494

COPPER INDUSTRY

STATISTICS FOR 1967 COMPARED WITH OTHER YEARS

ARIZONA, UNITED STATES AND WORLD

COMPILED BY ARIZONA DEPARTMENT OF MINERAL RESOURCES

Fairgrounds, Phoenix, Arizona

Frank P. Knight, Director

Leonard Klein, Statistical Consultant

B. H. Gerwin, Assistant to Director

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COPPER

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-centered 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 per cent 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 per cent eventually returns to use as copper or copper alloys.

* U.S.B.M.'s "MATERIALS SURVEY"

REFINED STOCKS - END OF PERIOD

Prior to Build-Up	Tons
Dec. 1960	456,094
" 1961	461,252
" 1962	465,592
" 1963	474,875
" 1964	429,989
" 1965	462,519
June 1966	460,848

Build-Up Strike, and Post-Strike Period			
Month	1966 Tons	1967 Tons	1968 Tons
January		553,627	446,839
February		560,544	426,445
March		587,410	424,960
April		606,009	474,562
May		619,278	488,748
June		641,083	485,222
July	507,689	633,016	
August	531,224	589,504	
September	525,908	540,711	
October	526,200	502,685	
November	533,227	480,069	
December	558,599	479,572	

At the end of June 1967, just before the strikes started, the inventory of 641,083 tons was the highest recorded; at the end of November and December 1967, the inventories were still above the highest recorded prior to July 1966; and after the resumption of operations in April 1968, fabricators' stocks climbed within three months to a level higher than at any time before the accumulation started in anticipation of the strikes.

It was fortunate for the United States copper fabricating industry, and especially for production of copper products required for Vietnam, that an economic recession set in in Europe even before 1966. The United States was able to import large quantities of refined copper that normally would have gone to European nations, from South America, Canada and Africa. European nations imported quantities of copper from the Soviet Union and East Germany which they retained for their use and shipped to us equivalent tonnages of refined copper they imported from South America, Canada and Africa (since it is illegal for an American firm to import copper received from Soviet nations). This gave the European nations a profit in the trading; seriously increased our dollar balance deficit; and increased the cost to Americans of copper products fabricated from refined copper thus imported.

The Business and Defense Services Administration reported that in 1967: "demand for copper raw materials in several European countries continued to lag behind that of previous years." (Quarterly Report - January 1968)

Japan became an important purchaser of European copper ore and concentrates as well as Chilean, African and Canadian ores and concentrates in 1966 and 1967. Imports of blister copper into the United States decreased and exports of refined copper processed therefrom on toll and then exported decreased because of the closing down of some of the American smelters and refineries by the strikes.

The inventory build-up by the fabricators was accomplished by (a) acceleration of production at American mines prior to the strike; (b) release of Government

EXHIBIT "A"

New Mine Production Entering U.S. Pipe Line
1966, 1967, Jan - June 1968 (short tons)

	1966 (a)		1967 (b)		1968 (c)	1966	1967
	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Total	Total
Ore, Matte, Blister Imported	169,647	222,212	180,501	121,668	125,752	391,859	302,169
Less Refined Copper Exported							
to Europe	103,254	76,260	83,695	20,489	46,412	179,514	104,184
Canada	4,249	6,100	3,558	1,228	1,190	10,349	4,786
Latin America	22,915	23,059	4,569	3,818	7,982	45,974	8,387
Africa	11	172	none	none	none	183	none
Asia	25,928	11,102	30,424	11,119	5,590	37,030	41,543
Australia	9	12	none	69	none	21	69
not specified	none	none	326	380	177	none	706
Total Refined Copper Exported	156,366	116,705	122,572	37,103	61,351	273,071	159,675
Net Unrefined Copper Imported	13,281	105,507	57,929	84,565	64,401	118,788	142,494
Refined Copper Imported							
from Europe	702	28,843	17,166	86,592	156,905	29,545	103,758
Canada	41,186	44,537	62,362	78,069	90,285	85,723	140,431
Latin America	22,349	23,046	29,988	28,495	65,706	45,395	58,483
Africa	none	1,500	6,781	15,660	29,422	1,500	22,441
Asia	442	none	none	none	516	442	none
Australia	none	none	none	2,247	4,036	none	2,247
not specified	none	none	266	642	3,890	none	908
Total Refined Copper Imported	64,679	97,926	116,563	211,705	350,760	162,605	328,268
Net Imports (imports minus exports)	77,960	203,433	174,492	296,270	415,161	281,393	470,762
U.S. New Mine Production							
Arizona	376,655	362,914	392,513	109,228	248,241	739,569	501,741
Other States	341,307	348,276	369,727	82,596	213,939	689,583	452,323
Total U.S. Mine Production	717,962	711,190	762,240	191,824	462,180	1,429,152	954,064
less Concentrates Exported	1,976	169	506	59,187	71,649	2,145	59,693
U.S. Production Remaining in U.S.	715,986	711,021	761,734	132,637	390,531	1,427,007	894,371
New Copper Entering U.S. Pipe Line - Total	793,946	914,454	936,226	428,907	805,692	1,708,400	1,365,133
Net Imports - Percent of Total	9.8%	22.2%	18.6%	69.1%	51.5%	16.4%	34.5%
Arizona Percent of Total	47.4%	39.7%	4.19%	2.55%	30.8%	43.3%	36.8 %
Arizona Percent of U.S. Production	52.5%	51.0%	51.5%	56.9%	53.7%	51.7%	52.6%

(a) Mineral Yearbook 1966 (b) Amer. Bureau Metal Statistics 1967 (c) Mineral Industry Surveys 1968

as in Chile, Peru and South African nations and is reported to have received offers to participate in major development projects on Bougainville Island and West Irian. However Japanese financial concerns at present are unwilling to accept mining assets abroad as collateral for mine development loans, due most probably to uncertainty regarding the intercessions by the foreign governments. A large part of this contemplated future production in the numerous non-consuming nations may be dependent upon the Japanese government's backing some of these development ventures.

The estimated 1968 capacities of Arizona copper mines compared with their presently contemplated 1969-1972 capacities are given below. Most of the construction and expansion projects being installed at the inception of the strikes were not affected by the strikes and the capacities completed in 1967 and 1968 are included in estimated 1968 capacity.

ARIZONA

ESTIMATED ANNUAL COPPER PRODUCTIVE CAPACITY *
(Estimated by Arizona Department of Mineral Resources)

	1968	1969	1970	1971	1972
Asarco-Silver Bell	24,800	24,800	24,800	24,800	24,800
Mission	65,000	65,000	65,000	65,000	65,000
No. San Xavier		(included in "Miscellaneous")			
Anaconda - Twin Buttes			46,000	46,000	46,000
Bagdad	20,000	20,000	20,000	20,000	20,000
Cyprus - Old Dick		4,500	4,500		
Pima	54,000	54,000	54,000	54,000	54,000
Duval-Esperanza	26,000	26,000	26,000	26,000	26,000
Mineral Park	27,500	27,500	27,500	27,500	27,500
Sierrita		19,000	57,000	57,000	57,000
Inspiration-Inspiration	55,000	55,000	55,000	55,000	55,000
Christmas	9,000	9,000	9,000	9,000	9,000
Ox-Hide		4,000	4,000	8,000	8,000
Kennecott-Ray	76,000	100,000	100,000	100,000	100,000
Magma-San Manuel	102,000	102,000	102,000	102,000	102,000
Superior	23,100	23,100	23,100	38,000	38,000
Kalamazoo					50,000
Phelps Dodge-Morenci	144,000	149,000	149,000	149,000	149,000
New Cornelia	71,000	71,000	71,000	71,000	71,000
Lavender Pit	35,000	35,000	28,000	21,000	14,000
Copper Queen	27,000	27,000	22,000	17,000	12,000
Ranchers - Bluebird	5,400	5,400	5,400	5,400	5,400
Tennessee - Miami	9,000	9,000	9,000	9,000	9.000
Castle Dome	2,000	2,000	2,000	2,000	2,000
Copper Cities	24,000	24,000	24,000	24,000	24,000
Miscellaneous	15,500	18,000	18,500	20,000	20,500
Total	815,300	874,300	946,800	950,700	989,200

* Short Tons

There is a "peril point" of 24¢ per pound. If the market price for copper drops to 24 cents, a 2¢ tariff will be reimposed.

The United States Senate has approved a two-year extension of the copper duty suspension with the peril point raised from 24 cents to 36 cents a pound, and the matter is before a Senate-House conference committee.

Had it not been for the strikes in the United States in 1967-68, the fall-off in European demand, accelerated production, and increase in capacity to produce would have resulted in a period of overproduction of copper, in spite of the increase in consumption occasioned by the Vietnam war, and the interference with production in countries abroad.

The London Mining Journal of August 30, 1968 summarizes the present situation as follows:

> "Clearly, there is no longer a shortage in America and despite the production that has been lost through fuel supply difficulties in Zambia and drought conditions in Chile, there is no physical shortage of copper in Europe. On the L.M.E. warehouse stocks have stood around 20,000 tons for some weeks and are still above 15,000 tons, despite the abnormal deliveries last week. Looking to the future, with Zambia now back at full output, everything points to a surplus before year-end at a rate equivalent to at least 200,000 s. tons per year - especially if U. S. consumption is no more than 1.5 - 1.6 million s. tons."

The consumption of "1.5 - 1.6 million s. tons" is the range of 1964-66 consumption, as is shown by the following table:

	"Withdrawals from Total Supply" (a)	U.S. Population June 20 of each year (b)	Pounds Cu Consumption Per Capita
1964	1,495,000 s. tons	192,120,000	15.6
1965	1,526,000 " "	194,592,000	15.7
1966	1,593,000 " "	196,920,000	16.1

(a) Withdrawals on domestic account - primary copper, Minerals Yearbooks, U. S. Bur. of Mines
(b) U. S. Bureau of Census

Others disagree with the Journal's prediction, and domestic and foreign copper prices do not yet reflect such anticipated surplus. However, there has been a decrease in copper set-asides.

Because of the increasing demand for copper, in February 1966 the Business and Defense Services Administration established a 10 percent set-aside of producers' domestic refined copper for defense-rated orders. These set-asides were revised upward to 13 percent for the third quarter and to 18 percent for the fourth quarter of that year. Effective December 2, 1966 the BDSA amended

	Cents Per Hour			
	1-24-68	1-24-69	1-24-70	Total
Wages	15.00	15.00	16.00	46.00
Increment between job classes	5.00		8.25	13.25
Job reclassification	1.50			1.50
Shift Differentials		1.07		1.07
One additional holiday		1.20		1.20
Change in Sunday work premiums	.30			.30
Increased disability costs	15.77			15.77
Change in medical and hospital costs	2.20			2.20
Change in insurance provisions		5.34		5.34
Impact (a)	3.20	2.41	3.64	9.25
	42.97¢	25.02¢	27.89¢	95.88¢

(a) "Impact" is the increased cost superimposed upon the added costs granted by the bargaining; where wages are increased, the overtime paid on the base wage is automatically increased proportionately; taxes paid based on payroll are increased as the base payroll is increased due to higher wages (including the "impact" thereon); insurance stood by the company increases as the total spent for wages increases (including all increases), etc.

The need for copper is expected to more than double by 1985. Therefore Arizona's copper resources are of great importance to the Nations' economy and defense. Her copper mines have been producing more than half of the copper produced in the United States, the largest producer of copper in the Free World (U.S.S.R. is by far the second largest producer). However, the copper developments in the world all have an affect upon Arizona, because copper has a world market. She has met the challenges of the past with tremendous advances in mining technology, and expects to continue to meet them. However, there has been a noticeable increase in U. S. investment in foreign mines. Capital will go where profit is greatest, and it behooves Arizona and the Nation to look to their mineral policies. Capital, never too available, wants the greatest possible stability of economic conditions, including that provided by protection against excessive imports of low cost, foreign copper. The Nation needs her copper mines and the capital investment necessary to find and develop them.

TABLE II

MINE PRODUCTION OF RECOVERABLE COPPER IN THE UNITED STATES

1965 - 1967, BY STATES, IN SHORT TONS 1/

STATE	1965	1966	1967	RANK in 1967
Alaska	32	- -	- -	
Arizona	703,377	739,569	501,741	(I)
California	1,165	1,078	788	
Colorado	3,828	4,237	3,993	(10)
Idaho	5,140	4,961	4,210	(9)
Michigan	71,749	73,449	58,458	(5)
Missouri	2,331	3,913	3,215	
Montana	115,489	128,061	65,483	(4)
Nevada	71,332	78,720	50,771	(6)
New Mexico	98,658	108,614	75,008	(3)
Oregon	- -	- -	- -	
Pennsylvania	4,354	3,178	4,401	(8)
South Dakota	- -	- -	- -	
Tennessee	14,823	15,410	14,600	(7)
Utah	259,138	265,383	168,609	(2)
Washington	30	34	21	
Wyoming	6	- -	- -	
Other States	282	2,545	2,766	
TOTAL	1,351,734	1,429,152	954,064	

1/ U.S. Bureau of Mines

TABLE III (Continued)

Year	ARIZONA Tons	ARIZONA % of U. S. Prod.	ARIZONA % of World Prod.	UNITED STATES Tons	UNITED STATES % of World Prod.	WORLD Tons	E.& M. J. Price Per Pound
1932 3/	91,246	38.3	8.0	238,111	20.9	1,138,676	5.555¢
1933 3/	57,021	29.9	4.9	190,643	16.4	1,159,000	7.025
1934 3/	89,041	37.5	6.3	237,401	16.8	1,415,353	8.428
1935 3/	139,015	36.0	8.4	386,491	23.5	1,647,939	8.649
1936 3/	211,275	34.4	11.1	614,516	32.4	1,899,263	9.474
1937	288,475	34.3	11.2	841,998	32.8	2,567,916	13.167
1938 4/	210,797	37.8	9.3	557,763	24.5	2,274,045	10.000
1939 5/	262,117	36.0	10.6	728,320	29.4	2,481,277	10.965
1940 5/	281,169	32.0	10.5	878,086	32.7	2,688,510	11.296
1941 5/	326,317	34.1	11.2	958,149	33.0	2,903,458	11.797
1932 to 1941	1,956,473	34.7	9.7	5,631,478	27.9	20,175,437	10.566¢
1942 5/	393,387	36.4	12.9	1,080,061	35.5	3,039,041	11.775¢
1943 5/	403,181	37.0	13.2	1,090,818	35.6	3,064,394	11.775
1944 5/	358,303	36.8	12.5	972,549	33.9	2,866,000	11.775
1945	287,203	37.2	12.0	772,894	32.2	2,400,000	11.775
1946	289,223	47.5	14.1	608,737	29.6	2,056,000	13.820
1947	366,218	43.2	14.6	847,563	33.9	2,500,000	20.958
1948 6/	375,121	44.9	14.4	834,813	32.1	2,600,000	22.038
1949 6/	359,010	47.7	14.4	752,750	30.1	2,500,000	19.202
1950	403,301	44.4	14.4	909,343	32.5	2,760,000	21.235
1951	415,870	44.8	14.3	928,330	32.0	2,900,000	24.200
1942 to 1951	3,650,817	41.5	13.7	8,797,858	33.0	26,685,435	16.699¢

(Continued)

TABLE III Continued

NOTES: 1/ World War I 1914 - 1918.

2/ Post World War I Recession. Lasted about one year.

3/ Depression began in 1930; was at its worst in 1933; gradually improved till 1937.

4/ Recession in 1938. Recovery in 1939 caused by War demand.

5/ World War II began in 1939; copper consumption reached its height in 1944.

6/ In the year 1948 and the early months of 1949, copper was being produced in the United States at the rate of 68,000 short tons per month, imports were at the rate of 18,000 tons of blister copper and 22,000 tons of refined copper, and exports were at the rate of 12,000 tons per month. The price of copper averaged 22.5 cts. during this period, varying from 21-3/8 to 23-3/8 cts.

In March 1949 the copper import tax was suspended, and during the months following the suspension, domestic demand fell drastically, and for four months net domestic consumption of copper was at or below the level of domestic production, even though the latter was severely curtailed. During this period, imports continued at practically the same rate. The price of copper dropped from 23-3/8 cts. to 16-1/2 cts. per pound. Many mines were forced to close down, and the large low-cost producers curtailed production. The average monthly production dropped from a high of 78,000 to a low of 56,000 tons.

7/ Curtailment early in the year, and a series of strikes in August and September caused a loss in production of over 100,000 tons. Reduced consumption in the U. S. was offset by an appreciable rise in the use of copper outside of this country, chiefly Europe. Result: a short supply of copper at the end of the year.

8/ Highest annual production in history.

9/ The 1967 Copper Strike started July 16, 1967, ending in March 1968.

10/ Mining Journal (London), May 1968, p35

TABLE V

WORLD MINE PRODUCTION OF RECOVERABLE COPPER

BY CONTINENTS AND PRINCIPAL COUNTRIES IN THOUSAND SHORT TONS

Years 1964, 1965 1966 and 1967

	1964	1965	1966	1967
NORTH AMERICA:				
U.S.A.	1,247	1,352	1,429	954
Canada	487	517	510	603
Mexico	58	76	82	69
Other	22	27	20	12
	1,814	1,972	2,041	1,638
SOUTH AMERICA:				
Chile	685	642	724	729
Peru	194	196	194	200
Other	10	9	10	20
	889	847	928	949
EUROPE:				
U.S.S.R.	770	830	880	850
Yugoslavia	70	69	69	70
Others	160	163	156	186
	1,000	1,062	1,105	1,106
ASIA:				
China	99	99	99	85
Cyprus	19	22	28	17
Japan	117	118	123	130
Philippines	67	70	81	95
Turkey	38	36	40	34
Others	33	35	37	20
	373	380	408	381
AFRICA:				
Zambia	697	767	687	730
Republic of the Congo	305	310	348	352
Republic of So. Africa	66	67	137	141
Others	80	85	83	69
	1,148	1,237	1,255	1,292
AUSTRALIA:	117	102	117	93
TOTAL WORLD:	5,340	5,600	5,854	5,459

Sources: U. S. Bur. of Mines; American Bur. of Metal Statistics 1967 p11

TABLE VII

IMPORTS OF COPPER INTO UNITED STATES

1965, 1966, 1967

1962, 1963, 1964

Short Tons

	1965	1966	1967*
Ore Matte-Regulus (Copper Content)	36,425	41,942	33,622
Canada	6,408	8,097	7,541
Chile	3,156	818	691
Mexico	104	83	206
Peru	10,364	6,838	6,924
Philippines	12,386	21,034	16,057
Republic of So. Africa	1,660	228	- -
Australia	845	1,202	1,085
Other Countries	1,502	3,642	1,118
Blister Copper (Copper Content)	332,560	349,917	268,671
Mexico	6,733	7,925	1,947
Chile	187,841	182,662	141,631
Peru	82,421	95,975	84,076
Republic of So. Africa	44,332	50,088	33,419
Other Countries	11,233	13,267	7,598
Refined Cathodes and Shapes	137,443	162,602	330,347
Canada	72,583	85,723	140,594
Chile	15,623	21,326	30,789
United Kingdom	342	14,104	20,268
Zambia, Malawi and Mozambique	3,190	1,164	11,077
Other Countries	45,705	40,285	127,619
TOTAL IMPORTS	506,428	554,461	632,640
TOTAL EXPORTS (refined & ore concts & matte)	340,475	275,220	219,045
EXCESS IMPORTS	165,593	279,241	413,595

YEARS	1962	1963	1964
TOTAL IMPORTS	474,052	536,560	579,296
TOTAL EXPORTS	338,442	312,687	321,645
EXCESS IMPORTS	135,610	223,873	257,651

* Category Totals are final. (U.S. Bureau of Mines Mineral Industry Survey June, 1967)

Sources: U. S. Bureau of Mines Minerals Yearbook.

TABLE IX

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

END OF PERIOD	IN U.S.A. U.S.B.M	IN U.S.A. COPPER INSTITUTE	OUTSIDE U.S.A. COPPER INSTITUTE
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	358,856
Year 1963	52,000	76,934	394,143
Year 1964	37,000	45,594	277,303
Year 1965	35,000	60,811	327,723
Year 1966	43,000	65,707	293,167
Year 1967	29,000	55,350	272,202

* 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 X

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 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
Year 1963	52,000	252,000	304,000
Year 1964	37,000	246,000	283,000
Year 1965	35,000	246,000	281,000
Year 1966	43,000	270,000	313,000
Year 1967	29,000	226,000	255,000

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

TABLE XII

U. S. PRODUCTION AND CONSUMPTION OF COPPER

Year	Mine Production	Secondary Production*	Total Production	Total Actual Consumption	Total Production As % of Consumption
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
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
Totals 1948-57	9,301,382	2,378,284	11,679,666	13,991,453	
10 Yr. Avg.	930,138	237,828	1,167,967	1,399,145	83.5
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
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	418,000	1,372,064	1,935,592	70.9
Total 1958-67	11,472,816	3,468,588	14,941,404	16,995,833	
10 Yr. Avg.	1,147,282	346,859	1,494,140	1,699,583	87.9

* Unalloyed Copper

Source: U. S. Bureau of Mines

TABLE XIII (continued)

	"G" Tons of Copper Ores Produced		"H" Pounds Equivalent 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 3 Years				
1965	92,859,535	173,286,198	1,341,593,000	2,533,750,000
1966	101,558,298	186,966,042	1,391,815,300	2,600,121,200
1967	74,289,203	127,066,097	1,029,484,000	2,183,386,000
1965-67 Avg.	89,569,012	162,439,446	1,254,297,000	2,439,086,000

* Includes value of gold and silver recovered from copper ore, converted into pounds copper at average price. Precipitates are not included.

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	Tons Copper Ore Produced Per Man Hour*		Pounds Equivalent Copper Produced Per Man Hour*	
	ARIZONA	U. S.	ARIZONA	U. S.
Base Period 1947-49 Avg.	1.5268	1.3336	29.9901	26.1639
1964-66 Avg.	2.8184	2.6485	40.657	38.5703
% Increase in 17 Years	84.60	98.60	35.57	47.42
Per Year	4.98	5.80	2.09	2.79

* Final figures to permit calculation of Pounds Equivalent Copper Produced Per Man Hour, are not available by months for 1967. Therefore, the averages for the 31 months period cannot be calculated yet, and 1964-66 figures are repeated in this report.

TABLE XV

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

	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	1,625,795,640
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
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	142,721,793	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
1963	146,449,540	438,537 $15,348,795	10,309,897 $13,187,595	2,178,498,800 $ 670,977,630	14.9 lbs. 30.8¢	$699,514,020	2,271,150,000
1964	155,200,464	430,630 $15,072,050	11,470,890 $14,831,861	2,280,880,781 $ 743,567,141	14.7 lbs. 32.6¢	$773,471,052	2,372,611,000
1965	173,286,198	567,531 $19,863,585	12,801,638 $16,552,518	2,430,879,000 $ 860,531,166	14.0 lbs. 35.4¢	$896,947,269	2,533,750,000
1966	186,966,042	547,327 $19,156,445	13,230,411 $17,106,921	2,499,863,100 $ 904,200,483	13.37 lbs. 36.17¢	$940,463,849	2,600,121,200
1967	127,066,097	321,398 $11,248,930	8,351,423 $12,942,033	1,608,078,200 $ 614,703,973	12.66 lbs. 38.226¢	$638,894,936	1,671,362,200

Source: U. S. Bureau of Mines

CONTENTS

ARIZONA SUPPLEMENT

A R I Z O N A

Notwithstanding the crippling effect of the strikes by the coalition of labor unions against most of the U. S. copper mining, smelting and refining companies, Arizona in 1967 retained the position it has held since 1910 of producing more copper than any other state in the country. For the seventh successive year Arizona also produced more copper than all of the other states put together. In 1967, 52.6 percent of the copper mined in the United States came from the mines of Arizona. The comparable figure in 1966 was 51.7 percent.

The strikes went into effect in mid-July 1967, but five of Arizona's major copper mines - Bagdad, Duval's Esperanza and Mineral Park, Asarco's Silver Bell, and Pima Mining Company's Pima mine - continued to operate. However in each case the smelter at which the mine's products had been treated, was shut down by the strike, so that the five properties, plus other smaller Arizona producers, were obliged to stockpile their concentrates and precipitates, except to the extent that they were able to make arrangements under the liberalized Federal licensing provisions to permit export of up to 80% of the accumulating concentrates for treatment abroad where the refined metal returned therefrom was to be sold abroad; or up to the entire output if the refined metal was to be returned to the United States. Duval Corporation's operations at the Esperanza and Mineral Park mines were the first to obtain a permit to export concentrates, followed by Pima Mining Company and Bagdad Copper Co. - with the concentrates being shipped to Japan and to Canada. The sizeable Arizona tonnage of stockpiled 1967 concentrates and precipitates is being processed in 1968.

A number of the dump leaching operations were continued during the strike so that Arizona's leach copper production dropped only from 62,502 tons in 1966 to 55,471 tons in 1967.

While Arizona's total copper production dropped from 739,569 tons in 1966 to 501,741 tons in 1967 -- a drop of 32.2 percent, the total United States production dropped from 1,429,152 tons to 954,064 tons or 33.2 percent.

With the completion of the expansion programs of Asarco's Mission mine, the Pima mine, Duval's Esperanza mine, El Paso Natural Gas Company's Emerald Isle and Lake Shore mines, and Ranchers Exploration and Development Corp.'s Bluebird mine, together with completion of process improvements at Morenci and Inspiration, it is estimated that Arizona will end 1968 with a productive capacity of over 815,000 tons per annum. The mines that had been closed by the strike were operating by the end of March 1968 - so that it is anticipated that 1968's production will compare favorably with the record 1966 production of 739,569 tons.

An indication of the capacity of Arizona's copper mines prior to the strike, is the 4.2 percent increase in Arizona's production for the six months period prior to the strikes (Jan.-June 1967, 392,513 tons) over the corresponding six months of the previous year, (376,655 tons).

New projects announced for additional Arizona copper production in later years are (1) the silicate ore treatment plant at Kennecott's Ray Mines Division to yield 24,000 tons per annum of copper beginning in 1969; (2) the Anaconda Twin Buttes development with an approximate annual capacity of 46,000 tons to start production in 1969; (3) the Old Dick property of Cyprus Mines Corp. to produce about 9000 tons of copper in 1969-1970; (4) the Sierrita property of Duval Corp. to be brought into production with the help of a contract with the General Services Administration

TABLE XVI

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

Year	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 to 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
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
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 $4,049,690	1,092,360,900 $326,845,395	14.6 Lbs/ton 29.9¢	$335,416,435	1,121,007,000
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
1963	80,615,132	121,177 $4,241,195	4,494,239 $5,748,132	1,217,337,700 $372,505,336	15.1 Lbs/ton 30.6¢	$382,494,463	1,249,982,000
1964	86,132,039	133,983 $4,689,405	4,915,362 $6,355,563	1,279,898,700 $417,246,976	14.9 Lbs/ton 32.6¢	$428,291,944	1,313,779,000
1965	92,859,535	133,830 $4,684,050	5,352,850 $6,921,235	1,308,809,700 $463,318,634	14.1 Lbs/ton 35.4¢	$474,923,919	1,341,593,000
1966	101,558,298	127,431 $4,460,085	5,595,644 $7,235,168	1,359,481,200 $491,724,350	13.39 Lbs/ton 36.17¢	$503,419,603	1,391,815,300
1967	74,289,203	66,933 $2,342,655	3,996,587 $6,193,431	901,853,500 $344,742,519	12.14 Lbs/ton 38.226¢	$353,278,605	924,184,000

* Does not include precipitate copper.

Source: U. S. Bureau of Mines

TABLE XVIII

MINE PRODUCTION OF GOLD, SILVER, COPPER, LEAD AND ZINC IN ARIZONA, 1967, BY CLASSES OF ORE OR OTHER SOURCE MATERIALS, IN TERMS OF RECOVERABLE METALS

Source	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	474	29	105	14,300	-----	-----
Dry gold-silver	4	49,529	73	3,426	846,300	-----	-----
Dry silver	10	13,551	8	37,995	44,300	5,100	-----
Total	19	63,554	110	41,526	904,900	5,100	-----
Copper	35	74,289,203	66,933	3,996,587	901,853,500	300	672,400
Copper-zinc	2	17,306	10	6,937	585,600	2,900	1,363,800
Lead	3	1,163	4	2,122	3,300	116,500	7,200
Lead-zinc and zinc 2/	3/ 7	344,307	12,997	526,233	1,014,700	9,350,400	26,616,600
Total	45	74,651,979	79,944	4,531,879	903,457,100	9,470,100	28,660,000
Other "lode" material:							
Gold-silver tailings	2	24,987	407	10,889	103,600	-----	---------
Copper cleanup	(4/)	1,309	31	868	296,500	-----	---------
Copper precipitates	21	66,892	---	------	98,718,600	-----	---------
Lead cleanup	(4/)	288	350	2,919	1,300	66,800	---------
Total	11	93,476	788	14,676	99,120,000	66,800	----------
Total "lode" material	75	74,809,009	80,842	4,588,081	1,003,482,000	9,542,000	28,660,000
Placer	1	-----	2	-----	-----	-----	---------
Total all sources	76	74,809,009	80,844	4,588,081	1,003,482,000	9,542,000	28,660,000

1/ Detail will not necessarily add to totals because some mines produce more than one class of material.
2/ Combined to avoid disclosing individual company confidential data.
3/ 6 lead-zinc mines and 1 zinc mine.
4/ From properties not classed as mines.

Source: U.S.B.M.

TABLE XIX (Continued)

COPPER PRODUCTION RECORD OF LARGE ARIZONA COPPER MINES

YEARS 1966 and 1967

	1966		1967	
	Tons Copper Ore Mined	Pounds Copper Recovered	Tons Copper Ore Mined	Pounds Copper Recovered
A. S. & R. CO:				
Silver Bell	3,576,600	42,540,315	3,807,300	44,717,114
Precipitate Copper		5,065,888		5,017,427
Mission Unit	5,968,600	93,167,629	4,603,600	71,428,849
Precipitate Copper				
Sub-Total	9,545,200	140,773,832	8,410,900	121,163,390
PIMA MINING CO:				
Pima	6,024,014	78,630,738	9,913,553	98,586,052
Precipitate Copper				
Sub-Total	6,024,014	78,630,738	9,913,553	98,586,052
BAGDAD COPPER CORP:	2,091,899	27,257,133	2,090,601	25,683,196
From Leach		13,023,567		11,065,786
Sub-Total	2,091,899	40,280,700	2,090,601	36,748,982
DUVAL:				
Esperanza	4,384,278	40,819,919	4,982,038	42,065,058
Precipitate Copper		5,908,897		6,132,419
Mineral Park	5,559,094	46,294,180	5,687,478	47,282,120
Precipitate Copper		4,836,610		7,004,597
Sub-Total	9,943,372	97,859,606	10,669,516	102,484,194
TOTALS	99,632,991	1,469,470,328	72,135,519	988,401,837
Other Copper Producers	2,027,891	9,667,672		
GRAND TOTAL	101,660,882	1,479,138,000		

Source: Company Reports and U. S. Bureau of Mines

Arizona Department of Mineral Resourses

TABLE XXI

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

Base Period 1947-1949 and Years 1965, 1966 and 1967

ARIZONA INDUSTRIES COVERED BY SOCIAL SECURITY

	Average No. of 1/ Employees	Total Wages	Average Annual Wage	Average Weekly Wage
		Base Period 1947-1949		
Copper Mining Only 2/	11,278	$ 39,432,008	$ 3,496	$67.23
Copper Smelting 3/	1,500	5,175,000	3,450	66.35
All Mining & Smelting	12,778	$ 44,607,008	$ 3,491	$67.13
Other Mining & Quarrying	1,592	4,913,010	3,085	59.33
All Mining, Quarrying & Smelting	14,370	$ 49,520,018	$ 3,446	$66.27
Manufacturing (Excl. Smelting)	12,639	36,910,624	2,920	56.15
Construction	10,844	35,424,826	3,267	62.83
Trans. & Utilities (Excl. R.R.s)	10,530	29,948,944	2,844	54.69
Wholesale - Retail Trade	36,213	91,916,860	2,538	48.81
Services Misc. (Incl. Agri.)	18,643	43,103,526	2,312	44.46
TOTALS AND AVERAGES	103,239	$286,824,798	$ 2,778	$53.42
		YEAR 1965		
Copper Mining Only 2/	15,239	$122,163,124	$8,016	$154.16
Copper Smelting 3/	1,808	12,892,848	7,131	137.13
All Copper Mining & Smelting	17,047	$135,055,972	$7,922	$152.35
Other Mining & Quarrying	1,438	9,109,659	6,335	121.83
All Mining, Quarrying & Smelting	18,485	$144,165,631	$7,799	$149.99
Manufacturing (Exlc. Smelting)	62,574	408,893,517	6,535	125.67
Construction	22,892	163,351,181	7,136	137.23
Trans. & Utilities (Excl. R.R.s)	21,165	137,827,200	6,513	125.25
Wholesale - Retail Trade	91,128	398,693,547	4,375	84.14
Services Misc. (Incl. Agri.)	65,695	298,848,828	4,549	87.48
TOTALS AND AVERAGES	281,939	$1,551,779,904	$5,504	$105.85

Source: Arizona Employment Security Commission.

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 report.

2/ This number includes all copper mining and milling employees and some copper smelting employees not reported under Manufacturing by the Employment Security Commission.

3/ Smelting Employment has been segregated from Manufacturing as reported by the Employment Security Commission.

4/ Total covered Smelting Employees - 1,265 in 1967.

(Continued)

TABLE XXII

MINERAL PRODUCTION IN ARIZONA IN 1967 1/

	Quantity	Value (Thousands)
Clays 2/ ---------- thousand short tons	67	$37
Copper (recoverable content of ores, etc.) -short tons	501,741	383,591
Diatomite ---------- short tons	W	W
Fluorspar ---------- short tons	10,000	280
Gem stones ----------	NA	150
Gold (recoverable content of ores, etc. troy ounces-	80,844	2,830
Gypsum ----------thousand short tons	W	W
Helium 3/ ----------thousand cubic feet	73,800	2,066
Lead (recoverable content of ores, etc.) -- short tons	4,771	1,336
Lime ---------- thousand short tons	186	3,142
Mercury ---------- 76-pound flasks-	W	W
Molybdenum (content of concentrate) --- thousand pounds	9,261	15,385
Natural gas (marketed) ---------- million cubic feet	1,255	193
Petroleum (crude)---------- thousand 42-gallon barrels	2,924	8,188
Pumice ---------- thousand short tons	1,064	904
Sand and gravel ---------- thousand short tons	16,580	17,017
Silver (recov. content of ores,etc) " troy ounces	4,588	7,112
Stone ---------- thousand short tons	1,910	3,491
Tungsten concentrate (60-percent WO_3 basis)-short tons	W	W
Uranium 4/ (recoverable content U_3O_8 thousand pounds	83	666
Vanadium ----------short tons	W	W
Zinc (recoverable content of ores, etc.)----short tons	14,330	3,967
Value of items that cannot be disclosed: Asbestos, cement, clay (bentonite), feldspar, iron ore, mica (scrap), perlite, pyrites, vermiculite (1967), and values indicated by symbol W ----------	XX	13,503
Total ----------	XX	463,858
Total 1957-59 constant dollars ---------	XX	370,189

NA Not Available. W Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."
XX Not Applicable.
1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
2/ Excludes bentonite; included with "Value of items that cannot be disclosed."
3/ Bureau of Mines estimate from non-company sources.
4/ Method of reporting changed from short tons of ore and f.o.b. mine value (AEC Circular 5, Revised, price schedule) to recoverable pounds of uranium oxide and f.o.b. mill value.

Source U. S. Bureau of Mines.