

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

**Mineral investigation of the North End Roadless area,
Cochise County, Arizona**

U.S. Bureau of Mines Mineral Land Assessment
MLA 1-83
1983

By
Bigsby, P.R.

This open file report summarizes the results of a Bureau of Mines wilderness study and will be incorporated in a joint report with the U.S. Geological Survey. The report is preliminary and has not been edited or reviewed for conformity with the U.S. Bureau of Mines editorial standards. Work on this study was conducted by personnel from Intermountain Field Operations Center, Building 20, Denver Federal Center, Denver, CO 80225.

*to be made for
Tucson*

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

MINERAL INVESTIGATION OF THE NORTH END ROADLESS
AREA, COCHISE COUNTY, ARIZONA

California Mining District

By
Philip R. Bigsby

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STUDIES RELATED TO WILDERNESS

The U.S. Bureau of Mines and U.S. Geological Survey jointly conduct mineral surveys of lands which, in the U.S. Forest Service Roadless Area Review and Evaluation (RARE II) program, have been designated for further planning. These evaluations are used in the RARE II program, which conforms with the Multiple-Use Sustained-Yield Act of 1960 (74 Stat. 215; 16 U.S.C. 528-531), the Forest and Rangeland Renewable Resources Planning Act of 1974 (88 Stat. 476, as amended; 16 U.S.C. 1601 note), and the National Forest Management Act of 1976 (90 Stat. 2949; 16 U.S.C. 1600 note). Reports on these surveys provide the President, Congress, the U.S. Forest Service, and the general public with information essential for determining the suitability of land for inclusion in the National Wilderness Preservation System.

This report is on the North End Roadless Area (03-112), Cochise County, Arizona.

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MINERAL INVESTIGATION OF THE NORTH END ROADLESS AREA
COCHISE COUNTY, ARIZONA

Philip R. Bigsby, U.S. Bureau of Mines

INTRODUCTION

During the spring and fall of 1979 the U.S. Bureau of Mines made a mineral investigation of the North End Roadless Area, including a literature search, a search of claim records in the Cochise County courthouse and the State office of the Bureau of Land Management, a search for mining claims and mineralized zones, and examination of known mines and prospects. Local residents and officials of mining companies the U.S. Forest Service, and Arizona State government agencies provided information regarding mining activity and mineral deposits.

Fifty-seven samples were taken for analysis. All samples were fire assayed for gold and silver and spectrographically analyzed for about 35 elements. Some samples were analyzed for copper and lead by atomic absorption. Complete analytical results are available for public inspection at the U.S. Bureau of Mines, Intermountain Field Operations Center, Denver Federal Center, Denver, Colorado 80225.

Location, size, and geographic setting

The North End Roadless area is on the north end of the Chiricahua Mountains, in Cochise County, southeast Arizona (fig. 1), and covers about 23,500 acres. Tucson is about 100 mi west and Willcox 30 mi northwest. The area is within the Coronado National Forest, and borders the north edge of Chiricahua National Monument.

South of the roadless area is the main mass of the Chiricahua Mountains, east is San Simon Valley, west is Sulphur Spring Valley, and northwest are the Dos Cabezas Mountains.

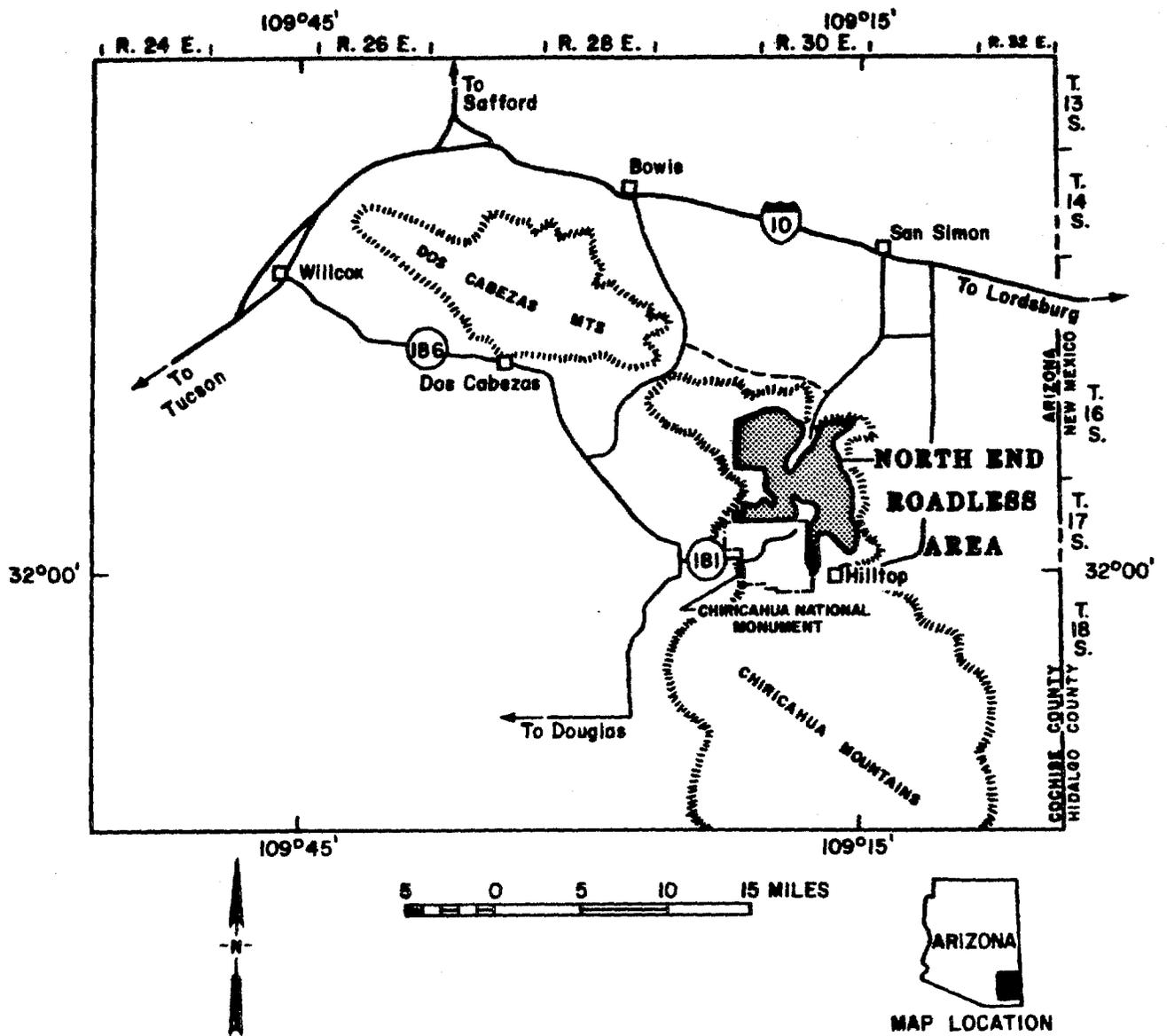


Figure 1.-Index map showing location of the North End Roadless Area, Arizona.

The Chiricahua Mountains are a typical "sky island" mountain range, with flanks rising to cool forested elevations, in contrast to the chaparral flats below. Within the Chiricahua Mountains, the North End area is a chain of narrow uplands and steep-sided valleys. Cochise Head, at 8,109 ft, is the highest point; the valley on the northeast boundary, at 4,800 ft, is the lowest. Local relief may exceed 2,000 ft.

Access to the west and south boundaries is from Arizona Highway 186 southeast from Interstate 10 at Willcox; the west boundary also is reached by dirt roads across private ranch land and the south boundary also by Arizona Highway 181 through Chiricahua National Mounument. The north side is approached from a jeep trail along the mountain front between the Bowie road and the San Simon road. Several trails to the east side lead from the San Simon road. Farther south, from the San Simon road, a dirt road follows East Whitetail Creek past the old Hilltop mine camp.

Mining activity

No recent mining activity was evident inside the North End Roadless Area except at a small graphite prospect south of Maverick Canyon near the west edge of the area. Past mining activity is evidenced by small workings scattered through the Apache Pass fault zone which trends northwest across the middle of the roadless area. At the King of Lead Mine, adjacent to the south side of the roadless area, the dump was being jigged and appraisal work was planned by the owner, Ralph Pursley.

MINING DISTRICTS AND MINERALIZED AREAS

The California (Chiricahua) mining district embraces all the Chiricahua Mountains, including the North End Roadless Area. The Dos Cabezas-Teviston mining district lies about 5 mi northwest of the roadless area. In both districts the mineralization occurs as contact-metasomatic and disseminated

replacement deposits near igneous intrusions, and shear zones in limestone, and along quartz veins. Such favorable geologic conditions for similar mineralization exist in the roadless area: igneous intrusions, major high-angle faults, and favorable host rocks.

Sixty-nine patented claims lie within 2 mi of the study area. About 560 location certificates for mining claims, inside or within 1 mi of the study area, are recorded in Cochise County; more than two-thirds of the claims were located between 1880 and 1910, and their descriptions are too vague to permit accurate placement.

Past production

The only production reported from inside the roadless area was from the Clair claims, near Emigrant Pass in the Apache Pass Fault zone; about 30 tons of lead-silver-copper-gold ore were produced from the claims in 1909-10 (Keith, 1973, p. 51). A total of about 135,000 tons of copper-gold-lead-zinc-silver-tungsten ore came from other Apache Pass Fault zone properties, outside the roadless area in the California and the Dos Cabezas-Teviston districts.

In the California district, most of the recorded production, 28,700 tons of lead-silver-zinc-copper-gold ore and concentrate (Drewes and Williams, 1973, p. 5), came from properties about 1/2 mi south of the southeast part of the roadless area. The major producer, the Hilltop Mine, has more than 5 mi of workings (Drewes and Williams, 1973, p. A5). In 1924-26, it produced about 2,600 tons of lead, and 57,600 oz of silver; in 1952-53, it produced 900 tons of lead, 18,800 oz of silver, 500 tons of zinc, and 30 tons of copper. (Brittain, 1954, p. 67-68). The King of Lead Mine shipped 360 tons of lead-silver-zinc-copper-gold ore between 1927 and 1970 (Keith, 1973, p. 53). In Buckhorn Basin, near the west side of the roadless area, the Buckhorn

Mine produced 28 tons of gold-silver ore in the late 1930's (U.S. Bureau of Mines production records). About 1 1/2 mi east of the northeast part of the roadless area, about 150 tons of copper-silver ore came from the Willie Rose Mine, mostly in 1913 (Keith, 1973, p. 55).

In the Dos Cabezas-Teviston district, mines at Apache Pass, 5 mi from the roadless area, have recorded production of about 600 tons of gold-silver ore, and, farther northwest, mines in the Dos Cabezas Mountains produced about 104,000 tons of copper, gold, lead, zinc, tungsten, and silver ores (Keith, 1973, p. 60-72).

For several years before 1913, marble was quarried from the Pavannazo and the Pentillicus patented placers (Mrs. Jose Lawhon, owner, oral commun., 1979), about 1 mi west of the roadless area. Some of the marble reportedly was used in construction of buildings in New York and Denver (Wilson and Roseveare, 1949, p. 48). Additional marble was prospected by pits and adits south of the Pavannazo claim on the patented Bowie Marble placer. Marble also is exposed southeast of the roadless area on the patented Cochise White Marble placer along both sides of East Whitetail Creek, but no quarries were found. The marble is dominantly white, soft, massive, and medium to coarse grained; where sparsely jointed and unmixed with silica, it can be used for dimension building stone. Unjointed and silica-free marble deposits, with areal extents of 3,000 to 150,000 square feet, have been estimated (Paige, 1909, p. 308) for some of the placers. No such deposits are known to be within the roadless area.

Mines and prospects

Mines and prospects inside or adjacent to the roadless area are located in the northwest-trending Apache Pass Fault zone: at Buckhorn Basin, Emigrant

Pass, northeast Timber Mountain, upper Emigrant Canyon, East Whitetail Creek, and Maverick Canyon (pl. 1; table 1). All workings are small. Samples taken at the workings and across outcrops included chip samples across zones of visible or suspected alteration or mineralization and grab samples from dumps (table 2).

Buckhorn Basin

Buckhorn Basin, on the west edge of the roadless area, contains six short adits, two of which are caved; an inclined shaft; three pits; and the remains of a stamp mill. The prospects explore high-angle shears that trend N. 10° E. to N. 60° E. near limestone-diorite contacts. A 15-ft adit and two pits have no visible ore minerals; three adits, the inclined shaft, and a 20-ft pit contained some ore minerals; samples taken in these places contained lead, zinc, copper, gold, and silver. Two adjacent chip samples taken across the portal of the northern caved adit totaled 4 ft in length and assayed 0.32 oz and 0.57 oz gold per ton.

Emigrant Pass

Inside the RARE II area, about 30 tons of lead-silver-copper-gold ore was produced from the Clair claim group in 1909-10 (Keith, 1973, p. 51). Two adits and a pit were found west of Emigrant Pass where local residents believe the claims lay. The three workings are on a fault contact between limestone and rhyolite that trends N. 85° W. The exposed fault is deeply oxidized, and five samples from the prospects contain from 0.1 to 0.5 percent zinc. A barren adit in iron-stained volcanic breccia is east of the pass, near Bitter Creek.

Northeast Timber Mountain

Predominantly lead and gold and some silver values were reported to be in ore packed out from the Pointer Mine on the northeast flank of Timber Mountain (Ralph Pursley, local miner and mine owner, oral commun., 1981). A 60-ft shaft and an adit, since caved, were driven on a 2- to 4-ft shear zone in Pinal Schist, containing pyrite and chalcopyrite in quartz veins. Three of four samples contained metal values; the highest, with 0.6 oz silver per ton, 0.02 oz gold per ton, 1.0 percent lead, and 0.1 percent copper, was a 15-in. chip sample taken across a quartz pod in the shear zone. A grab sample from the dump by another caved adit on the mountain spur north of the Pointer Mine assayed 0.02 oz gold per ton. A 5-ft chip sample taken across a cupriferous epidote-chlorite schist outcrop at the mouth of Overton Canyon assayed 0.3 oz silver per ton, 0.4 percent lead, 0.1 percent copper, and 0.1 percent zinc.

Upper Emigrant Canyon

About 4,000 ft west of Emigrant Pass, a small pit, short adit, and trench explore the contact between shale and limestone. Quartz pods and pyrite were found, and a chip sample taken across the collar of the pit assayed 0.03 oz gold per ton. Upslope to the north, a pod of quartz and argentiferous galena is exposed in a pit on a N. 80° W. fault in limestone.

East Whitetail Creek

Prospects south of East Whitetail Creek, near the Hilltop Mine, are in siliceous, rusty-colored shear zones in granite. A small stock pile at one adit contains galena and sphalerite. Samples from the prospects indicate spotty low-grade lead-silver mineralization.

Maverick Canyon

Two zones of soft, waxy, partly graphitic shale are exposed in an adit about 1,500 ft inside the roadless area south of Maverick Canyon. One zone, 5.5 ft wide in the left rib, narrows across the back, and is 4 ft wide in the opposite rib; the other zone is 3.5 ft wide in the left rib, absent across the back, and probably once present but mined out in the right rib. Two chip samples, 68 in. and 30 in. wide, assayed 10.6 and 17.0 percent carbon, respectively. Southeast of the adit are several pits in partly baked and folded shale that contains a sooty fracture. A chip sample and a grab sample assayed 0.25 percent carbon, at most.

CONCLUSIONS

No known ore deposits are inside the North End Roadless Area, but some 30 tons of lead-silver-copper-gold ore was produced in 1909-10, and hydrothermally mineralized zones are present at five prospect areas in the northwest-trending Apache Pass Fault zone. The Apache Pass Fault zone crosses the roadless area between the productive Hilltop and Dos Cabezas Mountains mining districts. Samples taken from these five prospects contained lead, silver, gold, zinc, and copper, even though all samples were taken from surface exposures or shallow prospects, mostly in terrain from which near-surface sulfides had been leached.

None of the area has been adequately tested by prospecting. Adjacent to but outside the roadless area, where more extensive excavation was done, ore was produced at the King of Lead Mine and at the Buckhorn Basin workings.

With its numerous branch faults and apparently associated mafic and silicic intrusives, the size and persistence of the fault complex indicate a favorable geologic environment for hydrothermal deposits and for small

discontinuous contact metasomatic deposits in the Apache Pass Fault zone. Metamorphosed and marmorized rock suggest that wide areas in the fault zone are underlain by extensions of the silicic intrusives. The presence of fractured, hydrothermally mineralized and altered rock, with metal concentrations in samples from prospects in the fault zone, and the proximity of significant production suggest this conclusion.

The North End may have small low-grade tungsten deposits in areas of tactite alteration of Paleozoic limestones by Laramide (Tertiary?) intrusives. As Dale and others (1960) pointed out, sporadic tungsten mineralization is known in limestones in the Hilltop-Paradise area and Teviston-Dos Cabezas district, where as much as 50 tons of byproduct tungsten ore was produced, and indicated reserves are about 36,000 tons of 0.15 percent WO_3 . Chip samples from the workings on the northeast slope of Timber Mountain contained minute amounts of scheelite, although tungsten was not detected in analyses of the samples.

REFERENCES

- Brittain, R. L., 1954, Geology and ore deposits of the western portion of the Hilltop mine area, Cochise County, Arizona: unpublished M.S. Thesis, University of Arizona, Tucson, 97 p.
- Dale, V. B., Stewart, L. A., and McKinney, W. A., 1960, Tungsten deposits of Cochise, Pima, and Santa Cruz Counties, Arizona: U.S. Bureau of Mines Report of Investigations 5650, 132 p.
- Drewes, Harald, and Williams, F. E., 1973, Mineral resources of the Chiricahua Wilderness Area, Cochise County, Arizona: U.S. Geological Survey Bulletin 1385-A, 53 p.
- Keith, S. B., 1973, Index of mining properties in Cochise County, Arizona: Arizona Bureau of Mines Bulletin 187, 98 p.
- Paige, Sidney, 1909, Building stones. Marble prospects in the Chiricahua Mountains, Arizona; in Contributions to Economic Geology, 1908, Part I--Metals and nonmetals except fuels: U.S. Geological Survey Bulletin 380, p. 299-311.
- Wilson, E. D., and Roseveare, G. H., 1949 Arizona nonmetallics (2nd ed., revised): Arizona Bureau of Mines Bulletin 155, 60 p.

Table 1.--Mines, prospects, and mineralized areas in and near the North End Roadless Area, Cochise County, Arizona

Area and location	Name of workings and sample nos.	Production ² and/or development and remarks	Mineralization and/(or) alteration
Buckhorn Basin sec. 2, T. 16 S., R. 29 E. ¹	Last Resort claim, sample nos. 1, 2.	Adit, 55 ft long. About 1/4 mi outside area.	Shear zone in silicic intrusive; hanging wall sample assayed 0.4 oz/ton Ag, 0.8 pct Pb, and 0.01 pct Cu.
Do.	Jewell claim, sample nos. 3-9.	Inclined shaft about 500 ft deep, shaft about 20 ft deep, two adits about 30 ft long. About 1/2 mi outside area.	Au, Cu contact metasomatic mineralization at contacts of quartz diorite(?) with limestone. Samples assayed as much as 0.57 oz/ton Au and 0.4 pct Cu.
Do.	Sample nos. 10-14.	Adit, 35 ft long; 18-ft adit with 40-ft winze, pit; adjacent to, but outside, area boundary.	Fault zone in limestone-diorite contact; small amounts of Ag, Cu, and Zn in assayed samples.
Emigrant Pass, upper Emigrant Canyon sec. 35, T. 15 S., R. 29 E.	Sample nos. 15-20.	Two shafts, each 15 ft deep, one with 4-ft drift; caved shaft; two adits, 10 and 15 ft long; trench, pits.	Minor Cu and Pb sulphides in quartz lens; shear zones and faults in limestones, probably near intrusives; small amounts of Au, Ag, Cu, and Pb detected in samples assayed.
Do.	Clair claim group, sample nos. 21-27.	Two adits, 16 and 9 ft long; caved adit, pit; a few tons of ore produced in 1909-10.	Gossan in fault zones, pyroclastics; samples assay as much as 0.5 pct Zn and more than 4 pct Mn and 10 pct Fe.

Table 1.--Mines, prospects, and mineralized areas in and near the North End Roadless Area, Cochise County, Arizona--Continued

Area and location	Name of workings and sample nos.	Production ² and/or development and remarks	Mineralization and/(or) alteration
Upper Wood Canyon, northeast flank of Timber Mountain sec. 1, T. 16 S., R. 29 E., sec. 6, T. 16 S., R. 30 E.	Sample nos. 28-35.	Shaft, 60 ft deep; two caved adits.	Minor amounts of Cu sulphides in quartz veins; shear zones in Pinal Schist near silicic intrusive; as much as 0.02 oz/ton Au, 0.6 oz/ton Ag, 1.0 pct Pb, 0.1 pct Cu, and 0.1 pct Zn assayed in samples.
Upper Wood Canyon, sec. 6, T. 16 S., R. 30 E.	Sample no. 36.	Outcrop	Cu sulphide in quartz vein in Pinal Schist; assayed 0.4 pct Pb, with minor amounts of Ag, Cu, and Zn.
West Whitetail Creek, sec. 11, T. 16 S., R. 29 E.	✓ Apache Chief (Riggs) Mine vicinity, sample nos. 37, 38.	Shaft, about 30 ft deep; adit, about 50 ft long; pit; patented claim 1/2 mi outside area.	Minor amounts of galena in quartz vein; assays show minor amounts of Au, Cu, Pb, and Zn.
Whitetail Pass, sec. 13, T. 16 S., R. 29 E.	Sample no. 39.	Shallow trench, 20 ft long.	Chalcedonic, vuggy, siliceous dike.
Northeast of Bonita Park, sec. 18, T. 16 S., R. 30 E.	✓ King of Lead Mine, sample nos. 40, 41.	Adits; production of about 360 tons of ore, 1927-70; Patented claims adjacent to, but outside, area boundary.	Base-metal sulfides and carbonates in fault zones and in disseminated bodies in limestone.

Table 1.--Mines, prospects, and mineralized areas in and near the North End Roadless Area, Cochise County, Arizona--Continued

Area and location	Name of workings and sample nos.	Production ² and/or development and remarks	Mineralization and/(or) alteration
East Whitetail Creek, sec. 20, T. 16 S., R. 30 E.	✓ Hail Drop claim, sample nos. 42-44.	Adit, 45 ft long; pits; about 1/8 mi outside area.	Shear zone in quartz monzonite.
Maverick Canyon, sec. 27, T. 15 S., R. 29 E.	✓ Graphite claims, sample nos. 45-48.	Adit, 40 ft long; pits.	Carbonaceous shale in metamorphosed Bisbee Formation; samples assay as much as 17 pct carbon.
Little Wood Canyon, sec. 18, T. 15 S., R. 30 E.	Sample nos. 49-53.	Hillside-cut, 15 ft deep; pit; about 1/2 mi outside area.	Quartz pods containing Cu sulfides in sheared greenstones; samples assayed 0.4 and 0.6 oz/ton Ag, and 0.2 and 0.6 pct Cu.
Fox Canyon-Dunn Springs Mtn., sec. 14, T. 15 S., R. 30 E.	✓ Rabbit claim group, sample nos. 54, 55.	Caved workings; minor production late 1800's-early 1900;s; about 1/2 mi outside area.	Fault zone with quartz stringers in metasediment and silicic intrusive.
Fox Canyon-Dunn Springs Mtn., sec. 26, T. 15 S., R. 30 E.	✓ Willie Rose Mine, sample nos. 56, 57.	Four shafts, each about 150 to 350 ft deep; production of about 150 tons of ore, 1913-53; about 1 mi outside area.	Spotty Cu sulfides in contact zone between silicic intrusive and limestone.

Table 1.--Mines, prospects, and mineralized areas in and near the North End Roadless Area, Cochise County, Arizona--Continued

Area and location	Name of workings and sample nos.	Production ² and/or development and remarks	Mineralization and/(or) alteration
Hilltop, secs. 28, 33, 34, T. 16 S., R. 30 E., secs. 3-5, T. 17 S., R. 30 E.	Hilltop, Hilltop Extension, Sullivan group of mines, no samples.	Extensive workings from adits; about 35,000 tons of ore produced 1910-54; patented and unpatented claims contiguous with and extends as far as 2 mi from area boundary.	Pb, Zn, and Ag sulfides and carbonates and spotty scheelite in fissure veins; metasomatic bodies in silicified limestones.
Marble Canyon, secs. 17, 20, 21, 28, 29, T. 15 S., R. 29 E.	Pentillicus, Pavonazzo placers.	Marble quarries as large as 100 x 40 ft x 50 ft deep; considerable production, early 1900's; ³ patented 160-acre placers 1/2 mi outside area.	Marble, white, coarse-grained, and soft.

¹Gila and Salt River Meridian.

²Keith, S. B., 1973, p. 51-55.

³Burchard, E. F., 1914, p. 1343; Wilson, E. D., and Roseverare, G. H., 1949, p. 48

Table 2.--Fire assay, chemical, and spectrographic analyses of samples from and near the North End Roadless Area, Arizona

[Complete spectrographic analyses for all samples are available for public inspection at the U.S. Bureau of Mines, Intermountain Field Operations Center, Denver, Colorado. Tr, trace; leaders (--), not found above detection limit; NA, not analyzed.]

Sample No.	Type and Width	Location and description	Fire assay		Chemical analysis			Spectrographic analysis		
			(oz/ton)		(percent)			(percent)		
			Au	Ag	Cu	Pb	Zn	Cu	Pb	Zn
1	Chip, 1 ft.	Adit face; shear zone in rhyolite; leached, clayey, iron-stained.	--	--	NA	NA	NA	--	--	--
2	Chip, 2 ft.	Adit face; hanging wall of shear zone in rhyolite.	--	0.4	NA	NA	NA	0.01	0.80	--
3	Chip, 31 in.	Caved adit portal; altered diorite in fault contact with limestone.	0.32	.1	0.01	NA	NA	.004	--	0.006
4	Chip, 17 in.	Caved adit portal; limestone adjacent to altered diorite; minor copper stain.	.57	.2	.45	NA	NA	.3	.002	.008
5	Chip, 18 in.	Caved adit portal; altered zone in diorite; heavily iron stained.	.10	.1	.03	NA	NA	.02	.002	.007
6	Specimen.	Caved adit; selected material from dump; altered silicified diorite and limestone, heavily iron stained.	.35	.5	.16	NA	NA	.2	--	.01
7	Grab, every 5 ft.	Shaft dump; mostly altered iron-stained diorite; pyritic vein quartz and silicified diorite.	.01	.1	.006	NA	NA	.001	.002	.006
8	Specimen.	Shaft dump; selected material, silicified diorite and pyrite.	.01	.1	.002	NA	NA	--	.002	.002

Table 2.--Fire assay, chemical, and spectrographic analyses of samples from and near the North End Roadless Area, Arizona--Continued

Sample No.	Type and Width	Location and description	Fire assay (oz/ton)		Chemical analysis (percent)			Spectrographic analysis (percent)		
			Au	Ag	Cu	Pb	Zn	Cu	Pb	Zn
9	Chip, 13 in.	Pit wall; contact zone between slickensided calcite-veined propylitized diorite and calcareous gouge and breccia.	--	--	0.004	NA	NA	0.009	0.002	0.005
10	Chip, 3 ft.	Adit face; fault gouge and limestone breccia; lightly iron stained; chlorite.	--	0.1	.001	NA	NA	--	--	.04
11	Chip, 31 in.	Adit face; zone of shear planes, gouge, and breccia in iron-stained limestone; scant chlorite.	--	Tr	.01	NA	NA	.004	--	.08
12	Chip, 8 in.	Adit face; shear zone in limestone; gouge and iron stain.	--	.2	.003	NA	NA	--	--	.007
13	Chip, 5 ft.	Adit portal back; limestone fault gouge and breccia; trace of chlorite; iron stained.	Tr	--	.02	NA	NA	.01	--	.03
14	Chip, 2 ft.	Pit wall; zone of propylitized diorite; calcite-veined and iron stained; faintly copper stained.	--	0.4	NA	NA	NA	--	--	--
15	Chip, 8 in.	Adit face; shear zone in altered silicic intrusive; quartz veinlets; epidote.	--	.2	NA	NA	NA	0.002	--	--

Table 2.--Fire assay, chemical, and spectrographic analyses of samples
from and near the North End Roadless Area, Arizona--Continued

Sample No.	Type and Width	Location and description	Fire assay (oz/ton)		Chemical analysis (percent)			Spectrographic analysis (percent)		
			Au	Ag	Cu	Pb	Zn	Cu	Pb	Zn
16	Chip, 6 in.	Adit face; hanging wall of shear zone; argillized and iron stained; fine-grained silicic intrusive.	--	0.2	NA	NA	NA	--	--	--
17	Chip, 15 in.	Drift face; weakly fractured limestone.	--	.2	--	NA	NA	0.001	0.01	--
18	Specimen.	Shaft wall; remnant of mined-out quartz pod; chalcopyrite and galena.	0.01	19.6	2.4	NA	NA	--	--	--
19	Chip, 14 in.	Adit portal back; iron-stained quartz vein in shear zone in limestone.	--	.2	NA	NA	NA	.002	--	--
20	Chip, 20 in.	Shaft wall; brown-weathered light-green shale.	.03	.2	NA	NA	NA	--	--	--
21	Chip, 19 in.	Caved adit portal; leached pyroclastics below gossan.	--	--	NA	NA	NA	--	--	0.1
122	Grab, every 3 ft.	Caved adit dump; gossanlike rock and leached pyroclastics.	--	.1	NA	NA	NA	--	--	.2
23	Chip, 58 in.	Adit rib; leached pyroclastics below gossan.	--	--	NA	NA	NA	--	--	.2
224	Chip, 50 in.	Adit face; gossan rock and leached pyroclastics.	--	--	NA	NA	NA	--	--	.3
325	Chip, 40 in.	Pit wall; gossan.	--	--	NA	NA	NA	--	--	.5

Table 2.--Fire assay, chemical, and spectrographic analyses of samples
from and near the North End Roadless Area, Arizona--Continued

Sample No.	Type and Width	Location and description	Fire assay (oz/ton)		Chemical analysis (percent)			Spectrographic analysis (percent)		
			Au	Ag	Cu	Pb	Zn	Cu	Pb	Zn
26	Chip, 24 in.	Adit rib; volcanic breccia, devitrified, oxidized.	--	--	NA	NA	NA	0.001	--	0.002
27	Chip, 40 in.	Adit face; volcanic breccia, devitrified, oxidized.	--	--	0.007	NA	NA	--	--	--
28	Grab, every 4 ft.	Caved adit dump; vein quartz with pyrite.	0.02	0.2	NA	NA	NA	--	--	--
29	Chip, 30 in.	Outcrop; quartz vein in Pinal Schist.	--	.4	--	NA	NA	.002	0.02	--
30	Chip, 30 in.	Caved adit portal; quartz vein in shear zone in Pinal Schist, near silicic, intrusive; pyrite.	--	--	.005	NA	NA	.003	--	.03
31	Chip, 15 in.	Shaft wall; quartz vein in shear zone in Pinal Schist; pyrite casts.	.02	.6	NA	NA	NA	.1	1.0	--
32	Chip, 4 ft.	Outcrop; quartz vein in shear zone in Pinal Schist; pyrite casts.	--	.4	NA	NA	NA	--	--	--
33	Grab, every 30 in.	Caved adit dump; iron-stained, pyritic vein quartz and sheared Pinal Schist; sparse chalcopyrite.	--	--	NA	NA	NA	.001	.2	.08

Table 2.--Fire assay, chemical, and spectrographic analyses of samples from and near the North End Roadless Area, Arizona--Continued

Sample No.	Type and Width	Location and description	Fire assay (oz/ton)		Chemical analysis (percent)			Spectrographic analysis (percent)		
			Au	Ag	Cu	Pb	Zn	Cu	Pb	Zn
34	Chip, 14 in.	Outcrop; quartz vein in Pinal Schist.	--	0.2	NA	NA	NA	--	--	--
35	Chip, 2 ft.	do.	--	.2	NA	NA	NA	--	--	--
436	Chip, 5 ft.	Outcrop; epidote-chlorite schist in Pinal Schist; quartz stringers and sparse chalcopyrite.	--	.3	0.1	NA	NA	0.07	0.4	0.1
37	Chip, 20 in.	Pit wall; shear zone in siliceous volcanic rock; iron-stained, cuprite in vugs.	--	--	.01	0.07	--	.005	.01	--
38	Chip, 2 ft.	Outcrop; fracture zone in fine-grained, gray-green volcanic rock; iron-stained.	--	.2	.01	NA	NA	.02	.2	.1
39	Chip, 3 ft.	Trench; white, siliceous rock; chalcedonic and cherty; drusy vugs.	--	.4	NA	NA	NA	.01	--	--
40	Chip, 2 ft.	Adit rib; fractured, greenish shale.	--	.4	NA	NA	NA	--	--	--
41	Chip, 2 ft.	Adit portal, altered iron-stained zone; galena.	--	.4	.01	.18	0.25	.02	.2	.1
42	Chip, 2 ft.	Adit portal back; shear zone in quartz monzonite; iron stained, clayey.	--	--	NA	NA	NA	.005	.1	--

Table 2.--Fire assay, chemical, and spectrographic analyses of samples from and near the North End Roadless Area, Arizona--Continued

Sample No.	Type and Width	Location and description	Fire assay (oz/ton)		Chemical analysis (percent)			Spectrographic analysis (percent)		
			Au	Ag	Cu	Pb	Zn	Cu	Pb	Zn
43	Chip, 42 in.	Adit rib; shear zone in quartz monzonite; iron stained, clayey.	--	0.4	NA	NA	NA	--	--	--
44	Chip, 1 ft.	Pit wall; shear zone in quartz monzonite; iron-stained, siliceous.	--	--	NA	NA	NA	--	--	--
45	Chip, 68 in.	Adit rib; soft black zone, waxy luster, partly flaky, in sheared Bisbee Formation; analysis shows 10.6 percent C.	0.01	.1	NA	NA	NA	0.001	--	0.003
46	Chip, 42 in.	Adit rib; soft black zone, waxy luster, partly flaky, in sheared Bisbee Formation; analysis shows 17.0 percent C.	--	.3	NA	NA	NA	--	--	--
47	Chip, 34 in.	Pit wall; metashale, hard, sooty, in sheared Bisbee Formation; analysis shows 0.2 percent C.	Tr	.1	NA	NA	NA	--	--	.007
48	Grab, every 5 ft.	Pit dump; metashale, hard, sooty, in sheared Bisbee Formation; analysis shows 0.2 percent C.	--	--	NA	NA	NA	--	--	.01
49	Specimen.	Pit wall; remnant of mined-out quartz lens in shear zone in greenstone.	--	.2	2.40	NA	NA	--	--	--

Table 2.--Fire assay, chemical, and spectrographic analyses of samples
from and near the North End Roadless Area, Arizona--Continued

Sample No.	Type and Width	Location and description	Fire assay (oz/ton)		Chemical analysis (percent)			Spectrographic analysis (percent)		
			Au	Ag	Cu	Pb	Zn	Cu	Pb	Zn
50	Chip, 18 in.	Pit wall; greenstone, adjacent to pinching-out quartz lens.	--	0.4	NA	NA	NA	0.03	--	--
51	Chip, 18 in.	Pit wall; shear zone in greenstone; vein quartz, chalcopyrite veinlets.	--	.6	0.55	NA	NA	.5	--	0.1
52	Chip, 4 ft.	Pit wall; shear zone in greenstone.	--	.4	.22	NA	NA	.2	--	--
53	Grab, every 2 ft.	Pit dump; mostly greenstone.	--	.8	1.40	NA	NA	--	--	--
54	Chip, 3 ft.	Outcrop; greenstone and sparse pyrite.	--	.2	NA	NA	NA	--	--	--
55	Chip, 18 in.	Outcrop; shear zone; quartz stringers in greenstone.	--	.2	NA	NA	NA	.001	0.01	--
656	Grab, every 5 ft.	Shaft dump, siliceous limestone, malachite stained.	--	.2	1.40	NA	NA	.8	--	.003
757	Grab, every 3 ft.	do.	--	.4	1.80	NA	NA	2.0	--	.002

Additional spectrographic analysis results:

- 1 Sample 22: more than 10 percent Fe and 4 percent Mn; 100 ppm Co.
- 2 Sample 24: 8 percent Fe and more than 3 percent Mn.
- 3 Sample 25: more than 10 percent Fe and 3 percent Mn; 200 ppm Co.
- 4 Sample 36: 300 ppm V.
- 5 Sample 51: 1,000 ppm Sr; 200 ppm V.
- 6 Sample 56: 2,000 ppm Ba.
- 7 Sample 57: 8,000 ppm Ba.

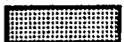
EXPLANATION OF SYMBOLS FOR MINE AND PROSPECT MAP



APPROXIMATE BOUNDARY OF THE NORTH END ROADLESS AREA



PATENTED MINING CLAIMS



UNPATENTED MINING CLAIMS



LOCALITY OF SAMPLED OUTCROP--Showing sample number

SURFACE OPENINGS--Showing sample locality number



Quarry



Tunnel



Prospect pit



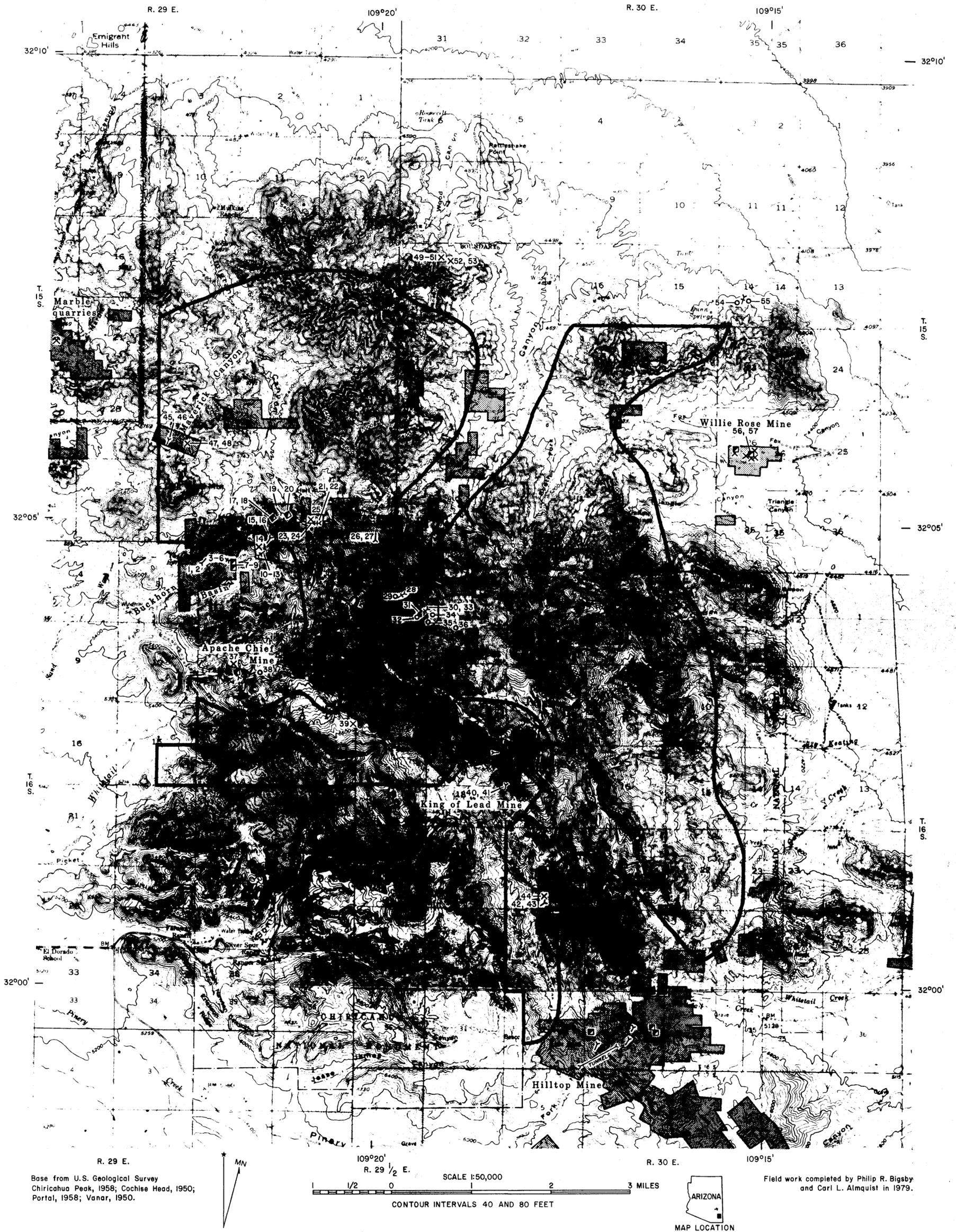
Adit



Caved adit



Shaft



MINE AND PROSPECT MAP OF THE NORTH END ROADLESS AREA,
COCHISE COUNTY, ARIZONA

BY
PHILIP R. BIGSBY, U. S. BUREAU OF MINES
1982