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LEAD AND ZINC PIGMENTS AND SALTS

By A. STOLL¹

SUMMARY

Combined sales of lead and zinc pigments and zinc salts decreased 3 per cent in quantity and 7 per cent in value, as compared with 1925. Sales of two of the lead pigments—red lead and the blue lead—were slightly larger than in 1925; sales of the zinc pigments increased—this was lithopone and the zinc salts—by 10 per cent.

Generally lower selling prices per ton prevailed in 1925 than in 1924, but the decrease in the prices of several of the products was small. The lower prices of lead pigments were coincident with quotations on pig lead. Prices of high-grade zinc oxide and lithopone responded to the pressure of keen competition. The selling prices of leaded zinc oxide and of the zinc salts showed an increase over those of 1925.

PRODUCTION

In this chapter the pigments and salts sold are taken to represent the production, no account being taken of the stocks on hand at the beginning and end of the year. The amounts used by producers for their own plants are included under sales. The total value of lead and zinc pigments and zinc salts sold by domestic producers was approximately \$106,253,000, as compared with \$114,000,000 in 1925 and \$105,822,000 in 1924.

Lead pigments sold by domestic manufacturers in the United States, in short tons

Year	White lead		Basic lead sulphate or sublimed lead		Red lead	Orange mineral
	Dry	In oil	White	Blue		
1917.....	27,869	87,331	8,231	1,369	25,478	(0)
1918.....	20,089	82,799	7,403	1,343	20,069	(0)
1919.....	30,085	109,005	9,068	1,360	32,382	(0)
1920.....	33,678	112,017	12,412	928	34,431	(0)
1921.....	28,738	143,545	11,568	463	21,805	(0)
1922.....	41,598	153,393	13,765	972	30,509	(0)
1923.....	37,786	125,087	11,949	800	28,037	(0)
1924.....	42,622	144,872	14,572	1,088	30,813	(0)
1925.....	43,426	120,479	14,990	1,090	41,609	(0)
1926.....	37,968	111,845	12,271	1,236	42,550	(0)

¹ Figures for red lead include orange mineral prior to 1921.

Figures on imports and exports compiled by J. A. Dorsey, of the Bureau of Mines, from the Bureau of Foreign and Domestic Commerce.

Lead pigments sold by domestic manufacturers in the United States, 1925-26

SOURCE

	1925			1926		
	Short tons	Value (at plant, exclusive of container)		Short tons	Value (at plant, exclusive of container)	
		Total	Average		Total	Average
Basic lead sulphate or sublimed lead:						
White.....	14, 006	\$2, 602, 069	\$180	12, 271	\$2, 221, 115	\$181
Blue.....	1, 090	210, 833	194	1, 236	225, 070	182
Red lead.....	41, 660	9, 445, 627	227	42, 550	9, 181, 072	218
Orange mineral.....	840	237, 408	283	813	220, 364	282
Litharge.....	86, 546	18, 587, 399	216	82, 540	10, 364, 479	198
White lead:						
Dry.....	43, 426	8, 022, 977	199	37, 968	7, 511, 098	198
In oil.....	120, 479	31, 352, 776	260	111, 845	28, 662, 988	256

Statistics for lead arsenate and lead acetate are collected biennially by the Bureau of the Census for odd years; figures for 1925 are as follows: Lead arsenate, 5,969 short tons, valued at \$1,777,552, and lead acetate, 1,251 short tons, valued at \$359,686.

Zinc pigments and salts sold by domestic manufacturers in the United States, 1917-1926, in short tons

Year	Zinc oxide	Leaded zinc oxide	Lithopone	Zinc chloride (50° Baumé)	Zinc sulphate
1917.....	107, 586	23, 450	83, 713	(1)	(1)
1918.....	100, 286	25, 714	62, 403	(1)	(1)
1919.....	117, 630	27, 591	78, 395	1 69, 228	1 2, 763
1920.....	99, 444	30, 480	89, 373	1 68, 945	1 3, 072
1921.....	74, 329	18, 103	58, 016	59, 457	3, 295
1922.....	128, 465	19, 613	83, 390	41, 627	5, 078
1923.....	126, 987	23, 504	98, 199	42, 431	5, 375
1924.....	131, 470	26, 720	109, 469	61, 064	4, 674
1925.....	151, 354	31, 750	145, 019	45, 019	5, 332
1926.....	146, 923	23, 859	159, 931	45, 724	3, 649

(1) No canvass.

(1) Figures cover production, not sales.

Zinc pigments and salts sold by domestic manufacturers in the United States, 1925-26

	1925			1926		
	Short tons	Value (at plant, exclusive of container)		Short tons	Value (at plant, exclusive of container)	
		Total	Average		Total	Average
Zinc oxide ¹	151, 354	\$21, 441, 347	\$142	146, 023	\$20, 339, 533	\$138
Leaded zinc oxide ¹	31, 750	3, 960, 282	125	23, 859	3, 110, 642	130
Lithopone.....	145, 019	15, 186, 147	105	159, 931	16, 002, 197	100
Zinc chloride, 50° Baumé.....	45, 810	2, 003, 828	44	45, 724	2, 160, 682	47
Zinc sulphate.....	5, 332	269, 703	51	3, 649	195, 167	53

¹ Zinc oxide containing .5 per cent or more of lead is classed as leaded zinc oxide.

The following table gives the quantity and source of the zinc contained in the pigments and salts produced in the United States in 1925 and 1926. It will be noted that the lead of the lead pigments is derived largely (94 per cent in both years) from domestic zinc ore, slab zinc furnishing the metal in the process zinc oxide; and that the zinc in zinc salts is derived from secondary materials—zinc ashes, skimmings, drosses and remanizers' scrap.

Metal content of lead pigments and zinc pigments and salts produced by domestic manufacturers, 1925-26, by sources, in short tons

Source	1925			1926	
	Lead in pigments ¹	Zinc Pigments	Salts	Lead in pigments ¹	Pigments
Domestic ore.....	17, 547	110, 554	673	13, 685	127, 630
Metal.....	256, 064	53, 581	453	240, 802	32, 479
Secondary material ²		11, 714	10, 928	1, 029	12, 145
	273, 611	155, 849	12, 054	255, 616	172, 254

¹ Includes also lead recovered in zinc oxide and leaded zinc oxide. The metal content of lead arsenate is not available, as no canvass of their production is made by the Bureau of the Census. Over these salts are derived from pig lead, and their metal content has already been taken account in the figures covering lead production.

² Zinc ashes, skimmings, drosses, and old metal.

PREPARATION AND USES

Lead and zinc pigments and salts are made both from the metals and from the oxides. Basic lead carbonate, or white lead, and from the oxides—litharge, red lead, and orange mineral—are made from pig lead, as are also the lead salts; basic lead sulphate, or white lead, is made directly from ore.

White lead is the oldest of the white pigments used in painting and was for many years the only white pigment so used. It is produced by chemical corrosion of metallic lead. The oldest and most widely used method of manufacture is the old Dutch process, which is long and painstaking; the Carter process consumes a small amount of metal in manufacture and is used successfully but not so widely as the Dutch process. The electrolytic process is used at one plant in the United States. Other processes have been tested and put to commercial use, especially in foreign countries.

Basic lead sulphate, or sublimed lead, is a fine pigment produced by volatilizing powdered galena at a high temperature in contact with air which oxidizes it to basic sulphate. The resultant fine powder is collected in bags. Two forms of this pigment are produced—“red” and “blue”—the former by complete, the latter by partial oxidation.

Litharge, or lead monoxide, is made from pig lead. The lead is melted in a furnace in the presence of air and the skimmed off, which forms is recovered. According to the method employed, the finished product is either in the form of a fine yellowish powder or of reddish-brown flakes.

Red lead is prepared by burning litharge in the muffle furnace to form a higher oxide of a brilliant scarlet or orange red color.

Orange mineral has the same composition as red lead and is produced from white lead by burning.

Lead pigments have many uses. The principal ones are: In the paint and rubber industries; in the manufacture of storage batteries, in making glass, pottery, enamel, tile, linoleum, printing inks, and for artists' colors.

Zinc oxide and lithopone are white zinc pigments that hold important places in a number of industries. The zinc oxide of commerce is divided generally into two classes, according to whether it is made by the American or the French process. As the name implies, American-process zinc oxide originated in this country, where its manufacture has been carried on for 75 years. In this process the zinc oxide is made from zinc ore, which is roasted, then treated in reducing furnaces in which metallic zinc is vaporized, and the zinc vapor is oxidized by contact with an excess of air. The white fume so formed is collected in bag houses. American process zinc oxide is of two types—one that is commercially lead free and one that contains from 5 to 35 per cent of lead sulphate. The latter type is commonly known as leaded zinc oxide. French process zinc oxide, first used extensively in France, is also produced in the United States, but not to the extent that the American process zinc oxide is made. It is made by the vaporization of metallic zinc, rather than zinc ore, and the oxidation of the vapors. Zinc oxide made by this process is the highest grade and is used where an extremely bright oxide is required. Zinc oxides are used in many industries, but chiefly in the rubber and paint industries, which, it has been estimated, absorb about 90 per cent of the output of the zinc oxides. They are also used in the manufacture of pottery, glass, oilcloth, printing inks, polishes, and medicinals and cosmetics.

Lithopone is a dense white pigment formed by mixing purified solutions of barium sulphide and zinc sulphate and calcining the resulting precipitate of barium sulphate and zinc sulphide. It passes through a number of processes before it is ready for market, and it is generally graded according to the use to which it is to be put. It is the newest of the pigments here mentioned, but its use has spread rapidly, and its desirable characteristics have brought it into great demand, especially in the manufacture of paints and enamels and to a less degree in the manufacture of rubber goods, oilcloth and linoleum, window shades, and printing inks.

Zinc chloride is formed by the direct combination of zinc with chlorine, or, more generally, by the action of hydrochloric acid upon the metal. Zinc sulphate is prepared either by the action of sulphuric acid on zinc or by the treatment of zinc sulphide ore. The sulphating or Coolbaugh process is used by the American Smelting & Refining Co. at Durango, Colo., for treating lead-zinc sulphide ores. The zinc sulphide is roasted to the sulphate, leached in water, filtered from the residue, and the zinc sulphate crystallized out of the solution by means of a spray drier. Secondary zinc material, such as drosses, ashes, skimmings, and galvanizers' scrap, is utilized largely as the zinc base for the production of zinc chloride and zinc sulphate. Zinc chloride is used extensively in wood preservation. Diluted with water it acts as a powerful disinfectant and germicide. It is also used in

the refining of petroleum, in the textile industry, in the manufacture of hard fiber, for medical purposes, and in dentistry. The uses of zinc sulphate are similar to those of zinc chloride. Its application, however, is in the manufacture of lithopone. The important uses are: As a mordant in calico printing, as a preservative and preservative in the manufacture of glue, and as an astringent.

IMPORTS AND EXPORTS

Records of lead pigments imported for consumption in the United States in 1926, as compared with 1925, show increases in the case of white lead and red lead, a decided decrease in litharge, and a decrease in orange mineral. Of the zinc pigments, imports of lithopone were the largest and made the greatest gain.

Exports of zinc oxide exceeded those of the other lead pigments for which separate statistics are recorded, and the quantity exported in 1926 was 35 per cent greater than that in 1925. The quantity exported in 1926 one-third of the zinc oxide and one-half of the white lead were consigned to the United Kingdom.

Basic carbonate white lead, red lead, litharge, and orange mineral consumed in the United States, 1917-1926

Year	Basic carbonate white lead		Red lead		Litharge	
	Pounds	Value	Pounds	Value	Pounds	Value
1917.....	20,238	\$1,965	50	\$13	100	\$12
1918.....	508	202	6	1	100	12
1919.....	21,213	2,490	7,199	1,136	21,002	2,647
1920.....	159,977	19,440	23,076	1,789	100	7
1921.....	124,176	12,598	12,236	84	1770	162
1922.....	224,465	21,335	1,405	220	22,525	1,314
1923.....	336,892	31,386	3,600	268	1,838	193
1924.....	141,156	13,478	1,874	155	2,417	330
1925.....	213,028	21,535	3,452	268	122	18
1926.....	297,667	31,690	9,591	817		

Zinc oxide, lithopone, zinc sulphide (white), zinc chloride, and zinc carbonate imported for consumption in the United States, 1917-1926

Year	Zinc oxide			
	Dry		In oil	
	Short tons	Value	Short tons	Value
1917.....	119	\$52,649	5	\$976
1918.....	182	62,703	4	1,043
1919.....	105	44,338	3	1,351
1920.....	1,431	289,890	14	3,596
1921.....	1,286	145,071	57	17,549
1922.....	2,712	361,690	42	8,595
1923.....	1,036	169,415	89	21,934
1924.....	1,703	229,629	110	25,874
1925.....	1,274	205,682	132	31,187
1926.....	1,127	198,897	94	23,108

Zinc oxide, lithopone, zinc sulphide (white), zinc chloride, and zinc sulphate imported for consumption in the United States, 1917-1926—Continued

Year	Zinc sulphide ¹		Zinc chloride		Zinc sulphate	
	Pounds ¹	Value	Short tons	Value	Short tons	Value
1917	9,990	\$6,619	2	\$403	(²)	\$67
1918	2,870	903	98	15,177	(²)	163
1919	10,035	4,413	1	192	(²)	163
1920	45,482	15,027	565	76,465	50	8,038
1921	93,637	8,330	2,199	213,995	17	820
1922	27,159	8,453	1,374	37,509	17	1,064
1923	11,844	5,403	551	44,164	20	3,450
1924	9,678	5,727	319	28,911	13	1,265
1925	14,604	5,589	469	50,712	17	1,398
1926	7,800	4,125	568	51,605	66	4,690

¹ Zinc sulphide is stated in pounds rather than tons because of its high value and smaller quantities.

² Less than 1 ton.

White lead and red lead exported from the United States, 1917-1926

Year	White lead ¹		Red lead ¹	
	Short tons	Value	Short tons	Value
1917	9,869	\$2,089,659	1,086	\$267,238
1918	7,794	1,786,739	2,870	662,884
1919	14,017	3,037,292	3,114	735,177
1920	14,901	3,105,101	1,532	368,576
1921	5,161	993,130	548	118,500
1922	4,598	710,705	1,683	294,133
1923	5,172	836,201	1,840	372,828
1924	5,055	853,444	940	210,596
1925	6,832	1,293,168	802	183,591
1926	6,230	1,119,350	775	175,273

¹ Exports of white lead and basic lead sulphate or sublimed lead not classified separately after 1922; the figures for 1923-1926 may include an unknown quantity of basic lead sulphate or sublimed lead.

² Exports of red lead and litharge not classified separately for 1923-24; the figures for those years may include an unknown quantity of litharge. Figures for other years are for red lead only.

³ Figures cover July 1 to Dec. 31; not classified separately prior to July.

White lead¹ exported from the United States, 1925-26, by destinations

Destination	1925		1926	
	Short tons	Value	Short tons	Value
North America:				
Canada	99	\$18,595	77	\$15,562
Cuba	80	17,740	77	20,081
Mexico	128	33,331	120	31,503
Panama	353	84,380	170	46,003
Other	110	20,941	113	28,052
	770	180,993	509	135,201
South America:				
Brazil	1	341	1	198
Colombia	23	5,270	64	10,103
Uruguay	55	10,337	43	8,281
Venezuela	13	3,602	34	7,580
Other	943	197,725	501	95,625
	1,035	217,241	643	121,787

¹ White lead and basic lead sulphate or sublimed lead not classified separately after 1922; the figures may include an unknown quantity of basic lead sulphate or sublimed lead.

LEAD AND ZINC PIGMENTS AND SA

White lead exported from the United States, 1925-26, by destination

Destination	1925	
	Short tons	Value
Europe:		
Belgium	113	\$19,000
Netherlands	484	82,000
United Kingdom	4,174	733,000
Other	1	1,000
	4,772	835,000
Asia:		
Philippine Islands	225	52,000
Other	20	4,000
	245	56,000
Africa	(²)	2,000
Oceania, including Australia	10	2,000
	6,832	1,203,000

¹ Less than 1 ton.

Zinc oxide and lithopone exported from the United States, 1917-1926

Year	Zinc oxide	
	Short tons	Value
1917	15,446	\$3,148,000
1918	12,421	2,779,000
1919	14,703	3,069,000
1920	11,164	2,151,000
1921	2,511	426,000
1922	3,877	593,000
1923	5,024	743,000
1924	3,927	605,000
1925	10,855	1,503,000
1926	14,661	1,917,000

¹ Not classified separately prior to 1922.

Zinc oxide exported from the United States, 1925-26,

Destination	1925	
	Short tons	Value
North America:		
Canada	4,320	\$630,000
Cuba	59	7,000
Mexico	136	31,000
Panama	38	8,000
Other	4,589	691,000
	11,062	746,000
South America:		
Brazil	11	2,000
Other	186	29,000
	197	31,000
Europe:		
France	92	12,000
Italy	160	20,000
United Kingdom	4,872	615,000
Other	765	94,000
	5,889	742,000
Asia:		
Philippine Islands	86	13,000
Other	63	17,000
	149	30,000
Africa	31	6,000
Oceania, including Australia	10,855	1,503,000

PRICES AND VALUE

The total value and the average price per ton received from sales of lead and zinc pigments and salts are given on preceding pages of this chapter. Market quotations on these products are printed weekly in the Oil, Paint and Drug Reporter. The range in 1924 to 1926 was as follows:

Range of quotations on lead pigments and zinc pigments and salts at New York, 1924-1926, in cents a pound

Product	1924	1925	1926
Basic lead sulphate, or sublimed lead	8½-10½	9½-11½	9-10½
White lead, or basic lead carbonate	8½-10½	10½-12	9½-10½
Litharge	10-12½	11½-13½	10½-11½
Red lead	10-12½	11½-13½	11-12½
Orange mineral	13-15½	13½-16½	13½-14½
Zinc oxide	8½	7½-8½	7-7½
Lithopone	6½-7½	6½-6½	5½-6½
Zinc chloride	2½-3½	2½-4½	3-4½
Zinc sulphate	3-8½	3½-4	3-4

Weekly quotations on basic lead sulphate (white), or sublimed lead, "in casks," remained at 10 to 10½ cents a pound from almost the beginning of the year until the week ended November 20, when it dropped to 9¾ cents; the following week it dropped to 9½ cents, and closed the year at 9 to 9½ cents.

The quotation on basic lead carbonate, or white lead, "American, dry, in casks," held steady at 10¾ cents a pound until November 20, when it fell to 10¼ cents. The last two weeks of the year a further reduction brought it to 9¾ cents.

Quotations on litharge, "commercial, powdered, in casks," fluctuated considerably during the year, ranging from 10½ to 11¼ cents a pound, as shown in the preceding table. At the beginning of the year the price quoted was 11¼ cents and at the close 10¾ cents.

Red lead, "dry, in casks," was quoted at 12¼ cents a pound at the opening of the year and at 11¼ cents at the close. The lowest quotation—11 cents—was in the spring.

Quotations on orange mineral, "American, in casks," opened the year at 14¼ cents a pound and fluctuated during the year, but the entire range was only 1½ cents. The quotation at the end of the year was 13½ to 14½ cents.

A review of quotations on all the lead pigments shows a general downward movement of about 1 cent a pound at the end of 1926, as compared with the first of the year.

Zinc oxide, "commercially lead-free, in barrels, l. c. l.," was quoted at 7¾ cents a pound until the latter part of October, when the price was cut to 7½ cents. Several changes in quotations followed, and by the end of the year the quotation was 7 to 7½ cents.

Lithopone, "domestic, in barrels, l. c. l.," was quoted at 6½ to 6½ cents a pound from January to May; at 6½ cents from June to November; and at 5½ cents in December.

Quotations on zinc pigments remained comparatively stable until the fall months, when a reduction of about ½ cent a pound was made.

LEAD AND ZINC PIGMENTS AND SALTS

Quotations on zinc chloride and zinc sulphate kept throughout the year. Zinc chloride, "solution, w" was quoted at 3 to 4 cents a pound from March to Dec. Quotations on zinc sulphate, "barrels," ranged from 3 to the year, as compared with a slightly smaller range i

PRODUCERS AND PLANTS

The following companies reported sales of lead and zinc salts of their own production in 1926:

White lead:	
Anaconda Lead Products Co. (electrolytic process)	East Chicago, Ind.
Carter White Lead Co.	West Pullman, Ill.
E. I. du Pont de Nemours & Co.	Philadelphia, Pa.
Eagle-Picher Lead Co.	East St. Louis, Ill.
Do.	Cincinnati, Ohio
Euston Lead Co.	Scranton, Pa.
W. P. Fuller & Co.	South San Francisco, Cal.
John T. Lewis & Bros. Co.	Philadelphia, Pa.
Matheson Lead Co.	Long Island City, N. Y.
National Lead Co. of California	Melrose, Calif.
National Lead Co.	Chicago, Ill.
Do.	St. Louis, Mo.
Do.	Brooklyn, N. Y.
Do.	Port Richmond, Va.
Do.	Cincinnati, Ohio
National Lead & Oil Co. of Pennsylvania	New Kensington, Pa.
Sherwin-Williams Co.	Chicago, Ill.
United Lead Co.	Perth Amboy, N. J.
Wetherill & Bro.	Philadelphia, Pa.
Basic lead sulphate, or sublimed lead:	
Eagle-Picher Lead Co.	Joplin, Mo.
St. Louis Smelting & Refining Works of	
National Lead Co.	Collinsville, Ill.
d lead, orange mineral, and litharge:	
Eagle-Picher Lead Co.	East St. Louis, Ill.
Do.	Joplin, Mo.
Do.	Newark, N. J.
Do.	Cincinnati, Ohio
Evans Lead Co.	Charleston, W. Va.
Franklin Lead Oxide Co.	Franklin, Pa.
W. P. Fuller & Co.	South San Francisco, Cal.
Gould Storage Battery Co.	Depew, N. Y.
Grasselli Chemical Co.	Grasselli, Ind.
Harshaw Fuller & Goodwin Co.	Cleveland, Ohio
John T. Lewis & Bros. Co.	Philadelphia, Pa.
Matheson Lead Co.	Long Island City, N. Y.
Metals Refining Co.	Hammond, Ind.
National Lead Co. of California	Melrose, Calif.
National Lead Co.	Chicago, Ill.
Do.	St. Louis, Mo.
Do.	Brooklyn, N. Y.
National Lead & Oil Co. of Pennsylvania	New Kensington, Pa.
Pennsylvania Smelting Co.	Carnegie, Pa.
Sherwin-Williams Co.	Chicago, Ill.
Wetherill & Bro.	Philadelphia, Pa.
Zinc oxide and leaded zinc oxide:	
American Zinc Co. of Illinois	Hillsboro, Ill.
American Zinc Oxide Co.	Columbus, Ohio
Eagle-Picher Lead Co.	Hillsboro, Ill.
Empire Zinc Co.	Canon City, Colo.
Grasselli Chemical Co.	Grasselli, Ind.
International Lead Refining Co. (French process)	East Chicago, Ind.
Do. (French process)	Akron, Ohio.

Zinc oxide and leaded zinc oxide—Continued.

Mineral Point Zinc Co.	Mineral Point, Wis.
New Jersey Zinc Co. (of Pennsylvania)	Palmerton, Pa.
Do. (French process)	Freemansburg, Pa.
Ozark Smelting & Mining Co.	Coffeyville, Kans.
River Smelting & Refining Co.	Florence, Colo.
U. S. Zinc Co.	Pueblo, Colo.
Western Zinc Oxide Co.	Leadville, Colo.
Lithopone:	
Chemical & Pigment Co. (Inc.)	Oakland, Calif.
Do.	Collinsville, Ill.
Do.	St. Helena, Md.
E. I. du Pont de Nemours & Co.	Newark, N. J.
Do.	Philadelphia, Pa.
Eagle-Picher Lead Co.	Argo, Ill.
Grasselli Chemical Co.	Grasselli, N. J.
Krebs Pigment & Chemical Co.	Newport, Del.
Mineral Point Zinc Co.	Depue, Ill.
New Jersey Zinc Co. (of Pennsylvania)	Palmerton, Pa.
	(2 plants)
Sherwin-Williams Co.	Chicago, Ill.
United Color & Pigment Co.	Newark, N. J.
Zinc salts:	
American Zinc & Chemical Co.	Langeloth, Pa.
Arkansas Preservative Co.	North Little Rock, Ark.
Charles Cooper & Co.	Newark, N. J.
General Chemical Co.	Chicago, Ill.
Grasselli Chemical Co.	Grasselli, Ind.
Do.	Grasselli, N. J.
Do.	Cleveland, Ohio.
Do.	Weirton, W. Va.
Great Western Electro-Chemical Co.	Pittsburg, Calif.
Charles Lennig & Co. (Inc.)	Philadelphia, Pa.
Merrimac Chemical Co.	Everett, Mass.
Monsanto Chemical Works	Monsanto, Ill.
New Jersey Zinc Co. (of Pennsylvania)	Palmerton, Pa.
Vulcan Detinning Co.	Neville Island, Pa.

Lithopone was produced by the Chemical & Pigment Co. (Inc.) at Oakland, Calif., and at Collinsville, Ill., as well as at their St. Helena (Md.) plant which has been in operation since 1920. All of these plants are subsidiaries of The Glidden Co. The Collinsville plant was purchased from the St. Louis Lithopone Co. in June, 1926.

The zinc oxide plant of the U. S. Zinc Co., at Pueblo, Colo., was closed down early in the year and has been dismantled and sold.

York Metal & Alloys Co., York, Pa., reported that they had discontinued the manufacture of zinc products.

Charles Lennig & Co. (Inc.), Philadelphia, Pa., installed equipment that would enable them to produce 125 tons of zinc chloride a month.

ZINC¹By AMY STOLL²

INTRODUCTION

By J. A. STADER

The great industrial activity and prosperity of the United States, which surpassed that of 1925, was reflected in the industries engaged in the production and consumption of zinc. In recent years, the largest part of the output of zinc in the United States came from the tri-State district of Missouri, Kansas, and Oklahoma, which has more than 150 concentrating mills. Most of these mills were in operation throughout the year. The chief factors in the increased production of 1926 were the largest source of zinc is from a number of smaller mills. During recent years have become very important, especially in the western States.

Concentration of lead and zinc ores was first accomplished by hand picking, but later gravity concentration of jigs and tables was employed and was generally used 10 years ago. This method depended solely on the difference in gravity of the materials treated and was not entirely successful. The zinc and lead minerals often were closely associated and of similar specific gravity from which they could not be separated. As the method of smelting lead ores was changed from that of smelting zinc, one or the other metal was lost. In consequence, most of the complex ores were smelted for recovery of lead only, the zinc usually being discarded as tailings. This wasteful practice prevented the economical treatment of many of the western complex ores; and in the tri-State district of the finely disseminated zinc blende was lost in the large part, however, these tailings have been successfully recovered by methods developed since they accumulated.

Three notable developments have greatly advanced the treatment of zinc ores. These are improvement in tables, magnetic separation, and selective flotation. Magnetic separation is successful in the treatment of coarsely crystalline mixtures of pyrite and zinc blende. Little use in the treatment of galena-blende ores. See

¹ Chapters on zinc that were more than ordinarily detailed were issued in 1914, dealing largely with metallurgy; for 1916, dealing with the zinc deposits of the United States; and for 1918, dealing with the zinc industry in relation to the World War.

² Figures on imports and exports compiled by J. A. Dorsey, of the Bureau of Foreign and Domestic Commerce.

The following table includes the imports and exports of rolled zinc taken from records of the Bureau of Foreign and Domestic Commerce. The approximate quantity of rolled zinc available annually for consumption in the United States is obtained by deducting the amount exported from the sum of the amounts produced and imported.

The average selling prices of grades B and C slab zinc—the grades of zinc generally rolled—are given for comparison with the average of the finished rolled zinc. The difference, or "spread," between these two figures was greatest during the war, when an increased demand for sheet zinc raised its price. In 1925 and 1926 the difference amounted to 2.5 and 2.8 cents, respectively.

Quotations on sheet zinc, f. o. b. mill, ranged from 11¼ to 12 cents per pound during the year. The price quoted at the end of the year was 11½ cents. These quotations, however, are subject to discounts which may fluctuate while the base quotations remain steady.

Rolled zinc available for consumption in the United States, 1925 and 1926

	1925			1926		
	Pounds	Value		Pounds	Value	
		Total	Average		Total	Average
Sheet zinc not over 0.1 inch thick	60,160,426	\$6,195,763	\$0.103	59,866,845	\$6,478,927	\$0.108
Boiler plate and sheets over 0.1 inch thick	2,202,347	199,435	.091	2,469,614	239,215	.097
Strip and ribbon zinc	79,892,173	8,119,030	.102	110,331,839	11,162,769	.101
Total zinc rolled	142,253,945	14,514,234	.102	172,668,298	17,880,901	.104
Sheet zinc imported for consumption	349	65	.158	352	46	.131
Rolled zinc exported	8,392,707	926,841	.110	9,281,465	1,086,967	.117
Available for consumption	133,871,687			163,387,185		
Slab zinc, grades B and C			.077			.078
Spread			.026			.028

The following companies reported production of rolled zinc in the United States in 1926:

Producers of rolled zinc in the United States in 1926

Producer	Location of plant
American Zinc Products Co.	Greencastle, Ind.
Ball Bros. Co.	Muncie, Ind.
Edes Manufacturing Co.	Plymouth, Mass.
Hazel-Atlas Glass Co.	Wheeling, W. Va.
Hegeler Zinc Co.	Danville, Ill.
Illinois Zinc Co.	Peru, Ill.
Matthiessen & Hegeler Zinc Co.	La Salle, Ill.
New Jersey Zinc Co.	Palmerton, Pa.
The Platt Bros. & Co.	Waterbury, Conn.

ZINC DUST

The commercial production of zinc dust, a by-product of the distillation process of smelting zinc, was begun by domestic smelters in 1910 at the Pueblo, Colo., plant of the United States Zinc Co. In 1911 production began at the Clarksburg and Meadowbrook, W. Va., plants of the Grasselli Chemical Co., and in 1917, 13 plants reported an output of 6,123 short tons. The table following gives the annual production from 1917 to 1926:

ZINC

Zinc dust sold by producers in the United States, 1917—

Year	Prepared "blue powder"			Zinc dust "atomized"	
	Short tons	Value		Short tons	Total
		Total	Average per pound		
1917	3,989	\$1,322,196	\$0.166	2,134	\$712,922
1918	4,016	877,171	.109	3,139	815,341
1919	4,083	801,366	.098	2,715	580,291
1920	9,068	2,006,117	.111	2,463	555,771
1921	2,006	333,890	.083	152	15,151
1922	3,394	531,225	.078	3,859	573,221
1923	3,676	643,766	.088	4,376	702,921
1924	3,894	620,078	.080	4,063	621,221
1925	8,314	1,600,768	.090	(¹)	(¹)
1926	7,904	1,490,293	.093		

¹ The amount of secondary zinc recovered in zinc dust, 1923-1926, is shown in table zinc, p. 234.

² Figures for "atomized" included under "blue powder." Bureau of Mines not figures separately.

The following companies reported the production of zinc dust in 1926:

Producers of zinc dust in the United States in 1926

Producer	
The Allbys Co.	San Francisco
John Finn Metals Works	San Francisco
Grasselli Chemical Co.	Clarksburg, W. Va.
New Jersey Zinc Co.	Palmerton, Pa.
United States Zinc Co.	Pueblo, Colo.

Under the heading of "Industrial chemicals," the Drug Reporter quoted prices on zinc dust, in barrels, 9 to 11 cents per pound during the year. The average for the year was 10 cents.

ZINC PIGMENTS AND SALTS

Zinc forms the base, either in whole or in part, of pigments—zinc oxide, leaded zinc oxide, and lithopigments, the chloride and the sulphate, are likewise made from ore and in part from secondary zinc. Details of the zinc pigments and salts and of market conditions are given in chapter on lead and zinc pigments and salts.

The zinc content of the pigments and salts made in the United States from ore, both domestic and foreign, for the year 1926 appears in the table that follows. Statistics of zinc recovered in the form of pigments and salts are given in the next heading.

Primary zinc content of zinc pigments and salts made in the United States, 1926, in short tons

Year	Pigments	Salts	Year
1917	97,573	(1)	1922
1918	102,778	(1)	1923
1919	96,817	3,393	1924
1920	110,095	6,284	1925
1921	63,480	3,749	1926

¹ Figures not available.

The world's production of nickel in 1925 and 1926, as gathered from official reports, is shown in the table following:

World's production of nickel, 1925-26, in metric tons

Country	1925				1926			
	Ore		Matte		Ore		Matte	
	Total	Nickel content	Total	Nickel content	Total	Nickel content	Total	Nickel content
Canada.....	1,142,003	(¹)	63,757	33,462	1,188,208	(¹)	71,343	35,414
Germany: Saxony.....	145	(²)			(²)	(²)		
Italy.....	200	0						
New Caledonia.....	86,550	5,409	4,820	8,711	100,304	5,260	5,039	3,880
United States.....			1,181	247			1,364	7,203

- ¹ Ore smelted.
² Data not available.
³ Includes 263 tons of nickel contained in cobalt ore.
⁴ Cobalt-bismuth-nickel ore.
⁵ Hydrous nickel sulphate.
⁶ Hydrous nickel sulphate and nickel-ammonium sulphate.
⁷ In addition to content of sulphate, figures include a quantity of nickel saved as such.

TANTALUM

Columbite, mined in the United States, shipped in 1918-1926¹

Year	Pounds	Value	Year	Pounds	Value
1918.....	4,500	\$2,250	1923.....	1,350	\$540
1919.....	300	90	1924.....	1,197	508
1920.....	4,000	1,450	1925.....		
1921.....	8,400	1,150	1926.....	2,100	650
1922.....	600	240			

¹ For several years prior to 1918 there was no market for tantalum or columbium minerals, and they were therefore not produced.

No imports of tantalum or tantalum ores were recorded for 1917 to 1919, 1922, or 1924. For other years in the decade 1917 to 1926 imports have been recorded as follows: 1920, 60 pounds of "ferro-alloys (tantalum)," valued at \$54; 1921, 1,229 pounds of "ferro-alloys (tantalum)," \$788, and 6,785 pounds of "steel-hardening ores (tantalum)," \$1,327. Beginning with 1923 the classification is "Ores of ferro-alloying metals (tantalum)," and the figures are as follows: 1923, 5,600 pounds, \$3,031; 1925, 5,022 pounds, \$1,347; 1926, 350 pounds, \$149.

TITANIUM⁴

During 1926 two plants in the United States were operated for rutile and ilmenite—that of Buckman & Pritchard (Inc.), at Mineral City, 4 miles south of Pablo Beach, Fla., and that of the American Rutile Co., at Roseland, Nelson County, Va.

At the first-named plant the beach sands are worked primarily for ilmenite, but rutile, zircon, monazite, and colored sand are saved as by-products. At the other place a syenite is quarried and milled for rutile, and ilmenite is saved as a by-product.

⁴ Titanium was treated somewhat more fully in Mineral Resources for 1925.

The production of titanium minerals in the United States during the last 10 years, so far as the data are available from official reports, is given in the table following. The figures shown are largely for shipments rather than production. Zircon shipments are also given, as the mineral is often associated with titanium minerals.

Titanium minerals and zircon produced in the United States, 1917-1926

Year	Titanium minerals				Value
	Rutile concentrates		Ilmenite concentrates		
	Short tons	Percentage of TiO ₂	Short tons	Percentage of TiO ₂	
1917.....	206	93	1,339	53-55	\$ 1,100
1918.....	261	95	1,644	53-55	1,400
1919.....	102	94-96	106	48-50	200
1920.....	277	94-96	288	50	1,000
1921.....					
1922.....	310	95	5,181	52-54	1,000
1923.....	270	95	6,270	52	1,000
1924.....			4,769	52	1,000
1925.....	40	95	5,566	52	1,000
1926.....	30	95	4,813	52	1,000

- ¹ Virginia production only; information regarding Florida not available.
² Bureau of Mines not at liberty to publish values.
³ Arbitrary value.
⁴ Figures for Florida only. Bureau of Mines not at liberty to publish values.

In the past ten years titanium has assumed a different position from that toward which most efforts have been directed. Formerly attempts were directed largely toward its use for steel, but now its greatest use appears to be in the production of white pigments. Titanium oxide pigment, especially in the cellulose paints, but in other pigments has a foundation of titanium dioxide on barium sulphate, and the resultant material is a pigment. For pigments, ilmenite carrying near 95 per cent of TiO₂ is preferred.

The price of rutile (92 to 95 per cent TiO₂) due to its scarcity has risen to 15 cents a pound. Prices of ilmenite concentrates have been low, and no market price could be set. Buying and selling took place, was probably at \$100 per short ton for material carrying 50 per cent TiO₂.

Ilmenite is known to have been imported from Africa and probably from other places, but separately tabulated by the Customs Service. "Ferro-titanium and titanium" 50,941 pounds of which \$9,189, was imported. There was also imported titanium potassium oxalate, valued at \$12,232.

The world's production of titanium minerals during the decade 1917 to 1926, according to the data obtainable from official reports, is given in the following table. The data for 1926 are very preliminary.

LEAD ¹

By AMY STOLL ²

INTRODUCTION

By J. A. STADER

The United States has long been the leader principal lead-producing countries, followed by Spain, and Canada.

Discoveries through prospecting for new lead ore areas already being mined were few in number and importance in the United States during 1926. The increase in output was due largely to improved methods of processing, especially to the use of selective flotation, a method which makes feasible a far greater recovery of concentrates but permits recovery from complex ores which previously considered too lean in lead for utilization. With the introduction of the electrolytic method for reducing leady zinc concentrates, a more complete recovery of lead was made from the residues in tanks which heretofore—while pyrometallurgical methods were available—would have been lost in part by being discarded as residues from the retorts.

That the United States has no large undiscovered lead reserves to supplement those being slowly exhausted may be offset by improved ore dressing and metallurgy and by the secondary output of secondary or reclaimed metal, which is being exploited should supply the requirements of lead. In the meantime, it is hoped, industrial research will develop methods to meet requirements without danger of overdraft of lead.

Mexican lead production, two-thirds of which is from the border States, was largely stimulated by the action of the United States and was favored by freedom from political disturbances.

Australian production in 1926, principally from the border States, have been exploited for many years, surpassed that of the United States as a result of the introduction of advanced concentrates. It was helped in the latter part of the year by favorable weather conditions which supplied an abundance of water for maximum operations.

¹ Chapters on lead giving more than ordinary detail were published in Mineral Resources of the United States (the lead industry in relation to the world production) and 1918 (the lead industry in relation to the world production).
² Figures on imports and exports compiled by J. A. Dorsey, of the Bureau of Foreign and Domestic Commerce.

ment in the Mount Isa district is yet mainly in the prospecting stage and has been greatly handicapped by the absence of a railroad to the east coast, which, however, is now under construction. One interesting development of the year was the acquisition of an option on the property of the Mount Isa (Ltd.), an Australian company, by the Anglo-American Corporation of South Africa (Ltd.). The extension of the holdings of this corporation to Australia and the entrance of the Anaconda Co. into Upper Silesia illustrate the tendency of large mining companies to broaden the scope of their operations.

Canadian lead resources have been developed very rapidly in the last few years. British Columbia produces most of the lead; the remainder of the Dominion output comes from Ontario, from the Mayo district of Yukon Territory, and from Quebec. The product from British Columbia was largely exported to the Orient and Europe, and that produced in Ontario supplied most of the Canadian demand for lead. The Sudbury district, which has been noted as nature's great nickel storehouse, gives promise of also being a lead producer.

The lead output of India is almost entirely that of the Bawdwin mine of the Burma Corporation (Ltd.), in the Upper Shan States. The increase in production over 1925 indicates a rapid recovery from the disastrous fire which necessitated closing parts of the workings by bulkheads and thereby curtailing the 1925 production. The lead deposits in the Southern Shan States, which formerly were worked extensively by the Chinese, have been inactive for many years.

Spain is the outstanding lead-producing country of Europe. The Spanish deposits have been exploited since ancient times and for the past three years have steadily increased their output of ore. Mines in the Province of Jaen account for about half of the total Spanish production. Next in importance are those in Cordoba, and third, those in Murcia. La Sociedad Minera y Metalurgica de Peñarroya, the principal producer, has a lead, zinc, and silver smelter in Cordoba. The Sociedad Minera Metalurgica Los Guindos is also a large producer of lead. Only a small part of the lead produced in Spain is consumed in the country, the larger part being exported to England or Germany as pigs, bars, or ore.

Africa, which has made important contributions to the world's lead supply from Morocco and promises a considerable output from Rhodesia, may also make important contributions from the Southwest Africa mandate, if the newly discovered Aiais field comes up to expectations. This district lies between the Great Fish and Kameldoon Rivers and is a more or less arid and unexplored country, but an ample supply of both water and power can be obtained from the Great Fish River.

The per capita consumption of lead in other countries is small in comparison to that of the United States. Storage-battery requirements in foreign countries, especially for automobiles, are not nearly so great as in the United States. Other countries have been slower in adopting and developing the telephone and other electrical devices as necessities of business or social life, therefore the demand for lead for cable sheathing has not yet reached the height it probably will. Construction in Europe is of a permanent character and uses comparatively little material requiring the protection of lead or zinc pigments; on the other hand, the vast timber

LEAD

resources of the United States have encouraged framing for which the protection of paint was necessary. They are depleted and wooden structures replaced with of nearly permanent material the building industry will use lead.

Many industries that consume lead are learning to use it to a greater advantage through research laboratories to use it to a greater advantage economically. Probably the cable industry has been the most in this respect, as indicated by comparing the thick, heavy sheathing of 20 years ago with the thinner and lighter antimony alloy sheathing of to-day that has higher tensile strength and other advantageous physical properties. Storage-battery manufacturers likewise have developed a grid which is lighter and of greater resistance to buckling. For some uses other than in pigments, partly supplanted lead, particularly in plumbing supplies and pigments.

SUMMARY

Refined primary lead produced in the United States from domestic ores in 1926 amounted to 680,685 short tons, valued at \$94,333,000 at the average selling price of pig lead. These figures represent an increase of 4 per cent in quantity but a decrease of 10 per cent in value as compared with 1925. Refined lead produced from foreign ores and base bullion amounted to 118,250 short tons, valued at \$18,921,000. The total output of lead from both domestic ores and foreign ores and bullion was 798,941 tons, valued at \$113,254,000.

Refined lead produced and consumed in the United States, 1925-1926

PRODUCTION	
Domestic desilverized lead.....	.....
Domestic soft lead.....	.....
Domestic desilverized soft lead.....	.....
Foreign desilverized lead.....	.....
Total refined primary lead ¹.....	.....
Antimonial lead.....	.....
Secondary lead ².....	.....

CONSUMPTION ³	
Apparent consumption of primary lead, refinery stocks disregarded.....	.....

¹ "Primary lead," which is produced directly from ore, is here distinguished from secondary lead, which is obtained by refining skimmings, drosses, and old metals. The statistics given on p. 361. In this report the word "lead" used without qualification means refined lead.

² For method of calculating consumption, see p. 368.

Refined lead produced in the United States from domestic ores

Year	Short tons	Value	Year	Short tons
1917.....	548,450	\$94,333,000	1922.....	.....
1918.....	539,905	76,687,000	1923.....	.....
1919.....	424,433	44,990,000	1924.....	.....
1920.....	476,849	70,290,000	1925.....	.....
1921.....	398,222	36,840,000	1926.....	.....

PRODUCTION

QUANTITY AND VALUE

The total refined lead produced in the United States from 1720 to 1926, from domestic ores and from foreign ores and base bullion, and its value are shown in the following table:

Refined lead produced in the United States, 1720-1926

Year	Short tons						Value	
	Desilverized lead ¹	Desilverized soft lead	Soft lead ²	Total production ¹	From domestic ores and base bullion	From foreign ores	Average per pound	Total
1720-1912.....	7,176,497	323,901	2,029,180	10,432,668	8,546,383	1,887,285	—	\$924,600,000
1913.....	301,180	29,433	131,807	462,400	411,878	13,223	37,350	\$0.044
1914.....	340,397	43,606	188,219	542,122	512,704	7,030	21,080	.030
1915.....	344,693	44,001	161,461	550,055	507,021	9,581	33,448	.047
1916.....	335,375	55,244	167,515	558,134	532,228	6,085	12,821	.069
1917.....	365,968	55,288	188,803	610,769	548,450	15,872	46,447	.086
1918.....	382,314	47,418	210,463	640,195	530,905	15,334	84,050	.071
1919.....	266,538	67,938	147,744	482,220	424,433	7,656	50,131	.053
1920.....	273,135	66,668	180,854	520,657	470,849	8,414	44,394	.089
1921.....	238,329	52,747	157,513	448,589	398,222	7,120	43,247	.045
1922.....	249,107	74,305	209,250	532,662	468,746	13,898	50,018	.055
1923.....	366,241	61,332	190,749	618,322	543,841	24,288	50,103	.070
1924.....	423,429	63,449	203,615	690,493	566,407	46,385	77,701	.080
1925.....	457,477	48,932	260,560	766,969	654,921	47,024	65,024	.087
1926.....	484,660	55,707	258,565	798,941	680,685	48,210	70,046	.080
	12,005,259	1,100,939	5,565,058	18,677,256	15,831,798	2,845,488	—	2,027,218,000

¹ The lead content of antimonial lead is excluded; see p. 360.
² Desilverized soft lead is excluded.

Details for years prior to 1913 are shown in the annual chapters. The value for years prior to 1917 is based upon the average price in New York; beginning with 1917 the value is based on the total sales of each producing company.

PRODUCTION BY STATES

To apportion the production of refined lead according to sources of ore is difficult; lead refiners treat products already smelted, whose origin may, as in custom refining, be unknown to them, because the identity of the ore is preserved only as far as the smelter. Accordingly, the following table is compiled, so far as possible, from smelter figures. It includes "pig lead" reported by all smelters running on Mississippi Valley or other "soft" lead ores and "work lead" produced at all other lead smelters, except that the greater part of the product reported by silver-lead smelters operated in conjunction with refineries is stated in terms of refined lead. A like part of the antimonial lead is thus eliminated from the "work lead" produced and appears only in the figures of production of antimonial lead.

In addition to the domestic lead ores smelted in this country, small quantities of domestic lead ore have been exported to smelters in Canada. During the period 1912 to 1919, 8,228 tons of desilverized lead was produced at Canadian smelters from Idaho, Washington, and Montana ores and 100 tons of soft lead from Wisconsin ores. No lead ore from the United States was treated in Canada from 1920 to 1926.

LEAD

Primary lead smelted or refined in the United States, 1917-1926
 short tons

Source of ore	1917	1918	1919	1920	1921	1922	1923	1924
Domestic ore:								
Alaska.....	884	531	645	591	773	324	400	9
Arizona.....	7,456	6,195	5,407	5,987	3,313	7,218	8,828	9
Arkansas ¹	300	14	2,004	2,200	614	3,018	5,168	2
California.....	11,471	6,228	18,867	17,752	12,104	11,108	23,885	25
Colorado.....	29,327	29,395	89,091	117,191	99,707	91,487	127,797	123
Idaho.....	174,045	142,640	89,091	117,191	99,707	91,487	127,797	123
Illinois ¹	867	1,010	977	948	271	750	1,286	1
Kansas ¹	2,063	5,023	7,951	8,421	10,939	10,900	20,207	12
Kentucky ¹	21	109	83	114	41	73	60	0
Missouri ¹	218,197	187,743	150,341	171,999	151,028	202,245	169,323	101
Montana.....	5,933	17,589	17,513	13,231	11,665	14,551	18,345	21
Nevada.....	12,384	8,720	5,958	8,650	3,653	4,204	8,044	8
New Hampshire.....	—	—	10	—	—	—	—	—
New Mexico.....	3,428	5,140	1,418	1,123	384	1,230	1,638	2
New York.....	—	49	—	—	—	—	—	—
Oklahoma ¹	10,648	58,765	40,984	40,984	40,902	67,436	69,602	56
Oregon.....	—	6	—	—	—	37	47	—
South Dakota.....	34	28	18	0	2	751	1,020	4
Tennessee ¹	58	843	2,371	2,705	1	5	40	—
Texas.....	82,081	70,160	65,102	64,000	51,872	63,130	104,078	110
Virginia ¹	147	59	—	—	—	—	—	—
Washington.....	920	908	1,000	2,460	325	478	2,008	2
Wisconsin ¹	2,930	4,276	3,975	3,841	1,079	1,323	601	1
Undistributed.....	145	59	119	201	101	75	691	—
Zinc residues.....	6,489	5,359	4,887	4,366	713	1,294	382	—
	679,385	556,878	427,825	494,347	395,287	481,689	554,036	58
Foreign ore:								
Africa.....	1,738	1,519	644	1,171	—	—	99	—
Australia.....	—	282	69	450	—	—	—	—
Canada.....	1,100	7,550	1,895	1,186	2,877	3,604	3,632	—
Central America.....	—	—	12	22	6	14	18	—
Europe.....	3,652	84	122	19	17	619	139	—
Mexico.....	7,607	4,798	2,251	2,729	1,912	7,280	18,867	3
South America.....	1,533	1,101	2,537	2,747	2,235	2,458	1,461	—
Other foreign.....	342	—	116	90	73	43	72	—
Foreign base bullion:								
Canada.....	6,750	8,108	567	1,019	1,599	2,900	50,193	7
Mexico.....	39,508	76,806	49,564	42,421	41,648	47,118	80,193	—
South America.....	189	39	—	64	—	—	—	—
	62,319	100,290	57,787	52,808	50,367	63,916	74,481	12
Grand total.....	641,704	657,168	485,612	547,155	445,654	545,605	628,517	70

¹ The lead produced by these States is nonargentiferous or soft lead. A small quantity of lead produced by Colorado and New Mexico ores is also nonargentiferous.

SOFT LEAD

The lead ores of the Mississippi Valley are almost all of the soft lead type, and the lead produced from them is known as soft lead. The output of the lead pigment known as basic lead sulphate or white lead is derived from these ores. The galena of southern Illinois is notably argentiferous as compared with the rest of the Mississippi Valley ores, and the silver-bearing lead concentrates from the period 1917 to 1926 averaged 5.5 ounces of silver to the ton. Lead in this district is now produced only incidentally in conjunction with fluor spar, and the output is small compared with that from other districts in the Central States. Lead ores of the eastern Missouri also contain a small amount of silver. The lead of years the silver-bearing lead concentrates smelted averaged about 1 ounce of silver to the ton.

Zinc ores from Western States, that are made into lead, contain some lead which goes into the pigment; the

strictly accurate to speak of the lead content of pigments as wholly soft lead.

In some years small quantities of foreign lead have also been made into pigments in the United States. During the period covered by the following table lead pigments were made from foreign ores in 1924 only, when the lead so recovered amounted to 545 tons.

Soft lead produced in the United States from domestic ores, 1922-1926, in short tons

Year	Soft pig lead			Soft lead recovered in pigments	Total soft lead	Total domestic lead ¹	Soft lead percentage of domestic lead
	Undesilverized	Desilverized	Total				
1922.....	209,250	74,305	283,555	13,892	297,447	438,448	61
1923.....	190,749	61,332	252,081	13,612	265,693	507,247	47
1924.....	203,615	63,449	267,064	15,338	282,402	593,486	48
1925.....	200,660	48,932	309,492	17,547	327,039	684,968	48
1926.....	208,665	55,707	314,272	13,686	327,957	710,990	46

¹ Includes domestic refined lead, domestic lead in antimonial lead, and domestic lead in pigments.

ANTIMONIAL LEAD

By-product antimonial lead, produced at lead refineries in 1926 from domestic and foreign argentiferous lead ores, amounted to 22,524 short tons. This amount is 15 per cent greater than the production in 1925 and has been exceeded only by the output in 1915 and 1916. Considerable antimonial lead from secondary sources was also produced at regular lead smelters in 1926; the figures covering such production are given in the chapter on secondary metals.

By-product antimonial lead produced in the United States, 1917-1926

Year	Total lead refined from base bullion (short tons)	By-product antimonial lead (percentage of total)	Antimonial lead					
			From domestic ore (short tons)	From foreign ore (short tons)	Total			
					Short tons	Value	Antimony content	
							Short tons	Percentage
1917.....	305,098	5.1	15,270	3,367	18,640	\$3,781,560	2,759	14.8
1918.....	382,314	4.9	10,777	7,703	18,570	2,826,350	2,660	13.8
1919.....	296,638	5.2	9,674	4,200	13,874	1,513,068	1,943	14.0
1920.....	273,135	4.6	9,604	2,931	12,535	1,963,255	2,033	16.2
1921.....	238,329	4.2	7,881	2,183	10,064	870,059	1,589	15.8
1922.....	249,107	3.2	7,068	1,007	8,075	844,993	1,441	17.8
1923.....	300,241	3.9	11,635	2,555	14,190	1,950,370	2,170	15.3
1924.....	423,429	4.9	13,593	7,194	20,787	3,376,713	2,703	13.3
1925.....	457,477	4.3	14,472	5,195	19,667	3,785,847	2,624	13.3
1926.....	484,669	4.6	18,909	3,615	22,524	3,910,714	2,093	12.0
Average.....		4.6						14.2

LEAD

LEAD PIGMENTS

The amount of lead contained in pigments was equal to 15 per cent of the total domestic lead recovered in 1926 and 14 per cent in 1925. By far the largest part was contained in white lead—white lead, red lead, and litharge. In these pigments the lead content ranges from 80 per cent to nearly 93 per cent. A smaller quantity of lead is recovered in the pigment known as basic lead sulphate, white lead and sublimed blue lead, and a still smaller quantity is recovered from the zinc ores from which the zinc oxide is produced. Further details regarding the manufacture and sale of lead pigments are given in the Mineral Resources chapter on "Lead and its compounds and salts."

Lead in pigments,¹ 1922-1926, by sources, in short tons

Year	Lead in pigments	
	Domestic ore	Foreign ore
1922.....	13,892	—
1923.....	13,612	—
1924.....	15,338	54
1925.....	17,547	—
1926.....	13,686	—

¹ Includes also lead recovered in zinc oxide and leaded zinc oxide.

SECONDARY LEAD

The recovery of lead from waste products is a branch of the lead industry that has expanded notably in recent years. The principal sources of secondary pig lead are old pipe, lead cable, lead lining of acid tanks, and the alloys—babbitt, brass, and metal. The most important of these sources is old pipe, the manufacture of which has increased greatly with the automobile and radio industries.

The recovery of secondary pig lead at regular smelters in 1926, those that treat only old material amounted to 125,000 short tons, an increase of 11 per cent over 1925.

Secondary lead recovered in the United States, 1922-1926

Year	Pig lead	Lead in alloys
1922.....	75,480	84,080
1923.....	90,430	95,000
1924.....	90,400	114,100
1925.....	112,420	114,400
1926.....	125,000	152,300

MINE PRODUCTION

The recoverable lead in ore mined in the United States in the 10-year period 1917 to 1926 is shown in the following table. These figures represent the lead content of all ore mined, less a deduction made for assumed loss in smelting and refining. This loss has been taken as 2 per cent in smelting the soft lead ores of the Mississippi Valley, and about 5 per cent in smelting and refining the argentiferous lead ores of the Western States.

The mine production of recoverable lead in 1926 was the largest ever reported, with the exception of that in 1925. Missouri easily retained first place as a producer, and Utah again ranked second. In both of these States, however, the production was slightly below that of 1925. Idaho ranked third in 1926 and showed a gain of 8 per cent over 1925. More than one-third of the country's mine production of recoverable lead during the 10-year period 1917 to 1926 was from Missouri.

Mine production of recoverable lead, 1917-1926, by States, in short tons

State	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926*
Alaska.....	852	564	687	875	750	377	410	631	780	778
Arizona.....	11,140	5,939	4,847	6,935	3,271	7,635	8,140	9,321	11,938	11,629
Arkansas.....	374	118	27	8	21	42	26	29	58	18
California.....	10,387	6,351	1,095	2,407	502	3,191	4,775	2,482	3,253	4,047
Colorado.....	33,905	32,080	18,535	23,316	9,830	11,739	22,840	23,779	31,483	34,494
Georgia.....				2		4				
Idaho.....	180,941	139,081	80,612	118,595	99,235	97,017	121,178	124,475	126,521	136,400
Illinois.....	1,410	2,228	2,063	1,708	672	1,325	1,381	1,464	1,001	655
Iowa.....	33									
Kansas.....	2,965	7,107	11,057	16,452	18,670	23,271	17,598	18,560	22,775	28,483
Kentucky.....	121	181	84	120	69	92	53	175	162	68
Maine.....			1							
Massachusetts.....				14				(¹)		
Missouri.....	229,473	190,292	160,024	161,812	180,085	178,412	169,743	180,929	211,606	207,012
Montana.....	10,427	17,640	16,358	14,846	10,183	14,884	17,973	19,738	18,765	21,153
Nevada.....	13,147	11,075	7,201	10,100	3,594	4,095	9,078	10,030	12,238	11,184
New Hampshire.....	48	30								
New Mexico.....	4,554	4,190	1,443	1,435	339	1,506	1,916	1,817	3,210	3,480
New York.....		29								
North Carolina.....										
Oklahoma.....	25,831	54,075	52,795	64,086	41,552	62,856	66,904	71,358	70,940	69,704
Oregon.....		4				38	14	(¹)	3	6
Pennsylvania.....				7						
South Dakota.....	34	27	16	6	2					
Tennessee.....	2,404	1,620	2,079	1,880		732	1,250	937	448	800
Texas.....	1	13	7			4	13		8	42
Utah.....	84,798	79,329	58,819	66,898	44,594	67,606	101,724	116,855	153,335	147,638
Virginia.....	816	774						1,275	2,229	2,450
Washington.....	4,650	2,504	1,019	2,749	72	691	1,453	1,968	2,814	2,273
Wisconsin.....	4,056	4,442	4,130	2,694	972	691	734	1,254	1,877	1,548
	628,464	562,402	429,589	406,814	414,491	477,633	547,217	596,008	684,430	683,917

* It is said that a few tons of lead ore was mined at the old Chipman mine in Massachusetts and was treated at a small smelter owned by the mine operators.
* 513 pounds.

LEAD SMELTERS AND REFINERIES

UNITED STATES

California: Selby—Selby plant, American Smelting & Refining Co. (Smelter and refinery.)
Colorado:
Durango—Durango plant, American Smelting & Refining Co. (Smelter.)
Leadville—Arkansas Valley plant, American Smelting & Refining Co. (Smelter.)
Idaho: Kellogg—Bunker Hill & Sullivan smelter. (Smelter and refinery.)

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Illinois:

Chicago—Great Western Smelting & Refining Co.³ (Smelter.)
Collinsville—St. Louis Smelting & Refining Works of National Lead Co. (Smelter and refinery.)
Federal—Federal plant, American Smelting & Refining Co.

Indiana:

East Chicago—International Lead Refining Co.⁴ (Refinery.)
Grasselli—U. S. S. Lead Refinery (Inc.).⁵ (Refinery only. lytic process.)

Kansas: Galena—Galena plant, Eagle-Picher Lead Co. (Smelter.)

Missouri:

Granby—American Zinc, Lead & Smelting Co.⁶ (Smelter.)
Herculaneum—St. Joseph Lead Co. (Smelter and refinery.)
Joplin—Eagle-Picher Lead Co. (Smelter.)

Montana: East Helena—East Helena plant, American Smelting Co. (Smelter.)

Nebraska: Omaha—Omaha plant, American Smelting & Refining Co. (Smelter.)
only. Betts electrolytic process.)

New Jersey:

Newark—Balbach plant, American Metal Co. (Ltd.). (Smelter.)

Perth Amboy—Perth Amboy plant, American Smelting & Refining Co. (Smelter and refinery.)

Oklahoma: St. Louis—Ontario smelter, Eagle-Picher Lead Co.

Pennsylvania: Carnegie—Pennsylvania Smelting Co. (Smelter and refinery.)

Texas: El Paso—Kansas City Consolidated Smelting & Refining Co. (Smelter.)

Utah:

International—International Smelting Co.⁸ (Smelter.)
Midvale—United States Smelting, Refining & Mining Co. (Smelter.)
Murray—Murray plant, American Smelting & Refining Co.

CANADA

British Columbia: Trail—Consolidated Mining & Smelting Co. (Ltd.). (Smelter and refinery. Betts electrolytic process.)

Ontario: Galletta—Estate of James Robertson. (Smelter.)

MEXICO

Chihuahua: Chihuahua—American Smelting & Refining Co. (Smelter.)

Coahuila:

Saltillo—Mazapil Copper Co. (Ltd.). (Smelter.)
Torreón—American Metal Co. (Ltd.). (Cia. Metalúrgica.)

Durango: Asarco (Velardeña)—American Smelting & Refining Co. (Smelter.)
Minera Asarco.⁹ (Smelter.)

Guerrero: Campo Morado—Reforma Mining & Milling Co. (Smelter.)

Nuevo Leon:

Monterrey—American Metal Co. (Ltd.). (Cia. Minera de Monterrey.)
(Smelter and refinery.)

Monterrey—American Smelting & Refining Co. (Smelter.)

San Luis Potosi:

Matchuala—American Smelting & Refining Co. (Cia. Metalúrgica.)
(Smelter.)

San Luis Potosi—American Smelting & Refining Co. (Cia. Metalúrgica.)
Asarco.⁹ (Smelter.)

Zacatecas: La Fé—American Metal Co. (Ltd.). (Cia. Minera de La Fé.)
(Smelter.)

¹ Smelters of secondary materials but treating some lead ores.

² Subsidiary of Anaconda Copper Mining Co.

³ Subsidiary of the United States Smelting, Refining & Mining Co.

⁴ Plant idle in 1926.

⁵ Subsidiary of American Smelting & Refining Co.

⁶ Subsidiary of Anaconda Copper Mining Co.

⁷ Plant closed in 1926 and being dismantled.

WORLD'S PRODUCTION

The accompanying table, prepared by L. M. Jones, of the Bureau of Mines, shows the world's smelter production of lead from 1922 to 1926, so far as statistics are available. Official figures are used wherever possible. For countries for which official data are not yet available, the figures are taken from the yearbook of the American Bureau of Metal Statistics and other reliable sources, but the official statistics will be substituted as received.

There is always a possibility of duplication in figures showing world's production, for some countries send "work lead" or base bullion to other countries for refining. Furthermore, secondary and antimonial lead are often included in the figures showing the foreign production, so that to put the United States on an equal footing in the statistics it would be necessary to include in its production the domestic output of secondary lead and antimonial lead. The figures for the United States represent refined lead that was smelted in this country, whatever the source of the ore.

World's production of lead, 1922-1926

[In metric tons, by countries where smelted, but not necessarily refined]

Country ¹	1922	1923	1924	1925	1926
Australia.....	108, 126	132, 105	128, 657	148, 474	152, 875
Austria.....	3, 380	4, 255	4, 985	5, 408	6, 478
Belgium.....	43, 674	51, 100	58, 320	65, 670	61, 762
Canada.....	40, 101	46, 801	76, 503	104, 303	116, 097
Chosen.....	(?)	(?)	(?)	485	1, 968
Czechoslovakia.....	2, 228	2, 452	2, 204	2, 050	2, 235
France.....	13, 944	17, 413	18, 881	20, 643	20, 000
Germany.....	83, 562	50, 110	67, 427	69, 468	76, 235
Great Britain.....	5, 036	6, 816	5, 387	4, 811	4, 334
Greece.....	4, 408	4, 235	5, 106	5, 366	5, 059
India (Burma).....	39, 843	40, 799	52, 600	48, 034	54, 165
Italy.....	10, 710	17, 131	22, 062	24, 475	23, 590
Japan.....	3, 239	2, 700	2, 941	3, 337	3, 610
Mexico.....	114, 235	150, 028	130, 973	167, 900	170, 723
Northern Rhodesia.....	20, 830	11, 197	5, 999	3, 468	3, 897
Norway.....	242	642	406	386	386
Poland.....	8, 375	10, 258	10, 276	27, 420	26, 388
Rumania.....	230	402	433	490	655
Russia.....	304	665	426	823	1, 000
South America.....	5, 030	6, 081	11, 703	11, 904	17, 003
Southwest African Protectorate ²	688	622	813	1, 619	1, 882
Spain.....	119, 387	127, 514	141, 849	153, 567	149, 514
Sweden.....	306	119	477	723	622
Switzerland.....	14, 562	14, 030	14, 201	16, 013	18, 166
Turkey.....	5, 400	1, 400	5, 104	4, 786	5, 000
Union of South Africa.....	4, 201	6, 000	4, 000	—	—
United States (refined).....	437, 845	515, 395	555, 913	630, 790	661, 239
Yugoslavia.....	8, 497	9, 280	11, 487	10, 950	9, 809
Known production.....	1, 096, 000	1, 245, 000	1, 345, 000	1, 549, 000	1, 596, 000

¹ In addition to the countries listed, China smelts lead, but no reliable data of output are available. Official estimates of production in 1925 range from 1,500 to 3,600 tons.

² Data not available.

³ Exclusive of Upper Silesia.

⁴ Data for year ended Sept. 30.

⁵ Data for year ended Mar. 31 of year following that stated.

LEAD

IMPORTS AND EXPORTS

The total imports of lead into the United States in ore, base bullion, and as refined lead in 1926 were greater than in any previous year and amounted to 147,554 short tons, or more than one-fifth of the refined lead produced from domestic ore; nearly seven-tenths of this lead came from Mexico. Some of the imported ore and base bullion leaves the country later in the form of pig lead and in many cases articles, and some of the imported refined lead also is exported. These exports are shown in the table of foreign lead exports on page 324. The imports of lead for consumption in the United States. The imports of lead for consumption are shown in the table on page 366. A description of the difference between foreign imports and imports for consumption and the method of house transactions is given in Mineral Resources, Part I, page 324.

Exports of refined lead from domestic ore began in 1914 and the price of lead at London rose above the price at New York in 1915 and amounted to 58,722 short tons; in 1916 exports reached a peak of 100,500 tons, but they declined immediately and from 1920 to 1926 have averaged annually 3,820 tons; the exports in 1926 were 4,276 tons, of which 65 per cent went to Mexico. The exports of refined lead from foreign ore are much less than those from domestic ore and in 1926 amounted to 67,600 tons, a decrease of 31 per cent from 1925 but greater than those of any year before 1924.

In past years small quantities of domestic lead ore have been exported to Canada for treatment, but no ore was exported to 1926.

Lead remaining in warehouse in the United States, December 31, 1926

[Stated in the form in which the material was entered for warehouse]

Year	Ore	Base bullion	Pigs, bars, and old	Year	Ore	Base bullion
1917.....	27, 005, 477	20, 848, 408	5, 370, 445	1922.....	10, 470, 144	7, 076, 000
1918.....	12, 805, 107	21, 102, 055	944, 483	1923.....	70, 031, 265	80, 308, 000
1919.....	20, 543, 811	61, 408, 873	408, 154	1924.....	103, 474, 370	95, 007, 000
1920.....	32, 023, 239	69, 517, 026	2, 644, 576	1925.....	105, 884, 711	91, 728, 000
1921.....	13, 079, 465	24, 692, 350	683, 440	1926.....	114, 630, 697	107, 562, 000

¹ Includes lead in reclaimed scrap, as follows: 1925, 241,078 pounds; 1926, 397,433 pounds. Figures for earlier years are not recorded separately.

Lead imported into the United States, 1917-1926, by classes, in

[General imports]

Year	Lead in ore	Lead in base bullion	Pigs, bars, sheets, and old
1917.....	41, 292, 876	103, 664, 970	11, 685, 900
1918.....	37, 070, 340	149, 663, 889	10, 480, 600
1919.....	19, 573, 856	112, 024, 518	10, 214, 700
1920.....	29, 488, 816	96, 103, 603	71, 437, 100
1921.....	14, 234, 039	71, 783, 838	62, 602, 800
1922.....	24, 474, 481	124, 074, 466	7, 101, 600
1923.....	66, 882, 850	181, 496, 495	42, 188, 800
1924.....	95, 320, 168	165, 501, 850	24, 463, 700
1925.....	88, 962, 602	141, 263, 559	14, 042, 300
1926.....	116, 232, 669	156, 570, 728	22, 304, 000

Lead imported into the United States, in ore, base bullion, and refined, 1917-1926, by sources, in pounds

[General Imports]

Year	Canada	Mexico	South America	Europe	Other countries	Total
1917.....	11,738,379	125,782,769	4,556,460	8,945,800	5,520,323	156,543,820
1918.....	28,225,878	162,250,199	1,062,124	62,510	4,705,049	197,214,700
1919.....	10,881,115	125,541,014	5,504,410	89,840	280,142	141,813,127
1920.....	8,199,224	131,815,278	7,985,351	38,700,504	11,153,100	197,029,827
1921.....	8,127,158	104,406,238	2,381,365	30,224,701	1,430,040	148,570,411
1922.....	8,663,236	141,216,136	3,803,478	1,454,384	513,335	165,650,509
1923.....	11,899,671	242,352,788	5,300,161	11,004,938	520,635	270,578,193
1924.....	11,022,091	243,161,069	15,820,867	4,867,805	453,432	275,315,204
1925.....	11,046,820	218,873,800	10,621,737	1,594,963	1,521,110	244,258,430
1926.....	12,810,740	254,203,852	24,790,075	3,224,504	572,850	295,108,027

Lead imported for consumption in the United States, 1917-1926, by classes

Year	Lead in ore ¹		Base bullion		Pigs, bars, and old ²		Sheets, pipe, and shot		Not otherwise specified	Total value
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value		
1917.....	5,438,931	\$207,370	6,965,849	\$470,539	1,750,223	\$85,743	12,538	\$2,069	\$10,287	\$776,638
1918.....	6,064,902	344,080	3,559,071	180,070	1,139,060	56,694	6,892	624	36,723	618,191
1919.....	4,106,823	196,363	31,796,593	1,130,937	10,174,115	415,094	8,018	628	17,187	1,760,209
1920.....	13,700,499	908,619	66,816,820	3,340,600	69,901,959	3,887,821	81,295	5,453	21,328	8,163,857
1921.....	6,842,807	327,046	56,819,980	1,668,410	61,909,094	1,972,710	3,987	140	11,204	3,979,516
1922.....	23,649,851	812,603	65,859,422	1,816,142	8,563,110	3,355,924	6,018	097	12,280	2,976,652
1923.....	22,420,046	1,190,414	11,124,151	628,201	42,925,265	2,510,460	19,525	4,496	90,027	4,421,603
1924.....	65,147,976	3,145,791	28,795,402	1,542,167	27,362,392	1,850,862	11,666	4,384	138,637	6,681,841
1925.....	12,706,608	672,112	24,747,666	1,823,600	15,464,205	1,038,350	27,679	10,420	139,533	3,083,990
1926.....	58,762,911	3,393,039	13,341,038	972,758	24,305,570	2,191,668	864,342	101,322	62,895	6,721,672

¹ Includes also lead in matte beginning Sept. 22, 1922.

² Includes also imports of antimonial lead, antimonial scrap lead, babbitt metal, solder, etc., beginning with tariff of Sept. 22, 1922, except in 1925 and 1926, when antimonial lead is excluded.

Type metal imported for consumption in the United States, 1917-1926

Year	Type metal		Lead content	
	Pounds	Value	Pounds	Percentage
1917.....	551,794	\$35,938	513,168	93.0
1918.....	13,394,803	816,642	11,000,498	82.1
1919.....	29,887,353	1,349,495	25,761,543	86.2
1920.....	38,971,351	1,191,553	30,700,845	78.8
1921.....	44,805,120	1,120,814	33,044,190	73.6
1922.....	(¹)	(¹)	7,353,463	(¹)
1923.....	(¹)	(¹)	1,288,766	(¹)
1924.....	10,000,161	463,134	4,309,549	71.7
1925.....	18,021,175	912,331	7,053,849	81.8

¹ Figures not available.

² Includes antimonial lead.

Refined lead, from domestic ores, exported from the United States, 1917-1926

Year	Short tons	Value	Year	Short tons	Value
1917.....	53,688	\$9,500,598	1922.....	5,823	\$604,605
1918.....	41,831	5,880,381	1923.....	1,900	200,487
1919.....	10,810	1,471,250	1924.....	5,332	711,147
1920.....	2,780	462,223	1925.....	4,955	784,440
1921.....	1,624	177,926	1926.....	4,276	601,061

LEAD

Foreign lead exported from the United States, 1917-1926

Year	Exported from warehouse	
	Pigs, bars, and old ¹	
	Pounds	Value
1917.....	78,304,480	\$9,050,187
1918.....	118,832,344	8,309,788
1919.....	81,951,396	4,536,278
1920.....	34,725,501	2,570,535
1921.....	60,000,260	2,284,107
1922.....	64,709,305	3,177,360
1923.....	97,471,326	5,195,266
1924.....	163,516,803	9,685,619
1925.....	197,128,517	14,910,891
1926.....	136,319,321	8,904,603

¹ Since July 1, 1915, the Bureau of Foreign and Domestic Commerce has classified or refined in this country and exported as "domestic exports of pigs, bars, etc., produced in the United States." The above figures include also the exports of foreign lead imported in the form of refined lead.

² Not separately classified after 1922.

Domestic and foreign pig lead exported from the United States, 1917-1926

Destination	Domestic	
	Short tons	Value
1925		
North America:		
Canada.....	167	\$31,721
Cuba.....	183	29,589
Mexico.....	65	13,659
Panama.....	126	24,130
Other.....	607	112,330
South America:		
Argentina.....	344	51,603
Brazil.....	174	29,402
Chile.....	12	2,649
Colombia.....	226	34,128
Guiana, Dutch.....	1	235
Peru.....	175	31,340
Uruguay.....	392	57,115
Other.....	21	4,435
	1,346	210,807
Europe:		
Belgium.....	448	68,350
France.....	812	125,682
Germany.....	347	53,454
Italy.....	519	74,600
Netherlands.....	560	86,144
Sweden.....		
United Kingdom.....	224	35,014
Other.....	29	4,950
	2,039	448,194
Asia:		
China.....	2	490
Japan.....		
Philippine Islands.....	52	10,888
Other.....	10	1,068
	64	13,071
Oceania, including Australia.....	(¹)	38
	4,955	784,440

¹ Less than 1 ton.

Domestic and foreign pig lead exported from the United States, 1925-29, by destinations—Continued

Destination	Domestic		Foreign	
	Short tons	Value	Short tons	Value
1926				
North America:				
Canada.....	127	\$27,441	(¹)	\$32
Cuba.....	00	11,162	302	42,442
Mexico.....	59	12,480	56	7,942
Panama.....	27	5,840		
Other.....	42	8,504	7	1,141
	315	64,926	305	51,557
South America:				
Argentina.....	41	7,539	386	50,552
Brazil.....	46	9,259	1,709	225,306
Chile.....	143	23,320	972	142,684
Colombia.....	245	37,530	18	2,820
Guiana, Dutch.....	3	545	392	65,050
Peru.....	29	4,840	44	7,003
Uruguay.....	29	3,697	450	61,295
Other.....	16	3,153	56	8,944
	552	90,284	4,027	550,824
Europe:				
Belgium.....	336	44,775	2,016	267,945
France.....	392	50,500	7,416	982,599
Germany.....	895	115,548	16,827	2,185,163
Italy.....			840	124,789
Netherlands.....	56	6,675	1,714	226,698
Sweden.....	112	14,350	2,829	365,764
United Kingdom.....	925	120,840	14,370	1,637,448
Other.....	58	8,381	280	36,255
	2,775	360,769	40,202	6,126,661
Asia:				
China.....	(¹)	12	2,864	355,779
Japan, including Chosen.....	504	64,209	14,022	1,800,822
Philippine Islands.....	72	13,175	38	6,461
Other.....	50	7,141	52	6,499
	632	84,537	16,976	2,169,561
Africa.....	2	545		
	4,276	601,061	67,660	8,904,603

¹ Less than 1 ton.

CONSUMPTION

Apparent consumption of refined primary lead in the United States, refinery stocks disregarded, 1922-1926, in short tons

	1922	1923	1924	1925	1926
Supply:					
Stock in bonded warehouse Jan. 1.....	347		2,017	5,045	8,162
Imports of pigs, bars, and old.....	3,551	21,099	12,247	7,021	11,152
Production.....	532,602	618,322	690,493	766,969	798,941
	536,500	639,421	705,357	779,035	818,255
Withdrawn:					
Exports of foreign lead—					
From warehouse.....	32,355	48,730	76,758	98,504	67,660
In manufactures, with benefit of drawback.....	5,677	12,520	15,275	11,699	17,955
Exports of domestic lead.....	5,823	1,099	5,332	4,955	4,276
Stock in bonded warehouse Dec. 31.....		2,617	5,045	8,162	10,711
	43,855	65,878	102,410	123,280	100,602
Apparent consumption.....	492,705	573,543	602,947	655,655	717,653

LEAD

PRICES AND VALUE

The average as calculated on the American Metal prices of lead at New York, outside market, including west, was 8.45 cents a pound in 1926. This quotation was lower than the average quotation in 1925 (9.1 cents) and lower than the average annual quotation recorded for the year except 1917.

The highest price of the year was 9.37½ cents at the beginning of January, and there was no change until when it fell to 9.32½ cents. Quotations fluctuated during the spring months and the general trend was downward until part of May, when the price reached 7.65 cents—the lowest of the year. A recovery then began which brought the price to 9 cents the last of July. Quotations ranged from 7.65 cents from August through November. The quotation fell to the close of the year was 7.80 cents.

The following table gives the average quotations for the market, New York, 1924 to 1926, and in London,

Average monthly quoted price of lead at New York, 1924-1926, in cents a pound ¹

Month	At New York (outside market)			At London, ² 1926	Month	At New York, 1924
	1924	1925	1926			
January.....	8.43	10.33	9.35	7.54	July.....	7.19
February.....	9.18	9.41	9.17	7.38	August.....	7.95
March.....	9.35	8.90	8.50	6.86	September.....	8.07
April.....	8.20	8.02	8.04	6.25	October.....	8.37
May.....	7.32	8.20	7.81	6.13	November.....	9.01
June.....	7.01	8.44	8.11	6.61	December.....	9.62

¹ American Metal Market, monthly review section.

² Conversion of English quotations into American money based on average as recorded by the Federal Reserve Board of the Treasury.