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## CONDENSED DATA ON BLUEBELL AND DeSOTO MINES

The Bluebell Mine is a replacement deposit in Yavapai schist. The vein has been developed to a length of over a mile and to a depth of 1570'. The ore is a mixture of chalcopyrite and iron pyrites with a siliceous gangue and occurs in lenses of varying length and width but uniformly with long vertical axes and the shoots are usually continuous from the surface to the greatest developed depth.

The mine has operated intermittently since 1895 and has produced altogether about one million two hundred thousand tons of ore of which around one million tons were taken out from 1913 to 1930 under my management. The maximum annual production of 131,000 tons was made in 1918. The mine was well developed down to the depth mentioned and was equipped for operating on any basis up to 400 tons per day. The equipment has been removed and the water has been allowed to rise to its normal level, which is probably about ~~400'~~ 700' below the collar of the shaft.

The average value of the ore produced has been around $2.35 per ton in gold and silver at present prices and slightly over 3% copper.

Before the Bluebell Mine was last shut down a careful estimate of ore reserves indicated that the positive and highly probable ore amounted to 79,500 tons and the partially developed and possible ore to an additional 101,000 tons. Future development may greatly increase these figures since it was never our policy to develop more than one to two years ore supply ahead of production and with one exception none of the six ore shoots appear to have been bottomed.

The average grade of the future output of the mine will probably be similar to the past production in gold and silver content, but somewhat lower in copper.

The showings on the 1500' level and in the winze below which is still in good ore, make it reasonably certain that this reserve will be substantially increased by a comparatively small amount of development. Looking beyond the developed ore reserves the future of the mine is largely dependent upon the continuation of the ore bodies to greater

depth, which seems highly probable as the lower workings now appear to be below the zone of faulting which shattered and in some cases cut off the ore between the 1200' and 1500' levels.

The cost of producing copper from the Bluebell ore after crediting gold and silver values varied from a fraction over 9¢ per pound to a considerably higher figure when wages and commodities had risen to the war-time level. Nearly all the ore is very suitable for concentration and if a flotation mill were built at the mine (where a sufficient water supply is obtainable) and modern equipment provided, I think that copper might be produced in future for 9¢ per pound or somewhat less considering the higher credits for gold and silver at present prices.

The cost of reopening the mine and providing equipment for large scale operations would be considerable, and I do not advise any such procedure while the price of copper holds below 10¢ per pound. I believe that a higher price is pretty sure to develop in the future and on that assumption I consider that this is an exceptional opportunity to secure a property with great potential value for an exceedinly small outlay. At present metal prices (copper @ 10¢ per lb.) an operating profit of only 50¢ per ton could be expected but should increase about 50¢ per ton with each additional one cent advance in the price of copper.

The DeSoto Mine is also a replacement in Yavapai schist and the geology is similar to the Bluebell Mine, but the lenses are smaller and located very irregularly in the mineralized zone which has been developed for a length of about 1,000' and to a depth of 900'. The width of the mineralized zone is considerably greater than the Bluebell and extends on both east and west sides of a steep ridge. The lenses on the east slope of the hill, which has been principally worked to date, do not appear to carry much value below a depth of 700' and 800' where barrent quartz replaces the sulphide minerals, but there is good prospect of finding lateral extensions of these ore-shoots in the upper levels

of the mine and also chances of opening up additional ore bodies, some of which are indicated by outcrops or shallow workings. The large orebody outcropping on the western side of the hill has so far been only partially developed and seems likely to prove more persistent and extend to greater depth than any of the others.

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Total production of ore appears to have been about 300,000 tons, of which 200,000 has been produced since 1915, but at no one time have the developed ore reserves been large. Exploration was naturally neglected by the lessees and the quantity of ore which can now be measured is relatively small but indications point to the discovery of additional ore, particularly under the WHALE CLAIM and a small expenditure for development work should greatly increase the present reserve.

The average grade of ore produced to date has been $2.68 value in gold and silver (at present prices) and 3% copper. Some ore of similar grade remains and in addition there is a very substantial tonnage of lower grade material which cannot be considered commercial under present conditions. This ore should all be concentrated and the recovery by flotation is excellent but only a small margin of profit could be expected until the price of copper passes 10¢ per pound.

At both the Bluebell and DeSoto there are found near the surface small ore shoots or pockets which are substantially richer than the average and could be profitably worked by leasers on a small scale and without the installation of any expensive equipment or transportation facilities. The royalty which could be obtained from such operations should serve to more than pay the taxes and carrying charges

until a better price of copper prevails, and over a period of two or three years, would probably also repay the purchase price of these mines. A record of the actual production of these mines is attached.

PRODUCTION OF BLUEBELL MINE

| YEAR | TONS | AVERAGE GOLD (OZ.) PER TON | AVERAGE SILVER (OZ.) PER TON | AVERAGE % COPPER PER TON |
|---|---|---|---|---|
| Prior to 1913 (about) | 200,000 | .06 | 1.5 | 4.00 |
| 1913 | 36,792 | .0465 | 1.33 | 3.76 |
| 1914 | 56,058 | .0368 | 1.27 | 3.64 |
| 1915 | 82,171 | .0340 | 1.11 | 2.97 |
| 1916 | 75,070 | .0454 | 1.20 | 3.28 |
| 1917 | 102,773 | .059 | 1.46 | 3.18 |
| 1918 | 131,090 | .0639 | 1.55 | 2.77 |
| 1919 | 122,069 | .0603 | 1.43 | 2.58 |
| 1920 | 111,749 | | | 2.37 |
| 1921 | NO PRODUCTION BECAUSE OF CONDITION OF COPPER MARKET AFTER WAR. | | | |
| 1922 (about) | 80,000 | .05 | 1.50 | 3.00 |
| 1923 | 80,811 | .055 | 1.01 | 3.23 |
| 1924) 1925) 1926) about | 70,000 | .06 plus | 1.50 | 3.50 |
| (Production reduced by reason of shutting down of mill and smelter at Humboldt in 1924 and '25.) | | | | |
| 1927) 1931) | Worked by leasers, small production of ~~which~~ high grade ore. | | | |
| TOTAL ABOUT | 1,200,000 | .06 | 1.5 | (over) 3.00 |

Average value in gold and silver at 1936 price $3.25 per ton)

PRODUCTION OF DE SOTO MINE

| | | | | |
|---|---|---|---|---|
| Prior to 1915 (about) | 100,000 | .05 | 1.3 | 4.00 |
| 1915 | 8,360 | .0453 | 1.14 | 3.50 |
| 1916 | 34,382 | .0421 | 1.08 | 3.37 |
| 1918 | 42,870 | .0527 | 1.20 | 2.58 |
| 1919 | 27,067 | .0499 | 1.09 | 2.36 |
| 1920 | 18,922 | | | |

Production of DeSoto Mine,(continued)

| YEAR | TONS | AVERAGE GOLD (OZ.)PER TON | AVERAGE SILVER (OZ.) PER TON | AVERAGE % COPPER PER TON |
|---|---|---|---|---|
| 1921) | 20,000 | .050 | 1.20 | 3.00 |
| 1930) | Worked by leasers. | | | |
| TOTAL ABOUT | 300,000 | .050 | 1.20 | 3.00 |

(Average value in gold & silver at 1936 prices $2.68.)

PRELIMINARY ESTIMATE OF CASH EXPENDITURES INVOLVED IN REORGANIZING SOUTHWEST METALS CO. AND RESUMING ACTIVE OPERATIONS.

| | | |
|---|---|---|
| 1. | Payment of Federal Transfer Tax on stock purchased by Hurst from Sheldon Co. | $ 534.00 |
| 2. | Payment of Delaware Corporation Taxes (about) | 168.00 |
| 3. | Payment to U. S. Incorporation Co. of Delaware for services at Statutory Agent | 50.00 |
| 4. | Payment of Delinquent Taxes on Arizona property (Bluebell and DeSoto Mines.) | 453.00 |
| 5. | Payment of Arizona Corporation Tax | 50.00 |
| 6. | Expenses incident to Directors' & Stockholders' meeting and transfer of office and books to Arizona, also some additional penalties and interest on taxes. (Approximately) | 245.00 |
| 7. | Legal and other services (approximately) | 500.00 |
| 8. | Required by Mr. Hurst to clear his personal situation in respect to the above transactions | 5000.00 |
| 9. | Option payment on account of purchase of Humboldt real estate including smelter, water rights, etc. of Southwest Metals Co., also buildings with some equipment. | 500.00 |
| 10. | Examination of mines and plant and preparation of documents including auditors, attorneys, and engineers reports necessary to qualify Southwest Co. Stock for sale in accordance with regulations of Federal S. E. C. and Arizona Corporation Commission. | 2500.00 |
| | TOTAL PRELIMINARY EXPENSES | $10,000.00 |

PROGRAM OF PROPOSED FURTHER PROCEDURE AND EXPENSES INVOLVED.

| | | |
|---|---|---|
| 1. | Complete purchase of Humboldt property at maximum cost of | $ 9,500.00 |
| 2. | Erect 100 ton concentrating mill at Humboldt for custom ores with bins | 60,000.00 |
| 3. | Rebuild portions of Humboldt smelter and sampling plant for custom ores and concentrates | 150,000.00 |
| 4. | Recondition Bluebell Mine for production of 100 tons of ore per day | 50,000.00 |
| 5. | Erect 100 ton mill at Bluebell | 50,000.00 |
| 6. | Recondition DeSoto Mine for production of 50 tons of ore per day | 30,000.00 |
| 7. | Erect 50 ton mill at DeSoto Mine | 30,000.00 |
| 8. | Working Capital required for proper operation of mines and Humboldt plant | 150,000.00 |
| 9. | Miscellaneous | 5,500.00 |
| | | $ 490,000.00 |
| | Add preliminary expense | 10,000.00 |
| | TOTAL CAPITAL TO BE PROVIDED | $ 500,000.00 |

Time required for all the above may be estimated at eight months and another four months should be allowed to adjust all equipment and put operations on a regular and efficient basis after which the monthly earnings (on basis of ~~1¢~~ 2¢ copper and present prices of gold and silver) may be tentatively estimated as follows:

| | | |
|---|---|---|
| Mining and milling profit on 3,000 tons Bluebell Ore | $ ~~6,000.00~~ | 3000 |
| Mining and milling profit on 1,500 tons DeSoto Ore | ~~3,000.00~~ | 1500 |
| Profit on custom mill operations at Humboldt | ~~4,500.00~~ | 4500 |
| Profit on Humboldt smelter operations, treating concentrates from Bluebell and DeSoto Mills also custom ore and concentrates | ~~7,500.00~~ | 6000 |
| | ~~$21,000.00~~ | 15000 |

Say a net profit of ~~$340,000~~ 180,000 per annum less State and Federal Income Taxes.

This profit should be increased if price of copper advances above ~~15¢~~ 12¢ per pound and will be reduced if the price of copper drops below that figure.

EXHIBITS - which may be examined at my office

(a) Copies of Certificate of Incorporation and By-Laws of Southwest Metals Co.

(b) Letter guaranteeing title of Southwest Metals Co. to Bluebell and DeSoto Mines with description of Mining Claims.

The deeds to the property of the Southwest Metals Co., original Certificate of Incorporation and By-Laws, Stock Books, Minute Books and other corporate records of the Company are now in the possession of ~~Mr. Rondon Hurst's attorney~~ certain parties in Detroit and can all be obtained upon payment of a certain amount of money thru Mr. Hurst. There are no corporate debts of the Southwest Metals Co. or encumbrances on its property other than the taxes, etc., listed above and the corporate promissory notes of the Company which are included with the 90% of the stock in the purchase made by Mr. Hurst from the Sheldon Company.

G. M. Colvocoresses

Phoenix, Arizona

Sept 1938

Originally written in Autumn of 1936.

Note changes in price of copper since that date.

BLUE BELL MINE.

(Extract ~~from~~ report of ~~G. M. Colvocoresses to Directors of Consolidated Arizona Smelting~~ Company, dated February 15th, 1913.)

DETAILED

REPORT ON THE MINES & OPERATIONS

OF THE

CONSOLIDATED ARIZONA SMELTING COMPANY.

## L O C A T I O N

The property is located in the Bradshaw Mountain District, Yavapai County, Arizona. The Company is operating the BLUE BELL MINE near Mayer, and Concentrating Mill and Smelter at Humboldt. The Company also owns the BLUE THUNDER CLAIMS and the DE SOTO MINE which was operated prior to 1907. The Sante Fe, Prescott and Phoenix Railroad passes through Humboldt and also within three miles of the Blue Bell and Blue Thunder and within one mile of the De Soto Mine.

## GEOLOGY & ORE OCCURRENCE.

In the immediate vicinity of the mine, the country is sericite schist, known as Yavapai schist and formed during the Algonkian period. The schist are cut by dykes of eruptive rock and by travertines of limestone. In the schists there are found zones of silicification and it is in these zones that the ore bodies occur. The ore deposits are of the replacement type and are found as lenses, varying considerably in size and apparently having a much greater length vertically than horizontally, with a width of three to fifteen feet. These lenses are frequently near the edges of the silicified zones.

On the surface the outcrops are quite prominent; the schists being stained with copper carbonates and chalcocite, is occasionally noted. Below the outcrops, there extends a zone of oxidation down toward local water level and below the oxidation, there is a comparatively unimportant bank of secondary enrichment denoted by bornite and chalcocite and succeeded in depth by the pri-

mary sulphides, mostly chalcopyrite, which constitute the main ore body. Associated with the chalcopyrite, there is a quantity of iron pyrites varying from equality to double the amount of chalcopyrite. There is also considerable quartz; all of these minerals having replaced the sericate and chlorite schist.

Aside from copper, the ore carries small values in gold and silver. The aggregate of these two metals varying from $1.00 to $2.00 per ton. There is also some lead and a little zinc; the zinc is not in sufficient quantity to be a hindrance in smelting the ore.

## BLUE BELL MINE.

### Description.

The silicified zone extends for a length of 2,500 feet and for a width of 600 feet. The strike is North 20° East and the dip approximately 70° toward the West. There are six distinct lenses or shoots of ore noted by outcrops on the surface or underground and referred to as follows:

"Blue Coat", "410 West or South", "410 East or North", "Blue Buck West", "Blue Buck East", "Blue Bell."

Of these ore shoots, the "410 East and West" have no well defined outcrops, while "Blue Buck East" is so far unproved underground, and "Blue Bell" though possessing an excellent outcrop and proved to a depth of 180 feet, has not yet been developed into the zone of primary sulphides. These lenses of ore occur in two parallel bands striking north and south and separated from each other by about 40 feet of the schist rock; the western bank is close to the edge of the silicified schist. Through the entire zone of silicification, there is a certain amount of mineralization and both copper and iron pyrites are found, but not in sufficient quantity to be of commercial value outside of the ore bodies mentioned above.

Blue Bell Group has been worked, but not continuously for the past twelve years and a large tonnage of ore has been produced; the average grade of all shipments made since 1907 appears

to have been 3.5% copper with gold and silver, to the value of $1.50 per ton. Aside from surface indications, the mine has been developed in one place to a depth of 850 feet by shafts and drifts, while Diamond Drill holes have gained an additional depth of from 50 to 100 feet. The development work to date is best shown by the tracing accompanying this report, and as will be noted, the property is only partially developed. The "Blue Coat" ore shoot is proved to a depth of 700 feet. The "410 South" to a depth of 850 feet and by drill holes to a depth of 950 feet. The "410 North" to a depth of 700 feet and the "Blue Buck" to a depth of 400 feet.

From a brief study of the general geology of this district and such information as I am able to gather regarding the behavior of similar ore bodies, I can see no reason why these deposits should not continue downward to a much greater depth than has been gained up to the present time. In your own mine the indications are encouraging, for none of the ore bodies so far developed show any tendency to become pinched or impoverished down to the lowest point at which they have been proved. It is true that the drill holes did not give encouragement regarding the continuance of the Blue Coat to a greater depth, and it may be that this particular ore deposit will not extend below 850 or 900 feet, but I do not consider the evidence conclusive on this point and it may go down much deeper. The "410" ore bodies were apparently blind on the surface and so far as developped, they show an improvement with depth and, considering the mine as a whole, each succeeding level has proved up an equal or greater quantity of ore than found on the levels above. It should be taken into consideration that the lenses of ore in which you are at present working were undoubtedly deposited at a time when the surface of the country was from one to three thousand feet higher than at present, and, therefore, that this ore was once at a very considerable depth. The upper portions of these lenses have been carried away by the erosion and it may be that other lenses have been altogether destroyed by this same influence, but conversely, new lenses of ore may well be discovered at any depth in the silicified portion of the schist, and it is my opinion that as long as this

silicification continues downward, you will continue to find ore bodies similar to those in which you are now working. The largest ore bodies of similar type in this district, are found at the United Verde Mine, which is at present developed to a depth of 1500 feet and in which I am reliably informed, that the ore in the 1000 and 1200 foot levels, also in the 1500 foot level, is of excellent quality and quantity and better than anything found below the original zone of secondary enrichment.

## ORE RESERVES.

From present development, I am able to estimate the ore reserve in the Blue Bell Mine, as follows:

| | POSITIVE: | HIGHLY PROBABLE: | PROBABLE: |
|---|---|---|---|
| "Blue Coat" | 39,000 tons at 3.50% copper (14,000 tons broken in stopes) | 12,000 tons @ 2.60% copper. | 9,000 tons @ 3.50 % copper. |
| "410 South" | | 7,000 tons @ 3.50% copper. | 6,000 tons @ 3.50% copper. |
| "410 North" | | 21,500 tons @ 4% copper. | 10,000 tons @ 4% copper. |
| "Blue Buck" | | | 20,000 tons @ 3.20% copper. |
| Total | 39,000 tons @ 3.50% | 40,500 tons @ 3.50% | 45,000 tons @ 3.50% |

Grand Total All Classes ..... 124,500 tons @ 3.50%.

In connection with the above estimate, the ore classed as "Positive" has been blocked out on three or four sides. The ore classes as "Highly Probable" is developed by two successive levels being not yet traversed by raise or winze. The ore classed as "Probable", represents the continuance of the ore shoots for a distance of approximately 100 feet above and below the last points of development. This extension may be fairly assumed to exist, considering the nature and proved extent of the ore bodies.

The average content of all ore at present developed is put at 3.50% copper, in addition, the average value in gold and silver is $1.50 per ton, representing an average of .05 ounces in gold and 1.2 ounces in silver.

According to instructions, I did not sample the ore bodies myself; a complete sampling would have required several weeks' time and would, I believe, have been altogether superfluous and a partial sampling would have been of no particular value and the results might have appeared misleading. I satisfied myself that the ore bodies had been thoroughly sampled by the management at the mine and I believe that this sampling has been conducted with care and judgment and the results are fairly well checked up by the assays of shipments made to the smelter. In order to obtain data for the above estimate of the grade of your ore, I obtained assay results of several hundred samples and from these, computed the average grade; in some cases unfortunately full data concerning the samples was not obtainable, more particularly, the width and exact point at which the samples were taken; but I feel satisfied that the above estimate is a conservative one and will be fully borne out by the production from the mine.

In addition to the reserves estimated above, there is a large amount of ground containing from one to two per cent of copper. Under present conditions, this cannot be mined and treated at a profit, hence is not considered as ore. It is possible that at some later date, decreased working costs combined with improved metallurgical practice may permit you to increase your tonnage by mining certain quantities of this low-grade stuff; but for the present at least, it is most essential that the grade of production should be maintained at 3.50% copper, and in order to do this, only the ore bodies estimated can be profitably mine, and further: care should be taken to maintain the grade of production by the use of selective stoping, prevention of wall rock slides in so far as possible, and hand-sorting of ore at the tramway-terminal.

## FUTURE POSSIBILITIES & DEVELOPMENT.

As stated above, your property is only partially developed and additional development should be prosecuted vigorously. The developments which I consider most important are as follows:

(1) Extension North and South of the drift on the 850 foot level through the "410 North" ore body and the "Blue Coat".

(2) The extension northward of the 400 foot level to tap and develop the "Blue Bell" ore shoot.

(3) The extension northward of the 700 foot level to develop the "Blue Buck" ore shoot.

You may quite reasonably expect to find ore in all of these drifts, and if such should prove the case, your reserves may be increased by approximately 75,000 tons positive and probable ore, which reserve will be further increased by gaining additional depth on the ore shoots named.

At the time of my visit, there were approximately 14,000 tons of ore broken in the stopes, and 124,500 tons developed. After your mill is in steady operation, I believe that it will be found expedient and possible to produce from 250 to 300 tons daily from your mine in order to supply the mill and smelters, and as soon as regular production on this basis is started, it would seem prudent to keep a minimum of 40,000 tons broken in your stopes and 200,000 tons developed in advance.

After the Blue Bell ore body has been cut on the 400 ft. level, I would recommend that crosscuts should be run eastward at intervals between the main shaft and the Blue Bell ore shoot; it is particularly important to explore under the surface outcrop known as the "Blue Buck East", and there also seems a possibility of discovering entirely blind ore bodies at any point in the silicified area. Similar crosscuts may be run out from the 700 ft. level and from deeper levels as these are driven. I would not recommend any further Diamond Drilling of your property, as I do not consider that Diamond Drills are well suited to explore this particular kind of ore body, and such work is nearly as expensive as crosscuts or drifts.

Aside from the crosscuts mentioned, I believe that your most valuable exploration will consist in deepening your shaft and developing at a greater depth the various ore shoots which you have proved in the upper levels. If the known ore bodies continue downwards as good as at present, you will develop from 30,000 to 40,000 tons of new ore for every additional hundred feet gained in depth.

# BLUE THUNDER CLAIMS.

## BLUE THUNDER:

This portion of your property is merely a prospect. It is located south of the Blue Bell Claims, approximately 2000 feet from the main shaft. The outcrop consists of a surface conglomerate found in the bed of a creek, the pebbles being cemented with iron oxide and copper carbonates.

The prospect has been developed by short adits and test-pits. So far as development has gone, the only ore found is in the form of narrow stringers scattered more or less through a mineralized zone about 40 feet wide. No commercial ore body has yet proved up and it is doubtful to my mind whether any such will exist. At the present moment, I would not recommend any additional development at this point, but at a later date, it may seem advisable to sink the test-pits to somewhat greater depth and crosscut the mineralized zone. It would not be necessary to go to any great depth, as the water level is comparatively near the surface at this point, and the primary sulphides should be encountered at rather less than 100 feet.

D.

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G. H. Colvocoresses
Jy. '38

SOME IMPORTANT FACTS RE SOUTHWEST METALS COMPANY

September 1938.

The profits earned by the Consolidated Arizona Smelting Company, predecessor in interest to the Southwest Metals Company, amounted to $2,612,473.00 from 1914 to 1920 and these would have been over $500,000.00 higher except for the cancellation of Government contracts for copper purchased near the close of the World War.

A large share of these earnings were the direct result of the mining operations at Bluebell and DeSoto.

In 1921 (when copper mines in the State were not operating) the Bluebell and DeSoto Mines were assessed by the State Tax Commission at a value of $1,751,558.00. These mines are still the property of the Southwest Metals Company and the tonnage of ore now in reserve (on which the assessment was largely based) is at least 75% of what it was at that time. The only other tangible decrease in their worth is therefore represented by the removal of the equipment which had a maximum value of about $150,000. On this basis the present value of these mines might be assumed to be 75% of $1,600,000; i.e. $1,200,000 provided that the average expectant price of copper could be estimated at 13.5¢ per lb. as it was at that time.

Earnings of the Southwest Metals Company for the first quarter of 1923 were approximately $50,000 with copper selling at about 15¢ per lb.

The gross value of over 10,000 tons of ore produced in '22 and '23 and '24 from the #6 ore body at Bluebell was over $20.00 per ton with copper figured at 13.5¢ per lb. This came from a zone of secondary enrichment and a substantial tonnage of similar high grade ore may be expected in the Blue Buck ore shoots which are only partially developed.

Total production of Bluebell to date 1,200,000 tons, average assay: gold .057 oz; silver 1.4 oz; copper 3.00%.

Reserves:

| | | |
|---|---|---|
| **Positive and Highly Probable** | | |
| Main workings | 79,500 | |
| Blue Buck | 10,000 | |
| | 89,000 | |
| **Partially Developed** | | |
| Main workings | 101,000 | |
| Blue Buck | 30,000 | |
| | 131,000 | |
| Total | | 220,500 |

Average value similar to above say $9.00 per ton. Ore in Blue Buck carries much higher copper, 4.5% but slightly less gold.

Past cost of producing copper after crediting gold and silver varies from 9¢ per lb. to higher figure during war conditions.

Assuming present prices for gold and silver, estimate of future cost from main workings with mill located at mine and shipment of concentrates to custom smelter 10.0¢ per lb.

If smelter were rebuilt at Humboldt and concentrates treated without smelting profit, cost should be reduced to 9¢ per lb.

The higher grade ore from the Blue Buck should serve to produce copper for 9¢ per lb. with small mill at mine or for 8¢ per lb. if concentrates were treated as above at Humboldt.

Total production from DeSoto slightly over 300,000 tons with gold 0.03 oz; silver 2.5 oz; and copper 3%. Reserves of positive and highly probable ore limited to about 15,000 tons but partially developed reserves may be taken at 40,000 tons or more with similar grade to past production. Excellent prospects that further development will open up much new ore in extensions of the main shoots and in the Whale Claim which is only partially explored and where outcrops and other indications are most promising.

Cost of producing copper with mill located at Middleton similar to estimates for production from main workings at Bluebell.

The acreage of land owned by the Company and utilized for the mill and smelter, camp buildings, etc., was about 200.

The water rights on the Agua Fria River covered 200 miners inches (1800 gals. per minute in Arizona.).

This land and water rights together with the remaining structures consisting of stacks and flues, power house, office building and laboratory can be repurchased from the present owner on favorable terms and for a total price of $5000 or less.

L. H. Colvocoresses

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PHOENIX, ARIZONA

September 1940

STATEMENT REGARDING BLUEBELL AND DE SOTO MINES

These properties are located in Yavapai County, Arizona and were worked for many years by the Consolidated Arizona Smelting Company and its successor, the Southwest Metals Company which is still their owner of record.

The reasons for considering their acquisition and reopening are set forth in the following statement which can be amplified by further details, maps etc.

Bluebell Mine: The Bluebell Mine, located on a group of nine patented claims, is a replacement deposit in Yavapai schist. The ore is a mixture of chalcopyrite and iron pyrites with a siliceous gangue and occurs in lenses of varying length and width but uniformly with long vertical axes and the shoots are continuous from the surface to the greatest developed depth.

The mine was operated intermittently from 1895 to 1938 and has produced altogether about one million two hundred thousand tons of ore with a recorded value of over $14,000,000. One million tons of this ore were taken out from 1913 to 1930 under my management. The maximum annual production of 131,000 tons was made in 1918. The mine has been developed for a length of over one mile along the vein and to a maximum depth

of 1570' and it was equipped for operating on any basis up to 400 tons per day. Subsequent to 1932 the equipment was removed and the water has been allowed to rise to its normal level, which is about 800' below the collar of the shaft.

The average value of the ore produced to date has been $2.35 per ton in gold and silver (at present prices) and over 3% copper. The positive and probable ore reserves including the more recent developments in the Blue Buck Claim are approximately 100,000 tons of similar grade and an equal additional tonnage is partially developed. Future developments should materially add to these reserves since it was never the policy of the management to open up the workings very far in advance of actual production and only one of the six ore shoots has actually been bottomed.

The profits earned from the operation of this mine fluctuated widely in accordance with the market price of copper but in the aggregate they were very substantial. The cost of producing copper after crediting gold and silver values varied from a fraction over 9¢ per pound to a considerably higher figure when wages and commodities had risen during the world war period. The ore is very suitable for concentration and if a flotation mill were built at the mine (where a sufficient water supply is obtainable) and modern equipment provided, I think that copper might again be produced for from

9¢ to 10¢ per pound considering the credits for gold and silver at present prices.

The cost of reopening the main shaft and deeper workings and providing equipment for large scale operations would be considerable, and I do not advise any such procedure at the moment but since I believe that a higher copper price will some day maintain, I consider that this situation offers an exceptional opportunity to secure at a very low price the ownership of a property with great potential value.

DeSoto Mine: The DeSoto Mine, comprising a group of 18 patented claims, is also a replacement in Yavapai schist and the geology is similar to the Bluebell. The lenses are smaller and located very irregularly in the mineralized zone which has been developed for a length of about 1000' and to a depth of 900'. The width of the mineralized zone is considerably greater than the Bluebell and extends on both east and west sides of a steep ridge. The lenses on the east slope of the hill, which have been principally worked to date, do not appear to carry much value below a depth of 800' where barren quartz replaces the sulphide minerals, but there is good prospect of finding lateral extensions of these ore-shoots in the upper levels of the mine and also chances of opening up additional ore bodies, some of which are indicated by outcrops or shallow workings. Very

little work has ever been done under the large outcropping on the western side of the hill which would appear to have great promise with depth.

This mine was operated on a small scale from 1890 to 1905 when quite extensive work was undertaken, interrupted by the panic of 1907 and renewed again from 1915 to 1921. Lessees subsequently operated with success until the drop in the price of copper, coupled with the burning of the lower tramway terminal, forced them to discontinue in September, 1930.

Total production of ore appears to have been 300,000 tons with value of about $4,000,000 but at no one time have the developed ore reserves been large. Exploration was naturally neglected by the lessees and the quantity of ore which can now be measured is relatively small but indications point to the discovery of additional ore, particularly under the WHALE CLAIM and a small expenditure for development work might greatly increase the present reserve.

The average grade of ore produced to date has been $2.68 value in gold and silver (at present prices) and 3% copper. Some ore of similar grade remains and in addition there is a very substantial tonnage of lower grade material which cannot be considered commercial under present conditions. This ore should all be concentrated and the recovery by flotation is excellent but little or no profit could be expected except when the price of copper exceeds ~~11¢~~ 18¢ per pound.

In 1921 the Bluebell and DeSoto Mines were assessed by the State Tax Commission at $1,751,558 and the developed ore reserves are now only about 25% less than they were at that date.

Proposed Program of Operation:

After clearing the title and acquiring complete ownership of these two mines, I should propose to concentrate attention upon the Blue Buck ore body. The workings of the Bluebell passed through this shoot and a considerable tonnage of ore was mined below the 300' level but above that point the veins branched into the foot-wall of the ore-bearing-zone and only one of them had been located before the large scale operations of the Bluebell were discontinued. However, a raise had been put up to the surface through which waste, broken in a glory hole, was dropped down for filling in the deeper stopes.

Just prior to the depression of 1930, lessees took over the Blue Buck and using this raise as a shaft, carried forward an exploration in the course of which they discovered the foot-wall ore shoots on the 100' level and mined a small tonnage of excellent ore. This work was resumed in 1936 and the developments opened up similar ore in two parallel veins in the foot-wall of the raise and additional ore in the hanging wall vein previously discovered.

The 1500 tons which were mined and shipped from these upper Blue Buck workings had an average assay of 0.044 oz. gold, 2.00 oz. silver and 6.67% copper equivalent to a gross value of over $16.00 per ton with gold at $35.00 per oz., silver at $0.71 per oz. and copper at 10¢ per pound.

The lessees were working under many disadvantages with a make-shift mining equipment and shipping the crude ore to distant smelters at Magma or Hayden. When the price of copper again fell below 10¢ per pound in the autumn of '37, they found it impossible to continue work with profit but, in my opinion, the showing which they developed can form the basis for a profitable mining and milling operation,- even with a 10¢ copper market.

While the tonnage of positively developed ore is small the indications very definitely point to a reserve of at least 50,000 tons in this section of the mine or easily accessible in other neighboring sections and the grade of this reserve is well in excess of the average of other sections of the property and should be close to $12.00 per ton gross value (with copper @ 11¢ per lb.). Mining and milling this higher grade ore at the rate of 50 tons per day should yield a net profit of $3.00 per ton.

This Blue Buck shoot of ore must first of all be further developed and prepared for stoping and considering the large

part of that work which has already been accomplished, I estimate the cost of this procedure, including the necessary equipment, at $15,000.00.

That the ore will concentrate readily and satisfactorily by flotation is definitely known and there is an excellent site for a mill close to the collar of the main Bluebell shaft from which ample water can be secured and right over which runs the electric power line of the Arizona Power Company. The expenditure involved in the purchase and construction of the mill with all accessory equipment should not exceed $45,000 so that the total investment required to develop and equip the Blue Buck ore body for operation may be estimated at $60,000 after which a three year period of operation should be reasonably assured with a profit of $150,000 assuming that the average price of copper holds at about 11¢ per pound.

Looking further into the future it must be admitted that the ultimate return on the investment will be largely dependent upon the course of the copper market for aside from the Blue Buck ore shoot, I do not believe that it would pay to reopen and work the balance of the Bluebell Mine or any of the ore-bodies at the DeSoto unless a 12¢ copper market were reasonably certain to maintain. At the worst, the claims could be held idle as at present with a carrying charge of about $500.00 per year for taxes and there would always be a substantial salvage from the sale of the mining and milling equipment.

Under favorable market conditions after reopening of the main Bluebell shaft and providing a large mill, a steady production of upwards of 150 tons per day might be anticipated for many years to come with copper produced at a cost of 9¢ to 10¢ per pound.

The future of the DeSoto is obviously more uncertain for either a sufficient tonnage must be developed to justify a local mill or one can only anticipate small scale operations by lessees from which, however, with a copper price of 11¢ or better, the royalties should normally be more than sufficient to cover the carrying charges and net a small annual income to the owner.

**Financial:** Except for the work of lessees at the mines, the Southwest Metals Company became inactive in 1930 and during the next five years sold all of its real and personal property except the 27 patented mining claims in the Bluebell and DeSoto Groups. The Delaware Charter of the Company and its license to do business in Arizona have been rendered subject to forfeiture for lack of payment of taxes and fees and the company has long since ceased to function as a corporation.

The mining claims in due course of time would have been offered at public sale for delinquent taxes but meantime,- and after having failed in all my efforts to revive and re-

finance the company itself,- I have so arranged matters that I can acquire clear title and ownership to all of these mining claims for an additional cash expenditure of about $5000.00 a part of which must be paid for legal services and for the release of the tax liens. It is my intention to acquire such title to this property and then endeavor to finance the re-opening of the Blue Buck as outlined above.

However, since I have already put a considerable amount of money and a great deal of work into this venture, I would gladly welcome sufficient financial assistance to enable me to carry out all or a portion of this program without the further delay that may result from the limitation of my personal resources.

I have already negotiated a tentative arrangement whereby sufficient money for the erection of the mill can be secured whenever the tonnage of the Blue Buck ore body is sufficiently developed and opened up to permit the production of 50 tons of ore per day and therefore the total amount of money now required is $20,000.

For certain other very good reasons and because it will surely be easier to secure the additional $15,000 after the title to the claims is in good shape and the Blue Buck workings more safely and easily accessible, I propose first of all and as promptly as possible to obtain and expend only

the $5000.00 required to acquire the title and in exchange for $4500.00 of this money to be furnished by other parties, I would give them a 45% interest in the ownership of the claims but with the distinct understanding that either they must be able and willing to provide the further funds required for the mining development and equipment or that they would be prepared to proportionately reduce their interest,- along with my own,- in order to procure these funds from outside parties.

It would be very gratifying to me to have as partners in this enterprise a few of those who were particularly interested in the old Consolidated Arizona and Southwest Metals or their close friends and I am therefore first suggesting participation in this subscription for $4500.00 to only a very few people as mentioned in special letter which accompanies this statement.

I hardly need to add that there is always a risk involved in any and every mining investment but since the purchase price of these 27 patented claims will represent only $10,000, I do sincerely believe that either through operation, lease or sale there is far more than a substantial probability that their new owners will get back their principal plus a very tangible but quite unpredictable profit.

S. Ly. Colvocoresses

file 144

12/28/44

# BLUE BELL PROJECT

Assume that from the average grade of the ore to be mined there would be recoverdd 20# of copper plus gold and silver to the net value of 0.50 per ton. If the copper could be sold on the basis of the present Government price of 12¢ per lb. it would be worth 11.86¢ at the refinery and allowing 1.86 for freight and refining and 0.50 for converting this copper would be worth 9.5¢ per lb. in matte. If the ratio of concentration should be 10 to 1 and smelting cost was 2.00 then smelting would represent 20¢ per ton of ore or 1¢ per lb. so that the value of one lb. of copper in concentrates would be 8.5¢ and the value of one ton of ore in concentrates would be 20# Cu X 8.5 $1.70

plus gold & silver 0.50

$2.20 which must cover the cost of mining, milling, repayment of capital investment and profit.

| | | |
|---|---|---|
| The mining cost by open-cut and caving (Miami) methods with production of 10.000 tons of ore per day might be . . . . . | $0.50 | 0.25 |
| Transportation to mills | 0.10 | 0.05 |
| The crushing & milling cost might be | 0.50 | 0.70 |
| Allow for overhead, taxes, etc. | 0.10 | 0.20 |
| Total operating cost | $1.20 | 1.20 |

The capital investment might be roughly estimated as follows:

| | |
|---|---|
| Stripping for open pit work:-- | |
| 10,000,000 tons @ 20¢ ..... | $2,000,000 |
| Tunnel (from Turkey Creek Mill & Smelter Site) for Underground Mining, legnth 25,000' X $100 per ft. .... | 2,500,000 |
| Mining plant, shovels, truck, etc. (say) | 1,000,000 |
| Milling plant, 10,000 tons per day | 5,000,000 |
| Smelting " | 2,500,000 |
| | $13,000,000 |
| Add preliminary drillings, etc. | 1,000,000 |
| Total | $14,000,000 |

The tonnage of ore which might be mined if the ore body proved to have a width of 100' would be

(a) Above the open cut on 300' level from shaft 4200' long X average height of 300' X width 100' = 126,000,000 cubic feet, say 10,000,000 tons

(b) From 300' level to 1600' level = 1300 X 4200 X 100 = 546,000,000 Cu. ft.= say 45,000,000 tons making a total of 55,000,000 tons which might likely be reduced to about 45,000,000 tons on account of ore already mined, or which would be lost in mining and barren sections of the ore zone.

Thus a charge of 40¢ per ton would have to be made against the ore for repayment of capital with interest after making allowance for salvage of equipment, etc.

Add this figure to the operating expense of $1.20 tabulated above and the total cost would be $1.60 to recover $2.20 leaving a net profit of 60¢ per ton less income taxes or $27,000,000 for the entire ore body which on this basis of 10,000 tons per day and 300 working days per year would be worked out in 15 years of operation.

On the basis of the above assumption the venture would be attractive but before reaching any decision it would first be necessary to :--

(1) Establish the length and width and average grade of the ore zone. This can be partially accomplished by a careful examination of the assay maps and other records of the mine and drill holes now in my possession and an examination of the accessible workings down to the water level with further sampling of the cross-cuts. If the investigation up to this point gave favorable results it would then be necessary to reopen the mine to the lowest level and to complete the drilling of lateral holes along the 800' level and to drift out to north and south on the 1500' level and repeat a similar drilling program. More drilling should also be done on the 300' and 500' levels and probably on the 1000 and 1200' levels.

The cost of cleaning out and reopening the longer levels in the mine would likely be $50,000, additional drifting on 500, 1200 and 1500' levels might involve 10,000 ft. @ $20.00 = $200,000 and drilling 100,000 ft. of holes @ $2.50 = 250,000 or a total cost of about $500,000.

In connection with the above program it is recognized that there are many sections of the zone which do not appear to contain any 1% or even 0.5% ore but on the other hand there is still a lot of 2% and 3% ore left in the ore shoots some of which are 20' or more in width that would serve as sweetener. The #3 ore body in the 1500' winze crosscut has a

width of over 20' and at the Blue Buck there are 3 or 4 veins of over 2% ore aggregating over 20' in a zone that is a full 100' in width and lower grade ore is known to exist between them.

Also there is much low grade material left between the large stopes that were worked along the hanging and foot wall ore bodies in the 45 and 50 area between the 800 and 1200' levels and there are many pockets of fair grade ore left in the faulted area around the 1210, 1230 and 1245 stopes.

In the #1 ore shoot a lot of 3% ore was buried under the cave below the Glory Hole and the #2 ore body was never mined below the 7th level (?) altho it contained 2 % ore with better than usual values in gold and silver.

All in all I feel that there is much reason to believe that in many placed there remains at least a 100' width of 1% ore but it is questionable if these sections would be contiguous and what length they would aggregate, but although these important questions could not be answered until the mine was reopened and further developed and drilled much suggestive data can be culled from my files.

(2) The cost of mining can be approximated from a study of the local conditions and records of other properties, some of which I have or can obtain and these should be checked and further inquiry made, and this same applies to the cost of milling and smelting, etc.

(3) As to the necessary capital expenditure this will largely depend upon the plan of operation which may be adopted, the location of the milling and smelting plants, availability of power (which can be probably obtained from the Reclamation Service @ 0.7¢ per kw. hour) and water, (some of which might have to be pumped from the Agua Fria, a distance of miles.

Much second-hand equipment should soon be available including milling and smelting machinery and structures from Clarkdale.

During the earlier operation of the mine up to 1915 the critical grade was 3% and near to the old stopes there may remain a lot of 2% or above the 800' level.

After 1915 we mined ore with as little as 25% copper and for a time down to 2% copper but after 1919 a lot of this low grade material was no longer carried in the estimate of reserves and was actually left in place. Much of this ore carried upwards of $1.00 value in gold and silver and this was true in the case of some material that assayed as low as 1% in copper.

In almost all parts of the mine the limits of the ore were determined by assay and the grade decreased gradually in both the walls and the ends of the ore shoots.

Mention is made of the fact that the silicified zone in the schist had a width of some 600' and the width of the ore zone is noted as being 125' in the vicinity of #1 ore shoot, 140' in the vicinity of #4 ore shoot. 100' in the vicinity of #5 ore shoot.

At the south end of the 610 stope there was a large body of low grade ore left in place and same was true around and below the 420.

The elevation of the collar of the main shaft was determined to be almost exactly 5000' above sea-level and all other elevations should be related to that datum which is called 0.

Then the collar of #5 Shaft is + 100.

Then " " of #6 " " + 162.

| | |
|---|---|
| Summit at north end of working where road caves beyond #6 is | + 200' |
| Summit of outcrop north of #5 is | + 250' |
| Blue Thunder wash is | — 362' |
| 800' level in mine is | — 700' |
| 1500' level in mine is | — 1500' |
| Turkey Creek Canyon almost 4 miles southeast of mine (Portal of proposed tunnel) | — 1600' |

Lateral distances are as follows:--

| | |
|---|---|
| South from main shaft to south end of Glory Hole | 375' |
| Main Shaft to Blue Thunder Shaft | 2200' |
| Main Shaft to Blue Thunder Wash | 2400' |

North from main shaft to:--

| | |
|---|---|
| Raise at north end of 343 Stope | 400' |
| #5 (Blue Buck) Shaft | 850' |
| #6 Shaft | 1725' |
| Summit of outcrop at road crossing | 2125' |
| Length of 800' level is | 4200' |

Strike of vein is N. 25° E.

Dip of vein is 70° N. 65° W.

Dip of shaft is 75° N. 65° W.

Shaft starts some 20' in footwall of ore zone

Maps to illustrate low grade ore body should represent a length of 5000', a height of 2000', a width of 1500' to show slope of waste mining in open pit work. Scale to be 1" = 200'.

Following notes are taken from assay records.

Ore in Crosscuts (Veins)

| | | | | | |
|---|---|---|---|---|---|
| Crosscut | 854 | width | 3' | Cu = | 0.52% |
| " | 855 | " | 6' | Cu = | 2.34% |
| " | 250 | " | 5' | Cu = | 2.60% |
| " | 602 | " | ? | Cu = | 1.46% |

Ore in drill holes

| | | | |
|---|---|---|---|
| In 851 hanging wall | | ? | 2.70% |
| 851 | | 5' | 1.92% |
| 851 " | " width | ? | 3.76% |
| 703 (raise) | | ? | 1.53% |
| 501 hanging wall | | ? | 1.10% |

Hole #25 footwall of 350' stope was drilled for 145' in sericite schist with average of entire width = 0.35% Cu.

#27 in footwall 75' south of S. end of 350 stope 10' assayed 0.55% Cu.

In this section it does not appear that any low grade ore was left in the hanging wall west of the 50 and 55 ore shoots that were mined out but there is pretty surely a lot of ore in the foot wall of these stopes as has been proved by the workings from the Blue Buck shaft down to the 200' level and the width of the ore zone on the 100' level seems to be over 100' and should average at least 17% Cu.

Hole #30.

Hanging wall 20' south of 540 stope as it comes up thru 300' level. First 10' assayed 4.53% copper and was probably mined out later.

Hole #31.

In footwall of 1245 went thru 25' of nearly barren schist and then 5' assayed 3.31% and barren beyond that. Since the 45 shoot is on the hanging wall zone this record probably indicates an extension of the 1240 which probably was not mined and here there should be a good with of + 1% ore.

Hole #32.

In footwall at south end of 1245 went thru 20' of low grade and next 15' assayed 1.85. This substantiates the preceding comment and most of the low grade ore in this section would probably lie along and between the extensions of the 1245 in the hanging wall and the 1240 in the footwall but some of the ore may have been broken up and displaced by the big and little faults.

Hole #35.

Drilled in footwall 32' south of 1255 crosscut, first 6' blank and than 6' assayed 0.54% and balance was only slightly mineralized. Seems probable that the ore zone here had narrowed down with depth especially below the 500' level.

Hole #36.

In hanging wall of 55 shoot drilled 81' south of 1255 Crosscut and showed 15' that assayed over 0.5% Cu.

Hole #39.

Drilled in hanging wall of 952 crosscut went thru diagonally 32' which assayed 1.46% but true width probably not over 20'.

Hole #40.

A vertical hole in face of 952 crosscut showed good ore in the

hanging wall of the 1050 stope. Think this was left in place.

Hole #43.

In hanging wall 55' south of 1055 stope. At 20' cut a vein 5' wide assaying 3.28%. This must be a branch vein or portion of the iron vein in the hanging wall which usually carried a much lower content of copper.

Hole #45.

In hanging wall from 700 level 53' south of extension of 850' stope. For width of 55' assayed 0;65% copper. This might indicate a hanging wall mineralization west of the 50 stope on the 700' level.

Hole #46.

Hanging wall of 700' level 90' north of 850 stope. For width of 42' averageed 0.46%. This confirms preceding comment.

Hole #47.

Hanging wall of 500 north drift opposite 571 crosscut. For 17' averaged 0.17%.

Hole #50.

Hanging wall of 800 south drift. 6' north of breast (Blue Thunder). For 195' averaged 1.19% Cu. This bears out the promise of the surface showings and indicates a wide zone of mineralized ground under the Blue Thunder outcrops.

Hole #54.

In hanging wall at south side of 1400 level south of 1400 station no ore for 155' and then 5' @ 1.37%.

Seems as if this must be a branch vein and west of the ore zone.

Hole #56.

At one end of 1430 south crosscut in hanging wall and blank for 56'

and then 9' assayed 0.5. Probably a branch vein or the iron stringer.

#60.

In hanging wall of 1241 crosscut and 23' from station 1207. Inclined 45° from 145 and assay from 111 to 145 = 0.88% which would represent a vein some 80' west of stope and with a width of about 20' This is probably an extension of the 1245 ore shoot.

#64.

In footwall of 800 south level 800' from south end in Blue Thunder shoot drilled for 154' and showed no ore except from 108 to 111' where 3' core assayed 1.2%.

#65.

In hanging wall opposite #64 drilled for 107' and showed no ore.

#66.

In footwall of 800 south level near station #71 and for width of 87' averaged 0.86%.

#67.

In footwall of 800 south level 100' from south face in Blue Thunder Drilled at 35° angle up i. e. above hole #64 or from 144 to 147' assayed 1.08%, then blank to 211 and for 8' assayed 1.10 and blank from 219 to 260 then 9' assayed 1.07 and blank to end of hole at 273.

#69

Hanging wall of 800 south level 215' south of station #68 drilled for 129' and for 60', i.e. from 60 to 120 averaged 0.75%.

#71.

In hanging wall of 800 south level 131' north of station #68 drilled for 110' and for 20' (from 85 to 105') averaged 1.02%.

#72.

In footwall of 400' south level at south end of drift, drilled for 85' and from 15 to 80' (i.e. for width of 65' averaged 0.44%.

#74.

In hanging wall of 500' level at top of 500 winze drilled for 57' and with incline of 40° down and from 30 to 50' showed 3.18% which probably represented an extension of the 650 ore shoot and may have been mined later.

#75.

In footwall of 500' level 242' south of the 560 crosscut (i.e. in the 550 or Blue Buck ore shoot) drilled for 117' and from 30 to 40' assays 0.5% and from 90 to 117 assays 0.77%.

This hole probably tapped the extension of the B. & C. veins developed in the Blue Buck workings above.

#76. (?)

In hanging wall side of 500' level opposite 75 drilled for 65' and from 20 to 65 assayed 1.45%. This may represent an extension of the 555 ore shoot.

#78.

In hanging wall of 550 and shows no ore for 24' and then 6' which assayed 3%. (May represent 555 ore shoot or iron stringer in the hanging wall).

#80. (?)

Drilled from 1400' winze with dip 65° and showed 15' of ore @ 2.42% (actual width about 6' and this was probably the 1430 ore and same applies to holes #81 - 86 incl., all of which showed ore averaging 2 to 3% copper and much of this was probably mined.

#87.

In hanging wall of 1400' level at point 17' south of 1403 station,- drilled for 155' due west. No ore to 136' and then 14' which averaged 2% copper before entering the true hanging wall of hornblende schist.

#13.

In footwall of 800 level north and opposite 855 crosscut. No ore for 30' and then from 70 to 100' averages 0.54%.

SPECIAL NOTES:-

Above the 100' level and just south of the main shaft there is a block of ore which assays 2.00% copper with 0.03 au and 1.8 ag.

In crosscut from 1500' winze on 1550' level a width of 20' of ore assayed 2.77% and below this to bottom of winze at 1570 the ore averaged over 3%. This is in the 1530 ore body which was developed on the 1500' level for a length of 150'.

The width of the ore zone on the 200,300,400, and 500' levels lying between the footwall of the stopes in the foot wall shoots (10 & 20) and the hanging wall shoot (30) is at least 60'.

The schist in the true foot wall of the ore zone is soft and light colored and might be classed as a serecite schist while the true hanging wall is much harder and darker and might be classed as a hornblende schist.

In many sections of the mine a seam or vein of heavy iron sulphide was noted in the hanging wall with a width of 5 to 10' and generally carrying only a little copper so that it was never mined as ore but this vein and the rock between it and the hanging wall ore shoots might all carry nearly or quite 1% copper and in some places the iron vein carried appreciable values in gold and silver.

A general resume of the conditions as shown by the stope maps and drill holes seems to be about as follows:--

Beginning at the Blue Thunder Wash at the south end of the ore body the surface showings and old workings in adit and shafts show a wide zone of low grade ore with iron capping but copper values have been badly leached near the surface and tonnage and grade are both very uncertain.

The indicated length of this shoot may be some 300' and width, say 100' with average height 100' above the level of the wash. say 150,000 tons of ore. Below the wash there is a depth of 400' to the 800' level representing 600,000 tons and allowing for some additional depth there may be about 1,000,000 tons or more since the ore appears to be wider on the 800' level than on the surface and there is every reason to believe that it will go down some distance below the 800' level.

The average grade of the ore as determined only from D.H. #50 should exceed 1% copper with no record of gold and silver values. From the north end of this shoot no ore has been developed to the south end of the #1 Ore body.-a distance of some 1400' over which there are very few outcrops. On the 800' level I recall that some values were found for a certain distance at a point about midway between the #1 and the Blue Thunder Shoots but for the time being this whole area must be considered as waste until further exploration should prove otherwise.

Beginning at the south end of #1, the mine has been well developed for a length of 1500,-up to the north end of the 55 ore body and for an average depth of 1600' assuming that the 50 and 55 ore bodies continue downwards. The width of this ore bearing zone may be taken as a minimum of 60' and a maximum of 100' and it therefore represents a block of 10,000,000 tons after making allowance for the 1,000,000 tons which has been mined.

Considering the quantity of pay ore which was left in place or caved into the stopes with an average value of 2.5% copper and the quantity of 2% ore which was not considered as pay ore it seems safe to assume that this area including the fills would average over 1% copper and with a gold and silver value of at least $1.00 per ton and there is also the chance of finding the downward continuation of the ore shoots below the 1600' level.

North of the 55 we have a length of 900' which seems to have been mineralized only down to the 500' level, which is 600' below the surface over this length and we do not have much data regarding the width but judging by surface showings and the north end of the Blue Buck workings and Glory Hole this can be assumed at an average of 80'making a block of 4,000,000 tons of 1% ore but with lower values in gold and silver than found further to the south.

The total reserve of 1% ore so far indicated is therefore about 15,000,000 tons and an average recoverably value of 50¢ in gold and silver may be conservatively assigned to this tonnage, the lower limit of which is drawn just below the 800' level up to the #1 Shoot and then at the 1600' level to the north end of the 55 and from that point north at the 500' level to beyond the #6 ore body.

In view of the contour of the surface and the character of the ore which is narrow in comparison to length and depth it seems probable that the best method of access would be thru a shaft that should be sunk vertically in

the hanging wall at a point about 800' west of the 343 stope where the surface is fairly level and shops, etc. could be erected.

Such a shaft with depth of 2000' would probably cost close to $1,000,000 if equipped to hoist 10,000 tons of ore per day and crosscuts would have to be drived to the ore body say. every 200'.

All mining would have to be done by the caving (Miami) method and it would have to start from near the surface and work downward making a mat of timbers, etc. on top of the caved ore to keep this separate from the waste that would come down on top of it.

(Most of the caving would be from the hanging wall and the distance to which this would extend should be carefully calculated as it might seem advisable on this account to sink the main shaft in the footwall, but this would involve longer haulage drifts on each level and perhaps some other disadvantages.

The shaft method of attack would probably save $3,000,000 in capital expense but it might increase the cost of mining and hoisting or other transportation to the mill which on this basis might either be located near to the mine or as before down by Turkey Creek where it could also serve the De Soto.

file 3 vu

# MEMO RE BLUE BELL MINE

## LOW GRADE ORE.

Although the shoots are separated by very low grade material on each of the levels, yet from surface to 1500 and from south end of #1 to north end of #55 there is pay ore found through the entire length of 1500' on one or more of the levels.

Below the 800 there does appear to be a barren section between #1 and #3 shoots upwards of 100' in length. but as I recall the situation the lower projection of #2 shoot along the foot wall and the southward extension of #3 along the hanging wall show low grade basic ore which often assays over 1% copper.

The width of the mineralized zone is more difficult to figure since many of the crosscuts and drill holes appear to have passed thru barren ground and elsewhere the visional appearance of the sample or core did not justify an assay while many of the assays taken in the crosscuts were not posted on the only assay map which is now in my possession.

From existing data and my best recollection of the facts it appears probable that there is much barren rock in this zone but that along the edges of the shoots and extending beyond them along the strike of the ore-zone there remains a lot of 2% ore and a larger tonnage that will average from 1 to 2% and this will all act as a sweetener but to just what extent is very difficult to judge.

# BLUE BELL MINE REPORT.

Eyt G. M. Colvocoresses
February 5th, 1943

## INDEX


| HEADING | PAGE |
|---|---|
| Location | 1 |
| Climatic and General Conditions | 2 |
| Geology and Ore Occurrence | 3 |
| History | 7 |
| Developed and Probable Ore Reserves | 11 |
| #5 and #6 Ore Bodies | 14 |
| Reconditioning the Mine For Operation | 18 |
| Camp Accomodations | 22 |
| Labor | 23 |
| Mining Costs | 23 |
| Concentration of Ore | 24 |
| Marketing Concentrates | 28 |
| Estimate of New Investment Required | 30 |
| Summary and Conclusion | 30 |


LIST OF EXHIBITS TO ACCOMPANY REPORT


A. Map of Mining Claims with Description
B. Large Section Map of Mine and Ore Bodies
C. Section Map of Principal Workings with Assays
D. Extracts from Berkey's Report
E. Record of Mine Production
F. Estimate of Ore Reserves
G. Assay Map of Blue Buck Upper Workings
H. Van Winkle's Report on Blue Buck, 1941.
I. Record of Concentration with Flow Sheet and Extracts from Report of H. R. Banks, 1924.
J. Log of Diamond Drill Holes.

Office Copy (Corrected)

February 5, 1943

Mr. H. N. How, President
Western-Knapp Engineering Company
760 Folsom Street
San Francisco, California

REPORT ON BLUE BELL MINE

Dear Sir:

In accordance with our agreement I submit my report on the Blue Bell Mine, together with exhibits as per list attached.

This report is based on my intimate personal acquaintance with the mine since I first examined it in January, 1913, and subsequently had full charge of its operations from December, 1913, until October, 1929. More recently I have visited it at intervals, particularly during the summer and autumn of 1941, when I was instrumental in having portions of the workings reconditioned and resampled.

LOCATION

The nine (9) patented lode claims which comprise the Blue Bell Group (as per map and list attached as Exhibit A) are located in Yavapai County, Arizona, five miles by road from Mayer and just under four miles from Blue Bell Siding on the Prescott Branch of the Santa Fe Railway.

Blue Bell Siding is 33 miles by rail from Prescott while the road distance from the mine to Prescott is 34 miles, following State Route #69 (Black Canyon Highway). The road from the railway siding to the mine was put in fair condition in the autumn of 1941 but will probably require some repairs at present which may cost as much as $1000. The last mile of this road is built up and down a rather steep grade but it can be made perfectly serviceable for

trucking and serve to replace the aerial ropeway which formerly provided the principal method of transportation between the mine and the railway.

The road distance from the mine to Clarkdale, the site of the nearest custom smelter, is 50 miles and it will probably prove more economical to truck the concentrates all the way rather than to truck them four miles to the siding and then ship 94 miles by rail to Clarkdale.

CLIMATIC AND GENERAL CONDITIONS

The elevation of the Blue Bell shaft is 5000 feet above sea level. The surrounding country is hilly with the Bradshaw Mountains rising to the south and west to a maximum height of over 8000 feet. The Blue Bell claims lie mostly along a ridge extending northeast-southwest and sloping down to a gulch near the south end into which runs a smaller gulch that lies along the western portion of the claims. The surface is rocky and barren with scant vegetation and no large trees. The climate is temperate with warm days and comparatively cool nights throughout the summer while in winter the night temperature is usually below the freezing point and occasionally there is a fall of snow.

The mean annual rainfall is about 16 inches, a large part of which is divided fairly evenly between winter storms of two or three days duration and short but frequent thunder showers during July and August.

Both on the surface and underground mining work can be carried on at all seasons with a minimum of hindrance due to weather con-

ditions. There is no local water supply except from the mine itself which normally made less than 100,000 gallons of water per day. This supply might be increased by opening up two or three of the long holes which were drilled in the hanging wall of the vein and afterwards plugged with the exception of one hole which was drilled from the 800 foot level and furnished a supply of drinking and domestic water that was pumped and piped separately to the camp. The balance of the mine water was not suitable for drinking but should be quite satisfactory for milling.

While the flow that might be obtained from the drill holes has never been fully tested it seems probable that reopening them might permit pumping as much as 150,000 gallons of water daily from the mine. Excess water, if required, would have to be obtained from Big Bug Creek--3½ miles to the northeast or from a branch of Turkey Creek about 2½ miles to the southwest but at a much lower elevation.

The high tension power line of the Arizona Power Company leading to the De Soto Mine and Crown King passes almost directly over the main Blue Bell Shaft where transformers were formerly located and could be replaced,--probably at the expense of the Power Company.

GEOLOGY AND ORE OCCURRENCE

The geology of this mine has been fully studied and seems to be simple, it has been described by numerous geologists who are in general agreement and a published report by Waldemar Lindgren is to be found in U. S. G. S. Bulletin #782 issued in 1926.

The country rock is pre-Cambrian Yavapai schist highly metamorphosed and with different phases ranging from chlorite and sericite schist, as found along the foot wall and throughout most of the mineralized zone, to a very hard biotite or mica schist generally comprising the hanging wall which in many places becomes a dark colored quartzite.

Intrusive post-mineral dikes of diabase (sometimes classified as kersantite) and ledges of limestone are found in places but appear to have no influence on the ore deposit.

In this area of Yavapai schist there is found a remarkably persistent zone or band of silicification apparently extending more or less continuously in a northeast-southwest direction for a distance of over 12 miles, i.e. from beyond the Arizona Binghampton Mine at the north to the De Soto Mine at the south and at both ends as well as in the central portion occur substantial ore bodies which are essentially replacements. The most intense mineralization occurs at the Blue Bell (which is roughly midway between the De Soto and Binghampton) and this has a length of over a mile. Here the width of the silicification is in places close to 600 feet on the surface but the maximum width of the mineralized section, in which more than a trace of copper is found, is about 125 feet. The strike of this ledge is 20-30 degrees east of north and the dip about 68 degrees to the northwest.

The better grade of copper ore is confined to lenses of which seven have been developed in the workings of the mine and all but one of which had a prominent copper-stained gossan outcrop. The long axis of all of these lenses is in the vertical dimension since five of them have been developed to a depth of 1200 feet below the

surface but the greatest length of any one of them along this strike of the vein was a little over 400 feet and the maximum width 40 feet. The average width of all of the shoots over an aggregate length of 1000 feet on the 800 foot level or 1200 feet in the five shoots which were opened up on the 1000 foot level may be taken as about 12 feet.

The ore is essentially a mixture of iron pyrites and chalcopyrites with small quantities of lead and zinc sulphides and a gangue of chlorite, sericite and biotite schist plus a varying percentage of quartz.

Some bornite, chalcocite and gray copper are found on nearly all the levels while oxidation has taken place near the surface usually depriving the outcrops of most of the copper values while in a zone of secondary enrichment, occurring at a varying depth of from 100 to 400 feet, the presence of carbonates, oxides and native copper often raised the normal grade of the ore from 3% to double or treble that amount.

As to the genesis of the ore,--according to petrographic report of Professor Charles P. Berkey (attached as Exhibit D)-the original schist rock was of sedimentary origin but has been highly metamorphosed and deformed prior to or concurrent with the mineralization which he believes to have taken place at one time and from one source which was doubtless a deep seated igneous magma, evidence of which is found in the form of a large granite intrusion lying west of the mine. The ore is primary and the deposition was controlled by the decreasing pressure and temperature in the highly heated solutions which impregnated and replaced the country rock.

Barkey finds no geological reason to think that the grade of the ore will decrease or increase with depth and believes that the actual record of production should be the best guide to this condition and he thinks that chalcopyrite and gray copper will continue to the deepest workings.

Since the mine has produced or still contains in place very nearly 1000 tons of ore for every foot of depth down to the 1500 foot level and there the ore seems to be still holding strong, there would appear to be good grounds for anticipating that its quantity and quality might be maintained for at least several hundred feet.

Analyses of two typical specimens of Blue Bell ore are as follows:

| | Basic | Siliceous |
|---|---|---|
| Au. | 0.06 oz. | 0.04 oz. |
| Ag. | 2.00 oz. | 1.50 oz. |
| Cu. | 3.25% | 3.00% |
| Fe. | 22.00 | 15.00 |
| S. | 24.50 | 17.00 |
| CaO | 1.00 | 1.00 |
| MgO | 1.50 | 1.00 |
| $Al_2O_3$ | 3.00 | 4.00 |
| Pb. | 1.00 | 1.00 |
| Zn. | 1.50 | 1.00 |
| $SiO_2$ | 42.00 | 37.00 |

HISTORY

Copper ore on the Blue Bell Claim was discovered prior to 1895 when an adit drift and later a shaft in what we now term the #6 ore body produced a substantial but unrecorded quantity of high grade copper oxide and carbonate from a short shoot which is reported to have bottomed within 200 feet from the surface. Some of the ore shipped from the adit to the old Boggs smelter carried over 15% copper.

In about 1902 work on the Blue Goat Vein was started and the present main shaft was sunk some 400 feet and stopes were worked in the #1, 2 and 3 ore shoots.

After the Consolidated Arizona Smelting Company acquired the property in 1905 a very substantial production was made until 1908 and again from 1909 to 1913 by which date an examination of such records as were then available, checked by measurements of the larger openings, indicated that some 200,000 tons of ore had been taken from the mine. In February of 1913 when I first examined the property the shaft was sunk below the 700 foot level and my estimate of positive and probable ore was 124,500 tons with average content of 0.5 oz. gold, 1.2 oz. silver and 3.50% copper. By November of that year the shaft had been sunk to the 850 foot level on which four of the ore shoots had been partially developed and the estimated reserves in the mine,—which was then producing about 100 tons of ore per day,—had increased to a total of 154,600 tons of similar grade. This was further increased to 190,720 tons by April of 1914 when the developments on the 850 foot level had made further progress.

Development and production proceeded steadily from that date forward, a record of the tonnage and grade of the latter being

attached as Exhibit E.

In 1915 the shaft was sunk to the 1000 foot level and drifts were extended northward to open up the #4 and #5 ore shoots. These developments were extremely satisfactory especially and the #4 and so called "45" ore bodies proved to be the largest in the mine so that in spite of a greatly increased production during 1915 and 1916, the tonnage in reserve rose to 479,500 tons at the end of that year.

The economic conditions prevailing during '16, '17 and '18;—especially the great demand and very high price of copper during the World War,—resulted in a substantial change in both development and mining policy since ore with only 2% copper had now for the first time become commercial and in place of producing 200 tons per day of 3.5% ore it paid well to increase the stoping width and include all ore that would average 2.5% and also to develop and prepare the ore bodies for the mining of even a lower grade, most of which actually was not mined until 1919 and 1920.

During 1917 and 1918, 254,000 tons of ore were shipped from the mine and at the end of that period the estimated reserve still stood at 470,000 but the average grade had dropped to 2.60% copper although the gold had increased to 0.06 oz. and the silver to 2.00 oz. since the quantity of these metals tended to increase as the ore came from greater depth.

After the close of the war and the precipitious drop in the price of copper, the funds available for development were greatly reduced and during 1921 and the first few months of 1922 the mine was entirely idle, while the Consolidated Arizona Smelting Company

went through a receiver-ship and was reorganized as the Southwest Metals Company. With the resumption of activity in 1922 the shaft was sunk to the 1350 foot level (14th level) and in 1925 to the 1500 foot level, where further development was carried on by drifting and from winze which eventually reached a depth of 70 feet below the level before all mining work in the lower levels was discontinued at the end of 1926.

On the ~~1400~~ 1350 and 1500 foot levels only two ore bodies (#3 and #4) were developed and on the ~~1400~~ 1350 foot level both of these were badly dislocated and broken up by the one major fault which apparently cuts through the entire mine (see Exhibit B and C). On the 1500 foot level the #3 ore came back strong in the solid vein and in so far as the developments went, it proved to be quite as good in both quality and quantity as at any point above, with length being over 100 feet and the width about 15 feet.

A portion of the #4 ore body still showed the effects of the fault above the 1500 and was mixed with waste to some extent in the 1540 stope but the average of samples shown on the map is slightly in excess of 3%. The length of this ore should be over 200 feet with width averaging about 10 feet.

The #3 ore body was being stoped above the 1500 foot level when work was stopped at the close of 1926. The ore in the winze had varied in grade from 3.44 to 2.57% and 50 feet below the level the ore body was crosscut for a width of 20 feet assaying 2.77% copper while a width of some 15 feet assayed better than 3%.

With the beginning of 1927 all work from the main shaft was stopped and pumping discontinued. By April 30, 1930, the water had

risen to a point 975 feet below the collar of the shaft and to the 940 feet mark in 1937 while between that date and September, 1941, (when the water was next measured) it had risen to the normal permanent level which is 640 feet below the collar of the shaft. At this depth there is an underground channel which drains off the flow into the gulch lying south-west of the workings.

During 1927 and until 1931 small scale operations were conducted by lessees, working in the upper sections of the various ore shoots and altogether about 4500 tons of ore were shipped, including 1000 tons from the #5 or Blue Buck shoot, of which the average grade was close to 5% copper.

In 1937 an additional 557 tons was shipped from the #5 shoot averaging 6.60% copper and completing the production of the mine to date which in round figures has amounted to nearly 1,200,000 tons with a general average of 0.06 oz. gold, 1.5 oz. silver and slightly over 3.00% copper representing at present bonus metal prices a gross value of $13.40 per ton.

The key to the record of the Blue Bell Mine is found mainly in the fluctuating course of the copper market. The mine has never been and probably will never be a cheap producer of copper in spite of the credit for gold and silver values. The nature of the ore occurrence with long areas of barren or low grade material between the shoots of pay ore and the limited length and width of these shoots will make for high cost of development while the actual mining was of necessity carried out by shrinkage or cut-and-fill methods.

The operations were further handicapped by the fact that all of the ore had to be sent over the three mile ropeway to Blue Bell

Siding where it was sorted to some extent and then shipped by rail 11 miles to the mill and smelter at Humboldt thus involving an average transportation cost of $0.60 per ton which can be much improved by the construction of a mill close to the collar of the mine shaft. Milling and smelting at Humboldt were always comparatively expensive operations and largely dependent upon the custom ore which was abailable and these conditions,--which largely determined the financial positions of the operating company,-were responsible for the slackening of the development program after 1918 and the final closing of the mine at the end of 1936.

The record of the mine, taken in conjunction with a conservative estimate of the ore reserves (as given below) indicate that it has contained roughly 100,000 tons of ore for each 100 feet of depth. This ratio was not maintained between the 1200 and 1400 foot levels where the principal ore bodies were shattered and displaced by the main fault but the work already done below that fault gives every reason to believe that it will be reestablished as further depth is gained and for an undetermined distance. Except for the fact that values were increased in the zone of secondary enrichment above the 200 or 300 foot levels the average grade of the ore has remained remarkably constant although the varying price of copper made it sometimes advisable to mine down to a 2% limit while in other years the economic line was drawn at 2.5 or even 3%.

DEVELOPED AND PROBABLE ORE RESERVES.

Several factors make it difficult to estimate these with any degree of exactitude. Shortly before the mine was closed down the available ore that was practically blocked out was figured at 90,000

tons while the probable ore was estimated at 100,000 tons. Since that date a substantial tonnage of probable ore has been proved up by the work of the lessees in the #5 ore body but conversely it must be assumed that a substantial but quite indeterminate quantity of this reserve has now become inaccessible except at prohibitive expense and should no longer be taken into account.

Therefore until the mine is actually reopened and partially reconditioned any estimate of this nature must be made with reserve and the detailed estimate which is attached as Exhibit F. is offered merely as the best that can be given under the circumstances:

[redacted]

The main shaft at Blue Bell is sunk in the footwall of the ore zone with crosscuts on each level to the vein and since the incline of the shaft (75 degs) is slightly steeper than the dip of the vein these crosscuts become a little longer on each successive level.

The shaft and crosscuts are in hard rock which stands up very well and while the mine has not been opened or examined since 1930 below the 600 foot level, nor below the 900 level since 1927, there is every reason to believe that these workings, as well as such portions of the drifts as are in the footwall, will still be found in good shape and will require little timber or mucking out.

The location of the various ore bodies and stopes along the strike of the vein is shown on the accompanying section prints of the mine but some of these are offset or overlapping and it is unfortunate that none of the plan maps of the mine have been preserved, so far as I have been able to determine after a very thorough search.

By reference to the main print (Exhibit B) and the assay map

(Exhibit C) it will be noted that in the #1, 2, 3 and 4 ore shoots the bulk of the pay ore has already been mined down to the 1000 foot level, except for sills and pillars, and also some workings in the footwall which last are not clearly represented on these maps. There are still a number of places where cleaning up operations would result in the production of ore and the aggregate tonnage which may thus be produced is substantial but a portion of this work can best be entrusted to a few experienced men who will probably prefer to work as leasers. Fortunately a few such men are locally available. The rate of production from these upper sections of the mine will be slow and uncertain.

The #5 or Blue Buck ore shoot still contains near to the surface a substantial tonnage of ore, some of which is likely to prove of higher than average grade and references to this ore body will be made separately. The best chance of developing new ore in the upper portion of the mine lies in the unexplored sections of the vein between the #5 and #6 ore shoots and in the footwall of the old drifts.

In order that a production of 200 tons per day should be attained and maintained over any long period of time it will be necessary to unwater and clean out the workings down to the 1500 foot level and continue the work from the winze below that level.

Between the 1000 and 1200 foot levels much ore still remains to be mined out from the stopes in the #3 and #4 ore shoots. These shoots were cut and broken up by the main fault between the 1200 and the 1350 foot (14th level) and the work in this section of the mine was and will be expensive while the ore will require a much greater than usual amount of sorting in order to bring it up to grade.

A substantial tonnage can none the less be recovered from above the 1430 and 1440 stopes although it does not appear to me that the map of these workings was revised just before the mining was discontinued and I have somewhat reduced my estimates of the reserve which the maps seem to indicate as having been left in place.

It had been the intention of the management to continue the 15th level both south through the #1 ore body and north through the #5 in both of which the ore proved on the 1200 may be expected to continue downward and this work should be done as quickly as possible.

The principal mining operations must be undertaken from the 1500 foot level above which stopes were started in the #3 and #4 ore shoots but the bulk of the ore still remains above their backs extending up to the 1350 foot level. These two stopes after proper preparation for handling the ore and the waste filling should quickly be able to reach a combined output of over 100 tons per day.

Since the winze in the #3 ore body had already reached a depth of 70 feet where the showing was very promising I believe that it will be advantageous to promptly continue this to a depth of 150 feet and thereafter to sink the main shaft to that point and open up a new level. Past experience in operating this mine had led us to decide that it was good practice to space the levels at intervals of 150 feet and the total tonnage which may reasonably be expected to develop in the #3 and #4 shoots from the 1500 and 1650 foot levels would be in the order of 100,000 while an additional 40,000 tons may be hoped for in the #1 and #5 ore shoots provided these should previously have been proved up on the 1350 and 1500 foot levels.



#5 and #6 ORE BODIES

These merit separate consideration since they are located along

way from the main shaft and have never been so thoroughly prospected as the other sections of the mine.

The special assay map of the #5 (Blue Buck) workings (Exhibit G) will serve to show their condition in the autumn of 1941 and the two veins lying in the footwall contain a substantial quantity of probable and possible ore as referred to in the Van Winkle Report attached as (Exhibit H).

These workings can already be reached through the Blue Buck Shaft and stopes and a connection with the main workings on the 300 foot level can be made with small expense. All of the ore to be mined above the 500 foot level can probably best be trammed out on that level to the main shaft and haulage at greater depth should be provided through the 800 and 1200 foot levels which will probably prove to be in better shape than any of the others although all of them are likely to be caved in places through the stoped out area south of the #5 shoot.

The workings of the Blue Bell Mine passed through the Blue Buck Claim many years ago and a considerable tonnage of ore was mined below the 300 foot level but above that point the veins had branched into the foot wall of the ore bearing zone and only one of them had been located before large scale operations were continued. However, a raise had been put up to the surface through which waste (broken in a glory hole) was dropped down for filling in the deeper stopes.

Just prior to the depression of 1930 lessees took over the Blue Buck and using this raise as a shaft carried forward an exploration in the course of which they discovered the footwall ore

shoots on the 100 foot level and mined a small tonnage of excellent ore.

This work was resumed in 1937 and similar ore in the two footwall veins was found on the 200 foot levels as well as some additional ore in the hanging wall vein which had previously been stoped up from the 300 foot level.

The 1500 tons which have been mined and shipped from these upper Blue Buck workings had an average assay according to settlement sheets of 0.044 oz. gold, 2.00 oz. silver and 6.67% copper.

In the present workings only a small tonnage of ore can technically be classed as positive or highly probable but considering the strength and persistence of the outcrops, the showing in the floor and ends of the drifts and the proven record of all of the similar shoots worked in the Blue Bell Mine, it is a fair and justifiable assumption that a very substantial tonnage will be developed by the extension of the present drifts and at greater depth. It must be borne in mine that this work was all done by lessees, who were under the compelling necessity of mining and shipping ore just as fast as it became available and who had neither the means nor the incentive to prove up tonnage in advance of their production.

On the 100 foot level four parallel veins have been partially developed but one of these is not considered because of the low grade of the ore. The width of ore in each of the other three veins is between 6 and 7 feet, an aggregate width of 20 feet and for each 100 feet of length these three veins, if continuous, will contain 166 tons of ore (@12 cu. ft. per ton) to each foot of vertical depth.

Since pay ore is also found close to the outcrops it may be

assumed that the leached zone has nearly all been eroded away at this point and after deducting the small amount of ore that has been stoped the future yeild of these veins from 100 feet of length and between the 100 foot level and the surface may be estimated conservatively at 15,000 tons.

On the 200 foot level only two of the three veins have so far been proved but since the 3rd vein, lying furthest in the footwall appears to continue down to the 500 foot level (where it is noted in a drill hole) there is a reasonable presumption that the shoots have a length of ~~only~~ over 100 feet and deducting the ore already stoped an additional reserve of 15,000 tons should be found between the 100 and 200 foot levels.

Below the 200 foot level considerable stoping has been done on the hanging wall vein down to the 500 foot level but the other two veins are untouched and because of the developments in the cross cuts and drill holes it is a fair assumption that they will continue downwards and again taking a length of only 100 feet they may be expected to add another 10,000 tons for each 100 feet of depth bringing the aggregate tonnage in the Blue Buck to 30,000 tons above the 300 foot level and to 50,000 tons above the 500 foot level. Actually there is every reason to believe that the length of the ore shoots will prove to be well in excess of 100 feet thus substantially increasing the tonnage.

The grade of this ore varies considerably in different sections of the shoots; the average can not be judged from the production previously described for shipments made by the lessees were taken from the richer sections and the ore was carefully sorted before shipment.

By continuing a system of selective mining with some sorting the grade from this section of the mine may perhaps be kept up to 4% but this will result in reducing the tonnage which is classed as possible in the above discussion of the ore body.

RECONDITIONING THE MINE FOR OPERATION

In the autumn of 1941 the cave around the collar of the shaft was caught up and ladders and timbers were repaired down to the 500 foot level and it was possible to climb down with some difficulty to the 600 foot level, to within about 40 feet of which the water had risen and appeared to be stationary.

To properly repair the shaft down to that point would involve some further work around the collar and new wall-plates, spreaders and guides involving a total expense of probably $5000.00. The shaft timbers from the 600 to 1000 foot levels are likely to be in worse shape than above but below the 1000 they have been under water since soon after the mine shut down and their condition should be good.

To resume operations at Blue Bell the logical procedure will be to first repair the road and next to put in a new collar at the main shaft, erect a suitable head frame and install an electric driven hoist and compressor with transformers and accessory equipment. As the shaft is reconditioned the skip-track and guides can be installed also wiring and piping for air and water and as soon as this work has proceeded to the water level the dewatering can begin. A large portion of the flow came into the mine on or above the 800 foot level and here the sump and main pumping station should still be in good shape and an electric station pump can be installed.

A similar pump should later be installed on the 1500 foot level.

As soon as hoisting and mining equipment is in working order it will be logical to start cleaning out certain of the drifts running to the north, namely the 300 and 500 foot levels and, after the water has been lowered, on the 800,1200, 1350 and 1500 foot levels.

The south drifts should also be cleaned out probably on the 500, 800,1000, 1250, 1350 and 1500 foot levels.

The expense and work involved in this procedure will depend upon the ~~present~~ condition of these drifts which at present is an unknown quantity. From my knowledge of the mine I do not anticipate that there will be much caving in any of the south drifts except the 800 which it may seem advisable to defer re-opening for the time, as only a relatively small tonnage of ore will be rendered accessible from the south side of this level.

A different situation will be found to the north of the shaft for even before the mine was closed there had been large caves in the 40 and 45 stopes and some of the original drifts had to be abandoned and by passes run through the footwall which should still be standing.

My estimate of the expense of this procedure would at present be merely to guess but I think that it would be wise to set aside the sum of at least $40,000 for cleaning and retimbering the old levels down to the 1500 and preparing for operation the stopes in which there remain a sufficient quantity of ore to justify the resumption of mining. To this figure should be added the cost of repairing the shaft and stations which may amount to

a total of $20,000 including the $5000. required to reach the water level. I believe that this is a very liberal estimate.

The new development work which should be promptly undertaken in order to make positive and accessible for mining the ore reserves which are now estimated as probable or indicated are as follows:

(a) #1 ore shoot.

Extend the 1500 foot level to the south for a distance of about 400 feet which should develop the full expected length of this ore body well below the zone of the main fault.

(b) #3 ore shoot.

Sink winze an additional 80 feet in the ore and crosscut at intervals.

(c) #4 and 5 ore shoots (Blue Buck)

Extend both 100 and 200 foot levels in #5 for about 100 feet and crosscut from 3rd level for 100 feet into footwall, with about 200 feet of drifting on footwall veins.

(d) Extend 1350 feet level north to the end of #4 shoot and continue on through the 50 and 55 ore shoots, a total of about 500 feet.

(e) Extend the 1500 foot levels for about the same distance to fully develop the #4, #5 and 55 shoots.

The above will aggregate about 2000 feet of drifting, which I estimate will cost $15.00 per foot or say a total of $35,000 allowing for the added cost of the winze and short crosscuts.

If this work has given satisfactory results, especially the winze in the 1630 and the drifts in the 1510, 1540 and 1550 it

will next be in order to continue sinking the main shaft to the 1650 foot level (i.e. another 150 feet) to crosscut on that level to the vein (say 200 feet) and then to drift for the full length of the above named ore shoots a distance of about 1500 feet. Assuming that the sinking will cost $100. per foot and the crosscutting and drifting $15.00 per foot this additional expense of properly opening up all of the expectant ore ~~on~~ to the 1650 foot level will be in the order of $40,000 with due allowance for sump, station, etc.

For future development,--aside from the continuance of the work at greater depth,--I suggest drifting on the 200 foot level from the #5 to the #6 ore bodies a distance of some 500 feet and also reopening the long drift south on the 800 foot level and further exploring the mineralized area in the Blue Thunder Claim, for which purposes some $14,000 may be required.

The future of the Blue Bell Mine in my opinion lies in working to greater depth, for the ore bodies have held fairly constant from the surface down except for a vertical distance of some 200 to 300 feet where their breaking up ~~&~~ and displacement by the main fault rendered them almost or entirely worthless. It seems reasonably certain that the lower limit of this faulted area has already been passed in the No. 3 ore body and logically we should be well below it on the 1500 level when this is advanced to the No. 1 ore body. The 1500 level should be near the bottom of the fault in the No. 4 ore body, but the 45, 5 and 55 will probably show the effects of the fault down to a depth of 1600 or 1700 feet. It seems probable that an 1800 foot level would cut all the ore bodies as far north as the 55 well below the faulted area, and should such prove to be the case deeper workings in the Blue Bell might yield tonnage comparable to those above

the 1200 where about 100,000 tons of ore was opened up for each 100 feet gained in depth.

It is impossible from present indications to make any definite statements regarding the probable grade of the ore below the fault; but No. 3 shoot, so far as developed, is equal in grade to the average above the fault, and there seems to be no good reason why a similar condition should not exist in all of the other ore bodies.

The policy which may later be adopted in respect to developments at greater depth will obviously be dependent upon the results of the work which is outlined above as well as on other conditions such as the course of the copper market which cannot be foreseen at present.

Further lateral development in the upper levels is not recommended at present since the indications obtained from explorations, by crosscuts and diamond drilling, while inconclusive, were not encouraging (see Exhibit ~~K~~ J). The ore which was found in the Blue Thunder Claim at and near the end of the long south drift on the 800 foot level was very low grade but the work done in that section of the mine was inconclusive.

CAMP ACCOMODATIONS

The mine has been completely dismantled of equipment and, except for a powder house and the basement and portion of the lower story of the old boarding house, there are no structures on the property.

It is believed that it will be possible to arrange for most of the crew to live in the town of Mayer (~~6~~ 5 miles distant) where housing facilities are ample and to drive back and forth to work.

In such event housing for only the Mine and Mill Superintendent and few of the key men would be required at the mine as well as an office and assay office all of which might be provided at a cost of perhaps $10,000.

If later on it should become necessary or advisable to have all of the crew live on the property an additional outlay of some $15,000 might be required.

LABOR

Because of excellent climatic conditions it was always possible in past times to secure a good crew of men at Blue Bell and in spite of the current scarcity of mining labor it is believed that a similar situation still exists. There are a number of men both Americans and Mexicans living in Mayer and vicinity who formerly worked in the mine and who have repeatedly expressed their desire to return there whenever active operations are resumed. Many of these men are over age for the larger mines but still well able to perform a good days work and younger members of their families will doubtless be attracted back to this district as soon as they are offered an opportunity for employment.

MINING COSTS

The costs of mining the remaining ore at Blue Bell will show a wide variation in different stopes but the following is believed to be a fair estimate based on past records and with due regard to present conditions,-as far as these can be visualized and to present costs of labor and materials. These estimates are intended to apply only to the ore which has been wholly or

partially developed and prepared for mining above the 1500 foot level. For all new ore which must be fully developed the cost will be increased by probably 60-75¢ per ton but this charge has been absorbed by the initial investment in respect to all ore tabulated as probable.

Estimate of Mining Cost on Present Developed or Partially Developed Ore Assuming that Prices for Labor, Material and Taxes Remain Approximately as at Present.

| | Per ton. |
|---|---|
| Preparing ore for stoping | 0.35 |
| Breaking ore and sorting in stopes (including filling and timbering) | 2.00 |
| Underground tramming | 0.18 |
| Hoisting | 0.20 |
| Pumping | 0.05 |
| Surface and camp expense | 0.06 |
| Supervision and clerical | 0.10 |
| Sampling and assaying | 0.06 |
| General, property tax, etc. | 0.05 |
| | $3.00 |

This estimate may be compared with the cost records for previous years as given below.

Mining, hoisting, etc. without development:

| | |
|---|---|
| 1915 | 1.567 |
| 1916 | 1.7286 |
| 1917 | 1.8871 |
| 1918 | 2.1558 |
| 1919 | 2.6250 |
| 1923 | 2.25 (about) |

CONCENTRATION OF ORE

The attached record of the Humboldt Mill (Exhibit I) covers the treatment of both Blue Bell and De Soto ores from 1913 through 1923 and also a small tonnage of custom ore which was milled during the last few years.

The mill at Humboldt was originally built in 1905 for the treatment of the De Soto ore which was more siliceous than most of the Blue Bell production. Only a small quantity of ore was treated before the De Soto operations were discontinued in 1907 and when in 1915 the mill was next put in operation, this time with feed from Blue Bell, it was only equipped for gravity concentration which gave very poor results.

Flotation was first installed in the spring of 1914 with marked improvement and subsequently various changes and additions increased the recovery until during the last run in 1923 and again in 1926, the saving in copper was from 91 to 93%, with recovery of about 85% of gold and silver values in the ore.

The flow sheet of May, 1917, which is attached to the record represents the general system employed although some minor changes were subsequently made. Not all of the Blue Bell output was at any time sent to the mill since the more basic ore was needed at the smelter.

The ratio of concentration varied from 3.3:1 to 4.3:1 depending largely upon the needs of the smelter which usually required a heavy iron concentrate whereas had this not been the case the ratio could have been raised to about 5 to 1.

Since some 600,000 tons of Blue Bell ore have been concentrated by flotation it may be confidently asserted that modern practice will permit the recovery in concentrates of at least 93% of the copper and 85% of the gold and silver values with a ratio of concentration of 5 to 1 or somewhat better.

In 1915 when the mill first operated for a full year by flotation treating over 200 tons of ore per day, the cost was

only $1.06 per ton, excluding flotation royalty, but from that time forward there was a steady advance in labor and materials and particularly in the cost of electric power which together over-balanced the economies that were introduced in practice.

The mill at Humboldt had been very unwisely built on level ground so that several elevators were required and the power cost represented just about 33% of the total milling expense.

In a modern hillside mill of good design, much power and electricity could be saved and even considering the present very high scale of wages and cost of most material it is believed that the total direct cost of milling, in which the flotation royalty of some 15¢ per ton would no longer figure, should not exceed $1.25 per ton which may be expected to be distributed about as follows:

Estimate of Milling Cost Based on Previous Operations:

| | Per ton milled. |
|---|---|
| Unloading and sorting ore | $0.05 |
| Coarse crushing | 0.15 |
| Fine Grinding | 0.47 |
| Flotation | 0.30 |
| Filtering and handling concentrates | 0.12 |
| Supervision and clerical | 0.08 |
| General expense, property tax, insurance, etc. | 0.03 |
| TOTAL | $1.25 |

Included in the above figures are charges for maintenance and repairs, also the estimated cost of power which should not exceed $0.30, water and compressed air. The payment of compensation, insurance, social security and unemployment taxes, etc. are considered as part of the cost of labor. It is believed that these figures are very liberal.

Attached to the report as part of Exhibit I is a print of the flow sheet of the mill and portions of a report on the treatment of the ore by H. R. Banks who was Mill Superintendent

at Humboldt in 1923 and now holds a similar position with the Consolidated Smelting Company of Canada where several thousand tons of ore per day are treated in the Sullivan Concentrator. Needless to say that Mr. Banks or any other competent metallurgist would at present substantially revise some of his recommendations in the light of modern practice and with the development of modern reagents.

It is now proposed that a new all-flotation mill, designed to eventually treat 200 tons of ore per day should be erected on sloping ground just south of the collar of the main shaft and that the ore should be transferred over a picking belt from the mine bin directly to the coarse crushing plant and from there to the fine ore storage bin in the mill. From 5 to 10% of waste will probably be sorted out on the belt but all costs are figured on the basis of tons of sorted ore or mill feed.

Electric power is already available at this point and water in sufficient quantity should be pumped from the mine. The slope of the hillside site is from 20-30 degrees and at the foot of the mill there should be constructed a bin for the concentrates to which a short stretch of new road will have to be built so that these concentrates can be loaded directly into trucks for haulage to Blue Bell Railway siding (four miles) or all the way to the Clarkdale smelter (50 miles).

The flow sheet and design of the mill and detailed estimate of costs of erection and operation will be prepared and furnished by others as will also the detailed estimate of the mining equipment.

MARKETING CONCENTRATES

It is expected that all of the ore produced from the mine will be concentrated and the concentrates will be shipped to any one of three custom smelters, namely Phelps Dodge (United Verde) Smelter at Clarkdale, Magma Copper Company Smelter at Superior, A. S. & R. Company smelter at Hayden.

Considering that almost identical terms are offered by these three plants it is probable that the shipments will be made to Clarkdale and the following calculations are made on that assumption.

Based on the ore reserves tabulated in Exhibit F the average grade of the sorted ore which will constitute the mill feed is taken to be 0.04 oz. gold, 1.5 oz. silver and 2.75% copper with a recovery in concentrates of 95% of the copper and 85% of the gold and silver and the ratio of concentration is estimated as 5 to 1 so that the concentrates will assay 0.17 oz. gold, 6.38 oz. silver and 12.79% copper. The smelter will pay:

| | | |
|---|---|---|
| For all gold @ 32.2 per oz. | $5.47 | per ton concentrates |
| For silver less 0.5 oz. @70¢ | 4.16 | " " " |
| For copper less 15# @ 9.275 | 22.53 | " " " |
| The Metals Reserve Corporation will pay a bonus price of 5¢ per pound on 241# copper | 12.05 | |
| Total payments . . . . . | 44.01 | |

| | | |
|---|---|---|
| Less: | | |
| Treatment charge | $5.00 | |
| R. R. freight (with allowance for moisture) | 2.06 (about) | |
| Truck from mill to siding with allowance for moisture | 1.10 " | |
| | 8.16 | 8.16 |
| Net value of concentrates at mill. | | $35.85 |

See note

Representing five tons of sorted ore or equivalent to $7.17 per ton of ore.

The operating expenses chargeable against each ton of ore will be about as follows according to my previous estimates:

| | |
|---|---|
| Mining | $5.00 |
| Milling | 1.25 |
| General expense and overhead, say | 0.12 |
| | $4.37 |

Should add sales tax = 0.09

4.46

2.71

Leaving a margin of $2.80 per ton from which the operator will have to repay the initial investment.

NOTE

[In all cost estimates for both mining & milling I have used the old rate for electric power which was about 1.5¢ per kilowatt hour but I believe that a better rate can now be obtained and also that better terms for the treatment of concentrates than those set forth can be procured. The costs include the property tax and operating taxes for social security and unemployment, also premiums on industrial insurance but they do not include any sales or income taxes nor royalty to the owner.]

The total cost of producing and marketing the 48.2# of copper which will be paid for in each ton of ore thus works out at about 11.27¢ per pound after crediting the amount which will be paid for the gold and silver in the ore and with no charge for royalty to the owner, depreciation, depletion, or amortizing the new investment which is now required and which is tentatively summarized below:

## ESTIMATE OF NEW INVESTMENT REQUIRED

| | | |
|---|---|---|
| | Repairs to road | $1,000 |
| X | Mine equipment and power house and charge room | 40,000 |
| | Repair and equip shaft to 1500 level with head frame | 20,000 |
| | Recondition levels and stopes | 30,000 |
| | Camp buildings, office and dwellings | 10,000 |
| | Accessory equipment and bin at siding | 10,000 |
| X | Mill buildings and equipment (say) | 100,000 |
| | | $211,000 |
| | Subsequent underground development to 1650 foot level. | |
| | New drifts, etc. on 1500 level and above | 35,000 |
| | Deepening shaft and development work on 1650 foot level | 40,000 |
| | Lateral developments on upper levels | 14,000 |
| | TOTAL | $300,000 |

X Estimates to be revised by Western-Knapp Engineers.

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## SUMMARY AND CONCLUSION

Since the metallic contents of the Blue Bell ore is nearly always greatest at the center of the ore shoots, then gradually shades off into the wall rock, it is evident that there is an inverse ratio between the tonnage and value of the ore and that economic conditions establish the lower limits of the material which it will pay to mine and mill at any given time.

Based upon the estimated reserve as tabulated in Exhibit (F) and my past experience in operating this mine I have now assumed that the pay ore should average 2.75% copper with gross values in gold and silver of about $2.50 per ton and on that basis I estimate that the recoverable tonnage developed as positive or reasonably probable by the existing workings is from 102,000 to 113,000 tons while the additional ore which should be proved by the development work which I have recommended,--including the ore which should be found between the 1500 and the 1650 foot levels,--is from 119,000 to 137,000 tons, partially doubtful. All developed and probable ore ~~taken~~ is estimated at an average grade of 2.75% copper, 0.04 oz. gold and 1.5 oz. silver.

The investment involved in reopening this mine and providing it with first class mining and milling equipment is tentatively figured at $211,000 with an additional estimate of $[illegible],000 to fully develop the indicated ore bodies down to the 1650 foot level.

Such a procedure should result in proving a substantial quantity of ore which cannot now be classed as even probable and in making accessible for mining a total of 300,000 tons of the estimated grade, if the ore shoots hold strong to that level. As long as the present bonus price of copper is maintained along with the current scale of wages and prices of essential commodities the operations should stand a substantial charge per ton to repay the initial investment and still earn a satisfactory profit to the operators.

Production of ore should commence within six or eight months from the time when active reconditioning and construction was

started and the full output of 200 tons of ore per day containing about 11,000 pounds of recoverable copper should be attained within the next two or three months and thereafter should be continuous for at least three years or as long as present economic conditions prevail.

Yours very truly,

S. M. C.

Bluebell file TRAMWAY

Blue Bell Mine,
Mayer Ariz.
April 11, 1918.

Mr. Wm. C. Starr,
U. S. Steel Prod. Co.,
Los Angeles, Cal.

Dear Sir:

Your favor of March 28th in regard to operation costs on the Blue Bell Tramway has been referred to me.

The following costs represent the actual operation and repair costs and are entirely separate from the ore sortingcosts, etc.

Length of Tramway 3.3 Miles.
Capacity per Hour 20 Tons.
One operator each end on each of 3 shifts.
Wages paid operators, $4.65 per day
Wages of repair man part time.
Wages of Foreman part time.
During 1917 shipped 106,915 Tons.

| Charge. | | Total | Per Ton |
|---|---|---|---|
| Labor | Repairs | $ 2367.05 | $ .0222 |
| " | Operations | 13614.50 | .1273 |
| Supplies | | 2451.25 | .0229 |
| Power | | 1387.54 | .0129 |
| | Total | $ 19820.34 | $ .1853 |

Costper ton mile $.05615

Yours very truly,

(Signed) W. V. D. Camp,

Mine Supt.

TONS OF ORE SHIPPED TO HUMBOLDT - 1918

| | Dry T. | Au Ozs | Ag Ozs. | Cu Lbs | Cost P T |
|---|---|---|---|---|---|
| Smelting Ore | 70,005 | 4,998.70 | 129,957.1 | 4,137,220 | $ 3.7861 |
| Concntg. Ore | 61,085 | 3,252.35 | 73,038.5 | 3,126,559 | 3.7861 |
| T O T A L | 131,090 | 8,251.05 | 202,995.6 | 7,263,779 | $ 3.7861 |

AVERAGE ANALYSIS OF ORE SHIPPED

1918

| | Dry Tons | Au. Ozs. | Ag. Ozs. | Cu. % |
|---|---|---|---|---|
| Smelting Ore | 70,005 | .0714 | 1.856 | 2.055 |
| Concentrating Ore | 61,085 | 0532 | 1.196 | 2.559 |
| T O T A L | 131,090 | 0.0629 | 1.548 | 2.771 |

?

1919

1920

## TONS OF ORE SHIPPED TO HUMBOLDT - 1918

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?

1919

1920

## BLUE BELL MINE - COST OF MINING AND TRANSPORTATION

| | 1915 | | 1916 | | 1917 | | 1918 | | 1919 | 1920 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Per Ton | Total | Per Ton | Total | Per Ton | Total | Per Ton | | |
| Jan. | $ 18,384.07 | $ 2.452 | $ 17,327.27 | $ 3.372 | $ 21,017.89 | $ 2.973 | $ 36,828.03 | $ 3.1886 | | |
| Feb. | 16,610.32 | 2.482 | 19,567.63 | 2.823 | 25,379.22 | 2.7918 | 31,221.95 | 3.1483 | | |
| Mar. | 18,735.47 | 2.539 | 24,359.39 | 3.549 | 25,593.51 | 2.9018 | 37,201.22 | 3.4005 | | |
| Apr. | 16,823.24 | 2.660 | 22,109.15 | 3.373 | 26,344.01 | 3.9121 | 43,246.17 | 3.9059 | | |
| May | 18,799.41 | 2.477 | 23,318.11 | 3.482 | 27,509.18 | 3.0340 | 38,408.55 | 3.4306 | | |
| Jun. | 17,955.73 | 2.491 | 24,395.90 | 4.417 | 29,367.60 | 3.6322 | 42,234.55 | 3.8482 | | |
| Jul. | 18,579.11 | 2.499 | 23,901.88 | 3.858 | 30,431.72 | 3.6263 | 43,153.80 | 3.5062 | | |
| Aug. | 20,169.92 | 2.869 | 21,400.41 | 3.885 | 32,475.48 | 3.7388 | 43,710.31 | 3.5893 | | |
| Sep. | 17,159.05 | 2.800 | 22,996.44 | 3.435 | 30,845.42 | 3.3466 | 44,747.72 | 4.1797 | | |
| Oct. | 17,006.70 | 2.653 | 24,089.88 | 4.103 | 34,401.09 | 3.5385 | 47,323.15 | 4.0909 | | |
| Nov. | 18,615.28 | 2.959 | 19,765.00 | 3.736 | 30,820.36 | 3.6822 | 41,788.13 | 4.4389 | | |
| Dec. | 17,236.24 | 2.788 | 24,482.54 | 3.139 | 30,202.97 | 3.1726 | 46,452.26 | 5.0132 | | |
| TOTALS | $ 216,074.54 | $ 2.629 | $ 267,713.60 | $ 3.565 | $ 344,388.45 | $ 3.3501 | $ 496,315.84 | $ 3.7861 | 4.006 | 4.49 |

The cost of $2.629 per ton for the year 1915 includes $0.273 for development work.
-do- 3.565 -do- 1916 -do- 0.84174 -do-
-do- 3.3501 -do- 1917 -do- 0.57739 -do-
-do- 3.7861 -do- 1918 -do- 0.5095 for development plus $0.0780 for exploration.

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-do- 3.7861 -do- 1918 -do- 0.5095 for development, plus $0.0780 for exploration.

BLUE BELL MINE --- TONNAGES OF ORE SHIPPED

| | 1913 Tons | 1914 Tons | 1915 Tons | 1916 Tons | 1917 Tons | 1918 Tons | 1919 | 1920 |
|---|---|---|---|---|---|---|---|---|
| Jan. | 3,387 | --- | 7,498 | 5,138 | 7,069 | 11,550 | | |
| Feb. | 3,214 | 1,058 | 6,693 | 6,932 | 9,091 | 9,917 | | |
| Mar. | 2,354 | 3,528 | 7,378 | 6,864 | 8,820 | 10,940 | | |
| Apr. | 3,336 | 3,826 | 6,325 | 6,555 | 6,734 | 11,072 | | |
| May | 3,356 | 3,953 | 7,588 | 6,697 | 9,067 | 11,196 | | |
| Jun. | 2,439 | 5,164 | 7,209 | 5,523 | 8,085 | 10,975 | | |
| Jul. | 2,957 | 5,287 | 7,435 | 6,195 | 8,392 | 12,308 | | |
| Aug. | 3,184 | 6,102 | 7,031 | 5,509 | 9,217 | 12,178 | | |
| Sep. | 3,320 | 5,266 | 6,129 | 6,695 | 8,686 | 10,706 | | |
| Oct. | 3,748 | 6,821 | 6,411 | 5,871 | 9,722 | 11,568 | | |
| Nov. | 3,918 | 7,405 | 6,291 | 5,291 | 8,370 | 9,414 | | |
| Dec. | 1,579 | 7,648 | 6,183 | 7,800 | 9,520 | 9,266 | | |
| TOTALS | 36,792 | 56,058 | 82,171 | 75,070 | 102,773 | 131,090 | 122,069 | 111,749 |
| Average P.Month | 3,066 | 5,096* | 6,848 | 6,256 | 8,564 | 10,924 | | |

*11 months only.

BLUE BELL MINE --- TONNAGES OF ORE SHIPPED

| | 1913 Tons | 1914 Tons | 1915 Tons | 1916 Tons | 1917 Tons | 1918 Tons | 1919 | 1920 |
|---|---|---|---|---|---|---|---|---|
| Jan. | 3,387 | --- | 7,498 | 5,138 | 7,069 | 11,550 | | |
| Feb. | 3,214 | 1,058 | 6,693 | 6,932 | 9,091 | 9,917 | | |
| Mar. | 2,354 | 3,528 | 7,378 | 6,864 | 8,820 | 10,940 | | |
| Apr. | 3,336 | 3,826 | 6,325 | 6,556 | 6,734 | 11,072 | | |
| May | 3,356 | 3,953 | 7,588 | 6,697 | 9,067 | 11,196 | | |
| Jun. | 2,439 | 5,164 | 7,209 | 5,523 | 8,085 | 10,975 | | |
| Jul. | 2,957 | 5,287 | 7,435 | 6,195 | 8,392 | 12,308 | | |
| Aug. | 3,184 | 6,102 | 7,031 | 5,509 | 9,217 | 12,178 | | |
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*11 months only.

# B L U E  B E L L  M I N E

## METAL CONTENTS OF ORE SHIPPED

| | Gold Ozs | Silver Ozs | Copper lbs |
|---|---|---|---|
| 1913 | 1,711.42 | 48,920.8 | 2,765,166 |
| 1914 | 2,064.15 | 71,526.48 | 4,078,021 |
| 1915 | 2,795.43 | 91,118.8 | 4,887,469 |
| 1916 | 3,411.57 | 90,048.5 | 4,921,367 |
| 1917 | 6,062.01 | 150,115.6 | 6,528,635 |
| 1918 | 8,251.05 | 202,995.6 | 7,263,779 |

## AVERAGE ASSAY OF ORE SHIPPED

| | Gold Ozs | Silver Ozs | Copper % |
|---|---|---|---|
| 1913 | .0465 | 1.330 | 3.758 |
| 1914 | .0368 | 1.276 | 3.637 |
| 1915 | .0340 | 1.109 | 2.97 |
| 1916 | .0454 | 1.200 | 3.278 |
| 1917 | .059 | 1.461 | 3.176 |
| 1918 | .0629 | 1.548 | 2.771 |
| 1919 | .0603 2.82 | 1.426 | 2.582 |
| 1920 | .0547 2.30 | 1.2139 | 2.368 |

## DEVELOPMENT WORK PERFORMED

| | |
|---|---|
| 1913 | 1,299 feet |
| 1914 | 1,411 " |
| 1915 | 2,743 " |
| 1916 | 4,819 " |
| 1917 | *3,676½ " |
| 1918 | **4,638½ " |
| ~~1919~~ 1920 | ~~2,821~~ " |

*Including 215½ ft. Shaft sinking.

**2,552½ ft. in Waste
2,086 ft. in Ore

# BLUE BELL MINE

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*Including 215½ ft. Shaft sinking.

**2,552½ ft. in Waste
2,086 ft. in Ore

CALCULATION OF GRADE OF ORE NECESSARY THAT MILLING ORE FROM

BLUE BELL MINE BE PROFITABLE.

| | |
|---|---|
| Estimated cost of mining & freight per ton..... | $ 4.00 ? |
| " " " concentrating " " ..... | 1.00 |
| " " " smelting " " ..... | 1.00 |
| | $ 6.00 |

| | |
|---|---|
| Gold value of Mill ore, estimated..... | $ .75 |
| Silver " " " " " ..... | .80 |

| | |
|---|---|
| $ .75 Au. @ 65% Recovery..... | $ .49 |
| .80 Ag. @ 75% " ..... | .60 |
| | $ 1.09 |

| | |
|---|---|
| Estimated cost of Mining, Conc.& ~~Milling~~ Smelt..... | $ 6.00 |
| Total recovered gold & silver values..... | 1.09 |
| | $ 4.91 |

$4.91 = net value of recovered copper necessary

90% mill recovery plus 95% smelter recovery = 85.5% net recovery.

Copper @ 14¢ = 11½¢ Net

$4.91 @ 11½¢ = 42.6 pounds recovered copper

42.6 pounds @ 85.5% recovery = 49.9 pounds gross copper or 2.5%

2.5% copper ore necessary to break even on operation copper at 14¢

Humboldt, Ariz.,
JLW:T
Aug. 11, 1922

4.00
1.00
1.00
6.00

115
50
5.75
1.00
6.75

3%

SOUTHWEST METALS COMPANY
(Memo re Taxes) 5/9/36

Bluebell and De Soto Mining Claims contain 543 acres of patented land.

Bluebell group of 180 acres valued at $25.00 per acre equals $4500 @ 1934 rate of 2.51 represents tax of $113.00 per annum. De Soto group of 360 acres at same value per acre represents tax of $226.00 per annum---Total $339.00.

On January 23rd, 1935, County Treasurer stated that the delinquent taxes on all this property plus penalty and interest amounted to $428.80. By May, 1936, this has probably been increased to a total of nearly $800.00 and there is also a tax of some $40.00 or so due the State Corporation Commission.

SUMMARY OF THE ASSETS OF

CONSOLIDATED ARIZONA SMELTING CO.

1927

| | |
|---|---|
| HUMBOLDT IMPROVEMENT COMPANY PROPERTY (As per appraisal) | $ 90,702.00 |
| WESTERN METALLURGICAL COMPANY STOCK (at Cost) | 25,250.00 |
| REAL AND PERSONAL PROPERTY OF CONSOLIDATED ARIZONA SMELTING COMPANY (as per appraisal) (including warehouse stock and supplies as per special inventory) | 1,503,596.73 |
| STOCK AND INTEREST IN SWANSEA LEASE, INC. (at Cost) | 190,000.00 |
| BLUE BELL MINE (assessment by Tax Com.) | 1,521,228.00 |
| DE SOTO MINE (assessment by Tax Com.) | 230,330.00 |
| TOTAL VALUE OF ASSETS (not including the value of any goodwill enjoyed by the Smelter as a custom treatment plant) | $ 3,561,106.73 |

Bluebell. 1521 228

De Soto 230.330

1,751,558

## 2. Blue Bell Mine.

**Patented Mining Claims: (Big Bug District).**

| | | |
|---|---|---|
| Blue Bell..... | 61.192 Acres... | $ 10,000.00 |
| Blue Buck..... | | |
| Blue Coat..... | | |
| Blue Thunder... | | |
| Victory No. 1. | | |
| Victory No. 2.. | 118.004 " ... | |
| Victory No. 5.. | | |
| Victory No. 6.. | | |
| Victory No. 7.. | | |
| | 179.196 Acres. | |

| | |
|---|---|
| Improvements on Patented Mines | 2,000.00 |
| **Personal Property:** | |
| Tramway | 1,000.00 |
| Power Transmission Line | 3,500.00 |
| Sorting Plant | 50.00 |
| Wagons etc. | -.-- |
| Mining Machinery & Supplies | 3,000.00 |
| Office & Household Furniture | -.-- |
| New Bunk House | 1,000.00 |
| Powder Magazine | -.-- |
| Bins at Siding | 1,000.00 |
| Water Well & Equipment, incl. Land | 100.00 |
| New Heating Plant | 100.00 |
| New Boarding House | 1,500.00 |
| Mine Pumps | 250.00 |
| Miscellaneous Equipment | 300.00 |
| Mexican Dwellings (5) | 125.00 |
| Total Blue Bell Mine | $ 23,925.00 |

## 3. Humboldt.

**Real Estate & Improvements thereon:**

**A. Patented Millsites:**

| | |
|---|---|
| Bashford Millsite, alias Agua Fria Millsite<br>Blue Thunder Millsite<br>Victory No. 1. Millsite<br>Victory No. 2. Millsite | $ 100.00 |

**B. Township 13, North Range 1 East.**

| | | |
|---|---|---|
| Section 14: | Part S½ of SW ¼ | |
| Section 23: | NE¼ of NW¼<br>Part of NW¼ of NW¼<br>S½ of NW¼ | 500.00 |

| | |
|---|---|
| **C. Improvements thereon** | 5,000.00 |

**D. Humboldt Townsite:**

| | |
|---|---|
| Block 15 | 100.00 |
| Improvements thereon | 750.00 |

**E. Well's Addition to Humboldt:**

| | |
|---|---|
| Block No. 1....Lot 7-13 & 15-22 incl<br>Block No. 2....Lot 1-13 incl<br>Block No. 8....Lot 27-36 incl | 150.00 |
| Improvements on Block No. 8 | 250.00 |

**Personal Property:**

| | |
|---|---|
| Wagons etc | -.- |
| Typewriters, Calculating Machines etc | 200.00 |
| Laboratory Equipment | 150.00 |
| Chaparral Pumping Plant | 100.00 |
| Agua Fria Pumping Plant | 150.00 |
| Pond Pumping Plant | 150.00 |
| Wooden Water Tank | 50.00 |
| Milling Machinery & Supplies | 10,000.00 |
| Smelter Appurtenances | 30,000.00 |
| Hospital Equipment | 100.00 |
| Office & Household Furniture | 1,000.00 |
| Cadillac Roadster<br>Cadillac Touring Car<br>Nash Six Touring Car (Tax paid)<br>Dodge Commercial<br>Nash Truck | 750.00 |
| Work Horse | none. |
| two Saddle Horses | 50.00 |
| Storage Bins | 3,000.00 |
| Crushing Plant | 1,000.00 |

**Total Humboldt** $ 53,550.00

## S U M M A R Y .

| | |
|---|---|
| 1. De Soto Mine..... | $ 13,920.00 |
| 2. Blue Bell Mine..... | 23,925.00 |
| 3. Humboldt..... | 53,550.00 |
| GRAND TOTAL..... | $ 91,395.00 |

Humboldt, Arizona, April 30th, 1926.

Bluebell Mine
Mayer, Ariz.
Jan. 18th. 1924.

Mr. J. L. White
Genl. Mine Supt.
Humboldt. Ariz.

Dear Sir,

I beg to submit the following brief report upon operations for the year 1923.

---

EXTRACTION.

Steping operations, which have been conducted on every level of the mine below the 400 in the old section of the mine and on the 300, 400 and 500 levels of the #1 Shaft section have produced 80810 tons at an average of $4.13 per ton .

This includes a considerable sum expended in the preparation of some of the old stopes for the recovery of the ore left in the shape of broken ore and pillars.

Six stopes have been completely worked out viz:- 562, 610, 720, 1210, 1240 and 1255. All other stopes have still a variable available tonnage, some of which however will be difficult to recover owing to the peculiar manner which will probably have to be used in its recovery. This mainly applies to the pillar of the 710 stope, under the 600 level.

Approximately 55000 tons of highly probable ore remains in the mine, preparations for the recovery of which should be immediately taken up irrespective of the results of the proposed developments on and below the 1400 level. This tonnage, with proper preparation, can be mined at the rate of approximately 5000 tons per month for 8 months and the remainder at a gradually reducing tonnage to 3000 tons with 70 men, effective. The cost per ton for the 5000 ton schedule would be under $4.00 and about $4.25 for the 3000 ton

DEVELOPMENT.

The #1 Shaft was cleaned out, re-timbered and sunk to the 410 Ft. level. Ore was first found in the 310 Station crosscut and has been developed by the 310 and 410 North and South drifts with connecting raises betweem levels. The ore apparently does not persist upwards from the 310 level only in close proximity of the respective faults at the North and South ends of the shoot. Drifting North is now in hand to prospect for the faulted portion of this ore as shown on surface. This work is being done on the 410 level.

The 310 level South after passing the end of the ore shoot, soon encountered the oxide and carbonate ore of the upper portion of the "65" and "60" ore bodies, which however has been so scattered that no definite reserve can be placed on it.

The 410 South has 500 feet of virgin ground to prospect, laterally, with whatever other development may be thought necessary and a considerable amount of development is necessary in this section to thoroughly determine its merits.

The 930 Footwall raise was put up on ore which is lying in the footwall of the 930 stope and has shown that there is ore worthy of consideration here, but owing to the fact that this ore is only 5 feet in the footwall of the old stope, which is waste-filled, it becomes necessary to empty this fill into the 1030 stope to safely work the ore. The stoping of the footwall ore of the 1030 stope has delayed this work.

The 1400 North drift has been driven 92.0 feet, following the fault, which has faulted the 1445 and 1450 ore bodies. Immediately under the fault there is a heavy sulphide ore which varies 6 inches to 2.5 feet wide and assays from 1.0% to 5.5% Cu. while under this lies a lower grade siliceous ore assaying from 1.0% to 3.5%. The face of the drift now assays 1.28% Cu. and is

composed, almost entirely of the siliceous ore, the heavier sulphide ore having apparently dropped lower under the fault. This ore is evidently the "45" and "50" ore, which, as shown on the 1450 sub-level is one continuous orebody but pinched to almost ~~xxxxxxx~~ nothing in the vicinity of the cross-fault. The extent and value of the ore below the fault on the 1400 level will b determined definitely by the proposed development during the next few months.

The 1451 raise was put up on the fault from the 1400 level and shows fairly conclusively that the ore on the 1400 is below the fault while that on the sub-level is above it, but to add further evidence on this point and to facilitate working the ore above the sub-level, a raise must be put up from the level further north.

The Diamond-drilling, amounting to 1977 feet on the 800, 1200 and 1400 levels failed to show ore of commercial extent.

The attached summary shows the cost of the underground work in the various workings.

Yours very truly

Thomas L. Davey

Mine Superintendent.

FORM 119

COPY FOR

# SOUTHWEST METALS COMPANY

HUMBOLDT, ARIZONA

1924 (?)

## NOTE REGARDING RECENT DEVELOPMENT

## AT

## BLUE BELL MINE

1924 ?

The most important recent development at Blue Bell consists of the exploration of the 1445 ore body, below the bottom of the winze - i.e., from 50 ft. below the 1400 level downwards. This exploration is accomplished by five Diamond Drill holes from the bottom of the winze, as per sketch herewith attached. A sample which was intended to represent the average of the cores of these drill holes has been assayed at Clarkdale and analysis is as follows:

Check assay
Should only 2% + Cu

| | | |
|---|---|---|
| Gold = | .14 Oz. | Combined Gold and Silver value of this material - $4.60 per ton. |
| Silver= | 2.72 " | |
| Copper= | 6.34 % | |

Results of this assay is surprisingly high and we cannot believe, off-hand, that the ore is as good as this result would indicate, since it is much richer than anything which is found in the winze or in the vein directly above on the 1400 level.

A chuck sample is now being made up from the drill cores and will be analyzed as rapidly as possible. (Check only 2% Copper.

Another important development was the drilling of the 1430 ore body on the 1400 level. The ore had a width of 6 ft., and sample from the core analyses :-

| | | |
|---|---|---|
| Gold= | .06 Oz. | Combined Gold-Silver value $1.60 per ton. |
| Silver= | .64 " | |
| Copper= | 3.72 % | |

The result of this sample is very gratifying and if 1430 ore should analyze 3.72 Copper it would be the best grade of milling ore that we have developed for some time in the past.

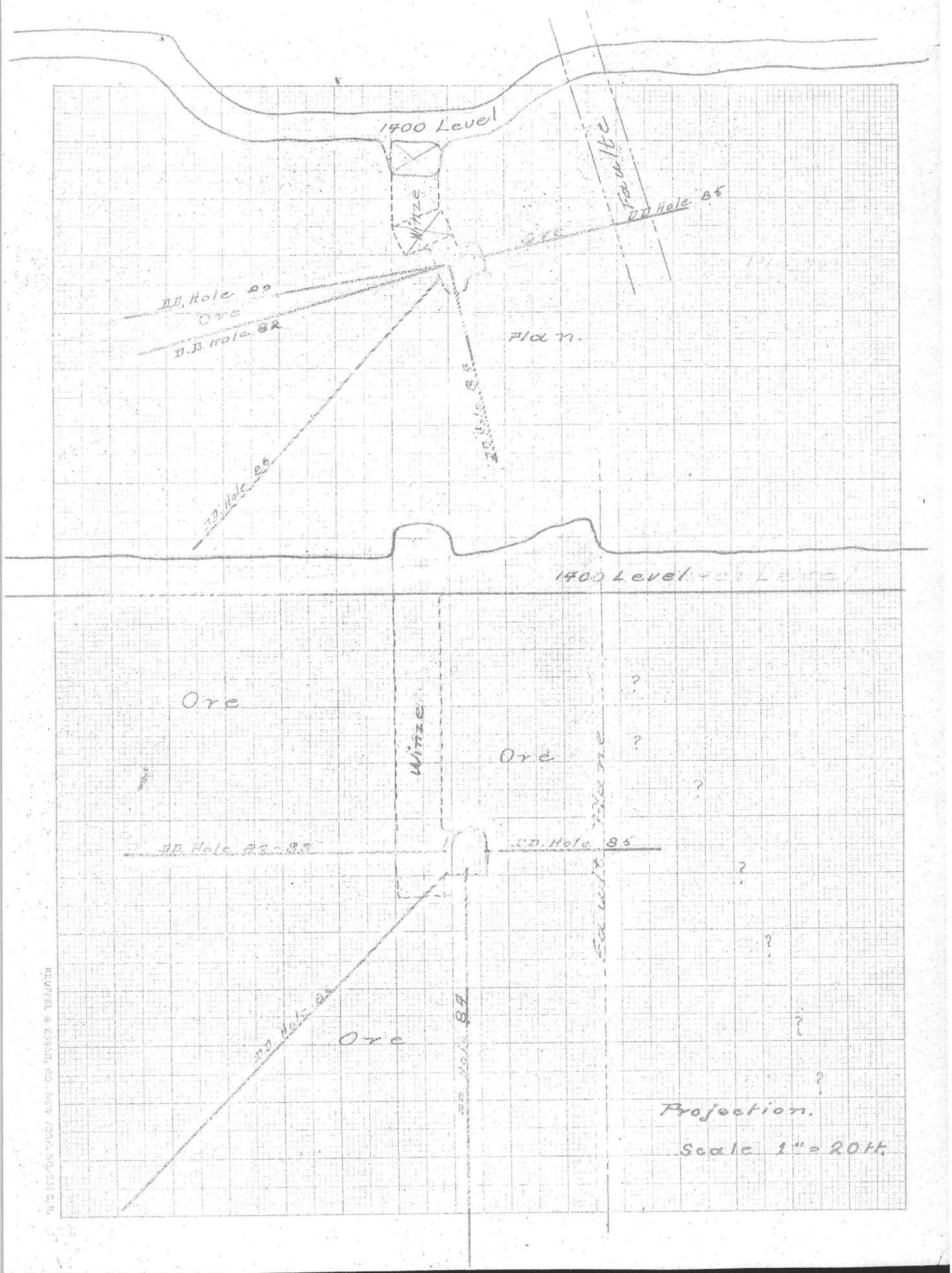
It seems very vitally important to obtain additional information relative to the 1430 ore and this is being accomplished by a cross-cut which ought to tap the ore between the 10th and 15th of October.

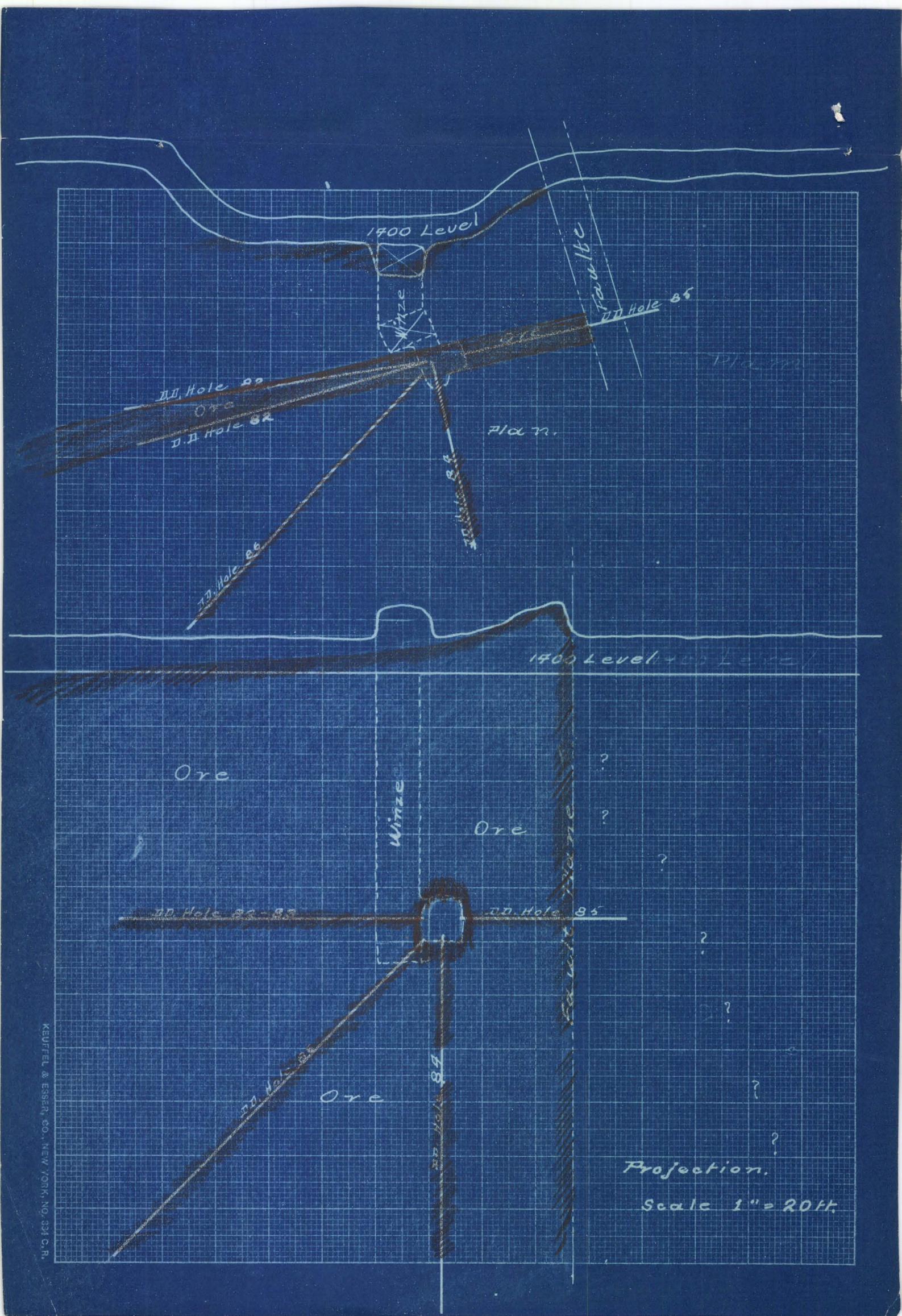
On the sub-level under the 560 sill and 60 ft. below the total length of the 60 vein was 40 ft., average width close to 3 ft., and average grade slightly better than 8 per cent Copper. Samples taken near the South end run up to 12 per cent Copper and from appearances in the drift, the grade and width of ore is improving with depth and the ore chute on this sub-level is much better than it was on the 500 level.

To further develop this ore we have resumed the sinking of the winze and will plan to go down another 60 ft., then cross-cut and drift on the vein at that depth.

- - - - -

GMC:D


1700 Level
Winze
Fault
D.D. Hole 85
D.D. Hole 89
Ore
D.D. Hole 82
Plan.
D.D. Hole 86
1700 Level
Ore
Winze
Ore
Fault
D.D. Hole 82-85
D.D. Hole 85
D.D. Hole 89
Ore
D.D. Hole 89
Projection.
Scale 1" = 20 ft.




KEUFFEL & ESSER, CO., NEW YORK, NO. 331 C.R.

Extracts from letters of J.J. McC. to Col. R. M. Thompson

Clm

BLUEBELL MINE

January 5, 1925:-

In reference to the Bluebell Mine, White is preparing such a report as you desire and he is inclined to be rather less optimistic than I am, myself. I have followed the Bluebell situation very closely and can state my opinion as follows:-

The production of high grade ore will depend almost entirely on what we find on the 660 level and below. We have only about 1000 tons of high grade ore above the sub-level, which we can definitely count on, but the assays on the sub-level were better than above and ran from 8 to 14% Copper and the ore seemed to be strengthening, so that we are very hopeful that it will improve with depth and we will open up 50 feet below in the course of a very few days. For the present, and in order to be absolutely conservative, I would only figure on producing 200 tons of this high grade ore for six months, as I am quite certain that we can do that, but we may be able to do very much better and I shall have more information to give you within the course of a short time.

Aside from this ore body, we have developed above the 1350 foot level, approximately 60,000 tons of ore, of which 25,000 is smelting ore - average recoverable value $2.50 per ton in gold and silver and 50 lbs. copper and with 15 cent copper market this ore is worth $9.00 per ton, in bullion, after it leaves the Humboldt Plant.

We have 35,000 tons of milling ore with average recoverable value $1.50 gold-silver and 40 lbs. copper. Much of this ore will not be easy to mine until some additional development work is completed and the grade is too low, in my judgment, to justify mining, unless copper sells at 16 cents or better per pound; moreover, it will be advantageous, if possible, to hold this ore until we haveother material available for the concentrator, so that we can run the concentrator three shifts and cut down the unit costs of operation.

Without any additional development work at the mine, the maximum economic production from Bluebell is 2000 tons of smelting ore per month and 3000 tons of milling ore (after some preliminary work) and on this basis the present reserves would last one year.

We continue the development work at the north end of the mine and are raising up in the small vein of high grade ore between the 660 and sub-level. The ore does not show any sign of substantial improvement and the tonnage will be small, as indicated in previous letters, unless we should happen to find a large bunch of high grade, but of this there is no certainty and, I fear, no probability.

In the 1445 we are breaking an average grade of smelting ore and are storing this under ground for the time being. The same thing applied to the 1450, 1245 and 710 stopes, in all

of which we are working a small force of men.

We are working North on the 800' level through some caved ground in order to render accessible some of the milling ore in case we should need this at a later date.

April 22, 1925.

I find that everything has gone smoothly during my absence from Humboldt. The development work at Bluebell is well up to schedule; the station on the 1500 foot level has been cut; the sump is now down about 25 feet below the station. We should complete the sump and get a good start on the cross-cut toward the ore bodies by the end of this month.

Elsewhere work has progressed satisfactorily at Bluebell, and at the north end of the mine we have been producing a small quantity of good grade ore from 60 ore body. Unfortunately, the tonnage here is very limited in extent and the production is relatively expensive and, considering conditions under which we are working, I think it would be advisable to push this work as fast as possible, mine out and stock practically all of the good grade ore during the next two or three months and then discontinue working in this north end of the mine.

We are also mining ore from the 1245 and 1445 and from the 710, and are producing a fair grade of smelting ore

which so far has averaged better than 3% copper with values of close to $3.00 per ton in gold and silver. The higher grade material is coming from the 1245 and 710, and the 1445 continues to carry only about 2½% copper but ~~the~~ otherwise is a good class of smelting ore with high content in iron and sulphur.

On the 800 foot level we are working north to render available the milling ore left in the 750 orebody but this work is of necessity slow and we are not attempting to push it as there seems to be no immediate prospect of requiring this ore before July or August at the earliest.

September 30, 1925.:-

Colonel Thompson:

Development during the past month has consisted principally in drifting northward on the 1500 level. I have already reported the finding of the 1530 ore body, which we crosscut presumably near the north end. The width of thie ore was approximately 14 feet, and while samples varied very considerably, the average was close to 3% copper, the gold and silver values, as usual in the 30 ore body, are less than $1.00 per ton.

We have been disappointed in not finding the 1545 ore body before this date, but just when we reached the point where we figured it should be located we ran into another series of faults and have since been working in much broken ground with

considerable gouge containing in places sulphide mineral but nothing that could be classed as an ore body. We intend to push forward to the north, and before the end of October should reach a point directly under the drill hole which we put down from the winze where we know that heavy sulphide ore is located a short distance above the 1500 level. It may become necessary to raise up at this point in order to actually locate the ore, and I much regret that this development is so slow and expensive and that we continue to be cursed at this depth with the same type of faults which have so often displaced ore bodies in the upper levels.

Prior to resuming stoping of mill ore, we have opened up the 750 ore body by means of a winze and we are working in ore which will average 2.50% copper. We expect to open up quite a nice body of milling ore between the 5th and 7th levels and should be ready for a steady production from this point be December of this year.

We have also been developing a tonnage of milling ore in the 1057, but so far the grade has been rather disappointing, although we have assurance that it will improve as we work upwards. Here also we will be ready to produce by December.

We have been breaking close to 2000 tons of ore per month in the mine and shipping to Humboldt upwards of 1500 tons a month. The greater portion of this ore is for direct smelting and has been coming largely from the 710 where the grade is very excellent, close to 4% copper, and from the

1245, which also produced a good grade of ore but is now finished, and from the lower grade stopes, principally the 1250 and the 1445.

The general condition of the mine is good, and neglecting altogether the expected production from the 1500 level we are prepared to produce approximately 2000 tons of smelting ore and converter flux per month, and some time in November, or certainly by December 1st, we hope to produce close to 3000 tons of mill ore per month, in which figure, however, would be included some production from the 1530.

A revised estimate of the tonnage available in the mine will have to await further development on the 1500, and the opening up of the 1530 ore body for its full length and development of the 1545, 1550 and 1540 ore bodies. It may also seem worthwhile to gradually drift out to the south in the hope of finding an extension of the 10 ore body, which seemed to be fading away on the 1200 level, and has never been sought for below that point.

December 19, 1925.

On the 1500 level we have opened up the 30 orebody for a length of 90 feet, and the ore is still strong in the heading. We have not fully developed the width of the ore which will be done when we retreat along the drift, but in places we know that it is from 10 to 15 feet wide, and the average grade is 3% copper with about $1.00 value in gold and

silver. It is quite certain that this will constitue an important addition to our reserve of milling ore and production from this point should be steady from this time forward.

The development in the 1545 has not been so satisfactory. The orebody is badly broken up by faults and at times is cut off altogether. The average grade of ore so far developed is about 2½% copper, with $3.00 values in gold and silver, and it is basic material suitable for direct smelting, but no definite statement can yet be made regarding the size or the average grade of the whole orebody. We are now raising up directly under the winze and drill hole which were put down in ore directly below the 1400 level and production from this raise should probably start quite soon and the size and value of the 1545 ore shoot can be better estimated after connection is made with the 1400 level winze.

Elsewhere development work has been quite satisfactory and a considerable tonnage of new mill ore has been developed in the foot wall of the old 540 stope, and also in the foot wall of the 930. Both of these points are now producing a good grade of milling ore averaging nearly 3% copper and this material will sweeten up the lower grade mill ore obtained from the 1250 and 1450.

The 750 orebody has been undercut along the fault and the south side of the winze is now ready to stope. An incline drift will be carried down on the north side of the winze and quite a substantial production can be made from this ore shoot at any time that we may desire to push production.

November 7, 1925

I am pleased to report that the North drift on the 1500 level Bluebell is now in commercial ore representing the 1545 ore body.

As I wrote you a short time ago, this drift had become mineralized, but at first we encountered white iron sulphide which contained only about 1/2 of 1% copper, but, strange to say, carried $2.00 value per ton in gold and silver. Working north the copper content has increased and now appears to be better than 2½%, and we believe that gold and silver values should also have increased, although, no assaysof this last material will be available until next week.

The delay in finding the ore body was caused by another one of the miserable step faults which had thrown the ore out of place and to the north, but now we are working a short distance south of the winze and diamond drill hole put down from the 1350 level and we are reasonably assured of a certain tonnage of smelting ore in this block. The exact size and character of which will be determined as fast as conditions permit.

In the 1530 we have begun to drift on the vein and this ore body will also be developed rapidly.

November 16, 1925

At Bluebell Mine we are drifting South on the 1530 ore body and the face of ore is 9 feet wide and, according to Mr. White, looks very good. We have so far developed a length of about 30 feet in this ore shoot. The samples of ore have been rather low grade because so largely mixed with waste at the outset, but the last few rounds, from which results are not yet available, would appear to be close to 3% copper and the grade of the ore seems to improve as we go farther South.

The North drift is advancing in the 1545 ore body, which so far has a width of about 8 feet, fairly solid basic smelting ore, except where it is cut up by the fault which continues along near the top of the drift. The composite sample of the ore shows values of $2.50 in gold and silver and 2.30% copper, but this is hardly representative of any substantial tonnage and we have advanced to date only about 20 feet in the ore, the best portion of which we believe lies considerably farther to the North.

The 750 orebody is developing extremely well, samples of this ore being somewhat erratic but averaging close to 4% copper and the outlook is favorable for developing a considerably larger tonnage at this point than we previously anticipated.

September 27, 1926

The development work at Bluebell, principally on the 1500 level, was disappointing except at one point where the 1530 orebody appeared to be fairly strong and of good grade on the

level and justified the sinking of a winze to determine the grade and quantity of greater depth.

This winze, as described in last weekly report, now has a depth of 32 feet, and the ore averages 3.44% copper. The width of the ore is in excess of ten feet, and the length we do not know, although it exceeded 100 feet on the level, but became low grade at either end of the shoot.

Since this ore did not hold up in grade or quantity as we stoped above the level, and since it is somewhat out of line with the 30 ore shoot, there is just a chance that we may have discovered an entirely new orebody and that the winze may develop something of real importance. The cost of sinking the winze is partly covered by the ore produced, and it seems well worth while to continue a small expenditure at this point on the chance that something really valuable might be found.

Rim

## NOTES REGARDING BLUE BELL MINE.

The Blue Bell Mine, except for operations of leasers working near the surface and from the No. 1 shaft, was closed down in January, 1927, and the following notes are made relative to the ore reserves developed or probable in that mine, the location and character of which are clearly indicated on the attached assay map.

### NO. 1 OREBODY:

Some work done by leasers from the Glory Hole at the south end of this orebody has indicated the possibility of the No. 1 ore having faulted to the west, that is, into the hanging wall, and while no ore can be considered as definitely exposed at this point, additional exploration is in order.

From this point down to the 1200 level, no ore is left except in pillars and sills where it is so located that it could probably not be recovered with any degree of profit. The orebody below the 1000 and presumably above the 1400 was cut and displaced by the series of inclined faults which traversed the entire mining property, dipping from south to north, and it is doubtful if any ore can be mined in this section. Indications are that the bottom of this faulted area should be found at about 1300 feet on No. 1 ore shoot, and the 1500 foot level should accordingly be extended farther south to pass under the line of the No. 1 downward extension where there is probably a considerable tonnage of ore awaiting development. An estimate of this orebody may be considered:

| | |
|---|---|
| Positive and highly probable - | None. |
| ~~Probable~~ - | 10,000 up to a |
| Possible - | Very substantial tonnage. |

The average grade of the probable ore may be taken as:

| | | |
|---|---|---|
| Gold | - | ~~.04~~ oz. .06 |
| Silver | - | 1.5 oz. |
| Copper | - | 3. % |

### NO. 2. OREBODY:

This ore apparently pinched out with depth, and there

Note It seems that the gold values as given here may be much in excess of those which have actually been obtained in the ore produced from the same location

is no liklihood of any tonnage remaining except a small quantity north of the 820 stop, which would appear too low grade to be mined with profit. No estimate of tonnage can be made.

NO. 3 OREBODY:

(a) BELOW 230.

There is here a block of positive and highly probable ore 80 x 50 x 10 feet, but portions of this cannot be considered as absolutely developed. There is also a fair chance that additional ore will be found on the north side of this block and in the foot and hanging walls. Estimate of Section (a):

Positive and highly probable - 4,000 tons.
Possible - 4,000 tons.

Average grade:

Gold - .01 oz.
Silver - 1.50 oz.
Copper - 3.5 %

(b) BELOW 630 - 730 - 830.

In this section there are some blocks of ore in pillars and sills and at the ends of the old stopes which might represent an aggregate tonnage of po

Positive and highly probable - 2,000 tons
Possible - 2,000 tons

Average grade:

Gold - .02 oz.
Silver - .60 oz.
Copper - 3. %

(c) ABOVE FAULT IN 830 and IN THE WALLS OF 930.

The tonnage here is not properly developed but is indicated by various openings and appears likely to prove considerable. From present showings it might be estimated as

Positive and highly probable - 1,000
Possible - 4,000

Grade about the same as Section (b).

(d) ABOVE 1230 AND IN PILLARS AND SILLS OF OLD STOPE.

Some of this ore may be difficult to mine, but the tonnage is well developed and there should be considered as

Positive and highly probable - 6,000 tons.

(d) (Cont'd.)

No additional ore can be considered as possible.

Average grade:

Gold - .02 oz.
Silver - .3 oz.
Copper - 2.5 %

(e) 1230 - 1530:

This section of the orebody has been displaced and shattered by the faults mentioned above in connection with No.1 orebody, but it is quite certain that a substantial tonnage of ore remains and some of it can be mined without great difficulty.

Estimate of the recoverable ore:

Positive and highly probable - 5,000 tons.
Possible - 10,000 tons.

The grade should be the same as Section "d".

(f) BELOW 1530.

This block of ore was being developed at the time the mine closed down. The ore is found on the level and down the winze which has been sunk for 70 feet and bottoms in excellent ore. At only one or two points was the width of the ore shoot developed and same has been proved to have a length of 150 feet, depth 70 plus, and width over 20 feet. In this block of ground it is fair to assume as

Positive and highly probable, about - 20,000 tons
Possible - about 20,000 tons

with every prospect that further development would substantially increase these figures. The average grade may be figured as

Gold - .01 oz.
Silver - .5 oz.
Copper - 3. %

This is the best showing in the mine for immediate future development, as the ore in this section is below the faulted area so far as the same has been determined and it may be expected that it will continue to a much greater depth, and also for some distance farther south than indicated on the 1500 foot level.

No. 4 ORE BODY:

(a) 343 STOPE:

A small block of ground remains here, say about 500 tons which is suitable for mining by leasers and might be sorted up to a grade of about 5% copper.

(b) AROUND THE 740 STOPE:

A block of ore is found to the north which has indicated dimensions of 60 x 200 x 10 feet. A similar block is partly developed to the south end of the stop, but tonnage is undertain. An estimate of

Positive and probable ore - 12,000 tons
Possible - 4,000

Average grade

Gold - .02 oz.
Silver - .715 oz.
Copper - 2.5 %

(c) AROUND 840 STOPE: PARTICULARLY AT THE NORTH END AND IN THE PILLARS:

A vein of good ore about 5 feet wide has been well developed at the north end of this stope, but the walls are bad and clean mining will be rather difficult. There should be recovered from this ore say

Positive and probable - 9,000 tons
Possible - 2,000 tons

Average grade

Gold - .02 oz.
Silver - .7 oz.
Copper - 3. %

(d)

Indications point with reasonable certainty to extensions of a substantial ore body north of the 1040 and in the foot wall. This ore should extend down to the 1500 foot level, in which case it will represent a substantial tonnage. Present estimate is

Positive and highly probable - None
Possible - 20,000 tons.

Grade about the same as Section (c).

No. 45 - 5 - 55 OREBODIES:

The 750 contains about 5000 tons of ore actually blocked out. The 755 and 855 containabout 7,000 tons of ore well developed. There is some good ore in the 850 and 852 sills, but it is hard to recover and the same applies to ore remaining in the 845 and 847.

This ore shoot is cut by the faulted area below the 1200 level and will probably not be found solid and in place except well below 1500 where good ore should again be found. There are also indications that the vein is duplex at this point and that additional ore will be found in the hanging wall of the 550 and in the foot wall of the 850. The estimate of tonnage is as follows:

| | |
|---|---|
| Positive and highly probable - | 20,000 |
| Possible - | 25,000 |

The grade may be estimated as

| | | |
|---|---|---|
| Gold | - | .02 oz. |
| Silver | - | .7 oz. |
| Copper | - | 2.75 % |

No. 6 OREBODY:

Only small pockets of ore are believed to remain in this section of the mine, which is now being operated from No. 1 shaft under lease.

A summary of the ore reserves as these may reasonable be estimated from present developments is as follows:

| | |
|---|---|
| Positive and highly probable - | 79,500 tons |
| possible - | 101,000 tons |
| a total of | 180,500 tons |

It should be understood that were estimates of possible ore are made there is no reason to believe that these figures will be justified. In addition to the above, there is every expectation, based on the geological conditions and the past history of the mine, that future development will develop substantial additional tonnages concerning which no estimate could properly be made at the present time.

The average grade of the positive and highly probable ore may be taken as Gold .03 oz.; Silver 1.2 oz.; copper 2.75%. From this ore there should be recovered approximately $1.00 value in gold and silver and 50 pounds of copper per ton.

The developments proposed at the mine upon its re-opening would contemplate deepening the 1530 winze to a total of 100 feet, and then drifting on what would become the 1600 foot level north and south of the limits of the ore ~~which would~~ with cross-cuts at intervals ~~and~~ to determine the width of same. Additional work at this point will be indicated by the result of these first developments.

The 1500 foot level should be extended south to pass under the No. 1 orebody, and work carried on from the 1500 to determine the location of the No. 4 and No. 5 orebodies. More especially a foot wall cross cut should be run to a point where there is indication that the No. 4 ore body will be found. Other mining developments were indicated above in discussing the various ore shoots.

South of the No. 1 orebody cross-cut should be run from various levels to extend beyond the limits of same into the hanging wall, since this section of the property has never been thoroughly prospected and the work recently done from the Glory Hole as well as other indications point to the probability of an ore shoot existing south of No. 1 and some distance west of same, and this may eventually be traced for a long distance south and perhaps connect up with the showing of low grade ore found on the 800 level in the Blue Thunder claim. The ore in the Blue Thunder so far as same has been developed was too low grade to mine with profit, but further exploration and development is justified in this section and it might be advisable to connect by raise the 800 level with the Blue Thunder orebody, which was found on the surface and developed to a small extent by shallow shaft and some drifting.

The main future of the Blue Bell Mine in my opinion lies in working to greater depth, for the orebodies have held constant from the surface down as far as the workings go, but

for a vertical distance of some 200 to 300 feet the faulted area rendered them almost or entirely worthless. It seems probable that the lower limit of thisfaulted area has already been passed in the No. 3 orebody and logically we should be well below it on the 1500 level of same as indicated on the No. 1 orebody. The 1500 level should be near the bottom of the fault in the No. 4 orebody, but the 45, 5 and 55 will still be faulted down to a depth of 1600 to 1700 feet. It seems altogether probable that at 1700 foot level would cut all the ore bodies as far north as the 55 well below the faulted area, and should such prove to be the case deeper working in the Blue Bell might yield results comparable to the development above the 1200 where a tonnage of from 60,000 to 90 80,000 was opened up for each 100 foot gained in additional depth.

It is impossible from present indications to make any definite statements regarding the probable grade of the ore below the fault, but No. 3 ore so far has developed is equal in grade to the average above the faults, and there seems to be no good reason why a similar condition should not exist in all of the ore bodies mentioned.

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