

LEAD AND ZINC INDUSTRY

STATISTICS FOR 1969 COMPARED WITH OTHER YEARS  
FOR ARIZONA, THE UNITED STATES, AND THE WORLD.

ARIZONA DEPARTMENT OF MINERAL RESOURCES

Fairgrounds

Phoenix, Arizona

JOHN H. JETT,  
Acting Director

LESTER R. BROWN, JR.,  
Statistical Consultant

DECEMBER, 1970

# CONTENTS

	<u>Pages</u>
Part I      Lead Industry	1-15
Part II     Zinc Industry	16-28
Part III    Arizona - Lead and Zinc	29-31

## PART I

### LEAD INDUSTRY

	<u>Page</u>
Lead: Physical Properties	1
Metal Duties on Lead, in effect January 1, 1970	2
Review of the Lead Industry - 1969	3-8
Graph, "A 50-Year Lead Production Comparison"	4
Salient U.S. Lead Statistics for 1968 and 1969 Arizona, The United States and World Mine Production of Recoverable Lead	TABLE I      9
U.S. and Arizona Mine Production of Recoverable Lead. Tons, Value and Prices by Years 1947-1969	TABLE II     10
Mine Production of Recoverable Lead in the United States, by States	TABLE III    11
World Mine Production of Lead (Content of Ore), by Countries	TABLE IV     12
Lead Imported into and Exported from the United States	TABLE V      13
Consumption of Lead in United States	TABLE VI     13
U.S. Lead Consumption, Years 1967, 1968 and 1969	TABLE VII    14
Imports and Exports of Lead into and from the United States, Years 1967, 1968 and 1969	TABLE VIII   15

## LEAD

### PHYSICAL PROPERTIES \*

Lead is one of the most important industrial nonferrous metals used in substantial quantities in the metallic form; it is also important for the properties it imparts to its alloys.

Lead is the softest and heaviest of the common metals. Although lead is very malleable and can be rolled into foil of less than 0.0005 inches in thickness, it cannot be drawn into fine wire. Alloying is the only method of hardening lead.

Some of the physical properties of lead are as follows:

Symbol - Pb. Atomic Weight - 207.21. Spec. Gravity - 11.34

Melting Point - 327.35°C (621.2°F). Boiling Point 1,740°C (3,164°F)

Specific Resistance (20°-40°C) (68°-104°F) - Microhm 20.65

Hardness (Mohs' scale) - 1.5. Tensile Strength #/sq. in. - 3,000

Crystal Structure - Face-centered Cubic Valences - +4 & +2

\* U.S. Bureau of Mines "MATERIALS SURVEY" - September, 1952

METAL DUTIES ON LEAD\*

As of December 31, 1969

According to the Tariff Classification Act of 1962, Amended.

Published in American Bureau of Metal Statistics Yearbook, 1969 page 147

As follows:

Lead:

Lead-bearing ores and other lead-bearing materials, dutiable lead content . . . . .	0.75¢ lb.
Lead dross, dutiable lead content . . . . .	1.0625¢ lb.
Lead bullion, lead waste and scrap on 99.6% of lead content . . . . .	1.0625¢ lb.
Refined lead in unwrought forms, Babbitt metal and solder, type metal and antimonial lead, lead content . . . . .	1.0625¢ lb.
Lead pipe, sheets, glaziers' lead and lead wire . . . . .	1.3125¢ lb.

\* The Kennedy Round of Geneva trade agreements was signed June 30, 1967. Tariffs on lead were not cut.



## Review of the Lead Industry - 1969

In 1969, the United States mine production of recoverable lead totaled 509,013 short tons, a record not exceeded since 1930 when 558,000 tons were produced. Only seven years ago, in 1962, 236,956 tons were produced domestically, a "low" figure not equalled in the past fifty years.

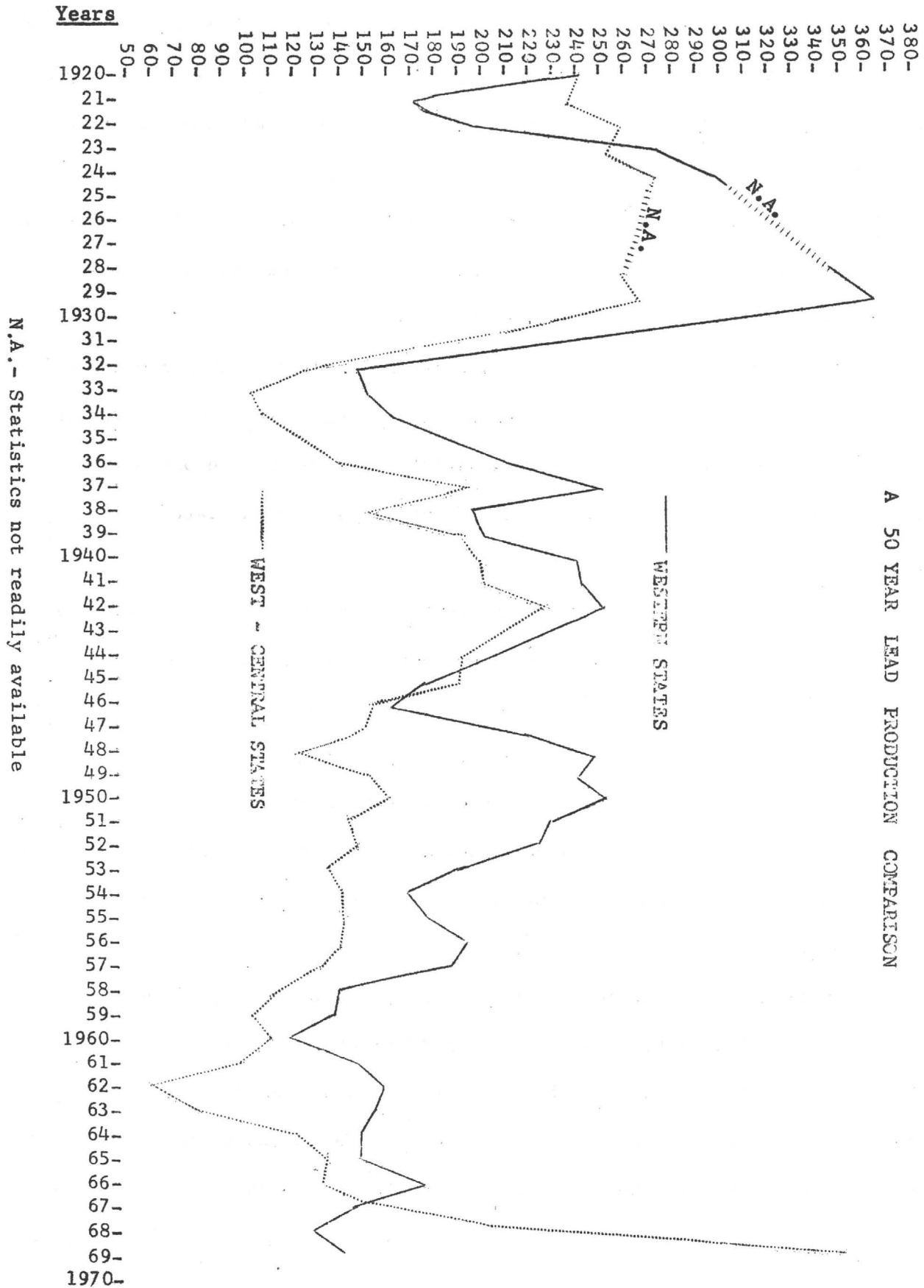
As shown in the accompanying graph, "A 50-Year Lead Production Comparison," domestic production diminished in varying steps after the 1920's and decreased further after the Korean incidents in the 1950's.

The wide variations reflect, to a considerable degree, the rise and fall of the production of mining districts in the Western States, the West Central States and States East of the Mississippi River. Finally, the pattern changed; the West Central States production gained rapidly and by the late 1960's, greatly surpassed the Western States'.

The "Production Comparison" graph depicts two principal conditions; 1) The dominant position held for so long by the Western States; made up mainly by Idaho, Utah, Colorado, and Arizona, and; 2) The change in the production pattern after 1962 as Missouri's output, the principal West Central source, started its dramatic increase. The area East of the Mississippi was never a serious contender. Comprised mainly of Illinois, Kentucky, New York, Virginia, and Wisconsin, the area's highest production level up to the present time, was established in 1956 when 11,295 tons were produced.

Missouri has been the principal producer, almost entirely through this 50-year period, though followed closely by Idaho at times. Utah has continually secured the third spot with the fourth rank passed around between Arizona, Oklahoma, and Colorado. As the 1960's decade closed, Missouri was first followed by Idaho, and Utah. In the last years, both Arizona and Oklahoma dropped from contention.

# LEAD PRODUCTION IN THOUSAND SHORT TONS



A geographic distribution of the United States mine production of recoverable lead is tabulated below, for 1960, 1968, and 1969.

Geographic Distribution of U.S. Mine Production of

Recoverable Lead. 1/

Area	1960	Per- cent	1968	Per- cent	1969	Per- cent
Western States	124,907	50.6	135,229	37.7	145,624	28.6
East of Miss. River	8,097	3.3	7,702	2.1	6,937	1.4
West Central States <u>2/</u>	113,665	46.1	216,225	60.2	356,452	70.0
	<u>246,669</u>	<u>100.0</u>	<u>359,156</u>	<u>100.0</u>	<u>509,013</u>	<u>100.0</u>

1/ Data supplied by U.S. Bureau of Mines

2/ Kansas, Missouri, and Oklahoma

Western States 1969 production increased over 1968, mainly in Idaho and Colorado. However, the large gain recorded by Missouri so surpassed all the others that the West Central area accounted for a notable 70 percent of the entire domestic production for the year. Production from East of the Mississippi continued its downward trend.

1969 was a good year for lead. In the face of the 41.7 percent increase in the supply of new lead during the year, referred to above, the price of New York common lead gained almost 27 percent as it climbed from 13.0 cents per pound at the start of the year to a firm 16.5¢ at year end. According to the annual E/MJ price tabulation, 1969's year end price has only been exceeded by the Annual Average price for the years 1948, 1951 and 1952.

The aforementioned Missouri lead production increases in 1969 came from several new mines and the general absence of major strikes, such as occurred in 1968.

The jointly owned, integrated lead mine, mill, and smelter project of American Metal Climax and the Homestake Mining Company in southeastern Missouri came into preliminary production in February, 1969. The smelter, having started earlier, in 1968, reached rated capacity in 1969. AMAX reported that the mine's production rate was slowed due to high labor turnover during start up and that in addition, a wildcat strike limited refined lead output to 76,000 tons for the year. The accompanying acid plant, an air pollution control measure, produced 34,000 tons of sulphuric acid during the year.

Another major contributor to the increase in the domestic new lead production was the Magmont mine and mill complex, Bixby, Missouri. Magmont, owned jointly by Cominco American, Inc. (a subsidiary of Cominco, Ltd. of Canada) and Magnet Cove Barium, (a subsidiary of Dresser Industries, Inc., a Delaware corporation), initiated production in 1968, reaching annual capacity rate of 50,000 tons of lead in 1969. The mine's ore reserves were reported to be 15 million tons containing some 1.3 million tons of lead-zinc.

The American Smelting and Refining Co., owners and operators of the new smelting and refining complex at Glover, Missouri reported that early in 1969, strikes in smelters and operating difficulties at the mines hampered operations but that later in the year, output had increased to double that of 1968. Glover was initially scheduled for a production rate of 5,500 tons of refined lead per month.

ASARCO announced in mid-1970 that the coming on stream of the new, modern Glover plant, was a major factor in the decision to close the company's old, well-known lead smelter at Selby, California. In addition, the company commented that rising costs and the changing patterns in world trade had made the Selby plant economically obsolescent.

Still further increases in Missouri's primary lead production are anticipated. In mid-1969, the St. Joseph Lead Company announced their decision to develop a new lead mine and a 5,000 tons per day mill in the Brushy Creek Area in southeastern Missouri. This was located by the company as about 6 miles north of their new Fletcher mine. Production of lead concentrates with copper and zinc concentrates by-products is expected by early 1972.

The increase in domestic primary lead production in 1969 pushed the United States into first place among the world's principal lead producing countries. This amounted to 14.4 percent of the world's total mine production, surpassing Australia, the U.S.S.R., Canada, and Mexico in that order. It had not held first rank since 1956 when it surpassed Australia by some 17,000 tons.

#### CONSUMPTION

1969 domestic lead consumption, at 1.389 million tons was 4.6 percent ahead of the record 1968 consumption and a striking 36.1 percent ahead of 1960. As shown in Table VII, the lead consumed in all categories exceeded the 1968 figures except for Pigments which declined 6.7 percent.

The largest increment of lead consumption - that used in storage batteries - at 582,546 tons, exceeded the 1968 total by 13.4 percent and the 1960 figure by 64.9 percent. The next largest use, antiknock compounds for gasoline, at 271,128 tons exceeded that of 1968 by 3.5 percent and 1960 by 65.5 percent. However; as 1969 closed on the highest domestic lead consumption figure in history, the new year opened under certain doubts. Lead, used in the preparation of gasoline antiknock additives, accounts for approximately 20 percent of the total domestic consumption and with the ecological studies for environmental improvement gaining popularity, the future of these lead additives has become uncertain.

#### FOREIGN TRADE

United States lead imports, in all forms, at 396,587 tons in 1969, were down 8.3 percent from 1968, continuing the trend of the late 1960's according

to data furnished by the U.S. Bureau of Mines and tabulated in Table VIII. This was almost 37 percent below the longer-term high figure established in 1952.

Imports in pigs and bars were down considerably from Belgium-Luxembourg, West Germany, and the United Kingdom. Imports were also down, in the principal categories, from the more traditional suppliers, Canada and Peru but were about equally balanced by increased shipments from Australia.

United States lead exports at 7,308 tons in 1969, continuing in their minor role, were almost 21 percent below the 1968 figure.

TABLE I

## SALIENT U. S. LEAD STATISTICS FOR 1968 and 1969

ARIZONA, THE UNITED STATES AND WORLD MINE PRODUCTION OF RECOVERABLE LEAD <sup>1/</sup>

	Unit: Short Tons	
	Year 1968	Year 1969
UNITED STATES:		
Producers' Stocks Beginning of Period	125,479	90,427
U. S. Mine Production Recoverable Lead	359,156	509,013
Secondary Lead Recovered from Old & New Scrap	550,879	603,905
Imported Lead in Ore & Matte, Base Bullion	87,844r	111,245
Imported Lead in Pigs, Bars	338,120	278,380
Imported Lead in Reclaimed Scrap, etc.	6,481	6,962
 TOTAL SUPPLY	 1,467,959r	 1,599,932
 Exported Lead in Ore, Matte & Base Bullion	 NA	 NA
Exported Lead in Pigs and Bars	8,281	4,968
Exported in Scrap	937	2,340
Producers' Stocks at End of Period	90,427	101,860
 Sub-Total	 99,645	 109,168
 NET APPARENT CONSUMPTION	 1,368,314r	 1,490,764
 REPORTED CONSUMPTION	 1,328,790	 1,389,358
 UNACCOUNTED FOR (Stockpiles, etc)	 +39,524r	 +101,406
 U. S. PRODUCTION OF REFINED PRIMARY LEAD:		
From Domestic Ores & Base Bullion	349,039	513,931
From Foreign Ores & Base Bullion	118,271	124,724
 ARIZONA MINE PRODUCTION	 1,704	 217
 WORLD MINE PRODUCTION	 3,298,741r	 3,523,401
 U. S. MINE PRODUCTION AS % OF REPORTED CONSUMPTION	 27.03%	 36.64%
 U. S. MINE PRODUCTION & SECONDARY AS % OF REPORTED CONSUMPTION	 68.49%	 80.10%
 Avg. Price of Lead - N.Y. (E/MJ)	 13.21¢	 14.90¢
 Avg. Price of Lead - London	 10.88¢	 13.09¢
r Revised NA Not Available.		

<sup>1/</sup> U.S. Bureau of Mines



TABLE II

## U. S. AND ARIZONA MINE PRODUCTION OF RECOVERABLE LEAD

TONS, VALUE AND PRICES BY YEARS FROM 1947 to 1969 INCLUSIVE 1/

Year	Avg. Price 2/ cts./lb	U. S. Mine Production Short Tons	Value	Arizona Mine Production Short Tons	Value
1947	14.673	384,221	\$ 112,750,000	28,566	r \$ 8,227,000
1948	18.043	390,476	140,907,000	29,899	r 10,704,000
1949	15.364	409,908	125,957,000	33,568	r 10,607,000
1950	13.296	430,827	114,566,000	26,383	r 7,123,000
1951	17.500	388,164	135,857,000	17,394	r 6,018,000
1952	16.467	390,162	128,496,000	16,520	r 5,319,000
TOTAL		2,393,758	\$758,533,000	152,330	r \$ 47,998,000
6 Yr. Avg.	15.844	398,960	\$126,422,000	25,388	r \$ 8,000,000
1953	13.489	342,644	\$ 92,438,000	9,428	r \$ 2,470,000
1954	14.054	325,419	91,470,000	8,385	r 2,297,000
1955	15.138	338,025	102,340,000	9,817	r 2,925,000
1956	16.013	352,826	112,996,000	11,999	r 3,768,000
1957	14.658	338,216	99,151,000	12,441	r 3,558,000
1958	12.109	267,377	64,753,000	11,890	r 2,782,000
1959	12.211	255,586	62,419,000	9,999	r 2,300,000
1960	11.948	246,669	58,944,000	8,495	r 1,988,000
1961	10.871	261,921	56,947,000	5,937	r 1,223,000
1962	9.631	236,956	45,642,000	6,966	r 1,282,000
1963	11.137	253,369	56,435,000	5,815	r 1,256,000
1964	13.596	286,010	77,772,000	6,147	1,611,000
1965	16.000	301,147	96,367,000	5,913	r 1,845,000
1966	15.115	327,368	98,963,000	5,211	1,575,000
1967	14.000	316,931	88,741,000	4,771	1,336,000
1968	13.212	359,156	94,903,000	1,704	450,000
1969	14.895	509,013	151,635,000	217	65,000
Total 1953-1968		4,809,620	\$1,300,281,000	124,918	\$32,666,000
Total 1953-1969		5,318,633	\$1,451,916,000	125,135	\$32,731,000
17 Yr Avg.					
U. S.	13.518	312,861	\$85,407,000		
Arizona	13.411			7,361	\$ 1,925,000
Annual Loss					
17 Yr. Period		86,099	\$41,015,000	18,027	\$ 6,075,000

1/ U.S. Bureau of Mines r Revised

2/ E/MJ, Annual Average Metal Price, N.Y. Common Lead.

TABLE III

MINE PRODUCTION OF RECOVERABLE LEAD IN THE UNITED STATES, BY STATES <sup>1/</sup>

		Unit: Short Tons		
		1967	1968	1969
Arizona	. . . . .	4,771	1,704	217
California	. . . . .	1,735	4,001	2,518
Colorado	. . . . .	21,923	19,778	21,767
Idaho	. . . . .	61,387	54,790	65,597
Illinois	. . . . .	2,384	1,467	791
Kansas	. . . . .	1,031	1,227	395
Kentucky	. . . . .	845	2/	- -
Missouri	. . . . .	152,649	212,611	355,452
Montana	. . . . .	898	1,870	1,753
Nevada	. . . . .	1,500	863	1,420
New Mexico	. . . . .	1,827	1,363	2,368
New York	. . . . .	1,653	1,396	1,686
Oklahoma	. . . . .	2,727	2,387	605
Utah	. . . . .	53,813	45,205	41,332
Virginia	. . . . .	3,430	3,573	3,358
Washington	. . . . .	2,762	5,655	8,649
Wisconsin	. . . . .	1,596	1,126	1,102
Other States <sup>3/</sup>	. . . . .	- -	140	3
Total		316,931	359,156	509,013

<sup>1/</sup> U. S. Bureau of Mines<sup>2/</sup> Included with "Other States"<sup>3/</sup> Includes Alaska and Oregon, as well as well as Kentucky in 1968 and South Dakota in 1969 to avoid disclosing individual company confidential data.

TABLE IV

WORLD MINE PRODUCTION OF LEAD, (CONTENT OF ORE), BY COUNTRIES 1/

Unit: Thousand Short Tons									
YEAR	U.S.A. <u>2/</u>	MEXICO	CANADA	PERU	AUSTRALIA	REST OF FREE WORLD	TOTAL FREE WORLD	SOVIET e <u>3/</u> SPHERE	TOTAL WORLD (ESTIMATED)
1960	247	210	<u>2/</u> 206	<u>2/</u> 145	345	811	1,964	656	2,620
1961	262	200	183	<u>2/</u> 150	302	840	1,937	703	2,640
1962	237	213	211	<u>2/</u> 141	415	820	2,037	728	2,765
1963	253	209	199	<u>2/</u> 164	460	796	2,081	694	2,775
1964	286	187	206	<u>2/</u> 166	420	794	2,059	718	2,777
1965	301	184	303	<u>2/</u> 170	406	r841	r2,205	762	r2,967
1966	327	192	323	<u>2/</u> 160	409	r904	r2,315	823	r3,138
1967	317	189	340	<u>2/</u> 176	r421	r895	r2,338	r821	r3,159
1968	359	192	r360	<u>2/</u> 170	r429	r929	r2,439	r860	r3,299
1969P	509	188	331	180	491	937	2,636	887	3,523

e Estimate P Preliminary r Revised

1/ U.S. Bureau of Mines 2/ Recoverable 3/ Some Smelter Production Included in Data.SOVIET SPHERE, MINE PRODUCTION OF LEAD, (CONTENT OF ORE), BY COUNTRIES 1/

Unit: Thousand Short Tons										
COUNTRIES	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969p
Bulgaria	92	88	104	98	101	e110	e110	r 95	r 95	91
China, Mainland e/	88	99	99	110	110	110	110	100	110	110
Czechoslovakia e/	7	7	15	15	15	15	15	r 8	r 8	8
Germany, East e/	8	8	8	11	11	11	13	r13	13	13
Hungary	--	1	1	1	1	2	e 2	NA	NA	NA
Korea, North e/	55	55	55	55	60	66	66	72	77	77
Poland	43	42	42	43	42	45	50	49	r53	54
Rumania, e/2/	13	13	14	14	14	17	44	44	44	44
U.S.S.R.	<u>2/</u> 350	<u>2/</u> 390	<u>2/</u> 390	347	364	386	413	440	r460	490
TOTAL e/	656	703	728	694	718	762	823	r821	r860	887

e Estimate P Preliminary r Revised NA Not Available

1/ U.S. Bureau of Mines 2/ Smelter Production

TABLE V

## LEAD IMPORTED INTO, AND EXPORTED FROM THE UNITED STATES 1/

Unit: Short Tons

Year	Imports	Exports	Net Imports
Avg. 1948-1952	434,909	3,500	431,409
1953	552,278	4,547	547,731
1954	443,243	4,592	438,651
1955	441,402	4,720	436,682
1956	481,655	7,819	473,836
1957	569,842	6,130	563,712
1958	601,044	3,386	597,658
1959	410,697	4,121	406,576
1960	359,656	5,843	353,813
1961	409,402	11,733	397,669
1962	402,752	7,467	395,285
1963	389,081	3,513	385,568
1964	340,993	23,342	317,651
1965	350,110	11,604	338,506
1966	439,088	5,933	433,155
1967	r498,523	6,930	r491,593
1968	r432,445	9,218	r423,227
1969	396,587	7,308	389,279

r Revised

TABLE VI

## CONSUMPTION OF LEAD IN UNITED STATES 1/

Unit: Short Tons

Year	Metal Products	Storage Batteries	Pigments	Tetra-ethyl Lead	Other Uses	TOTAL
1957	448,948	361,015	115,361	177,001	35,790	1,138,115
1958	382,822	312,725	95,901	159,412	35,527	986,387
1959	407,520	380,732	103,671	160,020	39,206	1,091,149
1960	369,731	353,196	98,541	163,826	35,878	1,021,172
1961	359,302	367,998	94,824	169,802	35,290	1,027,216
1962	380,623	419,906	102,968	168,926	37,212	1,109,635
1963	396,797	439,081	99,075	192,811	35,594	1,163,358
1964	406,523	429,348	103,636	223,466	39,165	1,202,138
1965	410,344	455,347	108,883	225,203	41,705	1,241,482
1966	440,117	472,492	119,888	246,879	44,501	1,323,877
1967	404,104	466,665	103,190	247,170	39,387	1,260,516
1968	401,797	513,703	109,734	261,897	41,659	1,328,790
1969	390,588	582,546	102,386	271,128	42,710	1,389,358

1/ U.S. Bureau of Mines

TABLE VII

U.S. LEAD CONSUMPTION - YEARS 1967, 1968 & 1969 <sup>1/</sup>

Unit: Short Tons

	1967	1968	1969
<b>Metal Products:</b>			
Ammunition . . . . .	78,766	82,193	79,233
Bearing Metals. . . . .	19,561	18,441	17,406
Brass and Bronze. . . . .	20,467	21,021	21,512
Cable Covering. . . . .	63,037	53,456	54,203
Calking Lead . . . . .	48,789	49,718	44,857
Casting Metals. . . . .	10,083	8,693	9,918
Collapsible Tubes . . . . .	11,299	9,310	12,484
Foil . . . . .	6,148	6,114	5,881
Pipes, Traps and Bends. . . . .	20,184	21,098	19,407
Sheet Lead . . . . .	26,763	28,271	25,818
Solder . . . . .	68,833	74,074	72,626
Storage Battery Grids, Posts, etc. . . . .	229,287	250,129	280,386
Storage Battery Oxides. . . . .	237,378	263,574	302,160
Terne Metal . . . . .	1,620	1,427	1,583
Type Metal . . . . .	28,554	27,981	25,660
<b>TOTAL</b>	<b>870,769</b>	<b>915,500</b>	<b>973,134</b>
<b>Pigments:</b>			
White Lead . . . . .	8,087	5,857	6,617
Red Lead & Litharge . . . . .	76,589	86,480	79,898
Pigment Colors. . . . .	13,041	14,163	14,670
Other <sup>2/</sup> . . . . .	5,473	3,234	1,201
<b>TOTAL</b>	<b>103,190</b>	<b>109,734</b>	<b>102,386</b>
<b>Chemicals:</b>			
Tetraethyl Lead . . . . .	247,170	261,897	271,128
Miscellaneous . . . . .	609	629	602
<b>TOTAL</b>	<b>247,779</b>	<b>262,526</b>	<b>271,730</b>
<b>Miscellaneous Uses:</b>			
Annealing . . . . .	4,202	4,194	4,252
Galvanizing . . . . .	1,854	1,755	1,797
Lead Plating . . . . .	532	339	406
Weights & Ballast . . . . .	15,794	16,768	17,366
<b>TOTAL</b>	<b>22,382</b>	<b>23,106</b>	<b>23,821</b>
Other Uses, Unclassified	16,396	17,924	18,287
<b>TOTAL REPORTED <sup>3/</sup></b>	<b>1,260,516</b>	<b>1,328,790</b>	<b>1,389,358</b>

<sup>1/</sup> U.S. Bureau of Mines.<sup>2/</sup> Includes lead content of leaded zinc oxide production.<sup>3/</sup> Includes lead content of scrap used directly in fabricated products.

TABLE VIII

## IMPORTS AND EXPORTS OF LEAD INTO AND FROM THE UNITED STATES

YEARS 1967, 1968 and 1969 1/

		Unit: Short Tons		
IMPORTS:				
Country of Origin		1967	1968	1969
Ore, Matte, etc.				
(Lead Content)	Total	124,067	87,836	109,252
Canada		33,474	36,815	48,606
Mexico		314	303	301
Guatemala		197	---	---
Honduras		6,513	9,272	12,988
Colombia		561	1	345
Peru		36,734	13,976	22,582
Bolivia		13,764	5,186	3,605
Republic of South Africa		359	608	365
Australia		25,553	20,592	20,335
Other Countries		6,598	1,083	125
Base Bullion (Lead Content)	Total	r 569	r 8	1,993
Australia		---	---	1,979
South America		---	---	---
North America		r 1	r 8	---
Other Countries		568	---	14
Pigs and Bars				
(Lead Content)	Total	363,598	338,120	278,380
Canada		37,238	60,161	44,457
Mexico		57,271	56,516	57,451
Peru		70,377	75,105	57,249
Belgium-Luxembourg		23,281	18,649	1,315
West Germany		49,077	20,711	1,289
United Kingdom		17,680	22,919	8,664
Yugoslavia		30,478	19,775	27,862
Australia		53,156	46,919	60,791
Other Countries		25,040	17,365	19,302
Reclaimed Scrap, etc.	Total	10,289	6,481	6,962
GRAND TOTAL IMPORTS		r 498,523	r 432,445	396,587
GRAND TOTAL EXPORTS		6,930	9,218	7,308
EXCESS IMPORTS		r 491,593	r 423,227	389,279

r Revised

1/ U.S. Bureau of Mines



PART II  
ZINC INDUSTRY

		<u>Page</u>
Zinc: Physical Properties		16
Metal Duties on Zinc in Effect, January 1, 1970		17
Review of the Zinc Industry - 1969		18-21
Statistics of the United States Zinc Industry	TABLE I	22
U.S. and Arizona Mine Production of Recoverable Zinc - Tons, Value and Prices by Years from 1947 to 1969	TABLE II	23
Mine Production of Recoverable Zinc, by States in 1967-1969	TABLE III	24
World Mine Production of Zinc (Content of Ore) By Countries	TABLE IV	25
Zinc Imported into and Exported from the United States	TABLE V	26
Consumption of Slab Zinc in United States	TABLE VI	26
Salient Zinc Statistics of the United States	TABLE VII	27
Arizona and World Mine Production of Recoverable Zinc	TABLE VIII	27
U. S. Consumption of Slab Zinc	TABLE IX	27
Imports and Exports of Zinc into and from the United States, Years 1967, 1968 and 1969	TABLE X	28



## Z I N C

### PHYSICAL PROPERTIES \*

Zinc is a bluish white, hard, brittle metal with a microscopic crystalline structure when broken. The commercial metal is now known in the U. S. as slab zinc, rather than by the older term spelter.

The commercial importance of zinc is based largely upon its properties as a corrosion inhibitor especially as a protective coating on steel in galvanized products and upon its use in alloys. On account of low strength and brittleness, the pure metal, when used alone, has few uses except as sheet metal and other rolled forms.

Zinc compounds are important as pigments, fillers, and chemicals, with a wide range of end uses.

Symbol - Zn. Atomic Weight - 65.38 Specific Gravity - 7.13

Melting Point - °F - 787.03. Boiling Point, °F - 1,663

Electrical Resistivity - Microhm per c.c. - 5.916

Tensile Strength, cast, Lb. per sq. in. - 9,000. Rolled - 21,000

Crystal Structure - close packed hexagonal. Valence - 2

\* U. S. Bureau of Mines "MATERIALS SURVEY" - September 1952

METAL DUTIES ON ZINC\*

As of December 31, 1969

According to the Tariff Classification Act of 1962, Amended.

Published in American Bureau of Metal Statistics Yearbook, 1969, page 147

As follows:

Zinc:

Zinc-bearing ores and other zinc-bearing materials, dutiable zinc content . . . . .	0.67¢ lb.
Zinc waste and scrap and zinc dross and skimmings . . . . .	0.75¢ lb.
Refined zinc in unwrought forms . . . . .	0.70¢ lb.
Zinc dust . . . . .	0.55¢ lb.
Zinc sheets, rolled and cross rolled . . . . .	0.8¢ lb.
Zinc sheets, rolled and cross rolled, coated or plated with metal . . . . .	0.9¢ lb.
Zinc sheets, rolled in one direction only . . . . .	15%
Leaded zinc oxide containing not over 25% of lead by weight:	
Dry . . . . .	0.45¢ lb.
Other . . . . .	0.8¢ lb.
Zinc oxide:	
Dry . . . . .	0.6¢ lb.
Other . . . . .	1.0¢ lb.

\* The Kennedy Round of Geneva trade agreements was signed June 30, 1967. Effective Jan. 1, 1970, the rate of duty on some of the items were reduced.

# REVIEW OF THE ZINC INDUSTRY - 1969

At 553,124 short tons, the United States mine production of recoverable zinc in 1969 was 4.5 percent higher than in 1968. However, this was almost 10 percent below the recent high of 611,153 tons produced by the mines in 1965 and well below the record 768,025 tons produced in 1942.

While not as abrupt as that described in the lead section of this report, the domestic zinc production pattern also changed as output from east of the Mississippi River surpassed that of the western states in 1960. Colorado, Idaho and New Mexico all made good production gains, but Arizona lost seriously in the Western States group in the 1960's. Thus, their net gain was sharply surpassed by the increases of New Jersey, Pennsylvania, and Tennessee. Zinc production in the West Central states, lead by Missouri, increased markedly through this same period. A geographic distribution of United States domestic zinc production follows.

## GEOGRAPHIC DISTRIBUTION OF U. S. MINE PRODUCTION OF RECOVERABLE ZINC 1/

IN THOUSANDS OF SHORT TONS

<u>Year</u>	<u>Western States</u>	<u>Per-cent</u>	<u>East of Miss.</u>	<u>Per-cent</u>	<u>West 2/ Central</u>	<u>Per-cent</u>	<u>Total</u>
1952	386	58.0	186	27.9	94	14.1	666
1955	278	54.0	163	31.6	74	14.4	515
1958	222	53.9	180	43.7	10	2.4	412
1959	213	50.1	210	49.4	2	0.5	425
1960	188	43.2	240	55.2	7	1.6	435
1962	255	50.5	233	46.1	17	3.4	505
1967	207	37.7	319	58.1	23	4.2	549
1968	188	35.5	319	60.3	22	4.2	529
1969	198	35.8	309	55.9	46	8.3	553

1/ Data supplied by the U. S. Bureau of Mines

2/ Comprised of Arkansas, Kansas, Missouri, and Oklahoma

1969 was also a good year for zinc. Even as the domestic supply of newly mined zinc increased, the East St. Louis price of prime western grade raised from 13.5¢ to 14.0¢ per pound on January 14th and to 14.5¢ on May 1st. After some

fluctuations, it settled at 15.5¢ in mid-September and remained there until year end and into 1970. According to the E/MJ tabulation of Annual Average Metal Prices, the 1969 average price of 14.600 cents per pound of P.W. zinc was the highest for any year of this century excepting the years of 1951 and 1952.

At 124,532 tons, Tennessee again lead the nation in newly mined zinc production in 1969, 0.4 percent greater than last year's record output, and more than that of the next two states combined, New York and Idaho, plus a Washington or an Arizona.

According to a tabulation by the U.S. Bureau of Mines, 8 of the nation's 25 leading zinc producing mines were in Tennessee in 1969. In descending rank, they were:

<u>Mine</u>	<u>Operating Co.</u>	<u>Rank</u>
Young	American Zinc Co.	(5)
New Market	New Market Zinc Co.	(7)
Zinc Mine Works	U. S. Steel Corp.	(9)
Jefferson City	New Jersey Zinc Co.,	(10)
Immel	American Zinc Co.	(12)
Copperhill	Tennessee Copper Co.,	(17)
Flat Gap	New Jersey Zinc Co.	(18)
Mascot No. 2	American Zinc Co.	(22)

In late 1969, it was reported that ore production capacity of the Immel mine, brought on stream in 1968 by the American Zinc Co., was to be increased 20 percent to 2,000 tons per day while the New Market mine, the New Market joint venture, was to be expanded to 3,600 tons per day from 2,800 tons, by the end of 1971.

At 58,728 tons, New York still retained second place among the nation's leading zinc mining states, even though output was 11 percent below the 1968 total.

At their Balmat mine in northern New York, (the nation's leading zinc-producing mine) the St. Joseph Lead Co. completed their new 3,200-foot shaft at the end of 1969 and continued work on the new 4,300 ton-per-day mill. This is contemplated to come on stream in 1971, replacing the existing mill. The capacity of the company's other New York state property, the Edwards mine, was reported to be 600 tons per day.

In the 10-year period (1960-1969 inclusive) the United States mine production of zinc increased 27 percent but was no match for the 58 percent increase of the Estimated World Total output. In 1960, the United States ranked first among world zinc producing countries, with an output of 435,000 tons, amounting to almost 12 percent of the World Total while Canada ranked third with 11.1 percent. Canada moved to the top spot in 1964 with an output of 730,000 tons, a position it has since maintained. For the past three years 1967-1969 inclusive, Canada has produced more than the next two ranking countries combined, while the U. S. slipped to fourth place, after the U. S. S. R. and Australia respectively.

United States smelter production of slab zinc totaled 1.11 million tons in 1969, an all time high figure and 0.9 percent above that of 1968. The tabulation below designates the sources of that production, according to U. S. Bureau of Mines data. While slab zinc derived from domestic ores was at its highest mark for the decade in 1965, zinc from foreign ores has increased each year since 1963, except for one year, 1967, and in 1969 accounted for 52.3 percent of the total smelter output. Slab derived from scrap remained in its 6-7 percent-of-total range.

#### SOURCES FOR U. S. SLAB ZINC PRODUCTION

IN THOUSANDS OF SHORT TONS

Year	From Domestic Ores	Percent of Total	From Foreign Ores	Percent of Total	From Scrap	Percent of Total	Total Tonnage
1960	334	38.5	465	53.6	69	7.9	868
1961	413	45.8	434	48.1	55	6.1	902
1962	448	47.8	431	45.9	59	6.3	938
1963	474	49.7	419	44.0	60	6.3	953
1964	532	51.9	422	41.1	72	7.0	1,026
1965	551	51.2	443	41.1	83	7.7	1,077
1966	524	47.3	501	45.2	83	7.5	1,108
1967	439	43.3	500	49.4	74	7.3	1,013*
1968	499	45.4	521	47.3	80	7.3	1,100*
1969	459	41.3	582	52.3	71	6.4	1,112*

\* Total variation due to rounding

## CONSUMPTION

United States consumption of slab zinc in 1969, at 1.37 million tons (Table VI, Zinc Section), was 2.6 percent ahead of 1968 but still 3 percent below the all-time consumption record set in 1966. There was no sizable change in the break down of the year's consumption from that of the previous year. The zinc-base alloy segment accounted for 42.1 percent of the total, followed by galvanizing, brass products, rolled zinc, other uses, and zinc oxide at 34.8, 13.1, 3.6, 3.4 and 3.0 percent respectively.

The outstanding feature, however, lies in the percentage gains made by these various consumption segments in the 10-year period of 1960-1969 as evidenced in the following tabulation.

### U. S. CONSUMPTION OF SLAB ZINC

#### IN SHORT TONS

<u>Industry Use</u>	<u>1960</u>	<u>1969</u>	<u>Percent Increase</u>
Zinc-base alloy	338,373	576,391	70.3
Galvanizing	371,589	476,324	28.2
Brass products	99,023	179,469	81.2
Rolled zinc	38,696	48,650	25.7
Other uses	14,610	46,042	215.1
Zinc oxide	15,593	41,447	165.8

#### STOCKS

Year end, 1969 stocks of slab zinc at producer's plants--67,662 tons--increased 3.5 percent from the previous year while consumer's plant stocks at 100,492 tons declined 1.3 percent at year end 1969.

#### FOREIGN TRADE

U. S. general imports of zinc in ores, concentrates and slabs, at 931,126 tons in 1969 were 9.6 percent above the record high figure set in 1968. Canada was the major supplier (some 55.9 percent of the total) followed by Mexico, Peru and Australia.

Exports of slab zinc - 9,298 tons - dropped by more than two-thirds in 1969 from 1968, with India the principal and usual recipient.

TABLE I

## STATISTICS OF THE UNITED STATES ZINC INDUSTRY 1/

	Unit: Short Tons	
	1968	1969
Stocks of Slab Zinc at Start of Period:		
Producers	81,916	65,379
Consumers	102,535	101,818
Sub-Total	184,451	167,197
Production:		
Smelter, Slab Zinc, from		
Domestic Ores	499,491	458,754
Foreign Ores	521,400	581,843
Redistilled Secondary		
(Slab Zinc from Scrap)	79,865	70,553
Sub-Total	1,100,756	1,111,150
Imports: Slab Zinc	306,540	329,008
GRAND TOTAL	1,591,747	1,607,355
Exports - Slab, Pigs, Blocks	33,011	9,298
Stocks of Slab Zinc, End of Period		
Producers	r65,379	67,662
Consumers	r101,818	100,492
Sub-Total	r167,197	168,154
Apparent Consumption	r1,391,539	1,429,903
Reported Consumption		
Slab Zinc	1,333,699	1,368,323
Consumed Directly in Ores	124,109	126,712
TOTAL	1,457,808	1,495,035

r Revised

1/ U. S. Bureau of Mines



TABLE II

## U. S. AND ARIZONA MINE PRODUCTION OF RECOVERABLE ZINC

TONS, VALUE AND PRICES BY YEARS FROM 1947 to 1969 INCLUSIVE 1/

Year	Average 2/ Price cts./lb.	U.S. Mine Production		Arizona Mine Production	
		Short Tons	Value	Short Tons	Value
1947	10.500	637,608	\$133,898,000	54,644	r \$13,224,000
1948	13.589	629,977	171,215,000	54,478	r 14,491,000
1949	12.144	593,203	144,077,000	70,658	r 17,523,000
1950	13.866	623,375	172,874,000	60,480	r 17,176,000
1951	18.000	681,189	245,228,000	52,999	r 19,292,000
1952	16.215	666,001	215,984,000	47,143	r 15,651,000
TOTAL		3,831,353	\$1,083,276,000	340,402	r \$97,357,000
6 Yr. Avg.	14.137	638,559	\$ 180,546,000	56,734	r \$16,226,000
1953	10.855	547,430	\$ 118,847,000	27,530	r \$6,332,000
1954	10.681	473,471	101,143,000	21,461	r 4,636,000
1955	12.299	514,671	126,599,000	22,684	5,580,000
1956	13.494	542,340	146,367,000	25,580	r 7,009,000
1957	11.399	531,735	121,225,000	33,905	r 7,866,000
1958	10.309	412,005	84,947,000	28,532	r 5,821,000
1959	11.448	425,303	97,377,000	37,325	r 8,585,000
1960	12.946	435,427	112,741,000	35,811	r 9,239,000
1961	11.542	464,390	107,200,000	29,585	r 6,804,000
1962	11.625	r 505,491	r 117,527,000	32,888	r 7,564,000
1963	11.997	529,254	126,989,000	25,419	r 5,846,000
1964	13.568	574,858	155,993,000	24,690	6,716,000
1965	14.500	611,153	177,234,000	21,757	r 6,353,000
1966	14.500	572,558	166,042,000	15,985	4,636,000
1967	13.843	549,413	152,110,000	14,330	3,967,000
1968	13.500	529,446	142,950,000	5,441	1,469,000
1969	14.600	553,124	161,512,000	9,039	2,639,000
Total 1953-1968		8,218,945	\$2,055,291,000	402,923	\$ 98,423,000
Total 1953-1969		8,772,069	\$2,216,803,000	411,962	\$101,062,000
17 Yr. Avg.					
U. S.	12.503	516,004	\$ 130,400,000		
Ariz.	12.179			24,233	r\$ 5,945,000
Annual Loss					
17 Yr. Period		122,555	\$ 50,146,000	32,501	\$ 10,281,000

1/ U. S. Bureau of Mines

2/ E/MJ, Annual Average Metal Price, E. St. Louis Prime Western Zinc.

TABLE III

MINE PRODUCTION OF RECOVERABLE ZINC, BY STATES, IN 1967-1969 1/

Unit: Short Tons			
STATE	1967	1968	1969
Arizona . . . . .	14,330	5,441	9,039
California . . . . .	441	3,525	3,327
Colorado . . . . .	52,442	50,253	53,715
Idaho . . . . .	56,528	57,248	55,900
Illinois . . . . .	20,416	18,182	13,765
Kansas . . . . .	4,765	3,012	1,900
Kentucky . . . . .	6,317	<u>2/</u>	<u>2/</u>
Missouri . . . . .	7,430	12,301	41,099
Montana . . . . .	3,341	3,778	6,143
Nevada . . . . .	3,035	2,104	941
New Jersey . . . . .	26,041	25,668	25,076
New Mexico . . . . .	21,380	18,686	24,308
New York . . . . .	70,555	66,194	58,728
Oklahoma . . . . .	10,670	6,921	2,744
Pennsylvania . . . . .	35,067	30,382	33,035
Tennessee . . . . .	113,065	124,039	124,532
Utah . . . . .	34,251	33,153	34,902
Virginia . . . . .	18,846	19,257	18,704
Washington . . . . .	21,540	13,884	9,738
Wisconsin . . . . .	28,953	25,711	22,901
Other States <u>3/</u> . . . . .	- - -	9,702	12,627
TOTAL	549,413	529,446	553,124

1/ U.S. Bureau of Mines2/ Included in "Other States".3/ "Other States" include Kentucky and Maine.

TABLE IV

## WORLD MINE PRODUCTION OF ZINC, (CONTENT OF ORE) BY COUNTRIES 1/ 2/

Unit: Thousand Short Tons

YEAR	U.S.A. 3/	CANADA	MEXICO	PERU 3/	AUSTRALIA	JAPAN	REST OF FREE WORLD	TOTAL FREE WORLD	SOVIET e SPHERE	TOTAL WORLD (ESTIMATED)
1960	435	3/407	289	196	355	173	973	2,828	852	3,680
1961	464	443	296	192	349	185	1,020	2,949	896	3,845
1962	505	502	277	179	378	212	977	3,030	900	3,930
1963	529	497	264	215	394	218	1,019	3,136	900	4,036
1964	575	730	260	261	386	239	1,048	3,499	941	4,440
1965	611	911	248	281	391	244	r 1,055	r 3,741	1,001	r 4,742
1966	573	1,047	242	284	414	280	r 1,069	r 3,909	r 1,033	r 4,942
1967	549	1,249	266	336	r 449	290	r 1,099	r 4,238	r 1,081	r 5,319
1968	529	1,273	265	r 321	r 466	291	r 1,208	r 4,353	r 1,146	r 5,499
1969P	553	1,316	279	347	556	297	1,292	4,640	1,187	5,827

e Estimate P Preliminary r Revised

1/ U.S. Bureau of Mines 2/ Czechoslovakia produces concentrate for export, and Rumania, North Vietnam, Brazil, and Hungary. Also produce zinc, but data not available. 3/ Recoverable

## MINE PRODUCTION OF ZINC (CONTENT OF ORE) SOVIET SPHERE 1/

Unit: Thousand Short Tons

COUNTRIES	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969P
Bulgaria	85	82	69	64	71	73	r 75	r 75	er 77	e 70
China, Mainland e/	88	110	110	110	110	110	110	r 100	110	110
Germany, East e/	8	8	8	11	11	11	13	13	13	13
Hungary e/	2	2	3	3	3	4	4	NA	NA	NA
Korea, North e/	95	100	100	110	110	115	115	r 125	r 130	138
Poland	159	154	160	162	166	168	166	173	182	184
U.S.S.R. e/	415	440	450	440	470	520	550	r 595	r 634	672
TOTAL	852	896	900	900	941	1,001	r 1,033	r 1,081	r 1,146	1,187

e Estimate P Preliminary r Revised NA Not Available

1/ U.S. Bureau of Mines

TABLE V

ZINC IMPORTED INTO, AND EXPORTED FROM THE UNITED STATES <sup>1/</sup>

Unit: Short Tons

Years	IMPORTS			EXPORTS	
	Ores	Blocks, Pigs or Slabs	TOTAL	Blocks, Pigs or Slabs	NET IMPORTS
1955	478,044	195,696	673,740	18,069	655,671
1956	525,350	244,978	770,328	8,813	761,515
1957	526,014	269,007	795,021	10,785	784,236
1958	461,560	195,199	656,759	2,073	654,686
1959	500,115	156,963	657,078	11,629	645,449
1960	457,155	120,767	577,922	75,144	502,778
1961	415,700	127,562	543,262	50,055	493,207
1962	467,398	141,957	609,355	36,102	573,253
1963	372,769	144,757	517,526	33,853	483,673
1964	357,145	118,340	475,485	26,515	448,970
1965	428,040	152,990	581,030	5,939	575,091 <sup>2/</sup>
1966	521,320	278,175	799,495	1,406	798,089 <sup>3/</sup>
1967	534,092	222,112	756,204	16,809	739,395 <sup>4/</sup>
1968	r 543,366	306,540	r 849,906	33,011	r 816,895 <sup>5/</sup>
1969	602,120	329,008	931,128	9,298	921,830 <sup>6/</sup>

<sup>1/</sup> U.S. Bureau of Mines<sup>2/</sup> 28.1% increase over 1964<sup>3/</sup> 38.8% increase over 1965<sup>4/</sup> 7.4% decrease from 1966<sup>5/</sup> 10.5% increase over 1967<sup>6/</sup> 12.8% increase over 1968

TABLE VI

CONSUMPTION OF SLAB ZINC IN UNITED STATES <sup>1/</sup>

Unit: Short Tons

Year	Galvan- izing	Brass Products	Zinc Base Alloy	Rolled Zinc	Zinc Oxide	Other <sup>2/</sup> Uses	Total Consumption
1955	451,141	146,243	430,807	51,589	22,433	17,599	1,119,812
1956	439,146	124,004	360,507	47,359	19,160	18,614	1,008,790
1957	367,757	112,390	376,039	41,269	20,428	17,737	935,620
1958	381,229	101,375	316,830	40,616	13,331	14,946	868,327
1959	361,027	129,278	389,331	42,949	18,248	15,364	956,197
1960	371,589	99,023	338,373	38,696	15,593	14,610	877,884
1961	382,077	128,523	341,766	41,204	18,137	19,506	931,213
1962	388,570	129,805	423,608	42,233	18,517	29,088	1,031,821
1963	420,287	128,237	468,619	42,166	16,037	29,767	1,105,113
1964	456,336	135,095	524,582	44,181	19,991	27,083	1,207,268
1965	482,421	126,848	637,970	45,882	25,781	35,190	1,354,092
1966	495,967	185,552	606,036	52,612	28,438	41,592	1,410,197
1967	458,605	131,537	535,118	45,443	29,774	36,331	1,236,808
1968	481,817	161,906	562,946	48,943	34,937	43,150	1,333,699
1969	476,324	179,469	576,391	48,650	41,447	46,042	1,368,323

<sup>1/</sup> U.S. Bureau of Mines<sup>2/</sup> Includes Zinc used in making Zinc Dust, Bronze Powder, Alloys, Chemicals, Castings and Miscellaneous uses not elsewhere mentioned.

TABLE VII  
SALIENT ZINC STATISTICS OF THE UNITED STATES 1/

Unit: Short Tons		
	1968	1969
Production:		
Mine, recoverable zinc	529,446	553,124
Smelter, slab zinc	1,100,756	1,111,150
Stocks of slab zinc, end of period:		
Producer	r 65,379	67,662
Consumer	r 101,818	100,492
Total	r 167,197	168,154
Imports (general)		
Ores and concentrates (zinc content)	r 543,366	602,120
Slab Zinc	306,540	329,008
Total	r 849,906	931,128
Exports:		
Slab Zinc	33,011	9,298
Consumption:		
Slab Zinc	1,333,699	1,368,323
Zinc in ores consumed directly (recoverable)	124,109	126,712
Zinc- base scrap (recoverable zinc content)	101,316	100,636
Copper-base scrap " " "	162,853	194,356
Aluminum & magnesium base scrap (recoverable zinc content)	6,423	7,083
Total	1,728,400	1,797,110

TABLE VIII  
ARIZONA AND WORLD MINE PRODUCTION OF RECOVERABLE ZINC 1/

Unit: Short Tons		
Arizona Mine Production	5,441	9,039
U.S. Mine Production	529,446	553,124
World Mine Production	r 5,498,997	5,826,621
U.S. Mine Prod. as % of U.S. Reported Consumption	36.3%	37.0%
Avg. Price of Zinc, E. St. Louis (E/MJ) <u>2/</u>	13.5¢	14.6¢

r Revised

TABLE IX  
U.S. CONSUMPTION OF SLAB ZINC 1/

Unit: Short Tons			
	1967	1968	1969
Galvanizers	458,605	481,817	476,324
Die Casters	535,118	562,946	576,391
Brass Product	131,537	161,906	179,469
Rolled Zinc	45,443	48,943	48,650
Zinc Oxide & Other	66,105	78,087	87,489
TOTAL SLAB ZINC CONSUMPTION	1,236,808	1,333,699	1,368,323

1/ U.S. Bureau of Mines

r Revised

2/ E/MJ Annual Average Metal Prices, Zinc PW, E. St. Louis

TABLE X

## IMPORTS AND EXPORTS OF ZINC INTO AND FROM THE UNITED STATES

YEARS 1967, 1968 and 1969 1/

Country of Origin	Unit: Short Tons		
	1967	1968	1969
Ores (Zinc Content)	534,092	r 543,366	602,120
Australia	4,836	2,267	2,940
Bolivia	9,576	r 6,011	2,069
Canada	289,387	310,586	367,529
Germany, West	6,248	5,942	---
Honduras	9,727	12,959	15,272
Mexico	119,135	142,313	143,747
Morocco	6,516	15,715	5,988
Peru	69,357	39,899	57,087
South Africa, Republic of	8,419	4,287	6,525
Other Countries	10,891	3,387	963
Blocks, Pigs or Slabs	222,112	306,540	329,008
Australia	7,187	19,915	34,237
Belgium-Luxembourg	16,100	16,500	16,361
Canada	80,487	118,701	152,947
Congo, Republic of the (Kinshasa)	2,921	8,146	4,801
Japan	41,621	45,735	52,502
Mexico	18,673	19,034	12,092
Peru	33,568	53,729	30,204
Poland	9,870	9,454	9,495
United Kingdom	1,145	3,398	1,086
Yugoslavia	474	-----	385
Other Countries	10,066	11,928	14,898
TOTAL IMPORTS	756,204	r 849,906	931,128
TOTAL EXPORTS (Slab Zinc)	16,809	33,011	9,298
EXCESS IMPORTS	739,395	r 816,895	921,830

1/ U.S. Bureau of Mines



PART III

ARIZONA

LEAD and ZINC

1969

	<u>Pages</u>
Arizona Lead and Zinc Production in 1969	29
Mine Production of Gold, Silver, Copper, Lead and Zinc in Arizona, 1969, by Classes or Ore or Other Source Materials	TABLE I 30
Production of Lead and Zinc in Arizona, Tons, Value and Prices, from 1948 to 1969	TABLE II 31



## Arizona Lead and Zinc Production in 1969

Arizona produced 217 tons of recoverable lead and 9,039 tons of recoverable zinc in 1969. While this was roughly one-eighth of the State's 1968 lead production, zinc output marked a turn-around and increased 66 percent over the 1968 figure of 5,441 tons.

While this lead output represented an infinitesimal part (0.04 percent) of the total domestic lead production, Arizona's zinc output increased to 1.6 percent (from 1.0) of the total U.S. recoverable zinc production. Arizona dropped to 16th place in a state-by-state lead production comparison for 1969 but returned to 14th place (from 16th) in zinc output.

Due to the closing of the Iron King mine in December, 1968, Arizona had no representation in a list of the 25 leading lead-producing mines in the United States in 1969 according to the U.S. Bureau of Mines. (The mine ranked 21st in 1968).

The State had no representation on a similar list of zinc-producing mines in 1968. However, in 1969, the Bruce mine, the Cyprus Mines Corporation subsidiary, (formerly known as the Old Dick mine, in Yavapai County) occupied the 20th spot in the Bureau of Mines listing.

Cyprus Mines reported that their 330 ton mill, located on the property, operated near capacity in 1969 and produced 6.4 million pounds of copper and 16.9 million pounds of zinc in concentrates.

The newly developed, Bruce, underground orebody was reported to be similar in character to that mined from the Old Dick orebody, depleted in 1966. The Company indicated that the new ore had been developed at depths ranging from 950 to 2,150 feet below the surface and that reserves between these levels were sufficient to sustain current production rates about 6 years.

Santa Cruz, Yavapai, and Yuma counties produced the principal amounts of Arizona's 1969 lead while Yavapai county accounted for over 93 percent of the state's recoverable zinc production.

TABLE I  
MINE PRODUCTION OF GOLD, SILVER, COPPER, LEAD AND ZINC IN ARIZONA, 1969, BY CLASSES  
OF ORE OR OTHER SOURCE MATERIALS, IN TERMS OF RECOVERABLE METALS <sup>1/</sup>

Source	Number of mines <sup>2/</sup>	Material sold or treated (short tons)	Gold (troy ounces)	Silver (troy ounces)	Copper (thousand pounds)	Lead (thousand pounds)	Zinc (thousand pounds)
Lode ore:							
Dry gold-----	7	512	500	25	5	---	-----
Dry gold-silver-----	8	63,565	139	4,245	1,057	---	-----
Dry silver-----	18	104,272	153	83,110	677	13	(3/)
Total 4/-----	33	168,349	792	87,380	1,738	13	(3/)
Copper-----	45	127,848,828	108,718	5,899,843	1,477,520	1	478
Copper-lead and lead-zinc 5/-----	2	2,945	4	3,674	28	241	208
Copper-zinc-----	1	103,838	26	36,460	6,404	34	17,307
Lead-----	8	571	106	5,224	1	126	8
Total 4/-----	56	127,956,182	108,854	5,945,201	1,483,953	403	18,001
Other "lode" material:							
Gold-silver tailings----	1	59,199	533	21,211	176	---	-----
Gold-silver cleanup----	(6/)	20	2	25	1	---	-----
Silver tailings-----	1	32,142	341	85,723	---	---	-----
Copper cleanup-----	(6/)	178	6	213	37	---	-----
Copper precipitates-----	15	83,418	---	---	116,023	---	-----
Copper tailings-----	1	133,617	---	---	749	---	-----
Lead cleanup, zinc cleanup, and uranium ore 5/-----	(6/)	7/ 217	345	1,269	48	18	76
Total 4/-----	18	308,791	1,227	108,441	117,034	18	76
Total "lode" material-	90	128,433,322	110,873	6,141,022	1,602,726	434	18,078
Placer-----	1	-----	5	-----	-----	---	-----
Total all sources-----	91	128,433,322	110,878	6,141,022	1,602,726	434	18,078

<sup>1/</sup> U.S. Bureau of Mines

<sup>2/</sup> Detail will not necessarily add to totals because some mines produce more than one class of material

<sup>3/</sup> Less than ½ unit

<sup>4/</sup> Data may not add to totals because of independent rounding

<sup>5/</sup> Combined to avoid disclosing individual company confidential data

<sup>6/</sup> From properties not classed as mines      <sup>7/</sup> Excludes uranium ore tonnage

TABLE II  
PRODUCTION OF LEAD AND ZINC IN ARIZONA

Year	No. of Mines Est. By U.S.B.M.	Tons Material Treated	Tons Lead Produced	Tons Zinc Produced	Value of Lead Produced	Value of Zinc Produced	E/MJ Annual Average Price	
							Lead	Zinc
1948	189	797,292	29,899	54,478	\$10,704,000	\$14,491,000	r18.0¢	r13.6¢
1949	174	968,301	33,568	70,658	\$ 10,607,000	\$17,523,000	r15.4¢	r12.1¢
1950	139	888,099	26,383	60,480	\$ 7,123,000	\$17,176,000	r13.3¢	r13.9¢
1951	136	954,985	17,394	52,999	\$ 6,018,000	\$19,292,000	r17.5¢	r18.0¢
1952	112	819,752	16,520	47,143	\$ 5,319,000	\$15,651,000	r16.5¢	r16.2¢
1953	68	452,660	9,428	27,530	\$ 2,470,000	\$r6,332,000	r13.5¢	r10.9¢
1954	45	346,313	8,385	21,461	\$ 2,297,000	\$r4,636,000	r14.0¢	r10.7¢
1955	46	408,486	9,817	22,684	\$ 2,925,000	\$ 5,580,000	r15.1¢	12.3¢
1956	46	452,191	11,999	25,580	\$r3,768,000	\$r7,007,000	r16.0¢	r13.5¢
1957	45	481,327	12,441	33,905	\$ 3,558,000	\$r7,866,000	r14.7¢	r11.4¢
1958	31	388,987	11,890	28,532	\$ 2,782,000	\$r5,821,000	r12.1¢	r10.3¢
1959	22	449,166	9,999	37,325	\$r2,300,000	\$r8,585,000	r12.2¢	r11.4¢
1960	22	515,075	8,495	35,811	\$r1,988,000	\$ 9,239,000	r11.9¢	12.9¢
1961	22	433,680	5,937	29,585	\$r1,223,000	\$ 6,804,000	10.9¢	11.5¢
1962	16	487,115	6,966	32,888	\$r1,282,000	\$r7,564,000	9.6¢	11.6¢
1963	17	419,853	5,815	25,419	\$ 1,256,000	\$ 5,846,000	11.1¢	12.0¢
1964	17	447,372	6,147	24,690	\$ 1,611,000	\$ 6,716,000	r13.6¢	13.6¢
1965	16	425,895	5,913	21,757	\$r1,845,000	\$r6,353,000	16.0¢	14.5¢
1966	r17	342,279	5,211	15,985	\$ 1,575,000	\$ 4,636,000	15.115¢	14.5¢
1967	r12	r362,776	4,771	14,330	\$ 1,336,000	\$ 3,967,000	14.000¢	13.8¢
1968	r12	r121,348	1,704	5,441	\$ 450,000	\$ 1,469,000	13.212¢	13.5¢
1969	11	107,354	217	9,039	\$ 65,000	\$ 2,639,000	14.895¢	14.6¢