

THE DEPENDENCY OF  
**ARIZONA**  
ON THE MINING INDUSTRY

Some statistics on the production, taxes, and  
far reaching influence of the mines — and  
their contributions to the economic stability  
of the state and welfare of its inhabitants.



*Compiled by the*  
**DEPARTMENT OF  
MINERAL RESOURCES**  
STATE OF ARIZONA  
and the  
**ARIZONA COPPER  
TARIFF BOARD**

## FOREWORD

The importance of the copper mining industry to the State of Arizona is graphically portrayed by these statistical studies showing the economic dependency of Arizona on its mines. The figures presented show the industry in normal times — not under the forced production demands of World War II — and give a picture of what can be expected during the years ahead.

The copper excise tax, established in 1932, brought to the domestic copper industry a prosperity such as it could not have enjoyed without protection against importations by lower cost producers abroad. As a direct result of that prosperity the mines of the country were able to supply the huge demands for copper occasioned by World War II. Any reduction in the 4-cent excise tax on copper will be particularly detrimental to Arizona's future as copper mining is the principal primary industry of the state.

Arizona is dependent on copper mining for its welfare, it is the most important copper producing state in the nation, and is one of the principal sources of that metal in the world. Thus a healthy mining industry in Arizona can make a major contribution to national security.





# Gold, Silver, Copper, Lead, and Zinc Produced in Arizona Since 1877

YEAR	GOLD		SILVER		COPPER		LEAD		ZINC		Total Value
	Production Ounces	Value	Production Ounces	Value	Production Tons	Value	Production Tons	Value	Production Tons	Value	
1877	15,091	\$ 311,931	386,728	\$ 464,074	1,500	570,000		\$		\$	1,355,286
1878	26,226	542,091	2,320,365	2,668,420	1,500	498,000					3,880,218
1879	38,701	799,950	2,745,765	3,075,257	1,542	573,624					4,734,390
1880	19,350	399,965	1,546,910	1,778,947	1,000	428,000					2,721,383
1877-80	99,368	2,053,937	6,999,768	7,986,698	5,542	2,069,624					12,110,259
1881	51,278	1,059,916	5,646,222	6,380,231	4,000	1,456,000					8,896,147
1882	51,519	1,064,898	5,800,913	6,613,041	8,992	3,434,944					11,112,883
1883	49,956	1,032,591	4,021,966	4,464,382	11,937	3,939,210					9,436,183
1884	44,988	929,902	3,480,548	3,863,408	13,367	3,475,420					8,268,730
1885	42,570	879,922	2,939,129	3,144,868	11,353	2,452,248					6,477,038
1881-85	240,311	4,967,229	21,888,778	24,465,930	49,649	14,757,822					44,190,981
1886	53,696	1,109,896	2,629,747	2,603,450	7,829	1,738,038					5,451,384
1887	40,155	830,004	2,939,129	2,880,346	8,860	2,445,360					6,155,710
1888	42,159	871,427	2,320,313	2,181,094	15,899	5,342,064					8,394,585
1889	43,537	899,910	1,500,000	1,410,000	15,793	4,264,110					6,574,020
1890	48,375	999,911	1,000,000	1,050,000	17,398	5,428,176					7,478,087
1886-90	227,922	4,711,148	10,389,189	10,124,830	65,779	19,217,748					34,053,786
1891	47,166	974,921	1,480,000	1,465,200	19,937	5,103,872					7,543,993
1892	51,761	1,069,900	1,161,900	1,010,853	19,218	4,458,576					6,539,329
1893	57,286	1,184,102	2,935,700	2,289,846	21,951	4,741,416					8,215,364
1894	86,324	1,784,317	1,147,204	722,739	22,257	4,228,830	1,480	97,680			6,833,566
1895	95,072	1,965,138	986,900	641,485	23,977	5,131,078	2,053	131,392			7,869,093
1891-95	337,609	5,978,378	7,711,704	6,130,123	107,340	23,663,772	3,533	229,072			37,001,345
1896	125,978	2,603,965	1,913,000	1,300,840	36,467	7,876,872	1,165	69,900			11,851,577
1897	140,098	2,895,826	2,239,900	1,343,940	40,765	9,783,600	2,184	157,248			14,180,614
1898	119,249	2,464,877	2,246,800	1,325,612	55,579	13,783,592	2,224	169,024			17,743,105
1899	124,133	2,565,829	1,578,300	946,980	66,527	22,752,234	3,377	303,930			26,568,973
1900	202,856	4,193,034	2,995,500	1,857,210	59,159	19,640,788					25,691,032
1896-1900	712,314	14,723,531	10,937,500	6,774,582	258,497	73,837,086	8,950	700,102			96,035,301
1901	197,515	4,082,635	2,812,400	1,687,440	65,389	21,839,926	4,045	347,870			27,957,871
1902	198,933	4,111,945	3,043,100	1,612,843	59,972	14,633,168	599	49,118			20,407,074
1903	210,799	4,357,215	3,387,100	1,829,034	73,824	20,227,776	1,493	125,412			26,539,437
1904	161,761	3,343,600	2,744,100	1,591,578	95,801	24,781,056	1,499	128,914			29,845,148
1905	130,192	2,691,069	2,605,700	1,589,477	113,427	35,389,224	2,091	196,554			39,866,324
1901-05	899,200	18,586,464	14,592,400	8,310,372	408,413	116,871,150	9,727	847,868			144,615,854
1906	132,891	2,746,857	2,969,200	2,019,056	131,283	50,675,238	2,884	328,776			55,769,927
1907	128,871	2,663,764	2,903,100	1,916,046	128,389	51,355,600	2,418	256,308	114	13,452	56,205,170
1908	120,937	2,499,768	2,900,000	1,537,000	144,762	38,217,168	1,464	122,976	339	31,866	42,408,778
1909	127,071	2,626,558	2,523,600	1,312,272	145,555	37,844,300	1,507	129,602	2,989	322,812	42,235,544
1910	165,114	3,412,906	2,655,700	1,434,078	148,625	37,750,750	948	83,424	2,742	296,136	42,977,294
1906-10	674,884	13,949,853	13,951,600	8,218,452	698,614	215,843,056	9,221	921,086	6,184	664,266	239,596,713
1911	170,348	3,521,093	3,228,900	1,711,317	151,601	37,900,250	3,428	308,520	2,281	260,034	43,701,214
1912	183,117	3,785,028	3,445,500	2,118,983	179,661	59,288,130	3,891	350,190	4,379	604,302	66,146,633
1913	198,406	4,101,052	3,912,000	2,362,848	202,139	62,663,090	4,901	431,288	4,714	527,968	70,086,246
1914	221,020	4,568,483	4,439,500	2,455,044	191,225	50,865,850	5,601	436,878	4,896	499,392	58,825,647
1915	220,392	4,555,503	5,665,672	2,872,496	216,234	75,681,900	6,953	653,582	9,110	2,259,280	86,022,761
1911-15	993,283	20,531,159	20,691,572	11,520,688	940,860	286,399,220	24,774	2,180,458	25,380	4,150,976	324,782,501
1916	197,989	4,092,433	6,680,252	4,395,606	347,424	170,932,608	15,328	2,115,264	9,840	2,637,120	184,173,031
1917	250,613	5,180,171	6,962,257	5,736,900	359,518	196,296,828	7,456	1,282,432	10,447	2,131,188	210,627,519
1918	270,078	5,582,512	6,831,465	6,831,465	384,761	190,071,934	6,195	879,690	1,135	206,570	203,572,171
1919	222,965	4,608,687	5,702,911	6,387,260	268,258	99,791,976	5,407	573,142	859	125,414	111,486,479
1920	240,032	4,961,461	5,431,637	5,920,484	276,494	101,749,792	5,987	957,020	729	118,098	113,707,755
1916-20	1,181,677	24,425,264	31,608,522	29,271,715	1,636,455	758,843,138	40,373	5,808,448	23,010	5,218,390	823,566,955
1921	160,498	3,317,494	2,519,200	2,519,200	77,583	20,016,414	3,313	298,170			26,151,278
1922	169,704	3,507,782	4,627,738	4,627,738	214,100	57,807,000	7,218	793,980	105	11,970	66,748,470
1923	296,437	6,127,353	7,376,832	6,049,002	307,747	90,477,618	8,828	1,235,920	260	35,360	103,925,253
1924	226,385	4,679,378	6,390,684	4,281,758	336,183	88,079,946	9,372	1,499,520			98,540,602
1925	204,471	4,226,416	7,371,358	5,115,722	361,327	102,616,868	10,281	1,788,894	3,666	557,232	114,305,132
1921-25	1,057,495	21,858,423	28,285,812	22,593,420	1,296,940	358,997,846	39,012	5,616,484	4,031	604,562	409,670,735
1926	232,200	4,799,574	7,516,708	4,690,426	364,662	102,105,360	10,646	1,703,360	6,473	970,950	114,269,670
1927	203,088	4,197,829	6,601,467	3,743,032	340,584	89,233,008	7,918	997,668	1,134	145,152	98,316,689
1928	189,519	3,917,358	6,564,933	3,840,486	367,816	105,931,008	8,144	944,704	639	77,958	114,711,514
1929	211,108	4,363,602	7,840,321	4,178,891	414,603	145,940,256	8,153	1,027,278	1,229	162,228	155,672,255
1930	148,681	3,073,236	4,910,394	1,890,502	285,449	74,216,740	4,223	422,300	815	78,240	79,681,018
1926-30	984,596	20,351,599	33,433,823	18,343,337	1,773,114	517,426,372	39,084	5,095,310	10,290	1,434,528	562,651,146
1931	136,805	2,827,759	4,070,860	1,180,549	200,155	36,428,210	2,085	154,290			40,590,808
1932	66,790	1,380,549	2,082,823	587,356	100,568	12,671,568	1,134	68,040			14,707,513
1933	79,992	2,044,596	2,390,363	836,627	61,349	7,852,672	1,718	127,132	6	504	10,861,531
1934	167,024	5,837,489	4,448,474	2,873,714	89,041	14,246,560	3,439	254,486	905	77,830	23,290,079
1935	241,755	8,461,411	6,601,280	4,744,670	139,260	23,076,431	7,783	622,644	3,337	293,656	37,198,812
1931-35	692,366	20,551,804	19,593,800	10,222,916	590,373	94,275,441	16,159	1,226,592	4,248	371,990	126,648,743
1936	322,408	11,284,287	8,386,043	6,494,990	211,275	38,874,600	10,688	983,296	3,589	358,900	57,996,073
1937	332,694	11,644,290	9,422,552	7,288,344	288,478	69,811,676	12,354	1,457,772	5,026	653,380	90,855,462
1938	305,043	10,676,505	7,479,153	4,835,008	210,797	41,316,212	10,571	972,532	5,814	558,144	58,358,401
1939*	323,000	11,305,000	7,975,540	5,413,700	259,200	53,913,600	10,750	1,075,000	6,850	726,100	72,433,400
TOTAL	9,384,070	\$218,598,871	253,383,756	\$187,995,165	8,801,326	\$2,686,118,363	235,196	\$27,114,020	94,422	\$14,741,236	\$3,134,567,655

\*Preliminary.

## TABLE OF CONTENTS

### STATISTICAL ARTICLES REPRINTED FROM PAY DIRT

	Page		Page
Metals pay one-third of Arizona sales tax. In 1937, Arizona mines paid \$1,418,352 in state sales taxes or nearly 35 per cent of the total collected. No other classification approached this figure.....	1	within Arizona since statehood consisted of products of the state's mines.....	17
Statistics reveal disproportionate direct state taxes paid by mines. In 1937, the Arizona mines paid \$147.90 in direct state taxes for each \$10,000 production. Agriculture paid \$32.75 and livestock, \$33.07.....	2	Arizona mines employ one-fifth the labor, but pay one-third state taxes. Five mining companies alone pay more than those owning city lots and the railroads, the utilities, farmers—in fact, any other classification.....	19
Arizona leads nation in copper production. Arizona produced \$53,913,600 in copper in 1939 which made it the number one copper producing state. Its output of gold, silver, copper, lead, and zinc was \$72,433,400.....	3	Importance of farming to state. Future gains in Arizona's agriculture and livestock industries will be relatively small unless there is a further development of irrigated lands which does not look promising at present.....	20
Arizona's basic industries have not grown since 1919. Increasing costs, to a large extent accounted for by taxes, are keeping the basic industries in the state from developing. Little growth has been seen since 1919.....	4	Who owns Arizona? The United States government controls 59.5 per cent of the land in Arizona. The state controls 14.7 per cent leaving only 25.8 per cent privately owned which must support the balance.....	23
The value of Arizona mine production is less but state taxes are 285 per cent higher than in 1914. New levies contribute to a mine tax burden of \$8.04 per ton of copper produced in 1938 against \$3.05 in 1914.....	7	State ore output shows gain while metal content drops. The future of the state's mining industry is dependent on the working of lower grade deposits which requires the opportunity for profitable capital investment.....	24
State taxes grow 1.030 per cent while population only doubles. In 1912, per capita taxes for state purposes amounted to \$6.26. In 1920 they were \$12.67; by 1930, \$19.93; and in 1938 a peak of \$32.60 was reached.....	9	Increased gold quotation causes record Arizona output. The increase in the price of gold has brought Arizona gold output to an all-time peak and has permitted the mining of lower grade ore than possible heretofore.....	28
Arizona mining industry has \$17,000,000 payroll. Arizona mining and smelting employees subject to the Arizona Unemployment Compensation Law, totaling 10,849, were paid \$17,088,308 in the year 1938.....	10	Relative importance of U. S. copper output declines. Since 1930 the United States has not produced as much as one-third the copper of the world in any year. From 1911 to 1920, U. S. producers accounted for 58.75 per cent.....	32
Briefs are filed opposing any cut in present 4-cent copper excise tax. Protests of the Arizona Small Mine Operators Association and Arizona Copper Tariff Board were effective in preventing slash in copper duty.....	11	Mines pay full share of taxes from standpoint of production. Both the value and metal content of ores mined today are far below what they were in 1919. The mines cannot carry the load they assumed during the war.....	33
Arizona's recent growth due to tourists. Population gains made in the past decade have been almost entirely accounted for by the counties attracting tourists—Maricopa and Pima—especially in Phoenix and Tucson.....	13	Arizona mine tax burden records 270 per cent increase from earnings standpoint. The mine tax load from a standpoint of ability to pay is nearly four times as great as it was 20 years ago. New taxes are imposed.....	35
Half of Arizona's population depends on mining industry. This conclusion reached by applying the results of an economic survey in Utah, showing 14 persons directly or indirectly dependent on each miner, to Arizona.....	14	Output and earnings of producing mines in Arizona drop sharply in 20 years. Twenty-two mines worth \$66,499,267 have been removed from the producing mine classification; they have been replaced by 16 with a value of \$1,899,840.....	38
Mines provide tremendous tonnage for railroads. Over 86 per cent of the revenue freight tonnage originating on railroads	16	Mines paid \$32 in direct state taxes for every \$1,000 they produced in 1939. Agriculture payments averaged \$8.81 and livestock came to \$9.40. Restrictive taxation hits small mine operators and prospectors hardest.....	41



TABLE OF CONTENTS—Continued

TABLES AND STATISTICS (Continued)

	Page		Page
Yield of Arizona copper ores in dollars and pounds of copper per ton of ore produced 1910-1938	26	Distribution of total property tax levy for state purposes	37
Value of Arizona ore production compared with tons of ore produced 1900-1939	27	Net earnings of three important mining companies 1915-1919 compared with 1935-1939	38
Percentage of Arizona's production of gold, silver, copper, lead, and zinc ore accounted for by gold 1900-1939	29	Assessed valuation of productive mines in Arizona in 1919 which are no longer assessed as productive mines	39
Gold production of Cochise, Mohave, and Yavapai counties since 1900	29	Assessed valuation of productive mines in Arizona in 1939 which were not assessed as productive mines in 1919	39
Production of gold in Arizona by kinds of ore	30	Population of counties in Arizona predominantly dependent on the mining, agriculture, and tourist industries for their growth (revised)	43
Quantity and value of siliceous gold ores produced in Arizona 1913-1938	31	Comparison of direct state taxes paid by and gross production of Arizona mining, agriculture, and livestock industries 1915-1919 and 1935-1939	43
Arizona gold production by counties	31	Direct state taxes paid for each \$1,000 of production by Arizona mining, agriculture, and livestock industries 1915-1919 and 1935-1939	44
Comparison of gold, silver, copper, lead, and zinc production in Cochise, Mohave, and Yavapai counties 1900-1938	32	Percentage of gross production of three basic Arizona industries paid out in direct state taxes 1912-1939	45
Arizona, U. S., and world copper production	32	Gold, Silver, copper, lead, and zinc produced in Arizona since 1877	46
Arizona gold, silver, copper, lead, and zinc production figures 1919, 1929, 1938, and 1939	34		
Income, assessed valuation, and taxation statistics of Arizona producing mines	35		

CHARTS TO ILLUSTRATE STATISTICAL MATERIAL

	Page		Page
Direct state taxes paid per \$10,000 production by Arizona miners, stockmen, and farmers	2	Prices of copper, lead, and zinc since 1877	25
Value of gold, silver, copper, lead, and zinc output of important producing states in 1939	3	Prices of gold and silver since 1877	26
Mine production of gold, silver, copper, lead, and zinc in Arizona, 1924-1939 in millions of dollars	3	Yield of Arizona ore production since 1900 in dollars per ton	27
Value of Arizona mineral, agricultural, and livestock production since 1909	4	Yield of Arizona copper ores since 1900 in dollars per ton and pounds of copper per ton compared with average price of copper	27
Composition and relative size of Arizona mine tax dollar—1914, 1924, 1934, and 1938	7	Arizona gold production and value since 1877	28
State taxes paid by Arizona mines per man employed	8	Arizona gold production in ounces by kinds of ores since 1900	29
State taxes paid by Arizona mines per \$1,000 gold, silver, copper, lead, and zinc produced	8	Percentage of Arizona gold production attributable to various classes of ores	29
State taxes paid by Arizona mines per ton of copper produced	8	Comparison of gold production from copper and silicious ores since 1900	30
Arizona state taxes from all sources 1912-1938	9	Relative production of copper in Arizona, United States, and the world 1918, 1928, 1938	32
Effect of the price of copper on the number of copper producers in Arizona	11	Relative output and value of gold, silver, copper, lead, and zinc ores produced in Arizona in 1919 and 1939	33
Average cost of producing copper in Arizona compared with costs abroad and at some Chilean properties	12	Average copper price in 1919 and 1939	34
Population of Arizona counties 1910-1938	13	Average yield per ton of Arizona's gold, silver, copper lead, and zinc ores in 1919 and 1939	34
Relative population of Arizona counties 1910-1938	14	Net operating income reported by Arizona mines for each dollar paid in direct mine taxes 1915-1918 compared with 1935-1938	35
Arizona population showing the relation of Phoenix and Tucson 1910-1938	15	Comparison of net operating income and direct state taxes paid by Arizona mines 1915-1918 compared with 1935-1938	36
Miles of branch line railroad built to serve Arizona industries	17	Assessed valuation, net operating income, and direct state taxes paid by Arizona mines during the years 1935-1938 as compared with 1915-1918	37
Revenue freight originating on railroads within Arizona	18	Assessed valuation of mining property in comparison with other classes of property, by counties, for the year 1938	37
Value of Arizona agricultural and livestock production	20	Comparison of production and taxes of basic Arizona industries 1912-1939	41
Acres of irrigated, dry farming, and grazing lands in Arizona	21	Relative production and taxes of basic Arizona industries 1912-1939	42
Importance of irrigation and farming in Arizona and Maricopa county	22	Comparison of state property taxes and production of three Arizona basic industries 1912-1939	44
Arizona gold, silver, copper, lead, and zinc production and value since 1877	24		

the mining, agriculture, and livestock industries since 1912 and reveals that mining has been the greatest contributor in 19 years or 68 per cent of the time. Agriculture was highest on two occasions or 7 per cent and livestock ranked first seven times or 25 per cent of the time.

Agriculture and livestock were in top position during the early years of statehood and during the war when the enormous production, at high prices, of the mines for war purposes made taxes appear relatively small as compared with output. Taxes paid by the mines loomed largest during the depression years such as 1921, 1930 to 1935, and in 1938.

By assuming a very large percentage of the cost of running the state during depression years, the industry helps to soften the effect on the others when they are least able to pay their share. However, it should only be expected that the mining industry might justifiably pay a lower percentage during years of prosperity in order to offset the unusually high cost during periods of poor business.

Nevertheless, last year, mining paid direct state taxes equal to 2.79 per cent of its gross income as compared with an average of 1.92 per cent for the whole period since 1912. Agriculture paid 1.06 which is just what its average has been while livestock paid 0.99 per cent against 1.45 per cent.

Pay Full Share

It is perfectly apparent that, in comparison to the taxes paid by the agriculture and livestock industries, mining is carrying far more than its proportionate share of the load. Twenty to 25 years ago the mines could well afford to assume a greater burden; their production was at record levels and yet, although there has been little tax relief for the industry, output has fallen and its ability to pay has been seriously impaired.

Still there are those who dogmatically state that the industry is not paying its fair share of state taxes. If mining isn't paying its share, it would be interesting to have those who criticize point out what it should pay and how they arrived at and justified their conclusion in the face of existing facts.

From a standpoint of production, from a standpoint of income, and in comparison with other basic industries, mining is paying far more than it should be expected to contribute. The industry is no longer of the importance that it was during the world war; many mines were war babies and have gone out of existence and they have been replaced by properties worth but a fraction as much.

As compared with 1919, the copper price in 1939 was 44 per cent lower; the value of the production of gold, silver, copper, lead, and zinc in the state was off 35 per cent; and the metal content of the ores mined was down 52 per cent. In 1919 the

TABLE IV  
Percentage of Gross Production of Three Basic Arizona Industries Paid Out in Direct State Taxes (1)

Year	Mining	Agriculture	Livestock	Total
1912	0.61	1.09	1.37*	0.76
1913	0.99	1.44*	1.30	1.09
1914	1.11	1.45*	1.43	1.20
1915	1.00	1.54	1.91*	1.15
1916	0.47	0.65	1.20*	0.53
1917	1.00	0.64	1.52*	0.99
1918	0.94	0.42	1.07*	0.86
1919	2.67*	0.67	1.60	1.99
1920	1.97*	0.84	1.51	1.63
1921	11.77*	1.94	2.57	5.87
1922	2.74*	1.00	1.72	2.13
1923	1.79	0.87	1.83*	1.57
1924	1.56*	0.92	1.37	1.39
1925	1.83	1.26	1.89*	1.71
1926	1.63*	1.20	1.40	1.52
1927	2.61*	1.19	1.67	2.12
1928	1.91*	0.8	1.51	1.58
1929	1.74*	1.17	1.62	1.61
1930	3.50*	1.48	1.50	2.31
1931	5.84*	3.00	2.06	4.27
1932	10.38*	3.78	2.70	5.66
1933	10.42*	2.11	1.59	3.79
1934	4.11*	1.32	1.49	2.40
1935	2.40*	0.95	0.96	1.60
1936	1.70*	0.63	0.61	1.19
1937	1.49*	0.48	0.49	1.09
1938	3.12*	0.88	0.99	1.99
1939	2.79*	1.06	0.99	1.90
1912-1939	1.92*	1.06	1.45	1.67

\* High.

(1) 1934-1939 Includes Property, Sales, and Income Taxes. Other years Property Tax Alone.

average yield per ton of ore produced was \$8.12; in 1939 it was \$3.92.

But this is not all. The net operating income of the mining companies has dropped so sharply that, for the years 1935-1938, the mines reported only \$11.54 in net operating income for each dollar paid in direct mine taxes. During the 1915-1918 years they earned \$48.39 for every dollar paid in direct state taxes.

From a standpoint of their ability to pay Arizona mines are now carrying a tax load that is almost four times what it was in 1919. And although other basic industries, such as agriculture and livestock, have stood still during the past 20 years and have felt the pinch of excessive taxation they have not done so to the same extent as the mines. Mining has lost ground in every direction at a time when its tax burden has been increasing—increasing to such an extent that new capital hesitates to venture into the state to assist in the development of new mineral resources, and older mines, particularly the marginal producers, are being taxed out of existence.

The mining industry is perfectly willing to admit that the determination of just what is a fair tax is extremely difficult and a task that is filled with pitfalls. But when, by every index of comparison that

can be obtained, gross production of the mines, net operating income of the industry, changes in population of the mining counties—the mining industry has been paying a far greater tax than it did 20 years ago or other industries are paying, it is obvious that there is no ground for the criticisms made by those who are uninformed or who have no desire to be informed.

Just what is mining's "fair share" anyway? Is it fair to tax the mines to a point that the greatest primary industry of the state is being slowly but surely crippled? Is it fair to expect the mines indefinitely to continue to pay 50 per cent of the state tax load—as they did during the prosperity of world war No. 1—in a commonwealth where other industries are growing while they are being slowly strangled out of existence? Is it fair to demand that mining pay more than other industries in relation to production? Is it fair to allow the mines no relief in taxes when production and earnings are declining constantly so that levies are absorbing what little profit there is left? Is it fair to impose such a burden that many small mines are finding it impossible to raise funds for exploration and development?

Is it fair to tax the mines into decadence, to tax employees onto relief rolls, to tax communities out of existence, and to throw an excessive burden on the little fellow so that some big outfit which appears to be able to pay, can be forced to cough up every last dime it earns?

Decidedly not—nor is it fair to the other taxpayers either. By taxing the mines out of existence, or killing the goose that laid the golden eggs, the principal source of revenue to the state is being eliminated. Taxpaying mines can and do fade into the realm of has beens, surrounded by ghost towns, and the development of new mines, which might otherwise spring forward to take the place of those that are worked out, is prevented. The incentive is disappearing for the risks are far too great for capital to take unless it can be assured that the investment of large sums in plant and equipment, as well as development work, will not be a signal to demagogues to advocate taxing all the traffic will bear and then some.

Capital can't move in and open and equip a mine and a milling plant and then move out without sacrificing all that has been spent on the mine and the bulk of what has gone into plant and equipment. Therefore, if conditions do not appear satisfactory capital just stays out.

This is what is happening today. And to correct it some assurance must be given that an already topheavy burden will not be increased and that the activities of those demagogues, who would pile insult on injury and slander on the tax situation by whole lies and half truths, be curbed. —Reprinted from PAY DIRT for October 21, 1940.



million dollars more than they paid on the average during the war years and just about \$491,000 short of the entire state tax load at that time. This means that, although the mining industry has declined tremendously in importance from a standpoint of production, population, and earnings since the war, they are now paying more taxes than they did at that time—in fact mining last year paid taxes equal to 82.5 per cent of the average tax load of the entire state during the war years and 61.3 per cent higher than it contributed at that time.

These statements are not to be interpreted as any criticism of the tax load paid by agriculture or livestock but are merely presented to show that, in relation to them, mining is more than maintaining its proportion. The fact is that all basic producing industries in Arizona—mining, agriculture and livestock alike—are tax burdened to the extent that they are struggling for their existence and that they are all facing the inevitable destruction that comes when the load is too great to be carried. The development of Arizona as a winter playground for tourists at the expense of the basic industries has so depleted the

TABLE III  
Direct State Taxes Paid for Each \$1,000 of  
Gross Production by Arizona Mining,  
Agriculture, and Livestock Industries

Industry	Years 1915-1919 and 1935-1939			
	1915-1919 Average	1919	1935-1938 Average	1939
Mining	\$ 8.40	\$26.71	\$20.30	\$32.00
Agriculture	6.47	6.69	7.28	8.81
Livestock	12.11	16.01	7.49	9.40

Source of Figures: See Table II.

tax paying possibilities of the producing group that a real problem has arisen.

#### Taxes Make Dent In Income

Another manner of comparing the tax burden assumed by the three major industries is by the percentage of the gross income required to meet the tax load. During the years 1912 to 1939 the mining industry paid taxes equal to 1.92 per cent of its gross production as compared with 1.06 per cent for agriculture and 1.45 per cent for livestock.

It should be remembered that gross production is by no means income. In the case of mining gross income means the value of the metals produced after they have passed through all the stages of treatment and are finally laid down in refined form in eastern markets.

No expenses have been deducted—mining costs, milling, smelting, and refining expense, transportation charges, labor, interest—in fact none of the many costs that are incurred in taking the raw material from the ground and processing it into a condition so that it can be sold have been provided for.

An idea of the dent that some of these charges make in the gross is revealed by comparison of the net operating income and gross output of the productive mines. From 1935 to 1938 the gross output of Arizona's productive mines, as reported by the State Tax Commission, averaged \$53,864,292. The net operating income of the same mines, before deductions for depletion, depreciation, taxes, or return on capital investment, averaged \$14,319,766.

Table IV shows the percentage of their gross income paid out in state taxes by

# Metals Pay One-Third of Arizona Sales Tax

## Arizona Mines Contribute More Than Any Other Group

\$1,418,352.49 PAID IN 1937

Analysis of the 1937 reports of the Arizona Tax Commission and the Arizona Unemployment Compensation Commission revealed the fact that those engaged in the mining industry in Arizona paid nearly 35 per cent of the total amount collected as sales taxes. The second largest contributor was wholesale and retail trade which contributed 23 per cent and service industries ranged third with 12 per cent. This is not taking into consideration the fact that much of the contribution of wholesale and retail trade, as well as the service industries, was made possible by the requirements of those engaged in mining and therefore the total contribution of the mining industry, direct and indirect, was far greater than is indicated by these figures.

The position the mining industry holds as the largest contributor of sales taxes is due to the fact that it contributes both a direct and indirect tax, whereas other industrial groups contribute only the direct tax which is passed on to customers in most cases and pay very little, if any, themselves. The mining industry is the only classification in which the taxes are levied on products sold outside the state and therefore the tax is wholly absorbed by those engaged in metal production.

The Arizona Tax Commission reported a collection of \$4,065,550.21 in the form of sales taxes in 1937 and of this amount 17.74 per cent or \$680,386.88 was paid directly by the mining industry. Added to this are the indirect payments which are made by those engaged in the mining industry, their families, and others en-

tirely dependent upon the industry for support, thus swelling the figure to \$1,418,352.49 or 34.91 per cent of the total. Inasmuch as the small mine industry accounts for about one-third the state's mining activity, it is probably responsible for close to half a million dollars in sales taxes.

The direct payments made to the state were greatest in the retail trade classification, this being due to the fact that their contributions were principally collections of sales taxes from other industries and their employees; in other words, they pass the tax on to the customer. The function of the retail trade, as well as many other classifications, is largely that of a tax collector; they assess and transmit their collections to the state but pay nothing themselves.

Payments made to the state by retail trade collections totaled 65 per cent but the sources, of course, were the employees of the various industries and the reason why those engaged in mining contributed so largely is because that industry has by far the largest payrolls. Irrespective of whether the tax is direct or indirect, it all starts from the value of new production.

A similar example would be the public utility industry, which pays no sales taxes on its own account except those paid as a purchaser from others, but derives its revenue almost entirely from the employees of other industries who buy utility services. The utilities merely turn over to the state the collections which they make from the employees of other industries in the natural course of their business.

To obtain a breakdown of sales tax payments and distribute them as to industrial sources, requires an analysis of income percentages of various groups which are

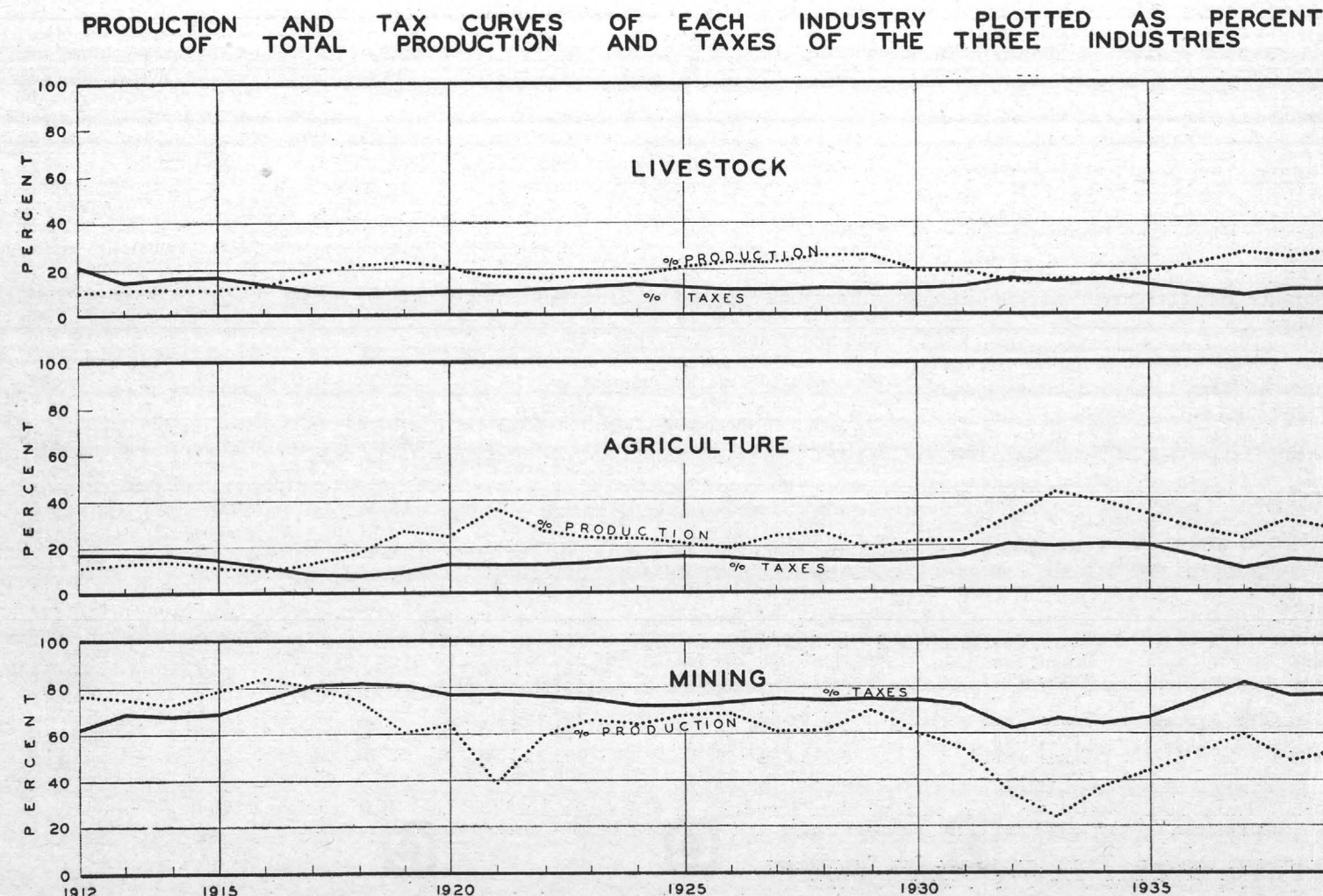
now made available regularly through the Arizona Unemployment Compensation Commission. They do not include, however, wage payments made where less than three people are employed, and wages paid in the agricultural industry, to government employees, and to certain non-profit organizations.

Based upon these figures for a representative month, the accompanying table shows the sales tax contributions, direct and indirect, of various industrial groups. Another table shows the direct sales taxes which were collected by various classifications and transmitted to the State Tax Commission. Inasmuch as the mining industry is the only one so taxed which derives its income from sales of products outside the state while others merely collect and transmit, a direct tax is shown in addition to the indirect.

It is interesting to note that, while the mining industry was the largest contributor of sales taxes in Arizona in 1937, the metal production paid directly 48 per cent of the total mining sales tax collected while those engaged in mining paid 52 per cent which, of course, also comes from the products of the mines and is made possible by the higher wage scales of the mining industry as compared with other groups. Mine employees are the highest paid workers in the state.

The average wage paid by mining and smelting industries in Arizona approximates \$155 per month, which is far higher than the average paid in any other classification in Arizona and higher than in most mining states. The mining and smelting industry paid about 21.80 per cent of the total wages in the state that are covered by the Arizona Unemployment Compensation law and ranked second only to wholesale and retail trade which together paid 27.8 per cent. A considerable proportion of the wages paid to employees in the wholesale and retail trade classification is directly influenced by the expenditures of mining companies and their employees. — Reprinted from PAY DIRT for October 18, 1938.

CHART III  
COMPARISON OF STATE PROPERTY TAXES AND PRODUCTION  
OF THREE BASIC ARIZONA INDUSTRIES



DIRECT ARIZONA SALES TAX COLLECTIONS  
FOR YEAR 1937

Classifications	Gross Income Reported	Sales Tax Collected	Per Cent of Total
Manufacturing	\$ 8,703,642.71	\$ 34,105.63	.339
Transporting	304,894.62	3,049.00	.075
Mining	68,038,646.19	680,386.88	16.735
Utilities	11,593,502.23	115,936.16	2.852
Communications	2,416,125.54	24,161.30	.594
Railroads	2,804,529.79	28,045.35	.690
Private Car Line	73,541.55	735.46	.018
Publishing	270,567.45	2,705.84	.067
Printing	1,253,032.99	12,531.14	.308
Restaurants	19,854,488.11	198,559.84	4.884
Amusements	2,292,395.71	45,849.71	1.128
Moving Pictures	1,363,226.09	13,651.06	.336
Rentals	6,501,632.27	180,035.07	3.198
Wholesale	38,558,455.75	96,395.19	2.371
Wholesale & Meat Pkg.	9,191,164.56	22,978.35	.565
Contracting	*2,236,813.42	22,367.88	.550
Feed, Wholesale	*1,036,767.06	2,591.94	.064
Retail	131,572,896.29	2,631,464.41	64.726

TOTALS .....\$308,066,322.29 \$4,065,550.11 100.000

TOTAL ARIZONA SALES TAX COLLECTIONS FOR YEAR 1937

Industry	Payroll*	Per Cent of Total	Direct Sales Tax	Indirect Sales Tax	Total Sales Tax	Per Cent of Total
Mining	\$1,834,132.28	18.92				
Smelting	221,318.96	2.38				
Mining & Smelting	2,055,451.24	21.80	\$680,386.88	\$ 737,965.61	\$1,418,352.49	34.91
Construction	399,012.73	5.80		196,339.47	196,339.47	4.80
Manufacturing (other than Smelting)	602,313.57	10.01		338,854.85	338,854.85	8.33
Transportation	981,189.50	11.94		404,188.50	404,188.50	9.94
Communication	105,882.13	1.74		58,901.84	58,901.84	1.45
Utilities	211,411.03	2.78		94,107.54	94,107.54	2.31
Wholesale & Retail Trade	1,524,022.77	27.82		941,752.44	941,752.44	23.16
Finance	54,264.61	.64		21,665.05	21,665.05	.53
Insurance	53,013.43	.62		20,988.01	20,988.01	.52
Real Estate	41,474.12	.73		24,711.69	24,711.69	.61
Administration	43,071.32	.47		15,910.27	15,910.27	.39
Service	699,865.60	14.37		486,447.97	486,447.97	11.97
Professional Service	74,162.96	.91		31,143.50	31,143.50	.77
Miscellaneous	17,590.19	.36		12,186.59	12,186.59	.30
Total or Average	\$6,862,725.20	99.99	\$3,385,163.33	\$4,065,550.21	\$4,065,550.21	99.99

\*The payroll figures are those reported for the month of November, 1937, a representative month.



# Statistics Reveal Disproportionate Direct State Taxes Paid by Mines

## Pay More than their Relative Share From Production Standpoint

The mining industry in Arizona paid in 1937 \$147.90 in direct state taxes for each \$10,000 of production as compared with \$32.75 paid by agriculture and \$33.07 by the livestock industry, according to statistics compiled for the Department of Mineral Resources, State of Arizona, which is making a statistical study of the mining industry and its relation to and interdependence with other basic industries of the state. The figures were gathered by Dixon Fagerberg, certified public accountant.

These figures include the levy of one per cent on the value of metals produced after deducting the value of silver and gold sold to the Federal government, which is paid by the mining industry as a sales tax, but which really is a production tax. No comparable tax is levied on the production of either the farmers or the stockmen. In addition to the sales tax, each industry has been paying an income tax since 1934, based upon their net profits. The Arizona mining industry paid \$497,553, or \$55.40 per \$10,000 produced as income taxes in 1937.

Despite uninformed statements to the contrary, the taxes being paid by the mining industry of Arizona, based upon production, are far higher at the present time than at any period since statehood except during the depression periods of 1921 and 1930-1936. During this period, when the industry was least able to pay, the taxes were much higher.

Mining, agriculture, and livestock are Arizona's three traditional basic industries and between them they contribute heavily to the support of the state government by taxation. Besides these three industries which produce new wealth for the state (most of the rest are service in character and would not exist if it were not for the basic industries which bring new dollars into the state) there is the tourist crop which is also an important source of outside money.

While the tourists bring wealth to the state, they contribute little in the way of taxes that can be measured. They, of course, pay sales taxes on the things they buy, a gasoline tax on the fuel they use, and property taxes are theoretically included in the rent they pay, but their contributions are indirect and the taxes they do pay are not proportionate to the services with which they are provided. Few tourists pay state taxes on their incomes or the taxes the state charges to businesses. In the last analysis, mining is the old stand-by so far as taxes are concerned.

The most equitable manner in which to compare the taxes paid by different basic industries is on a production basis and the figures that have been compiled show that "ability to pay" has crept into and been maintained in the state's property tax structure to a large degree even though such action is contrary to constitutional limitations.

Two charts have been prepared to graphically illustrate the statistics referred to and they present a most interesting historical picture. The larger chart shows the direct state taxes paid per \$10,000 of production by the mines and compares them with the taxes paid on the same basis by both the stockmen and the farmers. The chart does not include sales or income taxes.

The average direct state taxes paid by the mining industry per \$10,000 of production during the 26-year period included in the chart is \$186.20 while the average for agriculture is \$106.85 and the average for livestock is \$148.17. In 1937 the mining industry was paying \$147.90 for each \$10,000 produced or 79 per cent of its 26-year average, while agriculture paid \$32.75 or only 30 per cent and livestock \$33.07 or 22 per cent. Both agriculture and livestock are paying far less now than at any time since Arizona became a state.

The record of the direct taxes paid per \$10,000 produced by Arizona's basic mining, agriculture, and livestock industries shows that from 1912 to 1918 all three were paying about the same with mining getting somewhat the best of it. However, in 1918 mining taxes began to skyrocket and since then they have been far in excess of the other two classifications on a production basis.

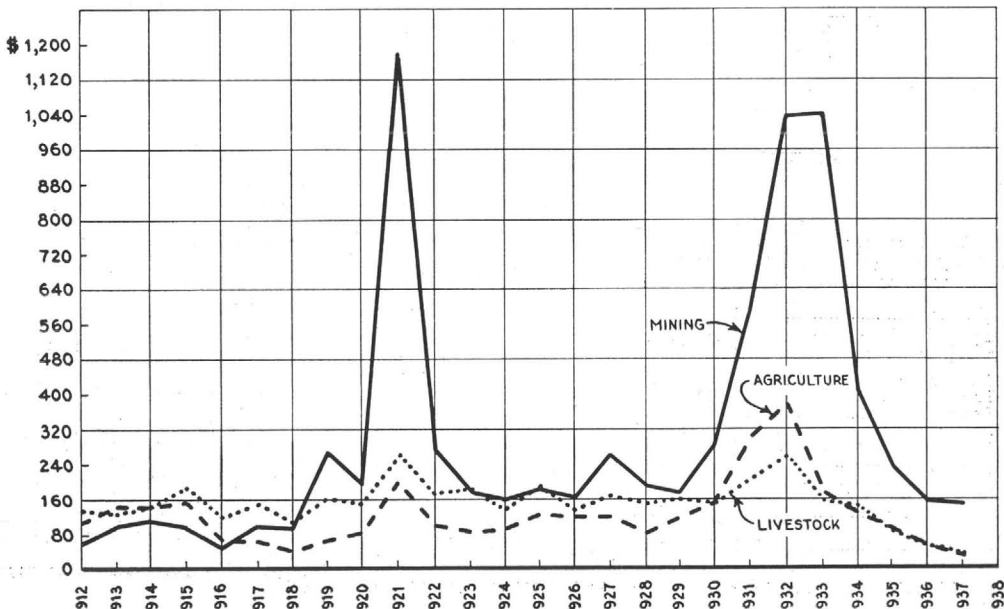
During the period from 1922 to 1929 mining consistently paid more taxes than either of the other two industries and during recent years, even though prosperity is increasing, the curves are steadily separating with mining getting the worst of the bargain as agriculture and livestock have gone down to new low records.

It is significant to note the high peaks to which mining taxes, figured on the value of production, soared in the depression periods. The year 1921 and the period of recent collapse in the early thirties clearly reveal this tendency. While livestock and agriculture also advanced during those years, the rise is not nearly so marked.

The high point of the curve showing taxes paid per \$10,000 of production by the mining industry was in 1921 when \$1,176.60 was paid to the state for each \$10,000 produced. This was during a depression period when taxes were high and production was low. The low point was in 1916 when \$47.10 was paid, but the lowest point ever reached by the mining industry was greater than the taxes now being paid by the agriculture and livestock industries.

The sharp increases during depressions shown by mining were due, of course, to

**DIRECT STATE TAXES PAID PER \$10,000 PRODUCTION BY ARIZONA MINERS, STOCKMEN AND FARMERS 1912-1937**



### State Tax Growth

One of the most important tax burdens, however, is imposed by the state in the property, income, and sales or production taxes as well as miscellaneous other excise taxes. The growing importance of state levies is illustrated by the fact that in 1919 Arizona taxes for state purposes aggregated \$5,152,070 or \$16.25 per capita. In 1938 they amounted to \$14,274,854 or \$32.60 per capita.

This tremendous growth in state taxation, which has far outstripped the gain in population, accounts in part for the heavier burden that the mining industry is now assuming. But, in addition to this, there has been a shifting of the tax load of other groups to the mines so that today they are bearing a much greater percentage of the cost of the state government, when considered from a production standpoint, than they did 20 years ago.

Comparison of the mining industry with agriculture and livestock clearly reveals this point. It has been pointed out that the population of the agriculture and livestock counties have increased 42 per cent since 1920 while the mining county population has been lowered 1.5 per cent. In 1920, 40 per cent of the people in the state lived in the mining counties, whereas in 1940 only 26 per cent of the population resided there.

It is interesting to note in Table II what has happened to taxes paid by these industries in the meantime. In 1919 the mining industry, with 60 per cent of the value of the output of mining, agricultural, and livestock products in the state, paid 80 per cent of the taxes paid by the three; in 1939, although mining production had declined to 53 per cent of the total, it was still paying 80 per cent of the taxes.

In other words, agriculture and livestock together paid 20 per cent of the taxes of the three industries in 1919 and accounted for 40 per cent of the production. In 1939 they were still paying 20 per cent of the taxes although they were then responsible for 47 per cent of the production.

In comparison with these other industries, mining today is paying more than its share of state taxes and those soap box orators and other piercers who state without explanation that mining is not paying its fair proportion of taxes make the as-

**TABLE I**

**Population of Counties in Arizona Predominantly Dependent on the Mining, Agriculture, and Tourist Industries for Their Growth.**

Year	Mining Counties Population	Mining Counties Per Cent	Agricultural Counties Population	Agricultural Counties Per Cent	Tourist Counties Population	Tourist Counties Per Cent	State Population	State Per Cent
1910	79,753	39.01	67,295	32.94	57,305	28.05	204,354	100
1920	132,910	39.76	76,996	23.04	124,256	37.19	334,162	100
1930	138,023	31.69	90,904	20.86	206,646	47.45	435,573	100
1940	131,032	26.28	109,201	21.91	258,287	51.81	498,520	100

Mining Counties: Cochise, Gila, Greenlee, Mohave, Pinal, Yavapai.

Agricultural and Livestock Counties: Apache, Coconino, Graham, Navajo, Santa Cruz, Yuma.

Tourist Counties: Maricopa, Pima.

sertion with no basis in fact. They do not state what constitutes a "fair share," they do not define their position, and they fail to take into consideration the taxes paid by other groups or other industries. They even fail to give the mining industry credit for all of the taxes which it pays.

### Agriculture and Livestock Taxes

A series of charts has been prepared to compare the production and taxes of the mining, agriculture, and livestock industries since statehood. Chart I compares the production and taxes of the three industries and it shows that, whereas the value of the output of the livestock industry has followed an upward trend to peak levels in the past few years, taxes have been declining. It also shows a reduction in the value of agricultural output which has roughly coincided with a decline in taxes.

The portion of the chart devoted to mining, however, reveals a tremendous loss in the value of production as compared with a relatively slight decline in taxes. Chart II presents these same figures from a relative standpoint comparing taxes paid by the three industries and their gross production.

The second chart clearly shows the manner in which the taxes of the mining, agriculture, and livestock industries have maintained a constant pattern from a relative standpoint at a time when the output of agriculture and livestock has shown marked gains as compared with mining.

These same figures are presented in a somewhat different manner in Chart III where the production and taxes of each of

the industries are plotted as a percentage of the total for comparative purposes. Prior to 1916 and 1917, the livestock and agriculture industries were much heavier contributors to the state treasury in relation to their output than was the mining industry, but in 1917 the positions were reversed—permanently.

Ever since then the relative tax burden of the mines has been much heavier than that of the others in relation to production. The percentage of the total tax load of the three industries borne by mining has been far in excess of its share of the production; in 1939, for example, mining with 53 per cent of the production paid 80 per cent of the taxes.

In 1939, the direct state taxes paid by the mines were three and one-half times as large as the contributions of the agriculture and livestock industries from a standpoint of the total production of the three. In 1939 the mines paid \$32 in taxes for each \$1,000 produced while agriculture and livestock combined paid \$9.06 for each \$1,000 of production. Agriculture by itself paid \$8.81 and livestock paid \$9.40.

In 1939 Arizona mines produced only \$72,433,400 in gold, silver, copper, lead, and zinc as compared with a yearly average of \$171,098,871 during the four-year period from 1915 to 1918 (the average for 1935-38 was \$61,102,187), but despite this tremendous decrease in output the tax burden was considerably higher. Total taxes for state purposes during the years 1915 to 1918 averaged \$2,833,942 of which the mines paid \$1,437,305.

In 1939 the mines paid an estimated \$2,318,069 in direct state taxes, nearly a

**TABLE II**

**Comparison of Direct State Taxes Paid by and Gross Production of Arizona Mining, Agriculture, and Livestock Industries Years 1915-1919 and 1935-1939**

Year	Mining Taxes Paid	Mining Per Cent	Agriculture Taxes Paid	Agriculture Per Cent	Livestock Taxes Paid	Livestock Per Cent	Total—Three Industries
1915-1918 Average	\$ 1,437,305	79.24	\$ 182,748	10.07	\$ 193,824	10.69	\$ 1,813,877
1919	171,098,871	79.45	28,250,000	13.12	16,000,000	7.43	215,348,871
	2,977,577	80.90	334,641	9.09	368,258	10.01	3,680,476
	111,486,479	60.43	50,000,000	27.10	23,000,000	12.47	184,486,479
1935-1938 Average	1,240,520	75.06	240,536	14.55	171,643	10.39	1,652,699
	61,102,187	52.19	33,042,750	28.23	22,918,750	19.58	117,063,687
1939	2,318,069	79.75	333,142	11.46	255,597	8.79	2,906,808
	72,433,460	52.71	37,800,000	27.50	27,200,000	19.79	137,433,460

Note: Taxes paid means direct taxes paid for state purposes. In the years 1915 to 1919 they consisted solely of property tax remittances. From 1935 to 1939, however, sales and estimated income taxes were also included.

Sources of Figures: Taxes from State Tax Commission.  
Mining production from U. S. Bureau of Mines.  
Agriculture and Livestock production from Crop and Market Reports of U. S. Department of Agriculture.



been restrictive taxation—and the shifting of the tax burden of other industries and groups on to the mines because it was felt by some that they could afford to foot the bill. In some instances they were able to meet the added tax load, but in many other cases, particularly among the smaller, marginal, relatively high-cost producers, they could not and their elimination as producers has been the main cause for the reduced mining production and lower population of the mining counties as compared with other sections of the state.

#### Mine Tax Burden Grows

The burden of taxation on the mining industry has grown consistently during the past 20 years in relation to its production. This growth has outstripped that of other industries and has now reached a point where the very future of the mines—the greatest source of new wealth to the state—is threatened. It is in new mine development that the effect is seen most clearly for it is there that the greatest damage is done. That is where the seeds are planted for future large taxpayers and employers of labor.

Restrictive taxation is a sinister influence the effects of which are felt slowly. All the mines in the state would not go into convulsions and fold up just because one new tax is enacted, but the cumula-

tive effect of many new levies, piling one on top of the other over a period of years, is similar to a process of slow starvation—or of gradual strangulation.

What happens is that the development of unexploited properties and potential reserves is brought to a halt gradually as the effects of the increased tax burden make the development of new properties and potential resources unprofitable. New capital shies away from the top heavy taxed state like a horse from a rattlesnake. And once the confidence of those who would invest in and develop the industry is destroyed, years of hard work and encouragement are necessary before it can be brought to take up where it left off.

Mines that are already in operation—where the plant and equipment has been installed—often have no choice but to continue to operate. They will lose less money by keeping on than by shutting down and selling the equipment at a tremendous sacrifice. Therefore, they often continue to operate despite excessive taxation in the hope of recovering a percentage of the invested capital. There is no profit in mining until the original investment is repaid.

But where the blows really tell is among the small mine operators who are struggling to make their small properties and prospects important future producers of

wealth to the state. This is the situation that Arizona faces today.

The Department of Mineral Resources is working against tremendous odds to encourage capital to invest in the small mines in the state and it deserves great credit for the remarkable results that have been obtained in the face of such a serious handicap. Officials of the department have stated that an analysis of the state tax situation by a number of prospective buyers has stopped some important deals and that they are constantly meeting resistance on this point.

The growth in tax burdens that has occurred has not been in any one classification exclusively. It has taken place over the entire tax field—from the municipal and school district taxes right straight up through county, state, and federal levies.

The local, county, state, and federal taxes levied on one mining corporation in Arizona amounted to 31 per cent of its consolidated net income before taxes and depletion, and represented a cost of \$1.83 per day worked by each employee or a total of \$500 per employee based on the average number of workers during 1939. In paying these levies, the company was required to file 1,030 tax returns and reports. And these figures apply only to the taxes directly paid; they do not include indirect levies, nor susceptible of accurate calculations.

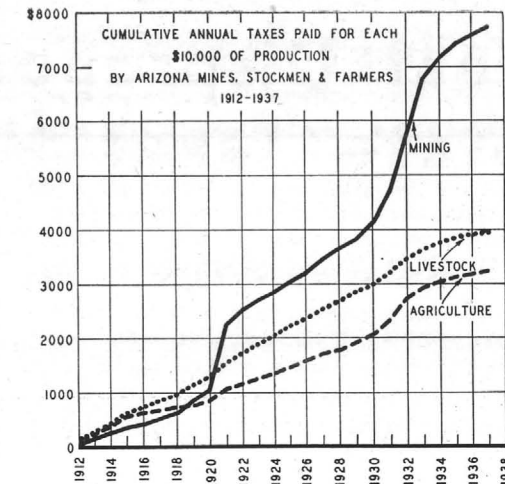
the ability of that industry to adjust itself to conditions and regulate its production more closely than could be done by the other industries. It also shows that the higher mining tax contribution at such periods tends to level off the income of the state and stabilize its revenue from taxes.

This curve demonstrates further that an industry cannot be penalized during depression years without equalizing to some extent during periods of prosperity. No industry can stand penalties all the time and retain its ability to pay, and it will probably be far better, from the state's point of view, if the situation remains as it is so that mine taxes will exert a stabilizing influence during periods when others are having difficulty in meeting their tax assessments.

The high point for agriculture in the curve showing taxes paid for each \$10,000 produced was in 1932 when \$377.82 was paid but this has skidded down in only six years to less than one-tenth of that amount—the lowest point reached in the history of the state was in 1937 when that industry contributed \$32.75 of each \$10,000 produced to the cost of running the state.

The situation was similar in the livestock industry which had a high point of \$270.16 paid in 1932 and a low point of \$33.07 in 1937 which it contributed to the cost of state government for each \$10,000 produced. At no time since statehood have the agriculture and livestock industries been paying less toward state expenses based upon production than during the last two years.

However, this lowering in direct state taxes has not been similarly reflected into



as follows: Starting off with the 1912 figure as the first one to be plotted, 1913 taxes per \$10,000 of production were added to those of 1912 to give the 1913 figure to be plotted. Similarly, the 1914 taxes were added to the total of those paid in 1912 and 1913 to give the 1914 figure to be plotted, etc.

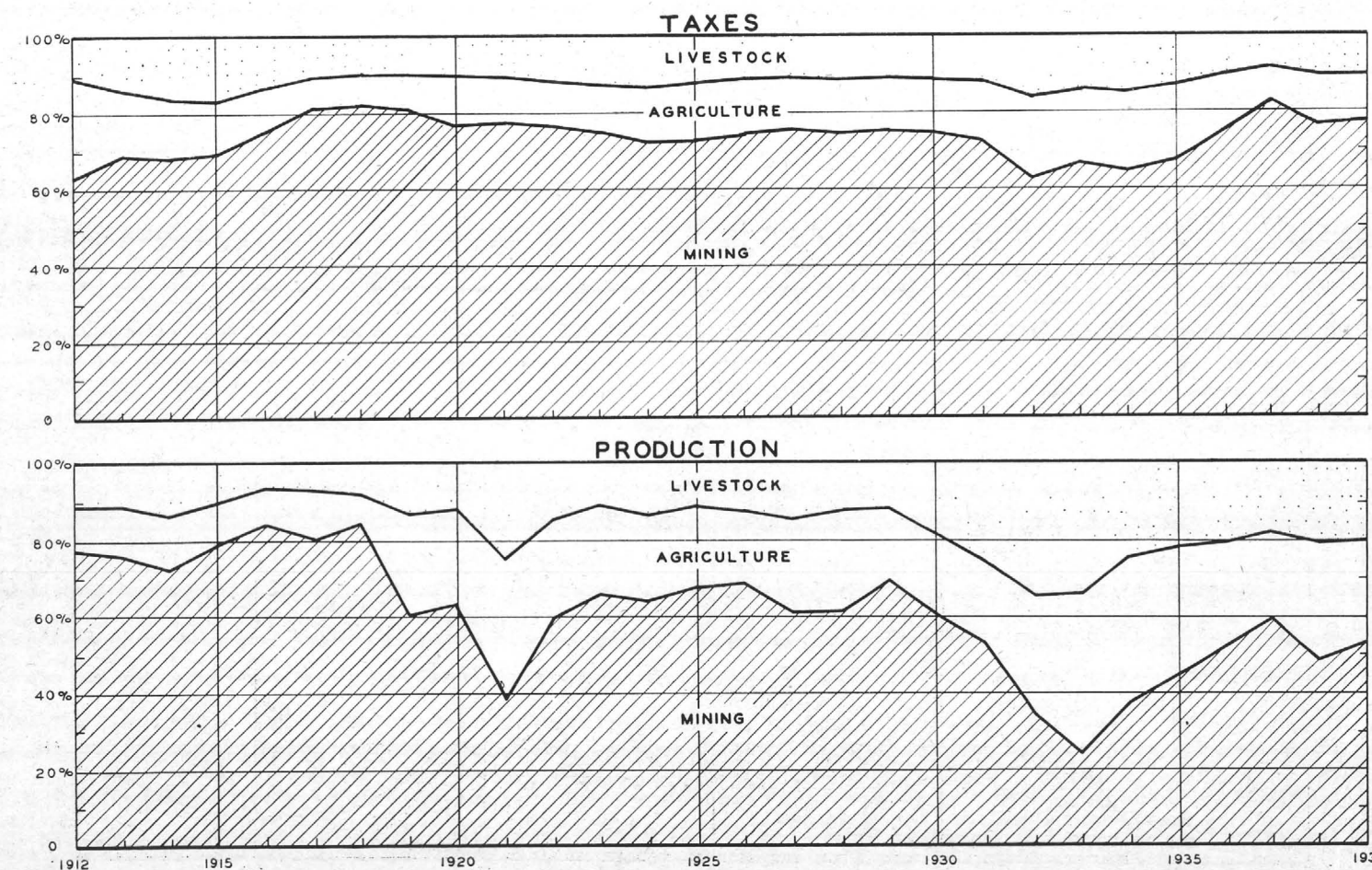
The cumulative chart shows that, in the 26-year period, mining has paid almost \$8,000 per \$10,000 of annual production while livestock has paid half as much or \$4,000 and agriculture has contributed about \$3,200. The cumulative chart emphasizes the consistency with which the mining industry has increased its relative tax burden over the other two basic industries and that, while the mining curve is still rising, the curves of the other industries are flattening out.

Although property taxes are presumed to be on cash valuations and equal for all, intentionally or unintentionally the ability to pay has crept into the state tax structure to a considerable extent. Taxes based upon the ability to pay are usually confined to income, sales, and other taxes, but Arizona has included them in the property tax structure as well.

Both the charts lead to the inescapable conclusion that mining has been paying more than its full share of the direct state taxes and that the burden it is carrying is growing steadily. Furthermore, these charts only tell part of the story since they do not include many other forms of taxation where mining is again by far the largest contributor.—Reprinted from PAY DIRT for July 18, 1939.

CHART II

### RELATIVE PRODUCTION AND TAXES OF BASIC INDUSTRIES



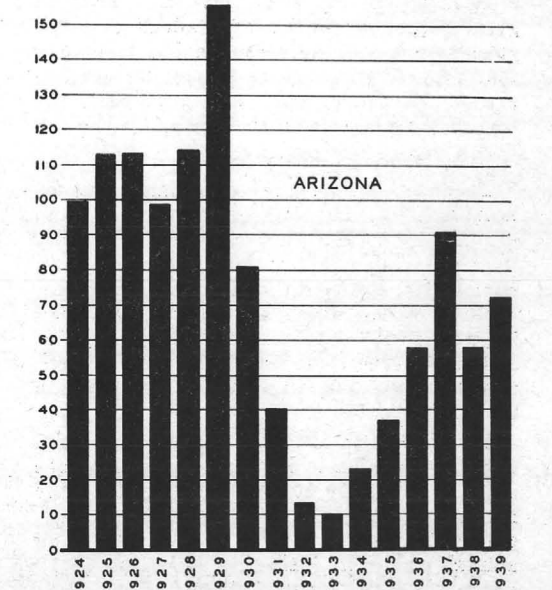
#### ARIZONA LEADS NATION IN COPPER PRODUCTION

The output of recoverable gold, silver, copper, lead, and zinc from lode and placer mines in Arizona in 1939 was valued at about \$72,433,400, according to an estimate by the Bureau of Mines. This is an increase of 24 per cent over the total value of \$58,358,401 in 1938. Nearly 90 per cent of the increase was in copper, but there was also an increase in the value of each of the other metals. The output of gold increased from 305,043 to 323,000 fine ounces, silver from 7,479,153 to 7,975,540 fine ounces, copper from 421,594,000 to 518,400,000 pounds, lead from



silver, \$4,835,008; copper, \$41,316,212; lead, \$972,532; and zinc, \$558,144.—Reprinted from PAY DIRT for February 26, 1940.

MINE PRODUCTION OF GOLD, SILVER, COPPER, LEAD, AND ZINC IN ARIZONA, 1924-1939, IN MILLIONS OF DOLLARS

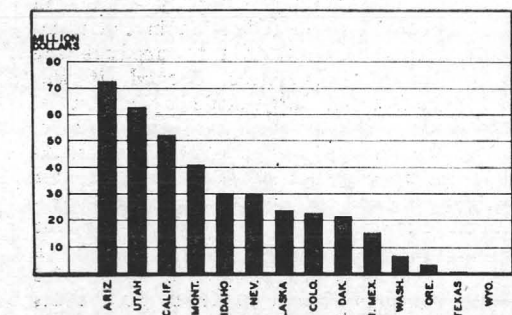


21,142,000 to 21,500,000 pounds, and zinc from 11,628,000 to 13,700,000 pounds.

Arizona was again the leading copper-producing area in the United States. The copper mines in Arizona operated at considerably less than normal rates during the first nine months of the year, but in September, as in other copper-producing states, the output of copper was increased markedly and mining was on a capacity basis during the last quarter of the year. The copper output (518,400,000 pounds) showed a gain of 23 per cent over 1938, but it was considerably less than the 576,956,000 pounds produced in 1937.

The gross calculated value of the 1939 output was: Gold, \$11,305,000; silver, \$5,413,700; copper, \$53,913,600; lead, \$1,075,000; and zinc, \$726,100. Comparable values in 1938 were: Gold, \$10,676,505;

VALUE OF GOLD, SILVER, COPPER, LEAD AND ZINC PRODUCTION IN 1939





# Arizona's Basic Industries Have Not Grown Since 1919

That increasing costs, a large portion of which are taxes, are keeping the basic producing industries of Arizona from developing and becoming a broader and stronger foundation in the state's industrial structure is evident from a study made by the Arizona Department of Mineral Resources. Agriculture, livestock, lumbering, and mining in Arizona have been barely able to maintain a steady position in the 27 years since statehood but have not—and are not likely under present conditions—to increase their activities. Soaring costs tend to weaken the industrial base and lessen the ability to remain and participate in the state's future. The statistical data from which the study was made were compiled by Dixon Fagerberg, C. P. A.

It is apparent that the basic producing industries in Arizona are bearing more than their share of the cost of running the state. The population of Arizona has grown steadily ever since the first settlers arrived. This growth has forced the state to render ever increasing services to the state's inhabitants and the expense has naturally risen to great heights.

Since 1919, Arizona's traditional basic industries, which create new wealth for the state, have shown little or no growth although the population of the state has increased 37 per cent during the period. The population has doubled since statehood. These industries include mining, agriculture, livestock, and, to a lesser extent, lumber—all of which are producers of new wealth and bring outside money to the state.

There is also another primary industry which has leaped into great prominence in recent years, an industry dependent on an intangible but important resource—climate. The expansion of the state's tourist trade has been the primary cause for its growth in population since 1919. The tourists have brought millions of dollars to the state, have created employment, have increased trade, but they have also brought greater responsibilities and added costs of government and it is reasonable to expect that they should assume a normal percentage of the tax burden caused by the services they receive from the state.

## Mining Shows No Growth

Because mining, the most important of Arizona's primary industries, has shown no growth since 1919—a loss in fact—its relative importance has greatly decreased and so has its ability to carry the same percentage of the state's taxes that it did during territorial days and the early days of statehood. The same has been true of agriculture, livestock, and lumber production to varying extents.

From 1909 to 1937 the combined production of these basic resource industries has exceeded \$3,800,000,000 of which the mines accounted for 64.69 per cent; agriculture, 20.55 per cent; livestock and animal products, including dairying, 13.12 per cent; and lumber, 1.64 per cent.

Thus the mines have accounted for nearly two-thirds of the combined value of the output of these resource industries which were responsible for the opening up of the state to civilization and which accounted for its early growth. They were the foundation upon which the state was built.

The accompanying chart displays clearly the development of Arizona's primary industries during the pre-war period and how they then ceased growing and continued on a relatively constant and stable basis. The production of the mines and the output of the lumber industry show much greater fluctuations than the others, which is to be expected since operations of both can be regulated during depressions and periods of prosperity while agriculture and live-

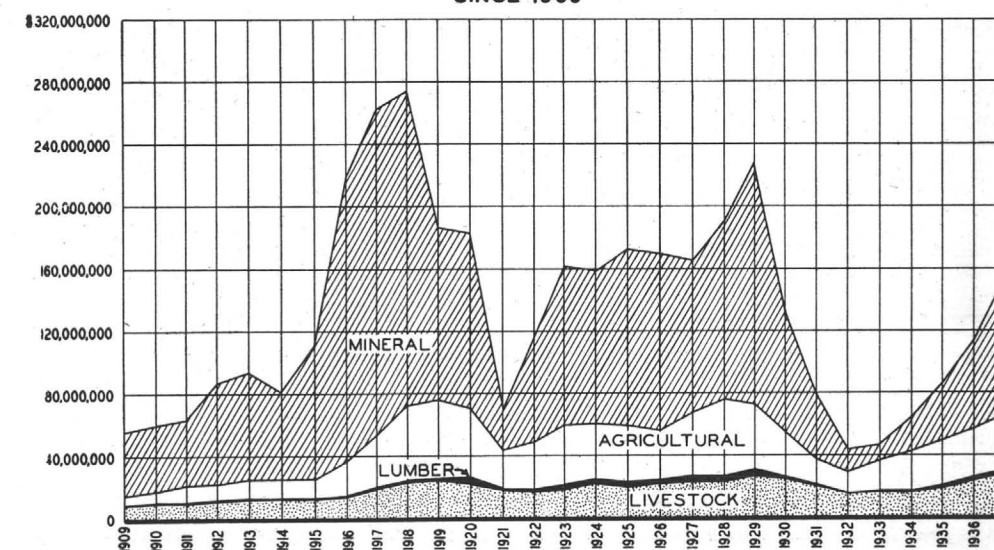
In 1929, during the greatest period of prosperity the nation has ever known, the value of Arizona gold, silver, copper, lead, and zinc production was \$155,567,133. However, the curve dipped sharply thereafter as the nation entered the depression and in 1933 the value of the production of these metals was less than \$11,000,000 or the lowest since 1895 when the development of the mineral resources of the state was just getting well under way. By 1937 the Arizona output had recovered to \$90,855,462.

From 1919 up to and including 1937, production of the five metals has averaged \$77,467,549 in value and the chart shows more clearly than the figures the lack of growth during that period.

## Less Men Employed

Perhaps figures on employment in the mines will demonstrate the point more effectively. According to the 1910 census, there were 20,046 wage earners working in

VALUE OF ARIZONA MINERAL, AGRICULTURAL, LIVESTOCK, AND LUMBER PRODUCTION SINCE 1909



stock output are not so adaptable in this respect.

Livestock and crop raising are governed by an annual cycle which results in the production and marketing of crops yearly. Although in some types of farming, production can be stopped or the crops can even be "plowed under," in livestock and in certain other branches of agriculture, such as the raising of citrus, the farmers have no control whatsoever over yearly output.

In 1909, the value of gold, silver, copper, lead, and zinc produced in the state's mines amounted to \$44,053,023. In 1919, just after the war, production of these five metals had nearly trebled and amounted to \$111,157,872. As a matter of fact, the state's production during the war year, 1917, was nearly double the 1919 amount. Production that year was \$210,627,519, the greatest in the state's history, and this figure was nearly equalled in 1918 when the output was \$203,572,171.

# Mines Paid \$32 in Direct State Taxes For Every \$1,000 They Produced in 1939

Agriculture Payments Averaged \$8.81 and Livestock, \$9.40

## SMALL MINES HIT HARDEST

A marked drop in the population of mining counties in Arizona has been revealed by the preliminary figures of the 1940 United States Census which were released a short time ago by D. Kelly Turner, state census director. The population of the mining counties in Arizona is now lower than it has been in any census year since 1910.

## Mining Population Drops

The figures in Table I show that the population of the mining counties in 1940 was 6,991 persons less than in 1930, a decline of 5 per cent. And not only was the population of these counties in the spring of 1940 lower than it was in 1930; it was off 1.5 per cent from the 1920 figure.

At the same time, both the agricultural and tourist counties continued their upward growth and set new records for 1940, the

gain in the agricultural county population since 1920 having been 42 per cent and that of the tourist counties 108 per cent. Yet there are those who criticize the mining industry because it is not now paying the same percentage of the state taxes that it did in 1920.

It would be just as equitable to state that because one large building in a town paid 50 per cent of the taxes 20 years ago it should continue to pay the same percentage despite the fact that the old building has depreciated and that 10 or 15 more new buildings have been erected in the meantime—buildings that require added protection, policing, street maintenance, and the countless other facilities that are included in the services of various governing units.

A decline in the population of the mining counties as marked as has been seen in the past 20 years, particularly when considered in the light of the tremendous growth that has been seen in other counties, at once raises the question: "Why?"

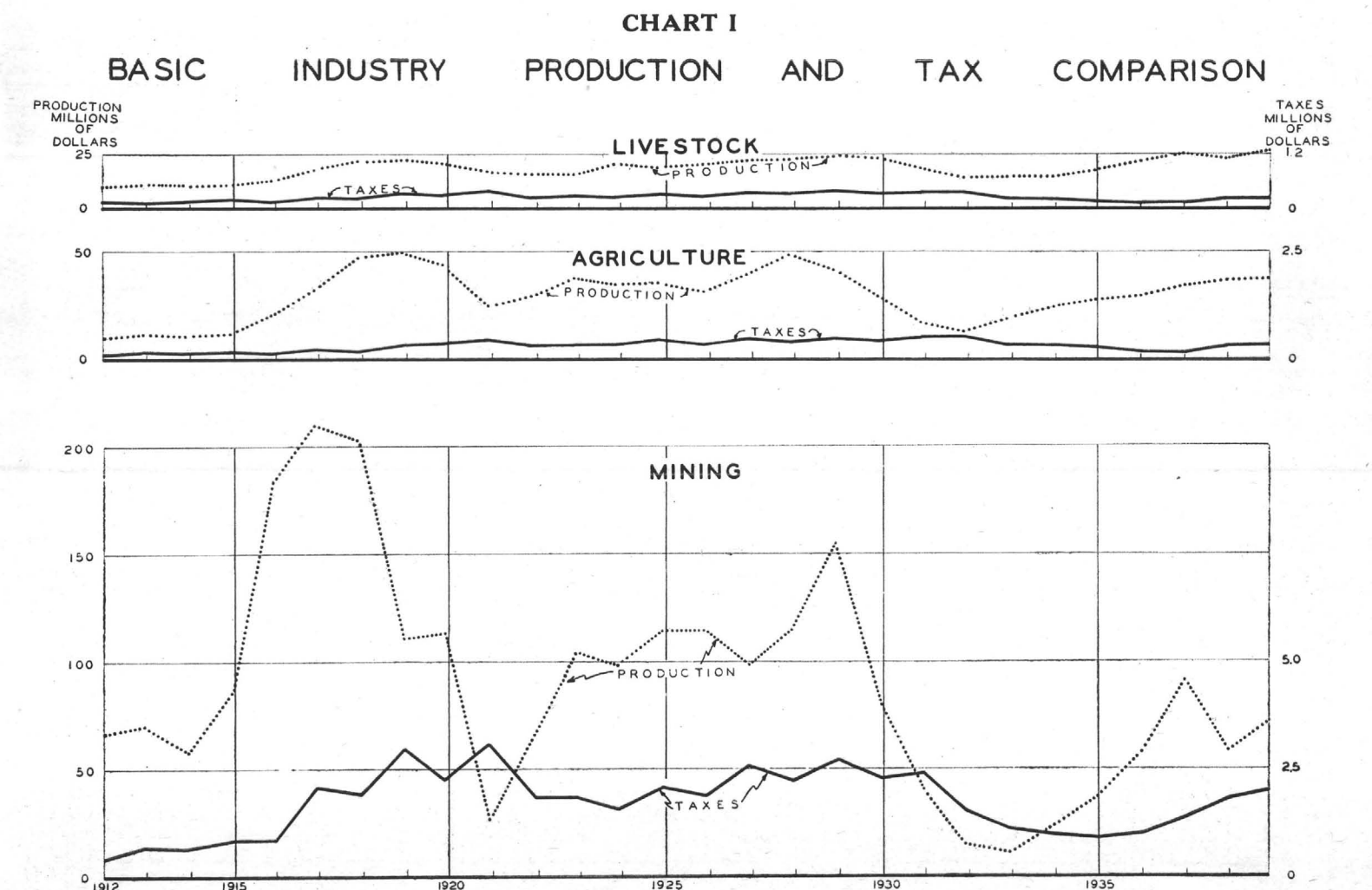
Many, without careful analysis, might select the superficial reasons and declare that some mines in the state have simply

been worked out and that other marginal properties were forced to shut down by the business collapse of the thirties or the present low price of metals. Such reasons as these are quite true and perfectly obvious to anyone. But they do not begin to tell the complete story.

While it is perfectly natural for some mines to be worked out as the years go by and for a business collapse or continued low prices to force cessation of operations by certain marginal producers, it is also logical to expect new producers to spring up to take the place of the old as technological developments and improvements are made. Some have appeared, but by no means as many as have been dropped.

In other words, Arizona's mining industry has been decadent because it has been neglected and unduly burdened. It has not been able to hold its own while other industries have forged ahead. Reduced prices for the metals and the working out of some of the higher grade deposits have been partly responsible but these reasons tell only a minor part of the story.

One of the outstanding reasons for the declining importance of the industry has





placed on its property by the tax commission. The property ceased producing in 1920.

The Duquesne Mining and Reduction Company which operated a half a dozen mines in the Patagonia district, 5 miles south of Mowry, was also a war baby. Operations were conducted from 1917 to 1919 and the company's property was assessed at \$236,618 in 1919.

The Christmas mine located at Christmas, five miles north of Winkelman, was a prominent producer during the war years and was at that time worked by the Gila Copper Sulphide Company. The company worked the mine from 1909 to 1925 when, as a result of difficulties arising from the reduced copper price a reorganization took place at which time the properties were transferred to the Christmas Copper Company.

The Christmas mine has been worked in times of good prices and the war conditions resulted in production on such a large scale that the tax commission placed an assessed valuation on the holdings of \$961,038. The mine was not listed as a producer last year as the copper price would not permit profitable operation but it is being kept in readiness to operate should costs and prices permit.

The Senator and Snoozer mines near Prescott, worked by the Copper Basin branch of Phelps Dodge Corporation produced during 1917, 1918, and 1919 and after that only small leasing operations were conducted which gradually disappeared. Also included in the holdings of that branch was the Copper World mine in the Cedar Valley district and the holdings of the branch were assessed in 1919 at \$299,815.

Production was reported from the Ray Silver-Lead mines from 1917 to 1920 and in 1921 operations ceased when market conditions forced the operating company into bankruptcy. The 1919 assessed valuation of that property was \$142,690 and, as has been the case with so many other properties, it is no longer classed as a producing mine.

The Keating Copper Syndicate operated a property west of Morenci in Greenlee County. The operation was a small one and the assessed valuation of the property in 1919 was \$78,783. Since then these claims together with others in the region have been taken over by the Dover Copper Mining Company. Some of the claims are now being worked under lease.

The United Eastern Mining Company was a gold mining concern and was one of the most prominent producers in the state from the time it started work in 1917 until operations were halted because of exhaustion of sufficiently high-grade ore in 1924. Its assessed valuation in 1919 was \$5,016,765. Since it no longer can produce, it was not listed in 1939.

A small high-grade production was obtained from the Wolverine and Arizona Mining Company property in the Warren mining district of Cochise County in the war years. The mine, assessed at \$183,148, was worked from about 1910 to 1930, but the major depression put it out of business.

Mining of tungsten was stimulated during the World War No. 1 and one of the important Arizona producers at that time was the Yucca Tungsten Mining Company, assessed in 1919 at \$98,906. Since then the Yucca mine has been taken over by the Boriana Mining Company but the mine was not listed as a producer on the 1939 tax rolls as the tungsten market did not justify production.

#### New Producers Less Valuable

To take the place of these companies which are no longer taxed as producers, 16 new companies have appeared on the tax rolls, but the total assessed value of all of them is only about one-twentieth that of the United Verde Extension property alone in 1919 and about one-seventh that of the Old Dominion.

Each of six companies assessed as producers in 1919, but no longer so classified, had an assessed valuation at that time exceeding the combined valuation of all producers in 1939 not listed 20 years ago. These included, in addition to Old Dominion and U. V. X., Arizona Commercial, Consolidated Arizona Mining and Smelting, Iron Cap, and United Eastern.

It is interesting to note that eight of the 16 new taxpayers are primarily gold producers and that three more are gold-silver properties. The increased gold and stabilized silver price has undoubtedly been an important factor in their operation.

Three important Arizona mining companies, listed as producing mines both in 1919 and 1939, have gone through the period with no fundamental change in either their properties or corporate setup and it is possible to analyze the changes in their assessed valuation and determine the reason. The three are Inspiration Consolidated Copper Company, Magma Copper Company, and Miami Copper Company.

In the case of Inspiration the assessed valuation was gradually reduced from \$72,823,671 in 1919 to \$5,400,000 in 1939 or 92.7 per cent. From a standpoint of earnings, as can be seen in Table III, this cut was fully justified. During the four years from 1915 to 1918 the earnings of the company averaged \$10,134,862 yearly which compares with an average of \$711,997 during the years 1935 to 1938. Thus, earnings dropped 98.2 per cent while assessed valuation declined but 92.7 per cent.

Miami Copper is a similar example for the earnings of that company dropped 98.2 per cent while assessed valuation was lowered 92.8 per cent. Miami's earnings from 1915 to 1918 averaged \$4,610,135 as compared with \$81,685 in the more recent period. The assessed valuation of the company has been lowered from \$26,974,343 in 1919 to \$1,950,000 in 1939. It is notable that the percentage changes of both Inspiration and Miami are the same in valuation as well as in earnings.

On the other hand, the assessed valuation of the third example, Magma Copper Company, has increased. The valuation of that property has been lifted from \$4,090,812 to \$4,750,000 or 16.1 per cent.

At the same time, Magma's earnings increased 18.5 per cent justifying its higher valuation. The average earnings of the company during the four war years totaled

\$859,497. From 1935 to 1939 they averaged \$1,018,591, a gain of \$159,094.

The Ray Branch of Nevada Consolidated Copper Corporation provides another illustration. The assessed valuation of this property in 1939 was \$3,750,000 as compared with \$39,518,668 in 1919. This is a decline of 90.5 per cent, but at the same time the net operating income of the company, as reported to the State Tax Commission, has shown a drop of 90 per cent, fully justifying the cut in assessed valuation.

#### United Verde Sold

A most interesting comparison which shows that assessed valuation figures are not low or out of line today, when compared with the actual value of the property, is provided by the United Verde mine. The assessed valuation of the United Verde in 1919 was \$43,822,275, and by 1939 this figure had been lowered to \$16,123,547.

In 1935 Phelps Dodge Corporation purchased the mine from the United Verde Copper Company for \$10,300,000 which included an investment in the local utilities company and the railroad which is assessed separately.

These examples show why the assessed valuation of Arizona's mines has been lowered. They show that many mines are no longer producing and that the production of others by no means brings the returns today that were enjoyed during the war years.

In order to get more mines on the tax rolls and increase revenue to the state it would be much more advisable to give tax relief and stimulate operation by lowering one of the most outstanding mining costs and hindrances to the investment of new capital in the state's resources for development. Thus, capital would be encouraged to invest in the state's mining industry and not forced to pull in its horns to offset the threat of confiscation by taxation.

As costs are added, whether they be additional tax loads, higher transportation, increased wages, social reforms, or what have you, ore reserves go down. Huge supplies of marginal ores are found in Arizona mines and the statement has often been made that if any way could be found to reduce the total costs of operation in Arizona mines by 50 cents a ton, a billion tons of additional commercial ore reserves immediately would be added to the state's resources.

Likewise, for each penny of additional cost, ore reserves are taken away for the ore that can be mined with 15 cent copper exists in far greater quantities than that which can be profitably handled when the red metal sells for 10 cents a pound.

The maximum contribution of the Arizona mining industry is in the millions of dollars expended for wages, transportation, purchase of Arizona products, and the multitude of other ways in which the income is divided. The mines create a new and indestructible wealth which reflects its value in a thousand directions, not alone in the state, but throughout the nation.—Reprinted from PAY DIRT for August 19, 1940.

Another reason for the relatively high number of employees in 1909 was the fact that a far larger number of men were working in non-productive enterprises or development work that year than in 1919. In the latter year, there were 15,268 persons employed in producing mines while there were only 12,838 so employed in 1909.

In 1929, when the workers in non-producing mines numbered practically the same as in 1919, there were 20,985 wage earners in mining and smelting. In 1937 there were 14,364 employees according to a calculation based on reports of the Arizona Unemployment Compensation Commission.

These figures show that, while the population and the number of gainful workers in the state have grown, the number of employees engaged in mining and smelting industries in Arizona has greatly decreased. In 1909, Arizona mines and smelters employed 22.8 per cent of the gainful workers in the state, in 1910 only 14.7 per cent of the workers were so employed, by 1929 the figure had dropped to 12.7 per cent, and in 1937 only 8.3 per cent of the gainful workers in all industries were classified as wage earners in the mining and smelting industry.

Comparison of the number of mining and smelting employees with the state's total population presents a similar picture. In 1909 mines and smelters employed 9.8 per cent of the state's population, 5.7 per cent in 1919, 4.6 per cent in 1929, and 3.1 per cent in 1937.

Thus, while the state's population has grown, the value of its mineral production, the number of wage earners, and also the number of mines have tended to mark time or decrease. This is not to infer that mining is not an important industry. It is, and always has been, the state's greatest primary industry, but its importance has diminished during the last two decades in its relation to the state as a whole.

#### Other Basic Industries Down

Statistics relating to agriculture, livestock, and lumber production present a similar picture. The value of the state's agricultural production in 1909 was \$5,000,000 and in 1919 a 1,000-per cent increase had been recorded when the state's output reached an all-time high of \$50,000,000. This was due to two factors: first, the bringing into cultivation of lands in the Salt River Valley upon the completion of Roosevelt Dam, and, second, the greater war demand for food and consequent higher prices.

Since 1919 no growth has been recorded. In 1928, the value of our crop production nearly reached the 1919 record and amounted to \$49,000,000 and in 1929 the total was a little under \$42,000,000. The 1937 figure was \$35,375,000.

The development of the agriculture industry has depended on the amount of water available, and, incidentally, it was the mining industry with its tremendous power requirements that made possible the delivery of cheap water for farming purposes to the Salt River Valley. Contracts

for power from Roosevelt Dam, and other dams subsequently built, with the mines have paid a large percentage of the cost of constructing the dams and have reduced the cost of water for irrigation purposes thereby making the Salt River project economically feasible.

However, since 1919 there has been little increase in the number of acres under irrigation because the water has not been available and the little change again points out clearly how the agricultural industry has stood still. In 1916, the first year for which records are available, there were 364,227 acres of land under irrigation in Arizona. In 1919 the acreage of irrigated lands had increased to 466,027, and the figure in 1929 was 442,993. Other dams on the Salt River and the Coolidge dam were responsible for the slight increase after that year to 505,624 acres of irrigated lands reported in 1937.

The number of persons engaged in agricultural industries has increased only very

slightly in recent years, further emphasizing the lack of growth of agriculture. There was a sharp rise from the 1909 figures of 22,416 persons gainfully employed in agriculture, animal husbandry, and forestry during the next few years as the irrigated lands were brought into cultivation and by 1919 there were 36,199 persons or 27.7 per cent of those gainfully employed in the state working on farms.

By 1929, however, only 23.7 per cent of the state's population were gainfully employed in agriculture although the number had increased somewhat to 39,928. The cause of the increase in the number so employed since 1919 has been due to a certain degree to the breaking up of the larger farms and ranches into smaller units.

This point is more forcefully shown by the figures listing the number of farm operators. In 1909 there were 9,227 farm operators in the state and in 1919 there were only 9,975 although the number of employes had grown 61 per cent. However,

#### SOME STATISTICS REGARDING ARIZONA'S BASIC INDUSTRIES SINCE 1909

Classification	1909	1919	1929	1937
Total Population	204,354	334,162	435,573	458,230
Total Number of Gainful Workers in All Industries	87,825	130,579	165,304	172,842
Number of Persons in State for Each Gainful Worker	2.327	2.559	2.635	2.651
<b>MINING</b>				
Value of Gold, Silver, Copper, Lead, and Zinc Production	\$44,053,023	\$111,157,872	\$155,567,133	\$90,855,462
Number of Mining Enterprises—				
Producing	135	155	133	
Non-producing	304	95	103	
Aggregate	439	250	236	
Number of Mines and Quarries—				
Producing	251	172	138	
Non-producing	896	96	106	
Aggregate	1,147	268	244	
Average Number of Wage Earners in Mines and Quarries—				
Producing	13,451	15,268	16,567	
Non-producing	3,466	798	707	
Aggregate	16,917	16,066	17,274	12,615
Number of Persons Employed in Smelting and Refining of Non-ferrous Metals	3,129	3,112	3,711	1,749
Total Number of Wage Earners in Mines and Quarries and Employed in Smelting and Refining of Non-Ferrous Metals	20,046	19,178	20,985	14,364
Percentage of Gainful Workers in All Industries that are Employed in Mining, Smelting, and Refining of Non-ferrous Metals	22.8	14.7	12.7	8.3
<b>AGRICULTURE</b>				
Value of Agricultural Crops Produced	\$ 5,000,000	\$ 50,000,000	\$ 41,790,000	\$35,375,000
Number of Farm Operators	9,227	9,975	14,173	
Acres of Irrigated Land		466,027	442,993	501,895
Persons Engaged in Agriculture, Animal Husbandry, and Forestry	22,416	36,199	39,298	
Percentage of Gainful Workers in All Industries Employed in Agriculture, Animal Husbandry, and Forestry	25.5	27.7	23.7	
<b>LIVESTOCK</b>				
Value of Livestock and Animal Products	\$ 8,000,000	\$ 23,000,000	\$ 25,546,000	\$26,375,000
Production	2,350	2,710		
Number of Stock Raisers				
Number of Head of Cattle, Sheep and Goats		1,898,903	1,031,197	874,436
<b>LUMBERING</b>				
Value of Lumber Production	\$ 796,056	\$ 2,114,635	\$ 4,480,082	\$ 3,000,000
Number of Lumbermen	565	657	644	



by 1929 the number of operators had advanced 42 per cent over the 1919 figure to 14,173.

Statistics relating to livestock similarly show a lack of growth. Although the value of livestock and animal products reached a high point in 1937 with a \$26,375,000 production, the number of head of cattle, sheep, and goats on ranges was lower than in any other year since 1913. The reason for this apparent discrepancy is that the growth of the dairying and the meat packing industries in the state has increased the value of the products although the number of head has decreased.

There was more stock on the ranges in 1918, when the combined total was 1,971,836, than in any other year since records have been kept. In 1913 there were 1,535,769 head while in 1929 the number of head of livestock amounted to but 1,031,197.

The lumber industry has shown a similar lack of development. The high point reached in the value of lumber production was in 1929 when the state's output came to \$4,480,082, but this figure was little higher than the 1920 total of \$4,348,432. The 1919 output amounted to \$2,114,635 and in 1909 the total was only \$796,056. A reliable estimate values the lumber production in 1937 at \$3,000,000.

The number of lumbermen gainfully employed in the industry has declined somewhat since 1919. In that year, according to the 1920 census, there were 657 persons or 0.5 per cent of the gainfully employed workers in the state engaged in that industry. By 1929 only 644 persons were employed and they constituted less than 0.4 per cent of the state's gainfully employed. In 1909, 0.6 per cent of the gainful workers or 565 individuals were engaged in lumbering.

The combined production of these four industries, represented by the top curve on the chart, reached a high point in 1918 when the value of mining, agricultural, livestock, and lumber products came to \$274,318,176. The 1909 output was \$56,031,600, in 1919 the figure was \$186,601,114, in 1929 it came to \$227,488,337, and in 1937 to \$154,472,500.

Thus it can be seen that the industries which caused the early settling and first development of the state have been standing almost still since the war. They will continue to play a most important part in the state for many years to come just as they have in the past, but since they have not gained during recent years despite growth in the state's population, there must have been another source or resource which created new wealth and was responsible for the growth of the state beyond that indicated by the basic producers.

#### Climate Is New Resource

There has been another and it is an intangible asset called climate—a resource which has caused a thriving tourist trade that has grown by leaps and bounds in recent years and which is now estimated as a \$70,000,000 annual business by a competent authority. Estimates place the annual influx of tourists into Salt River Valley for the winter climate at approximately

100,000 persons, and Tucson and other portions of the state are also great beneficiaries.

While the resulting business has been of great benefit to the state, has brought new wealth to the state, and has undoubtedly justified the increase of 37 per cent in the state's population, it has also brought greater responsibilities and higher costs to state, county, and municipal governments.

The tourists bring their children and place them in the public schools which are supported by state and local taxation; they use the highways and, although they pay fuel taxes, such revenues are not sufficient in themselves to pay for the construction and maintenance of our roads. They have demanded and received facilities in a 27-year old state that they had in the states from which they came and which often had 160 years of growth and development behind them.

The principal beneficiaries of the great resource of climate are the retail stores, hotels, tourist courts, real estate firms, public carriers, oil and fuel companies, and many others. One would expect these direct beneficiaries of the \$70,000,000 to appear with increasing prominence on the tax rolls although the tourist himself is getting much more than he is paying for.

The only direct tax levied on the tourist business is the small sales tax which is fully justified on the basis that they increase the cost of state government and should share in its support. The state, which has been built and is now maintained around the nucleus of its other great primary industries, must rely on the tourists for its future growth and support.

The basic producing industries will remain as the sound industrial foundation of

the state of Arizona, but there is no reason to expect them to increase. The state is fortunate indeed to have that other great resource—climate—and those who can share it are welcomed, but there is no reason why those engaged in the basic industries of mining, agriculture, livestock, and lumbering should be asked to foot the bill for attracting them and providing facilities to cause them to stay. Why should these industries be called upon to shoulder great added tax burdens to maintain a well-governed and equipped commonwealth which has become more expensive to keep because of the added cost of rapid growth?

Southern California learned, at great expense, that it could not exist by the tourist alone and started seeking "smoke stacks" because of the stable revenues they provide for community support. However, it was realized that those industries could not be attracted nor maintained if a tax burden was placed on them so high that the smoke would no longer issue from the stacks. Each basic industry, climate included, must pay its own way in the support of government and in proportion to that which it adds to the cost of being governed.

Hence, in Arizona, it would be well to inquire carefully into the increased costs of running the state and its various subdivisions which are attributable to the increased tourist trade and determine whether it is contributing to state support as befits a \$70,000,000 industry. This cost should be divided between those who have come to share the climatic resources and those within the state who are the direct beneficiaries. The records do not show that that is being done now or has been done in the past.—Reprinted from PAY DIRT for August 22, 1939.

#### WHO PAYS THE ARIZONA PROPERTY TAXES?

Following is an interesting and enlightening table which shows the assessed valuation of Arizona property and the percentage of taxes paid for county and state purposes in 1938:

	Assessed Valuation	Percentage
All mining property, including large and small mines, mills, smelters, etc.	\$90,035,468	23.29
City lots and improvements, including the full valuation of Phoenix, Tucson, Prescott, and all the other city lands and buildings	79,230,509	20.48
Railroads, including the mining company railroads in addition to the main lines	77,842,197	20.14
Lands and improvements, including all the farms, ranches and farm improvements in Salt River Valley, Yuma Valley, Gila Valley, and elsewhere	51,467,149	13.32
Public utilities, including telephone, telegraph, and power lines and property	26,473,006	6.85
Motor vehicles, including automobiles, trucks, motorcycles, etc.	18,095,131	4.68
Merchandise, which includes stocks of goods in all business houses and warehouses in the state	15,809,708	4.09
Livestock, which includes cattle, sheep, etc.	8,898,092	2.30
All other property, including banks, real estate improvements, personal property, etc.	21,117,904	5.48

Note—Out of \$386,550,388 total assessed valuation, there is almost 10 per cent exempt, the total exemptions being \$36,384,694. The bulk of this is on "Improvements on Lots." There are no exemptions on mines, smelters, concentrators or mining machinery. Mines, railroads, banks, and telephone and telegraph lines are the only classifications on which there are no exemptions.

Reprinted from PAY DIRT for January 4, 1939

TABLE I  
1919 Assessed Valuation of Productive Mines in Arizona Which Are No Longer Assessed as Productive Mines

Mine or Company	1919 Assessed Valuation
Arizona Binghamton Copper Co.	\$ 197,586
Arizona Commercial Mining Co.	2,417,819
Arizona United Mining Co.	642,712
Consolidated Arizona Mining & Smelting Co.	2,927,262
Copper Chief Mining Co.	21,760
Duquesne Mining & Reduction	286,618
Gibson Consolidated Copper Co.	123,685
Gila Copper Sulphide	961,038
Great Western Copper Co.	174,923
Imperial Copper Co.	460,403
Iron Cap Copper Co.	2,369,708
Keating Copper Syndicate	78,783
Leonard Copper Co.	92,978
Old Dominion Co.	12,666,855
Phelps Dodge Corporation	
Copper Basin	299,815
Ray Silver-Lead Mining Co.	142,690
Rosemont Copper Co.	78,145
Twin Buttes Mining & Smelting Co.	410,444
United Eastern Mining Co.	5,016,765
United Verde Extension Mining Co.	36,897,224
Wolverine & Arizona Mining Co.	183,148
Yucca Tungsten Mining Co.	98,906
TOTAL	\$66,499,267

was some production in the early days. The company's heyday was reached during the war, however, a 300-ton concentrator having been built in 1916 under the stimulus of the high war price and demand for metals.

Arizona Binghamton continued to expand its facilities after the new mill was erected and sank a shaft which was completed in 1920. The mine shut down shortly thereafter due to the break in the copper price and has never amounted to anything since as a producer. The possibilities of renewed production from this property appear to be very remote and would most likely require the rehabilitation and reopening of the Humboldt smelter.

During the war the Humboldt smelter was operated by the Consolidated Arizona Mining and Smelting Company which in 1919 had an assessed valuation of \$2,927,262. The company also operated the Blue Bell and De Soto mines near Mayer which produced from 1914 to 1920. Shortly thereafter unfavorable market conditions necessitated a shut down for profits had disappeared.

Later the Consolidated Arizona properties were taken over by the Southwest Metals Company which was incorporated in 1920. Southwest Metals became active in 1922 and the smelter was again operated until 1924. Development and production continued and the smelter was blown in once more early in 1926, but in January, 1927, all company operations ceased and the mines were leased to individuals.

This property is one that is definitely a marginal producer which reached its most prosperous period during the war when it paid some dividends. The high copper price in 1929 caused operations to be resumed by the Sheldon Mining Company which exercised an option it had obtained on the smelter and mines, and the smelter was blown in early in 1930. Operations were brief and the property was promptly shut down when the copper price again collapsed.

#### Globe District

There are a number of mines in the vicinity of Globe that were important producers 20 years ago but which have

TABLE II  
1939 Assessed Valuation of Productive Mines in Arizona Which Were Not Assessed as Productive Mines in 1919

Mine or Company	1939 Assessed Valuation
Arizona Eastern Gold Mines Co.	\$ 250,000
Bagdad Copper Co.	35,000
Eagle Picher Lead Co.	350,000
Golden Turkey Mining Co.	10,000
Gold Standard Mines Corporation	50,000
Hillside Mines Co.	150,000
Iron King Mining Co.	25,000
Liberty Hill Gold Mines, Ltd.	35,000
Lynx Creek Placer	10,000
Mammoth-St. Anthony, Ltd.	500,000
Molybdenum Gold Mining Co.	10,000
Phelps Dodge (Equator Group)	10,000
Tennessee Schuylkill Corp.	34,840
Tombstone Development Co.	10,000
U. S. Smelting, Refining & Mining Co.	400,000
Veta Mines, Inc.	20,000
Total	\$1,899,840

erty was assessed at \$642,712 in 1919. Production was reported in 1918 after which the mine shut down due to unsatisfactory market conditions.

The Great Western Copper Company at Courtland, Cochise County, reported a good production during the war years. Great Western also operated for a number of years prior to the war, but at the time of the copper price slump in 1921 company work was halted and only intermittent leasing operations have been reported since. Although no longer classified as a producer, the property of the company was assessed in the productive mine classification in 1919, the tax commission's valuation having been \$174,923.

Located in the same district was the Leonard Copper Company, another war baby which operated the Copper Belle mine assessed at \$92,978. This company was controlled by the Shannon Copper Company, a prominent producer in the Morenci district in the early days. Although some development was done there after the mine was shut down at the end of the war, no production of any importance has been reported since.

#### Lose Pima County Producers

Two prominent war producers in the vicinity of Tucson have also disappeared from the Tax Commission's roster of producing mines. One of these is the Imperial Copper Company, owner of the Silver Bell mines in the Silver Bell district 35 miles south of Tucson which were assessed at \$460,403 in 1913. The other was the Twin Buttes Mining and Smelting Company about 27 miles south of Tucson with an assessed valuation of \$410,444.

Twin Buttes operated the Glimmer, Queen, and Senator Morgan mines and the Twin Buttes Railroad. A good production was reported during the war, but after that operations became irregular, finally ceasing entirely. Even the railroad had disappeared from the tax rolls by 1935.

Imperial Copper operated the Silver Bell mines from 1903 to 1913 when the shaft was lost by fire. It had also erected a smelter at Sasco and after the 1913 fire the American Smelting and Refining Company took over the operation of both the mine and smelter under lease. The A. S. & R. work continued only through the war and the mine was shut down in 1919.

The Rosemont Copper Company which operated in the Helvetia district of Pima County was a small producer during the war and a valuation of \$78,145 was

shut down for various reasons. The most important of these is the Old Dominion Company. Although this company was not a war baby in the strictest sense of the word, inasmuch as it was operated both before and after the war, it certainly reached its zenith during that period.

The record high price for Old Dominion securities was 88 1/4 in 1916. In 1930 the stock sold for 1 1/4 and soon after the mine was shut down as a consequence of the depression and it has not been operated since. The reduction works have been dismantled and the mine was recently sold to Miami Copper Company for \$100,000. This compares with an assessed valuation of the Old Dominion properties amounting to \$12,666,855 in 1919.

Closely associated with the Old Dominion was the Arizona Commercial property which was also assessed as a producing mine 20 years ago but which is no longer in that category. The value placed on the property by the Tax Commission in 1919 was \$2,417,819. The operation of this company closely paralleled that of the Old Dominion and the management of the two was related. The Arizona Commercial was worked from 1912 until the end of 1929 and the Old Dominion concentrator handled its milling ore.

Adjoining the Arizona Commercial property are the holdings of the Iron Cap Copper Company which was formed to take over the National Mining Exploration Company in 1911. The mine had been idle when the world war broke out, but production was inaugurated in 1915 and continued until 1927 when exhaustion of sufficiently high-grade reserves necessitated a shut down. Iron Cap holdings were assessed at \$2,369,708 in 1919.

The Gibson Consolidated Copper Company, eight miles west of Globe, was distinctly a war baby. It was a producer prior to 1910, particularly during the years 1906 to 1909. It also produced during 1917 and 1918 which accounts for its being on the tax rolls as a producing mine in 1919 with an assessed valuation of \$123,685. After the war ended Gibson Consolidated brought its operations to a halt and it has not been a producer for many years.

#### U. V. X. Shuts Down

The most important of the many mines which have stopped producing is the United Verde Extension at Jerome which brought its operations to a close late in 1937. In 1919 the property of the U. V. X. was assessed at \$36,097,224. Shut down of the mine was necessitated by the exhaustion of its high-grade reserves and the smelter has been dismantled and the equipment sold for a song.

The Copper Chief property, located 3 1/2 miles southeast of Jerome and adjoining the Iron King mine, was an intermittent producer which was worked under lease by the Hayden Leasing Company from 1916 to 1918. The advanced price enjoyed as a result of war activity permitted the operation and as a consequence the property was assessed for \$21,760.

Another war producer was the Arizona United Mining Company at Dragoon in Cochise County. This company's prop-



# Output and Earnings of Producing Mines In Arizona Drop Sharply In Twenty Years

16 Mines Worth \$1,899,840 Replace 22 With \$66,499,267 Value

## ASSESSED VALUATION LOWER

A sharp reduction in the assessed valuation of mining property in Arizona has taken place in the past 20 years—the cut being accounted for by the removal of many properties in the state from the ranks of producing mines and by the decreased earning power of those that still remain.

Since 1919, 22 mining companies with a total assessed valuation of \$66,499,267 have been completely removed from the State Tax Commission's roster of producing mines. They have been replaced by 16 new and smaller companies whose holdings are assessed at only a total of \$1,899,840.

Moreover, many companies which have been on the tax rolls in both years have had to shut down some of their producing units and as a consequence the assessed valuation of those concerns has been reduced drastically. A typical example of the latter is the group of mines in the Morenci district now controlled by Phelps Dodge Corporation.

Since the Morenci district was first opened up consolidations of the various mines have been the rule and at statehood there were three important producers in the area. These were the Arizona Copper Company, Ltd., Shannon Copper Company, and the Detroit Copper holdings of Phelps Dodge.

In 1919 all three of these producers were assessed as separate companies and producers. In 1939 only one concern remained, Phelps Dodge Corporation, and of

the many mines that were operated in the district 20 years ago only two were being worked at all.

One of the properties was the Humboldt mine where leaching operations were in progress, of minor consequence as compared with the mining in progress in the twenties, and the other was the recently started Morenci Open-Pit mine where development work and a very limited production of test material is under way. It is interesting to note that both of these properties were formerly owned by Arizona Copper and that the original Detroit Copper holdings of Phelps Dodge as well as the Shannon Copper properties have all been shut down. The Yankee, Longfellow, Coronado, King, and other famous old mines in the vicinity have ceased to produce.

A similar example has been the consolidation of holdings in the vicinity of Bisbee. Twenty years ago, Phelps Dodge Corporation and Calumet and Arizona were the principal companies in the district along with what are now known as the Shattuck Denn properties.

Since then, Calumet and Arizona has disappeared from the picture as a corporate entity although the mines of that company are now being worked by Phelps Dodge which absorbed C. & A. in October, 1931. The original Phelps Dodge properties have been largely worked out and ores that can be commercially treated under present conditions have been removed—the Sacramento Pit work has been cleaned up and work in the P. D. limestone mines at Bisbee has been practically halted as the rock that remains cannot stand current costs.

Furthermore, the old Phelps Dodge smelter at Douglas has been disposed of and the ore produced in the district at

present is being treated in the smelter built by C. & A. before the consolidation.

The history of the Shattuck Arizona and Shattuck Denn mining companies near Bisbee provides a similar example. In 1919 the Shattuck Arizona was mining ores in Shattuck Gulch back of Bisbee while the Denn mine was only a very promising prospect.

Today the Shattuck mine is worked out and not even leasers are operating there. The Shattuck Arizona Copper Company has been combined with the Denn Arizona Copper Company making the Shattuck Denn Mining Corporation which now operates the Denn mine below Lowell. Shattuck Denn is now assessed at \$3,620,202, just \$1,000,000 less than the assessed valuation of Shattuck Arizona 20 years ago.

### War Babies Disappear

Over half the companies whose properties are no longer assessed as producing mines were war babies—properties which could produce with the high prices and exceptional demand seen 20 years ago but which could not continue to operate after the war when the price dropped abruptly or under conditions which have since existed.

The price of electrolytic copper reached a peak of 37 cents a pound f.o.b. New York in 1917 and the average quotation from 1910 to 1919 was 18.94 cents. Since then the quotation has steadily declined, having fallen to 14.55 cents for the 10-year period 1920-1929, and to 9.55 cents from 1930-1939.

The Arizona Binghamton Copper Company, the mines of which had an assessed valuation of \$197,586 in 1919 is one of the many that have ceased production. Its mines were discovered in 1882 and there

# The Value of Arizona Mine Production Is Less But State Taxes Are 285 Per Cent Higher Than In 1914

Although the production of Arizona's mines in 1938 was nearly \$1,000,000 less than it was in 1914, the amount of direct state taxes paid by them was 285 per cent higher, according to a report compiled by Dixon Fagerberg, C. P. A. for the Arizona Department of Mineral Resources. There was practically no difference in the amount of property tax paid in the two years; the great increase was accounted for by new and additional forms of taxation which have been imposed by the state in recent years, and which have become so important as sources of revenue that last year only 37.2 per cent of the revenues raised by taxation from the mining industry was provided by the property tax levy.

The great growth in mine taxation may be more graphically portrayed by pointing out that state taxes paid per ton of copper produced amounted to \$8.04 in 1938 against \$3.05 in 1914; that taxes per man employed came to \$158 last year as compared with \$34 in 1914; or that only 11.2 tons of copper were produced in 1938 for every \$100 in direct state taxes against 32.7 tons 25 years ago.

Although the mining industry of Arizona produced less value in 1938 than in 1914, the taxes for state purposes on each \$1,000 produced were almost three times as much, \$11.10 in 1914 and \$32.09 in 1938. Yet in 1938 it was necessary to produce 207,750 tons of copper to get approximately the same revenue as 191,225 tons got in 1914. This analysis covers state taxes only and does not take into consideration county, municipal, school, or any of the multitude of federal taxes.

Those inclined to criticize the state tax structure as it relates to the mining industry overlook the fact—intentionally or otherwise—that the present tax dollar is made up of three approximately equal parts: sales, income, and property, and mislead in comparing the total of previous years with a fractional part of the present tax dollar. It is the total tax dollar that counts and breaking it down into several names does not in any way relieve the burden on those who pay it.

The property tax is based on the value of the property, the sales tax gets its share from the gross production irrespective of whether or not it was a profitable operation, and the income tax gets its cut from the net profits. Thus there is full coverage with "ability to pay" amply cared for.

If state property taxes of today are to be compared with property taxes of the past, then sales and income taxes should be likewise related, but that is impossible as they were non-existing prior to 1934. In other words, before 1934 the state was almost entirely supported by the property tax whereas today the levy on real property for all taxpayers, including the mines, is but a small part of what is contributed towards the expense of running the state government.

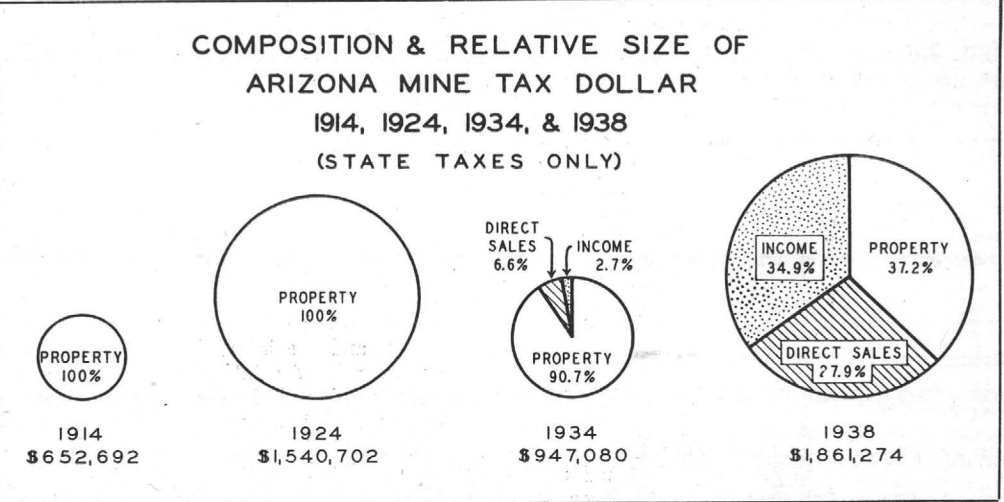
The property tax figure for the mines is not as high now as it has been at times in the past. In 1934, the property tax figure at \$859,167 was substantially higher than the 1938 figure of \$693,273, but the sharp growth in other taxes resulted in a total direct tax figure of \$1,861,274 in 1938 which was approximately double that in 1934. In 1924, when the mines paid property taxes that totaled \$1,540,702, there were no other forms of direct taxation.

The new taxes which are primarily responsible for the increase in the mine tax burden are the sales and income taxes. In 1938, the mines paid direct sales taxes totaling \$518,684, and, furthermore, min-

ing is the only industry in the state that is required to pay a levy on production.

The intent of the sales tax is to collect revenue from the consumers who pay taxes on the purchases they make. However, the mines are required to pay a sales tax of 1 per cent on their output although they do not sell the metals they mine within the state. The levy was originally one-fourth of 1 per cent, but was later advanced to 1 per cent.

In addition, the mines pay taxes on their purchases just as other buyers do. Last year, five of the larger copper mining companies spent \$4,376,215 for Arizona products on which they paid sales taxes. Furthermore, mining company employees pay

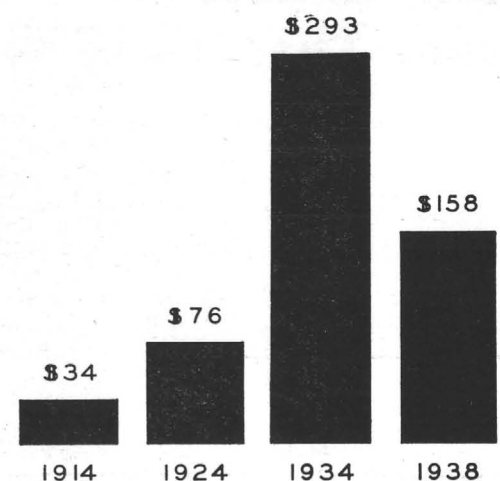


	1914	1924	1934	1938
Distribution of Mining Tax Dollar				
Property Tax	\$652,692	\$1,540,702	\$859,167	\$693,273
Income Tax			25,556	649,317
Direct Sales Tax			62,357	518,684
Total Direct Mine Taxes	\$652,692	\$1,540,702	\$947,080	\$1,861,274
Taxes per \$1,000 of Gold, Silver, Copper, Lead and Zinc Produced	\$11.10	\$15.64	\$40.60	\$32.09
Taxes per Ton of Copper Produced	\$3.05	\$4.10	\$9.52	\$8.04
Tons of Copper Produced per \$100 of State Taxes	32.7	24.9	10.5	11.2
Taxes per Man Employed	\$34	\$76	\$293	\$158
Value of Gold, Silver, Copper, Lead and Zinc Produced	\$58,825,640	\$98,540,602	\$23,290,079	\$57,969,900
Price of Copper	13.3c	13.1c	8.00c	10.22c
Tons of Copper Produced	191,225	336,183	89,041	207,750
Number of Men Employed	18,840	20,248	3,229	11,934

Company	Year	Amount	Year	Amount	Decline 1935-1938	Per Cent Decline
Inspiration Consolidated Copper Co.	1915	\$ 600,062	1935	\$1,216,770*	\$ 1,816,832	302.8
	1916	20,629,489	1936	353,722	20,275,767	98.3
	1917	11,080,732	1937	1,899,661	9,181,071	82.9
	1918	8,229,163	1938	324,616*	8,553,779	103.9
	4-year Total	\$40,539,446	4-year Total	\$ 711,997	39,827,449	98.2
	4-year Average	10,134,862	4-year Average	177,999	9,956,863	98.2
Magma Copper Company	1915	670,886	1935	665,697	5,189	0.7
	1916	1,179,764	1936	1,297,990	118,226**	10.0**
	1917	1,067,986	1937	1,456,332	388,346**	36.4**
	1918	519,350	1938	654,346	134,996**	26.0**
	4-year Total	\$ 3,437,986	4-year Total	\$4,074,365	636,379**	18.5**
	4-year Average	859,497	4-year Average	1,018,591	159,094**	18.5**
Miami Copper Company	1915	3,175,345	1935	176,985*	3,352,330	105.6
	1916	6,215,636	1936	55,962	6,159,674	99.1
	1917	4,710,995	1937	728,897	3,982,098	84.5
	1918	4,338,564	1938	281,134*	4,619,698	106.5
	4-year Total	\$18,440,540	4-year Total	326,740	18,113,800	98.2
	4-year Average	4,610,135	4-year Average	81,685	4,528,450	98.2



# STATE TAXES PAID BY ARIZONA MINES PER MAN EMPLOYED



sales taxes on their purchases, and it has been estimated that the mines pay directly and indirectly through their own purchases and those of their dependents about one-third of the total sales taxes paid to the state.

The income tax is another relatively new method by which the state collects revenues, and funds derived from this source are, of course, subject to wide variations depending on whether conditions are prosperous or depressed. Last year nearly 35 per cent of the taxes paid by the mines were collected in this manner. The mines contributed 42.73 per cent of the total income taxes collected by the state in 1936, the only year for which a complete analysis is available.

It can be seen readily that the mine tax dollar, which was formerly confined to the property tax, has been split into three nearly equal parts, and this development has been relatively recent. During the depression, the property tax became so burdensome as the sole means of collecting funds, that those administering state affairs had to devise new methods to ease the burden on the property owners.

While the burdens were made lighter for many, the records do not show that there has been any lessening in the mine tax load, but rather a continued growth. The direct sales tax that the mines alone are required to pay on their production had more than offset any advantage they might have derived from a lowering in the property tax.

Furthermore, property taxes are paid on assessed valuation, and no property in the state is valued as highly for tax purposes as that of the mines. While ordinary homes are often appraised at about half of their actual value, there are few if any mines in the state that could be sold for their assessed valuation.

The sales and income taxes both made their debut in 1934, and, since then, the revenues from these two sources have grown so sharply that they have been largely responsible for the fact that total state taxes collected during the last three years have successively set new high

records reaching \$14,274,854 in 1938. This compares with \$9,158,613 in 1929, the most prosperous year in the nation's history.

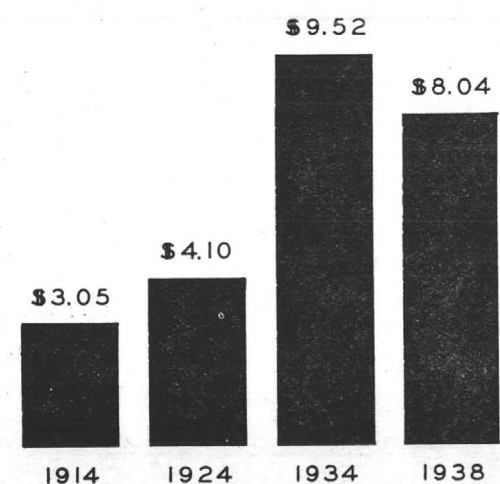
Significant in these tabulations is the huge load that the mining industry carried during the depression year of 1934 with \$40.60 state taxes on each \$1,000 of gold, silver, copper, lead and zinc produced; \$9.52 taxes on each ton of copper; and \$293 taxes for each man employed. Thus the mining industry has furnished a stabilizer for state's revenues by taking excessive burdens at a time when everyone—including the mines—was having difficulty meeting obligations. This situation must be recognized when considering the payments in more prosperous periods for no industry can take a jolt during both depression and prosperity and exist.

New forms of taxation have not been confined exclusively to the income and sales levies. The fuel tax is another important source of revenues, collections of which began in 1921, but this tax is earmarked for use in building and maintaining state highways and is collected when fuel is sold. Therefore, it is in proportion to the amount the payer uses the highways. The mines contribute to the state coffers through this method in relation to their use of the highways but also pay substantial sums through their purchases of fuel, for units used on private roads which the user must build and maintain.

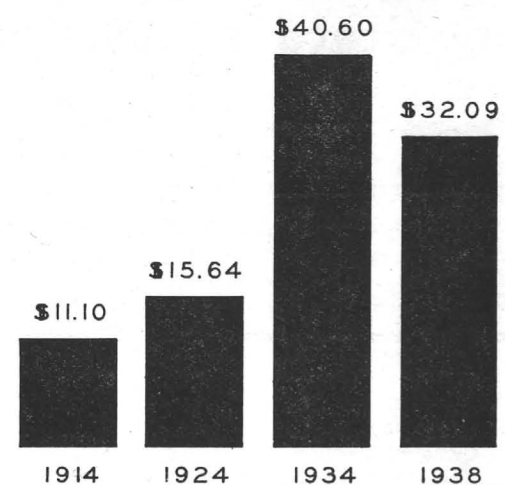
There are also the luxury and liquor license taxes, the former having commenced in 1934, and the latter in 1935. The liquor license tax is of relatively little importance to the mining industry and is probably largely paid by those who find an occasional stimulant helpful in easing their tax worries. The luxury tax, likewise, has no direct influence on the mining industry.

The mining industry is the principal contributor to the inheritance taxes collected by the state. The fortunes of many men, who made their accumulations from mining, have been shared with the state upon their death. For instance, the passing of one prominent mining man in 1938 served to cut the state tax rate by over 5

# STATE TAXES PAID BY ARIZONA MINES PER TON OF COPPER PRODUCED



# STATE TAXES PAID BY ARIZONA MINES PER \$1,000 GOLD, SILVER, COPPER, LEAD, AND ZINC PRODUCED



cents. One only has to look over the years when inheritance tax collections were substantial and he will almost invariably find that the reason for their size in that particular year was because of the death of one or more men who had pioneered in the development of Arizona mineral resources.

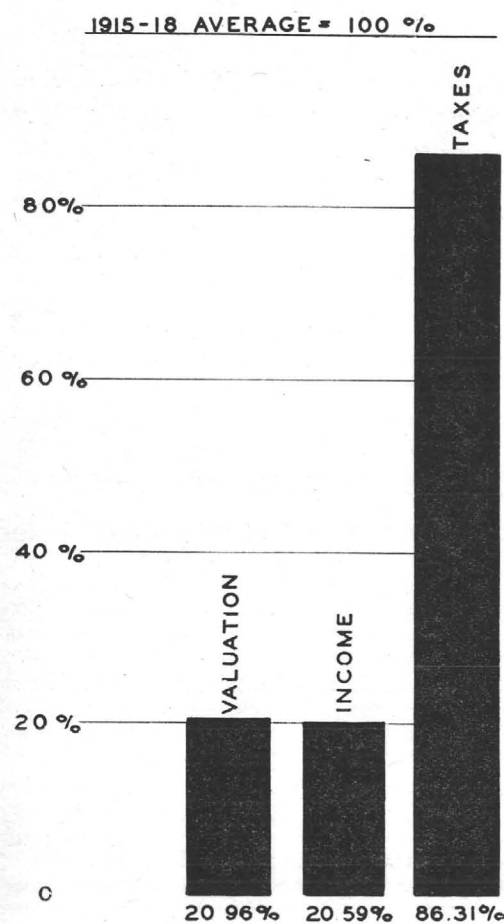
The accompanying charts clearly display how the taxes paid by the mines have grown and how their distribution has changed so that the mine tax dollar is now divided into three major parts. The mining industry today is assuming more of the tax load than it can continue to carry since its production and average grade of ore are steadily decreasing. Taxation has been an important factor in causing the loss in value of mine production in recent years and a continuation of the trend toward greater taxes can be expected to accentuate the tendency toward reduced output. Lower, rather than greater, taxes are needed in order to increase output and in the end will provide greater revenue to the state by encouraging the development and exploitation of its resources.

As costs increase, ores that once could have been mined profitably have to be left in the ground and no longer have any value. Taxation is one of the major cost items and its increase has done much to deplete the mineral resources of the state. It is obvious that as taxation increases, more and more rock that was once ore ceases to have any commercial value and it is but a short step to a point where there would be no commercial mineral left. The greatest depleters of the mineral resources of the state are not those who give employment, extract ores, and create permanent wealth, but those who advocate the placing of loads beyond the ability of the resources to carry.

Taxation is stifling mining progress in Arizona. The tax load has become so burdensome that outside capital has little desire to invest funds in the state's mines and take the inherent risks when they know in advance that, if they are successful and a new mine is developed, taxes will take the bulk if not all of the profits that are to be gained.—Reprinted from PAY DIRT for September 25, 1939

# ASSESSED VALUATION, NET OPERATING INCOME, AND DIRECT STATE TAXES PAID BY ARIZONA MINES DURING THE YEARS 1935-1938 AS COMPARED WITH 1915-1918

1935-38 figures shown as percentages of 1915-18 figures.



how the margin of profit is constantly narrowing and how the mines are less able to absorb an increasing tax load than they

were 20 years ago. Whereas the average gross income during the 1935 to 1938 years was 43 per cent of that during the war years, the net operating income was only 21 per cent. Increasing costs, lower metal prices, and the necessity of turning to lower grade ores have cut the margin of profit in two.

From a standpoint of earnings the mines paid one dollar in direct state taxes in 1939 for every \$6.25 of net operating income they obtained on the average during the preceding four years. In 1919 they paid one dollar for every \$23.36 they earned. On this basis mine taxes last year were 3.7 times what they were in 1919.

Taxes have increased over the years to a point where it is essential that relief be provided—that the mines and other basic industries be required to pay less and not more taxes. And it is highly probable that if taxes were lower the stimulation that such action would give to mining would result in greater production of wealth, increased employment, and marked gain in the tax revenues.

It is ridiculous to assert that mines or any industry, because of the fact that they paid a certain percentage of the cost of government at one time, should continue to pay that percentage. Just because of the added demand for government financed activities, state costs have soared and the basic industries, which once so largely supported the state, have become relatively less important in the economic structure. One of the prime reasons for the lessening importance, however, is that increasing tax burdens have caused units of the industries, one by one, to reach a point where the value of the production could no longer meet the increasing costs and they have disappeared, completely and irrevocably, from the tax rolls.

The placing of tax loads beyond ability to pay does more to shift the tax burden on to others than anything else which can be done. The road to greater government-

# DISTRIBUTION OF TOTAL PROPERTY TAX LEVY FOR STATE PURPOSES YEAR 1938

Education .....	\$1,620,703
State Institutions* .....	278,321
Administration .....	225,532
Legal, Legislative, and Judicial .....	67,007
Agriculture and Livestock .....	158,891
Interest and Redemption .....	32,957
Military .....	39,094
Special Appropriations .....	553,932
<b>TOTAL .....</b>	<b>\$2,976,437</b>

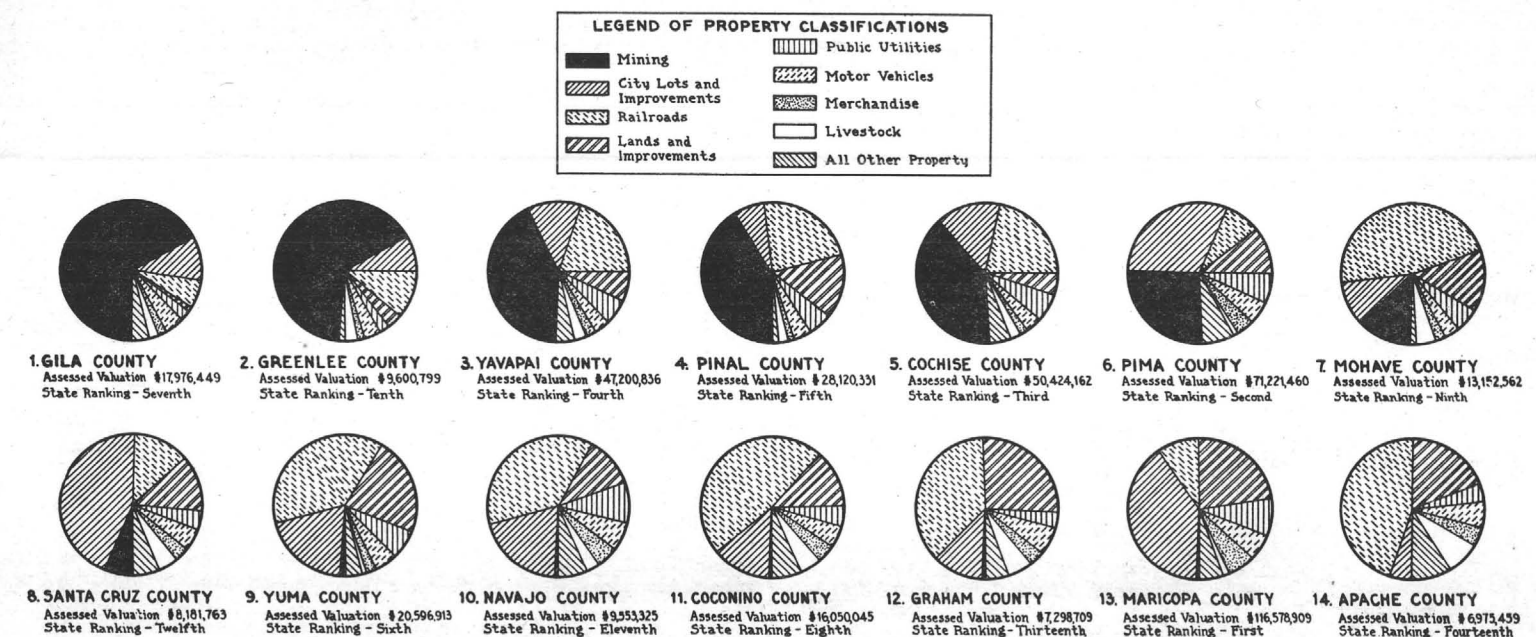
\*Other than Educational Institutions

Source: Fourteenth Biennial Report of the State Tax Commission of Arizona to the Governor, December 31, 1938.

# APPROXIMATE SEGREGATION OF ARIZONA'S COPPER YIELD

	1874 - 1936	
	Cents Per Pound	Per Cent
Wages and Salaries ..	5.0	30
Supplies and Equipment .....	3.6	21
Taxes (State and Federal) .....	1.5	9
Freight on Copper .....	0.9	6
Refining .....	1.0	6
Selling .....	0.2	1
Intangibles .....	1.4	8
Dividends .....	3.2	19
<b>TOTAL .....</b>	<b>16.7</b>	<b>100</b>
		<b>\$2,690,000,000</b>

# MINING PROPERTY IN COMPARISON WITH OTHER CLASSES OF ASSESSED VALUATIONS, BY COUNTIES, FOR THE YEAR 1938 SHOWING THE SEVERAL COUNTIES IN THE ORDER OF THEIR RELATIVE DEPENDENCY UPON THE MINING INDUSTRY





In 1939 Arizona's mines paid taxes to the state that amounted to 16 per cent of their average net operating income during the preceding four years. In 1919 the taxes they paid to the state amounted to 4.3 per cent of their net operating income during the preceding four years.

The net operating income of all of Arizona's producing mines put together averaged \$14,319,766 from 1935 to 1938 and this figure is before taxes and prior to making allowances for depreciation or depletion. The comparable figure for the years 1915 to 1918 was \$69,551,174. It should be remembered that these figures are not profit. They do not allow for any return on the capital investment and many costs have not been deducted.

#### Mine Income Declines

It will be seen by referring to the accompanying table that the assessed valuation of Arizona's mines in 1919 was many

times greater than the figure in 1939. The assessed valuation of mining property in the state in 1919 was \$496,262,860 and the assessed valuation of the productive mines was \$414,326,636. In 1939 the tax commission placed a value of \$90,249,166 on all mining property and \$66,329,840 on productive mines.

This is perfectly logical and justifiable for the value of any property is dependent primarily on what it is capable of earning. The tax commission in fixing assessed valuation carefully analyzes the earnings of the companies during the immediately preceding years and gives them considerable weight arriving at a final figure.

Thus, the assessed valuation was exceptionally high in 1919 because it followed the war years and a period of unprecedented prosperity. The years leading up to 1939, on the other hand, included a period of great depression so that the 1939 figure was naturally much lower.

Because mining property is assessed in this manner and taxes are collected on such a basis, income to the state is greatly stabilized. The mines are enormously over-taxed in periods of depression and low production when income is declining, and it is therefore necessary that they be given an opportunity to recoup to some extent during prosperous years when income is rising and other taxpayers in the state are more capable of contributing to the support of the state government.

From a relative standpoint, the drop in the net operating income of the productive mines in the years 1935 to 1938 as compared with 1915 to 1918 was 79 per cent. At the same time there was a drop of 86 per cent in the assessed valuation of the mines.

#### New Taxes Imposed

However, property taxes paid did not fall as rapidly as did the assessed valuation because of an increase in the tax rate. They dropped from \$2,977,571 in 1919 to \$1,128,115 in 1939 or 62 per cent, far less than the 79 per cent decline in income. And, in addition to these state taxes, the mines paid county, school district, and city taxes.

Furthermore, the drop in property taxes for state purposes was compensated to a large extent by imposition of sales and income taxes. In addition to the \$1,128,115 paid in property taxes for state purposes last year, the mines paid \$489,954 in sales taxes on metals produced and an estimated \$700,000 in income tax, bringing the total to \$2,318,069. To this sum should be added approximately \$75,000 for the sales tax paid on materials purchased. Neither of these tax sources existed in 1919.

Features that were taken care of in the property tax in 1919 are now included in the new income and sales taxes. The income tax plays greater emphasis on current ability to pay than the old property tax which took care of that angle solely by the practice of the tax commission in considering past earnings in fixing assessed valuation.

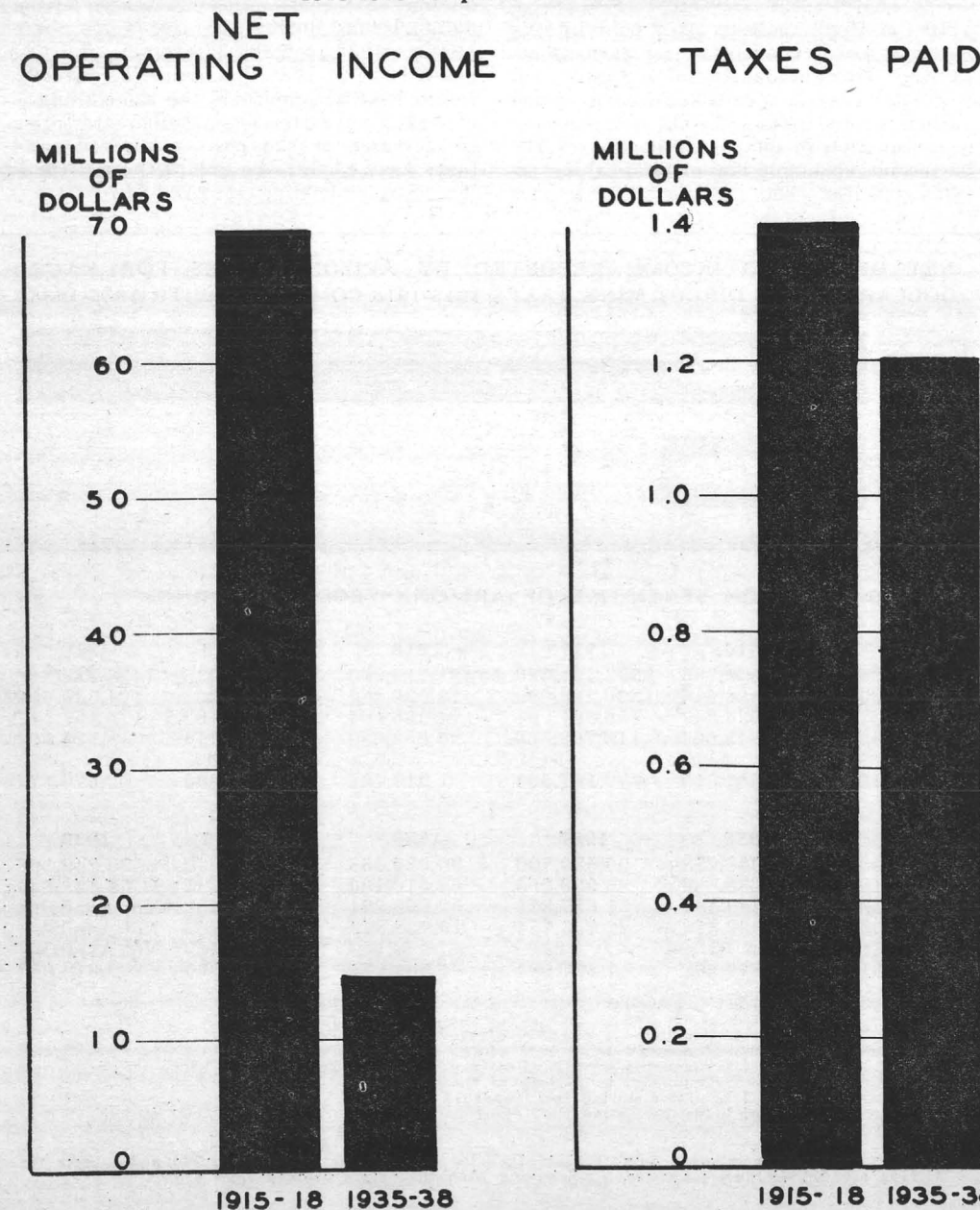
Furthermore, the sales tax is in reality a production tax. It is not what it is popularly believed to be inasmuch as the mines are unable to pass it on to the consumer. Other businesses and firms pass the tax on to the consumer by collecting the tax from them whenever a sale is made inside the state while they are not required to collect it from out-of-state customers.

The mines on the other hand are required to pay a sales tax despite the fact that their customers do not reside in the state and that they must sell their products in eastern markets in competition with products produced in other states. They, as is true with no other Arizona industry, pay both on that which they buy as well as that which they sell. This sales tax is in effect a 1 per cent tariff which Arizona has imposed on its mine production. It gives the mines of other states a 1 per cent advantage in marketing their products.

#### Relative Tax Growth

Figures listing the gross production of the mines and their net operating income 20 years ago as compared with today show

COMPARISON OF THE NET OPERATING INCOME AND DIRECT STATE TAXES PAID BY ARIZONA MINES  
1915-1918 compared with 1935-1938



# State Taxes Grow 1,030 Per Cent While Population Only Doubles

## Per Capita is Now \$32.60

An increase of 1,030 per cent in Arizona state taxes has been recorded in the 27 years since statehood according to a recent analysis made for the Arizona Department of Mineral Resources by Dixon Fagerberg, Jr., certified public accountant. The report further shows that the basic industries, which have always supported the state, are receding under the tax load.

While this tremendous growth in state cost has been partly due to an increase in population, other factors have been much more important, since the number of people in the state in 1938 was a little under twice the figure in 1912 while the cost is 10 times as much. According to the best available figures, the state's population in 1938 totaled 437,890 persons as compared with 230,316 in 1912.

The growth in state taxes is more startling when figured on a per capita basis. In 1912 taxes for state purposes amounted to \$6.26 for each resident; in 1920 they had more than doubled and totaled \$12.67, and they have steadily mounted since that time. By 1930 a figure of \$19.93 had been reached and in 1938 total state taxes, figured on a per capita basis, reached an all-time high of \$32.60.

This is a situation deserving of serious thought on the part of all citizens of the state because taxes have become so burdensome that they are stifling progress. The operations of industries already established are being handicapped and the investment of new capital in the state is being discouraged. Particularly is this true of primary mining ventures which, by their very nature, involve great risk and cannot assume a disproportionate tax burden.

Prior to 1921, the state collected its taxes almost exclusively by property levies. There was also an inheritance tax, now discontinued, but it was never of much consequence as a revenue producer. Today, however, the state has seven methods of taxation and the property tax accounts for less than 21 per cent of the total revenues it collects. There is also a fuel tax which provided 29 per cent of the collections in 1938; the sales tax which provided 27 per cent; income tax, 10.6 per cent; luxury tax, 9.5 per cent; liquor license tax, 1.3 per cent; and inheritance tax, 0.8 per cent.

The reason for this sharp increase in the number of different kinds of taxes is due to the tendency, for not only this state but all taxing bodies including the federal government, counties, and municipalities, to design tax structures which seemingly are not as painful or visible to the taxpayers and which also provide an equitable distribution of the tax burden. The burden of property taxes became so confiscatory that by 1934 it was imperative that

the load on all property be eased, but at the same time the state required additional revenue and a number of new excise taxes were devised. Long before that, however, the state had adopted a fuel tax which has steadily increased in importance.

The fuel tax is eminently fair and just since it is paid by those who use gasoline in proportion to the amount they consume and the entire sum is used for the maintenance and construction of the state's highways. It is a toll for the use of better roads. Prior to the war, few people had automobiles and an elaborate system of high-speed roads was not essential so that, at that time, their costs were absorbed by property taxes.

The constantly growing demand for more and better highways, however, caused the state to place a tax on gasoline in 1921 and it is interesting to note how much it is costing the operators of automobiles for the roads they use. In 1921 the fuel taxes totaled \$2.79 per vehicle; in 1930, \$28.14; and in 1937 a peak of \$46.15 was reached. Last year, however, the fuel tax per vehicle had dropped to \$40.17. This was due, not to any lowering of the tax rate, but to a decreased consumption of motor fuel and a larger number of vehicles registered.

Despite the enactment of the fuel tax law in 1921 to take the road load off real property, property taxes continued to mount steadily and while they totaled \$6.26 per capita in 1912, they amounted to \$12.57 in 1920 and \$13.13 in 1930 as shown in the accompanying table. By 1933, they had declined somewhat to \$10.05 as a consequence of the depression and lower valuations, and not only were

greater taxes needed to make up this difference, but there was also the necessity for a reduction in property levies.

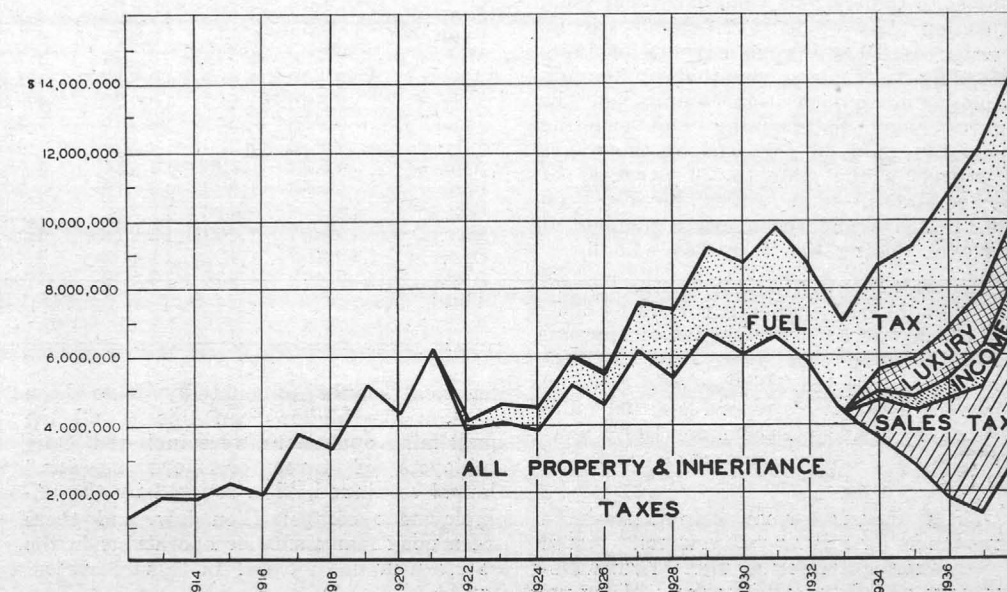
Consequently, a number of new excise taxes were designed and property taxes on all classes were lowered. In 1938, when total taxes collected by the state reached a new high of \$32.60 per capita, the per capita property tax amounted to only \$6.80.

The most important of the new excise taxes which the state has been collecting since 1934 is the sales tax which by itself has more than made up the reduction in property tax. The principle behind this tax is that it collects revenues in proportion to the amount of purchases made by individuals and companies. It is fully justified by the fact that the state has a large number of tourists or transients to serve, who do not pay property or income taxes, but who, by paying sales taxes, do share partially the costs of the advantages which they enjoy.

Next in importance is the graduated income tax which is based on the principal of "ability to pay," and following this come the luxury taxes, charged on items which are not considered to be necessities. Luxury tax revenues are earmarked for relief purposes. The liquor license tax is of relatively little importance in that it now contributes but 1.3 per cent of the total collected.

The records show that the mining industry has been paying more than its full share of each of these taxes. Changing forms of taxation, or new names of taxes, has not lightened the load of the mines. The in-

STATE TAXES FROM ALL SOURCES FROM 1912





# Arizona Mine Tax Burden Records 270 Per Cent Increase From Earnings Standpoint

## NEED FOR RELIEF SEEN

Mines in Arizona are staggering under a tax load that, from the standpoint of their ability to pay, is nearly four times as great as it was 20 years ago. The increase in state taxation that has occurred during the past 20 years has placed such an excessive burden on the great primary industries of Arizona that it is becoming essential that relief be provided before more of their units are smothered out of existence as has been the case during the period of growth of the state tax load.

Since 1919 the population of Arizona has grown 39 per cent, but taxes collected for state purposes have increased far out of proportion and are now 179 per cent greater than they were 20 years ago. The per capita tax for state purposes in 1919 was \$16.25. In 1938 it was \$32.60.

While the population of the state as a whole has been growing, the population of the portions of the state that are dependent on mining have declined. In 1919 the population of the counties predominantly dependent on the mining industry amounted to 137,150 persons according to calculations of the Arizona Department of Mineral Resources; it had declined to 123,736 in 1938—a drop of more than 10 per cent.

And mining is not the only industry that has stood still or declined in the past 20 years. The state's agricultural, livestock, and lumbering industries—all basic sources of new wealth from the mountains or valleys of the state, have long since reached maturity and are standing still, going up

or down only as influenced by prices or costs.

The growth that has occurred has taken place in Maricopa and Pima counties where a great influx of tourists and winter residents has not only increased the population of the state but has greatly added to the services demanded of it and consequently increased costs of government. The taxpayers of the state are being constantly called on to provide more and more funds in order to make the state attractive to those seeking a wonderful winter climate, and it is becoming apparent that, if Arizona's primary industries are to survive, a more equitable system of taxation must be devised whereby the tourists, or those who benefit from their presence here, will assume their share of the tax load in relation to the cost of serving them.

### Taxes Reach Saturation Point

In the final analysis taxes paid by any industry are dependent on its earning capacity. Tax an industry at a figure that is greater than it is capable of earning and various of its units will fold up, resulting in a reduction in total tax collections. The inexorable economic law of diminishing returns teaches that government revenues

can be increased by raising taxes only as long as a margin of profit remains. Remove that margin by exorbitant taxes and the tax source disappears. It is the old story of the goose that laid the golden eggs.

Today it has become clear that the point of diminishing returns has been reached in the ability of the mines, as well as other Arizona basic industries, to pay taxes. Whenever costs are increased, marginal mines are forced to shut down. On the other hand, opportunities for greater income will create new mines and a reduction in the tax load would probably result in larger rather than less total revenue to the state.

This is clearly demonstrated by the experience of gold mining during the past few years. The price of gold was increased in 1934 to \$35 an ounce and the ore production of gold mines increased from 325,823 tons during the five years from 1929 to 1933 to 2,804,338 tons in the five years 1934 to 1938. A reduction in costs would have accomplished the same thing—it makes no difference whether the price is increased or the cost is lowered—and taxes have come to be one of the outstanding costs of mining in Arizona.

### NET OPERATING INCOME REPORTED BY ARIZONA MINES FOR EACH DOLLAR PAID IN DIRECT MINE TAXES 1915-1918 COMPARED WITH 1935-1938

1915-18	\$ 48.39
1935-38	\$ 115.4

### INCOME, ASSESSED VALUATION, AND TAXATION STATISTICS OF ARIZONA PRODUCING MINES

	1915	1916	1917	1918	Average 1915-1918	1919
Net Assessed Valuation of Mining Property	\$159,109,288	\$216,879,796	\$393,421,536	\$491,719,960	\$315,282,645	\$496,262,860
Assessed Valuation of Productive Mines.....	118,026,004	171,888,616	329,220,629	416,080,482	258,803,933	414,236,636
Gross Production of Productive Mines.....	57,120,379	82,036,342	186,901,901	174,356,504	125,103,782	175,455,917
Net Operating Income of Productive Mines*	26,396,851	41,845,604	113,709,860	96,252,380	69,551,174	58,228,993
Ratio of Net Income to Gross Income.....	46%	51%	61%	55%	56%	33%
Mining Taxes Paid**	859,190	867,519	2,104,805	1,917,708	1,437,305	2,977,577

	1935	1936	1937	1938	Average 1935-1938	1939
Net Assessed Valuation of Mining Property	\$ 84,287,830	\$ 83,008,288	\$ 90,580,700	\$ 90,035,468	\$ 86,978,072	\$ 90,249,166
Assessed Valuation of Productive Mines.....	33,798,453	51,688,500	66,990,295	64,510,130	54,246,845	66,329,840
Gross Production of Productive Mines.....	24,129,569	55,489,434	81,637,871	52,200,294	53,364,292	Not Available
Net Operating Income of Productive Mines*	6,453,052	17,332,379	22,753,754	10,739,879	14,319,766	Not Available
Ratio of Net Income to Gross Income.....	27%	31%	28%	21%	27%	Not Available
Mining Taxes Paid**	874,511	899,262	1,327,034	1,861,274	1,240,520	2,318,069

NOTES: The Average Net Assessed Valuation of Mining Property during 1935-38 Amounted to 27.59% of the 1915-1918 Period  
The Average Assessed Valuation of Productive Mines during 1935-38 Amounted to 20.96% of the 1915-1918 Period  
The Average Gross Production of Productive Mines.....during 1935-38 Amounted to 42.66% of the 1915-1918 Period  
The Average Net Operating Income of Productive Mines during 1935-38 Amounted to 20.59% of the 1915-1918 Period  
The Average Direct Mining Taxes Paid\*.....during 1935-38 Amounted to 86.31% of the 1915-1918 Period  
The Direct Mining Taxes Paid\*.....in 1939 Amounted to 77.85% of those in 1919  
Taxes Paid in 1919 Amounted to 0.9 % of the Average Net Assessed Valuation during the 1915-1918 Period\*  
Taxes Paid in 1939 Amounted to 2.57% of the Average Net Assessed Valuation during the 1935-1938 Period\*

\*Net Operating Income is before depletion, depreciation, or taxes.

\*\*Total direct taxes for state purposes of 1915-1919 consisted of property tax only; 1935-39 Included sales tax on metals produced and income tax as well. The income tax figures for 1935, 1937, 1938, and 1939 were estimated, 1936 having been the only year they were broken down.

Source of Figures: State Tax Commission Records.

### ARIZONA POPULATION AND TAXATION

Year	Population	Total Taxes	Per Capita	Property Taxes	Per Capita
1912	201,756	\$ 1,263,044	\$ 6.26	\$1,263,044	\$ 6.26
1920	334,162	4,232,854	12.67	4,201,164	12.57
1930	435,573	8,680,762	19.93	5,719,566	13.13
1938	437,890	14,274,854	32.60	2,976,438	6.80

dust y has always paid a big share of the property tax and when the new excise taxes went into effect, it was given more than its share to pay, particularly on the sales and income taxes.

So far as the fuel tax is concerned, the mines have to pay this in relation to their use of the state and county roads, just as everyone else does, and they also have to pay a large amount from which they do not derive a benefit. They pay the tax on the gasoline that they use in their trucks and cars which, in some cases, seldom travel on state or county highways and use private roads which are built and maintained by the mines themselves.

As for the sales tax, the mining industry is unique in that it is the only one that is forced to pay a sales tax on its production, which is an unfinished product sold outside the state. In no other industry is a sales tax charged on production, but rather on goods sold within the state only, and then it is paid by the consumers and not the producers. The mines also pay a sales tax on all the commodities they buy within the state and the mining employees pay their share, just as do the workers in other fields, when they make purchases. Incidentally they pay a larger share of the sales tax because mine employees are the highest paid laborers in the state and have more money to spend.

Although the cost of running the state government has been multiplied more than ten times since 1912 and has more than tripled since 1920, the production of Ari-

zona's mines has been declining and their relative importance and ability to share the rapidly increasing state tax load has been falling. In 1920, Arizona's mining industry produced gold, silver, copper, lead and zinc valued at \$113,708,000, yet last year its output was less than \$58,000,000.

On the other hand total state taxes paid by the mines last year amounted to \$1,861,274 against \$2,230,843 in 1920 when the mines paid 52.5 per cent of all taxes collected. Thus, while the production of the mines fell 49 per cent, the taxes they paid declined only 18 per cent.

In 1923, for instance, the amount of taxes paid by the mines was almost exactly the same as the figure reported in 1938, yet production in 1938 was just about half what it was during the earlier year. In 1924 the industry paid less taxes by a considerable margin than it did last year. The 1924 output of the mines, however, was 41 per cent greater than it was in 1938.

These figures clearly show that the tax burden on the mining industry has been growing tremendously in relation to its ability to produce at current cost levels, and, consequently, its ability to pay taxes.



### ARIZONA MINING INDUSTRY HAS \$17,000,000 PAYROLL

Arizona mining and smelting companies subject to the Arizona Unemployment Compensation Law paid \$17,088,308 to an average of 10,849 wage earners in 1938, according to figures compiled by the unemployment compensation commission. The figures show that mining and smelting companies paid 23 per cent of the wages disbursed in the state to 20 per cent of the employees, total wages having been \$73,143,987 while the average number of employees during the year was 54,806.

The peak month of the year was December when 11,882 employees earned \$1,635,071 which was an improvement of approximately 25 per cent over July, the low month, when \$1,167,986 was paid to 9,559 workers. December's record was not quite as good as that of December, 1937, however, when 12,463 employees earned \$1,769,112.

"These figures clearly demonstrate the importance of mining to Arizona," stated J. S. Coupal, director of the Arizona Department of Mineral Resources. "However,

### Number of Mining and Smelting Company Employees and Wage Payments in Arizona—1938

Month	No. of Employees			Mining	Wage Payments	
	Mining	Smelting	Total		Mining	Total
Jan. ....	9,043	1,521	10,564	\$ 1,236,705.07	\$ 188,707.30	\$ 1,425,412.37
Febr. ....	9,028	1,471	10,499	1,194,585.28	168,657.23	1,363,242.51
Mar. ....	9,202	1,345	10,547	1,277,769.93	155,997.77	1,433,767.70
Apr. ....	9,552	1,265	10,817	1,261,027.49	153,526.23	1,414,553.72
May ....	9,446	1,287	10,733	1,246,529.15	162,329.64	1,408,858.79
June ....	9,069	1,361	10,430	1,182,917.63	166,695.53	1,349,613.16
July ....	8,333	1,226	9,559	1,024,935.05	143,050.65	1,167,985.70
Aug. ....	9,238	1,196	10,434	1,205,669.24	150,907.03	1,356,576.27
Sept. ....	9,583	1,227	10,810	1,271,472.86	143,754.96	1,415,227.82
Oct. ....	10,416	1,416	11,832	1,392,502.41	160,784.65	1,553,287.06
Nov. ....	10,607	1,469	12,076	1,394,675.42	170,037.24	1,564,712.66
Dec. ....	10,400	1,482	11,882	1,451,817.02	183,253.55	1,635,070.57
Ave. ....	9,493	1,356	10,849	\$ 1,261,717.21	\$ 162,308.48	\$ 1,424,025.70
Total.....				\$15,140,606.55	\$ 1,947,701.78	\$17,088,308.33

the total would undoubtedly have been substantially higher than this if all the small mine operations were included. Only employers of three or more persons," Coupal continued, "are covered by the unemployment compensation law and there are a good many smaller operations in the state which do not fall in this classification."

The taxes paid are no longer confined to the property tax. The added burden has been imposed through the sales tax on production and the income tax as well as by the sales tax on purchases, the luxury tax, and the fuel tax.

A similar situation exists in respect to the other basic industries—agriculture, livestock raising, and lumbering. The value of agricultural crops produced in 1937 was \$35,375,000 as compared with \$44,000,000 in 1920, and Arizona lumber production in 1937 was worth approximately \$3,000,000 against \$4,348,432 in 1920. A slight increase in the value of livestock and animal products produced has been recorded due to the greater production of dairy products. The output of this industry was valued at \$26,375,000 last year as compared with \$21,000,000 in 1920.

The accompanying chart shows clearly how state taxes have climbed steadily, with only short interruptions during the depressions in the early twenties and thirties, and at present the curve of total taxes is skyrocketing more sharply than ever. The picture, as it relates to the future of the state, is not a pleasant one and aggressive action must be taken to halt the mounting cost of state government if the mining industry and all other basic industries are to survive, let alone encourage new capital to invest in the industry.

The basic industries have been carrying a state tax load entirely out of line with their own growth—or lack of growth—yet the state, and the demands upon it, has grown because of other factors which apparently do not absorb their share of the cost of state-provided facilities which they enjoy. Much of the reason for the lack of new development in the basic industries such as mining, agriculture, livestock, and lumbering, is that the resources and opportunities existing at this time cannot take the added tax load and survive.—Reprinted from PAY DIRT for October 23, 1939.

Also excluded from coverage under the law are agricultural labor, domestic services, government employees, and the wage earners of certain non-profit organizations. The accompanying table lists the number of mining and smelting employees and the wages they earned during the year.—Reprinted from PAY DIRT for May 2, 1939.

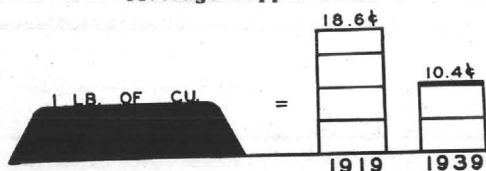


# Arizona Gold, Silver, Copper, Lead, and Zinc Production Figures

Classification	1919	1929	1938	1939
Value of Arizona Production of Gold, Silver, Copper, Lead, Zinc.....	\$111,157,872.00	\$155,567,133.00	\$ 58,358,401.00	\$ 72,433,400.00
Tons of Ore Produced.....	13,727,403	25,360,772	14,208,164	18,500,000
Average Yield Per Ton.....	8.12	6.02	4.11	3.92
Tons of Direct Smelting Ores Produced.....	2,334,410	3,266,575	1,659,601	Figures Not Yet Available
Ratio of Direct Smelting to Total Ores Produced.....	17.01%	12.63%	11.68%	
Value of Arizona Copper Production.....	\$100,086,757.00	\$146,190,600.00	\$ 41,316,212.00	\$ 53,913,600.00
Pounds of Copper Produced.....	538,100,844	830,628,411	421,594,000	518,400,000
Average Copper Price Per Pound.....	0.186	0.176	0.098	0.104
Tons of Copper Ores Produced.....	13,347,182	25,669,975	13,047,356	17,200,000
Pounds of Copper in Copper Ores Produced.....	537,201,237	828,414,224	418,786,954	515,000,000*
Value of Copper Ores Produced.....	\$105,690,358.00	\$153,049,769.00	\$ 48,631,096.00	\$ 61,000,000.00*
Average Yield Per Ton of Copper Ores.....	7.92	5.96	3.73	3.55*
Average Number of Pounds of Copper Per Ton of Copper Ores.....	40.2	32.1	32.1	30.0 *
Value of Arizona Gold Production.....	\$ 4,506,413.00	\$ 4,182,287.00	\$ 10,676,505.00	\$ 11,305,000.00
Ounces of Gold Produced.....	217,993	202,313	305,043	323,000
Gold Price Per Ounce.....	20.67	20.67	35.00	35.00
Tons of Siliceous Gold Ores Produced.....	190,069	68,891	698,687	Figures Not Yet Available
Ounces of Gold in Siliceous Gold Ores Produced.....	125,188	14,429	117,464	
Value of Siliceous Gold Ores Produced.....	\$ 2,671,114.00	\$ 508,929.00	\$ 5,004,286	
Average Yield Per Ton of Siliceous Gold Ores.....	14.05	7.39	7.16	Figures Not Yet Available
Average Number of Ounces of Gold Per Ton of Siliceous Gold Ores.....	0.659	0.209	0.185	
Value of Arizona Silver Production.....	\$ 5,893,598.00	\$ 4,020,570.00	\$ 4,835,008.00	\$ 5,413,700.00
Ounces of Silver Produced.....	5,266,605	7,543,283	7,479,153	7,975,540
Silver Price Per Ounce.....	1.12	0.533	0.646	0.678
Tons of Siliceous Silver Ores Produced.....	85,070	11,636	92,958	Figures Not Yet Available
Ounces of Silver in Siliceous Silver Ores Produced.....	809,522	286,657	941,637	
Value of Siliceous Silver Ores Produced.....	\$ 1,054,709.00	\$ 179,924.00	\$ 696,237.00	
Average Yield Per Ton of Siliceous Silver Ores.....	12.40	15.46	7.49	Figures Not Yet Available
Average Number of Ounces of Silver Per Ton of Siliceous Silver Ores.....	9.52	24.64	10.13	
Value of Siliceous Ores Produced.....	\$ 4,103,629.00	\$ 770,686.00	\$ 7,082,961.00	Figures Not Yet Available
Tons of Siliceous Ores Produced.....	294,675	89,904	928,707	
Average Yield Per Ton of Siliceous Ores.....	13.92	8.57	7.63	

\*Preliminary Figures

Average Copper Price



per were produced in 1939 as in 1919 and that the marked difference in value was due to a much higher price in 1919 when the price averaged 18.6 cents a pound as compared with 1939 with a figure of 10.4 cents. Arizona's copper production last year amounted to 518,400,000 pounds against 538,100,844 pounds in 1919.

In 1919 Arizona produced 13,347,182 tons of copper ores, each of which yielded, on the average, \$7.92. Last year's output of copper ores was 17,200,000 tons, and, according to preliminary figures, the yield was \$3.55 per ton. In 1919 the copper ores contained 40.2 pounds of copper to the ton; last year they carried 30 pounds.

The gold price has risen from \$20.67 to \$35 an ounce since 1919, and, as a consequence of this increase, the production of that metal has increased materially, advancing from \$4,506,413 to \$11,305,000. However, gold has been of relatively little importance as compared with total metal production and has accounted for only 7 per cent of the state's output of gold, silver, copper, lead, and zinc. Even last year, under the stimulus of the higher price, gold was responsible for only 15.6 per cent of the value of the state's production of the five major metals.

The quantity of silver production in Arizona was also considerably higher in 1939 than in 1919, but the value of the silver output was lower because of the reduced price. In 1919 silver was priced at \$1.12

an ounce while last year domestic newly-mined silver brought only 67.8 cents an ounce.

Production of silver in 1919 came to 5,266,605 ounces valued at \$5,898,598 and in 1939 the comparative figures were 7,975,540 ounces with a value of \$5,413,700.

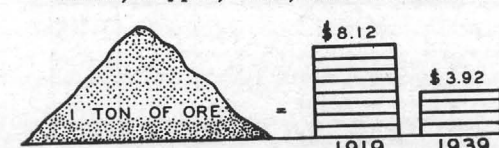
Figures revealing the yield per ton of the gold and silver ores produced in Arizona in 1939 have not yet been released, but in 1919 the siliceous gold ores produced in the state averaged \$14.05 in value against \$7.16 in 1938. The same ores yielded 0.659 ounce of gold on the average in 1919 against 0.185 ounce in 1938.

Similarly, siliceous silver ores had an average value of \$12.30 in 1919 as compared with \$7.49 in 1938. The silver content of the ores was higher in 1938 and was reported at 10.13 ounces per ton against 9.52 ounces.

The production of lead and zinc in Arizona has always been relatively insignificant as compared with the total of the five major metals. Last year, a good one as far as lead and zinc were concerned, those two metals were valued at only \$1,800,000 or about 2.5 per cent of the total.

Thus, it may be seen that Arizona's metal production today is far below levels in effect in 1919, the year after the armistice was signed. Furthermore, the value of the metal content of the ores mined today is much less than it was in 1919.

Average Yield per Ton of Arizona's Gold, Silver, Copper, Lead, and Zinc Ores



## Percentage of County Taxes Paid in Certain Mining Counties of Arizona by the Five Principal Copper Producing Companies — 1938

County	Percentage of Tax Paid
Cochise .....	40.8
Greenlee .....	71.2
Pima .....	30.0
Yavapai.....	38.3
Pinal .....	39.0
Gila .....	71.5

Source: Mining Company Questionnaires by Arizona Copper Tariff Board

Twenty years ago, 54.2 per cent of the ores produced in Arizona were of a direct smelting nature and could be shipped straight from the mine to the smelter without having to run through costly milling plants and processes. In 1938, only 11.68 per cent of the ores mined were adapted to direct smelting.

From a production standpoint it is obviously unreasonable to expect the mines to pay as large a percentage of taxes today as they did in 1919. With a higher copper price that would justify greater production and place more mines in operation the mines could be expected to pay more taxes, but with the copper price off 44 per cent, value of production down 65 per cent, and the metal content of the ores mined almost 52 per cent lower, it is obvious that the mines cannot now pay the excessive tax burden that was levied in 1919. The tax load of recent years has been one of the several causes for the lesser percentage paid by the mines for, when they can no longer stand the load, they have to shut down, produce less taxes, increase unemployment, depopulate mining communities, and increase the state's expense in other directions. — Reprinted from PAY DIRT for June 24, 1940.

## Briefs are Filed Opposing Any Cut In Present 4-cent Copper Excise Tax

### Many Objections Listed

Strong protests have been filed by the Arizona Small Mine Operators Association and the Arizona Copper Tariff Board with the Committee for Reciprocity Information, Washington, D. C., objecting to any reduction in the 4-cent copper excise tax in the coming negotiation of a Reciprocal Trade Agreement with Chile. The arguments were included in two comprehensive briefs and great credit is due to the Arizona Department of Mineral Resources which has been gathering statistics for many months for just such a purpose as this.

Both documents covered the subject thoroughly and presented incontestable arguments for retention of the protective excise tax. Their preparation could never have been accomplished in the short time allotted had not the data already been gathered and compiled through the facilities of the new department which has been in existence for less than a year.

The brief of the Arizona Copper Tariff Board dealt with the dependency of Arizona on the copper industry and pointed out how essential the excise tax is to the economy of the state as a whole. The document submitted by the Arizona Small Mine Operators Association, on the other hand, confined itself mainly to the effect of a reduction in the copper excise tax on the small mining operations in the state.

### Effect on Small Mines

The A.S.M.O.A. statement pointed out that price is a highly important factor to the small mines for they are all high-cost producers during their early days. Properties in the initial stages of development, which have not blocked out sufficient reserves to warrant the installation of expensive equipment for large-scale, low-cost production, incur much greater expenses than the larger mines.

"The large producers, which have already been developed and equipped, might be worked, even at a loss, if the price were lowered because the capital investment in plant and equipment has already been made and because tremendous waste often occurs in certain mining operations if production is interrupted. The small mines, however, will never be developed into large ones and investments will not be made if they are not afforded a reasonable chance of becoming profitable producers."

The importance of price on small mine operations was graphically depicted by the accompanying chart comparing the number of copper producing mines in Arizona with the copper price since 1903 and revealing the very close relationship existing between the two. It was pointed out that during the World War period, when

	1937	1938	Decline in 1938	Percentage Decline
Average Copper Price.....	12.1¢	9.8¢	2.3¢	19.0
Number of Copper Producers.....	208	97	111	53.4
Value of Copper Produced.....	\$69,811,676	\$41,316,212	\$28,495,464	41.0
Tons of Copper Ores Produced.....	19,928,824	13,047,356	6,881,468	34.5

the average price of copper for one year rose to 27.3 cents a pound, there were 272 producers. In 1929, another exceptionally good year, when the price averaged 17.6 cents, there were 198 producers.

When conditions were depressed, however, the opposite was shown to be the case. In 1932, when the price averaged 6.3 cents a pound, there were only 17 producers. Similarly there was a sharp decrease in the number of producers in 1921 and 1922 when the quotation collapsed after the war.

### Price Influence

The brief paid particular attention to conditions in recent years, showing that "the number of operating copper mines in 1938 totaled less than half the figure in 1937 as the price slumped 19 per cent from 12.1 to 9.8 cents a pound. The United States Bureau of Mines reported only 97 producing copper mines in 1938 as compared with 208 in 1937, as shown in the above tabulation.

"The reduction in the number of producers occurred among the small mines, where costs of production are higher," it was asserted, "and not among the large producers, which curtailed their output but did not completely suspend operations. A

decline of just 2.3 cents a pound in the average price of copper in 1938 caused over half the copper mines in Arizona to shut down and this shows what might be expected if the copper excise tax is cut in two and there is a 2-cent reduction in price."

The study carried the analysis farther, stating, "A 19 per cent reduction in the price caused a 41 per cent decline in the value of copper produced and a 34.5 per cent reduction in the tons of copper ores produced. The importance of copper to the state is shown by the fact that in 1937 metals recovered from copper materials accounted for 89 per cent of the total value of Arizona's metal output and in 1938 this ratio was 83 per cent.

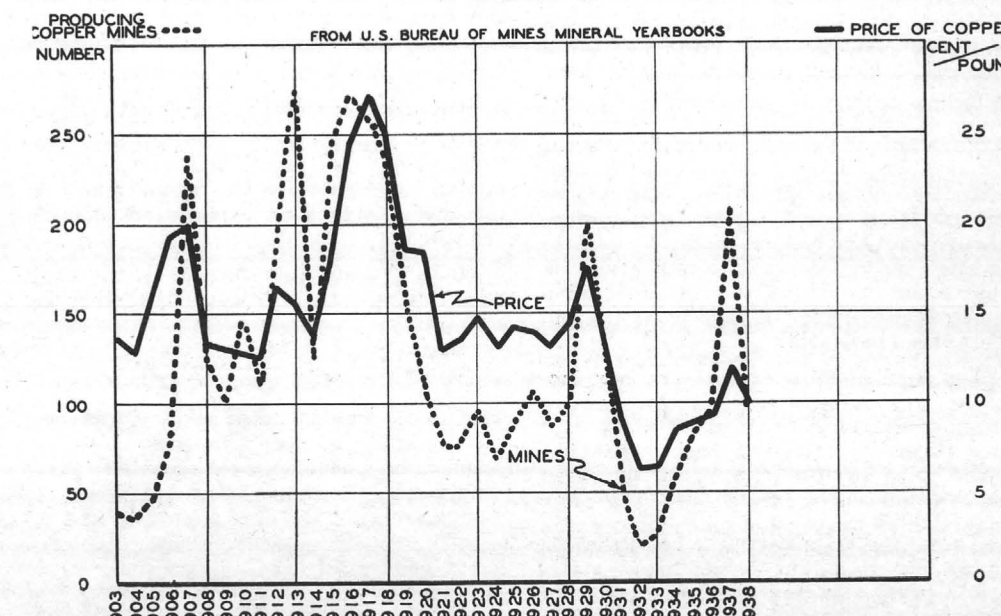
"The total value of gold, silver, copper, lead, and zinc production in the state in 1938 amounted to \$58,358,401, a decline of 35.8 per cent from the \$90,855,462 output in 1937, and, on a tonnage basis, the drop was 32.4 per cent, or from 20,976,359 to 14,203,164 tons. This decline was primarily due to the influence of the reduction of the copper quotation."

### Small Shippers

A further example included in the brief to show the effect of price on mining op-

CHART I

EFFECT OF THE PRICE OF COPPER ON NUMBER OF COPPER PRODUCERS IN ARIZONA





erations was the following table listing the shipments of copper bearing ores from Arizona properties to custom smelters:

Year	Number of Shippers	Tons of Ore	Price
1929	387	465,287	17.6
1932	268	60,621	6.3
1936	654	302,683	9.2
1937	542	439,022	12.1
1938	542	248,350	9.8

In regard to the above table, it was stated: "These ores are not all copper ores, some having their principal values in other metals, but copper smelters provide such shippers with a market for their products, and, therefore, they are dependent on continued operation of the smelters. If the copper mines shut down and close their smelters many of the shippers of other metals would be without suitable facilities for disposing of their output.

"This table does not show as great a reduction in the number of shippers as the preceding one did in the number of copper mines," the report continued. "The reason for this is that a number of these custom shippers are mining ores in which gold is the most valuable metal and the number of gold producers showed an increase last year. On a tonnage basis, however, a 19 per cent fall in the price caused a 43 per cent decline in shipments."

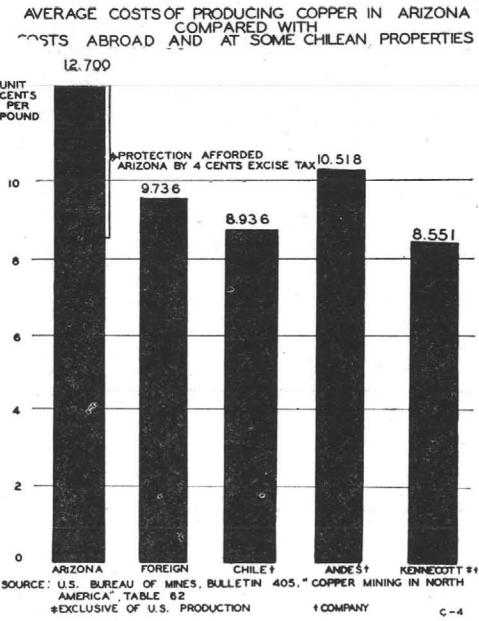
It was thus forcefully brought out that the small mine operators in Arizona are greatly affected by any changes in conditions in the copper industry and that any action that tends to reduce the copper price or depress conditions in the industry has a profound influence upon them. This depressing influence is felt much more severely by the small mine operators than the large ones because they do not have the necessary resources to meet such shocks.

Little Profit Margin

When small mines shut down, it means more than just passing a dividend; it means the livelihood of the owner and the workers and it often results in the elimination overnight of a lifetime of effort and savings. On this subject the brief stated:

"Many of the small operators are entirely dependent on their properties for a living and what small funds they do have are quickly wiped out when production becomes unprofitable—homes are lost and they are forced to seek relief at a great cost to local, state, and federal governments. They are providing employment and producing wealth for the nation, and, although foreign copper might be sold to domestic consumers at a lower price, its importation would serve to undermine standards of living in this country and create unemployment.

"The small mine operators are now facing the greatest opportunity that they have had in years to develop their mines and place them on a paying basis. The improved price and the outlook for increased demand and consumption justify greater production and expansion on their part; the great expenses incidental to exploration and development can only be met when prices are relatively high. If just one small mine develops into a large producer, millions of



hours of work and millions of dollars of wealth will be created."

The manuscript further asserted that, "Inasmuch as the large producers themselves can hardly compete with foreign mines with the excise tax at 4 cents a pound, it can be seen that the small producers would suffer much more seriously if the tax were lowered. The average cost of producing copper by the large Arizona producers over a 10-year period from 1922 to 1932 amounted to 12.7 cents a pound while Chile Copper Company's costs during the same period averaged 8.93 cents a pound, or a difference of 3.77 cents a pound. While the 4-cent protection now afforded might serve to equalize their costs with those of such foreign producers as Chile Copper, it is not adequate at the present time to equalize the costs of the small domestic producers and the large foreign companies.

"Mining remains the sole industry in the state which is able to pioneer," the brief concluded—"farming is now limited by the amount of water available and all that can be had is now being used to irrigate lands already developed. Cattle raising is limited by the grazing lands available and the rainfall, and lumbering is restricted to the speed with which new timber grows. Therefore, the principal field open to new development and continued pioneering is mining—primarily the small mines in the initial stages of exploration and development.

"It is, therefore, the prayer of the small mine operators of Arizona that they be



permitted to continue to develop the mineral resources of the state and that foreign produced copper, whether from Chile or any other country, not be allowed to enter the United States unless taxed an amount that is at least equal to the difference in the cost of production. The present tax of four cents per pound, while possibly adequate in 1932 when originally enacted, is hardly sufficient. The costs under which labor is now employed have materially increased due to the social reform program."

Copper Tariff Board Brief

The greatest emphasis in the brief submitted by the Arizona Copper Tariff Board was placed on the extent to which Arizona and the mining counties and communities are dependent upon copper mining and the damage that will be caused if there is curtailed production because of a reduction in the excise tax.

Statistics were presented showing that Arizona's mines pay about one-third of the state taxes, accounting for nearly the entire tax load in certain counties and municipalities; they support practically one-third of the state's population; and they have made possible the development of much of the state including the rich Salt River Valley agricultural area. "The economy of the state," it was said, "is primarily dependent on a healthy copper industry and this industry must be protected if it is to maintain its position.

"Miners have built homes and merchants have erected business houses on the basis that the copper industry is substantial and stable. Thus, they have built for permanency, but remove the market, or even cut it down materially, and all that they have vanishes. They deserve the utmost consideration for they had been given reason to believe that they were locating their homes and businesses where security, both present and future, could be found. Any cut in the excise tax on copper removes all the security that they had."

The Copper Tariff Board study showed the relief load to be greater in the copper mining counties and that while Cochise, Gila, Greenlee, Pima, Pinal, and Yavapai counties account for 37.3 per cent of the population of the state, 44.3 per cent of the combined load of three relief agencies was there in 1938 when mining activities were lessened because of low metal prices. The three relief agencies from which data were gathered were the WPA, Unemployment Compensation Commission, and the Arizona Department of Social Security and Welfare.

The Copper Tariff Board brief contained 63 pages of material including 24 tables, seven charts, and seven pages of photographs of typical mining camps, showing their permanency and the stake these communities and the state have in the pending trade negotiations. The pictures brought out the fact that mining people "do not live in trailers, but own their own homes, and are buying automobiles and furniture on time just as are employees in any other normal American community." — Reprinted from PAY DIRT for November 20, 1939.

Mines Pay Full Share Of Taxes From Standpoint Of Production

65 Per Cent Drop In Output Lowers Ability To Pay

The mining industry has been criticized with increasing frequency recently because it is no longer paying over half the property taxes collected in the state as it did 20 years ago. The "soak the mines" specialists are arguing that the mining industry should still pay half the state's property taxes and are ignoring completely the many changes that have taken place in the state since 1919. These changes have occurred in all industries and in the make up of the state itself.

No one ever seems to consider that in 1919 the mines might have been paying more than their share of the state's taxes. As a matter of fact, it was about 20 years ago when similar demagogues in an attempt to justify more exorbitant taxes, were declaring that Arizona's mines had a limited life and that by 1940 they would be worked out, therefore they should be "soaked" now.

The same type of argument may be heard today by those who will listen. Little consideration is given to the established fact that the mines of today are not natural resources, but rather resources created by vision, capital, engineering skill, and hard work. Nor do the critics seem to realize that the greatest mining development the state has ever witnessed—the opening of the Morenci open-pit mine—is a classic example of a man-made resource; a resource which it was impossible to exploit 20 years ago or even 10 years ago.

Since 1919 there have been drastic changes in the tax situation in Arizona and in the factors that affect taxes. For example, the property tax was the only form of state taxation prior to 1934. Now there are a number of excise taxes, an income tax, and a production (sales) tax as well—the latter being a levy of 1 per cent on the gross production of the mines and a tax not paid by any other industry. The mines also pay the customary 2-per cent sales tax on their purchases just the same as all others, but the 1 per cent levy is in addition and on gross output whether or not produced at a profit.

Whereas in 1919 the mines paid the whole of their state taxes in the form of a property tax, the structure is now entirely different. At the present time they still pay the property tax, plus a tax on production (sales tax) based upon the value of the production and it is paid whether or not any profit was derived. Then they also pay an income tax, if they made a profit on the production which had already been levied upon, and the income tax varies with the amount of the profit. Therefore, in any comparison it is the total of all three taxes which must be considered.

Pay Dirt herewith presents the first in a series of articles comparing conditions in the mining and other Arizona industries today with those of 20 years ago. The series is designed to answer the unfair criticism of those who imply that the mining industry is "ducking" its just share of the taxes because it is not paying over 50 per cent of the state property taxes as it did in 1919. This first discussion deals primarily with production. Other subjects will be taken up later to show that the industry is still shouldering more than its full tax responsibility.

Besides the changes in the tax situation, there have been radical changes in the character of the state's population and the services that are required of the state government. The population of Arizona has grown 39 per cent since 1919 and at the same time that of the counties mainly dependent on the mining industry (Cochise, Gila, Greenlee, Mohave, Pinal, and Yavapai) has dropped 10 per cent.

This alone indicates that an adjustment in the percentage ratio of taxes should be expected. While the population of the state as a whole has grown, thereby increasing the costs of government, the requirements of the mining counties have declined due to a decrease in population. The decline in the population of the mining counties has been largely due to a decrease in metal values from the all-time highs that were established during the World War.

Production figures clearly indicate just what taxes the mining industry is justified in paying because in the final analysis the value of a mining property, or any business for that matter, is dependent upon what it is capable of producing. Because of this the tax commission in determining the assessed valuation of a mining property in any individual year gives the production figures and averages for the years immediately preceding primary consideration.

Under such circumstances it is not surprising that the assessed valuation of mining property in 1919 was greater than at any other time in history because the cop-

per industry had just gone through a period of unprecedented production when, under the influence of heavy war demands, Arizona's production of gold, silver, copper, lead, and zinc reached levels never approached before or since.

The following table lists the value of the gold, silver, copper, lead, and zinc produced during the five years leading up to 1919:

Year	Value
1914	\$ 59,956,029
1915	90,806,349
1916	190,806,170
1917	209,393,802
1918	202,134,880
Total	\$753,097,230
Average	150,619,446

A much different picture has been presented by more recent production figures. The value of the output during the five years leading up to 1939 was only 35 per cent of that during the five war years as is apparent from the following figures:

Year	Value
1934	\$ 23,292,150
1935	37,198,809
1936	57,996,073
1937	90,855,462
1938	58,358,401
Total	\$267,700,895
Average	53,540,179

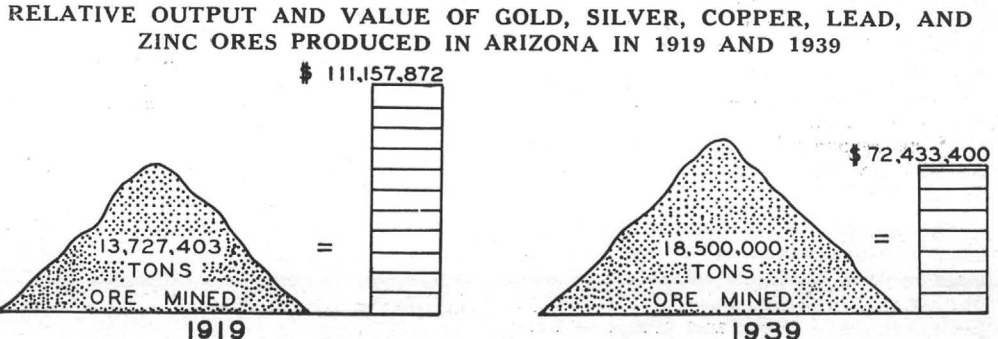
Arizona's production of the five major metals in 1939 amounted to \$72,433,400 which compares with \$111,157,872 in 1919. Not only was the total value of the output in 1919 considerably higher than it is today; the average value of each ton of ore mined was more than double that in 1939.

In order to obtain \$111,157,872 in 1919 it was necessary to mine only 13,727,403 tons of ore. Approximately 18,500,000 tons of ore had to be moved in 1939 to produce metals having a value 35 per cent lower.

Each ton of gold, silver, copper, lead, and zinc ore mined in 1919 yielded \$8.12 per ton on the average. In 1939 each ton yielded only \$3.92.

Analysis of the copper production presents a similar picture. Copper ores, by the way, have accounted for better than 85 per cent of Arizona's metal production and in 1919 the value of Arizona's copper production was \$100,086,757 while in 1939 it was only \$53,913,600.

At the same time, it is interesting to note that nearly as many pounds of cop-





32.1 pounds, the low of 28.8 pounds having been reached in 1937.

And so it has been with gold. In 1913 the average value of the siliceous gold ores mined was \$12.14 and by 1938 it had declined to \$7.16 despite the increase in price. From a standpoint of gold content there was only 0.185 ounce of the yellow metal on the average in each ton mined in 1938 against 0.572 ounces in 1913 as can be seen in Table III.

Of course the greatest stimulus to gold production in recent years has been the increase in the price for, while technologic improvements in the beneficiation of gold ores did occur, they were not sufficient to keep pace with the decline in the grade of ore in the state and the production from

siliceous gold ores was sharply curtailed from 1923 to 1933.

The increase in the gold quotation was a great boon to Mohave County for it permitted the working of a number of de-

posits that could not be handled commercially at the old price and it resulted in the employment of many men in mines that had either shut down entirely or curtailed their output drastically. — Reprinted from PAY DIRT for May 27, 1940

TABLE V  
Comparison of Gold, Silver, Copper, Lead, and Zinc Production in Cochise, Mohave, and Yavapai Counties 1900-1938

Metal	Cochise		Mohave		Yavapai	
	Gross Value	Per cent of Total	Gross Value	Per cent of Total	Gross Value	Per cent of Total
Gold	\$ 40,254,307	4.98	\$48,845,655	71.93	\$ 54,358,334	9.70
Silver	55,362,610	6.84	4,669,378	6.88	37,868,833	6.75
Copper	698,687,250	86.36	1,823,831	2.69	466,461,690	83.20
Lead	13,454,507	1.66	3,381,290	4.98	1,096,637	0.20
Zinc	1,237,472	0.15	9,187,527	13.53	845,862	0.15
Total	\$808,996,146	99.99	\$67,907,681	100.01	\$560,631,356	100.00

RELATIVE IMPORTANCE OF U. S. COPPER OUTPUT DECLINES

The declining importance of Arizona and the United States as sources of copper when compared with the world is clearly illustrated by an accompanying table. The discovery of deposits of copper susceptible to low-cost production in foreign countries and their development and operation has eliminated the foreign market that the United States mines used to enjoy. Moreover, since production costs are cheaper outside the United States than in this country, tariff protection through the 4-cent excise tax has been necessary to preserve the home market to domestic producers.

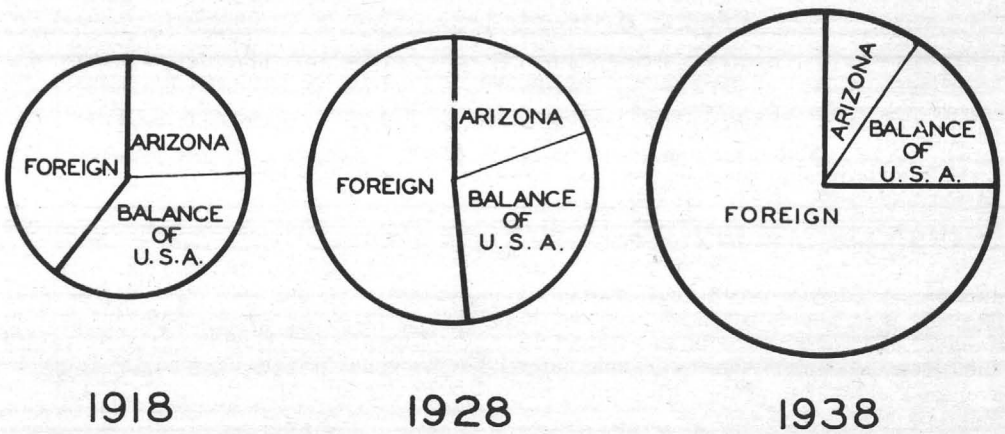
The table shows that since 1930 the United States has never produced as much as one-third of the copper of the world, while during the decades immediately preceding that year mines in this country accounted for nearly half the world's output. During the 10-year period, 1911 to 1920, United States producers accounted for 58.75 per cent of the world's output, and from 1901 to 1910, 56.13 per cent of the world's production was mined in this country.

In a similar manner, the relative importance of Arizona's production as compared with the world has declined. During the 20 years from 1911 to 1930, Arizona accounted for more than one-fifth of the world copper output while in 1938 the state's production amounted to less than one-tenth of the world total.

As compared with the United States as a whole, Arizona has maintained its position fairly well. In only one year since 1930 has Arizona produced less than one-third of the nation's output and that was in the depression year, 1933, when production throughout the United States was on a very restricted scale. The state's record was best during the 1921-1930 decade when it accounted for nearly 42 per cent of the nation's output. This compares with 25 per cent in 1933 and 37.5 per cent in 1938.

Of particular interest is the fact that production in the United States and in Arizona has assumed greater relative importance as compared with the world since the excise tax was enacted in 1932 and the invasion of the U. S. market by foreign

RELATIVE PRODUCTION OF COPPER



COPPER PRODUCTION—SHORT TONS

	World Total	United States	Percent of World	Arizona	Percent of U.S.A.	Percent of World
1801 - 1850.....	1,502,256	2,688	0.18			
1851 - 1860.....	759,079	41,440	5.46			
1861 - 1870.....	1,149,344	108,752	9.46			
1871 - 1880.....	1,423,744	208,768	14.66	4,600	2.20	0.32
1881 - 1890.....	2,488,591	820,408	32.33	116,429	14.19	4.68
1891 - 1900.....	4,149,353	2,174,416	51.92	365,839	16.82	8.82
1901 - 1910.....	7,628,334	4,281,714	56.13	1,117,616	26.10	14.65
1911 - 1920.....	12,187,341	7,160,559	58.75	2,613,653	36.64	21.45
1921 - 1930.....	14,927,560	7,333,404	49.13	3,069,848	41.86	20.56
1931 .....	1,536,000	521,356	33.94	200,672	38.49	13.06
1932 .....	1,045,000	272,005	26.03	91,246	33.55	8.73
1933 .....	1,157,000	225,000	19.45	57,021	25.34	4.93
1934 .....	1,458,000	244,227	16.75	89,041	36.46	6.11
1935 .....	1,681,000	381,294	22.68	139,015	36.46	8.27
1936 .....	1,895,000	611,410	32.26	211,275	34.56	11.15
1937 .....	2,583,000	834,661	32.31	288,478	34.56	11.17
1938 .....	2,228,000	562,328	25.23	210,797	37.49	9.46
1931 - 1938 .....	13,583,000	3,652,281	26.89	1,287,545	35.25	9.48
TOTAL .....	59,798,602	25,784,430	43.12	8,575,530	33.26	14.34

copper was prohibited. As soon as the excessive stocks in this country were reduced to a fairly normal level, which could not be accomplished as long as foreign copper was permitted free entry into the country, U. S. output advanced to nearly one-third of the world total and Arizona's production to more than 11 per cent.

In 1938, the relative importance of production in this country declined and copper mined in the United States amounted to only about one-fourth of the world output, but this was due principally to heavy production abroad to fill anticipated war requirements.—Reprinted from PAY DIRT for November 20, 1939.

Arizona's Recent Growth In Population Due To Tourists

Phoenix and Tucson Benefit

A study of the population growth of the state of Arizona, and the reasons therefore, made by the Arizona Department of Mineral Resources, shows that the gains made during the past decade have been almost entirely accounted for by the counties attracting persons who are seeking climate—Maricopa and Pima. Within those two counties, the development has been practically exclusively in Phoenix and its suburban area and the city of Tucson. Analysis shows that Maricopa County, outside of greater Phoenix, has not grown materially, and that Pima County, with the exception of Tucson, has actually decreased in population.

Up to the World War period, the basic industries, mining, agriculture, livestock raising, and lumbering, were responsible for the rapid development and population growth of the state. Since that time, however, Arizona's climatic resources have assumed greater prominence in justifying its population growth, and the basic industries, although still the foundation for the state's economic structure, have shown a relative decline.

Consequently, the basic industries, which largely have borne the cost of developing the state and made its climatic resources available and attractive to those who are seeking health or relief from the rigors of eastern winters, are carrying an increased load as a result of the migration of new citizens to the state and the greater services it must perform to serve them. This load has been keeping the basic industries from advancing, and, in some cases, actually stifling progress. It not only affects mining, but agriculture and lumbering as well to a marked degree.

This raises the question of whether those parts of Arizona which have benefited almost exclusively from the transient and tourist have contributed their share in creating the conditions and making available the resources which have attracted persons here from other parts of the nation and are paying their share toward the maintenance of the advantages which they enjoy. In other words, can the basic industries continue to develop and maintain a winter playground which adds nothing to their own prosperity unless some method can be devised whereby the tourists and transients, and those who benefit by their presence in the state, pay a goodly part of their own way insofar as the cost of running the state is concerned?

Early Population Growth

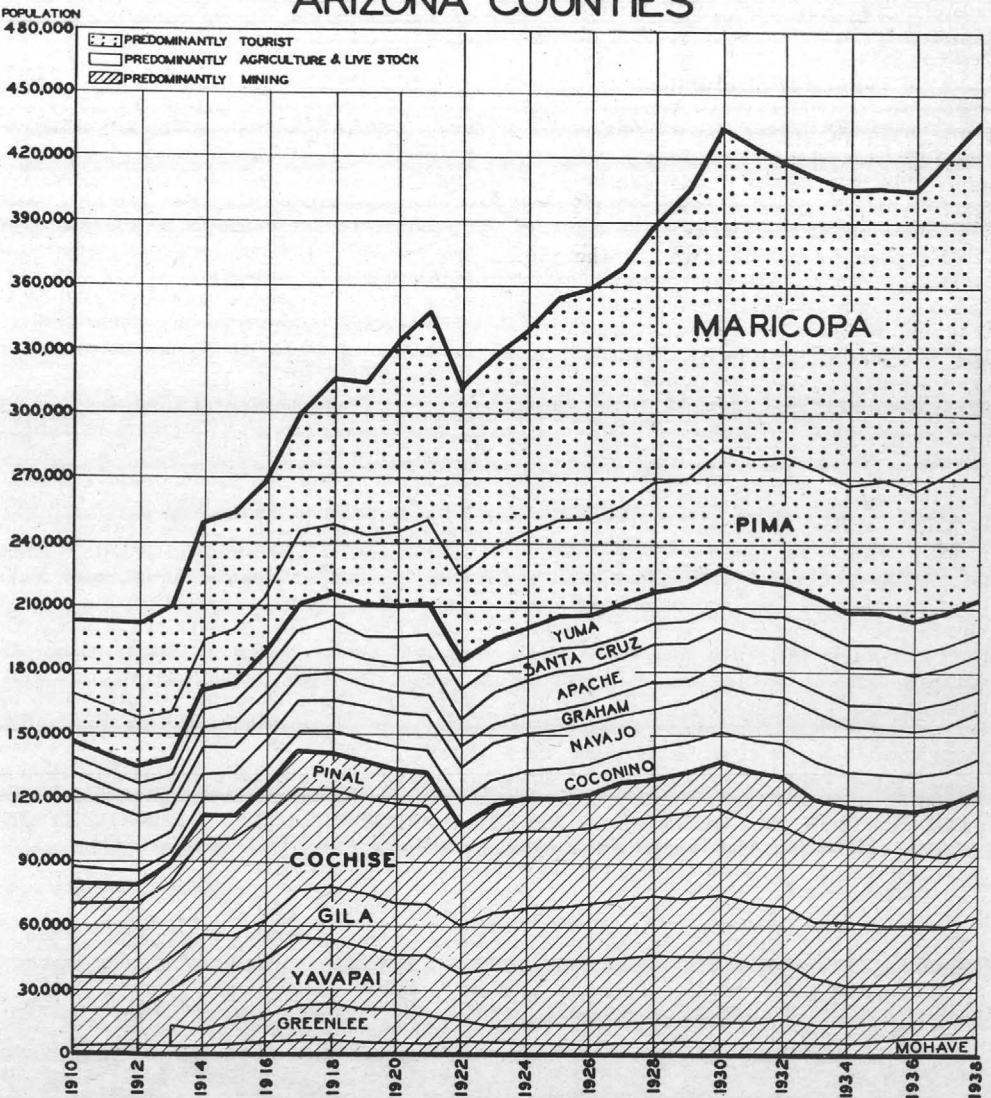
Arizona's population has had a remarkable growth since it first became a territory of the United States in 1863. According to the 1870 census, there were 9,685 residents in the entire territory and by 1930 the state had 435,573. The population is now estimated, based upon the school census, to be 437,890.

when copper became the most important metal produced, Arizona mines recovered \$38,837,000 in silver and \$18,165,000 in gold against \$21,049,800 in copper. It was the construction of the main line railroads with branches to the mines that permitted the successful exploitation of the copper deposits, and nearly every branch built in the state was for the purpose of serving some mining area. The value of Arizona's metal production to date has exceeded \$3,000,000,000 and over \$2,600,000,000 of this has been in the form of copper.

The second era in the state's growth began just about the time of statehood in 1912 and continued through the World War period. Mining again played the most important role, partly because of the development of methods of mining the low-grade porphyry deposits on a large scale, and partly because of the impetus provided by the war which placed an unprecedented demand on Arizona's copper mines.

Another industry grew to a substantial stature during that era, however, as agricultural crop production showed important gains following the completion of the Roosevelt Dam in 1911. In 1910, the pro-

CHART I  
POPULATION ARIZONA COUNTIES





duction of agricultural crops was valued at \$7,000,000, and, in 1919, an all-time high of \$50,000,000 was reached. The value of crop output in 1937 totaled \$35,375,000. Prior to 1911, livestock and animal products were the larger crops in dollar value, but in every year since agricultural products have been more important with the exception of the depression period during 1931 and 1932. The peak year for livestock and animal products output was 1937 when \$26,375,000 was produced. In 1919, however, the state's output was valued at \$23,000,000 which shows that there has been little, if any, growth in livestock production since the period immediately following the war.

The combined value of agricultural and livestock production in Arizona was \$73,000,000 in 1919, the peak year. This maximum was almost reached in 1928 when \$72,000,000 was recovered. In 1937 the state's production was \$61,750,000 against \$65,000,000 in 1920, showing that there has been no growth since the period immediately following the war.

Mine output has shown a material decline since the World War. The record year was 1917 when the value of the state's output of gold, silver, copper, lead, and zinc exceeded \$210,000,000. This figure has never since been approached, even in the prosperous year, 1929, when the state's output was nearly \$156,000,000. Mine production in 1938 was valued at \$58,358,401.

#### Recent Development

Despite the fact that Arizona's traditional basic industries have evidenced no growth, or a decline, since the war, the population of the state has continued its upward march, gaining more than 23 per cent since the 1920 census.

This period since the war is the third important era in Arizona's growth and it has been due to another natural, but intangible, resource — climate. During the past 20 years, the tourist, transient, and health seeker trade has made very rapid gains becoming an important factor in the state's economy — important both as to money brought into the state and as to the increased costs incurred by state, county, and local governments in rendering essential services to them.

Thus, three fundamental industries — mining, agriculture and livestock, and the tourist trade—have been primarily responsible for the increase in Arizona's population and their influence has been felt in varying degrees during the different periods of the state's development. The lumber industry has also been a factor, although of little relative importance inasmuch as the value of lumber output since

#### POPULATION OF COUNTIES IN ARIZONA PREDOMINANTLY DEPENDENT ON MINING, AGRICULTURE, AND TOURISTS FOR THEIR GROWTH 1938 Calculated from School Enrollment Figures

Year	Mining Counties Population	Percent	Agricultural Counties Population	Percent	Tourist Counties Population	Percent	State Population	Percent
1910	79,753	39.01	67,295	32.94	57,306	28.05	204,354	100
1920	132,910	39.76	76,996	23.04	124,256	37.19	334,162	100
1930	138,023	31.69	90,904	20.86	206,646	47.45	435,573	100
1938	123,736	28.26	90,502	20.67	223,652	51.07	437,890	100

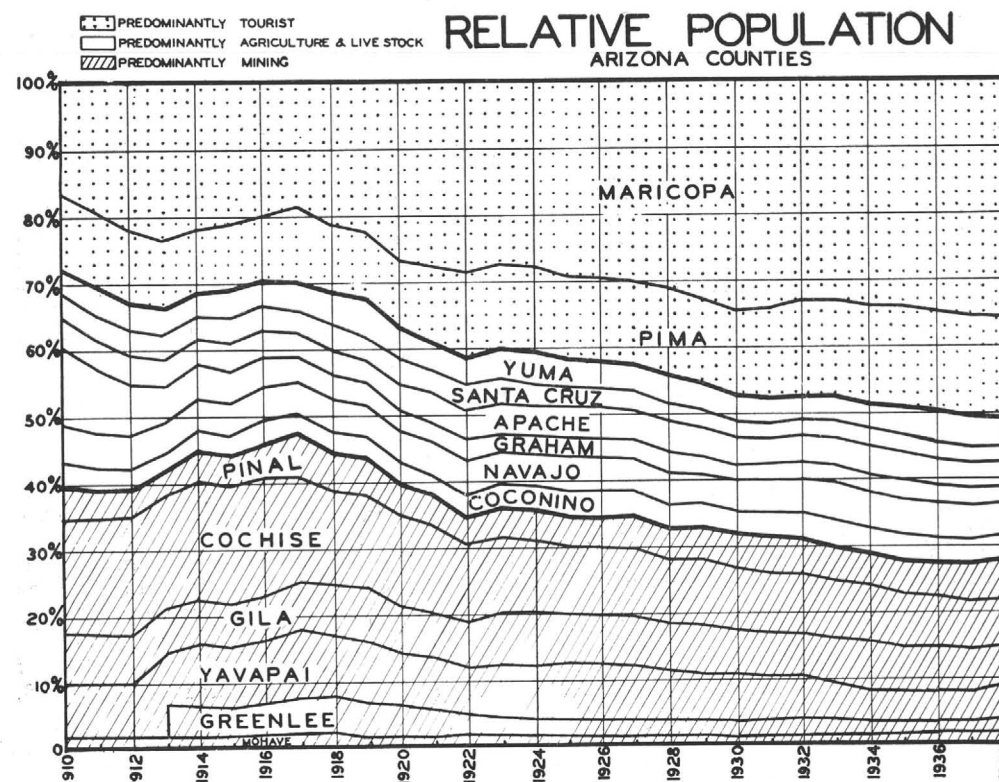
Mining counties: Cochise, Gila, Greenlee, Mohave, Pinal, Yavapai.

Agricultural and livestock counties: Apache, Coconino, Graham, Navajo, Santa Cruz, Yuma.

Tourist counties: Maricopa, Pima.

CHART II

### RELATIVE POPULATION ARIZONA COUNTIES



1909 has aggregated less than 2 per cent of the combined value of mineral and agricultural production in the state.

The state's basic industries have justified the establishment of many businesses and professions, and, although Arizona's population is far from being strictly confined to mining, agriculture, and tourists, the great bulk of the population is made up either of these people or of those who serve them. Doctors, lawyers, merchants, transportation employees, utility workers, etc., are all required and the growth of this service population has been a direct consequence of the development of the resource industries.

#### Classification of Counties

The counties in the state may be roughly classified into groups depending on whether they are at present predominantly dependent on mining, agriculture and livestock, or the tourist trade. Those counties which rely primarily upon mining include Cochise, Gila, Greenlee, Mohave, Pinal, and Yavapai. Those where agriculture and livestock play the major roles are Apache, Coconino, Graham, Navajo, Santa Cruz, and Yuma. The spectacular growth of Maricopa and Pima Counties in late years has been due almost entirely to the tourist trade.

One might question the classification of

Maricopa county in the tourist group when it has the largest agricultural area in the state, but the study shows that there has been but little change in the amount of land under cultivation or the rural farm population in the last decade; therefore, whatever growth there may have been has come from those who were attracted by the climate. Likewise, in Pima county, copper mining is important but it is no more important now than it was 20 years ago, and there has been practically no growth in the county outside of Tucson and the immediately surrounding area. The recent development of these two counties and their possibilities for future growth appear to be closely linked with their opportunities as winter playgrounds.

For purposes of this study the counties had to be arbitrarily classified into these three groups for no county is exclusively dependent on any one of them. They all benefit to a greater or lesser extent from each of the industries and it was necessary to assign them to groups depending on whether their growth, or lack of growth, was predominantly, rather than exclusively, due to mining, agriculture and livestock, or the tourist trade. The original cause for the development of any given county may have been different than that which has accounted for its more recent growth.

Chart I shows the population of the various counties in the state, classifying them as to whether their growth has been principally due to mining, agriculture and livestock, or the tourists. It graphically reveals the persistent growth in the state's population and shows that since the end of the World War it has practically all occurred in Maricopa and Pima counties. The climatic resources of these counties and the attractions they hold for the tourists account for their growth during the past 20 years.

TABLE III  
Quantity and Value of Siliceous Gold Ores Produced in Arizona 1913-1938

Year	Tons of Ore Produced	Gross Value of Total Metal Content	Value Per Ton	Ounces of Gold	Ounces of Gold Per Ton
1913	210,228	\$ 2,552,405	\$12.14	120,352	0.572
1914	263,895	3,110,192	11.79	136,558	0.517
1915	182,251	1,982,342	10.88	92,771	0.509
1916	164,918	1,419,513	8.61	63,562	0.385
1917	236,585	3,100,145	13.10	128,801	0.544
1918	201,411	3,046,567	15.13	141,126	0.701
1919	190,069	2,671,114	14.05	125,188	0.659
1920	201,334	3,001,067	14.91	139,858	0.694
1921	182,194	2,437,479	13.38	114,044	0.626
1922	173,070	2,184,041	12.62	102,814	0.594
1923	226,585	3,063,953	13.52	142,443	0.629
1924	209,356	2,171,506	10.37	92,771	0.443
1925	71,289	758,860	10.64	33,645	0.471
1926	111,083	1,061,793	9.56	47,586	0.428
1927	122,153	603,840	4.94	27,032	0.221
1928	52,089	390,676	7.50	17,844	0.343
1929	68,891	508,929	7.39	14,429	0.209
1930	48,538	714,238	14.72	33,047	0.681
1931	58,862	867,371	14.74	41,032	0.697
1932	55,730	411,623	7.39	19,061	0.342
1933	93,802	648,411	6.91	23,820	0.254
1934	344,910	2,797,278	8.11	74,299	0.215
1935	492,213	3,746,629	7.61	98,865	0.201
1936	652,914	4,701,494	7.20	120,025	0.184
1937	615,614	4,670,024	7.59	117,464	0.191
1938	698,687	5,004,286	7.16	129,177	0.185

Total 5,928,671 \$57,625,776 \$ 9.72 2,197,614 0.371  
Note: Value of gold recovered from siliceous gold ore 1913-38 amounted to \$53,249,262; value of gold from all siliceous ores, \$58,670,163; and value of gold from all classes of ore, \$132,345,959.

duction of copper ores by offsetting, at least in part, the lower metal content in some of the copper ores in the state. In 1937, for example, Arizona copper ores averaged only 28.8 pounds of copper per ton, less than ever before.

#### Gold Producing Counties

There are three outstanding gold producing counties in Arizona. These are Yavapai, Mohave, and Cochise in the order of their importance; and between them they have accounted for 76 per cent of the state's gold output of \$215,116,816.

Table IV lists the gold production by the various counties and shows that Yavapai County has produced \$68,233,334; Mohave County, \$50,277,921; and Cochise, \$44,954,307. In Yavapai and Cochise Counties the gold has been recovered primarily from copper ores while the output of Mohave County has been principally from siliceous ores.

TABLE IV

County	Arizona Gold Production Prior to 1900	1900-1938	Total
Cochise	\$ 4,700,000	\$ 40,254,307	\$ 44,954,307
Coconino		1,324	1,324
Gila	70,000	3,196,931	3,266,931
Graham	75,000	415,707	490,707
Greenlee		1,523,340	1,523,340
Maricopa	5,100,000	3,477,474	8,577,474
Mohave	1,432,266	48,845,655	50,277,921
Pima	1,106,000	7,388,271	8,494,271
Pinal	2,575,000	8,442,988	11,017,988
Santa Cruz	1,000,000	1,465,864	2,465,864
Yavapai	13,875,000	54,358,334	68,233,334
Yuma	8,720,000	7,093,355	15,813,355
Total	\$38,653,266	\$176,463,550	\$215,116,816

Of course, in both Cochise and Yavapai Counties there has been recovery of siliceous ores, but copper production has been so much more important that changes in the gold output have been principally due to variations in the rate of copper production. This is borne out by Table VI which lists the gold production of the three counties by five-year periods since 1900 giving the yearly average of the periods through 1934 and the production yearly since then.

The influence of copper on the production of Yavapai and Cochise counties was particularly pronounced during the years 1925 to 1929 when the production of siliceous ores in the state was at a very low level. During that period, the production of gold in Cochise County reached a new high with an average of 68,146 ounces of gold worth \$1,408,703 yearly.

In Yavapai County production also was sharply higher and the yearly average was 70,875 ounces valued at \$1,465,106. This was exceeded only in the 1900-1904 period.

#### Mohave County Siliceous Ores

Mohave County, on the other hand, showed a substantial loss during the period 1925 to 1929 when the mining of siliceous ores there was curtailed, and its production stayed down until the higher gold price justified further extensive operations. This drop is shown in Table VI which lists the yearly average production of gold in Mohave County from 1925 to 1929 at 23,074 ounces as compared with 113,369 ounces from 1920 to 1924. The recovery to nearly 80,000 ounces in 1938 as a consequence of the greater gold price is also shown.

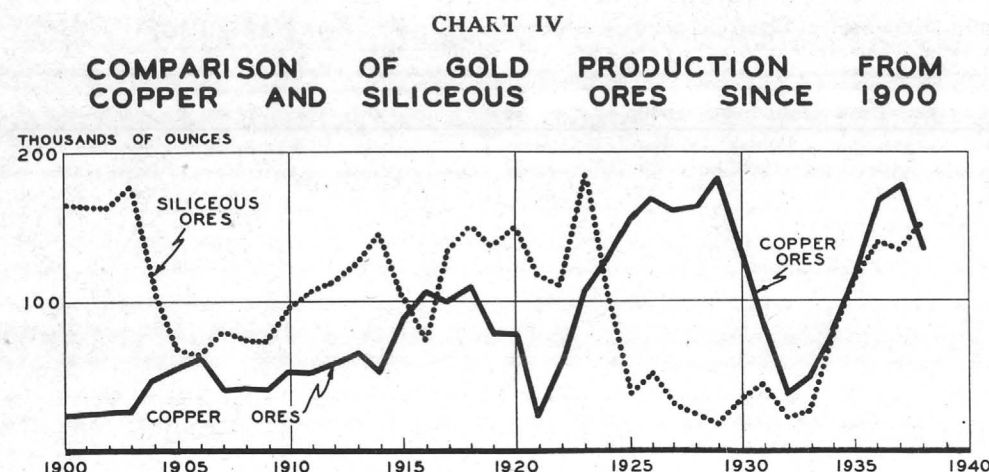
It is interesting to compare the production of gold in Mohave County in Table VI with Arizona's output of siliceous ores in Chart IV. It readily can be seen that after the slump in production in 1904, which was due to curtailed production of siliceous material in Yavapai and Yuma counties, the growth in the output of siliceous ores to the 1923 peak, the drop after that year, and the recovery in 1933 were largely accounted for by the production of Mohave County.

Thus it has been seen that there are two principal sources of gold in Arizona —siliceous and copper ores, and that Mohave County has been primarily responsible for the recovery from siliceous ore since 1905 while Yavapai and Cochise Counties have been the main sources of the gold recovered from copper ores.

Technological improvements have permitted the mining of lower grade gold ores in Arizona just as they have allowed the recovery of other metals from ores containing lower values. In 1900, the average yield of the ores of gold, silver, copper, lead, and zinc amounted to \$13.97 a ton. In 1910 it was \$10.98 a ton and by 1939 it had dropped to \$3.92.

Similarly, the yield of copper ores has followed a steady downward course falling from \$10.93 per ton in 1910 to \$3.73 in 1938. In the earlier year, copper ores contained an average of 81.4 pounds of copper per ton while in 1938 they carried only





and the lower grade of ore found at depth. The recovery in 1917 was due to the inauguration of operations at the United Eastern in Mohave County in January of that year.

The decline in the production of gold after 1918 was caused principally by curtailed production of gold from copper ores as the copper mines curbed their production to permit liquidation of war stocks. It was not until after 1921 that conditions in the copper market improved sufficiently to permit increased production and when they did there was a sharp increase in production of gold from copper ores with

production in the Warren district of Cochise County, the Verde district of Yavapai County, the Ajo district of Pima County, the Globe-Miami district of Gila County, and the Superior district of Pinal County all advancing to establish new records.

This sharp advance in the production of gold from copper ores to a large extent offset the decline that took place in recovery from siliceous ores which plummeted to the lowest level seen since 1900. The high year as far as the production of gold from siliceous ores was concerned was 1923 when work at the Goldroad mine was resumed and operations at the Tom Reed

and United Eastern properties continued at a high plane. Two years later gold output from siliceous ores reached the lowest level recorded since 1900.

#### Curtailed Output in Twenties

The reason for the break was the shutting down of the United Eastern and Goldroad properties and curtailment of production at the Tom Reed. Due to a decrease in the grade of the ores in the properties, operations in Mohave County remained at a low level until after 1933 and the production of gold from siliceous ores in Arizona was of much less consequence than previously.

Furthermore, after 1929, the production of gold from copper ores which had been at record heights tumbled as the depression set in and as a consequence gold production in Arizona from all sources in 1932 sank to levels not experienced since 1893. The following year, the price of gold started to move upward and the quotations for copper, silver, and other metals began to rise, resulting in a recovery that was even more marked than the decline.

New mills were constructed and old ones were revamped to treat siliceous gold ores in the state when the higher price justified the exploitation of lower grade ores—and copper mines were able to resume operations. The combination of the tremendous increase in activity at mines producing both copper and siliceous ores caused an advance in gold output in the state to establish new highs from a standpoint of both ounces and value as can be seen in Chart I.

#### Higher Gold Price

The outstanding feature of the recent gain in the production of gold from siliceous ores has been the fact that the increase in the price of gold has permitted the mining of ore of a lower grade than has ever been possible heretofore. Despite the increase in the price of gold, the value per ton of the siliceous gold ores did not increase.

The higher price permitted the working of old mines, particularly in Mohave County, which had been forced to shut down when the grade of ore declined, but could operate with a \$35 gold price. It also allowed the reworking of tailings and dumps in many sections of the state and the exploitation of other ore bodies which had formerly had no commercial value. Anything which increases the price or decreases the cost of the metals adds to the state's resources in a material manner.

It is true, of course, that the greater price meant increased profits for a few producers who were able to operate at the old price of \$20.67 an ounce, but only a small percentage of the gold being produced in Arizona today from siliceous gold ores could possibly be mined at the old price of \$20.67 an ounce. Production today is more than eight times as great as it was prior to the advance in the price and it is because of the tremendous increase in production of low-grade ores, made possible by the boost in the gold quotation, that the value per ton has declined.

Furthermore, the increase in the gold price has contributed to the greater pro-

#### Tourist Influence

Since 1920, the population in Maricopa and Pima Counties has increased 80 per cent and since 1930 there has been an increase of 8.2 per cent. However, at the time these rapid gains were being made, a much different picture was presented by the groups of counties dependent on mining and agriculture.

In sharp contrast with the records made by Maricopa and Pima counties, those dependent on mining have shown a 6.9 per cent decline in population since 1920 and the loss since 1930 has been 10.3 per cent. During the 18-year period following 1920 the agricultural counties were able to increase their population only 17.5 per cent and they have recorded a slight loss since 1930.

Statistics show that neither mining nor agriculture have played consequential parts in the recent population growth of Maricopa and Pima counties. While there is no question but that agriculture is an important factor in Maricopa County, which accounts for about 50 per cent of the state's output, there has been no agricultural development to speak of since 1920.

According to the 1930 census, 50 per cent of the state's agricultural workers resided in Maricopa and Pima Counties in that year. Of those gainfully employed in the two counties, however, less than 25 per cent were engaged in agriculture.

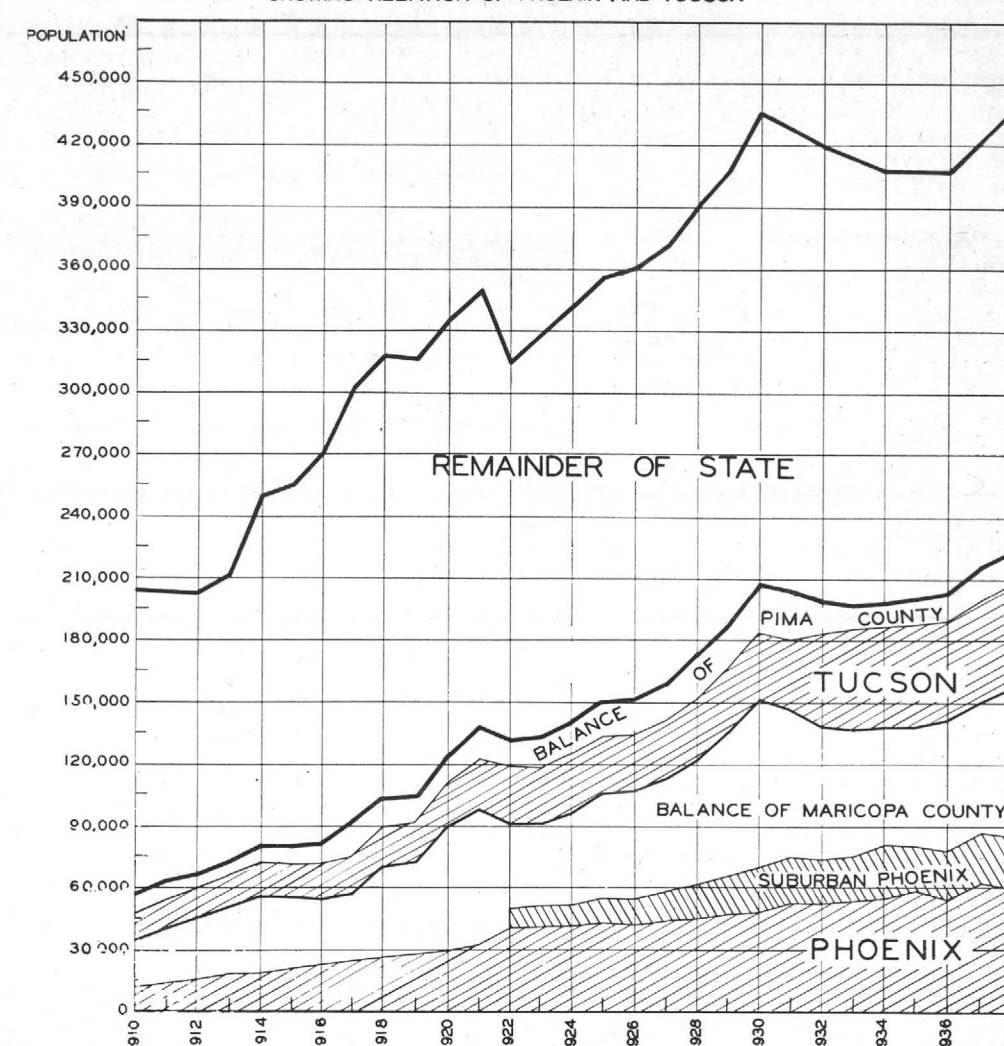
Figures showing the number of acres of irrigated lands in Arizona fully substantiate the statement that agriculture has made no important gains in Maricopa County since 1920. In that year the state had 462,565 acres under irrigation against 505,624 acres in 1938, and most of this increase took place outside the tourist counties. A large number of acres were placed under irrigation in Pinal County in 1928 when the Coolidge Dam was completed, and in Yuma County with the expansion of the Yuma project.

Thus it can be seen that the gains in Maricopa and Pima Counties were not accounted for by agriculture any more than in the state as a whole which has shown a loss in value of output since 1920. Similarly, statistics show that mining has played little or no part in their advancement.

Practically all the mineral output reported by the tourist counties comes from one mine, the New Cornelia at Ajo in Pima County, and the value of the major metals produced in that county in 1920 was \$8,314,153 against \$9,604,179 in 1938. The county peak was established in 1918 with over \$15,000,000. Maricopa County's mineral output in 1938 was \$158,020.

Maricopa and Pima Counties accounted for 11.8 per cent of the mining employees of the state according to the 1930 census, but, of the total population of the counties, only 2.6 per cent were engaged in mining. These figures reveal, as do those showing

CHART III  
ARIZONA POPULATION  
SHOWING RELATION OF PHOENIX AND TUCSON



the importance of agriculture, that mining and farming are important factors in the economy of the two counties, but the fact that there has been no growth in them since 1920 indicates that the health seekers and transients have been responsible for their recent marked gains in population.

#### Mines, Farms Less Important

The declining relative importance of the mining and agricultural industries to the state as a whole is shown in Chart II where the same figures as were used in Chart I are plotted as percentages of the total. At the time of the 1920 census, the mining county group accounted for 39.76 per cent of the state's total population and 10 years later they held only 31.69 per cent. By 1938 the percentage had shrunk to 28.26 per cent.

The agricultural counties, which held 23.04 per cent of Arizona's residents in 1920, did not decline in importance as rapidly as the mining counties, but in 1938 they contained only 20.67 per cent. On

the other hand, the tourist counties, which were responsible for only 37.19 per cent of the state's population in 1920, now account for 51.07 per cent.

It is interesting to note that according to the 1930 United States Census the six counties classified as being predominately dependent on agriculture contained 31.4 per cent of all persons over 10 years of age gainfully employed in agriculture and that over 35 per cent of those gainfully employed in the counties were following agricultural pursuits. Only 0.35 per cent derived their livelihood from mining.

The same authority revealed that the six mining counties contained 81.6 per cent of those in Arizona engaged in the extraction of minerals in 1930 and they accounted for 81 per cent of the value of the state's production of gold, silver, copper, lead, and zinc in 1938. Twenty-seven per cent of all those employed in the mining counties were engaged in the extraction of minerals and 13 per cent in agriculture.

Another interesting fact revealed by the census is that the largest percentage of people in the counties classified as being predominately dependent on the tourist trade for their growth live in urban areas, which are defined as being cities and other incorporated places having 2,500 inhabitants or more. The balance of the

	Ounces Contained in Siliceous Ore	Per Cent	Ounces Contained in Copper Ore	Per Cent	Ounces Contained in Other Ore	Per Cent	Total Ounces
1900	164,732	81.21	24,187	11.92	13,937	6.77	202,856
1901	163,409	82.73	24,187	12.25	9,919	5.02	197,515
1902	162,224	81.54	25,903	13.02	10,806	5.44	198,933
1903	176,547	83.75	25,853	12.26	8,399	3.99	210,799
1904	107,216	63.72	47,559	28.26	13,499	8.02	168,274
1905	67,572	49.90	55,668	41.12	12,172	8.98	135,412
1906	64,954	45.29	62,299	43.44	16,163	11.27	143,417
1907	80,505	63.58	41,829	33.04	4,279	3.38	126,613
1908	73,524	62.50	41,640	35.39	2,483	2.11	117,647
1909	73,590	55.57	40,146	30.32	18,691	14.11	132,427
1910	95,395	62.62	52,707	34.60	4,249	2.78	152,351
1911	104,012	62.68	51,378	30.96	10,561	6.36	165,951
1912	112,068	61.58	57,508	31.60	12,421	6.82	181,997
1913	123,764	63.58	64,437	33.10	6,456	3.32	194,657
1914	145,256	71.85	50,843	25.15	6,068	3.00	202,167
1915	104,350	51.78	87,707	43.52	9,474	4.70	201,531
1916	73,415	38.08	105,467	54.70	13,918	7.22	192,801
1917	131,998	53.84	98,531	40.19	14,645	5.97	245,174
1918	150,000	57.05	108,750	41.36	4,169	1.59	262,919
1919	135,942	62.36	78,103	35.83	3,953	1.81	217,998
1920	149,518	64.58	76,402	33.00	5,609	2.42	231,529
1921	116,458	82.15	21,732	15.33	3,563	2.52	141,753
1922	108,415	63.59	57,745	33.87	4,320	2.54	170,480
1923	184,459	62.29	106,691	36.03	4,959	1.68	296,109
1924	100,630	42.64	128,121	54.29	7,245	3.07	235,996
1925	36,964	18.32	153,350	76.01	11,427	5.67	201,741
1926	50,685	21.66	167,920	71.76	15,406	6.58	234,011
1927	30,418	15.17	159,844	79.72	10,233	5.11	200,495
1928	22,583	11.77	161,071	83.92	8,273	4.31	191,927
1929	16,082	7.95	179,489	88.72	6,747	3.33	202,318
1930	33,483	19.76	132,087	77.98	3,820	2.26	169,390
1931	43,026	34.10	80,685	63.94	2,475	1.96	126,186
1932	19,605	29.35	38,631	57.84	8,553	12.81	66,789
1933	24,568	30.83	47,411	59.27	7,924	9.90	79,993
1934	77,950	46.67	76,092	45.56	12,982	7.77	167,024
1935	112,267	46.43	112,784	46.65	16,704	6.92	241,755
1936	136,312	42.28	166,259	51.57	19,837	6.15	322,408
1937	131,927	39.65	176,918	53.18	23,849	7.17	332,694
1938	150,371	49.30	133,409	43.73	21,263	6.97	305,043

PERCENTAGE OF POPULATION GROWTH IN MINING, AGRICULTURAL AND TOURIST COUNTIES BETWEEN 1910 AND 1938

Period	Mining	Agricultural	Tourist	State
Since 1910.....	55 %	34.8 %	290 %	114 %
Since 1920 .....	-6.9	17.5	80	31
Since 1930 .....	-10.3	-0.4	8.2	0.5



population is classified as being rural and the bulk of the people in the agricultural and mining counties live in rural districts, the former living in the rural farm sections and the latter in rural nonfarm regions.

Thus, the census showed Maricopa and Pima counties to have 42.5 per cent of their population in urban areas, 20.5 per cent in rural farm districts, and 37 per cent in rural nonfarm regions. The population of the principal agricultural and livestock counties was divided 42.2 per cent in rural farm areas, 37.2 per cent in rural nonfarm districts, and 20.6 per cent in urban communities. The counties predominantly dependent on mining were shown to have 55.6 per cent of their population in rural nonfarm districts, 31.3 per cent in urban areas, and 13.1 per cent in rural farm sections.

#### Phoenix and Tucson

Chart III probably illustrates more clearly than the others how important the tourist and those who serve him have been to the state since 1920. It shows that the growth of the state since that year has been almost exclusively due to gains made by Maricopa and Pima counties and that in those counties the actual gains have been made in the cities of Phoenix and Tucson, rather than in the counties as a whole.

The United States Census for 1910 listed the Phoenix population at 11,134 persons; at 29,053 in 1920; and at 48,118 in 1930. By 1938 the population of Phoenix had increased to 59,515. The population of greater Phoenix, which is the area served by the Phoenix Union High School and includes Phoenix and suburban Phoenix, as shown on Chart III, amounted to 84,753 last year. The figures for 1938 are based upon school enrollment figures.

The chart shows that there are relatively few people in Pima County outside of the city of Tucson, where the growth has been largely confined, and that that city has grown from 13,193 in 1910 (when it was larger than Phoenix) to 20,292 in 1920, 32,506 in 1930, and an estimated 51,187 in 1938. Thus, Maricopa and Yuma Counties and Phoenix and Tucson in particular have been the principal beneficiaries of the tourist trade and the service population which it has created.

While the population of Arizona has increased from 334,162 persons in 1920 to 437,890 in 1938, or 31 per cent, the cost of running the state, as measured by total taxes collected for state purposes, has increased from \$4,232,854 to \$14,274,854 or 246 per cent. It would not be illogical to conclude that much of the increased costs of state government have been incurred

in developing the state to make it attractive to those who are seeking a wonderful winter climate, and that there has been neglect on the part of the state in creating conditions which would improve the opportunities and the future for the basic industries upon which the commonwealth was founded. —Reprinted from PAY DIRT for December 26, 1939.

## Half of Arizona's Population Depends on Mining Industry

### HAS WIDE INFLUENCE

Over half of the population of Arizona, exclusive of Indians on reservations, is directly dependent upon the mining industry for support, according to a compilation made by the Department of Mineral Resources. The conclusions were based upon an economic study made by Rolland A. Vandegrift and Associates which showed that, for each miner employed, there were 14 persons, including the miner himself, dependent upon his production.

Of the 400,000 Arizona population, 210,000 are gaining their livelihood from the products of the mines, stated the analysis which was made for presentation to congressional committees in support of the continuation of the excise tax on foreign copper. The report clearly showed the dependence of the state upon the maintenance of the United States market for domestic copper.

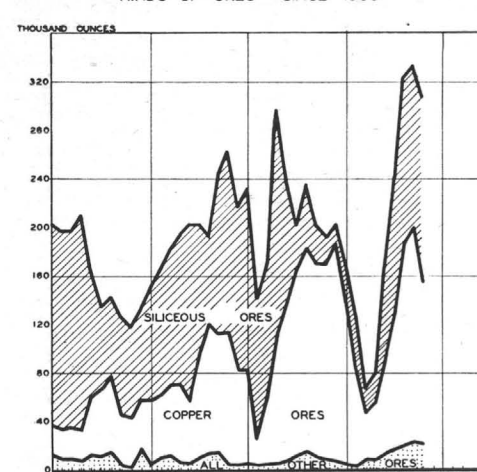
These figures sound unduly large until one begins to analyze and see how they are determined. For instance, there are approximately 15,000 employed in the mines of which 9,000 are in the large and 6,000 in the small mines. These 15,000 have an average of 3 1/2 direct dependents each, thus making a total of 52,500 directly supported. However, we know that for the 52,500 miners and their families there must be many grocery clerks, drug clerks, lawyers, school teachers,

nurses, and so on down the line of hundreds of employment classifications. Then each of those groups requires additional people to serve their needs.

Thus, the Vandegrift survey showed that, for each person directly concerned, there were four more persons, comprising the service population, indirectly, but fully, dependent. These include doctors, lawyers, teachers, clerks, salesmen, government employees, workers in amusement and utility industries, etc. Further evidence of the far-reaching truth of this statement is the fact that, while there are 9,000 employees of the five large copper companies in Arizona, the population of the communities directly and fully dependent upon these mines is 71,000.

According to the report made for the congressional committee, one large mining company spent in Arizona in 1938 \$7,999,000 for wages; \$1,291,000 for supplies and equipment; \$1,823,000 for taxes; \$844,000 for freight; and \$956,000 for miscellaneous expenditures. In addition to this total of \$12,913,000, one store from which mining employees bought many of their supplies purchased \$465,551 worth of Arizona products. Of this, \$324,991 came from Salt River Valley; \$110,122 from the Sulphur Springs Valley; \$15,552 was spent for products of the Gila Valley, and \$13,301 was paid for Duncan Valley products, thus showing how the business of the mines reaches all over the state and affects those gainfully employed in all industries. —Reprinted from PAY DIRT for June 8, 1939.

CHART II  
ARIZONA GOLD PRODUCTION IN OUNCES BY KINDS OF ORES SINCE 1900



source of mineral wealth to Arizona has been greater during the past few years than it has at any other time since the early part of the century. In no year from 1905 to 1931 did the value of the gold recovered amount to as much as 10 per cent of the value of the five major metals, gold, silver, copper, lead, and zinc.

In 1921, when the copper mines shut down in order to permit liquidation of the stocks that had accumulated as an aftermath of the World War, the value of the gold recovered did advance to nearly 10 per cent of the total. After that it promptly declined and remained down until 1931 and 1932 when the copper mines again shut down as a consequence of one of the most severe depressions ever experienced.

It will be noted that in both 1921 and the early thirties, the increased relative importance of gold resulted from curtailment in the output of other metals. After 1933, however, the gain was due to increased gold production and in 1937, when copper production had largely recovered, gold was responsible for 12.8 per cent of the value of Arizona's production of the five major metals. The high of 25 per cent was recorded in 1934. That was after the gold price had increased, but before copper production had improved materially.

By referring to Chart I it will be seen that the production of gold gained almost without interruption prior to 1900 as the railroads were extended across the state, new mines were discovered and opened,

and technological improvements, among them the cyanide process, permitted increased output.

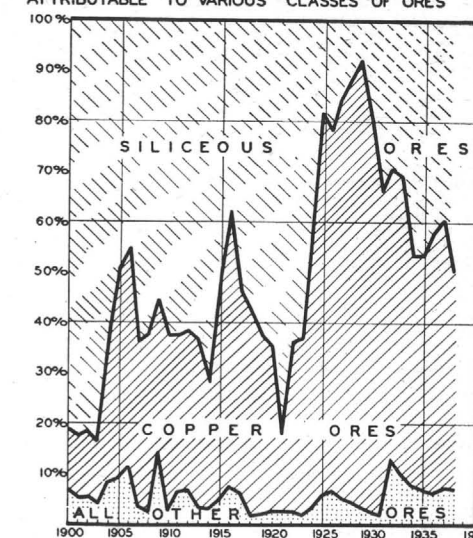
#### Production Since 1900

Four important peaks and three distinct valleys have been established by the curve of gold production since 1900. The peaks occurred during the years 1900 to 1903, in 1918, in 1923, and in the years since 1936. The low points occurred in the years 1905 to 1909, in 1921 and 1922, and again in the early thirties. The trend was steadily upward.

In order to analyze the causes of these fluctuations in the production of gold, Chart IV was prepared to compare the production of gold from copper ores with that from siliceous ores since 1900. This Chart shows very clearly where the responsibility for the variations in production lie and also the growing importance of copper ores as a source of gold.

The high production of gold in the early part of the century as well as the break that took place in 1904 was due to changes in the production of siliceous ores. Both Yavapai and Yuma counties were important sources of siliceous ores at that time and reduction in the grade of the material

CHART III  
PERCENTAGE OF ARIZONA GOLD PRODUCTION ATTRIBUTABLE TO VARIOUS CLASSES OF ORES



at a number of the mines resulted in the reduced production.

Although during the early part of the century Yavapai County was an important source of siliceous ores, in more recent years it has been much more noted for its output of copper ores and the great bulk of its gold has been mined incidentally to copper production.

The recovery in gold production in 1910 and the subsequent growth was due to increased mining of both copper and siliceous ores, the most important sources of gold in copper ores having been the Warren mining district of Cochise County and the Verde district of Yavapai County. The San Francisco district of Mohave County contributed heavily to the gain in the output of siliceous ores.

#### Affect of War

Production of gold from copper ores continued to gain without important interruptions through the World War when great demands were placed on Arizona's copper mines and high prices permitted peak production rates. There was a sharp drop in the production of gold from siliceous ores in 1915 and 1916, however, and Mohave County was largely responsible.

Operations at the Goldroad property, which had been an important producer in the San Francisco mining district, were suspended in 1916 due to increased costs

TABLE I  
Percentage of Arizona's Production of Gold, Silver, Copper, Lead and Zinc Accounted for by Gold 1900-1939

Year	Per Cent	Year	Per Cent
1900	16.12	1920	4.18
1901	14.60	1921	9.91
1902	20.15	1922	5.60
1903	16.42	1923	5.86
1904	11.67	1924	4.90
1905	6.96	1925	3.69
1906	5.22	1926	4.26
1907	4.71	1927	4.20
1908	5.82	1928	3.47
1909	6.21	1929	2.69
1910	7.37	1930	4.32
1911	7.77	1931	6.50
1912	5.61	1932	10.20
1913	5.68	1933	19.84
1914	6.97	1934	25.06
1915	4.59	1935	22.75
1916	4.59	1936	19.46
1917	2.08	1937	12.82
1918	2.69	1938	18.29
1919	4.05	1939	15.61

TABLE VI  
Gold Production Cochise, Mohave, and Yavapai Counties Since 1900

Period	Cochise			Mohave			Yavapai		
	Total Ounces	Yearly Average	Total Value	Total Ounces	Yearly Average	Total Value	Total Ounces	Yearly Average	Total Value
1900-1904	91,127	18,225	\$ 1,883,765	71,781	14,356	\$ 1,483,824	595,774	119,155	\$12,315,754
1905-1909	121,444	24,289	2,510,487	117,145	23,429	2,421,606	283,518	56,704	5,860,831
1910-1914	198,557	39,711	4,104,542	404,297	80,859	8,357,577	151,337	30,267	3,128,435
1915-1919	287,237	57,447	5,937,698	508,405	101,681	10,509,663	221,721	44,344	4,583,368
1920-1924	214,843	42,969	4,441,222	566,845	113,369	11,717,745	211,793	42,359	4,378,161
1925-1929	340,730	68,146	7,043,516	1,408,703	281,741	2,384,890	354,373	70,875	7,325,528
1930-1934	201,014	40,203	5,099,517	1,019,903	203,981	2,556,575	149,135	29,827	3,644,820
1935	61,979	61,979	2,169,258	46,840	46,840	1,639,400	69,242	69,242	2,423,456
1936	73,841	73,841	2,566,942	64,504	64,504	2,257,640	112,088	112,088	3,923,066
1937	72,140	72,140	2,524,900	77,898	77,898	2,726,430	102,096	102,096	3,573,360
1938	56,356	56,356	1,972,600	79,723	79,723	2,790,305	91,473	91,473	3,201,555
Total 1900-1938	1,718,768	44,071	\$40,254,307	2,156,961	55,807	\$48,845,655	2,342,550	60,065	\$54,358,334
Average 1900-38									

AVERAGE COST OF PRODUCING COPPER AT ARIZONA MINES, 1922-1932, BASED ON NET EARNINGS

Mining Company	Production Thousands of Pounds	Total Dollars <sup>1</sup>	Average per Pound, Cents	Average Selling Price Pound, Cents <sup>2</sup>	Average Cost per Pound, Cents	Ratio of Copper Sales to Total Sales Per Cent
Calumet and Arizona <sup>3</sup>	524,913	\$24,840,791	4.73	14.71	9.98	85.8
Inspiration Consolidated	840,991	14,095,448	1.68	12.99	11.31	100.0
Magma Copper	274,061	7,947,117	2.90	13.65	10.75	86.3
Miami Copper	594,408	6,682,632	1.12	13.38	12.25	100.00
New Cornelia <sup>4</sup>	431,367	13,580,320	3.15	13.74	10.60	96.4
Old Dominion <sup>5</sup>	210,685	-3,504,749	-1.66	13.64	15.31	94.7
Phelps Dodge	1,879,513	-24,548,941	-1.31	13.23	14.53	56.4
United Verde <sup>6</sup>						
United Verde Extension	460,696	41,788	.01	13.35	13.36	93.6
TOTAL	5,216,634	\$39,134,406			12.70	

(1) Take into account in most instances depreciation and depletion. (2) Average selling price for each company is weighted according to company yearly output, based on average New York selling price for the year; also the average for all companies combined is weighted accordingly. (3) Calumet and Arizona, 1922-30, inclusive. (4) New Cornelia, 1922-28, inclusive. (5) Old Dominion, 1922-31, inclusive. (6) No data available. (7) Not actual deficit, but due to high rate charged for depletion. Source: Gardner, E. D. Johnson, C. H., and Butler, B. S.: Copper mining in North America, United States Bureau of Mines, Bulletin 405, 1938, Table 62, p. 279.



# Increased Gold Quotation Causes Record Arizona Output

## \$35 Price Makes Mining of Low-Grade Ores Possible

Gold mines in Arizona are operating at the highest rate in the history of the state as a consequence of the advance in the price to \$35 an ounce, and the stimulus provided by the action has permitted the mining of ore of a lower grade than has generally been possible heretofore. In fact, the decline in the gold content of the ores has been so marked that it has offset the increase in price, and the value per ton of the gold ores being mined today is no greater than it was prior to 1934 when the United States Government began to pay \$35 an ounce for gold.

This is clearly shown by Table III listing the production of siliceous gold ores which are mined solely for their gold content. The output of such material during the five years from 1934 to 1938 was 8.6 times greater than it was during the 1929-1933 period. The increased price did not, as popularly supposed, build up profits but did greatly increase the extent of gold mining activity.

During the past five years, Arizona's recovery of siliceous gold ores came to 2,804,338 tons having an average value of \$7.46 a ton. This compares with 325,823 tons worth \$9.67 a ton during the preceding five-year period. The gold content of these ores during the past five years averaged 0.19 ounces per ton against 0.40 ounces from 1929 to 1933.

It should be remembered that the years 1929 to 1933 were not depression years for gold producers as they were for the producers of other metals and it will be noted in Table III that the drop in siliceous gold output occurred prior to 1929, before the depression set in. When business collapsed, there was no reduction in the price of gold; as a matter of fact the relative value of the metal was greater because the reduced prices of other commodities and services increased the quantities that an ounce of gold would buy.

Therefore, the business recovery that was seen after 1933 cannot be credited with the increase in the production of siliceous gold ores. It was due to the opening up of a number of gold mines, particularly in Mohave County where new mills were constructed and old ones revamped, under the stimulus of the higher price of the metal.

Chart I, which shows the quantity and value of gold produced in Arizona since 1877, and reveals the sharp increase that has taken place since 1932, includes the gold produced from all sources and different factors have been responsible for the sharp fluctuations shown. The gain after

1933 was due to a combination of increased production of gold on its own account and to greater output of other metals, principally copper, the ores of which contain substantial amounts of gold.

In 1933, the production of gold was lower than it had been at any time since 1893. However, the combination of greater copper production and the increased gold price resulted in such a steep advance that in 1936 all previous records were broken and in 1937 an all-time peak of 332,694 ounces worth \$11,644,290 was reached.

### Siliceous and Copper Ores

Copper, of course, has been by far the most important product of the state's mines and Arizona's gold production in 1937 was worth only one-sixth of the copper output. The copper produced in the entire period from 1877 to 1939 has been over 12 times as valuable as the gold.

Furthermore, copper has been responsible for a good percentage of the gold mined. The importance of gold recovered incidentally to copper mining operations is revealed by Chart II which shows the gold recovered from siliceous, copper, and other ores in the state since 1900. Chart III shows the relative importance of the three sources of gold.

Forty-four per cent of Arizona's gold production from 1900 to 1938 came from copper ores. Siliceous ores accounted for 51 per cent and others the balance. A further breakdown for the years 1913 to 1938 reveals that 40 per cent of the metal mined during that period came from siliceous gold ores.

Therefore, analysis of Arizona's gold production resolves itself into two distinct phases, one relating to gold mined on its own merits, and the other to that which has been recovered as a by-product of other metals, mainly copper, and which has been governed by different, and, in many cases, wholly unrelated factors.

The gold mined incidentally to copper has naturally depended on copper market conditions — upon the supply and demand for copper and the price. Gold mined on its own account, however, has not been subject to a constantly fluctuating market.

As a matter of fact, copper production during the recent depression was stimulated by the increased gold price. Several copper mines, which otherwise would have shut down, found it possible to operate simply because the higher gold price partly offset the low copper quotation.

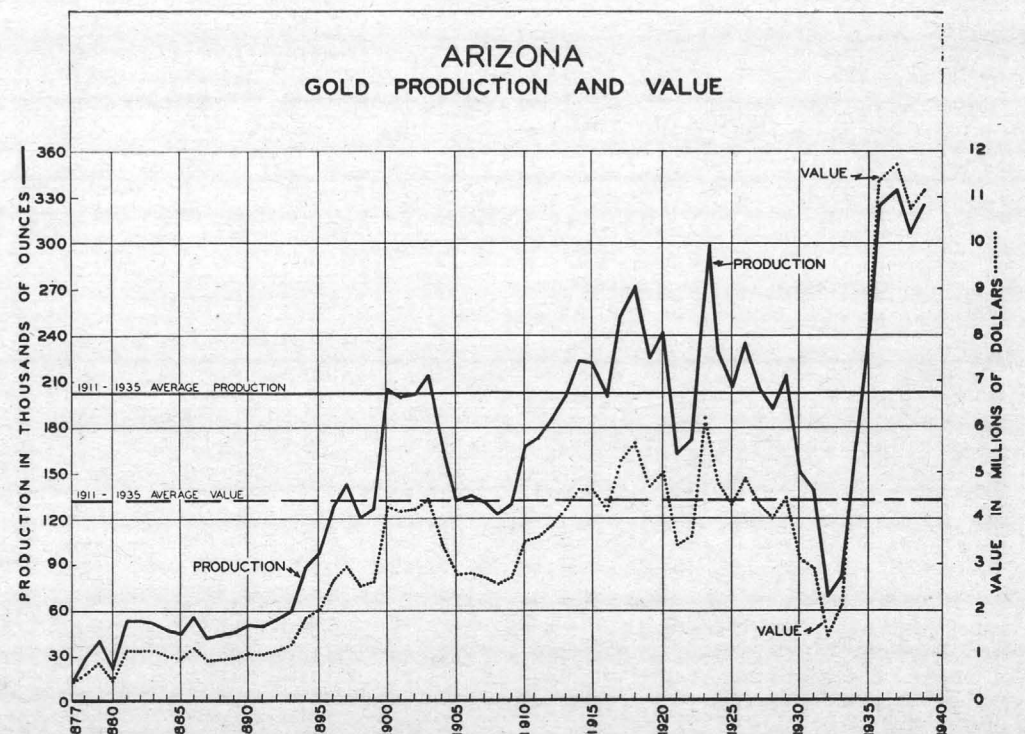
### Gold Price Stability

Gold is a monetary metal; it is characterized by a price stability and has an unlimited market which places it in a class by itself as far as metals are concerned. All that can be produced can be disposed of immediately. The weight of the gold dollar was fixed at 25.8 grains 9/10 fine by an act of Congress in 1837 and the price of \$20.67 an ounce that was thus established for gold remained unchanged for nearly 100 years.

Of course, fluctuations in the purchasing power of the dollar indirectly affected the value of gold, but the steady price gave that metal an advantage not enjoyed by other metals. Silver was benefited by a similar stability until it was demonetized by the Coinage Act of 1873.

The recent increase in the price of gold served as a great stimulus to production of the metal, and, as can be seen in Table I, the relative importance of gold as a

CHART I



# Mines Provide Tremendous Tonnage For Railroads

## Justified Construction of Nearly Every Branch Line

A study of Arizona railroads and their development clearly portrays the dominating influence of mining on the state's economy. Over 86 per cent of the revenue freight tonnage which has originated on railroads within Arizona during the 27 years since statehood has consisted of mining and smelting products according to a survey undertaken by the Arizona Department of Mineral Resources.

The survey further showed that over 71 per cent of the branch railroad trackage laid in the state was built to serve the mines. The mines, or any other state industry, can claim no credit for having any part in the building of the two transcontinental main lines, the Southern Pacific and the Atchison, Topeka and Santa Fe. These railroads merely crossed the state because it was on their route from the east to California.

However, the branch lines, with but few exceptions, were built to serve the mining industry. The Congress, Vulture, Poland, Crown King, Clara Consolidated, and other mines brought the Santa Fe, Prescott and Phoenix south as far as Wickenburg from the Santa Fe main line at Ash Fork and caused the construction of a branch through Humboldt and Mayer to the Crown King district. From Wickenburg, other mines were responsible for the extension of an additional branch west toward Parker to serve the Harqua Hala, Bouse, and Salome districts. The Arizona and Swansea Railroad Company then built a branch north from Bouse to reach the Swansea mine.

The United Verde and Pacific Railway was built in the early days to connect the United Verde mine at Jerome with the Santa Fe, and the construction of the smelter at Clarkdale at a later date justified the Verde Valley branch of the Santa Fe from Drake to Clarkdale. This line was subsequently extended to reach the United Verde Extension properties. Another Santa Fe branch line was built from McConico, a short distance west of Kingman, to Chloride to reach the mines in that district.

The Arizona Eastern was extended east from Phoenix to reach the Ray, Christmas, and Winkelman properties, as well as to serve the Superior district. The Magma mine at Superior was connected with this

Mining accounts for more freight to the railroads of the United States than all other sources combined, according to figures compiled by the Interstate Commerce Commission. The commission statistics show that the mines provided 55.7 per cent of the 23,924,719,000 tons of freight which originated on railroads in the United States during the years 1916 to 1937, inclusive. More than half of the tonnage hauled by the railroads in every year during the period consisted of products of mines.

Comparison of the Interstate Commerce Commission figures for the United States with the Arizona tabulation made by the Department of Mineral Resources shows that mining is much more important to Arizona than it is to the nation as a whole. Over 86 per cent of the revenue freight tonnage originating on railroads in Arizona since statehood has been accounted for by mining products.

branch of the Magma Arizona railroad.

The Bowie to Globe line of the Arizona Eastern was built to serve the Old Dominion mine and the Miami and Inspiration properties lengthened it. The same railroad extended a branch south from Cochise to reach the Pearce mine and that line was run farther south to Gleeson where it connected with the El Paso and Southwestern branch. The latter was extended north from Douglas to serve the mines in that area and to shorten the distance to the Douglas smelter.

The history of the present "South Line" is a saga in western railroad building. In the year 1888, Dr. James Douglas brought a tractor from Wales to haul freight from Bisbee to Fairbank and return, replacing the 18 mule teams previously used.

Machinery and supplies were brought from the east and Pacific Coast points over the Southern Pacific to Benson, thence over the Santa Fe to Fairbank where they were unloaded and taken to Bisbee in the ore wagons which had transported copper bullion from the smelter at Bisbee to the railroad at Fairbank. A

very good road was constructed and the traction engine negotiated the steep grades with ease, but bogged down in sand and mud.

In 1899, the Arizona and Southwestern Railroad was constructed from Bisbee to Fairbank and Dr. Douglas said that the cost was reduced from \$7 to \$1 per ton.

Some years later, disagreements with the Santa Fe over rate structures caused the extension of the Arizona and Southwestern into Benson where it made direct connection with the Southern Pacific. By 1902 continued disagreements with the Southern Pacific and the Santa Fe caused Phelps Dodge to extend the railroad from Bisbee to El Paso and to Santa Rosa, New Mexico, where connection was made with the Rock Island. This road became the El Paso and Southwestern, and in 1912 it was extended from Fairbank to Tucson.

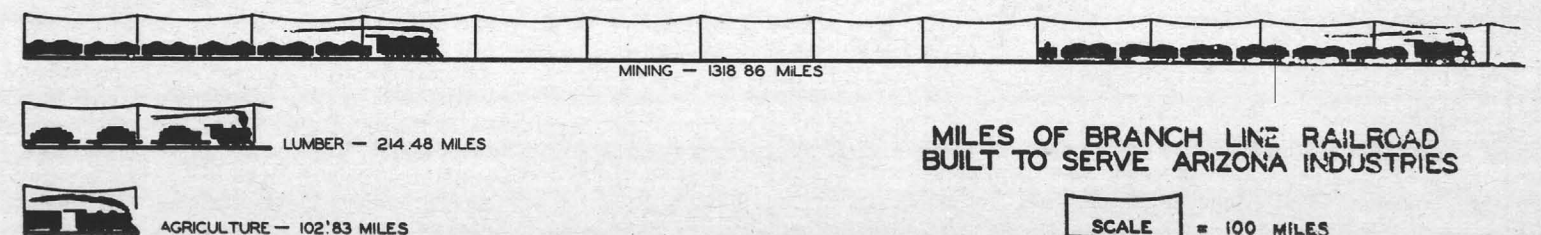
In 1922 negotiations began for extension of the El Paso and Southwestern from Tucson, through Phoenix, to Los Angeles. This resulted in the purchase of the E. P. & S. W. by the Southern Pacific, and the construction of the main line of the S. P. through Phoenix to Wellton and Yuma.

The Arizona and New Mexico was originally a narrow-gauge line from Lordsburg to Clifton with connections at Guthrie for Morenci and at Clifton for Metcalf. The gauge was broadened to standard as far as Clifton in 1900 and to Morenci in 1938. The road is now a part of the S. P.

The New Mexico and Arizona Railroad was a branch of the Santa Fe, built from Benson to Calabasas and Nogales, and south from Nogales to Guaymas. The original plan of the Santa Fe was to build from Deming to Benson, but the Southern Pacific leased the Benson-Guaymas line and eventually purchased it. The road from Calabasas to Flux has been abandoned, but the Southern Pacific still operates the line from Benson to Flux, serving the mines in that territory, and the track from Nogales to Guaymas is now the main line of the F. C. Sud Pacifico de Mexico.

The line from Tucson to Nogales is an extension of the old Tucson and Twin Buttes Railroad built by Milwaukee interests to connect their mine at Twin Buttes with the railroad at Tucson. The Southern Pacific purchased the property in 1910 and extended the line from Twin Buttes to Calabasas where it connected with the New Mexico and Arizona—and Southern Pacific trains operated into Nogales. This line is now the connection of F. C. Sud Pacifico de Mexico with the main line of the Southern Pacific.

In order to reach the Imperial Copper Company properties, the Arizona and Southern Railroad was built from Red Rock to Silver Bell; this line is now abandoned. The Mascot and Western Railroad





was built from Willcox to Dos Cabezas to serve the mines of the Central Copper Company. This line has also been abandoned and the area is served by trucks.

The 44-mile Tucson, Cornelia and Gila Bend Railroad was built shortly after statehood from Ajo to Gila Bend to serve the New Cornelia mine. This line has seen continuous service since its erection.

All of these branches, as well as a number of other spurs of less importance, were extended for the sole purpose of serving mines and 1,319 miles of track were laid in building them. The industry second in importance from a point of view of railroad branch lines built, lumbering, accounted for only 215 miles of track.

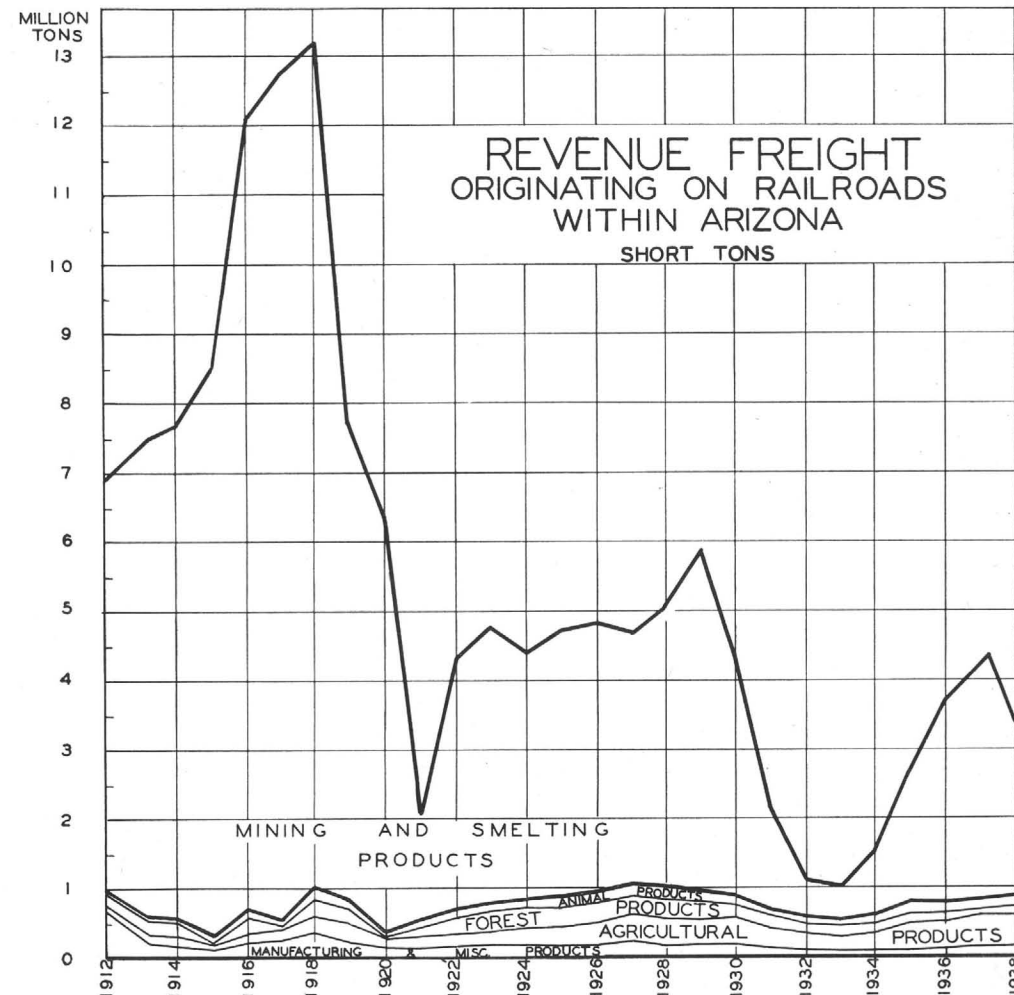
The most important line built to serve lumbering, the 72-mile Apache Railway Company branch from Holbrook to Cooley, opened the McNary district. Most of the other lumbering lines were built in Coconino County to haul the timber from operating sites to the Santa Fe for shipment to the lumber mills.

The only agricultural branches in the state are the Beardsley spur, and the branches from Tempe Junction to Maricopa, Tempe to Mesa, Pozo Junction to Casaba, and the line from Phoenix to Hasayampa. The latter, which was the longest farming branch, was built with a bonus and returned no dividends prior to the time it became part of the Southern Pacific main line through Phoenix.

Other branch lines in the state are the Grand Canyon Line of the Santa Fe from Williams to the canyon; the Santa Fe, Prescott and Phoenix Branch of the Santa Fe from Wickenburg to Phoenix, built by the Santa Fe primarily to transport agricultural products to the mining camps around Wickenburg and Prescott; and a short branch of the Southern Pacific from Lewis Springs to Ft. Huachuca to serve the army.

All together, 1,844 miles of branch line track have been laid in Arizona and the accompanying table shows that mining accounted for 71.5 per cent of the mileage. Lumber came second with 11.6 per cent and agriculture, third, with 5.6 per cent.

This track has by no means exclusively served the mines. It has played an important part in the development of the state, particularly in the early days when travel by horse and buggy was an adventure often accompanied by many hardships and not the commonplace automobile trip that it is today. The lines that were built to permit hauling of ores and metals to smelters and refineries also accommodated passenger trains and made many parts of the state readily accessible for the first time.



A different method of presenting the importance of mining to the state is illustrated by the accompanying chart of the revenue freight originating on railroads within Arizona. It shows that since statehood mining has accounted for 86.5 per cent of the revenue freight tonnage of state origin which would indicate that the mining branches are more heavily traveled than the others since they comprise only 71.5 per cent of the branch line track.

During the 27 years since statehood, the railroads have carried 127,632,635 tons of mining freight originating in the state and the importance of this is illustrated by the fact that the next in rank was agricultural products which accounted for only 7,037,711 tons of revenue freight or 4.77 per cent. Forest products were in third place with 3.29 per cent, followed by animal products, 2.26 per cent; manufacturing and miscellaneous, 2.01 per cent; and other sources, 1.17 per cent.

These figures are not restricted to the branch line tonnage, but include that orig-

inating on the main lines of the Southern Pacific and the Santa Fe as well as such lines as the Verde Tunnel and Smelter; Tucson, Cornelia and Gila Bend; Ray and Gila Valley; Magma Arizona; and the Phelps Dodge-operated Morenci lines. In 1938 the Southern Pacific carried 1,873,253 tons of freight from Arizona points and 1,376,987 tons or 73 per cent consisted of products of the mines.

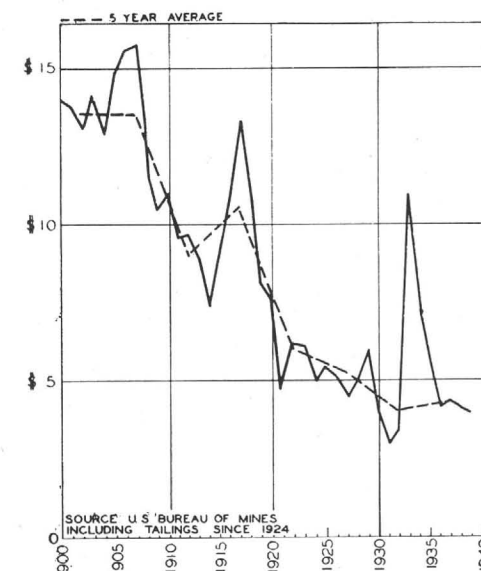
The influence that changes in economic conditions have upon the railroads is revealed by the fact that in 1917, the peak year, when the price of copper averaged 29 cents a pound, 12,576,982 tons of mining products were shipped from state points. In the depression year, 1933, when the price averaged 7 cents, only 458,043 tons were shipped.

In 1917 shipments of the products of the mines originating within the state accounted for 92.5 per cent of the total tonnage shipped (13,596,811). In 1933, the mines provided only 46.08 per cent of the 993,994-ton total.

Over one-fifth of the property values in the state consists of railroads holdings and the mines have played an important part in creating these values as is indicated by the Department of Mineral Resources survey showing they built practically all of the branch lines and have provided the great bulk of the freight originating in the state.

Although no figures are available, it is clearly evident that trucking is now an important means of transportation and the

CHART IV  
YIELD OF ARIZONA ORE PRODUCTION  
GOLD, SILVER, COPPER, LEAD, AND ZINC  
IN DOLLARS PER TON  
1900-1939



downward trend with but minor fluctuations from 1910 until the recent depression when it suddenly advanced to a peak of 128 pounds in 1933. From a standpoint of both value and quantity the yield advanced at that time for the value recovered per ton of ore moved upward to \$10.39 per ton, or the highest since 1918.

The reason for the advance is self-evident. The producers were able to work only deposits containing the highest metal content. The large low-grade open-pit mines ceased practically all operations for nothing but exceptionally high-grade ore could pay the costs of operation.

As prices recovered after 1933, the copper content of the ores was reduced until in 1937 an all-time low of 28.8 pounds of copper per ton was reached. The low yield in dollars per ton was in 1932, when prices were depressed, but before the producers ceased working their low-grade deposits. It was the experience of 1932 that caused the mining situation in following years.

Table III compares the value of Arizona's ore production with the tons of ore produced since 1900 and applies to ores of gold, silver, lead, and zinc as well as copper. It lists both the value of production and the per cent of the total value from 1900-1939 by five-year periods.

It will be observed in Table III that, from a standpoint of value, the peak period was during the five war years from 1915 to 1919 when 27.1 per cent of the value of the state's metal production during the past 40 years was recovered. However, only 17 per cent of the ore tonnage produced since 1900 was mined during that interval.

The high, as far as ore production is concerned, was from 1925 to 1929 when 26.4 per cent of the total tonnage was produced. Only 20.4 per cent of the total value of metal production was recovered during that period.

War Tonnage Being Mined

IT IS interesting to note that 74,269,411 tons of ore were produced from 1935 to 1939 or almost exactly the same as the recovery from 1915 to 1919 when 75,182,451 tons were mined. In other words, Arizona's production of ore during the past five years has been practically the same as during the five years that included the World War when the value of metal production established a record that has never been approached since.

To be sure, the value of recovery was only half as great in the 1935-1939 period when it amounted to only \$316,842,148 as compared with \$795,881,961 during the war due to a combination of a lower copper price and a reduced content of that metal in the ore. Copper output in pounds was about 30 per cent lower during the past five years than during the war.

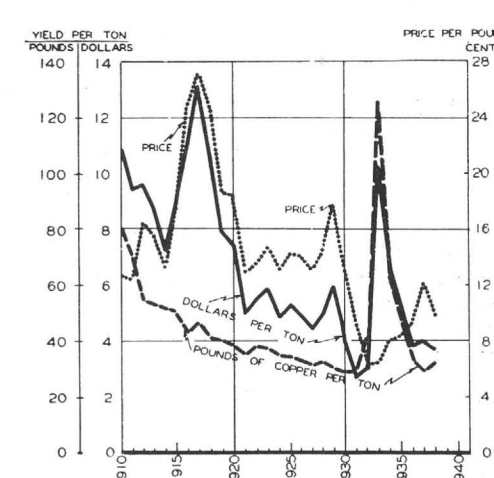
On the other hand, gold and silver production in the past five years was greater than in the war era due to the stimulus of higher prices of those metals. Gold output in ounces was up 36 per cent and silver 25 per cent, the production of both having reached new all-time peaks during the past five years. Lead output was also greater during the more recent period, its gain having been 10 per cent while the quantity of zinc production was 22 per cent lower.

It has been seen that the yield of Arizona's ore production has been dependent on two important factors. The first is price and the second is grade of ore. The increased prices of gold and silver brought sharp gains in the output of those metals in the past few years as compared with copper production.

As a whole, however, the yield of Arizona's ore production has followed a persistently declining trend with the exception of the depression years in 1932 and 1933 when the producers were forced to resort to selective mining. Advances in production technique and metallurgical processes have permitted the mining of a constantly lowering grade of ore in the past and it is only logical to expect that the future will see a continuation of this tendency.

Actually, the very future of mining in Arizona is dependent on the working of lower grade deposits for the days of bonanza ore bodies passed long ago. In order

CHART V  
YIELD OF ARIZONA COPPER ORES  
IN DOLLARS PER TON AND POUNDS OF COPPER PER TON COMPARED WITH AVERAGE PRICE OF COPPER



to mine profitably the low-grade ore, heavy capital investments are required so that the material may be handled on an enormously large scale and capital must be encouraged to invest in the state's mines if progress is to continue. The margin of profit today is narrow and the risks of capital investment are greater than ever.

The outstanding problems that faced the first mine operators and prospectors of the state were the opening up of the wilderness areas and bringing law and order and adequate transportation facilities. Today, these problems have disappeared, but they have been replaced by another which is even more sinister than Apaches on the warpath.

The tendency and threats to add great tax burdens and restrictions on the industry is checking progress — particularly among the small mines and prospects which are in development and exploration stages. Capital in large units must be attracted to aid in the opening and operation of the state's future mines, but it will not come if it cannot feel that it has an opportunity to earn a reasonable profit—assured that its presence is not to be a signal for heaping added burdens to the already top-heavy structure.—Reprinted from PAY DIRT for April 29, 1940.

TABLE III  
Value of Arizona Ore Production Compared With Tons of Ore Produced  
1900 - 1939\*

Period	Value Of Production	Per Cent of 1900-1939 Total	Tons of Ore Produced	Per Cent of 1900-1939 Total
1900-04	\$ 130,440,562	4.4	9,645,543	2.2
1905-09	236,485,743	8.1	17,557,174	4.1
1910-14	281,737,034	9.6	31,263,979	7.2
1915-19	795,881,961	21.1	75,182,451	17.4
1920-24	409,073,358	13.9	67,957,236	15.7
1925-29	597,275,260	20.4	113,991,479	26.4
1930-34	169,130,949	5.7	42,174,078	9.8
1935-39	316,842,148	10.8	74,269,411	17.2

1900-39 \$2,936,867,015 100.1 432,041,351 100.0  
\* 93.6 per cent of Arizona's ore production since 1877 occurred during the 40-year period 1900-1939.



The war probably played a prominent part in this development prior to 1920; since then the growth has been much less rapid. By 1930 the combined total amounted to 7,533,712 acres and in 1938 it was 8,792,896 acres.

As has been pointed out, the acreage of dry farming land has been declining and there is nothing to indicate that this trend will be reversed. The decrease has been partly due to the transfer of some dry farming lands into the irrigated classification as the different projects in the state have undergone expansion, and also to depressed farm prices. Under present conditions there is little, if any, profit in farming where an adequate supply of water is available, and even if prices should show an improvement there is little reason to expect a material increase in the number of acres of dry farm land under cultivation.

Some future growth of modest proportions in the grazing lands may be expected due to the activities of the United States Grazing Service under the authority of the Taylor Grazing Act. With prices and range conditions favorable, there could be an increase in both the quantity and value of livestock production.

The Grazing Service, under the authority of this act, is developing additional water for the ranges to permit a better distribution of cattle and increase grazing areas. Through a better control of production and by means of water development, a further increase in quantity and value of livestock production may be seen, but any gains that are made are expected to be relatively small.

The development of drinking water for the livestock on the ranges takes care of only one aspect of the water problem. The feed on the grazing lands of the state is dependent on rainfall and production is therefore limited by the precipitation.

In some years, of course, greater rainfall will create more abundant feed, but livestock production is not subject to sudden changes according to whether the rainfall is plentiful or scarce. It is dependent on a long cycle and therefore must be adjusted to conform with the lean rather than the rich periods.

#### Prospects for Future

Thus, with increases in the production of livestock on grazing lands likely to be of modest proportions if any gains are registered and with no progress in dry farming expected, it would appear that the one possibility for any material gain is by increasing the acreage of land under irri-

gation. There are many acres of land that are very fertile and on which excellent crops could be produced if water were available.

There is a possibility of a substantial increase in the irrigated land areas in the future by the development of a new system known as the Gila Valley Project. U.

## IMPORTANCE OF IRRIGATION AND FARMING IN ARIZONA & MARICOPA COUNTY

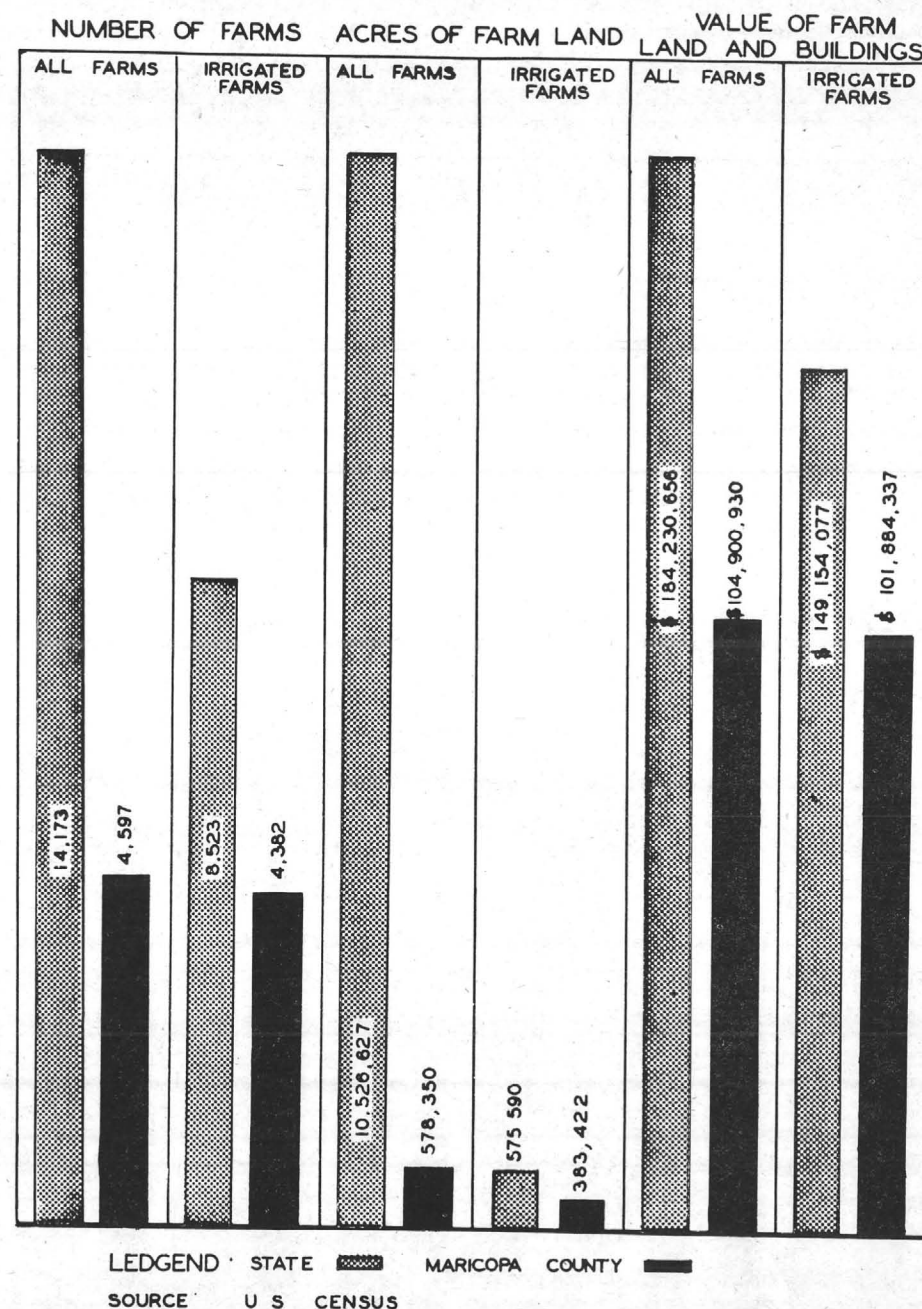


TABLE II  
RELATIVE IMPORTANCE OF FARMING TO THE PRINCIPAL AGRICULTURAL COUNTIES IN ARIZONA 1930

Classification	State	Maricopa	Yuma	Pinal	Graham	Pima
Number of Farms.....	14,173	4,597	773	1,008	749	757
Acres of Land in Farms.....	10,526,627	578,350	91,476	385,560	468,607	949,409
Value of Farm Land and Bldgs.....	\$184,230,856	\$104,900,930	\$14,968,981	\$13,698,912	\$8,012,090	\$7,740,995
Number of Irrigated Farms.....	8,523	4,382	697	523	579	261
Acres of Irrigated Farm Land.....	575,590	383,422	61,399	37,044	34,623	18,780
Value of Irrigated Farm Land and Bldgs.....	\$149,154,077	\$101,884,337	\$14,452,511	\$8,570,250	\$6,839,270	\$4,182,967
Investment in Irrigation Enterprises.....	\$73,328,197	\$47,812,637	\$10,458,342	\$9,522,328	\$856,777	\$2,152,665
Average Investment per acre of Area Enterprises were capable of supplying with water.....	\$88.97	\$95.86	\$123.95	\$90.57	\$18.46	\$67.78
Source: United States Census						

S. Reclamation engineers assert that from 600,000 acres of land upward to 1,000,000 acres could be irrigated by the Gila Valley Project and other contemplated irrigation systems.

It should be remembered, however, that this is an idea at present and is not a plan and therefore may be classified as possible but by no means probable. The idea provides for the irrigation of lands in the Gila Valley by using water from the Colorado River and by employing power from the same source to lift the water some 100 feet from the river.

Another idea which has been considered has been the transportation of water from the Colorado River to the Salt River Valley by an elaborate and expensive canal, but it has never been given serious consideration to date because of the large cost involved. Many problems and important factors will play a part in the utilization of water from the Colorado River.

The Colorado in recent years has become a political football and at the present time both Southern California and Mexico are seeking to establish rights to its water. Inasmuch as the surplus water in the river will only be available to Arizona until it is appropriated by some other

state, or Mexico, it would be extremely foolish to predict an increase in irrigation in Arizona using Colorado River water until a definite plan for its utilization, rather than an idea, is formulated. If Mexico appropriates it first for the development of land in Lower California, or if Southern California embarks on any new ambitious programs, such as the Metropolitan Aqueduct, there may be no water available for Arizona.

Thus, to be conservative, one could not predict that any material gains will be made in Arizona's agriculture and livestock industries in the future. The only possibility is through an increase in the area of irrigated lands which would be very expensive, and since no plan has yet been developed, there is no assurance that the water will be available when the spirit moves the powers that be to undertake the task.

Agriculture on the irrigated lands of Arizona will always be an important basic industry but the statistics show that it has

just about reached its peak economically. There is a limit to the capital expenditure that can be afforded to put water on to new land for, if the cost of the land and water development is too high, the available crops cannot make the land pay. The Arizona land possible of development with low water cost is already under cultivation and that which may be added in the future would probably prove more profitable if left alone.

The greatest agricultural development feasible in Arizona is a switch to the higher valued crops which are possible in the semi-tropical areas where water and other growing conditions can definitely be controlled. Even this, however, does not offer any materially greater agricultural future for Arizona than the state has had since the major irrigation projects have been completed. Farming on irrigated lands seems, according to the statistical evidence, definitely out as a foundation for development of the state beyond the present situation.—Reprinted from PAY DIRT for March 25, 1940.

## WHO OWNS ARIZONA?

Judging by curbside conversation we have some strange ideas about who owns Arizona. The largest landowner holds title to over three-fifths of the state, and he is an absentee landowner, managing his property in an arbitrary and bureaucratic manner, with little thought as to the benefit to the state in which the land lies. His address is Washington, D. C., and he is familiarly called "Uncle Sam."

The federal lands of Arizona total about 43,500,000 acres which includes 19,566,339 acres of Indian Reservations, 11,389,357 acres of national forests, 1,000,455 acres of national parks and monuments, 73,008 acres of military reservations, and 11,396,260 acres of public domain.

Then the state owns 10,685,500 acres or one-seventh of the area and all we have left to support it is 18,820,941 acres. In other words, only 25.8 per cent of the state consists of private lands which must support 74.2 per cent which contributes nothing. No wonder Arizona is having a hard time.

Even the 25.8 per cent has to be subdivided because a large part of that includes railroad grants which contribute but little to the running of a large state. Is it any wonder that we must intensively cultivate for maximum production the quarter of the state which must support the untaxed load of the other three-quarters? It takes more than average farms, mines, forests, and other productive facilities to carry the load and they must be given unhampered opportunity for maximum productiveness.

Here is the tabulation of who owns Arizona:

Type of Land	Acres	Per Cent of Total Area
U. S. Controlled Lands:		
Indian Reservations .....	19,566,339	26.8
National Forests .....	11,389,357	15.6
Public Domain .....	11,396,260	15.6
National Parks & Monuments.....	1,000,455	1.4
Military Reservations .....	73,008	0.1
Total U. S. Controlled Lands.....	43,425,419	59.5
State Owned Lands.....	10,685,500	14.7
Privately Owned Lands.....	18,820,941	25.8
Total .....	72,931,860	100.0

Reprinted from PAY DIRT for February 9, 1939

TABLE IV  
VALUE OF ARIZONA AGRICULTURAL, LIVESTOCK AND ANIMAL PRODUCTION 1909 - 1937

Year	Agricultural Crops	Livestock And Animal Products
1909.....	\$ 5,000,000	\$ 8,000,000
1910.....	7,000,000	9,000,000
1911.....	11,000,000	9,000,000
1912.....	10,000,000	10,000,000
1913.....	12,000,000	11,000,000
1914.....	11,000,000	11,000,000
1915.....	12,000,000	11,000,000
1916.....	21,000,000	13,000,000
1917.....	33,000,000	18,000,000
1918.....	47,000,000	22,000,000
1919.....	50,000,000	23,000,000
1920.....	44,000,000	21,000,000
1921.....	25,000,000	17,000,000
1922.....	30,000,000	16,000,000
1923.....	38,000,000	17,000,000
1924.....	35,000,000	21,000,000
1925.....	36,000,000	19,000,000
1926.....	32,000,000	21,000,000
1927.....	40,000,000	23,000,000
1928.....	49,000,000	23,000,000
1929.....	41,790,000	25,546,000
1930.....	29,152,000	23,499,000
1931.....	16,950,000	19,045,000
1932.....	13,791,000	14,692,000
1933.....	19,022,000	15,309,000
1934.....	24,450,000	14,982,000
1935.....	28,567,000	18,200,000
1936.....	30,779,000	22,500,000
1937.....	35,375,000	26,375,000
TOTAL	\$787,876,000	\$503,148,000

Source: Crop and Market Reports dated July, 1926 to December, 1937, issued by the U. S. Department of Agriculture.



# State Ore Output Shows Gain While Metal Content Drops

## Made Possible By Modern Methods and Large Capital Investment

THE outstanding feature of Arizona's metal output during the past 60 or 70 years has been a steady decline in the grade and value of ore mined together with an increasing trend in the quantity of production. In the early days, only bonanza deposits were susceptible to exploitation; today ores are mined which contain as little as 20 pounds of copper to the ton.

The fact that this progress has been made possible is the greatest tribute that could be paid to the technical men and capitalists who pioneered in mining and metallurgical fields. If this pioneering spirit is encouraged, it is inevitable that new methods of recovery in the future will permit the exploitation of mineral deposits which now have no commercial value. It is significant that over one-half of the copper production of the United States today comes from ore bodies considered absolutely worthless in 1900.

The most recent major development in the state is the one at Morenci where Phelps Dodge Corporation is preparing to work 230,000,000 tons of ore containing only 1.06 per cent copper and spending \$30,000,000 in necessary preparations. When the company first started work in Arizona in the eighties the ores it mined averaged better than 23 per cent copper.

The story of the progress of Arizona into front rank as a producer of non-ferrous metals has been one of pioneering on many fronts to overcome the great handicaps with which mining has been confronted. First, great risks were taken by the prospectors and early engineers who developed and mined ore deposits in the state in the hope that they would "strike it rich." Second, the extension of the transcontinental railroads across the state greatly facilitated mining activities. Third, and most important, the improvement of recovery methods and the use of large aggregations of capital have created mineral resources where none existed before.

History records the great hardships encountered by the early prospectors and explorers and their valiant struggles to overcome them—battles which were fought against adversity with the knowledge that if success were attained the rewards would be great. Those fights have been won and those hardships eliminated, and Arizona has moved into first place in the nation as a source of gold, silver, copper, lead, and zinc combined.

However, new problems have sprung up to supplant the old ones—problems which cannot be solved in the laboratory. The restrictions and burdens that have been placed on mining in the past few years have all but eliminated the inducement to

take the unavoidable financial risks involved in the development and operation of mines in the state, for if success is attained today that very success will be burdened so heavily that the goal is hardly worth the risk. Investment in Arizona's mines must be stimulated, not discouraged, if there is to be progress.

### Only Bonanza Ores Mined

IN THE early days of Arizona mining, economic factors and prices were not major considerations. Only bonanza ores found near the surface were mined and the problems were the same as those encountered throughout the west when new areas were first entered and settlement began. Those were the only days when resources were "natural."

Hostile Indians had to be subdued, transportation facilities had to be provided, and law and order had to be brought to the wilderness areas. For many years after Arizona became a territory of the United States none but the highest grade ores could be handled economically. Gold and silver were sought at first and copper attracted but little attention, prior to 1880, because it could not stand the costs of mining, transportation, converting to metallic form, and marketing.

The extensive equipment required for the treatment of copper ores and low-grade gold and silver ores had to be shipped to the site of operations by wagon from California or from La Junta, Colorado, and the ores and metals recovered had to return

over the same route. This condition alone prohibited the mining of any but the highest grade deposits prior to the coming of the railroads.

There was some mining of copper at Ajo as early as 1855, but copper accounted for only 7.5 per cent of Arizona's \$17,500,000 metal production prior to 1880. Gold provided 60 per cent and silver 32.5 per cent. It was not until 1888 that copper became the most important metal produced and it has become increasingly important ever since.

Modern methods of reduction were unknown in the eighties. Electricity for power and lighting was not available and the first smelter constructed at Clifton was a crude 1-ton copper furnace which used charcoal burned from mesquite. Power was derived from water wheels on the San Francisco River.

It was in the Clifton-Morenci district and at Bisbee that attention was first attracted to the state's great potentialities as a source of copper. Since 1877 that metal has accounted for 85 per cent of the state's total metal production of well over three billions of dollars.

A tremendous impetus was given to the production of copper, as well as that of the other metals, by the completion of the two transcontinental railroads in 1882. From that time until the end of the World War, production grew by leaps and bounds, particularly as the great porphyry deposits were opened after 1900.

The first experimentation in the recovery of copper from porphyry deposits was done in 1899 by Daniel C. Jackling at the property of the Utah Copper Company and production began there in 1905. Shortly thereafter production at the Arizona por-

valley also attempted to harness the Salt River, and, although they were able to develop a fairly substantial agricultural industry, flood waters regularly washed out the crude dams which were inadequate and were capable of serving only a limited acreage.

The development of the Salt River Project and the construction of the Roosevelt Dam overcame these difficulties and gave a tremendous impetus to agriculture within the state. The Roosevelt Dam was the first and most important dam in the system, but others were later built which

have increased the storage capacity about 41 per cent, although their primary purpose has been to provide hydro-electric power. At present the Salt River Project provides water for 240,000 acres of highly developed farm land and furnishes a partial irrigation supply for 95,000 acres of non-project land.

This project is the outstanding irrigation system in the state and one of the most successful in the country. It has earned an enviable reputation because it was soundly financed and is paying off its debt regularly. Its success has been largely

due to the sale of hydro-electric power, a substantial amount of which goes to the mines. Power sales to this outlet in 1938 amounted to 22.2 per cent of the total sales made by the system.

Other irrigation systems have also been developed in the state and substantial land areas are irrigated in Yuma, Pinal, Graham, and Pima Counties, but two-thirds of the irrigated lands in Arizona in 1930 were in Maricopa County, where the Salt River Project is located.

On the other hand, only 5.5 per cent of the total amount of land in farms was situated in Maricopa County that year. Pima County had 949,409 acres of farm land in 1930 or 64 per cent more than Maricopa, but it had only one-twentieth as many acres of irrigated land which accounts for the fact that the value of farm lands in Maricopa County was 13 times higher. (See Table II)

Because of the large acreage of irrigated land in Maricopa County, it holds a dominating position in relation to the state's agriculture despite the fact that it contains only 5.5 per cent of the total area of farm land. The value of farm land and buildings in Maricopa County amounted to \$104,900,930 in 1930 or 57 per cent of the value of all farm property and buildings in the state.

The value of irrigated farm land and buildings in the state as a whole in 1930 was reported at \$157,290,710 or 65 per cent of the value of all farm lands and buildings. The inescapable conclusion from these figures is that the state's agriculture is primarily dependent upon irrigation and that any material progress in the future will require the development of additional sources of water.

A tabulation of various types of lands in the state made by the Arizona Department of Mineral Resources and gathered from the State Tax Commission gives an interesting picture of the development of the different types of state lands since the last census report in 1930. The tax commission figures reported 505,624 acres of land under irrigation in 1938, a gain of 11 per cent since 1930. (See Table III)

### Dry Farming & Grazing

The same source gives a breakdown of the dry farming and grazing lands in the state since 1927 at which time there were 1,760,767 acres of dry farming lands and 5,068,946 acres of grazing land. Since that time, there has been a material decrease in dry farming land acreage. In 1930, there were 1,392,506 acres in this category and in 1938 there were 1,074,803 acres.

On the other hand, the area of grazing lands has increased. In 1927 there were 5,068,946 acres of grazing land; in 1930 there were 6,141,206 acres; and in 1938 there were 7,718,073 acres.

Prior to 1927 the tax commission did not segregate dry farming and grazing lands and only the combined figures are available. The combined figures showed an amazing growth in the two types of land between 1916 and 1920. In the earlier year, there were 1,948,425 acres of dry farming and grazing land and in 1920 there were 5,016,933 acres.

ACRES OF IRRIGATED, DRY FARMING AND GRAZING LANDS IN ARIZONA 1916-19

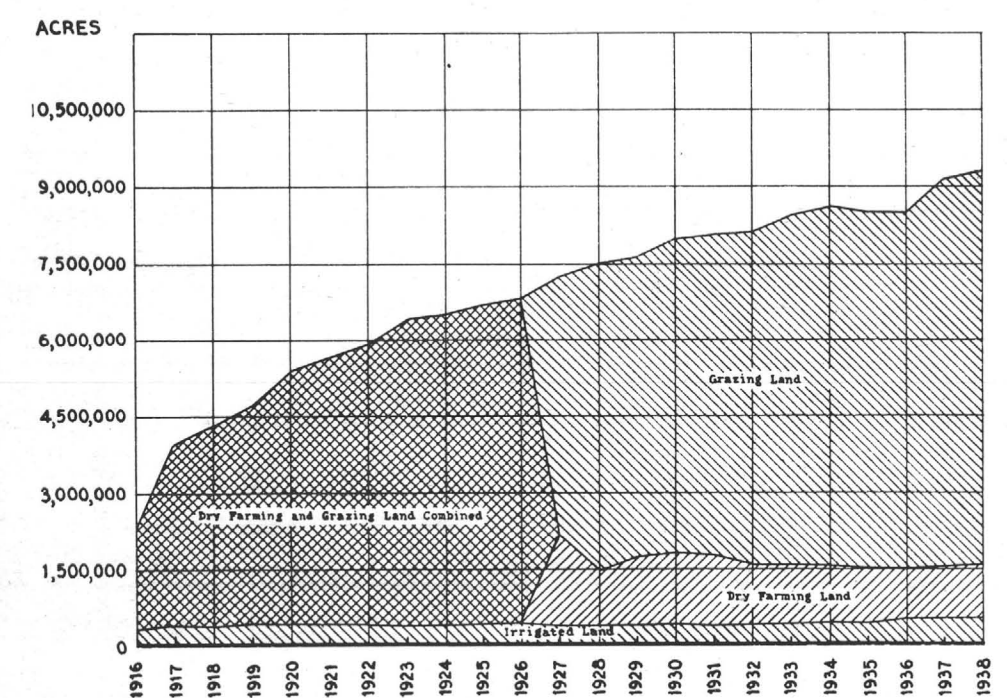
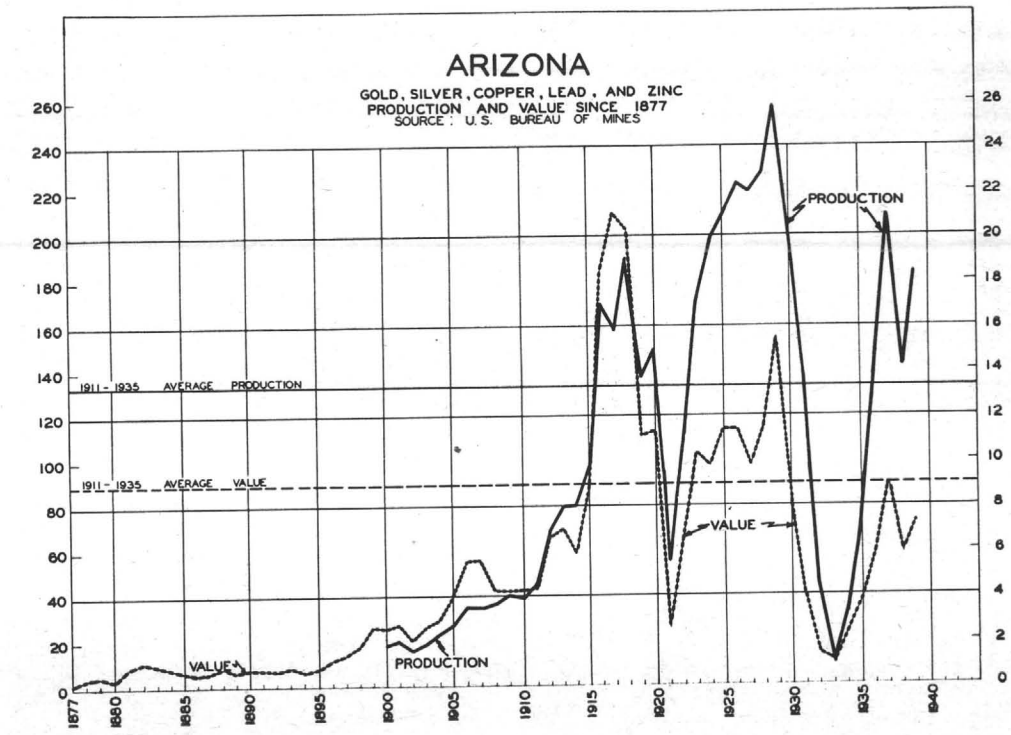


TABLE III  
ACRES OF IRRIGATED, DRY FARMING AND GRAZING LANDS IN ARIZONA 1916-1938

Year	Dry Farming & Grazing Combined 1916-1926*		Dry Farming 1927-1938		Grazing 1927-1938	
	Irrigated	Acres	Acres	Acres	Acres	Acres
1916	364,227	1,948,425	.....	.....	.....	.....
1917	437,026	3,524,766	.....	.....	.....	.....
1918	424,600	3,899,131	.....	.....	.....	.....
1919	466,027	4,247,353	.....	.....	.....	.....
1920	462,565	5,016,933	.....	.....	.....	.....
1921	453,114	5,199,556	.....	.....	.....	.....
1922	448,091	5,456,613	.....	.....	.....	.....
1923	446,935	5,994,549	.....	.....	.....	.....
1924	446,983	6,080,774	.....	.....	.....	.....
1925	458,208	6,255,393	.....	.....	.....	.....
1926	461,086	6,356,146	.....	.....	.....	.....
1927	.....	436,299	1,760,767	5,068,946	.....	.....
1928	.....	440,771	1,097,419	5,964,996	.....	.....
1929	.....	442,993	1,309,715	5,891,269	.....	.....
1930	.....	454,835	1,392,506	6,141,206	.....	.....
1931	.....	446,615	1,353,453	6,280,239	.....	.....
1932	.....	448,014	1,139,977	6,555,130	.....	.....
1933	.....	452,644	1,138,980	6,875,928	.....	.....
1934	.....	484,023	1,095,789	7,030,390	.....	.....
1935	.....	464,473	1,091,051	6,966,760	.....	.....
1936	.....	506,315	1,012,916	6,990,479	.....	.....
1937	.....	501,895	1,057,482	7,586,338	.....	.....
1938	.....	505,624	1,074,803	7,718,073	.....	.....

\* Prior to 1927 no separate classification.

CHART I





Importance Of Farming To State

Lack Of Water Will Restrict Growth In Future

IRRIGATED LANDS MOST VALUABLE

Future gains in Arizona's agriculture and livestock industries will be relatively small and unimportant unless there is a further development of irrigated land in the state, a recent survey by the Arizona Department of Mineral Resources indicates. The department is studying the principal industries in the state in order to determine their possibilities for future expansion and probable contributions to the state's welfare.

The survey shows that the exploitation of dry farming and grazing lands will not make any gains of consequence because production in such areas is limited by the amount of water available. Future gains in farming depend primarily on efforts to make supplies of water available by artificial means and although the irrigation of additional areas is a possibility, it is by no means probable due to the complicating factors and the cost involved.

Statistics on agriculture and livestock production in Arizona present an interesting picture of the development of farming and stock raising within the state and show that certain definite factors and changing conditions have accounted for their past growth and provide a clue as to future possibilities.

Growth of Farming

Farming in the state has registered a remarkable growth since early territorial days. At the time of the 1930 census there were 45 times as many persons in the state as there were in 1870, seven years after Arizona became a territory of the United States. However, there were 82 times as many farms, 483 times as many acres of farm land under cultivation, and the value of farm land and buildings was 1,427 times greater than it was in 1870.

One of the most illuminating points brought out by the survey is that the principal farming gains from a production and value standpoint were made prior to 1920. Although the acreage of farm land has nearly doubled since that time, the increase in the total value of land and buildings since then has been slight and there has actually been a decline in the combined

value of agricultural and livestock production.

Between 1910 and 1920 the area of farm land under cultivation increased 366 per cent to 5,802,126 acres and the value of farm land and buildings registered a 265 per cent gain to \$172,325,321. During the following decade, the area of farm land increased 81 per cent to 10,526,627 acres while the value of land and buildings advanced only 7 per cent to \$184,230,656.

Production of agricultural crops and livestock and animal products made good progress during the decade after 1910 according to crop and market reports of the United States Department of Agriculture. The all-time high was established in 1919 when their combined value was \$73,000,000, a gain of 356 per cent from 1910 (See Table IV). The next highest year was in 1928 when a figure of \$72,000,000 was reported and in no subsequent year has that amount been approached.

In 1937, when the output of livestock and animal products reached a new high at \$26,375,000 and when agricultural crop production at \$37,375,000 was the best since 1929, the combined value was \$61,375,000. This was about two-thirds as great as the state's \$94,564,494 mineral

production in the same year indicating that agriculture and livestock production together rank among the state's outstanding industries although they, like mining, have registered no growth in the past 20 years.

Irrigated Lands

Agricultural and livestock production are primarily dependent upon water, and, in Arizona where the climate is extremely dry, water is the fundamental asset. Because of the arid conditions in the state, the great bulk of its crop production is in irrigated areas. There is a large acreage of dry farming land, but the crops produced in such areas are considerably less important.

The contribution of irrigation to Arizona farming is shown by 1930 census figures which valued the 575,590 acres of irrigated land (exclusive of buildings) at \$131,238,561 as compared with a value of \$160,853,773 for the entire 10,526,627 acres of farm land in the state. In other words, irrigated land had an average value of \$228.01 per acre which compares with an average of \$15.28 for all farm land and \$2.98 for farm land not irrigated.

Irrigation was known in the state long before the first white settlers arrived. The Indians employed it in producing crops in the Salt River Valley although many hardships were encountered in controlling the river waters. The white pioneers in the

phyries began with Morenci leading off in 1907, followed by Miami in 1910, Ray in 1911, Inspiration in 1915, Ajo in 1917, and the Copper Queen in 1923. Morenci will again be back in the picture in 1942.

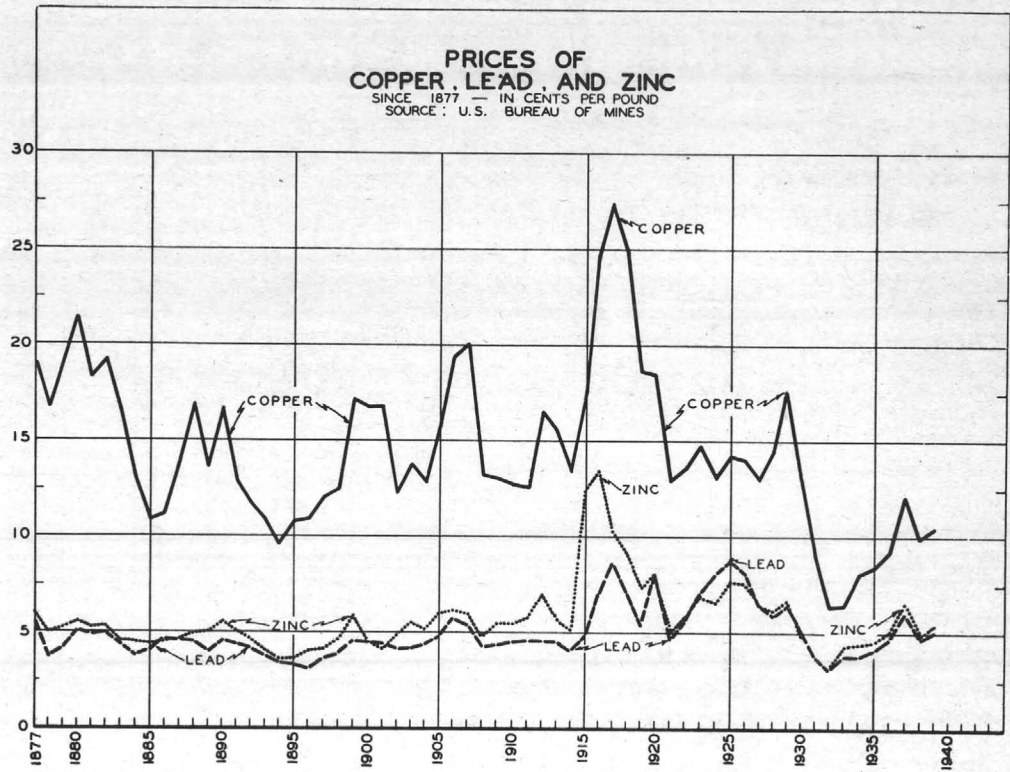
Production Increased Steadily

CHART I clearly shows that Arizona's production of gold, silver, copper, lead, and zinc, increased steadily with no major setbacks until the end of the World War. This chart records the value of production since 1877 and compares it with the tons of ore produced since 1910. Tonnage records are not available prior to that year.

It will be noted that fluctuations in the value of the output before the war were due primarily to changes in price. The survey shows that production of ore in tons climbed steadily with only minor setbacks from 1900 to the wartime peak in 1918.

During the pre-war period, the quantity of production was dependent primarily on technical developments which permitted the operation of additional mines. The first major stimulus, as already pointed out, was the completion of the railroads in the early eighties. That was followed by the introduction of the cyanide process of gold recovery in 1895, the inauguration of production at the low-grade porphyries in 1907, and the development of the flotation process which was first used in Arizona in 1915. Price was of much less im-

CHART II



portance prior to the war than it has been since.

Although prices of the major metals were considerably lower in 1914 than in 1906, with copper off 31 per cent at 13.3 cents a pound, silver 18.7 per cent lower at 55.3 cents an ounce, lead down 28 per cent at 3.9 cents a pound, zinc 16.4 per cent cheaper at 5.1 cents a pound, and gold unchanged at \$20.67 an ounce, production was more than double. In 1914 production of ores was 123 per cent greater than in 1906, and, despite falling prices, the value of production gained 5.5 per cent.

Price Becomes Major Factor

After the World War, economic considerations and price became major factors in the state's mining activity. The productive facilities of the nation had been developed sufficiently to meet the industrial demand which had increased sharply with the development of the electrical industry and the growth of automobile production and other industries.

Furthermore, competition from other metals developed on a large scale and the demand, instead of being practically unlimited, developed an acute sensitivity to variations in the price. Thus mining activity is now regulated by national or world economic conditions. Reference to Chart II shows the downward course that the prices of copper, lead, and zinc have followed during the past 20 years.

The silver price, Chart III, followed a similar pattern until legislation in 1932 permitted a recovery. The price of gold was unchanged until 1933 when the treasury buying price was advanced, reaching \$35 an ounce in 1934.

Whereas, production continued upward, despite price fluctuations prior to the war, it became extremely sensitive to changes during the post-war period and moved upward only in periods of relative national prosperity, such as seen in the years leading up to 1929 and in 1937. The sharp drops in prices in 1921 and in the early thirties left no alternative but to curtail output.

However, technological developments during the period brought with them a reduction in costs that was able to keep reasonable pace with the general downward price trend. The production of ore continued upward to the 1929 peak and was considerably higher in 1937 than in 1918. The price of copper during 1918 averaged 24.7 cents a pound against 17.6 cents a pound in 1929 and 12.1 cents in 1937.

Lower Grade Ores Handled

ONE of the most interesting features of the state's mining history has been the decline in the grade of ore recovered and which resulted from technical developments in the mining and beneficiation of ores, permitting the successful treatment of material of a lower grade. This has continued with but minor interruptions since mining was first undertaken in the state.

Table I shows that the average value of the ores of gold, silver, copper, lead, and zinc mined in Arizona in 1900 was \$13.97 per ton. In 1939 they had an average value of \$3.92 a ton, the low of \$2.97 having been established in 1931. The high was reached in 1907 with a figure of \$15.75. This downward trend is graphically portrayed by Chart IV.

VALUE OF ARIZONA AGRICULTURAL AND LIVESTOCK PRODUCTION SINCE 1909

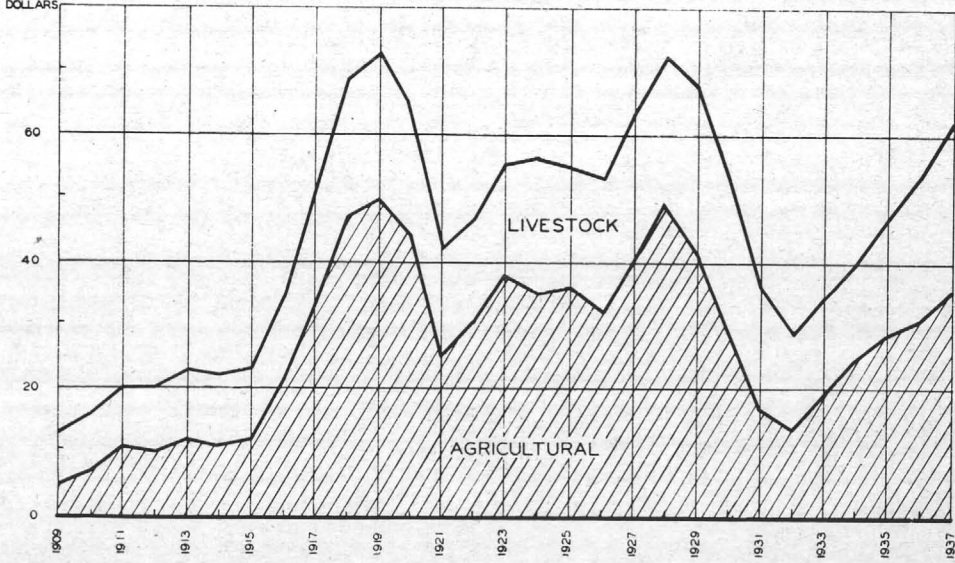


TABLE I GROWTH OF FARMING IN ARIZONA

	1870	1880	1890	1900	1910	1920	1930	Percent Growth 1910 - 1930
Population of State .....	9,685	40,440	88,243	122,931	204,354	334,162	435,573	113
Number of Farms .....	172	767	1,426	5,809	9,227	9,975	14,173	54
Acres of Farm Land.....	21,807	135,573	1,297,033	1,935,327	1,246,613	5,802,126	10,526,627	743
Value of Farm Land and Buildings .....	\$129,072	\$1,127,946	\$7,222,230	\$13,682,960	\$47,285,310	\$172,325,321	\$184,230,656	289
Number of Irrigated Farms .....			1,075	2,981	4,841	6,605	8,523	76
Acres of Irrigated Land....			65,821	185,396	320,051	467,565	575,590	80
Investment in Irrigated Enterprises .....			\$465,000	\$4,438,352	\$17,677,966	\$33,498,094	\$73,328,197	315

Source: United States Census Reports

TABLE I Yield of Arizona's Production of Gold, Silver, Copper, Lead, and Zinc in Dollars per Ton of Ore Produced.

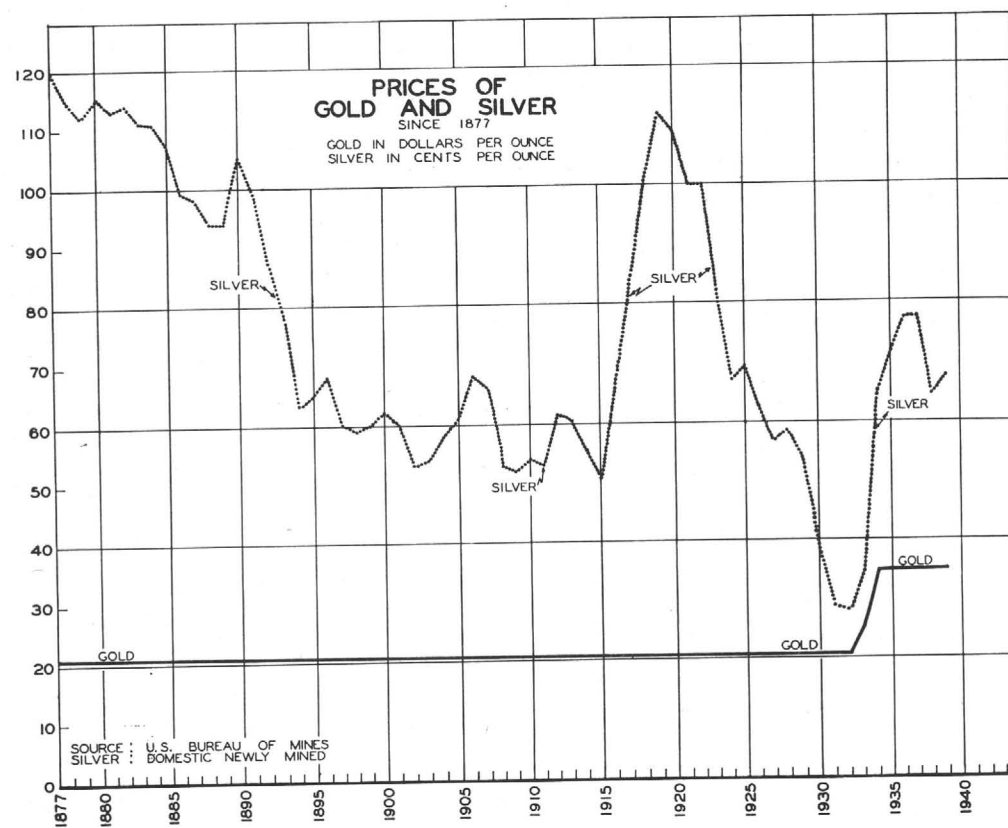
Year	Value	Year	Value
1900	\$13.97	1920	\$ 7.62
1901	13.67	1921	4.79
1902	13.04	1922	6.21
1903	14.15	1923	6.11
1904	12.84	1924	4.97
1905	14.88	1925	5.46
1906	15.55	1926	5.11
1907	15.75	1927	4.47
1908	11.47	1928	5.01
1909	10.48	1929	6.02
1910	10.98	1930	4.02
1911	9.56	1931	2.97
1912	9.67	1932	3.33
1913	8.84	1933	10.91
1914	7.34	1934	7.12
1915	8.95	1935	5.49
1916	10.81	1936	4.20
1917	13.35	1937	4.33
1918	10.69	1938	4.11
1919	8.12	1939	3.92

Average Yield by Five-Year Periods

Period	Value
1900-04	\$13.52
1905-09	13.47
1910-14	9.01
1915-19	10.59
1920-24	6.01
1925-29	5.24
1930-34	4.01
1935-39	4.27



CHART III



The increase in grade since 1931 has been due to two factors. First, the mining of higher grade ores in order to compensate for a lower price, and, second, the advance in the prices of gold and silver. Gold was worth \$35 an ounce in 1939 against \$20.67 in 1931, and silver was 67.8 cents an ounce as compared with 29 cents.

It will be noted in Table I and Chart IV that the yield per ton advanced sharply during the World War period attaining a peak of \$13.35 in 1917 which was almost up to the level in 1900. This gain was due to increased prices for it will be shown that mining of ores containing a greater metal content was not attempted at that time.

The price of copper averaged 27.3 cents a pound in 1917 compared to 16.6 cents a pound in 1900. Silver was worth 82.4 cents an ounce against 62 cents; lead sold for 8.6 cents a pound against 4.4 cents; zinc brought an average of 10.2 cents against 4.4 cents; and gold was, of course, unchanged. Higher prices also played a prominent part in the advance to the 1907 peak yield, as can be observed by referring to the charts.

#### Prices Reach Lowest Point

However, different circumstances were responsible for the increase in yield in 1933 when a figure of \$10.91 was attained for the yield of Arizona's production of major metals. During 1932 and 1933 the prices of copper and silver reached the lowest ebb encountered since metal production began to play an important part in the state's economy and the quotations for

show the effect of price on the yield, both in quantity and value of recovery.

It will be seen that all three curves on Chart V follow a general downward trend, the copper content of the ores declining in response to a lowering grade of ore mined and the value of the ores falling in response to reduced prices as well as lower metal content. However, there were two periods when the curves failed to follow the same general pattern.

The first was during the war when the price and yield in dollars per ton advanced sharply at a time when there was no gain to speak of in the copper content of the ores. The second was in the depression years of the early thirties when the yield of Arizona's copper ores from a standpoint of both value per ton and metal content recorded marked gains despite a falling price.

AT THE time of the war in 1917, the yield of Arizona's copper ores in dollars per ton advanced to a peak of \$13.13 as compared with \$7.26 in 1914 while the recovery in pounds of copper continued downward and was only 46.6 pounds in 1917 against 52.1 pounds in 1914. The increase in price during the war was the reason for the gain in the value per ton of the copper ores produced at a time when the copper content of the ores was following the general downward trend.

The yield of copper ores from a standpoint of copper content followed a steady

lead and zinc sank to depths not seen since the turn of the century.

At first glance, one would think that the low prices would have held the yield down, and in one sense they did, the gains having been made despite a weak price structure. However, when viewed from another standpoint it will be seen that the low prices actually caused the sharp increase—an advance made necessary because quotations had fallen to such a low level that it was inadvisable to operate any of the large, low-grade ore bodies, particularly in view of the great surplus that had accumulated, and mining of only the highest grade deposits was undertaken.

In 1933 the average metal content of the copper ores mined was 128 pounds of copper, 0.05 ounce of gold, and 2.3 ounces of silver. In 1931, on the other hand, the average metal content was 29.4 pounds of copper, 0.006 ounce of gold, and 0.2 ounce of silver.

Table II and Chart V both show this situation quite clearly. These were prepared to show the yield in Arizona copper ores since 1910 and, inasmuch as copper has dominated the state's metal production, they present a picture closely following the pattern in Table I and Chart IV which include the production of gold, silver, lead, and zinc as well.

In Table II and Chart V it is possible to show the production both in value and quantity since the ores were mined for their copper content and it will be observed that the yield is shown in dollar value per ton of ore mined and in pounds of copper recovered per ton. Yearly average prices have also been plotted on the chart to

**TABLE II**  
Yield of Arizona Copper Ores in Dollars and in Pounds of Copper Per Ton of Ore Produced 1910-1938

Year	Dollars Per Ton	Pounds of Copper Per Ton
1910	\$10.93	81.4
1911	9.44	71.4
1912	9.60	55.6
1913	8.74	53.7
1914	7.26	52.1
1915	9.20	50.3
1916	11.08	43.6
1917	13.13	46.6
1918	10.52	40.9
1919	7.92	40.2
1920	7.45	38.4
1921	4.93	35.6
1922	5.55	38.2
1923	5.86	37.5
1924	4.86	34.7
1925	5.24	34.4
1926	4.91	32.8
1927	4.42	31.4
1928	4.95	32.4
1929	5.96	32.1
1930	4.03	29.2
1931	2.86	29.4
1932	2.85	42.0
1933	10.39	127.9
1934	6.71	62.4
1935	5.02	46.0
1936	3.83	32.7
1937	4.04	28.8
1938	3.73	32.1

mines have provided a large amount of business for them. Not only do the trucks haul a large amount of material from the mines, but they take many of the products that they consume to them. Particularly is this true of farm products which are shipped from the agricultural areas of the state to the mines.

Only 4.77 per cent of the revenue freight tonnage originating on railroads in Arizona since statehood has consisted of agricultural products which points to the fact that large quantities of farm products are shipped to the mines over the highways. A similar condition prevails with animal products which have accounted for only 2.26 per cent.

The effects of mining in Arizona are far reaching and its influence is felt by all other industries in the state. The importance of the mines to the railroads is only one phase of the picture for the economic structure of the whole commonwealth has been built around the mines which were responsible for the development of much of the state.

A study of the lines of communication

Industries Served by Branch Line Railroads Built in Arizona		
Industry Served	No. Miles Track	Percentage of Total
Mining	1,318.86	71.5
Lumbering	214.48	11.6
Agriculture	102.83	5.6
Tourists (Grand Canyon Line)	63.79	3.5
To Connect with S. P. of Mexico	65.18	3.5
To Reach Govt. Fort	14.30	0.8
Miscellaneous	64.60	3.5
<b>TOTAL</b>	<b>1,844.04</b>	<b>100.0</b>

such as the telegraph and telephone lines would present a similar picture for the early lines in the state were constructed by private companies and by the railroads when they laid their tracks.

Transportation plays an important part in the development of any commonwealth but something must first be created which makes possible the construction of the transportation systems. In Arizona it was the mines which made possible extensive railroad development, and the figures show that they still contribute most heavily to the railroad revenues.

When the mines are prosperous, with fair metal prices and markets for that

which they produce, they not alone create employment at the mining camps but they call for large numbers of railroad men to assist in the moving of their products from the mines to the smelters and from the smelters to the east. Likewise, when metal prices are low and the markets will not absorb the quantities of metals that can be produced, there is a depression in Arizona, not only at the mines but among the railroads and railroad employees, farmers, business men, and others who serve and feed those who work in the mines. The welfare of each group depends upon all the others.—Reprinted from PAY DIRT for January 29, 1940.

## Arizona Mines Employ One-Fifth the Labor But Pay One-Third State Taxes

The Arizona mining industry, which accounts for one-fifth of those reported as gainfully employed by the Arizona Unemployment Compensation Commission, pays over one-fourth of the state's ad valorem taxes and contributes over one-third the total collected in sales taxes. This was revealed in a report recently compiled by the Arizona Copper Tariff Board for presentation to Congress in connection with an appeal for continuation of the copper excise tax.

The five large copper mining companies alone pay more in state and county taxes than all those owning city lots, homes, office buildings, hotels, business houses, and other city improvements in the entire state put together. They likewise pay more, according to the report, than all the farms and public utilities combined and 10 times as much as is paid on all livestock, which is still rated as an important industry.

The analysis, which is based upon Arizona Tax Commission statements, shows that the producing mines pay directly 23.29 per cent of the property taxes of the state at the present time. Besides this, they contribute much more indirectly into the state coffers in taxes which they pay on city lots and improvements, railroads, lands, utilities, motor vehicles, stocks of merchandise, etc., which are necessary adjuncts to mining activity.

Incidentally, over 71 per cent of the taxes paid in Greenlee County come from a single mine and a similar amount, 71.5 per cent, of those paid in Gila County come from two mines. Pinal gets 39 per cent of its taxes from two mines, Cochise 40.8 per cent from two mines, while Yavapai gets 38.3 per cent from one large mine and populous Pima finds one mine paying over 30 per cent of its total tax load.

**EXPENDITURES OF FIVE PRINCIPAL ARIZONA COPPER MINING COMPANIES**

	1929	1932	1936	1938
<b>In Arizona</b>				
Wages and Salaries	\$ 26,699,000	\$ 5,859,000	\$10,236,000	\$12,938,000
Supplies and Equipment	3,838,000	687,000	2,304,000	2,599,000
Taxes (State and County)	4,695,000	2,953,000	2,669,000	2,827,000
Freight — Intrastate	2,173,000	412,000	1,291,000	1,362,000
Hydro-Electric Power				290,000
Miscellaneous	2,837,000	718,000	1,956,000	1,574,000
<b>TOTAL</b>	<b>\$ 40,242,000</b>	<b>\$10,629,000</b>	<b>\$18,456,000</b>	<b>\$21,590,000</b>
<b>Out of Arizona</b>				
Wages and Salaries	\$ 150,000	\$ 124,000	\$ 116,000	\$ 202,000
Supplies and Equipment	14,309,000	1,299,000	5,509,000	6,016,000
Taxes (Federal)	2,550,000	3,000	1,579,000	1,567,000
Freight (Interstate)	10,225,000	1,343,000	3,611,000	3,331,000
Refining, Selling	6,870,000	1,232,000	2,875,000	3,330,000
Miscellaneous	5,894,000	3,485,000 credit	3,928,000	3,678,000
Dividends	29,750,000	650,000	8,146,000	5,683,000
<b>TOTAL</b>	<b>\$ 69,748,000</b>	<b>\$ 1,166,000</b>	<b>\$25,764,000</b>	<b>\$23,807,000</b>
<b>GRAND TOTAL</b>	<b>\$109,990,000</b>	<b>\$11,795,000</b>	<b>\$44,220,000</b>	<b>\$45,397,000</b>