



# 2019 Minerals Yearbook

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## ZINC [ADVANCE RELEASE]

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# ZINC

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In 2019, U.S. mine production of zinc contained in ores and concentrates was 753,000 metric tons (t), 9% less than the revised amount in 2018. Recoverable zinc mine production was 731,000 t, an 8% decrease from that in 2018, and the value of domestic recoverable zinc mine production was approximately \$2.0 billion (table 1). Alaska continued to be the dominant zinc-producing State (table 2). Other producing States included Idaho, Missouri, New York, Tennessee, and Washington (table 3). The United States exported most of its zinc mine production to foreign smelters for processing. Leading destinations for domestic exports of zinc contained in concentrates were Canada (34%), Spain (15%), and Belgium (13%) (table 6). Regionally, 42% of exports were sent to Europe, 35% to North America, 14% to Asia, 8% to Australia and Oceania, and the balance was sent to Central America and South America. Imports for consumption of zinc contained in concentrates were significantly less than exports, as the only domestic primary zinc smelter consumed primarily domestically produced zinc concentrates (table 1).

Estimated total U.S. refined zinc production in 2019 was essentially unchanged at 115,000 t. Imports for consumption of refined zinc in 2019 increased by 7% to 830,000 t, and domestic exports of refined zinc decreased to 5,170 t from 23,300 t in 2018. Apparent consumption of refined zinc increased by 8% from that of the prior year to 939,000 t (table 1). Most reported refined zinc consumption was for galvanizing; other major end uses were brass and bronze and zinc-base alloys (table 5).

Global zinc mine production increased slightly to 12.7 million metric tons (Mt) of zinc content from 12.6 Mt in 2018, and zinc smelter production increased by 3% to 13.7 Mt from 13.3 Mt (tables 9, 10). According to data from the International Lead and Zinc Study Group (ILZSG), global zinc metal consumption was essentially unchanged at 13.7 Mt in 2019 from 13.6 Mt in 2018 (International Lead and Zinc Study Group, 2020a).

## Legislation and Government Programs

A U.S. Government stockpile of refined zinc had been maintained since 1967 for national defense purposes. Public Law 102-484, signed in 1992, authorized the disposal of the entire inventory of zinc from the National Defense Stockpile (NDS). The Defense Logistics Agency Strategic Materials listed zinc for potential disposal on the Annual Materials Plan (AMP) for fiscal year 2019 (October 1, 2018, through September 30, 2019). The AMP ceiling disposal quantity for zinc in fiscal year 2019 was 7,250 t, which represented the maximum quantity of zinc that could be sold from the NDS during the fiscal year and the same quantity of zinc remaining in the stockpile (Defense Logistics Agency Strategic Materials, 2018).

In April 2017, the President of the United States signed a memorandum instructing the Secretary of Commerce to investigate the impact of steel imports on national security. The

investigation was conducted under the authority of section 232 of the Trade Expansion Act of 1962. In January 2018, the Secretary of Commerce concluded that investigation and advised the President that steel-mill articles were being imported into the United States at quantities that threatened to impact national security. The investigation found that the quantity of steel imports and the global excess steel-production capacity could result in further closure of domestic steel-production facilities, which would decrease the United States' ability to meet production requirements in a national emergency. In March 2018, the President of the United States issued Proclamations 9704 and 9705 on adjusting imports of steel and aluminum into the United States, after investigations conducted by the U.S. Department of Commerce (DOC) concluded that dependence on steel imports constituted a national security threat. The initial proclamations were announced in the Federal Register and instituted a 25% ad valorem tariff on certain steel-mill articles imported from all countries, except Canada and Mexico. Throughout 2018 and 2019, the United States engaged in discussions with multiple countries regarding the section 232 tariffs, and subsequently the tariffs were modified or removed for certain trading partners. As of December 2019, steel imports from all countries except Argentina, Australia, Brazil, Canada, the Republic of Korea, and Mexico were subject to the 25% ad valorem tariff (White House, The, 2017; Trump, 2018a, b; U.S. Department of Commerce, 2018, p. 2-6; Congressional Research Service, 2021, p. 7-10).

## Production

Domestic zinc production data were compiled from a U.S. Geological Survey (USGS) monthly canvass of mines and an annual canvas of smelters operating in the United States. Data on domestic zinc mine production were collected by means of the "Lode-Mine Production of Gold, Silver, Copper, Lead, and Zinc" survey, and data on domestic zinc smelter production were collected by means of the "Zinc" survey.

**Mine.**—In 2019, zinc was produced in six States: Alaska, Idaho, Missouri, New York, Tennessee, and Washington (table 3). Domestic mine production of zinc in ores and concentrates totaled 753,000 t, 9% less than that in 2018. Recoverable zinc mine production in 2019 was 731,000 t, 8% less than that in 2018 (table 1).

**Alaska.**—Teck Alaska Inc. (a subsidiary of Teck Resources Ltd., Canada) operated the open pit Red Dog zinc-lead mine in the Northwest Arctic Borough, the leading zinc-producing mine in the United States (table 3). The Red Dog property consists of several sedimentary exhalative zinc-lead sulfide ore bodies and was leased and operated under an agreement with NANA Regional Corp. Inc. (Kotzebue, AK), an Alaska Native-owned corporation. Teck reported that zinc-in-concentrate production at Red Dog decreased to 552,000 t in 2019 from 583,000 t in

2018 owing primarily to a lower average zinc ore grade and mill throughput rate compared with that in 2018. Approximately 30% of the zinc concentrates produced at Red Dog were refined at Teck's metallurgical complex at Trail, British Columbia, Canada. The remaining concentrates were exported to Asia and Europe. Most of Red Dog's concentrates were sold through long-term contracts. During 2019, Teck continued to upgrade the mill at Red Dog to increase the ore throughput rate by 15% to offset the lower ore grades and harder ore of the currently mined Aqqaluk and Qanaiyaq deposits. The company expected to complete the project by the first quarter of 2020. Reported reserves at yearend 2019 contained 5.4 Mt of recoverable zinc metal. Mine life was expected to extend to 2032; however, the company was conducting an exploration drilling program to study the development of other deposits at the mine site, which could potentially extend the life of the mine beyond 2032. Teck projected that zinc production at Red Dog would range from 500,000 to 535,000 t in 2020 and from 500,000 to 540,000 metric tons per year (t/yr) in 2021 through 2023 (Teck Resources Ltd., 2020, p. 18, 42–44, 50).

Hecla Mining Co.'s (Coeur d'Alene, ID) underground Greens Creek Mine recovered metals from a polymetallic (gold-lead-silver-zinc) massive sulfide deposit on Admiralty Island in the Tongass National Forest near Juneau. The mine produced bulk zinc-lead, lead, and zinc concentrates and a gravity concentrate that was upgraded into gold and silver dore by a third-party processor. Hecla reported that zinc-in-concentrate production increased slightly from that in 2018 to 51,500 t. Reported yearend proven and probable ore reserves at Greens Creek contained 710,000 t of zinc. Based on 2019 yearend reserves, the mine life was expected to extend to 2030 (Hecla Mining Co., 2020, p. 33–35).

**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. Reported zinc production increased in 2019 to 1,860 t from 611 t in 2018. Production at the mine continued to be affected by a strike of unionized employees in 2019. The strike began in March 2017 and ended on January 7, 2020, when a new collective bargaining agreement was established. Hecla projected that the Lucky Friday Mine would be operating at its full production rate by the end of 2020. All concentrates were sent to Teck's metallurgical facility in Trail for processing. Reported proven and probable ore reserves at yearend contained 200,000 t of zinc, and mine life was expected to extend for 18 years (Hecla Mining Co., 2020, p. 34–38).

**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 lead-zinc-copper ore bodies in southeast Missouri. In 2019, Doe Run processed ore from the Brushy Creek, 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.

**New York.**—Titan Mining Corp. (Canada) owned and operated the underground Empire State (No. 4) zinc mine, formerly known as the Balmat (No. 4) Mine, 2 kilometers

southwest of Fowler in St. Lawrence County. Empire is one of several sedimentary exhalative deposits in the Balmat-Edwards zinc mining district. In December 2016, Titan acquired the mine, which had been on care-and-maintenance status since 2008. The company began ramping up operations in January 2018, and milling commenced in March 2018. In 2019, zinc-in-concentrate production equaled 15,900 t. All zinc concentrates were sold to Glencore Ltd. (Switzerland) through a long-term offtake agreement. During the year, Titan conducted advanced definition drilling at near-mine exploration targets to identify additional material that could be processed at the mill, which was currently operating under capacity, and expected to complete an updated mine plan in the first half of 2020 (Titan Mining Corp., 2020, p. 4, 6).

**Tennessee.**—Nyrstar NV (Netherlands) operated the East Tennessee and Middle Tennessee zinc mine complexes that recovered ore from Mississippi Valley-type zinc deposits. The two mine complexes produced zinc concentrates, which were sent to Nyrstar's Clarksville, TN, zinc refinery for processing. In July, Trafigura Group Pte. Ltd., a privately held commodity trading company headquartered in Singapore, acquired majority ownership of Nyrstar (Trafigura Group Pte. Ltd., 2019).

**Washington.**—Teck operated the underground Pend Oreille zinc mine near Metaline Falls in northeastern Washington State. Pend Oreille is a carbonate-hosted zinc-lead ore body. Zinc concentrates from the mine were shipped to Teck's nearby metallurgical facility in Trail, British Columbia, Canada, for processing. Teck suspended mining operations at Pend Oreille on July 31 and placed the mine on care-and-maintenance status after the exhaustion of current reserves. Zinc-in-concentrate production was 19,400 t in 2019 compared with 29,700 t in 2018 (Teck Resources Ltd., 2020, p. 45).

**Smelter.**—In 2019, refined zinc was produced mainly in Tennessee (Nyrstar's Clarksville zinc refinery). A smaller quantity of zinc metal was produced by U.S. Zinc Corp.'s (owned by Votorantim Metais SA, Brazil) zinc recycling operation in Houston, TX. Refined zinc production in 2019 was essentially unchanged from that in 2018 at an estimated 115,000 t (table 1).

Nyrstar's Clarksville electrolytic zinc refinery was the only primary zinc smelter in the United States. Clarksville was specifically designed to treat zinc concentrates produced at the East Tennessee and Middle Tennessee mines but could also treat imported zinc concentrates and domestically sourced secondary crude zinc oxide. Clarksville produced Special High Grade (SHG) and Continuous Galvanizing Grade (CGG) zinc. Byproducts included cadmium metal, copper cementate, copper sulfate, germanium leach product, sulfuric acid, synthetic gypsum, and zinc sulfate. Zinc production at the Clarksville, TN, smelter was not publicly disclosed in 2019.

American Zinc Recycling Corp.'s (AZR) (Pittsburgh, PA) solvent extraction–electrowinning (SX–EW) zinc refinery in Mooresboro, NC, remained idle in 2019. The plant had the capability to produce SHG and CGG zinc in addition to Prime Western-grade (PW) zinc from secondary materials, sourced mostly from the company's four electric arc furnace dust recycling operations in Barnwell, SC, Calumet, IL, Palmerton, PA, and Rockwood, TN. In October, AZR announced that

repairs to the facility were on schedule, and it expected operations to restart in the first quarter of 2020 (American Zinc Recycling Corp., 2019).

U.S. Zinc produced PW zinc and zinc dust at its zinc recycling facility in Houston, TX. Feed materials were mainly top dross from continuous galvanizers and bottom dross and skimmings from general galvanizers. U.S. Zinc also produced zinc oxide at two recycling facilities in Tennessee (U.S. Zinc Corp., 2017).

## Consumption

Changes in zinc consumption generally follow trends in industrial production or, more generally, economic growth. Domestic apparent consumption of refined zinc in 2019 was 939,000 t, an 8% increase from that in 2018 (table 1).

According to reported data, most of the zinc consumed domestically in 2019 was used to produce galvanized (zinc-coated) steel (table 5). Galvanized steel was used extensively in the automotive and construction industries. Most of the zinc consumed domestically for galvanizing was at continuous galvanizing plants. About 50 continuous galvanizing plants were operated by 20 companies in the United States, and leading producers of galvanized sheet included AK Steel Corp. (West Chester, OH), ArcelorMittal USA LLC (East Chicago, IN), Nucor Corp. (Charlotte, NC), Steel Dynamics (Fort Wayne, IN), and U.S. Steel (Pittsburgh, PA). According to the American Iron and Steel Institute (2020), domestic net shipments of galvanized sheet and strip were 14.6 Mt in 2019, a slight decrease from shipments in 2018. Galvanized sheet and strip accounted for about 17% of steel mill product shipments.

The balance of zinc consumed for galvanizing was at general galvanizing plants that treated fabricated steel shapes (for example, structural beams or fasteners). About 170 general galvanizing plants were operated by 80 companies in the United States in 2019, of which the leading producers included AZZ Inc. (Fort Worth, TX), Valmont Industries Inc. (Omaha, NE), and Voigt & Schweitzer LLC (Columbus, OH).

Other major end uses of zinc included brass and bronze, chemicals, semimanufactures, and zinc-base alloys. According to the Copper Development Association Inc. (2020), about 122,000 t of zinc, including in unalloyed form and in secondary (scrap) copper alloys, was consumed by copper fabricators, mostly brass mills, in 2019, unchanged since 2016. Generally, the quantity of zinc consumed by brass mills has trended downward during the past 10 years. Leading zinc chemicals, by production quantity, included zinc oxide, which was used extensively in the tire manufacturing industry as an activator in the vulcanization process, and zinc sulfate, which was used as a micronutrient additive in animal feed and fertilizers. Leading zinc oxide producers in the United States included U.S. Zinc and Zochem LLC (Zinc Oxide LLC) (Dickson, TN). U.S. Zinc consumed zinc dross and skimmings to produce up to 78,000 t/yr of zinc oxide at its two plants in Clarksville, TN, and Millington, TN (U.S. Zinc Corp., 2017). Zochem consumed zinc metal and secondary zinc materials at its zinc oxide plant in Dickson, TN. The company also operated a zinc oxide plant in Brampton, Ontario, Canada. The two facilities had a combined production capacity of 95,000 t/yr of zinc oxide (Zochem LLC, undated).

Zinc semimanufactured products included zinc sheet, also known as rolled zinc, which was used in architectural

applications and to produce the U.S. 1-cent coin. Zinc-base alloys were used predominantly to make die-cast parts for such applications as automotive parts, builders and household hardware, electronics, home appliances, medical instruments, office equipment, power tools, and zippers.

## Stocks

Reported producer and consumer stocks of zinc in the United States equaled 116,000 t at yearend 2019 (table 1). Global London Metal Exchange Ltd. (LME) warehouses held 51,200 t of zinc at yearend 2019, a 60% decrease from the yearend 2018 stock level, and the Shanghai Futures Exchange held 28,054 t of zinc, a 40% increase from stocks held at yearend 2018. In the United States, LME stocks of zinc were held in warehouses in New Orleans, LA. At yearend 2019, LME warehouses in New Orleans, LA, held 6,125 t of zinc (London Metal Exchange Ltd., 2019; International Lead and Zinc Study Group, 2020a).

Aside from the United States, China was the only country known to hold a Government stockpile of zinc. China's State Reserve Bureau managed its stockpile, which reportedly contained 254,000 t of zinc at yearend 2019, unchanged from the stock level at yearend 2018 (International Lead and Zinc Study Group, 2020a).

## Prices

The annual average LME cash price for SHG zinc in 2019 decreased by 13% from that in 2018 to \$2,548.63 per metric ton (115.60 cents per pound) (table 1). The average monthly price increased from \$2,558.49 per metric ton (116.05 cents per pound) in January to an annual high of \$2,937.96 per metric ton (133.26 cents per pound) in April and then generally decreased for the remainder of the year to an annual low of \$2,273.40 per metric ton (103.12 cents per pound) in December. The annual average Platts North American price for SHG zinc in 2019, which was based on the LME cash price plus a regional North American premium, was 124.13 cents per pound, 12% less than that in 2018 (table 1). The monthly average North American SHG premium ranged from a low of 7.91 cents per pound in July to a high of 8.81 cents per pound in October. Increasing regional premiums are generally indicative of a decreasing supply of zinc in a regional market.

## World Review

**Mine Production.**—Global zinc mine production in 2019 increased slightly to 12.7 Mt from a revised 12.6 Mt in 2018 (table 9). China (33% share of global production), Peru (11%), Australia (10%), and India and the United States (6% each) were the leading producers of zinc in concentrate in 2019. Zinc mine production increased significantly in Australia (by 190,000 t), South Africa (102,000 t), Canada (48,700 t), and China (41,000 t). Partially offsetting these increases were production decreases in the United States (71,100 t), Peru (70,300 t), Turkey (an estimated 40,000 t), and India (an estimated 30,000 t). According to the ILZSG (2020c, p. 6, 10), global zinc mine capacity increased by a net 232,000 t in 2019 mostly as a result of the completion of expansions at Hindustan Zinc Ltd.'s Sindesar Khurd and Zawar Mines in India and the opening of several mines in Mexico.

**Metal Production.**—Global zinc metal production increased by 3% in 2019 to 13.7 Mt from 13.3 Mt in 2018 (table 10). China (45% share of global production), the Republic of Korea (7%), and Canada and India (5% each) were the leading producers of refined zinc metal in 2019. In terms of quantity, production increased most notably in China (492,000 t) and Mexico (52,200 t), which was partially offset by production decreases in Australia (54,000 t), the Netherlands (42,000 t), and Canada (41,600 t). Global zinc smelter production capacity decreased in 2019 owing mostly to closure of some primary zinc capacity in China (International Lead and Zinc Study Group, 2020c, p. 7).

**Metal Consumption.**—According to the ILZSG (2020a), global zinc metal consumption was essentially unchanged at 13.7 Mt in 2019 compared with 13.6 Mt in 2018. A significant increase in consumption in China and the United States more than offset notable decreases in Germany, India, Japan, the Republic of Korea, and Poland. The leading consumer of zinc was China, accounting for 48% of global consumption. Other significant consumers included, in decreasing order of consumption, the United States, India, the Republic of Korea, Japan, Germany, and Belgium. Collectively, these countries accounted for 24% of global consumption. ILZSG's data indicate that zinc metal consumption exceeded production for the fourth year in the row, by 205,000 t.

## Outlook

The ILZSG forecast that global zinc consumption in 2020 would decrease compared with that in 2019 to approximately 13.0 Mt. Zinc metal consumption is expected to decrease by 8% in Europe and remain flat in China. On the supply side, the ILZSG forecasts global zinc mine production to decrease by 4%, but metal production is forecast to be essentially unchanged. Overall, zinc metal production is expected to exceed consumption by 620,000 t in 2020 (International Lead and Zinc Study Group, 2020b).

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

(Metric tons, unless otherwise specified)

	2015	2016	2017	2018	2019
United States:					
Production:					
Domestic ores and concentrates:					
Zinc content	825,000	805,000	774,000	824,000	753,000
Recoverable zinc: <sup>2</sup>					
Quantity	802,000	778,000	748,000	799,000	731,000
Value	thousands				
	\$1,690,000	\$1,740,000	\$2,300,000	\$2,480,000	\$2,000,000
Refined zinc:					
At primary smelters	124,000	111,000	117,000	101,000	99,900 <sup>c</sup>
At secondary smelters <sup>c</sup>	48,000 <sup>r</sup>	15,000	15,000	15,000	15,000
Total	172,000	126,000	132,000	116,000	115,000 <sup>c</sup>
Exports:					
Ores and concentrates, zinc content	708,000	597,000	682,000	806,000	796,000
Refined zinc	12,700	46,900	32,600	23,300	5,170
Imports for consumption:					
Ores and concentrates, zinc content	22	60	6,780	32	10
Refined zinc	771,000	713,000	729,000	775,000	830,000
Reported stocks of refined zinc, December 31:					
Producer and consumer	86,700	79,500	114,000 <sup>r</sup>	119,000 <sup>r</sup>	116,000
Government stockpile	7,250	7,250	7,250	7,250	7,250
Consumption, refined zinc:					
Reported	434,000	462,000	518,000 <sup>r</sup>	514,000 <sup>r</sup>	562,000
Apparent <sup>3</sup>	931,000	792,000	829,000	868,000	939,000
Price: <sup>4</sup>					
North American	cents per pound				
	95.54	101.37	139.28	141.05	124.13
London Metal Exchange, cash	do.				
	87.64	94.82	131.25	132.66	115.60
World production:					
Mine	thousand metric tons				
	13,300	12,300	12,300	12,600	12,700
Smelter	do.				
	13,700	13,500	13,400	13,300	13,700

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

<sup>1</sup>Table includes data available through September 21, 2020. Data are rounded to no more than three significant digits, except prices; may not add to totals shown.

<sup>2</sup>Amount of zinc that can be recovered after smelting and refining.

<sup>3</sup>Smelter production plus imports for consumption minus domestic imports.

<sup>4</sup>Special High Grade. Source: S&P Global Platts Metals Week.

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

(Metric tons)

State	2018	2019
Alaska	620,000	586,000
Other <sup>2</sup>	179,000	145,000
Total	799,000	731,000

<sup>1</sup>Table includes data available through September 21, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Includes production from Idaho, Missouri, New York, Tennessee, and Washington.

TABLE 3  
LEADING ZINC-PRODUCING MINES IN THE UNITED STATES IN 2019, IN ORDER OF OUTPUT<sup>1</sup>

Rank	Mine	County and State <sup>2</sup>	Operator	Source of zinc
1	Red Dog	Northern Region, AK	Teck Alaska Inc.	Zinc-lead ore.
2	East Tennessee Zinc Complex <sup>3</sup>	Jefferson and Knox, TN	Nyrstar Tennessee Mines – Strawberry Plains LLC	Zinc ore.
3	Greens Creek	Southeastern Region, AK	Hecla Mining Co.	Silver-zinc ore.
4	Middle Tennessee Zinc Complex <sup>4</sup>	Smith, TN	Nyrstar Tennessee Mines – Strawberry Plains LLC	Zinc ore.
5	Pend Oreille	Pend Oreille, WA	Teck American Inc.	Zinc-lead ore.
6	Empire State	St. Lawrence, NY	Titan Mining Corp.	Zinc ore.
7	Brushy Creek	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
8	Viburnum (#29 and #35)	Washington and Iron, MO	do.	Do.
9	Lucky Friday	Shoshone, ID	Hecla Mining Co.	Silver ore.
10	Fletcher	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
11	Sweetwater	do.	do.	Do.

Do., do. Ditto.

<sup>1</sup>The mines on this list accounted for 100% of recoverable U.S. zinc mine production in 2019.

<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 75, Alaska's mineral industry 2019.

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

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

TABLE 4  
ZINC RECOVERED FROM SCRAP PROCESSED IN THE  
UNITED STATES, BY TYPE OF SCRAP<sup>1</sup>

(Metric tons)

Type of scrap	2018	2019
<b>New scrap:</b>		
Zinc-base	W	W
Copper-base	81,700	80,700
Magnesium-base	437	440 <sup>c</sup>
Total	W	W
<b>Old scrap:</b>		
Zinc-base	W	W
Copper-base	6,040	6,000 <sup>c</sup>
Aluminum-base	976	971
Magnesium-base	68	70 <sup>c</sup>
Total	W	W
Grand total	W	W

<sup>c</sup>Estimated. W Withheld to avoid disclosing company proprietary data.

<sup>1</sup>Table includes data available through September 21, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 5  
U.S. REPORTED CONSUMPTION OF ZINC IN 2019, BY INDUSTRY USE AND GRADE<sup>1</sup>

(Metric tons)

Industry use	Special High Grade	High Grade	Continuous Galvanizing Grade	Prime Western	Remelt and other grades	Total
Galvanizing	148,000	80,000	231,000	17,000	160	477,000
Zinc-base alloys	30,300	82	--	--	--	30,400
Brass and bronze	22,500	27,200	--	98	15	49,800
Other	4,830	--	--	--	--	4,830
Total	206,000	107,000	231,000	17,100	175	562,000

-- Zero.

<sup>1</sup>Table includes data available through September 21, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 6  
U.S. EXPORTS OF ZINC ORES AND CONCENTRATES, BY COUNTRY OR LOCALITY<sup>1</sup>

Country or locality	2018		2019	
	Quantity (metric tons, zinc content)	Value (thousands)	Quantity (metric tons, zinc content)	Value (thousands)
Australia	84,500	\$132,000	64,100	\$101,000
Belgium	60,800	86,800	107,000	159,000
Brazil	7,640	11,300	7,030	9,360
Bulgaria	1,230	1,330	--	--
Canada	282,000	585,000	268,000	475,000
China	--	--	16	44
Djibouti	150	66	--	--
El Salvador	62	235	45	150
Finland	30,400	52,800	29,400	48,900
Germany	30,000	57,700	29,700	46,900
India	--	--	18	11
Italy	32,500	62,200	33,800	60,600
Japan	47,600	107,000	38,500	76,200
Korea, Republic of	90,400	203,000	69,200	132,000
Mexico	9,100	10,100	10,700	17,500
Norway	4,230	14,400	--	--
Panama	6	30	4	37
Peru	--	--	5,000	2,010
Spain	109,000	181,000	116,000	178,000
Switzerland	15,400	22,400	17,500	17,900
Total	806,000	1,530,000	796,000	1,320,000

-- Zero.

<sup>1</sup>Table includes data available through September 15, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.



TABLE 7  
U.S. EXPORTS OF ZINC COMPOUNDS<sup>1</sup>

	2018		2019	
	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)
Chromates of zinc or lead	31	\$394	9	\$624
Lithopone	179	1,280	170	905
Zinc chloride	281	440	185	316
Zinc oxide	60,200	91,800	15,100	30,900
Zinc sulfate	1,000	879	486	648
Zinc sulfide	1,730	15,900	2,070	17,300

<sup>1</sup>Table includes data available through September 15, 2020. Data are rounded to no more than three significant digits.

Source: U.S. Census Bureau.

TABLE 8  
U.S. IMPORTS FOR CONSUMPTION OF ZINC COMPOUNDS<sup>1</sup>

	2018		2019	
	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)
Chromates of zinc or lead	140	\$379	32	\$178
Lithopone	272	822	1,170	4,240
Zinc chloride	208	1,840	196	1,450
Zinc oxide	115,000	334,000	99,300	272,000
Zinc sulfate	98,800	106,000	72,100	64,700
Zinc sulfide	2,730	10,400	956	3,590

<sup>1</sup>Table includes data available through September 15, 2020. Data are rounded to no more than three significant digits.

Source: U.S. Census Bureau.

TABLE 9  
ZINC: WORLD MINE PRODUCTION, BY COUNTRY OR LOCALITY<sup>1</sup>

(Metric tons, zinc content)

Country or locality <sup>2</sup>	2015	2016	2017	2018	2019
Argentina	30,498	22,792	23,392	22,050	22,000 <sup>e</sup>
Armenia <sup>3</sup>	6,790	4,730	5,780	6,500	6,700
Australia	1,610,004	884,826 <sup>r</sup>	852,164 <sup>r</sup>	1,135,780 <sup>r</sup>	1,325,367
Bolivia	442,154	486,955	527,206 <sup>r</sup>	519,630 <sup>r</sup>	520,000 <sup>e</sup>
Bosnia and Herzegovina	8,800	10,000	10,200	10,200 <sup>r</sup>	9,500
Brazil	156,926	158,197	156,348	167,250	163,394
Bulgaria	16,300	19,200	20,600 <sup>r</sup>	21,700 <sup>r</sup>	22,500
Burkina Faso	68,804	81,422	92,731	99,200	96,900
Burma	4,800	6,500	13,100	12,000 <sup>r</sup>	14,000
Canada	275,410	301,210	305,314	287,119	335,806
Chile	48,071	42,870	29,008	26,810	5,620
China	4,748,900	4,710,500	4,300,000	4,172,000 <sup>r</sup>	4,213,000
Congo (Brazzaville)	--	--	4,000 <sup>e</sup>	4,000 <sup>e</sup>	5,000 <sup>e</sup>
Congo (Kinshasa)	12,675	12,587	12,337	1,129	6,452
Cuba	--	--	5,000 <sup>e</sup>	45,000 <sup>e</sup>	60,000 <sup>e</sup>
Dominican Republic	4,655	3,636	3,920	4,038 <sup>r</sup>	4,000 <sup>e</sup>
Eritrea	--	40,900	95,400	125,000 <sup>r</sup>	121,260
Finland	25,332	45,852	66,284	85,335	68,153
Greece	14,900 <sup>e,3</sup>	18,900 <sup>e,3</sup>	18,300 <sup>3</sup>	20,300	22,000
Guatemala	14,810	5,564	6,100	--	--
Honduras	22,992	14,579	20,436	28,421 <sup>r</sup>	29,223
India	821,617	658,000 <sup>e</sup>	830,000 <sup>r,e</sup>	750,000 <sup>e</sup>	720,000 <sup>e</sup>
Iran <sup>e</sup>	124,000	135,000	140,000	140,000	140,000
Ireland	236,300	147,800	130,580	131,742	122,463
Kazakhstan	342,500	324,800	315,900	304,400 <sup>r</sup>	304,000 <sup>e</sup>
Korea, North <sup>e</sup>	26,000	30,000	20,000	20,000	10,000
Korea, Republic of <sup>3</sup>	2,070	2,257	3,321	3,656	4,000 <sup>e</sup>
Kosovo	3,986	4,800	4,500	3,600 <sup>r</sup>	3,100
Mexico	694,544	661,646	671,444	690,895	676,677
Mongolia	44,800 <sup>e,3</sup>	45,900	41,000 <sup>e,3</sup>	44,000 <sup>e,3</sup>	60,000 <sup>e,4</sup>
Montenegro	14,136	16,226	15,950	21,335	19,036
Morocco <sup>e</sup>	53,000 <sup>3</sup>	42,000 <sup>3</sup>	51,000 <sup>3</sup>	57,000 <sup>r,3</sup>	60,000
Namibia	123,529	124,749	132,584	118,435	114,735
Nigeria	7,000	9,700 <sup>e</sup>	6,800 <sup>e</sup>	12,000 <sup>r,e</sup>	12,000
North Macedonia <sup>3</sup>	29,200 <sup>e</sup>	24,900 <sup>e</sup>	24,200 <sup>e</sup>	30,400 <sup>e</sup>	31,300
Pakistan	--	7,700 <sup>e,3</sup>	19,500 <sup>e,3</sup>	27,000 <sup>e,3</sup>	37,400 <sup>e,3</sup>
Peru	1,421,218	1,337,081	1,473,073	1,474,674	1,404,382
Poland	65,000	61,000	50,000	43,483 <sup>r</sup>	40,309
Portugal	66,871	69,526	71,356	144,983 <sup>r</sup>	145,000 <sup>e</sup>
Russia <sup>5</sup>	246,100	245,800 <sup>r</sup>	255,200 <sup>r</sup>	260,000 <sup>r</sup>	260,000 <sup>e</sup>
Saudi Arabia	18,757	2,550	15,219	11,380 <sup>r</sup>	18,900
Serbia	4,000	6,300	4,000 <sup>r</sup>	10,000 <sup>e</sup>	10,000 <sup>e</sup>
South Africa	29,040	26,695	30,778	28,129 <sup>r</sup>	130,000 <sup>e</sup>
Spain	41,765	76,342	70,451	100,000 <sup>r,e</sup>	100,000 <sup>e</sup>
Sweden	246,983	258,264	250,960	234,321	244,703
Tajikistan	50,000	72,000	91,000	83,000	80,000 <sup>e</sup>
Thailand	34,738	34,500	1,460	--	--
Turkey	174,000 <sup>e</sup>	202,000	150,000 <sup>e,4</sup>	190,000 <sup>e,4</sup>	150,000 <sup>e,4</sup>
United States	825,000	805,000	774,000	824,000	753,000
Uzbekistan <sup>e</sup>	25,000	30,000	30,000	30,000	30,000
Vietnam <sup>e</sup>	15,000	12,000	12,000	12,000	10,000
Total	13,300,000	12,300,000	12,300,000 <sup>r</sup>	12,600,000 <sup>r</sup>	12,700,000

See footnotes at end of table.

TABLE 9—Continued  
ZINC: WORLD MINE PRODUCTION, BY COUNTRY OR LOCALITY<sup>1</sup>

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<sup>6</sup>Estimated. <sup>r</sup>Revised. -- Zero.

<sup>1</sup>Table includes data available through August 31, 2020. 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.

<sup>2</sup>In addition to the countries and (or) localities listed, Algeria, Indonesia, Romania, and Tunisia may have produced zinc, but available information was inadequate to make reliable estimates of output.

<sup>3</sup>Data derived from reported production of zinc concentrates.

<sup>4</sup>Estimated based on reported exports of zinc ores and concentrates.

<sup>5</sup>May not include production from some small-scale mining operations.

TABLE 10  
ZINC: WORLD SMELTER PRODUCTION, BY COUNTRY OR LOCALITY<sup>1,2</sup>

(Metric tons, gross weight)

Country or locality	2015	2016	2017	2018	2019
Algeria, primary	7,086	3,101 <sup>r</sup>	--	--	--
Argentina, primary	30,000 <sup>e</sup>	--	--	--	--
Australia, primary	489,030	464,176	462,095	489,967 <sup>r</sup>	435,977
Belgium, primary	260,000	236,000	249,000	275,000	270,000 <sup>e</sup>
Brazil, primary	270,715	284,457	245,200	246,400	283,700
Bulgaria, primary	75,095	75,811	73,715	75,150	75,000 <sup>e</sup>
Canada, primary	683,118	691,389	598,438	696,591	654,971
China, primary	5,910,000	5,900,000	5,850,000	5,670,000 <sup>r</sup>	6,162,000
Finland, primary	305,717	290,599	284,992	295,029	290,844
France, primary	169,000	149,000	166,000	155,000	160,000 <sup>e</sup>
Germany:					
Primary	138,600	134,400	137,500	129,600 <sup>r</sup>	130,000 <sup>e</sup>
Secondary	30,400	33,600	36,500	50,400 <sup>r</sup>	50,000 <sup>e</sup>
Total	169,000	168,000	174,000	180,000 <sup>r</sup>	180,000 <sup>e</sup>
India, primary	821,617	611,814	799,877	727,693 <sup>r</sup>	691,030
Iran, primary and secondary	138,000	135,000	140,000	140,000 <sup>r, e</sup>	140,000 <sup>e</sup>
Italy, primary and secondary	158,214	188,897	185,956 <sup>r</sup>	195,000 <sup>e</sup>	188,504
Japan:					
Primary	457,786	438,560	436,656	441,651	437,609
Secondary	108,833	95,129	87,263	79,459	89,108
Total	566,619	533,689	523,919	521,110	526,717
Kazakhstan, primary and secondary	323,848	325,820	331,018	317,965 <sup>r</sup>	320,000 <sup>e</sup>
Korea, North, primary and secondary <sup>e</sup>	20,000	20,000	15,000	10,000	10,000
Korea, Republic of, primary	934,949	1,012,763	970,455	988,695	986,291
Mexico, primary	326,642	321,159	327,003	336,300	388,511
Namibia, primary	71,818	88,650	83,768	67,122	64,985
Netherlands, primary	291,000	283,000	248,000	268,000	226,000 <sup>e</sup>
Norway, primary	162,878	170,541	172,086	190,570	195,374
Peru, primary	335,422	341,518	312,339	333,667	356,925
Poland, primary	161,500 <sup>r</sup>	161,200 <sup>r</sup>	161,800 <sup>r</sup>	160,000 <sup>r</sup>	160,000 <sup>e</sup>
Romania, primary and secondary	200	300	800	600 <sup>r</sup>	200
Russia, primary and secondary	229,602	247,300 <sup>r</sup>	256,700 <sup>r</sup>	254,600 <sup>r</sup>	250,000 <sup>e</sup>
Spain, primary	493,765	495,016	500,253	505,079	510,000 <sup>e</sup>
Thailand, primary	74,121	72,813	30,018	--	--
United States:					
Primary	124,000	111,000	117,000	101,000	99,900 <sup>e</sup>
Secondary <sup>e</sup>	48,000 <sup>r</sup>	15,000	15,000	15,000	15,000
Total	172,000	126,000	132,000	116,000	115,000 <sup>e</sup>
Uzbekistan, primary <sup>e</sup>	73,000	85,000	93,000	90,000	90,000
Vietnam, primary <sup>e</sup>	10,000	10,000	10,000	10,000	10,000
Grand total	13,700,000	13,500,000	13,400,000	13,300,000	13,700,000
Of which:					
Primary	12,700,000	12,400,000	12,300,000	12,300,000 <sup>r</sup>	12,700,000
Secondary	187,000	144,000	139,000	145,000 <sup>r</sup>	154,000
Undifferentiated	870,000	917,000 <sup>r</sup>	929,000 <sup>r</sup>	918,000 <sup>r</sup>	909,000

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

<sup>1</sup>Table includes data available through September 1, 2020. All data are reported unless otherwise noted. Grand 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 the raw material source was unreported and insufficient data were 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.