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LEAD

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LEAD

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Domestic lead mine production decreased by 2% compared with that of 2005. Alaska and Missouri were the principal producing States with a 94% share. Other appreciable lead mine production was in Idaho, Montana, and Washington. Lead was produced at 10 U.S. mines employing about 1,100 people. The value of domestic mine production was about $715 million. A significant portion of the lead concentrates produced from the mined ore was processed into primary metal at a smelter-refinery in Missouri.

Secondary lead, derived principally from scrapped lead-acid batteries, accounted for 88% of refined lead production in the United States. Nearly all the secondary lead was produced by 7 companies operating 13 smelters.

Monthly sales of lead from the National Defense Stockpile (NDS) continued during 2006. Disposals from inventory totaled about 23,500 metric tons (t) (25,900 short tons), leaving about 20 t (22 short tons) of uncommitted material in the NDS at yearend. Also during 2006, other U.S. Government agencies issued proposed and final rules on matters affecting the lead industry, announced funding availability for eliminating lead hazards, issued a notice requesting comment on a proposed lead test kit for use in renovation activities, and requested guidance in establishing industry guidelines for lead limits in candy likely to be consumed frequently by small children.

Lead was consumed in about 110 U.S. plants to manufacture end-use products, including ammunition, batteries, building-construction materials, covering for power and communication cable, electrical/electronic components and accessories, metal containers, and solders for motor vehicles.

Lead-acid batteries, including starting-lighting-ignition (SLI) and industrial types, continued to be the overwhelmingly dominant use of lead, accounting for about 89% of reported lead consumption. SLI battery shipments in North America totaled 116.9 million units in 2006, a marginal 1.0% decrease from those of 2005. This total included original equipment and replacement automotive-type batteries. An estimated 1.25 million metric tons (Mt) of lead was contained in new SLI batteries shipped during the year.

Lead prices increased during the year. The average London Metal Exchange (LME) and North American Producer prices were up by $0.138 per pound and $0.164 per pound, respectively, in 2006, from the average prices of $0.442 per pound and $0.610 per pound, respectively, in 2005.

Of the 38 countries in which lead was mined, the top 5 accounted for 79% of the world's total production of 3.47 Mt. China was the leading producer, with 35% of the world total, followed by Australia, 20%; the United States, 12%; Peru, 9%; and Mexico, 3%. Worldwide reserves of lead contained in demonstrated resources in producing and nonproducing deposits at yearend were estimated to be 67 Mt by the U.S. Geological Survey (USGS). Reserves for the three leading producers in the world—Australia, China, and the United States—were about 15 Mt, 11 Mt, and 8.1 Mt of contained lead, respectively (Gabby, 2007, p. 92-93).

Legislation and Government Programs

Monthly sales of lead from the NDS continued during 2006 under Basic Ordering Agreement (BOA) DLA-Lead-005. As a result of the BOA sales and the delivery of previously committed inventory, lead disposal from stockpile inventory during 2006 totaled about 23,500 t (25,900 short tons). The Defense National Stockpile Center's Annual Materials Plan (AMP) approved by the U.S. Congress for fiscal year 2006 included a maximum sales authority for lead of 54,400 t (60,000 short tons) with the actual quantity being limited to the remaining inventory (Defense National Stockpile Center, 2005). Under this authority, disposal of lead from NDS inventory during the first 9 months of calendar year 2006 was 23,100 t (25,500 short tons). The AMP approved by the U.S. Congress for fiscal year 2007 included a maximum sales authority for lead of 31,800 t (35,000 short tons) with the actual quantity also being limited to the remaining inventory (Defense National Stockpile Center, 2006). Under the fiscal year 2007 authority, disposal of lead from NDS inventory during the final 3 months of calendar year 2006 amounted to 400 t (440 short tons), leaving 20 t (22 short tons) of lead uncommitted at yearend.

In mid-January, the U.S. Environmental Protection Agency (EPA) proposed new requirements to reduce exposure to lead hazards created by renovation, repair, and painting activities that disturb lead-based paint. The proposal would establish requirements for training renovators and dust sampling technicians; certifying renovators, dust sampling technicians, and renovation firms; and accrediting providers of renovation and dust sampling technician training. The proposal would apply to all rental and owner-occupied housing built from1960 through 1977 (U.S. Environmental Protection Agency, 2006f). Subsequently, the EPA held several meetings to receive comments from the public on this proposal (U.S. Environmental Protection Agency, 2006e). In addition, a cost-benefit analysis associated with the proposed rulemaking, as well as a renovation-specific information pamphlet were made available to the general public (U.S. Environmental Protection Agency, 2006b, d). The pamphlet provided information on lead-based paint hazards in the home with emphasis on lead testing, contractor selection, specific renovation precautions, and proper cleanup procedures. The EPA also requested public comments on the development of lead test kits or similar technologies for use by renovators, repair persons, and painters (U.S. Environmental Protection Agency, 2006c).

In late January, the U.S. Department of the Interior's Fish and Wildlife Service issued a final rule approving four additional gun shot formulations as virtually nonlead types of ammunition for hunting waterfowl. These included tungsten-iron-copper-nickel, iron-tungsten-nickel, tungsten-bronze, and tungsten-tin-iron formulations. The environmentally acceptable level of residual lead in these forms of shot is less than 1%. Under authority contained in the Migratory Bird Treaty Act of 1918, the Fish and Wildlife Service controls the hunting of migratory game birds and, since the mid-1970s, has sought to identify shot that does not pose a significant toxicity hazard in feeding areas of migratory birds or other wildlife (U.S. Department of the Interior, Fish and Wildlife Service, 2006).

In mid-July, the EPA proposed several regulatory changes to the national primary drinking water regulations for lead and copper that focused on the areas of customer awareness, lead service line replacement, monitoring, and treatment processes. The proposed changes would not affect the basic requirements of existing lead and copper regulations, maximum contaminant level goals, or lead and copper action levels (U.S. Environmental Protection Agency, 2006g).

The EPA published a final rule in late July that amended its regulations under the Resource Conservation and Recovery Act (RCRA) to effectively streamline management requirements for recycling of used cathode ray tubes (CRT) and glass removed from CRTs. The amendments exclude these materials from the RCRA definition of solid waste under certain conditions, and thus encourage recycling and reuse of these items. All parties who send used CRTs and CRT glass for recycling, as well as those who conduct such recycling, are likely to be affected by the amended rule. CRTs derived from individual households are exempt, however, from Federal hazardous waste management requirements, even when the items are sent for recycling or disposal. Also conditionally exempt are nonresidential generators of less than 100 kilograms per month of hazardous waste, including CRTs (U.S. Environmental Protection Agency, 2006a).

In mid-September, the U.S. Department of Housing and Urban Development announced funding availability for its Lead Hazard Reduction Program under the agency's discretionary grant programs. Grants were available for three lead programs. These included the Lead-Based Paint Hazard Control Program, which assists States, Native American tribes, and local governments in undertaking comprehensive programs to identify and control lead-based paint hazards in eligible, privately owned housing used as rented or owner-occupied dwellings; the Lead Hazard Reduction Demonstration Program, which is similar to the Lead Hazard Control Program, but is targeted for urban jurisdictions with the most significant lead-based paint hazard control needs; and the Lead Elimination Action Program, which addresses lead hazards in privately owned housing for the purpose of eliminating lead as a public health threat to young children (U.S. Department of Housing and Urban Development, 2006).

Late in 2006, the U.S. Department of Health and Human Services' Food and Drug Administration (FDA) announced the availability of a final guidance document for industry pertaining to lead levels in candy. The guidance provided a maximum recommended lead level in candy likely to be consumed frequently by small children. In the production of candy and candy ingredients, this level was considered to be achievable with the use of good manufacturing practices. The recommended level was consistent with the FDA's policy of reducing lead exposure in the food supply to the lowest level that can practicably be obtained. (U.S. Department of Health and Human Services, Food and Drug Administration, 2006).

In December, the EPA issued a final rule revising the Toxic Release Inventory (TRI) reporting requirements, effectively reducing TRI reporting burden. TRI reporting is required by the Emergency Planning and Community Right-to-Know Act and the Pollution Prevention Act. The final rule expanded the non-persistent bioaccumulative and toxic (non-PBT) chemical eligibility reporting requirement on EPA Form A to 5,000 pounds of total annual waste management material, provided non-PBT chemicals compose no more than 2,000 pounds of the material. Prior to the EPA's revision, the qualification for use of Form A required that total annual production of waste management material be 500 pounds or less. Users of Form A need only report the name of the subject chemical(s) and certain facility identification information, whereas more detailed toxic release and waste management information is required to be reported on a separate form if not qualified to use Form A. The EPA's revised rule also allows for limited use of Form A for persistent bioaccumulative and toxic (PBT) chemicals when total annual releases of PBT chemicals are zero, and the total annual quantity of PBT chemicals recycled, combusted for energy, or treated for destruction does not exceed 500 pounds. The revised rule continued to provide important information to the public as well as promote recycling and treatment processes as alternatives to disposal and other forms of toxic release (U.S. Environmental Protection Agency, 2006h). In a related action, the EPA announced its intention to maintain the existing TRI reporting frequency. In September 2005, the agency had notified the U.S. Congress of its intent to explore potential approaches for modifying the existing annual reporting frequency. Alternate year reporting was, at that time, being considered as a possible reporting option (U.S. Environmental Protection Agency, 2006i).

Production

Primary.—In 2006, domestic mine production of lead decreased by about 7,000 t, or 2%, compared with that of 2005. The major share of the U.S. mine output of lead continued to be derived from production in Alaska and Missouri. Appreciable lead mine production also was reported in Idaho, Montana, and Washington. Domestic mine production data were collected by the USGS from a precious metal and base-metal voluntary survey on lode-mine production. All lead-producing mines responded to the survey. The lead concentrate produced from the mined ore was processed into primary metal at a smelter-refinery in Missouri (tables 1-4).

The Doe Run Resources Corporation (St. Louis, MO) produced primary lead at a smelter-refinery facility in Missouri. Concentrates for the smelter-refineries 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. The company reported the development of a drift connecting an existing production shaft to a new ore body called RC West Fork. Production from the new ore body was expected to begin by yearend 2006 (Doe Run Resources Corporation, 2006).

Teck Cominco Alaska Inc. (a wholly owned subsidiary of Teck Cominco Limited, Vancouver, British Columbia, Canada) operated the Red Dog zinc-lead mine in northwestern Alaska under a leasing agreement with NANA Regional Corporation, the sole owner of the property. NANA is a corporation organized under the provisions of the Alaska Native Claims Settlement Act of 1971. During 2006, production of lead in concentrate at Red Dog increased by 21.6% to 124,000 t compared with 102,000 t in 2005. Proven ore reserves at Red Dog, as of December 31, 2006, were estimated to be 16 Mt grading 20.2% zinc and 5.6% lead (Teck Cominco Limited, 2007).

Teck Cominco's Pend Oreille zinc-lead mine near Metaline Falls, WA, produced 5,000 t of lead in concentrates in 2006 compared with 8,000 t in 2005. Estimated production in 2007 is 8,000 t of lead in concentrate. Proven ore reserves at Pend Oreille, as of December 31, 2006, were estimated to be 1.5 Mt grading 6.8% zinc and 1.2% lead (Teck Cominco Limited, 2007).

Hecla Mining Company (Coeur d'Alene, ID) operated the Lucky Friday Mine in Mullan, ID, which it has owned and operated for 50 years. Lucky Friday is an underground silver-lead mine that reportedly was the deepest operating mine in the United States, with operations 1.8 kilometers (km) below the surface. Activities including a mill upgrade and further development at the current mining level resulted in increased production during the year. The mill upgrade included increased flotation capacity, a third-stage crushing system, a new flash cell, new column cells, and concentrate thickeners. Concentrates at Lucky Friday were produced in a 910-metric-ton-per-day (t/d) conventional flotation mill. In 2006, ore was processed at a rate of about 690 t/d, and production increased by 14% compared with that in 2005 to a level of 15,100 t of lead contained in concentrates. All silver, lead, and zinc concentrate production from the Lucky Friday operation was shipped to Teck Cominco's smelter in Trail, British Columbia, Canada, in 2006. The mine's proven and probable ore reserves of lead, silver, and zinc were estimated to be 1.24 Mt grading 8.2% lead, 2.9% zinc, and 456 grams per ton (g/t) (13.3 troy ounces per short ton) silver at yearend 2006 (Hecla Mining Company, 2007).

Hecla Mining also held a 29.73% interest in the Greens Creek Mine, an underground mine on Admiralty Island near Juneau, AK, through a joint-venture arrangement with Kennecott Greens Creek Mining Company (the manager) and Kennecott Juneau Mining Company (wholly owned subsidiaries of Kennecott Minerals Company). The Greens Creek unit is a polymetallic, stratiform, massive sulfide deposit lying within the Admiralty Island Monument area and includes 17 patented lode claims and 1 patented mill site claim. The unit also includes property leased from the U.S. Department of Agriculture's Forest Service and has title to mineral rights on Federal land adjacent to the properties (Hecla Mining Company, 2007).

In 2006, 1,900 t/d of ore was mined and then milled onsite at Greens Creek to yield lead, zinc, and bulk concentrates as well as gold-silver dore. At yearend 2006, Hecla Mining reported total production of lead in concentrate of 19,100 t compared with 19,900 t in 2005. Proven and probable reserves at Greens Creek at yearend 2006 were estimated to be 7.0 Mt grading 10.4% zinc, 4.0% lead, 494 g/t (14.4 ounces per short ton) silver, and 3.77 g/t (0.11 ounce per short ton) gold (Hecla Mining Company, 2007).

In August, hydroelectric power was supplied to the Greens Creek facilities by Alaska Electric Light and Power Company (AEL&P) via a submarine cable. In the past, Greens Creek was powered completely by diesel generators located onsite but an agreement was settled during 2005 to purchase excess hydroelectric power from the local power company, and installation of necessary infrastructure was completed in 2006. Hydroelectric power was expected to replace 20% to 30% of the total power needs at Greens Creek through 2008. The construction of a new hydroelectric plant by AEL&P was estimated to have the capacity to supply 95% of Greens Creek power needs. The completion of the hydroelectric plant was anticipated by 2009 (Hecla Mining Company, 2007).

In 2006, Apollo Gold Corp.'s Montana Tunnels open pit mine near Helena, MT, produced 543 t of lead, 1,380 t of zinc, 154 kilograms (kg) (4,960 troy ounces) of gold, and 3,600 kg (116,000 troy ounces) of silver. Following the suspension of mining in mid-October 2005 because of pit wall instability, the mill produced gold dore and lead-gold and zinc-gold concentrate from low-grade ore stockpiles until May 2006, when the property was placed on care and maintenance. In July, Apollo entered into a joint venture with Elkhorn Tunnels, LLC, in which Elkhorn was granted 50% interest in the Montana Tunnels mine. An open pit wall remediation program was then started in August, which included a planned removal of 7 Mt of waste from the unstable areas of the east and southeast sectors of the pit wall during a 6-month period, followed by the rebuilding of the access ramp to the pit. The mill was expected to restart operations in February 2007 (Apollo Gold Corporation, 2007).

Secondary.—Domestic secondary production increased slightly in 2006. Secondary lead accounted for 88% of domestic lead refinery production, compared with 89% in 2005. Lead-acid batteries continued to be the dominant source of recoverable lead scrap, accounting for 91% 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 15 companies producing secondary lead, exclusive of that produced from copper-base scrap, were canvassed; 14 responded, representing more than 99% of the total production of secondary lead. Of the total lead recycled in 2006, about 99% was produced by 7 companies operating 13 plants in Alabama, California, Florida, Indiana, Louisiana, Minnesota, Missouri, New York, Pennsylvania, and Texas. Production and consumption for the nonrespondents were estimated by using prior-year levels as a basis (tables 1, 5-9).

At the end of the year, Firefly Energy Inc. (Chicago, IL) developed a carbon-graphite foam lead-acid battery that reportedly resulted in improved battery efficiency along with environmental advantages. The patented carbon-graphite foam grid technology involves substituting coated lightweight foam

grids for the heavy lead grids in standard lead-acid batteries. The new product reportedly has the potential to extend battery life along with significantly reducing the size and weight associated with lead-acid batteries. The coated foam grids were estimated to require about 80% less lead than was used in the standard lead-acid battery. Firefly Energy had planned to commence production of the battery by the fourth quarter of 2007 (CRU Lead Monitor, 2006d, p. 10).

Shipments of SLI replacement batteries in North America totaled 96.0 million units in 2006, a marginal 0.4% decrease from those of 2005. Shipments of SLI original equipment automotive batteries were 20.9 million units in 2006 or 3.7% less than in 2005. U.S. imports of SLI batteries fell slightly in 2006 compared with those imported in 2005, but the 22.9 million units imported remained nearly 17% above the import level reported in 2004 (CRU Lead Monitor, 2007, p. 10).

Consumption

Reported U.S. consumption of lead increased by about 5% in 2006. Increases were noted in the lead-acid storage battery, ammunition, bearing metal, and copper-base alloy end-use sectors. Consumption of lead in SLI- and industrial-type lead-acid storage batteries represented 90% of the total reported consumption of lead. Industrial-type batteries included stationary batteries (such as those used in uninterruptible power-supply equipment for hospitals, computer and telecommunications networks, and load-leveling equipment for commercial electrical power systems) as well as traction batteries (such as those used in industrial forklifts, airline ground equipment, and mining vehicles) (tables 5-9).

Foreign Trade

In 2006, unwrought lead metal imports were 331,000 t, an 11% increase from those of 2005. Total exports of unwrought lead increased by 16% to 52,700 t. Net exports of unwrought lead metal to Mexico were 25,600 t, a 4% increase from those of 2005. In addition, 29,900 t of lead in lead concentrate was exported to Mexico. In 2006, however, 15.3 million lead-acid batteries, mostly for use in cars and light trucks, were imported from Mexico (tables 10-12).

Prices

Lead prices continued to increase significantly during the year. The increasing demand for lead in China, Southeast Asia (particularly India), and many countries in Eastern Europe continued to affect the world market. The average LME and North American Producer prices were up by $0.138 per pound and $0.164 per pound, respectively, in 2006, from the average prices of $0.442 per pound and $0.610 per pound, respectively, in 2005.

World Review

World mine production of lead increased by 20,000 t, or 1%, to 3.47 Mt in 2006 from that of 2005. Of the 38 countries in which lead was mined, the top 5 accounted for 79% of the world's total production. China was the leading producer, with 35% of the world total, followed by Australia, 20%; the United States, 12%; Peru, 9%; and Mexico, 3% (table 13).

World production of refined lead increased to 8.02 Mt in 2006 from 7.69 Mt in 2005 (table 14). Other statistics for 2006, as reported by the International Lead and Zinc Study Group, were as follows: world consumption increased to 7.97 Mt from 7.81 Mt in 2005, and commercial stocks of refined lead in industrialized countries at yearend 2006 were 291,000 t, or 2 weeks of consumption, compared with 295,000 t at yearend 2005 and 299,000 t at yearend 2004 (Monthly Bulletin of the International Lead and Zinc Study Group, 2007).

European Union.—In May, the European Union (EU) reached agreement on new battery recycling regulations. The goal of the new regulations was to manage the collection and recycling of all batteries and to prevent their incineration and disposal in the EU. Under the agreement, collected batteries were required to be recycled, and a recycling target was set at 50% of all batteries not containing cadmium or lead. The recycling targets for batteries containing cadmium and lead were 75% and 65%, respectively. According to the EU, 800,000 t of automotive batteries, 190,000 t of industrial batteries, and 160,000 t of portable batteries were placed on the EU market annually (Platts Metals Week, 2006c).

Beginning in July, the Restriction of Hazardous Substances (RoHS) Directive took effect in the EU, restricting the use of lead in the manufacture of electronic products. In addition to lead, the directive also bans the use of cadmium, hexavalent chromium, mercury, polybrominated biphenyls, and polybrominated diphenyl ether. The directive was approved in February 2003 and is closely related to the Waste from Electrical and Electronic Equipment Directive, which sets collection, recycling, and recovery targets for electronic waste (CRU Lead Monitor, 2006c).

Australia.—Operations at the Lennard Shelf Pillara Mine, located in the Kimberley region of Western Australia, were expected to commence in the first quarter of 2007. The Pillara Mine had been on care and maintenance since October 2003. The Lennard Shelf operations are owned by Teck Cominco (50%) and Xstrata plc (50%) through Lennard Shelf Pty. Ltd. The estimated production rate at Pillara is 15,000 metric tons per year (t/yr) of lead in concentrates with an anticipated mine life of 4 years (Teck Cominco Limited, 2007).

In May, Zinifex Limited (Melbourne) planned an additional 3-year exploration and development program called Project Horizon at the underground Rosebery Mine in Tasmania. Exploration results during 2006 reportedly revealed additional resources that would effectively replace that which had already been mined from the Rosebery site. The project involved drilling untested parts of the leased mine area which had the potential to extend the mine life to beyond 2020; current mine life stands at 6 years (CRU Lead Monitor, 2006e).

Lead in concentrate production at the Century Mine, also owned by Zinifex, was 17,000 t, a 40% increase from that of the previous year. The mine in Northwest Queensland experienced higher average lead ore grades through the first half of the year. Output of lead and silver at the mine was projected to decline in

2007, however, owing to planned mining of lower grades of ore (CRU Lead Monitor, 2006g).

Zinifex anticipated the completion of a full feasibility study in early 2007 at its Dugald River Project in Queensland. The company was then expected to begin the development of an estimated 200,000-t/yr mine. Resources at Dugald River reportedly were among the most significant in the world, containing high grades of lead, silver, and zinc (Platts Metals Week, 2006b).

CBH Resources Ltd. (Sydney) completed the acquisition of Triako Resources Ltd. (Sydney) in May and commenced work on the development of resources at the acquired Hera Project and Mineral Hill Mine. The Hera Project has an estimated resource of 1.94 Mt grading 2.8% zinc, 2.5% lead, 6.7 g/t gold, and 14 g/t silver. In December, CBH Resources restarted full production at its Endeavor Mine located in central New South Wales. The mine had closed following a stope failure in October 2005. Production at Endeavor was estimated to be 90,000 t/yr of lead and 180,000 t/yr of zinc in concentrate (CRU Lead Monitor, 2006e).

Beginning in the second quarter, 2006 BHP Billiton Ltd's. production of lead in concentrate decreased from that in 2005. The temporary closure of the southern zone at its Cannington Mine contributed to the decrease in production of concentrate. The closure was necessary in order to complete the decline and stope access improvement program at the Cannington Mine, a program primarily targeted to ensure the safety of employees and contractors. Following completion of the program in November, BHP expected to return to its normal production level of about 24,000 metric tons per month (t/mo) of lead in concentrate by early 2007 (CRU Lead Monitor, 2006g).

Ivernia Inc. (Toronto, Ontario, Canada) increased the daily mill throughput rate at its Magellan Mine in Western Australia by nearly 50% following the installation of a secondary ball mill in early August. Subsequently, Ivernia planned a mill throughput rate of 116,000 t/mo. Proven and probable reserves at Magellan were reported to be 16.2 Mt grading 6.2% lead (CRU Lead Monitor, 2006h).

In October, Xstrata plc (Zug, Switzerland) received final approval to convert the mining method at its McArthur River zinc-lead mine in Australia's Northern Territory from underground to opencast mining. The mine method change was projected to extend the mine's life by 25 years, with an ore production rate of 1.8 million metric tons per year (Mt/yr) (CRU Lead Monitor, 2006i). At its Mount Isa operations, Xstrata planned to raise concentrate production by 60% in 2008. By the second half of 2008, Xstrata expected to bring ore treatment capacity to 8 Mt/yr as a result of mill renovation and expansion (CRU Lead Monitor, 2006g).

Bolivia.—In May, Apogee Minerals Ltd. (Toronto) completed sole ownership of the La Solucion silver-lead-zinc mine in Colquecahua after acquiring an initial 51% interest in the mine in February 2005. Apogee Minerals undertook the second phase of its regional exploration program at the property during 2006. For the previous 14 years, approximately 100 t/d of ore had been treated at La Solucion Mine to produce silver-zinc-lead concentrates (CRU Lead Monitor, 2006e).

In September, Sumitomo Corporation (Tokyo, Japan) acquired a 35% interest in the San Cristobal silver-lead-zinc mine in southwestern Bolivia from Apex Silver Mines Ltd. (Grand Canyon, Cayman Islands) which holds the remaining 65% interest in the mine. Apex began development and construction of San Cristobal in early 2005. This mine project was continued through 2006. Production at San Christobal was scheduled to begin during the third quarter of 2007 and was expected to be about 82,000 t/yr of lead, 225,000 t/yr of zinc, and 480 t/yr (16.9 million ounces) of silver in concentrates (Apex Silver Mines Ltd., 2006; CRU Lead Monitor, 2006h).

Canada.—Breakwater Resources Ltd. (Toronto) and Virginia Mines Inc. (Quebec City, Quebec) signed a joint-venture agreement in May on the Coulon zinc, lead, silver, and copper project, located in the James Bay region of Quebec. The agreement stipulated that Breakwater Resources would invest Can$6.5 million in exploration expenditures to the joint venture and cash payments totaling Can$180,000 to Virginia Mines during an 8-year period. In return, Breakwater Resources would have the option of acquiring a 50% interest in the Coulon property. Virginia Mines would be the operator of the project until a prefeasibility study was completed (Virginia Mines Inc., 2006).

China.—In February, Red Dragon Zincorp Ltd. (Vancouver) (a subsidiary of Red Dragon Resources Corporation) entered into a joint-venture contract with Tibet Baoming Industry & Trade Ltd. (China), which owns exploration permits for the Weixi lead-zinc project located in Yunnan Province. At the end of 2006, the joint-venture agreement with Tibet Baoming Industry & Trade was amended to also include the copper mine area originally excluded from the contract. An exploration program was conducted, which focused on the Weixi District where Red Dragon reportedly identified numerous high-grade lead-zinc resources over an 18-km strike length. In 2007, Red Dragon planned to complete a systematic exploration program consisting of mapping, geochemistry, and drilling to identify and delineate potential deposits of economic mineralization (Red Dragon Resources Corporation, 2007, p. 16).

In March, SembCorp Environmental Management of Singapore and Jiangsu Chunxing Alloy Co. Ltd., China's leading lead recycler, set up a 50-50 joint-venture company, Jiangsu SembCorp Chunxing Alloy. The new company planned to raise production capacity progressively to 1 Mt/yr of secondary lead and lead alloys through its Chinese and foreign operations. Current total secondary lead production capacity at Jiangsu's lead recycling facilities in China was 130,000 t/yr. An investment by SembCorp included expansions at facilities owned by Jiangsu in seven locations, which would then increase capacity to 315,000 t/yr of lead and lead alloys by 2007 (Platts Metals Week, 2006a, p. 7).

In Chifeng, Inner Mongolia, the Inner Mongolia Baiyinhanshan Mining and Metallurgy Group began development of a new lead smelter in May. Planned production capacity of the smelter was 6,000 t/yr of lead. Production was expected to begin in June 2007 (Antaike Lead, Zinc & Tin Monthly, 2006).

In July, Huludao Zinc Industry Co., Ltd. started its new lead and zinc smelter in Liaoning Province. The smelter has the capacity to produce 30,000 t/yr of lead and 60,000 t/yr of zinc. The new smelter would provide Huludao with lead output

for the first time and would boost the company's estimated total zinc production capacity to 390,000 t/yr from the current 330,000 t/yr (CRU Lead Monitor, 2006j).

China's leading tin producer, Yunnan Tin Co. Ltd., made plans to expand lead capacity to 100,000 t/yr from 20,000 t/yr. In August, Yunnan signed a smelting contract with Ausmelt Ltd. (Melbourne) to achieve the lead expansion goal. According to the contract, Ausmelt provided lead smelting technology, design engineering services, commissioning services, and equipment to Yunnan Tin. The company expected the expansion project would be completed by 2009 (Platts Metals Week, 2006e).

In December, Yunnan Chihong Zinc & Germanium Co., Ltd. received approval to acquire the lead-zinc Yunnan Zhaotong Mine from Yunnan Metallurgical General Company. In 2007, Yunnan Chihong planned to raise the milling capacity to 150,000 t/yr from the 2006 capacity of 100,000 t/yr, which would yield an estimated 3,000 t/yr of lead in concentrate. The Yunnan Zhaotong Mine in Zhaotong City, Yiliang County, had a mine life of 16 years in 2006. Yunnan Chihong produced 22,300 t of refined lead in the first 10 months of 2006 (CRU Lead Monitor, 2006b).

India.—Hindustan Zinc Limited (a subsidiary of Vedanta Resources plc) commissioned its 50,000 t/yr capacity lead expansion project at the Ausmelt lead plant in Chanderiya in March. Plans for operation at full production capacity were extended from midyear 2006 into early 2007. The expansion project increased the company's capacity to 85,000 t/yr from 35,000 t/yr of lead in concentrates (Mining Journal, 2006; Vedanta Resources plc, 2006).

Indonesia.—Herald Resources Ltd. (West Perth, Australia) announced plans to proceed to full construction activity at the Dairi lead-zinc project in the Dairi Regency in North Sumatra, pending approval from the Minister of Forestry. The Dairi project is an 80/20 joint venture between Herald Resources and PT Aneka Tambang (Jakarta). The Dairi area reportedly was one of the highest grade undeveloped lead-zinc properties in the world, and the mine was expected to produce about 684,000 t of lead concentrate grading 64% lead during an estimated mine life of 7 years. Production at the Dairi Mine was scheduled to begin during the fourth quarter of 2007 (CRU Lead Monitor, 2006h).

Peru.—Production of lead at Compania Minera Milpo S.A.A.'s El Porvenir mine was expected to be about 19,000 t of lead in concentrate in 2006. The company's lead concentrate production during the first half of 2006 had increased by 19% on a year-on-year basis. Also, Compania Minera Milpo planned to begin production at its Cerro Lindo lead-zinc-copper mine by midyear 2007. Production capacity at Cerro Lindo was projected to be 15,000 t/yr of lead in concentrate (CRU Lead Monitor, 2006g).

In late May, the Energy and Mines Ministry of Peru approved a request by Doe Run Peru (a subsidiary of Doe Run Resources Corporation) to extend the project deadline for the construction of three sulfuric acid plants at its La Oroya smelter. Under the original environmental improvement program (PAMA), the construction of all three plants was to be completed by the end of 2006. In the modified PAMA, the construction of the zinc, lead, and copper circuits was extended to December 31, 2006, September 30, 2007, and October 31, 2009, respectively (Platts Metals Week, 2006d).

Portugal.—EuroZinc Mining Corporation received approval from the Government of Portugal to commence its Aljustrel lead-zinc mining project in May. Development and infrastructure preparation work proceeded at Aljustrel soon after the approval with a target mine startup date in September 2007. The Aljustrel Mine was expected to produce an average of 18,200 t/yr of lead in concentrate. EuroZinc Mining, which merged with Lundin Mining Corp. (Vancouver) in October and operated as Lundin Mining Corp., reportedly produced 45,100 t of lead in concentrate in 2006 (CRU Lead Monitor, 2006f; EuroZinc Mining Corporation, 2007).

Russia.—Lundin Mining reached a settlement with East Siberian Metals (a subsidiary of IFC Metropol) to acquire 49% of the Ozernoye lead-zinc mining project. The Ozernoye property, located in the Republic of Buryatia, was estimated to contain 157 Mt of ore grading 5.2% zinc and 1% lead. Construction of the mine began in July, and initial startup of the operation was expected in 2008. Lead and zinc concentrates produced at the mine would be transported to smelters, primarily in China, Japan, the Republic of Korea, and Russia, via the Trans-Siberian railway (CRU Lead Monitor, 2006h).

Spain.—In June, Lundin Mining AB (a subsidiary of Lundin Mining) acquired the lead-zinc-silver Toral property and planned to undertake exploration activities for the next 3 years. Based on an historical estimate, the property was estimated to contain 4.7 Mt of resources, grading 9.8% zinc and 7.6% lead, as well as a significant quantity of silver. The decision to commence operations at the Toral Mine was expected to be made in 2007 (CRU Lead Monitor, 2006f).

Outlook

Sales of refined lead metal for automotive batteries and industrial batteries for telecommunications and information technology industries were expected to continue to be a prominent factor for future growth in global lead consumption. The growth of hybrid electric vehicles using alternative battery technologies, such as nickel metal hydride and lithium-ion, could result in some decline in lead demand for SLI batteries, but not substantially for the immediate future (CRU Lead Monitor, 2006a).

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TABLE 1
SALIENT LEAD STATISTICS[1]

		2002	2003	2004	2005	2006
United States:						
Production:						
Mine, recoverable lead content:[2]						
Quantity	metric tons	440,000	449,000	430,000	426,000	419,000
Value	thousands	$423,000	$433,000	$523,000	$574,000	$715,000
Primary lead, refined, lead content:						
Domestic ores and base bullion	metric tons	262,000	245,000	148,000	143,000	153,000
Foreign ores and base bullion	do.	(3)	--	--	--	--
Secondary lead, lead content	do.	1,100,000	1,140,000	1,130,000	1,150,000 r	1,160,000
Exports, lead content:						
Lead ore and concentrates	do.	241,000	253,000	292,000	390,000	298,000
Lead materials, excluding scrap	do.	43,400 r	123,000	82,600	64,600	68,500
Imports for consumption, lead content:						
Lead in ore and concentrates	do.	6	--	--	--	--
Lead in base bullion	do.	--	6	3	29	539
Lead in pigs and bars	do.	210,000	175,000	197,000	298,000	331,000
Stocks, December 31, lead content:						
Primary lead	do.	(4)	W	W	W	W
At consumers and secondary smelters	do.	111,000	84,600	59,000	46,800 r	53,700
Consumption of metal, primary and secondary, lead content	do.	1,440,000	1,390,000	1,480,000	1,490,000 r	1,560,000
Price, North American Producer average, delivered[5]	cents per pound	43.56	43.76	55.14	61.03	77.40
World:						
Production, gross weight:						
Mine	metric tons	2,870,000 r	3,160,000 r	3,170,000 r	3,450,000 r	3,470,000 e
Refinery[6]	do.	3,430,000 r	3,410,000 r	3,330,000 r	3,770,000 r	4,020,000 e
Secondary refinery	do.	3,370,000 r	3,570,000 r	3,740,000 r	3,930,000 r	4,010,000 e
Price, London Metal Exchange, pure lead, cash average[5]	cents per pound	20.52	23.34	40.19	44.23	58.00

eEstimated. rRevised. W Withheld to avoid disclosing company proprietary data. -- Zero.

[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]Withheld to avoid disclosing company proprietary data; included with "Primary lead, refined, lead content: Domestic ores and base bullion."

[4]Withheld to avoid disclosing company proprietary data; included with "Stocks, December 31, lead content: At consumers and secondary smelters."

[5]Platts Metals Week.

[6]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	2005	2006
Alaska and Missouri	397,000	393,000
Other States[2]	29,500	26,100
Total	426,000	419,000

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

[2]Idaho, Montana, and Washington.

TABLE 3
LEADING LEAD-PRODUCING MINES IN THE UNITED STATES IN 2006, 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	Fletcher	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
3	Buick	Iron, MO	do.	Do.
4	Brushy Creek	Reynolds, MO	do.	Do.
5	Viburnum (#29 and #35)	Washington and Iron, MO	do.	Do.
6	Lucky Friday	Shoshone, ID	Hecla Mining Company	Silver ore.
7	Sweetwater	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
8	Greens Creek	Juneau, AK	Kennecott Greens Creek Mining Co.	Zinc ore.
9	Pend Oreille	Pend Oreille, WA	Teck Cominco American Inc.	Zinc-lead ore.
10	Montana Tunnels	Jefferson, MT	Apollo Gold Corp.	Gold ore.

[1]The mines on this list accounted for 100% of the U.S. mine production in 2006.

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)

		2005	2006
Kind of scrap:			
New scrap:			
Lead-base		14,200	13,500
Copper-base		4,580 r	4,630
Tin-base		1,530	1,530
Total		20,300 r	19,600
Old scrap:			
Battery-lead		1,050,000	1,060,000
All other lead-base		80,500	76,000
Copper-base		4,540 r	4,360
Total		1,130,000	1,140,000
Grand total		1,150,000 r	1,160,000
Form of recovery:			
As soft lead		869,000	948,000
In antimonial lead		271,000	200,000
In other lead alloys		4,490	3,260
In copper-base alloys		9,110 r	8,990
Total:			
Quantity		1,150,000 r	1,160,000
Value[2]	thousands	$1,550,000 r	$1,980,000

rRevised.
[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	2005	2006
	Metal products:		
3482	Ammunition, shot and bullets	61,300	65,300
	Bearing metals:		
35	Machinery except electrical	W	W
371	Motor vehicles and equipment[3]	W	W
37	Other transportation equipment	W	W
	Total	1,180	1,240
3351	Brass and bronze, billets and ingots	2,100	2,620
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	30,400 r	29,900
	Pipes, traps, other extruded products:		
15	Building construction	1,220	845
3443	Storage tanks, process vessels, etc.	(5)	(5)
	Total	1,220	845
	Sheet lead:		
15	Building construction	23,200 r	7,710
3443	Storage tanks, process vessels, etc.	W	W
3693	Medical radiation shielding	W	W
	Total	29,100 r	8,560
	Solder:		
15	Building construction	W	W
	Metal cans and shipping containers	W	W
367	Electronic components, accessories and other electrical equipment	7,720	6,860
371	Motor vehicles and equipment	W	W
	Total	8,370	7,140
	Storage batteries:		
3691	Storage battery grids, post, etc.	579,000 r	661,000
3691	Storage battery oxides	705,000 r	735,000
	Total storage batteries	1,280,000 r	1,400,000
27	Type metal, printing and allied industries	(4)	(4)
34	Other metal products[7]	22,200	22,600
	Grand total	1,440,000 r	1,530,000
	Other oxides:		
285	Paint	W	W
32	Glass and ceramics products	W	W
28	Other pigments and chemicals	W	W
	Total	14,100	16,200
	Miscellaneous uses	32,900	12,300
	Grand total	1,490,000 r	1,560,000

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: Grand total."

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

[6]Included with "Metal products: Storage batteries: Other metal products" to avoid disclosing company proprietary data.

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

TABLE 6
U.S. CONSUMPTION OF LEAD IN 2006, 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	28,300	1,430	4,440	--	34,100
Illinois	21,400	26,900	W	--	48,300
Iowa, Michigan, Missouri	1,060	W	W	--	1,060
Ohio and Pennsylvania	135,000	109,000	27,200	W	272,000
Arkansas and Texas	60,000	17,900	7,080	--	85,000
Alabama, Georgia, Oklahoma	5,100	W	W	--	5,100
Colorado, Indiana, Kansas, Kentucky, Minnesota, Nebraska, Tennessee, Wisconsin	277,000	91,200	71,800	W	440,000
Connecticut, Maryland, New Jersey, New York, North Carolina, South Carolina	18,300	13,600	3,010	--	35,000
Various States	327,000	81,400	234,000	1,250	643,000
Total	873,000	342,000	347,000	1,250	1,560,000

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 2006, 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	47,600	81,500	W	W	138,000
Storage batteries	797,000	260,000	339,000	--	1,400,000
Miscellaneous[3]	28,300	24	W	W	28,500
Total	873,000	342,000	347,000	1,250	1,560,000

W Withheld to avoid disclosing company proprietary data; included in Total. -- 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
2005	30,900 r	14,400 r	1,440	98	46,800 r
2006	33,600	11,100	W	W	53,700

rRevised. 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)

	2005				2006			
	Production		Shipments		Production		Shipments	
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	742,000	705,000	NA	NA	774,000	735,000	NA	NA
Total	742,000	705,000	NA	NA	774,000	735,000	NA	NA

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)
2005:		
White lead carbonate	--	--
Red and orange lead	355	$543
Chrome yellow, molybdenum orange pigments, lead-zinc chromates	6,260	19,800
Litharge	967	1,390
Glass frits (undifferentiated)	24,900	33,700
Total	32,500	55,500
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

-- 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	2005 Quantity (metric tons)	2005 Value (thousands)	2006 Quantity (metric tons)	2006 Value (thousands)
Ore and concentrates, lead content:				
Belgium	11,547	$7,778	8,910	$7,443
Bulgaria	5,763	3,882	--	--
Canada	144,622	54,439	32,287	27,565
China	115,249	75,291	124,893	106,539
India	219	134	185	94
Japan	47,774	20,166	45,262	42,129
Korea, South	31,179	10,013	46,699	54,385
Mexico	6,652	2,533	29,879	36,120
Switzerland	27,121	16,062	6,623	1,500
Other	44	21	2,881	2,451
Total	390,171	190,319	297,619	278,226
Base bullion, lead content:				
Japan	91	1,181	89	1,147
Mexico	82	80	79	88
Other	25	28	29	323
Total	198	1,289	197	1,559
Unwrought lead and lead alloys, lead content:				
Australia	4	29	--	--
Belgium	494	612	1,939	2,771
Brazil	(2)	3	54	43
Canada	1,811	1,807	3,119	3,782
China	34	356	3	19
Colombia	37	471	17	12
Dominican Republic	1	3	--	--
France	18	103	--	--
Germany	26	36	396	265
Hong Kong	158	87	42	56
India	12	28	141	126
Israel	111	1,373	544	680
Italy	15	11	--	--
Japan	331	303	11	33
Korea, South	1,464	1,465	25	23
Mexico	39,665	37,430	41,369	42,687
Poland	3	57	125	116
Saudi Arabia	116	71	--	--
Singapore	53	57	27	22
Spain	98	633	443	649
Taiwan	42	57	11	15
United Kingdom	1,013	963	4,193	6,024
Other	39	104 r	203	437
Total	45,545	46,059	52,662	57,759

See footnotes at end of table.

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

Country	2005 Quantity (metric tons)	2005 Value (thousands)	2006 Quantity (metric tons)	2006 Value (thousands)
Wrought lead and lead alloys, lead content:				
Armenia	97	$35	--	--
Belgium	257	2,190	236	$2,360
Brazil	149	1,090	58	321
Canada	1,660	4,570	3,190	8,230
China	1,050	3,170	663	1,480
Costa Rica	1,210	3,410	938	2,050
Dominican Republic	169	249	3	12
France	138	238	48	189
Germany	2,560	2,560	2,940	5,830
Hong Kong	1,250	2,810	1,010	2,130
India	409	592	139	211
Ireland	155	496	140	284
Israel	55	125	3	44
Italy	87	143	70	158
Japan	509	1,200	401	1,200
Korea, South	25	170	64	213
Malaysia	2,330	4,420	1,030	2,930
Mexico	3,110	6,260	3,030	7,080
Netherlands	107	382	216	967
Philippines	2,720	3,000	305	865
Saudi Arabia	20	58	--	--
Singapore	76	115	80	214
Sweden	26	71	15	45
Switzerland	121	145	27	73
Taiwan	51	1,090	60	813
United Arab Emirates	21	30	--	--
United Kingdom	436	849	615	934
Venezuela	68	185	3	25
Other	154 [r]	1,170	567	1,490
Total	19,000	40,800	15,800	40,200
Scrap, gross weight:				
Belgium	64	110	957	352
Canada	53,400	12,400	81,600	22,500
China	2,120	2,040	2,140	1,230
Dominican Republic	20	35	30	27
El Salvador	26	34	--	--
Finland	351	651	--	--
Guatemala	11	29	--	--
Honduras	82	175	98	68
Hong Kong	162	66	485	161
India	3,560	2,130	6,940	3,640
Korea, South	6,820	3,100	25,900	7,420
Mexico	32	55	52	110
Pakistan	166	48	122	27
Sri Lanka	138	60	--	--
United Kingdom	114	246	--	--
Vietnam	186	66	--	--
Other	74 [r]	394	2,600	1,630
Total	67,300	21,600	121,000	37,200

[r]Revised. -- 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 12
U.S. IMPORTS FOR CONSUMPTION OF LEAD, BY COUNTRY[1]

Country	2005 Quantity (metric tons)	2005 Value (thousands)	2006 Quantity (metric tons)	2006 Value (thousands)
Pigs and bars, lead content:				
Argentina	113	$120	75	$101
Australia	39,600	38,900	9,230	9,540
Belgium	51	334	--	--
Canada	190,000	199,000	222,000	284,000
China	22,700	22,500	41,700	50,100
Colombia	302	270	535	576
Germany	107	488	275	1,640
Japan	228	229	--	--
Mexico	15,200	12,300	15,800	13,800
Panama	--	--	--	--
Peru	23,900	24,400	34,600	45,500
Russia	-2	4	1,920	1,920
United Kingdom	5,460	4,830	4,490	4,890
Venezuela	--	--	188	577
Other	25	64 r	560	764
Total	298,000	303,000	331,000	413,000
Reclaimed scrap, including ash and residues, lead content:				
Canada	1,070	1,050	309	467
Chile	32	27	--	--
Colombia	1,060	897	506	545
Guatemala	110	116	25	97
Mexico	1,020	711	645	407
Russia	22	20	21	25
Tunisia	28	59	--	--
Other	--	--	50	107
Total	3,340	2,880	1,560	1,650
Wrought lead, all forms, including wire and powders, gross weight:				
Argentina	1,060	1,370	1,180	1,930
Australia	28	105	18	68
Austria	215	889	203	850
Canada	5,190	11,000	3,580	10,600
China	792	2,950	908	4,080
Colombia	3	3	--	--
El Salvador	120	185	815	1,540
France	78	242	180	399
Germany	982	3,980	1,030	4,770
Japan	7	163	--	--
Mexico	1,970	2,040	2,470	3,940
Netherlands	334	1,780	268	1,460
New Zealand	66	675	56	819
Peru	79	143	69	123
Russia	59	352	556	1,050
Taiwan	136	529	216	784
Turkey	40	65	--	--
United Kingdom	645	1,360	391	1,110
Other	92	993 r	154	1,940
Total	11,900	28,900	12,100	35,500

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 13
LEAD: WORLD MINE PRODUCTION OF LEAD IN CONCENTRATE, BY COUNTRY[1, 2]

(Metric tons, lead content)

Country[3]	2002	2003	2004	2005	2006[e]
Algeria	1,105	--	--	--	--
Argentina	12,011	12,079	9,551	10,683 [r]	11,000
Australia	694,000 [r]	688,000 [r]	674,000 [r]	767,000 [r]	686,000
Bolivia	9,893	9,740	10,267	11,231 [r]	13,600
Bosnia and Herzegovina[e]	200	200	850 [r]	1,100 [r]	1,200
Brazil	9,253	10,652	14,734	16,063 [r, p]	16,800
Bulgaria[e]	21,800 [4]	17,000	19,000 [r]	22,000 [r]	25,000
Burma[e]	2,000 [r]	2,000 [r]	2,000 [r]	2,000 [r]	2,000
Canada	97,178 [r]	81,264 [r]	76,730 [r]	79,252 [r]	82,000 [p]
Chile	2,895	1,697	2,286	878	500
China[e]	641,000	955,000	998,000	1,140,000 [r]	1,200,000
Colombia[e]	-- [r]	-- [r]	-- [r]	-- [r]	--
Ecuador[e]	-- [r]	-- [r]	-- [r]	-- [r]	--
Georgia[e]	400	400	400	400	400
Greece[e]	29,300	2,000	--	1,500	10,500
Honduras	8,128	9,014	8,877	10,488	11,775 [4]
India	34,000	44,000	51,300 [r]	60,400 [r]	67,000 [4]
Iran[e, 5]	19,000	20,000	22,000	23,000 [r, e]	24,000 [4]
Ireland[e]	32,000	50,000	65,915 [r, 4]	63,800	62,000
Italy[e]	2,000 [r]	2,000 [r]	600 [r]	800 [r]	800
Japan	5,723	5,660	5,512	3,437	777 [4]
Kazakhstan[e]	40,000	44,000	44,000	44,000	48,000
Korea, North[e]	10,000	20,000	20,000	20,000	20,000
Korea, Republic of	28	--	40	57 [r]	60
Macedonia	3,500	2,600 [r]	-- [e]	-- [e]	15,600 [4]
Mexico	138,707	139,348	118,484	134,388 [r]	120,000
Morocco	62,400	38,600	31,300 [e]	31,000 [e]	45,000
Namibia	13,809	18,782	14,338	14,320	14,300
Peru	305,651 [r]	308,874 [r]	306,211	319,345	313,325 [4]
Poland	56,600	55,000 [r]	64,000 [r]	51,000 [r]	51,000
Romania	15,136	18,102	18,000 [e]	11,600 [r]	7,500 [4]
Russia[e]	19,000	24,000	23,000	36,000	36,000
Saudi Arabia[e]	60	60	30	30	40
Serbia and Montenegro[6]	--	1,500 [r]	900 [r]	1,000 [r]	1,000
South Africa	49,444	39,941	37,485	42,159	48,273 [p]
Spain	6,171 [r]	1,765 [r]	--	-- [r]	--
Sweden	44,000	51,000 [e]	55,000	61,000	76,800 [4]
Tajikistan[e]	800	800	800	800	800
Thailand	3,200	--	-- [e]	-- [e]	--
Tunisia	5,081	5,000 [e]	5,470 [r]	8,708 [r]	--
Turkey	17,352	17,500 [r]	18,650 [r]	21,000 [r, e]	21,000
United Kingdom[e]	700 [r]	700 [r]	500 [r]	500 [r]	500
United States	451,000 [r]	460,000 [r]	445,000 [r]	437,000 [r]	429,000 [4]
Vietnam[e]	1,100	1,100	2,750 [r, 4]	3,300 [r, 4]	3,500
Total	2,870,000 [r]	3,160,000 [r]	3,170,000 [r]	3,450,000 [r]	3,470,000

See footnotes at end of table.

TABLE 13

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

[e]Estimated. [p]Preliminary. [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 July 26, 2007.

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

[4]Reported figure.

[5]Year beginning March 21 of that stated.

[6]In June 2006, Montenegro and Serbia formally declared independence from each other and dissolved their union. Mineral production data for 2006, however, still reflect the unified country.

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

(Metric tons)

Country[3]	2002	2003	2004	2005	2006
Algeria, secondary[e]	6,000	6,000	5,000	5,000	5,000
Argentina:					
Primary	10,567	11,011	11,111 r	10,200 r	11,000 e
Secondary	33,000	30,300	48,000 r	35,000 r, e	35,000 e
Total	43,567	41,311	59,111 r	45,200 r	46,000 e
Australia:					
Primary	268,000 r	270,000 r	232,000 r	230,000 r	233,000 e
Secondary	36,000 r	25,000 r	36,000 r	33,000 r	27,000 e
Total	304,000 r	295,000 r	268,000 r	263,000 r	260,000 e
Austria, secondary[e]	21,000	18,000	20,000	20,000	22,000
Belgium:[e]					
Primary[4]	68,000	45,000	43,000	63,400 r	34,000
Secondary	20,000	20,000	20,000	20,000	20,000
Total	88,000	65,000	63,000	83,400 r	54,000
Bolivia	100 e	50 r	84 r	33 r	500 e
Brazil, secondary	50,000 e, 5	128,610 r	137,121 r	104,904 r, p	110,000 e
Bulgaria:[e]					
Primary	57,000	74,000 r	69,000 r	80,800 r	64,700
Secondary	9,000	9,000	10,000	10,000 r	10,000
Total	66,000	83,000 r	79,000 r	90,800 r	74,700
Burma, primary	425	888	289	907 r	900 e
Canada:					
Primary	136,896	118,506	131,717 r	109,795 r	110,000 p
Secondary	114,664	104,927	109,453 r	119,613 r	125,000 p
Total	251,560	223,433	241,170 r	229,408 r	235,000 p
China:[e]					
Primary	1,100,000	1,290,000	1,500,000	1,870,000	2,140,000
Secondary	230,000	290,000	430,000	537,000 r	600,000
Total	1,330,000	1,580,000	1,930,000	2,410,000 r	2,740,000
Colombia, secondary[e]	12,000	12,000	12,000	12,000	12,000
Czech Republic, secondary[e]	29,000	26,000	25,000	26,000	25,000
El Salvador, secondary	8,000	8,000	10,000	10,000 e	10,000 e
Estonia, secondary	--	--	3,000	7,000 e	7,000 e
France:[e]					
Primary	76,000	14,000	--	--	4,000
Secondary	128,000	102,000 r	105,000 r	107,000 r	100,000
Total	204,000	116,000 r	105,000 r	107,000 r	104,000
Germany:					
Primary	141,202	132,155	115,869	118,778 r	110,000 e
Secondary	238,700	224,700 r	243,304	229,332 r	220,000
Total	379,902	356,855 r	359,173	348,110 r	330,000
Greece, secondary	5,000	4,000	4,000	4,000 e	5,000 e
India:[e]					
Primary	74,200 r	77,500 r	40,000 r	56,000 r	77,100
Secondary	35,000 r	41,000 r	25,000 r	35,000 r	35,000
Total	109,000 r	119,000 r	65,000 r	91,000 r	112,000
Indonesia, secondary	17,000	18,500 r	20,000	18,000	19,000

See footnotes at end of table.

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

(Metric tons)

Country[3]	2002	2003	2004	2005	2006
Iran:[e]					
Primary	12,000	11,342 [6]	17,857 [6]	21,000 [r]	25,000
Secondary	39,000	47,000	50,000	50,000	50,000
Total	51,000	58,342 [6]	67,857 [6]	71,000 [r]	75,000
Ireland, secondary[e]	7,000	9,000	19,600 [r]	20,000	22,000
Israel, secondary	22,000	25,000	27,000	27,000 [e]	27,000 [e]
Italy:[e]					
Primary	75,000	48,000	40,000 [r]	49,500 [r]	35,000
Secondary	130,000	166,000	162,000 [r]	162,000 [r]	156,000
Total	205,000	214,000	202,000 [r]	212,000 [r]	191,000
Japan:					
Primary	107,744	105,460	94,272	106,638	108,271
Secondary	178,016	189,831	188,603	167,980	171,143
Total	285,760	295,291	282,875	274,618	279,414
Kazakhstan, primary and secondary	161,800	133,200	157,000 [e]	131,316	125,000
Kenya, secondary	1,000	1,000	1,000	1,000 [e]	1,000 [e]
Korea, North, primary and secondary[e]	6,000	7,000	9,000	9,000	9,000
Korea, Republic of:					
Primary	178,722	169,297	173,609	180,784 [r]	180,784
Secondary[e]	63,900	60,000	55,780 [r, 6]	55,800 [r]	56,000
Total	242,622	229,297	229,389 [r]	236,584 [r]	236,784
Macedonia:[e]					
Primary	19,000	6,000	--	--	--
Secondary	1,000	4,000 [r]	300	300	200
Total	20,000	10,000 [r]	300	300	200
Malaysia, secondary[e, 7]	40,000	57,000	54,000	71,000	73,000
Mexico:					
Primary[8]	128,241	137,482	107,414 [r]	116,539 [r]	120,000 [e]
Secondary[e]	110,000	110,000	110,000	110,000	110,000
Total	238,241	247,482	217,414 [r]	226,539 [r]	230,000 [e]
Morocco:					
Primary	71,840	61,473	35,000	35,000 [e]	38,000 [e]
Secondary[e]	3,000	3,000	3,000	4,000 [6]	3,000
Total	74,840	64,473	38,000	39,000 [e]	41,000 [e]
Netherlands, secondary[e]	25,000	17,000	17,000	20,000	18,000
New Zealand, secondary[e]	9,000	8,000	8,000	7,000	7,000
Nigeria, secondary[e]	5,000	5,000	5,000	5,000	5,000
Pakistan, secondary[e]	2,100 [r]	2,330 [r]	3,000	3,200 [r]	3,100
Peru, primary	119,588	112,289	118,970 [r]	122,079	120,311
Philippines, secondary[e]	26,000 [6]	27,000 [6]	29,000	30,000 [r]	30,000
Poland:[e]					
Primary	32,000 [r]	32,000 [r]	32,000 [r]	28,000 [r]	28,000
Secondary	35,800	42,000 [r]	42,000 [r]	59,600 [r]	59,600
Total	67,800 [r]	74,000 [r]	74,000 [r]	87,600 [r]	87,600
Portugal, secondary[e]	4,000	4,000	4,000	4,000	3,000

See footnotes at end of table.

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

(Metric tons)

Country[3]	2002	2003	2004	2005	2006
Romania:[e]					
Primary	26,000	23,100	32,600 [r]	32,900 [r]	28,100
Secondary	3,000	5,000	3,000	3,000	3,000
Total	29,000	28,100	35,600 [r]	35,900 [r]	31,100
Russia, primary and secondary[e]	60,350 [6]	66,000	70,000	66,000	78,000
Saudi Arabia, secondary	17,000	25,000	32,000	36,000	38,000 [e]
Serbia and Montenegro, primary[e, 9]	170	500 [r]	800 [r]	700 [r]	700
Slovenia, secondary[e]	15,000	15,000	15,000	15,000	15,000
South Africa, secondary	61,000	64,900	64,100	65,300 [r]	67,000 [e]
Spain, secondary[e]	116,000	102,000	105,000	110,000 [r]	131,000
Sweden:[e]					
Primary	28,000	24,200	21,500 [r, 6]	27,400	26,000
Secondary	37,000	52,000	52,000 [6]	45,600	40,000
Total	65,000	76,200	73,500 [r, 6]	73,000	66,000
Switzerland, secondary[e]	9,000	8,000	9,000	9,000	9,600 [6]
Taiwan, secondary	55,000	56,000	56,000	55,000	55,000
Thailand, secondary	42,900	45,300	57,500	61,200 [r]	61,200 [e]
Trinidad and Tobago, secondary[e]	1,600	1,000	1,000	1,000	1,000
Turkey, secondary[e]	6,000	6,000	6,000	6,000	6,000
Ukraine, secondary[e]	12,000	7,000	15,000 [r]	60,000 [r]	60,000
United Arab Emirates, secondary[e]	2,000	2,000	2,000	2,000	2,000
United Kingdom:					
Primary	207,719 [r]	195,000 [r]	125,938 [r]	161,000 [r]	163,000
Secondary	166,927 [r]	169,574 [r]	120,000	143,000 [r]	144,000
Total	374,646 [r]	364,574 [r]	245,938 [r]	304,000 [r]	307,000
United States:					
Primary	262,000	245,000	148,000	143,000	153,000
Secondary	1,100,000 [r]	1,140,000	1,130,000 [r]	1,150,000 [r]	1,160,000
Total	1,360,000 [r]	1,380,000	1,280,000 [r]	1,300,000 [r]	1,310,000
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	6,800,000 [r]	6,980,000 [r]	7,070,000 [r]	7,700,000 [r]	8,030,000
Of which:					
Primary	3,200,000 [r]	3,200,000 [r]	3,090,000 [r]	3,560,000 [r]	3,810,000
Secondary	3,370,000	3,570,000 [r]	3,740,000 [r]	3,930,000 [r]	4,010,000
Undifferentiated	228,000	206,000	236,000 [r]	206,000 [r]	213,000

[e]Estimated. [p]Preliminary. [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 July 26, 2007. 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]Source: Lead and Zinc Statistics, Monthly Bulletin of the International Lead and Zinc Study Group, v. 42, no. 6, June 2002.

[6]Reported figure.

[7]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.

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

[8]Includes lead content in antimonial lead.
[9]In June 2006, Montenegro and Serbia formally declared independence from each other and dissolved their union. Mineral production data for 2006, however, still reflect the unified country.