LEAD INDUSTRIES ASSOCIATION, INC.

292 MADISON AVENUE
NEW YORK 17, N. Y.

SUBJECT TO REVISION

INDUSTRY DEVELOPMENT COMMITTEE MEETING MINUTES

St. Louis, Mo. April 7, 1962

A meeting of the Industry Development Committee of the Lead Industries Association, Inc., was held at 10:00 A.M. on Saturday, April 7, 1962, at the Chase-Park Plaza Hotel, St. Louis, Mo.

PRESENT	REPRESENTING
J. J. Lennon	American Metal Climax, Inc.
J. S. Smart, Jr.	American Smelting & Refining Co.
F. H. Burlees	Anaconda Sales Co.
R. J. Hopkins	The Broken Hill Associated Smelters Pty. Ltd.
G. A. Larson	Bunker Hill Co.
Ivor Thompson	Cerro Sales Corp.
L. L. Taylor	Compania Minera Asarco S.A.
A. O. Wolff	The Consolidated Mining and Smelting Co. of Canada Limited
C. R. Ince	St. Joseph Lead Co.
C. H. LeFevre	United States Smelting Refining and Mining Co.

OTHER MEMBERS

J. Vuilleques	American Metal Climax, Inc.
I. L. Barker	Cerro Corp.
W. G. Hiscock	Consolidated Zinc Corp. (BHAS)
A.P. Giraitis	Ethyl Corp.
W. P. Milke III	Hammond Lead Products, Inc.
E. W. Halton	C. Tennant, Sons & Co., (Agents BHAS)

OTHERS

J. M. Fisher	Armour Research Foundation
N. S. Kirby	Electrolytic Zinc Co. of Australasia, Ltd.
Lewis S. Goodfriend	Lewis S. Goodfriend and Associates
E. Varady	Ist.Italiano Piombo e Zinco Milan

Look Ahead with Lead

STAFF

Robert L. Ziegfeld, Executive Vice President, Secretary-Treasurer
David M. Borcina, Assistant to Secretary

Expanded Research Program
Schrade F. Rector, Director of Research
A. R. Cook
S. E. Eck
L. Kettler

The secretary reported a quorum was present.

The chairman, Robert L. Ziegfeld, presided, and the assistant to the secretary kept the minutes.

The minutes of the previous meeting of November 28, 1961 were approved.

REPORT OF THE RESEARCH DIRECTOR

At the request of the chairman, the research director presented a detailed report of the status of the various research projects, as per Exhibit "A" attached, reported by L. Kettler, E.R.P.

Lead for Sound Attenuation in Architecture - The committee requested copies of the report on this subject presented by Lewis S. Goodfriend, herewith attached as Exhibit "B".

Continuous Casting of Sheet Lead - The research director reviewed the proposal submitted by The Broken Hill Associated Smelters Pty. Ltd. for further development work on the continuous sheet lead casting machine. The cost would be $9,000 for one year's effort and had been reviewed and approved by the Technical Steering Committee.

A motion to approve $9,000 for this work was made, seconded and unanimously carried.

REPORT ON PROMOTIONAL ACTIVITIES

Lead for Sound Attenuation in Architecture - The chairman reported that the research report on Lead for Sound Attenuation in Architecture would soon be available to him for editing and printing and that he estimated the cost of printing and distribution at around $25,000.

This amount, he stated, could be secured from the 1962 budget as follows:

Included in 1962 budget for publication of this manual	$7,000
Postponing publication of one of three bulletins in budget	4,000
From Contingency Fund	14,000
TOTAL	$25,000

A motion was thereupon made, seconded and unanimously approved that $25,000 secured as outlined above, be set aside for printing and distribution of lead for sound attenuation publications.

DISTRIBUTION OF "LEAD ABSTRACTS"

The chairman reported that the first edition of "Lead Abstracts" prepared by the Lead Development Association, Great Britain, had been distributed by L.I.A. to its members and libraries of technical colleges and universities. He requested that $2,000 be taken from the Contingency Fund to increase the mailing list.

A motion was thereupon made, seconded and unanimously approved that $2,000 be taken from the 1962 Contingency Fund to increase the distribution list for the "Lead Abstracts."

The chairman reported that it will cost roughly $2.50 a name per year to distribute the "Lead Abstracts" and that perhaps a subscription price of that amount could be charged. At a question, the chairman replied that the Association could distribute the "Lead Abstracts" free to those companies and individuals who would be of definite value to the lead industry and to others, of perhaps questionable value, charge a subscription price.

It was the committee's opinion however that before any such action is taken that legal opinion be sought as to the validity of free and paid distribution.

PIG LEAD SALES STATISTICS

The chairman reported that the method of reporting pig lead sales statistics to the Association and to the publication "Metal and Mineral Markets" differed somewhat and occasionally led to some confusion as to the exact sales in any one month.

After some discussion, it was the committee's opinion that this be tabled for future discussion.

There being no further business, the meeting adjourned at 5 P.M.

David A. Bracuti
Assistant to Secretary

DAB:HDM

Appendix A

EXPANDED RESEARCH PROGRAM PRESENTATION

This meeting of the Industry Development Committee was held to permit a closer exchange of ideas between the commercial and technical phases of the Expanded Research Program. It is believed that only through this close exchange of ideas and discussion of the results of the research can effective commercialization of these technical developments be achieved. This was the first such meeting held with this objective in mind. Following is a discussion of the topics covered.

CHEMICAL RESEARCH

LC-18-62 A Fundamental Study of Organolead Chemistry, Organisch Chemisch Institunt, T.N.O.

Dr. Giraitis reviewed the chemical research programs and reported on the excellent progress of the T.N.O. research on organolead compounds on our project LC-18. Much interest has been shown in hexaphenyldilead which has been synthesized by T.N.O. and was being tested in fungicides and as PVC stabilizers. Hexaphenyldilead was also of special value in marine paints because of its special ability to migrate continuously to the surface of the paint as it is being abraded and thus retain its biocidal properties.

In its application as a stabilizer for polyvinyl chloride plastics, the compound was added in the amount of one to three percent.

LC-28-60 Organolead Chemistry, Quartermaster Research and Engineering Command

A parallel program of research on organolead compounds is being conducted at the Quartermaster Research and Engineering Command under our program LC-28. Contacts have been made with the U.S. Department of Agriculture and other agencies for the testing of our newly developed organolead compounds.

It was suggested that members of the IDC feel free to request samples of newly synthesized compounds and feed back to ERP information and reactions of the industry to this research to act as guides to further action.

LC-49-61 Lead Compounds as Lubricants and Lubricant Additives, Ethyl Corporation

Under program LC-49 lead compounds as lubricants and lubricant additives were being investigated by Ethyl Corporation with the objective of reducing the wear and friction between materials. Dr. Giraitis described a four ball lubricant testing machine designed by Ethyl Corporation and the results of tests performed with this machine. At 50°C, excellent results were obtained with diethylleaddichloride and with trimethylleadbromide.

As a result of the tests which simulated service conditions, it is concluded that these two compounds greatly increase the service life of lubricating oils provided that the lubricants operate at a low temperature (50°C). At higher temperatures (125°C), the compounds become unstable. We have therefore an excellent indication that this general class of compounds is worth investigating and that consideration be given to low temperature applications for these compounds.

It is of interest that the best commercially available lubricant additive tested was a zinc compound which gave better performance at the higher temperatures encountered in most service applications.

METALLURGICAL RESEARCH

LM-16-62 Lead for Sound Attenuation, Lewis S. Goodfriend & Associates

Mr. Goodfriend of Lewis S. Goodfriend & Associates discussed the excellent properties of lead for sound attenuation and the great market potential available in this area. The most obvious markets were in residential construction, hotels, industrial equipment enclosures, and office partitions. Mr. Goodfriend also emphasized that it was very important to bolster all sales efforts with competent engineering services if the lead industry is to succeed in developing this market. A separate report of Mr. Goodfriend's talk is attached with these minutes.

In summary, Dr. Raithe discussed the importance of our program on the use of lead for sound attenuation and on the necessity of educating our representatives in what can or cannot be done with lead. It was of utmost importance that our first installations be both economical and efficient and that results of field observations be fed back to the ERP for guidance to further research. This program has now become one of application engineering and industry must implement the results of research with promotion and sales.

In the course of ensuing discussion the following comments were included:

It was noted that sheet lead material was currently available at a cost of 5¢ above the price of pig lead but that special care must be taken to avoid excessively high costs of the finished sound attenuating panels.

Technical specialists must be made available to consumers to advise and instruct on the proper use of lead.

It was agreed that education in this area must be a joint effort by the industry and that plans should be formulated what each company should do and what the Lead Industries Association should do.

It was suggested that lead rollers be invited to join the training program and to educate their representatives in sound attenuation.

Publication of the Accustical Lead Manual is expected to take place by September, 1962 and this manual is expected to be the first step in providing practical information and data to architects and contractors on the application and uses of lead and lead products in architectural noise control. It is intended to issue periodic supplements to the manual which will discuss new developments as they become available.

A decision was made by the committee to hold a meeting on June 14 to discuss the subject in detail and to formulate definite plans as to what course of action was to be taken.

LM-7-61 Lead-Asbestos Pads for Vibration Attenuation, Lewis S. Goodfriend & Associates

In the area of lead-asbestos pads for vibration attenuation, Mr. Goodfriend reported that these pads will soon be subjected to controlled tests and that performance measurements on field installations will be made.

As a result of further studies, it has also been established that railroad vibrations which, in the past, have been assumed as consisting of low frequency vibrations, have now been found to consist of pulses of high frequency vibrations.

LM-9-62 Fiber Reinforced Lead, Armour Research Foundation

Mr. Fisher of Armour Research Foundation reported that this program has now become a product development program and that new commercial applications for this material are being sought for as lead solder tapes and as fiber reinforced lead babbitts for friction or sleeve bearings.

Much interest is being shown by the Association of American Railroads in fiber metal reinforced lead bearings which can show great durability without lubrication.

Among new applications for lead tape the following will be investigated:

1. For joining of pipes in plumbing application.
2. For automobile repair, where shops could use commercially available lead patches to simplify the repairs on rocker panels and similar jobs.
3. For industrial soldering, where man hours to do the jobs could be reduced, while more lead would be consumed by using tape.
4. For roofing tile, which could be made to sell for an estimated cost of 40¢/sq.ft.
5. For various farm applications.

Further research on fiber reinforced solder lead will include the following:

1. Consideration of various reinforcing materials including steel, copper and copper alloys.
2. Testing the strength of various joints made with reinforced solder tape.
3. Evaluation of the durability of tape under normal weathering conditions.
4. Distribution of samples for evaluation to commercial organizations such as Sears Roebucks.

Work by the Huyck Corporation is also proceeding on the production of fiber reinforced solder tape.

Lead in Ceramic Materials

Mr. Wilke of Hammond Lead reported on the employment of lead in ceramic materials and noted that toxicity, which has been the prime problem originally, has been eliminated to a large extent by proper handling methods and by precautionary measures. Mr. Wilke stated that the initiation of fellowship programs and the consequent contacts with professors and fellows, have been very useful in disseminating information on lead and have resulted in increased use of lead in glass manufacture and for electronic applications. This increase

in the use of lead for ceramic materials has taken place in spite of greatly increased imports of such materials from abroad. It was pointed out that lead was the only material which makes it possible to fire and glaze in one operation and at the same time to perform the operation in only one and one half to three hours which is necessary in the new fast-firing ceramic technology.

Mr. Liegfeld estimated that lead ceramic products sales in the United States have increased by about 30% and that the market potential for lead glazes for enamelling aluminum may be estimated at 50,000 to 60,000 tons per year.

D.M. Continuous Casting Process

Dr. Radtke reported that a proposal had been received from the Broken Hill Associated Smelters, Pty., Ltd. to continue work for one year on further development and improvement of the machine for the continuous casting of lead sheet directly from molten metal.

A motion was made by Mr. Smart to approve the BHAS proposal at a cost of $9,000, seconded by Mr. Thompson and unanimously approved by the committee.

LM-8-61 Fundamental Investigation of Lead Powder Metallurgy, Rensselaer Polytechnic Institute

Mr. Eck discussed our research performed in the area of lead powder metallurgy and reviewed the results of creep tests on several lead alloys which were developed in this program.

Mr. Kettler then reviewed a proposed method for the production of particulate lead and zinc and its conversion to wrought products. A brief description was presented of the equipment required and of the operation of the process. A review of estimated production costs showed that, excluding plant overhead and cost of sales, the production of particulate material from molten lead would be .37¢/lb and its conversion to wrought products would amount to .52¢/lb.

ELECTROCHEMICAL RESEARCH

LE-35-61 High Speed Plating of Lead, Graham, Savage & Associates, Inc.

In the area of electrochemical research, Mr. Cook reported on the satisfactory progress of the high speed plating program of lead and that samples were now being distributed for testing of their corrosion resistance. The results of these tests would be published as soon as they become available. A discussion followed on the desirability of patenting the methods developed and the committee took the view that, instead of patenting, greater benefit would ensue from a disclosure of the results and publication in technical literature.

LC-34-61 Anticorrosive Properties of Lead Pigments in Water Reducible Ferrous Metal Primers, The Eagle-Picher Company

LC-50-61 The Use of Lead Pigments in Air Drying Water Reducible Paints for Wood, The Eagle-Picher Company

Mr. Cook also reviewed briefly the progress of the program on lead pigments in metal primers which was proceeding satisfactorily and on the investigations of lead pigments in water thinnable paints for wood about which little could be reported at this time. There is clear indication that lead compounds reduce the staining of paint by wood exudations.

XE-38-62 An Investigation of Electrochemical Finishes for Zinc, The Consolidated Mining & Smelting Company of Canada, Ltd.

Dr. Radtke distributed a copy of the license agreement on the Cominco process to the committee members for review and reported that information on the process was now ready for release to the press.

ADJOURNMENT

There being no further business to discuss by the committee, the meeting was adjourned at 5:00 P.M.

LEAD IN ARCHITECTURAL ACOUSTICS

A Progress Report to The IDC

Lewis S. Goodfriend
Lewis S. Goodfriend & Associates
Little Falls, New Jersey

I am here today to sell you gentlemen on the idea of selling more lead.

This is not as ridiculous as it may first sound. I am more convinced today than at any time in the past that lead is the most effective practicable material for architectural noise control. It can provide considerable increases in the sound reduction of many conventional building partitions. If lead is designed into modern building products as an integral element of the product, it can produce spectacular results. The theory behind this was first presented to LIA in the Bolt Beranek & Newman report later published by LIA under the title "Improved Sound Barriers Employing Lead".

However, the key to the practical use of lead, in thin sheets, remained hidden in the theoretical approach and its complex method of application. As our own work progressed, we began to illustrate the differences that could be achieved with various common building materials using direct lamination. These results, later verified by laboratory tests, show great possibilities using leaded wallboards.

In the closing weeks of 1961 we were finally able to put together a graphic picture of lead's superb sound isolating capabilities. The first SLIDE shows how 3/32" lead laminated to three different thicknesses of plywood gives higher sound isolation in the critical speech privacy range, and much higher average TL and Sound Transmission Class at a just acceptable marketing cost.

On the slide, you can see that adding only 3/32 of an inch of lead to a single sheet of 3/8" plywood increases the TL to provide better sound isolation than is required for most office partitions. To work with conventional construction using 1/4" or 3/8" plywood we can use 3/64" or 3 pound lead laminated to the thin sheet plywood and still achieve the desired TL with sheets nailed or glued to each side of wood studs.

You can get a 5 to 13 decibel increase in TL using 1/8" lead laminated to most common building materials. As to our other test and field results, they are all of this order of magnitude. Using 3 or 4 pound lead can provide similar marked increases in sound isolation, but the application must be engineered with care since many mechanical factors are at work to minimize the

gain where light-weight lead is used.

Before looking ahead, I should like, briefly, to review our work to date. We have developed a satisfactory lead laminating technique suitable for both factory and field lamination, and we have examined the architect's and manufacturer's attitude toward use of proposed leaded building products. We found little enthusiasm on the part of most manufacturers whose product is sold to architects on a competitive-bid, first-cost basis. We found much interest by fabricators of materials such as office partitions which are sold on the basis of noise-reduction-test-data, and we found considerable enthusiasm from architects, all of whom have had problems with noise.

We have reviewed a variety of problems submitted by the LIA Expanded Research Program and we have assembled a manual on the application of lead in Architectural Acoustics. This manual contains much not related to lead, but which is required to show the architect how to achieve the fullest benefits of lead by preventing flanking paths of sound transmission. Many non-leaded partitions are shown so that the considerable improvement offered by leaded partitions is immediately apparent to the architect.

Now for a brief look at the marketing situation.

An architect will make use of any building material that provides the required noise reduction. Tell him that leaded wallboard does the job and he will use it in his designs: - but it will never end up in the finished job. The contractors will take one look at the plans and tell the architect and owner it will cost ten times more to use the leaded wallboard than plain wallboard with glass wool between the studs. He is sure that that works because he always uses it and it's cheap. Well, it is cheap, but doesn't work. The owner doesn't find this out until it is too late. At present the price gap between pig lead and finished laminate is considerably greater than it should be. The conventional laminating fabricators use giant presses and must write off the equipment cost. Most of these present laminating people are x-ray panel fabricators who charge a mark-up of 3 to 5 times. Now the contractor, who buys the panels from the laminating fabricator, knows that they are somewhat heavier than ordinary wallboard, he has never handled them before and doesn't know how to figure his fastening cost. So he doubles the panel cost and then adds on his usual labor and overhead charge. This is a factual account of two typical cases. When the architect gets the bids from the contractor, the lead goes out. The owner suffers, the lead industry suffers, the architect is blamed for a noisy building, but the contractor; he goes off feeling he has done a good job, has saved his customer money, and has given him a quiet building.

Although lead is good it will not solve every problem - a new muffler is not the remedy for worn piston rings. This means that every application area or job has to be sized up by the lead salesman or supplier and screened

for appropriateness and for flanking paths of sound transmission.

We have reviewed many projects including a few for LIA where the improvement of the TL of a wall would have been useless.

In one case, a bank, the walls were adequate - they just did not extend above the perforated metal ceiling. The sound travelled through the perforated metal and the thin glass-fiber pad, over the partition and down into the adjacent room.

In a large electric equipment plant, the boardroom was adjacent to the lobby waiting room. You could sit in the lobby and hear the board quietly discussing the company's most confidential matters. The wall which was poor to start with, had been improved considerably, but the clarity of boardroom speech in the lobby was still excellent. Two flanking paths existed: the thin, hollow, snap-on plywood base, and a continuous crack at the intersection of the partition with the exterior masonry block wall.

Another example is the large state office building where the sheet metal partitions were blamed for the lack of privacy between the Chief Judge's office and the Commissioner of Labor's office. If the Commissioner's telephone rang, the judge answered his. When a labor delegation knocked on the Commissioner's outer door, the Judge's secretary went to her door. In this building there were over 20,000 square feet of metal partitions, subject to similar complaints. First of all, the partitions only ran up to the perforated metal pan ceiling. Then there were 1/16" to 1/8" cracks at the meeting between partitions and building columns, of which there were many. Finally, there were large gaps at both the meeting with the window mullion and behind the heating convector covers. When all these leaks were closed off, the partitions turned out to be adequate. Adding lead would have made no difference here.

This should convince you that lead must be applied with care. Careful engineering, and I mean engineering, not a salesman's selector chart, will permit the application of lead to a broad range of architectural situations, industrial equipment housings, and office partitions. But, you cannot just roll out the lead and hang it on the wall. Every lead sales-engineer must do an engineering job on applying lead in individual architectural projects and in mass-produced, mass-market products.

The first applications are your critical ones. They must be appropriate areas for the use of lead. We should be able to get follow-up information from the user on the results, to check both our design procedures and our ability to convey the design requirements to the customers' engineer or architect. Every job must be done right. Each must be a showpiece for LIA.

Selling large quantities of lead for architectural purposes will be made easier by good eyecatching examples of successful applications. These may not

be the most economical job, but they will help to improve the marketing atmosphere.

The Manual on Lead In Architectural Acoustics will be a guide and will yield the solution of many simple problems. However, if a salesman goes to the Manual and picks out the right numbers: - for the wrong answer, it will permanently destroy a segment of your market.

I should also like to comment briefly on the specific, large potential market areas. The four greatest potential areas which we see at the moment are residential construction, hotel-motel construction, industrial equipment enclosures, and office partitions.

In the residential field lead, laminated to low cost materials, will provide sound isolation not achievable even by expensive construction techniques - only by space, the most expensive construction commodity. Lead-laminates can make toilets private, whether in bungalow, ranch or multi-story construction. In motels and hotels, leaded-panel partitions can provide the privacy of the 8" masonry wall in only three to four inches of thickness. This is unmatched by any other practical panel material. In medicine cabinets it will remove the classic leakage path for sound in both multiple dwellings and hotels.

In industrial equipment enclosures, lead applied by adhesives or double coated tapes can eliminate both noise annoyance and noise hazards by adding damping and increasing the isolation of the thin sheet metal walls. On one project we enclosed, and suitably vented, a portable teletype machine. The case was made of .050" steel and .050" lead. At three feet you can barely tell that it is operating. The same can be done with fans, air conditioners and business machines.

In the office partition field, the standard partitions sell for about $ 15.00 to $ 18.00 per running foot. So-called sound isolating office partitions go for about $ 35.00 per running foot. This includes stuffing the base and the posts with glass fiber. Partitions using lead-laminated steel panels provide more sound isolation than can be achieved by the premium partitions and at a cost between $ 25.00 and $ 35.00 per running foot, and no stuffing is required.

Although lead is one of the least expensive metals, the major drawback in its use in architectural and industrial applications is cost. At its present price, you have a material suitable for use in premium products and particular architectural applications. If sheet lead can be marketed for a cent-and-a-half above pig price as the English and French told me they were doing, you would be able to increase your potential volume many fold. At twelve to fourteen cents per pound you are going to be in a good position to compete with plywood panelling backed by gypsum board and with solid 2-1/4" gypsum and steel partitions.

Based on a laminating cost of 3 to 6 cents per square foot, and using 3 to 6 pound lead at a few cents above pig price, lead has a tremendous sales potential in these and other markets. At 18 to 22 cents per pound you have limited your market.

To get the lead out, into industry and architecutre, we must break the price barrier which I have indicated above, is based on two factors. One is the basic price of rolled lead. The other is educating the architect and contractor to the facts that lead is an easy and simple material to work with and that large mark-ups are not necessary as would be required with new materials of unknown properties.

To really make lead into a fast-selling architectural product will require:

1. Education of architects, contractors, and builders, and

2. Reduction of the gap between pig lead price and delivered, laminated-sheet price at the job site.

Lewis S. Goodfriend
Lewis S. Goodfriend & Associates
Consulting Engineers in Acoustics
Little Falls, New Jersey

April 11, 1962