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LEAD [ADVANCE RELEASE]

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LEAD

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In 2007, domestic lead mine production of recoverable lead was 434,000 metric tons (t), an increase of 4% compared with that of 2006. Alaska and Missouri were the dominant producing States with a 92% share. Other appreciable lead mine production was in Idaho, Montana, and Washington. Lead was produced at 11 U.S. mines employing about 1,100 people. The value of domestic mine production was more than $1.18 billion. Primary metal was produced at a smelter-refinery in Missouri.

Secondary lead, derived principally from scrapped lead-acid batteries, accounted for 91% of refined lead production in the United States in 2007. Nearly all the secondary lead was produced by 7 companies operating 15 smelters. Domestic secondary lead production increased by 2% from that of 2006.

Lead was consumed in about 110 U.S. plants to manufacture products, including ammunition; building-construction materials; covering for power and communication cable; lead oxides in ceramics, chemicals, glass, and pigments; lead sheet; solders for construction, electrical-electronic components and accessories, metal containers, and motor vehicles; and storage batteries.

Lead-acid batteries, including starting-lighting-ignition (SLI) and industrial types, continued to be the dominant use of lead, accounting for about 88% of reported lead consumption. SLI battery shipments in North America totaled 117.9 million units in 2007, up slightly from that of the previous year. This total included original equipment and replacement automotive-type batteries.

Lead prices increased significantly during the year. In 2007, the average London Metal Exchange (LME) cash price was up 102% from that of 2006, to $1.17 per pound, and the North American Producer price was up about 60% from that of 2006, to $1.24 per pound.

Legislation and Government Programs

The National Defense Stockpile's inventory of lead was sold out as of December 2006. As a result, lead was not included in the Defense National Stockpile Center's Annual Materials Plan approved by the U.S. Congress for the fiscal year 2008 (Defense National Stockpile Center, 2007).

In January, the U.S. Department of Housing and Urban Development awarded more than $31 million in grants to 12 State and local communities to help the targeted communities clean up lead-based paint hazards and aid in the improvement of housing for lower income families. The awards, under the Lead Hazard Reduction Demonstration Grant Program, were targeted at older rental housing and other communities with higher incidences of lead poisoning (U.S. Department of Housing and Urban Development, 2007).

In July, the Toxic Substance Control Act Interagency Testing Committee added lead and lead compounds to the priority testing list in its 2007 report submitted to the U.S. Environmental Protection Agency (EPA). According to the committee's report, the addition will permit the EPA to expeditiously obtain unpublished health and safety studies that relate to the lead content of consumer products intended for use by children (U.S. Environmental Protection Agency, 2007c).

The EPA issued a final rule promulgating mandatory criteria for the environmentally protective use of "chat" in transportation projects carried out in whole or in part with Federal Government funds. Chat is a granular waste material produced from the concentration of lead and zinc ores and is specific to the Tri-State mining district of, Kansas, Missouri, and Oklahoma. Uses for chat in transportation projects may involve its inclusion in asphalt concrete, cement, epoxy seals, microsurfacing material, or slurry seals (U.S. Environmental Protection Agency, 2007a, p. 39331-39353).

In August, the Federal Communications Commission (FCC) implemented an order that directed the Public Safety and Homeland Security Bureau to implement several recommendations made by the independent panel reviewing the impact of Hurricane Katrina on communications networks. This order included rules requiring some communication providers to maintain adequate backup power and to submit reports verifying the redundancy and resiliency of their 911 networks. Network operators, property managers, and service providers were to be required to ensure the availability of emergency backup power (typically in the form of lead-acid standby batteries or generators) to maintain critical communications services during times of commercial power failures, including natural and manmade occurrences. Specifically, the order required that these providers had at least 24 hours of backup power for communications assets in central offices and at least 8 hours of backup power for those in remote sites (Federal Communications Commission, 2007).

Effective in early December, the EPA finalized seven targeted regulatory changes to the National Primary Drinking Water Regulations for lead and copper. The final rule strengthened the implementation of the lead and copper rule in the areas of monitoring, treatment processes, public education, consumer awareness, and lead service line replacement. The changes were meant to protect the public by reducing exposure to lead in drinking water. The final revision required that water providers notify consumers in homes or buildings that had been tested for lead of the results and an explanation of lead health effects and the steps that consumers could take to reduce lead drinking water exposure (U.S. Environmental Protection Agency, 2007b, p. 57782-57796).

Production

Primary.—In 2007, domestic mine production of lead increased by about 15,000 t, or 4%, compared with that of 2006. Alaska and Missouri contributed the major share of the U.S. mine output of lead. Lead mine production also was reported in Idaho, Montana, and Washington. Domestic mine production data were collected by the U.S. Geological Survey (USGS) from a precious metal and base-metal voluntary survey on lode-mine production. All lead-producing mines responded to the survey. Lead concentrates produced from mined ore were processed into primary metal at one domestic smelter-refinery in Missouri (tables 1-4).

Doe Run Resources Corp. (St. Louis, MO) produced primary lead at a smelter-refinery facility in Herculaneum, MO. Concentrates for the smelter-refinery were provided mainly from four Doe Run mills that were supplied with ore mined from six production shafts along the Viburnum Trend in southeastern Missouri. In 2007, the company installed a new $3.5 million furnace at the Herculaneum smelter, which had been designed to reduce emissions and improve efficiency. In August, mechanical problems forced Doe Run to shut down operations of both existing furnaces at the smelter. The shutdown lasted until early September and was thought to have reduced annual refined lead production at the plant by about 6,500 t (Doe Run Resources Corp., 2007, p. 5).

Teck Cominco Alaska Inc. (a wholly owned subsidiary of Teck Cominco Ltd., Vancouver, British Columbia, Canada) operated the Red Dog zinc-lead mine in northwestern Alaska under a royalty agreement with NANA Regional Corp., the sole owner of the property. NANA is a corporation organized under the provisions of the Alaska Native Claims Settlement Act. During 2007, production of lead in concentrate at Red Dog increased by 10% to 136,000 t compared with 124,000 t in 2006. Zinc and lead production increased in 2007 compared with that of the previous year owing to higher recovery rates and additional mill throughput as a result of increased operating time. The average mill recovery of lead at Red Dog was 65.9% in 2007 compared with 62.8% in 2006. According to company reports, proven ore reserves at Red Dog, as of December 31, 2007, were estimated to be 12.6 million metric tons (Mt) grading 20.0% zinc and 5.5% lead. In 2007, Teck Cominco continued a shallow gas exploration program to test the economic potential of using natural gas as a replacement for diesel fuel for power generation at Red Dog in the future (Teck Cominco Ltd., 2008, p. 36, 74).

Teck Cominco's Pend Oreille zinc-lead mine in northeastern Washington produced 4,200 t of lead in concentrate in 2007 compared with 5,100 t in 2006. The company stated that the implementation of a revised ground control plan affected ore production and grade quality in 2007. Proven ore reserves at Pend Oreille, as of December 31, 2007, were estimated to be almost 2.2 Mt grading 5.7% zinc and 1.0% lead (Teck Cominco Ltd., 2008, p. 38, 74).

Hecla Mining Co. (Coeur d'Alene, ID) operated the Lucky Friday silver and lead mine in Mullan, ID. In 2007, the company reported that the mine produced 16,600 t of lead in concentrate, which was about 10% higher than the 15,100 t produced in the previous year. Metal recovery rates had significantly improved owing to mill upgrades. Proven ore reserves at Lucky Friday, as of December 31, 2007, were estimated to be about 690,000 t grading 7.2% lead and 2.5% zinc. All silver-lead and zinc concentrate production during 2007 was shipped to Teck Cominco's metallurgical complex in Trail, British Columbia, Canada. Hecla also owned a 29.73% interest in the Greens Creek Mine, on Admiralty Island near Juneau, AK, through a joint-venture agreement with Kennecott Greens Creek Mining Company, a subsidiary of Rio Tinto plc (London, United Kingdom). In 2007, Greens Creek produced 17,000 t of lead in concentrate, nearly unchanged from 2006 production (Hecla Mining Co., 2008, p. 3, 14, 17).

In February, the Apollo Gold Corp. successfully completed a wall remediation program, which had been started in August 2006, at the Montana Tunnels open pit mine near Helena, MT. The company resumed mill operations at the mine in March and began processing from an existing stockpile of ore. From March to December, the mill produced about 5,072 t of lead in concentrate. Lead and zinc concentrates were shipped by rail to Teck Cominco's smelter in Trail, British Columbia, Canada. The Montana Tunnels Mine was a 50-50 joint venture between Apollo Gold Corp. and Elkhorn Tunnels, LLC. Operations at the mine had been suspended in mid-October 2005, and the mine was subsequently placed on care-and-maintenance status owing to pit wall instability (Apollo Gold Corp., 2008, p. 1-2, 5, 12).

Secondary.—Domestic secondary production of refined lead increased by about 2% in 2007. Secondary lead accounted for 91% of domestic lead refinery production compared with 88% in 2006. Lead-acid batteries continued to be the dominant source of recoverable lead scrap, accounting for 93% of all lead produced from secondary sources. The domestic secondary statistics were derived by the USGS from a combined secondary producer and consumer survey that included data from monthly and annual surveys. All of the 13 companies producing secondary lead, exclusive of that produced from copper-based scrap, were surveyed; 10 responded, representing about 88% of the total production of secondary lead. Of the total lead recycled in 2007, about 99% was produced by 7 companies operating 15 plants in Alabama, California, Florida, Indiana, Louisiana, Minnesota, Missouri, New York, Pennsylvania, Tennessee, and Texas. Production and consumption for the nonrespondents were estimated by using prior-year levels as a basis (tables 1, 5-9).

Consumption

Reported U.S. consumption of lead increased by about 5% in 2007. Increases were reported in ammunition, casting metals, and lead-acid storage battery end-use sectors. Consumption of lead in SLI and industrial type lead-acid storage batteries represented about 88% of the total reported consumption of lead. According to the Battery Council International (BCI), North American shipments of replacement SLI batteries in 2007 were about 2% higher than they were in 2006. Replacement batteries represented nearly 83% of all North American battery shipments in 2007. Conversely, North American shipments of original equipment (OE) SLI batteries declined by about 3% in 2007 compared with those of 2006. The drop off in shipments of

OE batteries had been attributed, in part, to the decline in new vehicle sales during the year. Specifically, volume reductions took place in U.S. production of full-sized pickup trucks, minivans, and sport utility vehicles. During the time period between 2004 and 2007, shipments of motorcycle batteries had increased at a faster rate than any other type of SLI lead-acid battery in North America (CRU International Ltd., 2008, p. 18; tables 5-9).

In April, Power Technology, Inc. (Austin, TX) announced that a commercial battery plant was to begin manufacturing its valve-regulated, absorbed glass matt, maintenance-free, lead-acid batteries for independent evaluation and testing. The company claimed that it had developed a battery technology that was significantly smaller, lighter, and more efficient than conventional lead-acid batteries. The battery also used less lead than conventional lead-acid batteries owing to a more efficient collector grid design that was based on an open pore foam material composed of vitreous carbon coated with a lead-tin alloy. The company thought that these batteries had the potential to become attractive options for use in low emission electric and hybrid-electric vehicles, electric bicycles, and in motive power applications (Power Technology, Inc., 2007).

In the industrial-type lead-acid battery sector, shipments of motive power batteries were down compared with those in 2006, reflective of lower industrial production during that time period. In October, Exide Technologies (Alpharetta, GA) announced that it had reached an agreement with Ballard Power Systems (Burnaby, British Columbia, Canada) to jointly develop a new onboard hybrid hydrogen fuel cell and lead-acid battery energy system for the motive power materials handling market. The company thought that the system, which had onboard charging capabilities from the fuel cell, would significantly reduce the amount of downtime that materials handling equipment traditionally experienced for battery recharges or replacement. Initial prototypes of the system were scheduled to be delivered to the U.S. Department of Defense for evaluation. Shipments of the standby power sector of industrial batteries were driven by enterprise data center construction, continued expansion of the fiber-to-the-home infrastructure, and renewed investment in the North American electrical transmission network (C&D Technologies Inc., 2007; Exide Technologies, 2007b).

In 2007, the automotive service industry made efforts to move away from widespread use of lead wheel weights on vehicle tires in North America. In December, BFS Retail and Commercial Operation, LLC (BFRC) (a subsidiary of Bridgestone America Holding, Inc. in Bloomingdale, IL) announced that it was planning to offer all of its customers the opportunity to replace existing lead weights with steel wheel balance weights in 2008. The company aimed to reduce the environmental impact of lead weights lost during transit, potentially contaminating soil or water. The lead wheel weights were to be collected at service centers and then recycled. BFRC operated more than 2,200 consumer and commercial vehicle and tire service centers across the United States and Canada in 2007 (Bridgestone America Holding, Inc., 2007).

Foreign Trade

In 2007, imports of unwrought lead metal for consumption totaled 263,000 t, a 21% decrease from those of 2006. The leading source was Canada. Imports from Mexico increased by 125% to 35,600 t, while those from Peru were down 52% to 16,500 t. Total domestic exports of unwrought lead decreased by 2% to 51,800 t. Domestic exports of lead in concentrate were 300,000 t, up slightly from those of the previous year. Lead in concentrate exports to Belgium, Canada, Mexico, and the Republic of Korea increased, while exports to China and Japan declined.

In 2007, the United States imported about 24 million SLI lead-acid batteries for consumption, up 5% from those of 2006. Mexico was the leading provider of SLI batteries, responsible for 65% of the SLI batteries imported in 2007. SLI battery imports from China, Taiwan, and Vietnam increased in 2007, while those from Brazil, Germany, France, the Republic of Korea, and Spain declined (tables 10-12).

Prices

Lead prices continued the trend that had begun in 2006 and increased throughout the first three quarters of 2007. The ongoing economic growth in emerging industrialized nations such as China and India drove strong global demand for lead in 2007. This, coupled with the supply disruption at a major lead mine in Australia, drove lead prices to historically high levels in 2007. Lead price increases typically have been passed on to consumers by manufacturers because there were very few suitable substitutes for lead in the production of SLI and industrial batteries, which were its primary uses. The average LME cash and North American Producer prices in 2007 were up by $0.585 per pound (102%) and $0.464 per pound (60%) respectively, from the average prices of $0.585 per pound and $0.774 per pound, respectively, in 2006.

World Review

World mine production of lead increased by 120,000 t, or about 3% to 3.77 Mt, from that of 2006. China was the leading producer with about 40% of the world total mine production, followed by Australia, 17%; the United States, 12%; Peru, 9%; and Mexico, 3% (table 13). Australia's mine production was down almost 7% from that of 2006 partially owing to the suspension of operations at Ivernia's Magellan Mine in the spring of 2007.

World production of refined lead increased by almost 5%, to 8.28 Mt in 2007 from 7.89 Mt in 2006. China was the leading producer of refined lead with 36% of total world production, followed by the United States, 16%; Germany, 4%; the United Kingdom, 4%; and Japan, 3% (table 14). According to statistics published by the International Lead and Zinc Study Group (ILZSG), secondary (recycled) lead production represented about 54% of total refined lead production worldwide in 2007.

ILZSG also reported that worldwide consumption of refined lead increased slightly to 8.12 Mt from 8.09 Mt in 2007. The leading refined lead consuming countries in 2007 were China, 32%; the United States, 19%; Germany, 5%; and the Republic of Korea, 4% (International Lead and Zinc Study Group, 2008b, p. 6-9).

Europe.—The European SLI battery market was estimated to have grown by about 2% in 2007 owing to continued vehicle growth across Eastern Europe. Demand for motive power battery products in Europe increased as well in 2007. This was partially because of increased activity in the food industry and the warehousing sector, industries that rely heavily on motive power lift trucks, which often run on lead-acid batteries. The BCI estimated that the motive power lead-acid battery sector grew by nearly 7% in Europe. Growth was also reported in the European standby power market owing to wireless telecommunication infrastructure construction. Specifically, Eastern Europe drove demand for network power products (Kubis, 2008).

Australia.—In March, Ivernia Inc. (Toronto, Ontario, Canada) announced that it had suspended shipments of lead concentrate from its Magellan lead mine in Western Australia to the port in Esperance on Western Australia's southwest coast owing to environmental concerns associated with the export of lead in concentrate through the port. Consequently, Ivernia Inc. placed the Magellan Mine on temporary care-and-maintenance status in April pending shipping approval. In September, Ivernia submitted a formal application to the Western Australian Environmental Protection Agency for approval to transport lead concentrate sealed in bulk bags within shipping containers through the Port of Fremantle (Ivernia Inc., 2007d). In December, the agency had reviewed the application and had recommended that Ivernia's proposal be accepted. By yearend, the company was awaiting final approval and the exact conditions required for the commencement of lead in concentrate shipment through the Port of Fremantle. Also in 2007, Ivernia announced that it had reached a long-term deal to sell approximately 50% of future lead concentrate production from the Magellan Mine to the Yunnan Metallurgical Group Imp. & Exp. Co., Ltd. (Kunming, Yunnan Province, China). Under the terms of the relationship, the two companies agreed to collaborate to identify new base-metal opportunities and to ensure successful operations at Ivernia's Magellan Mine (Ivernia Inc., 2007a-d).

BHP Billiton Ltd. announced that its lead in concentrate production for the second half of 2007 was 53% higher than that in the same period of 2006. BHP produced 131,000 t of lead in concentrate at its Cannington lead-zinc mine located in northwest Queensland. The company attributed the increased performance to the completion of a rehabilitation project at the mine (BHP Billiton Ltd., 2008, p. 2-3).

Xstrata plc (Zug, Switzerland) announced that lead in concentrate production at its Mount Isa Mine in northwest Queensland was 104,400 t in 2007, down 4% from production of 109,000 t in 2006 owing to lower grades and recoveries. Production of lead in concentrate at its McArthur River zinc-lead open pit mine in the Northwest Territory was 33,000 t in 2007, up about 10% from 30,100 t in 2006. Total ore production at its Mount Isa zinc-lead concentrator rose by 9% in 2007 to 5 Mt, despite a fire that affected production during the fourth quarter. Lead in concentrate production at the concentrator decreased 4% in 2007 to 104,000 t owing to lower head grades and recoveries, according to the company (Xstrata plc, 2008a, p. 7, 84; b).

A new battery design, developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia, was successfully tested in a low-emission hybrid electric vehicle (HEV). The battery, called the UltraBattery, and built by the Furukawa Battery Co. (Yokohama City, Kanagawa, Prefecture, Japan) was comprised of a supercapacitor (an electrochemical capacitor which is able to store a large amount of energy for quick release) and a lead-acid battery. According to CSIRO, the UltraBattery produced more power, had a longer lifecycle, and cost significantly less than other common battery types used in HEVs (Commonwealth Scientific and Industrial Research Organisation, 2008).

Bolivia.—In August, Apex Silver Mines Ltd. (Denver, CO) commenced production at its San Cristobal Mine located in southwestern Bolivia. The San Cristobal site consisted of an open pit mine and concentrator with a designed capacity of 40,000 metric tons per day (t/d) of ore. The company planned to transport sealed containers of concentrate by train to the Port of Mejillones, which was approximately 644 kilometers (km) away. During 2007, the company continued to ramp up production rates and was able to ship 8,000 t of payable lead from the mine. Once in full production, Apex expected the mine to produce almost 80,000 metric tons per year (t/yr) of lead in concentrate (Apex Silver Mines Ltd., 2007, p. 5, 7).

In November, Bolivia's congress approved a reform to the mining tax code that increased taxes on mining companies operating within the country. The reform increased taxes on mineral extraction to 37.5%, up from 25%. The decision was expected to affect several major global mining companies that were operating in Bolivia (Metal-Pages, 2007a).

Canada.—In May, Acadian Mining Corp. (Halifax, Nova Scotia) announced that it had commenced production at the Scotia zinc-lead mine at Gays River, Nova Scotia. The company began shipping lead concentrate from the mine in September and produced 3,600 t of lead in concentrate by yearend 2007. The company stated that production numbers were a little lower than anticipated owing to operational disruptions typically experienced during a new mine startup. Acadian expected to produce 30,000 t of zinc in concentrate and 12,000 t of lead in concentrate in 2008 (Acadian Mining Corp., 2008).

In New Brunswick, Blue Note Mining Inc. (Montreal, Quebec) made the first delivery of lead concentrate from its Caribou zinc-lead mine to Xstrata's lead smelter in Zug, Switzerland, in August. The company had processed 298,000 t of ore by yearend 2007, producing 14,700 t of lead in concentrate. Blue Note had restarted operations at Caribou in May and expected to have the mine and mill ramped up to full production levels by early 2008 (Blue Note Mining Inc., 2008).

Teck Cominco Ltd. announced that refined lead production at its metallurgical complex in Trail, British Columbia, was 76,400 t, down 15% from that of 2006. The decline in production was because of less contained lead in the concentrate mix and

a shutdown of the lead smelter facilities for maintenance in early November. The $55 million maintenance project at the smelter included 23 individual projects related to the KIVCET furnace (a smelting furnace which produced lead bullion and slag), boilers, and related equipment and involved more than 750 contract employees. The work was successfully completed on time, and the lead smelter was back in operation at full production by the end of the month. Teck Cominco also continued to engage in the recycling of lead-acid batteries at its Trail metallurgical operations. In 2007, the company began to include electronic scrap in its recycling program as well and recycled more than 4,300 t of it during 2007 (Teck Cominco, Ltd., 2008, p. 32, 71).

China.—Consumption of lead increased by 11.5% during 2007, the fastest pace in the past 13 years and was driven by the need for lead-acid batteries used in its expanding vehicle population as well as strong industrial growth. According to the Chinese Association of Automobile Manufacturers, vehicle production and sales increased by 20% in 2007 compared with 2006. Along with automobiles and trucks, the booming electric bicycle (e-bike) market in China added to increased lead usage during 2007. There were between 25 and 40 million e-bikes on the roads in China by yearend 2007, up from 58,000 in 1998. The majority of e-bikes are powered by lead-acid batteries, which have a lifespan of about 1 year (CRU International Ltd., 2007, p. 16).

In June, the Ministry of Finance imposed new export taxes on a number of metals, ferroalloys, and steel products. According to the Ministry, the new export taxes were part of an attempt to cut exports, curb energy usage, and improve trade relations with some of China's main trading partners. The new tax structure included a 10% tax imposed on refined lead exports and a 5% tax on lead scrap exports (American Metal Market, 2007).

The Ministry of Finance and the State Administration of Taxation issued a joint policy raising the resource tax for lead and zinc ores by nearly 78% to $2.60 per metric ton from $0.58 per ton. The new taxation policy became effective on August 1, 2007. The tax adjustment was aimed at bringing the resource tax more in-line with the higher price of lead and zinc. This was the first adjustment to the resource tax since it was instituted in 1993 (China Mining Association, 2007).

In November, Western Mining Co., Ltd. (Xining, Qinghai Province) announced that it had signed a letter of intent with Yuguang Gold and Lead Group Co. Ltd. (Jiyuan City, Henan Province) to build a new lead smelter in Qinghai Province. The smelter was expected to have capacity of 100,000 t/yr of refined lead. Western Mining was to hold a 51% share of the project. Construction was scheduled to begin in 2008 with completion scheduled for early 2010. Separately, Yuguang Gold and Lead announced that it was intending to launch a new project in Henan Province to produce bipolar lead-acid battery plates. The project was initially expected to have the capacity to produce 20,000 t/yr of bipolar plates and was to be commissioned in November 2007. At full capacity, the plant was expected to produce 100,000 t/yr of the battery plates (CRU International Ltd., 2007, p. 160).

India.—In April, the Indian Government announced that it intended to change its lead-acid battery import laws to curb pollution generated by illegal small-scale secondary lead smelters. An estimated 75% of used batteries imported into India were going to unregulated smelters. Under the new proposed laws, only original equipment manufacturers and Government-approved secondary recyclers would be able to obtain used lead-acid batteries. The new law would allow the Government to monitor the amount of pollution generated by battery recycling facilities more carefully (CRU Lead Monitor, 2007).

Exide Technologies (Alpharetta, GA) announced plans to increase production capacity at its transportation manufacturing facility in Gujarat. The company planned to invest in equipment upgrades, line expansions, infrastructure, and utilities at the plant. The project was expected to be completed by June 2008 and was to increase production capacity from 600,000 to 1 million lead-acid batteries per year (Exide Technologies, 2007a).

Mexico.— Goldcorp Inc. (Vancouver, British Columbia, Canada) continued to make progress in developing a new mine and mill at its Penasquito property in the mining State of Zacatecas. Early in the year, Goldcorp had received all permits required for full mine and mill construction and operation at Penasquito. In December, Goldcorp announced plans to expand mill throughput by 30% at the Penasquito project to 130,000 t/d of ore. The company also increased its estimates of proven and probable lead reserves at the mine by 60% from those in June 2006 to 2.67 Mt. Goldcorp had projected that once it had reached full production, the mine would produce about 97,000 t/yr of lead in concentrate. Underground mine operations were due to start by yearend 2008, and mill startup was expected to follow in early 2009 (Goldcorp Inc., 2007).

Peru.—In late July, Minera Milpo S.A. (Lima) opened its Cerro Lindo zinc, copper, and lead mine located 177 km south of Lima. The mine was expected to yield 140,000 t/yr of zinc in concentrate, 40,000 t/yr of copper in concentrate, and 15,000 t/yr of lead in concentrate when operating at full production in 2008 (Metal-Pages, 2007b).

Portugal.—Lundin Mining Corp. (Vancouver, British Columbia, Canada) announced that production had restarted at the Aljustrel Mine in mid-December. The mine had been on care-and-maintenance status for the previous 14 years. Lundin was expecting the mine to ultimately produce lead in concentrate at a rate of 17,000 t/yr when it reached full production in the first quarter of 2009 (Lundin Mining Corp., 2007).

United Kingdom.—Altraverda Ltd., a supplier of bipolar battery technology in South Wales, announced in September that it had entered into commercial relations with Exide Industries, Ltd. (Kolkata, India) to develop and manufacture bipolar lead-acid batteries. Altraverda expected that the agreement with Exide, the leading lead-acid battery manufacturer in South Asia, would allow it to introduce its bipolar battery technology to the Asian market. According to the company, bipolar lead-acid batteries are more powerful, lighter, smaller, and contain less lead than conventional lead-acid storage batteries. In September, Altraverda entered into similar relations with Vladar, a Ukrainian battery manufacturer. The two companies expected to work together to develop bipolar lead-acid batteries for railcar power storage applications in Ukraine (Altraverda Ltd., 2007a, b).

Outlook

ILZSG forecast refined lead consumption to rise by 3.9% to about 8.6 Mt in 2008 owing to strong economic growth of nearly 13% in China combined with increased consumption in India, Japan, and the Republic of Korea. The surge in China's vehicle population which was inclusive of automobiles and e-bikes was expected to drive growth in lead-acid battery usage. Ongoing investment in the industry was also expected to lead a strong demand for standby and motive power lead-acid batteries in China (CRU International Ltd., 2008, p. 45).

On the supply side, global output of refined lead was expected to rise by about 4% in 2008, driven primarily by Chinese production increases. Global lead mine production was forecast to increase by 8.4% to almost 4 Mt in 2008. Higher European output along with production increases in Australia, Bolivia, Canada, China, Iran, Mexico, Peru, and the United States were expected to drive the overall growth in mine production (International Lead and Zinc Study Group, 2008a).

References Cited

Acadian Mining Corp., 2008, Acadian mining corporation year end results-revenue from Scotia Mine operations commences: Halifax, Nova Scotia, Canada, Acadian Mining Corp. news release, March 31, 4 p.

Altraverda Ltd., 2007a, Ebonex technology moves into Asia thanks to Exide deal: Abertillery, United Kingdom, Altraverda Ltd. news release, August 10, 2 p.

Altraverda Ltd., 2007b, Ebonex technology on track thanks to deal with Vladar: Abertillery, United Kingdom, Altraverda Ltd. news release, September 18, 1 p.

American Metal Market, 2007, China increasing taxes on metal, steel exports: American Metal Market, May 22. (Accessed September 5, 2008, via http://www.amm.com.)

Apex Silver Mines Ltd., 2007, Form 10-K—2007: Securities and Exchange Commission, 80 p.

Apollo Gold Corp., 2008, 2007 annual report: Greenwood Village, CO, Apollo Gold Corp., 58 p.

BHP Billiton Ltd., 2008, BHP Billiton production report for the half year ended 31 December 2007: Melbourne, Australia, BHP Billiton Ltd. news release, January 23, 20 p.

Blue Note Mining Inc., 2008, Blue Note Mining announces 2007 revenues: Montreal, Quebec, Canada, Blue Note Mining Inc. news release, March 28, 1 p.

Bridgestone America Holding, Inc., 2007, BFRC helps drivers get the lead out: Bloomingdale, IL, Bridgestone America Holding, Inc. news release, December 6, 1 p.

C&D Technologies Inc., 2007, C&D Technologies announces third quarter results: Blue Bell, PA, C&D Technologies Inc. news release, December 6, 6 p.

China Mining Association, 2007, China to raise resource tax on lead, zinc, copper and tungsten in August: China Mining Association, July 19. (Accessed January 30, 2008, at http://www.chinamining.org/Policies/2007-07-19/1184806612d6237.html.)

Commonwealth Scientific and Industrial Research Organisation, 2008, UltraBattery sets new standard for HEVs: Canberra, Australia, Commonwealth Scientific and Industrial Research Organisation news release, January 17, 2 p.

CRU International Ltd., 2007, Quarterly lead industry and market outlook: London, United Kingdom, CRU International Ltd., November, 192 p.

CRU International Ltd., 2008, Quarterly lead industry and market outlook: London, United Kingdom, CRU International Ltd., February, 184 p.

CRU Lead Monitor, 2007, Consumption trends: India to restrict battery imports, plans manufacturing plant: CRU Lead Monitor, April, p. 10.

Defense National Stockpile Center, 2007, Annual materials plan for FY 2008: Fort Belvoir, VA, Defense National Stockpile Center news release, October 5, 2 p.

Doe Run Resources Corp., 2007, 2007 report to communities: St. Louis, MO, Doe Run Resources Corp., 28 p.

Exide Technologies, 2007a, Exide Technologies announces capacity expansion at Tudor India location: Alpharetta, GA, Exide Technologies news release, December 13, 2 p.

Exide Technologies, 2007b, Exide Technologies signs agreement with Ballard Power Systems for forklift truck power solution: Alpharetta, GA, Exide Technologies news release, October 9, 3 p.

Federal Communications Commission, 2007, Recommendations of the independent panel reviewing the impact of hurricane katrina on communications networks: Federal Register, v. 72, no. 132, July 11, p. 37566-37673.

Goldcorp Inc., 2007, Goldcorp approves Penasquito expansion: Vancouver, British Columbia, Canada, Goldcorp Inc. news release, December 3, 4 p.

Hecla Mining Co., 2008, 2007 annual report: Coeur d'Alene, ID, Hecla Mining Co., 108 p.

International Lead and Zinc Study Group, 2008a, ILZSG spring 2008 meetings/forecast: Lisbon, Portugal, International Lead and Zinc Study Group news release, April 24, 4 p.

International Lead and Zinc Study Group, 2008b, Lead and zinc statistic monthly: Lisbon, Portugal, International Lead and Zinc Study Group, v. 48, no. 8, August, 68 p.

Ivernia Inc., 2007a, Ivernia advises of Western Australia Environmental Protection Agency's advice to Minister of Environment: Toronto, Ontario, Canada, Ivernia Inc. news release, December 9, 3 p.

Ivernia Inc., 2007b, Ivernia Inc. and Yunnan Metallurgical Group to form visionary long-term strategic relationship: Toronto, Ontario, Canada, Ivernia Inc. news release, November 30, 3 p.

Ivernia Inc., 2007c, Ivernia Inc. places Magellan mine on temporary care and maintenance; secures new financing arrangements: Toronto, Ontario, Canada, Ivernia Inc. news release, April 3, 3 p.

Ivernia Inc., 2007d, Ivernia's wholly-owned Magellan Metals submits final proposal for containerized lead concentrate shipments: Toronto, Ontario, Canada, Ivernia Inc. news release, September 17, 2 p.

Kubis, Ray, 2008, Europe briefing: Battery Council International Convention and Power Mart Trade Fair, 120th, Tampa, FL, April 27-30, 2008, Presentation, 14 p.

Lundin Mining Corp., 2007, Lundin mining commences production at the Aljustrel mine: Vancouver, British Columbia, Canada, Lundin Mining Corp. news release, December 18, 2 p.

Metal-Pages, 2007a, Bolivia increases mining taxes: Metal-Pages, November 28. (Accessed August 21, 2008, via http://www.metal-pages.com/.)

Metal-Pages, 2007b, Peru copper mine starts operations: Metal-Pages, July 23. (Accessed September 2, 2008, via http://www.metal-pages.com/.)

Power Technology, Inc., 2007, Power Technology to begin manufacturing maintenance free, absorbed glass matt batteries using patented electrodes: Austin, TX, Power Technology, Inc. news release, March 28, 1 p.

Teck Cominco Ltd., 2008, Annual report 2007: Vancouver, British Columbia, Canada, Teck Cominco Ltd., 122 p.

U.S. Department of Housing and Urban Development, 2007, Jackson announces $31 million in grants to protect children from dangerous lead paint hazards: U.S. Department of Housing and Urban Development news release, January 5, 3 p.

U.S. Environmental Protection Agency, 2007a, Criteria for the safe and environmentally protective use of granular mine tailings known as "chat": Federal Register, v. 72, no. 137, July 18, p. 39331-39353.

U.S. Environmental Protection Agency, 2007b, National primary drinking water regulations for lead and copper—Short-term regulatory revisions and clarifications: Federal Register, v. 72, no. 195, October 10, p. 57782-57820.

U.S. Environmental Protection Agency, 2007c, Sixtieth report of the TSCA Interagency Testing Committee to the Administrator of the Environmental Protection Agency—Receipt of report and request for comments—Notice: Federal Register, v. 72, no. 144, July 27, p. 41413-41418.

Xstrata plc, 2008a, Xstrata plc, Annual report 2007: Zug, Switzerland, Xstrata plc, 286 p.

Xstrata plc, 2008b, Xstrata plc, Production report for 12 months ended 31 December 2007: Zug, Switzerland, Xstrata plc news release, February 25, 2008, 8 p.

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Lead. Ch. in Mineral Commodity Summaries, annual.
Lead. Ch. in United States Mineral Resources, Professional Paper 820, 1973.
Lead. Mineral Industry Surveys, monthly.

Other

Lead. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.
U.S. Department of Commerce, International Trade Administration.

TABLE 1
SALIENT LEAD STATISTICS[1]

		2003	2004	2005	2006	2007
United States:						
Production:						
Mine, recoverable lead content:[2]						
Quantity	metric tons	449,000	430,000	426,000	419,000	434,000
Value	thousands	$433,000	$523,000	$574,000	$715,000	$1,180,000
Primary lead, refined content, domestic ores and base bullion	metric tons	245,000	148,000	143,000	153,000	123,000
Secondary lead, lead content	do.	1,140,000	1,130,000	1,150,000	1,160,000	1,180,000
Exports, lead content:						
Lead ore and concentrates	do.	253,000	292,000	390,000	298,000	300,000
Lead materials, excluding scrap	do.	123,000 r	82,600	64,600	68,500	56,400
Imports for consumption, lead content:						
Lead in base bullion	do.	6	3	29	539	1,990
Lead in pigs and bars	do.	175,000	197,000	298,000	331,000	263,000
Stocks, December 31, lead content:						
Primary lead	do.	W	W	W	W	W
At consumers and secondary smelters	do.	84,600	59,000	46,800	54,800 r	49,400
Consumption of metal, primary and secondary, lead content	do.	1,390,000	1,480,000	1,490,000	1,490,000 r	1,570,000
Price, North American Producer average, delivered[3]	cents per pound	43.76	55.14	61.03	77.40	123.84
World:						
Production, gross weight:						
Mine	metric tons	3,200,000 r	3,200,000 r	3,520,000 r	3,650,000 r	3,770,000 e
Refinery[4]	do.	3,390,000 r	3,330,000 r	3,760,000 r	3,940,000 r	4,090,000 e
Secondary refinery	do.	3,600,000 r	3,740,000 r	3,880,000 r	3,950,000 r	4,190,000 e
Price, London Metal Exchange, pure lead, cash average[3]	cents per pound	23.34	40.19	44.23	58.00	117.00

eEstimated. rRevised. do. Ditto. W Withheld to avoid disclosing company proprietary data.
[1]Data are rounded to no more than three significant digits, except prices.
[2]Lead recoverable after smelting and refining. Number in table 13 represents lead in concentrate.
[3]Platts Metals Week.
[4]Primary metal production only; includes secondary metal production, where inseparable.

TABLE 2
MINE PRODUCTION OF RECOVERABLE LEAD IN THE UNITED STATES, BY STATE[1]

(Metric tons, lead content)

State	2006	2007
Alaska and Missouri	393,000	400,000
Idaho, Montanta, and Washington	26,100	34,200
Total	419,000	434,000

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

TABLE 3
LEADING LEAD-PRODUCING MINES IN THE UNITED STATES IN 2007, IN ORDER OF OUTPUT[1]

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

Do., do. Ditto.
[1]The mines on this list accounted for 100% of U.S. mine production in 2007.

TABLE 4
LEAD RECOVERED FROM SCRAP PROCESSED IN THE UNITED STATES,
BY KIND OF SCRAP AND FORM OF RECOVERY[1]

(Metric tons, lead content, unless otherwise specified)

		2006	2007
Kind of scrap:			
New scrap:			
Lead-base		13,500	22,500
Copper-base		4,630	NA
Tin-base		1,530	1,530
Total		19,600	24,100
Old scrap:			
Battery-lead		1,060,000	1,100,000
All other lead-base		76,000	50,900
Copper-base		4,540 r	NA
Total		1,140,000	1,160,000
Grand total		1,160,000	1,180,000
Form of recovery:			
As soft lead		948,000	1,020,000
In antimonial lead		200,000	160,000
In other lead alloys		3,260	2,350
In copper-base alloys		9,160 r	NA
Total:			
Quantity		1,160,000	1,180,000
Value[2]	thousands	$1,980,000 r	$3,220,000

rRevised. NA Not available.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Value based on average quoted price of common lead.

TABLE 5
U.S. CONSUMPTION OF LEAD, BY PRODUCT[1]

(Metric tons, lead content)

SIC[2] code	Product	2006	2007
	Metal products:		
3482	Ammunition, shot and bullets	65,700 r	69,400
	Bearing metals:		
35	Machinery except electrical	W	W
371	Motor vehicles and equipment[3]	W	W
37	Other transportation equipment	W	W
	Total	1,240	1,410
3351	Brass and bronze, billets and ingots	3,130 r	2,870
36	Cable covering, power and communication	(4)	(4)
15	Calking lead, building construction	(4)	(4)
	Casting metals:		
36	Electrical machinery and equipment	W	W
371	Motor vehicles and equipment	W	W
37	Other transportation equipment	W	W
3443	Nuclear radiation shielding	W	W
	Total	29,900	31,500
	Pipes, traps, other extruded products:		
15	Building construction	1,440 r	1,320
3443	Storage tanks, process vessels, etc.	(5)	(5)
	Total	1,440 r	1,320
	Sheet lead:		
15	Building construction	17,600 r	17,000
3443	Storage tanks, process vessels, etc.	W	W
3693	Medical radiation shielding	W	W
	Total	28,400 r	28,600
	Solder:		
15	Building construction	W	W
	Metal cans and shipping containers	W	W
367	Electronic components, accessories and other electrical equipment	6,620 r	6,690
371	Motor vehicles and equipment	W	W
	Total	7,280 r	7,220
	Storage batteries:		
3691	Storage battery grids, post, etc.	586,000 r	640,000
3691	Storage battery oxides	710,000 r	738,000
	Total storage batteries	1,300,000 r	1,380,000
27	Type metal, printing and allied industries	(4)	(4)
34	Other metal products[6]	23,400 r	23,500
	Grand total	1,460,000 r	1,540,000
	Other oxides:		
285	Paint	W	W
32	Glass and ceramics products	W	W
28	Other pigments and chemicals	W	W
	Total	16,000 r	15,800
	Miscellaneous uses	12,500 r	9,490
	Grand total	1,490,000 r	1,570,000

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

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

[2]SIC Standard Industrial Classification.

[3]Includes "Metal products: Storage batteries: Terne metal, motor vehicles and equipment."

[4]Included with "Metal products: Other Metal products."

[5]Included with "Metal products: Sheet lead: Building construction" to avoid disclosing company proprietary data.

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

TABLE 6
U.S. CONSUMPTION OF LEAD IN 2007, BY STATE[1, 2]

(Metric tons, lead content)

State	Refined soft lead	Lead in antimonial lead	Lead in alloys	Lead in copper-base scrap	Total
California and Washington	27,900	1,100	5,290	--	34,300
Illinois	18,400	21,600	W	--	40,000
Iowa, Michigan, Missouri	4,940	1,030	W	--	5,970
Ohio and Pennsylvania	127,000	114,000	47,500	W	289,000
Arkansas and Texas	59,900	16,900	7,080	--	83,800
Alabama, Georgia, Oklahoma	24,900	866	4,950	--	30,700
Colorado, Indiana, Kansas, Kentucky, Minnesota, Nebraska, Tennessee, Wisconsin	208,000	65,900	56,500	W	331,000
Connecticut, Maryland, New Jersey, New York, North Carolina, South Carolina	6,250	3,370	1,810	--	11,400
Various States	379,000	82,000	283,000	1,060	744,000
Total	857,000	306,000	406,000	1,060	1,570,000

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

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

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

TABLE 7
U.S. CONSUMPTION OF LEAD IN 2007, BY CLASS OF PRODUCT[1, 2]

(Metric tons, lead content)

Product	Refined soft lead	Lead in antimonial lead	Lead in alloys	Lead in copper-base scrap	Total
Metal products	69,700	86,000	9,060	1,060	166,000
Storage batteries	762,000	220,000	397,000	--	1,380,000
Miscellaneous[3]	25,300	1	--	--	25,300
Total	857,000	306,000	406,000	1,060	1,570,000

-- Zero.

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

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

[3]Included in"Miscellaneous" are other oxides and gasoline additives.

TABLE 8
STOCKS OF LEAD AT CONSUMERS AND SECONDARY SMELTERS
IN THE UNITED STATES, DECEMBER 31[1, 2]

(Metric tons, lead content)

Year	Refined soft lead	Lead in antimonial lead	Lead in alloys	Lead in copper-base scrap	Total
2006	34,600 [r]	11,200 [r]	W	W	54,800 [r]
2007	23,300	14,800	W	W	49,400

[r]Revised. W Withheld to avoid disclosing company proprietary data; included in "Total."

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

[2]Includes stocks at primary refineries.

TABLE 9
PRODUCTION AND SHIPMENTS OF LEAD PIGMENTS AND OXIDES IN THE UNITED STATES[1, 2]

(Metric tons and dollars)

	2006				2007			
	Production		Shipments[e]		Production		Shipments[e]	
Product	Gross weight	Lead content	Quantity (lead content)	Value[3]	Gross weight	Lead content	Quantity (lead content)	Value[3]
Litharge, red lead and white lead, dry	--	--	10,200	10,800,000	--	--	10,200	10,800,000
Leady oxide	747,000	710,000	NA	NA	777,000	738,000	NA	NA
Total	747,000	710,000	NA	NA	777,000	738,000	NA	NA

[e]Estimated. NA not available. "-- Zero.

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

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

[3]At plant, exclusive of container.

TABLE 10
U.S. IMPORTS FOR CONSUMPTION OF LEAD PIGMENTS AND COMPOUNDS, BY KIND[1]

Kind	Quantity (metric tons, lead content)	Value (thousands)
2006:		
White lead carbonate	1	$6
Red and orange lead	519	935
Chrome yellow, molybdenum orange pigments, lead-zinc chromates	5,310	18,700
Litharge	1,250	2,350
Glass frits (undifferentiated)	20,900	33,400
Total	27,900	55,400
2007:		
White lead carbonate	--	--
Red and orange lead	--	--
Chrome yellow, molybdenum orange pigments, lead-zinc chromates	2,830	12,700
Litharge	1,340	3,630
Glass frits (undifferentiated)	17,000	34,700
Total	21,200	51,100

-- Zero.

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

Source: U.S. Census Bureau.

TABLE 11
U.S. EXPORTS OF LEAD, BY COUNTRY[1]

Country	2006 Quantity (metric tons)	2006 Value (thousands)	2007 Quantity (metric tons)	2007 Value (thousands)
Ore and concentrates, lead content:				
Belgium	8,910	$7,440	14,700	$20,900
Canada	32,300	27,600	37,500	80,100
China	125,000	107,000	110,000	198,000
Costa Rica	--	--	102	32
India	185	94	--	--
Italy	--	--	7,560	9,300
Japan	45,300	42,100	19,500	26,400
Korea, Republic of	46,700	54,400	74,400	134,000
Mexico	29,900	36,100	35,600	35,900
Switzerland	6,620	1,500	--	--
Other	2,880	2,450	24	39
Total	298,000	278,000	300,000	504,000
Base bullion, lead content:				
Canada	--	--	26	65
Japan	89	1,150	54	690
Mexico	79	88	73	93
Other	29	323	17	20
Total	197	1,560	170	868
Unwrought lead and lead alloys, lead content:				
Belgium	1,940	2,770	2,680	2,220
Brazil	54	43	210	239
Canada	3,120	3,780	5,400	6,950
China	3	19	143	126
France	4	3	73	63
Germany	396	265	834	612
Hong Kong	42	56	22	13
India	141	126	235	240
Indonesia	--	--	1,390	977
Israel	544	680	1,270	1,120
Italy	9	102	82	112
Japan	11	33	35	122
Korea, Republic of	25	23	706	1,400
Mexico	41,400	42,700	34,000	60,500
Philippines	31	68	1,640	1,870
Poland	125	116	--	--
Singapore	27	22	68	70
Spain	443	649	1,210	1,050
Taiwan	11	15	547	1,880
United Kingdom	4,190	6,020	441	837
Other	176 r	275 r	813	601
Total	52,700	57,800	51,800	81,000

See footnotes at end of table.

TABLE 11—Continued
U.S. EXPORTS OF LEAD, BY COUNTRY[1]

Country	2006 Quantity (metric tons)	2006 Value (thousands)	2007 Quantity (metric tons)	2007 Value (thousands)
Wrought lead and lead alloys, lead content:				
Belgium	236	$2,359	15	$22
Canada	3,187	8,229	2,121	3,997
China	663	1,478	203	273
Costa Rica	938	2,054	3	25
El Salvador	2	4	40	40
France	48	189	71	71
Germany	2,936	5,829	280	445
Haiti	8	20	54	55
Hong Kong	1,008	2,131	17	35
India	139	211	33	41
Ireland	140	284	--	--
Italy	70	158	4	5
Japan	401	1,202	70	122
Korea, Republic of	64	213	107	101
Malaysia	1,026	2,933	65	51
Mexico	3,031	7,082	1,111	1,547
Netherlands	216	967	1	14
Philippines	305	865	--	--
Singapore	80	214	80	76
Spain	31	122	20	46
Switzerland	27	73	--	--
Taiwan	60	813	6	5
United Kingdom	615	934	154	278
Other	608 r	1,792 r	156	277
Total	15,839	40,156	4,611	7,526
Scrap, gross weight:				
Australia	911	395	25	8
Belgium	957	352	230	76
Canada	81,616	22,538	76,031	34,129
Cayman Islands	8	17	1,642	367
China	2,142	1,225	7,923	4,123
Dominican Republic	30	27	848	351
Finland	--	--	229	50
France	520	115	792	175
Germany	61	21	514	201
Honduras	98	68	174	38
Hong Kong	485	161	2,668	1,793
India	6,944	3,641	14,746	6,057
Korea, Republic of	25,885	7,416	18,173	6,132
Mexico	52	110	544	172
Pakistan	122	27	--	--
United Kingdom	--	--	2,066	879
Other	1,103 r	1,081 r	2,232	808
Total	120,934	37,192	128,837	55,359

rRevised. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 12
U.S. IMPORTS FOR CONSUMPTION OF LEAD, BY COUNTRY[1]

Country	2006 Quantity (metric tons)	2006 Value (thousands)	2007 Quantity (metric tons)	2007 Value (thousands)
Base bullion:				
Canada	449	$512	--	--
Colombia	90	134	1,860	$3,720
Netherlands	--	--	60	118
Venezuela	--	--	67	169
Total	539	646	1,990	4,010
Pigs and bars, lead content:				
Argentina	75	101	18	32
Australia	9,230	9,540	--	--
Canada	222,000	284,000	208,000	457,000
China	41,700	50,100	613	2,400
Colombia	535	576	--	--
Germany	275	1,640	121	1,670
Italy	540	717	--	--
Mexico	15,800	13,800	35,600	60,300
Peru	34,600	45,500	16,500	43,300
Russia	1,920	1,920	1,120	3,780
United Kingdom	4,490	4,890	(2)	9
Venezuela	188	577	790	2,440
Other	20 r	47 r	38	66
Total	331,000	413,000	263,000	571,000
Reclaimed scrap, including ash and residues, lead content:				
Canada	309	467	609	1,200
Colombia	506	545	157	381
Guatemala	25	97	--	--
Mexico	645	407	584	540
Netherlands	--	--	126	107
United Kingdom	--	--	918	352
Other	71 r	133 r	33	165
Total	1,560	1,650	2,430	2,740
Wrought lead, all forms, including wire and powders, gross weight:				
Argentina	1,180	1,930	1,200	3,050
Australia	18	68	--	--
Austria	203	850	--	--
Canada	3,580	10,600	603	1,930
China	908	4,080	3	19
El Salvador	815	1,540	--	--
France	180	399	266	611
Germany	1,030	4,770	872	4,540
Mexico	2,470	3,940	168	417
New Zealand	56	819	133	892
Russia	556	1,050	522	584
Taiwan	216	784	20	162
United Kingdom	391	1,110	289	1,020
Other	490 r	3,530 r	109	397
Total	12,100	35,500	4,180	13,600

rRevised. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 13

LEAD: WORLD MINE PRODUCTION OF LEAD IN CONCENTRATE, BY COUNTRY[1, 2]

(Metric tons, lead content)

Country[3]	2003	2004	2005	2006	2007[e]
Argentina	12,079	9,551	10,683	12,778 [r]	12,800
Australia	688,000	674,000	767,000	686,000 [e]	641,000 [4]
Bolivia	9,740	10,267	11,231	11,955 [r]	12,000
Bosnia and Herzegovina[e]	-- [r]	850	1,100	1,200	1,200
Brazil	10,652	14,734	16,063	16,800 [e]	18,000
Bulgaria[e]	17,000	19,000	22,000	18,000 [r]	20,000
Burma[e]	2,000	2,000	2,000	2,000	2,000
Canada	81,264	76,730	79,252	81,529 [r]	82,000
Chile	1,697	2,286	878	672 [r]	1,305 [4]
China[e]	955,000	998,000	1,140,000	1,330,000 [r]	1,500,000
Georgia[e]	400	400	400	400	400
Greece[e]	2,000	--	1,500	10,500	15,000
Honduras	9,014	8,877	10,488	11,775	10,215 [4]
India	44,000	51,300	60,400	69,200 [r]	77,600
Iran[e, 5]	20,000	22,000	23,000	24,000 [4]	25,000
Ireland[e]	50,000	65,915 [4]	63,800	62,000	54,100
Italy[e]	2,000	600	800	800	800
Japan	5,660	5,512	3,437	777	--
Kazakhstan	37,500 [r]	33,000 [r]	31,000 [r]	48,100 [r]	40,200 [4]
Korea, North[e]	20,000	20,000	20,000	20,000	20,000
Korea, Republic of	--	40	50 [r]	17 [r]	12 [4]
Macedonia	2,600	-- [e]	-- [e]	15,600	17,000
Mexico	139,348	118,484	134,388	120,450 [r]	120,000
Morocco	38,600	31,300 [e]	45,800 [r]	53,000 [r]	44,800
Namibia	18,782	14,338	14,320	17,000 [r, e]	10,000
Peru	308,874	306,211	319,345	313,325	329,154 [4]
Poland	110,000 [r]	110,000 [r]	115,800 [r]	94,000 [r]	85,000
Romania	15,747 [r]	18,297 [r]	11,610 [r]	7,500	100
Russia[e]	24,000	23,000	36,000	36,000	50,000
Saudi Arabia[e]	60	30	-- [r]	-- [r]	--
Serbia[e]	2,000 [6]	2,000 [6]	1,600 [6]	6,000 [r]	7,000
South Africa	39,941	37,485	42,159	48,273	41,857 [4]
Spain	1,765	--	--	--	--
Sweden	51,000	55,000	61,000	76,800	62,100
Tajikistan[e]	800	800	800	800	800
Tunisia	5,000	5,470	8,708	-- [e]	--
Turkey[e]	16,000 [r]	17,000 [r]	19,000 [r]	15,000 [r]	20,000
United Kingdom[e]	700	500	500	500	500
United States	460,000	445,000	437,000	429,000	444,000 [4]
Vietnam	1,100 [e]	2,750	3,300	3,500 [e]	3,500
Total	3,200,000 [r]	3,200,000 [r]	3,520,000 [r]	3,650,000 [r]	3,770,000

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

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

[2]Table includes data available through June 26, 2008.

[3]In addition to the countries listed, lead is also produced in Nigeria, but information is inadequate to formulate reliable estimates of output levels.

[4]Reported figure.

[5]Year beginning March 21 of that stated.

[6]Montenegro and Serbia formally declared independence in June 2006 from each other and dissolved their union.

TABLE 14
LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY[1, 2]

(Metric tons)

Country[3]	2003	2004	2005	2006	2007
Algeria, secondary[e]	6,000	5,000	5,000	5,000	5,000
Argentina:					
Primary	11,011	11,111	10,607 [r]	12,064 [r]	12,000
Secondary	30,300	48,000	35,000 [e]	35,000 [e]	35,000 [e]
Total	41,311	59,111	45,607 [r]	47,064 [r]	47,000
Australia:					
Primary	270,000	232,000	230,000	206,000 [r]	202,000
Secondary	25,000	36,000	33,000	27,000 [e]	25,000 [e]
Total	295,000	268,000	263,000	233,000 [r]	227,000
Austria, secondary[e]	18,000	20,000	20,000	22,000	22,000
Belgium:[e]					
Primary[4]	45,000	43,000	63,400	34,000	97,200
Secondary	20,000	20,000	20,000	20,000	20,000
Total	65,000	63,000	83,400	54,000	117,000
Bolivia	50	84	33	500 [e]	500 [e]
Brazil, secondary	128,610	137,121	104,904	110,000 [e]	110,000 [e]
Bulgaria:[e]					
Primary	64,000 [r]	59,000 [r]	83,500 [r]	74,300 [r]	85,000
Secondary	9,000	10,000	10,000	10,000	10,000
Total	73,000 [r]	69,000 [r]	93,500 [r]	84,300 [r]	95,000
Burma, primary	888	289	907	537 [r]	500 [e]
Canada:					
Primary	118,506	131,717	109,795	110,000	110,000 [e]
Secondary	104,927	109,453	119,613	125,000	120,000 [e]
Total	223,433	241,170	229,408	235,000	230,000 [e]
China:[e]					
Primary	1,290,000	1,510,000 [r]	1,850,000 [r]	2,130,000 [r]	2,200,000
Secondary	290,000	430,000	537,000	590,000 [r]	800,000
Total	1,580,000	1,940,000 [r]	2,390,000 [r]	2,720,000 [r]	3,000,000
Colombia, secondary[e]	12,000	12,000	12,000	10,000 [r]	10,000
Czech Republic, secondary[e]	26,000	25,000	26,000	26,100 [r, 5]	26,000
El Salvador, secondary	8,000	10,000	10,000 [e]	10,000 [e]	10,000 [e]
Estonia, secondary	--	3,000	7,000 [e]	9,000 [r]	10,000
France:					
Primary	1,535 [r]	--	--	4,000	4,000 [e]
Secondary	95,155 [r]	105,600 [r]	104,979 [r]	100,195 [r]	100,200
Total	96,690 [r]	105,600 [r]	104,979 [r]	104,195 [r]	104,200
Germany:					
Primary	132,155	115,869	118,778	100,450 [r]	100,000 [e]
Secondary	224,700	243,304	229,332	220,000	220,000 [e]
Total	356,855	359,173	348,110	320,450 [r]	320,000 [e]
Greece, secondary	4,000	4,000	4,000 [e]	5,000 [e]	5,000 [e]
India:					
Primary	77,500	40,000	56,000	77,700 [r]	88,800
Secondary	41,000	25,000	35,000	35,000	35,000
Total	118,500	65,000	91,000	112,700 [r]	123,800
Indonesia, secondary	18,500	20,000	18,000	19,000	18,500

See footnotes at end of table.

TABLE 14–Continued
LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY[1, 2]

(Metric tons)

Country[3]	2003	2004	2005	2006	2007
Iran:[e]					
Primary	11,342 [5]	17,857 [5]	21,000	25,000	25,000
Secondary	47,000	50,000	50,000	50,000	50,000
Total	58,342 [5]	67,857 [5]	71,000	75,000	75,000
Ireland, secondary[e]	9,000	19,600	20,000	22,000	22,500
Israel, secondary	25,000	27,000	28,000 [r]	25,000 [r]	25,000 [e]
Italy:					
Primary	48,000	40,000	49,500	34,600 [r]	45,000
Secondary	198,000 [r, e]	162,000	162,000	155,900 [r]	165,000
Total	246,000 [r]	202,000	211,500	190,500 [r]	210,000
Japan:					
Primary	105,460	94,272	106,638	108,271	104,527
Secondary	189,831	188,603	167,980	171,143	171,795
Total	295,291	282,875	274,618	279,414	276,322
Kazakhstan, primary and secondary	133,178 [r]	157,016 [r]	135,446 [r]	115,974 [r]	117,641
Kenya, secondary	1,000	1,000	1,000 [e]	1,000 [e]	1,000 [e]
Korea, North, primary and secondary[e]	7,000	9,000	9,000	9,000	9,000
Korea, Republic of:					
Primary	169,297	173,609	180,784	163,370 [r]	176,000 [e]
Secondary[e]	60,000	55,780 [5]	55,800	56,000	60,000
Total	229,297	229,389	236,584	219,370 [r]	236,000 [e]
Macedonia:[e]					
Primary	6,000	--	--	--	--
Secondary	4,000	-- [r]	-- [r]	-- [r]	--
Total	10,000	-- [r]	-- [r]	-- [r]	--
Malaysia, secondary[e, 6]	57,000	54,000	71,000	73,000	73,000
Mexico:					
Primary[7]	137,482	107,414	116,539	102,498 [r]	102,000 [e]
Secondary[e]	110,000	110,000	110,000	110,000	110,000
Total	247,482	217,414	226,539	212,498 [r]	212,000 [e]
Morocco:					
Primary	61,473	35,000	35,000 [e]	38,000 [e]	45,000 [e]
Secondary[e]	3,000	3,000	4,000 [5]	3,000	3,000
Total	64,473	38,000	39,000 [e]	41,000 [e]	48,000 [e]
Netherlands, secondary[e]	17,000	17,000	20,000	18,000	17,000
New Zealand, secondary[e]	8,000	8,000	7,000	7,000	7,000
Nigeria, secondary[e]	5,000	5,000	5,000	5,000	5,000
Pakistan, secondary[e]	2,330	3,000	3,200	3,100	3,000
Peru, primary	112,289	118,970	122,079	120,311	116,774
Philippines, secondary[e]	27,000 [5]	29,000	30,000	29,000 [r]	30,000
Poland:[e]					
Primary	32,000	32,000	28,000	28,000	28,000
Secondary	42,000	42,000	59,600	59,600	60,000
Total	74,000	74,000	87,600	87,600	88,000
Portugal, secondary[e]	4,000	4,000	4,000	3,000	3,000

See footnotes at end of table.

TABLE 14–Continued
LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY[1, 2]

(Metric tons)

Country[3]	2003	2004	2005	2006	2007
Romania:[e]					
Primary	23,100	32,600	32,900	28,100	28,000
Secondary	5,000	5,000 [r]	5,000 [r]	5,000 [r]	5,000
Total	28,100	37,600 [r]	37,900 [r]	33,100 [r]	33,000
Russia, primary and secondary[e]	66,000	70,000	66,000	78,000	94,000
Saudi Arabia, secondary	25,000	32,000	36,000	38,000 [e]	38,000 [e]
Serbia, primary and secondary[e]	500 [8]	800 [8]	700 [8]	700	700
Slovenia, secondary[e]	15,000	15,000	15,000	15,400 [r]	15,500
South Africa, secondary	64,900	64,100	65,300	67,000 [e]	67,000 [e]
Spain, secondary[e]	102,000	105,000	110,000	131,000	130,000
Sweden:[e]					
Primary	24,200	21,500 [5]	27,400	26,000	26,000
Secondary	52,000	52,000 [5]	45,600	40,000	40,000
Total	76,200	73,500 [5]	73,000	66,000	66,000
Switzerland, secondary[e]	8,000	9,000	9,000	9,600 [5]	9,000
Taiwan, secondary	56,000	56,000	55,000	55,000	55,000
Thailand, secondary	45,300	57,500	61,200	61,200 [e]	61,200 [e]
Trinidad and Tobago, secondary[e]	1,000	1,000	1,000	1,000	1,000
Tunisia, secondary[e]	3,000	6,000	7,000	8,000	9,000
Turkey, secondary[e]	6,000	6,000	6,000	6,000	6,000
Ukraine, secondary[e]	7,000	7,000 [r]	6,000 [r]	6,000 [r]	6,000
United Arab Emirates, secondary[e]	2,000	2,000	2,000	2,000	2,000
United Kingdom:					
Primary	196,000 [r]	125,938	161,350 [r]	163,700 [r]	150,000
Secondary	169,574	120,000	143,000	144,000	150,000
Total	365,574 [r]	245,938	304,350 [r]	307,700 [r]	300,000
United States:					
Primary	245,000	148,000	143,000	153,000	123,000
Secondary	1,140,000	1,130,000	1,150,000	1,160,000	1,180,000
Total	1,380,000	1,280,000	1,300,000	1,310,000	1,300,000
Venezuela, secondary[e]	30,000	30,000	30,000	30,000	30,000
Zambia, secondary[e]	1,000	1,000	1,000	1,000	1,000
Grand total	6,990,000 [r]	7,070,000	7,640,000 [r]	7,890,000 [r]	8,280,000
Of which:					
Primary	3,180,000 [r]	3,090,000	3,550,000 [r]	3,740,000 [r]	3,870,000
Secondary	3,600,000 [r]	3,740,000	3,880,000 [r]	3,950,000 [r]	4,190,000
Undifferentiated	207,000 [r]	237,000 [r]	211,000 [r]	204,000 [r]	222,000

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

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

[2]Table includes data available through June 26, 2008. Data included represent the total output of refined lead by each country, whether derived from ores and concentrates (primary) or scrap (secondary), and include the lead content of antimonial lead but exclude, to the extent possible, simple remelting of scrap.

[3]In addition to the countries listed, Egypt and Iraq produced secondary lead, but output is not officially reported; available general information is inadequate for the formulation of reliable estimates of output levels.

[4]Derived by calculating reported total lead output plus exports of lead bullion minus imports of lead bullion.

[5]Reported figure.

[6]Metal Reclamation Industries' secondary lead smelter is receiving some primary mine concentrates from the Magellan Mine (Australia). The ore minerals are lead oxides and can be smelted at a secondary smelter.

[7]Includes lead content in antimonial lead.

[8]Montenegro and Serbia formally declared independence in June 2006 from each other and dissolved their union.