



CONTACT INFORMATION

Mining Records Curator
Arizona Geological Survey
1520 West Adams St.
Phoenix, AZ 85007
602-771-1601
<http://www.azgs.az.gov>
inquiries@azgs.az.gov

The following file is part of the

Arizona Department of Mines and Mineral Resources Mining Collection

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

05/13/87

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES FILE DATA

PRIMARY NAME: EAGLE NEST MINE

ALTERNATE NAMES:

LA PAZ COUNTY MILS NUMBER: 32

LOCATION: TOWNSHIP 10 N RANGE 18 W SECTION 16 QUARTER NW
LATITUDE: N 34DEG 12MIN 35SEC LONGITUDE: W 114DEG 08MIN 40SEC
TOPO MAP NAME: BLACK PEAK - 15 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:

COPPER
GOLD LODE
SILVER

BIBLIOGRAPHY:

KEITH, S.B., 1978, AZBM BULL. 192, P. 123
ADMMR EAGLE NEST MINE



Eagles Nest
T. 10 N. R. 18 W. Sec 16

Black Peak 15

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine	Empire	Date	Sept. 30, 1958
District	Cienega, Yuma County	Engineer	Travis P. Lane
Subject:	Status of Operation		

The property is owned by the Empire-Arizona Copper Corp. Mr. Harriet directs the affairs of the corporation. The property has been operated by 2 or 3 lessers for a number of years, shipping ore running around 2.5% Cu, \$8 to \$10 gold value. The ore is desirable as a siliceous flux and enjoys a favorable smelter rate (at Hayden). The lessers suspended for the summer, but were expected to resume in September or early October.

This information was obtained in conversation with Mr. Harriet at Parker on Sept. 16.

nace or converter" are intended to cover any metallurgical apparatus employing an air blast under pressure. The claims of the patent are five in number, as follows:

1. The method of operating blast furnaces or converters using an air blast, consisting in reducing the moisture content of the air to a small and substantially uniform percentage, supplying the dried air at a substantially uniform temperature and weight to blowing engines, and then forcing this air to the furnace or point of use; substantially as described.
2. The method of obtaining uniformity in the operation of blast furnaces and converters, consisting in supplying thereto air of a small and substantially uniform moisture content, and of a substantially uniform temperature and weight.
3. The method of supplying air to blast furnaces and converters, consisting in reducing the air to a low and substantially uniform temperature, reducing its moisture content to a small and substantially uniform percentage, maintaining the air thus treated at a substantially uniform temperature as it passes to the blowing engines, and then forcing said air to the blast furnace or converter.
4. In air supply apparatus for blast furnaces or converters, a refrigerating chamber, arranged to reduce the air to a low and substantially uniform temperature and to a low and substantially uniform moisture content, a blowing engine between the refrigerating chamber and the blast furnace or converter, and a conduit connecting the refrigerating chamber and the blowing engine and arranged to maintain a substantially uniform temperature of the air at the blowing engine.
5. The combination with a refrigerating chamber and a blowing engine, of a conduit connecting the same, and a conduit extending from the blowing engine to a blast furnace or converter, and means for insulating or protecting the conduit between the refrigerating chamber and the blowing engine, whereby air of a substantially uniform temperature and weight, as well as of a substantially uniform low moisture content, is supplied to the blowing engine.

The extensive onyx deposits of the Cervantes estate near Etla, Oaxaca, Mexico, have been taken under option by Consular Agent Lawton, of Oaxaca and associates. These deposits have not been systematically developed by the owners, but have been worked to some extent, and are part of extensive onyx deposits, some of which have been worked for about twenty years. The onyx is of close grain, of beautiful coloring, and fair weathering qualities, and the ease of working it, together with the extent of the deposit, makes it potentially valuable.

Ore Deposits in the Vicinity of Parker, Arizona

SPECIAL CORRESPONDENCE

For many years the region along the Colorado river, in the vicinity of the Parker Indian reservation, and on both the California and Arizona sides of the river, has been known to be a field of promise for the copper miner. Development, however, was slow until the building of the California & Arizona railroad. With the town of Parker as a center, a circle drawn on a radius of 20 miles would include within its area four important ranges, or parts of ranges, in which are copper, copper-gold and gold-ore deposits. There is one district where surface conditions indicate that lead minerals may be the basic ore carrying the gold, shallow workings having produced considerable material of this kind. These deposits occur in the Plomos mountains, 15 to 20 miles southeast of Parker. Some minerals of tellurium have also been found there.

Southwest of Parker, 18 miles, is the Riverside range, in which two companies are developing groups of claims, while the individual prospector is exceedingly busy. The ore-bearing formations are schists and limestones; the ores are copper-gold and gold, the gold tenor of those deposits now being developed being somewhat higher than in the copper ores of the other districts. West and north of Parker are the Whipple, Turtle and Copper Basin districts, the latter having been the scene of more or less activity for many years. A large area here is intensely mineralized and a number of operators are now opening ground; one company, it is stated, is mining ore of shipping grade. The Calumet & Arizona company, of Bisbee, has recently acquired the Horn group in the Turtle mountains.

ORE OCCURRENCE

The districts north and northeast of Parker have been more extensively developed and are being more vigorously attacked at present. A type of ore deposition in this district, serving to illustrate that in other mines in the same formation, is found on the property of the Arizona Empire Copper Mines Company. This property is nine miles northeast of Parker and exhibits all of the features characteristic of this area, both as to ores and geology. A geologic section from the river easterly through the Eagle, Carnation and Cyclone groups, begins at the river, with a red-brown granitoid basic rock, generally coarsely crystalline, intruded by gray porphyry dikes, along the course of which are copper-bearing veins, as yet undeveloped. This is succeeded by a gneiss in which are no mineral veins of commercial importance. Lying against the eastern margin of this gneiss is an eruptive

rock (syenite), in and over which are the uptilted limestones, shales, schists and quartzites of the ore-bearing zone. These have been intruded on the bedding planes by the same eruptive. Overlying all are flows of dolerite lava.

The sediments have been folded, and the ore deposits occur in the contacts and in the fault fissures due to the folding movement. Along the lines of contact with the limestone, the shales and limestones have been silicified to a marked extent, and the exposures are much like quartz veins. Mineralization along these contacts extends into both the shales and limes, forming chamber deposits in the lime and permeating the shales as a general impregnation of the lamination and fracture planes; the whole forming an ore-bearing zone with a core, or central vein, of quartz or quartzose material heavily mineralized with copper minerals. The gangue of this central vein is usually silicious, and the minerals, to the depth attained, entirely products of oxidation. Sulphides have not yet appeared. An important feature of these deposits, commercially, is the comparatively high gold tenor. This metal is present in all the ores thus far developed in this region.

HEMATITE ACCOMPANIES ORES

Hematite in the form of specular iron is a characteristic accompaniment of all of these deposits, large masses in chambers and veinlets occurring throughout both the limestone and shales, but especially in the contact zones. These bodies invariably contain gold in varying amounts, such determinations as have been made indicating an average content in the neighborhood of \$5. They will probably give place to copper or copper-iron minerals, in depth. At what depth the sulphide zone will be encountered is undetermined and will likely be first ascertained by the drilling operations about to be inaugurated by the Arizona Empire company. That the intricate system of veinlets in the mass of contact shale, now filled with oxidized copper ore, will have the mineral replaced by sulphide ores in depth, is the opinion of several prominent engineers who have inspected these holdings.

Two miles southeast of the Cyclone group, the company has acquired and will develop the Wardwell and Osborne group of six claims, where the showings are as strong and in general the same as those of the groups described. Pipe lines to the river will be laid, and the entire property vigorously developed. The Lewisohns are developing the Planet mine to the northeast of this district in the same formations. The Clara Consolidated is finishing its smelting plant and railroad at Swansea. The Arizona Empire company is preparing to test its properties with a core drill to learn the depth at which sulphides occur. The working shaft will not be sunk until this drilling is accomplished.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine EMPIRE MINE

District Cienega, Yuma Co., Ariz.

Date February 24, 1943

Engineer *Elgin B. Holt*

Subject:

R E P O R T

OWNER: Empire-Arizona Mining Co., 1931 W. 20th St., Los Angeles, Calif.

LESSEE: Frank W. Royer, Red Mountain, Calif.

SUB-LESSEE: W. W. Harritt, Parker, Arizona.

METALS: Copper and gold; copper predominating.

NOTE: This is the second report I have made on this property; date of first report being September 24, 1942.

LOCATION & AREA: The Empire property, consisting of 19 unpatented mining claims, is located 11 miles northeasterly of Parker, Arizona, with which it is connected by a serviceable truck road.

VEINS:

There are six main veins, from one to 50 feet in width, within the confines of this property; each vein being traceable on the surface from 1500 to 3000 feet.

WORKINGS:

Development work on these veins approximates 4000 feet, consisting of tunnels, open cuts, test pits and four main shafts: 125', 300', 300', and 600 feet deep. Ore is found in all of the said workings at or near the surface, thus affording excellent possibilities for small mining operations by means of "leasers".

VISITS:

I visited this property, in company with Mr. Harritt, on August 11, 1942, and again on February 21, 1943, on which dates I looked the main workings over and checked some of his reports and data concerning ore shipments, etc.

PRODUCTION:

During World War 1, per Mr. Harritt, 2270 tons of ore were shipped to Arizona smelters by "leasers"; said ore, which was hand-sorted material, averaged about \$30.00 per ton in copper and gold values. Total net smelter returns, during this period, amounted to \$68,052. This property was leased to Mr. Royer during January, 1941, and operations were carried on under the management of Mr. Harritt, who states that from April 27, 1941, to May 1, 1942, 956 tons of ore were shipped from property to various Arizona smelters, with an average assay value of \$14.74 per ton in copper and gold; this being mainly mine run ore with very little sorting, due to high labor costs. During the latter period, the total copper content of these shipments amounted to 44,195.53 pounds; and the gold amounted to 188.25 fine ounces. Also, in this period, 623 man shifts of work were carried out, and 1.53 tons of ore per man shift were produced.

Furthermore, during the said latter period, considerable money was spent on the following items, to-wit: road building, erecting loading bins at mine, pipelines, loading ramp at Parker R. R. station, cost of equipment, as well as cost of reconditioning various mine workings, also mine sampling and assaying.

However, as soon as the mines were gotten in shape, together with the bonus price received for copper, operations began to show some profit, when at this critical time, all laborers at the mine quit work in order to take higher paid jobs at a Federal project in the vicinity of Parker. For this reason the mine had to close down. However, work has been resumed recently; there now being 4 "leasers" at property and they are producing around 3 car loads of ore monthly, assaying 3.5 per cent copper, 0.25 ounce gold per ton, and 70 per cent silica. Alumina runs around 1 per cent only. This ore is shipped to the Clarkdale smelter.

ORE RESERVES:

There are no records available, as far as I could learn, concerning ore reserves, if any, in the mines included in the Empire holdings. And, from my brief observations, I do not believe there are any great amount of ore blocked out in these mines, due to the fact that these properties have always been worked on a leasing basis, and the "leasers" generally extracted all the ore they developed during tenure of their leases.

Again, such ores as are now exposed in these mines, consist of oxidized material, such as copper carbonates, silicates and oxides, and must be shipped to smelters for treatment, as such ores could hardly be concentrated on the ground by ordinary ore-dressing methods.

WATER:

Water for mining purposes and domestic use is secured from nearby wells.

OPERATIONS: PLANNED:

Harritt is now planning to raise around \$5,000 with which to carry out the following work: reopen the Eagle's Nest tunnel and the Eagle's Nest shaft to the 100-foot level of said shaft; clean out the Double Eagle tunnel for its full length of 130 feet; reopen the American Eagle shaft to the 180-foot level of same; also clean out a haulage tunnel 150 feet long in the Treasury Hill quarry; and expend about \$500 on road work at the mines.

The object of this preliminary work is to recondition the mine so the shipment of ores to smelters can be resumed in greater quantity than is possible at the present time.

FLUXING ORES:

Harritt stated that the principal workings of property carry high silica and low alumina, excepting the Eagle's Nest shaft workings, which contain ores assaying around 16 per cent iron and from 30 to 50 per cent silica; that the Treasury Hill Workings, the Double Eagle

workings, Gold Hill workings and the American Eagle shaft all carry high silica; and that the average tenor of ores from these workings runs about as follows: Copper, 3.5 per cent; gold, 0.18 oz. per ton, and silica, 65 per cent. That this estimate is based on throwing out the coarse waste material only, and producing in excess of 300 tons of shipping ore monthly, of the above grade.

COSTS:

Harritt also furnished me with the following rough estimate, concerning operating and marketing costs on ores running \$15.00 per ton in copper and gold; said costs being based on shipping to Clarkdale:

Value of ore in copper and gold -----		\$15.00 per ton
Less: Mining per ton -----	\$2.00	
Trucking to Parker, per ton -----	1.50	
R. R. freight, per ton -----	2.10	
Smelting charges, per ton -----	3.50	9.10
		<hr/>
Net profit, per ton -----		\$5.90
		<hr/>

NOTE: Harritt stated, also, that there is a small credit for silica on Empire ores shipped to Clarkdale, amounting to around 35 cents per ton, and which is figured as follows: On ores running in excess of 50 per cent silica, deduct 10 times the alumina content and pay 1¢ per unit on excess silica.

MARGINAL ORES:

Furthermore, Harritt stated that there is a considerable tonnage of lower grade marginal ores ^{in this mine} that could not be mined and marketed at a profit, ~~was that could be produced from this mine,~~ unless a higher price for copper could be obtained. He suggested that these ores could be moved profitably in the event a price of 20¢ per pound for copper could be ^{secured} ~~obtained~~. ^{obtained better.}

Elgin B. Holt

Elgin B. Holt,
Field Engineer.

Empire

S U B L E A S E.

THIS INDENTURE OF SUBLEASE, dated the 23rd day of

May, 1941, by and between FRANK W. ROYER, of Red Mountain, California,
as Party of the First Part, hereinafter called "Sublessor", and W. W. Harritt
and A. W. Clapp, As Parties of the Second Part, herein-
after collectively called "Sublessee",

W I T N E S S E T H:

Sublessor, for and in consideration of the royalties hereinafter reserved
and the covenants and agreements hereinafter expressed to be kept and performed by
Sublessee, does hereby sublet and demise, for the purpose of developing, mining and
marketing ore or ore products therefrom the following described portions (which por-
tions) will be hereinafter called "said premises"), to-wit:

That portion of the Carnation vein extending from a point seven hundred and fifty
(750) from the South West end line for a distance of (750 feet) seven hundred and
fifty feet to the N. E. end line of the Omega and Alpha Claims of the property
commonly known as the "Eagle Group" and the "Carnation Group" of unpatented lode
mining claims owned by Empire Arizona Mining Company (hereinafter called "Empire")
and situate in the Seneca Mining District, in the County of Yuma, State of Arizona,
which said property is the subject of a lease dated January 1, 1941, between Empire,
as Lessor, and Sublessor, Frank W. Royer, as Lessee. Said mining claims are more
particularly described as follows:

Name of Claim.

Book and Page of "Mines",
Records of said Yuma County,
wherein amended location
notice of claim is recorded.

EAGLE GROUP.

American Eagle	Book Q, Page 343.
Black Eagle	Book Q, Page 344.
Golden Eagle	Book Q, Page 345.
War Eagle	Book Q, Page 346.
Gray Eagle	Book Q, Page 347.
Bald Eagle	Book Q, Page 349.
White Eagle	Book Q, Page 348.
Double Eagle	Book Q, Page 350.
Eagle's Nest	Book Q, Page 351.
Royal Eagle	Book Q, Page 352.
Alpha	Book Q, Page 353.
Aloha, also known as Alamo	Book Q, Page 355.
Huron	Book Q, Page 362.

CARNATION GROUP.

Elmyra	Book Q, Page 356.
Leo	Book Q, Page 359.
Utica	Book Q, Page 360.
Trenton	Book Q, Page 361.
Olympia	Book Q, Page 363.
Omega	Book Q, Page 364.

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

FIELD ENGINEERS REPORT

PRODUCTION POSSIBILITY SURVEY

TYPE NO. 2

Mine EMPIRE MINE

Date September 24, 1942.

District Cienega, Yuma Co.

Engineer Elgin B. Holt.

Subject:

PRODUCTION POSSIBILITY

OWNER: Empire-Arizona Mining Company, 1931 W. 20th St., Los Angeles, Calif.

LESSEE: Frank W. Royer, Red Mountain, Calif.

SUPERINTENDENT: W. W. Harritt, Parker, Arizona.

METALS: Copper & gold.

LOCATION

The Empire property, consisting of 700 acres of mineralized ground, is located 11 miles northeasterly of Parker, Arizona, with which it is connected by a serviceable truck road.

VEINS

There are six main veins, from one to 50 feet wide, within the confines of this property; each vein being traceable on the surface for from 1500 to 3000 feet.

WORKINGS

Development work on these veins approximates 4000 feet, consisting of tunnels, open cuts, test pits and four main shafts: 125', 300', 300', and 650' deep. Ore is found in all of the said workings at or near the surface, thus affording excellent possibilities for small mining operations by means of "leasers".

VISIT

I visited this property, in company with Mr. Harritt on August 11, 1942, looked the main workings over and checked his reports and data concerning ore shipments, etc.

PRODUCTION

During World War I, per Mr. Harritt, 2270 tons of ore were shipped by "leasers"; said ore, which was hand-sorted material, averaged about \$30.00 per ton in copper and gold values. Total net smelter returns, during this period, amounted to \$68,052. This property was ~~then~~ leased to Mr. Royer during January, 1941, and operations were carried on under the management of Mr. Harritt, who states that from April 27, 1941, to May 1, 1942, 956 tons of ore have been shipped from property to various Arizona smelters, with an average assay value of \$14.74 per ton in copper and gold; this being mostly mine run ore with very little sorting, due to high labor costs. During the latter period, the total copper content of these shipments amounted to 44,195.536 pounds; and the gold amounted to 188.25 fine ounces. Also, in this period, 623 man shifts of work were carried out, and ~~xxx~~ 1.53 tons of ore per man shift were produced.

Furthermore, during the said latter period, considerable money was spent on the following items, to-wit: Road building, erecting loading bins at mine, pipe lines, loading ramp at Parker R. R. station, cost of equipment, as well as cost of reconditioning various mine workings, also mine sampling and assaying.

As soon as the mines were gotten in shape, together with the bonus price received for copper, operations began to show some profit, when at this critical time, all laborers at the mine quit work in order to take higher paid jobs at a Federal project in the vicinity of Parker. For this reason the mine had to close down and no work has been done since that time.

At the time of visit, there were no records available concerning ore reserves, if any, in the mines included in the Empire holdings. However, from my brief observations, I do not believe there are any great amount of ore reserves blocked out in these mines, due to the fact that the properties have always been worked on a leasing basis, and the "leasers" generally took out all ore they developed during the tenure of their leases.

Again, such ores as are now exposed in these mines, consist of oxidized material, such as malachite, azurite, chrysocolla, cuprite, etc. Hence, this kind of ore must be shipped to smelters for treatment.

WATER

Water for mining purposes and camp use is secured ~~by~~ from nearby wells.

PROBLEMS

Mr. Harritt states he has no idea of trying to make a large mine out of this property; but that it is an ideal mine on which to carry on leasing operations, as a large number of leases could be carried on at the same time. However, he states that "leasers" cannot be attracted to this property at the present price of copper. In other words, copper would have to increase materially in price before this mine can get under way again.

Elgin B. Holt

SUPPLEMENTARY REPORT

PROPERTY OF THE

EMPIRE - ARIZONA COPPER COMPANY

AUGUST 5, 1916.

By

EDWARD J. BROOKS.
Consulting Engineer.

Los Angeles, California,
August 5th, 1916.

✓
Empire-Arizona Copper Company,
Los Angeles, California.

Gentlemen:

Under date of September 14th, 1915, the writer examined and reported upon the Empire-Arizona Group of mining claims. This report was made for Mr. C.E. Finney and associates, and was intended to cover only the geological features of the property together with the genetic and structural relations of its copper ores, so far as these could be deciphered at the time. To Mr. O.A. Knox, my associate, was left the detailed sampling and assaying of the ores exposed, and all problems related to development and operations. Mr. Knox has embodied the results of his studies in a separate report to which you are respectfully referred.

Since the date of the report just referred to the writer has made further studies of the property, being aided in this by a very considerable amount of exploratory work accomplished since the former report was penned. This work has served to confirm to a very considerable degree the conclusions reached in the earlier report referred to and to establish the commercial importance of the property from the standpoint of permanent production.

Ore Occurrence:

In taking up this important question it will be necessary first to explain somewhat in detail the geological structure involved.

By reference to the sketched cross-section accompanying this report, it will be seen that the ore-bodies in this property occur chiefly along the contacts between different members of an ancient sedimentary series which has locally been folded into a sharp anticline overturned eastwardly. This fold was formed around an axis trending about North 45 degrees East, and pitching gently to the South-west. Erosion has removed the top of this anticlinal fold leaving only the flanks and center exposed to be later covered by a geologically recent heavy flow of Olivine Basalt. This basaltic sheet has in its turn been eroded in the locality occupied by the property leaving the folded and metamorphosed sediments again exposed at the surface.

Originally the sedimentaries here involved consisted of alternating beds of shales, quartzite and limestones of probably pre-cambrian age, with perhaps some conglomerates, grits and arkose members. The series was later invaded by igneous intrusives of generally acidic type, one of which - a rather coarsely crystalline quartz-porphyry - appears to have been closely connected with the metallization of the region. This will be again referred to. During the period of deformation and tectonic movement which followed, this sedimentary

series with its enclosed intrusives was subjected to enormous squeezing pressures accompanied by widely distributed shearing of the various rock-members involved. Extensive metamorphism of the original rocks resulted in the course of which the limestones were largely silicified and marmorized where relatively pure, and converted into schists in great part where accompanied by sand and earthy materials. The shales were uniformly changed to schists and slates. The quartzite members were further crushed and recemented with silica, or sheared into highly siliceous schists. The enclosed igneous intrusives were largely converted into schists or masses of highly siliceous porphyries. All these variations may be seen in the same member at different points being schistose in one part, almost pure quartz in another and preserving its original texture and composition in still another portion. The net result of all this is to yield an apparently confused complex varying widely in composition and texture.

Surrounding this folded and metamorphosed area on the Southwest, South and extending back under the basaltic cap to the Southeast and probably East, is an extensive field of a red-gray quartz porphyry. The full extent of this porphyry is not known. It appears as a horizontally disposed sheet of undetermined thickness. It exhibits but little effect of the folding and squeezing pressure which occasioned the anticlinal structure above referred to and is evidently of comparatively recent origin. Copper minerals occur widely dispersed through the mass from which the writer inclines to the opinion that it has been intimately connected with the origin of the copper ores, more especially since these copper ores are largely found at or near its contact with the sedimentaries where ever this can be traced. There is reason to believe, however, that copper ores were introduced during the period of earlier igneous intrusion which occurred before the folding and squeezing together of the original terrane. This will be further discussed in a subsequent paragraph.

An interesting as well as commercially important circumstance is the fact that the copper ores in this property all carry an unusually high gold content. This feature is more strongly developed in those ore-bodies which occur at or near the contact with the red-gray quartz porphyry referred to above, and less so with those acidic intrusives which antedate the period of dynamic metamorphism. This is contrary to the general habit of gold occurrences in Arizona, which, with few exceptions, accompany igneous intrusives of the older geological periods. It is significant that the most notable exception to the rule is the gold occurrence in the tertiary lavas of the Oatman Region about one hundred miles north of the Empire-Arizona property. Both localities have been affected by similar and probably closely related periods of eruptive activity.

It may be safely asserted that the average value of the gold found in the copper ores of the Southwest will fall ~~with~~ under one dollar per ton, whereas, the ores of the Empire-Arizona yield an average ranging from two to eight dollars in gold per ton so far as they have been developed. By this is meant the values in the shipping product.

It would thus appear that there have been two distinct periods during which copper has been deposited in this immediate locality -- an earlier and later coincident with the two periods of igneous intrusion yielding the highly siliceous porphyries mentioned herein. The circulation of mineralizing waters in the later period appear to have followed the channels of earlier depositional flow and to have measurably enriched and enlarged the ore-bodies resulting therefrom. Such natural channels of flowage are the contacts formed between the porphyry intrusives and their containing walls as well as the crushed and brecciated contacts between the different sedimentary members along which movement took place during the folding and uplifting of the region. In addition to these numerous intersecting fissures and faults were formed along which copper ores were deposited and are now found extensively.

In the course of the folding and development of the anticlinal structure from more or less horizontally disposed sedimentary beds, differential stresses both tensional and compressive, or torsional, are always developed causing the slipping of the beds upon one another with attendant shearing, crushing and brecciation of the slipping surfaces. All this results in more or less open and permeable zones of flowage. Where the composition of the rocks involved is such as to favor deposition of the metals contained in the underground circulation, as for example and pre-eminently limestones and limey shales, ore-bodies have been developed. The Empire-Arizona, in its many ore-bodies exposed and undergoing development, exemplifies the foregoing considerations to an exceptional degree.

All the ores thus far exposed on the property are in oxidized form, consisting chiefly of the carbonates Azurite and Malachite, Melaconite or black oxide, Cuprite and occasional silicates. As the primary or original deposition was in the form of the sulphides, these will undoubtedly be found at water-level or a little below it. The water-level referred to is, of course, that of the permanent standing ground water which, in the writer's judgment will be found at a depth of between five and six hundred feet, or about one hundred feet higher than the level of the Colorado River which flows from two to three miles to the west of the property.

Accompanying the second period of copper deposition, gold was also deposited accompanied by silicification of the rocks affected. This conclusion is at variance with that advanced concerning the origin of the gold in the earlier report and is the result of a further study of the ores of the locality.

Carnation Ore-body:

The ore-body at the Carnation Incline, ideal cross-section of which is hereto attached, appears to follow down along the steeply pitching contact between limestone and the Red Porphyry. The limestone was here a very impure one containing much admixed sand and clayey material and has been almost entirely transformed into schist along the contact as is also the porphyry, so that the ore occupies a well defined schistose zone. Occasional patches and irregular masses of unaltered limestone are found in the schist clearly evidencing its origin. The schistose margin of the porphyry passes gradually into fresh, unaltered porphyry a little distance out from the original plane of contact.

Here as general throughout the Southwest, the copper is appreciably concentrated at and near the surface through capillary action. Surface waters working along down the contact take up copper in solution and this is in part brought back to the surface and redeposited in the same manner that salts of the alkalis and alkaline earths are brought up and form crusts covering the soil in many localities. This process goes on until a very considerable amount of copper is gathered at and for a short distance below the surface forming frequently high grade surface ores. The balance of the copper taken into solution by the slowly sinking meteoric waters continues on down until it reaches the permanent water level and is there redeposited on the original sulphides or primary ores which are thus also enriched to a very considerable extent. The process is susceptible of all degrees of variation in intensity.

Between the zones of surface enrichment and secondary sulphide enrichment at the permanent water-level, there is usually a zone of so-called impoverishment which has been nearly or quite robbed of its original copper contents.

As is usual where bodies of copper ore out-crop in the Southwest, the ore immediately at the surface and for a considerable depth below is richer than that which lies immediately below. This is due to the taking into solution by meteoric waters of appreciable quantities of copper in the upper portions of the out-crop, part of which is carried upwards by capillary action and redeposited. This is commonly known as capillary concentration and is a familiar phenomenon in all arid regions. In the Carnation ore-body there is a very considerable tonnage of such ore of good commercial grade extending from the surface down to a depth of approximately one hundred

and fifty feet. Below this is a zone of impoverishment from which the copper has largely been leached, a part being carried upwards as just explained and the balance migrating downward to the permanent ground-water level where it may be expected to have enriched the original, primary sulphides forming the so-called secondary sulphide enrichment. The latter is apt to be by far the richer and more important of the two forms of concentration. The existence of numerous and more or less open water courses in the Carnation workings, together with the secondary products of leaching action strongly indicate that this process has been effective. The water level in the Carnation has not yet been reached but in the zone of capillary concentration at the top, commercial ore sufficient to sustain mining operations for a long time may be confidently expected.

At a depth of from five hundred to seven hundred feet the zone of secondary sulphide enrichment should be encountered in the writer's judgment.

✓ Walters Incline:

Very nearly the same conditions exist at the Walters Incline that have just been described in the Carnation workings except that the ore zone appears to follow a schistose contact between limestone and micaceous schist derived from a previously existing bed of shales. With the exception just mentioned, what has been said of one may be equally well applied to the other. In fact all the many ore-occurrences on this property are of precisely the same nature, differing only in structural relations and petrologic members involved.

✓ Treasure Hill:

This is a large, massive hill composed, in the main of altered and silicified limestone with some included schistose members, lying just Northwest of a line connecting the Carnation and Walters workings, about midway between the two.

The rocks composing this hill have been extensively shattered and sheared by dynamic stresses incident to the period of folding. Copper bearing waters have found their way into and through it in all directions resulting in what appears to be the thorough impregnation of the entire mass from the surface to an indefinite depth. A large quarry face has been opened on its Northwesterly side which discloses copper ore throughout. This can be cheaply broken by quarry methods and possesses a sufficiently high tenor in copper to make it a very important source of ore supply. Around on the other side of the hill a second face of excellent ore has been opened, the full extent of which is as yet undetermined. There is good reason to believe that practically the entire mass of this hill is ore-bearing and can be mined when properly opened and equipped. If, as the writer believes, this proves to be the case the available tonnage of oxidized, siliceous copper ores will run into the hundreds of thousands and will be

alone capable of sustaining mining operations for a long time to come on a heavy daily, tonnage basis.

✓ Eagle's Nest:

Brief reference was made to the ore showing in the Eagle's Nest Claim in the former report. This locality has produced a considerable tonnage of very rich ore in the past. The deposit appears to be about five hundred feet long and follows a contact between a very large dyke or sheet of quartz-porphyry and altered, silicified and somewhat schistose limestone. It is situated on the Northwesterly dipping flank of the anticline about one half mile or so Northwest of the present campsite. Only the surface ores have been mined and these are associated with a gangue consisting essentially of specular hematite, altered limestone and some earthy oxides. The ore still appears in the bottom of the old workings and an incline shaft sunk on the contact, now caved and inaccessible, is said to have disclosed the same ore to a depth of fifty or sixty feet below the bottom of the old stopes.

There is every reason to believe that this ore body will be found to continue down along the contact to a very considerable depth, and that, when opened it will yield a large tonnage of exceptionally rich copper ore, the profits on which can be quickly realized. A shaft is now being sunk on this ore-body to open the contact at a depth of two to three hundred feet.

The presence of the specular hematite in this occurrence points to contact metamorphism due to the influence of the quartz porphyry on its enclosing walls and to the influence, at least measurably, of this porphyry in the genesis of the ores. If this conclusion be well drawn, the expectancy of continuation of the ore to great depth is greatly strengthened. This, together with the high values shown in the past and now obtained, make the Eagle's Nest locality one of great commercial importance to the future operations of the property and one inviting immediate attention. More will be said in this regard in describing the showing on the Double Eagle Claim now to be taken up.

Double Eagle:

As the Eagle's Nest ore-body lies along the Southeasterly contact between the quartz-porphyry and limestone, the Double Eagle ore-body follows the opposite contact on the Northwest side of the dyke or sheet of porphyry. (See sketched cross-section attached).

The Double Eagle ore-body shows at the surface for a distance something like two thousand feet along the contact and dips conformably with the contact to the Northwest. The ore occurs in the limestone out from the contact and appears to have a width of upwards of twenty feet or more. In the Eagle's Nest the porphyry forms the hanging wall of the ore zone. In the Double Eagle the porphyry forms the foot wall of the ore zone. The ore

appears to be exactly similar to that in the Eagle's Nest both in respect to the copper minerals and the gangue in which they are found. This occurrence emphasizes the relation of this particular porphyry intrusive to the origin of the ore both in this and the Eagle's Nest occurrence. Both ore zones dip steeply to the Northwest following the contacts down the flank of the anticline. The structural relations are such as to indicate a very considerable depth to which the ore-zone may be expected to go -- certainly well below the level of the permanent ground-water.

The Double Eagle ore-body has been opened on its southerly extension by a short tunnel and the nature of the ore and its tenor in copper at this point determined. The ore is a very fine quality and there is every reason to believe that it will produce a very great though indefinitely large tonnage comparable in value with the ores of the Eagle's Nest side. Here as elsewhere on the property conditions for leaching are favorable with attendant two zones of enrichment, one at and near the surface and the other in the primary sulphide zone at the ground-water level or a little below it. The upper zone of capillary concentration in the copper mines of the Southwest very generally may be taken as a safe index to the size and extent of the zone of secondary enrichment below, and if this rule is applied here, an important and extensive body of enriched secondary sulphide ores at or immediately below the permanent ground-water level may be reasonably inferred affording full warrant for its development.

Viewed from every angle the Eagle's Nest and Double Eagle ore occurrences are among the most, if not the most important showings upon the property and promise, when developed, to sustain mining operations on a scale of profit comparable with any of the great copper producing mines of the Southwest.

The distance from contact to contact across the porphyry dyke or sheet at this point is in the vicinity of six hundred feet. An inclined shaft centrally located between the two contacts and sunk to water level would develop both the Eagle's Nest and Double Eagle ore-bodies through a series of cross-cuts run at different levels. The shaft should, of course, conform to the dip of the formation as nearly as possible.

The locality is accessible and the physical surroundings favorable to operations.

✓ Gray Eagle:

Farther to the Northwest other important occurrences of copper ore are found. These are now being worked by leasers who are taking out and shipping a fine grade of commercial ore.

Nature of the ore deposition.

As has been said, the ores so far opened and exposed

upon this property are all in oxidized forms and consist of carbonates, and oxides with occasional chrysocolla, a silicate of copper. Cementation and crustification are common, especially in the case of the carbonates which coat fragments of the country rock, and fill seams and fracture planes as well as other cavities of various kinds. Metasomatic replacement of the limestone and limey schists is frequent and extensive. In many places the clear, well crystallized forms of quartz in crusts and druses lining cavities and filling small veinlets appear, and where this is so, the gold values appear more prominently developed. Quartz also occurs in irregular, cellular, amorphous forms indicative of deposition from thermal waters and these too carry pronounced gold values which can frequently be seen in the free, metallic state. This is especially true at the Walters Incline where there is a strong probability that the gold may become the more important metal as regards the tonnage value of the ore. There is, in fact, reason to believe that development may reveal ore shoots in which the gold will constitute the chief value, exclusive of any copper associated with it.

A similar condition has been found in the Carnation workings where assays have occasionally returned more than an ounce of gold per ton.

All the ores so far found in the property are clean and docile to treatment containing no refractory accessories.

Aside from the specular hematite referred to in the Eagle's Nest and Carnation workings, residual earthy iron oxides, both hematite and limonite, with probably some siderite occur very generally in the gangue minerals of the ore. These minerals are left behind by the oxidation and subsequent leaching of the original primary copper-iron sulphides which constituted the original deposition. They are in the nature of a gossan and afford confirmation of the belief, previously expressed, that secondarily enriched sulphides will be found below the oxidized and leached zone at or near the permanent ground water level.

The copper ores in this property are characteristic of those generally found in a limey formation. They are found in irregular masses of varying size within the body of the limestone or limey shales. These so-called chamber deposits are connected by a network of generally well defined water courses extending from one to another. These water courses afford reliable guides in locating these ore chambers, and mining is thus greatly facilitated. Often the water courses themselves are large enough to afford substantial tonnages of ore as they are being followed.

If we exclude entirely from consideration the ores of the deeper, secondary sulphide levels and confine ourselves to the oxidized ores at and near the surface, these alone will afford the basis for mining operations on an extended scale for a long time to come. When to this is added the promise of the deeper explorations, the future of the property appears very

Empire-Arizona,
Page Nine.

bright indeed. It is undoubtedly one of exceptional promise and merit, and well worthy of the fullest exploitation.

Remarks:

The purpose of the present report is to extend and supplement the report of September 14th, 1915, and is to be read in connection therewith.

(Signed) Edward W. Brooks,
Consulting Engineer.

from COPPER REPORT NO. 1, DECEMBER 23, 1942, by Earl F. Hastings, for
Copper Branch, War Production Board.

9.

EMPIRE, Frank W. Royer, Leases, Red Mountain, California

The property is located in the Cienega Mining District, Yuma County, Arizona. Development consists of four shafts : 125', 300', 300' and 650' deep. Shafts and lateral workings total 4000 feet.

The ore is oxidized and must be shipped directly to a smelter. From April 1941 to May 1942, 956 tons of mine run ore was shipped during a period in which major repair work was being performed. The later shipments yielded a profit, but one insufficient to interest the groups of leasers who were mining there and they left for the high wages being paid on a Federal project at Parker.

A special copper price concession would make sub-leasing sufficiently interesting that leasers would return to the mine and a steady small production of relatively high grade ore result.

from COPPER REPORT NO. 2, DECEMBER 23, 1942, by Earl F. Hastings, for
COPPER BRANCH, WAR PRODUCTION BOARD.