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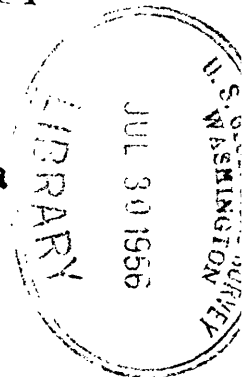
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UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

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REPORT ON THE PROPERTIES OF THE AMARGOSA MOLYBDENUM AND COPPER  
CORPORATION, PIMA COUNTY, ARIZONA

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ABSTRACT

The properties of the Amargosa Molybdenum and Copper Corp. are located in the Pima Mining District, Ariz., 30 miles south of Tucson. The New Years Eve mine has over 2,000 feet of underground workings open for examination, mostly excavated by the Calwest and Arizona Mining Co. in 1907-08. Some copper carbonate and a little sulfide ore was shipped from 1912 to 1916. The most favorable ground for molybdenum production is in an elongated quartz "blowout" in granodiorite near a quartzite contact. The quartz is mineralized below the adit level for an exposed vertical distance of 75 feet. Chalcoppyrite and molybdenite occur in erratic seams and bunches in the quartz. The quartz "blowout" is cut off by a fault on the 100 level. Forty-five thousand tons of indicated ore, containing 0.2-0.5 percent  $\text{MoS}_2$  and 0.5-1 percent Cu are present above the fault, and 20,000 additional tons of inferred ore are suggested of the same grade, making a total of 65,000 tons.

The Esperanza claims are in Coperos Gulch, one mile to the southwest of the New Years Eve mine. Granodiorite porphyry and diorite have been locally kaolinized and sericitized with a little silicification. These rocks plus quartzite have been brecciated and silicified. There is weak and sporadic chalcoppyrite and molybdenite

mineralization in the siliceous breccia and kaolinized rocks, where the latter carry quartz seams. On the basis of three diamond drill holes, drilled by the Bureau of Mines, there are large tonnages of mineralized rock averaging about 0.05 percent  $\text{MoS}_2$  and 0.30 percent Cu.

## INTRODUCTION

Two molybdenum-copper properties are owned by the Amargosa Molybdenum and Copper Corp., the New Years Eve mine with extensive underground workings, and the nearby Esperanza claims, which are in the exploration stage. Donald H. Kupfer and Charles A. Anderson worked from January 29 to February 19, 1943, on the New Years Eve mine, and from April 30 to May 4, 1943, did additional geologic work on the Esperanza claims. Kupfer logged the cores of the Bureau of Mines drill holes in May and June 1944. The New Years Eve mine was unwatered following the granting of an RFC loan; Travis P. Lane, Supervising Engineer of RFC, collaborated in the sampling of the mine.

## LOCATION AND WATER SUPPLY

The properties are located in the Pima mining district, Pima County, Ariz., on the eastern flanks of the Sierrita Mountains, at approximately 4,000 feet elevation, Twin Buttes quadrangle. The New Years Eve mine is in sec. 9, T. 18 S., R. 12 E., and the Esperanza claims are 1 mile to the southwest in sec. 17, T. 18 S., R. 12 E. (see pl. 1).

Both properties are reached from the graded McGee road which heads west from Twin Buttes, 25 miles south of Tucson. The nearest railroad connection is at Continental, 12 miles from the New Years

Eve mine, down grade to the east. The road into the New Years Eve mine is a fair dirt road with local short steep grades. It would require some improvement in case mining operations were started. The road into the Esperanza claims is also a fair dirt road with no appreciable grades.

Water supply would be a problem except for a small operation; some water is available from the New Years Eve mine and nearby shallow wells, but the terrace and wash deposits are thin and would not be an appreciable reservoir of subsurface water. On the Esperanza claims water for diamond drilling is available from two water-filled shafts.

#### DEVELOPMENT AND PAST PRODUCTION OF NEW YEARS EVE MINE

Over 2,000 feet of workings were accessible for mapping in the New Years Eve mine; the various levels are shown on a composite map, plate 3, with the individual levels shown on plates 4 and 5. In 1943 the main shaft to the 200 level was open and accessible with a small hoist in operation. The lower part of the combined raise-winch connecting the 200 level with the adit level is filled with 65 feet of muck. The 120 and 160 levels are inaccessible.

The early development exposing the oxidized copper ores near the surface is now largely caved and inaccessible. The resulting collapse of the shallow underground workings has formed the so-called glory hole. From the available records, about 2,000 tons of carbonate ore averaging about 4 percent Cu was shipped between 1912 and 1916. In 1912, 30 tons of sulfide ore averaging about 10 percent Cu was shipped, but the source of the sulfide ore is not known.

## OWNERSHIP AND HISTORY OF THE NEW YEARS EVE MINE

The claims were first located and recorded by P. H. Chambers in 1895; later they became known as the Snyder claims, and some exploration was done for copper carbonate near the surface. The present adit level and a winze were opened during this period of activity. From the available information considerable work was done on the 50 level off from the winze (see pls. 3 and 4). In 1907 and 1908 the Calumet and Arizona Mining Co. did considerable exploration in this region, working largely on the New Years Eve mine, known then as the Red Carbonate mine. They sank a shaft for 200 feet and drifted northwest and south with lateral crosscuts from the south drift. In addition they raised from the 200 level to the adit level winze and explored at the 100, 120, and 160 levels, measured down from the adit level. Actually the 200 level is 216 feet vertically from the adit level. Two winzes were sunk on the 200 level (see pl. 5). The Calumet and Arizona Mining Co. was interested solely in copper, and as the grade of the copper ore exposed plus the low tonnage estimates did not justify large scale mining, they abandoned the property after shipping a little sulfide and some carbonate ore.

The New Years Eve mine filled with water, and nothing further was done until 1936, when the Arizona Molybdenum Corp. unwatered the mine and examined it for the molybdenum possibilities, but the grade was not sufficiently high to interest them.

In 1939, an organization known as the Southern Arizona Molybdenum Corp., H. S. Hart, President, 151 Water Street, New York City, again

unwatered the mine and had C. J. Sarle, Tucson, Ariz., make an examination. His report is available, and his assays have been plotted on the appropriate maps. No additional work was done by the Southern Arizona Molybdenum Corp.; the options lapsed and the mine filled with water.

The present owners, the Amargosa Molybdenum and Copper Corp., Dr. Samuel Isermann, President, Catalina Footehill Estates, Tucson, Ariz., obtained control in 1942, and with the aid of an RFC loan, unwatered the mine.

#### GEOLOGY OF THE AREA AROUND THE NEW YEARS EVE MINE

The oldest rocks include brown fine-grained, massive, biotite quartz rock, which has been called a granulite, overlain by a white to pink massive quartzite (see pl. 2). These metamorphic rocks have been intruded by granitic rocks with some variation in composition and texture, but in the main the igneous rocks are biotite granodiorite. The southern re-entrant of the granitic rocks into the quartzite is characterized by a granodiorite porphyry margin of variable width. The porphyry grades into normal granular granodiorite, with local masses in which biotite is rare and the texture is aplitic. In other places large pink orthoclase phenocrysts are conspicuous, but these various facies seem to grade from one to the other and do not represent separate intrusions.

In the northern part of the mapped area, there is a small irregular intrusion of biotite-bearing aplite that is intrusive into the metamorphic granulite and the granodiorite.

A quartz "blowout" 170 feet long crops out south of the main shaft, and the upper development centered around this area, for the

surface oxidized copper ores were confined to the southern part of the quartz. The "blowout" has a north-northwest trend and the southern contact rakes to the southeast (see pl. 6). No positive evidence is available for the character of the north contact, and the south rake (pl. 6, A-A') is conjectural. The transverse form of the quartz body is irregular, as shown in the cross sections. Below the surface in the adit, 50 and 100 levels, the quartz has local areas of pink feldspar and nests of muscovite; on the 100 level in particular, the quartz has nests of large pink feldspar suggestive of a pegmatitic texture.

A small quartz body 20 feet long crops out 500 feet to the northwest of the large "blowout." Two quartz veins, 1 to 2 feet wide, crop out in the northwest part of the mapped area; the more northerly vein can be followed for over 400 feet. These quartz bodies carry a little copper carbonate, but no copper or molybdenum minerals in quantity were observed.

Along Amargosa Wash and the larger tributaries, there are terrace gravels up to 20 feet in thickness; these mask the basement rocks except for isolated exposures.

#### STRUCTURE OF THE NEW YEARS EVE MINE

Many faults were observed and plotted in the underground workings (pls. 4 and 5), but with the exception of the 30°-dipping fault under the quartz on the 100 level, these faults appear to have had small displacement. The heavy ground on the 200 level is probably the result of the intersection of small faults, as no thick gouge zones were recognized.

The 30°-dipping fault on the 100 level is important for it marks the lower boundary of the quartz "blowout" in contact with the underlying

granodiorite (pl. 6). No positive evidence is available to indicate whether the fault is normal or reverse in character, nor the direction and magnitude of displacement, for where the projection of this fault intersects the surface at the igneous-quartzite contact, only rubble, terrace gravels, or dump material are present (pl. 2). The low angle of the fault surface is more suggestive of reverse movement, and according to B. S. Butler (oral communication), low angle reverse faults are common several miles to the north. The fault surface has grooves 1 inch deep and striae striking N. 30° W. (strike of fault N. 70° W.), which indicates that the slip is oblique.

It was assumed that the fault was later than the quartz "blowout" so that a faulted segment could be anticipated, but it is the opinion of W. S. Burbank of the Survey that the quartz "blowout" may be later than the fault, partly because of the scarcity of crushed quartz at the contact and partly because of the suggestion of original shear lines now replaced by quartz. If the suggestion is correct, there is no faulted segment, but the quartz "blowout" may be continuous above the fault for some distance to the southeast.

#### MINERALIZATION AT NEW YEARS EVE MINE

No particular attention was paid to the oxidized copper ores at the surface, during the present investigation, either around the quartz "blowout" or around the numerous prospect pits. The latter are insignificant as regards tonnage, and the former have been worked out.

The upper part of the quartz "blowout," including the adit level, is barren of sulfides except for a little pyrite. In the winze from the adit level to the 50 and 100 levels, molybdenite and chalcopyrite

appear 17 feet below the adit level, and this mineralization continues down the winze to the 100 level where it is cut off by the fault. The quartz on the 50 and 100 levels is also mineralized with molybdenite and chalcopyrite, usually in short disconnected veinlets that are erratically distributed as shown by the variation in assays from these levels. These two sulfides are not always together. In several places, good high-grade bunches of molybdenite approach several inches in dimension, and on the 100 level a seam parallel to one of the crosscuts contains high-grade molybdenite.

On the 200 level, there are small seams of molybdenite, in some places with quartz, in others with chalcopyrite or both (pl. 5). Usually the seams are too far apart to be considered possible ore. Only at one place on the 200 level, 220 feet northwest of the main shaft, are the veinlets of molybdenite close enough together to show promise, but the area of mineralization is too small and discontinuous to insure an appreciable quantity of ore. These seams only indicate that molybdenite was present in some of the post-granodiorite solutions, but at no exposures is the mineralization concentrated sufficiently to form ore.

In the crosscuts on the 200 level, east of the south drift and 300 feet south of the main shaft, there is a small quartz body containing chalcopyrite in large bunches and finely divided associated molybdenite (pl. 5). The copper is erratic in distribution as shown by the assays. The quartz dips to the west and winze No. 1 continues downward into barren granodiorite. A subdrift to the west shows barren



quartz. This quartz body has no direct relationship to the quartz "blowout" above, for on the 200 level at the top of the quartz in the back of the crosscut, small veins of quartz penetrate the granodiorite, showing that it is not a fault contact.

A small inclined shaft has been sunk in mineralized granodiorite 500 feet southwest of the main shaft (see pl. 2), and a zone 3 to 4 feet wide, striking east-west and dipping 30° S., has been exposed showing chalcopyrite and molybdenite. The zone is too narrow, however, to be considered ore, and there are no surface indications of continuity.

It has been supposed by the present owners and C. J. Sarle that an extension of the main dump carrying 0.2-0.4 percent  $\text{MoS}_2$  came from the inaccessible south drifts on the 200 level; this supposition was based partly on the character of the dump material, as there are granodiorite fragments mineralized with quartz seams that carry molybdenite and pegmatitic feldspar, and quartz fragments that carry seams of molybdenite, the latter supposedly representing larger quartz seams in the granodiorite. This assemblage is different than would be expected from the quartz "blowout" because of the mineralized granodiorite. It was assumed that the bulk of the broken rock from the quartz "blowout" would be on the adit dump, and no exposed places in the 200 level would yield comparable dump material. Partly on the stories of "old timers," the supposition developed that one of the caved drifts on the 200 level penetrated a long mineralized zone that supplied this dump material.

As opposed to this supposition, the assay map of Calumet and Arizona does not indicate any mineralized zone on the two inaccessible drifts. Furthermore the history of the development of the mine as

shown by Calumet and Arizona Mining Co. records indicates that the raise from the 200 level connecting to the winze from the adit level was made by the Calumet and Arizona Mining Co., and that the muck was undoubtedly hoisted in the main shaft. The 100 and part of the 120 level, plus part of the raise, are in quartz, and this would account for the quartz and molybdenite on the dump. The pegmatitic material might also come from these workings, as the quartz "blowout" has pegmatitic masses on the 100 level in which are bunches of coarse pink feldspars. Granodiorite with small molybdenite seams is present in many places on the 200 level, and it is possible that such material was mixed on the dump with the muck from the quartz "blowout."

Without knowing the history of the dump, such a conclusion is subject to doubt, but it does fit the known facts and casts serious doubt on the possibility of a second ore zone being found on the 200 level, unless it is the faulted segment or extension of the quartz "blowout."

#### SAMPLES AND ASSAYS OF NEW YEARS EVE MINE

Four sources of assays are available; one is an assay map made by the Calumet and Arizona Mining Co. on which only copper is indicated. This map was loaned to the owners by Phelps Dodge Corp. These assays have been plotted on the various level maps accompanying this report (pls. 4 and 5). Judging from the channels that are still visible, these Calumet and Arizona Mining Co. samples were cut from both walls and across the back, except where only one wall is indicated. There seems to be no question but that these assay returns can be accepted.

A list of assay returns and locations is in a report by J. A. Udall, dated May 24, 1914, and although in several places his locations coincide with Calumet and Arizona Mining Co. locations, Udall's returns are much higher. It seems probable that his assays are not reliable, and they have not been plotted on the maps except where no other information is available. His assays refer only to copper.

C. J. Sarle in a report for the Southern Arizona Molybdenum Corp. gives assay returns for the 50 and 100 levels and winze. From his assay map it is possible to locate the approximate position of the samples and they have been plotted on the attached level maps (pl. 4). Most of his samples were horizontal channels from the walls and ceilings of the crosscuts. T. P. Lane, of RFC, and the Survey party took horizontal channel samples from the 50 and 100 levels and vertical channel samples from the winze. These paralleled Sarle's samples to some degree, and there is some agreement in returns, but in the main his returns for  $\text{MoS}_2$  are higher. Jacobs of Tucson was the assayer in both cases. Three vertical channels in the quartz-chalcopyrite zone were also taken on the 200 level, prior to obtaining the assay map of the Calumet and Arizona Mining Co.

The various assays from the 50 and 100 levels and winze, all from the mineralized quartz "blowout," show considerable variation, which is in keeping with the erratic distribution of the sulfides in the quartz. On the 50 level where Sarle's samples overlap those taken by Lane and the Survey party, the variations are as follows: Sarle's weighted average, 0.86 percent  $\text{MoS}_2$ , 1.08 percent Cu. Lane-Anderson-Kupfer weighted average, 0.43 percent  $\text{MoS}_2$ , 1.02 percent Cu. Probably the

grade of the ore is between these percentages, about 0.5 to 0.6 percent  $\text{MoS}_2$  and the copper above 1 percent. For the winze, the weighted average is 0.53 percent  $\text{MoS}_2$ , 0.32 percent Cu. The quartz as exposed on the 100 level is not well mineralized, and the average of 0.16 percent  $\text{MoS}_2$ , 0.45 percent Cu would imply a lower grade for this level. The high grade seam was not included in this average. The assays from the western part of the 50 level (No. 8, 0.20 percent  $\text{MoS}_2$ , and No. 9, 0.31 percent  $\text{MoS}_2$ ) are below average and it is possible that the western edge is not as richly mineralized in  $\text{MoS}_2$  on both levels. However, the Calumet and Arizona Mining Co. values for the 100 level indicate an average of 1.6 percent Cu. On the 120 level, now inaccessible, it is apparent that the quartz "blowout" was exposed south of the winze, and the Calumet and Arizona Mining Co. assay map indicates a length of 40 feet that is mineralized with copper, averaging 1.7 percent Cu. Possibly some molybdenite could be anticipated here also, but the grade might be as low as on the 100 level.

In summary, the assays indicate that the expected grade of the quartz "blowout" would be about 0.5 percent  $\text{MoS}_2$  and 1 percent Cu for the upper part of the mineralized zone, whereas the lower part around the 100 level would be 0.2 to 0.3 percent  $\text{MoS}_2$  and less than 1 percent Cu.

The grade of the mineralized quartz on the 200 level near No. 1 winze is around 2 percent Cu, taking all the Calumet and Arizona Mining Co. assays plus the recent assays, and the available assays indicate 0.2 percent  $\text{MoS}_2$ . However, the quartz becomes barren in depth, and this body cannot be considered among the favorable ones because of its small volume.

## ORE RESERVES AT NEW YEARS EVE MINE.

At present only the mineralized quartz "blowout" can be considered as potential ore. On the 50 level, block A (pl. 4) is partially outlined 80 by 100 feet in horizontal dimension, and 15 feet below the level and 30 feet above, giving a vertical dimension of 45 feet. This indicates 25,000 tons of indicated ore that would have a grade of 0.5 percent  $\text{MoS}_2$  and 1 percent Cu.

The northwest-southeast extensions of the quartz "blowout" on the 50 level are unknown, and no points on the various levels give satisfactory information on these extensions. The evidence indicates that the southeastern margin has a rake to the southeast and the limiting angle is indicated on the cross section A-A' by dotted arrows (pl. 6). For the northwestern margin, no points are definite except the surface outcrop; on the cross section this margin is drawn essentially parallel to the southeastern margin. Owing to the uncertainties of these contacts, the ore in this part of the body can only be inferred. Roughly this should amount to about 300 tons per foot of strike extension, width of 80 feet, for the 45 foot vertical block already known. If 70 feet additional are developed this would amount to approximately 20,000 tons of inferred ore. There is no direct evidence contrary to an even greater extension, but it is probable that the extension is likely to be about 70 feet.

There is mineralized quartz in the lower part of the raise below the 50 level, but the grade is not as high as on the 50 level except for the lower 11 feet, which is 0.47 percent  $\text{MoS}_2$ , 0.32 percent Cu.

Additional exploration might result in mineralized rock of sufficient grade to be considered ore, although the 30°-fault will cut down the volume. Assuming that the assays on the 120 level represent chalcopyrite-molybdenite-bearing quartz, 20,000 tons of indicated ore can be estimated for the quartz body 15 feet below the 50 level to the fault. On the basis of the assays, the anticipated grade would be lower than the ore about the 50 level, which is 0.2-0.5 percent  $\text{MoS}_2$ , 0.5-1 percent copper,

In summary, the ore reserves are as follows:

Block A

Indicated ore	50 level	25,000 tons	Grade 0.5% MoS <sub>2</sub>	1% Cu
	30' above - 15' below			

Block B

Indicated ore	100 level	20,000 tons	Grade 0.2 - 0.5% MoS <sub>2</sub> ,	
	30' above to 120 level below.		0.5 - 1% Cu	
This block is above fault.				

Blocks C and D

Inferred ore	Extension of block	20,000 tons	Grade 0.2 - 0.5% MoS <sub>2</sub> ,
	SE and NW on 50		0.5 - 1% Cu
	level		

RECOMMENDATIONS FOR NEW YEARS EVE MINE

The chief drawback to continued exploration at the New Years Eve mine is the low to moderate grade of the mineralized rock and the limited tonnage increase that can be anticipated by extension of the exposed reserves. Exploration south on the 200 level is regarded as speculative on the geologic evidence. If the need for molybdenum should warrant exploration in order to moderately increase the tonnage reserves at New Years Eve, the following <sup>program</sup> is suggested:

Since the tonnage increase at the New Years Eve mine anticipated by extension of the exposed reserves is limited, speculative exploration for the faulted or extended segment of the main quartz "blowout" on the 200 level remains as the only possible chance of appreciably enlarging reserves. On plate 5, the more favorable areas for such exploration on this level have been indicated; they are numbered I to IV in order of preference.

As mentioned above, there is an opportunity for a limited enlargement of the ore reserves, amounting to about 20,000 tons, by establishing the northwest-

southeast limits of the inferred ore on the 50 level. Exploration along the direction shown by the proposed crosscut extensions (see pl. 4) should parallel the axis of the quartz "blowout" and give the maximum extension. Should this work prove encouraging enough to justify it, the 120 level should be cleaned out in order to check the mineralization in the downward extension of the quartz and to determine the grade.

#### HISTORY OF THE ESPERANZA CLAIMS

In the early days the Esperanza claims were known as the Hughes claims, and the Calumet and Arizona Mining Co. drilled four diamond drill holes in 1907-08. These indicated a low copper content in the mineralized rocks, and the Calumet and Arizona withdrew. There are some caved adits and water-filled shafts on the claims, but no information is available as to the time of prospecting. Three adits 80, 100, and 120 feet long are open for inspection.

Little work was done on the Esperanza claims until the present company started a shaft in 1942 in the expectation of sinking to about 150 feet and then crosscutting to the east. At the suggestion of T. P. Lane, Supervising Engineer for RFC, this project was abandoned in December 1942 after sinking 88 feet. In May and June, 1944, the Bureau of Mines drilled three diamond drill holes, totaling 1,500 feet of depth.

#### GEOLOGY OF THE ESPERANZA CLAIMS

The oldest rocks are quartzite, similar to those exposed around the New Years Eve mine (see pl. 7). On the Esperanza claims, the quartzites have been feldspathized near the igneous contacts forming granular quartz-feldspar rock. The three diamond drill holes drilled by the Bureau of Mines are entirely in igneous rocks indicating that the quartzites are merely capping the igneous rocks in the mineralized area. The quartzites have been intruded by dikes and



plugs of igneous rocks and all variations from granodiorite porphyry to granodiorite to biotite diorite were found in the cores suggesting that these rocks are either gradational or intimately intrusive into each other. The dike of granodiorite-granodiorite porphyry cut by drill hole No. 3, and also exposed at the surface, suggests the latter possibility. The cores reveal some secondary orthoclase, particularly in the diorite. At the surface the igneous rocks are altered to clay presumably formed by sulfuric acid liberated by oxidation of pyrite. Sericite indicates some hydrothermal alteration.

In the northern part of Coperos Gulch where the igneous rocks are intensely altered, narrow quartz stringers cut the rocks with a parallel structure, striking N. 65° E. and having a vertical dip. Bureau of Mines hole No. 3 essentially intersects this structure at right angles. In the center of the mapped area in the gulch, the igneous rocks and feldspathized quartzites have been highly silicified; much of this rock is a breccia cemented with quartz, but in part it represents quartz veins of random orientation up to a foot in thickness. The silicified breccia some contains local masses of weakly silicified altered igneous rock. This mass of breccia was explored by Bureau of Mines hole No. 2, revealing that the breccia does not extend vertically/<sup>which</sup> implies that it may be related to the contact with the overlying quartzites. In the southern igneous area, which is also intensely altered at the surface, the quartz stringers are narrow and irregularly distributed. These rocks were effectively explored by Bureau of Mines hole No. 1.

#### MINERALIZATION ON THE ESPERANZA CLAIMS

Sulfides are only present at or near the surface in the silicified breccia, considerable pyrite being present in both the cementing quartz and fragments. Small flakes of molybdenite are limited to the quartz, and it is sporadic in its distribution. Chalcopyrite is rare in the surface outcrops and shallow cuts.

Sulfides are absent at the surface in the clay-sericitized rock and apparently more leaching has taken place than in the silicified breccia, for the pyrite is oxidized to greater depths. Near the face of Adit Two, which was driven in the altered rock, molybdenite and chalcopyrite are present in small quartz veinlets at a depth of 45 feet below the surface.

Scattered quartz veins, pyrite and a small amount of chalcopyrite and molybdenite were found throughout all the rocks of the cores of all three drill holes. Gypsum is present along many fractures. Wherever noted, molybdenite is closely associated with the quartz stringers. However, quartz-rich breccia zones showed no significant increase in molybdenite content. Pyrite was found associated with quartz veins and it is also disseminated. Chalcopyrite is disseminated throughout all of the rocks, but is of slightly lower grade in the highly brecciated and quartz-rich zones. The lower portion of holes 1 and 2 showed lower grade copper, but in hole 3 there is a slight increase in grade of copper.

#### GENERALIZED LOGS OF THE BUREAU OF MINES DRILL HOLES

The following are brief, generalized logs of the three Bureau of Mines drill holes. All of the Cu and MoS<sub>2</sub> assays given below are weighted averages of the cores and sludges, furnished by the Bureau of Mines. Their location is given in Plate 5.

<u>Log of Hole 1</u>	385 feet	Grade 0.05% MoS <sub>2</sub>	0.24% Cu
0-30 ft.	No core recovery. Presumably surface altered rock.		
30-221 ft.	Brecciated granodiorite porphyry and biotite diorite cut and cemented by numerous quartz veins.		
		0.05% MoS <sub>2</sub>	0.26% Cu
30-94 ft.	Brecciation not intense. Less quartz than in next zone.		
		0.02%	0.27%
94-221 ft.	Highly brecciated, high quartz content.		
		0.06%	0.26%
	From 192 to 195 feet no core was recovered and the surrounding rock was highly fractured and caved easily. This may represent a fault zone.		

221-385 ft.	Biotite diorite, sometimes locally altered and in a few places alternating with a little granodiorite porphyry.	0.06%	0.21%
221-283 ft.	Unaltered to slightly altered. Some quartz veins.	0.07%	0.29%
283-385 ft.	Feldspar partly kaolinized, very little quartz.	0.05%	0.15%
<b>Log of Hole 2 600 feet      Grade 0.05% MoS<sub>2</sub>    0.30% Cu</b>			
0-227 ft.	Brecciated granodiorite porphyry and biotite diorite cut and cemented by numerous quartz veins.	0.05%	0.33%
0-101 ft.	Brecciation not intense. Less quartz than in zone below.	0.05%	0.39%
101-227 ft.	Highly brecciated, high quartz content.	0.05%	0.29%
227-412 ft.	Silicified diorite or granodiorite with secondary orthoclase and very little biotite. Very little alteration to clay or sericite. Good granitic texture.	0.04%	0.29%
227-270 ft.		0.04%	0.30%
270-293 ft.	Numerous quartz veins, almost a breccia.	0.04%	0.28%
293-346 ft.		0.04%	0.40%
346-412 ft.		0.05%	0.21%
412-600 ft.	Silicified diorite or granodiorite with some secondary orthoclase and some biotite. Locally the feldspars are altered to clay and sericite.	0.05%	0.26%

<b>Log of Hole 3 515 feet      Grade 0.05% MoS<sub>2</sub>    0.29% Cu</b>			
0-140 ft.	Biotite diorite with feldspars partly altered to clay. In a few places alternating with granodiorite.	0.07% MoS <sub>2</sub>	0.21% Cu
140-166 ft.	Alternating biotite diorite and granodiorite.	0.04%	0.20%
166-216 ft.	Dike of granodiorite-granodiorite porphyry. Some facies rich in orthoclase.	0.04%	0.21%
216-515 ft.	Fresh biotite diorite, locally altered near fractures. Gypsum along most fractures. A few traces of galena and a trace of sphalerite.	0.05%	0.35%

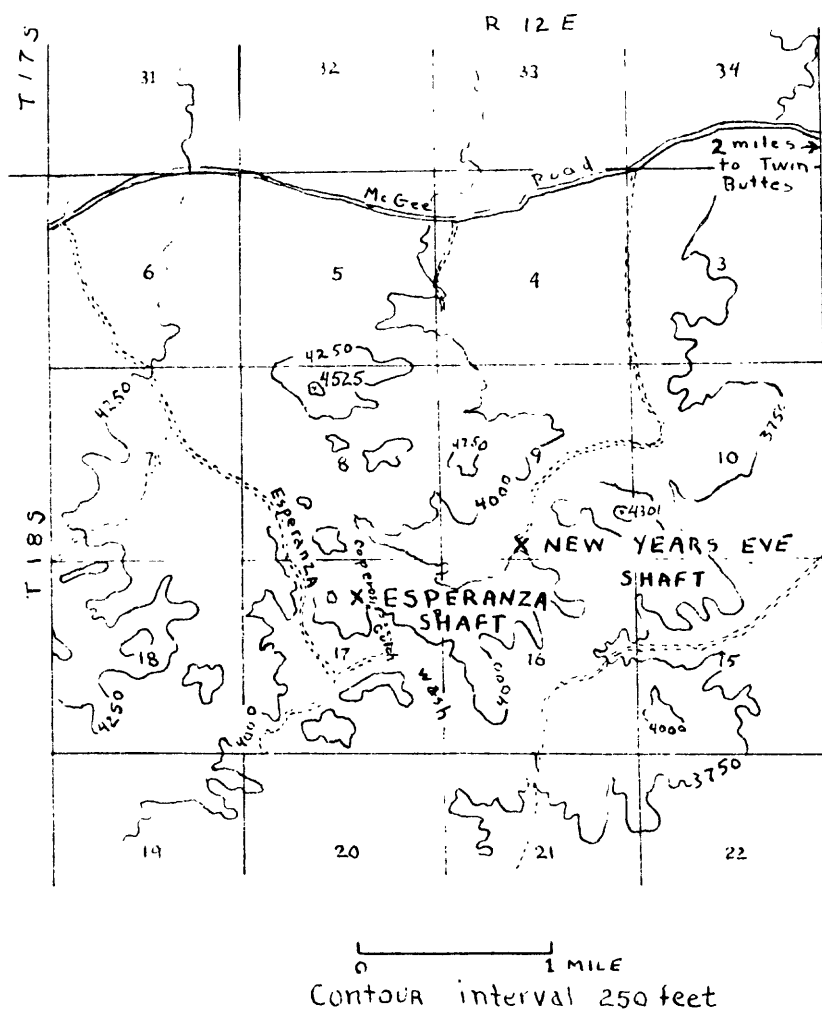
#### CALUMET AND ARIZONA DIAMOND DRILL RECORDS

The location of the Calumet and Arizona Mining Company diamond drill holes is given on Plate 8. The assay returns for copper are given on Plate 9. It is

not clear how many feet of core were assayed for some returns as the copper percentage is given opposite a single footage figure. Certain intervals apparently were not assayed, as no returns are given, and for two holes, the assay information is very meager. The presumption is that the chalcopyrite content was estimated as too low to warrant assaying.

#### GRADE AND RESERVES OF THE ESPERANZA CLAIMS

Although in the shallow surface cuts and adit (see pl. 8) and in the Bureau of Mines drill holes, local masses show grades as high as 0.25%  $\text{MoS}_2$  and 1.06 percent Cu, they are small and widely spaced. At most, only a few hundred tons of mineralized rock can be expected on the Esperanza claims that will average 0.10 percent  $\text{MoS}_2$  and 0.50 percent Cu. The drilling does indicate a large tonnage of mineralized rock that will average around 0.05 percent  $\text{MoS}_2$  and 0.30 percent Cu. For this report it will be sufficient to state that reserves of this grade are extensive.



INDEX MAP TO SHOW  
LOCATION OF NEW YEARS EVE  
AND ESPERANZA SHAFTS  
AMARGOSA MOLYBDENUM AND  
COPPER CORPORATION  
Pima County, Arizona