

ANNUAL MEETING OF THE MEMBERS OF THE
LEAD INDUSTRIES ASSOCIATION

St. Louis, Missouri

April 6-7, 1960

The annual meeting of the members of the Lead Industries Association was held on Wednesday and Thursday, April 6-7, 1960, at the Chase-Park Plaza Hotels, St. Louis, Missouri.

Members Present

Harold A. Cohn
William R. Black
Edward Brennick
C. K. Conard
Vincent E. Dorman
A. E. Lee, Jr.
David T. Steele
Jean Vuillequez
William B. Clancy
A. J. Phillips
J. S. Smart, Jr.
Simon D. Strauss
Chas. W. Ambler, Jr.
Carl H. Cotterill
Geo. L. Spencer, Jr.
Carl A. Underhill, Jr.
Howard L. Young
Richard A. Young
Rudolph O. Erickson
Thomas K. Graham
Roland J. Lapee
Frank P. Barton
Julian S. Bers
R. J. Hopkins
Ralph H. Cutler, Jr.
Hugh W. Halton
Sidney E. Sweet
W. G. Hiscock
A. Y. Bethune
Roger H. Cutting
William G. Hewitt
Harold E. Lee
Emmett A. Torney
I. L. Barker
A. L. de Munitiz
R. C. Bell
Harold T. Fargey
E. H. Geutsch
Robert Hendricks
A. D. Turnbull
A. Olaf Wolff

Representing

Alpha Metals, Inc. (Alpha Loy Corp.)
American Metal Climax, Inc.
do
do
do
do
do
American Smelting & Refining Co.
do
do
do
American Zinc, Lead & Smelting Co.
do
do
do
do
do
The Anaconda Co.
do
do
G. A. Avril Co.
Bers & Co., Inc.
Broken Hill Associated Smelters Pty., Ltd.
(C. Tennant, Sons & Co. of N. Y., Agents)
do
do
(Consolidated Zinc Corp. Ltd.)
The Bunker Hill Co.
do
do
do
do
Cerro de Pasco Corp.
do
Consolidated Mining & Smelting Co. of Canada, Ltd.
do
do
do
do
do

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Henry L. Day	Day Mines, Inc.
Wray D. Farnin	do
C. B. Anderson	Delco-Remy Div., General Motors Corp.
S. F. Miller	do
C. E. Bassett	Dixie Lead Co.
W. D. Attberry	The Eagle-Picher Co.
D. R. Carter	do
W. R. Dice	do
M. M. Zoller	do
K. W. Green	The Electric Storage Battery Co.
E. R. Anderson	Ethyl Corp.
J. A. Costello	do
John S. Wintringham	do
Morris Foodin	Federated Metals Div., American Smelting & Refining Co.
Harvey D. Ferer	Aaron Ferer & Sons Co.
Dick Propst	do
R. A. Gardiner, Jr.	Gardiner Metal Co.
W. P. Wilke, III	Hammond Lead Products, Inc.
Lewis S. Somers, 3rd	Imperial Type Metal Co.
Frank H. Hurless	International Smelting & Refining Co. (Anaconda Sales Co., Agents)
Herbert M. Weed	do
D. B. Murph	Murdock Lead Co.
J. V. Murph	do
J. Jennings	National Lead Co.
W. T. Trask	do
William J. Welch	do
Henry J. Whitson	do
V. J. Brazier	Olin Mathieson Chemical Corp.
John J. Forst	do
William A. Oakey	do
Jens Jensen	Pend Oreille Mines & Metals Co.
C. Merrill Chapin, Jr.	St. Joseph Lead Co.
Robert F. Doelling	do
Andrew Fletcher	do
Charles D. Henderson	do
William F. Hoffmann	do
Charles R. Ince	do
W. T. Isbell	do
Carleton C. Long	do
R. J. Mechin	do
John G. Wehn	do
Jack C. Pierce	Shattuck Denn Mining Corp.
L. A. Creglow	United States Smelting Refining and Mining Co.
Oscar A. Glaeser	do
G. H. LeFevre	do
C. G. Rice	do
F. L. Warner	do
Howard Novasel	The Victory White Metal Co.
Reuben Viener	Ryman Viener & Sons
Robert Quenell	Western Lead Products Co.

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Represented by Proxy

Allied Smelting Corp.
Lead Products Co., Inc.
New Park Mining Co.
Newmont Mining Corp.

John A. Roebling's Sons Div., The Colorado Fuel
& Iron Corp.
Vulcan Lead Products Co.
White Metal Rolling & Stamping Corp.

Guests

Jean Adamian
C. H. Allen
L. E. Antonices
C. W. Ballard
Richard J. Bauer
Philip R. Blanc
Thomas M. Burns
Frank Canard
Walther Casper
J. P. Dolan
Yves du Parc
William R. Farrell
William H. Finkeldey
E. L. Frank
Jack G. George
Arthur J. Gervais
Paul Guterman
Paul V. Higgins
Webster Hodge
W. D. Hook
F. R. Jeffrey
C. P. Jenney
Jacques Jerusalem
Lindsay F. Johnson
J. J. Kelleher
Roy L. Livingston
Edwin W. Magee, Jr.
Thomas D. Moder
Ary Mossiman
J. W. Patterson
A. J. Payne
K. E. Reinsberg
N. R. Serdarevic
Morton M. Shapiro
J. A. Singmaster
J. V. Stafford
Joe A. Stone
George J. Strong, Jr.
Mortimer J. Sullivan
Kazuo Tachibana
Brian Wilson
Clark L. Wilson
Joseph Zimmerman

Transamino S.A.
Vitalic Battery Co.
Associated Metals & Minerals Corp.
Hercules Powder Co.
Henning Bros. & Smith, Inc.
Indussa Corp.
Canadian Embassy
O. S. Tyson & Co.
Metallgesellschaft A.-G.
Orchan Mines
Societe Generale des Minerais
Bolt Baranck and Newman Inc.
Singmaster & Breyer, Inc.
Philipp Bros. Ore Corp.
The British Metal Corp. (Canada) Ltd.
International Minerals & Metals Corp.
Metal Traders, Inc.
O. S. Tyson & Co.
Battelle Memorial Institute
W. R. Grace & Co.
National Zinc Co., Inc.
Orchan Mines
Cie Royale Asturienne des Mines
The New Jersey Zinc Co.
Hercules Powder Co.
Australian Embassy
F. W. Dodge Corp.
The Lehman Corp.
Anaconda Wire and Cable Co.
Canadian Department of Mines & Technical Surveys
Electrolytic Zinc Co. of Australasia
Associated Metals & Minerals Corp.
Metalchemical Commercial Corp.
B. Shapiro & Co. Inc.
Singmaster & Breyer, Inc.
"American Metal Market"
Division Lead Co.
E. I. du Pont de Nemours & Co.
International Minerals and Metals Corp.
Mitsui Mining & Smelting Co., Ltd.
"Steel"
Emergency Lead-Zinc Committee
"Daily Metal Reporter"

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Government Representatives

O. W. Bilharz	Office of Minerals Mobilization, Department of Interior
Harlan P. Bramble	Department of State
R. W. Geehan	U. S. Bureau of Mines
H. Kenworthy	do
Thomas H. Miller	do
C. W. Nichols	Department of State
J. A. Rowland	U. S. Bureau of Mines
Harold J. Schroeder	do
Donald Shan	International Resources Staff, Department of Commerce
Jack Spore	Department of Interior

Lead Industries Association Staff

Robert L. Ziegfeld, Secretary-Treasurer
 David M. Borcina
 Manfred Bowditch
 Bruce Fader
 Edward J. Mullarkey
 Sid W. Turner
 Homer S. Yetman

Expanded Research Program--LIA-AZI

Schrade F. Radtke, Director
 Samuel E. Eck

The minutes of the previous meeting of April 22-23, 1959 were circulated to members after that meeting and no changes or corrections were received.

The president made the following remarks:

This is the 32nd annual meeting of the Lead Industries Association. Welcome to all.

Last year the Lead Industries Association and the American Zinc Institute suffered a great loss in the fatal accident of Mr. and Mrs. Jack Bradley. Jack was president of Lead Industries Association and had been an officer of American Zinc Institute. He constantly strove for better salesmanship in the industry and was in the forefront of the great strides which have been made in LIA's research and market development activities. He worked unstintingly in this regard for both lead and zinc. It is appropriate, I think, if we all stand and observe a moment of silence in honor of Jack's memory.

An outstanding development for lead in 1959 was that for the first time in many years the Free World's lead production and consumption were approximately in balance. Our estimates, which are, of course, partly conjectural, indicate that about

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the same balance will be maintained during 1960. Lead seems to be emerging from a long period of overproduction into a situation where natural increases in consumption should bring better days. However, there are still large stocks of lead in the hands of producers here and abroad. Discipline over production and sales will be necessary to accomplish an orderly disposal of these stocks. The international nature of the effort to improve the consumption of lead is very gratifying. I would like to thank all of the members of the Lead Industries Association here and abroad who contributed to the various funds of the Association and to the expanded research program. Quite apart from the value which will be received from the money spent for these various activities, the efforts to improve lead consumption on an international basis have, I believe, resulted in better understanding by all producers of the international aspect of the lead business and have underscored the fact that producers of lead, wherever they may be, all have common problems which can only be solved by a common effort against the inroads of substitute materials and towards the greater utilization of lead.

Producers and consumers all over the world are to be commended for the fine support given to these efforts which can only, in my opinion, improve the position of sellers and buyers alike.

As most of you know, under the auspices of the United Nations, many large producers of lead outside the United States have on two occasions agreed to limit their production or exports of lead.

Even the Russians demonstrated a degree of cooperation. Of course the Communist bloc may not have important quantities of nonferrous metals available for export to the West. This was touched upon in an article in the "New York Times" on Monday by M. S. Handler, who reported from Warsaw that Moscow informed members of the Soviet bloc that heavy economic commitments at home and outside Europe may result in fundamental revisions of Russia's trading policy toward Eastern Europe by 1965. The article indicates clearly that the Russians may need chiefly at home all of their industrial raw materials ranging from iron ore and petroleum to almost the entire field of nonferrous metals.

Not only the lead industry but other industries are thinking more and more in terms of lead. Lead has been glamorized recently by a number of articles which touch upon the uses of lead for sound attenuation, antivibration, and the potential market for lead storage batteries in electric trucks and cars.

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During these meetings we shall hear from representatives of the lead producing and consuming industries and from others. I think we shall hear of the outstanding potential of lead in the battle against noise and vibration, in porcelain enamels for steel and aluminum, in glazes for brick and new structural clay products, in electronics, in new paint pigments, and in other new products.

Look AHEAD with L E A D !

REPORT OF THE RESEARCH DIRECTOR

The research director reported on the progress of the various research projects and others being initiated. A copy of this report is available upon request.

REPORT OF THE SECRETARY-TREASURER

The secretary-treasurer reported to the membership on the 1959 activities and plans for 1960, his report having been circulated to members on March 28, 1960.

REPORT OF NOMINATING COMMITTEE FOR DIRECTORS

Mr. Emmett A. Torney, chairman of the Nominating Committee for Board of Directors, reported for his Committee, composed, in addition to himself, of Messrs. C. B. Anderson, D. A. Merson, J. C. Pierce and H. M. Weed, and placed in nomination the following slate:

Julian Bers	Bers & Company, Inc.
R. D. Bradford	Federated Metals Division, American Smelting and Refining Company
J. A. Costello	Ethyl Corporation
W. H. H. Cranmer	New Park Mining Company
H. L. Day	Day Mines, Inc.
Andrew Fletcher	St. Joseph Lead Company
K. W. Green	The Electric Storage Battery Company
P. H. Hurless	International Smelting & Refining Company (Anaconda Sales Company, Agents)
Harold E. Lee	The Bunker Hill Company
J. A. Martino	National Lead Company
C. G. Rice	United States Smelting Refining & Mining Company
S. D. Strauss	American Smelting & Refining Company
Jean Vuillequez	American Metal Climax, Inc.
William Wilke, III	Hammond Lead Products, Inc.
M. M. Zoller	The Eagle-Picher Company

There being no further nominations, the slate was unanimously elected.

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ADDRESSES AT MEETING

The following talks were delivered at the annual meeting:

- *Storage Batteries.....C. H. Allen, president, The Association of American Battery Manufacturers, Inc., and vice president, Vitalic Battery Co., Inc.
 - *Future Automobile Power Plants and the Gasoline Market.....John S. Wintringham, Ethyl Corporation Research Laboratories
 - Outlook for Building Construction.....Edwin W. Magee, Jr., associate economist, P. W. Dodge Corp.
 - Lead in Acoustics.....William R. Farrell, senior consultant, Bolt Beranek and Newman, Inc.
 - *The Outlook for Lead in the Cable Industry.....Ary Mossiman, manager of market research, Anaconda Wire & Cable Co.
 - *The International Lead and Zinc Study Group.....C. W. Nichols, special asst., Office of the Assistant Secretary for Economic Affairs, U. S. Department of State
 - *Recent Development in World Lead and Zinc Markets.....R. Hendricks, executive vice president, The Consolidated Mining & Smelting Co. of Canada, Ltd.
 - Style Is More Than Skin Deep.....Peter Kyropoulos, technical director, General Motors Styling, Technical Center
- *Copies available to members interested.

ANNOUNCEMENT OF ELECTION OF OFFICERS

The election of the following officers for the ensuing year at the meeting of the Board of Directors on April 7 was announced:

Jean Vuillequez, President and Chairman of the Board	
Joseph A. Costello	Vice President
Charles R. Ince	Vice President
Simon D. Strauss	Vice President

Secretary

FOR RELEASE NEXT JANUARY TERM
5:00 P.M., WEDNESDAY, APRIL 6, 1960

THE EXPANDED RESEARCH PROGRAM
OF THE
LEAD INDUSTRIES ASSOCIATION

By

Schrade F. Padtke
Director of Research
Lead Industries Association
60 East 42nd Street
New York 17, N. Y.

One year ago when we first discussed the Expanded Research Program at our annual meeting, we mentioned the fact that our industrial world today is one wherein the term "survival of the fittest" is most apt. At that time we stated that a material must remain competitive in today's world or accept ultimate extinction. We also stated that lead was a modern metal and could meet the challenge of today's competitive world and remain competitive. We discussed the broad scope of our research program and the various areas in which we were working. You no doubt want to know whether we still feel that we can remain competitive and whether we have met this challenge. The answer is--Yes! We are meeting the challenge and we are obtaining success in our research efforts. Significant progress is being made and we are forging ahead not only to retain our markets but to develop new markets for our materials.

Considerable time is required to take a new idea from the laboratory bench to a profitable item for a company or an industry. One cannot expect results overnight, yet despite the time which is required under ordinary conditions, we have been successful in two particular areas in lead. Our research on the development of new and improved methods of producing cable sheathing continuously, which was a joint venture between the Lead Industries Association and the John F. Robertson Company, has resulted in a process for continuously extruding all the known cable sheathing alloys at rates which are deemed economic, with physical properties at least equal-

(Presented at the annual meeting of the
Lead Industries Association, St. Louis,
Missouri, April 6, 1960)

S. F. RADIKH

nt to those obtained by earlier production methods. This is a truly significant development and has stimulated work in other countries to improve processes and to permit the continuous production of alloy lead cable sheathing. In addition to this, through one of our fundamental research programs, an ultra low-loss dielectric ceramic has been developed which has stimulated interest in a number of other companies commercially producing dielectric materials, and is another example of the fact that lead is a critical material in today's world. These are two truly significant developments. I will, of course, later on in this paper, discuss all the other research we have under way and point out to you its economic and technical significance.

We should point out to you that our industry, here and abroad, is enthusiastically supporting this program. It was not merely a fly-by-night venture which obtained contributions for a single year, instead these contributions have continued and, in fact, they have been significantly increased. Our budget for 1960 has been increased by 50% over last year showing that our industry believes in this Expanded Research Program and is providing the funds to continue the work and to expand its scope. While these direct contributions to our program have been increased by 50%, they do not truly reflect the cooperation and the contributions of our member companies. In many, many cases our companies are providing technical information, expensive and special experimental samples, and high spot research to contribute to the industry program. These materials, these dollars which do not show in our budget, the time and effort of their technical people, have all been provided for the good of the industry and to support and back up our research effort. Therefore, our research budget is probably increased by a sum of 75% over last year although the dollars do not show directly. I have mentioned before that I have never seen an industry which cooperates to the extent that our industry does. It is truly remarkable and most gratifying to be able to tell you how extensive is this cooperation, the sincerity with which the program is supported, and the strong desire to keep our metals modern and progressive to meet the challenge of today's competition and technical obsolescence.

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Research has stimulated interest in laboratories in this country and abroad. In fact, the interest is world-wide and in turn our information is disseminated to virtually every country in the world. This exchange of information and participation again increases the effectiveness of our research effort and our research dollars. Our industry, in its original objectives, agreed that, by and large, all our information was available for the use of all to stimulate interest and enthusiasm in lead and to insure that the fruits of our research be utilized by all who are interested. To date these objectives are being achieved and we can take comfort that the information which we have developed is being used effectively by our cooperating industries.

To disseminate this information, we have made available our technical reports to interested companies and laboratories throughout the world. We have issued our quarterly report which describes our research in some detail and this quarterly report is mailed to the four corners of the globe. As I have mentioned before, this broad dissemination of our information has stimulated an exchange of information and renewed interest in lead.

In addition, since our last report, our research effort has also expanded to the four corners of the world. We now have research under way in government laboratories, in our member company laboratories, in research organizations, and in universities. Investigations are under way in the United States, Canada, Holland, Australia, and England. We have placed our research in those organizations which we feel can contribute most to the furtherance of our materials and where we feel an effective job will be done for us. Where there are research projects of related interests, information on the various projects is exchanged between the participating laboratories. All of this research is screened and approved by member companies, and despite the miles which separate our member companies, the cooperation, interest, and enthusiasm has been maintained during this past year, and we feel that precedence has been established for carrying this on in the future.

S.F. RADTKE

Our research covers the entire span of industrial requirements--from metallurgical to chemical and to electrochemical applications. We have broken our research investigations down by the technical disciplines since each of the projects may cover many markets, and therefore the technical breakdown as chemical metallurgical, and electrochemical research. This has served our needs more effectively than if we had attempted to break down our research needs by markets. On the other hand, we do insure that the developments from each of the technical areas are directed toward solving the needs of the various markets for which lead and zinc and its chemicals are employed. Furthermore this breakdown has facilitated our screening, reviewing, and steering of the research.

A significant portion of our research is directed toward conducting fundamental research to provide us with new ideas and new thinking about lead. Here we have no immediate commercial objectives in view, although in many cases we can readily visualize that a successful program in any of these areas may have economic significance. Furthermore a major portion of our research is directed toward retaining present markets, and improving the performance of existing products to meet competition. A third major portion of our research monies is concerned with finding new markets and new uses for our materials to expand the over-all consumption of lead.

Now let us look at the distribution of our research according to the breakdown discussed above. In our lead research, approximately 31.4% of our research dollars is devoted to fundamental research. 68.6% of our research dollars is directed toward applied research. Here we have specific commercial objectives in mind to exploit our research dollars for economic advantage. To look at this another way, 31.4% of our dollars is concerned with fundamental research as I mentioned above, 24.7% is directed toward retaining our present markets, to improve our products and to maintain their competitive position. This can also be termed defensive research to prevent the encroachment of competitive materials in our principal market areas. 6.9% of our research dollars is directed toward new products to expand the uses of lead. This breakdown is quite logical. We feel that many of the present market

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for lead will continue on their present basis and only critical areas need investigation at this time. On the other hand, we are in need of new markets for lead to meet the available production capacity and the mining capabilities of our industry. Let us now become specific and look at the research projects we have under way in each of the categories I have mentioned above.

FUNDAMENTAL RESEARCH

LP-8-60 - Fundamental Investigation of the Powder Metallurgy Process for Producing Lead Alloys
(See Quarterly Report No. 4)

LP-4-60 - A Study of Lead Base Alloys
(See Quarterly Report No. 4)

LP-29-60 and LP-31-60 - Surface Characteristics of Lead and Lead Metallurgical Fellowship
(See Quarterly Report No. 4)

LP-11-60 - High Emission Lead Compounds
(See Quarterly Report No. 4)

LP-18-60 - Fundamental Study of Lead Organic Compounds
(See Quarterly Report No. 4)

LP-14-60 and LP-21-60 - Lead Fellowship Program in Ceramics
(See Quarterly Report No. 4)

RESEARCH TO RETAIN OR IMPROVE PRESENT MARKETS

LP-15-59 - Continuous Extrusion of Cable Sheathing
(See Quarterly Report No. 4)

LP-26-60 - Lead Coated Steel Can Stock
(See Quarterly Report No. 4)

LP-12-59, LP-19-59, LP-20-59, LP-22-59 - Lead Fellowship Program in Ceramics
(See Quarterly Report No. 4)

LP-34-60 - Development of a Primer Paint Incorporating Lead Compounds and Water Soluble Vehicles
(See Quarterly Report No. 4)

LP-35-60 - A Fundamental Study of the Electrochemical Behavior of Lead in Acid Media Under Cyclic Conditions

Despite the fact that the lead acid storage battery has been known for years and has had a very successful economic and technical history, little is known of the fundamental behavior of metallic lead when it is subjected to cyclic conditions in acid media, that is when it becomes an anode at one time and a cathode the next.

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Cooperating companies from the electric storage battery industry have felt that this would be a significant contribution to their industry and, therefore we plan to undertake this program as a fundamental study but yet with direct economic significance. This will undoubtedly be carried on in a university where it can be treated effectively as a fundamental study.

LP-36-60 - High Speed Plating of Lead

In project LP-26-60 discussed above concerning the production of lead-coated steel, we have considered the investigation of many techniques for applying the lead cladding. We feel that a separate investigation of high speed plating is warranted to provide a technique which would be competitive with the high speed tin plating lines. As we are looking for new approaches in plating technology, the study will be treated as a basic investigation rather than as a pilot operation which the aforementioned project considers.

The objective here will be to develop solutions with high throwing power and laying down effective, pore-free lead coatings. We have considered placing this with a university or with a laboratory which will consider this as a fundamental investigation.

RESEARCH TO DEVELOP NEW MARKETS FOR LEAD

LP-9-60 - Investigation of Metal-Fiber Reinforced Lead
(See Quarterly Report No. 4)

LP-7-60 - Lead Asbestos Pads for Vibration Attenuation
(See Quarterly Report No. 4)

LP-16-60 - Lead for Sound Attenuation in Architecture
(See Quarterly Report No. 4)

LP-10-60 - Lead Chemicals
(See Quarterly Report No. 4)

LP-28-60 - Organolead Chemistry

We soon hope to establish a program which will have both fundamental and applied significance with the Quartermaster Research and Engineering Laboratories in Natick, Mass. This program will be a corollary to our other research in lead chemicals

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We have mentioned before that we feel that the entire chemical industry holds considerable promise for our industry and this, therefore, is the basis for the broad coverage we are giving this area of investigation. The products arising from this research will be evaluated in the various laboratories of the Quartermaster Facility, and as we mentioned in the introduction, this is part of a planned cooperative venture in three separate laboratories; at Arthur D. Little, T.N.O. in Holland, and the Quartermaster laboratories. We feel that this program at the Quartermaster is of special significance as many of the needs of the armed services can conceivably be met by lead chemicals, in the form of plastic materials for radiation shielding, for materials with biological activity, fungicidal activity, and the like. We hope to initiate this program in the immediate future.

To summarize this review of our Expanded Research Program, you will have noted that the major technical spheres of interest are being covered by our research. Our fundamental investigations are providing new ideas and new information for us. Our fundamental research has already contributed new knowledge which has stimulated other commercial investigations. We are carrying out appropriate research to see that existing markets are maintained or at least that declines in some of these critical markets are stopped. We are moving ahead in new areas which will provide, we feel, new markets for our materials. It is a dynamic program, lead is a modern metal and will find its use in all conceivable areas from missiles to aircraft to electronics, architecture, and the many other known areas for lead applications. In turn, with the development of new technical information, we hope to serve our many consumers and potential using industries. All of this is being brought about through the wonderful cooperation and support of our member companies. Their dollars alone would be ineffective if it weren't for their enthusiastic support and their close participation. By our working together we hope to serve industry in general as well as ourselves through research.

LEAD INDUSTRIES ASSOCIATION

60 EAST 42ND STREET

NEW YORK 17, N. Y.

ANNUAL REPORT OF THE
SECRETARY - TREASURER
FOR THE YEAR 1959

Since this report marks the end of another decade, it seems appropriate, before reviewing our own recent activities, to take a searching look into the past to see what has been happening to our industry. Many people have said that lead is passé, that it is an old metal losing ground in our modern technology, that the lead industry has not kept abreast of modern developments and has been less than vigorous in protecting and developing markets. I think that such views are not supported by the facts.

Figure 1 charts the per capita consumption of lead in the United States in pounds since 1920. It can be seen that, despite the rugged peaks and valleys that occur over this 40-year span, the trend has been generally mildly upward. In fact, the average per capita consumption in the 1950-59 decade was 14.07 lb as compared with 13.69 lb in the equally prosperous 1920-29 decade, a modest increase.

The disturbing factor is that peak per capita consumption was reached in 1950 at 16.4 lb and the trend has been generally downward in the last ten years. Also the peak per capita consumption for the four decades covered was in the 1940-49 era at 14.80 lb. Yet there seem to be logical explanations for this, such as abnormal consumption during the war and postwar pipe-filling years and the Korean conflict.

Over the forty-year period, lead lost a big part of three major markets--white lead for paint, lead foil for cigarette packaging and lead sheathing for telephone cable. In at least partial compensation for these losses, a whole new market was found in tetraethyl lead; and other markets, such as lead oxides, calking lead and solder, increased. The white lead market started its decline in the twenties at almost the same time that the compensating TEL market began to develop. Foil received its crushing blow as a result of wartime restrictions from which, for economic reasons, it has never recovered. The loss of the cable sheathing market has been largely a development of the last decade, stimulated by temporary shortages.

In my opinion there is no reason why these last two losses will not eventually be compensated for by new developments just as TEL compensated for the loss of white lead. In fact, you can see this beginning to happen with such uses as nuclear radiation shielding, sound and vibration attenuating materials, plastic stabilizers, new pigments, and others. This, of course, can be accelerated by industry action.

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This brings me to the other criticisms raised, in my opinion, unfairly. To find new markets for an old material is much different from finding them for a new material. Unexplored areas are not so great and, even when an important new market is found, it may simply replace an old one that has become obsolete for technological or economic reasons.

However, our industry has long recognized its needs. It was five years ago, when per capita consumption of lead was at the respectable level of 14.7 lb, that our technical steering committee was established to guide a program of technical development to expand lead markets. Since then, outside experts have studied our research needs and other experts our needs in certain market areas. Two years ago our Expanded Research Program was launched. Simultaneously our Industry Development Program was greatly enlarged.

No one can say that the lead industry is not aware of what it has to do to assure a prosperous future or has been lax or penny-pinching in establishing a constructive program. For all of this the loyal support of the membership and the foresight and courage of the officers and directors are to be commended.

You have just heard a detailed report of our Expanded Research Program. I'll now try to give you a broad view of our other activities. I will not dwell on such routine but important activities as statistics, Information Bulletins, liaison with the many technical societies and government agencies, since they have been going on for years and are continuing. We have also continued our promotional efforts in certain specific areas such as paints, ceramics and construction.

But, in addition, we have taken strides in a new direction. To tie in with expanded research, we have attempted to make industry take a different attitude towards lead and to interest engineers in taking a new look at the solution of their many problems. By so doing we hope that favorable results coming out of our research will get widespread attention throughout industry, that others will do applied research with lead in the development of their products, and that thus we will help to create new markets. At the same time we are continuing to foster the expansion of older markets.

Our thinking is exemplified by the new slogan we are now using, "Look Ahead with Lead." We want people to realize that lead has just as important a place in modern technology as has the newest plastic or metal on the market. That is why we often emphasize some glamorous new use of lead even though we know it may never amount to a hill of beans tonnage-wise.

We have further expanded our ability to give technical service to industry in the application of lead to solve its problems. Another engineer has been added to our staff to supplement this work.

We have started a new advertising campaign in two leading design magazines--"Materials in Design Engineering" and "Product Engineering"--with a combined circulation of over 70,000 people. These ads are designed to emphasize the variety of lead's properties and the variety of jobs it is efficiently performing for industry today.

In the same vein, we exhibited last year for the first time at the Design Engineering Show and were favorably impressed by the interest shown by design engineers, particularly in some of the newer developments in lead. We are building up our mailing list with the addition of many design engineers and are planning new direct mail literature of interest to them.

All in all, in 1959, through our direct mail and space advertising and publicity, well over 3,500,000 individual messages about lead were delivered to industry.

As an illustration, let me cite one specific field of application--the use of lead in the form of lead-asbestos pads to prevent the transmission of vibration, an application which we believe could eventually consume upwards of 50,000 tons of lead a year. We have not as yet gone all out in the promotion of this use because, as you have heard, we have a research project in progress to develop a lot of unknown but badly needed engineering data. However, we have featured such pads used in the foundations of the Union Carbide Building in two ads in "Engineering News-Record," in an article in "Lead," and in several publicity stories which have been successfully placed. Similar pads were used in a new way on another New York skyscraper--in this case to isolate the vibration of a rooftop air conditioning cooling tower. This has been publicized in "Lead" and featured in two more ads in "Engineering News-Record" with a circulation of over 80,000. Both applications have also been featured in the two design magazines mentioned a few minutes ago. We also issued a four-page brochure on the current usage of these pads in buildings and circulated it to some 18,000 architects and engineers. And we have just received approval of the engineers who designed these pads into the air conditioning equipment to prepare an article for placement in engineering magazines which they will by-line. They are so pleased with the first installation that they have again specified the pads for another new office building at 43rd Street and Third Avenue, New York.

All this has resulted in literally hundreds of inquiries on this one subject, not just from the building industry but from almost any industry you can name. Industry is plagued with noise and vibration problems. Our engineers are personally following up many of these inquiries and are working with such organizations as IBM, Minnesota Mining and Manufacturing, Permacel, Cordo Chemical, Bar-Ray, U. S. Plywood, Carrier Corporation, the Mare Island and New York Naval Shipyards, National Association of Home Builders Research Institute and several architects and engineering firms. If and when our research develops more of the technical answers we need, we will really be in a position to crack down on this use of lead.

I cite the foregoing in detail merely to give you an example of our modus operandi. This procedure can and does apply to other uses. Now, before summarizing our 1959 activities briefly, I want to stress one other important phase of our activities. That is our health and safety work. I can not overemphasize its importance. The toxicity of lead poses a problem that other nonferrous industries generally do not have to face. Lead poisoning, or the threat of it, hurts our business in several different ways. While it is difficult to count exactly in dollars and cents, it is taking money out of your pockets every day.

In the first place, it means thousands of items of unfavorable publicity every year. This is particularly true since most cases of lead poisoning today are in children, and anything sad that happens to a child is meat for newspaper editors and is gobbled up by the public. It makes no difference that it is essentially a problem of slums, a public welfare problem. Just the same the publicity hits us where it hurts.

Secondly, it means that we are often subjected to unnecessarily onerous regulations, either in the use of our product or in its labeling. This may mean either an added expense in labeling or in control equipment in your or your customers' plants. It may even mean that your product won't be used at all because your potential customer doesn't want the problems that the use of lead may involve.

What are we doing about all this? We are working closely with governmental health authorities, childhood poisoning centers, the medical profession, and organizations like the American Standards Association, the Paint, Varnish and Lacquer Association and the Manufacturing Chemists Association to prevent enactment of unfair and onerous legislation and regulations. In fact we were largely responsible for the increase of one-third in the maximum permissible concentration of lead dust and fumes that became effective a couple of years ago. We make every effort to convince industry of the safety of using lead if properly handled. We attempt to correct unfavorable publicity.

You may recall that last year I told you of a popular TV program based on lead poisoning in a young boy, derived in an impossible way, and our efforts to have the film withdrawn. At that time our negotiations had not been concluded. I am pleased to report that that incident had a happy ending. The producer completely changed the sound track to make no reference to lead.

There is a law suit now pending in Milwaukee in which an apartment building tenant is suing the owner for \$200,000 damages for alleged lead poisoning from water passing through the building's lead service pipe. Success of a suit like this could well mean the end of lead services not only in Milwaukee, but in Chicago and many another city, amounting to thousands of tons of lead a year. We are working closely with the defense and, although the case does not come to trial for some months, our latest information is most encouraging.

There is sound reason to believe, but there are insufficient facts available to prove, that some lead compounds are more toxic than others, yet public authorities place the same limitations on all lead compounds. Thus today we believe that unnecessary restrictions on the use of lead chromate colors in paints and on lead silicates in porcelain enamels are holding back the use of thousands of tons of lead a year. In much the same way medical authorities in the automotive industry are opposing the use of certain lead paints that could also mean several thousand tons of lead a year. I am of the firm opinion that, although the cost may be high, we must enter into a medical research program to develop the facts on the relative and absolute toxicity of various lead compounds. I feel that this perhaps should be a continuing program to develop the same information about new lead compounds as they are developed and markets are found for them. In fact a proposal for such a study is being presented to your Board of Directors today. I hope you will agree with me that our health and safety activities are not just an altruistic public service. They can also mean just as much in dollars and cents to you as any market or product development or research program can.

Now, to summarize:

ADVERTISING

1. "Lead." This quarterly magazine, containing an average of six articles per issue, was mailed four times during the year to a list of over 50,000 names, resulting in some 1,200,000 individual messages on various uses of lead.
2. "Soldering Manual." This 170-page book, prepared by our Solder Committee and published by the American Welding Society, came off the press and copies were distributed to members at reduced cost.
3. Antivibration Pads. A four-page brochure, "Current Practice in Isolating Buildings from Vibration with Lead-Asbestos Pads," was prepared, printed and distributed to 18,000 architects, engineers and others in the construction industry.
4. Lead Hygiene Conference Proceedings. These proceedings of the Hygiene Conference sponsored by LIA late in 1958 were published in full in "Industrial Medicine and Surgery," with a circulation of about 10,000 industrial physicians. It was later reprinted by LIA in an 82-page book for distribution by the Association.
5. "Red Lead Technical Letter No. 14." Navy approval of this letter, which deals with a new red lead primer for ships, tested in cooperation with the Navy, was received and it was printed and circulated to about 10,000 people interested in anticorrosive paints.
6. Supplements to "Lead in the Ceramic Industries." Two new supplements, one two-page and one eight-page, were printed and distributed to all who had previously received the book. In addition the book itself was reprinted as the original supply of 6,500 copies was depleted.

7. Storage Battery Brochure. A brochure promoting the use of lead-acid battery powered industrial trucks as compared with gasoline powered trucks was prepared. Since the first of this year, 10,000 copies have been printed for our distribution, but so favorable has been its reception by industrial battery manufacturers that these companies have ordered more than 35,000 additional copies printed and distributed at their expense.

8. Architectural Flyer. A four-page flyer describing the sheet lead gutter linings on a new building at Duke University was printed and distributed to about 18,000 architects and builders.

9. Space Advertising. The following advertising schedule ran last year in trade and technical publications:

Publication	Pages	Circulation	Subject
Materials in Design Engineering	6	31,000	Properties and uses
Product Engineering	7	42,000	" " "
Engineering News-Record	6	81,000	Metallic lead for construction
" " "	7	81,000	Red lead primers
Marine Engineering/Log	6	16,000	" " "
Bulletin of American Ceramic Society	6	8,000	Lead ceramics of all kinds
Ceramic Industry	6	6,000	" " " " "
Ceramic Age	6	8,000	" " " " "
Ceramic News	3	4,000	" " " " "
Brick & Clay Record	6	5,000	Lead glazes for clay products
Metal Product Manufacturing	6	15,000	Leaded porcelain enamels

Our space advertising this year will result in a gross circulation of 212,000 and an individual message total of almost 2,000,000.

10. Advertising Inquiries. The Association processed some 5,000 inquiries of all kinds in 1959 as a result of all forms of advertising, but the important thing is the quality rather than the quantity of these inquiries. Practically every important company and governmental agency is represented by top engineering personnel, as well as most of the architectural and engineering firms who do the largest volume of business.

11. Exhibits. LIA exhibited at four important national trade shows in 1959 with combined attendance of between 75,000 and 100,000 industry people. They were the Design Engineering Show in Philadelphia, the Chemical Show in New York, the Home Builders Show in Chicago, and the Plumbing Contractors Show in Miami.

12. Sweet's Catalogs. We again had two four-page catalogs in Sweet's Architectural File and in Sweet's Light Construction File. They covered sheet metal work for buildings and lead plumbing. Combined circulation is over 40,000.

PUBLICITY

13. General. General articles on lead, its uses and properties were prepared and published in "Industrial and Engineering Chemistry," Lykes Bros. Steamship Company's house organ, New York Purchasing Agents' "Review," and "American Metal Market's" special lead-zinc issue. The first, the annual review of technical developments in "Lead and Lead Alloys," was reprinted in a quantity of 5,000 for our own distribution and we are advised that it is also being reprinted in England. The Purchasing Agents' "Review" article was reprinted for use in replying to school and general inquiries.

14. Ceramics. Two articles on lead in ceramics were prepared and published in "Ceramic Industry." Another, based on research sponsored by us at Rutgers, appeared in the "Journal" of the American Ceramic Society and was reprinted by LIA. A Japanese paper on lead in ceramics was translated and reproduced for our own limited distribution.

15. Chemical Construction. A paper on "Lead-Acid Brick Construction," previously presented by us before the National Association of Corrosion Engineers, appeared in "Corrosion" and was reprinted. Our own "Specifications for Lead Chemical Drainage Systems" were reprinted in "Air Conditioning, Heating & Ventilating" and "Actual Specifying Engineer," and our article on lead constructed scrubbers appeared in "Chemical Processing." LIA reprinted an article on lead-lined wooden tanks from "Chemical Engineering" for its own distribution.

16. Paints. Articles on lead paints were prepared and appeared in "Encyclopedia Americana," "American City," "Mass Transportation" and "Maintenance." The report presented at the 1959 Annual Meeting on "New Developments in Lead Paint Technology" appeared in full in "American Paint Journal."

17. Architectural. Our article on lead as a concrete joint filler was reprinted by the Portland Cement Association for their distribution. A chapter on lead was prepared for a new book, "Materials for Architecture," being published by Reinhold Publishing Company.

18. Miscellaneous. An article on nonsacrificial lead anodes was reprinted from "Corrosion" for our distribution. A chapter on lead coatings was prepared for the "Encyclopedia of Engineering Materials and Processes." An article on lead shielding for portable atomic reactors was prepared and accepted by "Materials in Design Engineering" but has not yet appeared. A paper on new uses for lead powder was presented before the annual meeting of the Metal Powder Industries Federation and later was printed in the "Proceedings" of that meeting. A chapter on solder was prepared for the American Welding Society "Welding Handbook" and another for a book, "Modern Materials," to be published by the Academic Press.

MISCELLANEOUS

19. Information Bulletin. Eight bulletins were circulated to members to bring to their attention new developments and interesting articles about lead that they might not otherwise have seen.

20. Annual Reviews. Annual review articles on lead were prepared for "Engineering and Mining Journal," "Steel," "Industrial and Engineering Chemistry," and the "Year Book" of the American Bureau of Metal Statistics.

21. Addresses. Addresses on lead were delivered before the Colorado Mining Association and graduate students of the Newark College of Engineering.

22. Annual Meeting. A successful annual meeting was held in Chicago in April, one session as usual being held jointly with the American Zinc Institute.

23. Statistics. Monthly statistics covering sales of pig lead in the United States by primary producers, physical shipments of pig lead, manufacturers' stocks of pig lead, shipments of white lead, red lead, litharge, solder, bearing metals, antimonial lead products, type metal, extruded products, rolled products, and miscellaneous metal products, and mine production of lead were circulated to members.

24. Meetings. Meetings of other organizations in which LIA staff participated included ADME, American Mining Congress, American Society for Metals, American Society for Testing Materials, American Ceramic Society, Porcelain Enamel Institute, Structural Clay Products Institute, the Signal Corps Battery Conference, Association of American Battery Manufacturers, National Association of Corrosion Engineers, American Nuclear Society, American Industrial Hygiene Association, American Public Health Association, Industrial Hygiene Foundation, and American Medical Association.

25. Committees. Staff members are serving on many committees that have to do with lead, including the American Standards Association, National Association of Corrosion Engineers on nonsacrificial anodes, ASTM on lead for radiation shielding, American Welding Society on soldering and brazing, American Industrial Hygiene Association, National Safety Council and Philadelphia Health Department.

26. X-Ray Shielding. LIA prepared a wallboard panel half covered with sheet lead and presented it to the New York City Health Department to be used to demonstrate the effectiveness of lead X-ray shielding in the Department's drive for more and better shielding in doctors' and dentists' offices.

27. Lead Plumbing Connections. Because of the growing popularity of wall-hung water closets for residences, LIA designed a new fixture for the use of lead connections in such instances. Several manufacturers have adopted the new design principles, which opens this market to lead since previous designs were for other pipe materials.

28. Yellow Traffic Marking Paint. LIA started a drive for the use of yellow paint, particularly for edge-stripping highways, because the yellow paint is based on lead chromate, and white contains no lead. It is too early to know what progress can be made.

29. Lead Anodes. Information was gathered on several actual installations of nonsacrificial lead anodes for corrosion protection for later use in advertising and publicity.

30. Plumbers' Apprentice Contest. LIA supplied a judge of lead work at the annual national plumbers' apprenticeship contest at Purdue University. It also awarded Government Savings Bonds to the three best lead workers and supplied an instructor to give the plumbing teachers a refresher course in how to teach lead work.

31. "Lead Work for Modern Plumbing." Nearly 900 copies of this textbook were sold during 1959. This book will now go into its fourth printing, with 11,000 copies having been distributed and the entire cost recovered by the Association.

32. Ceramic Luncheon. LIA sponsored a luncheon during the annual meeting of the American Ceramic Society. Guests were the heads of ceramic departments of colleges at which LIA is supporting research fellowships. The purpose was an exchange of views on ceramic research and developments between the college personnel, our Ceramics Technical Committee and LIA research and technical service personnel.

33. Paint Test. A new test program was started by the Pigments Technical Committee on anticorrosive primers in sea water and fresh water.

34. Sheet Lead Flashing. On request of the architects, specifications were prepared for sheet lead flashing on a new state office building in Indianapolis. The lead has since been installed.

HEALTH AND SAFETY

35. Air Quality Standards. At the request of the California State Department of Health, we are cooperating with them in a project looking to the establishment of standards of "ambient air quality" for a wide range of potentially toxic materials, including lead.

36. Welding Lead-Painted Steel. As a result of somewhat similar work done elsewhere, we have reopened discussions with staff members of the Harvard School of Public Health relative to the possibility of showing that the hazard involved in welding lead-painted steel is substantially less than had been thought.

37. TV. Our efforts to have an erroneous TV program, written around an impossible case of lead poisoning in a young boy, withdrawn were successfully concluded when the producer revised the entire sound track to remove any reference to lead.

38. Lead in Automobile Exhaust Gases. Periodically in recent years we have had to combat the contention that lead emanating from the tail pipes of motor vehicles constitutes a menace to the public health in urban areas. That our part in this effort has been in some degree productive seems indicated by the fact that, in a recent article on air pollution by motor exhaust gases, published by the American Medical Association, no mention whatsoever is made of lead.

39. Legislation. The 1959 state legislative sessions terminated with a number of bills, dealing mostly with warning labeling, in reasonably satisfactory status. These included bills in California, Illinois, Indiana, Montana, New Jersey and Washington.

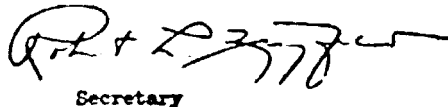
40. Childhood Lead Poisoning Because of its ramifications and importance, it is impossible to do justice to the problem of childhood lead poisoning in a single paragraph. Both in the breeding of adverse publicity, with its inevitable ill effects on sales, and as a source of all but insoluble problems, it continues to be our major "headache" in the health and safety field. Suffice it to say that we are in constant touch with all industrial, clinical, pediatric, toxicological, technical and governmental agencies known to be usefully interested, that all new approaches of any promise are followed up, and that the entailed consumption of time and effort must in all probability continue until our older cities are rid of the slums and the ignorance which are its parents.

STAFF

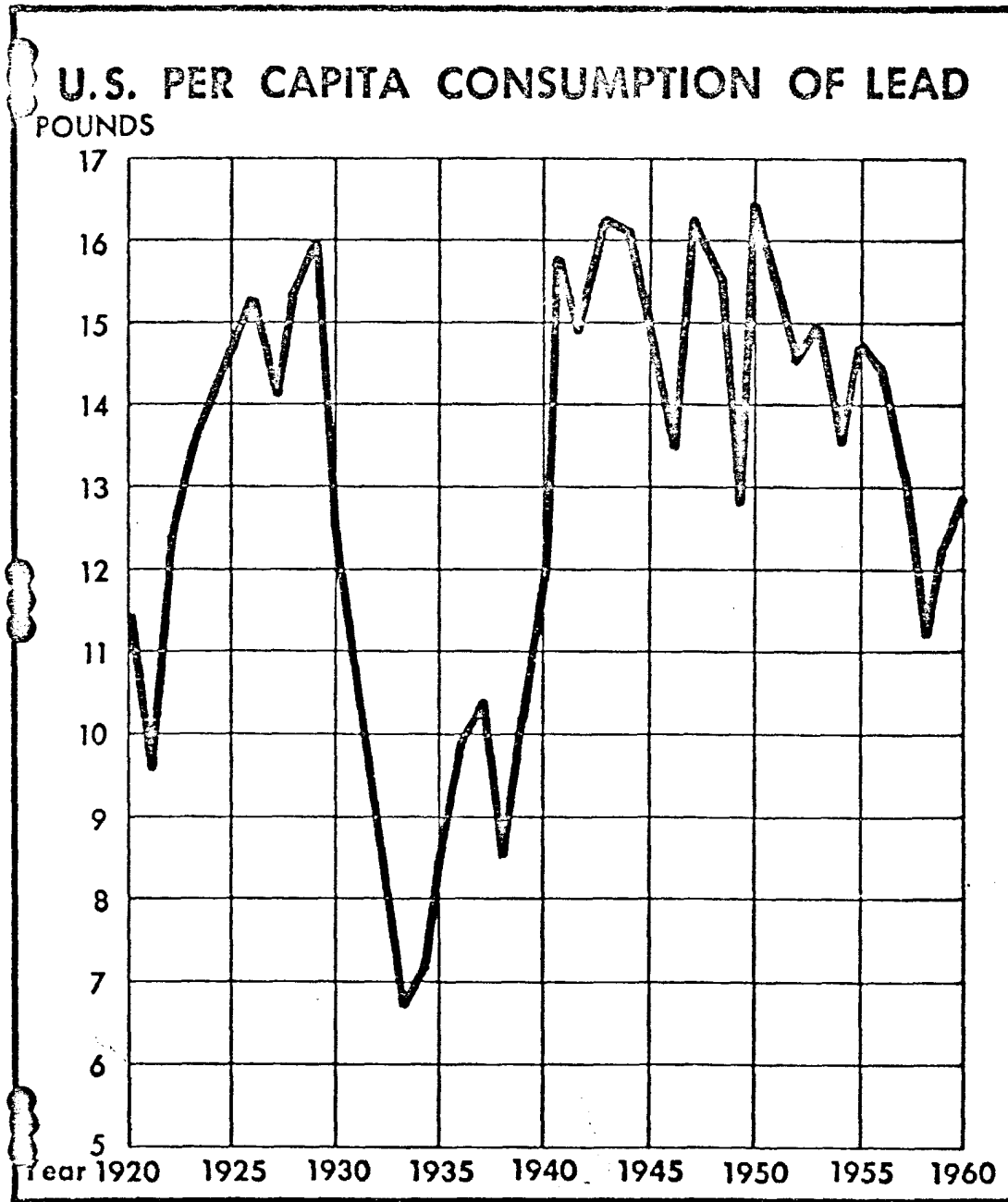
41. Staff Work. The staff was enlarged during 1959 and now totals 17. A chemical engineer with extensive technical writing and editing experience was added, as well as two secretaries. This was necessitated by the enlarged volume of promotional and technical service work. During the year David M. Borcina, assistant to the secretary, became the fourth employee and the second man on the staff with 25 or more years' service with LIA. In addition to work previously outlined, the staff rendered personal service in the field in such areas as semiconductors, anodes, piezoelectrics, porcelain enamels, paints (particularly for highway structures and markers), pearlescent pigments, radiation shielding, chemical construction, plumbing and sheet metal work, sound and vibration attenuation and others.

42. Headquarters. In closing, may I call your attention to the fact that about May 1 we will move to larger and more adequate quarters at 292 Madison Avenue, only about a half block from our present location. We hope you will visit us.

Respectfully submitted,



Secretary



April 1960

MEMBERS OF THE LEAD INDUSTRIES ASSOCIATION

Allied Smelting Corp.	5116 W. Lincoln Ave.	Milwaukee 14, Wis.
Alpha Metals, Inc.	Box 34, Bergen Station	Jersey City 4, N.J.
American Metal Climax, Inc.	1270 Ave. of the Americas	New York 20, N.Y.
American Smelting & Refining Co.	120 Broadway	New York 5, N.Y.
American Zinc, Lead & Smelting Co.	Paul Brown Bldg.	St. Louis 1, Mo.
The Anaconda Co.	25 Broadway	New York 4, N.Y.
The G. A. Avril Co., Lead Products Div.	Langdon Farm Rd. & Seymour Ave.	Cincinnati 12, Ohio
Bers & Co., Inc.	Ashland & Lewis Sts.	Philadelphia 24, Pa.
*Broken Hill Associated Smelters Proprietary Ltd.	Collins House	Melbourne 11, Aust.
*Broken Hill South, Ltd.	Box 194C, GPO	Melbourne, Australia
The Bunker Hill Co.	660 Market St.	San Francisco 4, Cal.
Cambridge Smelting Co.	100 Pacific St.	Cambridge, Mass.
Cerro de Pasco Sales Corp.	300 Park Ave.	New York 22, N.Y.
Circle Wire & Cable Co.	5500 Maspeth Ave.	Maspeth, L.I., N.Y.
*The Consolidated Mining and Smelting Co. of Canada, Ltd.	Box 1030	Montreal 1, Canada
Consolidated Smelting Corp.	Place d'Armes	Detroit 34, Mich.
	4700 E. Nevada	
Day Mines, Inc.	2401 Columbus Ave.	Wallace, Idaho
Delco-Remy Div., General Motors Corp.	Box 590	Anderson, Ind.
Dickson Weatherproof Nail Co.		Evanston 4, Ill.
The Eagle-Picher Co.	American Bldg.	Cincinnati 1, Ohio
The Edlow Lead Co.	P.O. Box 1936	Columbus 16, Ohio
The Electric Storage Battery Co.	Box 8109	Philadelphia 1, Pa.
Ethyl Corp.	100 Park Ave.	New York 17, N.Y.
Evans Lead Div., National Lead Co.	Box 1467	Charleston 25, W.Va.
Federated Metals Div., American Smelting & Refining Co.	120 Broadway	New York 5, N.Y.
Aaron Ferer and Sons Co.	101-19 S. 8th St.	Omaha 8, Neb.
*The Firestone Tire & Rubber Co.	Box F, Firestone Pk.	Akron 17, Ohio
The Flemm Lead Co., Inc.	52-01 - 31st Pl.	Long Island City 1, N.Y.
Gardiner Metal Co.	4820 S. Campbell Ave.	Chicago 32, Ill.
Glaser Lead Co., Inc.	31 Wyckoff Ave.	Brooklyn 27, N.Y.
Goldsmith Bros. Div. of National Lead Co.	111 N. Wabash Ave.	Chicago 2, Ill.
Hammond Lead Products, Inc.	5231 Hohman Ave.	Hammond, Ind.
Hecla Mining Co.		Wallace, Idaho
Imperial Type Metal Co.	3400 Aramingo Ave.	Philadelphia 34, Pa.
International Smelting & Refining Co. (Anaconda Sales Co., Agents)	25 Broadway	New York 4, N.Y.

*Associate Member

-2-

April, 1960

Knapp Mills, Inc.	23-15 Borden Ave.	Long Island City 1, N.Y.
Lead Products Co. Inc.	Box 1341	Houston 1, Texas
Lucky Friday Silver-Lead Mines Co.		Wallace, Idaho
John R. MacGregor Lead Co.	4520 W. 15 St.	Chicago 23, Ill.
Metalead Products Corp.	2901 Park Blvd.	Palo Alto, Cal.
Murdock Lead Co.	Box 5298	Dallas 2, Tex.
National Lead Co.	111 Broadway	New York 6, N.Y.
New Park Mining Co.		Keetley, Utah
Newmont Mining Corp.	300 Park Ave.	New York 22, N.Y.
*North Broken Hill, Ltd.	Box 1903R, GPO	Melbourne, Australia
Olin Mathieson Chemical Corp.		East Alton, Ill.
Pend Oreille Mines & Metals Co.	Old Natl. Ek. Bldg.	Spokane 8, Wash.
Phelps Dodge Copper Products Corp.	300 Park Ave.	New York 22, N. Y.
Price Battery Corp.		Hamburg, Pa.
Revere Copper & Brass Inc., Foil Div.	196 Diamond St.	Brooklyn 22, N.Y.
River Smelting & Refining Co.	Box 5755	Cleveland 1, Ohio
Rochester Lead Works, Inc.	380 Exchange St.	Rochester 8, N.Y.
John A. Roebling's Sons Div.,		
The Colorado Fuel & Iron Corp.	640 S. Broad St.	Trenton 2, N.J.
St. Joseph Lead Co.	250 Park Ave.	New York 17, N.Y.
Shattuck Denn Mining Corp.	120 Broadway	New York 5, N.Y.
*Societe Miniere et Metallurgique		
de Penarroya	12 Place Vendome	Paris 1, France
Sunshine Mining Co.	West 300 Mission Ave.	Spokane 1, Wash.
United States Smelting Refining		
and Mining Co.	62 William St.	New York 5, N.Y.
The Victory White Metal Co.	6100 Roland Ave.	Cleveland 27, Ohio
Eyman Viener & Sons	5300 Hatcher St.	Richmond 5, Va.
Vulcan Lead Products Co.	1545 W. Pierce St.	Milwaukee 4, Wis.
Western Lead Products Co.	P.O. Box 2291	City of Industry, Cal.
White Metal Rolling & Stamping Corp.	80 Moultrie St.	Brooklyn 22, N.Y.
*The Zinc Corp. Ltd.	Box 384D, GPO	Melbourne, Australia

*Associate Member

LIA21070

HASKINS & SELLS

CERTIFIED PUBLIC ACCOUNTANTS

TWO BROADWAY
NEW YORK 4

March 9, 1960

ACCOUNTANTS' OPINION

Lead Industries Association:

We have examined the balance sheet of Lead Industries Association as of December 31, 1959 and the related statement of income, expenses, and reserves and supplemental schedules for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying balance sheet and statement of income, expenses, and reserves and supplemental schedules present fairly the financial position of the Association at December 31, 1959 and the results of its operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Haskins & Sells

LEAD INDUSTRIES ASSOCIATIONBalance Sheet, December 31, 1959ASSETS

CASH:

Pension Fund savings bank deposits.....	\$122,805.09	
Other (including savings bank deposits, \$41,818.60).....	<u>206,991.43</u>	
Total cash.....		\$329,796.52
ACCOUNTS RECEIVABLE.....		860.83
ADVANCES FOR TRAVEL EXPENSES.....		2,175.00
AIR TRAVEL DEPOSIT.....		<u>425.00</u>
TOTAL.....		<u>\$333,257.35</u>

LIABILITIES
AND RESERVES

ACCOUNTS PAYABLE..... \$ 6,016.00

RESERVES:

Employees Retirement and Pension Plan Fund.....	\$122,805.09	
Ordinary Fund.....	51,342.70	
Health and Safety Fund.....	16,775.24	
Industry Development Fund.....	43,429.70	
Expanded Research Program.....	<u>92,888.62</u>	
Total reserves.....		<u>327,241.35</u>
TOTAL.....		<u>\$333,257.35</u>

NOTES:

- (1) The cost of furniture, fixtures and equipment has been written off to expense.
- (2) The employees retirement and pension plan fund reserve is based on an actuarial report and covers both past service and current costs.

LEAD INDUSTRIES ASSOCIATION

STATEMENT OF INCOME, EXPENSES, AND RESERVES FOR THE YEAR ENDED DECEMBER 31, 1959

	TOTAL	ORDINARY FUND	HEALTH AND SAFETY FUND	INDUSTRY DEVELOPMENT FUND	EMPLOYEES RETIREMENT AND PENSION PLAN FUND	EXPANDED RESEARCH PROGRAM (note)
INCOME:						
Membership assessments.....	\$568,193.00	\$91,673.00		\$191,941.00		\$284,579.00
Transfers between funds.....		(33,279.12)	\$24,250.00		\$ 9,029.12	
Interest on savings bank deposits.....	5,320.30	825.41	530.42		3,964.47	
Miscellaneous (including sales of publications).....	1,174.98	317.53		857.45		
Total income.....	574,668.28	59,536.82	24,780.42	192,798.45	12,993.59	284,579.00
EXPENSES:						
Salaries and payroll taxes.....	156,529.84	26,088.26	16,890.31	86,815.78		26,735.49
Rent and light.....	15,177.29	8,570.25		5,000.00		1,607.04
Office supplies and services.....	5,193.77	2,497.45	463.01			2,233.31
Travel.....	35,813.00	5,630.63	2,360.06	20,320.89		7,502.42
Association dues.....	1,147.25	120.00	201.00	707.00		119.25
Entertainment and luncheons.....	2,821.86	846.15	395.23	1,580.48		
Meetings (net of fees \$2,065.00).....	3,955.06	2,484.63	270.42	1,200.01		
Telephone and telegraph.....	3,107.11	1,308.26	241.58	643.40		913.87
Books and subscriptions.....	1,113.61	173.33	365.73	426.92		147.63
Group life insurance.....	1,118.30	1,078.46				39.84
Printing - net.....	404.79	404.79				
Mailing.....	4,322.73	2,114.17		1,613.39		595.17
Test program.....	1,054.79			1,054.79		
Legal, accounting and consultation fees....	2,055.00		175.00	1,230.00		650.00
Pension plan contributions.....	2,350.00					2,350.00
Conventions and exhibits.....	12,529.55			12,529.55		
Furniture and fixtures.....	3,521.47	2,021.10				1,500.37
Proceedings of hygiene conference.....	3,155.77		3,155.77			
Miscellaneous.....	9,755.09	2,670.91	2,489.34	4,443.72		151.12
Cost of publications, net (see Schedule A).....	41,326.59			41,326.59		
Advertising and publicity (see Schedule B).....	53,486.77			53,486.77		
Research projects (see Schedule C).....	129,495.15					129,495.15
Expenses - net.....	489,434.79	56,008.39	27,007.45	232,379.29		174,039.66
EXCESS OF INCOME (EXPENSES) FOR THE YEAR.....	85,253.49	3,528.43	(2,227.03)	(39,560.84)	12,993.59	110,539.34
RESERVES, JANUARY 1, 1959.....	241,987.86	47,814.27	19,002.27	83,010.54	109,811.50	(17,650.72)
RESERVES, DECEMBER 31, 1959.....	\$327,241.35	\$51,342.70	\$16,775.24	\$ 43,429.70	\$122,805.09	\$ 92,863.62

() Denotes red figure.

NOTE: Administrative expenditures in the Expanded Research Program are paid to American Zinc Institute, which handles the accounting for the program.

LEAD INDUSTRIES ASSOCIATION

SUPPLEMENTAL SCHEDULES FOR THE YEAR ENDED DECEMBER 31, 1959

SCHEDULE A

COST OF PUBLICATIONS, NET

"Lead"	\$ 19,159.56
"Lead in the Ceramic Industries" supplement (including \$3,300.00 provided for in 1958)	8,003.42
Red Lead technical letters	1,287.52
Sweet's Catalog	6,318.00
Flyer - American Artisan	528.21
Flyer - Anti-Vibration Folder	780.83
Flyer - Industrial Batteries	2,500.00
Soldering Manual	428.99
Reprints	2,320.06
TOTAL	\$ 41,326.59

SCHEDULE B

ADVERTISING AND PUBLICITY

Advertising space:	
Product design	\$ 7,992.75
Construction	4,841.25
Pigments	11,284.83
Ceramics	10,649.50
Total	34,768.33
Advertising production	9,876.93
Publicity	8,841.51
TOTAL	\$ 53,486.77

SCHEDULE C

RESEARCH PROJECTS

Cable sheathing - John Robertson	\$ 9,426.84
Heat emissivity - New York University	8,200.00
Lead alloys - Armour	19,086.54
Powder metallurgy - Rensselaer	3,120.89
Ceramics	27,100.00
Reinforced lead - Armour	20,000.00
Lead chemicals - A. D. Little	34,289.21
Lead - cemented materials - Battelle	243.04
Vibration attenuation - Lessells & Assoc.	7,219.88
Sound attenuation - Bolt Beranek & Newman	724.54
Miscellaneous research	84.21
TOTAL	\$129,495.15

LEAD INDUSTRIES ASSOCIATION

60 EAST 42ND STREET

NEW YORK 17, N. Y.

STORAGE BATTERIES - YEAR 1960 *

C. Herbert Allen

Vice-President, Vitalic Battery Company and Allied Battery Co., Dallas, Texas
President, Association of American Battery Manufacturers, Incorporated

I hope my estimates of lead consumption by the U. S. battery industry will be of some benefit to you. I assure you I've given the subject much study in an effort to make my report as accurate as possible. I have read copies of several previous reports given to you by past Presidents of the Association of American Battery Manufacturers, and I can appreciate how they felt about the responsibility of forecasting lead requirements for the entire battery industry.

There are several factors which are producing a change in lead requirements by the battery manufacturing industry. These changes, in some cases, cannot be accurately forecast.

First and perhaps of greatest importance at the present time is the fact that some manufacturers of very popular automobiles changed over to a 12 volt system on some of their 1953 models. By 1956 practically all American automobiles being manufactured were equipped with 12 volt systems. Present day twelve volt batteries use more lead than do six volt batteries. It should be remembered, however, that many of the 6 volt batteries now being sold are for older model cars, and the average person who buys a battery for an older model car does not spend as much for quality as does the average buyer of a replacement battery for a newer model car. Now that many of the 12 volt batteries being purchased are for replacement purposes in automobiles that are three or four years old, there has been a drop in the lead content of the average 12 volt replacement battery. Lead for 12 volt Compact car batteries is averaging rather close to the lead used in average 6 volt batteries.

Present indications are that 12 volt batteries will last longer than 6 volt batteries. It is certain that performance and reliability have been improved. These observations are based not only on reports received from dealers, but also on a study made of average battery age at the time replacements are found necessary. There was some thinking at first that 12 volt batteries would not last as long as 6 volt batteries, but I believe experience is now proving otherwise. Corrective measures have been taken to eliminate the early problems that existed. Automobile electrical systems, i.e., voltage regulator, hold-downs, etc., have been designed to assure better maintenance-free service, even under adverse operation conditions.

*Presented at the 32nd Annual Meeting, Lead Industries Association, St. Louis, Mo., April 6-8, 1960

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Second -- Statistics show that all batteries, even six volt types, are now lasting longer than they were five to ten years ago. This increase in battery life can be attributed to better manufacturing methods, and also to the availability of better raw materials than were available ten or even five years ago. The reduction in antimony used in battery grid metal helped improve battery life considerably. Where several years ago the antimony content was 9% up to 13% by weight of the grid metal, the percentage now generally used is $7\frac{1}{2}\%$ or lower. This change greatly improved the charge retaining characteristics of a lead acid storage battery. Corrosion resistance has also been improved by not only the reduction in the amount of antimony used, but by the use of other constituents in the grid metal and also through changes made in casting the grid metal.

The reduction in antimony used in batteries has, I understand, created some problems with smelters where battery scrap is recovered. Many scrapped batteries being put through smelting operations have grid metal composed of 9 to 13% antimony.

With most battery manufacturers buying a lower antimonial lead grid metal, the antimony recovered from the smelting of old batteries piles up because more is being removed from the scrap than is being purchased by battery manufacturers. In a few instances smelters offered lead having a higher antimony content than was specified at prices applicable to the lower specified antimony content. They perhaps felt the higher antimony would be welcomed by battery manufacturers because of better casting qualities, and since it appeared to be taking on the aspects of a "white elephant", some were willing to dispose of the recovered antimony at the price of lead. That, of course, would have defeated the purpose for which the antimony content was reduced.

The reduction made in antimony used in grid metal was not the result of an economy move. Actually batteries made with $4\frac{1}{2}\%$ antimonial lead alloys cost more than do batteries made using say -- 9% antimonial lead alloys. The slower rate of casting lower antimonial lead grids results in a higher labor cost, which more than offsets the slight decrease in the cost per pound of the alloy. There is also a slight increase in the resulting weight of the grids when lower antimonial lead alloys are used. The accumulation of high antimony dross by some smelters will undoubtedly be eliminated in the near future, if the situation has not already levelled off, when the bulk of the batteries being scrapped contain lower antimonial lead grid metal. The lower antimony content affects the value of junk batteries as you well know.

Third; it has been possible to reduce the quantity of lead used in batteries because of newly designed machinery which casts lighter weight grids. Ten years ago the use of lighter weight grids meant that grid corrosion during battery service would result in reduced battery life. Now the more corrosion-resistant grid metal and improved manufacturing processes have resulted in increased battery life. Competition is becoming keener every day and economy measures must, of necessity, be taken in every manner possible.

A fourth factor also will have a bearing on the amount of lead used in the future per average battery. Development work currently in progress has as its objective the obtaining of more complete utilization of the lead oxide active

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Storage Batteries - Year 1960

material used in storage batteries. Present development work is still in the laboratory stage. A reduction of 3 or 4% of lead content may become possible. This is being mentioned here as a factor which should perhaps receive consideration four or five years from now.

A fifth change in average lead content per battery that could occur, but we hope will not, is influenced largely by economic conditions. At the present time approximately 20% of replacement batteries being sold are in the lowest price category. Approximately 70% of replacement battery sales are in the medium price category. The remaining 10% of batteries being sold for replacement purposes are in the "Premium" or highest price category. Percentage of sales in these three arbitrary price ranges has, in the past, and can in the future, change very quickly and appreciably if the National Economy changes. Popular replacement batteries in the lower price ranges at the present time have a lead content averaging from 14 to 16 pounds each. Popular replacement batteries in the medium price range have a lead content averaging from 18 to 20 pounds each. Replacement batteries in the higher price range have a lead content averaging 20 to 24 pounds each. It can readily be seen that a change in the buying habits of the public can greatly influence the amount of lead used by battery manufacturers.

A battery, say with 30% less lead in it, does not result in a 30% lower cost. Other parts, such as containers, covers, labor, acid cartons, etc., cost approximately the same regardless of how much lead is inside. Therefore, making a cheap, low lead content battery does not reduce costs in proportion to the loss in quality. Bear in mind we are talking now about batteries that are cheapened by simply using less materials than is considered good practice, even with the better high quality raw materials now available.

Incidentally, lead processing companies deserve a great deal of credit for the improved battery quality existing today. More uniform, higher quality lead metal and oxide can be depended upon. Research and development work performed in the laboratories of our lead suppliers has been of prime importance to much of the progress made.

In order to arrive at the quantity of lead estimated for the battery industry, I first projected total motor vehicle registration for the year 1960. That was determined by adding to 1959 total registration the average gain per year during the preceeding four years. (Ref. Table I)

Total registration 1959		70,446,000
Total registration 1956		65,183,000
4 year difference	 4)	5,263,000

Average increase / year. 1,315,600

Adding that average yearly increase to the 1959 total registration gives in round figures 71,762,000.

As a result of a poll of a number of manufacturers of automotive equipment, it was estimated that 6,950,000 new vehicles would be manufactured in 1960. That figure was added to the 1959 registration. In order to balance out at 71,762,000

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Storage Batteries - Year 1960

total, it became necessary to assume that 5,634,000 vehicles would be scrapped in 1960.

In order to estimate vehicles with 12 volt batteries, I simply added together the vehicles manufactured with 12 volt systems starting with the year 1953. That was the year when passenger automobiles first started using 12 volt batteries. It was assumed that scrappage of vehicles manufactured since 1953 was insignificant and would not appreciably affect the calculated forecast.

Automobile production in the U. S. for 1960 was estimated on basis of estimated new vehicle registration plus export estimate minus import estimate --

$$(6,950 + 300 - 500 = 6,750,000)$$

It was assumed that vehicles to be exported in 1960 would not change appreciably from the quantity exported each of the previous three years.

I estimated there would be a drop in the number of vehicles imported because U. S. manufacturers are now making "compact" cars which should depress foreign car sales.

By referring to Table I, you will notice that it was assumed a new battery would be required for each vehicle estimated to be manufactured in 1960.

Replacement battery production in 1960 was calculated by using a factor obtained after reviewing vehicle registrations and vehicle mileage relationships with replacement battery shipments during the previous 7 years. (See Table II) The relationship that remained most constant or showed less variation with replacement battery shipments was that relationship to total vehicle registration. The average during the previous 7 years was .40% with the highest and lowest percentages being .42 and .37 respectively. On that basis I estimated there will be 28,701,000 replacement batteries produced in 1960 ($71,762,000 \times .40 = 28,701,000$).

It is recognized that such a relationship is not readily explained but the fact remains there is a closer or narrower band of deviation when replacement battery shipments are compared with total vehicle registration.

Batteries to be exported were estimated by averaging the opinions expressed by a number of large and medium sized battery manufacturers. The result, 221,000, is approximately the same as was exported each of the previous two years.

Approximately 45% of replacement battery shipments for 1960 will be of 12 volt types according to the composite of opinions expressed by the manufacturers polled. Therefore, I have estimated that 45% of 28,701,000 or 12,900,000 twelve volt batteries will be produced for replacement purposes in 1960.

Since all U. S. vehicles now have 12 volt systems, the total estimated 12 volt batteries will be 12,900,000 plus the O. E. batteries for estimated vehicle production of 6,750,000 or 19,650,000 12 volt batteries. The balance of 16,022,000 will be 6 volt batteries for automotive replacement purposes.

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Storage Batteries - Year 1960

Although a number of factors which have an effect on the amount of lead used by the battery industry were pointed out at the beginning of my report, I think that 12 volt batteries now in use will have the most significant effect on battery lead consumption this year.

In order to determine the quantities of lead used in average 6 volt and 12 volt batteries, a survey was made of lead recovered from several thousand scrap batteries of popular sizes from different manufacturers. Great variations were found to exist. If original equipment 12 volt batteries were compared with average 6 volt replacement batteries, the difference in lead content was not the same as when 12 volt replacement batteries were compared with 6 volt replacement batteries. There were also differences encountered between batteries of different manufacturers. When 6 volt and 12 volt batteries having similar adjustment policies were compared, the lead content was different than when making comparisons by weighting them by types in proportion to sales flow.

Other methods of determining lead content were also studied. The results obtained were as follows:

(All based on 1959 measurements)

	Pounds Lead per Battery	
	<u>6 Volt</u>	<u>12 Volt</u>
Assay X popular group 1 & 24 sizes	16.3	18.3
Assay X popular types with comparable adjustment policies, Weighted by sales flow	16.2	19.3
Assay Y popular group 1 & 24 S sizes	16.6	20.7
Assay Y popular types with comparable adjustment policies, Weighted by sales flow	17.0	21.6
Miscellaneous manufacturers tear down, new popular types	17.9	22.1
60% of U. S. production per K. W. Green in "Daily Metal Reporter" of 1/15/60	<u>19.0</u>	<u>21.0</u>
Average of above observations	<u>6)103.0</u> 17.2	<u>6)123.0</u> 20.5

I tested the validity of the above lead weights per battery by applying them to batteries produced during the past 5 years. (See Table III following)

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Storage Batteries - Year 1960

Table III
Testing 6 Volt and 12 Volt Battery Lead Weights

	Estimated 1960	1959	1958	1957	1956	1955
Total Auto Batts.	35,947,000	34,724,000	30,890,000	33,709,000	32,573,000	35,778,000
12V Auto "	19,650,000	15,804,000	12,460,000	13,188,000	7,395,000	4,133,000
6V Auto "	16,297,000	18,920,000	18,430,000	20,521,000	25,178,000	31,645,000
12V @20.5 lbs.x1000	403,000	324,000	255,000	270,000	152,000	82,800
6V @17.2 lbs.x1000	280,000	325,000	317,000	353,000	433,000	544,000
Total lbs. x 1000	683,000	649,000	572,000	623,000	585,000	626,800
Total Cal. Tons	341,500	324,500	286,000	311,500	292,500	313,400

Tons used in Auto.

Batts. (Table I)	342,000	326,000	285,000	323,000	329,000	346,000
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The above tabulation shows that particularly during the years 1958 and 1959 the 12 volt and 6 volt lead weights obtained for resolving estimated lead usage give calculated results very close to actual lead used. When looking at calculated results as compared with actual lead used for years 1957, 1956 and 1955 a greater difference exists. That is possibly caused by the fact that prior to 1958 both six volt, and particularly 12 volt batteries, contained more lead than is currently being used in average batteries.

It is felt that these averages are representative of 6 volt and 12 volt batteries currently being manufactured throughout the United States. Original equipment 12 volt types may contain more lead than these averages indicate but that possibility was considered when selecting samples for lead weight determinations.

Now the previously made calculations and estimates can be resolved in terms of estimated lead that will be consumed by the battery industry during the year 1960. Estimated lead required by the battery industry in 1960 was calculated by using the averages of the weights observed as follows:

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Storage Batteries - Year 1960

Table IV
Estimated Lead for Storage Batteries in 1960
 (See Table I and Table II)

	<u>Batteries</u>	<u>Lbs. each</u>	<u>Tons</u>
12 Volt Batteries 55%	19,771,000	@ 20.5	= 202,500
6 Volt Batteries 45%	16,176,000	@ 17.2	= 139,000
Total automotive and tractor Batteries	35,947,000	@ 19.0	341,500
Lead required for industrial batteries			40,000
Grand Total Lead required for Battery Industry			381,500

A review of metal and oxide used during the past 5 years (Table 1) shows metal has averaged 51.3%, oxide lead 48.7% of total lead. I have, therefore, projected those percentages for 1960 thus:

$$\begin{array}{rcl} 381,500 \times 51.3\% & = & 196,000 \text{ Tons Ant. Lead} \\ 381,500 \times 48.7\% & = & 186,000 \text{ Tons Oxide Lead} \end{array}$$

The above quantity of lead, 381,500 tons forecast for use in battery manufacturing compares with 361,114 tons reported used in preliminary Bureau of Mines report for 1959. You will notice this is an increase of approximately 6% as compared with an estimated battery production increase of approximately 4%. The greater number of 12 volt batteries in use will, I believe, account for a greater lead usage increase than the increase in vehicle registration would indicate this year.

You may be interested in the lead used for U. S. "compact" car batteries. At the present time indications are that such batteries will contain 15 to 16 lbs. of lead each. That is somewhat less than the lead weight in the average 6 volt batteries now being sold. An article in the American Metal Market for March 24, 1960 estimated that compact cars are taking about 22% of industry sales. If that prediction holds for all of 1960, lead usage by the battery industry will be affected noticeably in 1962 and following years.

According to the latest information I have (Automotive News) as of January 1, 1960, there are 1,422,163 foreign cars in operation in the U. S. Batteries for these cars use approximately the same quantity of lead as U. S. compact cars. Therefore, both U. S. and foreign compact cars will have a tendency to lower the lead content per average battery.

Finally a word about my calculated forecast and the composite opinion of a cross section of the country's battery manufacturers and suppliers. I will not take your time reviewing the figures in Table I of my report. I will simply say that my calculated total battery production forecast lies within one percent of the composite opinion given by battery manufacturers and merchandisers.

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Storage Batteries - Year 1960

The composite opinion on lead usage by the battery industry is, however, approximately 6% less than my calculated forecast, i.e., 360,000 tons instead of my estimated 382,000 tons. I received a great many more opinions on battery production for 1960 than on lead usage. I am, therefore, going to let my calculated quantity of 382,000 tons stand as my forecast. Remember that a test of the lead averages determined by actually weighing or assaying was very close to the quantity of lead used by the battery industry as reported by the United States Bureau of Mines. Perhaps actual usage in 1960 will fall between 360,000 and 382,000 tons. If it does, I don't think anyone would find too much cause for criticism.

In closing, I want to express my thanks and appreciation for the helpful suggestions and opinions I received from other members of the Association of American Battery Manufacturers. Their marketing experts and analysts were cooperative beyond expectations.

LEAD INDUSTRIES ASSOCIATION

60 EAST 42ND STREET

NEW YORK 17, N. Y.

FUTURE AUTOMOTIVE POWERPLANTS
AND THE GASOLINE MARKET*

John S. Wintringham
Ethyl Corporation
Research and Development Department
Detroit, Michigan

The last decade brought a substantial number of powerplants before the public eye. Some of these were described as being ready to replace the reciprocating gasoline engine in passenger cars. The group includes:

1. Gas turbine
2. Free-piston engine
3. Battery power
4. Fuel cell
5. Stirling engine
6. NSU (or Curtiss-Wright) engine

As we begin a new decade, it might be well to examine the potentialities of these powerplants in automobiles. If new powerplants are to be used in automobiles, they must compete with the familiar Otto-cycle gasoline engine that has powered cars for so many years.

Conventional gasoline engines are compact, powerful, and economical. Methods have been perfected to make them in large numbers at low cost. Gasoline engines have a high degree of flexibility in operation. When conditions require a change in speed or load, the engine responds instantly when we move the accelerator pedal.

Gasoline engines have another kind of flexibility. Their size can be varied over a wide range to fit best the operating requirements. Their efficiency is substantially independent of their size. As engine size is reduced, the ability of a given vehicle to accelerate and to climb hills drops off, but fuel economy increases.

In order to replace gasoline engines in automobiles, alternate powerplants should be competitive with respect to size, weight, power, flexibility, economy, manufacturing cost, and general convenience.

*Presented at the 32nd Annual Meeting,
Lead Industries Association
St. Louis, Mo., April 6 - 8, 1960

Lead Industries Association

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Future Automotive Powerplants
and the Gasoline MarketGAS TURBINE

Figure 1 shows an automotive gas turbine. Part of the unit produces hot gases under pressure, and these gases drive a turbine geared to the car wheels. The gas-producing section consists of a centrifugal air compressor, a combustion chamber, and a turbine wheel which drives only the compressor. This unit has to be cranked up to about 15,000 rpm by a starting motor before enough hot gases are available to keep the compressor going. Above that speed, feeding more fuel into the combustion chamber provides more hot gases to turn the compressor and power turbines. At full power, a typical unit will have a compressor speed of 50,000 rpm.

A gas turbine's rate of acceleration is sharply limited by the temperature its parts can stand. If fuel is added too fast, that temperature may be exceeded.

Because the maximum allowable temperature also limits the efficiency of a gas turbine, use of special, high-cost alloys appears unavoidable. And to be even reasonably efficient, a gas turbine must have a regenerator to transfer heat from the exhaust gases to the compressed air.

Although turbines are inherently simple, they require a long time to crank, they accelerate slowly, and they are costly if we try to make them efficient.

It is possible to calculate the fuel economy of a turbine-equipped automobile with a high degree of accuracy. To be conservative, we assign efficiencies to the turbine components that are higher than would be likely in mass-produced units.

Figure 2 shows how important an efficient regenerator is to the car's fuel economy. If the regenerator is designed to be only 70% efficient, instead of 90%, fuel economy at 40 miles per hour drops from 20 miles per gallon to 12-1/2.

Figure 3 shows how fuel economy of a gas turbine car varies with size of the turbine. Here, the high regenerator efficiency of 90% has been assumed. At 40 miles per hour, a 100-horsepower unit gives 20 miles per gallon, but a 300-horsepower unit gives only 14.

FREE-PISTON ENGINE

Figure 4 shows a free-piston engine. The unit produces hot gases at moderate pressure, and these gases are used to drive a power turbine geared to the car wheels.

Hot gases formed by diesel combustion of fuel in the power cylinder force the pistons outward, compressing air in the bounce cylinders at each end. The pressure built up in the bounce cylinders is great enough to return the pistons to inner dead center. In the engine shown here, combustion gases exit as the

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right piston uncovers exhaust ports during its outward travel. Next, air enters as the left piston uncovers intake ports. Some of the intake air flows through the cylinder and out the exhaust ports before the pistons bounce back to cover these ports. This air joins the combustion gases to drive the power turbine.

Free-piston engines are heavy, noisy, and relatively expensive. They are hard to start in cold weather.

The fuel economy of an automobile equipped with a free-piston engine can be calculated. However, the computations are much more time-consuming than those for the gas turbine. Here again, we assume high efficiencies for the components, in order to be conservative.

Figure 5 shows the fuel economy of a car equipped with three sizes of engine. If the free-piston engine is designed to produce 100 horsepower, the fuel economy at 40 miles per hour is 23 miles per gallon. With a 300-horsepower unit, however, fuel economy at 40 mph is only 12 miles per gallon.

It is very interesting to compare the fuel economy of the gas turbine or the free-piston engine with that of the gasoline engine. Such a comparison is made in Figure 6. All three units have the same power output, 200 horsepower. The relative fuel economies would be the same at any other power level.

The gasoline engine is substantially more economical in the normal operating range. The advantage is so large that the gasoline engine can use a fuel which costs more, and still deliver more miles per fuel dollar.

BATTERY POWER

Considerable performance data have been released on one typical contemporary battery-powered car. Its range before recharging is about 80 miles on level ground, and about 50 miles over hilly ground. The car costs \$2,800, and has 6.4 horsepower. In contrast to this low power is the 36 horsepower of the German Volkswagen. The limited driving range and the time required for recharging make battery-powered cars undesirable as a family's main car. These factors and the high cost also would seem to limit their appeal as a second car.

FUEL CELLS

Figure 7 shows a typical fuel cell. A chemical fuel and an oxidizer react in the cell, without burning, to form electricity. This is the reverse of electrolysis. Conversion of energy into power can be as high as 65%, as compared with 40% or so in internal-combustion engines.

In the cell shown here, hydrogen is introduced through one porous electrode, and oxygen through the other. Their reaction, which forms water, produces current that is used to power electric motors.

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Hydrogen-oxygen cells can operate at normal atmospheric temperatures. Cells using hydrocarbon fuels and air normally operate at about 900°F. This operating temperature can be reduced by using catalysts.

Allis-Chalmers recently introduced a fuel-cell farm tractor. The 20-horsepower fuel cell weighed 1,900 pounds. On this basis, a 200 horsepower fuel cell would weigh 19,000 pounds.

Much more favorable volume and weight data have come from other sources. Table 1 shows the most favorable published volume data, and Table 2 the most favorable weight data.

Table 1

Volume Comparison

<u>Powerplant</u>	<u>Cubic Feet/Horsepower</u>
Fuel Cells:	
Cell	1.0
Electric Motor	<u>0.1</u>
Total	1.1
Gasoline Engine + Transmission	0.25

Even in this most favorable comparison, the fuel cell occupies about four times as much room as does the gasoline powerplant.

Table 2

Weight Comparison

<u>Powerplant</u>	<u>Pounds/Horsepower</u>
Fuel Cells:	
Cell	8.3
Electric Motor	<u>5.0</u>
Total	13.3
Gasoline Engine + Transmission	3.0

Again, in the most favorable comparison, the fuel cell weighs about four times as much as the gasoline powerplant.

These comparisons do not include the substantial bulk of the containers for fuel and oxidizer.

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Future Automotive Powerplants
and the Gasoline MarketSTIRLING ENGINE

Figure 8 shows one arrangement of a Stirling "hot-air" engine. This external combustion engine was invented in 1816 by a Scottish minister. Rather inefficient versions were used during the last century to pump water.

Heat applied to the head of the Stirling engine's cylinder causes air or gas inside to expand at constant temperature, pushing down the power piston on the left. The air then moves through the regenerator as the displacement piston on the right moves down. Heat is stored in the regenerator, and the air contracts. The air volume is further reduced by cooling at constant temperature, as the right hand cylinder is water cooled. To complete the cycle, the air picks up heat in the regenerator.

Within the past two decades, Philips in Holland and General Motors have redesigned the engine to produce high efficiency. However, the engine is expensive. Moreover, it is very difficult to change the power output rapidly. For equal power outputs, the Stirling engine requires two or three times as much radiator surface as does a gasoline engine.

For these reasons, the Stirling engine is not attractive as an automotive powerplant. It will probably find use in central power stations.

NSU (Curtiss-Wright) ENGINE

Curtiss-Wright recently acquired U.S. rights to this gasoline engine. As shown in Figure 9, there are only two moving parts — a triangular rotor and the crankshaft. As the rotor turns inside the housing, a fuel-air charge is drawn in through a fixed port, compressed, and then ignited when it passes the spark plug. The expanding combustion gases push the rotor around until they exit through the exhaust port.

Some part of this sequence is going on at all times in each of the three chambers formed by the rotor's sides and the housing. Thus the engine's operation is virtually continuous intake, compression, expansion, and exhaust. Operating speeds are high; small units are reported to have turned 17,000 rpm.

The NSU engine poses very difficult sealing and lubrication problems. Some qualified American engineers believe these problems are insurmountable when high power output is desired.

DIESEL ENGINE

Although diesel engines have been used for trucks and other heavy-duty service for many years, there has recently been an upsurge of interest in the use of diesels for passenger cars.

For a given power output, diesel engines are larger, heavier, and more expensive than gasoline engines. They have to be about one-third larger, because they need more air to burn a given amount of fuel. Their greater weight

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Future Automotive Powerplants
and the Gasoline Market

stems both from their larger size and the heavier construction needed to withstand the higher operating pressures. Diesels are also less responsive than gasoline engines.

In the case of the diesel-powered taxicabs now being tested in various parts of the country, the extra cost of the engine requires about 75,000 miles of use to amortize. Disadvantages that must be accepted include poor acceleration, noise, and hard starting in cold weather.

THE FUTURE

Weighing the advantages and disadvantages of these various powerplants, it does not appear that any alternate powerplant is likely to replace the conventional gasoline engine in passenger cars. What then is going to take place? It appears that the public is becoming interested in better fuel economy in terms of more miles per dollar.

This trend will develop as more and more imported and compact cars join our passenger car population. It also may affect the size of engines in the full-size cars, and the weight and dimensions of these cars.

Table 3 is an estimate of the U. S. car population in the next five years. At the end of 1959, cars in use totaled 56-1/2 million. Of these, imported cars numbered 1.4 million, and U. S. compacts 1.0 million. Thus, at the end of 1959, our car population contained 4.2% of small cars.

At the end of 1964, it is estimated that cars in use will total 71.4 million, of which 3.9 million will be imports, and 7.8 million compacts. Small cars then will claim 16.4% of the car population.

Table 3
Passenger Car Population⁽¹⁾
(millions)

Year	Imports		Compacts		Full-Size		Total
	No.	%	No.	%	No.	%	
1959	1.4	2.4	1.0	1.8	54.1	95.8	56.5
1960	1.9	3.1	2.4	4.1	55.3	92.8	59.6
1961	2.4	3.8	3.5	5.7	56.2	90.5	62.1
1962	2.9	4.4	4.9	7.6	57.3	88.0	65.1
1963	3.4	4.9	6.5	9.5	58.6	84.6	68.5
1964	3.9	5.5	7.8	10.9	59.7	83.6	71.4

(1) This estimate is designed to be in substantial agreement with predictions of the U. S. Bureau of Public Roads.

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Future Automotive Powerplants
and the Gasoline Market

Despite the growing percentage of small cars, there will be more full-size cars in 1964 than there were in 1959. The increase in number of full-size cars is about 10%. Added to this are 11.7 million small cars predicted in 1964.

This growing car population will demand more and more gasoline. An estimate of the future trend in total motor gasoline demand is shown in Table 4. The figures include gasoline consumed in trucks, tractors, boats, and other uses. About 65% of motor gasoline is used in cars.

Table 4

Motor Gasoline Demand

<u>Year</u>	<u>Billions of Gallons</u>
1959	57.0
1964	67.1
UP	17.7%

Based on this estimate, motor gasoline demand will increase nearly 18% in the next five years, from 57 billion gallons in 1959 to 67 billion in 1964.

We expect that use of tetraethyllead in motor gasoline will increase. The average concentration of TEL in motor gasoline in 1964 will be greater than was the case in 1959. This is so because tetraethyllead is usually cheaper than refinery processing for raising gasoline octane numbers. Thus the output of tetraethyllead will increase at a rate faster than the gain in gasoline use.

We will be buying more and more lead.

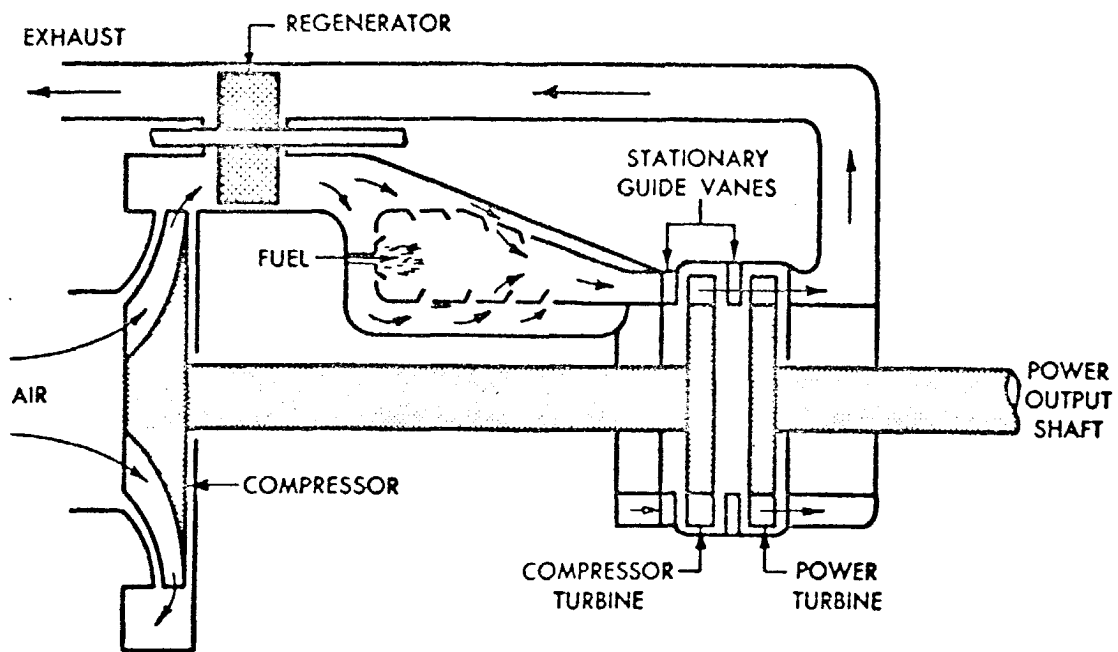


Figure 1 Automotive Gas Turbine with Regenerator

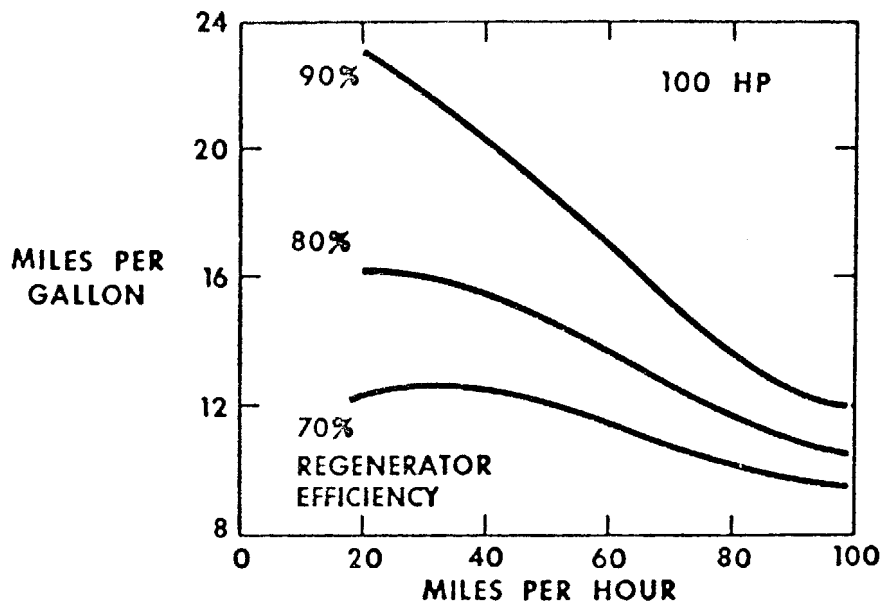


Figure 2 Effect of Regenerator Efficiency on the Fuel Economy of a 100-Horsepower Gas Turbine

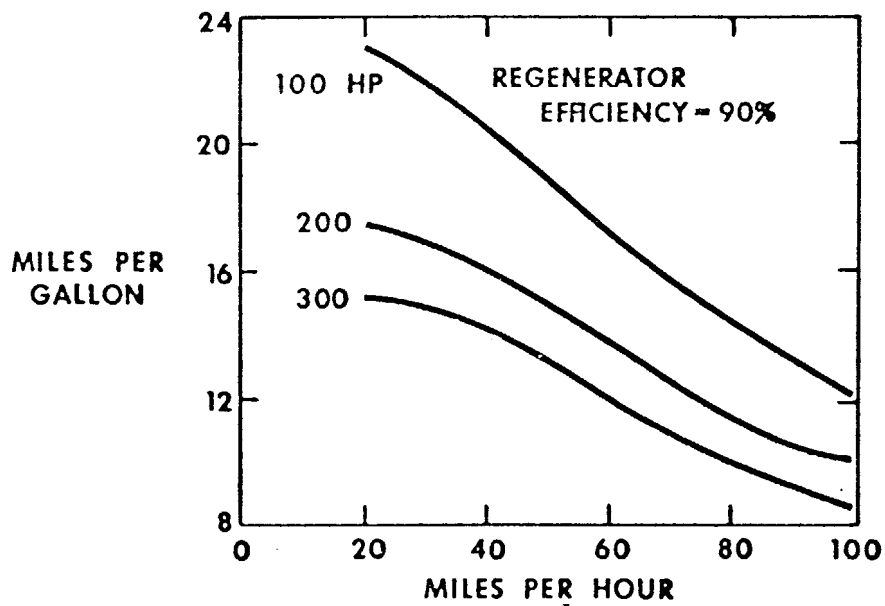


Figure 3 Effect of Size on Gas-Turbine Fuel Economy

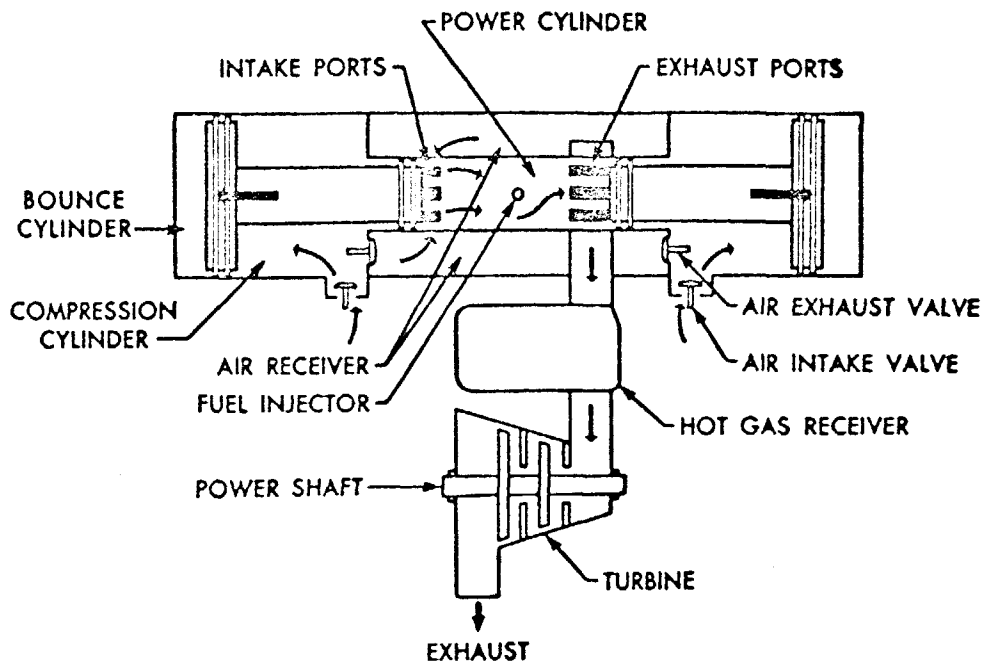


Figure 4 Free-Piston Engine

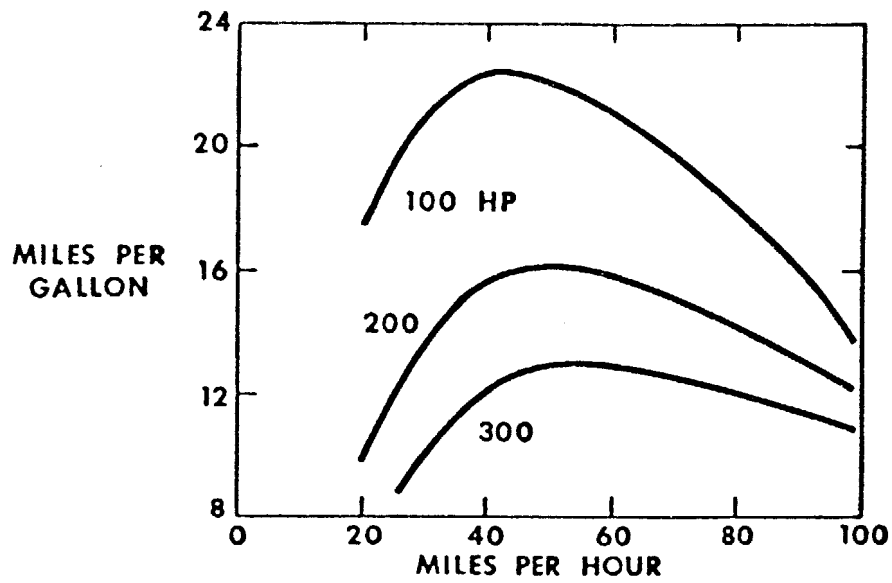


Figure 5 Effect of Size on the Fuel Economy of a Free-Piston Engine

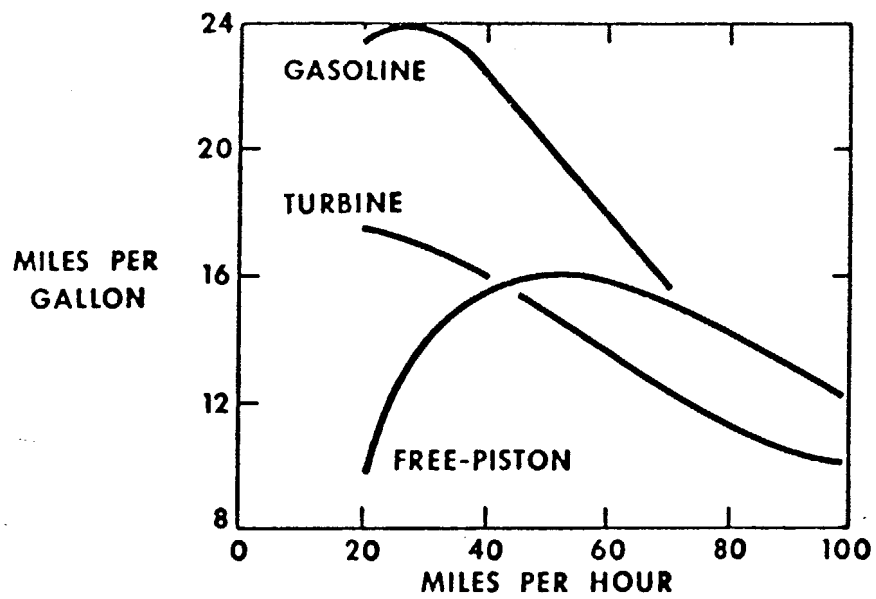


Figure 6 Fuel-Economy Comparison of 200-Horsepower Gas Turbine, Free-Piston, and Gasoline Engines

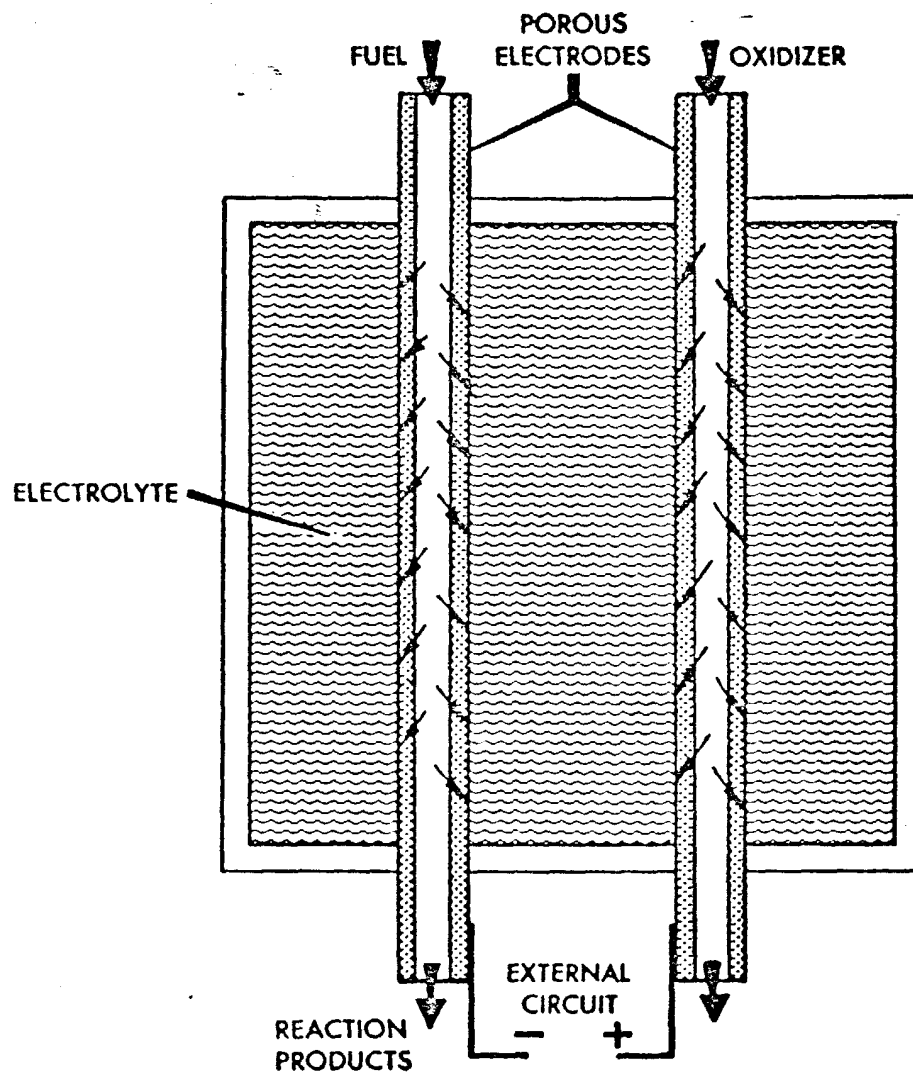


Figure 7 Schematic of Typical Fuel Cell

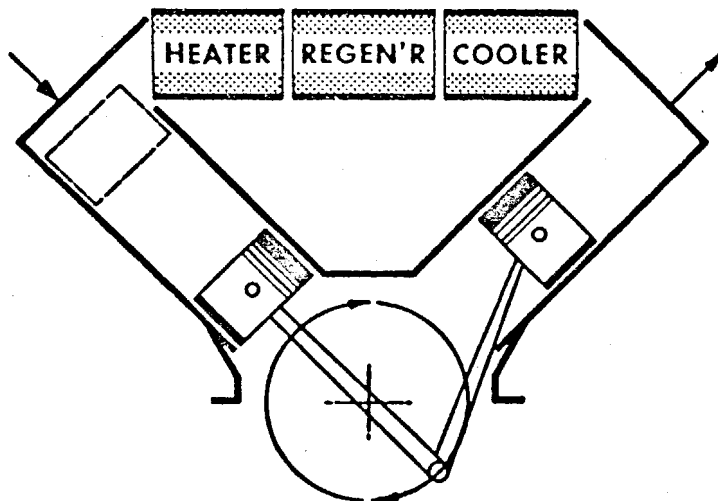


Figure 8 Schematic of Stirling Engine

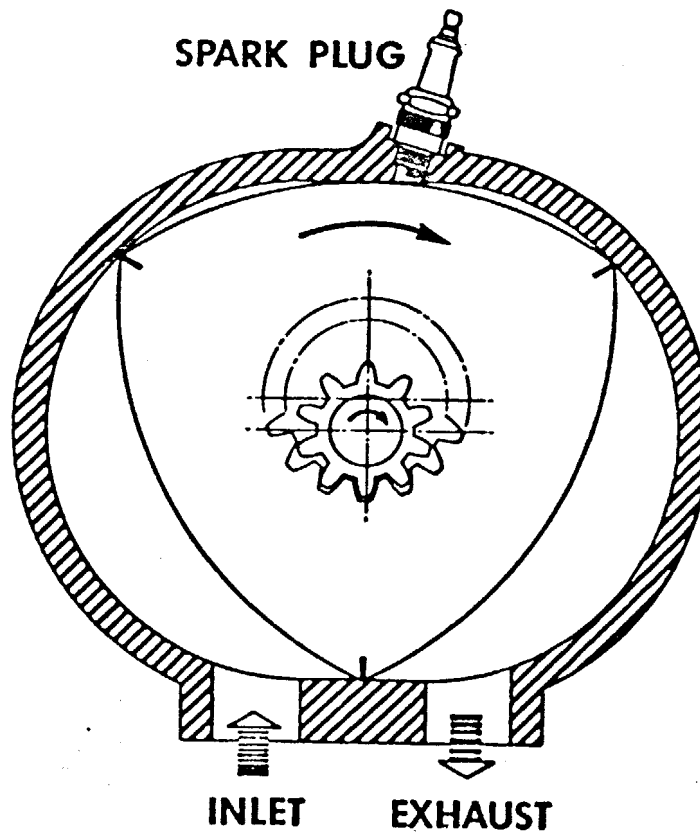


Figure 9 NSU (Curtiss-Wright) Engine

LEAD INDUSTRIES ASSOCIATION

60 EAST 42ND STREET

NEW YORK 17, N. Y.

THE OUTLOOK FOR LEAD IN THE CABLE INDUSTRY*

Ary Mossiman

Manager of Market Research
Anaconda Wire and Cable Company

In preparing this talk on the outlook for lead as a cable sheathing material, I quite naturally first examined what earlier speakers had said about the subject.

Those of you who recall the earlier discussions of this subject will undoubtedly agree the outlook has been far from rosy.

In 1951, for example, a cable manufacturer cautioned "the only reason for using lead is to obtain a moisture impervious sheath. If any other material were available which was impervious to moisture and could be applied to cables, the use of lead would be drastically reduced."

He also cautioned that "not so long ago lead was the only material considered suitable for a cable sheath. This condition no longer exists and, unless the producers show greater interest in technical development of lead sheaths, the use of lead for cable sheaths is due for a steady decline, irrespective of price or supply."

In 1951 the wire and cable industry applied 137,000 tons of lead as sheathing.

In 1953 another cable manufacturer prophesied that aluminum would completely displace lead as a cable sheathing material.

In two years he suggested lead will gradually lose out completely to aluminum in telephone cable. And a substantial percentage of European power cable will be sheathed with aluminum. In America the change, he predicted, would come more slowly.

In 1953 cable sheathing consumed 152,000 tons of lead.

In 1955 a leader and prime authority in the field of cable research development and manufacture noted that the development of rubber jackets during the previous twenty years had been responsible for a decrease in the use of lead for low voltage power cable sheaths.

And during these same twenty years, the development of pipe type cable systems had resulted in reductions of lead for extra high voltage cables.

*Presented at the 32nd Annual Meeting, Lead Industries Association, St. Louis, Mo., April 6-8, 1960

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The Outlook for Lead
in the Cable Industry

He further indicated that, in applications in which lead was still necessary, cable manufacturers were covering lead with neoprene and other materials. In doing this, he pointed out it was customary to reduce the lead sheath thickness at least 15 per cent. Sometimes the reduction amounted to as much as 33 per cent.

Lead was clearly in a squeeze between high and low voltages. And where its use was mandatory, substantial reductions were being effected.

Lead for cable sheathing stood at 121,000 tons in 1955.

In 1958 it was noted that Western Electric had completed development of a substitute for lead--a plastic and metal cable sheath--called Stalpath.

The telephone industry had grown up on lead sheathed cable. But, since the 30's, because of a growing concern over lead supply and price, Western Electric had been developing substitutes for lead.

Put into production in 1950, by 1958 leadless sheaths made up over 90 per cent of the entire Western Electric cable production.

Enormous savings have been reported by Western Electric in their switch from lead.

In 1958 lead use in cable sheathing fell to 75,000 tons, and 1959 saw a further drop to 65,000 tons.

The oft-repeated prophecy that lead would give way to other materials has apparently come true. It would not be difficult to predict with some assurance a further decline in lead consumption.

Before predicting the end of lead, let's first reexamine lead's position as a cable sheathing material and see if we can find something in lead cables that might be developed and promoted to stem the tide and halt or possibly reverse the decline.

Who now uses lead sheathed cable--and why do they continue to use it?

First, there is a hard core of lead cable users who pay more for lead because they want to use it and find its advantages well worth the price. One of these advantages being considerably longer life. As a supplier of telephone cable to independent telephone companies, we see a continued demand for paper lead telephone cable. The trend here, I must admit, is to follow the Bell System in its use of Alpeth and Stalpath. However, there are many important independents who still insist on using lead and show little inclination to change.

This insistence on lead is also found among some utility and industrial users of lower voltage rubber insulated cables.

The principal use of lead as a cable sheathing material today is in the manufacture of paper insulated power cable.

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This market, surprisingly enough, is restricted mainly to a handful of electric utilities serving large cities--New York, Los Angeles, Philadelphia, Syracuse, St. Louis, Cleveland, and a very few others, where better than 75 per cent of all the paper lead manufactured is installed.

A decision by any one of this limited number of companies to switch to aluminum or some other material could, of course, bring the significant use of lead as a cable sheathing material to a screeching halt.

But for the moment the processing of aluminum has not proceeded much beyond the preliminary development stage as a cable sheathing material in this country.

Companies who continue to use lead sheaths must obviously prefer lead for a good reason.

It's a fact--any cable insulation which cannot tolerate moisture must have a metallic sheath. Today, lead is the easiest of all metals to apply and use as a completely moistureproof barrier.

And equally important to the continued use of lead is the fact that paper power cable is today an often cheaper, more economical and trustworthy cable with a service history which cannot be rivaled by any other material.

And as the increasing size of electric loads demands distribution at higher and higher voltages, paper lead cables offer an excellent, reliable and economic answer.

Because of its economic advantage and service history, paper lead power cable warrants consideration by any user of higher voltage cable; and, in our opinion, paper lead power cable warrants consideration by the lead industry as an area in which lead might be expanded.

If paper lead cable is as worthy of consideration as we believe it is, why then do only a handful of electric utilities use it? Why don't more industrial plants use paper lead cable if it provides an economical answer to the cable users' number one problem--reliable service of large loads?

Quite frankly, industrial users of power cable rarely give lead a second thought for cable sheathing even when they have been troubled by failure due to moisture. Nor do they consider paper lead cable when they are searching for an economical solution to the problem of serving large electrical loads.

Many engineers specifying cables have never been acquainted with the fact that lead is used as a superior cable sheathing or that paper lead cable is economical and trustworthy.

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Where lead is known, engineers generally believe the splicing and terminating of lead cables is an involved procedure. And many industrial people have the idea that varnished cambric and rubber can be installed with less care than paper lead power cable. This is not so.

Another objection to the use of paper lead cable is the supposed lack of experienced cable splicers with lead wiping skill.

In our opinion, paper lead cable properly installed would more often than not prove a better and more economic solution in industrial applications.

Its use in industry has been restricted by fear and lack of understanding.

The successful promotion of other products such as neoprene, butyl and polyethylene has left most wire and cable salesmen unwilling or unable to sell paper lead cable to non-users. Most salesmen would be unwilling to un-sell a plastic or rubber insulation and re-sell paper lead if he has available the cable the customer is already asking for.

Thus, we find lead facing a continued decline when at the same time paper lead power cable provides an economical solution to a pressing problem.

Here is a situation in which lead use could, in our opinion, be increased.

Obtaining such an increase would require four things:

First, a better understanding of wire and cable manufacture, sale and application. Just where does lead fit into this picture?

Secondly, increased use would demand intelligent promotion of lead in applications where it can be demonstrated that paper lead cable can provide economical and outstanding service.

Thirdly, wire and cable users must be taught the ease of handling lead. This would involve working with industrial plants, utilities, contractors, and unions to provide a pool of adequately trained cable splicers skilled in lead wiping.

Last, but not least, continued work with cable manufacturers in improving lead sheaths and simplifying their application will be needed. This could also lead to the increased demand for lead in higher voltage cable.

All four steps would be necessary to reverse the trend and re-establish lead's position.

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Starting the program I have just outlined might be easier than you think. For example, you could start by insisting on the use of lead cables in your own plants--and, more important, insist that the individuals responsible for cable application carefully evaluate each and every installation in terms of the overall program. Find out how much lead really costs in terms of installation and length of service.

Secondly, study those industrial plants which are now using paper lead cable successfully.

These two steps will undoubtedly help in a solution to the important problem of cable splicer training.

Thirdly, I suggest that you carefully study the selling and promotional techniques of those people now selling materials which compete with lead--aluminum, neoprene, polyethylene.

Last, but not least, evaluate the potential increase in the use of lead which might result from its promotion.

Only a nominal expenditure would be required to bring any reasonable effort at understanding what might be done to promote the sale of lead to this point.

From there on, concerted salesmanship, effective promotion, training, development of trade relations, and metallurgical research could be brought to bear to restore lead as a cable sheathing material in the minds of cable purchasers.

To again quote one of your earlier speakers, "it appears that if in the past the lead industry has shown a complacent attitude, this must now be replaced with some intelligent planning and vigorous action if you have any interest in maintaining and improving present markets."

FOR RELEASE NOT EARLIER THAN
12 NOON, THURSDAY, APRIL 7, 1960

THE INTERNATIONAL LEAD AND ZINC STUDY GROUP

By C. W. Nichols
Special Assistant
Office of the Assistant Secretary
for Economic Affairs
U. S. Department of State

The Lead and Zinc Study Group is very young. Some of its activities have hardly begun. Yet this new organization already has influence in the lead and zinc industries throughout the world. The Group is not only recognized; it is even given credit for some substantial changes which have come about during the past year in the tenor and outlook of international trade in lead and zinc. Because of the relationships between domestic and international markets, the Study Group can be important, not only to importers and exporters but to all producers, consumers, and merchants of these materials.

Strictly speaking, the curtailments of international supplies which were in effect during 1959 should not be attributed to the Study Group. Those curtailments, and the Study Group itself, were the separate, joint products of the preceding exploratory conferences and an interim committee. The Study Group, however, has become the continuing machinery. It is naturally now thought of as an extension of the international discussions which began before it was organized.

The Study Group is an autonomous intergovernmental body. The members are national governments. Membership is open to any government which is a member of the United Nations, or of its specialized agencies, or is a Contracting Party to the General Agreement on Tariffs and Trade if the government considers itself substantially interested in the production, consumption or trade of lead or zinc.

(Presented at Joint Session of
American Zinc Institute and Lead Industries Assn.,
St. Louis, Missouri, April 7, 1960)

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Twenty-five governments have accepted membership. All continents are represented. The member countries account for more than 90 per cent of estimated world production, consumption, and trade of lead and zinc, ore and metal.

The members participate in sessions of the Study Group through national delegations which include officials of government and representatives of industry. Industry representatives have already contributed a great deal to the work. It is hoped and believed that their participation can be further increased.

The Study Group has its own rules of procedure. Its terms of reference permit considerable flexibility in operations. There is no fixed schedule of meetings. These are held at times and places decided by the members according to circumstances. The normal procedure is for the discussions in the Study Group to be held in private, and for the decisions of the Group to be taken according to the sense of the meeting, without voting.

The Group is authorized to make studies; arrange for statistics; consider possible solutions to special difficulties; and submit to member government reports, which may include suggestions or recommendations.

The Group has no regulatory authority. Membership involves no obligation upon a government as regards the production, consumption, or trade of its country. The Group is to remain in existence as long as the participating governments think it useful. A member government is free to withdraw at any time.

For the present, a small office and staff in New York are being provided by the United Nations on a reimbursable basis. The budget for 1960 is very modest. Part of the expenses are being shared equally by the member governments; the remainder being allocated among members in proportion to their volume of international trade, taking account of exports and imports.

The size and functions of the headquarters staff are presently at a minimum. These could be expanded if the members desired in time to establish statistical or publications programs as other study groups have done. The present disposition of the Lead and Zinc Group is to rely upon existing sources of statistics as far as possible, but to exert an influence toward improvement and extension of existing statistical work.

The close association of administrative operations with the United Nations at this time was considered necessary to enable the Study Group to begin to function more easily and speedily. This opportunity to obtain staff services from the UN makes a variety of professional skills in the larger organization available as required. The assistance of the UN is also reducing the expense of operation. These initial organizational arrangements are provisional; they will be reviewed and may be revised if the members so decide.

As long as the operations of the Study Group are related so closely to the United Nations, the meetings of the Group will probably be at New York or Geneva, since these are the locations where the UN maintains conference facilities. The Study Group could meet elsewhere, especially if a member government should extend an invitation to host a particular session. This has been a common practice of other commodity study groups. The next full session of the Lead and Zinc Study Group is expected to be in early September of this year, probably in Geneva, but a definite decision has not yet been taken concerning either the date or the place.

The Study Group has established a Standing Committee to deal with matters requiring attention between full sessions. The Standing Committee manages the budget; directs the secretariat; keeps the lead and zinc situation under review; and makes plans for future meetings of the full Group. The Standing Committee includes all members of the Group who wish to participate in its work. This Committee elects its own officers. The officers of the

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Standing Committee are expected normally to be the same individuals, or in part the same individuals, who are at the time holding offices of the Study Group to which they have been elected at full meetings. The Study Group currently elects its own officers for a term of one year, which may be extended until successors have taken office.

The Group has appointed a small panel of persons who are specially qualified in the field of statistics to consider the data now available concerning lead and zinc on a world basis, and the improvements which might be made in this data. This panel will report to the Standing Committee before the next Study Group meeting.

The Study Group is primarily a forum through which the members can seek and obtain more information and a better understanding of the outlook and the attitudes of others. It provides opportunities to correct misunderstandings and misconceptions, and should help in avoiding them. The full meetings of the Group are its principal activity and its chief opportunity to accomplish its purpose. The staff, the Standing Committee, and the other activities have a supporting relationship. While the full meetings are the high spots of the program, there is a great deal of preparatory work in advance of each of these meetings, and each meeting can generate follow-up activity extending through all or much of the interval until another session.

Each delegation to a Study Group meeting represents its government in an official capacity. The delegation must act as a unit in expressing official views.

Necessary guidance for the U. S. delegation is developed by our Government in advance of each Study Group meeting, after appropriate consultations among the responsible officials and with the industries concerned. Considerable effort has been made, both by government and industry, to insure that our delegation is adequately organized and equipped to represent this country effectively.

The U. S. delegations have included officials from several departments principally concerned, and industry members, who were appointed officially following their nomination by representative segments of industry. The industry members of the delegation serve without expense to the Government. The delegation needs to be representative of the interests concerned and needs to include a variety of specialized qualifications, but it also needs to be reasonably compact in size. This is sometimes a problem to hold the membership of the delegation within effective working limits. The delegation is appointed for a particular meeting and completes its work when its report on that meeting is submitted.

The newly organized Study Group comes on a stage which already had a giant backdrop of world concern with the problems and interests involved in international trade of primary commodities.

Nationalism is a strong force in the commodity field, but there is also an increasing recognition, especially since the second world war, of the interdependence among nations in a world situation.

As governments have taken greater responsibilities for economic affairs, the commodity policies of individual governments have created for these governments a set of new and more active relationships with private companies and other governments.

The waste and distress that can be caused by extreme economic cycles and excessive fluctuations in the prices of major commodities have become an ever more pressing concern as stronger emphasis is placed on the maintenance of high levels of productive employment and a steady economic development at home and abroad. Great efforts are made to encourage a flow of private and public capital into less industrialized countries, but this international investment and its broad objectives can be seriously undermined in many of those countries if their earnings on the commodities they export do not show long-term growth with reasonable stability along the way.

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Direct and detailed controls for purposes of stabilization have been undertaken in some commodities. The record of peacetime regulation has not been too impressive, either on a national or an international scale. But the world is in no mood to embrace fatalism. People are not inclined, either in the United States or in other countries, to regard the hardships of extreme price fluctuations as an affliction which is unavoidable.

Severe instability in external markets can increase greatly the problems which national governments face in pursuing liberal policies toward international trade.

These problems of primary commodities have engaged and continue to engage the serious attention of many international bodies. No panaceas have been discovered, but most governments place a high priority on a continuing search for ways to moderate instability and reduce the causes of international friction. The General Assembly of the United Nations has repeatedly discussed the objectives toward which international cooperation should be directed in the field of commodity problems. So have the Economic and Social Council, the Food and Agriculture Organization, and the Organization of American States. The Commission on International Commodity Trade was established for this purpose. Commodity problems have been emphasized in the sessions of the Contracting Parties to the General Agreement on Tariffs and Trade. None of these general organizations, however, has been able to devote continuing attention in depth to any particular commodity situation.

Specialized study groups for some commodities have existed for many years. One of the best-known is the International Cotton Advisory Committee which had its origins before the second world war and has functioned on a broadly representative and active basis since 1945. This committee has made itself the hub of extensive and authoritative information on cotton and has produced many competent studies concerning the world cotton situation. The

question of an international cotton agreement has received serious attention in this committee on more than one occasion, but proposals for intergovernmental regulation did not advance beyond the stage of discussion.

The International Wool Study Group, although in existence since 1947, has not been as active as the Cotton Advisory Committee.

The International Rubber Study Group, established in 1945, has been useful to its members in making their way together through a succession of striking developments, including reconstruction from wartime disruption; growth of a large synthetic industry; emerging political independence of areas which are the leading exporters of natural rubber; large-scale stockpiling; and, more recently, some liquidation from the stockpiles of natural rubber. The Rubber Study Group has assisted international trade in such matters as standardization of grades and improvements in type sampling. Its most valuable contribution, perhaps, has been the development and dissemination of authoritative statistics or estimates on the production, consumption, trade, and stocks of all types of rubber on a world-wide basis and authoritative forecasts of production and consumption, year by year. Like the Cotton Advisory Committee, the Rubber Study Group has at times given serious consideration to the possibility of an international agreement which would control the trade in rubber, but on each occasion the members decided that no general advantage could be expected from proceeding with such a project.

Coffee, cocoa, rice, and other commodities have also had study groups, and the activities of each have been tailored to the problems of the particular commodity and the desire of the member governments to use this method of consultation.

A few commodities, notably wheat, sugar, and tin, are subject to specific intergovernmental agreements. Each of these agreements is administered by an international council which, of course, is not concerned di-

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rectly with any other commodity. The functions of those councils are quite different from those of the commodity study groups.

Some commodities have received much more intergovernmental attention than others. The amount of international trade is not in itself the controlling factor. Each of the leading world commodities has some special characteristics which affect the interests of governments and the methods they think desirable for pursuing those interests. Some commodity study groups have been formed in response to an immediate, more or less fortuitous, situation. Study groups have only endured, however, and proven to have continuing usefulness, in those commodities where a considerable number of importing and exporting countries found continuing reason to keep developments under joint review.

A happy situation in a world commodity presumably would be one in which there were not enough uncertainties or problems for governments to attach much importance to a study group. Where the commodity is sufficiently important, however, and the need for a study group is felt sufficiently widely, these practical considerations are usually controlling rather than any theory about the desirability of study groups in principle.

Lead and zinc constitute in some respects a more complicated problem than other international commodities. Lead and zinc may be more in need of a study group because of the special circumstances under which these two materials are produced, marketed, and consumed. Other commodities are not affected to the same extent by characteristics such as large-scale recovery of secondary material; predominance of joint production at the mine; and a substantial volume of international trade in concentrates as well as in metal.

In 1957 and 1958, when the problems of instability in some nonferrous metals were giving increasing concern to a number of governments, there was no specialized international machinery available for multilateral consul-

tation. Inquiries were made through United Nations channels, and the replies indicated that many governments would be interested in an exploratory meeting to consider the position and prospects of copper, lead, and zinc. The Secretary General of the United Nations then issued invitations for this purpose and the meeting was held at London in September 1958.

The discussions in that meeting led the participants to the conclusion that there was no need for special action as to copper. Several problems were exposed in lead and zinc, however, both of a long-term and a short-term nature, which appeared to require further careful consideration by governments. As a possible means of dealing with the short-term problems, the London meeting suggested that governments should consider a reduction of exports or production for one year, with machinery for a prompt review if conditions changed. Governments were also asked to consider the establishment of a lead and zinc study group which could provide a framework for continuing cooperation with respect to long-term problems. In addition, the exploratory meeting arranged for a review of the available statistics to determine whether these provided satisfactory data for intergovernmental discussions of lead and zinc.

After allowing some time for separate study by governments, a second meeting was called, concerned entirely with lead and zinc, and this took place at Geneva in November 1958. Meanwhile, the United States had established import quotas by action taken under the escape clause procedure of the Trade Agreements Program. The world trade situation for lead and zinc was somewhat different from that which had existed at the time of the London meeting. Some delegations at Geneva thought that a further period of time would be required in order to appraise the outlook under the new circumstances. The discussions in November 1958 recognized that the lead and zinc markets were out of balance, but no action was taken at that time to curtail international supplies. Recommendations were made for the formation of a lead and zinc study group and

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for further efforts to improve the world statistics which governments could use in judging the position and considering proposals for adjustment.

The interested governments came together again in late April and early May of 1959 at New York, and took preliminary steps toward organizing the Lead and Zinc Study Group. A substantial excess of supplies in both metals still appeared to be in prospect at the time of the New York meeting, if no allowance were made for certain reductions and limitations then under consideration. The meeting, however, received reports of specific curtailments to be made in a number of countries and estimated that, after allowance for these, the world excess of lead metal would be reduced to an annual rate of 59,000 tons in the second half of 1959, and the excess for zinc metal would be reduced to about 16,000 tons.

These undertakings of which the New York meeting took notice were separate and voluntary. They entailed no formal commitments. It was clearly the view of the meeting, however, that these measures would improve the relationship between supply and demand, pending further review at a subsequent meeting. The New York discussions gave strong support to the announced limitations as a general method of approaching the short-term problem.

The first regular session of the Lead and Zinc Study Group was held at Geneva, January 27 to February 3, 1960, being preceded by a special statistical session. The consensus at this meeting was that there is no need at present for continued limitations on international supplies of zinc. The meeting noted with approval the plans in a number of countries to curtail marketings of lead until at least September 30, 1960, and considered those plans to be helpful in the interest of a current balance.

Twenty-four of the twenty-five members were represented by delegations at the recent meeting. The delegations included, in the aggregate, somewhat more than 100 persons. Some member governments accredited only one or two

persons, but others were represented by about half a dozen to a dozen. Approximately one-half of the individuals in attendance were officials of governments; the others were representatives of industries in their respective countries.

The normal procedure in meetings of the full Study Group and some of its committees, such as the Administrative Committee and the Economic Committee in the recent session, has been for each delegation to have a single spokesman, usually an official of the particular government. Participation in the discussion has been more general in other committees or subcommittees where more technical subjects were under consideration. This was especially true in various statistical groups. Representatives of industry have taken a direct and major part in those discussions. There are, of course, also many informal exchanges of views among participants on the occasion of Study Group meetings, and these become an important part of the total proceedings.

As the Study Group embarks on its full program in 1960, it will have the benefit of the experience which has been gained in the operation of other somewhat similar bodies. A commodity study group is no longer thought of as strictly temporary or as a prelude to a commodity agreement. Instead, the primary emphasis is on the question whether a continuing program of exchanging information and views can substantially increase the degree of stability in the lead and zinc industries on a world basis simply by promoting better and wider understanding, earlier and more accurate appreciation of trends, and a more responsible approach to problems of common international concern. If the member countries believe that this is possible and attach importance to a greater degree of stability in these industries than they have had, then the main problem of the Study Group is to devise the most effective methods of operation for these purposes.

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This will involve a question of ways to organize and conduct the meetings to make them most productive. Multilateral discussions have superseded the former reliance upon bilateral procedures. Some new techniques have evolved to facilitate this development in the conduct of international commodity relations. But the usual procedures still draw heavily upon the forms which were traditionally employed for debate or negotiations. Since the purposes of the Study Group are different, seeking chiefly the development of information and exploration of views, there appears to be a need for some further evolution away from traditional procedures in order to draw into the deliberations a more active participation by a larger number of the people in attendance, with less formality. The depth and range of substantive discussion might be increased considerably, to the benefit of all member countries, if the proceedings offered greater opportunity for active participation in the discussions by additional members of the delegations, especially industry representatives, it being understood, of course, that they would be expressing their individual views.

With these considerations in mind, it has been suggested that future sessions of the Study Group might include a special committee on production, consumption, and trade. This part of the Study Group session could be organized as an exploration of technical and economic questions, open to all members of the delegations. Specific topics could be on the agenda, and papers might be circulated in advance to focus the discussion. There need not be any attempt to reach conclusions, but a report of the discussion would be made to the full Study Group. It is recognized that an arrangement of this kind could present some dangers. There certainly would be problems which have not yet been fully explored. But the member governments have already recognized that reliance on customary procedures may not draw out the full contributions which persons in attendance are capable of making. The Group believes that some im-

improvements can be devised which will be practical and will make the meetings more valuable in projecting future trends.

Another problem will be that of drawing upon a sufficient cross section in industry and other competent sources for information and views which can help in preparing for Study Group meetings. Similarly, after each meeting, there will be need to make sure that the course and outcome of Study Group discussions become known sufficiently clearly and widely in the industries concerned to give practical effect to the desire that Study Group sessions can have a tangible influence on the actual conduct of industrial operations in the direction of the greater stability in which member governments are interested.

The operations of producers and consumers might be influenced in important respects, and in a generally constructive direction, by the work of the Study Group. For example, a more responsible management of stocks might become more justifiable and more likely. Some erratic variations in commercial stocks, even though conceived by individual companies as being defensive, have, in the aggregate, made an aggressive addition to the destabilizing influences otherwise at work. There is also a possibility that some important consuming industries will attach such significance to stability in their raw materials that any extent to which they believe the prospects for reasonable stability in lead and zinc are being improved will increase their willingness to plan on the use of these materials. This could be a basic contribution to the expansion of consumption, which is the dominant consideration in a satisfactory future development.

Since the personnel of each delegation and the total attendance at Study Group sessions must be somewhat limited, this problem of adequate communication with many other people in member countries, both before and after Study Group sessions, will need very careful attention, perhaps most especially in the U. S.

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The Group may have to decide whether it will consider the possibilities of an international agreement involving buffer stocks, export restrictions, or other controls. The terms of reference would permit this subject to be raised. The question would be whether any considerable number of member governments thought that a full examination of such proposals would be useful. Some members have already indicated their view that it will be appropriate for the Study Group to discuss regulatory measures for purposes of stabilization. Other members have already made clear that they believe the long-term interests of lead and zinc on a world basis will best be served by avoiding additional controls.

The United States Government maintains its well-known position that there are few situations in which intergovernmental commodity agreements are appropriate or desirable. The U. S. view emphasizes that the circumstances in which lead and zinc are produced, sold, and consumed make it very doubtful that an intergovernmental agreement to control either or both of these materials would be feasible of negotiation or operation.

There are, of course, some areas of interest to lead and zinc in which the Study Group cannot be expected to perform. For example, the Group cannot participate in the programs of research, product development, and commercial promotion which the industries in several countries are pursuing. These, however, have been noted in the Study Group discussions. They are recognized as having highly constructive possibilities. The Group appreciates the necessity to avoid actions which might prejudice the success of these important programs.

The Study Group cannot be expected to lend itself to advancing the interests of some members at the expense of others in those matters upon which there are conflicts of interest. The focus of the Group will have to be in the area of common interest, that is, consumption expanding at a substantial and rather regular rate with increasing requirements being supplied at reasonably

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stable prices which recognise the importance of a workable balance of supplies and requirements along the road of long-time growth. This is the plane of mutual interest where a basis can be found for effective cooperation among producers and consumers, exporters and importers.

The Study Group is not an instrument through which fast action or quick results can be obtained. Its eventual influence, however, could be deep and wide in the industries which supply or require lead or zinc.

Progress has been made in the ability and the desire of the national delegations to cooperate in matters of common interest. The members are distinguishing more clearly than they did a year or two ago the subjects and the types of activities which can usefully be undertaken in this forum and those which cannot.

What comes out of the Group must depend on what the member countries put in it. The beginning is auspicious. The indications are favorable. There is wide participation, and the Study Group has active support. It could become the center in a net of world-wide information and communication. The Study Group is a good tool for important work: to raise the level of understanding in many places; reduce the causes of international discord; and improve the prospects for growth in those industries without serious interruption.

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ANNEX IThe International Lead and Zinc Study GroupMember Countries

Australia	Federal Republic	Norway	Union of Soviet
Belgian Congo	of Germany	Peru	Socialist Republics
Belgium	India	Poland	United Kingdom of
Canada	Italy	Spain	Great Britain and
Czechoslovakia	Japan	Sweden	Northern Ireland
Finland	Mexico	Union of South	United States of
France	Morocco	Africa	America
Guatemala	Netherlands		Yugoslavia

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ANNEX IIThe International Lead and Zinc Study GroupTerms of ReferenceMembership

1. Membership of the International Lead and Zinc Study Group shall be open to the Governments of States Members of the United Nations or of appropriate specialized agencies or to Contracting Parties to the General Agreement on Tariffs and Trade, which consider themselves substantially interested in the production or consumption of or trade in lead and zinc.

Functions

2. The group shall provide opportunities for appropriate intergovernmental consultations on international trade in lead and/or zinc and shall make such studies of the world situation in lead and zinc, as it sees fit, having regard especially to the desirability of providing continuous accurate information regarding the supply and demand position and of its probable development. For this purpose the group shall arrange for the collection and dissemination of statistics, making use of existing sources so far as practicable.

3. The group shall, as appropriate, consider possible solutions to any special problems or difficulties which exist or may be expected to arise in lead or zinc and are unlikely to be resolved in the ordinary development of world trade.

4. The group may report to Member Governments. Such reports may include suggestions and/or recommendations.

5. For the purpose of these terms of reference, lead and zinc shall include scraps, wastes and/or residues and such lead and zinc products as the group may determine.

Operation of Study Group

6. The group shall meet at times and places mutually convenient to its members.

7. The group shall adopt such rules of procedure as are considered necessary to carry out its functions.

8. The group shall make such secretariat arrangements as it may deem necessary for the proper conduct of its work.

9. The participating Governments shall contribute to the expenses of the group on a basis to be determined by it.

10. The group shall remain in existence as long as it continues, in the opinion of the participating Governments, to serve a useful purpose.

11. The group shall make such arrangements as it considers appropriate by which information may be exchanged with the interested non-participating Governments of the States referred to in paragraph 1 and with appropriate non-governmental and inter-governmental organizations. The group shall cooperate in particular with the Interim Co-ordinating Committee for International Commodity Arrangements which, under resolution 557 P (XVIII) of the Economic and Social Council, has the function of co-ordinating the activities of study groups and councils.

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TABLE I

AUTOMOTIVE BATTERY AND BATTERY LEAD STATISTICS
Units x 1000, except where indicated otherwise

MARCH 1960

VEHICLES	Composite Opinion	Estimated 1960	1959	1958	1957	1956	1955	1954	1953
Total motor vehicles registered in U. S.	(1)	71,762	70,146	68,328	67,159	65,183	62,727	58,513	56,255
New motor vehicles registered	(1)	6,950	6,967	5,376	6,840	6,850	8,127	6,365	6,669
Registered vehicles in U. S. (Total reg-new reg.)		64,812	63,179	62,952	60,319	58,333	54,600	52,148	49,586
Old motor vehicles scrapped	(1)	5,634	5,000	4,900	4,264	4,948	4,392	4,353	4,074
Gain in total registration (by diff.)		1,316	2,118	1,169	1,976	2,156	4,184	2,288	2,951
Passenger vehicles mfgd. with 12 volt systems, accum.		37,117	30,167	23,200	17,824	10,984	5,125	1,434	104
Production of all motor vehicles in U.S.	(1)	6,750	6,729	5,135	7,221	6,921	9,169	6,601	7,323
Export sales of U. S. motor vehicles		300	312	304	373	398	447	401	325
Import of vehicles into U.S.	(1)	500	719	459	273	112	60	36	41
Vehicle miles in U. S. (x 1,000,000)	(1)	725	696	664	647	628	603	561	544
BATTERIES:									
Auto. domestic O.E. mfgd. by U. S. Mfgs.	(3)	6,946	6,750	6,729	5,135	7,221	6,921	9,169	6,601
Tractor O. E. mfgd. by U. S. Mfgs. (est.)		275	275	280	263	274	277	227	207
Auto. replacement mfgd. for export by U.S. Mfgs.	(3)	221	221	220	222	271	361	404	409
Auto. domestic replacement mfgd. by U. S. Mfgs.	(3)	28,369	28,701	27,495	25,270	25,943	25,014	25,828	23,771
Total auto. & tractor batts. mfgd. by U.S. Mfgs.		35,811	35,947	34,724	30,890	33,709	32,573	35,778	31,008
12 volt only domestic O.E. mfgd. by U. S. Mfgs.		6,946	6,750	6,729	5,135	7,221	5,859	3,691	1,030
12 volt only domestic replacement mfgd. by U.S. Mfgs. (est.)		13,500	12,900	9,075	7,325	5,967	1,536	442	31
Total 12 volt mfgd. by U. S. Mfgs. (est.)		20,446	19,650	15,804	12,460	13,188	7,395	4,133	1,061
Percent 12 volt auto. batteries mfgd. in U. S. (est.)		58%	55%	46%	40%	39%	23%	12%	3.4%
Ratio to re-registered cars	(3)		2.26	2.31	2.50	2.31	2.33	2.12	2.20
LEAD CONSUMED BY BATTERY INDUSTRY:									
Grids, posts, etc. (x 1000 tons)	(2)	180	196	182	160	186	192	196	
Oxides (x 1000 tons)	(2)	180	186	179	153	175	179	184	
Total lead used by battery industry (x 1000 tons)	(2)	360	382	361	313	361	371	380	337
Less lead used for industrial batteries (est.) (x 1000 T)		34	40	35	28	38	42	34	28
Lead used in automotive batteries (by diff.) (x 1000 T)		326	342	326	285	323	329	346	309
Calculated lead per average automotive battery lbs.			19.0	18.8	18.4	19.2	20.2	19.4	20.0

(1) AMA 1959-60 Year Book

(2) Bureau of Mines

(3) AABM 1959 Year Book shows shipments which for practical purposes are considered same as production.

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TABLE II

MARCH 1960

BATTERY PRODUCTION RELATIONSHIP TO VEHICLE REGISTRATIONS AND VEHICLE MILES

	Calculated from Data in Table I									
	1959	1958	1957	1956	1955	1954	1953	HIGH	AVERAGE	LOW
% Replacement to Total Vehicle Registrations*	39	37	39	38	41	41	42	42	40	37
% Replacement to Reregistered Vehicles	43	40	44	43	47	45	48	48	44	40
% Replacement to Previous Years Reregistered Vehicles	44	40	45	46	49	48		49	46	40
% Replacement to Reregistered minus scrapped Vehicles	47	43	46	47	52	50	52	52	48	43
% Total to Total Vehicle Registration	49	45	50	50	56	53	56	56	51	45
% Total minus Export Batteries to Total Vehicle Registration	49	45	49	58	54	52	55	58	52	45
% Replacement minus Export Batteries to Total Vehicle Registration	39	37	38	38	41	40	41	41	39	37
Replacement Batteries per Million Vehicle Miles	39.5	38.1	40.2	39.9	42.8	42.3	43.5	43.5	41.3	38.1
Total minus Export Batteries per Million Vehicle Miles	49.2	45.8	51.2	50.8	57.9	54.0	56.8	57.9	52.2	45.8

* Variance from year to year less than other relationships

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FOR RELEASE NOT EARLIER THAN
12 NOON, THURSDAY, APRIL 7, 1960

RECENT DEVELOPMENTS IN WORLD LEAD AND ZINC MARKETS

By R. Hendricks
Executive Vice President
The Consolidated Mining and Smelting Company of Canada, Ltd.

I am pleased to have the opportunity of addressing you today on "Recent Developments in World Lead and Zinc Markets" because I believe that marketing constitutes the critical segment of our business. I should perhaps warn you that while I shall give you some statistical and other information on lead and zinc consumption, the primary theme of my talk is international co-operation. However, I hope that before I finish you will all agree with me that international co-operation has a great deal to do with market development and that it is a subject of major concern to us all.

The ores of lead and zinc are unevenly distributed throughout the world and all countries are not equally well supplied with their own mines. Some countries, such as Africa, Australia and Canada, have resources in high grade ore which allow production of much more than they can use. Others, such as Great Britain, India, Japan and the United States, are unable to provide for their consumption from domestic ores and so are compelled to import. Consequently, there is much traffic in lead and zinc in various forms from one country to another and there is every expectation that this will increase. International trade is thus an integral part of the lead-zinc industry, and international co-operation is essential for its well-being. This latter fact is receiving growing recognition and I submit that the most important single international development in the industry in recent years is the increase in co-operation that has been brought about. This is not something that comes automatically. It has had to be initiated, and to be maintained and

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extended by deliberate action. All of us can make some contribution in this direction. Let me remind you of some of the ways in which increased co-operation is being translated into effective action.

For many years there has been considerable freedom between producers to exchange technical information relating to methods of mining, concentrating, smelting and refining. This is good, and it was encouraging to hear recently that the Russians may open their lead and zinc mines and smelters to visitors from certain Western countries on a reciprocal basis. I believe that such exchange on the technical level is beneficial not only for the direct results but also in a broader sense. I hope that all of us will do what we can to encourage this sort of thing.

We have just heard from Mr. Nichols about the International Lead-Zinc Study Group organized under United Nations' sponsorship. May I add that I have heard at first hand from delegates to these United Nations' meetings that a growing sense of mutual confidence and a resulting willingness to co-operate in creating a healthy lead-zinc industry have been clearly in evidence. Mr. Nichols mentioned the important matter of statistics where specific progress is being shown. Complete and accurate statistics can be of great help to everyone in the industry but they can only be assembled as the individuals concerned supply suitable information. I think we should all give this matter serious consideration and, as far as possible, contribute what is requested both as to matter and form.

Mr. Nichols also explained how, at the United Nations' conference held in New York about a year ago, steps were taken to set up the Study Group to which I have just referred. At the same conference in New York there was frank discussion of the difficulties facing the industry because of the over-supply situation and you also know how individual producers recognized the problem and

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made various adjustments to deal with it. The benefits of the resulting action to both producers and consumers are now apparent to all and it will suffice for me to point out that at the recent Geneva meetings of the Study Group it was recognized that the problem has been resolved with the zinc market now in an approximately balanced supply-demand position. Improvement was also seen in the lead situation but some over-supply was still in evidence, requiring attention for a time.

It is clear that the Study Group has amply demonstrated its value and I hope that it will continue on a permanent basis. It seems to me that such an international group could provide a continuing forum for the discussion of major industry problems which have international implications. It is also in an excellent position to set up committees which could investigate and report on matters of mutual concern. Unbiased, factual reports thus provided could be the basis for recommendations to governments for appropriate action. One area for such study might be the effects on the lead-zinc industry of governmental restrictions and other legislative action regulating international trade.

Another area of increasing international co-operation that I should like to discuss is in the trade associations, of which I can mention only one or two. The American Zinc Institute itself now has many associate members representing an important part of the industry outside the United States. Associate membership allows full participation and representation on the Industry Development Committee and pertinent subcommittees, an arrangement which in my experience is entirely satisfactory. In the other direction, I think of the Zinc Development Association, whose headquarters are in London, England. This Association formerly obtained its support from the United Kingdom, Australia and Canada, and was mainly concerned with promoting the use of zinc within the United Kingdom, although its literature was also circulated in

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Australia and Canada. Recently the interests of the Association have been extended to Europe and now there are a number of parallel co-operating associations in various European countries. Still more recently a number of companies in the United States have been contributing to the support of the Association and participating directly in its activities.

The Zinc Development Association includes a number of committees working in specified fields in the United Kingdom and aimed at furthering particular uses of zinc. There are also affiliated groups, such as the Zinc Pigment Development Association which is planning a co-operative research program on zinc oxide and lithopone in emulsion paints. Other groups concern themselves with rolled zinc, hot dip galvanizing, analytical techniques and other fields. Among the co-operating European committees, I might mention the European Zinc Producers' Technical Committee which, at this time, is having a meeting in London to which supporters from all over the world were invited. Also, the European Pressure Die Casting Committee has an international conference scheduled to be held in Stresa, Italy, next month. The previous conference in this series held in Paris in 1957 attracted over 300 delegates from 15 countries, and that to be held next month is expected to be even wider in its interest. I was pleased to learn that over 70 delegates are expected from the United States, including official teams from the American Die Casting Institute and the American Society for Die Casting Engineers. Representatives from Canada will also be attending. Similarly, the European General Galvanizers Association is planning an international conference on galvanizing to be held at Interlaken, Switzerland, in 1961.

More could be said on this subject but I give these as examples of how trade associations, originally relatively local in interest, have, during the last few years, been used as a means of international co-operation to develop the use of lead and zinc throughout the world. I hope that as individuals, and

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in our own particular trade associations we will extend co-operation of this type. I am confident any such action would work out to the mutual advantage of all concerned.

Another very encouraging evidence of co-operation is in our own AZI and LIA Expanded Research Program. Yesterday Dr. Radtke reported the work on lead and later today he will review that on zinc. I do not wish to duplicate his reports but I think it is worth remembering that the sponsors of this Program comprise 24 producing companies representing about half of the world's mine production of lead and zinc from three continents. I understand that other companies not now participating are anxious to join us in this work. I am sure that any such who are active in the lead-zinc industry would be welcomed by the present sponsors. It is also worthy of note that the actual research work sponsored under the Program is being carried out wherever the situation is favourable, regardless of international boundaries. It is most heartening that this fine level of co-operation has been achieved, and I believe that you will agree with me that the results augur well for the future.

However, if the industry is to enjoy the full benefits from the research work which we are supporting financially, there are a number of things which we can and should do. The responsibility of producers and fabricators is not ended until research results are translated into commercial products and sold in the markets of the world. We must keep in close touch with the research programs and exploit the results in our own operations and products as may be applicable. We must see that our engineers and technical people are constantly aware of their responsibility to evaluate and apply research findings in this way. In the research and development effort of our individual companies we must plan programs which will co-ordinate with the Expanded Program and further the consumption of lead and zinc.

While there is ground for encouragement in our research work, there is no room for complacency or thinking that we can reduce our efforts. Competition is extremely active and is coming from directions not thought of two or three decades ago. Let me mention just two examples to illustrate what I have in mind. After 12 years of research and development at a reported cost of \$6 million, DuPont Company now has under construction a plan to manufacture "Dycril." This is a new plastic printing plate material which will compete with zinc in lithography and photoengraving. Another plastic developed by DuPont, "Delrin," is threatening zinc in die casting. Delrin is a product of 10 years of research and development, reportedly costing \$42 million. To meet this sort of competition will take our best united efforts if zinc and lead are to have the place we want for them in the markets of the world. Although we are off to a good start, it is obvious that our research program must be greatly expanded and backed up by the whole-hearted co-operation of all participating companies.

At this point I must become more specific and attempt to give you a factual picture of the consumption of lead and zinc in the various parts of the world together with indications of the prospects for growth. In the present discussion, references are to the Free World because we do not have reliable statistics from the Soviet Bloc. However, metal from this area is appearing in Free World markets and we must keep these countries in mind and hope that in due course information from them will become available.

According to preliminary estimates, world consumption of both zinc and lead improved in 1959, reaching levels appreciably above those in 1958 and practically regaining the previous peaks in consumption reported in 1955. Had it not been for the steel strike in the United States, world consumption of zinc would certainly have been the highest on record. With further improvement forecast for both metals in 1960, the tide appears to have turned and world consumption of both metals to be moving upward again, though at a relatively

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slow rate unless we can achieve a break-through by new developments.

While the world picture is somewhat encouraging, that here in the United States is far otherwise. Although zinc consumption at 934,000 tons in 1959 was considerably above that in 1958, it was no higher than in 1957 and appreciably less than in a number of earlier years. Since it had been hoped that consumption would reach at least 1 million tons in 1959, the actual achievement is certainly disappointing. It is true that one important reason was the steel strike, a factor beyond our control, and with this settled the Department of Commerce now suggests about 1,100,000 tons consumption in 1960. This would be an improvement but it would still not reach the level of 1955. We thus have to face the disturbing situation that while the general industrial activity of the United States is advancing and while many other countries are increasing their consumption of zinc, here, in the world's most important single market, ground is being lost. It is evident that we must continue to seek methods of increasing the consumption of zinc, recapturing, if possible, any uses that may have slipped away too easily, and strengthening present uses which may be threatened. In this connection the importance of maintaining a stable price that is competitive in all aspects with other materials can not be stressed too often.

Having given you the dark side of things I should mention some bright spots. It is encouraging to see the increased demand for galvanized products. Some aspects of this industry will be discussed by Mr. Jennings later today. Meanwhile, may I say that I foresee a tremendous potential for galvanized products if we can ensure the quality of material and actively encourage its use wherever properly applicable. The zinc die casting industry is a classic example of co-operation in action. The success which this industry has achieved in offsetting further inroads by new materials is noteworthy, but, as I have already indicated, the job is not finished. It never will be. While the industries mentioned

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constitute the bulk of zinc slab consumption in the United States, we must not neglect the numerous small uses of zinc which make up the balance, for I think it is generally true that existing uses can be maintained and expanded with much less difficulty than is required to develop a new use.

Many of my remarks concerning zinc apply equally to lead. In 1959, the United States consumption of lead at 1,083,000 tons represented an increase of about 100,000 tons over 1958, but this was only a return to the same level as in 1943 and was still considerably below that in 1950. If we allow past conditions to continue we thus have no basis for expecting significant improvements in the future.

No doubt we can adduce various reasons which account for the declining use of lead, but in so doing we merely point out instances where competitive materials have taken over our markets. The situation challenges all of us to support an aggressive program of research and development in order to protect the markets we have and develop new ones.

After these critical remarks regarding consumption in the United States, I must hasten to add that we are in little, if any, better situation in Canada. Zinc consumption at 68,000 tons in 1959, though higher than for several years, was well below that in 1942 and 1943. Even so, 1959 is considered to represent an inflated demand due to the steel strike in the United States. Galvanizing is the most encouraging specific use of zinc in Canada but die casting, brass and others are relatively disappointing. Primary lead consumption at about 45,000 tons in 1959 was below that in 1955. As elsewhere, decreases in the use of lead in cable sheathing and pigments were marked. Canada is thus another country which needs aggressive research and we hope that the results of the Expanded Program and individual activities will lead to a real increase, not only as population increases, but in consumption per capita.

Before I speak about the consumption of lead and zinc in Europe I should like to say a few words on the European Common Market (the Inner Six) and the European Free Trade Association (the Outer Seven). The formation of these groups highlighted the economic and political developments in Europe during the past three years.

The Inner Six (France, West Germany, Italy, Belgium, Luxembourg and the Netherlands) form a compact geographic and industrial group in Europe with a market of 165 million people. The Seven Free Trade Associates (United Kingdom, Norway, Sweden, Denmark, Austria, Portugal and Switzerland) encompass a total population of some 90 million with a combined national income two-thirds as large and total trade three-quarters as large as the six Common Market Countries.

Both groups have as their current objective the attainment of free trade within their boundaries through the progressive removal of tariffs and quotas on industrial products. Basically, however, the Common Market purports to be but the first step towards the ultimate goal of complete political and economic integration, seeking eventually to place industries in member countries on an equal competitive footing. In contrast the European Free Trade Area is a plan for a free trade area only, and member countries will keep their individual tariffs applicable to non-members. In both groups, it would seem that the possibilities for economic development and industrial expansion are vastly improved, provided that trade on a world basis is not stifled.

It has been feared that the Inner Six might surround themselves with a high tariff barrier, making the area practically inaccessible to the rest of the world. However, the rates which have been announced by the Common Market have demonstrated a creditable spirit of co-operation. For lead and zinc metal, the tariff is to be 0.6¢ (U.S.) per pound, while ores, waste and scrap will be exempt. In addition, significant proportions of the metal imports of individual

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countries will also be exempt. As tariffs go, these proposals must be considered reasonable and indicative of a willingness to trade with other countries in good faith.

It is expected that by the formation of the Common Market and Free Trade Association, living standards in the participating countries will be raised, thus creating a demand for consumer goods which otherwise would have taken many years to develop on an individual basis. Already the European market is undergoing a revolution that many of us on this side of the Atlantic may not fully appreciate. Incomes are rising and are being translated into higher living standards. Europe is in the midst of a break-through to mass car ownership such as took place in the United States in the 1920's. Present total vehicle population in the Common Market countries is 16 million and by 1970 is expected to reach 38 million. This is only one example of a growing industry in which much lead and zinc is consumed. Similar growth is being shown in the construction industry and there is a great increase in demand for all types of appliances. All of this augurs well for the future consumption of raw materials, and we, as producers and fabricators of lead and zinc, must do our utmost to ensure that our products are priced at levels that will permit the fullest participation in this economic expansion. To do this we must keep our costs down and encourage free trade wherever and whenever possible.

The total consumption of zinc in Europe has shown almost uninterrupted growth since 1954, and since 1956 it has exceeded that in North America. Germany, France and the United Kingdom together account for almost 70 per cent of the European total and 30 per cent of the world total. One of the most promising uses for zinc in Europe is in galvanizing. There are now four continuous strip lines in the United Kingdom, all working at capacity, five in France, two in Belgium with a third under construction, and three in other countries.

Galvanized sheet is being used in some automobiles and galvanized structural steel is finding continuously wider use for buildings and other purposes. Zinc spraying is also making good progress with more than 1000 tons expected to be used on the new Forth bridge in Scotland. Zinc die casting in Europe has never experienced the same growth as in the United States. On the other hand, in spite of much dissatisfaction with plated products there was not a marked trend away from them. The average British car now uses about 50 pounds of die casting and with the results of recent research available, it is felt that this application is secure for the present. On the Continent, however, much less zinc is used in cars, and it has been reported that in France automobile manufacturers are turning to plastics because of what they term the present high cost of zinc.

In Europe the decline in lead consumption during the last few years now appears to have been wiped out and the estimated 1959 total is up to that for 1955. Germany and France show the most encouraging growth at present, but consumption in the United Kingdom also improved last year although the outlook for 1960 is not considered too good. Our friends in the Lead Development Association, while active in various projects of their own, have particularly asked me to stress the importance that they place on the Expanded Research Program and to assure you of their desire to co-operate in any way they can.

Turning to Australia and New Zealand, zinc consumption has generally been better maintained in recent years than in many other countries, and preliminary estimates are that 1959 consumption will about equal the former peak of 1957. As elsewhere, galvanizing is of major importance but die casting is also showing good growth. Lead consumption, on the other hand, has not been doing so well and in 1959 was apparently less than in any year since 1954.

This is in spite of the fact that in these countries lead still has an important place in the cable sheathing industry. One remarkable point about Australia and New Zealand is the high per capita consumption of both lead and

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zinc. In this respect they are well above the United States and far ahead of Canada, a country of roughly comparable population.

Let us now take a quick look at Asia where Japan is the outstanding country as far as our present interests are concerned. As a result of aid from the United States coupled with vigorous local activity, the economy has shown remarkable recovery and continuing growth. In zinc consumption there has been uninterrupted increase for at least 8 years. The consumption for 1959 is estimated to be close to 170,000 tons, nearly 2½ times that in 1951. A number of continuous galvanizing lines are now in operation in Japan and in 1958 the zinc consumption in galvanized sheet alone was over 76,000 tons. This may be compared with less than 20,000 tons, ten years previously. Die casting has also developed strongly and in 1958 accounted for 10,000 tons of zinc. With further growth expected in automobile manufacturing, the die casting industry should continue its progress. Lead consumption in Japan has not been so satisfactory. Although in 1959 consumption reached 75,000 tons, a 12 per cent increase over 1958, it was still more than 20 per cent below that in 1957. Again the main loss was in cable sheathing, although consumption in other uses also declined. It may be expected that the growing automobile industry will strengthen the demand for lead.

India, where industrial development is only beginning, has considerable potential as a consumer of lead and zinc but a major difficulty is the very limited domestic ore supply and a chronic shortage of foreign currency for imports. The present consumption of zinc is about 65,000 tons per year, some 50 per cent of which is used in galvanizing. At least one of the new State-owned steel mills is expected to be doing galvanizing within a few months and the growing demand for consumer products should increase activity in zinc die casting. Official forecasts suggest about 170,000 tons annual consumption

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by 1970. In view of the currency difficulties, the Government tends to favour aluminum since domestic raw materials are available for local production. Lead consumption, now about 22,000 tons per year, is expected to increase to about 55,000 tons per year by 1970. I suggest that India deserves our serious attention to see if there is not something more that the industry might do to promote uses of lead and zinc.

Elsewhere in Asia there are some possibilities. For instance in the Philippine Islands a galvanizing industry is developing that could consume 15,000 to 20,000 tons per year of zinc in the foreseeable future. It has also been reported that the Philippines will be making their own cars in the next three to five years.

Information on Communist China is sketchy and unreliable, but production of refined zinc in 1959 is indicated at 66,000 tons and at this level the supply is estimated to be slightly deficient. The production of refined lead in 1959 is indicated at a little over 80,000 tons. A slight deficiency of lead is also indicated.

Consumption of lead and zinc in South American countries has not shown any startling growth in recent years. The consumption of zinc in 1959 is estimated at about 50,000 tons, up slightly over recent years, while lead at an estimated 70,000 tons in 1959 is also slightly higher than in recent years. These countries seem on the brink of further industrial development with the reported increase in automotive production, using locally manufactured parts wherever possible. This industry is being developed to reduce the drain on foreign exchange.

It has been estimated that the present zinc consumption of Brazil, which is about 20,000 tons per year, will rise to 37,000 tons in 1960 with a further expansion to 51,000 tons expected by 1965. It has also been reported

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that a new plant for the production of die castings in Brazil is to be constructed. The current consumption of lead in Brazil is about 25,000 tons and is said to be on the increase as a result of the automobile industry. The consumption for 1960 is forecast at 40,000 tons.

Finally, let me say a word about Africa. Statistics of consumption are conflicting, some showing continued increase over a number of years and others a substantially static condition. However, they all agree in reporting that the consumption of lead and zinc is very low in relation to the population. Africa is awakening and will no doubt make rapid strides towards industrialization. The continent has abundant resources in lead and zinc and I believe has also a great potential as a consumer of these metals. At this time there may not be much that we can do directly to promote the use of our metals in Africa or in other parts of the world where much of the country is based on a traditional agricultural economy. However, we should be aware of these countries and on the alert for opportunities as they progress towards maturity.

I have reviewed some of the encouraging signs of increasing co-operation and I have discussed some features of consumption in specific areas, all of which should impress upon us the international character of the lead-zinc industry. It has been stated on good authority that international trade is now generally freer of restrictions than at any time in the last 30 years. This is good, but unfortunately, and particularly as affecting lead and zinc, there are areas where artificial barriers have recently been set up and where various political situations are still a serious hindrance to trade. I would be remiss if I did not point out some of these and urge that we approach our individual problems in a more broad-minded and co-operative attitude.

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If we, as producers, could get together on an international basis and frankly exchange ideas and discuss the broad industry problems, I believe we would find that many of our ultimate objectives coincide, and that we could work out ways of dealing with our own problems. I recognize the responsibilities of government to take care of national welfare and the authority of government to regulate industry accordingly, but I believe that all of us in industry have a tendency to appeal for government aid unnecessarily. When cyclical situations of over-supply arise due to decreased demand, lead and zinc mines and smelters throughout the world inevitably suffer hardships and individual countries can not insulate themselves by government action. What is needed is to take steps that will reduce or eliminate these periods of low demand by keeping consumption buoyant and growing. Experience in recent years indicates that the various interferences of governments have tended to aggravate the cyclical swings and added generally to the problems of the whole industry. Further, government aid inevitably means government regulation and, in the long run, this leads to government control of industry.

There is no longer a general world-wide shortage of dollars, but a number of countries, particularly in the Far East, still have serious currency difficulties and as a consequence their imports of lead and zinc are closely controlled. As I have already mentioned, some countries foresee this as a long-term problem and are therefore discouraging the use of lead and zinc which have to be imported. We can understand this situation and recognize the need for some government regulation. Nevertheless, we feel that freer conditions of trading are normally preferable and certainly better for the lead-zinc industry. Meantime it may be possible for producers in specific cases to accept local currency for sales of metal and use this in some way to finance exports. At least we must be aware of the problems in the convertibility of currency and

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take an interest in marketing within the country to ensure that, as far as possible, the ultimate consumer receives adequate supplies at reasonable prices.

Coming closer to home, we still have quotas restricting imports of lead and zinc into the United States. These were established in October 1958 and recent reports indicate that the Administration and Congress have no present intention of removing them. This is so in spite of the many objections that have been raised. For example, last August six major United States lead and zinc smelting companies, representing about one-half of the smelting and refining capacity, issued a statement opposing the quota system. In recent hearings before the United States Tariff Commission domestic smelters testified that a continuation of the quotas is a serious threat to the future of the lead and zinc industry. Our Canadian Government and that of Australia have repeatedly urged their elimination. At the recent meetings of the United Nations' Study Group held in Geneva, delegations voiced concern over the continuation of the quotas and particularly that these restrictions, originally stated to be temporary, might become permanent. It was pointed out that lasting damage might result if such restrictions caused consuming industries to use alternative materials.

Another point where co-operation is needed is in connection with Government stockpiles of lead and zinc. As you know, the United Kingdom stocks of zinc, amounting to about 53,000 long tons, are to be disposed of during the next four years. Intentions in this regard were announced at the United Nations' Study Group meetings and views of other participants were invited. This approach and the assurance that disposal would have due regard for market conditions are commendable. In view of the relatively small quantity involved, we may hope that its disposal will not depress markets to any extent and it will be good to have the problem out of the way.

The stockpiles in the United States are, of course, many times larger

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than those in the United Kingdom. Indeed, the quantities are so great that unwise disposal could disrupt the world industry. They therefore can not be considered from a purely domestic point of view. This is shown by the fact that during the period around 1956 when stockpiling was at its height, about 10 per cent of the total production of the Free World was being withdrawn from the market. When purchases were abruptly curtailed in 1957, prices deteriorated rapidly and the industry became depressed, a condition from which it is only now recovering. Stockpiles of lead and zinc may be necessary for strategic purposes to meet possible national emergencies, but if so they should not be released except as necessary for this purpose. Certainly any precipitate action to dispose of the United States Government stocks at this time could have extremely serious effects on the industry. I urge that no further major additions be made to these stockpiles of lead and zinc and particularly that if any future emergency should necessitate release of metal, consultation should first be held with industry on as wide a basis as possible.

Finally, I want to make a plea for the consumer. For too long industry and governments alike have overlooked the importance of consumers. At the various meetings and hearings when the needs and claims of different interests are presented and action is urged for their safe-guarding, seldom does anyone represent consumers or put in a claim for them. I suggest that it is time that this omission was rectified, for our own well-being if for no other reason. After all, the major task facing our industry is to stabilize and increase world consumption of lead and zinc and this will need careful attention to the interests of consumers.

One of the prime requirements will be to see that adequate supplies of good quality metal are available at reasonable prices. Producers must keep the supply of metal coming out in line with market requirements, in poor times as

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well as good. We must do our best to maintain reasonable and stable prices and these can not be considered solely on the basis of local costs. Competition must be recognized, particularly from alternative materials. Unduly high prices may give temporary benefit but experience has shown that in the long run they are detrimental to marketing. On the other hand, very low prices, insufficient to maintain a satisfactory level of world production and good quality, are also harmful.

Similarly, high tariffs, quotas and other such restrictions, though they protect high domestic prices, fail to give adequate consideration to the interests of consumers. Further, such restrictions place manufacturers of products containing large amounts of lead and zinc at a disadvantage when competing with foreign manufacturers. They thus hinder exports and increase the difficulty of balancing international payments. Imbalance of trade is currently causing concern in the United States, and it is also a cause of great concern to us in Canada. I believe that the long-range remedy lies in increasing productive capacity at lower costs, and in encouraging freedom of international trade. I was interested to note that this position is supported in a recent statement by the Committee for Economic Development which represents leading business industries in the United States.

I have tried to give you a picture of the growth of world-wide co-operation which is developing in the lead-zinc industry. As compared to conditions a few years ago, there has been definite improvement in the general health of the industry, and there are many signs of encouragement. At the same time, as we are now entering the 1960's, there are still many problems facing us. International co-operation has greatly helped the lead-zinc industry in its technical problems and in its broader marketing problems. With continued

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{ sincere and progressive international co-operation I believe that our industry
can look forward to a bright future in which our products will find ever-increas-
ing applications in the service of mankind.

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