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2017 Minerals Yearbook

LEAD [ADVANCE RELEASE]

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Lead

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In 2017, domestic mine production of recoverable lead was 302,000 metric tons (t), 10% less than that in 2016 (table 1). The value of domestic mine production in 2017 (based on the North American Market price) increased by 9% to $761 million. In the United States, lead in concentrate was produced at nine mines that employed about 1,890 people. Alaska and Missouri were the principal producing States, accounting for most of the domestic mine production. Primary lead metal has not been produced in the United States since the closure of the last operating smelter at yearend 2013.

Secondary (recycled) lead, principally derived from scrapped lead-acid batteries, was 1.14 million metric tons (Mt), slightly more than that in 2016. Recycled lead accounted for 100% of refined lead production in the United States in 2017 (table 1). Nearly all the secondary lead was produced by six companies operating 12 smelters.

World mine production of lead decreased by 5% to 4.65 Mt in 2017 from 4.87 Mt (revised) in 2016. The United States continued to be the third-leading producer and accounted for about 7% of global lead mine production. China and Australia were the two leading producers in 2017, accounting for 46% and 10%, respectively, of global lead mine production (table 11). World production of refined lead (primary and secondary) was 11.3 Mt in 2017, about 5% more than 10.8 Mt (revised) in 2016. The United States continued to be the second-leading global producer, accounting for 10% of global total refined lead production and 18% of global secondary refined production. China was the leading producer of refined lead, accounting for 45% of global total refined lead production, 66% of primary refined lead production, and 32% of secondary refined lead production in 2017 (table 12).

Lead metal was consumed domestically by more than 60 companies to manufacture such products as ammunition; building-construction materials; covering for power and communication cable; lead-acid storage batteries; lead oxides for ceramics, chemicals, glass, and pigments; lead sheet; and solders for construction, electronic components and accessories, metal containers, and motor vehicles.

Lead-acid batteries, including starting-lighting-ignition (SLI) and industrial batteries, continued to be the dominant use of lead, accounting for about 92% of reported lead consumption (table 4). In 2017, North American producers shipped 136 million SLI automotive-type original equipment and replacement batteries, 6.6 million more than the amount shipped in 2016 (SmithBucklin Statistics Group, 2018).

According to the International Lead and Zinc Study Group (ILZSG), global consumption of refined lead in 2017 was 11.7 Mt, 5% more than that in 2016. The leading refined-lead-consuming countries in 2017 were China, 42%; the United States, 15%; India and the Republic of Korea, 5% each; and Germany, 3% (International Lead and Zinc Study Group, 2018c, p. 10–11).

The 2017 average annual London Metal Exchange Ltd. (LME) cash price for lead was $1.05 per pound, a 24% increase from that of 2016. The Platts Metals Week North American Market price was $1.14 per pound, 21% more than that in 2016 (table 1).

Production

Mine.—In 2017, domestic mine production of recoverable lead was 302,000 t, 10% less than that in 2016 (table 1) and about 33% less than production in 2000. There were 9 lead-producing mines operating in the United States in 2017 (table 2), compared with 19 mines in 2000.

Alaska and Missouri accounted for most of the U.S. mine output of lead. Lead was also mined in Idaho and Washington. Domestic mine production data were collected by the U.S. Geological Survey (USGS) from a voluntary survey of lode mines. Eight lead-producing mines responded to the survey in 2017, accounting for about 90% of U.S. production. Production data for nonreporting mines were obtained from publicly available data.

The Doe Run Resources Corp. (St. Louis, MO) operated four mills that produced lead concentrates from ore supplied from six underground mines along the Viburnum Trend in southeast Missouri. Doe Run operations are considered to be among the leading lead mining districts in the world. In August 2017, the company announced that it was increasing its mine production owing to higher metal prices during 2017 (Batteries International, 2017). In previous years, the company reduced mine production in response to lower lead prices in 2015 and 2016. All the concentrates produced at the mines were exported. Doe Run also operated a secondary smelter which recycled up to 210,000 metric tons per year (t/yr) of lead-bearing materials (Batteries International, 2017).

Teck Alaska Inc. (a wholly owned subsidiary of Teck Resources Ltd., Canada) operated the Red Dog zinc-lead mine in northwestern Alaska under a royalty agreement with NANA Regional Corp., the sole owner of the property. NANA is an Alaska Native-owned corporation organized under the provisions of the Alaska Native Claims Settlement Act. Teck reported that production of lead in concentrates at Red Dog decreased to 111,000 t in 2017 from 122,000 t in 2016 owing to lower lead recoveries (Teck Resources Ltd., 2018, p. 23).

Hecla Mining Co. (Coeur d'Alene, ID) operated the Greens Creek gold, lead, silver, and zinc mine near Juneau, AK, and the Lucky Friday lead, silver, and zinc mine in the Coeur d'Alene mining district in northern Idaho. In 2017, Hecla produced 16,300 t of lead in concentrates at Greens Creek, 13% less than that in 2016. Hecla reported that proven and probable

reserves at yearend 2017 totaled 204,000 t of lead, and the company estimated that the remaining mine life was 10 years (Hecla Mining Co., 2018, p. HL10–K18). In 2017, Lucky Friday produced 4,300 t of lead in concentrates, a 78% decrease compared with 19,800 t produced in 2016 owing to an employee strike which started in March 2017. Hecla reported that proven and probable lead reserves at yearend 2017 totaled 465,000 t of lead, and the estimated remaining mine life at Lucky Friday was 22 years (Hecla Mining Co., 2018, p. HL10–K20—HL10–K21).

Primary Refined.—There was no primary refined lead production in 2017. Doe Run closed the only domestic primary lead smelter in Herculaneum, MO, at yearend 2013.

Secondary Refined.—Domestic production of secondary refined lead in 2017 increased slightly to 1.14 Mt from 1.11 Mt in 2016. The domestic secondary lead industry consisted of several vertically integrated battery producers that operated secondary lead smelters to supply lead for their lead-acid battery plants and several companies that operated stand-alone secondary smelters. The latter typically had tolling agreements with battery manufacturers to recycle their used lead-acid batteries and supply them with secondary lead. Lead recovered from lead-acid batteries continued to be the dominant source of recoverable lead scrap, accounting for 98% of all secondary lead (table 3). The domestic secondary lead data were derived by the USGS from monthly and annual surveys of secondary producers. In 2017, 12 smelters that produced secondary lead, exclusive of that recovered in copper-base scrap, were surveyed; 8 responded, representing about 90% of the total production of secondary lead. Production for the nonrespondents were estimated from prior-years' production. Of the total lead recycled in 2017, most was recovered by six companies operating 11 plants in Alabama, California, Florida, Indiana, Minnesota, Missouri, New York, Pennsylvania, South Carolina, and Tennessee.

Consumption

In 2017, reported U.S. consumption of refined lead was 1.96 Mt, essentially unchanged from that in 2016 (table 4). Consumption of lead in SLI and industrial-type lead-acid storage batteries accounted for 92% of the total reported consumption of lead (tables 4, 5). Demand for lead was heavily reliant on the automotive sector. The Battery Council International reported that 136 million lead-acid automotive batteries containing an estimated 1.14 Mt of lead (based on an average of 8.39 kilograms of lead content per battery) (SmithBucklin Statistics Group, 2018, 2019) were shipped by North American producers in 2017, a 5% increase from battery shipments (129 million batteries containing an estimated 1.08 Mt of lead) in 2016. Shipments of replacement lead-acid automotive batteries (115 million) increased by 6% from those in 2016, and shipments of original equipment lead-acid automotive batteries (21.1 million) decreased slightly from those in 2016 (SmithBucklin Statistics Group, 2018).

Prices and Stocks

In 2017, the average annual North American Market price and the LME cash price for lead increased by 21% and 24%, respectively, from those in 2016 (table 1). The average monthly LME cash price for lead was $1.01 per pound in January and generally trended upward during the year to a peak of $1.14 per pound in December. According to CRU International Ltd., LME lead prices reached a 6-year high in the second half of 2017 owing to increasing demand and an increasing supply deficit of refined lead in the global market (CRU International Ltd., 2017, p. 11).

Scrap prices also increased during 2017. According to Platts Metals Week, the average monthly price paid by domestic smelters for whole spent lead-acid batteries (the most prevalent form of lead scrap) increased from $0.35 per pound in January to $0.43 per pound in December.

Global LME lead stocks at the end of December 2017 were 142,225 t, 27% less than those at the end of December 2016 (London Metal Exchange Ltd., 2016, 2017).

Foreign Trade

In 2017, U.S. imports for consumption of unwrought (refined) lead metal in pigs and bars totaled 538,000 t, 29% more than those in 2016. There were considerable increases in imports from the Republic of Korea, 37,900 t; India, 35,000 t; and Mexico, 31,500 t. The leading sources were Canada, accounting for 30% of unwrought lead metal imports, followed by the Republic of Korea (24%) and Mexico (19%) (table 10).

Total domestic exports of unwrought lead and lead alloys in 2017 were 23,900 t, 44% less than those in 2016. Mexico and Belgium were the leading destinations for the unwrought lead and lead alloys exported in 2017, accounting for about 60% and 31%, respectively, of the total. Domestic exports of lead in concentrates were 269,000 t, 21% less than those of 2016; China (50%), the Republic of Korea (16%), and Canada (14%) were the leading destinations (table 9). In 2017, essentially all lead concentrates were exported following the yearend 2013 closure of Doe Run's Herculaneum primary smelter.

A substantial quantity of lead contained in new and spent lead-acid batteries is traded annually. U.S. Census Bureau trade data indicated that, in 2017, the United States imported about 37.3 million SLI lead-acid batteries for consumption, a 68% increase from that in 2016. Mexico was the leading provider of SLI batteries, accounting for 49% of those imported in 2017. SLI batteries were also mainly imported from the Republic of Korea (15%), China (10%), and Germany (6%). The United States exported about 19.7 million spent SLI lead-acid batteries in 2017, 18% less than those in 2016. Spent batteries were shipped to Mexico (99%) for recycling. Much of the lead recovered from the exported spent batteries was used to manufacture lead-acid batteries in Mexico, which were in turn exported back to the United States.

World Review

World mine production of lead decreased by 5% to 4.65 Mt in 2017 from 4.87 Mt in 2016 primarily owing to a 328,000-t combined decrease in production in China and Russia (table 11). The United States was the third-leading producer and accounted for about 7% of global lead mine production. Globally, approximately 130,000 t/yr of lead mine production capacity was opened in 2017, and no mines were reported as closed (International Lead and Zinc Study Group, 2018b, p. 22–23).

World production of refined lead (primary and secondary) was 11.3 Mt, about 5% more than 10.8 Mt (revised) in 2016. The United States was the second-leading global producer of refined lead after China and accounted for 10% of global production, the same as in 2016.

According to the ILZSG, global consumption of refined lead in 2017 was 11.7 Mt, 5% more than that in 2016. The leading refined-lead-consuming countries in 2017 were China, 42%; the United States, 15%; India, 5%; the Republic of Korea, 5%; and Germany, 3% (International Lead and Zinc Study Group, 2018c, p. 10–11).

Outlook

At its October 2018 meeting in Lisbon, Portugal, the ILZSG forecasted small global increases in lead consumption and refined lead production and a decrease in mine production in 2018 (International Lead and Zinc Study Group, 2018a). Global lead consumption in 2018 is expected to increase by 0.2%; China's consumption is expected to decrease owing to decreased use of lead-acid batteries for use in motorcycles and e-bikes. Global lead mine production in 2018 is forecast to decrease by 0.4% from that in 2017 owing to a decrease in mine production in Australia, China, Kazakhstan, and the United States. Global refined lead production in 2018 is forecast to increase by 0.4%. The ILZSG forecast that global refined lead demand would exceed supply by about 123,000 t in 2018 (International Lead and Zinc Study Group, 2018a).

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TABLE 1
SALIENT LEAD STATISTICS[1]

		2013	2014	2015	2016	2017
United States:						
Production:						
Mine, recoverable lead content:[2]						
Quantity	metric tons	331,000	367,000	360,000	336,000	302,000
Value	thousands	$802,000 r	$860,000	$724,000	$699,000	$761,000
Primary lead, refined content, domestic ores and base bullion	metric tons	114,000	--	--	--	--
Secondary lead, lead content	do.	1,150,000 r	1,060,000	1,050,000	1,110,000	1,140,000
Exports:						
Lead ore and concentrates, lead content	do.	210,000	357,000	350,000	341,000	269,000
Refined lead, unwrought, gross weight	do.	41,600 r	55,300 r	55,700 r	42,700 r	23,900
Imports for consumption, gross weight:						
Lead in base bullion	do.	1,940	1,180	342	237	--
Refined lead, unwrought	do.	324,000	464,000	417,000	416,000	538,000
Stocks, December 31, lead content:						
Primary lead	do.	--	--	--	--	--
At consumers and secondary smelters	do.	61,100	56,300 r	49,800 r	53,100 r	61,400
Consumption of metal, primary and secondary, lead content	do.	1,810,000	1,960,000	1,950,000 r	1,980,000 r	1,960,000
Price:[3]						
North American Market	cents per pound	109.98	106.17	91.20	94.39	114.45
London Metal Exchange Ltd., pure lead, cash average	do.	97.15	95.04	81.02	84.84	105.10
World production, lead content:						
Mine	metric tons	5,280,000 r	5,260,000 r	4,920,000 r	4,870,000 r	4,650,000
Refinery:						
Primary	do.	4,930,000	4,630,000 r	4,450,000 r	4,590,000 r	4,610,000
Secondary	do.	5,550,000 r	5,650,000 r	5,660,000 r	5,870,000 r	6,320,000
Undifferentiated		303,000 r	332,000	338,000 r	363,000 r	389,000

rRevised. do. Ditto. -- Zero.
[1]Table includes data available through February 25, 2021. Data are rounded to no more than three significant digits, except prices.
[2]Lead recoverable after smelting and refining. Data in table 11 represent lead in concentrate.
[3]Source: Platts Metals Week.

TABLE 2
LEADING LEAD-PRODUCING MINES IN THE UNITED STATES IN 2017, IN ORDER OF OUTPUT[1]

Rank	Mine	County and State[2]	Operator	Source of lead
1	Red Dog	Northern Region, AK	Teck Alaska Inc.	Zinc-lead ore.
2	Viburnum (#29 and #35)	Washington and Iron, MO	Doe Run Resources Corp.	Lead ore.
3	Fletcher	Reynolds, MO	do.	Do.
4	Brushy Creek	do.	do.	Do.
5	Sweetwater	do.	do.	Do.
6	Greens Creek	Southeastern Region, AK	Hecla Mining Co.	Silver-zinc ore.
7	Galena Complex	Shoshone, ID	Americas Silver Corp.	Silver ore.
8	Pend Oreille	Pend Oreille, WA	Teck American Inc.	Zinc-lead ore.
9	Lucky Friday	Shoshone, ID	Hecla Mining Co.	Silver ore.

Do., do. Ditto.
[1]Table includes data available through February 25, 2021. The mines on this list accounted for 100% of the U.S. lead mine production in 2017.
[2]For Alaska, mines are located by geographic region, as delineated by the Alaska Division of Geological & Geophysical Sciences in its Special Report 73, Alaska's mineral industry 2017.

TABLE 3
LEAD RECOVERED FROM SCRAP PROCESSED IN THE UNITED STATES BY KIND OF SCRAP AND FORM OF RECOVERY[1]

(Metric tons, lead content, unless otherwise specified)

		2016	2017
Kind of scrap:			
New scrap:			
Lead-base		W	W
Tin-base		W	W
Total		19,200	20,000
Old scrap, battery-lead[2]		1,090,000	1,120,000
Total, kind of scrap		1,110,000	1,140,000
Form of recovery:			
As soft lead		882,000 r	920,000
In antimonial lead		225,000 r	W
In other lead alloys		5,710	W
Total		1,110,000	1,140,000
Value, total[3]	thousands	$2,320,000 r	$2,870,000

rRevised. W Withheld to avoid disclosing company proprietary data; included in appropriate totals.
[1]Table includes data available through February 25, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]May include small amounts of other lead-base scrap.
[3]Value based on average quoted price of common lead.

TABLE 4
U.S. CONSUMPTION OF LEAD, BY PRODUCT[1]

(Metric tons, lead content)

SIC[2] code	Product	2016	2017
	Metal products:		
3482	Ammunition, shot and bullets	69,800	67,000
	Bearing metals:		
35	Machinery except electrical	W	W
371	Motor vehicles and equipment	W	W
37	Other transportation equipment	--	--
	Total	1,060	1,010
3351	Brass and bronze, billets and ingots	1,580	2,930
36	Cable covering, power and communication	(3)	(3)
15	Calking lead, building construction	(3)	(3)
	Casting metals:		
371	Motor vehicles and equipment	W	W
37	Other transportation equipment	W	W
3443	Nuclear radiation shielding	W	W
	Total	15,000	12,700
	Pipes, traps, other extruded products:		
15	Building construction	W	W
3443	Storage tanks, process vessels, etc.	W	W
	Total	7,160	6,560
	Sheet lead:		
15	Building construction	W	W
3443	Storage tanks, process vessels, etc.	W	W
3693	Medical radiation shielding	5,490 r	W
	Total	6,510	5,110
	Solder:		
15	Building construction	W	W
367	Electronic components, accessories and other electrical equipment	W	W
371	Motor vehicles and equipment	W	W
	Total	6,460 r	6,510
	Storage batteries:		
3691	Storage battery grids, post, etc.	674,000 r	743,000
3691	Storage battery oxides	1,130,000 r	1,050,000
	Total storage batteries	1,810,000 r	1,800,000
27	Type metal, printing and allied industries	(4)	(4)
34	Other metal products[5]	149 r	(3)
	Grand total, metal products	1,950,000 r	1,930,000
	Other oxides:		
285	Paint	W	W
32	Glass and ceramics products	W	W
28	Other pigments and chemicals	W	W
	Total	11,700	11,100
	Miscellaneous uses	18,000 r	W
	Grand total	1,980,000 r	1,960,000

rRevised. W Withheld to avoid disclosing company proprietary data; included in appropriate totals. -- Zero.

[1]Table includes data available through February 25, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]SIC Standard Industrial Classification.

[3]Withheld to avoid disclosing company proprietary data; included in "Grand total, metal products."

[4]Withheld to avoid disclosing company proprietary data; included in "Other metal products."

[5]Includes lead consumed in foil, collapsible tubes, annealing, galvanizing, plating, electrowinning, fishing weights, and terne metal.

TABLE 5
U.S. CONSUMPTION OF LEAD IN 2017, BY CLASS OF PRODUCT[1, 2]

(Metric tons, lead content)

Product	Refined soft lead	Lead in antimonial lead	Lead in alloys	Lead in copper-base scrap	Total
Metal products	52,400	74,600	W	(3)	127,000
Storage batteries	1,080,000	365,000	351,000	--	1,800,000
Other oxides	W	--	--	--	W
Gasline additives	W	--	--	--	W
Miscellaneous	24,400	7,100	7,580	--	39,100
Total	1,160,000	446,000	359,000	(3)	1,960,000

W Withheld to avoid disclosing company proprietary data; included in "Miscellaneous." -- Zero.
[1]Table includes data available through February 25, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes lead that went directly from scrap to fabricated products.
[3]Data for lead in copper-base scrap are withheld to avoid disclosing company proprietary data; included in "Lead in alloys."

TABLE 6
STOCKS OF LEAD AT CONSUMERS AND SECONDARY SMELTERS IN THE UNITED STATES, DECEMBER 31[1]

(Metric tons, lead content)

Year	Refined soft lead	Lead in antimonial lead	Lead in alloys	Lead in copper-base scrap	Total
2016	35,000 [r]	16,000 [r]	2,110 [r]	W	53,100 [r]
2017	34,100	19,100	8,230	W	61,400

[r]Revised. W Withheld to avoid disclosing company proprietary data; included in "Lead in alloys."
[1]Table includes data available through February 25, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 7
PRODUCTION AND SHIPMENTS OF LEAD PIGMENTS AND OXIDES IN THE UNITED STATES[1, 2]

(Metric tons and dollars)

	2016				2017			
	Production		Shipments[e]		Production		Shipments[e]	
Product	Gross weight	Lead content	Quantity (lead content)	Value[3]	Gross weight	Lead content	Quantity (lead content)	Value[3]
Litharge, red lead and white lead, dry	3,540	3,290	3,540	7,950,000	3,110	2,890	3,110	8,580,000
Leady oxide	969,000	920,000	NA	NA	1,080,000	1,030,000	NA	NA
Total	972,000	923,000	NA	NA	1,090,000	1,030,000	NA	NA

[e]Estimated. NA Not available.
[1]Table includes data available through February 25, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Excludes basic lead sulfate to avoid disclosing company proprietary data.
[3]At plant, exclusive of container.

TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF LEAD PIGMENTS AND COMPOUNDS, BY KIND[1]

Kind	Quantity (metric tons, gross weight)	Value (thousands)
2016:		
White lead carbonate	5	$14
Red and orange lead	5	42
Chrome yellow, molybdenum orange pigments, lead-zinc chromates	1,580	6,220
Litharge	936	2,910
Glass frits (undifferentiated)	38,800	59,900
2017:		
White lead carbonate	(2)	3
Red and orange lead	10	85
Chrome yellow, molybdenum orange pigments, lead-zinc chromates	1,630	6,850
Litharge	941	3,550
Glass frits (undifferentiated)	41,900	75,100

[1]Table includes data available through February 25, 2021. Data are rounded to no more than three significant digits.
[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 9
U.S. EXPORTS OF LEAD, BY COUNTRY OR LOCALITY[1]

Country or locality	2016 Quantity (metric tons)	2016 Value (thousands)	2017 Quantity (metric tons)	2017 Value (thousands)
Ore and concentrates, lead content:				
Belgium	8,940	$10,800	--	--
Canada	48,100	77,400	36,600	$76,400
China	161,000	226,000	134,000	258,000
Germany	32,700	44,300	14,800	27,400
Italy	17,700	19,000	7,470	13,500
Japan	20,200	27,900	24,400	46,800
Korea, Republic of	51,700	74,000	43,300	83,400
Mexico	535	965	868	1,990
Other	--	--	7,410	14,800
Total	341,000	480,000	269,000	522,000
Base bullion, gross weight:				
Canada	1,290	3,200	1,520	3,670
Other	20	36	24	61
Total	1,310	3,230	1,550	3,730
Refined lead and lead alloys, unwrought, gross weight:[2]				
Belgium	8,770	7,660	7,430	13,400
Canada	92 r	126 r	124	191
France	--	--	37	31
Greece	--	--	393	993
India	657	587	144	265
Japan	69	42	161	117
Mexico	32,000 r	27,600 r	14,400	27,100
Netherlands	--	--	38	54
United Arab Emirates	26	42	55	40
United Kingdom	35	31	1,040	2,500
Other	1,040 r	1,070 r	141	136
Total	42,700 r	37,200 r	23,900	44,800
Wrought lead and other products, gross weight:[3]				
Canada	1,160 r	5,240 r	2,500	10,100
China	135 r	811 r	305	615
France	161	1,150	157	1,080
Germany	90	558	183	4,370
India	1,110 r	1,940 r	1,120	2,430
Japan	227	930	171	702
Mexico	356 r	2,200 r	541	2,850
Peru	8	203	96	680
Philippines	404	781	123	258
United Arab Emirates	281	495	1,070	2,160
Other	1,970 r	12,700 r	1,280	8,450
Total	5,900 r	27,000 r	7,550	33,700
Scrap, gross weight:[4]				
Belgium	--	--	167	50
Cayman Islands	231	91	126	50
Dominican Republic	1,060	323	198	60
Ecuador	788	600	1,380	2,110
India	1,780	1,260	3,820	1,670
Korea, Republic of	11,000	13,000	12,100	18,100
Mexico	96	30	252	81
Pakistan	20	33	105	54
Sint Maarten	--	--	244	73
United Arab Emirates	21	35	1,200	732
Other	1,730 r	833 r	404	260
Total	16,700	16,200	20,000	23,200

See footnotes at end of table.

TABLE 9—Continued
U.S. EXPORTS OF LEAD, BY COUNTRY OR LOCALITY[1]

[r]Revised. -- Zero.
[1]Table includes data available through February 25, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes refined lead (Schedule B export code 7801.10.0000), containing by weight antimony as the principal other element (Schedule B export code 7801.91.0000), lead alloys (Schedule B export code 7801.99.9030), and other unwrought lead (Schedule B export code 7801.99.9050).
[3]Includes lead plates, sheets, strip and foil (Schedule B export codes 7804.11.0000, 7804.19.0000); lead bars, rods, profiles and wire (Schedule B export code 7806.00.0300); lead tubes, pipes and tube or pipe fittings (Schedule B export code 7806.00.0500); and other wrought lead (schedule B export code 7806.00.8000).
[4]Includes lead waste and scrap obtained from scrap lead-acid batteries (Schedule B export code 7802.00.0030).

Source: U.S. Census Bureau.

TABLE 10
U.S. IMPORTS FOR CONSUMPTION OF LEAD, BY COUNTRY OR LOCALITY[1]

Country or locality	2016 Quantity (metric tons)	2016 Value (thousands)	2017 Quantity (metric tons)	2017 Value (thousands)
Base bullion, gross weight:				
Chile	39	$67	--	--
Saudi Arabia	99	167	--	--
Senegal	99	163	--	--
Total	237	396	--	--
Refined lead, unwrought, gross weight:[2]				
Argentina	281	563	2,880	$6,520
Australia	3,820	14,700	7,570	17,300
Bolivia	511	876	889	1,930
Brazil	8,090	15,900	20,800	47,600
Canada	176,000	334,000	160,000	363,000
China	273	109	12	57
Colombia	2,020	4,050	1,490	3,520
Dominican Republic	317	642	693	1,560
Ecuador	4,280	8,170	14,400	35,000
Germany	1,230	2,220	(3)	2
India	20,500	39,000	55,400	130,000
Israel	--	--	1,990	4,410
Kazakhstan	10,600	19,900	5,550	13,100
Korea, Republic of	89,300	196,000	127,000	305,000
Mexico	71,800	121,000	103,000	182,000
Nigeria	1,040	1,920	1,480	3,450
Peru	1,410	4,160	3,900	9,460
Russia	13,200	23,500	14,700	35,000
Saudi Arabia	608	1,290	999	2,230
South Africa	677	1,180	654	1,420
Sri Lanka	1,730	3,160	2,500	5,630
Sweden	4,000	7,910	--	--
Thailand	200	431	3,590	8,780
Ukraine	79	154	--	--
United Arab Emirates	682	1,260	148	366
United Kingdom	289	634	532	1,330
Venezuela	3,480	6,600	3,030	6,710
Other	--	--	4,390	10,000
Total	416,000	809,000	538,000	1,200,000
Wrought lead and other products, gross weight:[4]				
Argentina	86 r	209 r	150	399
Canada	1,570 r	10,200 r	2,680	14,800
China	1,140	5,480	821	4,360
France	(3)	89	319	973
Germany	409 r	3,030 r	733	4,500
Mexico	1,150	1,780	766	1,300
Peru	115	291	105	248
United Kingdom	888 r	2,470 r	561	2,330
Venezuela	2,090	3,400	775	1,530
Vietnam	141	498	199	774
Other	616 r	3,750 r	369	2,340
Total	8,210 r	31,100 r	7,480	33,600
Scrap, lead content:[5]				
Canada	50 r	21	34	86
Dominican Republic	330 r	308	2,270	3,250
Honduras	52 r	91	206	363
Other	1,040 r	668	1,670	2,580
Total	1,480 r	1,090	4,180	6,280

See footnotes at end of table.

TABLE 10—Continued
U.S. IMPORTS FOR CONSUMPTION OF LEAD, BY COUNTRY OR LOCALITY[1]

[r]Revised. -- Zero.
[1]Table includes data available through February 25, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes refined lead [Harmonized Tariff Schedule of the United States (HTS) code 7801.10.0000].
[3]Less than ½ unit.
[4]Includes lead plates, sheets, strip and foil (HTS codes 7804.11.0000, 7804.19.0000); lead bars, rods, profiles and wire (HTS code 7806.00.0300); lead tubes, pipes and tube or pipe fittings (HTS code 7806.00.5000); and other wrought lead (HTS code 7806.00.8000).
[5]Includes lead waste and scrap obtained from scrap lead-acid batteries (HTS code 7802.00.0030).

Source: U.S. Census Bureau.

TABLE 11
LEAD: WORLD MINE PRODUCTION OF LEAD IN CONCENTRATE, BY COUNTRY OR LOCALITY[1]

(Metric tons, lead content)

Country or locality	2013	2014	2015	2016	2017
Argentina	28,673	29,911	29,834	28,016 r	28,000 e
Australia	711,210	727,954	653,488	441,338 r	459,487
Bolivia	82,131	75,571	75,273	89,510 r	110,000 e
Bosnia and Herzegovina[e]	4,500	4,200	5,000	4,800 r	5,000
Brazil	8,020	11,000 r, e	11,000 e	9,000 r, e	7,000 e
Bulgaria	15,986	15,461	16,456	19,688	16,009
Burkina Faso	1,017	1,100	1,100	--	--
Burma	11,700 e	18,000 r	13,600 r	14,000 r, e	20,900
Canada	22,895	3,579	3,699	12,020 r	13,137
Chile	1,829	2,678	2,979	1,110 r	1,562
China	2,696,500	2,608,600	2,335,000	2,410,000 r, e	2,150,000 e
Congo (Kinshasa)	621	764	653	101	--
Greece	13,000	11,800	9,200	11,300 r	9,200
Guatemala	863	10,359	10,193	4,181 r	13,803
Honduras	11,600	15,509	9,844	4,400 r	6,760
India	105,000	106,000 e	136,000	147,000 e	170,000 e
Indonesia[e]	5,000	5,000	5,000	5,000	8,000
Iran[2]	42,000	44,000	40,800	47,000 r, e	48,000 e
Ireland	43,000	40,500 e	31,300	19,600 r	17,083
Kazakhstan	40,100	37,800	40,700	40,700 e	112,000 e
Korea, North	30,000 e	30,000 e	42,000 r, e	35,000	35,000 e
Korea, Republic of	2,500	2,764	2,921	2,839 r	3,762
Kosovo	6,400	7,700	5,500	6,500 r	5,100
Laos	1,000	--	--	510 r	700 e
Macedonia	32,409	33,154	28,698	23,487	24,823
Mexico	253,361	250,462	263,772 r	241,271 r	243,000 e
Montenegro	3,350 e	3,400 e	3,476	5,188 r	4,447
Morocco	30,600 r, e	27,300 r, e	16,325 r	15,744 r	16,000 e
Namibia	11,000 e	11,200 e	9,300	9,300	6,000 e
Nigeria	11,500	11,400	8,000	9,700	5,000 e
Pakistan	NA	NA	NA	1,267	3,250
Peru	266,472	277,294	315,525	314,422 r	306,794
Poland[e]	25,000 r	24,000 r	20,000 r	17,000 r	13,000
Russia	223,300	239,000	171,200 r	272,400 r	200,000 e
Serbia	3,100	3,700	3,300 r	10,000 r	8,000 e
South Africa	41,848	29,348	34,573	39,344	48,000 e
Spain[e]	2,200 r	1,200 r	1,600 r	4,900 r	7,000
Sweden	59,556	70,848	79,354	76,066 r	74,322
Tajikistan[e]	19,000 r	25,000 r	38,000 r	57,000 r	61,000
Turkey	65,630	65,000 r, e	74,000 r, e	76,827 r	68,000 e
United States	339,000	378,000	370,000	346,000	310,000
Vietnam	1,870	2,840	1,890	810 r, e	4,560 e
Total	5,280,000 r	5,260,000 r	4,920,000 r	4,870,000 r	4,650,000

[e]Estimated. [r]Revised. NA Not available. -- Zero.

[1]Table includes data available through November 21, 2018. All data are reported unless otherwise noted. Totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Production is based on the fiscal year, with a starting date of March 21 of the year shown.

TABLE 12
LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY OR LOCALITY[1]

(Metric tons, lead content)

Country or locality	2013	2014	2015	2016	2017
Argentina:[e]					
Primary	13,800	12,000	8,000	8,000	10,000
Secondary	69,900	28,000	33,000	33,000	35,000
Total	83,700	40,000	41,000	41,000	45,000
Australia:					
Primary:	177,456	175,842	182,258	182,830	168,300
Secondary	18,153 [r]	16,567 [r]	15,891 [r]	13,811 [r]	15,670
Total	196,000 [r]	192,000 [r]	198,000 [r]	197,000 [r]	184,000
Austria, secondary	24,971	25,136	24,399	24,000 [e]	24,000 [e]
Belgium, secondary	130,000 [e]	130,000 [e]	130,000 [r]	141,000	136,000
Bolivia, primary	330 [e]	300 [e]	459	41	1,100
Bosnia and Herzegovina, secondary	2,382	1,227	145	182	25
Brazil, secondary	151,964	160,393	176,216	180,000 [e]	180,000 [e]
Bulgaria, primary and secondary	90,742	93,394	96,900 [r]	100,817	103,105
Burma, primary[e]	2,000	2,000	2,000	2,000	2,000
Canada:					
Primary	128,706	130,827	127,264	142,076	130,000 [e]
Secondary	153,075	150,629	141,600	132,150	149,506
Total	282,000 [r]	281,000 [r]	269,000 [r]	274,000 [r]	280,000 [e]
China:					
Primary	3,440,000	3,210,000	2,870,000 [r]	3,017,000 [r]	3,050,000 [e]
Secondary	1,500,000	1,530,000	1,552,000 [r]	1,663,000	2,000,000 [e]
Total	4,940,000	4,740,000	4,420,000 [r]	4,680,000 [r]	5,050,000 [e]
Czechia, secondary	42,000	44,000	45,000	43,000	44,000
Estonia, secondary	7,581	8,588	8,329	8,348 [r]	9,606
France, secondary	71,000 [e]	72,000 [e]	72,000 [e]	70,000	70,000
Germany:					
Primary	152,000 [r]	159,000 [r]	125,000 [r]	115,000 [r]	113,000
Secondary	248,000 [r]	249,000 [r]	253,000 [r]	224,000 [r]	241,000
Total	400,000	408,000 [r]	378,000	339,000	354,000
Ghana, secondary	3,076	2,817	3,048	1,800 [r]	1,150
India:					
Primary	120,000	129,000	143,000	134,000 [r]	165,122
Secondary	343,000	348,000	358,000	385,000 [r]	404,900
Total	463,000	477,000	501,000	519,000	570,000
Indonesia, secondary[e]	45,000	46,000 [r]	46,000 [r]	48,000	46,000
Iran:					
Primary	17,000 [r]	17,000 [r]	18,000 [r]	14,000	18,000
Secondary	59,000 [r]	55,000 [r]	60,000	72,000	72,000
Total	76,000	72,000 [r]	78,000 [r]	86,000	90,000
Ireland, secondary	20,000 [e]	17,200 [e]	17,200 [e]	18,000 [r]	18,000
Israel, secondary	22,418	26,426	26,000 [e]	24,128 [r]	25,261
Italy:					
Primary	30,000 [e]	50,000 [e]	52,100 [r]	47,300 [r]	47,300 [e]
Secondary	150,700 [r]	159,600 [r]	157,800 [r]	139,900 [r]	140,000 [e]
Total	181,000 [r, e]	210,000 [e]	210,000	187,000	187,000 [e]
Japan:					
Primary	92,227	87,303	85,655	84,660	87,366
Secondary	115,888	115,370	108,736	114,430	112,052
Total	208,000 [r]	203,000 [r]	194,000 [r]	199,000 [r]	199,000
Kazakhstan, primary and secondary	91,072	127,064	120,108	134,192 [r]	149,129
Kenya, secondary[e]	940	1,000	1,100	1,100	1,400
Korea, North, primary[e]	3,000	3,000	1,000 [r]	2,000 [r]	2,000
Korea, Republic of:					
Primary	227,700	299,000 [e]	291,000	441,000	423,320
Secondary	200,000	340,000 [e]	350,000	390,000	390,000
Total	428,000 [r]	639,000 [e]	641,000	831,000	813,000
Lebanon, secondary[e]	6,000	10,000	10,600 [r]	11,300 [r]	11,900

See footnotes at end of table.

TABLE 12—Continued
LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY OR LOCALITY[1]

(Metric tons, lead content)

Country or locality	2013	2014	2015	2016	2017
Mexico:					
Primary[2]	121,000 e	118,000 e	263,772 r	94,725 r	92,535
Secondary[e]	250,000	245,000	230,000	230,000	230,000
Total[e]	371,000 r	363,000 r	494,000 r	325,000 r	323,000
Morocco:[e]					
Primary	9,000 r	20,000 r	20,000 r	20,000 r	19,600
Secondary	5,000 r	5,000 r	5,000 r	5,000 r	5,000
Total	14,000	25,000 r	25,000 r	25,000 r	24,600
Mozambique, secondary	1,704	1,933	2,310	2,494	3,828
Netherlands, secondary	30,000 e	30,000 e	30,000 e	33,000	36,000
Nigeria, secondary[e]	14,000 r	14,000 r	2,000 r	9,000 r	9,000
Pakistan, secondary	1,000	9,000 r	5,000 r	8,000 r	8,000
Peru, primary	467	142	1,494	--	--
Philippines, secondary[e]	32,000	30,000 r	28,000	18,000	18,000
Poland:					
Primary	40,000	36,000	40,000	40,000	41,000
Secondary	103,000	112,000	114,000	115,000	119,000
Total	143,000	148,000	154,000	155,000	160,000
Portugal, secondary[e]	4,000	5,000	5,000	5,000	5,000
Romania:					
Primary	1,100 e	1,300 e	1,300 e	293 r	--
Secondary[e]	14,000	12,000	12,000	11,000	17,000
Total[e]	15,100	13,300	13,300	11,300 r	17,000
Russia, primary and secondary	106,000 r	96,500 e	106,000 r	113,400 r	122,000
Senegal, secondary	2,607	2,187	1,857	3,576	3,424
Serbia, primary and secondary[e]	15,000	15,000	15,000	15,000	15,000
Slovenia, secondary	12,000	11,000	12,000	12,000	12,000
South Africa, secondary	52,000	52,000	52,000	54,000 r	54,000 e
Spain, secondary	157,000 e	166,000 e	165,000 r	166,000 r	168,000
Sri Lanka, secondary	4,800	4,500	2,500	3,000 r	3,500
Sweden:[e]					
Primary	69,000	69,000 r	71,000 r	75,800 r	71,100
Secondary	45,000	44,000 r	45,000	46,000	50,000
Total	114,000	113,000 r	116,000 r	122,000 r	121,000
Taiwan, secondary	34,000 r	40,000 r	46,000 r	48,000	48,000 e
Turkey, secondary	50,000	55,000	56,000	58,000	58,000
Uganda, secondary[e]	800	800	800	800	800
Ukraine, secondary	30,000 e	30,000 e	30,000 e	28,465 r	33,633
United Kingdom:					
Primary[3]	174,200	110,000	149,000 r	170,000 e	165,000
Secondary[4]	155,000	157,000	158,000 r	158,000	160,000
Total	329,000 r	267,000	307,000 r	328,000 r, e	325,000
United States:					
Primary	114,000	--	--	--	--
Secondary	1,150,000 r	1,060,000	1,050,000	1,110,000	1,140,000
Total	1,260,000 r	1,060,000	1,050,000	1,110,000	1,140,000
Venezuela, secondary	22,000	20,000	20,000 e	16,000 e	16,000 e
Grand total	10,800,000 r	10,600,000	10,500,000 r, e	10,800,000 r, e	11,300,000 e
Of which:					
Primary	4,930,000	4,630,000 r	4,450,000 r	4,590,000 r	4,610,000
Secondary	5,550,000 r	5,650,000 r	5,660,000 r	5,870,000 r	6,320,000
Undifferentiated	303,000 r	332,000	338,000 r	363,000 r	389,000

[e]Estimated. [r]Revised. -- Zero.

[1]Table includes data available through November 13, 2017. All data are reported unless otherwise noted. Totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown. Data represent the total output of refined lead by each country, whether derived from ores and concentrates (primary) or scrap (secondary), and include the lead content of antimonial lead but exclude, to the extent possible, simple remelting of scrap.

[2]Includes lead content in antimonial lead.

[3]Produced entirely from imported bullion and includes the lead content of alloys.

[4]Includes a small quantity of primary lead from domestic concentrate.