

THE

COPPER

INDUSTRY

STATISTICS FOR 1971 COMPARED WITH OTHER YEARS

ARIZONA, THE UNITED STATES, AND THE WORLD

COMPILED BY THE ARIZONA DEPARTMENT OF MINERAL RESOURCES

FAIRGROUNDS

PHOENIX, ARIZONA

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FEBRUARY, 1973

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Complied by: Arizona Department of Mineral Resources

E R R A T A (Underlined)

<u>Page</u>	<u>Line</u>	<u>Should read in part</u>
23	3rd line of title	1965 - 19 <u>71</u>
28	1st paragraph, 4th line,	production, \$852,978, <u>000</u> , was....
	3rd paragraph, 3rd line,pounds in 197 <u>0</u> , 14.1.....
42	column headings	should read Value in thousands

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C O P P E R

Symbol, Cu. Atomic Weight, 63.54. Specific Gravity, 8.96. Valence, 1 & 2. Melting Point, 1981° F. Boiling Point, 4703° F. Electrical Resistivity, 1.682 Microhms/cm at 20° F. Tensile Strength, H.D. - 60,000 #/sq. in.; annealed - 30,000. Crystallizes in the isometric system.

Copper ranks next to iron as a metal of commercial importance. Its high electrical conductivity, 94 per cent of that of silver, high ductility and availability, make it the most important metal in the electrical field. The conductivity of aluminum is only 61 per cent of that of copper; and that of iron is only 17 per cent. Copper is easily drawn into wires or formed into sheets of desired sizes, including very fine, or thin. It is insoluble in water; soluble in nitric and hot sulphuric acids; slightly soluble in hydrochloric acid and ammonium hydroxide; and has great resistance to weathering. It is widely used in brass, alloyed with zinc; and is alloyed with tin to form bronze. It has excellent thermal conductivity also, and therefore is used extensively in heat exchangers such as car radiators, refrigeration coils and condensers of many types and uses. The long life of copper is illustrated by the large recovery as scrap after it has outlived its original use. In the 5-year period 1965 to 1969, the amounts of secondary copper produced in the United States from scrap copper or copper alloys averaged 99 per cent of the domestic mine output. Copper minerals, more commonly chalcopyrite, chalcocite, bornite, covellite, chrysocolla, malachite, azurite, cuprite and native copper, occur as minor - most frequently very minor - constituents of various kinds of rock in very irregular areas of material which can be economically extracted and processed as "ore". The copper minerals in the ore may be concentrated by hydro-metallurgy and either ore or concentrate may be processed chemically if feasible, or by pyro-metallurgy, or by both, to separate the copper from its minerals. The product may require refining, which may be done by a furnace process but most often is done electrically, thereby producing cathode copper which must be at least 99.9 per cent pure, any silver present being counted as copper. Fire refined copper is used for cast and wrought products and some alloys, and is allowed to be very slightly less pure. The refineries may cast the refined metal into wire bars or other shapes for fabrication or may ship the heavy cathodes without remelting.

The Copper Industry in 1971

The World Copper Industry, An Overview for 1971

The World produced more newly mined copper in 1971 than in any previous year, however, due mainly to labor strikes which affected the United States copper mining industry, the United States and Arizona production of copper fell below the 1970 record production. The domestic copper producer's price throughout 1971 was the most stable since 1967. The U. S. producers wirebar price opened the year at 52.6 cents a pound, fell to 49.8 by mid January, rose to 52.3 by the end of April, was suspended during the July strike and fell to 49.7 by year end. The London Metal Exchange cash price remained below the U. S. producers price throughout the year except during the last two weeks of March and throughout April.

World mine production of copper rose slightly in 1971, according to United States Bureau of Mines estimates. The rise in World production was only 0.5 percent and was accounted for mostly by estimates of increased output from Poland and the U.S.S.R. Free World mine production fell by 0.9 percent from 1970. The United State's output was 197,474 tons short of its 1970 output largely due to a midyear industry wide strike which occurred in spite of the predictions that no strike would occur. In most instances operations resumed in about a month, although some were suspended a surprisingly long time while local issues remained in deadlock. W. Harmon, corporate economist of the Copper Range Company, writing for E/MJ, March 1971, estimated that U. S. copper production lost due to strikes probably exceeded 250,000 tons.

In Zambia, production fell by nearly 27,000 tons adding further to lost production from the Mufulira mine following the major accident there in September, 1970.

Copper production in Chile during 1971 was little changed from the 783,391 tons reported for 1970, despite the addition of approximately 150,000 tons of effective new capacity installed late in 1970 and early in 1971. In comparison with Chilean government forecasts, production fell short by about 300,000 tons. Political obstructions are believed to be responsible for curtailed operations at new and established facilities. The Chilean government attributes the production deficiency to such factors as an inadequate provision of water supply, unsatisfactory training and technological transfer and faulty equipment. Other sources, however, attribute the shortage to the mass exodus from Chile of repatriates and Chilean nationals holding management and supervisory positions, as well as labor's resentment of the government's intervention in the mines. The situation in Chile contrasts sharply with the relatively steady flow of copper from Zaire (formerly the Congo-Kinshasa) and Zambia during the turbulent days of their political transitions in the 1960's.

Canada's increasing production reached 719,900 tons for 1971 and established that country as the world's third largest producer of copper, displacing Zambia. Of the ten largest world producers of copper, seven showed an increase in production in 1971. The United States, Zambia and Peru each showed a decrease in production in 1971. The ten largest world copper producers (with their percentage of world production) are: United States, 22.8%; Chile, 11.9%; Canada, 10.8%; Zambia, 10.8%; U.S.S.R. (estimated), 10.2%; Zaire, 6.7%; Peru, 3.5%; Philippines, 3.4%; Australia, 2.9% and Republic of South Africa, 2.6%.

Antipollution measures were an important factor restricting the supply of copper. Special interest groups have lobbied strongly in favor of stringent controls on sulfur dioxide emissions from copper smelters. Domestic producers contend they can comply with ambient air standards that would safeguard public health, by controlling all converter gases within the time period allotted by the federal government. However, with the present technology and cost structure there is no method by which all existing smelters can economically recover up to 90% of the total sulfur contained in the smelter feed. Considerable time and funds have been and are being committed toward the development of non-pyrometallurgical methods of reducing copper ore. There have been proposals to tax producers in 1¢ increments, until the aggregate reaches 10¢ per pound of emitted sulfur in 1976. Where restrictive measures have been enacted, smelters often are required to cutback their activity during adverse climatic conditions. In the course of 1971, it is estimated that U. S. smelter losses from curtailments in smelter feed have probably totaled about 120,000 tons.

In 1971, strikes, attempts taken to restrain inflation and international monetary disorders ultimately contributed to a growing inventory of semi-processed copper. This was most in evidence in the U. S. and Japan. In the U.S. where smelter capacity was already being curtailed by state laws, the extended strike caused a build-up of precipitate copper and concentrates from mines still in production. When the workers returned, the large backlog of smelter feed resulted in a reduction of the work week and substantial layoffs of mine personnel at several mining operations. The prolonged dock strike removed whatever opportunity existed to send the semi-processed copper ore overseas for further treatment. Japan, due to the sluggish economy, pollution problems and the

resultant surplus of copper concentrates, has been very reluctant to accept additional material thereby resulting in additional loss of refined copper production.

Although predictions were that large increases in refined copper inventories would result in 1971, such predictions were not realized due to many of the previously mentioned production curtailments, however, a considerable increase of approximately 70,000 tons was recorded by the London Metal Exchange (LME), which served as the major depressant on LME prices. Most of the 150,000 tons of copper held in LME warehouses at year end 1971 was under consignment and could be quickly absorbed by a surge in demand.

Copper consumers showed little interest in maintaining large inventories of refined copper due to prospects of expanding producer capacity and sluggish demand. It is felt that the shortfall in industrial activity kept the demand for copper pretty flat. Automotive and construction uses were strong all year, but business conditions in other applications failed to respond to fiscal and other economic inducements. Much of this has been attributed to uncertainties inherent in the wage and price controls imposed in mid summer 1971 and to the international monetary setback. Outside the U.S., the consumption of copper was restrained by efforts of the affluent nations to cope with accelerating inflation. Copper shipments to Communist countries during 1971 were running behind the 1970 pace, but, by early 1972, there were solid prospects of increased purchases by China and Russia, from Chile, Peru and Zambia.

The costs of producing copper everywhere in the Free World are increasing. In the U. S. anti-pollution controls enacted by many states will reportedly add another 2-5¢ per pound to producer costs in the next two years. As now envisioned, this additional cost will not of itself contribute to any measurable

increase in production. To this increment must be added another 3-4¢ per pound which will result from the three year labor pact concluded in late summer 1971. With decreasing grades of ore, governmental intervention, wage increases, etc., production costs of many Free World mines have risen in the last few years to the point where, in 1971, they were approaching prevailing prices. In this regard a sharp increase in labor productivity would safeguard the longevity of some soon to be marginal operations and, therefore, employment.

In addition to the temporary decrease in productivity, the expropriation of the large foreign mines in Chile has undermined the confidence on which all international contracts are based and will have far reaching repercussions on the world investment community. The termination of copper leases by Peru is of similar character. Companies, financial institutions and governments will need to develop global programs that will protect their investments, particularly in high risk situations. With or without such measures it appears that the character of the international mining company, as we know it today, will in time change.

The predominant factor in the near future outlook for the copper industry is the expected increase in supply arising from new capacity. Altogether, approximately 600,000 tons of new capacity are scheduled to come on stream at different times in 1972. The output produced therefrom will probably be considerably less than the maximum capability due to staggered entry of facilities, installation delays, postponements and start up difficulties. These additions to supply were expected to pose a continuing problem to sales, prices and profits for the near future, however, many of the problems existing in 1971 that suppressed production may continue into 1972. Therefore, it would seem that the copper industry must look to world economic recovery to absorb the expected increase in production and to avoid any further decrease in prices through 1972.

The United States Copper Industry, A Statistical Review for 1971

The United States produced 1,522,183 tons of newly mined copper in 1971, a decrease of 11.5 percent from the 1970 production of 1,719,657 tons, but more than any year prior to 1970. Arizona, in 1971, again produced more than all of the other states combined; 53.9 percent of the total. Utah was second with 17.3 percent followed by New Mexico, 10.3%, Nevada, 6.4%, Montana, 5.8%. None of the top thirteen copper producing states established production records in 1971, although the production of Colorado, Idaho and Pennsylvania exceeded their non-record 1970 production.

United States mine production includes copper recovered from copper ores, from ores in which other metals predominate and from precipitates from leaching of dumps or rock in place. The tonnage of copper ores mined in 1971 was 242,655,000 short tons and it yielded 88 percent of the domestic mine production of copper, 1,338,784 tons, or 11.0 pounds of copper per ton of ore. Arizona led in ore tonnage, followed by Utah, New Mexico, Montana, Nevada, Michigan and others. Of the top copper ore producing states, Michigan and New Mexico produced the highest grade ore containing 16.2 and 14.2 pounds of copper per ton, respectively, as compared to 9.8 pounds per ton for Arizona ore. Open pit copper mines were the source of 88 percent of the copper ores.

Domestic recovery of secondary copper consisted of 429,095 tons recovered from scrap as unalloyed copper and 771,025 tons recovered in alloys, making a total of 1,200,120 tons in 1971. The total amounts of 79 percent of the year's domestic mine output of copper, compared with 73 percent in 1970. Sixty three percent of the 1971 secondary copper was credited to "new scrap" and 37 percent to "old scrap." "New scrap" consists of cuttings from new copper material or alloys which are re-melted and re-cast into usable forms.

1971 U. S. mine production plus secondary copper recovered as unalloyed metal, a total of 1,951,278 tons, was 68,229 less than the 1971 U. S. consumption of refined copper. In 1970 the like production total was 161,491 tons greater than the U. S. consumption. U. S. production of secondary unalloyed copper was 43 percent greater in 1971 than the 300,000 tons produced in 1960.

The United States imported 352,020 tons of primary copper in 1971, of which 77 percent came from Chile, Peru and Canada. The total was 9.8 percent below 1970 and the lowest in 21 years. 1971 exports of primary copper amounted to 224,478 tons, 22.7 percent less than in 1970. Nearly two thirds of the copper in ores, concentrates and matte went to Canada. Brazil, Canada, France, West Germany and Italy took 65.9 percent of the refined copper exported. The United States continued to be a net importer of copper to the amount of 127,542 tons or 6.3 percent of the 1971 U. S. consumption. The 1971 net imports of copper were 27.7 percent higher than for 1970, but less than any of the previous eight years.

Producer's stocks of refined copper, blister copper and materials in the process of refining, totaled 378,000 tons at the end of 1971, according to the U. S. Bureau of Mines. This was 19.6 percent more than at the end of 1970. Refined copper stocks outside the United States totaled 371,809 tons at the end of 1971, according to the Copper Institute. This was 16.7 percent above 1970.

The United States consumption of refined copper in 1971 was 2,019,507 tons, 1.1 percent less than in 1970 and 14.4 percent less than the record 2,360,000 tons in 1966. Wire mills in 1971 used 65.6 percent of the domestic total and their consumption of 1,324,894 tons was 1 percent less than in 1970 and 60.3 percent greater than in 1960. Brass mills used 655,782 tons, 32.5 percent of the total, 0.7 percent lower than in 1970 and 36 percent above 1960.

The average number employed in U. S. copper mining in 1971 was 34,700, a decrease of 2,300 from 1970, but more than in any year prior to 1970. The aggregate man hours worked by production workers in 1971 was down almost 9 million from 1970 to 1971's total of nearly 60 million. The decrease is mostly due to the strike which kept many production workers out of work for over a month. The average numbers of tons of ore and pounds of copper produced per man hour of production workers 1971, 4.06 and 50.00 respectively, compared with 1970 averages of 3.76 and 49.13 and with 1947-49 averages of 1.47 and 28.21. Average yearly earnings of the production workers were \$9,280 in 1971, 1.6 percent higher than in 1970 and 2.85 times the average for the 1947-49 period. The only slight increase in annual earnings also reflects lost wages due to the strike. The increase from the 1947-49 period in tons of ore produced per man hour, was 176 percent, and in pounds of copper produced per man hour, was 77 percent. This data is shown in Table XIII.

Although 1971 was not a boom year for the U. S. Copper industry, all of the major U. S. corporations were able to declare stock dividends. The steady price throughout the year tended to lighten much of the pessimism caused by predictions of a large oversupply of copper.

Exploration for copper slowed somewhat in the United States in 1971 as a result of predictions of large over supplies, however, most major copper companies were active in exploration, spurred by U. S. Bureau of Mines prediction of U. S. need of nearly 6.3 million tons of newly mined copper by the year 2000.

TABLE I
SALIENT COPPER STATISTICS 1/

Mine Production	Short Tons		
	1969	1970	1971
Arizona	801,363	917,918	820,171
United States	1,544,579	1,719,657	1,522,183
World	6,224,760	6,634,451	6,665,124
<u>Primary Refined Stocks at U. S. Refineries a/</u>			
Beginning of Year	48,000	39,000	130,000
End of Year	39,000	130,000	75,000
<u>Primary Refined Prod. of U.S. Refineries</u>			
From Domestic Ores	1,468,889	1,521,183	1,410,523
From Foreign Ores, Matte, etc. a/	273,926	243,911	181,259
Total	1,742,815	1,765,094	1,591,782
<u>Secondary Copper Produced from Scrap</u>			
Recovered as Unalloyed Copper	514,593	521,137	429,095
Recovered in Alloys b/	860,900	726,465	771,025
Total Secondary Copper	1,375,493	1,247,602	1,200,120
<u>Imports:</u>			
Copper in Ores, Concentrates, Matte	39,048	33,841-	31,288
Copper in Blister	237,949	224,416	156,744
Refined Copper a/	131,171	132,143	163,988
Total Imports	408,168	390,400	352,020
<u>Exports:</u>			
Copper in Ores, Concs., Matte, Blister	5,517	69,343	36,824
Refined Copper a/	200,269	221,211	187,654
Total Exports	205,786	290,554	224,478
<u>Excess of Imports Over Exports</u>	202,382	99,846	127,542
<u>Consumption:</u>			
New Refined (Apparent Consumption)	1,682,717	1,585,026	1,623,000 d/
Total Refined (Actual Consumption)	2,142,218	2,043,303	2,019,507
<u>U. S. Mine Production</u>			
Per Cent of Apparent Consumption	91.8	108.5	93.8
<u>Average Price of Copper c/</u>	47.53¢	57.7¢ e/	51.43¢

1/ U. S. Bureau of Mines; American Bureau Metal Statistics.

a/ May include some from scrap.

b/ Includes copper in chemicals: 1969 - 3,824; 1970 - 2,525; and 1971 - 2,525.

c/ "Electrolytic copper, domestic refineries, on Atlantic Seaboard".
Source: E/MJ.

d/ U. S. Bureau of Mines data rounded to nearest thousand short tons in 1971.

e/ Based on known production and selling rates.

TABLE II

MINE PRODUCTION OF RECOVERABLE COPPER IN THE UNITED STATES 1/

(In short tons)

STATE	1969	1970	1971	RANK IN 1971
Arizona	801,363	917,918	820,171	1
California	1,129	2,308	515	13
Colorado	3,598	3,749	3,938	9
Idaho	3,332	3,612	3,776	10
Maine	1,320	2,703	2,510	12
Michigan	75,226	67,543	56,005	6
Missouri	12,664	12,134	8,445	8
Montana	103,314	120,412	88,581	5
Nevada	104,924	106,688	96,928	4
New Mexico	119,956	166,278	157,419	3
Pennsylvania	3,382	2,539	3,349	11
Tennessee	15,353	15,535	13,916	7
Utah	296,699	295,738	263,451	2
Other States <u>2/</u>	3,621	2,500	3,179	
TOTALS	<u>1,544,579</u>	<u>1,719,657</u>	<u>1,522,183</u>	

1/ Source: U. S. Bureau of Mines.2/ Includes: Alaska, Oklahoma, Oregon, Washington, and Wyoming.

TABLE III

MINE PRODUCTION OF COPPER IN
ARIZONA, THE UNITED STATES, AND THE WORLD
DOMESTIC PRICE OF COPPER a/
 1874 - 1971

Period	ARIZONA			UNITED STATES			WORLD
	Short Tons	% of U.S. Prod.	% of World Prod.	Short Tons	% of World Prod.	Price- ¢ Per Pound	Short Tons
1874- 1911	1,758,000	22.0	9.3	7,989,735 b/	49.1	14.40 c/	16,260,000
1912	182,519	29.2	16.2	624,547	55.5	16.341	1,125,656
1913	203,962	33.0	18.6	617,755	56.2	15.269	1,099,366
1914 1/	196,509	34.2	19.0	574,216	55.5	13.602	1,034,487
1915 1/	229,986	30.9	19.6	744,036	63.4	17.275	1,173,150
1916 1/	360,917	36.0	23.2	1,002,938	64.6	27.202	1,553,498
1917 1/	356,083	37.6	22.2	947,717	59.1	27.180	1,602,914
1918 1/	382,428	40.0	24.2	955,011	60.5	24.628	1,579,246
1919	269,050	44.4	24.6	606,167	55.3	18.691	1,095,697
1920	279,128	45.6	26.4	612,275	58.0	17.456	1,056,014
1921 2/	92,517	39.7	15.1	233,095	38.0	12.502	613,987
1912- 1921	2,553,099	36.9	21.4	6,917,757	58.0	20.649	11,934,015
1922	200,022	41.5	21.4	482,292	48.2	13.382	935,374
1923	309,464	41.9	22.8	738,870	54.5	14.421	1,355,327
1924	338,876	42.2	23.0	803,083	54.5	13.024	1,472,712
1925	356,678	42.5	22.6	839,059	53.2	14.042	1,576,998
1926	361,648	41.9	22.7	862,638	54.0	13.795	1,596,147
1927	341,095	41.3	20.5	824,980	49.5	12.920	1,666,694
1928	366,138	40.5	19.2	904,898	47.5	14.570	1,903,672
1929	415,314	41.6	19.3	997,555	46.4	18.107	2,150,587
1930 3/	288,095	40.9	16.2	705,074	39.7	12.982	1,775,805
1931 3/	200,672	37.9	13.0	528,875	34.2	8.116	1,545,425
1922- 1931	3,178,002	41.3	19.8	7,687,324	48.1	13.902	15,978,741

Source: Mineral Resources of the U.S., U.S. Geological Survey (Years 1882-1923), U.S. Bur. Mines (Years 1923-1931); Minerals Yearbooks and other reports, U.S. Bur. Mines (Years 1932-1969); Ariz. Bur. Mines Bull. 140 (1936).

a/ Annual average prices as reported by E/MJ. Decade averages are calculated from reported annual tonnages and values.

b/ Smelter production from domestic ores.

c/ Average price for Arizona copper only, calculated from total of values reported or estimated by sources, amounting to \$506,283,000.

1/, 2/, 3/ See page 14

TABLE III (Continued)

Period	ARIZONA			UNITED STATES			WORLD
	Short Tons	% of U.S. Prod.	% of World Prod.	Short Tons	% of World Prod.	Price- ¢ Per Pound	
1932 <u>3/</u>	91,246	38.3	8.0	238,111	20.9	5.555	1,138,676
1933 <u>3/</u>	57,021	29.9	4.9	190,643	16.4	7.025	1,159,000
1934 <u>3/</u>	89,041	37.5	6.3	237,401	16.8	8.428	1,415,353
1935 <u>3/</u>	139,015	36.0	8.4	386,491	23.5	8.649	1,647,939
1936 <u>3/</u>	211,275	34.4	11.1	614,516	32.4	9.474	1,899,263
1937	288,475	34.3	11.2	841,998	32.8	13.167	2,567,916
1938 <u>4/</u>	210,797	37.8	9.3	557,763	24.5	10.000	2,274,045
1939 <u>5/</u>	262,117	36.0	10.6	728,320	29.4	10.965	2,481,277
1940 <u>5/</u>	281,169	32.0	10.5	878,086	32.7	11.296	2,688,510
1941 <u>5/</u>	326,317	34.1	11.2	958,149	33.0	11.797	2,903,458
1932-							
1941	1,956,473	34.7	9.7	5,631,478	27.9	10.564	20,175,437
1942 <u>5/</u>	393,387	36.4	12.9	1,080,061	35.5	11.775	3,039,041
1943 <u>5/</u>	403,181	37.0	13.2	1,090,818	35.6	11.775	3,064,394
1944 <u>5/</u>	358,303	36.8	12.5	972,549	33.9	11.775	2,866,000
1945	287,203	37.2	12.0	772,894	32.2	11.775	2,400,000
1946	289,223	47.5	14.1	608,737	29.6	13.820	2,056,000
1947	366,218	43.2	14.6	847,563	33.9	20.958	2,500,000
1948 <u>6/</u>	375,121	44.9	14.4	834,813	32.1	22.038	2,600,000
1949 <u>6/</u>	359,010	47.7	14.4	752,750	30.1	19.202	2,500,000
1950 <u>7/</u>	403,301	44.4	14.4	909,343	32.5	21.235	2,760,000
1951 <u>7/</u>	415,870	44.8	14.3	928,330	32.0	24.200	2,900,000
1942-							
1951	3,650,817	41.5	13.7	8,797,858	33.0	17.103	26,685,435
1952 <u>7/</u>	395,719	42.8	13.1	925,359	30.6	24.200	3,020,000
1953 <u>7/</u>	393,525	42.5	12.9	926,448	30.4	28.798	3,050,000
1954 <u>8/</u>	377,927	45.2	12.2	835,472	27.0	29.694	3,100,000
1955	454,105	45.5	13.3	998,570	29.2	37.491	3,420,000
1956	505,908	45.7	13.4	1,104,156	29.1	41.818	3,790,000
1957 <u>9/</u>	515,854	47.5	13.3	1,086,859	27.9	29.576	3,890,000
1958 <u>9/</u>	485,839	49.6	12.9	979,329	25.9	25.764	3,780,000
1959 <u>10/</u>	430,297	52.2	10.7	824,846	20.4	31.182	4,040,000
1960	538,605	49.9	11.6	1,080,169	23.2	32.053	4,650,000
1961	587,053	50.4	12.1	1,165,155	24.0	29.921	4,850,000
1952-							
1961	4,684,832	47.2	12.5	9,926,363	26.4	31.353	37,590,000

3/, 4/, 5/, 6/, 7/, 8/, 9/, 10/ see page 11

TABLE III (Continued)

Period	Arizona			United States			World
	Short Tons	% of U. S. Prod.	% of World Prod.	Short Tons	% of World Prod.	Price ¢ per Pound	Short Tons
1962	644,242	52.4	12.7	1,228,421	24.2	30.600	5,085,000
1963	660,977	54.5	13.0	1,213,166	23.8	30.600	5,088,000
1964	690,988	55.4	13.0	1,246,780	23.5	31.960	5,297,000
1965	703,377	52.0	12.7	1,351,734	24.4	35.017	5,549,000
1966	739,569	51.7	12.8	1,429,152	24.6	36.170	5,800,000
1967 <u>11/</u>	501,741	52.6	9.0	954,064 <u>8/</u>	17.2	38.226*	5,552,000
1968 <u>11/</u>	627,961	52.1	10.4	1,204,621	20.0	41.847**	6,012,000
1969 <u>12/</u>	801,363	51.9	12.9	1,544,579	24.8	47.534	6,225,000 <u>r/</u>
1970 <u>13/</u>	917,918	53.4	13.8	1,719,657	25.9	57.700	6,634,000 <u>r/</u>
1971 <u>14/</u>	820,171	53.9	12.3	1,522,183	22.8	51.433	6,665,000
1962- 1971	7,108,307	53.0	12.3	13,414,357	23.2	40.054	57,907,000
1874- 1971	24,889,171	41.2	13.3	60,365,183	32.4		186,531,000

r Revised

* Based on first 8 months of 1967.

** Based on the last 9 months of 1968.

1/ World War I 1914--19182/ Post World War I Recession (1921). Lasted about one year.3/ Depression began in 1930; was at its worst in 1933; gradually improved to 1937.4/ Recession in 1938. Recovery in 1939 caused by War demand.5/ World War II began in 1939; highest copper consumption in 1944.6/ In 1948 and early 1949, copper was being produced in the U.S. at the rate of 68,000 short tons per month, imports ran 40,000 tons per month of blister and refined copper, exports ran 12,000 tons per month, and the price of copper averaged 22.5 cents.

In March 1949, Congress suspended the copper import tax, and in the ensuing months domestic demand fell drastically while imports continued at practically the same rate. The price dropped to 16½ cents. Many mines were forced to close. Production dropped to 56,000 tons from a high of 78,000.

7/ Korean War 1950-53.8/ Curtailment early in the year (1954), and a series of strikes in August and September caused a loss in production of over 100,000 tons. Consumption in the U. S. was reduced but the reduction was offset by an appreciable rise in consumption in other countries, chiefly in Europe. Result: a short supply of copper at the end of the year.9/ Recession 1957-58. Import tax restored 7/1/58 after 7 year suspension.10/ First U.S. troops killed in Vietnam in mid-1959. Record copper production rate first half of 1959 but 75% of U.S. output halted in August by strikes which lasted into 1960.11/ A major Copper Strike started in the U.S. on July 16, 1967, and ended in March 1968. A loss of 855,000 tons of copper production is estimated as a result of the strike.12/ 1969, Highest annual production in U.S. History.13/ 1970, Highest annual production in U.S. History and supply catches up with demand.14/ A copper strike started in the U.S. on July 1, 1971, and ended in August 1971.

A loss of 250,000 tons of copper production is estimated as a result of the strike

TABLE IV

MINE PRODUCTION OF COPPER - UNITED STATES AND WORLD

UNITED STATES PRODUCTION OF SECONDARY (UNALLOYED) COPPER

WORLD PRODUCTION AND CONSUMPTION OF REFINED COPPER
(Primary and Secondary)
(Short Tons)

Year	MINE PRODUCTION 1/				SECONDARY a/ PRODUCTION
	United States b/	Rest of 4/ Free World	Soviet Sphere e/	World 2/	United States 1/
1960	1,080,169	2,883,731	686,100	4,650,000	300,259
1961	1,165,155	2,911,145	773,700	4,850,000	290,805
1962	1,228,421	2,961,479	895,100	5,085,000	301,374
1963	1,213,166	3,037,175	837,659	5,088,000	314,643
1964	1,246,780	3,153,145	897,075	5,297,000	366,197
1965	1,351,734	3,233,897	963,369	5,549,000	462,811
1966	1,429,152	3,350,221	1,020,627	5,800,000	509,084
1967	1,954,064	3,527,000	1,070,932	5,552,000	423,054
1968	1,204,621	3,654,000	1,153,000	6,012,000	433,041
1969	1,544,579	r3,435,000	1,244,000	r 6,224,000	514,593
1970	1,719,657	r3,623,000	1,291,000 c/	r 6,634,000	521,137
1971	1,522,183	3,817,000	1,326,000 d/	6,665,000	429,095

Year	CONSUMPTION 5/				PRODUCTION 5/
	United States 1/	Rest of 4/ Free World	Soviet e/ Sphere 3/	World 3/	World 3/
1960	1,349,896	2,840,034	839,664	5,029,594	4,720,591
1961	1,462,830	3,033,270	1,038,300	5,534,400	5,671,700
1962	1,599,676	2,922,024	1,091,200	5,612,900	5,793,900
1963	1,744,273	3,061,327	1,147,500	5,953,100	5,917,600
1964	1,825,281	3,525,119	1,174,000	6,524,400	6,391,500
1965	2,004,623	3,504,677	1,231,300	6,740,600	6,787,000
1966	2,359,954	3,414,846	1,300,700	7,075,500	7,011,100
1967	1,935,592	r3,484,100	r 1,375,000	r 6,794,700	r 6,607,500
1968	1,880,300	r3,812,200	r 1,422,100	r 7,120,600	r 7,334,300
1969	2,142,218	r4,135,900	r 1,510,200	r 7,788,300	r 7,904,000
1970	r 2,043,303	r4,283,800	r 1,631,400	r 7,958,500	r 8,303,800
1971	2,019,507	4,211,793	1,699,800	7,931,100	7,994,000

r Revised

1/ U.S. Bur. Mines. a/ Recovered as unalloyed copper. b/ Recoverable content.

e/ Estimated. c/ Soviet Sphere 1970 estimated by taking the Am. Bur. Metal Stats. increase in Soviet Sphere production over 1969 and adding the figure to the 1969 U.S. Bur. of Mines estimate. d/ Soviet Sphere 1971 est. by taking the Am. Bur. Metal Stats. increase in Soviet Sphere production over 1970 and adding the figure to the 1970 est.

2/ Ore content, except when reported as recoverable or content of concentrate or other product. 3/ American Bureau of Metal Statistics.

4/ Determined by difference. 5/ Refined copper - primary and secondary.

TABLE V

WORLD MINE PRODUCTION OF COPPER
BY CONTINENTS AND PRINCIPAL COUNTRIES 1/ 6/

	1969 2/ 6/	1970 2/ 6/	1971 3/
NORTH AMERICA:			
U.S.A. 4/	1,545	1,720	1,522 a/
Canada 4/	573	673	720
Mexico	73	67	70
Others	10	9	19
Total	<u>2,201</u>	<u>2,469</u>	<u>2,331</u>
SOUTH AMERICA:			
Chile	771	783	780
Peru 4/	219	243	228
Others	13	15	13
Total	<u>1,003</u>	<u>1,041</u>	<u>1,021</u>
EUROPE:			
U.S.S.R. e 5/	610	630	1,010
Yugoslavia	90	100	104
Bulgaria	43	48	45
Finland	37	34	33
Poland e	53	79	91
Others	123	118	125
Total	<u>956</u>	<u>1,009</u>	<u>1,408</u>
ASIA:			
China, mainland e	110	110	110
Cyprus e	19	20	18
Japan	134	132	133
Philippines	145	177	218
Turkey	29	30	31
Others	38	40	26
Total	<u>475</u>	<u>509</u>	<u>536</u>
AFRICA:			
Zambia	825	754	718
Zaire (formerly Congo-Kinshasa)	393	425	447
South Africa, Republic of e	139	164	174
Others	86	90	71
Total	<u>1,443</u>	<u>1,433</u>	<u>1,410</u>
OCEANIA:			
Australia	144	174	178
Fiji (exports)	- 7/	--	--
Total	<u>144</u>	<u>174</u>	<u>178</u>
TOTALS 3/			6,884
TOTALS 6 8/	6,224	6,634	6,665 b/

1/ Ore content except as indicated, or where content of concentrate or other product of processing is part or all of that which is available. 2/ Source: U.S. Bur. Mines. e Estimate. 3/ Source: Am. Bur. Met. Stats. Not included are outputs of 12 countries which are included in the 1967-8-9 figures. ABMS estimates 34,400 tons for the 12 in 1970 and 34,600 tons in 1971. 3a/, 3b/ U.S. Bur. Mines figures. 4/ Recoverable content. 5/ USSR's Asian output included with its European. 6/ Totals do not include unavailable tonnages produced by Angola, Congo (Brazzaville), Cuba, Hungary, Kenya and Malaysia. 7/ Less than 500 tons. 8/ Detail will not necessarily add to totals because of rounding.

TABLE VI

NEW (PRIMARY) REFINED COPPER PRODUCED IN, IMPORTED BY AND EXPORTED BY
THE UNITED STATES, AND WITHDRAWN FROM SUPPLY ON DOMESTIC ACCOUNT

1966 - 1971

	Short Tons					
	1966	1967	1968	1969	1970	1971
Produced from U.S. Ores	1,353,087	846,551	1,160,925	1,468,889	1,521,183	1,410,523
Produced from Foreign Ores	357,897	286,431	276,461	273,926	243,911	181,259
Total New Refined Copper	1,710,984	1,132,982	1,437,386	1,742,815	1,765,094	1,591,782
Imports <u>1/</u>	164,328	330,571	400,278	131,171	132,143	163,988
Stocks at beginning of period <u>1/</u>	35,000	43,000	27,000	48,000	39,000	130,000
Total Available Supply	1,910,312	1,506,553	1,864,664	1,921,986	1,936,237	1,885,770
Exports <u>1/</u>	273,071	159,353	240,745	200,269	221,211	187,654
Stocks at end of period <u>1/</u>	43,000	27,000	48,000	39,000	130,000	75,000
Total	316,071	186,353	288,745	239,269	351,211	162,654
Withdrawn on Domestic Acc. (Apparent) <u>2/</u>	1,594,241	1,320,200	1,575,919	1,682,717	1,585,026	1,623,000
Reported Actual Consumption <u>3/</u>	2,359,954	1,935,592	1,880,300	2,142,218	2,043,303	2,019,507

Source: U.S. Bureau of Mines.

1/ May include some copper refined from scrap.

2/ Includes deliveries to Government stockpiles. Figure is of new copper, insofar as could be determined.

3/ Reported by consumer. Includes refined copper from secondary as well as the primary sources.

TABLE VII

IMPORTS OF PRIMARY COPPER INTO THE UNITED STATES

By Major Countries, 1969 - 1971
Totals only, 1966 - 1968

Source	Copper Content (short tons)		
	1969	1970	1971
<u>Ore, Concentrates, Matte</u>			
Canada	9,181	4,442	7,325
Chile	-----	-----	-----
Mexico	89	135	4
Peru	9,664	8,949	8,999
Phillippines	18,269	18,700	13,616
Australia	1,662	1,336	1,243
Other Countries	183	279	101
Total ore etc.	<u>39,048</u>	<u>33,841</u>	<u>31,288</u>
<u>Blister Copper</u>			
Mexico	2,816	2,504	4,926
Chile	100,768	97,952	40,594
Peru	107,385	94,868	89,901
South Africa, Republic of	25,160	28,946	21,247
Other Countries	1,820	146	76
Total Blister	<u>237,949</u>	<u>224,416</u>	<u>156,744</u>
<u>Refined Cathodes and Shapes</u>			
Canada	84,941	91,814	123,028
Chile	21,470	16,928	11,057
West Germany	2,574	(a)	4,387
Japan	(a)	13,132	(a)
Peru	4,372	6,209	3,510
United Kingdom	3,950	59	5,513
Zambia	999	1,102	6,668
Other Countries	12,865	2,899	9,825
Total Refined	<u>131,171</u>	<u>132,143</u>	<u>163,988</u>
Total Primary Copper Imports	408,168	390,400	352,020
Less: Primary Copper Exports	205,786	290,554	224,478
(Ore, conct's., matte, blister & refined)	-----	-----	-----
<u>Net Imports</u>	<u>202,382</u>	<u>99,846</u>	<u>127,542</u>
	1966	1967	1968
Primary Copper Imports	565,118	632,864	698,555
Less: Primary Copper Exports	275,220	219,045	321,484
<u>Net Imports</u>	<u>289,898</u>	<u>413,819</u>	<u>377,071</u>

Source: U. S. Bureau of Mines.

(a) Not listed separately.

TABLE VIII

EXPORTS OF PRIMARY COPPER FROM THE UNITED STATES
(Copper Content - Short Tons)

<u>Destination</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>
Argentina	191	693	115
Belgium - Luxembourg	3,962	10,507	18,791
Brazil	17,065	24,688	18,951
Canada	21,533	14,904	20,893
Chile	3	(1)	(a)
France	17,055	18,623	21,930
Germany, West	28,717	29,047	58,526
India	13,010	14,687	14,707
Italy	38,013	39,089	24,329
Japan	14,969	54,659	11,284
Korea, Republic	(a)	4,497	1,545
Mexico	18	2,642	241
Netherlands	8,372	20,562	7,108
Peru	3	2	(a)
Phillippines	(a)	1,810	1,320
Spain	2,705	4,901	677
Sweden	4,605	3,973	2,518
Switzerland	2,350	2,431	1,820
Taiwan	(a)	1,122	4,926
United Kingdom	24,436	25,168	13,245
Yugoslavia	2,713	14,593	407
<u>Other Countries</u>	<u>6,069</u>	<u>1,956</u>	<u>1,145</u>
Ore, Concls., Matte, Blister	5,517	69,343	36,824
<u>Refined Ingots, Bars, Etc.</u>	<u>200,269</u>	<u>221,211</u>	<u>187,654</u>
Total Exports of Primary Copper	205,786	290,554	224,478

Source: U.S. Bureau of Mines. (a) Not listed separately. (1) Less than $\frac{1}{2}$ ton.

TABLE IX

STOCKS OF COPPER AS REPORTED BY THE
U.S. BUREAU OF MINES AND THE COPPER INSTITUTE
(Short Tons)

End of	REFINED			BLISTER, ETC. <u>3/</u>
	In U.S.A. U.S.B.M. <u>1/</u>	Copper Inst. <u>2/</u>	Outside U.S.A. Copper Inst.	In U.S.A. U.S.B.M.
1961	49,000	79,755	332,479	236,000
1962	71,000	117,441	358,856	246,000
1963	52,000	76,934	394,143	252,000
1964	37,000	45,594	277,303	246,000
1965	35,000	60,811	327,723	246,000
1966	43,000	65,707	293,167	270,000
1967	27,000	55,350	272,202	220,000
1968	48,000	56,609	316,090	272,000
1969	39,000	45,943	234,739	291,000
1970	130,000	160,623	318,562	340,000
1971	6,000	102,976	371,504	303,000

1/ Stocks at primary U.S. smelters and refineries at end of year.

2/ Stocks at refineries, on consignment at end of year, include refined copper from whatever source.

3/ Blister and materials in process of refining, as reported by the U.S.B.M. Includes copper in transit from U.S. smelters to U.S. refineries.

TABLE X

COPPER FABRICATORS' STOCKS AND SALES POSITION
(Copper Content in Short Tons)

End of	<u>1/</u> Stocks	Unfilled Purchase Contracts	Total Supplies	Less <u>2/</u> Working Stocks	Less Unfilled Sales Contracts	Available for Sale or Deficit(-)
1961	461,252	89,745	550,997	361,286	144,344	45,367
1962	465,592	81,297	546,889	385,239	138,089	23,561
1963	474,875	100,357	575,232	382,692	163,558	28,982
1964	429,989	107,244	537,233	381,677	225,366	-69,810
1965	462,519	129,349	591,868	395,396	288,681	-92,209
1966	558,599	134,732	693,331	407,345	361,559	-75,573
1967	479,572	98,716	578,288	415,765	269,474	-106,951
1968	514,553	128,919	643,472	420,186	273,469	-50,183
1969	502,300	99,232	601,532	412,734	256,299	-67,501
1970	515,096	86,925	602,021	438,925	156,007	7,089
1971	510,810	96,209	607,019	431,348	187,688	-12,017

Source: The U.S. Copper Assoc. as reported by Am. Bur. of Metal Statistics.

1/ Primary fabricated shapes, metal in process, and small amounts held for fabricators.

2/ Estimated copper required for normal operations.

TABLE XI

REFINED COPPER CONSUMED IN THE UNITED STATES 1966 - 1971

BY CLASS OF CONSUMER 1/
(In short tons)

<u>Consumer</u>	<u>Cathodes</u>	<u>Wire Bars</u>	<u>Ingots & Ingot Bars</u>	<u>Cakes and Slabs</u>	<u>Billets</u>	<u>Other</u>	<u>Total</u>
<u>1969:</u>							
Wire Mills	50,631	1,237,939	<u>4/</u>	<u>4/</u>	-----	7,746	1,296,316
Brass Mills	183,644	31,847	152,529	172,264	256,714	128	797,126
Chemical Plants	-----	-----	471	-----	-----	2,624	3,095
2nd'y Smelt.	3,866	-----	3,025	-----	-----	67	6,958
Miscellaneous <u>2/</u>	3,008	1,014	23,777	238	1,659	9,027	38,723
Total	<u>241,149</u>	<u>1,270,800</u>	<u>179,802</u>	<u>172,502</u>	<u>258,373</u>	<u>19,592</u>	<u>2,142,218</u>
<u>1970:</u>							
Wire Mills	85,925	1,245,470	<u>4/</u>	-----	-----	7,345	1,338,740
Brass Mills	154,174	27,862	120,880	156,770	200,785	112	660,583
Chemical Plants	-----	-----	578	-----	-----	1,663	2,241
2nd'y Smelt.	3,286	-----	3,749	-----	-----	7	7,042
Miscellaneous <u>2/</u>	3,601	2,431	20,514	282	1,262	6,607	34,697
Total	<u>246,986</u>	<u>1,275,763</u>	<u>145,721</u>	<u>157,052</u>	<u>202,047</u>	<u>15,734</u>	<u>2,043,303</u>
<u>1971</u>							
Wire Mills	108,498	1,206,895	<u>4/</u>	<u>4/</u>	<u>4/</u>	9,501	1,324,894
Brass Mills	192,617	28,042	99,087	154,667	181,259	110	655,782
Chemical Plants	-----	-----	191	-----	-----	1,320	1,511
2nd'y Smelt.	4,221	-----	2,666	-----	-----	2	6,889
Miscellaneous <u>2/</u>	4,090	1,991	16,397	170	1,000	6,783	30,431
Total	<u>309,426</u>	<u>1,236,928</u>	<u>118,341</u>	<u>154,837</u>	<u>182,259</u>	<u>17,716</u>	<u>2,019,507</u>

1/ U. S. Bureau of Mines.2/ Foundries and miscellaneous manufacturers including iron and steel plants, primary smelters producing alloys other than copper, consumers of copper powder and copper shot.3/ Included with "Billets" to avoid disclosing individual company confidential data.4/ Included with "Wire Mills, Other," to avoid disclosing individual company data.

TABLE XII

UNITED STATES PRODUCTION AND CONSUMPTION OF COPPER

In Short Tons

Year	Production			Consumption	Total Production As % of Consumption
	Mine 1/	Secondary 2/	Total	Total 3/	
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
1954	835,472	212,241	1,047,713	1,254,729	83.5
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
Total	9,517,994	2,360,878	11,878,872	14,154,891	
Average					
1950-59	951,799	236,088	1,187,887	1,415,489	83.9
1960	1,080,169	300,259	1,380,428	1,349,896	102.3
1961	1,165,155	290,805	1,455,960	1,462,830	99.5
1962	1,228,421	301,374	1,529,795	1,599,676	95.6
1963	1,213,166	314,643	1,527,809	1,744,273	87.6
1964	1,246,780	366,197	1,612,977	1,825,281	88.4
1965	1,351,734	462,811	1,814,545	2,004,623	90.5
1966	1,429,152	509,084	1,938,236	2,359,954	82.1
1967	954,064	423,054	1,377,118	1,935,592	71.1
1968	1,204,621	433,041	1,637,662	1,880,300	87.1
1969	1,544,579	514,593	2,059,172	2,142,218	96.1
Total	12,417,841	3,915,861	16,333,702	18,304,643	
Average					
1960-69	1,241,784	391,586	1,633,370	1,830,464	89.2
1970	1,719,657	521,137	2,240,794	2,043,303	109.7
1971	1,522,183	429,095	1,951,278	2,019,507	96.6

Source: U.S. Bureau of Mines.

1/ Recoverable copper.

2/ Copper recovered as unalloyed copper.

3/ Refined copper in cathodes, wire bars, etc.; reported by consumers.

TABLE XIII

EMPLOYMENT, EARNINGS AND HOURS IN COPPER MINING
IN THE UNITED STATES AND ARIZONA
1965-1970 and Base Period 1947-1949

Period	All Employees		Production Workers							
	Ave. No. (Thousands)		Ave. No. (Thousands)		Ave. Weekly Earnings		Ave. Weekly Hours		Ave. Hourly Earnings	
	1/ Ariz.	2/ U.S.	3/ Ariz.	4/ U.S.	5/ Ariz.	U.S.	6/ Ariz.	U.S.	7/ Ariz.	U.S.
1947-49	10.7	26.9	8.7a/	24.2	\$ 64.06	\$ 62.58	44.8	44.7	\$1.43	\$1.40
1965	14.2	30.0	11.7	24.7	146.25	136.71	45.0	43.4	3.25	3.15
1966	15.2	31.9	12.4	26.2	150.06	140.07	45.2	43.5	3.32	3.22
1967	12.2	25.4	9.0	19.1	141.43	140.18	42.6	43.0	3.32	3.26
7 Mos.	15.7	33.2	12.4	27.3	149.41	142.76	44.6	43.5	3.35	3.28
5 Mos.	7.3	14.4	3.8	7.5	130.05	127.95	39.9	40.4	3.27	3.16
1968	13.8	28.1	11.1	21.3	149.21	161.68	43.0	47.0	3.47	3.44
3 Mos.	7.5	14.9	4.3	8.3	118.17	129.06	36.7	40.2	3.22	3.21
9 Mos.	15.8	32.5	13.0	25.6	160.11	165.28	45.1	47.8	3.55	3.46
1969	17.0	33.7	13.9	26.9	166.50	169.00	44.4	46.3	3.75	3.65
1970	18.8	37.0	14.9	29.5	173.01	175.67	43.8	44.7	3.95	3.93
1971	18.9	34.7	14.9	26.8	178.50	178.46	42.4	42.9	4.21	4.16
1966-71	15.9	28.4	12.7	25.0	159.78	160.84	43.6	44.6	3.67	3.61

	Production Workers				Copper Ore 10/ Shipped or Treated	
	Ave. Earnings per Man per Year 8/		Aggregate Man-hours (Thousands) 9/		(Thousand Short Tons)	
	Ariz.	U.S.	Ariz.	U.S.	Ariz.	U.S.
1965	\$7,605	\$7,109	27,378	55,743	92,860	173,286
1966	7,803	7,284	29,145	59,264	101,558	186,966
1967	7,354	7,284	19,937	42,708	74,289	127,066
1968	7,759	8,407	24,820	52,057	101,294	170,054
1969	8,658	8,788	32,092	64,764	127,849	223,752
1970	8,997	9,135	33,936	68,570	150,241	257,729
1971	9,282	9,280	32,852	59,785	149,294	242,656
Average						
1947-49	3,331	3,254	20,268	56,250	38,083	82,875
1966-71	8,309	8,363	28,797	57,858	117,421	201,370

(continued next page)

TABLE XIII (continued)

	Copper in Copper Ore ^{12/} (Recoverable Content) (Thousand pounds)		Production Workers			
			Copper Ore Mined per Man-hour (Tons)		Recoverable Copper Mined per Man-hour (Pounds)	
	Ariz.	U.S.	Ariz.	U.S.	Ariz.	U.S.
1965	1,398,092(a)	2,595,610	3.392	3.109	51.066	46.563
1966	1,474,447(b)	2,805,136	3.485	3.155	50.590	47.333
1967	1,000,572	1,866,087	3.726	2.975	50.187	43.694
1968	1,252,919	2,349,046	4.081	3.267	50.480	45.124
1969	1,593,544	3,021,590	3.984	3.455	49.656	46.655
1970	1,826,734	3,368,957	4.427	3.759	53.829	49.132
1971	1,633,568	2,986,599	4,544	4,059	49,725	49,996
Average						
1947-49	723,354	1,587,038	1,878	1,473	35,689	28,214
Average						
1966-71	1,463,630	2,732,902	4,041	3,445	50,744	46,989

^{1/} These estimates of "All Employees," made by the Employment Security Commission of Arizona, in cooperation with the U.S. Bureau of Labor Statistics, include all full and part time wage and salary workers who were employed in copper mining in any part of the pay periods which included the 12th of each month of the year. See note 2, Table XX for explanation of differences between numbers of "Covered Employees" in Arizona Copper Mining in that table and those in this Table XIII for "All Employees", for the respective years.

^{2/} Estimates of "All Employees" in the United States industry division, "Mining-Copper Ores," which excludes copper smelting. The estimates have been made by the U.S. Bureau of Labor Statistics with the cooperation of the 50 states, and are based upon monthly samplings similar to those in ^{1/} above, adjusted periodically to census benchmarks.

^{3/} Estimates of production (non-supervisory) workers in Arizona Copper Mining, based upon samplings as in Note ^{1/}.

^{3/a/} Estimate for 1947-49 is based upon assumption of the same ratio of "production" to "all" employees as that for the year 1949. The numbers of "All Employees" for the years 1947 to 1949 varied less than 2 per cent from the average of 10,700 for the three years.

^{4/} Estimates of "Production or Non-supervisory Workers" in U.S. "Mining-Copper Ores," made as in ^{3/} above.

^{5/} Figures for "Average Weekly Earnings" are products of the figures for "Average Weekly Hours" and "Average Hourly Earnings" for the respective years.

^{6/} The gross number of hours worked by production (non-supervisory) and related workers in a monthly sample period divided by the average number of the same workers in the corresponding period, provides the basis for the estimate of "average weekly hours" for the month. Averages for a year or period of months are arithmetical averages of the estimates for the months involved.

TABLE XIII (continued)

7/ Gross payroll aggregates, exclusive of irregular bonuses and other pay not earned in a sample pay period, are divided by gross man-hour aggregates of production and related workers for the period in order to determine average hourly earnings. Average hourly earnings for a year or period of months are arithmetical averages of monthly estimates based on the results of the respective sample periods.

8/ "Average Weekly Earnings" times 52 weeks.

9/ Number of production workers times "Average Weekly Hours" times 52.

10/ Copper ore mined and shipped or treated by concentration, smelting or leaching.

11/ Recoverable copper from copper ore (Note 10/) and from copper precipitates from dump and in-place leaching.

(a) Exclusive of some precipitates from Nevada, California, and Utah.

(b) Exclusive of some precipitates from Nevada and California.

12/ Copper from precipitates is held to be largely a by-product of copper ores, similar to the gold, silver, molybdenum, and other metals recovered from copper ores. In previous years, copper from precipitates has not been included in our tables similar to this one. For years prior to 1968, our tables have had added to the recoverable copper from ores a figure for "equivalent copper" computed by dividing the combined value of the by-product gold and silver recovered from the ore, by the average price per pound of copper. The rapid increase in value of the annual recovery of molybdenum has made it rather pointless to continue this somewhat equivocal figure for "equivalent copper" without including the moly. In recent years copper precipitates have yielded value greater than that of the other by-products combined. They require some labor from "Production Workers," and the inclusion of copper from precipitates as reported by the Bureau of Mines has some justification although its labor requirement is minor. The inclusion removes most if not all of the justification for a figure of "equivalent copper" - even with molybdenum added in its calculation.

TABLE XIV

EMPLOYMENT, WEEKLY EARNINGS, WEEKLY HOURS, HOURLY EARNINGS,

IN COPPER MINING IN ARIZONA AND THE UNITED STATES

1947 - 1971

Year	All Employees		Production Workers							
	Ave. No.		Ave. No.		Ave. Weekly		Ave. Weekly		Ave. Hourly	
	(Thousands)		(Thousands)		Earnings		Hours		Earnings	
	<u>1/</u>	<u>2/</u>	<u>3/</u>	<u>4/</u>	<u>5/</u>		<u>6/</u>		<u>7/</u>	
	Ariz.	U.S.	Ariz.	U.S.	Ariz.	U.S.	Ariz.	U.S.	Ariz.	U.S.
1947	10.7	27.5		24.7	\$ 59.40	\$ 59.02		45.4		\$1.30
1948	10.9	27.3		24.7	65.99	65.49		45.8		1.43
1949	10.5	25.9		23.2	66.45	63.34	44.3	42.8	1.50	1.48
Average										
1950	9.5	25.8		22.9	75.80	71.44	46.5	45.5	1.63	1.57
1951	10.1	25.9		22.7	83.00	77.52	47.7	46.7	1.74	1.66
1952	10.7	26.5		23.0	90.24	85.01	47.0	46.2	1.92	1.84
1953	11.4	28.6		24.6	96.20	90.94	46.7	46.4	2.06	1.96
1954	11.7	27.9		23.9	96.49	86.63	45.3	43.1	2.13	2.01
1955	11.8	28.9		24.5	104.81	95.00	47.0	44.6	2.23	2.13
1956	13.4	33.3		28.4	111.86	99.23	47.0	44.1	2.38	2.25
1957	14.0	32.3		27.1	106.68	96.88	43.9	41.4	2.43	2.34
1958	13.5	27.7		22.7	95.52	94.17	39.8	39.4	2.40	2.39
1959	11.1	23.3		18.5	106.68	105.90	42.5	42.7	2.51	2.48
1960	13.0	28.3		22.6	116.24	116.77	43.7	44.4	2.66	2.63
1961	13.3	29.0		23.8	126.62	119.03	44.9	43.6	2.82	2.73
1962	13.6	28.5		23.4	129.36	120.70	44.3	42.8	2.92	2.82
1963	13.3	27.7		22.7	133.80	124.56	44.6	43.1	3.00	2.89
1964	13.3	27.1		22.1	140.85	130.42	45.0	42.9	3.13	3.04
1965	14.2	30.0	11.7	24.7	146.25	136.71	45.0	43.4	3.25	3.15
1966	15.2	31.9	12.4	26.2	150.06	140.07	45.2	43.5	3.32	3.22
1967	12.2	25.4	9.0	19.1	141.43	140.18	42.6	43.0	3.32	3.26
1968	13.8	28.1	11.1	21.3	149.21	161.68	43.0	47.0	3.47	3.44
1969	17.0	33.7	13.9	26.9	166.50	169.00	44.4	46.3	3.75	3.65
1970	18.8	37.0	14.9	29.5	173.01	175.67	43.8	44.7	3.95	3.93
1971	18.9	34.7	14.9	26.8	178.50	178.46	42.4	42.9	4.21	4.16

1/, 2/, 3/, 3/a, 4/, 5/, 6/, 7/ See respective footnotes for Table XIII, pages 24, 25

TABLE XV

UNITED STATES COPPER MINING - OUTPUT OF COPPER ORE; AMOUNT AND VALUE OF

COPPER, GOLD, AND SILVER RECOVERED THEREFROM ^{1/}

Year	Copper Ore Tons	Gold	Silver	Copper ^{2/}		Value of Copper, Gold and Silver
		Troy Ounces Value	Troy Ounces Value ^{8/}	Pounds Value	Lbs./Ore Ton Ave. ¢/lb. ^{3/}	
1961	142,721,798	532,215 \$18,627,525	10,385,661 \$ 9,601,544	2,145,224,433 \$ 641,872,603	15.0 29.921	\$ 670,101,672
1962	150,216,710	483,243 \$16,913,505	10,944,522 \$11,874,806	2,239,326,000 \$ 685,233,756	14.9 30.600	\$ 714,022,067
1963	146,449,540	438,537 \$15,348,795	10,309,897 \$13,187,595	2,178,498,800 \$ 666,620,633	14.9 30.600	\$ 695,157,023
1964	155,200,464	430,630 \$15,072,050	11,470,890 \$14,831,861	2,280,880,781 \$ 688,734,761	14.7 31.960	\$ 718,638,672
1965	173,286,198	567,531 \$19,863,585	12,801,638 \$16,552,518	2,430,879,000 \$ 851,220,899	14.0 35.017	\$ 887,637,002
1966	186,966,042	547,327 \$19,156,445	13,230,411 \$17,106,921	2,499,863,100 \$ 904,200,483	13.37 36.170	\$ 940,463,849
1967	127,066,097	321,398 \$11,248,930	8,351,423 \$12,942,033	1,608,078,200 \$ 614,703,973	12.66 38.226 ^{4/}	\$ 638,894,936
1968	170,054,065	405,863 \$15,934,200 ^{7/}	9,532,341 \$20,443,000 ^{8/}	2,055,156,700 \$ 860,021,400	12.09 41.847 ^{5/}	\$ 896,398,600
1969	223,751,510	579,297 ^{6/} \$24,440,500 ^{7/}	13,581,516 ^{6/} \$24,320,000 ^{8/}	2,691,376,400 \$1,279,318,900	12.03 47.534	\$1,328,079,400
1970	257,729,000	552,140 ^{6/} \$21,080,600 ^{7/}	15,728,600 ^{6/} \$27,852,500 ^{8/}	3,025,021,000 \$1,745,437,000	11.74 57.700	\$1,794,370,000
1971	242,656,000	478,281 ^{6/} \$19,518,648 ^{7/}	13,142,041 ^{6/} \$20,312,339 ^{8/}	2,677,569,000 \$1,377,073,737	11.03 51.43	\$1,416,904,724

^{1/} U.S. Bur. Mines. ^{2/} Doesn't include precipitate copper from dump and in-place leaching. ^{3/} E/MJ average price, domestic, f.o.b. refinery. ^{4/} Based on first 8 months of 1967. ^{5/} Based on last 9 months of 1968. ^{6/} Does not include gold or silver recovered from vat or heap leaching of copper ores. ^{7/} At average domestic gold prices in "Metal Statistics, 1971": year 1968, \$39.26 per oz.; 1969, \$42.19; 1970, \$36.39; 1971, \$40.81. ^{8/} At average E/MJ N.Y. market price for silver .999 fine.

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Arizona's Copper Industry

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Mine Production of Copper, Gold, Silver, Lead,
and Zinc 1858-1971

Mine Production of Copper, Gold, Silver, Lead,
and Zinc in 1971, by classes or ore

Production of Large Copper Mines in 1970 and 1971

Covered Employment and Wages 1917-1971

Employment and Wages in Industries Covered by
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ARIZONA'S COPPER INDUSTRY

Arizona's mines produced 820,171 tons of recoverable copper in 1971, more than all of the other states combined. Her 1971 production was a decrease of 97,747 tons from the record 1970 production of 917,918 tons, but an increase over any year prior to 1970. The value of the 1971 production, \$852,978, was 19.5 percent below 1970, due both to decreased, but steady prices and production loss caused by the four to six week labor strike that affected many of Arizona's mines.

The August 1971 Directory of Arizona's Mining Activity published by the Arizona Department of Mineral Resources lists the following 19 companies as operating copper producing properties in Arizona. They are: American Smelting and Refining, Anaconda, Bagdad Copper, Big Hole Mining, Cities Service, Cyprus Mines, Duval, Duval-Sierrita, El Paso Natural Gas, Hecla, Inspiration, Kennecott, Magma, McAlester Fuel, Phelps Dodge, Pima Mining, Producers Minerals, Ranchers Exploration and Development and Red Hills Mining. These 19 companies operated 25 mines.

The average copper content of 149 million tons of ore mined in 1971 was only 9.8 pounds per ton. This is the lowest average grade of ore mined for any previous year and compares with 11.3 pounds in 1971, 14.1 in 1965 and 15.0 in 1960. Improvements in equipment and technology, plus increased recovery of molybdenum, especially from newer mines and steady prices, benefited the mining of lower grade ores.

The gross value of Arizona's 1971 copper production was 87.0 percent of the total value of all minerals, mineral materials and petroleum products produced in Arizona. Copper ores were the source of: 93.3 percent of the State's copper

production. (the remaining 6.7 percent of the State's copper production came from other ores and copper precipitates from dump and in-place leaching); all of the State's molybdenum output valued at \$39.9 million; 99.6 percent of the gold, valued at \$3.8 million; and 99.0 percent of the silver, valued at \$9.4 million. The combined value of the copper, molybdenum, gold and silver recovered from material classified as copper ore was \$830,598,891, or 84.7 percent of the value of all minerals produced by the state.

The ten larger companies, which produced 98 percent of Arizona's production, operated 16 large open-pit mines and 3 large underground mines. Sixteen of the nation's 25 leading copper mines are located in Arizona. They are: Phelps Dodge's Morenci Mine, 2nd to the first place Utah Copper Mine of Kennecott; Magma's San Manuel, the largest underground mine, 3rd; Kennecott's Ray Mine, 4th; Pima Mining Company's Pima Mine, 7th; Duval's Sierrita, 8th; Phelps Dodge's Copper Queen Lavender Pit and New Cornelia, 11th and 12th; Anaconda's Twin Buttes 13th; Inspiration, 14th; Asarco's Mission, 16th; Cities Service's Copper Cities, 17th; Duval's Mineral Park, 18th; Asarco's Silver Bell, 20th; Duval's Esperanza, 21st; Bagdad, 22nd; and Magma's Superior, 23rd. The ore from the 16 open pit mines of the ten larger companies yielded 9.5 pounds of copper per ton; that from the 3 underground mines yielded 16.1 pounds per ton. The open pit mines produced 82 percent of the copper recovered from ores. Eleven of the mines produced a total of 120,415,619 pounds of precipitate copper from dump or in-place leaching. Ore and copper production of the major Arizona copper mines in 1970 and 1971 is given in Table XIX of this report.

Arizona's copper industry operated throughout 1971 under the difficulties of labor negotiations, labor strikes, and confusing and stringent emission controls; however, many of the large copper producers still announced optimistic

future plans and completed many expansion programs. The strike at Anaconda's Twin Buttes mine, coupled with the treatment of lower-grade ore, adversely affected copper production from this location. A major slide in the open pit resulted in the average grade of ore treated being substantially lower than forecast. Although Bagdad's mine operated throughout the strike, the strike did close Asarco's smelter to which Bagdad ships its concentrate. Current production keeps the smelter operating at capacity so that at year-end 1971 the concentrates produced during the strike had not been treated. Bagdad arranged to ship the stockpiled concentrate to White Pine Copper Company in Michigan for treatment in 1972. Bagdad announced a mine expansion program that will cover more than 26 years and allow the mining of an additional 265 million tons of ore. Cities Service announced plans to develop its Pinto Valley orebody. When completed, the Pinto Valley mine-mill complex, located about eight miles west of Miami, will be one of the major open pit copper mines in the world, with a scheduled rate of mill feed of more than 40,000 tons per day. In December, 1971, Duval announced the closing of its Esperanza mine for a period of 9 to 12 months due to lack of capacity at smelting operations to handle ore concentrates produced at Esperanza. The excess of concentrates was due in part to Esperanza's continuing operation during the strike against the smelters and to decreased smelter capacity caused by air quality controls. Each month the mine is closed about \$670,000 in payrolls and expenditures will be lost to employees and suppliers. Duval's Sierrita property reached full production of 72,000 tons per day and announced plans to increase production capability to 84,000 tons per day, which will make it the largest copper mine in the state, in terms of daily production. At Kennecott's Ray Mine construction continued on the Mineral Creek flood-control dam project. Completion of the dam and diversion tunnel is scheduled for 1973. At year-end 1971, Inspiration had

nearly completed construction of new primary and tertiary crushing plants. Early in the year Inspiration abandoned pilot-plant testing of the Golden Cycle process for removal of sulfur oxides from smelter smoke in favor of methods using known technology. A tragic accident in November resulted in the death of three Inspiration employees. The cause appears to have been an uncontrolled reaction in the mixing of chemical reagents. The expansion program at Magma's San Manuel operation was completed late in 1971 and in February 1972 the mine and mill operated at a rate of about 65,000 tons of ore per day. The new electrolytic refinery at San Manuel was completed in December 1971, on schedule at a cost of \$31,000,000. The new refinery has an annual capacity of 200,000 tons of refined copper. Magma's Superior operation is under an expansion program to raise capacity to 3,300 tons of ore daily. Phelps Dodge announced that construction of emission control facilities moved ahead at their Ajo, Douglas and Morenci smelters with the \$28,000,000 Ajo sulphuric acid plant to be completed in late 1972 or early 1973. Detailed engineering and cost studies were completed for additional emission control facilities that would be required to try to meet Arizona's very strict standards. These studies indicate that the total cost of all such facilities would exceed \$240,000,000. The removal of overburden from part of the orebody at Phelps Dodge's Metcalf Mine continued throughout the year on a reduced basis. The preliminary development of the company's deep orebody at Safford continued during 1971. The company reported that mining operations at Bisbee are nearing an end, and they expect the open-pit mine to shut down in 1973 due to exhaustion of ore reserves. Pima's fourth major expansion of production facilities, begun in late 1970, became operational in February, 1972, at a cost of approximately \$17,000,000. The expanded facilities, consisting of new crushing, grinding and concentrating equipment, are expected to increase Pima's treatment of crude ore by about 35 percent

to approximately 54,000 tons per day. Hecla is continuing development on its Lakeshore Project near Casa Grande. Newmont announced its intention to hold back on plans to develop its Vekol Hills project until the confusion over air quality standards and the associated smelter bottleneck is resolved. Ranchers announced an increase in their in-sight ore reserves from 13 to 75 million tons at their Blue Bird property. Ranchers also announced plans for an in-place leaching project at the Old Reliable Mine.

All of the companies operating the 8 smelters in the State struggled to comply with emission control regulations. Magma permanently closed down its Superior smelter when the strike started in July. On October 20, 1971, Phelps Dodge petitioned the State Board of Health to reconsider the 90 percent reduction of emissions standard in favor of the less stringent Federal ambient air standards. Nine other major copper producers immediately followed Phelps Dodge's action. Against the cries of environmental extremists the State Board of Health agreed to hold hearings on reducing the State's 90 percent emission standard on December 30, 1971.

Assessed evaluation of Arizona's mining operations in 1971 was \$793,622,480, a 22.1% increase over the 1970 value of \$649,473,400. Duval's Sierrita mine accounted for \$106,000,000 of the \$144,149,080 increase.

Copper exploration continued to be active in the State and several potentially sizeable low-grade copper discoveries were announced by corporations with further exploration being required to determine the feasibility for development. Problems of public land withdrawals from mining and of proposed or actual changes in laws and regulations affecting mining, continued to be troublesome.

TABLE XVI

ARIZONA COPPER MINING - OUTPUT OF COPPER ORE; AMOUNT AND VALUE OF

COPPER, GOLD, SILVER AND MOLYBDENUM RECOVERED THEREFROM 1/

Year	Copper Ore Tons	Gold	Silver	Molybdenum 2/	Copper 3/		Value of Copper, Gold, Silver & Molybdenum
		Troy Ounces Value	Troy Ounces Value	Lbs.) Thous- Value) ands	Pounds Value	Lbs./Ore Ton Ave./cib.	
1961	71,918,001	129,184 \$4,521,440	4,380,458 \$4,049,690	4,878 \$6,232	1,092,360,900 \$ 326,845,305	14.6 29.921	\$341,648,435
1962	78,868,147	117,362 \$4,107,670	4,571,370 \$4,959,936	4,412 \$5,864	1,200,945,700 \$ 367,489,384	15.2 30.600	\$382,420,990
1963	80,615,132	121,177 \$4,241,195	4,494,239 \$5,743,132	5,553 \$7,584	1,217,337,700 \$ 372,505,336	15.1 30.600	\$390,073,663
1964	86,132,039	133,983 \$4,689,405	4,915,362 \$6,355,563	6,296 \$9,532	1,279,898,700 \$ 409,055,625	14.9 31.960	\$429,632,593
1965	92,859,535	133,830 \$4,684,050	5,352,850 \$6,921,235	9,399 \$15,880	1,308,809,700 \$ 458,305,893	14.1 35.017	\$485,791,178
1966	101,558,298	127,431 \$4,460,085	5,595,644 \$7,235,168	10,161 \$17,812	1,359,481,200 \$ 491,724,350	13.39 36.170	\$521,231,603
1967	74,289,203	66,933 \$2,342,655	3,996,587 \$6,193,431	9,261 \$15,385	901,853,500 \$ 344,742,519	12.14 38.226	\$368,663,605
1968	101,293,963	89,419 \$3,510,600 6/	4,697,394 \$10,074,000	12,127 \$19,207	1,146,313,600 \$ 479,697,900	11.32 41.847	\$512,489,500
1969	127,848,828	108,718 5/ \$4,586,800	5,899,843 5/ \$10,564,700	12,699 \$20,947	1,477,520,000 \$ 702,324,400	11.56 47.534	\$738,422,900
1970	150,240,842	107,292 5/ \$3,904,400 6/	7,130,261 5/ \$12,626,700	15,672 \$26,700	1,654,294,000 \$ 977,608,000	11.28 57.700	\$1,020,838,800
1971	149,293,547	93,617 5/ \$3,820,510 6/	6,106,204 5/ \$ 9,437,749 7/	22,684 \$39,872	1,529,780,500 \$ 786,812,004	9.76 51.433	\$ 830,598,891

1/ U.S. Bureau of Mines.

2/ Molybdenum content of recovered concentrate.

3/ Does not include precipitate copper from dump and in-place leaching.

4/ E/MJ average prices, domestic, f.o.b. refinery.

5/ Does not include gold or silver recovered from vat or heap leaching of copper ores.

6/ At average gold prices; See note 7/, Table XV.

7/ At average E/MJ N.Y. market price for .999 fine silver.

TABLE XVII

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

1858 - 1971 Inclusive - In Terms of Recoverable Metals

	COPPER		LEAD		ZINC	
	<u>Short Tons</u>	<u>Value (thousands)</u>	<u>Short Tons</u>	<u>Value (thousands)</u>	<u>Short Tons</u>	<u>Value (thousands)</u>
1874 - 1970	24,070,580	\$ 12,091,689	651,807	\$ 129,182	1,039,452	254,740
1971	820,171	852,978	859	237	7,761	2,499
Total 1874 - 1971	24,890,751	\$ 12,944,667	652,666	\$ 129,419	1,047,213	257,239

	GOLD		SILVER		COPPER, LEAD, ZINC, GOLD AND SILVER
	<u>Ounces</u>	<u>Value (thousands)</u>	<u>Ounces</u>	<u>Value (thousands)</u>	<u>Combined Value</u>
1858 - 1970	13,861,143	373,920	416,522,226	440,401	13,209,932,000
1971	94,038	3,879	6,170,000	9,538	869,131,000
Total 1858 - 1971	13,955,181	377,799	422,692,226	449,939	14,079,063,000

Est. Value of Other Metals & Non-Metallics Produced thru 1970	1,055,235,000
Value of Other Metals & Non-Metallics Produced in 1971	111,889,000
Est. Value of Other Metals & Non-Metallics Produced thru 1971	<u>1,167,124,000</u>
Grand Total Estimated Value of Arizona Mineral Production thru 1971	<u>15,246,137,000</u>

Source: U. S. Bureau of Mines; U. S. Geological Survey; Arizona Bureau of Mines

TABLE XVIII

MINE PRODUCTION OF GOLD, SILVER, COPPER, LEAD, AND ZINC IN ARIZONA IN 1971, BY CLASSES OF ORE OR OTHER SOURCE MATERIALS, IN TERMS OF RECOVERABLE METALS

Source	Number of Mines <u>1/</u>	Material sold or treated (short tons) <u></u>	Gold (troy ounces) <u></u>	Silver (troy ounces) <u></u>	Copper (short tons) <u></u>	Lead (short tons) <u></u>	Zinc (short tons) <u></u>
Lode ore:							
Dry gold and dry silver <u>3/</u>	3	10,158	10	5,539	2/	--	--
Copper	45	149,293,874	93,617	6,106,204	764,890	632	20
Copper-zinc, lead, and lead-zinc <u>3/</u>	5	98,289	25	30,518	3,219	227	7,741
Total	50	149,392,163	93,642	6,136,722	768,109	859	7,761
Other Lode material:							
Gold-silver & silver tailings	1	79,999	385	27,037	128	--	--
Copper cleanup	<u>4/</u>	180	1	325	38	--	--
Copper precipitates	10	71,085	--	--	51,894	--	--
Total	11	148,264	386	27,362	52,061	--	67
GRAND TOTAL	50	149,550,585	94,038	6,169,623	820,171	859	7,761

- 1/ Detail will not necessarily add to totals because some mines produce more than one class of material.
 2/ Less than $\frac{1}{2}$ unit.
 3/ Combined to avoid disclosing individual company data.
 4/ From properties not classed as mines.

Source: U. S. Bureau of Mines

TABLE XIX
COPPER PRODUCTION OF LARGE ARIZONA COPPER MINES
YEARS 1970 and 1971

<u>Company</u> <u>Mine</u>	1970		1971	
	Tons Copper Ore Mined	Pounds Copper Recovered	Tons Copper Ore Mined	Pounds Copper Recovered
<u>ANACONDA:</u> Twin Buttes	8,763,095	175,751,527	7,676,640	106,661,096
<u>ASARCO:</u>				
Silver Bell	3,787,700	38,385,030	3,796,000	38,692,504
Precipitate Copper		5,614,013	-	6,296,544
Mission	8,038,900	92,742,767	6,724,900	79,048,691
San Xavier - Si. flux	63,831	801,801	68,159	1,046,293
Total	11,890,431	137,543,611	10,589,059	125,084,032
<u>BAGDAD:</u>				
Bagdad	2,028,265	22,111,515	2,000,974	25,039,418
Precipitate Copper		7,281,397		-
Cathode Copper		5,158,961		14,680,540
Total	2,028,265	34,551,873	2,000,974	39,719,958
<u>CITIES SERVICE - MIAMI COPPER OPERATIONS</u>				
Copper Cities	4,970,196	47,456,074	4,629,571	44,858,816
Copper Cities Precipitate		4,490,916		4,375,751
Miami - Precipitate		14,965,326		12,806,085
Castle Dome - Precipitate		933,400		-
Total	4,970,196	67,845,716	4,629,571	62,040,652
<u>DUVAL:</u>				
Esperanza	5,513,508	41,144,966	5,280,200	36,958,100
Precipitate Copper		4,428,343		4,454,106
Mineral Park	5,951,896	46,699,924	5,645,080	43,495,519
Precipitate Copper		7,709,843		7,315,234
Sierrita	14,383,870	66,983,947	25,727,175	126,098,171
Total	25,849,274	166,967,023	36,652,455	218,321,130
<u>KENNECOTT:</u>				
Ray	12,648,564	179,598,170	10,277,916	126,856,249
Precipitate Copper		43,971,010		31,622,099
Total	12,648,564	223,569,180	10,277,916	158,478,348

Continued

TABLE XIX (Continued)

COPPER PRODUCTION OF LARGE ARIZONA COPPER MINES

<u>Company Mine</u>	<u>1970</u>		<u>1971</u>	
	<u>Tons Copper Ore Mined</u>	<u>Pounds Copper Recovered</u>	<u>Tons Copper Ore Mined</u>	<u>Pounds Copper Recovered</u>
<u>INSPIRATION:</u>				
Inspiration	9,376,513	81,147,159	6,862,253	74,229,548
Precipitate Copper		20,076,947	--	16,332,654
Christmas Division	1,829,122	17,343,153	1,537,883	13,652,047
Ox Hide Mine	3,833,018	13,298,157	2,630,267	7,962,311
Total	<u>15,038,653</u>	<u>131,865,416</u>	<u>11,030,403</u>	<u>112,176,560</u>
<u>MAGMA:</u>				
San Manuel	15,446,474	189,979,096	14,975,910	166,656,905
Superior	443,212	34,582,325	427,681	35,608,542
Total	<u>15,889,686</u>	<u>224,561,421</u>	<u>15,403,591</u>	<u>202,265,447</u>
<u>PHELPS DODGE:</u>				
Morenci	19,172,647	241,926,875	16,589,805	213,008,679
Precipitate Copper		16,949,491		14,188,039
New Cornelia	10,562,182	126,190,446	9,243,860	105,995,691
Lavender Pit	4,849,619	52,024,209	4,574,609	39,689,498
Precipitate Copper		7,407,045		8,344,567
Copper Queen	829,150	63,168,074	768,389	58,005,882
Precipitate Copper		*		*
Total	<u>35,413,598</u>	<u>507,666,140</u>	<u>31,176,663</u>	<u>439,232,356</u>
<u>PIMA MINING:</u>				
Pima	14,597,803	132,493,708	14,616,949	136,145,699
TOTAL - Large Co.'s	<u>147,089,565</u>	<u>1,802,815,615</u>	<u>144,054,221</u>	<u>1,600,125,278</u>
Other Copper Ores	3,151,435	23,918,385	5,239,779	33,442,722
GRAND TOTAL <u>1/</u>	<u>150,241,000</u>	<u>1,826,734,000</u>	<u>149,294,000</u>	<u>1,633,568,000</u>

Source: Company reports.

* Included with Lavender Pit precipitate copper.

1/ U. S. Bur. Mines figures - used to compute those for "Other Copper Ores."
The figures for copper recovered include that from copper precipitates.

TABLE XX

"COVERED EMPLOYMENT" AND WAGES IN ARIZONA COPPER MINING AND SMELTING

1947 - 1971 INCLUSIVE

Copper Mining	Average No. Covered Employees <u>1/</u>	Total Wages <u>2/</u>	Average Annual Wage	Average Weekly Wage	Tons Copper Ores <u>3/</u>
1947	11,340	\$ 36,365,277	\$ 3,207	\$ 61.67	37,810,448
1948	11,493	41,318,524	3,595	69.13	39,072,204
1949	11,001	40,612,224	3,692	71.00	37,365,611
1950	10,181	41,994,321	4,125	79.33	41,757,273
1951	10,754	47,825,698	4,447	85.52	42,784,388
1952	11,365	54,950,235	4,835	93.14	44,472,522
1953	12,068	62,742,982	5,199	99.98	45,187,838
1954	12,502	65,518,853	5,241	100.79	43,072,894
1955	12,399	71,293,263	5,750	110.58	52,189,728
1956	14,008	83,568,996	5,966	114.73	60,468,580
1957	14,652	85,125,320	5,809	111.71	59,571,834
1958	14,100	74,726,972	5,300	101.93	56,255,809
1959	11,568	72,095,130	6,232	119.85	53,121,545
1960	13,764	90,312,848	6,562	126.19	66,032,439
1961	14,275	97,271,286	6,814	131.04	71,918,991
1962	14,408	101,920,108	7,074	136.04	78,868,147
1963	14,303	104,291,588	7,292	140.23	80,615,132
1964	14,720	113,792,031	7,730	148.65	86,132,039
1965	15,239	122,163,124	8,016	154.16	92,859,535
1966 <u>1/</u>	17,018	137,187,611	8,061	155.02	101,558,298
1967	13,426	108,427,206	8,076	155.31	74,289,203
1968	15,734	136,089,579	8,649	166.33	101,293,963
1969	19,459	173,183,018	8,900	171.15	127,848,828
1970	21,479	201,665,064	9,389	180.56	150,241,000
1971	21,231	211,978,597	9,984	192.00	149,294,000

1/ "Covered Employment" by law includes all employees of employers of three or more persons. Therefore, the figures for "All Employees" in Tables XIII and XIV should be somewhat higher than those for "Covered Employees" in this table provided the same industries were involved. However, this table includes some smelter workers which the other two do not. Prior to 1966 the average numbers in this table included roughly 500 to 1000 Arizona copper smelter workers, the rest of the smelter employees being included under "Manufacturing." Beginning in 1966, all covered smelter workers are included in the average in this column. Figures are from the Unemployment Compensation Division, Employment Security Commission of Arizona.

2/ "Total Wages in Covered Industry," "Mining-copper."

3/ Short tons of "Lode ore: copper" reported by the U.S. Bur. of Mines.

TABLE XXI

ARIZONA INDUSTRIES COVERED BY SOCIAL SECURITY

AVERAGE NUMBER OF COVERED EMPLOYEES, TOTAL WAGES, AVERAGE ANNUAL WAGE
AND AVERAGE WEEKLY WAGE

Period 1947-1949 and Years 1969, 1970 and 1971

<u>Industry</u>	<u>Average No. of 1/ Employees</u>	<u>Total Wages</u>	<u>Average Annual Wage</u>	<u>Average Weekly Wage</u>
<u>Period 1947-1949</u>				
Copper Mining <u>4a/</u>	10,700	\$ 37,438,008	\$3,499	\$ 67.27
Copper Smelting <u>4b/</u>	2,078	7,169,000	3,450	66.35
Total Copper Min'g & Smelting	12,778	44,607,008	\$3,491	\$ 67.13
Other Mining & Quarrying	1,592	4,913,010	3,085	59.33
All Min'g, Quarry'g & Smelting	14,370	\$ 49,520,018	\$3,446	\$ 66.27
Mfg., Ex. Copper Smelting <u>4b/</u>	12,639	36,910,624	2,920	56.15
Construction	10,844	35,424,826	3,267	62.83
Transp., Utilities, etc. <u>5/</u>	10,530	29,948,944	2,944	54.69
Wholesale - Retail Trade	36,213	91,916,860	2,538	48.81
Services, Finance, and Misc.	18,643	43,103,526	2,312	44.46
TOTALS AND AVERAGES	103,239	\$ 286,824,798	\$2,778	\$ 53.42
<u>YEAR 1969</u>				
Copper Mining <u>2/</u>	17,473	\$ 156,278,772	\$8,923	\$171.60
Copper Smelting <u>3/</u>	1,986	16,904,246	8,512	163.69
Total Copper Min'g & Smelting	19,459	\$ 173,183,018	\$8,900	\$171.15
Other Mining & Quarrying	1,524	12,095,708	7,937	152.63
All Min'g, Quarry'g & Smelting	20,983	\$ 185,278,726	\$8,830	\$169.81
Mfg., Ex. Copper Smelting	92,370	723,505,497	7,833	150.63
Construction	33,303	307,238,608	9,226	177.42
Transp., Utilities, ext. <u>5/</u>	25,544	203,764,145	7,977	153.40
Wholesale - Retail Trade	112,775	592,249,783	5,252	101.00
Services, Finance and Misc.	85,118	477,274,188	5,607	107.83
TOTALS AND AVERAGES	370,092	\$2,489,310,947	\$6,726	\$129.35

Source: Arizona Employment Security Commission.

1/ Includes all covered employees. Figures relating to copper mining and smelting, and manufacturing, are adjusted as described in the following footnotes.

2/ The first number includes all covered employees in copper mining and milling and probably those in one smelter. The figure therefore is higher than that for "All Employees" in "Copper Mining" in Arizona in column 1, Table XIII.

(continued next page)

TABLE XXI (Continued)

Industry	YEAR 1970			
	Average No. of <u>1/</u> Employees	Total Wages	Average Annual Wage	Average Weekly Wage
Copper Mining <u>2/</u>	19,340	\$ 182,501,779	\$9,436	\$181.47
Copper Smelting <u>3/</u>	2,139	19,163,285	8,959	172.29
Total Copper Min'g & Smelting	21,479	\$ 201,665,064	\$9,389	\$180.55
Other Mining & Quarrying	1,802	16,351,472	9,074	174.50
All Min'g, Quarry'g & Smelting	23,281	\$ 218,016,536	\$9,364	\$180.08
Mfg., Ex. Copper Smelting	89,040	747,878,179	8,411	161.74
Construction	37,047	361,894,121	9,769	187.86
Transp., Utilities, etc. <u>5/</u>	27,478	235,905,293	8,585	165.10
Wholesale - Retail Trade	123,139	679,612,363	5,519	106.14
Services, Finance and Misc.	91,411	560,822,791	6,135	117.98
TOTALS AND AVERAGES	391,396	\$ 2,804,129,283	\$7,164	\$137.78

YEAR 1971				
Copper Mining <u>2/</u>	19,209	\$ 192,278,918	\$10,010	\$192.50
Copper Smelting <u>3/</u>	2,022	19,699,679	9,742	187.35
Total Copper Min'g & Smelting	21,231	\$ 211,978,597	\$ 9,984	\$192.00
Other Min'g, Quarry'g & Smelting	1,783	17,574,490	9,857	189.56
All Min'g, Quarry'g & Smelting	23,014	\$ 229,553,087	\$ 9,974	\$191.81
Mfg., Ex. Copper Smelting	86,398	767,838,982	8,887	170.90
Construction	43,783	478,564,486	10,930	210.19
Transp., Utilities, etc. <u>5/</u>	28,651	265,094,029	9,252	177.92
Wholesale - Retail Trade	130,669	766,582,732	5,866	112.81
Services, Finance and Misc.	99,957	657,528,823	6,578	126.50
TOTALS AND AVERAGES	412,472	\$ 3,165,162,139	\$ 7,674	\$147.58

3/ According to correspondence from the Employment Security Commission of Arizona, these figures include all covered smelter employees excepting those included in "Copper Mining." A majority of copper smelting employees customarily are reported under "Manufacturing" and the rest under "Copper Mining".

4a/ The 1947-49 figure of 10,700 for "All Employees" in "Copper Mining" is used for Copper Mining here, because an average figure of 11,278 computed from ESC reports for this category, obviously includes smelter employees which are assumed to amount to at least the difference of 578. Where the same mine and connected plants are concerned, "Covered Employees" by definition should be less than "All Employees."

4b/ The 1947-49 Figures for "Copper Smelting" wages include the 578 employees at average wages for an average 1500 Copper Smelting employees included under Manufacturing in published ESC reports for the period. Average figures for Copper Mining and Manufacturing wages for the period, are adjusted accordingly.

5/ Transportation exclusive of railroads.

TABLE XXII--Mineral Production in Arizona 1/

Mineral	1970		1971	
	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays-----thousand short tons---	199	\$454	2/119	2/\$84
Coal (bituminous)-----do-----	W	W	1,146	W
Copper-----short tons---	917,918	1,059,277	820,171	852,978
Gem Stones-----	NA	155	NA	160
Gold (recoverable content of ores, etc.)-----troy ounces---	109,853	3,998	94,038	3,879
Gypsum-----thousand short tons---	98	358	W	W
Helium, grade A-----million cubic feet---	62	1,186	W	W
Iron ore (usable)-----thousand long tons, gross weight---	W	W	15,859	W
Lead (recoverable content of ores, etc.)-----short tons---	285	89	859	237
Lime-----thousand short tons---	309	4,523	296	4,474
Molybdenum (content of concentrate)-----thousand pounds---	15,672	26,700	22,684	39,872
Natural gas (marketed)-----million cubic feet---	1,101	188	868	153
Petroleum (crude)-----thousand 42-gallon barrels---	1,784	5,281	1,236	3,918
Pumice-----thousand short tons---	824	627	949	625
Sand and gravel-----do-----	17,822	19,804	19,791	24,391
Silver (recoverable content of ores, etc.) thousand troy ounces---	7,330	12,981	6,170	9,538
Stone-----thousand short tons---	3,511	7,094	2,873	5,848
Zinc (recoverable content of ores, etc.)-----short tons---	9,618	2,947	7,761	2,499
Value of items that cannot be disclosed: Asbestos, cement, clays (bentonite, 1971), diatomite, feldspar, fluorspar, mica (scrap), perlite, pyrites, tungsten concentrates, and values indicated by symbol W-----	XX	21,105	XX	32,364
Total-----	XX	1,166,767	XX	981,020
Total 1967-constant dollars-----	XX	1,043,673	XX	p/852,310

p/ Preliminary. NA Not available. W Withheld to avoid disclosing individual company confidential data.

XX Not applicable.

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

2/ Excludes bentonite; included with "Value of items that cannot be disclosed."

Source: U. S. Bureau of Mines

Table XXIII--Value of mineral production in Arizona, by counties

County	1970	1971	Minerals produced in 1971 in order of value
Apache	\$7,231	\$5,913	Petroleum, helium, clays, natural gas, pumice, iron ore, sand and gravel, stone,
Cochise	78,297	62,799	Copper, stone, lime, silver, gold, sand and gravel, fluorspar.
Cocconino	2,290	666	Pumice, sand and gravel, stone.
Gila	124,653	101,614	Copper, molybdenum, asbestos, lime, stone, silver, sand and gravel, gold, fluorspar, clays.
Graham	W	W	Sand and gravel, stone, lead, zinc, copper pumice, silver, gold.
Greenlee	151,043	119,492	Copper, silver, lime, stone, gold, sand and gravel.
Maricopa	7,258	14,420	Sand and gravel, lime, stone, clay, mica, copper, silver, gold.
Mohave	40,762	34,017	Copper, molybdenum, sand and gravel, silver, stone, feldspar, gold, tungsten, clay.
Navajo	W	W	Coal, sand and gravel, pumice, stone.
Pima	422,298	378,219	Copper, molybdenum, cement, silver, sand and gravel, gold, stone, lead, clay, zinc, mica.
Pinal	285,166	211,772	Copper, molybdenum, silver, gold, sand and gravel, gypsum, lime, stone, perlite, diatomite, pyrites, lead.
Santa Cruz	W	W	Sand and gravel, stone, tungsten, copper, lead, silver, zinc.
Yavapai	41,698	46,284	Copper, cement, zinc, sand and gravel, stone, lime, molybdenum, gypsum, silver clays, lead, gold, pumice, iron ore.
Yuma	W	W	Sand and gravel, stone, copper, silver, gold.
Undist. 1/	6,071	5,819	
Total 2/	\$1,166,767	981,020	

1/ Includes, gem stones, sand and gravel, and stone that cannot be assigned to specific counties, and values indicated by symbol W.

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

W Withheld to avoid disclosing individual company confidential data; included with "Undistributed".

Source: U. S. Bureau of Mines