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Gila Copper Sulphide Company

File in Mine Books

Christmas Mine Development Report

March 1st, 1917

(COPY)

By Edward W. Brooks

Mining Geologist and Engineer

On February 1st from the 1st to 2nd inclusive the writer made a careful examination of the property of your company generally known as the "Christmas Mine". In presenting the following report the writer has had in mind the general description of the location of the property and the status of the property as reported by you in your report of the 1st of February. The writer has had in mind the general description of the location of the property and the status of the property as reported by you in your report of the 1st of February. The writer has had in mind the general description of the location of the property and the status of the property as reported by you in your report of the 1st of February.

The ore of the Christmas Mine is a massive, light-colored, crystalline material, which is found in the form of large irregular masses from which various sized pieces are broken out. These pieces are of various sizes, from a few inches to several feet in diameter. The ore is associated with a variety of gangue minerals, including quartz, calcite, and pyrite. The ore is found in a zone of variously sized lenses and veins, which are separated by a matrix of gangue minerals. The ore is found in a zone of variously sized lenses and veins, which are separated by a matrix of gangue minerals. The ore is found in a zone of variously sized lenses and veins, which are separated by a matrix of gangue minerals.

Development has hitherto been confined to three prominent localities within the general zone surrounding the central porphyry mass. They are respectively the "Christmas Face", the "Johnny", and the "Haskins". The two last named are also now being worked. It is at present being worked by means of a small development now to be undertaken will require the use of a relatively small tonnage of explosives, the production of the ore. With the exception of a relatively small tonnage of explosives, the production of the ore has been entirely from the "Johnny" locality. The "Johnny" locality has been worked for the past twelve months approximately in the vicinity of 12,000 feet. Connection has lately been made with the "Haskins" from the 300 ft. level of the "Johnny", through which large bodies of ore in the former will be delivered to market. In each of the three localities just enumerated all mining operations have been confined to horizons lying between the 200 ft. level and the surface. Large bodies of copper ore are known to exist below the 200 ft. level having been opened from the 200 ft. level in shaft No. 2, and by diamond drill hole No. 4 sunk from the 400 ft. level of the "Johnny". These lower horizons will be opened to mining as soon as practicable to do so.

Plans have been matured for the thorough exploration and development for the mining of ore of the entire proved contact zone. The writer has had in mind the general description of the location of the property and the status of the property as reported by you in your report of the 1st of February. The writer has had in mind the general description of the location of the property and the status of the property as reported by you in your report of the 1st of February. The writer has had in mind the general description of the location of the property and the status of the property as reported by you in your report of the 1st of February.

Christmas
(COPY)
mine

March 1st, 1917.

The Gila Copper Sulphide Co.,
Christmas, Gila County, Arizona.

Gentlemen:—

On February last from the 16th to 22nd, inclusive, the writer made a careful examination of the property of your company generally known as the "Christmas Mine".

In presenting the following report he begs to say that no attention has been given to specific location titles or general description geological or otherwise for the reason that this has all been fully covered in previous reports now in your hands. This report deals with the present status of the property respecting its development with particular reference to the commercial ore now blocked and in sight, tonnage reasonably assured, exposed and probable. In this connection new areas for development outside the present proven territory are considered and certain conclusions deduced as to what may reasonably be expected from them.

In order that this may be better understood, a brief description of the form and character of the ore-occurrence becomes necessary and will be considered first.

Ore Occurrence and Genetic Factors Involved:

The ores of the "Christmas Mine" are closely related to and dependent for their origin on certain intrusive bodies of Porphyry properly classified as Quartz-Mica-Diorite. The Porphyry occurs in the form of large irregular plugs from which radiate many dykes and sills. The formation into which these porphyry intrusives have forced their way is a series of marine sediments in which limestone largely predominated.

Centrally located within the property is a very large wedge-shaped body of this Porphyry with the point of the wedge directed almost due west. Two contacts are thus formed, known respectively as the North and South Contacts where the porphyry mass abuts against its enclosing walls. Along both contacts the limestones have been altered into Lime-Iron Garnet wholly or in part for a distance of variously from ten to more than one hundred feet out from the immediate contact. Invariably associated with this Garnet are copper ores and there are about four thousand feet of this garnet border-zone that have been proved, one thousand feet of which have so far been opened to the mining of copper ores. The garnet zone is known to extend beyond the limits taken in the above estimate indefinitely.

Bodies of copper ore are known to exist in the limestone well outside of and beyond the garnetized areas along zones of faulting and shearing as well as along the contacts of dykes radiating out from the central porphyry mass.

There are sound structural and genetic reasons for believing that the richer ores and possibly the larger ore-bodies will be found outside the garnet border-zone around the central porphyry mass, within which mining operations have thus far been confined. These reasons have been given in a separate report covering this subject and will not be further considered in this.

Development and Source of Present Production:

Development has hitherto been confined to three prominent localities within the garnet-border-zone surrounding the central porphyry mass. They are respectively the "Christmas Face", the "Johnny" and the "Hackberry". The two last named are alone now active. The "Christmas Face" is at present being worked by leasers, but projected development now to be undertaken will reopen this locality to Company operations in the near future. The "Christmas Face" is situated on the South Contact; the "Johnny" and "Hackberry" on the North Contact of the large central porphyry mass. Both the latter are tributary to and are not being worked through the No. 3 shaft.

With the exception of a relatively small tonnage supplied by leasers, the production for the past year has come entirely from the "Johnny" locality. Total shipments from all sources for the past twelve months aggregate in the vicinity of 79,000 tons. Connection has lately been made with the "Hackberry" from the 300 ft. Level of the "Johnny" through which large bodies of ore in the former will be delivered to market.

In each of the three localities just enumerated all mining operations have been confined to horizons lying between the 500 ft. Level, and the surface. Large bodies of copper ore are known to exist below the 500 ft. Level having been opened from the 800 ft. Level in Shaft No. 3, and by diamond drill hole No. 4, sunk from the 400 ft. Level of the "Johnny". These lower horizons will be opened to mining as soon as practicable to do so.

Projected Development:

Plans have been matured for the thorough exploration and development, for the mining of ores, of the entire proved contact both north and south along the margin of the central porphyry mass from No. 3 Shaft at the 500 ft. Level. This work, when completed, will, beyond any doubt, enlarge the present tonnage of available ore very greatly and provide an assured reserve capable of sustain-

ing production at the present rate for many years. The undeveloped part of the proved contact is, in all respects, identical with that from which ore is now being taken and may, with entire confidence, be expected to yield proportionately.

It is also planned to carry explorations into the most promising localities lying outside the garnetized contact border-zone, where large and relatively high grade bodies of copper ore are strongly indicated, with every assurance of success.

Ore Reserve

In making the following computations which are believed to be entirely conservative, tonnage has been estimated on the basis of ten cubic feet, in place, equivalent to one ton of ore. This has been determined by careful specific gravity tests, and is found to compare closely with the actual results obtained in mining.

Dimensions given are from actual measurements except where marked "assumed". Such assumed measurements are based on experience in working the ore-bodies in the property, and have been held within safe limits.

The percentage of Copper per ton shown are based on very careful sampling at regular five-foot intervals frequently checked by shipments in quantity and have been computed on the unit area, or "Foot Percent" basis, as well as on the direct tonnage basis. "Ore in sight" is employed in its strictly technical sense and means the use of three dimensions actually sampled and in some cases the full four sides have been taken. In conformity with the foregoing, the following estimates are submitted:

Ore in sight:	Tons	% Cu.
Copper Knob approximately,	5,000	2.80
Lower Copper Knob approximately,	10,000	2.40
Johnny Upraise Stope (Left in pillars.) approximately	1,000	3.00
Johnny,	10,000	3.00
Drift No. 105, (260x20x79 ft.,)	41,080	2.40
Las Novias Sub-Level, 12800 sq. ft. x 45 ft. thick, 576000 cubic ft.		
57600 tons, less approx. 7600,	50,000	3.00
Las Novias East Extension, 32000 sq. ft. by 60 ft. thick, 1,920,000 cu. ft.	192,000	2.70
Hackberry, 50 ft. Level, 3200 sq. ft. x 8 ft. thick	2,500	3.00
300 ft. Level, North Contact, 110x15x8 ft.,	1,320	2.50
400 ft. Level, South Contact, 70x40x15 ft.,	4,200	2.50
800 ft. Level, 100x50x15 ft. plus 20x40x15 ft.,	8,700	2.50
Drift No. 302, 50x20x60 ft. (thickness assumed.)	600	2.90
Drift No. 314, 290x10x15 ft. (thickness assumed.)	4,350	2.50
Lower Christmas Tunnel, 120x20x7 ft.,	1,680	2.00
Total	332,420	2.70
Ore reasonably assured:		
Drift 105, 260x79x200 ft., (assumed) say,	350,000	
Devil's Gate incline, 160x35x30 ft, say,	16,800	
Total	366,800	2.70

NOTE:—The copper contents per ton will probably range higher than that given, possibly averaging 3%, or better, in the estimate of reasonably assured ore.

Probable Ore

The entire production of the mine to date has come from the surface down to a depth of 400 feet. The tonnage given in the foregoing estimates less 8700 Tons on the 800 Level lies between the 400 Level and the surface. The ore-bodies are known to extend down to the 800 Level and probably much below this. It is, in fact, probable that the ground lying between the 400 Level, and the 800 Level, is more generally ore-bearing than that which lies above the 400 Level.

In estimating the amount of probable ore, the writer has considered only that portion of the Contact which is comprised between the surface and the 800 Level as follows:

There are 4000 feet of known ore-bearing contact. 1000 feet of this Contact down to a depth of 400 feet, gives:

	Tons
Ore extracted to date	200,000
Ore in sight 332430 less 8700,	323,730
Ore reasonably assured,	366,800
Total,	890,530

Double this amount for 800 ft. depth,
 890, 530x2,—1,781,060 Tons, Total for 1000 feet of Contact to 800 feet depth.
 Multiplying this tonnage by three gives,
 (1,781,060x3,) amounting to 5,343,180 Tons for the remaining 3000 feet of Contact.
 Estimated for 3000 feet of Contact, 5,343,180 Tons.
 Add amount between 400, and 800 Levels
 below present workings computed under
 headings, Ore extracted to date, ore in
 sight and ore reasonably assured, 890,530

Total, 6,233,710 Tons.

This figure represents the Probable ore in the remaining undeveloped 3000 feet of Contact plus that in the 1000 feet of explored Contact from the 400 ft. to the 800 ft. Level.

Condensed into a single statement the foregoing estimate will read as follows:

	Tons
Ore in sight,	332,420
Ore reasonably assured,	366,800
Probably ore,	6,233,710
Total,	6,932,940

The following calculations showing available net profits both upon the gross tonnage of ore in sight, and that reasonably assured are respectfully submitted:

In computing the above the actual scale of costs established for mining, transportation and smelting, as well as refining and marketing the refined copper for the past twelve months has been employed. These costs are made up as follows:

Direct Mining Cost:	Per Ton of Ore	
Development,	0.531	
Breaking and stoping,	0.993	
Timbering,	0.024	
Tramming,	0.181	
Hoisting,	0.206	
Sorting, weighing and loading,	0.098	
Draining,	0.096	
Sampling,	0.029	
Crushing and conveying,	0.078	
Total direct cost per ton of ore,	\$2.236	\$2.236
Indirect Cost:		
Salaries,	0.191	
General Expense,	0.180	
Insurance,	0.003	
Taxes,	0.192	
Laboratory,	0.022	
Tramway,	0.132	
Lighting,	0.015	
New York Office,	0.144	
Tucson Office,	0.024	
Total indirect cost per ton of ore,	\$0.903	\$0.903
Total of all costs per ton of ore,		\$3.139
Smelting Costs under present ten year Contract, on basis of ore carrying 3% copper per ton,	\$3.35	
Railroad freight to Smelter	0.225	
Total Freight and Smelting, per ton,	\$3.575	\$3.575
Total Mining, Freight and Smelting Costs per ton,		\$6.715

Copper is now quoted in New York at 33c to 35c per pound for the refined metal. For the purpose of this calculation a price of 25c per pound, New York, has been assumed, at or above which it is believed the metal will continue to rule for a long period. From these assumed quotations, must be deducted Freight, Refining and Commission Charges on the Blister Copper from Hayden to New York. This has been determined to be between one and one-quarter and one and one-half cents per pound of refined copper.

Eastern Railroad. The mines are about 1,000 feet above the level of the Arizona Eastern Railroad track, and at a distance from it of about 7,000 feet. An aerial tramway connects the mines with the railroad. The property consists of some 27 copper claims, aggregating about 530 acres. The Company also owns 13 gold and silver claims, aggregating about 265 acres, and 32 coal claims, aggregating about 640 acres, situate in Pinal County, Arizona, distant, respectively, approximately 5 and 10 miles from the copper mines.

The mines were taken over by the Gila Company in 1909, prior to which time they had been owned and operated by the San Carlos Mine & Development Company and later by the Saddle Mountain Mining Company.

From October, 1909, up to May, 1915, the Gila Copper Sulphide Company expended a very considerable amount in development and equipment and other expenses of the property.

In the property of the Gila Copper Sulphide Company, the structural relations attending the ore deposition are as follows:

An extensive batholithic mass of dacite forms a contact with the limestone and no doubt with the underlying quartzite shales and conglomerates. Probably three miles of this contact can be traced.

Wherever a contact exists a garnet zone of lime-iron variety, Andratite, has been developed, ranging in width from 10 to 60 feet. Other varieties of garnet are developed in less degree, the lime-alumina variety Crossularite, being most prominent, as well as other characteristic minerals of contact-metamorphic origin, such as Epidote, Willastonite, etc.

This garnet zone, being exceedingly resistant, has protected the contact and limestone strata back of it from erosion and stands out frequently as sharp erosion scarps of heights varying from a few feet to a hundred or more. The dacite being less resistant, has been eroded and may be traced on the ground by hollows and ravines, or small gulches.

This structure has characterized the large copper mines of Arizona, notably those at Bisbee and Globe, and cannot be too strongly emphasized in its relation to the genesis of ore carrying copper values. It has been almost universally recognized by Mining Engineers and Geologists, familiar with the mining of copper, as the particular structure affording the greatest promise as to extent and permanence of ore bodies developed in its connection.

Wherever exposed, throughout its entire length, copper ore is found in association with the garnet zone. The copper occurs in the upper portions of the contact principally as the carbonates, with lesser development of the oxides and sulphides. Malachite, azurite, cuprite, tenorite, bornite and chalcopyrite all appear. The values are very regularly distributed throughout the garnet zone, being richer immediately on the contact and gradually shading out into the barren limestone.

Early in 1915 negotiations were entered into with the American Smelting & Refining Company, which resulted in May, 1915, in the signing of a contract with the Smelting Company under the terms of which it was to properly and thoroughly equip the property and put it on a producing basis of at least 250 tons of ore per day, the Smelting Company to have the management of the property until the amount expended by them for equipping the property was repaid. The contract also provided for the Smelting Company to treat at its Hayden plant, for a period of 10 years, all the ores produced by the mines at a fixed charge, the minimum amount of ore to be treated being fixed at 250 tons per day.

In accordance with such contract, the American Smelting and Refining Company expended some \$163,000, in construction and equipment which has a capacity of 500 tons per day, and an additional \$13,000 for other purposes. These amounts were repaid to the Smelting Company in 1916, and it having indicated a desire to continue the management of the property, arrangements were made whereby it continues in such capacity on a month to month basis at the option of the Gila Company, the Smelting Company receiving from January 1st, 1917, 10% of the net earnings as its compensation for such management and the expenses of its Tucson and New York offices incurred in connection therewith.

During the year 1916, there was shipped over 75,000 dry tons of ore of a total value of \$1,022,156.36. During the same period the net earnings of the Company were \$440,611.08. During January, February and March, 1917, (March figures estimated) there were shipped over 22,000 dry tons of ore with a net profit to the Company in the neighborhood of \$125,000.

There are an excess of 330,000 tons of ore in sight in the mine at the present time, with an additional 366,000 tons reasonably assured and probable ore amounting to over 6,200,000 tons. It is, therefore, reasonably safe to assume that there is at least 7,000,000 tons of ore in the mines, which at 25c copper has a total value in excess of \$77,000,000.

Application was made to list the stock of the Company on the Boston Curb in July, 1916. Permission was given and trading began on September 25th last, with the stock selling in the neighborhood of \$3.00 per share. The stock is now selling at about \$12.00.

25c less 1½c is 23½c, Net per pound of refined copper sold.

Using the foregoing figures the net profit per ton of ore carrying 2.7% Copper, and 25c combined gold and silver values which represents a fair average for the past year's production, for this grade of ore, will be as follows:

	Debits, per ton ore.	Credits, per ton
2.7% Cu .is 54.0 lbs. copper per ton, less agreed deduction for Slag Loss, 8 lbs. net 46 lbs. @ 23½c, Established combined gold and silver values		\$10.81 .25
Gross value per ton of ore produced,		\$11.06
Mining Cost per ton, direct and indirect	\$3.14	
Transportation by rail to smelter at Hayden	.225	
Smelting and converting,	3.35	6.715
Net profit per ton of ore mined,		\$4.345
Net Profit 332,430 Tons ore in sight @ \$4.345 P. T.		\$1,444,408.
Net Profit 366,800 Tons ore assured, @ \$4.345 P. T.		1,593,746.
Total net profit ore in sight and reasonably assured.		\$3,038,154.

Payments for available lime in the ore up to a limited amount per month made by the Smelting Company to the Mining Company under its smelting contract, will add to the net profits given above by something like \$43,200 per year. The aggregate amount of this return for lime, based upon the tonnage given above, will depend entirely on the rate of production maintained, and, is, thus, a variable quantity which cannot be safely estimated at this time.

The writer believes the above estimates to be entirely conservative and that they will be borne out by the actual operations to follow. He further believes that these figures will be multiplied many times from the ores estimated as probable.

There is a reasonable assurance that development will be extended much beyond the definitely known areas which have thus far been considered. Structural and genetic evidences are at hand strongly justifying the expectation of ores of higher grade, in the main, than those now being mined when the development now planned has been fully extended.

In conclusion the writer begs to say that the showing which has thus far been made is but a small fraction of that of which your property is capable; that its future is assured permanent and exceedingly bright.

(Signed) EDWARD W. BROOKS,
Mining Geologist and Engineer.

(COPY)

New York, April 3rd, 1917.

B. P. Cheney, Esq.,
Pres. Gila Copper Sulphide Co.,
New York City.

My dear Mr. Cheney:

The following is a brief resume of the Gila Copper Sulphide Company and its property and operations.

The Gila Copper Sulphide Company was incorporated under the laws of Arizona in October, 1909, with a capital of \$2,500,000; 250,000 shares, par value \$10 per share and \$1,000,000 6% 5-year, first mortgage convertible gold bonds, \$1,000,000 of the stock was placed in the treasury for the conversion of the bonds; the balance of the stock i. e. \$1,500,000 is in the hands of the public, though very closely held. The bonds are dated April 1st, 1913, and are due April 1st, 1918; convertible into stock, par for par, at the option of the bondholder, and can be called by the Company at 105% of par at any time on 90 days notice. The interest on the bonds is payable April 1st and October 1st of each year. The April, 1917, and all prior coupons have been paid. There were retired April 1st, 1917, \$86,000 of the bonds, leaving now outstanding \$914,000.

The mines of the Gila Copper Sulphide Company are situated at Christmas, Gila County, Arizona, at an elevation of approximately 3100 feet, about seven miles north of Winkelman on the Arizona

I am enclosing herewith balance sheet of as December 31st, 1916. Owing to the fact that the books of the Company are kept in Arizona, and that the Secretary of the Company has been absent from the office very much since the first of the year, we have not as yet received a balance sheet as made up from the Arizona books. The balance sheet enclosed herewith is made up from figures in my possession and the American Smelting & Refining Company's statements, and can be considered approximately correct.

Yours very truly,

(Signed) LEO B. MULHEARN,
Assistant Secretary.

Enc. 1.

(COPY)

New York City, April 9, 1917.

Mr. Thomas W. Joyce,
% Messrs. J. P. Morgan & Co.,
23 Wall St., New York City.

Mr. dear Mr. Joyce:

In order that you may have a clear idea of what we have been doing in Gila Copper Sulphide Company during the past year, and what we hope to be able to bring about in the near future, I am handing you herewith papers which will give you a much better idea of the property than I could possibly tell you in the limited time which you have to spare during the day.

I think you will certainly be interested in what the figures show.

Just a few words about Mr. Finney and Mr. Brooks. Both gentlemen have been identified with the mining industry in all its branches of mining, smelting and refining for the past thirty years as executives, engineers and operators.

Mr. Finney was for some years manager of the Kansas City Smelting & Refining Company before the merger of the American Smelting & Refining Company, manager for M. Guggenheim's Sons here in New York, and later a member of the operating department or Committee of the A. S. & R. Co.

Mr. Brooks has been identified with the same companies and has been with Mr. Finney in the field for the last fifteen years.

These properties are not making the showing they are capable of at this time because of its limited facilities. The Gila Copper Sulphide Company is able at this time to increase its production to almost double and within a reasonably short time can further add to its output and consequent earnings, but it cannot market its ore with "Custom Smelters," because of their want of capacity.

You are no doubt aware of the present condition at the Hayden Smelter of the A. S. & R. Company, and that they now have piled up at this plant as of April 15th, some 85,000 tons of copper ores waiting to be smelted. You can therefore understand their reluctance to increase the amount above two hundred fifty tons per day, which they must take from the Gila Copper Sulphide Company under their contract with the latter company.

The ores of the Gila Copper Sulphide Company are docile and easy to smelt; they are self-smelting ores and therefore do not require large investments in concentrating mills. Plans are under way toward getting additional smelting facilities so that the output of the Gila Copper Sulphide Company will be approximately five hundred tons per day instead of two hundred fifty tons, as at present.

I have in my office complete sets of maps, reports and statistics which are available for a more detailed study of the situation.

Trusting that you may find the reading at least interesting, I am, with kindest regards,

Sincerely yours,

(Signed) B. P. CHENEY.

BALANCE SHEET

as of

JANUARY 1, 1917

ASSETS

Capital:

Mines, Mining Claims, Bldgs., structures, etc.	\$2,517,990.86		
Less Depreciation	150,000.00	\$2,367,990.86	
<hr/>			
Equipment, etc.	\$ 219,096.03		
Less Depreciation	22,500.00	196,596.03	\$2,564,586.89
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Current:

Suspense (Fire Loss)	\$ 15,325.42		
Accrued Interest Receivable	147.81		
Accounts Receivable	29,560.81		
Supplies, Fuel, Store Stock, etc.	25,493.92		
Ore (In Bins)	6,246.61		
American Smelting & Refining Company	81,319.86		
Cash	8,127.95	166,222.38	
<hr/>			

Deferred Charges:

Bond Interest	\$ 15,000.00		
Prospecting	24,554.23	39,554.23	
<hr/>			
		\$2,770,363.50	

LIABILITIES

Capital:

Stock (250,000 shares, \$10 par)			
Authorized	\$2,500,000		
In treasury for bond conver- sion	\$1,000,000		
<hr/>			
Outstanding	\$1,500,000.00		
Bonds, 5 Yr. 6% 1st Mtge. Convertible..	1,000,000.00	\$2,500,000.00	
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Current:

Accounts Payable	\$ 25,686.45		
Employees' Liability Insurance	5,900.11		
Bills Payable	37,621.56		
Accrued Interest Payable	4,892.33		
Bond Interest Accrued	15,000.00		
Unclaimed Wages	17.50	89,117.95	
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Reserves:

Hospital	\$ 636.52		
Taxes	10,160.71		
Insurance	14.07	10,811.30	
<hr/>			
Surplus			170,434.25
			<hr/>
			\$2,770,363.50

Handwritten notes and calculations:

- Vertical lines with numbers: 100,000, 150,000, 300,000, 170,000, 116,000, 300,000, 116,000.
- Handwritten percentages: 30%, 100%, 30%.
- Handwritten numbers: 29,560.81, 25,493.92, 6,246.61, 81,319.86, 8,127.95, 15,000.00, 24,554.23, 39,554.23, 2,500,000, 1,000,000, 1,500,000.00, 1,000,000.00, 2,500,000.00, 25,686.45, 5,900.11, 37,621.56, 4,892.33, 15,000.00, 17.50, 89,117.95, 636.52, 10,160.71, 14.07, 10,811.30, 170,434.25, 2,770,363.50.

COPY

CHRISTMAS MINE

Gila Copper Sulphide Company

Development Report
March 1st, 1917

By Edward W. Brooks, Mining Geologist and Engineer

* * * * *

March 1st, 1917.

The Gila Copper Sulphide Co.,
Christmas, Gila County, Arizona

Gentlemen:

On February last from the 16th to 22nd, inclusive, the writer made a careful examination of the property of your company generally known as the "Christmas Mine."

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In order that this may be better understood, a brief description of the form and character of the ore-occurrence becomes necessary and will be considered first.

Ore Occurrence and Genetic Factors Involved:

The ores of the "Christmas Mine" are closely related to and dependent for their origin on certain intrusive bodies of Porphyry properly classified as Quartz-Mica-Diorite. The Porphyry occurs in the form of large irregular plugs from which radiate many dykes and sills. The formation into which these porphyry intrusives have forced their way is a series of marine sediments in which limestone largely predominated.

Centrally located within the property is a very large wedge-shaped body of this Porphyry with the point of the wedge directed almost due west. Two contacts are thus formed, known respectively as the North and South Contacts where the porphyry mass abuts against its enclosing

walls. Along both contacts the limestones have been altered into Lime-Iron Garnet wholly or in part for a distance of variously from ten to more than one hundred feet out from the immediate contact. Invariably associated with this Garnet are copper ores and there are about four thousand feet of this garnet border-zone that have been proved, one thousand feet of which have so far been opened to the mining of copper ores. The garnet zone is known to extend beyond the limits taken in the above estimate indefinitely.

Bodies of copper ore are known to exist in the limestone well outside of and beyond the garnetized areas along zones of faulting and shearing as well as along the contacts of dykes radiating out from the central porphyry mass.

There are sound structural and genetic reasons for believing that the richer ores and possibly the larger ore-bodies will be found outside the garnet border-zone around the central porphyry mass, within which mining operations have thus far been confined. These reasons have been given in a separate report covering this subject and will not be further considered in this.

Development and Source of Present Production:

Development has hitherto been confined to three prominent localities within the garnet-border-zone surrounding the central porphyry mass. They are respectively the "Christmas Face", the "Johnny" and the "Hackberry". The two last named are alone now active. The "Christmas Face" is at present being worked by leasers, but projected development now to be undertaken will reopen this locality to Company operations in the near future. "The Christmas Face" is situated on the South Contact; the "Johnny" and "Hackberry" on the North Contact of the large central porphyry mass. Both the latter are tributary to and are not being worked through the No. 3 shaft.

With the exception of a relatively small tonnage supplied by leasers, the production for the past year has come entirely from the "Johnny" locality. Total shipments from all sources for the past twelve months aggregate in the vicinity of 79,000 tons. Connection has lately been made with the "Hackberry" from the 300 ft. level of the "Johnny" through which large bodies of ore in the former will be delivered

to market.

In each of the three localities just enumerated all mining operations have been confined to horizons lying between the 500 ft. Level, and the surface. Large bodies of copper ore are known to exist below the 500 ft. Level having been opened from the 800 ft. Level in Shaft No. 3, and by diamond drill hole No. 4, sunk from the 400 ft. Level of the "Johnny". These lower horizons will be opened to mining as soon as practicable to do so.

PROJECTED DEVELOPMENT:

Plans have been matured for the thorough exploration and development, for the mining of ores, of the entire proved contact both north and south along the margin of the central porphyry mass from No. 3 Shaft at the 500 ft. Level. This work, when completed, will, beyond any doubt, enlarge the present tonnage of available ore very greatly and provide an assured reserve capable of sustaining production at the present rate for many years. The undeveloped part of the proved contact is, in all respects, identical with that from which ore is now being taken and may, with entire confidence, be expected to yield proportionately.

It is also planned to carry explorations into the most promising localities lying outside the garnetized contact border-zone, where large and relatively high grade bodies of copper ore are strongly indicated, with every assurance of success.

ORE RESERVE:

In making the following computations which are believed to be entirely conservative, tonnage has been estimated on the basis of ten cubic feet, in place, equivalent to one ton of ore. This has been determined by careful specific gravity tests, and is found to compare closely with the actual results obtained in mining.

Dimensions given are from actual measurements except where marked "assumed". Such assumed measurements are based on experience in working the ore-bodies in the property, and have been held within safe limits.

ground lying between the 400 Level, and the 800 Level, is more generally ore-bearing than that which lies above the 400 Level.

In estimating the amount of probable ore, the writer has considered only that portion of the Contact which is comprised between the surface and the 800 Level as follows:

There are 4000 feet of known ore-bearing contact. 1000 feet of this Contact down to a depth of 400 feet, gives:

	TONS
Ore extracted to date	200,000
Ore in sight 332430 less 9700,	323,730
Ore reasonably assured,	366,800
	<hr/>
Total,	890,530

Double this amount for 800 ft. depth, 890,530x2, -- 1,781,060 Tons, Total for 1000 feet of Contact to 800 feet depth.

Multiplying this tonnage by three gives, (1,781,060x3,) amounting to 5,343,180 Tons for the remaining 3000 feet of Contact.

Estimated for 3000 feet of Contact,	5,343,180 Tons.
Add amount between 400, and 800 Levels below present working computed under headings, Ore extracted to date, ore in sight and ore reasonably assured,	890,530
	<hr/>

Total, 6,233,710 Tons.

This figure represents the probable ore in the remaining undeveloped 3000 feet of Contact plus that in the 1000 feet of explored Contact from the 400 ft. to the 800 ft. Level.

Condensed into a single statement the foregoing estimate will read as follows:

	Tons
Ore in sight	332,420
Ore reasonably assured	366,800
Probable ore,	6,233,710
	<hr/>
Total,	6,932,940

The following calculation showing available net profits both upon the gross tonnage of ore in sight, and that reasonably assured are respectfully submitted:

In computing the above the actual scale of costs established for mining, transportation and smelting, as well as refining and marketing the refined copper for the past twelve months has been employed.

These costs are made up as follows:

DIRECT MINING COST:	Per Ton of Ore	
Development,	0.531	
Breaking and stoping,	0.993	
Timbering,	0.024	
Tramming,	0.181	
Hoisting	0.206	
Sorting, weighing and loading,	0.098	
Draining,	0.096	
Sampling,	0.029	
Crushing and conveying,	0.078	
	<hr/>	
Total direct cost per ton of ore,	\$2.236	\$2.236
INDIRECT COST:		
Salaries,	0.191	
General Expense,	0.180	
Insurance,	0.003	
Taxes,	0.192	
Laboratory,	0.022	
Tramway,	0.132	
Lighting,	0.015	
New York Office,	0.144	
Tucson Office,	0.024	
	<hr/>	
Total indirect cost per ton of ore,	\$0.903	\$0.903
		<hr/>
Total of all costs per ton of ore,		\$3,139
Smelting Costs under present ten year Contract, on basis of ore carrying 3% copper per ton,	\$3.35	
Railroad freight to Smelter	0.225	
	<hr/>	
Total Freight and Smelting, per ton,	\$3.575	\$3.575
		<hr/>
Total Mining, Freight and Smelting Costs per ton,		\$6.715

Copper is now quoted in New York at 33¢ to 35¢ per pound for the refined metal. For the purpose of this calculation a price of 25¢ per pound, New York, has been assumed, at or above which it is believed the metal will continue to rule for a long period. From these assumed quotations, must be deducted Freight, Refining and Commission Charges on the Blister Copper from Hayden to New York. This has been determined to be between one and one-quarter and one and one-half cents per pound of refined copper.

25¢ less 1½¢ is 23½¢, Net per pound of refined copper sold.

Using the foregoing figures the net profit per ton of ore carrying 2.7% Copper, and 25¢ combined gold and silver values which

represents a fair average for the past year's production, for this grade of ore, will be as follows:

	Debits, per ton ore.	Cr. per T.
2.7% Cu. is 54.0 lbs. copper per ton, less agreed deduction for Slag Loss, 8 lbs. net 46 lbs. @ 23 $\frac{1}{2}$ ¢,		\$10.81
Established combined gold and silver values		.25
Gross value per ton of ore produced,		<u>\$11.06</u>
Mining Cost per ton, direct and indirect	\$3.14	
Transportation by rail to smelter at Hayden	.225	
Smelting and converting,	<u>3.35</u>	<u>6.715</u>
Net profit per ton of ore mined,		\$4.345
Net Profit 332,430 Tons ore in sight @ \$4.345 P.T.		\$1,444,408.
Net Profit 366,800 Tons ore assured, @ \$4.345 P.T.		<u>1,593.746.</u>
Total net profit ore in sight and reasonably assured		\$3,038.154.

Payments for available lime in the ore up to a limited amount per month made by the Smelting Company to the Mining Company under its smelting contract, will add to the net profits given above by something like \$43,200 per year. The aggregate amount of this return for lime, based upon the tonnage given above, will depend entirely on the rate of production maintained, and, is, thus, a variable quantity which cannot be safely estimated at this time.

The writer believes the above estimates to be entirely conservative and that they will be borne out by the actual operations to follow. He further believes that these figures will be multiplied many times from the ores estimated as probable.

There is a reasonable assurance that development will be extended much beyond the definitely known areas which have thus far been considered. Structural and genetic evidences are at hand strongly justifying the expectation of ores of higher grade, in the main, than those now being mined when the development now planned has been fully extended.

In conclusion the writer begs to say that the showing which has thus far been made is but a small fraction of that of which your property is capable; that its future is assured permanent and exceedingly bright.

(Signed) EDWARD W. BROOKS, Mining Geologist and Engineer.

CHRISTMAS MINE

(Note by G. M. Colvocoresses - Nov. 1937)

This well known property near Winkleman has operated at intervals for many years but only with profit when the market price of copper was at a high figure.

During 1915 and 1916 and 1917, it was worked under lease by the A. S. & R. and shipped 75,000 tons of ore in 1916 and 22,000 tons during the first three months of 1917.

The mine was shut down in 1919 or 1920 and it is my opinion that only a small production was made from that date until this year when it was operated quite extensively for a few months, but according to latest reports the rate of production has been reduced while some development work is still in progress.

The mine still contains large reserves of low grade basic copper ore but I do not think that the cost of producing copper has been or is likely to be less than 12¢ per lb.

Because of its location this mine should logically be worked by the A. S. & R. as a feeder for their smelter at Hayden.

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Knights Bros.
Operated by owner in 43 & 44 with
substantial shipments to Hayden.