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C O P Y

Oatman, Arizona, Sept. 14, 1915.

Mr. C. E. Finney,  
Los Angeles, California,

*copied*

Dear Sir: --

I beg to submit herewith the results of my examination of the "Arizona Empire Mines Company" situated in Seneca Mining District, Yuma County, Arizona, about twelve miles North of the town of Parker at the junction of the Parker cutoff of the Santa Fe Railway and the Colorado River. As you are in possession of maps of the property and are familiar with the titles to the ground I will not take up these matters at this time but pass at once to the economic and geologic considerations involved.

TOPOGRAPHY AND  
GENERAL SURROUNDINGS:

The property is located in an exceedingly rugged and broken area. Abruptly sloping hills and steep escarpments are separated by deeply scored canyons and gulches barren of vegetation except for the scanty lesser growths common to the desert.

From Parker a poor wagon road follows the margin of the Colorado River for a distance of approximately ten miles where it turns sharply to the East and winds up through a narrow, tortuous canyon to the camp on the property. The property is situated about three miles from the river and at an elevation six hundred feet or more above it. The road for its greater part is unsuited to the use of motor trucks or other methods of heavy haulage. A new, and apparently much better, road over which heavy loads could be transported has been surveyed from the present campsite on the property throughout the hills back from the river directly to Parker. This road, when built at an estimated cost of five thousand dollars, would shorten the haul to the railroad materially over the

distance now traversed in getting to the property -- by possibly three miles.

Water is brought at the present time for all camp purposes from the river. It is of excellent quality and abundant and can be cheaply pumped in quantity sufficient for all future requirements.

Fuel for all purposes would have to be brought in from the railroad station at Parker. Other needed supplies can be had at prices comparing favorably with those prevailing throughout Western Arizona.

#### GEOLOGY:

Geologically, the formation exposed in the properties is very old---much older than that with which, with the exception of the Jerome mines, the other copper properties of the Southwest are associated. There is reason to believe that it forms a part of the old pre-cambrian Complex which forms the basement series of the geologic column in Arizona. It consists of a series of impure limestones, shales and quartzite--all highly metamorphosed and intruded by numerous porphyry eruptives, generally of the lighter, acidic varieties. One occurrence of diabase was noted and a heavy basalt capping rests on the eroded surface of the older rocks and completely covers them forming the present surface on the South, East and North of the property. In the area covered by the property itself, this basalt capping has been scored off, exposing the older underlying series of rocks in which the ores occur.

Structurally the conditions observed show clearly that the ancient sedimentary series was first intruded by quartz-porphyry in dykes and intercallated sheets and sills. Following this tangential thrust lifted the entire region into an anticlinal fold along an axis trending Northeast by Southwest with a tendency to overturn towards the Southeasterly flank of the fold. This movement was accompanied by metamorphism of the involved

rock members, the limestones being crushed and marmorized and the shales and quartzite, with the included eruptives converted into schists. Accompanying the intrusion of the early eruptives contact metamorphism of the sedimentaries occurred, the limestones being converted into almost pure quartz over large areas, with intense silicification of the shales. Specular iron ores occur abundantly throughout the entire area occupied by the limestone members. Garnet, Epidote and other distinctive contact minerals are conspicuously absent. In fact silicification and the deposition of specular hematite seem to cover the entire range of contact minerals produced.

Following the period of dynamic movements which folded and no doubt faulted the region extensively, basalt was extruded and covered everything as a huge <sup>ambrose</sup> flow. Erosion has stripped off this basalt covering and eaten deep into the heart of the anticline, resulting in the present topography. A well preserved cross-section of a large part of the original sedimentary series is now shown within which the copper and other ores are found.

Movement later than that which produced the original anticlinal structure has resulted in a distinct series of shears and fractures generally parallel and trending Northerly and Southerly. These fractures appear to be the result of compressive strains and may be divided into two series; one dipping at a rather flat angle to the Southwest; the other series dipping in the opposite direction less steeply to the Northeast and intersecting the former. There are, of course, many faults and crushed zones and shears with varying strike and not connecting with the two series referred to above.

There are several members of the limestone series with outcrops forming concentric ridges well exposed to the Southwest of the camp which is situated in the eroded center of the anticline which here pitches

quite rapidly to the Southwest. The innermost member of this limestone series--that lying nearest to the anticlinal axis--is dense and nearly black in color. The ridge lying immediately outside of this is made up of a less dense, and purer yellowish limestone. It is this yellowish limestone that has been favored for the deposition of the ores, though some deposits of ore occur in the black limestone at many places.

Around the margin of the anticline on the Southwest and South and East a large area of very red, fine grained quartz porphyry occurs, evidently a flow. This can be seen passing back under the later basalt capping in many places and rests immediately against the yellowish limestone or is separated from it by a thin schist zone less than one hundred feet wide. All indications point to this red quartz porphyry as the source of the copper ores that are now found in the property. Copper ore occurs scattered in small amount throughout the whole mass of this particular porphyry, and deposits of considerable, perhaps great, size always seem to occur where the red porphyry contacts with the yellowish limestone, or between the schist and this limestone in close proximity to the porphyry.

ORE OCCURRENCE:

Gold and copper occur together in all of the ore bodies so far found. Roughly speaking the ratio seems to be about one third of the total value in gold, the rest in copper. Little or no silver is found. The gold is bright and free and rather coarse. The copper occurs variously as red and black oxides, carbonates and silicates. No sulphides have been found except in one unimportant case.

There is ground for believing that the gold and copper were deposited at different times and as the result of distinct genetic causes. From the peculiarity of its occurrence it appears likely that the early acidic porphy-

ry intrusive which was erupted prior to the development of the anticlinal structure was the source of the gold, and that copper bearing waters later found their way into the earlier formed gold deposits with resulting deposition of copper. This, however, cannot be affirmed with certainty.

The ores are widely distributed over the entire area embraced within the property lines and to some extent beyond. The two series of co-ordinated fractures previously mentioned all carry more or less copper-gold ore, some of it high grade and ranging up to one hundred dollars or more per ton in value. There are two especially promising localities which I think deserving of special mention at this time; they are: The "Eagle's Nest" on the claim of that name, and the "Carnation" - "Walters" workings on the Omega and Alpha claims.

The "Eagle's Nest" ore body is located North of the camp at a distance of a half mile, more or less, and consists of exceptionally rich oxides and carbonates of copper with some silicate on the contact between a thick sill of quartz-porphyry which lies against yellowish limestone on the Northwestern flank of the anticline. It has been opened for a distance of about five hundred feet on the strike and has produced a considerable tonnage of rich ore down to a shallow depth. An incline, now caved, is said to have two feet of solide Malachite at the bottom and to have followed good ore from the surface. This ore body dips conformably with the formation at about forty degress and its continuation may be looked for to a depth at least as great as its strike on the surface or say five hundred feet. The ore occurs in the limestone which forms the foot wall of the deposit with porphyry on the hanging wall. Considerable ore of shipping grade is exposed in the old workings and the old stopes indicate a width of from five to twenty feet of

workable ore. There seems every reason to believe that a large amount of rich ore could be developed here with very little work and the possibility of its opening into a very large and permanent ore body is exceptionally good. The gangue material is siliceous with abundant specularite through it.

The "Carnation"--"Walter" showing is located about one half mile South of the camp. The ore occurs in yellowish limestone along its contact with a narrow belt of schist on the farther or outer side of which occurs the red quartz porphyry. At the surface the ore shoot appears to outcrop more or less continuously for a total distance of about fifteen hundred feet and is opened at its Northeast end by the Walters shaft, and on its Southwesterly end by the Carnation shaft. In both of these shafts a large amount of commercial gold-copper ore is opened under conditions which warrant the belief that it will go to great depth. The ore appears to have a thickness of probably twelve feet, possibly a little more. If this ore body is continuous between the two shafts as appears likely from surface indications, the amount of available tonnage will run into big figures. This ore has been opened in the Walters Shaft which is an incline sloping at forty-five degrees from the fifty foot level down to the two hundred foot level. Here as at the "Eagle's Nest" workings the ore follows the dip of the formation.

While no ore is blocked in the technical sense there is every reason to believe that at this point shipments of good grade of ore can be immediately commenced and sustained for an indefinite period as soon as the necessary equipment can be installed.

One rather prominent <sup>other</sup> occurrence of ore should here be mentioned. That known as the "Treasure Hill" which is a large quarry face located a short distance Northeast of the camp. While not as high in value as either of the

*This is the  
found to determine*

two occurrences just mentioned there appears to be a very large body of this ore which could be mined by quarry methods very cheaply and with better transportation facilities could, without much doubt, be made to pay a handsome profit over the cost of mining and handling it. The limits of this ore body have not been determined but it is an important ore body which strongly invites future consideration.

Very many other promising occurrences of good ore might be mentioned, notably those of the "Gray Eagle" claim a matter of a mile more or less Northerly from the camp, but those indicated above have been selected as bearing the strongest evidence of size and permanence, as well as being the most accessible and capable of being made quickly productive.

For greater details concerning the matter of ore tonnage available and prospective together with matters pertaining to active mining operations, I beg to refer you to my associate in the examination, Mr. O. A. Knox, who considered this phase of the undertaking especially.

SUMMARY:

On the whole the property of the "Empire Arizona Mines Company" is a very promising one, with an exceptionally strong surface showing. Structurally and genetically it gives promise of very large, permanent and high grade bodies of gold-copper ore which can be made quickly profitable at a relatively small outlay. I therefore strongly recommend it to your favorable consideration.

(Signed) EDWARD W. BROOKS

ARIZONA EMPIRE MINES COMPANY

REPORT OF OSCAR A. KNOX

Los Angeles, Cal., Sept. 21, 1915.

Mr. C. E. Finney,  
723 Title Insurance Bldg.,  
Los Angeles, Cal.,

Dear Sir:

Pursuant to your instructions, I have made an examination of the properties of the Arizona Empire Mines Company, situated in the Seneca Mining District, Yuma County, Arizona, and herewith I beg to hand you the results of my investigations.

PROPERTY:

The property controlled by this Company consists of 35 contiguous mining claims located about ten miles North of Parker, Arizona, on the Phoenix-Los Angeles line of the Santa Fe Railway and two and one half miles East of the Colorado River. For the purposes of this examination, the property was segregated and the Territory which will be dealt with in this report comprises some sixteen claims or something over three hundred acres.

HISTORY:

The property is a very old one, and is known to have been worked previous to the year 1864, at which time high grade ores were shipped to Swansea, Wales, for treatment. The present ownership dates back some fourteen years. Several attempts have been made during this time to get the property on a producing basis, but it is evident that at no time was sufficient capital available to admit the proper equipment of the mines or to permit development in a systematic manner.

TITLE:

I take it that you have investigated the question of title. I find that the properties are held by location in compliance with the United States Mining laws

and that the whole group (35 claims) has been surveyed for United States Patent.

EQUIPMENT:

There is no equipment on the property for mining in a large way. There is a camp near the Carnation shaft which will provide boarding and sleeping accommodations for some twenty men.

There is a telephone line connecting the camp with Parker. This is at present out of commission, but could be easily repaired at a nominal expense.

OPERATING CONDITIONS:

The operating conditions are exceedingly favorable. The climate is that usually found throughout the arid districts of the Southwest. There are some three months in the year when the temperature becomes uncomfortably hot but the remaining nine months are ideal. There are no conditions which would operate against cheap work at any time of the year.

At the present time freight from Parker to the mine can be delivered by means of a small traction engine which is available at Parker at a cost of three dollars per ton. The plan of operations which I propose to outline contemplates the building of a new wagon road. Contractors who have been over the route of the proposed road have made a bid of \$1.25 per ton for hauling from the mine to Parker. This was one bid and it is my opinion that competitive bidding would result in a figure of about \$1.00 per ton.

Costs for labor and supplies are the same as prevail generally throughout the Southwest. Miners are paid \$3.50 per eight hour day; hoisting engineers and blacksmiths \$4.00; surface labor from \$2.00 to \$3.00.

Underground work, under the existing conditions should easily be done within the following figures;

Shaft sinking, including timbering	\$20.00 per foot
Drifting and cross-cutting	\$5.00 to \$8 " "
Mining, including development	\$2 per ton of ore

CARNATION GROUP:

The Carnation Group consists of six claims, but development has been mainly confined to two claims, known as the Alpha and Omega. These cover the outcrop of a contact vein occurring between Schist (foot wall) and Limestone (hanging wall). There is a fairly well defined outcrop showing some 1500 feet in length by 16 feet in width. I shall not go into details in regard to the geological conditions as these have been fully covered in the report of my associate, Mr. Edward W. Brooks, consulting geologist, who accompanied me on this trip and whose report, I understand, you have in hand.

CARNATION WORKINGS:

The Carnation shaft, so called, is located on the Southeast corner of the Omega Claim. The work antedates the present ownership. The shaft is sunk to a depth of 300 feet on an incline of about 45 degrees. The vein, however, pitches about 55 degrees and consequently the vein passes into the shaft at a depth of about 60 feet and dips out again at 200 feet. The shaft is started on the end of the ore shoot and it is inclined not only on the pitch but also along the strike of the vein. Therefore, the shaft gets further away from the ore shoot as depth is obtained. This shaft could not be used as a permanent working opening but it can, however, be utilized for the extraction of ores which have been proved above the 200 foot level.

The vein is 16 feet in width showing 5 feet of solid copper ore and 11 feet of a leached brownish quartz carrying stringers and bunches of copper ore. This leached portion of the vein is interesting in that it indicates that a zone of secondary enrichment will be found at or near the water level.

The ore can be very easily sorted and I estimate that sorting will produce a shipping product equal to 50% of the total vein matter.

The copper minerals are cuprite and chrysocolla. There is some hematite both red and specular. The ore is quite siliceous, Sampling by the writer indicates that the above mentioned shipping product will maintain an average of 8% copper and \$7.00 gold per ton.

WALTERS SHAFT:

The Carnation ore body shows a fairly distinctly traceable outcrop for a distance of 1500 feet North-easterly from the Carnation shaft. There are two or three open cuts, pits and shallow shafts along the outcrop between the Carnation shaft and the Walters shaft.

This shaft is located on the Alpha Claim and is said to have a depth of 150 feet, being sunk on an incline of about 45 degrees. At the present time, the shaft is bulkheaded at the 50 foot level. This shaft also is sunk at a different inclination than that of the vein, and therefore, passes out of the vein matter at a depth of 50 feet. The ore is said to be proved by a cross cut at a depth of about 100 feet but I am unable to confirm this statement on account of the bulkhead in the shaft above mentioned. There is also an old tunnel which cuts the vein at approximately the level of the collar of the Walters shaft. This is of no present value and was therefore not extensively examined.

At the 50 foot level, there is a drift 20 feet in length run in solid ore. The drift exposes 6 feet of this ore with no walls in sight. I estimate that the total width of the vein at this point is from ten to sixteen feet. A general sample of the drift assayed 5% copper and \$6.40 gold per ton. This ore can be sorted up to 8% copper at a very small cost for sorting.

The ore is highly siliceous, being a cellular quartz carrying cuprite, malachite and chrysocolla. Gypsum is present to a considerable extent, tending to prove that the ore is the result of the alteration of the sulphide minerals.

TREASURE HILL:

This is a mass of highly altered Limestone about 500 by 1000 feet in plan which rises 100 feet or more above the surrounding country. The original limestone has been silicified in part altered wholly to quartz and mineralized by cross fissuring from the Carnation contact. The whole mass appears to be ore of a commercial grade. On the west side of the hill, there is a quarry with a face of about 50 feet long. Forty three tons of unsorted ore broken in this quarry and shipped to the Copper Queen Smelter of Douglas, Arizona, are said to have given net smelter returns of \$12.60 per ton in gold and copper. A general sampling by the writer gave 4.8% copper and \$1.20 gold. A sample of the ore, as it could easily be sorted for shipment, assayed 9.2% copper and \$7.60 gold. This ore can be mined and sorted up to this grade for 50¢ per ton. A very large tonnage is available for immediate mining by open quarry work.

The minerals observed are cuprite, melachite, chrysocolla and specularite.

This ore body is one of the most important showings on the property. The writer is strongly of the opinion that a sufficient tonnage can easily be blocked to justify the building of a railroad from Parker to the mine. With cheap transportation thus provided the whole mass can be broken, and with a very little sorting, can be shipped direct to the smelters. I advocate, however, that this development be postponed until the property has been placed on an earning basis from the production of the higher grade ores, which are immediately available from the Carnation, Walters and Eagle's Nest workings.

EAGLE'S NEST GROUP: // stop

The Eagle's Nest Group consists of five claims situated roughly one and one half miles from the Carnation shaft and covering a contact between a coarsely crystalline quartz porphyry (foot wall) and yellow limestone (hanging wall). The contact strikes Northeast and Southwest and

itches to the Northwest about 50 degrees.

There is an old tunnel 400 feet in length which shows an ore shoot for a length of 250 feet. The high grade ore upon which this tunnel was run was from one foot to twenty feet in width, the large bodies making out into the limestone as replacements. There are four old stopes where the replacement ore bodies have been taken out for an average width of 20 feet. While the proved length of the shoot is 250 feet, there are at least three other shoots which come to the surface beyond the end of the tunnel and it is probable that the aggregate length of the known ore shoots is around 1000 feet. The tunnel is very old work and it is reported that 2500 tons were shipped from these workings in the early days which averaged 50% copper.

Work under the present management consisted of a shaft sunk on the ore body to a depth of 70 feet at an incline of 45 degrees. This shaft is now caved to within 20 feet of the surface. From the bottom of the shaft a drift was run 40 feet to the East. This proved an average width of vein of 20 feet, 20 inches of this was solid melachite averaging 45% copper and \$7.00 per ton gold. The balance of the vein is specularite with streaks and bunches of melachite and chrysocolla. Forty tons of the high grade ore mentioned were shipped to the smelter. The minerals occurring are melachite, chrysocolla, cuprite and specularite. Gypsum is present. The ore is very high in iron and apparently low in silica.

Although the shaft is inaccessible, the dump gives evidence that the statements made regarding the conditions found are correct. The dump consists of several hundred tons of specular hematite from which 80 or 100 tons of shipping ore could probably be sorted at the present time. A general sampling of the dump gave 7.7% copper and 80¢ gold; a sample of the sorted ore gave 30.1% copper and \$11.60 gold.

In addition to the main contact deposit, there are three or more cross fractures striking across the limestone and running out from the contact. These show a length of outcrop of about 600 feet and one of them has been quite extensively prospected showing a streak of high grade copper ore three feet in width. These cross veins can be easily developed at depth from the proposed Eagle's Nest workings. They are worthy of serious attention as the conditions are favorable for the occurrence of large replacement ore bodies in the limestone.

There are great possibilities on the Eagle's Nest Claim for the development of large chambers of high grade ore in the limestone, such as were extensively mined at Bisbee in the early days. The limestone is comparatively pure, soft and porous and easily acted upon by mineral bearing solutions.

DOUBLE EAGLE CLAIM:

This claim sidelines with the Eagle's Nest claim referred to above. The Double Eagle claims cover a belt of altered and silicified limestone about 30 feet wide and 2000 feet in length. The rock has the same characteristics as the Treasure Hill deposit. Copper occurs disseminated throughout the mass. The claim is developed by a tunnel 100 feet in length. No extensive examination was made of the claim at this time, but it has considerable prospective value.

ROBERTS SHAFT:

This shaft is located on the Girard claim and is sunk in the red porphyry a few feet from the limestone contact at a point where a cross-fracture from the Carnation contact cuts through the limestone and butts up against the porphyry. The work which has been done is all in the porphyry area, but it is my opinion that the large ore bodies will be found by following the cross-fracture back into the limestone.

The shaft is sunk to a depth of 75 feet on an incline

of 45 degrees and there is something over 100 feet of drifting from the bottom of the shaft. The shaft and drifts follow a high grade streak of ore averaging about 18 inches in width. There are also kidneys and bunches of this ore disseminated through the porphyry mass. The minerals observed are Cuprite, Chrysocolla, Melachite and Specularite.

The shaft takes its name from one Roberts, a leaser, who made these workings and shipped therefrom about 20 tons of selected ore, which returned 24% copper and \$7.00 gold per ton.

ORE RESERVES:

There is practically no ore blocked out in the property in the technical sense, as operations have never been conducted in conformity with any systematic plan of development. The natural conditions are such, however, that taken in conjunction with the development work so far accomplished, they practically assure a tonnage of ore hereinbelow referred to as "reasonably assured". In addition to this there is a tonnage classified as "possible ore", which, due to the conditions existing, could in many cases, be classed as "probable ore".

ORE RESERVES--CARNATION GROUP.

CARNATION SHAFT:

ORE PARTIALLY BLOCKED.

16 ft. x 60 ft. x 200 ft., estimated at 15,000 tons.

From the above tonnage it is estimated that 7500 tons can be sorted which will run 8% copper and \$7.00 gold.

ORE REASONABLY ASSURED

16 ft. x 200 ft. x 200 ft.; estimated at 50,000 tons

POSSIBLE ORE.

✓ 16 ft. x 1500 ft. x 15 00 ft., estimated at 1,730,770 tons.

WALTERS SHAFT:

ORE REASONABLY ASSURED.

16 ft. x 100 ft. x 100 ft.; estimated at 12,300 tons.

The "possible ore" is included in the estimate for the Carnation.

TREASURE HILL:

The present estimates have not taken into consideration the possibilities of "Treasure Hill" nor the various cross veins, which may well run up into two or three millions of tons.

ORE RESERVES---EAGLE'S NEST.

ORE REASONABLY ASSURED:

20 ft. x 100 ft. x 250 ft.; estimated at 50,000 tons.

PROBABLE ORE:

20 ft. x 400 ft. x 250 ft.; estimated at 200,000 tons.

POSSIBLE ORE:

20 ft. x 1000 ft. x 1000 ft.; estimated at 1,000,000 tons.

The above calculations do not consider the possibilities of the cross veins.

ESTIMATED WORKING PROFITS:

In the calculations below the total working cost has been assumed at the extremely liberal figure of \$14.00 per ton, covering mining and development, sorting, wagon haul, royalty and freight and treatment charges. Copper is figured at 14¢ per pound less the usual smelter deduction of 2¢ per pound for freight and refining.

CARNATION ORES:PARTIALLY BLOCKED

15,000 tons, sorted to produce 7500 tons @ 8%  
copper and \$7.00 gold, at a net value of \$10.28-----  
\$77,100

REASONABLY ASSURED

50,000 tons--sorted to produce 25,000 tons at a net  
value of \$10.28----- \$257,000

WALTERS SHAFT:REASONABLY ASSURED

12,300 tons, sorted to produce 6,000 tons @ 8%  
copper and \$7.00 in gold at a net value of \$10.28----  
\$61,680

EAGLE'S NEST ORES: EAGLE'S NEST DUMP:

300 tons at 7.7% copper, 80¢ in gold at \$10.00  
net value ----- \$3,000

REASONABLY ASSURED

50,000 tons at 10% copper and \$7.00 in gold  
at \$15.80 net----- \$790,000

## SUMMARY

<u>PROFIT ON ORES PARTIALLY BLOCKED AND ON DUMP</u>	\$ 80,100
PROFIT ON ORES REASONABLY ASSURED	\$ 1,047,000
<u>PRELIMINARY DEVELOPMENT AND EQUIPMENT:</u>	

While the physical conditions of this property are such that there can be no reasonable doubt that the tonnage indicated above will be rapidly put in sight and while a successful outcome seems assured; still, as a matter of sound business policy there should be an absolutely blocked tonnage before large and permanent improvements are undertaken.

The plan of operations advocated by the writer would contemplate retimbering the Carnation shaft to a depth of 200 feet; the installation of a suitable hoisting plant at the Carnation shaft and doing 200 feet of lateral work from the 200 foot level and later repairing the Walters shaft down to the 100 foot level and the installation of the horse whim now on the property at this point.

I recommend sinking a new shaft on the Eagle's Nest claim to a depth of 100 feet, cross cutting from the level to the ore body and doing 200 feet of drifting at this level.

The preliminary work outlined in the above paragraphs will in my opinion block out in a technical sense 45,000

tons of ore which should produce a net profit of \$572,000.

The equipment and costs involved by this preliminary work are estimated as follows:

Hoists	\$	2200
Freight and erection		1000
Cable skips and tools		2000
Headframes and Buildings		2000
Assay Office		1000
Camp equipment		2000
100 ft. Sinking Eagle's Nest		2000
200 ft. Drifting Eagle's Nest		1000
Repairing Carnation Shaft		1000
200 ft. Drifting Carnation		1000
		<hr/>
Contingent fund and working capital	\$	15000
		10000
		<hr/>
	\$	25000

A large portion of the above is in the line of permanent equipment, which will be of use for several years.

However, if the entire \$25,000 should be charged to Development Account, we should have 45,000 tons of ore blocked at a cost of  $55\frac{1}{2}$ ¢ per ton.

#### MINING OPERATIONS:

The principal conditions which has kept the property out of the producing class has been that of transportation. In order to put the property on a producing basis, it will be necessary to construct about four and one half miles of road suitable for caterpillar haulage connecting the Carnation shaft with the present County road. It will also be necessary to connect this proposed road with the Eagle's Nest workings and to connect the Carnation and the Walters shafts with a road.

To equip the property for permanent production will necessarily involve building the wagon roads above mentioned; ore bins and ore sorting devices at the mine and receiving bins at the railroad station at Parker, together with cars, track, tools, camp buildings and other adjuncts necessary to the economical and successful working of a mining property. This will require, together with a reasonable amount of working capital, the further sum of \$25,000.

Under the plan of operation which I have briefly outlined above, the property should within six months from the commencement of operations be placed on an earning basis

at the rate of not less than \$200,000 per annum. This takes into consideration only the high grade ores which are now reasonably assured. It is my opinion that development will result in proving a tonnage in addition to these high grade ores which will justify the railway company in building a branch line to the mine. Needless to say, this would result in increasing the output to a very large daily tonnage.

CONCLUSION:

✓ The property presents a number of attractive features the most important of which is the fact that we have a <sup>here</sup> reasonably assured tonnage which will show a handsome operating profit and at the same time admit of large development to be paid for from the revenue derived from operations. In a copper mine this is a unique situation. I recall very few instances similar to these conditions, The Copper Queen Mine at Bisbee and the mines of the Clifton-Morenci Districts being about the only copper mines in the United States, which were able to finance their early operations from operating profits. The Empire property presents similar conditions.

I recommend this property as being worthy of immediate equipment and aggressive development.

Respectfully submitted

(Sgd.) Oscar A. Knox

hand after

copy

Handwritten signature or name, possibly "George Washington" or similar, written in cursive.

NORRIS ENGLISH  
MINING ENGINEER  
719 MILLS BUILDING  
SAN FRANCISCO, CAL.

NORRIS ENGLISH  
MINING ENGINEER  
719 MILLS BUILDING  
SAN FRANCISCO, CAL.

San Francisco, Nov. 13, 1915.

Mr. G.M. Colvocoresses, Gen. Mgr.,  
Consolidated Arizona Smelting Co.,  
Humboldt, Arizona.

Dear Sir:-

Pursuant to your request I have examined the properties of the Arizona Empire Mines Company, and submit the following report.

The properties are located about seven or eight miles Northeast of Parker, Arizona, and are reached by a wagon road which follows the East bank of the Colorado River for about ten miles, and then follows a wash for about three miles to the property.

PROPERTY:

The property of this Company consists of thirty-five mining claims, shown on accompanying map, held by location, but this report deals with only a portion, consisting of sixteen claims. These claims are divided into two groups, which will be known in this report as the Carnation Group and the Eagle's Nest Group.

TITLE:

All the claims are possessory, although they have been surveyed for patent. The present owners have been

in control for the past fourteen years, and have done a large part of the development work.

The claims with which this report deals are at present under option to Mr. C.E. Finney, of Los Angeles, California, who submitted the property to you.

I have made no investigation of any kind as to the title of the property.

#### G E O L O G Y:

Lying along the East bank of the Colorado River is a belt of granitic gneiss about one mile wide. To the East of this is a belt of dioritic rock, of greenish color, and iron-stained along fissures and crevices, which gives the rock from a distance a pinkish color. This rock is locally known by the owners of the property as "quartz porphery."

To the East of this rock is a series of metamorphosed sediments, consisting in large part of limestone and schist, and which is classified by the U.S. Geological Survey as a pre-Cambrian age. This metamorphic series has been very greatly folded and faulted, so that the structure is very complicated.

The Eagle's Nest Group seems to lie on the Northwest flank of an anticline, while the Carnation Group lies on the Southeast flank.

The Eagle's Nest Group lies along, or close to, a contact of limestone, with intrusive diabase and an eruptive

rock, probably a quartz diorite.

The Carnation Group covers an area composed entirely of the sedimentary series, except along the eastern border, where it has been covered by a flow of basalt. The schists, which would probably be classes as amphibolitic, predominate.

#### EAGLE'S NEST GROUP.

This Group consists of the five following claims-- Aloha, Utica, Double Eagle and Royal Eagle, and has been developed by a number of scattered shallow workings.

#### WORKINGS:

The principal work has been done on the Eagle's Nest Claim, where a Northeast fissure, close to the contact of limestone and quartz diorite, has been developed by a tunnel, which starts near the center of the claim, and has been driven Northeast some 400 feet. At the time of my visit, only the first 250 feet was open. About 30 feet from the portal a body of ore 20 feet wide and about 30 feet long has been stoped to the surface. Beyond this point the fissure is narrow, and although several small bunches of ore have been stoped, there is nothing shown to indicate an ore-body of importance.

At the portal of the tunnel an incline shaft, said to have been 70 feet deep, was sunk, from which about

125 tons of ore were shipped, which assayed 25% to 30% copper. This shaft was inaccessible, on account of caving. The dump of this shaft, which was reported to contain very good values, failed to show any commercial values according to my sampling.

About 300 feet East of the shaft and 100 feet higher, a short tunnel has been driven along a dyke of diabase in the limestone. This contact is heavily mineralized with specularite, which shows some oxidized copper ores, and some specimens of which show free gold.

Sample No. 1 was taken from the breast of this tunnel over a width of 5.5 ft., and assayed .03 ounces in gold and 2.12% copper. One hundred feet further East, and about 50 feet higher on the opposite side of a ravine, is a similar deposit to the above, which has been opened by a short tunnel. The mineralization with specularite was much greater at this point, and a sample in the breast over a width of 2 ft. assayed a trace of gold and a trace of copper.

The principal workings on this claim are shown on Plate 1.

#### DOUBLE EAGLE CLAIM:

The Double Eagle Claim lies along the side line and to the North of the Eagle's Nest Claim and on the opposite side of the quartz diorite. This has been developed by a short tunnel close to the contact of the limestone and diorite, with a short drift on the contact. This drift was sampled for a length of 20 feet over an average width of 3.5 ft., and

assayed .03 ounces gold and 1% copper. The dump from this work, Sample No. 11, assayed .09 ounces gold and .94% copper. These workings are shown on Plate 2.

Some little work has been done on the Aloha and Utica Claims at points where the limestone has been mineralized with specularite, but there were no showings which justified the labor of sampling.

#### CARNATION GROUP.

This Group consists of six claims, with the principal workings known as the "Carnation Shaft," near the Southeast corner of the Omega Claim and the Walter's shaft and adits on the Alpha Claim. The Walter's shaft lies about 1200 feet Northeast of the Carnation shaft.

#### WALTER'S WORKINGS:

The Walter's workings consist of an adit at an elevation of about 1220 feet, which has been driven along fissures in the limestone and schist just below the basalt capping. All the ore found in these workings has been extracted and the richer portion shipped to smelters.

About 20 feet from the portal a winze has been sunk, and at a depth of 50 feet a station has been cut and about 25 feet of drifting done in a northwesterly direction. This level shows oxidized silicious copper ores in a very irregular body, apparently along the intersection of several

fissures in the limestone. Sample No. 12 was taken across 6 feet of ore at the breast of the drift, and assayed .08 ounces in gold and 1.30% copper. Sample No. 13 was taken across the back of the drift 10 feet from the breast across a width of 4.5 feet. It assayed .78 ounces gold and 3.62% copper.

Two samples were taken from the second-class dumps at the portal of the adit. The pile of ore probably contained in the neighborhood of 150 tons. Sample No. 14 was taken from that portion of the dump from the 50 foot level. It assayed .64 ounces gold and 2.36% copper. The other portion of the dump, Sample No. 15, assayed .10 ounces in gold and 1.08% copper.

At an elevation of about 1000 feet, or 220 feet below the above described workings, a tunnel has been driven in a southeasterly direction, which crosscuts the entire formation directly below the Walter's shaft workings. This tunnel has been connected by a raise to the Walter's shaft. About 450 feet of drifting and crosscutting has been done directly below the Walter's orebody without finding any indication of an important orebody, and nothing in any of these workings justified sampling. All of these workings are shown on Plate 3.

#### CARNATION SHAFT:

The collar of this shaft is located at an elevation of about 1000 feet. It is sunk in a southwesterly

direction at an angle of about 40 degrees, to a depth of 300 feet. There are no workings in this shaft below the 200 foot level. The shaft follows a shear zone in amphibolite schist, which shows a small amount of mineralization.

At the 200 foot level, a crosscut has been driven about 100 feet Southwest from the shaft, and another in a northeasterly direction, which is reported to have been over 200 feet long. Only about 20 feet of it is accessible, the balance having been used to store material broken in other workings to avoid hoisting by whim. This work is entirely in schist, and did not develop any ore.

Drifts have been run about 25 feet in a northwesterly direction, and 50 feet southeasterly from the station along a fissure in limestone. In the southeasterly drift, 30 feet from the station, a drift has been run about 15 feet along a contact between schist and limestone. This contact shows leached material containing a little oxidized copper minerals, and was reported to show 5 feet of solid copper ore, with 11 feet of leached material with bunches of copper ore. This 11 feet of material it was estimated could be sorted two tons into one, which would assay 8% copper and .35 ounces gold per ton.

Samples Nos. 21 and 22 were taken over a width of 5 feet above the contact, or from what is supposed to be the solid ore. No. 21 assayed .06 ounces gold and 1.48% copper; No. 22 assayed .30 ounces gold and 1.08% copper.

Samples Nos. 23, 24 and 25 were taken at intervals of 10 feet along the drift. No. 23 over a width of 5.3 feet assayed .05 ounces gold and .72% copper; No. 24 over a width of 5.5 feet assayed .28 ounces gold and 2.32% copper; No. 25 over a width of 5.6 feet assayed .18 ounces gold and .72% copper. These workings and assays are shown on Plate 4.

TREASURE HILL:

This name has been given to a spur lying between two deep ravines running southwest from a line joining the Walter's and Carnation shafts. It consists of a body of very much altered and fissured limestone, which dips to the Southwest. On the Northeast side, where a cross-section of the beds is exposed, oxidized copper minerals show for a length of about 100 feet and for a depth of 50 or 60 feet. This piece of ground is crossed by a number of Northeast Southwest fissures, along which the principal mineralization has taken place.

I took two samples across the beds-- No. 26 over a width of 7 feet. This assayed no gold and .54% copper. No. 27, taken across a width of 24 feet; it assayed .12 ounces in gold and .94% copper. Sample No. 28, which was a grab sample taken from a small pile of ore which had been sorted from a large amount of broken material, assayed .29 ounces gold and 4.16% copper.

A large amount of material has been broken down on this hill by shooting cracks, and in my opinion this

work has been persisted in until a good surface has been exposed.

A crosscut tunnel has been driven 320 feet into this hill, from a point 200 feet North Northeast from the Carnation shaft. This tunnel has penetrated far enough to crosscut the beds which are mineralized on the surface, and it shows no mineralization.

CONCLUSIONS:

In my opinion, the orebodies that have been found are small, superficial enrichments, which have been formed along fissures and joints in the rocks. The deeper workings, with the exception of the Carnation shaft, have failed to find any commercial ore under these surface showings, and I believe that the property is of no value except to work on a small scale by lessees.

Yours respectfully,

*W. W. English*

FINNEY AND COMPANY  
TITLE INSURANCE BUILDING  
LOS ANGELES

RECEIVED  
SEP 20 1915  
Ans'd 9/24

September 18, 1915.

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

My dear sir:-

We have just taken over the "Carnation" and Eagles Nest" Claims of the Arizona Empire Copper Mines Company, located in the Seneca Mining District, Yuma County, Arizona, otherwise known as Empire Flats.

I want to discuss with you the matter of co-operation with us in the operations of these properties which I know can be done to mutual advantage and profit.

The Property. Consists of 16 claims approximating 300 acres favorably located for economic operations.

Development. About 3000', a large portion of which is in ore. The work consists of shafts, tunnels and drifts.

Ore Reserves. The ore is not technically blocked out, but it is partially blocked and with a little work can be put technically "in sight".

Partially blocked.

Carnation Shaft.	15,000 tons.	
Eagles Nest	5,600 "	20,600 tons.

Reasonably assured.

Carnation Shaft	50,000 "	
Eagles Nest	50,000 "	100,000 "

Probable ore.

Eagles Nest.	200,000 "	200,000 "
--------------	-----------	-----------

Possible ore.

Carnation Shaft	1,730,770	
Eagles Nest	1,000,000 "	2,730,770 "
TOTAL - - - - -		<u>3,050,770 "</u>

Ore Value.

The ore which is represented as partially blocked has an estimated value of \$109,000.

GMC 2.

Development proposed. The preliminary work contemplates some 400' of drifting on the ore partially blocked.

It is estimated that this work will put "in sight" 55,000 tons of ore with a net value of \$251,000. Net values will increase as development progresses.

Character of ore.

Carnation Shaft.

au	cu	SiO <sub>2</sub>	Fe
\$5.00	8%	75%	7%

*CaO*

Eagles Nest

\$7.00	12%	28%	27%
--------	-----	-----	-----

*10.*

The Carnation will supply you with the silica for your Swansea ore and while the Eagles Nest shows now about neutral it is expected that later it will show an iron excess.

Financial. We shall require \$50,000 with which to put the properties on a shipping basis. With this money we will be able within four to six months to begin shipments of the grades of ore mentioned at the rate of 60 tons per day. This will be gradually increased as development progresses.

We will want \$25,000 at first. This money is to be used to provide some machinery and to do the development work outlined hereinbefore. As stated this work will put in sight \$251,000 net value.

When this has been accomplished we will want the additional \$25,000 with which to complete the facilities for economic handling including transportation, bins at the mines and at Parker etc.

My suggestion is that the Consolidated Arizona Smelting Company advance us this money on a loan in two installments as above indicated.

There would appear to be ample ore available to secure the loan. I would also discuss with you some additional security. With the expenditure of the first \$25,000 there would be abundant security.

As a consideration for the loan we would make a long time contract with you for the smelting of the ores.

We would propose to repay the loan out of the shipments of ore by applying some percentage of the net smelter returns, to be arranged.

I assume that the terms of an ore contract can be agreed on but as a suggestion I think a tonnage of ore of the character which we can supply you can afford to handle it on the basis of cost of smelting, freight and refining plus a profit of \$1.00 per ton.

General. There is every reason to expect that there is a chance here for a combination which will insure you a tonnage of ore within a reasonably short time which can be relied upon which will effect a reduction in your costs and give uniformity to your operations. This might put you in a position to reach out for

GMC 3.

for other custom ores and ultimately enable you to make a large operation of that Plant.

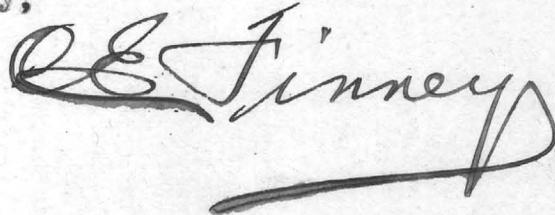
It is because of these things that I take the liberty of making this suggestion of a loan and a contract to smelt the ores.

The suggestions here are tentative and may be modified to meet necessities. After you have digested the matter I wish you would telegraph me advising whether or not you are impressed with the feasibility of the proposition and whether or not such a proposition would be entertained by your Company.

Should there be no chance of doing anything with your Company I want to proceed with other plans which I had already started. We do not want to lose any more time than we must.

Awaiting your pleasure, I am

Sincerely,

A handwritten signature in dark ink, appearing to read "O. E. Finney". The signature is written in a cursive style with a long, sweeping underline.

gef/f.

ARIZONA EMPIRE MINES

Memorandum of probable profits during development period.

Copper at 18¢ New York.

CARNATION--Available for shipment in 30 days; at rate of 30 tons per day.

Copper 8 % Gold \$7.00

Copper, 160#, less 16#--144# at 16¢ net	\$23.10
Gold	7.00
	<u>\$30.10</u>

COSTS

Mining	\$2.00	
Sorting	1.00	
Hauling	3.00	
Freight	3.60	
Smelting	<u>5.50</u>	<u>15.10</u>

PROFIT	\$15.00
<i>Royalty</i>	<u>3.15</u>
<i>Net Profit</i>	<u>11.85</u>

EAGLE'S NEST DUMP -- 300 tons, available in 30 days:

Copper 7.7% Gold 0.80 Fe 27.1% SiO2 28.8% CaO 10.5%

Copper 154# less 15# --139# @ 16¢	\$22.20
Gold	.80
Iron	1.35
Lime	<u>.52</u>
	\$24.87

COSTS

Hauling	3.00	
Loading	1.00	
Freight	3.60	
Smelting	<u>4.50</u>	<u>12.10</u>

PROFIT	\$ 12.77
<i>Royalty</i>	<u>2.57</u>
<i>Net Profit</i>	<u>\$ 10.20</u>

ARIZONA EMPIRE MINES

EAGLE'S NEST ORES --Available at rate of 30 tons per day within ninety days:

Copper 10%      Gold \$7.00

Copper 200#	less 20#	190#	@ 16¢	\$30.40
Gold				<u>7.00</u>
				\$37.40

COSTS

Mining	\$2.00	
Sorting	1.00	
Hauling	3.00	
Freight	4.20	
Smelting	<u>5.50</u>	<u>15.70</u>

PROFIT	\$ 21.70
<i>Royalty</i>	<u>4.15</u>
<i>net Profit</i>	<u>\$ 17.55</u>

COFD2W1TH BBO2  
EONIBWENL BOND

CERTIFICATE OF ASSAY FROM LABORATORY OF

A T K I N & M c C L U R E

ASSAYERS, CHEMISTS & METALLURGISTS

616 South Olive Streets

Los Angeles, Cal., 9/18/15.

Mr. O. A. Knox

Office Number	Owner's Mark	Ounces Gold	Copper Per Cent	Iron	Silica	Lime
9274	#1 5' Section Carnation	0.38	5.0			
9275	"2 11' " "	0.04	0.8			
9276	"3 4' Breast of Drift C	0.02	4.5			
9277	"4 1st Class Ore O.Dump	0.02	5.5	6.9		75.0
9278	"5 General Sample 50'level Walters	0.32	5.0	10.3		75.6
9279	"6 2nd Class Walters	0.30	5.1			
9280	"7 Grab Broken Ore T.H.	0.06	4.8	7.7		66.0
9280	"8 Grab Sorted Ore T.H.	0.38	9.2			
9281	"9 Grab Dump Eagle	0.04	7.7	27.1		28.8 10.5
9282	"10 Sorted Ore Eagle	0.58	30.1			

Charges \$28.00

(Sgd.) Atkin & McRae, Assayers

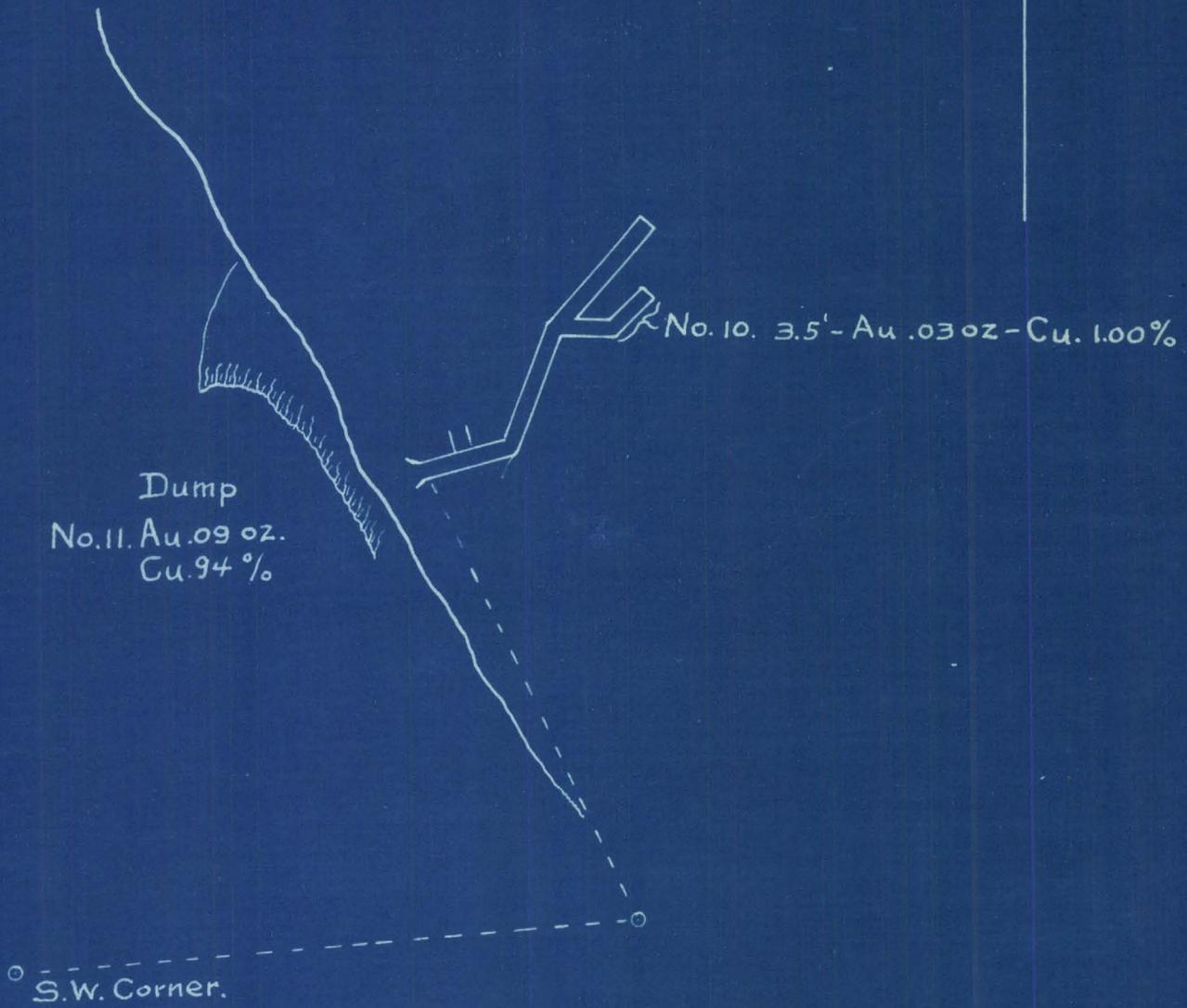
EMPIRE ARIZONA

Note by G. M. Colvocoresses, October, 1937.

The findings of English correspond clearly to those of R. T. Walker. I personally examined this mine on two occasions and fully agree with English and believe that there is little chance of ever developing any large body of pay ore in spite of enthusiastic statements by Finney, Brooks, <sup>King</sup> Royer, and others.

From time to time considerable additional development was done on the mine and a certain tonnage of high grade ore was mined by lessess mostly from very near the surface, but I believe that the general situation and future prospects are still much the same as when English made his report.

Empire Arizona



Double Eagle Tunnel  
Scale 50' = 1"

# Empire Arizona

N.



Tunnel 320' - No Ore.

## Dump Samples - Au. oz - Cu %

No. 16	.04	0.98
17	.03	1.94
18	.33	1.06
19	.05	1.70
20	.44	2.90

El. 1000'

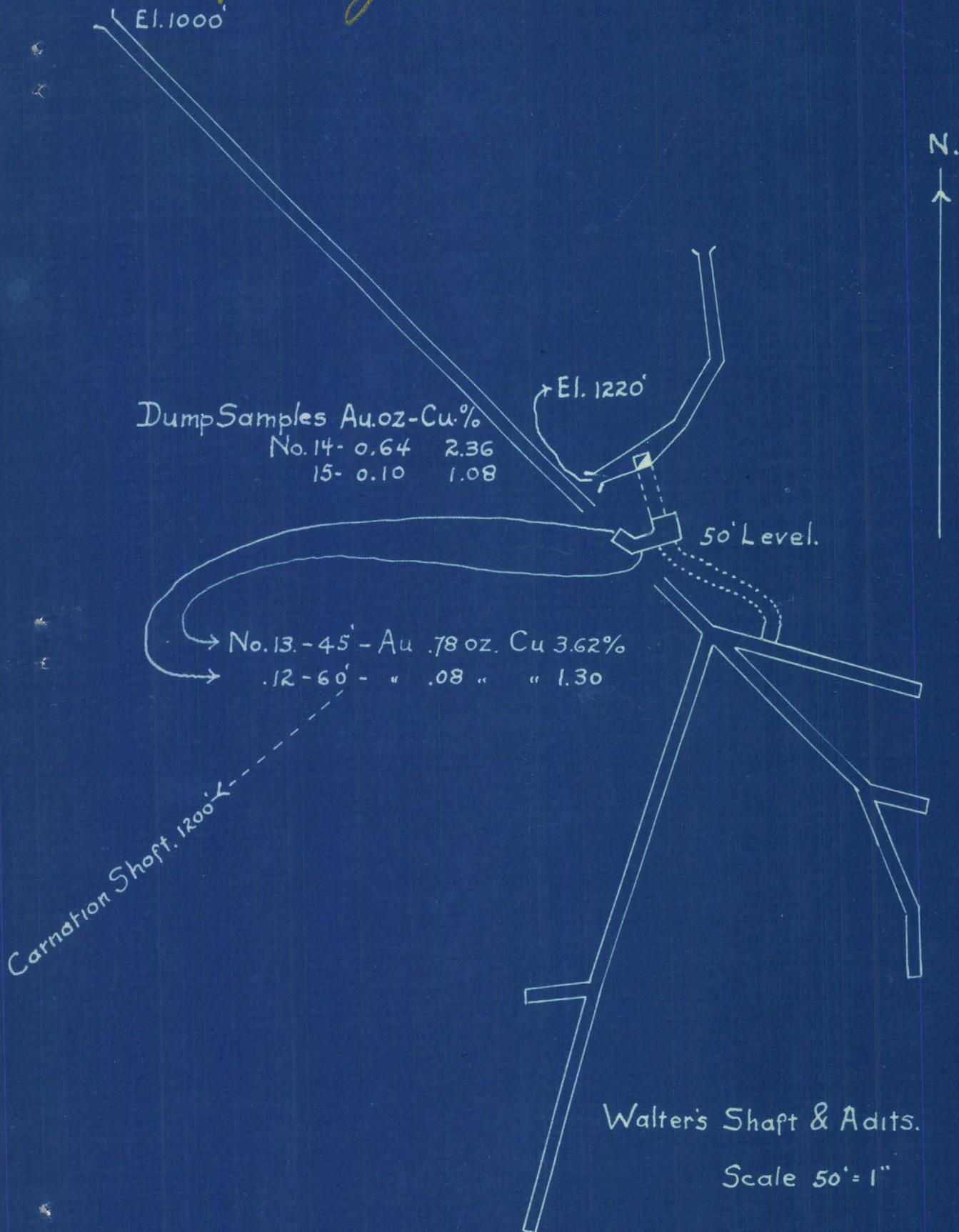
Walters Shaft.

No 23 - 5.3'	Au .05 oz.	Cu. 0.72%
24 - 5.5	" .28 "	" 2.32
25 - 5.6	" .18 "	" 0.72
22 - 5.0	" .30 "	" 1.08
21 - 5.0	" .06 "	" 1.48

Carnation Shaft.

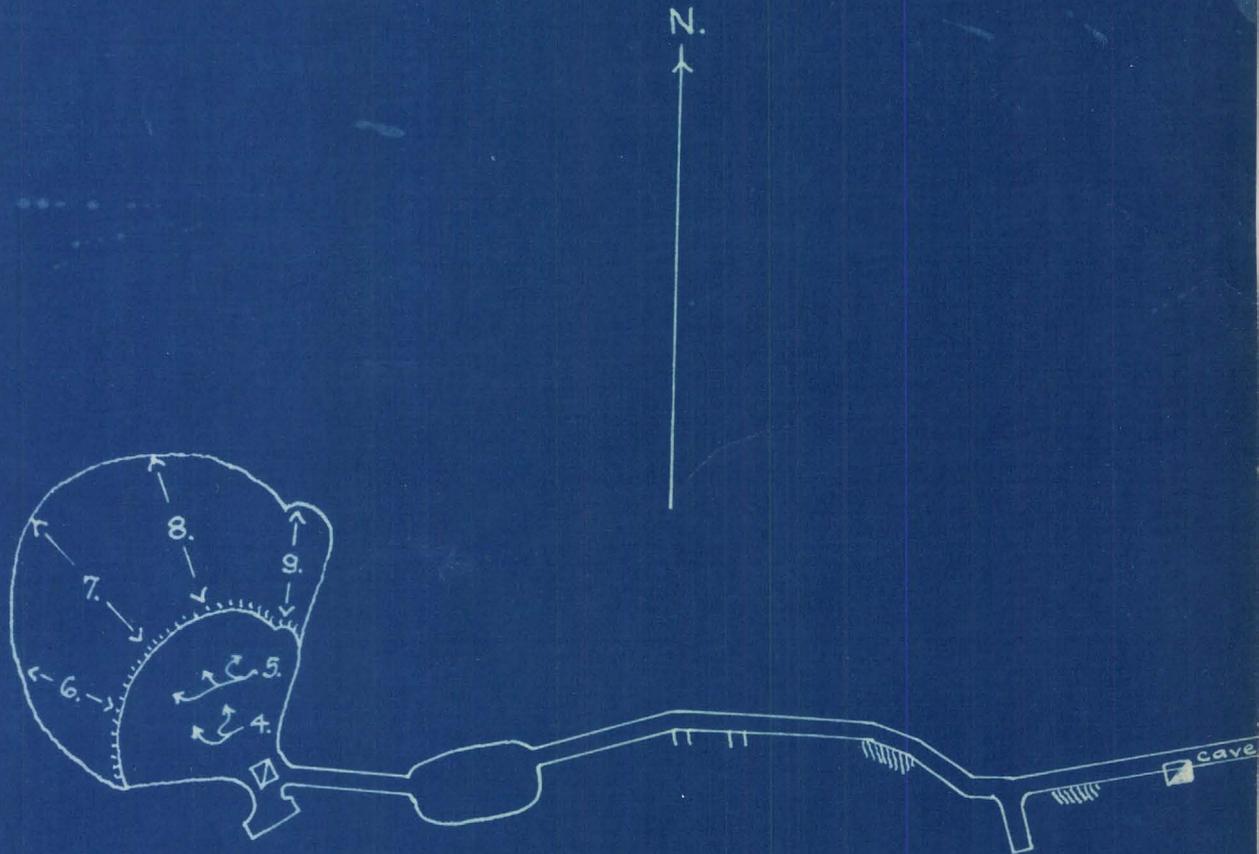
Scale 50' = 1"

# Empire Arizona



# Empire Arizona

Eagles Nest Shaft & Adit.  
Scale 50' = 1"



No. 1	- 5.5'	Au. .03 oz.	Cu. 2.12%	Upper Tunnel.
2	-	" .06 "	" 0.84	" " Dump.
3	- 2.0'	" .Tr "	" .Tr.	" " No. 3.
4	-	" .14 "	" 4.22	Shaft Dump.
5	-	" .02 "	" 1.66	" "
6	-	" .07 "	" 2.70	" "
7	-	" .03 "	" 1.84	" "
8	-	" .Tr "	" 1.30	" "
9	-	" .02 "	" .Tr.	" "

1016 West Ninth Street.

May 24, 1921.

Mr. F. S. Norcross, Jr.,  
C/o Mr. Thomas H. Leggett,  
149 Broadway,  
New York, N. Y.

My dear Norcross:

I have not as yet had time to fully digest and prepare, in a satisfactory technical form, all results of our test work done at Humboldt on the Empire-Arizona ore; however, I have gone rather thoroughly into the test run with calcium chloride, of which a copy of the preliminary data was supplied to you at the time of your visit. The data has been corrected and recalculated along the following lines, the final result of which I trust sincerely will meet with your approval, and will answer the question brought up in your letter of May 11th, regarding the "unaccountable gold" of 40 per cent, which you mentioned as being shown by that report.

In the beginning, it should be stated that the preliminary report as prepared down at the works was more in the nature of a summary of data for our own consideration, and should not be considered as a finished piece of technical work. The use of the term "unaccounted for" is certainly a loose expression, and although its meaning was perfectly clear to us, simply indicating a difference, it is readily understood how a misinterpretation of the facts could be readily secured by an outside engineer merely studying over this data in the very limited and urgent conditions under which you were preparing your report. The "unaccounted for" is difference and merely indicates that it is unaccounted for in the preceding list of figures. The preceding list of figures did not take into consideration all correction factors, as would a finished report, and as we expected to do, but during the period of testing work had lacked sufficient time to devote to the discussion and calculation end.

May 24, 1921.

The most striking consideration to be borne in mind is the fact that the fume collected and reported as 115 pounds represents only the material collected for about two-thirds of the run, the treater, due to a broken high tension shaking system as stated on page 1 of that report, being out of commission for some five hours.

It so happened that the general head sample of ore, stated at the beginning of this report, is the average for the entire carload lot, and although this data has been applicable practically without correction to our previous tests, it failed to meet the conditions existing for this run, and the reason for the latter is as follows:

On receipt of the carload of ore, the entire carload was passed through the sample mill crusher, and rolls and sampled. Approximately one-half of this carload lot was then passed through the plant and over the screen until about 90 to 95 per cent of it passed a 15-mesh screen. The remaining half of the carload, which had been through the mill once, was placed in a separate bin in the sample mill, while the half carload which had been passed through the 15-mesh was taken to a point near the volatilization test plant and supplied the materials for the test runs, up to this test run, No. 53. Ore for test run No. 53 was secured by merely screening a portion of the ore remaining in the bin at the sample mill. Approximately 50 per cent of this material passed a 15-mesh screen and the reject from such screening operations was stored in another bin, and is there at the present time. It appears from the analysis made by Scott on the head samples of this run, that the copper minerals present in this ore are softer in nature than the gold-bearing rock, and this is apparent also from the appearance of the ore, the copper being present largely in the form of a carbonate with a little chrysocolla, while the gold apparently is locked up in the quartz constituent. The analysis by Scott on the head sample which contained approximately 10 per cent calcium chloride, was as follows:

.09 ounces gold per ton  
2.81 % copper

Correcting for the presence of the calcium chloride, the original ore feed runs:

0.099 ounces gold per ton  
3.09% copper " "

Mr. F. S. Norcross, Jr., #3.

May 24, 1921.

You will note that the general carload sample analyzed:

.11 ounces gold per ton  
2.74% copper " "

The difference is sufficient to modify very greatly the results as given in the latter portion of that preliminary report.

As stated previously in this letter, and as well on the first page of that report, the Cottrell collecting device was out of operation for a number of hours. The data on this operation is as follows:

The length of the test run; that is, the period through which ore was being fed to the kiln, was 12.3 hours, the test beginning at 10:00 o'clock in the morning and finishing at 10:18 P.M. After one hour's operation, the treater was bypassed and shaken down. During this operation the weight on the high tension became loosened and fell in such a position as to make a short between the high tension and grounded members of the precipitator. Because of the fact that the entire staff of four people were completely tied up in the grinding of the calcium chloride, the mixing of this with the ore, the feeding, and the attention of the furnace, it was impossible to give immediate consideration to the Cottrell. However, the gases were allowed to continue to pass through the treater, but without the current being admitted thereto, and thus acted as a settler until 2:00 P.M. At this time the treater was bypassed again, and remained so bypassed until 3:05, at which time the short had been removed from the treater, and it was again available for operation, and from that time on until the close of the test, the treater was in satisfactory operation. Summing up the operation of the treater, it may be stated that a fume discharge existed from the kiln for 12.3 hours; that during that time the treater was settling dust for 11.2 hours, and that for 8.3 hours of that time it was in active operation with a high potential current discharge prevailing, disregarding time out for cleaning down - a special consideration for this particular test plant.

The material caught in a treater may always be divided into two factions: that which is due to the settling operation of the treater and which would be caught with the juice off, and that portion which represents the

fume which was secured by the use of the electrical discharge and which would have passed to the atmosphere without the apparatus. A sample of the fume from the top of the collected material in the Cottrell hopper was taken previous to the complete cleaning out of the hopper, and the average sample secured from the latter. Such top sample represented the normal material caught by the Cottrell and shaken from pipes after completion test. That sample showed a value of 1.56 ounces in gold and a copper value of 39.88 per cent, while the average sample for the entire collection in the hopper averaged 1.44 ounces gold per ton and 35.18 per cent copper. With these two analyses, and the analyses of the settled fume in that section of the dust chamber just preceding the Cottrell, we are enabled to calculate approximately the proportion of settled dust and fume existing in the sample so collected, and to estimate the total collection which would have been procured had the treater been in continuous operation throughout the length of the run. In the end of the large settling chamber, just preceding the Cottrell, the settled material analyzed:

.23 ounces gold per ton  
7.91 per cent copper

To arrive at a reasonable figure for the fume collection for the entire run, we may use either the gold or copper data, or we may calculate it by both, using one as a check against the other. We will proceed to calculate it from both the gold and copper content.

(Note: all calculations by 10-inch slide rule).

Let  $x$  = pounds of fume of 1.56 ounces Au per ton in collected product.

Let  $y$  = pounds of dust of .23 ounces in collected dust.

Then, since the collected Cottrell product weighed 115 pounds and carried 1.44 ounces of gold, the two following equations may be set up:

May 24, 1921.

$$\begin{array}{rcl} 1.56x + 0.23 y & = & 1.44 \times 115 \\ x + y & = & 115 \end{array}$$

Converting to a solvable form we have:

$$\begin{array}{rcl} 1.56 x + 0.23 y & = & 165.6 \\ \underline{1.56 x + 1.56 y} & = & \underline{179.4} \end{array}$$

$$\begin{array}{rcl} 1.33 y & = & 13.8 \\ y & = & 10.35 \text{ pounds dust collected in} \\ & & \text{11.2 hours} \\ x & = & 104.65 \text{ pounds fume collected in} \\ & & \text{8.8 hours} \end{array}$$

Then the total dust collected would be:

$$\frac{10.35}{11.2} \times 12.3 = 11.4 \text{ total dust for 12.3 hours}$$

and the total fume collected would be:

$$\frac{104.65}{8.8} \times 12.3 = \underline{155.2} \text{ total fume collected for 12.3 hours}$$

166.6 total dust and fume which would have been caught by treater, full operation 12.3 hours.

and

$$\frac{11.4}{2000} \times .23 = 0.0013$$

$$\frac{155.2}{2000} \times 1.56 = \underline{0.1210}$$

0.1225 ozs. Au in 166.6 lbs.  
above fume and dust = 1.47 ozs. per ton.

$$166.6 \text{ pounds at } 1.47 \text{ ounces per ton} = .1225 \text{ ounces}$$

which represents the amount of gold which one should introduce into a metallurgical balance statement as the reasonable collection of the Cottrell when in full operation for the full period of the test.

Mr. S. Norcross, Jr., - #6.

May 24, 1921.

A similar calculation for the copper follows:

Let  $x$  = pounds of fume of 39.88% in the collected product

and

Let  $y$  = the settled dust present of 7.91% copper

then

$$39.88\% x + 7.91\% y = 35.18\% x \quad 115$$

$$x + y = 115$$

$$39.88\% x + 7.91\% y = 40.46$$

$$\underline{39.88\% x + 39.88\% y = 45.86}$$

$$31.97\% y = 5.4$$

whence

$$y = 16.9 \text{ pounds}$$

$$x = 98.1 \text{ pounds}$$

then for the full period of operation we would have:

$$\frac{16.9}{11.2} \times 12.3 = 18.7, \text{ total dust 12.3 hours}$$

$$\frac{98.1}{8.3} \times 12.3 = \underline{145.2} \text{ pounds fume 12.3 hours' run}$$

Total, 163.9 pounds, total dust and fume which would have been caught by treater, full operation 12.3 hours

and

$$18.7 \times 7.91\% = 1.48$$

$$145.2 \times 39.88\% = 57.90$$

59.38 lbs. Cu in 163.9 pounds.

163.9 lbs.  $\times$  36.23% = 59.38 lbs. copper as the expected catch in precipitator for this run of 12.3 hours continuous operation.

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Comparing the calculated final weight of Cottrell product from both the gold and copper, it is seen that there is a substantial agreement. By the gold, an expected weight of approximately 167 pounds, and by the copper calculation an expected weight of 164 pounds. It will be noted that the proportion of dust by the copper calculation is considerably higher than that by the gold, but this is to be expected, as the settlement of the enriched copper dust is probably considerably more marked than that of the gold fume dust. As is well known, the gold chloride, although stable at the existing temperatures, in the kiln at the point where it is formed and volatilized, is unstable at lower temperatures and dissociates into metallic gold and chlorine at the temperatures existing in the collection apparatus. This final subdivision of the gold fume is expressed in a proportionately leaner gold product in the settled material in the flue chamber adjacent to the Cottrell over that encountered with the copper.

In order to effect an approximate balance sheet, it is now necessary to calculate the reasonable input of copper and gold into the kiln.

In the ore feed charge given in the preliminary write-up, no correction was introduced for a fraction of the feed which hung up in the feed end housing and was recovered and gave difficulty in the next succeeding run. As mentioned in the report, the ore contained some moisture and the calcium chloride, which is hygroscopic in nature, also increased somewhat the difficulty of satisfactory feeding through our disc type of feeder. The weight of the material so collected in the hopper under feeder amounted to 325 pounds of approximately 12.5 per cent calcium chloride content. There is, therefore, to be deducted from the feed reported of 4600 pounds, 284 pounds which remained in the hopper, or with this correction an assumed ore feed of 4316 pounds.

This run was subject to an unfortunate encounter with a sudden Arizona snow, rain and wind storm, and after the ore had been assembled on the charge floor, it was necessary to remove it most hurriedly from that station to beneath cover and alongside of the kiln. As a matter of fact, the ore which had been weighed out 100 pounds to a sack, did collect some moisture and portions of it were dried beneath the kiln, or spread out and exposed to the atmosphere preceding the run. In handling sacks of ore from the charge floor to the ground and back by a chute and rope, a dozen, more or less, were torn, ripped, or spilled and some ore lost. The charge floor, where some of the ore

Mr. W. S. Norcross, Jr. - #8.

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had been spread out to dry showed, at the close of the run, a considerable collection of ore. All told, at least 100 pounds of ore weighed out was scattered around and lost during the various movements about of this ore, the drying operation, and the loss incident to the feeding and drying of the kiln floor. The figure of 100 pounds for this loss is really lower than actually existed, for I can figure back from Scott's data on ignition loss, total weights in and out, and the error (about 1.3%) that exists in the calcine scale weighings, when the feed scale weighings are assumed correct, or vice versa, and derive a figure more than 50 per cent higher for the material lost during the preparation and feeding of the ore.

You will recollect, of course, that such loss is abnormally high on this run, due to the fact that a storm intervened and caused a greatly increased amount of labor in handling the material. However, taking, as indicated above, the figure of 284 pounds of ore left in the hopper feeder and of 100 as lost in the ore handling, and the analytical figures for the feed as determined by Scott, we arrived at a gold and copper input as follows:

$$\frac{4216}{2000} \times .09 \times \frac{110}{100} = .2087 \text{ ounces Au in ore fed to kiln.}$$

And

$$4216 \times 2.81\% \times \frac{110}{100} = 130.3 \text{ pounds copper, fed to kiln.}$$

The gold content in the furnace products, as given in the report handed you, but exclusive of the fume and the "unaccounted for", is as follows:

Calcines 2115 pounds x 0.0045 ounces	
per ton.	= 0.0046
#1 HFD 950 pounds at .085,	= 0.0405
#2 HFD 280 pounds at .11	= 0.0154
Wire hung Dust Chamber .37 pounds	
.23 ounces,	= 0.0043
Kiln burden 698 pounds at .01	= <u>.0035</u>
Total, (amt. carried forward) -	.0683

May 24, 1921.

Amount brought forward,		.0683
Calculated fume collection full test run (omitting periods of bypassing for shaking-down operation) (See page 5),	=	<u>0.1225</u>
Total,		.1908 ounces gold.
As our feed contained -----	.2087 ounces	
And our above unaccounted for products contained, -----	<u>.1908 ounces</u>	
The difference existing and unaccounted for as yet, is,	.0179 ounces,	or 8.6% of the original feed in gold is unac- counted for by the above cal- culation.

As a matter of fact, the treater is normally bypassed during shaking-down operations and for that particular fume we found it desirable to shake down once per hour. The increasing loss through treater, however, if only shaken down at longer intervals, (say 2 to 4 or 5 hours), about equals within reasonable limitations, and for  $\text{CaCl}_2$  and not  $\text{NaCl}$  as volatilizing agents, the loss experienced from the hourly bypassing of gases and fume. The cleaning operation requires a period of about 3 minutes, during which interval the treater is bypassed and the entire fume discharge goes to the atmosphere. If we make a correction for the time during which the treater is bypassed; that is, three minutes out of each hour, or 5 per cent of the time, and increase the calculated fume catch by the ratio:

$$.1225 : x :: 57 : 60$$

or,

$$x = 0.129$$

our unaccountable loss drops to about 5.4%.

Our stack filtrations did not provide samples sufficiently large to enable gold assays to be conducted thereon, but the copper loss determination on run No. 56, a second test with  $\text{CaCl}_2$  as volatilizing agent, indicated a rate of copper loss during normal operation between cleaning (shaking down) periods, of around 6 to 7%.

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For the copper, the calculation works out as follows: the copper in the products of the volatilization operation, excepting the fume, being as shown in the preliminary report:

				lbs. copper
Calcines,	2115 lbs. at	.177 =		3.744
#1 header FD	952 " "	3.98 =		37.890
#2 header FD	280 " "	3.89 =		10.892
Wire hung dust chamber,	37 " "	9.04 =		3.344
Kiln burden	698 " "	0.32 =		<u>2.234</u>

58.104

Calculated fume collection 12.3 hours' operation (omitting periods of bypassing for shaking-down operation)

= 59.38

Total,

117.48 lbs.

As our feed contained  
(See page 8)

130.3 lbs. copper

And our above accounted-for products,

= 117.48 " "

The difference existing and unaccounted for as yet, is,

12.82 pounds,

or,

Approximately 10% of the original feed in copper is unaccounted for by the above calculation;

and providing for a 5-minute out of every 60-minute operation for a shaking-down period, our calculated copper caught in the precipitator is in the ratio of:

$$59.38 : x :: 57 : 60$$

or,

$$x = .62.5$$

On this basis 120.6 pounds out of our 130.3 pounds feed is cared for by the figures, while 9.7 pounds, or 7.5% is not.

Mr. F. S. Norcross, Jr., - #11.

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As a matter of fact, the mean of four filtrations made on the stack gases in test run No. 56, a second test with  $\text{CaCl}_2$  as volatilizing agent showed an average hourly loss through stack of 0.9 pounds copper for conditions of normal operation between cleaning periods (shaking down), equivalent to 6.95 per cent of copper in feed.

As your report has been turned in, I realize perfectly well that this letter cannot influence, in any particular, that side of the matter. However, I was anxious to present this side of the discussion to you, thinking very possibly that you undoubtedly will be called in for further discussion and your good judgment and advice desired and secured in connection with the ultimate financing of the Western Metallurgical Company.

Although we discussed the general attitude of the Western Metallurgical Company towards the Pacific Mines, it seems very possible that in the limited time you had for preparing your report, that this phase of the matter may have been omitted from your considerations. As a matter of fact, it would not really apply to an engineer's examination, while it does apply very distinctly to the financial arrangement. The Western Metallurgical Company hopes to secure a number of mines and properties for exploitation, financing, development or operation in any one or all of these particulars, and the great stumbling block they have always encountered is that we have had no successful plant in commercial operation. Although the returns from this plant will not be on the bonanza order, it certainly ought to be a reasonably profitable enterprise, and with it, as Exhibit A, the further financing of the corporation should be satisfactorily accomplished. The financial arrangement proposed with the parties in the East, for whom you prepared your report, is, if I am not very greatly mistaken, on the basis of capital which is covered by preferred stock plus common stock, which represents the promotion and further possibilities and profits of the Western Metallurgical Company. When so viewed, the profits arising only from the operation of the Pacific Mines, are possibly of only limited attractiveness as compared to that offered by the holding of a considerable percentage of the common stock.

I am afraid I have wearied you with all the many and miscellaneous data, corrections and calculations, but

Mr. F. S. Norcross, Jr., - #12.

May 24, 1921.

knowing your ability to assimilate promptly and utilize with a most fair and discriminating judgment the data supplied you, and as a matter of fact as well to fulfill my own desire for figuring and satisfaction of proper presentation, I have rather more elaborated this single test and burdened you with my figuring, than would usually be the case.

This letter I realize will follow you to Nicaragua, where I sincerely trust the weather and job are both meeting with your most favorable approval.

If, in the course of the next few months, you will find a few minutes of unoccupied time, I would be greatly pleased to receive a line or two.

As ever,

Very sincerely yours,

Harry V. Welch

HW G

EMPIRE-ARIZONA  
COPPER COMPANY  
TITLE INSURANCE BUILDING  
LOS ANGELES

March 20, 1916.

Mr. G. M. Colvocoresses,  
Humboldt Arizona.

Dear Sir:-

I am just in receipt of your favor of the 17th.

We would be very glad to have you personally visit our property. The average Engineers are too much afraid they will find something. They do not take as broad a view of things as you would.

We started a drift at the 100' level in the Carnation shaft. A 12 ton sample showed cu 6 $\frac{3}{4}$ % and the gold will run pretty high although Knox could not make gold assays at the time. He says a good guess would be from \$8.00 to \$10.00 per ton. With a little sorting this ore will ship at about 8% cu.

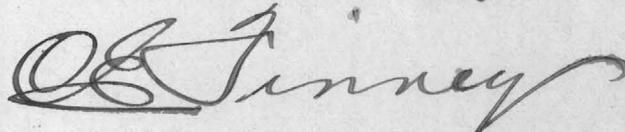
A large sample taken from the quarry face on Treasurer Hill showed 5.8% cu. This will sort to a higher grade.

On our Grey Eagle Claim we have opened a small bed 3' wide by 30' long which runs 15% cu. We do not expect this claim to open up a big depossis but the values are fine.

I am sorry that you are not in a position to form an alliance with us and get all of this ore for I believe that this property would prove a valuable asset for you in the future. I realize your present situation and am only sorry that you cannot get your Blast Furnace up promptly.

I regret that you did not have time to run in when you were here.

Sincerely,



EMPIRE-ARIZONA COPPER CO.

Assays made to March 21st, 1916.

		Cu.	Ins.	Fe.
1.				
1.	Grab sample sorted ore Treasure Hill 2/25	3.4	63.5	
2.	Grab sample " " " " 2/26	4.85	63.0	
3.	Grab sample " " " " 2/27	4.1	65.1	
4.	Pile of ore North end Walters Dump 3/8	4.2	67.8	
5.	Grab from broken ore 100 level, Carnation 3/8	3.9		
6.	Ore on side of hill Walters	3.3		
7.	Undersize of 1" screen 200 level Carnation 3/15	1.4		
8.	Ore found in bin Gray Eagle	2.4	39.2	10.5
9.	Old Second class dump Gray Eagle	1.8	42.4	9.4
10.	Grab from broken ore 100 level Carnation 3/13	3.6	66.5	
11.	Grab from 50 sax from 100 level Carnation 3/13	7.0	67.6	
12.	Grab from 84 sax 100 level Carnation 3/13	6.8	66.4	
13.	Grab from 33 sax 100 level m Carnation 3/13	8.8	57.5	
14.	Grab from 50 sax Walters dump 3/14	5.9	67.5	
15.	Grab broken ore Carnation 100 level 3/15	3.2	77.2	
16.	Grab broken ore 100 level Carnation 3/16	3.5	75.5	
17.	Undersize 1" screen 200 level Carnation	2.6	77.2	
18.	Grab from 52 sax Walters dump 3/15	4.5	65.2	
19.	Undersize 1" screen Carnation 3/17	1.7	76.9	
20.	Grab from 50 sax 200 level Carnation 3/17	4.7	70.1	
22.	Grab from 50 sax Walters dump 3/17	8.3	56.1	
23A.	Grab from 30 xas Walters dump 3/18	5.8	59.0	
23B.	Grab from 30 sax Carnation 200 3/18	6.7	69.3	
24.	Grab from 30 sax Carnation 3/19	5.8	76.0	
25.	Grab 30 sax Carnation Lot #2 3/19	8.5	67.5	
26.	Grab from 30 xas			

Assays Sheet #2.

26.	Grab from 30 sax Walters dump	3/19	9.6	60.5
27.	Grab from screenings Walters dump	3/19	5.7	59.5
28.	Black (Prospector's Sample)			
29.	Grab from 30 sax Walters dump	3/20	7.1	
30.	Undersize 1" screen Walters dump	3/20	4.9	
31.	Copper ore face of Gray Eagle Tunnel	3/19	9.8	
32.	Iron ore            Do            Do		Trace	
33.	Grab from 41 sax Walters dump	3/19	6.0	
34.	Undersize 1" screen Carnation	3/19	2.8	

Copied

Name - Arizona Empire Consolidated Copper Co.  
Location - 11 Miles over good road north of Parker, Arizona.  
Claims - 49  
Owners - Company of above name C.W. Moses & C.L. Moses of Los Angeles are interested but Frank Royer at present negotiation for development of property and installation of some method of treatment for the ores.

Elevation - 700' above Colorado River and 2 miles east of Empire landing.

History - Operated in a desultory way for many years. Present company took over property in 1916 and expended about \$100,000 on road, camp and mining equipment and during 1916, 1917 and 1918 produced fifty cars of ore carrying 7 to 10% Copper and \$5.00 to \$20. in gold.

Development work consisted of sinking the Eagle Nest shaft 600' balance of work confined to gauging and sorting higher grade ores from old workings.

The decline in copper market forced the company to suspend operations in 1918 and since that time a watchman has been maintained.

Geology - The rocks of the district originally consisted of an underlying gneiss later covered with lime and capped by several volcanic flows. This area was intruded by quartz porphyry and other intrusives, the identity of which has been destroyed. The whole mass subjected to considerable metamorphism and distortion resulting in blocks and beds of lime between schistose intrusive rocks. Considerable faulting is evident as well as intense shearing and silicification of certain portions of the lime.

Mineralization in some cases as shown in the Carnation shaft, Walters shaft and Leo claim and Treasure Hill consist of silicified mineralized lime at or close to the contact with a sericitized schist. Primary minerals chalcopryrite altered to glance, and copper carbonate.

These ores are highly siliceous and the sorted ores carried 6 to 10% copper and \$5.00 to \$20.00 in gold.

The Eagle's Nest shaft is sunk on a lime monzonite contact wherein the lime has been heavily mineralized at contact with pyrite and specularite carrying some copper. Development on lower levels of this 600' shaft was not carried far enough to determine influence of water level.

An average of mine samples and shipments from the various workings during period of operation is as follows:

CARNATION SHAFT

	Cu	Gold
Shipping Ore	6.9%	.5 oz.
Car & Mine Samples	3.0%	.24 "
Face Samples	2.2%	.20 "

EAGLE NEST

Shipping Ore	10%	.12 oz.
Car & Mine Samples	3%	.02 "

WALTERS SHAFT

Shipping Ore	7%	.22 oz.
Car & Mine Samples	2.5%	.19 "

TREASURE HILL

Shipping Ore	6.4%	.28 oz.
Car and Mine	3.0%	.12 oz.

Personal Samples:

1 Carnation Rejects	.48%	T
2 " Fines	1.49%	T
3 Treasure Hill Grab	1.74%	T

Conclusions - Eagles Nest area has no ore developed at present time.

Carnation shaft is down to 300' level but inaccessible below 200. On 200 foot level there is an ore body 15 by 150 ft. partly developed and partly stoped. This ore is striking along the contact directly towards the Walters shaft and there are indications that this ore may be more or less continuous for 2000 ft. and it might be possible to develop a considerable tonnage of ore by driving north from the present face and on through the Walters shaft area towards the Leo claim. This work could be expected to develop a tonnage of 2.5% Copper ore carrying \$2. to \$4. in gold that would justify some means of treatment provided the ore could be treated on the ground.

At the present time there is insufficient ore developed on the property to justify the erection of a plant for treatment of same.

## EMPIRE-ARIZONA

DISTRICT: Parker, Arizona, side of Colorado River.  
LOCATION: About 12-3/4 miles North Parker  
OWNERS & OPERATORS: Empire-Arizona C. M. Co. Milton Sutherland, Superintendent in charge. Clyde Baldwin, Asst. (Latter appears as "Manager" in advertisements). Producing.  
DATE VISITED: 1916 - November 10th.

### NOTES:

Last two carloads to Humboldt came from Gray Eagle. Norris English's report covers practically all present conditions. New Company being organized to which Empire-Arizona will turn over belongings, present shareholders to receive three shares in new Company for one in old. Shipping ore on dump to Sasco said to run 5½% Cu, \$4.00 Au. About 600 tons at time of my visit. Not much mining. Preparing to extend 100' shaft on diabase dike on Eagle's Nest in hope of finding ore in depth. Sutherland told me he had recommended directors to quit attempting to mine the Carnation ores from 300 foot shaft as cost of sorting to shipping grade was too great. New road 12 miles cost \$12,000.00. New Jeffrey Quad truck and trailer. Hauling to Parker now costs \$3.00 a ton against former cost \$8.00, according to Sutherland. Rix compressor 300 feet per min. "Standard" gas engine 50 H.P. New boarding and bunk houses and small residences. 9th Feb. 1917: Sutherland informed me that he is now obtaining all ore from open cut on Treasure Hill. Shipments running \$4.80 gold; 5 to 5½% copper. One miner and two muckers make all the ore he can truck. Going to sink on Eagle's Nest, which he regards as much the best chance. Other mining stopped to cut expenses.

April 1, 1917: New hoist and other equipment being installed at Eagle's Nest shaft. Sutherland informed me that he was now obtaining ore from new openings on Carnation. Grade about same as Feb. shipments.

ARIZONA - EMPIRE

see also Parker, Arizona, and  
Empire Arizona.

NOVEMBER 1915.

On the strength of claims made for the property by C. E. Finney and his engineers, Mr. Colvocoresses offered to help him develop it and preliminary to advancing Finney money on the ore said to be in sight had Norris English examine the property. Mr. English found no ore body of commercial importance disclosed; the copper seems to occur in mere superficial deposits and the property was greatly misrepresented by Finney and his engineers E.W. Brooks and Oscar A. Knox.

Following are excerpts from Norris English's report, dated November 13th, 1915.

"The properties are located about seven or eight miles Northeast of Parker, Arizona, and are reached by a wagon road which follows the East bank of the Colorado River for about ten miles, and then follows a wash for about three miles to the property.

PROPERTY.

The property of this Company consists of thirty-five mining claims, shown on the accompanying map, held by location, but this report deals with only a portion, consisting of sixteen claims. These claims are divided into two groups, which will be known in this report as the Carnation Group and the Eagle's Nest Group.

GEOLOGY.

Lying along the East bank of the Colorado River is a belt of granite gneiss about one mile wide. To the East of this is a belt of dioritic rock, of greenish color, and iron-stained along fissures and crevices which gives the rock from a distance a pinkish color. This rock is locally known by the owners of the property as "quartz

porphery".

To the East of this rock is a series of metamorphosed sediments, consisting in large part of limestone and schist and which is classified by the U.S. Geological Survey as a pre-Cambrian age. This metamorphic series has been very greatly folded and faulted, so that the structure is very complicated.

The Eagle's Nest Group seems to lie on the Northwest flank of an anticline, while the Carnation Group lies on the Southeast flank.

The Eagle's Nest Group lies along, or close to, a contact of limestone, with intrusive diabese and eruptive rock, probably a quartz diorite.

The Carnation Group covers an area composed entirely of the sedimentary series, except along the eastern border, where it has been covered by a flow of basalt. The schists, which would probably be classed as amphibolitic, predominate.

#### EAGLE'S NEST GROUP.

This Group consists of the five following claims - Aloha, Utica, Double Eagle and Royal Eagle and has been developed by a number of scattered shallow workings.

The principal work has been done on the Eagle's Nest Claim where a Northeast fissure close to the contact of limestone and quartz diorite has been developed by a tunnel which starts near the center of the claim and has been driven Northeast some 400 feet. At the time of my visit, only the first 250 feet was opened \*\*\*\*\*; there is nothing shown to indicate an ore body of importance.

At the portal of the tunnel an incline shaft, said to have been 70 feet deep, was sunk, from which about 125-tons of ore were shipped which assayed 25 to 30% copper. This shaft was inaccessible on account of caving. The dump of this shaft, which was reported to contain very good values, failed to show any commercial values according to

my sampling.

#### DOUBLE EAGLE CLAIM.

The Double Eagle Claim lies along the side line and to the North of the Eagle's Nest Claim and on the opposite side of the quartz diorite. This has been developed by a short tunnel close to the contact of the limestone and diorite, with a short drift on the contact. This drift was sampled for a length of 20 feet over an average width of 3.5 feet and assayed .03 ounces gold and 1% copper. The dump from this work, Sample No. 11, assayed .09 ounces gold and .94% Cu.

#### CARNATION GROUP.

This Group consists of six claims with the principal workings known as the Carnation Shaft near the Southeast corner of the Omega Claim and the Walter's Shaft and adits on the Alpha Claim. The Walter's Shaft lies about 1200 feet Northeast of the Carnation Shaft.

#### WALTER'S WORKINGS.

The Walter's Workings consist of an adit at an elevation of about 1220 feet, which has been driven along fissures in the limestone and schists just below the basalt capping. All the ore found in these workings has been extracted and the richer portion shipped to smelters.

About 20 feet from the portal a winze has been sunk, and at a depth of 50 feet a station has been cut and about 25 feet of drifting done in a northwesterly direction. This level shows oxidized siliceous copper ores in a very irregular body, apparently along the intersection of several fissures in the limestone. Sample No. 12 was taken across 6 feet of ore at the breast of the drift, and assayed .08 ounces in gold and 1.30% copper. Sample No. 13 was taken across the back of the drift 10 feet from the breast across a width of 4.5 feet. It assayed .78 ounces gold and 3.62% Cu.

At an elevation of about 1000 feet, or 220 feet below the above described workings, a tunnel has been driven in a southeasterly direction, which crosscuts the entire formation directly below the Walter's Shaft workings. This

tunnel has been connected by a raise to the Walter's shaft. About 450 feet of drifting and crosscutting has been done directly below the Walter's orebody without finding any indication of an important orebody, and nothing in any of these workings justified sampling. All of these workings are shown on Plate 3.

#### CARNATION SHAFT.

The collar of this shaft is located at an elevation of about 1000 feet. It is sunk in a southwesterly direction at an angle of about 40 degrees, to a depth of 300 feet. There are no workings in this shaft below the 200 foot level. The shaft follows a shear zone in amphibolite schist, which shows a small amount of mineralization.

At the 200 foot level, a crosscut has been driven about 100 feet Southwest from the shaft, and another in a northeasterly direction, which is reported to have been over 200 feet long. Only about 20 feet of it is accessible, the balance having been used to store material broken in other workings to avoid hoisting by whim. This work is entirely in schist, and did not develop any ore.

Drifts have been run about 25 feet in a northwesterly direction, and 50 feet southeasterly from the station along a fissure in limestone. In the southeasterly drift, 30 feet from the station, a drift has been run about 15 feet along a contact between schist and limestone. This contact shows leached material containing a little oxidized copper minerals, and was reported to show 5 feet of solid copper ore, with 11 feet of leached material with bunches of copper ore. This 11 feet of material it was estimated could be sorted two tons into one, which would assay 8% copper and .35 ounces gold per ton.

Samples No. 21 and 22 were taken over a width of 5 feet above the contact, or from what is supposed to be the solid ore. No. 21 assayed .06 ounces gold and 1.48% copper; No. 22 assayed .30 ounces gold and 1.08% copper.

Samples No. 23, 24 and 25 were taken at intervals of 10 feet along the drift. No. 23 over a width of 5.3 feet assayed .05 ounces gold and .72% copper; No. 24 over a width of 5.5 feet assayed .28 ounces gold and 2.32% copper; No. 25 over a width of 5.6 feet assayed .18 ounces gold and .72% copper. These workings and assays are shown on Plate 4.

#### TREASURE HILL.

This name has been given to a spur lying between two deep ravines running southwest from a line joining the Walter's and Carnation shafts. It consists of a body of very much altered and fissured limestone, which dips to the Southwest. On the Northeast side, where a cross-section of the beds is exposed, oxidized copper minerals show for a length of about 100 feet and for a depth of 50 or 60 feet. This piece of ground is crossed by a number of Northeast - Southwest fissures, along which the principal mineralization has taken place.

I took two samples across the beds -- No. 26 over a width of 7 feet. This assayed no gold and .54% copper. No. 27, taken across a width of 24 feet; it assayed .12 ounces in gold and .94% copper. Sample No. 28, which was a grab sample taken from a small pile of ore which had been sorted from a large amount of broken material, assayed .29 ounces gold and 4.16% copper.

A large amount of material has been broken down on this hill by shooting cracks, and in my opinion this work has been persisted in until a good surface has been exposed.

A crosscut tunnel has been driven 320 feet into this hill, from a point 200 feet North Northeast from the Carnation shaft. This tunnel has penetrated far enough to crosscut the beds which are mineralized on the surface, and it shows no mineralization.

#### CONCLUSIONS.

In my opinion, the orebodies that have been

found are small, superficial enrichments, which have been formed along fissures and joints in the rocks. The deeper workings, with the exception of the Carnation Shaft, have failed to find any commercial ore under these surface showings, and I believe that the property is of no value except to work on a small scale by lessees."

Signed by NORRIS ENGLISH

June 8, 1916, - received one carload of sorted ore assaying

Au.	.06	oz.;
Ag.	0.12	oz.;
Cu	9.22	%
Insol.	26.2	%
Fe.	29.5	%
CaO	3.8	
S	0.5	

*See also Parker District - Empire Arizona*

District	Property	Location	Owners & Operators	Date Visited 1916	Notes
Parker, Arizona, side of Colorado River. (Cont'd)	Empire-Ariz.	About 12-3/4 miles North Parker	Empire-Arizona C. M. Co. Milton Sutherland, Superintendent in charge. Clyde Baldwin, Asst. (Latter appears as "Manager" in advertisements). Producing.	Nov. 10th	Last two carloads to Humboldt came from Gray Eagle. Norris English's report covers practically all present conditions. New Company being organized to which Empire-Arizona will turn over belongings, present shareholders to receive three shares in new Company for one in old. Shipping ore on dump to Sasco said to run 5½% Cu, \$4.00 Au. About 600 tons at time of my visit. Not much mining. Preparing to extend 100' shaft on diabase dike on Eagle's Nest in hope of finding ore in depth. Sutherland told me he had recommended directors to quit attempting to mine the Carnation ores from 300 foot shaft as cost of sorting to shipping grade was too great. New road 12 miles cost \$12,000.00. New Jeffrey Quad truck and trailer. Hauling to Parker now costs \$3.00 a ton against former cost \$8.00, according to Sutherland. <b>Rix</b> compressor 300 feet per min. "Standard" gas engine 50 H. P. New boarding and bunk houses and small residences. 9th Feb. 1917: Sutherland informed me that he is now obtaining all ore from open cut on Treasure Hill. Shipments running \$4.80 gold; 5 to 5½% copper. One miner and two muckers make all the ore he can truck. Going to sink on Eagle's Nest, which he regards as much the best chance. Other mining stopped to cut expenses.

*Claim Map F. 29. 4.*

*See also Arizona Empire.*

Apr. 1  
1917

New hoist and other equipment being installed at Eagle's Nest shaft. Sutherland informed me that he was now obtaining ore from new openings on Carnation. Grade about same as Feb. shipments.

LONDON-ARIZONA  
CONSOLIDATED  
COPPER COMPANY  
TITLE INSURANCE BUILDING  
LOS ANGELES

*R. King*

Los Angeles, Cal., Nov. 12, 1915.

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

*A. I.*

Dear Sir:--

I have delayed acknowledging your favor of the 6th inst. until now. I regret exceedingly the immediate outcome of our negotiations, but I am as confident now as ever that there ought to be some common ground whereupon we can arrive at some basis for an arrangement.

First, I note that there is substantially an agreement as between English and Brooks as to the persistency of the ore bodies and therefore the promise of mines of some magnitude. This is of course a matter of vital importance.

Second, in regard to the ore in sight, I think there is no very great difference between English and Knox. Mr. Knox stated in his report that there was no ore actually and technically blocked out but that the natural conditions are such that taken in conjunction with the development work so far accomplished, they practically assure a tonnage of ore hereinbelow referred to "as reasonably assured". It would appear that Mr. English was not willing to recommend to you any tonnage of ore designated as reasonably assured as a basis for a collateral to a loan. That this ore estimated by Knox is reasonably assured, I feel just as confident now as ever, but it is not for me to say that you would be justified in considering it as ample collateral.

Third, The sampling: The results of the sampling and the assay results are quite disconcerting but after a careful canvass of the matter with Mr. Knox it appears to be as follows:

Mr. Knox sampled this property in four essential points and no other. His sampling was done essentially to determine our ability to operate this property profitably as a leasing operation with the expectation of uncovering ore bodies of considerable magnitude. In the opinion of Mr. Brooks and Mr. Knox these expectations are well within reason, if not assured. If Mr. Knox had been sampling the property in its entirety for the basis of a purchase price, he might have followed different lines but we are fully confident that the results set forth in our statement are well within the limits of accomplishment.

The unfortunate feature of this transaction is that you and I were unable to be present at the time the engineers were there so that we could have followed the plan more nearly of checking up the proposition which we had set up. I still believe that it would be wise for you to consider the property and to make a personal examination when possibly Brooks, Knox and myself could be present with you.

I wish to suggest here that there is another basis upon which you might be disposed to consider the property and upon which you might be justified in considering.

We, of course, have contemplated taking in some additional capital with which to equip the property and put it on a shipping basis and at the same time develop a head upon the ores already exposed.

3.

To put the property on a basis where it can ship a 1000 tons a month which could be done in four or five weeks from date of beginning operations, we would have to build a piece of road costing about \$3000, build several small pieces of roads up to the four different points of operation, install two hoists, together with supplying some camp equipment and supplies.

We have estimated that we should have for immediate purposes \$25,000 with which Mr. Knox is as confident now as when he made his investigations that we can ship 1000 tons of ore a month, sorted ore, that will approximate 7% in copper and \$5.00 or more in gold.

This amount of money would contemplate the sinking of 100 feet of shaft on the Eagle's Nest. At the Eagle's Nest there is little to examine at the present moment because the shaft is caved, but in the botom of this old shaft there was a vein of solid malachite which averaged 30% in copper. This would make tonnage in value very fast. Mr. Brooks and Mr. Knox are both of the same conclusions that the biggest mine on the property will be the Eagle's Nest where the ore bodies make in the limestone in contact with the porphyry and where the ore bodies may be expected to chamber out into the limestone into massive deposits. This ore, too, is neutral in character and of consequence very useful for your operations.

You will pardon us for the tenacity with which we cling to our conclusions but we see no reason after a further careful canvass of the situation to modify them. Now, it has been suggested that there might be another basis upon which this property with its possibilities might be attractive to you.

If upon examination, by you personally of this property, which said examination should be in the nature of a check upon the proposition which we have set up, you can agree with us at least substantially, then I will propose that if you would provide the said \$25,000 as an advance, which money would be returned to you out of the shipments, that we would be willing to transfer to your Company a 25% interest in the lease. This would be in addition, of course to a contract for a period of say, ten years for the smelting of the ore.

I take the liberty of suggesting this proposition based upon the fact that Brooks and English, as well as Knox, agree on the future probabilities of this property so far as the depth of the ores are concerned and the promise it has to make a property of considerable magnitude.

It has occurred to me that looking at the matter in the light of your participating in the profits of a mining operation along with the profits which will accrue to you in the smelting of the ores and further considering the fact that ultimately you will have no investment in the property at all, but that your interest will come to you free, that such a proposition might appeal to you.

This proposition, of course, is susceptible to variations and modification as the situation might demand in the course of negotiation.

I respectfully submit the matter for your consideration and if it appeals to you I will be glad to run down to Humboldt the first of the week for a further discussion of the matter.

Yours very truly,

*O. E. Finney*

ARIZONA EMPIRE CONSOLIDATED COPPER CO.

LOCATION: 11 Miles over good road north of Parker, Arizona.  
CLAIMS: 49  
OWNERS: Company of above name C. W. Moses & C. L. Moses of Los Angeles are interested but Frank Royer at present negotiation for development of property and installation of some method of treatment for the ores.  
ELEVATION: 700' above Colorado River and 2 miles east of Empire landing.

HISTORY:

Operated in a desultory way for many years. Present company took over property in 1916 and expended about \$100,000 on road, camp and mining equipment and during 1916, 1917 and 1918 produced fifty cars of ore carrying 7 to 10% Copper and \$5.00 to \$20 in gold.

Development work consisted of sinking the Eagle Nest shaft 600' balance of work confined to gauging and sorting higher grade ores from old workings.

The decline in copper market forced the company to suspend operations in 1918 and since that time a watchman has been maintained.

GEOLOGY:

The rocks of the district originally consisted of an underlying gneiss later covered with lime and capped by several volcanic flows. This area was intruded by quartz porphyry and other intrusives, the identity of which has been destroyed. The whole mass subjected to considerable metamorphism and distortion resulting in blocks and beds of lime between schistose intrusive rocks. Considerable faulting is evident as well as intense shearing and silicification of certain portions of the lime.

Mineralization in some cases as shown in the Carnation shaft, Walters shaft and Leo claim and Treasure Hill consist of silicified mineralized lime at or close to the contact with a sericitized schist. Primary minerals chalcopyrite altered to glance, and copper carbonate.

These ores are highly siliceous and the sorted ores carried 6 to 10% copper and \$5.00 to \$20.00 in gold.

The Eagle's Nest shaft is sunk on a lime monzonite contact wherein the lime has been heavily mineralized at contact with pyrite and specularite carrying some copper. Development on lower levels of this 600' shaft was not carried far enough to determine influence of water level.

An average of mine samples and shipments from the various workings during period of operation is as follows:

CARNATION SHAFT

	Cu	Gold
Shipping Ore	6.9%	.5 oz.
Car & Mine Samples	3.0%	.24 "
Face Samples	2.2%	.20 "

EAGLE NEST

	Cu	Gold
Shipping Ore	10%	.12 oz.
Car & Mine Samples	3%	.02 "

WALTERS SHAFT

	Cu	Gold
Shipping Ore	7%	.22 oz.
Car & Mine Samples	2.5%	.19 "

TREASURE HILL

	Cu	Gold
Shipping Ore	6.4%	.28 oz.
Car and Mine	3.0%	.12 "

Personal Samples:

	Cu	Gold
1 Carnation Rejects	.48%	T
2 " Fines	1.49%	T
3 Treasure Hill Grab	1.74%	T

CONCLUSIONS:

Eagles Nest area has no ore developed at present time.

Carnation shaft is down to 300' level but inaccessible below 200. On 200 foot level there is an ore body 15 by 150 ft. partly developed and partly stoped. This ore is striking along the contact directly towards the Walters shaft and there are indications that this ore may be more or less continuous for 2000 ft. and it might be possible to develop a considerable tonnage of ore by driving north from the present face and on through the Walters shaft area towards the Leo claim. This work could be expected to develop a tonnage of 2.5% Copper ore carrying \$2. to \$4. in gold that would justify some means of treatment provided the ore could be treated on the ground.

At the present time there is insufficient ore developed on the property to justify the erection of a plant for treatment of same.

Mr. Colv.

I failed to

enclose this

C. V. Finney

*Copied*  
*Full*

EMPIRE-ARIZONA COPPER CO.

Assays made to March 21st, 1916.

			Cu.	Ins.	Fe	
1.	Grab sample sorted ore	Treasure Hill	2/25	3.4	63.5	
2.	Grab sample " " "	" " "	2/26	4.85	63.0	
3.	Grab Sample " " "	" " "	2/27	4.1	65.1	
4.	File of ore	North end Walters Dump	3/8	4.2	67.8	
5.	Grab from broken ore	100 level, Carantion	3/8	3.9		
6.	Ore on side of hill	Walters		3.3		
7.	Undersize of 1" screen	200 level Carnation	3/15	1.4		
8.	Ore found in bin	Gray Eagle		2.4	39.2	105
9.	Old second class dump	Gray Eagle		1.8	42.4	94
10.	Grab from broken ore	100 level Carnation	3/13	3.6	66.5	
11.	Grab from 50 sax from	100 level Carnation	3/13	7.0	67.6	
12.	Grab from 84 sax	100 level Carnation	3/13	6.8	66.4	
13.	Grab from 33 sax	100 level Carnation	3/13	8.8	57.5	
14.	Grab from 50 sax	Walters dump	3/14	5.9	67.5	
15.	Grab broken ore	Carnation 100 level	3/15	3.2	77.2	
16.	Grab broken ore	100 level Carnation	3/16	3.5	75.5	
17.	Undersize 1" screen	200 level Carnation		2.6	77.2	
18.	Grab from 52 sax	Walters dump	3/15	4.5	65.2	
19.	Undersize 1" screen	Carnation	3/17	1.7	76.9	
20.	Grab from 50 sax	200 level Carnation	3/17	4.7	70.1	

Assays Sheet #2.

22.	Grab from 50 sax Walters dump	3/17	8.3	56.1
23A.	Grab from 30 sax Walters dump	3/18	5.8	59.0
23B.	Grab from 30 sax Carnation 200	3/18	6.7	69.3
24.	Grab from 30 sax Carnation	3/19	5.8	76.0
25.	Grab 30 sax Carnation Lot #2	3/19	8.5	67.5
26.	Grab from 30 sax Walters dump	3/19	9.6	60.5
27.	Grab from screenings Walters dump	3/19	5.7	59.5
28.	Black (Prospector's Sample)			
29.	Grab from 30 sax Walters dump	3/20	7.1	
30.	Undersize 1" screen Walters dump	3/20	4.9	
31.	Copper ore face of Gray Eagle Tunnel	3/19	9.8	
32.	Iron ore            DO            Do			Trace
33.	Grab from 41 sax Walters dump	3/19	6.0	
34.	Undersize 1" screen Carnation	3/19	2.8	