



# 2012 Minerals Yearbook

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## ZINC

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By Amy C. Tolcin

**Domestic survey data and tables were prepared by Hodan A. Fatah, statistical assistant, and the world production tables were prepared by Glenn J. Wallace, international data coordinator.**

In 2012, U.S. mine production of recoverable zinc was 713,000 metric tons (t), a 4% decrease from that of 2011 (table 1). The value of domestic mine production was approximately \$1.51 billion. Alaska continued to be the dominant zinc-producing State, followed by, in descending order of quantity, Tennessee and Missouri. Domestic exports of zinc contained in ores and concentrates decreased by 10% to 592,000 t in 2012. The Republic of Korea (22%), Canada (19%), Spain (17%), and Australia (13%) were the leading recipients of concentrate exports (table 7). Imports for consumption of zinc contained in ores and concentrates continued to trend downwardly, decreasing by 20,600 t (or 77%) to 6,140 t.

Estimated U.S. refined zinc production in 2012 increased by 6% to 261,000 t. Imports of refined zinc in 2012 decreased by 9% to 655,000 t. Refined zinc was imported primarily from Canada (71%), Mexico (14%), Peru (9%), and Australia (4%). Domestic exports of refined zinc decreased by 4,960 t (or 26%) to 14,100 t in 2012. Apparent consumption of refined zinc was 892,000 t, a 5% decrease from that of the prior year. Approximately 85% of reported refined zinc consumption was for galvanizing, followed by, brass and bronze (6%), zinc-base alloys (6%), and other uses (3%) (table 6). Global zinc mine production increased by 7% to 13.5 million metric tons (Mt); zinc metal production decreased by 3% to 12.8 Mt (tables 10, 11).

## Legislative and Government Programs

In April, in response to a petition filed by five U.S. companies, the U.S. International Trade Commission concluded that the U.S. industry was not materially injured by imports of galvanized wire from China and Mexico, which the U.S. Department of Commerce had previously determined had been sold at less than fair value. As a result, no antidumping or countervailing duties would be assessed on galvanized wire imported from those countries (U.S. International Trade Commission, 2012).

A U.S. Government stockpile of zinc has been maintained since 1967 for national defense purposes. In 1992, Public Law 102-484, which authorized the disposal of the entire inventory of zinc from the National Defense Stockpile (NDS), was signed. Sales of zinc from the NDS, however, have been suspended since August 2008 owing to concerns regarding domestic availability and access to various raw materials. At yearend 2012, the reported inventory of zinc remained at 7,250 t.

## Production

**Mine.**—In 2012, zinc was produced in three States; Alaska was the leading zinc-producing State, followed by Tennessee and Missouri. Domestic mine production of recoverable

zinc in 2012 was 713,000 t, a 4% decrease from that of 2011 (table 1). An increase in production in Tennessee was offset by decreases in the other states. Domestic mine production data were collected by the U.S. Geological Survey (USGS) from a voluntary survey of base-metal lode-mine production.

**Alaska.**—Teck Alaska Inc. (a subsidiary of Teck Resources Ltd., Vancouver, British Columbia, Canada) operated the open pit Red Dog zinc-lead mine in the Northwest Arctic Borough. Red Dog comprises several sedimentary-exhalative lead-zinc sulfide ore bodies. In 2012, ore was mined from the Aqqaluk and Main Pit deposits. Reserves from the Main Pit were exhausted in the first quarter of 2012, after which ore was mined solely from Aqqaluk. Zinc in zinc concentrate production at Red Dog decreased by 8% in 2012 from that of 2011 to 529,000 t as a result of reduced mill throughput and lower ore grades. Approximately 30% of the zinc concentrates was refined at Teck's metallurgical complex at Trail, British Columbia, Canada. Remaining concentrates were sent to Asia and Europe. Most of Red Dog's concentrates were sold through long-term contracts with the balance sold in the spot market. Reported reserves at yearend 2012 contained 8.05 Mt of zinc. Zinc in zinc concentrate production in 2013 was projected to decline further to between 500,000 and 525,000 t (Teck Resources Ltd., 2013a, p. 31–33, 40; 2013b, p. 46).

In February 2010, two nonprofit groups appealed the renewal of Red Dog's water discharge permit by the U.S. Environmental Protection Agency (EPA), which had been issued in January 2010 with revised effluent conditions. Subsequently, the EPA postponed the permit renewal to consider and discuss the appeal with the State of Alaska. The prior water discharge permit was issued in 1998 and contained limitations for total dissolved solids that Red Dog would not be able to meet after the development of the Aqqaluk deposit. In 2013, jurisdiction over the permit passed from the EPA to the State of Alaska, and in February, the State of Alaska renewed Red Dog's water discharge permit with the 2010 effluent limitations that allowed for a higher concentration of total dissolved solids (Teck Resources Ltd., 2013a, p. 32).

Hecla Mining Co.'s (Coeur d'Alene, ID) underground Greens Creek Mine recovered metals from a polymetallic (gold-lead-silver-zinc) massive sulfide deposit located on Admiralty Island in the Tongass National Forest near Juneau. The mine produced gold and silver dore, as well as bulk lead-zinc, lead, and zinc concentrates, which were sold globally to smelters. In 2012, zinc in concentrate production decreased slightly from that of 2011 to 58,300 t. During the year, Hecla was undergoing permitting to increase the tailings capacity at Greens Creek, which was only sufficient to meet the mine's needs until 2015, and expended capital on an exploration and development program to increase reserves and extend mine life. Yearend reserves

contained 638,000 t of zinc (Hecla Mining Co., 2013a, p. 6, 16; 2013b, p. 19–22).

**Idaho.**—Hecla operated the Lucky Friday Mine, an underground silver-lead-zinc mine in the Coeur d’Alene Mining District in northern Idaho, which produced silver-lead concentrate and zinc concentrate. Production and exploration activities at Lucky Friday were temporarily suspended in 2012 as Hecla removed loose backfill material in the primary shaft. Hecla expected the mine to return to full production in mid-2013. At yearend, reserves contained 110,000 t of zinc (Hecla Mining Co., 2013a, p. 8, 16).

**Missouri.**—Doe Run Resources Corp. (St. Louis, MO) operated a series of production shafts that ran along the Viburnum Trend within the Mississippi Valley-type (MVT) lead-zinc-copper ore body in southeast Missouri. Doe Run processed ore from the Brushy Creek, Buick, Fletcher, Sweetwater, and Viburnum (#29 and #35) mines at four mills to produce primarily lead concentrates and, to a lesser extent, zinc and copper concentrates.

**Tennessee.**—Nyrstar NV (Balen, Belgium) owned and operated the East Tennessee and Middle Tennessee zinc mine complexes that recovered ore from MVT zinc deposits. Zinc in concentrate production at the two complexes increased by 36% from that of 2011 to 109,000 t owing to higher zinc ore grades and increased mill throughput, which Nyrstar attributed to an optimization program undertaken in the first half of the year to improve process efficiency. The East Tennessee mine complex (the Coy, Immel, and Young Mines) produced 61,000 t of zinc in concentrate in 2012, and the Middle Tennessee mine complex (the Cumberland, Elmwood, and Gordonsville Mines) produced 48,000 t. The concentrates were sent to Nyrstar’s Clarksville, TN, zinc refinery for processing. Zinc reserves at yearend were 139,000 t at East Tennessee and 152,000 t at Middle Tennessee (Nyrstar NV, 2013a, p. 22–23, 62; 2013b).

**Smelter.**—In 2012, refined zinc was mainly produced in two States—Pennsylvania (Horsehead Holding Corp.’s Monaca facility) and Tennessee (Nyrstar’s Clarksville facility). Refined zinc was also produced to a lesser extent by U.S. Zinc’s (owned by Votarantim Metais, Sao Paulo, Brazil) recycling operations in Coldwater, MI, and Houston, TX. Refined zinc production in 2012 increased by 6% from that of 2011 to 261,000 t (table 1).

**Primary.**—Nyrstar’s Clarksville electrolytic zinc refinery [125,000 metric tons per year (t/yr) capacity] was the only primary zinc smelter in the United States. Clarksville’s feed mix was mostly zinc concentrate from its Tennessee mines, and the balance was imported zinc concentrates and domestically sourced secondary zinc oxides. Refined zinc production in 2012 increased by 4% from that of 2011 to 114,000 t. Zinc produced at Clarksville was Special High Grade (SHG) and Continuous Galvanizing Grade (CGG). Byproducts included cadmium metal, copper cementate, copper sulfate, synthetic gypsum, and sulfuric acid. In the third quarter, Nyrstar began producing an intermediate germanium concentrate at Clarksville, which was recovered from the Middle Tennessee concentrates. In 2013, Nyrstar planned to close the refinery for 2 weeks to perform maintenance to the roaster and acid plant, resulting in a projected production reduction of 5 t of zinc (Nyrstar NV, 2013a, p. 66–67).

**Secondary.**—Horsehead produced zinc metal—primarily Prime Western Grade (PW)—and zinc oxide at its electrothermic zinc smelter (136,000-t/yr capacity) at Monaca. The zinc metal was sold in both jumbo ingot and slab form. The PW zinc was sold to general hot-dip galvanizers and brass manufacturers or consumed internally for the production of zinc oxide. Zinc production at Monaca in 2012 increased by 7% from production in 2011, when intermittent production difficulties reduced output (Horsehead Holding Corp., 2013, p. 7–8).

Feedstock for the metal production was composed entirely of secondary materials; 79% of the feedstock was from Horsehead’s electric arc furnace (EAF) dust recycling operations, and the balance was generally composed of purchased galvanizing residues, such as dross and skimmings. EAF dust is a waste product recovered from the air flow exiting electric arc furnaces during the steel recycling process and typically contains 10% to 20% zinc. Horsehead’s five EAF dust recycling operations were in Barnwell, SC; Beaumont, TX; Calumet, IL; Palmerton, PA; and Rockwood, TN; its hydrometallurgical metals recovery facility was in Bartlesville, OK. In 2012, Horsehead recycled 586,000 t of EAF dust (Horsehead Holding Corp., 2013, p. 4, 9).

During 2012, Horsehead continued constructing a solvent extraction-electrowinning (SX-EW) zinc production facility in Rutherford County, NC, which would replace the Monaca smelter. The technology would generate SHG and CGG zinc in addition to PW zinc, and allow Horsehead to sell to new customers, including continuous galvanizers and diecasters. The metal would also be certified as deliverable against London Metal Exchange, Ltd. (LME) contracts. The plant was expected to produce about 140,000 t/yr of zinc and have a capacity of 160,000 t/yr of zinc. According to Horsehead, the new SX-EW technology would reduce the company’s manufacturing costs compared with the electrothermic technology employed at the Monaca facility owing to higher labor productivity, higher zinc recovery rates, lower energy usage, and lower maintenance costs. Plant construction was estimated to cost \$375 million and was anticipated to be completed in the third quarter of 2013 (Horsehead Holding Corp., 2012, p. 15–16, 19).

## Consumption

Changes in zinc consumption generally follow trends in industrial production or, more generally, economic growth. Domestic apparent consumption of zinc in 2012 was 892,000 t, a 5% decrease from apparent consumption in 2011 (table 1). Reported U.S. zinc consumption in 2012 was 806,000 t, representing 90% of domestic apparent consumption. Reported slab zinc consumption data were collected by the USGS from a voluntary survey on consumption of zinc by grade and end use.

According to reported data, galvanizing accounted for 85% of domestic zinc consumption in 2012 (table 6). Galvanized steel is used extensively in the automotive and construction industries. The American Iron and Steel Institute (2013, p. 25) reported that domestic shipments of galvanized steel in 2012 were 15.3 Mt, an 11% increase from those of 2011. Approximately 91% of the shipments was hot-dip galvanized, and the remaining 9% was electrogalvanized. Most of the zinc consumed domestically for galvanizing was at continuous galvanizing plants, where steel

sheet passes through a molten zinc bath at high speeds. There were an estimated 46 continuous galvanizing plants operated by 21 companies in the United States. The balance of zinc consumed for galvanizing was at general galvanizing plants, where fabricated steel shapes (for example, structural beams or fasteners) were immersed in a molten zinc bath individually or by batch. There were about 180 general galvanizing plants operated by 80 companies in the United States in 2012.

Brass and bronze accounted for 6% of reported consumption. Zinc-base alloys, which were predominantly used for coatings and die-casting, accounted for 6% and were produced mainly at nine facilities operated by six companies. Other major uses of zinc included chemicals and zinc semimanufactures.

## Stocks

Commodity exchange inventories [LME and the Shanghai Futures Exchange (SHFE)] totaled 1.53 Mt of zinc at yearend. Stocks of SHG zinc in global LME warehouses totaled 1.22 Mt at the end of 2012, a 49% increase from the yearend 2011 stock level. Some analysts thought that many of the LME zinc stocks were held under arrangements that allowed financial institutions and traders to profit from the ongoing gap between current and future prices, the contango, and the lower cost of carry (the actual cost of insuring, financing, and storing zinc). At yearend 2012, warehouses in New Orleans, LA, held 66% (800,000 t) of global LME zinc stocks. LME warehouses in New Orleans were primarily owned by Pacorini Metals AG (a subsidiary of Glencore International AG) and Metro International Trade Services (a subsidiary of Goldman Sachs Group, Inc.). About 10% (116,000 t) of LME zinc stocks were held in warehouses in Detroit, MI. At yearend 2012, the SHFE held 311,000 t of zinc, a 15% decrease from that of 2011 (International Lead and Zinc Study Group, 2014, p. 55).

Aside from the United States, China was the only other country to hold Government stockpiles of zinc. China's State Reserve Bureau (SRB) manages its stockpiles, which at yearend 2012, contained 209,000 t of zinc, an increase of 100,000 t from the stock level at yearend 2011 (International Lead and Zinc Study Group, 2014, p. 55).

## Prices

The annual average LME cash price for SHG zinc in 2012 decreased by 11% from that of 2011 to \$1,947.73 per metric ton (88.3 cents per pound). The annual average Platts North American producer price for SHG zinc in 2012, which was based on the LME cash price plus a premium, decreased by 10% to 95.8 cents per pound (table 1). Monthly average North American SHG premiums began the year at about 7 cents per pound and rose to about 8 cents per pound by October. Premiums decreased slightly during the last 2 months of the year to 7.5 cents per pound. Higher premiums are generally indicative of a tighter supply of zinc in the local market.

## World Review

Global zinc mine production increased by 7% in 2012 from that of 2011 to approximately 13.5 Mt (table 10). China (36% share of global production), Australia (11%), and Peru

(9%) were the three leading producers of zinc in concentrate in 2012. Most of the increase in production was attributed to an 850,000-t rise in China's mine production. Outside of China, zinc mine production also increased significantly in Mexico, Peru, Portugal, and Turkey. Mine production increased in Mexico owing primarily to the continued ramp up to full design capacity at Goldcorp Inc.'s polymetallic Penasquito Mine. In Peru, increased production at the Cerro Lindo, Colquijirca, and San Vicente Mines contributed to the country's overall rise in zinc mine production. In Portugal, zinc production at Lundin Mining Corp.'s Neves Corvo copper-zinc mine increased by 25,800 t from that of the prior year after the company recommenced producing zinc concentrate in the first quarter of 2012 (Ministerio de Energía y Minas, 2013, p. 41; Lundin Mining Corp., 2013).

India had the most significant contraction in zinc mine production, followed by Kazakhstan and the United States. India's decrease was due primarily to a decline in output at Hindustan Zinc Ltd.'s (HZL) Rampura Agucha open pit zinc-lead mine. During 2012, HZL continued the development of an underground mine at Rampura Agucha, and the company planned for ore production at the mine to be below capacity during the construction process (Hindustan Zinc Ltd., 2013, p. 21).

By yearend 2012, net global zinc mine operational capacity had increased by 350,000 t/yr. About 206,000 t/yr of zinc mine capacity came onstream in Australia, where Xstrata plc began production at the Lady Loretta Mine and expanded zinc in concentrate production capacity at the George Fisher Mine. In Canada, 138,000 t/yr of capacity was added, including the commissioning of Trevali Mining Corp.'s Halfmile Lake Mine and Hudbay Minerals Inc.'s Lalor Mine, as well as the reopening of Nyrstar's Langlois Mine. About 151,000 t/yr of operational capacity was also added in China, Mexico, Peru, and Portugal. Zinc mine closures in Australia and Canada removed 145,000 t/yr of zinc mine production capacity. In Australia, Kagara Mining Ltd. closed its Mungana and Vomacka Mines after a prolonged period of declining revenues, and in Canada, HudBay Minerals closed the Chisel North and Trout Lake Mines owing to resource depletion (International Lead and Zinc Study Group, 2013b, p. 35).

Global zinc metal production decreased by 3% from that of 2011 to 12.8 Mt (table 11) owing primarily to a 380,000-t decrease in China as smelters reduced production or idled operations owing to low zinc prices and treatment charges. Partially offsetting this decrease were substantial production increases in Japan and the Republic of Korea. Production recovered in Japan in 2012 following the 2011 Tohoku earthquake and tsunami, and in the Republic of Korea, capacity expansion of Korea Zinc Ltd.'s Onsan refinery contributed to the overall year-on-year increase in production. China (38% share of global production), the Republic of Korea (7%), India (6%), and Canada (5%) were the leading producers of refined zinc metal in 2012.

Net zinc smelter operational capacity increased by 330,000 t/yr in 2012. Capacity increases included Jiangxi Copper Corp.'s new zinc smelter in China, the expansion of Korea Zinc's Onsan refinery in the Republic of Korea, and the

restart of Doe Run's La Oroya smelter in Peru. Operations at OTZK's Kardjali smelter in Bulgaria were suspended, idling 30,000 t/yr of zinc metal production capacity (International Lead and Zinc Study Group, 2013b, p. 40–41).

According to the International Lead and Zinc Study Group (ILZSG) (2013b), global zinc consumption decreased by 3% in 2012 from that of 2011 to 12.3 Mt, principally owing to decreased consumption in China (225,000 t) and the countries of the European Union (189,000 t). Leading zinc-consuming countries included China, 43%; the United States, 7%; India, 5%; and the Republic of Korea, 5%. The countries of the European Union accounted for 16% of consumption. ILZSG's data indicated that zinc metal production exceeded consumption by 236,000 t in 2012 compared with 374,000 t in 2011 (International Lead and Zinc Study Group, 2014, p. 44–47).

## Outlook

ILZSG forecast global zinc consumption in 2013 to increase by 5% from that in 2012 to 12.9 Mt. China's consumption was expected to increase by 8%, and other notable increases in consumption were expected in Brazil, India, Turkey, and the United States. Consumption in the countries of the European Union was forecast to decline further in 2013 from that of 2012, while production in Japan and the Republic of Korea were expected to remain flat (International Lead and Zinc Study Group, 2013a).

On the supply side, mine production was expected to increase slightly to 13.7 Mt in 2013 owing to increases in China, India (owing to increased production at the Rampura Agucha Mine), and Burkina Faso (following the opening of Blackthorn Resources Ltd.'s Perkoa Mine). Canada's zinc mine production in 2013 was expected to decline significantly after the closure of Xstrata's Brunswick and Perseverance Mines, which produced a combined 316,000 t of zinc in concentrate in 2012. Lower output was also forecast for Finland and Ireland. Global refined metal production was predicted to increase by 3% to 13.0 Mt owing mostly to a production increase in China. Overall, zinc metal production in 2013 was forecast to surpass consumption by about 120,000 t (International Lead and Zinc Study Group, 2013a; Xstrata plc, 2013).

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TABLE 1  
SALIENT ZINC STATISTICS<sup>1</sup>

		2008	2009	2010	2011	2012
United States:						
Production:						
Domestic ores, contained zinc	metric tons	778,000	736,000	748,000	769,000	738,000
Domestic ores, recoverable zinc	do.	748,000	710,000	723,000	743,000	713,000
Value, recoverable zinc	thousands	\$1,470,000	\$1,220,000	\$1,620,000	\$1,740,000	\$1,510,000
Refined zinc:						
At primary smelters <sup>2</sup>	metric tons	125,000	94,000	120,000	110,000	114,000
At secondary smelters <sup>c</sup>	do.	161,000	109,000	129,000	138,000	147,000
Total	do.	286,000	203,000	249,000	248,000	261,000
Exports:						
Ores and concentrates, zinc content	do.	725,000	785,000	752,000	660,000	592,000
Refined zinc	do.	3,250	2,960	4,200	19,000	14,100
Imports for consumption:						
Ores and concentrates, zinc content	do.	63,200	74,200	32,200	26,700	6,140
Refined zinc	do.	725,000	686,000	671,000	716,000	655,000
Reported stocks of refined zinc, December 31:						
Producer and consumer	do.	58,100	84,800	108,000	145,000 <sup>r</sup>	155,000
Government stockpile	do.	7,490	7,490	7,490	7,250 <sup>3</sup>	7,250
Consumption, refined zinc:						
Reported	do.	387,000	459,000	558,000	679,000 <sup>r</sup>	806,000
Apparent <sup>4</sup>	do.	1,010,000	893,000	907,000	939,000	892,000
Price <sup>5</sup>						
North American	cents per pound	88.93	77.91	101.98	106.24	95.76
London Metal Exchange, cash	do.	85.01	75.06	97.99	99.47	88.35
World production:						
Mine	thousand metric tons	11,900 <sup>r</sup>	11,600 <sup>r</sup>	12,400 <sup>r</sup>	12,600 <sup>r</sup>	13,500
Smelter	do.	11,700	11,400	12,800	13,200 <sup>r</sup>	12,800

<sup>c</sup>Estimated. <sup>r</sup>Revised. do. Ditto.

<sup>1</sup>Data are rounded to no more than three significant digits, except prices; may not add to totals shown.

<sup>2</sup>Feedstock was partially composed of secondary materials.

<sup>3</sup>Government stocks decreased from prior year owing to an inventory adjustment.

<sup>4</sup>Domestic production plus net imports, plus adjustments for Government and industry stock changes. Apparent consumption from 2008 through 2011 does not reflect reported stock changes. Stock increases from 2008 through 2011 result from an increased response from industry rather than an actual increase in stock levels.

<sup>5</sup>Special High Grade. Source: Platts Metals Week.

TABLE 2  
MINE PRODUCTION OF RECOVERABLE ZINC  
IN THE UNITED STATES, BY STATE<sup>1</sup>

(Metric tons)

State	2011	2012
Alaska <sup>2</sup>	631,000	583,000
Other <sup>3</sup>	111,000	130,000
Total	743,000	713,000

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

<sup>2</sup>Data based, in part, on publicly available information.

<sup>3</sup>Includes production from Idaho (2011), Missouri, and Tennessee.

TABLE 3  
LEADING ZINC-PRODUCING MINES IN THE UNITED STATES IN 2012, IN ORDER OF OUTPUT<sup>1</sup>

Rank	Mine	County and State	Operator	Source of zinc
1	Red Dog <sup>2</sup>	Northern Region, AK	Teck Alaska Inc.	Zinc-lead ore.
2	East Tennessee Zinc Complex <sup>3</sup>	Jefferson and Knox, TN	Nyrstar NV	Zinc ore.
3	Greens Creek <sup>2</sup>	Southeastern Region, AK	Hecla Mining Co.	Zinc-silver ore.
4	Middle Tennessee Zinc Complex <sup>4</sup>	Smith, TN	Nyrstar NV	Zinc ore.
5	Brushy Creek	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
6	Buick	Iron, MO	do.	Do.
7	Viburnum (#29 and #35)	Washington and Iron, MO	do.	Do.
8	Fletcher	Reynolds, MO	do.	Do.
9	Sweetwater	do.	do.	Do.

Do., do. Ditto.

<sup>1</sup>The mines on this list accounted for more than 99% of recoverable U.S. zinc mine production in 2012.

<sup>2</sup>For 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.

<sup>3</sup>Includes the Coy, Immel, and Young Mines.

<sup>4</sup>Includes the Cumberland, Elmwood, and Gordonsville Mines.

TABLE 4  
REPORTED PRODUCTION OF ZINC PRODUCTS  
FROM ZINC-BASE SCRAP IN THE UNITED STATES<sup>1</sup>

(Metric tons)

Product	2011	2012
Redistilled slab zinc	141,000	149,000
Other zinc metal products <sup>2</sup>	2,930	2,410
Zinc in chemical products	W	W
Zinc dust	22,700	24,100

W Withheld to avoid disclosing company proprietary data.

<sup>1</sup>Data are rounded to no more than three significant digits.

<sup>2</sup>Includes electrogalvanizing anodes, remelt die-cast slab, and other metal alloys.

TABLE 5  
ZINC RECOVERED FROM SCRAP PROCESSED IN THE UNITED  
STATES, BY TYPE OF SCRAP<sup>1</sup>

(Metric tons)

Type of scrap	2011	2012
<b>New scrap:</b>		
Zinc-base	93,400	85,400
Copper-base	120,000	120,000
Magnesium-base	91	183
Total	213,000	205,000
<b>Old scrap:</b>		
Zinc-base	114,000	120,000
Copper-base	8,470	8,610
Aluminum-base	863	908
Magnesium-base	14	14
Total	123,000	129,000
Grand total	336,000	334,000

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

TABLE 6  
U.S. REPORTED CONSUMPTION OF ZINC IN 2012, BY INDUSTRY USE AND GRADE<sup>1</sup>

(Metric tons)

Industry use	Special	High Grade	Continuous	Controlled Lead Grade	Prime Western	Remelt	Total
	High Grade		Galvanizing Grade			and other grades	
Galvanizing	142,000	130,000	357,000	194	55,000	261	685,000
Zinc-base alloys	44,600	169	--	--	--	--	44,700
Brass and bronze	41,900	7,570	--	--	196	--	49,700
Other	26,400	--	--	--	43	--	26,500
Total	255,000	138,000	357,000	194	55,300	261	806,000

-- Zero.

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

TABLE 7  
U.S. EXPORTS OF ZINC ORES AND CONCENTRATES, BY COUNTRY<sup>1</sup>

Country	2011		2012	
	Quantity (metric tons, zinc content)	Value (thousands)	Quantity (metric tons, zinc content)	Value (thousands)
Australia	51,700	\$80,900	76,600	\$101,000
Belgium	28,900	40,900	58,700	68,400
Canada	150,000	246,000	113,000	192,000
China	27,200	39,900	17,100	17,400
Costa Rica	7	21	3	6
El Salvador	23	89	37	110
Finland	35,500	56,700	34,900	42,700
Germany	--	--	28,500	34,900
India	36	86	53	91
Israel	17	198	38	75
Japan	95,000	138,000	31,600	53,300
Korea, Republic of	157,000	223,000	132,000	176,000
Mexico	1	4	47	163
Panama	5	21	6	20
Singapore	24	102	--	--
Spain	114,000	171,000	99,200	119,000
United Kingdom	7	7	--	--
Total	660,000	997,000	592,000	806,000

-- Zero.

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

Source: U.S. Census Bureau.

TABLE 8  
U.S. EXPORTS OF ZINC COMPOUNDS<sup>1</sup>

Compound	2011		2012	
	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)
Chromates of zinc or of lead	4	\$396	3	\$227
Lithopone	316	1,510	377	2,190
Zinc chloride	1,800	2,860	902	1,590
Zinc oxide	31,600	51,300	41,800	50,200
Zinc sulfate	285	588	774	1,160
Zinc sulfide	5,310	6,890	8,310	12,600

<sup>1</sup>Data are rounded to no more than three significant digits.

Source: U.S. Census Bureau.



TABLE 9  
U.S. IMPORTS FOR CONSUMPTION OF ZINC COMPOUNDS<sup>1</sup>

Compound	2011		2012	
	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)
Chromates of zinc or of lead	144	\$628	69	\$351
Lithopone	1,190	1,670	845	2,400
Zinc chloride	255	1,290	190	1,490
Zinc oxide	90,000	181,000	82,700	158,000
Zinc sulfate	53,900	51,700	56,300	51,100
Zinc sulfide	2,510	4,320	2,540	7,710

<sup>1</sup>Data are rounded to no more than three significant digits.

Source: U.S. Census Bureau.

TABLE 10  
ZINC: WORLD MINE PRODUCTION, BY COUNTRY<sup>1,2</sup>

(Metric tons, zinc content of concentrate and direct shipping ore, unless otherwise specified)

Country	2008	2009	2010	2011	2012
Argentina	30,349	31,869	32,566	33,975 <sup>r</sup>	42,000 <sup>e</sup>
Armenia	7,467 <sup>r</sup>	6,989 <sup>r</sup>	14,361 <sup>r</sup>	15,588 <sup>r</sup>	10,075
Australia	1,519,000	1,290,000	1,479,000	1,515,000	1,514,000
Bolivia	383,619	430,879	411,409	427,129	405,000 <sup>e</sup>
Bosnia and Herzegovina <sup>c</sup>	4,700	3,400	5,500	6,900 <sup>r</sup>	7,000
Brazil	173,933	172,688	211,203	197,840 <sup>r</sup>	198,000 <sup>e</sup>
Bulgaria	10,600	9,339 <sup>r</sup>	9,904 <sup>r</sup>	10,977 <sup>r</sup>	12,116
Burma	7,000	6,000	7,000	7,000 <sup>e</sup>	7,000 <sup>e</sup>
Canada	750,502	699,145 <sup>r</sup>	649,065 <sup>r</sup>	622,600 <sup>r</sup>	641,260 <sup>p</sup>
Chile	40,519	27,801	27,662	36,602	26,762
China <sup>e</sup>	3,340,000	3,330,000	3,700,000	4,050,000 <sup>r</sup>	4,900,000
Congo (Kinshasa)	15,465 <sup>r</sup>	19,636 <sup>r</sup>	9,223	14,758 <sup>r</sup>	10,572
Finland	27,800	30,233	55,562	64,115	51,467
Georgia	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	--
Greece	22,694	18,126	19,976	20,000 <sup>e</sup>	20,000 <sup>e</sup>
Guatemala	14,000	--	--	--	--
Honduras	28,462	36,370	33,839	26,000	26,000
India	613,600	695,000	740,000 <sup>r</sup>	796,000 <sup>r</sup>	758,000
Iran <sup>e</sup>	69,267 <sup>3</sup>	72,048 <sup>3</sup>	80,000	80,000 <sup>r</sup>	80,000
Ireland	398,158	385,670	342,434	344,000 <sup>r</sup>	337,500
Kazakhstan	386,000 <sup>r</sup>	387,400 <sup>r</sup>	398,400 <sup>r</sup>	405,300 <sup>r</sup>	370,500
Korea, North <sup>c</sup>	70,000 <sup>r</sup>	70,000 <sup>r</sup>	70,000 <sup>r</sup>	70,000 <sup>r</sup>	70,000
Korea, Republic of	1,836	2,221	355	743 <sup>r</sup>	750 <sup>e</sup>
Kosovo <sup>4</sup>	-- <sup>r</sup>	5,332 <sup>r</sup>	8,678 <sup>r</sup>	6,597 <sup>r</sup>	6,607
Laos	2,200	3,400	5,000 <sup>r</sup>	4,320 <sup>r</sup>	4,500
Macedonia	29,000	29,000 <sup>r</sup>	29,000 <sup>r</sup>	28,000 <sup>r</sup>	28,000
Mexico	453,588 <sup>r</sup>	489,766 <sup>r</sup>	570,004 <sup>r</sup>	631,859	660,349
Mongolia	71,800	78,800	56,300	52,300	59,600 <sup>e</sup>
Morocco	96,900	48,600	61,900	60,000	58,000
Namibia	192,514 <sup>r</sup>	197,400 <sup>r</sup>	204,229 <sup>r</sup>	192,173 <sup>r</sup>	194,380
Nigeria	1,000	2,000	8,000	3,000	15,000
Pakistan	--	1,000 <sup>r</sup>	10,000 <sup>r</sup>	15,000 <sup>r</sup>	12,000
Peru	1,602,597	1,512,931	1,470,450	1,256,383 <sup>r</sup>	1,280,975
Philippines	1,619	10,035	9,268	18,170 <sup>r</sup>	19,559
Poland	132,400	115,500	92,000 <sup>r</sup>	60,000 <sup>r,e</sup>	60,000 <sup>e</sup>
Portugal	39,254	501	6,421	4,227	30,006
Russia <sup>e</sup>	204,000	225,000	269,000	275,000 <sup>r</sup>	288,000
Saudi Arabia	3,663	4,952	4,897	5,000 <sup>r,e</sup>	15,000 <sup>e</sup>
Serbia <sup>e</sup>	1,000	1,000	1,000	1,000 <sup>r</sup>	1,000
South Africa	29,002	28,159	36,142 <sup>r</sup>	36,629 <sup>r</sup>	37,000 <sup>e</sup>
Spain	--	1,200	17,318	33,200	33,200 <sup>e</sup>
Sweden	188,048	192,538	198,686	194,429	188,000
Tajikistan	--	--	--	8,000 <sup>e</sup>	18,000 <sup>e</sup>
Thailand	17,811	34,000	25,529	18,252 <sup>r</sup>	31,000
Turkey	127,000 <sup>r</sup>	136,000 <sup>r</sup>	196,000 <sup>r</sup>	160,000 <sup>r</sup>	206,000 <sup>e</sup>
United States <sup>5</sup>	778,000	736,000	748,000	769,000	738,000
Uzbekistan	--	--	--	15,000 <sup>e</sup>	25,000 <sup>e</sup>
Vietnam <sup>e</sup>	42,000	38,000	36,000	38,000 <sup>r</sup>	38,000
Total	11,900,000 <sup>r</sup>	11,600,000 <sup>r</sup>	12,400,000 <sup>r</sup>	12,600,000 <sup>r</sup>	13,500,000

<sup>e</sup>Estimated. <sup>p</sup>Preliminary. <sup>r</sup>Revised. -- Zero.

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

<sup>2</sup>Includes data available through January 17, 2014.

<sup>3</sup>Reported figure.

<sup>4</sup>On February 17, 2008, the Kosovo Assembly declared independence from Serbia.

<sup>5</sup>Reported zinc content in both lead and zinc concentrates.

TABLE 11  
ZINC: WORLD SMELTER PRODUCTION, BY COUNTRY<sup>1,2</sup>

(Metric tons)

Country <sup>3</sup>	2008	2009	2010	2011	2012
Algeria, primary <sup>c</sup>	30,000	30,000	30,000	30,000	30,000
Argentina:					
Primary	39,479	32,989	39,540	40,381 <sup>r</sup>	35,000 <sup>e</sup>
Secondary	3,158	2,639	3,163	3,230 <sup>r</sup>	2,600 <sup>e</sup>
Total	42,637	35,628	42,703	43,611 <sup>r</sup>	37,600 <sup>e</sup>
Australia:					
Primary <sup>4</sup>	499,000	525,000	499,000	507,000	498,000
Secondary <sup>c</sup>	6,000	6,000	6,000	6,000	6,000
Total	505,000	531,000	505,000	513,000	504,000
Belgium, primary	239,000	14,000	260,000	282,000	250,000
Brazil, primary	248,874	242,136	288,107	284,770 <sup>r</sup>	285,000
Bulgaria, primary and secondary	99,699	92,676	88,253 <sup>r</sup>	93,000 <sup>r, e</sup>	93,000 <sup>e</sup>
Canada, primary	764,312	685,504	691,221 <sup>r</sup>	662,151	648,614 <sup>p</sup>
China, primary and secondary <sup>c</sup>	4,000,000	4,280,000	5,160,000	5,210,000 <sup>r</sup>	4,830,000
Finland, primary	297,722	295,049	307,144	307,352	314,742
France, primary	117,861	161,000	163,000	164,000	161,000
Germany, primary and secondary <sup>c</sup>	292,284 <sup>5</sup>	153,000	165,000	170,000	169,000
India, primary and secondary	567,800	614,000	700,000	795,000	800,000
Iran <sup>c</sup>	120,000 <sup>r</sup>	115,000 <sup>r</sup>	120,000 <sup>r</sup>	132,000 <sup>r</sup>	148,000
Italy, primary <sup>c</sup>	100,000	100,000	105,000	100,000	100,000
Japan, primary and secondary	615,533 <sup>r</sup>	540,604 <sup>r</sup>	574,008 <sup>r</sup>	544,674 <sup>r</sup>	571,312
Kazakhstan, primary and secondary	365,572	327,873	318,858	319,752 <sup>r</sup>	319,847
Korea, North, primary and secondary <sup>c</sup>	70,000 <sup>r</sup>	70,000 <sup>r</sup>	70,000 <sup>r</sup>	70,000 <sup>r</sup>	70,000
Korea, Republic of, primary	738,000	751,179	717,100	828,735	875,000
Kosovo, primary <sup>6</sup>	--	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	--
Mexico, primary	305,409	385,400	328,100	322,100	322,000 <sup>e</sup>
Namibia, primary	145,396 <sup>r</sup>	150,400 <sup>r</sup>	151,688	145,639 <sup>r</sup>	145,342
Netherlands, primary	239,462	224,000	254,000	261,000	257,000
Norway, primary	145,469	138,973	148,862	153,200	152,647
Peru, primary	190,324	149,494	223,112 <sup>r</sup>	313,714	319,280
Poland, primary and secondary	142,600	139,100	135,000	156,000	150,000
Romania, primary and secondary	62,000	4,000 <sup>e</sup>	--	--	--
Russia, primary and secondary <sup>c</sup>	260,000	225,000 <sup>r</sup>	260,000 <sup>r</sup>	267,280 <sup>r, 5</sup>	270,000
South Africa, primary	87,000	87,000	90,000	73,000	--
Spain, primary and secondary	456,050	500,776	505,000	489,000	490,000
Thailand, primary	107,753	104,695	100,000 <sup>e</sup>	103,366	97,000
United States:					
Primary	125,000	94,000	120,000	110,000	114,000
Secondary <sup>c</sup>	161,000	109,000	129,000	138,000	147,000
Total	286,000	203,000	249,000	248,000	261,000
Uzbekistan, primary <sup>c</sup>	70,445 <sup>5</sup>	40,000	40,000	54,900 <sup>r, 5</sup>	61,100 <sup>5</sup>
Vietnam, primary <sup>c</sup>	16,000	17,000	16,000	16,000	18,000
Grand total	11,700,000	11,400,000	12,800,000	13,200,000 <sup>r</sup>	12,800,000
Of which:					
Primary	4,510,000 <sup>r</sup>	4,230,000 <sup>r</sup>	4,570,000 <sup>r</sup>	4,760,000 <sup>r</sup>	4,680,000
Secondary	170,000 <sup>r</sup>	170,000 <sup>r</sup>	170,000 <sup>r</sup>	170,000 <sup>r</sup>	170,000
Undifferentiated	7,050,000 <sup>r</sup>	7,060,000 <sup>r</sup>	8,100,000 <sup>r</sup>	8,250,000 <sup>r</sup>	7,910,000

<sup>c</sup>Estimated. <sup>p</sup>Preliminary. <sup>r</sup>Revised. -- Zero.

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

<sup>2</sup>Wherever possible, detailed information on raw material source of output (primary—directly from ores, and secondary—from scrap) has been provided. In cases where raw material source is unreported and insufficient data are available to estimate the distribution of the total, that total has been left undifferentiated (primary and secondary). To the extent possible, this table reflects metal production at the first measurable stage of metal output. Table includes data available through August 14, 2014.

<sup>3</sup>In addition to the countries listed, Israel also produces small amounts of secondary zinc, but available information is inadequate to make reliable estimates of output levels.

TABLE 11—Continued  
ZINC: WORLD SMELTER PRODUCTION, BY COUNTRY<sup>1,2</sup>

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<sup>4</sup>Excludes zinc dust.

<sup>5</sup>Reported figure.

<sup>6</sup>On February 17, 2008, the Kosovo Assembly declared independence from Serbia.