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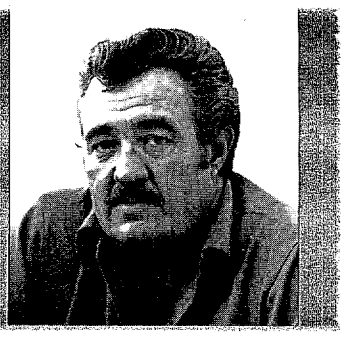
ARIZONA

COPPER CAPITAL, U.S.A.

A DECADE IN REVIEW



ABOUT THE COVER

These Arizonans represent a typical cross section of this state's more than 25,000 copper industry employees. Together, these 25 workers account for over 500 years of service to the mining industry. They are also participants in their own community's endeavors and serve on school boards, PTA's, governmental councils, and in religious, cultural, political, police, fire and civic organizations. Many have had previous distinguished military careers. Their cumulative contributions to youth activities, including foster and retarded care, is most commendable.

Arizona's Copper Industry is very proud of these employees and of their follow workers! Each in their own way is a valuable asset to Arizona and its future. The diagram below is an introduction to the employees appearing on the cover:

ROW 1

Dale E. Collier
Kearny
Smelter Fld. Repair
Gen. Foreman
Kennecott Minerals Co.

ROW 2

Joel G. Belloc
Eloy
Draftsman
Casa Grande Copper Co.

ROW 3

Katherine M. Lena
Tucson
Insurance Administator
Asarco Incorporated

ROW 4

Steve J. Drake
Globe
Gen. Mine Foreman
Ranchers Exp. & Dev. Corporation

ROW 5

Luther E. Collier
Casa Grande
Vat Leach Operator
Noranda Lakeshore Mines, Inc.

Cheryl Thompson
Tucson
Personnel Administrator
Cyprus Pima Mining Co.

ARIZONA
COPPER CAPITAL, U.S.A.

Jewell Beck
Tucson
Mill Superintendent
Duval Corporation

Sylvester A. (Tess) Hanson
Tucson
Mine Superintendent
Anamax Mining Co.

Virgil Ellis
Ajo
Power Plant Engineer
Phelps Dodge Corporation

Robert L. Hockett
San Manuel
Geologist
Magma Copper Co.

Lorrayne Langham
Globe
Executive Secretary
Inspiration Consolidated Copper Co.

Ben M. Coronado
Tucson
Utility Supervisor
Cyprus Pima Mining Co.

Kenneth W. Kape
Casa Grande
Mechanic
Noranda Lakeshore Mines, Inc.

Sandi Cole
Globe
Mining Engineer
Ranchers Exp. & Dev. Corporation

Santos S. Barajas
Bagdad
Gen. Shop Foreman
Cyprus Bagdad Copper Company

Jose M. Frasquillo
Silver Bell
Crusher Foreman
Asarco Incorporated

Ronald J. Shaddy
Kearny
Jr. Water Treatment Engineer Technician
Kennecott Minerals Co.

Ernest D. (Dave) Alexander
Miami
Security Shift Supervisor
Cities Service Company

Michael J. Guadiana
Globe
Safety Coordinator
Inspiration Consolidated Copper Co.

A DECADE IN REVIEW

Guadalupe A. (Arnold) Espinoza
Morenci
General Repair Foreman
Phelps Dodge Corp. Corporation

Alex Acosta
San Manuel
Civil Engineer
Magma Copper Co.

William R. (Bill) Watson
Bagdad
General Tire Supervisor
Cyprus Bagdad Copper Company

Mitchell Adams
Kingman
Railhead Operator
Duval Corporation

Otto G. Santa Anna
Miami
Lube Service Mechanic
Cities Service Company

Dorothy Stevens
Green Valley
Payroll Supervisor
Anamax Mining Co.

ARIZONA: COPPER CAPITAL, U.S.A. 1979*

Prepared By:

The Arizona Mining Association
Phoenix, Arizona
October, 1980

In Appreciation

To Dr. James K. Richardson, who served with distinction as President of the Arizona Mining Association from 1972 until his retirement on August 1, 1980, this edition of Arizona: Copper Capital, U.S.A. is respectively dedicated as an expression of appreciation for his many contributions to the mining industry. His accomplishments are outnumbered only by his friends.

*NOTE: This report is an annual publication of The Arizona Mining Association. Its general purpose is to acquaint interested people with the copper industry's economic impact on the state. This edition reflects statistical data for the year 1979 and for the ten-year period of 1970-1979. Much of the annual data contained in this report becomes available the following mid year. Thus, to present an accurate and complete annual report, it is published each year in the fall. Much of the basic data contained herein was compiled by the Southwest Economic Information Center, an independent economic research entity located in Marana, Arizona.

CONTENTS:

Arizona Mining Association Member Companies and Operations 4
Arizona's Copper Mine Impact to State's Economy: 5
- Direct 5
- Indirect 6
- Value of Mine Output 6
- Copper Industry Dollars Stay in Arizona 7

Copper Industry Employment 7
Arizona Copper in Prospective: 8
- Copper Mine Production by Region 8
- Leading Copper Mine Producing Countries 9
- Comparison of Arizona Copper Production to U.S. & World 10
- Copper Imports by Type 11
- Annual Average Price of Copper 12
- Copper Prices and Inflation 13
- Leading Copper Mine Producing States 14
- Arizona Molybdenum - Silver - Gold Production 15

Copper Consumption by End Use Category 16-17
Arizona Copper and Regulations 18
- Air Quality 18
- Land Use 18

Public Lands in Perspective 19
- Percentage of Federal Lands in States 19
- Arizona Lands in Perspective 20

About Mine Taxes 20
- Property Taxes 20
- Severance and Value Added Taxes 20
- Combined Impact 21

About Copper Mining and Water Use 21
- Groundwater Use 21
- Central Arizona Project 21
- Comparative Consumption of Water 21

Arizona's Copper Industry Impact Tables 22
- Other Arizona Business Income 22
- Geographical Distribution of Business Income 23
- State & Local Government Revenues 24
- State Government Revenues 25
- County Government Revenues 26
- Community College Revenues 26
- Municipal Government Revenues 27
- School District Revenues 29

Copper Production Flow Charts 32

ARIZONA MINING ASSOCIATION

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C. J. HANSEN
President

October 31, 1980

As that crafty old pitcher, Satchel Paige, once said, "never look back --- someone may be gaining on you." However, as we enter the new decade of the 1980's, it seems appropriate to review what transpired over those tumultuous years that history will record as 1970-79.

In many ways, the last decade was typical of the roller-coaster conditions that are inherent in the business of mining copper. The decade began on an upbeat note, but the oil embargo and the economic adversity that flowed from it brought disastrous consequences to the Arizona mining industry in 1974 and subsequent years. The price of copper declined, while operating costs escalated sharply. On top of this, imports of foreign copper increased dramatically as government controlled mines in other nations continued to produce at high levels without the constraints imposed on U.S. producers by cost and price conditions.

Caught in this crunch, Arizona copper producers were forced to shut down some operations and curtail others. Approximately 5,600 jobs were lost in the Arizona mining industry between 1974 and 1978. While these economic reversals worked a hardship upon our employees, the mining communities of this State, and the financial strength of individual companies, there were some positive aspects to the depression suffered by Arizona copper. The situation provided convincing evidence to many legislative and government leaders that a healthy mining industry is essential to Arizona's economic well-being. And there was a greater public recognition that the miners of Arizona are competing in a world market against foreign governments that enjoy many advantages, and that taxes and other costs cannot be "passed on" to consumers against a world price structure that is dictated by events and conditions far beyond the borders of this nation.

Fortunately, as the decade was concluding, conditions in the world copper market improved and operations in Arizona were returning to a more normal position. While copper prices rose, the increase should be placed in the context of inflation. For instance, the 1979 average price of 92.3¢ per pound is really only 49.3¢ per pound when adjusted to 1970 dollars, or 14.4% less than the 57.7¢ price in 1970.

The purpose of this publication is to acquaint you with these and many other facts about Arizona's copper mining industry. Some of the statistics are awesome -- such as the $48 billion impact mining has had on the Arizona economy over the past decade, and the payment of $931 million in Arizona taxes during that period.

Finally, as the cover denotes, mining in Arizona is a "people" business. It takes not only geology, engineering and metallurgy, but a variety of skills from accounting to zoology to operate a modern copper mine. Our more than 25,000 employees are good workers, good citizens and good neighbors. They make a real contribution to the State of Arizona.

Sincerely,

C J Hansen

The Arizona Mining Association

The Arizona Mining Association is a Business League of copper producers in the state. Its sixteen member companies and the location of their various operations are listed below:

AMAX ARIZONA, INC.
THE ANACONDA COMPANY
(Partners in Anamax Mining Company)

ANAMAX MINING COMPANY
Tucson—Pima County
- Twin Buttes Mine
- Eisenhower Mine (Partner)

ASARCO INCORPORATED
Hayden Smelter—Gila County
Tucson—Pima County
- Eisenhower Mine (Partner)
- Mission Unit
- San Xavier North Mine
- San Xavier South Mine
- Silver Bell Unit

Casa Grande—Pinal County
- Sacaton Unit

CASA GRANDE COPPER COMPANY
Casa Grande—Pinal County
- Proposed underground mine

CITIES SERVICE COMPANY
Miami/Globe—Gila County
- Pinto Valley Operations
- Miami Unit
- Miami East
- Copper Cities

CYPRUS MINES CORPORATION
Bagdad—Yavapai County
- Bagdad Mine

Benson—Cochise County
- Johnson Mine

CYPRUS PIMA MINING COMPANY
Tucson—Pima County
- Pima Mine

DUVAL CORPORATION
Kingman—Mohave County
- Mineral Park Mine

Tucson—Pima County
- Esperanza Mine
- Sierrita Mine

INSPIRATION CONSOLIDATED COPPER COMPANY
Miami/Globe—Gila County
- Oxhide Mine
- Inspiration Smelter
- Thornton & Live Oak Pits
- Christmas Mine

KENNECOTT MINERALS COMPANY
Hayden—Gila Company
- Hayden Smelter

Ray—Pinal County
- Ray Mine

MAGMA COPPER COMPANY
Superior—Pinal County
- Magma mine

San Manuel—Pinal County
- San Manuel mine
- San Manuel smelter

McALESTER FUEL COMPANY
Yavapai County
- Zonia Mine

NORANDA LAKESHORE MINES, INC.
Casa Grande—Pinal County
- Lakeshore Mine

PHELPS DODGE CORPORATION
Ajo—Pima County
- New Cornelia Mine
- Ajo Smelter

Bisbee/Douglas—Cochise County
- Copper Queen Branch
- Douglas Smelter

Safford—Graham County
- Safford Project

Morenci—Greenlee County
- Morenci Mine & Smelter
- Metcalf Mine

RANCHERS EXPLORATION & DEVELOPMENT CORPORATION
Miami/Globe—Gila County
- Bluebird Mine

Pinal County
- Old Reliable

"A Decade In Review"

Arizona's Copper Mines, 1970 - 1979, A $48.9 Billion Dollar Impact To Arizona's Economy

Mining is a basic industry that creates new wealth in an economy by extracting and refining a new mineral product for eventual consumption by society. Invested risk capital and sales income from a newly created mineral product enables a mining company to purchase equipment, make payrolls, pay taxes and provide a return to its investors. The economic benefits from this activity flow directly and indirectly to many people and businesses and to the governmental units at all levels.

Direct Impact

The direct impact is measured by actual dollars mines pay to its employees, in the amount of its purchases of goods and services and in the amount of taxes it pays to various governmental bodies. In *1979*, the total *direct* impact to the state was over *$1.2 billion dollars.*

	Personal Income	Business Purchases	State & Local Taxes	Total Direct Impact
1979	$534 Million	$565.7 Million	$124.1 Million	$1,223.8 Million

The total *direct* impact to the state for the ten-year period of *1970-1979*, was over *$7.9 billion dollars.*

	Personal Income	Business Purchases	State & Local Taxes	Total Direct Impact
1970-1979	$3,449.6 Million	$3,530.8 Million	$931.4 Million	$7,911.8 Million

Indirect Impact

As the direct dollars flow through the economy, additional dollars are generated through the creation of more jobs and purchases made possible by Arizona's mines. These jobs and purchases in turn make other jobs etc. possible. Additional taxes are also created in this manner. In 1979, it is estimated that Arizona's mines created *indirectly*, over *$6.1 billion dollars.* to the State's economy.

	Personal Income	Business Income	State & Local Taxes	Total Indirect Impact
1979	$1,445.8 Million	$4,238.0 Million	$422.9 Million	$6,136.7 Million

The total *indirect* impact to the state for the ten-year period of *1970-1979*, was estimated to be over *$41 billion dollars!*

	Personal Income	Business Income	State & Local Taxes	Total Indirect Impact
1970—1979	$9,460.0 Million	$28,760.8 Million	$2,858.0 Million	$41,078.8 Million

Directly and Indirectly

Arizona's copper mines contributed to the state's economy:

1979 - $7.36 Billion
1970 - 1979 - $48.99 Billion

Value of Mine Output

The ability of the mines to make any economic contribution to Arizona was made possible when potentially valuable rocks were turned into usable products. The value of mine output is determined by the value of the mineral products as they are either sold or exported from Arizona for further processing. To extract and upgrade the metals for sale, the mines had to expend in Arizona considerable amounts, as previously noted, in direct payrolls, equipment purchases and taxes. These monies, all of which contributed to the state's economy, are subtracted from the value of mine output to arrive at a "net value". The comparison of the net value of mine output to the total economic impact to the state, reveals that the mines are contributing far more to Arizona than the net value of its extracted and mostly exported products.

	1979	1970 - 1979
VALUE OF MINE OUTPUT	$2,108.0 Million	$11,653.0 Million
LESS: DIRECT ARIZONA EXPENDITURES	1,223.8 Million	7,911.8 Million
NET VALUE OF MINE OUTPUT	$ 884.2 Million	$ 3,741.2 Million
TOTAL ECONOMIC IMPACT	$7,360.0 Million	$48,990.0 Million
RATIO OF ECONOMIC CONTRIBUTION TO NET VALUE OF MINE PRODUCT	OVER 8 TIMES	OVER 13 TIMES

Copper Industry Dollars Stay in Arizona

From the value of mine output, some monies leave the state's economy in the form of federal taxes, out of state purchases, certain earnings and in the payment of dividends and obligations. The percentage that stays in the state, however, indicates that ARIZONA is the major beneficiary of its mining operations.

1970-1979 — Value of Mine Production
— $11.6 Billion

69% — Over $8 Billion Stayed In Arizona

Copper Industry Employment

The Arizona copper industry has been one of the state's major employers since the early 1900's. As the demand for copper has increased, more jobs were created providing excellent opportunities for the state's residents and for many others who moved to Arizona. The copper industry has always been ranked as one of the state's best paying industries. Throughout the years, copper dollars have consistently meant a better way of life, educational opportunities, retirement and other benefits to thousands of Arizonans.

Average Employment and Payroll 1970—1979*

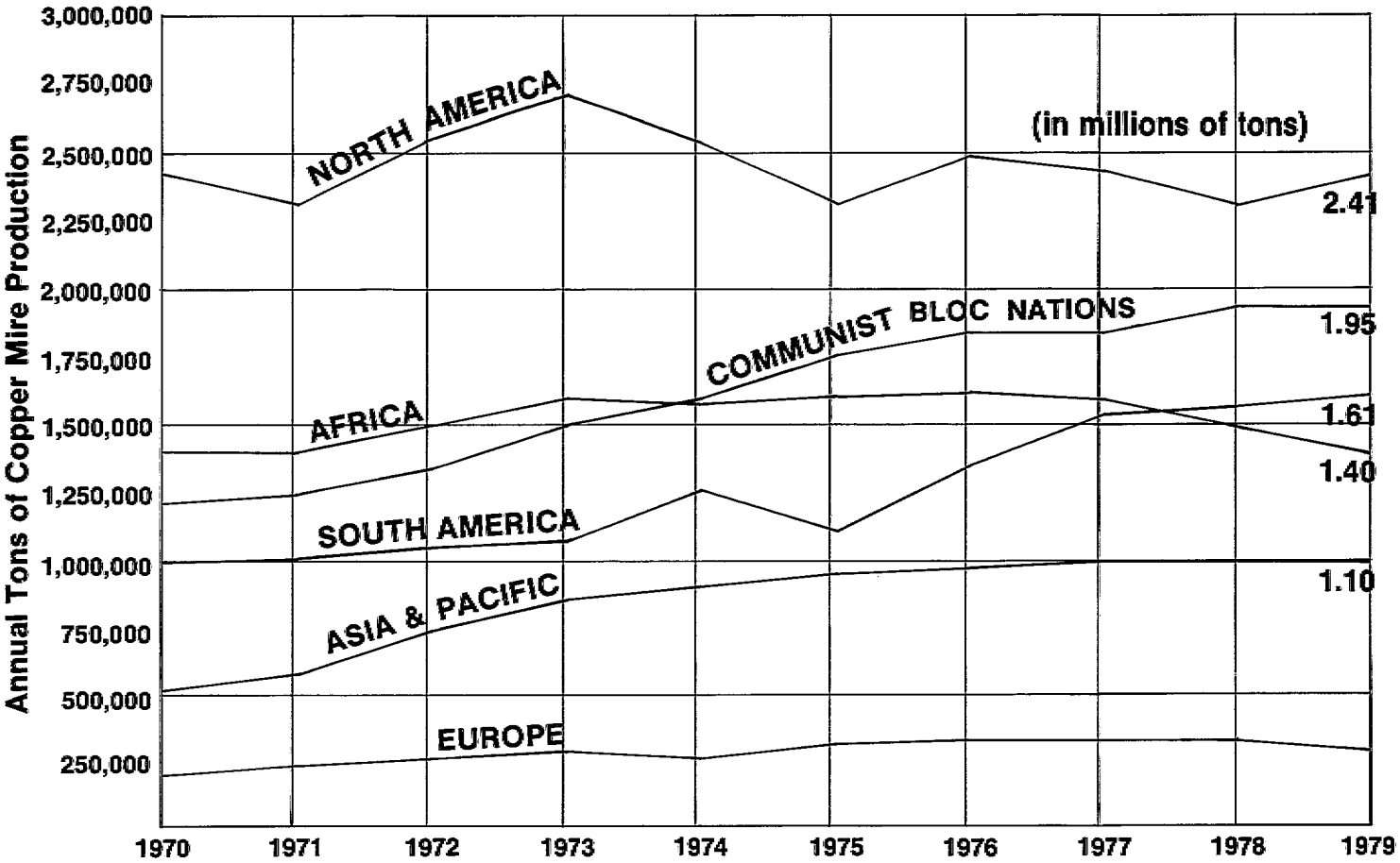
Year	Average # Of Jobs	Payroll ** (In Millions)	Annual Average
1970	21,900	$201.7	$ 9,210.
1971	21,700	212.0	9,770.
1972	23,700	224.0	9,451.
1973	26,400	282.4	10,697.
1974	28,700	330.6	11,519.
1975	26,200	333.3	12,721.
1976	25,700	379.2	14,755.
1977	22,600	353.7	15,650.
1978	21,100	376.7	17,853.
1979	23,700	496.6	20,954

* Source of data: Southwest Economic Information Center
** Excludes Benefits, Pensions, etc.

Arizona Copper in Perspective

Copper mineralization is widely distributed throughout the earth's crust. In 1979, sixty countries produced varying amounts of copper that totaled over 8.7 million tons. The following graphs and charts, along with their explanations, are presented in order that Arizona copper, and its ability to economically contribute to the state, may be better understood.

Copper Mine Production by Region 1970-1979*



*Source: American Bureau of Metal Statistics

Leading Copper Mine Producing Countries — 1979*

The United States is the world's largest producer of copper. If Arizona's production would be separately ranked with other countries, it would be third behind the U.S.S.R. and Chile. The remaining U.S. production would be ranked sixth behind Zambia. Certain countries, denoted below, are members of CIPEC, an organization of copper producing countries which seek to collectively influence market conditions. While they have achieved relative success in the past, in 1979 their collective production represented about one third of the world's production of copper and about two fifths of the free world's production. Additionally, over one-half of the world's total production of copper is essentially controlled by governmental policies and not necessarily be free market conditions. Since copper is an internationally traded commodity, U.S. and Arizona produced copper is considerably influenced by events and policies throughout the world.

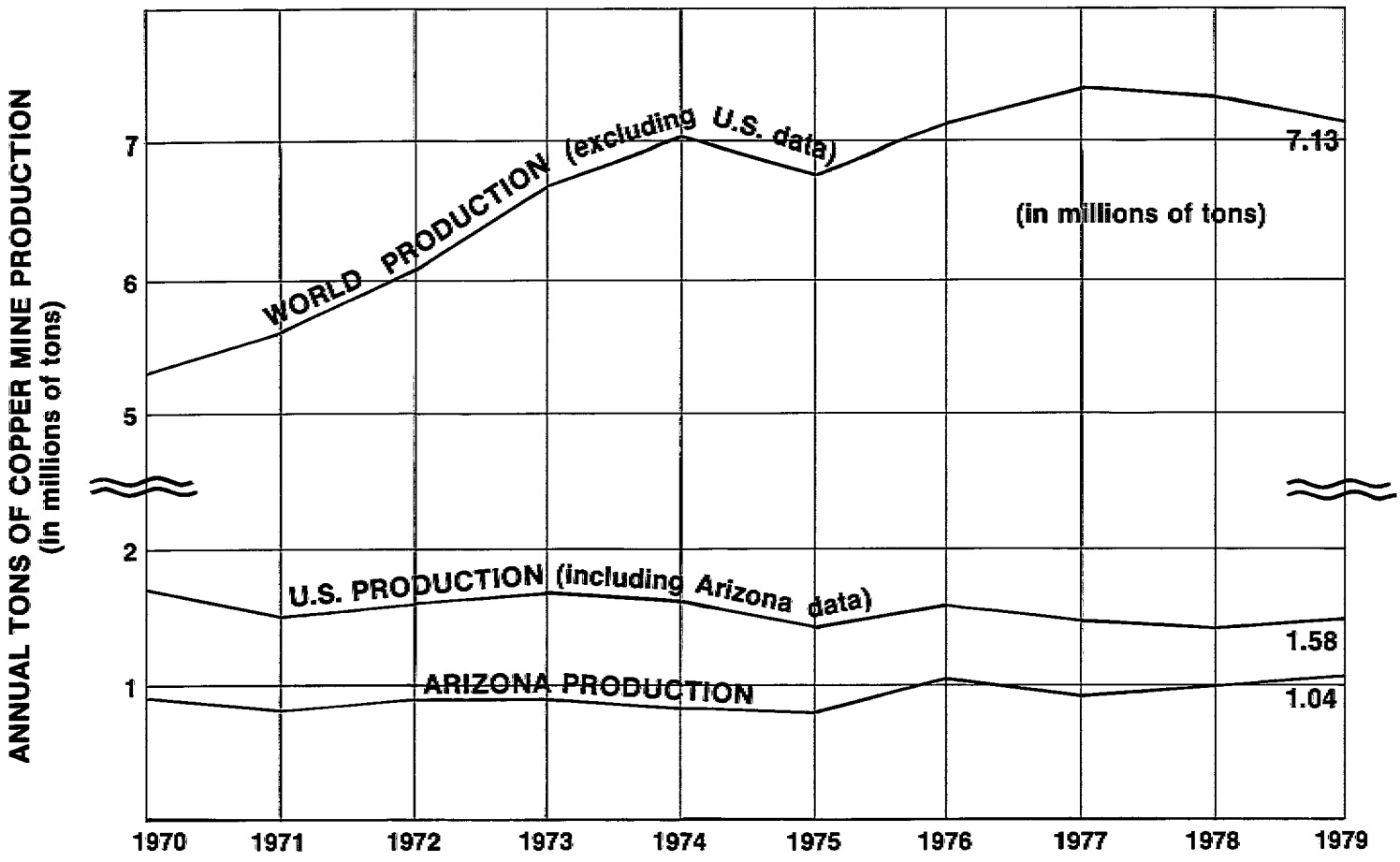
	PRODUCTION (SHORT TONS)	% OF WORLD (PRODUCTION)
United States	1,588,754	18.22
U.S.S.R	1,256,600	14.41
Chile (a)	1,173,851	13.46
(ARIZONA)	(1,042,715)	(11.95)
Canada	709,617	8.14
Zambia (a)	647,800	7.43
Republic of Zaire (a)	441,300	5.06
Peru (a)	438,700	5.03
Phillipines	327,433	3.75
Australia (a)	252,800	2.89
Republic of South Africa	214,300	2.46
Other	1,670,303	19.15
Total World Production	**8,721,458**	**100.0%**

(a) Member: Council of Copper Exporting Countries (CIPEC)

*Source: American Bureau of Metal Statistics

Comparison of Arizona Copper Production to U.S. and World Production 1970-1979*

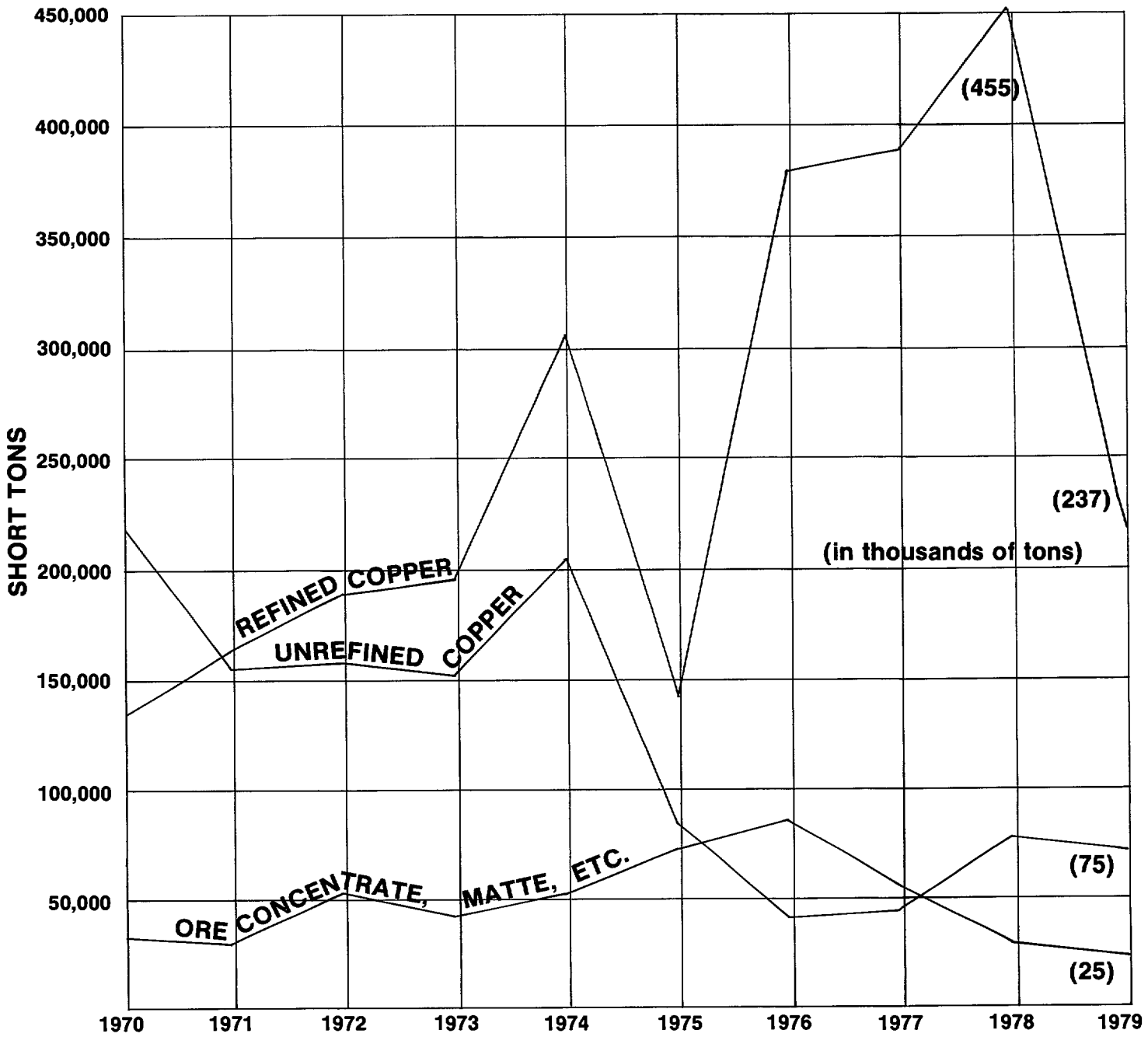
The following graph shows a rapid increase in world production of copper during the seventies. At the same time, U.S. and Arizona copper production reflect little relative change. The increase in world production, without the corresponding increase in actual consumption, resulted in an unprecedented surplus of worldwide copper inventories that accumulated in the mid to late decade. As will be more fully discussed with succeeding graphs, these factors exerted tremendous pressure and contributed to the depressed conditions of the times that were felt by the domestic copper industry.



Source: American Bureau of Metal Statistics

Copper Imports by Type 1970-1979*

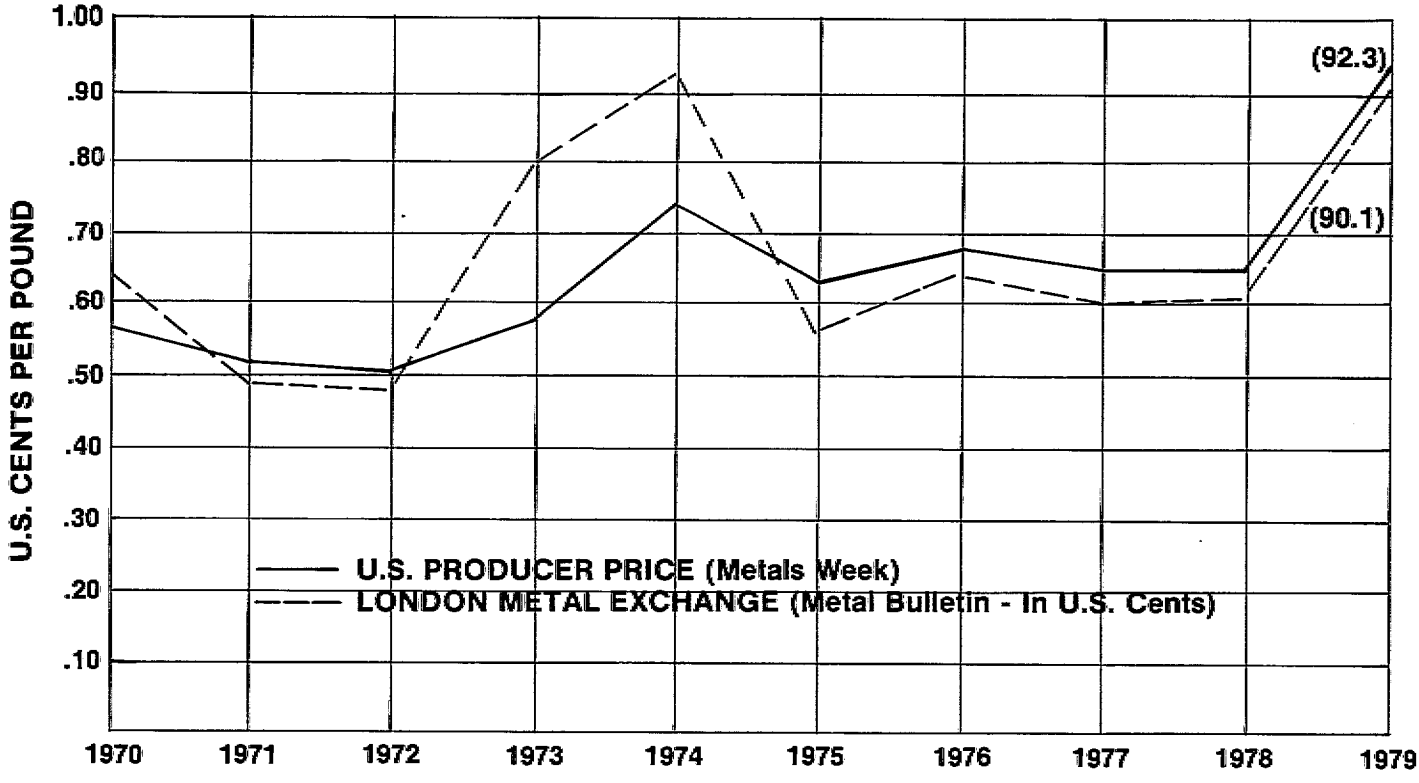
This graph shows that in the latter half of the seventies, lower cost foreign copper imports significantly increased. Certain foreign countries, during this time, found it necessary to produce and sell copper in the world market at levels and prices that would generate sufficient international value for needed foreign exchange. These imports further contributed to an already depressed Arizona copper industry. Copper imports were reduced when greater world consumption gradually eliminated much of the world surpluses.



*Source: U.S. Bureau of the Census

Annual Average Prices of Copper 1970—1979 (Electrolytic Grade)

This graph shows the relationship between the domestic price of copper and the world price through the seventies. Numerous accounts have been published which comprehensively analyze the effect of the chaotic economic conditions of the past decade upon the copper market. The most significant highlight of which occurred at a time when world copper prices were escalating during the early seventies, and domestic prices were restricted by government price controls to 68¢ per pound. For several months, foreign producers enjoyed a world price that exceeded one dollar per pound. When domestic price controls were removed at the end of April, 1974, just after the U.S. Government sold over a quarter million pounds of copper at almost one dollar per pound from its stockpile, the recession of the mid-seventies was beginning. The domestic price briefly increased but fell and remained depressed in the sixty cent range until late 1978. Then, it increased to an average of 92¢ last year. The effect upon the Arizona copper industry from increased foreign production, copper surplus and depressed prices was disastrous. Some mines shut down, others reduced production and severe umemployment existed. The economic contribution to the state and its people was sharply curtailed.



Copper Prices and Inflation

The impact of inflation has extracted a tremendous toll from everyone. There is general agreement that the increase in the size and cost of government, whose spending is now about one-third of this nation's gross national product, is a major cause of inflation. To establish some measurement of inflation, the U.S. Department of Labor's Bureau of Labor Statistics compiles and publishes a Consumer Price Index (CPI) that monitors the effect of changing prices of goods and services to households. Similar indices exist that would be more specific in measuring the inflationary impact on mining operations. They generally indicate a more severe impact than the CPI, but due to their complexities and unfamiliarity, the more common CPI is used in the following chart to show the affect of inflation on annual copper prices.

The most significant comparisons for the decade from the chart below shows that while the 1979 price of copper was 60% over the 1970 price, the 1979 price in real terms, was actually 14.4% less than the 1970 price. To show the continuing impact of inflation, the August, 1980 comparisons have been added. Inflation also contributes to the cost of producing copper as it is an integral part of rising costs of equipment, labor, and other mining supplies. When rising costs are paid by diluted dollars, inflation is enhanced and the entire economy, workers, consumers and producers alike, suffer.

Year	CPI*	Decline of Dollar as a % of 1970 $'s	Annual Average** Price of Cu	% Change of Annual Average Price to 1970	Annual Average Price of Cu Adjusted to 1970 $'s	% Change of Annual Average of Cu Adjusted to 1970
		(1970 = $1.00)				
1970	100.0	—	57.700¢	—	57.700¢	—
1971	104.3	95.8	51.433¢	-10.8	49.312¢	-14.5
1972	107.7	92.8	50.617¢	-12.3	46.998¢	-18.5
1973	114.4	87.4	58.865¢	+ .2	51.455¢	-10.8
1974	127.0	78.7	76.649¢	+32.8	60.353¢	+ 4.6
1975	138.6	72.1	63.535¢	+10.1	45.840¢	-20.5
1976	146.6	68.2	68.824¢	+19.3	46.946¢	-18.6
1977	156.1	64.0	65.804¢	+14.0	42.155¢	-26.9
1978	168.0	59.5	66.510¢	+15.3	39.589¢	-31.4
1979	187.0	53.5	92.334¢	+60.0	49.376¢	-14.4
(Aug.) 1980	214.4	46.6	98.540¢	+70.7	45.960	-20.3

* Consumer Price Index as published by the Bureau of Labor Statistics, U.S. Department of Labor (calculated to 1970 = $1.00)

** Source: *Metals Week*

Leading Copper Mine Producing States 1970-1979*

Arizona is Copper Capital, U.S.A.

Arizona has consistently produced over half of this nation's annual newly mined copper since the early 1960's. In fact, more newly mined copper each year has come from Arizona than from any other state since the 1910's. This chart points out the amount and percentage of copper production by state for the last ten years. It also indicates why ARIZONA, is COPPER CAPITAL, U.S.A.

(in thousands of short tons)*

	1970	%	1971	%	1972	%	1973	%	1974	%
ARIZONA	917.9	53.4	820.1	53.9	908.6	54.6	927.3	54.0	852.7	53.5
UTAH	295.7	17.2	263.4	17.3	259.5	15.6	256.7	14.9	230.1	14.4
NEW MEXICO .	166.3	9.6	157.4	10.3	168.0	10.1	204.7	11.9	197.4	12.4
MONTANA	120.4	7.0	88.6	5.8	123.1	7.4	132.5	7.7	133.7	8.4
OTHER (a) ...	219.3	12.8	192.7	12.7	205.6	12.3	196.7	11.5	179.7	11.3
TOTAL U.S. 1970-1974	**1,719.6**		**1,522.2**		**1,664.8**		**1,717.9**		**1,593.6**	

	1975	%	1976	%	1977	%	1978	%	1979	%
ARIZONA	813.2	57.5	1,024.4	63.8	923.8	61.4	982.6	65.7	1,042.7	65.6
UTAH	177.1	12.5	185.5	11.6	194.1	12.9	205.3	13.7	209.2	13.2
NEW MEXICO .	146.2	10.3	172.3	10.7	164.7	10.9	140.9	9.4	183.5	11.6
MONTANA	87.9	6.2	91.1	5.7	86.2	5.8	74.2	5.0	77.1	4.9
OTHER (a) ...	188.9	13.5	132.3	8.2	135.1	9.0	93.5	6.2	76.2	4.7
TOTAL U.S. 1975-1979	**1,413.3**		**1,605.6**		**1,503.9**		**1,496.5**		**1,588.7**	

Arizona Molybdenum—Silver—Gold Production 1970—1979*

Molybdenum mineralization is often found along with the minerals that contain copper. And, small amounts of silver and gold are frequently present in the copper bearing minerals. If economically and technically feasible, these metals are extracted and refined as by-products of copper production. In the case of molybdenum, its occurrence in some mines is sufficient to consider it as a co-product with copper. Molybdenum is principally used as a hardening alloy in the production of specialty steel. It has excellent applications in space and nuclear projects and in chemicals, catalysts, pigments and lubricants. Although the presence of silver and gold is very minute in some copper minerals, vast amounts of copper production makes it a major source of this nation's new supply. About one-third of the total supply for each of these metals is from copper by-product production. In 1979, about one-fifth of the silver and a little more than one-tenth of the gold resulted from Arizona's copper production. Arizona ranks second to Colorado in molybdenum production, second to Idaho in silver production and fourth, behind South Dakota, Utah and Nevada, in gold production.

*Source: American Bureau of Metal Statistics

(a) Includes production from approximately ten states

Arizona - U.S. Molybdenum Production 1970-1979*

(in thousands of pounds)

	1970	1971	1972	1973	1974
United States.....	111,352	109,592	112,138	115,859	112,011
Arizona	17,733	24,580	26,524	34,394	27,506
% of U.S.....	15.9	22.4	23.6	29.7	24.5
	1975	**1976**	**1977**	**1978**	**1979**
United States.....	105,980	113,233	122,408	131,843	143,967
Arizona	26,409	31,039	32,081	31,753	35,831
% of U.S.....	24.9	27.4	26.2	24.1	24.9

Arizona - U.S. Silver Production 1970-1979*

(in thousands of troy ounces)

	1970	1971	1972	1973	1974
United States.....	45,005.6	41,564.1	37,232.9	37,827.1	33,761.8
Arizona	7,330.4	6,169.6	6,652.8	7,199.2	6,355.8
% of U.S.....	16.3	14.8	17.9	19.0	18.8
	1975	**1976**	**1977**	**1978**	**1979**
United States.....	34,937.5	34,328.2	38,165.7	39,385.3	37,067.9
Arizona	6,285.8	7,615.1	6,828.1	6,637.8	7,380.6
% of U.S.....	18.0	22.2	17.9	16.8	19.9

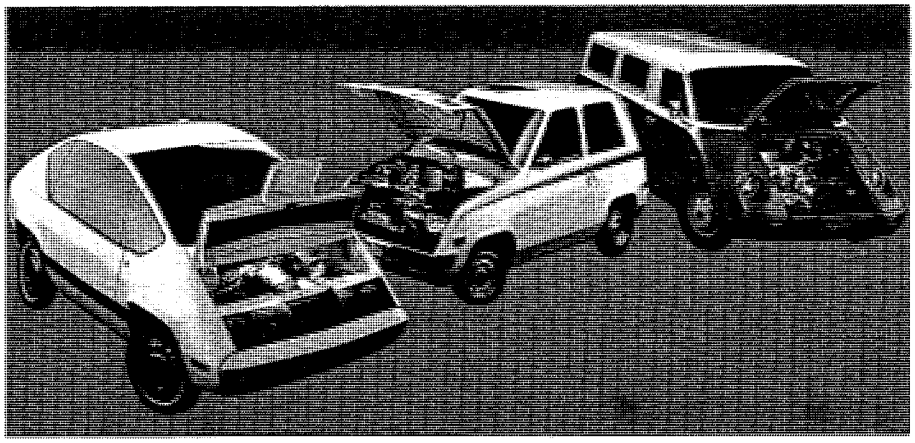
Arizona - U.S. Gold Production 1970-1979*

(in thousands of troy ounces)

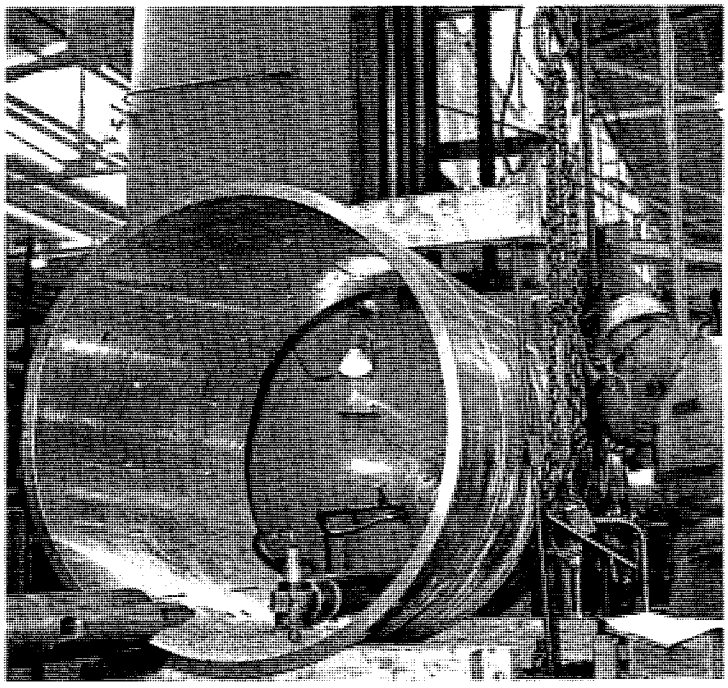
	1970	1971	1972	1973	1974
United States.....	1,743.2	1,495.1	1,449.9	1,175.7	1,126.8
Arizona	109.8	94.0	103.0	102.8	90.6
% of U.S.....	6.3	6.3	7.1	8.7	8.0
	1975	**1976**	**1977**	**1978**	**1979**
United States.....	1,052.3	1,048.0	1,100.3	998.8	887.3
Arizona	85.8	102.1	90.2	93.0	100.1
% of U.S.....	8.2	9.7	8.2	9.3	11.3

*Source: U.S. Bureau of Mines

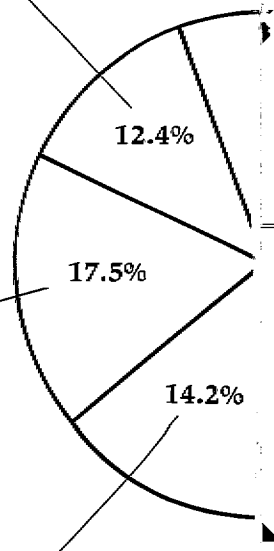
Copper Consumption by

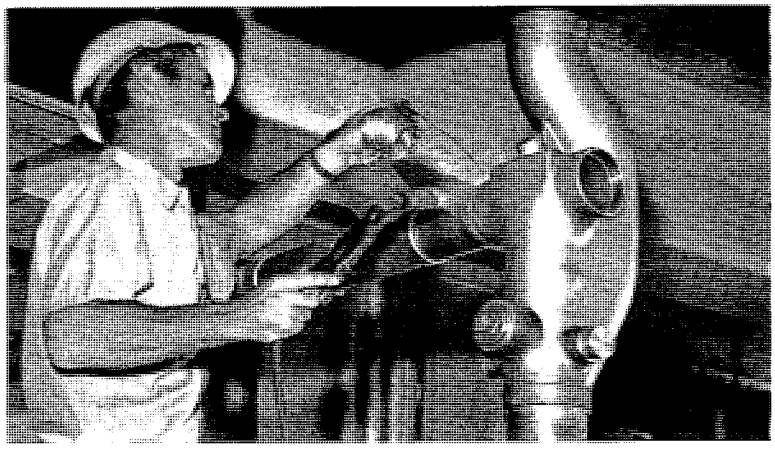


TRANSPORTATION:
More copper will be needed for quiet emission free electric cars that require no oil, antifreeze or cooling systems!

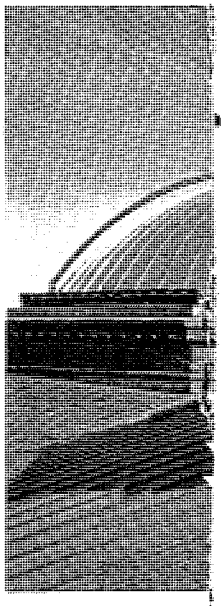


INDUSTRIAL MACHINERY & EQUIPMENT:
This 1600 lb. solid bronze bushing is a component of a 22 story dragline!





CONSUMER & GENERAL PRODUCTS:
Copper plumbing lasts, and lasts, and lasts and lasts————!

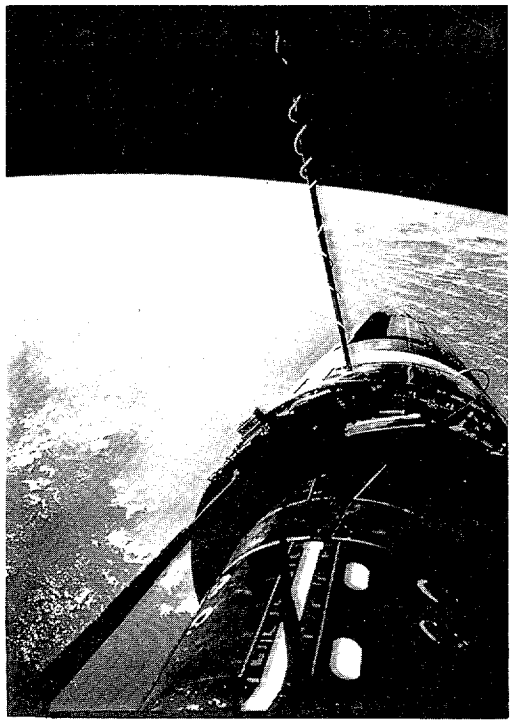


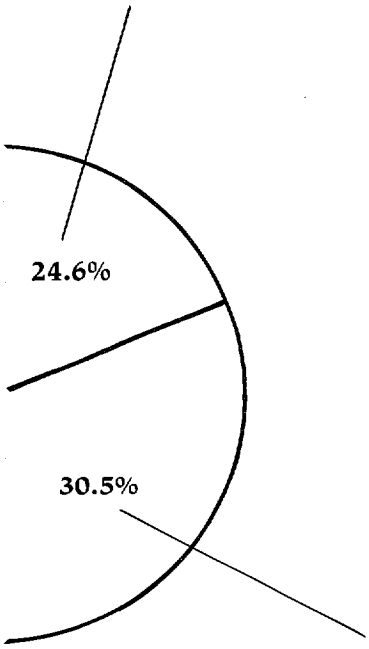
Source: Copper Development Association

General End Use Categories

ELECTRICAL & ELECTRONIC PRODUCTS:

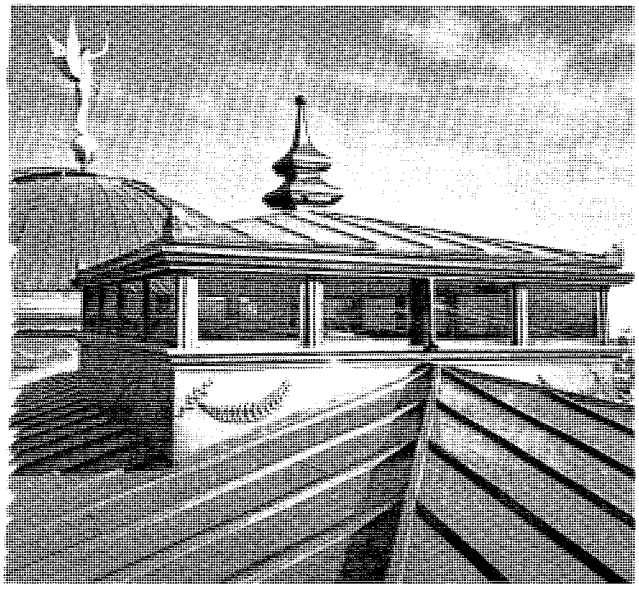
Copper is an essential part of our advanced society everywhere!

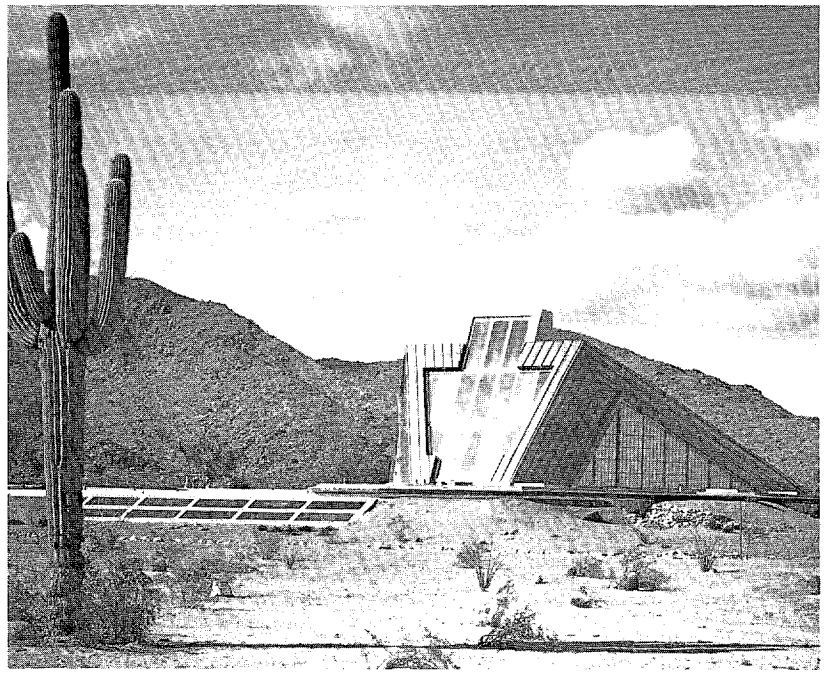




BUILDING CONSTRUCTION:

A copper roof adorns Arizona's Capitol and copper is abundant on and in this new solar home at Ahwatukee!





Arizona Copper and Regulations

All of men's productive endeavors require the use of the earth and its resources to sustain life. The mining industry supports prudent, technical and economically achievable environmental regulations. Massive efforts and capital have been devoted to insure that succeeding generations will be able to enjoy the benefits that the earth can yield. The task of achieving environmental quality is costly, but it is everyone's (industry, people and consumer) responsibility to support.

During the seventies, America's industries were subjected to voluminous governmental rules and regulations that significantly affected most every facet of business and production. The impact upon Arizona's copper industry was equally as critical as costly regulations coincided with a time when the industry was undergoing severe adverse market conditions. As noted previously, some mines were closed, production was curtailed and unemployment resulted. In addition to the surplus inventories and reduced copper consumption, regulatory costs also contributed to domestic copper's depressed conditions. A recent Environmental Protection Agency (EPA) study projected that regulatory compliance costs added 10¢ - 15¢ per pound to industry production costs. In the world market, these costs cannot be passed on to the consumer, but must be incurred by the producer. No foreign producer is subjected to a similar structure of regulations or costs. Thus, Arizona copper is competing in a market at a disadvantage with foreign copper of which over half is produced in countries under strict governmental policies.

Air Quality

Arizona's copper industry has expended over a half billion dollars in the last decade to improve air quality. The Clean Air Act of 1970 mandated that ambient air standards be set to limit sulfur oxides and particulate emissions from smelting operations. By mid-seventies, where technically and economically feasible, Arizona's smelters had constructed metallurgical acid plants to process sulfur dioxide, a natural by-product from smelting, and electrostatic precipitators to limit particulates. An added control, called a "supplementary control system" (SCS), was employed to curtail emissions during adverse meteorological conditions. These combined controls succeeded in reducing sulphur dioxide SO_2 by over half. Other smelters reduced overall input to achieve similar results.

The Clean Air Act Amendments of 1977 mandated that stated ambient air standards be met through positive or constant controls by December 31, 1982. Due to the absence of adequate technology to achieve those standards and of prevailing economic conditions, provisions for waivers, called non-ferrous smelter orders (NSO), were included in the amendments. Under certain circumstances, waivers can be granted that extends compliance to 1983 and 1988. Costly penalty provisions for non-compliance were also a part of the amendments.

The cost of regulatory compliance according to a recent Department of Commerce study could exceed four and one half billion dollars for the period of 1974 to 1987. Predictably, the domestic copper industry will suffer from a lack of competitive ability. The industry is diligently working with state and federal officials in the pursuit to achieve air quality goals with minimal economic disruption. It should be pointed out, however, that due to a shortage in smelter capacity, Arizona produced copper concentrates have already been exported for smelting, and along with it, go lost jobs and economic benefits to Arizona.

Land Use

Advanced civilizations require an array and an abundance of mineral products. An economically sound society is self dependent upon its own mineral resources and not upon foreign supplies. The United States has been blessed with a wide mineral base and in the past, the domestic mining industry has provided most of the raw materials required by society. Since the mid-sixties, however, federal land use policies and regulations have increasingly and severely restricted exploration and mining operations by withdrawing or limiting millions of acres from mineral activity.

The Wilderness Act of 1964 established a non-use concept for certain public lands that would be permanently preserved for their unique characteristics. Public use of these lands is generally restricted to hiking or horseback riding. Productive use of these lands has been effectively eliminated due to stringent regulations that economically discourage potential users. Subsequent government programs, the most common of which are RARE I & II, Federal Land Policy and Management Act, Wild & Scenic Rivers Act and the Alaskan Lands legislation have entirely or partially closed almost 600 million acres of public land to mineral activity. These withdrawals and restrictions have occurred without any or little regard to possible mineral potential of the lands they affect. The net result of total land use regulations, has been to unnecessarily and perilously make the U.S. dependent upon foreign supplies and prices for many of its critical mineral requirements. The Arizona copper industry supports the preservation of those lands that contain unique value, but it does not support the wholesale withdrawal of lands, as is presently occurring, that contain little or no unique value. As a positive alternative, the industry strongly supports the concept of multiple use for public lands. Its wide ranging productive uses better serves the needs of society. While mining is considered a dominant land use, modern reclamation concepts and practices have returned millions of acres of disturbed land into agricultural, ranching and recreational uses.

Public Lands in Perspective

The greatest opportunity for this country's future mineral supplies, lie in the eleven contiguous western states and Alaska. As described above, federal policies and regulations have severely restricted mineral development. The following graphs and data depict how the federal government wields so much influence and control over the west and its mineral development.

(a) The 50 United States contain 2.271 Billion Acres.

(b) The total land under federal administration is 775.3 Million Acres or 34.1% of all land in the U.S.

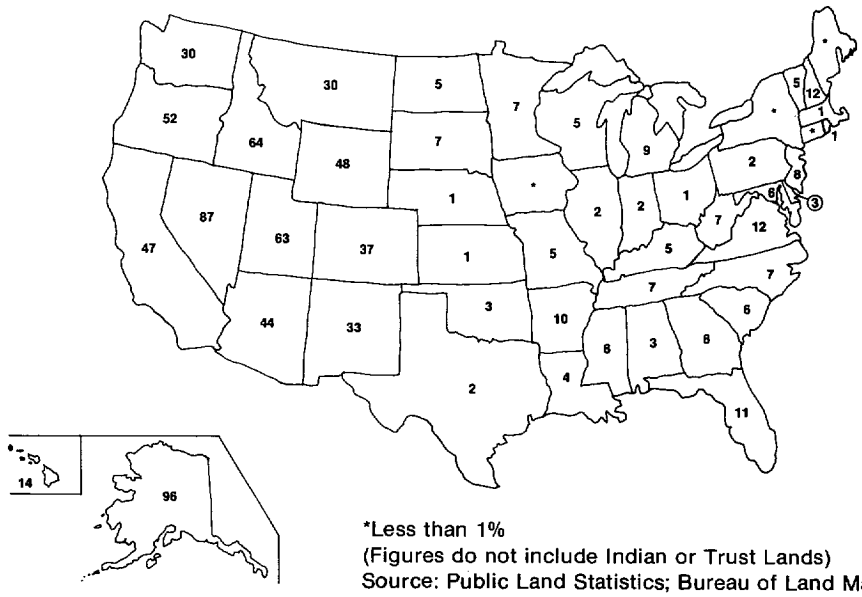
(c) The total land in the 12 western states is 1.118 Billion Acres or 49.2% of all land in the U.S.

(d) 722.3 Million Acres or 93.2% of all federally administered lands are in the 12 western states.

(e) The twelve western states are represented in Congress by 17% of the House of Representatives and 24% of the Senate.

(f) By February, 1980, approximately 600 Million Acres or 76% of the public lands have been entirely or partially closed to mineral development.

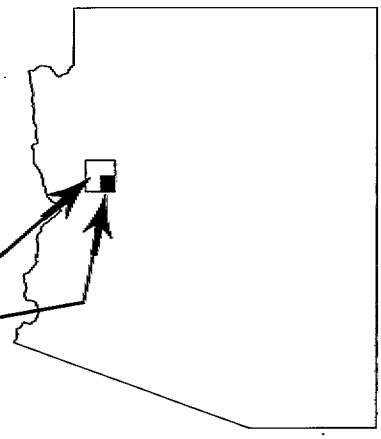
Percentage of Federally Administered Lands in States



*Less than 1%
(Figures do not include Indian or Trust Lands)
Source: Public Land Statistics; Bureau of Land Management, Dept. Of Interior-1978

Arizona Lands in Perspective

		ACRES	% OF TOTAL
(a)	The state of Arizona contains:	72,688,000	100.0
(b)	Federally Administered Lands:	32,034,000	44.0
	Forest Service:	(11,270,000)	(15.5)
	Bureau of Land Management:	(12,595,000)	(17.3)
	National Parks & Monuments:	(1,895,000)	(2.6)
	Other	(6,274,000)	(8.6)
(c)	Indian Lands:	19,100,000	26.2
(d)	State Trust Lands:	9,334,000	12.8
(e)	Private Lands:	12,220,000	17.0
(f)	Approximate present acres entirely or effectively restricting mining development: (includes Indian Lands)	33,829,000	46.5%
(g)	This represents 1% of Arizona's land:		
(h)	This represents 189,187 acres or an average of 0.26% required by Arizona's copper industry in the last ten years to contribute an *average* of 58.2% of this nation's copper and $48.99 BILLION TO ARIZONA'S ECONOMY!		



"Wouldn't you say that's putting the land to pretty good use?" — "For all of us?"

About Mine Taxes

Property Taxes

Property in Arizona is categorized into one of eight different classes which have different assessment ratios. This system mandates unequal treatment of the state's taxpayers by requiring Class I property, mining, to bear more than twice the tax burden as Class III property, commercial, and more than three times the tax burden of Class IV property, farms and vacant land.

The 1980 Special Session of the legislature initiated steps to dismantle in part the classification system. However, statistics from the legislative staff at the time of enactment disclose that the overall effect of the program will produce a significant increase in the tax burden on Class I property. Further, all classes of property except Class I will benefit from provisions designed to limit future increases in valuation. Even though the Legislature attempted to rectify the gross inequities of the state's property tax system, the mining industry still must bear a disproportionate burden. The Arizona Mining Association fully recognizes that the State of Arizona and its various political subdivisions require a sound and reliable property tax base to efficiently function. Such a system is only possible if all taxpayers share a fair and equitable proportion of a just governmental cost.

Severance and Value Added Tax

Arizona also has a combination severance and a value added tax, even though it is called by another name. This 2½ percent tax comprised of a (1) Privilege Sales Tax; (2) Education Excise Tax, and (3) Special Education Excise Tax is applied against the gross value of mineral and forest products shipped out of the state for subsequent sale, regardless of the profitability of the operation.

To the extent the tax is applied to the value of unprocessed ore, it is a "severance" tax. Ore, of course, increases in value because of the operator's productive activities in milling, smelting, and refining the raw material. Since the tax is applied to the increased value of the mineral product resulting from these activities, it is also a "value added" tax. The state's manufacturing and agriculture industries are not subjected to this type of tax burden.

Combined Impact

According to a study by Dr. Donald W. Gentry of the University of Arizona, this combination tax, taken together with the property tax, results in a greater tax burden on mining in Arizona than in any of the eight western states. Taxes, particularly those imposed without regard to profitability, have the effect of reducing the size of ore bodies by forcing the extraction of higher grade material only. The lower grade, subeconomic material, often remains forever as a wasted national resource. These taxes are also an integral part of the cost of producing Arizona copper. Excessive and inequitable taxation serves only to unnecessarily burden Arizona's copper in world markets and reduce its economic contribution to the state.

About Water Use

Groundwater Use

Water is a vital commodity to everyone in Arizona. Surface and groundwaters are not adequate to meet present and future demands by agricultural, industrial and municipal users. In 1980, the Arizona Groundwater Management Act was passed. It enacts a comprehensive system of groundwater rights designed to reduce Arizona's severe groundwater overdraft and requires stringent groundwater conservation by all users. The Arizona Mining Association is a strong supporter of the new Groundwater Law and of the mandatory conservation measures contained in the new act. Arizona's mines have been long-time practitioners of water conservation. Mining users only about 2.7% of all water consumed in the state and it is recycled and reused many times. Mining processes require water, and without it, mining activity would cease along with its economic contributions.

Central Arizona Project

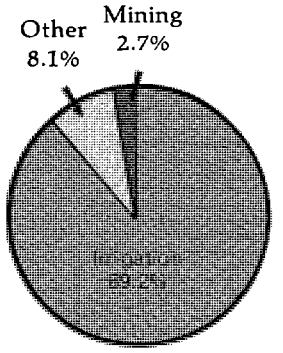
Arizona's mines are also strong supporters of the Central Arizona Project. Without imported water from the Colorado River, Arizona has little chance of reducing the demands on its groundwater supplies to safely sustainable levels. Water allocations from the C.A.P. are critical to many users as they are to new and continued mining operations. Allocations that were recommended by the Arizona Water Commission in 1977 to mining companies would cease within forty years. The copper industry believes that it should be given allocations throughout the life of the C.A.P. and that provisions be made to shift water use from completed projects to new mining developments. Modern mining requires years of advanced and technical planning to efficiently and effectively acquire and allocate resources. And, water is a critical resource. The future of mining in Arizona, one of the most significant mining regions of the world, is dependent upon an assurance that a relatively small amount of water will be available for use. As noted in the graph below, Arizona's copper mines use less than three percent of the state's total water use. Although Arizona's mines are small but efficient users of water, they will continue to take a participatory interest in the near and long-term adequacy of this state's water supplies and in its governing policies.

Comparative Consumption of Water *

Water Uses

Irrigation	4,294,000 Acre Feet*
Other	389,000
Mining	131,000
Total	4,814,000 Acre Feet

**An acre foot (AF) is 325,850 gallons, enough water to cover one acre of land to a depth of one foot.*



*Source: Arizona Water Commission

Arizona Copper's Impact Tables

The following tables reflect the copper industry's purchases from Arizona's businesses by category for 1979 and for the period of 1970-1979. They also reflect the amount of mine generated taxes that have been received by state and local governments, community colleges and the state's school districts for the same years.

Other Arizona Businesses Receiving Income from the Arizona Copper Industry

Business Sector	Copper Industry Purchases of Goods and Services	
	1979	1970-1979
	(in thousands)	
Agriculture	$ 262.0	$ 3,154.2
Other Mineral Industries	$ 631.0	$ 4,252.6
Contract Construction	$ 34,665.0	$ 367,836.9
Manufacturing	$ 80,315.0	$ 485,624.0
Lumber and Wood Products	$ 1,407.5	$ 12,200.5
Paper and Paper Products	237.4	3,550.1
Printing and Publishing	406.5	3,509.6
Chemicals	29,799.0	130,984.2
Rubber and Plastics	2,207.0	6,747.8
Stone, Clay and Glass Products	1,756.0	51,556.5
Primary Metals	27,351.6	148,990.0
Fabricated Metal Products	2,285.1	63,278.3
Non-Electrical Machinery	7,624.8	36,223.9
Electrical Machinery and Equipment	6915.0	26,115.4
All Other Manufacturing	325.1	2,467.7
Transportation	$ 39,577.0	$ 237,134.4
Communications	$ 2,098.0	$ 14,984.4
Public Utilities	$ 181,134.0	$ 919,966.8
Wholesale Trade	$ 209,164.0	$1,365,118.5
Automotive Equipment	$ 26,611.8	$ 230,810.2
Drugs and Chemicals	2,853.5	29,803.6
Apparel	1,937.2	26,402.6
Electrical Goods	14,976.7	82,201.5
Hardware, Plumbing, and Heating Supplies	34,787.7	267,282.2
Machinery and Equipment	66,917.4	420,675.7
Petroleum Products	48,227.8	225,504.1
All Other Wholesalers	12,851.9	82,438.6

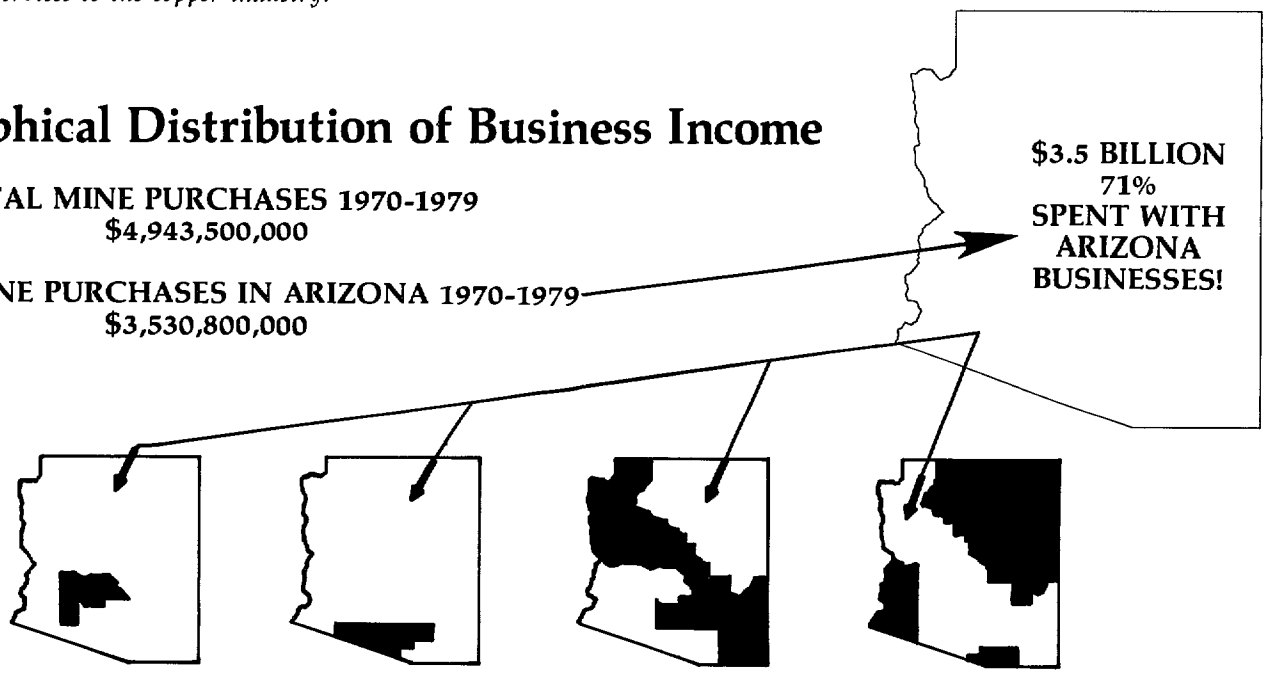
Business Sector	Copper Industry Purchases of Goods & Services	
	1979 (in thousands)	1970-1979
Retail Trade	$ 9,281.0	$ 68,882.1
Building Materials and Supplies	$ 1,722.7	$ 11,820.0
General Merchandise	467.5	9,272.1
Automobile Dealers and Service Stations	6,363.0	30,215.4
All Other Retailers	727.8	17,574.6
Finance, Insurance, and Real Estate	$ 3,268.0	$ 19,402.4
Services	$ 5,340.0	$ 44,468.8
Personal Services	$ 89.0	$ 3,778.1
Business Services	2,902.9	17,702.7
Automotive Repair Services	566.6	4,257.6
Other Repair Services	427.9	9,377.6
Miscellaneous Professional Services	868.4	6,957.2
All Other Services	485.2	2,395.6
Total Arizona Purchases	**$ 565,735.0**	**$ 3,530,825.1**

Source: Southwest Economic Information Center, based on data from the Arizona Department of Mineral Resources, the Arizona Mining Association, individual copper producing firms, and specific suppliers of goods and services to the copper industry.

Geographical Distribution of Business Income

TOTAL MINE PURCHASES 1970-1979
$4,943,500,000

TOTAL MINE PURCHASES IN ARIZONA 1970-1979
$3,530,800,000



	Phoenix Metropolitan Area	Tucson Metropolitan Area	Non-Metropolitan Mining Counties[a]	All Other Counties[b]
1979	$ 172,938,000	$ 204,517,000	$ 186,316,000	$ 1,964,000
1970-1979	$1,174,676,900	$1,263,472,600	$1,077,640,800	$15,009,700

a) Cochise, Gila, Graham, Greenlee, Mohave, Pinal, Yavapai Counties.
b) Apache, Coconino, Navajo, Santa Cruz and Yuma Counties.

Source: Southwest Economic Information Center, based on data from the Arizona Department of Mineral Resources, the Arizona Mining Association, individual copper producing firms, and specific suppliers of goods and services to the copper industry.

State and Local Government Revenues Provided By The Arizona Copper Industry

1979 and 1970-1979*

Type of Tax	Amount Paid (in thousands) 1979	Amount Paid (in thousands) 1970-1979
Property Taxes	$ 45,113.4	$ 424,815.0
Severence Taxes		
Privilege Sales Tax	$ 21,958.0	$ 118,651.7
Education Excise Tax	10,979.0	59,325.8
Special Excise Tax for Education	10,979.0	81,376.7
Corporate Income Tax	$ 10,988.0	$ 44,231.0
Payroll Taxes		
Unemployment Compensation	$ 4,877.0	$ 24,672.0
Workmen's Compensation	5,627.0	50,708.0
Miscellaneous Taxes (a)	$ 11,601.0	$ 94,771.0
Land Rents and Royalties (b)	$ 2,021.0	$ 32,824.7
Total	**$ 124,143.4**	**$ 931,375.9**

(a) Miscellaneous taxes include sales taxes paid on Arizona purchases as well as motor vehicle licenses and fees.

(b) Land rents and royalties are those paid to the State of Arizona for the use of State lease land and for the use of State-owned mineral resources located beneath State-owned land.

NOTE: The total includes small amounts paid to various fire and drainage districts not reflected in the following charts.

**Source: Southwest Economic Information Center, based on data from the Arizona Department of Revenue, the Arizona State Land Department, and the Arizona Mining Association.*

Arizona State Government Revenues Provided By The Copper Industry

1979 and 1970-1979*

Source of Revenue	Amount of Revenue (in thousands) 1979	1970-1979
State Property	$ 2,374.1	$ 77,194.6
Severance Taxes		
Privilege Sales Tax (a)	$ 9,090.6	$ 49,121.8
Education Excise Tax	(b)	(b)
Special Excise Tax for Education	(b)	(b)
Corporate Income Tax (a)	$ 10,790.4	$ 39,442.1
Payroll Taxes		
Unemployment Compensation	$ 4,877.0	$ 24,672.0
Workmen's Compensation	5,627.0	50,708.0
Sales Taxes on Purchases		
Privilege Sales Tax (a)	$ 1,177.0	$ 14,189.8
Education Excise Tax	(b)	(b)
Special Excise Tax for Education	(b)	(b)
Motor Vehicle Taxes and Fees	$ 229.0	$ 1,931.0
Land Rents and Royalties	$ 2,021.0	$ 32,824.7
Total	**$ 36,186.1**	**$ 290,084.0**

(a) Excludes amounts shared with county and municipal governments.

(b) Although paid directly to the State General Fund, all educational excise taxes are, in effect, distributed to the school districts.

* *Source: Southwest Economic Information Center*

County Government Revenues Provided By The Arizona Copper Industry

1979 and 1970-1979*

County	Amount of Revenue (a) (in thousands) 1979	1970-1979
Pima	$ 8,473.3	$ 85,396.4
Pinal	4,503.1	33,385.0
Maricopa	4,420.8	26,181.2
Gila	2,552.5	24,473.6
Yavapai	1,266.1	5,755.8
Cochise	734.0	6,048.9
Greenlee	570.5	2,756.7
Mohave	356.9	3,585.7
Coconino	332.0	1,796.1
Navajo	269.1	1,117.2
Yuma	236.5	1,457.3
Apache	72.9	340.5
Graham	61.5	517.2
Santa Cruz	61.2	367.7
Total	**$ 23,910.4**	**$ 193,179.3**

(a) Contributed directly through the property tax and the automatic apportionment of privilege sales taxes collected by the State of Arizona.

Community College Revenues Provided By The Arizona Copper Industry

1979 and 1970-1979*

Community College District	Amount of Revenue (a) (in thousands) 1979	1970-1979
Central Arizona	$ 1,499.1	$ 12,163.2
Pima	1,184.2	12,832.9
Yavapai	641.5	2,807.4
Cochise	214.6	1,713.0
Mohave	56.2	547.3
Eastern Arizona	2.6	26.4
Western Arizona	-0-	8.9
Total	**$ 3,598.2**	**$ 30,099.1**

(a) Contributed directly through the property tax. These and other community college districts also receive some county and state funds by appropriation that have been paid as a result of county and state property taxes and the state severance tax.

**Source: Southwest Economic Information Center*

Municipal Government Revenues Provided By The Arizona Copper Industry

1979 and 1970-1979*

Municipality	Amount of Revenue (a) (in thousands) 1979	1970-1979
Phoenix	$ 2,537.0	$ 18,168.3
Tucson	1,160.7	8,361.8
Mesa	$ 380.1	$ 2,247.0
Tempe	354.1	2,237.3
Scottsdale	294.5	2,095.6
Hayden	266.9	1,565.2
Glendale	253.9	1,446.5
Flagstaff	118.3	824.4
Yuma	113.5	854.9
Sierra Vista	$ 75.9	$ 538.0
Chandler	75.6	488.4
Prescott	63.7	436.5
Casa Grande	51.3	372.8
Lake Havasu City	51.0	51.0(b)
Douglas	47.0	366.3
Nogales	42.1	269.4
Apache	38.3	38.3(b)
Paradise Valley	34.4	232.5
Bisbee	31.5	405.4
Winslow	30.4	233.9
Kingman	30.3	219.4
Peoria	29.2	176.6
Globe	27.7	216.0
Coolidge	25.3	189.8
Avondale	25.0	192.1
Eloy	25.0	170.1
South Tucson	23.5	180.2
Safford	22.4	162.4
Page	22.2	75.0(b)
Holbrook	$ 19.2	$ 142.2
Clifton	19.2	181.1
Superior	19.0	47.1(b)
Miami	17.9	204.8
Guadalupe	16.1	54.5(b)
El Mirage	14.8	102.7
Tolleson	14.6	112.5

Municipality	Amount of Revenue (a) (in thousands) 1979	1970-1979
Gilbert	$ 13.6	$ 77.8
Cottonwood	13.5	91.4
Kearny	13.1	98.3
Benson	12.9	89.6
Show Low	12.7	77.6
Surprise	12.5	81.7
Somerton	11.7	75.7
Florence	11.0	73.7
Wickenburg	11.0	80.9
Payson	10.9	59.2(b)
Thatcher	10.8	74.1
Willcox	10.2	76.0
Buckeye	$ 9.8	$ 75.4
Snowflake	9.7	64.9
Williams	9.0	69.1
Goodyear	8.8	64.4
Mammoth	7.7	70.2
Chino Valley	7.6	45.7
Eagar	7.4	45.7
Parker	7.3	56.4
Youngtown	7.1	54.6
Saint Johns	6.9	44.8
Prescott Valley	6.8	6.8(b)
Gila Bend	6.8	52.0
Huachuca City	6.4	41.6
Taylor	5.6	33.5
Marana	5.5	13.7(b)
Pima	5.4	37.5
Tombstone	4.7	36.0
Oro Valley	4.4	19.5(b)
Springerville	4.3	33.3
Clarkdale	4.0	28.0
Winkelman	3.7	29.2
Wellton	3.6	28.0
Fredonia	3.0	23.1
Duncan	2.9	22.4
Patagonia	2.4	18.2
Jerome	1.1	9.1
Total	**$ 6,667.4**	**$ 45,639.1**

(a) Contributed directly through the property tax and the automatic apportionment of privilege sales taxes and corporate income taxes collected by the State of Arizona.

(b) Municipalities that became incorporated during the ten-year period receiving revenues only after incorporation.

**Source: Southwest Economic Information Center*

School District Revenues Provided By The Arizona Copper Industry

1979 and 1970-1979*

School District	Amount of Revenue (a) (in thousands) 1979	1970-1979
Sahuarita Unified	$ 3,990.4	$ 29,530.0
Mammoth-San Manuel Unified	3,892.3	25,517.1
Tucson Unified	3,414.6	25,614.0
Morenci Unified	2,866.0	18,097.1
Miami Unified	2,376.3	19,491.8
Hayden - Winkelman Unified	2,039.0	12,357.1
Bagdad Unified	1,974.7	9,382.9
Mesa Unified	1,911.1	11,662.5
Washington Elementary	1,459.0	10,118.8
Phoenix Union High School	1,447.9	11,198.7
Scottsdale Unified	1,442.1	11,390.8
Ajo Unified	1,404.8	11,780.0
Tempe Combined (b)	1,186.7	7,771.6
Ray Unified	1,102.6	10,845.0
Paradise Valley Unified	$ 980.0	$ 5,173.6
Casa Grande Combined (b)	970.1	6,174.6
Glendale Union High School	960.2	6,330.4
Superior Combined (b)	958.0	8,684.7
Marana Combined (b)	936.3	8,705.9
Cartwright Elementary	734.9	5,215.5
Douglas Unified	704.4	5,926.1
Sunnyside Unified	$ 594.7	$ 4,003.3
Yuma Combined (b)	592.5	4,347.6
Amphitheater Unified	550.3	3,654.4
Roosevelt Elementary	538.1	4,152.7
Flagstaff Unified	499.3	3,452.4
Continental Elementary	486.6	765.7
Alhambra Elementary	437.1	3,593.0
Glendale Elementary	436.1	2,955.0
Peoria Unified	435.2	2,110.1
Deer Valley Elementary	415.9	1,745.8
Phoenix Elementary	395.9	3,299.4
Chandler Unified	385.2	2,584.3
Mohave Union High School	357.3	3,397.1

School District	Amount of Revenue (a) (in thousands) 1979	1970-1979
Sierra Vista Combined (b)	$ 329.8	$ 1,985.9
Isaac Elementary	272.9	2,120.4
Nogales Unified	270.3	1,833.7
Madison Elementary	269.3	2,369.1
Prescott Unified	266.7	1,930.8
Clifton Unified	265.6	1,689.5
Creighton Elementary	252.6	2,100.7
Chinle Combined (b)	226.4	1,498.4
Dysart Unified	214.1	1,588.5
Flowing Wells Unified	211.9	1,629.9
Bisbee Unified	$ 185.9	$ 4,249.5
Gilbert Unified	182.4	978.5
Tuba City Unified	168.9	1,012.1
Chloride Elementary	167.6	1,484.3
Window Rock Combined (b)	163.9	1,080.2
Osborn Elementary	160.5	1,206.0
Crane Elementary	158.6	897.1
Globe Unified	154.4	1,277.2
Coolidge Unified	146.6	1,112.9
Kingman Elementary	143.2	993.7
Winslow Unified	141.8	1,065.2
Safford Unified	141.0	1,041.7
Tolleson Combined (b)	141.0	896.7
Holbrook Unified	136.2	951.1
Snowflake Unified	133.4	809.4
Murphy Elementary	124.0	975.6
Parker Combined (b)	117.0	593.9
Pendergast Elementary	114.6	494.4
Eloy Combined (b)	113.9	831.0
Apache Junction Unified	113.9	578.6(c)
Avondale Elementary	109.8	718.9
Lake Havasu Elementary	109.0	578.5(c)
Balsz Elementary	107.1	883.6
Kyrene Elementary	105.4	419.4(c)
Page Unified	104.4	701.4(c)
Catalina Foothills Combined (b)	103.2	410.9(c)
Laveen Elementary	100.0	716.4
Buckeye Combined (b)	$ 99.0	$ 574.7(c)
Kayenta - Monument Valley Unified	98.5	554.2(c)
Tanque Verde Combined (b)	92.1	327.7(c)
Ganado Combined (b)	89.5	657.6
Fort Huachuca Elementary	89.4	249.4(c)

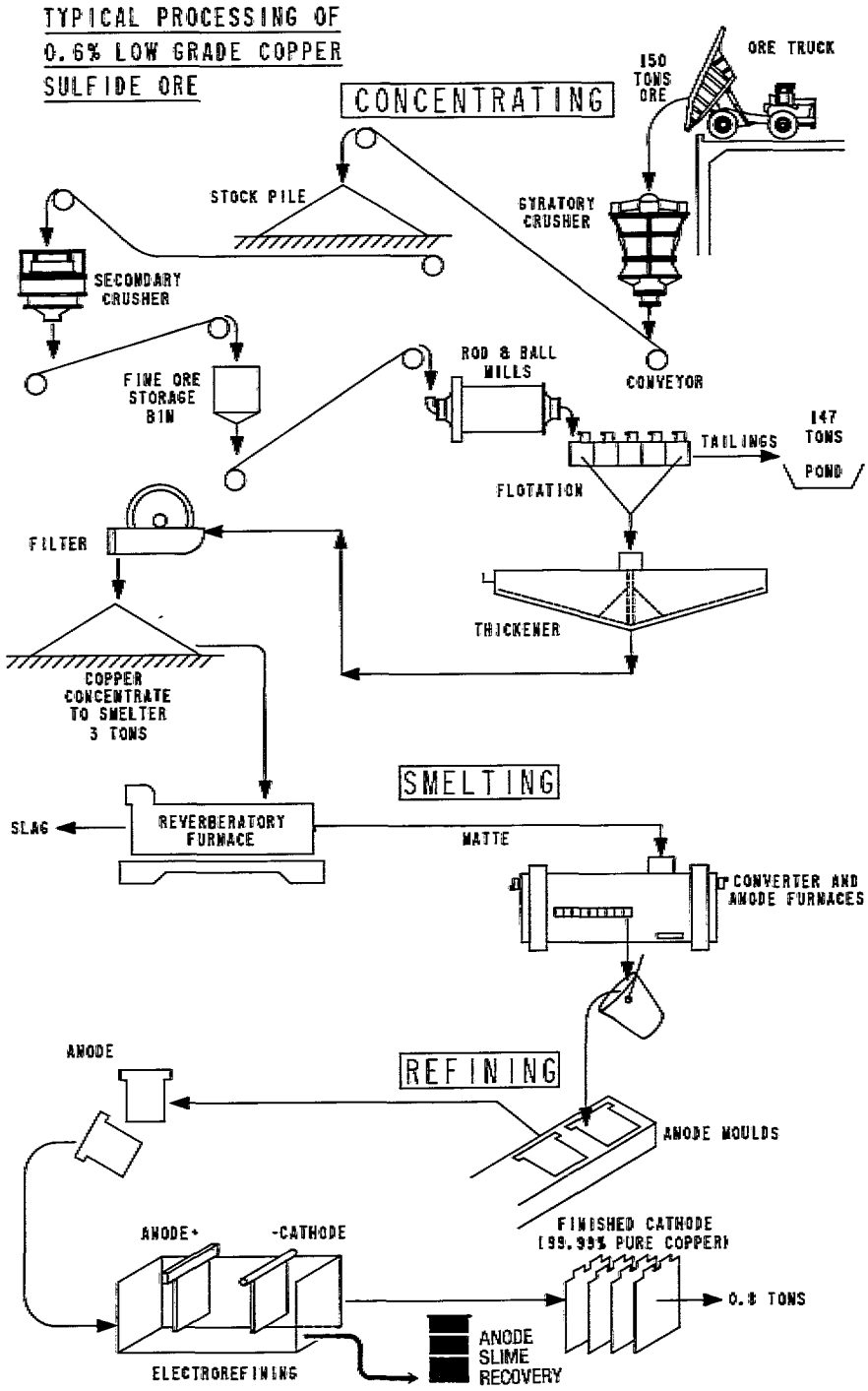
School District	Amount of Revenue (a) (in thousands) 1979	1970-1979
Show Low Unified	$ 89.4	$ 340.1(c)
Cottonwood - Oak Creek Elementary	87.5	460.8(c)
Agua Fria Union High School	85.8	559.5
Willcox Unified	85.4	626.9
Littleton Elementary	83.1	517.5(c)
Pinetop - Lakeside Unified	81.8	360.2(c)
Whiteriver Elementary	79.8	537.3
Wilson Elementary	78.4	710.2
Litchfield Park Elementary	76.2	493.7
Somerton Elementary	73.6	402.8(c)
Apache County High School	$ 69.6	$ 309.5(c)
Thatcher Unified	64.6	329.1(c)
Tombstone Unified	63.2	314.6(c)
Payson Unified	62.9	297.8(c)
Florence Unified	61.2	364.9(c)
Benson Combined (b)	60.8	700.2(c)
Rice Elementary	60.8	341.1(c)
Indian Oasis Combined (b)	58.2	311.4(c)
Bullhead City Elementary	56.8	184.0(c)
Mingus Union High School	54.9	231.5(c)
Round Valley Elementary	54.6	254.3(c)
Owens Whitney Elementary	51.7	51.7(c)
Saint Johns Elementary	51.7	87.9(c)
Oracle Elementary	$ 48.4	$ 209.4(c)
Humboldt Unified	46.9	120.0(c)
Camp Verde Unified	46.3	166.0(c)
Wickenburg Unified	45.7	270.3(c)
Sacaton Elementary	45.2	250.5(c)
Williams Unified	43.1	163.5(c)
Hopi Combined (b)	43.0	115.4(c)
Maricopa Unified	39.6	151.7(c)
Duncan Unified	37.3	148.6(c)
Gila Bend Unified	36.8	149.6(c)
ALL OTHER SCHOOL DISTRICTS	1,907.9	12,161.9
Total	**$ 53,503.6**	**$ 371,791.6**

(a) Provided directly through the property tax and the apportionment of educational excise taxes collected by the state.

(b) Combined elementary and high school districts.

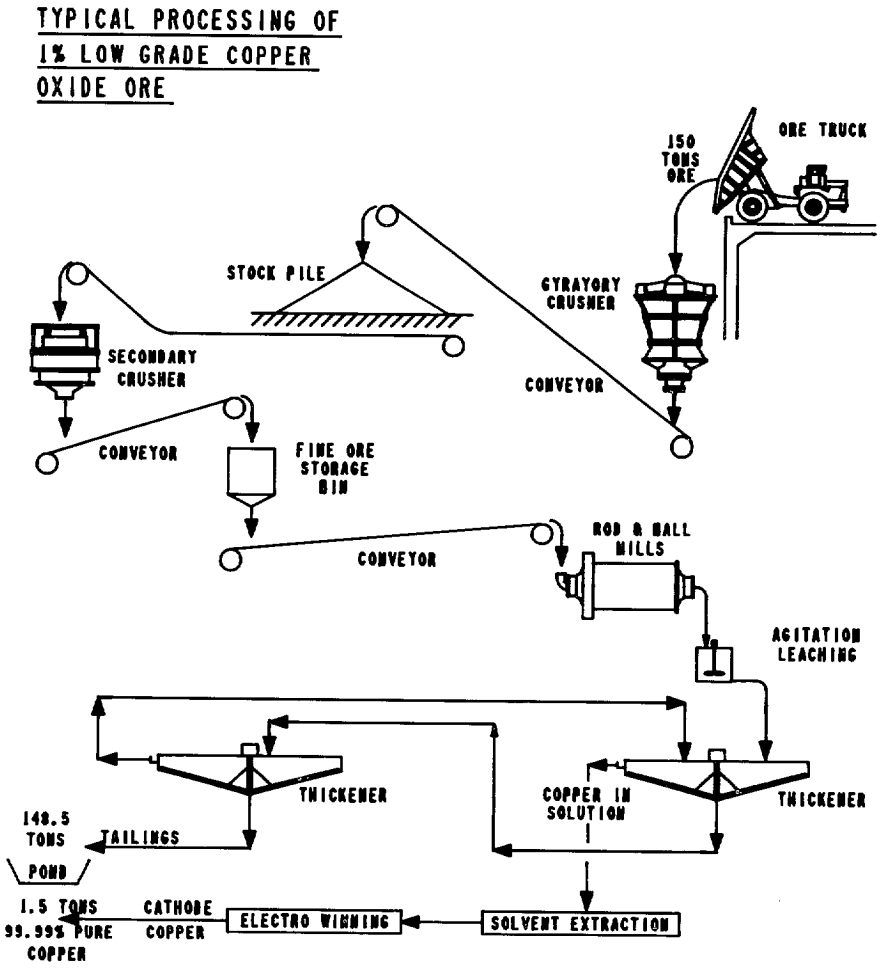
(c) When annual revenues to school districts were approximately $30,000 or less, the amounts were included in the "all other total." The actual receipt of revenues, therefore, would be somewhat higher.

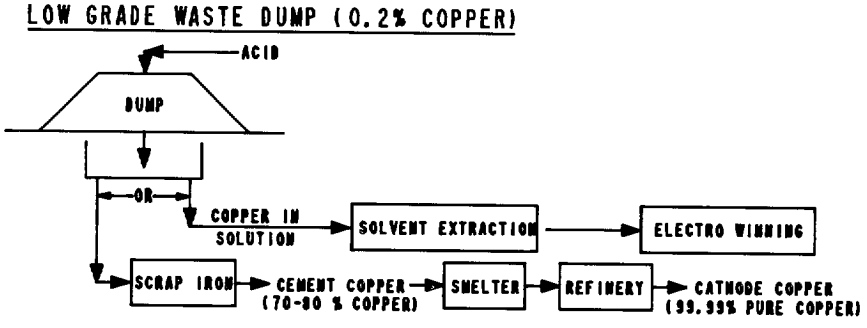
Source: Southwest Economic Information Center



PROCESSING COPPER SULFIDES

1. In open pit mines, an average of two tons of non-ore material must be mined to obtain one ton of ore for processing. Thus, 6,000 lbs. of material will eventually yield about 12 lbs. of copper.
2. The ore is subjected to a series of crushers which reduce its size to about 3/8" or less.
3. Water is added in rod and ball mills to further reduce the crushed ore to a fine slurry thereby liberating the metallic particles from the host rock.
4. In flotation cells the slurry, with chemical reagents, is agitated to create bubbles which cause the metallic particles to rise to the surface for collection. The non-metallic material, called tailings, is pumped to a disposal area where the water is reclaimed for reuse in the processing circuit. Any molybdenum to be recovered, would be separated from the metallic particles at this point.
5. Through thickners and filters, more water is extracted for reuse leaving a fine powdery concentrate containing about 25% copper and about 30% each of iron and sulfer.
6. The concentrate is melted at about 2600°F. in a reverberatory furnace which produces a discardable slag, an iron silicate, and a copper matte, a material consisting of about 32% copper, 28% sulfur and 35% iron.
7. The converter furnace produces a product called blister copper which is about 99% pure. The iron and sulfur impurities have been largely removed. Sulfur dioxide gas, a natural product of the converting process, is generally sent to an acid plant to produce sulfuric acid.
8. The anode furnace further upgrades the copper to a purity of about 99.5% which is called tough pitch copper. It is now ready to be poured into molds. A typical anode will weigh about 800 lbs.
9. Anodes are placed into tanks containing a special electrolyte solution which allows the copper, in solution form, to be carried by electric current and metallically plated onto a pure copper cathode sheet that will be 99.0+% pure.
10. In the electrorefining process, certain impurities do not metallically plate, but fall to the bottom of the cell as slimes where they are collected. They contain certain precious metals that are later recovered by a special process.





PROCESSING COPPER OXIDES

1. Oxidized copper ores must be processed differently than sulfide ores, although the initial extraction, crushing and milling is about the same.
2. The ore in slurry form is agitated in an acid solution which leaches the copper and forms a solution called copper sulfate.
3. From the agitation tanks, the material is fed into a series of thickners to separate the copper sulfate solution from the now barren tailings. The tailings are pumped to a disposal area where the water is again reclaimed. The copper sulfate solution contains about 3 grams of copper per liter and must be further upgraded.
4. Solvent extraction is a concentrating process wherein a solution of chemical reagents and kerosene, in counter flow with the copper sulfate solution, absorbs and upgrades the copper from about 3 grams per liter to about 50 grams per liter. The copper in solution form is ready to be metallically plated in an electrowinning tank.
5. In the electrowinning tank, the electric current from a "lead" anode, picks up the copper in the solution and metallically plates it on a copper cathode sheet that will be 99.90+% pure and ready for market.

PROCESSING LOWER GRADE COPPER

1. A significant amount of very low grade material cannot be economically treated by conventional processing methods. Wherein feasible, copper from this material is extracted by applying water and/or acid solutions to leach the copper which will be collected and processed as in the above manner. At many locations, however, the solution is applied to piles of recycled scrap iron which, by a natural chemical process, produces a reddish "cement copper" sludge of about 70-80% copper. This material is generally processed at smelters.

Flow charts courtesy of Mountain States Mineral Enterprises, Inc.

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