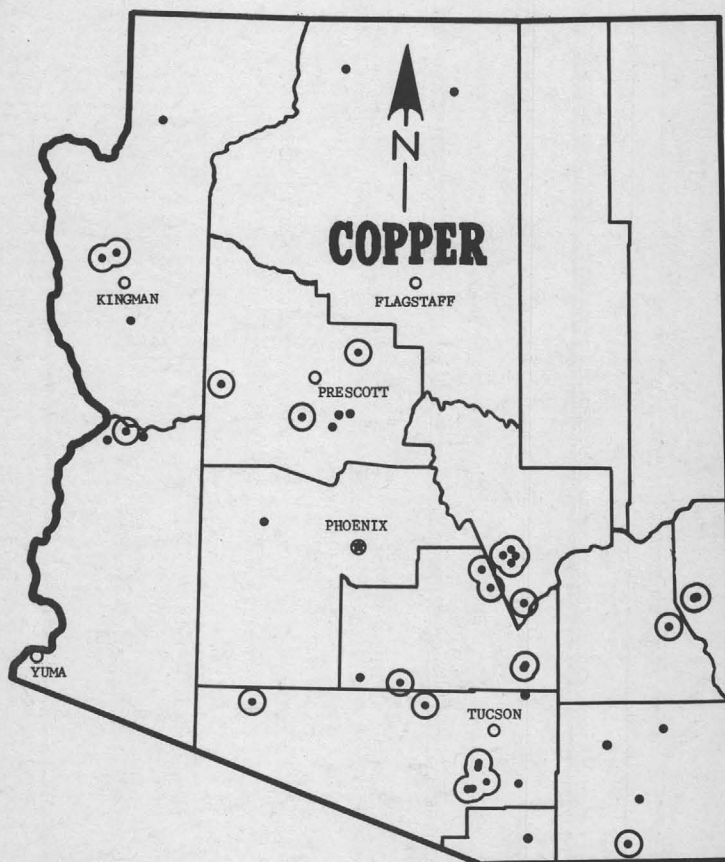


**DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
PHOENIX, ARIZONA**

FRANK P. KNIGHT, DIRECTOR



**31st Annual Report
for
Year Ending June 30, 1970**

Honorable Jack Williams
Governor of Arizona
Capitol Building
Phoenix, Arizona

Dear Sir:

The Annual Report of the Department of Mineral Resources, covering the fiscal year July 1, 1969 to June 30, 1970, is submitted herewith.

The report contains, as formerly, a review of mining activity in the State, and of this department's activities which are directed towards the development and welfare of Arizona's mining industry.

Very truly yours,

Frank P. Knight

FRANK P. KNIGHT
Director.

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ARIZONA'S MINERAL PRODUCTION

The value of Arizona's total mineral production in 1969 increased to \$859,475,000, an all-time record, 39 percent above 1968. Copper accounted for \$761,840,000 or 89 percent of the 1969 total value. The copper recovered from ores in 1969 amounted to 738,760 short tons, 110,799 tons more than in 1968. The copper recovered from each ton of ore was only 11.6 pounds. In 1960 it was 15 pounds.

The grand total of the value of Arizona's mineral production to the end of 1969, is approximately 13.1 billion, of which approximately 84.2 percent has come from copper. Arizona mined 51.9 percent of the Nation's copper production in 1969, ranking first among the United States as it has done since 1910. It ranked 2nd in silver, 4th in gold, 16th in lead, 13th in zinc and 2nd in molybdenum production. Arizona has at San Manuel the largest underground copper mine, and at Morenci, the second largest open pit copper mine, in the Nation.

Details of the mineral production are to be found in the Appendix to this report.

ACTIVE MINES

Two major open pit copper mines started production in the fiscal year; development of a large underground copper deposit and a large open pit copper project were started; two large copper expansion projects were started; feasibilities of other developments were being studied; and exploration activity held at a high level, in this important year of Arizona copper mining. The number of producing mines is shown in Table VI on page VII of the Appendix. In April 1970, a department survey showed 36 producing copper mines, including one with ore containing important amounts of zinc; 4 lead and/or zinc mines; 6 gold and/or silver; and 41 other producers of metallic or non-metallic minerals; making a total of 87, 9 more than in April 1969. Sand & gravel, stone, common clay and solid and liquid fuel producers are omitted from the lists. The United States Bureau of Mines has reported the following number of base metal mines producing during 1969: 48 copper, 3 with copper-zinc ores; 15 gold and/or gold-silver; 18 silver; and 8 lead and/or zinc; ranging in size from a placer gold mine with production of 5 ounces of the metal, to the largest of the State's copper mines with production of 136,827 tons of copper.

EMPLOYMENT

Information supplied by the Arizona Employment Security Commission is that in 1969 (1968 in parentheses) there were employed in Arizona mining, quarrying and smelting an average of 20,983 (16,913) covered employees on payrolls with total wages of \$185,278,726 (\$144,782,917) or an average of \$8,830 (\$8,560) per year per employee. The "total covered wages" reported by the Commission represent the payroll amounts paid by the employer directly to the employees for straight time wages and for certain "fringe benefits" including time-off for vacations, jury duty, holidays, etc., and additional premiums paid for overtime and for shift

differentials. Other "fringe benefits" are the labor costs not paid directly to the worker, such as statutory employer payroll taxes for social security and unemployment compensation, supplementary unemployment compensation reserves, group life and health insurance, retirement plan contributions, etc. It is estimated that the total "fringe benefits" amount to a figure well in excess of 30 percent of the total labor costs for hours actually worked on a straight time basis, and that over half of the total is outside of the payroll. Not included are costs of workmen's compensation and disability expenses. These are regarded as operating costs of insurance against injuries.

COPPER

The 801,363 tons of copper produced from Arizona's mines in 1969, made an all-time record as did its value of \$761,800,000, and it again was more than the combined tonnage of all of the other states.

Production from the 16 largest copper mines in Arizona is given for the years 1968 and 1969 in Table VI of the Appendix. These mines produced 97.5 percent of the total copper production of the state in 1968 and 96.3 percent in 1969. Included in the production figures are copper tonnages recovered from waste dumps by leaching. The copper recovered from ores mined at the 16 mines averaged only 11.8 pounds per ton in 1968 and 11.9 in 1969. In 1960, the Arizona ores yielded 15 pounds per ton.

Anaconda's Twin Buttes mine south of Tucson started operating at part capacity in September 1969 and the mine will show a substantially greater production for 1970. In the second quarter of 1970, Anaconda announced their study of developing their leased Helvetia and Eisenhower ore deposits.

Duval Sierrita's new operation southwest of Tucson mined and stockpiled some 1,500,000 tons of ore in 1968 and 1969, but the new concentrator did not go into operation until early 1970. Plans were announced for increasing production capacity from 66,000 to 72,000 ore tons per day.

Phelps Dodge started its \$100 million project to develop its Metcalf mine near Morenci late in 1969.

Hecla in December 1969 started twin 7500 ft. inclined development shafts at the Lakeshore property south of Casa Grande.

Magma proceeded with shafts and other facilities for expansion projects at its San Manuel and Superior divisions estimated to cost more than \$135 million, and announced plans for an electrolytic refinery with capacity of 200,000 tons of refined copper annually, beginning with 1972.

Asarco in the spring of 1970 announced plans for a 4000 ore tons per day leaching facility at its San Xavier mine southwest of Tucson.

Copper leaching operations continued in the fiscal year at the Miami, Castle Dome, Blue Bird, and Ox Hide mines of Gila County; Zonia and Big Hole mines in Yavapai; Emerald Isle in Mohave; and San Juan mine in Graham County. Some leaching also was done at the Mame in Cochise and the Mineral Hill mine in Yuma County. Inspiration took over the Sanchez property in Graham County and

proceeded with experimental leaching and exploratory drilling.

Increasing regulation of pollution from copper smelters alarmed the copper producers, especially when Asarco cut its smelter input by 15 percent because of pollution restrictions. The cut caused stocking of concentrates by Asarco customers, Anaconda, Duval, Pima and Bagdad, and their consideration of using foreign facilities. Intensive research in chemical extraction of copper, and sulphur, plus large increases in expenditures for reduction in particulate matter and sulphur in smelter gases, were undertaken.

Copper exploration continued at a high level with several significant findings being actively explored and studied as to feasibility of operation.

Copper-Zinc

The Old Dick mine near Bagdad continued to supply most of the zinc output of the state.

Early in 1970, Standard Metals Corp. completed its 250 t.p.d. copper-zinc mill east of Yucca, and started to feed it ores from its Antler and Copper World mines.

LEAD-ZINC

Arizona's lead production dropped to a mere 217 tons in 1969, and was 171 tons for the first six months of 1970. In the period 1947-1952 the state averaged 25,388 tons of lead annually. And it may be a long time before it has another mine like the Iron King at Humboldt, which for many years up to 1969 was its major producer of lead and zinc.

Arizona produced 9,039 tons of zinc in 1969, over two-thirds of it coming from the Old Dick mine mentioned above. 5,013 tons were produced in the first half of 1970.

Far Mining Enterprises in the Aravaipa area and Magnum Consolidated near Signal attempted to restore lead-zinc production in the areas, but work by both has died down.

GOLD - SILVER - MOLYBDENUM

Practically all of Arizona's production of these metals comes as by-products from copper, lead-zinc and complex ores.

Gold

In 1969 Arizona produced 110,878 troy ounces of gold worth \$4,603,000 or 16 percent more quantity and 23 percent more value than in 1968. The average price received in 1969 was \$41.51 per troy ounce as against \$39.26 in 1968. In the first half of 1970 the State produced 56,172 ounces, 5 percent less than in the first half of 1969, according to figures of the U.S. Bureau of Mines. The market

price also declined and on June 30, 1970, gold at London was \$35.49. The Bureau reported one placer gold mine in Arizona in 1969 which produced 5 ounces only, and 7 dry gold lode mines which produced an average of 71 ounces each.

Seven of Arizona's larger base metal mines were in the top 25 gold producers in the Nation in 1968. They, with their ranks in parentheses, were New Cornelia (6), Bisbee (7), San Manuel (10), Morenci (13), Magma (16), Iron King (18) and Christmas (20). All except Iron King were copper mines.

Silver

The average price received for Arizona's silver production fell 16 percent from \$2.14 per troy ounce in 1968 to \$1.79 in 1969. This was more than offset by a 24 percent increase in quantity and the value of Arizona's production rose from \$10,633,000 in 1968 to \$10,997,000 in 1969. The price also declined in the first half of 1970 to \$1.61 at the end of June. The State's production of silver for 1969 was 6,141,022 ounces. Production for the first half of 1970 was 3,549,242 ounces, up 18 percent from the first half of 1969. The major Arizona silver producing mines, with their national ranking in 1968 in parentheses were Pima (10), Mineral Park (12), Bisbee (13), Morenci (15), Mission (16), New Cornelia (22), and Magma (23). All are copper mines.

96 percent of Arizona's 1969 silver output came from copper ores. A total of 83,110 ounces was produced by 18 lode silver mines, according to Bureau of Mines reports.

Molybdenum

Molybdenum has become the most important by-product of a number of the copper producers of Arizona. Its total value in 1969 was \$20,947,000, 9 percent over 1968 and 34 percent above the combined value of the gold and silver produced in 1969. It ranked second behind copper in value among minerals produced in the state.

Molybdenum is of particular importance to the new \$165,000,000 Sierrita operation of Duval Sierrita Corp. which is expected to nearly double the amount of Arizona's 1969 production of the metal.

URANIUM - VANADIUM

Uranium

The amount of Arizona's production of U_3O_8 in 1969 has not been reported publicly. However, it is reported that New Mexico, Wyoming, Colorado, Texas and Utah combined produced 99 percent of the domestic output and that the balance of 1 percent "came primarily from Arizona." Since production at the Orphan mine at Grand Canyon, the last uranium producer of much consequence active in Arizona, stopped in April 1969, it is probable that production in the fiscal year has been small and the lowest in over 20 years.

Uranium exploration, however, continued to be active.

OTHER METALS AND NONMETALLIC MINERALS

1969 production figures for other Arizona metals and nonmetallic minerals are included in Table II of the Appendix. The more important ones for which individual figures are given, are: helium, down 13% from 1968; lime, up 9%; natural gas, up 29%; petroleum, down 28%; pumice, down 12%; sand and gravel, up 20%; and stone, down 14% from 1968.

An important mineral, coal, is about to become prominent in Arizona mining. Peabody Coal Co. has contracted to supply 117 million tons of coal to a 1,580,000 KW power plant being built in Nevada across from Bullhead City, Arizona, and 210 million tons to a 2,311,000 KW plant to be built near Page, Arizona. The first unit of the "Mohave" plant in Nevada was scheduled to go on line in Mid-1970. Ground has been broken for the Page plant at which the first unit is scheduled for operation in mid-1974. The coal for the Mohave plant is supplied by a slurry pipeline and slurry preparation and movement is handled by Black Mesa Pipe Line, Inc. Coal for the Page Plant is to move by shuttle trains. Power from both plants will be used in the southwest, especially the Los Angeles area. Power from the Page plant is partly for future use for the Central Arizona Project. The Black Mesa coal to be mined is in Navajo and Navajo-Hopi lands of northern Arizona.

DEPARTMENT ACTIVITIES

The statutory duties of the department are transcribed on page II of the Appendix. They are summarized in the first paragraph, which reads: "Aid in the promotion and development of the Mineral Resources of the State."

Reliable geological and mining information is a prime requisite for the attraction of interest in and capital for mineral exploration and the development of mines. Therefore, a major part of the department's budget was devoted to the collection of such information and its dissemination in publications including statistical reports, by correspondence and verbally. The department's extensive library of Arizona Mining, including its files of individual mine information, was in constant and effective use. Cataloging has been in progress for a number of years but needs to be completed as quickly as possible.

Department personnel met, conferred and corresponded with parties interested in Arizona mining, including other state and federal agencies, and conducted economic and technical studies of problems arising therefrom. Federal legislation related to Arizona mineral exploration and development was studied, discussed with others, and commented upon in hearings and correspondence with parties concerned.

The director during the year attended three meetings of the Western Governor's Mining Advisory Council as a delegate and chairman of its Mineral Taxation committee; two meetings of the Mining Advisory Committee of the Four Corners Regional Commission of which he is a member; and meetings of the Rocky Mountain Mineral Law Institute, American Mining Congress; American Institute of Mining, Metallurgical and Petroleum Engineers, Mining and Ecology Symposium, and the Arizona Small Mine Operators Association. One or more of the field engineers attended meetings of the last three groups listed.

The department published a revision of its booklets, Mining in Arizona, and prepared for publication a revision of its booklet, Laws and Regulations Governing

Mineral Rights in Arizona. The former was jointly printed, the Arizona Mining Association ordering 15,000 copies for its educational program and the department ordering 10,000.

The following statistical reports were mimeographed and distributed to a mailing list of approximately 300 including news media:

	<u>Pages</u>
The Copper Mining Industry 1966-1970	32
Copper Industry Statistics for 1968	31
Inventory of Arizona Lands as of June 30, 1968	8
Lead and Zinc 1968	28
Gold, Silver and Molybdenum - 1968, 1969 (Preliminary)	31

Other papers mimeographed and made available were:

Active Mine List, as of October 1969	10
Active Mine List, as of April 1969	10
Directory of State and Federal Agencies in Arizona of Interest to Mining	4
Arizona Registered Engineers Available for Consulting Work	4
Pertinent Data for New Mining Operations in Arizona	3

During the year, the field engineers were available in the field for consultation at announced places and times. They travelled 27,709 miles; attended 118 meetings of the A.S.M.O.A.; made 484 mine visits; and discussed mining problems with 1600 individuals, 261 in the field, 500 in their offices and 839 by telephone.

There were 2051 visitors and 5659 phone calls to the department during the year.

The museum continued to be supported by the Arizona Mining Association. The department continued to furnish utilities and janitor services.

Expenditures for the year were as follows:

APPROPRIATION - Fiscal 1969-1970 93,650.00

EXPENDITURES

Personal Services	\$ 62,099.01
Professional Services	6,000.00
Travel - State	5,244.47
Travel - Out of State	957.88
Current Expenditures	
Tel & Tel	1,399.72
Utilities	1,554.14
Postage	1,070.00
Printing	1,281.05
Mtnc. & Repairs	799.17
Office Supplies	1,172.07
Janitor Supplies	292.46
Mtnc. Supplies	111.05
Other Supplies	96.87
Subscriptions & Dues	224.75
Fixed Charges	35.00
Building & Equipment Ins.	88.00
Capital Outlay	<u>1,740.96</u>

TOTAL EXPENDITURES

84,166.60

Balance - Returned to General Fund

9,483.40

93,650.00

The large amount returned to the General Fund was mostly unused allotment for salaries and the remainder was due to the below normal employment. During the year it was unusually difficult to get adequate replacements at the salaries available.

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

BOARD OF GOVERNORS

William T. Elsing, Phoenix - Chairman
(term expires January 31, 1971)

Jack W. Still, Prescott (to 8/25/69)

Matt Danenhauer, Clifton
(term expires January 31, 1972)

Kenrick L. Lamb, Kingman
(term expires January 31, 1973)

Robert C. Bogart, Bagdad (8/25/69)
(term expires January 31, 1974)

Stephen H. Congdon, Tucson (to 1/31/70)

Robert E. Heineman, Tucson (2/1/70)
(term expires January 31, 1975)

PERSONNEL

Frank P. Knight	Director
B. H. Gerwin (to 12/15/69)	Assistant to Director
Gerald W. Irvin	Field Engineer - Southern District
Fremont T. Johnson	Field Engineer - Northern District
John H. Soule' (to 11/1/69)	Field Engineer - Central District
Glen Walker (5/1/70)	Field Engineer - Central District
Mrs. Glenn W. Pare	Administrative Assistant
Mrs. Pauline Halloren	Secretary
Mrs. Ray E. Sparkes	Secretary
Mrs. Robert E. McIndoo (to 2/27/70)	Secretary
Lester R. Brown	Consultant

OFFICES

Phoenix Office - Mineral Building, State Fairgrounds
Tucson Office - Room 106, State Office Building

STATUTORY POWERS AND DUTIES

"Aid in the promotion and development of the Mineral Resources of the State.

Conduct studies of the economic problems of prospectors and operators of small mines for the purpose of assisting in their solution.

Assist in discovering sources of supply for persons desiring to buy minerals.

List and describe available mining properties.

Make mineral resource surveys and conduct other investigations which may interest capital in the development of the state's mineral resources.

Serve as a bureau of mining information in conjunction with the Arizona Bureau of Mines.

Publish and disseminate information and data necessary or advisable to attain its objectives.

Cooperate with the state land department to encourage mining activity on state lands.

Cooperate with the corporation commission in its investigations and administration of laws relating to the sale of mining securities.

Cooperate with the Arizona Bureau of Mines, and deliver to the Bureau problems which the field work of the division shows to be within the scope of the activities of the Bureau.

Cooperate with federal and other agencies designed to develop mines and minerals.

Oppose congressional acts favoring reciprocal or duty free imports of foreign minerals.

Use its authority in other ways to assist in more extensive exploration and development of the mineral resources of the state."

TABLE I

Arizona production and value of the six principal metals in 1969, as reported by the United States Bureau of Mines, were as follows:

801,363	tons copper	@	47.5¢/lb	\$ 761,840,000
217	tons lead	@	15.0¢/lb	65,000
9,039	tons zinc	@	14.6¢/lb	2,639,000
110,878	ozs. gold	@	\$41.514/oz	4,603,000
6,141,000	ozs. silver	@	\$ 1.791/oz	10,997,000
12,699,000	lbs. molybdenum	@	\$ 1.650/lb	<u>20,947,000</u>
				\$801,091,000

This compares with the following final figures for 1968:

627,961	tons copper	@	41.8¢/lb	\$ 525,566,000
1,704	tons lead	@	13.2¢/lb	450,000
5,441	tons zinc	@	13.5¢/lb	1,469,000
95,999	ozs. gold	@	\$ 39.261/oz	3,769,000
4,958,000	ozs. silver	@	\$ 2.145/oz	10,633,000
12,127,000	lbs. molybdenum	@	\$ 1,584/lb	<u>19,207,000</u>
				561,094,000

TABLE II
MINERAL PRODUCTION IN ARIZONA IN 1969 1/

		Quantity	Value (Thousands)
Clays -----	thousand short tons	120	\$394
Copper (recoverable content of ores, etc.)	short tons	801,363	761,840
Diatomite -----	short tons	725	W
Gem stones -----		NA	153
Gold (recoverable content of ores, etc.)	troy ounces	110,878	4,603
Gypsum -----	thousand short tons	83	424
Helium, grade a <u>2/</u> -----	thousand cubic feet	56,300	1,126
Iron ore (usable) --	thousand long tons, gross weight	18	136
Lead (recoverable content of ores, etc.)	short tons	217	65
Lime -----	thousand short tons	283	5,074
Mercury -----	76-pound flasks	W	W
Molybdenum (content of concentrate)	thousand pounds	12,699	20,947
Natural gas (marketed) -----	million cubic feet	1,136	199
Petroleum (crude)-----	thousand 42-gallon barrels	2,433	7,056
Pumice -----	thousand short tons	910	814
Sand and gravel-----	thousand short tons	16,744	18,224
Silver (recoverable content of ores, etc.)			
	thousand troy ounces	6,141	10,997
Stone -----	thousand short tons	2,827	5,812
Tungsten concentrate (60-percent WO ₃ basis)	short tons	1	2
Uranium (recoverable content U ₃ O ₈)	thousand pounds	W	W
Zinc (recoverable content of ores, etc.)	short tons	9,039	2,639
Value of items that cannot be disclosed: Asbestos, cement, feldspar, mica (scrap), perlite, pyrites, vanadium, vermiculite, zeolite, and values indicated by symbol W,-----			
		XX	18,970
coal (bituminous, 1968)			
Total -----		XX	859,475
Total 1967 constant dollars -----		XX	p/725,125

p/ Preliminary. NA Not available. W Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers.)

2/ Bureau of Mines estimate from non-company sources.

Source: U.S. Bureau of Mines

TABLE III
ARIZONA'S MINE PRODUCTION OF

	GOLD ozs.	SILVER ozs.	COPPER tons	MOLYBDENUM (Thousands) lbs.	LEAD tons	ZINC tons	VALUE (Thousands)
1959	124,627	3,898,336	430,297	3,181	9,999	37,325	286,996
1960	143,064	4,774,992	538,605	4,359	8,495	35,811	371,551
1961	145,959	5,120,007	587,053	4,878	5,937	29,585	376,333
1962	137,207	5,453,585	644,242	4,412	6,966	32,888	422,282
1963	140,030	5,373,058	660,977	5,553	5,815	25,419	433,622
1964	153,676	5,810,510	690,988	6,296	6,147	24,690	481,275
1965	150,431	6,095,285	703,377	9,399	5,913	21,757	535,215
1966	142,528	6,338,696	739,569	10,161	5,211	15,985	572,211
1967	80,844	4,588,081	501,471	9,261	4,771	14,330	414,221
1968	95,999	4,958,162	627,961	12,127	1,704	5,441	561,094
1969	110,878	6,141,022	801,363	12,699	217	9,039	801,091

TABLE IV
RELATIVE 1969 PRODUCTION

	U. S.	ARIZONA	Rank in U.S.	LEADING STATE	
Gold	ozs. 1,733,176	110,878	4th	South Dakota	593,146
Silver	ozs. 41,906,311	6,141,022	2nd	Idaho	18,929,697
Copper	tons 1,544,579	801,363	1st	Arizona	801,363
Lead	tons 509,013	217	16th	Missouri	355,452
Zinc	tons 553,124	9,039	13th	Tennessee	124,532
Molybdenum	lbs in Conc. 99,807,000	12,699,000	2nd	Colorado *	62,610

Source: U.S. Bureau of Mines

* Preliminary figure.

TABLE V

COPPER, GOLD, SILVER AND MOLYBDENUM RECOVERED
FROM MINES IN ARIZONA IN 1967, 1968 and 1969

	<u>1967</u>	<u>1968</u>	<u>1969</u>
Ozs. gold from copper ores mined	66,933	89,419	108,718
Ozs. silver from copper ores mined	3,996,587	4,697,394	5,899,843
Lbs. molybdenum from copper concentrates	9,261,000	12,127,000	12,699,000
Lbs. copper from copper ores mined, including clean-up	902,150,000	1,146,574,000	1,477,557,000
Lbs. copper from precipitates	<u>98,718,600</u>	<u>106,604,800</u>	<u>116,023,000</u>
TOTAL LBS. COPPER FROM COPPER MINES	1,000,868,600	1,253,179,200	1,593,580,000
TOTAL LBS. COPPER FROM OTHER MINES	<u>2,613,400</u>	<u>2,742,800</u>	<u>9,146,000</u>
GRAND TOTAL LBS COPPER FROM ALL MINES	1,003,482,000	1,255,922,000	1,602,726,000
TOTAL TONS COPPER ORES MINED	74,289,203	101,293,963	127,848,828
TOTAL TONS ALL ORES MINED	74,809,009	101,643,870	128,433,322

Source: U.S. Bureau of Mines

TABLE VI

COPPER PRODUCTION OF LARGE ARIZONA COPPER MINES

Mine	Company	1968		1969	
		Tons Ore Mined	Tons Copper Recovered *	Tons Ore Mined	Tons Copper Recovered *
1. Morenci	Phelps Dodge	15,474,029	106,857	19,270,608	136,827
2. San Manuel	Magma	11,367,640	72,074	15,280,816	95,722
3. Ray	Kennecott	6,746,163	55,407	11,653,549	90,803
4. New Cornelia	Phelps Dodge	9,018,377	58,544	10,736,239	67,792
5. Pima	Pima	13,060,328	64,487	14,104,752	65,612
6. Inspiration	Inspiration	6,167,134	34,862	8,514,309	51,755
7. Mission	Asarco	6,009,700	38,059	7,939,500	48,661
8. Lavender	Phelps Dodge	4,715,382	24,701	5,550,147	32,528
9. Copper Queen	Phelps Dodge	622,597	22,606	781,959	29,555
10. Mineral Park	Duval	6,226,284	28,704	6,030,700	28,721
11. Silver Bell	Asarco	3,907,900	24,282	3,874,100	22,651
12. Esperanza	Duval	5,473,156	24,390	5,487,589	22,446
13. Copper Cities	Miami Div. Tenn. Corp.	3,359,097	16,787	4,644,525	21,792
14. Bagdad	Bagdad	2,099,223	18,238	2,030,112	17,624
15. Superior	Magma	333,607	14,706	422,629	17,618
16. Twin Buttes	Anaconda	- - -	- - -	3,014,557	11,140
17. Christmas	Inspiration	1,173,407	7,641	1,913,813	10,651

* Includes precipitate copper.

TABLE VII

PRODUCING MINES IN ARIZONA IN 1969 and 1970

MINES

	During 1969*	April 1969 **	April 1970 **
Copper	45	32	35
Copper, with lead or zinc	3	1	4
Lead and/or zinc	8	3	4
Sub-total	56	36	43
Dry gold lode	7	-	1
Dry gold-silver lode	8	2	3
Dry silver lode	18	4	2
Sub-total	33	6	6
Gold Placer	1	-	1
Uranium	-	-	-
Mercury	-	2	1
Silica (with or without metal content)	-	11	11
Asbestos	-	3	4
Gypsum	-	4	4
Lime, limestone, cement.	-	5	5
Marble	-	2	2
Perlite	-	2	3
Bentonite	-	2	2
Mica	-	1	1
Feldspar	-	1	1
Iron ore or concentrate.	-	2	2
Diatomite	-	1	1
Totals		78	87

* Source: U.S. Bureau of Mines

** Source: Arizona Department of Mineral Resources

TABLE VIII

VALUE OF MINERAL PRODUCTION IN ARIZONA, BY COUNTIES

County	1967	1968	Minerals produced in 1968 in order of value
Apache	\$ 11,895,000	\$ 12,190,000	Petroleum, helium, sand and gravel, clays, natural gas, pumice, uranium, vanadium, stone.
Cochise	30,675,000*	W	Copper, lime, silver, stone, gold, sand and gravel, zinc, lead.
Coconino	3,541,000	6,055,000	Uranium, stone, sand and gravel, pumice, copper, silver, lead, zinc.
Gila	43,680,000	61,248,000	Copper, lime, asbestos, molybdenum, silver, stone, gold, sand and gravel, mercury, clays.
Graham	311,000	157,000	Sand and gravel, copper, pumice, stone.
Greenlee	64,893,000	92,925,000	Copper, lime, silver, stone, gold, sand and gravel, molybdenum.
Maricopa	6,229,000*	7,134,000	Sand and gravel, lime, mercury, mica, stone, clays, copper, gold, silver, vermiculite.
Mohave	26,682,000	31,535,000	Copper, molybdenum, silver, sand and gravel, stone, feldspar, zinc, gold, clays, lead.
Navajo	802,000	W	Sand and gravel, iron ore, stone.
Pima	151,151,000*	198,077,000	Copper, cement, molybdenum, silver, sand and gravel, gold, stone, zinc, clays, lead, tungsten.
Pinal	91,310,000*	129,325,000	Copper, molybdenum, silver, gold, sand and gravel, perlite, gypsum, stone, lime, pyrites, diatomite, iron ore, lead.
Santa Cruz	581,000*	W	Sand and gravel, silver, stone, lead, tungsten concentrate, copper.
Yavapai	30,488,000	30,312,000	Copper, cement, zinc, molybdenum, stone, silver, lime, lead, sand and gravel, gold, gypsum, clays, iron ore, pumice.
Yuma	2,869,000*	W	Copper, sand and gravel, stone, silver, lead, tungsten concentrate, zinc.
Undistributed	150,000	48,580,000	
Total <u>1/</u>	465,255,000*	617,541,000	

* Revised

W Withheld to avoid individual disclosure. Included in Undistributed.

1/ Data may not add to totals shown because of independent rounding.

Source: U.S. Bureau of Mines.