



CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
3550 N. Central Ave, 2nd floor
Phoenix, AZ, 85012
602-771-1601
<http://www.azgs.az.gov>
inquiries@azgs.az.gov

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PRELIMINARY RECONNAISSANCE EXAMINATION

Date: 1/8/71

By:

Name of Property: SULLIVAN

State: ARIZONA

County: COCHISE

Location: CHIRICAHUA MOUNTAINS

District: CALIFORNIA

Date of this Report:

By:

Map & Aerial Photo Ref.:

Extent of Property: 10 PATENTED CLAIMS

Ownership (Name & Address):

Leased or Optioned to (Name & Address):

Facilities:

RALPH W. MORROW
BOX 17052
TUCSON, ARIZ.

(a) Accessibilities (Roads, Trails, etc.):

(f) Water:

(b) Air Fields:

(g) Labor:

(c) Power:

(h) Climate:

(d) Telephone:

(i) Supply Source:

(e) Housing:

(j) Miscellaneous:

Type of Deposit: (Describe briefly under following headings; Structure, Lithology, Mineralogy, Stratigraphic conditions, Physiographic conditions, Reserves, Possible Extensions, Geology, Geophysics & Drilling):

Mine Workings: (Brief description of methods used, map to be attached if available)

Production Data: (Past, present and possible future)

Sampling and Analysis: (By whom--Results)

SEE ENCLOSED

REPORT OF MINES

Mining Equipment on Property: *NONE*

Mill Equipment on Property: *NONE*

Misc. Equipment on Property: *NONE*

Camp Facilities: *YES*

Ore Reserve Estimates: *INFORMATION NOT AVAILABLE TO ENABLE A REALISTIC ESTIMATE.*

Recommendations and Conclusions:

Two possibilities for exploration of this property are feasible. Exploration drifts could be run along one or more of the exposed mineralized veins or ore shoots. Exploration, development and active mining would be carried on simultaneously.

A second possibility would be a minimum of ten, four hundred foot holes drilled at an angle to the vertical & the dip of the known mineralized structures.

References: (Bibliography, Maps, Former Workers or Engineers)

R. I. 4015

FEBRUARY 1947

UNITED STATES
DEPARTMENT OF THE INTERIOR
J. A. KRUG, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

REPORT OF INVESTIGATIONS

SULLIVAN COPPER MINE, COCHISE COUNTY, ARIZ.



BY

CHARLES A. KUMKE

R.I. 4015,
February 1947.
November 1969

REPORT OF INVESTIGATIONS

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

SULLIVAN COPPER MINE, COCHISE COUNTY, ARIZONA^{1/}

By Charles A. Kumke^{2/}

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INTRODUCTION

The Sullivan Mine was examined by Thomas L. Chapman, an engineer of the Bureau of Mines, in March 1943. Samples taken from the few mineralized exposures justified further investigation of the property. To determine whether extensive exploration of the property would be warranted, the Bureau did a small amount of trenching and underground work during April 1943^{3/} under Bureau project 1462.

ACKNOWLEDGMENTS

In its program of exploration of mineral deposits, the Bureau of Mines has as its primary objective the more effective utilization of our mineral resources to the end that they make the greatest possible contribution to national security and economy. It is the policy of the Bureau to publish the

^{1/} The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is made: "Reprinted from Bureau of Mines Report of Investigations 4015."

^{2/} Mining engineer, Bureau of Mines.

^{3/} Charles A. Kumke, project engineer.

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facts developed by each exploratory project as soon as practicable after its conclusion. The Mining Branch, Lowell B. Moon, chief, conducts preliminary examinations, performs the actual exploratory work, and prepares the final report. The Metallurgical Branch, R. G. Knickerbocker, chief, analyzes samples and performs beneficiation tests.

The investigations of the Mining and Metallurgical Branches of the Bureau, as reported in this paper, were supervised by J. H. Hedges, district engineer for Arizona, and S. R. Zimmerly, regional engineer for the Western Region, respectively.

Special acknowledgment is made to the Arizona Bureau of Mines for cooperation on the survey and geological mapping of the property.

HISTORY

From 1879, when the mine was first located, until 1899, when George H. Crosby purchased the property for \$35,000, only a few open cuts were dug and a short tunnel was run. Crosby sank a 60-foot vertical shaft and from its bottom drove a 120-foot crosscut. No further work was done until 1943, when the property was leased to J. H. Byrd, who began mining ore exposed in one of the old open cuts. Production as of May 1943 had amounted to approximately 500 tons of sorted ore, which averaged about 4 percent copper. The ore had been shipped to the International Smelter at Miami, Ariz.

PROPERTY OWNERSHIP

The property, owned by George H. Crosby of Duluth, Minn., consists of 14 patented lode-mining claims. Patent surveys of five of the claims are recorded as mineral survey 3125 in the land office at Phoenix, Ariz.

LOCATION AND ACCESSIBILITY

The mine is in the Chiricahua Mountains, Cochise County, Arizona, adjoining the Hilltop mine on the southeast (fig. 1). It is reached by 26 miles of graded desert road running southward from San Simon, Ariz., a town on the Southern Pacific Railroad, and paved Arizona State Highway 86.

PHYSICAL FEATURES AND CLIMATE

Outcrops and workings on the property are in rugged topography at an altitude of about 6,000 feet. They follow this contour along an eastward trending hillside, which has a slope of approximately 30 degrees. The entire area is covered by a dense growth of brush, mainly scrub oak, cacti, and small pines and junipers.

The extreme range of temperature recorded at San Simon^{4/} (altitude 3,609 feet) is from minus 5 degrees to 111 degrees.

^{4/} Smith, H. V., The Climate of Arizona: University of Arizona Agricultural Exp. Sta. Bull. 130, p. 356.

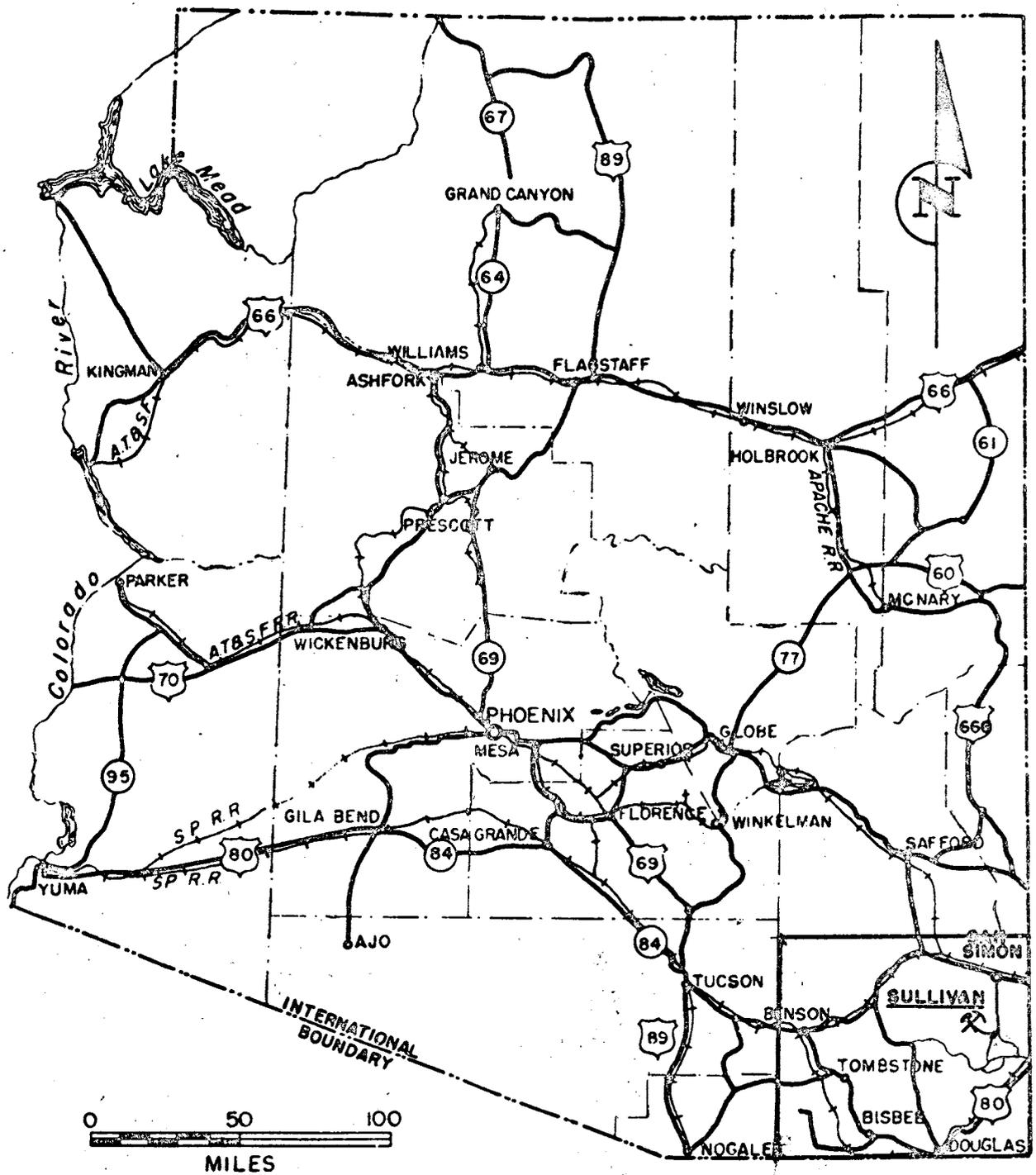
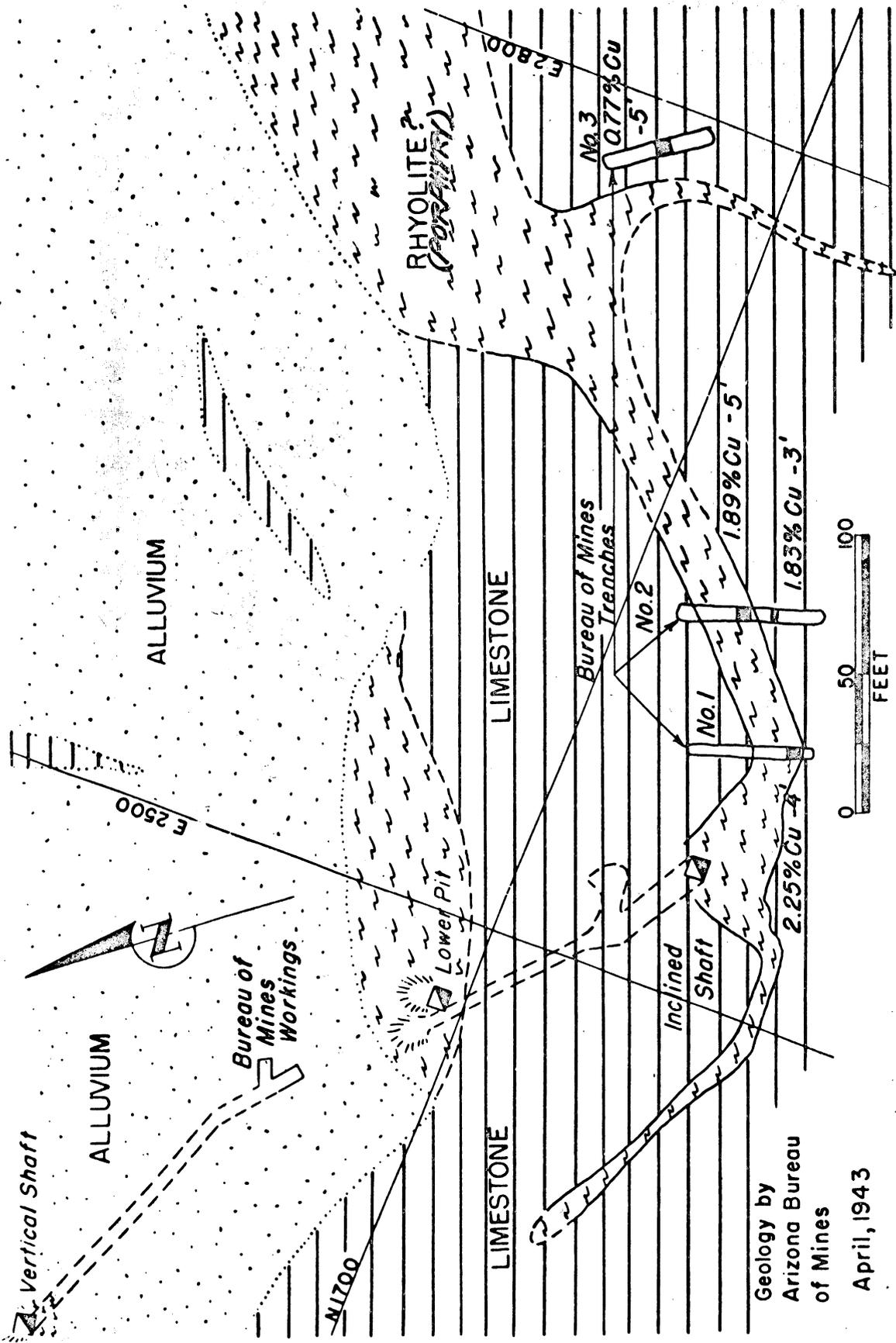


FIG.1-GENERAL LOCATION MAP, SULLIVAN MINE, COCHISE CO., ARIZONA



Geology by
Arizona Bureau
of Mines

April, 1943

FIG 2-GEOLOGIC MAP OF SULLIVAN PROPERTY, PROJ. 1462, COCHISE CO., ARIZ.

The average annual rainfall at San Simon is 7.27 inches. The heaviest precipitation occurs during July and August.

GEOLOGY AND ORE OCCURRENCE

The predominant rock in the vicinity of the workings is limestone, which has been marbleized in places (fig. 2). It strikes northwest and dips northeast at angles of 50 degrees or steeper. It is intruded by rhyolite, which outcrops as elongated, irregular masses (fig. 2). The contact on the south of the rhyolite with limestone is exposed in several places, but at the north it is covered with overburden. It trends westward and dips north at angles of 50 degrees or steeper.

Mineralization, with one minor exception, is confined to shear zones in the rhyolite. The strike and dip of the shearings tend to conform with the trend of the long axes and dip of the rhyolite masses.

In addition to copper mineralization, which predominates, some gold and silver are present. Copper minerals present at the surface are chalcocite, malachite, azurite, chrysocolla, chalcopyrite, and bornite. The presence of sulfide minerals at the surface indicates that oxidation in the ore zone is shallow.

MINE WORKINGS

When the property was first examined, development consisted of 10 shallow surface cuts, an 80-foot adit, a 60-foot vertical shaft, from the bottom of which a crosscut extended 120-feet southeast, and a 35-foot inclined shaft. The inclined shaft had been sunk on the main ore streak exposed in the most prominent surface cut. The 80-foot adit is east of the project area.

Later, the lessee began mining ore exposed in the main surface cut. After shipping two carloads of ore from this operation, he drove an adit that cut the ore zone about 80 feet below its outcrop. A stope, started from this adit, connected with the inclined shaft and continued to the surface. This working then resembled a glory hole 18 feet in diameter and 60 feet deep.

WORK DONE BY THE BUREAU OF MINES

When the Bureau's engineer first visited the Sullivan property, the lessee was enlarging the main open-cut. The south, east, and west sides of the cut presented faces of ore. Owing to the talus and thick brush covering the bedrock, it was impossible to estimate how far the ore might extend to the east or west along the contact of the rhyolite with the limestone. Copper mineralization similar to that in the main cut was exposed at several places on this contact. As the mineralization along the contact might be more or less continuous and, in places, strong enough to form sizable ore shoots that could be mined at a profit, a nominal amount of surface trenching was undertaken.

In April 1944, the Bureau began trenching to the east of the main open-cut. Three trenches were completed (fig. 2). Trench 1 was 50 feet east of

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the main open-cut. The trenches were cut across the main contact of the rhyolite with the limestone. Each trench, except for about 1 foot of unconsolidated overburden, was in rock, which had to be drilled and blasted (fig. 3).

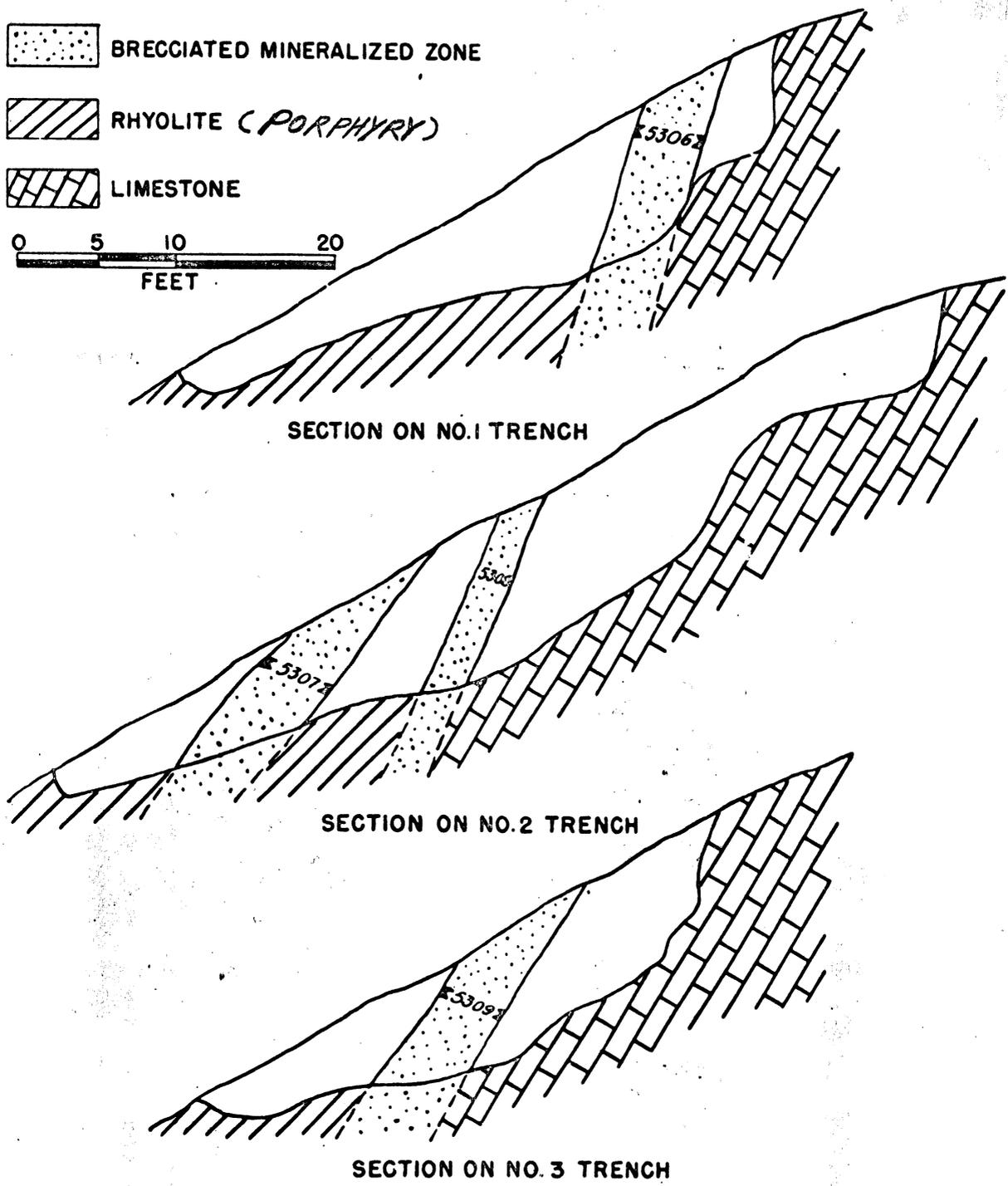
After making the old 60-foot shaft safe and accessible and cleaning out the crosscut, which was half-filled with muck, the crosscut was advanced 12 feet. This advance was all in barren limestone. An east drift was advanced 8 feet on a mineralized streak that had been cut in the main crosscut 2 feet from the face.

Seven samples were taken by the Bureau's examining engineer, which analyzed as follows:

No.	Description	Width, feet	Analysis		
			Ounces		Percent Cu
			Ag.	Ag.	
1221	Lower pit on 70-degree shear zone.....	5.0	0.015	2.40	2.53
1222	Inclined shaft on 55-degree shear zone from hanging wall.....	8.0	.015	2.90	3.50
1223	Inclined shaft next to #1222, toward hanging wall.....	4.5	.015	3.50	4.32
1224	Inclined shaft from #1223 to footwall.....	2.5	.02	4.70	3.83
1225	Sorted ore from inclined shaft.....		.03	7.30	7.95
1226	Reject ore from inclined shaft.....		.01	2.50	4.03
1227	Shear zone, 800 feet S.65 degrees E. from #1226.....	7.0	.01	3.25	3.64

The following four samples were cut in the trenches excavated by the Bureau (figs. 2 and 3):

No.	Description	Width, feet	Analysis, percent Cu
5306	No. 1 trench, across mineralized zone.....	4.0	2.25
5307	No. 2 trench, across mineralized zone.....	5.0	1.89
5308	No. 2 trench, across second mineralized zone.....	3.0	1.83
5309	No. 3 trench, across mineralized zone.....	5.0	.77



GEOLOGIC N-S SECTIONS AT TRENCHES

APRIL, 1943

FIG.3- SULLIVAN MINE, PROJ. 1462, COCHISE CO., ARIZONA