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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.

EMERALD ISLE COPPER CO.

District: Hualapai, Cerbat Range.

Location: Five miles southeast of Chloride, Arizona. One mile east of the Santa Fe line from Kingman to Chloride.

OWNERS: Emerald Isle Copper Co., Mr. A. J. Braley, Pres.
Essex Bldg. St. Paul, Minn. Mr. R. C. Jacobson, Mgr. Kingman, Arizona.

Visited August 15, 1919.

Notes: 11 claims as follows: Jimtown Copper, Jimtown Copper No. 1, 2, 3, and 4; Hemes and Hemes No. 2 and No. 3; Copper Hill and Copper Hill, Copper Hill and Copper Hill No. 1, 2; and Jupiter.

GEOLOGY:

Ore consists of an agglomerate, the cementing material of which is either copper silicate, copper carbonate or insoluble copper sulphate. This agglomerate occupies a position related to old Tertiary drainage channels and not to present surface drainage of the district. Source of copper probably the hills to the east, where there is indication on the Porphyry Copper Fields property of a large low grade semi-disseminated copper deposit.

The estimates of tonnage which follow are within reason, considering the amount of work done on the property, altho there is a possibility of opening up by a small amount of exploration, consisting of shallow pits a much greater tonnage, both on the Emerald Isle property and on the area a mile south of the Emerald Isle where there is every indication of another deposit of similar agglomerate.

DEVELOPMENT. Former owners developed property by a series of test pits and glory holes, one of which shows a depth of 35' of copper bearing agglomerate, but most of which merely served to expose the upper surface of the ore without penetrating same to any depth.

EQUIPMENT: A forty to sixty ton acid leaching plant, consisting of 8 tanks using decantation system, and since ore carries a very small amount of lime, the process was very successful, altho power and sulphuric acid costs were high. A fifty cell electric precipitation plant, with capacity of 1800 to 2500 pounds of electrolytic copper per day.

Ore was hoisted on incline from Glory Hole to top of crusher building, crushed after picking out the large boulders & screened thru $\frac{1}{2}$ inch screen. From this point fed to leaching vats by means of hand tramming. Tanks were emptied in same way.

2-

Camp equipment consists of ten tent houses and a cook house, also office and laboratory. In all the camp will accommodate thirty men. All buildings, shops, equipment etc. are in good condition.

PRODUCTION

During 1918 the Company mined 2340 tons of ore, assaying 2.21% copper, and from this produced a total of

Next page

89,021 pounds of electrolytic copper, showing an extraction of 36.7 pounds of copper per ton of ore treated. They estimate a cost of 13.73 cents per pound, though there was no opportunity of checking this cost.

- Map No. 1 - Claim map of property
- Map No. 2 - Ore bearing area with probable extension marked AAAA and showing blocks of ground on which tonnage was estimated.

<u>Block</u>	<u>Depth</u>	<u>Area</u>	<u>Tonnage</u>
1	3 feet	1800 Sq.Ft.	360
2	3 "	2460 " "	492
3	3 "	3200 " "	640
4	4 "	3000 " "	733
5	4 "	2850 " "	700
6	20 "	3800 " "	5066
7	20 "	3600 " "	3600
8	9 "	3600 " "	2160
9	6 "	3600 " "	1440
10	9.5 "	3600 " "	2280
11	4 "	3600 " "	940
12	2 "	1800 " "	175
13	2 "	3600 " "	480
14	6.5 "	3600 " "	1560
15	9 "	3600 " "	2160
16	6 "	3000 " "	1440
25	12 "	600 " "	480
A	14 "	2000 " "	1933
B	9.5 "	1800 " "	1140
C	27 "	3000 " "	5400
D	24 "	3600 " "	5700
E	25 "	2600 " "	6000
F	25 "	2000 " "	3333
G	15 "	2400 " "	1600
H	28 "		
I	15 "	3600 " "	3600
J	8 "	3600 " "	1920
K	8 "	3600 " "	1920
L	8 "	1500 " "	800
M	8 "	1500 " "	800
O			
P	15 "	1000 " "	1000
Totals	10.83	910,980" "	60,890 T

Estimate based on 15 Cu. Ft. per ton of ore

Conclusion

Property presents possibilities for the inatallation of a Volatilization plant, and since power costs are high, the present owners might be induced to make a shipment of a few cars of ore for a test run, with a view to installing a plant.

If the owners could be persuaded to do a small amount of work on the property, I believe a tonnage greatly in excess of their present estimates might be exposed in which event they might consider entering into an agreement for the construction of a Volatilization Plant.

La Camp

DISTRICT Mineral, Arizona, Cerbat Range.

PROPERTY Emerald Isle Copper Company.
Blanket deposit of copper carbonates of unknown area.

LOCATION 4 miles from Mineral Park, 7 miles from Chloride.

OWNERS &
OPERATORS Emerald Isle Copper Company,
R. C. Jacobson of Kingman, Arizona--General Manager.

DATE VISITED August 17, 1918 by J. L. White.

NOTES

The mine is situated in the flat, one mile west of the Cerbat Range, and consists of a deposit of copper carbonates cementing and impregnating the wash. The Wash is mostly water worn fragments of porphyry.

The carbonates have been exposed in cuts and pits for 1000 feet in length and for over 100 feet in width in some places. Even the roughest dimensions of the ore body are not known. The greatest depth exposed at present is in the quarry where the ore for the test plant was mined. Here it shows 15 feet, and a pit 8 feet deep in the bottom is said to have been in ore. In several pits the ore was 8 feet deep with ore in the bottom. Only in the east end was the copper pierced at 5 feet. The intersection of a travertine deposit with several dykes of porphyry is supposed to have had considerable bearing on the forming of the deposit.

Forty-seven pounds per ton of ore treated were recovered in the test plant, and the ore is said to carry from 25 % to 5 % copper. A test plant was operated for about one year, and a scheme of treatment worked out. The method to be used is to follow the practice at New Cornelia without regenerating the solution with SO₂.

A leaching plant of 100 tons is being built. The ore is to be crushed 3/4 mesh in crusher and rolls, and leached in wooden tanks with a 10% solution of sulphuric acid. The copper is to be recovered electrolytically as refined copper and a small amount of cement copper.

There appears to be a plentiful supply of ore, the treatment is the problem.

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File

Muffle Tests on Emerald Isle Copper Ore

Humboldt, Arizona May 13th, 1920.

Head Assay

<u>Cu</u>	<u>Insol</u>	<u>Fe</u>	<u>CaO</u>
2.15	87.8	2.6	3.0

Charges

<u>Test</u>	<u>Wt Ore</u>	<u>Wt Salt</u>	<u>Time</u>	<u>Temp</u>	<u>Wt Calcine</u>	<u>Assay Calcine</u>	<u>Extraction</u>
148	50 G	1 1/3 G NaCl	35 M	900	43.3	0.79	68.2
		1 G CaCl ₂	35 M	900			
149	50 G	"	"	"	48.6	0.96	56.6
			30 M	920-950	48.2	0.44	80.1
153	50 G	"	30 M				

Theoretical NaCl = 1.88 Grms for 50 Gms Ore.

January 4, 1927.

Mr. Harry V. Welch,
1016 West 9th Street,
Los Angeles, California.

Dear Welch:

Under separate cover I am sending you a sample of the ore from the Emerald Isle near Kingman. This represents an average of a carload shipment and analysis by our Assayer is as follows:

Gold, Trace; Silver, Trace; Copper 9.30%; Insoluble 67%; Iron 1.8%;
Lime 1.7%, Manganese 2.4%.

The copper occurs probably as a hydro-silicate and there is also some carbonate and possibly some oxide present. I think the ore should volatilize readily unless the manganese or other constituent makes it fuse at too low a temperature, and with no values to recover other than copper the metallurgy should be comparatively simple.

This property is being operated by some good friends of ours, and they are developing quite a large tonnage of material considerably lower in grade than represented by the sample. I would judge that they would produce quite cheaply an ore of similar character but averaging about 3% copper and it would merely be a question as to whether leaching or volatilization could recover the values most efficiently and economically. The latter process would have some advantage as the mine is located quite a distance from any water supply, but only a few miles from the Chloride-Kingman branch of the Santa Fe Railroad.

Mr. Welch, - 2.

January 4, 1927.

I am going to Kingman in a few days and will look over this property and I would be greatly obliged if you could run some tests just as quickly as possible without inconveniencing your other work and see if you think it would be worth while to follow up the matter further. The owners of the property are well financed, and quite prepared at their own expense to build a treatment plant of one kind or another, and if we can convince them that our process is superior to leaching it might be possible to arrange with the Trustee of the bankrupt Signal Mines Company to remove and sell the kiln and other equipment from which we should then hope to derive some ready cash, at the same time obtaining without expense to us a commercial test on the C.-V. process.

Let me hear from you on this matter at your convenience.

The sample of ore which Patton sent me, as I mentioned in my last letter to Walter, has just been analysed and shows Gold, .01 oz.; Silver 11.8 oz.; Copper 46.90%. This is chalcocite and resembles very much the high grade ore found in the properties around Senorito, New Mexico, with which I previously compared it. Of course this represents a picked sample and does not mean anything except that he has some copper on his property.

Sincerely yours,

GMC-s

For additional assay results, see
assay map.

E.E.C.

EMERALD ISLE

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

13 unpatented claims 4 miles south of Chloride, Arizona, and on good road.

A large mineralized zone in conglomerate or cemented river gravel overlying porphyry into which the solutions did not penetrate. Mostly chrysocollar and black oxides which require leaching or volatilization to recover the values.

High grade ores resulting from a ^{re} concentration of these minerals have been mined and shipped with 6 to 10% copper, but the main body of ore will not average better than 3% copper (no gold or silver) but might amount to 700,000 tons and there are chances of developing a large additional tonnage of 2% ore which at present can only be classed as possible.

Mining would be cheap as the ore comes right to the surface and leaching gives good extraction but would involve a large initial plant expense.

Gross value of ore @ 3% (14¢ copper) is \$8.40 per ton and \$7.50 might be recovered as copper cement. Terms would probably be reasonable at present but title would require careful checking.

For anyone who has confidence in the future of copper this looks like a good opportunity and can be recommended for further investigation.

I personally examined this mine on several occasions and twice prior to 1929 tried to take it over on bond and lease but could not make a satisfactory deal with the owner.

EMERALD ISLE COPPER CO.

Mineral Park District, Cerbat Range, Arizona.

Location: 4 miles from Mineral Park, 7 miles from Chloride.

Owners & Operators: Emerald Isle Copper Co. R. C. Jacobson of Kingman, Arizona, general manager.

Visited August 17, 1918 by J. L. White.

The mine is situated in the flat, one miles west of the Cerbat Range and consists of a deposit of copper carbonate cementing and impregnating the wash. The wash is mostly water worn fragments of porphyry.

The carbonates have been exposed in cuts and pits for 1000' in length and for over 100' in width in some places. Even the roughest dimensions of the ore body are not known. The greatest depth exposed at present is in the quarry where the ore for the test plant was mined. Here it shows 15', and a pit 8' deep in the bottom is said to have been in ore. In several pits the ore was 8' deep with ore in the bottom. Only in the east end was the copper pierced at 8 feet. The intersection of a travertine deposit with several dykes of porphyry is supposed to have had considerable bearing on the forming of the deposit.

47 pounds per ton of ore treated were recovered in the test plant, and the ore is said to carry from 25 to 5% copper. A test plant was operated for about one year, and a scheme of treatment worked out. The method to be used is to follow the practice at New Cornelia without regenerating the solution with SO_2 .

A leaching plant of 100 tons is being built. The ore is to be crushed 3/4 mesh in crusher and rolls and leached in wooden tanks with a 10% solution of sulphuric acid. The copper is to be recovered electrolytically as refined copper and a small amount of cement copper.

There appears to be a plentiful supply of ore, the treatment is the problem.

who never knew at what moment
savage beasts or equally savage me

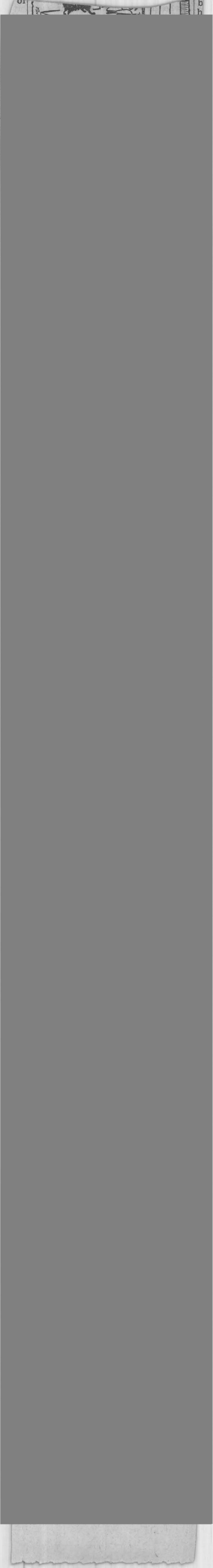
Pickin' Down *mine file*

Emerald Isle Copper Mine Is Reopened

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Arg. Republic 11/23/47



COPY FOR

C.O. file
SOUTHWEST METALS COMPANY

HUMBOLDT, ARIZONA

August 12, 1926

Carl G. ~~Krook~~,
Kingman, Arizona.

Dear Sir:

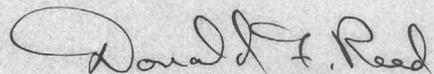
The result of our analysis of the ore from the Emerald Isle was as follows.

Au.	Ag.	Cu.%	Ins.%	Fe.%	Mn.%	Gross Value Ton.
Nil	Nil	7.60	61.4	1.8	4.5	\$22.04

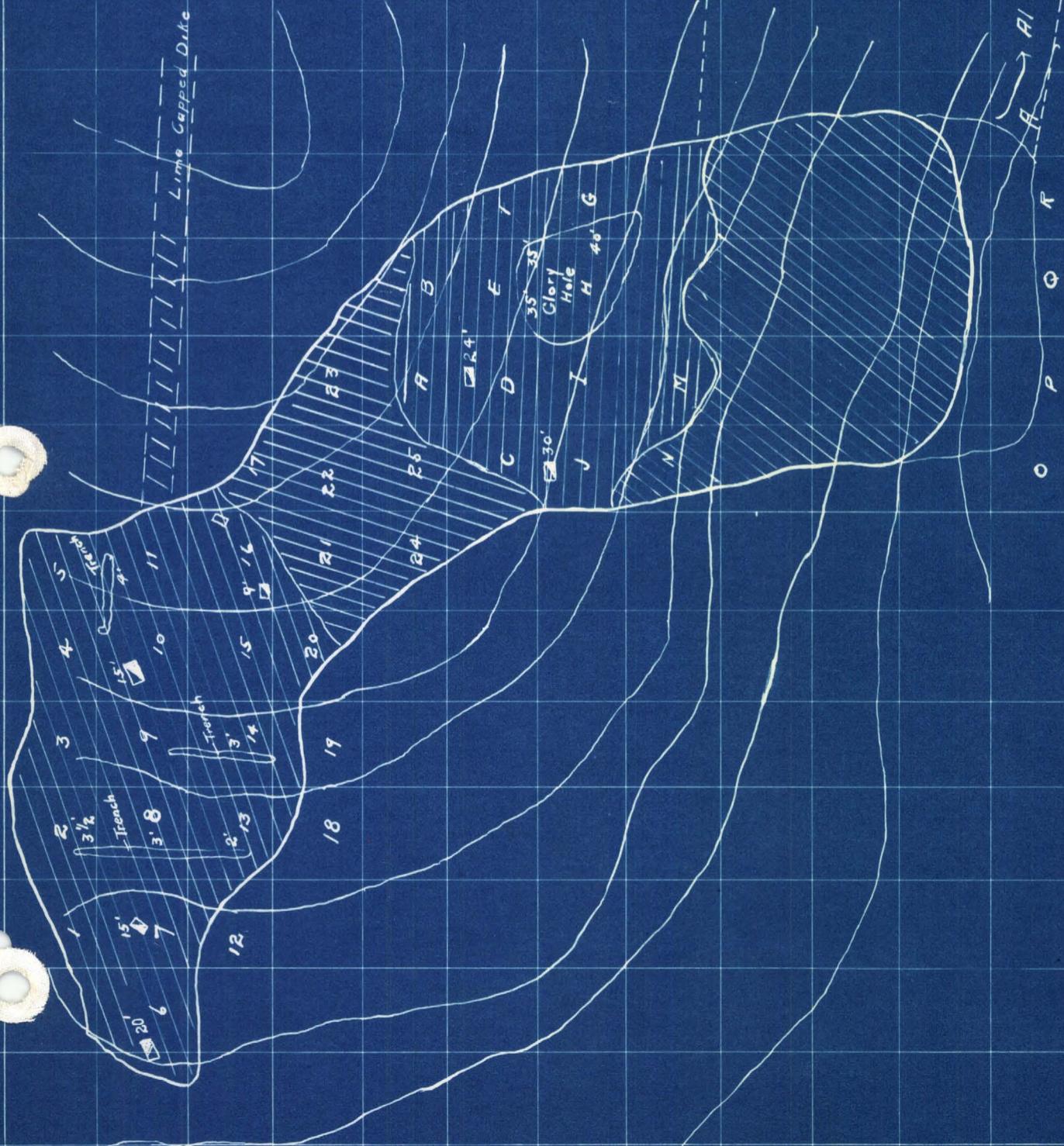
The above value considers all of the copper contained in the ore, at the full market price, in this instance assumed at 14.5¢ per pound.

We recover, and pay for, 92% of copper contained, at the market less three cents per pound. With a smelting charge of approximately \$4.00 per ton, the net value to the shipper would be, F. O. B. Humboldt, about \$12 per ton. Freight from Kingman on this class of ore would be \$2.00 per ton.

Very truly yours



Donald P. Reed
Ore Purchasing Agent.



EMERALD ISLE COPPER CO.
60' Squares

D. Z. 27

*2 days
Cupm with carbon*

note by S. M. C. Cid 37

EMERALD ISLE 6/16/37 ~~See mines file~~

13 unpatented claims 4 miles south of Chloride, Ariz.
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A large mineralized zone in conglomerate or cemented river gravel overlying porphyry into which the solutions did not penetrate. Mostly chrysocolla and black oxides which require leaching or volatilization to recover the values.

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LOCATION 4 miles from Mineral Park, 7 miles from Chloride.
OWNERS & OPERATORS Emerald Isle Copper Company,
R. C. Jacobson of Kingman, Arizona--General Manager.
DATE VISITED August 17, 1918 by J. L. White.

NOTES

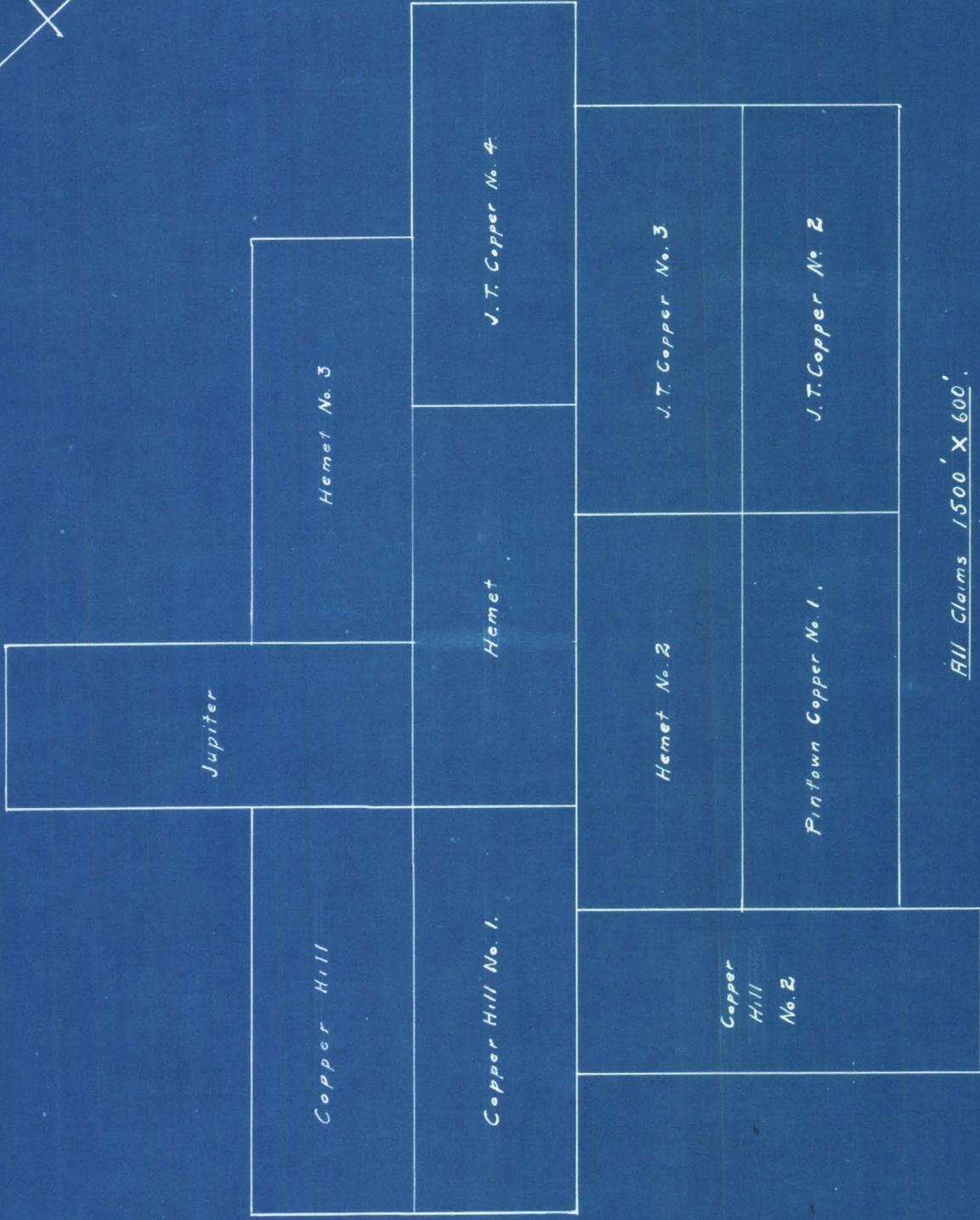
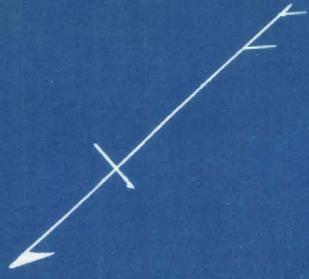
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All Claims 1500' X 600'

d. G. Coconino Copper

May 12, 1947

Mr. T. O. Evans, Mining Engineer
The Atchison, Topeka and Santa Fe Railroad Company
121 East Sixth Street
Los Angeles 14, California

RE: Emerald Isle

Dear Mr. Evans:

I have received yours of May 10, your file No. 5.0050 and thank you for sending me a copy of the item from the Wall Street Journal referring to the above named property, and it happened that only a day after we met here in Phoenix, the local papers had a somewhat similar news item in which they referred to the acquisition of the Emerald Isle property, and also particularly to a large area of copper silicate in sandstone located some 100 miles north of Flagstaff and which used to go by the name of a Coconino Copper Company, and I was familiar with it a number of years ago.

Apparently the Lewin-Mathes Company of St. Louis and perhaps also the Montsanto Chemical Company have been looking for some time for a large deposit of oxidized copper ore and have now picked out the area at White Mesa (Coconino Copper) as well as the Emerald Isle and according to the papers they are going to spend a great deal of money in developing these showings and treating the ore by what is known as the Mardun process.

Your company will naturally be interested since both of these locations are on your line of railroad, but I think that it would be wise to watch the developments for some months before attempting to draw any conclusion as to the final outcome of these two ventures which so far seem to be given more publicity by the daily press than by any of the responsible technical journals.

With personal regards and hoping to have the pleasure of seeing you this way again before very long, I remain,

Yours very truly,

GMC: IM

[Handwritten signature]

Arg. Republic
May 9th

Copper Resources ⁴⁷ Will Be Protected

Twin moves to protect raw copper resources which may mean the ultimate investment of several million dollars in Arizona plant facilities were announced here yesterday by the Lewin-Mathes Company of St. Louis, Mo., and Monsanto, Ill., through Phoenix agents.

First was the transfer of 28 mining claims in the White Mesa area 25 miles northeast of The Gap, and 110 miles north of Flagstaff, on a lease, with option to purchase, to the eastern firm of copper fabricators.

The deal was handled by Darlington, Hastings and Thorne, Phoenix industrial consultants. Extensive exploratory drilling operations on the property are to begin at once, they stated, with a probability that new processing plant and camp facilities to cost an estimated \$500,000 will be under way within 90 days.

SECOND DEVELOPMENT revealed exploratory drilling operations on a wide scale at the Emerald Isle mine at Kingman. Here, the consulting firm said, an electrolytic plant will be constructed, if developments warrant it, to cost a minimum of \$500,000, with a possible future maximum development cost of \$2,000,000.

The White Mesa mining area, according to an announcement by Thomas D. Darlington, head of the consulting firm and agent for the St. Louis principals, comprises approximately 35 square miles of ore body. The greater part of this, Darlington said, will run about 1 1/4 to 1 1/2 per cent copper in open pit mining.

Some high-grading, running in excess of two per cent copper, already has been done on the area, he stated. But through usage of a new air-suction mining process, perfected by the Mardun Company of Clemenceau, Ariz., exclusive rights to which have been obtained by Lewin-Mathes, any ore deposits in this relatively arid section running above one per cent

copper can be profitably mined, he added.

THE 28 CLAIMS transferred are all on Navajo Indian reservation land. Previous holders of the claims were E. G. Archer and K. E. Anderson, both of Los Angeles, and Claude F. Thompson, an Indian trader whose post is at the claim site.

The Emerald Isle property, recently acquired by Lewin-Mathes, has been worked periodically for some 10 years, Darlington said. A camp and leaching plant already have been built there, but lack of acid temporarily has forced the closing of the plant, he revealed. Reopening should come, he said within the next 10 days.

"New exploratory drilling, both deeper and in a wider area, now is in process," Darlington declared. "If we find what we expect to find, an electrolytic plant will be constructed immediately.

"The whole development is, of course, designed to protect the copper resources of the Lewin-Mathes interests," he continued. "Copper obtained will be shipped to the Monsanto plant for manufacture."

Due to an unusual sandstone formation in the White Mesa area, an entirely new drilling process will be utilized, Earl F. Hastings, another member of the consulting firm, said.

Red Cross Offers Advanced Aid Class

A new Red Cross advanced first-aid class will start at Red Cross Chapter headquarters, 213 North First avenue, next Tuesday night, according to Russell Bergstrom, chairman of the Red Cross First Aid committee, Maricopa county chapter.

Any person now holding a standard first aid card, with instruction completed within the last three years, may attend, Bergstrom said.

Calvin

The Atchison, Topeka and Santa Fe Railway Company

DEPARTMENT OF MINERAL RESOURCES

Telephone Mutual 0111

~~XXXXXXXXXX~~

Please refer to

File No. 5.0050

~~XXXXXXXXXXXXXXXXXXXX~~

~~510 South Main Street~~

T. O. EVANS,
Mining Engineer

Los Angeles, ~~12~~ California
121 East Sixth Street
Zone 14

May 10, 1947

A 5/11/47

Mr. G. M. Colvocoresses
1102 Luhrs Tower
Phoenix, Arizona

Dear Mr. Colvocoresses:

As I promised you yesterday when in your office, I am sending you the following item quoted from the April 24 issue of the Wall Street Journal (Pacific Coast Edition).

"COPPER PROPERTY LEASED--Lease of the Emerald Isle copper properties, 15 miles north of Kingman, Ariz., was announced by Darlington, Hastings & Thorne, industrial consultants, to eastern interests. The price was not given.

"A crew has started work on rehabilitating the mine so that it may be put on a production basis and a 500-ton-a-day leaching plant on the property likewise is being prepared for operation. The property had been idle for several months.

"Negotiations were completed last month by Earl F. Hastings, representing the former owners. These followed an engineering survey made by the Missouri School of Mines to determine a maximum of copper that might be expected from the mine, all of which will be used by an eastern fabricating firm.

"The mine will be operated by Robert Payne, its former production superintendent."

I want you to know that I appreciate the information and the courtesies extended to me while at your office, and I am hopeful that I may have the pleasure of meeting you in Los Angeles shortly.

With kindest personal regards.

Yours truly,

T. O. Evans

Mining Engineer

MINING LEASE AND OPTION

Ernest J. ...

THIS LEASE AND OPTION, Made the 27 day of September, A.D. 1926, between EDITH B. DOWNIE, of Minneapolis, Minnesota, first party, and E. E. CAMPBELL, of Kingman, Mohave County, Arizona, second party, WITNESSETH:

That first party, for and in consideration of the rents, royalties, payments, covenants and agreements hereinafter reserved, and by said second party to be paid, kept and performed, has let and by these presents does let unto said second party, all of those certain unpatented lode mining claims, together with all the machinery, appliances, equipment, tools, buildings and improvements thereon, or thereunto belonging, situate in the WALLA-PAI MINING DISTRICT, Mohave County, State of Arizona, the names of which, and the books and pages where the location notices thereof appear of record in the office of the Recorder of said Mohave County, are as follows, to-wit:

Price 25,000

<u>NAME OF CLAIM</u>	<u>BOOK</u>	<u>PAGE</u>
COPPER HILL - - - - -	WW - - - - -	149
COPPER HILL NO. 1 - - - - -	WW - - - - -	150
COPPER HILL NO. 2 - - - - -	WW - - - - -	151
JIMTOWN COPPER NO. 1 - - - - -	KK - - - - -	546
JIMTOWN COPPER NO. 2 - - - - -	KK - - - - -	547
JIMTOWN COPPER NO. 3 - - - - -	KK - - - - -	548
JIMTOWN COPPER NO. 4 - - - - -	KK - - - - -	549
HERMES - - - - -	Y - - - - -	463
HERMES NO. 1 - - - - -	GG - - - - -	403
HERMES NO. 2 - - - - -	AA - - - - -	191
JUPITER - - - - -	Y - - - - -	464
ACQUARIUS - - - - -	SH - - - - -	208

TO HAVE AND TO HOLD, unto said second party for the term of 99 years from the date hereof, expiring on the 26th day of September A.D., 2025, unless sooner forfeited or

Emerald Isle Mine - File

CONTENTS OF FILE OF G. M. COLVOCORESSES
ON EMERALD ISLE MINE NEAR CHLORIDE, ARIZONA

Report by W. V. DeCamp) Both of these engineers were in
Report by J. L. White) my employ at the time they made
these examinations.

Report by E. E. Campbell 1927 with complete record of
samples and assay map of 100' level.

Survey and Assay Map of workings by E. Ross Householder.

Print of mining claims

Print of Surface workings and outline of ore body.

Metallurgical tests on ore.

Record of some shipments to Humboldt.

Lease and Option from Edith B. Downie, owner to
E. E. Campbell, 1927.

Comment by G. M. Colvocoresses based on personal visits
to mine and reports of other engineers.

LAW OFFICE OF
Carl G. Krook
POWERS BUILDING
Kingman, Arizona

W 6/22-37

Subject

Emerald Isle Mine

June 18, 1937

Mr. George M. Colvocoresses
1102 Luhrs Tower
Phoenix, Arizona

Dear Mr. Colvocoresses:

I wonder how I can square myself for not answering your inquiry of April 21st last long before this.

Anyhow, at the time I received your letter I was planning on a trip to Phoenix in connection with matters pending before the inheritance tax commissioner, but Court and office work have constantly intervened to such an extent that I have not been able to fix a date until now, and I expect to be in Phoenix next Monday.

I have not been in touch with the conditions at the Emerald Isle. My last letter from Mrs. Downie is dated September 2, 1936, and at that time her address was 619 Radcliffe, Pacific Palisades, California. Just what interest she has in the property now I do not know.

The other day I ran across a report on the Emerald Isle, written by Mr. Campbell on January 27, 1927, and I am enclosing herewith a copy thereof, which you may keep.

I will suggest you write Mrs. Downie direct and if I can be of help in any way, please do not hesitate to write me, and I promise to be more prompt.

With kind regards.

Yours truly,

Carl G. Krook

CARL G. KROOK

HA
Enc.

Operated by ^{Carl G. Krook} Chan in 43 + 44

Review copy to W

REPORT
on
EMERALD ISLE COPPER MINE

*Send copy to Richard J
C-S & R in 1940*

REPORT
on
EMERALD ISLE COPPER MINE

The following report is submitted on mining property, formerly owned and operated under the name of the EMERALD ISLE COPPER COMPANY. The details of this report are based on a personal examination of the property by the writer, embodying the results of a two months development campaign, together with the records of former examinations by Mr. R. C. JACOBSON, who operated this property some years ago, and who carried on very extensive investigations in connection with the sampling of the ore outcrops, the methods of treatment of the ore, and the estimating of the available tonnage exposed.

The ^{unpublished} Emerald Isle property consists of a compact group of thirteen mineral claims, held by annual assessment. The property is situated in the Sacramento Valley, four miles south of the town of Chloride, and one mile from Keystone Siding on the Santa Fe Railway. An excellent automobile road has been built to the property from the main highway, which passes within a half mile. This property is in the center of a very well known mining district, and is surrounded by many promising prospects and mines, and is situated about one mile from the foothills of the Cerbat Range, noted for its showings of complex lead, zinc, copper, gold and silver ores, which, at present, are creating much interest throughout the west.

The Emerald Isle property is owned by Mrs. EDITH B. DOWNIE, of Minneapolis, Minnesota, who acquired it through purchase at Tax sale and by the purchase of labor liens due against the original company that formerly owned and operated this mine, consequently at the present time the title to the property is perfect and there are no debts or other liens against it.

The surface of the country surrounding the mine is comparatively flat, with the exception of a few rolling hills and some shallow gulches cut out by occasional cloudbursts and desert rains. The exposed mineralized area consists of a low ridge striking roughly north south and rising gradually to the north, with a gulch on either side. The width of the ridge is approximately 600 feet and the length 1500 feet. The grade from the railroad to the mine is gradual, with an average of not more than 3%, consequently a spur could be built to the mine at a very small cost, and if the tonnage, on development, should warrant, this would be the logical arrangement in order to assure low operating costs.

The rocks of the district consist in general of pre-Cambrian granites, which is the basic rock of this section of country. Intruded through these granites are certain areas of porphyritic rocks cutting these older series. Associated with these later intrusions may be found quite a wide variety of volcanic eruptives, but with the exception of the porphyry these eruptive phases are absent on the Emerald Isle property.

The mineralized zone at the Emerald Isle occurs in conglomerate or indurated river gravels lying on top of porphyry. The conglomerate is made up of granitic and porphyritic boulders, varying in size from several tons in weight to fine grained sand. Many of the larger fragments are quite angular, while others are rounded and water worn. This conglomerate is not at all strongly cemented but just sufficiently so to stand well in the underground workings. It is very porous, and due to this fact it has been widely impregnated by highly acid copper bearing solutions which deposited copper mineral in the form of chrysocolla or copper silicate. This replacement has taken place particularly in the finer material surrounding the larger pieces, and these latter have not been replaced by the mineralizing solutions to any great extent.

The source of these mineral solutions has always been a matter of speculation to engineers and geologists examining this deposit, but as work progresses the evidence obtained points to the probability of the mineralization being produced by surface waters which impregnated the conglomerate from on top and may not have any connection whatever with the underlying porphyry. The porphyry underlies this mineralized conglomerate at depths varying from 50 to 100 feet. The shaft which was sunk in the ore encountered the porphyry at a depth of 85 feet, at which point a crack or vein, which was being followed in the vertical shaft, changed its dip on reaching the porphyry to conform with the contact, which, at the point of the intersection of the shaft, was dipping at approximately 30 degrees. A considerable amount of movement and crushing is apparent along the margin or contact between the porphyry and the overlying conglomerate. No evidence of faulting is observed in the conglomerate between the contact and the surface, consequently it is probable that very little movement has taken place on this contact, and most of the crushing and slickensiding is caused simply by the weight of the overlying gravels. This flexing of the conglomerate over the underlying porphyry apparently is the cause of the cracking and opening of the overlying conglomerate beds, which would explain the series of high grade veins which occur in these overlying rocks.

The mineralized area has not been at all definitely outlined, but it is apparent that the zone is at least 300 feet wide and

600 feet long with a depth varying from at least 40 feet to 100 feet, where the present workings are being carried on. The ore consists of mineralized conglomerate with values ranging from 2% up to 15%, but as the higher grade ore is confined to mineralized fissures and veins not exceeding 6 feet in width, it is probable that the average of the whole mass would not be more than from 3% to 4%. From surface openings, consisting of open cuts and shafts made in the earlier history of this property, an average of the mineralized zone, which did not include any high grade veins, was established by Mr. R. C. JACOBSON at 2.67%. The recent development has proven this deposit to extend to a much greater depth than was anticipated, as the grade of the ore shown on the 100 foot level is as good, if not better, than that showing between there and the surface, and from present indications there seems no reason why an additional 100 feet of depth would not be expected. It has been stated by the U. S. Geological Survey that the gravels occupying the Sacramento Valley should be in excess of 3000 feet deep, consequently in following the contact between the porphyry and conglomerate one would not expect to reach the bottom of these gravels for many hundreds of feet, although the footwall might, in places, be rather flat. Should a depth be obtained reaching to the water table of this valley no further sinking could be done, as the porosity of the consolidated river gravels would be such that an unlimited flow of water would enter any workings below that point, however, several test wells have been put down in this valley for water with little success, consequently one would expect the water to be at least 1000 feet deep, and above this point no water would be expected. Although present work has not been conducted sufficiently far enough to establish any certainty as to the distribution of values, it is probable that the conglomerate lying on top of the porphyry from the point where work is being conducted eastward for several hundred feet will prove to be commercial ore. The main crosscut from the foot of the shaft, extending from the porphyry contact into the conglomerate, gave the following values:

6 feet on contact - - - - -	7.44%,
Next 9 feet into the con-	
glomerate - - - - -	6.98%,
Next 13½ feet - - - - -	2.61%,
Next 15 feet - - - - -	0.40%,
Next 11 feet - - - - -	1.20%,
Next 10 feet - - - - -	1.96%,

The last three of these samples are not taken as being commercial, but the first three, making a width of 28½ feet, average 5.01%. Up to the present this is the only extended crosscut showing the probable commercial width from the contact. Drifting both north and south from the shaft on the contact has extended 350 feet.

On the north side the ore is lower grade than that encountered on the south, but the average of 32 samples taken on this level, omitting the three low grade samples in the crosscut, is 5.52% copper, while the average width of these samples is 6.4 feet. It must be borne in mind that this width is not the width of the mineralized zone, but simply the width of the ground broken in our drifting. At the present writing, I have no hesitation in stating that the average value of all of the ore known to exist in this deposit will be in excess of 3%.

The work done to date is not sufficiently complete to make an estimate on ore tonnage, but from what work is done some very definite ideas may be formed regarding what could be expected as a minimum tonnage. Taking the old pit as the northeast limit of the ore zone, the present 100 foot level workings as the western limit, a width of ore 300 feet is easily assured, while a length of 500 feet is certain. The shallowest known place of this ore zone is in the old pit, where a depth of 40 feet was proven without reaching the bottom of the ore, while the workings in the present shaft show the ore to be at least 100 feet deep. This should make an average assured depth of at least 70 feet of ore. $300 \times 500 \times 70 \div 15 = 700,000$ tons, with a probable tonnage far in excess of this.

The ore, as stated before, consists of a copper silicate known as chrysocolla, accompanied by a black copper mineral at present unidentified, but which resembles chrysocolla in all of its properties except color. These minerals are found disseminated through a deposit of conglomerate in varying amounts. It is also found in veins or fissures cutting the conglomerate, or on the contact between the conglomerate and the underlying porphyry. In general, the copper contained in the unfissured portions of the conglomerate amounts to about $2\frac{1}{2}\%$, while that in the veins goes as high as 20% copper. This ore is easily soluble in weak sulphuric acid, and the early operations on the property showed very gratifying results as far as ore treatment is concerned, the ore leaching perfectly in twenty-four hours when crushed to half inch.

This property was acquired by some St. Paul people in 1916, who spent considerable money in its development, which consisted of the construction of a leaching plant with a maximum capacity of 50 tons per day. This plant used sulphuric acid as a leaching agent and precipitated electrolytically. The material was crushed to $\frac{3}{4}$ " and an almost perfect recovery of the copper contained in the ore was obtained. Due to troubles incident to war conditions this plant was not completed until late in 1918, which left only a few months of high copper market in which to operate. This operation is reported to have been profitable during the war period, as their costs, as reported to me, totalled 13.73 cents per

pound of copper. During the post war period, in which time the copper market fell below the cost of production for this operation, the outfit soon became insolvent, as they were not sufficiently financed to keep going. Apart from this, the operation was too small to have any reasonable chance of success under any but extreme market conditions such as those prevailing during the war period. When the operation became unprofitable, those responsible for the financing of the company refused to advance any further money, and in time the corporation drifted into difficulties, with the result that the property was sold for taxes and certain labor liens, which transferred the ownership to Mrs. EDITH B. DOWNIE, of Minneapolis, Minnesota, from whom an operating lease was obtained on September 27, 1926.

The type of reduction plant necessary for an ore of this character must necessarily be some type of leaching plant, the simplest of which, and that ordinarily used in present day practice, is sulphuric acid leach and precipitating the copper from solution on scrap iron, or by electrolytic precipitation.

In submitting tentative figures on operating costs, certain cost prices on supplies are estimated, as there is no definite quotations on these commodities at hand at present, but the costs are made sufficiently high to assure their reliability insofar as the total operating expense is concerned. The cost estimates also are based on the assumption that the property contains a large tonnage of medium grade ore and is equipped with a plant of 500 tons daily capacity, with proper mechanical arrangements for handling both the ore and the crushed material to and from the leaching tanks, and a modern power plant, including up to date precipitating equipment. The main item of supply in the reduction of this ore by leaching and precipitating electrolytically is sulphuric acid. From all records available, the consumption of acid varies widely, depending on the care taken with the solution. From tests run on this ore it is established that by taking one ton of clean ore running 2.6% copper, 100 pounds of acid was used, which gave an almost neutral solution to the precipitating tanks. It is evident that less than two pounds per pound of copper produced would be consumed, and the actual net consumption would probably approach one pound of acid per ton of copper. Acid can probably be landed at Keystone Siding in tank cars at \$18.00 per ton, which would figure out at 1.8 cents per pound of copper produced.

It was established during operations on this property when electrolytic precipitation was instituted that the power consumption in precipitating one pound of copper was one kilowatt hour, which power could be produced in a modern Diesel plant at one cent per kilowatt hour. The following table of production costs has

been compiled, using different grades of ore, and assuming a plant of about 500 tons per day capacity.

% COPPER	2%	3%	4%	5%	6%
	¢ per lb.	¢ per lb.	¢ per lb.	¢ per lb.	¢ per lb.
ACID	1.8	1.8	1.8	1.8	1.8
POWER	1.0	1.0	1.0	1.0	1.0
MILLING	2.5	1.6	1.2	1.0	0.8
MINING	2.5	1.6	1.3	1.0	0.9
FREIGHT & MARKETING ..	1.0	1.0	1.0	1.0	1.0
ROYALTY	0.6	0.5	0.3	0.25	0.2
TAXES	0.3	0.3	0.3	0.3	0.3
	<u>9.7</u>	<u>7.8</u>	<u>6.9</u>	<u>6.35</u>	<u>6.0</u>

Taking the cost figures for 3% ore, and a copper market of 14¢, net profits per year for such an operation would be \$614,000.00. These costs per ton could probably be duplicated in a 250 ton per day plant, which would give profits per year of slightly over \$300,000.00.

The capital expenditure necessary to develop this property, construct a reduction plant, would be approximately \$500,000.00 on a 250 ton basis, and \$750,000.00 on a 500 ton basis. This should amply provide for mine development and all plant construction and contingent expense.

The above cost figures being submitted as estimates only are sufficiently accurate that they represent actual operating costs should the conditions of ore grade and tonnage assumed be materialized, and the writer has no hesitation in submitting them as representing results that can be duplicated under future operating conditions.

Respectfully submitted,

Kingman, Arizona,
January 27, 1927.

E. E. CAMPBELL

EMERALD ISLE SAMPLES

100 FOOT LEVEL

CROSSCUT FROM FOOT OF SHAFT

<u>SAMPLE</u>	<u>WIDTH</u>	<u>% COPPER</u>	<u>REMARKS</u>
1	9'	6.98 ...	Sample taken from west side of south drift along south wall of crosscut, omitting 6 feet of ore in drift.
2	13½'	2.61 ...	Continuing along crosscut from sample 1, showing low grade mineralized conglomerate.
3	15'	0.40 ...	Continuing from sample 2 along crosscut, very low grade conglomerate.
4	11'	1.20 ...	Continuing along crosscut from sample 3, very low grade conglomerate.
5	10'	1.96 ...	Continuing along crosscut from sample 4 to face, conglomerate with some copper carbonate.

NORTH DRIFT FROM FOOT OF SHAFT

6	6'	8.83 ...	Sample taken across full width of drift on contact between porphyry and conglomerate.
7	4'	10.51 ...	Vein in porphyry, conglomerate not exposed in drift.
8	4'	6.06 ...	Vein in porphyry, conglomerate not exposed in drift.
9	6'	3.71 ...	20 feet along drift from sample 8, sheared porphyry showing considerable mineralization. Conglomerate not shown in drift.
10	7½'	4.60 ...	South side of crosscut into conglomerate, 20 feet along drift from sample 9.

NORTH DRIFT FROM FOOT OF SHAFT, Cont'd.

<u>SAMPLE</u>	<u>WIDTH</u>	<u>% COPPER</u>	<u>REMARKS</u>
11	5' ...	2.69 ...	Lower portion of crosscut from sample 10 to face.
12	6' ...	1.31 ...	Low grade conglomerate. This sample taken 20 feet from sample 10.
13	6' ...	1.53 ...	Low grade conglomerate showing much manganese. Sample taken 15 feet from sample 12.
14	4½' ...	2.01 ...	On contact at face of drift, 10 feet from sample 13.

DRIFT SOUTH FROM FOOT OF SHAFT

15	6' ...	7.44 ...	From porphyry foot-wall across drift, showing streaks of high grade ore.
16	7' ...	6.54 ...	On contact, streaks of high grade and mineralized conglomerate.
17	7' ...	13.62 ...	On contact, streaks of high grade and mineralized conglomerate.
18	7' ...	7.08 ...	In porphyry, conglomerate wall not broken into.
19	5' ...	2.98 ...	In porphyry, conglomerate wall not exposed.
20	5' ...	3.77 ...	In porphyry, conglomerate wall not exposed.
21	6' ...	4.90 ...	Half of drift in porphyry, half in conglomerate.
22	15' ...	4.58 ...	From porphyry foot-wall to face of crosscut driven into the conglomerate at this point, ore still remaining in face.
23	6' ...	6.87 ...	Drift here all in conglomerate.

DRIFT SOUTH FROM FOOT OF SHAFT, Cont'd.

<u>SAMPLE</u>	<u>WIDTH</u>	<u>% COPPER</u>	<u>REMARKS</u>
24	6' ...	6.43 ...	Drift at this point all in conglomerate.
25	6' ...	5.66 ...	Drift at this point all in conglomerate.
26	6' ...	4.90 ...	Drift at this point all in conglomerate.
27	6' ...	5.56 ...	Drift at this point all in conglomerate. Face of drift.

Note:- Except where stated all the above samples are taken along drifts at 10 foot intervals, and in no place except in main crosscut is the width of mineral zone in the conglomerate shown.

SOUTH DRIFT:

28	6' ...	3.9 ...	Sample taken across full width of drift on porphyry conglomerate contact.
29	4' ...	3.1 ...	Sample taken in porphyry, conglomerate wall not broken into.
30	6' ...	8.6 ...	Half porphyry, half conglomerate.
31	6' ...	14.7 ...	Half porphyry, half conglomerate.
32	6' ...	8.4 ...	All conglomerate contact turning to left.

NORTH DRIFT:

33	6' ...	2.2 ...	In conglomerate.
34	6' ...	1.8 ...	In conglomerate.
35	6' ...	2.7 ...	In conglomerate.

SOUTH DRIFT:

36	4' ...	8.56 ...	In conglomerate, 3 foot granite slab in back of drift not included.
37	6' ...	2.78 ...	In conglomerate.
38	6' ...	3.29 ...	In conglomerate.