

C O P P E R I N D U S T R Y

STATISTICS FOR 1962 COMPARED WITH OTHER YEARS

ARIZONA, UNITED STATES AND WORLD

COMPILED BY ARIZONA DEPARTMENT OF MINERAL RESOURCES
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C O P P E R

PHYSICAL PROPERTIES *

Symbol - Cu. Atomic Weight - 63.54. Specific Gravity - 8.96

Melting Point - 1981.4°F. Boiling Point - 4700°F

Electrical Resistivity - Microhm-cm. - 1.673

Tensile Strength (H.D. - 60,000 #/sq.in.) (annealed - 30,000)

Crystal Structure - Face-centred cubic. Valence - 1 & 2

Copper ranks next to iron as a metal of commercial importance. It has the best conductivity of any base metal; for example, measured on the ordinary basis of conductivity per unit of cross sectional area, aluminum's conductivity is only 61 percent of that of copper, but 3.5 times that of iron. Copper is therefore the most important metal in the electrical field. Copper has enough strength for minor structural purposes (such as sheet-metal work, electrical manufactures, etc.), is easily rolled and drawn into wire, has great resistance to weathering, and is of moderate cost compared to competitive materials. In addition to these properties, copper is widely used alloyed with zinc to form brass, which is easily worked, offers good resistance to weathering and most solutions (principal exceptions are certain acids and alkalies), and is fairly strong and elastic; and alloyed with tin to form bronze, of note for its resilience. It has good thermal conductivity, so finds many uses in heat-transfer units, such as cooling fins and water heaters. In addition, a large percentage of copper may be recovered as scrap after it has outlived the usefulness for which it was originally intended. Of the total copper consumed in the United States it has been estimated that about 60 percent eventually returns to use as copper or copper alloys.

* U.S.B.M.'s "MATERIALS SURVEY" - September, 1952

Arizona Department of Mineral Resources

August, 1963

COPPER INDUSTRY IN 1962

Reported by U.S.B.M. in Annual Copper Report for 1962. Prepared August 2, 1963, by F. L. Wideman, Gertrude N. Greenspoon and Wilma F. Washington under the supervision of P. F. Yopes, Chief, Branch of Nonferrous Metals, Division of Minerals.

Accelerated rates of copper production, begun in late 1961, continued through the first six months of 1962, according to the Bureau of Mines, United States Department of the Interior. Supplies began to exceed requirements and in mid-July producers here and abroad inaugurated curtailments in output or sales. Nevertheless, record highs were established in U.S. and world mine production and in domestic smelter and refinery outputs from primary materials. The price of electrolytic copper in the U.S., established at 31 cents per pound on May 19, 1961, was unchanged throughout the year, while that on the London Metal Exchange was fairly stable at 29.25 cents.

Production of copper at U. S. Mines increased 5 percent to 1,228,400 tons, a new record high. Arizona supplied 52 percent of the total output; production rose 10 percent over 1961 to a new record. The Mission project completed its first full year of operation and the Christmas mine, Gila County, began production in August.. Utah maintained its rank as the second largest copper producing State; output rose 2 percent and the State accounted for 18 percent of the total U.S. production. Montana ranked third with 8 percent of the U.S. total. Output was 10 percent below 1961 as a result of the closure of the Anaconda Company open pit and underground mines on July 16 and 23, respectively. Operations at the Butte mines were resumed on August 2, and at the Berkeley pit on September 21. New Mexico's output, increasing 4 percent over 1961 production, exceeded the previous record of 1942 by 3 percent. Output in Nevada rose 6 percent. Michigan, ranking sixth, produced 5 percent more copper than in 1961. Output in Tennessee rose 17 percent to establish a new record.

By mid-year, when supplies of copper began to exceed requirements, a number of producers moved to curtail production. On July 11, Phelps Dodge Corp. announced a 6-percent reduction and on September 7 a further cutback was reported, equivalent to a 10-percent reduction below pre-July levels for both cutbacks. The Anaconda Company began a 5-percent curtailment on July 12, and on July 16, a 9-percent cut was begun by Inspiration Consolidated Copper Co. Kennecott Copper Corp. announced 10-percent reductions effective September 9 at its Nevada and New Mexico properties, September 10 at the Utah mine, and September 16 at the Arizona mine.

Consumption of refined copper rose 9 percent to the largest on record. Use of copper rose from a monthly average of 133,300 tons in 1961 to 145,300 in March 1962, and averaged 134,000 tons in January to June 1962. In July consumption dropped to 93,100 tons, with the result that fabricators consumed an average of 125,600 tons in the last six months.

Despite the record consumption and production curtailments, producers' inventories of refined copper turned upward in each month from July through December except for September. Yearend stocks increased 45 percent. Unrefined stocks rose 4 percent. On December 31, 1962, inventories in Government stockpiles totaled 1,133,230 tons. Of this quantity, 1,008,351 tons was in the national (strategic) stockpile, 113,430 tons in Defence Production Authority inventory, 196 tons in Commodity Credit Corp. inventory, and 11,253 tons in the supplemental stockpile.

Included in these data were 24,784 tons of oxygen-free high conductivity copper in the national stockpile, 196 tons in CCC inventory, and 5,199 tons in the supplemental stockpile. Also, included were 2,171,449 pounds of beryllium-copper master alloy in the national stockpile, and 12,623,973 pounds in the supplemental stockpile.

May 19 marked the end of a complete year during which the primary producers' price for electrolytic copper had been unchanged at 31 cents per pound, delivered. This represented the longest period of price stability except when under Government control. Previous periods of an unchanged copper price occurred from May 1929 to March 1930 (18 cents per pound) and from November 12, 1959 to October 12, 1960 (23 cents per pound). The custom-smelter price established on May 31, 1961 at 31 cents also has remained unchanged.

The price of copper on the London Metal Exchange averaged £230 9s. per long ton (28.92 cents per pound) during January. Prices rose in February to a high for the year of £235 0s. 8d. (29.53 cents) but were lowered in March. A producer-maintained price of approximately £234 (29.25 cents) was in effect thereafter. The average for the year was 2 percent more than in 1961.

Imports of unmanufactured copper rose 5 percent over 1961. Receipts of refined copper exceeded 1961 by 48 percent mainly because of large receipts from the Federation of Rhodesia and Nyasaland. Blister-copper imports declined 2 percent as increased receipts from Mexico, Chile, and Republic of South Africa did not offset the 21-percent decrease from Peru. The other unrefined classes - ore, concentrate, matte and cement copper - dropped 8 percent. Chile was the chief source of foreign copper, supplying 47 percent of the total but furnishing slightly less copper than in 1961. Canada regained second place as a principal supplier with 21 percent of the total - 26 percent more than in 1961. Peru furnished 15 percent of the imported copper but 20 percent less than in 1961.

As the price of copper remained above 24 cents per pound throughout 1962, the 1.7-cent-per-pound excise tax, effective July 1, 1958, was applicable to imported copper. If the price were to drop below 24 cents, the tariff would be 2 cents per pound.

Refined copper, the chief export class, decreased 22 percent. Although 72 percent of the total exported went to European countries, all of the purchasers took substantially smaller quantities than in 1961. India was the second largest recipient with 19 percent of the total shipments.

Exports of copper scrap and brass and bronze scrap dropped sharply. Netherlands, Yugoslavia and Japan were the principal destinations of scrap copper. Japan received 87 percent of the scrap brass and bronze exported compared with 90 percent in 1961.

World production of copper continued upward for the fourth consecutive year. Voluntary reduced production rates instituted by many leading world producers coupled with labor and political disturbances in some countries prevented even higher copper outputs. Stimulated by demand of Japanese smelters for concentrate, Canada's output rose 6 percent to a record high. Copper production in Chile was at a record high with output more than in 1961, and in the Republic of the Congo production was slightly higher than in 1961. Of the other principal producing countries, Peru and Northern Rhodesia recorded decreased outputs.

Production cutbacks similar to those in the U.S. were announced in other countries. The Rhodesian Selection Trust Co. and Anglo American Corp. stated on July 1 that immediate cutbacks would be made in production or sales (a 10-percent reduction had been in effect since October 1960). Also, on July 1, the Union Minière du Haut Katanga announced an additional 5-percent production cut. On August 8, Messina (Transvaal) Development Co. stated it would reduce sales by 5 percent. In Canada, production curtailments of 10 percent at Noranda Mines, Ltd. and Gaspé Copper Mines, Ltd., instituted in June 1960, were increased by 5 percent on July 3. The International Nickel Co. of Canada, Ltd., began a 10-percent cutback in the fourth quarter of the year. The Anaconda Company began a 5-percent curtailment on July 12 at its Chilean subsidiaries. In September Kennecott Copper Corp. curtailed output at the El Teniente mine by reducing the work week from 7 to 6 days.

Work stoppages included the Lubumbashi plant and Kipushi mine of Union Minière du Haut Katanga which were closed from December 1961 to February and March 1962. In late December 1962 all facilities of the company were closed because of lack of power due to damage to power stations. A 21-day strike in May closed Northern Rhodesian mines, and operations of Southern Peru Copper Co., Peru, were halted by a strike from August 11 to September 18. A 74-day strike at La Africana mine of Santiago Mining Co., Chile, a subsidiary of the Anaconda Company, was settled September 7. The El Salvador mine and Potrerillos smelter of Andes Copper Mining Co., another Anaconda subsidiary, were closed on November 11 for 40 days.

OUTLOOK

As reported by Arizona Department of Mineral Resources

The 1962 copper statistics have been analysed by such copper authorities as Phelps Dodge's president, Robert G. Page, the Rhodesian Trust Groups' Chairman, Sir Ronald Prain, American Metal Climax, Vice President, Jean Vuillequez, and Miles Metal Corporation's Dr. Joseph Zimmerman. They have all agreed that the copper industry is healthy. All large producers, both here and abroad, maintain exploratory staffs which have developed substantial untapped ore reserves. Because of good production and marketing discipline by many individual producers, the price for copper has fluctuated very little over the past two years.

The answer as to how long the foreign producers will succeed in keeping the price of copper stabilized has been supplied by Sir Ronald Prain, who, in a recent statement said: "Future stability will, therefore, depend largely on the willingness of producers to continue to adjust their primary outputs to the pattern of consumption".

COMMENTS ON TABLES XI, XII AND XIII

A study of United States copper production and consumption figures (Table XI), by years from 1946 to 1953 inclusive, and years 1955 to 1962 inclusive, brings out some pertinent statistics. The small increase in domestic consumption of refined copper is especially notable.

The average annual domestic consumption from 1946 to 1953 inclusive (8 years) was 1,376,978 tons and from 1955 to 1962 inclusive (8 years) it was 1,437,165 tons, an increase of only 4.37 percent for the 8 years, or only 0.55 percent increase per year, where one might expect a normal growth-rate of at least 2 percent. The growth rate in production of refined copper for the two 8-year periods was 2.4 percent per year.

The other thing of note is that the United States has become self-supporting in copper production. This has been the case for the last five years.

Table XII indicates a mine production capacity of 1,400,000 tons of copper per year, and with an estimated added production of 300,000 tons of secondary unalloyed copper, this country is now well prepared to produce all the copper it will need for some time to come. Such capacity should permit economical operation for most of the big producers at an 85 to 90 percent of capacity during a recession or lull in demand.

Meanwhile, a copper tariff high enough to bar out low-cost foreign copper should always be kept in mind, as from now on domestic copper will be mostly high-cost due chiefly to lowering grades of ore and rapidly increasing costs. The new producers, which have brought about this new production capacity, must be kept active, not only for security reasons but for employment stability in a very important industry in our economy.

A study of Table XIII shows that during the last three years it took an annual average of 65,324,653 man-hours of U.S. labor at \$2.73 per hour to produce 142,644,197 tons of copper ore, with a recovery of 2,209,525,933 pounds of equivalent copper; a labor cost of \$178,336,303 for copper mining, or \$0.0807 per pound of copper.

With foreign ores assaying more than twice the grade of U.S. ores, and foreign labor averaging less than half the U.S. wage-rates, it is easy to calculate a foreign copper mining labor cost of less than half the U.S. labor cost of producing a pound of copper. As the object of a copper tariff primarily is to equate the difference in wage cost per pound of copper, such a tariff should be at least four cents per pound.

In order to insure, continuous production of the number one strategic metal, the domestic copper industry must be protected against a flood of low-cost foreign metal. Our foreign aid program has helped the foreign producer to develop his copper production techniques, and he can find a ready market for his product in a rapidly expanding economy throughout the world. The growth-rate of copper consumption throughout Europe has been truly amazing. According to the Copper Institute figures for deliveries of refined copper outside the U.S.A., the average annual consumption of copper for the 8-year period (1946-1953) was 950,000 tons, and for the 8-year period (1955-1962) it was 1,802,000 tons.

TABLE I

SALIENT U. S. COPPER STATISTICS

YEARS 1960, 1961 AND 1962

Compiled By Arizona Department of Mineral Resources from U.S.B.M. Reports

	1960	1961	1962
Arizona Mine Production - Tons Copper	538,605	587,053	644,242
U. S. Mine Production - Tons Copper	1,080,169	1,165,155	1,228,421
World Mine Production - Tons Copper	4,590,000	4,850,000	5,050,000
Refined Stocks - Beginning of Period	18,000	98,000	49,000
Refined Stocks - End of Period	98,000	49,000	71,000
Refinery Production (From Domestic Ores) ...	1,121,286	1,181,015	1,214,146
Refinery Production (From Foreign Ores)	397,641	369,124	397,584
Secondary Copper Recovered from Scrap as Unalloyed Copper	300,259	279,511	301,374
IMPORTS:			
Copper from Ore, Matte, Regulus	80,536	47,392	43,552
Blister Copper	296,160	340,312	331,686
Refined Copper	142,706	66,856	98,820
Total Imports - Crude & Refined	519,402	454,460	474,058
EXPORTS:			
Copper in Ores, etc.	11,111	4,478	1,916
Refined Copper	433,762	432,253	336,525
Total Exports - Crude & Refined	444,873	436,731	338,441
EXCESS IMPORTS OVER EXPORTS	74,529	17,729	135,567
CONSUMPTION:			
New Refined (Apparent Consumption)	1,148,000	1,234,000	1,352,000
Total Refined (Actual)	1,349,896	1,462,830	1,599,676
U.S. Mine Prod. % of Appar. Consumption .	94.1	94.4	90.9
Average E. & M. J. Price of Copper	32.053¢	29.921¢	30.600¢

TABLE II

ARIZONA, UNITED STATES AND WORLD MINE PRODUCTION OF COPPER

E. & M. J. DOMESTIC AND EXPORT PRICE OF COPPER

By Years 1945 - 1962 Incl.

Source: U.S.B.M.

Year	ARIZONA			UNITED STATES		WORLD	E. & M. J.	E. & M. J.
	Tons	% of U. S. Prod.	% of World Prod.	Tons	% of World Prod.	Tons	PRICE Per Pound	EXPORT PRICE Per Pound
1945	287,203	37.2	12.0	772,894	32.2	2,400,000	11.775¢	11.700¢
1946	289,223	47.5	14.1	608,737	29.6	2,056,000	13.820¢	14.791¢
1947	366,218	43.2	14.6	847,563	33.9	2,500,000	20.958¢	21.624¢
1948	375,121	44.9	14.4	834,813	32.1	2,600,000	22.038¢	22.348¢
1949	359,010	47.7	14.4	752,750	30.1	2,500,000	19.202¢	19.421¢
1950	403,301	44.4	14.4	909,343	32.5	2,760,000	21.235¢	21.549¢
1951	415,870	44.8	14.3	928,330	32.0	2,900,000	24.200¢	26.258¢
1952	395,719	42.8	13.1	925,359	30.6	3,020,000	24.200¢	31.746¢
1953	393,525	42.5	12.9	926,448	30.4	3,050,000	28.798¢	30.845¢
1954	377,927	45.2	12.2	835,472	27.0	3,100,000	29.694¢	29.889¢
1955	454,105	45.5	13.3	998,570	29.2	3,420,000	37.491¢	39.115¢
1956	505,908	45.7	13.4	1,104,156	29.1	3,790,000	41.818¢	40.434¢
1957	515,854	47.5	13.3	1,086,141	27.9	3,890,000	29.576¢	27.157¢
1958	485,839	49.6	12.9	979,329	25.9	3,780,000	25.764¢	24.123¢
1959	430,297	52.2	10.7	824,846	20.5	4,020,000	31.182¢	28.892¢
1960	538,605	49.9	11.7	1,080,169	23.5	4,590,000	32.053¢	29.894¢
1961	587,053	50.4	12.1	1,165,155	24.0	4,850,000	29.921¢	27.919¢
1962	644,242 ^{1/}	52.4	12.8	1,228,421 ^{2/}	24.3	5,050,000 ^{3/}	30,600¢	28.514¢

^{1/} Highest annual production in history of Arizona.

^{2/} Highest annual production in history of United States.

^{3/} Highest annual production in history of The World.

Arizona Department of Mineral Resources

August, 1963

TABLE III

MINE PRODUCTION RECOVERABLE COPPER - PRODUCTION SECONDARY UNALLOYED COPPER
REPORTED REFINED COPPER CONSUMPTION IN U.S.A.
ESTIMATED WORLD REFINED COPPER CONSUMPTION

	MINE PRODUCTION RECOVERABLE 1/				SECONDARY COPPER PRODUCTION		
	United States	Rest of Free World	Communist Controlled	TOTAL WORLD	United States 1/	Rest of World 2/	TOTAL WORLD 2/
1946	608,737	1,226,000	221,000	2,056,000	137,000	363,000	500,000
1950	909,343	1,551,000	300,000	2,760,000	261,000	460,000	721,000
1954	835,472	1,749,000	416,000	3,100,000	212,000	400,000	612,000
1956	1,104,156	2,171,000	515,000	3,790,000	273,000	537,000	810,000
1957	1,086,859	2,259,000	544,000	3,890,000	248,000	547,000	795,000
1958	979,329	2,217,000	584,000	3,780,000	255,000	525,000	780,000
1959	824,846	2,590,000	605,000	4,020,000	262,000	520,000	782,000
1960	1,080,169	2,829,000	681,000	4,590,000	300,000	550,000	850,000
1961	1,165,155	2,873,000	812,000	4,850,000	280,000	620,000	900,000
1962	1,228,421	2,888,579	933,000	5,050,000	301,000	900,000	1,200,000

	CHANGE IN STOCKS	REPORTED CONSUMPTION	ESTIMATED CONSUMPTION
	Total World	United States 1/	Total World 2/
1946	8,000 I	1,187,000	2,548,000
1950	75,000 D	1,424,000	3,556,000
1954	141,000 D	1,254,000	3,853,000
1956	133,000 I	1,521,000	4,467,000
1957	104,000 I	1,348,000	4,581,000
1958	196,000 D	1,251,000	4,756,000
1959	30,000 I	1,463,000	4,772,000
1960	134,000 I	1,350,000	5,300,000
1961	20,000 D	1,463,000	5,730,000
1962	64,000 I	1,600,000	6,186,000

1/ Source: U.S.B.M. 2/ Estimated. No official records have been published of either secondary unalloyed copper or of world consumption. Estimates are calculated from: "World Mine Production (U.S.B.M.) plus estimated secondary unalloyed copper, plus or minus change in stocks (Decrease or Increase)"

TABLE IV

WORLD MINE PRODUCTION OF RECOVERABLE COPPER
BY CONTINENTS AND PRINCIPAL COUNTRIES IN THOUSANDS SHORT TONS

Years 1958, 1959, 1960, 1961 and 1962

Source: U.S.B.M.

	1958	1959	1960	1961	1962
NORTH AMERICA:					
U.S.A.	979	825	1,080	1,165	1,228
Canada	345	399	438	450	465
Mexico	72	63	67	54	52
Other	14	10	13	11	14
	1,410	1,297	1,598	1,680	1,759
SOUTH AMERICA:					
Chile	515	602	587	604	646
Peru	59	53	202	218	183
Other	5	4	4	4	4
	579	659	793	826	833
EUROPE:					
U.S.S.R.	470	480	510	600	700
Yugoslavia	39	43	37	55	57
Others	129	141	147	154	162
	638	664	694	809	919
ASIA:					
China	33	33	77	110	110
Cyprus	37	40	39	32	28
Japan	90	93	98	106	114
Philippines	52	55	40	57	60
Turkey	28	31	30	32	31
Others	11	10	13	13	19
	251	272	306	350	362
AFRICA:					
No. Rhodesia	441	599	635	633	620
Belg. Congo	262	311	333	325	325
U. of So. Africa	55	56	51	58	51
Others	58	76	59	67	63
	816	1,032	1,078	1,083	1,059
AUSTRALIA:	82	104	121	102	118
TOTAL WORLD	3,770	4,040	4,590	4,850	5,050

TABLE V

NEW (PRIMARY) REFINED COPPER WITHDRAWN FROM SUPPLY ON DOMESTIC ACCOUNT

Years 1957-1962	Source: U.S.B.M.	Unit: Short Tons		
	Year 1957	Year 1958	Year 1959	
Ref. Prod. of New Cu from U.S. Ores.....	1,050,496	1,001,645	796,452	
Ref. Prod. of New Cu from Foreign Ores..	403,680	350,875	301,795	
Total Ref. Prod. of New Copper	1,454,176	1,352,520	1,098,247	
Imports of Refined Copper	162,309	127,630	214,056	
Stocks at beginning of period	78,000	109,000	48,000	
TOTAL AVAILABLE SUPPLY	1,694,485	1,589,150	1,360,303	
Exports of Refined Copper	346,025	384,868	158,938	
Stocks at end of period	109,000	48,000	18,000	
TOTAL	455,025	432,868	176,938	
Withdrawn on Domes.Acc.(Apparent Cons.).	1,239,000	1,157,000	1,183,000	
Reported Actual Consumption	1,352,124	1,250,677	1,463,031	

	Year 1960	Year 1961	Year 1962	
Ref. Prod. of New Cu from U.S. Ores	1,121,286	1,181,015	1,214,146	
Ref. Prod. of New Cu from Foreign Ores .	397,641	369,124	397,584	
Total Ref. Prod. of New Copper.....	1,518,927	1,550,139	1,611,730	
Imports of Refined Copper.....	142,709	66,855	98,820	
Stocks at beginning of period	18,000	98,000	49,000	
TOTAL AVAILABLE SUPPLY	1,679,636	1,714,994	1,759,550	
Exports of Refined Copper	433,762	432,253	336,525	
Stocks at end of period	98,000	49,000	71,000	
TOTAL	531,762	481,253	407,525	
Withdrawn on Domes.Acc.(Apparent Cons.)..	1,148,000	1,234,000	1,352,000	
Reported Actual Consumption	1,349,896	1,462,830	1,599,676	

TABLE VI
IMPORTS OF COPPER INTO UNITED STATES
1960, 1961 and 1962

Source: U.S.B.M. & American Metal Market

	1960	1961	1962
Ore Matte-Regulus (Copper Content)	80,536	47,392	43,552
Canada	14,950	14,532	18,176
Chile	14,192	1,993	22
Mexico	1,894	298	244
Peru	9,423	7,631	6,899
Philippines	17,563	13,897	10,126
U. of So. Africa	13,812	7,275	5,751
Australia	771	826	751
Other Countries	7,931	940	1,583
Blister Copper (Copper Content)	296,160	340,212	331,686
Mexico	18,647	20,519	23,473
Chile	190,489	222,542	224,516
Peru	73,120	82,747	65,234
U. of So. Africa	13,022	14,404	18,409
Other Countries	882	-----	54
Refined Cathodes and Shapes	142,706	66,856	98,820
Canada	100,640	61,660	76,600
Chile	3,485	1,983	856
United Kingdom	727	1,301	845
Rhodesia & Nyasaland	5,785	1,797	18,997
Other Countries	32,069	115	1,522
TOTAL IMPORTS	519,402	454,460	474,058
TOTAL EXPORTS	444,873	436,731	338,441
EXCESS IMPORTS	74,529	17,729	135,617

YEARS	1955	1957	1959
TOTAL IMPORTS	580,521	587,863	584,244
TOTAL EXPORTS	207,105	361,490	162,683
EXCESS IMPORTS	373,416	226,373	421,561

TABLE VII

EXPORT OF COPPER FROM THE UNITED STATES
1960, 1961 and 1962

Source: U.S.B.M. and Bureau of Census

	1960	1961	1962
Ore, Concts. & Matte	11,111	4,478	1,916
Refined Ingots, Bars, etc.	433,762	432,253	336,525
Argentina	12,469	12,886	8,931
Australia (Oceania)	3,774	3,036	-----
Belgium-Luxembourg	3,318	2,165	1,574
Brazil	14,892	20,288	4,765
Canada	1,333	2,436	1,013
Denmark	----	1,573	-----
Finland	----	965	-----
France	56,866	60,305	39,044
Germany, West	105,998	77,352	67,353
Greece	----	140	-----
India	5,258	15,558	65,124
Italy	61,459	63,047	54,314
Japan	35,569	60,839	13,134
Netherlands	13,658	9,102	6,467
Norway	3,460	2,940	2,658
Sweden	5,314	4,486	3,861
Switzerland	6,945	6,566	4,126
Taiwan	1,611	631	540
United Arab Republic	----	1,512	----
United Kingdom	90,664	76,370	52,186
Yugoslavia	5,450	9,432	6,554
Other Countries	5,724	624	4,881
TOTAL EXPORTS (Crude-Refined)	444,873	436,731	338,441

TABLE VIII

STOCKS OF REFINED COPPER REPORTED BY
U. S. B. M. AND COPPER INSTITUTE *

STOCKS END OF PERIOD	IN U. S. A.		OUTSIDE U. S. A.
	U.S.B.M.	Copper Institute	Copper Institute
Year 1952	26,000	58,858	130,103
Year 1953	49,000	89,193	280,530
Year 1954	25,000	47,108	181,529
Year 1955	34,000	61,554	159,777
Year 1956	78,000	120,645	233,775
Year 1957	109,000	181,024	277,316
Year 1958	48,000	80,722	178,152
Year 1959	18,000	64,763	228,243
Year 1960	98,000	139,272	288,510
Year 1961	49,000	79,755	332,479
Year 1962	71,000	117,441	360,177

* Inventory data of the Bureau of Mines and Copper Institute always differ owing to somewhat different bases. After Jan. 1, 1947, differences were due chiefly to the method of handling metal in process of refining (included as "refined" by Copper Institute and as "unrefined" by the U.S.B.M.), and to other minor variations in interpretation until May, 1951. Then the Institute's inventory data began to include tonnages delivered to U.S. consumers at foreign ports. Bureau of Mines figures are on the basis of metal physically held at primary smelting and refining plants in the U.S. In the Bureau's classification cathodes to be used chiefly for casting into shapes are considered stocks in process and not refined stocks.

TABLE IX

STOCKS OF REFINED COPPER, BLISTER, AND MATERIALS IN PROCESS
REPORTED BY UNITED STATES BUREAU OF MINES
IN SHORT TONS

END OF PERIOD	REFINED	BLISTER & MATERIALS IN PROCESS OF REFINING 1/	TOTAL
Year 1952	26,000	185,000	211,000
Year 1953	49,000	223,000	272,000
Year 1954	25,000	189,000	214,000
Year 1955	34,000	201,000	235,000
Year 1956	78,000	261,000	339,000
Year 1957	109,000	274,000	383,000
Year 1958	48,000	257,000	305,000
Year 1959	18,000	253,000	271,000
Year 1960	98,000	261,000	359,000
Year 1961	49,000	236,000	285,000
Year 1962	71,000	246,000	317,000

1/ Includes copper in transit from smelter in the U. S. to refineries therein.

TABLE X

REFINED COPPER CONSUMED IN U. S. 1959-1962
BY CLASSES OF CONSUMERS

Source: U.S.B.M.		Unit: Short Tons					
Class of consumer	Cathodes	Wire bars	Ingots and ingot bars	Cakes and slabs	Billets	Other	Total
1959:							
Wire mills	6,432	817,030	11,790	-----	-----	925	836,177
Brass mills	86,648	64,277	116,190	146,852	170,074	59	584,100
Chemical plants .	-----	-----	310	-----	-----	484	794
Secondary smelters	5,320	-----	2,079	246	-----	466	8,111
Foundries	4,877	218	11,465	17	216	795	17,588
Miscellaneous 1/.	1,298	4	4,064	6	295	10,594	16,261
Total	104,575	881,529	145,898	147,121	170,585	13,323	1,463,031
1960:							
Wire mills	3,928	810,570	13,450	-----	-----	875	828,823
Brass mills	74,993	48,776	80,247	137,667	144,725	52	486,460
Chemical plants .	-----	-----	465	-----	-----	571	1,036
Secondary smelters	5,939	-----	1,913	177	-----	177	8,206
Foundries	4,644	92	10,224	26	275	900	16,161
Miscellaneous 1/.	1,220	5	2,328	6	558	5,903	9,210
Total	90,724	859,443	108,627	137,876	145,558	7,668	1,349,896
1961:							
Wire Mills	604	812,065	10,356	-----	-----	774	823,799
Brass mills	119,172	42,391	95,943	152,876	189,333	50	599,765
Chemical plants .	-----	-----	720	-----	-----	549	1,269
Secondary smelters	6,782	-----	2,390	172	-----	160	9,504
Foundries	6,157	92	9,186	-----	720	923	17,078
Miscellaneous 1/.	2,532	4	4,072	25	505	4,277	11,415
Total	135,247	854,552	122,667	153,073	190,558	6,733	1,462,830
1962:							
Wire mills	-----	913,131	8,964	-----	-----	813	922,908
Brass mills	113,402	42,799	97,090	184,085	198,676	97	636,149
Chemical plants .	-----	-----	761	-----	-----	727	1,488
Secondary smelters	7,368	-----	1,928	159	-----	5	9,460
Foundries	5,760	41	8,417	30	327	1,083	15,658
Miscellaneous 1/.	1,066	1	7,259	24	602	5,061	14,013
Total	127,596	955,972	124,419	184,298	199,605	7,786	1,599,676

1/ Includes iron and steel plants, primary smelters producing alloys other than copper, consumers of copper powder and copper shot, and miscellaneous manufacturers.

TABLE XI

U. S. PRODUCTION AND CONSUMPTION OF COPPER

Source: U.S.B.M.

YEAR	MINE PRODUCTION	SECONDARY PRODUCTION *	TOTAL	ACTUAL CONSUMPTION TOTAL	PRODUCTION AS % OF CONSUMPTION
1946	608,737	136,909	745,646	1,187,009	62.8
1947	847,563	303,092	1,150,655	1,463,294	78.6
1948	834,813	284,026	1,118,839	1,420,584	78.8
1949	752,750	250,089	1,002,839	1,129,686	88.8
1950	909,343	260,704	1,170,047	1,424,434	82.2
1951	928,330	186,462	1,114,792	1,416,865	78.7
1952	925,359	173,904	1,099,263	1,479,732	74.3
1953	926,448	242,855	1,169,303	1,494,215	78.3
Totals 1946-53	6,733,343	1,838,041	8,571,384	11,015,819	
8-Yr.Avg.	841,668	229,755	1,071,423	1,376,978	77.8
1955	998,570	246,928	1,245,498	1,502,004	82.9
1956	1,104,156	273,060	1,377,216	1,521,389	90.5
1957	1,086,141	248,015	1,334,156	1,347,815	99.0
1958	979,329	255,121	1,234,450	1,250,677	98.7
1959	824,846	261,588	1,086,434	1,463,031	74.3
1960	1,080,169	300,259	1,380,428	1,349,896	102.3
1961	1,165,155	279,511	1,444,666	1,462,830	98.8
1962	1,228,421	301,374	1,529,795	1,599,676	95.6
Totals 1955-62	8,466,787	2,165,856	10,632,643	11,497,318	
8-Yr.Avg.	1,058,348	270,732	1,329,080	1,437,165	92.5

* Unalloyed copper

Arizona Department of Mineral Resources

August, 1963

TABLE XII

ESTIMATED ANNUAL COPPER PRODUCTIVE CAPACITY
ARIZONA, UNITED STATES, OTHER FREE COUNTRIES, COMMUNIST COUNTRIES

- 1961 -		End of 1961
Based on Continuous Full Operation - 350 Days Per Year		-
<u>ARIZONA:</u>	<u>Tons Copper</u>	
Morenci	140,000	
New Cornelia	72,000	
Copper Queen	35,000	
Lavender Pit	38,000	
	<u>285,000</u>	
Ray	72,000	
Miami - Copper Cities	35,000	
Inspiration	47,000	
San Manuel	82,000	
Magma	24,000	
Silver Bell	20,000	
Pima	18,000	
Bagdad	12,000	
Duval	30,000	
Mission	45,000	
Miscellaneous	30,000	
Sub-Total - Arizona		<u>700,000</u>
<u>OTHER STATES:</u>		
Utah (chief mine-Utah Copper)	225,000	
Montana (chief mine - Butte)	130,000	
Nevada (chief mine - Ely & Yerington)	95,000	
New Mexico (chief mine - Chino)	100,000	
Michigan (chief mines-White Pine & Cal. & Hecla)...	80,000	
Miscellaneous	70,000	
Sub-Total - Other States		<u>700,000</u>
GRAND TOTAL UNITED STATES		<u>1,400,000</u>
<u>OTHER FREE COUNTRIES:</u>		
Canada	500,000	
Chile	650,000	
Peru	205,000	
Western Europe	140,000	
Asia	240,000	
Africa	1,100,000	
Australia	100,000	
Other Countries	65,000	
Sub-Total - Free Countries Other Than U.S.		<u>3,000,000</u>
GRAND TOTAL - All Free Countries		<u>4,400,000</u>
COMMUNIST COUNTRIES		<u>800,000</u>
GRAND TOTAL - WORLD		<u>5,200,000</u>

TABLE XIII

COPPER MINING EMPLOYMENT, WAGES AND HOURS IN U. S. AND ARIZONA

Base Period, (1947-1949) compared with Three-Year Period (1960-1962)

Source: "Employment and Earnings", U.S. Dept. of Labor.
 U. S. B. M. Mineral Yearbooks "Arizona's Current Employment
 Development" Arizona Employment Security Commission.

	"A" Number Of All Employees		"B" Weekly Earnings		"C" Weekly Hours		"D" Hourly Earnings	
	ARIZONA	U.S.	ARIZONA	U.S.	ARIZONA	U.S.	ARIZONA	U.S.
Base Period: 1947-49 Avg.	10,700	27,100	\$ 64.20	63.11	44.83	44.10	\$ 1.432	\$ 1.43
Last Three Years:								
1960	12,733	29,600	116.83	114.75	43.7	43.3	2.674	2.65
1961	13,117	29,000	126.29	119.03	44.8	43.6	2.817	2.73
1962	13,350	28,500	129.29	120.98	44.3	42.9	2.920	2.82
1960-62 Avg.	13,067	29,033	\$ 124.24	118.21	44.27	43.30	\$ 2.806	\$ 2.73

	"E" Annual Man-Hours		"F" Annual Earnings		Annual Earnings Per Man	
	"A" x "C" x 52		"E" x "D"		"F" ÷ "A"	
	ARIZONA	U.S.	ARIZONA	U.S.	ARIZONA	U.S.
Base Period: 1947-49 Avg.	24,943,412	62,145,720	\$ 35,718,966	\$ 88,930,525	\$ 3,338	\$ 3,282
Last Three Years:						
1960	28,934,469	66,647,360	77,370,770	176,615,504	6,076	5,967
1961	30,557,363	65,748,800	86,080,092	179,494,224	6,562	6,189
1962	30,753,060	63,577,800	89,798,935	179,289,396	6,726	6,291
1960-62 Avg.	30,081,631	65,324,653	\$ 84,409,057	\$ 178,336,303	\$ 6,435	\$ 6,143

Continued -

TABLE XIII (Cont'd)

	"G" Tons Copper Ores		"H" Pounds Equiv. * Copper Produced From Copper Ores	
	ARIZONA	U.S.	ARIZONA	U.S.
Base Period: 1947-49 Avg.	38,082,754	82,875,491	748,056,267	1,625,975,640
Last Three Years:				
1960	66,032,439	134,994,082	1,016,449,300	2,056,147,800
1961	71,918,991	143,721,798	1,121,030,000	2,239,636,000
1962	78,868,147	150,216,710	1,230,386,000	2,332,794,000
1960-62 Avg.	72,273,192	142,644,197	1,122,621,767	2,209,525,933

* Includes value of gold and silver recovered from copper ores, converted into pounds copper at average copper price.

	Tons Copper Ore Produced Per Man-Hour "G" ÷ "E"		Lbs. Equiv. Copper Produced Per Man-Hour "H" ÷ "E"		Earnings Per Man-Hour "D"	
	ARIZONA	U. S.	ARIZONA	U. S.	ARIZONA	U. S.
Base Period: 1947-49 Avg.	1.5268	1.3336	29.9901	26.1639	\$ 1.432	\$1.431
1960-62 Avg.	2.4026	2.1836	37.3192	33.8237	\$ 2.806	\$2.73
% Incr. in 13 years Per Year	57.36% 4.41%	63.74% 4.90%	24.44% 1.88%	29.28% 2.25%	95.95% 7.38%	90.78% 6.98%

TABLE XIV

SUMMARY OF ESTIMATED* COPPER MINING EMPLOYMENT, WEEKLY EARNINGS,
WEEKLY HOURS, HOURLY EARNINGS, IN ARIZONA AND UNITED STATES,
BY YEARS, 1947 TO 1962 INCLUSIVE

Source: "Employment and Earnings" - U. S. Dept. of Labor.
"Arizona's Current Employment Developments" -
Arizona Employment Security Commission.

	ALL EMPLOYEES		WEEKLY EARNINGS		WEEKLY HOURS		HOURLY EARNINGS	
	Arizona	U.S.	Arizona	U.S.	Arizona	U.S.	Arizona	U.S.
1947	10,700	25,700	\$ 59.40	\$ 59.27	45.0	44.8	\$ 1.32	\$ 1.32
1948	10,900	27,800	65.99	65.81	45.2	45.2	1.46	1.46
1949	10,500	27,300	66.98	63.96	44.3	42.3	1.512	1.512
Avg. 1947-1949	10,700	27,100	\$ 64.20	\$ 63.11	44.83	44.1	\$ 1.432	\$ 1.431
1950	9,500	25,800	\$ 75.80	\$ 72.05	46.5	45.0	\$ 1.63	\$ 1.601
1951	10,100	25,900	83.01	78.37	47.7	46.1	1.74	1.70
1952	10,700	26,500	90.31	85.73	47.06	45.6	1.92	1.88
1953	11,400	28,600	96.03	91.60	46.73	45.8	2.055	2.00
1954	11,900	27,400	96.60	87.33	45.31	42.6	2.132	2.05
1955	11,800	27,200	104.90	95.70	47.0	44.1	2.232	2.17
1956	13,300	34,400	112.07	100.95	47.1	43.7	2.377	2.31
1957	14,000	32,500	106.22	98.23	43.8	41.1	2.425	2.39
1958	13,500	28,400	95.40	94.62	39.8	39.1	2.399	2.42
1959	11,100	22,400	108.15	106.25	42.8	42.5	2.526	2.50
1960	12,733	29,600	116.83	114.75	43.69	43.3	2.674	2.65
1961	13,117	27,000	126.29	119.03	44.8	43.6	2.817	2.73
1962	13,350	28,500	129.29	120.98	44.3	42.9	2.920	2.82

* These estimates include all full and part-time wage and salary workers who worked or received pay during the pay period ending nearest the 15th of the month.

TABLE XV

UNITED STATES COPPER MINING - OUTPUT IN TONS COPPER ORE,
VALUE OF COPPER, GOLD, SILVER PRODUCED

Source: U. S. Bureau of Mines

	Tons Copper Ore Annual Rate	Gold Ounces & Value	Silver Ounces & Value	Copper Pounds & Value	Lbs. Cu Recov. Per Ton & Copper Price	Value of Copper, Gold & Silver	Lbs. Copper Equiv. to Total Val. Cu, Gold & Silver
1947-1949	82,875,491	479,589 \$16,785,615	7,785,382 \$7,045,770	1,511,500,640 \$ 314,664,195	18.2 lbs. 20.818¢	\$338,495,580	1,625,975,640
1950	94,585,792	583,205 \$20,412,175	8,389,913 \$7,592,871	1,691,778,098 \$ 358,656,570	17.9 lbs. 21.2¢	\$386,616,616	1,823,876,000
1951	95,494,214	564,471 \$19,756,485	8,362,150 \$7,567,746	1,709,655,673 \$ 413,736,679	17.9 lbs. 24.2¢	\$441,060,910	1,822,566,000
1952	99,947,492	572,882 \$20,050,870	8,197,888 \$7,419,089	1,695,789,296 \$ 410,381,011	17.0 lbs. 24.2¢	\$437,850,970	1,809,300,000
1953	101,064,945	617,712 \$21,619,920	9,163,964 \$8,293,387	1,712,438,757 \$ 493,182,374	16.9 lbs. 28.8¢	\$523,095,681	1,816,305,000
1954	93,654,258	502,091 \$17,573,185	8,073,017 \$7,306,080	1,547,643,795 \$ 459,650,209	16.5 lbs. 29.7¢	\$484,529,474	1,631,412,000
1955	112,549,665	581,421 \$20,349,735	11,527,224 \$10,432,138	1,871,640,306 \$ 701,865,113	16.6 lbs. 37.5¢	\$732,646,986	1,953,725,000
1956	131,775,959	579,617 \$20,286,595	11,512,013 \$10,418,372	2,049,455,804 \$ 856,672,524	15.55 lbs. 41.8¢	\$887,377,491	2,122,912,000
1957	129,715,586	562,234 \$19,678,190	11,097,267 \$10,043,027	2,006,037,881 \$ 593,787,218	15.5 lbs. 29.6¢	\$623,508,435	2,106,447,000
1958	114,824,468	464,051 \$16,241,785	9,182,070 \$ 8,309,773	1,819,464,806 \$ 469,421,918	15.8 lbs. 25.8¢	\$493,973,476	1,914,626,000
1959	103,715,843	367,455 \$12,860,925	6,838,927 \$ 6,189,229	1,533,867,852 \$ 478,566,785	14.8 lbs. 31.2¢	\$497,616,939	1,594,926,200
1960	134,994,082	539,249 \$18,873,715	9,469,133 \$ 8,569,565	1,970,387,781 \$ 630,524,096	14.6 lbs. 32.0¢	\$657,967,376	2,056,147,800
1961	142,721,798	532,215 \$18,627,525	10,385,661 \$ 9,601,544	2,145,224,433 \$ 641,422,000	15.0 lbs. 29.9¢	\$669,651,000	2,239,636,000
1962	150,216,710	483,243 \$16,913,505	10,944,522 \$11,874,806	2,239,326,000 \$ 689,712,408	14.9 lbs. 30.8¢	\$718,500,719	2,332,794,000

Arizona Department of Mineral Resources

August, 1963

ARIZONA

ARIZONA'S PART IN THE ECONOMY OF THE COPPER INDUSTRY

In the last eleven years, Arizona has increased its copper production from 395,719 tons of recoverable copper in the year 1952 to 644,242 tons in the year 1962, or almost 63 percent. The annual tonnage of copper ore has increased from 44,473,000 tons in 1952 to an estimated 78,868,147 tons in 1962, or over 77 percent. New producers have come into the picture during that time, such as Phelps Dodge Corporation's Lavender Pit, Magma Copper Company's San Manuel Mine, Asarco's Silver Bell Mine, Pima Copper Company's Pima Mine, Duval Corporation's Esperanza Mine and Asarco's Mission Unit. In addition, Kennecott Copper Corporation has expanded its Ray Mine by almost 50 percent, and Bagdad Copper Corporation has expanded its operations by the construction of an acid plant and leaching plant to treat its oxidized ores.

As a result of this new production, Arizona has not only maintained its rank as the Number One copper producing state, but has raised its proportion of United States production from 44.2 percent in 1952 to over 50 percent in the last five years. In other words, Arizona is producing more copper than all the other states combined. (See Table II).

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* * * * *



MINERAL INDUSTRY SURVEYS

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES



Stewart L. Udall, Secretary

Marling J. Ankeny, Director

Robert W. Geehan, Area Director, Area V
Mineral Resource Office
224 New Customhouse
Denver, Colorado 80202

Area Report

THE MINERAL INDUSTRY OF ARIZONA, 1962

Arizona's mineral production as reported to the Bureau of Mines, United States Department of the Interior, totaled \$474.1 million--an increase of \$48.1 million (11 percent) over that of 1961. Of the total value, metals accounted for 90.2 percent; nonmetals 9.6 percent; and mineral fuels less than 1 percent. Increased output of copper accounted for most of the increase in value. The value of metals production increased \$44.6 million primarily because of the first full year of operation of the Mission Unit operated by American Smelting and Refining Co. (Asarco). Output of copper from the newly installed leach-precipitation facilities at Esperanza, operated by Duval Sulphur & Potash Co., also contributed to the increase. The value of silver, lead, and zinc output increased; lower values were reported for gold, mercury, molybdenum, and uranium ore. Production and value of uranium ore in 1962 was markedly less than in the previous year primarily because of the closing of the Orphan mine in Coconino County caused by the collapse of the ore bin and headframe in December 1961. Although improved metallurgical processing resulted in a higher mill recovery of the molybdenum contained in the ore, the State molybdenum production was down slightly from that of the previous year because of lower grade ores treated.

Sand and gravel output was ranked second in value of mineral commodities produced in the State and accounted for 38 percent of the value of all non-metals produced and 4 percent of the State total value of mineral output. Cement output approximated 1961 production.

Expansions of properties located in the Twin Buttes mining district in the Sierrita Mountains of southern Arizona were planned by Banner Mining Co. and Pima Mining Co., adjoining Asarco, Mission Unit, and by Duval Sulphur & Potash Co. at its property 8 miles to the south.

The Office of Minerals Exploration (OME) executed its first contract in Arizona to assist the Cerbat Mining and Milling Co. of Kingman explore for silver, lead, and zinc in Mohave County. Total cost of the work was estimated at \$49,920 of which the Government's participation was \$24,960.

Prepared by L. P. Larson, Physical Scientist, under the supervision of William H. Kerns, Project Coordinator, Mineral Resource Office, Area V, in cooperation with the Arizona Bureau of Mines, for release July 31, 1963.

TABLE 1.--Mineral production in Arizona^{1/}

Mineral	1961		1962	
	Quantity	Value (thousands)	Quantity	Value (thousands)
Beryllium concentrate-----short tons, gross weight--	8	\$4	1	(2/)
Clays ^{3/} -----thousand short tons--	165	240	138	\$184
Copper (recoverable content of ores, etc.)-----short tons--	587,053	352,232	644,242	396,853
Gem stones-----	(4/)	119	(4/)	120
Gold (recoverable content of ores, etc.)-----troy ounces--	145,959	5,109	137,207	4,802
Iron ore (usable)-----long tons, gross weight--	246	(5/)	(5/)	(5/)
Lead (recoverable content of ores, etc.)-----short tons--	5,937	1,223	6,966	1,282
Lime-----thousand short tons--	167	2,686	174	2,914
Mercury-----76-pound flasks--	148	29	(5/)	(5/)
Molybdenum (content of concentrate)-----thousand pounds--	4,878	6,232	4,412	5,864
Petroleum (crude)-----thousand 42-gallon barrels--	6/73	(5/)	7/43	(5/)
Pumice-----thousand short tons--	745	1,893	756	1,640
Sand and gravel-----do-----	6/17,688	6/16,175	15,579	17,404
Silver (recoverable content of ores, etc.)--thousand troy ounces--	5,120	4,733	5,454	5,917
Stone-----thousand short tons--	3,582	4,626	4,333	6,616
Tungsten ore and concentrate (60-percent WO ₃ basis)---short tons--	-----	-----	15	14
Uranium ore-----do-----	228,225	4,965	143,196	3,047
Vanadium-----do-----	(5/)	(5/)	632	(5/)
Zinc (recoverable content of ores, etc.)-----do-----	29,585	6,804	32,888	7,564
Value of items that cannot be disclosed: Asbestos, cement, clays (bentonite and fire clay), diatomite, feldspar, gypsum, helium, manganese ore and concentrate (1961), mica (scrap), perlite, pyrites, and values indicated by footnote 5-----	-----	6/18,925	-----	19,894
Total-----	-----	6/425,995	-----	474,115

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

^{2/} Less than \$500.

^{3/} Excludes bentonite and fire clay; included with "Value of items that cannot be disclosed."

^{4/} Weight not recorded.

^{5/} Figure withheld to avoid disclosing individual company confidential data.

^{6/} Revised figure.

^{7/} Preliminary figure.

The Federal Bureau of Land Management received patent applications to 33 claims, totaling nearly 5,000 acres of gold placer claims in Maricopa County, from Alaska International Corp.; the Silverton Mining and Milling Co., Inc.; and the Arizona Placer Mining Co., Inc. The three companies held patents on approximately 8,000 acres in the area.

METALS

Arizona continued to lead the Nation in mine production of copper, contributing 52 percent to the U.S. total. Copper output from mines in the State, increasing 10 percent to 644,242 tons, represented 93 percent (\$396.9 million) of total value of metals output and 84 percent of all minerals produced. Beginning in July output was cut back 5 to 10 percent to maintain world stocks at safe levels. In accord with this action, Phelps Dodge Corp. in July, and again in September, voluntarily reduced production by 5 percent. The cutbacks lowered company production to slightly less than 90 percent of rated capacity, the monthly curtailment averaging 2,350 short tons. Inspiration Consolidated Copper Co. also curtailed output, reducing production by 9 percent, or by 400 tons per month. According to the company annual report, curtailment of output reduced the tonnage of ore material mined at the Thornton and Live Oaks pits from 16,500 tons per day to 15,000 tons per day. In Arizona, the primary output totaled 331,121 tons for the first 6 months, whereas, during the second 6 months, production was reduced 5 percent to 313,121.

The 5 leading copper producers furnished 416,754 tons, or 65 percent; the top 15 accounted for 628,307 tons, or 98 percent, of the State total copper output. Of the five leading mines, Phelps Dodge Corp. operated three, supplying 41 percent of the total copper output; San Manuel Division, Magma Copper Co., and Ray Mines Division, Kennecott Copper Corp., each operated one.

Asarco reportedly had prospect-drilled replacement copper ore bodies located in the contact zone northeast of the El Tiro pit, near Silver Bell. According to the company, sufficient ore had been found to justify expanding the pit in that direction.

Banner Mining Co. awarded a contract to Stearns-Roger Manufacturing Co. to erect a 5-ton-per-day pilot plant for recovering copper from low-grade copper oxide lime ores. The plant was to be constructed near the company 1,000-ton-per-day concentrator at Mineral Hill in the Pima mining district, 20 miles south of Tucson. Exploration work was continued in the Helvetia area, 25 miles southeast of the Palo Verde mine.

Production continued throughout the year at the Atlas mine and mill of the B S & K Mining Co. in the Silver Bell mining district, Pima County. Since completing its shaft to a depth of 554 feet in August 1961, the company established four levels and completed 1,200 feet of drifting.

D. M. B. D. Mining Co., Inc., completed constructing a 60-ton selective flotation mill at the Childs-Aldwinkle mine near Mammoth to treat gold-silver-molybdenum-bearing copper ore.

Duval Sulphur & Potash Co. completed installing leach-precipitation facilities at its Esperanza open-pit copper mine, located 33 miles southwest of Tucson in the Pima mining district. The new facilities were designed to handle 1,000 gallons per minute of pregnant copper solution resulting from the leaching of dumps containing sub-milling copper values segregated for this purpose during stripping and mining operations. Production from the leach dumps was to supplement the company output of copper from its 12,000-ton-per-day concentrator. Plant-scale testing of an autogeneous grinding circuit for metallic ores was in progress at the Esperanza mill during the second half of 1962. The results of the tests demonstrated that autogeneous grinding was feasible for certain Arizona porphyry ores.

Duval Sulphur & Potash Co. announced plans to develop and place in production its Mineral Park copper-molybdenum property, located 15 miles northwest of Kingman. Plans for developing this property included removing approximately 23 million tons of overburden and constructing a 12,000-ton-per-day concentrator. Ore from the new mine was to be processed to recover copper and molybdenum concentrates. Cost to complete the project was estimated at \$28 million. Design and construction work commenced late in 1962. Completion and commencement of production was scheduled for late 1964.

Inspiration Consolidated Copper Co. began mining operations at the Christmas mine in August, after completing the 1,600-foot level connecting the main ore body with the McDonald shaft and after installing haulage equipment. At full production, the mine was expected to yield 5,600 tons of copper ore per day on a 5-day-week basis.

At the Inspiration mine the company equipped a large dump for leaching copper. First solutions were placed in December. The new area was to replace old leaching sites showing signs of exhaustion. Plans were made for stripping a low-grade ore deposit in the Thornton pit. Mining equipment was ordered and development begun. Investigations were being made on the feasibility of increasing plant capacity at Inspiration to 20,000 tons of ore per day to treat the additional reserves of low-grade ore in the Thornton pit and in the separate Red Hill mine.

Mine production was resumed at the Magma mine near Superior in February, following a 2-month shutdown resulting from a fire, which broke out December 2, 1961. The fire, presumably caused by spontaneous combustion of splintered and crushed mine timbers, started in an abandoned stope on the 2,900-foot level in a part of the east replacement area. The fire was isolated between the 2,900- and 3,100-foot levels by placing 4-foot concrete bulkheads in all openings leading to the area.

Miami Copper Co. Division, Tennessee Corp., developed an area of the west side of the Copper Cities pit near Miami to reduce the pit slope in this area and increase copper ore reserves.

Gold production in Arizona was 8,752 ounces or 6 percent less than that of the previous year. Most of the gold (86 percent) was recovered as a byproduct of copper ores mined; 13 percent was recovered from complex copper-lead-zinc ores; and the remaining 1 percent was recovered chiefly from ores of silver and gold. Output primarily was by five large companies, producing over 90 percent of the total production.

Cochise County was the leading gold-producing county, followed in order by Pima, Pinal, Yavapai, Greenlee, Gila, Mohave, Yuma, Santa Cruz, and Maricopa Counties.

The dry-land gold dredge, Geraldine, owned by United Placers Industries, Inc., was moved to the Middle Camp placers in the Quartzite district of Yuma County from its previous location near Morristown. The dredge, equipped with a multiple screening machine and four dry-separation machines, reportedly was capable of handling 75 to 100 tons of gravel per hour.

Thirty unpatented gold mining claims on the east slope of Sugar Loaf Mountain, Maricopa County, were optioned by Noble Heck to the Mexico-Pacific Mining Co. Exploration work continued throughout the year.

The value of output of iron ore was five times greater than in 1961. Direct-shipping hematite ore was produced by George B. Smith Chemical Works from the Sally mine in Mohave County and by Ferro-Oxide Research, Inc., from a stockpile in Yavapai County. Arkota Steel Corp. produced magnetite ore from the Omega mine in Pinal County. Sponge iron was produced from pyrite by the Ray Mines Division, Kennecott Copper Corp., at Hayden and from iron oxides obtained in the smelting process by Phelps Dodge Corp. at Douglas. In addition, a small quantity of magnetite ore was shipped by E. M. Seitz from the Margaret Howard mine in Gila County.

The Colorado Fuel and Iron Corp. (CF&I) was granted a 2-year extension of its prospecting permit for 120,000 acres of Fort Apache Indian Reservation lands in Gila and Navajo Counties. The company requested the time extension to permit additional drilling and to study the feasibility of bringing a railroad into the area of the Chediski and Apache iron deposits. The 2-year extension also was needed to determine the feasibility of an iron-beneficiation plant in the area.

Iron King mine (Yavapai County), operated by the Shattuck Denn Mining Corp., was the principal lead producer in the State, with an output of 4,869 tons of lead recovered from lead-zinc ore, as quoted from the company annual report to stockholders. Production from this property represented 70 percent of the State total output. Nash & McFarland, the State second largest producer, operated the Flux mine in Santa Cruz County. B S & K Mining Co., operator of the Atlas mine in Pima County, was ranked third.

Newmont Mining Co. acquired 80.6 percent ownership of Magma Copper Co. through an exchange of stock. Newmont issued three-quarters of a share of new 4-percent cumulative preferred stock of \$100 par value for each Magma share deposited before the deadline date. Newmont previously owned 285,961 shares or 21.5 percent of Magma. Magma was maintained as a separate operating subsidiary.

Phelps Dodge Corp. filed an application with the Federal Power Commission for a license to build a hydroelectric plant in Coconino and Gila Counties. The project called for a 160-foot concrete arch dam (creating a reservoir having a gross capacity of 15,000 acre-ft), a powerhouse with an installed capacity of 2,800 kw, water conduits, and transmission lines. Total cost was estimated at \$6.7 million.

Phelps Dodge Corp. continued underground exploration work throughout 1962 at the Copper Queen mine. According to the company, no new ore bodies were discovered, but the tonnage of new ore developed about equaled the tonnage of ore mined. During the year, the shaft serving the Campbell area was deepened an additional 372 feet, to a total depth of 3,332 feet.

The 25-ton-per-day sponge-iron plant completed at the Douglas smelter in 1961 was operated most of the year. Satisfactory results were obtained and plans were announced to double the plant capacity. This plant made sponge iron from iron oxides produced in the smelting process. The sponge iron was produced for use as a precipitant of copper from solutions obtained from dump leaching operations at Bisbee.

Pima Mining Co. proceeded with expanding the Pima mill south of Tucson from 3,800 to 7,000 tons of ore per day. This mill expansion, planned for completion by October 1963, was to permit the company to treat an additional 18 million tons of proved ore averaging 0.66 percent copper. In addition to mining and milling company ore, Pima continued to mine and mill Banner Mining Co. ore (Daisy mine) from the Pima pit under an agreement signed with Banner in November 1959. Under this agreement Pima was required to mine and mill an annual average of 256,670 tons.

Strong & Harris, Inc., produced high-silica copper ore from an open-pit deposit on the Burro claims in the Cochise district of Cochise County. The ore was trucked to Dragoon for rail shipment to the Asarco smelter at El Paso, Tex., and to the Phelps Dodge Corp. smelter at Douglas.

West Range Mines Co., two-thirds owned by Noranda Mines, Ltd., and one-third by Iso Mines, Ltd., of Toronto, Canada, was active in the Patagonia area. The company reportedly held 87 claims, including 42 claims on which preliminary study and exploration indicated copper mineralization under a leached area; 16 claims considered to have appreciable silver values; and 29 claims containing a brecciated porphyry copper stock in which tested sections averaged 2 percent copper.^{1/}

^{1/} Min. World, v. 24, No. 10, Sept. 1962, p. 67.

Arizona was ranked third in the Nation in output of molybdenum, accounting for approximately 9 percent of the national production. Colorado, the Nation's leading producer of molybdenum, recovered all of its production from processing molybdenum ores, whereas Arizona production along with that of Utah (second largest) was derived as a byproduct in processing copper ores. Six producers contributed to the State production of 4.7 million pounds; a 2-percent decline from the previous year's output.

Duval Sulphur & Potash Co. completed exploring and evaluating the Ithaca Peak copper-molybdenum ore body at Mineral Park near Kingman. Molybdenum production by Duval Sulphur & Potash Co. from the Esperanza mine was down slightly from that of the previous year because of decreased molybdenum content of the ore milled during the year, as reported by the company. Percentage recovery of molybdenum increased; unit production cost remained unchanged from 1961.

In April, Inspiration Consolidated Copper Co. closed the molybdenum recovery unit at the Inspiration mill for major modifications. The alterations were completed in late October. Difficulties in control that had prevented the company from producing a satisfactory product consistently or achieving proper recoveries were eliminated.

Asarco completed construction and placed in operation an addition to its molybdenum recovery unit at the Silver Bell copper concentrator 40 miles northwest of Tucson. Erected under contract by Western Knapp Construction Co., at an estimated cost of \$400,000, the new plant materially increased the production of byproduct molybdenum concentrates from the copper ores of the El Tiro and Oxide pits.

B. O. & W. Mining Co. shipped its first carload of lead-silver ore from Silver Belle-Martinez mine 15 miles northeast of Florence. Since taking over the property, first opened in 1870, the present group sunk a new inclined shaft and constructed a new 100-ton-per-day mill.

Arizona Silver, Inc., started mining and milling silver-lead ore from holdings on the east slope of Mineral Mountain, 18 miles northeast of Florence. Diamond drilling reportedly disclosed mineralization averaging 10 ounces of silver per ton and 18 percent lead.

Because of the dispute over ownership of ore extending beyond the Orphan uranium claim under the Grand Canyon National Park, operations were not immediately resumed following the collapse in December 1961 of the ore bin at the Western Equities, Inc., Orphan mine. This question was resolved by an Act of Congress, Public Law 87-457, on May 28, 1962. Under this legislation, Western Equities was to convey to the United States title to the 20.6-acre Orphan patented claim and also any rights to pursue extra-lateral rights to ore under National Park land. In exchange, Western Equities acquired 25-year rights to mine and remove such ore that could be removed through the existing shaft on the Orphan claim and additional workings beyond the northeast boundary, extending along the dip of the ore body apexing within the claim. Ore extracted from beneath National Park lands was to be subject to royalty payments.

Ores from the Orphan mine were allocated by the Atomic Energy Commission (AEC) to the Tuba City processing plant operated by El Paso Natural Gas Co., successor to Rare Metals Corporation of America. The original AEC contract to purchase uranium oxide concentrate produced at the Tuba City mill expired on March 31, 1962. Upon passage of Public Law 87-457, negotiations were begun on a new contract to provide for processing ores from the Orphan mine and other properties in the area, primarily from Navajo Tribal properties. A new contract was approved on November 19, covering the period of September 30, 1962, through December 31, 1966. Enacting Public Law 87-457 and signing the new purchase contract removed the uncertainties of operations at the Orphan mine; a small quantity of ore broken in 1961 was shipped to the Tuba City mill by the close of the year, and full resumption of operations was expected early in 1963.

NONMETALS

Jaquay Mining Corp. operated the Regal and Chrysotile asbestos mines in the Salt River Canyon district (T. 5 N., R. 17 E.). Selectively mined ore was hand-sorted at the property and shipped to the company asbestos mill at Globe. Processed fiber was sold to the General Services Administration (GSA) at the Globe purchase depot and to out-of-State purchasers.

The halfway mark in the delivery of cement to the Glen Canyon Dam was reached in March when the 1,650,000th barrel was delivered. Since deliveries began in February 1960, 11,600 truck round trips, averaging 385 miles per trip, had been logged. Completion of the dam was scheduled for spring 1964.

The 4-millionth cubic yard of concrete for Glen Canyon was poured in November. When completed, the dam should contain about 5 million cubic yards of concrete.

Output of crude gypsum from mines in two counties rose 3 percent as demand for gypsum products continued to expand. Arizona Gypsum Corp. operated two properties, one in Pinal County near Winkelman and one in Yavapai County near Camp Verde. Output of the two properties was sold uncalcined for agricultural use and as cement retarder. National Gypsum Co. operated a mine near Winkelman and calcined the crude gypsum for use in manufacturing wallboard and lath at the company-owned plant in Phoenix.

Lime used in concentrating copper ores accounted for more than 88 percent of all lime sold or used. Forty-seven percent of this total was produced at copper-company plants. The steel industry was the second largest user. Lime also was used by the construction, food, agricultural, and other industries. Six lime-burning plants were operated during the year, one each in Cochise, Greenlee, Pinal, and Yavapai Counties, and two in Gila County. Natural gas was the main fuel used. Annual capacity of the six plants in operation in Arizona during 1962 was estimated at 214,000 tons.

A small quantity of scrap mica produced by Buckeye Mica Co. at its mica mine in Maricopa County was sold mainly for use as roofing materials.

Production of perlite in Arizona during 1962 increased 3 percent over that of the previous year. Arizona Perlite Roofs, Inc., operated the Adams and Iberri quarries near Superior in Pinal County. Harborlite Corp. operated the Harborlite quarry in the same general area and shipped crude perlite to a company-owned plant at Escondito, Calif. Expanded perlite produced by Supreme Perlite, Inc., at its expanding plant near Phoenix primarily was used as a plaster aggregate, replacing sand. The expanded products also were used for loose fill insulation, concrete aggregate, and soil conditioning.

Arizona led the Nation in the output of pumice and pumicite materials, accounting for more than 33 percent of the national production. Total pumice or pumicite sales from deposits of scoria in Coconino County, volcanic cinders in Cochise, Coconino, Graham, and Yavapai Counties, and pumice in Coconino and Yavapai Counties were 1 percent higher in quantity and 13 percent lower in value than in 1961. Material produced at eight properties was sized and graded for use as concrete admixtures, concrete aggregate, railroad ballast, and other uses.

Renewed activity was reported at the zeolitized volcanic ash deposits being explored by Union Carbide Nuclear Co. Division, Union Carbide Corp., in Graham and Cochise Counties. Company holdings were reported to include 200 claims (4,000 acres) of Federal land in Graham County and 2,560 acres of State land in Cochise County held by State prospecting permits.

Sand and gravel was ranked second in value of all mineral commodities produced in the State. A 12-percent decline in sand and gravel sold and used lowered the State total to 15.6 million tons, valued at \$17.4 million. Commercial and noncommercial sand and gravel each accounted for approximately 50 percent of the production and value. Maricopa County, the center of production activity, had an output of 6.8 million tons, valued at \$6.8 million. Pima County was ranked second with 1.8 million tons, valued at \$1.7 million.

Sand and gravel and stone were used by contractors of Federal Bureau of Public Roads, Arizona State Highway Department, and county highway departments in constructing interstate, State, and county highways throughout the State. A report^{2/} showed that from July 1956 to January 1, 1963, Arizona completed, to full or acceptable standards, 275.7 miles of road, plus 265.7 miles of highway improved to standards adequate for present travel (a total of 541.4 miles open to traffic). Work in progress with interstate funds included 48 miles under construction and 288.3 miles in engineering or right-of-way status, for a total of 336.3 miles. In mileage completed, Arizona was ranked 8th in the Nation; in total underway, it ranked 17th. Arizona's State highway contracting program^{3/} in 1962 included \$2.5 million in State-financed roads, \$15 million under the Federal-Aid Primary and Secondary (ABC), and \$42.5 million

^{2/} Bureau of Public Roads, Quarterly Report on the Federal-Aid Highway Program, Dec. 31, 1962: Press Release BPR 63-10, Feb. 10, 1963.

^{3/} Road Contractors Will Set Record. Eng. News-Record, v. 170, No. 16, Apr. 18, 1963, pp. 21-24.

in interstate highway contracts for a total of \$60 million. Planned for 1963 were \$2.5 million in State-financed roads, \$13 million in ABC contracts, and \$42.5 million in contracts for interstate roads, for a grand total of \$58 million. This total represented a decrease of 13 percent (\$2 million) in ABC contracts, for an overall 3-percent reduction in outlay for road construction in 1963.

MINERAL FUELS

Lawrence Isaac Coal Co. produced less than 1,000 tons of bituminous coal from the Black Mesa coal seam of the Cow Spring No. 3 mine in Coconino County.

Production of petroleum from wells in Apache County was below that of 1961. However, 1962 was the most active year of record for the State for oil exploration with 54 completions. Twice the number of wells was drilled in 1962, as compared with the previous year. The activity, including 41 exploratory and 13 development wells, resulted in 1 oil and 9 infield gas discoveries in Apache County. Much of the development drilling in Pinta Dome field was aimed at locating helium reserves rather than hydrocarbons. Oil activity in the State, primarily exploratory, was confined to three general areas of interest: the northeastern corner of the State flanking existing Pennsylvanian and Mississippian production; the Vernon area, south of the town of St. Johns in southern Apache County; the area around the town of Holbrook in Navajo County, ranging westward into southeastern Coconino County.

Apache County was the most active area in the State, accounting for 31 of the State 54 completions, 18 exploratory, and all 13 development wells. Of the remaining 23 exploratory wells, 17 dry holes were drilled in Navajo County, 3 in Coconino, and 1 each in Yavapai, Pima, and Yuma. Total drilling in the State during the year included 19,762 feet of development and 81,896 feet of exploration drilling for a cumulative total of 101,658 feet.

In administrative action, the Oil and Gas Commission adopted changes in the State production regulations. Most significant of the changes was a proposal to allow the major operator to control production in a field should demand be exceeded. The commissioners also voted favorably urging legislation requiring compulsory unitization in a field if 62.5 percent of the field operators approved unitization.

TABLE XVI

ARIZONA COPPER MINING - OUTPUT IN TONS COPPER ORE,
VALUE OF COPPER, GOLD, SILVER PRODUCED

Source: U. S. Bureau of Mines

	Tons Copper Ore Annual Rate	Gold Ounces & Value	Silver Ounces & Value	Copper Pounds & Value	Lbs. Cu Recov. Per Ton & Copper Price	Value of Copper, Gold & Silver	Lbs. Copper Equiv. to Total Val. Cu, Gold & Silver
1947-1949	38,082,754	79,612 \$2,786,420	2,603,485 \$2,356,154	723,353,767 \$150,588,843	19.0 lbs/ton 20.818¢	\$155,731,417	748,056,267
1950	41,757,037	79,562 \$2,784,670	2,853,375 \$2,582,304	765,334,514 \$162,250,916	18.3 lbs/ton 21.2¢	\$167,617,890	767,000,000
1951	42,784,388	83,521 \$2,923,235	3,087,865 \$2,794,518	775,609,514 \$187,697,501	18.1 lbs/ton 24.2¢	\$193,415,254	799,236,600
1952	44,472,522	83,692 \$2,929,220	2,900,851 \$2,625,270	730,809,903 \$176,855,996	16.4 lbs/ton 24.2¢	\$182,410,486	753,762,300
1953	45,187,838	89,724 \$3,140,340	3,164,255 \$2,863,809	738,404,453 \$211,922,077	16.3 lbs/ton 28.7¢	\$217,926,226	759,324,830
1954	43,072,894	94,648 \$3,312,680	3,380,060 \$3,058,954	714,154,795 \$212,103,976	16.6 lbs/ton 29.7¢	\$218,475,610	735,608,120
1955	52,189,728	105,330 \$3,686,550	3,629,191 \$3,284,418	856,270,850 \$321,101,569	16.4 lbs/ton 37.5¢	\$328,072,537	874,860,100
1956	60,468,580	119,435 \$4,180,225	3,963,579 \$3,587,039	935,039,400 \$390,846,469	15.5 lbs/ton 41.8¢	\$398,613,733	953,621,100
1957	59,571,834	123,375 \$4,318,125	4,088,618 \$3,700,200	947,840,100 \$280,560,670	15.9 lbs/ton 29.6¢	\$288,579,000	975,720,000
1958	56,255,809	114,262 \$3,999,170	3,543,044 \$3,206,455	913,973,800 \$235,805,240	16.2 lbs/ton 25.8¢	\$243,010,865	941,903,000
1959	53,121,545	96,153 \$3,365,355	2,724,701 \$2,465,854	803,087,000 \$250,563,144	15.1 lbs/ton 31.2¢	\$256,394,353	821,777,000
1960	66,032,439	115,602 \$4,046,070	3,689,622 \$3,339,108	993,370,700 \$317,878,624	15.0 lbs/ton 32.0¢	\$325,263,802	1,016,449,300
1961	71,918,991	129,184 \$4,521,440	4,380,458 \$4,049,733	1,092,360,900 \$326,616,000	15.2 lbs/ton 29.9¢	\$335,187,173	1,121,030,000
1962	78,868,147	117,362 \$4,107,670	4,571,370 \$4,959,936	1,200,945,700 369,891,276	15.2 lbs/ton 30.8¢	\$378,958,882	1,230,386,000

ARIZONA MINE PRODUCTION OF COPPER, LEAD, ZINC, GOLD AND SILVER

Source: U. S. B. M.

	GOLD		SILVER		
	Ounces	Value (thousands)	Ounces	Value (thousands)	TOTAL VALUE
1858-1961	12,739,697	\$ 333,385	364,433,656	\$ 282,298	\$ 8,021,840,000
1962 Only	137,207	4,802	5,453,585	5,917	416,418,000
Total 1858-1962	12,876,904	\$ 338,187	369,887,241	\$ 288,215	\$ 8,438,258,000
Avg. Price		\$ 26.263		\$ 0.7792	

First year of reported production: Gold & Silver-1858, Copper-1874, Lead-1894, Zinc-1905.

TABLE XVIII

MINE PRODUCTION OF GOLD, SILVER, COPPER, LEAD AND ZINC IN ARIZONA IN THE YEAR 1962

BY CLASS OF ORE IN TERMS OF RECOVERABLE METALS

Source: U.S.B.M. Final Figures

	Number of mines ^{1/}	Material sold or treated (short tons)	Gold (troy ounces)	Silver (troy ounces)	Copper (pounds)	Lead (pounds)	Zinc (pounds)
Lode ore:							
Dry gold -----	5	1,725	75	328	51,700	-----	-----
Dry gold-silver -----	6	107,082	338	8,502	1,742,600	-----	-----
Dry silver -----	13	31,565	1	10,999	261,300	-----	-----
Total	24	140,372	414	19,829	2,055,600	-----	-----
Copper-----	41	78,868,147	117,362	4,571,370	1,200,945,700	1,200	577,900
Copper-lead-zinc -----	1	900	287	6,798	9,800	54,800	12,100
Copper-zinc -----	3	173,766	138	56,475	10,472,700	28,700	22,129,800
Lead -----	7	2,281	32	7,388	14,500	237,100	27,500
Lead-zinc -----	4	290,733	17,954	760,351	810,000	13,512,300	37,994,900
Zinc -----	1	19,435	6	9,882	42,700	97,900	5,030,500
Total -----	56	79,355,262	135,779	5,412,264	1,212,295,400	13,932,000	65,772,700
Other "lode" material: --							
Gold tailings and							
gold-silver tailings --	2	22,706	931	15,449	56,700	-----	-----
Copper cleanup -----	(2/)	386	25	382	103,100	-----	-----
Copper precipitates -----	12	54,127	-----	-----	73,215,900	-----	-----
Copper tailings -----	1	10,000	-----	1,930	123,200	-----	-----
Uranium ore -----	-----	-----	-----	3,727	634,100	-----	3,300
Total	15	87,219	956	21,488	74,133,000	-----	3,300
Total "lode" material -	83	79,582,853	137,149	5,453,581	1,288,484,000	13,932,000	65,776,000
Gravel (placer operations)	5	-----	58	4	-----	-----	-----
Total, all sources	88	79,582,853	137,207	5,453,585	1,288,484,000	13,932,000	65,776,000

^{1/} Detail will not necessarily add to totals because same mines produce more than 1 class of material.^{2/} From properties not classed as mines.

TABLE XIX

COPPER PRODUCTION RECORD OF LARGE ARIZONA COPPER MINES
YEARS 1961 and 1962

Source: U.S.B.M. & Company Reports

MINE	1961		1962	
	Tons Copper Ore Mined	Pounds Copper Recovered	Tons Copper Ore Mined	Pounds Copper Recovered
PHELPS DODGE:				
Morenci	16,286,000	222,886,000	16,983,000	242,604,000
New Cornelia	9,358,000	140,668,000	9,648,000	142,016,000
Lavender Pit	4,928,000	79,170,000	5,374,000	83,563,000
Copper Queen	595,000	60,796,000	618,000	61,484,000
Sub-Total	31,167,000	503,520,000	32,623,000	529,672,000
Kennecott - Ray	7,428,104	128,722,000	7,695,757	132,950,000
MIAMI:				
Miami		19,102,143		18,077,492
Copper Cities	3,137,253	34,672,592	3,150,952	33,827,784
			Copper Cities Dump Leach	175,661
Castle Dome		5,397,242		5,505,398
Sub-Total	3,137,253	59,171,977	3,150,952	57,586,335
INSPIRATION	4,847,164	78,330,640	5,552,219	104,581,211
MAGMA:				
San Manuel	12,529,243	165,223,023	12,565,545	168,416,024
Superior	410,958	41,521,458	337,618	29,825,874
Sub-Total	12,940,201	206,744,481	12,903,163	198,241,898
A.S. & R. CO:				
Silver Bell	2,686,800	45,400,000	2,760,600	42,932,700
Mission Unit	2,198,600	29,840,000	5,223,500	80,510,800
Sub-Total	4,885,400	75,240,000	7,984,100	123,443,500
Pima Mining Co. Pima	1,398,367	33,230,008	1,528,556	40,769,270
Bagdad Copper Corp.	1,766,418	21,161,047	1,990,910	22,762,100
Duval - Esperanza	4,188,775	48,484,348	4,130,149	44,542,483
			Precipitate Copper from leaching	1,406,189
Sub-Total	4,188,775	48,484,348	4,130,149	45,948,672
Banner Mining Co:				
Palo Verde,				
Mineral Hill & Daisy	158,791	6,773,538	256,600	7,336,193
TOTALS	71,917,473	1,160,996,039	77,815,406	1,263,291,179

TABLE XX

MINERAL PRODUCTION OF LARGE AND SMALL PRODUCERS IN ARIZONA IN 1962 ^{1/}

Source: U.S.B.M. Area Report for Arizona, 1962

LARGE COPPER PRODUCERS:*		PRODUCTION	VALUE
Copper (lbs)	1,263,291,179		\$ 389,094,000
Gold (ozs.)	117,362		4,107,670
Silver (ozs.)	4,571,370		4,959,936
Molybdenum (lbs.) (content of concentrate)	4,412,000		5,864,000
Total Value of Large Mine Production in 1962			\$ 404,025,606
SMALL MINERAL PRODUCERS:			
Beryllium concentrate ... short tons, gross weight ..	1		(2/)
Clays ^{3/}	138	\$	184,000
Copper (recoverable content of ores etc.) lbs.....	25,192,821		7,759,000
Gem stones	(4/)		120,000
Gold (recoverable content of ores etc.) troy ounces	19,845		694,330
Iron ore (usable) .. long tons, gross weight	(5/)		(5/)
Lead (recoverable content of ores etc.) short tons	6,966		1,282,000
Lime	174		2,914,000
Mercury	76-pound flasks	(5/)	(5/)
Petroleum (crude)	thousand 42-gallon barrels	(7/)	(5/)
Pumice	thousand short tons	756	1,640,000
Sand and Gravel .	thousand short tons	15,579	17,404,000
Silver (recoverable content of ores etc.) troy ounces	882,630		957,064
Stone	thousand short tons	4,333	6,616,000
Tungsten ore and concentrate (60 % WO ₃ basis) short tons	15		14,000
Uranium ore	short tons	143,196	3,047,000
Vanadium	short tons	632	(5/)
Zinc ..(recoverable content of ores etc)	32,888		7,564,000
Value of items that cannot be disclosed: Asbestos cement, clays (bentonite and fire clay), diatomite, feldspar, gypsum, helium, mica (scrap), perlite, pyrites, and values indicated by footnote 5/			19,894,000
Total Value of Small Mine Production ^{6/}			\$ 70,089,394
GRAND TOTAL VALUE OF MINERAL PRODUCTION			\$ 474,115,000
PERCENTAGE DUE TO SMALL MINES			14.78%

* Phelps Dodge, Kennecott, Inspiration, Miami, Magma (incl. San Manuel)
Asarco's Silver Bell, Pima, Bagdad, Duval's Esperanza, Asarco's
Mission Unit, Banner Mining Co.

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

^{2/} Less than \$500.

^{3/} Excludes bentonite and fire clay; included with "Value of items that cannot
be disclosed."

^{4/} Weight not recorded.

^{5/} Figure withheld to avoid disclosing individual company confidential data.

^{6/} Revised figure.

^{7/} Preliminary figure.

TABLE XXI

SUMMARY OF TOTAL COVERED EMPLOYMENT & WAGES IN ARIZONA COPPER MINING
1947-1962 INCLUSIVE

Source: Arizona Employment Security Commission
United States Bureau of Mines

COPPER MINING	No. Covered Employees	Covered Wages	Average Annual Wage	Tons Copper Ores	Average Weekly Wage
1947	11,340	\$ 36,365,277	\$ 3,207	37,810,448	\$ 61.67
1948	11,493	41,318,524	3,595	39,072,204	69.13
1949	11,001	40,612,224	3,692	37,365,611	71.00
1950	10,181	41,994,321	4,125	41,757,273	79.33
1951	10,754	47,825,693	4,447	42,784,388	85.52
1952	11,365	54,950,235	4,835	44,472,522	93.14
1953	12,068	62,742,982	5,199	45,187,838	99.98
1954	12,502	65,518,353	5,241	43,072,894	100.79
1955	12,399	71,293,263	5,750	52,189,728	110.58
1956	14,008	83,568,996	5,966	60,468,580	114.73
1957	14,652	85,125,320	5,809	59,571,834	111.71
1958	14,100	74,726,972	5,300	56,255,809	101.93
1959	11,568	72,095,130	6,232	53,121,545	119.85
1960	13,764	90,312,843	6,562	66,032,439	126.19
1961	14,275	97,271,236	6,814	72,000,000	131.04
1962	14,408	101,920,103	7,074	78,868,147	136.04

TABLE XXII
AVERAGE NUMBER OF COVERED EMPLOYEES, TOTAL WAGES, AVERAGE ANNUAL WAGE, AND AVERAGE WEEKLY WAGE
 Base period 1947-49, 1960, 1961 and 1962
 Arizona Covered Industry

Compiled by Department of Mineral Resources
 Source: Arizona Employment Security Commission

	Average No. of <u>1/</u> Employees	Total Wages	Average Annual Wage	Average Weekly Wage	Average No. of <u>1/</u> Employees	Total Wages	Average Annual Wage	Average Weekly Wage
		Base Period	1947 - 1949			Year 1960		
Copper Mining Only <u>3/</u>	11,278	\$ 39,432,008	\$ 3,496	\$ 67.23	13,764	\$ 90,312,848	\$ 6,562	\$126.19
All Mining & Quarrying	12,870	44,345,018	3,446	66.27	15,837	102,175,093	6,452	124.08
Smelting <u>2/</u>	1,500	5,175,000	3,450	66.35	1,033	5,995,780	5,804	111.62
All Mining, Quar., & Smelting	14,370	49,520,018	3,446	66.27	16,870	108,170,873	6,412	123.31
Manufacturing (Excl. Smelting)	12,639	36,910,624	2,920	56.15	46,470	265,799,784	5,720	110.00
Construction	10,844	35,424,826	3,267	62.83	32,174	200,203,313	6,223	119.67
Transp. & Utilities (Excl. RR's)	10,530	29,948,944	2,844	54.69	19,906	106,302,227	5,340	102.69
Wholesale-Retail Trade	36,213	91,916,860	2,538	48.81	74,423	291,911,971	3,922	75.42
Services & Misc. (Incl. Agri.)	18,643	43,103,526	2,312	44.46	47,190	187,753,626	3,979	76.52
Totals and Averages	103,239	\$286,824,898	\$ 2,778	\$ 53.42	237,033	\$1,160,141,794	\$ 4,894	\$ 94.12
		Year 1961				Year 1962		
Copper Mining Only <u>3/</u>	14,275	\$ 97,271,286	\$ 6,814	\$131.04	14,408	\$ 101,920,108	\$ 7,074	\$136.04
All Mining & Quarrying	16,178	107,813,787	6,664	128.15	15,988	110,647,421	6,921	133.10
Smelting <u>2/</u>	965	5,923,749	6,139	118.05	988	6,639,024	6,720	129.23
All Mining, Quar., & Smelting	17,143	113,737,536	6,635	127.60	16,976	117,286,445	6,909	132.87
Manufacturing (Excl. Smelting)	48,865	289,083,011	5,916	113.77	52,811	321,603,378	6,090	117.12
Construction	31,233	209,974,317	6,723	129.30	31,348	229,040,530	7,306	140.50
Transp. & Utilities (Excl. RR's)	20,147	111,590,519	5,539	106.52	20,544	118,785,459	5,782	111.19
Wholesale-Retail Trade	77,471	309,450,570	3,994	76.81	81,289	334,681,623	4,117	79.17
Services & Misc. (Incl. Agri.)	52,451	214,534,813	4,090	78.66	56,702	238,801,787	4,212	81.00
Totals and Averages	247,300	\$1,248,370,766	\$ 5,048	\$ 97.08	259,670	\$1,360,199,222	\$ 5,238	\$100.73

1/ This number includes all covered employees on payroll, and is not restricted to production workers only, on which the average hourly and weekly earnings are reported. 2/ Smelting employment has been segregated from Manufacturing as reported by the Employment Security Commission. 3/ This number includes all copper mining and milling employees and some copper smelting employees not reported under Manufacturing by the Employment Security Commission.

Note: Fringe benefits are not included in the total wages.