

Minerals Year 1974

Volume I

METALS, MINERALS, A



Prepared by staff of

BUREAU OF MIN

N49799

kiln linings was discussed.¹⁷ Construction is usually accomplished by pneumatically operated bench rammers. Plastic refractories are composed of crushed or ground calcined aggregate bonded with specific clays and chemicals, mixed and packaged to a specific workability to permit handling and ramming in place. The plastic construction is said to have several desirable aspects, including fuel savings.

Chemical analysis of refractories, including mullite, by X-ray fluorescence was described.¹⁸ Three sample preparation methods were evaluated: Pressed powders, borate fusions, and sodium-silicate melts. Mineralogical problems were encountered with pressed powders, and incomplete refractory solution was found with borate fusions. Sodium-silicate glass melts produced durable samples and reportedly the best results.

A patent was issued for the formation of mullite in clay wares.¹⁹ Lower firing temperatures are achieved by incorporating in the clay mix about 1% to 3% of a fluorine compound, such as fluorspar or topaz. A patent for a new type of mullite brick refractory containing from 56% to 80% mullite, 6% to 13% calcined kyanite,

5% to 8% alumina, 1% to 9% silica, and 4% to 25% iron-chromite ore was granted.²⁰ This new refractory is said to have increased service life and decreased alkali and slag attack when used in the steel industry. A summary of the main types of refractory products, including mullite, was given.²¹

Refractory mullite was one of the materials for which mechanical and electrical properties were listed in a summary table.²²

Phases in the kaolinite-mullite reaction sequence were reexamined by infrared absorption spectrophotometry.²³

¹⁷ Bernoth, N. T. Plastic Refractories Facilitate Kiln Linings. *Rock Products*, v. 77, No. 5, May 1974, pp. 102-104.

¹⁸ Winger, L. A., and E. L. McKinley. Chemical Analysis of Refractories by X-Ray Fluorescence of Glass Pellets. *Am. Ceram. Soc. Bull.*, v. 53, No. 9, September 1974, pp. 638-640.

¹⁹ Shutt, T. C. (assigned to Fiberglas Canada Limited). Mullite Formation. U.S. Pat. 3,761,295, Sept. 25, 1973.

²⁰ Manigault, E. L. (assigned to The Chas. Taylor's Sons Co.). Mullite-Chrome Refractory. U.S. Pat. 3,773,532, Nov. 20, 1973.

²¹ Brick & Clay Record. Solve Industries' Hot-test Problems. V. 164, No. 1, January 1974, p. 44.

²² Materials Engineering. 1973 Materials Selector. V. 80, No. 4, Mid-September 1974, p. 289.

²³ Percival, H. J., J. F. Duncan, and P. K. Foster. Interpretation of the Kaolinite-Mullite Reaction Sequence From Infrared Absorption Spectra. *J. Am. Ceram. Soc.*, v. 57, No. 2, February 1974, pp. 57-61.

Lead

By J. Patrick Ryan¹ and John M.

World mine production, which had been trending upward for several years, dropped slightly in 1974 but smelter production increased marginally from the record high level of output achieved in 1973. World metal consumption decreased about 1% but exceeded production by nearly 4%, the shortfall in production being balanced essentially by withdrawals from producers and Government stocks. The U.S. lead price advanced to a record high in 1974 following removal of price controls in December 1973. The U.S. producers average price reached 24.5 cents per pound late in June, virtually the same as the London Metal Exchange (LME) price. The average equivalent LME price exceeded the U.S. producers price during the first 8 months of the year then fell slightly below the U.S. price in the last 4 months. The average equivalent LME price in 1974 was 26.83 cents per pound. The average domestic price of lead on a nationwide basis in 1974 was 22.53 cents per pound.

Domestic mine production increased 10% in 1974 to a 47-year record high, but smelter production was slightly lower than the 43-year high level achieved in 1972. Secondary smelter output increased 7% to nearly 698,700 tons, a new record representing about 50% of total smelter and refinery production of lead.

Consumption of lead reached a record high of 1.6 million tons, nearly 4% more than in 1973. Lead requirements in the transportation field continued to grow, accounting for 69% of total lead consumption in 1974. Storage battery requirements increased 11%, more than offsetting a 9% decline in lead used in gasoline antiknock compounds. Moderate gains were recorded in the quantity of lead used in pigments and ammunition which together accounted for 13% of total consumption.

Stocks of antimonial 43% during yearend. O lead and le alloys incre yearend.

Park Ci The Anac Smelting & Inc.) con construction trator at th City, Utah production

Legislati The Gener A) reporte surplus lea pile totaled total about mercial co the remain transfers fo ments und uncommitt 643 tons, stockpile i disposal. Governmen 676 tons, storage of The shelf- sales to co Governmen 1974. The long-term domestic p

A bill in the Co of 464,900 and suppl

¹ Physical als.

further action had been taken on the bill.

Proposed regulations to phase out lead shot for water fowl hunting throughout much of the United States starting in 1976 were published in the Federal Register. Public hearings were held in four cities but a final decision had not been reached at yearend.

In October the Environmental Protection Agency (EPA) published standards of performance for new and modified sources for primary copper, lead, and zinc smelters under authority of section 111 of the Clean Air Act, as amended. The proposed standard for sulfur dioxide (SO₂) emissions was designed to reflect the degree of limitation attainable through the application of the best available technology. The basic standard for primary lead smelters would prohibit the discharge of any gases which contain more than 0.065%

sulfur dioxide by volume.

On December 20 the U.S. Circuit Court of Appeals for Washington set aside the EPA regulations for a gradual phasedown of lead in gasoline by a two-to-one vote. The phasedown which was scheduled to begin on January 1, 1975, would direct that gasoline refiners reduce the average lead content of gasoline over a 4-year period from 1.7 grams per gallon after January 1, 1975, to 0.5 gram per gallon after January 1, 1979. The formal written opinion on an appeal by Ethyl Corp. and others, challenging the health aspects set forth by EPA, was issued in January 1975. The Court found that evidence did not support the EPA contention that auto emissions contributed significantly to blood lead levels in adults and children and that issuance of the EPA regulations was arbitrary and capricious.

Table 1.—Salient lead statistics
(Short tons unless otherwise specified)

	1970	1971	1972	1973	1974
United States:					
Production:					
Domestic ores, recoverable					
lead content	571,767	578,550	618,915	603,024	663,870
Value	\$178,609	\$159,679	\$186,045	\$196,456	\$298,742
Primary lead (refined):					
From domestic ores and					
base bullion	528,086	573,022	577,398	567,256	580,078
From foreign ores and					
base bullion	138,644	76,993	103,001	107,260	92,946
Antimonial lead (primary					
lead content)	11,655	16,116	8,185	13,223	9,867
Secondary lead (lead content)	697,300	696,797	616,697	654,286	698,698
Exports of lead materials					
excluding scrap	7,747	5,925	8,376	66,676	61,982
Imports, general:					
Lead in ore and matte	112,406	65,998	101,282	109,947	94,299
Lead in base bullion	296	41	895	4	831
Lead in pigs, bars, and old	261,480	198,970	245,853	181,486	119,579
Stocks December 31					
(lead content):					
At primary smelters and					
refineries	192,985	121,660	145,573	89,847	121,051
At consumer plants	133,502	125,577	118,544	124,121	166,589
Consumption of metal, primary					
and secondary	1,360,552	1,431,514	1,485,254	1,541,209	1,599,427
Price: Common lead, average,					
cents per pound ¹	15.69	13.89	15.03	16.29	22.53
World:					
Production:					
Mine	3,741,546	3,742,950	3,801,094	3,877,593	3,844,687
Smelter	3,628,422	3,590,730	3,723,409	3,796,413	3,820,544
Price: London, common lead,					
average, cents per pound	13.76	11.52	13.68	19.47	26.83

¹ Revised.

¹ Quotations for 1970-71 at New York and for 1972-74 on a nationwide, delivered basis.

LEAD

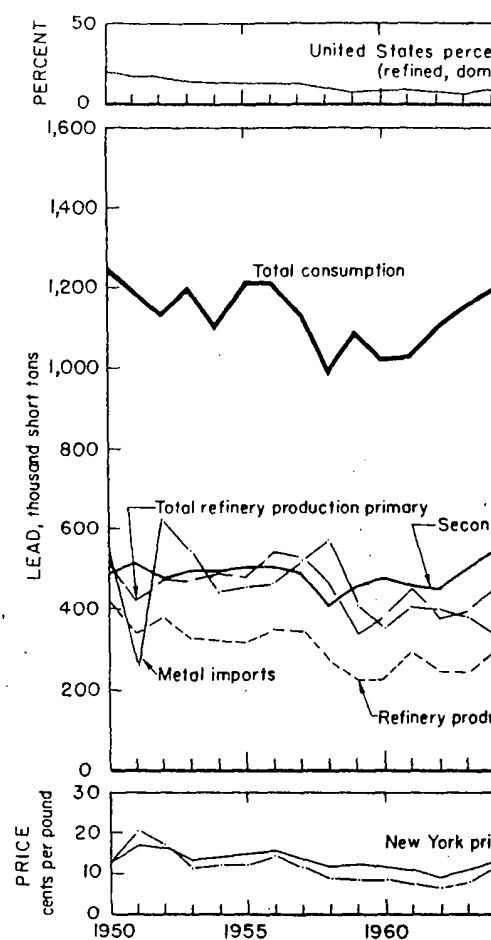


Figure 1.—Trends in the lead industry

DOMESTIC PRODUCTION

MINE PRODUCTION

Continuing an almost uninterrupted rising trend since 1962, mine production of lead increased 10% in 1974 to nearly 663,900 tons, the highest level of output since 1927. Monthly production reached a maximum of 64,900 tons in October, nearly 9,000 tons more than the maximum achieved

in 1962. In 1974, production increased 10% to nearly 663,900 tons, the highest level of output since 1927. Monthly production reached a maximum of 64,900 tons in October, nearly 9,000 tons more than the maximum achieved

years. Lower production at Kennecott's Urgin mine in Utah County, the State's only lead-producing mine, was attributed to adverse operating conditions including groundwater problems and high temperatures. Kennecott's Ozark mine in Missouri achieved record production in 1974 with an output of 74,500 tons of lead in concentrates compared to 59,000 tons in 1973.²

The Buick mine jointly owned by Amax and Homestake Mining Co. of Missouri (AMAX) and Homestake Mining Co. was the leading producer for the fourth consecutive year with an output of 1.56 million tons of ore, about the same as in 1973. However, lead concentrate production increased about 11% in 1974 to 250,600 tons.³

The seven leading mines, all in Missouri, contributed 80% of the total U.S. mine production of lead. The 12 leading mines produced 90%, and the 25 leading mines accounted for 99% of the total. About 100 persons were employed in the Nation's lead, lead-silver, and lead-zinc mines and mills in 1974. Output of lead and zinc from these mines per man-year was approximately 127 tons. Average grade of lead ore mined was 6.24% lead and 0.1% zinc compared with 6.55% lead and 1.08% zinc in 1973.

St. Joe Minerals Corp., the Nation's largest lead mining company, continued to operate its four mine-mill units in southeast Missouri and reported that 1974 production of lead in concentrate increased 1,436 tons to 247,494 tons.⁴ The production gain was largely due to near-capacity operations at the corporation's new Brushy Creek mine which began operation in 1973.

Hecla Mining Co. reported that production at its Lucky Friday mine in the Coeur d'Alene district, Idaho, was 165,700 tons of ore assaying 9.93% lead, 1.18% zinc, and 13.53 ounces of silver per ton compared with 176,900 tons assaying 11.14% lead, 2.2% zinc, and 15.49 ounces of silver per ton in 1973. The decrease in mine output was attributed to a shortage of experienced underground miners. Ore reserves at Lucky Friday at yearend totaled 9,000 tons compared with 510,000 tons a year earlier. Hecla also reported that production at the Star-Morning mine jointly owned by Hecla (30%) and The Bunker Hill Co. (70%) increased 15,800 tons to 281,580 tons. Hecla's share of the 1974 production of lead-zinc-silver ore

was 84,470 tons assaying 4.77% lead, 6.04% zinc, and 2.45 ounces of silver per ton. Hecla's share of the computed ore reserves increased 90,000 tons to 376,000 tons at yearend.⁵

In Colorado, Idarado Mining Co. treated 396,600 tons of lead-zinc-copper ore averaging 2.46% lead, 3.33% zinc and 0.55% copper compared with 378,200 tons milled in 1973 averaging 2.55% lead, 3.44% zinc, and 0.56% copper. Ore reserves at yearend 1974 increased 20% to 3.88 million tons averaging 3.13% lead, 4.41% zinc, 0.69% copper, 1.77 ounces of silver and 0.02 ounce of gold per ton. The Leadville mine (Resurrection mine) a joint venture of ASARCO and Newmont Mining Corp., milled 163,000 tons of lead-zinc-silver ore in 1974, about 43,000 tons more than in 1973. However, manpower shortages continued to retard operation of the mine at full capacity. Ore reserves at yearend were estimated at 2.65 million tons averaging 5.0% lead, 9.4% zinc, 2.4 ounces of silver and 0.07 ounce of gold per ton.⁶

Bunker Hill reported that production from company owned and controlled mines in 1974 aggregated 31,000 tons of lead, about the same as in 1973. The company also reported that proven and probable ore reserves at yearend in the Bunker Hill mine totaled 3.27 million tons averaging 2.2% lead, 3.5% zinc and 1.2 ounces of silver per ton. The company also reported that at yearend its 70% interest in proven and probable reserves in the Star mine totaled 849,500 tons averaging 6.7% lead, 7.2% zinc, and 3.8 ounces of silver per ton.⁷

SMELTER AND REFINERY PRODUCTION

Output of refined lead from the Nation's five primary refineries in 1974 dropped slightly below production in 1973 as the gain in metal recovered from domestic concentrates failed to offset a decline in metal recovered from foreign ores and concentrates. However, total primary metal production of 682,900 tons was the largest

annual output since 1929. About 86% of the total output was recovered from domestic ores compared with 84% in 1973. Antimonial lead production at primary refineries declined 19% to 12,513 tons, continuing a general downward trend since 1968. The average antimony content of the alloy increased 1.3% to 8.8%, the highest level since 1967.

Metal production at the Herculaneum, Mo., smelter of St. Joe Minerals Corp. reached capacity in 1974 with a production of 230,870 tons of lead metal and lead alloys, about 15,900 tons more than in 1973.⁸

ASARCO reported that lead production at its Omaha and Glover refineries, totaling 218,600 tons, was about 9% less than in 1973. The Omaha, Nebr., refinery treated base bullion essentially from the company's custom smelters at El Paso, Tex., and East Helena, Mont. Most of the concentrate treated at the Glover, Mo., smelter-refinery came from Kennecott's Ozark mine at Sweetwater, Mo. The East Helena smelter, operating at 78% of rated capacity during the year, processed ore and concentrate from about 110 domestic mines in 7 States and from mines in Canada, Peru, and Australia. The El Paso lead smelter, operating at 67% of capacity in 1974, processed ore and concentrate from approximately 36 domestic mines in 8 States and from mines in Peru, Canada, Honduras, Nicaragua, Australia, and Mexico. The smelter was closed by a strike for 5 weeks during the year. The company reported the installation of a computerized monitoring system at the Glover smelter to give early warning of increases in the sulfur dioxide content of ground-level air so that operations can be curtailed when necessary to assure compliance with State and Federal ambient air standards.⁹

The AMAX-Homestake smelter-refinery at Boss, Mo., produced 134,300 tons of refined lead, approximately one-half of which was derived from concentrates treated on toll for others.¹⁰

At the Bunker Hill smelter-refinery of Gulf Resources & Chemical Corp., lead production declined about 6% to 123,000 tons. The lower output was attributed largely to interruption of operations, caused by storms and a 10-day labor strike by craft unions. In addition production was curtailed occasionally during weather inversions to meet sulfur dioxide emission

LEAD

standards.¹¹ Processed concentrates from the States and Peru.

Secondary production from recycled lead, about 7% to a refinery producing secondary products of lead and during the represented assumption in processing year.

U.S.S. L. of U.V. facilities for at East Chic double the monial and

RA

Primary ores and concentrates yielding 58% antimonial 86% of total compared with monial lead concentrates smelted to 96,900 tons in 1973. Scrap processed to about 1, lead compared

Scrap material 929,100 tons in 1973. About 10% counted for consumed. chased drove variety of about 14% compared of the total old scrap, small quantities solder, bab

A small totaling one ported for

⁹ Work cited ASARCO P. 18.

¹⁰ Work cited Gulf Resources & Chemical Corp. Report. Pp.

² Kennecott Copper Corp. 1974 Annual Report. P. 11.

³ AMAX Lead Co. 1974 Annual Report. P. 5.

⁴ St. Joe Minerals Corp. 1974 Annual Report. P. 16.

⁵ Hecla Mining Co. 1974 Annual Report. Pp. 6-7.

⁶ Newmont Mining Corp. 1974 Annual Report. P. 6.

⁷ Gulf Resources & Chemical Corp. 1974 Annual Report. P. 11.

CONSUMPTION AND USES

Domestic consumption of lead increased nearly 4% in 1974 to a new record of 1.60 million tons. On a monthly basis consumption ranged from a low of 112,800 tons in July to a new record high of nearly 157,000 tons in October. Use of lead increased in all major product sectors except chemicals (gasoline antiknock additives) which declined nearly 9% from the 1973 level and accounted for about 16% of total lead consumption. The 6% increase in the metal products sector, which accounted for 74% of the total consumption, represented gains in battery requirements and, to a lesser extent, ammunition. These gains more than offset combined losses in metal used in bearings, pipes, sheets, and solder. Changes in metal consumed in most other metal products were relatively minor. According to type of material consumed, soft refined lead represented 66% of the total consumption, antimonial lead accounted for 29%, and lead in other alloys, mainly solders and bearing metals, accounted for 4%. Lead in copper-base scrap accounted for 1% of total consumption.

Lead requirements for battery grids and oxides increased 11% and accounted for 53% of total lead consumption. The gain in battery lead consumption reflected increased demand for batteries used for power in starting, lighting, and ignition (SLI), and traction of motor vehicles, both on-the-road and off-the-road types. A total of 55.7 million SLI-type batteries was produced in 1974, 1.4 million less than in 1973. Of the total battery production, about 44.4 million were replacement, 10.1 million were original equipment, and the remainder were exported. The 9% drop in the quantity of lead used in antiknock compounds in 1974 reflected a reduction in the average lead content per gallon of gasoline from about 2.2 grams per gallon in 1973 to about 1.90 grams per gallon, and a 2.5% drop in total gasoline production.

Lead used in pigments, particularly red lead and litharge, increased 7% and accounted for 7% of the total consumption in 1974. Miscellaneous and other unclassified uses increased 6% and accounted for 3% of the total. About 5% of the total was used for ammunition. Lead used in metal products, other than battery components and ammunition, accounted for approximately 15% of total consumption.

The domestic supply of lead metal from all sources—primary and secondary production, imports for consumption, industry stock changes, and stockpile releases—totaled about 50,600 tons more than reported consumption and exports. The apparent excess supply in 1974, amounting to about 3% of reported consumption, was attributed partly to unreported consumption, incomplete export data, and stock buildup, especially by small producers and dealers that do not report to the Bureau of Mines.

LEAD PIGMENTS

Pig lead used in the production of lead oxides and pigments totaled nearly 558,000 tons, about 9% more than in 1973. The quantity of lead used in making black oxide increased 20% and accounted for 70% of the total lead in pigments. Litharge production was down 12% and accounted for 26% of the total in 1974. Most of the litharge shipments went to battery manufacturers and is included in "Other" in table 20. Litharge shipped for use in the ceramics industry increased nearly 30% constituting 29% of the total litharge shipments in 1974.

Prices.—The published price of basic carbonate white lead in carload lots, freight allowed, remained unchanged at 23.9 cents per pound, the same as in 1973. The quoted price of red lead (Pb_3O_4) 95%, in carload lots at works, was unchanged at 21–21.2 cents per pound through April, then was advanced to 26 cents in May, to 27.75 cents in June, 27.75–29.25 cents in July, and remained unchanged thereafter to yearend. The price quotation of lead silicate ($PbSiO_3$) remained unchanged at 23 cents during the year. The price quotation for commercial-grade litharge in carload lots at works remained unchanged at 21.25–22.75 cents until May when the price was increased to 22.75–25.25 cents. The price was again increased in June to 26.50–27.25 cents and to 27.25–28.75 cents in July, remaining unchanged thereafter to yearend.

The value of shipments of white lead, red lead, and litharge amounted to \$89.2 million, an average of \$494 per ton compared with \$72.9 million and \$356 per ton in 1973.

LEAD

Foreign Trade.—Imports for consumption of lead pigments and compounds decreased 30% in quantity but the value increased 16% to \$10 million. Litharge, which comprised 60% of the total quantity imported, decreased 40%; imports of chrome yellow, comprising 30% of the total, were 3% less than in 1973. Virtually all of the imports of litharge came from

Mexico; yellow d
Export
totaled
and exp
ment gr
at \$1.5
countrie

STOCKS

Inventories of refined and antimonial lead at primary smelters and refineries trended downward in the first 7 months of 1974 from about 26,100 tons at the beginning of the year to a low of 17,600 tons at the end of July then trended upward through the next 4 months to 24,600 tons at the end of November. In December refiner's stocks increased sharply to about 37,300 tons at yearend, indicating a gain of 11,200 tons for the year. Stocks of lead in base bullion at yearend were about 3,300 tons less than a year earlier, but the lead content of ore and matte stocks increased nearly 23,400 tons.

Stock
and se
nearly
42,500
Refined
total co
Stock
inomial
ducers
600 ton
domesti
old lea
creased
at year

PRICES

The U.S. producer price for common and corroding-grade lead on a nationwide basis as reported by Metals Week advanced on January 4 from a split quotation of 18–19 cents to 19.0 cents per pound. In the last week of March the price was advanced again to 21.5 cents remaining unchanged until mid-June when the price quotation was split at 21.5–24.5 until June 21 when all producers quoted 24.5 cents per pound, a new record high; thereafter, the lead price remained unchanged to yearend. The weighted average monthly U.S. producer price ranging upward from 18.98 cents in January to 24.50 cents in December, indicated a 29% gain during the year. The average price for the year was 22.53 cents compared with 16.29 cents in 1973.

The
cash bi
curren
quarter
per po
March,
low of
rising s
The L
during
near pa
last 4
LME c
cents, b
Exchan
with a
1973 v
245.10

FOREIGN TRADE

Exports of lead metal, lead alloys, and scrap materials declined 4% in 1974 below the record high level established in 1973. Metal and alloy exports totaled nearly 62,000 tons, about 4,600 tons less than in 1973, whereas scrap outflow (59,400

(tons) v
About
unwrou
Europe
went to
38%

Canada and the remainder to about 22 other countries. In addition 111,200 tons of lead and zinc concentrates was exported. Nearly one-half of the concentrates was shipped to Japan; and most of the remainder went to Belgium-Luxembourg (26%), Brazil (10%), Romania (15%), Yugoslavia (4%), and Mexico (4%). The quantities of lead and zinc contained in the concentrates are not available separately.

General imports of lead materials into the United States in 1974 dropped 26% to a total of 214,700 tons valued at \$92.1 million. Receipts of lead in concentrates and other unrefined materials were down 13%, and metal receipts dropped 34% from the 1973 level of imports to about

118,400 tons, the smallest quantity of metal imported since 1946. As in 1973 the decline in lead imports in 1974 was attributed partly to the effect of the lead dumping determination by the International Trade Commission against Canadian and Australian exporters. Metal receipts from Australia and Canada were approximately 42,000 and 22,000 tons, respectively, less than in 1973.

Peru was again the leading supplier of crude lead materials with nearly 28% of the total imports; shipments from Australia, Canada, Honduras, and Mexico accounted for most of the remainder. Canada, Peru, and Mexico together furnished 92% of the total metal imported.

WORLD REVIEW

Mine production of lead in 1974 in market economy countries of the world, based on data compiled by the Bureau of Mines, totaled 2.71 million tons, about 8% less than in 1973. Mine production in centrally controlled economy countries, including Yugoslavia, was estimated to be 1.13 million tons, 29.5% of the total world production of 3.84 million tons. Smelter production of lead in market economy countries, limited to primary metal where possible, totaled 2.64 million tons and the output from centrally controlled economy countries was estimated to be 1.18 million tons yielding a world total of 3.82 million tons. Compared with 1973, the 1974 world mine production showed an 0.8% decline, whereas the world smelter production registered a 0.6% gain.

The United States increased its lead as the country producing the most lead from mine sources, accounting for 17% of the world total. Other countries producing over 100,000 tons of lead in mined ore were the U.S.S.R., Australia, Canada, Mexico, Peru, Yugoslavia, Bulgaria, North Korea, and the People's Republic of China, in descending order of quantity mined. The North American continent produced 1.29 million tons or 34% of the world total.

The United States again was the leading producer of primary lead metal. The U.S.S.R. probably ranked second, followed by Australia, Mexico, Japan, France, Yugoslavia, Canada, West Germany, Bulgaria, the People's Republic of China, North

Korea, and Belgium. Each of the 13 countries produced over 100,000 tons of lead and collectively they accounted for 79% of the 1974 world production. The smelter output data for Yugoslavia, Bulgaria, and Belgium may include recovery from secondary materials.

Data released by the International Lead and Zinc Study Group (ILZSG) on consumption of refined lead in market economy countries estimated a total of 4.07 million tons in 1974, about 0.2% more than the final figure for 1973. The greatest increase was in the United States which accounted for 37% of world market economy consumption; France, West Germany, Japan, and the United Kingdom registered decreases in consumption in 1974. ILZSG reports of world lead metal production showed a deficit in supply of 130,000 tons in 1974 probably accounted for by combined changes in producers stocks and the U.S. Government stockpile.

Australia.—Due to reduced output from Broken Hill mines, mine production of lead in 1974 was 7% below that of the previous year and totaled 415,900 tons. The Zinc Corporation (ZC) and New Broken Hill Consolidated (NBHC) mines were handicapped by delays in development brought on by caving in stopes of the NBHC mine in 1973, by labor disputes, and a shortage of manpower. Nonetheless Australia remained the world's third ranking lead-producing country.

The combined production of refined lead

and lead bullion within Australia was 374,800 tons, about the same output as in 1973. Broken Hill Associated Smelters, Pty. Ltd., a subsidiary of Conzinc Riotinto of Australia, Ltd., at Port Pirie produced 222,600 tons of refined lead. Mount Isa Mines Ltd., 49% owned by ASARCO, at Mount Isa produced 139,200 tons of lead in unrefined products during fiscal 1973-74; and Sulphide Corp., Pty. Ltd., a subsidiary of Conzinc Riotinto produced 27,500 tons of lead bullion for refining elsewhere.

Consumption of primary lead in Australia declined about 4% in 1974 from the record level of 1973. Batteries, using metal and oxides, accounted for 48% of the total 54,100 tons of primary lead consumption. Total lead consumption was estimated to be 92,600 tons including refined pig lead and lead content of anti-monial lead.

Canada.—Mine production of lead contained in ores and concentrates was below normal capacity in 1974 and decreased 15% from the 1973 output to about 365,000 tons. Production of primary refined metal dropped from 206,000 tons in 1973 to 138,000 tons in 1974. Strikes or lock-outs at mines operated by Cyprus-Anvil Mining Corp., Brunswick Mining & Smelting Co. Ltd., and Cominco, Ltd., reduced mine production, and a 4-month strike at Cominco's Trail, British Columbia, plant cut refined metal production.

As a result of a U.S. International Trade Commission finding of injury from lead imports, shipments of lead to the United States from Canada were reduced to avoid penalties for dumping. Exports of refined lead worldwide decreased 37% to 79,050 tons, with 40% going to the United Kingdom and 39% to the United States. Exports of concentrates were maintained at a high level, totaling 213,900 tons of contained lead; 58% went to Japan, 13% to the United States, 10% to West Germany, and the balance to other European countries and Brazil. Consumption of primary metal within Canada was estimated at 75,000 tons in 1974. Secondary recovery was about 38,000 tons in 1974. Imports of refined lead in 1974 were 12,500 tons mostly from Japan and the United States.

The Yukon Territory provided the largest share of lead mine production with 32% of the total; Northwest Territories ranked

work at the Navan mine were suspended by Tara Exploration and Development Co. Ltd., in August 1974 because terms of the proposed State Mining Lease offered by the Irish Government were unacceptable. During the suspension, negotiations continued and agreement on a revised lease was announced in February 1975. As a result of the delay and of world-wide inflation, the estimated capital cost of the project was increased from \$87 million (in 1973) to \$150 million (in early 1975). Prior to the shutdown, 95,000 tons of development ore estimated to grade 11.4% zinc and 2.4% lead was stockpiled on the surface. The mine and concentrator were being designed to treat about 2.5 million tons of ore annually.

Mogul of Ireland, Ltd., a subsidiary of International Mogul Mines Ltd., operated its mine near Silvermines in County Tipperary and reported production of 23,600 tons of lead concentrate and 96,300 tons of zinc concentrate. Ore reserves were estimated at 8,470,000 tons averaging 2.75% lead and 6.48% zinc.

Irish Base Metals Ltd., a subsidiary of Northgate Exploration Ltd., operated the Tynagh mine in County Galway and produced concentrates containing 26,500 tons of lead, 19,700 tons of zinc and 870,000 ounces of silver in 1974.

Mexico.—Lead mine production increased 22% from 1973 to 1974 to a total of 240,300 tons. Industrial Minera Mexico, S.A. had a lead output of 108,200 tons and Industrias Peñoles S.A. reported production of 107,000 tons. Only 15,000 tons of lead in concentrates were produced for export by Mexican mines. Industrial Minera was modernizing its lead smelter in Chihuahua to achieve a capacity of 130,000 tons per year by 1976. Met-Mex Peñoles, S.A., a subsidiary of Industrias Peñoles, continued making improvements to the sintering, sulfuric acid, and refining plants at Torreón, designed to increase capacity to 190,000 tons per year and reduce atmospheric pollution.

In April 1974, ASARCO sold part of its equity in Industrial Minera Mexico (formerly Asarco Mexicana S.A.) to Mexican investors reducing its residual ownership to 34% of the outstanding stock.

Morocco.—Lead was the second most important mineral export of Morocco (after phosphate rock), even though production dropped 20% by metal weight, or 11%

by concentrate weight, to 141,000 tons of concentrates in 1974. The largest lead mine located at Zeida maintained the same level of production as in 1973, producing 40,000 tons of concentrate. Three other mines, at Touissit, Aouli, and Aoum, had decreased activity due either to a strike or depletion of reserves in the older parts of the mine.

Discussions with the U.S.S.R. for geological studies in the northern Rif Mountains concentrated on exploration for lead and zinc in this region. A new lead smelter was planned for the Meknes area to accommodate the production of several small mines.

Peru.—With a mine production of 224,900 tons of recoverable lead, Peru ranked sixth among lead-producing nations in 1974. This output was used to produce 88,850 tons of refined lead with most of the balance exported as concentrates. The lead exported from Peru included 26,200 tons in lead concentrates and 40,000 tons of lead metal shipped to the United States.

At the El Povenir mine, Cia. Minera Milpo was expanding capacity from 1,000 to 1,800 tons of ore per day, and was planning to increase lead concentrate production to 22,000 tons per year. El Povenir ore averaged 4.3% lead, 6% zinc, and 5 ounces of silver per ton.

The Santander mine of the St. Joe Minerals Corp. continued development to convert from the former open pit operation to a completely underground operation using trackless mining equipment on three new levels. Production of lead concentrate was at the rate of 10,000 tons per year.

Spain.—Spanish lead production was expected to increase by 40,000 tons per year within the next few years. The Rubiales zinc-lead mine in the province of Lugo in northwestern Spain was scheduled for development in 1975 and initial production by 1977. The principal shareholders were Cominco Europe N.V., 47.5%; Union Corp. (Luxembourg) S.A., 27%; and Dugwill Pty., Ltd., Asturiana de Zinc S.A., and Banco Urquijo S.A. sharing the balance. At full production the Rubiales mine will have an annual production of 16,500 tons of lead concentrate and 126,000 tons of zinc concentrate. Another zinc-lead development project, the d'Aznacollar mining complex of d'Aznacollar d'Andaluz de Piratas S.A. (APIRSA) was started during 1974 with full produc-

tion of 42,000 tons of lead concentrate and 98,000 tons of zinc concentrate expected by 1978. A zinc-lead mine being developed by Asturiana at Huelva was due to reach capacity in 1975 producing 3,300 tons of lead and 7,700 tons of zinc. A new lead smelter was planned at Linares to be built by a consortium of Cia. La Cruz, Cie. Royale Asturienne des Mines S.A., EN Adaro, Société Minière et Metallurgique de Peñarroya and Cia. Minero Metallurgica Los Guindos S.A.

TECHNOLOGY

The International Lead Zinc Research Organization (ILZRO) reported that batteries and environmental health were the principal areas of its research activities in 1974. Fundamental research in the battery area to improve technology was directed toward obtaining a better understanding of the mechanisms of active material shedding in the positive electrodes of the lead-acid system, effects of minor constituents in the system, the effect of aging of grids on anodic corrosion, and new approaches to paste mixing. The basic thrust of fundamental research conducted in cooperation with the U.S. Naval Research Laboratory (NRL) was to improve efficiency and power density of the lead-acid battery as well as to determine the active material softening failure mechanism of the PbO₂ electrode.

ILZRO research in the environmental health area included investigations of population and occupational exposures to lead. Studies completed on a large group of workers employed in lead production facilities or battery plants over a 23-year period disclosed that the life expectancy of lead workers is approximately the same as that of all U.S. males. A study conducted in Tokyo, Japan of policemen exposed to low concentrations of lead in areas of heavy traffic concluded that at the present level of lead in air in Tokyo, no direct relationship between lead levels in blood and urine could be established.

Other ILZRO lead research was directed toward developing new low-cost alloys for the electric power industry, improved methods of splicing cable sheathing, fundamental work in the ceramics area, and field evaluation of synthesized organolead compounds.

Gould Inc. announced that it had de-

Yugos
ued to
zinc mi
veloping
mine in
are to
Two ne
in Mac
1.5 mill
trates f
processe

free an
calcium
its charg
batteries
power.

The
of lead
nomic e
the ant
when l
recycle

Burea
Wash.,
of the
determin
in lead
various
the eng
ability
study

can be
for lea
rates of
(60 m
is estim
under 2
total (

prices
Rese
of Mir
ported
in app
recover
centrat
smeltin
centrat
and su
residue
cipitati
lead v
trolysis

Bure

method of processing galena concentrates was electrolyzed in a fused-salt cell to without SO₂ or lead emissions by leaching obtain lead metal meeting ASTM stand- with brine solution containing FeCl₃. Over ards. Efforts to scale up the process and 99% of the lead was converted to PbCl₂ develop an efficient demonstration cell in bench-scale tests, while sulfur was continued.

continued.

Table 2.—Mine production of recoverable lead in the United States, by State

State	(Short tons)				
	1970	1971	1972	1973	1974
Alaska	285	859	1,783	763	1,058
Arizona	1,772	2,284	1,193	44	38
California	21,886	28,746	31,386	28,112	24,618
Colorado	61,832	68,746	61,386	61,717	57,717
Idaho	1,532	1,238	1,386	641	483
Maine	80	—	85	204	279
Missouri	421,764	429,634	489,397	487,143	562,097
Montana	906	615	287	176	184
Nevada	364	111	(1)	—	1,785
New Mexico	3,580	2,971	3,582	2,556	2,364
New York	1,280	877	1,089	2,304	3,076
Oklahoma	797	—	—	—	W
Oregon	(1)	—	—	—	W
South Dakota	3	—	—	—	—
Utah	45,377	38,270	20,706	13,733	10,610
Virginia	3,366	3,366	3,441	2,637	2,106
Washington	6,784	6,177	2,667	2,217	1,386
Wisconsin	161	720	767	844	1,286
Other States	—	—	—	—	2
Total	671,767	678,550	618,915	603,024	668,870

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

1 Less than 1/2 unit.

Table 3.—Production of lead and zinc in the United States in 1974, by State and class of ore, from old tailings, etc., in terms of recoverable metals

State	Lead ore			Zinc ore			Lead-zinc ore		
	Gross weight (dry basis)	Lead content	Zinc content	Gross weight (dry basis)	Lead content	Zinc content	Gross weight (dry basis)	Lead content	Zinc content
Arizona	712	32	1	667	—	47	4,903	546	941
California	217	25	—	—	—	—	800	1	5
Colorado	3,110	34	—	195,563	2,143	17,213	464,300	12,653	21,385
Idaho	190,000	18,446	1,607	10,021	10	437	1,037,704	32,404	36,853
Illinois	—	—	—	—	—	—	—	—	—
Maine	—	—	—	—	—	—	—	—	—
Missouri	9,110,057	562,097	91,987	206,404	279	10,425	—	—	—
Montana	239	34	6	792	4	26	200	5	6
Nevada	2,270	47	10	50	—	1	301,688	1,725	3,393
New Jersey	—	—	—	196,499	—	32,848	—	—	—
New Mexico	16	2	—	168,567	2,120	13,262	9,713	242	292
New York	—	—	—	1,231,833	3,076	93,077	—	—	—
Pennsylvania	—	—	—	415,568	—	20,288	—	—	—
Tennessee	—	—	—	3,093,382	—	82,182	—	—	—
Utah	—	—	—	—	—	—	163,022	10,509	12,617
Virginia	—	—	—	619,760	3,106	17,195	—	—	—
Washington	—	—	—	5,000	1	107	(1)	(1)	(1)
Wisconsin	—	—	—	443,662	1,286	8,737	—	—	—
Other States	—	—	—	—	—	—	—	—	—
Total	9,306,671	580,717	93,611	6,587,848	12,024	295,845	1,982,330	58,085	75,492
Percent of total lead-zinc	—	87	19	—	2	59	—	9	15

State	Copper-lead, copper-zinc, and copper-lead-zinc ores			All other sources ¹			Total		
	Gross weight (dry basis)	Lead content	Zinc content	Gross weight (dry basis)	Lead content	Zinc content	Gross weight (dry basis)	Lead content	Zinc content
Arizona	92,820	36	8,691	59,384,767	446	19	59,483,869	1,059	9,699
California	—	—	—	4,474	9	3	6,491	35	8
Colorado	396,600	8,269	10,173	129,263	1,510	718	1,188,836	24,609	49,489
Idaho	—	—	—	440,576	867	572	1,678,301	51,717	39,469
Illinois	—	—	—	—	493	4,104	—	493	4,104
Maine	—	—	—	—	—	—	206,404	279	10,425
Missouri	—	—	—	—	—	—	9,110,057	562,097	91,987
Montana	12	1	1	21,177	110	97	22,470	154	136
Nevada	—	—	—	1,730,997	13	1	2,035,006	1,785	3,405
New Jersey	—	—	—	—	—	—	196,499	—	32,848
New Mexico	—	—	—	3,318,859	—	230	3,497,245	2,364	13,784
New York	—	—	—	—	—	—	1,231,833	3,076	93,077
Pennsylvania	—	—	—	—	—	—	415,568	—	20,288
Tennessee	1,153,035	—	3,489	—	—	—	4,246,417	—	86,671
Utah	—	—	—	29	1	2	163,061	10,510	12,619
Virginia	—	—	—	—	—	—	619,760	3,106	17,195
Washington	—	—	—	1270,478	11,298	16,802	275,476	1,299	6,908
Wisconsin	—	—	—	—	—	—	443,662	1,286	8,737
Other States	—	—	—	6,198	2	23	6,198	2	23
Total	1,842,467	8,305	22,354	65,806,316	4,789	12,571	84,826,132	643,870	499,873
Percent of total lead-zinc	—	1	4	—	1	2	—	100	100

¹ Lead-zinc ore and ore from "Other sources" combined to avoid disclosing individual company confidential data.

Table 4.—Mine production of recoverable lead in the United States, by month
(Short tons)

Month	1973	1974	Month	1973	1974
January	53,462	57,149	August	55,662	58,670
February	49,958	52,785	September	51,394	49,975
March	45,302	57,956	October	53,743	64,919
April	40,056	52,297	November	49,006	53,222
May	55,934	53,348	December	53,206	53,902
June	43,907	54,884			
July	51,396	54,763	Total	603,024	663,870

Table 5.—Twenty-five leading lead-producing mines in the United States in 1974, in order of output

Rank	Mine	County and State	Operator	Source of lead
1	Bulck	Iron, Mo	AMAX Lead Co. of Missouri	Lead ore.
2	Fletcher	Reynolds, Mo	St. Joe Minerals Corp	Do.
3	Ozark	do	Ozark Lead Co	Do.
4	Marion	Iron, Mo	Cominco American, Inc	Do.
5	Brushy Creek	Reynolds, Mo	St. Joe Minerals Corp	Do.
6	Viburnum No. 29	Washington, Mo	do	Do.
7	Viburnum No. 28	Iron, Mo	do	Do.
8	Bunker Hill	Shoshone, Idaho	The Bunker Hill Co	Lead-zinc ore.
9	Lucky Friday	do	Hecla Mining Co	Lead ore.
10	Star Unit	do	do	Lead-zinc ore.
11	Indian Creek No. 32	Washington, Mo	St. Joe Minerals Corp	Lead ore.
12	Viburnum No. 27	Crawford, Mo	do	Do.
13	Burgin	Utah, Utah	Kennecott Copper Corp	Lead-zinc ore.
14	Idarado	Ouray and San Miguel, Colo	Idarado Mining Co	Copper-lead-zinc ore.
15	Indian Creek No. 23	Washington, Mo	St. Joe Minerals Corp	Lead ore.
16	Leadville	Lake, Colo	American Smelting and Refining Co.	Lead-zinc and lead-zinc-copper ores.
17	Sunnyside	San Juan, Colo	Standard Metals Corp	Lead-zinc ore.
18	Austinville and Ivanhoe	Wythe, Va	The New Jersey Zinc Co	Zinc ore.
19	Italmat	St. Lawrence, N. Y.	St. Joe Minerals Corp	Do.
20	Camp Bird	Ouray, Colo	Federal Resources Corp	Lead-zinc ore.
21	Eagle	Eagle, Colo	The New Jersey Zinc Co	Zinc ore.
22	Ground Hog	Grant, N. Mex	American Smelting and Refining Co.	Do.
23	Dayrock	Shoshone, Idaho	Day Mines, Inc	Lead ore.
24	Pnn American	Lincoln, Nev	St. Patrick Mining Co. Inc	Lead-zinc ore.
25	Bulldog Mountain	Mineral, Colo	Homestake Mining Co	Silver ore.

Table 6.—Refined lead produced at primary refineries in the United States, by source material
(Short tons)

	1970	1971	1972	1973	1974
Refined lead: ¹					
From primary sources:					
Domestic ores and base bullion	528,086	513,022	577,388	567,256	580,078
Foreign ores and base bullion	138,644	76,993	103,001	107,260	92,946
Total	666,730	590,015	680,389	674,516	673,024
From secondary sources	4,367	1,223	1,189	--	--
Grand total	671,097	591,238	681,578	674,516	673,024
Calculated value of primary refined lead (thousands) ²	\$209,220	\$180,574	\$204,528	\$219,757	\$303,265

¹ GSA metal is not included in refined lead production.² Value based on average quoted price and excludes value of refined lead produced from scrap at primary refineries.

Table 7.—Antimonial lead produced at primary

Year	Production (short tons)	Antimony content	
		Short tons	Percent
1970	20,438	1,184	5.8
1971	10,686	1,191	6.0
1972	15,051	1,050	7.0
1973	15,455	1,167	7.5
1974	12,613	1,097	8.8

Table 8.—Stocks and consumption of new and old
(Short tons, gross)

Class of consumers and type of scrap	Stocks Jan. 1	Receipts
Smelters and refineries:		
Soft lead	2,007	33,814
Hard lead	656	56,571
Cable lead	1,335	46,801
Battery-lead plates	54,225	610,016
Mixed common babbitt	434	5,948
Solder and tinny lead	1,190	12,999
Type metals	2,208	26,464
Drosses and residues	21,099	141,560
Total	84,054	943,173
Foundries and other manufacturers:		
Soft lead	--	--
Hard lead	--	--
Cable lead	--	--
Battery-lead plates	--	--
Mixed common babbitt	239	5,804
Solder and tinny lead	--	--
Type metals	--	--
Drosses and residues	--	--
Total	239	5,804
All consumers:		
Soft lead	2,007	33,814
Hard lead	656	56,571
Cable lead	1,335	46,801
Battery-lead plates	54,225	610,016
Mixed common babbitt	678	11,752
Solder and tinny lead	1,190	12,999
Type metals	2,208	26,464
Drosses and residues	21,999	141,560
Grand total	84,293	948,977

Table 9.—Secondary metal recovered¹ from lead 1974, by type of
(Short tons)

Refined pig lead	18
Remelt lead	4
Total	23
Refined pig tin	
Remelt tin	
Total	
Lead and tin alloys:	
Antimonial lead	37
Common babbitt	1
Genuine babbitt	
Solder	2
Type metals	2
Cable lead	1
Miscellaneous alloys	
Total	44
Tin content of chemical products	
Grand total	68

Table 10.—Secondary lead recovered in the United States
(Short tons)

	1970	1971	1972	1973	1974
As metal:					
At primary plants	4,367	1,223	1,189		
At other plants	164,800	148,911	172,168	186,124	238,216
Total	159,167	150,134	173,357	186,124	238,216
In antimonial lead:					
At primary plants	7,599	2,379	5,816	1,065	1,549
At other plants	340,769	340,333	340,066	374,173	369,964
Total	348,368	342,712	345,882	375,238	371,513
In other alloys	89,866	103,961	97,358	92,384	88,979
Grand total:					
Quantity	597,390	596,797	616,597	654,286	698,699
Value (thousands)	\$187,461	\$165,790	\$185,349	\$213,166	\$314,833

Table 11.—Lead recovered from scrap processed in the United States, by kind of scrap and form of recovery
(Short tons)

Kind of scrap	1973	1974	Form of recovery	1973	1974
New scrap:			As soft lead:		
Lead-base	110,787	92,680	At primary plants		
Copper-base	4,506	4,792	At other plants	186,124	238,216
Tin-base	403	281	Total	186,124	238,216
Total	115,696	97,753	In antimonial lead ¹	375,778	371,503
Old scrap:			In other lead alloys	75,545	72,597
Battery-lead plates	369,819	418,400	In copper-base alloys	16,806	16,361
All other lead-base	153,938	169,184	In tin-base alloys	34	21
Copper-base	14,831	13,359	Total	468,162	460,482
Tin-base	2	2	Grand total	654,286	698,699
Total	538,500	600,945			
Grand total	654,286	698,698			

¹ Includes 1,065 tons of lead recovered in antimonial lead from secondary sources at primary plants in 1973 and 1,549 tons in 1974.

Table 12.—Lead consumption in the United States, by product
(Short tons)

Product	1973	1974	Product	1973	1974
Metal products:			Pigments—Continued:		
Ammunition	81,479	87,090	Pigment colors	16,983	17,336
Bearing metals	15,657	14,609	Other ¹	477	718
Brass and bronze	22,795	22,240	Total	108,766	116,213
Cable covering	23,005	48,426	Chemicals:		
Calking lead	20,057	19,739	Gasoline antiknock		
Casting metals	7,220	7,507	additives	274,410	250,502
Collapsible tubes	2,860	2,488	Miscellaneous chemicals	944	708
Foil	4,985	4,404	Total	275,354	251,210
Pipes, traps, and bends	21,291	16,455	Miscellaneous uses:		
Sheet lead	23,394	21,294	Annealing	3,974	4,097
Solder	71,770	66,280	Galvanizing	1,294	1,564
Storage batteries:			Lead plating	744	498
Battery grids,			Weights and ballast	20,848	21,418
posts, etc.	365,557	391,479	Total	26,860	27,677
Battery oxides	408,890	460,402	Other, unclassified uses	21,749	24,098
Terne metal	2,658	2,300	Grand total ²	1,541,209	1,599,427
Type metal	21,922	20,516			
Total	1,108,480	1,180,229			
Pigments:					
White lead	1,749	1,996			
Red lead and litharge	89,577	96,163			

¹ Includes lead content of leaded zinc oxide and other pigments.

² Includes lead which went directly from scrap to fabricated products.

Table 13.—Lead consumption in the United States
(Short tons)

Month	1973	1974	Month
January	135,308	140,071	August
February	131,696	129,404	September
March	143,197	130,884	October
April	128,432	126,500	November
May	128,776	142,616	December
June	129,124	121,530	
July	101,894	112,802	Total

¹ Includes lead which went directly from scrap to fabrication of zinc oxide and other pigments.

Table 14.—Lead consumption in the United States in the form of material
(Short tons)

Product	Soft lead	Leaded
Metal products	181,205	64,811
Storage batteries	475,619	376,111
Pigments	116,127	8,911
Chemicals	251,093	1,111
Miscellaneous	13,432	1,111
Unclassified	21,942	1,111
Total	1,059,418	458,156

¹ Includes lead which went directly from scrap to fabrication of zinc oxide and other pigments.

Table 15.—Lead consumption in the United States
(Short tons)

State	Refined soft lead	Leaded
California	113,333	47,811
Colorado	1,231	1,111
Connecticut	9,585	8,911
District of Columbia	181	1,111
Florida	10,032	8,911
Georgia	50,935	24,098
Illinois	65,044	42,616
Indiana	145,259	52,616
Kansas	16,748	14,098
Kentucky	6,812	11,111
Maryland	816	8,911
Massachusetts	2,285	1,111
Michigan	11,247	14,098
Missouri	31,877	9,111
Nebraska	3,469	1,111
New Jersey	115,427	20,098
New York	50,860	4,098
Ohio	10,823	4,098
Pennsylvania	75,367	58,111
Rhode Island	3,976	1,111
Tennessee	3,481	1,111
Virginia	619	2,098
Washington	15,371	1,111
West Virginia	18,266	1,111
Wisconsin	6,115	9,111
Alabama and Mississippi	6,949	6,098
Arkansas and Oklahoma	4,154	6,098
Hawaii and Oregon	5,538	6,098
Iowa and Minnesota	9,625	14,098
Louisiana and Texas	211,691	38,111
Montana and Idaho	947	1,111
New Hampshire, Maine, Vermont,		
Delaware	11,386	11,111
North and South Carolina	10,509	10,111
Utah, Nevada, Arizona	26	1,111
Total	1,059,418	458,156

¹ Includes lead that went directly from scrap to fabrication of zinc oxide and other pigments.

Table 16.—Production and shipments of lead pigments¹ and oxides in the United States

Product	1973				1974			
	Production (short tons)	Shipments		Value ²	Production (short tons)	Shipments		Value ²
		Short tons	Value ²			Short tons	Value ²	
White lead, dry -	7,103	9,544	\$4,906,724	\$514	5,905	5,905	\$2,759,668	\$467
Red lead -	17,339	16,023	6,300,051	393	19,880	13,290	7,045,540	530
Litharge -	175,167	179,144	61,729,436	345	153,562	161,445	79,390,214	492
Black oxide -	342,283	-	-	-	410,716	-	-	-

¹ Excludes basic lead sulfate, figures withheld to avoid disclosing individual company confidential data.² At plant, exclusive of container.Table 17.—Lead content of lead and zinc pigments¹ and lead oxides produced by domestic manufacturers, by source (Short tons)

Product	1973				1974			
	Lead in pigments produced from—			Total lead in pigments	Lead in pigments produced from—			Total lead in pigments
	Ore		Ore					
	Domestic	Foreign	Pig lead		Domestic	Foreign	Pig lead	
White lead	----	----	5,682	5,682	----	----	4,724	4,724
Red lead	----	----	15,718	15,718	----	----	18,021	18,021
Litharge	----	----	162,905	162,905	----	----	142,813	142,813
Black oxide	----	----	326,580	326,580	----	----	392,421	392,421
Lensed zinc oxide	W	W	----	W	W	W	----	W
Total	W	W	510,885	510,885	W	W	557,979	557,979

W Withheld to avoid disclosing individual company confidential data.

¹ Excluding lead in basic lead sulfate.Table 18.—Distribution of white lead (dry and in oil) shipments,¹ by industry (Short tons)

Industry	1970	1971	1972	1973	1974
Paints	4,460	4,396	6,768	3,198	--
Ceramics	26	34	31	18	--
Other	4,152	2,351	3,267	6,328	5,905
Total	8,638	6,781	10,066	9,544	5,905

¹ Excludes basic lead sulfate, figures withheld to avoid disclosing individual company confidential data.

Table 19.—Distribution of red lead shipments, by industry (Short tons)

Industry	1970	1971	1972	1973	1974
Paints	7,848	8,717	4,909	6,509	5,344
Storage batteries	W	W	W	W	W
Other	11,596	12,272	14,864	9,514	7,946
Total	19,444	20,989	19,773	16,023	13,290

W Withheld to avoid disclosing individual company confidential data; included with "Other."

Table 20.—Distribution of litharge (Short tons)

Industry	1970
Ceramics	24,578
Insecticides	W
Oil refining	2,016
Paints	1,315
Rubber	1,663
Other	116,771
Total	146,343

W Withheld to avoid disclosing individual company confidential data.

Table 21.—U.S. imports for consumption

Kind	1970
White lead	--
Red lead	--
Litharge	--
Chrome yellow	--
Other lead pigments	--
Other lead compounds	--
Total	--

Table 22.—Stocks of lead at primary smelters and refiners (Short tons)

Stocks	1970
Refined pig lead	90,866
Lead in antimonial lead	6,988
Lead in base bullion	11,711
Lead in ore and matte	83,421
Total	192,986

Table 23.—Consumer stocks of lead in the United States (Short tons, lead content)

Year	Refined soft lead	Lead content
1970	82,823	42
1971	81,934	35
1972	74,161	36
1973	84,274	32
1974	106,246	49

Table 24.—Average monthly and yearly lead prices (Cents per pound)

Month	1970	1971	1972	1973	1974
January	1	1	1	1	1
February	1	1	1	1	1
March	1	1	1	1	1
April	1	1	1	1	1
May	1	1	1	1	1
June	1	1	1	1	1
July	1	1	1	1	1
August	1	1	1	1	1
September	1	1	1	1	1
October	1	1	1	1	1
November	1	1	1	1	1
December	1	1	1	1	1
Average	1	1	1	1	1

¹ Metals Week, Quotations for United States on a national basis.