

COPY

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OFFICE OF THE COUNTY TREASURER

Prescott, Arizona, Sept. 14, 1936

Southwest Metals Co.,
Humboldt

This is to notify you that I will offer at public sale at the office of the Treasurer of Yavapai County, Arizona, on the 28th day of October, 1936, and on the succeeding days, so much of the following described real property, upon which there are delinquent taxes, as shall be deemed necessary to pay the taxes, herein below set down, together with the interest, penalties and charges thereon, to-wit:

DESCRIPTION	Acres	Total value of Property.
	<u>540</u>	
DeSoto Mine Peck District Water Lode, Enterprise, Tidal Wave, Favorite, Iron Clad, Arizona Chief, Fortune, Grand View, Elephant, McKinley, Anchor, Whale, Copper Bar, Homestake, Washington, Garfield, Hot Number, Copper Link, Copper Link Millsite,	10500	
Blue Bell Mine--Big Bug District: Blue Bell, Blue Buck, Blue Coat, Blue Thunder, Victory No. 1, No. 2 No. 5, No. 6, No. 7	7000	17,500.00
No. 1474	Total Delinquent Taxes	423.50
	Penalties	
	Interest	<u>29.27</u>
	TOTAL	452.77

27
20
540

Very truly yours,

David H. Biles, County Treasurer

*Amount to
\$ 32.40 per acre*

540 / 17500
162
130
108
220

SOME NOTES REGARDING DESOTO MINE
(APPARENTLY MADE IN SEPTEMBER OF 1929)

The Buster Cut and Buster Stope show carbonate ore which carries about 3% copper and carries good values in gold and silver and some ore shows also in the tunnel which runs to the south of this. All this work is in the hanging wall of the worked out stopes and to the north of them so that there is a chance that considerable new ore may be found in this section of the property.

Further to the northwest there is good ore 40' down in the old so-called Treadwell Shaft and some new ore has recently been found in the Whale Claim from which it appears that there is a chance to develop additional ore shoots of some size to the north of the old workings and in the hanging wall where there is a good outcrop on the hill.

A big new stope has been opened up from the Double O tunnel. This is about 300' long and 80' west of the outcrop and has now been mined down for 100'. There is a chance that this ore will continue downwards in the hanging wall. The ore is irregular in value but there is some fine material and recent shipments carry 8% copper. It is now being mined by a length of 60' and a width of 25' but the main body is rather low grade. There are additional values in the hanging wall, some of which will go 3 $\frac{1}{2}$ % copper.

Low Grade oxidised ore lies to the north and in the foot wall from the Double O Tunnel under the outcrop and along the Chaffee, the end of which is probably 30 to 40 feet above the top of our old 130 Stope, known as Nigger Heaven, where the ore had a width of 30'. The Double O Tunnel is 40' above the 100' adit which had an elevation of 6169' above sea level.

2-

The elevation of the 200' level was 6105'.

The main ore reserves at present comprise the oxidised ore above the Chaffee Tunnel and extending to the 130' stope and below this perhaps to the old 100' level. There is also sulphide ore below the Double O Tunnel which may extend downwards in the hanging wall along side of the old stope. There is ore in the Buster Cut which Chaffee estimates as amounting to 12,000 tons and there is ore in the north end of the 200' and at the south end of the 200' and extending through to the 230'. There is low grade ore in the footwall of the 100' level where the swinging bridge was constructed across the top of the old steps.

Chaffee thinks that the Whale and other shoots rake very sharply to the south so that this ore would extend downwards passing over the drift and stoping which we had in the south drift from the Whale Tunnel and it might be found 200' or more beyond the south end of our drift.

There is some very good ore in the north end of the 300', i. e. above the 320' stope and extending towards the 330'.

On the Anchor Claim it is said that there was found a vein with high silver values on which was sunk a 50' shaft many years ago and this was called the New York Mine and is in New York Gulch, 3/4 of a mile Southwest of the Whale Tunnel. Below this is a n outcrop of quartz showing copper, ~~all of which should be found on the contour map which was made by Rocca.~~

Chaffee thinks that there is a good chance to follow up the fault above the 600' level and just beyond the winze and that this might run up into the ore and extend ~~downwards~~ upwards on an incline to the old Treadwell shaft, in which he has already found some good values.

57

5

CONSOLIDATED ARIZONA SMELTING CO.

Annual Report

1915

- - - -

DE SOTO MINE

This mine was re-opened and fully equipped during 1915 and shipments of only 8,360 tons were made, although 12,000 tons of additional ore was broken in the stopes ready for shipment at the end of the year.

Development:

Our development work consisted entirely in extending the limits of the known ore shoots and so far we have not found any really new ore but have merely delimited the ore bodies which were worked in part by former management before the mine was most injudiciously abandoned. Cost of development was \$5,328.81, equal to \$0.70 per ton ore shipped.

Production:

This amounted to 8,360 tons, containing on the average gold and silver to the value of \$1.50 per ton and 3.5 per cent copper.

At date of writing we are shipping at the rate of 100 tons per day and expect to ship upwards of 40,000 tons during the present year.

Working Costs:

Cost of production at the outset was naturally very high, and has averaged \$4.633 per ton f.o.b. Humboldt, everything included. The cost has been falling steadily and was \$3.58 in December and it is our expectation that during this year the average cost will be lower. The railroad freight on the ore is \$0.70 per ton against \$0.35 per ton from Bluebell to Humboldt.

Ore Reserves:

Before we decided to reopen and equip this mine a careful estimate of ore left in the old workings showed a reserve of 32,000 tons. On January 1, 1916, the reserve was estimated at 65,000 tons, and at date of writing it may be estimated at 75,000 tons, with an average value of \$1.50 in gold and silver and 3.75 per cent copper.

*Original by patent copy
in safe deposit box*

Grand file

S. M. C. Copy as presented

Aug 8th 1941

AGREEMENT

THIS AGREEMENT entered into between G. M. COLVOCORESSES of Phoenix, Arizona, party of the first part, and OHIO COPPER COMPANY OF UTAH, a Maine corporation, party of the second part, WITNESSETH:

First party has brought to the attention of the second party the following described patented mining claims situated in Big Bug Mining District, Yavapai County, Arizona:

- De Soto Group
- Water Lode
- Anchor
- Enterprise
- Whale
- Tidal Wave
- Copper Bar
- Favorite
- Homestake
- Iron Clad
- Washington
- Arizona Chief
- Garfield
- Fortune
- Hot Number
- Grand View
- Copper Link
- Elephant
- McKinley

- Blue Bell Group
- Blue Bell
- Blue Buck
- Blue Coat
- Blue Thunder
- Victory No. 1, No. 2,
No. 5, No. 6, No. 7.

*Make in
Ohio Park
Pine Co. D
in 1941*

all of which are hereinafter sometimes referred to as the "Mining Property."

First Party has informed second party that the mining property has been sold for taxes and that the tax titles can be acquired for not to exceed \$2500.00. First and second parties have been advised that in order to make the titles to the mining property acceptable it will be necessary to foreclose the tax lien when so acquired and to quiet title to the mining property; that the cost of such proceeding will not exceed \$500.00 and that such a decree can be obtained in from 75 to 90 days. First party has represented to second party that an expenditure of not to exceed \$2,000.00 during the period when such decree is being

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Fortune
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Grand View
Copper Link
Elephant
McKinley

Blue Bell Group

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Blue Thumder
Victory No. 1, No. 2,
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secured will be sufficient to open portions of the Blue Bell Mine to the 500 level, unless the water shall have risen above that point, to permit check sampling, to estimate the ore tonnage and to run flotation tests. First party has proposed to second party that second party advance the aggregate of the above sums, to wit: not to exceed \$5,000.00 in order to enable first party to accomplish the foregoing and upon completion, the interests of the parties in said acquired titles shall be on the basis of 60% in the first party and 40% in second party, such interest to be subject to change as hereinafter set forth.

NOW THEREFORE, in consideration of the premises and of the mutual agreements and covenants hereinafter contained the parties hereby agree as follows:

1. First party will make available to the second party and its nominee copies of all records, reports, maps and other data relative to all ore located in the mining property and will act for and assist second party and its nominee in all particulars in securing said tax titles and will make available to second party at all times while this agreement is in effect his knowledge respecting the mining property and the ore deposits therein.

2. Tax titles to the mining property shall be acquired through first party but for and in the name of E. G. Snedaker of Salt Lake County, Utah, funds therefore, not to exceed \$2500.00 in the aggregate, to be advanced by second party to first party. The said tax titles shall remain in the name of E. G. Snedaker for the benefit of second party until all of the terms and conditions set forth in paragraphs 1, 2, 3, 4 and 6 hereof have been fulfilled by the first party, whereupon the said E. G. Snedaker shall make a declaration of trust to the effect that he holds 60% thereof for the use and benefit of first party and 40% thereof for the use and benefit of second party.

3. Second party will advance to first party not to exceed \$500.00 for the purpose of foreclosing the lien of the tax titles so acquired in the name of E. G. Snedaker and securing a decree quieting title to the mining property, which first party agrees to use his best efforts to accomplish without further expense to either second party or E. G. Snedaker who shall be entitled to receive for the benefit of second party any monies that may be paid by others to redeem the tax titles acquired by said E. G. Snedaker.

4. Second party will advance to first party not to exceed \$2,000.00 for the purpose of opening portions of the Blue Bell Mine to the 500 level, unless the water shall have risen above that point, sufficient to permit second party to conduct a check sampling, estimate the ^{ore} tonnage and to make flotation tests, it being the intention of the parties that such work will be conducted during a period of approximately ninety days during which the action to foreclose the tax liens and to quiet title will be in progress, and first party agrees to complete this provision without further expense to second party.

5. Second party shall have the right at any time during the conduct of the action to foreclose the tax liens and to quiet title and the said opening of the Blue Bell Mine to terminate its participation in the transaction and first party shall thereupon return to second party any monies theretofore advanced to him and not theretofore expended or obligated for the purposes above set forth which have not already been consummated. If second party exercises this option so to terminate its participation it shall thereafter have no right, title or interest in or to any of the said mining property, but shall cause such equity in same as may have been acquired by it or its agent to be transferred to first party.

6. If and when the tax titles to the mining property shall have been acquired as provided above and a decree secured foreclosing the tax liens thereon and quieting title thereto and second party shall have provided not less than \$2,000.00 for the purpose of opening portions of the Blue Bell Mine to the 500 level as above limited and described or when second party shall have advanced an aggregate of \$5,000.00 for the said next above described purposes, then the beneficial ownership of the said mining property shall be 60% in first party and 40% in second party and the said E. G. Snedaker, in whose name the titles shall have been taken, shall be under the obligation of making a declaration of trust to that effect.

7. It is understood and agreed that when and as first party carries out his obligations undertaken in paragraphs 1, 2, 3 and 4 hereof and performs or causes to be performed the acts specified therein, that first party shall be entitled to retain and use for his personal account as a consideration for this agreement, and for the services to be rendered and expenditures to be made in carrying out his obligations hereunder; the difference, if any, between the actual expense incurred and the above mentioned maximum estimated cost of procuring the tax title, prosecuting the suit to quiet title in order to obtain, if possible, the court decree and deeds to the mining property and reopening portions of the Blue Bell Mine as limited and described above. It is also agreed that such compensation, if any, shall be the only payment which first party shall be entitled to receive hereunder for the services which he hereby undertakes to render and for personal expenses involved in performing his obligations under the terms of this agreement. Other services or acts, if any, which are not stipulated herein and which second party may later require of first party, shall be made the subject of subsequent

agreements with such additional compensations as may then be agreed upon between the parties hereto.

8. When either of the contingencies described in paragraph six has occurred the second party shall have the right to exercise either of the following options, and in the event that second party does not exercise either of these options within a period of six months after the title has been quieted, then and in that event, first party may, at his option, proceed as outlined in paragraph (c) hereof.

(a) First Option: To expend monies for the rehabilitation and re-equipping of the Blue Bell Mine and for the providing of a concentration flotation mill of about 50 tons daily capacity and the provision of camp and office buildings sufficient for the accommodation of approximately 20 employes and for the placing of the Blue Bell Mine on a basis to produce approximately 50 tons of ore per day. Second party shall have the right to provide such suitable equipment as it may have on hand, in which event the fair market value thereof shall be deemed an expenditure by the second party for the purposes of this agreement. For every \$1200.00 so expended by second party the interest of second party in the mining property and improvements shall increase 1% and the interest of the first party shall decrease 1% and the same rate of increase and decrease shall obtain for fractions of \$1200.00 expended therefor by second party; provided, however, that the interest of second party shall not be increased to exceed 80% and the interest of first party shall not be decreased to less than 20%. Any expenditures made by second party in excess of expenditures sufficient

to increase its interest in the mining property to 80% shall be in the nature of loans to the operators of the transaction which is the subject hereof whether then conducted by the parties hereto or by a corporation to be formed, or otherwise, it being understood that first party shall not be personally liable for the repayment of such a loan or any part thereof except as may be represented by first party's interest in the mining property. Second party shall have the right at any time to discontinue making further expenditures from its own funds and in lieu thereof to attempt to secure loans from other sources and to give as security for such loans mortgages on any or all of the mining property, equipment, buildings and all property involved in this transaction. In the event of the exercise of this right the interests respectively of the first and second parties in the mining property shall be fixed on the basis of expenditures theretofore made by second party. After having secured any such loan second party shall thereafter have the same right described above to make further expenditures for the same purpose and upon the same terms.

(b) Second Option: Instead of making expenditures from its own funds second party, together with first party, may secure from some other source a loan or loans of money deemed to be sufficient for the purposes described in the first option and also for working capital and may mortgage the mining property and all equipment, buildings and other property involved in this transaction as security therefor and may expend the proceeds of any such loan or loans for the purposes described in

the first option. First party will cooperate with second party in the preparation of reports, applications or other data required in connection with obtaining such loan or loans without charge for said services. In the event second party proceeds under second option the interests of first party shall continue as 60% and of second party as 40%. After the proceeds of any such loan or loans have been expended and provided that additional funds are found to be necessary for the continuance or expansion of operations, second party shall have the right to make further expenditures from its own funds for the said purposes and in the event it makes such expenditures its interest in the mining property shall increase and the interest of the first party shall decrease as is above described under first option; provided, however, that the interest of the first party shall not be decreased below 20% and the interest of the second party shall not be increased over 80% and any expenditures made by second party in excess of the amount necessary to increase its interest to 80% shall be in the nature of loans.

(c) Failure of second party to exercise either one of the next above described options for a period of six months after the title to the said mining property has been quieted will entitle first party, with the cooperation of the second party, and either for his own account or in association with others, to exercise either one of the two options outlined above, and if first party exercises either such option in such a way that he expends his funds for the purposes described, for every \$2400.00 so expended by first party his

interest in the mining property and improvements shall increase 1% and that of second party shall decrease 1%; provided, however, that the interest of the second party shall in no event be reduced below 20%.

9. If exploration or operation of the mining property shall be discontinued second party shall be entitled to recover all of the salvage value of equipment, buildings and other property placed in and upon the mining property by second party or from the proceeds of sums advanced by the second party over and above any sum for which said property is mortgaged; provided, however, first party shall have the privilege of purchasing said equipment and buildings and re-establishing by this purchase first party's original interest in said property by tendering an amount equal to the amount offered by any other party.

10. It is contemplated by the parties that after the tax titles are acquired, the tax liens foreclosed and the title quieted and if the preliminary opening and exploration of the Blue Bell Mine proves encouraging that a corporation may be formed for the purpose of becoming the owner of the mining property and of carrying on the exploration, development and operation of the mining property. In that event the stock of such corporation shall be issued according to the then respective interests of the first and second parties but the portion of stock representative of the interest which may be transferred from first party to second party by reason of advances to be made by second party under either of the options referred to in paragraph 8 shall remain in control of such new corporation for such purpose until the six months period allowed for exercising these options has expired.

11. General administrative work of the mining property, whether the same is owned by a new corporation or not, shall be

performed by second party through its present office presently in Salt Lake City at cost to it or at a charge to be agreed upon between the first and second parties.

12. All of the terms and provisions hereof shall inure to and be binding upon the successors and assigns of the parties hereto.

IN WITNESS WHEREOF the parties hereto have executed this agreement the 5th day of Aug, 1941.

Witness: Aileen Turner

S. M. C.
Party of the First Part.

OHIO COPPER COMPANY OF UTAH

ATTEST: (CORPORATE SEAL)

Seal
E. G. Snedaker
Secretary.

By Perry H. Rittle
Its President
Party of the Second Part.

I, E. G. Snedaker, named in the foregoing agreement, hereby agree to comply with the terms and provisions thereof.

Dated Aug 8, 1941.

WITNESS:

Perry H. Rittle

E. G. Snedaker

November 9, 1945

Mr. Thomas Bardon, President
Shattuck-Denn Mining Company
120 Broadway
New York City, New York

RE: Blue Bell and DeSoto Mines

Dear Mr. Bardon:

You are doubtless somewhat familiar with the mines which are the subject of this letter and which were operated by the Consolidated Arizona Smelting Company until 1921, and thereafter by its successors, the Southwest Metals Company, until the depression of 1931.

The Blue Bell Mine produced around 1,200,000 tons of ore and the DeSoto 350,000. In both cases the average copper contained was slightly over 3% and gold and silver values varied from \$1.50 to \$2.50 per ton. The ore concentrated very nicely by flotation with the recovery of nearly 93% of the copper and around 85% of the precious metals.

At the time these mines were closed down all of the better grade ore in the upper levels had been mined out at the DeSoto and the workings were left in pretty bad shape. At the Blue Bell only small shoots of better grade ore were accessible, and also a large tonnage of 2½% copper ore mostly between the 1,000 and 1,600 foot level so that a substantial initial investment would have been necessary to reopen the mine.

Between 1935 and 1941 the stock ownership of the Southwest Metals Company changed hands, and the parties now holding control made no investment at the mines but merely tried to have the work carried on by lessees who gophered around near the surface, and produced only a small tonnage in spite of receiving a high premium price for the copper.

I understand that parties now owning a majority of the stock have no thought of resuming operations and would be willing to dispose of a controlling stock interest for between \$15,000 and \$20,000.

I do not mean to suggest that either of these mines can yield a profit under present conditions and with copper selling at 12¢ as we must anticipate by the middle of next year, but I do believe that in both cases modern mining methods can eventually

Mr. Thomas Bardon--page 2

be applied to the large tonnage of low grade ore remaining in the mines and that they might prove of substantial value at some future time. Please let me hear from you if the matter is of interest, ^{and} on that basis I feel that they merit consideration.

Your Mr. Mills at the Iron King doubtless knows a good deal concerning the property and can give you his opinion while I shall be glad, if you do desire, to go into considerable detail as I do not think that anyone else has nearly so much information concerning the past history and remaining ore reserves in the two mines.

Yours very truly,

E. H. C.

GMC: IW

March 29th, 1945

Mr. Robert A. Orr
Cleator, Arizona

Re: De Soto Mine

Dear Robert:

I have your letter of the 27th. and I am very glad that you wrote to me for I always take much interest in what is happening around the De Soto, even though as you may know, I have no legal claim to the property since the Arizona Supreme Court took away my title in 1942. So you will realize that nothing that I say in this letter is in any sense official.

The parties with whom you have been having trouble have been in to see me two or three times;-Mr. and Mrs. Ray Parker, and one of their associates from Nevada,-and their story was to the effect that they had purchased the Glass and Bishop Claim and were trying to build a road to reach it by way of Peck Canyon. They told me that you had tried to prevent them from building this road by claiming that it passed across the patented mining claims of the De Soto Group, and they never mentioned their interest in the Little Johnnie.

The story did not sound quite right since I felt sure that you would not try to prevent people from building a road anywhere in that district, and moreover, there was no reason why they should cross any of the De Soto property in coming from the old Peck Canyon Road to the Glass property.

I explained this situation to them and showed them a map of the De Soto Claims, of a portion of which I am herewith enclosing a rough sketch. *location* The portion of the Glass Claim may not be correct as I merely have a note to the effect that it was located north of the Little Johnnie.

The claims enclosed in the solid line are all patented and belong to the Southwest Metals Company, but when I was in charge of operations we also had some unpatented claims including the Little Johnnie where we mined some ore and as I recall left it on the dump. The Little Johnnie was never patented while I was in charge of the property, and I doubt very much if it was done afterwards since it is not listed as one of the claims that was sold by order of the Court in 1940, and probably it has been open for location for some years past unless the Southwest Metals Company have taken steps to keep it in good standing. Regarding that point and also in respect to payment of taxes you will have to consult the County Records in Prescott.

Mr. Robert A. Orr
March 29th, 1945
Page 2

If the Parkers or others have re-staked the Little Johnnie they probably have a right to carry on mining work and ship any ore that may be left on the dump. I should think that you and they could get along very nicely together and probably you would find it to your advantage to have some one living and working near to the old mine.

Sorry that there is not much prospect of my getting up your way in the near future. But please remember me to members of your family who are still around there (I believe that your father and mother have both died) and to Jimmie Cleator and other mutual friends.

Sincerely,

GMC/b
Enclosure

April 22, 1947

Mr. Fred Gibbs
Sunnyslope
Prescott, Arizona

RE: De Soto

Dear Fred:

Replying to yours of the 19th I also assume, although I do not positively know, that the lease given to Farnham by the Southwest Metals Corporation covers the De Soto as well as the Blue Bell. The previous lease to the Western Machinery Company covered both of these mines, but Western Machinery when they applied for government premiums on ore produced from the Blue Bell, very stupidly forgot to mention the De Soto and when I tried to help them to get sub-lessees working on some of the better grade surface showings at De Soto, they found that it would take several months to arrange for premium payments and otherwise that copper produced from De Soto would only be paid for at 12¢ a pound.

There are a good many surface showings at the De Soto which can be examined by anyone who climbs up the hill and some of these are over on the west slope of the ridge; Al Adams is familiar with all of them.

The last active mining work at De Soto was done by Ed Chaffee and some sub-lessees who worked there until the tramway burned down during the winter of 1930-31, if I recall correctly. Chaffee's work was largely confined to various orebodies located close to the surface and in the main workings he robbed a pillar which was left close to the main winze connecting the 200' level with the 600' level known as the Hot Number Tunnel. The remaining ore in the vicinity of the winze caved down soon after so that most of the old workings are now inaccessible.

I did at one time investigate the possibility of leaching the surface ore in place, but I knew that I could not make any kind of a satisfactory deal with the present management of the Southwest Metals Company so I dropped the matter sometime ago and I shall be glad to give you copies of all of the maps, reports and other data which are in my file provided we can agree upon a fair value for same.

In this connection I might say that I never made any thorough investigation of the Chaffee workings although I went over them on two or three occasions after he had discontinued his work and I am sure that you will find quite a substantial tonnage of good grade oxidized copper ore remaining around these workings; although in some cases the ore is covered by waste which caved in from the hanging wall and the blocks of ore which he left in place are more or less scattered but could doubtless be worked with profit if proper transportation was provided.

Now that the price of copper has advanced to a reasonable figure, I consider that the De Soto has several possibilities. In the first place, there are a number of small detached showings on or near the surface which could be reopened and mined on a small scale as was done by Chaffee.

Secondly, there is still a substantial body of ^{sulphide} 2½% copper ore with gold and silver values of \$2.00 per ton left in the main workings of the mine and this could be made accessible at a comparatively small expense. My assay maps and estimates of tonnage cover this pretty thoroughly as they were revised in 1928 and in 1930.

In addition, there is a very large but uncertain tonnage of low grade copper ore part oxidized and part sulphide left between and around the old stopes and in part developed by drill holes and cross-cuts of which I have the assay records. This low grade material was never fully explored although at one time, about 1918 when copper was selling at a very high price, I partially worked out a plan of breaking down the entire top of the hill ^{or} within the area of the outcrops and carrying down a big open pit into the old workings, and I made a partial investigation of the possibilities of such a program.

Later on I figured on the possibility of leaching some of the oxidized ore as mentioned in your letter, but that did not appear to be feasible, and of course my program of operating on a large scale from an open pit or otherwise would have to be preceded by an expensive investigation which could best be carried on while the better grade ore was actually being mined on a smaller scale.

I know that the ~~personal~~ management of the Southwest Metals Company would not do any business with me or with anyone with whom I might be associated, but a couple of years ago I had a third party sound them out and at that time they would have been willing to sell the De Soto at a very reasonable cash price.

I am going to look through my file which is quite extensive and I will send you either enclosed with this letter or within the course of the next day or two a list of the maps, reports and other documents which bear on the present and future value of the property and which seem to be of importance in connection with any resumption of operations on a comparatively small scale.

The work which I have done in connection with large scale operations is not by any means complete and we can discuss that at a later date if you find that the situation is interesting, and assuming that we can reach an agreement in regard to the value of the data of which I am now able to send you.

With personal regards to you and your family,

Sincerely,

GMC: IM

Est will follow

May 16, 1947

Mr. Fred Gibbs
Sunnyslope
Prescott, Arizona

RE: De Soto

Dear Fred:

Glad to receive yours of May 14 and am not surprised that there are some complications in respect to Farnham's lease from Clark for my personal opinion of Clark is such that I would not care to send it through the mails.

However, the mine has real merit in my opinion and I hope that you and Farnham can work out something and obtain a lease and option.

A short time before the Western Machinery Company gave up their lease on the Blue Bell, I learned that they were not at all interested in the De Soto and would give away such equity as they had in that property and I then had a third party approach Clark and he could have obtained a lease and option to purchase on a very favorable basis for it was evident that Clark, at that time, believed the De Soto to be quite worthless and Western Machinery had never obtained any premium payments on copper that might be produced from the De Soto. The difficulty of obtaining such premiums at a late date and the rather unfavorable outlook in the copper market prevented us from doing anything further, and soon after I became somewhat crippled so that I have not followed the matter up until quite recently.

I also saw the advertisement respecting a copper mine near Mayer which had been a big producer and was believed to still contain a large amount of ore (as it does in the deeper levels) and I figured out that this very probably referred to the Blue Bell since I had learned that Clark had been trying without success to secure some maps and reports on the Blue Bell workings from some of the old stock holders of the Southwest Metals Company.

I also learned that Clark had recently been out here in Arizona through an attorney who holds some of the Southwest stock that Clark had to give up to a man named Hurst, and this attorney told me that Clark offered to buy his stock at a very trivial figure; although I find it hard to understand why Clark should have made any such offer.

Of course Clark has undoubtedly raised his sights in reference to both the Blue Bell and the De Soto since the price of copper recently advanced, but unless he can submit some evidence that they still contain reserves of pay ore, I think he will find it hard to find a reliable lessee or purchaser, and I hope that you and Farnham will not drop the matter unless and until you are definitely certain that you cannot do business with Clark.

Aside from the ore reserves which have been measured and sampled at the De Soto and which are shown on my maps, there is a real possibility that the entire top of the hill might be worked out from the surface along the mineralized zone and in a manner similar to the work which is being done at Castle Dome. Of course this is a problem for a large mining company with ample capital and I know that you would not be interested at present nor would you be likely to want the material which I listed as Class B in my letter of May 1 but the next time that you are down in Phoenix, I hope you will find time to drop in my office and I will tell you some things which might be worthy of careful consideration provided we are going to have a good copper market for some years to come.

As a matter of fact my own study of that low grade situation is by no means complete, but I hope to make progress from time to time as opportunity permits.

Personal regards.

Sincerely,

GMC:IM .

CONSOLIDATED ARIZONA SMELTING CO.

ANNUAL REPORT

1916

DE SOTO MINE

After having been shut down for a period of nine years, this mine was opened up in the middle of 1915 and operations have since proceeded continuously.

Exploration and Development:

A long crosscut was extended to the west under the Whale outcrop and we have drifted along the mineralized zone for a distance of 252 feet. I regret to state that up to the present time the results of this work have not been particularly successful, for, although we have found a considerable amount of mineral and some small lenses and stringers containing ore we have not as yet developed any really commercial ore body, except possibly at one point where a small stope has been started. It will be understood that so far we have only explored a comparatively small portion of the area in which mineral deposits are likely to occur, and it is our intention to continue this work slowly but steadily and we hope that some really valuable discoveries will still be made.

All other developments in the mine were in line with those undertaken in 1915 and consisted in the extension of the limits of the known ore bodies which had been partially worked by the old company. This work has been successful, ~~and~~ as the comparative statement of ore reserves will testify.

The total amount of exploration and development work amounted to 1,814 feet, same being accomplished at a cost of \$17,301.40, equivalent to \$9.63 per foot of advance. The above mentioned cost represented a charge of \$0.50 per ton against the ore produced during the year and this development served to prove up 72,882 tons of new ore during the year against which the charge for development would amount to \$0.237 per ton, and it will also be noted that at this mine we developed two tons of new ore for every ton of ore extended. During 1917 we shall probably carry on a considerable amount of development on the 700 and 800 foot levels and

perhaps also at greater depth.

Production:

The DeSoto production amounted to 34,382 tons of ore having an average value of \$1.58 in gold and silver and 31.375% copper, the copper value being slightly higher than the Bluebell and the gold and silver values slightly lower, the total value being very nearly the same. The production which we have made has been altogether limited by the capacity of the plant at Humboldt and we could have increased this 50% had we been able to take care of the material in the Mill. The DeSoto ore is highly silicious, and none of it is suitable for direct smelting. The clean sulphide ore concentrates readily, but the upper levels of the mine are oxidized and ore from these points cannot be treated satisfactorily in the Concentrator and is, therefore, used as converter flux at the Smelter.

The equipment of the DeSoto Mine is good and an increased production is merely a matter of obtaining additional milling capacity at Humboldt and the outlook is favorable for a production of 50,000 tons or better during the year 1917.

Working Costs:

The cost of production f.o.b. Humboldt, and including all items in the same manner as figured at Bluebell, amounted to \$3.358 per ton as against \$4.633 per ton in 1915, when the mine was in the course of reopening and working costs were naturally high. In the above connection it will be noted that the freight from shipping point, Middleton to Humboldt is \$0.70 [per ton of ore. The total cost of DeSoto ore is practically identical with the cost of Bluebell ore; DeSoto ore pays twice as much freight as Bluebell, but on the other hand, the charge for development was \$0.33 per ton less than at Bluebell. The comparatively high working costs were affected by the same causes as at Bluebell and no additional explanation is necessary. I believe, however, that it can fairly be said that with increased shipments, the costs of production at DeSoto are likely to decrease as long as we can maintain the output from the levels above the adit, but when it becomes necessary to work on the 700 and 800 foot levels and to hoist from the winze, the costs of production will probable increase to some extent.

Ore Reserves:

The estimate of ore reserves as of January 1st, 1917, amounts to 103,500 tons, the average grade being estimated as \$1.50 per ton in gold and silver and 3.20% copper. As shown in the table furnished with this report the reserves at DeSoto Mine have been steadily increasing in a satisfactory manner and we are hopeful that such increase will continue.

General:

During 1917 we shall probably carry on more extensive development work than has been done in the past and it may be advantageous to extend the workings below the present bottom or 800' level, and to test out the values of the ore shoots at greater depth.

The record is particularly interesting when it is recalled that the DeSoto Mine was for many years considered practically worked out and at one time all the old equipment was removed on the supposition that it would never be reopened. Since reopening, the mine has produced 42,742 tons of ore and the steady increase in the ore reserves as shown in the table. There are indications that some important new discoveries may yet be made in outlying portions of the property, particularly on the Whale and Little Johnnie Claims.

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CONSOLIDATED ARIZONA SMELTING CO.

ANNUAL REPORT

1917

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DE SOTO MINE

Exploration and Development

The exploration and development work represented a total advance of 532 feet accomplished at a cost of \$5,957.82, an average of \$11.20 per foot of advance, equal to \$0.13394 per ton of ore produced. The exploration work was confined to drifting under the Whale Claim but no satisfactory results were obtained from this work and the Whale still shows only a small shoot of low grade ore. In stoping upwards from the Whale drift we were disappointed as to the quantity and value of the ore, but there remains the possibility that we have tapped the ore shoot close to its top and during the present year we shall probable sink a winze from the drift in an effort to prove up the downward extension of this ore body.

Other development was largely confined to proving up the limits of the known ore bodies and we were successful in discovering one new ore shoot, viz.: the #9, which has so far been proved up on the 2nd level only.

Much of the development work, especially on the 7th and 8th levels, yielded a negative result since we found that the ore shoots on these levels were considerably smaller than they had appeared on the levels above, and this fact reduced the tonnage which was figured in previous estimates.

We have started to sink the winze below the 8th level and aim to prove up the #7 and #8 ore bodies 125 feet below the 8th or present lowest level. This work is progressing steadily and definite result should be obtained in May. We shall also continue to explore the Whale and shall probable drive northward under the Little Johnnie Claim. It must be admitted that the [results of development and exploration at the DeSoto have not been encouraging during the past year and the future of the Mine is problematical and will depend very largely upon the results of this year's work.

Production:

The production of the DeSoto Mine amounted to 44,483 tons, an increase of 29% over the production of the previous year. The average grade of the ore was \$2.23 in gold and silver values and 3.035% copper. As at the Bluebell the percentage of copper diminished while the gold and silver increased to such an extent as to more than compensate for the reduction in copper values. Practically all of the DeSoto production is concentrating ore although a small portion of the ore body located near the surface has become so much oxidized as to render it suitable for converter flux.

At present we are producing about 150 tons of ore per day from the DeSoto and shall make every effort to maintain this rate throughout the year although it is not certain that we can do so unless new ore should be developed by the work now under way.

Working Costs:

The cost of the DeSoto ore f.o.b. Humboldt, including all expenses as at Bluebell, was \$3.15 per ton a decrease of 41 cents from 1916. The mining cost excluding freight and development work was \$2.31 per ton against \$2.35 in 1916 and considering that all outside conditions tended to steadily increase the cost of mining, I am particularly pleased to have shown the decrease of 4 cents per ton and believe that this cost can be maintained although development charges will probably be greater during 1918.

Ore Reserves:

The estimate of positive, highly probable and probable ore reserves as of January 1, 1918 is 66,200 tons of which 17,105 tons was broken in the stopes. The average value of the reserves is figured at \$2.00 in gold and silver and 3% copper. The estimated reserves ~~in figures~~ ~~at \$2.00~~ have decreased during the past year to the extent of 37,300 tons or only 7,183 tons less than the year's production. During the present year we shall make every effort to prove up additional reserves of ore, and if these are found we hope to end the year 1918 with at least as large a reserve as can be estimated at the present time. Should it prove impossible to discover any additional reserves of ore the Mine at the end of the present year will be in such condition that it will be necessary

to materially reduce the rate of output and no production can be counted on after the year 1919. I do not think that such a contingency is probable, but the possibility must be faced.

General:

It will be recalled that the DeSoto Mine was closed down as having been worked out between the years 1906 and 1915, and since the reopening of the property 87,225 tons of ore have been produced, while reserves amounting to 66,200 tons can still be estimated for future production and there is sufficient unexplored ground to permit us to reasonably hope for the discovery of new ore bodies. Also, we think, that the #7 and #8 ore shoots may improve below the 8th level where they appear to be much reduced in size and show up larger on the 9th and lower levels.

The Mine equipment is in excellent condition and the operation of the Mine continues to be very satisfactory.

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CONSOLIDATED ARIZONA SMELTING CO.

ANNUAL REPORT

1918

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DE SOTO MINE

Exploration and Development:

No diamond drilling was carried on at the DeSoto Mine, but exploration and development to the extent of 874½ feet of advance was accomplished, at a cost of \$16,949.61 equal to \$19.39 per foot of advance. This charge was borne by the ore produced from the Mine and amounted to \$0.3954 per ton of ore produced. The comparatively high cost of footage advanced was due largely to the character of the work since much of the development was carried on at the bottom of a deep winze and for the most part the balance was at the extension of a Tunnel approximately one half mile in length.

The results of the development work were comparatively meagre, although some extensions to the old ore bodies were found during the year. On the 9th level (which was reached by a winze,) the downward extension of the ore shoots proved to be extremely disappointing and taken as a whole the development work at the DeSoto Mine cannot be considered as satisfactory, although it served to somewhat increase the life of the Mine. I am pleased to state that since the beginning of the present year some rather favorable results have accompanied the small amount of development work which is now in progress and the outlook for the future of this Mine is rather more favorable than it was four or five months ago.

Ore Reserves:

The total reserves of positive, highly probable and probable ore was estimated on January 1st, 1919 at 33,000 tons. A considerable portion of this reserve is comparatively low in grade and the average value is figured at \$2.30 in gold and silver and 2.60% copper. At the DeSoto Mine as well as at the Bluebell Mine the content in gold and silver has tended to increase during the past few years while the copper content has gradually diminished.

Production:

The production from the DeSoto Mine was a trifle less than in 1917 amounting to 42,870 tons containing on the average \$1.54 in gold, \$1.20 in silver and 2.576% copper. At the present time the rate of production is approximately 100 tons per day and we hope to maintain this rate throughout at least the greater part of the present year, although it is not certain that this can be done.

Working Costs:

The cost of the DeSoto ore f.o.b. Humboldt was \$3.6857 per ton or 10 cents less than the cost of ore from the Bluebell. This cost also shows an increase over previous years, amounting to an additional 53 cents since 1917. A part of this increase is found in the extra charge of 26 cents per ton because of additional development work and also since July 1st, 1918 the freight has been increased from 70 cents to 90 cents per ton from the shipping point at Middleton to Humboldt. Here (as at the Bluebell) we hope and expect the average cost of production will show a decrease in 1919.

General:

The DeSoto Mine, since reopening in 1915, has produced a total of 130,095 tons of ore and there is still a considerable amount of unexplored ground and we have not lost hope in the discovery of new ore bodies or in finding further extensions of those ore shoots in which we are now working. If conditions permit, it is planned to use a diamond drill on this property within the course of the next year and some substantial results may be hoped for from this work.

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CONSOLIDATED ARIZONA SMELTING CO.

ANNUAL REPORT

1919

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DE SOTO MINE

Exploration and Development:

The total expense on this account was \$17,284.58, representing \$0.6385 per ton ore shipped. 1417 feet of diamond drilling were carried out at a cost of \$2.175 per foot; also 1,167 feet of drifts and crosscuts at an average cost of \$12.17 per foot.

This work did not result in finding any new ore bodies, but enlarged to some extent the limits of the ore bodies which were already known. On the whole the result was disappointing and we now feel that the DeSoto ground has been as thoroly explored as conditions justify and the chance of finding new ore does not warrant any further expense under present conditions.

Development and exploration work has been discontinued from the first of the present year and the mine may be considered as completely developed and will be worked out gradually and in accordance with market conditions.

Ore Reserves:

The estimate of ore reserves, including positive, highly probable and probable ore as of January 1st, 1920 is 21,000 tons, the average content being \$2.30 value in gold and silver and 2.15% copper. In addition to the above tonnage there is a very considerable quantity of low grade material which will average approximately \$1.50 in gold and silver and 1.75% copper. This is not estimated as ore at present since it cannot be treated with profit under existing market conditions but should the price of copper exceed 25 cents per pound, it would automatically become commercial ore and provision to mine and treat same would then be made. No figure can be put on the tonnage of this material as it is a variable rather than a constant quantity depending entirely upon market price.

Production:

As forecasted in my last Annual Report, the production of the DeSoto fell off largely during 1919 and amounted to 27,067 tons; the average grade of this ore was \$2.23 in gold and silver values and 2.355% Cu. During 1920 it will become necessary to further reduce the output of the DeSoto and unless the market should materially improve before the middle of the year, the production will probable not exceed 15,000 tons. In any event the mine will probably be exhausted during 1921 unless at that time a very high price for copper should maintain and enable us to continue working the low grade ore bodies.

Working Costs:

The costs of production have increased because of general conditions and also because of the lower tonnage produced during the past year and because much of the ore came from small and narrow veins in which the stoping costs were necessarily extremely high. Our cost last year, including exploration and development was \$4.746 per ton f.o.b. Humboldt. The actual mining and transportation cost was \$4.10 per ton and during 1920 we hope to approximate this last figure since no exploration nor development work will be carried on.

General:

Since reopening the mine in 1914 the DeSoto has produced a total of 157,162 tons of ore. The production was very profitable until the last year, but during 1919 the copper produced from the DeSoto has cost just about the average price received, even after crediting gold and silver values.

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CONSOLIDATED ARIZONA SMELTING CO.

Annual Report

1915

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DE SOTO MINE

This mine was re-opened and fully equipped during 1915 and shipments of only 8,360 tons were made, although 12,000 tons of additional ore was broken in the stopes ready for shipment at the end of the year.

Development:

Our development work consisted entirely in extending the limits of the known ore shoots and so far we have not found any really new ore but have merely delimited the ore bodies which were worked in part by former management before the mine was most injudiciously abandoned. Cost of development was \$5,328.81, equal to \$0.70 per ton ore shipped.

Production:

This amounted to 8,360 tons, containing on the average gold and silver to the value of \$1.50 per ton and 3.5 per cent copper.

At date of writing we are shipping at the rate of 100 tons per day and expect to ship upwards of 40,000 tons during the present year.

Working Costs:

Cost of production at the outset was naturally very high, and has averaged \$4.633 per ton f.o.b. Humboldt, everything included. The cost has been falling steadily and was \$3.58 in December and it is our expectation that during this year the average cost will be lower. The railroad freight on the ore is \$0.70 per ton against \$0.35 per ton from Bluebell to Humboldt.

Ore Reserves:

Before we decided to reopen and equip this mine a careful estimate of ore left in the old workings showed a reserve of 32,000 tons. On January 1, 1916, the reserve was estimated at 65,000 tons, and at date of writing it may be estimated at 75,000 tons, with an average value of \$1.50 in gold and silver and 3.75 per cent copper.

General:

We are operating from eight ore shoots at De Soto, no one of which is very large, but we believe that considerable additional ore still remains to be proved up in them and the small amount of work done on the 700 and 800' levels would seem to indicate that ore continues strong to a considerably greater depth. Six of the ore shoots are cut off by a strong fault which traverses the property and during the present year we shall make every effort to find the continuations of these ore shoots below the fault. We have also good reason to hope that exploration now under way will develop some entirely new ore bodies of considerable importance. I consider the prospects of the De Soto to be very good indeed.

CONSOLIDATED ARIZONA SMELTING CO.

ANNUAL REPORT

1916

DE SOTO MINE

After having been shut down for a period of nine years, this mine was opened up in the middle of 1915 and operations have since proceeded continuously.

Exploration and Development:

A long crosscut was extended to the west under the Whale outcrop and we have drifted along the mineralized zone for a distance of 252 feet. I regret to state that up to the present time the results of this work have not been particularly successful, for, although we have found a considerable amount of mineral and some small lenses and stringers containing ore we have not as yet developed any really commercial ore body, except possibly at one point where a small stoppe has been started. It will be understood that so far we have only explored a comparatively small portion of the area in which mineral deposits are likely to occur, and it is our intention to continue this work slowly but steadily and we hope that some really valuable discoveries will still be made.

All other developments in the mine were in line with those undertaken in 1915 and consisted in the extension of the limits of the known ore bodies which had been partially worked by the old company. This work has been successful, ~~and~~ as the comparative statement of ore reserves will testify.

The total amount of exploration and development work amounted to 1,814 feet, same being accomplished at a cost of \$17,301.40, equivalent to \$9.63 per foot of advance. The above mentioned cost represented a charge of \$0.50 per ton against the ore produced during the year and this development served to prove up 72,882 tons of new ore during the year against which the charge for development would amount to \$0.237 per ton, and it will also be noted that at this mine we developed two tons of new ore for every ton of ore extended. During 1917 we shall probably carry on a considerable amount of development on the 700 and 800 foot levels and

perhaps also at greater depth.

Production:

The DeSoto production amounted to 34,382 tons of ore having an average value of \$1.58 in gold and silver and 31.375% copper, the copper value being slightly higher than the Bluebell and the gold and silver values slightly lower, the total value being very nearly the same. The production which we have made has been altogether limited by the capacity of the plant at Humboldt and we could have increased this 50% had we been able to take care of the material in the Mill. The DeSoto ore is highly silicious, and none of it is suitable for direct smelting. The clean sulphide ore concentrates readily, but the upper levels of the mine are oxidized and ore from these points cannot be treated satisfactorily in the Concentrator and is, therefore, used as converter flux at the Smelter.

The equipment of the DeSoto Mine is good and an increased production is merely a matter of obtaining additional milling capacity at Humboldt and the outlook is favorable for a production of 50,000 tons or better during the year 1917.

Working Costs:

The cost of production f.o.b. Humboldt, and including all items in the same manner as figured at Bluebell, amounted to \$3.358 per ton as against \$4.633 per ton in 1915, when the mine was in the course of reopening and working costs were naturally high. In the above connection it will be noted that the freight from shipping point, Middleton to Humboldt is \$0.70 per ton of ore. The total cost of DeSoto ore is practically identical with the cost of Bluebell ore; DeSoto ore pays twice as much freight as Bluebell, but on the other hand, the charge for development was \$0.33 per ton less than at Bluebell. The comparatively high working costs were affected by the same causes as at Bluebell and no additional explanation is necessary. I believe, however, that it can fairly be said that with increased shipments, the costs of production at DeSoto are likely to decrease as long as we can maintain the output from the levels above the adit, but when it becomes necessary to work on the 700 and 800 foot levels and to hoist from the winze, the costs of production will probable increase to some extent.

Ore Reserves:

The estimate of ore reserves as of January 1st, 1917, amounts to 103,500 tons, the average grade being estimated as \$1.50 per ton in gold and silver and 3.20% copper. As shown in the table furnished with this report the reserves at DeSoto Mine have been steadily increasing in a satisfactory manner and we are hopeful that such increase will continue.

General:

During 1917 we shall probably carry on more extensive development work than has been done in the past and it may be advantageous to extend the workings below the present bottom or 800' level, and to test out the values of the ore shoots at greater depth.

The record is particularly interesting when it is recalled that the DeSoto Mine was for many years considered practically worked out and at one time all the old equipment was removed on the supposition that it would never be reopened. Since reopening, the mine has produced 42,742 tons of ore and the steady increase in the ore reserves as shown in the table. There are indications that some important new discoveries may yet be made in outlying portions of the property, particularly on the Whale and Little Johnnie Claims.

CONSOLIDATED ARIZONA SMELTING CO.

ANNUAL REPORT

1917

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DE SOTO MINEExploration and Development

The exploration and development work represented a total advance of 532 feet accomplished at a cost of \$5,957.82, an average of \$11.20 per foot of advance, equal to \$0.13394 per ton of ore produced. The exploration work was confined to drifting under the Whale Claim but no satisfactory results were obtained from this work and the Whale still shows only a small shoot of low grade ore. In stoping upwards from the Whale drift we were disappointed as to the quantity and value of the ore, but there remains the possibility that we have tapped the ore shoot close to its top and during the present year we shall probable sink a winze from the drift in an effort to prove up the downward extension of this ore body.

Other development was largely confined to proving up the limits of the known ore bodies and we were successful in discovering one new ore shoot, viz.: the #9, which has so far been proved up on the 2nd level only.

Much of the development work, especially on the 7th and 8th levels, yielded a negative result since we found that the ore shoots on these levels were considerably smaller than they had appeared on the levels above, and this fact reduced the tonnage which was figured in previous estimates.

We have started to sink the winze below the 8th level and aim to prove up the #7 and #8 ore bodies 125 feet below the 8th or present lowest level. This work is progressing steadily and definite result should be obtained in May. We shall also continue to explore the Whale and shall probable drive northward under the Little Johnnie Claim. It must be admitted that the results of development and exploration at the DeSoto have not been encouraging during the past year and the future of the Mine is problematical and will depend very largely upon the results of this year's work.

Production:

The production of the DeSoto Mine amounted to 44,483 tons, an increase of 29% over the production of the previous year. The average grade of the ore was \$2.23 in gold and silver values and 3.035% copper. As at the Bluebell the percentage of copper diminished while the gold and silver increased to such an extent as to more than compensate for the reduction in copper values. Practically all of the DeSoto production is concentrating ore although a small portion of the ore body located near the surface has become so much oxidized as to render it suitable for converter flux.

At present we are producing about 150 tons of ore per day from the DeSoto and shall make every effort to maintain this rate throughout the year although it is not certain that we can do so unless new ore should be developed by the work now under way.

Working Costs:

The cost of the DeSoto ore f.o.b. Humboldt, including all expenses as at Bluebell, was \$3.15 per ton a decrease of 41 cents from 1916. The mining cost excluding freight and development work was \$2.31 per ton against \$2.35 in 1916 and considering that all outside conditions tended to steadily increase the cost of mining, I am particularly pleased to have shown the decrease of 4 cents per ton and believe that this cost can be maintained although development charges will probably be greater during 1918.

Ore Reserves:

The estimate of positive, highly probable and probable ore reserves as of January 1, 1918 is 66,200 tons of which 17,105 tons was broken in the stopes. The average value of the reserves is figured at \$2.00 in gold and silver and 3% copper. The estimated reserves ~~is figured at~~ ~~six \$2.00~~ have decreased during the past year to the extent of 37,300 tons or only 7,183 tons less than the year's production. During the present year we shall make every effort to prove up additional reserves of ore, and if these are found we hope to end the year 1918 with at least as large a reserve as can be estimated at the present time. Should it prove impossible to discover any additional reserves of ore the Mine at the end of the present year will be in such condition that it will be necessary

to materially reduce the rate of output and no production can be counted on after the year 1919. I do not think that such a contingency is probable, but the possibility must be faced.

General:

It will be recalled that the DeSoto Mine was closed down as having been worked out between the years 1906 and 1915, and since the reopening of the property 87,225 tons of ore have been produced, while reserves amounting to 66,200 tons can still be estimated for future production and there is sufficient unexplored ground to permit us to reasonably hope for the discovery of new ore bodies. Also, we think, that the #7 and #8 ore shoots may improve below the 8th level where they appear to be much reduced in size and show up larger on the 9th and lower levels.

The Mine equipment is in excellent condition and the operation of the Mine continues to be very satisfactory.

CONSOLIDATED ARIZONA SMELTING CO.

ANNUAL REPORT

1918

DE SOTO MINE

Exploration and Development:

No diamond drilling was carried on at the DeSoto Mine, but exploration and development to the extent of 874½ feet of advance was accomplished, at a cost of \$16,949.61 equal to \$19.39 per foot of advance. This charge was borne by the ore produced from the Mine and amounted to \$0.3954 per ton of ore produced. The comparatively high cost of footage advanced was due largely to the character of the work since much of the development was carried on at the bottom of a deep winze and for the most part the balance was at the extension of a Tunnel approximately one half mile in length.

The results of the development work were comparatively meagre, although some extensions to the old ore bodies were found during the year. On the 9th level (which was reached by a winze,) the downward extension of the ore shoots proved to be extremely disappointing and taken as a whole the development work at the DeSoto Mine cannot be considered as satisfactory, although it served to somewhat increase the life of the Mine. I am pleased to state that since the beginning of the present year some rather favorable results have accompanied the small amount of development work which is now in progress and the outlook for the future of this Mine is rather more favorable than it was four or five months ago.

Ore Reserves:

The total reserves of positive, highly probable and probable ore was estimated on January 1st, 1919 at 33,000 tons. A considerable portion of this reserve is comparatively low in grade and the average value is figured at \$2.30 in gold and silver and 2.60% copper. At the DeSoto Mine as well as at the Bluebell Mine the content in gold and silver has tended to increase during the past few years while the copper content has gradually diminished.

Production:

The production from the DeSoto Mine was a trifle less than in 1917 amounting to 42,870 tons containing on the average \$1.54 in gold, \$1.20 in silver and 2.576% copper. At the present time the rate of production is approximately 100 tons per day and we hope to maintain this rate throughout at least the greater part of the present year, although it is not certain that this can be done.

Working Costs:

The cost of the DeSoto ore f.o.b. Humboldt was \$3.6857 per ton or 10 cents less than the cost of ore from the Bluebell. This cost also shows an increase over previous years, amounting to an additional 53 cents since 1917. A part of this increase is found in the extra charge of 26 cents per ton because of additional development work and also since July 1st, 1918 the freight has been increased from 70 cents to 90 cents per ton from the shipping point at Middleton to Humboldt. Here (as at the Bluebell) we hope and expect the average cost of production will show a decrease in 1919.

General:

The DeSoto Mine, since reopening in 1915, has produced a total of 130,095 tons of ore and there is still a considerable amount of unexplored ground and we have not lost hope in the discovery of new ore bodies or in finding further extensions of those ore shoots in which we are now working. If conditions permit, it is planned to use a diamond drill on this property within the course of the next year and some substantial results may be hoped for from this work.

CONSOLIDATED ARIZONA SMELTING CO.

ANNUAL REPORT

1919

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DE SOTO MINE

Exploration and Development:

The total expense on this account was \$17,284.38, representing \$0.6385 per ton ore shipped. 1417 feet of diamond drilling were carried out at a cost of \$2.175 per foot; also 1,167 feet of drifts and crosscuts at an average cost of \$12.17 per foot.

This work did not result in finding any new ore bodies, but enlarged to some extent the limits of the ore bodies which were already known. On the whole the result was disappointing and we now feel that the DeSoto ground has been as thoroly explored as conditions justify and the chance of finding new ore does not warrant any further expense under present conditions.

Development and exploration work has been discontinued from the first of the present year and the mine may be considered as completely developed and will be worked out gradually and in accordance with market conditions.

Ore Reserves:

The estimate of ore reserves, including positive, highly probable and probable ore as of January 1st, 1920 is 21,000 tons, the average content being \$2.30 value in gold and silver and 2.15% copper. In addition to the above tonnage there is a very considerable quantity of low grade material which will average approximately \$1.50 in gold and silver and 1.75% copper. This is not estimated as ore at present since it cannot be treated with profit under existing market conditions but should the price of copper exceed 25 cents per pound, it would automatically become commercial ore and provision to mine and treat same would then be made. No figure can be put on the tonnage of this material as it is a variable rather than a constant quantity dependng entirely upon market price.

JK

Production:

As forecasted in my last Annual Report, the production of the DeSoto fell off largely during 1919 and amounted to 27,067 tons; the average grade of this ore was \$2.23 in gold and silver values and 2.355% Cu. During 1920 it will become necessary to further reduce the output of the DeSoto and unless the market should materially improve before the middle of the year, the production will probable not exceed 15,000 tons. In any event the mine will probably be exhausted during 1921 unless at that time a very high price for copper should maintain and enable us to continue working the low grade ore bodies.

Working Costs:

The costs of production have increased because of general conditions and also because of the lower tonnage produced during the past year and because much of the ore came from small and narrow veins in which the stoping costs were necessarily extremely high. Our cost last year, including exploration and development was \$4.746 per ton f.o.b. Humboldt. The actual mining and transportation cost was \$4.10 per ton and during 1920 we hope to approximate this last figure since no exploration nor development work will be carried on.

General:

Since reopening the mine in 1914 the DeSoto has produced a total of 157,162 tons of ore. The production was very profitable until the last year, but during 1919 the copper produced from the DeSoto has cost just about the average price received, even after crediting gold and silver values.

DE SOTO -- ESTIMATE OF ORE RESERVES, JULY 1, 1920.

NOTES.

- a- Nominal estimate, sill work not finished
- b- There is this much ore, but its recovery is so questionable that none of it can be called positive.
- c- There is at least this much ore now proved up on the Sill, and the conditions are so much better on the 400 than on the 300, that its recovery is fairly well assured.
- d- If the 430 sill proves up comparable with 330 sill in size, this ore will then become Probable.
- e- Small bunch in So. end of old 340 Sill.
- f- Average grade below 2%, therefore not ore under present conditions.
- g- Pillar just below 300 level.
- h- Broken ore in stope in excess of estimate, and not included in estimate of Broken Ore reserves.
- i- Two blocks of 400 and 540 tons respectively, the major portion of which can probably be recovered, ultimately.
- j- A pillar of 770 tons left to protect the Sill; a portion of this may be recovered, but conditions in the stope, after the ore is all drawn, will probably make the recovery of more than a small portion of the pillar very questionable.
- k- Pillars, to be recovered in the final wind-up.
- l- Pillar below 360 Sill, drilled and ready to break.
- m- Triangular block of low grade ore in No. end of Stope, above the Sill; there may be more than 300 tons, depending upon how it holds up in grade.
- n- Pillar below the 460 Sill, to be recovered when the stope is drawn.
- o- Pillars between Main Sill and Sub-Sill.
- p- Triangular bunch between Sub-Sill and fault; size more or less indeterminable.
- q- Smelting ore; only a nominal estimate possible at present stage of development.

- r- A small amount of ore was found in 370 which is probably a continuation of the 270 ore, but the grade was too low, and amount too small to be of any interest.
- s- Worked out.
- t- Present stoping area, 405 sq. ft.; backs remaining, 70 ft.; grade good.
- u- If ore is encountered in 490 Sill, there will be more than 1000 tons.

(signed) CLAUDE FERGUSON,
Supt.

MINING OF REPLACEMENT DEPOSITS OF COPPER ORE

Ever since D. C. Jackling and his associates pioneered the way the operation of the so-called porphyry-coppers has been carried on with profit and on an increasing scale until at present it accounts for more than three-fourths of the total U. S. output of copper and is reasonably certain to represent an even larger percentage as time goes on.

The natural conditions which permit the profitable application of such a procedure involve the fairly uniform distribution of small quantities of copper mineral, generally in the form of sulphide, throughout a large mass of mineralized rock which makes it possible to cheaply mine the very low grade ore in great quantity often more than 10,000 tons per day and then to concentrate it with a ratio of from 20 to 50 to 1 so that only a comparatively small tonnage of high grade material is subjected to the expensive pyro-metallurgical procedure that results in finally putting the metal into a marketable product.

Thus copper derived from crude ore containing less than 1% of the metal is being produced and marketed in some cases for an operating cost of as little as seven or eight cents per pound and where the tonnage in the deposit amounts to some hundreds of millions of tons, as at Bingham Canyon and Morenci, the large initial investment required to prepare and equip the mines for operation can be amortized at a very trivial figure per ton of ore or pound of copper produced.

Obviously no such procedure could be applied to any ore body that occurred in narrow veins or in any other manner that precluded cheap mining or that could only be beneficiated with a low ratio of concentration

and up to the present time only the disseminated ore bodies,--usually in some type of porphyry rock,--have been profitably exploited.

However, for many years I have given some thought to the possibility of applying a somewhat similar procedure to the replacement deposits in schist such as are found in Yavapai County, Arizona, and of which the largest is the United Verde at Jerome, while among the smaller deposits of similar character may be mentioned the Blue Bell, De Soto, Arizona Binghampton and Little Copper Queen.

The conditions at the United Verde were somewhat unique and here after the best of the ore had been mined from the lenses in the upper levels the entire mineralized zone was stripped of the barren material at the surface and then the low grade ore was mined out from a huge glory hole extending down to the old 600' level, with an area of 52 acres at the top of the mountain which was 1040' above the bottom of the pit where the area was only 1.5 acres. From this pit there was taken 34,000,000 tons of waste and 9,080,904 tons of ore with an average content of 3.00% copper plus 0.03 oz. au, and 2.00 oz. silver.

In all of the other mines mentioned the ore occurs in lenses which have the following characteristics in common:-

(a) The long axis is vertical so that in some cases as at Blue Bell an ore shoot with a horizontal length of only 300' has a known vertical length of 1500' and may extend much deeper.

(b) The greatest width of ore is at or near the horizontal center of the lenses and this condition maintains all the way from the top to the bottom where, except when the shoots are cut off by faults, the copper content decreases and the lense either pinches out or the chalcopryite gives place to iron sulphide or barren quartz.

(c) On both sides of the core of high grade ore and at its ends the values gradually decrease in the foot and hanging wall of the shoot and the width and length of the mineable ore is determined by assay with the limits extending farther in all directions as the critical grade of the pay ore is reduced.

(d) Where several lenses wholly or partially overlap the wall rock between them is nearly always mineralized to a small extent and often there are stringers of ore connecting the other shoots which are strung out thru the length of a mineralized zone.

These conditions may best be illustrated by sketches which follow and which, while not pretending to accurately represent the exact conditions of any one of the deposits, are fairly representative of the general conditions found in many of them.

In all of the mines mentioned above the heart or core of the ore shoots have already been mined out,--since there was no thought of large scale mining when they were operated,--and therefore the higher grade material has been eliminated,--as shown in the sketches, and the practical application of the proposed procedure must depend upon the tonnage and value of the remaining ore.

While the work previously done in these mines has had the obvious disadvantage above noted yet it has had the advantage of partially proving up the grade and tonnage remaining and thus making future exploration much less expensive than would be the case with a virgin ore-body.

Also this work often serves to make the remaining ore more accessible and advantage can be taken of existing shafts or adits where the caving system of underground mining may be applied in line with the

practice at Miami and at the Ohio Copper Co. of Utah.

In cases where open cut mining methods could best be followed the existence of the old stopes and workings would be advantageous in some respects and disadvantageous in others. The breaking down of ore along the terraces should be made easier but there would be extra expense involved in handling the timber and the fill but if this fill consisted of low grade ore, as is often the case, the general effect should be favorable.

The character of the ore is a matter of the utmost importance for in many cases, e. g., the Blue Bell, much of the ore contains a high percentage of iron-sulfid and unless nearly all of the former could be dropped in the flotation circuit there would be a low ratio of concentration and a low grade concentrate would be produced. At De Soto where there is less iron and the ore is more siliceous I have assumed that the ratio of concentration might be about 10 to 1 so that a 1% ore would produce a 10% cu concentrate.

Equally important is the fact that much of the ore is wholly or partially oxidized in the upper levels of most of these mines and on such material the recovery of values would not be so good as when sulphides were treated. However, the great bulk of the ore is in the form of sulphide and a recovery of 90% should be made. Incidentally, much of the oxidized ore is richer than the sulfide.

The character and dip of the walls must also be given due consideration. The dip of the ore shoots and of the mineralized zone at both the Blue Bell and De Soto is in the order of 70° (to the E 25° N) and while the foot wall will generally stand up pretty well the hanging

wall will naturally tend to cave, altho at the De Soto both walls were remarkably solid and firm.

If an open cut at De Soto were carried down to the 600' level and the northeast contour of the hill averaged 30° (which is about right) it might be necessary to remove some 5,000 tons of waste for each running ft. of the cut in order to bring the slope of the hanging wall to the angle of repose (45°) and this would mean removing some 3,000,000 tons of waste if the pit had an ultimate length of 600'.

Total cost @ 10¢ per ton would be 300,000 equivalent to a charge of 15¢ per ton if only 2,000,000 tons of ore were extracted from the pit. Thus the actual mining of the ore to the mill could not exceed a cost of 25¢ per ton if the total mining cost was to be kept at 40¢ per ton. This might be pretty difficult.

NOTES ON DE SOTO MINE, 1/17/27. Visited with J. L. White.

Went over the ground with E. S. Chafey. Chafey has found some carbonate ore under an outcrop near the Buster Cut and not far from the Treadwell Tunnel, which is noted as Tannel No. 5. This is perhaps the outcrop of the No. 1 orebody, which was worked up 40' above the 100' level, whereas the outcrop is ~~only~~ 200' above this level so that there is possibly 160' vertical dimension of ore between the back of our old stope and the outcrop on which Chafey is working. In this ground there is very probably more carbonate and oxide and some lenses of high grade may be found between the surface and the stope.

On the other hand there is a possibility that Chafey's outcrop on which he is drifting the Zero Tunnel covers an entirely new ore body which has never been previously explored with depth, and may represent a very substantial tonnage.

Under ground Chafey has found some ore in the bend of the 200' level, (before the long drift starts out toward the surface) and this may extend to an outcrop now on the surface approximately 170' above this point, and which has been developed in the past by several small surface pits. This ore is probably an extension of the 50 ore body and a little good grade material may be expected, but tonnage is entirely uncertain.

Another chance to find ore is above the No. 9 orebody which pinched out approximately 100' below the surface in the back of our stope, but which may have been cut off by a fault. There is a prospect that between this point and the surface a lense of the material is effected by secondary enrichment and may prove to be well worth mining.

Leaser has been shipping ore which was sorted from the dump and is now beginning to mine some material in the Zero Tunnel, also on the 200' level. Shipments at present are approximately 100 tons per month, average grade about 6% copper.

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NOTES ON DESOTO MINE - 6/21/27.

Chafey now working on 200' level and just to the north side and top of winze. At this point a little good ore shows in the footwall. On the 100' level, south of the winze and at end of old stope, there is said to be a considerable body of silver ore which was left by the old operators in 1905. This ore is now coming down in the stope and being used for filling, but can be drawn again and taken out when desired. Chafey states that several samples show it to carry gold: \$1.80 a ton, about 10 ounces silver and $1\frac{1}{2}\%$ copper. At some later date this ore both that which is coming down in the stope and that which still remains in place should be thoroughly sampled and investigated.

The stope referred to is marked 5208 on tracing D-25-11.

Going down the winze there is ore in the foot wall of the 250 stope on the 250 level and on both sides of the winze, especially the north side. Chafey has worked into this foot wall and at one point has a width of about 12' of good ore which he states will average 9% copper. Believes that this ore body will continue a long distance south and amount to several thousand tons. The silver ore mentioned above has run down as filling into the present work, particularly on the south side of the winze.

On the 275' level there is a vein of good ore on the south side of the winze 3' wide. This is at present not accessible.

From general indications a substantial tonnage of ore remains in the foot wall of the 250 stope, and this may extend considerably further north than previously supposed. It will probably pay to clean out all of the old shoots and run ore down to the Hot Number tunnel, where Chafey plans to put a horse and dump cart, and perhaps to install rails and cars later.

On the surface and to the north and west of the main workings, Chafey has opened up the Zero tunnel, which is about on the 50' level, that is 150' above the 200 or Copper Link.

This tunnel is now in 60' under an outcrop which shows mineralization over a length of 150', and which may prove to represent a very substantial orebody. The ore in the tunnel shows a width of 8' and grade in excess of 8% copper, and this is just on the line between the oxides and sulphides, which latter look to be extremely good. About 400 tons of ore has been shipped from these workings, averaging 8% copper.

Surface prospecting has also been done in the vicinity of the Treadwell tunnel, and slightly to the east of this point where there is a very large and strong outcrop of leached ground showing iron oxide and in place copper carbonates and oxide. This is a promising showing and should be further investigated, as there is a chance that a large orebody may be found under the leached ground in the Treadwell tunnel.

Shipments of ore in June will run about 320 tons and average in net smelter returns about \$12.00 a ton. July shipments should exceed 400 tons. Present method of mining by hand steel costs about \$3.00 a ton to break ore, which is packed on burros to terminal and costs about \$1.75 per ton. Running tram adds about 25¢ so that ore costs Chafey \$5.00 or upwards per ton in cars at railroad. There would be a chance to save considerable money by putting in a small air compressor and especially by providing better methods of transportation running the ore down through the workings and out on the mail haulage tunnel. With present low prices of copper it will not be advantageous to attempt to push production; told Chafey I was well satisfied to let matters go ahead slowly as he might desire and that I would not be in favor of having him extract more than a maximum of 1,000 tons of ore per month while the copper market stayed as at present, less than 12½¢ a pound.

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DE SOTO MINE

G. J. Harbauer letter - March 18, 1930.

"Chafey is still drawing the caved material and has it drawn down almost to the 500 level. He hopes to have the mine clear again in about ten days. Most of the caved material is waste and the fines assay about 2% copper so the ore shipped has been low in grade. After the ore-pass is cleared, mining will be resumed in the 290 ore-body where there is still some ore in sight. Several leas-ors are working on the Whale outcrops and McCutcheon is still working his tunnel, but is not doing well. The storm has stopped ore haul from the sub-leases."

G. J. Harbauer letter - April 24, 1930.

"The outlook for a permanent job with the Southwest does not look so good since the drop in the price of copper and it is doubtful that Chafey will be able to continue very long as he has no great amount of shipping ore developed and is not financially able to do much development work.

"The Zero Stope has become lower grade in depth (about 3%) and the subleases have been very disappointing. The latest development has been a crosscut from "Nigger Heaven" to a point above the 110 stope and connecting with the "Stove Pipe Raise" started by Ferguson from the 111 level. This ore is running about 4% as mined and there are several cars in sight.

"I have been sampling the lower levels at the De Soto to get a line on the mill ore available. There seems to be a lot of low grade ore in sight that might be mined to a certain width but I have not had returns on my samples yet so cannot tell."

G. J. Harbauer letter - May 29, 1930.

"I finished at the DeSoto on May 10, 1930, as Chafey could not pay his own men, some of whom he owes over \$400, and the Sheldon people did not care to do any further sampling there.

"I took 88 samples on the "40 New" orebody which indicated about 8,000 tons of 2% Cu. ore between the 550 and 300 levels and I figure that at least 15,000 tons of this grade of sulphide ore can be mined without much development work. The upward extension of the 110 stope which was developed by the Stovepipe Raise and a crosscut from "Nigger Heaven" proved to

DeSoto Mine - page #2.

G. J. Harbauer letter - May 29, 1930 (continued)

be only a stovepipe of ore as it produced less than 400 tons of 5% ore.

"Chafey is now working on material shot down from the back of the Zero stope which is mostly an oxide ore and requires sorting. He may continue to ship a car or two per week for a while, but his credit is about gone as he owes around \$5,000."

NOTES RE DE SOTO MINE

January '27

There was some ore between 200 and 100 levels just at the edge of the main winze which would carry 0.09 oz. au and 10 oz. ag and 1.5% cu. It may be that Chaffee mined this. Present value would be \$14.40 per ton. (There should still be some really good ore with over 4% copper left in the pillars alongside the main winze if it can be gotten out without too much expense.

Note the gouge of the main fault on the Hot Number level and elsewhere. This could be easily mined and in places is said to carry 4.80% copper.

McCutcheon was mining out some good ore from the surface some distance north of the Whale adit. The vein at the end of a 100' adit had a width of 35'., the section near the foot wall ran 7% copper for width of 8', then 2% copper for width of 22' and 3% copper for width of 5' against the hanging wall. This showing is about 80' west (in hanging wall of the Buster Cut in which there is also some good oxidised ore about 20' wide.

NOTES ON DE SOTO MINE - November 18, 1927.

Chafey will transfer his account to the Valley Bank and we will arrange to allow him a credit up to a maximum of \$1,000, but not all at one time, so that he can purchase compressor, pump, drills and accessory equipment, and arrange for electric power from Arizona Power Co.

UNDERGROUND NOTES.

Chafey has developed some good ore at the north end of the 210, 230 and 250 stopes. On the second level (Copper Link) also there is more ore than was believed to exist in the back of the 260 and in the back of the 230, at which latter point the ore is 6 feet wide and appears to be good grade. This extends upwards for 100 or possibly 150 feet and while the length of the shoot cannot now be determined it may very well represent a substantial tonnage and should run 5% or better.

There is a large scab of ore on the foot wall of the 230 stope both above and below the second level, and has a width in places of from 5 to 8 feet, and Chafey states that farther down this ore turns back into the foot wall and he believes will work into a very substantial ore body. The grade is said to be better than 5%, but probably will not mine much over 4½%.

The gouge of the big fault was sampled on the tunnel level by Nelson and showed grade of 4.80% for a width of about 7 feet, also there was considerable lead and zinc in this gouge, and have instructed Chafey to take some additional samples and send them down to Humboldt. The tonnage may be considerable, but am doubtful as to value and moreover a large proportion of this material will probably be oxidized and not suitable for concentration, but it should be tested carefully. ✓

There appears to be a small body of good grade ore in the back of the 160 stope.

An adit has been run in to the north of No. 1 level and about thirty feet above and some ore is developed at this point which may represent the south extension of the 210, or which may, in Chafey's opinion, constitute an entirely new body in the hanging wall of all the previously developed ore shoots. This ore may extend upwards and northwest to the Buster Cut.

The compressor which Chafey will purchase from the Peck Company will cost \$300.00, plus the hauling to De Soto. Chafey now has eight men working and a cook.

He has 250 tons of ore in transit and over 100 tons broken in the mine, and this latter tonnage is increasing rapidly through scaling down the scab of ore on the foot wall of the 230. He expects to ship three cars per week from this time forward.

Chafey estimates that he has over \$2,000 worth of ore broken and in transit and he is indebted \$2600 to James Cleator, which indebtedness however is only secured by his note and would be inferior to any indebtedness that he might incur to us, which would be secured by ownership of the ore itself, as well as by title to the equipment which he might purchase with these advances until such time as the equipment had been paid for by deductions on shipments which as long as he continues to ship steadily we will keep down to a minimum of 50¢ a ton or a larger amount whenever he indicates that larger deduction would be satisfactory to him.

Since much of the ore shipped from DeSoto has a value of about \$15.00 per ton and it would be advantageous if a new rate could

be secured from Middleton to Superior on \$15.00 ore. This should not exceed \$3.00 per ton, since present rate on \$10.00 ore is \$2.60 and on \$20.00 ore \$3.50.

The general situation at De Soto looks promising. There is unquestionably considerably more ore left in the mine than any of us estimated and no doubt that Chafey will develop additional tonnage and can probably increase his shipments to 800 or possibly 1000 tons per month. The difficulty will be to keep up the grade of the ore to a point where this is profitable to Chafey, since his methods of sampling are not accurate and he appears to considerably over-estimate the value of most of the material which he finds as evidenced by the fact that many of his carload shipments which he believed would run 6% to 7% only ran 5% or a little less. He figures that he can lay ore down at Middleton for \$2.00 per ton, which figure is considerably too low, and the charges subsequent to loading the ore at present on low grade material are freight \$2.60, treatment \$2.00, royalty approximately \$1.00, copper market deduction $2\frac{1}{2}\%$ per pound. Accordingly a 5% ore (90% paid for) would, with slightly over \$1.00 value in gold and silver, net Chafey at $13\frac{1}{2}\%$ market, approximately \$11.00. Deducting freight, treatment and royalty, with allowance for moisture, his net returns should represent \$5.00 per ton, which gives him a good profit even if his mining and haulage costs reached closer to \$4.00 than \$2.00 per ton, which in my opinion is actually the case.

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GEORGE M. COLVOCORESSES
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February 5, 1946

**Notes on Feasibility of Reopening the DeSoto Mine for the
Recovery and Treatment of Remaining Low Grade Copper Ore.**

These notes are based upon my personal acquaintance with this mine and investigations by engineers made under my direction.

I first examined the property in November, 1913, subsequently supervised its reopening and operations from 1915 until 1921 and to a certain extent the work of the leasers until the autumn of 1929 since which date I have visited the property only at infrequent intervals, the last occasion being in September, 1941.

LOCATION

The eighteen (18) patented lode mining claims and one mill site which comprise the DeSoto Group with an area of 364 acres (see map attached as Exhibit A) are located in the Bradshaw Mountains, Yavapai County, Arizona, five (5) miles S. 20° W. from the Blue Bell Mine.

The Crown King Branch of the Santa Fe Railway formerly passed within a mile of the mine from which the ore was sent down to Middleton Siding by a gravity aerial ropeway. The lower ropeway towers and siding bins burned down in 1930 and this section of the railway has since been taken up as far as Cordes Siding which is some 7 miles from Middleton. Present access to the mine is by way of the Black Canyon and Crown King Highway to the site of Middleton Siding, a distance of 48 miles from Prescott, 19 miles from Mayer or 18 miles from Blue Bell Siding.

From the Crown King Road to the mine there is only a steep horse-trail nearly two miles in length and this would have to be replaced by about four miles of mountain road in order to make the workings accessible by auto or truck.

The mining claims cover the summit of a steep ridge extending northeast-southwest for over a mile and they extend down along its eastern and western slopes for a considerable distance. Most of the outcrops and mine openings are located along the upper portion of the eastern slope which descends over 1,500 feet to a gulch locally known as "Crazy Basin". The west slope of the ridge extends down into Peck Canyon. (See Map Exhibit B)

CLIMATIC AND GENERAL CONDITIONS:

Climate^x

The altitude of the main haulage level known as the "600" or "Hot Number Adit Tunnel" is 5,765 feet above sea level and the ore shoots extend upwards from this point to the various outcrops, the highest of which--near the summit of the ridge--has an elevation of about 6,500 feet.

The climate is pleasantly cool throughout the summer with considerable frost and often some snow in winter. The mean annual rainfall is about 17 inches and both surface and underground work can be conducted at all seasons with very little inconvenience due to weather conditions.

The surrounding country is mountainous with deep gulches between the ridges and summits. There is little vegetation except for native shrubs and grasses and no large timber.

Water

Running water is found in the deeper gulches only during wet weather and on the "Water" Claim there is a very small spring which has never been developed. Domestic water was obtained from a well near Middleton Siding and taken up to the mine on the aerial ropeway. From the Hot Number Adit (600' level in the mine) there is a steady flow of about 5,000 gallons per day which would be suitable for industrial purposes but to obtain a supply sufficient for large scale mining it would be necessary to tap the underflow in Crazy Basin which has never been thoroughly tested but would probably exceed 100,000 gallons per day. A much larger supply might be obtained from Turkey Creek, some three miles north of Middleton Siding, along which creek there are favorable sites for a large mill and storage space for tailings.

Power

The Prescott-Mayer-Blue Bell-Crown King high tension power line of the Arizona Power Company passes close to the portal of the Hot Number Adit where transformers were formerly installed and the compressor room and shops were located. The old rate for electric power averaged about 1.5¢ per kilowatt hour but it is reasonably certain that within the course of a few years the U. S. Reclamation Service will furnish Colorado River Power throughout all this district at a cost of less than 0.5¢ per kilowatt hour.

Labor

Because of the long distance from any town, living accommodations would have to be provided at the mine and mill. All of the old dwellings and other buildings have been burned or wrecked.

A certain number of local men would be available from the vicinity of Mayer and Prescott. Mexican miners were formerly employed to a large extent and with satisfactory results while the excellent climate always attracted workers from other camps in the State.

GEOLOGY AND ORE OCCURRENCE

This has been studied by various geologists and is described briefly by Lindgren (who did not visit the mine) in U. S. G. S. Bulletin No. 782 at pages 162-164.

The country rock is pre-Cambrian Yavapai schist of sedimentary origin, highly metamorphosed and uptilted now lying with strike north 20 east and dip of about 70 degrees to the northwest. Different phases of this rock range from highly siliceous chlorite and sericite schist to a much more compact biotite or hornblende schist. A zone of silicification extends for several miles northward from the DeSoto through the Blue Bell claims and on to the Binghampton, but a short distance south of the DeSoto the formation changes giving place to Bradshaw granite and Crooks complex which extend south throughout the greater part of the Crown King district.

The ore bodies, which at DeSoto are largely confined to the chlorite schist, are of the replacement type occurring in detached lenses or shoots in a more intensely silicified ledge which occupies practically the entire DeSoto ridge having a width of over 3,000 feet and a length of some 6,000 feet. The lenses generally conform to the strike and dip of the schist and overlap one another as may be noted from the plan maps of the workings (Exhibits C and D).

The greatest individual length of any one shoot of 3% copper ore was slightly over 200 feet with maximum width of about 40 feet. The maximum vertical height is about 1,000 feet for while all of the shoots outcrop on the surface none was found to persist to any great depth below the main fault which cut through the mine between the 400 and 600 foot levels. Two of the ore bodies were followed down for an additional 300 feet but as depth was gained, the dimensions of the pay ore rapidly decreased while the copper minerals gradually gave place to barren quartz. These ore bodies may be considered to represent the roots of original shoots since the pre-Cambrian surface is believed to have had a much greater elevation than at present and several thousand feet has been removed by erosion.

The ore consists of chalcopyrite and iron pyrites, mixed with quartz, and while similar in character and origin to the Blue Bell ore, it is generally more siliceous, carries a slightly lower content in gold and silver and only traces of lead and zinc except in one or two specific locations.

The outcrops of most of the ore shoots are very prominent, standing up many feet above the normal surface and stained bright green with small veinlets of malachite. In this mine as at the Blue Bell the best ore was always found at and near the heart of the various lenses where the maximum grade might be 6 or 7% copper, decreasing gradually toward the ends and sides of the lenses until it became no longer commercial. Oxidation of the ore extends irregularly downward from 100 to 200 feet below the surface and the impregnation of copper into the wall rock was much more extensive than at Blue Bell particularly in the upper levels and between the various parallel lenses so that a large mass of rock between and

around the shoots was found to carry appreciable copper values as will be mentioned later.

HISTORY AND PRODUCTION

The DeSoto Mine, which formerly was known at different times as the "Buster" and "Copper Cobre", was discovered in about 1890 when at first a small tonnage of high grade carbonate ore was gouged out and shipped by burro and wagon from various outcrops; no records of this production have been preserved. Later on the mine was worked on a more extensive scale and the larger ore bodies were developed and partly mined above the 600 foot level.

In 1904 the mine was acquired by the Consolidated Arizona Smelting Company and equipped with the aerial ropeway to the siding where a steam power plant was located. The Hot Number Adit, otherwise known as the 6th level, was driven ^{with double track to} ~~beyond~~ the main workings and connected with the upper stopes which were located in six ore shoots above the level while two of them, which were followed down by a winze were mined for over two hundred feet below the adit.

From 1904 until August, 1907, about 40,000 tons of ore were produced with average content of 0.05 oz. gold, 1.30 oz. silver and over 4.00% copper.

The principal ore shoots had been partially developed by that date but, by reason of the low price of copper, no further work was done until 1915 when a careful measurement and sampling of the positive and probable ore, made under my direction, resulted in estimating a developed reserve of 31,588 tons with average 0.05 oz. gold, 1.2 oz. silver and 4.28% copper. This estimate justified the reopening of the mine. A record of the total production to date is approximately as follows:

PRODUCTION OF DESOTO MINE

	Tons	Au. OZS.	Ag. OZS.	Cu. %	
1890 to 1905	30,000	?	?	5.00%	(estimated)
1905 through 1907	40,000	.05	1.3	4.00	(approximate)
1915	8,360	.0453	1.14	3.50	
1916	34,382	.0421	1.08	3.37	
1917	44,483	.0575	1.29	3.04	
1918	42,870	.0527	1.20	2.58	
1919	27,067	.0499	1.09	2.36	
1920	19,219	.040		2.09	
1922 to 1931 (worked by leasers)	54,000	.050	1.20	3.75	(approximate)
TOTAL (ABOUT)	280,000	.050	1.20	3.00	plus

During the period from 1915 to 1920 the relatively high price of copper made it profitable to mine and ship a lower grade of ore than had been estimated as commercial in January of 1915 and a substantial additional tonnage of ore was developed by the Consolidated Arizona Smelting Company operations which were discontinued after 1920 when the Humboldt Mill and Smelter were shut down for over a year.

When active operations were resumed at Humboldt and at the Blue Bell in 1922 it did not appear advisable for the Southwest Metals Company (successor to Consolidated Arizona) to reopen the DeSoto which was later leased to E. S. Chafey who in turn employed a number of sub-lesers and whose work proved to be much more extensive and profitable than had been anticipated. Chafey confined his mining largely to portions of the upper workings,--above the 200 foot level,--and to various outlying outcrops to the north and west

of the mine and near the summit of the ridge. A large quantity of new ore was thus developed and mined much of it being highly oxidized and in some cases carrying 6 to 8% copper. These operations sometimes produced up to 1,000 tons per month but naturally very little development work was done by the leasers and my estimate of the ^{3% copper} ore reserves made in 1931 was as follows:

	Positive	Probable	Possible or Indicated.
Old workings around main winze	6,000	4,000	-
In gouge of main fault	2,000	3,000	-
Above O and OO stopes and in hanging wall	2,000	4,000	10,000
Chafey Tunnel		5,000	5,000
Treadwell Shaft		4,000	4,000
Guthrie Tunnel		3,000	2,000
Buster Cut		3,000	2,000
McCutchen Stope		2,000	3,000
Whale Adit and above near surface		<u>4,000</u>	<u>10,000</u>
	<u>10,000</u>	<u>32,000</u>	<u>36,000</u>

There would obviously be no incentive to recondition this mine in order to work out so small a tonnage of better grade ore unless one were assured a very high price for the copper.

CHARACTER AND METALLURGY OF ORE

The following is a complete analysis of typical DeSoto sulphide ore as mined and milled at Humboldt.

Au.	0.05 oz.
Ag.	1.20 oz.
Cu.	3.08
Fe.	5.9
S.	6.54
CaO	1.2
MgO	0.77
Al ₂ O ₃	4.9
SiO ₂	72.3

Some 150,000 tons were treated by flotation from 1915 through 1920 with an average recovery of 85% of the gold and silver and 93% of the copper and with a ratio of concentration of about 6 to 1.

Obviously the lower grade copper ore would be much more siliceous and with combined iron and sulphur content not exceeding 4 or 5% and by dropping out some of the iron, the ratio of concentration might be expected to approximate perhaps as much as 20 to 1 with a 90% recovery of copper but probably not more than a 70% recovery of gold and silver.

LOW GRADE ORE RESERVES

Except for the mining of a considerable tonnage of slightly lower grade ore during '18, '19, and '20, it had always been the intention of the management of this mine to keep the average grade of production above 3% copper and no stoping was done except in the hearts of the various lenses where work was discontinued nearly as soon as the assay value of the ore fell below that point. There remains around all of these old stopes and between them a shell of lower grade material whose extent and character have only been investigated in a few places, and since the great bulk of the higher

grade ore has been removed and chances for finding any large new bodies of such ore are dubious, the future value of the mine, if any, must depend upon the tonnage and average tenor of low grade material.

Because of the fact that some of the ore shoots and much of the mineralized rock extended to or very near to the surface of the eastern slope of the ridge, it occurred to me during the First World War, that an open pit might be started through opening benches along this slope and that a large tonnage of 1% copper ore might thus be cheaply mined after removing a comparatively small quantity of waste capping.

In order to obtain some basic data on this point I then started to explore and investigate the mineralized rock between and around the ore shoots and although this investigation was never carried to a logical conclusion, some of the data obtained, as noted below, appears to have been significant and not unfavorable.

Above the 400 foot level at points where the mineralization extended into the wall rock between the lenses, an investigation was carried out in one block of ground which might have been partly or entirely mined by a glory hole or benches from the surface. Here we put in a number of diamond drill holes whose cores were carefully sampled while 128 channel samples were cut in drifts and crosscuts. This block was then estimated to contain 275,000 tons with average content of 1.28% copper. Only a few samples were assayed for gold and silver from which it was judged that this ore would carry somewhat less than half as much of these metals as in the working stopes say 0.02 oz. gold, and 0.6 oz. silver, with combined value of slightly over \$1.10 per ton at present prices. It appeared that

this estimate of tonnage could have been substantially increased by further exploration and development throughout a wider area in the same section of the mine.

A small block of low grade ore left in another section between the 3rd and 6th levels was found to contain 1,500 tons that would average 2% copper and this estimate was checked by a resampling in 1930.

Other investigations of low grade material adjacent to the main workings by drills and crosscuts have indicated that the following areas justify further investigations.

On 1st level (elevation 6171') a large number of samples taken in an area 300' north-south by 200' east-west averaged better than 2% copper.

2d level (elevation 6104') area 350 x 200', samples averaged around 2%

250' level (elevation about 5950') 5 samples along one wall averaged 1.61% copper.

300' level (elevation about 5900') area 300 x 150, samples averaged about 2% copper.

4th level (elevation about 5850) area 120 x 100, samples averaged about 2% copper.

5th level (elevation about 5800') area 120 x 100, samples averaged about 2% copper.

6th level, Hot Number Adit, (elevation 5765') area 150' north-south x 200' east-west, samples averaged about 2% copper.

Most of these samples were cut along the side walls of the old stopes while some were cut in the walls of crosscuts or were core samples from short drill holes. They were not taken in any logical

pattern and hence can not be used to calculate any weighted average of the sampled ore nor as a basis for any estimate of tonnage. However a careful study of the assay maps has lead me to conclude that they roughly represent the outer shell of the ore zone from which the core has been removed with a remaining tonnage in the order of 1,500,000. This material should assay close to 2% copper with approximately \$1.00 value in gold and silver and surrounding it is found a certain amount of mineralized rock which I shall call the outer ore-zone and this has a length (north-south) of well over 600 feet, a width of 300 feet and an average height to surface of probably 550 feet so that, allowing for the tonnage which has already been removed, there should remain some 7,000,000 tons of mineralized rock a large part of which, including as a sweetener the small tonnage of 3% ore left in place and the above described 2% ore in the shell of the ore shoots, may reasonably be hoped to have an average grade in excess of 1% copper and with values of perhaps \$0.70 in gold and silver.

At some distance from the main workings are found several ore showings which probably have no connection with the principal ore body but the ore found on and near the surface of the Whale Claim along the east slope of the DeSoto Ridge is in a different category and while the tonnage of better than 1% ore is very problematical, it appears as if it might either be mined with the main deposit or more probably worked from a separate open pit with a possible production of over one million tons. This ore was partly found in a porphyry dike near the surface but apparently petered out with depth; I have not taken it into account in making calculations of investment and returns and merely mention it as a possibility.

In order to check the estimates of tonnage I also applied a different method of calculating based on such data as I possess concerning the contours of the surface and the extent of copper mineralization which had been actually noted on each of the underground levels. Although the estimate resulting from this procedure did not work out so well as in the first instance, it appeared that the quantity of mineralized rock which might be hoped to average 1% copper was in the order of six million tons which is the figure that I have used in subsequent calculations.

WORKING COSTS

After the mine had been properly prepared and equipped for operation and for the purpose of making preliminary calculations, one may assume that the working cost of the low grade ore, to be mined by open-cut or caving and milled at the rate of 3,000 tons per day, would be about as follows:-

Mining including stripping and development	\$0.40
Coarse crushing	0.10
Transportation to mill, fine grinding and concentration	0.40
Freight and treatment of concentrates ratio 20 to 1	0.15
Refining and marketing Cu (over 2.5¢ per lb.)	<u>0.45</u>
	\$1.50
Add for taxes and amortization of plant	<u>0.50</u>
	\$2.00

From a 1% copper ore it may be assumed that at least 18 pounds of copper would be recovered (making due allowance for the fact that some of the ore will be oxidized) and at 12¢ market price this would have a value of \$2.16 to which one might add \$0.44 for recovered gold and silver making the total return \$2.60 and leaving a margin of profit of 60¢ per ton or say \$3,600,000 for the entire venture if a total of 6,000,000 tons of ore should be produced.

PRELIMINARY CAPITAL EXPENDITURE

Local conditions are such that the preparation of the ore body for large scale operation by benching along the east slope of the hill should be a comparatively inexpensive matter.

A good road must first be built up from the old railway grade (now the highway to Crown King). This would probably have a length of some 4 miles to the top of the proposed workings and with hard rock surface and proper drainage it would cost in the order of \$100,000.

The side roads or levels of the working benches would branch directly off this main haulage way and such capping as would have to be removed could be hauled on an average for not over half a mile and dumped on the west slope of the ridge south of the ore body.

The ore, as broken in the benches, would be loaded in self dumping trucks and dumped into a large underground storage bin to be located above the present Hot Number Adit which was cut out for a double track and ^{once provided} with electric equipment could handle a large tonnage. At the bottom of this bin would be located the coarse crushing plant with belt conveyor to the fine ore bin on the surface from

which either an aerial gravity ropeway or the main truck road would lead to the mill, the proposed site of which is near the junction of Turkey and Cedar Creeks about 3 miles from the mine and at an elevation of some 3,700 feet.

The total cost of mine equipment including the roads and trucks should not exceed \$1,000,000 if coarse storage bin and crusher were installed at the mine and ropeway erected to the mill.

Such a plan would probably result in permitting the lowest operating cost but much more careful study will have to be given to the entire project before any detailed program of operation can be planned.

The Mill might possibly require some special equipment for the treatment of a small quantity of oxidized ore but essentially would consist of a very simple flotation plant with fine grinding equipment required to reduce the size of the ore to approximately 65% through 100 mesh, which we found adequate at Humboldt, and if built on a site where gravity could be utilized, it would not seem that its cost, with capacity up to 3,000 tons per day, should exceed \$1,500,000 since no power plant needs to be provided. An additional \$500,000 should be allowed for camp buildings and miscellaneous equipment making the total investment in the order of \$3,000,000.

As to Power the high tension line of the Arizona Power Co. passes directly over the mining claims and only a short distance from the proposed mill-site; however this would have to be replaced by a line of much larger capacity which may be constructed by the Government.

RAIL TRANSPORTATION TO SMELTER

The southern section of the Crown King Branch of the Santa Fe Railroad has been torn up and no longer passes by the DeSoto at Middleton and the end of the line is now at Cordes Siding about 4 miles from the proposed site of the mill and at a similar elevation. If a substantial traffic were definitely assured, there is every reason to believe that the Santa Fe Railroad would gladly replace the rails as far as the mill-site so that all material could be delivered by rail and the concentrates could be loaded for direct shipment to the Phelps Dodge smelter at Clarkdale (about 100 miles) or if that smelter should no longer be in operation to the A. S. & R. plant at Hayden (nearly 300 miles).

WATER SUPPLY

The local water supply including the flow in the mine which runs out through the Hot Number Adit, a spring on the Water Claim, and the underflow in Crazy Basin at the foot of the DeSoto Hill will be sufficient and suitable for domestic and mining requirements but wholly inadequate for a large concentrating mill. Water sufficient for this mill might perhaps be obtained from Turkey Creek which flows within two miles of the mine and at its junction with Cedar Creek, some three miles from the mine, is close to the location that I should prefer for the mill-site, but the flow in this creek has never been gauged, so far as I know, and it is very seasonal so that it may be found essential to obtain a supplemental supply which would have to be secured from the Agua Fria River involving a pumping

plant to lift the water probably 300 feet and force it through some eight miles of pipe.

Below the millsite which I have tentatively selected (or several other possible sites) there is ample room for the disposal of the tailings by gravity and an ordinary dam built up by the tailings themselves should serve to properly impound them and avert any claims for damages through fouling either lower Turkey Creek or the Agua Fria River.

TENTATIVE PROGRAM OF MINING

Lacking a contour map of the surface and complete cross-sections of the ore body it is difficult to visualize the methods by which the ore might best be mined, nor can this be determined until the limits of the ore are more accurately defined.

While there are some outcrops on the west side of the ridge and along the top, the bulk of the surface showings are on the eastern slope, the upper outcrop along a portion of the crest being at an elevation of 6,500 feet or 735 feet above the Hot Number Adit; however the average elevation of the top of the deposit is around 6,365 feet so that the vertical dimension of the deposit is about 600 feet, and I have used a figure of 550 in my calculations to allow for capping and leached material near the surface.

The dip of the ore zone is to the ^{north}west, about 70°, which would tend to produce an overhang in a pit unless the grade of material in the hanging wall should prove good enough to be mined.

To mine the eastern section of the ore body benches could be run along the slope and waste carried off at the south end, where there is quite a deep gulch while the ore could presumably be best

handled by dumping it into a long chute or pocket to the Hot Number level crushing plant and fine ore bin from which it would be sent to the mill, preferably by an aerial ropeway of large capacity.

GENERAL

The text of the above is intended to present a general picture of the possibilities at the DeSoto Mine as these appear from scattered records and very incomplete data which was not originally gathered with any such program in mind. If it should appear that the acquisition, reopening and operation of this property might constitute an attractive mining venture capable of ^{profitably} producing some 120,000,000 pounds of copper over a period of six years and with chances of a larger production and longer life, it would first of all be advisable to recheck all of the records and data on which I have based this summary and at the same time to make certain minor physical examinations of the physical conditions at the mine, which is entirely abandoned at present, and to very quietly investigate the ^{best} method of securing title.

In order to more definitely determine the mining conditions and value of the low grade ore it would next seem advisable to make a thorough physical examination of the surface and all accessible workings and a topographical survey. If the result of this investigation should be favorable, it would then be in order to reopen portions of the old workings and put in a number of horizontal diamond drill holes on the various levels so as to thoroughly cross-cut the formation.. This last will probably involve some 6,000 to 8,000 feet of drilling and the total cost of the investigation, including the cleaning out of portions of the mine, may be estimated at around \$40000. The result of this work could be checked and

combined with all of the data previously secured and it is my opinion that a basis would then be reached for drawing a pretty definite conclusion as to the merit of the entire venture, particularly in the light of the most recent developments in the copper market which will obviously be a factor of the greatest importance.

February 5, 1946

Notes on Feasibility of Reopening the DeSoto Mine for the Recovery and Treatment of Remaining Low Grade Copper Ore.

These notes are based upon my personal acquaintance with this mine and investigations by engineers made under my direction.

I first examined the property in November, 1913, subsequently supervised its reopening and operations from 1915 until 1921 and to a certain extent the work of the leasers until the autumn of 1929 since which date I have visited the property only at infrequent intervals, the last occasion being in September, 1941.

LOCATION

The eighteen (18) patented lode mining claims and one mill site which comprise the DeSoto Group with an area of 364 acres (see map attached as Exhibit A) are located in the Bradshaw Mountains, Yavapai County, Arizona, five (5) miles S. 20° W. from the Blue Bell Mine.

The Crown King Branch of the Santa Fe Railway formerly passed within a mile of the mine from which the ore was sent down to Middleton Siding by a gravity aerial ropeway. The lower ropeway towers and siding bins burned down in 1930 and this section of the railway has since been taken up as far as Cordes Siding which is *Some* 7 miles from Middleton. Present access to the mine is by way of the Black Canyon and Crown King Highway to the site of Middleton Siding, a distance of 48 miles from Prescott, 19 miles from Mayer or 18 miles from Blue Bell Siding.

LIST OF REPORTS, MAPS, ETC.

Bearing on present and future value of De Soto Mine

Of Which copies are available in file of

GEORGE M. COLVOCORESSES

* * * * *

REPORTS

- 43 ✓
45 ✓
1. General report by G. M. C. embodying all information from previous reports by self and others which appear to have any bearing on the present or future value of the mine; except for large scale operations and the production of low grade (1% plus) ore. Prepared in February 1943 and revised in November 1945 and again in April 1947.
 2. Report of special sampling of low grade ore in upper levels by H. R. Banks in 1919. Assay map of samples listed as map No. 5.
 3. Report on sampling of portions of the mine between the 3rd and 5th levels by G. J. Harbauer in May 1930 with assay map listed as map No. 7.
 4. Estimate of ore reserves with notes by Claude Ferguson as revised in January 1921. Almost all of this ore still remains in the mine but some of it will not be easily accessible.

MAPS

- ✓
1. Print of survey of 18 patented mining claims or ⁿ factions with descriptive list attached, -scale 200' = 1".
 2. Print of section of stopes from surface to 9th level inclusive, all reduced to one plane, made in 1919.
 3. Print of survey map of Pen, Extension and Iron Chief Claims with note, -scale 100' = 1".
 4. Print of plan of all mine workings from surface downward to 900' level, -scale reduced on photostat to 60' = 1", made in 1928.
 5. Assay maps to go with Banks report, -scale 30' = 1"
 - (a) 100' level
 - (b) 200' "
 - (c) 250' "
 - (d) 300' "
 - (e) 400' "
 - (f) Stope known as 130
- ✓

6. Print of assay maps of various cross cuts and all drill holes (12 prints) made in 1919 and 1920, -scale 30' = 1".
7. Print of assay maps of sills on 340, 440 and 540 stopes to accompany Harbauer's report in 1930.
8. Print of assay maps of mineralized section of Whale Drift, -scale 30' = 1".
9. Assay maps of all drifts, etc. on levels 1 to 8 inclusive, super imposed on coordinates. Made in 1919 and some of the ore shown has since been removed.

(Might be difficult to reproduce these tracings as they are in poor condition but perfectly legible)

De Soto, July 2, 1919.

SUGGESTIONS FOR DIAMOND DRILLING (Smith--White--Ferguson)

1. Look for No. 6 Orebody on 800 Level under fault; a hole in a southerly direction from near the end of the 800 south drift; 150 to ----- 200 Ft.
 2. Drive E. from 200 Level to cut O. C. showing on surface; say, 1 hole from a point about 80' N. of Station, and another from a point about 150' N. from Station; these would be comparatively short holes, possibly not over ---- 200 "
 3. One hole W. from 150' point above mentioned, to catch showing in Perona Drift; say, about ----- 150 "
 4. A west hole from S. end of 460; 150 to ----- 200 "
 5. An East hole from same point, to test mineralized ground in Hanging of 60 orebody; say, ----- 100 "
 6. WHALE:
 - (a) Say, a 100' hole W. from 2nd H.W. X-C, ---- 100'
 - (b) 2 down holes from breast of Main X-C, East, to X-C ore about 100' below 600 Level, fanning out at about 60 or 70; total, ----- 300'
 - (c) A series of short holes E & W from S. Drift, at intervals of 100'; F.W. holes to run to heavy, black schist, possibly 20 to 50' long;
~~say, a total of 400' 800'~~
Say, a total of ----- 400' 800 "
- Total, ----- 1,650 Ft.

(17)

DE SOTO MINE.

ESTIMATE OF ORE RESERVES

LOCATION	<u>Reserves, July 1, 1920</u>			<u>Revised, Jan. 1, 1921</u>
	<u>Positive & Highly Probable</u>	<u>Probable</u>	<u>Possible</u>	<u>Positive & Probable</u>
110 Stope			100 a	100
330 "		500	500 b	500
430 "	1000 c	1000	1800 d	4000
340 "	300 e			300
340 New	f			
440 Stope	300 g			300
440 New	f			
540 Stope	500 h	750 i	600 j	1500
350 "	200 k		500 k	700
450 "	200 k	300 k		500
460 "	200 l	300 m		
560 "	270 n			
660 "	360 o	940 p		1000
860 "	f			
270 "			100 q	100
370 "	r			
970 "	s			
390 "	2500 t			
490 "			1000 u	4500
Sub-Totals	5830	3790	4600	13500
Broken Ore	4702			1891
TOTALS	10,532	3,790	4,600	15,391

Average grade -- gold and silver, \$2.00; copper, 2.50%.

(For notes see Sheet #2.)

DE SOTO ORE HEAD ASSAY

A sample of the De Soto Ore was taken from the Mill. This ore appeared to be fairly dirty and to contain a considerable amount of Carbonate or Oxidized Copper.

ASSAYS

<u>Au</u>	<u>Ag</u>	Copper		<u>Total</u>	Al ₂ O ₃		<u>Total</u>
		<u>Sulphide</u>	<u>Oxide</u>		<u>Soluble</u>	<u>Insoluble</u>	
Tr	0.66	2.98	0.10	3.08	2.6	2.3	4.9
<u>Fe</u>	<u>CaO</u>	<u>S</u>	<u>MgO</u>	<u>Insol</u>	<u>SiO₂</u>		
5.9	1.2	6.54	0.77	74.3	72.3		

DE SOTO CARBONATE ORE - 35 MESH

Test #25

<u>Test</u>	<u>Wt.Ore</u>	<u>Wt.Salt</u>	<u>Time</u>	<u>Temp</u>	<u>Wt.Calc.</u>	<u>Assay Calcines</u>		<u>Extract.</u>
						<u>Cu</u>	<u>Cl</u>	
#25	25G	3G	20 M	900	25.07	1.25	0.48	59.4

Test #30

Head Sample

Cu % 3.08 (same as for #25)

Charge

<u>Test</u>	<u>Wt.Ore</u>	<u>Wt.Salt</u>	<u>Time</u>	<u>Temp</u>	<u>Wt.Calc.</u>	<u>Assay Calcines</u>		<u>Extract.</u>	
						<u>Cu</u>	<u>Cl</u>	<u>Cu</u>	<u>Cl</u>
30	15	3	1.63H	800	14.42	1.07	0.0	66.8	100.0

The above two tests were run along the same lines. In the latter a little larger proportion of salt was used than in the former test. The latter charge was in the furnace considerably longer than the former test. This is explained by the fact that the latter charge was run in conjunction with another series of experiments and was allowed to remain in the furnace until the completion of the test, though the fuming of this charge was completed some considerable time before it was taken from the furnace. It will be seen that all the chlorine has been driven off so that no further action would take place after the Chloridizing reagent had been used up.

The results obtained in the latter test are slightly better than in the former, but it is felt that a considerably better extraction can be obtained on this ore than has been done to date.

PRODUCTION OF DE SOTO MINE

Year	Production (tons)	Gold (Au)	Silver (Ag)	Value (\$)
1890 & 1904	40,000	?	?	5.00 (estimated)
Prior to 1904-1908	40,000			
1915 (about)	100,900	.05	1.3	4.00 (approximate)
1915	8,360	.0453	1.14	3.50
1916	34,382	.0421	1.08	3.37
1917	44,483	.0575	1.29	3.04
1918	42,870	.0527	1.20	2.58
1919	27,067	.0499	1.09	2.36
1920	18,922	.050	1.20	2.80 (approximate)
21-31	44,000	0.05	1.20	3.50 (approximate)
Worked by leasers, substantial production of higher grade ore averaging about 4% copper.				
TOTAL (ABOUT)	300,000	.050	1.20	3.00

(Average value in gold & silver at 1936 prices \$2.68 per ton)

According to statistics compiled by Willis of the Arizona Mining Journal the value of the output of the De Soto Mine up to 1933 has been 3,250,000. It is not stated on what price of metals this figure is based.

(fill in if 1920 y ton)

GEORGE M. COLVOCORESSES
MINING AND METALLURGICAL ENGINEER
1102 LUHRS TOWER
PHOENIX, ARIZONA

OK Refer

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 re-opening 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 chalcopryrite 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.

2
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 ⁶⁴⁰800' 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¢ 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.

CONSOLIDATED ARIZONA SMELTING COMPANY

MINE DEPARTMENT

ALL COMMUNICATIONS SHOULD BE
ADDRESSED TO THE COMPANY

De Soto Mine,
February 10, 1920.

MEMORANDUM ESTIMATE OF PRODUCTION AND COSTS, BEGINNING MARCH 1, 1920

Preliminary Note: On account of the unfavorable copper market, it is proposed to allow the 340 and 440 New Stopes, together with the North Extensions to the 460 and 560 Stopes, representing seven to eight thousand tons of 1.75 to 2.0% ore, rest until such time as a higher price for Cu will assure this ore being mined at a profit. This applies, as well, to the possible ore in 860, in case the latter ore does not prove of mineable under present conditions.

Broken Ore Reserves, February 1, 1920,	5568	Tons
Less low grade 130 ore, say,	<u>368</u>	
	5200	"
To break in February (more or less)	<u>1150</u>	"
	6250	"
To Ship in February (about 72 cars)	<u>2450</u>	"
Broken Ore Reserves March 1,	<u>3800</u>	"
Ore remaining to be broken on March 1, Classes 1 & 2 (See Est. Attchd)	<u>6050</u>	"
Total Reserves of 2% plus ore, 3/1/20	<u>9850</u>	"

Which represents a life of 12 months on the basis of a production of 800 tons per month. Of this production, 300 tons will be drawn, per month, from the broken ore reserves, and 500 tons per month will be broken from the unbroken ore reserves.

The Costs for mining and shipping this amount of ore per month, will be approximately as follows:

Freight on 800 tons @ .94	750.00
10 men at an average of \$6 per day, 30 days (liberal)	1800.00
1 Foreman @	250.00
Explosives @ .40 per ton (liberal)	200.00
Other Supplies	150.00
Power (running 4 to 5 machines, 3 to 4 days per week)	150.00
Taxes, Insee, etc.,	<u>400.00</u>
TOTAL COST FOR HUMBOLDT	3700.00
Cost Per Ton	4.60

Grade of ore, 2.0% plus. Gold-Silver, \$1.50 per ton.

The above estimate is considered conservative, and in actual practice can probably be bettered.

[Signature]
Supt.

*Bring in final
for De Soto
Jan 16*

MEMO RE DE SOTO MINE 3/27/45

Call from Mr. and Mrs. Ray Parker of Box 25, Bumble Bee, Arizona and their associate, M. H. Whitacre of Nevada or California. Mrs. Parker had called on the 22nd and also a couple of years ago.

Whitacre has purchased from Parker the Old Manley Glass (Glass and Bishop) Claim which adjoins the Little Johnnie on the northwest and they are now building a road up from Mayer along or near the route of the old stage road that ran up Peck Canyon from Mayer to Peck Mine and Crown King. They are trying to get assistance from the Government to build this road.

Claim that they would be interested in leasing or buying the De Soto Claims if they could be obtained cheap and I told them I thought that they might be purchased for \$10,000 cash and could be worked by lessees.

Want me to get positive statement of terms as soon as possible and advise Parker,--will try to do this thru Hurst.

A man named ^{Hanson}~~Harrison~~ is associated with Whitacre. Doubt if they have much money.

07

CONDENSED DATA ON DeSOTO MINE

(from report by G. M. Colvocoresses - December, 1930)

The DeSoto Mine is also a replacement in Yavapai Schist and the geology is similar to the Blue Bell 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 Blue Bell and extends on both east and west sides of a steep ridge of country rock. 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 700 to 800' where barren quartz replaces the sulphide minerals but there is excellent prospect of further lateral extension of these ore shoots in the upper levels of the mine and also good chances of finding additional orebodies, some of which are indicated by outcrops or shallow surface workings. The large orebody outcropping on the Whale Claim 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.

The mine was operated on a small scale from 1890 to 1905 when quite extensive work was undertaken but was interrupted by the panic of 1907 and renewed again from 1915 to 1921. Lessees took over the property in 1926 and 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 270,000 tons of which 230,000 has been produced since 1915, but at no time, except during 1916 when a very large amount of development had been carried on, have the ore reserves been much in excess of 50,000 tons. Development work has naturally been neglected by the lessees and the quantity of ore which can now be estimated is relatively small but all indications point to the discovery of additional ore, particularly under the WHALE CLAIM, and an expenditure of about \$10,000 in development should greatly increase the estimated reserve.

The average grade of ore produced to date has been \$1.50 value in gold and silver and 3.5% copper. The grade of ore now blocked out

is about the same, and in addition there is a very substantial tonnage of considerably lower grade ore which is not considered commercial under present or probable future conditions. The net value of the developed ore is about \$8.00 per ton and the operating cost is figured at \$6.50 per ton, leaving a profit of \$1.50 per ton.

To reopen the mine, install new equipment, and repair the ropeway, lower terminal and ore bins, would require probably \$30,000.

GEORGE M. COLVOCORESSES
MINING AND METALLURGICAL ENGINEER
1102 LUHRS TOWER
PHOENIX, ARIZONA

November 28, 1945

REPORT ON DE SOTO MINE

This report is based upon my personal acquaintance with this mine and investigations by engineers under my direction.

I first examined the property in November, 1913, subsequently supervised its reopening and operations until 1921 and to a certain extent the work of the lessees until the autumn of 1929 since when I have visited the property only at infrequent intervals, the last occasion being in September, 1941.

LOCATION

The eighteen (18) patented lode mining claims and one mill site which comprise the De Soto Group with an area of 364 acres (see map and description attached as Exhibit A) are located in the Bradshaw Mountains, Yavapai County, Arizona, five (5) miles S. 20° W. from the Blue Bell Mine.

The Crown King Branch of the Santa Fe Railway formerly passed within a mile of the mine from which the ore was sent down to Middleton Siding by a gravity aerial ropeway. The lower ropeway towers and siding bins were burned down in 1930 and this section of the railway has since been taken up. Present access to the mine is by way of the Black Canyon and Crown King Highway to the site of Middleton Siding, a distance of 48 miles from Prescott, 19 miles from Mayer or 18 miles from Blue Bell Siding which is the present end of the railway.

From the siding to the mine there is only a steep horse-trail nearly two miles in length and this would have to be replaced by

over three miles of mountain road in order to make the workings accessible by auto or truck. The rebuilding of the aerial ropeway is also feasible.

The mining claims cover the summit of a steep ridge extending northeast-southwest for over a mile and they extend down along its eastern and western slopes for a considerable distance. Most of the outcrops and mine openings are located near to the top of the eastern slope which descends over 1500 feet to a gulch locally known as "Crazy Basin". The west slope of the ridge extends down into Peck Canyon.

CLIMATIC AND GENERAL CONDITIONS: Climate

The altitude of the main haulage level known as the "600" or "Hot Number Adit Tunnel" is 5765 feet above sea level and the ore shoots extend upwards from this point to the various outcrops, the highest of which--near the summit of the ridge--has an elevation of about 6500 feet.

The climate is pleasantly cool throughout the summer with considerable frost and often some snow in winter. The mean annual rainfall is about 17 inches and both surface and underground work can be conducted at all seasons with very little inconvenience due to weather conditions.

The mine workings are located mostly along the east slope of the ridge and the surrounding country is mountainous with deep gulches between the ridges and summits. There is little vegetation except for native shrubs and grasses and no large timber.

Water

Running water is found in the deeper gulches only during wet weather and on the "Water" Claim there is a very small spring which has never been developed. Domestic water was obtained from a well

near Middleton Siding and taken up to the mine on the aerial ropeway. From the Hot Number Adit there is a steady flow of about 5,000 gallons per day which would be suitable for industrial purposes but to obtain a supply sufficient for milling it would be necessary to tap the underflow in Crazy Basin which has never been thoroughly tested but would probably exceed 100,000 gallons per day. A much larger supply might be obtained from Turkey Creek, some three miles north of Middleton Siding at which point there are favorable sites for a large mill and storage space for tailings.

Power

The Prescott-Mayer-Blue Bell-Crown King high tension power line of the Arizona Power Company passes close to the portal of the Hot Number Adit where transformers were formerly installed and the compressor room and shops were located. The old rate for electric power averaged about 1.5¢ per kilowatt hour but it is expected that within the course of a few years the U. S. Reclamation Service will furnish Colorado River Power throughout all this district at a ~~xxxxxxx~~ much lower cost.

Labor

Because of the long distance from any town, living accommodations would have to be provided at the mine. All of the old dwellings and other buildings have been burned or wrecked.

A certain number of local men would probably be available but to fill out any sizable crew, workers would have to be brought from some distance. Mexican miners were formerly employed to a large extent and with satisfactory results.

Transportation

Present lack of transportation facilities constitute a serious handicap to reopening this mine and no large scale work could be

undertaken until the situation is improved which could be done by building a road along the old railway grade from Middleton Siding to the present terminus of the railway at Blue Bell Siding a distance of about 10 miles.

In order to transport machinery and supplies from Middleton Siding to the mine and to haul ore from the mine to a siding or to a mill site, it will be necessary to either construct a new ropeway or to build a branch road from the siding to the mine workings.

GEOLOGY AND ORE OCCURRENCE

This has been studied by various geologists and is described briefly by Lindgren (who did not visit the mine) in U. S. G. S. Bulletin No. 782 at pages 162-164.

The country rock is pre-Cambrian Yavapai schist of sedimentary origin, highly metamorphosed and uptilted now lying with strike north 20 east and dip of about 70 degrees to the north west. Different phases of this rock range from highly siliceous chlorite and sericite schist to a much more compact biotite or hornblende schist. A zone of silicification extends for several miles northward from the De Soto through the Blue Bell claims and on to the Binghampton and a short distance south of the De Soto the formation changes giving place to Bradshaw granite and Crooks complex which extend south throughout the greater part of the Crown King district.

The ore bodies, which at De Soto are confined to the chlorite schist, are of the replacement type occurring in detached lenses or shoots in a more intensely silicified ledge which occupies practically the entire De Soto ridge having a width of over 3000 feet and a length of some 6000 feet. The lenses generally conform to the strike and dip of the schist and overlap one another as may be noted from the plan maps of the workings (Exhibits C and D).

The greatest individual length of any one shoot of pay ore is slightly over 200 feet with maximum width of about 40 feet. The maximum vertical height is about 1000 feet for while all of the shoots outcrop on the surface none was found to persist to any great depth below the main fault which cut through the mine between the 400 and 600 foot levels. Two of the ore bodies were followed down for an additional 300 feet but as depth was gained the dimensions of the pay ore rapidly decreased while the copper minerals gradually gave place to barren quartz. These ore bodies may be considered to represent the roots of original shoots since the pre-Cambrian surface is believed to have had a much greater elevation than at present and several thousand feet has since been removed by erosion.

The ore consists of chalcopyrite and iron pyrites, mixed with quartz, and while similar in character and origin to the Blue Bell ore, it is generally more siliceous, carries a slightly lower content in gold and silver and only traces of lead and zinc except in one or two specific locations.

The outcrops of most of the ore shoots are very prominent, standing up many feet above the normal surface and stained bright green with small veinlets of malachite. In this mine as at the Blue Bell the best ore was always found at and near the heart of the various lenses where the maximum grade might be 6 or 7% copper, decreasing gradually toward the ends and sides of the lenses until it became no longer commercial. Oxidation of the ore extends irregularly downward from 100 to 200 feet and the impregnation of copper into the wall rock was much more extensive than at Blue Bell particularly in the upper levels and between the various parallel lenses so that a large mass of rock between and around the shoots was found to carry appreciable copper values as will be mentioned later in this report.

HISTORY AND PRODUCTION

The De Soto Mine, which formerly was known at different times as the "Buster" and "Copper Cobre" was discovered in about 1890 when at first a small tonnage of high grade carbonate ore was gouged out and shipped by burro and wagon from various outcrops; no records of this production have been preserved. Later on the mine was worked on a more extensive scale and the larger ore bodies were developed and partly mined above the 600 foot level.

In 1904 the mine was acquired by the Consolidated Arizona Smelting Company and equipped with the aerial ropeway to the siding where a steam power plant was located. The Hot Number Adit, otherwise known as the 6th level, was driven beyond the main workings and connected with the upper stopes which were located in six ore shoots above that level while two of them, which were opened up through a winze, were mined for two hundred feet below the adit.

From 1904 until the mine was closed in August, 1907, about 40,000 tons of ore were produced with average content of 0.05 oz. gold, 1.30 oz. silver and over 4.00% copper.

All the principal ore shoots had been well developed by that date but by reason of the low price of copper no further work was done until 1915 when a careful measurement and sampling of the positive and probable ore, made under my direction, resulted in estimating a reserve of 31,588 tons with average 0.05 oz. gold, 1.2 oz. silver and 4.28% copper. This estimate justified the reopening of the mine, a record of whose production to date is approximately as follows:

PRODUCTION OF DE SOTO MINE

	Tons	Au. ozs.	Ag. ozs.	Cu. %	
1890 to 1905	30,000	?	?	5.00%	(estimated)
1905 to 1908	40,000	.05	1.3	4.00	(approximate)
1915	8,360	.0453	1.14	3.50	
1916	34,382	.0421	1.08	3.37	
1917	44,483	.0575	1.29	3.04	
1918	42,870	.0527	1.20	2.58	
1919	27,067	.0499	1.09	2.36	
1920	19,219	.040	1	2.09	
1922 to 1931	44,000	.050	1.20	3.75	(approximate)
<hr/>					
TOTAL (ABOUT)	290,381	.050	1.20	3.00	plus

During the period from 1915 to 1920 the relatively high price of copper made it profitable to mine and ship a lower grade of ore than had been estimated as commercial in January of 1915 and a substantial additional tonnage of ore was developed by the company operations which were discontinued after 1920 when the Humboldt Mill and Smelter were shut down for over a year.

When active operations were resumed at Humboldt and at the Blue Bell in 1922 it did not appear advisable for the Southwest Metals Company to reopen the De Soto which was later leased to E. S. Chafey who in turn employed a number of sub-leasers and whose work proved to be much more extensive and profitable than had been anticipated. Chafey confined his mining largely to portions of the upper workings,--above the 100 foot level,--and to various outlying outcrops to the north and west of the mine and near the summit of the ridge. A large quantity of new ore was thus developed and mined much of it being highly oxidized and in some cases carrying 6 to 8% copper. These operations sometimes produced up to 1000 tons

per month and in the aggregate I am informed that they produced over 40,000 tons of ore, although I have no complete record of the tonnage or grade. They continued until the lower tramway tunnel and ore bins were destroyed by fire in 1930 and on a smaller scale until the early part of 1931 when the price of copper fell to a point which made all copper mining unprofitable.

Since 1931 there has been no active work at the De Soto and all of the equipment and the structures,--except for the upper terminal of the aerial ropeway,--have been dismantled and removed from the property.

ORE RESERVES

The manner in which the nine commercial lenses of ore wholly or partially overlap one another makes it difficult to visualize the true nature of the deposit but in the section map these lenses are projected into one plane, while the two plan maps show the relative locations of the principal stopes on the various levels and the surface location of the outlying workings which were the principal sources of the ore produced by Chafey and the other leasers.

The better grade of ore in the main shoots had been largely worked out when the mine was closed at the end of 1920 at which time the positive and probable ore which could be estimated in these workings amounted to 15,391 tons with average values 0.05 oz. gold, 1.2 oz. silver and 2.50% copper, about 10,000 tons of this ore averaged better than 3% copper. This estimate did not include a large but uncertain quantity of ore which was indicated by outcrops and shallow workings in outlying sections of the property and subsequently mined by the leasers.

After 1929 the leasers were unfortunately permitted to work in and around the old stopes and to rob the sills and pillars which resulted in the caving of the workings in the vicinity of the main

winze from the 200 to the 400 foot levels thus rendering much of the remaining ore inaccessible without a certain preliminary expenditure.

Obviously the leasers did not carry out any comprehensive campaign of development at any point but merely followed the best of the ore as long as it could be mined with economy from each one of the six or seven different diggings in which they worked and often shifted to a new location mainly because the cost of tramping or hoisting had become disproportionately high.

The present condition of the mine is therefore most unsatisfactory and estimates concerning the remaining ore can only be made from the old maps and records because so small a portion of the ore bodies can actually be examined.

On the occasion when I last went through the main workings of the De Soto, which was in 1930, shortly before all mining in those workings was discontinued, nearly all of the ore which had been left in 1920 was still in place. Subsequently I was informed that some 2000-3000 tons of ore had been robbed from the pillars around the main winze before that section caved in and rendered this portion of the mine inaccessible.

I believe that upwards of 6000 tons of 3.00% ore should still be left at or near this winze and could be mined after an expenditure of about \$2000 had been made to clean out the waste which has caved around it.

Some good ore was left in the gouge of the main fault where 3% and 4% copper ore was sorted out at several points near the 600 foot level but the tonnage of this material is uncertain. There is also a small block of ore at the very top of one of the shoots above the 00 tunnel.

Aside from the above most of the reserves left in or near the main workings are low grade material to which reference will be made below.

In one section of the mine between the 3rd and 6th levels some 15,000 tons of ore that will average 2% copper was left in place and the tonnage and grade of this material was carefully checked in 1930.

Above the fault which cuts through the mine below the 400 foot level the mineralization extends into the wall rock between the lenses of higher grade ore and in 1919 a very thorough investigation was carried out to determine the quantity and quality of low grade ore which might have been partly or entirely mined by a glory hole from the surface or block caving from below. In order to secure accurate information on this matter a number of diamond drill holes were drilled and carefully sampled and 128 channel samples were cut. The estimate of this block was 275,000 tons with average content of 1.28% copper. Only a few samples were assayed for gold and silver from which it was judged that this ore would carry somewhat less than half as much of these metals as in the working stopes, say 0.02 oz. gold, and 0.6 oz. silver, with combined value of slightly over \$1.²/₅₀ per ton. I am inclined to think that this estimate of tonnage could be substantially increased by further exploration and development.

Another area in which there appeared to be a wide spread mineralization was found in the Whale Claim on the west side of the De Soto Ridge but a thorough sampling of the ground opened up by the Hot Number Tunnel indicated that there was no substantial tonnage which would carry as much as 1% copper although better values had been found at a higher level from the old Whale adit and in winzes.

Aside from the ore which has been mentioned as remaining near to the main winze, in the gouge of the fault and at the top of the #9 shoot above the 00 tunnel, it is my opinion that all of the commercial ore in this property will be found above or away from the old main workings and much of this outlying ore can only be classed as ~~other than~~ "probable" or "possible".

The location and tonnage of this material is estimated in the table which follows:

Remaining Ore Reserves in De Soto Mine with Average Grade of ^{over} 2.5% copper and about 0.05 oz. gold and 1.20 oz. silver.

	Positive	Probable	Possible or Indicated.
Old workings around main winze	6,000	4,000	-
In gouge of main fault	2,000	3,000	-
Above 0 and 00 stopes and in hanging wall	2,000	4,000	10,000
Chafey Tunnel		5,000	5,000
Treadwell Shaft		4,000	4,000
Guthrie Tunnel		3,000	2,000
Buster Cut		3,000	2,000
McCutchen Stope		2,000	3,000
Whale Adit and above near surface		4,000	10,000
	10,000	32,000	36,000

The location of some of the openings by which this ore is indicated is shown on the plan map of the upper levels (Exhibit C) and nearly all of them were being worked by the lessees until the price of copper started to fall in 1930 and reached an all time low in 1931.

I inspected these operations in 1929 and 1930. At that time there was a very favorable showing in and near the "Buster Cut" located in the hanging wall of the main stopes where the ore carried better than 3% copper with higher than average values in gold and silver. To the northwest of this location some good ore was being opened up and mined in the Treadwell Shaft. In the 00 tunnel the ore was averaging over 3.5% copper, the shoot at this point is some 20 feet wide and while some of the best ore was mined out, a substantial tonnage should still remain.

On the west side of the hill two very good stopes were producing, one known as the McCulcheon workings and the other above the old Whale Adit Tunnel.

Another inspection of some of the workings at the De Soto was made by me in 1937 and all of the accessible openings in the autumn of 1941. Very little ore had been mined since 1930. On this last occasion the 1st level of the mine and the upper tunnels known as the 0 and 00 were largely open but there had been some caving near the stopes. The 2nd level was open almost to the main winze but caving in that section of the mine made it impossible to get down into the lower levels. Some of these would probably have been accessible by way of the Hot Number Tunnel but although this appeared to be in good condition a dam at the portal had backed up the water to a depth of 3 feet through which I did not attempt to wade.

COSTS

The operating costs were as follows for the years when the mine was a regular producer:

	Mining per ton excluding develop- ment, exploration and transportation to Humboldt	Total cost per ton of ore at Humboldt mill or smelter
1916	1,8383	3,558
1917	1.8000	3.1501
1918	2.11296	3.6857
1919	2.7297	4.7460
1920	2.50 (about)	3.9336

The following table shows the detailed operating costs for 1918 and 1919 per ton of ore shipped:

	1918	1919
Exploration and development	0.3954	0.6385
Mining, tramming, pumping, hoisting, etc.	1.2420	1.5202
Tramming in haulage level to upper terminal	0.1327	0.1215
Ropeway, sorting and loading	0.2425	0.3321
General surface work and supplies	0.3069	0.4340
General expense and supervision, taxes, etc.	0.5797	0.7755
Freight on ore to Humboldt	0.7865	0.9242
Total cost F. O. B. (Humboldt)	3.6857	4.7460
" " " per pound copper contained with no credit for gold and silver	0.07155	0.1076

PROPOSED PROGRAM OF DEVELOPMENT AND OPERATION

From the above description of the mine it will be evident that there is only a small tonnage of positive or fully developed ore that can at present be estimated as available and that the future of the mine will largely depend upon the results of further development in the ore bodies which are now partially developed or only indicated.

Such a situation is perfectly natural in the case of any mine where the last ten years of operation were carried on exclusively by leasers and followed by over a decade of complete idleness.

The past record of the De Soto and its condition when work was discontinued in my opinion amply justifies the resumption of activity at any time that a copper price of say 18¢ can be expected and such a situation exists today.

However, before any large expenditure is actually made, I believe that it will be prudent and advisable to carry on development in all of the more promising showings to such a point that the ore which can now be classed as only probable or possible is exposed in such a manner that it can actually be measured and sampled;

For this purpose I recommend that:

(1) A truck road from the siding to the workings should be constructed as cheaply as possible in order to make it passable.

(2) That the Hot Number Tunnel should be drained and cleaned out and the old winze reconditioned up to the 400 and 300 foot levels which can probably be accomplished at a very small expense. This should render accessible most of the pay ore which still remains in and around the caves in the upper stopes and in the gouge of the fault.

(3) That all of the workings at the locations where probable and possible ore is estimated should be cleaned out and advanced to such an extent that at least the probable tonnage of ore can be classed as reasonably assured.

Aside from the road building machinery which can be leased from the County, it will be advisable to secure two portable gas driven compressors and two or three tigger-hoists in order to carry on the work in the most advantageous manner together with the

requisite drills and steel, small tools, etc. A light truck will be particularly essential and it will be desirable to put up at least two small buildings; one to serve as an office and assay office and the other as a boarding house with bunks for the workmen. The bulk of the crew can be housed in tents during the summer months.

The above outlined development work will not serve to produce any ore but if the results are in line with my expectations it will serve to develop and make accessible for mining a total of from 40,000 to 60,000 tons of ore with an average content of 0.05 oz. gold, 1.2 oz. silver and over 2.5% copper, having a gross value at present prices of about \$13.00 per ton with every reasonable prospect that much additional tonnage will subsequently be proved up by further development.

METALLURGY OF THE ORE

None of the ore produced from the De Soto was sufficiently basic to make it desirable for direct smelting but some of it was so highly siliceous as to be suitable for convertor flux. Moreover some of the ore, especially from workings near to the surface was largely oxidized and it must be expected that a certain amount of carbonate and oxide ore will be produced in future and cannot be treated in a mill with high recovery of values. The tonnage of such ore will be comparatively small and the grade of same,--after a certain amount of sorting,--should be sufficiently rich to permit its shipment to Clarkdale or Hayden as convertor flux with a fair margin of profit since the smelters will take ore of this character with a low treatment charge.

Aside from the oxidized material all of the ore is extremely suitable for flotation and its average composition can be inferred from the following analysis:

TYPICAL ANALYSIS OF THE DE SOTO ORE

Au.	0.05 oz.
Ag.	1.20 oz.
Cu.	3.08
Fe.	5.9
S.	6.54
CaO	1.2
MgO	0.77
Al ₂ O ₃	4.9
SiO ₂	72.3

Upwards of 150,000 tons of De Soto ore were concentrated in the Humboldt Mill from 1915 through 1920 along with a larger tonnage of ore from the Blue Bell Mine.

While no separate records were kept to apply only to the De Soto ore it was well recognized that this was even better suited to concentration than the ore from Blue Bell and that an equally good recovery of values was obtainable with a higher ratio of concentration, while the cost of crushing and fine grinding was substantially less.

It may therefore be confidently anticipated that,--aside from oxidized ore,--the future output of the De Soto can be milled with a recovery of 85% of the gold and silver and over 93% of the copper and with a ratio of concentration of 6 to 1.

SUMMARY AND CONCLUSION

The present physical condition of the De Soto Mine is largely due to the generally uncertain and unfavorable condition of the copper market since the close of the first World War.

The normal amount of exploration and development which had been maintained up to the end of 1918 was reduced at that time and discontinued entirely before the end of 1919, so that the last two

years of production made by the Consolidated Arizona Smelting Company amounting to 46,000 tons, was largely drawn from the ore reserves.

The mining subsequently done by the leasers was surprisingly successful under the circumstances and served to discover and partially develop a large quantity of new ore but obviously they had no incentive to open up the mine for future operations and their efforts during 1930 and 1931 were devoted to cleaning up as much of the remaining ore as could be mined and shipped before the constantly falling price of copper rendered all operations unprofitable.

The present showings coupled with the recently advanced price of copper seem to well justify the reopening of the mine on a comparatively small scale which can later be increased as the new development work proceeds and always assuming that the results of this work are favorable and in line with reasonable expectations.

Yours very truly,

G. M. Colvocoressi

*File
"De Soto"*

De Soto Mine,
July 12, 1919.

Mr. G. M. Colvocoresses, General Manager,
Humboldt, Arizona.

Dear Sir:

REPORT ON SPECIAL SAMPLING

Pursuant to your instructions, I have carried out, with the assistance of Mr. H. R. Banks, Special Sampling work in the De Soto and in the Whale, with the idea of throwing some light on the possibilities of the De Soto as a low grade mining proposition, and beg to submit herewith the results of such sampling as has been done to date. It is hoped that considerable additional, and possibly more illuminating data will be obtained from certain diamond drilling which is under contemplation.

I. DE SOTO; MAIN WORKINGS

METHOD OF SAMPLING: Channel samples 2" wide and 1/2" deep were cut across the formation in the accessible faces of the known areas of mineralization on the upper four levels. 128 samples were obtained, the assay results of which appear on the accompanying assay plans.

ESTIMATE OF LOW GRADE ORE TONNAGE
BETWEEN SURFACE AND 400 Ft LEVEL:

Owing to the inaccessibility of the walls of most of the stopes, the

sampling done is inadequate to reach any definite conclusions as to the value of the remaining ore. It is thought, however, that the following estimates, based on the results of the sampling done, are sufficiently conservative to form a basis for the adoption or rejection of any new method of mining and treatment of the ore as a low grade proposition.

It would appear from the results of sampling that the mineral content carries out from the defined orebodies into the wall rock for a

short distance. This distance, in the estimating of a zone of mineralization whose copper content is greater than 1%, is, due to the inadequacy of the sampling, a somewhat arbitrary figure. A study of the results of the sampling, however, would seem to suggest that a distance of 10 feet might reasonably be used as a basis of calculation. That is, that the zone of such mineralization extends for a distance of 10 feet from the existing walls of the stopes which have been previously mined. The perimeters of these zones are represented by heavy lines on the level plans.

The average mineralized areas of consecutive levels (including the areas of pillars between the orebodies), multiplied by the distance between levels, should give the probable cubic content of 1% ore. A factor of 12 cu ft to the ton of unbroken ore was used to obtain the available tonnage.

The number of samples falling within the mineralized zone is 90. The average assay value of these samples is 1.28% copper. The remaining 38 samples which were taken outside this zone have an average assay value of 0.44% copper.

In addition to the faces selected for sampling which are contained in the estimated zone of mineralization, there are known bodies of ore which are at present being worked at a 2% minimum and whose copper content would materially increase the average assay value of the mineralized zone. It is thought, however, that these orebodies should not be represented in the average assay, but should be held in reserve to offset any possible falling off in the values of those areas which it was impossible to sample, but which have been included in the zone of mineralization. In this connection, it would seem, on the whole, in view of the meagerness of the sampling, rather farfetched to assume a total of 275,000 tons of ore averaging 1.28% copper.

The following calculations were used to estimate the tonnage

contained within the zone of mineralization:

*Area of Mineralized Zone,	100 Ft Level,	3760 Sq Ft
" " "	200 " "	14805 " "
" " "	300 " "	9000 " "
" " "	400 " "	9050 " "

ESTIMATED TONNAGE FROM SURFACE TO 400 Ft Level = 275,000 Tons.

*These figures allow for pillars. Where pillar is small, the cross-sectional area is taken. For the larger pillars it is assumed that the 10 ft depth of mineralization will represent more closely the cubic content of low grade ore.

Appended hereto will be found a tabulation of the results of the assays, as well as blue prints of the assay plans above referred to.

II. WHALE SAMPLING

METHOD OF SAMPLING: Channel samples 2" wide and 1/2" deep were cut across the formation at 15 ft intervals, beginning at the north face of the Whale North Drift, and for 360 ft south in the Whale South Drift. In addition, continuous channel samples were cut in the walls of the cross-cuts within this zone, and 2 samples in the Whale Stope.

RESULTS: A total of 51 samples were obtained in the Whale, and a tabulation of the results of these samples is appended hereto, as well as a blue print of an assay plan showing the location of the samples, lengths of cuts, and copper content. In connection with the latter item it should be pointed out that, owing to the fact that traces of organic matter contained in the tap water used for assaying gives a slight, but variable reaction with the Permanganate solution used for titrating, any assays running less than 0.05% copper should be considered as carrying "nil"; while those running between 0.05 and 0.10% might more properly be reported as a "trace".

In commenting upon the results of the Whale samples it is deemed sufficient to point out that, of the 51 samples taken, only three ran over 1% copper, and the highest of these was 1.37%. No estimation of tonnage is possible.

Respectfully submitted,

H. R. Banks

TABULATION OF ASSAYS OF WHALE SAMPLES

Sample No.	Place	% Cu	Sample No.	Place	% Cu
1	Main X-C	0.20	29	No. 1 XC	0.55
2		0.18	30		0.82
3		0.09			
4		0.08	31	S. Drift	0.19
5		0.66	32		0.40
6		0.11	33		0.76
7		0.04	34		0.38
8		0.02	35		0.59
9		0.04	36		0.32
10		0.21	37		0.10
11		0.05			
12		0.02	38	No.2 XC	0.03
13		0.02	39		0.27
14		0.02	40		0.40
15	N.Drift	0.10	41		0.17
16		0.23	42		0.06
17		0.13	43		0.06
18		0.08	44		0.04
19		1.37	45	S. Drift	0.10
20		0.90	46		0.46
21		0.29	47		0.90
22		0.73			
23	S. Drift	0.50	48	Stope	0.69
24		0.36	49		1.26
25		0.75			
26		1.11	50	No.3 XC	0.25
27		0.50	51		0.42
28		0.50			

TABULATION OF ASSAYS OF DE SOTO SAMPLES

S. No.	Level	% Cu	S. No.	Level	% Cu	S. No.	Level	% Cu
1*	100	0.31	46	Stope	0.60	90	200	2.45
2		0.62	47	Cont.	1.36	91		1.28
3		1.41	48		0.09	92		1.30
4		1.17	49		0.75	93		0.44
5		2.94	50		1.36	94		0.12
6		3.46	51		1.51	95		0.15
7*		0.77				96		0.07
8*		0.34	52*	100	0.49	97		0.36
9		1.06	53*		0.36			
10		1.24	54*		0.13	98*	300	0.06
11		1.77	55*		0.06	99*		0.11
12		0.84	56*		0.07	100*		0.21
13		0.88				101*		0.37
14		0.98	57	Stope	2.31	102*		1.31
15		1.32				103*		0.80
16		0.53	58	200	1.30	104		1.66
17		1.54	59		1.79	105*		0.43
18		0.64	60*		0.58	106*		0.78
19		2.32	61*		1.26	107*		0.35
20		1.96	62*		0.37	108*		0.21
21		2.24	63*		0.58	109*		1.18
22		0.90	64*		0.39	110*		0.76
23		2.22	65*		0.45	111		0.57
			66*		0.62	112		0.23
24	Stope	0.82	67*		0.53	113		0.76
25		3.72	68*		0.51	114		1.26
26		3.26	69*		0.29			
27		1.85	70*		0.26	115	250	1.04
28		0.62	71*		0.19	116		0.72
29		1.75	72*		0.36	117		0.08
30		0.99	73*		0.35	118		0.24
31		1.28	74*		0.42	119		5.98
32		0.97	75*		0.43			
33		0.78	76*		0.94	120	400	0.72
34		2.52	77*		0.95	121		0.18
35		0.44	78		1.17	122		1.31
35A		1.71	79		0.50	123		0.40
36		0.28	80		0.31	124		0.27
37		0.38	81		1.55	125		1.18
38		0.32	82		0.50	126		2.27
39		0.28	83		0.18	127		1.45
40		0.72	84		0.20			
41		1.75	85		0.71			
42		2.18	86		4.58			
43		0.53	87		4.28			
44		2.54	88		4.74			
45		1.92	89		3.74			

*Samples outside assumed mineralized zones.

9

REPORT ON SAMPLING AT DE SOTO MINE
May, 1930, by G. J. Harbauer

There appears to be considerable low grade sulphides of copper remaining in the DeSoto Mine, especially in the section known as the "40 New" orebody which was opened up on the 3rd, 4th and 5th levels.

On the 3rd level a sill floor was cut and timbered and a shrinkage stope carried up 23 feet. Wide sills were cut on the 4th and 5th levels but not timbered.

To determine what portion, if any, of this sulphide body could be mined and milled at a profit, sampling was started on the 540 sill. Channels were cut five feet apart at right angles to the schistosity and a length of 5 ft. was included in each sample which averaged about 20 pounds.

A total of 47 samples was cut on the 540 sill and 41 samples were cut on the 440 sill. No samples were cut in the 340 stope due to a drop in the price of copper.

The results of the sampling are shown on the assay map and the tonnage figured is based upon a 1.9% Cu. content allowing for sorting out some of the coarse waste to make a 2% grade. On the 540 sill a width of 10 ft. and length of 60 ft., or 600 square feet is figured. On the 440 sill a width of 15 ft. and a length of 25 ft. is considered, or an area of 375 sq. ft.

The slope distance between these two faces is 105 ft. and the contents of the block would be:

$$\frac{600 + 375}{2} \times 105 = 51,200 \text{ cu. ft.}$$

Using 11 cu. ft. per ton this would be 4660 tons.

The block between the 440 and 340 sills would be possible ore and would contain:

$$\frac{375 \times 93}{11} = 3,170 \text{ tons.}$$

The block above the 340 sill shows some good streaks of sulphides and might yield at least 2,000 tons of 2% ore.

Other sulphide bodies that should yield additional tonnage of milling ore are the 490, 390, and 290 stopes which carry a higher copper content but are smaller than the "40" ore-bodies.

The 490 sill is cut but not timbered. The 390 stope is worked out half way up to the 200 level but the timbers are down now. The 290 stope was not worked to its full width and several thousand tons might be expected in this body.

A total of 15,000 tons of 2% ore is reasonably assured and with some new prospecting and development additional tonnage can be expected.

G. J. Harbauer.

DE SOTO MINE.

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

This mine is located five miles south, - 20° east of the Blue Bell Group. The geology and ore occurrence are entirely similar to the Blue Bell. The lenses outcrop on the summit of a mountain and the property has been developed by adit levels to a depth of 600 feet and by winze and drifts for an additional depth of 200 feet.

The ore from this mine was sent by aerial ropeway to Middleton on the railroad, a distance of one mile. This ropeway is still in fair condition, although the terminals would have to be rebuilt. The rails and mine equipment have been mostly removed and before operations could be recommenced, it would be necessary to arrange for electric power equipment. I understand that the Arizona Power Company would be willing to build a line to the mine if assured of a contract covering a certain period of years; the additional cost of equipping the mine and putting same in operation should not exceed \$15,000.00 at the start, and further equipment could be added as conditions render same justifiable.

The mine has not been worked since 1907 and neither Mr. Walker nor any other person in the vicinity was familiar with the old workings or with the ore bodies developed in same. The present condition of the mine renders a thorough examination impossible, as the upper workings are caved in, and the two lower levels are full of water. From visiting all the accessible portions of the property, I gather a rather favorable impression and I believe that the mine thoroughly warrants the small expense which would be necessary in order to make a thorough examination for the purpose of determining if it is advisable to recommence mining operations.

The outcrop on the surface is large and extends for a length of nearly one-half mile. The carbonates and oxides of copper predominate over the iron gossan and the general character

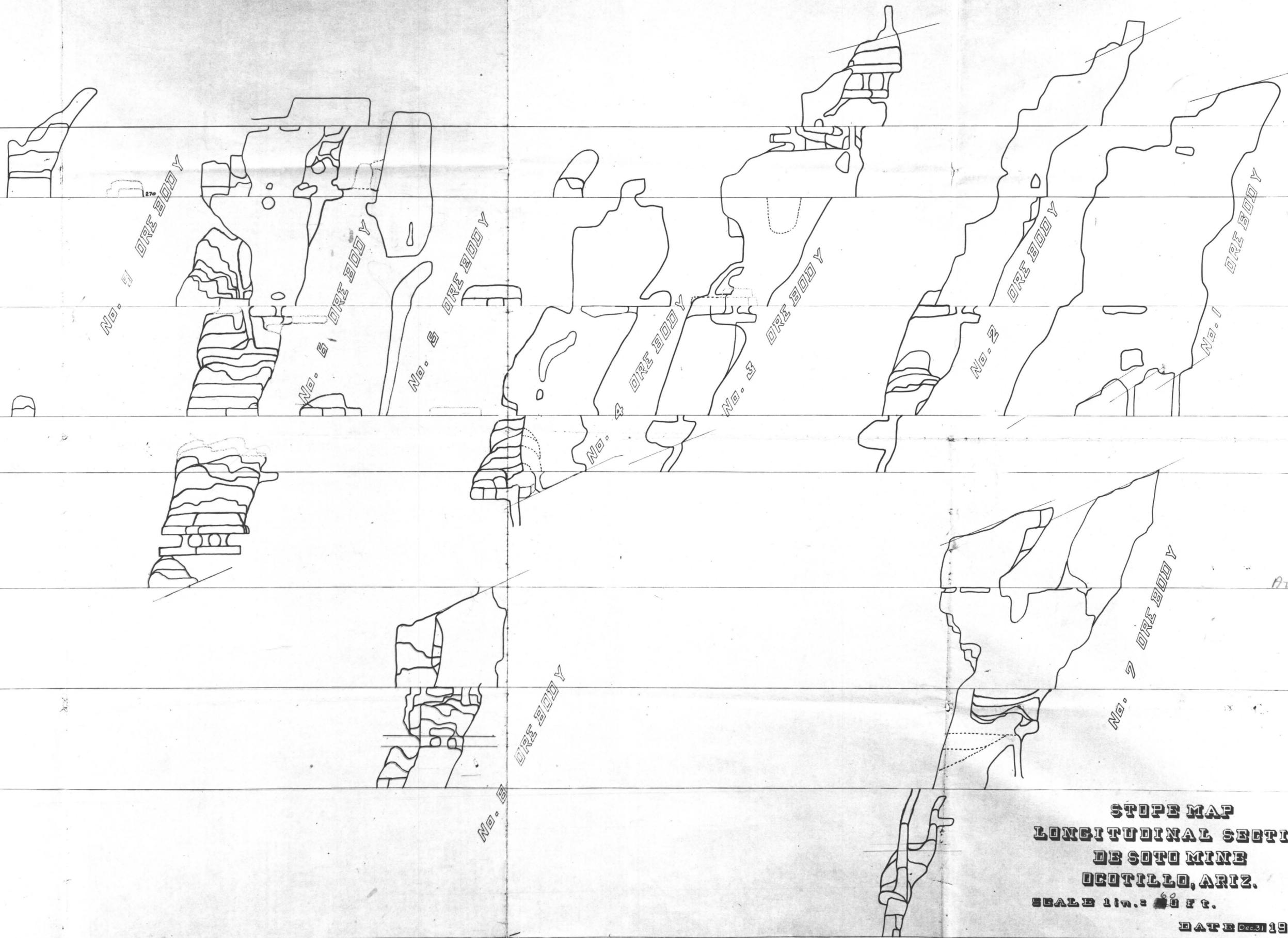
of the copper ore is silicious and suitable for concentration. From the underground workings, it would appear that the commercial ore occurred in small lenses, three of them very well defined and having a maximum width of 30 feet with a length of somewhat less than 200 feet.. The average value of all ore extracted from the mine appears to have been 4% in copper with \$2.00 of gold and silver per ton. I could find no accurate record of the total tonnage produced, but estimate that it may have been between thirty and forty thousand tons.

It is not possible to give any figures as to the ore reserves left in this mine. I have it on good authority, that approximately 3,000 tons of broken ore was left in the stopes and aside from this, a very considerable tonnage may remain in place. I would suggest that in the near future, a young engineer should be employed by Mr. Walker to sample and estimate the reserves in the mine above the 600 foot level, and at the same time, that the main winze should be pumped out by means of a small gasoline pumping outfit, and the lower 200 feet of the mine unwatered; so that the examination might be carried down to the lowest level; at which point especial care should be taken with the samples. The results of this examination would give a basis for estimate as to whether or not it will pay to reopen the De Soto; the total cost of examination should not exceed \$1,200.00.

As a prospect, I consider the DeSoto promising and there is good reason to believe that the ore bodies on which you have worked may extend downwards to a considerable depth and there would also appear to be good chances of discovering other lenses of ore. It should be borne in mind that because of the development which has already been done, the ore from the upper workings could be mined very cheaply and each additional hundred feet opened up will add to your reserves (judging from the upper levels) between twelve to fifteen thousand tons of ore.

At the time the mine was formerly worked, the high cost of transportation was a very serious handicap. The railroad charged \$1.25 per ton to haul the ore from Middleton to Humboldt

and before opening the mine, it would be most essential to get a new and much better freight contract; I believe that the freight should not exceed 50 cents per ton, to which would be added the cost of operating the gravity ropeway approximately 10 cents per ton so that ore from the De Soto would cost about 10 cents per ton more than ore from the Blue Bell assuming the mining costs to be the same.



No. 4 ORE BODY

No. 5 ORE BODY

No. 5 ORE BODY

No. 4

ORE BODY

No. 5 ORE BODY

No. 2

ORE BODY

No. 1

ORE BODY

No. 6 ORE BODY

No. 7 ORE BODY

ADIT?

NORTH

STOPE MAP
LONGITUDINAL SECTION
DE SOTO MINE
OCOTILLO, ARIZ.
 SCALE 1 in. = 50 ft.
 DATE Dec. 31 1919

Ex. B. 760

1420
Ex. B.

DE SOTO MINE - COST OF MINING AND TRANSPORTATION

	1916			1917			1918		
	Total Cost	Cost P T Ore Shpd	Cost P Lb Cu Shipped From Mine	Total Cost	Cost P T Ore Shpd	Cost P Lb Cu Shipped From Mine	Total Cost	Cost P T Ore Shpd	Cost P Lb Cu Shipped From Mine
Exploration	\$ 8,947.44	\$.26024	.38550¢	\$ 1,573.01	\$.03536	.05825¢	\$ ---	\$ --	---
Development in Waste	3,314.25	.09539	.14280	2,120.27	.04767	.07852	9,095.63	.2122	.4119¢
Development in Ore	5,039.71	.14659	.21714	2,264.54	.05091	.08386	7,853.98	.1832	.3557
Extraction	42,893.69	1.24756	1.84809	52,882.02	1.16633	1.92122	47,326.03	1.1109	2.1566
Pumping	107.42	.00312	.00463	192.65	.00433	.00714	761.23	.017	.0344
Hoisting in Winze	204.70	.00595	.00882	1,453.35	.03267	.05382	4,860.36	.1134	.2202
Traming to Upper Terminal	3,840.22	.11169	.16546	5,445.27	.12241	.20164	5,690.45	.1327	.2576
General Supplies	4,254.00	.12373	.18328	3,009.52	.06766	.11144	3,913.43	.0913	.1772
General Surface Work	9,667.53	.28118	.41653	10,303.74	.23153	.38155	9,241.29	.2156	.4185
Operating Ropeway-Sort. & Load Ore	8,674.98	.25231	.37376	11,933.54	.26827	.44190	10,396.69	.2425	.4709
Gen. Expense & Gen. Supervision	16,355.35	.47600	.70510	17,910.83	.40264	.66324	18,937.25	.4417	.8575
TOTAL	\$ 103,309.30	\$3.00415	4.45111¢	\$ 108,088.74	\$2.42988	4.00258¢	\$ 118,376.59	\$ 2.7612	5.3605¢
CREDIT OPERATING REVENUES	\$ 415.58	\$.07205	.01782¢	\$ 2,049.81	\$.04608	.07531¢	\$ 755.81	\$.0177	.0333¢
TOTAL NET EXPENDITURES	\$ 102,893.72	\$2.99272	4.43329¢	\$ 106,038.93	\$2.38380	3.92667¢	\$ 117,640.50	\$ 2.7441	5.3272¢
INCREASE OR DECREASE STOCK IN MINE AND TRANSIT	\$ 4,945.00	\$.14583	.21305¢	\$ 2,550.00	\$.05733	.09433	\$ 6,649.00	\$.1551	.3010¢
TOTAL COST OF ORE SHIPPED (F.O.B. MIDDLETON)	\$ 97,950.72	\$2.84889	4.22023¢	\$ 108,588.93	\$2.44113	4.02100¢	\$ 124,289.50	\$ 2.8992	5.6282¢
FREIGHT TO HUMBOLDT	\$ 24,380.91	\$.70912	1.05046¢	\$ 31,527.93	\$.70899	1.16787¢	\$ 33,719.26	\$.7865	1.5269¢
TOTAL COST OF ORE SHIPPED (F.O.B. HUMBOLDT)	\$ 122,331.63	\$3.55801	5.27069¢	\$ 140,116.86	\$3.15012	5.18887¢	\$ 158,008.76	\$ 3.6857	7.1551¢
		(54,382) Tons	(2,320,980) Lbs		(44,483) Tons	(2,700,478) Lbs		(42,870) Tons	(2,208,296) Lbs

(The cost of \$3.558 per ton for the year 1916 includes \$0.26297 for development work, and \$0.26024 for exploration.)

The cost of \$3.1501 per ton for the year 1917 includes \$0.09353 for development work, and \$0.03536 for exploration.)

The cost of \$3.6857 per ton for the year 1918 includes \$0.3954 for development work; there were no charges against exploration.)

DE SOTO MINE COST SHEET FOR THE YEARS 1918 & 1919

	1918			1919		
	Total Cost	Cost P.T. Ore Shpd.	Cost P.lb. cu.in ore shipped	Total Cost	Cost P.T. ore shpd.	Cost P.lb. cu.in ore shipped
<u>EXPLORATION</u>	---	---	---	\$ 3,081.63	\$.1136	.2416 ¢
<u>DEVELOPMENT IN WASTE</u>	\$ 9,095.63	\$.2122	.4119 ¢	4,257.24	.1573	.3340
<u>DEVELOPMENT IN ORE</u>	7,853.98	.1832	.3557	9,945.51	.3674	.7800
<u>EXTRACTION</u>	47,626.03	1.1109	2.1566	37,954.41	1.4022	2.9770
T O T A L	\$ 64,575.64	\$ 1.5063	2.9242 ¢	\$ 55,238.79	\$ 2.0407	4.3326 ¢
<u>PUMPING</u>	\$ 761.28	\$.0177	.0344 ¢	\$ 761.37	\$.0282	.0599 ¢
<u>HOISTING IN WINZE</u>	4,860.36	.1134	.2202	2,429.78	.0898	.1907
<u>TRAMMING TO UPPER TERMINAL</u>	5,690.45	.1327	.2576	3,290.03	.1215	.2580
<u>GENERAL SUPPLIES:</u>						
Lubricants	\$ 628.28	\$.0146	.0284 ¢	\$ 262.83	\$.0097	.0206 ¢
Illuminants	287.96	.0067	.0130	610.44	.0226	.0480
Drill Parts	1,956.02	.0456	.0866	1,943.37	.0718	.1524
Drill Steel	904.47	.0212	.0410	206.21	.0075	.0159
Miscellaneous	136.70	.0032	.0062	---	---	---
T O T A L	\$ 3,913.43	\$.0913	.1772 ¢	\$ 3,021.85	\$.1116	.2369 ¢
<u>GENERAL SURFACE WORK:</u>						
Blacksmith Shop	\$ 4,695.63	\$.1096	.2126 ¢	\$ 4,274.51	\$.4579	.3352 ¢
Power House	2,604.53	.0607	.1179	2,306.95	.0853	.1811
Maint. Buildings & Camp	1,275.65	.0297	.0578	1,621.51	.0599	.1272
Repairs Gen. Mine Equipment	223.89	.0053	.0102	395.63	.0146	.0310
Gen. Repairs at Humboldt	420.97	.0098	.0191	127.95	.0047	.0090
Gen. Surface Work General	20.62	.0005	.0009	---	---	---
TOTAL GENL. SURFACE WORK	\$ 9,241.29	\$.2156	.4185 ¢	\$ 8,726.55	\$.3224	.6845 ¢
<u>SORT. ORE OPTG. ROPEWAY & LOAD. ORE</u>	\$ 10,396.69	\$.2425	.4709 ¢	\$ 8,988.48	\$.3321	.7051 ¢
<u>GENL. EXPENSE & GENL. SUPERVISION:</u>						
Superintendence	\$ 3,871.67	\$.0903	.1753 ¢	\$ 3,601.52	\$.1404	.2981 ¢
Foremen and Shift Bosses	4,977.09	.1161	.2254	4,352.81	.1608	.3414
Office Expense	1,139.77	.0266	.0516	1,303.17	.0480	.1019
Warehouse Expense	464.01	.0106	.0211	573.43	.0212	.0450
Sampling, Assyg. & Eng.	175.69	.0041	.0079	600.20	.0222	.0471
Taxes	5,386.49	.1256	.2439	5,550.00	.2052	.4357
Employers' Liab. Ins. Premium	157.50	.0037	.0072	108.00	.0040	.0085
Fire Insurance Premiums	1,014.55	.0237	.0459	1,133.10	.0419	.0890
Depreciation Tools in Use	1,285.34	.0300	.0582	1,583.24	.0585	.1242
Comp. Pmnts. & Indust. Expense	465.14	.0108	.0210	1,794.53	.0663	.1408
TOT. GEN. EXP. & GEN. SUPRVSN.	\$ 18,937.25	\$.4417	.8575 ¢	\$ 20,800.00	\$.7685	1.6317 ¢
TOTAL EXPENDITURES	\$ 118,376.39	\$ 2.7612	5.3605 ¢	\$ 103,256.85	\$ 3.8148	8.0994 ¢
<u>OPERATING REVENUES:</u>						
Boarding House	235.52	.0055	.0107	1,393.76	.0515	.1093
Commissary	257.87	.0062	.0121	7.36	.0003	.0006
Rentals	232.50	.0054	.0105	230.00	.0085	.0160
TOTAL OPERATING REVENUES	\$ 725.89	\$.0171	.0333 ¢	\$ 1,156.40	\$.0427	.0907 ¢
TOTAL NET EXPENDITURES	\$ 117,640.50	\$ 2.7441	5.3272 ¢	\$ 104,413.25	\$ 3.8575	8.1901 ¢
<u>INCREASE OR DECREASE STOCK IN MINE AND TRANSIT</u>	6,649.00	.1551	.3010	967.00	.0357	.0758
T O T A L	\$ 124,289.50	\$ 2.8992	5.6282 ¢	\$ 103,446.25	\$ 3.8218	8.1143 ¢
<u>FREIGHT ON ORE SHPD. TO HUMBOLDT</u>	33,719.26	\$.7865	1.5269	25,014.28	.9242	1.9620
TOT. COST OF ORE FOB HUMBOLDT	\$ 158,008.76	\$ 3.6857	7.1551 ¢	\$ 128,460.53	\$ 4.7460	10.0763 ¢
		(42,870) tons	(2,208,296) lbs.		(27,067) tons	(1,274,877) lbs.

DE SOTO MINE - COST OF MINING AND TRANSPORTATION

	1916		1917		1918			1919		
	Cost P.T. Ore Shpd.	Cost P.Lb. cu.shippd. from Mine	Cost P.T. Ore Shpd.	Cost P.Lb. cu.shippd. from Mine	Total Cost	Cost P.T. Ore Shpd.	Cost P.Lb. cu.shippd. from Mine	Total Cost	Cost P.T. Ore Shpd.	Cost P.Lb. cu.shippd. from Mine
EXPLORATION	\$.26024	.38550 ¢	\$.03536	.05825 ¢	\$ ---	\$ ---	---	\$ 3,081.63	\$.1138	.2416 ¢
DEVELOPMENT IN WASTE	.09659	.14280	.04767	.07852	9,095.63	.2122	.4119 ¢	4,257.24	.1573	.3340
DEVELOPMENT IN ORE	.14658	.21714	.05091	.08386	7,853.98	.1832	.3557	9,945.51	.3674	.7800
EXTRACTION	1.24756	1.84809	1.16633	1.32122	47,626.03	1.1109	2.1566	37,954.41	1.4022	2.9770
PUMPING	.00312	.00463	.00433	.00714	761.28	.0177	.0344	761.37	.0282	.0599
HOISTING IN WINZE	.00595	.00882	.03267	.05362	4,860.36	.1134	.2202	2,429.78	.0898	.1907
TRAMMING TO UPPER TERMINAL	.11169	.16546	.12241	.20164	5,690.45	.1327	.2576	3,290.03	.1215	.2580
GENERAL SUPPLIES	.12373	.18328	.06766	.11144	3,913.43	.0913	.1772	3,021.85	.1116	.2369
GENERAL SURFACE WORK	.28118	.41653	.23163	.38155	9,241.29	.2156	.4185	8,726.55	.3224	.6845
OPERTG. ROPEWAY, SORT. & LOAD. ORE	.25231	.37376	.26827	.44190	10,396.69	.2425	.4709	8,988.48	.3321	.7051
GEN. EXP. & GEN. SUPERVISION	.47600	.70510	.40264	.66324	18,937.25	.4417	.8575	20,800.00	.7685	1.6317
T O T A L	\$ 3.00475	4.45111 ¢	\$ 2.42988	4.00258 ¢	\$ 118,376.39	\$ 2.7612	5.3605 ¢	\$ 103,256.85	\$ 3.8148	8.0994 ¢
CREDIT OPERATING REVENUES	\$.01203	.01782 ¢	\$.04608	.07591 ¢	\$ 735.89	\$.0171	.0333 ¢	\$ 1,156.40	\$.0427	.0907 ¢
TOTAL NET EXPENDITURES	\$ 2.99272	4.43329 ¢	\$ 2.38380	3.92667 ¢	\$ 117,640.50	\$ 2.7441	5.3272 ¢	\$ 104,413.25	\$ 3.8575	8.1901 ¢
INCREASE OR DECREASE STOCK IN MINE AND TRANSIT	\$.14383	.21306 ¢	\$.05733	.09433 ¢	\$ 6,649.00	\$.1551	.3010 ¢	\$ 967.00	\$.0357	.0758 ¢
TOTAL COST OF ORE SHIPPED (F.O.B. MIDDLETON)	\$ 2.84889	4.22023 ¢	\$ 2.44113	4.02100 ¢	\$ 124,289.50	\$ 2.8992	5.6282 ¢	\$ 103,446.25	\$ 3.8218	8.1143 ¢
FREIGHT TO HUMBOLDT	\$.70912	1.05046 ¢	\$.70899	1.16787 ¢	\$ 33,719.26	\$.7865	1.5269	\$ 25,014.28	\$.9242	1.9620 ¢
TOTAL COST OF ORE SHIPPED (F.O.B. HUMBOLDT)	\$ 3.55801	5.27069 ¢	\$ 3.15012	5.18887 ¢	\$ 158,008.76	\$ 3.6857	7.1551 ¢	\$ 128,460.53	\$ 4.7460	10.0763 ¢

(34,382 T.)(2,320,980 lbs.) (44,483 T.)(2,700,478 lbs.)

(42,870 T.)(2,208,296 lbs.)

(27,067 tons) (1,274,877 lbs.)



Bradley
Butte

B.M. 4888

B.M. 4024

Dripping
Spring

Cordes
di

B.M. 3074

Blaine
Springs

Basin

Badger
Spring

B.M. 2686