



CONTACT INFORMATION  
Mining Records Curator  
Arizona Geological Survey  
3550 N. Central Ave, 2nd floor  
Phoenix, AZ, 85012  
602-771-1601  
<http://www.azgs.az.gov>  
[inquiries@azgs.az.gov](mailto:inquiries@azgs.az.gov)

The following file is part of the Grover Heinrichs 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.

## The View From Bagdad Copper Corporation

Bagdad Copper Corp. was incorporated in Delaware on Feb, 28, 1927. The company operates the Bagdad Mine in western Yavapai County, Arizona. In 1967 the company had sales of \$17,816,563, resulting in net income of \$2,532,107, equivalent to \$2.00 per share. In addition to the Bagdad Mine, the company also owns the Garland Steel Company and Bagdad Plastics Company. The former was acquired in 1967 and the latter was formed in 1967.

The Bagdad Mine changed over from underground to open pit methods in 1948. Both sulfide and oxide ores are produced. The mine accounts for about 75% of the corporation's sales and 90% of its earnings. It employs 75% of the personnel of the company. By porphyry copper standards it is not a large mine. A breakdown of metals sales in 1967 is shown below.

### Copper products

Concentrates	\$6,482,683
Precipitates	2,827,066
Electrolytic copper	1,228,753
Copper powder	1,951,781
Molybdenum concentrates	838,346
Silver bullion	<u>50,877</u>
	<u>\$13,379,506</u>

The mines produced 25,683,000 pounds of copper from sulfide concentrates, and 11,066,000 pounds were recovered from leach solutions as cement copper. Molybdenum shipments in 1967 were 519,639 lbs.

While the copper industry strike did not close down the Bagdad Mine, the company's earnings were affected by it. The smelter to which sulfide concentrates had been shipped was closed. This resulted in excessive stockpiling of concentrates and precipitate. At Dec. 31, 1967 Bagdad had 4,497,000 pounds of copper in inventories, as compared with 1,990,000 lbs at Dec. 31, 1966. The situation would have been worse, but for liberalized federal licensing provisions for export of copper from the United States. Up to 80% of accumulating concentrates were permitted to be exported for treatment abroad where the refined metal recovered from the concentrates was to be sold abroad. One-hundred percent of output could be exported if the refined metal was to be returned to the United States. Bagdad, as well as Duval and Pima, took advantage of these provisions. Bagdad is believed to have exported concentrates to Japan and/or Canada. Foreign smelters became increasingly heavily booked as 1967 wore on, and in the early months of 1968 sales were difficult for Bagdad because smelter capacity was not available. The company sold about 13,300,000 lbs of copper for overseas smelting in 1967. In the first months of 1968, an additional 4,300,000 lbs were sold similarly. Bagdad's 1967 annual report pointed out that freight, handling and smelter charges were considerably higher when exporting, but the average realized price of copper during the strike was on the order of .05 per pound higher than realized before the strike.

The table below shows grades and average prices realized for 1964-67.

	1964	1965	1966	1967
ore grade	0.77%	0.83%	0.94%	0.77%
avg. price realized per lb.	32¢	35.2¢	38.1¢	41.6¢

The 4.5 million pound inventory at Dec. 31, 1967 was valued on Bagdad's books at cost of about 12¢/ lb. It should be remembered that this was

in the form of sulfide concentrates and cement copper.

Bagdad is pioneering in metallurgy. For a small company, it shows a great deal of spunk. Among its achievements is a commercial plant to precipitate copper by hydrogen reduction using impure cement copper as raw material. It is presently working with the liquid ion exchange (solvent extraction) method of recovering copper from acid leach solutions. In early 1968 tests were underway to see if pregnant solutions from the LIX circuit could be used to feed the hydrogen reduction powder refinery, or whether they would have to go into an electrowinning plant.

A full sized LIX-64 extraction plant for handling 3300 gpm of leach solution at Bagdad was estimated at \$1,980,000 or \$600/gpm installed. Operating costs have estimated at 2.1 - 3.8¢ per pound of copper contained in the feed solution. The high end of this range is about equal to the cost of scrap iron used to precipitate 1 lb. of copper in conventional practice. That latter cost is about 3.75¢/lb. of copper precipitated. About 1.5 lbs. of scrap iron is consumed per pound of copper precipitated in the conventional method. The iron costs about \$50/ ton delivered. Copper recovery in Bagdad's pilot LIX-64 plant was just under 98%. (Duval's pilot plant at Esperanza had average extraction of 95%.) The company estimates that use of the LIX method will reduce by 3¢/lb. the cost of copper from oxide ores. At 1966 production rates, that would amount to savings of \$400,000.

The path of pioneering in metallurgy has not been rosy. During 1963 Bagdad acquired a half interest in Arizona Chemcopper Corporation, which had been organized to engage in the production of copper powder for use in the manufacture of metal products. On Jan. 21, 1965, Bagdad and Chemstals Corp. of New York entered into an agreement to transfer all assets of Arizona Chemcopper Corp. to a joint venture, Arizona Chemcopper Company. The agreement gave

Bagdad a 50% interest in the venture.

A refinery was built capable of producing a pure (99.95%) copper powder as its primary product and also capable of producing high purity copper briquettes suitable for special melt stocks. The plant was completed in May 1966. The powder is reported to command about a 15% premium over copper metal.

In 1966 Bagdad lost \$324,000 on the refinery, and in 1967 lost \$1,012,000 on it. Of this latter amount, \$325,000 was depreciation and \$218,000 was write off of old autoclaves. Operating problems of the refinery prevented the monthly production from ever getting much above 400,000 lbs. Breakeven production is on the order of 700,000 lbs. per month.

As to Bagdad's future, there are 350 million tons of copper-mineralized rock surrounding Bagdad's present orebody. Drilling in recent years has shown that 17 million tons of this rock located in the main pit area and averaging 0.71% Cu, can be added to ore reserves. The 17 million tons has a stripping ratio of 2.5:1. This addition to reserves has extended the mine's life 8 years beyond the 15 years considered to be remaining at the end of 1967.

BAGDAD COPPER CORPORATION

AN

UNDervalUED COPPER MINE

WITH

GROWTH POTENTIAL

*Yavapai*

C. J. Kundert, Min. Exp. & Mining  
A. M. Missakian, Corp. Fin'l Plng.  
July 25, 1969

## TABLE OF CONTENTS

	<u>Page</u>
RECOMMENDATIONS & SUMMARY	1
INTRODUCTION	3
ENVIRONMENTAL	4
Prices	4
Arizona Copper Mines	4
BAGDAD COPPER CORPORATION	5
Ownership & Operations	5
Financial Performance	5
Earnings Growth	6
Return on Investment	6
Preliminary Cash Flow Analysis	7
Copper Price	9
Production	9
Operating Costs	10
Expansion Potential	10
RECOMMENDATIONS	12
APPENDIX	

BAGDAD COPPER CORPORATION  
AN  
UNDERVALUED COPPER MINE  
WITH  
GROWTH POTENTIAL

---

RECOMMENDATIONS  
AND SUMMARY

Recommendations

Bagdad Copper Corporation is an attractive candidate for acquisition. It has substantial reserves from which it is now earning a substantial profit; it has the potential of expanding production and earnings considerably; and the stock is selling at a very low level relative to current earnings. We recommend some form of association with Bagdad either through joint venture or acquisition assuming that the above conditions are supported during negotiations with Bagdad.

Summary

Bagdad is a closely held corporation that produces copper from its open pit property in Arizona. Bagdad has substantial undeveloped reserves of two types, sulphide ore amounting to 185 million tons and leach ore in excess of 200 million tons having a gross value at current price of \$1.5 billion. It compares favorably with other major copper mines in Arizona which together produce 22 percent of free world copper. Bagdad is also engaged in small scale steel fabrication and plastic manufacturing.

The earnings growth for Bagdad has been outstanding. Subsequent to start-up of leaching operations in 1961 earnings have increased at an average rate of 78 percent per year. From 1966 through 1968 earnings fluctuated, apparently as a result of the industrywide copper strike. In 1968 annual cash flow amounted to about \$5 million, net income amounted to \$3.4 million, and production was 36.5 million pounds of copper.

The reported reserves amount to over 80 years production at current rates and offer an opportunity for a dramatic increase in production. A 20,000 ton per day mine-mill expansion is being considered by Bagdad which could potentially add \$5-10 million to annual cash flow.

The investment requirement for the mine-mill expansion is estimated by Bagdad to require \$35 million, which compares with a market value of \$25 million for the entire company at current stock prices. It would, therefore,

Summary (Continued)

seem difficult for Bagdad to fund such an expansion without outside equity capital. Should it be possible to acquire the common stock of Bagdad it appears that a 10 percent return could be realized on an acquisition cost of \$40 million, or \$15 million greater than market price. In other words, if Getty Oil were to acquire Bagdad and expand the operations, \$60 million to \$75 million would be required.

The common stock of \$20 per share is priced at less than 7 times 1969 projected earnings. The present worth of cash flows projected from current operations and discounted at 10 percent is \$31 per share, 50 percent greater than the market price. A mine-mill expansion has the potential of adding \$15 per share to the present value increasing it to \$46 per share.

## INTRODUCTION

Getty Oil Company management has recognized that acquisition of a producing mining concern would yield immediate profit, increase the scale of our effort, add reserves, add technical and managerial skills, and provide opportunity for further investments. Mining companies have been screened using the following principal criteria: profitability and growth potential; involvement in favored commodities, and geographic location.

In the course of screening criteria it has been noted that acquisition minded companies typically subject 100 companies to preliminary screening to produce 10 promising candidates. Out of 10 candidates perhaps one or two might be acquired. Faced with such long odds, it is most efficient to confirm mutual interest at an early date, rather than invest undue effort in preliminary evaluation.

From our screening we conclude that Bagdad is a viable candidate offering reasonable returns and recommend that steps be taken to establish feasibility of acquisition. Mr. C. J. Kundert, Minerals Exploration and Mining, prepared the material on Bagdad Copper's ownership and operations; Mr. A.M. Missakian, Corporate Financial Planning, prepared the financial analysis; and Mr. R. A. Murphy, Corporate Financial Planning prepared the update of the outlook for copper supply, demand and price.

The report begins with a description of the environment of the copper industry and of the industry in Arizona in particular.

The report includes a discussion of ownership and operations which is followed by a section on financial performance and evaluation. An appendix is provided covering additional detail on financial statistics, a brief review of industry supply and demand and other descriptive information and analytical support.

## ENVIRONMENTAL

This section briefly reviews copper prices and copper mining in Arizona. Additional discussion of supply and demand is provided in the appendix.

Prices

Appendix A shows that the price of copper has been increasing over the long term. Currently demand exceeds supply as a result of curtailed supplies from the prolonged strike during 1967 and early 1968 and the nationalization of Chilean reserves. The price is expected to retreat from the current level of 46-1/4¢, perhaps during 1970, as better balance is achieved between supply and demand. It seems reasonable to expect prices to retreat to a level of 40¢ thereafter, which is the value incorporated in analyzing Bagdad.

Arizona Copper Mines

Appendixes B and C tabulate major Arizona copper mines and lists their daily gross revenue. Approximately 900,000 tons of copper per year are being produced yielding a daily revenue of \$2.3 million. This is about 22 percent of the free world's annual production of copper and demonstrates the tremendous wealth generated by copper in Arizona.

Current investments totalling several hundred million dollars have been made to increase production in this area. The demand for copper and rising prices for the past 10 years create solid confidence for the future of this commodity. Bagdad is the only producer in Arizona that has not increased production in recent years; it can participate in this future if it receives the necessary funds to increase its milling and mining capacity.

## BAGDAD COPPER CORPORATION

Ownership

In 1943 John C. Lincoln, a millionaire and founder and head of the Lincoln Electric Company of Cleveland, acquired Bagdad. Bagdad is now controlled by the Lincoln family which holds about 54 percent of the common stock as shown in Appendix D. Bagdad under Lincoln had repaid an RFC loan of \$2.5 million and had in 1955 a cash surplus of \$1.8 million. After the death of Lincoln, his son David C. became president of Bagdad. Under his guidance Bagdad reached its current production rate of about 18,000 tons of copper per year, with a net profit of \$3.4 million in 1968.

Operations

Bagdad produces about 11,000 tons of copper per year in the form of sulphide concentrate and 7,000 tons per year in the form of cement copper derived from leach ore. The sulphide, or primary ore, is mined by open pit methods and milled in a 6,000 tpd concentrator. Leach ore is heaped on pads and leached with acid waters. These are collected in ponds laden with scrap iron and copper is precipitated by the iron. Both sulphide concentrates and cement copper from leaching are shipped to a smelter for further processing.

Primary or sulphide ore reserves are estimated at 185 million tons of 0.56 percent copper and leach ore reserves are estimated to be 250 million tons of 0.435 percent copper. These reserves are comparable to those of the major Arizona producers and are capable of supporting production several times the current rate.

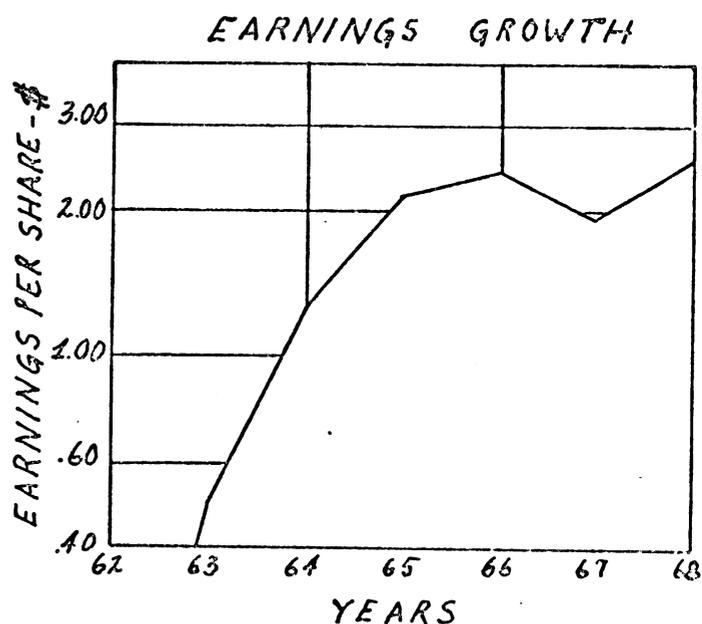
Bagdad is currently investing \$5 million on a solvent extraction and electrowinning plant that will yield a high quality product from leach solutions. This facility will replace a portion of the cement copper production. As reported in the Bagdad 1968 Annual Report, plans are being considered to build a modern 20,000 tpd concentrator as a supplement to the old 6,000 tpd facility. Expansion costs are reported to be about \$35 million.

Financial Performance

Bagdad's historical earnings growth has averaged 78 percent per year since 1962. Return on investment (ROI) data indicate that recent returns exceed 15 percent after tax. Cash flow projections, developed from available data, indicate that an acquisition price of \$31 per share is justified, compared with a current market price of about \$20 per share.

Earnings Growth

Annual earnings for 1963-68 are shown on the chart to the right. In 1961 Bagdad incurred a loss during start-up of leaching operations. Subsequently, earnings growth has averaged better than 78 percent per year, probably a result of increasing production from leaching operations coupled with rising copper prices. For 1966-68 earnings fluctuated, apparently from strike induced conditions including curtailed sales and inventory accumulation followed by tight industry supply conditions.



Despite the earnings growth which Bagdad has achieved, the stock is currently priced at 6.7 times estimated 1969 earnings. Copper companies have generally been accorded low price-earnings multiples for the period reviewed, 1966-69, and Bagdad has typically been priced at one of the lowest multiples for a copper company. Investment services such as Value Line suggest that the low multiples are explained by lack of "glamour" rather than by potential industry problems, and they generally rate copper securities as good values.

Return on Investment

Earnings growth alone is an insufficient measure of financial performance. Return on investment (ROI) is introduced to assess the level of earnings. The average ROI for the last three years is indicated in the table shown in Appendix K. Since these three years include both favorable and unfavorable years, the average level might be representative of a "normalized" return.

The average ROI for Bagdad for 1966-68 is 16.7 percent, which is slightly better than the average for other mining companies that have been reviewed. The profit margin ratio has followed a pattern similar to that for ROI. (Additional financial detail is provided in Appendix E.) The average grade for sulphide ore processed is one factor that explains the pattern in the profit margin which in turn explains fluctuations in ROI. The grade declined

## Return on Investment (Continued)

from 0.93 percent to 0.65 percent from 1966 to 1968, suggesting rising costs to produce the same amount of copper from the same amount of ore. As one important consideration in determining future profitability, the grade and reserves should be carefully reviewed.

Preliminary Cash Flow Analysis

The economic reason for acquiring any ongoing concern is future earnings. Future cash flows are projected from operational factors, such as price, production rate, and operating costs, and the present worth of Bagdad stock is indicated for these projections and for selected departures in assumptions. The table at the top of the next page shows values selected for key variables for a point of departure referred to as "likely" and values chosen for three departures. The resulting benefits are indicated in terms of annual cash flow and present worth of Bagdad stock. The support for the selected values is described briefly following the discussion of the results. See Appendix F for further information.

Summary of Results

<u>Key Variables</u>	<u>1968</u>	<u>"Likely" Proj.</u>	<u>Departures</u>		
			<u>High Copper Prices</u>	<u>Low Prod. Rate</u>	<u>Increasing Costs</u>
Price of Copper-¢/lb.	41.9	40.0	48		
Production Rate-MM lbs.	36.5	36.0		32	
Operating Cst-¢/lb.	20.4	Same			+3%/yr.
Capital Invstmt-\$MM	1.2	5.0			
Avg. Annual Cash Flow (\$ Million A-Tax)	4.7	4.6	6.0	4.0	3.3
Present Worth @ 10%- Dollars/Share		31	41	28	26

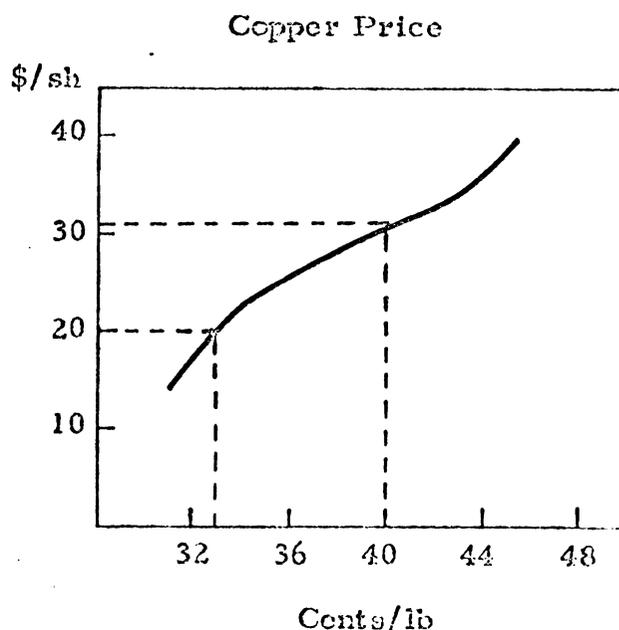
-----

The present worth of Bagdad stock amounts to about \$30 per share for the values chosen as "likely." This compares with a recent market price of about \$20. Departures range from \$26 to \$41 per share. In addition to the cases tabulated above, cash flow projections are calculated for a potential 20,000 ton per day mine-mill expansion, at a cost of \$35 million, which Bagdad indicates they are considering. For the same conditions as projected in the likely case, this expansion could add \$5-\$10 million in cash flow and increase the present worth of the stock to \$46 per share. Therefore, the current price for Bagdad Stock appears low in comparison with potential earnings from existing operations. The value might be further enhanced by the expansion under consideration. If the \$30 per share value is supported by further evaluation, Getty Oil could afford a substantial premium over the market price and still earn a return consistent with corporate guidelines.

If Bagdad stock can be acquired at present market price of \$20/share the discounted cash flow rate of return for the current operations is 19 percent. The rate of return for the expansion of operation is 17 percent.

### Copper Price

The outlook for copper prices was discussed in an earlier section, indicating long-term prices in the range of 40¢ per pound. The chart, opposite, compares present worth per share with alternate projections of price. It shows a present worth of \$31 per share for a 40¢ per pound copper price, as tabulated earlier. On the downside, a copper price in the range of 33¢ could justify the current stock price of \$20/share. Since such a low price projection appears extremely unlikely, the worth of Bagdad seems to be insensitive to plausible downside fluctuations in copper prices. On the other hand, the current copper price of 45¢ shows a present worth of \$38 per share.

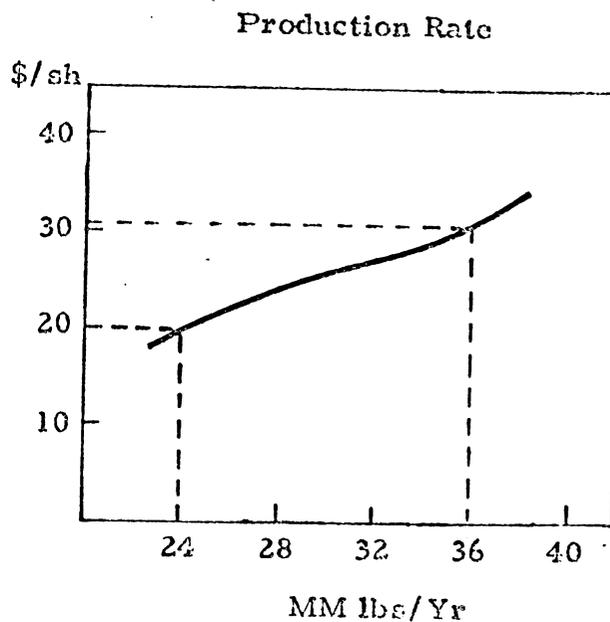


### Production

The overall production rate for Bagdad has been steady for the last three years averaging 38 million pounds of copper per year. Although production of sulphide concentrates declined during this period, the production of leach precipitates has increased, offsetting the decline.

<u>Year</u>	<u>Production</u> <u>Million Pounds</u>
1966	40.3
1967	36.8
1968	<u>36.5</u>
Average	37.9

The chart to the right shows that copper production could fall from the present level of 36 million pounds to 24 million pounds and still yield a projected 10 percent return on the current stock price of \$20/share.



#### Operating Costs

Operating costs in 1968 amounted to 20¢ per pound. As is the case for other mining companies, a substantial portion of these costs are accounted for by labor, and wage rates have been increasing sharply. In the calculations referred to as "likely" conditions, it is assumed that price increases and efficiency gains would offset cost increases and the profit margin would remain constant. In order to test the impact of this assumption a departure is presented of operating costs increasing at a rate 3 percent faster than prices. This departure reduces present worth by \$5 per share.

#### Expansion Potential

In the 1968 annual report, Bagdad reports 185 million tons of primary (sulphide) ore. This contrasts sharply with the average reserve of 25 million tons carried on its books for the past 15 years. The sudden announcement of a vast reserve suggests that Bagdad is seeking financial aid for the proposed expansion.

Bagdad is contemplating a 20,000 ton-per-day mine-mill expansion. As stated in their 1968 annual report, the estimated cost for this facility is \$35 million, which compares with a market value of \$25 million for the entire company. It would, therefore, seem difficult for Bagdad to fund such an expansion without seeking outside equity capital.

## Expansion Potential (Continued)

Pima Mining Company has been in a similar situation and it is informative, therefore, to review its experience (see Appendixes G, H, and I). In 1966 Pima (Cyprus 50 percent, Union Oil 25 percent, Utah 25 percent) tripled production from 6,000 to 18,000 tons per day with reserves similar in grade and quantity to the current reserves at Bagdad. A further expansion was completed in 1968 to 30,000 tpd in spite of a decrease in grade from 0.733 percent copper to 0.586 percent copper.

The gross revenue at Pima amounted to \$147,000 per day compared with \$47,000 for Bagdad and \$25,000 for Petrotomics. For 1968 the total net income for Pima is \$15.1 million. In contrast, Bagdad, operating a small mill with attendant high costs, earned \$3.4 million or about one-fourth of the earnings for Pima.

Another way to measure the impact of a company like Bagdad is to compare the gross value of its reserves with other commodities. At the current price of copper, Bagdad's reserves total \$1.5 billion. This value would require a uranium reserve of 250 million pounds at current prices.

RECOMMENDATIONS

We recommend that overtures be made to Bagdad Copper Corporation to determine some form of association either through joint venture or acquisition. In order to assure that actual conditions support the values apparent from the analysis the following subjects should be reviewed during negotiations:

1. Verification of grade and quantity of reserves, amount of inventory, other operations, and other physical assets.
2. Technical and managerial skills of Bagdad personnel.
3. Bagdad operating cost experience.
4. Tax and accounting consequences of alternate forms of acquisition.

APPENDIX INDEX

- I - Copper Industry Supply and Demand .
- A - Copper Prices
- B - Arizona Copper District
- C - Arizona Copper Mines
- D - Board of Directors & Ownership
- E - Financial Statistics
- F - Annual Cash Flow
- G - Pima Bagdad Comparison
- H - Economic Effect of Pima Expansion
- I - Economics of Typical Operations
- J - Copper Production
- K - Return on Investment
- L - Price - Earnings Ratio
- M - Bagdad Ore Reserves

## COPPER INDUSTRY SUPPLY AND DEMAND

In 1965, as part of a series of economic studies of selected minerals, Stanford Research Institute evaluated the outlook for copper. For 1970, they forecast a ceiling price of 36¢ per pound. Currently, the price is 46.5¢ per pound because of temporary supply restrictions emanating from the 1967-68 copper strike as well as the uncertainty surrounding Chilean operations. This study also projected Free World demand growth from 1963 to 1970 at from two to four percent per year and a slightly lower rate for domestic growth. On the supply side, SRI stated that "there is the distinct possibility that considerable excess mine capacity will exist in the copper industry by 1970...". As for prices, SRI felt that competing materials--aluminum and plastics--would place a ceiling on prices of some 36¢ per pound in the longer term. Subsequently, SRI has drafted a report on the "World Mining Industry" and copper is reviewed as one important segment. In this study, SRI projected a higher ceiling price--38¢ per pound.

The following analysis updates the previous studies and evaluates the projections in terms of more recent events.

### DEMAND

The 1965 SRI study projected Free World demand growth from 1963 to 1970 at 2 to 4 percent per year. It now appears likely that demand in 1970 will more closely reflect the conservative estimate. SRI's more recent study projects world demand growth from 1970 to 1980 at 4 percent per year. It appears likely that Free World copper demand growth from 1970 to 1980 will be on the order of three (historical) to four (reflecting accelerated development in the have-not nations) percent per year. Domestic demand, however, should grow at a lower rate--say two to three percent per year--reflecting the relative maturity of the U.S. economy. Recent high growth rates were largely attributable to military requirements which are not expected to continue.

Increasing per capita copper consumption is a characteristic of a developing nation because copper is a basic material in development investment. This characteristic is the basis for our own and SRI's more optimistic projection of Free World demand in that the developing countries are expected to make considerable headway during the seventies. On the other hand, per capita copper consumption in highly developed countries tends to level off--due to its increasing use in consumer items--and this is the basis for projecting a lower rate of growth domestically for copper.

SRI devoted considerable attention to the question of substitution of aluminum and plastics for copper in their 1965 effort for TOC. SRI now

feels that the future effects of substitution on the demand for copper are likely to be slight because the major markets for copper that were once vulnerable have already been taken over and other markets are not as susceptible. The major area of substitution was overhead high voltage lines which are now dominated by aluminum.

### SUPPLY

Free World copper supply is composed of two sources--mine production and scrap--while a third source--imports--can be added to the domestic picture.

Based on announcements, it appears likely that Free World mining capacity will grow 5.6 percent per year to 1973 while domestic mining capacity appears likely to grow some 4.4 percent per year over the same period.

The amount of scrap recovered closely follows the volume of copper fabricated domestically and consequently is projected to grow at the same rate as the demand for primary copper. Imports are projected to grow at the historical rate, i.e., slightly slower than the overall growth in world supply.

The higher rates of growth forecast for supply vs. demand indicate that a shift toward balance and then some oversupply could be expected during the early part of the seventies.

### PRICE

Current prices are about 46.5¢ and well above the long term trend. Based on demand/supply considerations the price could reasonably be expected to decline as soon as the effects of the 1967-1968 copper strike have worn off.

SRI, in the 1965 Copper Study, estimated the long term ceiling on copper prices at 36¢ per pound while a more recent study by the same source raised that estimate to 38¢. SRI's ceiling price is based on the concept that above that price, competing materials will encroach upon copper's market. SRI raised the projected ceiling from the one in the 1965 study to the price in the "World Mining Industry" because their current view is that competing materials have already made their major inroads in major markets.

However, the following observations tend to support the position that copper prices will not decline to pre-1967 (36¢ per pound) levels and indeed may gradually rise after the effects of the 1967-1968 copper strike:

1. Domestic refinery price behavior (generally stable or gradually rising) during periods of severe shortages and high mine operating rates during the early sixties would argue that a period of relatively controlled price behavior has arrived and is expected to continue.
2. Offsetting the overcapacity projected for the early seventies is the increasing interest and power of some countries whose principal source of foreign exchange is copper operations. A recent example is the purchase by the Chilean Government of Anaconda's very large operations. Government ownership facilitates price maintenance in times of oversupply and price increases during periods of excess demand.
3. Cost inflation pressures in the longer term argue for a gradually rising price structure. Labor costs constitute some 30% of all costs in copper production. If, as in oil, the copper industry is facing an annual labor cost increase of some six percent, it follows that production costs will rise by at least 1.5-2.0 percent per year. In that competing materials industries will be facing the same labor cost increases, it can be argued that any ceiling imposed by these materials will also gradually rise over time.

The outlook then is for a price decline from the current high level to some 38-40¢ per pound when the effects of the 1967-1968 copper strike are fully absorbed--say 1970--and then gradually increasing prices in future periods--on the order of 1.0 percent per year.

Russell A. Murphy  
Corporate Financial Planning  
July 24, 1969

Table I  
Domestic Copper Demand/Supply  
(Thousands of Short tons)

	SUPPLY				DEMAND			Stock Change
	Mine Production	+ Imports	Appar- ent Second- ary	Total Supply	Deliveries to Fabricators	+ Exports	Total Demand	
1960	1,093	524	245	1,862	1,280	506	1,786	76
61	1,160	459	347	1,966	1,426	472	1,898	(68)
62	1,224	479	213	1,916	1,522	351	1,873	42
63	1,208	539	151	1,898	1,580	326	1,906	( 8)
64	1,251	584	186	2,021	1,683	365	2,048	(27)
65	1,356	518	355	2,229	1,855	372	2,227	2
66	1,408	574	593	2,575	2,240	293	2,533	42
67	950	637	183	1,770	1,595	237	1,832	(62)
68 (e)	1,200	715	245	2,160	1,707	428	2,135	25

SOURCE: Yearbook of the American Bureau of Metal Statistics, various years. Engineering & Mining Journal secondary copper is a residual number. Current sources do not allow a more precise measurement.

Table II  
Brass Mill Shipments by Market Category  
Percent of Total

	(1)		(2)		(3)		(4)									
	Redraw- ers and Reroll- ers	Metal Work- ing	Fasten- ings	Jobbers, Dealers, Distrib.	Contractors Products	Auto.	Transp.	Mach. & Mach. Parts	Elect. Mach. Equip.	Appliances Utensils, & Cutlery	Other Dom., Comm. & Prof. Equip.	Ord. & Other Military	Export			
1960	7.9	10.9	1.9	24.9	10.2	11.6	1.3	10.2	10.2	2.5	6.3	1.9				
1961	7.0	12.1	1.7	27.7	10.2	10.1	1.2	8.8	9.8	2.1	5.9	3.2				
1962	5.8	11.9	1.6	27.9	10.4	10.4	1.3	9.1	10.7	1.9	5.6	3.1				
1963	5.1	11.5	1.6	27.9	11.1	11.1	1.1	9.2	10.5	1.7	5.8	3.1				
1964	5.4	13.5	1.8	26.7	10.6	10.3	1.1	9.7	10.4	1.7	5.7	2.8				
1965	5.7	12.3	1.7	26.4	10.1	10.9	1.2	9.0	10.5	1.5	7.6	2.7				
1966	5.7	11.9	1.8	22.5	9.6	9.6	1.1	9.8	11.5	1.5	9.1	5.8				
1967	4.9	11.5	1.6	22.4	9.8	8.8	1.2	11.3	9.9	1.6	7.2	9.6				
1968(e)	4.9	11.5	1.6	22.4	9.8	8.8	1.2	11.3	9.9	1.6	7.2	9.6				

SOURCES: This distribution is based on reports covering approximately 90% of total mill shipments.

(1) Approximately 60% of this volume is applicable to "contractors products".

(2) Excluding ignition and other electrical.

(3) Other than automotive.

(4) Except electrical.

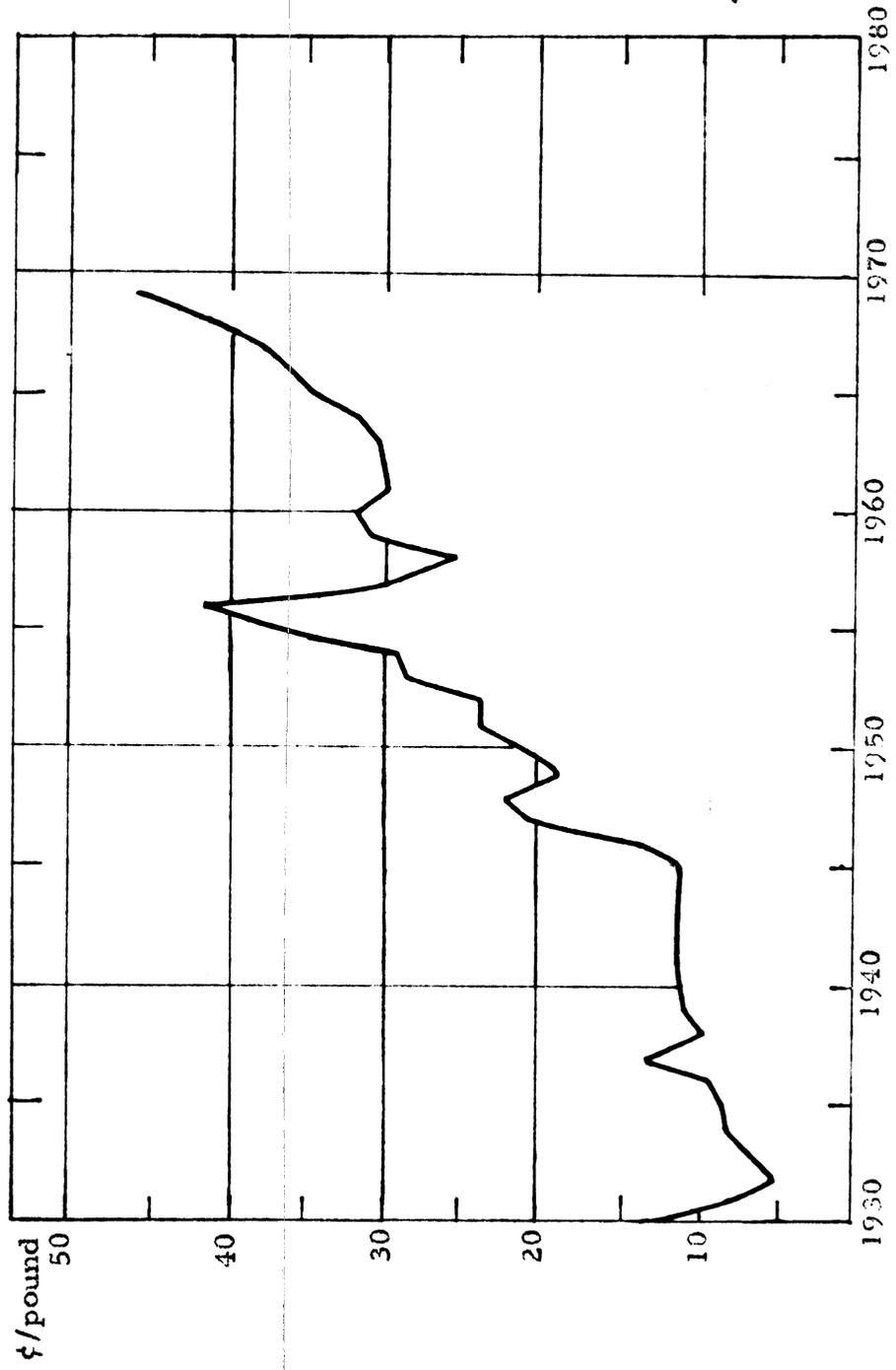
Table III  
 Domestic Copper Mines  
Apparent Operating Rates

	<u>Nominal Capacity</u> (MST/Yr.)	<u>Mine Production</u> (MST/Yr.)	<u>Operating Rates</u> (%)
1960	1, 217	1, 093	90
1961	1, 227	1, 160	95
1962	1, 237	1, 224	99
1963	1, 369	1, 208	88
1964	1, 377	1, 251	91
1965	1, 448	1, 356	94
1966	1, 518	1, 408	93
1967 *	1, 661	950	57
1968 *	1, 683	1, 200	71

SOURCE: Engineering and Mining Journals, Annual Reviews.  
 Yearbooks of The American Bureau of Metal Statistics.

\* Nine month copper industry strike during these two years.

# COPPER PRICES



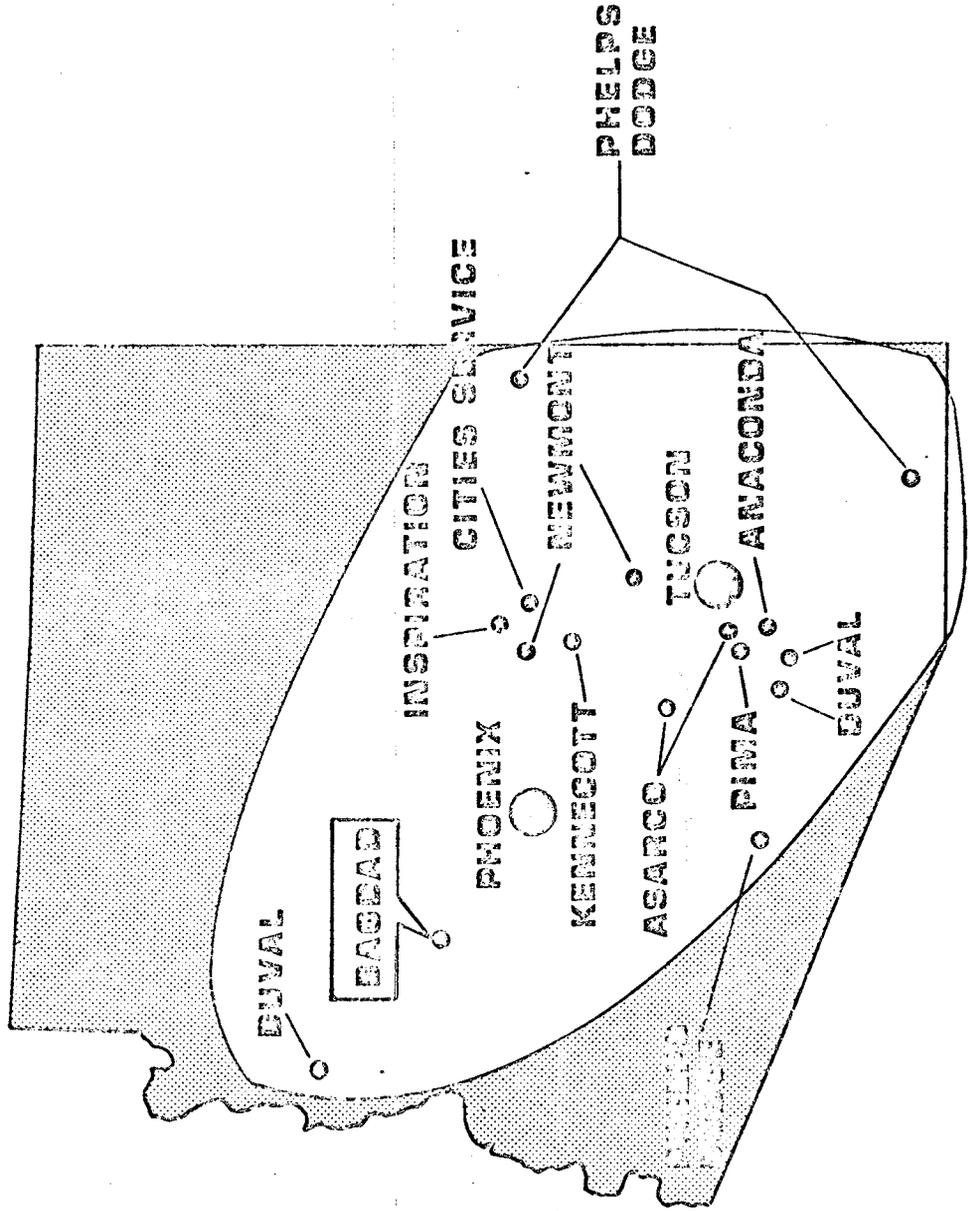
# ARIZONA COPPER DISTRICT

1969

GROSS VALUE OF DAILY PRODUCTION

\$2,300,000

22% OF FREE WORLD PRODUCTION



# ARIZONA COPPER MINES

## DAILY GROSS REVENUE

<u>MINE</u>	<u>\$ PER DAY</u>
MORENCI (PHELPS DODGE)	\$ 335,000
SERRITA (DUVAL)	305,000
SAN MANUEL (NEWMONT)	242,000
MISSION (ASARGO)	221,000
DODGE (PHELPS DODGE)	190,000
AJO (PHELPS DODGE)	180,000
TWIN BUTTES (ANACONDA)	157,000
RAY (KENNECOTT)	150,000
PIMA ( CYPRESS-UNION OIL-UTAH )	147,000
MIAMI (GITHS SERVICE)	82,000
MINERAL PARK (DUVAL)	64,000
SILVER BELL (ASARGO)	58,000
ESPERANZA (DUVAL)	57,000
INSPIRATION	53,000
<hr/>	
MAGMA (NEWMONT)	43,000
<hr/>	
TOTAL	\$ 2,331,000

47,000

Bagdad Copper Corp.

Board of Directors

Walter R. Bimson	Chairman of the Board The Valley National Bank of Arizona Phoenix, Arizona
George W. Colville	Executive Vice President Bagdad Copper Corp. Bagdad, Arizona
William T. Garland	President and General Manager Garland Steel Company Phoenix, Arizona
David C. Lincoln	President of Bagdad Copper Corp. Phoenix, Arizona
Joseph T. Melczer, Jr.	Member of the Law Firm of Snell & Wilmer Phoenix, Arizona
Frank L. Snell	Member of the Law Firm of Snell & Wilmer Phoenix, Arizona
R. L. Webb	Securities Broker Prescott, Arizona

Ownership and  
Percent Holding of Common  
as of March 15, 1967

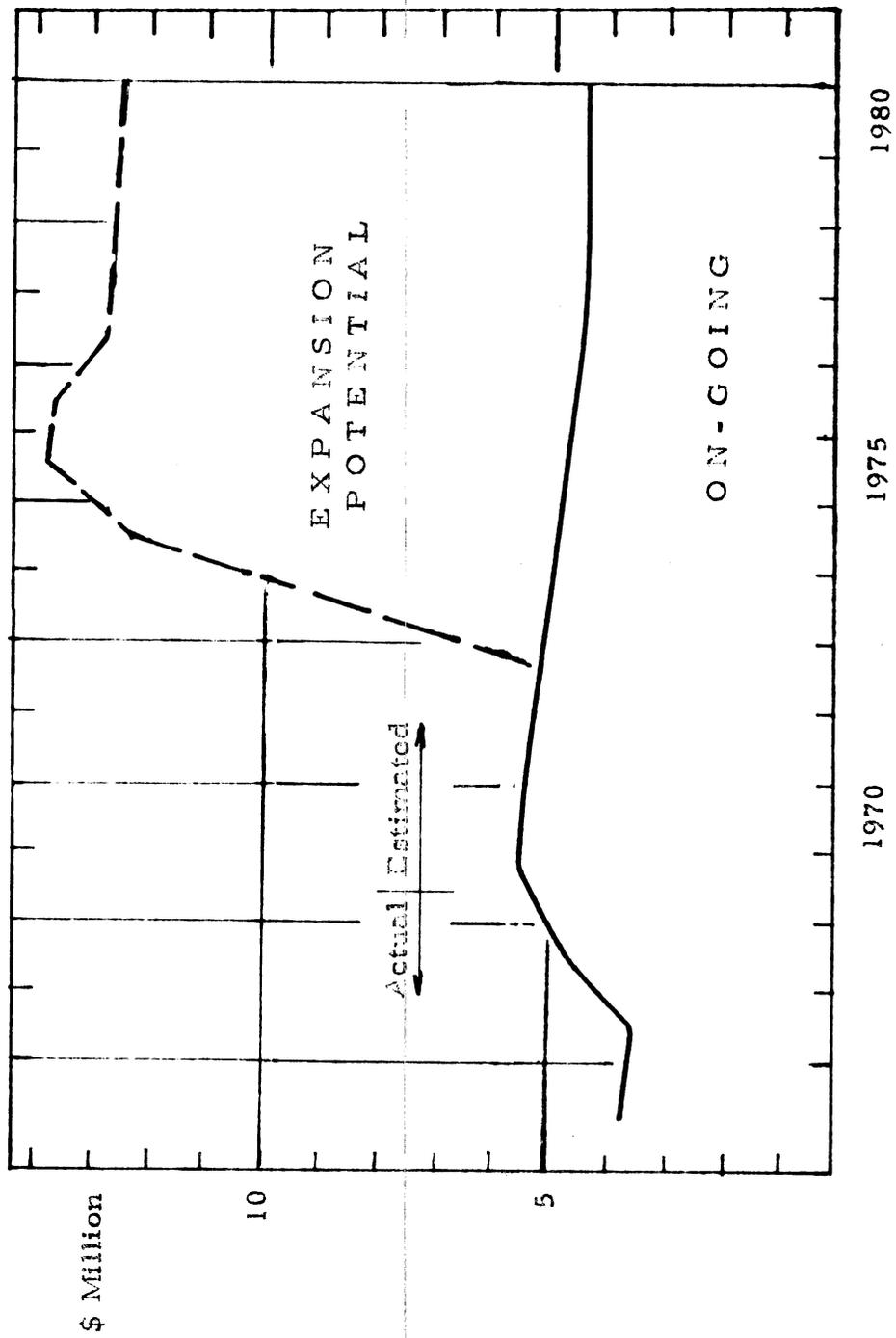
	<u>Percent Holding of Common</u>	<u>Shares Owned</u>
David C. Lincoln	13.5	170,414
Lincoln Foundation	10.4	130,952
Helen C. Lincoln	8.6	108,850
Joseph C. Lincoln	10.8	136,726
Lillian L. (Lincoln) Banta	<u>10.9</u>	<u>137,106</u>
Total	54.2	684,048

Financial Statistics  
Bagdad Copper Corporation

Market Value of Common (July 18, 1969) \$27 Million

	Fiscal Year Ending December 31			
	1965	1966	1967	1968
<u>In Thousands Except Per Share Amounts</u>				
Net Sales	\$12,390	13,940	18,002	21,440
Net Income	\$ 2,783	3,149	2,532	3,398
Net Income + 50% Interest	-	-	-	-
Margin in Percent	22.5	22.6	14.1	15.8
Turnover	.984	.906	1.026	1.035
Return on L. T. Assets + Working Capital	22.1	20.5	14.5	16.4
Return on Common Equity	22.1	20.5	14.5	16.4
Interest	\$ -	-	-	-
Long Term Debt	-	-	23	-
Preferred	-	-	-	-
Common Equity	\$12,554	15,391	17,526	20,713
Senior Capital to Common Equity	-	-	-	-
Working Capital	\$ 4,369	6,990	7,335	10,424
Long Term Assets	\$ 8,217	8,401	10,214	10,290
Long Term Assets + Working Capital	\$12,586	15,391	17,549	20,714
Total Assets	\$14,174	16,677	19,880	23,927
Shares Outstanding	1,185	1,261	1,266	1,351
Dividends	\$ 0.40	0.50	0.25	0.30
Earnings Per Share	\$ 2.10	2.38	1.90	2.51
Price Range	\$ 7-20	14-23	131/4-18 1/2	14 3/4 - 23
Price Earnings Ratio	\$ 3-9	6-9	7-9	6-9
Average P/E Ratio	6.0	7.5	8.0	7.5
Recent Price 7/18/69 OTC - \$20				

# ANNUAL CASH FLOW



COMPARISON TO SHOW ECONOMIC LEVERAGE OF INCREASING PRODUCTION

PIMA - BAGDAD FOR YEARS 1962 - 1968

	<u>Copper Production/(lbs.)</u>	<u>Avg. Price/(lbs.)</u>	<u>Total Net</u>	<u>Avg. Grade Primary Ore % (lbs./ton)</u>
<u>1962</u>				
PIMA	37,690,000	\$0.306	\$ 2,102,000	1.54 (30.8 lbs.)
BAGDAD				
<u>1963</u>				
PIMA	44,300,000	\$0.306	\$ 2,757,000	1.34 (26.8 lbs.)
BAGDAD				
<u>1964</u>				
PIMA	57,027,000	\$0.331	\$ 3,027,000	1.17 (23.4 lbs.)
BAGDAD	39,263,814	\$0.320	\$ 1,547,368	0.77 (15.4 lbs.)
<u>1965</u>				
PIMA	33,944,000	\$0.419	\$ 4,824,000	0.76 (15.2 lbs.)
BAGDAD	40,551,433	?	\$ 2,782,831	0.83 (16.6 lbs.)
<u>1966</u>				
PIMA	67,134,000	\$0.455	\$ 9,071,000	0.733(14.7 lbs.)
BAGDAD	40,280,700	\$0.381	\$ 3,149,276	0.940(18.8 lbs.)
<u>1967</u>				
PIMA	72,680,000	\$0.494	\$10,846,000	0.575(11.5 lbs.)
BAGDAD	36,749,000	\$0.416	\$ 2,532,107	0.770(15.4 lbs.)
<u>1968</u>				
PIMA (10 mos.)	94,960,000	\$0.442	\$11,225,000	0.586(11.7 lbs.)
BAGDAD	36,476,000	?	\$ 3,398,039	0.650(13.0 lbs.)

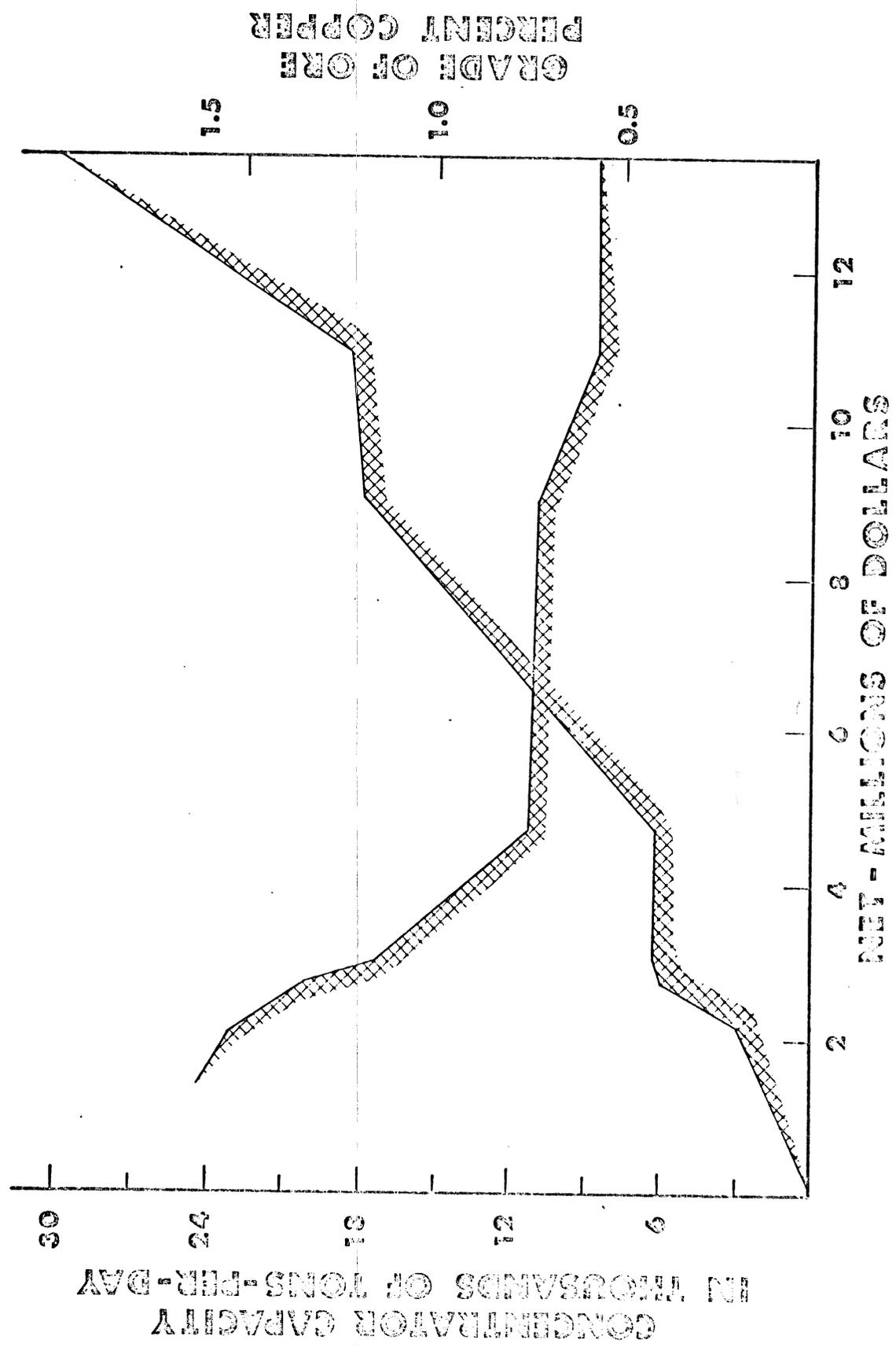
Note: Pima increased production from 6,000 tpd to 18,000 in 1966 to 30,000 tpd in 1968.

Reserves:

PIMA: In 1966, 128 million tons of 0.58% (11.6 lbs/ton); as of January 1, 1969; increased to 216 million tons of 0.56% (11.2 lbs./ton) primary ore.

BAGDAD: As of January 1, 1969, 185 million tons of 0.56% (11.2 lbs/ton) primary ore, and an estimated 250 million tons of 0.435% (8.7 lbs/ton) leach ore.

# ECONOMIC EFFECTS OF EXPANSION AT PIMA - 1962-1968



ECONOMICS OF TYPICAL OPERATIONS

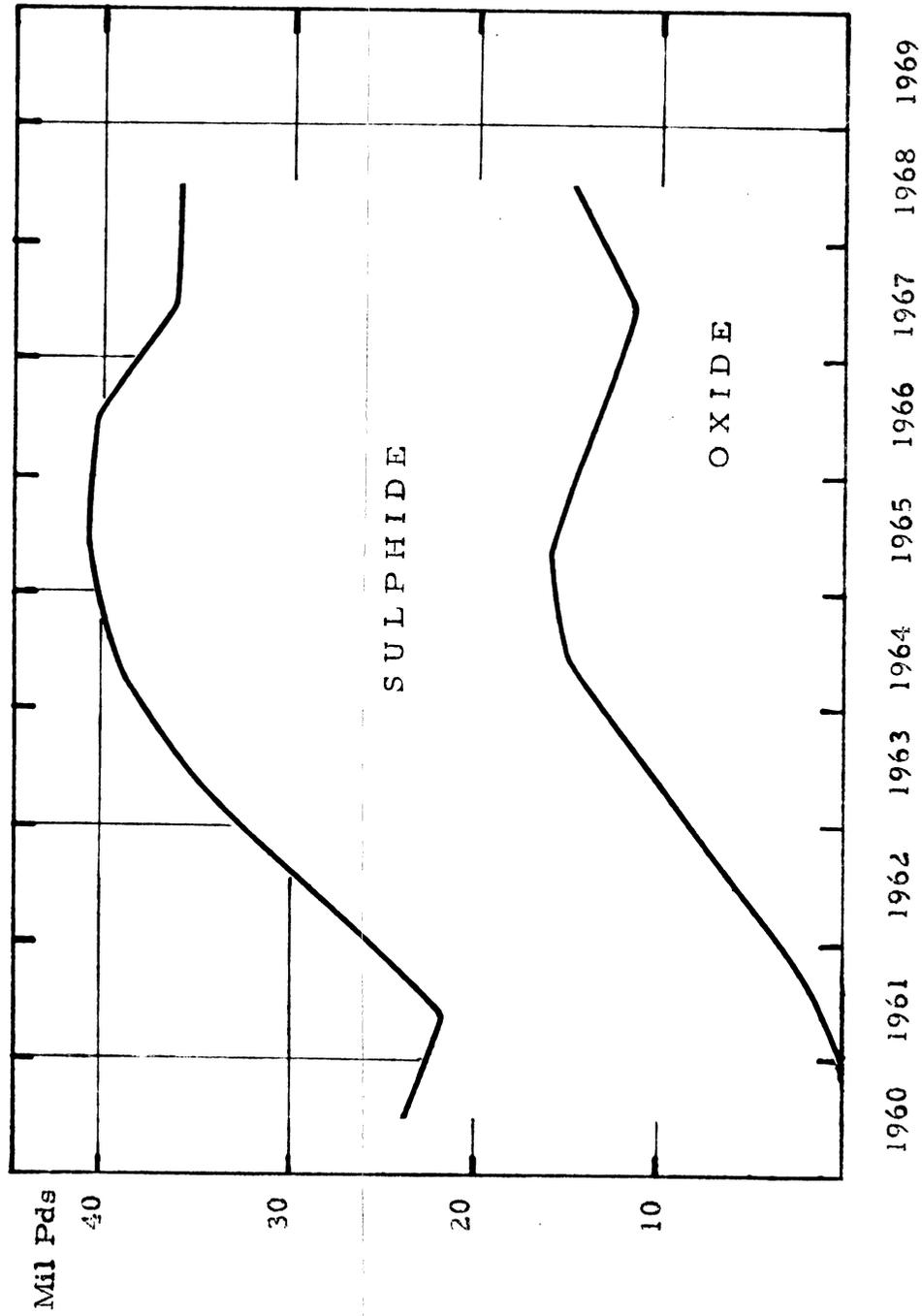
	Open-Pit Operations		
	Expansion	Western Knapp-Eng	Pima
Production - Tons/Day Ore	20,000	25,000	30,000
MM-lbs of Cu/Yr	65	131	73
Reserves in MM Tons	185	175	120
Grade in %	.56	.80	.51
Investment in \$-MM	35	32	
Copper Price ¢/#	40.0	34.0	40.0
Operating Cost ¢/#	20.4	10.1	
\$/Ton-Ore	1.82	1.46	
Average Cash Flow (Aft. Tax & Bef. Inv.) in \$-MM	7.6	12.0	6.4 <sup>(2)</sup>
Net Income (After Tax)	5.5 <sup>(1)</sup>	-	
Present Worth @ 10%(Aft. Inv.) in \$-MM	20.4	51.4	
R. O. R.	17.4	27.0	

(1) Estimated by Bagdad's 1968 ratio of net income to cash flow.

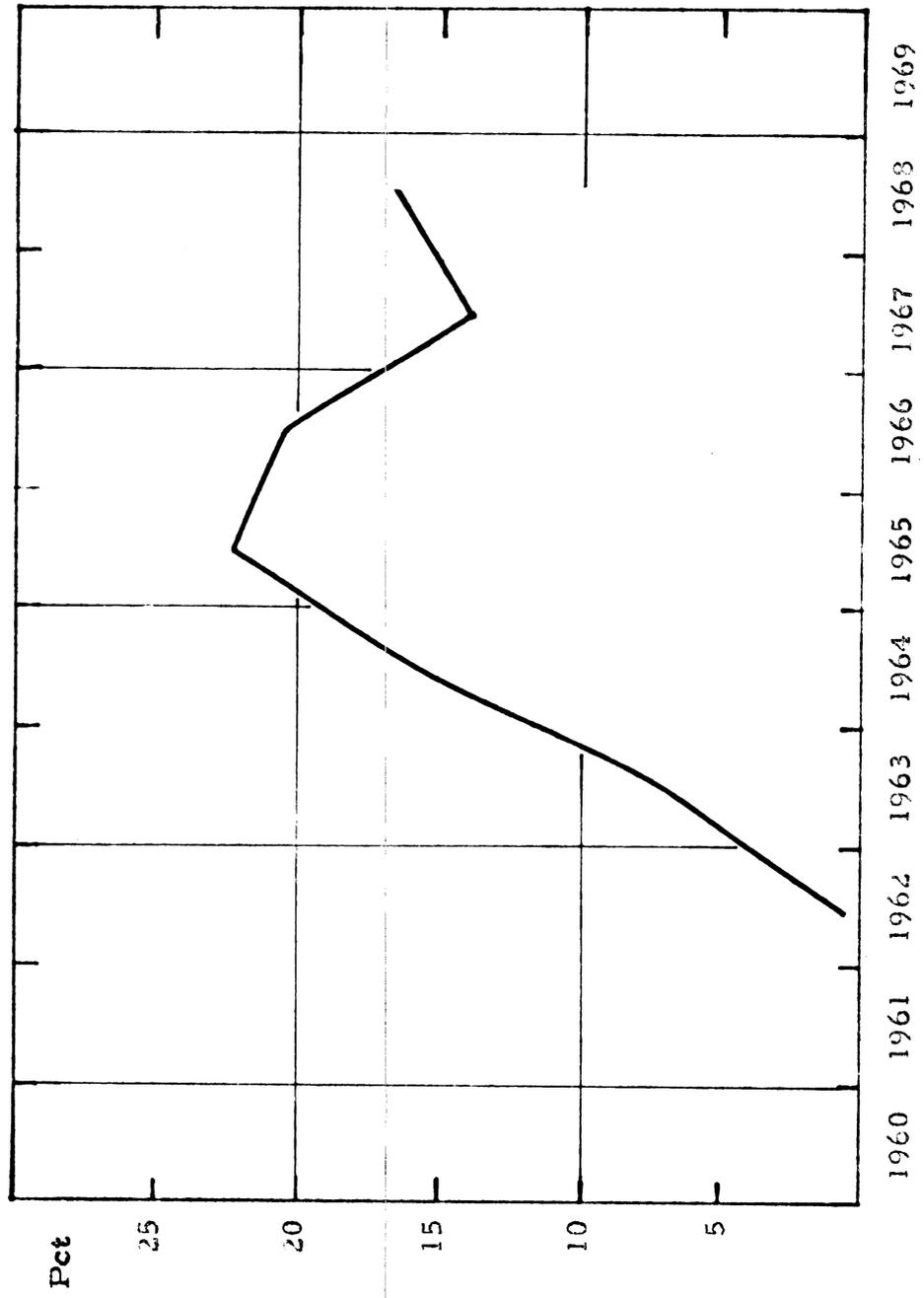
(2) Adjusted to 40¢/# of Copper. At 49.4 ¢/# as reported for

1967, total net income is \$10.8 million.

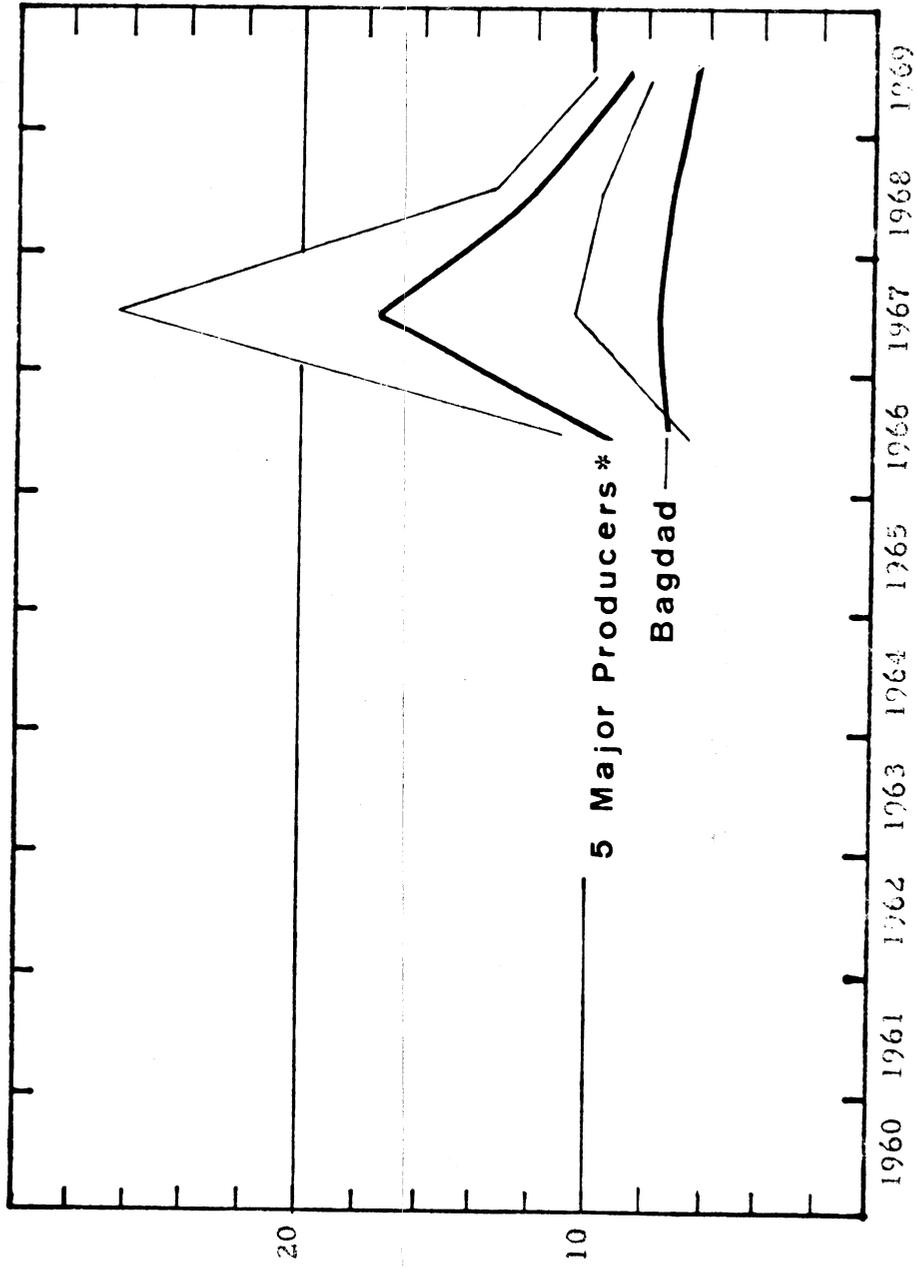
# COPPER PRODUCTION



# RETURN ON INVESTMENT



# PRICE-EARNINGS RATIOS



\* Anaconda  
 Copper Range  
 Inspiration  
 Kennecott  
 Phelps Dodge

# BAGDAD RESERVES

PRIMARY ORE - 185 MILLION TONS - 0.56% COPPER  
(11.2 LBS. PER TON)

LEACH ORE - 250 MILLION TONS - 0.435% COPPER  
(8.7 LBS. PER TON)

GROSS VALUE ( AT 45¢ PER/LB. COPPER)

PRIMARY ORE \$ 800 MILLION

LEACH ORE 700 MILLION

TOTAL \$ 1.5 BILLION