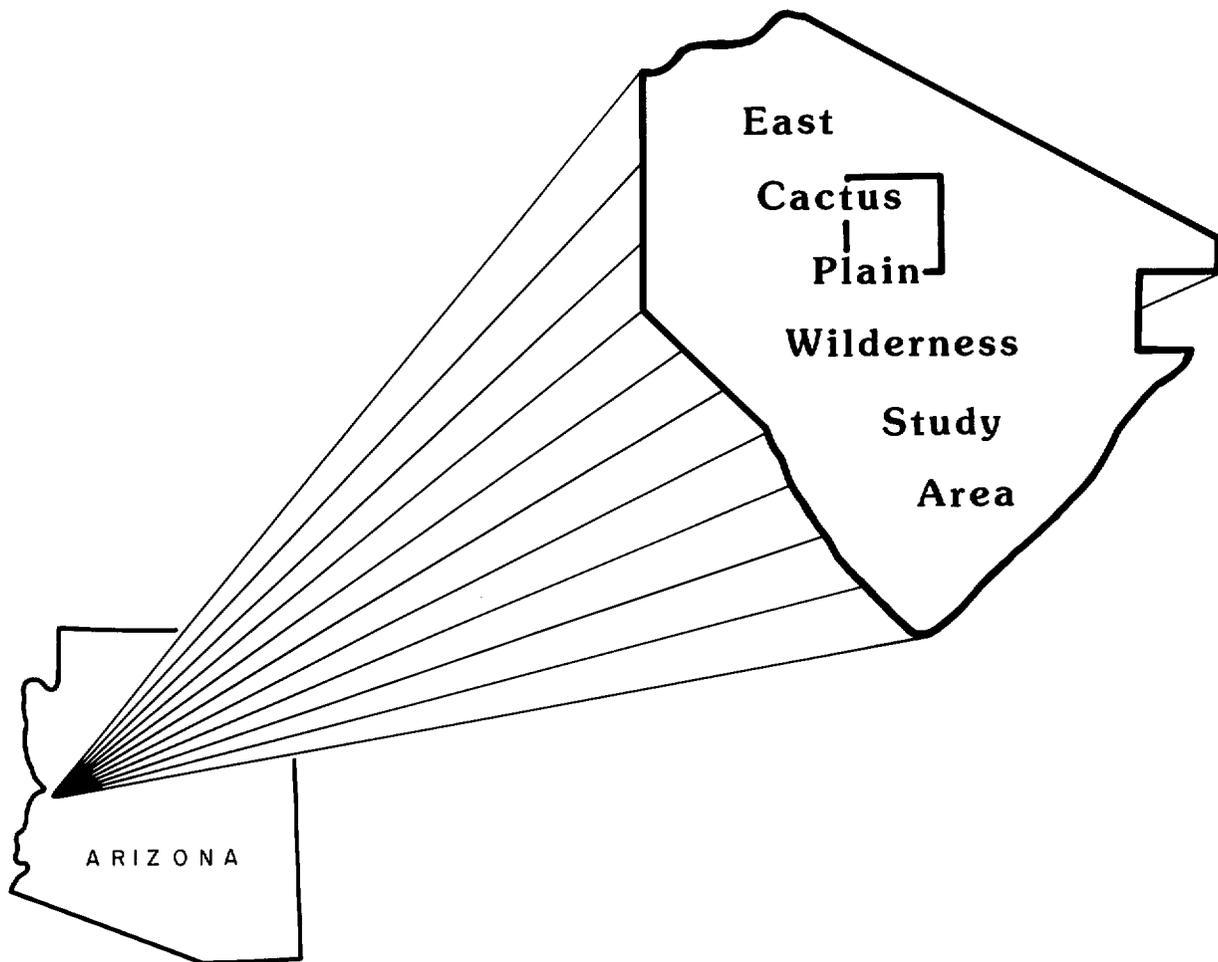


MLA 81-87

Mineral Land Assessment
Open File Report/1987

**Mineral Investigation of the East Cactus Plain
Wilderness Study Area (AZ-050-017),
La Paz County, Arizona**



**BUREAU OF MINES
UNITED STATES DEPARTMENT OF THE INTERIOR**

MINERAL INVESTIGATION OF THE EAST CACTUS PLAIN WILDERNESS STUDY
AREA (AZ-050-017), LA PAZ COUNTY, ARIZONA

by

Terry J. Kreidler

MLA 81-87
1987

Intermountain Field Operations Center
Denver, Colorado

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

BUREAU OF MINES
David S. Brown, Acting 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 East Cactus Plain Wilderness Study Area (AZ-050-017), La Paz 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, P. O. Box 25086, Denver Federal Center, Denver, CO 80225.

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

°F	degree Fahrenheit	oz/st	ounce per short ton
ft	foot	ppb	part per billion
in.	inch	ppm	part per million
mi	mile	%	percent

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SUMMARY

In accordance with the Federal Land Policy and Management Act of 1976 (Public Law 94-579), and at the request of the Bureau of Land Management, the Bureau of Mines conducted a mineral survey in May 1987 to appraise the mineral resources of the 13,735-acre East Cactus Plain Wilderness Study Area, La Paz County, Arizona.

The East Cactus Plain study area contains no known metallic mineral resources. Deposits of base and precious metals occur both north and southeast of the study area and may be hosted by the volcanic and sedimentary rocks beneath the sand dunes inside the boundary, but subsurface data are lacking. The sand is an identified resource useable in several industrial applications such as foundry, fracturing, and abrasive sand.

INTRODUCTION

In May 1987, the Bureau of Mines, in a cooperative program with the U.S. Geological Survey (USGS), studied the mineral resources of the East Cactus Plain Wilderness Study Area (WSA), La Paz County, Arizona, on lands administered by the Bureau of Land Management (BLM), Yuma District Office. The WSA comprises 13,735 acres.

The Bureau surveys and studies mines, prospects, and mineralized areas to appraise reserves and identified subeconomic resources. The USGS assesses the potential for undiscovered mineral resources based on regional geological, geochemical, and geophysical surveys. The USGS will open file the results of their studies separately. A joint report, to be published by the USGS, will

integrate and summarize the results of both surveys. This report presents the results of the Bureau's study, which was completed prior to the USGS investigations.

Geographic and geologic setting

The East Cactus Plain WSA is in northern La Paz County, about 18 mi east-southeast of Parker, Arizona (fig. 1). The western boundary follows section lines and a Central Arizona Project canal, which separates it from the Cactus Plain WSA (a part of which was studied by Kreidler in 1986). The southeastern boundary parallels the Swansea Road, and the northern boundary is along a powerline. Access to the boundary is provided by the bounding roads; access to the interior is by foot or pack animal.

This part of Arizona receives about 4.5 in. of precipitation a year and temperatures over 100° F. are common during the summer months. Elevations in the WSA range from about 1,650 ft on an unnamed peak along the northern boundary to about 1,200 ft in the southern tip.

The study area is in the Sonoran Desert section of the Basin and Range physiographic province (Hunt, 1967, p. 310-312), and is mostly covered by sand dunes stabilized by desert vegetation, primarily grasses. The sand dunes are underlain by Tertiary- and Quarternary-age basalts in the northwest and Tertiary andesite and interbedded limestone, sandstone, and conglomerate in the south-central part (Wodzicki and others, 1982, p. 122).

Method of investigation

Bureau personnel reviewed sources of minerals information including published and unpublished literature, Bureau files, and mining claim and oil and gas lease records at the BLM State Office in Phoenix. Discussions on the mineral resources of the study area were held with BLM personnel at the

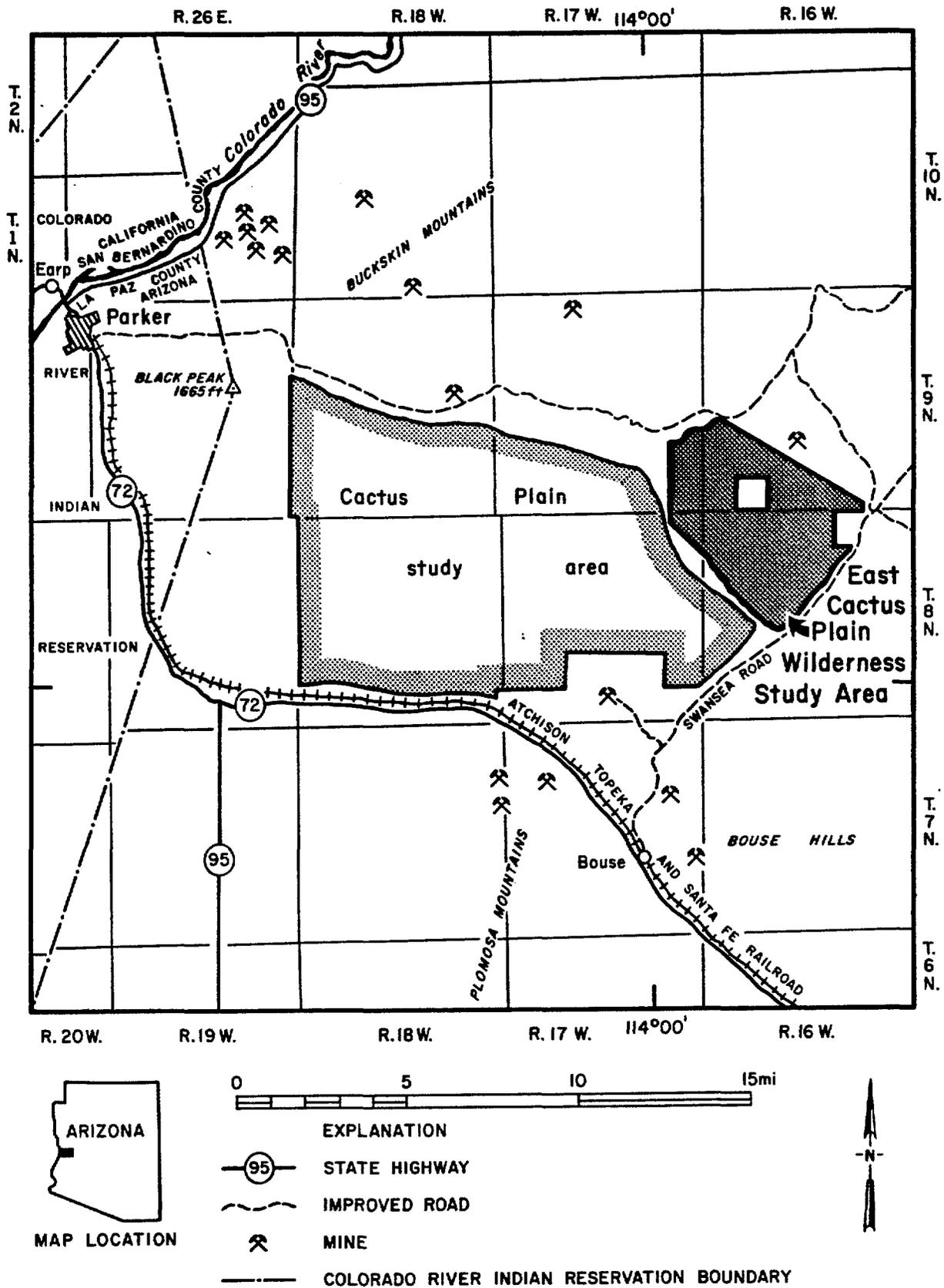


Figure 1.—Index map of the East Cactus Plain Wilderness Study Area, La Paz County, Arizona.

District Office in Yuma and the Resource Area Office in Lake Havasu City, Arizona.

Field work, completed in four employee-days, consisted of a search for mines and prospects--none were found in the study area--and examining and sampling rock outcrops in and near the study area. Four samples were taken: three outcrop and one dune sand. Three of the samples were analyzed for gold, silver, and 35 other elements by neutron activation and direct coupled plasma-atomic absorption spectrometry. The dune-sand sample was analyzed for silica and other elements that affect the suitability for industrial uses by inductively and direct coupled plasma and fusion. Complete analytical data are available for inspection at the U.S. Bureau of Mines, IFOC, Building 20, Denver Federal Center, Denver, CO.

Mining activity

The northeastern part of The East Cactus Plain WSA is included in the Midway mining district; the study area is also near three others (pl. 1). The Midway mining district contained gold, silver, and copper in spotty deposits along faults and fractures in Precambrian-age gneiss and schist and Paleozoic-age limestones. The Cienega mining district (7.5 mi northwest) produced gold, silver, copper, and minor lead from ore occurring as replacement pockets in partially metamorphosed Paleozoic- and Mesozoic-age limestones, shales, and quartzites, which locally underlie overthrust Precambrian-age metamorphic rocks. The Santa Maria mining district (5 mi north) produced gold, silver, and copper from ore occurring in massive to lensing replacement bodies of iron oxide in Paleozoic carbonate rocks. The Plomosa mining district (6.5 mi southwest) contained deposits of gold, silver, copper, lead, zinc, manganese, and barite in veins and irregular bodies in Paleozoic and Mesozoic sedimentary

rocks and volcanics of possible Cretaceous or Tertiary age. Mining in these districts took place from within 0.5 mi to 12 mi of the WSA boundary. (See Keith, 1978.) Table 1 summarizes the production history of the districts. As of September 1987, the mines within 5 mi of the study area were inactive.

Mining claims have been staked near the study area in the Cienega, Plomosa, and Midway mining districts; no claims are currently (September 1987) staked inside the boundary (pl. 1). There was no visible evidence of any recent activity on any of the claims.

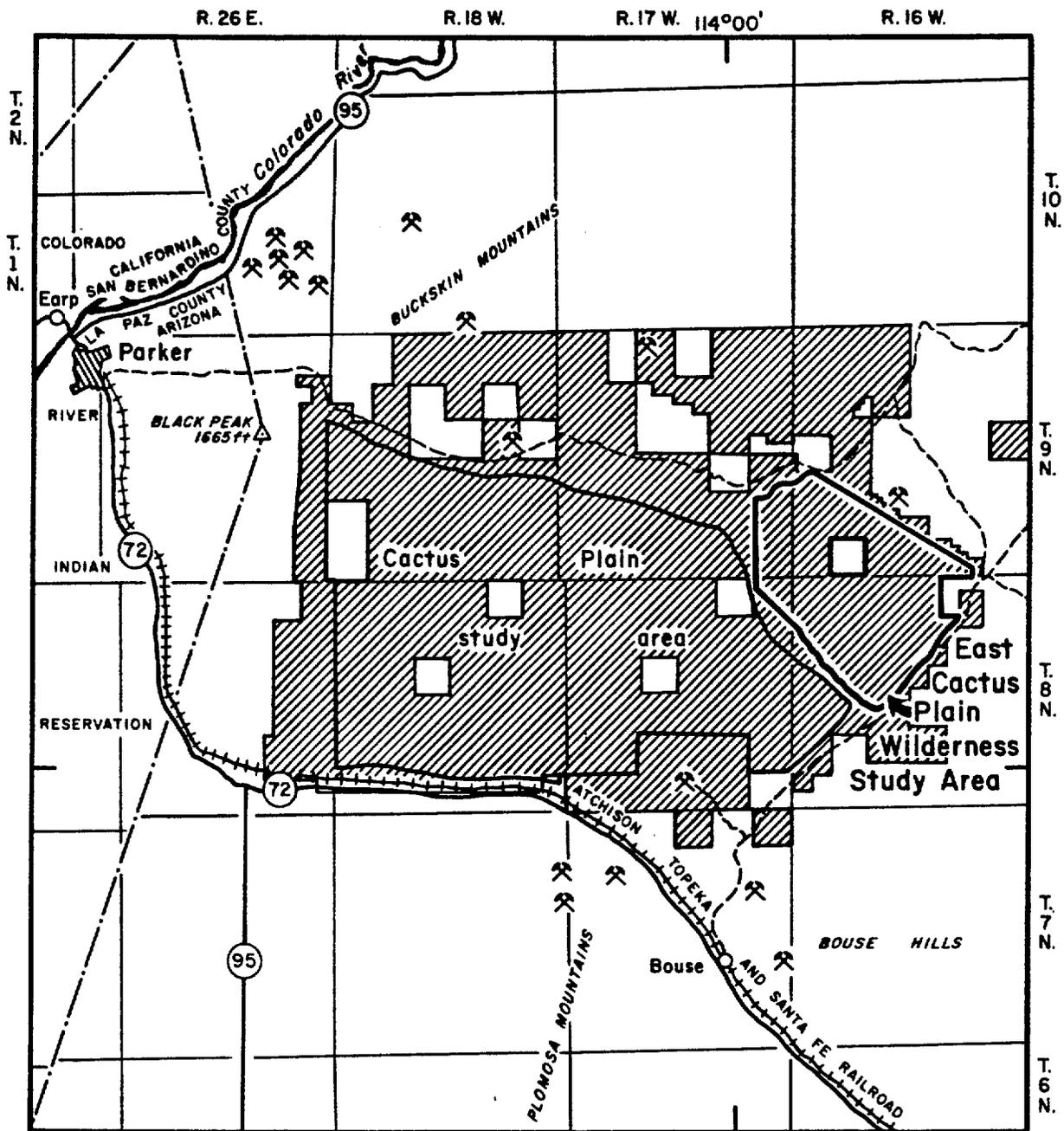
Table 1.--Summary of production data for mining districts near the East Cactus Plain WSA, Arizona.

[All data from Keith, 1978. Gold and silver given in ounces, copper, lead, and zinc given in tons. Symbols used: Mn, manganese.]

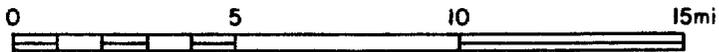
District name	When active	Production data					
		gold	silver	copper	lead	zinc	other
Cienega	1880-1969	11,707	3,364	917	500	na	
Santa Maria.	Intermittently since 1860's.	1,128	35,000	23,000	na	na	400 tons Mn ore.
Midway	Early 1900's-present.	45	35	4.5	na	na	
Plomosa	Intermittently since 1860's.	25,000	129,200	526	344	65	9,000 tons Mn ore, 2,700 tons barite ore.

Energy resources

The entire study area is covered by oil and gas leases (fig. 2). Ryder (1983, p. C19), however, rates the oil and gas potential of the study area low because the organic richness, reservoir quality, and thermal history of the



R. 20 W. R. 19 W. R. 18 W. R. 17 W. 114°00' R. 16 W.
 Oil and gas lease information from the Bureau of Land Management; current as of September 1987.



- EXPLANATION
-  OIL AND GAS LEASES
 -  STATE HIGHWAY
 -  IMPROVED ROAD
 -  MINE
 -  COLORADO RIVER INDIAN RESERVATION BOUNDARY

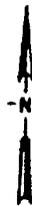


Figure 2.—Oil and gas leases in and near the East Cactus Plain Wilderness Study Area, Arizona.

rocks were not conducive to the formation of significant volumes of hydrocarbons. The leasing is probably a result of speculation that the hydrocarbon-rich overthrust belt, which produces large quantities of oil and gas in Wyoming, extends southward into Arizona (Keith, 1979, p. 10). To date, all exploratory drilling in Arizona testing this theory has had negative results. As of September 1986, the leases in the study area had not been drilled, but in 1985, Petty-Ray Geophysical Co. ran a seismic survey along a line across the southern part of the area.

RESOURCE APPRAISAL

No metallic mineral resources were identified in the study area. Cenozoic volcanic rocks that crop out just inside the northeastern boundary bear no signs of mineralization.

At the Green Streak Mine, about 1 mi northeast of the study area (pl. 1), spotty copper oxide minerals occur in a quartz vein, trending N. 35° W. and dipping 55° NE., in Precambrian gneiss and schist. Workings consist of two shafts, about 100 and 35 ft deep, an adit, and several prospect pits and trenches; the mine accounts for nearly all the recorded production from the Midway district. Samples from the mine area contained copper ranging from 7,443 to greater than 20,000 ppm; amounts of gold, silver, lead, and zinc were insignificant, except for sample 3, which contained 1,870 ppb (0.052 oz/st) gold (table 2).

Because of the spotty, discontinuous nature of the mineralization at the Green Streak Mine, no base- or precious-metal resource was identified.

Barium content in the three samples from the Green Streak Mine was higher than the average for metamorphic rocks, but no barite resource was identified. Concentrations ranged from 1,500 to greater than 30,000 ppm barium

(table 2). Average content for similar rock types is 425 ppm (0.043%) (Levinson, 1980, p. 865).

Table 2.--Data for rock samples 1-3 from the Green Streak Mine.

[Gold (Au), silver (Ag), arsenic (As), and barium (Ba) determined by neutron activation, detection limits: 5 ppb, 5 ppm, 1 ppm, and 0.01% respectively; copper (Cu), lead (Pb), and zinc (Zn) determined by direct coupled plasma, detection limits: 1 ppm, except Pb, 5 ppm. Symbols used: ---, not detected; >, greater than.]

Sample no.	Sample type	Au ppb	Ag	Cu	Pb ppm	Zn	Ba	As
1	Select	608	1.5	7,443	7	72	1,500	---
2	Chip	400	6.4	>20,000	9	78	>30,000	3
3	Select	1,870	.6	15,392	56	107	25,500	4

Barium is highly mobile in primary mineralizing systems and is often a pathfinder element for lead-zinc-silver deposits. Being mobile, it often forms a barium-rich halo extending up to several miles from the deposit (Levinson, 1980, p. 865). In the northern part of the Plomosa district, barite, a barium sulfate mineral, is a common byproduct in the silver-copper-lead-zinc ores; barite also occurs with fluorite in volcanic agglomerate about 4 mi southeast of the study area in sections 34 and 35, T. 8 N., R. 17 W. (Kreidler, 1986, p. 9). The barium enrichment is most likely part of an alteration halo related to the mineralization that took place in the region and indicates that similar base- and precious-metal deposits may underlie the study area, but extensive and costly subsurface exploration would be necessary to test this hypothesis.

Analysis of a dune-sand sample from within the WSA showed it to be unsuitable for use in glass production because of the low silica and high iron, chromium, and aluminum content (table 3). The sand is suitable for use as foundry, fracturing, and abrasive sand according to criteria described by Bates (1960, p. 99-103). Currently (1987), there is no local market for this material, and high transportation costs preclude shipment to distant markets.

Table 3.--Analytical results for the dune-sand sample from the East Cactus Plain Wilderness Study Area, Arizona.

[All determinations by inductively coupled plasma, direct coupled plasma, and fusion. Symbol used: <, less than.]

Sample no.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	Cr	Co	Ti
	percent			ppm		
4	88.7	4.6	1.3	<50	<10	1700
average glass sand ^{1/}	98.5	.1	.02	6	<2	150

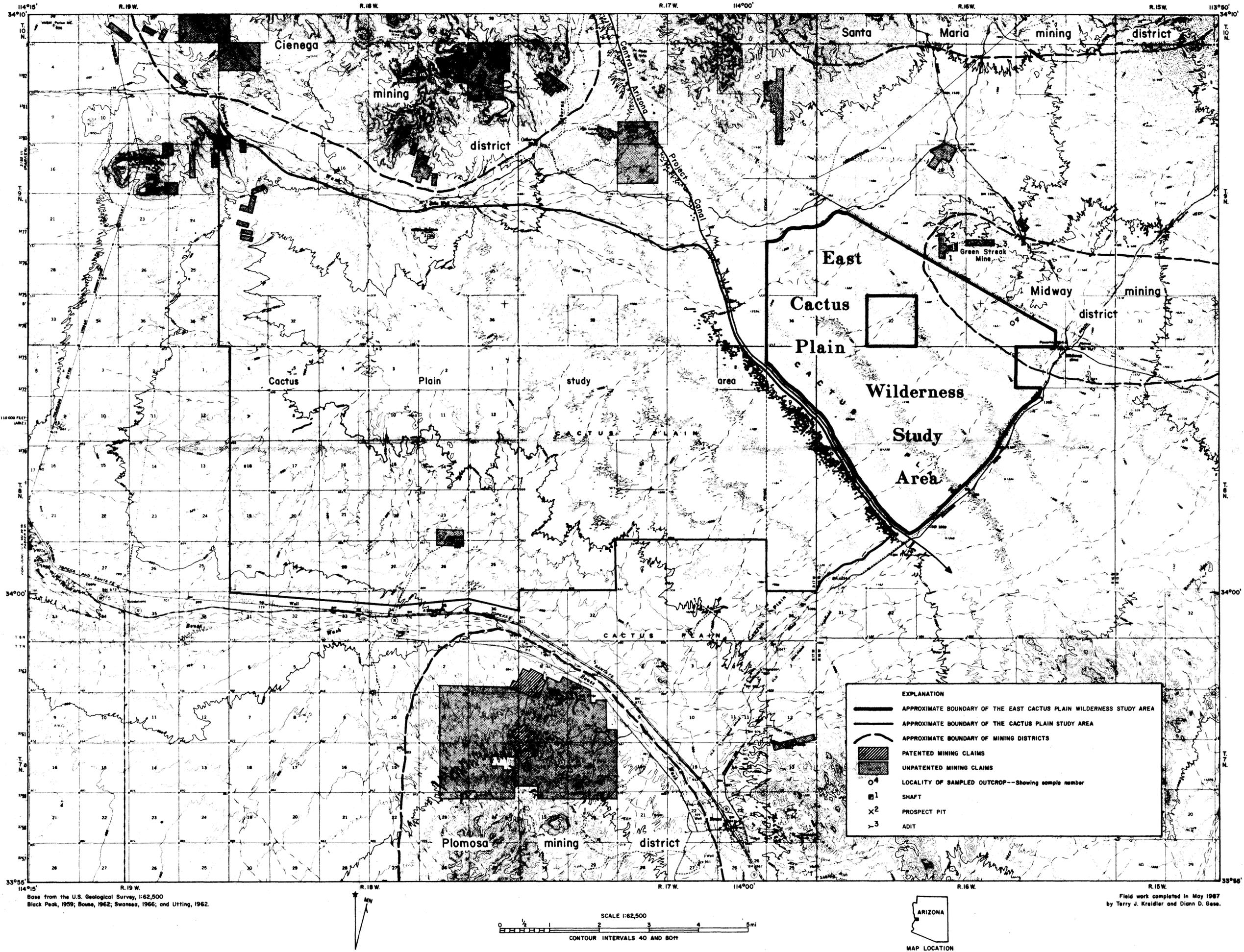
^{1/} from Coope and Harben, 1977, p. 16.

CONCLUSIONS

The East Cactus Plain Wilderness Study Area contains no metallic mineral resources. Vein material at the Green Streak Mine, about 1 mi northeast of the study area, is enriched in barium, a pathfinder element associated with lead-zinc-silver deposits. This is an indication that similar deposits may underlie the sand dunes in the study area, but subsurface data are lacking. The dune sand is an identified resource useable in several industrial applications such as foundry, fracturing, and abrasive sand, and for construction purposes, but such high-volume, low-unit-value commodities must have a local market to be mined profitably, and one does not currently exist near the WSA.

REFERENCES

- Bates, R. L., 1960, Geology of the industrial rocks and minerals: Dover Publications, Inc., 459 p.
- Coope, B. M., and Harben, P. W., 1977, Silica sand; in Raw materials for the glass industry: Metal Bulletin Ltd., 131 p.
- Hunt, C. B., 1967, Physiography of the United States: San Francisco, W. H. Freeman and Company, 480 p.
- Keith, S. B., 1978, Index of mining properties in Yuma County, Arizona: Arizona Bureau of Geology and Mineral Technology Bulletin 192, 185 p.
- _____, 1979, The great southwestern Arizona overthrust oil and gas play: Arizona Bureau of Geology and Mineral Technology Fieldnotes v. 9, no. 1, p. 10-14.
- Kreidler, T. J., 1986, Mineral investigation of a part of the Cactus Plain Wilderness Study Area, La Paz County Arizona: U.S. Bureau of Mines Mineral Land Assessment Open File Report MLA-64-86, 10 p.
- Levinson, A. A., 1980, Introduction to exploration geochemistry: Wilmette, Illinois, Applied Publishing, 924 p.
- Ryder, R. T., 1983, Petroleum potential of wilderness lands in Arizona; in Miller, B. W. ed., Petroleum potential of wilderness lands in the Western United States: U.S. Geological Survey Circular 902 A-P, p. C1-C22.
- Wodzicki, A., Krason, Jan, and Cruver, S. K., 1982, Geology, energy, and mineral resources assessment of the Bill Williams Area, Arizona: prepared for the Bureau of Land Management, Arizona State Office, 130 p.



SAMPLE LOCALITY MAP OF THE EAST CACTUS PLAIN WILDERNESS STUDY AREA, LA PAZ COUNTY, ARIZONA

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1987