UNITED STATES DEPARTMENT O
HAROLD L. ICKES, Secre
BUREAU OF MINE
JOHN W. FINCH, Directo

MINERALS YEA

1936

Compiled under the supervi
O. E. KIESSLING and H. H.
Mineral Resources and Economi

UNITED STATES
GOVERNMENT PRINTING
WASHINGTON : 193

For sale by the Superintendent of Documents, Washin

LEAD

By Elmer W. Pehrson and

SUMMARY OUTL

The lead industry of the United State
1935. For the first time since the dep
refined pig lead was held below deliveri
sultant decline in producers' stocks and a
Total consumption of pig lead increased
better demand in the lead-pigments an
Cable coverings and building gained som
at extremely low levels. As a consider
consumption was met by withdrawals
output of secondary metal, productio
increased only 4 percent. Mine prod
percent, indicating, that there was som
concentrates. Apparently higher gold a
lead production to a minor extent only, a
in the Western States, where the preciou
ant, was less than in the other lead-produ
lead at refineries decreased from 234,000
tons on December 31, the latter amo
supply at the current rate of consumptio
The New York quotation rose from
beginning of the year to 4.50 cents at the
was 4.06 cents compared with 3.86 cents i

Outside the United States consumpti
production (smelter basis) increased 7
was a decrease in stocks of refined met
this point are not available. The Londo
3.12 cents per pound (United States ex
2.46 cents in the previous year. The di
and London thus fell from 1.4 cents i

Foreign lead producers met in London in July; and while no formal cartel was organized, it was reported in the press that some of the producers agreed informally not to increase production without due notice to one another. On August 27 the British import duty on lead was reduced from about 32 shillings (10 percent ad valorem), to 7½ shillings per long ton.

The recovery in the lead industry outside the United States is in striking contrast to the recovery in the domestic industry. In 1935 consumption of lead in the United States equaled only 53 percent of the 1929 total, whereas elsewhere in the world it exceeded the 1929 level by 4 percent. Likewise, domestic production was only 46 percent of the 1929 total, while foreign production was 96 percent.

Salient statistics of the lead industry in the United States, 1925–29 and 1931–35

	1925–29 average	1931	1932	1933	1934	1935
Production of refined primary lead:						
From domestic ores . . .short tons	660, 525	390, 260	255, 337	259, 616	200, 841	310, 505
From foreign ores and base bullion short tons..	123, 104	52, 504	33, 024	13, 963	11, 395	14, 055
	783, 629	442, 764	288, 361	273, 579	311, 236	324, 560
Recovery of secondary lead:						
As pig lead.....do....	126, 600	128, 800	128, 000	131, 800	124, 500	156, 800
In alloys.....do....	153, 400	105, 900	70, 300	92, 700	83, 900	113, 600
	280, 000	234, 700	198, 300	224, 500	208, 400	270, 400
Total production of pig lead (primary and secondary).....short tons..	910, 229	571, 564	416, 361	405, 379	435, 736	481, 360
Imports: [1]						
Lead in base bullion.....do....	05, 747	32, 320	13, 462	1, 587	[1] 2, 450	[1] 2, 692
Lead in ore.....do....	40, 096	20, 888	21, 601	5, 958	[1] 10, 611	[1] 20, 025
Exports of refined pig lead.....do....	98, 048	21, 665	23, 516	22, 831	5, 906	6, 976
Refined primary lead available for consumption.....short tons..	677, 322	410, 006	257, 069	244, 349	298, 141	309, 911
Estimated consumption of primary and secondary lead.....short tons..	900, 250	567, 700	416, 200	452, 700	491, 300	543, 200
Prices:						
New York:						
Average for year cents per pound..	7. 47	4. 24	3. 18	3. 87	3. 86	4. 06
Quotation at end of year...do....	6. 25	3. 75	3. 00	4. 15	3. 70	4. 60
London average.....do....	5. 87	2. 04	1. 86	2. 21	2. 46	3. 12
Mine production of recoverable lead short tons..	664, 230	404, 622	292, 968	272, 677	287, 432	[2] 331, 720
World smelter production of lead..do....	1, 850, 000	1, 528, 000	1, 287, 000	1, 282, 000	1, 462, 000	[2] 1, 550, 000

[1] Data for 1934 and 1935 include lead imported for immediate consumption plus material entering the country under bond.
[2] Subject to revision.
[3] Approximate production.

N. R. A.—The code of fair competition established on June 4, 1934, became inoperative when the Supreme Court declared the enabling act unconstitutional on May 27, 1935. The uncertainty following this action was responsible for a sharp decline in domestic shipments, which was reflected in increased stocks and falling prices. This proved to be temporary, however, for by the end of August all of the losses had been regained.

Lead reserves and capacity for production.—Kenneth Leith and Donald M. Liddell, in a report on the Mineral Reserves of the United States and Its Capacity for Production prepared for the Planning Committee for Mineral Policy, state:

The measured and published lead-ore reserv
tons of metallic lead. Finlay [1] says of the
Southeastern Missouri, the Coeur d'Alenes, t
believe it is difficult to see how all these distri
8,000,000 tons more. The amount actually in s
It is equally difficult to see how the whole count
000 tons.) * * *"

The projection of a curve of apparent consu
indicates a normal demand of the order of 500
of Finlay's estimate of outside probabilities, t
remaining. On the basis of lead definitely in si
only be a little more than 6 years.

This time of exhaustion may and probably
remains that our reserves are not large and w
of this metal within this or the next generatio

The United States' lead-smelting capacity (
lent to about 4,000,000 tons of ore and conce
is about 895,000 tons of metal.

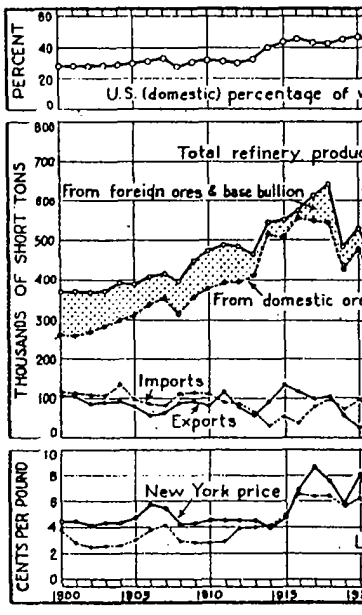

FIGURE 59.—Trends in the lead industry in the United Sta
base bullion, and refined lead; exports include refined
benefit of draw-back.

Reciprocal trade agreements.—Trade
the end of 1935 include the following ch
duties on lead products:

White lead.—Duty reduced from 2.5 cents
May 1, 1935.

Suboxide of lead.—Duty changed from 30
pound, but not less than 15 percent nor mor

[1] Finlay, J. R., Mining and Metallurgical Society of Ame

DOMESTIC PRODUCTION

Refined pig lead produced in the United States is derived from three main sources—domestic ore, foreign ore and base bullion, and secondary materials. The following table shows the production from each of these sources from 1926 to 1935.

Total pig lead produced in the United States, 1926–35, short tons

Year	From domestic ores and base bullion	From foreign ores and base bullion	From secondary materials	Total
1926	680,685	118,256	125,000	923,941
1927	668,320	128,210	119,000	915,530
1928	626,202	154,869	138,000	919,071
1929	672,498	102,135	138,500	913,133
1930	573,740	60,293	120,000	772,033
1931	390,260	52,504	128,800	571,564
1932	255,337	33,024	128,000	416,361
1933	259,616	13,963	131,800	405,379
1934	299,841	11,395	124,500	435,736
1935	310,505	14,055	156,800	481,360

PRIMARY LEAD

Refinery production.—Production of refined primary lead in 1935 increased 4 percent and was equivalent to the normal production at the close of the nineteenth century. Production from foreign ores and base bullion increased 23 percent but was equivalent to only 14 percent of the 1929 output; it accounted for only 4 percent of the total refined primary lead output. Lead derived from domestic ores increased less than 4 percent in 1935.

Refined primary lead produced in the United States, 1929–35

Year	Production (short tons)				Sources (short tons)			Value	
	Desilverized lead [1]	Desilverized soft lead	Soft lead [2]	Total production [1]	From domestic ores and base bullion	From foreign ores	From foreign base bullion	Average per pound	Total
1929	483,622	55,666	235,345	774,633	672,498	29,675	72,460	$0.063	$97,604,000
1930	396,094	45,578	201,361	643,033	573,740	34,348	34,945	.050	64,303,000
1931	263,919	40,456	138,389	442,764	390,260	22,254	30,250	.037	32,765,000
1932	180,707	35,524	63,130	288,361	255,337	21,747	11,277	.030	17,302,000
1933	185,791	22,210	85,578	273,579	259,616	7,677	6,286	.037	20,245,000
1934	186,498	22,744	102,024	311,236	299,841	10,241	1,154	.037	23,031,000
1935	102,544	35,233	96,783	324,560	310,505	13,659	396	.040	25,965,000

[1] The lead content of antimonial lead is excluded (see p. 142).
[2] Desilverized soft lead is excluded.

Source of primary lead.—Of the total refined lead produced in 1935, 95.7 percent was derived from domestic ores, 4.2 percent from foreign ores, and 0.1 percent from foreign base bullion. Production from foreign ores increased 33 percent in 1935 owing to greater tonnages received from Mexico. The production of refined lead from foreign base bullion decreased 66 percent in 1935. In 1928, over 128,000 tons of foreign bullion were refined in the United States; in 1935 less than 400 tons were treated. Details of the sources of lead derived from domestic ores are given in the section on mine production.

Refined primary lead produced in the United States,

Source	1929	1930	1931
Domestic ore	672,498	573,740	390,2
Foreign ore:			
Australia	5	3	
Canada	9,499	14,309	3,8
Europe	28	41	
Mexico	16,807	14,949	6,4
South America	3,285	3,476	2,2
Other foreign	51	1,510	9,6
	29,675	34,348	22,2
Foreign base bullion:			
Mexico	51,295	18,592	30,0
South America	21,165	16,353	1
	72,460	34,945	30,2
Total foreign	102,135	60,293	52,5
Grand total	774,633	643,033	442,7

Soft lead.—Nonargentiferous lead ores soft lead can be produced without elabo known as soft-lead ores. Most of the so United States are smelted into pig lead, is used each year in the manufacture of sublimed lead and leaded zinc oxide. Us pig lead produced from soft-lead ores is d in the manufacture of white lead where hi

Soft lead produced in the United States from dom

Year	Soft pig lead		
	Undesilverized	Desilverized	Total
1929	235,345	55,666	291,011
1930	201,361	45,578	246,939
1931	138,389	40,456	178,845
1932	63,130	35,524	98,654
1933	85,578	22,210	107,788
1934	102,024	22,744	124,768
1935	96,783	35,233	132,016

[1] Includes domestic refined lead, domestic lead in antimonial
mestic lead in antimonial lead computed on different basis be

Antimonial lead.—Antimonial lead or byproduct of the refining of base bullio from this source is only a small part of the The major part is derived from the smelt and some is produced by mixing metallic lead.

Several lead-smelting plants operate or Production data from such plants are su Secondary Metals. A large quantity of l at primary smelters and refineries, and t lead at these plants is shown in the tabl

Antimonial lead produced at primary lead refineries, 1929–35

Year	Production (short tons)				Antimony content		Lead content by difference (short tons)			
	From domestic ore	From foreign ore	From scrap	Total	Short tons	Percentage	From domestic ore	From foreign ore	From scrap	Total
1929	17,962	8,607	17,575	43,244	4,935	11.4	(1)	(1)	(1)	38,309
1930	8,918	4,793	11,086	24,707	2,967	12.0	(1)	(1)	(1)	21,830
1931	(2)	(2)	(2)	21,842	2,438	11.2	3,628	1,003	14,173	19,404
1932	(2)	(2)	(2)	21,024	2,495	11.9	3,577	1,466	13,486	18,529
1933	(2)	(2)	(2)	17,805	1,720	9.7	4,158	791	11,136	16,085
1934	(2)	(2)	(2)	16,607	2,263	13.6	5,901	330	8,113	14,344
1935	(2)	(2)	(2)	16,384	1,729	10.6	4,685	401	9,479	14,565

[1] Not recorded.
[2] Segregation discontinued.

SECONDARY LEAD

Recovery of secondary lead increased 30 percent in 1935 and was the highest recorded since 1929. Since the output of domestic refined primary lead was only 4 percent higher, the ratio of secondary to primary lead production was the highest on record—87 percent. The increase in output of secondary lead may be ascribed in part to the large number of automobiles scrapped in 1935. Automobile storage batteries are one of the principal sources of scrap lead. Higher lead prices probably induced some liquidation of stocks of scrap accumulated during the depression.

Secondary lead recovered in the United States, 1929–35

[Compiled by J. P. Dunlop]

Year	Pig lead (short tons)—			Lead in alloys (short tons)	Total recovered lead		
	At primary plants	At secondary plants	Total		Short tons	Value	Ratio to domestic refined primary lead (percent)
1929	65,359	73,141	138,500	172,500	311,000	$39,186,000	46
1930	48,135	80,865	129,000	126,800	255,800	25,580,000	45
1931	43,774	85,026	128,800	105,900	234,700	17,367,800	60
1932	33,611	94,389	128,000	70,300	198,300	11,898,000	78
1933	41,632	90,168	131,800	92,700	224,500	16,613,000	86
1934	33,557	90,943	124,500	83,900	208,400	15,421,600	70
1935	44,748	112,052	156,800	113,600	270,400	21,632,000	87

LEAD PIGMENTS

Lead pigments manufactured in 1935 contained 197,404 tons of lead from the sources shown in the following table. Of this total about 185,151 tons were derived from refined pig lead, of which white lead accounted for 45 percent, litharge 40 percent, red lead 14 percent, and sublimed lead and orange mineral 1 percent. Sublimed lead and leaded zinc oxide are the principal pigments in which the lead content is derived from ores.

Lead in pigments,[1] 1929–35, by so

Year	Lead in pigments from—				Year
	Domestic ore [2]	Metal	Scrap	Total	
1929	9,429	248,657	2,427	260,513	1933
1930	6,686	190,182	689	197,557	1934
1931	5,722	166,328	710	172,760	1935
1932	4,932	127,318	262	132,512	

[1] Includes also lead recovered in zinc oxide and leaded zinc o
[2] No pigments from foreign ore.

MINE PRODUCTI

Mine production of recoverable lead
tons, an increase of 15 percent over 1934
average for 1925 to 1929. Production
creased 14 percent, in the Central Sta
Eastern States 37 percent.

Compared with the 5-year average
1935 was as follows: Western States 52
percent, and Eastern States about 122 p
to rank first in production and increased
ranked second and Utah third, with inc
respectively. These three States contrib
output in 1935. All of the other impo
except New Mexico produced more lead
southeastern Missouri district produced
and the tri-State district (Joplin), 36,1

Mine production of recoverable lead in the Unit

State	1925–29 average	1930	1931
Western States and Alaska:			
Alaska	982	1,365	1,661
Arizona	9,743	4,246	982
California	2,070	1,780	1,879
Colorado	30,112	22,130	6,884
Idaho	141,610	134,058	99,365
Montana	18,871	10,653	4,430
Nevada	9,807	11,529	7,930
New Mexico	6,730	10,378	11,269
Oregon	6	5	2
South Dakota	21		
Texas	213	198	
Utah	149,509	116,495	79,212
Washington	1,323	576	1,386
Wyoming			
	370,997	312,413	215,000
Central States:			
Arkansas	38	53	78
Illinois	552	248	205
Kansas	26,121	12,910	7,082
Kentucky	136	101	
Missouri	202,240	199,632	160,121
Oklahoma	58,306	23,052	13,210
Wisconsin	1,745	1,537	952
	289,137	237,533	181,648
Eastern States:			
New York			
Tennessee	4,096	8,367	7,974
Virginia			
	4,096	8,367	7,974
	664,230	558,313	404,622

[1] Subject to revision.

Mine production of recoverable lead in the principal lead-producing districts of the United States, 1929–35, in short tons

District	State	1929	1930	1931	1932	1933	1934	1935
Southeastern Missouri region	Missouri	197,435	108,022	158,950	116,162	83,970	89,580	[1] 96,941
Coeur d'Alene region	Idaho	141,658	129,311	97,771	71,605	73,926	70,331	[1] 78,314
Bingham	Utah	49,447	42,580	33,607	32,640	33,030	32,420	[1] 36,293
Joplin region	Kansas, Missouri, Oklahoma	74,143	36,972	21,463	18,131	25,137	24,465	[1] 36,100
Park City region	Utah	42,570	30,875	17,308	12,653	11,557	12,360	[1] 13,180
Tintic	do	44,113	29,474	18,427	9,842	6,433	5,715	[1] 8,838
Willow Creek	New Mexico	5,720	5,431	7,503	6,449	7,075	6,143	5,162
Rush Valley	Utah	11,751	10,157	8,773	7,222	6,916	5,594	(2)
Butte	Montana	8,230	2,540	------	1	4,185	5,391	(2)
Ploche	Nevada	2,986	4,868	2,802	(3)	(3)	4,644	(2)
Central	New Mexico	3,706	3,936	3,420	3,521	3,408	2,846	(2)
Eagle	Montana	------	1,287	3,480	771	1,521	2,560	(2)
San Juan Mountains	Colorado	17,386	11,722	908	702	906	1,051	2,428
Oro Blanco	Arizona	(3)	(3)	------	------	------	1,076	(2)
Ophir	Utah	25	18	(3)	2	87	1,340	(2)
Leadville	Colorado	5,172	6,808	1,470	76	505	524	1,288
Pend d'Orelle	Idaho	863	956	1,020	576	309	318	(2)
Upper Mississippi Valley	Iowa, northern Illinois, Wisconsin	1,536	1,537	962	910	540	234	286
Inyo County	California	670	1,711	1,705	1,102	301	277	(2)
Metaline	Washington	328	207	1,257	682	722	237	(2)
Eagle County	Colorado	108	2,821	3,816	221	8	52	155
Banner	Arizona	2,038	920	------	------	385	77	(2)
Bisbee (Warren)	do	1,020	151	252	431	(3)	64	(2)
Warm Springs	Idaho	1,507	1,793	37	------	21	8	(2)
Cedar Plains	Montana	1,177	120	25	2	1	2	(2)
Barker	do	6,137	4,578	21	------	28	------	(2)
Dome	Idaho	1,870	829	------	1	------	------	(2)
Tybo	Nevada	1,901	3,622	4,083	------	(3)	(3)	(2)
San Francisco	Utah	691	1,883	436	------	------	------	(2)
Austinville [4]	Virginia	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Jack Rabbit [4]	Nevada	2,430	1,404	240	(3)	(3)	(3)	(3)
St. Lawrence County [4]	New York	------	(3)	(3)	(3)	(3)	(3)	(3)

[1] Subject to revision.
[2] Data not yet available.
[3] Bureau of Mines not at liberty to publish figures.
[4] Not listed according to rank.

STOCKS

Lead stocks, as reported by the American Bureau of Metal Statistics, are shown in the following table. Stocks of refined and antimonial lead include metal held by all primary refiners and most of the refiners of secondary material that produce common lead. Foreign lead refined in the United States and entered for domestic consumption is included.

Lead stocks at end of year at smelters and refineries in the United States, 1929–35, in short tons

	1929	1930	1931	1932	1933	1934	1935
Refined pig lead	41,726	95,524	147,460	164,722	191,024	223,593	215,595
Antimonial lead	9,350	7,723	4,187	11,435	11,437	10,437	6,711
	51,076	103,247	151,653	176,157	203,061	234,030	222,306
Lead in base bullion:							
At smelters and refineries	8,313	8,171	12,952	13,911	12,786	6,045	15,072
In transit to refineries	7,116	4,261	2,971	1,302	2,191	1,528	1,860
In process at refineries	16,089	14,368	10,228	10,720	10,403	11,567	16,233
	31,518	26,800	26,151	25,933	25,380	19,140	33,165
Lead in ore and matte and in process at smelters	28,290	28,697	40,185	61,206	67,263	60,699	58,502
	110,803	158,744	217,989	263,296	295,704	313,869	314,033

From 1929 to 1934 stocks of refined lead in
1935 the trend was reversed; nevertheless, at
were 5.2 times larger than at the close of 192
refined and antimonial lead on December 31,
a 6-month supply at the average rate of consu
of base bullion on hand and in process incre
the year.

Available data on stocks of lead held outsid
the close of 1935 vary considerably. The
Smelting Co. of Canada, Ltd., in its annual re
world stocks of lead declined from 525,000 sh
of the year to 510,000 tons at the close.
stocks of refined and antimonial lead declined
tons, stocks outside of the United States a
from 291,000 to 288,000 tons. A year ago
poration estimated stocks outside the United
of 1935 to be 286,000 tons, but in its ann
company states that it is unable to give an e
at the close of 1935. However, this autho
was considerable reduction during the yea
stantiated by the Metal Bulletin, which, in i
an unofficial estimate of 150,000 long tons
stocks outside the United States at that time

DOMESTIC CONSUMPT

New supply.—The following table shows
available for consumption from 1929 to 1
does not take into account variations in p
these have changed considerably during the
titites shown do not indicate the true trend o
of new lead. The supply available for con
percent greater than in 1934 but was equiv
of that in 1929. Total consumption of lead
1935, but much of the increased demand wa
metal.

*Refined primary pig lead available for consumption i
1931–35, in short tons*

	1929	1931	1
Supply:			
Stock in bonded warehouse Jan. 1	4,139	(1)	
Imports of pigs, bars, and old	1,658	10	
Production	774,633	442,764	28
	780,430	442,774	28
Withdrawn:			
Exports:			
Pig lead	73,251	21,665	2
In manufactures, with benefit of drawback	13,086	10,503	
Stock in bonded warehouse Dec. 31	1,328	(1)	
	87,665	32,168	3
Supply available for consumption	692,765	410,606	25

[1] Stocks of pigs, bars, etc., in bonded warehouse included with b

Consumption by uses.—Owing to the large return of secondary lead from lead-consuming industries, the total consumption of pig lead greatly exceeds the supply of new lead avilable. The following table gives the American Bureau of Metal Statistics estimate of the total consumption of lead by industries during the past 7 years.

Lead consumed in the United States,[1] in 1929–35, in short tons

Purpose	1929	1930	1931	1932	1933	1934	1935
White lead	119,700	83,900	77,500	54,500	50,100	64,500	80,000
Red lead and litharge	30,000	32,000	18,000	32,000	38,000	42,000	47,500
Storage batteries	210,000	163,000	157,000	138,000	147,000	163,000	175,000
Cable covering	220,000	208,000	117,000	55,000	31,000	34,100	37,800
Building	96,000	67,000	40,000	22,000	26,000	30,000	32,000
Automobiles	18,000	11,000	6,000	3,500	5,000	7,300	10,000
Railway equipment	5,700	5,200	1,000	300	200	1,100	500
Shipbuilding	300	500	400	200	100	200	200
Ammunition	41,100	33,300	29,700	23,300	32,300	34,800	29,200
Terneplate	4,200	2,700	2,200	1,400	2,500	2,600	4,700
Foil	39,800	26,000	20,000	14,000	22,500	16,200	15,900
Bearing metal	33,000	20,000	12,000	10,000	15,000	16,500	17,400
Solder	37,000	27,000	20,500	14,000	16,000	16,000	20,000
Type metal	18,000	16,000	14,400	10,800	11,000	13,000	15,000
Calking	31,500	21,000	15,000	10,000	12,000	10,000	12,000
Castings	18,000	12,000	7,000	5,000	5,000	5,000	5,000
Other uses	50,000	40,000	30,000	22,200	30,000	35,000	41,000
	972,300	768,600	567,700	416,200	452,700	491,300	543,200

[1] Source: American Bureau of Metal Statistics. These estimates are for the total consumption of lead irrespective of whether its origin be primary or secondary. Antimonial lead is included.

The total industrial use of lead increased 11 percent in 1935 but was still 44 percent below the 1929 record. Exceptionally good gains were made in lead consumed as white lead and the red oxides, but the use of lead in cable covering and for building continued to lag, while lead consumption in the manufacture of ammunition and foil declined sharply. The amount of lead used to manufacture cable covering was notably less than in any other major use of lead and was only 17 percent of the amount used in 1929. Improvement in this outlet for lead is contingent upon stabilization of the Government's policy with respect to public utilities. Only one-third as much lead was used for building in 1935 as in 1929. While construction increased in 1935, most of it was residential and affected chiefly white lead. A revival of factory construction would benefit this market greatly.

PRICES

The two major markets for lead in the United States are New York and St. Louis; a large part of the lead produced in the United States is sold at prices based on quotations in these markets. The New York quotations are influenced to some extent by the lower prices usually prevailing on the London market, so that the New York price seldom exceeds the St. Louis price by as much as the freight differential, normally 0.35 cent a pound.

The price of lead in 1935 was higher than in 1934. The average New York quotation was 4.06 cents per pound compared with 3.86 cents in 1934; it was 41 percent below the 1929 average of 6.83 cents. Early in 1935 the price was 3.70 cents. This quotation was maintained until the latter part of January, when a temporary decline in sales sent the price down to 3.50 cents early in February—the low for the year. Notwithstanding a dull market in March,

which resulted in an increase in stocks, t
cents by the end of the month. From t
May it rose steadily to 4.35 cents, su
demand and a rapidly rising London
following the Supreme Court decision ag
was reflected in a sharp drop in lead purc
pressure to be felt in selling. By June
cents. That condition was temporary,
last half of the year the demand for lead
steadily to a high for the year of 4.65 cen
settled to 4.50 cents, at which point it
of the year.

The London quotation for 1935 (Uni
averaged 3.12 cents per pound—0.9 cent
compared with 1.4 cents in 1934. The
producers in July not to increase produ
each other, the settlement of the dispute
August, the threatened curtailment of s
to the shut-down of one of the large sm
and the high rate of consumption in Eu
relatively higher rise in prices abroad.

Average monthly and yearly quoted prices of lead
don, 1933–35, in cents p

Month	1933			
	St. Louis	New York	London	St. Louis
January	2.87½	3.00	1.57	3.90
February	2.87½	3.00	1.59	3.90
March	3.03	3.15	1.63	3.90
April	3.13	3.27	1.74	4.05
May	3.52	3.65	2.12	3.99
June	4.02	4.17	2.45	3.82
July	4.30	4.45	2.78	3.63
August	4.35	4.50	2.45	3.60
September	4.35	4.50	2.49	3.54
October	4.18	4.32	2.46	3.51
November	4.14	4.29	2.65	3.42
December	4.04	4.14	2.61	3.45
Average	3.74	3.87	[2] 2.21	3.73

[1] St. Louis: Metal Statistics, 1936, p. 387. Average daily
Louis (open market), as reported daily in the American Meta
New York: American Metal Market, daily issues. Pig
shipment from West.
London: Metal Statistics, 1936, p. 390. Average price of fo
in Metal Statistics, converted to cents per pound at average ex
Board.
[2] London quotations in pounds sterling per long ton, as
£14.2375.

FOREIGN TRA

The foreign trade of the United Stat
imports of ore and base bullion, which
bond, and the export of this lead either
factured products. Since 1927, however
1935 only 24,039 tons of lead in ore a

[1] Figures on imports and exports compiled by M. B. Price
Bureau of Foreign and Domestic Commerce.

small amount of refined and scrap lead) were imported compared with 161,389 tons in 1927; exports of refined lead decreased from 125,267 to 6,976 tons. During the same period lead exported in manufactures with benefit of draw-back declined from 12,004 to 8,995 tons.

Imports.—Total imports of lead in ore and matte, including imports for immediate consumption and entries for warehouse, increased 89 percent in 1935 due to increased shipments from Mexico and Newfoundland. Imports of base bullion increased 10 percent; imports of refined lead, which for several years amounted to only a few hundred tons, increased to 1,322 tons as a result of shipments from the new refinery at Peru. Total imports of lead increased 80 percent but were equivalent to less than 21 percent of the 1929 total.

Total lead imported into the United States, 1929–35, by classes, in short tons [1]

Year	Lead in ore and matte	Lead in base bullion	Pigs, bars, sheets, and old	Total lead content
1929	31,331	83,071	1,657	116,059
1930	39,377	38,630	209	78,216
1931	20,888	32,320	[2] 10	53,218
1932	21,001	13,462	44	34,507
1933	5,958	1,587	109	7,654
1934	10,611	2,450	283	13,344
1935	20,025	2,692	1,322	24,039

[1] Data for 1934 and 1935 include lead imported for immediate consumption plus material entering the country under bond.
[2] Reclaimed scrap, etc. No imports of pigs, bars, etc., were recorded for 1931.

Total lead imported into the United States, in ore, base bullion, and refined, 1929–35, by sources, in short tons [1]

Year	Canada	Mexico	Newfoundland	South America	Europe	Other countries	Total
1929	4,512	87,036		23,520	14	71	116,050
1930	17,208	30,721		22,472	113	1,642	78,216
1931	2,618	38,700	9,708	2,171		16	53,218
1932	2,459	13,545	10,598	2,811	5,053	41	34,507
1933	1,629	2,154		1,485	2,368	18	7,654
1934	1,160	3,270	3,357	5,455	67	35	13,344
1935	236	9,786	6,837	6,643	512	25	24,039

[1] Data for 1934 and 1935 include lead imported for immediate consumption plus material entering the country under bond.

Total lead imported into the United States, in ore and matte, 1929–35, by countries in short tons [1]

Country	1929	1930	1931	1932	1933	1934	1935
Canada	3,953	17,257	2,014	2,459	1,629	902	58
Chile	2,295	3,313	1,866	2,211	651	1,443	1,102
Mexico	23,415	16,341	6,495	195	862	1,283	7,986
Newfoundland and Labrador	[2]		9,708	10,598		3,357	6,818
Peru	1,601	831	194	477	522	3,545	3,716
Sweden				5,024	2,292		
Other countries	67	1,635	11	37	2	81	345
	31,331	39,377	20,888	21,001	5,958	10,611	20,025

[1] Data for 1934 and 1935 include lead in ore and matte imported for immediate consumption plus material entering the country under bond.
[2] Less than 1 ton.

Total lead imported into the United States, in ba... in short tons [1]

Country	1929	1930	1931
Mexico	63,458	20,350	32,210
Peru	19,605	18,280	110
Other countries	8		
	83,071	38,630	32,320

[1] Data for 1934 and 1935 include lead in base bullion importe... entering the country under bond.

Lead remaining in warehouses in the United Stat...

[Stated in the form in which the material wa...

Year	Lead in ore and matte	Lead in base bullion	Pigs, bars, sheets, and old	Y...
1929	60,207	75,434	1,328	1933
1930	39,516	[1] 5,642	(1)	1934
1931	52,849	[1] 5,343	(1)	1935
1932	42,314	[1] 3,769	(1)	

[1] Pigs, bars, and old included with base bullion.

Lead imported for consumption in the Unite...

Year	Lead in ore and matte [1]		Lead in base bullion		Pigs, bars, an...	
	Short tons	Value	Short tons	Value	Short tons	Va...
1929	10,823	$1,160,533	6,198	$627,455	10,089	$1,05...
1930	15,458	1,461,350	10,423	1,127,920	571	6...
1931	10,734	1,194,191	10,436	671,002	[2] 10	...
1932	9,647	863,135	2,574	131,579	44	
1933	19,239	1,154,093	306	31,700	45	
1934	10,760	558,558	2,220	117,720	286	1...
1935	8,273	258,964	1,154	60,559	1,590	9...

[1] Classification as follows: Jan. 1, 1929, to June 17, 1930, "Lea... 1935, "Lead in ores, flue dust, and mattes, n. s. p. f."
[2] Reclaimed scrap, etc. No imports of pigs, bars, etc., recor...

Miscellaneous products containing lead importe... States, 1929–3...

Year	Babbitt metal, solder, white m... and other combinations con... ing lead		Va...
	Gross weight (short tons)	Lead content (short tons)	
1929	1,505	663	$77...
1930	1,399	530	59...
1931	906	310	43...
1932	498	191	14...
1933	349	51	3...
1934	709	102	7...
1935	128	24	4...

Exports.—Exports of refined lead increased 18 percent in 1935 but were equivalent to only 7 percent of the average from 1925 to 1929. The decline since 1929 has been due largely to the loss of markets in Japan and Europe, which have increased their purchases from Mexico, Canada, India, and Australia.

Foreign lead exported in manufactures with benefit of draw-back amounted to 8,995, an increase of 20 percent over 1934. About 33 percent of the 1935 total was contained in storage batteries exported. Other lead exports included litharge and red lead, 16 percent; white lead, 12 percent; sheets, pipes, solder, etc., 11 percent; and electrical apparatus, 9 percent.

Refined lead exported from the United States, 1929–35

Year	Pigs, bars, and old		Foreign lead exported in manufactures with benefit of drawback (short tons)	Year	Pigs, bars, and old		Foreign lead exported in manufactures with benefit of drawback (short tons)
	Short tons	Value			Short tons	Value	
1929	73,251	$7,178,337	13,086	1933	22,831	$832,084	6,508
1930	48,307	3,904,213	12,161	1934	5,906	304,681	7,472
1931	21,665	1,241,881	10,503	1935	6,970	471,542	8,995
1932	23,516	1,069,697	7,220				

Refined pig lead exported from the United States, 1929–35, by destinations, in short tons

Destination	1929	1930	1931	1932	1933	1934	1935
COUNTRY							
Argentina	599	934	226		113	(1)	
Brazil	1,538	874	1,382	760	320	475	338
Canada	141	9	58	133	0	21	45
France	2,202	8,001	318	224			
Germany	9,745	823	52	1,344	5		11
Japan	16,416	15,653	17,301	20,219	21,236	4,454	5,324
Mexico	83	40	171	13	5	21	38
Netherlands	1,522	22	13	112		4	188
Philippine Islands	111	543	400	475	360	169	217
Sweden	7,255	7,557	392				
United Kingdom	23,732	9,157	3			36	8
Uruguay	448	364	146	84	140		112
Other	9,459	9,330	1,204	153	637	726	695
	73,251	48,307	21,665	23,516	22,831	5,906	6,976
CONTINENT							
North America	603	318	435	160	41	107	156
South America	3,852	2,442	1,903	863	732	1,076	663
Europe	50,049	27,899	795	1,703	5	40	212
Asia	18,055	17,290	18,524	20,700	21,693	4,512	5,945
Africa and Oceania	2	359	8		360	171	(1)
	73,251	48,307	21,665	23,516	22,831	5,906	6,976

[1] Less than 1 ton.

WORLD ASPECTS OF LEAD INDUSTRY

International cooperation.—During 1928 an association of foreign lead producers was formed in an attempt to stabilize the foreign lead market. At first activities were confined to mere exchange of statistical data, but later sales agreements and production-control measures were adopted. However, with the imposition of the British tariff on lead in March 1932, stabilization measures were abandoned, and during the latter part of 1934 the compilation of statistics also was discontinued. In July 1935, foreign lead producers met in London to consider reformation of a cartel. According to press reports, no formal organization was formed, but ap agreed informally not to increase pro each other.

World production.—World smelter p percent in 1935 and was equivalent to in 1929. Production increased 5 per States and 7 percent elsewhere. The only 46 percent of the 1929 total, wher was 96 percent. The United States co and contributed 21 percent of the 193 producing countries and the percentag tributed in 1935 were as follows: Aust ada, 10.6; Germany, 8.7; Belgium, pr 5.2; Spain, 4.5; U. S. S. R. (Russia), 3 Of these, Australia, Mexico, Canada a increases in 1935; India a small increa increase of two-thirds, whereas the p Tunisia declined substantially. Amon outstanding gains were made in Poland, France's lead production amounted to put. Production in the British Emp tons in 1935, an increase of 9 percent of world output was 33 percent in 1 from 1925 to 1929.

World production of lead, 193

[Compiled by R. E

Country [2]	1930	1
Argentina	8,882	
Australia	171,248	15
Austria	6,935	
Belgium	85,370	7
Canada	138,105	12
Chosen	130	
Czechoslovakia	4,225	
France	20,170	1
Germany [3]	110,800	10
Greece	7,329	
Hungary	70	
India (Burma)	81,010	7
Indochina	11	
Italy	24,340	2
Japan	3,581	
Mexico	242,537	21
Northern Rhodesia		
Norway	[4] 300	
Peru	14,979	
Poland	40,900	3
Portugal	89	
Rumania	984	
South-West Africa [5]	3,681	
Spain	123,263	10
Tunisia	19,400	1
Turkey	4,604	
U. S. S. R. (Russia)	10,750	1
United Kingdom	10,383	1
United States (refined) [6]	551,645	37
Yugoslavia	10,049	
	1,696,000	1,38

[1] By countries where smelted but not necessarily refine
[2] In addition to the countries listed, China smelts lead.
[3] Data not available.
[4] Approximate production.
[5] Exclusive of secondary material (Metallgesellschaft, F
[6] Year ended Mar. 31 of year following that stated.
[7] Figures cover domestic refined and lead refined from base bullion not included.

LEAD AND ZINC PIGMENTS

By Elmer W. Pehrson and

SUMMARY OUTL

Sales of lead and zinc pigments in 19 increase of 13 percent over 1934. The co zinc pigments increased 16 percent. A producers were slightly lower in 1935. increase in production in 1935 were the dollar volume of paint sales, the 9-percent of rubber, the 43-percent rise in automob stantial rise in storage-battery output—al industries. The higher paint sales reflect building industry.

Lead pigments again fared better than of all lead pigments increased 17 percent quantity, whereas sales of zinc pigments i value and 14 percent in quantity. Large pigments, white lead and leaded zinc ox percentage increases. Lead producers at realization by paint manufacturers tha ingredient in high-grade exterior paints. interesting to note that several produce percent leaded zinc oxide.

In the white-pigment field titanium larger share of the market. Statistical d is probable that production of titanium pi in 1935. These products are used exte pigment-consuming industries, but the pr in interior paints. Here they are particu high hiding power makes possible a satis this market has always provided the pr producers of that product are feeling the pigments most keenly. Nevertheless the since 1932 has been such that the lithopo to market increasing amounts of their pr consumption of titanium pigments.

During the past few years there has been a large increase in the manufacture of French process zinc oxide from secondary materials. This product has been competing with oxide made from slab zinc. To meet this competition the regular producers drastically cut prices on red, green, and white seal oxides on October 1, 1935.

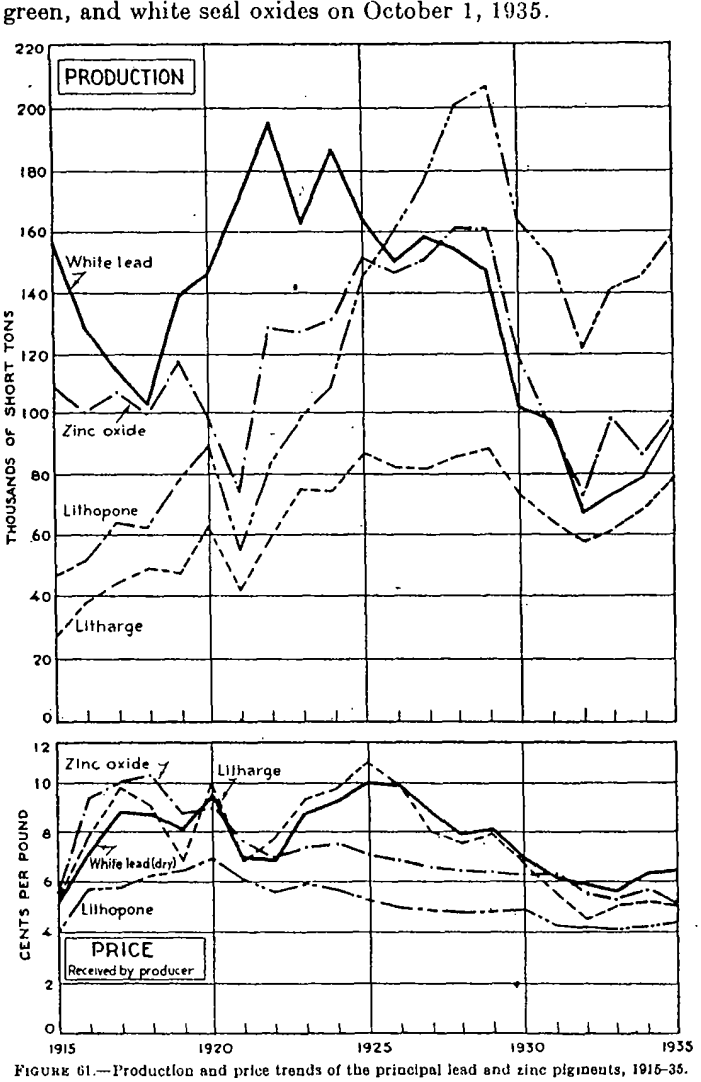

FIGURE 61.—Production and price trends of the principal lead and zinc pigments, 1915-35.

The Supreme Court decision of May 27, 1935, declaring the N. R. A. unconstitutional, ended the Codes of Fair Competition for the lead and zinc industries under which the pigment producers were operating.

Reciprocal trade agreements concluded up to the end of 1935 included the following reductions on United States import duties on lead and zinc pigments:

Lithopone containing less than 30 percent cents per pound to 1½ cents, effective Feb

White lead.—Duty reduced from 2.5 c May 1, 1935.

Suboxide of lead.—Duty reduced from pound but not less than 15 percent nor m

Salient statistics of the lead and zinc pigmen and 193

	1925-29 (average)	193
Production (sales) of principal pigments:		
White lead (dry and in oil) short tons	154,483	97,
Litharge do	84,845	63,
Red lead do	41,362	25,
Zinc oxide do	154,208	95,
Leaded zinc oxide do	26,609	18,
Lithopone do	177,745	151,
Value of products:		
All lead pigments	$60,092,000	$29,128
All zinc pigments	41,314,000	27,139
Total	101,406,000	56,267
Value per ton received by producers:		
White lead (dry)	178	
Litharge	176	
Red lead	193	
Zinc oxide	133	
Leaded zinc oxide	124	
Lithopone	98	
Foreign trade:		
Lead pigments:		
Value of exports	1,346,000	947,
Value of imports	30,000	14,
Zinc pigments:		
Value of exports	2,150,000	1,058,
Value of imports	931,000	636,
Export balance	2,535,000	1,356,

[1] Import balance.

PRODUC

In this report, sales of pigments resent production, no account bein the beginning and end of the year. at their own plants are included un

The total value of lead and zinc ducers was approximately $54,564,(108,000 in 1934. The total valu $28,064,000 and that of all zinc pi of lead pigments increased 17 perc in quantity, whereas sales of zinc total value and 14 percent in quan of lead pigments sold in 1935, as 0.8 percent, whereas the average increased 5 percent. Zinc pigment per ton compared with a 4-percent i for slab zinc.

Lead pigments.—Production of al Production of white lead increase below the peak of 1922. Productio in 1934 and was only 9 percent und the output of red lead, which inc

percent below 1929. Production of sublimed lead was 17 percent more than in 1934. Unit values of all lead pigments except litharge decreased in 1935.

Lead pigments sold by domestic manufacturers in the United States, 1934–35

Pigment	1934			1935		
	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	6,300	$677,897	$106	7,572	$727,004	$96
Blue	668	69,043	103	727	71,682	99
Red lead	26,743[r]	3,279,013	123	28,776	3,492,141	121
Orange mineral	234	50,778	217	252	47,515	189
Litharge	68,733	7,083,569	103	79,930	8,286,339	104
White lead:						
Dry	22,569	2,838,700	126	27,972	3,481,988	124
In oil [1]	56,165	10,002,820	178	68,859	11,957,171	174

[1] Weight of white lead only but value of paste.

Lead pigments sold by domestic manufacturers in the United States, 1926–35, in short tons

Year	White lead		Basic lead sulphate or sublimed lead		Red lead	Orange mineral	Litharge
	Dry	In oil	White	Blue			
1926	37,968	111,845	12,271	1,230	42,550	813	82,540
1927	38,669	119,026	13,482	1,061	39,073	709	81,655
1928	42,049	111,923	16,002	1,234	40,497	459	85,570
1929	42,159	104,872	15,580	1,234	43,021	678	87,916
1930	32,548	69,502	10,308	1,219	32,041	356	72,578
1931	30,922	66,446	8,790	896	25,853	282	63,890
1932	19,946	46,728	5,708	549	18,880	212	58,096
1933	24,628	48,354	7,320	625	21,088	231	61,193
1934	22,569	56,165	6,399	668	26,743	234	68,733
1935	27,972	68,859	7,572	727	28,776	252	79,930

Zinc pigments and salts.—Production of all zinc pigments was higher in 1935 and the percentage increases were as follows: Zinc oxide, 14 percent; leaded zinc oxide, 46 percent; and lithopone, 10 percent. The 1935 tonnages were equivalent to the following percentages of the 1929 outputs: Zinc oxide, 62; leaded zinc oxide, 110; and lithopone, 77. Unit values of the oxides decreased in 1935 and that of lithopone was unchanged.

Zinc pigments and salts sold by domestic manufacturers in the United States, 1934–35

Pigment or salt	1934			1935		
	Short tons	Value (at plant, exclusive of container)		Short tons	Value (at plant, exclusive of container)	
		Total	Average		Total	Average
Zinc oxide [1]	87,088	$9,851,421	$113	99,697	$10,237,953	$103
Leaded zinc oxide [1]	20,506	2,018,935	98	29,976	2,791,808	93
Lithopone	145,565	12,235,624	84	159,486	13,476,274	84
Zinc chloride, 50° B	[2] 19,614	[2] 897,062	[2] 46	(3)	(3)	(3)
Zinc sulphate	6,783	288,180	42	7,108	324,966	46

[1] Zinc oxide containing 5 percent or more lead is classed as leaded zinc oxide.
[2] Revised figures.
[3] Figures not yet available.

Zinc pigments and salts sold by domestic manufactur
in short tons

Year	Zinc oxide	Leaded oxide
1926	146,923	23,
1927	151,246	26,
1928	160,904	24,
1929	160,611	27,
1930	119,142	17,
1931	95,700	18,
1932	72,250	14,
1933	98,542	22,
1934	87,088	20,
1935	99,697	29,

[1] Revised figures. [2] Figu

CONSUMPTION BY IN

White lead.—About 95 percent of the w in the manufacture of paint. The tonna 1935 was 22 percent above that in 1934 a 1929. Consumption of white lead in the 28 percent in 1935.

Distribution of white lead (dry and in oil) so

Industry	1932		1933	
	Short tons	Percent of total	Short tons	Percent of total
Paint	63,390	95.1	68,368	93.7
Ceramics	1,761	2.6	1,617	2.2
Other	1,514	2.3	2,997	4.1
	66,674	100.0	72,982	100.0

Basic lead sulphate.—This pigment is us quantity so used in 1935 was 18 percen 42 percent below that in 1929. In 1929 c sulphate were used in storage batteries, bu

Distribution of basic lead sulphate sales,

Industry	1932		1933	
	Short tons	Percent of total	Short tons	Percent of total
Paints	5,689	90.9	7,072	89.0
Storage batteries	195	3.1	99	1.3
Rubber	77	1.2	161	2.0
Other	296	4.8	613	7.7
	6,257	100.0	7,945	100.0

Litharge.—The principal use of litharg storage batteries, but this outlet has bee growing tendency of battery makers to suboxide of lead, which they manufactu

tice was begun in 1923, and by 1929 a total of 33,000 tons of the black oxide was being made. In 1931 the tonnage declined to about 23,000; it increased again to nearly 33,000 in 1934 but fell to 29,000 tons in 1935. In 1935 all major uses of litharge increased.

Distribution of litharge sales, 1932–35, by industries

Industry	1932		1933		1934		1935	
	Short tons	Percent of total	Short tons	Percent of total	Short tons	Percent of total	Short tons	Percent of total
Storage batteries	29,365	50.5	27,327	44.6	30,024	43.7	35,007	45.1
Insecticides	11,735	20.2	11,126	18.2	12,271	17.9	14,605	18.3
Oil refining	4,703	8.3	6,070	9.9	7,614	11.1	7,809	9.8
Ceramics	2,963	5.1	5,438	8.9	6,696	9.7	6,761	8.5
Chrome pigments	2,591	4.5	3,973	6.5	6,102	9.0	7,350	9.2
Rubber	1,921	3.3	2,875	4.7	2,466	3.6	3,171	4.0
Varnish	1,360	2.3	610	1.0	414	.6	564	.7
Linoleum	169	.3	100	.2	104	.1	280	.4
Other	3,199	5.5	3,698	6.0	2,982	4.3	3,207	4.0
	58,096	100.0	61,193	100.0	68,733	100.0	79,930	100.0

Red lead.—The use of red lead in storage batteries in 1935 increased 10 percent over 1934. Its use in paint was virtually unchanged.

Distribution of red lead sales, 1932–35, by industries

Industry	1932		1933		1934		1935	
	Short tons	Percent of total	Short tons	Percent of total	Short tons	Percent of total	Short tons	Percent of total
Storage batteries	10,655	56.4	12,949	58.9	15,987	59.8	17,657	61.4
Paints	6,389	33.8	7,182	32.7	8,766	32.8	8,721	30.3
Ceramics	467	2.5	715	3.2	595	2.2	867	3.0
Other	1,369	7.3	1,142	5.2	1,395	5.2	1,531	5.3
	18,880	100.0	21,988	100.0	26,743	100.0	28,776	100.0

Orange mineral.—Sales of orange mineral increased slightly in 1935. This pigment is used chiefly in the manufacture of inks and color pigments, and the tonnage involved is quite small.

Distribution of orange mineral sales, 1932–35, by industries

Industry	1932		1933		1934		1935	
	Short tons	Percent of total	Short tons	Percent of total	Short tons	Percent of total	Short tons	Percent of total
Ink manufacture	58	27.4	18	7.8	24	10.2	85	33.7
Color pigments	108	50.9	96	41.6	68	29.1	125	49.6
Other	46	21.7	117	50.6	142	60.7	42	16.7
	212	100.0	231	100.0	234	100.0	252	100.0

Zinc oxide.—Total sales of zinc oxide increased 14 percent in 1935 following a decline of 12 percent in 1934. Recovery was more pronounced in rubber, floor coverings, and textiles than in paint. In the preparation of exterior paints manufacturers are using smaller proportions of zinc oxide than formerly. Of the 1935 total 42 percent was made by the French process and 58 percent by the American process. The proportion of French process oxide made from scrap zinc is increasing.

Distribution of zinc oxide sales, 193

Industry	1932		1933	
	Short tons	Percent of total	Short tons	Perc of to
Rubber	37,679	52.1	53,869	
Paints	22,369	31.0	29,218	
Floor coverings and textiles	2,837	3.9	4,087	
Ceramics	1,782	2.5	2,639	
Other	7,583	10.5	8,729	
	72,250	100.0	98,542	

Leaded zinc oxide.—This pigment is u
manufacture of paint. The quantity sol
was 45 percent more than in 1934. The
lead content in exterior paints is reflected
of leaded zinc oxide in 1935. Some manu
a 50-percent leaded zinc oxide.

Distribution of leaded zinc oxide sales,

Industry	1932		1933	
	Short tons	Percent of total	Short tons	Percent of total
Paints	14,072	98.4	22,488	98.3
Rubber	26	.2	46	.2
Other	207	1.4	334	1.5
	14,305	100.0	22,868	100.0

Lithopone.—Sales of lithopone to the
percent in 1935. About 13,100 tons of
manufacture of titanated lithopone in 193
in 1934. Sales of high-strength lithopone
as those of regular lithopone increased or
ings and textiles took 31 percent more
lithopone in 1935 than in 1934. Lithopo
reported at 235,320 tons per year in 1935
in 1934.

Lithopone is used extensively in interio
is now subject to intense competition fro

Distribution of lithopone sales, 193

Industry	1930 (short tons)	1931 (short tons)	1932 (short tons)
Paints, etc	126,076	119,446	93,46
Floor coverings and textiles	23,656	20,780	17,60
Rubber	5,997	5,833	3,95
Other	8,336	5,791	6,64
	164,065	151,850	121,06

Zinc chloride.—According to the Dep
consumption of zinc chloride by wood-t
2,040 tons in 1935. From a peak of 26,0
consumption of zinc chloride in this fiel
1928, 2,500 tons in 1933, and 1,600 ton
market is due primarily to the fact tha

water and therefore is not as effective as creosote, its principal competitor, in preserving wood exposed to moisture. From time to time various insoluble zinc preservatives have been developed, none of which has found a wide market. Recently a chromated zinc was introduced, but enough time has not elapsed to gage its effect on this market for zinc.

Complete data on total sales of zinc chloride in 1935 are not available at this time, but returns received from producers representing roughly two-thirds of the total output indicate the following distribution of sales by uses in 1935:

	Percent		Percent
Soldering flux	26	Oil refining	4
Wood preserving	25	Others	9
Dry-cell batteries	23		
Vulcanized fiber	13	Total	100

Zinc sulphate.—In 1935 producers of zinc sulphate were asked to distribute their sales according to various industries. The results of the tabulation are not very satisfactory because the distribution was incomplete. Producers sell large tonnages to jobbers and were unable to classify sales of this type further. Of the total sales of 7,108 tons, 3,385 tons were reported as sold to the rayon industry, 354 tons to electrogalvanizers, 188 tons to flotation plants, 114 tons to glue manufacturers, 106 tons to printers and dyers of textiles, and 56 tons to paint and varnish manufacturers; 2,905 tons were undistributed. A break-down of the latter figure would undoubtedly show much larger tonnages for the various uses enumerated. In 1934, for instance, 667 tons of zinc sulphate were used as a flotation reagent, according to data collected by T. H. Miller of the Bureau of Mines.

RAW MATERIALS USED IN THE MANUFACTURE OF LEAD AND ZINC PIGMENTS AND SALTS

Lead pigments and zinc pigments and salts are manufactured from a variety of materials, including ore, refined metal, and miscellaneous secondary materials, such as scrap and waste from various industrial processes. In 1935, 93.8 percent of the lead in lead pigments was derived from pig lead, 6.1 percent from ore, and 0.1 percent from secondary material. In 1934 for zinc pigments and salts the proportions were 63 percent from ore, 21.1 percent from slab zinc, and 15.9 percent from secondary materials. Details for 1935 were not available at the time this report was prepared.

Metal content of lead pigments and zinc pigments and salts produced by domestic manufacturers, 1934–35, by sources, in short tons

Source	1934		1935	
	Lead in pigments [1]	Zinc in pigments and salts	Lead in pigments [1]	Zinc in pigments and salts
Domestic ore	7,538	76,331	12,109	85,772
Metal	157,294	[2] 25,624	185,151	[3]
Secondary material [4]	379	[2] 19,201	144	[3]
	165,211	[2] 121,156	197,404	[3]

[1] Includes also lead recovered in zinc oxide and leaded zinc oxide. The metal content of lead acetate and lead arsenate is not available as no canvass of their production is made by the Bureau of Mines. Moreover, these salts are derived from pig lead, and their metal content has already been taken into statistical account in the figures covering lead production.
[2] Revised figures. [3] Figures not available. [4] Zinc ashes, skimmings, drosses and old metal.

In the following tables the source of the
facture of each pigment and salt is given.
either directly or indirectly, in the manufac
red lead, and orange mineral and to a large
of basic lead sulphate. Zinc oxide is the o
siderable slab zinc is used. Ore is employed
oxide, leaded zinc oxide, lithopone, zinc su
phate. Some secondary lead is used in
lead sulphate, and a substantial proportio
and zinc chloride made in the United States
material. There was a large increase in
zinc used in the manufacture of zinc oxide
This material has displaced slab zinc in the
process oxide.

*Lead content of lead and zinc pigments produced by do
by sources, in short ton*

Pigment	1934			
	Lead in pigments produced from—			Total lead in pigments
	Domestic ore	Pig lead	Secondary material	
White lead		63,593		63,593
Red lead		24,972		24,972
Litharge		66,690		66,690
Orange mineral		142		142
Basic lead sulphate	2,789	1,897		4,686
Leaded zinc oxide	4,749		379	5,128
Zinc oxide				
	7,538	157,294	379	165,211

*Zinc content of zinc pigments and salts produced by do
by sources, in short ton*

Pigment or salt	1934			
	Zinc in pigments and salts produced from—			Total zinc in pigments and salts
	Domestic ore	Slab zinc	Secondary material	
Zinc oxide	42,804	25,371	3,355	71,530
Leaded zinc oxide	11,478		95	11,573
Lithopone	[1] 20,819		10,836	[1] 31,355
Zinc chloride		[2] 252	[2] 4,504	[2] 4,756
Zinc sulphate	1,530	1	411	1,942
	76,331	[2] 25,624	[2] 19,201	[2] 121,156

[1] Includes zinc content of a small quantity of zinc sulphide produc
[2] Revised figures.
[3] Figures not yet available.

PRICES

The total value and the average price re
sales of lead and zinc pigments and salts
chapter. The range of market quotations,

Paint, and Drug Reporter, appears in the following table. On October 1, 1935, quotations on French process zinc oxides were reduced drastically to meet competition from secondary producers and importers.

Range of quotations on lead pigments and zinc pigments and salts at New York (or delivered in the East), 1933–35, in cents per pound

Product	1933	1934	1935
Basic lead sulphate, or sublimed lead, less than car lots, barrels	5.50–6.00	6.25	6.25
White lead, or basic lead carbonate, dry, car lots, barrels	6.00–6.50	6.25–6.50	6.50
Litharge, commercial, powdered, barrels	5.50–7.00	6.00–6.75	6.00–7.00
Red lead, dry, 95 percent or less, less than car lots, barrels	6.50–8.00	7.00–7.75	7.00–8.00
Orange mineral, American, small lots, barrels:			
Ex-white lead	10.25–11.75	10.75–11.50	9.50–11.00
Ex-red lead	9.00–10.50	9.50–10.25	9.00–10.50
Zinc oxide:			
American process, lead-free, bags, car lots	5.75	5.75–6.50	5.00–6.50
American process, leaded, barrels, car lots	5.75	5.75–6.50	5.13–6.50
French process, red seal, bags, car lots	8.63	8.38	5.50–8.38
French process, green seal, bags, car lots	9.63	9.38	6.00–9.38
French process, white seal, barrels, car lots	10.88	10.63	6.50–10.63
Lithopone, domestic, 5-ton lots, bags	4.50	4.50	4.50
Zinc sulphide, less than car lots, bags, barrels	13.00–13.50	10.50–13.25	10.50–11.75
Zinc chloride, works:			
Solution, tanks	2.00–3.00	2.00	2.00
Fused, drums	4.25–5.75	4.25–5.75	4.50–5.75
Zinc sulphate, crystals, barrels	2.75–3.75	2.65–4.50	2.65–2.80

FOREIGN TRADE [1]

Imports of lead and zinc pigments and salts increased 26 and exports 17 percent in 1935. The export surplus increased from $419,000 to $452,000; in 1929 it was over $3,000,000. In 1933 there was an apparent import surplus.

The following table shows the value of the various pigments and salts imported and exported for 1934–35.

Value of foreign trade of the United States in lead and zinc pigments and salts, 1934–35

	1934		1935	
	Imports	Exports	Imports	Exports
Lead pigments:				
White lead	$2,790	$202,683	$1,153	$277,583
Red lead		95,521	109	98,727
Litharge	6	106,010		135,976
Orange mineral	992	(1)	368	(1)
Total	3,788	404,214	1,630	512,286
Zinc pigments:				
Zinc oxide	148,792	195,681	205,264	170,757
Lithopone	219,752	199,508	256,731	221,611
Zinc sulphide	4,062		6,073	
Total	372,606	395,189	468,068	392,368
Lead and zinc salts:				
Lead arsenate		53,059		94,448
Other lead compounds	25,598		36,598	
Zinc chloride	23,990		34,027	
Zinc sulphate	7,660		6,381	
Other zinc compounds		(1)		(1)
Total	57,248	[2] 53,059	77,006	[2] 94,448
Grand total	433,642	[2] 852,462	546,704	[2] 999,102

[1] Figures not available.
[2] Exclusive of the value of "other zinc compounds", figures for which are not available.

[1] Figures on imports and exports compiled by M. B. Price, of the Bureau of Mines, from records of the Bureau of Foreign and Domestic Commerce.

Lead pigments and salts.—Imports of t
negligible proportions. The most importan
compounds, including lead acetate, lead nit

Lead pigments and salts imported for consumption in short tons

Year	Basic carbonate white lead	Red lead	L
1930	74	10	
1931	68	(1)	
1932	29	4	
1933	3	1	
1934	15		
1935	6	1	

[1] Less than 1 ton.

The principal exports are white lead, lit
arsenate. Less than 3 percent of the dom
lead, red lead, and litharge was exported in

Lead pigments and salts exported from the United

Year	White lead	Red lead [1]	L
1930	6,546	4,128	
1931	5,008	3,087	
1932	1,681	493	
1933	1,048	570	
1934	1,561	745	
1935	2,337	750	

[1] Includes litharge for 1930 and 1931 and an unknown quantity o
[2] Included with red lead.

White lead and red lead, orange mineral,[1] and lith States, by destinations, 1932–3

Destination	White lead			
	1932	1933	1934	1
Countries:				
Argentina	31	60	69	
Canada	23	75	91	
Netherlands	387	377	463	
Netherland West Indies	3	2	10	
Panama	201	26	201	
Philippine Islands	145	138	130	
United Kingdom	743	73	47	
Others	148	296	550	
Total	1,681	1,047	1,561	2
Continents:				
North America	326	223	477	
South America	75	150	177	
Europe	1,131	479	590	1
Asia	148	141	(2)	
Africa	(2)	53	167	
Oceania	1	1	150	

[1] Orange mineral is not included in this group in 1934 and 1935.
[2] Less than 1 ton.

Zinc pigments and salts.—Imports of zinc oxide and lithopone increased in 1935 and were approximately twice as large as exports. Net imports amounted to less than 2 percent of domestic production.

Zinc pigments and salts imported for consumption in the United States, 1930–35, in short tons

Year	Zinc oxide		Lithopone	Zinc sulphide	Zinc chloride	Zinc sulphate	Total value
	Dry	In oil					
1930	1,056	79	7,018	80	351	519	$831,284
1931	1,352	105	5,074	67	278	208	662,706
1932	2,515	157	4,724	33	251	131	530,380
1933	2,350	182	5,596	27	431	103	600,474
1934	1,204	64	3,927	12	382	140	404,256
1935	1,931	50	4,603	15	564	136	508,476

Exports of zinc oxide and lithopone declined slightly in 1935. Most of this trade is with North American countries, chiefly Canada.

Zinc pigments and salts exported from the United States, 1930–35, in short tons

Year	Zinc oxide	Lithopone	Zinc salts	Total value	Year	Zinc oxide	Lithopone	Zinc salts	Total value
1930	10,753	3,665	1,558	$1,956,085	1933	722	1,186	(1)	[2] $230,024
1931	5,131	3,821	1,011	1,146,395	1934	1,155	2,401	(1)	[2] 395,189
1932	1,261	3,212	299	512,559	1935	1,140	2,371	(1)	[2] 392,368

[1] Zinc salts not separately recorded.
[2] Exclusive of value of zinc salts.

Zinc oxide and lithopone exported from the United States, by destinations, 1932–35, in short tons

Destination	Zinc oxide				Lithopone			
	1932	1933	1934	1935	1932	1933	1934	1935
Countries:								
Argentina	79	16	36	35	19	12	33	74
Canada	740	286	439	453	2,883	881	1,803	1,652
Cuba	23	22	87	116	82	41	185	198
France	4	5	12	15	(1)		1	2
United Kingdom	97	36	68	56	89	132	104	138
Others	318	357	513	466	139	120	275	307
Total	1,261	722	1,155	1,140	3,212	1,186	2,401	2,371
Continents:								
North America	904	437	856	724	2,983	975	2,046	1,970
South America	94	39	48	78	44	54	116	118
Europe	116	72	66	94	95	133	125	140
Asia	61	80	41	132	1	3	1	15
Africa	5	3	12	5	1	1		2
Oceania	81	91	132	107	88	20	113	126

[1] Less than 1 ton.

GOLD, SILVER, COPPER, AND

(MINE REPORT)

By CHAS. W. HENI

SUMMARY OUT

The total output of gold, silver, copp and gravels in 1935, in terms of recover metals, was 470,116.09 fine ounces of silver, 15,477,000 pounds of copper, ar This output compares with a production 168,868 ounces of silver, 114,000 poun pounds of lead in 1934 and shows a de gold and 42,000 pounds of lead and i silver and 15,363,000 pounds of copper.

Calculation of value of metal productio duction herein reported has been calcu the table that follows: Gold in 1931–32 ounce, the Treasury legal coinage valu 18, 1835, to January 31, 1934; in 193 $34.95, the average weighted yearly prices;[2] and in 1935 at $35 per ounce, Reserve Act of January 31, 1934. The average New York price for bar silver; price for newly mined silver, $0.6464646 weighted Treasury buying price for new ounce. The copper, lead, and zinc pric each year, of all grades of primary meta

Prices of gold, silver, copper, lead

Year	G
	Per oz
1931	[1] $2
1932	[1] 2
1933	2
1934	3
1935	3

[1] $20.671835. [2] $0.64646464.

[1] Figures for 1935 are preliminary; detailed data with final
[2] The Treasury from Feb. 1, 1934, through December 1934 per ounce, under authority of the Gold Reserve Act of Jan. fluctuating price of gold in 1933 to Jan. 31, 1934, may be found

satisfactorily in 1935. The name of the Fansteel Products Co., Inc., North Chicago, Ill., was changed to Fansteel Metallurgical Corporation. This firm is the world's leading producer of tantalum, using imported ores, and specializes in rare metals, including tungsten, molybdenum, cesium, rubidium, tantalum carbide, and columbium. It is the sole producer of columbium, but the demand for this metal is insignificant as yet. Ferrocolumbium, on the other hand, is finding increasing use in weldable stainless steels; this alloy is made by the Electro Metallurgical Co. at Niagara Falls, N. Y.

In 1935, 7,681 pounds of columbite valued at $4,521 were reported shipped from domestic mines. Of the total, 7,241 pounds containing about 75 percent Ta_2O_5 and Cb_2O_5 were produced by George V. Bland, lessee of the property of Greene & Collingwood in South Dakota, and shipped to England; and 440 pounds were shipped by the Black Hills Keystone Corporation (also in South Dakota) to the South Dakota School of Mines. In addition, 4,000 pounds of columbite were produced (but not sold) in New Mexico by Philip S. Hoyt; the ore contained 70 percent Cb_2O_5 and 14 percent Ta_2O_5.

Imports.—Imports of tantalum and columbium ores in 1935 aggregated 1,190,398 pounds valued at $107,079, of which 6,083 pounds (tantalite) valued at $9,342 came from Australia and 1,184,315 pounds (columbite) valued at $97,737 came from Nigeria. In 1934 imports from Australia amounted to 24,630 pounds valued at $35,441.

World supplies.—Tantalite, either alone or sometimes with tin ore, occurs in several deposits in Southwestern Uganda, some of which may be opened up.[24] Russian occurrences likewise are reported, but no plans seem to have been made for working them. The leading developments recently have been in Nigeria, the world source of columbite at present, which ships its entire output to the United States. According to the report of the Jantar Nigeria Co., Ltd.,[25] for the year ended September 30, 1935, the 20-percent dividend declared by the company was due largely to profits derived from the sale of columbite recovered in connection with tin-mining. Proceeds from the sale of 420 long tons of columbite were reported as £23,000, or £55 ($270) a ton. Of this, 350 tons were from a dump, and for the ensuing fiscal year a maximum output of 240 tons of newly mined material was contemplated. Test borings on "Kuru 3" have already proved some 1,800 tons of columbite concentrates at an average yield of 1.5 pounds per cubic yard.

TELLURIUM

After many years of apparently fruitless research, commercial uses were found for tellurium, and since about 1929 domestic production has reached sizeable figures, as shown in the subjoined table. Tellurium lead, the Tainton electrolytic zinc process, and rubber cable-making are the main outlets at present. However, the use of tellurium ("metalloid of the selenium-tellurium group") is covered by Carpenter Steel Co. patents for free-machining steels (United States Patents 2009713–16). Three American companies reported production of tellurium in 1935, and a fourth reported sales from stock. Exports are made to Europe, and in 1935 inquiry developed from Germany for additional supplies of the element either in ore or metallurgical residues. British requirements forme
cipally from Germany, but more recently from
Canada; they may aggregate as much as 1,000
month, predominantly for hardening lead. I
now being produced at Copper Cliff, Ontario,
Quebec, as a byproduct in the refining of nickel
tion in 1935 totaled 14,375 pounds valued for
the high figure of $65,550 compared with 5,13
nally at $25,599 in 1934; prior to October 19
produced commercially in Canada.

From Russia comes word that tellurium
product from treatment of the Kyshtym copp
has been produced from Cottrell-precipitator
phate plant in Odessa. There is no occasio
product supplies of this hitherto obnoxious
inadequate for current needs, but it is signi
developed for additional supplies of metallu
deposits of tellurium-bearing ores. An occurr
associated with more or less gold, in Catron
being seriously investigated in 1935.

The New York quotations for tellurium ha
unchanged at $2 a pound for several years, bu
year London trade journals began quoting 6s
$1.85), which doubtless approaches more near
than the former nominal quotations, which w

Tellurium sold by producers in the United Stat

1931	(1)	1934	
1932	1,567	1935	
1933	11,980		

[1] Bureau of Mines not at liberty to publish figures.

TITANIUM

Only long-established custom justifies incl
the rare or minor metals. It ranks ninth
nature's elements, being more than five time
nese, and following a rather late start com
a rapidly growing consumption in three d
ceramics, and metallurgy. World productio
is of the order of 200,000 tons, with an agg
content of probably 50,000 tons, accordi
president of both the Titanium Pigments
Alloy Mfg. Co., in a statement at the Febru
Metals and Minerals Committee of the Ame
and Metallurgical Engineers. Titanium p
duced by three companies in the United
one in Germany, one or two in Italy, and
Even so, production has scarcely begun.

New plants [26] are projected in Australia, a
land, under license agreement with the Int
of Toronto, and in Japan. In the latter co
K. K. plans an initial output of 800 tons ye

[24] Bulletin Imperial Institute (London): Vol. 33, no. 1, April 1935, p. 82.
[25] Mining Journal (London): Vol. 191, no. 5232, Nov. 30, 1935, p. 914; vol. 192, no. 5238, Jan. 11, 1936, p. 25.

[26] Bureau of Foreign and Domestic Commerce, World Trade No
Vol. 9, no. 15, Apr. 13, 1935, p. 7; no. 20, May 18, 1935, p. 7.

process. Further increases are on the way, but large factories and investments are involved. The United States is by far the leading producer of titanium pigments, production representing 32,000 tons of dioxide in 1934, rising to 35,000 tons in 1935. The majority of the tonnage is in the titanium-calcium, titanium-barium, and other composite pigments, although use of pure dioxide seems to be gaining somewhat at present. Lead titanate, $PbTiO_3$, is the latest addition to the list of titanium pigments; remarkable durability, accompanied by better gloss retention and less cracking and flaking, is claimed for paints containing 20 percent or more of this material. It has a very high refractive index and high hiding power, but the color is light yellow, whereas other leading titanium pigments are brilliant white. Still another new pigment product is "Ti-Sil", a combination of 30 percent of titanium dioxide and 70 percent of specially treated silicate extender. It is recommended for blending with other pigments, especially leaded zinc oxide, and is quite durable. From an industrial point of view the most important domestic development in the pigment industry during 1935 was the completion of a large new factory at Sayreville, N. J., and the completion of the first unit of the new plant at Edge Moor, Del. Productive capacity in terms of titanium-inert combination pigment was thus increased to 125 tons or more per day.

Inasmuch as the ilmenite used for pigment manufacture is largely of foreign origin, the import statistics afford an index of the growth of the titanium-pigment industry, although it should be noted that some portion of the large increase during the last 2 years represents building up of adequate raw-material stocks at newly constructed plants.

Rutile, the natural dioxide, is also finding a rapidly growing market, largely in the field of welding-rod coatings. Although imports of rutile (latterly all from Brazil) have been increasing greatly during the last several years, domestic requirements are largely supplied from Virginia. The leading producing company formerly operated its milling plant only 2 or 3 months out of every other year, but in 1935 the mill was operated almost continuously and treated 300 tons of raw ore daily. A new modern mill is under construction. In addition to its use in welding rods, rutile is finding a steadily growing market for sundry other uses, chiefly in the ceramic industries.

E. L. Lasier, vice president, Titanium Alloy Manufacturing Co., in a letter to one of the authors summarizing 1935 development in the metallurgical field, notes the launching of a nickel-titanium alloy with commercial possibilities; the development of an alloy containing manganese and titanium in aluminum for which is claimed similar strength and ductility in the as-cast condition to that of the strongest aluminum alloys after heat treating; and interesting results with beryllium-copper which indicate that titanium additions help to maintain hardness at temperatures that otherwise would cause softening of the alloy.

Domestic production of ilmenite is largely a byproduct of rutile or a joint product of monocalcium phosphate. The latter item is produced at Piney River, Amherst County, Va., by the Southern Mineral Products Corporation from apatite, the output of which is roughly

one-fourth the ilmenite output from th
that disposal of the phosphate is the li
its output of ilmenite could still be in
year. The leading domestic producer
Co., produces about as much ilmeni
(Nelson County, Va.) operation. A
prospect. The Burgess Laboratory in
quietly exploring the Nelson-Amherst
have acquired properties and are expec
In Arkansas, the Titanium Corporat
made carload shipments of brookit
Malvern property but was unable to fi
at a satisfactory price. In addition t
company has attempted to market a
this low-grade material must compet
$12 a ton delivered at Niagara Falls,
of the freight rate from Arkansas to t

Imports.—Imports of ferrotitanium
quite small, amounting in 1935 to 4,4
pared with 3,240 pounds valued at $43
was the only source of these shipments
have been imports from Italy under t

Ilmenite imports recently came exc
at least a temporary limit seems to h
production from Travancore beach s
may act as a further deterrent to t
around the globe. In 1935 Norway
Canada 94 tons, and British India 93,
it may be noted, carries some magne
be mixed with Virginia concentrates
principal impurity.

Titanium ores imported for consumptio

Year	
1930	
1931	
1932	
1933	
1934	
1935	

According to official reports from
persons employed daily in producing
in Travancore rose from 421 in 1929
of ilmenite meanwhile increased only
and the concurrent production of z
creased. The figures for individual
tion in output per person from 50 to
1933, indicating that more intensive
at least—lowered rather than increas

World production of titanium minerals, 1931–35, in metric tons

[Compiled by M. T. Latus]

Mineral and country	1931	1932	1933	1934	1935
Ilmenite:					
Australia: Tasmania			559		(1)
Canada (Quebec)	1,360			1,835	2,076
Egypt		487		164	(1)
French West Africa (Senegal)[2]	370		160	540	959
British India (Travancore)	36,746	50,856	53,830	76,858	(1)
Norway	5,000	13,481	23,213	26,306	(1)
Portugal	152	766	645	434	385
Sierra Leone	10				(1)
United States	(3)	(3)	(3)	(3)	(3)
Rutile:					
Brazil [2]		35	90	116	(1)
Norway	[4] 21	[4] 30	[4] 56	247	(1)
United States	(3)	(3)	(3)	(3)	(3)

[1] Data not available.
[2] Exports.
[3] Bureau of Mines not at liberty to publish figures.
[4] Concentrates.

ZIRCONIUM

The feature of the zirconium situation in 1935 was the extraordinary increase in imports of zirconium ores, reflecting rapidly expanding consumption. No zircon is known to have been produced in the United States for several years, and hitherto domestic needs have been supplied almost exclusively by imports of baddeleyite from Brazil, but in 1935 zircon was imported in large quantities, both from British India and Australia, the former country supplying 3,099,732 pounds valued at $45,606 and the latter country 1,325,060 pounds valued at $17,433, whereas Brazil contributed only 1,331,934 pounds of ore valued at $13,884. In British India the zircon is a byproduct of the ilmenite output from Travancore beaches. The Australian zircon likewise is recovered from beach sands, though in these operations zircon is apparently the main product. According to a New South Wales Department of Mines statement forwarded by F. E. McFadden, American vice consul, the beach deposits extend discontinuously from Fort MacQuarie to the Queensland border and have been worked mainly in the vicinity of Evan's Head and Ballina. Typical concentrates from different beaches carry: Zircon, 40 to 75 percent; ilmenite, 14 to 43 percent; rutile, 7 to 18 percent; and other minerals, 2 to 8 percent. Small amounts of gold, platinum, and tin occur in the concentrate and in some small patches of beach, reconcentrated by wave action, are found in recoverable quantities. In 1935 these sands were being worked by three companies. The Zircon Mining Co., Ltd., a Titanium Alloy Mfg. Co. subsidiary, secured a lease at the mouth of Clarence River, Yamba. Metals Recoveries, Ltd. (head office, Sydney), is operating near Brunswick Heads, and Zircon Rutile, Ltd. (head office, Melbourne), near Byron Bay.

Zirconium powder is used in flashlight mixtures and in ammunition primers. Pure, wrought metal is marketed by the Foote Mineral Co., the wire being used in radio tubes and sheet metal in spinneret cups for rayon manufacture. Zirconium-silicon and zirconium-ferrosilicon are finding a growing use in steel making. From a tonnage standpoint, however, the main uses of zirconium compounds are in enamels and for electrodes or welding-rod coatings. A new

product developed in 1935, known as TAM I
for-pound substitution for tin oxide as an op
els of all types, and at about one-half the pri

Another new product is a practically C.
powder form, spectrographically free of suc
titanium and iron.

Zirconium ores and alloys imported for consumption

Year	Zircon	
	Pounds	
1931	1,124,034	
1932	26,500	
1933	568,581	
1934	1,706,192	
1935	5,756,726	