



2014 Minerals Yearbook

LEAD [ADVANCE RELEASE]

LEAD

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In 2014, domestic mine production of recoverable lead was 368,000 metric tons (t), 11% more than that in 2013 (table 1), primarily owing to increases in Alaska and Idaho. The value of domestic mine production in 2014 (based on the North American Producer price), however, increased by only 3% to \$860 million owing to a decline in the price of lead. In the United States, lead in concentrate was produced at 10 mines that employed about 1,730 people. Alaska and Missouri were the principal producing States accounting for the majority of domestic mine production. In 2014, primary lead metal was not produced in the United States for the first time in more than 100 years owing to the closure of the last operating smelter at yearend 2013.

Secondary (recycled) lead, derived principally from scrapped lead-acid batteries, declined by about 11% from that in 2013 and accounted for 100% of refined lead production in the United States in 2014 (table 1). Nearly all the secondary lead was produced by seven companies operating 12 smelters.

World mine production of lead decreased by 9% to 4.91 million metric tons (Mt) from 5.37 Mt in 2013 owing primarily to a production decline in China. The United States was the third-leading producer (unchanged from 2013) and accounted for about 8% of global lead mine production, compared with about 6% in 2013. China and Australia were the two leading producers in 2014, accounting for 49% and 15%, respectively, of global lead mine production (table 12). China's share of global lead mine production increased to 54% in 2013 from 41% in 2009, before decreasing in 2014. World production of refined lead (primary and secondary) was 10.6 Mt, essentially unchanged from that in 2013. The United States was the second-leading global producer of refined lead after China and accounted for 10% of global production. China produced about 45% of global refined lead in 2014 (table 13).

Lead metal was consumed domestically by more than 70 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 88% of reported lead consumption (table 4). In 2014, North American producers shipped 126.2 million SLI automotive-type original equipment (OE) and replacement batteries, 1.99 million more than shipped in 2013 (Battery Council International, 2015, p. 23–24).

According to the International Lead and Zinc Study Group (ILZSG), global consumption of refined lead in 2014 was 10.9 Mt, slightly less than that in 2013. The leading refined-lead-consuming countries in 2014 were China, 43%; the United States,

15%; the Republic of Korea, 5%; India, 5%; and Germany, 3% (International Lead and Zinc Study Group, 2015a, p. 10–11).

The 2014 average annual London Metal Exchange Ltd. (LME) cash price for lead was \$0.95 per pound, a slight decrease from that of 2013. The Platts Metals Week North American Market price was \$1.06 per pound, 3% less than that in 2013.

Legislation and Government Programs

In August, the U.S. Environmental Protection Agency (EPA) released the Second Integrated Urban Air Toxics Report to Congress, the second of two reports required under the Clean Air Act (CAA) of 1990 to inform Congress of the EPA's actions and progress in reducing public health risks from urban air toxics. The report showed that substantial progress had been made in reducing air toxics across the country since passage of the Integrated Urban Air Toxics Strategy in 1999. Highlights included an 84% reduction of lead in outdoor air since passage of the CAA that was attributed to EPA regulation and enforcement actions (U.S. Environmental Protection Agency, 2014).

Production

Mine.—In 2014, domestic mine production of recoverable lead was 368,000 t, 11% more than that in 2013 (table 1), reaching levels last seen in 2009. Lead mine production in the United States had decreased by about 26% from 2000 to 2011 owing to shutdowns and curtailments at zinc and lead mines and remained essentially unchanged in 2012 and 2013. In 2014, there were 10 lead-producing mines operating in the United States (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 2014, accounting for about 88% of the reported U.S. production. Production data for nonreporting mines were estimated 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. The company does not publicly disclose annual lead production data but reported that it generally produces about 230,000 metric tons per year (t/yr) of lead in concentrate. All of the concentrates produced at the mines were exported (Doe Run Company, The, 2015, p. 1, 6, 36).

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 a corporation organized under the provisions of the Alaska Native Claims Settlement Act. During 2014, Teck reported that production of lead in concentrates at Red Dog increased by 27% to 122,500 t from 96,700 t in 2013 owing to greater mill throughput. Teck expected that lead production would be between 90,000 and 95,000 t in 2015. Proven and probable ore reserves at yearend 2014 totaled 52.8 Mt grading 4.3% lead (Teck Resources Ltd., 2015a, p. 27; 2015b, p. 40).

In December 2014, Teck restarted its Pend Oreille zinc-lead mine in northeastern Washington State. The mine was placed on care-and-maintenance status in February 2009 owing to low zinc prices. Teck expected that the mine would reach full production levels during the second quarter of 2015 and have a mine life of 5 years. Pend Oreille produced 5,700 t of lead in 2008, the last full calendar year that the mine operated. Proven and probable ore reserves at yearend 2014 totaled 3.70 Mt grading 1.1% lead (Teck Cominco Ltd., 2009, p. 23; Teck Resources Ltd., 2015a, p. 27; 2015b, p. 40).

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 2014, Hecla produced 18,300 t of lead in concentrates at Greens Creek, essentially unchanged from that in 2013. Proven and probable reserves at yearend 2014 totaled 218,000 t of lead and the company estimated that the remaining mine life at Greens Creek was 9 years. Production at Lucky Friday was temporarily suspended during 2012 and the mine was restarted in 2013 after maintenance work was completed. In 2014, Lucky Friday produced 18,200 t of lead in concentrates, nearly double the amount that was produced in 2013. Proven and probable lead reserves at yearend 2014 totaled 427,000 t of lead and the company estimated that the remaining mine life at Lucky Friday was 28 years (Hecla Mining Co., 2015, p. 38–42).

Primary Refined.—Doe Run closed the only domestic primary lead smelter, which was in Herculaneum, MO, at yearend 2013. After the smelter closed, the company continued to operate the alloying and casting facilities, refinery, and strip mill at the Herculaneum site to produce lead-alloy products. The refinery was not expected to operate at commercial production levels (Doe Run Company, The, 2015, p. 7).

Secondary.—In 2014, secondary (recycled) lead accounted for 100% of domestic refined lead production. Domestic production of secondary refined lead in 2014 decreased by 11% to 1.02 Mt from 1.15 Mt in 2013, owing primarily to plant closings. Exide Technologies, Inc. (Milton, GA) closed three secondary lead refineries from 2012 to 2014 (for more information, see the Lead chapters of the 2012 and 2013 Minerals Yearbook, volume I, Metals and Minerals). 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-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 2014, 11 companies that produced secondary lead, exclusive of that recovered in copper-base scrap, were surveyed; 10 responded, representing about 99% of the total production of secondary lead. Of the total lead recycled in 2014, the majority was recovered by seven companies operating 12 plants in Alabama, California, Florida, Indiana, Minnesota, Missouri, New York, Pennsylvania, Tennessee, and Texas. Production for the nonrespondent was estimated by using prior-year levels as a basis (tables 1, 3).

In April 2013, the California Department of Toxic Substances Control directed Exide to temporarily suspend recycling operations at its Vernon, CA, secondary lead refinery owing to issues related to its stormwater piping system and excessive lead emissions from the furnace. In July 2013, the company successfully challenged the temporary suspension in court and received permission to resume operations. In October 2013, however, the South Coast Air Quality Monitoring District (SCAQMD) filed a petition seeking the suspension of operations at the Vernon refinery for alleged violations of an SCAQMD rule and related furnace control equipment permit conditions. In April 2014, SCAQMD filed a second petition seeking an order that Exide “cease and desist” operations owing to violations of the SCAQMD ambient air standard for lead. Exide suspended operations at the refinery in April 2014 until it could design, engineer, permit, install, and test new equipment needed to operate in compliance with air quality standards. At yearend 2014, the refinery had yet to reopen (Exide Technologies, Inc., 2014, p. 11–12, 32–33).

Consumption

Reported U.S. consumption of refined lead increased by about 11% in 2014 from that of 2013 owing primarily to increases in lead used for brass and bronze, sheet lead, and storage batteries (table 4). Consumption of lead in SLI and industrial-type lead-acid storage batteries accounted for 88% of the total reported consumption of lead (tables 4, 6). Demand for lead was heavily reliant on the lead-acid battery industry and, in turn, the automotive sector. In 2014, North American producers shipped 126.2 million SLI automotive-type batteries including OE and replacement automotive-type batteries, slightly more (1.99 million) than that in 2013. Shipments of replacement lead-acid automotive batteries (105.6 million) were essentially unchanged, but shipments of OE lead-acid automotive batteries (20.6 million) increased by 8% from those in 2013 (Battery Council International, 2015, p. 23–24).

Prices and Stocks

In 2014, the average annual North American Market price and the LME cash prices for lead declined slightly from that in 2013 (table 1, fig. 1). The average monthly LME cash price for lead was \$0.975 per pound in January and trended downward during the first quarter of the year before increasing to a peak of \$1.01 per pound in August. Average monthly lead prices declined for the rest of the year, reaching a low of \$0.878 per

pound in December. The decrease in the LME price during the last quarter of the year was partially attributed to subdued investor interest in metals and other commodities owing to the increased strength of the U.S. dollar and uncertainty about economic growth in China and Europe in 2015 (CRU International Ltd., 2016, p. 3).

Scrap prices were relatively stable during most of the year but declined during the last quarter. 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) decreased from \$0.398 per pound in January to an annual low of \$0.374 per pound in November and was \$0.377 per pound in December 2014.

Global LME lead stocks at the end of December 2014 were 221,975 t (725 t in the United States), an increase of 4% from those at yearend 2013.

Foreign Trade

In 2014, imports of unwrought (refined) lead metal in pigs and bars for consumption totaled 593,000 t, a 19% increase from those of 2013, primarily owing to an increase in imports from Kazakhstan (54,800 t), the Republic of Korea (36,400 t), Russia (13,200 t), and Peru (10,100 t) that were partially offset by declines from Australia (46,000 t) and France (10,300 t). The leading source was Canada, accounting for 45% of unwrought lead metal imports, a decrease from 51% in 2013, followed by Mexico (20%) (table 11). The increase in imports was partially attributable to lead consumers substituting imports for lead that had been produced at Doe Run's primary lead smelter in Herculaneum, MO, that closed at yearend 2013.

Total domestic exports of unwrought lead in 2013 were 55,300 t, 33% more than those in 2013. Mexico was the leading destination for the unwrought lead exported in 2014, accounting for about 72% of the total. Domestic exports of lead in concentrates were 356,000 t, 65% more than those of 2013. Exports of lead in concentrates to China more than doubled those in 2013. About 94% of the lead in concentrates produced domestically was exported in 2014 compared with 63% in 2013. The increase in total exports was mainly owing to the yearend 2013 closure of Doe Run's Herculaneum primary smelter (table 10).

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 2014, the United States imported about 22.9 million SLI lead-acid batteries for consumption, compared with 20.0 million in 2013. Mexico was the leading provider of SLI batteries, accounting for 55% of those imported in 2014. SLI batteries were also imported from China, Colombia, Germany, Japan, the Republic of Korea, the Philippines, Taiwan, and Vietnam. The United States exported about 30.2 million spent SLI lead-acid batteries in 2014, 14% more than those in 2013. The majority of those units were shipped to Mexico (86%) and Canada (11%) for recycling. Much of the lead recovered from the exported spent batteries was recovered and used to manufacture lead-acid batteries at plants in Canada and Mexico that were exported to the United States.

World Review

World mine production of lead decreased by 9% to 4.91 Mt from 5.37 Mt in 2013 owing primarily to a decline in China's production. The United States ranked third in the world (unchanged from 2013) and accounted for about 8% of global lead mine production, compared with about 6% in 2013. China and Australia were the two leading producers in 2014, accounting for 49% and 15%, respectively, of global lead mine production (table 12). Globally, 150,000 t/yr of lead mine production capacity was added in 2014 (about 87,000 t/yr from the expansion of two mines in Australia) and no lead mines closed (International Lead and Zinc Study Group, 2015b, p. 5, 22).

World production of refined lead (primary and secondary) was 10.6 Mt, essentially unchanged from that in 2013. The United States was the second-leading producer of refined lead after China and accounted for 10% of global production. China produced about 45% of global refined lead in 2014 (table 13). Refined lead production increased significantly in Australia, Belgium, Brazil, Italy, Japan, Kazakhstan, the Republic of Korea, Russia, and the Ukraine, but declined significantly in Argentina, China, Germany, Mexico, Peru, Sweden, the United Kingdom, and the United States. Secondary lead production was about 53% of total world refined lead production in 2014, essentially unchanged from that in 2013. In 2014, two secondary refineries opened, one in China and one in Greece, that added about 115,000 t/yr of lead smelting capacity. A 20,000-t/yr-of-lead primary smelter in Bolivia, constructed in 1988 but never commissioned, operated briefly in September but was then closed owing to a furnace leak. One primary lead smelter that fed a refinery in the United States and one primary refinery in Peru closed, removing about 200,000 t/yr of lead refining capacity (International Lead and Zinc Study Group, 2015b, p. 5–6, 23, 25).

According to the ILZSG, global consumption of refined lead was 10.9 Mt in 2014, slightly less than that in 2013. The leading refined-lead-consuming countries in 2014 were China, 43%; the United States, 15%; the Republic of Korea, 5%; India, 5%; and Germany, 3% (International Lead and Zinc Study Group, 2015a, p. 10–11).

European Union.—Recylex S.A. (France), a leading lead producer in Europe with a refinery in Germany, processed lead-bearing material from scrap battery treatment facilities in Belgium, France, and Germany. In 2014, the company produced 139,300 t of refined lead, a slight decrease compared with 139,700 t in 2013. Production in 2013 included 6,000 t from a smelter in Belgium that closed during the second half of 2013 (Recylex S.A., 2015, p. 4).

Australia.—In 2014, lead mine production in Australia increased slightly (17,000 t) from that in 2013, primarily owing to increased production at Ivernia Inc.'s (Canada) Paroo Station Mine (85,000-t/yr production capacity) in Western Australia. The mine reopened in April 2013 after a July 2012 ruling by the Minister of Environment of Western Australia that approved conditions for the restart. The mine had shut down in April 2011 owing to concerns about possible lead contamination after lead-bearing mud was detected on shipping containers that

had been transported from the mine to the Port of Fremantle. In 2014, the mine processed 1,437,958 t of ore and produced 80,915 t of lead in concentrates compared with 44,000 t in 2013 (Ivernia Inc., 2015, p. 7).

Canada.—In 2014, lead mine production in Canada declined by 16,200 t to 4,000 t, primarily owing to the June 2013 closure of its leading lead-producing mine, Glencore plc's (Switzerland) Brunswick underground zinc-lead mine near Bathurst, New Brunswick. The company reported that there was no production of lead in concentrates at the Brunswick Mine in 2014 compared with 13,500 t in 2013 (Glencore plc, 2015, p. 52, 55).

In 2014, primary refined lead production at Teck's metallurgical complex at Trail, British Columbia, was 82,100 t, a slight decrease from 86,400 t produced in 2013, partially owing to a 36-day scheduled maintenance shutdown of the lead smelter in the fourth quarter. Trail also treated 41,200 t of lead containing scrap, primarily lead-acid batteries and cathode ray tube glass (Teck Resources Ltd., 2015b, p. 35).

China.—In 2014, China continued to be the leading global producer and consumer of lead and the leading producer of lead-acid batteries although declines were reported for each compared with those in 2013. Refined lead production in 2014 decreased to 4.74 Mt from 4.78 Mt in 2013, the first decrease in production in several years (table 13). Some analysts believed that despite Government efforts to force consolidation, the average smelter utilization rate in China was about 60%. ILZSG reported that one 200,000-t/yr lead refinery opened during 2014 (replacing an existing 100,000-t/yr plant) in Shandong Province. Lead in concentrate production in 2014 was about 2.40 Mt, a 17% decrease from the 2.90 Mt produced in 2013 and the first decline in lead mine production since 2002 (table 12). The decrease in mine production was due primarily to the decline in prices for refined lead and an increase in environmental regulations for mines by Provincial governments (International Lead and Zinc Study Group, 2015b, p. 25).

Between 1999 and 2013, China's increased consumption of lead for the production of lead-acid batteries was attributed to growth in the production of automobiles, electric bicycles (e-bikes), and motorcycles. According to ILZSG, consumption of lead in China decreased by 4% to 4.71 Mt in 2014 from 4.91 Mt in 2013 compared with a 7% increase from 2012 to 2013. The decline in domestic lead consumption was attributed to a slowdown in sales of e-bikes in 2014 (which accounted for about 30% of annual lead consumption) and elevated stocks of lead-acid batteries (International Lead and Zinc Study Group, 2015c, p. 5).

Republic of Korea.—In 2014, refined lead production increased by about 49% (211,000 t) from that in 2013, primarily owing to increased production at Korea Zinc Co., Ltd.'s zinc-lead refinery in Onsan. The plant produced about 300,000 t of refined lead in 2014, compared with 200,000 t in 2010, and was expected to produce 360,000 t in 2016, making it one of the largest lead smelters in the world (Korea Zinc Co., Ltd., 2014, p. 4; International Lead and Zinc Study Group, 2015a, p. 32; CRU International Ltd., 2016, p. 96, C–12).

Outlook

At its October 2014 meeting in Lisbon, Portugal, the ILZSG forecast global increases in lead consumption and mine production but decreased refined lead production in 2015. Global lead consumption in 2015 is expected to increase slightly, primarily owing to increased consumption in China for use in lead-acid batteries for automobiles, e-bikes, and standby power for telecommunications networks. Global lead mine production in 2015 is forecast to increase by about 6% from that in 2014 owing to increased mine production in Australia and China. Global refined lead production is forecast to increase slightly in 2015 owing to increases in Belgium, China, India, Italy, and the Republic of Korea. Note that the 2014 ILZSG world production estimate differs from that of the USGS. The ILZSG forecast that global refined lead consumption would exceed production by about 23,000 t in 2015 (International Lead and Zinc Study Group, 2014).

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TABLE 1
SALIENT LEAD STATISTICS¹

		2010	2011	2012	2013	2014
United States:						
Production:						
Mine, recoverable lead content: ²						
Quantity	metric tons	356,000	334,000	336,000	331,000	368,000
Value	thousands	\$854,000	\$895,000	\$845,000	\$837,000	\$860,000
Primary lead, refined content, domestic ores and base bullion	metric tons	115,000	118,000	111,000	114,000	--
Secondary lead, lead content	do.	1,140,000	1,130,000	1,110,000	1,150,000	1,020,000
Exports, lead content:						
Lead ore and concentrates	do.	299,000	218,000 ^r	211,000 ^r	215,000 ^r	356,000
Lead materials, excluding scrap	do.	83,500	47,200	53,400	48,500	61,300
Imports for consumption, lead content:						
Lead in base bullion	do.	602	434	1,020	1,900	1,080
Lead in pigs and bars	do.	271,000	313,000	349,000	500,000 ^r	593,000
Stocks, December 31, lead content:						
Primary lead	do.	W	W	W	W	W
At consumers and secondary smelters	do.	64,800	48,300	71,700 ^r	69,900 ^r	66,800
Consumption of metal, primary and secondary, lead content	do.	1,430,000	1,410,000	1,350,000	1,390,000	1,540,000
Price: ³						
North American Market	cents per pound	NA	NA	NA	109.98	106.17
North American Producer	do.	108.91	121.70	114.16	NA	NA
London Metal Exchange, pure lead, cash average	do.	97.42	108.92	93.53	97.15	95.04
World:						
Production, gross weight:						
Mine	metric tons	4,170,000 ^r	4,750,000 ^r	5,160,000 ^r	5,370,000 ^{r,e}	4,910,000 ^e
Primary refinery	do.	4,160,000	4,590,000	4,790,000	4,700,000 ^{r,e}	4,580,000 ^e
Secondary refinery	do.	5,150,000 ^r	5,400,000 ^r	5,450,000 ^r	5,600,000 ^{r,e}	5,640,000 ^e
Undifferentiated	do.	294,000 ^r	292,000	262,000 ^r	350,000 ^{r,e}	375,000 ^e

^eEstimated. ^rRevised. do. Ditto. NA Not available. W Withheld to avoid disclosing company proprietary data. -- Zero.

¹Data are rounded to no more than three significant digits, except prices.

²Lead recoverable after smelting and refining. Data in table I2 represent lead in concentrate.

³Source: Platts Metals Week.

TABLE 2
LEADING LEAD-PRODUCING MINES IN THE UNITED STATES IN 2014, IN ORDER OF OUTPUT¹

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

Do., do. Ditto.

¹The mines on this list accounted for 100% of the U.S. lead mine production in 2014.

²For Alaska, mines are located by geographic region, as delineated by the Alaska Division of Geological & Geophysical Surveys in its Special Report 67. Alaska's mineral industry 2011—Exploration activity.

TABLE 3
LEAD RECOVERED FROM SCRAP PROCESSED IN THE UNITED STATES BY KIND OF SCRAP AND FORM OF RECOVERY¹

(Metric tons, lead content, unless otherwise specified)

	2013	2014
Kind of scrap:		
New scrap:		
Lead-base	19,200	16,900
Copper-base	--	--
Tin-base	1,530	1,530
Total	20,700	18,400
Old scrap:		
Battery-lead	1,090,000	961,000
All other lead-base	39,800	39,500
Copper-base	--	--
Total	1,130,000	1,000,000
Grand total	1,150,000	1,020,000
Form of recovery:		
As soft lead	860,000	786,000
In antimonial lead	282,000	224,000
In other lead alloys	7,890	8,830
In copper-base alloys	--	--
Total:		
Quantity	1,150,000	1,020,000
Value ²	thousands \$2,910,000	\$2,640,000

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Value based on average quoted price of common lead.

TABLE 4
U.S. CONSUMPTION OF LEAD, BY PRODUCT¹

(Metric tons, lead content)

SIC ² code	Product	2013	2014
Metal products:			
3482	Ammunition, shot and bullets	84,800	85,300
Bearing metals:			
35	Machinery except electrical	W	W
371	Motor vehicles and equipment	W	W
37	Other transportation equipment	W	W
Total		1,110	1,150
3351	Brass and bronze, billets and ingots	1,420	2,990
36	Cable covering, power and communication	W	W
15	Calking lead, building construction	W	W
Casting metals:			
36	Electrical machinery and equipment	W	--
371	Motor vehicles and equipment	W	W
37	Other transportation equipment	W	W
3443	Nuclear radiation shielding	W	W
Total		20,400	19,100
Pipes, traps, other extruded products:			
15	Building construction	W	W
3443	Storage tanks, process vessels, etc.	W	W
Total		7,030 ^r	6,900
Sheet lead:			
15	Building construction	W	W
3443	Storage tanks, process vessels, etc.	W	W
3693	Medical radiation shielding	W	W
Total		4,870	6,090
Solder:			
15	Building construction	W	42
Metal cans and shipping containers		--	--
367	Electronic components, accessories and other electrical equipment	W	W
371	Motor vehicles and equipment	W	W
Total		8,200	7,380
Storage batteries:			
3691	Storage battery grids, post, etc.	464,000 ^r	581,000
3691	Storage battery oxides	734,000 ^r	771,000
Total storage batteries		1,200,000 ^r	1,350,000
27	Type metal, printing and allied industries	W	W
34	Other metal products ³	177 ^r	200
Grand total		1,360,000	1,510,000
Other oxides:			
285	Paint	W	W
32	Glass and ceramics products	W	W
28	Other pigments and chemicals	W	W
Total		9,740	9,740
Miscellaneous uses		20,400 ^r	20,000
Grand total		1,390,000	1,540,000

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

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Standard Industrial Classification.

³Includes lead consumed in foil, collapsible tubes, annealing, galvanizing, plating, electrowinning, and fishing weights.

TABLE 5
U.S. CONSUMPTION OF LEAD IN 2014, BY STATE^{1,2}

(Metric tons, lead content)

State	Refined soft lead	Lead in antimonial lead	Lead in alloys	Lead in copper-base scrap	Total
California and Washington	26,000	34,100	3,710	--	63,800
Illinois	12,800	21,500	--	--	34,300
Iowa, Michigan, Missouri	23,500	2,140	W	--	25,700
Ohio and Pennsylvania	190,000	97,600	123,000	W	411,000
Arkansas and Texas	55,500	11	W	--	55,500
Alabama, Georgia, Oklahoma	15,900	20,100	W	--	36,100
Indiana, Kansas, Kentucky, Minnesota, Nebraska, Tennessee, Wisconsin	145,000	115,000	10,800	W	271,000
Connecticut, Maryland, New Jersey, New York, North Carolina, South Carolina	2,330	--	--	--	2,330
Other States	406,000	69,400	138,000	--	643,000
Total	878,000	360,000	275,000	577	1,540,000

W Withheld to avoid disclosing company proprietary data; included in "Other States." -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes lead that went directly from scrap to fabricated products.

TABLE 6
U.S. CONSUMPTION OF LEAD IN 2014, 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	66,100	86,800	8,530	W	162,000
Storage batteries	784,000	301,000	267,000	--	1,350,000
Miscellaneous ³	29,700	--	--	--	29,700
Total	880,000	388,000	275,000	577	1,540,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes lead that went directly from scrap to fabricated products.

³Includes other oxides and gasoline additives.

TABLE 7
STOCKS OF LEAD AT CONSUMERS AND SECONDARY SMELTERS IN THE UNITED STATES, DECEMBER 31^{1,2}

(Metric tons, lead content)

Year	Refined soft lead	Lead in antimonial lead	Lead in alloys	Lead in copper-base scrap	Total
2013	42,800 ^r	24,100 ^r	2,970	W	69,900 ^r
2014	43,400	20,200	3,120	W	66,800

^rRevised. W Withheld to avoid disclosing company proprietary data; included in "Total."

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes stocks at primary refineries.

TABLE 8
 PRODUCTION AND SHIPMENTS OF LEAD PIGMENTS AND OXIDES IN THE UNITED STATES^{1,2}

(Metric tons and dollars)

Product	2013				2014			
	Production		Shipments ^c		Production		Shipments ^c	
	Gross weight	Lead content	Quantity (lead content)	Value ³	Gross weight	Lead content	Quantity (lead content)	Value ^{3,4}
Litharge, red lead and white lead, dry	3,760	3,470	3,760	9,540,000	23,900	21,900	23,900	55,900,000
Lead oxide	740,000	703,000	NA	NA	749,000	711,000	NA	NA
Total	744,000	707,000	NA	NA	773,000	733,000	NA	NA

^cEstimated. NA Not available.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Excludes basic lead sulfate to avoid disclosing company proprietary data.

³At plant, exclusive of container.

⁴Increase in value partially owing to improved response rate.

TABLE 9
 U.S. IMPORTS FOR CONSUMPTION OF LEAD PIGMENTS AND COMPOUNDS, BY KIND¹

Kind	Quantity	
	(metric tons, lead content)	Value (thousands)
2013:		
Chrome yellow, molybdenum orange pigments, lead-zinc chromates	970	\$7,050
Litharge	1,670	4,640
Glass frits (undifferentiated)	30,900	53,400
Total	33,500	65,100
2014:		
Chrome yellow, molybdenum orange pigments, lead-zinc chromates	967	6,530
Litharge	1,820	4,300
Glass frits (undifferentiated)	31,900	56,100
Total	34,600	66,900

¹Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 10
U.S. EXPORTS OF LEAD, BY COUNTRY¹

Country	2013		2014	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Ore and concentrates, lead content:				
Australia	74	\$23	--	--
Belgium	8,420	13,400	7,740	\$14,000
Canada	20,500 ^r	37,000	29,200	51,800
China	113,000	203,000 ^r	257,000	410,000
France	--	--	84	26
Germany	9	9	15,700	26,900
Italy	11,200	16,000	7,890	13,800
Japan	8,590 ^r	14,100 ^r	13,500	24,300
Korea, Republic of	52,600 ^r	102,000 ^r	23,900	40,300
Mexico	287	615	490	1,030
Taiwan	412	44	--	--
Other	15 ^r	3 ^r	29	10
Total	215,000 ^r	386,000 ^r	356,000	582,000
Base bullion, lead content:				
Canada	327	1,010	963	2,820
Other	22	290	1	11
Total	349	1,300	964	2,830
Unwrought lead and lead alloys, lead content:				
Belgium	8,410	8,970	11,200	9,880
Canada	2,080	2,770	638	921
China	163	178	--	--
Costa Rica	235	204	--	--
Ecuador	1,000	850	18	13
Japan	6	4	266	162
Korea, Republic of	--	--	122	160
Malaysia	984	2,270	1,720	3,420
Mexico	26,300	43,600	39,700	46,000
Netherlands	80	71	71	134
Russia	620	1,710	6	3
United Arab Emirates	521	454	--	--
United Kingdom	43	34	104	125
Venezuela	894	1,390	1,260	2,680
Other	204 ^r	184 ^r	222	289
Total	41,600	62,700	55,300	63,800
Wrought lead and lead alloys, lead content:				
Canada	1,520	3,040	1,790	3,200
Chile	286	388	36	92
China	259	786	24	131
Columbia	864	1,300	23	43
India	1,230	1,860	1,460	2,330
Korea, Republic of	67	159	25	119
Mexico	891	814	455	738
Singapore	404	424	477	712
United Kingdom	172	275 ^r	201	405
Other	915 ^r	1,710 ^r	536	2,310
Total	6,610	10,800	5,020	10,100
Scrap, gross weight:				
Canada	5,700	8,650	4,120	6,700
China	4,360	1,950	805	752
Dominican Republic	732	220	1,200	360
Ecuador	4,500	7,830	7,590	12,300
India	7,240	11,900	8,550	12,800
Ireland	212	181	94	170
Korea, Republic of	10,500	13,300	10,700	13,700

See footnotes at end of table.

TABLE 10—Continued
 U.S. EXPORTS OF LEAD, BY COUNTRY¹

Country	2013		2014	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Scrap, gross weight—Continued:				
United Arab Emirates	497	203	720	\$1,520
Other	1,200 ^r	1,260 ^r	2,590	3,000
Total	34,900	45,400	36,400	51,300

^rRevised. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 11
U.S. IMPORTS FOR CONSUMPTION OF LEAD, BY COUNTRY¹

Country	2013		2014	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Base bullion:				
Canada	--	--	45	\$289
Colombia	1,540	\$3,180	--	--
Mexico	148	319	487	560
Panama	--	--	425	850
Spain	210	174	--	--
Venezuela	--	--	124	200
Total	1,900	3,680	1,080	1,900
Pigs and bars, lead content:				
Australia	46,800	110,000	787	1,850
Belgium	1,440	3,410	347	703
Brazil	887	2,040	--	--
Canada	257,000 ^r	588,000 ^r	264,000	605,000
Chile	4,220 ^r	9,020	3,140	6,360
China	441	1,140	59	243
Dominican Republic	440	976	438	948
Ecuador	2,020 ^r	4,300	8,840	19,300
France	11,900	28,300	1,560	3,690
Guatemala	639	1,410	--	--
India	1,020	2,160	10,300	23,100
Israel	4,190	9,270	3,020	6,750
Italy	103	243	822	1,660
Kazakhstan	4,980	11,800	59,700	134,000
Korea, Republic of	2,200	4,770	38,600	85,700
Mexico	111,000 ^r	155,000	120,000	158,000
Panama	99	197	796	1,560
Peru	39,600	84,300	49,700	106,000
Russia	5,220	11,900	18,400	39,900
South Africa	45	204	--	--
Spain	--	--	5,420	11,000
Sri Lanka	1,030	2,320	740	1,710
United Kingdom	2,370 ^r	6,240	3,670	8,940
Venezuela	980	1,780	917	1,550
Other	536 ^r	1,320 ^r	1,690	3,480
Total	500,000 ^r	1,040,000 ^r	593,000	1,220,000
Reclaimed scrap, including ash and residues, lead content:				
Canada	10,200	3,400	4,760	4,960
Colombia	--	--	152	308
Dominican Republic	1,810	2,840	1,350	2,600
Honduras	170	422	742	1,990
Mexico	2,030	1,900	1,920	1,530
Venezuela	482	1,070	869	1,800
Other	939	943	1,610	2,060
Total	15,600	10,600	11,400	15,200
Wrought lead, all forms, including wire and powders, gross weight:				
Argentina	59	128	60	132
Canada	57	239	28	191
Germany	491	3,140	495	3,170
India	119	377	117	284
Japan	1	68	2	13
Sweden	27	485	18	293
United Kingdom	641	1,550	795	2,200
Other	46	163	82	398
Total	1,440	6,140	1,600	6,680

^rRevised. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 12
LEAD: WORLD MINE PRODUCTION OF LEAD IN CONCENTRATE, BY COUNTRY^{1,2}

(Metric tons, lead content)

Country ³	2010	2011	2012	2013 ^c	2014 ^c
Argentina	22,554	26,074	26,475	26,000	29,000
Australia ^c	625,000 ⁴	621,000 ⁴	622,000	711,000	728,000
Bolivia	72,803	100,051	79,044 ^r	82,000 ⁴	94,000 ⁴
Bosnia and Herzegovina ^c	3,000	4,000	4,000	4,400 ^r	4,000
Brazil	19,650	15,100	16,953	17,000	12,000
Bulgaria	12,136	10,121	14,366	15,986 ⁴	17,000
Burma ^c	7,000	8,700	9,800 ⁴	11,700 ^r	18,000
Canada	64,845	67,505	61,224	20,188 ⁴	4,000 ⁴
Chile	695	841	410	1,000 ⁴	2,000 ⁴
China ^c	1,850,000	2,400,000	2,800,000	2,900,000	2,400,000
Greece	12,200 ^c	16,592	18,062	18,000 ⁴	11,000
Honduras	16,944	16,954	12,400	11,600	16,000
India	86,000	88,000	103,000	106,000 ⁴	106,000
Iran ^{e,5}	25,000 ⁴	40,000 ⁴	35,000	42,000	36,000
Ireland	39,100	50,700	51,000	51,000	41,000 ⁴
Italy ^c	800	800	--	--	--
Kazakhstan	35,400	38,800	38,100	38,000	38,000
Korea, North ^c	26,000	32,000	38,000	59,000	45,000
Korea, Republic of	1,168	1,289	1,434	1,500 ⁴	1,500
Macedonia	41,000	37,000	36,000	36,000	38,000 ⁴
Mexico	192,062	223,717	210,382	210,000 ^{r,4}	250,000 ⁴
Morocco	46,400	43,800	39,100	40,000	28,000
Namibia ^c	10,301 ⁴	9,139 ⁴	9,000	11,000 ^r	12,000
Peru	261,990	230,199	249,236	266,472 ⁴	278,000 ⁴
Poland	60,200	53,100	56,600	51,710 ⁴	38,000
Russia, recoverable ^c	97,000	94,500	92,700 ^r	90,000 ^r	90,000
South Africa	50,625	54,460	52,489	53,000	29,000
Sweden	67,700	61,999	63,551	59,556 ⁴	71,000 ⁴
Tajikistan ^c	4,000 ^r	10,000 ^r	15,000 ^r	19,000 ^r	22,000
Turkey, Pb content of Pb-Zn ore ^c	38,000	40,000	56,000	78,000 ⁴	65,400
United Kingdom ^c	500	500	500	500	500
United States	369,000	342,000	345,000	340,000 ⁴	379,000
Vietnam ^c	6,500	6,400	6,300	1,900 ^r	2,800
Total	4,170,000 ^r	4,750,000 ^r	5,160,000 ^r	5,370,000 ^r	4,910,000

^cEstimated. ^rRevised. -- Zero.

¹World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Includes data available through June 3, 2016.

³In addition to the countries listed, Nigeria, Serbia, and Uzbekistan may have produced lead, but information is inadequate to formulate reliable estimates of output levels.

⁴Reported figure.

⁵Year beginning March 21 of that stated.

TABLE 13
LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY^{1,2}

(Metric tons)

Country ³	2010	2011	2012	2013 ^c	2014 ^c
Argentina:^c					
Primary	14,245 ⁴	11,859 ⁴	16,445 ⁴	13,800	12,000
Secondary	63,000	72,700	73,820 ⁴	69,900	28,000
Total	77,200	84,600	90,265 ⁴	83,700	40,000
Australia:					
Primary	178,000	187,000	160,000	177,000	176,000
Secondary ^c	26,000	26,000	24,000	24,000	50,000
Total ^c	204,000	213,000	184,000	201,000	226,000
Austria, secondary	25,499	26,208	24,504	38,800 ^r	37,100
Belgium, secondary	105,000 ^e	88,129	87,958	87,900	127,000
Bolivia, primary	310 ⁴	269 ⁴	250	330	2,000
Brazil, secondary	114,887	138,537	165,397	165,400 ⁴	190,000
Bulgaria, primary and secondary	99,116	90,933	86,156	90,742 ⁴	92,000
Burma, primary	200 ^r	200 ^r	200	200	200
Canada:					
Primary	105,836	112,531	133,495	128,706 ⁴	131,000
Secondary	167,101	170,059	144,570	159,595 ⁴	151,000
Total	272,937	282,590	278,065	288,301 ⁴	282,000
China:^c					
Primary	2,840,000	3,200,000	3,300,000	3,280,000	3,260,000
Secondary	1,360,000	1,400,000	1,400,000	1,500,000	1,480,000
Total	4,200,000	4,600,000	4,700,000	4,780,000	4,740,000
Czech Republic, secondary ^c	30,000	32,000	30,000	28,000	44,000
Estonia, secondary	7,199	7,840	8,046	7,100 ⁴	7,400
France, secondary ^c	71,000	80,000	83,000	71,000	72,000
Germany:^c					
Primary	125,000	136,000	140,000	151,000	131,000
Secondary	279,000	293,000	290,000	249,000	248,000
Total	404,000	429,000	430,000	400,000	379,000
India:					
Primary	62,000	72,000	110,000	116,000	120,000
Secondary	305,000	347,000	350,000	355,000	357,000
Total	367,000	419,000	460,000	471,000	477,000
Indonesia, secondary ^c	45,000 ^r	47,000 ^r	45,000 ^r	42,000 ^r	46,000
Iran:^c					
Primary	20,000	25,000	25,000	20,000	23,000
Secondary	55,000	57,000	56,000	56,000	47,000
Total	75,000	82,000	81,000	76,000	70,000
Ireland, secondary ^c	20,000	20,000	20,000	20,000	17,000
Israel, secondary	27,000	27,000 ^e	21,791	22,418 ⁴	25,000
Italy:					
Primary	--	--	--	30,000	50,000
Secondary	150,000	149,500	138,400	150,000	160,000
Total	150,000	149,500	138,400	180,000	210,000
Japan:					
Primary	101,610	100,078	91,037	95,000	87,000
Secondary	114,218	117,937	117,957	115,000	153,000
Total	215,828	218,015	208,994	210,000	240,000
Kazakhstan, primary and secondary	103,110	111,249	88,099	90,000	126,000
Kenya, secondary ^c	250	250	250	250	250
Korea, North, primary and secondary ^c	3,000	3,000	3,000	3,000	3,000
Korea, Republic of:					
Primary	197,900	256,851	280,000	227,700 ⁴	299,000
Secondary	130,000	160,000	180,000	200,000 ⁴	340,000
Total	327,900	416,851	460,000	427,700 ⁴	639,000

See footnotes at end of table.

TABLE 13—Continued
LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY^{1,2}

	(Metric tons)				
Country ³	2010	2011	2012	2013 ^e	2014 ^e
Mexico:					
Primary ⁵	110,980	101,729	112,431	100,000	119,000
Secondary ^e	175,000	216,000	303,000	300,000	195,000
Total ^e	286,000	318,000	415,000	400,000	314,000
Morocco:					
Primary	38,237	36,469	38,000	-- ^r	--
Secondary ^e	3,000	3,000	2,500	2,500	5,000
Total ^e	41,200	39,500	40,500	2,500 ^r	5,000
Mozambique, secondary	--	--	892	1,704 ⁴	1,700
Netherlands, secondary ^e	17,000	17,000	17,000	17,000	31,000
New Zealand, secondary ^e	9,000	9,000	9,000	9,000	--
Pakistan, secondary ⁶	2,899	919	2,900	2,000	16,000
Peru	--	--	--	81,000 ^r	46,000
Philippines, secondary	30,000	34,000	32,000	32,000	30,000
Poland:					
Primary	38,000	47,000	47,000	39,000 ⁴	36,000
Secondary	82,000	87,000	87,000	103,000 ⁴	112,000
Total	120,000	134,000	134,000	142,000 ⁴	148,000
Portugal, secondary	9,000	6,000	5,000	4,000 ⁴	5,000
Romania:					
Primary	9,000	11,000	6,500	-- ^r	--
Secondary ^e	3,000	3,000	3,000	3,000	12,000
Total ^e	12,000	14,000	9,500	3,000 ^r	12,000
Russia, primary and secondary ^e	89,000	86,700	85,100	85,000	108,000
Slovenia, secondary ^e	14,000	15,000	14,000	12,000	11,000
South Africa, secondary	51,000	56,000	54,000	54,000	52,000
Spain, secondary ^e	165,000	177,000	160,000	157,000	166,000
Sweden:^e					
Primary	56,000	52,400	62,000	69,000	25,000
Secondary	40,000	41,000	44,000	45,000	44,000
Total	96,000	93,400	106,000	114,000	69,000
Switzerland, secondary ^e	5,000	3,000	2,500	-- ^r	-- ^r
Taiwan, secondary ^e	35,000	35,000	35,000	35,000	34,000
Thailand, secondary	70,700 ^r	93,000 ^r	87,000 ^r	87,400 ^r	79,300
Turkey, secondary ^e	48,000	48,000	50,000	50,000	55,000
Uganda, secondary ^e	800	800	800	800	800
Ukraine, secondary ^e	7,000	13,500	13,700	14,000	32,000
United Kingdom:^e					
Primary ⁷	151,000	125,000	157,000	137,000	110,000
Secondary ⁸	144,000	144,000	155,000	155,000	157,000
Total	295,000	269,000	312,000	292,000	267,000
United States:					
Primary	115,000	118,000	111,000	114,000 ⁴	--
Secondary	1,140,000	1,130,000	1,110,000	1,150,000 ⁴	1,020,000 ⁴
Total	1,260,000	1,250,000	1,220,000	1,260,000 ⁴	1,020,000 ⁴
Grand total:	9,610,000 ^r	10,300,000 ^r	10,500,000 ^r	10,600,000 ^r	10,600,000
Of which:					
Primary	4,160,000	4,590,000	4,790,000	4,700,000 ^r	4,580,000
Secondary	5,150,000 ^r	5,400,000 ^r	5,450,000 ^r	5,600,000 ^r	5,640,000
Undifferentiated	294,000 ^r	292,000	262,000 ^r	350,000 ^r	375,000

^eEstimated. ^rRevised. -- Zero.

¹Grand totals, U.S. data, and estimated data are rounded to more than three significant digits; may not add to totals shown.

²Includes data available through June 23, 2016. Data included 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.

³In addition to the countries listed, Algeria, Colombia, Egypt, El Salvador, Iraq, Malaysia, Nigeria, Saudi Arabia, Serbia, Trinidad and Tobago,

TABLE 13—Continued
 LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY^{1,2}

Venezuela, and Zambia produced secondary lead, but output is not officially reported; available general information is inadequate for the formation of reliable estimates of output levels.

⁴Reported figure.

⁵Includes lead content in antimonial lead.

⁶Duddar Lead-Zinc Mine project was suspended starting from 2012 to current time due to on-site maintenance and maintenance of underground system.

⁷Produced entirely from imported bullion and includes the lead content of alloys.

⁸Includes a small quantity of primary lead from domestic concentrate.

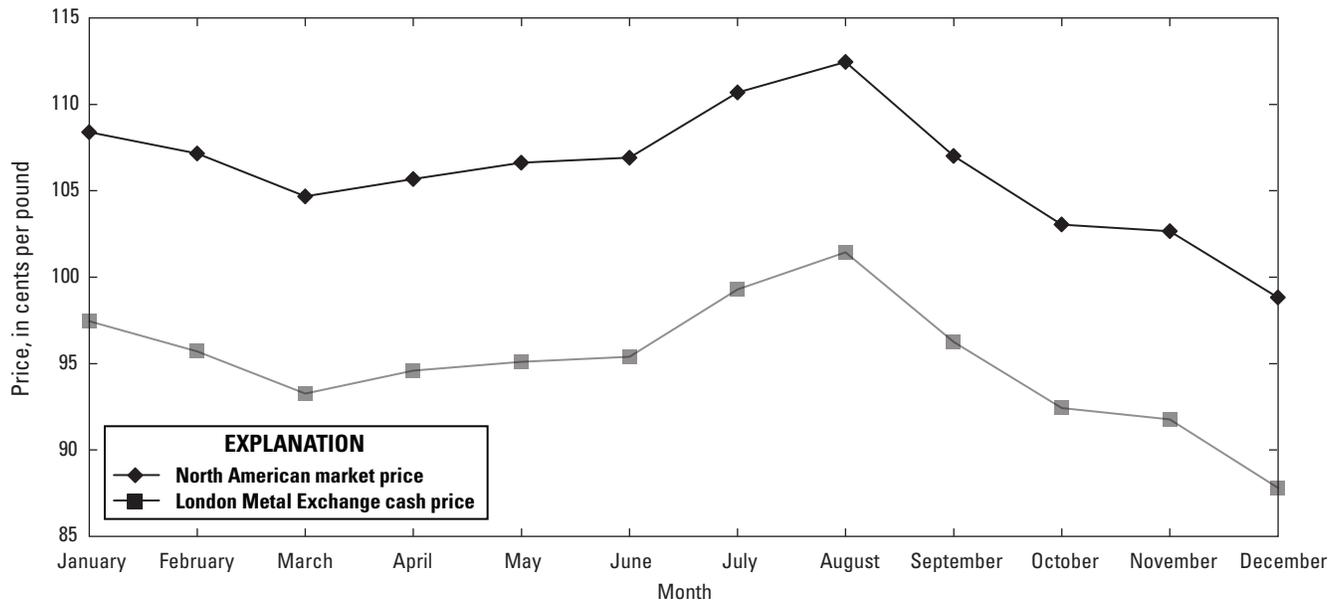


Figure 1. Average monthly prices for refined lead metal from January 2014 through December 2014.
 Source: Platts Metals Week.