LEAD

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Domestic lead mine production decreased by about 9% compared with that of 1999. Alaska and Missouri were the dominant producing States with a 91% share. Other appreciable lead mine production was in Idaho and Montana. Lead was produced at 19 mines employing about 1,100 people. The value of domestic mine production was about $440 million. The lead concentrates produced from the mined ore were processed into primary metal at two smelter-refineries in Missouri and a smelter in Montana.

Secondary lead, derived principally from scrapped lead-acid batteries, accounted for 77% of refined lead production in the United States. Nearly all the secondary lead was produced by 7 companies operating 15 smelters.

During 2000, U.S. Government agencies issued several proposed and final rules on matters affecting the lead industry. The rules included issuance of new standards for identifying lead in paint, dust and soil, issuance of new motor vehicle standards to address battery safety in electric vehicles (EVs), revision of regulations for hunting and sport fishing in the National Wildlife Refuge System, and approval of new, nontoxic forms of ammunition for hunting water fowl. In addition, the availability of transition assistance was announced with regard to implementation of the new requirements for notification, evaluation, and reduction of lead-based paint hazards in federally owned residential property and housing receiving federal assistance. A notice of funding availability also was announced in which proposals from Indian Tribes were solicited to conduct blood-lead screening tests on tribal children.

Lead was consumed in about 140 plants to manufacture end-use products, including batteries, ammunition, covering for power and communication cable, building-construction materials, and solders for motor vehicles, metal containers, and electrical/electronic components and accessories.

Lead-acid batteries, including starting-lighting-ignition (SLI) and industrial types, continued to be the overwhelmingly dominant use of lead, accounting for about 87% of reported lead consumption. SLI battery shipments in 2000 totaled 98 million units. This total included original equipment and replacement automotive-type batteries. An estimated 1.04 million metric tons (Mt) of lead was contained in SLI batteries shipped during the year.

Monthly sales of lead from the National Defense Stockpile (NDS) continued during 2000. Sales totaled about 32,000 metric tons (t) (35,300 short tons), leaving about 220,000 t (242,000 short tons) in the NDS at yearend.

Lead prices continued to decline throughout the year. The average London Metal Exchange (LME) and North American Producer prices were down by $0.022 per pound and $0.002 per pound, respectively, in 2000, from the average prices of $0.228 per pound and $0.437 per pound, respectively, in 1999.

Of the 42 countries in which lead was mined, the top 5 accounted for 70% of the world's total production of 3.1 Mt. Australia was the largest producer, with 23% of the world total,

Lead in the 20th Century

In 1900, the United States was the largest producer of refined lead in the world, accounting for about 29% of world production. Other significant producers included Australia, Germany, Mexico, and Spain. Mine production of lead was conducted principally in the States of Colorado, Idaho, Kansas, Missouri, Montana, and Utah, with the Coeur d'Alene mining district in Idaho contributing about 28% of the total production. The demand for lead was essentially in balance with domestic production, necessitating very little reliance on imports. Uses of lead in the United States were primarily for ammunition, brass, burial vault liners, ceramic glazes, leaded glass and crystal, paints or other protective coatings, pewter, and water lines and pipes. The use of recycling as a source of refined lead had begun as early as 1867. By 1900, recycled lead continued to represent a small but undifferentiated portion of the total production of refined lead. In 1907, as further information became available, lead recycling was estimated to represent about 6% of the total production of refined lead in the United States.

In 2000, the United States continued to be a major producer of refined lead, representing about 23% of the total world production. Other major producers of refined lead were Australia, Canada, China, France, Germany, Italy, Japan, and the United Kingdom. Nearly 77% of the U.S. production was derived through recycling. The predominant source of lead scrap for recycling was spent lead-acid batteries. Mine production of lead was conducted principally in Alaska and Missouri. A continuing strong demand for lead, particularly in the battery sector where 87% was used, required that the United States depend on imports and purchases from the U.S. Defense Stockpile for about 22% of its lead consumption. Lead was also consumed in end-use products including ammunition, building construction materials, sheet and oxides for radiation shielding, solders, and automobile wheel weights.

followed by China, 18%; the United States, 15%; Peru, 9%; and Mexico, 5%.

Worldwide reserves of lead contained in demonstrated resources from producing and nonproducing deposits at yearend were estimated to be 64 Mt by the U.S. Geological Survey (USGS). Reserves for the three largest producers in the world, Australia, the United States, and China, were about 15 Mt, 6.5 Mt, and 9 Mt, respectively. The reserve base (reserves plus measured and indicated resources that are marginally economic and some of those that are currently subeconomic) for Australia and China was 28 Mt and 30 Mt, respectively. The reserve base for the United States was 20 Mt. The total world reserve base at the end of 1999 was estimated to be 130 Mt.

The USGS has issued a report on undiscovered gold, silver, copper, lead, and zinc deposits in the United States (U.S. Geological Survey, 2000). In the report, the estimate of the amount of lead in undiscovered mineral deposits ranged from greater than 47 Mt (90% probability) to greater than 130 Mt (10% probability). The mean estimate of lead in undiscovered deposits was 85 Mt with nearly one-half thought to be contained in undiscovered sedimentary exhalative deposits. Other major lead deposit types considered in the report were Mississippi Valley and polymetallic replacement deposits. Identified U.S. lead resources were estimated to be 51 Mt. Coupled with an estimated past lead production of 41 Mt, the total discovered lead resource in the United States was estimated to be 92 Mt.

Legislation and Government Programs

Monthly sales of lead from the NDS continued during 2000. As a result of these sales and the delivery of previously committed inventory, lead disposal from stockpile inventory during 2000 totaled about 32,000 t (35,300 short tons). The Defense National Stockpile Center's (DNSC) Annual Materials Plan (AMP) approved by the U.S. Congress for fiscal year 2000 (October 1, 1999, to September 30, 2000) included a maximum sales authority for lead of 54,400 t (60,000 short tons). Under this authority, disposal of lead from NDS inventory during the first 9 months of calendar year 2000 was 24,200 t (26,700 short tons). The AMP approved by the U.S. Congress for fiscal year 2001 (October 1, 2000, to September 30, 2001) also included a maximum sales authority for lead of 54,400 t (60,000 short tons). Under the fiscal year 2001 authority, disposal of lead from NDS inventory during the last 3 months of 2000 amounted to 7,800 t (8,600 short tons), leaving about 220,000 t (242,000 short tons) of lead at yearend. A solicitation was issued by the DNSC in July 2000 for the sale of lead from the NDS in negotiated long-term contracts extending for a contract period of 360 calendar days. This solicitation included several grades of lead totaling about 23,600 t (26,100 short tons).

During 2000, U.S. Government agencies issued several proposed and final rules, announced funding availability, and requested specific information and comments from the public on matters affecting the lead industry. A State Government agency also initiated enforcement of a ban on disposal of certain electronic waste materials containing lead. In February, the U.S. Environmental Protection Agency (EPA) solicited preapplication grant proposals from Indian tribes to conduct blood-lead screening for tribal children and to conduct lead awareness outreach activities for Indian tribes. Grants totaling approximately $2 million were to be awarded to perform these activities and to encourage continuation of these activities in the future. The grants were to be awarded based upon evaluation of the preapplication proposals (U.S. Environmental Protection Agency, 2000a).

In December, the EPA announced new national standards for identifying dangerous levels of lead in paint, dust, and soil. Under these new standards, Federal agencies (including the U.S. Department of Housing and Urban Development (HUD) as well as State, local, and tribal governments) will have new uniform benchmarks on which to base remedial actions taken to safeguard the public from exposure to lead. The standards also will apply to other Federal lead provisions, such as EPA real estate disclosure requirements presently in place for individuals selling or renting a home or an apartment and EPA programs engaged in the cleanup of toxic waste. In addition, the standards will provide landlords, parents, and childcare providers with information on specific lead hazard levels, so that informed decisions can be made on such levels of lead found in homes, yards, or play areas. Under the new standards, lead is considered a hazard if levels are greater than the following: 40 micrograms of lead per square foot in dust on floors; 250 micrograms of lead per square foot in dust on interior window sills; and 400 parts per million (ppm) in the bare soil of children's play areas or 1,200 ppm average in the bare soil in the remainder of the yard. Identification of lead hazards through these standards will allow inspectors and risk assessors to assist property owners in deciding on appropriate processes to correct lead-related problems. These processes may include lead paint abatement, covering or removing lead-containing soil, and professional cleaning of lead dust. The EPA's new standards are in accordance with section 403 of the Toxic Substances Control Act, as amended by the Residential Lead-Based Paint Hazard Reduction Act of 1992, also known as Title X (U.S. Environmental Protection Agency, 2000b).

In August, the EPA issued a notice of availability and solicitation of public comment on the Agency's draft National Action Plan to promote further voluntary reductions of use and exposure to alkyl-lead compounds. Alkyl-lead (e.g. tetraethyl and tetramethyl lead) is used as a fuel additive to reduce "knock" in combustion engines and also to help lubricate internal engine components and protect intake and exhaust valves against recession. Alkyl-lead additives are permitted for use in aviation gasoline for general aviation (piston-engine) aircraft and in fuels for racing vehicles, and nonroad vehicles such as farm machinery, marine vessels, construction equipment, and recreational vehicles. The National Action Plan was developed pursuant to the EPA's Multimedia Strategy for Priority Persistent, Bioaccumulative, and Toxic (PBT) Pollutants (U.S. Environmental Protection Agency, 2000c). The EPA had issued its final rule on the reporting thresholds for certain other PBT chemicals in October 1999 but had excluded any final action on the alkyl-lead compounds in this final rule (U.S. Environmental Protection Agency, 1999).

In September, HUD announced the availability of transition assistance with regard to the implementation of HUD's new requirements for notification, evaluation, and reduction of lead-based paint hazards in federally owned residential property and housing receiving Federal assistance. The new requirements (Lead Safe Housing Regulations) implement Se

ctions 1012 and 1013 of the Residential Lead-Based Paint Hazard Reduction Act of 1992, which is Title X of the Housing and Community Development Act of 1992. The final rule on these requirements was issued by HUD in September 1999 with an implementation date effective September 15, 2000. In order to ensure that adequate service providers were available to conduct lead-based paint hazard evaluation and reduction activities safely, effectively, and efficiently under the new requirements, HUD developed a three-component transition assistance policy. The first component authorized a 6-month transition period for program participants in jurisdictions that notified HUD by November 15, 2000, that they lacked the capacity to implement one or more provisions of the Lead Safe Housing Regulation. The second provided a 12-month transition period for post-1960 properties occupied by children under 6 years of age receiving only tenant-based rental assistance. The third component provided a twelve-month transition period for properties receiving Federal rehabilitation assistance greater than $25,000 that are occupied by the elderly, and where no child under 6 years of age resided or was expected to reside. A submission by a jurisdiction was not required in order for participants to be eligible under the second and third components of the transition assistance policy (U.S. Department of Housing and Urban Development, 2000).

In May, the U.S. Department of the Interior, Fish and Wildlife Service, issued its final rule on the 1999-2000 Refuge-Specific Hunting and Sport Fishing Regulations. Under this rule, a revision was made requiring that individuals may possess only approved nontoxic shot while on Waterfowl Production Areas and certain other defined areas of the National Wildlife Refuge System. In addition, in areas where the hunting of wild turkey and deer was permitted, lead-containing shot or slugs could be used unless prohibited by refuge-specific regulations and/or State law. Excluded from the final rule was the establishment of lead-free fishing areas. The Fish and Wildlife Service planned to address this issue in a separate final rule at a later date (U.S. Department of the Interior, 2000d).

In further actions, the Fish and Wildlife Service issued a final rule approving the use of tungsten-matrix shot, and a proposed rule approving tungsten-nickel-iron shot as nontoxic forms of ammunition for hunting waterfowl and coots (U.S. Department of the Interior, 2000a, b). A proposed rule giving temporary approval for the use of tin shot in hunting waterfowl and coots during the 2000-2001 hunting seasons also was issued by the Fish and Wildlife Service (U.S. Department of the Interior, 2000c).

The U.S. Nuclear Regulatory Commission (NRC) amended its regulations in October to add the NAC Universal Storage System (NAC-UMS) to the list of approved spent nuclear fuel storage casks. The amendment allows the holders of power reactor operating licences to store spent fuel in this approved cask system under a general license. Simultaneous with the approval of the NAC-UMS system, the NRC issued a final Safety Evaluation Report and a Certificate of Compliance for the cask system, effective November 20, 2000. Interlocking lead bricks are used in the transfer cask portion of the system. These bricks effectively shield gamma radiation from being emitted from the spent nuclear fuel during loading, unloading, and transfer operations between the transportable storage canister and the vertical concrete cask storage components of the system (U.S. Nuclear Regulatory Commission, 2000).

The U.S. Department of Transportation, National Highway Traffic Safety Administration, issued a final rule in September establishing a new Federal motor vehicle safety standard, FMVSS No. 305, that addresses electrolyte spillage, battery retention, and electrical shock protection in crashes involving EVs. In order to conform to the safety standards, electrolyte spillage of not more than 5 liters will be allowed outside the passenger compartment, and no visible trace of electrolyte will be permitted to spill into the passenger compartment in controlled impact tests. Electrolyte spillage is measured from the moment the vehicle ceases motion following a barrier impact test until 30 minutes thereafter, and throughout any static rollover after barrier impact. Also, no part of the battery component system positioned outside the passenger compartment will be permitted to enter the passenger compartment as a result of the impact. In addition, electrical isolation must be maintained between the battery system and the electrically conductive structure of the EV after impact, such that the electrical resistance is not less than 500 ohms per volt. The final rule applies to all EVs that have a propulsion power source greater than 48 volts and a gross vehicle weight rating of 4,536 kilograms (kg) or less. The final rule will become effective October 1, 2001 (U.S. Department of Transportation, 2000).

In April, the State of Massachusetts began enforcing a ban on the disposal of cathode ray tubes (CRTs) at landfills, transfer stations, and incinerators. The action was taken by the State's Department of Environmental Protection as a measure to prepare for the projected significant increase in the level of CRT disposals in unwanted older televisions and computer monitors. One of the factors considered in the State's concern over the disposal of the CRTs is the environmental consequences of the relatively high lead content associated with them. The lead, an important material in CRTs that protects the consumer from exposure to harmful radiation, is present in CRTs at a level of about 2 to 4 kg. Environmental officials in Massachusetts were hopeful that the ban on discarding CRTs would prompt a strong interest in reuse and recycling of CRT components (American Metal Market, 2000b).

Production

Primary.—In 2000, domestic mine production of lead decreased by about 46,000 t, or 9%, compared with that of 1999. A significant portion of the decline was attributed to planned cutbacks in production at several mines in Missouri. 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 and Montana. Domestic mine production data were collected from a voluntary survey on lode-mine production of gold, silver, copper, lead, and zinc by the USGS. All lead-producing mines responded to this survey. The lead concentrates produced from the mined ore were processed into primary metal at two smelter-refineries in Missouri and a smelter in Montana (tables 1-4).

The Doe Run Resources Corp., St. Louis, MO, produced primary lead at two smelter-refinery facilities in Missouri. Concentrates for the smelter-refineries were provided from six Doe Run mills that were supplied with ore mined from eight

production shafts along the Viburnum Trend in southeastern Missouri. In addition, concentrate for the smelter-refineries was purchased in the open market. The open market purchases served to supplement Doe Run's announced reductions in mine production in January and April. As of October 31, 2000, the company's proven and probable U.S. ore reserves were about 58 Mt, grading 5.78% lead, 1.25% zinc, and 0.23% copper. In fiscal year 2000, ending October 31, 2000, Doe Run shipped about 510,000 t of refined lead and lead alloy products, including recycled lead produced at its secondary smelter in southeastern Missouri. Doe Run's issued and outstanding stock are indirectly owned by The Renco Group, Inc., a New York-based, privately held company with investments in natural resources and industrial operations. During 2000, the company continued exploration drilling in the vicinity of all eight of its mines in the Viburnum Trend region. Exploration activity was carried out both at the surface and underground, with an intent to delineate additional ore reserves. Drilling also was carried out within most of Doe Run's mines to access ore beyond the current mining areas (Doe Run Resources Corp., 2000, p. 1-7; Metal Bulletin, 2000a, b).

ASARCO Inc., a wholly owned subsidiary of Grupo Mexico, S.A. de C.V., continued to operate the custom primary lead smelter in East Helena, MT, during the year. By midyear, the quantity of lead bullion sold from smelter production was about 32,600 t, an increase of about 8% compared with the same period in 1999 (Grupo Mexico, S.A. de C.V., 2000).

Cominco Alaska Inc., a wholly owned subsidiary of Cominco Ltd., Toronto, Canada, operated the Red Dog zinc-lead mine in northwestern Alaska under a leasing 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. The average mill recovery of lead at Red Dog was 58% in 2000, compared with 59% in 1999. Overall production of lead concentrate decreased by 8% to about 140,000 t at an average concentrate grade of 59.6% lead. Delineation drilling during the year outlined the underground Anarraaq deposit that was discovered in 1999 about 10 kilometers northwest of Red Dog. Anarraaq is estimated to contain an inferred resource of 17.2 Mt grading 15.8% zinc and 4.8% lead. A second area of mineralization also was discovered near Anarraaq during the year and, in addition, gravity surveys and borehole geophysics further identified several new target areas of mineralization. The five deposits at Red Dog's mineralized center (Main Zone, Aqqaluk, Paalaaq, Qanaiyaq (formerly Hilltop), and Anarraaq) were estimated to contain total resources of 148 Mt of ore grading 16.6% zinc and 4.5% lead. A major program of in-fill drilling and metallurgical tests conducted on the Aqqaluk deposit during 2000 resulted in the reclassification of some of the Aqqaluk mineralization to the probable reserve category. Proven ore reserves at Red Dog (Main Zone) in 2000 were estimated to be 41.9 Mt grading 19.2% zinc and 5.2% lead. Probable reserves at Aqqaluk were estimated to be 56.1 Mt grading 16.6% zinc and 4.1% lead. In other developmental activities during the year, Cominco, in cooperation with the U.S. Army Corps of Engineers, continued their 2-year study to determine the viability of upgrading Red Dog's existing shipping facility into a deep-water port. The study is addressing the feasibility of dredging a deep channel through the shallow coastal waters to the shoreline in order to accommodate ocean-going vessels, thus permitting direct loading of the concentrate onto ships. The study is due to be completed in 2001 (Cominco Ltd., 2000a, p. 11-22).

Cominco also continued the development of the Pend Oreille zinc-lead mine near Metaline Falls, WA. In September, the Board of Directors of Canada's Cominco Ltd. endorsed the decision made by the Board of Directors of Cominco American Inc., a wholly owned subsidiary of Cominco Ltd., to rebuild the mill and reopen the mine. The 2-year construction project began in October 2000 and involved refurbishment of the existing concentrator, sinking of an internal mine shaft, and conducting other mining preparation activities. Production from the mine is scheduled to begin in September 2002 and is expected to yield 84,000 metric tons per year (t/yr) of zinc concentrate and 13,000 t/yr of lead concentrate. The concentrates will be shipped to Cominco's nearby Trail, B.C., facility for further processing. Cominco officials anticipate that the Pend Oreille Mine will have a minimum life of 10 years and will provide employment for about 170 people (Cominco Ltd., 2000b).

Hecla Mining Co., Coeur d'Alene, ID, operated the Lucky Friday Mine in Mullan, ID, throughout 2000. Lucky Friday is an underground silver-lead mine 100% owned by Hecla that has been a producing mine for Hecla since 1958. A second full year of production was carried out at the adjacent Gold Hunter ore body, effectively increasing lead production by 15.7% to a level of 29,000 t. Ore was processed during the year in a conventional flotation mill at a full-capacity rate of about 1,000 metric tons per day (t/d). Both silver-lead concentrates and zinc concentrates were produced at the mill, with 94% of the silver, 93.6% of the lead, and 41.4% of the zinc being economically recovered. In the fourth quarter of 2000, Hecla recorded a financial adjustment to the Lucky Friday Mine, thereby reducing the carrying value of mine property, plant structures, and equipment. The adjustment was necessitated by continuing low silver and lead prices. In addition, as a result of the low metal prices, Hecla's Board of Directors deferred a decision in the fourth quarter of the year to approve the additional capital expenditures that were needed to carry out development of another area of the mine. Total proven and probable ore reserves at the Lucky Friday and the Gold Hunter deposits were about 1.2 Mt grading 10.7% lead at yearend 2000 compared with 1.5 Mt grading 9.6% lead at yearend 1999.

Hecla Mining also held a 29.7% interest in the Greens Creek Mine on Admiralty Island, near Juneau, AK, through a joint-venture arrangement with Kennecott Greens Creek Mining Co., the manager of the mine, and Kennecott Juneau Mining Co., both wholly owned subsidiaries of Kennecott Corp. At Greens Creek, about 1,500 t/d of ore was mined from the underground 200 South, Southwest, and West ore zones and milled on-site to yield lead, zinc, and bulk concentrates, as well as a gold-silver doré. Total production of lead in concentrate was about 22,800 t in 2000 compared with about 23,100 t in 1999. Estimated reserves at the Greens Creek Mine at yearend 2000 were 9.1 Mt grading 4.4% lead. Drilling continued during 2000, serving to essentially replace the quantity of reserves depleted through production during the year (Hecla Mining Co., 2000, p. 6-12).

Secondary.—Domestic secondary production increased about 2% in 2000. Secondary lead accounted for 77% of domestic lead refinery production compared with 76% in 1999. Lead

recovered from scrap lead-acid batteries continued at a high level and accounted for 90% 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 18 companies producing secondary lead, exclusive of that produced from copper-based scrap, were surveyed; 16 responded, representing more than 99% of the total production of secondary lead. Of the total lead recycled in 2000, about 98% 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).

Exide Corp., Reading, PA, completed its acquisition of GNB Technologies, Inc., Atlanta, GA, on September 29, 2000. As a result of the purchase, and following shareholder approval, Exide Corp. was renamed Exide Technologies. GNB had supplied a significant portion of the industrial batteries used in the North American market. Thus, the purchase allowed Exide to reenter the North American industrial battery business. GNB also was a leading supplier of automotive batteries for both the original equipment and replacement battery markets. Following the acquisition, Exide also announced several initiatives designed to restructure the newly formed company: consolidation of automotive battery manufacturing facilities in the United States; consolidation of industrial battery operations in Europe; closure of several distribution centers and branch locations by the end of 2000; and downsizing and relocation of new headquarters to Princeton, NJ, from Reading, PA (Exide Technologies, 2000).

In January, Johnson Controls, Inc., Milwaukee, WI, signed new tolling agreements to recover lead from spent lead-acid batteries for its battery business on the west coast of the United States. Reportedly, the processing of the spent battery units was to be divided between the secondary smelter plants of RSR Corp. at City of Industry, CA, and GNB Technologies, Inc. at Vernon, CA. The tolling agreements were expected to be in effect for 1 year (Ryan's Notes, 2000).

Consumption

Reported consumption of lead increased by 2% as the demand for lead in storage batteries continued to increase. The demand for lead declined in a number of other end uses, including bearing metals, cable covering, and construction materials, such as caulking lead, pipes, traps, and other extruded products. Consumption of lead in SLI- and industrial-type lead-acid storage batteries represented 87% 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). Of the 108 consuming companies to which a USGS survey request was sent, 83 responded, representing about 96% of the total reported U.S. lead consumption.

The Battery Council International reported SLI-type battery shipments of 98 million units in 2000 compared with 100 million units in 1999 (Amistadi, 2001, p. 12-31). The totals included original equipment and replacement automotive-type batteries. By using an estimate of 10.6 kg (23.3 pounds) of lead per unit, the SLI shipments in 2000 accounted for about 1.04 Mt of lead. SLI batteries included those used for automobiles, buses, trucks, tractors, motorcycles, and marine craft. (tables 6-13).

World Review

World production of refined lead increased to 6.46 Mt in 2000 from 6.13 Mt in 1999. Other statistics for 2000, as reported by the International Lead and Zinc Study Group, are as follows: world consumption increased to 6.46 Mt from 6.24 Mt in 1999; commercial stocks of refined lead in industrialized countries were 421,000 t, or 4 weeks of consumption, at yearend 2000 compared with 472,000 t at yearend 1999 and 418,000 t at yearend 1998; and significant exports of refined lead to industrialized countries from developing Asian countries, notably China, continued during 2000, increasing by about 10%, to 628,000 t, compared with those of 1999 (International Lead and Zinc Study Group, 2001, p. 6-21).

Lead prices exhibited a declining trend for the fourth consecutive year. The average LME and North American Producer prices were down by $0.022 per pound and $0.002 per pound, respectively, in 2000, from the average prices of $0.228 per pound and $0.437 per pound, respectively, in 1999.

The structure of the lead mining and refining industries was affected by a number of changes, including the opening and development of new facilities, as well as the closing, reopening, expanding, selling, and modernizing of existing facilities (tables 14, 15).

New Mines, Plants, Properties, Resources.—Ireland's Lisheen lead-zinc mine in County Tipperary Ireland was officially opened in late June (Mining Journal, 2000e). By yearend, the mine was being operated at about 70% of capacity. Lisheen was expected to reach full production capacity in the second quarter of 2001, yielding 300,000 t/yr of zinc concentrate and 40,000 t/yr of lead concentrate over a mine life of 14 years. During the first half of 2000, about 58,000 t of zinc concentrate and 19,000 t of lead concentrate were produced at Lisheen. The Lisheen mining operation is a 50-50 joint venture between Ivernia West plc and Anglo American plc in which Anglo American's subsidiary, Anglo Base Metals Ltd., operates the mine (Platt's Metals Week, 2000d).

Canada's Minco Mining and Metals Corp. and Teck Corp. continued a drilling program at the White Silver Mountain polymetallic property in China. Drilling results disclosed in March showed lead contents of up to 10.0%. Earlier drill results had revealed mineralization containing between 3.9% and 4.4% lead. During the remainder of the year, the joint-venture partners developed further the underground region of mineralization to permit additional exploration drilling and also conducted a surface geophysical program (Mining Journal, 2000b).

Canada's Noranda Inc. proceeded with a full feasibility study in May on the development of the Lady Loretta zinc-lead-silver deposit in Queensland, Australia, through its Australian

subsidiary Noranda Pacific. Noranda had an option to acquire a 75% interest in the Lady Loretta project from Melbourne-based Buka Minerals Ltd., and had been actively exploring the deposit since early 1999. A decision by Noranda to complete the full feasibility study prior to the option expiration date suggested that development of the Lady Loretta deposit was likely to occur. A drilling program completed by Noranda in the first quarter of the year reportedly indicated a significant increase in the resource estimate at Lady Loretta. Prior to the option agreement the identified resources were 8.2 Mt, averaging 17.6% zinc, 8.4% lead, and 122 grams per ton silver. Although the deposit is very high grade, its development has been hindered thus far by the extremely fine-grained characteristic of the ore that has made it difficult to process using conventional technology (Metal Bulletin, 2000k).

In June, Exide Corp., Reading, PA, announced plans to construct a lead-acid battery manufacturing facility in Bawal, India. The plant, located in the State of Haryana, will be used to manufacture batteries for export, with sales targeted mostly in Southeast Asia through Exide's subsidiary, Chloride Batteries Co. in Singapore. The latter company's strategic partner, Shin Kobe Electric Co., has expressed interest in sourcing battery supplies from India, which would benefit the Exide project (Metal Bulletin, 2000d).

EuroZinc Mining Corp., Vancouver, Canada, reported positive results from a feasibility study completed in June on its Aljustrel project in southern Portugal. Results of the study indicated that about 65,800 t of zinc, 15,400 t of lead, and an appreciable quantity of silver could be produced annually over the first 9 years of operation at Aljustrel's Feitas and Moinho deposits. Aljustrel had operated for several years in the early 1990s. However, low recoveries and inefficient mining methods, combined with low metal prices, forced the closure of the mine. Since that time, the mill and related facilities have been maintained in good condition. With most infrastructure already in place, mine production at Aljustrel could begin as early as the fourth quarter of 2001, with initial feed to the mill coming from the Moinho deposit (Northern Miner, 2000a).

In July, Canada's Vancouver-based Expatriate Resources Ltd. completed the initial process metallurgy and concentrate marketing stages for its Finlayson project in Yukon Territory. The project combines development of the recently acquired Kudz Ze Kayah deposit and the Wolverine deposit, the latter being 40% owned by Atna Resources Ltd. Flotation test results confirmed that ores from Kudz Ze Kayah and Wolverine can be combined to yield improved flotation results over those obtained using only the Wolverine ore as feed material. Based on assessments of a combined mill feed of 4,250 t/d, production of about 200,000 t of zinc concentrate, and 33,000 t of lead concentrate, each containing 55% of the respective metal, were considered possible per year. A prefeasibility study completed at the end of the year outlined probable reserves of 14.6 Mt at Finlayson, grading 7.2% zinc, 1.5% lead, and significant quantities of copper, gold and silver (Mining Journal, 2000d; Northern Miner, 2000b).

Apex Silver Mines Ltd., Denver, CO, received initial assay results in midyear from a drilling program at its Platosa lead-silver-zinc property in central Mexico. The intersection of massive and semimassive sulfide mineralization revealed lead concentrations ranging from 3.6% to 25.2% and zinc concentrations ranging from 0.1% to 17.6%. Apex, through its Mexican subsidiary Mineras de Cordilleras S.de R.L. de C.V., owns a 65% interest in Platosa. Also, Apex reportedly was in the process of increasing its land holdings in the Platosa region where it also owns the adjacent Saltillera property (Mining Journal, 2000g).

In November, Canada's Vancouver-based International Annax Ventures, Inc. (IAV) received assay results from its drilling program at the Sopokomil polymetallic deposit, part of the Dairi property in northern Sumatra, Indonesia. Drilling results showed the intersection of both massive sulfide and carbonate-hosted Mississippi Valley-type mineralization with lead concentrations ranging from 8.4% to 15.2% and zinc concentrations ranging from 6.7% to 23.3%. Australia's Perth-based Herald Resources Ltd. holds a 71% undiluted capital interest in IAV, and was manager of Dairi until May 2000. At that time, Cominco Ltd. began management of the property in accordance with an agreement to earn a 40% interest in the property from IAV in exchange for a 5-year monetary investment in the property (Mining Journal, 2000c, h).

In August, Australian base metals miner MIM Holdings Ltd. reported that its 70%-held McArthur River zinc-lead-silver mine achieved a record production of about 117,000 t of zinc and 30,000 t of lead in concentrate in the 1999-2000 fiscal year. In addition, Mount Isa's output of lead contained in lead-silver bullion was up 7% to a level of 137,000 t compared with the previous fiscal year. MIM also reported that its George Fisher zinc-lead-silver mine at Mount Isa was on target for commissioning within budget by October 2000 (Platt's Metals Week, 2000f).

Australia's Pasminco Ltd. reported the first shipment of lead concentrate from its Century Mine in mid-August. According to Pasminco, shipments of lead concentrate were to proceed on a regular basis and were expected to reach 40,000 t by the end of the year. The company was in the process of progressively increasing its annual production to the full capacity of 880,000 t/yr of zinc concentrate and 70,000 t/yr of lead concentrate. Full production levels were anticipated by the end of 2001 (American Metal Market, 2000a).

Malaysia's Metal Reclamation Bhd began commissioning its new secondary lead smelter near Kuala Lampur in September. According to a company official, Metal Reclamation will continue to target an output of 40,000 t/yr from its existing plant, up 10,000 t from that produced in 1999. The new plant will boost the company's total production capacity to 110,000 t/yr. Metal Reclamation is mainly a processor of secondary lead and a producer of lead alloys (Platt's Metals Week, 2000e).

Denver-based Solitario Resources Corp. reported in December that its joint-venture partner Pasminco Ltd. had completed their 2000 drilling program at the Bongará zinc-lead property in northern Peru. Canada's Cominco Ltd. presently owns a 65% interest in Bongará. Assay results from drilling completed in the Florida Canyon area revealed zinc concentrations ranging from 3.4% to 15.8% and lead concentrations ranging from 2.1% to 12.4%. Pasminco was accorded the right to earn Cominco Ltd.'s 65% interest in Bongará by fully funding the 2000 drilling program and by contributing additional funds for future exploration as part of its overall commitment to the project. Solitario holds a 35% interest in Bongará (Mining Journal, 2000a).

In November, Russia's Urals Mining and Metallurgical Co. (UGMK) reportedly was preparing to expand its metals operation to include production of lead and zinc. UGMK, formed a year ago to unite upstream and downstream copper producers in the Urals region into one of Russia's largest metal groups, plans to recover the lead and zinc from byproducts of several of the company's subsidiaries, including the Sredneuralsk copper plant, and the Krasnouralsk and Svyatogor blister copper smelters. Lead and zinc production will be distributed across three sites: Uralelectromed copper refinery, Kirovgrad Metallurgical Co., and the Upper Neivinsk non-ferrous plant. The full production system for lead and zinc is scheduled to be commissioned by September 2001. The principal source of raw material will be metallurgical dust and coke that result from processing copper concentrate and scrap at UGMK's plants. These byproducts can contain between 20% and 25% lead. It is expected that up to 12,000 t/yr of electrolytic lead will be recovered from the copper byproducts when the full production system is in operation (Metal Bulletin, 2000m).

Closings and Curtailments.—In April, Australia's Western Metals began the closure of its Hellyer Mine in Tasmania owing to the depletion of reserves at the mine. Processing of the mined ore was completed in June, at which time the facilities were placed on care-and-maintenance status. Operations at the Hellyer Mine yielded 20,400 t of zinc and 7,600 t of lead in concentrate during the first quarter of the year (Metal Bulletin, 2000n).

China's Shenyang primary lead smelter in Liaoning Province was declared bankrupt in early August as a result of prolonged financial difficulties, according to an official from the Shenyang Minmetals trading company. The Shenyang smelter has a capacity of 60,000 t/yr of refined lead but was operated below its capacity in the first 7 months of 2000 owing to financial constraints that limited the quantity of feedstock the company could purchase. Shenyang smelter officials reportedly were seeking a buyer for the facility immediately following the declaration of bankruptcy (Platt's Metals Week, 2000a).

In Kosovo, international peacekeepers closed the Zvecan primary lead smelter near Mitrovica in mid-August as a result of concerns regarding excessive emissions of lead into the environment. The smelter, part of the Trepca mining complex, was to be placed under the control of the United Nations (UN) following the closure. According to a UN official, the closure was a temporary measure that would allow a French, Swedish, and U.S. consortium, ITT Kosovo, to begin construction that would bring the facility up to environmental standards (Platt's Metals Week, 2000g).

Reopenings and Expansions.—Boliden Apirsa S.L., a subsidiary of Canada's Boliden Ltd., resumed full operation at its Los Frailes Mine near Seville, Spain, in March 2000, producing at a rate of 125,000 t/yr of zinc and 48,000 t/yr of lead contained in concentrates. Los Frailes had been forced to close in April 1998 when a tailings dam failed, flooding a significant portion of the neighboring land. The mine was restarted in June 1999 after its milling license was restored by the local administration, along with a permit to dump tailings in the adjacent Aznalcollar open pit mine (Metal Bulletin, 2000e). In October, however, Boliden Ltd. reported that its subsidiary would not invest in any further development of the open pit operations at Los Frailes and filed for the equivalent of Chapter 11 bankruptcy protection, citing appreciable financial losses since resuming operations (Mining Journal, 2000f). By yearend, Australia's Murchison United NL had entered into an agreement with Boliden Apirsa S.L. to undertake due diligence at the Los Frailes Mine. According to a Murchison spokesperson, it would be necessary to expand the open pit mine in order to access further resources and thus keep the mine in operation for an additional 10 years. Murchison planned to use its due diligence commitment to assess the extent of restructuring and the required investment to achieve this operational goal (Metal Bulletin, 2000j).

In February, Australia's Western Metals Ltd., announced plans to expand the ore processing capacity at its Pillara lead-zinc mine in the Kimberley region of Western Australia. The expansion from the existing level of 1.5 Mt/yr to a level of 2.4 Mt/yr of ore processed will effectively consolidate and reduce the cost of Western's processing operations. Expansion of the Pillara facilities was expected to be completed by January 2001 and more than compensate for the loss of production at the soon-to-be-closed, aging concentrator at Western's nearby Cadjebut Mine (Metal Bulletin, 2000o).

Israel's Hakurnas, a secondary lead producer near Ashdod, proceeded with its expansion plans to increase the quantity of lead-acid batteries recycled. According to a company spokesperson, the move to expand was made in response to the increase in demand for lead by automotive battery producers in Israel and other parts of the Middle East, as well as to the projected increase in demand for lead-acid batteries in electric vehicles during the next 10 years. The increase in secondary lead production resulting from the expansion was expected to be realized in the fourth quarter of 2000. Israel's stringent battery collection system supports the recycling of 95% of the lead consumed in the manufacture of batteries. Thus, much of the supply of spent lead-acid batteries for the Hakurnas operation was expected to be derived from domestic sources (Metal Bulletin, 2000g).

In China, plans to increase lead production were reported by several companies. The Yuguang Gold and Lead Group reported that refined lead production in 2000 was about 78,000 t, exceeding its original target by 8,000 t. Yuguang continued to construct new production facilities and, upon completion, anticipated an additional output capacity of 20,000 to 30,000 t by midyear 2001. Yuguang's refined lead exports in 2000 were about 30,000 t, nearly 10,000 t above the level exported in 1999 (Platt's Metals Week, 2000b). China's Jiyuan Gold Smelter in Henan Province began its 50,000-t/yr lead expansion project and expected to complete the project by the end of 2001. According to a company spokesperson, production at the primary lead smelter was officially scheduled to begin in early 2002. Upon completion of the expansion project, Jiyuan's capacity for production of refined lead will be raised to 120,000 t/yr (Platt's Metals Week, 2000c). Refined lead production at China's Hunan-based Shuikoushan Mining Authority reached 50,000 t in 2000, up appreciably from the levels of the previous 2 years. The company reportedly was considering renovation plans that would nearly double Shuikoushan's current lead production, but a firm schedule had not been set for initiating the 2- to 3-year renovation project (Platt's Metals Week, 2000h).

Production at Romania's Sometra zinc-lead primary smelter in Copsa Mica reached a total of 75,000 t in 2000. Lead production represents about one-third of the total production at Sometra. Production levels at Sometra have nearly doubled since its privatization 2 years ago when production was less than 40,000 t/yr. Sometra is now 88% owned by Greek base metals producer Mytilineos Holdings S.A., which has confirmed its long-term commitment to the progress of Sometra through continued modernization and environmentally related improvements. According to a spokesperson for Sometra, a recent decision by the Romanian Government to grant the Copsa Mica area a special status to encourage investment will assist further the modernization process (Metal Bulletin, 2000l).

Transfers of Ownership, Sales Offerings, Mergers.—In September, Eco-Bat Technologies plc, a principal European lead-acid battery manufacturer, agreed to purchase Exide Technologies' Gast secondary lead smelter in Pont-Sainte-Maxence, France. Exide had purchased the Gast facility from Paris-based Cie Européene d'Accumulateurs SA in 1995, but had decided in early 2000 to sell the Gast smelter as part of a move to scale down its global operations. According to an Eco-Bat spokesperson, environmental issues had been resolved at the Gast facility and an extension of the required environmental permit had been received from the French Government. A new furnace also was installed at the facility, increasing the production capacity to 35,000 t from the previous 25,000 t (Metal Bulletin, 2000c, f).

In April, the Privatization Agency of Bulgaria (BPA) reported the receipt of one bid for the purchase of an 80% stake in the Kombinat za Czvetni Metali (KCM) primary lead-zinc smelter near Plovdiv. The bid was received from KCM's management through KCM-2000, a separate entity formed so that KCM could participate in its own privatization. According to the terms of the purchase, KCM-2000 would be permitted to extend payments for the smelter over a 10-year period with no payment due during the first year. The BPA had resumed efforts to privatize KCM in March 2000 following a failed attempt to privatize it in August 1999 (Metal Bulletin, 2000i).

In September, Irish miner Ivernia West plc achieved total control of the Magellan lead project in Western Australia through its acquisition of Polymetals Ltd. Ivernia West previously had a 15.7% interest in the project. Results of a pre-feasibility study showed a minable resource at Magellan sufficient to support a 10-year mine life. A drilling program was continued at Magellan and new ore reserves were evaluated throughout the year. It was anticipated that a full feasibility study would be completed by yearend (Metal Bulletin, 2000h).

Outlook

Total world demand for refined lead is expected to rise in 2001 by 2.2% to 6.54 Mt; in the industrialized countries alone, demand is expected to increase by 1.9% to 5.66 Mt. Demand is expected to continue to grow in Asia, rising by 4.2%, and to remain at the same level as during 2000 in Europe. Lead mine output in 2001 is predicted to rise by 1.0% worldwide to 2.99 Mt and by 1.4% in the industrialized countries to 2.29 Mt. The increase in mine output will be principally as a consequence of increases in production in Australia, Ireland, Mexico, and Sweden. Refined lead production is expected to increase by 2.3% worldwide in 2001 to 6.66 Mt, and by 2.7% in the industrialized countries to 5.21 Mt. Contributing to this increase will be projected rises in production in Australia, Canada, India, and the United States, and the commissioning of new capacity in Israel, Malaysia, and the Republic of Korea (International Lead and Zinc Study Group, 2000).

Lead-acid batteries will continue to dominate the demand for lead. The Chicago-based Battery Council International anticipates continued growth in lead-acid battery usage during the next 5 years. U.S. demand for replacement SLI lead-acid batteries is expected to grow at the rate of about 2% per year. Demand for original equipment SLI batteries, however, will be down, at least through 2001, as a result of a significant decline in passenger car and light truck production (Amistadi, 2001, p. 6-10). Demand for industrial-type lead-acid batteries will grow by 5% in 2001. The industrial battery demand will continue to grow at a rate of about 8% per year through the year 2005 for both motive power batteries and large stationary batteries. Growth in the use of the stationary batteries will be driven principally by their increasing need in the infrastructure supporting the wireless telecommunications markets and uninterruptible power supply systems. However, the rate of growth in the demand for industrial batteries will be tempered somewhat through 2005, as telecommunications companies begin to reduce capital expenditures (Cullen, 2001).

Mine production in the United States should remain constant or decline slightly in 2001 as a result of additional temporary production cutbacks at several of the larger facilities. Refined lead production from primary refineries also will decline as a result of temporary production cutbacks (Metal Bulletin, 2001). Secondary production of lead is expected to remain at a level comparable to that of 2000, but could rise by 2% to 3% should weather-related temperature extremes significantly increase the demand for replacement automotive-type batteries.

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TABLE 1
SALIENT LEAD STATISTICS 1/

(Metric tons, unless otherwise specified)

	1996	1997	1998	1999	2000
United States:					
Production:					
Mine, recoverable lead content 2/	426,000	448,000	481,000	503,000	457,000
Value thousands	$459,000	$460,000	$480,000	$485,000	$439,000
Primary lead (refined):					
Domestic ores and base bullion	326,000 3/	343,000 3/	337,000	350,000	341,000
Foreign ores and base bullion	W	W	W	W	W
Secondary lead (lead content)	1,070,000	1,110,000	1,120,000	1,110,000	1,130,000
Exports (lead content):					
Lead ore and concentrates	59,700	42,200	72,400	93,500	117,000
Lead materials, excluding scrap	121,000	104,000	100,000	103,000	92,000
Imports for consumption:					
Lead in ore and concentrates	6,570	17,800	32,700	12,300	31,200
Lead in base bullion	5	25	464	90	65
Lead in pigs, bars, reclaimed scrap	268,000	265,000	267,000	311,000	356,000
Stocks, December 31:					
Primary lead	8,140 3/	11,900 3/	10,900	12,300	18,600
At consumers and secondary smelters	72,100	89,100	77,900	78,700 r/	104,000
Consumption of metal, primary and secondary	1,540,000	1,620,000	1,630,000	1,680,000	1,720,000
Price, North American cents per pound producer average, delivered 4/	48.83	46.54	45.27	43.72	43.57
World:					
Production:					
Mine thousand metric tons	3,090	3,110	3,080	3,050 r/	3,100 e/
Refinery 5/ do.	2,870 r/	3,040 r/	3,100 r/	3,300 r/	3,530 e/
Secondary refinery do.	2,760 r/	2,840 r/	2,840 r/	2,830 r/	2,930 e/
Price, London Metal Exchange, cents per pound pure lead, cash average 4/	35.10	28.29	23.96	22.78	20.57

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data; included with "Domestic ores and base bullion."
1/ Data are rounded to no more than three significant digits, except prices.
2/ Lead recoverable after smelting and refining. Table 14 represents lead in concentrate.
3/ American Bureau of Metal Statistics Inc.
4/ Platt's Metals Week.
5/ 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)

State	1999	2000
Alaska and Missouri	464,000	416,000
Montana	7,950	W
Other States 2/	31,200	41,000
Total	503,000	457,000

W Withheld to avoid disclosing company proprietary data; included with "Other States."
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Includes Colorado, Idaho, Nevada, New York, and Tennessee.

TABLE 3
LEADING LEAD-PRODUCING MINES IN THE UNITED STATES IN 2000, IN ORDER OF OUTPUT

Rank	Mine	County and State	Operator	Source of lead
1	Red Dog	Northwest Arctic, AK	Cominco Alaska Inc.	Lead-zinc ore.
2	Fletcher	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
3	Brushy Creek	do.	do.	Do.
4	Buick	Iron, MO	do.	Do.
5	Sweetwater	Reynolds, MO	do.	Do.
6	Lucky Friday	Shoshone, ID	Hecla Mining Co.	Silver ore.
7	Viburnum #28	Iron, MO	Doe Run Resources Corp.	Lead ore.
8	Greens Creek 1/	Admiralty Island, AK	Kennecott Greens Creek Mining Co.	Zinc ore.
9	West Fork	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
10	Viburnum #29	Washington, MO	do	Do.
11	Casteel	Iron, MO	do.	Do.
12	Montana Tunnels	Jefferson, MT	Apollo Gold Co.	Zinc ore.
13	Sunshine	Shoshone, ID	Sunshine Mining Co.	Silver ore.
14	Gordonsville	Smith, TN	Pasminco Ltd.	Zinc ore.
15	McCoy/Cove	Lander, NV	Echo Bay Minerals Co.	Gold ore.
16	Galena	Shoshone, ID	Silver Valley Resources Corp.	Silver ore.
17	Balmat	St. Lawrence, NY	Zinc Corp. of America	Zinc ore.
18	Pierrepont	do.	do.	Do.
19	Young	Jefferson, TN	ASARCO Inc.	Do.

1/ Updated to reflect locality name change.

TABLE 4
REFINED LEAD PRODUCED AT PRIMARY REFINERIES IN THE UNITED STATES, BY SOURCE MATERIAL 1/

(Metric tons, unless otherwise specified)

Source material		1999	2000
Refined lead:			
Domestic ores and base bullion		350,000	341,000
Foreign ores and base bullion		W	W
Total		350,000	341,000
Calculated value of primary refined lead 2/	thousand	$337,000	$328,000

W Withheld to avoid disclosing company proprietary data; included with "Domestic ores and base bullion."
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Value based on average quoted price.

TABLE 5
LEAD RECOVERED FROM SCRAP PROCESSED IN THE UNITED STATES,
BY KIND OF SCRAP AND FORM OF RECOVERY 1/

(Metric tons, unless otherwise specified)

		1999	2000
Kind of scrap:			
New scrap:			
Lead-base		42,700	35,500
Copper-base		10,100	11,400
Total		52,800	46,900
Old scrap:			
Battery-lead		1,020,000	1,020,000
All other lead-base		37,100	59,300
Copper-base		7,210	4,730
Total		1,060,000	1,080,000
Grand total		1,110,000	1,130,000
Form of recovery:			
As soft lead		635,000	651,000
In antimonial lead		444,000	428,000
In other lead alloys		18,100	36,800
In copper-base alloys		17,300	16,100
Total		1,110,000	1,130,000
Value 2/	thousands	$1,070,000	$1,090,000

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 6
U.S. CONSUMPTION OF LEAD, BY PRODUCT 1/

(Metric tons)

SIC code	Product	1999	2000
	Metal products:		
3482	Ammunition, shot and bullets	58,300	63,500
	Bearing metals:		
35	Machinery except electrical	W	W
36	Electrical and electronic equipment	W	W
371	Motor vehicles and equipment 2/	1,120	1,090
37	Other transportation equipment	W	W
	Total	1,570	1,480
3351	Brass and bronze, billets and ingots	3,940	3,670
36	Cable covering, power and communication	2,410	W
15	Calking lead, building construction	971	1,140
	Casting metals:		
36	Electrical machinery and equipment	W	W
371	Motor vehicles and equipment	27,600	28,400
37	Other transportation equipment	W	W
3443	Nuclear radiation shielding	1,770	1,270
	Total	34,300	35,100
	Pipes, traps, other extruded products:		
15	Building construction	2,020	2,010
3443	Storage tanks, process vessels, etc.	(3/)	(3/)
	Total	2,020	2,010
	Sheet lead:		
15	Building construction	11,600	17,600
3443	Storage tanks, process vessels, etc.	(3/)	(3/)
3693	Medical radiation shielding	3,890	6,190
	Total	15,400	23,800
	Solder:		
15	Building construction	2,450	1,440
	Metal cans and shipping containers	W	W
367	Electronic components,accessories and other electrical equipment	6,140 r/	5,430
371	Motor vehicles and equipment	W	W
	Total	13,100	11,500
	Storage batteries:		
3691	Storage battery grids, post, etc.	765,000 r/	796,000
3691	Storage battery oxides	707,000 r/	690,000
	Total storage batteries	1,470,000	1,490,000
371	Terne metal, motor vehicles and equipment	(4/)	(4/)
27	Type metal, printing and allied industries	(5/)	(5/)
34	Other metal products 6/	7,130	21,700
	Total	1,610,000	1,650,000
	Other oxides:		
285	Paint	W	W
32	Glass and ceramics products	W	W
28	Other pigments and chemicals	W	W
	Total	58,200	52,400
	Miscellaneous uses	15,100	14,000
	Grand total	1,680,000	1,720,000

r/ Revised. 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/ Includes "Terne metal, motor vehicles and equipment."
3/ Included with "Building construction" to avoid disclosing company proprietary data.
4/ Included with "Bearing metals, motor vehicles and equipment."
5/ Included with "Other metal products" to avoid disclosing company proprietary data.
6/ Includes lead consumed in foil, collapsible tubes, annealing, galvanizing, plating, electrowinning, and fishing weights.

TABLE 7
U.S. CONSUMPTION OF LEAD IN 2000, BY STATE 1/ 2/

(Metric tons)

State	Refined soft lead	Lead in antimonial lead	Lead in alloys	Lead in copper-base scrap	Total
California, Oregon, Washington	25,600	25,500	5,010	--	56,200
Florida and Georgia	5,530	1,250	18,800	--	25,600
Illinois	24,700	34,000	16,900	--	75,600
Iowa, Michigan, Missouri	44,800	38,800	18,700	--	102,000
Ohio and Pennsylvania	104,000	45,200	66,800	1,270	217,000
Arkansas and Texas	37,200	19,900	16,100	--	73,100
Alabama, Louisiana, Mississippi, Oklahoma	9,930	2,380	--	--	12,300
Colorado, Indiana, Kansas, Kentucky, Minnesota, Nebraska, Tennessee, Wisconsin	433,000	110,000	98,100	197	641,000
Connecticut, Delaware, Maine, Maryland, Massachusetts, Montana, New Hampshire, New Jersey, New York, North Carolina, Rhode Island, South Carolina, Vermont	29,700	16,600	29,400	--	75,800
Various States	241,000	137,000	61,600	--	439,000
Total	955,000	431,000	331,000	1,460	1,720,000

-- 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.

TABLE 8
U.S. CONSUMPTION OF LEAD IN 2000, BY CLASS OF PRODUCT 1/ 2/

(Metric tons)

Product	Soft lead	Lead in antimonial lead	Lead in alloys	Lead in copper-base scrap	Total
Metal products	60,700	91,300	13,300	1,460	167,000
Storage batteries	832,000	339,000	315,000	--	1,490,000
Other oxides	W	--	--	--	W
Miscellaneous	62,500	312	3,620	--	66,500
Total	955,000	431,000	331,000	1,460	1,720,000

W Withheld to avoid disclosing company proprietary data; included with "Miscellaneous." -- 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 9
STOCKS OF LEAD AT CONSUMERS AND SECONDARY SMELTERS
IN THE UNITED STATES, DECEMBER 31 1/

(Metric tons, lead content)

Year	Refined soft lead	Lead in antimonial lead	Lead in alloys	Lead in copper-base scrap	Total
1999	35,300 r/	24,500 r/	18,700 r/	135	78,700 r/
2000	58,500	30,300	15,400	94	104,000

r/ Revised.
1/ Data are rounded to no more than three significant digits.

TABLE 10
PRODUCTION AND SHIPMENTS OF LEAD PIGMENTS AND OXIDES IN THE UNITED STATES 1/ 2/

(Metric tons, unless otherwise specified)

	1999				2000			
	Production		Shipments		Production		Shipments	
Product	Gross weight	Lead content	Quantity	Value 3/	Gross weight	Lead content	Quantity	Value 3/
Litharge, red lead and white lead, dry	1,750	1,430	20,800	$17,400,000	1,770	1,450	21,000	$10,800,000
Leady oxide	728,000	692,000	NA	NA	724,000	687,000	NA	NA
Total	730,000	693,000	NA	NA	725,000	689,000	NA	NA

NA Not available.
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 11
U.S. IMPORTS FOR CONSUMPTION OF LEAD PIGMENTS AND COMPOUNDS, BY KIND 1/

Kind	Quantity (metric tons)	Value (thousands)
1999:		
White lead carbonate	1	$11
Red and orange lead	86	664
Chrome yellow, molybdenum orange pigments, lead-zinc chromates	8,470	25,900
Litharge	15,700	9,580
Glass frits (undifferentiated)	13,400	20,000
Total	37,700	56,100
2000:		
White lead carbonate	--	--
Red and orange lead	104	594
Chrome yellow, molybdenum orange pigments, lead-zinc chromates	8,900	26,400
Litharge	18,000	10,600
Glass frits (undifferentiated)	13,300	20,100
Total	40,300	57,600

-- 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. EXPORTS OF LEAD, BY COUNTRY 1/

(Lead content, unless otherwise specified)

	1999		2000	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Ore and concentrates:				
Belgium	31,800	$7,430	49,300	$12,000
Canada	12,600	10,000	11,100	9,190
China	--	--	--	--
Japan	39,400	9,240	32,200	7,530
Korea, Republic of	1,840	905	5,380	3,400
Mexico	7,600	5,670	17,500	9,230
Netherlands	63	41	--	--
United Kingdom	2	5	629	409
Other	165 r/	57 r/	425	885
Total	93,500	33,400	117,000	42,600
Ash and residues:				
Belgium	280	68	536	116
Canada	709	1,640	695	1,890
Japan	--	--	9,820	16,200
United Arab Emirates	321	232	206	122
Other	122	62	64	75
Total	1,430	2,000	11,300	18,400

See footnotes at end of table.

TABLE 12--Continued
U.S. EXPORTS OF LEAD, BY COUNTRY 1/

(Lead content, unless otherwise specified)

Country	1999 Quantity (metric tons)	1999 Value (thousands)	2000 Quantity (metric tons)	2000 Value (thousands)
Base bullion:				
Belgium	422	$475	638	$922
Canada	1,870	6,160	7,840	24,600
Mexico	61,800	69,500	23,600	49,800
Other	19	33	12	15
Total	64,100	76,200	32,100	75,300
Unwrought lead and lead alloys:				
Canada	9,880	6,360	9,070	6,150
France	36	267	--	10
Germany	14	73	68	99
Hong Kong	55	276	33	173
India	69	121	116	208
Israel	43	155	353	766
Japan	55	371	46	333
Korea, Republic of	5,140	3,240	3,190	2,060
Mexico	7,580	5,580	8,150	13,400
Netherlands	39	127	4	25
Thailand	8	35	47	33
United Arab Emirates	146	205	17	29
United Kingdom	56	221	65	80
Other	295 r/	661 r/	220	446
Total	23,400	17,700	21,400	23,800
Wrought lead and lead alloys:				
Argentina	133	502	5	76
Australia	12	57	45	82
Belgium	183	2,190	136	1,660
Canada	5,660	4,230	5,260	4,790
China	131	380	1,320	928
Colombia	27	67	23	71
France	32	396	77	148
Germany	70	1,250	143	1,780
Hong Kong	833	2,500	528	2,470
Israel	14	126	165	456
Korea, Republic of	139	409	245	6,740
Kuwait	59	751	66	861
Malaysia	26	709	17	831
Mexico	2,580	13,300	15,900	22,100
Netherlands	234	388	143	260
Saudi Arabia	434	3,810	787	6,270
Singapore	2,080	2,600	1,000	1,240
South Africa	65	144	84	188
Spain	18	351	26	530
Taiwan	195	541	211	1,400
United Arab Emirates	34	251	3	41
United Kingdom	355	1,100	166	974
Other	553 r/	2,440 r/	826	3,710
Total	13,900	38,500	27,200	57,600
Scrap (gross weight):				
Argentina	--	--	253	418
Canada	110,000	17,000	65,500	9,850
China	3,160	1,070	2,770	1,140
Dominican Republic	35	206	20	29
France	9	89	131	188
Haiti	36	27	113	66
Hong Kong	186	116	127	76
India	1,200	700	239	237
Japan	258	426	73	55
Korea, Republic of	625	649	328	72
Mexico	146	81	1,640	599
Saudi Arabia	88	144	11	29
Spain	59	55	--	--

See footnotes at end of table.

TABLE 12--Continued
U.S. EXPORTS OF LEAD, BY COUNTRY 1/

(Lead content, unless otherwise specified)

Country	1999 Quantity (metric tons)	1999 Value (thousands)	2000 Quantity (metric tons)	2000 Value (thousands)
Wrought lead and lead alloys--Continued:				
Taiwan	1,610	$918	141	$134
Trinidad and Tobago	33	40	--	--
United Arab Emirates	99	127	--	--
United Kingdom	53	123	75	187
Venezuela	1	9	74	9
Other	204 r/	218 r/	69	125
Total	117,000	22,000	71,600	13,200

r/ Revised. -- 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
U.S. IMPORTS FOR CONSUMPTION OF LEAD, BY COUNTRY 1/

(Lead content, unless otherwise specified)

Country	1999 Quantity (metric tons)	1999 Value (thousands)	2000 Quantity (metric tons)	2000 Value (thousands)
Ore and concentrates (lead content): 2/				
Australia	87	$81	--	--
Brazil	5,710	907	9,990	$2,280
Canada	(3/)	5	(3/)	25
Mexico	1,580	726	12,600	3,900
Peru	193	60	1,720	306
Poland	2,890	879	4,530	805
South Africa	--	--	2,310	491
Other	1,860 r/	438 r/	--	--
Total	12,300	3,100	31,200	7,810
Base bullion (lead content):				
Colombia	88	38	65	30
Other	2	20	--	--
Total	90	58	65	30
Pigs and bars (lead content):				
Australia	21,900	11,100	36,000	15,700
Belgium	218	505	65	172
Canada	198,000	119,000	216,000	123,000
China	47,700	23,700	72,100	34,800
Colombia	1,960	782	189	78
Germany	1,000	876	537	1,600
Kazakhstan	2,390	1,130	4,160	1,990
Mexico	27,200	13,100	18,400	7,270
Peru	6,930	3,590	1,790	1,040
United Arab Emirates	46	182	30	137
Other	3,840 r/	1,840 r/	7,250	3,720
Total	311,000	175,000	356,000	190,000
Reclaimed scrap, including ash and residues (lead content), United Kingdom 4/	--	--	25	5
Grand total	324,000	179,000	388,000	198,000
Wrought lead, all forms, including wire and powders (gross weight):				
Australia	3,070	1,610	28	129
Belgium	80	54	75	178
Canada	2,690	4,460	2,870	4,960
China	295	963	519	1,130
El Salvador	814	536	803	568
France	32	63	66	292
Germany	501	2,340	895	2,440
Guatemala	1	4	125	86

See footnotes at end of table.

TABLE 13--Continued
U.S. IMPORTS FOR CONSUMPTION OF LEAD, BY COUNTRY 1/

(Lead content, unless otherwise specified)

Country	1999 Quantity (metric tons)	1999 Value (thousands)	2000 Quantity (metric tons)	2000 Value (thousands)
Wrought lead, all forms, including wire and powders (gross weight)--Continued				
Hong Kong	173	$570	118	$412
Italy	260	299	12	71
Japan	79	555	117	943
Mexico	1,110	1,370	415	814
Netherlands	320	1,220	858	2,890
New Zealand	53	495	56	487
Peru	330	257	437	276
Philippines	51	215	10	42
Taiwan	1,300	1,450	1,130	1,340
United Kingdom	441	1,220	476	1,380
Other	235 r/	641 r/	186	855
Total	11,800	18,300	9,200	19,300

r/ Revised. -- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Also includes other lead-bearing materials containing more than 5 troy ounces per short ton of gold or more than 100 troy ounces per short ton of total precious metals.
3/ Less than 1/2 unit.
4/ Also includes other lead-bearing materials containing more than 10% by weight of copper, lead, or zinc (any one).

Source: U.S. Census Bureau.

TABLE 14
LEAD: WORLD MINE PRODUCTION OF LEAD IN CONCENTRATES, BY COUNTRY 1/ 2/

(Metric tons)

Country	1996	1997	1998	1999	2000 e/
Algeria	1,016	845 r/	3,467 r/	5,801 r/	6,215 3/
Argentina	11,272	13,760	15,004	14,256 r/	15,000
Australia	522,000	531,000	618,000	681,000	699,000
Bolivia	16,538	18,608	13,848	10,153 r/	10,100
Bosnia and Herzegovina e/	200	200	200	200	200
Brazil	13,157	14,258	12,394 r/	16,319 r/	16,400
Bulgaria	28,000	32,000	25,000	18,000	15,000
Burma e/	2,200	1,900	2,200	2,000	2,000
Canada	257,253	186,234	189,752	155,369 r/	143,049 p/ 3/
Chile	1,374	1,264	337	170	180
China e/	643,000	712,000	580,000	549,000 r/	570,000
Colombia e/	300	300	300	300	300
Ecuador e/	200	200	200	200	200
Georgia e/	200	200	200	200	200
Greece	8,400	19,300	18,000 e/	16,000 e/	14,000
Honduras	4,700	5,900	4,329	5,226	5,100 p/
India	35,000	32,000	39,300	32,100 r/	28,900
Iran e/ 4/	15,700	18,200 3/	11,000 r/	11,000 r/	15,000
Ireland	45,344	45,149	46,000 e/	45,000 e/	58,600
Italy	11,100	11,792	6,800 e/	6,000 e/	2,000
Japan	7,753	5,227	6,198	6,074	8,835 3/
Kazakhstan e/	35,000	31,000	30,000 3/	34,100	40,000
Kenya e/	5	5	--	--	--
Korea, North e/	80,000	75,000	70,000	70,000	70,000
Korea, Republic of	5,131	3,632	3,558 r/	1,822 r/	1,500
Macedonia	27,000	28,000	26,000	26,000 e/	25,000
Mexico	173,831	174,661	166,060	125,656 r/	156,000
Morocco	71,667	77,056	79,300 r/	79,798 r/	79,800
Namibia	15,349	13,577	13,568 r/	9,361 r/	12,900

See footnotes at end of table.

TABLE 14--Continued
LEAD: WORLD MINE PRODUCTION OF LEAD IN CONCENTRATES, BY COUNTRY 1/ 2/

(Metric tons)

Country	1996	1997	1998	1999	2000 e/
Norway e/	2,083 3/	2,000	-- r/	--	--
Peru	248,787	258,188	259,710	271,782 r/	270,576 p/ 3/
Poland	58,700	55,000	60,000	61,000	60,000
Romania	18,712	17,000	15,000	20,484	20,000
Russia	23,000	16,000	13,000	13,000	13,300
Serbia and Montenegro	10,000	11,000	12,000 e/	3,200 r/ e/	9,000
South Africa	88,613	83,114	84,128	80,191	75,262 3/
Spain	23,826	23,900	18,800	15,000 r/ e/	51,000
Sweden	98,800	108,600	114,430	116,300 r/	108,000 3/
Tajikistan e/	800	800	800	800	800
Thailand	21,000	5,400 r/	6,700 r/	11,900 r/	12,000 3/
Tunisia	4,764	1,424	4,274	6,599 r/	6,602 3/
Turkey	10,971	13,113	13,500 e/	12,000 e/	12,000
United Kingdom e/	1,800	1,800	1,600	1,000	1,000
United States	436,000	459,000	493,000	520,000	468,000 3/
Uzbekistan e/	10,000	-- 5/	-- 5/	-- 5/	-- 5/
Total	3,090,000	3,110,000	3,080,000	3,050,000 r/	3,100,000

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/ In addition to the countries listed, lead is also produced in Nigeria, but information is inadequate to estimate output. Table includes data available through June 29, 2001.
3/ Reported figure.
4/ Year beginning March 21 of that stated.
5/ Mining operations appear to have been sharply curtailed or to have ceased.

TABLE 15
LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons, gross weight)

Country	1996	1997	1998	1999	2000 e/
Algeria:					
Primary e/	900	900	900	900	900
Secondary	7,700	7,100	6,100	6,100 e/	6,100
Total	8,600	8,000	7,000	7,000 e/	7,000
Argentina:					
Primary	396	3,282	300 e/	495 r/ e/	8,700
Secondary	27,705	28,834	30,057	25,200 r/ e/	21,000
Total	28,101	32,116	30,357	25,695 r/	29,700
Australia:					
Primary	204,000	204,000	173,000	240,000	223,366 3/
Secondary	24,000	34,000	33,000 r/	32,828 r/	28,430 3/
Total	228,000	238,000	206,000 r/	272,828 r/	251,796 3/
Austria, secondary	22,000 e/	22,700 r/	23,100 r/	24,000 e/	24,000
Belgium:					
Primary	94,400 e/	84,400	74,300 r/	82,900 r/	98,000
Secondary	31,000 e/	26,400	17,200 r/	20,300 r/	20,000
Total	125,000 e/	110,800	91,500 r/	103,200 r/	118,000
Brazil, secondary	45,000	44,500	45,000 e/	45,000 e/	45,000
Bulgaria:					
Primary e/	64,700	62,600	63,000	60,000	60,000
Secondary e/	10,000	10,000	10,000	13,000	10,000
Total	74,670	72,580	72,975	73,000	70,000
Burma, primary	1,984	1,760	1,936	1,666	1,100
Canada:					
Primary	194,031	139,736	129,750	145,889	156,954 p/ 3/
Secondary	115,348	131,659	135,737	117,023	125,898 p/ 3/
Total	309,379	271,395	265,487	262,912	282,852 p/ 3/
China: e/					
Primary	562,000	584,000	665,000	821,000 r/	930,000
Secondary	144,000	123,000	92,000	97,000 r/	100,000
Total	706,000	707,000	757,000	918,000 r/	1,030,000

See footnotes at end of table.

TABLE 15--Continued
LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons, gross weight)

Country	1996	1997	1998	1999	2000 e/
Colombia, secondary	10,000	10,000	12,000	12,000 e/	12,000
Czech Republic, secondary e/	15,000	15,000	15,000	15,000	15,000
France:					
Primary	140,750	131,480	146,000 r/	124,000 r/	100,000
Secondary	162,000	170,820	172,000 r/	155,000 r/	158,000
Total	302,750	302,300	318,000 r/	279,000 r/	258,000
Germany:					
Primary	88,700	164,800	176,800 r/	169,557 r/	210,000
Secondary	149,400	164,400	203,400 r/	204,000 r/	205,000
Total	238,100	329,200	380,200 r/	373,557 r/	415,000
India: e/					
Primary	67,000	69,000	70,000	72,000	70,000
Secondary	27,000	24,000	25,000	20,000	26,000
Total	94,000	93,000	95,000	92,000	96,000
Iran:					
Primary e/	7,000	8,400	9,000	9,000	9,000
Secondary	39,900	41,000	38,000	38,000 e/	38,000
Total	46,900	49,400	47,000	47,000 e/	47,000
Ireland, secondary e/	10,000	10,000	11,000	12,000	12,000
Israel, secondary	12,000	12,000	12,000	13,000	13,000
Italy:					
Primary	65,900	65,700	57,400 r/	66,954 r/	75,000
Secondary	143,900	145,900	141,900 r/	148,354 r/	160,000
Total	209,800	211,600	199,300 r/	215,308 r/	235,000
Jamaica, secondary e/	800	800	800	800	800
Japan:					
Primary	140,531	142,326	144,542	125,514	129,969 3/
Secondary	146,842	154,438	157,555	167,915 r/	182,142 3/
Total	287,373	296,764	302,097	293,429 r/	312,111 3/
Kazakhstan, primary and secondary	70,000 e/	81,974	118,632	160,000 e/	210,000
Korea, North: e/					
Primary	75,000	75,000	75,000	70,000	70,000
Secondary	5,000	5,000	5,000	5,000	5,000
Total	80,000	80,000	80,000	75,000	75,000
Korea, Republic of:					
Primary	88,556	121,296	133,066	140,317	170,704 3/
Secondary e/	10,000	10,000	10,000	10,000	10,000
Total e/	98,600	131,000	143,000	150,000	181,000
Macedonia:					
Primary	23,000 r/	24,046 r/	26,000 r/	19,000 r/ e/	19,000
Secondary e/	600 r/	2,000	2,415 r/ 3/	738 r/	1,000
Total e/	23,600 r/	26,000 r/	28,415 r/ 3/	19,700 r/	20,000
Malaysia, secondary e/	36,000	42,000	35,000 r/	35,000 r/	35,000
Mexico:					
Primary 4/	150,395	168,164	163,206	111,136 r/	150,000
Secondary e/	10,000	10,000	10,000	10,000	10,000
Total e/	160,000	178,000	173,000	121,000 r/	160,000
Morocco:					
Primary	59,749	64,202	59,000	57,000 e/	57,000
Secondary	3,100	3,000	3,000	3,000 e/	3,000
Total	62,849	67,202	62,000	60,000 e/	60,000
Namibia, primary 5/	8,588	1,530	236	--	--
Netherlands, secondary	22,000	19,500	13,200	19,900 r/	20,000
New Zealand, secondary e/	6,000	6,000	6,000	6,000	10,000
Nigeria, secondary e/	4,000	4,000	5,000	5,000	5,000
Pakistan, secondary e/	2,000	2,000	2,000	2,000	2,000
Peru, primary	94,324	97,882 r/	109,492	111,276	116,412 p/ 3/
Philippines, secondary e/	17,200	17,000	17,000	12,389 r/ 3/	16,218 3/
Poland: e/					
Primary	51,000	49,900	49,300	50,000	35,412 3/
Secondary	15,000	15,000	15,000	13,985 r/ 3/	10,000
Total	66,000 3/	64,900	64,300	64,000 r/	45,400
Portugal, secondary e/	5,900	6,000	6,000	6,000 r/	6,000

See footnotes at end of table.

TABLE 15--Continued
LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons, gross weight)

Country	1996	1997	1998	1999	2000 e/
Romania: e/					
Primary	20,000 3/	18,000	20,000	15,000 r/	15,000
Secondary	4,000	4,000	4,000	2,500 r/	2,500
Total	24,000	22,000	24,000	17,500 r/	17,500
Russia, primary and secondary e/	30,000	52,000	36,000	62,000 r/	59,000
Serbia and Montenegro, primary	30,317	23,632	23,756 r/	3,690 r/	1,242 3/
Slovenia, secondary	7,237	14,500 r/	14,000 r/ e/	14,000 r/ e/	15,300
South Africa, secondary	32,200	41,500	39,200	40,000 e/	40,000
Spain, secondary e/	86,000	74,900	90,000 r/	96,000 r/ 3/	120,000
Sweden:					
Primary	42,200	34,700	40,600 e/	38,000 r/ e/	37,800
Secondary	41,900	51,500	52,000 e/	48,000 r/ e/	45,000
Total	84,100	86,200	92,600 e/	86,000 r/ e/	82,800
Switzerland, secondary e/	6,200	6,000	7,600	7,000	8,000
Thailand, secondary	12,789	14,968	18,906	23,741	24,000
Trinidad and Tobago, secondary e/	1,600	1,600	1,600	1,600	1,600
Turkey: e/					
Primary	4,000	7,000	8,000	4,000	4,000
Secondary	2,000	2,000	4,000	4,000	2,000
Total	6,000	9,000	12,000	8,000	6,000
Ukraine, secondary e/	21,000	11,000	9,000	9,902 r/ 3/	15,034 3/
United Kingdom:					
Primary	168,108	215,243	186,212 r/	185,422 r/	166,411 3/
Secondary	177,466	175,783	162,651 r/	162,651 r/	170,740 3/
Total	345,574	391,026	348,863 r/	348,073 r/	337,151 3/
United States:					
Primary	326,000	343,000	337,000	350,000	341,000 3/
Secondary	1,070,000	1,110,000	1,120,000	1,110,000	1,130,000 3/
Total	1,400,000	1,450,000	1,450,000	1,460,000	1,470,000 3/
Venezuela, secondary e/	25,000 r/	25,000 r/	25,000 r/	25,000 r/	30,000
Grand total:	5,630,000 r/	5,880,000 r/	5,940,000 r/	6,130,000 r/	6,460,000
Of which:					
Primary	2,770,000 r/	2,910,000 r/	2,940,000 r/	3,070,000 r/	3,260,000
Secondary	2,760,000 r/	2,840,000 r/	2,840,000 r/	2,830,000 r/	2,930,000
Undifferentiated	100,000	134,000	155,000	222,000 r/	269,000

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 June 29, 2001. 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/ Reported figure.

4/ Includes lead content in antimonial lead.

5/ Includes products of imported concentrate.