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THE ESPERANZA CONCENTRATOR

COPPER DIVISION

DUVAL CORPORATION

by

C. H. Curtis

Metallurgical Superintendent
and
Resident Manager

This paper is intended to present a comprehensive survey of the milling operations of the Esperanza Concentrator, located 32 miles southwest of Tucson, Arizona. To this end, detailed process flow diagrams are presented, together with a text, which points up the salient mechanical and metallurgical features of the plant.

Production operations began on March 1, 1959.

CRUSHING (See process flow diagram, Fig. I)

Conventional three stage crushing is provided for by a 48" primary gyratory, followed by one 84" secondary crusher, and two 84" tertiary crushers, operating in open circuit with vibrating screens.

An important feature of the crushing circuit is the use of crushers equipped with hydraulically supported mantles; specifically, a 48-74 Gyratory Crusher, a 17-84 Cone Crusher, and two 5-84 Cone Crushers.

The hydraulic feature greatly facilitates the adjustment of the crusher settings, in fact the Duval installation design has provided for adjusting the cone crusher settings while operating under load. In addition, these hydraulic crushers have been equipped with Duval designed instrumentation and automatic controls. Thus, with the tertiary crusher settings adjusted to yield an acceptable product size, the desired loading of the tertiary crushers is maintained by instruments, which vary the original feed rate to the secondary-tertiary crusher circuit. In addition, the desired relative loading of the two tertiary crushers, operating in parallel, is maintained by instrumentation. Concurrently, the secondary crusher loading is also controlled, as desired, by instruments, which vary the mantle position and therefore the crusher setting. In this manner, the secondary-tertiary crusher circuit is subject to fully automatic control whereby, with the tertiary crushers set to yield the desired product size, each crusher in the circuit is operated at optimum capacity.

The crusher product passes over a load cell type weight recorder and is delivered into a 20,000 ton live capacity fine ore bin by a continuously travelling tripper.

Dust control throughout the crusher operations, including the fine ore bin and attendant feeder belts to the wet grinding sections, is effected with multiple dust collecting units.

Design capacity of the Primary Crusher circuit is 1,400 tons per hour, with that of the Secondary-Tertiary circuit at 1,000 tons per hour. This provides for 2 shift operation, 6 days per week, to service the grinding-flotation circuit scheduled at 12,000 tons per day, seven days per week.

WET GRINDING & FLOTATION (See process flow diagram, Fig. II)

Wet grinding and flotation operations are conducted in two mill sections that are essentially metallurgically independent, each with separate reclaimed water systems, and each producing its own final concentrate and tailing. Thus, competitive plant scale metallurgical testing can be conducted at will.

Each grinding section consists of one rod mill in open circuit with discharge split to two ball mills, operating in closed circuit with cyclone classifiers. All the grinding mills are 12.5 feet in diameter, inside the shell, with the rod mill 16 feet long, and the ball mills 14 feet long. The rod mill reduces a 10% + 3/4" feed to a 10% + 10 mesh product, which is further reduced in the ball mill-cyclone closed circuit to a 10% + 65 mesh product at 33% solids for flotation feed.

WET GRINDING & FLOTATION (Continued)

Feed to the wet grinding section to date has been subject to manual control. However, instrumentation provides for automatic control of the original feed rate to maintain the desired circulating sand load on the ball mills and experimentation with the fully automatic system is currently in progress. Total water addition to the grinding circuits, which includes the flotation middlings return, is controlled by instrumentation to maintain the desired pulp density in the ground product, which is the flotation feed. Distribution of the total water within the grinding circuit is regulated by instruments for desired pulp density control in the rod and ball mills.

Alkalinity (normally in the high pH range above 11.5) for the flotation feed is automatically maintained by instrument controlled lime addition to the grinding circuit.

The two flotation sections are equipped with 48" mechanical cells having double froth overflows and froth paddles. The roughers are arranged in rows of ten cells each with step-down transitions providing independent pulp levels for the first two cells, the next four cells, and the final four cells of each row. Instrumentation provides automatic control of these pulp levels. There are nine parallel rows of roughers in each section which furnish approximately 5.5 minutes flotation time at design capacity, 12,000 tons per day.

The flotation reagents to date have consisted of potassium ethyl and amyl xanthate as collectors together with stove oil as the molybdenite promoter. Methyl amyl alcohol has been the frother. The reagents are fed by Flowrators located on instrument panels established at the flotation control centers for each section. Instruments provide a continuous and permanent record of the reagent flows.

WATER RECLAMATION AND SUPPLY (See process flow diagram, Fig. III)

The rougher flotation tailings are the final plant tailings and are flowed to two 225 foot diameter traction thickeners, each preceded by a 26 foot diameter hydro-separator. The hydro-separator spigot discharges are equipped with pressurized rubber control valves; the thickeners are instrumented for automatic underflow control. Fresh water make-up to the mill circuits is added to the tailing thickeners to utilize the excess lime alkalinity of the tailings for alkalizing the new raw water.

The combined underflows of the hydro-separators and thickeners are flowed by gravity through 16 inch O.D., 14 gauge, welded steel pipe, with a 1/2 inch thick cement lining, to the tailing storage area. This line closely follows the natural ground contour, and includes one major dip or so-called inverted syphon. "Drop boxes" are provided, where necessary, to limit the line gradient to 0.8% to the actual tailing storage area, within which the line is maintained horizontal. The tailing dam is developed by throwing up an 8 foot berm with a dragline, followed by sand fill in front of the berm with cyclone classifiers set at 72 foot intervals along the top of the berm. The cyclone overflow material is released 40 feet in front of the berm. After this sanding phase of tailing deposition is completed, the tailings are released without classification at high volume flow rates to encourage maintenance of solids in suspension to permit transportation of the tailings at minimum ultimate flow gradient, and thus maximize the storage per vertical foot of dam height. Plans

WATER RECLAMATION AND SUPPLY (Continued)

for water reclamation from the tailing storage area have provided a pump on skids with floating suction hose at a favorable collection zone, according to the natural contour of the original ground. The water is to be directed toward this zone by judicious scheduling of the points at which the tailings are released into the area.

All of the rougher flotation concentrates are advanced for up-grading. They are initially cyclone classified, with the cyclone underflow material sent to 8½ foot by 12 foot re-grind ball mills, one on each section. The cyclone overflow, substantially all -200 mesh, is pumped to distributors ahead of five parallel rows of cleaners on each section. Each cleaner row consists of four cells, with finished concentrate produced on the first two cells, while the concentrate from the last two is advanced for re-cleaning in two parallel rows of two cells each. The re-cleaner rejects are returned to the cleaner feed. The cleaner rejects are returned to the primary grinding circuit as part of the integrated and automatically controlled dilution water.

The final copper-molybdenum concentrates are flowed to a 50 foot diameter thickener on each section. The thickener underflows are serviced by diaphragm pumps and the combined underflows advanced to the molybdenum recovery plant.

MOLYBDENUM RECOVERY

The molybdenum circuit provides for direct steaming and heating of the thickened copper-molybdenum concentrates. Heat exchangers provide for transfer of heat from the hot pulp leaving the steamer to pre-heat the cold pulp approaching the steamer. The use of ferro-cyanide is provided for in the flotation steps following steaming to further depress minerals other than molybdenite. In addition, a four hearth furnace is available for drying and heating an intermediate molybdenite flotation concentrate if certain minerals other than molybdenite fail to respond to the depressing effects of the steaming and ferro-cyanide. To date, operation of this furnace has not been necessary.

Extensive instrumentation provides for automatic control of the steaming operation, together with automatic pH control of the flotation phase of the operation.

The molybdenite rougher flotation consists of a twelve cell row of 48 inch machines having double froth overflows and equipped with froth paddles. Step-down transition boxes following each run of 4 cells provides three independent pulp levels in the row, subject to automatic control. The design retention time in the rougher is 10 minutes. The rejects are flowed to one 60 foot thickener, the underflow from which is filtered on an 8 foot 6 inch diameter, 7 disc filter. The cake is conveyed to a storage area from which it is loaded by front-end loader into 20 ton trucks and hauled to the railroad siding 11 miles from the plant for shipment to the smelter.

All the moly rougher flotation concentrate is advanced to a 40 foot diameter thickener, the underflow from which is cycloned in closed circuit with a 5' x 6' ball mill. The cyclone overflow is pumped to the head of a 10-cell bank of 32" flotation machines. The cleaner rejects are returned to the concentrate thickeners feeding the moly circuit. All of the cleaner concentrate is advanced to the #5 cell of a 10-cell bank of 28" flotation machines. Five re-cleanings are provided as the concentrates advance to the #1 cell in the

MOLYBDENUM RECOVERY (Continued)

row, which produces the final molybdenite concentrate. The re-cleaner rejects are returned to the regrind circuit ahead of the cleaner as part of the dilution requirement.

The molybdenite concentrate is stored in a surge tank from which a metered flow is filtered by a 3 foot diameter by 2 foot face drum filter. The filter cake is advanced to an 8 foot 9 inch I.D. ten hearth roaster. The roasting furnace is completely instrumented, including push button lighting of pilots and burners with automatic flame-out protection; temperature recorder controllers, draft controllers, etc.. The roasted calcine is further purified by leaching, filtering and washing, and is finally dried in a 4 foot I.D., four hearth dryer. Automatic weighing and packaging facilities are provided for preparing the purified molybdenum trioxide calcine for shipment in steel drums containing 800 pounds calcine each, or cans containing 20 pounds equivalent molybdenum metal each.

OPERATING STATISTICS

Power Consumption	KWH/Ton
Crushing	1.4
Wet Grinding	12.8
Flotation	4.2
Water	0.9
Molybdenum Recovery	0.9
Total	20.2

Reagent Consumption	Lbs./Ton Ore
Lime	3.5
Potassium ethyl xanthate	0.025
Potassium amyl xanthate	0.005
Methyl amyl alcohol	0.10
Stove oil	0.03
Sodium ferrocyanide	0.05

Manpower (hourly paid)	Tons/man-shift
Operating	237
Maintenance	249
Operating & Maintenance	126

TYPICAL METALLURGICAL DATA

Tons milled per operating day	12,000
Operating time, % of possible	95.0

Copper Recovery	
% of sulfide copper	92.0
% of acid-soluble copper	60.0
% of total copper	83.0

Molybdenum Recovery	
Primary recovery from ore	80.0
Secondary recovery from Cu-Mo concentrates	90.0
Overall recovery	72.0

GRADE COPPER CONCENTRATE

% Cu	25.0
% Fe	25.0
% Insol	14.0

GRADE MOLYBDENUM TRIOXIDE CALCINE

% Mo	58.6
% MoO_3	88.0
% Cu	0.25
% Fe	2.5
% Insol	8.0
% S	0.25

REPORT ON NEW YEAR'S EVE LODE CLAIMS, PIMA MINING DISTRICT, PIMA COUNTY, ARIZONA

By

A. M. PHIPPEN
Mining Engineer

Los Angeles, California
March 10, 1942

Wendell P. Hubbard
Los Angeles
California

Dear Sir:

In pursuance to your request, I spent several days examining the New Year's Eve group of lode mining claims located in the Pima Mining District, Pima County, Arizona. I herewith submit in the following my brief report on same.

Respectfully submitted,

A. M. PHIPPEN

LOCATION: The New Year's Eve Lode Claims are located in the Pima Mining District, Pima County, Arizona, in Township 18 South, Range 12 East, in Sections 9 and 16, Gila and Salt River Meridian.

This places the claims in Amargosa Gulch, at an approximate altitude of 4,000 feet, in the Southern Part of the Sierrita Mountains, about 28 miles airline distance and a little west of south of Tucson and 4¼ miles a little south of west from the old mining camp of Twin Buttes.

The city of Tucson on the Southern Pacific Railway is the nearest supply and shipping point. From the mine to Tucson by road is 33.5 miles. All but the first 2.3 miles of this distance, which is a ranch and mine road with some short, rather steep grades, is overgraded and well maintained highway - 3.6 miles eastward to Twin Buttes, thence 27 miles northward to Tucson, the last 9 miles paved. From the junction of the mine road with the Twin Butte road there is a descent of over 1600 feet by well distributed grades into Tucson. Trucking time from the mine to Tucson is about one hour.

The property is ten miles distant over an excellent improved road from Continental, a loading point on the Southern Pacific, and approximately eighty-five miles by railroad to the American Smelter and Refining Company at Hayden, Arizona. The quoted freight rate from Continental to Hayden is 90¢ per ton and trucking charges to the mine from the railroad point quoted at 50¢ per ton.

PROPERTY HOLDINGS: The New Year's Eve group of lode mining claims consists of three claims held by right of location. Records of the New Year's Eve claims are found in the Records of Mines in the office of the County Recorder at the county seat of Pima County at Tucson, Arizona, as follows:

Book	R.M.	Page	Locator	Claim Name	Min. Dist.	Date Loc.
69	Qqq	259	Raf. M. Robles	New Year's Eve	#1 Pima	1-1-33
"	"	260	" " "	" " "	#2 "	1-1-33
"	"	261	" " "	" " "	#3 "	1-1-33

WATER: There is sufficient water available on the property for domestic and mining and milling purposes. The water level is fifty feet below the collar of the shaft.

HISTORY AND DEVELOPMENT: The district is credited with the production of over $8,000,000.00, values mainly in copper with some gold and silver. The New Year's Eve lode mining claims have been held over a long period of time by various owners and have been extensively developed. In 1907, the property was acquired by the Calumet and Heckler Copper Mining Company of Michigan and an extensive development campaign was carried on and consists of some 4,000 feet of underground workings. The property has been developed by a standard two and one-half compartment shaft to a depth of 200 feet and drifts run on 100, 150 and 200 foot levels on the orebody. Previous to 1907, the property was developed by numerous shallow surface tunnels and open pits, all of which exposed large quantities of low grade copper ores which were mainly oxidized and unsuitable for smelting or milling purposes. At the time this property was developed, the large copper companies were looking for gigantic tonnage of low grade disseminated copper porphyry types of deposits. The development of this property disclosed a huge mass of a crystalline variety of quartz containing values in copper, gold and silver and molybdenum. On account of the high molybdenum content, it was found that it was not suitable for low grade copper property and molybdenum at that time was of no value.

The property was never put on a production basis but developed only. The dumps consist of materials from ore from the underground workings and probably contain 100,000 tons. There was no attempt to pile the ore in any particular dump. As a result high grade and low grade are all mixed together in the dump, which can be sorted into milling and shipping grades of ore producing an immediate source of revenue, part of which can be shipped direct to the smelter and part stockpiled for some system of recovery on the property. My observation of the available tonnage can be obtained from these dumps by sorting ten to one, which will give approximately 10,000 tons of a grade of ore that can be either shipped direct to the smelter or treated on the property. The main mass of the orebody developed by the old Calumet and Arizona showed an approximate assay value of 1½% copper and approximately 1% molybdenum. The development disclosed chutes of extremely high grade copper running as high as 48%. The ore taken from these high grade streaks was placed in the dumps along with the average mining run and considerable ore can be sorted containing high values in copper and molybdenum. The workings open for inspection above the 100 foot level discloses a body of ore containing approximately 25,000 tons of a positive blocked-out which contains high grade chutes and bunches of copper and molybdenum which is immediately available for milling and shipping purposes. Information gained from reliable sources discloses the fact that this high grade chute of ore continues on downward and was developed on the 200 foot level. It is said more particularly on the 200 foot level a considerable quantity of high grade ore is available. I understand some 150 mine cars of high grade copper ore, claimed to contain 40% copper, are broken and piled along the bottom of the drift near the shaft.

SUMMARY AND CONCLUSION: This property has been developed to the point beyond the prospect stage and sufficient tonnage has been developed to the immediately put on a production basis without any further development.

As long as, first, the risk has already been eliminated by its present development exposing both high grade and low grade copper and, secondly, because of the quantity and quality of available ore and the ease of concentration, thus preparing the various materials for the market, I, therefore, recommend this property to you and under judicious management will pay a handsome dividend.

A. M. PHIPPEN

RECOMMENDATION
FOR MILL AND FLOW SHEET
FOR
NEW YEAR'S EVE GROUP
OF CLAIMS

* * * * *

GRINDING

This ore is a crystalline quartz which fractures quite easily. Most of the oxidized copper is found in the fractures and interstices of the ore. This is opened up to solution at a grind of not more than 30 mesh. Equipment consisting of fine crushing, followed by rolls with a screen in closed circuit will bring this to the desired mesh dry.

LEACHING

This ground ore is then fed into a counter-current system with our fast leaching solution, with a leaching time of not more than thirty minutes. The solution is then clarified and run to a precipitation system.

PRECIPITATION

There are two types of precipitation, displacement by iron and electrolytic deposition. The iron used is generally tin cans which have been previously cleaned and detinned. By proper handling this forms a high grade copper precipitate, called cement copper which is 95% pure metallic copper. Precipitation from our solution takes place in less than one hour, and by building the solution up to proper strength it is again reacy to leach copper from more ore. Electrolytic deposition is accomplished by low voltage direct current using carbon anodes and copper cathodes. This method is somewhat slower than the iron displacement method, requiring about four hours. It requires more power and equipment but makes a somewhat superior product. The solution is then re-used to leach more ore.

CONCENTRATION

The tailings from the leaching system now contain molybdenite, copper sulphides, gold and silver. Bulk concentration followed by selective flotation will give two products, a molybdenite concentrate, and a copper concentrate containing gold and silver. The molybdenite concentrate is salable in that form while the copper concentrate containing the gold and silver is all paid for by the Copper Smelters.

COST

It is reported that cost of mining ores of similar grade and condition in this district are not over $1.50 per ton. Grinding cost for a fifty ton mill should not be over 50¢ per ton. The replacement cost of leaching solution is not more than $1.00 per ton of ore leached. Concentration cost is about 75¢ per ton, while iron displacement precipitation will be about 1¼¢ per pound of copper produced. The cost of electrolytic deposition depends upon how cheaply power can be produced, but should not run over 1½¢ per pound with the proper installation.

Operating cost for 5% copper and 2% molybdenum is as follows:

Mining	1.50	per ton
Grinding	.50	" "
Leaching	1.00	" "
Concentration	.75	" "
Precipitation, 80 lbs. @ 1¼¢ ...	.75	" "
	$4.50	

Gross returns per ton

Copper, 100 lbs. @ 14¢ net	14.00
Molybdenum, 40 lbs. @ 40¢ net ..	16.00
	$30.00

Net returns	25.50	per ton
50 tons per day, net	$1,275.00	per day
30 day period, net	$38,250.00	per month

Several thousand tons of 5% plus ore are now available on the stockpile and many thousands more in the mine above the water level.

Ample water is available in the lower portion of the mine to maintain permanent 50 ton leaching production.

As soon as advisable the water level could be lowered so that mining operations of 18% plus copper sulphide ore in the 200 ft. level could be started.

This could be concentrated or shipped to smelter as is, and should net an average of more than $40.00 per ton.

A contract to build the leaching mill and put on production can be consummated with Mr. Morrison, a reliable construction man, who has specialized in mine and mill work and who is financially responsible.

The contract cost for a 50-ton per 24 hr. plant will be $10,000.00, and another $8,000.00 to set up a mining and shipping operation from the lower level. This, however, could come later and should be paid for out of profits from the leaching plant.

The leaching plant necessary to handle 50 tons per day is much smaller than the common type due to the ready solubility of the ore and the high speed leaching solution. It is standard in design and very simple, consisting of

Ore bin and feeder
Crushers
Leaching trough
Settling tanks
Precipitating tanks
Classifying tables

WESTERN PACIFIC LABORATORIES

BY WALTER F. HAUSSLER

Copy

REPORT OF A RECONNAISSANCE
OF THE
NEW YEAR'S EVE LODE CLAIMS

PIMA MINING DISTRICT

PIMA COUNTY, ARIZONA

BY:

C.J.SARLE
GEOLOGIST

TUCSON, ARIZONA
DECEMBER 18,1939

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REPORT OF A RECONNAISANCE

OF THE

NEW YEAR'S EVE LODE CLAIMS

Pima Mining District
Pima County, Arizona

By:

C.J.Sarle, Ph.D.
Geologist

****

Summary and CONCLUSION:

The property of the Southern Arizona Molybdenum Corporation is located in the Pima Mining District, Pima County, Southern Arizona, about 33 miles southerly by good roads from Tucson. These holdings comprise 42 unpatented lode claims, owned by the Corporation by right of location and the remainder held under lease and option. Together these claims form an unbroken tract of about 840 acres, which lies across a low, hilly, east-west extending granitic ridge exposed by deep erosional stripping, which for a length of 2 miles or more and a width of nearly a mile constitutes a bolt of persistent molybdenite chalcopyrite mineralization.

The three claims, New Year's Eve Nos. 1-2-3, with which this Reconnaisance Report is concerned, are among the northernmost of the group, and were selected for initial development and operation because of the existence of more than 3500 feet of mine workings. These workings represent an attempt by the Calumet and Arizona Copper Company in 1906-7 to prove up a large tonnage of silicious copper ore for smelting. Although the results obtained were disappointing to the Company, they have revealed the possibilities for profitable mining of the alloy metal, molybdenum.

As shown on the accompanying assay map of the upper workings, in the New Year's Eve mine there is an unmined block of ore, part of a large quartz displacement mass, lying between the 50 and 100 feet levels, estimated to contain not less than 25,000 tons of ore, which a reconnaissance sampling has shown to be of good milling grade. Besides this partially developed tonnage of ore there is an estimated additional 10,000 tons at least in the undeveloped portion of the quartz mass. Also there are 2400 tons of milling grade ore on the point of the main dump, quite different in character from that of the quartz mass, definitely indicating the occurrence of a large gody of ore of milling grade at some point on the 200 foot, or lower, level of the mine, which is now under water. Moreover, there are several other promising ore showings on the property meriting the expense of investigation. These facts give reasonable assurance of sample tonnage for a two years operation of a 50 ton mill.

The delimitation of the 25,250 ton block of ore in the quartz displacement was based on values shown by 21 samples, the average assay value of which gives 0.820% MoS2 and 1.013% Cu. This, assuming a gross value of 40 cents per pound of MoS2 and 10 cents per pound of Cu. would give a total gross value per ton of $8.59. The calculated cost of mining and milling, given in this report as $4.35 per ton would leave a net profit per ton of $3.38 or a total net profit of $85,345 for the partially developed ore en-block, allowing for a 10% loss in recovery.

The 2400 tons of ore on the point of the dump, from 4 samples taken in a reconnaissance sampling, runs 0.56% MoS2 and 0.30% Cu., making the gross value per ton of this ore $5.08. Figuring cost of moving this already mined ore from dump to bin at 30 cents per ton, the cost of treatment would be $2.20 per ton--leaving $2.37 net profit per ton after allowing for a 10% extraction loss, or a total profit of $5,688 for ore on dump.

These figures show a total net profit of $91,033 for commercial ores as indicated by sampling.

The cost of putting this property into production, including road repair, establishing a camp, unwatering and reconditioning the mine, the cost of mining equipment, erection of a 50 ton flotation plant and the development of a water supply would be $22,447, or in round figures $25,000. To this should be added the sum of $15,000 for the operation of the plant for the first three months, which means that $40,000 will be needed to put the New Year's Eve mine on a paying basis.

In conclusion it may be said that the several ore showings together with ore sufficient to maintain a 50 ton operation for a period of two years, place this property out of the prospect class. However, it must be remembered that explanatory work on this property should be pushed vigorously, and such ore bodies as may be encountered should be developed as rapidly as practicable. Likewise, the study and development of ore resources of the other 39 contiguous claims should go forward with a view to increased production with lowered costs and assurance ofa long period of operation. If this program is adopted and adhered to and provision made for the financing of this larger exploratory work, this mining undertaking is considered to be of more than usual merit and to fully warrant the expenditure of the initial $40,000 required.

LOCATION:

The New Year's Eve Lode claims are located in the Pima Mining District, Pima County, Arizona; in Township 16 South Range 12, East, in Sections 9 and 16--Gila and Salt River Meridian.

This places the claims in Amargosa Gulch, at an approximate altitude of 4000 ft., in the southern part of the Sierrita Mountains---about 28 miles airline distance and a little west of south of Tucson and 18 miles a little south of west from the old mining camp of Twin Buttes.

The city of Tuxson, on the Southern Pacific Railway, is the nearest supply and shipping point. From the mine to Tucson by road is 33.5 miles. All but the first 2.3 miles of this distance, which is a ranch and mine road with some short rather steep grades is ever graded and well maintained highways--3.6 miles

eastward to Twin Buttes, thence 27 miles northward to Tucson, the last 9 miles paved. From the junction of the mine road with the Twin Butte road there is a descent of over 1600 ft. by well distributed grades into Tucson. Trucking time from the mine to Tucson is about one hour.

PROPERTY HOLDINGS:

The New Year's Eve claims, with which this report is mainly concerned, comprise three of the most northerly of the 42 unpatented lode claims, a group held by the Southern Arizona Molybdenum Corporation. Of these claims 19 (White Tiger 1-3 inclusive and Molly Bell 1-16 inclusive) are owned by right of location, and 23 claims (Esperanza 1-8, Amargosa 1-4, Ballota 1-8, and New Year's Eve 1-3) are held under option, or bond and lease. All are reported duly recorded in the office of the County Recorders office at Tucson, together with an affidavit of annual assessment work performed.

Record of the New Year's Eve claims are found in the record of Mines, in the office of the County Recorder at the County Seat, Tucson, as follows:

Book-R.M.	Page	Locator	Claim Name	Min.Dist.	Dat.Loc.
69--QQQQ	259	Raf.M.Robles	New Year's Eve #1	Pima	1-1-33
" "	260	" " "	" " " #2	"	1-1-33
" "	261	" " "	" " " #3	"	1-1-33

As recorded each of these claims is given the standard width of 600 feet and length of 1500 feet, approximately 20 acres, long axis extending east and west, and claims lying side by side.

In the field it was found, however, the work of location of these claims had been very roughly done and the measuring of distances very inaccurate. Thus, as shown in the Reconnaissance Map accompanying this report, the claims instead of lying easterly and westerly have their long axes running approximately north-east and southwest. Their western bounding and monuments are well aligned and in good condition, but those demarking their easterly ends are either down and confused with other monuments in like condition, or poorly alligned. Moreover, New Year's Eve claim Number 1, the southern most of the three, and New Year's claim number 2 are short in both dimensions.

While New Year's Eve claim number 3, the northernmost is slightly oversized in both.

It would seem advisable therefore, in order to safeguard against future possible conflictions of boundary to re-survey these claims, making such corrections as found possible, repair the monuments, and then to make record of amended locations.

GEOLOGY-SIERRITA MOUNTAINS:

The Sierrita Mountains are a short, north-south lying range, located a few miles to the south of Tucson; similar in origin and general structure to some 120 or more northerly to northwesterly trending, barren-flanked, deeply eroded, fault-block mountains, which collectively dominate the landsacpe of the southwestern half of Arizona.

The Sierrita Mountains as viewed today are little more than a remnant of their former mass. Long continued work of the agencies of weathering and erosion have removed thousands of feet of rock from their surface and cut back their flanks far beyond their former limits. The only ruggedly mountainous portion remaining is a deeply dissected, north-south extending ridge, roughly cross-shaped in plan, some eight or ten miles in length and perhaps six miles in greatest breadth--a few higher points on its crest reaching elevations approximating 6500 feet above tide. Encircling this axial ridge is a broad, outwardly-sloping, rock floored plain, or pedimentary area, concordant with the gradings of the beds of the intermittant streams, which are relieving the area of its constantly forming rock litter.

Centrally, the rocks flooring the pediment are but imperfectly veneered with rock wastage, and between drainage lines are extensively exposed. Outwardly, however, they are lost to view as the pedimentary plain passes beneath a deepening alluvial mantel which continues in long, gentle slope to merge with the floor of the broad Santa Cruz Valley on the east and that of the Avra on the west. Rising out of the alluvial slope occasional rocy buttea or ridges, left by circumdenudation, give proof of the continuance of the mountain pediment beneath, and of the former much greater extent of the Sierrita Range.

The erosional stripping of many cubic miles of rock from the surface of the Sierrita Range has brought much of its innermost structure to view. A widely exposed porphyritic, biotite granite forms the core of the range. This granite, Mid-Tertiary in age, is the result of the slow cooling and consequent coarse crystallization of an enormous body of fluid acidic-lava under a thick covering of rock. Its emplacement was an essential factor in the formation of the range. The lava, slowly ascending--possibly in compensating adjustment with the crustial settlings under the adjacent Santa Cruz and Avra Valley area--is seen to have lifted and shouldered aside, by magmatic wedging, great masses of Pre-Cambrian basement rocks (grabites, gnieases and pegmatites, schists, etc.) In this same upward movement of the lava a great series of sedimentary rocks, Paleozoic and Mesozoic in age, andatheir covering of Older Tertiary lavas which together rested upon the ancient peni-planed surface of the Pre-Cambrian formations, was thrust upward some thousands of feet; and by stresses produced by intrusion and foldings was broken into countless great blocks; which by normal and reversed fault movements were lowered or raised, rotated, tilted, even overturned; and frequently wedged apart basaly by intruding tongues of the lava or forced downward to form roof-pendants in the lava.

The exposed portion of the biotite granite core covers an area estimated at 70 square miles--centering upon the common corner of a group of four townships, of which it surfaces about half. The encountering of this granite in two wells on the Santa Cruz side of the pedimentary slope beneath forty feet of alluvium, distant three miles northeasterly from the nearest granite outcrop, indicates that its erosional stripping is of much greater extent than the present surface exposure would indicate. The difference in elevation on the eroded surface of the granite in the wells and at its highest point on the central ridge, 8 or 9 miles to the southwestward, is approximately 3000 feet.

The granite at most points examined is quite consistently porphyritic, and its groundmass of average granitic texture. Often, however, in marginal positions, the feldspar--phenocrysts become few and smaller, or are lacking; the texture becomes finer; small phenosrysts of quartz show up prominently on weathered

surfaces, and the interstitial quartz increases. In several instances a marked increase in biotite is noted together with an absence of the feldspar phenocrysts. Variations suggestive of monzonitic gradations are also noted occasionally.

Numerous dikes, finer textured and in appearance generally more silicious, cut the grabite. These dikes apparently represent later differentiates formed in the still molten heart of the acidic magma, forced upward through fissures produced by stresses in the already congealed outer portion of the grainite mass, and sometimes into the older covering rocks.

Fault-block remnants of the various rock formations, once completely covering the Tertiary granite, now from an encircling, interrupted belt lying between the centrally outcropping granite and the outwardly deepening mantle of alluvium. The blocks of this belt, often discordant in dip and mixed as to geologic horizon, owe their survival to al combination of factors, namely: circum-erosion, pendant position in the granite mass, and to the superior resistance to weathering of the rocks composing them to that of the granite.

The belt of residual roof-rocks along the eastern and western sides of the range varies up to about a mile in width, and is composed of stratified rocks of Paleozoic and Mesozic ages. The Paleozoic series, incompletely reconstructed from various fault-blocks, comprises limestones of Upper-Cambrian, Devonian, Mississippian, Pennsylvanian and Permo-Carboniferous ages, with an Upper-Cambrian quartsite at the base of the series. The Mesozoic strata consists of a repition of beds of arkosic conglomerates, arkosic grits and fine grained sandstones, beds of mud-rock and vari-colored shales, and some limestone, or their metamorphosed equivalents--probably all of Cretaceous age--which represent parts of a series originally several thousands of feet in thickness.

On the northward slope of the range the belt of exposed remnant roof-rocks is represented by an outcrop,about a township in area, of Pre-Cambrian basement rocks (granite,gniess and peg matite, schist, etc.) On the southern end of the range this belt is composed of Older Tertiary volcanic rocks. These abut the south end of the grabite and comprise two southward extending lobes, which outwardly disappear beneath the surface of the alluvial slope. The westerly of these two lobes froms the southern half of the high north-south extending ridge, which forms the axis of the range. These volcanic rocks are minor intrusives adidic and sub-acidic in composition, varying texturally from felsitic to granitic, and are older than the grabite as proved by intrusions of the granite into them.

Productive mining in the Sierrita Mountains, since its beginning in 1857 to the present, has been confined to ores occurring in the old residual roof-rocks which form the broken belt above described. The earliest mining was for rich silver-lead ores. After the demonitization of silver in 1893 attention was directed more particularly to the mining of copper, which was carried on with varying success until 1914, when with the beginning of the World War mining in the Sierritas experienced several years of great activity. Not only many copper mines, but also silver-lead, silver-lead-zinc, and silver-lead-zinc,copper mines which had long been closed down were reopened. These included the mines in and about the Mineral Hill-San Xavier-Olive Camps at the northern end of the eastern strip of Paleeozoic and Mesozoic formations, and those in and about Twin Buttes at its southern end; also the mines on the western side of the range, in these

sedimentary rocks, as for example in the Sunshine and Banner Camps; and on the south, in the Older Tertiary volcanics, including the Esperanza and High-Hill Camps.

With the possible exception of some of the ore occurences found in the Older Tertiary volcanic formations at the southern end of the Sierritas--in which gold constitutes the principle value, or is present in appreciable amount, and may date back in origin to this earlier period of igneous activity--the major part of the ore bodies observed, appear to have been formed by mineralizers emanating directly from the surface of the great mass of acidic lava at an early stage of its crystallization into grabite. In other cases they appear to have been formed later from more vaporous and gaseous elements expelled from deeper portions of the magma through fissures formed in the already lithified outer portions of the granite--identified with the later magmation which produced the acidic-dikes, previously described, and still later through fissures and plahes of fault movement, in some instances indicated by displacements of the dikes.

The above described relations, of course, are often obscured and perforce inferential. But in the case of the occurence of mixed garnet-copper sulphide ores, a typical product of contact-metamorphism, by metasomatic alteration of limestone, as shown by their persistant occurrence in limestone on the granite contact, or within a few score feet of the contact, as observed in the Glance, Queen, King, Minnie and other mines at Twin Buttes and in the South San Xavier and Vulcan Mines to the north, where such ores have been extensively mined, precludes any doubt as to the direct genetic relationship between granite intrusive and these ores ocurrences. Again the shoot of copper-lead-zinc-silver sulphide ores developed inthe south-tilting bedding planes of Carboniferous limestone in the San Xavier mine, formed by a replacement of the lime, although not affording evidence so directly connecting their origin with the granite intrusive, yet it must be conceded that the tilting of the great block of limestone in which this mine is located and the invading minera;izers, utilizing fissures and bedding planes as controls, resulted from emplacement of the grainite-the youngest igneous rock present.

Collectively the ores of the Sierritas including many of the deposits of the Older Tertiary volcanics, are complex ores in which copper preponderates. In the contact meta orphic garnet sulphide ores, the copper is often associated with objectionable amounts of zinc; and in other cases cupriferous zinc-lead is a common combination, zinc-lead-silver not unusual and silver-lead. All are combinations so linked together or overlapping in their occurerences as to indicate their origin in a common magmatic source, that represented by the granite. Such differences, moreover, may well be interpreted as indicating a tendency on the part of the metals to occur separately, or in zones, based upon an adjustment to gradations in terperature and pressure; copper and deepest seated, near the source of mineralization and having the greatest vertical range or zonal thickness. It is predictated that many ore bodies in the Sierritas will, before mining has extended to the full depth of the roof-rocks in which the ore body may be confined, will have changed to the sulphides of copper--and may in exceptional cases be found to continue downward into the mother granite.

That the greater part of the broadly exposed granite core of the Range should be devoid of ore occurrences except for the occasional finding of copper-oxides, usually little more than stainings of the rock, associated with fault-fissurings, is belived due to erosional stripping having bottomed the zone of ores over most

of the area. There is one notable exception, however, This is the occurrence of a wide diffusion of molybdenite associated with the primary copper mineral, chalcopyrite, in a roughly east-west extending ridge--bounded on the south by the area of Older Tertiary volcanic rocks--which forms a part of the eastern arm of the high, cross shaped, axial ridge of the Sierritas. This occurrence has a length of over 2 miles and a breadth varying up to nearly a mile. Its delimitation is based on a partial reconnaissance of the area, supplemented by information supplied by persons who have extensively prospected the region.

The Tertiary granite comprises the bulk of this ridge and includes large masses of a holo-crystalline, rather finely granular, dark to sage gray weathering rock, which from field determination may be called a diorite known to be older than the granite because of minor projections of the latter into it. There is also an exceedingly fine grained massive quartzite occurring in large masses which because of its more effective resistance to weathering, forms the cap rock of some of the higher hills, and by the inclination of its basal plane, is seen to have a southerly dip. Occasional smaller masses of this quartzite form inclusions in the granite, as in the case of the diorite. The diorite, while older than the granite, is younger than the bulk of the Older Tertiary volcanic-series as shown by dikes and other less regular intrusions of it into the volcanics.

Numerous dikes, representing later, apparently more acidic phases of the magma from which the granite formed, cut the grahite. These dikes in some instances, appear to have been instrumental in bringing mineralizers outward, and in one dike molybdenite appears disseminated interstially with the rock forming minerals. Fissure, both earlier and later than these dikes, formed pathways for mineral diffusion and deposition.

Finer textured, more silicious phases of the granite, suggestive of maginal chilling and differentiation, are common in this belt, are common in this belt. These are often sheared and brecciated and are seamed with innumerable quartz veinlets--the fracurings, collectively constituting pathways of mineral diffusion and zones of molydenite-chalcopyrite deposition.

Aside from the occurence of these ore minerals in the more silicious areas, molybednite-chalcopyrite deposition is often found in other brecciations, shear zones and fissurings, in fault gouges and in relation to quartz displacements.

Many showings of these minerals are encountered in shallow prospect shafts and also in deeper workings, made in an attempt in earlier years to develop copper ores of shipping grade. Other occurrences of molybdenite are indicated by stains of yello ochre or molybdite on steeper outcroppings on hillsides and on the walls of dissecting canyons.

With all of these persistently reoccurring surface showings of molybdenite and chalcopyrite it seems very reasonable to expect that commercial bodies of these minerals will be found, once the geolocical structures and relations of the area are better understood.

The New Year's Eve group of 3 claims, and the 39 other claims held by the Southern Arizona Molybdenum Corporation, form an unterrupted blanket of 840 acres, more or less, which lies acoss this ridge in a general northeast-southwest direction, and in an east-central position in the molybdenite belt.

GEOLOGY, NEW YEAR'S EVE GROUP:

The three claims comprising the New Year's Eve group have a combined area of about 60 acres, and form a square, about 1500 feet on a side, which lies in a diagonal northeast-southwest position--covering in part the floor of a basin-like widening of Amargosa Gulch--which occurs above the confluence with it of a large tributary from the north, and of smaller tributaries to both from the west--and covering in part, the northwestern face of a steep, out-jutting shoulder, or hill, forming the southern flank of the valley at this point, around which the Amargoso channel makes a northward turn, swings back, and then resumes its general easterly course. (See Plate of Panoramic Views appended.)

To the east and to the northwest of this valley widening lie hills with summits of 4300 and 4400 feet (See Reconnaisance Map accompanying report). The crest of the above mentioned out-jutting shoulder, situated a little south of the center of the property, is approximately 4300; the top of a small hill located in the western part of the claims area has an elevation of a little over 4100 feet; and the elevation of the channel of the Amargoso wash, at the center of the property is approximately 3975 feet above the tide.

The Tertiary, porphritic biotite-granite flanks this basin, on all sides and forms its southeasterly-sloping bottom, except for a roughly triangular area which is underlain by a rather fine grained diorite, lying in the angle between the Amargoso and its tributary from the north. This diorite mass, older than the granite, as proved by penetrating tongues of the latter, is believed to be an inclusion in the granite.

A massive, very fine-grained quartzite, probably Pre-Cambrian in age, forms the top of Mexican Peak (See Position on above cited Map) and there capping the granite, is extensively exposed on the crest of the ridge to the eastward and along down its southern slope. A small tabular mass of this quartzite, lying in the granite, outcrops on the property, on the northern face of the abovementioned shoulder.

A rather superficial study of rock jointages, at points of best exposure, as in the beds and along the sides of stream channels, showed a preponderance of planes with angles of from 40 to 45 degrees from the horizontal, indicative of strong comprehensive action, repeated from many quarters. There also occurs less numerous, but more persistent north-south vertical joints in conjugate system with weaker transecting joint planes--interpreted as due to tensional stresses.

Examination of a number of dikes, cutting the granite in areas contiguous to the property, show faulting to be rare and generally of small displacement. On the property a thrust, or reversed fault, occurs in the granite on the east side of Amargoso Gulch about 250 feet south-west of the portal of the lower tunnel. (See Reconnaissance Map) Its strike is east and west and dip south 45 degrees from horizontal, and its plane, if continued, would pass under the large quartz outcrop.

Three normal faults were observed. Two have roughly east-westerly trend and form shear zones containing quartz leaves showing comb-structure and accompanying oredeposition. The third located in the northwest corner of New Year's Eve claim No.3, strikes roughly north and south and cuts one of the former ore-bearing faults or veins, causing a throw of 30 to 40 feet--as indicated on Map No.2.

Two outcroppings of quartz occur, both lying in the granite. One is located on the south side of Amargoso Gulch, on the northern face of the outjutting shoulder described above, its height above the stream channel ranging from about 80 to 150 feet--the higher end to the southwest. Referring to the Reconnaissance Map it will be seen that this places it in the northwest-southeast position across the northeast-southwest extending sideline between New Year's Eve claims No.1 and No.2. Though its limits are partially obscured by talus around its lower end and one side, the outcrop appears to be about 175 feet in length by 70 feet in width. The other quartz body, possibly 35 feet by 18 feet in extent, outcrops on the floor of the basin about 600 feet to the northwest of the former. (See Reconnaissance Map and Panoramic View--Photo No.2.)

The quartz in these occurrances is massively crystalline in texture and, in the larger one, often noticeably viterous. In this respect it is in marked contrast to quartzes formed from aqueous solutions, which are characterized by such structural features as banding, laminations, comb-structures and druse-lined vugs; and is believed to have been produced by an injection of silica gel into the granite--in other words, a displacement by igneous intrusion.

DEVELOPMENT--NEW YEAR'S EVE GROUP:

The three claims which comprise the New Year's Eve group are a relocation, made by Rafeal Robles in 1933, of the nuclear part of a larger group located and recorded by P.H.Chambers in 1895

which under various changes in ownership had come to be known as the Snyder Group.

The Snyder Group is located because of various showings of oxide ores of copper, was centered upon the large quartz "blow out" described above as outcropping on the out jutting shoulder on the south side of Amargoso Gulch, some 150 feet above its bottom. All subsequent mining on this property centered about this quartz out-crop--amounting all told to about 3500 linear feet.

Earlier operations appear to have been interrupted and spread over an interval of several years; and confined mainly to mining oxidized copper ore of shipping grade in the eastern end of the blowout. A cave-in some 40 to 50 feet across, locally known as the "Gloty Hole", marks the site of the earlier work. (See Reconnaissance Map of New Year's Eve Claims--No.1) Remnants of a dump give indication of a short tunnel, or open cut, driven from the north outer slope into the quartz mass near its top. A second tunnel, located some 40 feet lower and 40 feet to the west, started in granite, cuts the northern face of the quartz just inside of its portal, where it dips little south from vertical. About 25 feet within there is a badly caved winze. This tunnel about 65 feet in length, was driven apparently to get under the ore. Later a third tunnel located some 70 or 80 feet lower and about 25 feet above the floor of the wash on the northwest side of the outjutting shoulder, was driven southeasterly some 230 feet where, at the end of a 50 foot cross-cut to the right, a raise was made to connect with the above-mentioned winze--now badly caved, but not completely closed. Approximately 100 feet from its portal the tunnel, leaving the granite, cuts the southwest side of the quartz mass, which at this point strikes north 30 degrees west with a dip south 53 degrees from the horizontal and crosses it obliquely emerging from its north 10 degrees west striking face, exposing the granite at a point about 8 feet beyond the drift.

The only other work ascribable to this earlier period of mining appears to have been the sinking of a shaft on the westerly-trending hillside-vein at a point about 700 feet northwest from the portal of the lower tunnel. Judging by the size of the dump and from soundings made with stones this shaft could not have been less than 80 feet deep; and there may have been some lateral workings. Altogether the workings of this earlier period probably totaled close to 500 feet.

During 1906-7 the Calumet and Arizona Company, securing a lease and option from the late Fred Snyder made an extensive exploration of the property in hopes of proving the existence of a large body of silicious copper ore of commercial grade. After doing about 3000 linear feet of development work and spending many thousands of dollars the company abandoned the undertaking.

A double compartment shaft--located a little south of center on New Year's Eve claim No.2, on the south side of Amargoso Gulch, at the base of the slope below the quartz blowout, some 350 feet outward from the Glory Hole, and 280 feet from the portal of the lower tunnel--was sunk in granite to the depth of 200 feet with an added 20 feet for a sump. From the foot of this shaft two long drifts with lateral workings were run--one to the south, the other to the northwest.

The 200 foot level is now under water, a sounding showing water at 194 feet below the collar of the shaft. The information concerning this level comes from a generalized tracing of the plan of this level shown on an Exploration Map of the Calumet and Arizona Co. (See reproduction on accompanying Map No.2 of the New Year's Eve Mine Wrokings); and from information supplied by Antonic Zambonmni, foreman in charge when the Arizona Molybdenum Corporation unwatered and examined the property in 1936. (See plan of 200 ft. level on above cited map No.2).

The south drift, passing under the east end of the quartz displacement, is reported open for 530 feet and caved for an unknown distance beyond. From this drift a second one, started some 250 feet from the station, and driven to the southeast is reported open fro 300 feet and gobbed beyond. Several short crosscuts were driven, most of them to the west from the main drift; two of them ending in winzes 70 feet deep. The workings open in the south drift total 1400 feet and so far as accessible, are in the Tertiary granite. The major part of thesedrifts were retimbered by the Arizona Molybdenum Corporation while making their investigations.

From a point in the south drift, 320 feet from the foot of the shaft, a 200 foot raise was made, opening into the crosscut from the end of the lower tunnel, and some 15 feet distant from the bottom of the old raise to the Glory Hole. The first forty feet of the raise is said to be partly filled with muck and for 90 feet in need of re-timbering. The remaning 110 feet of the raise was retimbered in 1938 and is in excellent condition. Of this 200 feet the first 90 to 95 feet are in the granite, the remainder in the large quartz displacement. The contact between the quartz and granite is a fault plane striking east and west and dipping south about 30 degrees from the horizontal. (See Vertical Projection in Plane of Shaft and Raise on above cited map No.2.)

At the 100 foot level in the raise a drift was run 63 feet to the southwest--the first 43 feet in quartz and the remaining 20 in granite. The plane of contact between the quartz and granite is essentially vertical and strikes north 30 degrees west. In the drift, 40 feet from the raise a crosscut was driven 56 feet southwesterly paralleling the contact between the quartz and granite. On the other side of the drift there appears to be a second crosscut, opposite the first, and alligning with it, but which is now bulkheaded off. The workings open to inspection on this level approximate 120 ft. (See Assay Map #3).

A 50 foot level in the raise has a total footage of 262 ft. in drifts and crosscuts. This includes a 53 ft. drift to the northeast, which passes from the quartz displacement to the granite at 48 feet--the contact between granite and quartz vertical and striking north about 30 degrees west. And, a 60 ft. drift to the west south passing from the quartz at 51 ft.--the contact vertical and striking north 15 degrees west. These figures show the quartz to have a width of almost 100 ft. on the 50 foot level. In the northeast drift some 18 ft. from the quartz-granite contact is a 22 ft crosscut to the southeast, and 12 feet nearer the shaft another running southwest from the drift 34 ft. In the southwest drift, 18 ft. beyond the Raise, a crosscut 45 ft. in length runs to the southeast, and 13 feet beyond is a crosscut extending 24 feet north and 24 feet south from the drift. This level together with 100 ft. level and the 200 ft. Raise represent 582 ft. of the development work done by the C. and A. Company.

Resuming the discussion of the 200 ft.level--the Northwest drift, as indicated on the Map No.2 of New Year's Eve group-Mine Workings, is somewhere between 720 and 740 ft. in length with a few short crosscuts at the far end. This should place the breast of the northwest drift about 100 feet north of the old shaft on the hillside vein, mentioned above. As near as can be ascertainedm this drift and crosscut have a combined footage of 835 feet, all in granite, which with the 220 feet represented by the main shaft and sump, would account for 1055 linear feet of the 3000 odd feet of development work done by the Calumet and Arizona Co., and that with the estimated 450 to 500 feet of older workings makes a grand total of over 3500 feet of open workings on the three New Year's Eve Claims.

ORE OCCURRENCES AND VALUES:

From the above description the development of the New Year's Eve property, it will be seen that the only parts of the mine workings, at present open to investigation of ore occurrences are; the lower-tunnel level and crosscut at its end, amounting to approximatley 270 linear feet; the upper 110 feet of the raise from the 200 foot level to Tunnel-level; and the drifts and crosscuts at the 50foot and 100 foot levels in that raise, amounting respectively to 262 feet and 120 linear feet--together totaling 770 feet on development. It likewise shows that the first 100 feet of the lower tunnel is in the granite; as is also about 20 feet at the ends of the northeast and southwest drifts on the 50 foot level; and 20 feet at the end of the southwest-extending drift on the 100 foot level and that the balance, 630 feet, lies in the eastern end of the large quartz displacement. (See above cited map--No.3)

As to ore occurrences;- The granite exposed in the lower tunnel is barren of ore minerals; and only occasional traces of them are to be found in the quartz. In the raise,however, about 15 feet below the crosscut from the lower tunnel, molybdenite and chalcopyrite appear abruptly in the quartz and the sides of the raise for several feet down are coated with copper-sulphate--from oxidation of the chalcopyrite. From this point on, the molybdenite and chalcopyrite persist wherever the quartz has been opened up.

A study of the manner in which the molybdenite and chalcopyrite occur in the quartz indicates that the deposition of these ores minerals took place in two stages. The first occurred while the silica was still in the condition of a jell; the second, after its congealation into the massive srystalline body of quartz--the deposition taking place in this instance along planes of shearing and crushing. Connected with the first stage was the deposition of the tungsten mineral hubnerite (manganese tungstate.) Whether or not the occurrence of tungsten in the ore will prove of importance can be established only through further investigation.

Assays of 21 of the samples taken in a reconnaissance sampling of the 50 foot and the 100 foot levels and the connecting raise, roughly demark a block of partially developed molybdenite-chalcopyrite ore of good milling grade. This block, lying between the 100 foot level and the lower tunnel level and pierced by the raise has an estimated thickness of sixty feet, a north-south length of 75 feet and a breadth of 70 feet; and a contained tonnage of 25,250 tons allowance being made for ore removed in development, amounting to a little over 1000 tons. (See above cited map-No.3).

An average of the value shown by these 21 samples calculated on the bais of footage represented by each, shows the above cited block or ore to contain a general average of 0.820% of MOS2 and 1.013% of copper. This gives a computed content of 414,100 pounds of MoS2 (207 tons) and 511,565 pounds of copper (256 tons). Assuming a gross value of 40 cents per pound for MOS2 and of 10 cents per pound for copper, would make the total gross value of the ore en-block $216,797.00.

Any estimate made as to the amount of ore of commercial milling grade which could be developed within this quartz mass by further exploration must of course be largely conjectural. However, based upon the manner of occurrence of the ore minerals; and the proportion of milling grade ore to low grade which development has thus far shown; and the relative amount of explored to unexplored quartz should enable one to conservatively estimate a tonnage of milling ore which can be added to that already roughly proved up.

The observed occurrence of the ore minerals in the quartz, while variable within narrow limits, has proved to maintain consistent averages of commercial grade throughout large areas, and it is reasoned, therefore that other bodies of commercial grade willbe found with development.

Referring to the plan showing the lower tunnel and lateral workings in the Raise, it will be seen that the quartz has a width of a little less than 100 feet on the 50 foot level and that its lateral limits have been established at other points. From this it may be concluded that the average width of the lower part of the quartz displacement is close to 100 feet. Its length, however, is somewhat problematical, but by projecting the outcrop of the quartz upon the plan of the workings together with the outline of the Glory Hole, which indicates caved-in workings of the quartz, it will be seen that this mass is 200 feet or more in length.

Using the above dimensions of the quartz mass as a basis for calculation and taking 80,000 tons as representing that portion of its easterly end lying below the upper plane of the block of ore, then the 25,000 odd tons of partially developed ore would be equivalent to a little lss than one half that mass;and therefrom it is reasonable to assume that one third of the mass of quartz will prove commercial grade ore.

With this ratio as the basis for an estimate of the commercial ore at this horizon, in the northwestern or undeveloped portion of the quartz block, and allowing for the 30 degrees northward and upward level of its lower surface and figuring 30,000 tons of quartz as the amount in the northwestern half of the block at the horizon of the blocked ore, there should be in addition 10,000 tons of commercial molybdenite-chalcopyrite ore.

As to the existence of ore above the lower tunnel level in this part of the quartz-displacement, nothing, of course, is known at present; but this could easily be determined by exploratory work carried on from the tunnel level.

While that part of the quartz mass lying below the block of commercial ore, averaging 30 feet in thickness, and opened up on the 100 foot level, was classed as low grade from a single sample taken lengthwise of the 45 foot drift, there are indications pointing to the existence of a considerable tonnage of milling ore which might be developed and selectively mined in this block with but little exploratory work.

From the foregoing facts it seems reasonably certain that this quartz mass, when it has been thoroughly exploited, will have yielded ore for a two year operation on a 50 ton per diem basis.

Aside from the occurrence of ores in the quartz displacement, just discussed, there are 2400 tons of ore of milling grade on the extreme point of the main dump. An average of 4 samples taken of the dump show it to contain 0.56% of MoS_2 and 0.30% of Cu. This gives a total content of 26,880 pounds of MoS_2 (13 tons) and 14,000 pounds of Cu. (7 tons) for the 2400 tons of ore on the dump, or a gross value of $12,192, based on metal values given above.

This ore differs markedly in character from the former in that the gangue is a massively felsitic pegmatite, laced with many quartz veinlets. Moreover, the ore minerals are distributed through the mass by innumerable fissurings, the molybdenite is more usually crystalline and the copper content is much lower. Many of the later formed fracture planes in the feldspar ground mass are coated with the secondary mica, Sericite, and the presence of sizable plates of micaceous gypsum, Selenite, representing the effect of permeating metoric waters, are among other contrasting features. In mining, this mass of ore on the dump, would represent the material extracted from about 500 or 600 feet of linear development work. This is too much to be accounted for by assuming that it came from the lower 90 feet of the raise, or from the 100 foot level, where, it should be noted, the presence of some feldspar in the quartz, showing along the floor of the drift and in gob partly filling the southeast crosscut, apparently coming from the opposite bulk head at crosscut, are indicative of a tendency to pegmatization.

As shown in the discussion of development, all of the workings on the 200 foot level are, according to report, in the granite. The only remaining portions of the workings from which this ore could have been mined, would lie in the caved portion of the main south drift and the far end of the southeasterly branch-drift, now gobbed. Assuming that the pegmatite ore comes from this quarter, it could well fall into aligment with the 30 degree south-pitching fault plane bottoming the quartz displacement just below the 100 level in the raise. Should this prove to be the case it seems highly probable that development along this plane would open up a large tonnage of ore.

Referring to the map No.2 of the 200 foot level, reconstructed from information supplied by Mr. Zambonini, it will be observed that molybdenite occurs at several points in crosscuts to the west of the main south drift and at one point a short distance west of the main shaft in the northwest drift. From this limited information, it would appear that the ground lying to the west of the south drift is another favorable quarter for exploration.

On the surface there are a few ore showings deserving of investigation. One of these is the occurrence of ore on the plane of the east-west striking thrust-fault described in discussing the geology of the property as cutting under the quartz "blowout". Openings on this plane a little above the Amargoso channel show five or six feet of the hanging wall to be impregnated with molybdenite and chalcopyrite. Development work at this point would soon establish its value as an ore horizon, and its relation to the structure upon which the large quartz displacement rests.

A second point of importance is the old shaft on the hillside vein, some 700 feet nort west of the main shaft. A later and smaller lobe of the dump is a compound of quartzose ore containing molybdenite and chalcopyrite. While a sample taken assayed only 0.30% MoS_2, it warrants exploratory work. Should it prove up on development, it could be mined from a crosscut and raise driven from the northwest drift on the 200 foot level. (See Map No.2.)

The dump of a shallow shaft on a second vein which has been mentioned earlier, also shows molybdenite and chalcopyrite. This showing also merits investigation.

The smaller of the quartz "blowouts", previously described has only been shallowly prospected; but that it is mineralized is shown by copper oxide stainings. Possibly with depth this may enlarge, and like the larger quartz displacement, be the locus of another ore body. This could be investigated from the 200 foot level, the northwest drift of which passes within 100 feet, judged by the position of the quartz outcrop.

TABULATION OF ASSAYS:

Samples from Block of 25,250 Tons And Averages of Values based upon length of Samples in feet:

Sample No.	MoS2	Cu.	Length of Sample Feet
1	1.47	0.71	18
2	0.32	1.80	12
3	4.20	0.57	12
4	0.93	0.76	30
5	0.90	0.38	4
6	1.15	0.95	8
7	0051	1.09	8
8	0.37	2.61	12
9	0.26	0.81	34
10	0.50	1.19	6
11	0.44	1.20	6
12	1.57	1.09	6
13	0.30	0.43	18
14B	0.54	----	12
15	0.26	2.28	15
20	0.72	0.56	6
21	1.56	1.35	5
22	3.00	1.33	5
23	0.61	0.72	6
17 **	0.27	0.47	25
18 ***	0.70	1.10	30
Average	0.820	1.013	278

Numbers on assay map accompanying report correspond to those of assays above and show where samples were taken.

** Number 17 sample covering upper 25 feet in raise, between 100 and 50 feet levels.

*** Number 18 sample covering first 30 feet in raise above 50 foot level.

Samples of 2400 Tons of Ore on Dump.

Sample No.	MoS2	Cu.	
Sp.1	0.67	0.42	
" 2	0.65	0.38	
" 3	0.59	0.25	
" 4	0.33	0.15	
Average	0.56	0.30	
14	0.21	0.95	24
15	0.24	0.76	43

CAMP AND ROAD COSTS:

The masonry foundations of three large adobe buildings--walls of two, in part, still standing--mark the former camp-site occupied by the Calumet and Arizona Company while exploring the property for copper. These foundations can be used again should the time come requiring the establishment of a large and permanent camp.

In the first stage of development of the property, however, considering the mild, open winters, a few tent houses--each requiring about $12 worth of canvas and perhaps $40 in lumber--would probably suffice--entailing an outlay of about $300.00.

Water, assured for domestic use, is discussed later in conjunction with that of Supply for Mill.

The camp and mine road described under "Location," though in fair condition as a mountain road, could begreatly improved for trucking by an expenditure of $150 in grading.

RECONDITIONING MINE AND COSTS:

The mine workings are apparently in good condition and their repair will entail only a few comparatively small expenditures. This is due to the fact that the main shaft and 200 foot level were retimbered as late as 1936 and the main shaft repaired in 1938--and at the same time the inner raise retimbered down to the 100 foot level.

The lower 100 feet of this raise will have to be retimbered after removal of about 50 feet of muck from the bottom--estimated cost $750, which includes rental for necessary mining equipment. Preparatory to this work will, of coursem be the reconditioningof the 200 foot level. Estimating from previous experience this would require about 3 weeks time and cost approximately $300., including labor, rental of equipment and fuel. The total cost of reconditioning the mine would therefore approximate $1050.

MINE EQUIPMENT AND COST:

The usual mine equipment, including such items as compressor, hoist,headframe, mine cars,jack-hammers and other accessories, can be installed for about $1500, considering that much of this will be reconditioned machinery.

MILL EQUIPMENT AND COST:

Because costs have been figured with the idea of using reconditioned machinery, the price of which fluctuates widely, only an estimate can be given. The latest prices for machinery for a 50 ton mill, including a 125 h.p. oil engine and generator, ore bins, crusher, ball mill, classifier, flotation cells and accessory equipment, supplied by a reliable machinery company, indicates that a complete mill can be erected on the property for $16,500.

WATER AND COSTS:

Water sufficient for camp purposes can be siphoned from an old well, lying some 1500 feet to the westward, as was done by the Calumet and Arizona Company during their exploration of the property in 1906-7.

The cleaning and curbing of the well, pipe line and tank should cost some $300.00. Owner's charge for the water would probably not exceed $15. per month.

About 1000 gallons of water, per ton of ore are required for the operation of a flotation mill. With plans for installation of a 50 ton mill provision must be made for 50,000 gallons per operating day of 24 hours.

Investigation has shown the impossibility of securing sufficient water within the short upper drainage of Amargosa Gulch. But a promising site has been found in Esperanza Wash, a short 3/4 mile to the westward of the mill-site. This wash, through many tributaries, receives the run-off from a large part of the southeastern slope of the Sierritas. The site selected for the well is at the side of the wash in the edge of a large area of diorite, enclosed by the younger Tertiary granite. This diorite has been proven by local mine shafts and other workings to contain much more water than other rocks of the area. Moreover, a shaft some 16 feet deep, located nearby, stands nearly full of water throughout the year. An aneroid reading indicates a lift of approximately 180 feet will place the water on the divide heading Amargosa Gulch, some 1100 feet away. From this point, over a favorable terrain, there is a crop of about 200 feet to the millsite.

An 8 inch cased well, sunk to a depth of 100 feet, at a quoted price of $750, would, it is believed, furnish the required water. An electrically driven turbine pump, capacity 50 gallons per minute, or 72,000 per 24 hours, together with the necessary pipe and labor of installation has been quoted at $1509.

A 25,000 gallon storage tank, located above the mill, and costing about $400., would receive this water together with water from the mine workings and reclaimed water from tailings ponds.

Information gained in unwatering the mine in 1938 indicates that the mine probably makes about 4500 gallons per 24 hours. Reclaimed water from tailings dams can conservatively be estimated at 50% of total used, taking this 25,000 of returned water and 4500 of mine water leaves 20,500 gallons of new water to be supplied daily.

Should it become necessary, through future development of the property as a whole, to enlarge the capacity of the plant, a larger, but unknown, supply of water reported from an old mine workings, distant about 2½ miles from the New Year's Eve property, would be available.

SUMMATION OF COST OF EQUIPMENT:

Road Repair	$150.00	
Camp	300.00	
Unwatering mine Rental of equipment and labor	333.00	
Reconditioning Mine Equipment (small compressor, jack hammers, steel, etc.) for reconditioning mine are available and can be rented for possibly $25.00 per day 10 days	250.00	
Contract price for cleaning and timbering ore chute $12.00 per foot	500.00	
	$1,533.00	$1533.00

Mine equipment

Compressor and motor	$425.00	
Receiver	25.00	
Air Line (1 1/2 pipe 400 feet)	60.00	
Jack Hammers, steel, tools	150.00	
Grizzly	15.00	
Mine cars (3)	75.00	
Hoist and motor	400.00	
Headframe	300.00	
Total	$1,450.00	$1450.00

Mill

Because costs have been figured with the idea of using reconditioning equipment, the price of which is variable, only an estimate can be given. The latest price furnished by a reliable firm, indicates that a 50 ton flotation plant with a 125 H.P. oil engine and generator can be erected on the property for $16,500.00 — $16500.00

Water Supply

Camp supply		
Cleaning and curbing well	50.00	
Pipe	215.00	
Tank	25.00	
Rent of well	15.00	
	$305.00	$305.00
Mill and plant supply		
100 ft.--8 inch well --cased	$750.00	
Pump, pipe and labor	1509.00	
25,000 gal, tank	400.00	
	$2659.00	$2659.00

Total cost of equipment — $22,447.00

MINING COSTS :

Probably the cheapest and most practicable method of mining the known body of commercial ore, lying between the 50 and 100 foot levels, and pierced by the raise, or south shaft, would be by stoping, work being carried outward from the shaft, starting work at a point 75 feet below the level of the lower tunnel. The plan would be to drop the ore through the shaft to a chute on the 200 foot level--where by car it can be trammed to the main shaft and hoisted to the surface. This method of procedure would permit of the mining of all ore from shaft outward; whereas, if ore as mined were raised to the level of the lower tunnel and trimmed to the surface, Federal law would not permit the mining of ore close to the shaft.

Another advantage growing out of the plan for removal of ore by way of the 200 foot level would result from the unwatering of the mine, thus permitting ofa thorough investigation of the ore showings and structures on the 200 foot level and the development of possible ore from the depth, or lower.

The homogenity of the oe mass, the great mining width, the fact that the ground stands well, permitting of wide stopes with a minimum of timbering and that the ground has already been extensively opened should make for a very low mining cost, not to exceed $1.25 a ton placed in the skip. To this should be added the cost of powder, fuse, caps and timber; power for air and hoisting and complementary labor amounting to approximately $1.20 per ton, making a total mining cost of $2.45 for ore placed in bin. Details of this cost estimate will be found under "Summation of Costs" appearing later in this report.

MILLING COSTS:

The treatment of this ore by differential flotation, a standarized process, involves no costly experimental features. The ore crushes easily with a minimum of slimes and is very amenable to flotationbecause of the clean, crystalline texture of the ore minerals.

Cost per ton for treating this ore at the rate of 50 tons per 24 hours should not exceed $1.90. This allows for an operating crew of 10 men, power and water, reagents, superintendence, etc. Details of this cost estimate are given in "Summation of Operating Costs."

SUMMATION OF OPERATING COSTS-ON A BASIS OF 50 TONS PER DAY:

Power	per 24 hours
9 gals fuel oil at 9 cents per gal.	
81 cents per hr.	$19.44
3 operators at $4.50	13.50
oil	0.75
repairs	2.00
	$35.69
per ton	0.72

In the costs below, one third of the power cost has been allocated to the mine and two thirds to the mill, or $0.24 to the mine and $0.48 to the mill.

Mill

Labor	24 hours		
Superintendence	5.00		
3 operators at $4.50	13.50		
3 oilers at $3.50	10.50		
1 crusherman at $4.00	4.00		
1 swamper at $3.00	3.00		
1 engineman and mechanic at $4.50	4.50		
	$40.50	$40.50	
Power at 48 cents per ton (includes water costs)	24.00	24.00	
Reagents (details undetermined)	7.00	7.00	
Repairs and replacements at 30 cents per ton	15.00	15.00	
		$86.50	
Taxes and incidentals (10%)		8.65	
		$95.15	
Per ton	1.90		$1.90

Mine

Ore in skip at $1.25 per ton	62.50		
1 hoistman at $4.50	4.50		
1 topman at $3.50	3.50		
1 skiptender at $3.50	3.50		
Caps, fuse, timbers at 50 cents per ton	25.00		
Power (Hoist and air) at 24 cents per ton	12.00		
	$111.00		
Taxes and incidentals (10%)	11.10		
	$122.10	$122.10	
Per ton	2.45		$2.45
Total for mining and milling			$4.35

ESTIMATED PROFITS:

With the cost of mining and milling established at $4.35 per ton, the profit to be derived from treatment of the 25,250 tons of partially developed ore, which has a gross value of $8.59 per ton, would be $3.38 per ton, allowing for a 10% loss in recovery. This would make the total net profit $85,345.

Since the 2400 tons of ore on the dump are already mined, the only expense, aside from milling, would be an estimated 30 cents per ton for moving it from dump to ore bin. The cost of milling has been given as $1.90 per ton, making a total cost for treating the ore on the dump of $2.20 per ton. The gross value of this ore is $5.08 per ton, and the net profit per ton, allowing for a 10% extraction loss would be $2.37, or a total net profit of $5,688 for ore on dump.

These figures show a total net profit of $91,033 for commercial ores as indicated by sampling.

OPERATING CAPITAL:

Capital also should be provided to cover operating expenses for the first three months following completion of the plant, or until returns from the first carload lot of concentrates has been received. On the basis of a 25 day month, this would amount to the cost of mining and milling of 3750 tons of ore, which at the estimated cost of production would amount to $15,000.

(Signed) C. J.Sarle
C. J.Sarle
Geologist

Report of a Reconnaissance
of the
New Year's Eve Lode Claims
Pima Mining District
Pima County, Arizona.
Tucson, December 18,1939.

EXPLANATION OF PANORAMIC VIEWS.

LOCATION-SOUTH CENTRAL SIERRITA MOUNTAINS.

VIEW A.

Camera facing a little west of south down northerly tributary to Amargoso Gulch. Mine road lies to left of camera.

a. Dump of New Year's Eve Mine, seen on far, or south side of Amargoso Gulch - far center field. The Amargoso Wash drains from right to left around point of dump and earthward.

b. "Glory Hole" just above and beyond.

c. Dump of lower tunnel - lower and a little to the right.

g. Mexican Peak, in foreground on left.
Sahura (Giant Cactus) to left of automobile, in line with Mexican Peak.)
Octoillo, or Cat's Claw, thorny shrub on left.

VIEW B.

Camera facing southeast from dump of Old Shaft on Hillside Vein -New Year's Eve Claim #3. The Amargoso channel swings left around the dump and then away eastward - See f.and f.

a. New Year's Eve Mine Dump -Dark Point, Molybdenite ore.

b. "Gloy Hole."

c. Lower tunnel and dump.

d. Collar of main shaft near back of main dump-above letter "d".

e. The outcrop of smaller quarts displacement mass, in foreground.

g. Mexican Peak.

h. Road to Tucson.

i. Trees with heavy folliage are oaks (Spanish Ballota) pronounced Bi-yo-tah.) The Ballota above letter "i" fronts thrust fault described in report. Steep face of bluff to the left stained yellow with oxide of molybdenum, or molybdite.

REPORT OF RECONNAISSANCE OF T HE NEW YEAR'S LODE CLAIMS

PIMA MINING DISTRICT

PIMA COUNTY, ARIZONA

by

C.J.Sarle,
Geologist

Tucson, Arizona
December 18th 1939.

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This is a true copy of the original report
signed by C.J.Sarle,Ph.D.,Geologist Tucson,December 18th 1939.

REPORT OF A RECONNAISANCE
OF THE
NEW YEAR'S EVE LODE CLAIMS
Pima Mining District,
Pima County, Arizona.

By
C.J. Sarle, Ph.D.
Geologist.

Summary and Conclusion

The property of the ~~Arizona-Molybdenum~~ Southern Arizona Molybdenum Corporation is located in the Pima Mining District, Pima County, Southern Arizona, about 33 miles southerly by good roads from Tucson. These holdings comprise 42 claims which are not patented; 19 are owned by the corporation by right of location and the remainder is held under lease and option. Together these claims form an unbroken tract of about 840 acres, which lies across a low, hilly, east-west extending granitic ridge exposed by deep erosional stripping, which for a length of two miles or more and a width of nearly a mile constitutes a belt of persistent molybdenite-chalcopyrite mineralization.

The three claims, New Years Eve Nos 1, 2, 3, with which this Reconnaisance Report is concerned, are among the norther most of the group, and were selected for initial development and operation because of the existence of more than 3500 feet of mine workings. These workings represent an attempt by the Calumet & Arizona Copper Company in 1906-7 to prove up a large tonnage of silicious copper ore for smelting. Although the results obtained were disappointing to the Company, they have revealed the possibilities for profitable mining of the alloy metal, molybdenum.

As shown on the accompan ying assay map of the upper workings, in the New Year's Eve mine there is an unmined block of ore, part of a large quartz displacement mass, lying between the 50 and 100 foot levels, estimated to contain not less than 25000 tons of ore, which a reconnaisance sampling has shown to be of good milling ore. Besides this partially developed tonnage of ore there is an estimated additional 10,000 tons at least in the undeveloped portion of the quartz mass. Also there are 2400 tons of milling grade ore on the point of the main dump, quite different in character from that of the quartz mass, definitely indicating the occurrence of a large body of ore of milling grade at some point on the 200 foot, or the lower level of the mine, which is now under water. Moreover, there are several other promising ore showings on the property meriting the expense of investigation. These facts give reasonable assurance of ample tonnage

for a two years operation of a 50 ton mill.

The deli mitatiom of the 25,250 tom block of ore in the quartz displacmemtwas based om values shown by 21 samples,the average assay values of which gives 0.820% MOS2 and 1.013 % CU.This ,assuming a gross value of 40 cents per pound of MOS2 and lo cent s per lb of CU would give a total gross value per tom of $8.59. The calculation cost of mining and milling ,givem im this report as $4.85 per ton would leave a net profit per tom of $3.38 or a total net profit of $85,345 for the partially developed ore en-block,allowing for a 10% loss in recovery.

The 2400 tons of ore on the point of the dump,from four samples t aken in a reconnaissance sampling ,runs 0.56% MOS2 and 0.30% Cu,making the gross value per tom of this ore $5.08. Figuring cost of moving this already mined ore from dump to bim at 30 cts per ton ,the cost of treatment would be $2.20 per tom ----leaving $2.37 net profit per ton after allowing for a 10% extraction loss,or a total profit of $5,685 for ore on the dump.

These figures show a total net profit of $91,033 for commercial ores as indicated by sampling.

The cost of putting this property into production ,including road repair,establishing a camp,unwatering and reconditioning the mine,the cost of mining equipmemt ,erectiom of a 50 tom flotation plant and the development of a water supply would be $22,447 or in round figures $25,000.- To this should be added the sum of $15000 for the operation of the plant for the first three months,which means that $40,000.- will be needed to put the New Year's Eve mime om a paying basis.

In conclusiom it may be said that the several ore showings together with sufficient ore to maintain a 50 tom mill operation for two years ,place this property out of the prospect class. However,it must be remembered that exploratory work om this property should be pushed vigorously ,and such ore bodies as may be encountered should be developed be developed as rapidly as practicable.. Likewise,the study and development of ore resources of the other 39 contiguous claams should go forward with a view to increased production with lowered costs and assurance of a long period of operation.If this program i s adopted and adhered to and provisiom made for the financing of this larger exploratory work,this ming undertaking is comsidered of more than usual merit and to fully warramt the expemditure of the initial $40,000.- required.

Location

The New Year's Eve Lode claims are located im the Pima Miming di strict,Pima County ,Arizona :im Township 18 South ,Range 12,East ,im sections 9 and 16 -Gila and Salt River Meridian.

This places the claims in Amargosa Gulch,at an approximate altitude of 4000 ft ., im the Southerm part of the Sierrita Mountains-about 28 miles airlime distance and a little West of South of Tucson and 4 1/2 miles a little South of West from the old mining camp of Twin Buttes.

Location continiued:

The City of Tucsonom the Southern Pacific Railway,is the nearest supply and shipping point. From the mi ne to Tucson by road it is 33.5 miles.All but the first 2.3 miles of this distance ,which is a ranch and mine road with some short rather steep grades,is over graded and well maintained highways---3.6 miles eastward to Twin Buttes,thence 27 miles northward to Tucson,the last 9 miles paved. From the junction of the mine road to the Twin Butte road there is a descent of over 1600 ft by well distributed grades into Tucson.Trucking time from the mine to Tucson is about one hour.

Property Holdings

The New Year's Eve claims ,with which this report is mainly concerned,comprise three of the most no rtherly of the 42 unpatented lode claims,a group held by the Southern Arizona Molybdenum Corporation. Of these c laims 19(White Tiger 1-3 inclusive and Molly Bell 1-16 inclusive) are owned by right of location,and 23 claims(Esperanzas 1-8,Amargosa 1-4,Ballotta 1-8 ,and New Years Eve 1-3) are held under option,or bond and lease.All are reported duly recorded in the office of the County Recorder of Tucson,together with an affidavit of the annual assessment work performed.

Record of the New Year's Eve claims are found in the Record of Mines ,in the office of the County Recorder at the County Seat, Tucson as follows:

Book	R.M.	Page	Locator	Claim name	Min.	Distr.	Date	Loc.
69	QQQ	259	Raf.M.Robles	New Year's Eve	#1	Pima	1-1-33	
"	"	260	" " "	" "	#2	"	1-1-33	
"	"	261	" " "	" "	#3	"	1-1-33	

As recorded each of these claims is given the standard width of 600 ft and length of 1500 ft ,approximately 20 acres,long axis extending East and West ,and claims lying side by side.

In the field it has been found,however,the work of location of these claims had been very roughly done and the measuring of distances very inaccurate.Thus,as shown in the reconnaissance map accompanying this report,the claims instead of lying easterly and westerly have their long axes running approximately northeast and sout h-east. Their Western bounding end monuments are well alligned and in good condition,but those demarking their easterly ends are either down and confused with other monum ents in like condition,or poorly alligned.Moreover,New Year's Eve claim #1,the Southern most of the three ,and New Year's Eve claim #2 are short in both dimensions. While N w Year's Eve claim number 3 ,the northernmost is slightly over sized in both.

It would se m advisable therefore,in order to safeguard against future possible conflictions of boundary to re-survey these claims,making such corrections as found possible,repair the monuments,and then make record of amended locations.

Geology- Sierri ta Mountains

The Sierrita Mountains are a short ,north-south lying range, located a few miles to the South of Tucson;similar in origin and general structure to some 120 or more northerly to northwesterly trending,barren-flanked,deeply eroded,fault -block mountains,which collectively dominate the landscape of the southwestern half of Arizona.

The Sierrita Mountaims as viewed today are little more than a remment of their former mass. Long continued work of the agencies of weathering and erosiom have removed thousands of feet of rock from their surface and cut back their flanks far beyond their former limits.The only ruggedly mountainous portion remaining in a deeply dissected,north-south extending ridge,roughly cross-shaped in plan,some eight or ten miles in length and perhaps six miles im greatest breadth-a few higher points on the crest reaching elevatioms approximating 6500 feet above tide.Encircling this axial ridge is a broad ,outwardly -sloping,rock floored plain,or pedimentary area,comcordant with the gradings of the beds of the intermittant streams,which are relieving the area of its comstantly forming rock litter.

Centrally,the rocks flooring the pediment are but imperfectly veneered with rock wastage,and between draimage lines are extensively exposed. Outwardly,however,they are lost to view as the pedimentary plain passes beneath a deepening alluvial mantel which continues in long,gentle slope to merge with the floor of the broad Santa Cruz Valley on the east and that of the Avra om the West . Rising out of the alluvial slope occasional rocky buttes or ridges ,left by circumerosion,give proof of the continuance of the mountain pediment beneath,and of the former much greater extend of the Sierrita Range.

The erosional stripping of many cubic miles of rock from the surface of the Sierrita Range has brought much of its innermost structure to view. A widely exposed porphyritic,biotite grani te forms the core of this range . This granite,Mid-Tertiary in age ,is the result of the slow cooling and consequent coarse crystallization of an enormous body of fluid acidic lava under a thick covering of rock .Its emplacement was an essential factor in the formation of the range.The lava ,slowly ascending--possibly in compensating adjustment with the crustal settlings under the adjacemt Samta Cruz and Avra Valley area -- is seen to have li fted and shouldered aside ,by magmatic wedging ,great masses of Pre-Cambrian basement rocks (grani tes,gniesses and pegmatites ,schists etc.) In this same upward movement of the lava a great series of sediementary rocks ,Paleozoic and mesozoic in age ,amd their covering of older terti ary lavas which together rested upon the ancient peni-planed surface of the pre-cambrian formations,was thrust upward some thousands of feet;and by stresses produced by intrusion and foldings was broken into countless great blocks which by normal and reversed fault movements were lowered or raised,rotated ,tilted,even over turned;and frequemtly weged apart basaly by intruding tongues of the lava or forced downward to form roof-pendants in the lava.

Geology- Sierra Mountains cont.

The exposed portion of the biotite granite core covers an area estimated at 70 square miles --- centering upon the common corner of a group of four townships ,of which it surfaces about half. The encountering of this granite in two walls om the Santa Cruz side of the pedimentary slope beneath forty feet of alluvium ,distant three miles northeasterly from the mearest granite outcrop,indicates that the erosional stripping is of much great r ext ent t ham the present surface exposur e would indicate. The difference in elevation on the eroded surface of the granite im the wells a nd at the highest point on the central ridge ,8 to 9 miles southwestward,is approximately 3000 ft.

The granite at most points examined is quite consistemtly porphyritic ,and its groundmass of average granitic texture.Often,however, in margimal po si tions ,the feldspar--phenocrysts became few and smaller, or are lacking;the texture becomes fimer;small phenocrysts of quartz show up promimently on weathered surfaces ,and the interstitial quartz increases. In several instances a marked increase in biotite is noted together with an absence of the feldspar phenocrysts. Variations suggestive of monzonitic gradations are also noted occassionally.

Numerous dikes ,fimer textured and in appearance,generally more silicious,cut the granite.These dikes apparently represent later differentiates formed in the still molten heart of the acidic magma ,forced upward through fissures produced by stresses in the already congealed outer portion of the granite mass,and sometimes into the older covering rocks.

Fault -block remments of the various rock formations,once completely covering the teritary granite,now form an encircling ,interrupted belt lying between the centrally outcropping granite and the outwardly deepening mantle of alluvium .The blocks of this belt,often discordant in dip and mixed as to geologic horizon,owe their survival to a combination of factors ,namely ;circum-e rosiom ,pemdant position in the granite mass,and to the superior resistance to weathering of the rocks composing them to that of the granite .

The belt of residual roof-rocks along the eastern and western sides of the range varies up to about a mile in width ,and is composed of stratified rocks of Paleozoic and Mesozoic ages . The Paleozoic series ,incompletely reconstructed from various fault-blocks,comprises limestones of Upper-Cambrian ,Devonian ,Mississipian ,Pennsylvanian and Permo-Carboniferous ages ,with an upper -cambrian quartzite at the base of the series. The Mesozoic strata comsists of a repetition of beds of arkosic conglomerates ,arkosic grits and fine grained sandstones ,beds of mud-rock and vari-colored shales ,and some limestone ,or their metamorphosed equivalents --- probably all of Cretaciuos age --which represent parts of a series originally several thousands of feet in thickness.

On the northward slope of the range the belt of exposed remment roof-rocks is reprented by an outcrop,about a township in area ,of precambrian basement rocks ¢ granite ,gniess, pegmat ite and schists etc. On the Southern end of the range this belt is composed of older tertiary volcanic rocks . These are about the south end of the granite and comprise two southward extendi ng lobes ,which outwardly disappear beneath the surface of the alluvial slope .The westerly of these two lobes forms the southern half of the high north-south extending ridge ,which forms the axis of the range . These volcanic rocks are minor intrusives ,acidic and sub-acidic in composition ,varying texturally from felsi tic to granitic ,and are older than the granite as proved by intrusions of the granite into them.

Geology-- Sierrita Mountains cont.

Productive mining in the Sierrita Mountains ,since its beginning im 1857 to the present ,has been confined to ores occurring im the old residual roof-rocks which form the broken belt above described.The earliest mi ning was for rich silver-lead ores .After the demonitization of s silver im 1895 attentiom was directed more particularly to the minging of copper ,which was carried om with varying success umtil 1914,when with the beginning of the world war mining im the Sierritas experienced severa years of great activity .Not only many copper mines ,but also silver-lead, silver-lead-zinc ,and silver-lead-zinc -copper mines whi ch had long been c losed down were reopemed.These imcluded the mimes in and about the Mineral Hill-San Xavier -Olive Camps at the northern end of the eastern strip of Paleozoic and Mesozoic formations ,and those in and about Twin Buttes at its Southern end ;also the mines om the Western side of the range,in t hese sedimentary rocks ,as for example im the Sunshine and Banner Camps; and om the South ,im the older tertiary volcanbes ,including the Esperanza and High-Hill Camps.

With the possible exception of some of the ore occurrences found in the older teriary volcanic formations at the southern end of the Sierritas --in which gold comstitutes the principle value ,or is present in appreciable amount ,and may date back in origin to this earlier period of igneous activity -- the major part of the ore bodies observed ,appear to have been formed by mineralizers emanating directly from the surface of the great mass of acidic lava at an early stage of it's crystallization into granite .In other cases they appear to have been formed later from more vaporous and gaseuos elements expelled from deeper portions of the magma through fissures formed im the already lithified outer portion o f the granite identified with the later magmation which produced the acidic dikes ,previ ously described ,and still later through fissures and planes of fau lt movement ,in some imstances indicated by displacements of the dikes .

The above described relations,of course,are often obscured and perforce inferential .But im the case of the occurrence of mixed garnet-copper sulphide ores ,a typical ppoduct of contact metamorphism,by metasomatic alteratiom of limestone ,as shown by their persistemt occurrence in li mestome om the granite contact,or withim a few score feet of the contact ,as observed im the Clance ,Queen,King ,Mimnie and other mimes at Twim Buttes and in the South San Xavier and Vulcan mines to the north , where such ores have been extensively mined,precludes any doubt as to the direct gemetic relatiomship betweem granite intrusive and these ore occurrences .Againm the shoot of copper -lead-zinc-silver sulphide ores developed in the south-tilting bedding plames of carboniferous limestone in t he Sam Xavier mine ,formed by a replacement of the lime,although not affording evidence so directly connecting their o ri gin with the granite intrusive ,yet it must be conceded that the tilting of the great block of limestome in which this mi ne is located and the invading mineralizers,utilizimg fissures and bedding plames as controls,resulted from emplacement of the granitite-the youngest igneous rock present.

Colloectively the ores of the Sierritas imcluding many of the deposits of the older tertiary valcamics ,are complex ores im which copper preponderates . Im the comtact metamorphic garnet sulphide ores ,the coppe is oftem associated with objectionable amounts of zinc;and in other cases cupreforous zi nc-lead is a common combinatiom,zinc -lead-silver not unusual ,also silver-lead. All are combinations so linkedto-gether or overlappimg im their occurrences as to indicate their origim in a common magmatic source ,represented by the granite. Such differences ,moreover,may well be interpr eted as indicating a tendemyy om the part of the metals t o occur separatelyor im zones ,based upom an adjustment to gradations im temperature and pressure;copper the deepest seated,near the source of mineralizatiom and having the greatest vertical range or zonal thickness. It is predicted that many ore bodies in the Sierritas will,before mining has extended to the full depths of the roof rocks im which the ore body may be confimed ,have changed to the sulphides of copper---- and may in excetional cases to be found to continue down ward into the mother granite

That the greater part of the broadly exposed granite core of the Range should be devoid of ore occurrences ,ecept for the occassional findings of copper-oxides ,usually little more than stainings of the rock,associated with fault-fissurings ,is believed due to erosional strippings having bottomed the zone of ores over most of the area.There is one notable exception,however, Thi s is the occurrence of a wide diffusion of MOLYBDENITE associated with the primary copper mineral ,CHALCOP YRITE,in a roughly east west extending hilly ri.dge--bounded on the south by the area of Older Tertiary rocks ---whi ch fo rm a part of the eastern arm of the high ,cross shaped ,axial ridge of the Sierritas . This occurrence has a length of over 2 miles and a breadth varying up to nearly a mile. Its delimination is based on a parti al reconnaissance of the area ,supplemented by information supplied by persoms who have extensively prospected the region.

The teritary granite comprises the bulk of this ridge and includes large masses of a holo-crystalline,rather finely granular,dark to sage gray weathering rock,which from field determination- determination may be called a diorite known to be older than the granite bewause of minor projections of the latter into it.There is also an exceptonally fine grained massive quartzite occurring in large masses which because of it's more effective resistence to weathering,forms the cap rock of some of the higher hills,and by the incli nation of its basal plane,is seen to have a southerly dip. occassional smaller masses of this quartzite form imclusions in the g ranite ,as im the case of the diorite .The diorite ,while older than the granite ,is younger than the bulk of the older tert iary volcanic seri es as showm by dikes and other less regular intrusioms of it into the volcanics.

Numerous dikes ,representing later ,apparently more acidic phases of the magma from which the granite formed,cut the granite. These dikes in some instances ,appear to be have been instrumental in bringing minerilzers outward,and in one dike MOLYBDENITE appears disseminated interestingly with the rock forming mimerals.Fissure,both earlier and later than these dikes ,formed-pathways--- also formed pathways for mineral diffusion and deposition.

Finer textured ,more selicious phases of the granite ,suggestive of margimal chilling and differemtiation ,are common in the belt.These are often sheared and brecciated and are seamed with innumerable quartz veinlets -- the fracturings ,collectively consti tuting pathways of mineral diffusion and zones of MOLYBDENITE-CHALCOPYR ITE dispesition.-

Aside from the occurrence of these ore minerals in the more silicidup areas ,MOLYBDENI TE*CHALCOPYRITE deposition is often found in other brecciations ,shear zones and fissurings ,im fault gouges and in relation to quartz displacements .

Many showings of these minerals are emcountered in shallow prospect shafts and also in deeper workings ,made in an attempt in earli er years to develop copper ores of shipping grade. Other occurrences of MOLYBDENITE are indicated by staims of yellow molybdi c ochre ,or Molydite ,om steeper outcroppimgs om hillsides and on the walls of dissectimg canyoms .

With all these persistently reoccurring surface showings of MOLYBDENI TE and ChALCOPYR ITE it seems very reasonable to expect that commercial bodies of these minerals will be found ,once the geological structures and relations of the area are better understood.

The New Year's EVE group of 3 claims ,and the 39 other claims held by the Southern Arizoma Molybdenum Corporation ,form an uninter - rupted blanket of 840 acres ,more or less ,which lies across thi s ridge im a general north-west-southwest direction,and in an east-central position in the MOLYBDENITE belt.

GEOL OGY ,NEW YEAR'S EVE GROUP

The three claims comprising the New Year's Eve group have a combined area of about 60 acres ,and form a square ,about 1500 feet on a side ,which lies in a diagonal northwest-soutwest position- covering in part the floor of a basim -like widening of Amargoso Gulch-- which occurs above the comfluence with it of a large tributary from the north ,and a smaller tributary to both from the West --and covering in part ,the northwestern face of a steep ,cutt-jutting shoulder ,or hill ,forming the southerm flank of the valley at this point ,around which the Amorgoso channel makes a northwest turn ,swings back ,and then resumes its general easterly course .

To the East and to the northwest of this valley -widening lie hills with summits of 4300 and 4400 feet. The crest of the above mentioned cut-juttimg shoulder ,situated a little south of the center of the property ,is approximately 4300;the top of the small hill located i n the Westtern part of the claims area has an elevation of a little over 4100 feet;and the elevation of the channel of the Amargoso wash,at the center of the property is approximately 3975 feet above tide .

The tertiary ,porphyritic biotite -granite flanks this basin on all sides and forms the southeaterly -sloping bottom ,except for a roughly triangular area which is underlain by a rather fine grained diorite, lyimg in the angle between the Amargoso and the tri butary from the north .This diorite mass ,older than the grani te ,as proved by penetrating tongues of the latter ,is believed to be an inclusiom in the granite .

A massive,very fine -grained quartzite,probably Pre-Cambrian in age ,forms the top of the Mexican Peak and there capping the granite, is extensively exposed om the crest of the ridge to the eastward and along down its southern slope.A small tabular mass of this quartzite, lying in the granite ,outcrops on the property,on the northern face of the above mentioned shoulder.

A rather superficial study of rock jointages ,at points of best exposure ,as in the beds and along the sides of stream channels ,showed a prepondereance of planes with angles of from 40 to 45 degrees from the horizontal ,indicative of strong compressive action,repeated from many quarters .There also occur less numerous ,but more persistent north-south vertical joimts im conjugate system with weaker transacting joint planes---interpreted as due to tensional stresses.

Examination of a number of dikes ,cutting the granite in areas comtiguous to the property,show faulting to be rare and generally of small displacement. On the property a thrust,or reversed fault ,occurs in the granite om the east side of Amargoso Gulch about 250 feet south- west of the portal of the lower tunnel .Its strike is east and west and dips south 45 degrees from horizontal ,and its plane,if continued,would pass under the large quartz outcrop.

Three normal faults were observed . Two have roughly an east- westerly trend and form shear zones containing quartz leaves showing comb-structure and accompanyimg ore deposition. The third ,located in the northwest corner of New Year's Eve claims No 3 strikes roughly north and south and cuts one of the former ore-bearing faults or veins,causing a throw of 30 to 40 feet--as indicated on map no 2.

Two outcroppimgs of quartz occur ,both lying in the granite.One is located om the south side of Amargoso Gulch ,on the northern face of the outjutting shoulder described above,its height above the stream channel ranging from about 80 to 150 feet ---the higher end to the south west. Referring to the Reconnaissance map it will be seen that this places it im north-west -south-west position across the north-east- souht-west extending sideline between New Year's Eve claims No 1 and 2 . Though the limits are partially obscured by talus around its lower end on one side ,the outcrop appears to be about 175 feet in length and 70 feet in width . The other quarts body ,possibly 35 feet by 18 feet in extemt ,outcrops on the floor of the basin about 600 feet to the northwest of the former .

The quartz in these occurrences is massively crystalline in texture and ,in the larggr one,often noticeably vitreous.In this respect it is in marked contrast to quartzes formed from aqueous solutions,which are characterized by such structural features as banding ,laminations,comb-structures and druse-lined vugs ;and is believed to have been produced by an injection of silica gel into the granite --in other words,a displacement by igneous intrusion.

DEVELOPMENT--- NEW YEAR'S Eve Group

The three claims which comprise the New Year's Eve group are a relocation ,made by Rafael Robles in 1933 ,of a newcliver part of a larger group located and recorded by P.H. Chambers in 1895 - - which under various changes in ownership had come to be known as the Snyder Group.

The Snyder Group,located because of various showings of oxide ores of copper ,was centered upon the large quartz"blow out" described above as outcropping on the out jutting shoulder on the south side of Amargoso Gulch, some 150 feet above its bottom .All subsequent mining on this property centered about this quartz outcrop-amounting all told to about 3500 linear feet.

Earlier operations appear to have been interupted and spread over an interval of several years;and confined mainly to mining of oxidized copper ore of shipping grade in the eastern end of the blowout.A cave-in some 40 to 50 feet across,locally known as the " Glory Hole", marks the site of the earlier work . Remnants of a dump give indication to a short tunnel ,or open cut ,driven from the north outer slope into the quartz mass near its top. A second tunnel ,located some 40 feet lower and 40 feet to the West,started in granite ,cuts the northen face of the quartz just inside of it's portals ,where it dips a little south from vertical . About 25 feet within there is a badly caved winze.This tunnel,about 65 feet in length ,was driven apparently to get under the ore .Later , a third tunnel ,located some 70 to 80 feet lower and about 25 feet above the floor of the wash on the northwest side of the putjutting shoulder,was driven souhteasterly some 230 feet,where,at the end of a 50 foot cross-cut to the right ,a raise was s to connect with the above mentioned winze -now badly caved ,but not completely closed . Approximately 100 feet from its portal ,the tunnel ,leaving the granite ,cuts the southwest side of the quartz mass ,which at this point strikes north 30 degrees west with a dip south 55 degrees from the horizontal and crosses it obliquely emerging from ~~the~~ it's north 10 degree west striking face ,exposing the granite at a point about 8 feet beyond the drift .

The only other work ascribable to this earlier period of mining appears to have been the sinking of a shaft on the westerly -trending hillside -vein at a point about 700 feet north-west from the portal of the lower tunnel . Judging by the size of the dump and from soundings made with stones this shaft could not have been less than 80ft deep; and there may have been some lateral workings .Altogether the workings of this earlier period probably totaled close to 500 feet.

During 1906-7 the Calumet and Arizona Company ,securing a lease and option from the late Fred Snyder,made an extensive exploration of the property in hopes of proving the existence of a large body of siliceous copper ore of commercial grade .After doing about 3000 linear feet of development work and spending many thousands of Dollars the company abandoned the undertaking.

Development of New Year's Eve Group continued

A double compartment shaft -located a little south of the center on New Year's Eve claim #2 ,on the south side of Amargoso Gulch ,at the b a se of the slope below t he quartz blowout ,some 350 feet outward from the Glory Hole ,and 26 0 feet from the portal of the lower tunnel---- was sunk i n granite to the depth of 200 feet with an added 20 feet for a dump . From the foot of this shaft two long drifts with lateral workings were rum --one to the south ,the other to the northwest.

The 200 foot level is nowunder water ,a sounding ,showing water at 194 feet below the collar of the shaft. The information comcerning this level comes from a gemeralized tracing of the plam of this level shown on an exploration map of the Calumet and Arizoma Company and from information supplied by Antonio Zambomini ,foreman in charge when the Arizoma Molybdenum Corporation unwatered and exami ned the property in 1936.

The south drift ,passing under the east end of the quartz displacement ,is reported open for 550 feet and caved for an unknown distance beyond . From the drift a second one started some 250 feet from the station and driven to the southeast is reorted open for 300 feet and gobbed beyond.

Several short cross-cuts were driven ,most of them to the West from the main drift ;two of them ending in winzes 70 feet deep. The workings opem in the south drift total 1400 feet and so far as accessible ,are in the tertiary granite .The mayor part of these drifts were re-timbered by the Arizoma Molybdenum Corporation wh ile making their investigations.

From a point in the south drift ,320 feet from the foot of the shaft ,a 200 feet raise was made ,openiimg imto the crosscut from the end of the lower tunnel ,and some 15 feet distamt from the bottom of the old raise to the Glory Hole . The first forty feet of the raise is said to be partly filled with muck and for 90 feet in meed of re-timbering . The remaining 110 feet of the raise was re-timbered in 1938 and is im excellentt condition .Of this 200 feet the first 90to 95 feet are in granite ,the remainder in the large quartz displacement .The contact between the quartz and the gramite is a fault plame striking east and west and dipping south about 30 degrees from the horizontal .

At the 100 ft level in the raise a drift was run 63 feet to the southwest --- the first 43 feet in quartz and the remaining 20 in granite , The plane of comtact between the quartz and granite is essentially vertical and strikes north 30 degrees west . In the drift ,40 feet from the raise a crosscut was driven 56 feet southwesterly paralelling the contact between the quartz and granite . Om the other side of the drift there appears to be a second crosscut ,opposite the first ,and alligning with it,but which is now bulkheaded off.The workings open to inspection on this level appr oximate 120 feet.

A 50 foot level in the raise has a total footage of 260 feet in drifts and crosscuts . This imcludes a 53 ft drift to the northeast , which passes from the quartz displacememt to the granite at 48 feet --the contact between granite and quartz being vertical and striking north about 30 degrees west. Amd a 60 ft drift to the west of south passing from the quartz at 51 feet ---the contact vertiual and striking north 15 degrees west . These figures show the quartz to have a width of almost loo ft on the 50 foot level .Im the northwest drift some 18 feet from the quartz--granite comtact is a 22 ft crosscut to the southwest(southeast),and 12 feet nearer to the shaft another running southwest from the drift 34ft. In the southwest drift ,18 ft ,beyond the raise ,a crosscut 45 ft in lengt runs to the southeast,and 13 feet beyond is a crosscut extending 24 feet morth and 24 feet south from the drift . This level together with the loo ft.level and the 200 ft raise represent 582 ft of the developemnt work dome by the C and A Company.

DeVelopment of New Year's Eve Group cont.

Resuming the discussion of the 200 ft level ---the northwest drift, as indicated on the map no.2 of the NEW YEAR'S EVE mine workings,is somewhere between 720 and 740 ft in length with a few short crosscuts at the far end . This should place the breast of the northwest drift about 100ft north of the old shaft on the hillside veim mentioned above. As near as can be ascertaimed ,this drift and crosscut have a combined footage of 835 feet ,all in granite ,which with the 220 feet represented by the main shaft and dump,would account for the 1055 li near feet of the 3000 odd feet of development work done by the Calumet & Arizona Co.,and that with the estimated 450 to 500 feet of older workings makes a grand total of over 3500 feet of open workings on the three New YEAR' S EVE claims.

Ore OCURRENCES AND VALUES

From the above description of the development of the New Years EVE property ,it will be seen that the only parts of the mine workings, at present open to investigation of ore occurrences are the LOWER TUNNEL LEVEL and CROSSCUT at this end ,amounting to about 270 linear feet;the upper 110 feet of the raise from the 200ft level to tunnel level;and the drifts and cross-cuts at the 50 ft and 100 ft levels in that raise ,amounting respectively to 262 feet and 120 linear feet----shews together totaling 770 feet of development. It likewsie shows that the first 100 feet of the lower tunnel is in the granite,as is also about 20 feet at the ends of the northeast and southwest drifts on the 50 ft level;and 20 feet at the end of the southwest -extending drift om the 100 ft level and that the balance ,630 feet,lies in the eastern end of the large quartz displacement.

As to ore occurrences :- The granite exposed in the lower tunnel is barrem of ore minerals ;and only occassiomal traces of them are to to be found in the quartz. In the raise,however,about 15 feet below the crosscut from the lower tunnel ,MOLYBDENITE and CHALCOPYRI TE appear abruptly in the quartz and the sides of the raise for several feet down are coated with copper -sulphate from oxidization of the chalcopyrite. From this poimt on ,the MOLYBDENITE and CHALCOPYRI TE ppersist wherever the quartz has been opened up .

A study of the manner in which the MOLYBDENITE and CHALCOPYRITE occur in the quartz imdicates that the deposition of these ore minerals took plawe in two stages . The first occurred while the silica was still in the comdition of a jell;the second ,after its congealation into the massive crystalline body of quartz -the deposition taking place in this instance along planes of shearing and crushing . Connected with the first stage was the deposition of the tungsten mineral hubnerite (manganese tung state). Whether or not the occurrence of TUNGSTEN in the ore will prove of importance can be established only through further investigation.

Assays of the 21 of the samples taken in a reconnaissance sampling of the 50 and 100 ft levels and the connecting raise ,roughly demark a block of partially developed MOLYBDENITE and CHALCOPYRITE ORE of good milling grade . This block ,lying between the 100 ft level and the lower tunnel level and pierced by the raise has an estimated thickness of sixty feet ,a north-south length of 75 feet and a breadth of 70 ft ; and a contained tonnage of 25,250 tons -allowance being made for ore removed in development ,amounting to a little over 1000 tons.

An average of the values shown by these 21 samples calculated on the basis of footage represented by each ,shows the above cited block of ore to contain a general average of 0.82% of MOS2 and 1.013 % of CU

This gives a computed total amount of 414,100 pounds of MOS2 (207 tons) and 511,585 pounds of copper (256 tons) Assuming a gross value of 40 cts per pound for MOS2 and 10 cts per pound of copper ,would make the total gross value of the ore en-bloc $216,797.-

An estimate made as to the amount of ore of commercial milling grade which COULD BE DEVELOPED WITHIN THIS QUARTZ MASS by further exploration must of course be largely conjectural. However,based upon the manner of occurrence of the ore minerals and the proportion of milling ore to low grade which development has thus far shown and the relative amount of explored and unexplored quartz should enable one to conservatively estimate a tonnage of milling ore which can be added

to that already roughly proved up.

The observed occurrence of the ore minerals in the quartz ,while variable within narrow limits ,has proved to maimtain consistent averages of commercial grade ore throughout large areas ,and it is reasoned ,therefore, that other bodies of commercial grade will be found with development. Referring to the plam showing the lower level and lateral workings in the raise ,it will be seen that the quartz has a width of a little less than 100 feet on the 50 foot level and that its lateral limits have been established at other points .rom this it may be concluded that the average width of the lower part of the quartz displacement i s close to 100 feet. Its length,however,is somewhat problematical ,but by projecting the outcrop of the quartz upom the plam of the workings together with the outline of the glory hole ,which indicates caved -in workings in the quartz ,it will be seen that this mass is 200 ft or more in length.

Using the above dimensions of the quartz mass as a basis for calculation and taking 60,000 tons as representing that portion of its easterly end lying below the upper plame of the block of ore ,then the 25,000 odd tons of partially developed ore would be equivalent to a little less than one half of that mass;and therefore it is reasonable to assume that one third of the mass of quartz will prove commercial grade ore.

With this ratio as the basis for an estimate of the commercial ore at this horizom,in the northwestern or undeveloped portion of the quartz bloc k ,and allowing for the 30 degrees northward and upward level of its lower surface and figuring 30,000 tons of quartz as the amount in northwestern half of the block at the horizon of the blocked ore ,there should be in addition 10,000 tons of commercial MOLYBDENITE -CHALCOPYRITE ore.

As to the existence of ore above the lower tunnel level in this part of the quartz -displacement ,nothing,of course,is known at present but this coul easily be determined by exploratory work carried om from the tunnel level .

While that part of the quartz mass lying below the block of commercial ore ,averaging 30 feet in thickness ,and opened up on the 100 ft level, was classed as low grade ore from a simple sample taken lengthwise of the 45 foot drift ,there are indications pointing to the existence of a considerable TONNAGE of MILLING ORE which might be developed and selectively mimed in this block with but little exploratory work .

From the foregoing facts it seems reasonably certain that this quartz mass ,when it has been thoroughly exploi ted ,will have yielded ore for a two year operation on a 50 tom per diem basis .

Aside from the occurrence of ores in the quartz displacement ,just discussed ,there are 2400 toms of ore of milling grade on the extreme point of the maim dump .An average of 4 samples taken at the dump show it to contaim 0.56 % of MOS 2 and 0.30 % of CU .This gives a total content of 26,880 pounds of MOS2(13 toms) and 14,400 pounds of CU (7 tons) for the 2400 tons of ore om the dump ,or a gross value of $12,192 ,bassed on metal values given above.

This ore differs markedly in character from the former ,in that the gangue is a massively felsitic pegmatite ,laced with many quartz veinlets. Moreover,the ore minerals are distributed through the mass by innumerable fissurings ,the MOLYBDENITE is more usually crystalline and the copper content is much lower .Man yof the later formed fracture planes in the feldspar ground mass are coated with the secondary mica ,Sericite ,and the presence of sizeable plates of micaceous gypsum ,Selenite ,representing the effect of permeating metoric waters ,are among other contrasting features. I n mining ,this mass of ore on the dump ,would represent the material extracted from about 500 or 600 feet of li near developemtn work. Thi s is too much to be accounted for by assuming that it came from the lower 90 feet of the raise ,or from the 100 foot level ,where, it should be noted,

ORE OCCURRENCES AND VALUES

the presence of some feldspar in the quartz ,showing along the floor of the drift sand-- and in gob partly filling the southeast crosscut , apparently coming from the opposite bulkhead at crosscut ,are indicative of a tendency to pegmatization .

As shwom in the discussion of development ,all of the workings on the 200 foot level are ,according to report ,in the granite . The only remaining portions of the working s from which this ore could have been mined ,would lie im the caved portion of the main south drift and the far end of the southeasterly branch-drift ,now gobbed. Assuming that the pegmatite ore comes from this quarter ,it would fall into alignment with the 30 degrees southpitching fault plane bottoming the quartz displacement just below the 100 leve l in the raise .Should this prove to be the case it seems highly probable that development along this plane would open up a large tonnage of ore.

Referring to the map No 2 of the 2 0 foot level ,reconstructed from information supplied by Mr.Zambomi ,it will be observed that MOLYBDENITE occurs at several points im crosscuts to the west of the main south drift and at ome poimt a short distance west of the main shaft in the northwest drift . From this li mited information ,it would appear that the ground lying to the west of the south drift is another FAVORABLE QUARTER for E XPLORATION .

Om the surface there are a few ore showings deserving of investigation . One of these is the occurrence of ore on the plane of the eastwest striking thrust-fault described im discussing the geology of the property as cutting under the quartz "Blowout".Openings of this plame a little above the Amargoso channel show five or six feet of the hanging wall t o be impregnated with MOLYBDENITE and CHALCOPYRITE .Developemnt work at this poimt would soon establish its value as an ore horizom , and the relation to the structure upon which the large quartz displacement rests .

A second poimt of importamce is the old shaft on the hi llside vein ,some 700 feet northwest of the main shaft . A later and smaller lobe of the dump is a compou nd of quartz ore comtaiming MOLYBDENI TE and CHALCOPYRI T E . While a sample takem asayed only 0.30 % MOS2 ,it warrants exploratory work . Should it prove up om development ,it should be mined from a cross-cut and raise drivem from the northwest drift on the 200 foot level.

The dump of a shallow shaft om a second vein which was memtioned earlier ,also shows MOLYBDENI TE and CHALCOPYR ITE .This showing also merits investigation.

The smaller of the quartz "blowouts",previously decribed has only been shallowly prospected ;but that it is mineralized ii shown by copper oxide staimings . Possibly with depth this may enlarge ,and like the larger quartz displacement ,be the locus of another ORE Body. This could be investigated from the 200 foot level ,the northwest drift o f which passes within 100 feet ,judged by the position of the quartz outcrop.

TABULATION OF ASSAYS

Samples from block of 25,250 tons and averages of values ,based upom leng th of samples In F E E T

Sample No.	MOS2	CU	Length of sample -feet
1	1.47	0.71	18
2	0.32	1.80	12
3	4.20	0.57	12
4	0.93	0.76	30
5	0.90	0.38	4
6	1.15	0.95	8
7	0.51	1.09	8
8	0.37	2.61	12
9	0.26	0.81	34
10	0.50	1.19	6
11	0.44	1.20	6
12	1.57	109	6
13	0.30	0.43	18
14B	0.54	----	12
15	0.26	2.28	15
20	0.72	0.56	6
21	1.56	1.35	5
22	3.00	1.33	5
23	0.6 1	0.72	6
17	0.27	0.47	25
18	0.7 0	1.10	30
Average	0.820	1-013	278

Numbers on assay map accomp amying report correspond to those of assays above and show where samples were taken .

Number 17 sample covering upper 25 feet im raise ,between 100 and 50 feet lvels .

Number 18 samp le covering first 30 feet im raise above 50 foot level.

Samples of 2400 tons of ore on dump

Samp le Nzo .	MOS2	CU	
No 1	0.67	0.42	
2	0.65	0.38	
3	0.59	0.25	
4	0.33	0.15	
Average	0.56	0.30	
14	0.21	0.95	24
15	0.24	0.76	43

Camp and Road Costs .

The masonry foundations of three large adobe buildings --- walls of two ,in part,still standing --- mark t he former camp-site occupied by the Calumet & Arizoma Company while exploring the property for copper. These foundations cam be used again should the time come requiring the establishment of a large and permanent camp.

In the first stage of the development of the property,however, considering the mild,open winters, a few tent houses--- each requiring about $12 worth of canvass and perhaps $40.-in lumber --- would probably suffice ---- entailing an outlay of about $300.-.

Water,assured for domestic use ,is d iscussed later in conjunction with that of supply for mill.

The camp and mine road described under "Locations",though in fair condition as a mou ntain road,could be greatly improved for trucking by am expenditure of $150.- in grading. page 14

Reconditioning Mine and Costs

The mine workings are apparently in good condition and their repair will entail only a few comparitively small expenditures.This is due to t he fact that the maim shaft and 200 foot level were retimbered as late as 1936 and the maim shaft repaired in 1938 --- and the same time the inner raise retimbered down to the 100 ft level.

The lower 100 feet of this raise will have to be retimbered after removal of about 50 feet of muck from the bottom--estimated cost $750.-,which imcludes rental for necessary mining eqipment .Preperatory to this work,will, of course ,be the dewatering of the 200 foot level .Est imating from previuos experience this would require about three weeks time and cost approximately $300.-,imcluding labor ,re ntal of equipment and fuel . The total cost of reconditioning the mine would,therefore,approximate $1050.

Mine EQUIPMENT AND COST

The usual mine equipment ,im cluding such items as compressor,hoist, headframe ,mine cars ,ja ck -hammers and other accessories ,can be installed for about $1500.-,considering that much of this will be recondit oned machinery .

Mill EQUIPMENT AND COST

Because costs have been figured with the idea of using reconditioned machinery ,the price of which fluctuates widely ,only an estimate can be given . The latest prices for machinery for a 50 ton mill,imcluding a 125 h.p . oil engi ne and generator ,ore bins ,crusher,ball mill,classifier , flotation cells and accessory equipment ,supplied by a reliable machinery company,,indicate that a complete mill can be erected on the property for $15,500.-

Water and Costs

Water sufficent for camp purposes can be siphoned from an old well lying some 1500 feet to the westward ,as was done by the Calumet and Arizona Company during their exploration of the property in 1906-7.

The cleaning and curbing of the well,pipe line and tank should cost some $300.-Owner's charge for the water would probably not exceed $15.- per month .

About 1000 galloms fo water ,per ton, of ore are required for the operation of a flotation mill . With plans for installation of a 50 ton mill provisiom must be made for 50,000 galloms per operating day of 24 hour s.

Investigation has shown the impossibility of securing sufficient water within the short upper drainage of Amargosa Gulch. But a promising site has beem found in Esperanza Wash ,a short 3/4 mile to the westward of the mill-site .This wash ,through many tributaries,receives the run-off from a large part of the southeasterm slope of the Sierritas .The site selected for the well is at the side of the wash in the edge of a large area of diorite ,enclosed by the younger teriary gramite . This diorit e has been provem by local mi ne shafts and other workings to contain much more water tham other rocks of the area. Moreover,a shaft some 16 feet deep ,located nearby ,stands nearly full of water throughout the year. An aneroid reading indicates that a lift of approximately 180 feet will place the water on the divide heading Amargosa Gulch ,some 1100 feet away. From this poimt , over a favor able terraim ,there is a drop of about 200 feet to the millsite.

An 8 inch cased well ,sunk to the depth of 100 feet,at a quoted price of $750,-,would,it is believed, furnish the required water. An electrically drivem turbine pump ,capacity 50 galloms per minute ,or 72,000 per 24 hours ,together with the necessary pipe and labor of installation has beem quoted at $1509.

A 25,000 gallom storage tank ,located above the mill ,and costing

Water and Costs continued

about $400.- would receive this water together with water from the mine workings and reclaimed water from tailings ponds .

In formatiom gained in unwatering the mine in 1938 indiactes that the mine probably makes ab out 4500 gallons per 24 hours .Reclaimed water from tailings dams can conservatively be estimated at at 50% of the tot al used ,taking this 25,000 of returned water and 4500 of the mine water leaves 20,500 gallaons of new water to be supplied daily.

Shoul it become necessary ,through future development of the property as a whole ,to enlarge the capacity of this plamt , a larger but unknown supply of water reported from an old mine workings ,distant about 2 1/2 miles from the New Year's Eve property ,would be available.

SUMMATION OF COST OF EQUPMENT

Road Repair	$ 150.-	
Camp	300.-	
Unwatering mine	333 .-	
Reconditioning mine	250.-	
Contract price for timbering and cleaning ore chute	500.-	
		$1533.-

Mine Equipment

Compressor & Motor	425.-	
Receiver	25.-	
Air Li ne (1 1/2 pipe 400 ft	60.-	
Jack Hammer, steel tools	150.-	
Grizzly	15.-	
Mine cars (3)	75.-	
Hoist and motor	400.-	
Haedframe	300.-	
Total		1450.-

Mill

Because costs have been figured with the idea of using reconditiomed equipment, the price of which varies, only an estimate can be given. The latest price furmished by a reliable firm, indicates that a 50 ton flotation plant with a 125 H.P. oi l engine and generator can be erected om the property for 16,500.-

Water Supply

Camp Supply

Cleaning and curbing well	50.-	
Pipe	215.-	
Tank	25.-	
Rent of well	15.-	
		305.-

Mill and plant supply

100 ft ----8 inch well, cased	750.-	
Pump, pipe and labor	1509.-	
25,000 gallon tank	400.-	
		2659.-
Total cost of equipment		$22,447.-

Mining Costs

Probably the cheapest and most practiable method of mi ning the known body of commercial ore ,lying between the 50 and 100 foot levels and pierced by the raise or south shaft ,would be by stoping,work being carried on outward from the shaft,starting work at a point 75 feet below the level of the lower tunnel.The plan would be to drop the ore through the shaft to a chute on the 200 ft level --where by car it can be trammed to the main shaft amd hoisted to the surface. This method of procedure wouldpermit of the mining of all ore from the shaft outward;wheras ,if ore as mined wase raised to the level fo the lower tunnel and trammed to the surface ,Federal law would not permit the mining of ore close to the shaft.

Another advantage growing out of the plam for removal of the ore by way of the 200 ft level would result from the unwatering of the mine ,thus permittimg of a thorough investigation of the ore showings and structures omothe 200 ft level and the development of possible ore from that depth ,or lower.

The homogenity of the ore mass ,the gr eat mining width,the fact that the ground stamds well,permitting of wide stopes with a minimum of timberimg and that the ground has already been extensively opened ,should make for a very low mining cost ,not to exceed $1.25 a ton placed im the skip .To this should be added the cost of powder ,fuse,caps and timber;power for air and hoi sting and complementary labor amounting to approximately $1.20 per ton ,making a total mining cost of $2.45 placed im bin per ton. Details of this cost estimate will be found under "Summation of Costs " appearing later in this report.

MILLING COSTS

The treatment of this ore by differemtial flotation,a standardi zed process , involved no costly experimental features . The ore crushes easily with a minimum of slimes and is very amenable to flotation because of the cleam ,crystalline texture of the ore minerals .

Cost per ton for treating this ore at the rate of 50 tons per 24 hours should not exceed $1.90.This allows for an operatimg crew of ten mem ,power and water ,reagents ,superintendence etc..Details of this cost estimate are given in "Summatiom of operating costs ."

SUMMATION OF OPERATING COSTS -ON A BASIS OF 50 TONS PER DAY

	per 24 hours
Power	
9 gallons fuel oil at 9 cts per gallon 81 cts per hour	$19.44
3 operators at $4.50	13.50
oil	0.75
repairs	2.-
	35.69
per ton	0.72

In the costs below ,ome thrid of the power cost has been allocated to the mime and two thirds to the mill,or $0.24 to the mine and $0.48 to the mill

Mill

Labor	24 hours	
Superintendemce	5.-	
3 operators at $4.50	13.50	
3 oilers at 3.50	10.50	
1 crusherman at	4.-	
1 swamper	3.-	
1 engine man and mechanic	4.50	
		40.50
Power at 40 cts per ton (includes water cost)	24.-	
Reagents(details umdtermimed)	7 .-	
Pepairs and replacememts at 30 cts per ton	15.-	
	86.50	
10% for taxes and incidentals	8.65	
	95.15	
per t on		1.90

MI NE

Ore in skip at $1.75 per tom	62.50	
1 hoistman at $4.50	4.50	
1 topman	3.50	
1 skiptender	3.50	
Caps ,fuse,timbers at 50 cts per ton	25.-	
Power (Hoist and air)at 24 cts per ton	12.-	
	111.-	
Taxes and incidentals 10%	11.10	
	122.10	
per ton		2.45
Total for mining and milling		4.35

ESTIMATED PROFITS

With the cost of mining and milling established at $4.35 per ton, the profit to be derived from treatment of the 25,250 toms of ore, partially developed, which has a gross-value of $8.59 per ton, would be $3.38 per ton allowing for a 10% loss im recovery . This would make the total met profit $8 5,345.-

Simce the 2400 toms on the dump are already mined, the only expense, aside from milling, would be an estimated 30 cts per tom for moving it from the dump to the ore bin. The cost of milling has been given as $1.90 per tom, making a total cost for treatment $2.20 per tom. The gross value of this ore is $5.08 per ton, and the net profit per tom, allowing for a 10% extration loss would be $2.37 or a total net profit of $5,688.-

$85,345.-
5,688.-

Total $91,033 for commercial ore as indicated by sampling.

Operating Capital

Capital also should be provided to cover operating expense for the first three months following completion of the plant, or until returns from the first carload lot of concentrates have been received. On the basis of a 25 day month, this would amount to the cost of mining and milling of 3750 tons of ore, which at the etsimated cost of prodcution would amount to $15,000.-

signed : C.J.Sarle
Geologist

Report of Reconnaissance
of the
New Year's Eve Lode Claims
Pima Mining District,
Pima County, Arizona.
Tucson, December 18th 1939.

REPORT sent in by Herman S. Hart in file under

HART

The chemist of a well known mining company [illegible]
denum property has recently been brought to my attention. I have studied
over a reconnaissance report on the property, followed by a brief inspec-
tion personally and am sufficiently impressed with it's possibilities to
submit the following summarized prospectus for your consideration.

The property is located about 32 miles south of Tucson near the
old Twin Buttes mining district and consists of 42 claims, most of which
are at present held under option.

T he principal mineral showing on the property occurs on three claims
within the group and has been quite extensively prospected and explored.
The Calumet & Arizona Company did considerable work on these claims in
1907 in an effort to develop some copper ore. This work consisted of a 200
ft vertical two-compartment shaft, a 200 ft raise and extensive lateral wor-
kings on 50 ft, 100 ft and 200 ft levels totaling some 3500 ft. This work,
though disappointing from the standpoint of developing copper ore, has re-
vealed a zone of MOLYBDENITE mineralization of major importance.

The surface out-crop is a quartz blow- out which has been partially
obliterated by a glory-hole from which considerable tonnage of copper ore
is said to have been removed in the early workings of the property. This out-
crop is on the side of a hill about 100 ft above thes wash. A tunnel driven
into the side of the hill connects with a raise in the midst of the quartz
intrusive. Exploratory workings in the quartz mass were driven from the
raise 50 to 100 ft below the tunnel level. These workings have been inspected
and sampled within the last six months and are covered in the report re-
ferred to above. In addition, there are even more extensive workings in
the altered country rock lying below the quartz mass on the 200 ft level
which were under water at the time of the above inspection.

The upper workings of the quartz mass define it to be an intrusive
mass about 100 ft in width with pr actically lateral contacts. Its lower
bottom contact intersects the raise abiut 10 ft below the 100 ft level
in a full plane dipping 30 o from the horizontal.

At a poi nt approx imately 15 ft below the tunnel level the
MolYBDITE mineralization abruptly appears in the quartz. My personal in-
spedtion of the 50 ft level(the 100 ft level is now under water)revealed
a remarkably uniformly distributed MOLYBDENITE mineralization in the quartz
throughout the workings. Both of the 50 ft and the 100 ft levels were
sampled and an average of 0.8% was recorded in the report cited above.

The contact zones were the workings left the quartz and penetrated
the granite country rock showed intense alteration significant of the
mineralogical importance of the quartz intrusion.

Near the collar of the shaft there is a large dump of altered
granite rock which shows strong MOLYBDENITE mineralization. Samples of
this asayed 0.5% MOS2 according to the report. The amount and nature
of the material on this dump indicated that it must have come from the
200 ft level workings immediately below the quartz mass. This suggests
t hat the contact zone along the bottom of the quartz intrusive is well
mineralized and constitutes a locus of ore in addition to the quartz it-
self.

It may be said t hat extensive prospecting has been done and a
remarkable showing of MOLYBDENI TE mineralization developed. T he massive
quartz intrusive, is well mineralized- apparently some 100 ft in width,
together with the adjacent intense altered contact areas denote a zone
of major mineralization and certainly justify a throrough inspection,
including the at present inaccessible workings on the lower levels.

A grab sample of broken material taken from the drift on the
50ft level during my visit as ayed 0.47% MOS2. A single laboratory flo-
tation test on the material YIELDED CONCENTRATES, after only one recleaning,
of 89.5% MOS2 and 0.7% Cu and containing 86% of the original MOS2 in the
feed. T he tailing after 10 minutes flotation was 0.015% MOS2.
THIS INDICATES HOW RE ADILY THE ORES FROM THE QUARTZ INTRUSIVE
RESPONDS To CONCENTRATION BY FLOTATION.

Herman S Hart 151 Water Str.