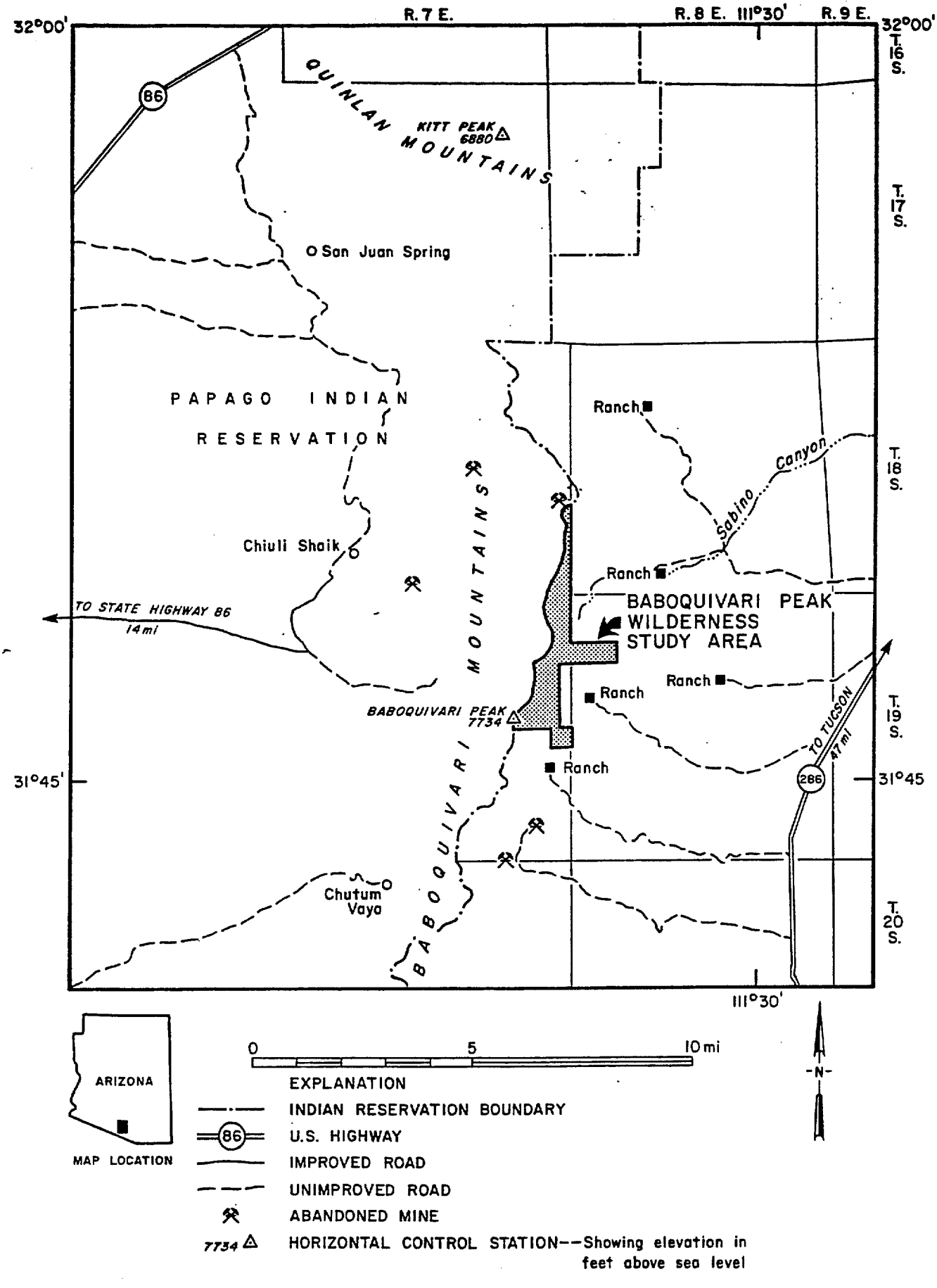


Figure 1.--Index map of the Baboquivari Peak Wilderness Study Area, Pima County, Arizona.

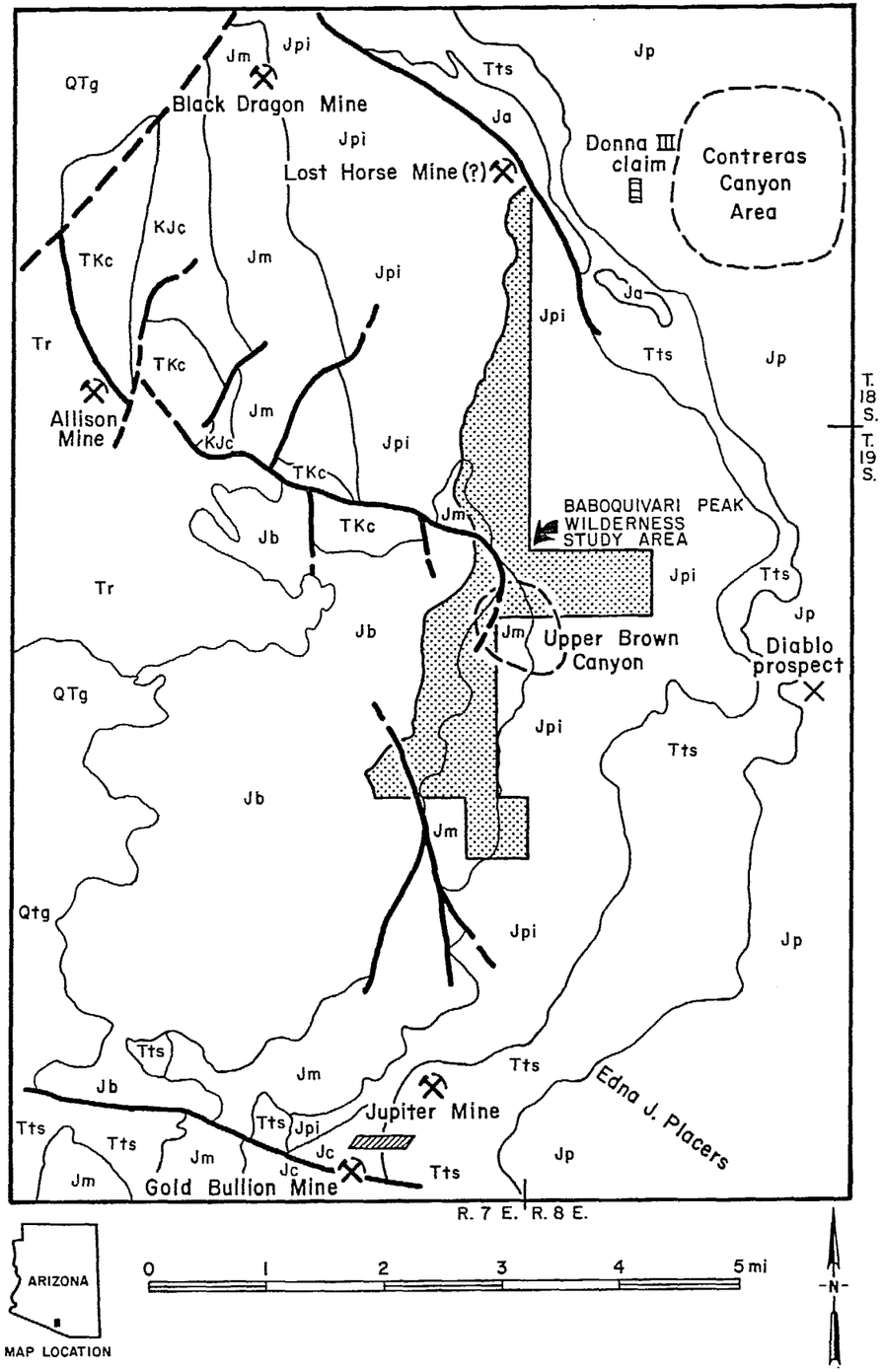
surrounding area. Current (1985) BLM records show two patented mining claims about 2 1/2 mi south of the WSA and one unpatented claim less than 1 mi east of the northern tip of the WSA (fig. 2). The establishment of the Papago Indian Reservation (fig. 1) in 1955 closed the western part of the district to mineral entry under rules of the 1872 Federal Mining Act.

Mining in the Baboquivari district began in the late 1800's at the Allison and Jupiter mines (fig. 2). Keith (1974, p. 14-17) summarized the geology and history of the district, and estimated a total production of 57,000 st of ore containing about 14,000 oz gold, 173,000 oz silver, 122 st copper, 12 st lead, and a small amount of zinc, plus about 24 st of tungsten concentrates and 200 lt of manganese ore. A small amount of placer gold has also been recovered.

Most of the nearby mining activity was either west to northwest or south to southwest of the WSA. Figure 2 summarizes the activity that has taken place within 3 mi of the WSA. Two groups of tungsten deposits, one 9-12 mi northeast of the WSA near San Juan Spring and the other 6-8 mi southwest of the WSA near Chutum Vaya (fig. 1), are not shown but have contributed to the total production reported above.

ENERGY RESOURCES

There have been no reported oil or gas discoveries, or Federal leases or lease applications filed in the Baboquivari WSA. Ryder (1983) evaluated the petroleum potential of wilderness lands in Arizona on the basis of geologic framework and petroleum geology derived from published literature. The evaluation rated the WSA among a group that has "zero" potential because any oil or gas accumulations would have been subject to migration or destruction due to later tectonic and magmatic activity.



EXPLANATION

Tertiary and Quaternary	QTg	Gravel and alluvium
Tertiary	Tr	Sedimentary, volcanic, and intrusive rocks
Cretaceous or Tertiary	Tts	Rhyodacite porphyry of Tinaja Spring
	TKc	Conglomerate
	KJc	Chiuli Shaik Formation--volcanic, sedimentary, and intrusive rocks
Jurassic or Cretaceous — Middle and Upper	Jb	Perthite granite of Baboquivari Peak
	Jp	Granite of Pavo Kug Wash
	Jm	Mulberry Wash Formation--volcanic, sedimentary, and intrusive rocks
Jurassic — Lower	Jpi	Pitoikam Formation--sedimentary rocks
	Ja	Ali Molina Formation--metasedimentary rocks
	Jc	Metamorphic rocks of Chutum Vaya--metasedimentary rocks and subordinate metavolcanic and metaplutonic rocks

Contact

Fault, dashed where approximate

Area of minerals exploration activity

Unpatented claim on file with BLM, as of September 1985

Patented mining claims

NAME / LOCATION	COMMODITIES	DEVELOPMENT / GEOLOGY / PRODUCTION	REFERENCES
Allison Mine T.18S., R.7E., center sec. 33 (unsurveyed).	Ag, Au, Cu, Pb, Mn.	Several thousand feet of underground workings and mill ruins; mineralized quartz veins occur in NW-striking, steeply SW-dipping shear zones in partly metamorphosed sedimentary rocks and rhyolitic to andesitic flows and intrusions; production estimated at over 47,000 tons of ore averaging 0.22 oz gold/ton, 2.7 oz silver/ton, and minor lead and copper.	Keith, 1974; US Bureau of Mines file data.
Black Dragon Mine T.18S., R.7E., SE 1/4 sec. 15, NE 1/4 sec. 22 (unsurveyed).	Mn	Opencuts and pits; discontinuous lenses, coatings, and fracture-fillings of manganese minerals in sheared and brecciated rhyolite; production to 1956, 165 long tons of ore averaging 27.6% manganese, and 19 tons of concentrate averaging 36.0% manganese.	Keith, 1974; US Bureau of Mines file data.
Contreras Canyon area (includes Hop Sage, Shamrock, Windy, and Donna III) T.18S., R.8E., secs. 19-21, 28-30.	Be	Shallow trenches and exploratory drilling; mineralized quartz veins and pegmatites up to 3 ft thick in granite, typically NW-striking and steeply dipping, "few" thousand tons of inferred reserves at 0.002% BeO; no known production.	US Bureau of Mines file data; Ariz Bureau of Mines file data.
Diablo prospect T.19S., R.8E., N center sec. 16.	Cu	30-ft-deep shaft; mineralization occurred along a narrow fracture zone in a rhyolite dike; no known production.	Donald, 1959.
Edna J. Placer T.19S., R.8E., secs. 31-32, T.20S., R.8E., secs. 5-6.	Au	Small intermittent placer operation; finely divided gold in a 6- to 11-ft-thick gravel bar; few tens of oz gold recovered.	Keith, 1974.
Gold Bullion Mine T.19S., R.7E., S center sec. 35, T.20S., R.7E., N center sec. 2.	Au, Ag, Mo, Cu, Pb, W, V, Zn.	Several hundred ft of underground workings and mill ruins; discontinuous mineralized quartz fissure veins and pegmatites up to 12 ft thick cutting partly metamorphosed sedimentary rocks, granite, and rhyolite dikes, typically NW-striking with near vertical dip; intermittent production of at least 3,100 tons of ore averaging about 1.0 oz gold/ton, 12 oz silver/ton, several hundred tons of high grade molybdenum, and minor copper, lead, tungsten, and vanadium.	Keith, 1974; US Bureau of Mines file data; Ariz Bureau of Mines file data.
Jupiter Mine area (includes Iowana Mine) T.19S., R.7E., NW 1/4 sec. 36.	Au, Ag, Pb, Cu, Zn, W.	Several thousand ft of underground workings and mill ruins, exploratory drilling for large tonnage, low grade open pit operation in 1974 yielded negative results; discontinuous mineralized quartz-calcite fissure veins cutting partly metamorphosed sedimentary rocks, granite, and diorite dikes; intermittent production thru 1941 of several hundred tons of ore averaging 1 oz gold/ton, 16 oz silver/ton, and minor lead and copper.	Keith, 1974; Ariz Bureau of Mines file data.
Lost Horse Mine (?) T.18S., R.7E., sec. 24 (unsurveyed).	Mo, Au, Ag, Cu (?).	About 200 ft of underground workings; fracture filling in fault zone cutting partly metamorphosed sedimentary rocks; no known production.	US Bureau of Mines file data.
Upper Brown Canyon T.19S., R.8E., SW 1/4 sec. 7, NW 1/4 sec. 18, T.19S., R.7E., SE 1/4 sec. 12, NE 1/4 sec. 13.	Au (?), Ag(?)	Minor prospecting by past landowner along dike system, may be same as Cruver and others locality 98; Bureau field check could not locate any evidence of prospecting or production.	Kip Ripley, Tucson, Az, oral commun., 1985; Cruver and others, 1982.

Figure 2.—Mining activity in the vicinity of the Baboquivari Peak Wilderness Study Area, showing geology simplified from Haxel, May, and others (1980; 1982).

No geothermal waters or leasing activity are known within the Baboquivari WSA. 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 WSA, and the area was not defined as favorable for the discovery and development of geothermal resources.

No uranium or thorium occurrences are known within the Baboquivari WSA. A regional uranium resource evaluation by Luning and Brouilland (1981) rated the sedimentary and volcanic rocks in the area as being unfavorable for uranium occurrences because no reductant is present. The evaluation also rated the intrusive rocks as unfavorable because they are not anomalously uraniferous, even though they showed some favorable characteristics.

MINERAL APPRAISAL

No mineral deposits or occurrences were found within the Baboquivari Peak WSA. Cruver and others (1982) and Stipp and others (1967) reported a gold-silver occurrence near the center of the WSA. Bureau personnel traversed the area, but no gold-silver occurrence was found. Two stream sediment samples were collected outside the WSA from drainages in upper Brown Canyon where the occurrence was suspected; one of the samples assayed 0.042 ppm gold. The samples were also assayed for silver and tungsten but both samples had values below the lower detection limits (silver, 0.7 ppm; tungsten, 0.01%). The gold was detected in a sample from a drainage from sec. 13, T. 19S., R. 7E. where a prominent northwest-striking dike is exposed near the ridgeline. The drainage headwaters and dike are within the southern part of the WSA.

Gold, silver, molybdenum, copper, lead, manganese, tungsten, and zinc have been mined or prospected at several sites near the WSA (fig. 2). The

occurrences generally are related to veins associated with rhyolitic to andesitic dikes. The dikes typically strike northwest and commonly were intruded along pre-existing faults (Haxel, May, and others, 1980). Haxel, May, and others (1980) showed a complex dike network that is generally bounded by the major northwest-striking faults shown in figure 2. The dike network includes most of the nearby mineralized occurrences and extends through the WSA. Keith (1974) noted a general precious- and base-metal zoning pattern and considerable sulfide mineralization on the eastern side of the Baboquivari district and suggested the possibility of a hidden porphyry-type deposit along the northwest-striking structural trend.

Beryllium occurrences have been prospected in the Contreras Canyon area 1-2 mi northeast of the WSA. The beryllium values are in quartz veins and pegmatites in granite and typically strike northwest. Although veins and pegmatites striking northwest from the Contreras Canyon area would not extend into the WSA, Haxel, May, and others (1980) reported that the complex dike network discussed above may include some aplite and pegmatite dikes. Beryllium-enriched veins and dikes may therefore occur within the northwest-striking structure that passes through the WSA.

CONCLUSION

No mineral or energy resources are known within the Baboquivari Peak WSA. Occurrences of gold, silver, molybdenum, beryllium, copper, lead, manganese, tungsten, and zinc, however, have been mined and prospected within 3 mi of the study area. The mineralized rock generally is in a northwest-striking zone of faults and dikes that extends through the WSA.

Although no exposed mineral occurrences are known in the WSA, geological features that are mineralized nearby are known to extend into the study area.

If the mineralization extended along these features, then occurrences of gold, silver, molybdenum, beryllium, copper, lead, manganese, tungsten, and zinc could be present below surface in the WSA. It also has been suggested that a porphyry-type deposit could be hidden along this trend.

A detailed geological and geochemical survey of the dikes within the study area would be necessary to determine if the mineralizing processes have occurred through the WSA.

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