



# 2008 Minerals Yearbook

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ZINC [ADVANCE RELEASE]

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# ZINC

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In 2008, U.S. production of recoverable zinc was 748,000 metric tons (t), a 3% decrease from that of 2007 (table 1). The value of domestic mine production was approximately \$1.47 billion. Alaska continued to be the dominant zinc-producing State, accounting for 79% of recoverable production. Zinc was also produced from mines in Idaho, Missouri, Montana, New York, Tennessee, and Washington. Domestic exports of zinc contained in ores and concentrates decreased by 11% to 725,000 t in 2008. Exports of zinc in concentrates were predominantly sent to Canada (36%), Japan (16%), the Republic of Korea (16%), and China (10%) (table 8). Imports for consumption of zinc contained in ores and concentrates decreased by 77% to 63,200 t from those in 2007. Total U.S. refined zinc production in 2008 was estimated to have increased by 3% to 286,000 t. Imports of refined zinc in 2008 decreased by 4% to 725,000 t. Refined zinc was imported primarily from Canada (78%), Mexico (13%), Kazakhstan (5%), and Peru (3%). Domestic exports of refined zinc decreased by 60% to 3,250 t in 2008. Globally, zinc mine production increased by 5% to 11.5 million metric tons (Mt); zinc metal production increased by 3% to 11.8 Mt (tables 11, 12).

## Legislation and Government Programs

A U.S. stockpile of zinc has been maintained for several decades 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. The Defense Logistics Agency (DLA), which maintains the NDS, was authorized to sell 27,200 t of zinc during fiscal year 2008 (October 1, 2007, to September 30, 2008; actual quantity sold would be limited to remaining inventory). Sales of zinc during the fiscal year amounted to 190 t, all of which was sold during October and November 2007. During calendar year 2008, the stockpile inventory decreased from 7,730 t to 7,490 t (U.S. Department of Defense, 2008, p. 8, 58).

As a result of concerns regarding availability and access to various raw materials, Congress directed the U.S. Department of Defense (DOD) to review its current stockpile disposal policy and determine whether the NDS is properly configured to assure future availability of materials for defense needs in light of current world market conditions. The DOD submitted an initial report to Congress in August 2006 and recommended a more detailed review of the issues. In January 2008, a working group was established to review the findings of the previous studies and the issues raised by Congress. The conclusions of the working group will be reported to Congress in Fiscal Year 2009. In conjunction with the formation of the working group, sales of certain commodities were suspended or curtailed. Each of the materials selected has no feasible substitute, is a material with respect to which the United States is wholly or substantially

import dependent, or is a commodity that faces significant risk of supply disruption. Pending the outcome of the current policy review, sales of the following mineral commodities were suspended to retain remaining quantities in the NDS—iridium, niobium (columbium), platinum, tantalum carbide, tin, and zinc (U.S. Department of Defense, 2008, p. 1–2).

## Production

**Mine.**—In 2008, zinc was produced in seven States, with Alaska as the leading zinc-producing State. Other zinc-producing States were Idaho, Missouri, Montana, New York, Tennessee, and Washington. Domestic mine production of recoverable zinc in 2008 was 748,000 t, a 3% decrease from that of 2007. Domestic mine production data were collected by the U.S. Geological Survey (USGS) from a base-metal voluntary survey of lode-mine production.

**Alaska.**—Teck Cominco Alaska Inc. (a subsidiary of Teck Cominco Ltd., Vancouver, British Columbia, Canada) operated the open pit Red Dog zinc-lead mine in the Northwest Arctic Borough under a royalty agreement with NANA Regional Corp. Inc., an Alaskan Native-owned corporation. Zinc in concentrate production at Red Dog decreased by 10% in 2008 from that of 2007 to 515,000 t owing to lower mill availability as a result of mechanical issues at the mill. Approximately 25% of Red Dog's zinc concentrates was refined at Teck's metallurgical complex at Trail, British Columbia. Remaining concentrates were sent to Asia and Europe. Reported proven and probable ore reserves at yearend 2008 totaled 61.4 Mt averaging 17.1% zinc. Zinc in concentrate production was projected to increase to 570,000 t in 2009 (Teck Cominco Ltd., 2009a, p. 22; 2009b, p. 26).

In September, Teck announced that it had settled a complaint filed by plaintiffs from the Alaskan village of Kivalina. The complaint related to the level of total dissolved solids in the effluent that was being discharged from the mine site into the local river systems. As part of the settlement, Teck agreed to construct a water discharge pipeline from the Red Dog Mine to a port on the Chukchi Sea, 84 kilometers (km) southeast of the mine. The pipeline would divert the effluent from the Red Dog Creek, the village's primary source of drinking water, to the ocean (Teck Cominco Alaska Inc., 2008).

Teck continued to work towards approval of the supplemental environmental impact statement for the Aqqaluk deposit, the next ore body to be developed at Red Dog. Currently, ore produced at Red Dog has originated from the Main Deposit, which contains enough reserves to sustain current production rates until the first quarter of 2011. To ensure a continuous production level at Red Dog, Teck planned to begin mining the adjacent Aqqaluk deposit in 2010. From 2010 to 2012, ore from Aqqaluk would be blended with ore from the Main deposit. After 2012, ore production would completely transfer to

Aqqaluk, extending Red Dog's mine life 18 years to 2031 (Teck Cominco Ltd., 2007, p. 2–2, 2–3, 2–22; Teck Cominco Ltd., 2009a, p. 23).

Teck also continued long-term dewatering of natural gas test wells located near the mine. The wells were installed as part of a shallow shale-gas exploration program initiated by the company to investigate the feasibility of replacing the operation's use of diesel fuel with the local natural gas resource. Gas flow tests would be conducted once the shale formation has been sufficiently dewatered (Teck Cominco Ltd., 2009a, p. 22).

The underground Greens Creek Mine is a polymetallic (silver-zinc-gold-lead) massive sulfide deposit located on Admiralty Island in the Tongass National Forest near Juneau. Products included gold and silver dore, as well as lead and zinc concentrates, which were sold to smelters globally. At the beginning of 2008, Hecla Mining Co. (Coeur d'Alene, ID) held a 29.7% interest in the Greens Creek Mine through a joint-venture arrangement with Kennecott Greens Creek Mining Co. and Kennecott Juneau Mining Co. (indirect subsidiaries of Rio Tinto plc, London, United Kingdom). In April, Hecla Mining acquired the remaining 70.3% interest in Greens Creek from Rio Tinto for \$750 million (Hecla Mining Co., 2009, p. 17).

Historically, Greens Creek was completely powered by diesel generators located onsite. In 2006, necessary infrastructure was completed to allow surplus hydroelectric power supplied by Alaska Electric Light and Power Co. to reach Greens Creek's facilities; however, significant amounts of hydroelectric power would not likely be supplied to the operation until 2010 owing to increases in power demand and low lake levels in the nearby Juneau area. The project was expected to reduce Greens Creek's production costs, which were significantly affected by fuel prices in 2007 and 2008 (Hecla Mining Co., 2009, p. 18, 30).

**Idaho.**—Hecla Mining operated the Lucky Friday Mine, an underground silver-lead-zinc mine in the Coeur d'Alene Mining District in northern Idaho. Products included silver-lead concentrate and zinc concentrate. All concentrates were sent to Teck Cominco's facility at Trail for processing in 2008. Zinc in concentrate production at Lucky Friday increased in 2008 from that of 2007 to 8,510 t. At yearend, reserves measured 1.6 Mt at 2.6% zinc (Hecla Mining Co., 2009, p. 19–20).

During 2008, Hecla Mining initiated the development of an internal shaft, which would provide access to ore-grade mineralization deeper than the current mining level and potentially extend Lucky Friday's mine life. The project, however, was placed on hold in the second half of the year, owing to lower metals prices (Hecla Mining Co., 2009, p. 21).

**Montana.**—Apollo Gold Corp. (Greenwood Village, CO) operated the Montana Tunnels open pit gold mine, near Helena, through a 50-50 joint venture with Elkhorn Tunnels LLC. Products included gold and silver dore and lead-gold and zinc-gold concentrates, which were sent via rail to Teck's operations at Trail. In 2008, Montana Tunnels produced 17,200 t of payable zinc in concentrate. Reserves at yearend contained 171,000 t of zinc (Apollo Gold Corp., 2009, p. 59). During the year, Apollo Gold received all permits necessary to expand the pit at Montana Tunnels. The expansion plan, referred to as the M Pit project, would involve an initial 12-month prestripping

program at a cost of \$70 million. However, Apollo Gold announced that the decision to move the project forward would depend on available smelter terms, the company's ability to acquire one-half of the project financing, and metal prices (Apollo Gold Corp., 2009, p. 60).

In early December, Apollo Gold ceased mining activities at Montana Tunnels after the company had exhausted the ore at the current "L Pit." Concentrates would continue to be produced from a stockpile of ore large enough to keep the mill operational until the end of April 2009. Total production in 2009 was forecast to be 4,990 t of zinc in concentrate. Montana Tunnels had been in commercial production since 1987.

**New York.**—St. Lawrence Zinc Co. LLC [a subsidiary of HudBay Minerals Inc. (Winnipeg, Manitoba, Canada)] operated the Balmat No. 4 zinc mine in upstate New York. The Balmat property contained several reclaimed zinc mines and the Balmat No. 4 Mine. In 2008, the mine produced 21,300 t of zinc in concentrate for sale. Zinc concentrate produced from Balmat was trucked to Xstrata plc's (Zug, Switzerland) Canadian Electrolytic Zinc refinery in Montreal, Quebec, Canada, 158 km away (HudBay Minerals Inc., 2009, p. 17).

On August 22, HudBay announced that operations at Balmat had been suspended, and the mine would be placed on care-and-maintenance status. The company determined that the mine was no longer economically viable as a result of low zinc prices and high operating costs associated with the geology of the mine. HudBay had purchased Balmat from Zinc Corporation of America Mines, Inc. (ZCA) in 2003 and made the decision to reopen the mine in 2005 based on a feasibility plan that assumed lower costs and higher levels of production. The Balmat property had previously been in production from the early 1900s until 2001 when ZCA placed it on care-and-maintenance status owing to a previous period of low zinc prices. HudBay restarted production operations in 2006, and the mine achieved commercial production in 2007. Balmat's closure affected approximately 200 employees (HudBay Minerals Inc., 2008).

**Tennessee.**—Glencore International AG (Baar, Switzerland) resumed mining at the Coy, Immel, and Young underground zinc mines in 2007 under the subsidiary East Tennessee Zinc Co., LLC. The mines were purchased by Glencore from Asarco LLC in 2006. Production capacity was 80,000 metric tons per year (t/yr) of zinc concentrate. In the past, concentrates produced at the Young mill reportedly graded nearly 63% zinc. In December, a local news source in Knoxville, TN, reported that Glencore intended to place the mines on care-and-maintenance status on February 3, 2009, as a result of declining zinc prices. Approximately 320 employees would be affected by the impending suspension of mining operations (Marcum, 2008).

In December 2006, Strategic Resource Acquisition Corp. (SRA) (Toronto, Ontario, Canada) acquired the Middle Tennessee zinc mining complex (MTZ) from Mossy Creek Mining, LLC. The project, approximately 80 km east of Nashville, TN, included a complex of five underground zinc mines—Carthage, Cumberland, Elmwood, Gordonsville, and Stonewall—and the Gordonsville mill. Mining began at Gordonsville in December 2007 with the first shipments of zinc concentrate beginning in April 2008. During the second quarter of 2008, SRA continued developing the Cumberland

and Elmwood Mines; the company announced that it expected to have Elmwood in production by late 2008 and Cumberland, by January 2009. Once in full production, MTZ was expected to produce 66,700 t/yr of zinc in concentrate. SRA aligned agreements with Teck Cominco Metals, Ltd. (Canada), and MG Rohstoffhandel GmbH (Ruhr-Zink refinery, Datteln, Germany) and an agreement in principle with Nyrstar NV (Clarksville refinery, Clarksville, TN) to process the zinc concentrates, which also contained significant amounts of recoverable gallium and germanium. However, on October 9, SRA announced that it would be placing MTZ on care-and-maintenance status after the operation was deemed uneconomic following an extensive evaluation of alternative operation scenarios and zinc pricing projections. The cost of producing a payable pound of zinc at MTZ remained above prevailing zinc prices since SRA began production at Gordonsville in April. The company produced about 7 t of zinc in concentrate from April 2008 until operations ceased (Strategic Resource Acquisition Corp., 2008a; 2008b).

**Washington.**—Teck Washington Inc. (a subsidiary of Teck Cominco Ltd.) operated the underground Pend Oreille zinc-lead mine in northeast Washington. In 2008, zinc in concentrate production was 35,000 t, an increase of 6,200 t from that of 2007. Increased production was attributed to increased mill throughput, improved ore grades, and better mill recoveries. All concentrates were trucked to Teck Cominco's operations at Trail, 80 km west-northwest. At yearend, proven and probable reserves at Pend Oreille reportedly measured 2.0 Mt grading 6.1% zinc (Teck Cominco Ltd., 2009a, p. 23; 2009b, p. 26).

In mid-December, Teck announced plans to temporarily shut down Pend Oreille in February 2009 as a result of reduced zinc metal demand and low zinc prices. The company was considering restarting the mine if the zinc market significantly improved. The shutdown would affect 165 employees. Teck acquired ownership of Pend Oreille in 1996, and reopened the mine for commercial production in 2004. The Pend Oreille Mine had been on care-and-maintenance status since the late 1970s owing to a labor strike and low zinc prices (Teck Cominco Ltd., 2009a, p. 23).

**Smelter.**—Domestic metal production data were collected by the USGS from a voluntary survey of zinc metal and compounds production. Domestic zinc metal production data were estimated based on publicly available information to protect company proprietary data. In 2008, refined zinc was mainly produced in two States—Pennsylvania (Horsehead Holding Corp.'s Monaca facility) and Tennessee (Nyrstar's Clarksville facility). Estimated refined zinc production in 2008 was 286,000 t.

**Primary.**—Nyrstar's Clarksville electrolytic zinc refinery was the only primary zinc smelter in the United States. Products included Special High Grade (SHG) zinc metal and galvanizing alloys as well as a number of byproducts including cadmium metal, intermediate copper cementate, leach product, synthetic gypsum, and sulfuric acid. Refined zinc production by yearend 2008 increased by 3% from that of 2007 to 125,000 t, which was a production record for the refinery. Nyrstar attributed the rise in production to the increased use of secondary oxide materials, processing excess calcine sourced from its smelter in Aubry, France, and higher cell house throughput. Feedstock was predominantly composed of primary materials and to a

lesser extent, secondary oxide materials. In 2008, concentrates were partially sourced from the recently reopened zinc mines in Tennessee; the balance was imported.

Despite increased electricity prices, Clarksville's operating costs declined in 2008 when compared with those of the previous year owing to the weaker U.S. dollar during the first half of 2008 and ongoing cost management programs. Program initiatives at Clarksville in 2008 included designing a new oxide washing facility to treat various zinc oxide materials produced domestically and constructing a flotation plant to improve zinc recovery rates.

On December 15, Nyrstar announced plans to reduce Clarksville's production rate by 40%. The 6-month voluntary production cut would begin in January 2009 and reduce zinc output by 25,000 t. The reduction was made in an effort to reduce the global zinc metal surplus (Nyrstar NV, 2008; 2009a, p. 18; 2009b, p. 9, 11).

**Secondary.**—Horsehead Holding Corp. (Monaca, PA) produced zinc metal—primarily Prime Western Grade (PW) and to a lesser extent, Special Special High Grade (SSHG)—and zinc oxide at its electrothermic zinc smelter (159,000 t/yr capacity) in Monaca. The PW zinc was sold to hot-dip galvanizers and brass manufacturers, and the SSHG zinc was used as feed for the production of high-purity zinc alloys and powder. Feedstock for the metal production was composed entirely of secondary materials; 64% of the feedstock was sourced from Horsehead's electric arc furnace (EAF) dust recycling operations, and the balance was composed of dross and skimmings sourced from hot-dip galvanizers and other zinc-bearing residues sourced from the zinc, brass, and alloying industries. In addition to the Monaca facility, Horsehead operated five other facilities, including four EAF dust recycling operations located in Beaumont, TX; Calumet, IL; Palmerton, PA; and Rockwood, TN, and a hydrometallurgical metals recovery facility in Bartlesville, OK. Total EAF dust processing capacity was 561,000 t/yr. Horsehead installed an additional kiln at its Rockwood facility in January 2008. The new kiln had the capacity to recycle 72,600 t/yr of EAF dust, increasing Horsehead's recycling capacity by 15% and providing an additional 13,200 t/yr of contained zinc to be sent to its own smelting facility or to other zinc smelters. Other planned developments included constructing a fifth EAF dust recycling facility in South Carolina, which could be brought online in 2010 or later depending on market conditions.

Horsehead reported that its shipment volume of zinc metal increased in 2008 from that of 2007 owing to strong demand from brass and battery manufacturers, as well as from the hot-dipped galvanizing market through the third quarter of 2008. However, shipments slowed significantly during the fourth quarter owing to weaker customer demand. In December, it was announced that the company planned to idle its recycling facilities during the last week of 2008 to cut costs and in response to the reduced availability of EAF dust owing to the rapid decline in steel production. It was anticipated that two kilns at the Rockwood facility and the flame reactor at the Beaumont facility might be offline during the first quarter of 2009, as well (Platts Metals Week, 2008b; Horsehead Holding Corp., 2009, p. 3, 6, 7, 8, 20).



Secondary refined zinc was also produced to a lesser extent at U.S. Zinc's (owned by Votarantim Metais, Sao Paulo, Brazil) operations in Coldwater, MI, and Houston, TX. The facilities produced PW grade and continuous galvanizing grade zinc metal primarily from galvanizing residues, such as dross and skimmings.

## Prices and Stocks

The annual average London Metal Exchange, Ltd. (LME) cash price for SHG zinc in 2008 declined by 42% from that of 2007 to \$1,874.20 per metric ton (85.01 cents per pound). Monthly average zinc prices strengthened during the first quarter of 2008 in conjunction with most other base metals, rising to \$2,511 per metric ton in March from \$2,340 per metric ton in January. Prices generally declined thereafter owing to a significant metal surplus in the market. In October, the monthly average price dropped considerably, declining by 25% from that of September, coinciding with the collapse of the credit market. The average price in December was \$1,100 per metric ton, more than 50% less than the average price in January.

The annual average Platts North American producer price for SHG zinc in 2008, which was based on the LME cash price plus premium, was 88.93 cents per pound (table 1). Monthly average North American SHG premiums generally declined the first few months of the year, starting the year at nearly 4.5 cents per pound and falling to nearly 4 cents per pound in June. Monthly average premiums remained stable at approximately 4 cents per pound until October. During the last quarter of 2008, premiums decreased to about 3.5 cents per pound.

At yearend, stocks of SHG zinc in global LME warehouses totaled 253,475 t, almost three times greater than the closing stock level in 2007. LME stocks of zinc in U.S. warehouses totaled 65,250 t, of which 97% was held in New Orleans, LA. The remainder was in St. Louis, MO, and Long Beach, CA.

## World Industry Structure

Global zinc mine production increased by 5% in 2008 from that of 2007 to approximately 11.5 Mt. Production increased in Latin America owing to significant rises in output from Bolivia and Peru. Mine production rose in Europe as well as a result of a significant increase in output from Portugal, which more than offset declines in Finland and Sweden. Elsewhere, Canada, China, India, and Kazakhstan also saw significant increases in mine production. China (28% share of global production), Peru (14%), and Australia (13%) were the three leading producers of zinc in concentrate in 2008. The International Lead and Zinc Study Group (ILZSG) recorded global zinc mine production increasing by 5.6% in 2008 from that of 2007 to approximately 11.8 Mt (International Lead and Zinc Study Group, 2009b).

Declining zinc prices in 2008 led to several mine closures, mostly during the second half of the year. Notable mine closures outside of the United States included the Lennard Shelf Mine in Australia; the Caribou, Langlois, and Myra Falls Mines in Canada; the El Monte Mine in Mexico; the Rosaura Mine in Peru; and the Aljustrel and Neves Corvo Mines in Portugal. Junior mining companies were also unable to advance projects owing to reduced access to capital. Investment in new mining

projects declined along with falling zinc prices. It was reported that during the first half of 2008, 101 new zinc projects were under development at a total cost of \$50 billion. During the third quarter, the number of new projects decreased to 34 at cost of \$17 billion and further declined during the fourth quarter to 23 projects at \$14 billion (International Lead and Zinc Study Group, 2009a).

Global zinc metal production increased by 3% in 2008 from that of 2007 to 11.8 Mt. Metal production rose during the first half of the year, then declined during the second half of the year, and fell off significantly in November and December as a result of smelter closures and cutbacks that were implemented during that time. Production increases in China, India, and the Republic of Korea contributed to the overall increase in annual metal production. India's production was boosted significantly by the commissioning of Hindustan Zinc Ltd.'s refinery at Rampura Agucha in late 2007. China (34% share of global production), Canada (6%), and the Republic of Korea (6%) were the leading producers of refined zinc metal in 2008. Similarly, ILZSG recorded a 2.9% increase in global metal production increased in 2008 from that of 2007 to about 11.7 Mt (International Lead and Zinc Study Group, 2009b).

Global monthly zinc consumption continued to increase during the first half of 2008 owing predominantly to rising consumption in China, which offset decreases reported in Europe and the United States. Thereafter, global consumption began to deteriorate, moderately in the third quarter, then more sharply during the fourth as the financial crisis spread globally. Poor vehicle sales and a slowdown in the construction industry largely were responsible for the decline in zinc consumption during this period. The supply-side response during this time—in the form of production curtailments and project cancellations and postponements—was considered to be quicker than in the past market downturns.

## Mergers and Acquisitions

Australian copper and zinc producer Oxiana Ltd. and zinc mining company Zinifex Ltd. formally merged their businesses in early July. The new entity, OZ Minerals Ltd., would be based in Melbourne, Australia, and would produce approximately 750,000 t/yr of zinc, positioning OZ as the second leading zinc mining company in the world, reportedly following Xstrata, which produced about 800,000 t/yr of zinc, and surpassing Teck Cominco and Hindustan Zinc. OZ's three zinc- and lead-producing operations included the Century, Golden Grove, and Rosebery Mines. The company also owned three lead-zinc deposits in Northwest Territories, Canada. The merger was considered significant within the zinc mining industry; however, overall producer consolidation was still considered low compared with that of other metals, such as copper, iron ore, and nickel (Gilcrest, 2008; Platts Metals Week, 2008c).

Indonesian coal producer PT Bumi Resources Tbk (through its wholly owned subsidiary Calipso Investment Pte. Ltd.) took majority ownership of Australian zinc mining company Herald Resources Ltd. in July. Herald owned the Dairi zinc-lead mine project in North Sumatra, Indonesia. Dairi was forecast to produce 220,000 t/yr of zinc concentrate and 100,000 t/yr of

lead concentrate at full production. Bumi Resources initially made a \$396 million takeover offer to purchase Herald in December 2007. In late January 2008, however, Herald received a rival joint bid from Indonesia's state-owned nickel mining company PT Antam Tbk and China's zinc-lead mining and smelting company Shenzhen Zhongjin Lingnan Nonfemet Co., Ltd.; the rival bid valued Herald at \$448 million. Thereafter, Bumi Resources and Antam/Zhongjin engaged in a bidding war for Herald Resources for the next 6 months until Antam/Zhongjin dropped its cash offer in July, at which time, Herald was purchased by Bumi Resources. At yearend, Herald was still waiting for forestry approval before commencing full development of the project; however, the company was confident that approval from the Indonesian Government would be forthcoming with the support of state-owned Bumi Resources (Platts Metals Week, 2008a; Herald Resources Ltd., 2009, p. 2).

In July, China's Jinduicheng Molybdenum Group Co. Ltd. and Northwest Nonferrous International Investment Co. Ltd. acquired Canadian exploration and development company Yukon Zinc Corp (Vancouver). Yukon's main asset was the Wolverine zinc deposit, which would be capable of producing 1,400 metric tons per day of ore containing copper, gold, lead, silver, and zinc (American Metal Market, 2008).

## Outlook

Global economic activity was expected to continue to contract during the first half of 2009, with the notable exception of China and India. China's zinc consumption was expected to increase in 2009 partly owing to its fiscal stimulus package announced in late 2008, which was to direct investment into domestic infrastructure. As global economic activity recovers, global demand for zinc will probably increase.

Global zinc mine production was expected to decrease in 2009 as a result of mine closures and cutbacks that were implemented during late 2008 and were expected to take place in 2009. Refined metal production and consumption was also expected to decrease in 2009 from that of 2008. Despite producer cutbacks, a metal surplus was expected through 2010; however, it was expected that the curtailments would expedite a price recovery.

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

		2004	2005	2006	2007	2008
United States:						
Production:						
Domestic ores, contained zinc	metric tons	739,000	748,000	727,000	803,000	778,000
Domestic ores, recoverable zinc	do.	715,000	720,000	699,000	769,000	748,000
Value, recoverable zinc	thousands	\$827,000	\$1,070,000	\$2,450,000	\$2,620,000	\$1,470,000
Refined zinc:						
At primary smelters	metric tons	194,000 <sup>e</sup>	195,000 <sup>e</sup>	113,000	121,000	125,000
At secondary smelters <sup>e</sup>	do.	156,000	156,000	156,000	157,000	161,000
Total	do.	350,000	351,000	269,000	278,000	286,000
Exports:						
Ores and concentrates, zinc content	do.	745,000	786,000	825,000	816,000	725,000
Refined (slab) zinc	do.	3,300	784	2,530	8,070	3,250
Zinc plates, sheets, strip, and foil	do.	9,770	8,760	3,780	4,310	4,970
Imports for consumption:						
Ores and concentrates, zinc content	do.	231,000	156,000	383,000	271,000	63,200
Refined (slab) zinc	do.	868,000	700,000	895,000	758,000	725,000
Zinc plates, sheets, strip, and foil	do.	2,500	3,630	2,050	2,160	3,330
Reported stocks of slab zinc, December 31:						
Producer and consumer	do.	73,000	71,100	70,200	62,700	69,000
Government stockpile	do.	71,800	45,100	15,300	7,730	7,490
Consumption, refined zinc:						
Reported	do.	524,000	500,000	564,000	470,000 <sup>r</sup>	433,000
Apparent <sup>2</sup>	do.	1,190,000	1,080,000 <sup>r</sup>	1,190,000 <sup>r</sup>	1,040,000 <sup>r</sup>	1,000,000
Price <sup>3</sup>						
North American	cents per pound	52.47	67.11 <sup>r</sup>	158.89	154.40	88.93
London Metal Exchange, cash	do.	47.51	62.66	148.53	147.03	85.01
World production:						
Mine	thousand metric tons	9,610 <sup>r</sup>	10,000 <sup>r</sup>	10,300	11,000 <sup>r</sup>	11,500
Smelter	do.	10,600	10,400	10,900 <sup>r</sup>	11,500	11,800

<sup>e</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>Domestic production plus net imports, plus adjustments for Government and industry stock changes.

<sup>3</sup>Special High Grade.

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

(Metric tons)

State	2007	2008
Alaska <sup>2</sup>	641,000	588,000
Other <sup>3</sup>	128,000	160,000
Total	769,000	748,000

<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, Missouri, Montana, New York, Tennessee, and Washington.

TABLE 3  
LEADING ZINC-PRODUCING MINES IN THE UNITED STATES IN 2008, IN ORDER OF OUTPUT<sup>1</sup>

Rank	Mine	County and State	Operator	Source of zinc
1	Red Dog	Northwest Arctic, AK	Teck Cominco Alaska Inc.	Zinc-lead ore.
2	Greens Creek	Juneau, AK	Hecla Mining Co.	Zinc-silver ore.
3	Pend Oreille	Pend Oreille, WA	Teck Washington Inc.	Zinc-lead ore.
4	East Tennessee Zinc Complex <sup>2</sup>	Jefferson and Knox, TN	Glencore International AG	Zinc ore.
5	Montana Tunnels	Jefferson, MT	Apollo Gold Corp.	Gold ore.
6	Balmat	St. Lawrence, NY	Hudbay Minerals Inc.	Zinc ore.
7	Brushy Creek	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
8	Buick	Iron, MO	do.	Do.
9	Gordonsville	Smith, TN	Strategic Resources Acquisition Corp.	Zinc ore.
10	Viburnum (#29 and #35)	Washington and Iron, MO	Doe Run Resources Corp.	Lead ore.

Do., do. Ditto.

<sup>1</sup>The mines on this list accounted for more than 98% of recoverable U.S. zinc mine production in 2008.

<sup>2</sup>Coy, Immel, and Young Mines.

TABLE 4  
SLAB ZINC CAPACITY OF PRIMARY ELECTROLYTIC ZINC PLANTS  
IN THE UNITED STATES

(Metric tons)

Company	2007	2008
Big River Zinc Corp., Sauget, IL	--	--
Nyrstar Clarksville Inc., Clarksville, TN	125,000	125,000
Total	125,000	125,000
-- Zero.		



TABLE 5  
PRODUCTION OF ZINC PRODUCTS FROM  
ZINC-BASE SCRAP IN THE UNITED STATES<sup>1</sup>

(Metric tons)

Products	2007	2008
Redistilled slab zinc	67,300	171,000
Other zinc metal products <sup>2</sup>	6,380	1,880
Zinc in chemical products	24,300	W
Zinc dust	1,390	26,300

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 6  
ZINC RECOVERED FROM SCRAP PROCESSED IN THE UNITED  
STATES, BY TYPE OF SCRAP<sup>1</sup>

(Metric tons)

	2007	2008
Type of scrap:		
New scrap:		
Zinc-base	68,400	84,500
Copper-base	139,000	120,000
Magnesium-base	19	5
Total	207,000	205,000
Old scrap:		
Zinc-base	16,000 <sup>r</sup>	83,300
Copper-base	10,200 <sup>r</sup>	8,470
Aluminum-base	448 <sup>r</sup>	410
Magnesium-base	9	14
Total	26,700 <sup>r</sup>	92,200
Grand total	234,000 <sup>r</sup>	297,000

<sup>r</sup>Revised.

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

TABLE 7  
U.S. REPORTED CONSUMPTION OF ZINC IN 2008, BY INDUSTRY USE AND GRADE<sup>1</sup>

(Metric tons)

Industry use	Special high grade	High grade	Prime western	Remelt and other grades	Total
Galvanizing	97,700	48,800	39,800	75,800	262,000
Zinc-base alloys	23,100	82	--	--	23,200
Brass and bronze	34,500	10,300	61,900	2	107,000
Other	39,500	1,120	22	--	40,600
Total	195,000	60,400	102,000	75,800	433,000

-- Zero.

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

TABLE 8  
U.S. EXPORTS OF ZINC ORES AND CONCENTRATES, BY COUNTRY<sup>1</sup>

	2007		2008	
	Quantity (metric tons, zinc content)	Value (thousands)	Quantity (metric tons, zinc content)	Value (thousands)
Aruba	--	--	1	\$6
Belgium	45,500	\$53,200	53,000	35,200
Canada	268,000	485,000	261,000	277,000
Chile	--	--	73	70
China	40,300	85,200	69,900	57,200
Colombia	1	6	--	--
Congo (Brazzaville)	9,140	5,720	--	--
Costa Rica	1	6	--	--
Dominican Republic	16	56	--	--
El Salvador	4	11	--	--
Finland	31,700	65,900	39,600	25,200
France	(2)	3	--	--
Germany	44,900	22,800	33,600	35,600
Greece	9,140	2,310	--	--
Guyana	29	123	--	--
India	2	13	68	114
Israel	5	3	29	19
Italy	33,900	20,200	1	12
Jamaica	2	19	--	--
Japan	101,000	107,000	119,000	66,700
Korea, Republic of	152,000	218,000	116,000	85,200
Netherlands	10	35	--	--
Norway	8	4	--	--
Panama	3	31	--	--
Saudi Arabia	24	49	9	15
Spain	80,200	105,000	32,600	14,900
Trinidad and Tobago	1	4	--	--
United Kingdom	--	--	68	78
Venezuela	17	110	--	--
Total	816,000	1,170,000	725,000	598,000

-- Zero.

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

<sup>2</sup>Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 9  
U.S. EXPORTS OF ZINC COMPOUNDS<sup>1</sup>

	2007		2008	
	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)
Chromates of zinc or of lead	18	\$82	17	\$157
Lithopone	865	2,530	350	1,400
Zinc chloride	1,700	2,320	1,830	2,110
Zinc oxide	34,900	64,200	39,900	61,700
Zinc sulfate	398	708	578	799
Zinc sulfide	4,940	7,140	6,850	10,300

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

Source: U.S. Census Bureau.

TABLE 10  
U.S. IMPORTS FOR CONSUMPTION OF ZINC COMPOUNDS<sup>1</sup>

	2007		2008	
	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)
Chromates of zinc or of lead	1,130	\$3,320	298	\$1,310
Lithopone	3,380	2,600	1,850	1,960
Zinc chloride	685	3,110	462	1,780
Zinc oxide	117,000	299,000	114,000	192,000
Zinc sulfate	31,900	34,300	41,900	45,700
Zinc sulfide	2,820	5,070	2,450	4,380

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

Source: U.S. Census Bureau.

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

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

Country	2004	2005	2006	2007	2008
Algeria	231	4,463	4,412	--	--
Argentina	27,220	30,227	29,808	27,025 <sup>r</sup>	30,340
Armenia <sup>e</sup>	3,000	3,000	2,932 <sup>3</sup>	2,585 <sup>3</sup>	4,200
Australia	1,334,000	1,367,000	1,362,000	1,514,000 <sup>r</sup>	1,477,000
Bolivia	147,430	159,502	172,747	214,056 <sup>r</sup>	383,618
Bosnia and Herzegovina <sup>e</sup>	1,000 <sup>r</sup>	3,000 <sup>r</sup>	1,000 <sup>r</sup>	2,000 <sup>r</sup>	2,000
Brazil	158,962	170,659 <sup>r</sup>	185,211 <sup>r</sup>	193,887 <sup>r</sup>	173,933
Bulgaria <sup>e</sup>	15,500	17,500	13,476 <sup>3</sup>	12,206 <sup>3</sup>	10,600
Burma	196 <sup>4</sup>	78 <sup>4</sup>	46	10	20
Canada	791,373	666,654	637,956	622,985 <sup>r</sup>	716,078
Chile	27,635	28,841 <sup>4</sup>	36,238	36,453	40,519
China	2,390,000	2,550,000	2,840,000	3,040,000 <sup>r</sup>	3,200,000
Congo (Kinshasa)	8,027	7,588	16,831	18,500 <sup>r</sup>	18,000 <sup>e</sup>
Finland	37,200 <sup>r</sup>	40,500 <sup>r</sup>	35,700	38,900 <sup>r</sup>	27,800
Georgia <sup>e</sup>	400	400	400	400	400
Greece	--	1,300 <sup>r</sup>	16,414 <sup>r</sup>	19,549 <sup>r</sup>	22,694
Honduras	41,413	42,698	37,646	29,211	28,462
India <sup>e</sup>	340,000 <sup>r</sup>	477,100 <sup>r</sup>	501,700 <sup>r</sup>	538,900 <sup>r</sup>	613,600
Iran <sup>e</sup>	121,000	167,000	164,000	100,000 <sup>r</sup>	100,000
Ireland	438,308 <sup>r</sup>	429,464 <sup>r</sup>	425,756	400,898	398,158
Japan	47,781	41,452	7,169	--	--
Kazakhstan	361,400	364,300	404,600	446,000 <sup>r</sup>	459,000
Korea, North <sup>e</sup>	62,000	65,000 <sup>r</sup>	85,000 <sup>r</sup>	95,000 <sup>r</sup>	65,000
Korea, Republic of	14	77	16	2,034	2,000
Kosovo <sup>5</sup>	--	700	3,800	4,200	8,400
Laos	950	3,410	1,100	1,100	1,100 <sup>e</sup>
Macedonia	--	--	11,000 <sup>r</sup>	31,000 <sup>r</sup>	38,700
Mexico	426,360	476,307	432,347	426,509	397,306
Mongolia	--	11,400	54,850 <sup>r</sup>	77,350 <sup>r</sup>	70,000 <sup>e</sup>
Morocco	87,000 <sup>r</sup>	128,000 <sup>r</sup>	95,000 <sup>r</sup>	47,000 <sup>r</sup>	46,000
Namibia <sup>6</sup>	66,028 <sup>4</sup>	69,368 <sup>r</sup>	55,455 <sup>r</sup>	52,000 <sup>r</sup>	50,000
Peru	1,209,006	1,201,671	1,201,794	1,444,354	1,602,597
Philippines	--	--	--	7,364	1,000 <sup>e</sup>
Poland	140,300	135,600 <sup>r</sup>	126,600 <sup>r</sup>	129,600 <sup>r</sup>	125,000
Portugal	--	--	7,505	24,380 <sup>r</sup>	39,254
Romania	23,599	13,784	8,052	1,000	--
Russia <sup>e</sup>	179,000	180,000	190,000	185,000	204,000
Saudia Arabia	1,500 <sup>e</sup>	--	983	716	3,663
Serbia	1,000 <sup>r,7</sup>	1,000 <sup>r,7</sup>	2,000 <sup>r</sup>	1,000 <sup>r</sup>	1,000
South Africa	32,001	32,112	34,444	31,061	29,430 <sup>p</sup>
Sweden	197,034	215,691	210,029	214,576	172,194
Thailand	43,400	47,250	39,700	33,700	33,000
Tunisia	29,011	15,889	--	--	--
Turkey	39,000 <sup>r</sup>	56,000 <sup>r</sup>	59,000 <sup>r</sup>	71,000 <sup>r</sup>	73,000
United States	739,000	748,000	727,000	803,000	778,000
Vietnam <sup>e</sup>	45,000	48,000	45,000	46,000	45,000
Total	9,610,000 <sup>r</sup>	10,000,000 <sup>r</sup>	10,300,000	11,000,000 <sup>r</sup>	11,500,000

<sup>e</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>Table includes data available through June 23, 2009.

<sup>3</sup>Reported figure.

<sup>4</sup>Data are for fiscal year ending March 31 of the following year.



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

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<sup>5</sup>On February 17, 2008, the Kosovo Assembly declared independence from Serbia. Kosovo's data for 1999–2007 are not included in Serbian statistics.

<sup>6</sup>Does not include ores sent to solvent extraction-electrowinning plant.

<sup>7</sup>Montenegro and Serbia formally declared independence in June 2006 from each other and dissolved their union.

TABLE 12  
ZINC: WORLD SMELTER PRODUCTION, BY COUNTRY<sup>1, 2</sup>

(Metric tons)					
Country <sup>3</sup>	2004	2005	2006	2007	2008
Algeria, primary	36,800	32,000	30,000 <sup>r, e</sup>	30,000 <sup>e</sup>	30,000 <sup>e</sup>
Argentina:					
Primary	35,461 <sup>r</sup>	37,460 <sup>r</sup>	42,584	42,876 <sup>r</sup>	43,000 <sup>e</sup>
Secondary	2,837	2,997	3,407	3,430 <sup>r</sup>	3,400 <sup>e</sup>
Total	38,298 <sup>r</sup>	40,457 <sup>r</sup>	45,991	46,306 <sup>r</sup>	46,400 <sup>e</sup>
Australia:					
Primary <sup>4</sup>	473,000	457,300	463,000	502,000 <sup>e</sup>	499,000 <sup>e</sup>
Secondary <sup>e</sup>	65,000	75,000	85,000	82,000	80,000
Total	538,000	532,300	548,000	584,000 <sup>e</sup>	579,000 <sup>e</sup>
Belgium, primary <sup>e</sup>	263,000	257,000	251,000 <sup>5</sup>	241,000 <sup>5</sup>	241,000
Brazil, primary	265,987	267,374	272,438	265,126	265,200 <sup>p</sup>
Bulgaria, primary and secondary	102,110 <sup>r</sup>	92,077 <sup>r</sup>	95,341 <sup>r</sup>	99,992 <sup>r</sup>	100,000 <sup>e</sup>
Canada, primary	805,438	724,035	824,464	802,103 <sup>r</sup>	764,312 <sup>p</sup>
China, primary and secondary <sup>e</sup>	2,720,000	2,780,000	3,170,000	3,740,000 <sup>r</sup>	4,000,000
Czech Republic, secondary <sup>e</sup>	250	250	250	250	250
Finland, primary	284,525 <sup>r</sup>	281,904 <sup>r</sup>	282,238 <sup>r</sup>	305,543 <sup>r</sup>	297,722
France, primary	268,408	267,524	127,777 <sup>r</sup>	129,110 <sup>r</sup>	117,861
Germany, primary and secondary	382,020	344,891	342,566	294,735 <sup>r</sup>	292,284
India:					
Primary	238,400	266,200	420,900	430,800 <sup>r</sup>	545,800
Secondary <sup>e</sup>	24,000	23,000	23,000	23,000	22,000
Total	262,400	289,200	443,900	453,800 <sup>r</sup>	567,800
Iran <sup>e</sup>	109,400 <sup>5</sup>	120,000	140,000	90,000 <sup>r</sup>	100,000
Italy, primary and secondary	118,000	121,000	109,000	109,000 <sup>e</sup>	100,000 <sup>e</sup>
Japan:					
Primary	534,830	536,768	505,532	501,135	502,910
Secondary	132,417	138,453	148,715 <sup>r</sup>	137,560 <sup>r</sup>	112,623
Total	667,247	675,221	654,247 <sup>r</sup>	638,695 <sup>r</sup>	615,533
Kazakhstan, primary and secondary	357,090	364,821	364,821	358,226	365,561
Korea, North, primary and secondary <sup>e</sup>	67,000	72,000	72,000	75,000	75,000
Korea, Republic of, primary	668,666	644,828	662,521	674,100 <sup>r</sup>	715,000 <sup>e</sup>
Mexico, primary	316,864	327,205	279,734	321,932	305,409
Namibia <sup>6</sup>	119,200	132,800	129,900	150,080 <sup>r</sup>	145,400
Netherlands, primary	223,950	224,549	238,274	224,838	239,462
Norway, primary	140,901 <sup>r</sup>	151,285 <sup>r</sup>	160,670 <sup>r</sup>	157,027 <sup>r</sup>	145,469
Peru, primary	195,692	163,603	175,250	162,375	190,324
Poland, primary and secondary	155,500	137,300	134,000	142,000 <sup>r</sup>	140,000 <sup>e</sup>
Portugal, secondary <sup>e</sup>	3,000	2,000	--	--	--
Romania, primary and secondary	52,746	57,000 <sup>e</sup>	43,705	58,342	58,000 <sup>e</sup>
Russia, primary and secondary <sup>e</sup>	240,000	220,000	240,000	260,000	260,000
Serbia, primary and secondary	4,000 <sup>7</sup>	1,800 <sup>r, 7</sup>	15,000 <sup>r</sup>	-- <sup>r, e</sup>	-- <sup>e</sup>
South Africa, primary	104,000 <sup>r</sup>	102,000 <sup>r</sup>	90,000	101,000	87,000
Spain, primary and secondary	524,810 <sup>r</sup>	506,230 <sup>r</sup>	507,440 <sup>r</sup>	494,090 <sup>r</sup>	456,050
Thailand, primary	115,112 <sup>r</sup>	101,186	96,469	98,877	104,134
United States: <sup>e</sup>					
Primary	194,000	195,000	113,000	121,000	125,000
Secondary	156,000	156,000	156,000	157,000	161,000
Total	350,000	351,000	269,000	278,000	286,000

See footnotes at end of table.

TABLE 12—Continued  
ZINC: WORLD SMELTER PRODUCTION, BY COUNTRY<sup>1,2</sup>

(Metric tons)

Country <sup>3</sup>	2004	2005	2006	2007	2008
Uzbekistan, primary	60,000 <sup>e</sup>	35,030	45,000 <sup>e</sup>	71,800	70,445
Grand total	10,600,000	10,400,000	10,900,000 <sup>r</sup>	11,500,000	11,800,000
Of which:					
Primary	5,230,000 <sup>r</sup>	5,070,000 <sup>r</sup>	5,080,000 <sup>r</sup>	5,180,000 <sup>r</sup>	5,290,000
Secondary	384,000	398,000	416,000	403,000 <sup>r</sup>	379,000
Undifferentiated	4,950,000 <sup>r</sup>	4,950,000 <sup>r</sup>	5,360,000 <sup>r</sup>	5,870,000 <sup>r</sup>	6,090,000

<sup>e</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 June 23, 2009.

<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.

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

<sup>5</sup>Reported figure.

<sup>6</sup>Special High Grade electrowon cathodes from Anglo American plc's Skorpion solvent extraction-electrowinning plant.

<sup>7</sup>Montenegro and Serbia formally declared independence in June 2006 from each other and dissolved their union.