

Minerals Year 1967

Volume I-II

METALS, MINERALS, AND



Prepared by staff of
BUREAU OF MINERAL INVESTIGATION

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indicates a \$26.9 million drop in comparison with that of 1966.

The expansion program increasing capacity at the Herculaneum, Mo., smelter of St. Joseph Lead Co. to over 200,000 tons of refined lead annually, was completed early in 1967 after a conversion shutdown period begun in December 1966. Herculaneum production from company concentrates in 1967 totaled 120,207 tons of lead metal in comparison with 90,729 tons in 1966. Output curtailed by equipment adjustments approached capacity during the closing months of the year.

Operations at the Tooele, Utah, smelter of International Smelting & Refining Co. were suspended on May 18 in the wake of an explosion in the air blower system, without employee injury, which necessitated extensive repairs prior to resumption of operations in late June.

The 50th anniversary of the blowing in of the Bunker Hill lead smelter was observed in July. In the period, starting July 5, 1917, the plant has produced over 3.3 million tons of lead and 368 million ounces of silver. The modernization and expansion program continued at the smelter with installation of a downdraft sintering machine and exhaust gas system underway to eliminate air pollution and increase sulfuric acid plant output.

Secondary lead output decreased about 19,100 tons to 553,800 tons from the high level of 1966. Primary plants reported an output of only 10,300 tons of secondary lead in comparison with 19,800 tons in 1966. The major demand continued in antimonial lead with a record output of 288,700 tons, 52 percent of the total secondary. The major decline was in other lead alloys, which decreased from 23 percent of the total in 1966 to 21 percent. Soft lead output continued at about the same level undoubtedly reflecting some demand resulting from the decreased domestic primary output of refined lead.

CONSUMPTION AND USES

Consumption of lead declined in 1967 after five successive years of growth culminating in the record high of 1.32 million tons in 1966. Total consumption of 1.26 million tons in 1967 represented a decrease of 63,400 tons or 4.8 percent. Industry requirements again exceeded 100,000 tons monthly except for February and the vacation month of July. Consumption in

Secondary lead in 1967 represented 59 percent of the domestic production of lead from all materials and 43 percent of total supply including metal imports for consumption. This compares with 56 percent and 44 percent, respectively, in 1966.

Raw Material Source.—The domestic component of smelter feed reversed the upward trend of recent years and represented 68 percent of the 389,000 tons of primary metal in comparison with 72 percent of the 451,900 tons in 1966. Imported ores and bullion supplied 125,000 tons of metal. The smelting of scrap at primary plants continued to decrease from the high of 1965 and in 1967 contributed only 10,300 tons, principally as antimonial lead. Raw materials and material in process at primary plants at the beginning of the year totaled 136,200 tons, lead content, of which 94,900 tons was primary and secondary materials for smelting and 41,300 tons was in the process of smelting and refining. Stocks of materials were gradually built up to a high of 164,900 tons at the end of October and then drawn down to end the year at 150,300 tons, of which 105,000 tons was available for smelting and 45,300 tons was in the process of smelting.

Consumption of scrap materials* during the year was 726,300 tons, gross weight, in comparison with 741,000 tons in 1966 and 748,300 tons in 1965. Receipts of scrap at consuming plants were essentially in balance with consumption, with stocks ranging from 52,800 tons at the beginning of the year to lows of 47,200 tons in March and September, and ending the year at 58,000 tons. Battery plates supplied 73 percent of the old scrap consumed in comparison with 70 percent in 1966, and drosses and residues from manufacturing and foundry sources accounted for all of the new scrap processed amounting to 101,100 tons in comparison with 112,000 tons in 1966.

each month except January and April, however, was well below that of the corresponding month in 1966. The daily average was 3,453 tons in comparison with the 3,627-ton average in 1966. The decrease in consumption was distributed over all types of lead—soft lead, antimonial lead, and lead alloys—and over all product categories except chemicals. The two

major uses of lead—batteries and gasoline antiknock compounds—held up well, however, with battery requirements down only 5,800 tons (1 percent) and antiknock compounds slightly increased. These two major end products required almost 57 percent of the total lead consumed and ammunition moved into third place in 1967 supplanting red lead and litharge.

The requirements for ammunition have increased 29,000 tons since 1963, influenced by increased military needs as well as the use of sporting ammunition. The relatively unchanged requirements for collapsible tubes, foil, plumbing, white lead, and pigments was noteworthy. A significantly lower consumption in calking lead accelerated the downward trend in this use area and solder requirements, after a slight gain in 1966, were much lower in 1967. The use of lead in red lead and litharge, after an abnormally high level in 1966, decreased to approximately the level existing in 1964–65 and requirements for type metal and terne metal continued to decline.

The manufacture of storage batteries, the largest use of lead, consumed 245,200 tons of soft lead and 221,500 tons of lead in antimonial lead in comparison with 237,400 tons of soft lead and 234,600 tons of antimonial lead in 1966. Batteries are of two categories—starting-lighting-ignition (S.L.I.) batteries used in conjunction with internal combustion engines and the industrial batteries used for power, lighting, and communications. Industrial batteries over the past 8 years have required from 10 to 12 percent of the total lead used in batteries. Shipments of S.L.I. batteries both for original equipment and replacement, totaled 41.5 million units in 1967 in comparison with 43 million units in 1966. Shipments of replacement batteries, only slightly below the 1966 total, represented 77 percent of the total; original equipment batteries, down to 9.3 million from 10.7 million units in 1966, represented 22 percent; and export of 204,400 batteries accounted for the remaining 1 percent. Technological advances in battery manufacture and in improved charging equipment has materially reduced the weight of lead per battery unit to the present average of 18.8 pounds and has increased battery life from an average of 20 months in 1950 to 27 months in 1966. Greater emphasis on methods of combating air pollution has served to point up the

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with 58 percent in 1966. Litharge, the other large item, consumed 28 percent in comparison with 30 percent in 1966.

Distribution of shipments of pigments and oxides reflected the diminishing requirements for white lead and red lead in the paint industry. The ceramic requirements for white lead, red lead, and litharge also decreased as did the use of litharge in oil refining, rubber processing, and varnish manufacture. Manufacturers' shipments not specifically defined as to end product represent a major tonnage of white lead, red lead, and litharge and a substantial decline was posted for the "Other" categories for each of these materials in comparison to the high requirements of 1966.

Prices.—The quoted price of lead pigments and oxides was unchanged during the year reflecting the stable price of lead. Basic carbonate white lead was quoted at 20.5 cents per pound in carload lots, freight allowed. Red lead, 95 percent Pb_3O_4 , in carload lots, at works, was quoted at 16.75 cents per pound effective in mid-October 1966. The price of litharge was 16.25 cents per pound for commercial grade, powdered, in carload lots, at works, also effective in mid-October 1966.

Shipments of dry white lead declined in average value per ton from \$412 to \$407 while the average value of white lead in oil increased from \$658 to \$677 per ton. The total valuation of white lead shipments decreased about \$1.3 million. Red lead shipments declined in average value from \$361 to \$342 per ton and litharge from \$341 to \$321 per ton and total value decreased \$5.4 million. The total value of shipments of white lead, red lead, and litharge was \$46.8 million, a decrease of

16 percent in comparison with the \$56 million value in 1966.

Foreign Trade.—The export of lead oxides, pigment grade, including compounds of lead arsenate and others, decreased from 2,600 tons valued at \$1.04 million in 1966 to 1,909 tons valued at \$772,500 in 1967. Canada was the leading importer at 666 tons followed by the United Kingdom, 175 tons and South Viet-Nam, 115 tons. Twelve other countries received shipments ranging from 15 to 84 tons and small shipments aggregating 213 tons were consigned to various other countries.

Imports for consumption of lead pigments and compounds was slightly higher in tonnage but declined in value some \$784,000. White lead was received, in order of importance, from West Germany, Canada, Netherlands, the United Kingdom, and Japan. Red lead was chiefly supplied by Mexico (45 percent), France (26 percent), and West Germany (25 percent), with Denmark, the United Kingdom, and Belgium-Luxembourg the other suppliers. Litharge, representing 80 percent of the lead pigments and compounds imports, was predominantly from Mexico, 98 percent, with France, West Germany, Belgium-Luxembourg, Netherlands, and Canada the other sources. Other pigments, including leaded zinc oxide, blue lead, orange mineral, and unspecified, aggregated 74 tons and came predominantly from West Germany and the United Kingdom. Lead nitrate imports of 220 tons from the United Kingdom and Republic of South Africa and 130 tons of unspecified lead compounds, mainly from Canada, made up the 350 tons of other lead compounds.

STOCKS

The stock position of all segments of the lead industry improved in 1967 although still well below normal levels. Primary producer stocks of refined lead at the beginning of the year amounted to 16,200 tons and antimonial lead stocks were 6,400 tons. The combined stocks gradually increased through May to 33,700 tons, declined to close the year at 18,200 tons of refined lead and 5,200 tons of lead in antimonial lead. The combined stocks of metal at primary plants has thus ranged from 25,200 tons in 1965 to 22,600

tons in 1966 and 23,400 tons in 1967. The total lead in primary materials, including ore, bullion, in process, in transit, and refined, as reported by the American Bureau of Metal Statistics at yearend 1967 was 189,900 tons in comparison with 177,100 tons at yearend 1966 and the low of 140,800 tons at yearend 1965.

Consumer and secondary stocks of lead in all forms opened the year at 90,300 tons and increased moderately to a peak of 114,200 tons in July and then declined to 105,800 tons at yearend. The major

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increase was in soft lead which comprised 57 percent of total stocks. Government inventory tons to a

PRICES

The domestic quoted price for common lead at New York, after two decreases of 1 cent per pound in 1966 from the December 1964 peak of 16 cents per pound, was unchanged at 14 cents per pound throughout the year. The foreign market, as illustrated by the London Metal Exchange, was relatively stable with daily fluctuations within a narrow range. The average monthly price in U.S. currency equivalent ranged from a low of slightly under 10 cents per pound in January to

a high of differential between the well above additional New York a favorab The G was at equivalen the vario tion stora

FOREIGN TRADE

The foreign market for domestic raw materials and refined metal continued unfavorable during 1967. The 1,000-ton increase in refined exports resulted mainly from larger metal shipments to Japan and, also, increased small-lot shipments to other countries. Scrap shipments abroad continued to decline indicating the upward trend in lead raw material availability at the European smelters.

General imports of ore and bullion during the first 6 months of 1967 were 15,800 tons or 23 percent above the receipts during the like period in 1966. The strike closure of domestic smelters relying on foreign ores during the last half of the year resulted in a 15-percent decrease for the year. General imports of metal, however, posted a 38-percent increase for the first 6 months and 27 percent for the year in comparison with the like periods in 1966. A large tonnage of lead in ore was moved from bond into commercial channels in 1967 and imports for consumption exceeded general imports by over 20,000 tons. Metal deliveries were entered for duty payment as landed and general imports and imports for consumption were identical in 1967. General scrap receipts were about 900 tons above the amount

entered ore and value of \$30. \$220 in \$88.7 million year. Imp pipe, and to contin Four c ada, and of the o consump than land down of b ing metal total follo Germany, six count the meta the 90,00 European Luxembor Kingdom tons in movement compensa mestic ou

WORLD REVIEW

Statistical summaries of world production and consumption of lead compiled by the Bureau of Mines, American Bureau of Metal Statistics (ABMS), and the International Lead and Zinc Study Group

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Table 10.—Secondary lead recovered in the United States

(Short tons)

	1963	1964	1965	1966	1967
As metal:					
At primary plants.....	3,741	8,505	13,140	9,004	2,538
At other plants.....	130,788	140,702	168,774	147,215	147,806
Total.....	134,529	149,207	181,914	156,219	150,344
In antimonial lead:					
At primary plants.....	7,672	13,421	19,299	10,758	7,808
At other plants.....	237,126	257,101	261,364	272,977	280,911
Total.....	244,797	270,522	270,653	283,735	288,719
In other alloys.....	114,145	121,863	123,252	132,880	114,709
Grand total:					
Quantity.....	493,471	541,682	575,819	572,834	553,772
Value (thousands).....	\$106,590	\$141,894	\$179,656	\$167,268	\$148,411

Table 11.—Lead recovered from scrap processed in the United States, by kind of scrap and form of recovery

(Short tons)

Kind of scrap	1966	1967	Form of recovery	1966	1967
New scrap:			As soft lead:		
Lead-base.....	79,573	71,829	At primary plants.....	9,004	2,538
Copper-base.....	7,424	4,500	At other plants.....	147,215	147,806
Tin-base.....	608	578	Total.....	156,219	150,344
Total.....	87,605	76,907	In antimonial lead ¹	283,735	288,719
Old scrap:			In other lead alloys.....	108,264	96,884
Battery-lead plates.....	285,489	303,258	In copper-base alloys.....	24,566	17,795
All other lead-base.....	179,502	155,892	In tin-base alloys.....	50	30
Copper-base.....	20,334	17,711	Total.....	416,615	403,428
Tin-base.....	4	4	Grand total.....	572,834	553,772
Total.....	485,329	476,865			
Grand total.....	572,834	553,772			

¹ Includes 10,758 tons of lead recovered in antimonial lead from secondary sources at primary plants in 1966 and 7,808 tons in 1967.

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Table 12.—Lead consumption in the United States

(Short tons)

Product	1966	1967	Product
Metal products:			
Ammunition.....	78,435	78,766	Pigments—Copper.....
Bearing metals.....	21,588	19,561	Pigment c.....
Brass and bronze.....	25,447	20,467	Other.....
Cable covering.....	66,491	63,037	Total.....
Calking lead.....	63,250	48,789	
Coating metals.....	6,671	10,083	Chemicals:
Collapsible tubes.....	11,987	11,299	Gasoline a.....
Foil.....	6,041	6,148	additive.....
Pipes, traps, and bends.....	19,984	20,184	Miscellaneous.....
Sheet lead.....	28,938	26,763	chemi.....
Solder.....	78,898	68,833	Total.....
Storage batteries:			
Battery grids, posts, etc.....	240,635	229,287	Miscellaneous.....
Battery oxides.....	231,957	237,378	Annealing.....
Terne metal.....	1,966	1,620	Galvanizing.....
Type metal.....	30,421	28,554	Lead plati.....
Total.....	912,609	870,769	Weights and.....
Pigments:			Total.....
White lead.....	8,131	8,087	Other, unclassi.....
Red lead and litharge.....	89,600	76,589	Grand total.....

¹ Includes lead content of leaded zinc oxide and other pigments.
² Includes lead which went directly from scrap to fabricated products.

Table 13.—Lead consumption in the United States

(Short tons)

Month	1966	1967	Month
January.....	104,651	107,431	August.....
February.....	101,606	99,789	September.....
March.....	114,670	112,912	October.....
April.....	106,834	106,964	November.....
May.....	113,849	110,808	December.....
June.....	110,555	108,011	Total.....
July.....	93,238	84,161	

¹ Includes lead content of leaded zinc oxide and other pigments and fabricated products.

Table 14.—Lead consumption in the United States by types of material

(Short tons)

Product	Soft lead	Lead in antimonial lead
Metal products.....	195,869	103,371
Storage batteries.....	245,208	221,461
Pigments.....	100,967	18,718
Chemicals.....	247,779	1,689
Miscellaneous.....	10,676	11,600
Unclassified.....	13,928	1,689
Total.....	814,427	338,327

¹ Excludes 39,513 tons of lead which went directly from scrap to fabricated products contained in leaded zinc oxide and other nonspecified pigments.

Table 15.—Lead consumption in the United States in 1967, by States¹

State	(Short tons)				Total
	Refined soft lead	Lead in antimonial lead	Lead in alloys	Lead in copper-base scrap	
California.....	88,663	31,097	5,204	905	125,869
Colorado.....	1,070	2,714	72	.....	3,856
Connecticut.....	16,233	16,112	124	1,169	32,638
District of Columbia.....	154	.....	.....	.....	154
Florida.....	5,255	4,914	.....	.....	10,169
Georgia.....	35,545	11,729	2,019	.....	49,293
Illinois.....	86,431	51,679	8,936	2,067	148,113
Indiana.....	74,835	42,175	1,282	742	119,034
Kansas.....	10,784	9,141	41	312	20,278
Kentucky.....	2,546	6,290	3	.....	8,839
Maryland.....	3,454	18,562	212	.....	22,228
Massachusetts.....	3,706	1,700	500	162	6,068
Michigan.....	13,256	14,542	1,837	598	30,233
Missouri.....	35,425	10,923	159	499	47,006
Nebraska.....	2,306	1,017	68	660	4,651
New Jersey.....	123,239	19,414	8,751	497	151,901
New York.....	38,239	2,905	13,314	778	55,236
Ohio.....	13,360	3,186	3,159	1,049	20,754
Pennsylvania.....	50,935	29,830	1,180	2,687	84,632
Rhode Island.....	1,351	409	41	.....	1,801
Tennessee.....	189	10,714	286	310	11,499
Virginia.....	1,973	995	790	1,379	5,137
Washington.....	6,837	499	307	.....	7,643
West Virginia.....	17,036	3,259	.....	.....	20,295
Wisconsin.....	2,997	2,461	106	116	5,680
Alabama and Mississippi.....	874	2,380	.....	652	3,906
Arkansas and Oklahoma.....	4,453	3,734	79	.....	8,266
Hawaii and Oregon.....	1,071	2,650	2	35	3,758
Iowa and Minnesota.....	3,807	7,691	128	439	12,065
Louisiana and Texas.....	157,270	17,973	2,082	381	177,706
Montana and Idaho.....	5,472	.....	10	190	5,472
New Hampshire, Maine, Vermont, Delaware.....	4,612	5,909	.....	.....	10,721
North and South Carolina.....	1,445	2,719	.....	.....	4,164
Utah, Nevada, Arizona.....	104	.....	.....	.....	104
Total.....	814,427	338,323	50,692	15,527	1,218,969

¹ Excludes 39,513 tons of lead which went directly from scrap to fabricated products and 2,034 tons of lead contained in leaded zinc oxide and other non-specified pigments.

Table 16.—Production and shipments of lead pigments¹ and oxides in the United States

Pigment	1966				1967			
	Production (short tons)	Shipments			Production (short tons)	Shipments		
		Short tons	Value ²	Average per ton		Short tons	Value ²	Average per ton
White lead:								
Dry.....	9,680	10,909	\$4,492,202	\$412	7,316	8,871	\$3,609,808	\$407
In oil ³	2,619	3,967	2,610,603	658	2,807	3,257	2,205,973	677
Total.....	12,299	14,876	7,102,805	477	10,123	12,128	5,815,781	480
Red lead.....	31,080	31,270	11,302,545	361	26,869	25,741	8,814,995	342
Litharge.....	108,098	110,303	37,580,505	341	95,581	99,982	32,135,289	321
Black oxide.....	198,941	.....	.....	.....	203,571	.....	.....	.....

¹ Except for basic lead sulfate, figures withheld to avoid disclosing individual company confidential data.

² At plant, exclusive of container.

³ Weight of white lead only, but value of paste.

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Table 17.—Lead content of lead and zinc pigments¹ and domestic manufacturers, by source (Short tons)

Pigment	1966			Total lead in pigments	Lead in domestic manufacturers
	Lead in pigments produced from—		Pig lead		
	Ore				
	Domestic	Foreign			
White lead.....	.....	.....	9,839	9,839	.....
Red lead.....	.....	.....	28,174	28,174	.....
Litharge.....	.....	.....	100,531	100,531	.....
Black oxide.....	.....	.....	190,931	190,931	.....
Leaded zinc oxide.....	1,247	528	.....	1,775	.....
Total.....	1,247	528	329,475	331,250	.....

¹ Excludes lead in basic lead sulfate, figures withheld to avoid disclosing data.

Table 18.—Distribution of white lead (dry and in oil) (Short tons)

Industry	1963	1964
Paints.....	11,358	10,531
Ceramics.....	138	11
Other.....	3,906	4,778
Total.....	15,402	15,420

¹ Excludes basic lead sulfate, figures withheld to avoid disclosing data.

Table 19.—Distribution of red lead shipments (Short tons)

Industry	1963	1964
Paints.....	13,213	14,111
Storage batteries.....	W	W
Ceramics.....	W	W
Other.....	13,032	13,900
Total.....	26,245	28,011

W Withheld to avoid disclosing individual company confidential data.

Table 20.—Distribution of litharge shipments (Short tons)

Industry	1963	1964
Ceramics.....	17,762	20,508
Chrome pigments.....	6,763	6,421
Floor covering.....	W	W
Insecticides.....	W	W
Oil refining.....	1,973	2,142
Rubber.....	1,702	1,978
Storage batteries.....	W	W
Varnish.....	4,240	4,004
Other.....	72,394	64,388
Total.....	103,834	99,398

W Withheld to avoid disclosing individual company confidential data.

Table 21.—U.S. imports for consumption of lead pigments and compounds

Kind	1966		1967	
	Short tons	Value (thousands)	Short tons	Value (thousands)
White lead.....	1,916	\$668	2,293	\$672
Red lead.....	2,130	691	3,296	761
Litharge.....	25,638	5,685	24,632	4,969
Other lead pigments.....	78	19	74	22
Other lead compounds.....	736	390	350	145
Total.....	30,497	7,353	30,645	6,569

Table 22.—Stocks of lead at primary smelters and refineries in the United States, Dec. 31 (Short tons)

Stocks	1963	1964	1965	1966	1967
Refined pig lead.....	48,780	34,100	17,524	16,175	18,243
Lead in antimonial lead.....	7,890	4,012	7,680	6,396	5,119
Lead in base bullion.....	14,947	13,218	10,735	15,606	16,622
Lead in ore and matte.....	49,219	33,068	47,504	77,296	85,495
Total.....	120,836	84,398	83,443	115,473	125,479

Table 23.—Consumer stocks of lead in the United States, Dec. 31, by types of material (Short tons, lead content)

Year	Refined soft lead	Lead in antimonial lead	Lead in alloys	Lead in copper-base scrap	Total
1963.....	71,558	40,606	6,558	1,208	119,930
1964.....	69,361	35,163	7,933	987	113,444
1965.....	61,586	36,190	10,406	1,013	109,195
1966.....	44,490	34,704	10,071	1,041	90,306
1967.....	59,837	35,879	8,919	1,151	105,786

Table 24.—Average monthly and yearly quoted prices of lead at St. Louis, New York and London¹ (Cents per pound)

Month	1966			1967		
	St. Louis	New York	London ²	St. Louis	New York	London ²
January.....	15.80	16.00	13.68	13.80	14.00	9.96
February.....	15.80	16.00	13.23	13.80	14.00	10.04
March.....	15.80	16.00	13.26	13.80	14.00	10.34
April.....	15.80	16.00	12.69	13.80	14.00	10.28
May.....	14.94	15.14	11.84	13.80	14.00	10.35
June.....	14.80	15.00	11.71	13.80	14.00	10.31
July.....	14.80	15.00	11.90	13.80	14.00	10.44
August.....	14.80	15.00	11.93	13.80	14.00	10.51
September.....	14.80	15.00	11.41	13.80	14.00	10.23
October.....	14.04	14.24	10.57	13.80	14.00	10.18
November.....	13.80	14.00	10.07	13.80	14.00	10.44
December.....	13.80	14.00	10.14	13.80	14.00	10.12
Average.....	14.92	15.12	11.87	13.80	14.00	10.28

¹ St. Louis: Metal Statistics, 1968. New York: Metal Statistics, 1968. London: Metals Week.
² Based on monthly rates of exchange by Federal Reserve Board.

Table 25.—U.S. exports of lead, by countries¹

Destination	(Short tons)		
	1965	1966	1967
Pigs, bars and anodes:			
Belgium.....	691	1,115	13
Brazil.....	1	799	558
Canada.....	213	299	353
Colombia.....	428	630	237
Italy.....	259	12	42
Japan.....	585	15	1,402
Mexico.....	128	156	200
Netherlands.....	336	118	166
Philippines.....	129	68	119
Spain.....	348	11	1
Switzerland.....	289	1	(?)
Taiwan.....	73	233	190
United Kingdom.....	1,928	200	321
Venezuela.....	363	346	206
Viet-Nam, South.....	639	521	19
Other.....	1,401	1,011	2,719
Total.....	7,811	6,436	6,536
Scrap:			
Belgium.....	243	101	35
Luxembourg.....	161	—	56
Canada.....	2,348	5	—
Germany, West.....	12	—	16
Italy.....	235	238	139
Japan.....	83	138	120
Netherlands.....	584	—	—
United Kingdom.....	127	16	28
Yugoslavia.....	—	—	—
Other.....	—	—	—
Total.....	3,793	498	394
Grand total.....	11,604	6,933	6,930

¹ In addition foreign lead was reexported as follows: pigs, bars and anodes, 1965, 659 tons; 1966, 7 tons; 1967, 162 tons. Scrap, 1965, 99 tons; 1966-67, none.
² Less than 1/4 unit.

Table 26.—U.S. imports¹ of lead, by countries

Country	(Short tons)		
	1965	1966	1967
Ore, blue dust, and matte (lead content):			
Australia.....	26,658	22,614	25,553
Bolivia.....	5,096	11,136	13,764
Canada.....	43,622	52,707	33,474
Colombia.....	677	445	561
Guatemala.....	18	35	197
Honduras.....	8,712	11,132	6,513
Mexico.....	760	624	314
Peru.....	26,419	41,610	36,734
Philippines.....	106	164	37
South Africa.....	—	—	—
Republic of.....	10,570	1,394	359
Other.....	23	2,130	6,561
Total.....	122,661	143,991	124,067

¹ Data lead import material

Table 27.—U.S. imports for consumption¹ of lead, by countries

(Short tons)			
Country	1965	1966	1967
Ore, flue dust, and matte (lead content):			
Australia.....	23,408	21,460	37,879
Bolivia.....	3,885	1,454	14,707
Canada.....	33,637	23,617	41,416
Colombia.....	439	228	892
Honduras.....	7,406	3,506	5,350
Mexico.....	577	425	409
Peru.....	30,732	10,177	40,321
Philippines.....	96		264
South Africa, Republic of.....	28,712	2,963	478
Sweden.....			2,377
Other.....	41	20	63
Total.....	128,933	63,850	144,156
Base bullion (lead content):			
Australia.....	448	1,272	
Belgium.....			442
Luxembourg.....			23
Canada.....	50	62	
Germany, West.....		56	20
Mexico.....	43	474	66
Peru.....	25	64	
United Kingdom.....			71
Other.....	(?)		55
Total.....	566	1,928	677
Pigs and bars (lead content):			
Australia.....	50,484	44,160	53,156
Belgium.....	422	2,535	23,281
Luxembourg.....		5,532	2,548
Burma.....	31,697	34,283	37,236
Canada.....	514	672	423
Denmark.....			
Germany, West.....	2,161	15,499	49,077
Japan.....	4,363	2,106	
Mexico.....	73,386	75,394	57,271
Morocco.....	112		2,413
Netherlands.....	224	5,137	878
Peru.....	27,484	51,593	70,377
South Africa, Republic of.....	3,002	11,925	6,989

Table 27.—U.S. imports for consumption¹ of lead, by countries—Continued

(Short tons)			
Country	1965	1966	1967
Pigs and bars (lead content):			
United Kingdom.....	425	3,101	17,680
Yugoslavia.....	28,639	31,322	30,478
Other.....	548	2,529	11,789
Total.....	223,461	286,788	363,596
Reclaimed scrap, etc. (lead content):			
Australia.....	23	61	67
Canada.....	3,127	2,807	6,340
Dominican Republic.....		179	248
Germany, West.....	1		1,568
Japan.....	42		13
Mexico.....	328	314	278
Netherlands.....			167
Antilles.....		188	80
New Zealand.....		80	374
Panama.....	45		
Peru.....		150	
Other.....	46	127	233
Total.....	3,612	3,956	9,368
Sheets, pipe, and shot:			
Belgium.....	121	219	513
Luxembourg.....	83	30	99
Canada.....			
Germany, West.....	5	134	2
Mexico.....	265		
Netherlands.....	377	514	402
Other.....	29	22	196
Total.....	880	919	1,212
Grand total.....	357,452	366,441	519,009

¹ Excludes imports for manufacture in bond and export, classified as "imports for consumption" by the Bureau of the Census.

² Less than 1/2 unit.

LEAD

Table 28.—U.S. imports for consumption of lead

(Thousand short tons and thousand dollars)

Year	Lead in ore, flue dust or fume, and matte, n.a.p.f. (lead content)		Lead in base bullion (lead content)		Pigs and bars (lead content)		Reclaimed scrap, etc. (lead content)	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1965.....	129	\$26,923	1	\$380	228	\$60,924	4	
1966.....	64	13,871	2	575	285	75,312	4	
1967.....	144	29,111	1	1,224	364	88,697	9	

¹ Revised.

² Excludes imports for consumption in bond and export, classified as "Imports for consumption" by the Bureau of the Census.

Table 29.—U.S. imports for consumption of miscellaneous

Year	B and G	
	Quantity	Value
1965.....	3	
1966.....	1	
1967.....		

blast-furnace slags containing about 7 to 13 percent zinc. Such slags were treated

to extract zinc and remaining lead by the following companies in 1967:

<i>Company</i>	<i>Plant location</i>
American Smelting and Refining Company.....	Selby, Calif.
Do.....	El Paso, Tex.
The Anaconda Company.....	East Helena, Mont.
The Bunker Hill Co.....	Kellogg, Idaho
International Smelting & Refining Co.....	Tooele, Utah

These five plants treated 494,900 tons of hot and 34,900 tons of cold lead slag plus 4,400 tons of crude ore, all of which yielded 96,900 tons of oxide fume containing 62,200 tons of recoverable zinc. Corresponding figures for 1966 were 818,900 tons of feed materials, 133,600 tons of fume, and 87,100 tons of recoverable zinc.

Secondary Zinc Smelters.—Zinc-base scrap (principally skimmings and drosses, die-cast alloys, old zinc, engravers' plates, new clippings, and chemical residues) was smelted chiefly at secondary smelters, although about one-third was reduced at primary smelters and most sal ammoniac skimmings were processed at chemical plants.

Details of the zinc recovered in processing copper-base scrap are contained in the secondary copper and brass section of the Copper chapter of this volume.

CONSUMPTION AND USES

Consumption of slab zinc was 1.24 million tons, 12 percent below the 1966 record high and a reversal of the upward trend for the preceding 6 years. The reduced consumption was principally in the three largest industrial categories—zinc alloy, galvanizing, and brass—which consumed 535,100 tons, 458,600 tons, and 131,500 tons, respectively.

Of the 1.24 million tons of slab zinc used, 52 percent was Special High Grade, 29 percent Prime Western, and the remaining 19 percent all other grades. Galvanizing used mostly Prime Western grade while brass and bronze products consumed mostly the higher grades of zinc. Of the 535,100 tons of slab zinc used in zinc-base alloys, 99 percent was Special High Grade.

Rolling mills used 45,400 tons of slab zinc and remelted and rerolled 18,700 tons of metallic scrap produced in fabricat-

ing plants operated in connection with the rolling mills. In addition, a small quantity of purchased scrap (new clippings and old zinc) was melted and rolled. Small quantities of alloying metals were added for some uses. The rolled-zinc industry, however, classified these alloys as rolled zinc.

Net output of salable rolled zinc decreased 14 percent to 44,200 tons, approximately equal to 1965 production. Stocks of rolled zinc at the mills were 1,600 tons at yearend. Besides shipments of 20,000 tons of rolled zinc, the rolling mills consumed 42,700 tons of rolled zinc in manufacturing 25,300 tons of semifabricated and finished products.

Rolled zinc was produced in the form of sheet, strip, ribbon, plate, rod, and wire. Its major domestic use was for dry cell battery cases and similar cases for radio condensers and tube shields. Photoen-

graving plates, weather stripping, roof flashing, and household electric fuses were other uses.

CONSUMPTION OF SLAB ZINC BY GEOGRAPHIC AREAS

Ohio, Pennsylvania, Indiana, and Illinois accounted for 56 percent of the slab zinc used in galvanizing. The iron and steel industry used zinc to galvanize steel sheets, wire, tube, pipe, cable, chain, bolts, railway-signal equipment, building and pole-line hardware, and other items.

Connecticut again ranked first in consuming slab zinc in brass making, followed by Illinois and Michigan.

Michigan led in the consumption of slab zinc in making zinc-base alloys. Other large consuming States were Illinois, Ohio, New York, and Indiana.

ZINC PIGMENTS AND COMPOUNDS

Production.—Output of zinc pigments and compounds, excluding lithopone, was 296,600 tons, a 9-percent decrease from the high level of 1966 which had included record outputs of lead-free zinc oxide and zinc sulfate. Lead zinc oxide production

ZINC

continued 20 years 1913.

Pigment from various ing ore, Plants produced pounds n for zinc and one f

Lead-fr processes: and residu percent fr and 13 p secondary. Lead zinc chlor and second sulfate wa materials.

Leaded several gr content. T grade con duction. F 5 percent percent, a produced.