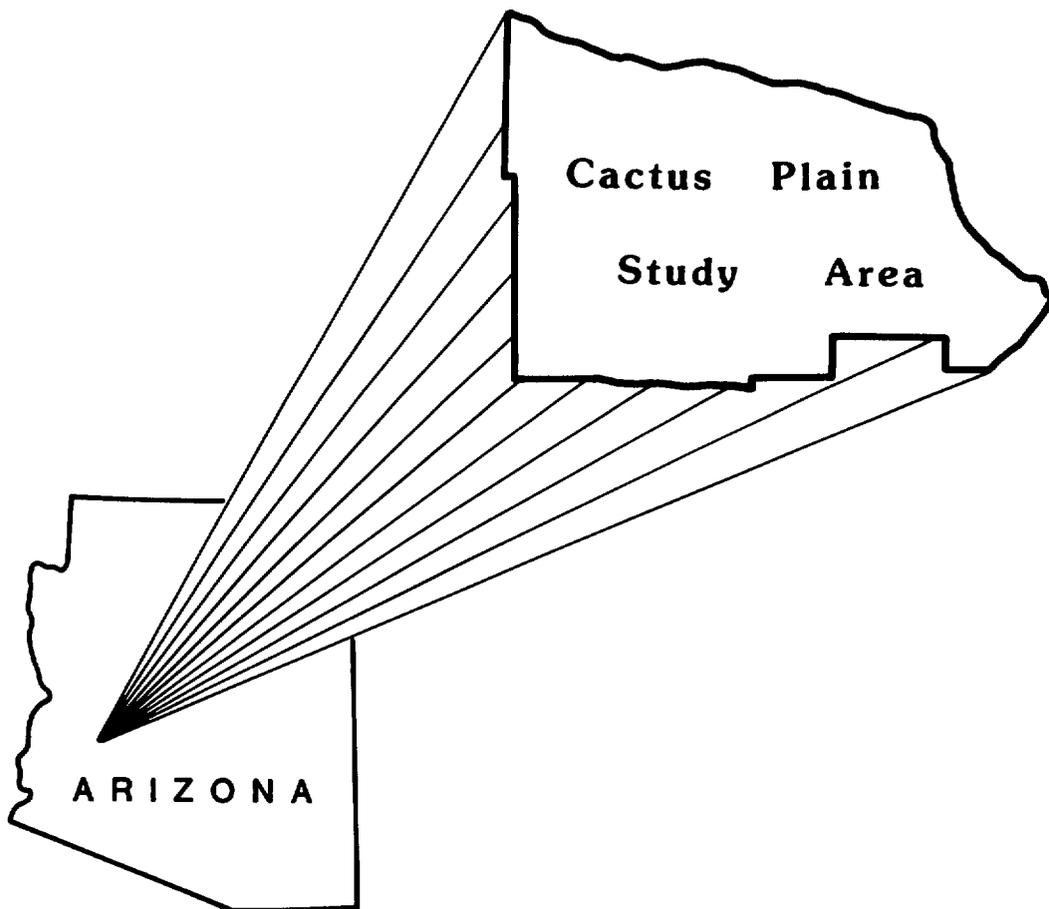


**MLA 64-86**

Mineral Land Assessment  
Open File Report/1986

**Mineral Investigation of a Part of the Cactus  
Plain Wilderness Study Area (AZ-050-014A/B),  
La Paz County, Arizona**



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

MINERAL INVESTIGATION OF A PART OF THE CACTUS PLAIN WILDERNESS  
STUDY AREA (AZ-050-014A/B), LA PAZ COUNTY, ARIZONA

by

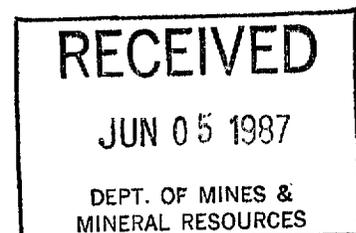
Terry J. Kreidler

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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 a part of the Cactus Plain Wilderness Study Area (AZ-050-014A/B), 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, Building 20, Denver Federal Center, Denver, CO 80225.

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SUMMARY

In accordance with the Federal Land Policy and Management Act of 1976, the Bureau of Mines conducted a mineral survey in March 1986 to appraise the mineral resources in that part of the Cactus Plain Wilderness Study Area designated preliminarily suitable for inclusion in the National Wilderness Preservation System (53,270 of the original 20,360 acres).

The Cactus Plain study area contains no known metallic mineral resources; but rock outcrops inside the area have been enriched in barium and arsenic. Although barite (a barium mineral) has been mined just south of the area and occurs as an accessory in ores from the Plomosa mining district, no evidence of a barite occurrence was found in the study area. Arsenic can be used as a pathfinder element for deposits of base and precious metals. Deposits of these metals occur both north and south of the study area and may be hosted by the volcanic and sedimentary rocks beneath the sand dunes inside the study area, but subsurface data are lacking. The sand is useable in several industrial applications such as foundry, fracturing, and abrasive sand but only for local markets.

INTRODUCTION

In March 1986, the Bureau of Mines, in a cooperative program with the U.S. Geological Survey (USGS), studied the mineral resources of a part of the Cactus Plain Wilderness Study Area, La Paz County, Arizona, on lands administered by the Bureau of Land Management (BLM), Yuma District Office. The Wilderness Study Area comprises 70,360 acres; the Bureau studied the

53,270 acres designated preliminarily suitable for inclusion in the National Wilderness Preservation System. "Study area" as used in this report refers only to the smaller area.

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. This report presents the results of the Bureau of Mines study, which was completed prior to the USGS investigation. The USGS will publish the results of their studies. A joint report, to be published by the USGS, will integrate and summarize the results of both surveys.

#### Geographic and geologic setting

The Cactus Plain study area is in northern La Paz County, about 10 mi southeast of Parker, Arizona (fig. 1). The western and part of the southern boundaries follow section lines; the rest of the southern boundary approximately parallels the Santa Fe railroad and State Highway 72. The northern boundary is along a gravel road and the eastern boundary follows the Central Arizona Project canal. Access to the boundaries is provided by the bounding roads; access to the interior is by foot or pack animal, except for an old four-wheel-drive road that leads from Highway 72 to Bales Peak.

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 range from about 1,200 ft along the eastern boundary to about 750 ft in the southwestern corner.

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

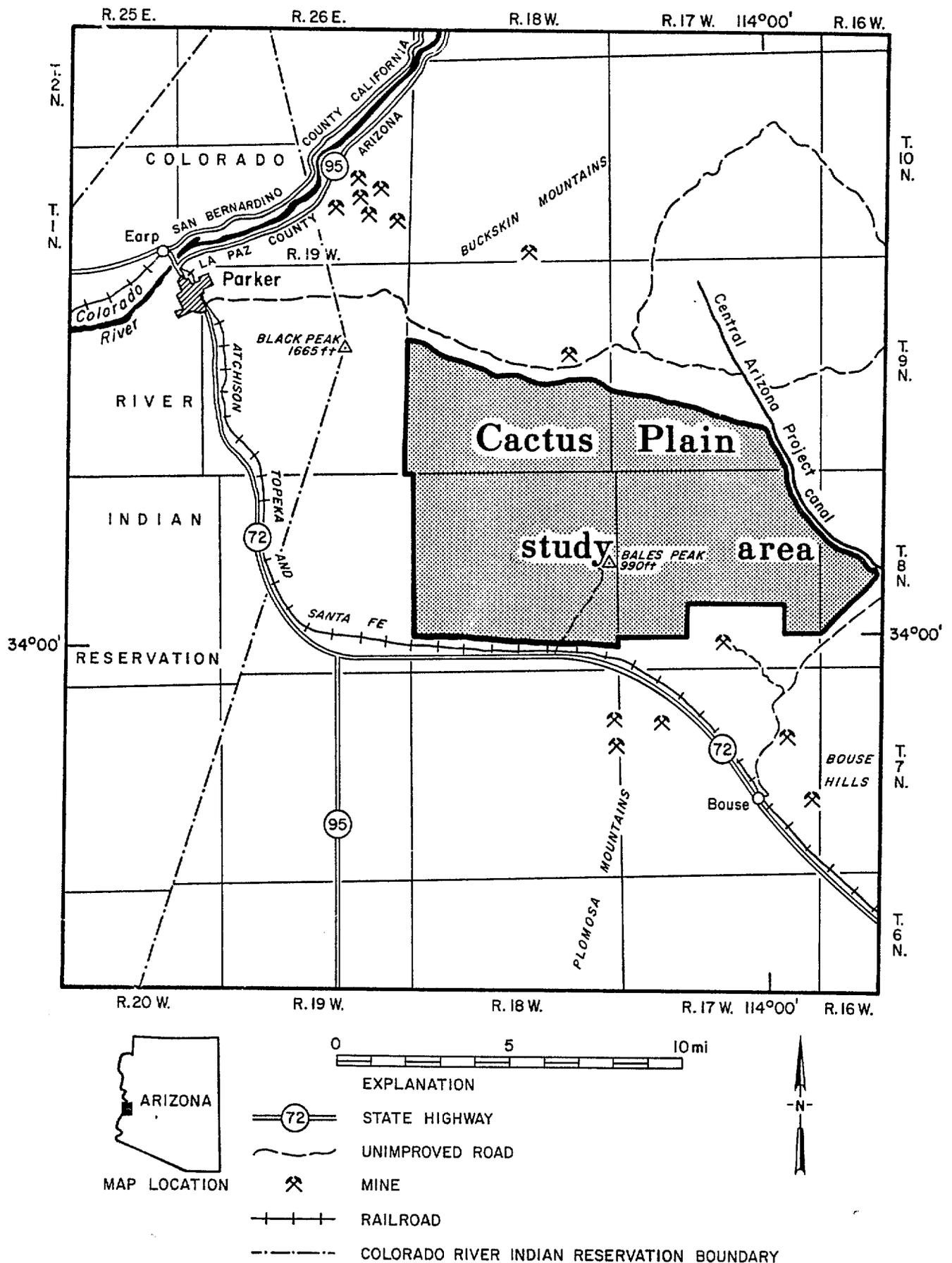


Figure 1.--Index map of the Cactus Plain study area, La Paz County, Arizona.

dunes stabilized by desert vegetation, primarily grasses. The sand dunes are underlain by Tertiary and Quaternary 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 District Office in Yuma and the resource area office in Lake Havasu City, Arizona.

Field work, completed in 12 employee-days, consisted of a search for mines and prospects (none were found in the study area) and examining and sampling rock outcrops and unpatented mining claims in and near the study area. Nine samples were taken, five outcrop, two stream sediment, one panned concentrate, and one dune sand. Three of the samples were analyzed for gold and silver by fire assay and five by inductively coupled plasma-atomic emission spectroscopy for copper, lead, zinc, barium, and arsenic. The dune-sand sample was analyzed for silica and other elements that affect the suitability for glass manufacture and other industrial uses. Complete analytical data are available for inspection at the U.S. Bureau of Mines, IFOC, Building 20, Denver Federal Center, Denver, CO 80225.

#### Mining activity

The Cactus Plain study area is not included in any mining district; however, four districts are proximate to it (pl. 1). The Cienega mining district (0.5 mi north) produced gold, silver, copper, and minor lead from ore

occurring as replacement pockets in partially metamorphosed Paleozoic and Mesozoic limestones, shales, and quartzites, which locally underlie thrust Precambrian metamorphic rocks. The Santa Maria mining district (4 mi northeast) produced gold, silver, and copper from ore occurring in massive to lensing iron-oxide replacement bodies in Paleozoic carbonate rocks. The Midway mining district (4 mi east) is characterized by gold, silver, and copper in spotty deposits along faults and fractures in Paleozoic limestones. The Plomosa mining district (0.5 mi south) contained deposits of gold, silver, copper, lead, zinc, manganese, and barite in veins and irregular bodies in Paleozoic and Mesozoic sedimentary rocks and volcanic rocks of possible Cretaceous or Tertiary age. Mining in these districts occurred from within 0.5 mi to 12 mi of the study area. (See Keith, 1978.) Table 1 summarizes the production history of the districts. As of September 1986, mines within 4-5 mi of the study area were inactive.

Table 1.--Summary of production data for nearby mining districts.

[All data from Keith, 1978. Gold and silver given in ounces, copper, lead, and zinc given in tons. Symbols used: Mn, manganese; --, not applicable; <, less than.]

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

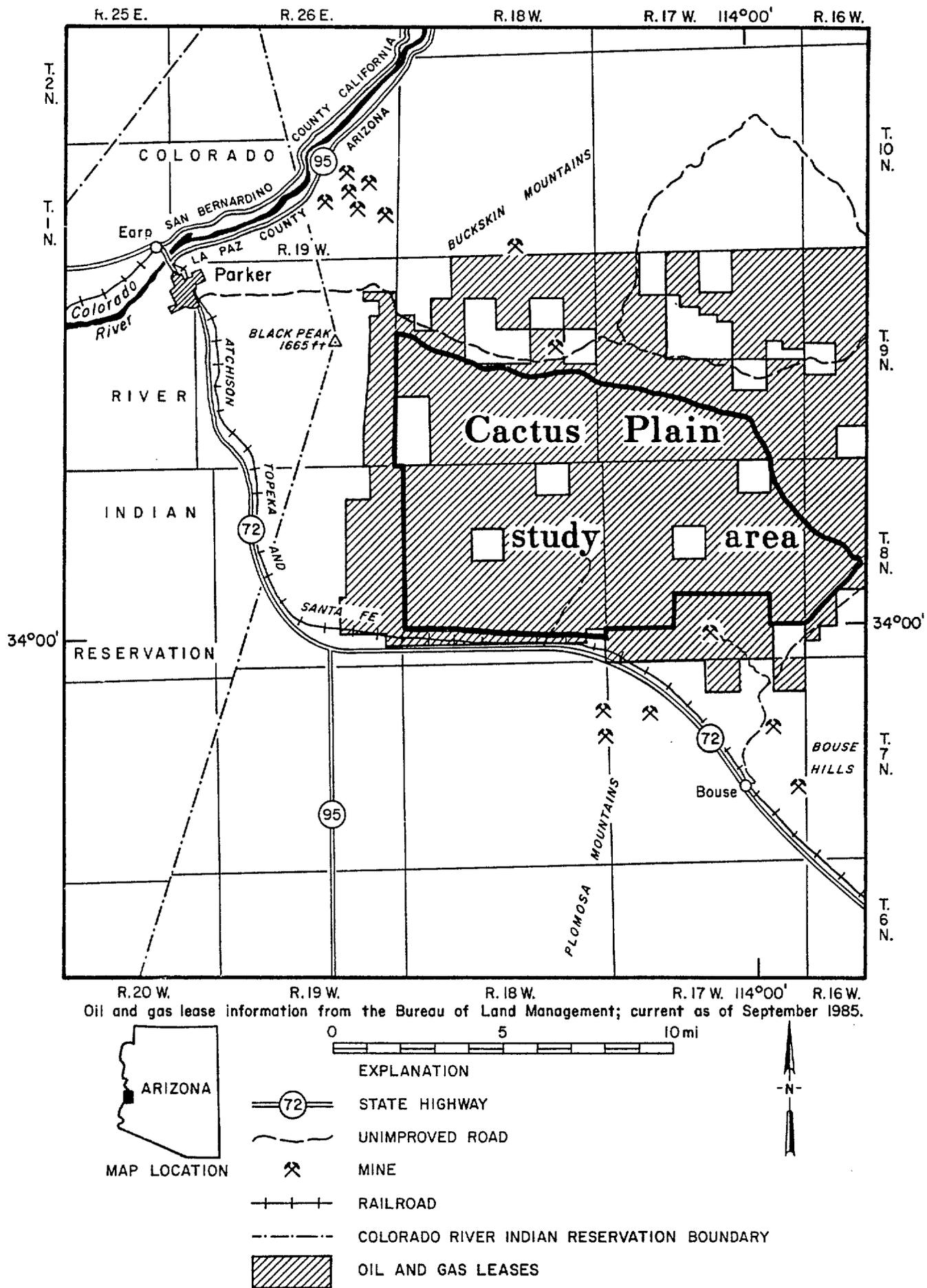


Figure 2.--Oil and gas leases in and near the Cactus Plain study area.

Mining claims have been staked near the study area in the Cienega and Plomosa mining districts, and at least eight claims have been staked on Black Peak just outside the western boundary. Fifteen unpatented claims are listed in the BLM claim recordation files as being within the study area. (See pl. 1.) There was no visible evidence of any recent activity on any of the claims.

#### Energy resources

About 50,000 acres of the 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 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 or tested, but in 1985, Petty-Ray Geophysical Co. ran a seismic line a few miles north and east of the area; the results are company confidential.

#### RESOURCE APPRAISAL

No metallic mineral resources were identified in the study area. The Cenozoic volcanic and sedimentary rocks that crop out inside the study area bear no signs of mineralization. Samples taken in and near the study area contained insignificant amounts of gold, silver, copper, lead, and zinc, except for sample 1. This sample, which is from outside the study area, contained several times the background level of lead and zinc (table 2).

Barium and arsenic values in the three basalt and two sandstone samples were higher than the average for their respective rock types. Sample values

ranged from 1,200 to 8,000 ppm barium and 30 to 50 ppm arsenic (the 130 ppm value for sample 7 is suspect). Average contents for similar rock types are: barium, 250 ppm for basalt and 10-100 ppm for sandstone; arsenic, 2 ppm for basalt and 1 ppm for sandstone. (See Levinson, 1980, p. 864-865.)

Table 2.--Data for samples 1-8 from the Cactus Plain study area.

[Gold and silver determined by fire assay, all other elements by inductively coupled plasma-atomic emission spectroscopy. Symbols used, --, not detected; na, not analyzed; <, less than given value; oz/st, ounces per short ton; ppm, parts per million.]

Sample no.	Au oz/st	Ag	Cu	Pb	Zn ppm	Ba	As	Description
1	na	na	30	400	500	3700	50	Iron-stained sandstone and conglomerate.
2	--	--	na	na	na	na	na	Material from wash draining Black Peak.
3	na	na	7.9	32	180	8000	30	Iron-stained sandstone and conglomerate.
4	--	0.1	na	na	na	na	na	Material from wash draining east side of Black Peak.
5	--	--	na	na	na	na	na	Panned concentrate from same locality as sample 4.
6	na	na	41	<10	120	3700	32	Scoriaceous basalt, capped by stromatolitic limestone.
7	na	na	21	27	31	6200	130	Do.
8	na	na	6.9	<10	170	1200	30	Do.

Barium is highly mobile in mineralizing systems and is often a pathfinder element for lead-zinc-silver deposits. Being mobile, it often forms a barite halo extending up to several miles from the deposit. (See Levinson, 1980, p. 865.) In the northern part of the Plomosa district, barite, a barium mineral, is a common byproduct in the silver-copper-lead-zinc ores, and barite also occurs with fluorite in volcanic agglomerate south of the study area in sections 34 and 35, T. 8 N., R. 17 W. (pl. 1, Black Mountain Barite). Thus, the barium enrichment is most likely an alteration halo related to the mineralization that took place in the Plomosa district. The Black Mountain barite deposit (currently unclaimed) is restricted to Black Mountain and does not extend into the study area. No evidence of a barite deposit was found in the study area.

Arsenic can be used as a pathfinder element often associated with deposits of gold, silver, copper, and zinc (Levinson, 1980, p. 864-865), all of which have been produced from the nearby mining districts, particularly the Plomosa. As with barium, arsenic enrichment is probably an alteration halo surrounding the deposits in the northern Plomosa mountains and possibly those in the other districts as well.

The barium and arsenic alteration patterns indicate that similar base- and precious-metal deposits may underlie the study area, but extensive and costly subsurface exploration would be necessary to test this speculative theory.

Analysis of a dune sand sample from the southern part of the study area 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, there is no local market for these materials, and high transportation costs preclude shipment of the material very far.

Table 3.--Analytical results for the dune sand sample from the Cactus Plain study area.

[All determinations by inductively coupled plasma-atomic emission analysis.]

Sample no.	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub> percent	Fe <sub>2</sub> O <sub>3</sub>	Cr	Co	Ti
				parts per million		
9	90.2	4.5	1.6	180	9.1	1200
average glass sand <sup>2</sup>	98.5	.1	.02	6	<2	150

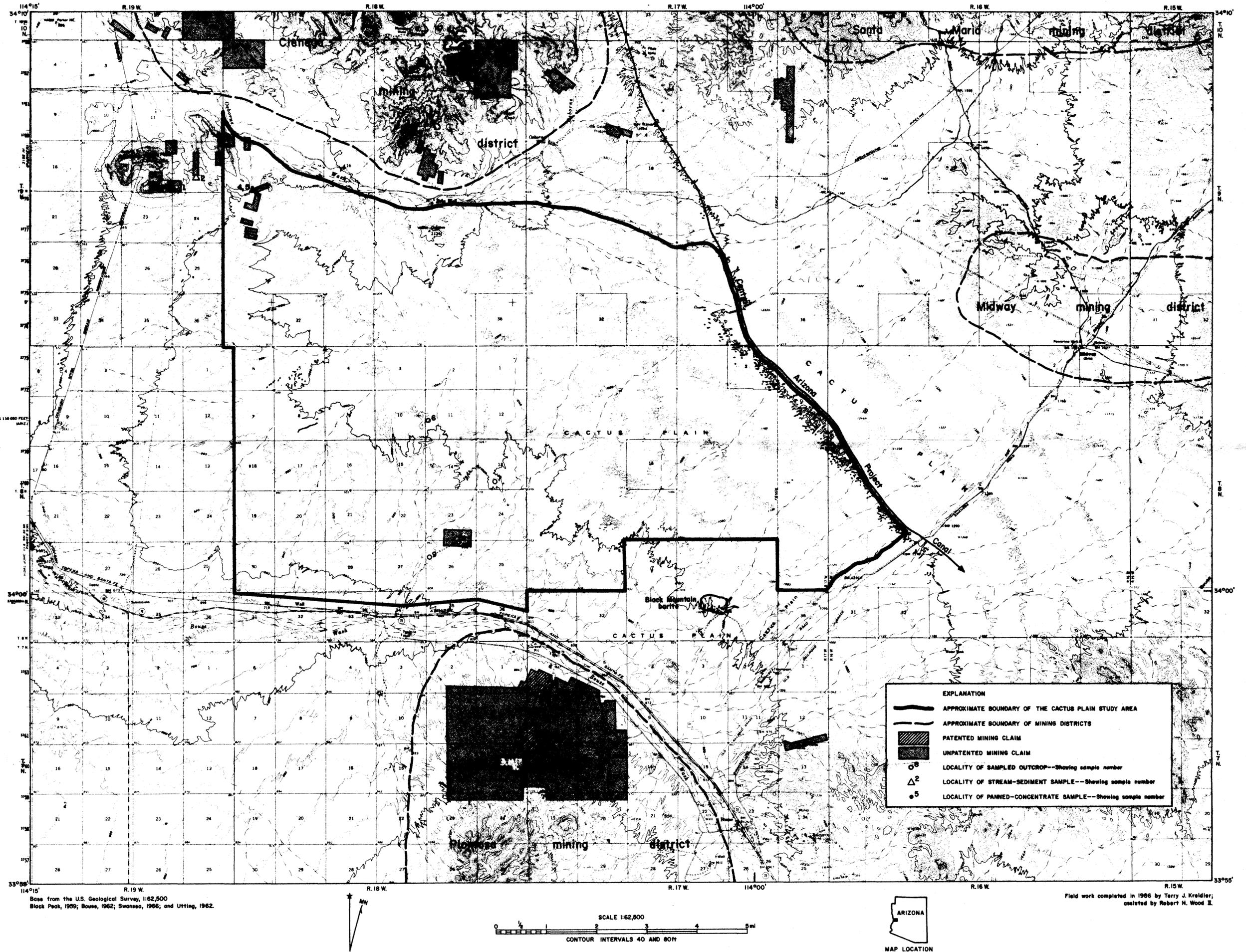
<sup>2</sup> from Coope and Harben, 1977, p. 16.

#### CONCLUSIONS

The Cactus Plain study area contains no known metallic mineral resources. Rock outcrops inside the area are enriched in barium and arsenic. Although barite, a barium mineral, has been mined just south of the area and occurs as an accessory mineral in ores from the Plomosa mining district, no evidence for a barite deposit was found in the study area. Arsenic can be used as a pathfinder element for deposits of gold, silver, copper, and zinc, all of which occur north and south of the study area and may underlie the sand dunes, but subsurface data are lacking. The sand is useable in several industrial applications such as foundry, fracturing, and abrasive sand, but this high-volume, low-unit-value commodity can not be shipped any distance profitably.

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**SAMPLE LOCALITY AND MINING CLAIM MAP OF THE CACTUS PLAIN STUDY AREA, LA PAZ COUNTY, ARIZONA**

BY  
**TERRY J. KREIDLER, U.S. BUREAU OF MINES**

1986