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COUNTY:	COUNTRY:	STATE:	NAME OF PROPERTY:
Mohave	U. S. A.	Ariz.	Copper World Mine

DISTRICT OR AREA:	METALS:	ACCOUNT NUMBER:	NUMBER:
Cedar Valley Mng. Dist	Cu, Pb, Zn	A048	82

GENERAL DESCRIPTION: Small < 50 Ton/day replacement vein type deposit.

EXAMINED BY: Report by
DATE: J. D. Forrester

BRIEFED BY:
DATE:

STATUS: Inactive

TYPE OF DEPOSIT: Replacement, Vein ass't mineral showing

GEOLOGY: Predominant host rocks are gneisses & schists of Pc cambrian age striking N45E dipping vertically. The mineral control appears to be occuring along fault zones where sporadic emplacement of pegmatite masses has developed.

LOCATION: Sec. 25 T. 16 N. R. 16 W.
ELEVATION: 5000' above sealevel
LAT: LONG:

ACCESS: From Yucca 16.7 miles easterly towards E/W junctions to Antler & Bonnie Mine.

DEVELOPMENT: A glory hole, several underground levels to 600' beneath the surface with considerable stoping.

MINERALIZATION: Chalcopyrite, sphalerite and minor occurences of galena. Sparse occurences of pyrite, gold & silver.
The ratio of copper to zinc is generally 1:3

PROPERTY & OWNERSHIP: Bobcat Mining Co., which is part of the University of Hawaii.

GEOPHYSICS: Turam Electromagnetic survey, & Self potential survey have been conducted.

AERIAL PHOTOGRAPHS: ?

GEOCHEMISTRY: None Known

TOPOGRAPHIC MAPS: Advance 7½' Topo. sheet due EAST of NE 4 U.S.G.S. 15' Yucca Quad.

MAPS & REPORTS: Geological, Geophysical Investigations by Utah Exploration 1966 & Summary Property report by J. D. Forrester 1963 with updated maps 1965.

MINERAL PROSPECT DEPOSIT DATA SHEET

ESSEX INTERNATIONAL, INC.
1704 WEST GRANT RD., TUCSON, ARIZONA 85705
PHONE (602) 624-7421

BY: E. G. H.
DATE: 5-18-71

NAME OF PROPERTY:	NUMBER:

REFERENCES: 1963

PRODUCTION & RESERVES	SAMPLES:
1963 Reserves Developed 14,703 Ton 4.6% Cu 11.39% Zn Probable 18,890 3.58 " 13.73 "	
METALLURGY: Likely difficult complex ore.	**ENGINEERING:**
FACILITIES: Some poor bldgs. a 35 T/day mill original cost. $70,000 plus other misc. equip. salvage value $13,470.00	**EXPLORATION POSSIBILITIES:** Appear limited on strike & poor to fair at depth.

ADDITIONAL INFORMATION OR SKETCH MAP:

GEOLOGICAL AND GEOPHYSICAL INVESTIGATIONS OF THE COPPER WORLD MINE STANDARD COPPER CORPORATION

by

Jack F. B. Silman

18 August 1966

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GEOLOGICAL AND GEOPHYSICAL INVESTIGATIONS

OF

THE COPPER WORLD MINE

STANDARD COPPER CORPORATION

INTRODUCTION

The Copper World Mine, located in S25, T18N, R16W, Mohave County, Arizona, has been worked periodically for many years by various operators who mined copper and zinc ore from a section of the Copper World Vein approximately 400' in length and 450' in vertical extent. The bulk of the ore was produced from a high grade ore shoot comprising the southwest 200' of the vein. The boundaries of the old workings indicate that the southwest limits of the ore shoot were quite definite and abrupt. Development work and some exploratory drilling on several levels failed to locate a possible southwest extension of the vein.

The vein structure was explored northeast of the main ore shoot by development headings on several levels, but the mineralization in it apparently became sporadic, less extensive, lower grade and eventually uneconomic.

Geological and geophysical work was done on the property to evaluate additional ore possibilities during June and July, 1966. The geological work consisted of surface reconnaissance and underground detailed examination and mapping. Electromagnetic and self potential surveys were made over the known part and the projected extensions of the vein.

A Prospecting Permit was applied for on the NW$\frac{1}{4}$ of State Section 36, T18N, R16W, and two claims, CW 1 and CW 2, were located in the SW$\frac{1}{4}$ of S25, T18N, R16W to protect the projected southwest extension of the vein for a distance of approximately 4000 feet (see Figure 1).

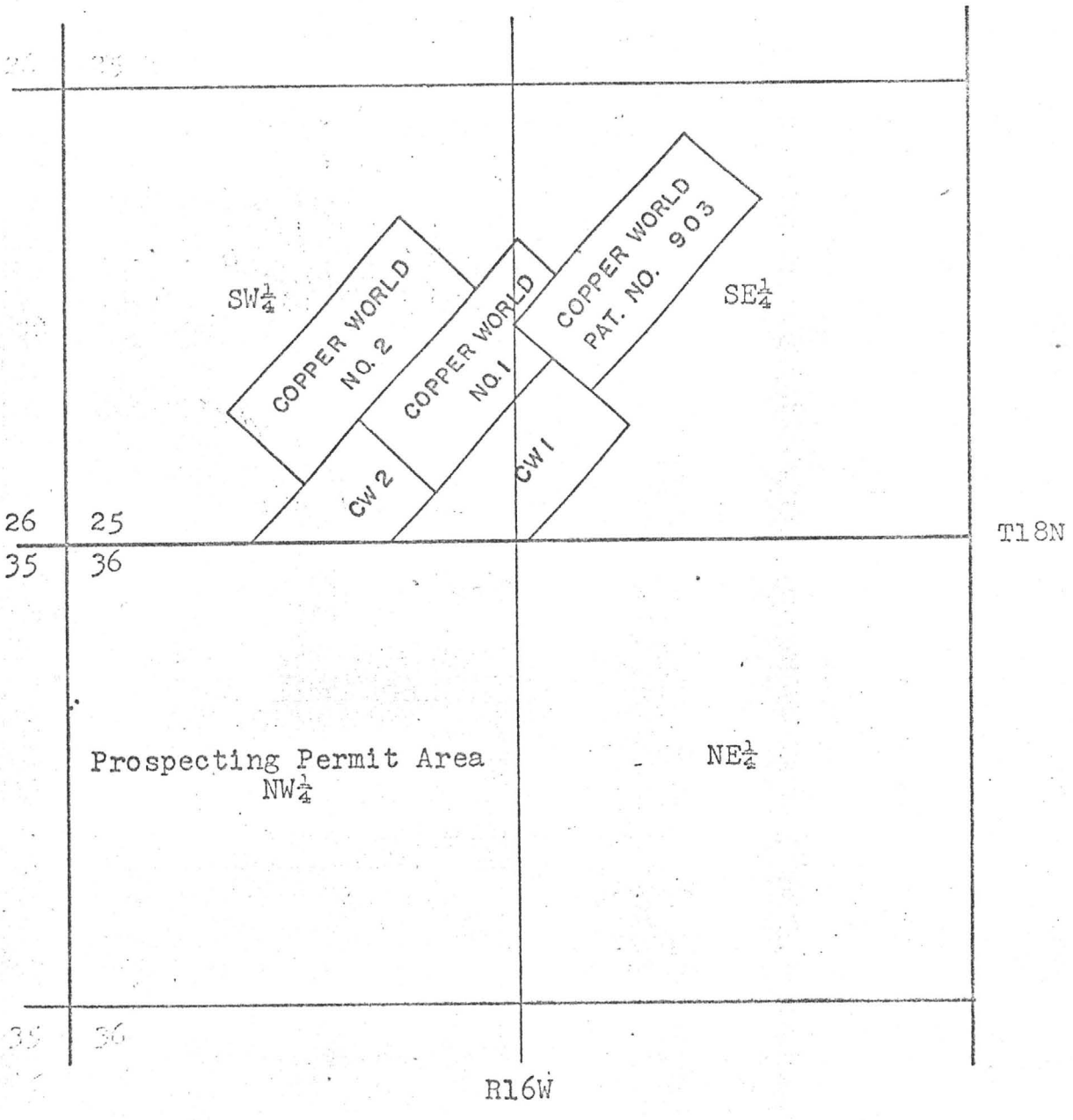


Figure 1. Claims and Prospecting Permit Area of Standard Copper Corporation, S25 and 36, T18N, R16W, Mohave County, Arizona.

GEOLOGY

The Copper World Mine area is underlain by Precambrian gneisses that have a general trend of N30°E and an attitude of 85°NW (see Figure 2). The Copper World Vein occurs at and along the contact of two slightly different types of gneiss. The footwall gneiss, on the southeast side of the vein, is fine-grained, biotitic, siliceous and characteristically blocky or flaggy. The hanging wall gneiss, on the northwest side of the vein, is medium-grained to coarse-grained, also biotitic and siliceous, but not noticeably blocky. The hanging wall gneiss in the vicinity of the main, high grade, ore shoot has been hydrothermally altered and is colored reddish-brown to pink. Irregular, tabular masses of pegmatite have been introduced into the gneisses and are generally concordant with the gneissocity but locally they exhibit cross-cutting relationships. Numerous faults, slips and shears parallel and transect the gneissocity of the country rock.

The Copper World Vein occurs in a complex, thrust, fault zone that has an overall strike of about N45°E and a vertical dip. In detail, the fault zone pinches to less than 1 inch and swells to more than 10' wide, splits, comes together again and changes direction and attitude over relatively short distances. The hanging wall is marked by a persistent band of sheared, biotite schist that varies from less than 1 inch to more than 2' wide. Biotite schist can also occur elsewhere within the fault zone. A band of silicification, several inches wide, commonly marks the footwall of the fault zone at the gneiss contact. Irregular, tabular, masses of anthophyllite, from a few inches to more than 6' wide, occur within the fault zone, generally adjacent to and in the biotite schist.

The ore minerals, chalcopyrite and sphalerite, occur mainly in massive concentrations up to 6' wide along the

footwall and disseminated throughout the anthophyllite. Small amounts of sulphides occur also in narrow, discontinuous, streaks within the biotite schist and in narrow veins along some of the minor, steeply-dipping, faults and shears that split off from the main fault zone or cut across it. Flat faults are common and, in places, they have provided channelways for mineralizing solutions to migrate out into the gneiss and replace some of it with small, flat, lenses and seams of chalcopyrite and/or sphalerite.

The ore deposits have some characteristics of both replacement-type and vein-type controlled primarily by a fault zone. Although the fault zone is essentially vertical, it dips locally up to 80° either northwest or southeast. These changes in dip seem to have played a major role in localizing the ore shoots, especially in the northeast part of the mine. Here, the ore appears to be localized for the most part, along the vertical and northwest dipping segments of the fault zone. With thrust movement along the fault, the hanging wall moved up relative to the footwall thereby causing the southeast dipping segments to be tight, bearing surfaces and the vertical and northwest dipping segments dilatant areas in and through which mineralizing solutions could migrate and deposit ore. The mechanism is illustrated in Figure 3. The horizontal component of movement along the fault, although apparently much smaller than the vertical component, seems to have exerted a similar but less obvious influence in localizing the ore shoots. With right hand movement, i.e. hanging wall northeast relative to the footwall, the more northerly-striking segments became bearing surfaces and the more easterly-striking segments were opened up and mineralized. The rake of the ore shoots, in the northeast part of the mine, is estimated to be approximately 70° northeast.

Southeast dipping segment, bearing surface, tight and barren

Northwest dipping segment, dilatant area, widest ore shoots

Vertical dipping segment, dilatant area, narrow ore shoots

Barren

Ore

Figure 3. Illustration of ore shoot formation and control by vertical thrust movement along fault zone. Similar mechanism possibly controls ore shoots in horizontal plane.

The locus of mineralization appears to have been a relatively small, complicated, fold that plunges steeply northeast. Available assays and the location of the old mine workings between surface and the 600 level indicate that the richest and most extensive ore, probably massive sulphides, was in and immediately adjacent to the fold. The glory hole on surface is in the fold (see Figure 2) as is the high grade ore section on the 600 level (see Figure 4). Northeast and away from the locus of mineralization, the copper and zinc values of the vein diminish until finally they almost completely disappear at about the northeast end line of the Copper World Claim on the 500 level.

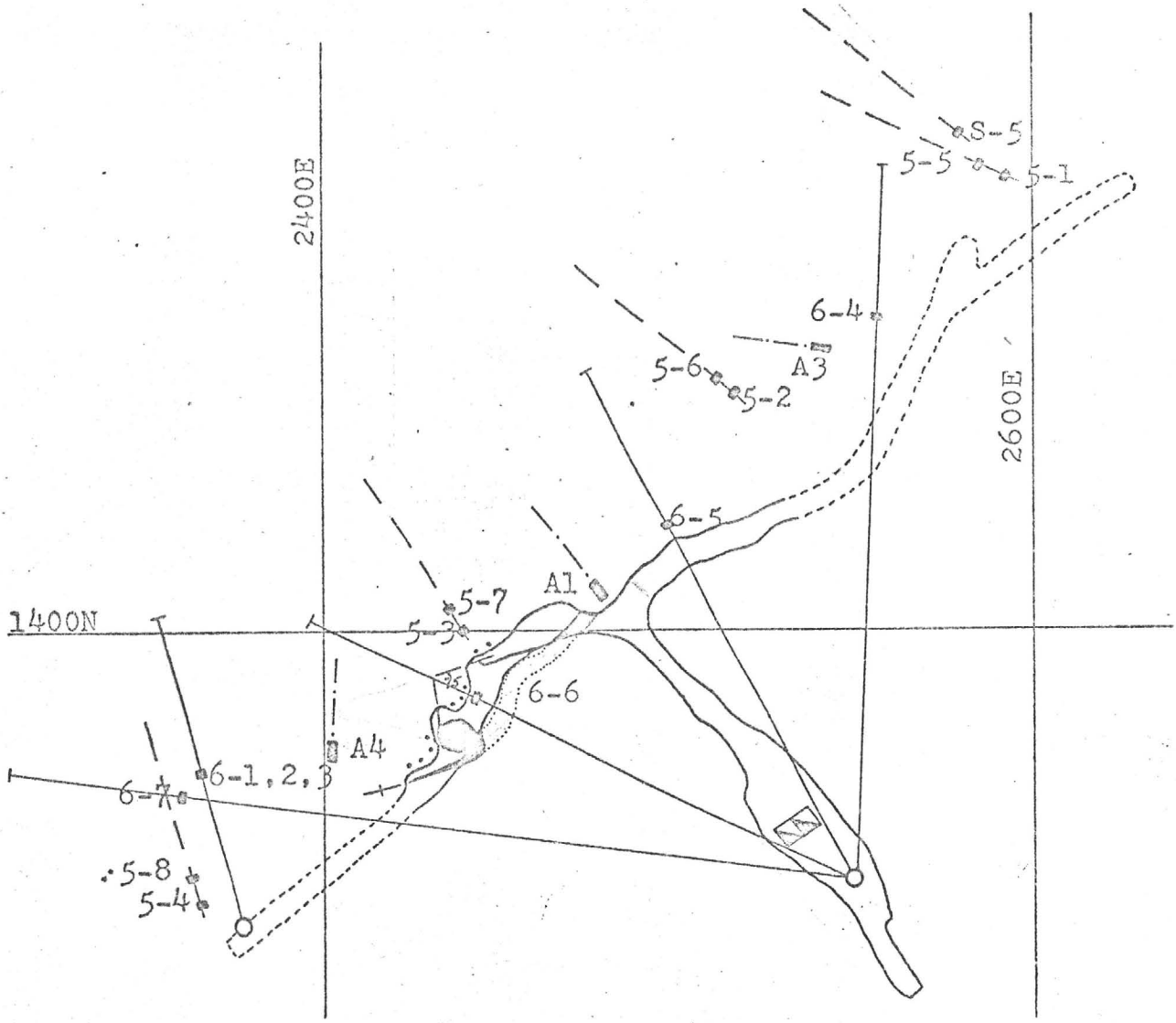
Neither the fault zone nor any vein material has been found yet southwest of the fold. Complex faulting, evident at the apparent end of the high grade ore section, has undoubtedly displaced the vein, but there is no obvious geological reason why the vein should not continue to the southwest.

GEOPHYSICS

Electromagnetic and self potential surveys were made on the property in an effort to trace the Copper World Vein beyond its present known limits. A grid consisting of a 1700-foot base line and 18 cross lines was established for survey control. The base line extended from the glory hole, on the main ore section of the vein, southwest 740' to the southwest end center marker and northeast to a point 200' beyond the northeast end line of the Copper World Claim.

EM Survey

Preliminary resistivity tests on the 500 level indicated that at least part of the Copper World Vein has electrical continuity and is a conductor. Electromagnetic or EM surveys detect conductors within the earth by



LEGEND

- Ore vein exposed
- Ore vein projected
- Mineralized fault, attitude
- Alteration, red
- A4 — Existing drill hole from 500 level, vein intersection
- 5-7 — Proposed drill hole from 500 level, anticipated vein intersection
- 6-4 — Proposed drill hole from 600 level, anticipated vein intersection

Figure 4. Map of 600 level.

measuring properties of the secondary field they produce when energized by a primary field. The Turam method, which measures both phase angle shift and intensity ratio, gives better resolution and depth penetration than most other EM methods, and was used for the survey.

Readings were taken at a total of 178 stations spaced 50' apart on 14 cross lines along 1000' of the base line. Readings that gave questionable results were checked for validity. Curves plotted from the phase angle shift and intensity ratio values as calculated from the readings are shown on Figure 5.

The survey lines on Figure 5 are used as datum lines for the curves and, by convention, the intensity ratio and the positive phase angle shift increases above the datum. A high intensity ratio coincident with a negative phase angle shift constitutes an anomaly. The shape of the curves between 1.5N and 0.5S on line 1.5E is considered to be characteristic of an anomaly over a strong vertical conductor. The peaks of the curves are quite symmetrical and occur almost directly over the actual surface location of the vein on this line. Asymetrical curves indicate a dipping conductor.

In as much as the Copper World Vein is a conductor, and that pipe and rail on the various underground levels are also conductors, anomalies are to be expected on the lines that cross the known part of the vein. The anomalies on lines 2E and 3E are broad and not very characteristic where the vein is known to exist. This may be due to the fact that the ground wire for the primary field was laid out to work southwest from the glory hole and that these lines are somewhat beyond the northeast limits of the working area.

The last indications of the vein on surface occurs between lines 0 and 0.5W. The area beyond this is covered by overburden. However, the EM survey results indicate that a conductor, "A", which could be the extension of the

mineralized Copper World Vein, or, just a wet fault or shear zone, does continue to the southwest. The anomalies on lines 0.5W, 1W and 2W locate a strong conductor between 45' and 15' southeast of and almost parallel to the base line. Between lines 2W and 3W, the conductor appears to be offset about 110' to the northwest. Definite, but weaker, anomalies trace the conductor through lines 3W, 4W and 5W between 120' and 160' northwest of the base line. A questionable anomaly on line 6W and a weak anomaly on line 7W about 300' northwest of the base line may indicate that the conductor is again offset about 150' to the northwest, between lines 5W and 6W. The small amplitudes of the curves of the anomalies at about 3N on lines 6W and 7W could mean that the conductor is dying out or that it is at a depth approaching the limits of detection with Turam equipment.

A second conductor "B", located about 200' southeast of conductor "A" , is indicated by anomalies on lines 3W, 4W, 5W, 6W and 7W. This conductor does not appear to extend along its projected strike through any of the lines northeast of 3W, thus, it may be a branch of the stronger conductor "A".

If either conductor "A" or "B" proves to be an ore-bearing structure, additional geophysical surveys should be made southeast and southwest of the Copper World Claim.

SP Survey

Oxidizing sulphide bodies generate a natural potential and thus they can be detected by self potential or SP surveys. Copper minerals in the upper part of the Copper World Vein are undergoing oxidation as evidenced by the presence of abundant secondary copper minerals, especially in the vicinity of the glory hole.

The SP survey was made over the known part and along the projected strike of the vein for distances of 700' southwest and 1000' northeast of the glory hole. SP readings were taken at a total of 206 stations, spaced 25' and 50'

apart, on 15 cross lines. The curves plotted from the readings are shown on Figure 5.

The survey lines on Figure 5 are used as datum lines and, by convention, positive values in millivolts are plotted above the datum line and negative values below. Positive values are normal while negative values in excess of -20° mv are considered to be anomalous.

Anomalies were obtained only on three lines, 0, 0.55E and 1E, in the vicinity of the glory hole. The location of the vein is known for approximately 500' northeast of the glory hole and some oxidized copper minerals are evident along it. However, the vein apparently does not contain enough sulphides in the zone of oxidation to produce an SP anomaly. The lack of SP anomalies on the lines southwest of the glory hole indicate that there are no appreciable concentrations of oxidizing copper minerals at the bedrock surface immediately below the overburden. If the Copper World Vein does continue to the southwest, any wide ore shoots containing abundant copper minerals are probably at depth.

MINING AND EXPLORATION GUIDES

The Copper World Vein has certain mineralogical and structural features that can be used as tentative guides in mining and exploration if they are recognized.

Mineralogical Guides

1. Biotite - fine-grained to coarse-grained; brown to light brown; intensely sheared; generally occurs as a band of schist on the hanging wall but can occur elsewhere within the fault zone; distinguishable from the normal, fine-grained, black, biotite in the host gneisses by its lighter color and greater widths.

2. Anthophyllite - large, lamellar, radiating crystals; gray to brownish-gray; occurs in irregular, tabular masses only within the vein; generally adjacent to

the hanging wall biotite schist but can occur elsewhere in the fault zone; contains disseminated chalcopyrite and sphalerite and makes low grade ore.

3. Silicification - fine-grained to cherty quartz; gray to white; commonly occurs in a narrow band at the gneiss contact on the footwall.

4. Massive sulphides - high grade concentrations of chalcopyrite and sphalerite generally occur on the footwall of the fault zone.

5. Wallrock alteration - the hanging wall gneiss in the vicinity of the high grade ore shoot associated with the fold has an overall reddish-brown to pink color.

6. Sphalerite - small structures that contain sphalerite and split off from the main fault zone may lead back to the main structure some distance ahead.

7. Chalcopyrite - a mobile mineral easily moved into small fractures and openings under pressure; not considered to be too significant as a possible ore lead unless associated with sphalerite.

Structural Guides

1. Vertical - ore appears to be located on the vertical northwest dipping segments of the fault zone; southeast dipping segments are generally tight and unmineralized; turn raises into hanging wall if ore pinches out; keep raises on the footwall side of the fault zone.

2. Horizontal - ore appears to be located on the more easterly striking segments of the fault zone; the more northerly striking segments are generally tight and unmineralized; turn to the left if ore pinches out; keep headings on the footwall side of the fault zone.

3. Rake - the rake of ore shoots in the northeast section of the mine is believed to be about 70°NE but locally it may be steeper or flatter; the rake of the main ore shoot appears to be steeper, approximately 80°NE (see Figure 6).

The character and disposition of the mineralization in

the Copper World Vein will become better known as mining progresses and the validity of these tentative guides in mining and exploration will be either confirmed or disproved.

ADDITIONAL ORE POSSIBILITIES

Possibilities for additional ore exist northeast and southwest of and at depth below the present mine workings (see Figure 6). If these possibilities can be proven to be actualities by development work and drilling, the ore reserves will be substantially increased (see Table 1) and the life of the mine greatly prolonged under present economic conditions.

Northeast Possibilities

The possible ore most readily available above the 500 level is exposed in a section about 180' long on the 500 level at the extreme northeast end of the Copper World Claim. The ore shoot is believed to rake at about 70°NE and continue upwards to surface where it crops out in the vicinity of a small adit. The ore shoot could be offset by faulting or folding about 150' above the 500 level, as the main ore shoot to the southwest appears to be. The average grade of the ore as indicated by assays from the 500 level is about 1.5% Cu. and 1.5% Zn. and these values are considered representative. Assuming an average width of 4' and a tonnage factor of 10, the ore shoot could contain approximately 72 tons per vertical foot. Above the 500 level, Blocks A and A-1 could contain 11,800 and 12,200 tons of inferred ore respectively.

The ore shoot below the 500 level contains an additional 9,000 tons of inferred ore down to 4900' elevation in Block A-2. If the ore shoot does exist and has the anticipated grade and continuity through Blocks A, A-1 and A-2, it can be expected to continue downward and provide an additional 21,000 tons of projected ore in Block A-3

Table 1. Possible additional ore reserves.

Block	Tons	Category
A	11,800	Inferred
A-1	12,200	Inferred
A-2	9,000	Inferred
A-3	21,600	Projected
B	10,000	Inferred
B-1	20,000	Projected
B-2	20,000	Projected
C	5,500	Inferred
Southwest extension	?	
Total	110,100	

Note: Inferred ore - exposed or sampled on one side, assumed to continue for reasonable distances beyond either side of exposure.

Projected ore - not exposed, believed to be the continuation of inferred ore based on geological information.

between 4900' and 4600' elevation.

The ore shoot mined in the most northeasterly existing stope on the 500 level should rake about 70°NE, continue downward at least to the 600 level, and contain approximately 5,500 tons of inferred ore in Block C.

Depth Possibilities

The main, high grade, ore shoot at the southwest end of the vein has been mined and opened up by underground workings for a vertical distance of 550 feet. The ore shoot, as exposed on the 600 level and cut by drill holes about 35' above the level, appears to be just as wide, extensive and high grade as it was on the upper levels. It is believed that the ore shoot rakes about 80°NE and continues to depth without much change in either tonnage per vertical foot or total metal content. A comparison of Cu:Zn ratios from surface down to the 600 level indicates that the zinc content is possibly increasing (see Table 2) and this trend can be expected to continue with depth.

Table 2. Change of ore tenor in main ore shoot with depth.

Level	Total % Cu+Zn	Ratio %Cu:%Zn
Surface to 100	10	9:1 due probably to secondary enrichment
200	25	1:4
250	15	1:3
500	15	1:4
600	20	1:5

The ore shoot appears to be about 200' long and, with an assumed average width of 4' and a tonnage factor of 8, it would contain 100 tons per vertical foot. Below the 600 level, the ore shoot could contain 10,000 tons of inferred ore to 4800' elevation in Block B, 20,000 tons of

projected ore between 4800' and 4600' elevation in Block B-1 and 20,000 tons of projected ore between 4600' and 4400' elevation in Block B-2.

Southwest Possibilities

Geological mapping on surface and the 600 level indicates that the main, high grade, section of the vein is controlled by a complicated fold and apparently terminated by complex faulting. Exactly what has happened to the vein and where its extension could be located is not readily apparent. However, the results of the EM survey and study of the vein on the 600 level provide several leads that warrant further investigation.

The EM survey located two conductors beneath the overburden southwest of the glory hole (see Figure 2). Either of these conductors could be the mineralized southwest extension of the Copper World Vein.

A pod, or enlargement, of high grade ore is the apparent end of the main ore shoot on the 600 level. However, a tight and rather insignificant structure that contains some chalcopyrite and sphalerite continues across the back and leaves the drift in the northwest wall about 15' southwest of the pod (see Figure 4). Another small, mineralized structure also leaves the northwest wall of the drift about 20' northeast of the pod. Either of these structures may be the lead to the southwest extension of the vein. Drill hole A4 from the 500 level intersected 6' of ore 35' above and 30' due west of the pod. This intersection does not line up with the upward projection of the main ore shoot and therefore it could be on the southwest extension of the vein.

These leads must be explored for, if the southwest extension of the vein is located, it is possible that very substantial ore reserves could be proven and an entirely new section of the mine developed.

EXPLORATION

A knowledge of grade, tonnage, character and location of proven ore reserves is fundamental to the efficiency of any mining and milling operation whether it be large or small. This information can only be obtained by exploration work which should be carried out well in advance of actual mining to permit mine planning, level development and stope preparation. Diamond drilling is the fastest and most economical method of exploring for and proving ore reserves and should be utilized fully. Crosscutting, drifting and raising are often necessary to explore areas that cannot be tested effectively by diamond drilling. Although slower and more costly, well-planned exploration openings yield more information concerning the ore and provide access to it for subsequent mining operations. Both diamond drilling and underground exploration headings are required to investigate the various possibilities for additional ore at the Copper World Mine.

The ore shoot exposed in the northeast end of the 500 level drift can be investigated by exploration headings (see Figure 6). A vertical raise on the southwest side of the ore shoot between the 500 level to the 350 level should be in ore all the way and provide a working opening to mine most of Block A. The upper part of Block A can be explored by continuing the 350 level drift about 200' northeast. Block A-1 can be investigated by a raise from the most northeasterly box hole on the 350 level to surface. Block A-2 and Block C of the next ore shoot to the southwest can be explored by extending the 600 level drift about 440' northeast. The downward extensions of these ore shoots can be explored and mined from deeper levels that may be established.

Ore possibilities below the 600 level can be tested best by diamond drilling from surface and the 500 and 600

levels. Holes to probe the vein at appropriate intervals below the 600 level are listed in Table 3. The anticipated vein intersections in these holes are shown on Figures 4 and 6.

Four surface and eight underground drill holes are necessary to explore for the possible southwest extension of the Copper World Vein. The surface holes to test the EM conductors and the holes from the 500 and 600 levels to check the underground leads are listed in Table 3 and shown on Figures 2, 4 and 6. If the southwest extension of the vein is located and found to be mineralized in any of these holes, additional drilling will be necessary to determine the extent, tonnage and grade of the ore.

The total cost of the foregoing exploration work, which could increase the ore reserves by 110,100 tons or more, will be approximately $137,760. Included in this amount is the cost of 11,040 feet of diamond drilling at $9.00 per foot and the cost of 960 feet of underground development at $40.00 per foot. The exploration work can be done in phases as required to meet the demands of the presently scheduled rate of production. Or, it can be expedited and the overall potential of the mine determined within a relatively short period of time. The possible advantages of the latter course of action, which might prove the feasibility of mill expansion and increased production, deserves careful consideration under present economic conditions.

Table 3. Exploratory diamond drill holes.

Section	Hole	Collar Location	Bear.	Dip	Anticipated Intersection	Total Length	Remarks
Northeast Ore Shoot	S-6	Sur.5050'el. 2207N,2533E	S48°E	-45°	640',4600'el.	750'	Block A-3. Collar elevation estimated
Main Ore Shoot	6-4	600 level 1329N,2550E	N02°E	-27°	225',4798'el.	280'	Block B
	6-5	600 level 1329N,2550E	N28°W	-42°	150',4798'el.	215'	Block B
	6-6	600 level 1329N,2550E	N64°W	-40°	160',4798'el.	220'	Block B
	5-1	500 level 1675N,2262E	S66°E	-42°	490',4700'el.	590'	Block B-1
	5-2	500 level 1675N,2262E	S50°E	-45°	460'.4700'el.	570'	Block B-1
	5-3	500 level 1675N,2262E	S33°E	-45°	460',4700'el.	570'	Block B-1
	5-5	500 level 1675N,2262E	S66°E	-53°	600',4550'el.	730'	Block B-2
	5-6	500 level 1675N,2262E	S50°E	-56°	570',4550'el.	720'	Block B-2
	5-7	500 level 1675N,2262E	S33°E	-56°	570',4550'el.	720'	Block B-2
	S-5	Sur.5012'el. 1940N,2073E	S51°E	-46°	940',4350'el.	1070'	Block B-2
Southwest Extension	S-1	Sur.5345'el. 1.45W,2.10S 1005N,2370E	N37°W	-45°	255',5265'el.	400'	Cond. "A". Elev. est. Survey grid Mine grid

Table 3. Exploratory diamond drill holes (cont'd)

Section	Hole	Collar Location	Bear.	Dip	Anticipated Intersection	Total Length	Remarks
Southwest Extension (cont'd)	S-2	Sur.5450'el. 4.00W,2.80N 1245N,1880E	S37°E	-45°	515',5085'el.	650'	Cond. "B". Elev. est. Survey grid Mine grid
	S-3	Sur.5480'el. 4.00W,3.70N 1395N,1765E	S37°E	-45°	470',5145'el.	600'	Cond. "A". Elev. est. Survey grid Mine grid
	S-4	Sur.5460'el. 6.50W,4.20N 1210N,1595E	S37°E	-45°	515',5090'el.	675'	Cond. "B". Elev. est. Survey grid Mine grid
	5-9	500 level 1237N,2262E	N35°W	0°	100',5025'el.	150'	
	5-10	500 level 1237N,2262E	S35°E	0°	100'.5025'el.	200'	
	6-1	600 level 1318N,2377E	N15°W	+45°	65',4940'el.	125'	
	6-2	600 level 1318N,2377E	N15°W	0°	45',4900'el.	90'	
	6-3	600 level 1318N,2377E	N15°W	-45°	65',4860'el.	125'	
	6-7	600 level 1329N,2550E	N83°W	-28°	215',4798'el.	270'	
	5-4	500 level 1675N,2262E	S17°E	-42°	490',4700'el.	590'	
	5-8	500 level 1675N,2262E	S17°E	-53°	600',4550'el.	730'	
					Total	11,040'	

SUMMARY AND CONCLUSIONS

The ore deposits of the Copper World Mine have vein-type and replacement-type characteristics and are localized in and controlled by an essentially vertical thrust fault that is concordant with the gneissocity of the Precambrian host rock.

Differential vertical and horizontal movement has opened up the vertical and southwest dipping and the more easterly striking segments of the fault which localize the ore shoots. The ore shoots are believed to rake between 70° and 80° northeast.

The main economic minerals are chalcopyrite and sphalerite which have been deposited in massive and disseminated concentrations from mineralizing solutions introduced along a steeply-plunging fold. The massive sulphides occur along the footwall of the fault and the disseminated sulphides occur in irregular, tabular masses of the gangue mineral anthophyllite within the fault zone. Biotite is a prevalent gangue mineral and occurs in a band of schist along the hanging wall of the fault zone.

Certain mineralogical and structural features of the ore deposits can be used as tentative guides in mining and exploration.

The fault zone, and the mineralized material in it, is apparently terminated by complex faulting at the southwest end of the fold. EM survey results indicate that two conductors, either of which could be the continuation of the vein, extends beneath the overburden southwest of the presently known ore limits. Negative SP survey results in this area indicate that if the conductor is the continuation of the vein, any high grade concentrations of copper minerals within it are not oxidizing at surface but are probably at depth.

Possibilities for additional ore exist northeast and

southwest of, and at depth below, the present mine workings. Diamond drilling and underground development work to explore these possibilities will cost approximately $137,760. In excess of 110,100 tons of additional ore could be located by this exploration work.

RECOMMENDATIONS

In order to explore the various possibilities for additional ore at the Copper World Mine, the proposed diamond drilling and underground development work should be done.

The company should consider the possible advantages of increased production to capitalize on the current economic conditions and decide whether or not the exploration work should be expedited to evaluate relatively quickly the overall potential of the mine.

Although the mine is small, the geology is not simple and a competent mine geologist should be employed to do the work connected with exploration drilling and development, production, and general mine engineering.

SW END LINE COPPER WORLD

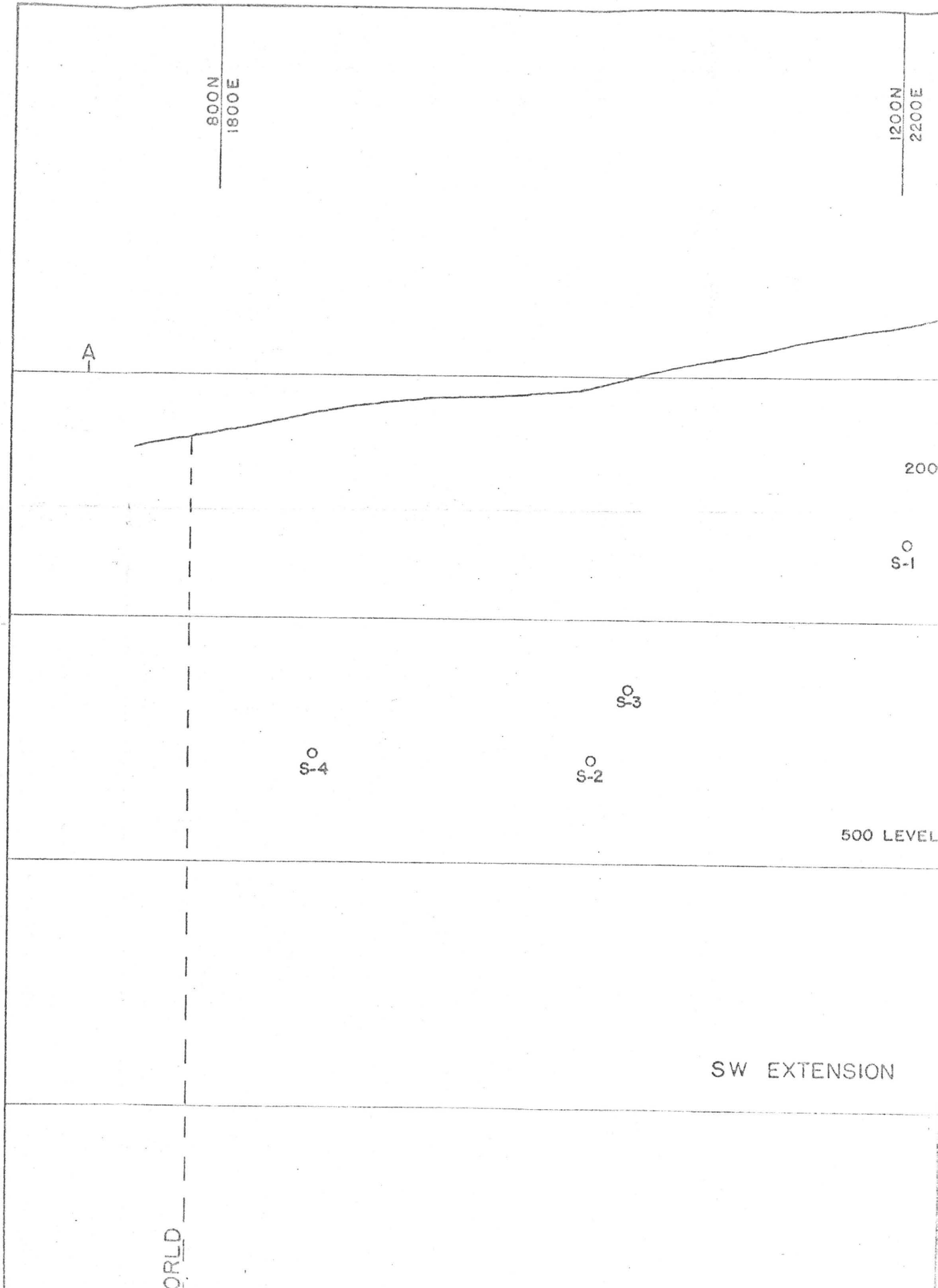
A4

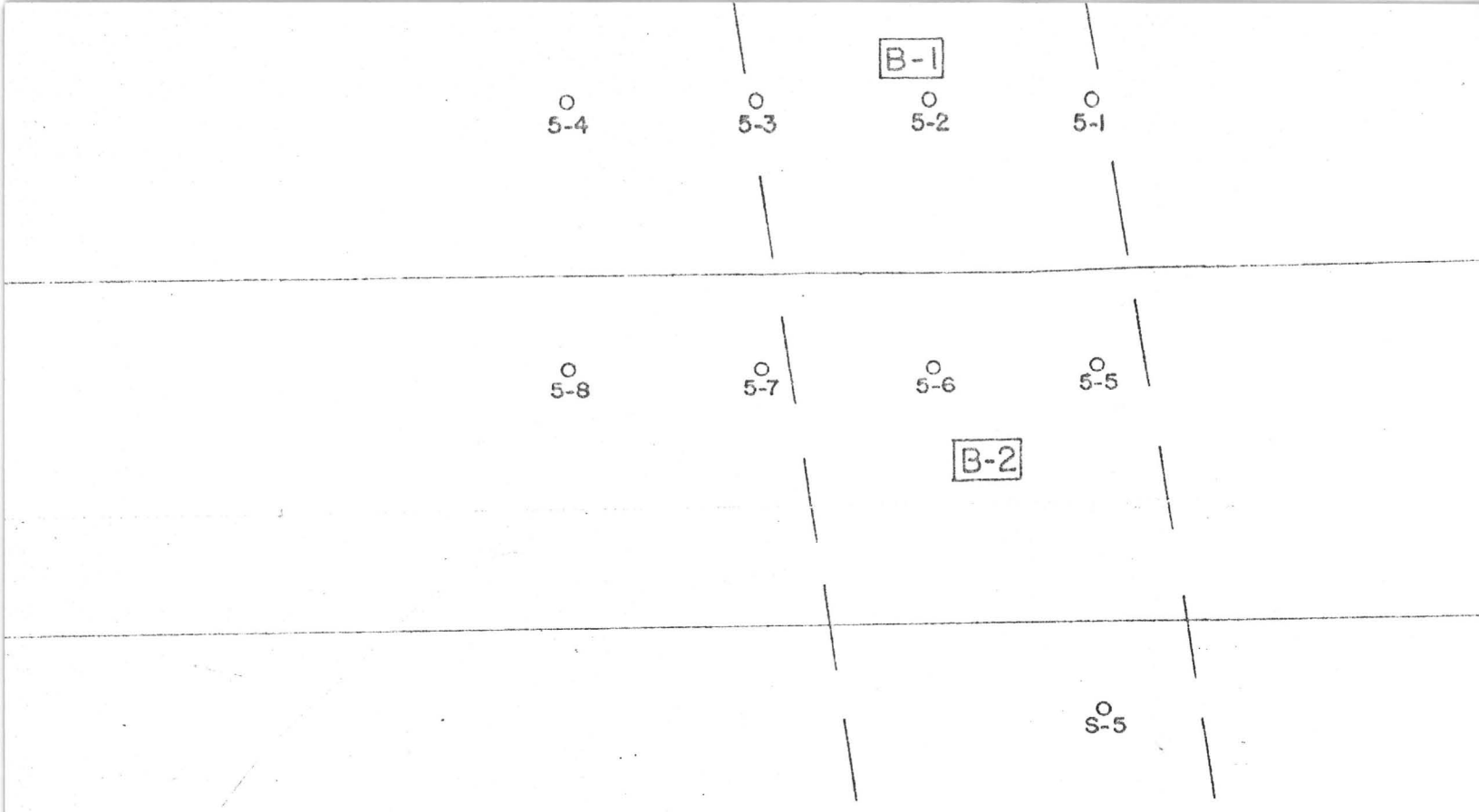
G-1

A

A-2

NOTES

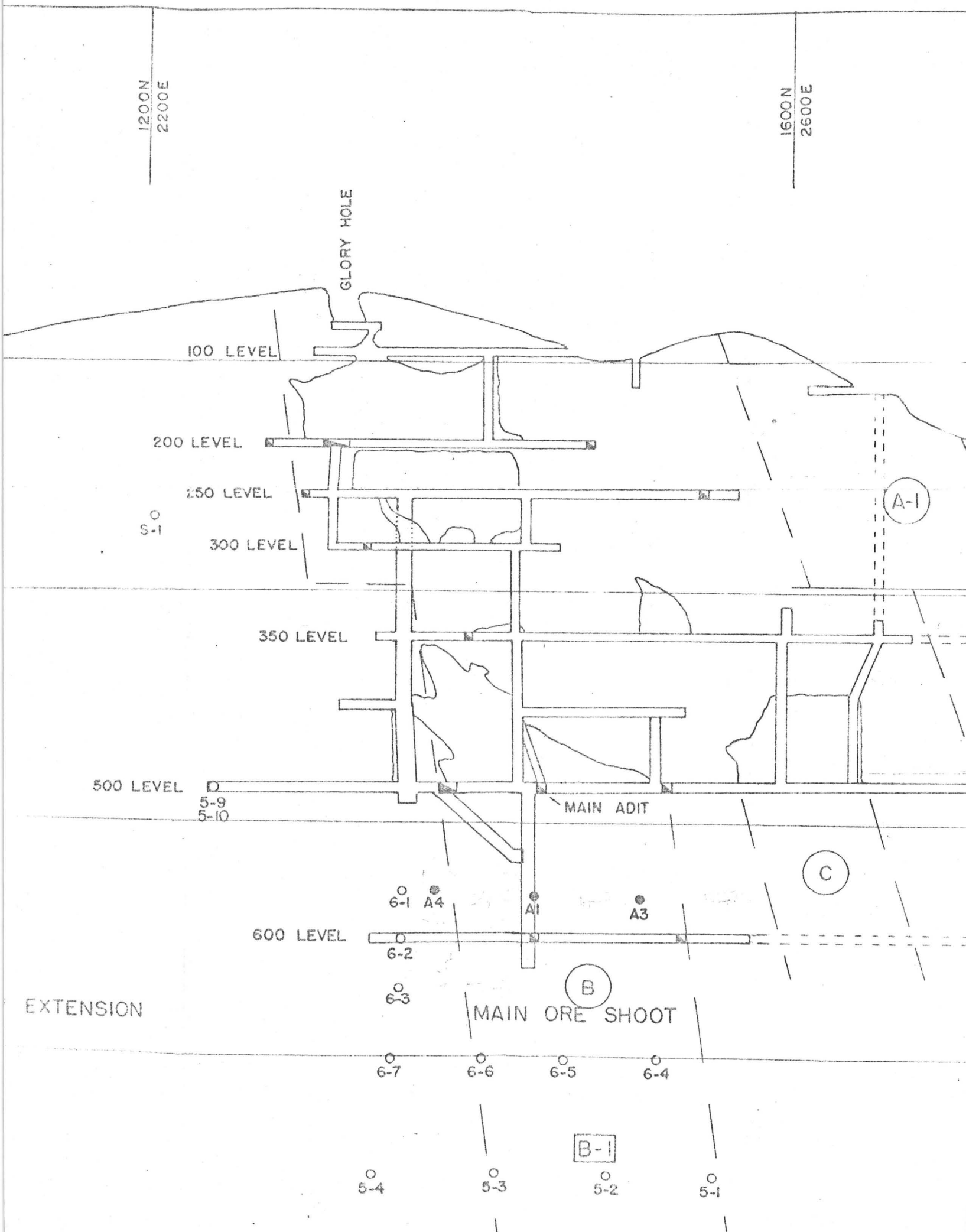

800N
1800E
1200N
2200E
A
200
S-1
S-3
S-4
S-2
500 LEVEL
SW EXTENSION
ORLD

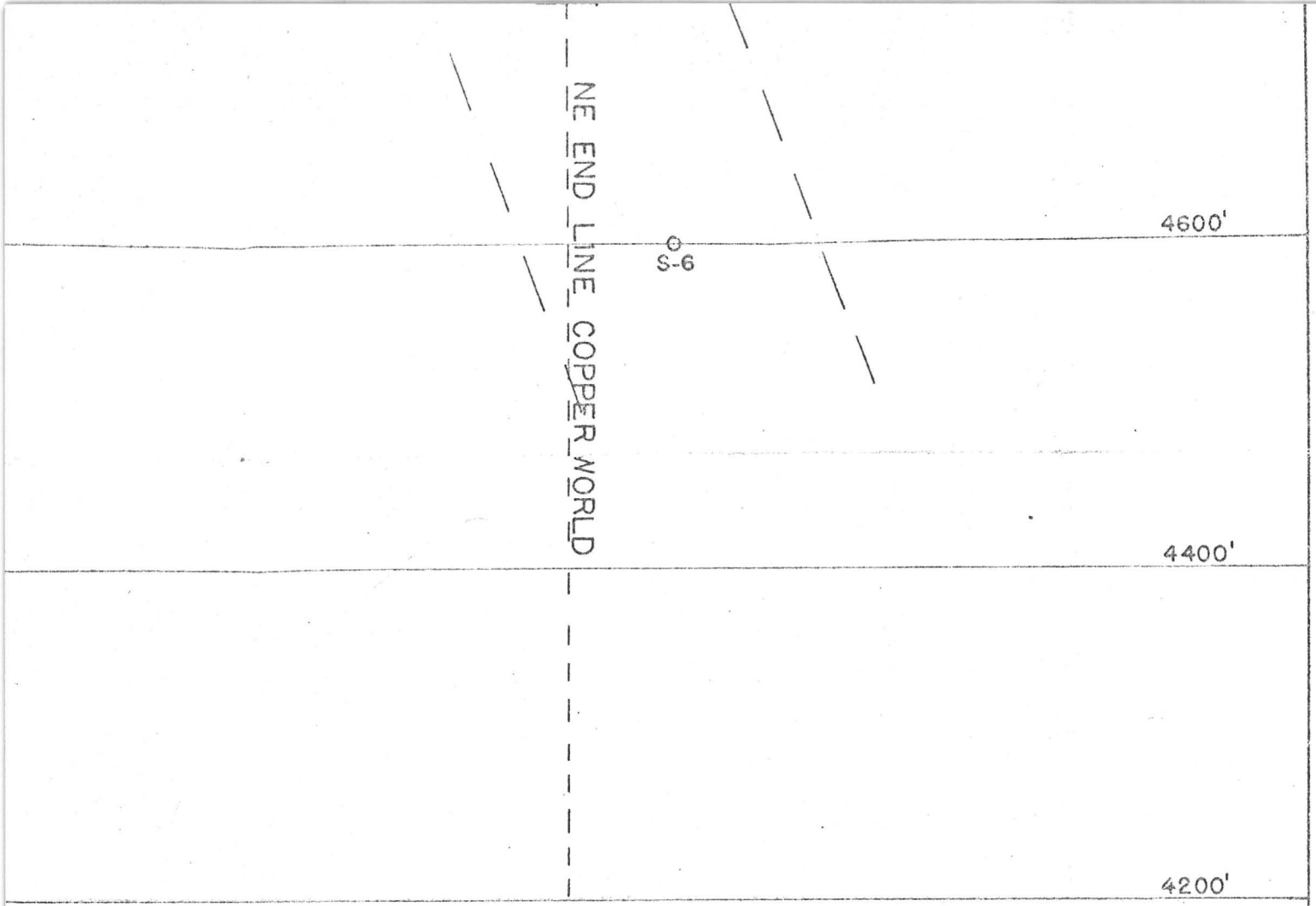


LEGEND

- EXISTING STOPES
- EXISTING HEADINGS
- PROPOSED HEADINGS
- A4 — EXISTING DRILL HOLES
- 6-1 — PROPOSED DRILL HOLES
- ASSUMED ORE SHOOT LIMITS
- (A) — INFERRED ORE BLOCKS
- A-2 — PROJECTED ORE BLOCKS

NOTES
1. PLANE OF SECTION N45°E, LOOKING NORTHWEST
2. LOCATION OF WORKINGS FROM J.D. FORRESTER REPORT, 1963


1200N
2200E
1600N
2600E
GLORY HOLE
100 LEVEL
200 LEVEL
250 LEVEL
S-1
300 LEVEL
350 LEVEL
A-1
500 LEVEL
5-9
5-10
MAIN ADIT
C
6-1
A4
A1
A3
600 LEVEL
6-2
6-3
B
EXTENSION
MAIN ORE SHOOT
6-7
6-6
6-5
6-4
B-1
5-4
5-3
5-2
5-1



STANDARD COPPER CORPORATION

LONGITUDINAL SECTION
OF
COPPER WORLD MINE

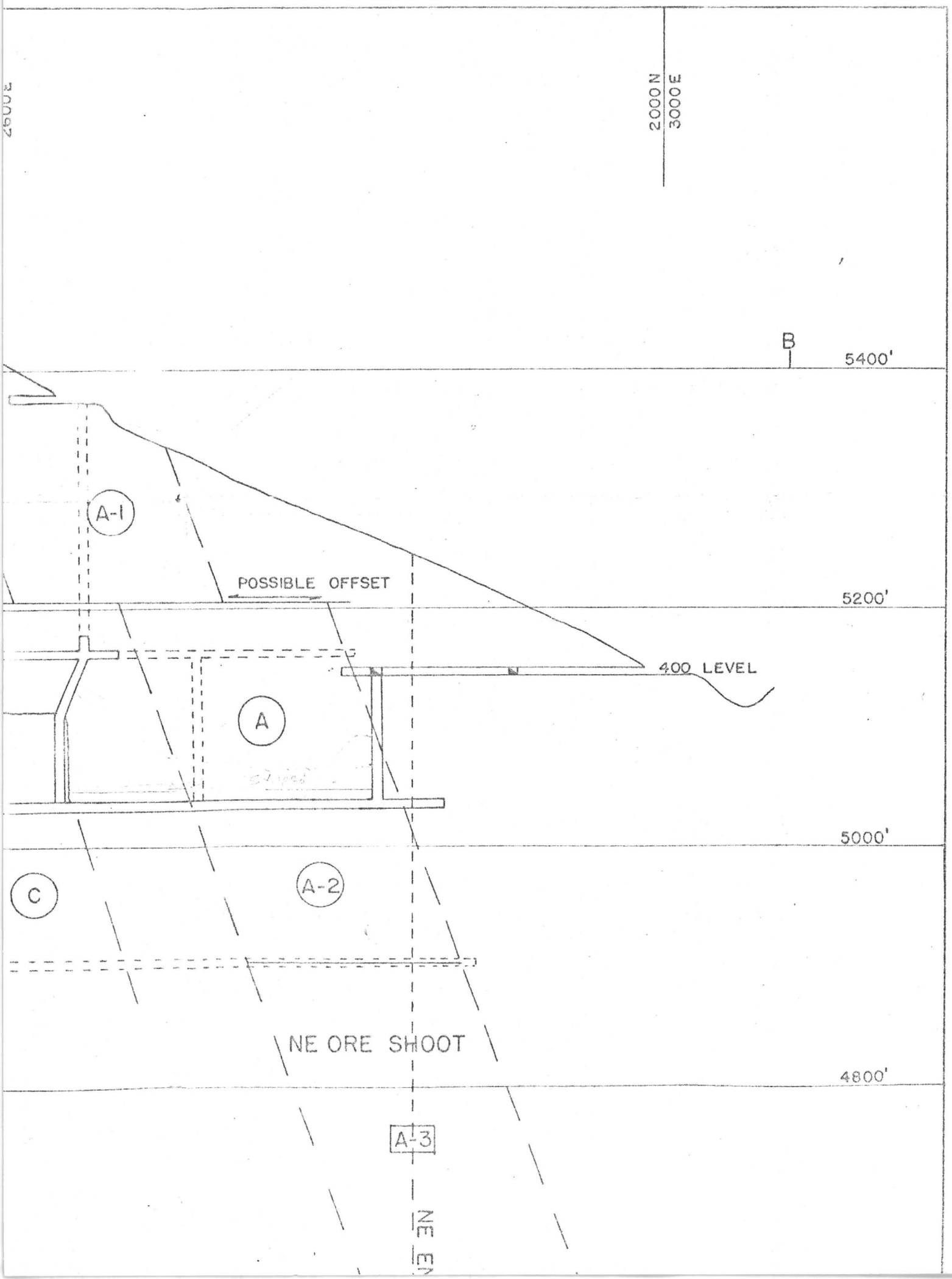
S25, T18N, R16W
MOHAVE COUNTY, ARIZONA

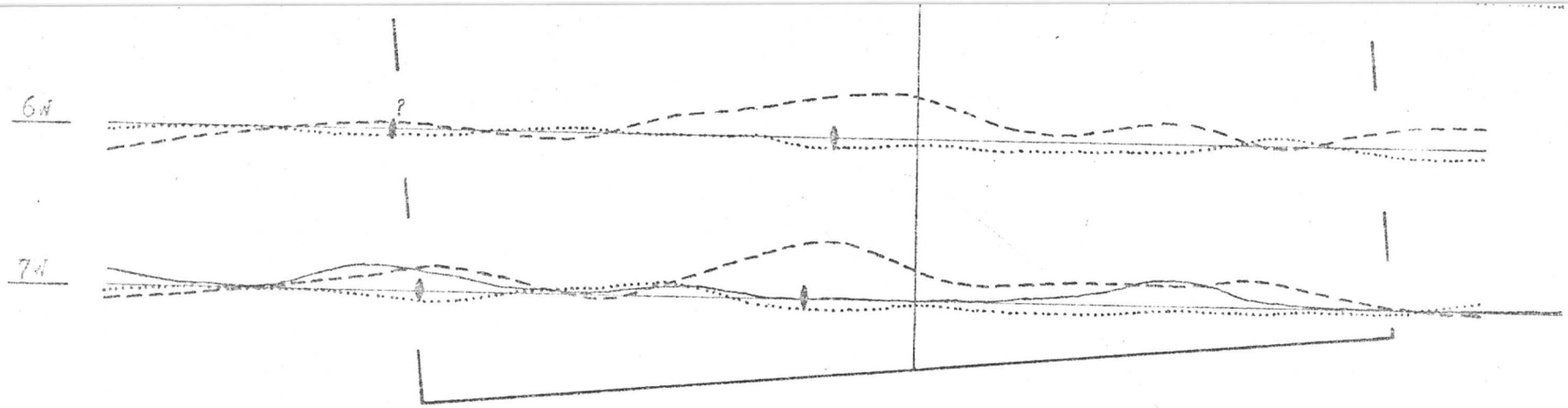
SCALE 1"=100'

JFBS

15 AUG. '66

FIGURE 6


2000 N
3000 E
B
5400'
A-1
POSSIBLE OFFSET
5200'
400 LEVEL
A
5000'
C
A-2
NE ORE SHOOT
4800'
A-3



LEGEND

- Claim boundary
- 7W Survey and datum line
- SP potential profile
- SP anomaly
- EM intensity ratio profile
- EM phase angle shift profile
- EM conductor

SCALES

SP Profile	EM Profiles	
Pot.	Int. Ratio	Ph. Ang. Sh.
+50mv	1.200	+10°
0	1.100	0
-50mv	1.000	-10°

STANDARD COPPER CORPORATION

Map Showing Results
of

SP AND EM SURVEYS

at

THE COPPER WORLD MINE

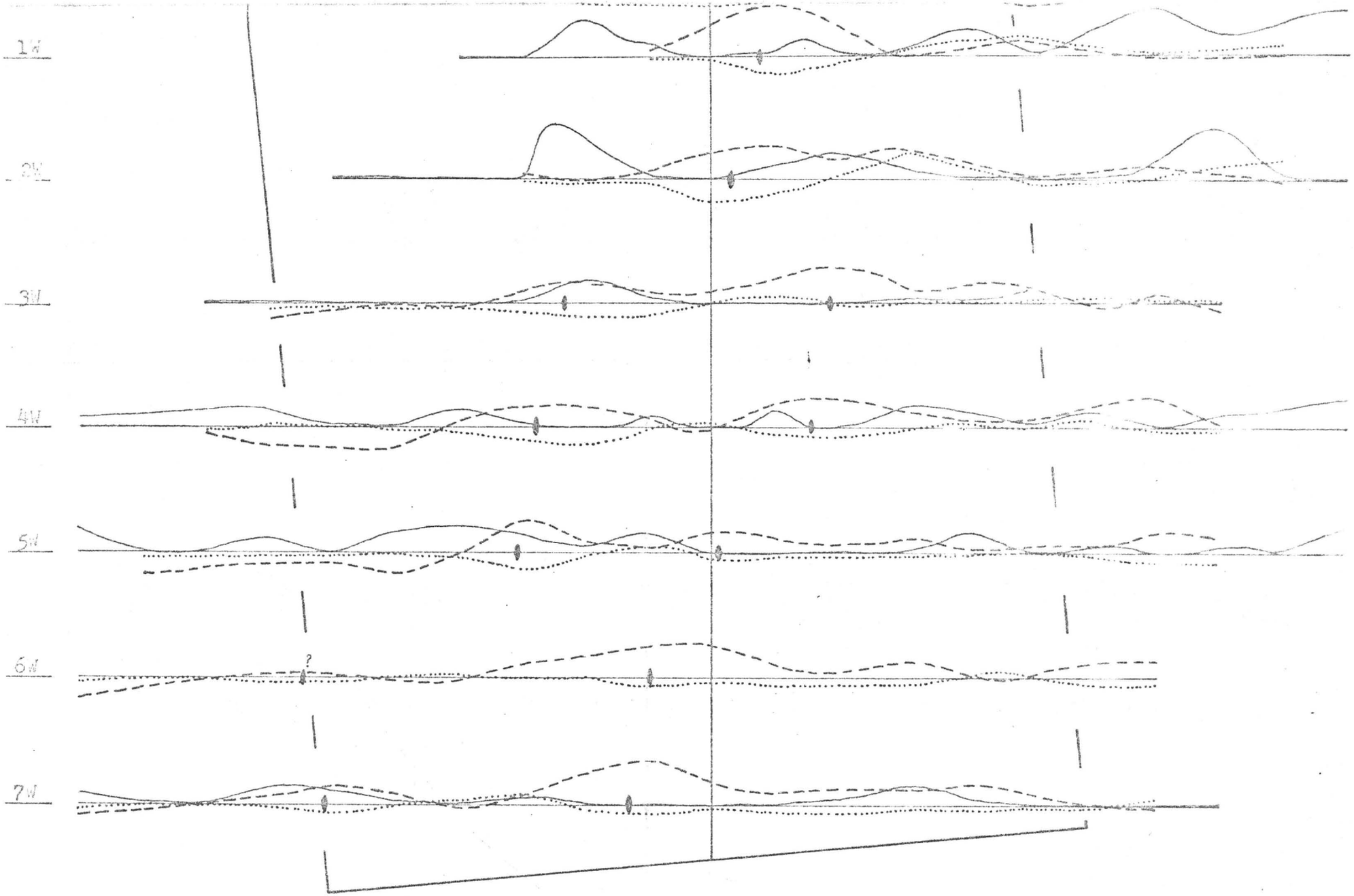
S25, T18N, R16W
Mohave County, Arizona

Scale 1" = 100'

JFBS

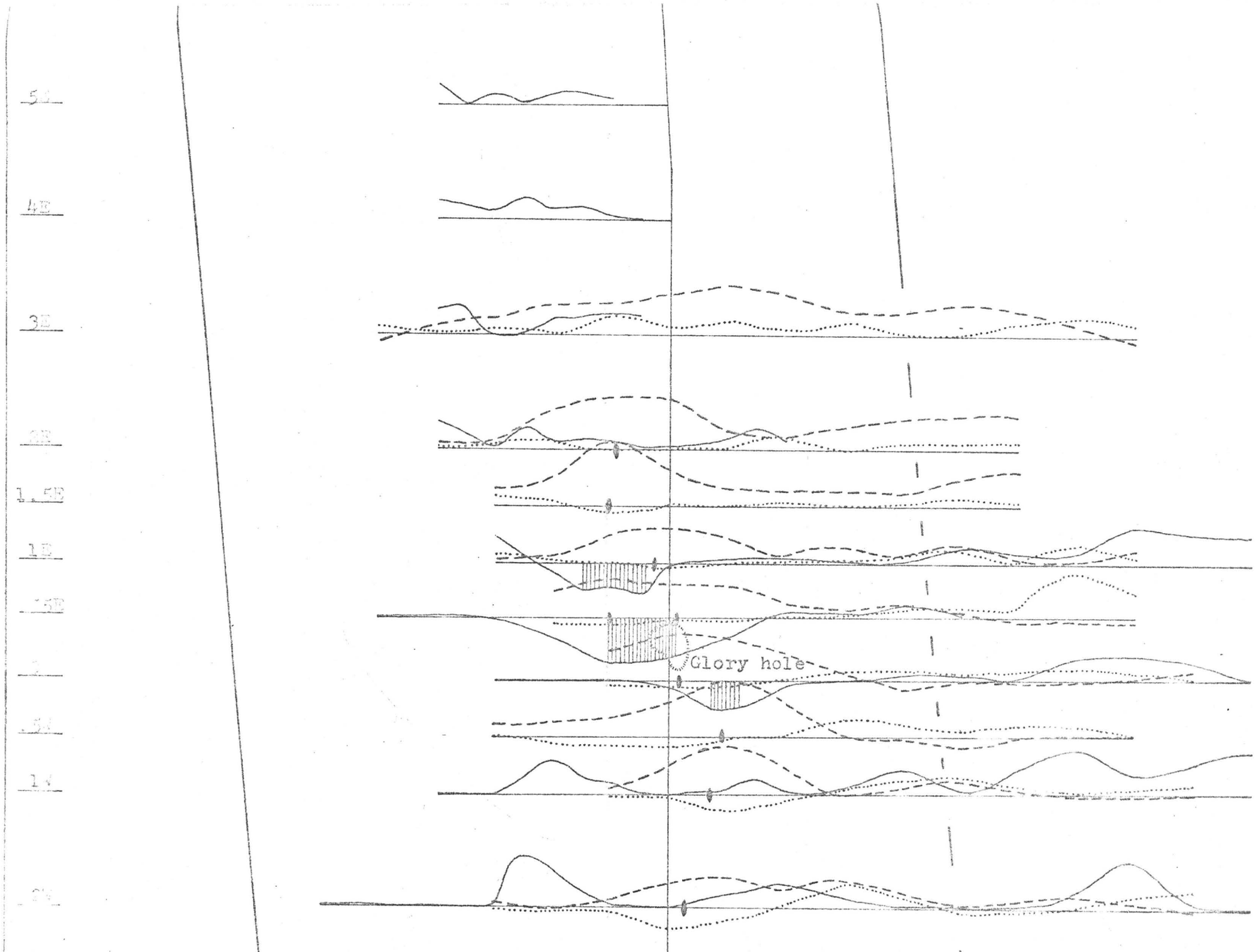
15 Aug.'66

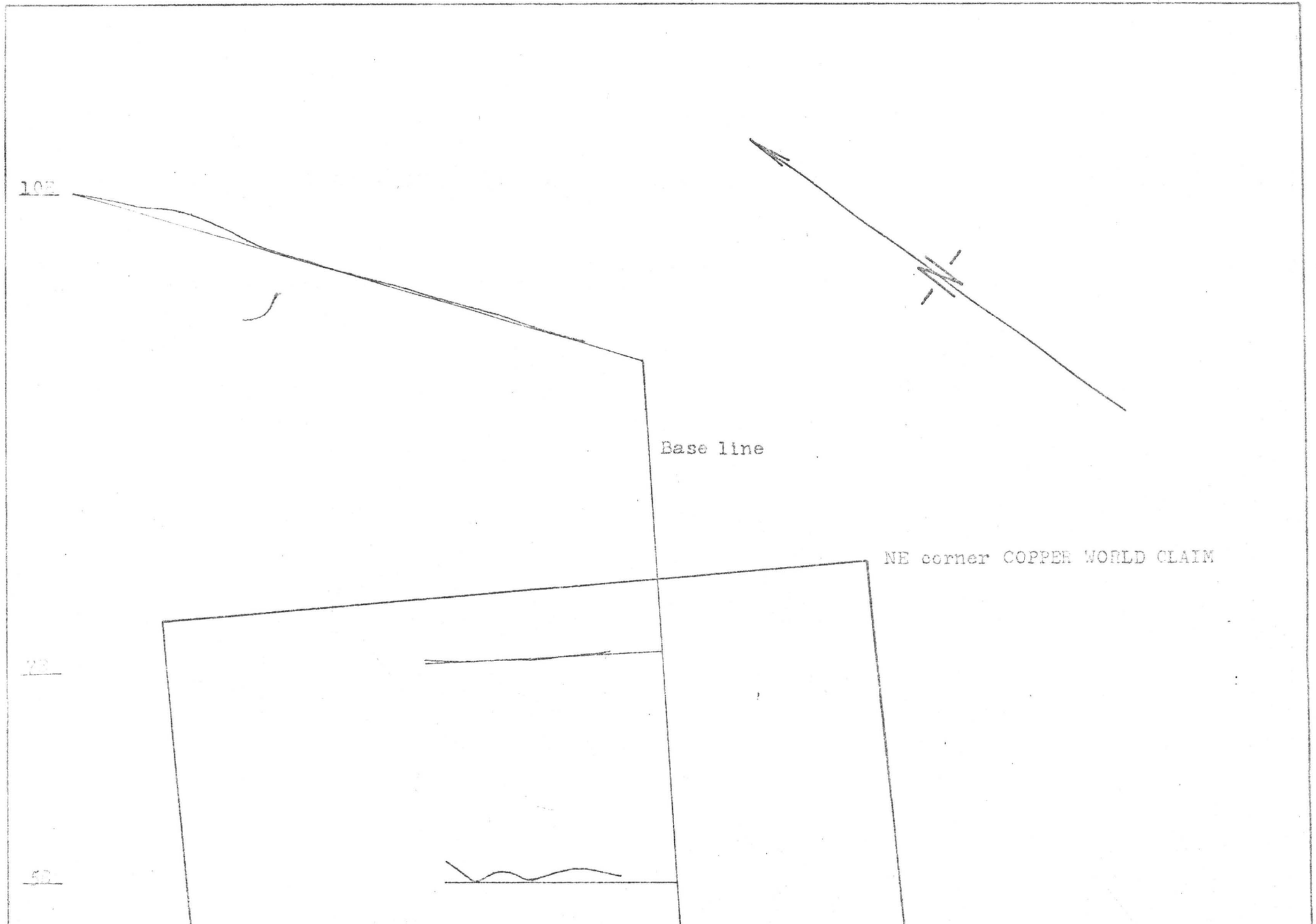
FIGURE 5

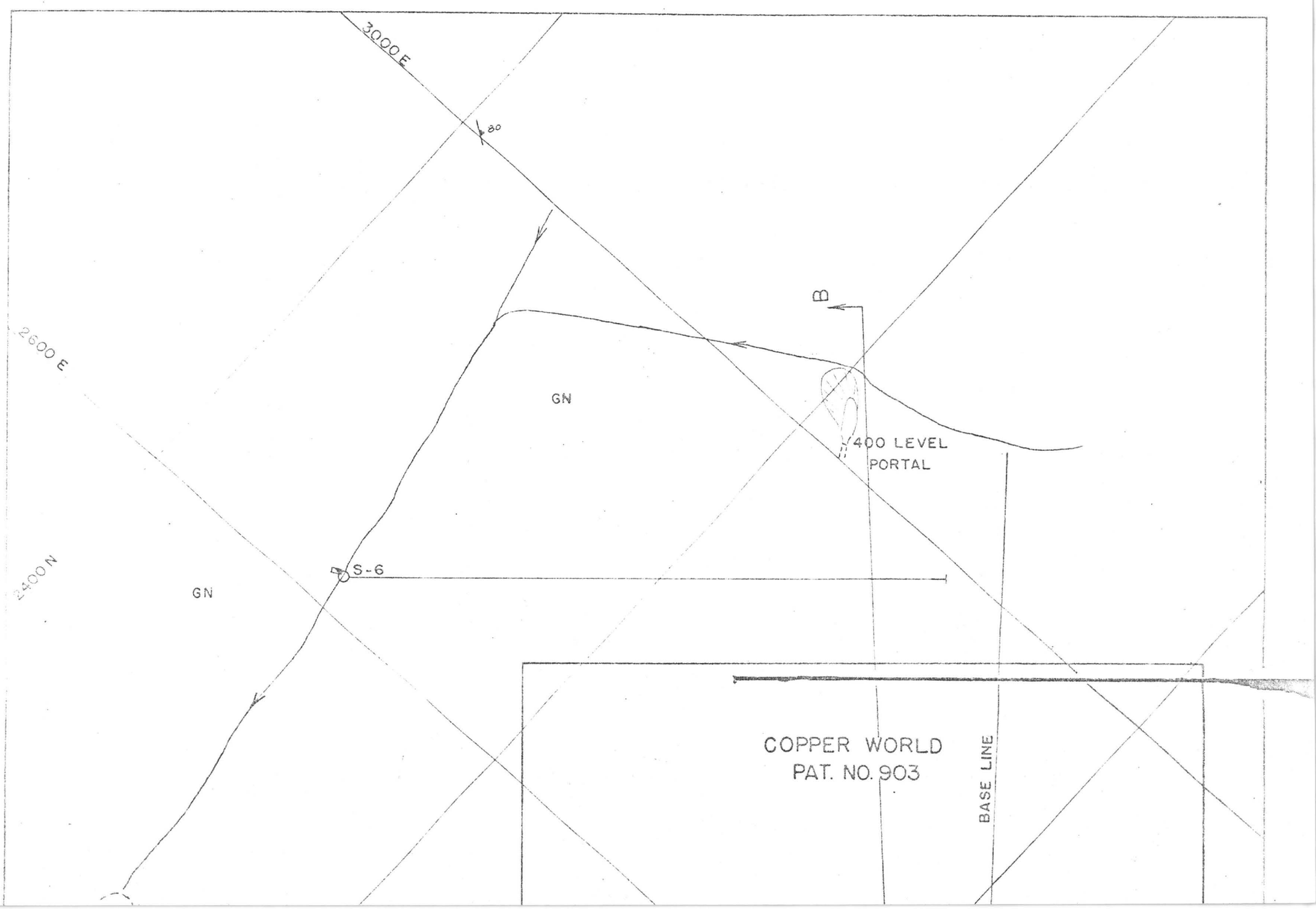


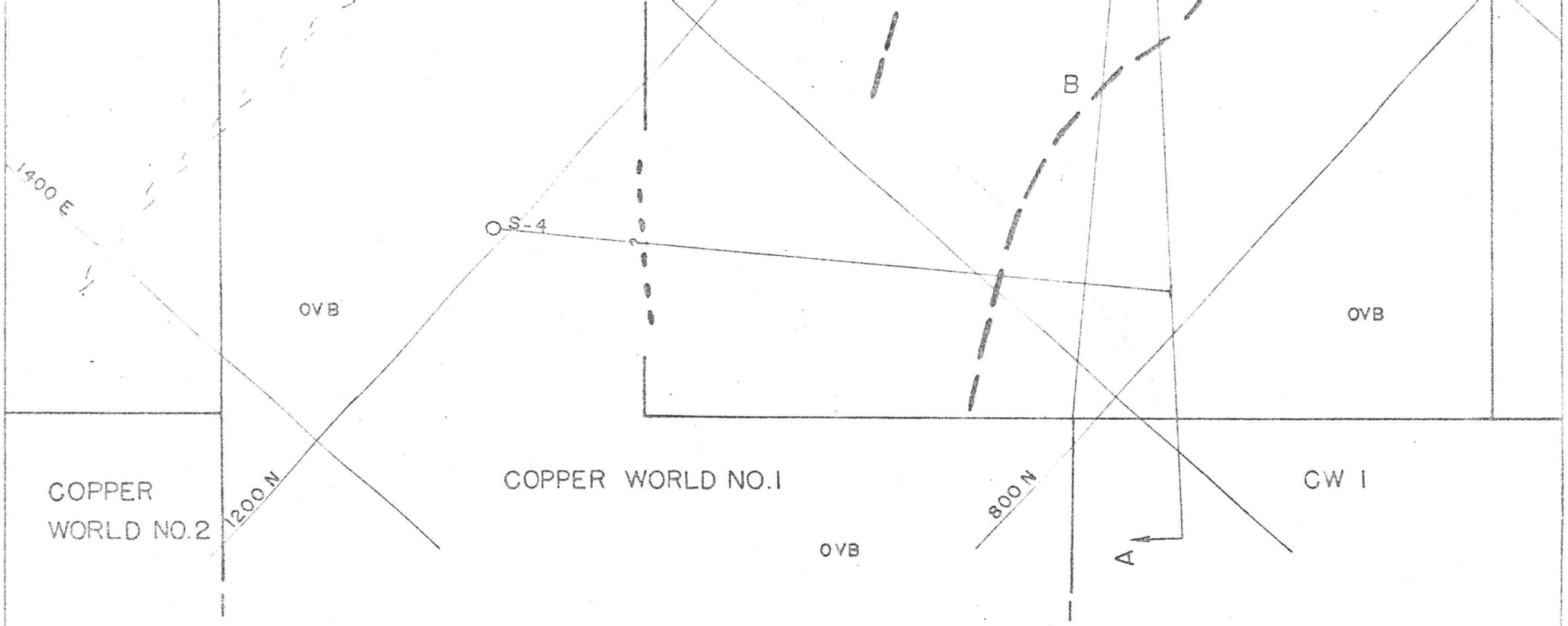
LEGEND

—— Claim boundary


5D
4D
3D
2D
1.5D
1D
.5D
0
.5D
1D
2D
Glory hole


10E
Base line
NE corner COPPER WORLD CLAIM
22
5S


3000 E
80
2600 E
2400 N
GN
GN
B
400 LEVEL
PORTAL
S-6
COPPER WORLD
PAT. NO. 903
BASE LINE



LEGEND

GN	Gneiss		Dump
90	Gneissocity	85	Vein, attitude
P	Pegmatite	70	Fault, attitude
OVB	Overburden	80	Drag fold, attitude
	Alteration, red		EM conductor
	Shaft		Drill station
	Portal	S-1	Drill hole, surface
	Trench	6-3	Drill hole, underground

STANDARD COPPER CORPORATION

SURFACE MAP

of

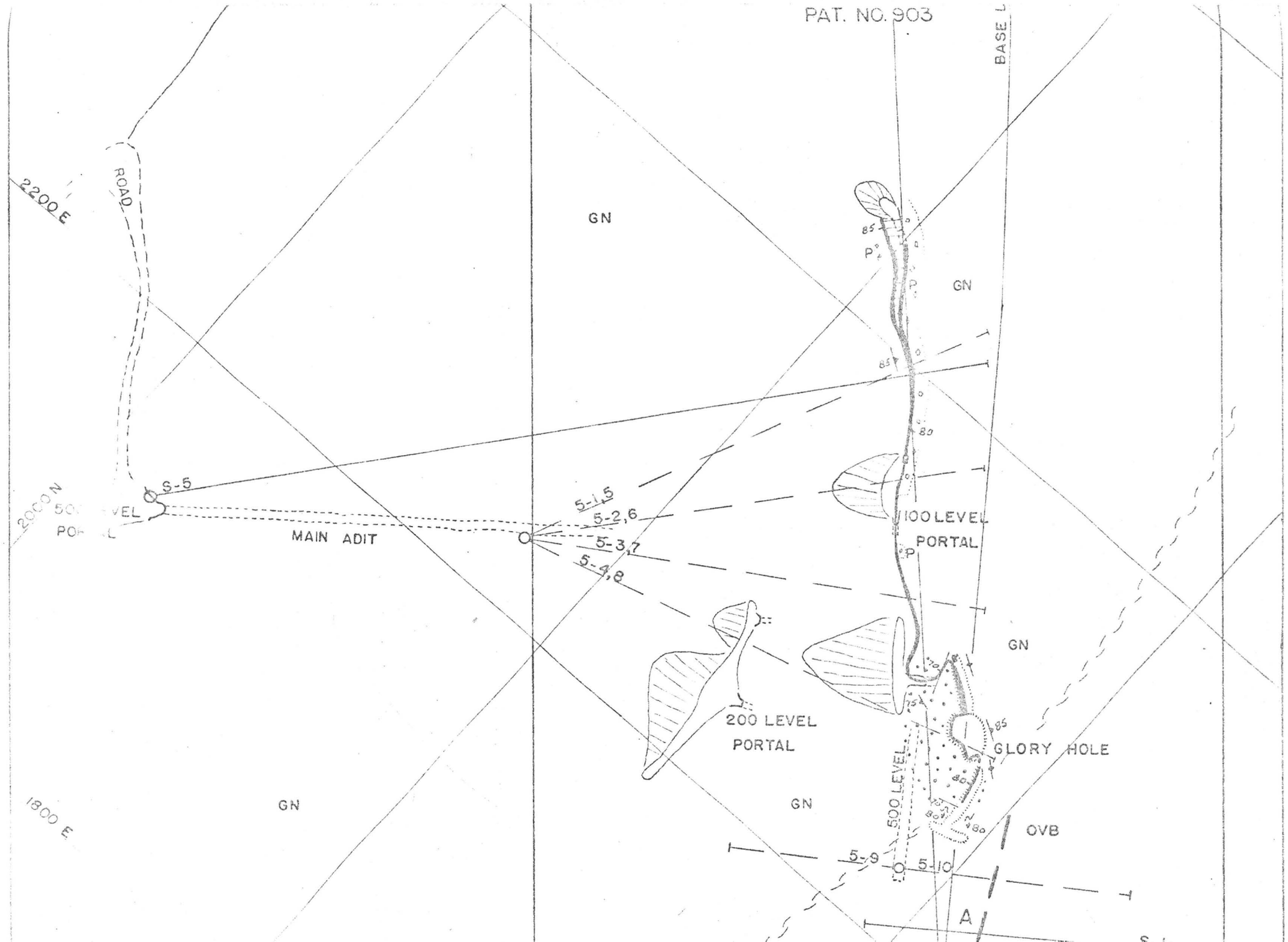
THE COPPER WORLD MINE

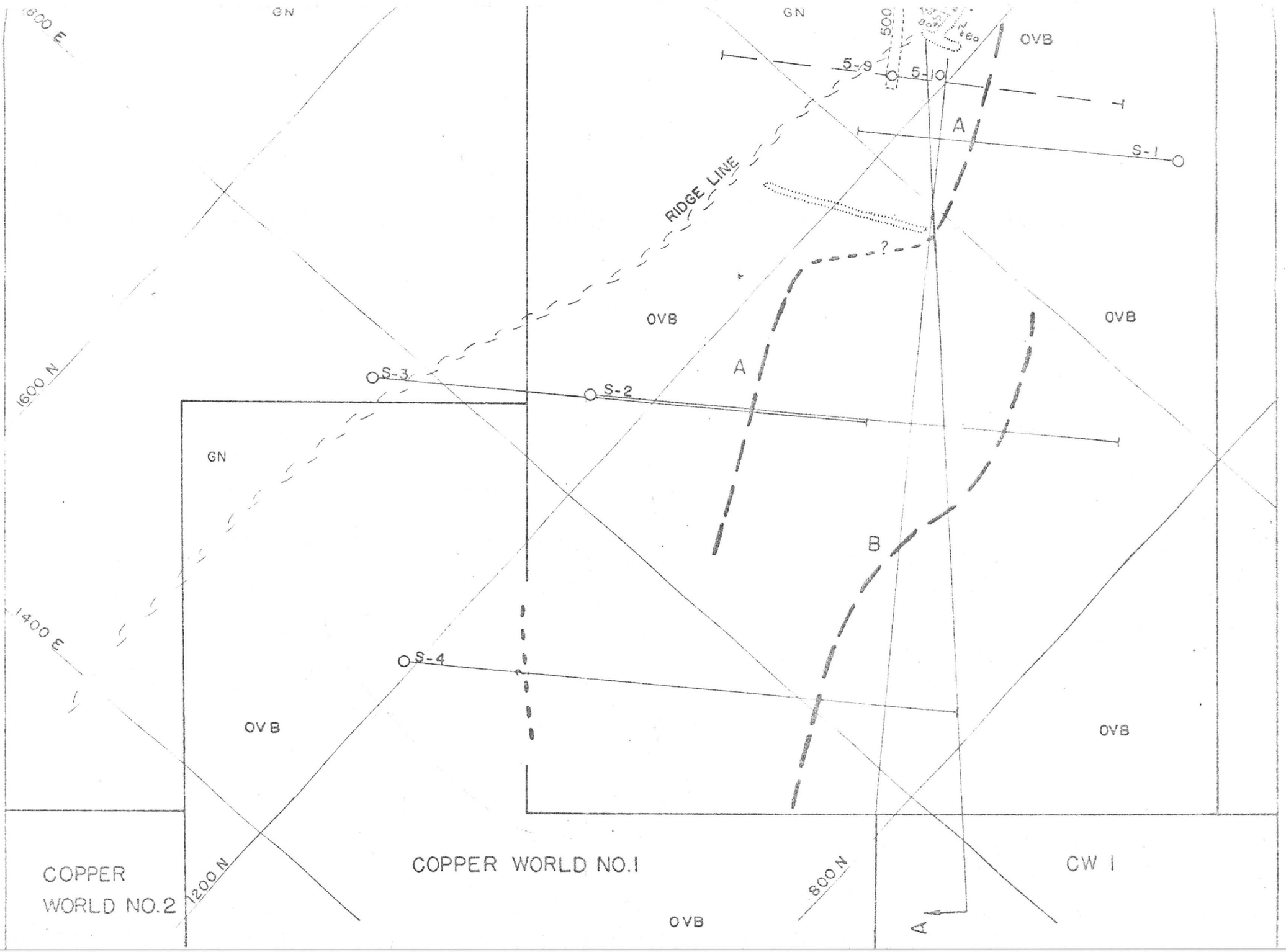
S25, T18N, R16W
Mohave County, Arizona

Scale 1" = 100'

JFB3 15 Aug.'66

FIGURE 2


PAT. NO. 903
BASE L
2200 E
ROAD
GN
85
P
GN
85
80
S-5
2000 N
MAIN ADIT
5-1,5
5-2,6
5-3,7
5-4,8
100 LEVEL
PORTAL
GN
200 LEVEL
PORTAL
GLORY HOLE
500 LEVEL
OVB
1800 E
GN
GN
5-9
5-10
A


GN
GN
500
OVB
5-9
5-10
A
S-1
RIDGE LINE
?
OVB
OVB
A
S-3
S-2
GN
B
S-4
OVB
OVB
1600 N
1400 E
1200 N
800 N
COPPER
WORLD NO.2
COPPER WORLD NO.1
OVB
CW 1
A

REPORT

ON THE

BOBCAT MINING COMPANY PROPERTY
(COPPER WORLD MINE)

NEAR

YUCCA, MOHAVE COUNTY, ARIZONA

By

J. D. Forrester

March 30, 1963 Tucson, Arizona

Introduction

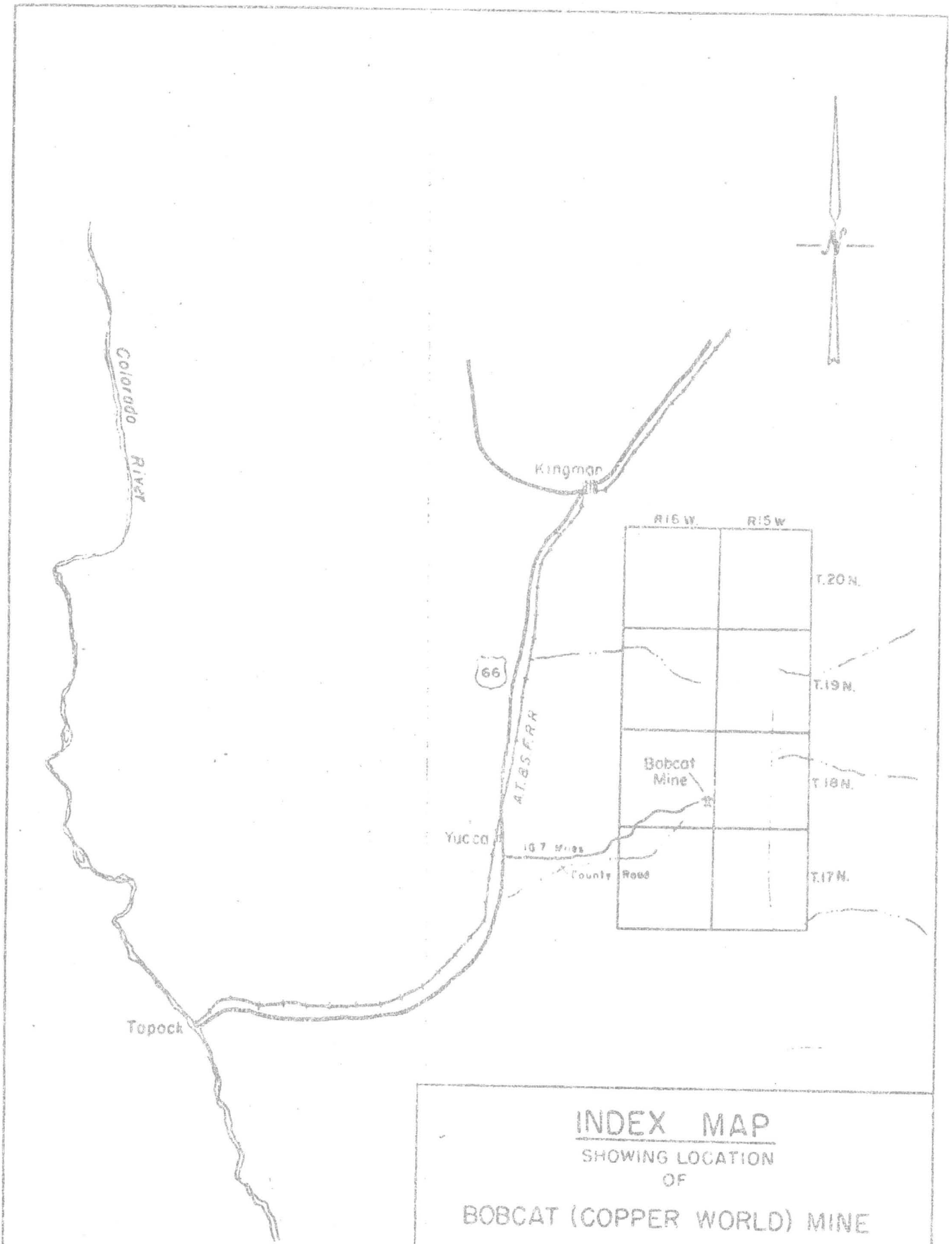
The field study upon which this report of the Bobcat Mining Company property is based was undertaken to ascertain the general condition of the mine and its ownership and to make an appraisal of the present and possible future value of the property. The field examination by the writer was done on March 5-8, 1963, in company with Dr. E. D. Wilson, Mr. R. T. Moore, Mr. R. T. O'Haire, and Mr. F. L. Stubbs, all of the Arizona Bureau of Mines staff. Two conferences also were held with Messrs. R. L. Dye and J. H. Bathrick, both of Kingman, Arizona.

Location

The Bobcat Mining Company property is situated on the west flank of the Hualapai Mountains of Mohave County, Arizona, in Section 25; T. 18 N; R. 16 W. It is in the Cedar Valley Mining District and it is respectively about 17 miles east of Yucca and 21 (airline) miles south of Kingman, the County Seat of Mohave County.

Physical Setting and Access

Access to the property is gained from Yucca which is a small community located along the main line of the Atchison, Topeka and Santa Fe Railroad and on U. S. Highway 66 (see Index Map). A loading dock exists at Yucca and,



INDEX MAP

SHOWING LOCATION
OF

BOBCAT (COPPER WORLD) MINE

Near
Yucca, Mohave County, Arizona

Scale 1" = 8 Miles

To accompany report by J. D. Forrester
March 1963

therefore, this site is available for railroad shipping. A gravel road which is apparently maintained, in part at least, by Mohave County, extends from Yucca to the mine and all haulage, to and from the property, must be along this route. A log of the road from the loading dock at Yucca is as follows:

1.5 miles --- Going south from Yucca, leave U.S. Highway 66. (Turn left or east)

3.6 miles --- Junction with road from Alamo Crossing. (Take left fork)

9.8 miles --- Junction with road from Leviathan Mine. (Take left fork)

10.3 miles --- Cattle guard and fence.

10.9 miles --- Junction with road to ranch on right. (Take left fork)

11.3 miles --- Cattle guard and fence -- Entry to Herridge Ranch.

11.8 miles --- Ranch house on left.

12.3 miles --- Junction with road from Antler Mine. (Take right fork)

(Note-- The road from Highway 66 to the Antler Mine junction is wide and well-maintained).

13.5 miles --- Ranch house on left. (Take right fork)

13.6 miles --- Gate and cattle guard and junction with road from Boriana Mine. (Take right fork)

16.7 miles --- Mine camp and mill of Bobcat Mining Company.

(Note-- The road from the Antler Mine junction to the Bobcat Property is narrow and rough; numerous curves and steep sections exist. Its use for freight haulage, etc., would require extensive repair and maintenance.)

The Bobcat Mining Company camp buildings and mill are at about 5000 feet above sea level. The topography is of pronounced relief and the property is situated in a narrow east-west trending canyon which is defined by steep mountain slopes on the north and south. Although dense growths of thorny scrub oak occur sporadically on the hill slopes, there are no types of

commercial timber-growing trees present in the general area and, other than for comparatively sparse seasonal rainfall and snow, no surface water is available. Indeed, the only sustained or perennial supply of water for the total mining operations, including mine, mill and camp use, is obtained from a shaft which has been sunk on the Helen Ruth claim The amount of water which can be thus available is in the quantity of 7 to 9 gallons a minute, according to Mr. Dye. When the mine and mill were previously operated, a 2 inch line, laid on the surface, was employed to bring the water from the Helen Ruth to the mine property. It is not presently in condition for immediate use.

A 44,000 volt electric power line extends from the Kingman-Oatman main transmission line to the property. It is in good condition.

Geology

The predominant rocks of the area, which constitute the host rocks wherein the mineral deposit occurs, are gneisses and schists of Precambrian age. Their "grain" generally strikes N 43° E and it is essentially vertical in most exposures, both underground and on the surface. These rocks have been broken by a series of faults, some of which are pre-mineral in age and, in the writer's opinion, these fractures have served as loci to control the sporadic emplacement of some later aplitic-pegmatitic (igneous) masses as well as to guide the localisation of the primary copper and zinc-bearing ore mineral materials which were borne into place by upward migrating solutions. An affinity appears to exist between the

aplitic-pegmatitic rocks and the economic mineral substances and, also, the development of hydrothermal alteration, chiefly biotitization, has notably occurred in the wall rocks near the mineral deposit.

Because of the geometric pattern of the pre-mineral and post-mineral shearing (faulting) which has occurred, that portion of the mineral deposit that is of economic size has assumed the general shape of essentially a vertical, chimney-like vein form. That is, the occurrance of notable vein-forming minerals is very sparse laterally along the structural strike (NE-SW), away from the complex, chimney-like central zone. These relationships are depicted on the several 50-scale Level Maps* which have been prepared to accompany this report and the writer believes it is very unlikely that additional ore localizations of consequence can be expected to occur in the lateral reaches or along the lengthwise extents of the mineral deposit, as a whole. Thus, it appears that the possible future discovery of presently un-revealed ore-bearing zones within the Bobcat Mine will result only from development in depth.

The economic mineral mass is considered to be of a "replacement" type and it is composed chiefly of the so-called "ore minerals" of chalcopyrite ($CuFeS_2$) a copper sulphide, and sphalerite (ZnS) a zinc sulphide. Minor occurrances of galena (PbS) a lead sulphide also exist. Accessory (non-ore) minerals such as pyrite (FeS_2) are sparsely present. Gold and silver minerals are not common and, therefore, precious metal values are essentially nil. The ratio of copper to zinc percentages in the ore ranges in the general order of 1 to 3.

* The vein materials are shown in red and the fault structures are depicted in blue on the 50-scale Level Maps.

The developed, probable, and possible ore reserve units occurring in the Bobcat Mine deposit are discussed later in this report under the heading of Ore Reserves.

Mine and Mill-Plant Development

Mine: The mine is comprised of an abandoned open pit (glory hole) and several underground levels, some of which are open, on-grade, to the surface; others accessible only from the levels within the mine. It (the mine) has been opened up through a vertical reach of approximately 600 feet beneath the surface and considerable stoping of ore has been done, chiefly in the upper portion of the deposit.

The extent and position of the excavations in the mine, as they are related to each other and to the claim boundaries on the surface, are depicted on the various maps which have been assembled and which are a part of this report (see Surface Map, Longitudinal Section, and 50-scale level Maps).

Except for the lowermost level (600), the mine is reasonably accessible for entry but, in order to bring it into condition for production and, also, to preclude unauthorized entry, some rehabilitation, re-equipping, and repair work will be required. This matter is further discussed below under Rehabilitation of Mine, Mill, and Camp.

Whereas the mine below the 500 level is flooded and, therefore, cannot presently be entered without dewatering by pumping, the upper openings of the mine (above the 500 level) are extremely dusty and this makes work in them very irritating inasmuch as the fine dust that rises on ingress is predominantly zinc sulphate ($ZnSO_4$); a chemical compound which has been formed by post-mine oxidation of original minerals.

It is considered that the stopes cannot be entered safely, in most cases, until some repair work is done in them.

The mining method which has been employed is a modified type of shrinkage - cut and fill stoping. It is believed that if future mining is done in the zone above the 500 level, the ore can be passed downward through existing transfer chutes to the 500 level which then would serve as a haulageway to the mill or main dump. An abandoned surface-tramway was used in the past for some of the haulage. It extends from the mill site to the elevation of the portal of the 200 level; it is not now in operating condition and its rehabilitation is neither necessary nor warranted.

A list of the mining equipment which occurs on the property is given below under the heading of Value of Mine and Mill Equipment.

Mill: The mill, which reportedly was built in 1951, is rated as a "35-ton" unit and it is well-equipped to conduct concentration of the ore by means of flotation. The general design of the plant appears to be good and, although an appreciable amount of repairs and cleaning is necessary, it could be brought to operating condition in a comparatively short time. A listing of the mill equipment is given under Value of Mine and Mill Equipment. It is estimated that the original cost of the mill-plant was in the order of about $70,000.

Camp:

The lay-out of the camp of the Bobcat Mine property is shown on the 100-scale Surface Map accompanying this report. The buildings generally are in rather poor condition and, before they could be used for mine-office quarters or for other incidental uses, such as for an assay office, they would need repairing and re-equipping.

Record of Past Production

Summary records of mineral production of the Bobcat Mining Company property during the several periods when the mine has been worked since 1943 have been secured from Dye and Bathrick. These data, which are presented in the following table titled, "Summary - Bobcat Mine (Copper World) - Production," indicate

Summary - Bobcat Mine (Copper World) - Production

Company	Date	Dry Tons Ore	Dry Tons Concentrate Copper	Dry Tons Concentrate Zinc	Assays Au(oz)	Assays Ag(oz)	Assays Cu%	Assays Zn%	Value to Shipper	Treatment Method
Dye & Bathrick	10/44- 3/47	13,552					3.62	10.19	$ 26,527.11	Direct shipping
Omego Metals	1/49- 4/49	1,019			.0041	0.671	2.75	13.23	12,383.84	Some shipped
" "	12/48- 6/49		119.482		.0030	3.350	22.21	5.93	5,260.03	Some milled
" "	6/49- 6/50			231.187	.0019	0.669	1.65	51.43	11,472.33	
Dye & Bathrick	1950	1,503				0.648	3.43	9.15	2,435.00 (est.)	Milled at Antler
Mt.States Met.Co.	6/51- 3/52		806.843		.0082	3.200	21.16	10.3	52,821.81	
" " " "	6/51- 3/52			829.781	.0049	0.959	2.23	45.09	52,614.60	Milled
" " " "	3/52-12/52		735.222		.0055	2.830	21.87	12.48	47,234.69	on
" " " "	4/52- 9/52			815.726	.0059	1.110	3.12	44.71	52,123.40	property
" " " "	10/52-12/52			144.205	.0050	1.420	4.72	40.79	4,325.61	
W. L. Allison	5/53-12/53		543.121		.0071	4.230	24.34	11.33	50,598.26	Milled on
" " "	5/53-12/53			341.648	.0082	1.510	3.55	43.86	8,424.45	property
Copper World Min.Co.	2/54- 8/54		97.953		.0037	3.947	24.22	12.21	8,355.61	Milled on
(Arnold Lease)	3/54- 8/54			127.992	.0050	1.285	3.03	45.13	2,683.78	property
Bobcat Min. Co.	? - 2/63	No Ore Processed								
Totals:									$347,260.52	
	Ore	16,074	---	---	.0017	0.657	3.55	10.29		
	Copper Conct.		2302.623		.0067	3.369	22.32	11.09		
	Zinc Conct.			2510.539	.0054	1.090	2.84	45.13		

that some of the ore which was produced was milled on the property; other amounts were shipped directly to outlying reduction plants; some tonnages were processed at mill-plants in the near vicinity, such as at the Antler property; and some portions were neither treated nor shipped.

As shown on the foregoing table, the mine has had a recorded, more or less intermittent yield through essentially the last 20 years. The shipments of ore and concentrate have yielded a total gross value of $347,260.52. This value is not, of course, the net profit that has been realized during the operations inasmuch as it does not reflect the costs which have attended the work of production.

Value of Mine and Mill Equipment

Although much of the mine and mill equipment and related facilities are suitable for use if operations of the property are begun, it is necessary that they be directly appraised only on the basis of a salvage value that could be realized as they now exist at a given site, either at the mine or in the Dye and Bathrick warehouse in Kingman. This is standard practice in making a mineral property evaluation.

Mine Equipment (At Mine Site):

Item	Condition	Salvage Value
1-Hoist, Elec., w/approx. 300' of 3/4" wire rope, 60 HP motor, controller and switch gear.	Excellent	$ 3,000.00
1-Mine Cage, 57" x 51", w/automatic safety lock	Good	250.00
1-Drag Scraper, 30" wide	Fair	10.00
1-Drag Scraper, 26" wide	Fair	10.00
1-Blower, 8"	Poor	10.00
1-Tugger Hoist, air operated, drum 7" x 8"	Fair	40.00
1000 ft.-Elec. Conductor, 3-No. 1 twisted conductors	Excellent	300.00

Item	Condition	Salvage Value	
3000 ft.-Mine rail, 16 lb.	Fair to Poor	$ 200.00	
6-Mine Cars, 1-ton, end dump	Fair	150.00	
1-Hoist, drum 15" x 17", w/20 HP motor and switch gear	Fair	100.00	
1-Air Compressor, 11 x 10, w/30 HP motor and switch gear.	Poor	100.00	
1-Air Compressor, 12 x 20, w/40 HP motor and switch gear.	Poor	100.00	
1-Air Receiver, 3' x 8'	Fair	50.00	
1-Anvil, 200 lb.	Fair	10.00	
1-Vise, 6"	Poor	2.00	
1-Swing Saw, timber framing, 30" w/10 HP motor and switch gear.	Fair	50.00	
1-Building, hoisthouse, 750 sq. ft., wooden frame and corrugated steel	Fair	50.00	
	Sub Total		$4,632.00

Mine Equipment (At Dye & Bathrick Warehouse, Kingman, Arizona):

Item	Condition	Salvage Value	
1-Pump, vertical 10 HP, w/switch	Rebuilt	30.00	
1-Bit Sharpener, elec.	Fair	30.00	
1-Vise, pipe, 4"	Fair	5.00	
1-Vise, pipe, 1-1/2"	Poor	3.00	
3-Stopers, w/legs and fittings	Poor	30.00	
1-Jack Hammer, w/air leg	Good	100.00	
2-Jack Hammers, w/air legs	Poor	100.00	
1-Air Motor, w/3/4" water pump	Fair	25.00	
1-Box, steel storage, 2' x 2' x 6'	Good	10.00	
	Sub Total		333.00
	Total		$4,965.00

Mill Equipment (At Mine Site):

Item	Condition	Salvage Value
1-Ballmill, 5'x 5', w/75 HP motor and switch gear.	Fair	$ 1,800.00
1-Classifier, 3'-6" screw, w/3 HP drive and switch gear.	Good	900.00
1-Flotation Machine, Denver Unit Cell No. 250, w/5 HP motor and switch gear.	Fair	250.00
1-Flotation Machine, 8-cell, Denver No.21 w/4-10 HP motors and switch gear.	Fair	900.00
1-Flotation Machine, 6-cell, Denver No. 18 w/3-3 HP motors and switch gear.	Fair	800.00
1-Filter, vacuum, 2-disk, w/accessories	Fair	800.00
1-Pump, Denver vertical sandpump, 2", w/5 HP motor	Fair	100.00
1-Belt Feeder, 16" x 6'	Poor	10.00
3-Feeders, reagent	Poor	10.00
1-Elec. Motor, 10 HP	Fair	20.00
1-Jaw Crusher, 10-20, w/30 HP motor and switch gear.	Fair	1,000.00
1-Belt Conveyor, 16" x 20'	Fair	50.00
1-Thickener, 40' diam. steel, w/drive and switch gear.	Good	900.00
1-Pump, diaphragm, 2", w/1 HP motor and switch gear.	Fair	50.00
1-Tank, galv. steel, w/top, 9' diam. x 7.5' high.	Good	30.00
1-Tank, redwood, 19' diam. x 11.5' high	Fair	50.00
1-Building, mill, 2900 sq. ft., wooden frame and corrugated steel	Good	200.00
	Sub Total	$7,870.00

Mill Equipment (At Dye & Bathrick Warehouse, Kingman, Arizona):

Item	Condition	Salvage Value	
1-Ballmill, laboratory, 12" x 12", w/base	Good	$ 40.00	
1-Pump, water, 3" x 2", 5 HP motor direct connected	Rebuilt	30.00	
1-Elec. Motor, 1 HP	Rebuilt	15.00	
	Sub Total		85.00
	Total		$7,955.00

Miscellaneous and Unsegregated (At Mine Site):

Item	Condition	Salvage Value	
125-Timber, 3" x 6" x 9', pine	Good	$ 20.00	
64-Tank Staves, wooden, 2" x 6" x 8'	Fair	10.00	
1200 ft.-Pipe, black, 2"	Fair	60.00	
1-Tank, steel, 30" x 8', skid mounted	Poor	5.00	
Scrap iron, pipe, rail, etc.	--	25.00	
Camp Buildings	Poor	50.00	
	Sub Total		$ 170.00

Miscellaneous and Unsegregated (At Helen Ruth Claim):

Item	Condition	Salvage Value	
1-Pump, No. 12 D	Fair	$ 20.00	
1-Pump, Triplex, 4" x 6"	Poor	10.00	
7000 ft.-Pipe, black, 2" (connects Helen Ruth with Copper World)	Fair	350.00	
	Sub Total		380.00
	Total		$ 550.00

GRAND TOTAL, Salvage Value of Equipment $13,470.00

Rehabilitation of Mine, Mill, and Camp

In order to undertake to make the Bobcat Mining Company property operable, it will be necessary to pursue the rehabilitation of the entire facility. This will include the following items and estimated expenditures:

Repair of road (approximately 4.5 miles)	$ 500
Repair and clean-up of mine	3,000
Repair and clean-up of mill	2,000
Repair of camp buildings	2,500
Repair of water line from Helen Ruth claim	500
Dewatering of 600 level	300
Contingencies, such as purchase of incidental tools and supplies	2,500
Total	$11,300

Ore Reserves

The underground development work and stoping which have been conducted in the Bobcat Mine are of sufficient scope to permit an ore reserve estimate. The distribution of the ore reserve blocks is shown on the longitudinal section accompanying this report. The calculations of the individual block tonnages are based on a minimum stoping width of 4 feet; an overall operating cost of $30.00 a ton; a tonnage factor (cubic feet per ton) of 7.0; a mill recovery of 80.0% of the copper values and 70.0% of the zinc; and a market price per pound of 30.5¢ for copper and 11.5¢ for zinc.

Although the writer's interpretations are founded, of course, upon personal observations in the mine, many of the assay data, on which the ore reserve calculations have been made have been taken from past production records and other information supplied by Mr. R. L. Dye, and others.

It will be noted in the following Ore Reserve tabulation that the ore blocks have been defined into three groups, namely; Developed (Proved), Probable (Indicated), and Possible (Inferred). Only the first two divisions, Developed and Probable, are considered as actual ore in reserve for evaluation purposes. The third class, Possible, is that type of future, or potential occurrence that may possibly exist in view of the range of the ore body, as judged on the extent of previous mining in general and, also, on the basis of

Tabulation of Ore Reserves -- Bobcat Mine

Developed Ore

Block No.	Width	% Cu	% Zn	Tons	Tons x % Cu	Tons x % Zn	Unprofitable or Inaccessible to Mine: Tons	Tons x % Cu	Tons x % Zn	Remarks
1	3.26	11.10		354	3,929		354	3,929		Caved near surface zone -- Inaccessible to ready mining.
2	2.94	7.25	2.00	359	2,603	718	359	2,603	718	Caved, near surface zone -- Inaccessible to ready mining.
3	2.35	9.00		138	1,242		138	1,242		Too small and narrow -- Inaccessible to ready mining.
4	2.94	7.25	2.00	454	3,292	908	454	3,292	908	Below caved zone -- Would have to be stoped underhand.
5	2.30	4.56	23.40	520	2,371	12,168	520	2,371	12,168	Probably marginal; narrow width. Grade estimated.
6	4.78	8.25	18.80	273	2,252	5,132				
7	4.60	7.50	21.10	350	2,625	7,385				
8	2.30	4.56	23.40	335	1,528	7,839	335	1,528	7,839	Probably marginal; width narrow. Grade estimated.
9	4.78	5.77	2.39	338	1,950	808				
10	4.45	6.03	2.33	1,046	6,307	2,437				Width and grade partially estimated.
11	3.80	3.87	18.86	1,681	6,506	31,704				Width and grade partially estimated.
12	4.00	3.80	9.00	3,815	14,497	34,335				Width and grade estimated from previous shipments.
13	4.00	3.80	9.00	1,126	4,279	10,134	1,126	4,279	10,134	Width and grade estimated from previous shipment records. Requires extensive clean-up and repairs.
14	8.25	5.16	16.80	1,749	9,025	29,383				
15	6.00	2.44	11.30	2,164	5,280	24,453				
Total (Developed)				14,702	67,686	167,404	3,286	19,244	31,767	

Probable Ore

Block No.	Width	% Cu	% Zn	Tons	Tons x % Cu	Tons x % Zn	Unprofitable or Inaccessible to Mine: Tons	Tons x % Cu	Tons x % Zn	Remarks
1	2.30	4.56	23.40	282	1,286	6,599	282	1,286	6,599	Probably marginal; width narrow. Grade estimated.
2	5.00	8.30	20.10	229	1,901	4,603				
3	4.78	5.77	2.39	218	1,258	321				
4	4.00	3.80	9.00	974	3,701	8,766				Width and grade estimated from previous mining.
5	4.00	3.00	7.00	430	1,290	3,010	430	1,290	3,010	Width and grade estimated Would require underhand stoping
6	8.25	5.16	16.80	562	2,900	9,442				
7	6.00	2.38	11.94	4,588	10,919	54,781				Width and grade partially estimated.
8	4.40	6.50	6.40	2,574	16,731	16,474				Width and grade estimated from previous mining.
9	3.30	2.89	15.59	6,431	18,586	100,259				Could be Developed Block, in part at least, if 600 level is dewatered.
10	4.60	3.49	21.13	2,602	9,081	54,980				Requires development in depth.
Total (Probable)				18,890	67,653	259,435	712	2,576	9,609	

Possible Ore

1	4.39	4.88	5.40	214	1,044	1,156		All Possible blocks require further development for proof and mining. Widths and grades are generally estimated.
2	4.40	6.50	6.40	1,320	8,580	8,448		
3	4.95	3.16	18.15	3,405	10,760	61,801		
4	4.95	3.16	18.15	8,729	27,584	158,431		
5	4.60	3.49	21.13	2,606	9,095	55,065		
Total (Possible)				16,274	57,063	284,901		

geological inference. The existence of ore in this classification is not specifically defined and, therefore, the tonnage of blocks which thus are classified cannot be counted or directly equated in the calculation of the Ore Reserves, as such. This procedure is considered to be a proper engineering practice and it is one followed by many mining companies.

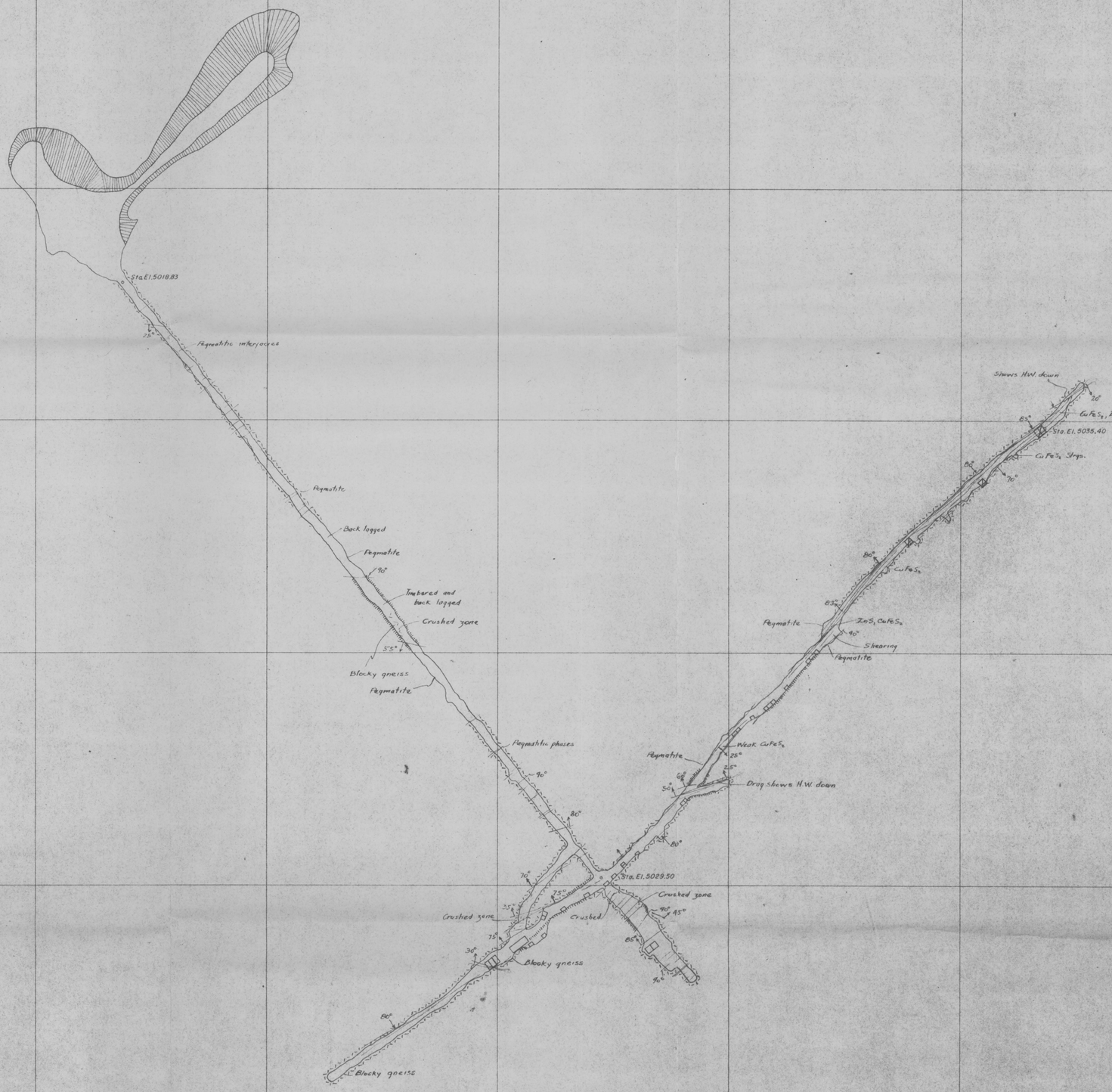
Also, it will be noted in the foregoing tabulation that some ore reserve blocks, which lie generally in the older, upper portion of the mine where their mining would be inordinately difficult in contrast to the benefit that would accrue, have been categorized as "Unprofitable to Mine or Inaccessible." This is because they are considered now to be either too small or too remote in older caved sections of the mine and, hence, too costly to exploit, even though they qualify technically as ore, on the bases of the fixed standards of width and grade which have obtained in the ore reserve calculation, as a whole. This being the case, although their presence in the mine is cited in the gross ore reserve tabulation, it is neither practicable nor realistic to include such blocks in a determination of the available ore of the property and, therefore, the units that have been so identified, have been excluded from the total of the net available tons that currently exist in the Bobcat Mine. These tonnages could not be economically mined unless the overall operating cost per ton is reduced markedly or the price of metals is greatly improved.

Ore Reserve Recapitulation:

	Tons	Grade % Cu	Grade % Zn
Gross Total (Developed).....	14,702	4.60	11.39
Gross Total (Probable)	18,890	3.58	13.73
Gross Total (Developed and Probable)	33,592	4.03	12.71
Total (Possible)	16,274	3.51	17.51

	Tons	Grade % Cu	% Zn
Total Net Available (Gross Developed minus Unprofitable)	11,416	4.24	11.88
Total Net Available (Gross Probable minus Unprofitable)	18,178	3.58	13.74
Gross Total Net Available (Gross Developed plus Probable minus Unprofitable)	29,594	3.84	13.03

On the basis of a market price of 30.5 cents a pound for copper and 11.5 cents a pound for zinc and when a respective recovery of 80.0% and 70.0% of the copper and zinc content from the ore of the Bobcat Mine is applied, the total net available tons (29,594) of ore in reserve, which have an average of 3.84 copper and 13.03 zinc, are calculated to have a combined gross metal value of $1,173,473.68.



2000 E 2200 E 2400 E 2600 E 2800 E 3000 E 3200 E

2200 N 2000 N 1800 N 1600 N 1400 N 1200 N 1000 N

500 Level

BOBCAT (COPPER WORLD) MINE

Near
Yucca, Mohave County, Arizona

Scale 1" = 50'

To accompany report by: J. D. Forrester
March 1963

Revised to date, January 1968.

Base map survey from work by J.T. Jordan (1957)

2000E 2200E 2400E 2600E 2800E 3000E 3200E

2200N 2200 N

2000N 2000N

1800N 1800N

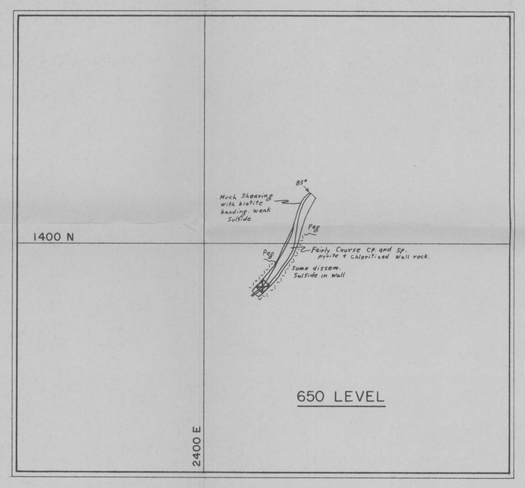
1600N 1600N

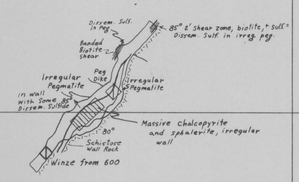
1400N 1400 N

1200N 1200 N

1000N 1000 N

2000E 2200E 2400E 2600E 2800E 3000E 3200E





700 Level

BOBCAT (COPPER WORLD) MINE

Near

Yucca, Mohave County, Arizona

Scale 1" = 50'

Brunton Survey

Revised January 1968

S. B.K., H.W.P. 9/14/67

200E 600E 1000E 1400E 1800E 2200E 2600E 3000E

2400N 2000N 1600N 1200N 800N 400N 200N

Camp

Road

Mill

Portal - 500 Level

Tramway (abandoned)

Portal - 400 Level

Portal - 200 Level

Portal - 100 Level

Shaft

Opencut

Copper World No.2 (Unpatented)

Copper World No.1 (Unpatented)

Copper World (Patent No. 903)

1 2 3 4 5 6

S 41° 49' E 600'

(Record Bearing N 51° E)

1500'

N 48° 11' E

Surface Map

BOBCAT (COPPER WORLD) MINE

Near

Yucca, Mohave County, Arizona

Scale 1" = 100'

To accompany report by: J. D. Forrester
March 1963

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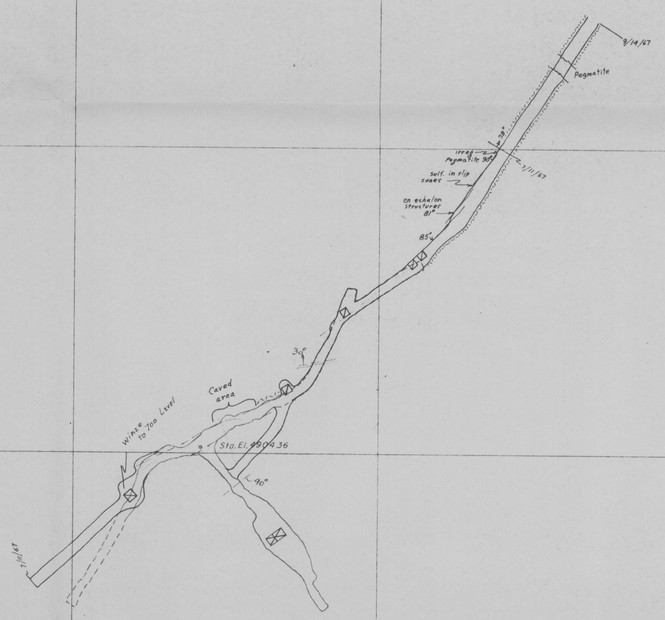
2200N 2000N 1800N 1600N 1400N 1200N 1000N



600 Level

BOBCAT (COPPER WORLD) MINE

Near

Yucca, Mohave County, Arizona

Scale 1" = 50'

To accompany report by: J.D. Forrester
March 1963

Revised to date, January 1968.

Base map data obtained from R.L. Dye and others

2000 E | 2200 E | 2400 E | 2600 E | 2800 E | 3000 E | 3200 E

2200 N

2000 N

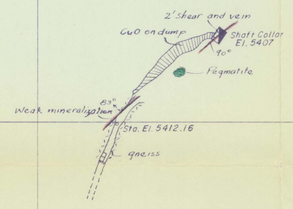
1800 N

1600 N

1400 N

1200 N

1000 N



100 Level

BOBCAT (COPPER WORLD) MINE

Near

Yucca, Mohave County, Arizona

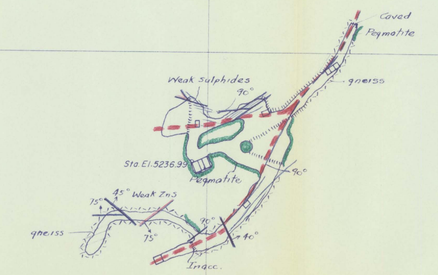
Scale 1" = 50'

To accompany report by: J. D. Forrester
March 1963

Base map survey from work by J.T. Jordan (1957)

2000 E
2200 E
2400 E
2600 E
2800 E
3000 E
3200 E

2200 N
2000 N
1800 N
1600 N
1400 N
1200 N
1000 N



300 Level

BOBCAT (COPPER WORLD) MINE

Near

Yucca, Mohave County, Arizona

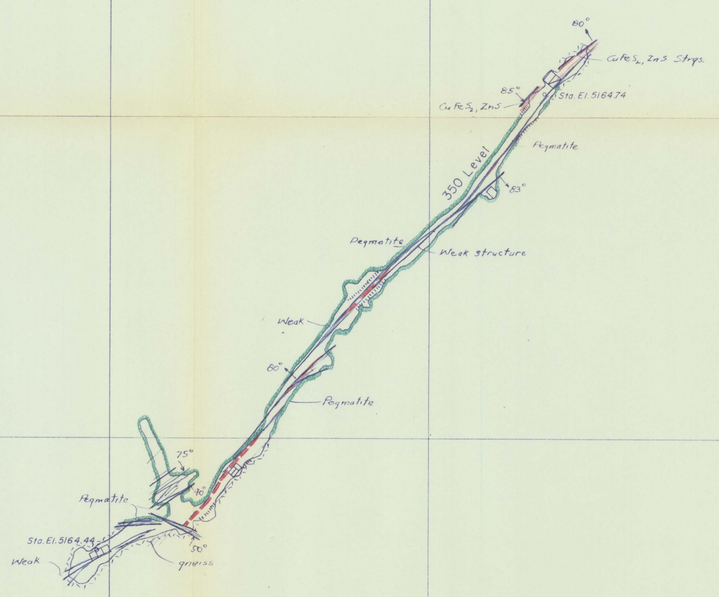
Scale 1" = 50'

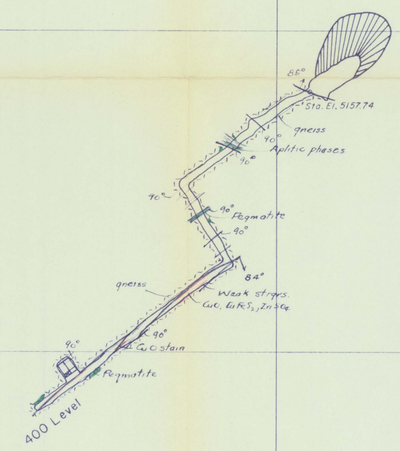
To accompany report by: J.D. Forrester
March 1963

Base map survey from work by J.T. Jordan (1957)

2000 E 2200 E 2400 E 2600 E 2800 E 3000 E 3200 E

2200 N 2000 N 1800 N 1600 N 1400 N 1200 N 1000 N





350-400 Level

BOBCAT (COPPER WORLD) MINE

Near

Yucca, Mohave County, Arizona

Scale 1" = 50'

To accompany report by: J. D. Forrester
March 1963

Base map survey from work by J.T. Jordon (1957)

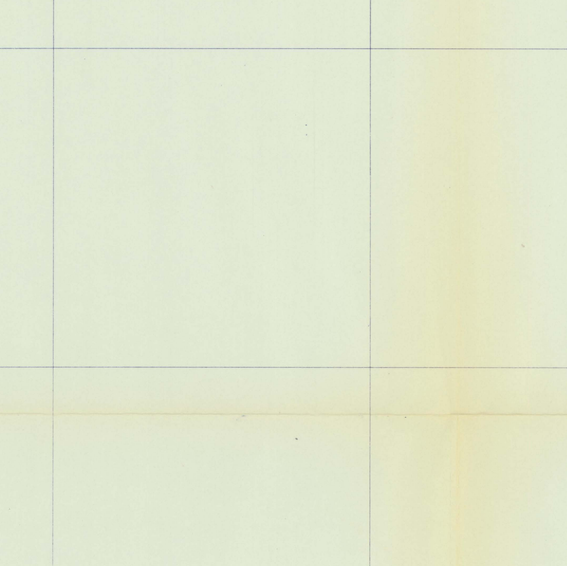
2000E 2200E 2400E 2600E 2800E 3000E 3200E

2200N 2200 N

2000 N 2000N

1800N 1800N

1600 N 1600N



1400 N 1400N

1200 N 1200N

1000 N 1000 N

2000 E 2200 E 2400 E 2600 E 2800 E 3000 E 3200 E

200 Level

BOBCAT (COPPER WORLD) MINE

Near

Yucca, Mohave County, Arizona

Scale 1" = 50'

To accompany report by: J.D Forrester
March 1963

Base map survey from work by J.T Jordan (1957)

2000 E | 2200 E | 2400 E | 2600 E | 2800 E | 3000 E | 3200 E

2200 N

2000 N

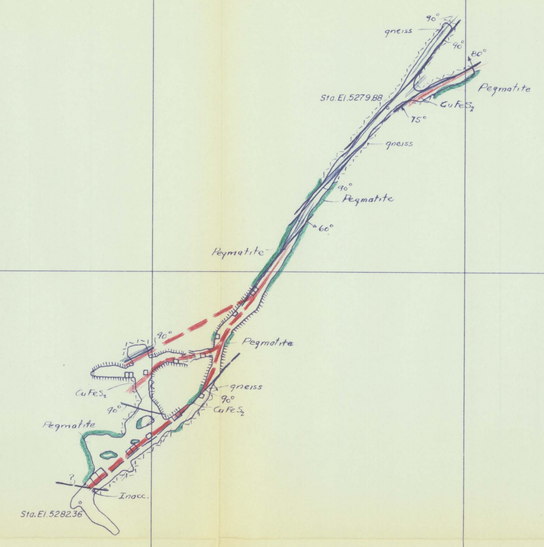
1800 N

1600 N

1400 N

1200 N

1000 N



250 Level

BOBCAT (COPPER WORLD) MINE

Near

Yucca, Mohave County, Arizona

Scale 1" = 50'

To accompany report by: J. D. Forrester
March 1963

Base map survey from work by J.T. Jordan (1957)

— Workings before March 1963.

— Workings since March 1963.

2 — Reserve Ore blocks.

— Developed Ore

— Probable Ore

— Possible Ore

1400N 2400E

1600N 2600E

5500'

5400'

5300'

5200'

5100'

5000'

4900'

4800'

100 Level

200 Level

250 Level

300 Level

350 Level

400 Tunnel Level

500 Level

600 Level

650 Level

700 Level

Shaft

Main Cross-Cut Adit

Fault

Patent No. 903

Northeast End Line — Copper World Claim

4.17' – 12.3 Cu – 0.0 Zn

2.35' – 9.0 Cu – 0.0 Zn

2.94' – 7.25 Cu – 2.0 Zn

2.30' – 4.56 Cu – 23.40 Zn

4.78' – 8.25 Cu – 18.8 Zn

No sample record

3.80 – 3.87 Cu – 18.86 Zn

4.78' – 5.77 Cu – 2.39 Zn

No sample record

No sample record

No sample record

4.0' – 2.14 Cu – 0.70 Zn

No sample record

6.5' – 5.15 Cu – 24.95 Zn

10.0' – 5.17 Cu – 11.45 Zn

6.0' – 2.46 Cu – 14.57 Zn

6.0' – 2.42 Cu – 8.02 Zn

6.0' – 3.2 Cu – 3.7 Zn

4.62 – 1.55 Cu – 1.47 Zn

6.5' – 5.15 Cu – 24.6 Zn

7.5' – 2.90 Cu – 5.50 Zn

No sample record

4.6' – 3.49 Cu – 21.13 Zn

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 30 31 32 33

Longitudinal Section

(SHOWING ORE RESERVES)

BOBCAT (COPPER WORLD) MINE

Near

Yucca, Mohave County, Arizona

Plane of Section — N. 45° E.
Looking Northwest

Scale 1" = 50'

To accompany report by: J. D. Forrester
March 1963

36239
36039
1-50

Revised to date, January 1968

Base map data obtained from R.L. Dye and others