

# LEAD

By Gerald R. Smith

Domestic lead mine production increased by about 2% in 1994, following a 3-year decline. Missouri remained the dominant producing State with an 80% share, and Alaska, Idaho, and Montana contributed an additional 1%. Lead was produced at 16 mines, employing approximately 1,300 people. The value of domestic mine production was approximately \$300 million. Primary lead was processed at two smelter-refineries in Missouri, a smelter in Montana, and a refinery in Nebraska.

Several proposed rules were issued by Government agencies during 1994, affecting the regulation of new and existing uses, and clean-up activities for lead, as well as the disclosure of information regarding its potential risks. A final rule also was issued on contaminant level goals and regulations for drinking water. In addition, two reports were completed in compliance with mandates within the Housing and Community Development, and Residential Lead-Based Paint Hazard Reduction Acts of 1992, that concluded the need for additional protection from lead risk for children in tenant-based housing, and the need for standards to ensure availability of lead-based paint hazard insurance for property owners and for contractors involved in lead abatement activities.

Lead was consumed in about 200 plants in the manufacture of end-use products, including batteries, ammunition, covering for power and communication cable, building construction materials, and solders for motor vehicles, metal containers, and electrical and electronic components and accessories.

Lead-acid batteries continued to be the overwhelmingly dominant use of lead, accounting for about 84% of reported lead consumption in 1994. The Battery Council International reported a 1994 starting-lighting-ignition (SLI) battery production of 97.5 million units. This total included both original equipment and replacement automotive-type batteries. An estimated 1.031 million metric tons (Mmt) of lead were consumed in SLI batteries in 1994.

Monthly sales of lead from the National Defense Stockpile (NDS) were continued during 1994. Sales totaled about 63,400 metric tons (mt) (69,900 short tons) (st) leaving about 447,000 mt (493,000 st) in the NDS at yearend.

London Metal Exchange (LME) and North

American producer average prices in December 1994 were \$0.078 per pound and \$0.079 per pound, respectively, above those in the final month of 1993. Prices rose steadily throughout the year with the yearly average LME and North American producer prices up by \$0.064 and \$0.054 per pound, respectively, compared with those of 1993.

Lead was mined in 48 countries, of which the top five accounted for 58% of the world total of 2.81 million tons. Australia was the largest producer, with 19% of the world total, followed by the United States (13%), China (12%), Peru (8%), and Canada (6%).

## Legislation and Government Programs

Monthly sales of lead from the NDS were continued during 1994 and totaled about 63,400 mt (69,900 st). A revision in April 1994 to the Defense National Stockpile Center's (DNSC) Annual Materials Plan (AMP) for fiscal year 1994 (October 1, 1993, to September 30, 1994) increased the maximum disposal authority for lead in the fiscal year from 31,751 mt (35,000 st) to 68,039 mt (75,000 st). Actual sales totaled 67,143 mt (74,013 st), of which 52,322 mt (57,675 st) were made in the first 9 months of calendar year 1994. For fiscal year 1995, the DNSC proposed the sale of 31,751 mt (35,000 st) of lead. Actual sales of lead in the first 3 months of the fiscal year amounted to 11,064 mt (12,196 st), leaving about 447,000 mt (493,000 st) of lead in the NDS at yearend 1994. A proposal made by DNSC in November 1994 to sell an additional 22,680 mt (25,000 st) of lead on a long-term basis remained under discussion at yearend.

The Environmental Protection Agency (EPA), issued a proposed rule in March 1994, that would effectively ban the use of certain lead and zinc fishing sinkers. The proposed rule would impose a ban on all manufacture, import, and processing of fishing sinkers containing lead or zinc and which are 1 inch or less in any dimension for use in the United States 1 year after promulgation of the final rule. The distribution in commerce of such fishing sinkers would be prohibited 2 years after promulgation of the final rule. The rule would not prohibit the manufacture and processing of these sinkers solely for export, but their manufacturers and processors would be

required to maintain records regarding the production, inventory, and shipment of these sinkers. After soliciting public comments in an initial 60-day comment period and a 60-day extension of the period, EPA continued to receive numerous comments from the public. In order to give all interested persons the opportunity to respond fully, the written comment period was extended to November 9, 1994.

In February, the Food and Drug Administration (FDA) announced its intentions to take several related actions to reduce the amount of lead in food attributable to the use of food and color additives and food ingredients whose use is generally recognized as safe (GRAS). The FDA identified the lead levels that it intended to propose as new, lower lead specifications for the most heavily used food and color additives and GRAS ingredients. Public comments on the feasibility of these specifications were accepted by the FDA through August 3, 1994.

The U.S. Senate, by a vote of 97 to 1, passed a bill entitled the Lead Exposure Reduction Act of 1994 at the end of May. This legislation had undergone significant changes since it was first introduced in 1992. The 1994 version contained restrictions on continuing use of certain lead-containing products in categories that included paints, pesticides, and packaging materials. It would further require the creation of an inventory by the EPA Administrator of uses of lead-containing products in commerce. From this inventory, a list was to be formulated of those lead-containing products that may present an unreasonable risk of injury to human health or the environment, and provision was to be made for the appropriate labeling of products included on this exposure concern list. In addition, the act would require any person commencing to manufacture, process, or import lead products for new applications in commerce to inform the Administrator of EPA of such activity. The U.S. House of Representatives did not reintroduce its version of this legislation during 1994.

EPA issued its final rule, effective June 30, 1994, on Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper. The final rule was amended to clarify language, and to restore special primacy requirements

inadvertently deleted from the Code of Federal Regulations. The rule was promulgated on June 7, 1991, with two subsequent technical amendments issued in July 1991 and June 1992.

In May, the U.S. General Accounting Office (GAO) issued a report, entitled "Lead-Based Paint Poisoning--Children in Section 8 Tenant-Based Housing Are Not Adequately Protected," to the U.S. Senate and House of Representatives Committees on Banking, Housing, and Urban Affairs. The report was prepared in response to a requirement in the Housing and Community Development Act of 1992 that GAO review the enforcement of and compliance with federal lead safety laws and regulations as they apply to Section 8 Tenant-Based Housing. Section 8 federal assistance is provided to the tenant rather than to the housing project or to a public housing authority, as with public housing.

In another report issued by GAO to the U.S. Senate and House of Representatives Committees on Banking, Housing, and Urban Affairs, the need for abatement standards relating to lead-based paint hazards was emphasized. The report entitled, "Lead-Based Paint Hazards--Abatement Standards Are Needed to Ensure Availability of Insurance," was prepared in response to the mandates included in the Residential Lead-Based Paint Hazard Reduction Act of 1992. The act required EPA to develop work-practice standards for inspection and abatement activities, as well as health-based standards for lead-based paint hazards and lead-contaminated dust and soil. The act also required the Department of Housing and Urban Development (HUD) to issue guidelines primarily for reducing lead hazards in the agency's federally assisted properties. As an additional part of the mandate, the 1992 Act required that GAO address the problems that property owners face in obtaining insurance for lead-based paint hazards. This GAO report examined the risks facing property owners because of the limited availability of insurance for lead hazards and the reasons that insurance companies were excluding this coverage; the contractors' experiences in obtaining liability insurance for their lead abatement activities; and the measures taken by the States and the Federal Government for increasing the availability of liability insurance for lead-based paint hazards.

EPA issued two additional proposed rules concerning lead in September. The first, "Requirements for Lead-Based Paint Activities" governed lead-based paint activities, including risk assessment, identification, inspection, abatement, deleading, and demolition. The proposed regulation would ensure that

individuals engaged in such activities are properly trained; that training programs are accredited; and that contractors engaged in such activities are certified. It would also establish standards for performing lead-based paint activities and require that all these activities be performed by certified individuals. EPA issued this proposed rule under the authority of the Toxic Substances Control Act directing EPA to promulgate such regulations. Written comments in response to this proposed rule were to be received by EPA by November 1, 1994. The second, "Significant New Uses of Lead," explored the possibility of issuing new regulations for certain uses of elemental lead and lead compounds under the Toxic Substances Control Act. The significant new uses rules would require individuals to notify EPA at least 90 days before commencing the manufacture, import, or processing of lead or lead compounds for uses identified by EPA as significant new uses. This rule was proposed by EPA to: (1) communicate its intention to regulate significant new uses of elemental lead and lead compounds; (2) identify components of its proposed regulatory approach; (3) request comment on issues related to this approach; and (4) request comment and information on existing uses of lead that would assist in supporting EPA's selection of proposed criteria for defining significant new uses of lead. Public comments in response to this proposal were to be received by EPA on or before November 28, 1994.

In November, HUD and EPA, acting under the Residential Lead-Based Paint Hazard Reduction Act of 1992, jointly issued a proposed regulation requiring the disclosure of certain information by persons selling or leasing (including renting) housing that may contain lead-based paint hazards. Specifically, these persons, or agents acting in their behalf, would be required to provide purchasers and lessees with all information known to the sellers and lessors on the presence of lead-based paint hazards, as well as provide an EPA information pamphlet pertaining to such hazards. In addition, sellers would be required to grant purchasers 10 calendar days to conduct an inspection or risk assessment for lead-based paint hazards before being obligated under any contract to purchase that housing. Furthermore, the regulation would require that a standard warning, disclosure, and acknowledgment form be attached to all sales and lease contracts involving target housing.

## **Production**

**Primary.**—In 1994, domestic mine production of lead increased by slightly more

than 8,000 mt, or 2%, from the 1993 level, following a 3-year decline. Loss of production as a result of the closure of Cominco American Inc.'s Magmont Mine in Bixby, MO, in early 1994 was countered by an increase in production at other major mines in Missouri and Alaska. Missouri's share of the total mined lead production was 80%, about 3% higher than in 1993. Production in Alaska, Idaho, and Montana accounted for an additional 19% of U.S. mine output. The top 10 mines listed in table 3 produced more than 98% of the total. Domestic mine production data were developed by the U.S. Bureau of Mines (USBM) from a voluntary survey on Lode-Mine Production of Gold, Silver, Copper, Lead, and Zinc. All of the major lead producing mines responded to this survey. (See tables 1, 2, and 3.)

The Doe Run Co., St. Louis, MO, a wholly owned subsidiary of Fluor Corp., Irvine, CA, was sold to The Renco Group, a New-York based, privately held company, in early April 1994. According to Doe Run officials, The Renco Group's past record of focusing on diversity and growth in basic industries was complimentary to Doe Run's long term strategy. The Renco Group is a holding company with investments in natural resources and industrial operations. During 1994, Doe Run operated five lead mines and four mills centered around Southeastern Missouri, supplying concentrates to its smelter and refinery at Herculaneum, MO.

Cominco American Inc., Spokane, WA, operator of the Magmont Mine, Bixby, MO, permanently closed the mine at the end of May 1994. The reasons stated for the closure were the depletion of minable ore reserves and the lack of discovery of additional ore reserves. The Magmont Mine, a joint venture between Cominco American and Dresser Industries, Houston, TX, was opened in 1968 and was initially scheduled to be operated for only 12 to 15 years. Subsequent discovery of additional ore reserves permitted the mine to be operated for a total of 26 years. According to the Annual Report of the parent company, Cominco Ltd., Vancouver, B.C., Canada, approximately 23.8 Mmt of ore, grading 7.5% lead, were mined during that period. At yearend, Magmont held 8,373 tons of lead concentrate in inventory for subsequent sale until the inventory is depleted.

Cominco Alaska Inc., a wholly owned subsidiary of the NANA Regional Corp., operated the Red Dog zinc-lead mine in northwest Alaska under a leasing agreement with NANA. The latter is a corporation organized under the provisions of the Alaska Native Claims Settlement Act. According to the Cominco Ltd. Annual Report, the total zinc and lead concentrates produced at Red Dog during 1994 increased by about 25%.

Contributing to this increase was the completion of an expanded grinding circuit in late 1994. Concentrates produced at Red Dog were shipped to customers in Canada, Japan, the Republic of Korea, and Europe.

Asarco Incorporated, New York, operated two mines in southern Missouri that produced more than 90% of the concentrate feed for its nearby Glover, MO, smelter and refinery. Production of lead in concentrates at the mines was 119 thousand metric tons (Kmt) in 1994, down about 3% from the record 1993 production level, according to the company's annual report to stockholders. Refinery production at the Glover facility set a record of 133 mt of lead in 1994, as the Glover refinery implemented new operating and maintenance programs which allowed it to produce in excess of design capacity. Asarco also operated a custom primary lead business, processing concentrates from other producers at its East Helena, MT, smelter and Omaha, NE, refinery. This custom processing circuit was largely dependent upon the purchase of concentrates from mines in the United States and South America for its source of processing material. A small portion of its feed came from Asarco's mines in Leadville, CO, and Quiruvilca, Peru. In 1994, transportation delays affected concentrate shipments from South America, and a temporary shutdown by the principal U.S. supplier terminated shipments for 4 months. As a result, production at the East Helena smelter was down in 1994, thus prompting the purchase of lead bullion to maintain production levels at the Omaha refinery. (See table 4.)

Asarco, reportedly, also began upgrading its East Helena smelter in 1994. The project, started in early April, was being carried out by JSG Technical Services Inc., Goshen, NY. It focused on the design and upgrading of fume and dust control and materials handling systems in the manufacturing facility. At yearend, Asarco reported total lead reserves in Missouri of 16.3 Mmt, with 11.2 million tons, grading 4.78% lead at Sweetwater and 5.1 million tons grading 5.56% lead at West Fork.

The Burgin lead/zinc/silver mine, southwest of Salt Lake City, UT, was under consideration for reopening, pending results of a drilling program to expand proven reserves, and an economic feasibility study to determine the costs of reopening the mine. Chief Consolidated Mining Co., Eureka, UT, owner of the mine since 1992, expected to complete the drilling program in April 1995. The Burgin Mine was last operated in 1978 by Kennecott Copper Corp.

**Secondary.**—Domestic secondary production in 1994 was estimated to have increased by about 2% compared with that of

revised 1993 figures. Secondary lead accounted for 72% of domestic lead refinery production, reflecting a continued high level of lead-acid battery recycling. Lead recovered from scrap lead-acid batteries accounted for 89% of all lead produced from secondary sources during 1994. The domestic secondary statistics were developed by the USBM from a combined secondary producer and consumer survey, that included data from both monthly and annual respondents. Of the 174 consuming companies to which a survey request was sent, 139 responded, representing 88% of the total U.S. lead consumption. Of the 24 companies producing secondary lead, exclusive of that produced from copper-based scrap, to which a survey request was sent, 21 responded, representing 91% of the total refinery production of secondary lead. Production and consumption for the nonrespondents were estimated using prior year levels as a basis. (See tables 1, 5, 6, 7, 8, and 9.)

GNB Battery Technologies Inc., Atlanta, GA, received approval from the Georgia EPA early in 1994 to build and operate a new and expanded lead-acid battery recycling facility at its present Columbus, GA, location. The new secondary smelter/refinery, expected to be completed in mid-1995, will have a production capacity of 90,000 tons per year of lead, 4.5 times that of the existing plant at the Columbus site. GNB also acquired Quenell Enterprises, a Los Angeles-based lead oxide producer, in October 1994. This purchase reportedly was intended to further support GNB's growing in-house demands in battery production, recycling, and distribution associated with the opening of the new Columbus plant.

GNB's decision to build its new facility at the Columbus location followed an announcement in late 1993 that it was suspending indefinitely plans for a proposed greenfield secondary lead smelter in Waynesboro, GA. According to GNB officials, however, the company was still considering construction of a secondary smelter at the Waynesboro location that would be similar to the new Columbus facility.

Exide Corp., Reading, PA, began construction of a new 35,000 unit-per-day lead-acid battery manufacturing plant in Bristol, TN, during the first quarter of 1994. The 500,000-square-foot facility will employ as many as 1,000 people when its anticipated full production capacity is reached in early 1995. Exide expects to use secondary lead as its principle feedstock, but may also use some domestic or imported primary lead to supplement the secondary metal.

In September, RSR Corp., Dallas, TX, suspended the process of obtaining permits for

its planned \$60 million battery recycling plant in Aiken County, SC. The suspension of such activity was made at the request of the Aiken County Economic Development Partnership, pending the outcome of a federal grand jury indictment alleging environmental violations at RSR's Indianapolis, IN, recycling plant.

## Consumption

Reported consumption of lead increased by about 13% in 1994. This increase was due to a 13% increase in demand for SLI batteries. Most of this increase was in the demand for replacement batteries that resulted from the abnormally harsh 1993-94 winter nationwide. Consumption of lead in all forms of lead-acid batteries represented 84% of the total reported consumption of lead in 1994.

The Battery Council International reported a 1994 SLI battery production of 97.5 million units, compared with 86.0 million units in 1993 and 81.1 million units in 1992. The totals include both original equipment and replacement automotive-type batteries. Using an estimate of 10.6 kilograms (23.3 pounds) per unit, the SLI offtake for 1994 was about 1.03 Mmt of lead. SLI batteries include those used for buses and trucks, tractors, marine, golf carts, motorcycles, aircraft, mine equipment, floor care, and military equipment. Lead consumption in lead-acid batteries for uses other than SLI, such as for stationary, industrial, and motive power applications, was 190,000 tons in 1994. (See tables 6, 7, 8, 9, 12, 13, 14, and 15.)

## World Review

Statistics published by the International Lead and Zinc Study Group (ILZSG) indicated that world production of refined lead decreased to 5.3 million tons and world consumption increased to 5.3 million tons in 1994 from about 5.4 million tons and 5.2 million tons, respectively, in 1993. Worldwide commercial stocks of refined lead subsequently declined to 0.77 million tons, or 7 weeks of world consumption, at yearend 1994. This compared with 0.79 million tons, or 8 weeks of consumption, at yearend 1993, 0.74 million tons, or 7 weeks of consumption, at yearend 1992, and 0.58 million tons, or 5 weeks of consumption, at yearend 1991.<sup>1</sup>

Significant exports of lead to Western consumers from Eastern countries, notably China, continued during 1994. Lead prices increased steadily throughout 1994, continuing the increase that began in the last half of 1993. The average annual LME and North American producer prices were up by \$0.064 and \$0.054

per pound, respectively, compared with average prices in 1993.

During 1994, two mines and one primary smelter-refinery were reopened, as a consequence of the increasing demand and rising prices for lead. Brunswick Mining and Smelting Corp. Ltd., Toronto, Canada, reopened its Belledune plant in New Brunswick in January. The plant had been closed in late 1993 owing to insufficient concentrate supplies as a result of the temporary closure of the company's nearby Brunswick Mine and the indefinite closure of its Heath Steele Mine, also in New Brunswick. Belledune derived about 80% of its concentrates from these two mines. In May, the company announced plans to reopen its Heath Steele Mine in late 1994. At full capacity, the Heath Steele Mine will produce 10,000 tons per year of lead in concentrate. Noranda, Inc., Toronto, Canada, owns a 75% stake in Heath Steele and Brunswick a 25% share.

In Mexico, Mineral Real de Angeles' (MRA) polymetallic mine in Zacatecas State reopened near the beginning of the year at a reduced rate of operation. The MRA mine had been closed since April 1993 because of the depressed market. MRA produced 45,000 tons of lead in 1992 and had produced about 15,000 tons in 1993 before it was closed.

During 1994, the sale of two significant lead mining interests occurred in Australia. In April, BHP Minerals, Melbourne, Australia, sold its 58% interest in the Cadjebut lead/zinc mining operation in Western Australia to an unlisted private company, Western Metals. About 22,000 mt of lead were produced at the mine in 1993. The ore body reserves at Cadjebut were expected to be depleted by yearend 1995, but the sales transaction reportedly included the nearby Blendevalle, Twelve Mile Bore and Kapok deposits, which had significant development potential. In May, CRA Ltd., Melbourne, Australia, sold a 38.9% interest in the lead/zinc producer Pasmenco Ltd. to a large number of local and international institutional investors, but retained its remaining 10% interest until a suitable buyer was located. According to CRA officials, the sale was made to release funds for CRA to develop the significant Century zinc/lead/silver deposit in Northern Queensland, Australia. Century has indicated resources of 118 Mmt containing 10.2% zinc, 1.5% lead, and 36 grams per metric ton silver. Full development of the Century project was expected to take about 3 years with initial production scheduled for 1998. An environmental impact assessment, a feasibility study, and a bulk ore sampling evaluation were in progress at yearend.

Arcon International Resources, Dublin,

Ireland, received final state approval in April for the development of its Galmoy zinc-lead deposit in County Kilkenny, Ireland. Subsequently, Arcon reached agreement with the state on the terms and conditions for acquiring a state mining license. Under the terms of the licensing agreement, significant potential will exist for additional mineral discoveries at Galmoy, where, at present, only 3% of the licensed area has been explored. Production of concentrate at the Galmoy facility was expected to begin in late 1996. The operators anticipated a mine life of approximately 10 years at a 10,000-ton-per-year lead concentrate production rate.

During 1994, the Organization for Economic Cooperation and Development (OECD) continued its discussions on means whereby the hazard to lead exposure might be reduced worldwide. Significant effort was directed toward the formulation of a possible lead risk reduction council act that would impose certain standards on the uses of lead, and could be supported by the OECD member countries. The OECD working group involved in the council act formulation began the process by consolidating the views of OECD member countries as identified in a draft outline prepared at the Joint Chemicals Group and Management Committee Meeting in February 1994 in Paris, France. Specifically, the working group examined the products/uses of lead identified in the outline as candidates for standardization, and considered comments by member countries pertaining to nonproduct issues and action programs described in the outline. Subsequently, the working group prepared a lead risk reduction proposal for consideration at a workshop on lead products and uses held in September 1994 in Toronto, Canada.

In a response to this proposal, the Australian Bureau of Agricultural and Resources Economics (ABARE) reported on a study in which they provided an economic perspective on the risk reduction strategy being considered by the OECD. The ABARE study concluded that the imposition of lead exposure standards in OECD member countries would adversely affect base metal mining and lead processing industries, effectively reducing demand for lead and lowering prices while pushing costs higher. Furthermore, if lead prices declined, the incentive to recycle lead would fall. Such a result would be counter to the development of efficient and sustainable recycling industries capable of reducing the risk of exposure to lead.

Following the workshop in Toronto, the Joint Chemicals Group and Management Committee met in Paris in November 1994, where the OECD participants agreed to proceed

with the preparation of a draft council act on lead risk reduction. By yearend, technical issues pertaining to the draft act were continuing to be discussed.

**Mine Capacity.**—During 1994, three lead-producing mines were opened and another closed. Metall Mining produced its first concentrates from the Bougrine lead/zinc mine in the Tunisian State of Kaf in early May 1994. Metall Mining, a Canadian-based subsidiary of Metallgesellschaft AG, Germany, owns a 45% share in the mine, which is operated jointly with Tunisian mining interests. Production of lead concentrates was expected to reach 14,000 tons annually. In Mexico, concentrate production was begun in August at the Tizapa lead-zinc mine in the Zacazonapan mining area. Production at Tizapa, developed by the Japanese-Mexican joint venture Minera Tizapa, was expected to reach 950 tons of lead concentrate per month according to an official from Dowa Mining Co., the Japanese company which holds a 39% interest in the mining venture. Japan's Sumitomo Corp. owns a 10% stake in the venture and Mexico's Industria Penoles SA de CV owns the remaining 51% interest in Minera Tizapa. The lead concentrates produced at Tizapa were to be smelted by Penoles in Mexico. Rights to development of the Tizapa Mine by the joint-venture company had been awarded in March 1992. In China, the Changba lead/zinc mine in the northern Province of Gansu came on-stream at the beginning of the year with a production capacity of 1,800 mt per year of lead in concentrate. According to China National Nonferrous Metals Import and Export Corp., the capacity of Changba will be increased to 5,000 metric tons per year by yearend 1996. At yearend 1994, two other lead/zinc mines in China, Lijiagou in the northern Province of Gansu and Lanping in the southern Province of Yunnan, were awaiting approval from Government authorities to proceed with production plans.

Zambia's state-owned mining group Zambia Consolidated Copper Mines (ZCCM) closed its lead/zinc mine in Kabwe at the end of June 1994, citing increasing financial losses resulting from declining production and rising costs of operation. Production of lead at the mine was estimated to be near 8,000 mt in 1993. Through mid-April 1994, about 2,330 tons of lead in concentrate were produced at the mine. At yearend, ZCCM provided public notice that it was accepting bids on the sale of all the Kabwe assets. (See table 10.)

**Metal Capacity.**—In April 1994, Mitsubishi Metal Corp. closed its 42,000-ton-per-year capacity primary smelter and refinery on Naoshima Island, in the Sea of Japan. At the

time of closure, Naoshima was producing lead at a rate of about 3,000 tons per month. The decision to close the facility was based on a combination of factors, including low lead prices, the rise in the value of the yen, and less expensive lead imports. Starting in July 1995, the import duty paid on refined lead was expected to be reduced progressively from the existing \$70 per ton to \$24 per ton by the year 2000.

Australia's MIM Holdings Ltd. (MIM) closed indefinitely its 60,000-ton-per-year ISASMELT primary smelter at Mount Isa in the beginning of the year. The action was taken principally due to insufficient concentrate feed from the Mount Isa mill for full utilization of both the conventional sintering and blast furnace smelter and the ISASMELT smelter. MIM had decided in late 1992 to restrict mine output to 85% of full production. Consequently the stockpiled concentrate that had provided additional feed to maintain the ISASMELT facility became depleted at the start of the year. Before the closure, the smelting complex was operated at a production rate of 16,000 to 17,000 tons per month of lead bullion. Operation of the conventional smelter was continued during the year, producing bullion at a rate about 2,000 tons per month lower than the previous combined rate of the two smelters. Discussions were carried out during the year between MIM and BHP Minerals Ltd., Melbourne, Australia, for MIM to acquire an appreciable interest in the Cannington lead/silver mining project in Queensland, Australia. It was anticipated that, should the acquisition be agreed upon by the companies, it would enable MIM to eventually gain an additional source of concentrate to reopen the ISASMELT plant.

Oriental Technique, a Malaysian-Korean joint-venture company, began production of lead at its new secondary lead smelter near the end of the year. The smelter, with a production capacity of about 1,500 metric tons per month, is located at Port Klang, Selangor, in West Malaysia. The company planned to acquire a significant portion of its lead scrap feed material from local sources.

During 1994, the capacity of the Zhuzhou primary lead smelter, Zhuzhou, Hunan Province, China, reportedly was increased from the current 70,000 tons per year of lead to 80,000 tons per year. In recent years, Zhuzhou received a significant portion of its concentrates from the Fankou Mine, Guangdong Province. In 1994, however, the company began to buy concentrate from several local open pit mines after the price of concentrate from Fankou became unsatisfactory. (See table 11.)

**Reserves.**—Worldwide reserves of lead

contained in demonstrated resources from both producing and nonproducing deposits at yearend were estimated at 68 million tons by the USBM. Reserves for the two largest producers in the Western world, Australia and the United States, were about 19 million and 8 million tons, respectively. Canada, the fifth largest producer in the world in 1994, had reserves of 4 million tons. China, the third leading producer in 1994, had reserves of 7 million tons. The reserve base (reserves plus marginal economic deposits, measured and indicated) for Australia and the United States was 34 million tons and 20 million tons, respectively. In Canada, the reserve base was 13 million tons and in China, 11 million tons. Total world reserve base at the end of 1994 was estimated to be 124 million tons.

### Outlook

The rate of economic growth in the United States is expected to decline in 1995, with the gross domestic product (GDP) growing at a rate of 2.5% to 3.0%, compared with a rate of about 4.1% in 1994. The automotive manufacturing sector, nonetheless, is expected to remain relatively strong during 1995, resulting in a higher demand for original equipment batteries. The U.S. new vehicle production is anticipated to increase by 5.7%, to 12.9 million units in 1995. Countering this increase in the demand for new lead-acid batteries, however, is an expected decrease in the demand for replacement batteries. Consumption of lead in replacement batteries was particularly strong in 1994 owing to the harsh 1993-94 winter nationwide. The net result is a predicted moderate decrease of 1% to 2% in overall lead demand during 1995.

Domestic mine production should increase by about 4% in 1995 as a result of continued higher production at some of the larger facilities. Total metal production from primary and secondary refineries is expected to show a net decline of about 1%, mainly because of a slight decline in available scrap for the secondary sector.

The tighter world lead market of 1994 is likely to begin easing somewhat in 1995 because world consumption is expected to remain static while world production is predicted to increase marginally. The latter increase is related to planned expansion in metal production in Europe, Canada, and the Republic of Korea. The expansion will be dependent, however, on adequate supplies of secondary materials from Eastern bloc countries.

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<sup>1</sup>International Lead and Zinc Study Group (London). Lead and Zinc Statistics. Monthly Bull., v. 35, No. 6, June 1995.

## OTHER SOURCES OF INFORMATION

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TABLE 1  
SALIENT LEAD STATISTICS 1/

(Metric tons unless otherwise specified)

	1990	1991	1992	1993	1994
<b>United States:</b>					
<b>Production:</b>					
Domestic ores, recoverable lead content	484,000	466,000	397,000	355,000	363,000
Value	thousands \$491,000	\$344,000	\$307,000	\$249,000	\$298,000
<b>Primary lead (refined):</b>					
From domestic ores and base bullion	386,000	324,000	284,000	310,000	328,000
From foreign ores and base bullion	18,000	21,900	20,800	24,900	23,400
Secondary lead (lead content)	922,000	885,000	916,000	893,000 r/	913,000
<b>Exports (lead content):</b>					
Lead ore and concentrates	56,600	88,000	72,300	41,800	38,700
Lead materials, excluding scrap	76,700	114,000	71,700	60,300	74,200
<b>Imports for consumption:</b>					
Lead in ore and concentrates	10,700	12,400	5,310	483	473
Lead in base bullion	2,710	419	218	18	577
Lead in pigs, bars, and reclaimed scrap	90,900	117,000	191,000	196,000	231,000
<b>Stocks, Dec. 31:</b>					
Primary lead 2/	25,500	9,090	20,500	14,300	9,270
At consumers and secondary smelters	86,300	71,700	82,300	80,500 r/	67,500
Consumption of metal, primary and secondary	1,280,000	1,250,000	1,240,000	1,290,000 r/	1,450,000
Price: Metals Week average, delivered, cents per pound	46.02	33.48	35.10	31.74	37.17
<b>World:</b>					
<b>Production:</b>					
Mine	thousand metric tons 3,370 r/	3,330 r/	3,100 r/	2,830 r/	2,810 e/
Refinery 3/	do. 3,090	3,080 r/	2,950 r/	3,050 r/	2,970 e/
Secondary refinery	do. 2,860 r/	2,690	2,480	2,400 r/	2,420 e/
Price: London Metal Exchange, pure lead, cash average, cents per pound	37.05	25.30	24.50	18.42	24.83

e/ Estimated. r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits, except prices.

2/ American Bureau of Metal Statistics Inc.

3/ 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	1993	1994
Missouri	277,000	290,000
Montana	W	9,940
Other States 2/	77,800	63,100
Total	355,000	363,000

W Withheld to avoid disclosing company proprietary data; included in "Other States."

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Includes Alaska, Arizona, Colorado, Idaho, Illinois, New York, Tennessee, and Washington.

TABLE 3  
LEADING LEAD-PRODUCING MINES IN  
THE UNITED STATES IN 1994, IN ORDER OF OUTPUT

Rank	Mine	County and State	Operator	Source of lead
1	Sweetwater	Reynolds, MO	ASARCO Incorporated	Lead ore.
2	Fletcher	do.	The Doe Run Co.	Lead-zinc ore.
3	West Fork	do.	ASARCO Incorporated	Lead ore.
4	Casteel 1/	Iron, MO	The Doe Run Co.	Lead-zinc ore.
5	Red Dog	Northwest Arctic, AK	Cominco Alaska Inc.	Zinc ore.
6	Buick	Iron, MO	The Doe Run Co.	Lead-zinc ore.
7	Viburnum No. 29	Washington, MO	The Doe Run Co.	Do.
8	Magmont	Iron, MO	Cominco American Inc.	Lead ore.
9	Lucky Friday	Shoshone, ID	Hecla Mining Co.	Lead-zinc ore.
10	Montana Tunnels	Jefferson, MT	Pegasus Gold Corp.	Zinc ore.
11	Leadville Unit	Lake, CO	ASARCO Incorporated	Do.
12	Balmat	St. Lawrence, NY	Zinc Corporation of America	Zinc ore.
13	Viburnum No. 28	Iron, MO	The Doe Run Co.	Lead-zinc ore.
14	Pierrepont	St. Lawrence, NY	Zinc Corporation of America	Zinc ore.
15	Rosiclare	Hardin, IL	Ozark-Mahoning Co.	Fluorspar.
16	Coy	Jefferson, TN	ASARCO Incorporated	Zinc ore.

1/ Includes Brushy Creek Mill.

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

(Metric tons unless otherwise specified)

Source material	1993 2/	1994 3/
Refined lead:		
Domestic ores and base bullion	310,000	328,000
Foreign ores and base bullion	24,900	23,400
Total	335,000	351,000
Calculated value of primary refined lead 4/	thousands \$234,000	\$288,000

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Total refined lead: American Bureau of Metal Statistics Inc.; domestic and foreign ores: U.S. Bureau of Mines calculations.

3/ U.S. Bureau of Mines reported figures.

4/ 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)

KIND OF SCRAP	1993	1994
New scrap:		
Lead-base	48,200 r/	47,100
Copper-base	6,870 r/	8,000 e/
Tin-base	(2/)	--
Total	55,000 r/	55,100
Old scrap:		
Battery-lead	796,000 r/	816,000
All other lead-base	33,500 r/	33,800
Copper-base	8,780 r/	8,000 e/
Tin-base	--	--
Total	838,000 r/	858,000
Grand total	893,000 r/	913,000
FORM OF RECOVERY		
As soft lead	444,000 r/	510,000
In antimonial lead	417,000 r/	371,000
In other lead alloys	17,000	16,100
In copper-base alloys	15,600 r/	16,000 e/
In tin-base alloys	(2/)	1
Total	893,000 r/	913,000
Value 3/	thousands \$625,000 r/	\$748,000

e/ Estimated. r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Revised to zero.

3/ Value based on average quoted price of common lead.



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

(Metric tons)

SIC Code	Product	1993	1994
	Metal products:		
3482	Ammunition: Shot and bullets	65,100	62,400
	Bearing metals:		
35	Machinery except electrical	W	W
36	Electrical and electronic equipment	425	288
371	Motor vehicles and equipment	3,510 2/	4,190 2/
37	Other transportation equipment	W	W
	Total bearing metals	4,830	5,560
3351	Brass and bronze: Billets and ingots	5,750 r/	6,320
36	Cable covering: Power and communication	17,200	16,000
15	Calking lead: Building construction	961	764
	Casting metals:		
36	Electrical machinery and equipment	W	W
371	Motor vehicles and equipment	W	W
37	Other transportation equipment	2,460	2,650
3443	Nuclear radiation shielding	W	W
	Total casting metals	18,500	18,900
	Pipes, traps, other extruded products:		
15	Building construction	5,740	3,370
3443	Storage tanks, process vessels, etc.	(3/)	(3/)
	Total pipes, traps, other extruded products	5,740	3,370
	Sheet lead:		
15	Building construction	15,200	14,900
3443	Storage tanks, process vessels, etc.	(3/)	(3/)
3693	Medical radiation shielding	6,030	6,620
	Total sheet lead	21,200	21,500
	Solder:		
15	Building construction	3,290	2,680
	Motor vehicles, equipment, metal cans and shipping containers	4,970	3,020
367	Electronic components and accessories	4,890	5,530
36	Other electrical machinery and equipment	1,240	1,180
	Total solder	14,400	12,400
	Storage batteries:		
3691	Storage battery grids, post, etc.	677,000 r/	802,000
3691	Storage battery oxides	374,000 r/	419,000
	Total storage batteries	1,050,000 r/	1,220,000
371	Terne metal: Motor vehicles and equipment	(4/)	(4/)
27	Type metal: Printing and allied industries	(5/)	(5/)
34	Other metal products 6/	5,360	5,330
	Total metal products	1,210,000 r/	1,370,000
	Other oxides:		
285	Paint	W	W
32	Glass and ceramics products	W	W
28	Other pigments and chemicals	9,870	10,200
	Total other oxides	63,600	62,700
	Miscellaneous uses	11,800	12,000
	Grand total	1,290,000 r/	1,450,000

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in appropriate totals.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to 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, and fishing weights.

TABLE 7  
U.S. CONSUMPTION OF LEAD IN 1994, 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, and Washington	54,300	37,000	15,500	--	107,000
Florida and Georgia	21,400	15,200	2,480	--	39,000
Illinois	24,100	43,400	9,570	544	77,600
Iowa, Michigan, and Missouri	56,500	49,900	16,700	--	123,000
Ohio and Pennsylvania	122,000	76,800	50,400	1,180	250,000
Arkansas and Texas	84,500	63,000	16,300	--	164,000
Alabama, Louisiana, Mississippi, and Oklahoma	19,200	6,760	20,500	--	46,500
Colorado, Indiana, Kansas, Kentucky, Minnesota, Nebraska, Tennessee, and Wisconsin	266,000	100,000	74,600	1,120	442,000
Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Rhode Island, South Carolina, and Vermont	103,000	61,200	35,700	--	200,000
Total	750,000	453,000	242,000	2,840	1,450,000

1/ Data rounded by the U.S. Bureau of Mines to 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 1994, 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	59,600	71,500	18,600	2,840	153,000
Storage batteries	620,000	381,000	221,000	--	1,220,000
Other oxides	62,700	3	--	--	62,700
Miscellaneous	8,460	1,420	2,160	--	12,000
Total	750,000	453,000	242,000	2,840	1,450,000

1/ Data rounded by the U.S. Bureau of Mines to 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
1993	39,300 r/	33,900 r/	7,200 r/	120	80,500 r/
1994	32,900	26,300	8,080	175	67,500

r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

TABLE 10  
LEAD: WORLD MINE PRODUCTION OF LEAD IN CONCENTRATES, BY COUNTRY 1/ 2/

(Metric tons)

Country 3/	1990	1991	1992	1993	1994 e/
Algeria e/	1,100	900	900	900	900
Argentina	23,400	23,700	18,000	11,800 r/	12,000
Australia	570,000	579,000	577,000 r/	519,000 r/	537,000
Austria	1,490	1,150	920	1,340 r/	--
Bolivia	19,900	20,800	20,000	21,200 r/	19,600
Bosnia and Herzegovina e/	XX	XX	2,000	400	500
Brazil	9,290	7,270	2,520 r/	2,500 r/ e/	2,000
Bulgaria e/	57,000	43,600	39,000	39,000	40,000
Burma e/	2,700 r/	2,750 r/	2,800 r/	2,200 r/	2,300
Canada	241,000	277,000	344,000	183,000 r/	172,000 4/
Chile	1,120	1,050	298	343 r/	350
China e/	315,000	352,000	330,000	338,000 r/	340,000
Colombia	331	611	620 r/	447 r/	440
Czech Republic	XX	XX	XX	1,000 e/	1,000
Czechoslovakia e/ 5/	3,040	3,430	2,800	XX	XX
Ecuador e/	200	200	200	200	200
Finland	1,700	1,400 r/	576	-- r/	--
France	1,190	1,730	--	--	--
Georgia e/	XX	XX	800	500	400
Germany: Western states	7,150	5,930	1,490	--	--
Greece	26,200	31,700	28,300	26,400 r/	22,800 4/
Greenland	16,000	--	--	--	--
Honduras	5,790	8,720	10,800 r/	3,550 r/	2,810 4/
India	23,200	25,100	30,500 r/	26,000 r/	23,300 4/
Iran e/ 6/	11,000	16,000	25,000	25,000	30,000
Ireland	35,300	39,900	42,900	44,600 r/	45,000
Italy	16,000	14,200	16,000 e/	7,400 r/ e/	6,500
Japan	18,700	18,300	18,800	16,500	9,950 4/
Kazakhstan e/	XX	XX	170,000	160,000	140,000
Korea, North e/	80,000	80,000	75,000	80,000	80,000
Korea, Republic of	14,900	12,600	13,600	14,800 r/ e/	15,000
Macedonia e/	XX	XX	15,000	15,000	15,000
Mexico	187,000	168,000	170,000	154,000 r/	170,000
Morocco	68,800	73,700	76,600	81,700 r/	73,200 4/
Namibia e/	18,000	15,000	15,000	11,600 r/ 4/	13,000 4/
Nigeria e/	106	100	100	100	100
Norway	3,020	3,520	3,770	1,700 r/	3,160 4/
Peru	210,000 r/	218,000 r/	196,000 r/	217,000 r/	220,000
Poland	61,300	63,600	63,000	63,000 e/	63,000
Romania	24,700	16,200	16,800	16,800 e/	16,800
Russia e/	XX	XX	40,000	50,000	40,000
Saudi Arabia e/	250	250	250	250	250
Serbia and Montenegro	XX	XX	20,000	20,000 e/	20,000
Slovakia	XX	XX	XX	1,800 e/	1,800
Slovenia e/	XX	XX	2,000	--	2,000
South Africa, Republic of	69,400	76,300	75,800	100,000 r/	95,800 4/
Spain	58,500	49,200 r/	31,000 r/	25,300 r/	26,000
Sweden	98,300	91,100	105,000 r/	112,000 r/	113,000 4/
Tajikistan e/	XX	XX	2,000	1,600	1,200
Thailand	22,200	16,700	11,900 r/	6,050 r/	7,950
Tunisia	2,970	1,290	1,360	1,300 e/	1,300
Turkey	18,400	15,300	10,800 e/	10,900 r/	11,000
U.S.S.R. 7/	420,000	380,000	XX	XX	XX
United Kingdom	1,380	1,020	500 r/ e/	240 r/	--
United States	497,000	477,000	407,000	362,000	370,000 4/
Uzbekistan e/	XX	XX	40,000	40,000	35,000
Yugoslavia 8/	99,100	90,000 e/	XX	XX	XX
Zambia 9/	9,640	9,080	4,450 r/	7,030 r/	--
Total	3,370,000 r/	3,330,000 r/	3,080,000 r/	2,830,000 r/	2,800,000

See footnotes at end of table.

TABLE 10--Continued

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

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e/ Estimated. r/ Revised. XX Not applicable.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Table includes data available through July 6, 1995.

3/ In addition to the countries listed, Uganda may produce lead, but available information is inadequate to make reliable estimates of output levels.

4/ Reported figure.

5/ Dissolved Dec. 31, 1992. Production from 1990-92 came from the Czech Republic and Slovakia.

6/ Year beginning Mar. 21 of that stated.

7/ Dissolved in Dec. 1991.

8/ Dissolved in Apr. 1992.

9/ Pb content of ore milled in year beginning Apr. 1 of that stated. Mine closed in June 1994.

TABLE 11  
LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country	1990	1991	1992	1993	1994 e/
<b>Algeria: e/</b>					
Primary	1,000	1,000	1,000	1,500 r/	1,500
Secondary	3,500	3,500	3,500	3,500 r/	3,500
Total	4,500	4,500	4,500	5,000	5,000
<b>Argentina:</b>					
Primary e/	10,000	10,000	14,600 3/	15,000	15,000
Secondary	13,400	13,700	15,000 e/	14,500 e/	14,000
Total e/	23,400	23,700	29,600	29,500	29,000
<b>Australia:</b>					
Primary	212,000	220,000	215,000	221,000 r/	209,000
Secondary	17,000	19,000	17,000	22,000 r/	17,000
Total	229,000	239,000	232,000	243,000 r/	226,000
<b>Austria:</b>					
Primary	8,390	6,350	5,730	4,780 r/	--
Secondary	15,100	16,300	18,200	17,900 r/	17,000
Total	23,500	22,700	23,900	22,700 r/	17,000
<b>Belgium:</b>					
Primary	68,800	78,100	75,300	75,900 r/	75,000
Secondary	37,000	32,600	41,000	51,000 r/	60,000
Total	106,000	111,000	116,000	127,000 r/	135,000
<b>Brazil:</b>					
Primary	30,100	22,000	24,500 r/	27,700 r/	30,000
Secondary	45,300	42,000	38,300 r/	47,000 r/	45,000
Total	75,400	64,000	62,800 r/	74,700 r/	75,000
<b>Bulgaria:</b>					
Primary e/	56,000	46,000	43,000 r/	45,000	45,000
Secondary e/	10,600	10,200	10,100 r/	10,000	10,000
Total	66,600	56,200	53,100 r/	55,000 e/	55,000
Burma: Primary	1,690 r/	2,180	2,120	1,560 r/	1,450
<b>Canada:</b>					
Primary	87,200	106,000	151,000 r/	151,000 r/	150,000
Secondary	96,500	106,000	102,000 r/	69,100 r/	70,000
Total	184,000	212,000	253,000 r/	220,000 r/	220,000
<b>China: e/</b>					
Primary	266,000	290,000	325,000	372,000 r/	367,000
Secondary	30,000	40,000	40,000	40,000	40,000
Total	296,000	330,000	365,000	412,000 r/	407,000
Colombia: Secondary e/	3,500	3,600	3,600	3,600	3,500
Czech Republic: Secondary e/	XX	XX	XX	20,000	20,000
Czechoslovakia: 4/ Secondary	23,700	17,800	24,000	XX	XX
<b>France:</b>					
Primary	162,000	155,000	161,000 e/	158,000 e/	160,000
Secondary e/	270,000 3/	284,000	284,000	280,000	284,000
Total e/	432,000 r/	439,000 r/	445,000	438,000	444,000
<b>Germany:</b>					
<b>Primary:</b>					
Eastern states e/	15,800	XX	XX	XX	XX
Western states	162,000	XX	XX	XX	XX
Total primary	178,000 e/	161,000 r/	175,000	175,000 r/	189,000 3/
<b>Secondary:</b>					
Eastern states 5/	45,500 r/	XX	XX	XX	XX
Western states	187,000	XX	XX	XX	XX
Total secondary	233,000 r/	202,000	179,000	160,000 r/	142,000 3/
Total Germany	411,000 r/	363,000 r/	354,000	335,000	331,000 3/
Guatemala: Secondary	-- r/	-- r/	-- r/	-- r/	--
Hungary: Secondary e/	100	100	100	100	100
<b>India: e/</b>					
Primary	29,900 3/	30,600 r/	40,800 r/	43,200 r/	29,400
Secondary	16,800 3/	17,200 r/	22,900 r/	24,200 r/	16,500
Total	46,700 3/	47,800 r/	63,700 r/	67,400 r/	45,900 3/
<b>Iran:</b>					
Primary	--	--	--	--	10,000 3/
Secondary e/	10,000	8,000	7,800	8,000	8,000
Total e/	10,000	8,000	7,800	8,000	18,000

See footnotes at end of table.

TABLE 11--Continued  
LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country	1990	1991	1992	1993	1994 e/
Ireland: Secondary	15,000 e/	11,600	12,000	12,000 e/	10,000
Italy:					
Primary	64,600	112,000	102,000	89,900 r/	86,000
Secondary	102,000	96,500	84,300	92,900 r/	94,000
Total	167,000	209,000 r/	186,000	183,000 r/	180,000
Jamaica: Secondary e/	1,000	1,000	1,000	800	800
Japan:					
Primary	205,000	220,000	219,000	212,000 r/	183,000 3/
Secondary	122,000	112,000	111,000	97,300 r/	109,000 3/
Total	327,000	332,000	330,000	309,000 r/	292,000 3/
Kazakhstan: e/					
Primary	XX	XX	180,000	170,000	150,000
Secondary	XX	XX	30,000	25,000	20,000
Total	XX	XX	210,000	195,000	170,000
Korea, North: e/					
Primary	70,000	75,000	70,000	75,000	75,000
Secondary	6,000	5,000	5,000	5,000	5,000
Total	76,000	80,000	75,000	80,000	80,000
Korea, Republic of: e/					
Primary	61,000	40,600 r/	63,000 r/	88,000 r/	76,000
Secondary	14,000	40,000	25,000 r/	10,000 r/	15,000
Total	75,000	80,600 r/	88,000 r/	98,000 r/	91,000
Macedonia: e/					
Primary	XX	XX	6,000	6,000	6,000
Secondary	XX	XX	2,000	2,000	2,000
Total	XX	XX	8,000	8,000	8,000
Malaysia: Secondary e/	16,000	24,000 r/	28,500 r/	29,000 r/	28,800 3/
Mexico:					
Primary	167,000	152,000	167,000 r/	178,000	180,000
Secondary e/	65,000	10,000	10,000	10,000	10,000
Total e/	232,000	162,000	177,000 r/	188,000	190,000
Morocco: e/					
Primary	64,000	70,000	68,000	69,000 r/	69,000
Secondary	2,000	2,000	2,000	2,000	2,000
Total	66,000	72,000	70,000	71,000 r/	71,000
Namibia: Primary 6/	35,100	33,400	31,700	31,200	23,800 3/
Netherlands: Secondary	44,100	33,700	24,300 r/	24,200	25,000
New Zealand: Secondary e/	5,000	5,000	5,000	3,000 r/	3,000
Pakistan: Secondary e/	2,500	2,500	3,000	3,000	3,000
Peru:					
Primary	69,300	74,500	82,500	87,400 r/	87,000
Secondary e/	5,000	5,000	5,000	5,000	5,000
Total e/	74,300	79,500	87,500	92,400 r/	92,000
Philippines: Secondary	12,100	16,100 r/	19,100 r/	24,300 r/	24,300
Poland:					
Primary e/	49,800	35,800	38,700	47,300 r/	46,300
Secondary e/	15,000	15,000	15,000	15,000	15,000
Total	64,800	50,800	53,700	62,300 r/	61,300 3/
Portugal: Secondary e/	6,000	5,000	7,400 r/	8,000 r/	8,000
Romania:					
Primary	15,700	13,200	14,400	10,500 r/	22,000 3/
Secondary e/	5,000	4,000	1,750 3/	1,500	4,000 3/
Total	20,700 e/	17,200 e/	16,200	12,000 r/	26,000 3/
Russia:					
Primary	XX	XX	24,100 r/	31,600 r/	21,000 3/
Secondary e/	XX	XX	40,000	30,000	20,000
Total e/	XX	XX	64,100 r/	61,600 r/	41,000
Serbia and Montenegro:					
Primary	XX	XX	23,300 r/	6,390 r/	4,460 3/
Secondary	XX	XX	390 r/	--	--
Total	XX	XX	23,700 r/	6,390 r/	4,460

See footnotes at end of table.

TABLE 11--Continued  
LEAD: WORLD REFINERY PRODUCTION, BY COUNTRY 1/

(Metric tons)

Country	1990	1991	1992	1993	1994 e/
<b>Slovenia: e/</b>					
Primary	XX	XX	1,000	1,000	1,000
Secondary	XX	XX	3,000	3,000	3,000
Total	XX	XX	4,000	4,000	4,000
<b>South Africa, Republic of:</b>					
Secondary	31,200	32,200 r/	29,000	31,800 r/	31,800
<b>Spain: e/</b>					
Primary	60,000	110,000	62,000	62,400 r/	70,400
Secondary	50,000	59,000	58,000	62,400 r/	69,600
Total	110,000	169,000	120,000	125,000 r/	140,000
<b>Sweden:</b>					
Primary	47,500	49,200	54,100 r/	46,800	46,600
Secondary	22,100	38,800	37,100 r/	37,800 r/	36,000
Total	69,600	88,000	91,200 r/	84,600 r/	82,600
Switzerland: Secondary	5,700	5,000	6,400	6,000 r/	6,350 3/
Taiwan: Secondary e/	57,600	20,000	--	--	--
Thailand: Secondary	15,900	12,800	18,900	17,100 r/	18,000
Trinidad and Tobago: Secondary e/	1,800	1,800	1,800	1,700	1,600
<b>Tunisia: e/</b>					
Primary	2,200	750	913	900	900
Secondary	500	250	250	250	250
Total	2,700	1,000	1,160	1,150	1,150
<b>Turkey: e/</b>					
Primary	5,400	5,400	3,000 r/	3,000	3,000
Secondary	3,600	3,100	2,100 r/	2,000	2,100
Total	9,000	8,500	5,100 r/	5,000	5,100
<b>U.S.S.R.: e/ 7/</b>					
Primary	420,000	380,000	XX	XX	XX
Secondary	280,000	250,000	XX	XX	XX
Total	700,000	630,000	XX	XX	XX
Ukraine: Secondary e/	XX	XX	5,000	4,000	4,000
<b>United Kingdom:</b>					
Primary	156,000	164,000	199,000	210,000 r/	182,000 3/
Secondary	174,000	147,000	148,000	154,000 r/	161,000 3/
Total	330,000 r/	311,000	347,000	364,000 r/	343,000 3/
<b>United States:</b>					
Primary	404,000	346,000	305,000	335,000	351,000 3/
Secondary	922,000	885,000	916,000	893,000 r/	913,000 3/
Total	1,330,000	1,230,000	1,220,000	1,230,000 r/	1,260,000 3/
Venezuela: Secondary e/	14,000	15,000	15,000	14,000 r/	15,000
<b>Yugoslavia: 8/</b>					
Primary	82,000	70,000 e/	XX	XX	XX
Secondary e/	17,000	18,000	XX	XX	XX
Total e/	99,000	88,000	XX	XX	XX
<b>Zambia: Primary 9/</b>					
Primary	3,670	2,640	3,030	2,000 r/	--
Total primary	3,090,000	3,080,000 r/	2,950,000 r/	3,050,000 r/	2,970,000
Total secondary	2,860,000 r/	2,690,000 r/	2,480,000 r/	2,400,000 r/	2,420,000
Grand total	5,950,000 r/	5,770,000 r/	5,430,000 r/	5,450,000 r/	5,380,000

e/ Estimated. r/ Revised. XX Not applicable.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Table includes data available through July 6, 1995. 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/ Dissolved Dec. 31, 1992. All production in Czechoslovakia from 1990-92 came from the Czech Republic.

5/ May include primary.

6/ Includes products of imported concentrate.

7/ Dissolved in Dec. 1991.

8/ Dissolved in Apr. 1992.

9/ Data are for fiscal year beginning Apr. 1 of that stated. Smelter operation closed Mar. 1993. Production in 1993 includes secondary output and may all be simply remelt.

TABLE 12  
 PRODUCTION AND SHIPMENTS OF LEAD PIGMENTS 1/ 2/  
 AND OXIDES IN THE UNITED STATES

(Metric tons unless otherwise specified)

Product	1993				1994			
	Production		Shipments		Production		Shipments	
	Gross weight	Lead content	Quantity	Value 3/	Gross weight	Lead content	Quantity	Value 3/
White lead, dry	W	W	W	W	W	W	W	W
Litharge and red lead	74,200	68,800	70,400	\$56,600,000	75,600	70,100	70,400	\$56,100,000
Lead oxide	276,000 r/	262,000 r/	NA	NA	290,000	275,000	NA	NA
Total	350,000 r/	331,000 r/	NA	NA	366,000	346,000	NA	NA

r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; not included in "Total."

1/ Excludes basic lead sulfate; withheld to avoid disclosing company proprietary data.

2/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

3/ At plant, exclusive of container.

TABLE 13  
 U.S. IMPORTS FOR CONSUMPTION OF LEAD PIGMENTS  
 AND COMPOUNDS, BY KIND 1/

Kind	Quantity (metric tons)	Value (thousands)
1993		
White lead carbonate	69	\$116
Red and orange lead	57	186
Chrome yellow and molybdenum orange pigments and lead-zinc chromates	4,540	10,800
Litharge	18,600	9,280
Lead litharge	508	333
Glass frits (undifferentiated)	7,080	12,900
Total	30,900	33,600
1994		
White lead carbonate	121	209
Red and orange lead	84	189
Chrome yellow and molybdenum orange pigments and lead-zinc chromates	5,970	14,100
Litharge	19,700	12,600
Lead litharge	401	307
Glass frits (undifferentiated)	10,400	16,200
Total	36,700	43,600

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

Source: Bureau of the Census.



TABLE 14  
U.S. EXPORTS OF LEAD, BY COUNTRY 1/

(Lead content unless otherwise specified)

Country	1993		1994	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
<b>Ore and concentrates:</b>				
Belgium	14,300	\$1,140	13,900	\$3,410
Canada	6,120	3,540	10,800	4,100
Italy	16,400	2,630	--	--
Japan	4,380	206	2,880	707
Korea, Republic of	457	263	7,740	1,980
Mexico	38	12	3,130	934
Other	108 r/	47 r/	244	84
Total	41,800	7,840	38,700	11,200
<b>Ash and residues:</b>				
Belgium	1,400	368	13,600	6,460
Canada	249	913	6,810	4,530
Other	76 r/	45 r/	190	125
Total	1,730	1,330	20,600	11,100
<b>Unwrought lead and lead alloys:</b>				
Belgium	252	350	86	525
Canada	4,630	2,670	5,100	3,200
Chile	3,360	8,290	1,100	2,190
Indonesia	4,030	1,720	2,230	1,180
Israel	481	349	1,410	747
Japan	4,860	2,400	2,820	1,800
Korea, Republic of	18,700	8,660	23,400	12,100
Malaysia	1,660	706	1,230	624
Mexico	164	214	522	660
Taiwan	13,100	5,960	9,910	5,400
Other	201 r/	929 r/	427	1,130
Total	51,400	32,200	48,200	29,500
<b>Wrought lead and lead alloys:</b>				
Brazil	17	64	67	89
Canada	1,310	3,360	1,110	3,350
Costa Rica	97	211	108	240
France	9	486	49	280
Germany	189	223	265	138
Hong Kong	1,100	2,740	1,330	2,670
India	26	34	163	158
Japan	188	617	109	555
Korea, Republic of	974	934	160	558
Malaysia	235	573	41	269
Mexico	1,150	4,570	871	7,850
Netherlands	121	356	251	343
New Zealand	79	131	138	213
Saudi Arabia	12	39	115	305
Taiwan	729	2,030	82	290
United Kingdom	206	479	101	703
Other	703 r/	2,850 r/	385	1,330
Total	7,140	19,700	5,340	19,300
<b>Scrap (gross weight):</b>				
Bahamas, The	119	54	(2/)	27
Brazil	4,680	643	4,110	936
Canada	38,700	6,840	68,400	13,000
China	1,550	372	458	288
Germany	105	35	15	119
Hong Kong	656	323	49	19
India	970	237	941	156
Japan	520	511	127	321
Korea, Republic of	2,680	3,000	9,440	6,070
Mexico	2,030	1,010	903	1,140
United Kingdom	457	219	903	292
Other	1,770 r/	1,250 r/	2,750	2,150
Total	54,100	14,400	88,100	24,500

r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

Source: Bureau of the Census.

TABLE 15  
U.S. IMPORTS FOR CONSUMPTION OF LEAD, BY COUNTRY 1/

(Lead content unless otherwise specified)

Country	1993		1994	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
<b>Ore and concentrates: 2/</b>				
Belgium	--	--	184	\$57
Canada	--	--	163	40
Korea, Republic of	--	--	126	39
Mexico	464	\$345	(3/)	3
Peru	19	2	--	--
Total	483	347	473	138
<b>Base bullion:</b>				
Canada	13	49	575	278
Other	5 r/	13 r/	2	7
Total	18	62	577	284
<b>Pigs and bars:</b>				
Australia	5,000	2,140	500	191
Belgium	303	346	704	1,470
Bulgaria	--	--	31	18
Canada	131,000	58,500	159,000	92,300
China	6	13	167	131
France	56	46	252	366
Germany	330	478	4,460	3,040
Korea, Republic of	59	42	2,000	1,020
Mexico	40,300	16,100	31,900	16,500
Morocco	--	--	300	187
Namibia	--	--	3,200	2,000
Peru	18,300	6,850	25,600	14,400
Russia	--	--	1,150	629
South Africa, Republic of	13	18	39	38
Sweden	--	--	799	477
United Arab Emirates	384	545	261	977
United Kingdom	30	28	10	28
Venezuela	--	--	332	178
Other	(4/)	(4/)	59	97
Total	196,000	85,100	231,000	134,000
<b>Reclaimed scrap, including ash and residues: 5/</b>				
Canada	58	29	128	39
Other	19 r/	11	16	40
Total	78 r/	39	144	80
<b>Wrought lead, all forms, including wire and powders (gross weight):</b>				
Canada	1,760	3,000	2,590	4,020
Chile	50	84	--	--
China	104	421	85	509
France	12	90	62	163
Germany	297	1,090	193	1,060
Hong Kong	196	530	170	463
India	(2/)	2	144	259
Italy	283	521	389	553
Japan	55	552	317	1,510
Mexico	1,600	1,290	1,490	1,460
Namibia	1,000	448	--	--
Peru	168	131	18	13
South Africa, Republic of	1,000	448	--	--
Taiwan	124	374	197	732
United Kingdom	169	644	99	746
Other	74 r/	662 r/	66	615
Total	6,890	10,300	5,820	12,100

r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Also includes other lead-bearing materials containing greater than 5 troy ounces of gold per short ton, or greater than 100 troy ounces of total precious metals per short ton.

3/ Less than 1/2 unit.

4/ Revised to zero.

5/ Also includes other lead-bearing materials containing greater than 10% by weight of copper, lead, or zinc (any one).

Source: Bureau of the Census.