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PRINTED: 10-24-2012

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: SARJAC COPPER CLAIMS

ALTERNATE NAMES:

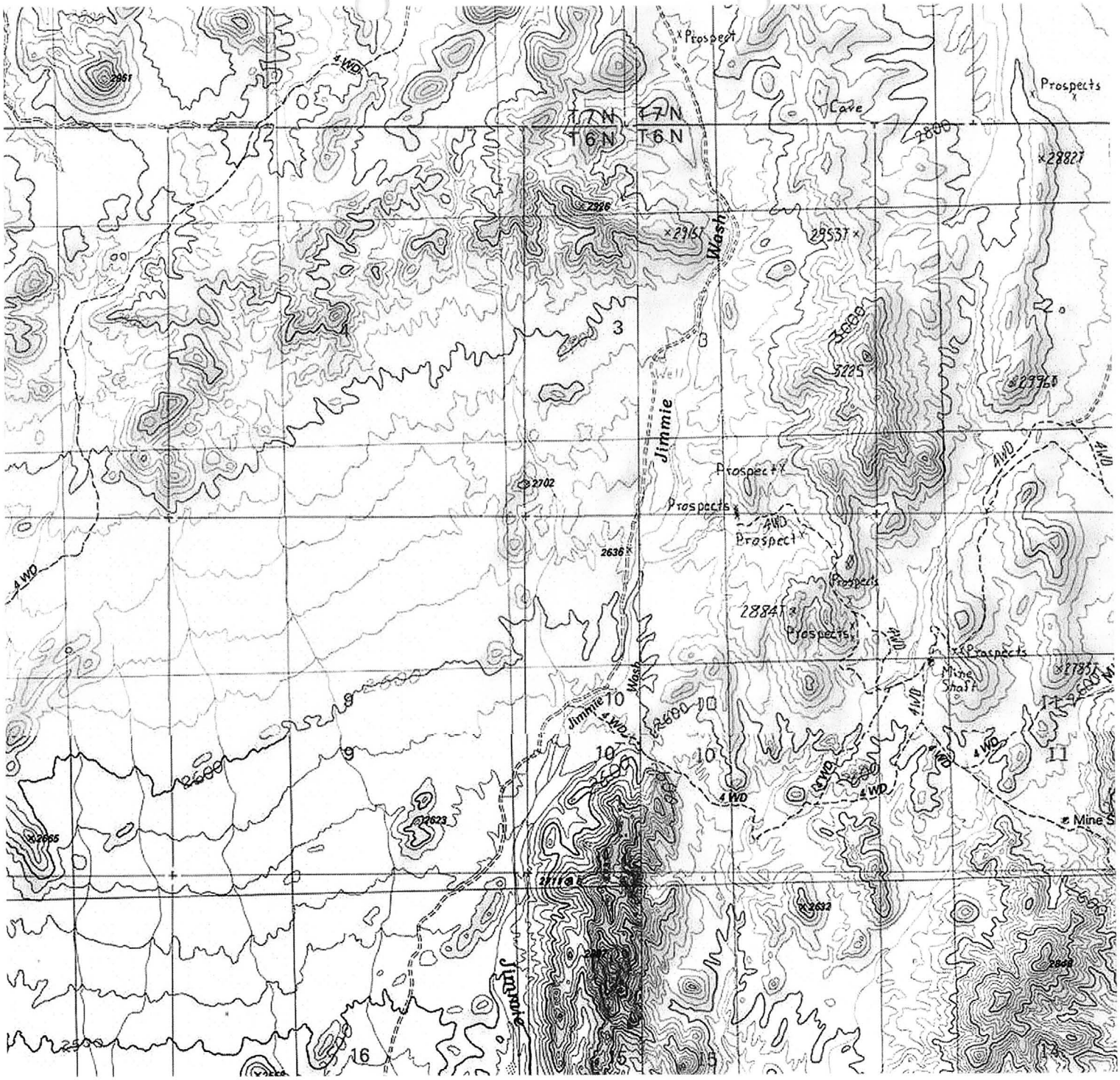
MARICOPA COUNTY MILS NUMBER: 869

LOCATION: TOWNSHIP 6 N RANGE 6 W SECTION 4 QUARTER
LATITUDE: N 33DEG 53MIN 39SEC LONGITUDE: W 112DEG 53MIN 22SEC
TOPO MAP NAME: OUTLAW HILL - 7.5 MIN

CURRENT STATUS:

COMMODITY:
MILL

BIBLIOGRAPHY:
ADMMR SARJAC COPPER CLAIMS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ArcGIS -

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SARJAC COPPER OXIDE CLAIMS

LEACHING AND CEMENTING CU CEMENT

* * * * * * * * * * *

PRE FEASIBILITY TESTS for a 750 ton per year cement unit at mine site.. F.C.SENIOR, Engr.

REPORT TO SARJAC

on

LEACHING AND CEMENTING COPPER CEMENT

from

SARJAC HIGH GRADE COPPER OXIDE

and

PRE FEASIBILTY TESTS - REPORT

for a

SMALL 750 TON PER YEAR CEMENT UNIT AT THE MINE SITE

SUMMARY SECTION

LEACH AND CEMENT TEST PROGRAMS

for

SAPJAC COPPER PROSPECT

July 18, 1973

SARJAC Leachability

The attached leach test of the "silica like" Sarjac copper oxide ore from the #1 and #2 shafts in claims 11 - 13, performed by John Long of ARC Labs in Phoenix is very interesting. It should be noted that ARC has a great experience in leaching characteristics of copper oxide ordes and the production of cement copper.

The test establish several points of great interest to the mine owners and their partners:

a. That the silica to diorite back ground rock has virtually no useful copper content, at least in the area of the shafts and must be wasted.
b. That the high grade concentrates "at about 8% to 10% copper content" are 86% leachable at 5 to 6 hours of contact with a simple 2½% (26 grams per liter) sulphuric acid leach stream at about pH 1.0 at average rock size of 10 mesh.
c. That no more than 12 hours is needed for ¼" rock to achieve 85% extraction. About 4.6 parts acid per lb of copper in 1% mix.
d. The test indicate about 45% of the acid is used to form gypsum, about 20% to ferrric sulphate, or 65% lost and about 35% to $CuSO_4$. In a 2½ % rock the acid will be 3.3 lbs.

It is very important to note that the 50 lbs of rock sample taken from shafts 1 and 2, delivered to ARC Labs, was composited at about 90% by weight of the background quartz and about 10% of the Azurite - chrysocolla high grade. Since the high grade in the area is about 8% to 10% and the composition assayed 1.0%, we must conclude that the background quartz etc. is virtually sterile.

6.6 lbs of this compo rock was sized at about 8 to 10 mesh x down, but crushing did not produce many fines. The 6.6 lbs or 3000 grams of compo rockwas fed to 6.0 liters of water containing 150 grams of H_2SO_4, or a leach solution of about 26 grams per liter or 2.6% by weight of initial acid and 5 grams per liter at end. A good cement copper per acid ratio.

At the end of ½ hour - 15 grams of copper or 50% was $CuSO_4$ and at the end of 2 hours, 22 grams (3.6 grams per liter) or 72% was in solution and about 70% of the acid consumed, leaving 8.5 grams per liter of free acid. At the end of 6 hours over 86% of the copper was leached and 80% of the acid was consumed indicating more iron than copper leached at this point.

On the basis of this test and extrapolating to ¼" x 0 rock, selected and graded to say 2% to 3% on a picking belt or other means, one could project a situation for a 2000 lb ton of 2½% average leachr rock.

The leach test was an average of say 10 mesh rock, and we wish to leach an average of say ¼" or ½" (4 or 2) mesh rock, the table shows the area per volume relationship:

	Ave ½" Diameter	Ave ¼" Diameter	Average 10 Mesh
Area / Vol.	= 1.2	2.3	6.2

Thus 10 mesh rock should leach about 3 times faster than ¼" and say 6 times faster than ½" rock.

PRODUCT DEVELOPMENT APPLIED RESEARCH

ARC LABORATORIES

Division of Arizona Mineral Consultants, Inc.

3828 NORTH 10TH AVE. PHOENIX, ARIZONA 85013 242-2872

FOR: Frank Senior
1836 West Virginia
Phoenix, Arizona

DATE 7-18-73

LAB No. 12238

RESULTS

3000 grams of (85% minus 10 mesh) ore was agitation leached with 6 liters of 25 g/l H_2SO_4. The ore contained 1.0 % copper.

Time hrs.	In solution g/l Cu	In solution g/l H_2SO_4	percent leached	
0.5	2.5	12.0	50.0 %	
1.0	3.1	10.2	62.0	
2.0	3.6	8.5	72.0	
3.0	3.98	7.0	79.6	
4.0	4.14	6.0	82.8	
5.0	4.24	5.4	84.8	
6.0	4.32	4.9	86.4	Fe = 2.04 g/l

Acid/ Cu^{++} = 4.6

Tails contained 0.09 % Cu

Respectfully submitted,
ARC LABORATORIES

John T. Long, Jr.

As a mutual precaution to clients, the public and this corporation, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used in whole or in part, in any advertising or publicity matter without prior written authorization from this corporation.

Analysis of the test results on the 1% rock mix show the following general data starting with 1% or 30 grams of copper and 150 grams of H_2SO_4 in 3000 grams of mixed rock:

Time	Copper in Solution	Acid Used	Estimated Iron in Solution	Estimated Copper Used
½ hr	15.0 gms - 50%	78 gms - 52%	2 gms	20 gms
1 hr	19.0 gms - 62%	88 gms - 59%	5 gms	20 gms
2 hr	22.0 gms - 73%	100 gms - 67%	6 gms	20 gms
3 hr	24.0 gms - 80%	108 gms - 72%	8 gms	20 gms
4 hr	25.0 gms - 83%	114 gms - 76%	10 gms	20 gms
5 hr	25.5 gms - 85%	118 gms - 78%	11 gms	20 gms
6 hr	26.0 gms - 86%	121 gms - 80%	12 gms	20 gms

It is well known that copper in the presence of oxygen and H_2SO_4 will form $CuSO_4$, that some of the iron will form feric sulphate - $Fe_2(SO_4)_3$ - and that lime-magnesia or carbonates will consume acid to form gypsum or equal.

The stokiemetric consumption of acid for these 3 general acid consumers is about as follows:

Metal	Theoretical Acid Rates
Cu	1.52 x Cu
Fe	2.62 x Fe
Ca - Mg etc	2.4 x Ca

Thus, one can construct a general picture of how the acid would be used by this rock mix at about 1% copper content, about as follows:

Time	Free Acid	Used Acid SO_4	SO_4 to Cu		SO_4 to Fe		SO_4 to Ca etc.	
			SO_4	Cu	SO_4	Fe	SO_4	Ca
½ hr	72	78	23	15	5	1	50	21
1 hr	62	88	29	19	9	3	50	21
2 hr	52	98	33	22	15	5.7	50	21
3 hr	42	108	36	24	22	8.4	50	21
4 hr	36	114	38	25	26	10	50	21
5 hr	32	118	39	25.5	29	11	50	21
6 hr	29	121	40	26	31	12	50	21

These figures are reasonably correct, since the 6 liters of leach liquor carried 4.32 grams per liter of copper and 2.0 grams per liter of iron at the 6th hour.

If we list the copper iron ratio in leach liquor we can see that the first 3 to 4 hours were essentially leaching copper and the last 2 to 3 hours more iron was leached.

	Copper to Iron Ratio
½ hr	15.0 to 1
1 hr	6.0 to 1
2 hr	3.8 to 1
3 hr	2.8 to 1
4 hr	2.5 to 1
5 hr	2.5 to 1
6 hr	2.1 to 1

Therefore, this leach should stop at about 3 hours for 10 mesh and about 6 hours for ¼" mesh to achieve about 80% copper extraction at about 2.8 to 1 copper to iron ratio and a total acid usage of about 4.5 parts of acid per part of copper leached. It can be seen that at the 3rd or 4th hour the indicated acid consumption is about as follows:

For copper	33%
For iron	20%
For lime	47%

It is fairly obvious that if we increase leach grade from 1% up we would tend to reduce the wastage to lime, but the copper to iron ratio would probably be about the same.

Thus, an approximate projected acid usage vs rock grade is about as follows for 6 hours at 80% leach of ¼" rock:

	Lbs 93% Acid Per Ton of Rock				
	1% Cu	2% Cu	2.5% Cu	3% Cu	4% Cu
Acid used Cu	26	52	65	79	105
Acid used Fe	20	30	37	45	55
Acid used Ca	35	40	43	45	45
Lbs per ton of rock	81	122	145	169	205

Thus, if we maintain 2% to 3% grade, say 2½% average we should leach out 43 lbs of copper per ton for say 145 lbs of acid consumed or say 3.3 lbs of 93% acid per lb of copper recovered.

For each ton of rock leached at 2½% grade we would expect to produce the following:

Hard rock	2000 lbs
Acid make up	145 lbs
Leach solution	
$CuSO_4$	108 lbs
$Fe_2(SO_4)_3$	50 lbs
Gypsum etc.	110 lbs
Tails	1875 lbs to waste

The actual strength of the leach solution is obviously a function of the water acid ratio. The test leach solution was 150 grams of acid in 5850 grams of water or about 2½% acid to make 6 liters.

We are proposing a 3.3 net ton per day cement copper installation containing 5000 lbs per day of copper or say 1.5 million lbs per year for sale at say 52¢ per lb of contained copper as the initial installation. This can be adjusted to suit the

reserves developed by drilling.

A tank house can be installed later, after more is known about the deposit.

A 24" jaw crusher and a small hydrocrane unit to process about 20 tons per hour to ¼" size and a picking belt is indicated for this small 150 ton per day leach unit.

The crushing to 3" x 0 in a jaw might cost 8¢ per ton and 2 sorters on the belts might cost $50 per day or say 25¢ per ton of leach rock and crushing to ¼" x 0 might cost 12¢ per ton. Hence, ¼" x 0 leach rock could be delivered to a 1000 ton stock pile for say $3 per ton, including fixed costs etc.

2 concrete = underflow leach tanks, good for say 6 days operation or 750 tons, with pitch or PVC coating each 20' wide x 80' long could be filled and emptied by the loader scraper unit at costs not exceeding 25¢ per ton using 375 tons per leach tank on 72 hour cycles.

Thus, raw material handling for this deal might be operated for $3.25 per ton of leach rock, or say $406 per day for 5,000 lbs of copper leached or say 8.1¢ per lb, not including the acid make up.

Acid Cost

McKesson Chemical of Glendale reports a current acid shortage in Arizona - but this may be due to the price freeze etc. They advise that 93% acid can be delivered 15 miles west of Wickenburg for a low of $23 per ton to a high of $38 per ton on the basis of 8 tons per day usage. We may make a deal direct with Bagdad and get a lower price. If we take $30 per ton of 93% acid or say 1½¢ per lb delivered, and we actually use 3.3 lbs per lb of copper then we produce a 5 to 10 gram per liter leach liquor for say 8.1¢ per lb of copper plus 5¢ for acid or say 13.1¢ per lb of copper.

The leach liquor at say 7 grams per liter of copper and say 3 grams per liter of iron to be clarified and delivered to the copper cement tanks.

A small crane will load the shredded auto body steel to the cement section and about 7,000 lbs per day of scrap will be used to precipitate 5000 lbs of copper.

The President of National Metals quoted about $60 per ton delivered to the mine site or a cost of some $210 per day or 4.2¢ per lb of copper recovered. This would indicate a direct cost before labor, maintenance etc. of about 17.3¢ per lb of copper.

If the rock is mined in narrow cuts, say 25 feet wide, selective rejection of the sterile rock may be practiced.

To drill and shoot, these possibly narrow veins, may be fairly costly, but no idea can be obtained until a drilling or exploration program is performed.

We assume that one ton of 2.5% copper leach rock can be mined, delivered, sorted, and crushed ti ¼" x 0 for a total cost of $3.00 per ton or about 6¢ per lb of copper to stockpile. This can only be checked after ore body definition.

The leach-cementing unit should not be more than 300 feet from the ore body and the following items are indicated to move say 300 tons of sterile rock to waste, and deliver 140 tons to unit for disposal of say 15 tons by manual sorting and deliver 125 tons to final sizing and leach tanks.

Thus, the mining, loading, drilling and hauling could work 4 hours at say 120 tons

per hour including the waste rock. The haul for waste rock using at dozer-loader and a 10 ton self loader (or truck). The copper rock to be delivered by the same units in say 12 trips.

	Total Cost per 4 Hour Day
1. Drill rig and powder etc.	$ 50
2. Loader unit at $30 per hour	120
3. Haul rig at $25 per hour for waste and leach	100
4. General and miscellaneous dozer etc.	100
Total costs including ownership	$ 370

This shows that one might shoot, load and waste for about $2.60 per ton for the 140 tons delivered to the primary crusher at say 12" x 0.

Production of Cement Copper

It seems much more sensible to initiate operations on oxide copper for the production of cement grade and then at a later date, if the reserve picture justifies same, to install an SEC type tank house.

Mr. Dave Lincoln - ex-president of Bagdad and now one of the major shareholders in Cypress Mines, expressed a keen interest in acquiring a source of cement grade copper for Bagdad at 8¢ under the price of metal, or say 52¢ in the present frozen market, or perhaps 60¢ to 65¢ when copper is free. He said "we can take all you would produce", hence I am basing this on a conservative 2½ tons of contained copper per day for 300 days. This would be about 1.5 million lbs per year copper, contained in about 2.0 million lbs of cement.

Cement, a precipitation copper, is made by leaching oxide ore to say 10 grams per liter and then passing the leach liquor over steel scrap to precipitate the copper.

The ARC leach tests, projected to 2½% average grade, indicate a total acid consumption of about 3.2 to 3.4 lbs of 93% acid per lb of copper. There is no return of the sulphate radical of copper in precipitation since it is all converted to iron sulphate and lost to the pile. I checked acid prices and find a range - from Bagdad, Ray, etc. - of about $23 to $38 per ton of 93% grade delivered. An average at the mine should be in the order of $30 per ton or 1.5¢ per lb of acid, or say 5.4¢ per lb of copper.

Shredded autobodies, delivered to the mine are quoted at $60 per ton - by Mr. Michael Haakes, President of National Metals - or say 3¢ per lb of iron for precipitation. Thist leach operation take 1.2 to 1.4 lbs of iron scrap per lb of copper, since the iron is not totally used - theoretical usage being about 0.9 lbs iron per lb of copper.

The cost of precipitation iron per lb of copper is therefore about 4.2¢ per lb at the present market.

The two important costs, besides ore, are therefore 9.6¢ per lb of copper cemented. 9.6¢
Labor is quite small and the capital cost is relatively small compared to a tank house.

If the reserve picture - even 5 years at 40,000 tons per year, or say 200,000 tons of rock at 2.5% copper average - is developed, and the copper rock can be mined, crushed and handled in and out of the leach tanks for the $3.25 per ton of ¼" rock noted above, then cement copper can be produced for about 17.3¢ per lb for mining, acid and iron.

Leaching Tanks

We could install 2 bottom flow leach tanks - each say 20 feet wide by 4 feet deep and 80 feet long - to hold a total of about 750 tons of ½" rock, or about 72 hours of leaching on each unit. Thus, we would only have to run the 10-ton scraper for say 8 hours per week (on Sunday) to remove leached rock to waste and put in new rock for the next week of leaching.

I have noticed that this high grade ore seems to be cemented together by the copper bearing structure and that a ½" piece will fall apart into fine grain silica after the copper is leached.

Starting with ½" x 0 rock, I had 10% if the rock as a fine particle size (about 325 to 400 mesh) and the great balance as sands. Thus, any top percolation vat would be clogged and bottom flow forced upward flow of leach liquor is definitely indicated

If we wish to remove 5000 lbs per day of copper (say 2.27 million grams) in a leach liquor of 7 grams per liter we need say 325,000 liters per day of liquor. This would be about 185,000 gallons per day in the system.

This liquor would come over a top wier and go to a large clarifying-holding tank and then be pumped - or by gravity - to the cement tanks. If we provide 2 hours settling in the hold tank, we need about a 20,000 gallon capacity for clarifier-holder tank for a leach rate of 160 gallons per minute.

SARJAC Ore Leach Cement Tests Summary

4700 grams of typical Sarjac ore crushed to ½ x 0 was leached in 17 liters of 7% acid yielding a strong solution of 24.1 grams per liter (deep blue) of copper - or a total of some 409 grams of copper extracted. The ore looked to be typical of the 10% rock or about 87% extraction.

The 17 liters were diluted to 52 liters (13.7 gallons) with water for an initial pregnant cement liquor of about 7.8 grams per liter of copper liquor at pH 1.3 or say 4 to 5 grams per liter of free acid.

This was circulated at about 4.5 grams per liter over 3.6 lbs of shredded auto body steel for 2.5 hours when the liquor was water shite or stripped of copper. Final pH was 1.25, twmperatur was 92°F. The actual liquor/scrap contact time being 600 seconds or 10 minutes for this high velocity run.

The cement copper recovered and dried weighed 489 grams or 1.08 lbs and the iron consumed was 463 grams or 1.02 lbs. The copper extracted was 390 to 400 grams (.87 lbs) hence evidence of an iron consumption of about 1.17 lbs of scrap per lb of copper and a cement grade of about 82% copper.

The pumping rate was equivalent to about 18 grams per minute of liquor per square foot, scrap at 30 lbs per cubic foot. The stripping rate is indicated at about 0.78 grams per liter per minute of actual high velocity contact for test conditions.

These data enable design of an underflow leach and cementing operation on the SARJAC ore to obtain 82% cement at 3.3 lbs of acid and say 1.2 lbs of scrap per lb of copper recovered.

SARJAC Leach - Cement Test (August 1-10, 1973)

An underflow cement system with a total of 60 liters holding capacity, a 20 liter per minute stainless pump , piping and a 1 liter cementing vessel constructed at a cost of $4790

Typical auto body scrap was obtained from the National Metals shredder in Phoenix and 1643 grams (3,6 lbs) filled about one half of the 3 liter leach vessel. This would indicate about 25 lbs per cubic foot average bulk density for this type scrap.

The unit was calibrated with water before charging the leach liquor and worked well at 10 to 20 liters per minute and 17 liters per minute was used in this test. This is equal to 4.5 gallons per minute or say 18 gallons per minute per square foot of precipitation iron.

About 4700 grams (10.3 lbs) of rock from Sarjac shaft was crushed to about ½ x 0 and leached for 20 hours with 1300 grams of 98% sulphuric acid in 17 liters of water or about 7% acid strength.

The 17 liters (4.5 gallons) of leach liquor was assayed at 24.1 grams per liter by AEC, or about 409 grams of copper in solution. The rock looked like the typical 10% leach rock, indicating about 87% extraction.

The 17 liters of deep blue liquor was diluted to 52 liters, by adding 35 liters of tap water for a pregnant solution of about 7.8 grams per liter of copper and the pH was lowered from 1.4 to 1.2 by adding 300 grams of acid to the 520 liters of pregnant solution.

The pump was turned on and copper formed almost immediately on the thin jangled steel scrap. At the end of one hour, the strength of the liquor was much lower and the pH was 1.3. The pumping rate was held at 17 liters per minutes and the temperature was 92°F.

At the end of 2.5 hours the liquor was virtually stripped as it was almost water white and the pH was 1.25. The contact vessel held about 3 liters of liquor or an actual residence contact time of 10.5 seconds per cycle of 52 liters in 3 minutes. With 50 reflux cycles we have say 600 seconds or 10 minutes actual contact time.

At the end of 3 hours the pump was stopped since the liquor was white and cement copper was partially filling the vessel. The final pH was 1.25.

The scrap was cleaned of copper, dried and weighed at 1180 grams or a loss of 463 grams (1.02 lbs) in the run.

The cement copper was quite clean and weighed 489 grams when dried. Since we obviously removed some 390 to 400 grams of copper from liquor, it would appear that this cement is about 82% copper, balance iron, oxygen and other salts.

Thus, this test shows that the scrap is about 25 to 30 lbs per cubic foot, that a flow rate of 18 to 20 gallons per minute per square foot of scrap, with 7.8 grams per liter solution at 1.25 pH gives a vigorous scrubbing and removes 98% of the copper in about 10 minutes of actual high velocity contact time.

The indication is a good 82% to 85% copper in cement for this run.

1.02 lbs of scrap produced about 390 grams of copper or say 1.2 lbs of scrap per lb of copper. This is good since it shows a high percentage of iron present as Ferric (Fe+++) hence a low iron usage.

CATHODE PLATING TEST July 18, 1973

One 12 square inch (0.12 square feet) titanium cathode placed at 3" spacing between 2 lead antimony anodes at 2 amps loading at 3.5 volts.

2 liters of 27 grams per liter filtered leach liquor was placed in cell and after 10 hours, about 18 grams of a very nice copper cathode was easily stripped from the titanium cathode.

Titanium is advantageous because it eliminates the need for expensive starter sheets and is easy to strip - in, short, a perpetual pathode.

PREFEASIBILITY APPRAISAL

OF

SAPJAC COPPER CLAIMS

for

BLUE EAGLE COPPER CO. PROSPECT

near

WICKENBUPG, APIZONA

FRANK C. SENIOR · CONSULTING ENGINEER

SUMMARY OF REPORT

A somewhat unique situation currently exists at the Bagdad Unit of Cypress Mines, located in central Arizona. This mine very successfuly produces Copper Sulphide Concentrates, and has the largest LIX Tank house in the USA producing cathode copper from mine leach liquor, BUT currently is in almost desperate need of CEMENT Copper for its Powder plant.

Cement, or precipitation copper is the oldest, and simplest method of copper production. Oxide ores of copper are leached with weak sulphuric acid, and the leach liquor is then passed over iron or steel scrap, producing a copper sponge that runs from 75 to over 90% copper content, at very low cost.

The Cement process is totally non pollutant, and very simple to install and run.

The Sarjac claims are located about 70 miles south of Bagdad, on good roads, and are favorabley located only 3½ miles south of the main Wickenburg highway in gentle rolling hills, close to power, and the good sized town of Wickenburg.. Water is said to be 500 down, and not more than 40 GPM of make up are needed.

The almost spectaculat series of outcrop stringers, but much more importantly, the occurance of high grade in all three of the 4x4 shafts(totalling about200 ft) gives evidence of being the basis of a sound small oxide leaching Cemmt operation. In general the veins in the granitic rock seem to run from 1.5 to 8% copper, and the high grade from the 3 shafts, all in the Quartz runs from 6.% to a bonanza 34%, but an average of 10% copper in the excavated rock is indicated by random grab samples taken in the past two weeks by us.

The ore from the shafts was composited by taking 90% by weight of the quartz and about 10%-of the obvious high grade, and the lab assayed same at 1.0%. This mix was leach tested by standard Leach Test methods, and yeilds 86.4% of the Copper in 6 hours, which is wry good.

If an exploration program, costing about $45,000, develops 200,000 tons of ore at only 2% average, this is enough for operation of a small 1 .5 Million lb/ yr leach unit for 5 years, with a very good payback on the investment.

If a mining venture called, say Blue Eagle Copper Co., is organised with 20% of the shares to the mine owners, the same to the WArd Group, and 20% to the Drilling Money, or say 60% to the owners-oporators, and they give say 40% for the $,300,000 needed for the mine and leach unit, a very good return on these funds should be realized. If a Bank loan deal could be set, then these 3 groups might take an equal 33% each.

The profit potential is developed by the report at about $ 320,000 per year after all direct and indirect costs are paid, for a small 750 ton per year leach Cement plant.

If, the exploration gives indication of a larger reserve picture, thea the leach unit could be made larger, and considerations of a small Tank House to produce Cathode grade metal might be made in the future.

GENERAL:

Copper is a strategic metal currently in world-wide short supply and predicted by many to remain critical. Currently, copper metal wire bar (or cathode) has been trading in the London market at 85¢ to 90¢ per lb and is frozen in the USA at 60.25¢ per lb. Most experts predict it would go to 70¢ or 73¢ if allowed to trade free in the USA.

About 70% of the US copper is produced from sulphide ores and 30% from the non-sulphide or so-called oxide ores.

Perhaps the simplest way to produce copper is by leaching oxide ores with cheap sulphuric acid and then precipitating the copper on shredded steel scrap such as tin cans, turnings or auto body shards etc. This is called cement copper.

At the present time, precipitation or CEMENT copper commands 8¢ under metal or 52.25¢ per lb of copper contained in the cement. Normally, cement copper is about 75% to 80% copper (Cu) plus iron and other impurities.

Essentially, the major direct costs in producing cement, are the cost of leach grade oxide ores, cost of acid and the cost of scrap. Labor, power and maintenance are relatively minimal in this - the simplest way of recovering valuable copper metal. Ore, acid and steel scrap represent about 85% of the costs and labor, power and maintenance are the balance.

The total capital cost, including mining equipment etc., of a modern oxide leach-cement plant runs about $390 per annual ton(2% ore) in a 750 ton per year unit. For a 1500 ton per year installation, this would drop to about $260 per annual ton - or about 13¢ to 15¢ per annual lb of copper - or say 3¢ to 4¢ on a 5-year write-off basis.

The production of cement copper is almost totally non pollutant, whereas everyone knows of the great problems with the sulphide smelter plants. The capital cost of a smelter unit, even at huge capacity is about $3,800 per annual ton, or 10 times a simple oxide leach unit.

Thus, production of copper from oxide ores by way of leach-cement has many definite advantages and is an almost certain way to enter the game on a profit basis given a reasonable ore body.

The SARJAC Situation

The existing 70 contiguous lode claims, covering 1450 acres, located only 3½ miles south of the Wickenburg Highway, in gentle rolling desert hills at 2800 feet of elevation - and only 14 miles from the Town of Wickenburg, Arizona would seem to enjoy many logistical advantages.

The claims were staked and filed in March 1968 by the stakers, Messrs. Dan Jacobs and William Sargent of Congress and Wickenburg, and have been maintained by assessment until September 1, 1972, by proper affidavits of labor according to Arizona law governing mineral claims on Federal land. Assessment labor and costs for the period of August 30 to September 1, 1973 will be filed by the owners. We have personally checked these documents in the Recorders Office of Maricopa County in Phoenix, Arizona in July 1973.

These potentially valuable claims cover about 1450 acres of Federal land, and thus

can be taken to patent in the future if so desired. The claims are arranged as shown on the attached map.

A series of preliminary surface sampling examination of the property, as well as sampling from the 3 shafts in claims 11 and 13 - varying from 40 to 100 feet deep, discloses a series of outcrop stringers on some 200 acres of the claims.

These have been sampled by our group and assayed by Arizona Testing Labs and Hawley and Hawley and the preliminary assays are as follows:

	ATL	Hawley and Hawley
High grade shafts	11.4% Cu	7.50% to 34.50% Cu
Outcrop stringers	8.0%	6.10% 3.95% 3.60%
General diorile	0.97%	1.68%

These preliminary "non-geologist" grab samples obviously confirm the existance of very high grade oxide ores on surface and in the shafts. The copper-iron ratio at about 2 copper to 1 iron is favorable.

Leach Tests (SARJAC Ore)

Not all the copper oxide ores are amenable to sulphuric - oxygen leach. Chrysocolla and tourquoise, for instance, leach very poorly, but most of the other and numerous forms of carbonates, hydroxide, chloride or pure oxide ores respond readily to acid leach. One of the rich oxide ores - black tenorite - can be as high as 88% copper, which probably accounts for the 34.50% assay, which I checked by gravity on another sample of SARJAC tenorite at 4.2 gravity or about 45% copper.

A 100 lb sample of ore composed of 90% quartz and about 10% of the obviously high grade was composited from the 2 shaft locations. This was mixed and crushed to 10 mesh size and 30 lbs delivered to ARC Labs in Phoenix. The ARC Labs have performed hundreds of leach tests on Arizona ores and their report of July 17, 1973 - #12,238 - shows 86.4% of the copper leached in 6 hours using 2.5% starting acid. The details of this leach test and subsequent leach tests by F. C. Senior, are covered by a separate report, but the highlights developed by this work and projected for a 2% average copper leach rock at ¼" size are as follows:

Leach time for ¼" rock	18 hours
Total copper in 2000 lb rock	40 lbs
Copper extracted (86.4%)	34.6 lbs
Indicated 93% acid per ton of rock	122 lbs
Lbs of acid per lb of copper recovered	3.5 lbs

Obviously, since about 32% of the acid is wasted on lime or magnesia in the rock, if one improves the grade to say 4% average copper, the acid requirement drops to about 2.9 lbs of acid per lb of copper leached. Conversely, leaching a 1% rock would require about 4.6 lbs per lb of copper because of the higher loss to lime etc.

It can be seen, that if the drilling program give confirmation to the rather high surface and shaft assays of say 8% to 11% copper, that maintaining a 2% to 4% average leach grade seems quite probable.

SARJAC Potential

Cypress Mines, owners of the Bagdad Copper Mine, located 70 miles north of the

Sarjac claims, has a large acid plant and one of the largest and very successful Liquid-Liquid organic extraction plants in the world. They also have a special hydrogen reduction plant to produce some 40 tons per day of pure copper powder from cement copper. This plant is now starved for cement and Mr. David Lincoln, President, advised that they would buy all we could produce at 8¢ under metal.

There is a large production of sulphuric acid in Arizona, due to pollution control, and acid is quoted from $23 to $33 per ton delivered to the mine site.

Shredded auto bodies - a good precipitation steel scrap - is available at the mine site at $59 to $60 per ton, according to the President of National Metals of Phoenix.

The freight on cement copper from mine to Bagdad should not exceed $7.00 per ton or about 0.45¢ per lb of copper.

In summary, if the modest exploration and feasibility program costing some $40,000 develops say 200,000 tons of 2% average grade rock - this would justify the investment of $300,000 for a 1.5 million lb per year cement plant operated 300 days per year or about 1.8 million if operated 350 days.

For the conditions cited above, such a small unit, when selling at 52.25¢ delivered Bagdad, could recover $260,000 cash per year after depletion, all taxes and royalty payments. With the mine owners as proper shareholders the venture could generate $320,000 cash per year after all costs. The details of these figures are shown below.

Direct Operating Costs

On the premise that 3000 feet of 1¼" drill holes, plus 8 or 10 days of D8 ripper exploration can develop a volume of say 200,000 tons of 2% copper (or better) ore, or enough to operate a 1.5 million tons per year cement plant for about 5 years, we examine the probably direct costs of this small operation based on present costs in Arizona.

We deliberately test this unit on the premise that we develop 3 or 4 vertical veins each say 5 feet wide by 100 feet deep that average 2% copper content. We assume these veins to be say 100 feet apart, and requiring the removal of 1.2 tons of sterile waste rock to dump for every ton delivered to the small jaw crusher. We should be able to drill, shoot, waste and load 2.2 tons of rock for $1.30. This would be about $1.30 per ton of leach rock and at the rate of about 80 tons per hour, for a total cost of about $200 per day.

The loader performs the initial sorting and the 10" x 0 rock is crushed to 2½" x 0 and then 2 manual sorters reject say 1 ton per hour of sterile rock (or 15 tons per day) and the hand cobbed rock is reduced to ¼" x 0 and goes to stock pile at about 18 tons per hour for 8 hours.

Thus, the drilling, shooting and loading of say 300 tons per day in 4 hours or say 80¼ tons per hour would deliver about 180 tons of rock to waste in say 20 trips and send 165 tons of leach rock to crusher. The jaw crusher, picking belt and secondary unit to be run at say 18 to 20 tons per hour for 8 hours to deliver 150 tons per day to the stock pile.

The cost of the crushing, cobbing and final sizing to be about $50 per day or say 33¢ per ton of leach rock.

If the drilling confirms such a structure, we might provide 150 tons per day of ¼" leach rock to the pile for direct costs of $250 per day.

If the drilling indicates a more massive ore structure, we might then deliver the leach rock for considerably less cost.

It would require about 3 to 4 men to operate the pit crushing cobbing operation for 8 hours, or about $100 per day labor, and about $110 per day for fuel, lube, maintenance, tires, filters etc. for the drill, crane and 15 ton rear dump truck and say $40 for drill steel, powder etc. This totals say $250 per day.

The total connected power would be about 100 kw and the energy usage say 60,000 KwH per month or say a monthly billing of about $1,000. The power for the crushers, conveyors and pumps etc.

The unit would use say 3.5 lbs of 93% acid or say 17,500 lbs per day at a delivered cost of 1.5¢ per lb or about $260 per day. Acid to be delivered from Bagdad in 20 ton rigs to keep the 10,000 gallon storage tank full. We need about 2 or 3 trips per week.

After the leach liquor at say 5 grams per liter of copper is clarified it is pumped to the cementing vessels at about 80 gallons per minute and the stripped liquor recycled or wasted to heap leach on the cump.

This unit would consume about 7000 lbs or 3 ½ tons per day of precipitating steel scrap at a delivered cost of $60 per ton or say $210 per day. The dealer could deliver 20 tons every week or so and the clam shell crane would place same in the cement tanks.

The leach-cement units would operate for 24 hours and one man could operate both, but we provide say 6 men per day or $150 for the leach-cement operation.

All deliveries, loading, shipping in day turn and a total of say 10 men per 24 hours are needed, 6 on day turn and 2 on middle and night turns.

The recap of the total direct costs to produce 5,000 lbs of copper per day for 300 days per year would be about as follows: the mining and hauling includes operator labor etc.

Direct Production Costs - 5,000 lbs per day of copper in 6,600 lbs of cement

	Average Cost Per Day	Cost per 300 Day Year
1. Drill, shoor, load and haul 100,000 tons per year of rock	$ 200	$ 60,000
2. Crush, cob and size 45,000 tons per year - ¼" leach	50	15,000
3. Place and waste leach rock	25	7,500
4. Power cost (2600 KwH per day)	40	12,000
5. Acid cost (2625 tons per year at $30)	260	78,000
6. Scrap cost (1050 tons per year at $60)	210	63,000
7. 6 men - leach unit	150	45,000
8. General maintenance, lab etc. (for leach unit)	50	15,000
9. Freight to Bagdad	20	6,000
	$ 1,005	$ 301,000

Indirect Costs

It is assumed that the mine owners take down a 20% equity in the final operating company.

The group providing the $45,000 development funds to have a 20% equity position

and to be repaid on a preferred position until the original investment is recaptured and then revert to his normal 20% share.

The Ward group to have a 20% equity for continuing technical, management, accounting and general organization skills throughout the initial development and routine operations.

The funding group for the $300,000 capital exposure - almost a bank loan situation - if the 200,000 tons, or better, of ore are developed, to have a 40% equity position.

By thus making the mine owners in equity consistant with a rational royalty, all concerns of royalty calculations are avoided, and all enjoy their share of the depletion allowance.

In this situation, then, the only major Indirect cost would be as follows:

General Manager operations	$ 20,000 / yr
Local taxes	6,000 "
Aver Interest provision (5 year write off)	14,000
General Legal, phone ,travel etc.	7,000
Total Indirects	$ 47,000 per year

BREIF FINANCIAL APPRAISAL OF 750 TON PER YEAR UNIT

A typical cash situation for the first 5 year period, when selling 1.5 and up to 1.75 million lbs per year Copper at 52.25 ¢ / lb dld, and using the amortization funds as cash, would be about as follows for a 300 and a 350 Day year.

	300 Day year	350 day year
1: Income sales	$ 783,750	$ 914,375
2: Direct costs	(319,500)	(372,500)
3: Indirects	(47,000)	(47,000)
4: Gross before Depletion	417,250	494,875
5: Depletion credit	(117,560)	(137,155)
6: Subject to US tax	239,690	357,720
25,000 x 22%	(5,500)	(5,500)
Balance at 48%	(103,050)	(159,700)
7: TOTAL US Tax	108,550	165,200
8: Cash avail for dividend	$ 308,700	$ 329,675

For these conditions, the 20% shareholders would expect $ 60,000 to 65,000 per year , and the 40% share about $ 125,000, ora ROI of about 2.4 years.,if he had actually invested $ 300,000 in the plant facilities, and working capital.

If, however, The plant funding of say $300,000 could be negotiated as a straight Bank Loan (ave interest is paid in indirects), then the Mine owners, the Ward group, and, the Drilling investor might become 33% owners of equity. If the operation refunded the 300,000 in say 10 semi annual payments, or $60,000 per year then a reasonable 350 day year situation would look about as follows:

Income	914,375
Operating costs	(372, 00)
Indirects	(107,000)
Gross before depletion	434,875
Less depletion credit	(137,155)
Subject to US Tax	297,720
Total US TAX	135,550
Cash available for Dividends	299,325

In this case, each of the groups could look forward to almost $100,000 per year.

If the drilling program, or subsequent exploration develops say 400,000 Tons of 2% ave grade ore, then a unit twice as large could be installed, and the profit potential obviously would be increased.

APPENDIX

ASSAY REPORTS, GRAB SAMPLES

LEACH TEST REPORT

MAP OF AREA AND CLAIMS

DETAILS DRILLING PROGRAM

ARIZONA TESTING LABORATORIES

A DIVISION OF CLAUDE E. McLEAN & SON LABORATORIES, INC.
817 WEST MADISON ST. PHOENIX, ARIZONA 85007 PHONE 254-6181

For Frank Senior
1838 W. Virginia
Phoenix, Arizona

Date July 9, 1973

Sample of Ore

Received:

Submitted by: same

ASSAY CERTIFICATE

Gold figured at $ 80.00 per ounce

Silver figured at $ 2.00 per ounce

LAB. NO.	IDENTIFICATION	GOLD		SILVER		PERCENTAGES	
		OZ. PER TON	VALUE	OZ. PER TON	VALUE	Copper	
4771	Sarjack-1 general outcrop hi-grade					8.00%	
	Sarjack-2, general outcrop, vein					0.97	
	Sarjack-3, Bottom 100' shaft #1					11.4	

Respectfully submitted,

ARIZONA TESTING LABORATORIES

Claude E. McLean

Claude E. McLean, Jr.

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
P.O. Box 50106, 1700 W. Grant Rd., Tucson, Arizona 85703

CERTIFICATE OF ANALYSIS

SAMPLE IDENTIFICATION	GOLD	SILVER	LEAD	ZINC	COPPER %	MO	Fe %	SiO_2 %	
Sample # 1					<0.01				
Sample # 2					1.68				
Sample # 3					3.95			62.32	
Sample # 4					6.10			56.99	
Sample # 5					7.50		4.25		
Sample # 6					3.60				
Sample # 7					34.50				
Sample # 8								74.44	

TO:
Mr. Charles Ward & Assoc.,
4766 E. Alta Vista Road
Phoenix, Arizona 85040

REMARKS:
Single determination

CERTIFIED BY: H E [illegible]

CHARGES:
PREPARATION $ 6.00
ANALYSIS $ 23.25

ACCT.:	DATE REC'D:	DATE COMPL.:		
CHARLES WARD & ASSOC.,	7/18/73	7/26/73	347618	$ 29.25

PRODUCT DEVELOPMENT

APPLIED RESEARCH

ARC LABORATORIES

Division of Arizona Research Consultants, Inc.

9236 NORTH 10TH AVE. PHOENIX, ARIZONA 85021 943-3573

FOR: Frank Senior
1838 West Virginia
Phoenix, Arizzona

DATE 7-18-73

LAB No. 12238

RESULTS

3000 grams of (85% minus 10 mesh) ore was agitation leached with 6 liters of 25 g/l H_2SO_4 The ore contained 1.0 % copper.

Time hrs.	In solution g/l Cu	In solution g/l H_2SO_4	percent leached	
0.5	2.5	12.0	50.0 %	
1.0	3.1	10.2	62.0	
2.0	3.6	8.5	72.0	
3.0	3.98	7.0	79.6	
4.0	4.14	6.0	82.8	
5.0	4.24	5.4	84.8	
6.0	4.32	4.9	86.4	Fe = 2.04 g/l

Acid/ Cu = 4.6

Tails contained 0.09 % Cu

Respectfully submitted,
ARC LABORATORIES

John T. Long, Jr.

As a mutual protection to clients, the public and this corporation, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from this corporation.

PRELIMINARY COSTS OF DRILLING PROGRAM

Option payment to mine	$ 5,000
General travel, legal and misc.	3,000
Geologist expense 10 days	2,000
General dozer, ripper work	2,500
3,000 ft drill hole	28,000
Assay & leach tests	1,000
Engineering and final report	4,000
Estimated total	$ 45,500

R 6 W
SANTA FE RR
N
HWY 60
10 MI TO WICKENBURG
64 KV
Wickenburg
T 7 N
Power Line
SARJAC Mine Area
LOCATION PLAN
Scale 1" = 5280'
T 6 N
ENLARGED MAP
STATE MINERAL RIGHTS
640 ACRES
STATE MINERAL RIGHTS
80 A.
STATE MINERAL RIGHTS
NEW ACCESS ROAD
PROPOSED
3 MI TO HWY
2920
AREA 2
2900
1580' OFFSET
ROAD
STATE MINERAL RIGHTS
370 ACRES
T 6 N
3050
3000
2880
2800
2760
2720
2940
Shaft 1
Shaft 2-3
75' - 50'
SARJAC MILL SITE
AREA 4
AREA 1
AREA 3
DATA FROM:
1) ARIZONA STATE LAND
2) USGS - VULTURE MTS
3) GENERAL SUBDIVISION
F. SENIOR
GEN'L PLAN SAR.
R 6 W