



## **CONTACT INFORMATION**

Mining Records Curator  
Arizona Geological Survey  
1520 West Adams St.  
Phoenix, AZ 85007  
602-771-1601  
<http://www.azgs.az.gov>  
[inquiries@azgs.az.gov](mailto:inquiries@azgs.az.gov)

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**REPORT ON**

**YUCCA MINING & MILLING CO., INC.**

**Prepared for**

~~XXXXXXXXXXXXXXXXXXXX~~

Marmatite - Fe Zn S

Cedar Mining Dist.  
Ariz

Mason W. Rankin  
Phoenix, Arizona

February 17, 1961

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## A P P E N D I X

- 1- Harridge Well and Ground Lease Contract
- 2- Water Contract, Boriana Well
- 3- Letter Contract, Nelson Wirick
- 4- Option and Purchase Agreement, Arizona Antlers Mining Co.

### General Statement

The property was first discovered and located in the 1870's, and the two claims, Antler and Spuyten Dayvil were taken to patent prior to 1900. There are no records of early production, but it is reported that during World War I Phelps-Dodge had possession of the property, and that 27 cars of oxidized copper ore were shipped, assaying in the range of 6 to 12 percent copper. Later production was intermittent.

In 1944 the property was acquired by F. F. Hintze of Salt Lake City who formed the Arizona Antlers Mining Company. The operating shaft was sunk to the fifth level, some 243 feet on a slope of 69 degrees below the collar, and lateral work was performed. In 1948 the property was acquired by Faire Mining Company, and thence transferred to Yucca Mining & Milling Co., Inc.

In early 1949 a mill was constructed on the property having a rated capacity of 135 tons per day. Ore production continued with fair continuity into 1956, the last operation of the property being conducted by Samicol Minerals Corporation, a Catholic organization. Detailed records for the operating years are not readily available, but it is apparent that approximately 50,000 tons of ore were mined and milled, yielding some \$450,000 in net smelter returns from sales of concentrates. In 1951, 17,332 tons were milled, the total mining and milling cost being \$13.51 per ton. These operations were conducted at a loss. During the later stages of the operation, it was determined that the mine tailings were very beneficial as a soil conditioner-fertilizer. A bagging plant was constructed, and sales of processed, bagged material continued through 1960 with some interruptions. Gross sales of this material are reported to be on the order of \$300,000 after freight charges. Of this amount the company has received approximately \$60,000. The last bagging operation was conducted by Dr. A. A. Arnold of Kingman, Arizona, who sold his product to R. J. Dalton & Sons who in turn sold to west coast fertilizer companies, principally Bandini and Downey. The company received \$6.00 per ton for the tailings in place. This operation was terminated at the close of 1960. Presently, under letter contract with Mr. Nelson Wirick, the operation is being resumed on a basis that will yield the company \$6.00 per ton for the tailings in place plus 50% of the net profits of the operation. At the present time, 4000 tons of tailings are available for processing. The balance of tailings from the operation have been dissipated and scattered in the washes below the mill.

Late in July, 1960 mine and mill rehabilitation was commenced in an effort to place the property in profitable production, and to insure a continuing supply of mine tailings for processing. The mill was first operated on October 8th, but numerous mechanical difficulties persisted through that month. In November, the mechanical difficulties were largely overcome, but for various reasons, principally lack of flotation capacity, the recoveries and product grades were unsatisfactory. Late in November a water shortage made itself apparent, and this condition has persisted to date. In all, the operation since October has produced 5 carloads of copper concentrates, 2 carloads of zinc concentrates, and 2 carloads of bulk concentrates. Production of the bulk concentrates resulted in a loss in concentrate value of approximately \$1500 and the attempt was abandoned. The best copper concentrates produced to date assay 0.04 Au, 4.39 Ag, 3.95 Pb, 11.81 Cu, and 10.4 Zn. No payment is received for the lead values in this product, and zinc over 5% incurs a penalty of 30¢ per unit. The best zinc concentrate assayed 0.02 Au, 1.84 Ag, 1.5 Pb, 3.09 Cu, and 39.9 Zn. Tailings values range from 0.7 to 1.2 Cu, and 2.5 to 4.5 Zn. The net operating loss for the period July 25th to February 10th amounts to approximately \$51,000 after crediting sales of concentrates, and the production of 1500 tons of tailings at \$6.00 per ton. Approximately \$6,200 of new development work is included in this expense and \$33,000 was expended in mine and mill rehabilitation prior to production. Costs of rehabilitation were approximately as anticipated, but the management erred seriously in the original assumption that a satisfactory mill operation could be sustained within the limitations of the existing mill circuit and water supply.

The mine has yielded in excess of 300 tons per foot on dip within the extreme upper reaches of the sulphide ore zone. Lateral development has been very limited. It is anticipated that systematic development within the known limits of the mineralization should yield ores in excess of 600 tons per foot on dip. This may roughly be classified as possible yields of 360 tons per foot on the main or footwall vein, 75 tons per foot on the hangingwall vein, and 165 tons per foot along extensions on both veins. The total depth to which the deposit may persist is a major question, but deposits within similar environments in Arizona and elsewhere commonly persist to depths well beyond 1,000 feet.

It is believed the mine has a potential in the range of 200-500 tons per day in prospective ores carrying an average value of approximately 0.01 Au, 2.5 Ag, 2.0 Pb, 3.5 Cu, and 8.5 Zn. Total potential of soil conditioner-fertilizer is beyond the writer's present knowledge of this market, but should be in excess of 500 tons per month, based on recent

sales experience. The commercial production and sale of anthophyllite presents apparently attractive possibilities.

### Property

Mining property consists of two patented claims, the Antler and Spuyten Duyvil held under option agreement, copy of which is appended. Numerous unpatented claims have been located by Yucca Mining & Milling Co., Inc. The claims occupy portions of Sec.'s 3, 4, 9 and 10, Township 17 North., Range 16 West, Cedar Valley Mining District, Mohave County, Arizona. Santa Fe Railroad holds mineral rights in many odd-numbered sections within the immediate area.

Additional ground leases, and water rights are held by the company. Copies of these contracts are appended hereto.

### Operating Conditions

Electric Power at 44,000 volts is delivered to the property by Citizens Utilities Company. Power cost ranges from 23.5 mills per KWH for a 10% load factor, downward by 10% stages to a low of 13.5 mills per KWH, based on a 90% load factor. \$35.00 monthly rentals are paid on transformer banks at the mine and the mill. An immediate saving of \$35.00 per month could be realized by putting in one bank of transformers for both the mine and mill. An improvement in load factor could also be realized in this manner.

Timber is available from a number of Northern Arizona mills, the laid-in cost of Grade 3 Ponderosa Pine being \$85.00/mbf. Peeled round timber in 16 foot lengths with 8-inch tops is laid in at an approximate cost of \$2.50 per linear foot.

Water is sparingly present, and must be rigidly conserved. Current inflow from two wells below the mill amounts to 5 gpm. Inflow from the Harridge Well is approximately 1.5-2.0 gpm. Available water from the mine, in excess of drilling needs, ranges from 1-2 gpm. Additional water is available from the Borianna Well and reference is made to the recently executed water contract with Bobcat Mining Company covering this water, and that from the Copper World Mine. The Borianna Well has an approximate open hole storage of 260,000 gallons, and an unknown amount of water-in-rock storage. Available inflow after extended drawdown should be not less than 7 gpm. based on past pumping experience at this well. The Copper

World drift is currently making approximately 2 gpm. at the portal, and an additional source of water is available here in an underground shaft.

It is anticipated that with additional development in depth the Antlers Mine will produce a fairly substantial amount of water. The north heading on the 500 level is currently making a little new water as is the 30-foot winze below the 500 level on the south end of the mine. At the Boriana Mine, 4 miles distant, the original workings were essentially dry and water for milling was pumped in from the Boriana Well. Following shaft sinking and lateral work on the lower levels the mine produced sufficient water to operate a tungsten mill of approximately 200-ton capacity. This water would likely be available for use at the Antlers Mill if needed.

Labor is available in an adequate supply of experienced underground miners many of whom are married and have homes in Kingman. As a consequence, turnover is light to moderate. Current wages range from \$1.875 for helpers to \$2.125 for miners. The only contract heading is the 501 Winze at a total labor price of \$40.00 per foot. Experienced flotation operators are extremely scarce in the area. The operation is now paying \$2.50 per hour for mill operators and for a master mechanic. Outside help at the mill ranges from \$1.875 to \$2.00 per hour. The mill operates with one man inside and one on the crusher and general outside work. The operation is non-union at present.

Climate. The property is situated in foothills of the Hualapai Mountains at an elevation of 3,200 feet within the Sonoran Life Zone. Annual precipitation is on the order of 8 inches total, with temperatures ranging from a winter minimum of 17°F. to a maximum of around 117°F. in the summer. The long, hot summers are relieved by occasional thunder-showers. Vegetation consists of saguaro, ocotillo and numerous other varieties of cacti together with greasewood, yucca and mesquite. Ponderosa Pine stands occur on the upper reaches of the Hualapai range at elevations of 5,000 feet and upward therefrom.

Transportation. The Atchison, Topeka and Santa Fe railroad maintains an agent and station at Yucca, some 12 miles from the mine. Commodity rates have been established to various treatment plants and smelters from this station. Current applicable freight rates are as follows: Hayden, Arizona - \$5.03; El Paso, Texas - \$7.88; International, Utah - \$9.88; Amarillo and Dallas, Texas - \$10.81; all per wet ton. Soilcon, the soil conditioner-fertilizer, has been shipped by rail also, but most shipments into California are via truck at a cost of \$7.50 per ton.

Mill Operation. As directed, the various details concerning the metallurgy are not dealt with in this report. The mill operation is conventional selective flotation to a large degree with some unusual problems additionally. Fibrous silicate is abundant in some of the ores treated and this material presents a mechanical problem in pumps, cyclones and flotation cells. The high iron content of the marmatite makes production of a high-grade zinc concentrate rather difficult.

Although numerous mechanical problems were encountered during the outset of mill operations, the last 200 hours of mill operation have shown less than 3% downtime due to mechanical difficulties.

It is the writer's opinion that the number one mill necessity is additional flotation equipment and, of course, additional water must be secured in order to handle a satisfactory tonnage. The additional water will also permit a continuity of operation not heretofore experienced. It in itself should result in better recoveries and product grades.

Mine Operation. The mine operation is entirely conventional. The ore bodies are steeply dipping to vertical and the ground stands very well. Several stoping methods are offered, among these being shrinkage, fill stoping or a slot method. The shrinkage stoping will perhaps be the cheapest method and may be used on any of the ore bodies excepting those containing a high proportion of pyrrhotite. Drifts on the mineralized structures stand well without timbering which is required only for chute and man-way sets and occasional slabby areas. Due to the nature of the ground, dilution in all stoping operations should be small to moderate.

## Geology

The mine is situated within a broad zone of pre-Cambrian schists trending north-northeasterly and dipping steeply to the northwest. Some distance to the west the schist zone is conformably overlain by a large mass of pre-Cambrian granite. Irregular and lenticular dikes of pegmatite and aplite intrude the schist zone. The schist ranges from quartz-mica types to more mafic varieties containing hornblende and other minerals of the ferro-magnesium group. Fibrous silicates are locally present in sizable segregations.

Mineralization is present principally along two main shear zones which are parallel and sub-parallel to the schistosity of the enclosing rocks. Locally these zones are known as the Main Vein and Hangingwall Vein. These veins appear in

fair surface exposures, bearing some quartz with locally abundant oxide mineralization principally in the form of limonite, smithsonite, malachite, azurite and chrysocolla. At a few points stopes persist to the ground surface. The surface exposures, generally speaking, do not provide an accurate picture of the extensive mineralization below. Roughly the top 100 feet of the vein is dominantly oxidized followed by a 50-foot transitional zone, with the lower 100 feet of mine workings in dominantly sulphide mineralization.

Individual sulphide ore shoots are lenticular, although sometimes extending for several hundred feet with good continuity on the strike and dip, as for example the Main Vein on the 500 level. Ore thicknesses range downward from a maximum of approximately 20 feet. The Hangingwall Vein is much less extensive but shows lengthening stopes in depth, with average thicknesses around 4 to 4.5 feet. The average grade of ore on the Hangingwall Vein is somewhat better than the Main Vein.

Sulphide mineralization consists of early pyrite, pyrrhotite, marmatite and chalcopyrite, followed by later low iron sphalerite and galena. The lead-silver mineralization may have originally appeared at the now existing land surface only as a weak, end stage effect and it is almost conclusive that lead values are increasing in depth.

The physical and chemical makeup of the enclosing schist together with pre-mineral cross faulting may both be of importance in the localization of ore lenses.

### Ore Reserves

Reasonably assured ore reserves above the 500 level consist only of 4000 tons in two blocks, the major one lying within the Main Vein and extending from the north 500 level to the 400 level. This block contains 3500 tons. Two small blocks containing a total of 500 tons are present between the 400 and 500 levels on the south end of the mine.

Probable ore reserves amount to 87,000 tons, these ores being a two-hundred-foot extension below the 500 level directly below the known ore bodies.

Prospective ores may range upward from 500,000 tons, dependent upon vein extensions in strike and dip.

In the absence of systematic floor samples on the 500 level, it is a bit difficult to establish an overall average grade for anticipated ores. Random sampling usually fails to detect the erratic high lead-zinc values that run up to 6% Pb and 20% Zn over mineable thicknesses.

Available assay data includes the record of 890 tons of crude ore shipped in 1948 and 1949 to the Hayden and El Paso smelters as well as recent samples taken by Mr. E. V. Chettle and the writer.

The tonnage shipped crude was mined on the Main Vein at and near the shaft sump. The weighted average of the 890 tons shipped is Au 0.01, Ag 1.25, Cu 4.59, Zn 8.63. The weighted average of the samples recently taken by Mr. Chettle on the Main Vein is Au 0.01, Ag 1.31, Cu 3.64 and Zn 7.53.

Samples taken by the writer on the Hangingwall Vein average 0.01 Au, 2.5 Ag, 4.5 Cu and 7.6 Zn, with erratic lead values to 5 percent.

On the basis of all the evidence the writer concludes that the overall average grade of ore will be on the order of 0.01 Au, 2.5 Ag, 2.0 Pb, 3.5 Cu, and 8.5 Zn.

#### Proposed Mine Development

It is first proposed to develop the mine immediately down dip below the known ore shoots, with the first level to be cut at the 600, one-hundred feet down dip below the 500 level. Following, it is proposed to drive south approximately 700 feet and raise a new shaft out from the 600 level. This would be an incline shaft on the Main Vein and the total drive to surface would be approximately 275 feet in all. An existing shaft at this location is caved at 40 feet and the total depth unknown. This project would explore the veins in favorable ground to the south of present workings as well as providing a suitable operating shaft. Due to past stoping operations in and near the present shaft, it will never be possible to enlarge this heading to suitable size.

Additional development is proposed on the 500 level to the north of the present face now in ore.

### By-Products

Production and sales of Soilcon should be exploited to the fullest and the company should cooperate fully with Mr. Nelson Wirick, the present contractor in this department. The product has found ready acceptance in the California market and over a period of years has proven its effectiveness in correcting alkali and low-iron soil conditions. A sizable untapped market exists in the Salt River and Rio Grande valleys of Arizona, New Mexico and Texas.

Vigorous research on the recovery and sale of fibrous silicate should be entered into immediately.

### Outcome and Conclusions

No detailed projection of outcome has been prepared in view of instructions from E. H. Snyder, Jr., not to dwell at length on the metallurgy or recoveries.

The writer's brief operating experience at the property leads to the conclusion that an overall mine-mill production well in excess of 2.5 tons per man shift can readily be accomplished.

It is concluded that the property presents an unusually attractive opportunity for development of a successful mine.

Participation in the venture is invited on favorable terms.

Respectfully submitted,

Yucca Mining & Milling Co.  
Mason W. Rankin, General Manager

Phoenix, Arizona  
February 17, 1961

1948

# I N D E X

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## MAPS

Surface Geological Map	Scale - 1" = 200'
Adit (No.1 Level) Plan	Scale - 1" = 20'
2nd Level "	Scale - 1" = 20'
3rd Level "	Scale - 1" = 20'
4th Level "	Scale - 1" = 20'
5th Level "	Scale - 1" = 20'
A-A' Section through shaft and Drill Hole No.2	" 1" = 40'
B-B' Section through D.D. Hole No.1	" 1" = 40'
C-C' " " " No.5	" 1" = 40'
D-D' " " " No.4	" 1" = 40'
E-E' " " " No.3	" 1" = 40'
Longitudinal Section on Main Shaft Workings Showing Ore Estimates	" 1" = 40'
* Lower Tunnel Plan	" 1" = 40'

Prescott, Arizona  
December 31, 1948

Shattuck Denn Mining Corpn.,  
120 Broadway,  
New York City, N. Y.

Gentlemen:

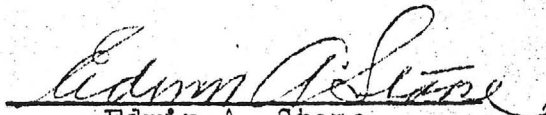
Herewith is my report on the Antler Mine, which was made at the request of Mr. H. F. Mills, General Manager of your Iron King Branch.

I attempted to get factual data, only to the extent necessary to appraise the ore possibilities and five days were spent on the ground for this purpose. While the geological maps accompanying this report serve the purpose for which they are intended, they should be used only in a general way, for operating purposes, until base surveys are checked.

In the course of the study, Mr. R. J. Dalton contributed much through his knowledge of the property and was otherwise very helpful in the examination. Mr. Frank Garrett has been of great assistance in preparing the maps, attached copies of which are evidence of the excellent job he did.

I trust that the following report covers the essential data to your satisfaction.

Respectfully yours,

  
Edwin A. Stone

ANTLER MINE  
Cedar Valley Mining District  
Mohave County, Arizona

The United States Bureau of Mines, Report of Investigations No. 4214, covers the general geology and other factors relative to the district. Some revisions are made in their geology as related to the structural pattern which is fully discussed in the following pages. For general geology and rock classifications, by Dr. Eldred D. Wilson, and for general data on the area, reference is made to this report.

GEOLOGY:

The schist belt described by Wilson strikes generally Northeast, the direction of the schistosity striking from North to N 60° E and dipping generally 70° Westerly. The schist is divided into two members, termed the Black and the Gray. The contact between the two is shown on the surface geological map.

The schist appears to have been compressed in a NE-SW direction, forming several folds within the area between coordinate 4500 and 5500. The sharpest and most extensive of these folds is in the vicinity of the main shaft. Here the schist is compressed into a double roll, forming both an anticline and syncline on which the beds are almost over-turned. In this vicinity the schist is foliated and severely shattered. Blocks of the schist have been thrust short distances both along flat fissures and in one case along a reverse dipping fissure on the second level as shown in Section B-B. These are minor displacements caused by readjustment within the area of deformation. This structure is about 180 feet in strike length outside of which the schist conforms to a more or less normal trend. Another lesser fold occurs about 180 feet SW from the shaft and 3 more pronounced folds occur from 500 to 700 feet SW of the shaft, all of lesser magnitude. The extreme SW fold appears to have been another double roll but not as sharp as the one at the main shaft. In the areas of deformation considerable NW shearing was noted which may be an influencing factor.

NE of the area shown on the map the schist maintains a uniform trend about N 40° E. In the southern part of the mapped area for a distance of 1000 feet, partly off the map, the schist trends generally N 50° E. with little change in dip or strike.

The NE faults shown on the surface map are in effect bedding fissures which appear to have slight movement. They follow the schistosity quite regularly where the trend of the schist is normal. In the areas of deformation and particularly where NW shears occur, these fissures jump to other planes of schistosity forming an en echelon pattern. The en echelon is generally to the left. This condition can be observed on the Surface Geological Map and again in the No. 1 (Adit) Level Map. What is termed the Cholla Fault on the Bureau of Mines Map, No. 1 Level, swings off on NW shears, to form the fissure termed the Saguaro Fault. It follows the NW shearing for about 50 feet where elements begin to peel off on the strike of the schistosity and again pick up full strength to form what is termed the displaced segment of the Cholla Fault. Another prominent example is in the NE drift on the back vein from the lower tunnel. Here the ore fissure follows the same plane of schistosity for over 400 feet from the south and when encountering some weak NW shearing near the NE face, turns almost at right angle for 15 feet directly across the plane of schistosity, selects another plane of schistosity and follows its normal course.

No post mineral faults were observed that constituted more than local readjustments and are unimportant in the general structure, although the en echelon structure gives the appearance of post mineral displacement.

Shattering appears to have been more intense where double folds occur and the greatest concentration of ore appears to be in these structures. Two such multiple structures occur, the major one in the area at the main shaft and the lesser one in the area around the Copper Shaft 700 feet SW. The single rolls do not appear to have shattered the schist sufficiently to form ore reservoirs of much size.

Mineralization is continuous along the bedding fissures for a known distance of 1200 feet. The ore appears to narrow perceptibly when the fissures pass out of the shattered zones, although widths of 5 feet appear to have been stoped 100 feet SW of the Main shaft to the next roll in the schist. In the next 400 feet SW little work is done but where exposed mineralization was from 1 to 4

feet wide. Mineralization could not be traced NE and appears to fade out before it reaches the gulch. In the SW part of the area where the schist is uniform in strike and dip, mineralization on the front fissure where exposed in two holes was only a foot or two wide and the ground was tight. The back fissure in this same area is exposed in the drift from the main tunnel and shows continuous mineralization, as far as explored, from 2 to 6 inches wide. The ore streak on this fissure swells locally to as much as 2 feet of massive sulphide.

The massive silicified schist outcrop indicated on the surface map, lying within the major disturbed zone and NW of the main shaft should be explored in connection with development of the main orebody. This outcrop lies in the black schist and is divided into two zones, one near the collar of No. 1 drill hole, the other SW from the collar of No. 6 hole. The schist in these areas is highly altered, containing much tremolite and some anthrophyllite, garnet, manganese and iron oxides. Little or no copper oxide minerals were noted such as are present in the main ore zone.

In general the principal ore tonnage may be expected to be limited within the more intensely shattered areas represented by the major folding in the schist. Smaller orebodies may occur in several places of lesser disturbance. Along the undisturbed section ore will probably occur as narrow fissure deposits much of which will be too narrow to be profitably mined. Most of the drill holes penetrate the ore within the areas of deformation, but projection of this information must be confined laterally only to the limits of the structure as defined by the geological conditions.

#### ORE OCCURRENCES:

In the major structure which the present main shaft workings explore, the schist has been severely altered and replaced in a great part by anthro phyllite (magnesium iron silicate). The anthrophyllite was classified by Wilson and hereafter will be termed silicate.)

\* The silicate appears to have been an early phase of the mineralization or came in with the sulphide. It occupies much of the original reservoir and in much part is not mineralized. It occurs as massive bodies in which no

sulphide was observed and in irregular masses containing spotty sulphide values. Occurrence of the silicate with the ore is more often a massive band within the ore or as narrow alternate banding with sulphide ore.

The better grade ore occurs as replacement of the schist with little silicate present. The silicate mineralization is everywhere closely associated with the ore throughout the mine. From present information it is impossible to determine accurately what proportion of the mineralized zone is diluted by the silicate to below ore grade. In calculating ore reserves a factor is used for each block, based upon observations on the respective levels.

The minor readjustments within the ore structure, chiefly along flat dipping fissures, together with the erratic occurrence of silicate cause the orebodies to be very irregular. This condition will probably make mining costs abnormally high, or otherwise cause considerable dilution. On the whole it is believed that experience will prove that the ore deposits will follow a regular pattern conforming to the structure, and minor unconformities will adjust themselves to the general pattern as development progresses.

Many fissures observed in the mine and which appeared to be on the plane of schistosity dip 50 to 60°, which is somewhat flatter than the general dip.

These fissures in many cases limited the orebodies. They were particularly noticeable on the lower levels and give the impression that the schist may be flattening in depth. No record of the dips was kept on the drill logs; otherwise they may have given some clue in this respect. A gradual flattening of the schist could influence ore deposition, unless it were only a local condition. Some of the sections indicate gradual flattening of the schist but the fissures selecting other planes of schistosity could give this impression. Under the conditions it is unsafe to project the orebodies very far in depth below the points of present information. One vertical drill hole in the hanging wall to a depth of 400 to 600 feet would give information in this respect so that orebodies could be projected with greater confidence. Also, more detailed mapping of the hanging wall schist might give some clue.

### TONNAGE ESTIMATES AND ORE GRADE:

The accompanying longitudinal section shows the estimated tonnages. The dimensions used in calculating tonnage show in each block. The percentage of silicate indicated is based upon observations on each level. On projected blocks a 1 to 1 ratio is used for ore and silicate. The Copper shaft workings were inaccessible; therefore, calculation of tonnage for this area is based upon surface observation and diamond drill data.

#### Tonnage in Main Shaft Area to Elevation 3000

		Diluted
Partially Developed Ore	27,550 Tons or	45,430 Tons
Probable Ore	19,440 Tons or	38,880 Tons
Possible Ore	<u>14,718 Tons or</u>	<u>14,718 Tons</u>
	61,700	99,000

Possible Tonnage  
Per 100 ft. in depth  
projected below Elev.  
3000 14,000 Tons or 28,000 Tons

Possible Tonnage at  
Copper Shaft  
Per 100 ft. in depth  
projected

$$\text{From surface } \frac{120 \times 100 \times 6}{10} = 7,200 \text{ tons}$$

Grade of ore given by the Bureau of Mines for 6,026 Tons  
- Copper 2.43% - Zinc 8.38% - Lead 0.69%, Silver 0.95 oz.  
- Gold 0.009 oz.

This value compares very closely with the weighted average of assays on holes No. 1 and 2 and by using Dalton's shipping records on the high grade copper section shown in hole No. 2. This value is therefore assumed for mine run ore. A reduction of this grade by 25% is used to apply to the mine run on the larger tonnage where the silicate is included. The 25% factor is a mean between zero for barren silicate and sulphide containing 50% silicate which is classed as ore.

Values at the Copper shaft are based upon the average assays from No. 4 and 5 holes or

Copper 2% - Zinc 10.4% - Lead 0.73%

Tonnage to depth of Elev. 3000

Main Shaft Area all classes of ore:

61,700 tons. Copper 2.43% - Zinc 8.38% -  
Lead 0.69%

or

99,000 tons. Copper 1.82% - Zinc 6.28% -  
Lead 0.52%

Copper Shaft to 2900 Elev. (depth of ore in drill holes)

21,600 Tons - Copper 2% - Zinc 10.4% -  
Lead 0.73%

Total Tonnage to depth of drill holes:

61,700 tons.	Copper 2.43%	-	Zinc 8.38%	-	Lead 0.69%
<u>21,600 tons.</u>	" <u>2.00</u>	--	" <u>10.4</u>	-	" <u>0.73</u>

83,300	" 2.32		" 8.88		" 0.70
--------	--------	--	--------	--	--------

or

120,600 tons. Copper 1.84% - Zinc 7.05% - Lead 0.56%

Projection of tonnage below ore horizon in drill holes:

14,000 Tons or 28,000 Tons below Main shaft

7,200 Tons or 7,200 Tons below Copper shaft

21,200 Tons or 35,200 tons per 100 feet in depth.

(No dilution is calculated for ore in Copper Shaft. If much silicate is encountered this tonnage may be increased and grade of ore correspondingly reduced.

CONCLUDING REMARKS:

(1) Essentially the mineralized area at the Antler Mine lies within a disturbed belt of schist about 1200 feet long, which is mineralized its entire length. The chief orebodies are confined within the areas where stresses have been most severe at the main shaft and at the copper shaft. Between these areas deformation does not appear to have shattered the schist sufficiently to form ore reservoirs of importance. The area NE and SW of this disturbed belt shows no evidence of favorable ore structures, as far as observed. In the area between the main ore body and the Copper shaft the ore will probably be too narrow and erratic to be profitably mined. No tonnage is estimated for this area, excepting in block 8 at the main shaft, and to 300 feet SE for which possible tonnage of an average width of 3 feet is estimated.

(2) The drill holes were spotted to penetrate the best of the known ore showings, which incidentally located most of them in the areas of greatest disturbance. Therefore, projection of ore laterally from drill hole information must be limited to geological control.

(3) The silicate mineralization creates a serious problem both in estimating ore reserves and in future mining operations. Undoubtedly the ore mined to date has been selected and much of the silicate has been by-passed. No sample record is available to give any information as to extent of mineralization in the silicate. Much of the silicate will have to be taken in mining due to its close association with the ore. In one round a massive sulphide section may break into silicate, or from silicate into ore. Again a massive orebody may be banded with silicate or contain a 4 or 5 foot section of silicate within it. Marginal massive silicate areas can in places be left in mining.

(4) The maximum tonnage of ore indicated for the Antler area to the depth of exploration by shaft and drill holes is 83,300 or 120,600 tons. Quite a lot of this tonnage is tied up around the main shaft. At present there is little available tonnage for a mill. It will require many months of intensive development work to assure enough ore to justify an installation of 100 ton daily milling capacity.

Projection of orebodies indicates 21,200 to 35,000 tons per 100 feet in depth. This should be verified by deeper exploration, either by drill or by sinking.

232 cu  
1.88 gm  
no gird  
T. 2.50

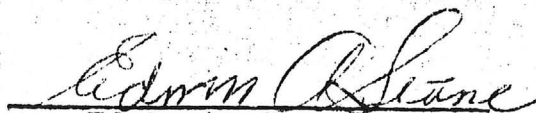
-7-

Lead negligible

1.84 cu  
7.00 gm  
no gird anchor

after  
min  
2.00 @ 23 1/2 - 9.40  
8.00 @ 17 1/2 - 25.00  
37.40

(5) The property requires more development before a milling operation of any size is justified. However, from present observations the advantage of a small mill (possibly 50 ton) operating on higher grade ore, should be weighted against a larger mill operating on lower grade ore. A systematic sampling of the orebodies will undoubtedly aid in this respect. It may be found that a much greater percentage of the silicate can be eliminated and a reduced tonnage of ore mined of correspondingly higher grade.

  
Edwin A. Stone

December 1948

\*

## REPORT ON ANTLERS MINE

December 11, 1948

This report summarizes the factors, pertinent to the evaluation of the Antlers Mine, in Mohave County, Arizona, on which the Shattuck Denn Mining Corporation has a sixty-day right of refusal, expiring on February 9, 1949. This is a consolidation of information accumulated to date through property examination by Mr. H. F. Mills; property examination by Mr. J. A. Wilcox; examination of documents pertaining to title; conference with Mr. R. J. Dalton, President and Manager of the Faire Mining Corporation (the man who has been in charge of development of the subject mine); and negotiations with the President and Vice-President of the Faire Mining Corporation, directed toward ascertaining terms and conditions of a possible purchase agreement. The summary is presented as briefly as possible, under appropriate headings.

### OWNERSHIP

The title structure appears to include no transactions which would cloud the title or offer any real problem in making a complete and satisfactory transfer. Fractional interests in the claims, formerly under ownership of individuals, have been consolidated by means of option agreements, in the hands of the Antlers Mining Company (a Utah Corporation). The Antlers Mining Company has, in turn, given a lease and option on a two-third undivided interest to Mr. R. J. Dalton, who has assigned this interest to the Faire Mining Corporation (a Colorado Corporation) of which Mr. Dalton is President. Subsequent to beginning of negotiations with our Firm, the Antlers Mining Company entered into an agreement with the Faire Mining Corporation, under which the latter Company obtains an option expiring on February 14, 1949, on the remaining one-third interest. Through these transactions the Faire Mining Corporation is apparently in a position to make complete and satisfactory delivery, subject, of course, to the usual title examination by attorneys.

### DESCRIPTION OF THE PROPERTY

The property consists of two patented mining claims, namely; Antlers and Spuyton Duvvil, extending along the ore vein, and one adjoining unpatented claim which covers the site of the well and proposed mill. It is located 13 miles South of Yucca in Mohave County, Arizona, a rail point on the Santa Fe railroad main line. Kingman, Arizona is 35 miles from the property and is the trading center. The mine is at an elevation of some 3250 feet above sea level and at the foot of a range of mountains which reaches an elevation of some 7000 feet. Climate is arid and temperatures range from quite hot in the summer to very moderate in the winter. Roads from the mine to Yucca and from Yucca to within four miles of Kingman are unpaved and graded, and the portion from mine to Yucca is a gradual down grade. The roads are maintained by the county and are passable at all times of the year.

### MINE DEVELOPMENT

The mine is developed by an inclined shaft sunk on the vein for a depth of 300 feet, and followed ore all the way, bottoming in Copper ores. There is an adit tunnel, 35 feet below the collar of the shaft which is used as a station for surface operations. Below the level of the tunnel adit are additional levels at 65 feet, 140 feet and 235 feet, with the bottom of the shaft 30 feet lower. Practically all the mining done in the past was above the 65' level. The bottom level contains some 150' of drifting along the vein which has exposed ore along its entire length. Five

drill holes have been drilled from the surface at intervals of slightly over 200' and have cut the vein at approximately the same elevation as the bottom of the shaft; each of these drill holes encountering ore of marketable grade. Ore is exposed in surface outcrops along this same distance. A sixth drill hole north of the Occatillo fault has cut the vein but the ore here was lean. This is an indication that mineralization extends beyond the Occatillo fault and may, upon further exploration, open up additional ore in this area. Surface outcrops extend 600' south of the drilled area and may prove of great value.

#### ORE RESERVES

Ore occurrence is in a half mile long fragment of schist lying between two granite walls. Ore was deposited in recurring bulges along a line of fracture in the schists. The work to date establishes a block of proven ore above the lower level, developed for stoping, of some 50,000 tons. The grade of this ore, undoubtedly, will be equal to that shipped to the Denn Mill during 1947, which was Au.0073 ozs, Ag.852 ozs, Cu 2.588%, Pb .465%, Zn 7.121%.

Because of the continuity of surface outcrops and small surface workings which show ore, and the similarity to ore deposits in deeper stopes, the surface for a distance of 1200 feet can be considered as one exposed side of an ore body. Drilling along the same has shown consistent ore values for this length at a depth of 235 feet. The width of the ore varies, but from an examination of the extracted areas, it indicates an average width for reserve purposes of 7 feet. These factors indicate that there is probable ore reserves above the present bottom level of the mine of an additional 190,000 tons.

The calculated weighted average grade of the ore cut in the drill holes is as follows: 3.76% cu., 7.743% Zn. This ore would probably be diluted by 10% in mining.

There is no known geological reason why ore should not extend downward in this vein for an indefinite distance, nor is there any known reason why values would decrease with depth. Therefore, it can reasonably be assumed that at least an additional 250,000 tons of possible ore lies below the present workings.

#### EQUIPMENT

The incline shaft is equipped with a small electric hoist with one-ton skip, and air is made by a small electrically driven compressor. There are the usual small tools and shop equipment including a double drum slusher hoist and rock drills. The company owns two dump trucks and hauls their own ore to Yucca. The mine makes about 10 gallons of water per minute which is lifted by a small air driven pump. All the equipment on the property is useful and could be integrated into a larger operation. A heavy duty power line crosses the property and would furnish any power requirements. There are several small buildings which are now used as dwellings, boardinghouse, storehouses and shops.

#### MILLING AND METALLURGICAL PROBLEMS

The principal values, which are Copper and Zinc are well disseminated through a gangue consisting of Silica and complex silicates. The silicates have a tendency to float as readily as sulphides, which has been the most serious problem in milling the ore. Furthermore because of the great distances between this mine and mills capable of handling this complex ore and, because of the poor recovery made in the past, mining has not been profitable in the past. During the last two years Mr. Dalton of Antlers

and Messrs. Hendricks, Mills and Hamilton of the Shattuck Denn conducted extensive research, both in the laboratory and by regular mill runs of the ore and have found means to largely overcome the metallurgical difficulties. Also new theories of grinding have improved the separation of the minerals. This research work has indicated that construction of a mill on the property designed for Antlers ores would considerably improve the recovery of metals, which plus elimination of ore transportation costs would result in an excellent profit margin.

The proposed mill should have a capacity of 150 tons per day, and should not cost more than \$150,000.00 complete. Present development of the mine would permit production of 100 ton per day, and additional development will raise the capacity to 150 tons or more. The adjacent Copper World mine can supply 50 tons per day, in the interim, on which could be realized approximately \$1.50 per ton. This adjoining property has some 50,000 tons of known ore, without a satisfactory treatment arrangement. In the event the Copper World ores should not materialize, the 150 ton mill could be efficiently operated on a 100 ton basis.

#### WATER SUPPLY

The Antlers mine is situated in the mouth of a valley with some 10 square miles of drainage. The upper reaches of the valley attain an altitude of some 7000 feet. Several wells with permanent water and flowing springs, within the drainage area, gives assurance of an underground flow of water in the creek channel. A well is being sunk in a location above a dyke crossing the creek channel. This well should tap the major portion of the water flowing down the valley. Water has been encountered and with further sinking of the well it is expected to develop sufficient water for all anticipated mine, mill and domestic needs.

Should the well not equal expectations, the Faire Mining Corporation has a lease on wells and springs, which together with the present gallonage pumped from the shaft would be sufficient to support a 125 ton mill. There are other springs available for lease with sufficient capacity to make the supply adequate.

#### LABOR SUPPLY AND HOUSING

This property, being located in a sparsely populated part of the State, is handicapped by the distance to the nearest labor pool at Kingman, some 35 miles distant. The situation is further complicated by the scarcity of housing, either at the mine or at the nearest village of Yucca. The ultimate solution to the housing problem would probably be expansion at Yucca, but, in the meantime, there would probably be some capital outlay necessary to supplement the limited housing at the mine, and temporarily operate a boarding house. These factors present some difficulty but should have no greater significance with regard to this property, than the same problem presents with most other initial mining operations.

#### TERMS OF PROPOSED DEAL

Lengthy negotiations with the Faire Mining Corporation culminated in a tentative agreement (subject to acceptance by our Board of Directors), the major points of which are as follows:

1. Payment to Faire Mining Corporation, by Shattuck Denn Mining Corporation of \$40,000.00, upon execution of a purchase and sale agreement.

2. Cancellation of a note from the Faire Mining Corporation, payable to the Shattuck Denn Mining Corporation, in the amount of \$10,000.00. (This note represents an advance by the Shattuck Denn Mining Corporation to the Faire Mining Corporation to permit them to meet obligations due and payable to prior owners of the property and was made to allow us time to proceed with investigation of the property).
3. The Shattuck Denn Mining Corporation is to construct, upon the subject property, a flotation mill of a daily capacity of not less than 100 tons of crude ore.
4. The Faire Mining Corporation is to receive thirty percent (30%) of the profits, for a period of ten years, out of which earnings they are to make payments to the Antlers Mining Company, as required under their agreement.
5. Payments to prior owners of fractional interests in the claims are to be paid out of earnings, and shared between the Shattuck Denn Mining Corporation and the Faire Mining Corporation in the same ratio as the sharing of earnings (70% and 30%). These payments amount to \$24,507.50, of which \$17,632.50 is due and payable during the year 1949, and \$6,875.00 is due during the first half of 1950. Earnings for 1949, during the period of mill construction, would not be available to absorb these payments and they would be met by Shattuck Denn Mining Corporation and deferred against future earnings. Payments, of these fractional interests, were originally provided for in the form of 10% royalty ~~production~~, in agreements between the prior owners and the Antlers Mining Company, but such royalty provisions either have been or will be rendered ineffective through application of the due date provisions.
6. Purchase and sale agreement would be prepared to provide definitions of "costs" and "income", for use in determining "Earnings" subject to the profit-sharing provision; provide for escrow arrangements, title transfer and other essential matters; as well as setting up the terms, as listed in Sections 1 to 5 above. This agreement would be along the lines of the Iron King purchase agreement, improved by our experience in that transaction.

\*

#### ESTIMATE OF PROFITS

<u>Account</u>	<u>Per ton of ore</u>
Net Recovery Value (after deductions for concentrate freight & treatment)	\$ 16.50
Mining	\$ 5.50
Milling	\$ 3.50
Trucking concentrates to railroad	.25
Profit obtainable on developed ore	\$ 9.25
Less additional cost for current development	\$ 7.25
Normal operation net profit	\$ 1.00
	\$ 6.25

This profit estimate is based on current metal prices of 23.5¢ for Copper and 17.5¢ for Zinc, and a conservative estimate of metal recoveries. Assuming a 20% decline in metal prices, without any offsetting decrease in costs, the margin of profit would drop to approximately \$2.00 per ton. The margin of profit would disappear at approximately 17¢ Copper and 12¢ Zinc, again assuming no decrease in operating costs.

The Metallurgy should again be mentioned in connection with the net recovery value used herein, in that the consensus of opinion is that the recoveries can be greatly improved in a mill designed for treating this ore.

#### ESTIMATE OF INVESTMENT

After careful study of the various factors and opinions, it is estimated that the maximum investment, prior to beginning production, would be as follows:

Consideration for right of refusal	\$	5,000.00
Cash payment to Faire Mining Corporation	\$	40,000.00
Cancellation of note of Faire Mining Corp.	\$	10,000.00
Mill installation for 150 ton daily capacity	\$	150,000.00
Mine equipment, housing, water supply, etc.	\$	30,000.00
Payments to former owners, of fractional interests, due during 1949 (30% recoverable from profits payable to Faire Mining Corp.)	\$	17,632.50
Sub Total	\$	252,632.50
Mine expense, during mill construction period, expended in further development of the mine (10 Months @ \$5,00.00)	\$	50,000.00
Total	\$	302,632.50

The estimate for the mill is extremely liberal, even for all new equipment, and there appears to be opportunity to secure a used plant at less cost. Furthermore, the consensus of opinion is that the mill construction period would not exceed eight months and might be as low as six, in which case the mine expense estimate would prove to be excessive. There is an additional factor of importance, in that a substantial tonnage of ore would be stockpiled from development, resulting from the "mine expense" expenditures, which would be available for conversion into concentrates without further cost, other than milling.

We have based these investment estimates on construction of a mill of 150 ton capacity, which would permit milling the production from the adjacent Copper World mine, on a custom basis, if desirable. This property now has sufficient developed tonnage to amortize approximately 50% of the total cost of the proposed Antlers mill, on the basis of a reasonable custom fee, and the cost of a 150 ton mill would not exceed that of a 100 ton mill by more than \$25,000.00.

#### CONCLUSIONS

Based upon current metal prices, estimated operating costs and liberally estimated initial investment, it appears likely that the 50,000 tons of developed ore would, alone, return 85% of our investment. Prospective custom milling of tonnage from the Copper World Mine, if realized, would assure return of the capital investment within two operating years. The probable ore above the deepest working level, estimated at 150,000 tons, plus possible ore below

the present workings (some of which is certain) furnishes a substantial cushion for any margin of error in some or all of the estimates, used herein.

This property is, by far, the most promising opportunity that has come to our attention during our search for another mine. The extent of ore development, the accessibility of the property (both as to rail and automobile roads), availability of adequate power, and the terms of possible acquisition give it a unique status among obtainable properties.

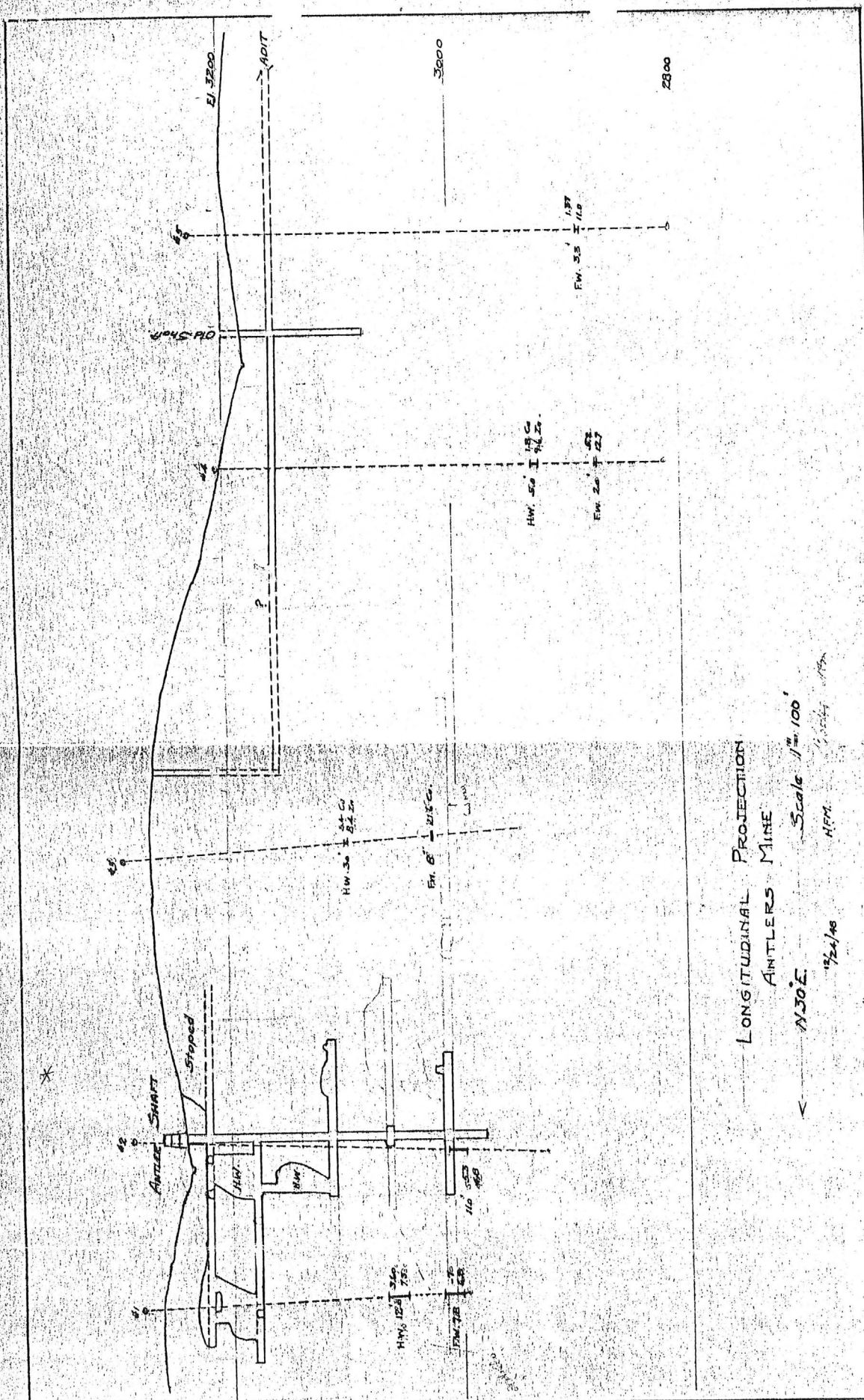
J. A. Wilson

anbockm

APPROVED:

J. A. Shattuck

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LONGITUDINAL PROJECTION  
ANTLERS MINE

Scale 1" = 100'  
N 30° E

12/24/40

HFM

1000 ft

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

BUREAU OF MINES  
JAMES BOYD, DIRECTOR

*Antler Mine File*

REPORT OF INVESTIGATIONS

ANTLER COPPER-ZINC DEPOSIT, MOHAVE COUNTY, ARIZ.



BY

T. M. ROMSLO

R.I. 4214,  
March 1948.

REPORT OF INVESTIGATIONS

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

ANTLER COPPER-ZINC DEPOSIT, MOHAVE COUNTY, ARIZ.<sup>1/</sup>

By T. M. Romslo<sup>2/</sup>

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<sup>1/</sup> The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Report of Investigations 4214."

<sup>2/</sup> Mining engineer, Bureau of Mines, Tucson, Ariz.

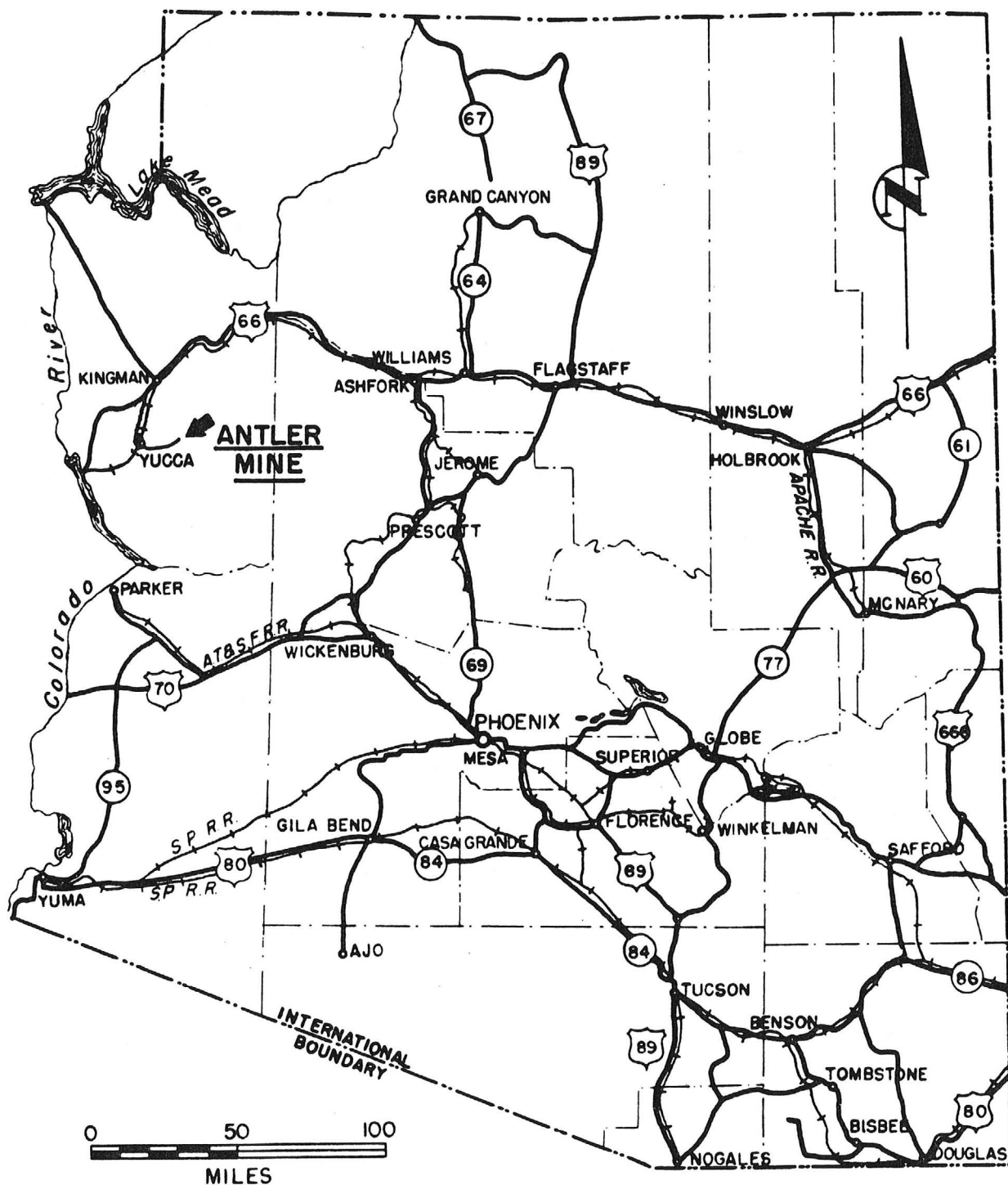


Figure 1. - Location map, Antler copper-zinc deposit, Mohave County, Ariz.

### PHYSICAL FEATURES AND CLIMATE

The Antler mine is on the southwest flank of the north-trending Hualpai Mountains at an altitude of approximately 3,200 feet. The mountain range, about 35 miles long, has an average crestline altitude of about 7,000 feet, with a maximum of 8,200 feet on Hualpai Peak. One of the several canyons that cut deeply into the range emerges near the mine onto an alluvial plain.

Vegetation at the lower altitudes is of the typical desert variety. Scrub oak and groves of yellow pine grow near the top of the mountain range.

The climate is characteristic of the intermediate altitudes of northern Arizona. At Kingman, the average annual temperature is  $61^{\circ}$ , with an annual range from  $8^{\circ}$  to  $117^{\circ}$ . The winters are mild and the summers are hot. Annual precipitation averages about 11 inches. Snow seldom falls at the mine.

### PROPERTY AND OWNERSHIP

The Antler property consists of two patented lode-mining claims, the Antler and the Spuyten Duyvil. The side lines of the claims bear N.  $19^{\circ}$  E. and S.  $35^{\circ}$  W., respectively, from the common corner monument shown on figure 2. The end lines have a common bearing of N.  $71^{\circ}$  W.

The property is owned jointly by R. B. Strassburger of Philadelphia, Pa., and the operating company, the Arizona Antlers Mining Co., 603 Beason Bldg., Salt Lake City, Utah. The company owns one third of the property. It has a lease with option to purchase Strassburger's interest.

### HISTORY AND PRODUCTION<sup>3/</sup>

The Antler and Spuyten Duyvil claims were located in 1879 and 1888, respectively. Later the claims were patented, and the Phelps-Dodge Corp. obtained possession of them. Although some work had been done on the property, little or no ore was produced before World War I. During the period 1916 - 18, when high copper prices prevailed, lessees shipped 27 cars of 5- to 12-percent copper ore, mostly oxidized. Most of this ore came from trenches and shafts south of the Antler shaft.

In 1929 the property was leased by Pete Vukoye of Kingman, Ariz., who shipped 7 cars of 5- to 14-percent copper ore. In 1943 Pete and Mike Vukoye obtained a lease with an option to purchase and later bought the property. The Vukoyes sold the mine to R. B. Strassburger of Philadelphia, who leased it in October 1943 to the Silver Shield Mining & Milling Co. of Salt Lake City, Utah. That company started production in December 1943 but suspended operations in February 1944. Production by the Silver Shield company amounted to about 400 tons of ore averaging 12 percent copper and 2.5 percent zinc.

The Arizona Antlers Mining Co., the present operators, acquired the lease and reopened the mine in July 1944. Labor shortage forced them to

<sup>3/</sup> Wadsworth, A. H., Jr., and Griggs, R. L., The Antler Mine: Unpublished report, Geol. Survey, 1945.



The schist has been displaced by two fault systems. The faults of the older system roughly parallel the schistosity and have been offset by a later system of northwestward-striking faults. The faults of the first system become progressively weaker southward from the Antler shaft.

### Geology of Ore Deposits

The ore and associated minerals mainly replace altered schist. They also fill open fissures, seam and impregnate altered schist, pegmatite, and gneiss, and fill fractures in unaltered schist.

In the workings from the Antler shaft the Cholla and Yucca faults form the footwall and hanging wall respectively of the "vein" zone (figs. 3 and 4). The vein zone is composed mainly of altered schist. The contacts between the altered and unaltered schist are irregular, and altered schist sometimes encloses bodies of unaltered schist. Masses of quartz, coarsely crystalline mica, and feldspar are common in both types of schist. Pegmatite is found erratically throughout the zone. The ore occurs as pods and lenses that swell and pinch rapidly along both strike and dip. The maximum width stoped is about 20 feet. Above the first level, the ore is almost completely oxidized, while below this level very little oxidation has occurred. The vein zone shows a maximum width of about 40 feet. It is offset about 45 feet to the west by the Saguaro fault. Drilling data show that the Ocotillo fault offsets the zone to the west by about 85 feet. Both these faults dip steeply southwest. The average dip of the Cholla fault is approximately  $70^{\circ}$  to the northwest. The Yucca fault dips  $50^{\circ}$  northwest in the stope nearest to the Antler shaft. It steepens in depth, as indicated by its position in drill holes 1 and 2.

To the south of the Antler shaft veins ranging in width from 6 inches to 2 feet have been prospected. They are thoroughly oxidized at the surface, but sulfides were encountered at depths of less than 30 feet in some of the prospects. These veins occur along schistosity-plane faults belonging to the northeast system. Ore mineralization encountered by drill holes in this area appears to lie within a zone bounded by the Cholla and Yucca faults. Gneiss, verging on quartz diorite, was penetrated only in holes 3 and 4.<sup>6/</sup>

### Mineralogy

The principal ore minerals, in order of their abundance, are marmatite, chalcopryrite, and galena. Covellite occurs as a coating on pyrrhotite, and a small amount of bornite was noted. Minerals common to the oxidized zone are antlerite (a basic copper sulfate first described from this mine), chalcantite, and malachite.

The principal gangue minerals are mica, quartz, pyrrhotite, magnetite, anthophyllite, tremolite, and pyrite. A thin section of altered schist from the present workings consisted largely of anthophyllite, tremolite, sericite, antigorite, allophané, and delessite. Specimens of altered schist from

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<sup>6/</sup> Rock identified by H. Wenden, mineralogist, Arizona Bureau of Mines.

- ▣ SHAFT
- ▤ RAISE
- ⊠ WINZE
- ◻ CHUTE
- ▨ STOPE CONNECTION
- SHEAR
- - - ANTICLINE

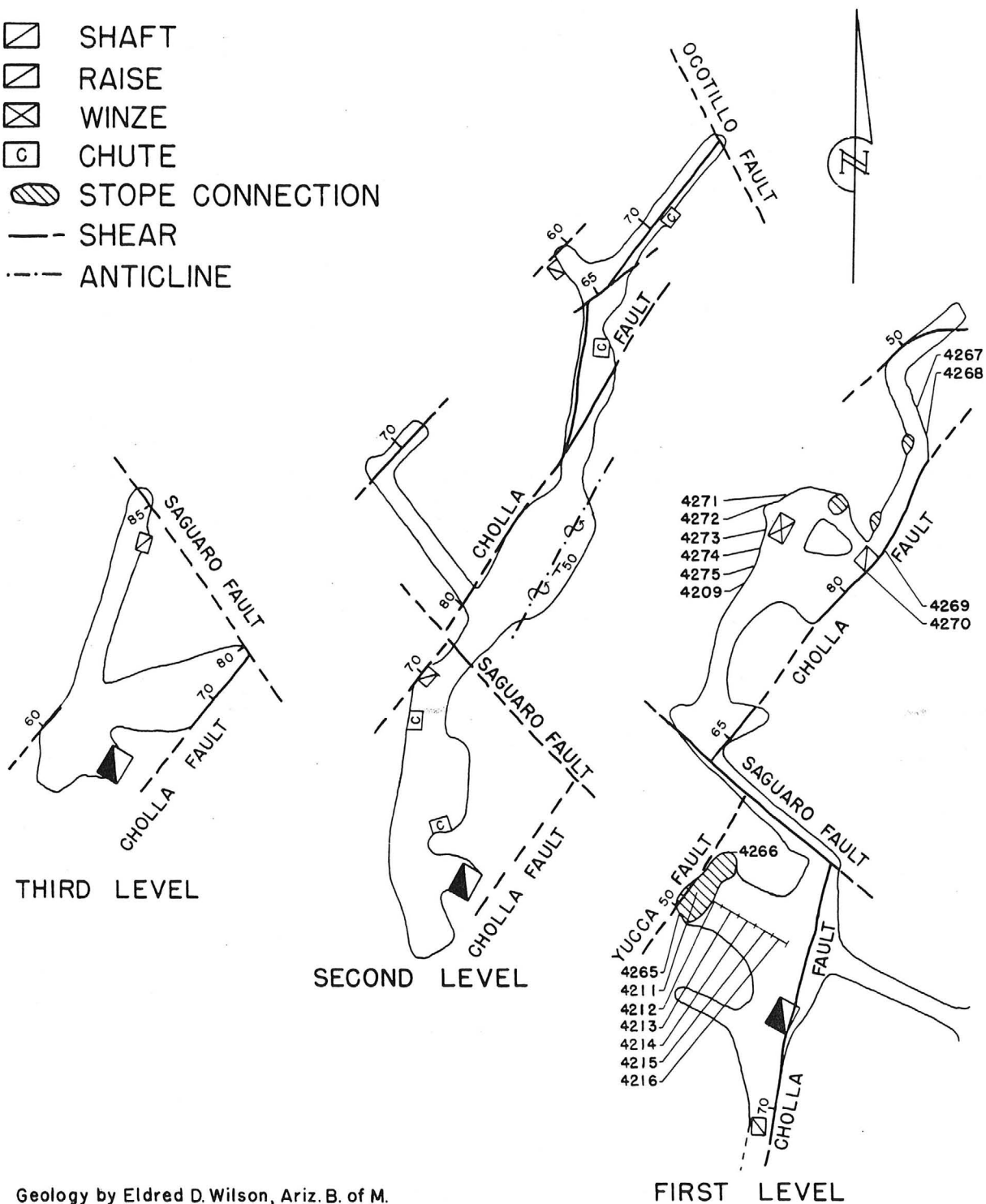


Figure 3. - Main workings, Antler copper-zinc deposit.

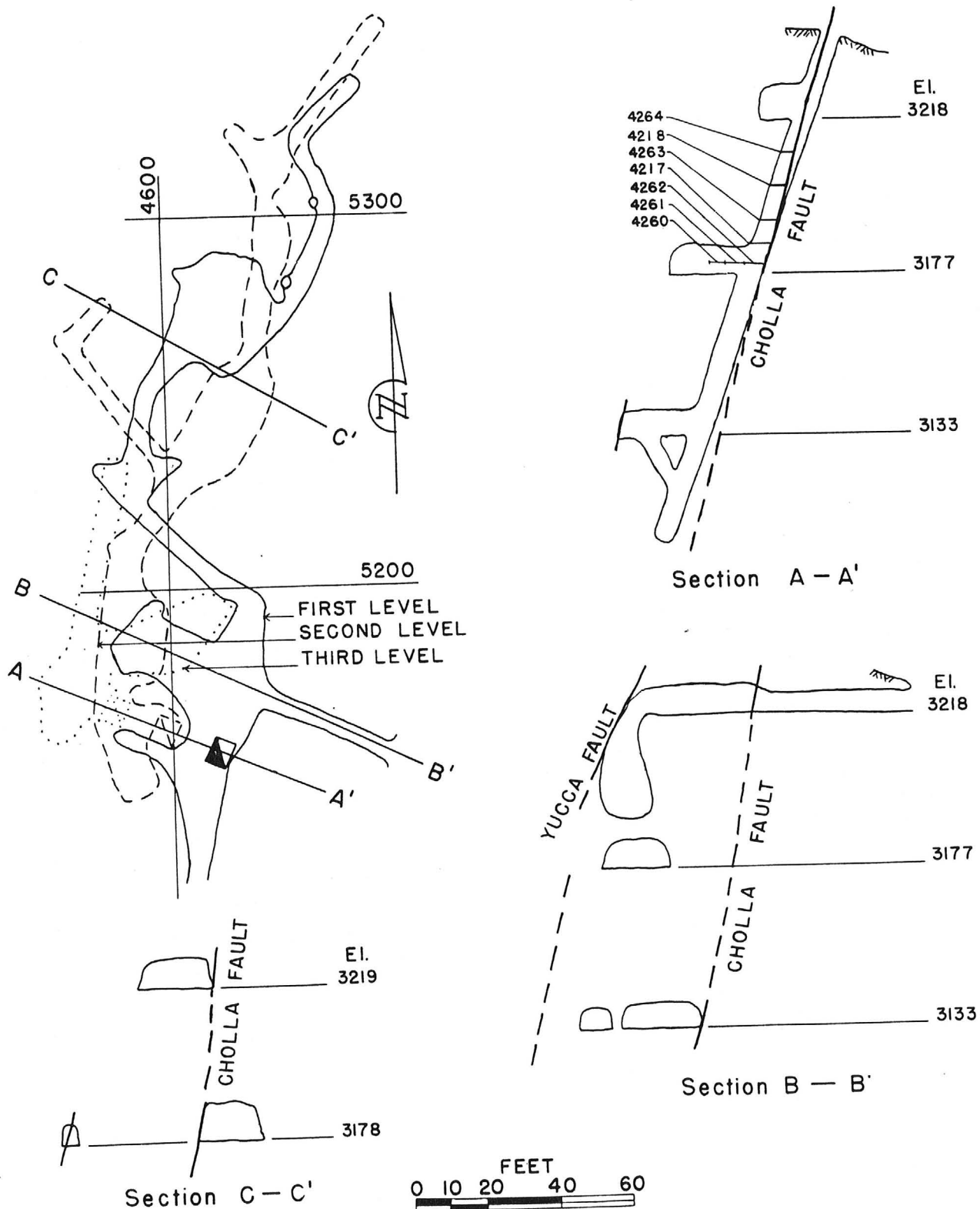


Figure 4. - Plan and sections of main workings, Antler copper-zinc deposit.



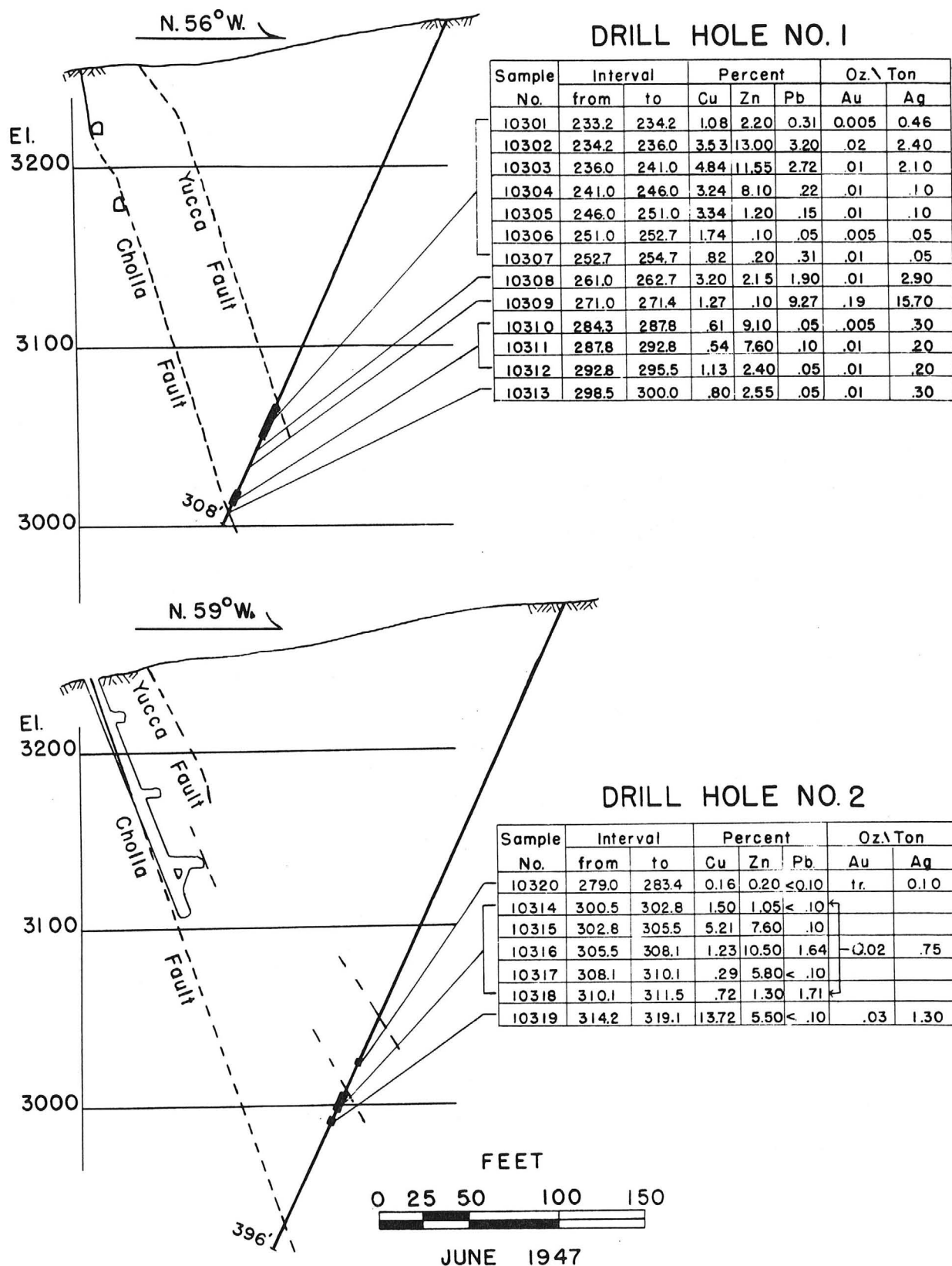


Figure 6. - Sections through drill holes 1 and 2, Antler copper-zinc deposit.

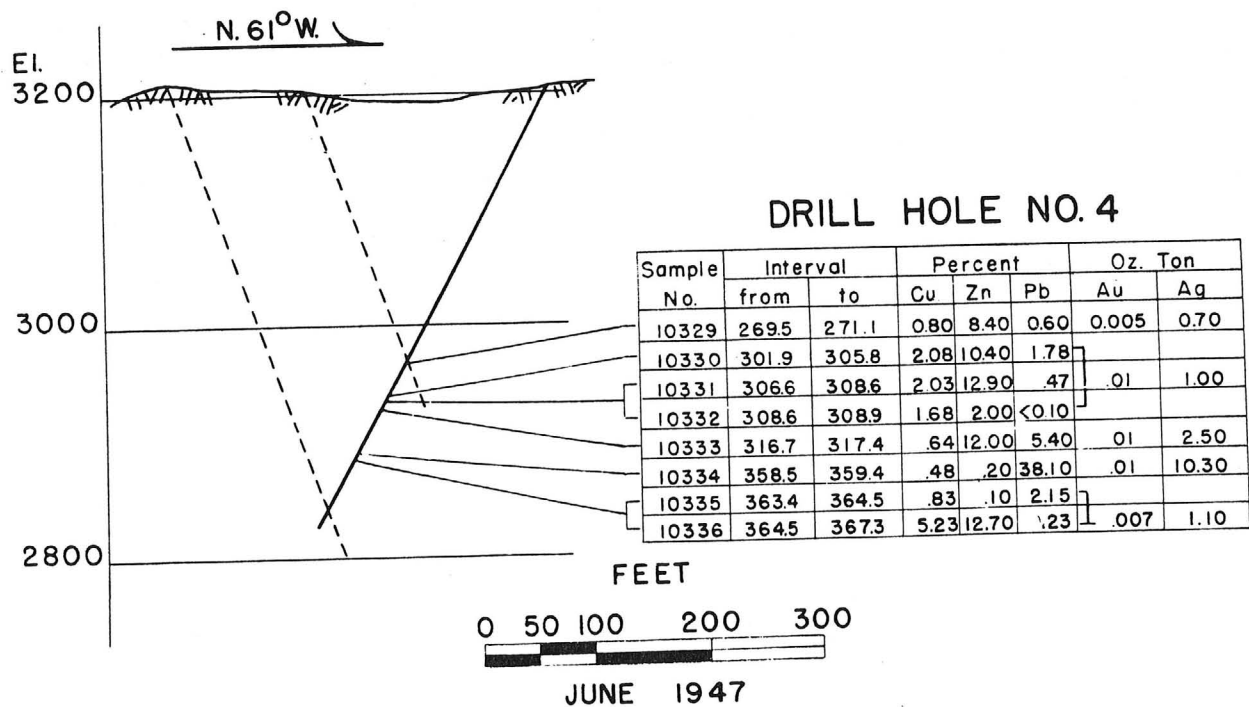
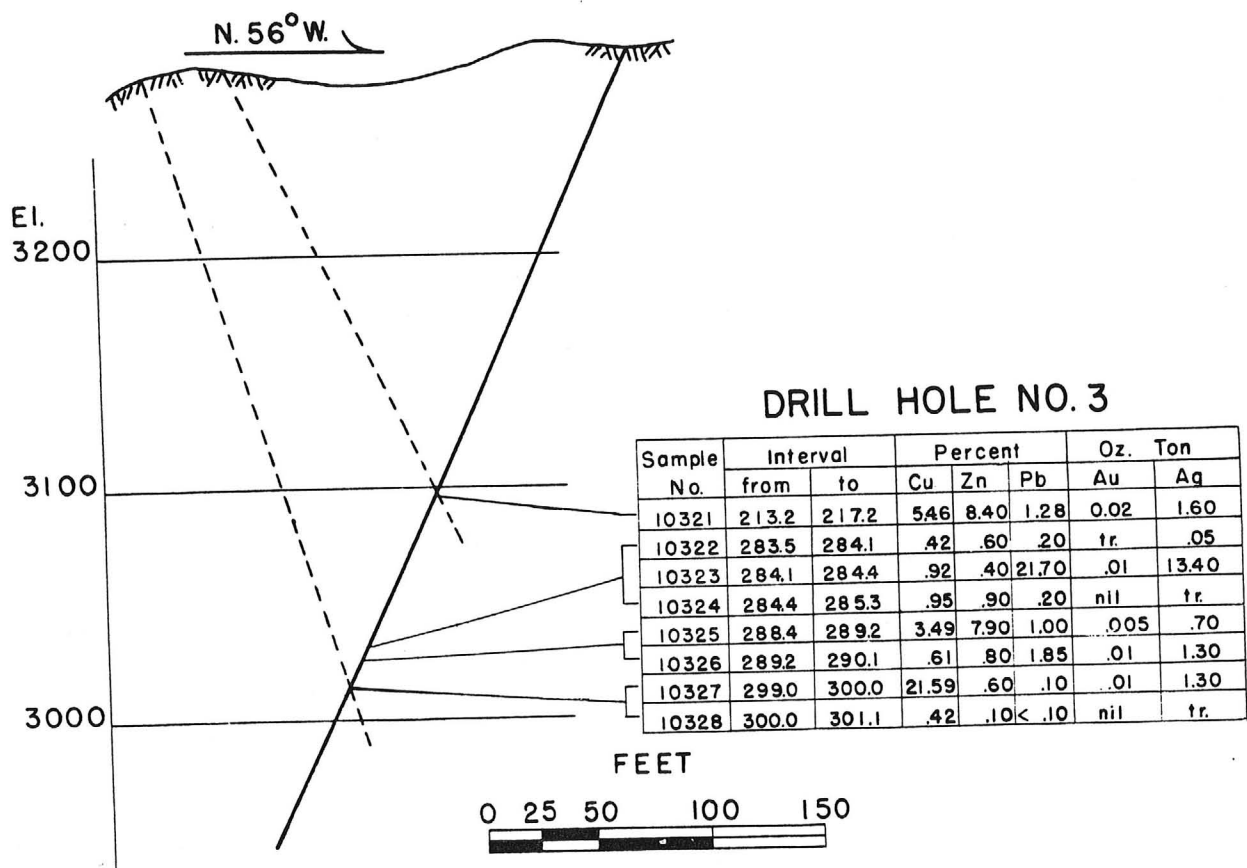
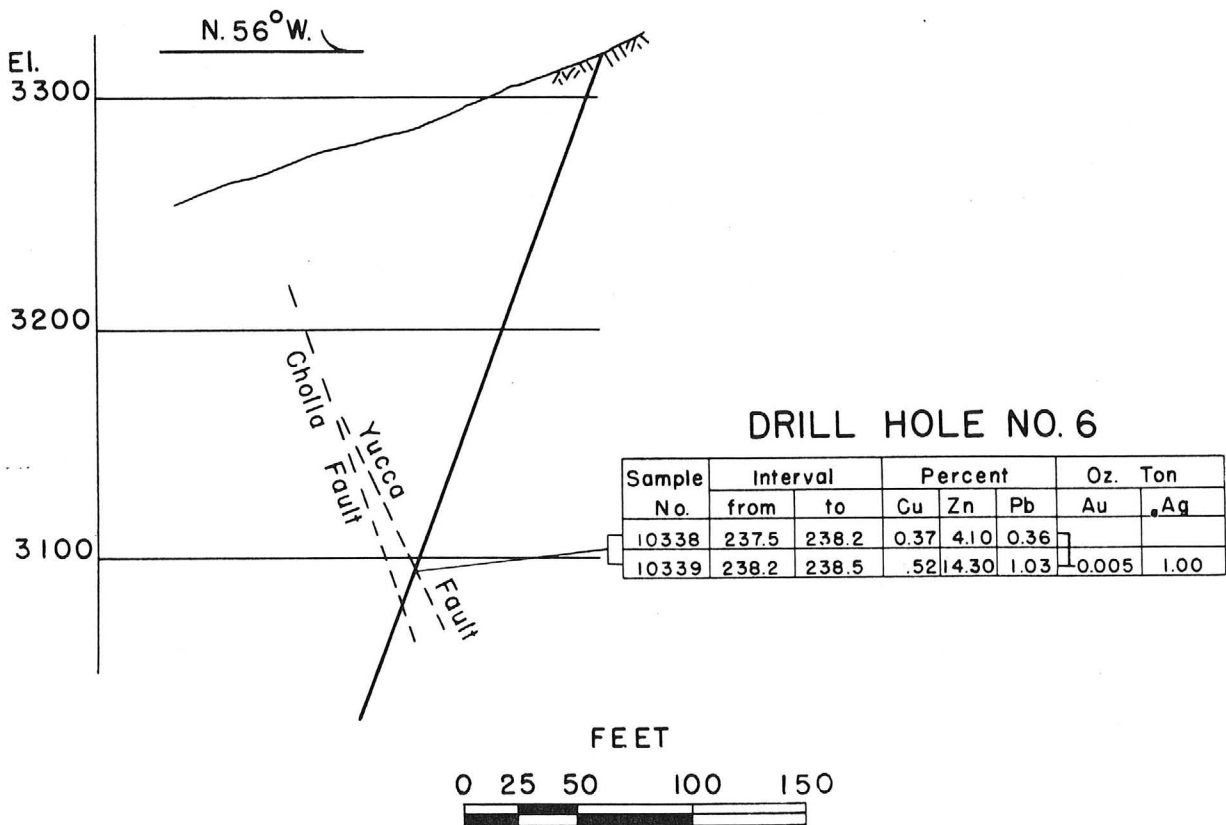
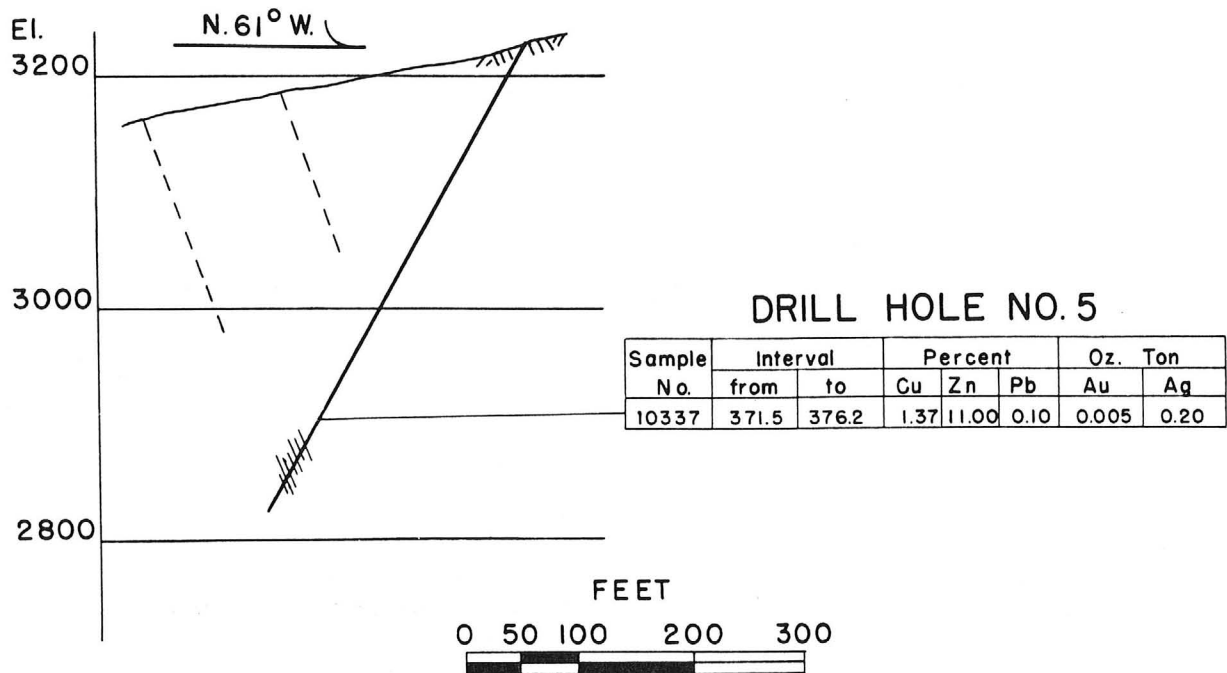


Figure 7. - Sections through drill holes 3 and 4, Antler copper-zinc deposit.



JUNE 1947

Figure 8. - Sections through drill holes 5 and 6, Antler copper-zinc deposit.

Drilling equipment consists of two stopers, two drifters, one jackhammer, and the necessary accessories. Detachable bits are used, and drilling water is supplied to the drills from pressure tanks. Drill holes are loaded with 1-1/8- by 8-inch sticks of 45-percent gelatin dynamite. The charges are detonated by fuse and No. 6 blasting caps.

Ore and waste rock, trammed in a 1-ton end-dump car, are dumped directly into a skip of the same capacity. On the bottom level development rock is moved by a double-drum slusher to a grizzly installed over a small ore pocket. At the skip dump a gate is lowered to divert waste rock to a small bin.

Ground water entering the present workings amounts to 10 to 20 gallons an hour. It is removed from the mine by an electrically driven centrifugal pump installed near the bottom of the shaft.

#### WORK BY BUREAU OF MINES

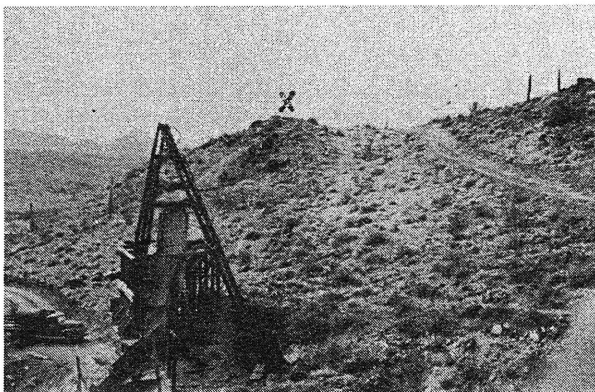
During the preliminary examination, 25 channel samples and 3 grab samples were obtained from the locations shown on figures 3 and 4. At that time the Antler shaft was bottomed at the second level and development of this level had been started. The analyses of these samples are given in table 1.

On the project a transit survey was made of the surface and underground workings. Topographic and geologic maps were prepared. Invitations to bid on a minimum of 1,500 feet of diamond drilling were mailed to 13 prospective bidders, and the contract was awarded to the lowest bidder December 12, 1946.

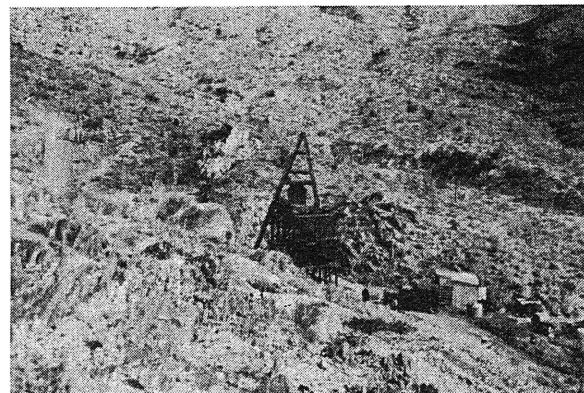
The project engineer arrived at the mine January 7, 1947. Drilling sites were located, and 2,000 feet of 7-foot-wide main and branch trails were completed by January 14. The trail work, awarded to a local contractor, was done with a bulldozer. It involved moving 380 cubic yards of alluvium and 20 cubic yards of loose rock.

Diamond drilling started January 16 and was completed April 25, 1947. A total of 2,282 feet of hole was drilled in six holes ranging in depth from 308 to 459 feet. Samples obtained for analysis numbered 39. The locations from which the holes were drilled are shown on figure 2. Vertical cross sections through the holes and the analyses of the samples are shown on figures 6, 7, and 8. The logs of holes are appended to this report.

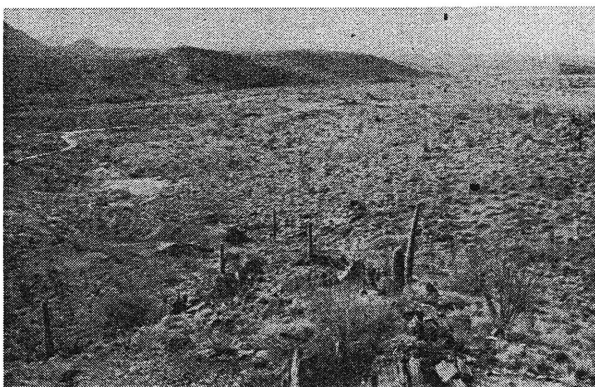
One drill rig, mounted on skids and powered by a gasoline engine, was operated two shifts a day. Cast bits with a powdered metal matrix and double core barrels of 5- and 10-foot lengths were used. The maximum drill run in the sampled zones was 5 feet. Drill cuttings from each interval drilled were saved until the core from the respective interval had been inspected. The lowest core recovery, by drilling intervals, was about 91 percent; consequently all sludge samples were discarded. Recirculation of drilling water from settling tanks was permitted while coring barren rock. Water recovery was generally over 90 percent.



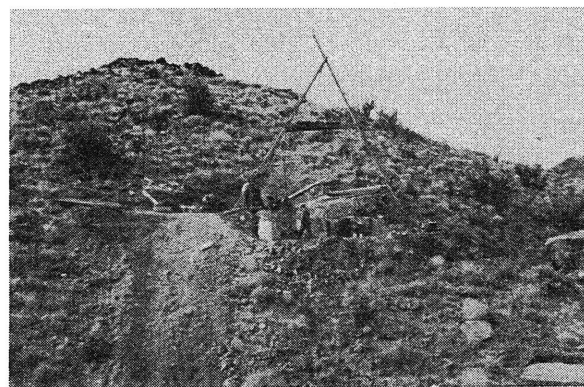
A. Head frame and ore bin at Antler shaft, looking southwest.



B. View from point X on picture A, looking northeast.



C. View from point X on picture A, looking south.



D. Drill set-up at hole 2; view taken from near hole 1.

Figure 9. - Views at Antler mine.

TABLE 2. - Drilling data

Hole No.	Feet									
	Depth	Stand- pipe (3")	Drilled, bit size			Reamed		Cased		Cemented
						BX				
			NX	BX	AX	to NX	to BX	BX	AX	
1.....	308	13.0	193.0	102.0	0	0	0	0	206.0	12.0
2.....	396	14.0	291.5	90.5	0	0	0	0	305.5	32.5
3.....	380	14.0	12.0	206.5	147.5	5	0	31	232.5	39.0
4.....	430	10.5	27.5	240.0	152.0	0	33	38	311.0	15.0
5.....	459	11.0	17.0	261.5	169.5	0	0	28	289.5	32.5
6.....	309	7.0	15.0	103.0	184.0	0	12	22	137.0	47.5
Totals.	2,282	69.5	556.0	1,003.5	653.0	5	45	119	1,481.5	178.5

TABLE 3. - Sampling and core-recovery data

Hole No.	No. of samples	Core recovery			
		Sampled intervals		Over-all <sup>1/</sup>	
		Feet	Percent	Feet	Percent
1 .....	13	35.6	97.2	255.7	86.7
2 .....	7	20.3	99.5	307.5	80.5
3 .....	8	9.6	100	318.8	87.1
4 .....	8	13.1	97.7	323.3	77.1
5 .....	1	4.7	95.5	392.1	87.5
6 .....	2	1.0	100	177.9	58.9
Totals.....	39	84.3	98.1	1,775.3	80.2

<sup>1/</sup> Core recoveries below standpipes.

Log of diamond-drill hole No. 2

Antler copper-zinc project 1480

Location: N. 5302; E. 4400  
 Elevation of collar: 3285 ft.  
 Depth: 396 ft.

Dip: -65°  
 Bearing: S 59° E.  
 Date: 2/3 to 2/17/47

Footage			Core recovery		Description and remarks
From	To	Feet	Feet	Percent	
0	158	158			Black schist, silicated.
158	192	34			Black schist.
192	194	2			Black schist, brecciated.
194	255	61			Gray schist.
255	279	24			Schist, partly altered.
279	283.4	4.4	4.4	100	Ore min. in fractures of partly altered schist.
283.4	298	14.6			Schist, partly altered, magnetite concentrations.
298	300.5	2.5			Shear zone, partly altered schist, much mica.
300.5	302.8	2.3	2.3	100	Ore min. in sheared, partly altered schist.
302.8	305.5	2.7	2.7	100	Ore min. in altered schist.
305.5	308.1	2.6	2.6	100	do.
308.1	310.1	2.0	2.0	100	do.
310.1	311.5	1.4	1.4	100	do.
311.5	314.2	2.4			Altered schist, leached.
314.2	319.1	4.9	4.9	100	Ore min. in altered schist.
319.1	396	76.9			Gray schist, fractured; shearing 380 feet to 382 feet.

Log of diamond-drill hole No. 4

Antler copper-zinc project 1480

Location: N. 4767; E. 4367  
 Elevation of collar: 3206 ft.  
 Depth: 430 ft.

Dip: -62°  
 Bearing: S. 61° E.  
 Date: 3/6/ to 3/20/47

Footage :			Core recovery		Description and remarks
From	To	Feet :	Feet :	Percent	
0	79	79			Black schist.
79	89	10			Black schist, silicated.
89	121	32			Black schist.
121	135	14			Black schist, leached.
135	207	72			Black schist.
207	269	62			Gray schist.
269	269.5	0.5			Gray schist, fractured.
269.5	271.1	1.6	1.6	100	Ore min. in sheared zone.
271.1	272.6	1.5			Gray schist, bands of mica.
272.6	272.9	.3			Pegmatite.
272.9	301.9	29			Schist with quartz and mica concentrations, some garnet.
301.9	305.8	3.9	3.8	97.4	Ore min. in altered schist.
305.8	306.6	.8			Gray schist.
306.6	308.6	2	2	100	Ore min. in altered schist.
308.6	308.9	.3	.3	100	Ore min. in fractured pegmatite.
308.9	316.7	7.8			Gneiss.
316.7	317.4	.7	.7	100	Ore min. in altered schist.
317.4	336	18.6			Gray schist.
336	338	2			Pegmatite.
338	358.7	20.7			Gray schist.
358.7	359.4	.7	.7	100	Ore min. in fractured schist.
359.4	363.4	4			Gray schist.
363.4	364.5	1.1	1	90.9	Ore min. in pegmatite.
364.5	367.3	2.8	2.7	96.4	Ore min. in sheared zone.
367.3	430	62.7			Gray schist, quartz bands.

DEPARTMENT OF MINERAL RESOURCES  
STATE OF ARIZONA  
FIELD ENGINEERS REPORT

Mine ✓ ANTLER

Date September 9, 1943

District Maynard, Mohave Co., Arizona.

Engineer Elgin B. Holt

Subject:

✓ R E P O R T

OWNER: Phelps Dodge Corporation.

✓  
LESSEE: Pete Vukoye, Kingman, Arizona.

METALS: Zinc, copper and lead.

LOCATION:

The Antler mine is situated in the Cedar Valley Mining District, Mohave County, Arizona, 12 miles east of Yucca adjacent to the Boriana road, which is kept in repair by the county. Except for a short period of activity during the first World War, the Antler mine has been idle for nearly 60 years. Within the last several months, Pete Vukoye and his brother Mike took the property over, and secured an RFC development loan in the sum of \$5,000, which they are now spending cleaning out and rehabilitating the old workings of the mine. In the deeper workings they have opened up a large body of zinc-copper sulphide ore amenable to selective flotation.

EXAMINATION:

I visited this property on September 1 and again on September 8, 1943, in company with Pete Vukoye, on which dates I secured the following information:

GEOLOGY - MINERALIZED ZONE, ETC.:

\* The prevailing rocks are granite. The zinc-copper deposit of this property is contained in sheared and schistosed rocks along a fault zone, which strikes N. 20 degrees E., and dips west. This schistosed structure is about a quarter of a mile wide, with a hanging wall vein and a foot wall vein occurring near the foot wall of the "schist" belt. The main vein is the foot wall vein, inasmuch as

the hanging wall vein intersects it and the by forms a huge ore shoot 33 feet in width and of unknown length. However, ore is found in the various workings of property along the foot wall vein for a distance of 500 or 600 feet, or better.

MINE WORKINGS:

The huge ore shoot mentioned is developed by a cross cut tunnel, running from east to west for a distance of 80 feet, more or less. This tunnel cuts a body of zinc-copper sulphide ore with a width of around 33 feet. A drift was run north along the ore vein for a distance of 200 feet and south about the same distance. Vukoye has cleaned out the north drift; but the south drift is caved in and not accessible. From the top of the cross-cut tunnel mentioned, <sup>to the surface</sup> the ore is oxidized material; but below this tunnel the ore consists of massive sulphide material, reported to assay:

Zinc -----	11.0%
Copper -----	2.4%
Lead -----	1.5%

Some gold and silver are also present in the ore; but at the time of visits I could get no definite information as to the value of the ore in these metals.

At the time of my last visit, Vukoye had cleaned out a winze sunk on the foot wall of the the ore shoot to a depth of 40 feet; the said winze sunk in massive sulphide ore. Vukoye plans to clean this winze out to a depth of 100 feet, if it goes that deep; but if not he will sink it on down to the 100-foot level, at which point he will drive a cross-cut west across the ore body to the hanging wall of the same. This in order to determine exactly the width and value of this main ore shoot at the said level.

\*

Also, Vukoye is now taking out a test shipment, consisting of a car load of sulphide ore which he will ship to the U. S. Smelting, Refining & Mining Company, at Midvale, Utah. In this regard, yesterday, when I was at the mine, he shot twelve holes that had been drilled in the sulphide ore across a width of 20 feet in the said cross-cut tunnel. After these holes had been blasted, I went into the mine and found that all of the ore that had been knocked down was solid sulphide material and no waste rock at all. Again, this round of shots knocked down about 30 tons of ore of seemingly even grade material.

As the Antler mine now stands, it has all the ear-marks of a large tonnage milling proposition in the making.

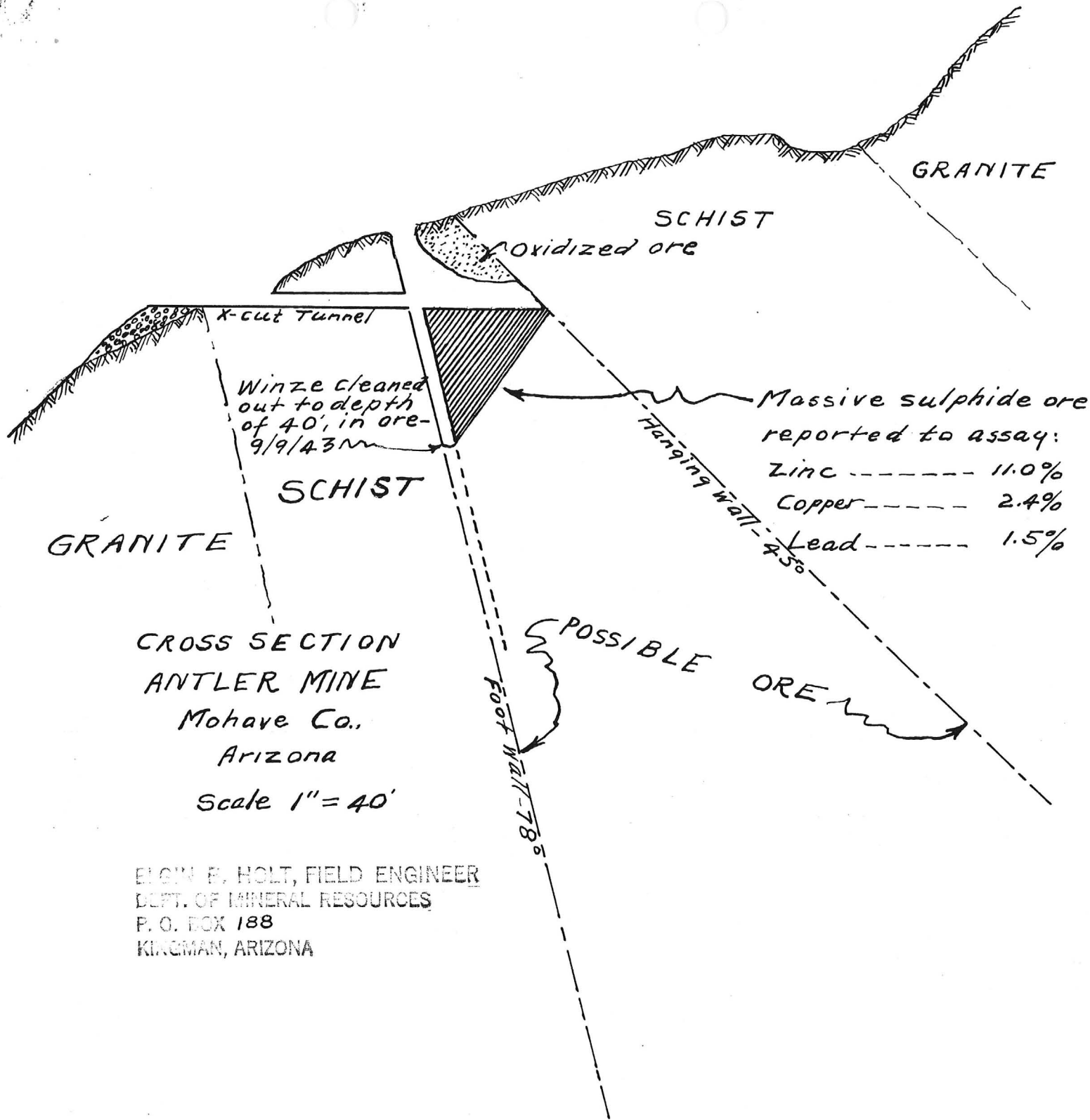
WATER:

Water for domestic purposes is obtained by means of gravity flow through a small pipe line with a length of 1500 feet. Ample mill water can no doubt be secured by sinking shallow wells in Borianna wash which crosses the south end of property at a point around 800 feet from the main mine workings. Ranch wells which have been sunk at various points along this wash demonstrate that there is plenty of water in the same for milling purposes, up to say 200 tons of ore daily. This being merely a rank guess.

POWER:

A power line, leading from Yucca to the Borianna mine, also crosses the property. Vukoye states he has arranged to get all the power needed from this line, when and if the same should be required later on.

Elgin B. Holt,  
Field Engineer.



ELGIN B. HOLT, FIELD ENGINEER  
DEPT. OF MINERAL RESOURCES  
P. O. BOX 188  
KINGMAN, ARIZONA

\*

ELGIN B. HOLT\* discusses the

✓ ANTLER MINE IN MOHAVE COUNTY, ARIZONA

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The Antler mine may become the largest producer of copper-zinc ore opened in Mohave County, during its long years of successful mining activity, dating back to Civil War days, or earlier. This property was discovered and worked superficially around 1880-85; but lay dormant until reopened by the Vukoye brothers, of Kingman, during the first part of 1943.

---

THIS PROPERTY is located adjacent to the Borianna road about 12 miles east of Yucca, Arizona. It was first worked by Dr. Douglas about 1882. Around the same time, or possibly later on, Dr. Douglas also worked the Copper World mine, situated higher up on the Hualpai mountains. Both the Antler and Copper World produced some tonnage of oxidized copper ore of shipping grade near the surface; but at shallow depths, in both mines, zinc-copper sulphide ores came in which could not be treated economically at that time.

Later both of these mines were patented and passed into the hands of the Phelps Dodge Corporation.

Pete and Mike Vukoye during the winter of 1942-43 secured a lease and option from Phelps Dodge on the Antler group, consisting of two patented claims. They then arranged a development loan from RFC with which they cleaned out and rehabilitated some of the old workings of the mine; and in the deeper workings they opened up a large body, or shoot, of zinc-copper sulphide ore amenable to treatment by selective flotation.

\* Field Engineer, Arizona Department of Mineral Resources, Kingman, Arizona.

ANTLER MINE

About October 1, 1943, Vukoye brothers sold their lease and option to R. B. Strassburger, mine operator and owner of the Norristown, Pa., Times-Herald. During the same month Strassburger granted a long-term lease and option to the Silver Shield Mining & Milling Company, 409 Hooper Building, Salt Lake City, Utah.

The Silver Shield Company started work at Antler on November 8, 1943, with Kenneth O. Watkins in full charge of operations. Buildings were erected to accommodate a crew of around 15 men. Also a head-frame was constructed at the Antler shaft, and conventional mining machinery and equipment were installed, such as a compressor, hoist, etc. Also this company has constructed a loading ramp at Yucca to take care of ore shipments to either Clarkdale or Midvale. Ores with predominant copper values are shipped to the former place and zinc ores to the latter.

The writer first visited property on September 8, 1943, and again on January 6 and 31, 1944, on which dates the following general information was secured:

The Antler mine is situated on the western foot-hills of the rugged Hualpai mountain range, at an elevation of about 3200 feet above sea level; the crest of the main range approximating 6,700 feet.

The prevailing rocks are granite. The zinc-copper deposit of this property is contained in sheared and schistosed rocks along a fault zone, which strikes N. 20 degrees E., and dips westerly. This schistosed structure is about a quarter of a mile wide and can be traced for seven or eight miles, according to Pete Vukoye, across the Hualpai mountains, and paralleling a similar structure in which the Borianna tungsten-copper mine is found.

At Antler, there is a hanging wall vein and also a foot wall vein, the latter occurring near the foot wall of the "schist" belt. The main vein is the foot wall vein, inasmuch as the hanging wall vein intersects it and thereby forms a huge ore shoot with a maximum width of 33 feet and of unknown length. However, ore is found in the various workings along the foot wall vein for a distance of 500 or 600 feet south of the Antler shaft and about 200 feet north therefrom.

The ore shoot mentioned is developed by a cross-cut tunnel, running from east to west about 80 feet. This tunnel cuts a body of zinc-copper sulphide ore, chalcopyrite and sphalerite, with a width of 33 feet at this particular point, which is the widest part of the shoot. Years ago, a drift was run north/along the ore vein, with an average width in excess of 10 feet; the vein being slightly displaced at one point by a diagonal fault. Also "horses" of country rock are found occasionally in the vein. ~~XIXX~~ Another drift was run south from the cross-cut tunnel about 200 feet, following the foot-wall vein with an ore width in this direction of 6 feet, per Watkins. The north drift has been cleaned out to its face. The south drift, however, is partly caved, but can be entered with some difficulty.

From the roof of the cross-cut tunnel mentioned to the surface the ore is oxidized material; but below this tunnel, as well as underneath the north and south drifts, the ore consists of massive sulphide material, carrying copper, zinc and lead, with a little silver.

The results of the first car load of ore shipped from property by Vukoyes was furnished us by Watkins, as follows: Tons, 47.5; silver, 1.5 ounces; gold, none; copper, 2.7%; lead, 1.15%; zinc, 7.85%; iron, 34.6%; silica, 20.1%; lime, 0.3%.

Also, Watkins stated that during January, 1944, three cars of ore were shipped to Midvale and one car to Clarkdale; but returns on these four shipments had not been received at the time of our last visit.

\* A matter of interest to mineralogists was pointed out to the writer by Watkins, who stated that the mineral "Antlerite" was first discovered at this mine and named after it, perhaps during the 1880's. This mineral is described in Dana's as follows:

"Antlerite. - Perhaps  $\text{CuSO}_4 \cdot 2\text{Cu}(\text{OH})_2$ . In light green soft lumps. \*\*\*\*\*. From the Antler mine, Mohave County, Arizona. Also from Chuquicamata, Chile." This ore might be termed, "green vitriol", as against "blue vitriol", a hydrous cupric sulphate,  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ , known as "Chalcanthite", which is also found in the Antler mine. The writer has forwarded specimens of both the Antlerite and Chalcanthite, from the Antler mine, to the J. N. Moore collection, 14 Clark Street, Malden, Mass.

The Antler shaft mentioned, where the head-frame has been erected, has been sunk from the surface on the foot wall of the said ore shoot, with a dip of 78 degrees west, about 30 feet to the main tunnel level, and then 47 feet below the said level. At the bottom of the shaft a cross-cut has been driven recently by Watkins 19 feet toward the hanging wall of shoot, which dips west at angle of 45 degrees. Note that the foot wall of shoot dips west at 78 degrees; hence, the ore shoot seems to be widening as depth is attained.

Per Watkins, the first three feet of the 19-foot cross-cut is barren selvage material. The next 5 feet is massive sulphide ore, assaying: zinc, 7.2%; copper, 4.8%; lead, gold and silver not tested. The next five feet of cross-cut is massive chalcopryrite and bornite material, which has been sampled; but assay results had not been received at the time of visit. The last 6 feet of the cross-cut consists of heavy sphalerite material with some chalcopryrite, which ~~xxxx~~ had been sampled; but also assay results had not been received at the time of visit.

## ANTLER MINE

Due to the difference in dip of the foot and hanging walls of the ore shoot, it will be necessary to drive the cross-cut at bottom of shaft about 50 feet further, or a total distance of around 69 feet, in order to reach the hanging wall of shoot.

It will be interesting indeed to watch the progress of this cross-cut; for should it prove the massive copper-zinc sulphide ore shoot to have an approximate width of 69 feet at this point; and should drifts now planned to be run on vein, later on, north and south from this cross-cut, prove the ore shoot to have a length of 400 feet or better, then and in such events the potential ore reserves of the mine would be greatly increased.

By and large, the Antler property has all the ear-marks of a large tonnage mine in the making. However, a great deal of money will be needed with which to develop it in a large way, block out ore and erect a proper treatment plant at property, before any great amount of <sup>net</sup> cash returns may be expected.

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ANTLER

Standard Metals Corporation  
(NKA American Holdings, Inc.)  
768 College Avenue  
Haverford, PA 19041-1205  
Tele/fax (610) 896-5097

June 2, 2009

Division of Corporation Finance  
Securities and Exchange Commission  
Via EDGAR Correspondence Submission

Re: Request to withdraw/delete Form 15-12B filing, accession  
number 0001225279-09-000020

Dear

Standard Metals is an insolvent corporation currently in the process of closing down. Since ceasing active operations in 1997, Standard Metals has not submitted 10-K or 10-Q reports. In response to contact from SEC Enforcement regarding the failure to file, company counsel submitted a form 15-12B through the SEC EDGAR website to request a change in filing status. We have since learned that Standard Metals is not eligible for a status change via the rule 12g-4(a)(1) cited on the form 15. In light of this, we are opting to settle the failure to file by consenting to a voluntary revocation of registration and we would like to withdraw the Form 15 filing.

The form to be withdrawn was submitted via the SEC EDGAR system on March 13, 2009, at 17:28 by the Heskett & Heskett law firm (CIK number 0001225279). The Standard Metals CIK is 0000093383. The accession number for the filing is 0001225279-09. Confirmation email from the EDGAR postmaster refers to file number 001-04255. Per SEC technical support instructions, we will follow up this correspondence submission with an email to CFITEDGAR@SEC.gov.

Any questions regarding these actions or this request may be directed to either individual signed below, or to SEC Enforcement attorney Allison Lee at (303) 844-1055.

Sincerely,

Winston G. Gresov  
Vice President and Acting CEO