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Mineral Land Assessment
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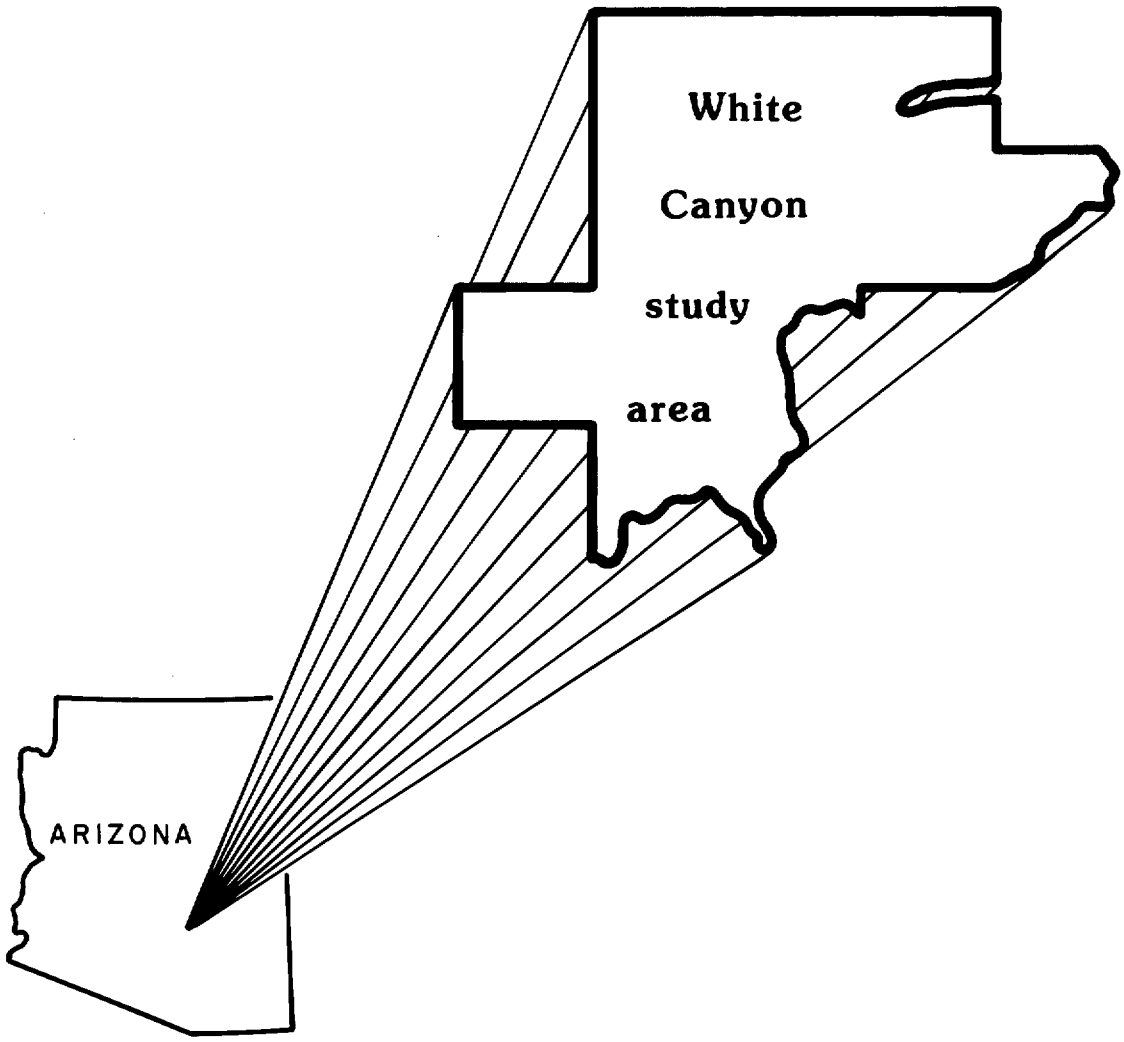
Mineral Investigation of the White Canyon study area, Pinal County, Arizona



BUREAU OF MINES
UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL INVESTIGATION OF THE WHITE CANYON STUDY AREA (AZ-2-187), PINAL COUNTY, ARIZONA

by

David C. Scott and John R. McDonnell, Jr.

MLA 23-89

Intermountain Field Operations Center,
Denver, Colorado

UNITED STATES DEPARTMENT OF THE INTERIOR
Manuel Lujan, Jr., 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 the White Canyon Study Area (AZ-2-187), Pinal 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 Resource Evaluation Branch, Intermountain Field Operations Center, Building 20, Denver Federal Center, Denver, CO 80225.

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

°	degree
ft	foot
mi	mile
ppm	part per million
%	percent
lb	pound
oz/st	troy ounce per short ton

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SUMMARY

In June 1989, the Bureau of Mines conducted a mineral investigation of the 6,968-acre White Canyon study area, Pinal County, Arizona. Bureau personnel investigated mines, prospects, and mineralized areas in and near the area to appraise reserves and identified mineral resources. Forty-eight samples were taken in and near the study area.

Approximately 90% of the study area is covered by Tertiary-age sedimentary and volcanic rocks that are devoid of near-surface mineral occurrences. Although no mineral resources were identified in the surface rocks, mining districts adjacent to the study area contain deposits of copper, gold, lead, silver, and zinc in Whitetail Conglomerate and Pinal Schist, rock units that occur at depth in the study area. Asarco, Inc. verified this by finding copper sulfide mineralization in several holes drilled into the Whitetail Conglomerate and Pinal Schist along the southeastern study area boundary and also in a hole drilled in the study area in sec. 23, T. 3 S., R. 12 E. In addition, Asarco has identified three major copper deposits within 1 mi of the southeastern boundary of the study area. The Copper Butte Mine with proven mineable reserves of 22,000,000 tons of ore containing 1.09% copper. The Buckeye East deposit has a proven tonnage of 20,000,000 tons of ore containing 0.65% copper, and projections indicate an additional 20,000,000 tons. The Buckeye West deposit, which has not been thoroughly defined, but covers a large area, is one of the reasons for Asarco's speculation that a world class

porphyry copper deposit may exist in the area north of Buckeye West.

Elevated concentrations of copper in bulk stream-sediment samples, panned-concentrate samples, and samples of clasts containing secondary copper minerals from the Whitetail Conglomerate in the south-central part of the area suggest that copper occurs in the Whitetail Conglomerate throughout the region, including the study area. It is therefore possible that deposits similar to Copper Butte and Buckeye East exist at depth within the study area.

The San Luis Mine, 1/2 mi east of the study area, is developed on a vein deposit containing copper, gold, lead, silver, and zinc. The vein trends toward the study area and is in Pinal Schist, which also extends beneath the study area. If the structural features and mineralizing fluids continued along strike, similar deposits could be present beneath the study area.

Claimant Jim Shea reported that rhyolite on his claims in the western part of the study area contains as much as 0.038 ounces of gold per short ton of rock. A minor gold concentration was detected in a panned-concentrate sample taken by the Bureau from a drainage whose catchment area is on the claims and in the study area. One other panned-concentrate sample taken from a drainage in the northern part of the study area also contained a gold concentration. The source of the gold is probably altered and mineralized zones in the Sleeping Buffalo Rhyolite, which is exposed in the study area.

Perlite occurs in the Sleeping Buffalo Rhyolite in the northern part of the study area in White Canyon. Similar material is used in construction, industry, and agriculture, but the perlite in the study area contains many impurities and is remote from any market. The location of the occurrences prohibits it from any commercial interest.

INTRODUCTION

In June 1989, the Bureau of Mines conducted a mineral investigation of the 6,968-acre White Canyon study area, Pinal County, Arizona, on lands administered by the Phoenix District Office of the Bureau of Land Management (BLM). The area was recommended for further study in Senate Bill S.1080-Arizona Wilderness Act of 1989. The Bureau of Mines surveyed and studied mines, prospects, and mineralized areas to appraise reserves and identified mineral resources. Based on field observations, regional and detailed geologic mapping, and sample data, the Bureau identified other areas that may have mineral resources in the White Canyon study area.

Geographic setting

The study area encompasses part of the Mineral Mountains in the Basin and Range physiographic province, southeastern Arizona. Kearny, Arizona, is about 12 mi southeast of the area, and Superior is 7 mi to the north (fig. 1). Access to the area is from State Highway 177 between Superior and Kearny. Four-wheel-drive roads and trails from Highway 177 follow the area boundaries and provide access to the interior. The area is bounded on the north by the Tonto National Forest and is about 2 mi west of Asarco's Ray Mine, a major open-pit copper mine.

Topography in the study area is characterized by the deeply incised north-south White Canyon, which essentially bisects the area. Elevations range from about 1,900 ft in the southern part of the area to 4,053 ft in the northeastern corner; vertical relief in White Canyon is about 800 ft. Another major topographic feature is the Rincon, a large amphitheater towering 600 to 1,000 ft above the outwash plain along the southern boundary of the study area.

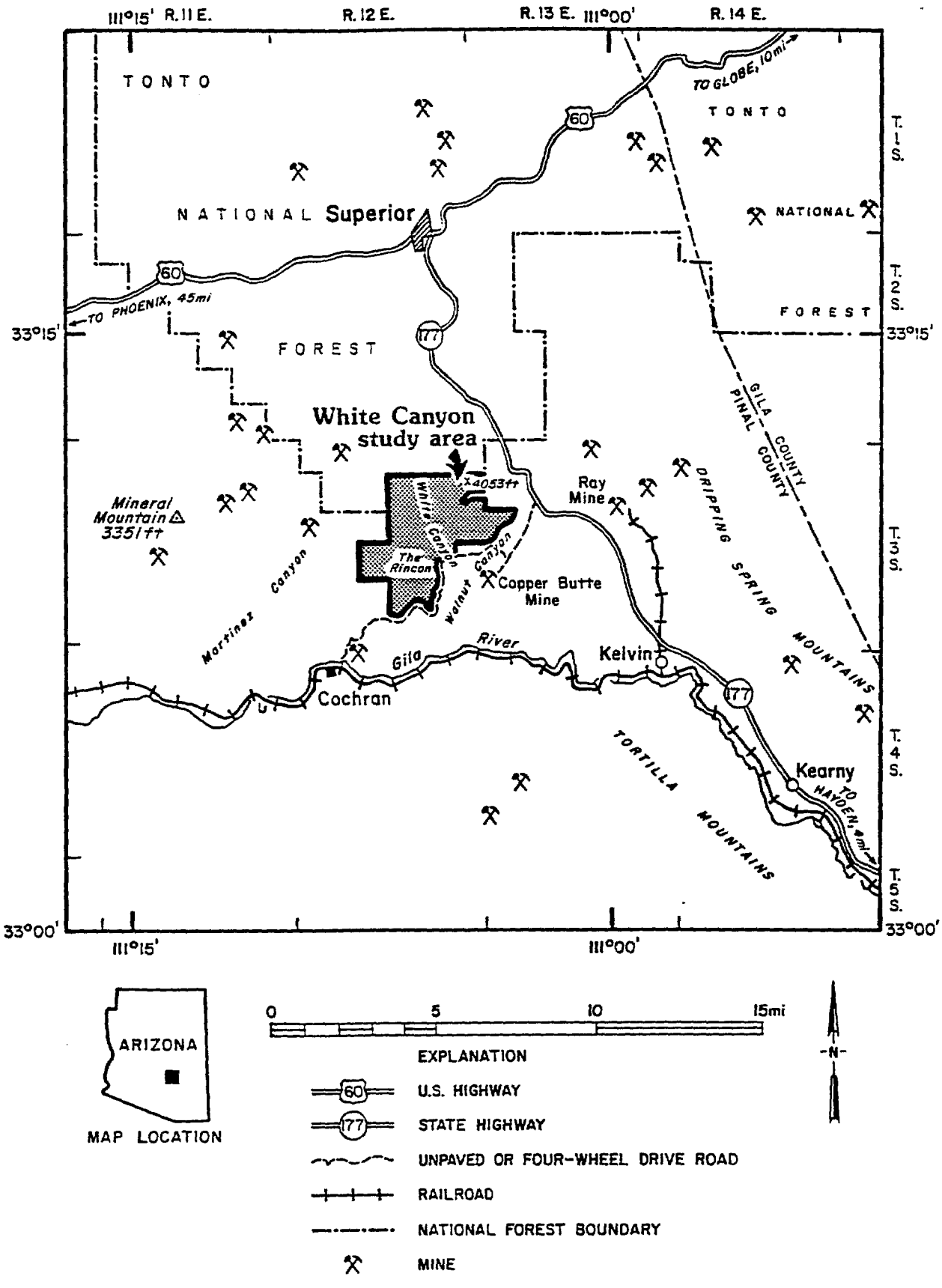

Figure 1.--Index map of the White Canyon study area, Pinal County, Arizona.

Previous investigations

A geologic map of the Teapot Mountain quadrangle, which includes about 95% of the study area, was completed by Creasey and others (1983). A preliminary geologic map of the Mineral Mountain quadrangle, which includes the remaining 5% of the study area, was done by Theodore and others (1978). Results of a mapping project near Ray, Pinal County, Arizona, which includes the study area,were reported by Stanley B. Keith (1983). Metallic mineral districts adjacent to the study area were reported by Keith and others (1983). Many reports have been written about the geology and mineralization adjacent to the study area. A bibliography for these reports was compiled by Welty and Schnabel in 1989. Kennecott Copper Corp. (prior to the purchase of their interest in the area by Asarco, Inc.) conducted extensive geologic investigations in the vicinity of the study area (private company data).

Methods of investigation

A review of pertinent literature on geology, mineralization, and mining activity was completed prior to a field examination. Mining claim records were researched and those claims recorded with the BLM as of June 1989 are shown on figure 2. BLM oil and gas lease records as of June 1989, were also examined. Leases cover all 12 sections that include the study area.

Two Bureau geologists spent 9 days conducting a field investigation of the study area. Accessible mine workings were surveyed by the compass-and-tape method and sampled. A total of 48 samples was taken, including 18 rock-chip samples, 15 bulk stream-sediment samples, and 15 panned-concentrate samples. Stream-sediment and panned-concentrate samples were taken at the same site in secondary drainages. Each sample site is defined by one sample number, and includes the bulk stream-sediment and panned-concentrate sample. Both types

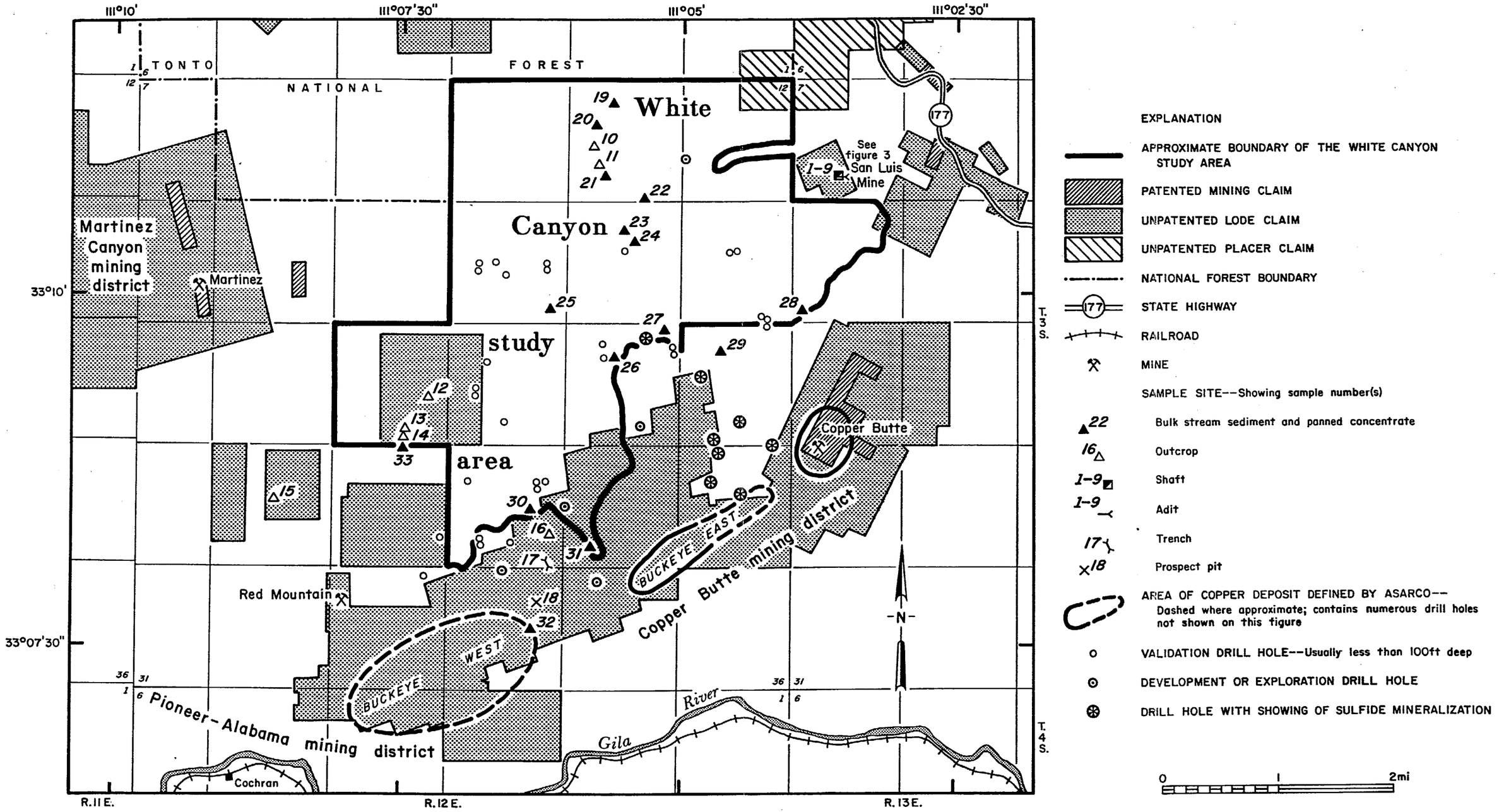

Figure 2.--Mining activity in and near the White Canyon study area, Pinal County, Arizona (modified from Arizona Mining Association, 1989).

of samples were screened to minus-16 mesh in the field and then pulverized in the lab before assay. The panned-concentrate samples were panned down from the screened material in the field. All samples were analyzed by inductively coupled plasma-atomic emission spectroscopy for a suite of nine elements and by fire assay/atomic absorption spectroscopy for gold. All analyses were performed by Skyline Labs., Denver, CO. (See tables 1-3.)

Acknowledgements

The Bureau of Mines thanks Jim Shea, San Juan Capistrano, California, for supplying data on samples and other information about his mining claims. Ed John of Asarco, Inc. (Kearny, Arizona) aided the investigation by supplying drill hole data, assay results, and other data that Asarco had on file. H. H. Hoodenpyle of Kearny, Arizona, also supplied valuable information concerning his mine.

GEOLOGIC SETTING

The Precambrian-age Pinal Schist is the oldest rock unit in the study area (Creasey and others, 1983). The schist crops out in the very northeastern part of the study area and drill hole data from Asarco, Inc. indicates that this schist is also the basal unit underlying the entire study area. This unit hosts much of the mineralization at the Ray Copper Mine, 2 mi east. Ruin Granite is a coarse-grained porphyritic rock of Precambrian age that intruded the Pinal Schist. No exposures of this unit were seen in the study area. The contact between Ruin Granite and Pinal Schist extends from the Gila River at the southwestern part of the study area to the Ray Copper Mine to the east of the study area. This contact may have controlled the location of the igneous intrusive rocks that generated the Ray copper deposit (Ed John, Geologist, Asarco, oral commun., June 1989).

Outside the northern part of the study area, the Apache Group consists of steeply dipping sedimentary beds intruded by diabase dikes and sills; Paleozoic-age limestone is present locally (Ed John, oral commun., 1989). These rocks, which also host mineralization at the Ray Copper Mine, are not exposed in, but underlie, the study area beneath younger Tertiary rocks.

The Granite Mountain Porphyry is exposed outside the eastern boundary of the study area and extends beneath the area (Creasey and others, 1983). Ed John (oral commun., 1989) suggested that this porphyry is the igneous intrusion that created the hydrothermal system responsible for deposition of the Ray copper deposit.

About 90% of the White Canyon study area is covered by Tertiary-age sedimentary and volcanic rocks. The oldest unit is the Whitetail Conglomerate, which consists of alternating beds of well-indurated coarse sandstone, pebble conglomerate, and boulder conglomerate (Creasey and others, 1983). Clasts in the conglomerate range from angular to rounded and consist of all regionally exposed older formations. Ed John (oral commun., 1989) suggested that a deep canyon was cut along the southeastern edge of the study area and filled with Whitetail Conglomerate. The conglomerate consists of debris flows containing mineralized and partially oxidized material that came from a leached-capping, secondary enrichment blanket of a nearby porphyry copper system (Ed John, oral commun., 1989).

The Apache Leap Tuff overlies the Whitetail Conglomerate and is part of an extensive ash-flow sheet that consists of nonwelded to welded tuff ash flow. An Older Tuff unit, which overlies the Apache Leap Tuff consists of well-bedded water-deposited tuff. The youngest volcanic rock in the study area is the Sleeping Buffalo Rhyolite, which ranges from intrusive to flow and

includes agglomerates, glass breccias, autobreccias, distorted flow layering, and gas-rich phases that produced pumice. Flows are locally glassy, perlitic, devitrified, and microcrystalline. The rhyolite is porphyritic and glomeroporphyritic; clusters of felsic phenocrysts are common. (See Creasey and others, 1983.)

No major fault systems are exposed at the surface. Thrust faults have been mapped north of the study area and were shown to extend beneath the northern part of the area (Creasey and others, 1983). Ed John (oral commun., 1989) also suggested that the thrust fault may extend beneath the Quaternary gravels covering the northern part of the study area. This type of fault is known to provide conduits for mineralizing fluids throughout Arizona and could have introduced similar mineralization into the underlying strata.

MINING DISTRICTS AND HISTORY

The White Canyon study area is almost entirely surrounded by mining districts. Perlite, an industrial commodity, is being mined several miles north, but no activity has taken place in the study area. The Mineral Creek mining district is about 2 mi east and includes the operating Ray Mine. From 1905 to 1981, production from the district totalled 5,591,950,000 lb of copper, 57,900 oz of gold, 12,122,000 lb of lead, 8,789,000 oz of silver, and 285,000 lb of zinc (Keith and others, 1983, p. 36). The Ray copper deposit occurs in the Pinal Schist, Apache Group, and Granite Mountain Porphyry.

The Pioneer-Alabama mining district is along the southwestern boundary of the study area (fig. 2). In the district, copper occurs in Paleocene porphyry in Pinal Schist. There is no reported production from the district (Keith and others, 1983, p.15), but a sufficient amount of workings are present to suggest some production has taken place.

The Martinez Canyon mining district is 1 to 2 mi west of the study area (fig. 2). From 1923 to 1971, production from the district totalled 91,000 lb of copper, 2,363,000 lb of lead, and 167,000 oz of silver (Keith and others, 1983, p. 34). Mineral occurrences are in middle Tertiary veins associated with rhyolitic volcanic rocks and plugs.

The Copper Butte mining district is adjacent to the southeastern boundary of the study area and includes the Copper Butte Mine and Buckeye deposits (fig. 2). From 1901 to 1968, production from the district totalled 9,155,000 lb of copper, 500 oz of gold, 2,000 lb of lead, and 5,000 oz of silver (Keith and others, 1983, p. 22). At the mine, copper occurs as secondary copper minerals surrounding clasts in the Whitetail Conglomerate.

Kennecott Copper Corp. undertook extensive drilling and geologic work in the Copper Butte district on the large claim block that extends along the southern study area boundary. The properties have since been purchased by Asarco, Inc. and their plans include development of the Copper Butte Mine. Asarco has calculated proven mineable reserves at Copper Butte of 22,000,000 tons of 1.09% copper ore. Recovery of copper from the deposit will be by a leaching process (Ed John, oral commun., 1989).

Asarco company data reported copper sulfides in a drill hole in NE 1/4 sec. 23, T. 3 S., R. 12 E., inside the southeastern boundary of the study area (fig. 2, near sample site 27). The drill hole was collared in Whitetail Conglomerate and bottomed in Pinal Schist at 1,312 ft and suggests that the Whitetail Conglomerate and Pinal Schist in the study area could contain mineral occurrences similar those at Copper Butte and Buckeye East.

The Buckeye East deposit is about 1 mi southwest of the Copper Butte Mine and is considered the faulted and folded continuation of the Copper Butte

deposit. Asarco has calculated a proven tonnage of 20,000,000 tons of rock containing 0.65% copper and projects an additional 20,000,000 tons for a potential resource of 40,000,000 tons (Ed John, oral commun., 1989).

The Buckeye West deposit is about 1 mi southwest of Buckeye East and exhibits copper sulfide enrichment in Pinal Schist. This deposit covers a large area and is one of the reasons for Asarco's speculation that world class porphyry copper deposition may have taken place in the covered rocks to the nor th of the Buckeye West deposit. Mineralization is secondary enrichment of copper within a large, low-grade system (Ed John, oral commun., 1989).

Claims in the vicinity of the study area and on file with the BLM as of June 1989, are shown on fig. 2. No evidence of any current mining activity, other than prospecting, was found in the study area.

RESULTS OF INVESTIGATION

Deposits containing copper, gold, lead, silver, and zinc occur in mining districts adjacent to the study area and in rock units that extend beneath the study area. Rock-chip, bulk stream-sediment, and panned-concentrate samples were taken to see if similar mineralization occurred near the surface in the study area. Samples are discussed by type and location below.

Rock-chip samples

Eighteen rock-chip samples were taken in and near the study area. Nine of those were taken from the San Luis Mine, about 1/8 mi east of the northeast boundary of the area (fig. 2, nos. 1-9; fig. 3). The mine, on unpatented mining claims owned by H. H. Hoodenpyle of Kearny, AZ, consists of an adit (350 ft long) and a shaft to the surface. The adit was driven in Pinal Schist on a N. 73° E.-striking, 70° NW-dipping fault, ranging from 1 ft to about 10 ft in width. The fault contains a vein as thick as 1/2 ft; the vein contains

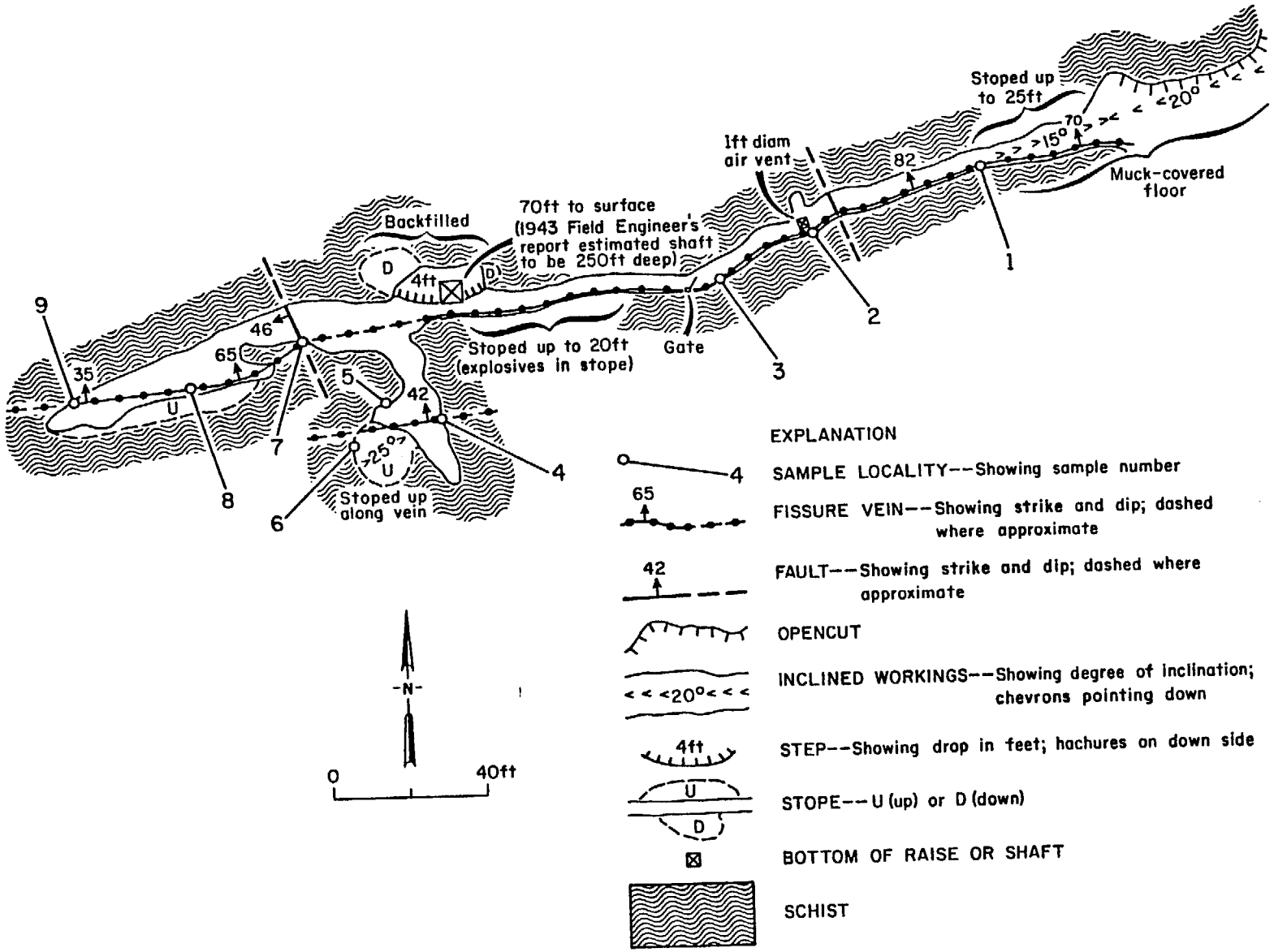

Figure 3.--San Luis Mine, showing sample localities.

bornite, chalcopyrite, galena, pyrite, and sphalerite in a quartz matrix. Vein samples contained as much as 0.80 ppm (0.023 oz/st) gold, 370.0 ppm (10.79 oz/st) silver, 0.075% copper, 11.9% lead, and 9.55% zinc (table 1, nos. 1-9).

The fault and vein trend toward the study area, but they cannot be traced on the surface due to lack of exposure. The Pinal Schist host rock, however, does extend beneath the study area, and if the structural preparation and mineralizing fluids continued along strike, similar deposits could be present at a minimum depth of 200 ft within the study area.

Three outcrop samples were taken from a claim block in the western part of the study area in sec. 21, T. 3 S., R. 12 E. (fig 2, nos. 12-14). Jim Shea, San Juan Capistrano, CA, owner of the claims, reported that the claims were staked for gold because gold concentrations in samples that he took were as much as 0.038 oz/st. Bureau rock samples did not contain unusual concentrations of any metals, but a gold anomaly was found in a panned-concentrate sample from a drainage crossing the claims (table 3, no.33). The gold may be in the Sleeping Buffalo Rhyolite. Another sample (no. 15) was taken on Shea's Nugget claims in sec. 29, just outside the study area, but no unusual concentrations of any metal were detected.

One sample (no. 17) was taken from a small trench about 1/2 mi south of the study area in sec. 27, T. 3 S., R. 12 E. The trench is on Asarco's unpatented claims and was dug in clayey alluvium of the Whitetail Conglomerate. Although no mineralized rock is visible in the trench, 0.076% copper was detected in the sample. It is probable that malachite-stained clasts were found in the float at this location and the trench was dug in search of outcrop because the Bureau found several malachite-stained clasts in

the general vicinity (one sample was taken, table 1, no. 16, and assayed 2.65% copper). The presence of these clasts supports the idea that the Whitetail Conglomerate has copper mineralization outside the Copper Butte area.

Perlite was found in the northern half of the study area in White Canyon and occurs in the Sleeping Buffalo Rhyolite. The perlite crops out in large masses in the bottom of the drainage, is dark gray, and appears to contain abundant impurities. Perlite is an industrial commodity used in construction as insulation, concrete aggregate, plaster, tile, and wallboard; in industry as a filter and additive medium; and in agriculture as a soil conditioner and c hemical carrier. The estimated quality, which would probably have to be upgraded for production, and the remote location of this material suggest that it would not be ecomomic to develop commercially. Two samples of the perlite were taken (fig. 2 and table 1, nos. 10-11), and analyses are being performed for a later edition of this report.

Stream-sediment samples

Fifteen bulk stream-sediment samples that were taken from washes that drain the study area represent erosional material from within the drainage. Samples from drainages in the Rincon area (southwestern part of the study area) had elevated copper concentrations (fig. 2 and table 2, sites 30-32). The drainages contain material from the Whitetail Conglomerate, and the elevated copper concentrations suggest a copper source in the study area within the Whitetail Conglomerate.

Panned-concentrate samples

Fifteen panned-concentrate samples were taken in conjunction with the bulk stream-sediment samples to check for heavy-mineral concentrates. The concentrates from drainages in the Rincon area also had elevated copper

concentrations (fig. 2 and table 3, sites 30-32); two samples also contained anomalous gold concentrations (fig. 2 and table 3, sites 21 and 33). The elevated copper concentrations were in samples from drainages that contain material from the Whitetail Conglomerate, and suggest that copper mineralization occurred in the study area within the Whitetail Conglomerate. The gold concentrations were in samples from drainages in the Sleeping Buffalo Rhyolite in the northwestern corner and western part (Shea's claim group) of the study area.

CONCLUSIONS

About 90% of the area is covered by Tertiary-age sedimentary and volcanic rocks. The study area is surrounded by mining districts and lies within a highly mineralized part of Arizona. Asarco, Inc. has defined three large copper deposits along the southeastern edge of the study area: the Copper Butte Mine with proven mineable reserves of 22,000,000 tons of ore containing 1.09% copper; the Buckeye East deposit with 20,000,000 tons of ore containing 0.65% copper and another 20,000,000 tons projected; and the Buckeye West, which is viewed by Asarco as a possible world class copper deposit. The same rocks that host these deposits are present in the subsurface of the study area and could contain similar copper deposits.

Analytical data from rock-chip, bulk stream-sediment, and panned-concentrate samples suggest that copper occurs in the Whitetail Conglomerate throughout the study area. Deposits similar to Copper Butte and Buckeye East could exist at depth within the study area.

The survey of the San Luis Mine, just east of the study area, suggests that vein occurrences of copper, gold, lead, silver, and zinc, could be present in Pinal Schist beneath the eastern part of the study area.

Anomalous gold concentrations were detected in sediment samples from two drainages in the study area. The gold is probably from the Sleeping Buffalo Rhyolite, which is exposed in the northwestern and western parts of the study area.

Perlite occurs in the northern half of the study area. Although no analyses were available at the time of this report, abundant impurities can be seen in the perlite, and the material would probably have to be upgraded for production. Even if the perlite is of useable quality, and if sufficient tonnage is available, the remoteness of the occurrences would prohibit any near future commercial development.

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Table 1.--Analytical data and description of rock-chip samples from in and near the White Canyon study area, Pinal County, Arizona.

[Au was determined by fire assay/atomic absorption spectroscopy; all elements were determined by inductively coupled plasma-atomic emission spectroscopy. <, less than; ppm, part per million; Au, gold; As, arsenic; Co, cobalt; Cu, copper; Mo, molybdenum; Ni, nickel; Pb, lead; Ag, silver; Zn, zinc; Random, random chips of rock that make up sample; ---, not assayed at time of report.]

Sample		Assay data								
No.	Length (ft)	Au	Ag	Co	Cu	Mo	Ni	Pb	Zn	Description
		(ppm, unless otherwise indicated								
1	1.7	0.38	370.0	35	0.075%	240	60	0.46%	1.70%	San Luis Mine; N. 73° E.-striking, 70° northern-dipping fissure vein; calcite, limonite stain; Pinal Schist.
2	2.0	.03	4.9	35	.066%	12	50	.19%	.066	Do.
3	.5	.35	93.0	20	195	195	20	1.35%	1.35%	Do.
4	.8	.10	16.0	30	375	60	35	2.60%	1.75%	Do.
5	1.0	.80	140.0	25	320	215	20	11.9%	9.55%	San Luis Mine; same vein; bornite, chalcopyrite, galena, sphalerite.
6	1.0	.31	50.0	25	100	315	25	5.25%	1.25%	Do.
7	2.0	.05	5.9	25	100	110	35	.61%	.50%	Do.
8	1.0	.15	28.0	20	55	100	30	6.00%	1.90%	Do.
9	1.2	.05	19.0	30	125	26	50	2.95%	1.45%	Do.
10	Random	---	---	---	---	---	---	---	---	Dark gray perlite containing abundant clay inclusions.
11	do.	---	---	---	---	---	---	---	---	Do.
12	do.	<.01	.5	<5	10	4	<5	.066%	125	Sleeping Buffalo Rhyolite, minor limonite stain.
13	do.	<.01	.4	<5	30	2	10	95	60	Rhyolite breccia flow containing fragments of other volcanic rocks, minor limonite stain.
14	do.	<.01	.5	<5	55	2	10	75	160	Sleeping Buffalo Rhyolite, limonite stain.
15	do.	.01	1.1	<5	10	<2	5	25	75	Rhyodacite, no minerals observed.

Table 1.--Analytical data and description of rock chip-samples from in and near the White Canyon study area, Pinal County, Arizona--Continued.

[Au was determined by fire assay/atomic absorption spectroscopy; all elements were determined by inductively coupled plasma-atomic emission spectroscopy. <, less than; ppm, part per million; Au, gold; As, arsenic; Co, cobalt; Cu, copper; Mo, molybdenum; Ni, nickel; Pb, lead; Ag, silver; Zn, zinc; Random, random chips of rock that make up sample; ---, not assayed at time of report.]

Sample		Assay data								
No.	Length (ft)	Au	Ag	Co	Cu	Mo	Ni	Pb	Zn	Description
		(ppm, unless otherwise indicated								
16	Random	0.04	13.0	<5	2.65%	10	<5	15	10	Malachite-stained clast from the Whitetail Conglomerate.
17	do.	<.01	.4	10	.076%	18	20	50	155	Trench; weathered clays and muds in Whitetail Conglomerate.
18	do.	.02	.9	10	.51%	22	20	30	95	Pit; gravel, clay, minor malachite stain; Whitetail Conglomerate.

Table 2.--Analytical data and description of bulk stream-sediment samples from in and near the White Canyon study area, Pinal County, Arizona--Continued.

[Au was determined by fire assay/atomic absorption spectroscopy; all elements were determined by inductively coupled plasma-atomic emission spectroscopy. <, less than; ppm, part per million; Au, gold; As, arsenic; Co, cobalt; Cu, copper; Mo, molybdenum; Ni, nickel; Pb, lead; Ag, silver; Zn, zinc; Random, random chips of rock that make up sample; ---, not assayed at time of report.]

Sample Site	Au	Ag	Co	Cu	Mo	Ni	Pb	Zn	Description
	(ppm, unless otherwise indicated								
19	<0.01	0.3	10	35	<2	15	5	65	Drainage is in Sleeping Buffalo Rhyolite and Older Tuff unit.
20	<.01	.3	<5	25	<2	10	20	35	Do.
21	<.01	.2	<5	30	4	<5	15	25	Do.
22	<.01	.3	10	40	2	15	10	80	Do.
23	<.01	.3	5	<5	2	5	20	45	Do.
24	<.01	.3	10	25	<2	10	10	65	Do.
25	<.01	.3	<5	20	<2	<5	10	45	Drainage is in Older Tuff unit and Apache Leap Tuff.
26	<.01	.3	10	20	<2	5	10	40	Do.
27	<.01	.3	<.5	45	<2	<5	20	70	Drainage is in Older Tuff unit, Apache Leap Tuff, Whitetail Conglomerate, and Pinal Schist.
28	.01	.4	10	45	4	15	30	95	Drainage is in Whitetail Conglomerate and Pinal Schist.
29	<.01	.3	15	50	4	25	25	105	Do.
30	<.01	.4	10	210	6	15	25	110	Drainage is is Whitetail Conglomerate.
31	<.01	.3	10	65	4	<5	30	85	Do.
32	<.01	.4	10	75	4	10	20	70	Do.
33	<.01	.3	<5	10	2	<5	50	70	Drainage is is Sleeping Buffalo Rhyolite and Apache Leap Tuff.

Table 3.--Analytical data and description of panned-concentrate samples from in and near the White Canyon study area, Pinal County, Arizona--Continued.

[Au was determined by fire assay/atomic absorption spectroscopy; all elements were determined by inductively coupled plasma-atomic emission spectroscopy. <, less than; ppm, part per million; Au, gold; As, arsenic; Co, cobalt; Cu, copper; Mo, molybdenum; Ni, nickel; Pb, lead; Ag, silver; Zn, zinc; Random, random chips of rock that make up sample; ---, not assayed at time of report.]

Sample Site	Au	Ag	Co	Cu	Mo	Ni	Pb	Zn	Description
	(ppm, unless otherwise indicated)								
19	0.08	0.3	30	25	6	40	25	220	Drainage is in Sleeping Buffalo Rhyolite and Older Tuff unit.
20	.02	.3	10	20	<2	10	15	65	Do.
21	.59	.4	<5	30	6	<5	15	60	Do.
22	.03	.3	30	25	6	35	10	265	Do.
23	.04	.3	25	70	30	20	155	195	Do.
24	.01	4.2	25	20	6	20	20	230	Do.
25	.03	.3	25	45	8	10	50	295	Drainage is in Older Tuff unit and Apache Leap Tuff.
26	.02	.4	20	35	10	10	25	165	Do.
27	.01	.3	30	40	8	15	25	360	Drainage is in Older Tuff unit, Apache Leap Tuff, Whitetail Conglomerate, and Pinal Schist.
28	.06	.4	20	35	10	10	25	165	Drainage is in Whitetail Conglomerate and Pinal Schist.
29	.01	.7	25	45	6	50	65	210	Do.
30	.09	.5	30	150	16	25	100	360	Drainage is is Whitetail Conglomerate.
31	.01	.4	35	70	14	20	95	305	Do.
32	.03	.4	35	100	18	20	115	265	Do.
33	.21	.3	<5	20	2	10	20	70	Drainage is is Sleeping Buffalo Rhyolite and Apache Leap Tuff.