CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
520-770-3500
http://www.azgs.az.gov
inquiries@azgs.az.gov

The following file is part of the

James Doyle Sell Mining Collection

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

FORM SL—1035 3M 1-18-46

KEEP THIS ON TOP

File No.
13-19.13C-(12)

LEAD

Subject: Metals and Minerals

See file 13-19.2A - Wayne Burnham Thesis, 1955 on "Metallogenic Provinces of Western U.S. and Mexico"

J. H. C
OCT 2 5 19.1

October 16, 1961

Mr. Roy T. Kruger, Secretary
Compton Export Company
13609 N. Willowbrook Ave.
Compton, California

GOLD-SILVER-LEAD PROSPECT,
Nevada

Dear Sir:

Your letter of October 11 to our San Francisco (Selby) Office has been forwarded to me because exploration matters are handled out of this office.

I am sorry to advise you that this Company would not be interested in investigating, at this time, the property you describe. However, we thank you very kindly for bringing this to our attention.

Yours very truly,

Original Signed By
K. Richard

KENYON RICHARD

KR/z
cc: GHPlayter

October 13, 1961

K. R.
OCT 16 1961

Mr. Roy T. Kruger, Secretary
Compton Export Company
13609 N. Willowbrook Ave.
Compton, Calif.

Dear Sir:

We have your letter in regard to our possible interest in a gold-silver-lead property located in Nevada.

This letter is being referred to Mr. K. E. Richard, Chief Geologist Southwestern Mining Department, American Smelting and Refining Company, 813 Valley National Building, Tucson, Arizona, who will advise you of our possible interest.

Yours very truly,

ORIGINAL SIGNED
GEORGE H. PLAYTER

GEORGE H. PLAYTER
Asst. Manager

GHP:EC

cc: K.E.Richard - w/enc.

J.H.C.
OCT 25 1961

EXPORT — ALL AROUND THE WORLD MAIL DEALS — IMPORT

COMPTON EXPORT COMPANY
PROMOTION AND SALES
13609 N. WILLOWBROOK AVE.
COMPTON, CALIFORNIA

American Smelting Company.
405 Montgomery Street,
San Francisco, California. c/o Manager.

Dated: OCT 11 1961.

Dear Sir:

Re: Silver - gold - lead ore property.

I have some good news for you. How would you like to purchase this property? The owner will sell outright for $40,000.00 cash offer.

But if you wanted it under an option lease. He would consider $75,000.00 at $300.00 per month plus I5% royalty on all ore shipped. If interested please draw up the lease deal so I can get the owner to agree and sign it.
The Option monthly payment $300.00 continue for a year.Then on Royalty payments.
This Property has 33 claims in gold, silver, and lead. It is located in the State of Nevada.

This tonnage is estimated plenty blocked out and has lots of veins. The assays shows as follows:
The recommendation according the ton.
Gold: .0225 oz -
Silver: 22.92 oz -
Copper: Percentage: .I5%-
Lead: Percentage: I2.6% -
Insoluble: Percentage: 66.6% -
Iron: Percentage: 6.6% -
Zinc: Percentage: I.6% -
Sulphur: Percentage: .3% -
Lime: Percentage: .2 -
Arsenic: Percentage: .I5% -

The Metal values:Gold - Silver - lead total $3I.90 per ton.

The Owner said: That this property can be operated on the open pit or under ground which ever is suitable to you.

All this is proven according the smelter returns. I am suppose to think that the owner wish to retire or whether He is an old mam now.

If you wish to see the property on trip inspection please make an appointment so I can contact him to be prepared to meet you. Hoping you will be please to undertake the mining action within 90 days. Please let me know at once. Thanks.

Sincerely yours,

Roy T. Kruger.

Roy T.Kruger.
Secretary.

P.S. I am trying to be helpful to promote it for him. He promise to pay me for promotion service. Thank you.

OCT 13 1961

1-3-19.13C-(12)

August 14, 1961

Mr. Francis M. Boyce
Box 1103
Elko, Nevada

ELKO, NEVADA
Lead and Silver Samples

Dear Sir:

Your letter of August 8, 1961, addressed to the American Smelting and Refining Company at Salt Lake City, Utah, has been forwarded to me for reply.

We do not maintain an exploration office in Salt Lake City now and since selling the Garfield smelter, we do not have the facilities now for assaying samples sent in by prospectors.

I would suggest that you try one of the custom assayers in Salt Lake, such as Black and Deason or Union Assay office. Both of these firms have done good work for us in the past.

In answer to your question about markets we would be interested in lead and silver at either the Selby or El Paso plants.

Very truly yours,

E. W. NEWMAN

EWN/z
cc: KERichard

WESTERN MINING DEPARTMENT
Salt Lake City, Utah

August 10, 1961

Mr. K. E. Richard, Chief Geologist
Southwest Mining Department
American Smelting and Refining Co.
813 Valley National Building
Tucson, Arizona

SAMPLES FROM PROPERTY NEAR
ELKO, NEVADA. (FRANCIS M. BOYCE)

Dear Mr. Richard:

Herewith for your consideration is letter from Mr. Francis M. Boyce of Elko, Nevada concerning samples which are being sent to you under separate cover.

I believe this follows Mr. Pollock's instructions to the effect that all exploration matters are to be referred to you.

Yours truly,

J. F. Frost

J. F. FROST

JFF:bm
Encl.

A. S. & R. Co.
Salt Lake City.

Gentlemen:

I am mailing you today two ore samples.

Please assay No 1 for lead and silver.
" " " 2 " gold, silver, lead and antimony.

If sufficient values were present would you be in the market for this type of ore, particularly No. 1 sample?

Thanking you I am
Very truly yours,

Francis M. Boyce
Box 1102
Elko,
Nevada

BROADENING THE FIELD OF CONSUMPTION OF LEAD PRODUCTS

By
ROBERT L. ZIEGFELD, SECRETARY, LEAD INDUSTRIES ASSN., NEW YORK CITY
AT THE NATIONAL WESTERN MINING CONFERENCE
OF THE COLORADO MINING ASSOCIATION
DENVER, COLORADO, FEBRUARY 6, 1958

Most of you who are interested in the lead business are concerned primarily with mining the metal - and I use the word "concerned" advisedly under the economic conditions prevailing in the mining industry today. However, I am grateful to our friend, Bob Palmer, for this opportunity to approach the subject of our mutual problems from the other direction - the marketing of lead.

Long after the lead ore has left your mines and when it has been converted to pig lead or even fabricated into one of hundreds of lead products, the finished metal or products must find somebody who wants to use them and is willing to pay for them. It must have markets. And it must find these markets among an ever-changing welter of competitive products - old and new metals and alloys, plastics, rubber, chemicals and the like.

Its success in finding these markets in sufficient quantity determines to a very large extent the degree of profitability that you attain in your mining operations. Therefore, I hope you will be interested in what I have to tell you about what the lead industry is doing to maintain and to develop new markets for lead which will help to balance the industry's capacity to produce, and create a favorable economic atmosphere and profitable business all the way along the line.

Thirty years ago a small group of ten pig lead producers and fabricators of lead products recognized the need for concerted effort on the part of the lead industry to maintain and develop markets for their products and serve other useful purposes on an industry-wide basis. They organized the Lead Industries Association. Today we enjoy the support of some seventy companies - all in the lead business in one way or another. Some are strictly miners of lead and associated metals, others are producers of pig lead, and still others are fabricators of lead products like sheet, pipe, solder, white lead, lead oxides, tetraethyl lead, storage batteries, lead-sheated cable, ammunition and so on.

One of the first efforts of the Association was to gather information on how lead was being or could be used and to publish it in a 100-page book, "Useful Information About Lead." The purpose was to place this information before industry to suggest how lead or its products might help solve industry's problems and thus encourage the greater use of lead. This little book is long since out of print, but it has been superseded by a second book of 230 pages, far more comprehensive in scope and detailed in its technical and engineering information. This second book, "Lead in Modern Industry," was published by the Association in 1952 for the same general purpose as the earlier publication.

We are now engaged in a third phase of this same program. We are preparing, with the aid of many experts in various aspects of lead's production, usage and technology, a Monograph on Lead for publication by the American Chemical Society. This will be a massive work of some 600 or 800 pages and will cover the subject of lead in extreme detail. It will contain much information to help users and prospective users of lead find the data they need to try lead intelligently in their products. All of these books, too, make useful references for students who will become the engineers and scientists of tomorrow.

Another publication was started about the same time as the first book was published. It is our quarterly magazine "Lead." It has been published continuously for 28 years and depicts current applications of lead in actual practice ranging from the mundane to the bizarre, from the old to the new. Starting with a mailing list of about 10,000 names, it now goes four times a year to some 50,000 potential users of lead and its products in an effort to encourage their use by showing them what lead is actually doing.

Still another Association effort, which had its beginnings in the early '30's and is still continuing, is our work in the building construction field, principally on the use of lead for plumbing and sheet metal work. We have used and are

using a combination of methods here. For more than 15 years we published a little bi-monthly magazine for plumbers which was discontinued last year in order to put more effort on architects. In its place we now have two inserts in Sweet's Catalogs for architects and builders with a combined circulation of about 40,000. This is the architect's and builder's "bible." One insert deals with lead plumbing; the other with lead roofing and flashing.

For many years we have had experienced men in the field to work with plumbers, architects, builders and sheet metal contractors. They address meetings of groups of these people and help with advice on installation methods and in the preparation of specifications. As an example, just last year 3,000 sq. ft. of 3 lb. hard lead gutter linings were installed on a new dormitory at Duke University using working drawings and specifications prepared in our office.

Our specification work for architects and builders also includes a series of Building Construction Bulletins of which three have been printed and distributed in the last two years. These provide detailed specifications for the use of lead in specific construction applications, together with helpful practical hints for installation. Here are samples.

One of our problems in the marketing of lead plumbing goods has been a shortage of plumbers sufficiently skilled in lead work to install the material properly and economically. To correct this we have supported the plumbers' union efforts to improve training of plumbers' apprentices and prepared and printed a text book for the use of apprentices and their instructors. The international plumbers' union has made this book the standard text on lead for use in their courses and it is now in its third printing with some 10,000 copies already in use. We also supply a skilled man for a week each year to teach plumbing instructors how to teach lead work and a judge for the international contest of plumbers' apprentices.

For more than fifteen years we have had an active technical committee working to maintain and expand the use of red lead paint. We have tested literally thousands of new paint formulations based on red lead to reduce cost, improve performance, speed drying time, or meet special exposure conditions. These tests have resulted in our publication of a series of twelve Red Lead Technical Letters which are circulated to some 12,000 makers, specifiers and users of metal protective paints. We are now conducting an intensive advertising campaign on red lead paints directed to the construction industry and particularly aimed at the greatly expanded, Federally-aided, highway building program. I think we can safely say that this program has not only maintained the market but has reversed a trend away from red lead that developed during World War II.

Now we come to two fields in which we have great hopes for the future. One of these is ceramics which embraces glass, glazes, porcelain enamels, glass colors, ceramic bodies and the like. Our program in this field started only about two and a half years ago with the formation of a technical committee on ceramics, chairmanned by the Director of the School of Ceramics at Rutgers University, Dr. John H. Koenig. The first job was preparation of a book in which was gathered as much known information as possible about the use of lead in ceramics. It has been distributed to some 6,000 people in the ceramic industries. Being loose-leaf, supplements will be issued to keep it up to date. One has already been distributed, another is at the printers.

We are also running a broad advertising campaign on the use of lead in ceramics, which is blanketing the ceramic trade publications. In addition we are supporting nine graduate research fellowships in universities from coast to coast which include work on lead in low-firing porcelain enamels for aluminum and steel, glazes for whiteware, sewer pipe and brick, lead in ceramic bodies, lead ferroelectrics, lead in glass, and phase diagrams involving lead ozide. Twenty permanent educational exhibits on lead in ceramics are being constructed to be offered for display in each of the accredited ceramic schools in the country.

As I said, we are very optimistic about the future possibilities of this market. Porcelain enamel on aluminum is brand new and the enamel contains around 35 or 40 per cent lead oxide. The trend in enamels on steel is toward lower firing temperatures and the use of lead is about the most effective way of accomplishing this. In ceramic bodies lead contributes unique electrical properties making these bodies useful in electronics, a rapidly growing field. Those are a few examples of our opportunities.

The second area which seems to offer new potentialities is in atomic shielding. Here a substantial amount of lead - nobody knows exactly how much - is already being used, particularly for isotope and spent fuel shipping containers, for protection in "hot" laboratories, and on mobile reactors for ships and the like. These are all bound to grow. To give you some idea what this means, the submarine Nautilus has about 250 tons of lead shielding in it and the first atomic merchant ship, the N. S. Savannah, will have 521 tons of lead shielding. A shipping container for spent fuels may contain around 15 tons of lead, which is about the same amount of lead that is used in doors for "hot cells." The Aerojet-General mass produced reactor contains about 7 tons of lead in each unit.

Of course, lead has competition with concrete, steel and other materials. Therefore we have a secret "Q" cleared technical man on our staff whose job it is to gather all the information he can on the proper use of lead shielding and thus be able to assist the designers of shields in the use of lead to best advantage in relation to competitive materials.

Chemical construction is another field we are not neglecting. Here lead is used in various types of equipment to resist the attack of corrosive chemicals like sulphuric acid. A trained man on our staff operates in this area much as we do in atomic shielding. He is a source of advice as to what chemicals lead will resist and what engineering design will give best results under any specific set of conditions. He publicizes the use of lead for this purpose in technical magazines and in talks before scientific organizations. For example, he will address the annual meeting of the National Association of Corrosion Engineers on this subject in San Francisco next month.

Exhibits at trade shows are an important part of many of our promotional activities. In connection with the work I have just described, we exhibit at the annual Exposition of the Chemical Industries, which was in New York last December and will be in Chicago next September. In connection with our promotion of lead in the construction industry we exhibit at two national expositions. One is at the Home Builders Show which is held in Chicago next January. We also exhibit at the annual show of the National Association of Plumbing Contractors. Usually held in June, it was in Dallas last year and will be in Los Angeles this year.

Another very important piece of work that we have been engaged in for the last several years is the preparation of a Handbook on Soldering, which is to be published by the American Welding Society. As you know, solder is one of the important lead consuming products tonnage-wise. This book will contain complete technical information on the selection of solder for various purposes and just how to use it to get the best results. It is being prepared by a committee of technical representatives of members of the Association who make solder, under the chairmanship of a member of our staff.

So much for what we have been and are doing in the development of markets for lead. Of necessity I have only given you the highlights. But I hope it will suffice to impress on you the fact that the Lead Industries Association is deeply conscious of the need for concerted effort to develop markets for our products.

The industry need not feel ashamed of what it has done. Despite the fact that lead is one of the oldest metals that mankind has put to use and despite the influx of so many newer metals and other materials, lead has made a pretty good record. Perhaps two-thirds of its present day usage results from developments of the last fifty years or less. Many of its properties are uniquely adaptable to the technology of today.

What is newer than the atomic industry, in which lead plays such an important part? Thousands of tons of lead are used in plastic stabilizers. Aren't plastics about as modern as anything? Lead is essential to porcelain enameled aluminum, a commercial development of only the last five years. As a modifier of rocket fuels, lead is a part of the rocket age. Lead sulfide is an essential part of the electronic brains of certain missiles and in ceramic bodies lead is also a part of the great, new electronics industry.

(over)

Because of changing technology lead is and can continue to be one of the newest materials with which scientists can work. That is why we already have quadrupled our appropriations for market development and research in the last three years, and why a still vastly more expanded program is being worked out now. We need to know a lot more about lead than we do now in the light of new technological developments. This we plan to find out through research. Battelle Memorial Institute has just completed a comprehensive study and evaluation of the research needs of our industry. Our Technical Steering Committee, composed of the best research brains among both lead producers and manufacturers, is preparing an expanded industry research program, based on this study, on which we expect to embark soon. In addition, the internationally famous firm of architects and engineers, Skidmore, Owings and Merrill, is critically studying the construction industry for us. They are trying to determine the place of lead in that huge industry tomorrow and how lead can best serve it. This study will be the basis of our future plans for marketing lead to the construction industry and in developing products best suited to its needs.

No industry can stand still amidst the competitive markets and technology of today, and the lead industry has not been standing still and does not intend to stand still. Admittedly it's much easier to show growth for a new material. Starting from nothing, every gain appears substantial. But despite all the competition lead has faced and some important changes in the pattern of usage, per capital consumption of lead is not too greatly different from thirty years ago. It is true that the world's capacity to produce lead has increased more rapidly than markets have been developed, so we must strain every muscle to build new and expanded markets so that the whole industry may prosper.

You have sometimes doubtless heard, as I have, people say, "Why doesn't the lead industry do a bang-up job of research and promotion such as is being done for some of the newer metals?" Well, even some of the newer metals are cutting back production to keep it in line with consumption. I believe the lead industry has been doing more than most people realize, both cooperatively and in the laboratories of individual companies. They forget that at least twice since World War II, shortages of lead, largely created artificially by government policies, have spurred industry to find substitutes for lead. So our problem is one of finding uses for expanded production capacity and combatting inroads made by efforts to find substitutes.

I don't mean to belittle the need for more and more intensive efforts. But the mere spending of large sums without careful analysis of the problems and wise direction of the efforts can be merely a waste of time and money. I believe that lead is finding its place in the world of today as exemplified by its use in many of the most modern technological developments. In my opinion lead has an exciting future and we can "look ahead with lead" with confidence if we all continue to do our part.

* * * * * * *

PREPRINT FROM

BUREAU OF MINES MINERALS YEARBOOK

1953

Lead

BY O. M. BISHOP AND EDITH E. DEN HARTOG

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. Price 15 cents

PROPERTY
OF
AMERICAN SMELTING AND REFINING COMPANY
WESTERN MINING DEPARTMENT
PACIFIC NATIONAL LIFE BUILDING
SALT LAKE CITY 1, UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR • Douglas McKay, Secretary

BUREAU OF MINES • Thos. H. Miller, Deputy Director

This publication is a chapter from Volume I, MINERALS YEARBOOK, 1953. The complete volume, covering all mineral commodities, except fuels, may be purchased from the Superintendent of Documents, Washington 25, D. C., at a date to be announced later. Volume II (Mineral Fuels) and Volume III (Geographic Areas) also will be available from the Superintendent of Documents.

Lead

By O. M. Bishop[1] and Edith E. den Hartog[2]

TOTAL SUPPLIES well in excess of demand, decreased mine production, increased consumption, and continued high imports were salient features of the domestic lead industry in 1953. Lead supply in 1953 totaled 1,377,000 tons compared with total consumption of 1,202,000 tons; in 1952 supply totaled 1,477,000 tons and consumption 1,131,000 tons, respectively. Plentiful supplies were attributed largely to record mine and smelter production of lead outside of the United States which stimulated exports to the United States and accentuated the market problems of the domestic mining industry. United States imports of recoverable lead were the second highest on record, whereas domestic mine production declined 12 percent and (with the exception of 1946) was the lowest since the depression year 1935. The price of lead ranged from a high of 14.75 cents a pound in early January to a low of 12.00 cents in late April; various fluctuations brought the price to 13.50 cents on September 16, where it remained for the balance of the year. The average price for the year was 13.48 cents compared with 16.47 cents in 1952 and 17.49 cents in 1951.

Lead supply in 1953 consisted of 343,000 tons of recoverable lead from mine production, 487,000 tons of secondary lead recovered from scrap, and 547,000 tons of imports (exclusive of imported scrap, which normally goes to secondary smelting plants and is thus included in the scrap total). The total of 1,377,000 tons was 7 percent under the 1952 supply. Consumption of lead, including that in pigments and chemicals, totaled 1,202,000 tons compared with 1,131,000 tons the preceding year. Producers' stocks of primary refined lead increased from 31,000 to 65,000 tons during the year, and primary antimonial lead stocks increased from 11,000 to 14,000 tons. Smelters' stocks of ores and concentrates and base bullion also increased substantially, whereas consumers' stocks of metal dropped from 123,000 tons to 114,000.

Domestic mine production of recoverable lead declined from 390,000 tons in 1952 to 343,000 tons in 1953. Many mines in the Western and West Central States curtailed production or shut down as a result of low lead and zinc prices. Production during the first half of the year was at a rate of about 30,400 tons a month, or 7 percent below the 1952 annual rate, while output during the last 6 months was at a rate of 26,600 tons a month, or 18 percent below the average monthly yield in 1952. Production in 13 of the 16 principal producing States was lower than in 1952. The largest decreases, on a tonnage basis, were in Utah, Colorado, Arizona,

[1] Commodity-industry analyst.
[2] Statistical assistant.

Oklahoma, New Mexico, and Missouri. The only States in which lead production increased were Idaho, New York, and Wisconsin.

The total lead content of imports exclusive of scrap declined 11 percent from the alltime high of 1952; the tonnage (547,000), nevertheless, was the second highest on record and created an excess supply that exerted a depressing influence upon domestic mine production.

Because of widespread mine closings and reduced employment in the lead- (and zinc-) mining industry much thought was given to tariff revision through either new legislation or the invoking of the "escape clause" of the Reciprocal Trade Agreements Act; various other proposals were made to restrict imports or provide means of direct or indirect relief to the domestic industry. In July the Tariff Commission, in response to resolutions of the United States Senate Committee on Finance and the House of Representatives Committee on Ways and Means, instituted a general investigation of the lead and zinc industries to determine relevant facts of production, trade, consumption, and competitive position, "including the effect of imports of lead and zinc on the livelihood of American workers." A report of the investigation was published April 20, 1954.[3]

GOVERNMENT REGULATIONS

Although all controls governing the use and distribution of lead had been revoked in May 1952 and lead was removed from the list of scarce materials in June, producers and consumers were required to continue reporting stocks, production, and consumption of lead through June 30, 1953, in order that the National Production Authority could continue its "surveillance of lead supplies and consumption." The Office of Price Stabilization price ceilings on lead and zinc were revoked February 13, 1953.

GOVERNMENT PROGRAMS UNDER DEFENSE PRODUCTION ACT OF 1950

Provisions of the Defense Production Act of 1950 with respect to exploration were carried out by the Defense Minerals Exploration Administration (DMEA) and those with respect to procurement by the Defense Materials Procurement Agency (DMPA).

DEFENSE MINERALS EXPLORATION ADMINISTRATION

Exploration contracts and amendments to existing contracts continued to be made by the DMEA during 1953, but in conformance to a directive issued by the Office of Defense Mobilization no applications were accepted for lead- and zinc-exploration projects after May 15, 1953. The turnabout in lead supplies from scarcity to plenty in the second half of 1952 and the continued accumulation of stocks in the United States as well as abroad in 1953 were considered determining factors in the decision reached by the Office of Defense Mobilization (ODM).

[3] U. S. Tariff Commission, Lead and Zinc—Report on Investigation Conducted Under Section 332 of the Tariff Act of 1930 Pursuant to a Resolution by the Committee on Finance of the United States Senate, dated July 27, 1953, and a resolution by the Committee on Ways and Means, House of Representatives, dated July 29, 1953, April 1954, Parts I, II, III, IV, and V.

The objective of the DMEA—to encourage exploration and increase reserves of strategic and critical minerals and metals, including lead and zinc—was achieved through projects to explore potential domestic ore sources. The Government financed up to 50 percent of the total cost of approved exploration projects for lead and zinc and during calendar year 1953 entered into 30 contracts involving maximum Government participation of $2,068,303.[4] Through December 31, 1953, 193 lead- and zinc-exploration contracts had been executed which authorized a maximum Government participation of $7,614,636. Lead-zinc or lead-zinc-copper exploration contracts in 1953 comprised 17 percent of all DMEA contracts executed and for 40 percent of the funds obligated and through 1953, 32 percent of all contracts and 43 percent of the funds obligated. A list of DMEA contracts for lead and zinc exploration in 1953 is given in the Zinc chapter of this volume.

DEFENSE MATERIALS PROCUREMENT AGENCY

The Defense Materials Procurement Agency program was greatly reduced in early 1953 with respect to lead and zinc as the supply-requirement ratio increased and production-expansion programs put in force in 1951 and 1952 were coming to fruition. On August 14, 1953, the remaining function of DMPA—that of servicing contracts and completing those in negotiation—was transferred to the Emergency Procurement Service (EPS) of General Services Administration (GSA).

The only contract providing for lead-zinc production expansion approved in 1953 was that executed on June 29, 1953, with Chief Consolidated Mining Co., Salt Lake City, Utah. Under this contract the Government advanced Chief Consolidated $283,373 or 25 percent of proposed expenditures for developing the Chief No. 1 and Plutus mines in the Tintic district, Juab County, Utah. The contract was a percentage royalty agreement of 3 years' duration, repayment of the loan to be made on the basis of 5 percent of net smelter returns from ores developed under terms of the contract.

United States assistance in developing foreign lead resources was negligible in 1953. Mutual Security Administration contracts, using counterpart funds, were executed with several foreign companies, but only a few hundred tons of lead was involved.

DOMESTIC PRODUCTION

Statistics on lead output may be prepared on a mine or smelter and refinery basis. Mine-production data, compiled on the basis of lead content in ores and concentrates, adjusted to account for average losses in smelting, are a better measure of domestic output from year to year and are more accurate for showing the geographic distribution of production. Pig-lead output, as reported by smelters and refiners, presents a more precise figure of actual lead recovery but indicates in only a general way the source of crude material treated. Smelter and refinery output usually differs from the mine-production figure owing to the lag between mine shipments and smelter treatment of ores and concentrates.

[4] Includes funds provided through amendments to contracts previously executed; also includes funds for participation in exploration contracts that were subsequently canceled or terminated upon completion.

TABLE 1.—Salient statistics of the lead industry in the United States, 1944–48 (average) and 1949–53, in short tons

	1944–48 (average)	1949	1950	1951	1952	1953
Production of refined primary lead:						
From domestic ores and base bullion	352,962	404,449	418,809	342,644	383,358	328,012
From foreign ores and base bullion	65,888	72,889	89,505	75,049	89,494	139,879
Total	418,850	477,338	508,314	417,693	472,852	467,891
Recovery of secondary lead	419,857	412,183	482,275	518,110	471,294	486,737
Imports (general):						
Lead in pigs, bars, and old	205,196	289,889	461,827	188,175	523,059	390,510
Lead in base bullion	1,791	2,373	3,488	2,281	389	869
Lead in ores and matte	64,504	107,279	76,520	67,471	104,621	160,929
Exports of refined pig lead	3,890	969	2,735	1,281	1,762	803
Consumption of primary and secondary lead	1,086,523	957,674	1,237,981	1,184,793	1,130,795	1,201,604
Prices (cents per pound):						
New York:						
Average for period	10.76	15.36	13.30	17.49	16.47	13.48
Quotation at end of period	12.41	12.00	17.00	19.00	14.12	13.50
London average for period	10.11	16.95	13.29	20.25	[2] 16.82	11.48
Mine production of recoverable lead [1]	383,573	409,908	430,827	388,164	390,162	342,644
World smelter production of lead	1,361,000	[2] 1,648,000	[2] 1,808,000	[2] 1,764,000	[2] 1,973,000	1,995,000

[1] Includes Alaska.
[2] Revised figure.

The competitive position of the domestic lead and zinc industry with reference to foreign producers in 1952 and part of 1953 was reported[5] April 20, 1954, by the United States Tariff Commission. The report, which was based on all available information including industry hearings and a canvass of domestic lead and zinc mining, milling, smelting and refining companies, revealed that many important changes had taken place in the domestic industry since 1939, when the last Mineral Census was made. One tabulation showed that in 1939 the lead-zinc mines of the United States produced 16,317,000 tons of crude ore with a recoverable metal content of 2.2 percent lead, 2.8 percent zinc, 0.71 and 0.004 ounce per ton of silver and gold, respectively, utilizing 32,283,000 man-hours of labor at $0.62 per hour. The total value of mine or mill products for that year was $62,652,000. A similar tabulation for 1952, covering 89 percent of the national output of recoverable lead and 90 percent of the recoverable zinc, showed striking differences. Reports from 211 firms indicated that in 1952 they produced 22,919,000 tons of crude ore with a recoverable metal content of 1.4 percent lead, 2.5 percent zinc, 0.1 percent copper, and 0.73 and 0.006 ounce of silver and gold, respectively. Man-hours worked by production and related workers in mining and milling this tonnage totaled 43,791,000, paid at an average hourly rate of $1.95. The total mine or mill value of all products was $225,384,000. These figures indicate that wages increased 215 percent in the period 1939 to 1952, tons of ore mined and milled per man-hour increased from 0.51 to 0.52, the recovery of zinc and lead per ton of ore declined 11 and 36 percent, respectively, and the value of products sold per ton of crude ore increased from $3.84 to $9.83, or 156 percent.

Tables from the Tariff Commission report showing the quantity and value of products, principal expenses, hourly earnings, and man-hours worked in lead and zinc mining and milling in the United States

[5] Work cited in footnote 3.

by State or principal region, and the crude ore sold or treated along with the recoverable metal content by State, region, or district in 1952, are given in the Zinc chapter of this volume. Wages, productivity per unit of labor, and grade of ore in 1953 were at essentially the same as in 1952, but the average value of the mine products was estimated by the Bureau of Mines to have dropped about 31 percent to approximately $6.75 per ton.

On the basis of reports to the Tariff Commission, the number of employees engaged in mining and milling lead and zinc ores, which supplied 92 percent of the mine output of lead and 93 percent of the zinc, declined from 23,800 in January 1952 to 16,200 in October 1953, or 32 percent for the period. Employment at primary lead smelters and refineries (exclusive of construction workers) declined from an average of nearly 3,600 in 1952 to an average of 3,300 in the first 10 months of 1953.

In studying the competitive position of the domestic lead-zinc mining industry, the Tariff Commission obtained reports from foreign producers which in 1952 supplied 80 and 61 percent, respectively, of the lead and zinc mined in Canada, 28 and 45 percent of that mined in Mexico, and 68 percent of the combined lead and zinc output of Australia. From these confidential reports the Commission concluded as follows with relation to Canada, the United States, and Mexico:

> * * * that total principal operating expenses, as well as expenses for wages and salaries, are lower *per ton of crude ore* mined in the United States than in Canada and Mexico. This appears to be the case even though average hourly earnings of workers are much lower for operations in Mexico than for those in either Canada or the United States, and are slightly lower for Canada than for the United States. The data also indicate that taxes other than income taxes *per ton of crude ore* mined in Mexico were much higher than in Canada and very much higher than in the United States.
>
> However, when allowance is made for the differences in the average value of the ores mined in the three countries, as affected by differences in the yield of metals obtained from them, the situation with respect to the foregoing comparison of costs is quite different. Notwithstanding apparently higher operating expenses, and higher expenses for salaries and wages, *per ton of crude ore* mined in Canada and Mexico than in the United States, these expenses are lower *per unit of recoverable metal* in Mexico and Canada than in the United States.

MINE PRODUCTION

Domestic mine production of recoverable lead in 1953 declined 12 percent to 343,000 tons and, with the exception of 1946, when production was 335,000 tons, was the lowest since 1935. Many mines in the Western and West Central States curtailed production or shut down as a result of low lead and zinc prices. Production during the first half of the year was at a rate of about 30,400 tons a month—7 percent below the 1952 annual rate—while output during the last 6 months was at a rate of 26,600 tons a month—18 percent below the average monthly yield in 1952. Missouri, with 126,000 tons (37 percent of the total), was again the largest lead-producing State. Idaho and Utah produced 75,000 tons (22 percent) and 42,000 tons (12 percent) of recoverable lead, respectively, and were the second and third ranking States. Production in 13 of the 16 principal producing States was lower than in 1952. The largest decreases, on a tonnage basis, were in Utah, Colorado, Arizona, Oklahoma, New Mexico, and Missouri. Idaho, New York, and Wisconsin were the only States in which lead production increased.

TABLE 2.—Mine production of recoverable lead in the United States, 1944–48 (average) and 1949–53, by States, in short tons

State	1944–48 (average)	1949	1950	1951	1952	1953
Western States and Alaska:						
Alaska	153	51	149	21	1	9
Arizona	24,394	33,568	26,383	17,394	16,520	9,428
California	8,404	10,318	15,831	13,967	11,199	8,664
Colorado	19,123	26,853	27,007	30,336	30,066	21,754
Idaho	75,890	79,299	100,025	76,713	73,719	74,610
Montana	13,180	17,996	19,617	21,302	21,279	19,949
Nevada	7,399	10,626	9,408	7,148	6,790	4,371
New Mexico	6,772	4,652	4,150	5,846	7,021	2,943
Oregon	5	12	17	2	1	5
South Dakota	12	4	----------	2	2	10
Texas	59	132	129	43	56	----------
Utah	45,939	53,072	44,753	50,451	50,210	41,522
Washington	5,024	6,417	10,334	8,002	11,744	11,064
Wyoming	1	----------	----------	----------	----------	----------
Total	206,355	243,000	257,803	231,227	228,608	194,329
West Central States:						
Arkansas	9	1	9	33	4	----------
Kansas	7,776	9,772	9,487	8,947	5,916	3,347
Missouri	144,981	127,522	134,626	123,702	129,245	125,895
Oklahoma	14,302	19,858	20,724	16,575	15,137	9,304
Total	167,068	157,153	164,846	149,257	150,302	138,546
States east of the Mississippi River:						
Illinois	2,972	3,824	2,729	3,160	4,262	3,391
Kentucky	165	187	66	107	60	52
New York	1,261	1,317	1,484	1,500	1,120	1,435
Tennessee	40	257	113	14	18	9
Virginia	4,351	3,313	3,254	1,508	3,792	2,788
Wisconsin	1,361	857	532	1,391	2,000	2,094
Total	10,150	9,755	8,178	7,680	11,252	9,769
Grand total	383,573	409,908	430,827	388,164	390,162	342,644

The West Central States produced 138,500 tons of recoverable lead in 1953 (8 percent less than in 1952) from the mines of southeastern Missouri and those of the Tri-State district, comprised of southwestern Missouri, north-eastern Oklahoma, and southeastern Kansas.

As in the previous 45 years, the southeastern Missouri lead belt was the major lead-producing district in the United States, furnishing 37 percent of the Nation's total lead production. Although crude-ore production was down about 7 percent, output of lead approximated that in 1952. The chief producer was the St. Joseph Lead Co., operating the company-owned Bonne Terre, Desloge, Federal, and Leadwood mine-mill units in St. Francois County. Ore from the company Doe Run operation was milled at the Federal mill, and a sink-float plant concentrate from the new Hayden Creek mine was concentrated further at the Leadwood mill. The company also operated the Mine La Motte mine-mill unit in Madison County and continued development and construction at its new Indian Creek mine-mill unit in Washington County. The second largest producer was the National Lead Co., operating its Madison County mine-mill unit at Fredricktown.

The Tri-State district produced 13,300 tons of lead in 1953 compared with 27,400 tons in 1952. Crude zinc-lead ore production was 3,480,000 tons or 43 percent less than the 6,140,000 tons mined in 1952. Much of the decline in mine output of lead and zinc in the

Tri-State was attributed to the closure of Eagle-Picher Co. mines and Central mill as a result of a strike beginning June 21 and extending through the remainder of the year. This shutdown alone reduced the total ore treated more than 1,500,000 tons. Curtailment of production at the National Lead Co. Ballard mine-mill unit and its closure in mid-November was another factor in reduced lead output. At the year end approximately 30 mines and 9 mills were operating in the district compared with about 150 mines and 18 mills in January. The recoverable zinc and lead in the ore (recovered as concentrates) was 2.87 and 0.50 percent, respectively, of the ore treated compared with 2.75 and 0.56 percent in 1952. This comparison suggests the limited potentiality of upgrading Tri-State ores to offset lower metal values. The Western States had a combined mine production of 194,300 tons of recoverable lead in 1953 compared with 228,600 tons in 1952. The decline, as elsewhere in the United States, resulted chiefly from low lead-zinc prices that forced curtailments or mine closures as mining of submarginal ores was stopped.

Idaho was the second largest producer of lead in the United States, with 74,600 tons (73,700 tons in 1952). As in other years, the Coeur d'Alene region produced over 90 percent of the State output of lead, with the Bunker Hill, Star, Page, and Morning mines the foremost producers. The Nabob mine (Nabob Silver-Lead Mines, Inc.) closed early in 1953 owing to low metal prices, and Day Mines, Inc., ceased company operation of the Sherman and Tamarack mines, leasing them on a block-leasing system. On October 4 the Morning mine (American Smelting & Refining Co.) was closed after 64 years of continuous operation. A considerable quantity of ore remaining in pillars will be mined before complete abandonment of the underground workings. Numerous exploration and development programs were under way in the Coeur d'Alene region in 1953. Bunker Hill & Sullivan Mining & Concentrating Co. started a $1 million shaft extension and deep-exploration project at its Crescent mine during the year. The Triumph mine in Blaine County was the only major lead-producing mine in Idaho outside the Coeur d'Alene region.

Utah ranked third among lead-producing States, with an output of 41,500 tons—almost 9,000 tons less than in 1952 and the smallest since 1946. The principal producing mines, in order of output, were the United States & Lark property (United States Smelting, Refining & Mining Co.), Chief No. 1 and Eureka Hill mines (Chief consolidated Mining Co.), and Blue Ledge district mine (New Park Mining Co.), West Calumet mine (Combined Metals Reduction Co.), and the Ophir mine (United States Smelting, Refining & Mining Co.). The Park Utah Consolidated and Silver King Coalition mines, closed in 1952, remained inoperative throughout 1953. A 2-week strike in November at the United States & Lark property also reduced output.

Lead output from Colorado mines totaled 21,800 tons in 1953, a 28-percent decline from 1952. The greatest production losses were in San Juan County, where the Shenandoah-Dives mine group and 700-ton mill were closed March 14, and in Lake County, where the Resurrection Mining Co. suspended company operations July 3. Callahan Zinc-Lead Co. Akron-Erie mine in Gunnison County, closed November

369170—56——2

1952, remained inoperative throughout 1953. The Eagle mine, Colorado's foremost zinc and fourth most important lead producer in 1953, was closed by a strike from September 1 to November 2.

Lead production in Montana declined 6 percent to 19,900 tons in 1953. The chief production was from Anaconda Copper Mining Co. owned or leased properties in the Butte area and the East Helena slag dump. The Blacktail mine, an open-pit mine in Missoula County, operated by Linton Mines, Inc., was closed in the fall of 1953 because of the low lead price. Begun in 1949, the mine had produced about 500 tons of lead annually. The Jack Waite mine (American Smelting & Refining Co.) in Sanders County maintained a high production level, but the Iron Mountain mine of the Mineral Leasing Co. in Mineral County was closed in July.

Mine output of lead in Washington in 1953 was 11,100 tons, or about 700 tons less than in 1952. The lead was produced chiefly by the Pend Oreille mine of Pend Oreille Mines & Metals Co., the Grandview mine of American Zinc, Lead & Smelting Co., and the Deep Creek mine of Goldfield Consolidated Mines Co. Other lead-producing mines included the Bonanza, the Lead King, Oriole, Johnsburg, Advance, Electric Point, Gladstone, King Tut, Lead Trust, Long Shot, Old Dominion, Red Top, Santiago, United Treasure, Young America, Leo Ray, and Queen mines, all in either Pend Oreille or Stevens County. In late 1953 the Grandview and Pend Oreille mine output was curtailed by reducing the workweek, and beginning in October the Deep Creek activity was limited to development.

Lead output in Arizona in 1953 decreased 43 percent to 9,400 tons, the lowest since 1935. Low lead and zinc prices throughout the year resulted in continued idleness of the San Xavier mine and in suspension of mining lead-zinc ores at the Copper Queen, and a general decline in activity at small-scale mining operations. The chief lead producers of the State in 1953 were the Iron King mine (Shattuck Denn Mining Corp.); Trench unit (American Smelting & Refining Co.); Aravaipa mine (Athletic Mining Co.); Hilltop mine (American Zinc, Lead & Smelting Co.); and Copper Queen mine (Phelps Dodge Corp.).

Lead production from California mines declined 23 percent in 1953 to 8,700 tons. The Darwin group operated by Anaconda Copper Mining Co. in Inyo County was the only large producing unit operating throughout the year, but in early 1953 the New Penn mines produced both zinc and copper concentrates containing recoverable lead. Other producing mines included the Silver Reid, Christmas Gift, Lane, Defense, Modoc, Mimetta Reward, Le Moine, and Lippincott mines in Inyo County; the Alexander mine in Mono County; the Umberci mine in San Bernardino County; the Black Eagle mine in Riverside County; the Green Dragon mine in Siskiyou County; and the Hazel Creek mine in El Dorado County.

The recoverable lead content of Nevada-mined ores in 1953 was 4,400 tons, a 36-percent drop from the 1952 output. The decrease was brought about by low lead-zinc prices, which caused Combined Metals Reduction Co. to divert more of its Caselton mill capacity to manganese-lead-zinc ores at the expense of lead-zinc ores. Other producers of lead included the Bristol mine (Bristol Silver Mines Co.), Lincoln County; and the Ward mine (Walker Corp.), White Pine County.

Output of lead in New Mexico declined 58 percent to 2,900 tons during 1953 owing to closure of all zinc-lead mines not previously closed in 1952. Zinc-lead mines closing during the year included the Kearney mine of New Mexico Consolidated Mines Co. (January 28); the Ground Hog group of American Smelting & Refining Co. (February 23); the Bayard group of the United States Smelting, Refining & Mining Co. (September 30); and the Lynchburg mine of Elayer & Co. (April). The principal lead-producing mines in 1953 were the Bayard zinc-lead group in the Central district, the Portales lead mine in the Hansonburg district, and the Ground Hog zinc-lead mine in the Central district.

Mine production of lead in States east of the Mississippi River was 10,000 tons in 1953, a 13-percent decline from the peak production of 1952. The principal producing areas were the Upper Mississippi Valley district of northwestern Illinois and southwestern Wisconsin (3,688 tons); Wythe County, Va. (2,788 tons); and St. Lawrence County, N. Y. (1,435 tons). The remaining lead production was a byproduct of the southern Illinois-western Kentucky fluorspar-zinc mining district (1,849 tons) and of the zinc-mining area of eastern Tennessee (9 tons).

Northern Illinois and southwestern Wisconsin lead output increased 4 percent and was chiefly from the mines of the Calumet & Hecla, Inc., Vinegar Hill Zinc Co., Inc., Eagle-Picher Co., and the Mifflin Mining Co., operating in Lafayette and Iowa Counties, Wisconsin; and mines of Tri-State Zinc, Inc., and the Eagle-Picher Co., operating in Jo Daviess County, Ill. The Eagle-Picher mine operations in both States were brought to a halt March 31 when fire partly destroyed the company Graham Central mill near Galena, Ill. The damaged mill was repaired; but the mines, which included the Birkett and Andrews in Wisconsin and the Graham and Snyder in Illinois, were not reopened. The Mifflin Mining Co. ceased production January 30 but in March resumed operations for 4 months at the Coker and Bickford mines, Iowa County, Wis.

Lead output of the Illinois-Kentucky fluorspar-zinc district declined 34 percent owing to smaller output by the Ozark-Mahoning Co. plant at Rosiclare, Ill., and to smaller quantities of lead-bearing ores being treated. The Hutson zinc mine in western Kentucky, which also produced lead, was closed January 15 because of low metal prices.

Lead output in New York, chiefly from the Balmat mine of the St. Joseph Lead Co., was 28 percent greater than in 1952, but lead production in Virginia declined 26 percent owing to lower lead content in the ore from the Austinville mine of the New Jersey Zinc Co. Late in 1953 the New Jersey Zinc Co. announced acquisition of the Arminius zinc-lead mine, Louisa County, Va. The property has been unproductive since 1911. The lead output of eastern Tennessee was a byproduct recovered in smelting the zinc concentrates.

The 25 leading lead-producing mines in the United States in 1953, listed in table 4, yielded 78 percent of the total domestic output; the 10 leading mines produced 61 percent and the 4 leading mines 43 percent.

More detailed information on the production of mines and mining districts in the United States appears in volume III of the Yearbook.

TABLE 3.—Mine production of recoverable lead in the United States, 1944–48 (average) and 1949–53, by districts that produced 1,000 tons or more during any year, 1949–53, in short tons

District	State	1944–48 (average)	1949	1950	1951	1952	1953
Southeastern Missouri region.	Missouri	141,719	126,269	133,680	122,318	122,942	125,273
Coeur d'Alene region	Idaho	70,488	74,152	94,697	70,570	67,330	69,885
West Mountain (Bingham).	Utah	24,614	32,600	27,472	29,120	34,328	29,311
Summit Valley (Butte)	Montana	6,465	11,490	15,679	16,630	16,153	16,767
Tri-State (Joplin region)	Kansas, southwestern Missouri, Oklahoma.	25,224	30,883	31,157	26,906	27,356	13,273
Metaline	Washington	3,751	4,030	7,445	5,234	(1)	8,694
Coso (Darwin)	California	5,632	4,928	8,479	7,191	(1)	8,269
Upper San Miguel	Colorado	2,433	5,285	7,780	8,008	7,657	7,440
Park City region	Utah	10,521	8,583	7,538	11,719	7,494	4,735
Big Bug	Arizona	2,076	3,330	4,357	4,035	4,135	4,339
Upper Mississippi Valley	Iowa, northern Illinois, Wisconsin.	1,851	2,046	1,801	1,923	3,532	3,688
Tintic	Utah	5,325	6,676	6,520	5,553	4,279	3,590
Pioche	Nevada	3,927	6,630	6,761	4,751	4,632	3,306
California (Leadville)	Colorado	4,850	5,080	6,392	5,996	5,624	3,072
Austinville	Virginia	4,269	3,313	3,254	1,508	3,792	2,788
Rush Valley & Smelter (Tooele County).	Utah	3,587	2,953	1,393	2,674	2,595	2,753
Warm Springs	Idaho	2,102	2,339	2,648	3,036	3,455	2,583
Red Cliff	Colorado	950	1,600	2,110	4,274	3,980	2,500
Northport (Aladdin)	Washington	447	342	237	937	(1)	2,165
Harshaw	Arizona	1,472	1,546	1,931	1,668	1,921	2,104
Pioneer (Rico)	Colorado	2,383	1,388	1,138	2,231	2,230	1,871
Kentucky-Southern Illinois.	Kentucky, southern Illinois.	2,648	2,822	1,526	2,516	2,790	1,849
Creede	Colorado	362	1,162	1,422	1,167	1,513	1,696
Bayhorse	Idaho	1,569	1,073	1,679	1,732	1,091	1,484
Central	New Mexico	4,039	2,479	2,315	3,133	4,486	1,460
St. Lawrence County	New York	1,261	1,317	1,484	1,497	1,120	1,435
Sneffels	Colorado	(1)	1,064	866	1,094	1,044	1,307
Animas	do	2,437	2,935	3,069	3,963	3,464	1,212
Eagle	Montana	638	1,024	1,013	(1)	733	1,179
Ophir	Utah	479	1,089	948	712	999	1,157
Breckenridge	Colorado	101	308	347	246	499	1,056
Hansonberg	New Mexico	24	131	451	753	847	1,031
Bossburg	Washington	599	2,011	2,640	1,768	(1)	168
Battle Mountain	Nevada	92	1,290	564	[2] 351	907	1
Old Hat	Arizona	4,835	6,788	5,980	4,241	3,913	-------
Pima (Sierritas, Papago, Twin Buttes).	do	2,726	4,232	2,996	2,834	1,864	-------
Heddleston	Montana	2,458	2,335	930	1,398	1,251	-------
Warren (Bisbee)	Arizona	9,692	13,865	7,790	1,606	1,828	-------
Magdalena	New Mexico	1,790	1,162	926	1,004	1,046	-------
Aravaipa	Arizona	575	1,271	1,498	1,294	865	-------
Tomichi	Colorado	863	1,221	645	761	739	-------
Ten Mile	do	1,415	3,671	910	6	8	-------
Resting Springs	California	(1)	(1)	(1)	(1)	(1)	-------

[1] Figure not shown to avoid disclosure of individual company operations.
[2] Revised figure.

TABLE 4.—Twenty-five leading lead-producing mines in the United States in 1953, in order of output

Rank	Mine	District	State	Operator	Type of ore
1	Federal	Southeastern Missouri	Missouri	St. Joseph Lead Co	Lead.
2	United States & Lark	West Mountain (Bingham)	Utah	U. S. Smelting, Refining & Mining Co	Lead-zinc.
3	Bunker Hill	Yreka	Idaho	Bunker Hill & Sullivan Mining & Concentrating Co	Do.
4	Leadwood	Southeastern Missouri	Missouri	St. Joseph Lead Co	Lead.
5	Butte Hill mines and dumps	Summit Valley (Butte)	Montana	Anaconda Copper Mining Co	Lead-zinc.
6	Mine La Motte	Southeastern Missouri	Missouri	St. Joseph Lead Co	Lead.
7	Desloge	do	do	do	Do.
8	Bonne Terre	do	do	do	Do.
9	Page	Yreka	Idaho	American Smelting & Refining Co	Lead-zinc.
10	Darwin group	Coso	California	Anaconda Copper Mining Co	Do.
11	Star	Hunter	Idaho	Sullivan Mining Co	Do.
12	Pend Oreille	Metaline	Washington	Pend Oreille Mines & Metals Co	Do.
13	Morning	Hunter	Idaho	American Smelting & Refining Co	Do.
14	Treasury Tunnel-Black Bear	Upper San Miguel	Colorado	Idarado Mining Co	Do.
15	Iron King	Big Bug	Arizona	Shattuck-Denn Mining Co	Do.
16	Dayrock	Placer Center	Idaho	Day Mines, Inc	Lead.
17	Chief	Tintic	Utah	Chief Consolidated Mining Co	Lead-zinc.
18	Park Galena-Mayflower	Park City region	do	New Park Mining Co	Do.
19	Combined Metals group	Pioche	Nevada	Combined Metals Reduction Co	Do.
20	Grandview	Metaline	Washington	American Zinc-Lead Smelting Co	Do.
21	Resurrection	Leadville	Colorado	Resurrection Mining Co	Do.
22	Smuggler Union	Upper San Miguel	do	Telluride Mines, Inc	Do.
23	Frisco	Lelande	Idaho	American Smelting & Refining Co	Do.
24	West Calumet	Rush Valley	Utah	Calumet Mining Co	Do.
25	Triumph, North Star	Warm Springs	Idaho	Triumph Mining Co	Do.

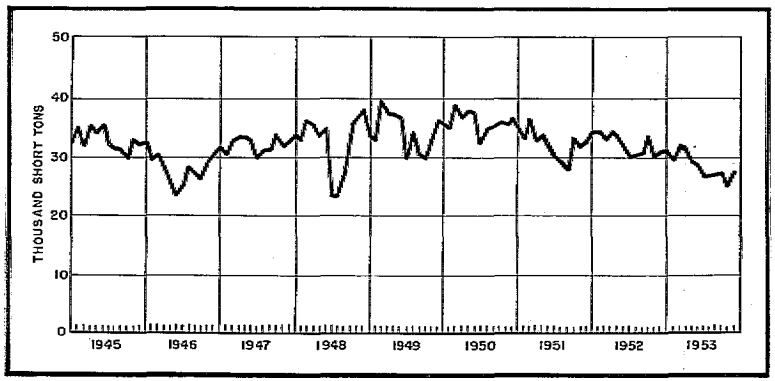


FIGURE 1.—Mine production of recoverable lead in the United States, 1945–1953, by months.

TABLE 5.—Mine production of recoverable lead in the United States,[1] 1952–53, by months, in short tons

Month	1952	1953	Month	1952	1953
January	34,551	31,073	August	30,454	26,531
February	34,601	29,861	September	30,633	26,934
March	33,637	31,780	October	33,853	27,225
April	34,724	31,490	November	30,152	25,154
May	34,087	29,507	December	31,178	27,455
June	32,202	28,797			
July	30,090	26,837	Total	390,162	342,644

[1] Includes Alaska.

SMELTER AND REFINERY PRODUCTION

Pig (refined) lead produced in the United States is derived from three principal sources—domestic mine production, imports of foreign ores and base bullion, and scrap materials (treated largely at secondary smelters)—and is recovered at primary refineries that treat ore, base bullion, and small quantities of scrap and at secondary plants that process scrap exclusively. Of the 13 primary lead plants in the United States, 6 combine smelting and refining operations, 5 produce only base bullion (containing approximately 98 percent lead plus gold and silver, and small quantities of other impurities recovered from the ores smelted), and 2 confine their activities to refining. Refined lead and antimonial or "hard" lead may be produced by both primary and secondary plants. Because of the large quantity of hard lead, such as battery scrap, melted at secondary smelters, the output from this type of operation is principally antimonial lead. Statistics on the production of refined lead and alloys at secondary plants are given in the Secondary Lead section of this chapter.

The 11 primary smelters in operation in 1953 consumed 475,000 short tons (lead content) of primary materials in the form of ores and concentrates, of which 69 percent was of domestic and 31 percent of foreign origin. Total consumption was 5 percent less than in 1952 but 9 percent above consumption in 1951.

ACTIVE LEAD SMELTERS AND REFINERIES

Primary lead smelters and refineries operating in the United States in 1953 were as follows:

California: Selby—Selby plant, American Smelting & Refining Co. (smelter and refinery).
Colorado: Leadville—Arkansas Valley plant, American Smelting & Refining Co. (smelter).
Idaho: Bradley—Bunker Hill Smelter, Bunker Hill & Sullivan Mining & Concentrating Co. (smelter and refinery).
Illinois: Alton—Federal plant, American Smelting & Refining Co. (smelter and refinery).
Indiana: East Chicago—U. S. S. Lead Refinery, Inc. (refinery).
Kansas: Galena—Galena plant, Eagle-Picher Co. (smelter and refinery).
Missouri: Herculaneum—Herculaneum plant, St. Joseph Lead Co. (smelter and refinery).
Montana: East Helena—East Helena plant, American Smelting & Refining Co. (smelter).
Nebraska: Omaha—Omaha plant, American Smelting & Refining Co. (refinery).
New Jersey: Barber—Perth Amboy plant, American Smelting & Refining Co. (smelter and refinery).
Texas: El Paso—El Paso plant, American Smelting & Refining Co. (smelter).
Utah:
Midvale—Midvale plant, United States Smelting, Refining & Mining Co. (smelter).
Tooele—Tooele plant, International Smelting & Refining Co. (smelter).

Bunker Hill & Sullivan Mining & Concentrating Co. completed a $3 million modernization program at its lead smelter. New installations included a crushing and fine-grinding plant, a charge-preparation and pelletizing plant, and a 202-foot smokestack.

Four companies operated five slag-fuming plants in 1953 to recover zinc and some lead from lead slags.

A list of the companies and plant locations follows:

California: Selby—American Smelting & Refining Co.
Idaho: Kellogg—Bunker Hill & Sullivan Mining & Concentrating Co.
Montana: East Helena—Anaconda Copper Mining Co.
Texas: El Paso—American Smelting & Refining Co.
Utah: Tooele—International Smelting & Refining Co.

The new slag-fuming plant [6] at the Selby lead smelter, which began operation April 20, 1953, was described in the technical press. The plant has capacity to recover 10,000 tons of zinc annually from lead slags.

REFINED LEAD

Primary refineries in the United States produced 472,000 short tons of refined lead in 1953, a 1-percent decrease from the 476,000 tons produced in 1952.

Of the 467,900 tons of refined lead derived from primary sources, 70 percent came from domestic ores and base bullion and the remainder from imported ores and bullion (81 and 19 percent, respectively, in 1952). Table 7 gives the production of refined lead by source material and by country of origin. Details of the sources of lead from domestic ores are given in the Mine Production section of this chapter.

[6] Engineering and Mining Journal, Slag-Fuming at Selby: Vol. 154, No. 12, December 1953, pp. 95–97.

TABLE 6.—Refined lead produced at primary refineries in the United States, 1944–48 (average) and 1949–53, by source material, in short tons

Source	1944–48 (average)	1949	1950	1951	1952	1953
Refined lead:						
From domestic ores and base bullion	352,962	404,449	418,809	342,644	383,358	328,012
From foreign ores	64,523	71,413	86,241	71,984	89,092	139,711
From foreign base bullion	1,365	1,476	3,264	3,065	402	168
Total from primary sources	418,850	477,338	508,314	417,693	472,852	467,891
From scrap	11,704	23,230	5,455	3,893	3,070	4,211
Total refined lead	430,554	500,568	513,769	421,586	475,922	472,102
Average sales price per pound	$0.107	$0.158	$0.135	$0.173	$0.161	$0.131
Total calculated value of primary refined lead [1]	$88,964,000	$150,840,000	$137,245,000	$144,522,000	$153,247,000	$123,691,000

[1] Excludes value of refined lead produced from scrap at primary refineries.

TABLE 7.—Refined primary lead produced in the United States, 1944–48 (average) and 1949–53, by source material and country of origin, in short tons

Source	1944–48 (average)	1949	1950	1951	1952	1953
Domestic ore and base bullion	352,962	404,449	418,809	342,644	383,358	328,012
Foreign ore:						
Australia	12,902	6,465	6,984	9,056	5,888	19,886
Canada	6,159	3,317	7,892	7,986	7,113	26,673
Europe	8	30	----------	17	454	199
Mexico	4,071	8,477	5,992	3,620	2,344	5,876
South America	18,433	29,163	38,770	36,849	48,625	50,828
Other foreign	22,950	23,961	26,603	14,456	24,668	36,249
Total	64,523	71,413	86,241	71,984	89,092	139,711
Foreign base bullion:						
Australia	93	1,382	2,427	2,815	----------	----------
Mexico	1,160	36	435	27	70	42
South America	53	58	402	75	177	126
Other foreign	59	----------	----------	148	155	----------
Total	1,365	1,476	3,264	3,065	402	168
Total foreign	65,888	72,889	89,505	75,049	89,494	139,879
Grand total	418,850	477,338	508,314	417,693	472,852	467,891

ANTIMONIAL LEAD

Production of 62,400 tons of antimonial lead at primary refineries in 1953 was 7 percent above 1952 production, with all 5 plants contributing to the increase. Distribution of antimonial lead production at primary refineries in 1949–53 by source material, is shown in table 8, as is also the average antimony content.

Although antimonial lead is an important byproduct of the refining of base bullion, the quantity derived from this source is only a small part of total domestic output. The major production is recovered from smelting antimonial lead scrap at secondary smelters. Production data from lead-smelting plants treating scrap materials exclusively are summarized in the following section.

TABLE 8.—Antimonial lead produced at primary lead refineries in the United States, 1944–48 (average) and 1949–53

Year	Production (short tons)	Antimony content		Lead content by difference (short tons)			
		Short tons	Percent	From domestic ore	From foreign ore	From scrap	Total
1944–48 (average)	70,343	4,559	6.7	15,232	7,218	43,334	65,784
1949	41,402	3,385	8.2	692	4,620	32,705	38,017
1950	57,959	4,504	7.8	10,728	4,344	38,383	53,455
1951	65,309	4,416	6.7	17,372	9,218	34,303	60,893
1952	58,203	4,392	7.5	12,993	5,673	35,145	53,811
1953	62,373	4,537	7.3	10,366	10,721	36,749	57,836

SECONDARY LEAD

Some scrap lead is treated at primary smelters, but the greater part is processed at a large number of plants that specialize in treating secondary materials. Secondary lead is recovered in the form of refined lead, antimonial lead, and other alloys.

Recovery of secondary lead in 1953 totaled 486,700 tons, a 3-percent increase over the 471,300 tons recovered in 1952. Lead reclaimed as metal and in alloys again exceeded domestic mine production as it had in the preceding 7 years. Data on lead recovered in 1949–53, by type of plant, are shown in table 9. Detailed information on secondary lead appears in the Secondary Metals—Nonferrous chapter of this volume.

TABLE 9.—Secondary lead recovered in the United States, 1944–48 (average) and 1949–53, in short tons

	1944–48 (average)	1949	1950	1951	1952	1953
As refined metal:						
At primary plants	11,704	23,230	5,455	3,893	3,070	4,211
At other plants	74,952	129,396	123,858	165,023	137,032	122,363
Total	86,656	152,626	129,313	168,916	140,102	126,574
In antimonial lead:						
At primary plants	43,335	32,705	38,383	34,303	35,145	36,749
At other plants	172,279	140,037	187,257	195,660	187,806	199,806
Total	215,614	172,742	225,640	229,963	222,951	236,555
In other alloys	117,587	86,815	127,322	119,231	108,241	123,608
Grand total:						
Short tons	419,857	412,183	482,275	518,110	471,294	486,737
Value	$96,065,459	$130,249,828	$130,214,250	$179,266,060	$151,756,668	$127,525,094

LEAD PIGMENTS

The principal lead pigments are litharge, white lead, red lead, sublimed lead, leaded zinc oxide, and orange mineral. These products are manufactured for the most part from metal, but some ore and concentrates are converted directly into pigments. Details of the production of lead pigments are given in the Lead and Zinc Pigments and Zinc Salts chapter of this volume.

369170——56——3

CONSUMPTION AND USES

Domestic lead consumption (including lead in lead ore consumed directly in the manufacture of lead pigments and salts) totaled 1,202,000 tons in 1953, an increase of 6 percent over consumption in 1952. Of the total consumed, 795,000 tons was refined soft lead (including both primary and secondary refined lead), 278,000 tons was contained in antimonial lead (the greater part of which was secondary), 26,000 tons in white-metal scrap, 43,000 tons in percentage metals, 27,000 tons in copper-base scrap, and 24,000 tons in drosses and residues; and 9,000 tons was recovered from ore in leaded zinc oxide. About 42 percent of all lead consumed was used in metal products, 30 percent in storage batteries, 11 percent in pigments, 14 percent in chemicals (including tetraethyl lead), and 3 percent in miscellaneous uses. Production of the 3 largest lead-consuming items—batteries, tetraethyl fluid, and cable covering—took 30.5, 13.5, and 12 percent, respectively, or 56 percent of all lead consumed in 1953. Although aluminum, polyethylene, and neoprene have replaced lead cable sheathing in some uses, lead continues to be favored because of high corrosion resistance, flexibility, the ease with which it may be jointed, and its very considerable salvage value. Lead consumed for cable covering increased 3 percent to 147,000 short tons, the largest quantity so consumed since 1948. Lead consumed in manufacturing tetraethyl lead was 10 percent above 1952 and 93 percent greater than in 1948.

TABLE 10.—Consumption of lead in the United States, 1952–1953, by products, in short tons

	1952	1953
Metal products:		
Ammunition	36,182	45,147
Bearing metals	36,545	38,591
Brass and bronze	25,807	26,203
Cable covering	142,571	146,565
Calking lead	45,150	48,236
Casting metals	18,017	12,906
Collapsible tubes	10,095	11,583
Foil	2,124	4,410
Pipes, traps, and bends	29,465	28,693
Sheet lead	28,697	30,476
Solder	72,664	78,743
Terne metal	1,812	3,200
Type metal	27,413	26,729
Total metal products	476,542	501,482
Storage batteries:		
Antimonial lead	187,506	191,753
Lead oxides	163,424	175,822
Total storage batteries	350,930	367,575
Pigments:		
White lead	22,943	17,775
Red lead and litharge	76,742	88,649
Pigment colors	12,839	12,859
Other [1]	9,775	10,307
Total pigments	122,299	129,590
Chemicals:		
Tetraethyl lead	146,723	162,443
Miscellaneous chemicals	3,996	6,976
Total chemicals	150,719	169,419
Miscellaneous uses:		
Annealing	5,084	5,280
Galvanizing	2,002	2,029
Lead plating	1,037	987
Weights and ballast	7,660	8,244
Total miscellaneous uses	15,783	16,540
Other, unclassified uses	14,522	16,998
Grand total	1,130,795	1,201,604

[1] Includes lead content of leaded zinc oxide production.

TABLE 11.—Consumption of lead in the United States 1952–53, by months, in short tons [1]

Month	1952	1953	Month	1952	1953
January	97,503	96,377	August	105,729	109,943
February	92,527	92,121	September	107,728	105,565
March	88,664	103,336	October	108,841	104,716
April	83,719	104,816	November	96,509	89,944
May	82,714	101,282	December	93,614	85,474
June	87,679	108,534			
July	85,568	99,496	Total	1,130,795	1,201,604

[1] Includes lead content of leaded zinc oxide production.

TABLE 12.—Consumption of lead in the United States in 1953, by classes of product and types of material, in short tons

	Soft and antimonial lead	Scrap, percentage metal, drosses, etc.	Total
Metal products	385,439	116,043	501,482
Storage batteries	366,152	1,423	367,575
Pigments	120,037		120,037
Chemicals	169,419		169,419
Miscellaneous	16,279	261	16,540
Unclassified	15,568	1,430	16,998
Total	1,072,894	119,157	[1] 1,192,051

[1] Excludes 9,553 tons of lead contained in leaded zinc oxide.

STOCKS

Producers' Stocks.—Lead stocks, as reported by the American Bureau of Metal Statistics, are shown in table 13. Stocks of refined and antimonial lead include metal held by all primary refiners and by some of the refiners of secondary metal who produce soft lead. Despite decreased supply and increased consumption in 1953 compared with 1952, supply continued to outstrip demand and exceeded consumers' requirements by 173,000 tons. In consequence, stocks of lead in raw material, in process, and in finished form increased 31 percent to 196,000 tons, approximately the same as at the close of 1949.

TABLE 13.—Stocks of lead at smelters and refineries in the United States at end of year, 1944–48 (average) and 1949–53, in short tons

[American Bureau of Metal Statistics]

	1944–48 (average)	1949	1950	1951	1952	1953
Refined pig lead	27,348	61,329	28,894	18,518	31,405	65,036
Antimonial lead	7,044	9,095	6,725	6,821	12,155	16,116
Total	34,392	70,424	35,619	25,339	43,560	81,152
Lead in base bullion—						
At smelters and refineries	8,351	16,364	11,993	11,315	17,583	17,920
In transit to refineries	4,536	3,696	4,959	3,909	3,105	2,867
In process at refineries	15,976	15,561	15,341	15,700	19,759	26,713
Total	28,863	35,621	32,293	30,924	40,447	47,500
Lead in ore and matte and in process at smelters	87,066	95,481	69,757	67,817	65,771	67,688
Grand total	150,321	201,526	137,669	124,080	149,778	196,340

Figures reported to the Bureau of Mines in its annual survey of smelters and refiners represent physical inventory at the plants, irrespective of ownership, and do not include material in process or in transit. Bureau reports indicated stocks of 65,000 tons of refined lead at these plants on December 31, 1953, compared with 31,400 tons on January 1. Stocks of antimonial lead at primary plants increased from 11,000 tons to 14,400 during the year. Stocks of ore and concentrates (lead content) also increased, rising from 34,000 tons to 44,000; inventories of base bullion at refineries that receive bullion and smelters that produce bullion for shipment to refineries, increased from 13,500 tons to 18,200.

Consumers' Stocks.—Consumers' stocks of lead decreased 7 percent in 1953. Stocks on January 1 totaled 123,000 tons, changed very little through the first 4 months of the year, increased to 139,000 tons by the end of June, and thereafter declined gradually to 114,000 tons on December 31. Consumers' stocks of refined lead, antimonial lead, unmelted white-metal scrap, and lead in copper-base scrap decreased 6, 27, 7, and 9 percent, respectively, increases being reported in percentage metals and drosses.

TABLE 14.—Consumers' stocks of lead in the United States at end of year, 1949–53, by type of material, in short tons, lead content

Year	Refined soft lead	Antimonial lead	Unmelted white scrap	Percentage metals	Copper-base scrap	Drosses, residues, etc.	Total
1949	64,542	16,837	2,957	5,405	2,087	5,439	97,267
1950	87,285	27,737	5,406	6,446	1,558	11,452	139,884
1951	56,731	28,221	3,140	7,054	1,429	6,185	102,760
1952	80,888	20,309	3,877	6,191	2,282	8,983	122,530
1953	75,801	14,867	3,607	7,921	2,083	9,484	113,763

PRICES

The market price for common lead, New York, was 14.75 cents a pound for the first few days of the year, the highest quotation of the year. On January 7 the price dropped to 14.50 cents a pound, and subsequent decreases brought it to 12.00 cents, the low point of the year, on April 20. On April 29 it advanced again to 12.50 cents and then six ¼-cent advances raised the quotation to 14.00 cents on July 23. On September 16 there was a ½-cent decrease to 13.50 cents, and the price remained there through December 31.

The London free lead market was in operation throughout the year. Quotations ranged from a high of £105 per long ton (equivalent to 13.11 cents per pound computed on the base of 279.75 cents per pound) on January 5 to a low of £73 per long ton (9.12 cents per pound) on April 22. The average monthly quoted price of common lead is given in table 15. Comparison of the New York and London prices shows that for the year the New York price was 2 cents a pound higher.

TABLE 15.—Average monthly and yearly quoted prices of lead at St. Louis, New York, and London, 1951–53, in cents per pound [1]

Month	1951			1952			1953		
	St. Louis	New York	London [2]	St. Louis	New York	London [3]	St. Louis	New York	London [4]
January	16.80	17.00	17.00	18.80	19.00	21.73	13.99	14.19	12.51
February	16.80	17.00	17.00	18.80	19.00	21.10	13.30	13.50	11.86
March	16.80	17.00	17.00	18.80	19.00	20.82	13.20	13.40	11.46
April	16.80	17.00	20.00	18.72	18.92	20.43	12.44	12.64	10.34
May	16.80	17.00	20.00	15.53	15.73	17.18	12.55	12.75	10.32
June	16.80	17.00	20.00	15.06	15.26	16.26	13.21	13.41	11.14
July	16.80	17.00	21.45	15.80	16.00	16.53	13.48	13.68	11.71
August	16.80	17.00	22.49	15.80	16.00	16.30	13.80	14.00	11.98
September	16.80	17.00	22.49	15.80	16.00	16.27	13.54	13.74	11.68
October	18.72	18.92	21.87	14.20	14.40	[4] 11.28	13.30	13.50	11.59
November	18.80	19.00	21.88	13.98	14.18	[4] 11.69	13.30	13.50	11.82
December	18.80	19.00	21.84	13.92	14.12	[4] 12.20	13.30	13.50	11.34
Average	17.29	17.49	20.25	16.27	16.47	16.82	13.28	13.48	11.48

[1] St. Louis: Metal Statistics, 1954, p. 525. New York: Metal Statistics, 1954, p. 519. London: E&MJ Metal and Mineral Markets and Quin's Metal Handbook.
[2] Conversion of English quotations into American money based on average rates of exchange recorded by Federal Reserve Board.
[3] Revised.
[4] Average of daily mean of bid-and-asked quotations, at morning session of London Metal Exchange.

FOREIGN TRADE [7]

Imports.—General imports of lead decreased 12 percent from the 1952 total to 552,000 tons; nevertheless, the quantity was the second highest on record. The large surplus of lead in the United States in 1952 and 1953 was brought about principally by the influx of foreign metal. Of the total lead imported in 1953, 385,000 tons (70 percent) was in the form of pigs and bars, and 161,000 tons (29 percent) was lead contained in ores, flue dust, and matte. Mexico supplied 37 percent, Australia 18 percent, Peru 14 percent, and Yugoslavia and Canada 13 percent of the pigs and bars. Of the lead contained in ores, flue dust, and matte 24 percent came from Canada, 20 percent from Peru, 19 percent from the Union of South Africa, 13 percent from Australia, and 12 percent from Bolivia.

TABLE 16.—Total lead imported into the United States in ore, matte, base bullion, pigs, bars, and reclaimed, by countries, 1944–48 (average) and 1949–53, in short tons [1]

[U. S. Department of Commerce]

Country	1944–48 [2] (average)	1949	1950	1951 [2]	1952 [2]	1953
Ore and matte:						
Africa	4,391	31,373	19,713	10,673	22,656	32,473
Australia	13,876	8,983	9,792	7,423	8,932	20,706
Bolivia	6,296	24,098	13,336	15,989	18,473	18,984
Canada (including Newfoundland and Labrador)	22,992	10,326	9,452	7,239	[3] 12,030	39,242
Chile	2,902	3,395	2,605	1,945	3,197	3,341
El Salvador	51	333	417	286	126	----------
Guatemala	5	2,827	325	3,169	4,721	5,391
Honduras	13	465	412	381	595	1,090

See footnotes at end of table.

[7] Figures on imports and exports compiled by Mae B. Price and Elsie D. Page, Division of Foreign Activities, Bureau of Mines, from records of the United States Department of Commerce.

TABLE 16.—Total lead imported into the United States in ore, matte, base bullion, pigs, bars, and reclaimed, by countries, 1944–48 (average) and 1949–53, in short tons [1]—Continued

Country	1944–48 [2] (average)	1949	1950	1951 [2]	1952 [2]	1953
Ore and matte—Continued						
Mexico	2,101	8,388	2,846	2,525	[3] 2,497	3,443
Peru	10,007	14,970	16,010	16,946	[3] 28,213	32,842
Philippines	8	279	949	789	2,446	2,980
Other countries	1,862	1,842	663	106	735	437
Total ore and matte	64,504	107,279	76,520	67,471	[3] 104,621	160,929
Base bullion:						
Australia		2,246	2,263	2,234		
Guatemala			232		266	736
Japan			921			
Mexico	1,546	25				
Peru	166	102	72	47	123	133
Other countries	79				(4)	
Total base bullion	1,791	2,373	3,488	2,281	389	869
Pigs and bars:						
Africa	117	280		2,279	6,670	9,706
Australia	12,725	17,192	22,009	13,598	82,800	70,348
Belgium-Luxembourg	1,782	212	166	331	1,785	2,017
Bolivia					635	220
Burma	469	1,414				
Canada (including Newfoundland and Labrador)	31,097	56,432	107,673	56,959	104,531	49,000
Germany		8,333	8,643	738	[5] 6,052	[5] 4,006
Italy	4,270	3,419				
Japan	3,032	2,108	5,712			
Mexico	113,132	126,398	220,767	36,987	198,872	140,751
Netherlands	365	219	484		2,747	1,981
Peru	25,783	34,626	31,988	31,528	42,169	52,216
Spain	331		440		5,509	
United Kingdom	85	341	49	299	4,216	1,148
Yugoslavia	802	23,436	43,855	36,311	53,997	51,826
Other countries	482	830	2	2	737	1,852
Total pigs and bars	194,472	275,240	441,788	179,032	510,720	385,071
Reclaimed, scrap, etc.:						
Africa	164	479				17
Australia	2,084	2,971	1,061	2,175	924	2,666
Belgium-Luxembourg	197	329	13			202
Burma		205			203	
Canada (including Newfoundland and Labrador)	4,548	1,856	1,317	1,730	6,047	371
Canal Zone	132	384	319	228	858	205
Chile	15			84		
France	(4)	289		88		
Germany		663	290			
Italy	475	346				
Jamaica	9	89	51	252	101	28
Japan	1,067	2,765	14,769	470	345	21
Mexico	337	845	934	2,089	872	98
Netherlands	492	599	4	18	454	502
Panama	55	92	80	234	300	138
Peru				159	297	59
Philippines	555	1,144	99	114	96	
Venezuela	(4)	8	106	668	196	
Western Pacific Islands			6	81	282	43
Yugoslavia	130				345	103
Other countries	464	1,585	990	753	1,019	986
Total reclaimed, scrap, etc	10,724	14,649	20,039	9,143	12,339	5,439
Grand total	271,491	399,541	541,835	257,927	[3] 628,069	552,308

[1] Data are "general imports," that is, include lead imported for immediate consumption plus material entering the country under bond.
[2] In addition to data shown "flue dust or fume containing lead and zinc, and other minerals or metals (lead content)," imported as follows—1944–48 (average): 100 tons; 1951: 13 tons; 1952: 40 tons.
[3] Revised figure.
[4] Less than 1 ton.
[5] West Germany.

TABLE 17.—Lead imported for consumption in the United States, 1944–48 (average) and 1949–53, by classes [1]

[U. S. Department of Commerce]

Year	Lead in ores, flue dust, and mattes, n. s. p. f.		Lead in base bullion		Pigs and bars		Sheets, pipe, and shot		Not otherwise specified (value)	Total value
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value		
1944–48 (average)	56, 620	$6, 426, 912	2, 559	$733, 473	191, 634	$36, 364, 443	66	$39, 111	$20, 117	$46, 075, 679
1949	121, 848	34, 397, 026	1, 133	374, 954	272, 437	80, 148, 110	178	101, 084	29, 830	119, 054, 978
1950	95, 068	21, 045, 414	1, 148	193, 356	434, 410	104, 340, 645	207	78, 111	78, 690	129, 613, 215
1951	31, 359	8, 278, 266	------	--------	179, 021	63, 682, 071	255	123, 377	174, 265	74, 528, 528
1952	107, 581	32, 755, 497	2, 951	1, 137, 813	510, 718	165, 018, 991	11	8, 446	221, 779	[2]202, 354, 782
1953	67, 030	15, 214, 084	742	294, 058	379, 119	95, 285, 223	178	58, 291	242, 925	111, 919, 578

[1] In addition to quantities shown (value included in total values), "reclaimed, scrap, etc.," imported as follows—1944–48 (average): 10,712 tons, $2,424,653; 1949: 14,076 tons, $4,003,974; 1950: 22,524 tons, $3,876,999; 1951: 8,020 tons, $2,183,240; 1952: Revised figures, 11,358 tons, $3,198,844; 1953: 3,660 tons, $824,997; and "flue dust or fume containing lead and zinc and other minerals or metals (lead content)," imported as follows—1944–48 (average): 100 tons, $66,970; 1951: 13 tons, $87,309; 1952: 40 tons, $13,412; 1949–50, 1953: None. Figures include lead received by the Government and held in stockpiles but exclude imports for manufacture in bond and export, which are classified as "imports for consumption" by the U. S. Department of Commerce.

[2] Revised figure.

TABLE 18.—Miscellaneous products containing lead, imported for consumption in the United States, 1944–48 (average) and 1949–53

[U. S. Department of Commerce]

Year	Babbitt metal, solder, white metal, and other combinations containing lead			Type metal and antimonial lead		
	Gross weight (short tons)	Lead content (short tons)	Value	Gross weight (short tons)	Lead content (short tons)	Value
1944–48 (average)	174	111	$149, 884	10, 510	9, 756	$2, 089, 876
1949	281	127	459, 236	5, 861	5, 207	2, 255, 909
1950	4, 345	2, 744	2, 814, 264	12, 518	10, 582	3, 431, 650
1951	1, 533	988	1, 494, 792	9, 128	8, 663	3, 845, 671
1952	[1] 1, 540	[1] 990	[1] 1, 348, 288	10, 909	9, 415	4, 153, 960
1953	2, 375	1, 343	1, 869, 312	6, 366	5, 016	1, 921, 453

[1] Revised figure.

Exports.—Exports of pigs and bars totaled less than 1,000 tons in 1953. Export restrictions imposed under the Export Control Act of 1940 remained in effect throughout 1953.

TABLE 19.—Total lead exported from the United States in ores, matte, base bullion, pigs, bars, anodes, and scrap, by destinations, 1944–48 (average) and 1949–53, in short tons [1]

[U. S. Department of Commerce]

Destination	1944–48 (average)	1949	1950	1951	1952	1953
Ore, matte, base bullion:						
Belgium-Luxembourg	20		132			
Canada	2	1,616	1	557	836	1,038
Total ore, matte, base bullion	22	1,616	133	557	836	1,038
Pigs, bars, and anodes:						
Belgium-Luxembourg		76		37		
Brazil	240	126	47	62	433	76
Canada	14	14	306	138	40	32
Canal Zone	12	15	19	24	18	1
Chile	67	40	35	107	193	18
Colombia	27	60	123	42	10	21
Cuba	62	68	61	48	52	28
Denmark		131				
Ecuador	2	15	15		84	
El Salvador	3	34	96	35	23	2
Honduras	5	29	6	14	10	3
India	28	4		11	4	
Pakistan			569			
Philippines	8	53	306	17	78	405
Turkey	17	7			280	
United Kingdom			67			
Uruguay	9	69	734	424	231	
Venezuela	45	148	95	62	67	41
Other countries	3,354	80	256	260	239	176
Total pigs, bars, and anodes	3,893	969	2,735	1,281	1,762	803
Scrap:						
Belgium-Luxembourg	(2)	362		31		
Canada	(2)	95	41	203	20	27
Germany	(2)		264	145		[3] 39
Japan	(2)			195		640
Lebanon	(2)	11				
United Kingdom	(2)	279	1,271	20	55	2,000
Total scrap	(2)	747	1,576	594	75	2,706
Grand total	3,915	3,332	4,444	2,432	2,673	4,547

[1] In addition, foreign lead in pigs and bars was reexported as follows: 1944–48 (average) 117 tons; 1949—86 tons; 1950—53 tons; 1951—none; 1952—2 tons; 1953—799 tons.
[2] Not separately classified.
[3] West Germany.

Tariff.—The duties on pig lead and lead in ores and concentrates remained at 1 1/16 cents and 3/4 cent per pound, respectively, in 1953.

Because of widespread mine closures and reduced employment in the lead- (and zinc-) mining industry much thought was given to tariff revision through either new legislation or the invoking of the "escape clause" of the Reciprocal Trade Agreements Act, and various other proposals were made to restrict imports or provide other means of direct or indirect aid to the domestic industry. On July 29, 1953, the Tariff Commission, in response to resolutions of the United States Senate Committee on Finance and the House of Representatives Committee on Ways and Means, instituted a general investigation of the lead and zinc industries to determine all relevant facts of production, trade, consumption, and competitive position including the effect of imports of lead and zinc on the livelihood of American workers. A report of the investigation was submitted April 20, 1954.[8]

[8] Work cited in footnote 3.

TABLE 20.—Lead articles: United States rates of duty imposed under Tariff Act of 1930, in specified years, 1930–54

[United States Tariff Commission]

Item	Tariff rate in—				
	1930	1945	1948	1951	1954
	Cents per pound; percent ad valorem				
Par. 72:					
Lead pigments:					
Litharge	2½ cents	2¼ cents [1]	2¼ cents [2]	1¼ cents [3]	1¼ cents.
Orange mineral	3 cents	2½ cents [4]	2 cents [2]	2 cents	2 cents.
Red lead	2¾ cents	2¼ cents [1]	1⅞ cents [2]	1⅞ cents	1⅞ cents.
White lead	2½ cents	2 1/10 cents [5]	2 1/10 cents [2]	1 1/20 cents [3]	1 1/20 cents.
All pigments containing lead, dry or in pulp, or ground in or mixed with oil or water, n. s. p. f.:					
In chief value of suboxide of lead	30 percent	3 cents, 15 percent min., 30 percent max.[6]	3 cents, 15 percent min., 30 percent max.[2]	3 cents, 15 percent min., 30 percent max.	3 cents, 15 percent min. 30 percent max.
Other	30 percent	20 percent [1]	20 percent [2]	20 percent	20 percent.
	Cents per pound of lead content				
Par. 391: Lead-bearing ores, flue dust, and mattes of all kinds.	1½ cents	¾ cents [7]	¾ cents [8]	1½ cents [9]; ¾ cents [3]	¾ cents.[10]
Par. 392:					
Lead bullion or base bullion, lead pigs and bars, lead dross, reclaimed lead, scrap lead, type metal, antimonial lead, and antimonial scrap lead.	2⅛ cents	1 1/16 cents [7] [11]	1 1/16 cents [8] [11]	2⅛ cents [9] [11]; 1 1/16 cents [3] [11]	1 1/16 cents.[10]
Babbitt metal and solder	2⅛ cents	1 1/16 cents [7]	1 1/16 cents	2⅛ cents [9]; 1 1/16 cents [3]	1 1/16 cents.
Alloys or combinations of lead, n. s. p. f.	2⅛ cents	1 1/16 cents [7]	1 1/16 cents	2⅛ cents [9]; 1 1/16 cents [3]	1 1/16 cents.
	Cents per pound				
Lead in sheets, pipe, shot, glaziers' lead, and lead wire.	2⅜ cents	2⅜ cents	2⅜ cents	1 5/16 cents [3]	1 5/16 cents.

[1] Trade agreement with the United Kingdom, effective Jan. 1, 1939, through Dec. 31, 1947.
[2] General Agreement on Tariffs and Trade (GATT) (Geneva), effective Jan. 1, 1948.
[3] GATT (Torquay), effective June 6, 1951.
[4] Trade agreement with France, effective June 15, 1936, through Dec. 31, 1947.
[5] Trade agreement with Belgium, effective May 1, 1935, through Dec. 31, 1947.
[6] Trade agreement with Switzerland, effective Feb. 15, 1936.
[7] Trade agreement with Mexico, effective Jan. 30, 1943, through Dec. 31, 1950.
[8] Duty suspended from June 20, 1948, to June 30, 1949, inclusive (Public Law 725, 80th Cong.).
[9] Trade agreement with Mexico terminated, effective Jan. 1, 1951; the rate of duty reverted to the statutory rate provided under the Tariff Act of 1930.
[10] Duty suspended from Feb. 12, 1952, to June 25, 1952, inclusive (Public Law 257, 82d Cong.).
[11] Duty on scrap lead was suspended for virtually the entire period from Mar. 14, 1942, to June 30, 1952, inclusive (Public Law 497, 77th Cong.; Public Law 384, 80th Cong; Public Law 613, 80th Cong.; Public Law 869, 81st Cong.; Public Law 66, 82d Cong.)

TECHNOLOGY

During 1953 the Bureau of Mines published the following reports of investigation relating to lead:

4945. Browning, James S., and Clevenger, Clinton B., Process for Beneficiating Great Gossan Lead Ores, Carroll County, Va.; 14 pp.
4953. Townsend, James W., Investigation of Lead-Zinc Deposits at the Harrington-Hickory Mine, Beaver County, Utah; 2 pp.
5014. Popoff, C. C., Lead-Zinc Deposits of the Dunkelberg District, Granite County, Mont.; 41 pp.

Geological Survey publications relating to lead and issued in 1953 are:

Circular 213. Harrison, J. E., and Leonard, B. F., Preliminary Report on the Jo Reynolds Area, Lawson-Dumont District, Clear Creek County, Colo.; 9 pp.
Circular 231. Agnew, A. F., Flint, A. E., and Allingham, J. W., Exploratory Drilling Program of the United States Geological Survey for Evidences of Zinc-Lead Mineralization in Iowa and Wisconsin; 37 pp.
Circular 242. Luttrell, G. W., Bibliography of United States Geological Survey Publications on Lead and Zinc; 18 pp.
Circular 271. Stieff, L. R., Stern, T. W., and Milkey, R. G., A Preliminary Determination of the Age of Some Uranium Ores of the Colorado Plateaus by the Lead-Uranium Method; 19 pp.
Professional Paper 235. Behre, Charles H., Jr., Geology and Ore Deposits of the West Slope of the Mosquito Range; 176 pp.
Bulletin 998–B. Gault, H. R., Rossman, D. L., Flint, G. M., Jr., and Ray, R. G., Some Zinc-Lead Deposits of the Wrangell District, Alaska; 43 pp.
Bulletin 998–C. Robinson, G. D., and Twenhofel, W. S., Some Lead-Zinc and Zinc-Copper Deposits of the Ketchikan and Wales Districts, Alaska; pp. 59–83.

Articles on new methods and techniques in mining and milling published during the year were:

Tomkinson, E. R., Sinking Iron King's No. 7 Shaft: Min. Cong. Jour., vol. 39, No. 10, October, pp. 36, 37.
Mining World, Iron King Uses Close Control: Vol. 15, No. 2, February, pp. 26–29. How Bunker Hill Stair Step Block Caves Low-Dip Lead-Zinc Ore Body in Quartzite: Vol. 15, No. 8, July, pp. 57–59. National Lead Company Driving 16- by 14-Foot Crosscut, 2,250 Feet to Velie Swalley: Vol. 15, No. 6, May, pp. 38, 39. Eureka Corporation Found It—A Way to Adapt Oil-Well Methods to Mine Exploration: Vol. 15, No. 9, August, pp. 40–43.
Doyle, W. R., Steel Rail Sets at Resurrection: Min. Cong. Jour., vol. 39, No. 10, October, pp. 49–52, 65.
Kinney, L. M., Trackless Mining at Pend Oreille: Vol. 29, No. 11, November, pp. 28, 29, 105.
Huttl, J. B., New Oxide Lead Unit for Darwin: Eng. and Min. Jour., vol. 154, No. 3, March, pp. 81–83.
Stockett, Norman A., Developments in Mining Practice in Southeast Missouri: Min. Cong. Jour., vol. 39, No. 4, April, pp. 84–87.
Bain, C. K., St. Joseph Lead's Indian Creek Development: Min. Eng., vol. 5, No. 9, September, pp. 899–904.
Allen, V. C., Mechanization at an Upper Mississippi Valley Zinc-Lead Mine: Bull. Inst. Min. and Met., vol. 63, No. 556, March, pp. 261–269.

A number of articles relating to secondary lead smelting appeared in the technical press during 1953. One describes the secondary plant[9] of the George Sall Metals Co. in Philadelphia, Pa., which features pneumatic conveying, automatic weighing, flexibility in casting, and use of seasonal gas. The plant produces ingots from lead, aluminum, brass, and zinc scrap. Another describes the layout and operation of the Pennsylvania Smelting & Refining Co. lead plant,[10] Philadelphia, Pa.

Some other articles concerning metallurgical processes and product development published in 1953 were:

Schumacher, E. E., Ultra-Pure Metals Produced by Zinc-Melting Technique: Jour. Met., vol. 5, No. 11, November, pp. 1428–1429.

Chemical Engineering and Mining Review (Melbourne, Australia), Electrodeposition of Lead on Steel, by the Broken Hill Associated Smelters Pty., Ltd: Vol. 46, No. 2, November 10, pp. 49, 50.

Metal Industry (London), Antimonial Lead Alloys–I: Vol. 82, No. 14, April 3, p. 268. Antimonial Lead Alloys–II: Vol. 82, No. 16, April 17, p. 304.

American Institute of Electrical Engineers, Tellurium Alloy Lead Sheath for Power Cable: Tech. Paper 54–7, October, 11 pp.

WORLD REVIEW

World mine production of lead in 1953 established an alltime high of 1,900,000 metric tons, a gain of about 3 percent over the previous record set in 1952. Lead ores are mined in many countries (approximately 53 in 1953), but 5—United States, Australia, Mexico, Canada, and U. S. S. R.—have furnished about three-fifths of the total output in recent years. World smelter production also attained a new record in 1953—1,810,000 metric tons. On a smelter basis, there were approximately 33 lead-producing countries in 1953; the same principal producers on a mine basis supplied virtually the same percentage of the total world smelter output. Annual world mine production by countries for 1949–53, insofar as statistics are available, is given in table 21; world smelter production for the same years is given in table 22.

World smelting and refining facilities outside of the United States are listed in table 23.

---

[9] Fadden, W. J. Jr., New Plant for Secondary Smelting: Eng. and Min. Jour., vol. 154, No. 11, December 1953, pp. 72–77.

[10] Wakesberg, S. B., Orderliness is the Keynote at This Lead-Smelting Plant: Waste Trade Jour., vol 97, No. 3, April 10, 1954, pp. 44, 45.

TABLE 21.—World mine production of lead, by countries, 1944–48 (average) and 1949–53, in metric tons [1]

[Compiled by Pauline Roberts]

Country	1944–48 (average)	1949	1950	1951	1952	1953
North America:						
Canada	170,611	144,945	150,317	143,544	153,170	177,618
Cuba	13	47	12	----------	----------	----------
Guatemala	438	3,154	3,000	3,300	4,200	7,066
Honduras	29	449	279	454	538	[2] 989
Mexico	189,438	220,763	238,078	225,468	246,027	221,549
Salvador [3]	40	530	530	470	100	----------
United States [4]	347,970	371,860	390,838	352,135	353,947	310,840
South America:						
Argentina	19,925	16,000	[3] 20,000	[3] 20,000	18,000	15,400
Bolivia (exports) [4]	12,782	26,311	31,176	30,558	28,291	23,788
Brazil	[3] 495	2,000	4,000	3,500	2,800	3,000
Chile	1,978	2,859	3,318	7,801	[3] 4,000	[3] 3,200
Ecuador	279	380	229	30	114	114
Peru	50,807	65,357	62,118	82,350	98,069	122,900
Europe:						
Austria	2,433	4,297	4,440	4,522	5,503	5,150
Bulgaria [3]	4,500	10,000	10,000	10,000	10,000	(5)
Czechoslovakia	[3] 2,000	(5)	(5)	(5)	(5)	(5)
Finland	146	130	142	216	246	217
France	6,498	10,004	12,430	10,074	11,815	11,530
Germany:						
East [3]	[6] 1,375	2,500	2,500	2,600	2,600	(5)
West	[6] 16,930	40,944	44,830	50,377	51,597	62,901
Greece [7]	775	1,200	5,800	3,800	6,000	5,700
Hungary	60	(5)	300	(5)	(5)	(5)
Ireland	----------	152	375	1,207	1,118	(5)
Italy	14,900	35,800	40,100	40,200	40,100	40,500
Norway	113	301	234	414	413	500
Poland [3]	12,677	17,850	18,000	18,000	20,000	21,300
Portugal	384	746	1,311	1,621	1,921	1,700
Rumania [3 8]	2,673	4,000	4,000	4,000	5,000	6,000
Spain	31,366	29,685	39,266	40,442	42,384	54,204
Sweden	20,395	23,900	22,673	19,693	20,593	23,714
U. S. S. R. [3 8]	54,200	90,000	111,600	128,400	154,200	183,200
United Kingdom	3,017	2,505	3,336	4,925	5,774	4,357
Yugoslavia	42,434	72,144	86,039	78,750	78,968	85,152
Asia:						
Burma [3]	10	300	1,000	2,000	3,000	8,000
China [3]	300	1,000	1,200	1,500	2,000	(5)
Hong Kong	----------	----------	----------	179	300	300
Iran	----------	----------	2,000	1,100	17,500	16,300
Japan	8,165	9,132	10,896	12,876	17,484	18,516
Korea:						
North [3]	} [3] 5,882	} 5,000	3,000	(5)	(5)	(5)
Republic		87	40	----------	142	149
Philippines	17	550	879	571	2,300	2,434
Thailand (Siam)	----------	183	691	1,321	1,048	3,600
Turkey	815	200	260	600	[3] 1,000	[3] 1,400
Africa:						
Algeria	935	1,121	1,393	2,838	4,220	7,950
Belgian Congo	658	180	----------	----------	----------	----------
Egypt	12	12	1	144	15	99
French Equatorial Africa	2,788	731	1,814	2,504	3,551	4,424
French Morocco	16,819	37,155	48,759	68,134	83,608	78,860
Nigeria	73	29	12	4	27	35
Northern Rhodesia [8]	8,057	14,169	13,905	14,194	12,802	11,694
Southern Rhodesia	60	83	----------	----------	----------	62
South-West Africa	9,340	38,400	33,680	39,230	[4] 52,842	[4] 59,227
Spanish Morocco	150	159	178	370	732	[3] 600
Tanganyika	2	----------	652	1,561	2,833	[3] 3,500
Tunisia	9,353	17,767	18,860	21,250	23,270	23,700
Uganda (exports)	4	39	44	9	8	16
Union of South Africa	151	166	600	900	575	500
Australia	193,383	216,918	222,694	228,407	236,780	249,099
Total (estimate)	1,286,000	1,550,000	1,670,000	1,690,000	1,840,000	1,900,000

[1] This table incorporates a number of revisions of data published in previous Lead chapters.
[2] Imports into United States.
[3] Estimate.
[4] Tonnage recoverable from ore.
[5] Data not available; estimate by senior author of chapter included in total.
[6] Average for 1945–48.
[7] Includes lead content of zinc-lead concentrates.
[8] Smelter production.

TABLE 22.—World smelter production of lead, by countries where smelted, 1944–48 (average) and 1949–53 in metric tons [1] [2]

[Compiled by Pauline Roberts and Berenice B. Mitchell]

Country	1944–48 (average)	1949	1950	1951	1952	1953
North America:						
Canada	144,004	132,608	154,551	147,609	166,367	150,915
Guatemala	121	68	271	60	316	658
Mexico	184,397	212,004	230,831	219,107	237,443	214,972
United States (refined) [3]	378,734	431,692	458,171	376,142	428,597	424,309
South America:						
Argentina	21,005	18,037	18,960	24,000	20,000	13,000
Brazil	296	1,172	4,200	[4] 3,000	1,946	2,450
Peru	36,496	36,017	31,693	44,247	48,622	59,160
Europe:						
Austria [5]	5,758	9,841	10,910	11,147	10,316	11,836
Belgium [5]	28,869	79,304	62,094	72,821	79,506	76,351
Czechoslovakia	[6] 3,419	(7)	(7)	(7)	(7)	(7)
France	20,841	54,450	61,236	47,974	51,538	54,917
Germany:						
East	[4] 58,660	[4] 10,000	[4] 12,000	16,800	[4] 18,000	[4] 18,000
West		54,551	66,619	76,063	92,682	106,775
Greece	908	2,389	2,125	3,890	2,460	[4] 2,500
Hungary	[8] 674	(7)	300	(7)	(7)	(7)
Italy	12,752	26,346	37,469	36,480	34,931	37,994
Poland	12,677	17,850	18,000	18,000	20,000	21,300
Portugal	263	304	591	724	1,065	(7)
Rumania [4]	2,673	4,000	4,000	4,000	5,000	6,000
Spain	30,988	33,021	40,568	44,711	46,543	51,249
Sweden	9,947	10,757	16,681	9,307	11,390	16,410
U. S. S. R. [4]	54,200	90,000	111,600	128,400	154,200	183,200
United Kingdom [5]	2,800	2,134	3,048	4,158	3,986	4,357
Yugoslavia	28,500	56,760	57,204	60,068	67,180	70,796
Asia:						
Burma	1,514	230	11	4,966	2,675	8,746
China	524	[5] 2,062	[4 5] 4,000	[4 5] 5,000	[4 5] 6,000	[4 5] 9,000
India	182	603	636	873	1,150	1,728
Indochina	10	----------	----------	----------	----------	----------
Japan	12,826	7,716	9,984	10,740	15,156	17,724
Korea:						
Korea, Republic of	[9] 183	100	(7)	(7)	126	50
North Korea	[9] 4,333	[4] 5,000	[4] 3,000	----------	----------	[4] 2,000
Africa:						
French Morocco	564	7,073	12,097	22,322	30,088	27,433
Northern Rhodesia	8,057	14,169	13,905	14,194	12,802	11,694
South-West Africa	29	----------	----------	----------	----------	----------
Tunisia	9,541	19,429	23,536	22,906	25,506	27,280
Australia [10]	155,234	152,464	163,102	168,418	159,153	175,236
Total (estimate)	1,235,000	1,495,000	1,640,000	1,600,000	1,790,000	1,810,000

[1] Data derived in part from Monthly Bulletin of the United Nations, Statistical Summary of the Mineral Industry (Colonial Geology Surveys, London), and the Yearbook of the American Bureau of Metal Statistics.
[2] This table incorporates a number of revisions of data published in previous Lead chapters.
[3] Figures cover lead refined from domestic and foreign ores; refined lead produced from foreign base bullion not included.
[4] Estimate.
[5] Includes scrap.
[6] Average for 1945–48.
[7] Data not available; estimate by senior author of chapter included in total.
[8] Data represented Trianon Hungary after October 1944.
[9] Average for 1946–48.
[10] Excluding lead content of bullion exported, figures for which are as follows: 1944–48 average, 14,609 metric tons; 1949, 33,145; 1950, 37,615; 1951, 32,384; 1952, 38,314; 1953, 34,840.

TABLE 23.—Foreign lead smelting and refining capacity, 1953 [1]

[Yearbook of American Bureau of Metal Statistics, 1953, and Minerais et Métaux Société Anonyme, 1953]

Location	Company	Type [1]	Estimated annual capacity for refined lead short tons
Argentina:			
Mercedes	Elaboracion General del Plomo, S. A	S. & R	7,900
Puerto Vilelas (Chaco)	National Lead Co., S. A	do	19,800
Australia:			
Port Pirie, South Australia	Broken Hill Assoc. Smelters Pty., Ltd	do	246,400
Mount Isa, Queensland	Mount Isa Mines, Ltd	S	55,100
Austria: Gailitz, Carinthia	Bleiberger Bergwerks-Union	S. & R	11,000
Belgium:			
Beersee	Cie Mét. de la Campine	S	6,600
Hoboken	Soc. Gen. Mét. de Hoboken	S. & R	66,100
Overpelt	Cie des Métaux d'Overpelt-Lommel et de Corphalie.	do	19,800
Baelen-Wezel	Soc. Anon. des Mines et Fonderies de Zinc de la Vieille Montagne.	do	48,200
Brazil:			
Apiaí, São Paulo	Instituto de Pesquisas Tecnologicas	do	3,900
Panelas, Parana	Plumbum, S. A	do	11,000
Burma: Namtu	Burma Corp. (1951), Ltd	do	74,000
Canada: Trail, B. C	Consolidated Mining & Smelting Co. of Canada.	do	220,000
Czechoslovakia:			
Banska Stiavnica	State-owned	do	1,600
Pribram	do	do	4,400
France:			
Mortagne	Cie Royale Asturienne des Mines	do	4,100
Couëron	Soc. Anon. des Mines et Fonderies de Pontgibaud.	do	27,500
L'Estaque	Soc. Min. et Met. de Peñarroya	R	19,800
Noyelles Godault	do	S. & R	79,400
Saint-Denis (Seine)	Ste. Francais des Metaux et Affiages Blanco.	do	22,000
Germany, West:			
Mechernich	Gewerkschaft Merchernicher Werke	do	14,300
Hamburg	Norddeutsche Affinerie	do	33,100
Clausthal & Lautenthal	Preussag-Harzer Berg- und Hüttenwerke	do	25,400
Braubach	Blei- und Silberhütte Braubach	do	44,100
Binsfeldhammer	Stolberger Zink A. G. f. Bergbau u. Zinkhüttenbetrieb.	do	55,100
Oker (Harz)	Unterharzer Berg- und Hüttenwerke G. m. b. H.	do	26,400
Friedrich-August-Hütte, Post Nordenham.	Metallwerke Unterweser A. G	do	26,400
Germany, East:			
Hettstedt	Mansfeldscher Kupferschieferbergbau A. G.	do	3,300
Freiberg (Saxony)	Vereinigung Volkseigener Betriebe-Buntmetall.	do	11,000
Greece: Laurium	Cie Française des Mines du Laurium	do	6,600
Guatemala: Villa Linda-Huehuetenango.	Compania Minera de Huehuetenango, S. A.	S	
India: Tundoo, Katrasgarh	Metal Corp. of India, Ltd	S & R	6,600
Italy:			
Monteponi, Sardinia	Soc. di Monteponi	do	13,200
La Spezzia	Soc. Min. & Met. di Pertusola	do	26,400
S. Gavino Monreale, Sardinia	Montevecchio Soc. Italiana del Piombo e dello Zinco.	do	39,700
Japan:			
Kamioka	Mitsui Mining & Smelting Co., Ltd	do	7,900
Takehara	do	do	7,100
Hosokura	Mitsubishi Metal Mining Co., Ltd	do	11,900
Saganoseki	Nihon Mining Co., Ltd	do	12,700
Aizu	Nihon Soda, K. K	R	2,000
Chirigishima & Annaka	Toho Aen K. K	S & R	2,900
Mexico:			
Monterrey, N. L	American Metal Co., Ltd	R	108,000
Do	American Smelting & Refining Co	do	216,000
Torreon, Coah	American Metal Co., Ltd	S	
Chihuahua	American Smelting & Refining Co	do	
San Luis Potosi	do	do	
Concepcion del Oro, Zacs	Mazapil Copper Co., Ltd	do	
Mazatlan	Met. Occidental, S. A. (Mesa)	do	
Morocco: Oued-el-Heimer	Fonderies Peñarroya-Zellidja	S & R	38,600
Netherlands: Arnhem	N. V. Hollandsche Metallurgische Bedrijven.	do	6,600

[1] S denotes smelter, R refinery.

TABLE 23.—Foreign lead smelting and refining capacity, 1953 [1]—Continued

[Yearbook of American Bureau of Metal Statistics, 1953, and Minerais et Métaux Société Anonyme, 1953]

Location	Company	Type [1]	Estimated annual capacity for refined lead short tons
Peru: Oroya	Cerro de Pasco Corp	S. & R	77,200
Poland:			
Trzebinia	Giesche Sp. Akcyjna	do	11,000
Mala Dabrowka	Giesche Sp. Akcyjna (Huta Walther Croneck).	do	16,500
Strzybnica	Polska Huta (Tarnowitz)	do	33,100
Brzozowice-Kamien	Zaklady Hohenlohego	R	3,100
Federation of Rhodesia and Nyasaland: Broken Hill, Northern Rhodesia.	Rhodesia Broken Hill Dev. Co	S	19,800
Rumania:			
Firija de Jos, Satu Mare	State Mines, Baia-Mare Soc. "Minaur"	S. & R	5,500
Baia-Mare, Lucaci	Phönix, Fabrica de Acid Sulfuric si Prod. Chim.	do	3,600
Spain:			
Linares (Jaén)	Cia. "La Cruz"	do	40,200
Do	Cia. Sopwith	do	27,500
Malaga	Cia. Min. Met. Los Guindos	do	22,000
Peñarroya	Soc. Min. et Met. de Peñarroya	do	66,100
Santa Lucia, Cartagena (Murcia).	do	do	33,100
Bellmunt de Ciurana (Tarragona).	Minas del Priorato	do	6,600
Renteria	Cie. Royale Asturienne des Mines	do	8,800
Aisúa (Vizcaya)	Industrias Reunidas Minero-Metalurgicas.	do	13,200
Sweden:			
Rönnskär	Bolidens Gruv A. B	do	22,000
Fliseryd	Svenska Ackumulator AB Jungner		5,000
Tunisia:			
Souk-el-Khémis	Soc. Anon. Francaise de Djebel Hallouf	S. & R	2,600
Mégrine	Soc. Min. et Met. de Peñarroya	do	27,600
Bizerte	Mines & Fonderies Tunisiennes	do	3,900
United Kingdom:			
Northfleet	Britannia Lead Co., Ltd	R	82,700
Rotherhithe and Darley Dale	H. J. Enthoven & Sons, Ltd	do	44,100
London, Chester and Newcastle-on-Tyne.	Associated Lead Manufacturers, Ltd	S. & R	82,700
U. S. S. R.:			
Chimkent (Kazakhstan)	State-owned	do	110,000
Leninogorsk (Kazakhstan)	do	do	110,000
Tetiukhe (Siberia)	do	do	5,500
Dzhaudzhukau (Caucasus)	do	do	16,500
Yugoslavia:			
Mezica	Rudnici i Topionice Olova i Cinka (Trepca).	do	16,500
Zvecan	do	do	66,100

[1] S denotes smelter, R refinery.

NORTH AMERICA

Canada.[11]—Mine output of lead in Canada in 1953 totaled 197,200 short tons, an increase of 17 percent over the 1952 total. The increased production came largely from British Columbia and Yukon. Output, by Provinces, was as follows: British Columbia, 153,600 tons; Newfoundland, 17,800 tons; Yukon, 14,400 tons; Quebec, 9,200 tons; Nova Scotia, 1,900 tons; and Ontario, 300 tons. Production of refined lead by The Consolidated Mining & Smelting Co. of Canada, Ltd., which operates Canada's only lead smelter at Trail, British Columbia, was 165,800 tons compared with 182,900 tons in 1952.

British Columbia was again the leading lead-producing Province in 1953 by a wide margin. The Sullivan zinc-lead-silver mine at Kim-

[11] Neelands, R. E., Lead in Canada, 1953 (Preliminary): Canada Dept. of Mines and Tech. Surveys, 1953.

berley, owned by Consolidated Mining & Smelting Co., is Canada's principal source of lead. About 11,000 tons of ore was mined daily in 1953, and approximately 430 tons of lead concentrate averaging 63 percent lead and 650 tons of zinc concentrate averaging 48 percent zinc was produced per calendar day for shipment to Trail. About 3,000 tons a day of coarse waste rock was eliminated from the mill feed in a sink-float plant and returned to the mine for use as fill. Production at Consolidated's Bluebell lead-zinc mine on the east side of Kootenay Lake was increased. Construction of a 1,000-ton mill at the company H. B. zinc-lead mine near Salmo was completed, but commencement of production awaits an improvement in metal prices. Sil-Van Consolidated Mining & Milling Co., Ltd., began to produce lead and zinc concentrates in a 150-ton mill in June at its property near Smithers. Giant Mascot Mines, Ltd., deepened its underground workings and increased production to about 500 tons of ore a day at its lead property near Spillamacheen. Canadian Exploration, Ltd., completed a large-scale development program, including installation of about 7,000 feet of conveyor-belt ore-transport systems, at its Jersey zinc-lead mine near Salmo. Trackless mining methods are to be used. Due to the decline in metal prices the daily tonnage milled was reduced in December from 1,800 tons to 1,000. Other producers of lead concentrate included: Tulsequah Mines, Ltd., a subsidiary of Consolidated Mining & Smelting Co., Taku River area; Violamac Mines, Ltd., and Carnegie Mines, Ltd., near Sandon; Sunshine Lardeau Mines, Ltd., near Camborne; Silver Standard Mines, Ltd., Hazelton; and Yale Lead & Zinc Mines, Ltd., at Ainsworth. Because of low prices during the year production was suspended at a number of lead-zinc mines, the most important being Reeves MacDonald Mines, Ltd., which discontinued operation of its 1,200-ton concentrator in April. Operations were discontinued also at the Zincton and Paradise mines of Sheep Creek Gold Mines, Ltd.; the Cork Province, Monarch, and Kicking Horse mines of Base Metals Mining Corp., Ltd.; and the Premier and Indian Mines of Silbak Premier Mines, Ltd. Britannia Mining & Smelting Co., Ltd., discontinued the production of lead concentrates early in 1953.

In Newfoundland, Buchans Mining Co., Ltd., operated its 1,350-ton mill at an average of 950 tons a day, producing zinc, lead, and copper concentrates containing a total of about 17,800 tons of recoverable lead.

United Keno Hill Mines, Ltd., the principal operator in the Yukon, increased production of lead and zinc concentrates from its property in the Mayo district, particularly from newly developed levels at the Hector mines. A new deeper level was established at the adjoining Calumet mine. The 150-ton mill constructed jointly by Mackeno Mines, Ltd., Yukeno Mines, Ltd., and Bibis Yukon Mines, Ltd., also in the Mayo District, began to produce lead concentrates in April. Most of the ore treated came from the Mackeno mine and from the workings of Bellekeno mines.

In the Province of Quebec, lead concentrates were produced by New Calumet Mines, Ltd., Pontiac County; Anacon Lead Mines, Ltd., and United Montauban Mines, Ltd., Portneuf County; Golden Manitou Mines, Ltd., Abitibi County; and Consolidated Candgo Mines, Ltd., North Gaspé County. Ascot Metals Corp., Ltd., pro-

duced a bulk copper-lead concentrate from its Suffield and Moulton Hill mines near Sherbrooke. The Moulton Hill mine was closed in October. United Montauban Mines, Ltd., commenced production of zinc and lead concentrates in a new 500-ton mill about mid-1953.

Mindamar Metals Corp., Ltd., continued to operate the Stirling mine, Cape Breton Island (Nova Scotia), at which production had been resumed in 1952. It produced zinc concentrate and copper-lead concentrate containing about 1,900 tons of lead.

In Ontario a small tonnage of lead concentrate was produced by Matachewan Consolidated Mines, Ltd., from the Matarrow lead mine in the Matachewan area. The operation was uneconomic, and the mine was closed in January 1953.

Intense exploration activity for base metals again was in evidence in New Brunswick. Brunswick Mining & Smelting Corp., Ltd., continued diamond-drill exploration of its large zinc-lead deposit 25 miles southwest of Bathurst, discovered in 1952. Overburden was stripped from a section of the ore zone to permit mining a small tonnage of ore for metallurgical tests, which will be carried out in 1954. In September the company acquired the Anacon-Leadridge property about 5 miles north of the Brunswick deposit, where a similar type of ore body was delineated. The 2 deposits are estimated to contain over 50 million tons of reserves to a depth of 1,000 feet, averaging 5.3 percent zinc and 1.7 percent lead, with appreciable quantities of silver, copper, tin, and pyrite. Keymet Mines, Ltd., completed constructing a 200-ton mill at its property 15 miles north of Bathurst, where production of zinc and lead concentrates was expected to begin early in 1954.

In Northwest Territories, Pine Point Mines, Ltd., a subsidiary of Consolidated Mining & Smelting Co. and Ventures, Ltd., discontinued in September an exploratory diamond-drilling program that had been active several years at its zinc-lead deposit at Pine Point, Great Slave Lake. Several million tons of ore, averaging 10 percent combined metals, has been blocked out on the Pine Point property; a large part of the reserves may be mined by open-pit methods. Ore-dressing tests have shown that high-grade concentrates can be produced.

Greenland.—The Mestersvig lead-zinc deposit in East Greenland continued under active development by the Nordic Mining Co., Ltd., throughout 1953. According to the Danish press, the management planned to continue exploration throughout the winter of 1953–54 with a labor force of about 50 men. Work during the summer was primarily surface drilling, which was to be continued until more knowledge of the extent and value of the mineralization was revealed. The company notified the Danish Government, which owns 27.5 percent of the capital stock, that only 2.5 million ($368,000) of the original 15 million kroner ($2,210,000) capital would remain by the end of 1953 and that the company must be prepared to discontinue its exploration if additional capital is not subscribed. A considerable tonnage of lead-zinc ore has been proved. Mestersvig is 7 miles from docking facilities on a fiord that is normally ice free only 4 to 5 weeks a year and has in some years been icelocked throughout the year.

Mexico.—Mine and smelter production of lead declined approximately 10 percent in 1953 compared to 1952. This relatively moderate decrease, in view of the substantially lower average price during the

year, was attributed to two factors. The first and more important factor is the inflexibility of operating levels of large Mexican mines. To reduce costs by closing down or by laying off part of the working force involves complex legal and administrative problems and is attended by heavy indemnity payments to workers released. In consequence, production tends to be maintained, if company resources permit, with little consideration of short-term market conditions. The second factor was the production and export tax subsidy provided by a decree of July 28, 1953. Provisions of the decree provide for a sliding-scale subsidy to mines whose net monthly contributions of production and export taxes to the Government are less than 200,000 pesos. This prevented a number of marginal mines from closing.

The American Smelting & Refining Co. operated its lead smelter at San Luis Potosi throughout the year, except for a strike of about 4 weeks' duration in April and May. Operating mines in Mexico owned or leased by the American Smelting & Refining Co.[12] that produced lead ores included the Charcas unit, San Luis Potosi; the Parral, Santa Barbara, Santa Eulalia, Montezuma Lead, and Plomosas units, Chihuahua; the Taxco unit, Guerrero; the Angangueo unit, Michoacan; and the Aurora-Xichu unit, Guanajuato. During 1953 the American Smelting & Refining Co. virtually completed construction of the mine plant, mill, powerplant, and townsite at the Nuestra Senora lead-zinc-silver property, Cosala, Sinaloa, which will produce and mill 12,000 tons of ore monthly. Exploration and development of the Rosario lead-zinc property at Rosario, Sinaloa, were continued, and design work for mine and mill plant was in progress. Limited ore reserves at the Angangueo unit, in combination with a disastrous fire at the Dolores mine, caused the company to make application to the Government to abandon the Angangueo operations; and the Michoacan Railway & Mining Co., Ltd., owner of the property, was notified that the lease would not be renewed after December 31, 1954.

The American Metal Co., Ltd.,[13] through its Mexican subsidiary, Cia Minera de Peñoles, S. A., produced lead concentrates at its Avalos unit, Avalos, Zacatecas; Icampo unit, Boquillas, Coahuila; Calabaza unit, Etzatlan, Jalisco; Topia unit, Topia, Durango; and Guadalupe unit, Villaldama, Nuevo Leon. The Topia unit completed its first full year of operation with satisfactory technical results. Lead concentrates were smelted at the company Torreon, Coahuila, smelter and refined at the Monterrey, Nuevo Leon, refinery.

Other large producers in Mexico during the year were San Francisco Mines of Mexico, Ltd., El Potosi Mining Co. (subsidiary of Howe Sound Co.), Fresnillo Co., and Minas de Iquala, S. A. (subsidiary of Eagle-Picher Co.).

SOUTH AMERICA

Argentina.—Compania Minera Aguilar, S. A., a subsidiary of St. Joseph Lead Co., produced 19,800 metric tons of lead concentrates and 31,800 of zinc concentrates in 1953 compared with 23,100 and 30,400 tons, respectively, in 1952. The lead concentrates were smelted at the National Lead Co., S. A., smelter at Barranqueras (Puerto Villelas), Chaco Territory. The St. Joseph Lead Co. re-

[12] American Smelting & Refining Co., 55th Annual Report for the Year Ending December 31, 1953.
[13] American Metal Co., Ltd., Annual Report for the 66th Year, 1953.

ported that the potential ore-reserve position of the Aquilar mine had improved markedly during 1953.[14]

Peru.—Mine output of lead increased from 98,100 metric tons in 1952 to a record 122,900 tons in 1953. Smelter production increased 22 percent to 59,200 tons—also a new high—as the Cerro de Pasco Corp. operated its smelter at above 80 percent of rated capacity.

Chavin Mines Corp. (controlled by Ventures, Ltd., through Frobisher, Ltd., and associated companies) continued underground development at its property in the Andes about 100 miles southeast of Lima. At the end of 1953 underground work had indicated about 430,000 metric tons of ore averaging 9.1 percent lead, 15.4 percent zinc, and 1.3 percent copper and 4.5 ounces of silver per ton. The company plans to construct a mill in the near future based on successful tests.[15]

EUROPE

France.—Mine production of lead in 1953 was virtually the same as in 1952—11,500 metric tons. Imports of lead ores, predominantly from French Morocco, and pig lead, largely from Tunisia and Morocco, totaled 68,200 (gross weight) and 40,000 tons, respectively. Domestic production of refined lead was 54,900 tons. Consumption of primary lead totaled about 90,000 tons.

Germany, West.—Mine production of lead increased 22 percent to 62,900 metric tons in 1953 despite closings and curtailments at marginal mines. Increased output was the outgrowth of recent heavy investments in developing and exploiting lead and zinc ores. The major lead-zinc producing areas of West Germany are in the Harz Mountains and the Rhineland. The more important mines include Mechernich (Gewerkschaft Mechernicher Werke), Rammelsberg (Unterharzer Berg-und Hüttenwerke G. m. b. H.), Ramsbeck and Holzappel (Stolberger Zinc A. G. für Bergbau und Hüttenbertrieb), Bad Grund (Preussische Bergwerks und Hütten A. G.), Auguste Victoria (Gewerkschaft Auguste Victoria), and Leuderich (A. G. des Altenbergs für Bergbau und Zinchüttenbetrieb). The Mechernich is one of the largest lead deposits in the world, containing nearly 2 million tons of metal. The ore, however, is very low grade, assaying on an average only 1 to 2 percent lead.[16]

In 1953 West Germany imported 60,000 tons of lead in ores and concentrates and 20,700 tons of pig lead and scrap, while exports of pig lead and scrap totaled 37,400 tons. Lead (primary and secondary) consumption increased from 127,200 tons in 1952 to 154,000 in 1953.

Ireland.—The Irish Republic has three nonferrous ore-mining enterprises.[17] Abbeytown Mining Co., Ltd., works a deposit of galena and sphalerite at Ballysodare, on the northwest coast, near Sligo Bay. About 300 tons of ore is extracted daily by open-pit methods; shipments are in the form of concentrates. Wicklow Mining Co., Ltd., operates at Glendalough, County Wicklow; the deposit contains galena and sphalerite. Silvermines Lead & Zinc Co. works a galena deposit in the Silvermine Mountains northeast of Limerick.

[14] St. Joseph Lead Co., 90th Annual Report to the Stockholders, 1953.
[15] Ventures, Ltd., Annual Report, 1953.
[16] Metal Bulletin (London), No. 3844, November 17, 1953, pp. 14–15.
[17] Metal Bulletin (London), July 27, 1954, p. 11.

Italy.—Mine production of lead in Italy in 1953 was virtually the same as in 1952—about 40,000 metric tons—while smelter production increased slightly to 40,000 tons. The bulk of the output came from mines in Sardinia, Italy's most important lead- and zinc-mining Province. A second sink-float plant was under construction at the end of the year at Montevecchio, the largest lead-zinc mine in Sardinia, and a new lead-zinc flotation plant had been built by Societa per Azroni Piombo e Zinco (SAPEZ) at the Aguxau Mount mine. Exploration of lead-zinc properties outside of the established mining areas in Sardinia was undertaken by a new company (RI. MI. SA.), formed as a joint venture of four mining companies in the region.

U. S. S. R.—The lead resources of the U. S. S. R. were described and evaluated in a textbook.[18] Production, consumption, and imports of lead are given, as well as the location of lead deposits and estimated reserves, and the location and capacity of smelters and recovery factors.

United Kingdom.—Output of recoverable lead increased slightly to 4,400 metric tons in 1953. A large lead deposit was discovered at Riber Hillside, Matlock, Derbyshire, by Matlock Lead Mines in 1953.[19] The company proposes to erect a plant capable of treating enough ore to produce 10,000 tons of lead a year. A lead-zinc mine at Llanwrst, North Wales, was reopened during the year by Llanwrst Lead Mines, Ltd.[20]

Consumption of lead in the United Kingdom in 1953 totaled 308,600 metric tons, of which 158,000 tons was imported virgin lead, 66,700 tons English refined, and 83,900 tons scrap, including remelted lead. The principal uses of lead were cable coverings (92,500 tons); batteries, including oxides and compounds (52,700 tons); and sheet and pipe (71,700 tons).[21]

Yugoslavia.—Mine production of lead in 1953 was slightly below the alltime high recorded in 1950, but output of refined lead established a new peak—70,800 tons. Of the many lead-zinc mines in Yugoslavia the Stari Trg mine in the Trepca group is by far the largest, with about 10.5 million tons of ore reserves containing an estimated lead content of 660,000 tons. Nine flotation mills, including 2 (Lece and Suplja Stena) completed in 1953, treat the ore from these mines; combined daily milling capacity is approximately 5,000 metric tons. Smelter-refinery units are at Zvecan (70,000 metric tons annual capacity) and Mezica (15,000 tons). Known lead-zinc ore reserves in Yugoslavia total about 18 million metric tons, of which approximately 13 million tons, with an estimated 780,000 tons of lead-metal content, is the share of the Trepca mines.

ASIA

Burma.—The Burma Corp., Ltd., operator of the Bawdwin silver-lead-zinc mine in the Shan States of northern Burma, continued to expand mine output and rehabilitate the mine and mill, as well as the lead smelter at Namtu. Since the mine was reopened in the

[18] Shimkin, Demitri B., Minerals—A Key to Soviet Power: Harvard University Press, Cambridge, Mass., 1953, ch. 4, pp. 120-129.
[19] Mining World, vol. 15, No. 13, December 1953, p. 67.
[20] Mining World, vol. 15, No. 11, October 1953, p. 92, and Metal Bulletin (London), No. 3849, Dec. 4, 1953, p. 20.
[21] Metal Bulletin (London), No. 3868, February 12, 1954, p. 17.

summer of 1952 mine production has increased steadily and in 1953 totaled 58,500 tons. Ore was concentrated in the rebuilt Bawdwin mill, and in all about 3,900 metric tons of zinc and 8,000 tons of lead were produced in concentrate form. About 8,700 metric tons of lead and 580,000 troy ounces of silver were refined at Namtu during the year. The company plans to increase further its rate of ore production to about 300,000 tons a year, which is well below the 480,000 tons production in effect immediately before World War II. Reserves at the Bawdwin mine were estimated in 1951 to be 2,736,000 long tons containing 12.5 percent zinc and 20 percent lead and 15.5 ounces of silver per ton.

India.—The Geological Survey of India reported an output of 2,800 metric tons of lead concentrates with an average content of 73.08 percent lead and 6.5 percent zinc and 24.78 ounces of silver per ton in 1953. Production was from the Zawar lead-zinc mines of the Metal Corporation of India. These deposits are estimated to contain 1 million tons of high-grade, 2 million tons of medium-grade, and 6 to 8 million tons of low-grade ore. Average content of the ore mined in 1952 was about 5 percent lead and 7 percent zinc. The company smelter at Tundoo, Katrasgarh, Bihar, treated 2,700 tons of concentrates to recover 1,700 tons of lead.

Thailand.—Production of lead ore by the Consolidated Mining Co. increased from 2,000 metric tons in 1952 to 7,100 tons (recoverable metal content about 3,600 tons) in 1953. Exports of ore, all to Canada, totaled 6,000 tons. Lead-zinc ore reserves at the company Nong Plai mine in Kanburi are estimated at 900,000 metric tons; ore mined in 1952 was reported to average 55 to 70 percent combined lead and zinc, with the lead content slightly higher than that of zinc.

AFRICA

Algeria.—Mine output of lead concentrates increased from 6,700 metric tons in 1952 to 11,500 in 1953; lead-metal content was approximately 4,200 and 8,000 tons, respectively. The largest producers were Compagnie des Mines d'Ouasta (3,400 tons), Société Minière & Metallurgigne de Peñarroya (2,700 tons), and Société Algerienne du Zinc (2,300 tons).

Federation of Rhodesia and Nyasaland.—Rhodesia Broken Hill Development Co., Ltd., in northern Rhodesia, the only producer of lead and zinc in the Federation, produced 11,700 metric tons of lead in 1953 compared with 12,800 tons in 1952. The new company lead smelter began operations during the year but owing to technical difficulties operated intermittently and produced only 1,200 tons of lead. The remainder of the output was produced at the old plant, chiefly in Newnam hearth furnaces. Proved and indicated oxide and sulfide ore reserves at the end of 1953 totaled about 2.5 million short tons averaging 17.2 percent lead and 26.7 percent zinc.

French Morocco.—Output of lead concentrates (72 percent lead) decreased from 115,300 metric tons in 1952 to 110,400 in 1953. The sharp drop in world lead and zinc prices early in 1953 caused many small Moroccan lead mines to curtail or suspend operations. Sixteen mines were reported to have shut down by the end of the year, leaving 22 in operation. Three companies—Société des Mines de Zellidja,

Compagnie Royale Asturienne des Mines, and Société des Mines d'Aouli—supplied 86 percent of the entire output. The Zellidja-Peñarroya lead smelter at Oued-El-Heimer processed 42,000 tons of lead concentrate during the year and recovered 27,400 tons of lead. Société des Mines d'Aouli obtained authorization from the Protectorate Government to build and operate a hydroelectric power station in the Upper Moulouya Basin. This authorization was reportedly sought with a view to building a lead smelter near Midelt, which would be well placed to process the concentrates from the mines of the Midelt-Taouz-Haut Guir region, most of which are under the control of the Peñarroya group.

South-West Africa.—Lead content of ores and concentrates produced in South-West Africa in 1953 totaled 59,200 metric tons compared with 52,800 tons in 1952. Virtually the entire output was exported—31,400 tons to the United States and 27,400 to Belgium. The Tsumeb mine of Tsumeb Corp., Ltd., was by far the largest producer, with more than 90 percent of the total output. The South-West Africa Co., operating a mine at Abenab, is the only other producer in the territory. Tsumeb Corp. continued sinking its seven-compartment DeWet shaft, which is to become the main operating shaft of the mine, and installed a mechanical loading plant at Walvis Bay that can handle 300 tons of concentrates an hour.

Tanganyika.—Exports of lead concentrates by Uruwira Minerals, Ltd., from the pilot plant at the Mpanda mine increased from 4,800 tons in 1952 to 6,100 in 1953.[22] Construction of the new 1,200-ton-per-day lead-copper heavy-medium separation and flotation plant at Mukwamba continued satisfactorily.[23] In 1952 the Mutual Security Agency, as agent for the Defense Materials Procurement Agency, agreed to advance $1,640,000 to Uruwira for plant construction. The dollars will be repaid with 5-percent interest by deliveries of copper and lead to United States stockpiles until December 31, 1956. The United States also has a purchase option on up to 50 percent of production for 10 years after the advance and interest have been repaid.

Tunisia.—The output of lead concentrates in 1953 was 37,900 metric tons, a slight gain over 1952. The most important mines were Djebel Semene (7,000 tons), El Grefo (6,200 tons), Sidi Bou Aouane (5,400 tons), and Djebel Hallouf (3,500 tons). Pig-lead output was 27,300 tons; the Megrine smelter furnished 22,800 tons, Djebel Hallouf 1,700 tons, and Bizerte 2,800 tons.

AUSTRALIA

Mine and smelter production of lead increased moderately in 1953 to 249,100 and 175,200 metric tons, respectively. Increased output at the larger mines in New South Wales and Queensland more than offset the small losses incurred by closing of some of the marginal cost producers in Western Australia. Price controls of both zinc and lead, established at A£95 September 4, 1952, were discontinued by Queensland September 13, 1952, but remained in effect in the other

[22] Mining Magazine (London), vol. 90, No. 4, April 1954, p. 207.
[23] Mining World, New Uruwira Mill Discards 50-Percent Feed by HMS to Triple Lead-Copper Flotation Head: Vol. 16, No. 1, January 1954, pp. 49–52, 77.

five States until April 17, 1953. Thereafter both zinc and lead prices declined, reflecting the changes on the London Metal Exchange and elsewhere. The Dominion embargo on export of zinc and lead was removed at the end of March 1953.

In New South Wales the Consolidated Zinc Corp., Ltd., which operates the New Broken Hill Consolidated, Ltd., and the Zinc Corporation, Ltd., mines, milled 542,600 long tons (449,300 tons in 1952) to produce 108,400 tons (87,400) of zinc concentrate and 105,600 tons (77,200) of lead concentrates. Mill heads in 1953 averaged 15.4 percent lead (13.5 percent in 1952) and 11.7 percent zinc (11.2) and 3.4 ounces of silver (3.1). The annual report of the Zinc Corp. lists reserves of 8,300,000 long tons of high-grade ore, with yet larger quantities indicated. Other producers in the Broken Hill district were North Broken Hill, Ltd., and Broken Hill South, Ltd.

Lake George Mining Corp., Ltd., mined complex basemetal ore at Captain's Flat. In the fiscal year ended June 30, 1953, 178,000 long tons was milled compared with 180,000 tons in the preceding fiscal year. Metals contained in marketable products were 14,300 tons of zinc, 8,200 tons of lead, 900 tons of copper, 183,400 ounces of silver, and 4,000 ounces of gold. Ore reserves of 1,600,000 tons average 6.4 percent lead, 11.5 percent zinc, and 0.62 percent copper and 1.39 ounces of silver and 0.07 ounces of gold. The corporation's annual report states that overall costs per ton of ore milled were A£10.7 as compared with A£4.3 in 1947.

Mount Isa Mines, Ltd., milled 623,800 long tons of 6.4-percent zinc and 7.4-percent lead ore in the fiscal year ended June 30, 1953, to recover 41,800 tons of 51.2-percent zinc concentrate and 115,700 tons of 33.8-percent lead concentrate. The lead concentrate was smelted at Mount Isa and the zinc concentrate exported. Estimated reserves of lead-zinc-silver ores at the end of the year totaled 9,880,000 tons containing 8.5 percent lead and 6.9 percent zinc and approximately 6 ounces of silver per ton. Drilling below the limits of open-cut mining showed increased values in lead, zinc, and silver. A new ventilation shaft and air-conditioning plant was being installed. Exploratory diamond drilling in the Northern Prospect area indicated excellent potentialities.

The Electrolytic Zinc Co. of Australasia, Ltd., operated its Rosebery and Hercules mines and during the fiscal year milled 168,800 tons (162,600 tons in 1952) of ore averaging 18.0 percent zinc, 5.2 percent lead, and 0.44 percent copper and 6.45 ounces of silver and 0.09 ounce of gold per ton to recover 48,000 tons of 55.3-percent zinc concentrate, 9,300 tons of 58.6-percent lead, and 4,400 tons of 18.25-percent copper concentrate.

U. S. GOVERNMENT PRINTING OFFICE: 1956

Preprint From

Bulletin 556
BUREAU OF MINES

LEAD

A Chapter From MINERAL FACTS AND PROBLEMS

PROPERTY
OF
AMERICAN SMELTING AND REFINING COMPANY
WESTERN MINING DEPARTMENT
PACIFIC NATIONAL LIFE BUILDING
SALT LAKE CITY 1, UTAH

By O. M. Bishop and R. L. Mentch

UNITED STATES DEPARTMENT OF THE INTERIOR • Douglas McKay, Secretary

BUREAU OF MINES • J. J. Forbes, Director

This publication is a chapter from Bulletin 556, MINERAL FACTS AND PROBLEMS. The complete volume, covering all mineral commodities, may be purchased from the Superintendent of Documents, Washington 25, D. C., at a date to be announced later.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. - Price 20 cents.

LEAD

By

O. M. Bishop[1] and R. L. Mentch[1]

LEAD, the softest and the heaviest of the base metals, is vital to modern civilization, particularly in transportation, communications, and chemical manufacture.

Transportation annually requires over a billion pounds of lead for storage batteries, bearing metals, and tetraethyl gasoline; and equally important, but smaller quantities are used in communications, typemetal, telephone and telegraph-cable coverings, solder, and the glass of electronic tubes. The construction industry also is a large user for pipe, sheet, and calking ingots.

Summary

The use of lead predates the Christian era by 2,000 to 4,000 years. The ancients used the metal in coinage, weights, piping, and corrosion-resistant containers. It was also employed in ceramic glazes and glass. Man still utilizes lead for most of these same products. In addition, a host of newer uses has been developed, including those in storage batteries, bearings, cable coverings, ammunition, type metal, pigments, and chemicals.

The United States is the world's leading source of lead ores and the largest producer and consumer of the metal. During the 29-year period 1925–53 the mines of the United States produced 12,822,000 tons of recoverable lead or for the same period, 26 percent of the total world mine output; and United States industries consumed about 36 percent of the world supply of new lead. In recent years world mine production has increased substantially while United States output has declined; in 1950–53 United States mine output averaged 388,000 tons annually or only 20 percent of the world total, but its consumption totaled 41 percent of the new lead.

World War II marked the beginning of United States dependence on imports for a large portion of its needs. For many years the United States had been self-sufficient in lead; but, beginning in 1940 and continuing thereafter, greatly increased domestic requirements necessitated the importation of large tonnages of foreign metal and ores and concentrates to augment home supplies. The return of the United States to a position of self-sufficiency is highly improbable. Australia, Mexico, and Canada normally are the second, third, and fourth largest producers of lead, and historically Mexico and Canada have been the chief sources of United States imports. Following the United States, other major producers of lead on a mine basis, in order of output in 1953, were Australia, Mexico, U. S. S. R., Canada, Peru, Yugoslavia, and French Morocco. Together with the United States these seven countries produced three-fourths of the total world output in 1953.

[1] Commodity-industry analyst, Bureau of Mines.

Total developed world reserves of lead ore are estimated to contain approximately 40.5 million tons of the metal; in all probability, the lead content of inferred ore is somewhat larger. Of the total developed reserves 10 million tons is in North America, 2.5 million in South America, 10 million in Europe, 3.5 million in Africa, 2 million in Asia, and 12.5 million in Australia. The largest and most important known reserves are in Australia, Canada, the United States, Mexico, Peru, Argentina, Bolivia, Germany, Spain, Italy, Sweden, U. S. S. R., Yugoslavia, French Morocco, Algeria, and Burma.

The various segments of the lead industry in the United States—mining, smelting and refining, secondary-recovery operations, fabricating, and marketing—are limited in varying degrees to relatively few companies. The 5 largest producers, on a mine basis, normally supply over half of the total United States output; almost all the primary refining capacity is controlled by 4 companies; and in marketing 2 companies are preeminent. However, over 200 companies are engaged in secondary-recovery operations, which, in the 12 years 1942–53, produced an average of 428,000 tons of recovered lead annually.

World production of primary and secondary lead in recent years (1948–54) has been well in excess of world requirements; consequently, large stocks have accumulated. In 1950 and 1951 consumer demand and the stockpiling program not only stimulated further production but absorbed much of the excess output. When in 1952 stockpiling and world consumption were both cut back, prices began to fall. Much of the excess production was shipped to the United States to be sold in competition with domestic output. Prices fell rapidly, many mines closed, and by 1954 domestic mine production was at the lowest rate in 20 years. In the second half of 1954 resumption of United States stockpiling and increased world consumption tended to alleviate the market situation somewhat, and there were indications that domestic production was reviving. The solution to the world problem of oversupply would appear to be increased consumption with market research guiding any future production-expansion programs. Since consumption is stimulated by low lead prices, every effort must be made to improve extraction techniques and to lower costs per unit of output.

BACKGROUND

HISTORY OF LEAD INDUSTRY (*19*) [2]

Lead is among the metals longest known to man. Many of the earliest known writings refer to lead. Its uses in pipe, sheet metal, weights, and solder and in glass and ceramic glazes were known in various degrees by the ancient Egyptians, Phoenicians, Greeks, and Romans. The Phoenicians worked lead mines in Cyprus, Sardinia, and Spain, and the famed lead-silver mines of Laurium, Greece, supplied the ancient Greeks with much of their revenue. The Romans mined lead in what is now Rumania, France, England, Spain, and Italy. The great quantities of silver that enriched Rome for 6 centuries were derived from lead smelting-refining operations in Spain, Sardinia, and Britain.

In the United States lead was mined and smelted in Virginia as early as 1621, and the discovery of lead in the Upper Mississippi Valley was reported in 1690. Various efforts were made by the French to establish lead-mining operations in what is now the Southeast Missouri lead district during the first part of the 18th century, but it was not until 1763 that the area began producing on a continuous basis. The mines of the Upper Mississippi Valley were important sources of lead during much of the 19th century but have since declined, owing to exhaustion of the surface concentrations. In 1867 new discoveries in Southeast Missouri at depths of over 100 feet led to the further development of one of the most productive lead regions in the world. The year 1953 marked the 46th consecutive year in which Southeastern Missouri was the leading lead-producing mining district in the United States.

Early lead production in the United States was small; the average yearly output from 1801 through 1810 was only 1,000 tons. Production increased progressively during the early part of the 19th century. From 1831 to 1840 the United States produced about 10,000 tons of lead a year—approximately 10 percent of the total world output. The Missouri and Upper Mississippi Valley areas were the principal producing regions during that time. Lead production from 1840 through 1870 was essentially at the same rate as in the decade 1831–40; but world production had increased so that during 1861–70 United States production was only 4 percent of the world total.

[2] Italicized figures in parentheses refer to items in the bibliography at the end of this chapter.

Completion of the first transcontinental railway in 1869 gave great impetus to the lead-mining industry. An era of prospecting followed that led to discovery of lead deposits at Eureka, Nev.; Bingham Canyon, Park City, and Big and Little Cottonwood Canyons, Utah; Leadville, Colo.; Cerro Gordo, Calif.; Bonne Terre and Joplin, Mo.; and the Coeur d'Alene, Idaho. Production increased sharply in the 1870's; the average yearly output from 1871 through 1880 was 60,000 tons, approximately 16 percent of the world output.

Mine and smelter production increased rapidly during the 1880's and 1890's. The average yearly output from 1881 through 1890 was about 140,000 tons—nearly 30 percent of the world total. The United States became the world's largest lead producer during the 80's, and for the decade 1891–1900 production was annually over 200,000 tons, or more than 25 percent of the total world output.

Lead production increased remarkably from 1900 through 1929. In 1900 the mine production of recoverable lead totaled 270,000 tons, and by 1925 it was 684,000 tons—over one-third of the total world output. The United States attained its greatest mine output during 1925–29, when the average yearly production was 662,000 tons.

The development of selective flotation has contributed greatly to the mining industry since 1925 by making it possible to selectively concentrate the lead occurring in many complex western ores. Smelting and refining capacity was increased during the first 25 years of the 20th century, and recovery of lead from scrap has increasingly become a more important element of lead supply, so that in recent years secondary production has been over a third of the United States total lead supply.

The United States continued to be the world's leading lead-mining nation throughout the 1925–53 period; but owing to increased requirements, beginning in 1940, imports were necessary to fulfill domestic needs.

SIZE, ORGANIZATION, AND GEOGRAPHIC DISTRIBUTION OF INDUSTRY

Lead is one of the most important nonferrous metals produced and used in substantial tonnages by modern industrialized nations. From 1925 through 1953 United States mine production of lead ranged from 684,000 tons to 273,000 and for the 29 years averaged 442,000 tons or

about 26 percent of the total world output. In addition to the smelting-refining industry based on the reduction of ores and concentrates, the smelting of scrap lead is an important factor in the lead supply of the United States; since 1946 such production has averaged 472,000 tons annually, exceeding mine production. United States consumption (primary and secondary) from 1941 through 1953 has averaged more than 1,100,000 tons annually or considerably more than half of total world consumption.

A comparison of the lead industry of the United States with that of the world is given in table 1. The table includes data on the consumption of primary lead.

Economic lead-mineral deposits are widely distributed on all continents of the world; consequently lead mining and smelting operations are performed in many countries. In 1953, 21 countries produced over 10,000 short tons of lead on a mine basis, and 34 other countries produced smaller quantities. The United States was by far the largest producer, followed by Australia, Mexico, U. S. S. R., Canada, and Peru. Together these countries produced nearly 1,400,000 tons of lead or two-thirds of the world total.

In 1953 there were 94 smelters and refineries in 30 countries. The smelter production in the United States, Mexico, U. S. S. R., Australia, Canada, and West Germany comprised 70 percent of the total output.

World mine and smelter production, by countries, is given in tables 2 and 3 and smelting and refining facilities in the United States and foreign countries in tables 4 and 5.

TABLE 1.—*Comparison of lead industry of the United States with world totals 1925–53* [1]

[Thousand short tons]

Year	Mine production			Smelter production			Primary consumption [2]		
	Total	United States	Remainder of world	Total	United States [3]	Remainder of world	Total	United States	Remainder of world
1925	1,683	684	999	1,717	702	1,015	1,627	688	939
1926	1,765	684	1,081	1,805	729	1,076	1,701	755	946
1927	1,849	665	1,184	1,898	700	1,198	1,749	695	1,054
1928	1,809	627	1,182	1,858	653	1,205	1,786	702	1,084
1929	1,890	648	1,242	1,968	702	1,266	1,820	727	1,093
1930	1,819	558	1,261	1,869	608	1,261	1,700	575	1,125
1931	1,461	405	1,056	1,530	412	1,118	1,412	399	1,013
1932	1,315	293	1,022	1,279	271	1,008	1,192	275	917
1933	1,305	273	1,032	1,273	257	1,016	1,301	313	988
1934	1,446	287	1,159	1,464	310	1,154	1,485	333	1,152
1935	1,523	331	1,192	1,524	324	1,200	1,582	389	1,193
1936	1,656	373	1,283	1,629	399	1,230	1,739	490	1,249
1937	1,863	465	1,398	1,852	467	1,385	1,922	551	1,371
1938	1,942	370	1,572	1,873	365	1,508	1,808	400	1,408
1939	1,902	414	1,488	1,909	446	1,463	(4)	(4)	(4)
1940	1,936	457	1,479	1,936	517	1,419	(4)	(4)	(4)
1941	1,784	461	1,323	1,875	545	1,330	(4)	(4)	(4)
1942	1,793	496	1,297	1,835	549	1,286	(4)	(4)	(4)
1943	1,584	453	1,131	1,644	469	1,175	(4)	(4)	(4)
1944	1,281	417	864	1,424	465	959	(4)	(4)	(4)
1945	1,257	391	866	1,233	443	790	(4)	(4)	(4)
1946	1,268	335	933	1,165	338	827	1,352	542	810
1947	1,498	384	1,114	1,455	441	1,014	1,605	744	861
1948	1,570	390	1,180	1,504	400	1,104	1,578	745	833
1949	1,692	410	1,282	1,648	476	1,172	1,478	579	899
1950	1,840	431	1,409	1,808	505	1,303	1,922	885	1,037
1951	1,863	388	1,475	1,763	415	1,348	1,818	678	1,140
1952	2,028	390	1,638	1,940	472	1,468	1,757	782	975
1953	2,094	342	1,752	1,973	468	1,505	1,931	784	1,147
Average	1,680	442	1,238	1,678	478	1,200	1,648	592	1,056

[1] Sources: Materials Survey—Lead, Bureau of Mines and Geological Survey, 1951; Yearbooks of the American Bureau of Metal Statistics; and various Bureau of Mines data. It should be borne in mind that world statistics contain numerous estimates, some of which are based on incomplete information.

[2] It is aimed, so far as possible, to have the accounting by countries on the basis of new lead, hence United States totals will not correspond with domestic consumption figures given elsewhere in this report.

[3] Refined lead production, excluding that produced from foreign base bullion.

[4] Comprehensive data not available.

TABLE 2.—*World mine production of lead, by countries, 1944–48 (average) and 1949–53* [1]

[Metric tons]

Country	1944–48 (average)	1949	1950	1951	1952	1953
North America:						
Canada	170, 611	144, 945	150, 317	143, 544	153, 170	177, 618
Cuba	13	47	12	----------	----------	----------
Guatemala	438	3, 154	3, 000	3, 300	4, 200	7, 066
Honduras	29	449	279	454	538	[2] 989
Mexico	189, 438	220, 763	238, 078	225, 468	246, 027	221, 549
Salvador [3]	40	530	530	470	100	----------
United States [4]	347, 970	371, 860	390, 838	352, 135	353, 947	310, 139
South America:						
Argentina	19, 925	16, 000	[3] 20, 000	[3] 20, 000	18, 000	15, 400
Bolivia (exports) [4]	12, 782	26, 311	31, 176	30, 558	28, 291	23, 788
Brazil	[3] 495	2, 000	4, 000	3, 500	2, 800	3, 000
Chile	1, 978	2, 859	3, 318	7, 801	[3] 4, 000	[3] 3, 200
Ecuador	279	380	229	30	114	114
Peru	50, 807	65, 357	62, 118	82, 350	98, 069	122, 900
Europe:						
Austria	2, 433	4, 297	4, 440	4, 522	5, 503	5, 150
Bulgaria [3]	4, 500	10, 000	10, 000	10, 000	10, 000	(5)
Czechoslovakia	[3] 2, 000	(5)	(5)	(5)	(5)	(5)
Finland	146	130	142	216	216	217
France	6, 498	10, 004	12, 430	10, 074	11, 815	11, 530
Germany:						
East [3]	[6] 1, 375	2, 500	2, 500	2, 600	2, 600	(5)
West	[6] 16, 930	40, 944	44, 830	50, 377	51, 597	62, 901
Greece [7]	775	1, 200	5, 800	3, 800	6, 000	5, 700
Hungary	60	(5)	300	(5)	(5)	(5)
Ireland	----------	152	375	1, 207	1, 118	(5)
Italy	14, 900	35, 800	40, 100	40, 200	40, 100	40, 500
Norway	113	301	234	414	413	500
Poland [8]	12, 677	17, 850	18, 000	18, 000	20, 000	21, 300
Portugal	384	746	1, 311	1, 621	1, 921	1, 700
Rumania [3] [8]	2, 673	4, 000	4, 000	4, 000	5, 000	6, 000
Spain	31, 366	29, 685	39, 266	40, 442	42, 384	54, 204
Sweden	20, 395	23, 900	22, 673	19, 693	20, 593	23, 714
U. S. S. R. [3] [8]	54, 200	90, 000	111, 600	128, 400	154, 200	183, 200
United Kingdom	3, 017	2, 505	3, 336	4, 925	5, 774	4, 357
Yugoslavia	42, 434	72, 144	86, 039	78, 750	78, 968	85, 152
Asia:						
Burma [3]	10	300	1, 000	2, 000	3, 000	8, 000
China [3]	300	1, 000	1, 200	1, 500	2, 000	(5)
Hong Kong	----------	----------	----------	179	300	300
Iran	----------	----------	2, 000	1, 100	17, 500	16, 300
Japan	8, 165	9, 132	10, 896	12, 876	17, 484	18, 516
Korea:						
Korea, Republic of	[3] 5, 882	87	40	----------	142	149
North Korea [3]		5, 000	3, 000	(5)	(5)	(5)
Philippines	17	550	879	571	2, 300	2, 434
Thailand (Siam)	----------	183	691	1, 321	1, 048	3, 600
Turkey	815	200	260	600	[3] 1, 000	[3] 1, 400
Africa:						
Algeria	935	1, 121	1, 393	2, 838	4, 220	7, 950
Belgian Congo	658	180	----------	----------	----------	----------
Egypt	12	12	1	144	15	99
French Equatorial Africa	2, 788	731	1, 814	2, 504	3, 551	4, 424
French Morocco	16, 819	37, 155	48, 759	68, 134	83, 608	78, 860
Nigeria	73	29	12	4	27	35
Northern Rhodesia [8]	8, 057	14, 169	13, 905	14, 194	12, 802	11, 694
Southern Rhodesia	60	83	----------	----------	----------	62
South-West Africa	9, 340	38, 400	33, 680	39, 230	[4] 52, 842	[4] 59, 227
Spanish Morocco	150	159	178	370	732	[3] 600
Tanganyika	2	----------	652	1, 561	2, 833	[3] 3, 500
Tunisia	9, 353	17, 767	18, 860	21, 250	23, 270	23, 700
Uganda (exports)	4	39	44	9	8	16
Union of South Africa	151	166	600	900	575	500
Australia	193, 383	216, 918	222, 694	228, 407	236, 780	249, 099
Total (estimate)	1, 286, 000	1, 550, 000	1, 670, 000	1, 690, 000	1, 840, 000	1, 900, 000

[1] Compiled by the Bureau of Mines Division of Foreign Activities for the Lead chapter of Minerals Yearbook, 1953; incorporates a number of revisions of data published in previous lead chapters.
[2] Imports into United States.
[3] Estimate.
[4] Tonnage recoverable from ore.
[5] Data not available; estimate included in total.
[6] Average for 1945–48.
[7] Includes lead content of zinc-lead concentrates.
[8] Smelter production.

TABLE 3.—*World smelter production of lead by countries where smelted, 1944–48 (average) and 1949–53*[1 2]

[Metric tons]

Country	1944–48 (average)	1949	1950	1951	1952	1953
North America:						
Canada	144, 004	132, 608	154, 551	147, 609	166, 367	150, 915
Guatemala	121	68	271	60	316	658
Mexico	184, 397	212, 004	230, 831	219, 107	237, 443	214, 972
United States (refined)[3]	378, 734	431, 692	458, 171	376, 142	428, 597	424, 309
South America:						
Argentina	21, 005	18, 037	18, 960	24, 000	20, 000	13, 000
Brazil	296	1, 172	4, 200	[4] 3, 000	1, 946	2, 450
Peru	36, 496	36, 017	31, 693	44, 247	48, 622	59, 160
Europe:						
Austria [5]	5, 758	9, 841	10, 910	11, 147	10, 316	11, 836
Belgium [5]	28, 869	79, 304	62, 094	72, 821	79, 506	76, 351
Czechoslovakia	[6] 3, 419	([7])	([7])	([7])	([7])	([7])
France	20, 841	54, 450	61, 236	47, 974	51, 538	54, 917
Germany:						
East	[4] 58, 660	[4] 10, 000	[4] 12, 000	16, 800	[4] 18, 000	[4] 18, 000
West		54, 551	66, 619	76, 063	92, 682	106, 775
Greece	908	2, 389	2, 125	3, 890	2, 460	[3] 2, 500
Hungary	[8] 674	([7])	300	([7])	([7])	([7])
Italy	12, 752	26, 346	37, 469	36, 480	34, 931	37, 994
Poland	12, 677	17, 850	18, 000	18, 000	20, 000	21, 300
Portugal	263	304	591	724	1, 065	([7])
Rumania [4]	2, 673	4, 000	4, 000	4, 000	5, 000	6, 000
Spain	30, 988	33, 021	40, 568	44, 711	46, 543	51, 249
Sweden	9, 947	10, 757	16, 681	9, 307	11, 390	16, 410
U. S. S. R. [4]	54, 200	90, 000	111, 600	128, 400	154, 200	183, 200
United Kingdom [4]	2, 800	2, 134	3, 048	4, 158	3, 986	4, 357
Yugoslavia	28, 500	56, 760	57, 204	60, 068	67, 180	70, 796
Asia:						
Burma	1, 514	230	11	4, 966	2, 675	8, 746
China	524	[5] 2, 062	[4 5] 4, 000	[4 5] 5, 000	[4 5] 6, 000	[4 5] 9, 000
India	182	603	636	873	1, 150	1, 728
Indochina	10	----	----	----	----	----
Japan	12, 826	7, 716	9, 984	10, 740	15, 156	17, 724
Korea:						
Korea, Republic of	[9] 183	100	([7])	([7])	126	50
North Korea	[9] 4, 333	[4] 5, 000	[4] 3, 000	----	----	[4] 2, 000
Africa:						
French Morocco	564	7, 073	12, 097	22, 322	30, 088	27, 433
Northern Rhodesia	8, 057	14, 169	13, 905	14, 194	12, 802	11, 694
South-West Africa	29	----	----	----	----	----
Tunisia	9, 541	19, 429	23, 536	22, 906	25, 506	27, 280
Australia [10]	155, 234	152, 464	163, 102	168, 418	159, 153	175, 236
Total (estimate)	1, 235, 000	1, 495, 000	1, 640, 000	1, 600, 000	1, 760, 000	1, 790, 000

[1] Data derived in part from Monthly Bulletin of the United Nations, Statistical Summary of the Mineral Industry (Colonial Geological Surveys, London), and the Yearbook of the American Bureau of Metal Statistics.

[2] Compiled by the Bureau of Mines Division of Foreign Activities for the Lead chapter of Minerals Yearbook, 1953; incorporates a number of revisions of data published in previous lead chapters.

[3] Figures cover lead refined from domestic and foreign ores; refined lead produced from foreign base bullion not included.

[4] Estimate.

[5] Includes scrap.

[6] Average for 1945–48.

[7] Data not available; estimate included in total.

[8] Data represent Trianon Hungary after October 1944.

[9] Average for 1946–48.

[10] Excluding lead content of bullion exported, figures for which are as follows: 1944–48 average, 14,609 metric tons; 1949, 33,145; 1950, 37,615; 1951; 32,384; 1952, 38,314; 1953, 34,840.

TABLE 4.—*United States primary lead smelting and refining capacity, 1953* [1]

SILVER-LEAD SMELTERS

Location	Company	Annual capacity (short tons charge)
East Helena, Mont.	American Smelting & Refining Co.	336,000
El Paso, Tex.	do.	300,000
Leadville, Colo.	do.	180,000
Selby, Calif.	do.	192,000
Bradley, Idaho	Bunker Hill & Sullivan Mining & Conc. Co.	300,000
Tooele, Utah	International Smelting & Refining Co.	300,000
Midvale, Utah	U. S. Smelting, Refining & Mining Co.	250,000
Total		1,858,000

SILVER-LEAD REFINERIES

Location	Company	Annual capacity, refined lead (short tons)
Selby, Calif.	American Smelting & Refining Co.	72,000
Barber, N. J.	do.	144,000
Omaha, Nebr.	do.	200,000
Bradley, Idaho	Bunker Hill & Sullivan Mining & Conc. Co.	100,000
East Chicago, Ind.	U. S. S. Lead Refinery, Inc.	40,000
Midvale, Utah	U. S. Smelting, Refining & Mining Co.	72,000
Total		628,000

SMELTERS AND REFINERIES OF MISSOURI LEAD [2]

Location	Company	Annual capacity, pig lead (short tons)
Herculaneum, Mo. [2]	St. Joseph Lead Co.	120,000
Federal, Ill.	American Smelting & Refining Co.	128,000
Galena, Kans.	Eagle-Picher Mining & Smelting Co.	10,000
Total		258,000

[1] Source: Yearbook of the American Bureau of Metal Statistics, 1953.
[2] The smelting and refining of Missouri lead ore is done in the same plant. The smelting is of a high grade of galena concentrate, which is generally nonargentiferous, although a little desilverization is done by St. Joseph Lead Co.

342241—55——2

TABLE 5.—*Foreign lead smelting and refining capacity, 1953* [1]

Location	Company	Type [2]	Estimated annual capacity for refined lead (short tons)
Argentina:			
Mercedes	Elaboracion General del Plomo, S. A.	S&R	7, 900
Puerto Vilelas (Chaco)	National Lead Co., S. A	do	19, 800
Australia:			
Port Pirie, Southern Australia	Broken Hill Assoc. Smelters Proprietary, Ltd.	do	246, 400
Mount Isa, Queensland	Mount Isa Mines, Ltd	S	55, 100
Austria: Gailitz, Carinthia	Bleiberger Bergwerks-Union	S&R	11, 000
Belgium:			
Beersee	Cie. Met. de la Campine	S	6, 600
Hoboken	Soc. Gen. Met. de Hoboken	S&R	66, 100
Overpelt	Cie des Metaux d'Overpelt-Lommel et de Corphalie.	do	19, 800
Baelen-Wezel	Soc. Anon. des Mines et Fonderies de Zinc de la Vieille Montagne.	do	48, 200
Brazil:			
Apiai, Sao Paulo	Instituto de Pesquisas Tecnologicas	do	3, 900
Panelas, Parana	Plumbum, S. A	do	11, 000
Burma: Namtu, Burma	Burma Corp. (1951), Ltd	do	74, 000
Canada: Trail, B. C	Consolidated Min. & Smg. Co. of Canada	do	220, 000
Czechoslovakia:			
Banska Stiavnica	State-owned	do	1, 600
Pribram	do	do	4, 400
France:			
Montagne	Cie Royale Asturienne des Mines	do	4, 100
Couëron	Soc. Anon. des Mines et Fonderies de Pontgibaud.	do	27, 500
L'Estaque	Soc. Min. et Met. de Peñarroya	R	19, 800
Noyelles Godault	do	S&R	79, 400
Saint-Denis (Seine)	Ste. Francais des Metaux et Alliages Blanco.	do	22, 000
Federal Republic of Germany:			
Mechernich	Gewerkshcaft Mechernicher Werke	do	14, 300
Hamburg	Norddeutsche Affinerie	do	33, 100
Clausthal & Lautenthal	Preussag-Harzer Berg-und Hüttenwerke	do	26, 400
Braubach	Blei- und Silberhütte Braubach	do	44, 100
Binsfeldhammer	Stolberger Zink A.-G. f. Bergbau u. Zinkhüttenbetrieb.	do	55, 100
Oker (Harz)	Unterharzer Berg- und Hüttenwerke G. m. b. H.	do	26, 400
Friedrich-August-Hütte, Post Nordenham.	Metallwerke Unterweser A.-G	do	26, 400
East Germany:			
Hettstedt	Mansfeldscher Kupferschieferbergbau A. G	do	3, 300
Freiberg (Saxony)	Vereiningung Volkseigener Betriebe-Buntmetall.	do	11, 000
Greece: Laurium	Cie. Francaise des Mines du Laurium	do	6, 600
Guatemala: Villa Linda-Huehuetenango	Compania Minera de Huehuetenango, S. A	S	
India: Tundoo, Katrasgarh	The Metal Corp. of India, Ltd	S&R	6, 600
Italy:			
Monteponi, Sardinia	Soc. di Monteponi	do	13, 200
La Spezzia	Soc. Min. & Met. di Pertusola	do	26, 400
S. Gavino Monreale, Sardinia	Montevecchio Soc. Italiana del Piombo e dello Zinco.	do	39, 700
Japan:			
Kamioka	Mitsui Mining & Smelting Co., Ltd	do	7, 900
Takehara	do	do	7, 100
Hosokura	Mitsubishi Metal Mining Co. Ltd	do	11, 900
Saganoseki	Nihon Mining Co. Ltd	do	12, 700
Aizu	Nihon Soda, K. K	R	2, 000
Chirigishima and Annaka	Toho Aen K. K	S&R	2, 900

See footnotes at end of table.

TABLE 5.—*Foreign lead smelting and refining capacity, 1953* [1]—Continued

Location	Company	Type [2]	Estimated annual capacity for refined lead (short tons)
Mexico:			
Monterrey, N. L.	American Metal Co. Ltd.	R	108,000
Do.	American Smelting & Refining Co.	do.	216,000
Torreon, Coah.	American Metal Co. Ltd.	S	
Chihuahua	American Smelting & Refining Co.	do.	
San Luis Potosi	do.	do.	
Concepcion del Oro, Zacs.	Mazapil Copper Co., Ltd.	do.	
Mazatlan	Met. Occidental, S. A. (Mosa)	do.	
Morocco: Oued-el-Heimer	Fonderies Peñarroya-Zellidja	S&R	38,600
Netherlands: Arnhem	N. V. Hollandsche Metallurgische Bedrijven	do.	6,600
Peru: Oroya	Cerro de Pasco Corp.	do.	77,200
Poland:			
Trzebinia	Giesche Sp. Akcyjna	do.	11,000
Mala Dabrowka	Giesche Sp. Akcyjna (Huta Walther Croneck).	do.	16,500
Strzybnica	Polska Huta (Tarnowitz)	do.	33,100
Brzozowice-Kamien	Zaklady Hohenlohego	R	3,100
Federation of Rhodesia and Nyasaland:			
Broken Hill, Northern Rhodesia	Rhodesia Broken Hill Dev. Co.	S	19,800
Rumania:			
Firija de Jos, Satu Mare	State Mines, Baia-Mare Soc. "Minaur"	S&R	5,500
Baia-Mare, Lucaci	Phönix, Fabrica de Acid Sulfuric si Prod. Chim.	do.	3,600
Spain:			
Linares (Jaén)	Cia. "La Cruz"	do.	40,200
Malaga	Cia. Min. Met. Los Guindos	do.	22,000
Peñarroya	Soc. Min. et Met. de Peñarroya	do.	66,100
Santa Lucia, Cartagena (Murcia)	do.	do.	33,100
Bellmunt de Ciurana (Tarragona)	Minas del Priorato	do.	6,600
Renteria	Cie. Royale Asturienne des Mines	do.	8,800
Linares (Jaén)	Cia. Sopwith	do.	27,500
Alsúa (Vizcaya)	Industrias Reunidas Minero-Metalurgicas	do.	13,200
Sweden:			
Rönnskär	Bolidens Gruv A. B.	do.	22,000
Fliseryd	Svenska Ackumulator AB Jungner	do.	5,500
Tunisia:			
Souk-el-Khémis	Soc. Anon. Francaise de Djebel Hallouf	do.	2,600
Mégrine	Soc. Min. et Met. de Peñarroya	do.	27,600
Bizerte	Mines & Fonderies Tunisiennes	do.	3,900
United Kingdom:			
Northfleet	Britannia Lead Co., Ltd.	R	82,700
Rotherhithe & Darley Dale	H. J. Enthoven & Sons, Ltd.	do.	44,100
London, Chester & Newcastle-on-Tyne.	Associated Lead Manufacturers, Ltd.	S&R	82,700
U. S. S. R.:			
Chimkent (Kazakhstan)	State-owned	do.	110,000
Leninogorsk (Kazakhstan)	do.	do.	110,000
Tetiukhe (Siberia)	do.	do.	5,500
Dzhaudzhukau (Caucasus)	do.	do.	16,500
Yugoslavia:			
Mezica	Rudnici i Topionice Olova i Cinka (Trepca)	do.	16,500
Zvecan	do.	do.	66,100

[1] Source: Yearbook of the American Bureau of Metal Statistics, 1953, and Minerais et Metaux Société Anonyme, 1953.

[2] S denotes smelter; R refinery.

The United States primary lead industry is composed of approximately 300 companies engaged in mining, smelting and refining, and marketing lead.

MINING

Six companies—St. Joseph Lead Co., United States Smelting, Refining & Mining Co., American Smelting & Refining Co., Bunker Hill & Sullivan Mining & Concentrating Co., the Eagle-Picher Co., and the Anaconda Copper Mining Co., annually produce about two-thirds of the total domestic mine output of lead. Some of these same companies also have substantial lead-mining interests in foreign countries. Many medium-size and small mining companies supply the remaining third of domestic mine production. In 1952 almost 97 percent of the mine output was recovered at 670 lead and lead-zinc mines, the remaining 3 percent being a by-product of copper, gold-, and silver-mining operations. In that year the 39 largest mines, each producing 4,000 or more tons of recoverable lead and zinc, supplied 74 percent of the lead mined. Only 8 percent was from the 584 lead and lead-zinc mines that produced less than 1,000 tons of combined lead-zinc.

In 1953 production was derived from an estimated 575 mines and prospects. The 25 leading mines yielded 78 percent of the domestic output, the 10 leading mines 61 percent, and the 4 largest mines 43 percent of the total production.

Nearly 60 percent of the lead mine production normally comes from the Western States, chiefly Idaho, Utah, Colorado, Montana, Washington, Arizona, and California. The most important districts or regions are the Coeur d'Alene, Idaho; West Mountain (Bingham), Utah; Summit Valley (Butte), Mont.; Metaline, Wash.; Coso (Darwin), Calif.; and Upper San Miguel, Colo.

The remaining mine production comes from the West Central States and Eastern States. The Southeastern Missouri lead district has been the leading producer of lead in the United States for 46 consesutive years. In 1953 output from this district totaled 126,000 tons or nearly double that from the second largest district. The Tri-State (Joplin) region of Oklahoma, Kansas, and Missouri is one of the larger lead-producing districts, but its importance has declined considerably over the 1925–53 period owing to substantial exhaustion of reserves. Virginia, New York, Wisconsin, Illinois, and Kentucky produce a small fraction of the United States output. The 43 leading districts are listed in table 6, in order of their production in 1953, and mine output of recoverable lead, by States, in recent years, is given in table 7.

All the ores, with some minor exceptions, are beneficiated at mills near the mines to produce concentrates for shipment to the smelters.

SMELTING

Smelting and refining operations require large investments and are economic only when a commensurately large supply of raw material is assured over a number of years. Mining companies not having facilities for treating ores and concentrates sell their product to companies that include smelting and refining in their operations or are primarily engaged in the smelting and refining business. The total primary-lead-refining capacity of the United States at the end of 1953 was approximately 886,000 tons of pig lead. The silver-bearing ores of the Western States are treated at silver-lead smelters and refineries and the low-silver content ores of southeastern Missouri, the Tri-State, and Upper Mississippi Valley region are processed at other plants. Silver-lead refineries supply 628,000 tons of the total annual capacity of refined lead, and refineries of the other primary lead producers have an annual capacity of 258,000 tons of pig lead.

Actual production of refined primary lead in 1953 totaled 468,000 tons, representing an operating rate of 53 percent of capacity.

Table 4 lists the capacities and locations of United States primary smelters and refineries.

SECONDARY RECOVERY

The recovery of lead from lead scrap and other lead-bearing scrap material constitutes an integral and important part of the United States lead industry. About 85 percent of all secondary lead in the United States is recovered as refined lead or lead in alloys in the more than 275 secondary lead smelters in the various States; the remaining 15 percent is recovered at primary smelters and refineries as refined lead or one of several lead alloys, or as lead-bearing brass or bronze in brass mills or the plants of ingot makers.

An exact total of secondary lead smelting and refining capacity is unavailable; however, in view of scrap recovery during recent years, secondary-lead smelter capacity must approximate 550,000 tons annually.

In 1953 more than 200 companies were engaged in the processing of scrap lead. The National Lead Co., with its Magnus Metals Division, is by far the largest producer. The following principal companies produced nearly 80 percent of the secondary lead output in 1953: A. M. A. Corp., American Smelting & Refining Co. (including Federated Metals Division), Bers & Co., Inc., Bowers Battery & Spark Plug Co., Electric Storage Battery Co., Goldsmith Bros. Smelting & Refining Co., Imperial Type Metal Co., Metro Smelting Co., Nassau Smelting & Refining Co. (Western Electric Co.), National Lead Co. (including

Magnus Metals Division), North American Smelting Co., Northwest Lead Co., Pennsylvania Smelting & Refining Co., Price Battery Corp., Schuylkill Products Co., Thos. Seitzinger's Sons, Southern Lead Co., U. S. S. Lead Refinery, Inc., and Hyman Viener & Sons.

The secondary smelters are principally in areas of heavy industrial concentration, usually in the vicinity of big cities, such as New York, Philadelphia, Pittsburgh, Buffalo, Baltimore, Cleveland, Detroit, Chicago, St. Louis, Los Angeles, and San Francisco.

MARKETING

There are two principal types of marketing operations in the lead industry. The first involves the purchase of ores and concentrates by custom smelters. These transactions are largely individual contracts between buyer and seller and vary a great deal with local conditions. The other kind of marketing with which this section treats is the sale of refined lead and various alloys of lead.

The American Smelting & Refining Co. and St. Joseph Lead Co. are the principal sellers of primary refined lead in the United States. These two companies market roughly one-half to three-fourths of all such lead, depending upon the quantity being imported.

The Metal Statistics Yearbook for 1953 lists 18 companies—15 domestic and 3 foreign—engaged in marketing 26 brands of refined lead—21 domestic and 5 foreign. In addition to the American Smelting & Refining Co. and the St. Joseph Lead Co., other important sellers of refined lead in the United States are: The American Metal Co., Ltd.; Northwest Lead Co.; C. Tennant, Sons and Co.; Anaconda Sales Co.; United States Smelting, Refining & Mining Co.; and the Yugoslav Government.

In addition to refined lead from ores, the primary refiners normally market a small amount of refined lead obtained from scrap and about 35,000 tons of antimonial lead. The secondary smelters in turn produce some refined lead; but their products are preponderantly secondary pig metals, including antimonial lead, solder, babbitts, and type metal.

The two major markets for refined lead in the United States are New York and St. Louis, and the bulk of domestically produced lead is sold at prices normally based upon quotations in these markets. The differential between New York and St. Louis prices is about 0.2 cent a pound. Quotations are for pig or common lead.

The Engineering and Mining Journal (Metal and Mineral Markets) daily quotation of pig lead is obtained by compiling the weighted average price of sales made during the day. Weekly averages published in this journal are the arithmetical average of the week's daily prices, while the monthly average price is the arithmetical average of the weekly prices. Pig lead is often sold at the average for the month of shipment or at a predetermined price. Annual contracts are on the basis of the average price of the month of shipment, with a fixed tonnage for each month.

Several types of pig lead are marketed by domestic producers.

Corroding lead.—Normally made by submitting desilverized, chemical, or common lead to a second refining process—but if the ores are initially low in bismuth or the refining is by the Betts process, corroding grade can be produced in a single refining operation. It usually commands a premium of $2 to $3 per ton.

Chemical lead.—A term used to describe the undesilverized lead produced from Southeastern Missouri ores. It also commands a premium of $2 to $3 per ton. These ores contain too little silver for profitable desilverization and are very low in bismuth. Copper is present in small quantities.

Acid lead and copper lead.—These are made by adding small quantities of copper to fully refined and desilverized lead. The principal difference is the maximum quantity of bismuth allowed. After copper is added, these grades serve the same uses as chemical lead and also command a premium.

Desilverized lead.—This is made from the argentiferous lead ores mined in the Rocky Mountain States. Some of these ores contain bismuth. The bullion is desilverized primarily to recover the silver and gold values.

Desilverized and soft leads.—These are used mainly in manufacturing white lead, sheet, pipe, shot, and alloys; some minor uses are the preparation of lead wool, powdered lead, ribbon lead, and assay lead. They serve further for the production of litharge, red lead, orange mineral, and lead salts.

The market prices of most lead compounds and high-lead products bear a fixed relation to the price of pig lead.

The major consuming centers for pig lead in the United States are New York, Chicago, Philadelphia, Baton Rouge, Houston, and St. Louis. Other large lead-consuming areas are Detroit, Cleveland, Baltimore, Boston, Pittsburgh, San Francisco, Buffalo, Cincinnati, Seattle, Los Angeles, Atlanta, Dallas, and Charleston, W. Va.

TECHNOLOGY

ECONOMIC GEOLOGY

Lead ores are aggregates of minerals, one or more of which contains lead in economic quantity. The common lead minerals are galena (lead sulfide), cerussite (lead carbonate), and anglesite (lead sulfate). Galena is the most abundant lead mineral found in deposits that have been exploited in the United States. Galena is commonly associated with zinc, silver, gold, and iron minerals. However, in a few districts the ore bodies are characterized by very simple mineralization, with the lead mineral present to the virtual exclusion of other ore minerals. A noteworthy example is Southeastern Missouri, where the lead ores are generally composed of galena in an essentially nonmetallic gangue, with relatively little silver, zinc, copper, or other valuable metals present.

The principal lead-ore minerals are as follows:

Mineral	Composition	Specific gravity	Lead, percent
Galena	PbS	7.4–7.6	86.6
Anglesite	$PbSO_4$	6.1–6.4	68.3
Cerussite	$PbCO_3$	6.5–6.6	77.5
Pyromorphite	$Pb_5Cl(PO_4)_3$	5.9–7.1	71.4

The more important economic deposits in the United States occur either as cavity fillings or replacements (*5, 6*). The origin of the mineralization in the cavity filling and replacement deposits is similar. The theory that the mineral-bearing solutions were derived from a deep-seated igneous mass is most commonly accepted today. Examples of the cavity-filling type of deposit are the San Juan, Colo., and the Upper Mississippi Basin districts. Replacement-type deposits are classified further as follows: Massive type, as at Leadville, Colo., and Bingham and Tintic, Utah; lodes, as at Park City, Utah, and in the Coeur d'Alenes, Idaho; disseminated, as in the Tri-State district and in Southeast Missouri; and metasomatic, as represented by the Central district, New Mexico.

PROSPECTING AND EXPLORATION

Generally speaking, prospecting is the search for ore, while exploration is the work done to get data on the size, shape, location, and quality of an ore body. Both functions were relatively simple in the 18th and 19th centuries, when such important districts as Southeast Missouri, the Tri-State, Upper Mississippi Valley, and Austinville, Va., were first brought into production. Many silver deposits of Colorado, Utah, Nevada, Idaho, and New Mexico proved to have associated lead minerals, or search in those districts led to the discovery of lead, and great reserves of ores containing zinc and lead were found in the Butte district during exploration for gold, silver, and copper. As the easily discovered ore bodies were exploited, it became necessary to employ new prospecting techniques involving careful geologic mapping of rock formations and structural features that control or may control ore deposition. Through intensive study the mining geologist or exploration engineer has learned the fundamentals of replacement, structural control, contact metamorphism, zonal distribution, structural barriers, wall-rock alteration, oxidation, and tectonics both before and after ore deposition. Utilizing geophysical (*17, 25*) and geochemical (*12*) techniques, largely developed in petroleum exploration, geologists and engineers have worked intensively seeking anomalous conditions indicative of conditions favorable to economic mineralization. At present the Southeast Missouri lead district has been magnetically mapped by airborne methods, as has the famous Tri-State mining district. Geophysics and geochemistry have recently achieved considerable successes in finding copper-lead-zinc ores in the Little River area of New Brunswick, but most discoveries at present are made on the basis of comparative geology and the finding of analogous conditions, which when tested by drill holes or other openings demonstrate whether a discovery has been made.

MINING

Various mining methods, depending on the type of ore body, are used in extracting lead ore. Underground methods employing either open or supported stopes are employed in most production, but open-pit methods have found limited application in the Tri-State district and Washington (*13, 21*). Underground stoping methods in use include block caving, room-and-pillar, with and without roof bolts, shrinkage stopes, cut-and-fill stopes, and timbered stopes. Lead mines amenable to open-pit methods have been restricted to relatively few areas, and at the present have minor importance. Mining methods, their advantages and disadvantages, are described in Bureau of Mines Bulletin 419 (*15*).

Improvements in mining practice in the past 40 to 50 years have been based largely on the development and extensive use of power equipment. Thirty years ago almost all lead ores were loaded by hand shoveling, whereas now all loading is done by power shovels, scrapers, or mucking machines. Transportation also has undergone great changes, as hand tramming

and mule power have been replaced by motor trains operating on heavy-gage track. More recently trackless mining, which utilizes electric- or diesel-powered units, is finding wide usage in the lead and lead-zinc mines of Washington (*10, 18*), the Tri-State, the Upper Mississippi Valley (*1*), and Southeast Missouri.

Other changes in equipment that have done much to improve mine output per manshift include better lighting at working faces, better ventilation (including air conditioning), better and more efficient pumps, and harder hitting light rock drills, using carbide bits.

MILLING

Milling, the physical process by which the lead minerals are concentrated, consists of crushing and grinding to liberate the valuable mineral particles, followed by separation of the lead mineral particles by gravity, flotation, or some combination thereof.

The particular combination of ore-dressing equipment used varies with the quantities and kinds of ore minerals present, their value, the character of the gangue mineral, and the mineral particle sizes. Simple ores, such as coarsely disseminated lead or zinc-lead minerals occurring with a low-specific-gravity gangue, are easily treated in heavy-medium cones, jigs, and tables after being crushed and rolled in closed circuit with vibrating or trommel screens and classifiers to give properly sized feed. Collective or differential flotation of the slime products or of a reground middling product completes the flowsheet. Ores of this kind are common in the mines of the Mississippi Valley and eastern United States, but in some instances the ores are concentrated wholly by flotation.

The more complex sulfide ores consist of disseminated mixtures of fine-grained lead and zinc sulfides, usually accompanied by pyrite, some copper sulfides, and some gold and silver in a quartz or quartz-calcite gangue. Such ores may be complicated further by partial oxidation of the sulfides and high-specific-gravity gangue minerals, such as barite, siderite, rhodochrosite, or fluorite. The usual procedure on such an ore is to crush and grind in closed circuit with classifying equipment to a mesh at which the ore minerals are preponderantly separated from the gangue minerals. When the ore minerals are interlocked, the usual practice is to make a bulk sulfide concentrate, followed by regrinding and selective flotation.

Low capital and operating costs have extended the field of the sink-float method to include pretreatment of certain ores, permitting upgrading of ores diluted by nonselective mining methods.

The concentration and reduction of lead ores are accompanied by loss of metal content, which leaves room for considerable improvement. Present ore-dressing practices result in recovery of 85 to 94 percent of the sulfide lead and up to about 88 percent of the oxidized lead. Sulfide losses consist largely of the extremely fine particles, and although much research has been done and improvements have been made (*16*), the results are still unsatisfactory. The Bureau of Mines is doing basic research to improve recovery of slimed lead and zinc sulfides through improved fine grinding practice and flotation. Other research is directed toward more satisfactory recovery in the flotation of oxidized lead mineral particles (*11*).

SMELTING (*20*)

Lead is recovered from its ores almost exclusively by smelting in blast furnaces or ore hearths employing carbon fuels. Ores or concentrates that contain few impurities may be reduced to metal in roasting hearths. Air is used to oxidize the sulfides and coke or coal to reduce the oxides. Some reduction takes place by the reaction between the metallic oxides and sulfides such as $2PbO+PbS=3Pb+SO_2$. Other reactions between the lead compounds present also take place to produce metallic lead. The ore hearth practice is followed at the Federal, Ill., and Galena, Kans., smelters, where Newnam roasting hearths are used.

In blast-furnace smelting the sulfur in the ores and concentrates must be removed by roasting, which is usually accomplished on a Dwight-Lloyd sintering hearth. The Dwight-Lloyd equipment not only eliminates most of the sulfur but produces a blast-furnace feed of desirable characteristics from the mechanically mixed concentrate, undersized sinter particles, and byproduct dusts and fumes collected in the smelter collecting systems. In some plants fluxes are also a constituent of the sinter. In general, the charge to the lead blast furnace consists of lead sinter, coke, fluxing material (such as silica, lime, etc.), and some lead-bearing furnace byproducts. Air is blown through the charge burning the coke to CO and CO_2 and producing a temperature of approximately 1,400° C. The carbon monoxide formed and the hot solid carbon reduce the oxidized lead compounds to bullion, which settles in the bottom or crucible of the furnace. The slags from ores containing considerable zinc are commonly re-treated in slag-fuming furnaces to recover that zinc and any remaining lead. The lead bullion produced in the blast furnace contains any precious metals present in the ore and some metallic impurities and consequently must be refined.

Metallurgical recoveries at primary lead smelters are generally about 97 to 98 percent of the lead contained in the ore and offer a relatively small margin for improvement, except through lowering the unit cost of processing. Recent modernization programs center largely on roasting, dust collection, and transport equipment within the plants.

REFINING (20)

Lead bullion from the Mississippi Valley ores, termed chemical lead, is pure enough for most commercial uses without further refining. Most of the lead bullion produced by the blast furnace from complex ores contains enough gold and silver to make their extraction profitable. It also contains various base-metal impurities that must be removed before the lead is marketable for end use. The entire sequence of processes for softening and desilverizing lead bullion and the recovery of byproducts is complex and subject to many variations in practice.

Softening consists of the removal of copper, tin, antimony, and arsenic and is usually accomplished in a drossing or refining kettle. The copper is removed by holding the bullion just above the melting point and skimming copper dross from the surface. Agitation, with addition of elemental sulfur, causes the remaining copper to rise to the surface as a black copper sulfide powder, which is skimmed off. After the copper drossing the temperature of the bullion is normally raised and the bath agitated to induce surface oxidation. The tin, arsenic, and antimony are oxidized, and the oxides (being insoluble in the bath) rise to the surface with some lead oxide, which is skimmed off.

The softened bullion usually is desilverized by the Parkes process of stirring metallic zinc into the bullion. Gold and silver, in that order, combine with the zinc, rise to the surface, and are skimmed off as gold and silver zinc crusts. The zinc remaining in the lead after desilverizing is commonly removed by vacuum distillation or with caustic by the Harris process. If bismuth above acceptable limits is present, the bullion must be refined by the Betts electrolytic process, as at Trail, B. C., and East Chicago, or debismuthizing may be accomplished by the newer Kroll-Betterton process applied to the bullion after desilverizing.

BYPRODUCTS AND COPRODUCTS

Approximately two-thirds of the domestic output of lead is produced on a coproduct basis with zinc from mixed lead-zinc ores. The Southeast Missouri district is the only major lead-producing region in the United States where there has been relatively little zinc mineralization. Silver is an important coproduct of lead and lead-zinc mines, particularly in Idaho, Utah, Nevada, and Colorado. Many mines in these States would not have been opened, and many of them could not operate, if it were not for the silver credit, which helps meet the mining and other production costs. In the Southern Illinois–Kentucky district, fluorspar is recovered as a coproduct with lead and zinc. In some western mines copper and lead are produced as coproducts. Cadmium is generally recovered as a byproduct from lead blast-furnace baghouse dust. Other byproducts produced by virtually all western lead mines include gold, antimony, arsenic, and bismuth. In the Central States coarse tailings from jigs and sink-float machines are sold for railway-track ballast and road building. If the tailings are limestone or dolomite they may be sold for agricultural limestone.

FABRICATION

The fabrication of lead and its alloys includes casting, rolling, and extrusion. Lead alloys are suited to casting in a great variety of molds, ranging from those made of sand to those made of wood, paper, rubber, or plaster. Certain lead alloys are readily die-cast. The reclamation value of scrap from castings is almost 100 percent of the original alloy.

Rolling reduces the pig lead to sheets ranging in thickness from foil to 1-inch. The process consists essentially of melting the charge and casting into slabs up to 8 feet wide and 4 to 6 inches thick. The slab is then hot-rolled to a thickness of 1 inch, cold-rolled to the desired thickness, and finally trimmed to the desired size.

Lead and lead alloys can be extruded in a variety of shapes and by various methods. These may be classified into three groups: (1) The processes used in making such shapes as bar, wire, and pipe; (2) those used in producing cable sheathing; and (3) impact extrusion, as employed in manufacturing collapsible tubes.

LEAD COMPOUNDS

Various lead compounds, most important of which are white lead, red lead, and litharge, are produced from pig lead. Leaded zinc oxide is generally made directly from ores.

White lead is the popular name for basic lead carbonate, one of the oldest of the paint pigments. It is produced by a variety of methods, most common of which are the Carter, Euston, Sperry, and Thompson-Stewart processes. The Old Dutch process, most widely used some years ago, is no longer employed.

The Carter or "quick" process is basically the same as the Old Dutch, except that the metallic lead is blown with steam or air to a fine powder and treated with acetic acid, air, water, and carbon dioxide gas in large, revolving wooden cylinders. Under these conditions the corrosion of metallic lead into white lead proceeds at a rapid rate, requiring only 12 to 14 days, as compared to over 100 days by the Old Dutch process.

In the Sperry electrolytic process pure white lead is produced quickly by the electrolysis of a lead acetate solution between lead anodes and iron cathodes in a concrete cell separated by a porous diaphragm.

In the Thompson-Stewart process the chemical reactions involved are essentially the same as in the Carter process; however, the reaction rate is controlled until all the metallic lead has been oxidized to lead oxide, and the latter is reacted with acetic acid, water, and carbon dioxide to produce basic lead carbonate.

Red lead is made by heating litharge (lead monoxide) in a reverberatory furnace at 900° to 950° F. At this temperature the litharge gradually absorbs oxygen from the air and is converted to red lead. About 24 hours are required to make 85-percent grade, a longer time being required for the grades of higher red-lead content.

Litharge is produced for commercial purposes by roasting pig lead in a reverberatory furnace in the presence of air, which furnishes the oxygen for the conversion to lead monoxide. The lead oxide lumps are then ground to a powder.

Leaded zinc oxide, a pigment consisting of zinc oxide and basic lead sulfate, is manufactured by mixing lead sulfide ore with roasted zinc ore and coal and heating in a furnace. Under proper conditions, a fume of zinc oxide and basic lead sulfate is obtained, which then is cooled and collected in a baghouse. Blended leaded zinc oxides are made by dry-mixing zinc oxide and basic lead sulfate in the proper proportions.

RESERVES (*9*)

Lead-ore reserves are widely distributed on all continents, with important deposits in the United States, Canada, Mexico, Greenland, Guatemala, Peru, Bolivia, Argentina, and Chile, in North and South America and in many countries of Europe, Africa, and Asia, as well as in Australia. The total world reserves of lead in the measured and indicated classification are about 40.5 million tons. Between 80 and 90 percent of these reserves are classified as recoverable. Reserves of inferred ore will probably be as much or more. Of total measured and indicated reserves, approximately 10 million occurs in North America, 2.5 million in South America, 10 million in Europe, 3.5 million in Africa, 2 million in Asia, and 12.5 million in Australia.

North America.—The United States, with Canada and Mexico, have about 25 percent of the world's developed reserves or about 10 million tons of lead. Of this quantity the United States has about 2.5 million tons, Canada about 6.5 million, and Mexico about 1 million. Inferred reserves in the United States are estimated at about 5 million tons, while those in Canada and Mexico are believed to be at least as large as developed reserves.

The United States has maintained its preeminence in mine and smelter output of lead by maintaining sources of ore. Since January 1950 numerous exploration, development, and modernization programs to lower unit cost have been undertaken. These include development and plant expansion at the Iron King mine, Arizona; exploration and plant expansion at Telluride mines, Colorado; numerous extensive exploration programs in the Couer d'Alenes; exploration, development and construction at Hayden Creek, Indian Creek, and Madison mines in Missouri; mine exploration and development program by the Eureka Corp., Ltd., Nevada; development and operation of the Van Stone open-pit mine and expansion program at the Pend Oreille mine, Washington; mine development and expansion of plant facilities at the Austinville and Ivanhoe mines, Virginia; and mine exploration, development, and plant construction in southwest Wisconsin. Modernization programs to improve costs and metal recovery have been completed or are in progress at the Selby, Kellogg, Falena, and Herculaneum smelters.

Since 1950 prospecting, exploration, and preliminary development in Canada have indicated approximately 100 million tons of new lead-bearing ores in the Pine Point area of Northwest Territories and the Bathurst area of New Brunswick. Other important but smaller exploration and development programs include new production of lead-zinc ores at the Blue Bell, H & B, Sil-Van, and Sheep Creek mines, British Columbia; at the United Mantauban mines, Quebec; increased lead production at the United Keno Hill Mines, Yukon Territory; and the coming into production of the Sterling mine (Mindamar Metals Corp), Nova Scotia.

Partial development of the Mestersvig deposit in East Greenland has indicated about 15 million dollars worth of high-grade lead-zinc ore. In Mexico the Nuestra Senora and Minas de Iguala and Topia properties have begun producing lead and zinc.

South America.—Lead reserves in South America are estimated at 2.5 million tons. Peru, Argentina, and Bolivia have the largest supplies. Uncorroborated reports indicate that Chile may have important reserves of both lead and zinc. Lack of development in most South American countries suggests that larger reserves might yet be developed. In Peru the Cerro de Pasco Corp. expanded its mine and mill facilities for the production of zinc and lead. The newly erected facilities at the Chilets mine were put into production in 1952.

Elsewhere numerous exploration and expansion programs have or will result in an increase in world output. Such programs include exploration and plant expansion in Africa, Europe, and Australia.

Europe.—Reserves of measured and indicated lead ore in Europe contain about 10 million tons of lead or approximately one-fourth of the world total. The bulk of these reserves is in Germany, Spain, Italy, and Sweden in Western Europe and in U. S. S. R. (including the Asiatic as well as the European portions), Yugoslavia, and Poland.

Africa.—Lead reserves in Africa total about 3.5 million tons. The largest deposits are in French Morocco, Algeria, and Nigeria (largely undeveloped). Other smaller but important deposits are found in South-West Africa, Northern Rhodesia, Tunisia, French Equatorial Africa, Belgian Congo, and Tanganyika.

Asia.—Lead reserves in Asia are relatively small, totaling about 2 million tons. It is believed, however, that exploration and development work could double the present estimates. The famous Bawdwin mine in Burma, formerly one of the leading world producers of lead, contains the largest reserves. Japan and China are the only other countries with notable reserves.

Australia.—Developed lead deposits in Australia are the largest in the world, containing about 12.5 million tons of lead reserves or nearly one-third of the world total. The important deposits are at Broken Hill and Captain's Flat, New South Wales; Mount Isa, Queensland; and the Read-Rosebery mine, Tasmania.

SUPPLY—DISTRIBUTION

Supply and distribution data may be analyzed by several methods, depending on the purpose for which they are to be used. Total supply, as used in this chapter, consists of the recoverable lead content of domestic mine production, secondary production, metallic imports, and the recoverable lead content of imported ores and concentrates. Total distribution is composed of consumption of primary and secondary metal and metallic exports. Supply-distribution statistics for the 29-year period, 1925–53, are shown in table 8. The total supply of lead during this period was 28,668,000 tons compared with total distribution of 27,778,000 tons. This difference of 890,000 tons arises from the inaccuracies of the consumption series, changes in stocks, and Government purchases of lead for the National Stockpile which are not accounted for in the table.

The most significant development in the lead-supply position of the United States over the 1925–53 period has been the transition from self-sufficiency to dependence on foreign sources for a large part of total supply. Domestic sources—mine production and recovery from scrap—were adequate for United States consumption requirements until the beginning of World War II, when the sharply increased military and industrial demands for lead necessitated importation of large quantities of metal and lead-bearing raw materials. Secondary production of lead has also become increasingly important since World War II. Of the total lead supply for 1940–53 domestic mine production contributed 34 percent; recovery from secondary sources 35 percent; and imports 31 percent.

The total available supply of lead in the United States for the 29 years 1925–53 averaged 989,000 tons a year compared with total distribution of 958,000 tons annually. Comparable figures for the 14-year period 1940–53 were 1,192,000 and 1,095,000 tons, respectively.

PRODUCTION AND CONSUMPTION TRENDS

Lead supplies throughout the world slightly exceed total requirements at present. Even in 1951, when consumption of lead in the United States exceeded supply by a slight margin, the deficit was not due to inadequate supplies but rather to the purchase of large quantities of metal for the National Stockpile. The emergency stocking of lead beyond consumers' requirements in Great Britain further aggravated the apparent shortage. Early in 1952 the true situation—that of adequate or excess supplies—became apparent. Imports of both metal and ores and concentrates were available to the United States in greater quantity, smelter stocks increased, and the United States market price fell below the 19-cent-a-pound ceiling to average 16.47 cents in 1952, 13.48 cents in 1953, and 14.05 cents in 1954.

A review of world mine production versus consumption of primary lead (table 1, p. 4) shows that mine production has increased much more rapidly than has consumption. World mine production of lead (in 1952–53) was approximately 4,120,000 tons, but the consumption of primary lead was only 3,688,000

tons. In 1950 and 1951 consumption exceeded mine production by 40,000 tons (3,700,000 tons mine output versus 3,740,000 tons of primary lead consumption), but in 1948–49 mine output was almost 200,000 tons over consumption. As stocks in the hands of producers and consumers increased, prices declined and competition for markets became very keen. Much of the foreign production is derived from large mines and smelting plants capable of producing metal at a lower unit cost than can most domestic mines. Details of domestic mine costs and grade of ore mined in 1952 were published by the Tariff Commission (*29*), and it was noted that, although average labor costs per ton of ore are lower in the United States than in either Canada or Mexico, the metal content is much lower, and hence the cost per unit of lead (and zinc) is much higher in the United States.

Reflecting the substantially lower prices in the second half of 1952, mine production of recoverable lead in the United States dropped from an annual rate of 408,000 tons during the first half of the year to an annual rate of 373,000 tons in the latter half of the year. Production dropped further to 342,000 tons in 1953 and in 1954 totaled 317,000 tons, the lowest since 1934.

Imports of recoverable lead to the United States in 1954 totaled about 444,000 tons, a substantial decrease from 1953 total of 552,000 tons.

In 1949–53 total supply and total distribution of lead were 24 and 4 percent, respectively, higher than in 1925–29. The most notable changes occurred in the sources of supply. Domestic mine production, secondary production, and imports composed 29, 36 and 35 percent, respectively, of supply in 1949–53 compared with 61, 26, and 13 percent, respectively, in 1925–29. The pattern of distribution has changed, in that exports have been negligible in recent years, whereas in 1925–29 exports comprised about 10 percent of total distribution. It should be noted, however, that the lead comprising these exports had been imported in bond for refining and reexport.

MINE PRODUCTION

Mine-output data are compiled on the basis of lead content in ore and concentrates and are adjusted to account for average losses in smelting. Production calculated on this basis gives a closer measure of actual lead output from year to year than statistics prepared on a smelter or refinery basis and is the most accurate method for assessing the geographic distribution of production. Mine production of lead by leading districts and by States in recent years is shown in tables 6 and 7.

Mine production was the most important single source of lead supply in the United States until 1946, when it was surpassed by secondary production. The outbreak of World War II in 1939 marked the beginning of United States dependence upon large imports to supplement production from domestic mines and secondary sources to satisfy consumer demand for lead.

Mine production declined markedly during 1925–53, and the decline is attributed principally to the substantial exhaustion of reserves in several important producing districts, notably the Tri-State region. The average yearly output for selected periods reveals the extent of the decline in United States mine production: 662,000 tons in 1925–29; 377,000 tons in 1930–39; 444,000 tons in 1941–45; 380,000 tons in 1946–49; and 388,000 tons in 1950–53. Other factors, such as the depression of the 1930's, the shortage of skilled workers during World War II, and low prices in 1953, contributed to the drop in production over the 29-year period, but the major cause would appear to be the depletion of reserves in some areas.

SECONDARY PRODUCTION

Secondary lead is recovered in the United States at primary smelters and refineries as refined lead and in antimonial lead and at secondary plants that process scrap exclusively to produce refined lead, antimonial lead, and other lead alloys (copper-base, tin-base, and others).

Recovery of secondary lead averaged 474,000 tons annually or 36 percent of the total supply in 1949–53 compared with 280,000 tons a year or 26 percent of the supply in 1925–29. Table 8 shows that output of lead from secondary materials did not decline to near the extent that mine production did during the depression years of the 1930's. The constancy of the supply of scrap lead accounted for the maintenance of a relatively high level of production of secondary metal during those years. The larger return of scrap is due to the fact that a major part of the lead consumed each year goes into nondissipative uses and eventually returns to the smelter for reworking and reuse. The nature of scrap recovery contributes to the relative stability of secondary production. Unlike a mine, which closes if the price of lead makes operation unprofitable, a factory that uses lead will continue to market its scrap lead, even if the price is very low; plant scrap must be disposed of, and usually it is more profitable to deliver to a smelter than to a waste dump. Cheap labor also facilitates the collection of scrap during periods of depressed economic activity; however, when a depressed state of industrial activity delays replacement of worn or obsolete lead items, the quantity of scrap entering the market is lessened. Secondary

TABLE 6.—*Mine production of recoverable lead in the United States, 1944–48 (average) and 1949–53, by districts that produced 1,000 tons or more during any year*

[Short tons]

District	State	1944–48 (average)	1949	1950	1951	1952	1953
Southeast Missouri region	Missouri	141,719	126,269	133,680	122,318	122,942	125,273
Coeur d'Alene region	Idaho	70,488	74,152	94,697	70,570	67,330	69,885
West Mountain (Bingham)	Utah	24,614	32,600	27,472	29,120	34,328	29,311
Summit Valley (Butte)	Montana	6,465	11,490	15,679	16,630	16,153	16,767
Tri-State (Joplin region)	Kansas, Southwestern Missouri, Oklahoma.	25,224	30,883	31,157	26,906	27,356	13,273
Metaline	Washington	3,751	4,030	7,445	5,234	(1)	8,694
Coso (Darwin)	California	5,632	4,928	8,479	7,191	(1)	8,269
Upper San Miguel	Colorado	2,433	5,285	7,780	8,008	7,657	7,440
Park City region	Utah	10,521	8,583	7,538	11,719	7,494	4,735
Big Bug	Arizona	2,076	3,330	4,357	4,035	4,135	4,339
Upper Mississippi Valley	Iowa, Northern Illinois, Wisconsin.	1,851	2,046	1,801	1,923	3,532	3,688
Tintic	Utah	5,325	6,676	6,520	5,553	4,279	3,590
Pioche	Nevada	3,927	6,630	6,761	4,751	4,632	3,306
California (Leadville)	Colorado	4,850	5,080	6,392	5,996	5,624	3,072
Rush Valley & Smelter (Tooele County).	Utah	3,587	2,953	1,393	2,674	2,595	2,753
Warm Springs	Idaho	2,102	2,339	2,648	3,086	3,455	2,583
Red Cliff	Colorado	950	1,600	2,110	4,274	3,980	2,500
Northport (Aladdin)	Washington	447	342	237	937	(1)	2,165
Harshaw	Arizona	1,472	1,546	1,931	1,668	1,921	2,104
Austinville	Virginia	4,269	3,313	3,254	1,508	3,792	2,016
Pioneer (Rico)	Colorado	2,383	1,388	1,138	2,231	2,230	1,871
Kentucky, Southern Illinois.	Kentucky, Southern Illinois.	2,648	2,822	1,526	2,516	2,790	1,849
Creede	Colorado	362	1,162	1,422	1,167	1,513	1,696
Bayhorse	Idaho	1,569	1,073	1,679	1,732	1,091	1,484
Central	New Mexico	4,039	2,479	2,315	3,133	4,486	1,460
St. Lawrence County	New York	1,261	1,317	1,484	1,497	1,120	1,435
Sneffels	Colorado	(1)	1,064	866	1,094	1,044	1,307
Animas	do	2,437	2,935	3,069	3,963	3,464	1,212
Eagle	Montana	638	1,024	1,013	(1)	733	1,179
Ophir	Utah	479	1,089	948	712	999	1,157
Breckenridge	Colorado	101	308	347	246	499	1,056
Hansonberg	New Mexico	24	131	451	753	847	1,031
Bossburg	Washington	599	2,011	2,640	1,768	(1)	168
Battle Mountain	Nevada	92	1,290	564	351	907	1
Old Hat	Arizona	4,835	6,788	5,980	4,241	3,913	-------
Pima (Sierritas, Papago, Twin Buttes).	do	2,726	4,232	2,996	2,834	1,864	-------
Heddleston	Montana	2,458	2,335	930	1,398	1,251	-------
Warren (Bisbee)	Arizona	9,692	13,865	7,790	1,606	1,828	-------
Magdalena	New Mexico	1,790	1,162	926	1,004	1,046	-------
Aravaipa	Arizona	575	1,271	1,498	1,294	865	-------
Tomichi	Colorado	863	1,221	645	761	739	-------
Ten Mile	do	1,415	3,671	910	6	8	-------
Resting Springs	California	(1)	(1)	(1)	(1)	(1)	-------

[1] Figure not shown to avoid disclosure of individual company operations.

production, by form of recovery and kind of scrap processed in 1952 and 1953, is shown in table 9.

IMPORTS

The United States did not become dependent on imports of foreign lead for any sizable portion of its supply until the beginning of World War II. From 1925 to 1939 the bulk of United States imports was as base bullion and ore and matte, which were entered for smelting and refining and subsequent reexport.

Beginning in 1940, when it became apparent that domestic sources of lead would not meet the greatly increased demand, and continuing to the present a large part of the total United States supply has been obtained from foreign

TABLE 7.—*Mine production of recoverable lead in the United States, 1944–48 (average) and 1949–53, by States*

[Short tons]

State	1944–48 (average)	1949	1950	1951	1952	1953
Western States and Alaska:						
Alaska	153	51	149	21	1	9
Arizona	24, 394	33, 568	26, 383	17, 394	16, 520	9, 428
California	8, 404	10, 318	15, 831	13, 967	11, 199	8, 664
Colorado	19, 123	26, 853	27, 007	30, 336	30, 066	21, 754
Idaho	75, 890	79, 299	100, 025	76, 713	73, 719	74, 610
Montana	13, 180	17, 996	19, 617	21, 302	21, 279	19, 949
Nevada	7, 399	10, 626	9, 408	7, 148	6, 790	4, 371
New Mexico	6, 772	4, 652	4, 150	5, 846	7, 021	2, 943
Oregon	5	12	17	2	1	5
South Dakota	12	4	----------	2	2	10
Texas	59	132	129	43	56	--------
Utah	45, 939	53, 072	44, 753	50, 451	50, 210	41, 522
Washington	5, 024	6, 417	10, 334	8, 002	11, 744	11, 064
Wyoming	1	----------	----------	----------	----------	--------
Total	206, 355	243, 000	257, 803	231, 227	228, 608	194, 329
West Central States:						
Arkansas	9	1	9	33	4	--------
Kansas	7, 776	9, 772	9, 487	8, 947	5, 916	3, 347
Missouri	144, 981	127, 522	134, 626	123, 702	129, 245	125, 895
Oklahoma	14, 302	19, 858	20, 724	16, 575	15, 137	9, 304
Total	167, 068	157, 153	164, 846	149, 257	150, 302	138, 546
States east of the Mississippi River:						
Illinois	2, 972	3, 824	2, 729	3, 160	4, 262	3, 391
Kentucky	165	187	66	107	60	52
New York	1, 261	1, 317	1, 484	1, 500	1, 120	1, 435
Tennessee	40	257	113	14	18	9
Virginia	4, 351	3, 313	3, 254	1, 508	3, 792	2, 016
Wisconsin	1, 361	857	532	1, 391	2, 000	2, 094
Total	10, 150	9, 755	8, 178	7, 680	11, 252	8, 997
Grand total	383, 573	409, 908	430, 827	388, 164	390, 162	341, 872

sources. Imports of all classes totaled 277,000 tons in 1940, and increased to 377,000 tons in 1941 and 489,000 tons (the wartime high) in 1942. The yearly average for 1941–45 was 358,000 tons or 31 percent of total supply. Imports declined to 160,000 tons in 1946 but increased thereafter, reaching an alltime high of 623,000 tons in 1952 and averaging 471,000 tons annually in 1949–53.

The character of lead imports changed completely during World War II, principally because imports were not entered for treatment and reexport but for domestic consumption. Whereas pigs and bars represented only a small portion of total imports up to 1940, from 1940 through 1945 imports of this kind comprised 71 percent of the total. Ore and matte, base bullion, and reclaimed (scrap, etc.) were 24, 4, and 1 percent of all imports, respectively. In 1953 imports of pigs and bars, and ore and matte comprised 70 and 29 percent, respectively, of total imports.

Mexico has been the principal source of United States lead imports throughout the 29 years 1925–53 and during 1940–53 supplied about 40 percent of total imports. Canada is the next largest source of United States imports, followed by Peru and Australia. Bolivia, South-West Africa, and Yugoslavia have also shipped sizable quantities of lead as metal or ore to the United States in recent years. Table 10 shows imports of lead, by classes and major countries, for 1940–53.

TABLE 8.—*Salient statistics of the lead industry in the United States, 1925–53* [1]

[Thousand short tons]

Year	Supply				Distribution		
	Total	Recoverable mine production	Recoverable secondary	Imports [2]	Total	Consumption [3]	Exports [4]
1925	1,031	684	227	120	1,030	915	115
1926	1,106	684	277	145	1,122	1,032	90
1927	1,100	665	276	159	1,108	971	137
1928	1,090	627	309	154	1,140	1,011	129
1929	1,073	648	311	114	1,124	1,038	86
1930	890	558	256	76	894	834	60
1931	692	405	235	52	666	634	32
1932	524	293	198	33	504	473	31
1933	504	273	224	7	567	538	29
1934	508	287	208	13	554	541	13
1935	624	331	270	23	675	659	16
1936	659	373	263	23	780	753	27
1937	779	465	275	39	855	826	29
1938	657	370	225	62	680	625	55
1939	741	414	242	85	752	667	85
1940	994	457	260	277	821	782	39
1941	1,235	461	397	377	1,086	1,050	36
1942	1,308	496	323	489	1,071	1,043	28
1943	1,111	453	342	316	1,130	1,113	17
1944	1,063	417	331	315	1,155	1,119	36
1945	1,051	391	363	297	1,067	1,051	16
1946	888	335	393	160	957	956	1
1947	1,121	384	512	225	1,174	1,172	2
1948	1,234	390	500	344	1,135	1,134	1
1949	1,216	410	412	394	961	958	3
1950	1,451	431	482	538	1,242	1,238	4
1951	1,161	388	518	255	1,187	1,185	2
1952	1,484	390	471	623	1,134	1,131	3
1953	1,373	342	487	544	1,207	1,202	5
Average	989	442	331	216	958	919	39

[1] Sources: Bureau of Mines (with the cooperation of the Geological Survey), Materials Survey—Lead: 1951; Yearbooks of the American Bureau of Metal Statistics; and Bureau of Mines Minerals Yearbook.

[2] Factored to include 95 percent of the lead content of ores, mattes, and concentrates, and 100 percent of pigs, bars, base bullion, and scrap. Includes material entering country under bond as well as that for consumption.

[3] Includes primary and secondary metal; data are from various sources

[4] Includes lead that entered the United States under bond.

TABLE 9.—*Secondary lead recovered in the United States, 1952–53*

[Short tons]

Recoverable lead content of scrap processed			Lead recovered from scrap processed		
Kind of scrap	1952	1953		1952	1953
New scrap:			As refined metal:		
Lead-base	51,380	49,902	At primary plants	3,070	4,211
Copper-base	8,083	8,085	At other plants	137,032	122,363
Total	59,463	57,987	Total	140,102	126,574
Old scrap:			In antimonial lead:		
Battery lead plates	254,827	247,332	At primary plants	35,145	36,749
All other lead-base	130,302	152,897	At other plants	187,806	199,806
Copper-base	26,679	28,498			
Tin-base	23	23	Total	222,951	236,555
Total	411,831	428,750	In other lead alloys	93,048	92,379
			In copper-base alloys	14,479	30,826
Grand total	471,294	486,737	In tin-base alloys	714	403
			Total	108,241	123,608
			Grand total	471,294	486,737

TABLE 10.—*United States imports* [1] *of lead, by classes and countries, 1940–53*

[Thousand short tons]

Year	Pigs and bars						Ore and matte [2]					Base bullion	Reclaimed, scrap, etc.	Grand total
	Mexico	Canada	Peru	Australia	Others	Total	Canada	Peru	Australia	Others	Total	Total	Total	
1940	129	------	18	4	1	152	36	18	17	40	111	19	--------	282
1941	100	90	41	43	------	274	23	7	23	29	82	25	--------	381
1942	192	69	22	83	------	366	31	11	21	16	79	44	3	492
1943	215	------	20	9	------	244	20	3	20	27	70	5	--------	319
1944	168	------	54	1	------	223	42	11	27	14	94	-----	3	320
1945	160	19	34	14	------	227	26	15	18	11	70	-----	3	300
1946	54	23	16	8	15	116	24	5	8	7	44	-----	2	162
1947	86	59	1	11	3	160	15	10	7	19	51	1	16	228
1948	98	54	24	30	41	247	8	9	9	38	64	7	29	347
1949	126	56	35	17	41	275	10	9	9	79	107	3	15	400
1950	221	108	32	22	59	442	9	16	10	42	77	3	20	542
1951	37	57	32	14	39	179	7	17	7	37	68	2	9	258
1952	199	105	42	83	82	511	12	28	9	56	105	-----	12	628
1953	141	49	52	70	73	385	39	33	21	68	161	1	5	552

[1] Source: Figures on imports and exports compiled from records of U. S. Department of Commerce. Data include lead imported for immediate consumption plus material entering country under bond.

[2] Not factored as in table 8; hence totals will not coincide with those in that table.

TARIFF

For well over a century there has been a tariff on lead ranging from a low of 15 percent ad valorem to a high of 3 cents a pound, except for periods when such tariffs were suspended by act of Congress. The import duty set by the Tariff Act of 1930 on lead-bearing ores, flue dust, and mattes was 1½ cents per pound (lead content) and on lead bullion, pigs, bars, scrap lead, antimonial lead, type metal, babbitt metal, solder, and alloys not specifically provided for 2⅛ cents per pound. In accordance with the Mexican Trade Agreement of January 30, 1943, these rates were reduced to ¾ cent and 1 1/16 cents per pound, respectively. In June 1948 these duties were suspended for 1 year by act of Congress. As the Congress took no action on a bill to extend the suspension beyond June 30, 1949, the expiration date of the original legislation, the import duty of 1 1/16 cents a pound on pig lead and ¾ cent a pound on lead in ores and concentrates was reinstated automatically on July 1 and continued throughout 1950. Abrogation of the Mexican Trade Agreement, effective January 1, 1951, restored the full duties established by the Tariff Act of 1930. On June 6, 1951, the Torquay Agreement reestablished the 1 1/16-cent and ¾-cent duties on pig lead and lead in ores and concentrates, respectively. Owing to shortages of lead in the United States, import duties were suspended by congressional act on February 12, 1952, until March 31, 1953, or until the end of the present emergency, whichever came first.

The act stipulated that the rates of June 6, 1951, were to be reimposed if the average market price of lead fell to 18 cents a pound for a calendar month. The Tariff Commission informed the President on June 6 that the average price of pig lead for May was below 18 cents a pound, and on June 26, 1952, the President signed the order ending suspension of duties.

The high level of imports established in 1952–53, together with the depressed state of the domestic lead- (and zinc-) mining industry, stimulated much study of various protective tariff proposals and plans whereby the domestic industry might be aided. In September 1953 a committee formed by a large proportion of the lead and zinc mining industry petitioned the Tariff Commission for an investigation under the "escape-clause" provisions of the Trade Agreements Extension Act of 1951, which permits the President, upon recommendation of the Tariff Commission, to increase duties by up to 50 percent of the rates prevailing on January 1, 1945. Congressional committees also adopted resolutions instructing the Tariff Commission to investigate imports of lead and zinc and their effects on domestic output. The report of this investigation (*29*) was factual and contained no recommendations. It showed that the existing tariff structure restricted imports but slightly and that during the past decade a substantial part of all lead imports were exempted from duty.

The report on the "escape-clause" provisions of the Trade Agreements Extension Act of 1951

(*30*) recommended that import duties on most lead and zinc materials be increased 50 percent above the rates existing on January 1, 1945. The President did not accept the recommendations of the Tariff Commission (*32*); instead he outlined an expanded stockpiling program for strengthening the lead and zinc industry as an integral part of the Nation's defense-mobilization base.

CONSUMPTION, USES, AND SUBSTITUTES

Domestic consumption of lead, including both primary and secondary, has increased substantially during 1925–53. In 1950–53 the average annual consumption was 1,189,000 tons, or 20 percent higher than the 1925–29 yearly average.

Consumption of lead was at a high level during the boom period of the 1920's, averaging 993,000 tons a year in 1925–29. In the depression of the 30's consumption declined sharply, falling to a low of 473,000 tons in 1932. From 1933 to 1937 consumption increased steadily as business conditions improved, reaching a high of 826,000 tons in 1937. The general recession of 1938 halted industrial recovery, and lead usage decreased to 625,000 tons. It was not until 1941 that consumption exceeded that of 1937. During World War II lead consumption was high, averaging 1,075,000 tons for the 5 years 1941–45. Consumption declined markedly in 1946, but in the ensuing 7 years the annual average was even higher than during the war period; in 1950 consumption totaled 1,238,000 tons, an alltime peak.

An unusual combination of physical and chemical properties has given lead a wide range of industrial uses. The most important of these properties are: Softness and extreme workability, high specific gravity, alloying properties, low initial cost and high recoverability, high boiling point and low melting point, good corrosion resistance, and impenetrability by short-wave radiation.

The principal uses of lead (*8*, *19*) are for storage batteries, tetraethyl lead, cable covering, paint pigments, building construction, ammunition, and various alloys, chiefly solder, bearing metals, and type metal. War uses, though numerous, are largely the same, except for increased substitution for scarcer metals, especially to replace copper or tin in bearing metal, terneplate, solder, and plumbing supplies. Two of the larger uses—paint pigments and tetraethyl fluid—are dissipative. The greater part of the lead used in other forms is recoverable and usually returns to supply as secondary metal. Table 11 shows the quantities of lead used for various purposes in 1948–53.

Lead is widely utilized alloyed with certain metals, principally antimony and tin. The common alloys of lead are roughly classified into bearing alloys, solders, type metals, and low-melting alloys. Numerous other alloys of lead are extensively employed in industry. The most notable contain varying quantities of antimony and are used for cable sheathing and storage-battery grids. Lead also finds wide usage in machine brasses and bronze, approximately 30,000 tons being consumed annually for this purpose.

Large quantities of lead are consumed in the production of litharge, red lead, and white lead. Litharge is used principally in storage batteries in both the positive and negative plates, either alone or mixed with finely divided metallic lead. Smaller quantities are used in ceramics, chrome pigments and varnish, insecticides, oil refining, and rubber. Red lead is used chiefly in storage batteries mixed with litharge and metallic lead in the positive plates and in paints. White lead is used almost exclusively as a paint pigment.

Another pigment, basic lead sulfate, is used extensively in leaded zinc oxide and as a stabilizer for certain plastics.

An important application of lead is nuclear shielding (*19*) against certain types of dangerous radiation, chief among these being gamma rays. The first consideration in preventing penetration of rays is density. Lead has the advantage of being the densest of any commonly available material. Where space is at a premium and utmost radiation protection is paramount, lead is prescribed. Another advantage is that lead does not become contaminated and may be used continuously without becoming radioactive and emitting its own harmful rays. For this reason it is important that lead for shielding purposes be free of impurities, particularly those that may become radioactive upon exposure to high-energy radiation. The atomic reactors operated by the Atomic Energy Commission employ a combination of concrete, lead, cadmium, and space to protect operating personnel from all types of radiation, including alpha, beta, gamma, and neutron rays. The two last are particularly dangerous because of their ability to ionize matter and hence injure living tissue. Lead is particularly effective in absorbing gamma rays. Cadmium or a hydrogenous material, such as paraffin or water, is used to shield against neutrons; but, since gamma rays are emitted when neutrons are absorbed, it is necessary to stop the gamma ray with lead shielding. Containers used in handling and shipping radioactive isotopes at the Brookhaven National Laboratories alone weigh over 1,000 tons.

The greater part of lead used as metal ultimately returns to supply as secondary metal, but that used as pigments and chemicals is wholly lost. Of the chemicals containing lead,

tetraethyl lead is the most important. Tetraethyl lead is a colorless, heavy liquid that forms the active ingredient of the principal "antiknock compounds" added to gasoline to improve their antiknock qualities and efficiency. Premium gasoline for automobiles contains 2 to 3 cc. of tetraethyl lead, while most other gasolines contain up to 1.5 cc. per gallon. The improved efficiency of gasoline as a result of this additive results in a huge economy in the amount of fuel used. In 1950 it was estimated that the use of tetraethyl lead conserved 4 billion gallons of gasoline. In 1953 over 162,000 tons of lead was consumed in this use, and there is every indication that the use will increase.

There are a number of substitutes for lead in many of its uses. In the storage-battery industry, the largest consumer of lead, there are some competitive products; but these have different electrical characteristics, and the raw materials for their manufacture are not available in adequate quantities to replace any sizable quantity of lead in battery usage. From the conservation standpoint, the lead consumed in batteries does not represent a complete depletion of total supply, for about 90 percent of the lead content is recovered as secondary metal.

In the cable-covering industry—the third largest user of lead—a substitute has been developed that gives lead considerable competition. This new covering is extruded polyethylene, which is replacing lead telephone-cable sheathing for inside use. There are also various combinations of polyethylene with lead and aluminum sheathing for outside and underground use. There has been some substitution of aluminum in telephone and power cable, but numerous economic factors and technical shortcomings will have to be overcome before the substitution becomes widespread. Progress is being made in meeting these problems, however, and it seems likely that the next 10 years will see continued substitution of plastics and aluminum for lead.

The development of substitutes for lead in paint pigments has proceeded rapidly during the past few years. The lead content of paints has been reduced, and in many instances lead has been eliminated from paint formulations. Titanium and zinc pigments are the chief competitors of lead in pigments.

A substantial quantity of lead in the building industry could be replaced by aluminum, synthetic resins, and other nonmetallic materials. The use of lead in foil manufacture has already been significantly reduced, mainly through replacement by aluminum foil. Plastic films can also be substituted for lead foil.

Several materials may be used as a substitute for lead in caulking. Nonmetallic fibers and plastic compounds are probably the best materials to be substituted for lead in this application, although aluminum wool may also be utilized.

The quantity of lead used in type metal could be reduced substantially by substitution of magnesium plates.

The use of aluminum and aluminum-coated steel as replacements for lead in terneplate and the development of new bearing alloys using noncritical metals and materials may be expected in the future.

EXPORTS

Exports of lead have been relatively unimportant in the distribution of United States lead supplies over the 1925–51 period. Only during 1925–29 have they averaged 111,000 tons a year; from 1930 through 1953 United States shipments to foreign countries were about 24,000 tons annually and from 1946 to 1953 slightly over 2,000 tons a year.

PRICES

Lead prices have fluctuated considerably during the 29 years 1925–53. The average price of pig lead, New York, was 7.47 cents per pound in 1925–29 and 4.91 cents in 1935–39, with an intervening low quotation of 2.65 cents in 1932. During World War II the price of lead was controlled by the Office of Price Administration; from January 1942 to June 1946 the ceiling price was 6.50 cents per pound and from June to November 8.25 cents. The total average price for all grades of refined lead (weighted average price plus the increment of subsidies for overquota production and special mine contracts paid by the Office of Metals Reserve) was about 8.50 cents per pound throughout the war years. Prices advanced markedly in the postwar period, reaching an alltime high of 21.50 cents per pound in late 1948 and averaging 15.34 cents for 1947–50.

Following the outbreak of war in Korea in June 1950 lead prices increased steadily, attaining a high of 17.00 cents in October. Ceiling prices were established for lead on January 26, 1951, at the highest price (for each seller) at which sales were made between December 19, 1950, and January 25, 1951; thus a number of ceiling prices were maintained. Most lead sales, however, were at 17.00 cents per pound, common lead, New York. This price remained in effect until October 2, 1951, when the Office of Price Stabilization permitted an increase of 2 cents per pound. Increased supplies and lower consumption brought about substantial reduc-

TABLE 11.—*Consumption of lead in the United States, 1948–53, by products* [1]

[Short tons]

	1948	1949	1950	1951	1952	1953
Metal products:						
Ammunition	49, 635	24, 111	38, 438	40, 242	36, 182	45, 147
Bearing metals	42, 594	29, 189	38, 241	35, 410	36, 545	38, 591
Brass and bronze	23, 239	14, 946	21, 461	29, 858	25, 807	26, 203
Cable covering	171, 654	144, 340	131, 989	131, 863	142, 571	146, 565
Calking lead	31, 473	34, 944	53, 450	46, 544	45, 150	48, 236
Casting metals	8, 974	12, 672	19, 295	22, 497	18, 017	12, 906
Collapsible tubes	11, 071	8, 692	13, 386	13, 657	10, 095	11, 583
Foil	3, 203	2, 503	3, 941	2, 881	2, 124	4, 410
Pipes, traps, and bends	39, 843	29, 858	41, 361	33, 095	29, 465	28, 693
Sheet lead	31, 559	27, 144	30, 778	31, 210	28, 697	30, 476
Solder	71, 025	62, 104	94, 606	82, 465	72, 664	78, 743
Terne metal	3, 278	3, 256	3, 805	2, 051	1, 812	3, 200
Type metal	26, 279	20, 695	24, 776	28, 236	27, 413	26, 729
Total metal products	513, 827	414, 454	515, 527	500, 009	476, 542	501, 482
Storage batteries:						
Antimonial lead	203, 869	175, 308	212, 464	199, 838	187, 506	191, 753
Lead oxides	150, 536	138, 410	185, 945	175, 546	163, 424	175, 822
Total batteries	354, 405	313, 718	398, 409	375, 384	350, 930	367, 575
Pigments:						
White lead	30, 970	18, 400	36, 181	25, 578	22, 943	17, 775
Red lead and litharge	80, 356	70, 832	101, 974	88, 031	76, 742	88, 649
Pigment colors	10, 832	8, 400	13, 464	12, 796	12, 839	12, 859
Other [2]	20, 230	9, 515	14, 768	13, 099	9, 775	10, 307
Total pigments	142, 388	107, 147	166, 387	139, 504	122, 299	129, 590
Chemicals:						
Tetraethyl fluid	83, 809	94, 644	113, 846	128, 407	146, 723	162, 443
Miscellaneous chemicals	10, 280	4, 191	11, 680	6, 949	3, 996	6, 976
Total chemicals	94, 089	98, 835	125, 526	135, 356	150, 719	169, 419
Miscellaneous uses:						
Annealing	6, 132	4, 935	6, 456	6, 656	5, 084	5, 280
Galvanizing	1, 995	1, 228	2, 426	2, 173	2, 002	2, 029
Lead plating	2, 274	997	1, 521	1, 444	1, 037	987
Weights and ballasts	6, 290	4, 627	6, 870	7, 913	7, 660	8, 244
Total miscellaneous	16, 691	11, 787	17, 273	18, 186	15, 783	16, 540
Other unclassified uses	12, 495	11, 733	14, 859	16, 354	14, 522	16, 998
Grand total	1, 133, 895	957, 674	1, 237, 981	1, 184, 793	1, 130, 795	1, 201, 604

[1] Based on survey of consumers by Bureau of Mines.

[2] Includes lead content of leaded zinc oxide production.

tions in lead prices in the spring and summer of 1952. On April 29 the price of lead declined to 18.00 cents, and subsequent drops brought it to 15.00 cents on May 12. The quoted price advanced to 16.00 cents on June 24, where it remained until October 7, when it again dropped to 15.00 cents. Limited buying caused further declines in the following weeks, and on October 22 the price was down to 13.50 cents—the low point of the year. In November and December the market improved, and on December 30 the quotation for lead was 14.75 cents per pound.

Price cuts in early 1953 brought the quotation to 13.50 cents on February 2 and 13.00 cents a pound on March 4. Thereafter the price fluctuated between 12.00 and 14.00 cents a pound, becoming stable at 13.50 cents on September 17, where it remained throughout the balance of the year. Early in 1954 the price dropped, reaching a low of 12.50 cents on February 18; thereafter, however, the price increased in a series of ¼-cent advances to 15 cents a pound on October 5, where it remained for the balance of the year. Table 12 shows the average yearly quotation for lead in 1925–53.

TABLE 12.—*Average yearly quoted price of common lead, New York, 1925–53*

[Cents per pound]

1925–9.02	1935–4.06	1945– 6.50
1926–8.42	1936–4.71	1946– 8.11
1927–6.75	1937–6.01	1947–14.67
1928–6.31	1938–4.74	1948–18.04
1929–6.83	1939–5.05	1949–15.36
1930–5.52	1940–5.18	1950–13.30
1931–4.24	1941–5.79	1951–17.49
1932–3.18	1942–6.48	1952–16.47
1933–3.87	1943–6.50	1953–13.48
1934–3.86	1944–6.50	1954–14.05

SELF-SUFFICIENCY AND STRATEGIC CONSIDERATIONS IN THE UNITED STATES

From 1925 through 1953 about 45 percent of the total supply was from domestic mine production, 33 percent from secondary recovery, and 22 percent from imports. During the 4 years ended in 1953 mine production was only 28 percent of the supply, and imports and secondary lead each furnished 36 percent of the supply. In addition to heavy dependence upon imports since the beginning of World War II, it should be borne in mind that the lead recovered in secondary operations was not wholly from domestic sources; it represents recovery from new lead used in earlier years, which was from both domestic and foreign sources.

Supplies considerably exceeded requirements during the early years of World War II and particularly in 1952–53 (see table 8) and thus permitted accumulation of large stocks. If stock accumulations and exports had been eliminated, actual consumption would have required about 257,000 tons of imported lead annually, rather than the 368,000 tons actually imported. Thus, while the United States is not self-sufficient in lead, it does not depend on foreign sources to the degree recent imports suggest.

A review of imports shows that total imports from Canada and Mexico in 1950–53 averaged almost 250,000 tons, which suggests that, under emergency conditions, the actual deficit might be met by imports from those 2 countries with but minor imports from other sources.

GOVERNMENT PROGRAMS

REGULATIONS

The Government regulated the lead industry during World War II and again in 1951–52 to provide adequate supplies for all essential purposes. In World War II measures were taken to increase imports greatly, expand or at least maintain domestic mine production, increase secondary recovery, decrease exports, and control consumption.

The expansion of imports was undertaken even before the United States entered the war. Import controls were instituted in December 1941, after which time lead could be imported only by the Metals Reserve Company or other Government agencies. Duties were suspended on Government purchases after May 1942. Total recoverable imports increased from 85,000 tons in 1939 to 277,000 tons in 1940 and 489,000 tons in 1942. For 1940–45 imports averaged 345,000 tons a year, (31 percent of supply from all sources) compared with average yearly imports of 46,000 tons (7 percent) in 1935–39.

Various measures were undertaken to stimulate domestic mine production while maintaining ceiling prices. The most important of these measures—the Premium Price Plan—was designed primarily to increase production by paying premium prices for production above a certain quota, which was based on 1941 output. Through payment of these premiums, marginal and submarginal ores were mined; and tailings piles—previously unprofitable to treat—were reworked. In addition, some new and idle mines were brought into operation, and extensive development was undertaken at yet other mines. Production increased from 414,000 tons in 1939 to 496,000 tons in 1942 but declined thereafter to 391,000 tons in 1945. Mine production for 1942–45 averaged 439,000 tons per year—only 12 percent above the 1935–39 average yearly output. A serious manpower shortage in the lead mines, brought about by the drafting of skilled workers and a general migration of labor away from the mines to higher paying industries, was partly responsible for declining mine production after 1942.

During the life of the Premium Price Plan (from February 1942 through June 1947) 45 percent of all domestically mined lead received premiums. Payments totaling about 64 million dollars were made on 1,000,600 tons of over-ceiling lead production. The weighted average price paid for all lead during the period was 8.84 cents, of which premium payments totaled 2.61 cents a pound.

Additional measures undertaken to increase mine production were the exploratory programs of the Geological Survey and the Bureau of Mines of the United States Department of the Interior. These programs indicated several deposits of value, thus in part replenishing reserves heavily depleted during the war years. Large supplies of lead were available for consumption throughout the greater part of World War II; no serious shortages developed, and as a result lead was available as a substitute for more critical metals in certain uses.

Lead was placed under export control in March 1941, more to keep supplies from going

to the Axis countries than from any serious need for conservation.

In May 1941 General Metals Order 1, designed to prevent accumulation of excessive inventories, was made applicable to lead. General Preference Order M-38, issued in October of that year, placed lead under priority control. This order, with subsequent modifications and additions, controlled the allocation of lead, including scrap, for essential military and civilian uses; prohibited or restricted its utilization for certain purposes; created a reserve pool; established inventory control; and required producers and distributors to file schedules of proposed shipments with the Director of Priorities. The order was administered after January 1942 by the War Production Board, successor to the Office of Production Management, originator of the measure.

Lead was first recommended for stockpiling in May 1941, when the Office of Production Management proposed that the Metals Reserve Company acquire 50,000 to 100,000 tons. Government stocks, built up largely from imports, increased monthly from 5,000 tons in August 1941 to a peak of 266,000 tons in April 1943. It was not until the latter part of 1944 that requirements necessitated continued withdrawal of large quantities of metal from the stockpile; by July 1945 the inventory had decreased to 65,000 tons. Thus the Government stockpiling program served the purpose for which it was intended; that is, it was effective in meeting critical wartime needs. In the postwar period stocks were made available to consumers, and in 1948 the small quantity remaining was transferred to the National Stockpile.

In 1951 the Government exercised limited controls over the lead industry owing to concern over possible shortages for defense requirements. Lead was brought under inventory control on February 16 through National Production Authority Order M-38. This order was amended on May 28 to set forth certain limitations on the acceptance of rated orders, so as to provide for equitable distribution of such orders, to provide for the creation of a setaside reserve of pig lead to meet emergency situations, and to establish limitations on the use of lead and lead products. The amended order beginning June 1 restricted the use of lead to not more than 100 percent of the average monthly quantity consumed during the first 6 months of 1950, and prohibited its use for any new purposes. Order M-76, issued July 26, placed the supply of soft pig lead produced by primary refiners under allocation control. Effective November 1 imported pig lead was also placed under allocation control by Order M-76 as amended. All NPA restrictions on lead were completely revoked on May 15, 1952, as increased supplies brought about by peak scrap recovery and the renewal of large-scale importations appeared to have overcome the shortage that existed in 1951.

BUREAU OF MINES EXPLORATION PROGRAM

During World War II the Bureau of Mines, under authorization of the Congress, undertook an exploration-development program that included lead. Over 2,200 lead and zinc properties were examined, of which 148 were drilled or otherwise explored. About 2,150,000 tons of lead ore, 13,600,000 tons of lead-zinc ore, and 6,600,000 tons of zinc ore were indicated. The most significant accomplishments were ore discoveries in the Metaline district of northeastern Washington and the Upper Mississippi Valley near Galena, Ill. Subsequent private exploration greatly increased the indicated zinc-lead reserves and resulted in increased output of lead and zinc ores from the two areas.

GOVERNMENT EXPLORATION AND EXPANSION PROGRAMS UNDER DEFENSE ACT OF 1950

On December 4, 1950, the Defense Minerals Administration was established to stimulate the production of critical metals and minerals needed for national defense. The Defense Minerals Exploration Administration was subsequently created and given responsibility for mineral-exploration programs, and the Defense Materials Procurement Administration—a division of the General Services Administration—at the same time was assigned responsibility for production expansion and procurement as they applied to minerals and metals. The DMEA financed up to 50 percent of the total cost of approved lead and zinc projects and had through 1953 helped to finance 175 mineral-exploration projects totaling $7,297,000 in cost. A directive issued by the Office of Defense Mobilization banned loans on lead and zinc applications received after May 15, 1953, because excess supplies of both metals were available. Loans were resumed, however, March 23, 1954, because it was realized that additional reserves of ore would add to the security of the Nation.

The DMPA was responsible for making purchase contracts (including subsidies to high-cost producers), for granting priority ratings for production machinery and equipment, and for recommending production expansion, operating loans, and certification of certificates of necessity for assistance through tax-amortization programs. The DMPA program was greatly reduced in early 1953; and on August 14 its remaining function—that of completing contracts in negotiation and of servicing existing

contracts—was transferred to the Emergency Procurement Service of General Services Administration. Through December 1953 purchase commitments involving 26,250 tons of lead at guaranteed prices had been made with a Guatemalan producer, and a 15-cent-floor price and purchase commitment for 2,460 tons of lead had been guaranteed to an Idaho company. Loans totaling $820,000 were certified for 9 domestic and 1 foreign producer, with the objective of increasing annual metal output by 5,940 tons of lead and 27,750 tons of zinc. In all, 41 tax-amortization programs were certified, which would assist in plant expansion to provide annually about 38,000 tons of additional lead and 182,000 tons of additional zinc.

OUTLOOK

Total world lead supplies, currently at an alltime high, exceed requirements, despite greatly reduced mine production in the United States. World reserves of developed and inferred ore are adequate to meet foreseeable uses for the next 30 years, and the potential reserves of areas at present undeveloped are believed even greater.

Future United States supply will be derived in yet larger part from imports and secondary sources, as consumption is expected to increase while domestic mine production remains relatively constant. Government purchases of newly mined domestic lead should stimulate domestic mine production to about 330,000 tons in 1955, but over the ensuing decade it is likely that domestic mines will average about 300,000 tons annually.

Domestic reserves are adequate to meet this or even slightly higher output. In evaluating the long-run reserve and productive capacity of the United States, it must be realized that existing estimates of reserves understate the resource base. If the price-cost ratio of lead increases, domestic production and domestic reserves will be stimulated. Under such conditions new sources of ore supply will be developed in known and new mining districts. New techniques will also be developed to make the mining of lower grade ore profitable but whether at a rate to maintain or augment present production for over 25 years or so is unknown.

Consumption of lead in the United States in 1954 will approximate 1,100,000 tons. In 1955 it is expected to be about 1,200,000 tons, because of increased demand for automobile batteries, building construction, and tetraethyl lead. Projecting requirements on the present use pattern with normal population growth and assuming a high level of industrial activity, the total lead demand in the United States should be approximately 1,275,000 tons by 1960 and 1,450,000 by 1975.

Elsewhere in the world consumption should increase considerably owing to improved standards of living as well as increased population in many areas.

World mine production of lead can be expected to exceed 2 million tons annually in the future. Should the need for greater supplies arise, output can be expanded considerably as important new discoveries of lead have been made in recent years. The total world output will probably not decrease to any marked extent unless voluntary restrictions by producers limit it.

PROBLEMS

The major problem in the lead industry is to maintain an ample supply of ore and metal produced at prices that stimulate consumption and rising standards of living throughout the world.

The distress caused by the current oversupply can best be met by action to reduce the costs of production and by greater development of markets. In the long run, the problem in supply will be one of shortage. The easily discovered deposits have been found. Those yet to be found require intensive scientific search based on a sound and increasing knowledge of ore occurrences, geophysical guidance, and sound exploration practice.

In mining, numerous research problems to effect lower costs and improved extraction present themselves. These involve improved methods of ore breaking and transport, as well as more effective and cheaper means of ground support.

In milling there is constant need for research to lower the cost of fine crushing and grinding; research must also be continually focused on slime recovery of the sulfides and overall recovery of the complex and difficult sulfide and oxide ores.

Market development offers an area of unlimited research to expand the demand for lead and its alloys and compounds.

The lead industry needs better information on which to base industry decisions. More detailed statistics should make more accurate forecasts possible and help assure that productive capacity remains at an optimum rate. Such statistics, to be of maximum value, should apprise the industry of the total situation with relation to mine production, smelter output, and world requirements much sooner than at present.

BIBLIOGRAPHY

1. Allen, V. C. Mechanization of an Upper Mississippi Valley Zinc-Lead Mine. Bull. Inst. Min. and Met., vol. 63, No. 556, March 1953, pp. 261–269.
2. American Bureau of Metal Statistics. Yearbook. Annual publication.
3. American Institute of Mining and Metallurgical Engineers. Reduction and Refining of Nonferrous Metals, Trans., vol. 159, 1944, 994 pp.
4. American Metal Market. Metal Statistics. New York, N. Y. Annual publication.
5. Bateman, A. M. Economic Mineral Deposits. John Wiley & Sons, Inc., New York, N. Y., 2d ed., 1950, 916 pp.
6. Brady, George S. Materials Handbook. McGraw-Hill Book Co., Inc., New York, N. Y., and London, 6th ed., 1947, 831 pp.
7. Bray, John L. Nonferrous Production Metallurgy. John Wiley & Sons., New York, N. Y., 2d ed., 1947, 587 pp.
8. Bureau of Mines. Minerals Yearbook; Lead chapter. Annual publication.
9. Bureau of Mines and Geological Survey. Materials Survey—Lead. 1951, 587 pp.
10. Engineering and Mining Journal. How Mechanized Mining at Grandview Upped Output and Cut Costs. Vol. 155, No. 5, May 1954, pp. 56–59.
11. Fleming, Marston G. Effects of Alkalinity on the Flotation of Lead Minerals. Min. Eng., vol. 4, No. 12, December 1952, pp. 1231–1236.
12. Huff, Lyman C. Abnormal Copper, Lead, and Zinc Content of Soil Near Metalliferous Veins. Econ. Geol., vol. 47, No. 5, August 1952, pp. 517–542.
13. Huttl, John B. American Smelting & Refining Co.'s Van Stone Mine. Eng. and Min. Jour., vol. 154, No. 4, April 1953, pp. 72–76.
14. International Geological Congress. The Geology, Paragenesis, and Reserves of the Ores of Lead and Zinc. Rept. 18th sess., part 7, London, 1950, 400 pp.
15. Jackson, Charles F., and Hedges, J. A. Metal-Mining Practice. Bureau of Mines Bull. 419, 1939, 512 pp.
16. Kane, J. M., and Walpole, R. H. Principles of Present-Day Dust Collectors and Their Application to Mining and Metallurgical Industries. AIME Tech. Pub. 3427B, Feb. 20, 1952; Min. Eng., vol. 5, No. 1, January 1953, pp. 85–88.
17. Kennedy, V. C. Geochemical Studies in the Coeur d'Alene Mining District, Idaho. Geol. Survey Circ. 168, 1952, 15 pp.
18. Kinney, L. M. Trackless Mining at Pend Oreille. Min. Cong. Jour., vol. 29, No. 11, November 1953, pp. 28–29, 105.
19. Lead Industries Association. Lead in Modern Industry. 1952, 230 pp.
20. Liddell, Donald M. Handbook of Nonferrous Metallurgy. McGraw-Hill Book Co., Inc., New York, N. Y., and London. 2d ed., 1945, 721 pp.
21. Mining World. Van Stone, American Smelting's Newest Zinc Operation. Vol. 15, No. 4, April 1953, pp. 26–31, 68.
22. Morgan, J. D., Jr. The Domestic Mining Industry of the United States in World War II. Nat. Security Resources Board, 1948, 500 pp.
23. Perry, R. A. The Lead Industry. Min. and Met., February 1945, pp. 66–67.
24. Peele, Robert (ed.). Mining Engineers' Handbook. John Wiley & Sons, Inc., New York, N. Y., 3d ed., 1941, vol. 1, sec. 2, 23 pp.
25. Powers, Harold, and Others. Geophysical Case History, Fredericktown Lead District, Missouri. Min. Eng., vol. 5, No. 3, March 1953, pp. 317–320.
26. Shea, William P. Foreign Ore Reserves of Copper, Lead, and Zinc. Eng. and Min. Jour., vol. 148, No. 1, January 1947, pp. 53–58.
27. Taggart, Arthur F., and Others. Elements of Ore Dressing. John Wiley & Sons, Inc., New York, N. Y., 1951, 595 pp.
28. Tyler, Paul M. From the Ground Up; Facts and Figures of the Mineral Industries. McGraw-Hill Book Co., Inc., New York, N. Y., and London, 1st ed., 1948, 248 pp.
29. United States Tariff Commission. Lead and Zinc. Rept. on Investigation Conducted Under Section 332 of the Tariff Act of 1930 Pursuant to a Resolution by the Committee on Finance of the U. S. Senate Dated July 27, 1953, and a Resolution by the Ways and Means Committee of the U. S. House of Representatives Dated July 29, 1953, parts I–V, April 1954, 553 pp.
30. ———. Lead and Zinc. Report to President on Escape-Clause Investigation 27, Under the Provisions of Section 7 of the Trade Agreements Extension Act of 1951, May 1954, 34 pp. (with statistical appendix).
31. ———. Summary of Tariff Information. Vol. 3, parts 1–5, Metals and Manufactures, 1948.
32. White House. Statement Concerning the President's Action on Lead and Zinc. Aug. 23, 1954.

U. S. GOVERNMENT PRINTING OFFICE: 1955

RECEIVED
JUL 29 1955
WESTERN MINING DEPT.

W. R. L.
JUL 29 1955

UTAH MINING ASSOCIATION
918 Kearns Building
Salt Lake City, Utah
July 28, 1955

TO MEMBERS OF THE UTAH MINING ASSOCIATION:

The 1954 Yearbook of the American Bureau of Metal Statistics recently became available and a study of world-wide, new metal production and consumption data for copper, lead and zinc yields some very interesting facts. The period of 1947 to 1954, inclusive, is particularly informative on the trends of those metals for the reason that war time price controls ended in 1946 and, therefore, both production and consumption operated during that period under open market conditions.

The trend of both production and consumption has been strongly upward. The comparative production relationship of 1954 to 1947 being 125% for copper, 144% for lead and 148% for zinc. The comparative consumption relationship for the same years is 124% for copper, 133% for lead and 139% for zinc. Consumption and production of copper practically parallel each other upwards, any outbalance trends were toward shortage of supply thus exerting upward pressure on prices. Copper price rose to more than the combined price of lead and zinc in 1953 and 1954.

Lead and zinc production was generally in excess of consumption although both trended upward strongly. This surplus, beginning in 1949 and interrupted but shortly in the Korean emergency, resulted in excessive imports to the United States market, lowering prices and mine closures in the United States. Foreign mining areas continued upward in productive capacity while U. S. production dropped markedly under the economic squeeze.

The attached charts show these relationships for each of the three metals.

COPPER

Production and consumption of copper has maintained a relatively parallel trend throughout the period. Some secondary metal, impossible to segregate, places the consumption curve at a higher level than production, so the relationship is relative rather than actual so far as new metal is concerned. However, the parallel trend explains the relatively strong position which copper has maintained in world-wide markets. The only exception being in the 1949 recession when marked declines in consumption and price reduced production by about 65,000 tons from the 1948 total.

Production data for major producing areas, illustrated on the copper chart, show 1954 production in the United States to be 96% of the 1947 production, and the balance of the world to be 141%. 1954 production in the United States, however, was lower than any other year in the period studied, excepting 1949, and was due to voluntary restriction by the producing companies in anticipation of possible over-supply in the 1954 minor business recession.

African production made a steady and spectacular increase - 1954 totals being 177% of 1947.

Because of the close balance between production and consumption, imports of copper into the United States have not exceeded the need and, therefore, have not served to depress domestic price or production.

LEAD

The 44% increase in 1954 world-wide new lead production over production for 1947, breaks down to a 17% decrease in United States production compared with a 65%

increase for the balance of the world. Generally, North American producers fared poorly in the over-all increase of 44% for Mexico decreased by 3% and Canada gained but 18%. North America in 1954 produced but 95% of the lead it produced in 1947, while the balance of the world in 1954 produced 204% compared to its 1947 production.

The decrease in United States production is a reflection of mine closures and a slow down of exploration and development work. From 1947 to 1950, United States mines in a post war recovery effort gained materially in their lead productive capacity, reaching a peak in 1950 of 430,827 tons, an actual increase of 46,606 tons or 112% compared with 1947. The 1949-50 world-wide recession created surplus stocks of lead and forced prices sharply downward. Those surpluses came very largely to the United States markets in terms of increased imports, due to severely restrictive import controls in most other major consuming countries and to lack of import restrictions or adequate duties in the United States. (See Tariff Com. Report to President on Lead-Zinc Case - Page 4, Item 2, under "Findings of the Commission").

Prices returned to a satisfactory level in 1951, as a result of demands created by the Korean emergency, but the mines being peculiarly inflexible in productive rate, had barely started upgrade productive-wise in 1952, when the surpluses of both excess foreign stockpiling and mine production began again to flood United States markets. As a result lead production dropped in 1953 and again in 1954, reflected in further mine closures and curtailments in exploration and development. 1954 mine production of lead in the United States (318,985 tons) was the lowest for any year since 1935.

The attached Chart on "World Production of New Lead" shows the net results of these events; i.e., continued expansion of foreign productive capacity and a "squeezing" of United States production because of the surpluses available to our practically "free" domestic market.

United States mines are operating largely on developed reserves. Past experience serves as a barrier to expenditures of long range nature for new ore reserves. Foreign producers, encouraged by trade agreement administration by the Executive Department of our Government, have developed a possessory right attitude concerning the United States lead-zinc market. A situation evidenced by the fact that the Tariff Commission recommendations were not acted upon because of foreign pressures and in spite of almost unanimous support for those recommendations by other departments of our Federal Government. The citizens of western and other lead-zinc producing states are becoming impatient with alternatives and delays in a sound, basic solution of the lead-zinc problem. They think the intent of Congress as expressed in the Escape Clause of the Trade Agreements Act is the answer; i.e., adequate duties to protect domestic industry against excessive imports.

Some encouragement for United States lead miners is offered by the fact that in 1954 world consumption of new lead exceeded mine production. As long as world-wide consumption stays on a high plane, imports should be moderate and prices strong. Any recession, however, would again make the United States the dumping ground for surplus production and would serve to "squeeze" more of the remaining life from the domestic mining industry.

ZINC

Consumption of new zinc consistently stayed below new metal production - the greatest oversupply occurring in 1953 and 1954. United States production in 1954 was but 73% of 1947 production as compared with 186% for the balance of the world for the same comparative years - in other words U.S. lost 27% while the balance of the world gained 86%. The squeeze on domestic mine production followed the same pattern as lead in regard to prices, imports, attitude of the Executive Department toward duties on imports, etc.

The plight of mine operators is the same as discussed under lead, in that the remaining operating mines are living on previously developed reserves, exploration and long range development work is at a low ebb and the threat of any recession in consumption stands as a threat to the moderate price recovery experienced in 1954. The consumption trend, after sinking in 1952 to a record low in relation to production, recovered slightly in 1953 and fairly strongly in 1954.

In conclusion it is pertinent to note that the tremendous increase in productive capacity of the areas outside of the United States is due largely to demands stimulated during the war, strong prices during that period in those areas, large grants, loans and floor price purchase contracts from the United States during the post war years. United States money financed much of the expansion as well as the excessive stockpiling of foreign governments and industrial consumers during the Korean emergency, both factors proving detrimental to domestic producers, who ironically were heavily taxed on any profits realized to help finance such generosity.

Copper having escaped the disastrous experience of lead and zinc can be attributed to statistics rather than to principles, for if the increase in world-wide copper production had been similar to lead-zinc (144 or 148% rather than 125%) the history of that metal in the 1947-1954 period could most probably be read from the histories of lead-zinc by simply changing the names.

The principle of protecting the competitive position of domestic industry to an extent consistent with operating costs in our domestic economy is consistent with the basic tariff precept and with the fair competition idea incorporated by the Congress in the Trade Agreements Act under the provisions of the Escape Clause. The effort to obtain lasting relief for industries now being damaged and to assure protection for those which can be injured has gained understanding and support toward solution - but it is still an uphill grind.

Miles P. Romney

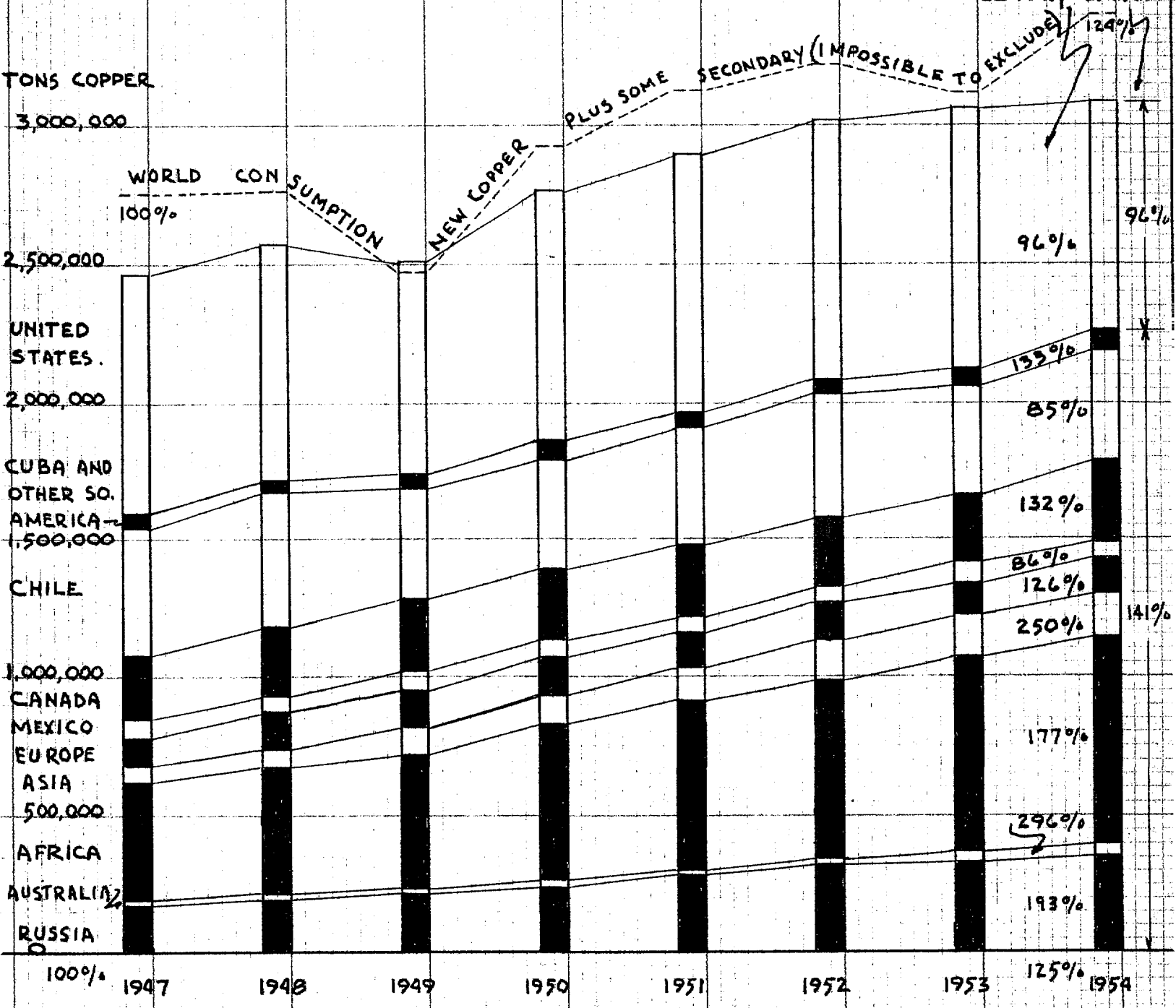
Miles P. Romney, Manager

Encls.

WORLD PRODUCTION OF NEW COPPER

UTAH MINING ASSOCIATION - M.P.R.
DATA FROM AMERICAN BUREAU OF METAL STATISTICS
YEAR BOOK JUNE 1955

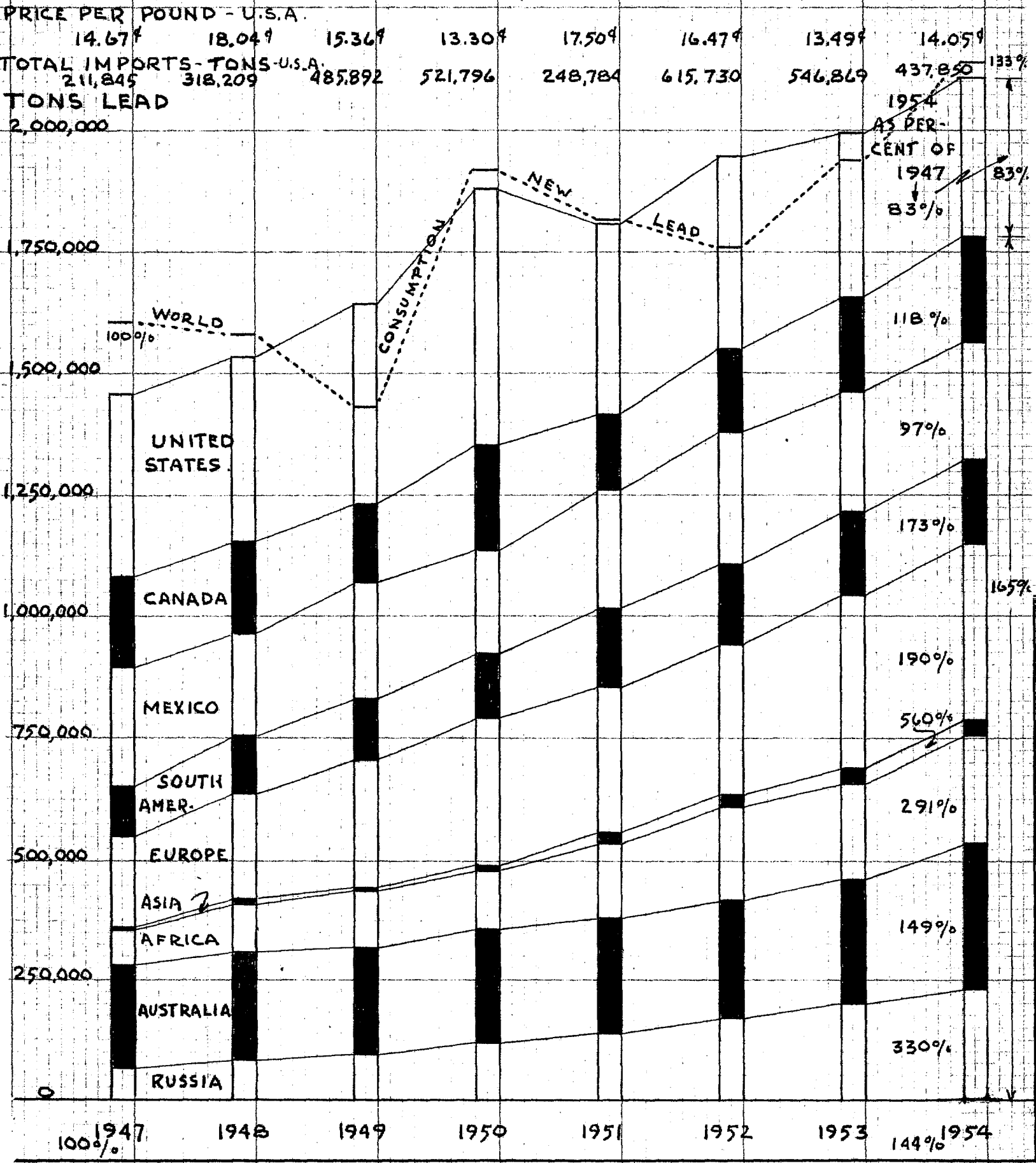
	1947	1948	1949	1950	1951	1952	1953	1954
PRICE PER POUND - U.S.A.	20.96¢	22.04¢	19.30¢	21.24¢	24.2¢	24.2¢	28.8¢	29.69¢
TOTAL IMPORTS - TONS - U.S.A.	498,115	545,908	651,586	483,571	614,427	669,276	585,551	



WORLD PRODUCTION OF NEW LEAD

UTAH MINING ASSOCIATION M.P.R.

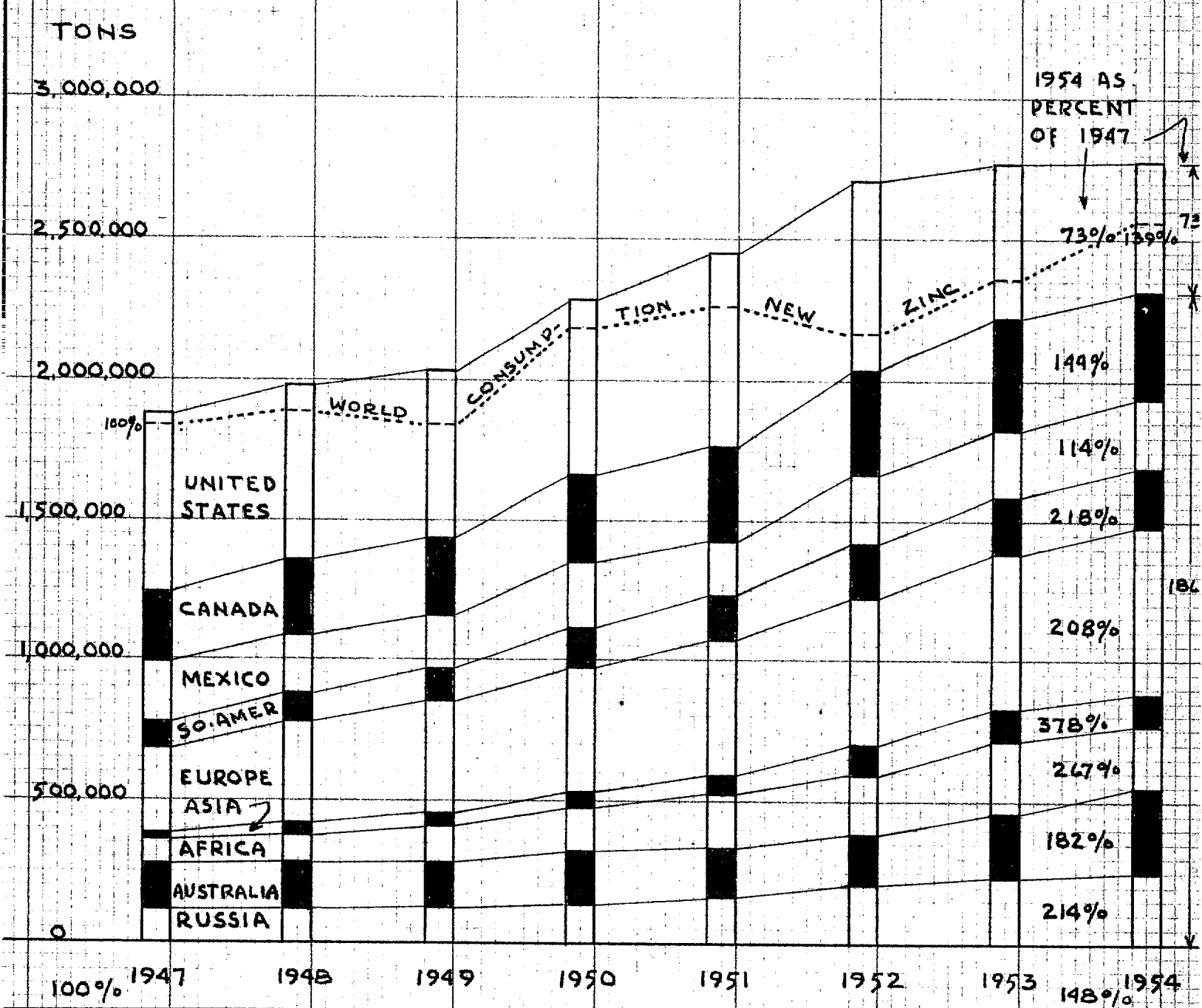
DATA FROM AMER. BUR. OF METAL STATISTICS - YEAR BOOK JUNE 1955



WORLD PRODUCTION OF NEW ZINC

UTAH MINING ASSOCIATION M.P.R.
DATA FROM AMERICAN BUREAU OF METAL STATISTICS
YEAR BOOK JUNE 1955

	1947	1948	1949	1950	1951	1952	1953	1954
PRICE PER POUND - U.S.A.	10.5¢	17.5¢	9.75¢	17.5¢	19.5¢	14.21¢	10.85¢	10.63¢
TOTAL IMPORTS - TONS : U.S.A.	370,271	357,476	368,121	435,019	391,072	565,474	749,004	605,627



LEAD INDUSTRIES ASSOCIATION

420 LEXINGTON AVENUE

NEW YORK 17, N. Y.

F.R.
Sandefur
Trost
Ness
Weiss
Newman-Eaton
Stevenson
Evans
Hamilt
Lacy
Lard

January 26, 1955

SUBJECT: MATERIALS THE RAILROADS BUY - THE STORY OF LEAD

To Members of the Lead Industries Association:

Attached please find a copy of an article entitled "Materials the Railroads Buy - The Story of Lead," reprinted from "Railway Purchases and Stores," December, 1954, issue.

The second article in this series which will deal with the railroads use of lead particularly in bearings, batteries and paints will appear in their February issue, and reprints will be sent you when available.

We hope you will find this reprint of interest. If you would like additional copies, we shall be glad to supply them upon request.

Sincerely yours,

Robert L. Zwegat

Secretary

W. R. L.
FEB 1 1955
A. W. N.
FEB 7 1955
J.F.F.
FEB 14 1955

LEAD INDUSTRIES RELY ON LEAD ASSOCIATION

Materials the Railroads Buy

The Story of Lead

Reprinted from

RAILWAY PURCHASES AND STORES

December, 1954

Distributed by

LEAD INDUSTRIES ASSOCIATION

420 Lexington Avenue

New York 17, N. Y.

A lead mine and concentrating mill in Idaho

Materials the Railroads Buy

No. 17 of a Series

The Story of Lead

ROBERT L. ZIEGFELD AND DAVID M. BORCINA

SECRETARY AND ASSISTANT TO SECRETARY, RESPECTIVELY, LEAD INDUSTRIES ASSOCIATION

The United States is, and has been for a great many years, the principal lead producing country of the world, currently accounting for about 20 per cent of the world's output of approximately 1,900,000 tons. Commercial quantities of lead are mined in 20 of the 48 states with the western states predominant. However, Missouri is the largest producing state with Idaho, Utah, Colorado, Montana, Washington, Oklahoma and others adding to the supply each year, approximately in the order named. By far the major portion of the lead mined is by underground methods with the ore generally containing galena, a lead sulphide, and usually associated with other metals, notably zinc and silver. Of considerably less commercial importance are the other lead minerals, cerrusite, a lead carbonate, and anglesite, a lead sulphate.

Lead Ore Concentrated Before Shipment to Mills

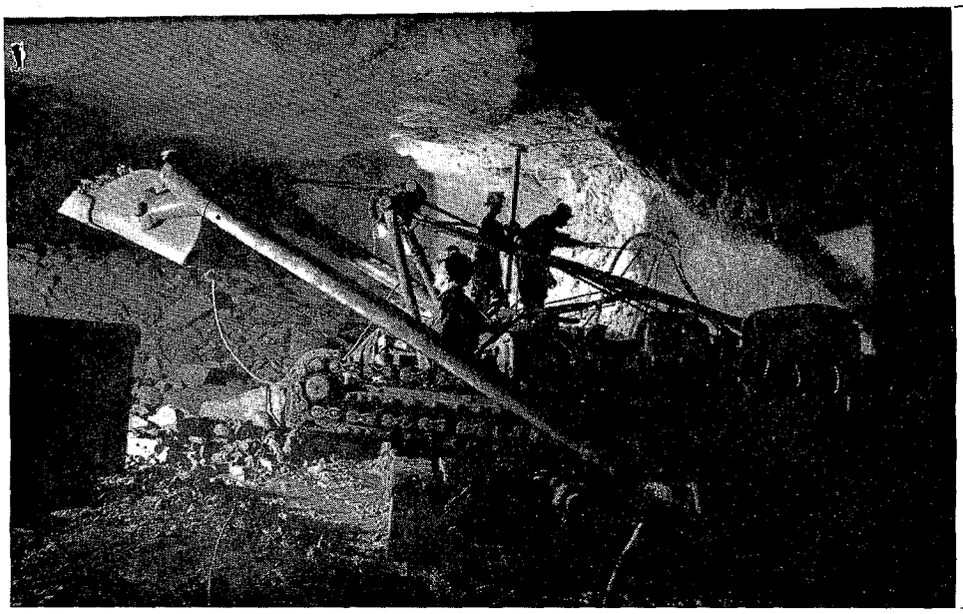
Few mines produce ores rich enough or pure enough to be shipped directly to a smelter without intermediate processing. More often the miner will struggle with a comparatively low grade of lead ore. On the other hand, an ore can be phenomenally rich in lead but contain so much zinc and copper that special treatment is required before shipment can be made to a smelter where penalties may be incurred by the presence of such impurities.

Obviously, it is not economically feasible to ship ore containing only 10 per cent, let us say, of lead content or ore containing impurities that will penalize the miner, so it becomes necessary to concentrate the ore. Concentrating mills are therefore located in mining areas where one or more mining properties can haul their ore for concentrating and/or removal of impurities.

The Flotation Process

At the mill the lead ore is crushed extremely fine, sometimes to particles less than 1 mm. in diameter, and treated by one of the modern processes of mineral concentration. The remarkable flotation process may be used, a method simple enough to describe but complicated in execution, and such an important and marvelous metallurgical development of the twentieth century that it has left a deep impression upon the lead and practically all other metal mining industries.

Flotation is applicable principally to the sulphide type of ore, fortunately the commonest variety, or to an oxide ore which has received a preliminary sulphiding. Briefly, the flotation process generally constitutes taking finely crushed ore diluted with, say, four times as much



Loading ore in a Missouri lead mine

water, and agitating the mass violently with air in a tank to which a fraction of one per cent of pine oil, with or without small amounts of other suitable chemicals, has been added. As a result of the agitation a froth containing most of the metallic constituents of the ore is formed on top of the tank while the valueless gangue matter remains unaffected at the bottom of the tank. The froth flows from the tank and is easily dried.

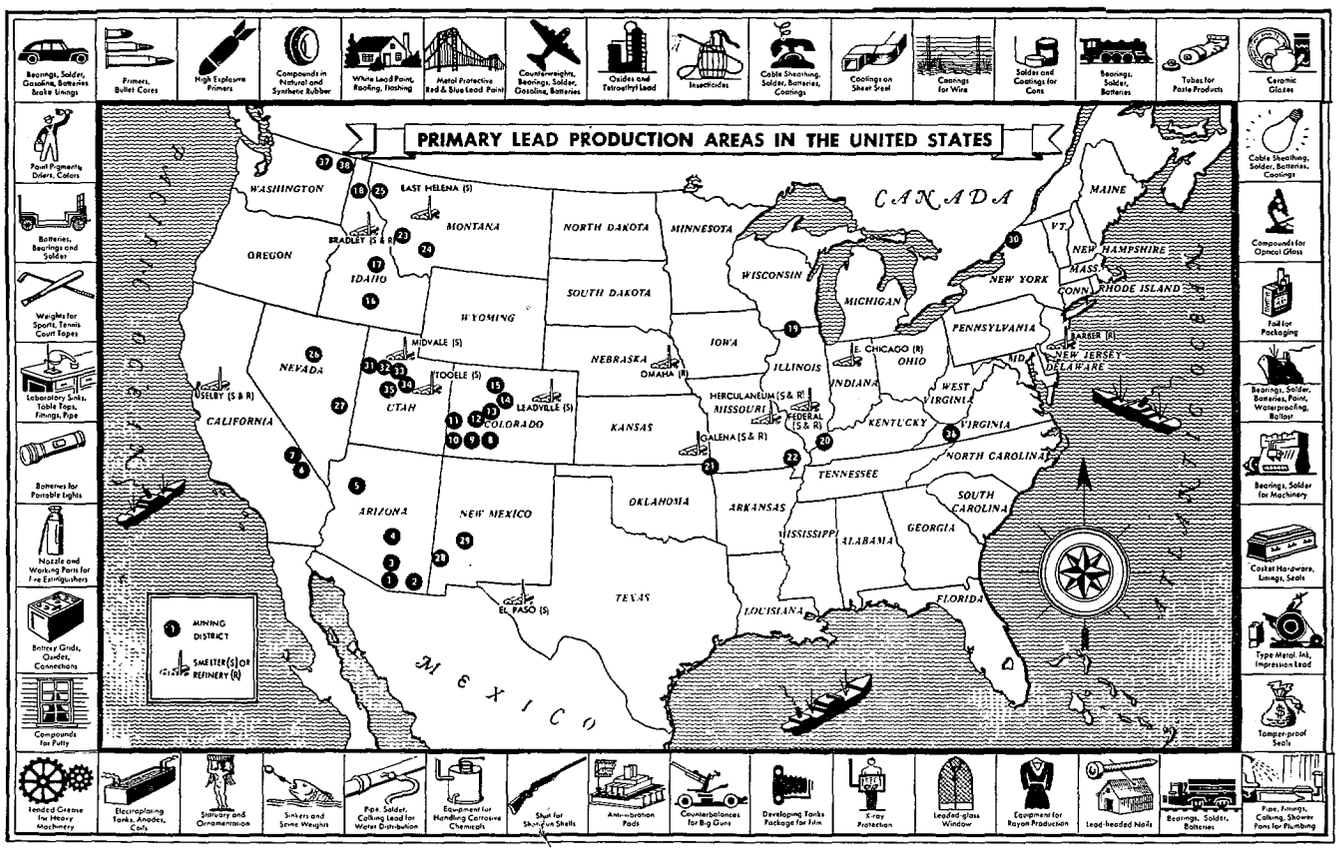
Flotation practice has reached such a stage of perfection that extraordinarily efficient work is being done, not only in extracting a single mineral from an ore, but also in separating the several minerals in so-called complex ores, for example, an ore consisting of an intimate mixture of lead, copper and zinc minerals. For years the treatment of many complex ores baffled metallurgists, but with selective flotation as a tool, many mineral deposits once considered practically worthless have developed into important lead mines. Furthermore, many straight lead ores formerly believed too low grade for economical treatment suddenly became profitable possibilities, adding greatly to the world's available lead reserves.

Flotation has, to a considerable extent, supplanted earlier methods of concentration using gravitational methods of milling, that is, pulsating jigs, vibrating tables, and many other machines, but the older mechanical methods are used alone or with flotation in treating many ores for which they are particularly suited.

Smelting

Lead concentrates when they leave the mill contain 40 per cent and upwards of lead. The richer the lead content the better, for it reduces transportation and smelting costs. Smelting is a continuous operation generally conducted in blast furnaces. Before the concentrates can be charged into the furnace, they must be roasted to remove most of the sulphur contained in the concentrates and to agglomerate the very

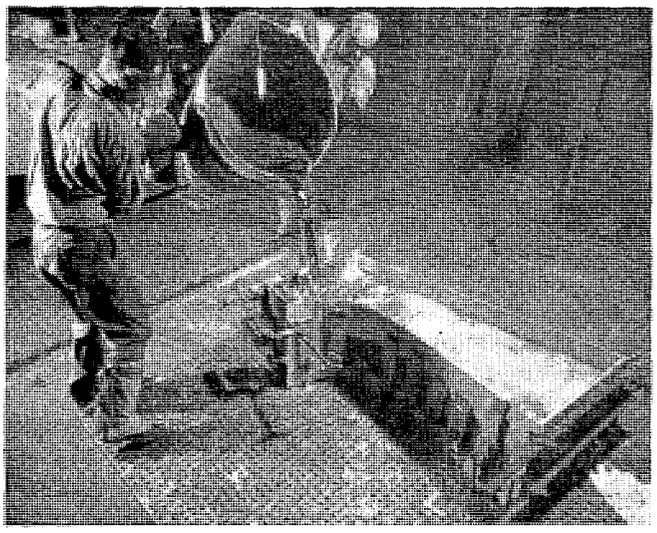
Map showing the primary lead production areas in the United States. The sketches around the border show some of the products which use lead



1. Extruded – pipe, rod, wire, ribbon, traps, bends, wedge lead, special shapes
2. Rolled – sheet, foil, strip, blanks for drawing, stamping and spinning, blanks of various shapes
3. Cast – sand or die-cast (gravity or pressure)
4. Chemical Compounds – oxides, carbonates, sulphates, chromates, organic compounds, silicates, acetate, etc.
5. Other – Metallic powder, wool, shot

Lead and its alloys can be fabricated by almost all commercial processes. It can, for instance, be extruded, drawn, rolled, cast, stamped, spun, and can be applied as a coating to other metals either by hot-dipping, electroplating or spraying. Thick layers of lead can be bonded to steel or other metals for greater strength. Joints may be made by soft soldering or welding.

The properties of lead and most of its alloys are quite different from those of other metals, but this very difference makes lead peculiarly suitable for many applications where other metals would not be practical.



Because of its low melting point, lead is readily cast into practically any shape

On the other hand, it is often possible to gain some useful property of lead in cases where lead may not at first seem suitable, if these differences are clearly recognized. For instance, slight design changes or changes in manufacturing technique may make it possible to use lead with greater satisfaction in place of a metal with quite different characteristics.

In general, lead and its alloys have high resistance to corrosion, high specific gravity, are comparatively soft, have a low melting point are easily fabricated. They have low electrical conductivity and tensile strength and a relatively high coefficient of thermal expansion. However, the properties can be varied within quite a wide range by judicious use of alloying elements. For instance, strength and hardness of ordinary lead can be multiplied many times or melting point greatly reduced by alloying.

Lead hardened and strengthened with small amounts of tin, antimony and arsenic, or even smaller percentages of the alkaline earth metals is a standard anti-friction material for many types of bearings, and the largest consumer of lead for this purpose is the railroads. The standard A.A.R. solid bearing assembly contains about 8 lb. of lead.

Incidentally, speaking about railroads, the lead industry is a pretty important customer. In a recent year about 1,124,000 net tons of lead ore and concentrates were shipped in a total of 20,000 railroad cars within the borders of this country. More than 8,000 cars shipped over 447,000 tons of lead-containing residues and scrap. About 757,000 tons of lead bullion and pig lead were shipped in 14,500 cars. Thus American railroads in one year used about 42,500 railroad cars to transport more than 2,328,000 tons of lead and lead-containing materials to and from lead smelters and refineries.

These large tonnages are still only a part of the total lead shipped by rail each year. A major source of domestic supply of lead comes from foreign sources and the bulk of this tonnage, 555,000 tons in 1953, upon arrival at American ports is shipped by rail. Secondary lead, the third source of supply amounting to 435,000 tons in 1953, is also shipped by rail, though to a lesser extent than the primary sources.

The use of the railroads by the lead industry does not stop with the raw material. Pig lead, and the hundreds of products made from lead, such as the storage battery which contains approximately 20 lb. of lead, are also major users of rail freight.

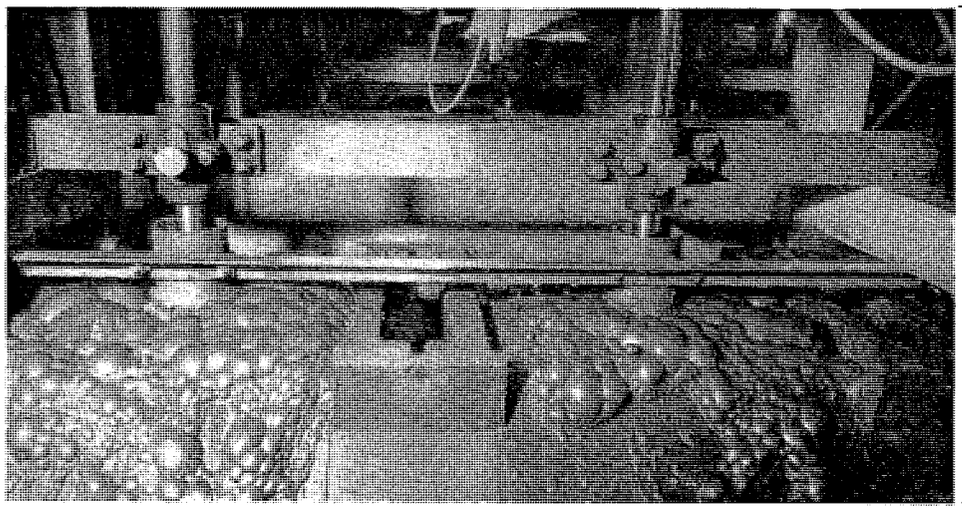
Lead Reserves Ample

There has been considerable discussion about U. S. lead reserves in recent years. To the uninitiated, figures representing lead reserves can be misinterpreted very easily. For instance, in 1947, hearings before the subcommittee on Investigation of National Resources of the Senate Committee on Public Lands were published. In these hearings, representatives of the U. S. Bureau of Mines and the U. S. Geological Survey estimated recoverable lead contained in reserves in the ground at about 6,500,000 tons in 1944, or about 15 times the average 1935-1944 rate of production.

The layman, given this set of facts, would reach the conclusion that by 1959 there would be no more lead left in the U. S. to be mined. However, in the report of the President's Materials Policy Commission, published in June, 1952, reserves are estimated at about 7,000,000 tons in 1950, or about 16 times 1950 production. Thus estimated reserves were somewhat higher in 1950 than in 1944 despite the fact that nearly 2,500,000 tons of lead had been mined from United States mines in the intervening years. Both reports admit that the reserve figures given are minima. This clearly indicates the danger of using reserve figures as of any particular date as a guide to the life of the reserves because they cannot of necessity take into account the new reserves opened up each year.

Also, a mining company will block out its reserves for only a few years ahead of its actual mining operations because of the economic factors involved. The general practice is to find through development work enough reserves each year to replace the amount extracted.

Experience has shown that reserves will be adequate to take care of the World's needs for lead for many years to come and any temporary shortage that has developed has been the result of economic maladjustment and artificial controls. Currently, lead is plentiful and there is nothing to indicate that it will not remain so.



One of a bank of flotation cells in a concentration mill. The froth which overflows the cell contains the leadrich component of the ore

fine flotation product which is not a physically desirable blast furnace material. The roasted concentrate, or sinter, now in the form of lumps, is charged into the top of the heated blast furnace with limestone and other suitable fluxes and coke for fuel. A blast of air is admitted to the lower part of the furnace to aid combustion and to complete the formation of metallic oxides which are reduced to metal by the coke and carbon monoxide present. The non-metallic waste forms a slag with the fluxing materials.

The blast furnace is then tapped so that the lead flows off into kettles or molds. In this form the lead is a semi-finished product known as base bullion, containing silver and impurities. Specifically, base bullion contains small amounts of gold, silver, copper, zinc, antimony, arsenic, bismuth and other impurities which must be removed in whole or in part by refining to produce a commercial lead.

Refining

The most widely used refining process is the Parkes process. By this treatment the lead is first melted and allowed to cool below the freezing point of copper, which crystallizes and is removed by skimming. It then passes to a reverberatory or softening furnace where the temperature is raised and the molten lead stirred. A blast of air oxidizes any antimony or arsenic present, both of which impurities harden lead (hence the term "softening" furnace), and these oxides are skimmed off.

A continuous softening process for the elimination of antimony and arsenic from lead bullion has been perfected which represents more than just a conversion from batch to continuous procedure. In this process, oxidation rates, many times in excess of those obtainable by usual batch softening methods, are realized by the continuous maintenance of the antimony content of the furnace metal within a determined optimum range of 0.01-0.05 per cent antimony. The accelerated oxidation rate obtainable in continuous operations permits a marked reduction not only in the operational costs of batch methods, but also in space and equip-

STANDARD SPECIFICATION FOR PIG LEAD

A.S.T.M. Designation: B29-49

Chemical Requirements

	*Corroding Lead**	*Chemical Lead**	*Acid Lead**	*Copper Lead**	*Common Desilverized Lead A**	*Common Desilverized Lead B**	*Soft Undesilverized Lead**
Silver, max., per cent	0.0015	0.020	0.002	0.020	0.002	0.002	0.002
Silver, min., per cent	. . . . .	0.002	. . . .	. . . .	. . . .	. . . .	. . . .
Copper, max., per cent	0.0015	0.080	0.080	0.080	0.0025	0.0025	0.04
Copper, min., per cent	. . . . .	0.040	0.040	0.040	. . . .	. . . .	. . . .
Silver and copper together, max., per cent	0.0025	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .
Arsenic, max., per cent	0.0015	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .
Antimony and tin together, max., per cent	0.0095	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .
Arsenic, antimony, and tin together, max., per cent	. . . . .	0.002	0.002	0.015	0.015	0.015	0.015
Zinc, max., per cent	0.0015	0.001	0.001	0.002	0.002	0.002	0.002
Iron, max., per cent	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Bismuth, max., per cent	0.05	0.005	0.025	0.10	0.15	0.25	0.005
Lead (by difference), min., per cent	99.94	99.90	99.90	99.85	99.85	99.73	99.93

*Explanatory Note:

Corroding lead is a designation that has been used for many years in the trade to describe lead which has been refined to a high degree of purity.

Chemical lead has been used for many years in the trade to describe the undesilverized lead produced from Southeastern Missouri ores.

Acid lead is made by adding copper to fully refined lead.

Copper lead is made by adding copper to fully refined lead.

Soft undesilverized lead is used in the trade to describe the type of lead produced from ores of the Joplin, Mo., district.

ment requirements.

After softening, the lead goes to the desilverizing kettles where small quantities of zinc are added. Gold and silver are more soluble in zinc than in lead, and, consequently, any of these metals present in the lead

Pouring lead bullion into a kettle for fire refining

immediately leave it in favor of the zinc. As zinc is lighter than lead, the zinc rises to the surface and, when the temperature is lowered, solidifies and is skimmed. This leaves only a little zinc remaining as an impurity which is oxidized and skimmed in a reverberatory furnace. A more recent development removes the zinc as a vapor by creating a vacuum over the surface of the molten lead. The zinc vapor is condensed as metal on the cool dome of the vacuum vessel and re-used. Refined lead becomes one of the purest of the commercial metals through this treatment and is cast into pigs.

The Pattinson process, now rarely used, depends upon the fact that when lead is cooled slowly, part of it will solidify and can be skimmed off while the silver will remain in the molten lead left behind. The Betts process, employed in several plants including one in the United States, is an electrolytic method advantageously used with bullion high in bismuth. The bismuth is removed and recovered, which is not the case with the Parkes process.

The Harris process of softening and dezincing by the use of molten caustic salts is used in some plants in England, Europe and Japan. The process is designed to remove impurities from molten desilverized lead by pumping it through a mixture of molten salts contained in a tank above the lead kettle. The metallic impurities react with the chemicals and are collected in the form of their oxides or oxysalts. The Harris process while sound in theory has not been universally adopted since in practice it cannot always compete economically with the Parkes or Betts process.

Some ores, such as those of southeastern Missouri, contain too little silver for profitable desilverizing. Therefore the finished pigs, while free from other impurities, are noted for their comparatively high silver and copper content and are given the designation "Chemical" lead because of wide use in the chemical industries in the form of sheet and pipe. This is but one of the commercial grades of pig lead available to the consumer. These grades are described in the accompanying table of the American Society for Testing Materials specification for the various grades of pig lead.

Scrap an Important Source of Lead

An important source of lead each year is scrap or secondary lead as it is more formally known. In 1953, in the United States, approximately 435,000 tons of lead were produced from secondary sources accounting for more than a third of all the lead consumed by American industry in that year.

The chief source of lead scrap is from automobile storage batteries which contain somewhere between 20 and 25 lb. of lead a piece. The bulk of this lead is recovered after an average service life of about 26 months. Additional sources for lead scrap include such items as lead sheathed cable, pipe and sheet, solder, railroad bearings, type metals and lead drosses.

Secondary lead is reclaimed by fire refining methods in refineries usually devoted exclusively to the handling of secondary lead and lead alloys. A comparatively small percentage is also refined at primary refineries.

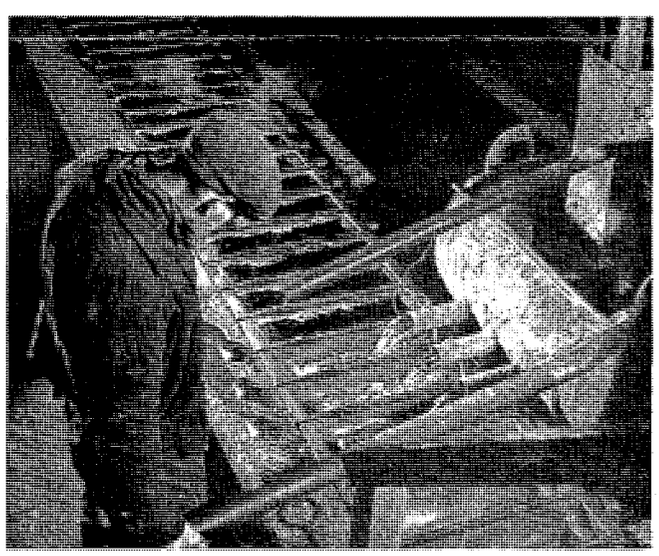
Much of the secondary lead produced is sold as lead alloy, particularly lead from reclaimed batteries and cable sheathing which contain small percentages of antimony and other metals. The bulk of the secondary lead recovered containing antimony is re-sold to battery manufacturers. Secondary lead containing tin is most often re-used in the manufacture of solder, bearing metals and other lead-tin alloys.

By applying proper refining techniques, soft lead can be produced from secondary sources to meet primary lead specifications.

Pigs of lead and antimonial lead usually weigh about 100 lb. each, while ingots of lead or its alloys may have almost any desired weight and shape from the small 3- to 5-lb. cakes to be melted in portable gasoline furnaces to 100-lb. cylindrical billets to fit extrusion presses.

Lead and Lead Alloy Products

In semi-fabricated and fabricated form, a variety of lead and lead alloy products are available. Examples are:



Casting fully refined lead into pigs

REVIEW OF LEAD-ZINC -

PRODUCTION - MARKETS - IMPORTS - STOCKPILING

AND

TRADE AGREEMENTS EXTENSION ACT OF 1955

Utah Mining Association, Wiles P. Romney, Manager

February 8, 1955

The Trade Agreements Act as amended is due to expire June 12, 1955. The first bill placed before the Congress in the 84th session was one proposing extension of the Act to June 30, 1958; certain tariff reducing powers for the President; as well as power for the President to negotiate foreign trade agreements with respect to any provisions relating to international trade which will not be inconsistent with existing legislation.

The present Act, originally passed in 1934 and amended extensively since, provides for protection of domestic industry both in the negotiation of and the functioning of a trade agreement. These provisions relate to "domestic industry producing like or directly competitive articles" - as such articles are considered for or included in an agreement.

Section 3 of the Act, requires a study by the Tariff Commission and a report by it to the President on all articles proposed for inclusion in a trade agreement before that agreement is negotiated. The United States Government under this Act negotiated 32 separate agreements with 28 different countries before the Geneva Agreement (General Agreement on Tariffs and Trade 1947). Studies and reports were made by the Commission on all articles involved in each of these agreements.

The Escape Clause, (Section 7 of the Act) provides for an investigation of claims of injury being sustained by domestic industry because of concessions granted in Trade Agreements.

Those specific provisions, commonly called "peril point" and "escape clause", designed by the Congress to insure competibility of domestic industry, have been largely ineffective in both pre-trade agreement considerations and in post-trade agreement application. The effect has been to eliminate the Tariff Commission as a critical judge of tariff reductions under trade agreements; to circumvent the Constitutional Authority of the Congress to regulate foreign and domestic trade; and to add materially to the arbitrarily assumed trade controlling powers being exercised by the Executive Department, through the State Department.

There is an increasing interest in trade agreement matters among major domestic industries which are competing with foreign industries in the United States market. Progressively more of such industries are being put in an unfair competitive position through wage, tax and other cost differentials. Although that interest has probably not yet reached a sufficiently wide circle to pose a threat against the proposed extension, there is a strong possibility that the Act can be amended to make the peril point and escape clauses effective in the way that the Congress intended when they were written into the Act. That amendment would simply provide that Tariff Commission recommendations following peril point and escape clause investigations would become effective within 60 days after being presented to the Congress unless within that period the Congress should by majority vote override the Tariff Commission's recommendations.

Congressman William A. Dawson of Utah has a bill proposing this specific action. He justified transferring approval of Tariff Commission recommendations on escape clause actions from the President to the Congress, with the following statement:

> "It occurs to me that there is something wrong with a set-up which puts the decision to change a trade agreement in the hands of the same person who made it, when it later turns out the agreement was a mistake or is failing to work."

The ineffectiveness of the peril point and escape clauses under the present arbitrary power of the Executive Department to either accept or reject Tariff Commission recommendations has been vividly illustrated by the Lead-Zinc Case, recently

investigated by the Commission. A unanimous recommendation made to the President for restoration of duties on lead and zinc by the Tariff Commission following nine months of exhaustive study, was disregarded in favor of a stockpiling provision. The rather obvious reason was that the protests of foreign-producing countries, made through the State Department, outweighed the imposing combination of: the Tariff Commission's recommendations; pleas of domestic industry; the supporting letters from some 32 senators; appeals for approval from a large block of representatives; and the strong support of the public, labor and related industries and business in the mining areas.

Briefly the history of the Lead-Zinc case is as follows:

Prior to the Trade Agreements Act, duties on lead and zinc metal were 2.125 and 1.75¢ per pound respectively for lead and zinc.

Trade Agreements negotiated in 1939 and 1943 reduced the duties to 1.06 and 1.25 respectively for lead and zinc.

As these are "fixed rate" duties, their ad valorem relationship to price has dropped progressively as metal prices increased.

The ad valorem relationship of duties to metal prices over the years and as affected by Trade Agreements is illustrated below:

	Lead		Ad Valorem	Zinc		Ad Valorem
Date and Act	Price	Duty	Equivalent	Price	Duty	Equivalent
1930 Tariff Act	5.52¢	2 1/8¢	38.5%	4.55¢	1.75¢	38.41%
Immediately prior to Canadian Agreement				4.61	1.75	37.96
Canadian Agreement 1939				5.11	1.4	27.40
Immediately prior to Mexican Agreement	6.48	2 1/8	32.8	8.25	0.875	10.61
Mexican Agreement	6.50	1 1/16	16.3			
Tourque Agreement-1951	17.75	1 1/16	6.0	18.357	0.7	3.81
Present-Jan., 1955	15.0	1 1/16	7.1	11.25	0.70	6.2

Under such drastically reduced protective duty - imports into the United States in 1949 and again beginning in 1952, amounting to the major portion of Free World surplus production of lead-zinc, created distress among domestic producers. The National Lead-Zinc Committee, representing the major portion of domestic production, proposed relief to the 83rd Congress in a proposed so-called Simpson Bill. Hearings

were conducted by the House Ways and Means Committee and administration officials appeared before the Committee. (~~Senators~~ Secretaries McKay, Dulles, Humphrey and Mr. Stassen.) While they voiced Administration opposition to the bill, they encouraged the industry to seek relief under existing law - specifically under the escape clause of the Trade Agreements Act.

The Simpson Bill was sent back to committee by vote of the House late in July, 1953. Immediately following that action the Senate Finance Committee and the House Ways and Means Committee passed unanimous resolutions instructing the Tariff Commission to make an investigation of lead and zinc - "including the effect of the imports of lead and zinc on the livelihood of American workers." and "facts . . . . relative to the production, trade, and consumption . . . . including the interests of consumers, processors and producers." also "as to the effect upon the competitive position of the domestic lead and zinc industries of the present tariff status of imported lead and zinc . . . .".

The lead-zinc industry in September filed an application for escape-clause action. Hearings on the entire subject were held in Washington by the Tariff Commission in November of 1953. In April, 1954, the Tariff Commission reported to the congressional committees that damage to the industry had been sustained and that substantial reduction of employment had resulted from greatly increased imports - to which imports present duties were found to present an ineffective barrier. To the President, in a confidential report, the Commission unanimously cited imports as damaging to domestic industry and employment and unanimously recommended relief by upward adjustment of duties.

Representatives and Senators of both parties in western and other mining states joined in requesting that the President approve the Tariff Commission's recommendations. The public, labor organizations and the industry made appeal after appeal for such action. There is reason to believe that every Cabinet officer consulted on the matter recommended approval, <u>excepting the State Department whose objections apparently</u>

carried more weight than all the approvals. The President chose the alternative of stockpiling. His announcement of that alternative made August 20, 1954, recognized "unemployment for miners" community distress and that "an adequate mobilization base is not being maintained." The alternative stockpiling plan directed the Office of Defense Mobilization "to increase purchases at market prices of newly mined domestic lead and zinc" and further stated "The Government is in a position where it could purchase in this fiscal year up to 200,000 tons of lead and 300,000 tons of zinc."

The President further stated:

"I am directing the Secretary of State to seek recognition by the foreign countries which are principal suppliers of lead and zinc that this increased stockpile buying is designed to help domestic production and that they will not themselves seek to take any unfair advantage of it."

"It is my belief that the above actions will help bring about the attainment of market prices for lead and zinc that are sufficient to maintain an adequate domestic mobilization base."

"If the course of action above outlined has not accomplished the objectives we seek, I will be prepared early next year to consider even more far reaching measures, and to make appropriate recommendations to the Congress."

The industry was keenly disappointed, after having followed Administration officials' advice to seek "escape clause" relief and having been cheered by a unanimous "relief" recommendation from that body, to be denied that relief by the President. However, the industry agreed to go along and give the alternate plan a try.

The time is appropriate to review developments in the lead-zinc industry since that date, particularly in view of the fact that a new Congress has convened; that it is now "early next year" - the prescribed time to consider the "even more far-reaching measures" suggested by the President - and for the reason that Trade Agreement revision and extension is being considered currently by the Congress.

Current factors in the lead-zinc industry pertinent to consider are:

1. Price of metals.
2. Stockpile purchases.
3. Domestic production, consumption and imports.
4. Import rates in 1954.
5. Effect on western mines.
6. Effect on Utah's mines, employment and economy.

Price of Metals.

Prices of lead and zinc were at a low point in March, 1954 (13.0¢ for lead; 9.75¢ for zinc) when the President announced the intention to inaugurate a long-range stockpiling program for lead-zinc and other metals. Buying interest increased immediately and prices had edged upward to 14.25¢ for lead and 11.0¢ for zinc at the time ODM issued the first purchase order for lead and zinc (June 7, 1954) under the President's March directive. One of the first results was an 0.25¢ drop in lead price (June 15) due to ODM declining the first offer of lead with the explanation that the price was too high. Protests of miners and congressional groups soon obtained a decision from ODM to buy "at market price." However, it was August 25th before lead again recovered to 14.25¢. Lead increased an additional 0.75¢ to 15¢ on October 5, 1954, where it has since remained. Zinc was 11¢ at the time of the actual beginning of stockpile purchases. It increased to 11.5¢ on September 7, 1954, where it has remained since.

The major increase in prices occurred after announcement that stockpile purchases would be made - 1.25¢ for lead and 1.25¢ for zinc. Prices since actual stockpile purchases began have increased 0.75¢ for lead and 0.50¢ for zinc, with lead losing and then regaining 0.25¢ as above recited.

Stockpile Purchases.

A release from the White House on August 20, explaining the President's decision to not approve the Tariff Commission's recommendations, stated that "he is taking affirmative steps at this time to strengthen and protect our mobilization base for lead and zinc." Among those steps was cited: "Increased purchases at market prices of newly mined domestic lead and zinc under the long-term stockpile program. In this fiscal year the Government could purchase up to 200,000 tons of lead and 300,000 tons of zinc."

The American Metal Markets of January 11, 1955, reported that 93,400 tons of zinc were purchased for stockpiling in the last six months of 1954. This amount

then represented the purchases made under the newly announced program, or at a rate of 15,567 tons per month. December's purchases were, in the same article, reported at 17,218 tons. The rate of purchasing so far, if continued, will not reach 200,000 tons, or even two-thirds of the possible 300,000 ton total set by the President.

Price of zinc has not risen to a point where the "mobilization base" has been either "strengthened" or "protected." Domestic mine production still continues downward and the industry has no reason to feel that the program will produce the desired results. The following quotation from the January, 1955, issue of Mining World typifies the uncertainty under which the domestic miner is operating:

"On the whole, long-term stockpiling seems to be not much more than an abortive gesture so far. In the case of lead-zinc purchases, it is not known whether the recent acquisitions are for the minimum or long-term objectives, but in any case it seems that purchases will be gauged in such a way as not to float prices above what the ODM experts consider satisfactory. What strikes and acts of God may do to prices is another matter, but the opinion around Washington is that ODM will quit buying if lead and zinc prices advance much above the present levels."

Domestic Production, Consumption and Imports.

Domestic miners of lead-zinc were staggered by the flood of imports in 1949 and early 1950, but were saved temporarily by increased demands incident to Korea. Import floods resumed in mid-1952 and have continued to the present. The domestic producer has been forced to curtail or to quit as the following data clearly illustrate:

DATA ON ZINC

	I Domestic Mine Production	II Imports of Zinc (General Imports)	III Total U.S. Consumption of Slab Zinc	IV Excess of Imports of Zinc over that Necessary to Supplement Domestic Production (I + II) - III
1949	593,203	368,104	711,800	249,507 tons
1950	623,375	434,547	967,134	100,788 "
1951	681,189	390,940	933,971	138,158 "
1952	666,001	563,850	852,783	377,068 "
1953	547,430	745,542	985,927	307,045 "
1954	464,445*	596,400**	854,312***	206,533 "

*Based on first 10 months mine production - American Zinc Institute data - 387,038 tons.
**Based on average monthly rate of imports of zinc ore and concentrates and slab zinc for first 10 months of 1954 - actual average monthly rate was 49,700 tons. (See "Imports" following, for data on impact of imports on domestic market.)
***Based on first 10 months consumption of slab zinc-Amer.Zinc Inst. data - 711,927 tons.

Howard I. Young, President of the American Mining Congress, President of the American Zinc, Lead and Smelting Company, one of the major domestic zinc producers; and for many years President of the American Zinc Institute, made the following comments at the 1954 Annual Meeting of the American Zinc Institute, regarding the effect of zinc price on domestic production: (Page 31, Journal of the American Zinc Institute-Inc. - Vol. XXXII - 1954)

"While many of the mines operated by the larger companies are continuing to operate today, it is estimated that only approximately 225,000 tons annually of zinc can be produced today on a break-even or profitable basis on a 10-cent market. Less than half of this tonnage can be mined at a reasonable profit when capital charges, overhead, taxes, and depletion are considered. This means that at the 10 cents level, only approximately 25 per cent of our nation's needs can be supplied from domestic mines on a break-even basis.

"Only between 10 per cent and 15 per cent of our nation's needs can be supplied profitably at the 10-cent level.

"At the 12-cent level the tonnage which can be produced at break-even or better is approximately 400,000 tons.

"At the 14-cent level approximately 500,000 tons can be produced, and an additional 100,000 tons at the 15-cent level.

"These estimates assume that the price of lead and silver will remain in the price relationship to zinc that has prevailed since World War II. Also, present day costs are assumed. I would call to your attention the fact that the production at any given price will never be exactly equal to estimates. There are always certain mines which will operate for rather a long period at a loss so as to keep the property in good physical condition and maintain an operating organization. Mine operations usually continue until cash operating losses exceed shutdown expense, which in many cases is quite sizable."

The surplus available supply, whether accumulating in government stockpiles or industry inventories, has been instrumental in forcing prices down to disastrous levels for the domestic mine producer. The net result in the above six years has been a complete reversal in the relative share of the domestic market between domestic and foreign producers. In 1949, domestic miners had 62.2% of the total domestic market, the foreigner 37.8%. In 1954, domestic miners had but 39% and the foreigner 61%.

True, imports decreased somewhat in 1954, compared with 1953, about 18.5% to be specific, but domestic mine production dropped 29.5%, a readily foreseeable result considering the lack of import controls, reduced domestic consumption (13.5%) and stockpile buying below the level of the excess of available supplies.

The foreign producer will not voluntarily reduce his level of metal offered for import, despite the President's instruction to the State Department to seek that understanding. On the contrary, the opposite view has been expressed by the representative of one country. The Australian consulate general in San Francisco stated in a release:

> "Australian lead-producing companies expect to increase their sales to the United States as a result of a recent decision by President Dwight D. Eisenhower against imposition of higher duties on lead duties."

The question as to whether or not the stockpile buying of zinc has either "strengthened or protected our mobilization base for lead-zinc" is obviously answerable - painfully so for the domestic miner.

The story for lead has been the same except in degree. For one thing, strong European demands have diverted a greater portion of foreign lead production to that market and price has reacted accordingly. Price of lead at 15¢ is probably reasonable for productions costs in our economy, but zinc mines gain no benefit therefrom and mines producing a combination of lead-zinc (as do most western mines) suffer from an inadequate combined price.

Imports.

Lead and zinc imports have actually increased in volume since stockpile purchases began in June, 1954.

Imports during the first six months compared with imports since stockpile buying began are compared below:

Before Stockpile Buying Total First Six Months 1954	Average Month. Rate	After Start of Stockpile Buying Total July - Oct. Inclusive	Average Month. Rate	Increase in Month. Rate since Stockpiling (tons)
Zinc				
288,162 tons	48,027	208,831	52,208	4,181
(Total Zinc Imports new zinc first 10 months 1954 = 496,993 tons.)				
Lead				
214,463 tons	35,744	167,429	41,857	6,113
(Total Lead Imports new lead first 10 months 1954 = 381,992 tons.)				

The above import figures are "general imports" or the tonnages actually making entry into the United States in the period shown. "Imports for consumption" or the

tonnage of imported metal released on the market (released from current imports and from imports previously entered for warehouse) was substantially higher than "general imports."

Mr. Otto Herres reports zinc "Imports for Consumption" to have averaged 58,874 tons per month for the first 10 months of 1954, or a total of 588,740 tons in the period, or 91,747 tons greater than total general imports in the first 10 months of 1954.

Illustration of Squeeze in 1954 on Domestic Mine Production:

		Projected to one Year Basis
Total domestic consumption 1st 10 months	= 711,927 tons	854,312
Total imports for consumption 1st 10 "	= 588,740 "	706,488
Tons short of satisfying market	123,187	147,824
Tons domestic production	387,038	464,445
Tons surplus depressing market	263,851	316,621

Because of wage and other cost differentials the domestic miner is marginal in the over-all supply picture. Further illustration is hardly needed to explain the progressively lowered domestic production over the past few years. The situation is a complete reversal of the President's expressed hope for a strengthened and protected mobilization base. The basic solution is in reasonable control of import volume so that our capacity to produce domestically can be supplemented rather than be further dangerously surplanted. This solution was directly recognized by the Tariff Commission. The President, the Cabinet Committee and the State Department made less direct comment but recognized import effects.

Effect on Western Mines (9 states)*.

PRODUCTION RECORD

	Lead Tons	Lead Value	Zinc Tons	Zinc Value	Total Pb.-Zn. Tons	Total Pb.-Zn. Value
1949	242,750	$76,725,100	357,519	$88,664,700	(600,269	($165,389,800
1950	247,508	69,527,600	366,729	104,151,800	(614,237	(173,679,400
1951	231,159	79,980,800	397,355	144,627,600	(628,514	(224,608,400
1952	228,548	73,323,400	385,648	128,034,500	(614,196	(201,357,900
1953	194,434	50,960,300	304,314	69,921,500	498,748	120,881,800
1954	169,738	46,182,300	234,949	52,156,100	404,687	98,338,400

*From Bureau of Mines data - 1954 is Bureau of Mines preliminary data.

The average combined lead-zinc tonnage in these states for 1949-50-51 and 52 was 614,304 tons, having an average gross metal value of $191,258,900. 1954 tonnage was but 66% of that average and value dropped to only 51.3%.

The total lead-zinc tonnage and value comparisons illustrate the extent to which production and economic value of lead and zinc has been reduced in western states. The reduction has been due almost entirely to inability of the domestic miner to compete with imports.

Tonnage production and value losses are directly reflected in terms of lowered mine, mill and smelter employment, and decreased related business activity, such as transportation, utilities, suppliers, community business, tax income, etc.

The effects in the several states have varied with types of mines, with costs of production in relation to price and with decisions of various managements in the matter of whether to sustain production losses or maintenance losses.

Arizona, New Mexico and Nevada suffered most production-wise when 1954 records are compared with 1951. For Arizona, 70,000 tons of lead and zinc valued at $25 million in 1951, compares with 31,000 tons in 1954 valued at 7 million. Nevada, 24,600 tons valued at 8.8 million in 1951, compares with 4,500 tons in 1954 valued at 1.2 million. New Mexico suffered most for 58,000 tons as late as 1952 valued at 19 million, compares with 877 tons valued at $240,000 in 1954.

Utah, tonnage-wise, has suffered less than the above three - 84,800 tons in 1951, compared with 76,000 tons in 1954. As to gross value, however, 30 million in 1951, compares with 19 million in 1954.

The portion of the 1954 gross value for Utah production which was actually received by the mines in Utah was entirely absorbed in costs. Although 1954 figures are not yet available, Utah's lead-zinc mines for 1953 reported to the Utah State Tax Commission total receipts of $9,592,053 and "allowable" costs of $10,128,376. ($19 million gross value as determined by the Bureau of Mines is full market value of metals produced. From this value, milling, smelting, refining, transportation and sales costs must be deducted to determine mine receipts, which, as illustrated above,

prove to be about half of the gross metal value.)

The western states are not the only ones to suffer - for example, Tennessee produced 38,600 tons of zinc in 1951, valued at 17.5 million, but produced only 30,200 tons in 1954, valued at 12.2 millions. New York produced 40,000 tons of zinc in 1951, valued at 14.5 millions, whereas in 1954 a production of 53,300 tons was valued at only 11.8 million. For Virginia, the comparison is 7,300 tons in 1951, valued at 2.7 million, to 16,300 tons in 1954, valued at but 3.6 million. New Jersey on the same basis records 62,900 tons in 1951 of 24.3 million value, compared with 36,500 tons in 1954, valued at 8.1 million.

The immediate result of present conditions is that the domestic lead-zinc mining industry has been reduced principally to a struggle for continued existence. Exploration and long-range development have ceased, mines having the better grade ores, being better able to sustain losses, are the ones remaining in operation. Even in these properties selective mining is being practiced - high-grading is a more descriptive term. Employment is decreasing and communities in mining areas are feeling the economic pinch. In terms of national defense the industry is being demobilized.

It is proper at this time, in view of the plight of the industry and the expressed interest of all who have considered it, to request review of the lead-zinc situation by the President, government agencies, officials and committees who have authority or jurisdiction affecting the industry. It is time for friends, employees and officials of the industry to join in demanding that review in order that further decline of production, employment and income might be avoided and that conditions favorable for return of the industry to a healthy status might be created.

EDWARD P. FLEMING
420 S. NORTON AVE.
LOS ANGELES 5, CALIF.

RECEIVED
NOV 19 1954
WESTERN MINING DEPT.

AIR MAIL

November 18, 1954

Mr. W. R. Landwehr
American Smelting & Refining Co.
Pacific National Life Bldg.
Salt Lake City, Utah

Dear Walt;

I have just received your letter of November 16 with typed sheet of production figures and charts showing the lead statistics.

I feel that Mrs. Crane has done a swell job on the graphs, and the half-size appears to be a big improvement on the original. It is just as legible and will make the report less bulky and more easy to read.

I will start at once on the complete report so that I can mail you the skeleton copy for multigraphing.

Since I prepared the tabulation of statistics and graph I have received the 1954 edition of American Bureau of Metal Statistics. This has enabled me to give the following figures for 1953:

World production of Lead: 2,066,449 short tons
U.S.Total production of Primary Lead: 365,923 short tons.

With kindest regards,

c.c.E.McL.Tittmann
file

Yours very truly,

E. P. Fleming

E. P. Fleming

November 16, 1954

AIR MAIL

Mr. E. P. Fleming
420 So. Norton Avenue
Los Angeles 5, California

LEAD STATISTICS

Dear Ed:

Herewith are one typed sheet of production figures, and charts showing the lead statistics, one on the scale of your chart and the other reduced by half. If you will tell us which you prefer, we will have the remaining ones finished as soon as possible.

I apologize for the delay in getting these to you, but Mrs. Crane was busy with other material which was needed first.

Very truly yours,

W. R. Landwehr

WRL:si

SL-3.0

FOR MEMBERS ONLY

CONFIDENTIAL

NOT FOR PUBLICATION

RECEIVED

APR 30 1953

WESTERN MINING DEPT.

LEAD INDUSTRIES ASSOCIATION
420 LEXINGTON AVENUE
NEW YORK 17, N. Y.

FORM E
In Two Pages
Report No. 123
April 27, 1953

F. V. R.
APR 30 1953

DOMESTIC MINE PRODUCTION OF LEAD
(In Short Tons)

end 1953 based on 1st quarter

	TOTAL 1951	TOTAL 1952	TOTAL FIRST 3 MOS. 1952	FINAL FEB. 1953	PRELIMINARY MAR. 1953	TOTAL FIRST 3 MOS. 1953	
IDAHO, MONTANA & WASHINGTON							
American Zinc, Lead & Smg. Co.	2,194	4,053	1,078	589	329	1,263	
Anaconda Copper Mining Co.	12,044	11,588	3,365	898	988	2,862	- reducing
Bunker Hill & Sullivan Mining & Concentrating Co.	25,472	25,526	7,296	1,988	2,512	7,048	- reducing
Day Mines, Inc.	8,836	9,039	2,397	673	628	2,178	
Federal Mining & Smelting Co.							
Frisco Mine	1,554	1,773	353	134	174	475	
Galena		296		68	53	163	
Jack Waite	714	741	133	45	80	154	
Morning Mine	4,672	4,450	1,184	401	615	1,428	
Page Mine (Inc. Black Hawk)	7,676	7,249	1,742	614	792	2,093	
(a) Hecla Mining Co.	65	13	0	0	0	0	
(b) Mike Horse Mining & Milling Co.	1,341	1,251	386	0	0	0	
Pend Oreille Mines & Metals Co.	2,900	4,748	1,422	519	435	1,323	
Sidney Mining Co.	2,904	1,525	562	179	175	497	
Spokane-Idaho Mining Co.	1,757	1,112	344	43	41	141	
Sullivan Mining Co.	7,630	6,229	1,843	596	593	1,851	
Sunset Minerals	796	391	192	21	20	59	
Sunshine Mining Co.	4,228	3,360	1,113	205	208	658	
Triumph Mining Co.	3,132	3,553	1,019	219	275	630	
SUB-TOTAL	87,915	86,897	24,429	7,192	7,918	22,816	91,000
UTAH, NEVADA & CALIFORNIA							
Anaconda Copper Mining Co.	13,357	11,520	3,618	817	913	2,671	
(c) Chief Consolidated Mining Co.	6,556	5,217	2,145	294	300	1,149	
Combined Metals Reduction Co.	10,493	10,999	2,506	937	950	3,060	
New Park Mining Co.	3,865	3,563	1,036	331	375	1,090	
(d) Park Utah Consolidated Mines	4,627	2,466	1,294	0	0	0	
(e) Silver King Coalition Mines Co.	3,901	1,786	780	0	0	0	- 5 days/wk
U. S. Smg., Rfg. & Mng. Co.	26,713	33,578	7,699	2,859	3,379	8,926	67500
SUB-TOTAL	69,512	69,129	19,078	5,238	5,917	16,896	
ARIZONA, COLORADO & NEW MEXICO							
Eagle-Picher Co.	2,747	1,790	735	0	0	0	- down.
(l) Ground Hog Unit	1,832	2,659	443	214	6	483	
Idarado Mining Co.	4,883	4,979	1,233	410	400	1,267	
(f) New Jersey Zinc Co.							
Empire Zinc Division	4,766	4,565	1,058	255	235	752	
Phelps Dodge Corp.	1,266	1,409	272	118	83	275	
Resurrection Mining Co.	5,232	5,059	1,124	503	500	1,454	
Rico Argentine Mining Co.	2,006	2,157	544	133	140	487	
(g) St. Anthony Mining & Development Co.	4,999	4,088	1,076	0	0	0	
Shattuck Denn Mining Co.	4,812	5,094	1,301	398	477	1,279	
(m) Shenandoah Dives Mining Co.	4,224	4,479	705	291	0	513	- down
Telluride Mines, Inc.	3,831	3,632	1,008	317*	330	990	- down
Trench Unit	1,882	2,052	537	135	164	478	
U. S. Smg., Rfg. & Mng. Co.	1,460	2,047	542	144	136	441	
SUB-TOTAL	43,940	44,010	10,578	2,918	2,471	8,419	33,500

NOTE: See Footnotes Page 2.

READ AND RETURN

DJP		
WRL	✓	
KW	✓	
NW		

W. R. L.
APR 30

DOMESTIC MINE PRODUCTION OF LEAD (Continued)
(In Short Tons)

TRI-STATE DISTRICT	TOTAL 1951	TOTAL 1952	TOTAL FIRST 3 MOS. 1952	FINAL FEB. 1953	PRELIMINARY MAR. 1953	TOTAL FIRST 3 MOS. 1953	
American Zinc, Lead & Smg. Co.		2,745	802	154	137	469	
Eagle-Picher Co.	17,979	16,462	4,484	1,314	1,354	4,057	
Federal Mining & Smelting Co.	1,393	776	295	9	28	81	
St. Louis Smg. & Rfg. Div. National Lead Co.		980	430	91	99	296	
SUB-TOTAL	19,372	20,963	6,011	1,568	1,618	4,903	-19600
SOUTHEASTERN MISSOURI							
(h) Midwest Mng. & Milling Co.	11	0	0	0	0	0	
(i) Fredericktown Lead Co.	28	0	0	0	0	0	
Mine LaMotte	10,182	10,458	2,485	756	970	2,476	
St. Louis Smg. & Rfg. Div. National Lead Co.	5,421	7,655	1,903	667	733	2,104	
St. Joseph Lead Co.	108,436	106,940	28,218	8,429	9,045	26,364	
SUB-TOTAL	124,078	125,053	32,606	9,852	10,748	30,944	122,000.
MISCELLANEOUS							
(j) Balmat Mine	1,531	1,143	439	108	90	327	
New Jersey Zinc Co. Bertha Mineral Div.	1,495k	3,969	891	343	290	939	
Ozark-Mahoning Co.	2,478	2,876	833	211	206	646	
Vinegar Hill Zinc Co. Custom Mill	352	1,181	189	120	122	366	
Miscellaneous	51	4	0	0	0	0	
SUB-TOTAL	5,907	9,173	2,352	782	708	2,278	9100.
GRAND TOTAL	350,724	355,225	95,054	27,550	29,380	86,256	345,000.
DAILY AVERAGE	961	973	1,045	984	948	958	

NOTES: This report is based upon the total content of ore or concentrates. Average Daily Production is based on the actual number of days in ths month.

The above figures are estimated represent slightly over 90 percent of the total recoverable lead production of the country.

* Preliminary
(a) Closed down June 8, 1949.
(b) Ceased operations Nov. 1952.
(c) On strike June 25, 1952, to Sept. 1952.
(d) On strike July 1, 1952, through period currently reported.
(e) Ceased operations Aug. 15, 1952.
(f) New Mexico operation shut down by strike from Oct. 17, 1950 to January 24, 1952. Shut down again Oct. 11, 1952 through period currently reported.
(g) Operations suspended Dec. 6, 1952.
(h) Operated Blue Bonnet Mng. Co. lease. Ceased operations June, 1952.
(i) Ceased operations June 1, 1951.
(j) On strike July 1, 1952 to Sept. 15, 1952.
(k) Shut down by strike April 1, to Sept. 30, 1951.
(l) Operations suspended Feb. 24, 1953.
(m) Operations suspended March 1953.

W. R. L.
JAN 9 1953

RECEIVED
JAN 6 1953
WESTERN MINING DEPT.

UTAH MINING ASSOCIATION
918 Kearns Building
Salt Lake City, Utah
January 5, 1953

TO THE MEMBERS:

Below is a copy of the press release from which an article in the Salt Lake Tribune of Sunday, January 4, was composed. A few errors were made - obvious to one familiar with metal mining. Among them: "average 1951-52 price of lead and zinc of 13½¢ and 12½¢"; gold and silver production statistics were for lead-zinc ores only; "largely dependent on foreign metals" was misquoted as "wholly dependent."

Miles P. Romney
Miles P. Romney, Manager

ESTIMATED LEAD-ZINC PRODUCTION IN THE ELEVEN WESTERN STATES IN 1953

For Release - January 4, 1953

The eleven western states normally produce approximately 60% of the lead and the zinc mined in the United States - a great contribution to our Nation's industry and of vital importance to the economy of the producing area.

Following scare buying of metals in the "Free World" in 1951, supply balanced, then exceeded demand. Dollar value and lack of effective import duties attracted surplus lead-zinc to our market, early in 1952, resulting in a gradual price decline up to October, when dumping of British lead and the threat of dumping zinc forced prices down to 13½¢ per pound of lead and 12½¢ per pound of zinc. A fall of 5½¢ and 7¢ per pound respectively.

A study has been made for the purpose of estimating lead and zinc production in 1953, in the eleven western states, on the assumption of lead and zinc prices continuing at 13½¢ and 12½¢ per pound for the year.

The results, showing very material decreases over 1951 and 1952, in lead and zinc and in gold and silver normally produced with these metals are shown below: (Gold and silver production from lead and zinc ore.)

	1951 Production	1952 Estimated Production	1953 Estimated Production
Lead in Tons	231,161	227,200	152,900
Zinc in Tons	387,695	380,900	248,800
Gold in Ounces	214,426	210,146	133,610
Silver in Ounces	18,111,731	17,749,475	11,554,000

At average metal prices for 1951-1952 - and the assumed 13½¢ for lead and 12½¢ for zinc for 1953 - the above metals would represent new wealth for the eleven

[illegible] cost [illegible] western states as [illegible] freight charges to marketing points was deducted from average metal prices to determine such value.)

1951	1952	1953
$224,187,298	$201,747,538	$105,450,000

The price of lead has risen to 14-3/4¢ per pound as of December 31, which increase if carried through 1953 would add $3,822,500 to the above estimated 1953 value.

The estimated drop of one-third in metal production in 1953, marketed at present prices, would mean less than half the 1951 value.

Lead and zinc mining like any other business can be carried on only under profitable conditions. The price drops forced many small mines to close, others, large and small, to restrict production to their available higher grade ore.

Direct employment, wholesale and retail trade, personal professional services, taxes to Local, State and Federal governments in the eleven western states will all suffer losses along with the mines.

Utah's share of this loss of new wealth is estimated at $13,800,000 for 1953 as compared to 1951.

It is historic that in times of scarcity, attendant with war or war threat emergencies, metals are scarce in the United States. Government has in those periods urged greatest possible domestic metal production, meanwhile imposing price ceilings on newly produced metals and allocation of the available supply on metal fabricators and users. Foreign prices at the same time, uncontrolled, rise above our ceiling prices and we purchase whatever foreign supplies we can get at those higher prices. In times between such emergencies when there are surpluses of metal, government forgets the previous serious scarcity, forgets the all out effort of our domestic producers, and favors throwing the doors wide open to the foreign producer. He, favored by lower cost operations, by comparative value of the "dollar" and by the fact that import duties are unrealistically low in relation to comparative costs, dumps his surplus metal on our market with

results illustrated by the above production and value figures.

Each such cycle further discourages domestic production, or development for future production. If not corrected this condition can continue to the point where our dependency for metals can be so great as to leave us largely dependent on foreign metal production. We can then assuredly expect to pay prices higher than those necessary to maintain a healthy domestic industry, but more seriously, we can reasonably doubt availability of those metals to us in an emergency or in war.

We have had excellent but painful examples of extortionate prices for foreign rubber, tin and copper in the last few years, when our domestic dependency permitted that advantage to be taken.

INTERMOUNTAIN PRESS
CLIPPING BUREAU
SALT LAKE CITY, UTAH
P. O. WXRI 103
OCT 22 1952

Pocatello, Ida.
State Journal
Oct. 13. 52.

Tests Show Lead Can Be Taken From Rare Ore Mined in Idaho

WASHINGTON (AP)—Tests have shown lead can be recovered through conventional processes from a rare ore mined in Idaho, the Bureau of Mines reported Monday.

The bureau said valuable knowledge of ways of upgrading ores containing nonsulfide lead was gained through tests of ore taken from the Sherman Mine in the Leland district near Burke.

The predominant lead - bearing mineral was a minor ore called pyromorphite, little of which is being mined in the nation. Laboratory experiments were made with four tons of pyromorphite lead ore, then mill tests were made.

"It was found that conventional concentration methods of flotation and gravity separation gave excellend lead recovery," the bureau said. "Considerable difficulty was encountered, however, in recovering the silver contained in the ore."

The tests were made in the bureau laboratory at Albany, Ore.

LEAD INDUSTRIES ASSOCIATION

420 LEXINGTON AVENUE

NEW YORK 17, N. Y.

RECEIVED

APR 21 1952

WESTERN MINING DEPT.
AMERICAN S. & R. CO.

READ & RETURN			JFJ		
WRL	✓		NW		
KW	✓		SLT		
RJL			JGP		
SIB			AWN		

April 18, 1952

SUBJECT: ANNUAL MEETING

To Members of the Lead Industries Association:

We are enclosing a copy of a press release which will give you the synopses of papers delivered at the annual meeting of the Association held on April 18-19, 1952 at the Drake Hotel in Chicago.

As you will note, certain papers are available in complete form, if you wish them.

Very truly yours,

Robert L. Bogue

Secretary.

D. J. P.

APR 21 1952

K.W.

APR 23 1952

W. R. I.

22 1952

LEAD INDUSTRIES ASSOCIATION — RELY ON LEAD

For Release - April 19, 1952
Annual Meeting of Lead Industries
Association, Drake Hotel, Chicago

Lead Industries Association
420 Lexington Avenue
New York 17, New York

The recently changed lead supply-demand picture was subjected to a thorough airing at the Twenty-Fourth Annual Meeting of the Lead Industries Association held at the Drake Hotel in Chicago, Illinois, on April 18-19, 1952. The outlook for this vital metal was discussed by those best informed among the domestic and foreign lead producers and the major lead consumers. General Chairman of the sessions on lead production was Felix E. Wormser, Vice President, St. Joseph Lead Company, New York, N. Y.

New mine developments and resources of the lead industry both here and abroad were discussed under the chairmanship of F. S. Mulock, President, United States Smelting, Refining and Mining Company, Boston, Massachusetts.

Coeur D'Alene and Metaline District, Idaho - L. J. Randall, President, Hecla Mining Company, Wallace, Idaho.

California - F. A. Wardlaw, Jr., General Manager, International Smelting and Refining Company, Salt Lake City, Utah.

Utah - Cecil Fitch, Jr., Vice President, Chief Consolidated Mining Company, Eureka, Utah.

Tri-State, Nex Mexico and Arizona - Elmer Isern, Vice President, The Eagle-Picher Company, Miami, Oklahoma

(more)

*Southeastern Missouri - Elmer A. Jones, Assistant General Manager, St. Joseph Lead Company, Bonne Terre, Missouri.

"Total production of pig lead in Southeast Missouri during 1951 was slightly less than 1950. Indications are that the total in 1952 may be about the same as 1951. By the middle of this year, St. Joseph Lead Company's Hayden Creek Mine should be producing and by the end of 1953, their Indian Creek property should be ready to produce. No serious subtraction of present producers seems to be imminent so that long term prospects look good for at least keeping up with present day production. There is every indication that prospecting will continue on about the present scale."

Peru - George P. Sawyer, Vice President, Cerro De Pasco Corporation, New York, N. Y.

"Over a period of about twenty-five years the lead production of Peru has expanded from a small quantity of lead ore, mined chiefly for silver values, to a mine production which in 1952 is expected to equal about 80,000 tons of recoverable lead.

"About 65 percent of this will be produced in the form of refined lead by the Cerro de Pasco Corporation which operates the only lead smelter and refinery in Peru. Improvements now under way will increase the capacity of this plant to about 75,000 tons annually. Cerro's product is one of the purest leads produced in the world.

"The lead production of Peru is increasing and in the late 1950's it is expected that annual mine production will reach a figure equivalent to about 100,000 tons of recoverable lead."

*Complete paper available on request.

(more)

Foreign Operations of American Smelting & Refining Company - L. H. Hart, Resident Engineer, American Smelting and Refining Company, New York, N. Y.

"New lead mine developments by the American Smelting and Refining Company in foreign fields support the general conclusion that lead output from Company mining properties will be maintained at current levels for a number of years. This applies to Asarco's interests in the three principal lead producing countries of the world, namely, at Mt. Isa in Australia, at Buchans in Newfoundland (Canada), and generally in Mexico.

"Among the new developments, the Nuestra Senora Mine and the old Plomosas Mine in Sinaloa, Mexico, will probably be brought into production within about two years. The Protheroe Mine in West Australia, a new but small unit, was recently brought into production, and this summer it is expected that production will begin at Chilete in Peru. In the more distant future, provided exploration results continue to be encouraging, another operation may be started in Nigeria."

Mexico and Southwest Africa - Thomas G. Moore, Manager, Geological and Exploration Department, The American Metal Company, Ltd., New York, N. Y.

Canada - F. L. Hallam, Assistant Comptroller, Consolidated Mining and Smelting Company of Canada, Ltd., Trail, B.C., Canada.

*Argentina and North Africa - Rene Mechin, Vice President, St. Joseph Lead Company, New York, N. Y.

"Mining in Argentina has, in recent years, been greatly handicapped by exchange restrictions, very low unrealistic ceiling prices, inadequate transportation facilities, extremely high "fringe" labor costs, and a generally unfavorable governmental climate.

*Complete paper available on request.

(more)

"This has been particularly true in the case of locally produced pig lead, the controlled price of which is only three cents per pound at black market rates.

"The country is, however, basically rich in its natural resources, people and climatic conditions, and could quickly recapture its former enviable economic position given proper governmental encouragement.

"In contrast, one of the brightest spots in mining since the war has been in eastern Morocco. The Soceite des Mines de Zellidja increased production of lead and zinc some twelve-fold; likewise Royale Asturienne has considerably expanded output and Nord Africaine du Plomb will contribute a sizable production before the end of this year.

"If political unrest does not interfere, this area promises to be one of the major lead and zinc producers in the world."

The Lead Industry in Australia - Frank A. Green, Works Manager, The Broken Hill Associated Smelters Proprietary Limited, Port Pirie, Australia.

The Secondary Lead Situation - P. W. Ruppert, Assistant Manager, Metal Department, National Lead Company, New York, N. Y.

General Chairman of the sessions on lead consumption was J. A. Martino, President, National Lead Company, New York, N. Y.

The Lead Market - Dr. Joseph Zimmerman, Editor-In-Chief, Daily Metal Reporter, New York, N. Y.

Preliminary to discussing the important lead consuming industries, Dr. Zimmerman reviewed significant developments in the lead market over the past year.

"The time has come for the N.P.A. and the O.P.S. to scrap all regulations and price controls relating to lead and give the industry back its complete freedom," said Dr. Zimmerman.

"I have heard it said in Washington that during a national emergency, controls are a necessary evil. I am convinced of the evil but I was never sold on the necessity," he declared.

(more)

The plan of the D.M.P.A. to acquire lead for civilian and defense use in case of another shortage was criticized by Dr. Zimmerman, "even though the plan provides that in case the shortage fails to materialize, the lead is to be transferred to the national stockpile." Such a plan he said would only serve to prolong government control over the industry when lead no longer needs to be controlled.

The lead shortages that gave rise to the controls have disappeared, he said, and the industry now faces a surplus. Instead of trying to build up a big reserve of lead as they did last year, said Dr. Zimmerman, consumers are most likely to let the producers carry the inventory bag for them.

Were it not for the fact that the suspended import duties on lead are to be re-imposed should the domestic average price drop below 18 cents a pound, the market would probably not be as steady as it is, said Dr. Zimmerman.

Leaders in each of the lead consuming fields discussed the outlook for their own products including some new developments under the chairmanship of J. P. Ruth, Vice President, The Glidden Company, Cleveland, Ohio.

Storage Batteries - R. L. Sommerville, Assistant General Sales Manager, Electric Storage Battery Company, Philadelphia, Pennsylvania, and President, Association of American Battery Manufacturers.

Tetraethyl Lead - J. A. Costello, Vice President, Ethyl Corporation, New York, N. Y.

Communication Cable - T. G. Stover, Purchasing Agent, Western Electric Company, New York, N. Y.

"The unprecedented demand for telephone cable to satisfy expanding defense and civilian telephone service requirements has imposed a tremendous problem of overcoming shortages in lead and copper. New developments and substitutions have provided considerable relief. To supplement lead jacketed cable, two new types of telephone cable have been introduced; namely, Alpeth and Stalpeth, both of

(more)

which utilize poly ethylene plastic sheathing. With regard to the copper shortage, the Western Electric Company recently has been experimenting with aluminum conductors and field tests are now in progress. It is hoped that all cable raw materials will be in more balanced supply in the early future, and also that those materials best suited to cable manufacture ultimately may be selected and used in accordance with their relative suitability and cost. Consequently the knowledge gained from these developments and substitutions should provide the communications industry with more flexibility leading to greater operating and economic advantages."

Ammunition - J. J. Sharkey, Director of Purchases, Olin Industries, Inc., East Alton, Illinois.

"Lead used in the ammunition industry in 1951 totaled 40,185 tons as compared to 38,438 tons in the previous year.

"On a percentage basis the use of lead in the small arms ammunition industry is relatively small, but it may be of some interest to note the average annual consumption of 33,100 tons in the pre-war years 1935 to 1938 inclusive represented approximately 5.52 percent of total consumption, while the annual average use of 34,837 tons in the post-war years 1946 to 1951 inclusive represents only about 3.16 percent of the total consumption. These percentage figures, of course, indicate an increase in consumption by other industries during the post-war years.

"The annual average use in the industry during the war years 1939 to 1945 inclusive was 76,686 tons, or about 7.85 percent of the total consumption in those years. The peak consumption was in the war year of 1943, the total being 178,000 tons or about 16 percent of the total consumption in that year.

"Consumption in 1952 will be influenced by government controls, game laws, and price levels.

(more)

"The Defense Program will probably not require as much lead for small arms ammunition as was used during World War II years because of the changes in types of such ammunition."

Solder - J. A. Stone, Executive Partner, Division Lead Company, Chicago, Illinois.

*Bearings - M. J. Turner, Vice President, Magnus Metal Corporation, Chicago, Illinois.

"The railway journal bearing industry constitutes one of the largest volume markets for lead. The lead content of journal bearings purchased or manufactured by American railroads in 1951 exceeded 27,000 tons. While strong efforts are being made by the roller bearing interests to supplant the lead-base solid type bearings on freight cars, operational and economical advantages of the latter actually make for its superior adaptability to rail freight service as practiced in this country."

Type Metal - Lewis S. Somers, Executive Vice President, Imperial Type Metal Company, Philadelphia, Pennsylvania.

"Due to a large number of technological developments in the graphic arts industry, the use of type metal is rapidly becoming obsolete. Photographic composition will soon replace slug and type casting equipment and rapid, wholly mechanical etching of zinc, aluminum and magnesium will replace the use of stereotype. In this field as well as that of electrotyping, plastics are rapidly taking the place of lead-base alloys."

House Paints - John R. MacGregor, President, John R. MacGregor Lead Company, Chicago, Illinois.

Oxides - William Wilke III, Vice President, Hammond Lead Products, Inc., Hammond, Indiana.

"Although the bulk of the 177,000 tons of lead oxides shipped in 1951 went to the battery and ceramic industries, about one-third or 57,000 tons of lead oxides went into paints, chrome colors, oil refining, insecticides and miscellaneous other industries.

*Complete paper available on request.

(more)

"The lack of any unusual developments in the use of lead oxides in these industries would indicate that 1952 shipments will probably follow the general economic trend. However, the recent critical lead shortage has promoted research to find lead substitutes and intensified economy of usage. The effect this trend will have on the market is not yet known.

"One manner in which this market shrinkage can be minimized is the revival of consumer confidence in the reliability of the supply of lead."

*Chemical Construction - J. D. Magee, General Manager, Lone Star Lead Construction Company, Houston, Texas.

"It is essential that those selling lead for use as a material of chemical construction reach all potential users of such equipment with information regarding the proper use of lead and its corrosion resistant qualities; information concerning where it should and should not be used," declared Mr. Magee. "For the best interests of our industry we should advise our customers against using lead when it will not give satisfactory service without, however, neglecting the many other installations where lead is very superior to other materials of construction." Mr. Magee said that "Lead construction prices are still in line with more competitive products and even cheaper than some. In this case our biggest selling point is the low maintenance cost and the high salvage value of lead." "The use of lead in the chemical industry has been steadily increasing since 1940," declared Mr. Magee. "This is due largely to the tremendous expansion of the chemical industry and the very good work being done by the Lead Industries Association. However, we cannot leave it to chance and the work of one organization. It is going to take the concerted efforts of all of us who are interested in seeing the use of lead expand in the chemical industry."

Plumbing - J. J. Flemm, President, The Flemm Lead Company, Inc., Long Island City, N. Y.

*Complete paper available on request.

(more)

Ceramics - J. S. Nordyke, The Eagle-Picher Sales Company, Pittsburgh, Pennsylvania.

"Periodic shortage of lead during recent years has forced many ceramic consumers of lead chemicals and pigments to develop means for use of substitute materials and thus reduce their dependency on lead. Because some of these substitutions will be permanent, consumption of lead by the ceramic industry is not expected to be greater in 1952 than last year, even though the supply is greatly improved. While the immediate outlook is not one of great optimism, the healthy growth of all branches of the ceramic industry along with new developments indicate an improving picture during the years ahead."

*Stabilizers - Henry J. Whitson, Assistant to the Sales Manager, National Lead Company, New York, N. Y.

"The use of lead in the form of lead chemicals for the stabilization of polyvinyl chloride plastics is still growing along with the whole vinyl industry. While lead salts will probably continue to represent the most important vinyl stabilizers from a volume standpoint, other metallic salts especially those of cadmium are making some inroads. It is estimated that about 4,000 tons of lead per year are used for this purpose."

The Treatment of Lead Poisoning - Some New Concepts - Elston L. Belknap, M.D., Medical Director, Globe-Union, Inc., Milwaukee, Wisconsin.

Guest speaker at the luncheon was Stanly A. Easton, President, Bunker Hill and Sullivan Mining and Concentrating Company, Kellogg, Idaho, who described his experiences of more than one-half a century of lead mining in the Northwest.

*Complete paper available on request.

(End)

K.W.
FEB 5 1952

S. T. B.
FEB 4 1952

J. F. J.
FEB 5 1952

D. J. P.
FEB 11 1952

READ AND RETURN

DJP	✓	
WRL	✓	
KW	✓	
JFJ	✓	
NW	✓	
JGA	✓	

N. W.
FEB 12 1952

THE LEAD MINER UNDER GOVERNMENT CONTROLS

By Felix Edgar Wormser*
Vice President, St. Joseph Lead Company

W. R. L.
JAN 11 1952

When the Defense Production Act of 1950 was amended in 1951 and passed, those of you who have been advocating government aid to mining must have rubbed your eyes in amazement at the scope of the law. You had achieved complete victory. Here was potential aid almost beyond expectation. Loans, subsidies, price floors, military stockpile purchases, exploration payments. What else was there to ask for? Tax relief to mining? Even that was granted by Congress to some degree for the first time in history. Hence, for the year 1951, we have had a test of government machinery in operation in the mining industries, involving controls completely superseding the free market. I expressed the hope a year ago, when I appeared here, that the administration of the Act would help you, and that it give you what you wanted, after many years of struggle for subsidy legislation.

Do the results please you? It is my belief, based solely upon the record, that the small miners, in fact, the entire mining industry - yes, the public itself, would have been better served without government price control of lead and zinc, the two metals in which I am chiefly interested, and that a free market would have shown greater benefit to all. If I am correct in my conclusion, then the speedier we return to a free market and terminate price control for lead and zinc, the better for all of us. Before I begin my analysis, may I say that we, in the mining industries, have been singularly fortunate in the high caliber of the men who have served, and are still serving, the government in the administration of the Defense Act controls. I am sure that they have done their level best. My comments are directed at the underlying policies they have had to apply.

Now let's examine what actually happened in lead during a full year of price control. I think you will quickly grasp the difficulty, indeed the futility, as the story unfolds, of trying to control the price of a world commodity like lead, under present conditions, and how policies established with the best of intention, no doubt, are easily undermined by other countries having different views and working, quite understandably, towards their own best interest.

At the beginning of 1951 the government froze the price of lead at 17¢ per pound New York, a price which was, unfortunately, below the price which buyers of lead in Europe were willing to pay. The British Ministry of Materials, which purchases lead for internal consumption, a short time later established a price of 21¢ per pound, or 4¢ above our ceiling. Still higher

---

* Address delivered before the Colorado Mining Association, Denver, Colorado, Friday morning, February 1, 1952.

prices were paid on the Continent - 23¢ or more. The uniformly higher prices ruling abroad naturally diverted metal from Mexico that had normally been imported into the United States, to foreign customers. Indeed, Mexican and other producers were permitted to sell, and able to procure, right from the start of 1951, 18½¢ for their metal in the United States, but we miners were forbidden to sell our lead at that price. One would have thought our lead was inferior in quality! As time went on, the disparity between the ceiling of 17¢ and the foreign price grew wider and wider. Foreign lead was freely sold at 25 and 26¢ per pound in large volume abroad, but there was no change in the domestic ceiling.

Government regulations did, however, permit domestic manufacturers to buy lead at any price they desired to pay. Some of them bought Mexican, Australian, Peruvian and other lead at higher than our ceiling prices - prices that varied from 21¢ to 25¢ per pound. Of course, most domestic manufacturers were caught by ceilings on their own manufactured products, which limited or prevented them from passing on the increased cost of foreign lead. They had to absorb it.

Congress was becoming increasingly critical of this marked discrimination against the American lead miner. The situation was as if, under the provisions of the Defense Production Act, someone in authority had said: "Mine all the metal you can, but you will be punished if you sell it at higher than 17¢ per pound. However, it will be perfectly all right for your Mexican, Australian and other competitors to sell their metal here at any price they can get in the United States, and you cannot export your metal, either".

At any rate, on October 2, 1951 a regulation of the government partly terminated this rank discrimination against the American lead miner, by forbidding consumers to buy any foreign lead at higher than the domestic ceiling price. Simultaneously, Washington advanced the ceiling to 19¢ per pound, where it stands today. This narrowed the spread between the foreign and domestic markets but did not eliminate it, nor did it help our customers, the lead-consuming industry, because the necessary imports from foreign lead producers still continued to be diverted from the United States for sale abroad at higher than ceiling prices.

Just to give you an indication of the extent to which this trend operated, the imports of lead in all forms into the United States in 1950 were about 550,000 tons; in 1951 they dropped in half, to 275,000 tons. This is the reason for the lead shortage you have been hearing so much about. In a free market there would have been no shortage. The price might have risen for a short time here, until international supply and demand became in line again. Then it would have declined or fluctuated. Lead imports into the United States are the balance wheel between a satisfactory supply and an unsatisfactory one - a shortage. Our domestic mine production, as you know, is around 400,000 tons, and even if production had been greatly increased, it could never have made up the drop in imports amounting to 275,000 tons.

Now, what was the reason for this policy on the part of the government? Certainly it was not to insure the government receiving an adequate supply of lead for defense purposes, because, as you know, the direct military requirements of lead are small. It is the regular civilian uses of lead which loom large in any defense effort, and they do not have to be earmarked for defense. No, it must have been to control inflation -

"to hold the line" - but if we are sincerely interested in controlling inflation (and sometimes I have my doubts as to whether we want to have deflation), price control is a thoroughly discredited device for accomplishing this. Fiscal and credit controls are the effective government instrumentalities needed to control inflation.

Lead enters into our everyday cost of living only to an insignificant degree. How often do you buy anything made of lead? Probably when you buy a home, which is rarely, when you paint it, which is infrequent, or when you buy a battery for your car, which is every two years or so. The saving in the daily cost of living by maintaining the ceiling price of lead a few cents below the world market and creating a shortage, was much less than the cost to us all of operating motor cars on lower octane gasoline than would otherwise have been available, or using lower lead content paints, or substitutes for lead plumbing.

Perhaps another impelling motive in keeping the price of the nonferrous metals down was the fact that the larger and successful mining corporations would make too much money! If so, we come back to profit control, the great target of the socialist thinker who would like to take profits out of our economy altogether, and have everybody work just for the love of it - or for the government. As the Committee for Economic Development has so well stated recently:* "Profit standards have no function in a well designed system of price control, for the main objective is to control prices, not the incomes earned in particular industries, or by particular parts of the economy." One would think that, with the government now reaping a major share of corporate profits, and desperately needing all the revenue it can get, there would be an interest in seeing that profits become as high as possible. Competition has a way of leveling profits and protecting the public, especially in international trade. Also, we have an excess profits tax.

If you were to ask me by what formula, or possible incantation, the government arrives at a price of 17¢, or a price of 19¢ under its planning, as a proper one, I would have to reply I don't know. Nor do I think this secret has ever been revealed. It is a thankless, indeed, impossible task for anyone, for once the die is cast and the price set, repercussions inexorably follow. The ceiling has its effect both on production and consumption, and the international movements of the metal. In lead, it was so low it failed to stimulate domestic production. ~~Indeed, domestic lead mine output declined 10% during 1951.~~ On the other hand, the ceiling price was low enough both to stimulate domestic consumption and to decrease our imports to such an extent that we heard nothing but a cry of shortage throughout the year - a cry which reached such a high pitch that, at the year-end, the government decided to release 30,000 tons of lead from the military stockpile as the only source of prompt relief. Of course, the government could have purchased lead from foreign mining companies at higher than ceiling prices and resold it here at a loss, at the ceiling. But this would have meant subsidizing foreign producers and not domestic miners, obviously a discriminatory and undesirable policy. It illustrates the difficult and vexing problem of price control of an international commodity like lead.

Another most regrettable consequence following from the establishment of an unrealistic ceiling price on lead, and the resultant government-made shortage, was the unleashing of a new control, the inevitable result in a planned economy, for one controls always spawns another. The government

* December, 1951.

instituted measures to curb the use of lead and invite substitution. I can not too strongly deplore this unnecessary step, for it involves an impairment and possible destruction of the miners' commercial, and highly competitive, lead markets, markets that have been carefully built up over years. The amount of lead to be permitted in certain government paint specifications, the type and quantity of certain storage batteries, have already been the subject of restriction. No doubt others are to come. This approach puts the cart before the horse and is another reason why I feel that we must ask Congress to exempt lead from price control and return to a free market.

Lead consumption in the United States is well over 1,000,000 tons per year and can grow still larger. There are three ways in which the lead for our commerce is procurable: (1) virgin lead from domestic mines; (2) imports of foreign lead in all forms; and (3) reclamation of domestic scrap lead. They are all usually fairly equal in volume, but as I have explained before, in 1951 by virtue of price control the necessary imports were cut in half, seriously disturbing the balance between available supply and consumption, and creating a shortage. The public generally has overlooked the fact that the metal shortages they have been reading about are simply the result of government price-fixing. Decontrol lead and the shortage would disappear promptly, doing away with the need of allocations.

And now I want to spend a few minutes to acquaint you with a comparatively new global development in the metals that has not received much public notice, but which, if it indicates a trend, is something we should watch closely. It is the creation and operation of a new inter-governmental - or, should I say, super-governmental, agency known as the International Materials Conference. This is an organization which, insofar as information is available, was prompted by the socialist government of Great Britain two years ago under Mr. Atlee, to plead for an increasing share of the world's raw materials. Why this should be necessary in the case of lead, or zinc, is beyond me, inasmuch as the Ministry of Materials has consistently kept its buying prices well above those of our own ceilings and, therefore, has been able to procure all the lead it needed from Canada, Australia, Mexico and other foreign sources, without need of any international conference.

The Conference has headquarters in Washington under the auspices of the State Department and includes representatives of most of the governments outside the Russian orbit. The I.M.C. functions through committees, each one specializing in one or more metals. They have acted in both copper and zinc by recommending certain world-wide allocations. Lead is under study but no recommendations have been made, [redacted]. The I.M.C. has introduced a new conception in economic literature such as the unique expression, "Entitlement for Consumption." Think that one over for a moment. It means that countries, like our own, with exportable surpluses of certain commodities are given quotas of consumption, to which they are expected to adhere. For example, although we are the most important sulphur and molybdenum producers in the world, we are told how much sulphur and molybdenum we should use. At the same time it is noteworthy that tin and natural rubber, which we do not produce in this country, are not included in the scope of the Conference. I have not been able to understand why this "Entitlement of Consumption" does not extend to foodstuffs. Perhaps it does. Why should we not be given a quota on how much food we raise we can retain, and how much textiles we may keep to clothe ourselves?

What I am trying to imply is that the International Materials Conference movement has a direct bearing on our standard of living , for, if carried on for a number of years, it will obviously tend to lower our standard, while increasing that of other countries. Our own government has traditionally been opposed to monopolies and cartels, but here, already functioning is a super cartel , and if you think it confines itself only to an exchange of observations, crystallized in the form of recommended international allocations, you will be disillusioned when you learn that it actually tries to fix some prices, as it has done, in establishing maximum and minimum prices for tungsten.

Although you may feel, perhaps, that the International Materials Conference is primarily concerned with the proper allocation of the available supply of the world's minerals, upon examination it apparently intends to spread far afield - economically speaking. Listen to this official statement of the Conference which reads: "Although most of the Committees have not dealt with problems of prices, it is likely that the consideration of methods of increasing production and distributing of available supplies will require that they give attention to such problems". (Information Bulletin No. 29, Friday, November 29, 1951).

And if you think that that is all that the I.M.C. is planning to do, you will be further disillusioned. Another egg is to be hatched. A statement released a short time ago on copper and zinc reads as follows: "So that the current supplies of copper and zinc may be used to the best advantage, the Committee has recommended that countries adopt measures to eliminate unessential consumption and to encourage substitution by materials not in short supply." So here we have a super-duper inter-governmental curb, with little sanction in law so far as I can find out, but, like the nose of the camel under the tent, is entering the metal picture gradually, first through international allocation, then proposing international attention to increasing production and distribution, and finally international conservation.

Strip the movement of its high sounding phrases and it reveals an effort to circumscribe our standard of living. This is not a drive against inflation, as we were led to believe when the ceiling price of lead was set. This is not an effort to make certain that the United States and the rest of the world receive enough metals for defense. This movement is definitely tied into civilian economies. This is a socialist sponsored move that has received high praise abroad, and will take over completely the functions of a free market - if we permit it - which has heretofore determined who gets what and how much.

By what authority in law does the I.M.C. operate? How are its decisions determined? Who decides the selection of some commodities and the exclusion of others? Does each country have one vote? What experience have accredited representatives had in their respective specialties? Other questions come to mind which should be clearly answered for the information of the American people, if we are to have an "austerity" program established by international understanding.

From all I have said, you can see that we, in an important natural resource industry, are now deeply enmeshed in a jungle of government controls, nationally and internationally. Fortunately, there is such a tremendous demand for our product, stimulated by worldwide defense requirements and the revival of Europe, that prices are relatively high and there is a natural disposition

to accept the condition without too much complaining, for almost everyone in mining has had profitable years lately.

In the long run, however, in endeavoring to control world commodities, our government is trying to do something beyond its power. No matter how worthy the motive, its effort will only create more problems and a greater and unnecessary bureaucracy. I agree with Senator O'Mahoney who, in speaking about wool recently, contended that the OPS should not control U. S. wool prices, because it cannot fix foreign wool prices. He is reported to have stated, "Both the supply and the price of this international commodity are dependent upon factors in the world market that are beyond our control". Senator O'Mahoney might just as well have substituted the word "lead" for wool, for the principle is applicable to both. I hope that if he feels as strongly about the subject as I do, he and his many western colleagues in the Senate will introduce an amendment to the Defense Stabilization Act of 1952 which will not only remove wool prices from government control, but also lead and zinc.

The small miner in Colorado, and elsewhere, is at a considerable disadvantage in knowing what goes on in Washington. To be sure, Congress recognized the desirability of having all branches of the mining industry, large and small, represented in Washington in the defense effort, through Advisory Committees, but I find these committees have one serious drawback, namely, that only those who are fortunate to be actually present, and to hear learn what is discussed, derive any benefit. They are on the inside, so to speak. Subsequent releases made by the government of Advisory Committee meetings are generally so cursory and condensed, if made at all, that they do not give detailed information and the discussion that would be of help to the small miner. One way out would be to permit Trade Association officials to be present, and I have the impression Congress included a stipulation to that effect in the Defense Production Act. For some reason or other, this step has not been carried out. If a Trade Association secretary were present, he, being in a neutral position, would have a chance to advise any interested small mining company of the nature of the problems discussed, the varying points of view, and the action recommended. Perhaps this criticism is no longer important, in that Advisory Committee meetings are infrequent anyway.

The conflict in government policies, or planning, is extremely confusing. On the one hand, the government sets up a pricing system which cuts imports of lead some 275,000 tons, and on the other hand it professes a desire to set up a subsidy system to increase domestic production - now around 400,000 tons per year. It would take years to find the ore needed to make up the deficiency in imports, through increased mining operations, and the capital risk is hardly justified. Even assuming a subsidy plan is perfected to increase mine production, say 10 per cent, or 40,000 tons per year, not an easy assignment, what is that for an economy requiring 1,000,000 to 1,200,000 tons? I think you may be surprised to discover that a subsidy system which supplies a premium of, say, 5¢ per pound for all lead production over a base period, is equivalent to an increase of only 1/2¢ per pound in a free market for a 10 per cent rise in production.

The government has not yet announced what kind of a subsidy system it will devise under the Defense Production Act, although it is known to be working on one. The reason for subsidies now given is to increase production in the fight against inflation, not defense requirements. There are much sounder methods of overcoming inflation, that is, through credit controls and

taxes. One of the domestic copper companies was recently granted a "subsidy" by the government of 5¢ per pound of all copper produced to keep going. Nowhere in the press reports did I see any reference to the fact that this seemingly generous act on the part of the Government was actually not a subsidy, because, in a free market, if permitted to dispose of its copper abroad, copper mining companies could do much better than the ceiling price of 24½¢, plus a 5¢ "subsidy". They could sell it for 45¢ or more. Subsidy is a wrong designation under these circumstances.

Against the concentration of attention to subsidies and other expedients to assist mining in the emergency, think for a moment what would have happened to the domestic lead miners had a free market prevailed. While the lead producers were receiving an average ceiling price in 1951 of 17½¢ per pound New York, Mexican, Australian, Peruvian and other competitive producing countries were able to operate in a free market. I estimate they received the equivalent of at least 5¢ per pound more than American mines. In other words, the domestic lead mining industry as a whole could have procured approximately $40,000,000 more under a free market than it did under controls. The result is still more striking for zinc, as the difference in the domestic ceiling and the foreign market were greater in zinc than in lead.

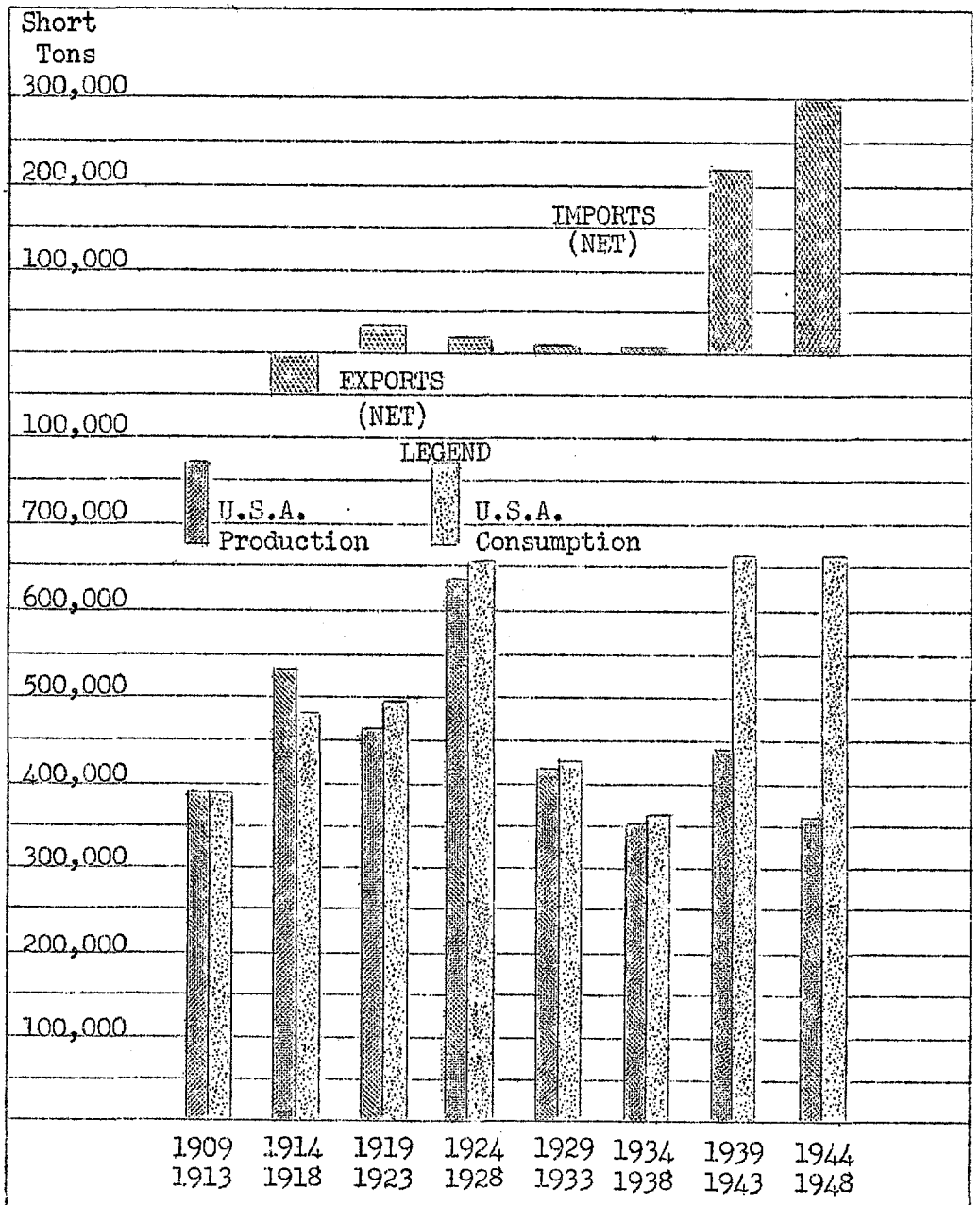
The Government has deprived you of one of your most precious freedoms the right of a free market, or to do with the fruits of your labor what you wish This is the fifth freedom. The four freedoms - freedom of want, freedom of fear freedom of religion and freedom of speech can be found in a penitentiary. The fifth is equally, if not more, crucial. You have now had a taste of controls just about in full bloom. How much better off the public and the lead miners would have been without price control, and under a free market, I have tried to indicate. If you agree, then isn't it time to end the blank check given the government under the Defense Production Act, limiting controls to priorities for whatever the rearmament program requires?

The tragedy of the present situation is that men are becoming unemployed because their employer cannot, under present controls, go out in the open market, even if he doesn't interfere with supplies for the defense effort, and, depending solely upon his own resources, purchase the copper and other metals which he needs to keep in operation. Furthermore, during the current defense emergency, there is a reluctance on the part of the government to touch the huge stockpiles of metals it has already accumulated.

General Lucius Clay recently told the Mining and Metallurgical Society in New York that there was no need of a frenzied rush to rearm at the risk of bankrupting our nation and imitating the form of government compulsion characteristic of the communism we are ostensibly fighting. We must never forget that we who live in our beloved land have a heritage of priceless freedom given to us, which we ought to pass on to those who follow us unimpaired.

Let me close with a quotation from a great President, Thomas Jefferson:

> "Were we directed from Washington when to sow
> and when to reap, we should soon want bread."



LEAD PRODUCTION AND CONSUMPTION OF THE UNITED STATES.
NET EXPORTS AND IMPORTS.
5--Year averages.
1909 - 1948.

Source: Mineral Resources; Minerals Yearbook.

FIG. 3

File under Lead

C
O
P
Y

For Release
June 15, 1949 - A.M.

Lead Industries Association
420 Lexington Avenue
New York 17, N. Y.

The Shifting Scene in Lead*

By: Robert Lindley Ziegfeld, Secretary
Lead Industries Association
New York, N. Y.

After two years of record-breaking lead prices, we have just passed through three months of the most precipitous price drop in history. Looking back, the forces which caused these movements are always easy to understand. The end of the war left the country with a terrific demand for lead products since the public had been unable to buy many of the things they needed and wanted.

Huge consumption of lead in the years following the war finally caught up with this backlog all along the line and when dealers' and manufacturers' shelves were filled with lead products ultimate consumption dropped back to normal and buying of the raw material, pig lead, virtually stopped. As these inventories of lead products are worked off, lead manufacturers are bound to reenter the market, but probably with more normal buying than we have had in the last three years. For the first time in several months manufacturers' stocks of pig lead showed a rather substantial drop on May 1, according to Lead Industries Association statistics. That is encouraging.

Post-War Trend

First, the abnormal demand coupled with the low production rate immediately following the war which resulted from postponed development work and a shortage of labor, caused the price to swing upward at an unprecedentedly rapid rate. When lead reached its high of 21½¢ per lb., its price index, based on 1926 as 100, stood at 255.3. At the same time the Bureau of Labor Statistics price index of all commodities only reached a high of 165 and even farm products only reached 188. Obviously such a price for lead could not hold for long. It stimulated production and curtailed consumption.

Now that the sky-rocket has come down and lead is back to 12¢ per lb., its price index is 142.5, while the index for all commodities is still at 156.5 and for farm products at 174.5. Just as the price on the upswing went to an extreme, it also appears that on the downswing the same thing has happened. As a matter of fact the price today is not much different from what it was at the end of the war if premiums paid at that time are taken into consideration.

Storage Batteries

Now, what straws do we find in the wind today to help us guess at the future course of your lead outlets? There are some optimistic factors. In the first four months of this year only a little over 3,000,000 replacement storage batteries were manufactured. That was less than half of the production of the corresponding

* Address before Idaho Mining Association, Sun Valley, Idaho, June 14, 1949.

period last year. Yet battery makers who held their annual convention just a few weeks ago still expect to produce some 17,000,000 or 18,000,000 batteries this year as against about 24,000,000 last year and their optimism may be warranted from the fact that there are over 40,000,000 cars on the road. The average life of a battery is less than two years.

Thus, if the battery industry is right it will have to produce in the last six months of this year some 12,000,000 batteries, which would closely approximate last year's rate. In passing it is interesting to note that the weight of lead per battery has been increasing in the last few years and has risen from 22 or 23 lb. to about 27 lb.

Tetraethyl Lead

Another optimistic note is supplied by the tetraethyl lead industry which has grown from nothing a little over 20 years ago to a lead consumption of about 80,000 tons last year. Two things are contributing to its further growth, more cars and higher compression engines. Several of the oil companies have stepped up their octane ratings in recent months and the automobile manufacturers are just waiting for better gasoline further to ~~to~~ increase the power of their engines. That means more tetraethyl lead. Also, there are some 10,000,000 more cars on the road today than at the end of the war. That means more gasoline and more lead. So the indications are for continuing increases in the use of lead for tetraethyl lead. Toward that end the tetraethyl lead industry is increasing its productive capacity. Some of the new capacity will be in operation as early as August or September of this year and more next year. Estimates have been made by the best informed people that use of tetraethyl lead may more than double in the next five years.

Lead Sheathed Cable

In another big use of lead there is a further ray of sunshine. The cable industry, while it is not using lead at quite the rate it did last year, is likely to continue on a fairly even keel. There is even some possibility of improvement. During the severe lead shortage and period of high prices a substantial amount of cable sheathed with substitutes for lead was manufactured. The lower lead price may influence some swing back to lead as these substitutes are still generally considered to have certain drawbacks in comparison with lead for cable sheathing.

Paint

In the paint and construction fields, two other important outlets for lead, the outlook is more clouded. In paint the consumption of lead has probably suffered more as a result of the high price and shortage than in any other lead consuming product or industry. The paint business is highly competitive and even at normal prices lead is the most expensive common pigment used by paint manufacturers. So quality has been sacrificed by reducing the lead content of house paints as much as possible. Lower lead prices may stop this trend or even reverse it in view of the recognized improvement in quality that lead provides, but it is too soon to tell just what the net result will be.

In the case of red lead paints for iron and steel the picture is more cheerful. Substitute pigments became quite well entrenched during the war in certain quarters. There are now definite indications of a lack of complete

satisfaction with the substitutes. At the same time new red lead formulations have been developed to meet the special requirements exacted of today's industrial paints, and red lead is making a strong bid to regain substantial lost markets. I am proud that much of this is attributable to the research and educational work of the Red Lead Technical Committee of the Lead Industries Association.

Construction

In building construction where lead is used mainly for water distribution and plumbing, the recent high prices gave great impetus to efforts of producers of competitive materials to substitute their materials for lead. They have made some progress, but again through the efforts of the Lead Industries Association in large measure, we have managed to hold on to most of our business. How much longer we could have held out against these high prices is problematical but the lower lead prices should relieve the pressure to some extent. However, immediate trends in lead consumption in building construction will depend very largely on the trend of construction itself, which is expected to be somewhat lower than last year's record, but nevertheless at a relatively high rate.

In chemical construction, where lead is employed to fabricate corrosion resistant equipment,

there is no doubt that considerable construction is being held in abeyance until costs and business generally show signs of stabilizing. Lower prices for lead should help to some extent competitively.

The foregoing uses of lead on which I have commented in some detail account for about three-quarters of all lead consumption. On them, to a large extent, depends the lead market. There are, of course, many things about the markets for these products over which we have little control and general business conditions have a profound influence on them. Yet there is also much that can be done to stimulate the use of lead products. Some of this we are doing and have been doing for years. There is still much more that can and should be done.

To stimulate the market for lead products is only part of the battle for a prosperous industry, although it is a mighty important part. I have elaborated on the principal uses of lead because that phase is more remote from you as producers of the raw material.

Stockpiling

Government stockpiling in the past year has taken a place of prominence in the lead picture that makes it comparable with some of the major uses of lead. For instance in the current fiscal year which ends this month, the Government has stockpiled an amount of lead roughly equal to the consumption of lead in tetraethyl. It has, therefore, become something of major importance to you.

Last week lead producers met with the Munitions Board on the stockpile question. While to my knowledge no indication was given of the amount to be purchased in the new fiscal year starting July 1, I am confident that purchases will be sizeable and will be well in excess of this year's purchases.

Taxation

There are other angles which must be pursued but they are familiar to you and need no repetition on my part. There is just one I would like to emphasize because its accomplishment requires the education of the Government and the public to the peculiar problems of the mining industry. It is taxation.

We must all work together for a more realistic attitude toward taxation. The investment of risk capital in mining must be encouraged by making it possible to realize returns commensurate with the risk. It must also be recognized that the risk in mining today, as most surface deposits have been discovered and worked out, is greater and that exploration and development costs are higher, which calls for a more sympathetic attitude toward taxation than has ever been accorded the mining industry.

THE LEAD MARKET - FIRST HALF 1939

By Andrew Fletcher*

Both foreign and domestic prices of lead were remarkably stable during the first half of this year, the New York price fluctuating within a ten point spread - $4.75 to $4.85 Cwt. The year opened with lead at 4.85 and it was at that level that the first half closed. The average price for the first half of 1939 was 4.80, compared with 4.51 for the same period last year. In London, the futures price fluctuated between a low of £ 14 - 2s - 6d (2.96¢) and £ 15 - 3s - 9d (3.18¢), a spread of 22 cents per Cwt. this year, whereas during the first half of 1938 the range was $1.02 Cwt., the high being 3.96 and the low 2.94. There were times during the first half of this year that higher domestic prices were perhaps justified, but an advance in the domestic quotation with the London market so depressed would have invited importations at a time when domestic mines were operating at less than full time and were fully capable of supplying all domestic requirements.

Sales of lead as reported by the Lead Industries Association, for the first half of this year were 223,933 tons, a monthly average of 37,322 tons. This was 24% better than the 181,274 tons sold during the first six months of 1938, which sales averaged 30,212 tons per month. With the exception of January, when the sales were 29,000 tons, the rate of sales this year has been very stable, ranging from 36,200 to 40,800 tons monthly.

According to the American Bureau of Metal Statistics, domestic shipments January to June 1939, inclusive, were 232,406 tons, a monthly average of 38,734 tons, compared with 182,208 tons, or an average of 30,368 tons, during the first half of 1938, an increase of 50,198 tons or 27%. The distribution of the shipments was as follows:

	1939 Net Tons	1938 Net Tons	Increase or Decrease Net Tons
Cable	25,769	26,502	- 733
Ammunition	10,346	6,705	3,641
Foil	9,372	12,078	- 2,706
Batteries	27,768	11,529	16,239
Brass, Sundries and Jobbers	23,752	20,354	3,398
White lead, red lead, litharge, pipe, sheet and unclassified	135,399	105,040	30,359
TOTAL	232,406	182,208	50,198

The lead content of the litharge produced during the first five months of this year was 30,520 tons, compared with 21,699 tons during the same period last year; red lead 12,214 as against 7,957; white lead, dry and in oil 31,919 as compared with 26,180; lead pipe and sheet 13,592 as against 12,643 tons. The total production of the foregoing commodities for the first five months this year was 88,245 tons compared with 68,479 tons for the same period last year, an increase of 29%.

* Vice President, St. Joseph Lead Company

Presented Annual Metal Mining Convention, Western Division, The American Mining Congress, Salt Lake City, Utah, August 28-31, 1939

Total stocks of lead, including refined lead, ores and concentrates, bullion, and antimonial lead, amounted to 215,711 tons on July 1, 1939. These stocks at the beginning of the year were 209,956; however, on March 1, 1938 said stocks amounted to 216,070 tons, indicating that over a sixteen month period ending July 1, 1939, production and consumption were in balance. Refined stocks were 129,131 tons on January 1, 1938; 115,902 tons on January 1, 1939; and 129,366 tons on July 1, 1939. The present stocks represent a reserve supply of lead equivalent to about three months' requirements at the present rate of consumption, and are good insurance against any shortage of metal in the event of a sudden increase in consumer demand.

Stocks of lead owned by customers, but held at refineries, amounted to 76,000 tons on January 1, 1937; 31,000 tons on January 1, 1938; 22,500 tons on January 1, 1939; and 22,975 tons on July 1, 1939. The stocks now at refineries, owned by customers, are equal to a little over two weeks shipments at the current rate of consumption. However, said stocks are probably held by a few companies, and most companies have no such reserve stock.

Inventories of pig lead in consumers' plants are generally lower than at this time last year. On June 1, 1939 certain pigment manufacturers held 19,000 tons this year, compared with 25,400 tons on the same date last year; certain metallic lead products manufacturers 17,800 tons compared with 14,000; total 36,800 tons compared with 39,400 tons. The lead content of stocks of white lead, dry and in oil, in certain manufacturers' plants on June 1, 1939 were 24,100 compared with 24,000 tons on June 1 last year. Litharge stocks on May 1, 1939 were 7,236 tons compared with 9,200 tons; red lead 5,310 tons versus 6,300 tons.

With a view to protecting and enlarging the market for its most important product today, the Lead Industry launched a program in the spring of 1939 to promote the wider use of white lead in paint. Without devoting any time to a sales talk on the merits of white lead, the fact remains that this pigment is the basis of all fine painting today, just as it has been for centuries. All the experimentation and research that have been done in the paint industry have not produced anything equal, from the standpoint of economy and durability, to white lead. It remains the only pigment that can be used alone, with linseed oil, to give a satisfactory paint job. Other paints require the admixture of different ingredients. The lead industry, therefore, has embarked on a long term program to tell the American public about the merits of white lead paint. The program is unique in that the lead mining industry is the most important contributor to it. Mining companies may forget that they have an important interest in the ultimate disposition of their mined product. The lead mining industry, by recognizing that the responsibility of the miners towards the use of lead in its many forms does not end with its delivery as concentrate to the smelter, is only doing something which other industries more thoroughly integrated, notably nickel and aluminum, have been successfully doing for years.

Some people believe that a definite prospect of world peace might have a detrimental effect on lead because purchases by Governments for re-armament would cease. While some lead is used as war munitions, we believe that with the absence of a general war, and a restoration of confidence in a lasting peace, consumption of lead throughout the world will be accelerated to a point where the peace-time use of the metal will far exceed any amount that could possible be consumed for munitions purposes.

Permission to reprint will gladly be given. Please inquire of American Mining Congress as to publication date - Booth 421

LEAD*

By Andrew Fletcher, Executive Vice President
St. Joseph Lead Company

In connection with the lead situation, it seems to me that the two points of interest are

1. Why does the lead shortage exist, and
2. What is going to be done about it?

At times a brutally frank statement is necessary--I feel that the shortage today is in a very great measure due to the Governmental controls which existed on lead during the war period and are continuing today, coupled with the fact that certain Government agencies have either refused or have been unable to accept the advice of the lead industry.

Under date of August 6, 1946, Mr. Crane, President of St. Joseph Lead Company, which as you know is the largest producer of primary lead in the United States, wrote to Mr. Steelman, Director, Office of War Mobilization and Reconversion, as follows:

"I am informed that no formal written request has been made to you for restoring the lead price to the 9.50¢ New York basis. As our Company will not benefit from a financial point of view because we are receiving under the Premium Price Plan practically the equivalent of 9.50¢ New York base, I feel that we are in a suitable position to make the formal request for the sake of the lead industry.

I wish to state that in my opinion the higher lead price is most necessary for the following reasons:

1. That sufficient quantity of secondary lead may again be available.

2. To lessen the wide gap between the U. S. ceiling price and the foreign market.

3. To lessen the use of lead in non-essential applications through setting a price that more correctly reflects its competitive position in our country's economy.

4. To develop the production of lead from a long-term point of view, which is not possible under a one-year subsidy plan.

5. To unfreeze the heavy tonnage of lead that was made from concentrates and scrap purchased at the 9.50¢ price."

*Presented at the 1946 Metal Mining Convention and Exposition, Western Division, the American Mining Congress, Denver, Colo., September 9-12

Copies of this letter were sent to Mr. Porter, Administrator of the Office of Price Administration, and Mr. Huff, Price Executive, but to date no acknowledgment of any of the letters has been received. Immediately upon the restoration of the OPA, the Lead Industry recommended that an Industry Advisory Committee should be appointed, and at the OPA's request, suggestions as to the personnel of the Committee were forwarded - however, without any consultation with the Industry, under date of August 29 the OPA issued a release, with which you are all probably familiar, advising:

> "No increase in the current ceiling prices of lead or lead scrap - - - is planned in the foreseeable future."

and Mr. Porter of the OPA in a subsequent release stated:

> "Since the Premium Price Plan takes care of the mining of lead, and since the Reconstruction Finance Corporation is buying obtainable foreign lead and reselling it here at the domestic ceiling price, there is no sound reason for a further increase in lead ceiling prices - - - - .
>
> - - - - It previously had been made clear that no 'bail out' would be provided for those who bought at over-ceiling prices during the interim."

In my opinion the two releases, and the apparent complete lack of cooperation on the part of the Governmental agencies with the Industry was a very great mistake, and the results will unfortunately be detrimental to the entire economy of the United States.

The telegram of Mr. G. W. Mason, President of the Automobile Manufacturers Association, to Mr. Steelman, in connection with the lead shortage and made public on September 6, 1946, included the following pertinent sentence:

> "It is inconceivable that over 500,000 men directly employed in the automotive industry should be faced with unemployment and that literally millions of prospective car and truck purchasers who need transportation for essential purposes should be further delayed in obtaining their vehicles because of lack of action on the part of Government to correct conditions which are within its power to correct."

The Automobile Association believes that some companies will be forced to drastically curtail production before the end of September, others probably in October, because of the critical shortage of lead - the Western Electric Company have advised the St. Joseph Lead Company that their plans for telephone expansion and increased employment must also be greatly curtailed. The shortage of lead to Tetra-Ethyl is already being felt in increased operating costs for automobiles and trucks. The elimination of practically all lead from paint cannot but adversely affect the protection of property throughout the United States, which, because of manpower shortage has had little, if any, paint during the war period. I believe that the postwar domestic economy requires approximately one million tons per year, of lead which can come from only four sources:

Domestic mine production
Scrap lead
Lead imports
Government lead stocks

Domestic mine production is in part handicapped, as we all know, by the lack of adequate labor, but basically in my opinion, by the setting of an OPA ceiling price which is too low in relation to the value of lead to the domestic economy. At the present time, the lead market outside of the United States is established at around 2¢ per pound higher than the present OPA ceiling of 8.25¢ New York. Unfortunately, certain Government agencies believe that the Premium Price Plan, wherein the average cost for lead is over 10¢ per pound, offsets the need for a higher ceiling price than 8.25¢. It must be realized that the subsidies, which serve as a profit limitation, at the same time guarantee a producer approximately the same price per ton milled regardless of the grade of ore, and therefore does not encourage the fullest and most effective operation of the United States lead mines. It is difficult, if not impossible, for management to insist on efficient work, when the miners know that the employer receives approximately the same amount per ton milled through increases in the subsidies even if they shirk in their work or if they handle lower grade ore. Likewise, there is little incentive to the mine owners to increase their capital investment in new equipment which would increase efficiency, because with the profit limitation per ton milled, the subsidy would be reduced and would offset the operating gain.

I cannot fully agree with the interpretation given by many that the estimates of ore reserves of the Bureau of Mines indicate that the United States is a "have-not" nation. I do agree, however, that under the Premium Price Plan, insufficient margin for development work has been given, and that therefore the known ore reserves in this country present a depressing picture,but I feel sure that there must be great ore reserves in this country which have not outcropped and which will be found provided sufficient funds are available for exploration and development, and the outlook for a profit in mining is attractive to risk capital. Until such reserves are found, we probably cannot count on a mine production of much morethan 400,000 tons per year for our million ton requirement.

We normally receive about 300,000 tons of lead per year, or about 25,000 tons per month, from scrap reclamation. Although I have been repeatedly told that the scrap dealers were not withholding lead at the 6½ price, it is of interest to realize that when the ceiling price of lead was raised from 6.50 to 8.25¢ in June, the scrap production increased to 30,000 tons, and in July under a 9½¢ price the output is estimated at around 35,000 - in August when the price was rolled back from 9½¢ to 8.25¢, there was practically no production. Having a high regard for the ingenuity and far-sightedness of the scrap dealers, I do not believe that they will be unduly influenced by the OPA's August 29 release stating that "no increase - - - is planned in the foreseeable future", when the present ceiling price is 8.25¢, the foreign price 10½¢ and over 11¢ if duty is included, and when the Government is actually paying over 10¢ for domestic production. An appeal to patriotism on the part of the scrap dealer carried considerable weight in wartime, but dollars in his pocketbook probably carry considerably more weight in peacetime, especially when he knows that the economic conditions of the world and of this country can be expected to force the OPA to raise the price of lead some time within the next year, whether they like it or not.

Assuming that the mines will produce 400,000 tons per year, and the 300,000 may still be obtained from scrap, we must import 300,000 tons if we are to cover our requirements of one million tons. Last April I was very much upset upon learning that our Government had made an agreement with England to import only 137,000 tons in 1946, even though 350,000 tons were imported in 1945. Actually, the imports to date have only been around 8,000 tons per month, or at the rate of about 100,000 tons per year.

Although I am in favor of doing our part in trying to better the distressing conditions throughout the world, I cannot see any justification for our loaning billions of dollars to foreign nations so that they in turn will have the funds to buy the available foreign lead, as well as other commodities, when we, in the case of lead so urgently need it, and at prices vastly in excess of the OPA ceiling prices. I might add that I see no justification for ceiling prices being set at a level which subsidizes the use of a scarce commodity. Is it not much better to have a lead price which assures lead for automobiles, cable covering, and other articles that are dependent upon lead, than to keep the price at such a low level that industries which do not need lead are encouraged to use it?

I am far from an expert on world economy and I do not know whether our Government was justified in cutting our imports from over 350,000 per year to a probable 100,000, but I am absolutely sure that the economy of the United States would have been furthered if publicity had been given, and the Lead Industry consulted as to the necessity of such an agreement.

As the lead stocks in Government hands amount to only about 31,000 tons, even if the military policy of our Government would permit a further decrease in the stocks, which I doubt, the amount available is negligible from this source. The stocks in the hands of producers and consumers are also low and offer little relief.

To conclude, and in order to eliminate criticism for not recommending a constructive procedure to aid the present lead shortage, I offer the following suggestions:

1. Immediately decontrol lead and let free market conditions prevail even though for a time this may result in a materially high price. If this is done, the industries which need lead will obtain it, and the other industries which do not need lead as greatly will be forced by economic necessities to find substitutes.

2. If decontrol immediately is not possible, because of the difficulty of decontroling the industries which use lead, then I would suggest we raise and maintain the ceiling price on lead at approximately the world market. If the world price is not sufficient to maintain the production required for the domestic economy as well as the military necessities, then adjust the Premium Price Plan so that in effect a uniform bonus per pound of lead produced would be paid to those marginal districts that require it, rather than a subsidy per rock ton milled, which is virtually a "cost plus" contract. Although the uniform bonus might vary as to districts, it should not vary as to producers within a district.

It is hoped that my offering of these two suggestions will be received in the same spirit in which I have made them, and that they may serve as a foundation upon which we in the lead industry - producers, consumers, and Government - can work together and I certainly hope that we will work together, and once more establish a sound basis for lead within the national economy of the United States.

Lead

Address Delivered by FELIX E. WORMSER, Secretary, Lead Industries Association, New York City, Before the Colorado Mining Association Annual Meeting at Denver, Colorado, February 7, 1947.

WHY MORE LEAD PRODUCTION IS NEEDED

I want to take a little time today to tell you what happens to your lead after the smelter settles with you and why it is highly important nowadays to redouble your efforts to mine existing lead ore deposits and to discover new ones. Miners generally are not as well acquainted as they should like to be with the market for their metals. This is quite understandable as miners have enough problems turning out metal under a constantly fluctuating economic background besides worrying about what happens to the metal after they obtain a smelter settlement.

It will be no surprise to you that there is currently a world wide lead shortage well advertised by the fact that today the price of lead is a record-breaking 13¢ per lb. New York, brought about largely by an intense demand for the metal from various sources, together with a diminished supply. Perhaps you have tried to buy some white lead recently, or a storage battery, only to have to do an extraordinary amount of shopping in the process before being successful. These are but two illustrations of the use of lead which typify the shortage. Many other important uses of which the public seldom hears are just as vital to our economy, such as the use of lead for cable sheathing and gasoline, but more about them and their importance later on.

Last year, I tried to tell you about the impediments to a free operation of the lead industry in the form of government controls on prices, uses and imports. All of that we can now happily dismiss. Once again we are almost entirely on our own. The future is largely up to us. I shall, therefore, try to tell you briefly something about our peacetime position with respect to the use of lead.

I don't know of any other metal that has the wide diversity of uses of lead, both in metallic and chemical form, nor for that matter any other metal which has so many important outlets each representing a large volume of production for public consumption with only a modest amount of replaceability by other materials. I refer, for example, to the use of lead in storage batteries. This is at once the largest single use of lead. Practically no substitute is available, largely because it is a staggering problem to serve the 26,000,000 cars on the road and the product to do the job must be in plentiful supply. To be sure, some competitive products such as the nickel-iron battery and the cadmium battery, are known, but they have different electrical characteristics and are not available in sufficient quantity to do the job. Therefore, look to the continued use of large amounts of lead for storage batteries for an indefinite period. At the same time, from a conservation standpoint, the storage battery industry returns to the lead smelting industry a large part of the metal manufactured into storage batteries each year - at least three fourths of it. On balance, therefore, its importance as a permanent lead consumer is not great. I think it is fair to estimate the battery requirements as about 300,000 tons of lead per year but of this vast tonnage only about 75,000 tons is new lead.

The second largest use of lead is by the electric cable industry, both for telephone toll cable, which is so well known in our metropolitan centers and may be found stretched on poles alongside railroads through the United States, or buried in the ground, and also electric power conductors for underground high tension powder communication. The large growth in the use of telephones in the United States, and the prospect of still further growth, will require extraordinarily large amounts of lead.

The American Telephone & Telegraph Co. recently announced that it would expend about $2,000,000,000 to enlarge its facilities in the United States and that, within the next three to five years, some 20,000 miles of toll cable will be required, 12,000 miles of it coaxial cable for television purposes, as well as for phone messages. I am reliably informed that this program alone will necessitate a consumption of about 125,000 tons of lead per year for telephone cable sheathing. This estimate does not take into consideration the requirements of the power cable industry for high tension underground installations. About 75,000 tons of lead could be utilized for power cable construction this year. Substitution for lead in cable manufacture can only be done with great difficulty and inconvenience.

All in all it looks as if the cable industry will require for the next few years some 200,000 tons or more per year. Although 200,000 tons of lead may appear record-breaking, it is approximately the tonnage consumed by cable manufacturers back in 1929 and 1930 but it is far greater than the cable requirements of recent years when construction of all kinds fell off.

From time to time you hear of substitutes to take the place of lead but none, so far as I know, are practical, considering the engineering requirements of a good cable installation whether for telephone or power use with emphasis on longevity or durability. This is not to conclude that satisfactory substitutes may not be ultimately forthcoming.

I now wish to talk to you about an old friend of the lead miners which has been a standby for years and formerly comprised the largest outlet for the miner, namely white lead. As recently as 1924 white lead was the leading outlet but, owing to drastic restrictions on its use during the war, and the inability of the white lead corroders to procure an adequate supply of pig lead today, the white lead industry has suffered more than perhaps any other lead using industry in being restored to a peacetime economy. Without difficulty 100,000 tons of white lead, or more, could be sold today. It remains a market of great importance to the lead mining industry. The miners are justified in going to extraordinary measures to protect its competitive position. White lead remains unexcelled for exterior painting, but because of its relatively high cost compared with other paint pigments there is a tendency on the part of paint manufacturers to use as little as possible of it in their formulations. Let me show you what I mean.

I have here a booklet which shows the analysis of some paints and varnishes sold in the State of North Dakota, where the regulations require the formulas to be printed on the can, a practice which numerous other states have since followed. The reason for such a regulation is obvious. So many abuses occurred in the marketing of inferior paint among the farmers that, in self defense, North Dakota passed labeling laws and occasionally publishes results of its paint investigations. Here are several examples of exterior paints manufactured by large companies that contain water and excessive amounts of extenders.

I think you will see from this brief expose how important it is to acquaint the American public with the merits of white lead. Hundreds of thousands of people insist on having nothing but pure white lead on their homes because they know by experience that white lead provides durability in paint. We must do a lot more to educate the people of the United States to the merits of white lead and the responsibility in part must rest upon the mining industry for, after all, the paint manufacturer can use other and cheaper ingredients in his paint.

In this connection, you will be interested to know that the Lead Industries Association has been working closely with the U. S. Office of Education and the State educational departments of nearly every state in the United States, seeking to assist them in establishing courses on paint instruction which would help the universities, colleges and high schools of the United States in developing an appreciation of good paint. Here is a manual entitled, "Painting Farm Buildings and Equipment" which was prepared with the cooperation of the U. S. Office of Education, and which has been widely distributed in the United States.

Here is another manual entitled, "Instructor's Manual for Teaching Exterior Painting of Farm Buildings and Equipment," designed specifically for the use of instructors and prepared for us by Professor G. A. Schmidt of the Colorado A & M College.

As a result of all of these efforts, I am glad to say that many technical courses and text books used throughout the United States for instructional purposes have been improved in their treatment of paints and painting. But, above all, we must mine and produce as much lead as possible to satisfy the great unfilled demand for white lead from the public.

Red lead is also important in the paint industry for protecting steel work from corrosion. In fact about 20,000 tons are used annually for the purpose. Competition is keen for business and our industry has mobilized its technical resources to make sure that the preeminent position of red lead will be maintained. Recently we have made some remarkable advances in the use of red lead for marine painting which are being disclosed currently.

Besides being applied to the exterior of buildings as paint, substantial amounts of lead are used elsewhere, in plumbing, in shower pans, and even in flashings. Indeed, lead plumbing, which has been known for centuries, still accounts for some 20,000 tons of lead per year in the form of pipe, sheet and solder. If to this is added the substantial tonnage of lead used for calking cast iron pipes in buildings and in the distribution system of waterworks, we must provide another 35,000 tons. Needless, to say, these are highly competitive outlets, for lead, and it will be interesting to see how they survive the intense period of competition ahead in the changed relationship in the price of lead with brass, iron and copper and nonmetallic calking compounds.

We have not been altogether asleep and have developed a unit type of lead plumbing, which has the merit of permitting the plumber to fabricate part of the plumbing installation in his shop and then adjusting it on the job by virtue of the flexibility inherent in lead.

Sheet lead is widely used in hospitals, in x-ray rooms, and wherever x-ray equipment may be found, it is the most efficient barrier, known to science, to x-rays and kindred radiation.

Wherever sulphuric acid is used, and sulphuric acid is the commonest acid used in industry today, one is apt to find lead in the form of vats, sheet or pipe to convey the acid from point to point. Hence, rayon plants, oil refineries, coke plants and other large industries are constant users of lead. Often the mining industry, itself, in many leeching and electrolytic operations involving sulphuric acid, use large tonnages. But, competition here from glass, rubber and alloy steels will be keen. Perhaps 50,000 tons of lead are consumed annually for x-ray protection and for use in the chemical industry.

I haven't yet mentioned another fertile field for lead, namely its use in alloys. The commonest lead alloy known to you is solder, which requires about 50,000 tons annually. Then the ammunition industry, which generally uses an alloy of lead and arsenic requires about 50,000 tons of lead annually. The printing industry uses type metal to the tune of some 30,000 tons of lead annually. Then, we have bearing metals for railroads, automobiles and other machinery, which probably require about 40,000 tons of lead annually. Then, the copper industry, in various bronzes and brasses, uses substantial quantities of lead, perhaps 35,000 tons of lead a year. The steel industry uses it both in production and as a constituent of free machining steel.

There are so many minor uses of lead that we could spend the better part of an hour discussing their fascinating applications. For example, the use of lead in glazes for ceramic ware, glassware, fluorescent tubes, gasoline refining, brake linings, and the like. Many of these uses have been found indispensable with no substitutes available. Often the lack of a small quantity of lead may mean failure to produce an important component part of, say, an automobile. Recently the officer of an important pottery company told me that $1,000 of lead pigments mean $500,000 in employment in his factory where the lead was used in glazes.

But I want to devote a moment to a rather spectacular comparatively new and large use of lead which has grown increasingly important to the lead industry, namely the use of tetraethyl lead in gasoline which did yeoman service during the war in providing the high octane gas for airplane operation and is year by year contributing to the production of better automotive fuels in the United States. About 60,000 tons of lead are needed yearly for ethyl fluid. Indeed, if lead becomes plentiful we shall soon have gasolines of such high antiknock value that we shall be bale to run cars with higher compression ratios at comparatively high speeds, that is 50 to 60 miles or more per hour, with economies double that of prewar days. This is one good reason why we should increase our efforts to cure the lead shortage - we are helping the American standard of living constantly to grow.

There are still other important uses, for example, insecticides. Lead arsenate, which is so important in the economy of the northwest apple and fruit industry, should consume about 20,000 to 25,000 tons of lead per year. When I recently spoke to the convention of the Agricultural Insecticide and Fungicide Association in New Jersey, and told them about the lead shortage, I felt that perhaps here was one use which we would have to kiss goodby because of the advent of DDT but, to my surprise, I was informed that DDT is not yet a complete answer to insect pest control. Apparently it controls the coddling moth but not the orchard mite. This was confirmed by a private communication from the Department of Agriculture which estimates that DDT may displace 1/3 the lead arsenate used in the northwest this year.

I think this brief analysis indicates why there is such a huge demand for lead today. If you were to add it up with me you will find that the total accounts for over 1,000,000 tons and as the figures I have given are purely approximations I think the overall figure should be used with some reservation.

The markets I have described to you are the result of research, invention and evolution reaching back deep in our history. They illustrate what can be done with one of nature's great natural resources. We want to keep these markets, and to develop others if need be. Indeed, that is the traditional American way-to depend on our own resourcefulness in creating a market for our wares so strong that the lead mines will operate steadily and profitably rather than to depend on a Government subsidy to keep us going.

Last year only 330,000 tons of lead were mined domestically, the lowest output since 1934. In fact, lead produced from scrap was larger than that coming from our domestic mines, or about 350,000 tons. If it had not been for imports of 125,000 tons, which were unfortunately limited by the Government as the sole importer, and for heavy withdrawals from lead stocks in the hands of private industry and the Government we would indeed be in a serious jam today. As it was, the total available supply outside of stocks in the hands of manufacturers and refiners was only about 805,000 tons to meet requirements of roughly 1,000,000 tons. The withdrawal from government and private stocks is estimated at 150,000 tons in 1946. Larger imports as well as increased domestic mine production are needed to help us out of our difficulties and to hold out markets, as the stocks of all description in the country have been severely depleted.

The United States is now on a different lead economy than it was before the war. Then domestic production and consumption were approximately in balance, but now, consumption has grown to such an extent that we shall need imports to supplement domestic output. The tariff to protect the domestic mining industry frankly becomes a needed revenue measure and a subsidy to the domestic miner to compensate him in part for his higher cost of production compared with low cost foreign operators, but it is a subsidy paid by the consumer and not by the public at large.

I place my faith in the operation of a free market to cure the lead shortage speedier than any form of Government control. The price of lead will ultimately settle at a value which will create a balance between effective supply and demand. No one knows what price will do the job. In this connection I think we shall have to revise our conception of what constitutes a high price for lead in the light of the great rise in the cost of farm commodities, house furnishings, wages, in fact everything relating to our economy except possibly rents, which are still under control. In looking at the Index of the Bureau of Labor Statistics recently, I was struck by the fact that lead is certainly not out of line with farm commodities and other items.

I hope you will share with me the conclusion that all the energies of the lead mining, smelting and refining industry must be centered at once upon the problem of increasing our lead production through the intensive working of known deposits and prospecting for new supplies. The high price of lead today warrants extraordinary efforts on the part of prospectors or miners in looking for new deposits and demonstrating to the consumers that we are not a "have-not-nation" but that in Colorado and elsewhere there is lead waiting the enterprise of the miner.

Some people, without thinking, had the impression that once Government controls disappeared the lead shortage would likewise vanish. But you and I know that it takes time to bring a new mine into production, especially with labor shortages, not to mention the difficulty of increasing production in mines that operated during the war on a scale that subordinated necessary development and exploration. Let us now use extraordinary efforts to stimulate output from every conceivable source. By doing so we shall hold our priceless markets and serve our own best interests, as well as the public's. We cannot afford to lose our markets. Once gone they may never be recaptured. Therefore, in conclusion I urge all my mining friends in this wonderful Rocky Mountain area, so bountiful in lead in the past, to demonstrate what they can do in increasing lead production as quickly as possible.

* * * * * * * * *

ADJUSTMENT OF PREMIUM PRICE PLAN FOR COPPER, LEAD AND ZINC TO REIMBURSE INDUSTRY FOR APPROVED RETROACTIVE WAGE AND SALARY PAYMENTS - Directive 126.

Increased wage and salary costs are taken into consideration in the administration of the Premium Price Plan for Copper, Lead and Zinc. Both production quotas and premiums are revised in the light of changes in total income resulting from such costs. As a result of the recent wage and salary settlements in the non-ferrous metal mining industry, practically all firms have granted wage and salary increases and have agreed to make these increases retroactive to some date prior to the date of settlement and prior to the date upon which such firms were authorized, under applicable OPA regulations, to increase their ceiling prices. According to the normal practice followed by the government agencies administering the Premium Price Plan, increased wage and salary costs incurred by premium-receiving mine operators as a result of such retroactive wage and salary payments would be taken into consideration so as not to render inadequate the operating margin earned by such mine operators during the period covered by the retroactive wage payments.

In order to treat operators who had not previously received premium payments on a basis similar to mine operators who had, insofar as the cost of retroactive wage and salary payments is concerned, and in order to prevent the possibility of unequal treatment from holding up settlement of the labor-management dispute in the mine companies which had not previously reveived premium payments, the Office of Economic Stabilization on April 16, 1946, publicly announced that the non-ferrous metal mining industry as a whole would be reimbursed under the Premium Price Plan for any approved retroactive wage and salary payments it made. It is the purpose of this Directive to carry out this commitment made to the industry.

Accordingly, pursuant to the authority vested in me by the Stabilization Act of 1942, as amended, and by Executive Order 9250 of October 3, 1942 (7 F. R. 7871), Executive Order 9328 of April 8, 1943 (8 F. R. 4681), Executive Order 9599 of August 18, 1945 (10 F. R. 13487), Executive Order 9697 of February 14, 1946 (11 F. R. 1691), Executive Order 9699 of February 21, 1946 (11 F. R. 1929, and Executive Order 9762 of July 25, 1946 (11 F. R. 8073), the Office of Price Administration, the Civilian Production Administration, the Reconstruction Finance Corporation and the Quota Committee for the Premium Price Plan for Copper, Lead and Zinc, are authorized and directed:

1. To make payments, out of funds set aside for the operation of the Premium Price Plan for Copper, Lead and Zinc, to reimburse copper and lead mine operators who were not eligible to receive premium payments at any time during the period from January 1, 1946 to June 3, 1946, for:

a. Any retroactive wage and salary payments at the rate, not in excess of that approved by the National Wage Sta bilization Board for prospective application, made by them to their employes at the mine covering any period prior to the date upon which such operators were authorized, under the applicable regulations of the Office of Price Administration, to sell their metal on the basis of the recently increased ceiling prices.

b. Any retroactive wage and salary payments at the rate, not in excess of that approved by the National Wage Stabilization Board for prospective application, made by them to their employes at mills, smelters and refineries which they own, for treating ores and concentrates originating from their mines and covering any period prior to the date upon which such operators were authorized, under the applicable regulations of the Office of Price Administration, to sell their metal on the basis of the recently increased ceiling prices.

c. Any payments made by them, under escalator-clause, or cost-plus, contracts to treatment plants operated by others because of retroactive wage and salary payments at the rate, not in excess of that approved by the National Wage Stabilization Board for prospective application, made by such treatment plants to their employes for treating metal which is owned by such operators and which such operators are not authorized under the applicable regulations of the Office of Price Administration to sell on the basis of the recently increased ceiling prices.

2. To continue to take into consideration retroactive wage and salary payments, in accordance with existing administrative policies and procedures, in revising the quota of any copper, lead, or zinc mine operator.

3. To issue such rules and regulations as are necessary to carry out the purposes of this Directive.

/s/ JOHN R. STEELMAN
Director of Economic Stabilization.

August 1, 1946

HIGH PRIORITIES GIVEN LEAD PRODUCERS The Civilian Production Administration has granted to lead producers "CC" ratings on orders for (1) capital equipment (2) materials for maintenance, repairs and operations, and (3) construction and development work. Applications for priorities assistance should be made to CPA in Washington, D. C.

STOCKPILING BILL The signing by President Truman of the Strategic and Critical Materials Stockpiling bill ended a long controversy over this legislation. The bill was sent to conference with the result that certain provisions favorable to domestic producers were deleted. When representatives of your organization discovered this action by the Conference Committee steps were taken to send the bill back to Conference. Senators from the West, headed by our able senior Senator Johnson from Colorado, and members of the House who were concerned lest domestic producers not be given the opportujity of selling minerals to the government for stockpiling purposes, joined in re-inserting the "Buy American" provisions, and the provisions which in effect will establish the price for minerals used in stockpiling purchases at the foreign price, plus tariff. It was contended that in the event the original conference reports were adopted by both Houses, the price of materials purchased from abroad would be the foreign price less tariff, thus excluding domestic producers, forced by their government to meet the higher cost conditions that exist abroad. The State Department's criticism as voiced by the President when he signed the bill is of particular interest to domestic producers, for it clarifies the position of the administration towards the domestic producer.

As a special service to our members we include a greater part of the text issued by the President at the time he signed the stockpiling bill. We suggest that you read this statement with the utmost care to keep well informed on present trends in Washington resulting from the efforts of those within and without the State Department, who advocate the importation of minerals in preference to the stockpiling of minerals in the future from domestic production.

The President stated:

"I have today signed the Strategic and Critical Materials Stockpiling Act because it is important to the national interest that this Government have the power to acquire stockpiles.

"It is only because of the overriding importance of this purpose that I am able to overcome my reluctance to signing a bill which reaffirms the application to stockpile purchases of the provisions of Title III of the Act of March 3, 1933 (47 Stat. 1520), known as the Buy American Act. Those provisions will not only materially increase the cost of the proposed stockpiles but will tend to defeat the conservation and strategic objectives of the bill by further depleting our already inadequate underground reserves of strategic materials. Furthermore, there can be a serious conflict between those provisions and the foreign economic policy which this Government is actively pursuing. It also seems to me that the application of the Buy American Act may frequently hamper the effective achievement of the essential purpose of the legislation which is to enlarge the stock of vital raw materials available within our borders in time of possible emergency.

"The Buy American Act requires that only articles produced or manufactured from materials originating in the United States shall be purchased for public use. However, the Act also provides that exceptions to this rule may be made when Buy American purchases are determined 'to be inconsistent with the public interest or the cost to be unreasonable.' This provision clearly indicates that the stockpiling program should not be used as a means of generally subsidizing those domestic producers who otherwise could not compete successfully with other domestic or foreign producers. Furthermore, to ensure that the necessary stockpiles are accumulated as rapidly as deemed advisable and with a minimum cost to the public, this Act should not be used as a device to give domestic interests an advantage over foreign producers of strategic materials greater than that provided by the tariff laws.

"It is the policy of this Government to work for international action to reduce trade barriers. We have proposed to other countries a set of principles governing trade, and look forward to the successful conclusion of broad international arrangements embodying the essential principles of these proposals. Pending the conclusion of such arrangements, it is the policy of this Government to avoid taking measures that will raise barriers to trade or prejudice the objectives of the forthcoming discussions. We are asking other countries to follow similar policies.

"The United States is opposed to governmental policies fostering autarchy, for itself as well as for others. Encouragement of uneconomic domestic production and unjustified preferential treatment of domestic producers destroys trade and so undermines our national economic strength. A large volume of soundly based international trade is essential if we are to achieve prosperity in the United States, build a durable structure of world economy and attain our goal of world peace and security."

It should be kept in mind that appropriations as outlined in the original bill were stricken, and that the House Committee on Appropriations deferred action on the request by the Under-Secretary of War for $250 million dollars for purchase of strategic and critical materials under the stockpiling act.

The House Committee concluded that surplus materials now on hand are being stockpiled, and that "additional requirements can better be gauged when more progress has been made in the accomplishment of the task".

There was considerable confusion in Washington on the meaning of the word current. For example, what are the current requirements or needs of our government with respect to mineral stockpiles?

Colorado Association at its meeting in Denver on August 9th decided to urge administrative officials of the Premium Price Plan to establish a Technical Assistant in Denver for consultation by operators in the Western area of the United States. It is the feeling of some that small operators in particular have not been able to familiarize themselves with the formula used by the Quota Committee in computing Premium Prices, and that while in many instances small operators have received excellent consideration by the Quota Committee, it has not always been possible to present factual information in written form by mail. With the enactment of the new Premium Price Plan it is hoped that the smaller operators will gain the consideration they deserve.

EXECUTIVE COMMITTEE CONSIDERING PERMANENT PREMIUM PRICE PLAN The Executive Committee of your Association is anxious to learn from you whether you feel marginal mines can operate after July 1, 1947 without premiums. Your Association is also sending representation to Salt Lake City to oppose freight increases on ores and concentrates.

WESTERN MINING MEETING IN JANUARY Many inquiries are being received from those who attended the Mining Meeting in Denver last January regarding the date for the 1947 meeting. The dates have not been set, but will probably be during the last week in January or the first week in February. These dates are being held up pending negotiations with some of the boys who are cooperating with us in planning the greatest mining meeting yet held in the Western part of the United States. These officials have their sights set high, and they believe that the Golden Anniversary of the Colorado Mining Association is the proper time to shoot the works.

You can plan on something new, different, distinctive, important and helpful in Denver to start out the year 1947 right.

We also point out to you that we are purposely holding this meeting at a time when the tourists will not occupy all of the hotel space in the City of Denver. Make your plans now for the 50th Anniversary of the Colorado Mining Association.

Claims for losses incurred during the war period for those making expenditures in an effort to win the war should be filed with your Association, or with Mr. Adkerson of the American Manganese Producers Association in the Press Building in Washington. No special legislation will be passed unless claims are denied. Won't you, therefore, file your claims at the earliest possible date.

In concluding this Bulletin we again express our sincere appreciation to our Western Senators and Congressmen for the fine job they are doing for the mining industry, There is hardly a member of this group who has not written to the office of the Colorado Mining Association, advising it of their appreciation for the work recently done by your Association in Washington on the three pieces of legislation which vitally affect our future, namely, Silver, Premium Prices, and Stockpiling.

* * * * * * * * * * *

ADDRESS DELIVERED BY FELIX E. WORMSER, SECRETARY, LEAD INDUSTRIES ASSOCIATION, BEFORE THE ANNUAL MEETING OF THE COLORADO MINING ASSOCIATION, AT DENVER, COLORADO, ON JANUARY 25, 1946.

THE LEAD SITUATION

After World War I lead was frequently referred to as the "precious metal". No doubt the title reflected the marked difference between the price of lead before the war of about 4.00¢ per lb. and the price after the war, to the order of 7¢, 8¢, 9¢ and even 10¢ per lb. In fact, the average price for the ten years 1919-1929 was close to 7¢ per lb.

Perhaps history is repeating itself. Today, after World War II lead is precious in that it isn't freely available but it certainly isn't precious at the OPA ceiling price of 6.50¢ per lb. But that price doesn't give a true picture of the situation as the metal is being heavily subsidized in the United States. For example, in 1945 about $17,500,000 was paid by the Government to the lead miners so they could maintain their production and lest any one think that this subsidy enabled the mining companies to profit handsomely they need only look at their balance sheets.

Lead is already selling abroad at higher prices than in the United States. This is a most curious situation. I think that in all recorded American history, with one exception in 1937-1938, lead has always brought more in the United States than in the rest of the world, never less. Perhaps even more curious is the fact that the Government now will have to subsidize the producers of any foreign lead to be imported into the United States. All of which is a reflection of lead's current strong position, stronger than that of any other domestically produced non-ferrous metal.

The consumption of lead has subsided but little from its wartime rate of over 1,000,000 tons a year and only because of strict government controls on its use. The demand for lead is not expected to decline in the first few postwar years to anything like the rate of the late 1930's. When you investigate that rate you will find it averaged about 650,000 tons a year - but that was in a period of business actively below "normal". In the late '20's it was about 900,000 tons.

In other words, we may look for such a large postwar increase in the use of lead that we need either new domestic ore supplies or we shall have to import a larger tonnage of lead from Mexico, Canada, Australia and other foreign countries than we have ever imported before.

You may ask why is there such a large demand for lead? It is a metal generally so inconspicuous in its applications that 1,000,000 tons a year may be difficult to visualize. But it is there nevertheless. Several of the largest uses of lead, such as the manufacture of storage batteries (which alone consumed about 300,000 tons of lead last year), plus the use of lead as cable sheathing and the use of lead in gasoline, are essentially non-competitive in that substitutes are either more costly or not as effective. In the aggregate these three uses alone are equivalent in tonnage to more than the entire domestic production of lead in any of the last three years. Of course, one must not make too misleading a deduction from this simple statement because a large amount of the lead used by the battery industry comes from secondary or scrap sources and any appraisal of the American lead situation must give prominent thought to the scrap industry which has grown increasingly important as the years go by and will grow more and more important as our mines become progressively exhausted. But the fact remains that the postwar demand for lead has outstripped the ability of the domestic mines to meet it alone.

You will note that I have confined this analysis so far to only three uses of lead. I have not given any consideration to other large uses such as white lead, which can consume around 75,000 to 100,000 tons of lead a year, red lead, lead for the chemical construction industry, lead in ammunition, foil, bearing metals, collapsible tubes, solder, type metal and a multitude of other uses. It is well to note that lead is in a most enviable position in that it is generally indispensable for all these applications.

The following table will give you at a glance the prewar and 1945 rates of consumption and show how the 1,000,000 tons of lead a year is accounted for:

CONSUMPTION OF LEAD
(In Short Tons)

	1940 A.B.M.S.	1945 Estimated
Storage Batteries	220,200	310,000
Cable Covering	107,[illegible]00	109,000
Chemicals	124,900(a)	135,000
Ammunition	56,000	56,000
Tetraethyl	44,000	77,000
Sheet and Pipe	65,000(b)	75,000
Solder	24,000	47,000
Bearing Metal	14,000	40,000
Foil	23,500	19,000
Collapsible Tubes	(c)	17,000
Brass and Bronze	(c)	38,000
Type Metal	16,800	27,000
Terne Metal	(c)	6,000
Weights & Ballast	(c)	12,000
Heat Treating	(c)	3,500
Seals, Nails, Washers	(c)	3,500
Other and Unclassified	86,200	83,000
Total	782,000	1,058,000

(a) Exclusive of oxides for storage batteries.
(b) Includes lead used in chemical construction.
(c) Included in "Other and Unclassified".

We might spend hours analyzing the interesting competitive situation in each one of these outlets but time does not permit. Suffice it to say that each application will proba bly continue to demand large amounts of lead for a long time to come even though some uses may be displaced ultimately by substitutes.

Now what are the domestic lead resources doing to meet this continued large demand for lead? It is no news to you that lead production has declined in the last year but I am afraid a good many people have received a misleading impression from publicity that has been given to the reasons for the falling off of production. I ha ve seen it ascribed to a dwindling of our ore supplies whereas the simple fact is that it is mainly due to a shortage of labor. The United States is far from being depleted of its lead resources but it is undeniably true that during the war normal exploration and development work had to be sacrificed on behalf of production. Now that has to be made up.

Current careful estimates indicate that the lead mines in the United States require about 4,000 additional men and that with this comparatively modest part of the huge American labor supply they could increase production substantially, I should say between 25 to 35%, or perhaps another 100,000 tons of lead a year, assuming, of course, that no restrictions or restraints are put in the way of an incentive to continue operations through price control. By that I mean a complete return to a free market for lead. The following table shows how our production has dropped off in the last few years:

PRODUCTION OF LEAD *
(In Short Tons)

1929	647,995
1939	413,979
1940	457,392
1941	461,426
1942	496,289
1943	453,313
1944	416,861
1945	385,000 (estimated)

*Recoverable lead - U.S. Bureau of Mines

I look for output to grow slowly from now on. One will be immediately struck by the large gap between the 1,000,000 tons a year we need to satisfy the American demand and the 400,000-odd tons drawn from the mines as new lead. This gap has to be made up largely by lead from scrap and the balance from imports. Scrap production should average about 300,000 to 350,000 tons a year leaving 250,000 tons needed from imports if the American mines do not increase their production.

The government lead stockpile has declined to a point where it can contribute only a modest amount of metal during 1946. On December 31, 1945 the government lead stockpile was 75,000 tons. On March 31, 1946 it is expected to be 50,000 tons.

Foreign demand for lead is just as strong as it is in the United States. Europe has been starved for lead for many years. Lead is traditionally a preferred metal for building construction in England. One may anticipate, therefore, a strong continuing bid from Europe for available foreign supplies and currently only a comparatively moderate amount is coming into the United States by government arrangement from Mexico and other foreign countries, compared with what has flowed into the country during wartime, the figures being roughly 10,000 tons per month currently compared with 20,000 tons per month during 1945. This only emphasizes the need of utilizing our domestic resources to help meet the demand.

Available Government statistics indicate that the average price of lead received by miners in recent months is over 8.6¢ per lb. When I spoke to you a year ago I indicated that the price in 1944 was roughly 7.75¢ per lb. I believe that today the price is even higher than the 8.6¢. What it would be without any Government control no one knows, but I feel strongly that the sooner we procure the removal of these Government price controls the sooner the lead situation will be cured. By taking away from the lead market the one means by which the amount of lead coming on to the market was always carefully adjusted, namely the operation of the price of lead in a free market, a great many serious distortions are created which require other regulations to correct. Where Government attempts to do the impossible - to control the domestic lead economy, which is only a fraction of the world lead economy, and to supplant the operations of a free market, the results are not likely to be happy.

It is quite obvious that the official 6.50¢ price is well below the price lead would rule today in the general market and although, to be sure, miners are receiving A and B quotas which are intended to compensate for the lack of a free market, these quotas can be revised at short notice. I know of at least one mine that is not receiving any quota and is turning out lead at the official price. Now that the incentive of wartime patriotism is gone, and recognizing the Government figures that lead is worth more than 6.50¢, any lead company might well question a policy of continuing to turn out the metal at a fixed ceiling price without any premium in peacetime when it can procure a higher price for the metal if permitted to sell it abroad.

Lead mining operators face an altogether different situation than in wartime. Under the operations of a free enterprise system in America they must decide how they can make the greatest profit from their operations. Any other policy is not sound in peacetime. The greater their net income the more they can expend on further explorations, on taxes to help discharge the huge Government debt, or to get in a strong financial position so as to meet the inevitable rainy day and to maintain employment.

No doubt questions of taxation and the effect of the capital gains tax on new ventures in Colorado mining may take up other parts of this convention. That, too, is a barrier to the resumption of full-scale mining in the United States and I haven't attempted to enlarge upon it here. We might note in passing that there is no capital gains tax in Canada. I believe that has a lot to do with the intensive exploration of Canada's mineral resources now going on.

In conclusion, it seems to me that the Colorado lead mining industry would be well advised to work for a complete removal of all Government price restrictions on lead and its derivatives on June 30, 1946, the expiration date set by Congress. In fact, I can think of nothing better calculated to cure the lead situation than that single step.

* * * * * * * *

COPY

LEAD STATISTICS

EXPLANATION OF GRAPH

WITH COMMENTS.

FOREIGN CONSUMPTION OF PRIMARY LEAD:

This is plotted from figures obtained in column "N" and shown on the Graph by the dotted black line. The "trend," as indicated by the straight line, gives an annual increment of 16,000 tons consumption of new lead.

Whatever the cause of the poor condition of the Domestic lead industry we cannot blaim it on the decline of lead as a basic metal. Foreign consumption would indicate that lead is holding its own regardless of competition from other metals and oxide pigments. For each of the past four years Foreign consumption has broken all existing records and, in spite of low metal prices, the demand holds consumption well above the expected gradient. This large demand can only in part be attributed to rearmament. The largest increase in consumption of lead during recent years has taken place in Great Britain, apparently due to the tremendous expansion in their building program.

It is of interest to note the great importance that selective Flotation played in the lead industry, particularly as regards the Foreign situation. From the year 1912 up to 1920 inclusive, the Foreign consumption of lead dropped from 888,000 tons down to 510,000 tons. During the same period the London Price increased from 3.87¢ per lb. to 6.25¢. This situation indicated that the available lead was approaching exhaustion. In 1920 the selective flotation of lead and zinc was perfected, releasing the huge tonnages of complex ore in the Sullivan, Broken Hill, Burma, Buchans and other large mines. Since 1920 Foreign production has increased very rapidly and, due to the high metal content of the Foreign ores, there apparently is an enormous tonnage of lead available at a London price of 15.5 or 3.25¢ per lb.

DOMESTIC CONSUMPTION OF PRIMARY LEAD:

This is plotted from figures contained in column "L" and shown in the Graph by the full black line. The "trend" as indicated by the straight line, shows an average annual increment of 14,000 tons of new lead.

For the period 1900 to 1929 inclusive, the annual increase in the use of new lead was very consistent. Due largely to the extensive deposits of "zinc free" lead in Missouri, this country did not experience the shortage of metal encountered abroad before selective flotation was perfected.

From 1929 to 1932 the domestic consumption of primary lead dropped from 696,300 tons to 232,680 tons. Since then the industry has recovered to some extent, but consumption is still 300,000 tons below the normal gradient. Apparently the business depression is responsible, particularly as regards the normal consumption of lead for cable covering.

During the period 1920 to 1924 inclusive, domestic consumption accounted for over 45% of world use of newly mined lead. During the depression the corresponding figure dropped below 20% and is having considerable difficulty getting back to 25%.

It should be noted that these figures of domestic consumption do not include lead manufactured for export. It is assumed that this business will eventually be lost when the foreign plants perfect their fabricating facilities.

DOMESTIC CONSUMPTION OF SECONDARY LEAD:

The domestic production of secondary lead is shown in column "P" and it is assumed that consumption of secondary lead is equal to production. It will be noted that in recent years there has been a tendency towards a decrease in secondary tonnage. This is probably explained by the use of lighter storage batteries. When the use of the lighter grids for batteries becomes general and the bulk of the chamber acid plants have been "scrapped" in favor of the contact process, it is probable that the secondary lead production will drop to under 150,000 tons per year.

TOTAL DOMESTIC CONSUMPTION OF LEAD:

This figure, obtained by adding secondary production to primary consumption as shown in column "L", is plotted in "red." The total domestic consumption is also nearly 300,000 tons per annum short of normal.

LEAD STOCKS IN HANDS OF PRIMARY REFINERS:

This figure is shown on the Graph by the dot and dash line. It represents the refined lead, including antomonial, held on hand by the primary refiners on December 31st. Figures are obtained from column "J" of tabulation.

IMPORTS:

These are shown on Graph by "green" line.

EXPORTS:

Total exports are represented on the Graph by the "blue" line.

METAL PRICES:

The N. Y. average price for each particular year is shown by the full black line, and the London equivalent by the dotted black line.

GENERAL COMMENTS:

It would appear that there is a large supply of Foreign Lead available at a London price of 3.25¢. Past experience proves that when the differential between the N. Y. price and the London price reaches 1.75¢, imports of leadincrease to a marked degree.

Assuming that there is no upward revision of the tariff on lead, we should expect a considerable increase in imports when the domestic price reaches 5.00¢, unless there is also a material increase in Foreign consumption.

Eventually the domestic industrial condition should improve and we should consume 300,000 tons more lead annually. The question arises as to where this lead is to come from, if foreign competition is going to hold the N. Y. price around 5.00¢. Indications are that the domestic supply is not only diminishing, but the cost per pound of producing lead is going up. We hear many of the domestic producers saying that they cannot afford to operate until the price reaches 5.00¢, this taking into account the present silver subsidy. A glance at the tabulation shows that in 1930 the domestic production of new lead was 582,658 tons with a N. Y. price of 5.52¢. In 1937 with a 6.01¢ price the domestic production dropped to 450,975 tons. An increase of ½¢ in price resulted in a decrease in production of 132,000 tons and a 6.00¢ market fell 100,000 tons short of bringing out enough lead to satisfy normal requirements.

It would appear that any large increase in domestic consumption will largely be satisfied by imports of lead. From a Company standpoint it would be desirable that such imports be in the form of ore or concentrates, but the question arises as to where these can be smelted. There is no smelter on the Atlantic Seaboard and Selby is hampered by a Court decree limiting sulphur output. If the above premises are correct the question of sulphur recovery from lead plants takes on increased importance.

COPY

LEAD STATISTICS

KEY TO TABULATION

GENERAL:

Statistics for recent years were obtained from American Bureau of Metal Statistics. Earlier figures were found in old publications of the U. S. Geological Survey. Early in this century statistics bearing on the Lead Industry were very incomplete and in many cases no figures are available. In order to obtain a comparison with recent trends, some estimates have been made for the period 1900-1910. All figures are given in short tons of 2000 lbs.

COLUMN "A":

World production of base bullion allocated so far as possible according to origin of ore. For practical purposes this tonnage may be considered as primary metal.

COLUMN "B":

Domestic production of lead obtained from same table in A. B. of M. S. as Column "A". In general this tonnage represents the base bullion and pig lead production as smelters and therefore includes a very small amount of secondary. For practical purposes, however, this tonnage may be considered as primary metal.

COLUMN "C":

This shows the percentage U. S. production of primary metal as compared to the World production. It will be noted that during the period 1914-1920, U. S. produced approximately 45% of the world's new lead. For recent years the corresponding figure is approximately 24%.

COLUMN "D":

This column gives the refinery production of refined lead derived from domestic ores and base bullion. Antimonial lead is excluded.

COLUMN "E":

This column gives the Domestic production of primary lead in the form of Antimonial lead as reported by the U. S. Geological Survey.

COLUMN "F":

The sum of Dolumn "D" and Column "E" gives the total production of U. S. primary lead as metal. It does not include lead ores directly converted into oxides or pigments.

COLUMN "G":

This column gives classified figures of lead imports as:

1st: Crude ores and concentrates.

2nd: Base bullion.

3rd: Pig lead.

4th: Total lead imports.

COLUMN "H":

This column gives the lead exports as:

1st: Pigs and bars with occasional ore shipments.

2nd: Manufactured lead products with benefit of Draw Back.

3rd: Total lead exports.

COLUMN "I":

This column shows the excess of imports over exports. In some instances the exports have exceeded imports and in these cases the figures are shown in red.

COLUMN "J":

This column gives metal stocks on hand December 31st as held by the Primary Refiners. It includes refined lead and antimonial lead.

COLUMN "K":

This column gives the domestic consumption of Primary Lead. Included in this figure is the metal manufactured in the U.S. but exported with benefit of Draw Back. Tonnage in this column is obtained as follows:

> Column "E" plus Column "G" (Total) minus Column "H" (Pigs and Bars) plus or minus correction for decrease or increase in Refinery Mwtal stocks on hand Dec. 31st. Column "H" covers the tonnage of lead fabricated in the U. S. Should we lose the business of fabricating for export, domestic consumption would be reduced by that amount.

COLUMN "L":

This column gives Domestic Consumption of Primary Lead exclusive of manufactured exports as noted above.

COLUMN "M":

This column gives the World Consumption of lead. For practical purposes it may all be considered as primary lead.

COLUMN "N":

This column gives the Foreign Consumption of Primary Lead. It is obtained by subtracting Column "L" from Column "M".

COLUMN "O":

This column shows the percentage U. S. Consumption of Primary Lead compared to the Total World Consumption. It will be noted that during the period 1920-1926 inclusive we consumed approximately 45% of the World's Lead. For the period 1935 - 1938 inclusive the corresponding average has been under 25%.

COLUMN "P":

This column gives the U. S. production of "Secondary Lead" as obtained from figures published by the U. S. Geological Survey.

COLUMN "Q":

This column shows the total Domestic Consumption of lead as metal including Secondary Lead. Figures are obbained by adding Column "L" and Column "P". Consumption of lead converted directly from ore into oxides and pigments is not included.

COLUMN "R":

This column gives the average N. Y. price of lead in cents per pound.

COLUMN "S":

This column gives the average London price of lead converted into U. S. currency.

COLUMN "T":

This column gives the average differential between the N. Y. price and London price. In cases where the London price was higher the figure is shown in Red.

COLUMN "U":

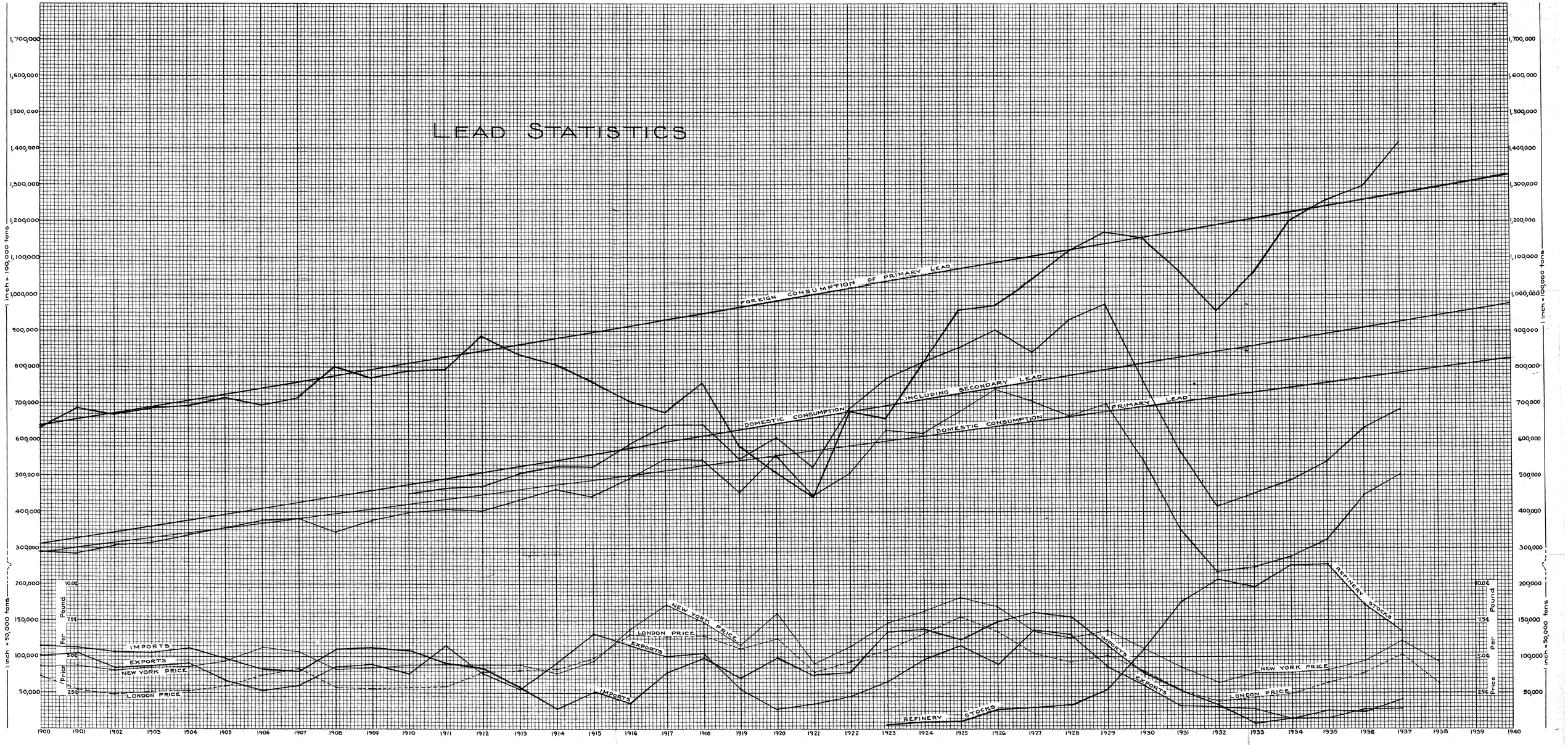
This column shows the Domestic Tariff on lead:

A. As Bullion.

B. As Ore.

LEAD STATISTICS

	A	B	C	D	E	F	G				H			I	J	K	L	M	N	O	P	Q	R	S	T	U	
							Imports - Lead in				Exports - Lead in															Tariff	
Year	World Production of Base Bullion	United States Production of Base Bullion	Per Cent United States of Total	United States Primary Refinery Lead	United States Primary in Antimonial Lead	United States Production Total Primary	Crude	Base Bullion	Pigs	Total	Pigs and Bars	Manufactured With Drawback	Total	Excess Imports Over Exports	Stocks - Dec 31 Refined And Antimonial Lead	Domestic Consumption of Primary Lead Including Manufactured Exports	Domestic Consumption of Primary Lead Excluding Manufactured Exports	World Consumption of Primary Lead	Foreign Consumption of Primary Lead	Per Cent United States of Total Consumption	United States Production of Secondary Lead	United States Total Consumption	New York Price ¢ Per Pound	London Price ¢ Per Pound	New York Differential ¢ Per Pound	Bullion ¢ Per Pound	Ore ¢ Per Pound
1900	936,000	282,000 Est.	30.2	270,824	6,760 Est	277,584	Not available	Not available	Not available	114,397	98,913	4,283	103,196	11,201	10,000 Est.	293,068	288,785	920,000	631,000	31.4	20,000 Est.	338,785	4.37	3.69	0.68	2.125	1.50
1901	990,000	281,000 "	28.4	269,266	6,755 "	276,021	"	"	"	112,471	97,387	7,694	105,081	7,390	"	290,166	283,411	970,000	687,000	29.2	" "	333,411	4.33	2.72	1.61	"	"
1902	995,000	287,000 "	28.9	276,455	6,900 "	283,355	"	"	"	107,715	78,968	5,837	84805	22,910	"	312,102	306,265	975,000	669,000	31.4	25,000 Est.	356,265	4.07	2.45	1.62	"	"
1903	1,012,000	302,000 "	29.8	290,194	7,250 "	297,444	"	"	"	106,407	81,915	5,836	87,715	18,692	"	321,972	316,136	1,000,000	684,000	31.6	" "	366,136	4.24	2.52	1.72	"	"
1904	1,055,000	322,000 "	30.5	308,603	7,720 "	316,323	"	"	"	112,852	83,887	6,696	90,583	22,269	"	345,225	338,529	1,030,000	691,000	32.8	30,000 Est.	388,529	4.31	2.60	1.71	"	"
1905	1,090,000	332,000 "	30.5	318,509	7,960 "	326,469	"	"	"	98,378	59,456	8,142	67,598	31,140	"	365,391	357,249	1,070,000	713,000	33.4	" "	407,249	4.71	2.98	1.73	"	"
1906	1,088,000	350,000 "	32.1	336,200	8,400 "	344,600	Not available	Not available	Not available	83,134	47,249	5,992	53,241	29,893	"	380,485	374,493	1,070,000	695,000	34.6	35,000 Est	424,493	5.66	3.78	1.88	"	"
1907	1,115,000	367,000 "	32.9	352,381	8,780 "	361,161	32,408	38,130	9,277	78,982	51,448	8,268	59,716	19,266	"	388,695	380,427	1,095,000	715,000	34.8	" "	430,427	5.32	4.13	1.19	"	"
1908	1,165,000	324,000 "	27.8	311,666	7,800 Est.	319,466	32,354	76,961	2,759	110,394	76,857	9,253	86,110	24,284	10,000 Est.	353,003	343,750	1,145,000	80,100	30.0	40,000 Est.	393,750	4.20	2.86	1.34	"	"
1909	1,164,000	368,000 "	31.6	352,839	8,889	361,728	35,679	74,926	3,576	112,545	86,078	4,795	90,873	21,672	17,405	380,790	375,995	1,145,000	769,000	32.9	" "	425,995	4.27	2.78	1.49	"	"
1910	1,205,000	389,211	32.3	375,402	10,140	385,542	47,376	59,031	3,485	108,602	69,787	8,800	78,587	30,015	35,972	405,790	396,990	1,185,000	788,000	33.5	55,422	452,412	4.45	2.81	1.64	"	"
1911	1,220,000	405,863	33.2	391,995	9,636	401,631	17,843	70,741	2,632	89,952	101,787	12,080	113,867	23,915	4,481	421,287	409,207	1,200,000	791,000	34.1	54,284	463,491	4.42	2.92	1.50	"	"
1912	1,312,892	414,807	31.7	392,517	8,549	401,066	9,789	76,210	272	83,561	64,906	113,967	76,273	7,288	10,492	413,710	402,343	1,290,000	888,000	30.2	67,168	469,511	4.47	3.87	0.60	2.125	1.50
1913	1,291,799	435,665	33.7	411,878	14,667	426,545	9,942	48,454	41	57,147	44,544	9,779	54,323	2,824	5,310	444,330	434,551	1,270,000	835,000	34.2	72,834	507,385	4.37	3.98	0.39	1.90	0.75
1914	1,271,867	538,588	42.4	512,794	15,475	528,269	11,825	16,722	148	28,338	80,267	9,488	89,755	61,417	7,668	473,982	464,494	1,270,500	806,000	36.6	61,062	525,556	3.86	4.09	0.23	1.20	"
1915	1,214,303	535,776	44.1	507,026	19,371	526,397	9,093	43,124	410	51,496	126,924	3,983	130,907	79,411	12,169	446,468	442,485	1,202,500	760,000	36.8	78,900	521,385	4.67	4.85	0.18	0.95	"
1916	1,239,485	592,079	47.8	552,228	17,246	569,474	17,543	12,131	5,655	35,330	110,380	5,170	115,550	80,220	12,369	494,224	489,054	1,197,000	708,000	43.7	96,300	585,354	6.86	6.58	0.28	1.25	"
1917	1,269,749	581,557	45.9	548,450	15,279	563,729	20,646	57,832	5,793	78,272	91,340	7,537	98,877	20,605	10,000 Est.	553,030	545,493	1,222,000	677,000	44.7	93,500	638,993	8.79	6.37	2.42	1.20	"
1918	1,312,552	556,233	42.5	539,905	10,777	550,682	18,535	74,832	5,240	98,607	101,247	3,426	104,673	6,066	"	548,042	544,616	1,300,000	755,000	41.9	97,100	641,716	7.41	6.40	1.01	1.15	"
1919	976,239	454,797	46.7	424,433	9,674	434,107	9,787	56,012	5,107	70,907	51,486	1,936	53,422	17,485	"	453,528	451,592	1,031,700	580,000	43.8	96,858	548,450	5.76	5.57	0.19	1.05	"
1920	1,006,629	476,125	47.3	476,849	9,604	486,453	14,744	48,052	35,719	98,515	20,093	6,175	26,268	72,247	"	564,875	558,700	1,068,900	510,000	52.4	46,100	604,800	7.96	6.25	1.71	1.30	"
1921	974,056	402,479	41.3	398,222	7,881	406,103	7,117	35,867	31,301	74,285	26,624	9,369	39,993	38,292	"	453,764	444,395	886,500	442,000	50.2	76,155	520,550	4.55	3.90	0.65	0.90	"
1922	1,179,140	470,000	39.9	468,746	7,068	475,814	12,237	62,037	3,551	77,825	38,178	5,677	43,855	33,970	10,000 Est.	515,461	509,784	1,189,000	679,000	42.9	173,366	683,150	5.73	4.69	1.04	1.40	0.75
1923	1,314,001	530,000	40.3	543,841	11,635	555,476	33,441	80,748	21,099	135,289	50,735	12,526	63,261	72,028	8,833	641,197	628,671	1,287,000	658,000	48.9	139,329	768,000	7.27	5.48	1.79	2.125	1.50
1924	1,467,265	590,000	40.2	566,407	13,593	580,000	47,660	77,751	12,247	137,658	82,090	15,275	97,365	40,293	11,294	632,477	617,202	1,427,000	810,000	43.2	194,948	812,150	8.10	6.64	1.46	"	"
1925	1,669,854	662,500	39.0	654,921	14,472	669,393	44,481	70,627	7,021	122,129	103,519	11,699	115,218	6,911	11,373	688,554	676,855	1,632,000	955,000	41.5	179,645	856,500	9.02	7.73	1.29	"	"
1926	1,770,278	696,000	39.3	680,685	18,909	699,594	58,116	78,285	11,152	147,555	71,936	17,955	89,891	57,664	28,693	757,893	739,938	1,709,000	969,000	43.2	160,962	900,900	8.42	6.74	1.68	"	"
1927	1,857,998	673,000	36.2	668,320	16,040	684,360	40,638	118,284	2,467	161,389	125,267	12,004	137,271	24,118	30,801	718,374	706,370	1,745,000	1,039,000	40.4	134,580	840,950	6.75	5.25	1.50	"	"
1928	1,841,012	649,800	35.2	626,202	17,930	644,132	25,915	128,468	661	155,044	116,269	13,224	129,493	25,551	33,618	680,090	666,866	1,785,000	1,118,000	37.4	263,734	930,600	6.30	4.58	1.72	"	"
1929	1,932,520	688,000	35.6	672,498	17,062	689,560	31,331	83,071	1,657	116,059	73,251	13,086	86,337	29,722	56,700	709,386	696,300	1,865,000	1,169,000	37.3	276,000	972,300	6.83	5.04	1.79	"	"
1930	1,845,672	593,129	32.2	573,740	8,918	582,658	39,377	38,630	209	78,216	48,307	12,161	60,468	17,748	112,544	556,923	544,762	1,700,000	1,155,000	32.0	225,838	768,600	5.52	3.92	1.60	"	"
1931	1,535,534	411,336	26.8	390,260	3,628	393,888	20,888	32,320	10	53,218	21,665	10,503	32,168	21,050	176,818	361,167	350,664	1,412,000	1,062,000	24.8	217,036	567,700	4.24	2.64	1.60	"	"
1932	1,302,124	277,435	21.2	255,337	3,577	258,914	21,001	13,462	44	34,507	23,516	7,220	30,736	3,771	206,623	240,100	232,880	1,186,000	953,000	19.6	183,820	416,700	3.18	1.86	1.32	"	"
1933	1,322,273	292,543	22.1	249,713	4,158	253,871	5,958	1,587	109	7,654	22,835	6,508	29,343	21,689	194,859	250,454	243,946	1,299,000	1,055,000	18.7	205,554	449,500	3.87	2.21	1.66	"	"
1934	1,493,391	330,911	22.2	299,841	5,901	305,742	10,611	2,450	283	13,344	5,909	7,472	13,381	37	226,936	281,100	273,628	1,473,000	1,199,000	18.4	214,372	488,000	3.86	2.46	1.40	"	"
1935	1,565,852	371,212	23.7	310,505	4,685	315,190	20,025	2,692	1,322	24,039	6,982	8,995	15,977	8,062	226,559	332,624	323,629	1,582,000	1,258,000	20.5	215,271	538,900	4.06	3.12	0.94	"	"
1936	1,646,357	400,009	24.3	387,698	7,442	395,140	20,713	312	2,590	23,615	18,313	8,312	26,625	3,010	172,637	454,364	446,052	1,742,000	1,296,000	25.6	187,498	633,550	4.71	3.91	0.80	"	"
1937	1,886,334	469,892	24.9	443,142	7,833	450,975	34,103	1,800	4,903	40,806	20,091	8,679	28,770	12,036	134,522	509,805	501,126	1,919,000	1,418,000	26.1	180,574	681,700	6.01	5.15	0.86	2.125	1.50
1938																							4.74				


LEAD STATISTICS
FOREIGN CONSUMPTION OF PRIMARY LEAD
DOMESTIC CONSUMPTION INCLUDING SECONDARY LEAD
DOMESTIC CONSUMPTION PRIMARY LEAD
REFINERY STOCKS
NEW YORK PRICE
LONDON PRICE
EXPORTS
IMPORTS
Price Per Pound
10.0¢
7.5¢
5.0¢
2.5¢
1 inch = 100,000 tons
1 inch = 50,000 tons
1,700,000
1,600,000
1,500,000
1,400,000
1,300,000
1,200,000
1,100,000
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
150,000
100,000
50,000
1900
1901
1902
1903
1904
1905
1906
1907
1908
1909
1910
1911
1912
1913
1914
1915
1916
1917
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
1936
1937
1938
1939
1940