LEAD INDUSTRIES ASSOCIATION, INC.
292 MADISON AVENUE
NEW YORK 17, N. Y.

December 11, 1962

To Members of the Lead Industries
Association, Inc.:

Attached is a special supplement of the London "Metal Bulletin" which was issued at the time of the International Lead Conference in October.

I think that you may find this report of the meeting, which I think was an outstanding success, of interest.

Very truly yours,

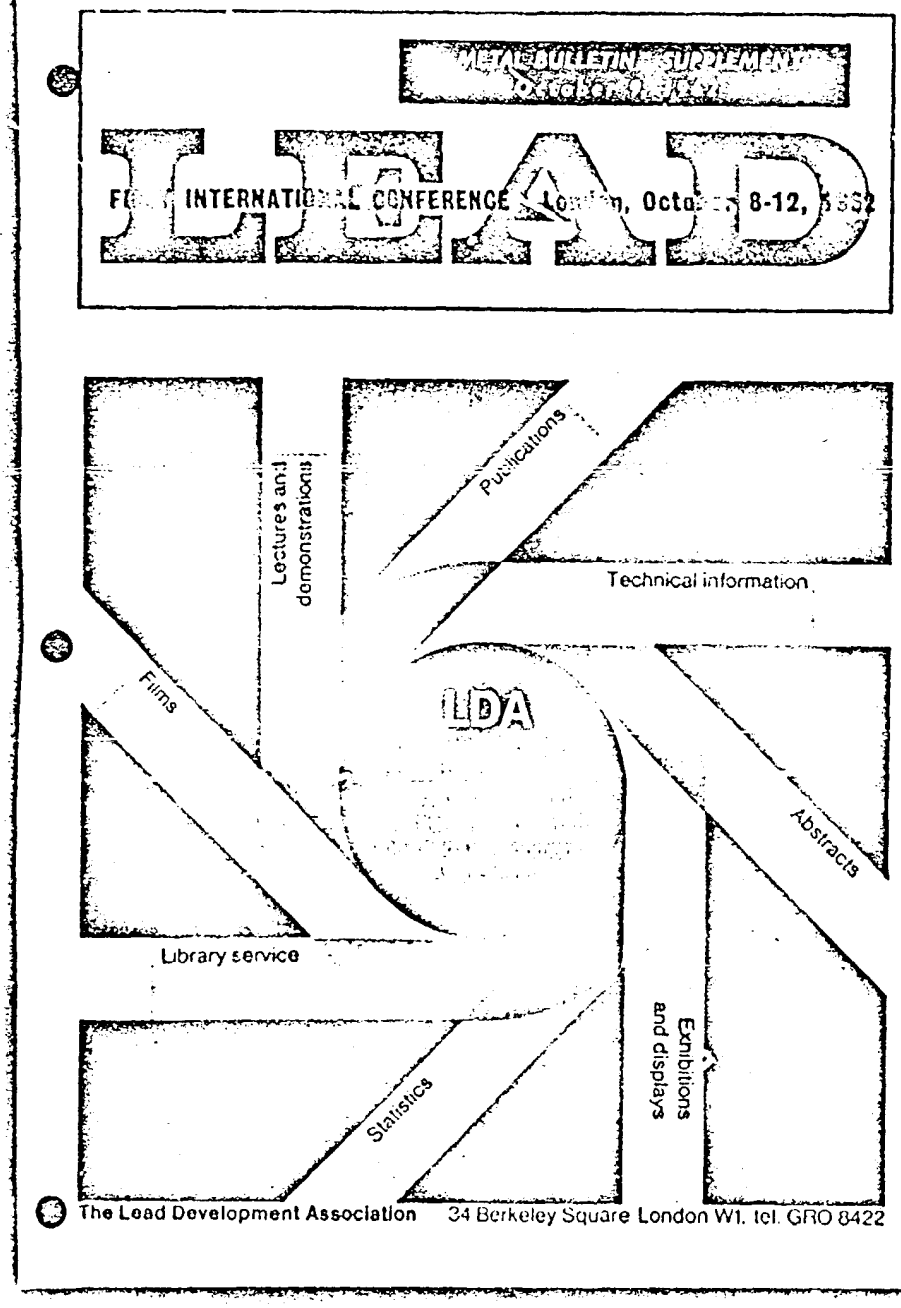
R. L. Zeller

RLZ:mk

Executive Vice President

Look Ahead with Lead

LIA23577



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LEAD Problems and Progress

L. H. Tarring

IT appears to be quite fortuitous that the first International Lead Conference (convened by the Lead Development Association for the European Lead Development Committee and now meeting in London) and the sixth meeting in Geneva of the International Lead and Zinc Study Group practically coincide. Nevertheless the conjunction of the two meetings, studying widely different aspects of the same subject, serves to sharpen the attention currently being paid to lead and to the difficult situation in which the metal finds itself.

One of the main reasons for the International Conference is to exchange and disseminate technical knowledge in order that the industry may offer its customers the best materials and the best techniques, thereby, it is hoped, retaining and broadening existing uses and encouraging new ones.

The technical aspects will be expertly covered in the papers presented at this week's conference and the discussions they evoke and it is not our purpose to go into these aspects at great length in this review. The first International Lead Conference is, however, an obvious opportunity to take a comprehensive look at the world position of the metal; to see how its present difficulties developed and to see what can be done to overcome them. As is so often the case, it is necessary to look backwards in order to understand the present, or to formulate views on the future.

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Recapitulation

After the Second World War lead prices in this country were officially controlled by the British Government until September, 1952 but this was of local rather than international significance and prices moved sharply upwards in the early post-war years as the unrealistic control prices of 1939-45 had to give way to figures reflecting the level of post-war demand and costs of production.

After prices had moved from only £30 in 1945 to £136 per ton in 1950, the Korean war broke out. This aroused fears especially in the USA of a possible shortage and heavy buying forced up prices on the London market to £180 and lead, along with other metals came under the control of the International Materials Conference. This met periodically in U.S.A. and allocated supplies to individual countries. Whilst this rationing system was, on the whole, successful in allaying unjustified fears of an impending famine in supplies it did not prevent the United States the world's biggest lead producer, but nevertheless a substantial post-war net importer from pressing forward vigorously with its plan for accumulating a huge strategic stockpile based on estimated requirements for a five years' war after allowing for domestic supplies.

The scale of buying for the US stockpile was so large – 1,300,000 short tons were accumulated by 1961 or thereabouts that both American and other mine and smelter production were encouraged to expand to, and then to remain at, a level considerably in excess of actual consumption. The surplus was of such dimensions as to be more than sufficient to turn a strong market into a weak one when the artificial support was withdrawn. The problem was aggravated to some extent by the fact that after America's strategic needs were covered the US Government gave way to pressure from domestic mines and stockpiled further large tonnages of domestic and foreign lead in an attempt to hold up open market prices in face of a growing surplus of world supplies. The situation was not helped by the imposition in October, 1958, of import quotas in the USA which seriously restricted outlets in that direction for several major exporting countries. This had the inevitable result of intensifying the pressure of supplies on the world market to the detriment of prices.

US Quotas and After

Just prior to the drastic action taken by the U.S.A. in imposing import quotas (in addition to the not inconsiderable import duties already in existence) in order to bolster up the domestic price and protect home producers, the United Nations called an exploratory international conference in London in September, 1958, to consider the lead situation and determine what, if any, steps should be taken to improve it. In general there was a disposition to favour reduction of exports of lead, but no uniformity of opinion as to whether this should be coupled with curtailment of production. There was a good deal of opposition voiced against the US import quotas. A statistical review forecast a further surplus of supplies in 1959 and there was a good deal of discussion on the desirability of the formation of an International Study Group on lead and zinc; but no definite steps were taken at that time. A further meeting of the lead and zinc conference was held in Geneva in November, 1958, and a third session in New York in May, 1959.

Although it was estimated that the excess of production of lead by primary smelters over consumption in 1957 was

195,000 metric tons and in 1958, 240,000 tons, these estimates could not be taken as a measure of the growth of commercial stocks owing, among other things, to additions to Government stockpiles. Nevertheless, by the end of 1958 heavy commercial stocks had been accumulated, predominantly in the United States and this was obviously a contributory factor to the introduction of the US import quotas. It was agreed that further reductions in commercial production and exports were needed, and various countries agreed to make voluntary curtailments in mine production or concentrates exports. This, however, caused some major difficulties by temporarily limiting production of lead metal whilst building up stocks of concentrates. These, when later smelted, augmented the then current mine output and put supplies out of balance with demand again.

International Study Group

Agreement was eventually reached on the formation of an International Lead and Zinc Study Group, the first meeting of which was held in Geneva from January 27th to February 3rd, 1960. During this meeting voluntary cuts in supplies of lead were promised by leading concerns in various countries but at the second session in September, 1960, it was found that the earlier estimates had been optimistic. Instead of an anticipated deficiency in supplies compared with consumption (after allowing for the promised cuts), a surplus had developed. Australia, Canada, Mexico, Peru and Yugoslavia agreed to restrict output or supplies until March, 1961, when the third Study Group session was held in Mexico. Despite the record lead consumption in 1960 it was found that supplies had exceeded consumption by some 92,000 metric tons, and continued cuts in mine and metal supplies were announced.

At the fourth session in October, 1961, it was found that the cuts in supplies had not been as effective as had been hoped, but it was agreed to continue these since there was an estimated surplus for 1961 of 73,000 tons. The main cuts in output were those in Canada (effective to June, 1962) and Australia (effective to March 31st, 1962) these being made in return for an offer by the U.S. Government to take under barter 95,000 short tons of surplus stocks from Canada and Australia on condition that mine and smelter production were curtailed.

At the fifth session of the Study Group in Geneva in March, 1962, no agreement was officially reached at first as to the further steps to be taken, and the meeting was adjourned until the end of May. The surplus for 1961 was now put at 100,000 tons, but promised cuts in smelter output during 1962 were expected to result in a deficiency of new supplies compared with consumption of some 20,000 tons. Whether this forecast will be realised remains to be proved. So far it has been difficult to convince the big consuming countries who are also substantial producers, that they should reduce output in the interests of the global position.

Oppressive Surplus

Meanwhile, towards the end of March this year the United States for the first time released official details of its huge stockpile of lead which amounted to no less than 1,050,000 short tons in the strategic stockpile plus 244,000 tons in the Commodity Credit Corporation and supplemental stockpiles and a further 8,000 tons in the DPA Inventory, a total of 1,302,000 tons, of which no less than 1,016,000 tons were declared to be surplus to America's revised strategic requirements.

Liquidation Unlikely

For the present no specific suggestion has been made regarding the possible disposal on the market of any of this huge reserve of lead, although President Kennedy's broad intimation that stockpile surpluses should be reduced was enough to send cold shudders down the back of any lead producer in the United States or anywhere else. Actually, having regard to the political power of the mining bloc in the US Senate, it seems extremely unlikely that any of this stockpile metal will, in fact, be released until such time as the lead situation has moved into a much stronger position than it is at the present. Nevertheless, now that offers of surplus stockpile tin have actually begun and the whole question of adjusting America's strategic reserves to entirely new volumetric concepts has become a fact and not a remote

Marking Mills bars at Broken Hill Associated Smelters.

possibility, these huge reserves are bound to cast a shadow over the market for a very long time. Especially when one considers the amount of fuss that was made from time to time over the disposal after 1956 of British Government strategic stocks which – at some 50,000 tons – by comparison were a mere flea-bite.

Mr. Simon D. Strauss, vice-president of the American Smelting & Refining Co., America's biggest lead producer, in an address to the American Mining Congress on September 26th, said, with regard to the stockpile question:

"A fresh overall look is needed. Consequently it would be a good thing indeed if the Congress were to restate at this time – after an interval of 16 years – what it believes to be the proper objectives for a stockpile.

"Should a stockpile only be sufficient to assure a continued production of military weapons in the event of war? Should it take into account the needs of heavy industry for the renewal and maintenance of plants? Should it take into account the possible need for reconstruction of devastated communities and facilities following a nuclear attack? . . .

"Before we proceed to dispose of stockpiles which some people say are excessive in terms of military needs, but which we in the mining industry know are irreplaceable in the sense that they come from exhaustible resources of the earth, before we dispose of these stockpiles we should be quite certain as to what are our real objectives for stockpiles . . .

"Today a substantial portion of these inventories is viewed by some as an expensive encumbrance. Five or ten years from now, if we face the task of rebuilding a damaged economy, these same stockpiles may be considered of priceless value. . . .

"It seems essential that any disposal plan should specify the establishment of minimum price levels below which the Government will not sell . . . Any new disposal legislation which the Congress may enact should embody not only a minimum price but should also provide periodic reviews of the minimum price to ensure that the Government keeps abreast of the times . . . Any new legislation with regard to stockpile disposals must require in quite specific terms that industry be consulted and that details be approved by the Congress.

"Considering the very large quantities that have recently been earmarked as surpluses, limitations of the amounts to be sold in any one year appear almost as important as minimum prices.

"If the Government finds that it wishes to dispose of stockpile surpluses, or as a result of such appraisal of stockpile objectives has been made, then a procedure must be formed that will be least unsettling to the normal operation of the market . . .

"To put on the market today, regardless of price, commodities such as lead and zinc which are already in over-supply, would be an economic crime of the first magnitude."

International Lead Conference
List of Papers

FIRST SESSION

1 "Lead in the Course of Centuries" Dr. Ing. G. Rolandi, *Montecatini and Montecatini, S.p.A.*

2 "The Lead Sheathing of Submarine Power Cables" J. F. Giblin, *British Insulated Callender's Cables Ltd.*

3 "The Work of the International Atomic Energy Agency" G. W. C. Tait, *International Atomic Energy Agency, Vienna*

4 "Various Aspects of the Manufacture and Use of Lead-Sheathed Cables in France"

(a) "General Observations on the Use of Lead for Power Cables in France" R. Tellier, *Electricité de France*

(b) "Report of Tests on Various Alloys Extruded in Series Presses" P. Pattou and G. Pouilleau, *Trefileries et Laminoirs du Havre*

(c) "Making the Lead Sheath and Flexible Joints on the Cossor Submarine Cable" J. Macardier and J. Matheron, *Les Cables de Lyon*

SECOND SESSION

5 "The Competitive Position of the Lead-Acid Battery" A. Hardy, *Oldham & Son Ltd.*

6 "The Use of Lead for Nuclear Shielding in France" A. Sarrot, *Societe Commerciale Plombifere Industrielle*

Discussion on "Recent Development in Research on Lead" Introduced by Dr. S. T. Radtke, *Director, ILZRO Expanded Research Programme, USA.*

THIRD SESSION

7 "The Harwell Standard Lead-Brick Shielding System" R. V. G. Webster, *United Kingdom Atomic Energy Authority, Harwell*

8 "The Uses of Lead and Lead Alloys in the Chemical Industry" H. Besserer, *Bleiwerk Goslar GmbH*

9 "Some Modern Developments in Lead-Acid Storage Batteries" Dr. M. Rirsh, *The Chloride Electrical Storage Co. Ltd.*

10 "The Use of Lead Dust in Battery Manufacture" Dr. C. Reutel, *Accumulatoren-Fabrik A.G.*

FOURTH SESSION

11 "The Continuous Extrusion of Lead-Sheathed Cables"

(a) "The Pirelli-General Continuous Lead Extrusion Machine" R. G. Butler, *Pirelli-General Cable Works Ltd., Southampton*

(b) "Development and Experience of the Hanson-Robertson Continuous Lead Extruder" Brew O. N. Hanson, *AB Telefonverken Kabelfabrik, Stockholm*

(c) "Observations on the Use of the Pirelli-Midano Continuous Lead Press" Ing. G. Davini, *Pirelli S.p.A., Milan*

FIFTH SESSION

12 "The Outlook for Lead" R. L. Stubbs, *Lead and Zinc Development Associations, London*

13 "The Development of Lead Alloys for Cable Sheathing, Contributions of the B.N.F.M.R.A." G. L. Bailey, *The British Non-Ferrous Metals Research Association*

14 "The Manufacture of Special Lead Shields for Nuclear Shielding" H. Arnold Jenkinson, *W. G. Jenkinson*

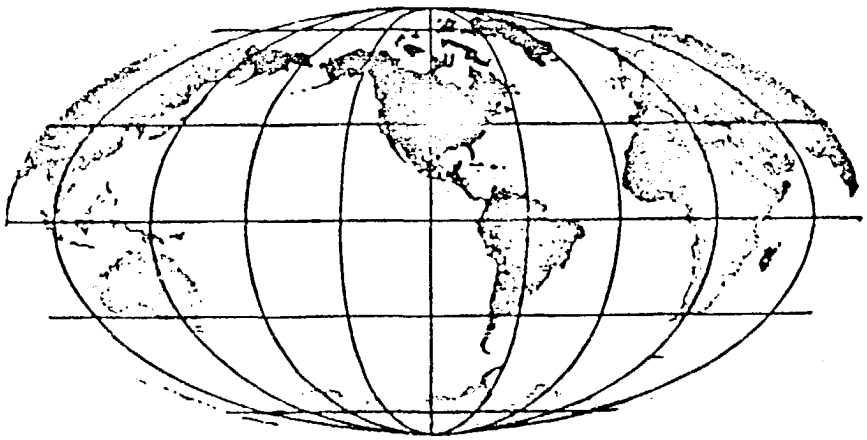
15 "Production of Lead Bricks for Temporary and Movable Shields" G. Vesey, *British Lead Mills Ltd.*

SIXTH SESSION

16 "Recent Developments in the United States Battery Industry" R. L. Ziegfeld, *Lead Industries Association, New York*

17 "An Account of Developments and Progress in Lead-Acid Starter Batteries, Their Development and Future" G. Grenin, *Societe de l'Accumulateur Tudor*

18 "Lead-Acid Storage Batteries in the Propulsion of Industrial Trucks and Mining Locomotives, Uses and Developments" Dr. R. Gainbone, *S.A. Tudorica Accumulatori, Milan*



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American Smelting and Refining Company
120 Broadway, New York 5, N. Y.

ASARCO

The Outlook

The sixth meeting of the International Lead and Zinc Study Group starting in Geneva in a few days' time is bound to be a difficult one and may well be crucial. Recent tribulations of the lead market have perhaps created a greater disposition to consider the possibility of a full-scale international commodity agreement on lead, although such an idea is still strongly opposed by leading producers in many countries though not, perhaps, by all.

Not the least of the problems faced by the world's lead industry is the great diversity of outlook of the many producing countries. Apart from the protectionist and protective attitude of the U.S. Government towards its domestic mines, France and Italy (largely self-sufficient) also have a strongly protectionist outlook and the West German mines are clamouring for protection against the wickedness of the open market by one means or another, ranging from immediate implementation of the ultimate EEC tariff to a subvention from German consumers to ensure a minimum price of £65. As Germany is a net importer, however, the consumers there are not quite of the same mind but present indications are that the Government may push the scheme through. Russia, of course, though restricting exports to the Western world in 1962 to not more than the 1961 level is regarded as something of an unknown factor for the future. Canada and Australia, despite a sizeable internal consumption, are basically looking for export markets for their production and ipso facto favour free and untrammelled markets. Mexico and Peru are even more dependent on exports.

Hopeful Features

A disposition has appeared in the last year or two to regard lead as a metal whose future is anything but rosy. This has grown partly owing to the depression in prices and partly owing to the fact that in some of its major uses it is vulnerable to competition and substitution by other metals and plastics. In this respect it is little different from any other commodity. Metals and non-metals compete for many markets; steel and non-ferrous metals compete and one non-ferrous metal competes with another. This aspect will no doubt be dealt with in some detail in the papers being presented at the Conference, but in the meantime it is worth looking at the record. The rate of growth in lead consumption since the first world war has not equalled that of aluminium, copper or zinc, but it has been better than tin, and in the last decade or so has risen at an average rate of over 3% per annum. Indeed in only one year since 1952 has world lead consumption suffered a setback and compared with 1938 shows a very considerable growth from 1,805,186 short tons to the 1961 level of 2,960,900 tons (ABMS figures) a rise of 64 per cent.

It should also be noted that in the somewhat difficult economic conditions affecting a number of countries in the past year, lead consumption has held steadier than that of some of its competitors. The picture has its bright side therefore, but despite the various output and or sales curtailments, and the lifting of substantial tonnages of surplus stocks off the market, supplies have so far shown a persistent tendency to remain ahead of demand with a consequential downward pressure on prices. Possibly one factor has been that the heavy world demand in recent years for zinc concentrates has temporarily over-stimulated supplies of lead, as such a large proportion of the total world production originates in mixed lead zinc ores. This, however, may not be a continuing factor. Much will depend upon the relative rates of expansion in consumption of the two metals in the future.

Economic Pressure Resisted

The reasons for the depression are complex. In theoretical economics, declining prices should gradually push marginal producers out of production and so restore equilibrium in demand and supply and an economically satisfactory price. Nowadays, however, such basic economic pressures are no longer regarded as inevitable and are resisted by all sorts of means for strategic, political or sociological reasons.

America has intimated clearly that she intends to keep the rump of her lead and zinc mining industry intact and has gone to considerable lengths to achieve this by import duties, import quotas on both ore and metal, outright subsidies to small mines and by taking into Government stocks large quantities of metal for which there was no immediate strategic or commercial need and which are now declared to be surplus.

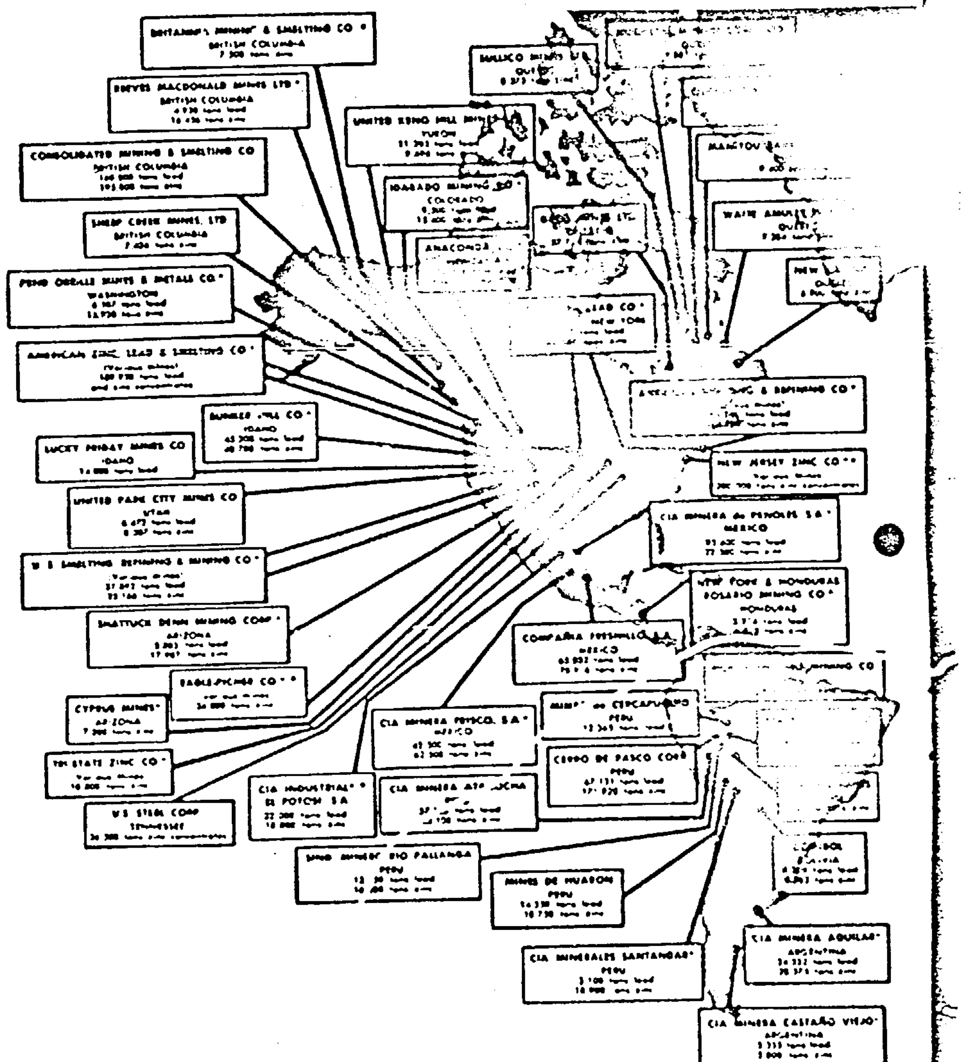
In a number of other countries, for similar or different reasons, mine production has not shrunk in the way that might have been expected. A look (see page xx) at mine output of the largest producing countries over the ten years to 1961 (during which London prices shrunk by more than 50 per cent and have fallen further in 1962) shows some interesting changes in relative importance. The outstanding ones are, perhaps, the decline in the USA and Mexico and

Production and Consumption

(ABMS Figures—Short Tons)

	Production: Mine	Production: Smelter	Consumption	Net Process Metal
USA	260,344	661,067	[illegible]	134,793
Canada	182,997	171,812	49,700	122,112
Mexico	199,876	209,059	41,500	160,159
Argentina	29,700	29,200	29,000	600
Peru	147,628	84,312	*	84,312
Belgium	—	110,109	65,700	44,409
France	20,062	107,571	177,100	69,579
W. Germany	54,306	224,447	280,500	56,053
Italy	49,219	49,740	91,000	41,231
Spain	61,777	85,068	48,000	37,068
Sweden	68,433	42,145	36,500	6,245
Yugoslavia	106,971	97,449	23,000	74,449
Japan	51,013	71,003	104,200	12,997
Morocco	97,341	26,944	*	26,944
N. Rhodesia	16,955	16,955	*	16,955
S.W. Africa	77,683	—	*	—
Tunisia	12,554	21,816	*	21,816
Australia	282,811	217,375	13,000	204,375
Sino-Soviet Bloc	655,000	628,100	627,000	1,100

*No details. Total probably very small.


BRITANNIA MINING & SMELTING CO *
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REEVES MACDONALD MINES LTD *
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CONSOLIDATED MINING & SMELTING CO
BRITISH COLUMBIA
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PEND OREILLE MINES & METALS CO *
WASHINGTON
AMERICAN ZINC, LEAD & SMELTING CO *
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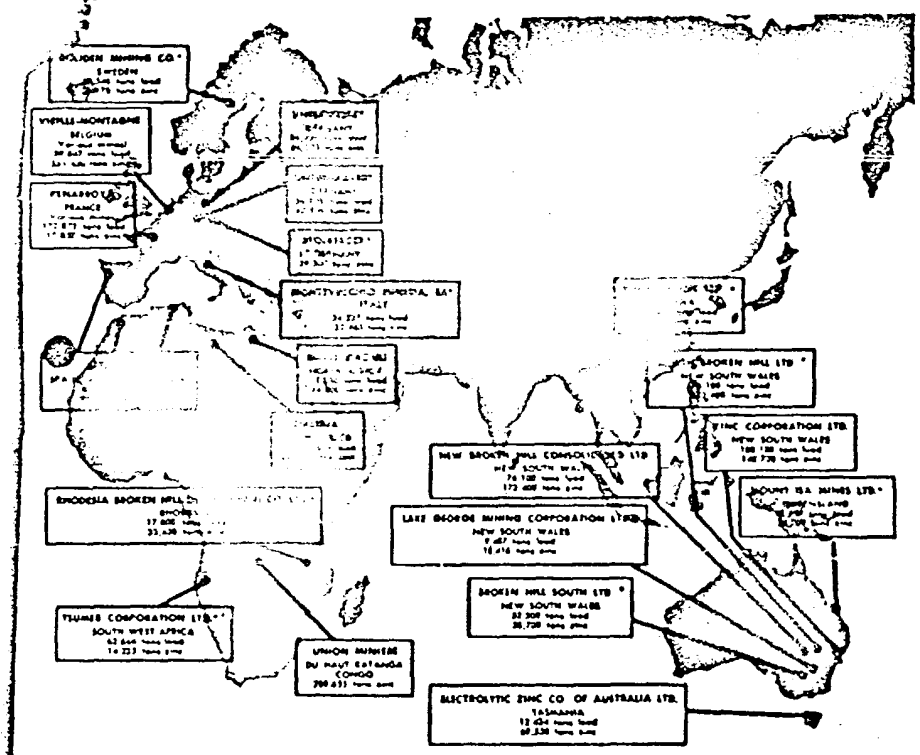
IDAHO
LUCKY FRIDAY MINES CO
IDAHO
UNITED PARK CITY MINES CO
UTAH
U S SMELTING REFINING & MINING CO *
SHATTUCK DENN MINING CORP *
ARIZONA
EAGLE-PICHER CO * *
CYPRUS MINES *
ARIZONA
TRI STATE ZINC CO *
U S STEEL CORP
TENNESSEE
CIA INDUSTRIAL * *
EL POTOSI S A
UNITED KENO HILL MINES
YUKON
IDARADO MINING CO *
COLORADO
NEW JERSEY ZINC CO * *
CIA MINERA de PENOLES S A *
MEXICO
NEW YORK & HONDURAS
ROSARIO MINING CO *
HONDURAS
COMPAÑIA FRESNILLO S A
MEXICO
CIA MINERA FRISCO, S A *
MEXICO
CERRO DE PASCO CORP
PERU
MINES DE HUARON
PERU
CIA MINERALES SANTANDER *
PERU
CIA MINERA AGUILAR *
ARGENTINA
CIA MINERA CASTAÑO VIEJO *
ARGENTINA

World's Lead and Zinc Mines

Map refers to mines producing over 5,000 short tons of lead or zinc concentrates. An asterisk indicates short tons of metal. This map was compiled by and reproduced by permission of Cyanamid International of New York.



the growth of the Soviet Bloc. The effect of the latter on the world position has only in recent years manifested itself in appreciable exports to the Western world. Its impact, however, has been disproportionately large owing to the mystery surrounding the Soviet's long-term export potential and intentions.

Although in spite of import duties and quotas the United States is still a very large net importer of lead in one form or another, these protectionist devices have, in fact, gone a long way to isolate the domestic U.S. position from that of the world at large. American internal prices are not completely unaffected by world open market levels but they are very largely so. It is necessary, therefore, in any appraisal of the world situation to bear this fact in mind. It is also wise to remember that, directly or indirectly, most of the steps taken by the US Administration to help and protect the US lead mining industry have tended to have a depressing effect on the world market price. As more countries seek to protect their own mining industries (whether large enough to meet all internal requirements or not) this factor becomes increasingly apparent. The smaller the open market becomes the more marked is its sensitivity to pressure of unwanted supplies or, alternatively, to shortage.

Important Scrap Factor

In any consideration of lead marketing problems the importance of lead recovered from scrap and residues should never be underestimated. In most of the uses of lead the metal, thanks to its high resistance to corrosion, returns sooner or later as scrap and, at any rate in industrialised countries, the recovery and treatment of lead scrap is highly organized. Perhaps the outstanding example is the battery industry which, as explained later, generates year by year up to 80 per cent of its total lead consumption in the form of scrap. Apart from pigments and lead tetraethyl the other main uses of lead, batteries, cable sheathing, pipe and sheet, all provide a rich harvest of scrap. The net result is that of the total annual consumption of lead probably over 30 per cent is derived from scrap. This secondary lead must of necessity always be able to undersell primary production and must therefore be recognized as satisfying the first tranche of demand. Some of the scrap is most economically reused in recovered alloys but much of it re-emerges as refined lead with satisfactory assay and physical characteristics. To suggest (as Mexico did at the last Study Group meetings) that an international control scheme could be devised based on a proportionate cut in secondary supplies to any curtailment in new metal is wishful thinking and, if pursued seriously, could only lead to trouble. Experience in war and peace has shown that scrap, like murder, "will out".

Price Determination

The London Metal Exchange for very many years has had the traditional role (among others) of providing a home at a price for the world's surpluses. In times of excess supplies such as the present this means that, even if only marginal tonnages are involved, as is in fact usually the case, the effect on prices can be quite pronounced. Like the ripple from a stone thrown into a pond, the effect spreads over a wide area. Many countries have, to a greater or lesser degree, internal price levels different from that of the LME but, outside the dollar area at any rate, the London quotations are still taken as the basic yardstick of values for most of the world's trade.

There has been much talk in recent years either of setting up some machinery that will keep open market price levels within certain arbitrary limits or of finding some alternative method of price-fixing as a basis for business, including direct producer-consumer long-term contracts. As already mentioned, the idea of a full-scale international commodity agreement has been mooted and may well be discussed again. The history to date of such agreements in other commodities, however, has not been sufficiently inspiring to encourage most producers willingly to surrender the right to run their companies in their own way for the benefits sometimes more theoretical than actual which might accrue from letting Governments fix their production and export programmes for them. As the *Financial Times* rather aptly put it recently, international commodity agreements have achieved almost the same status as disarmament; in theory they enjoy the support of all, while in practice it is rarely possible to achieve sufficient agreement on matters of detail to enable a workable scheme to be put into effect.

European Common Market

A factor of obvious importance in the overall situation is the European Common Market. Already a tariff wall is growing round the six countries constituting the EEC and eventually this will amount to the fairly formidable figure of about £4 15s. per ton. It is hardly to be wondered at that the possibility of Britain joining the EEC is worrying Canada and Australia (whose lead enters the U.K. free of duty) very considerably and that they view with alarm the unresponsiveness of the Six to Mr. Heath's proposals that zero tariffs should be granted for lead, zinc and aluminium of Commonwealth origin.

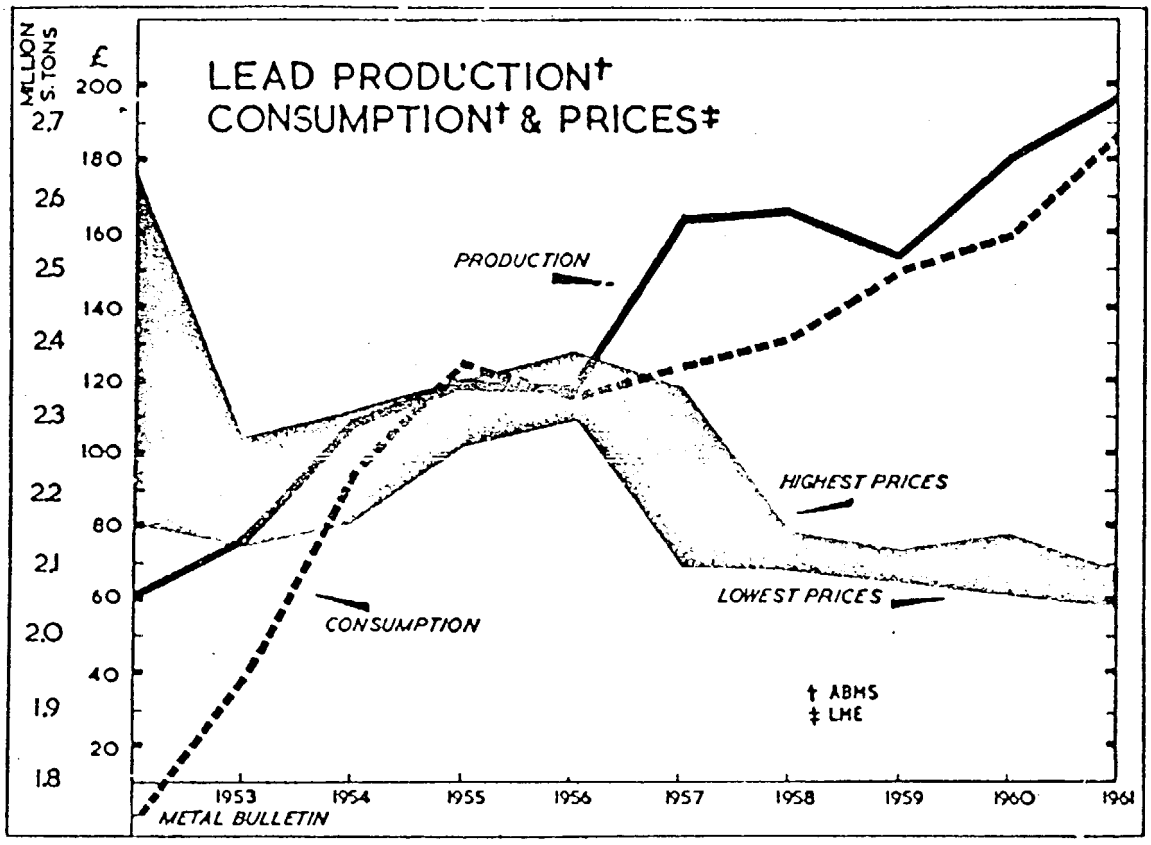
France and Italy, who have long been highly protectionist with regard to their lead and zinc mining industries, are unlikely to give way on this point except, possibly for a very limited period, and they will certainly be supported by the West German mines who, at present, seem to have the backing of their Government in their search for protection against the economic problems of a depressed open market price. At Study Group meetings the Common Market countries have increasingly argued and voted in unison and form a bloc which, in view of its very substantial production and consumption, carries a good deal of weight.

Lead Mine Output

(American Bureau of Metal Statistics—Short Tons)

Average Price		1953 £126 15s.	1956 £176 4s.	1961 £64 4s.
USA	...	390,102	351,826	240,348
Canada	...	168,642	188,854	182,593
Mexico	...	271,196	220,008	199,876
Peru	...	105,571	142,279	147,628
West Germany	...	56,875	72,181	54,586
Italy	...	44,293	51,237	49,219
Spain	...	45,422	64,719	83,777
Sweden	...	22,700	36,097	68,433
Yugoslavia	...	87,048	98,298	106,571
Japan	...	19,642	32,674	51,013
Morocco	...	92,161	93,453	97,343
S.W. Africa	...	30,324	87,480	77,483
Australia	...	247,719	319,167	282,811
Russia	...	170,000*	280,000*	363,000*
Bulgaria	...	n.a.	61,000*	95,000*
Poland	...	28,700*	38,000*	43,000*
China	...	2,200*	40,000*	80,000*
World Total	..	1,966,791	2,405,816	2,507,678

*Conjectural.


LEAD PRODUCTION† CONSUMPTION† & PRICES‡
MILLION S. TONS
£
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2.0
1.9
1.8
200
180
160
140
120
100
80
60
40
20
PRODUCTION
CONSUMPTION
HIGHEST PRICES
LOWEST PRICES
† ABMS
‡ LME
1953
1954
1955
1956
1957
1958
1959
1960
1961
METAL BULLETIN

What is the Right Price?

This is one of the burning topics of the day and one on which a great deal is likely to be heard including, if experience is any guide, a great deal of nonsense. Every country would like to see its lead producers busy and prosperous. Unfortunately today it does not seem to be possible for all to be both at the same time. The problem is to find some means of adjusting supply to demand so that a "satisfactory" level of prices may be established. Not the least of the difficulties in the way of doing so is the different interpretations of what constitutes a "satisfactory" price, even from the producers' angle. In America the Government is subsidising small producers by paying them the difference between the market price and 14½ cents per lb. or a target price of £116 per ton. On the other hand the chairman of Consolidated Zinc Corp. (now The Rio Tinto-Zinc Corporation Ltd.), Mr. Alfred M. Baer, said in May this year that lead and zinc prices at the prevailing depressed prices (lead was then standing at around £60 a ton) were approximately four times as high as they were in the pre-war decade, adding "I suggest that this appreciation is reasonably in line with the cost today of other commodities, goods and services, provided of course increased taxes in specified instances are not taken into account. Perhaps, therefore, these so-called 'depressed' levels of today are not out of balance with the rest of the world's economy."

Who is to arbitrate and reconcile such divergent views?

It would be foolish, however, to ignore the fact that viewpoints on this question have moved a long way in the past quarter of a century. More and more people believe that economic results can, in a large measure, be contrived and should not resignedly be accepted as an inevitable visitation of fate. How far this belief is justified has not yet been finally assessed, but the fight to control the economic elements will almost certainly persist.

The Real Solution

Whatever may, or may not, be achieved by a managed economy in lead, few would deny that the lasting and most solid hope for the future of the metal is a buoyant and increasing consumption to absorb all the supplies that the producers can provide.

To some extent lead has in recent years suffered from its own antiquity. For many centuries lead products have served the world and served them well. Its valuable physical characteristics—high resistance to corrosion, malleability, etc.—came to be taken too much for granted. Latterly, however, the depressed condition of prices and the growing awareness of the threatened encroachment into lead's traditional uses by competing materials has engendered a livelier attitude towards research and development. The industry today is fighting to retain its established markets and to gain new ones. Perhaps its first and most important task is to challenge and defeat the idea that lead is a metal with a splendid past but a diminishing future. To rebuild faith and confidence in the future of lead may take time and effort, to say nothing of money, but there is an obvious awareness in the lead industry of the need for action. Lead production and consumption are in better balance now than for some long while, which is a hopeful feature but the indications are that supplies will remain fully adequate and prices at a competitive level, thus facilitating the development of new markets.

Consumption by Products

There are quite remarkable differences in end uses of lead in different countries as the following figures compiled by the Lead Development Association clearly show. Figures are in thousands of metric tons. Per capita consumption figures are in lb.

W. Germany	1957	77.4		48.1		42.6		29.0		32.2			
	1960	81.9	1.5	71.2	1.0	52.4	2.2	32.7	0.94	38.4	1.6		
Belgo-Lux	1957	18.0		11.7									
	1960	16.2	4.0	6.5	1.6					1.4	0.35		
France	1957	55.2		44.1		56.7		15.6		20.2		2.5	
	1960	60.8	2.95	45.0	2.2	49.2	2.4	17.1	0.84	11.0	0.53	6.1	0.3
Italy	1957	25.0		21.0		29.0		4.5		5.6		4.0	
	1960	27.5	1.1	25.5	1.2	36.0	1.7	6.0	0.28	10.2	0.47	4.8	0.22
UK	1957	116.2		54.4		78.5		30.0		34.8		21.7	
	1960	97.0	4.2	76.2	3.3	85.8	3.7	38.0	1.6	35.9	1.5	27.1	1.2
Austria	1957	2.4		1.5		3.4		2.3		1.9			
	1960	5.0	1.6	7.5	2.4	3.9	1.2	2.1	0.67	1.9	0.61	0.3	0.096
Norway	1957	6.0		2.0		0.5		—		0.5			
	1960	6.4	3.6	1.9	1.07	0.4	0.224	0.6	0.34	0.1	0.064		
Sweden	1957	24.4		6.1		1.0		—		1.0			
	1960	25.1	8.1	9.0	2.7	1.0	0.32	—		2.3	0.74		
Switzerland	1957	10.0		1.6		1.6		0.2		0.5			
	1960	10.4	4.7	3.8	1.7	1.9	0.85	0.1	0.045	1.9	0.85		
Spain	1957	15.5		6.0		25.9		3.0		3.0			
	1960	19.5	1.5	6.5	0.49	22.8	1.7	2.5	0.19	3.3	0.25		
Europe	1957	350.2		196.9		256.2		76.1		99.7		28.2	
	1960	352.0	2.4	255.1	1.7	269.4	1.8	89.3	0.60	107.3	0.72	38.3	0.25
USA	1957	98.4		328.2		99.9		137.2		115.4		160.9	
	1960	54.3	0.66	315.0	3.8	94.0	1.15	112.2	1.37	91.2	1.11	148.6	1.8

The Expanded Research Programme for Lead and Zinc in the United States is probing a number of possible new uses for the metal as well as trying to improve techniques in existing ones. Similarly in this country the Lead Development Association, whose help in the compilation of this supplement we gladly acknowledge is becoming more active. This week's first international lead conference which is being attended by some 250 delegates from nearly 30 countries is itself tangible evidence of this. In Australia a development association has quite recently been formed and is getting to work to promote wider use of lead in Australia and outside it and the Indian Lead Zinc Information Centre is to be opened very shortly. Promotional work is also gathering way in European countries and there is much more international co-operation than ever before.

Results from this sort of work do not necessarily come quickly but in the long run improved demand should certainly result, especially if there is the maximum international co-operation to avoid overlapping and wasteful duplication of effort, time and expense.

Consuming Industries

Despite its long history which stretches back before the Christian era began, lead has played, and is playing, a major part in several very important modern industries. It has been intimately associated with the growth of the use of electricity through its widespread application as cable sheathing and dually with electricity and the motor car industry in the shape of the lead acid storage battery. It has strong links with motor cars and aircraft through lead tetra-ethyl and lead tetra-methyl in high octane petrol and is, so to speak, industrially and strategically right up to the minute as a preferred shielding material for a number of applications in connection with nuclear energy.

Batteries

One of the main outlets for lead is the storage battery industry. Indeed in the USA it is the largest consumer and in the UK nearly the second biggest. At the same time it has to be remembered that it is the largest generator of scrap.

Discussing recent developments in the US battery industry Mr. Robert I. Ziegfeld, Executive Vice President of the Lead Industries Association, Inc., tells the International conference that in 1961 batteries accounted for a consumption of 361,000 short tons of lead, roughly divided equally between grid metal and oxides. On the other hand it generated scrap from which about 300,000 short tons of lead were recovered, giving a net consumption of only 61,000 tons. However, since the bulk of oxides are made from new lead, an excess of secondary lead is produced from old batteries which goes into other applications and the battery industry uses considerably more new lead than appears on the surface.

In America the battery industry's gross consumption in 1961 was about 35% of total consumption and its net consumption about 6%, whilst it accounted for no less than 66% of the secondary lead recovered. For reasons mentioned above, however, the actual consumption of primary lead was nearly 200,000 short tons, or about one-third of all the primary lead used in America. An important point to bear in mind is that the market for replacement batteries is four or five times as that in new cars.

The trend in the early 1950's in America to the use of 12-volt batteries resulted in an increase of 4 to 5 lb. of lead per battery, but was accompanied by longer life, reducing the differential. More recently the introduction of American-made compact cars has resulted in the 12-volt batteries used for them weighing only about the same as 6-volt batteries for conventional cars, thus having the effect of reducing the weight of lead in the average battery.

A difference in the annual production rate of cars of one million can mean a difference of close to 10,000 short tons of lead consumption said Dr. Ziegfeld. Each compact car sold instead of a larger one might mean as much as 3 lb. less of lead or 1,500 short tons per million cars. A 10 per cent increase in efficiency can result in a saving of 7,000 short tons of lead in original equipment batteries in a 7 million car production year, " and it is probably conservative to estimate that battery efficiency or output per lb. of lead has improved more than 50 per cent in the last ten years."

The lead acid battery is still by far the most economical packaged electric power source. Some experts believe that economies in the use of lead in batteries will not be as marked in the future as in recent years, and if this view is accurate " perhaps we can look toward lead consumption in batteries increasing more nearly in proportion to the number of batteries themselves."

Industrial Batteries

With regard to industrial batteries which currently account for about 10 per cent of the total battery market for lead in America, or about 35,000 to 40,000 tons of lead, Mr. Ziegfeld said " We believe that there is a large tonnage potential in the motive power field which has not yet been realized by the lead industry. For example, only about 25 per cent of the industrial trucks, particularly lift trucks, in the United States are battery powered. . . . . We believe that the record for battery power in industrial trucks in Europe is much better than ours and we are taking steps to improve the situation."

[An interesting aspect of this is that in the UK the unions favour electric powered trucks and, with little or no cost incentive to use other types, employers are often therefore favourably inclined towards battery powered vehicles. Ed.]

America be said also seemed to be lagging behind Europe or at least England, in the use of battery-powered multi-

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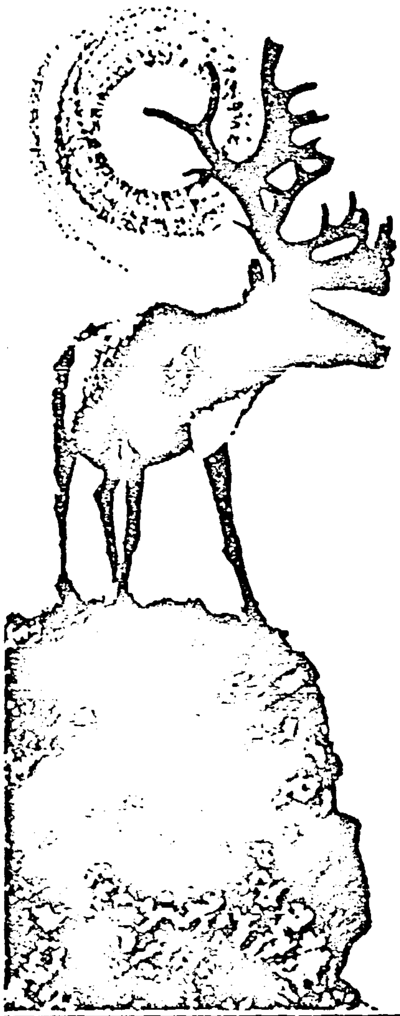

stop delivery trucks, golf carts and their close relatives, personnel carriers. Another possible opening is for small electric passenger cars not supplanting the average gasoline car, but as a complement to it for short shopping and other runs.

Possible Competitors

In another paper on "Some Modern Developments in Lead Acid Storage Batteries" Dr. M. Barak of the Chloride Electrical Storage Co. Ltd. discussed possible competitors of the lead battery. He pointed out that with regard to alkaline nickel cadmium and nickel iron tubular batteries the ratios of watt hrs. lb. and watt hrs./cu. in." are still no more favourable than those of comparable lead acid batteries and as the cost is two to three times as high it is difficult for alkaline batteries to compete in such fields as electric traction.

As far as fuel cells are concerned, he concluded that a practical type using an economic fuel is still not in sight.

Mr. A. Hardy of Oldham & Son Ltd. also discussed possible competitors to the lead battery. Whilst solar cells are being developed rapidly *inter alia* as a source of power for space vehicles he said, the cost of conversion material is high, having been quoted at £30 to £60 per watt and the low energy intensity at the earth's surface with means that a very large area of solar cells would be required to provide appreciable levels of power output.

Of thermal energy batteries (thermo-electric or thermionic) he said that whilst the Russians have reported producing thermo-electric devices which convert waste heat from kerosene lanterns into electric power sufficient to operate radio receivers and transmitters" very considerable development is still required as" those engaged in this field are limiting the field of application to space satellites and nuclear power."

Nuclear energy can be converted to electrical energy on a variety of ways, states Mr. Hardy. However, little data is available of costs" but, in general, these will be high".

Comparative Costs

Of orthodox cells he gives the following interesting table of comparative costs and life, commenting that the figures are based on a 100 A.h. capacity and on the fact that the average car battery is much smaller in the region of 34 to 60 A.h. at the 20 hour rate." The actual cost is thus less than £13.3s." As few owners expect 20 years' life from a car "they are not interested in an expensive nickel battery with this potential life duration."

Comparison of 12v 100 A.h.

Type	*Initial Cost*	*Life*	*Cost per Year*
Lead acid automotive ...	£13 6s.	3 yrs.	£4 8s.
Industrial	£23 6s.	6 yrs.	£3 18s.
Nickel cadmium sintered ...	£100	10–20 yrs.	£5–£10
Silver zinc	£266	1 yr.	£266

Mr. Hardy concludes that "For the next decade it seems reasonable to regard these new devices as complementary to, rather than supplanting, the conventional systems in which the lead acid battery will continue to dominate for a long time to come."

Cable Sheathing

The European Lead Development Committee, after a survey in 1961 reported that more than a third of a million tons of lead is used to sheath cables each year in Europe and in every country at least a quarter of the total annual lead consumption is applied to cables. Telegraph cables were first sheathed in lead in 1845 and the metal has thus given excellent service for over 100 years. There has, however, been a partial replacement in recent years of lead by other metals or plastics in some classes of cables. In America the downward trend of lead in cables has been marked in recent years, but in Europe the consumption has remained essentially constant although somewhat below peak values that have been recorded since the war. Substitution was materially encouraged by the high prices for lead at the time of the Korean war. After examining the role played by various competitors to lead in this field the Committee concluded:

> In most European countries it appears that no significant change in the present usage and application for lead is to be expected over the next three to five years. Replacement is either virtually complete (for example by aluminium on trunk cables in Norway) or else both manufacturers and users agree that a further period is necessary to gain experience before the new constructions can be considered as "proved". Furthermore with the present price of lead, much of the incentive to use alternatives has disappeared. In general some further replacement of lead may be expected but an increased cable production is also anticipated and this should at least help to maintain lead consumption at its present level. In some countries a modest increase in consumption may even be evident. Finally, to illustrate the continued confidence in lead and faith in its future it may be noted that a number of companies have installed or ordered new lead sheathing equipment (continuous machines) over the past few years.

In his paper to the Lead Conference on the use of lead for power cables in France Mr. R. Tellier of L'Electricite de France pointed out that some 56,000 tons of lead were used in 1961 in the French cable industry. It was only likely, he said, that aluminium would replace lead in the foreseeable future for particular applications. The trend towards the use of steel pipe high voltage cables had been confirmed in France but lead still is the main material used for the water-resistant sheaths in medium and low tension cables.

He referred to the cross Channel cable between England and France which is one of the most interesting recent developments in lead-sheathed submarine cables. The extrusion of lead sheath is being carried out at four plants in lengths of 2.5 kilometres, with flexible joints. On the basis of preliminary tests it was decided to adopt an alloy containing 0.2% Sn and 0.075% Cd for a sheath 2.6 mm thick. Armouring is supplied by 28 galvanised steel wires of 6 mm individually lacquered and covered.

Despite the competition which lead has to meet in this field it is interesting to note that in the U.K. consumption of lead in cables this year has come fully up to expectations and shows a sizeable gain as follows (British Bureau of Non-Ferrous Metal Statistics' figures, in long tons):

	January–July		
	1960	1961	1962
Lead used in Cables ...	55,759	56,621	61,825

Nuclear Shielding

The use of lead as nuclear shielding is one which has attracted a lot of attention although as yet it represents only a small proportion of the total use of lead. Mr. G. Vestey (British Lead Mills Ltd.) points out in his paper to the Conference that while large static installations "can be adequately shielded by concrete, water or even only air, there are many cases where temporary or movable shielding is required."

After outlining the characteristics needed for such shielding Mr Vesley claims that lead being the most abundant and easily the cheapest of the heavy metals is clearly the best available material, adding that in brick form a weight of 35 to 40 lbs is a maximum for convenient handling without mechanical aids. As a basis for design a 4" cube weighing 26½ lbs was selected together with a 4" × 4" × 2" unit. To avoid any direct path through the wall between courses the "chevron" brick was designed with two 4" × 4" opposing flat faces and the other four sides consisting of two male V's with 90° angles and two female V's to match. Where more substantial shielding is required and mechanical lifting tackle is available a 7" and 10" system is adopted. The lead bricks can be produced by a variety of methods including gravity casting, gravity casting plus machining, pressure casting, pressure forming (compacting) and machining, extrusion and machining and gravity casting and cold pressing.

Mr H. Arnold Jenkinson (W. G. Jenkinson Ltd.) states that the standard alloy for lead shielding, both bricks and isotope containers, is 4 per cent antimonial lead to conform to the U.K. specification A1 SS10420. Where a curved form of pouring is required pure lead may be used. In the construction of X-ray rooms lead sheet up to ¼" may be used but where exceptionally large shielding is required thickness of 1" to 12" or more may be necessary. For instance the shielding required for the NS Savannah gives dimensions of 35' diameter, 57' length and over 500 tons weight. The lead was supplied 6' × 3' in area and 1" to 2" thick.

Mr G. W. C. Tait of the International Atomic Energy Agency, Vienna, makes the interesting comment that, as a result of technical considerations, the demand for lead in large nuclear establishments can be quite variable. "In one typical establishment, Chalk River, it is doubtful if on a steady yearly basis more than 10 to 20 tons per annum (of lead) would be accounted for, whereas the automobiles of the workers alone would account for 20 tons of lead per year and their homes for an equivalent amount. In contrast it is estimated that Saclay uses several hundred tons of lead per year." He went on to say:

> On the average (in various countries) we can presume that for each installed power capacity of 1 Megawatt, about 7 tons of lead products will be consumed. That is, whereas a nuclear power reactor 500 MW electrical capacity would probably account for less than 5 tons of lead in its structure per year of expected life, the associated consumption of lead by the users of the power will be of the order of 3,500 tons per year. The lead industry's most obvious hope of increasing consumption lies, therefore, in a general increase in the industrial development of a country, which must in time depend on the availability of power.

Sheet and Pipe

Another long established and important use of lead is in the form of sheet and pipe. A rather surprising fact in this field is that the consumption in the U.K. has always been much bigger proportionately than in the USA and, despite broadly similar climatic conditions, also considerably larger than in European countries.

The outlets for lead pipe cannot truthfully be said to show much promise of expansion at the present time. Indeed they are tending to shrink. Lead sheet is no longer used extensively for roofing, but for flashings, weatherings, damp proof courses, etc., it is eminently suitable and is finding a growing market. Figures of consumption almost invariably lump sheet and pipe together and in the aggregate

they appear to be fully holding their own. Efforts are being and will be made to encourage use in Europe on a scale closer to that existing in the UK.

In recent years competition from plastic piping has become a very real factor and an added problem to the loss of some building tube outlets to copper and galvanized iron. Indeed, some lead pipe manufacturers are interesting themselves in plastic pipe production as indeed have also some copper tube manufacturers. In some quarters it is felt that the lead pipe industry is too apt to think in terms of the former palmy days and that a more expansionist and dynamic policy is called for if the loss of outlets is not to become acute. At today's prices of pig lead the opportunity for aggressive marketing could hardly be bettered.

Apart from the usual uses of lead sheet in the building industry referred to above, a good deal of interest has been shown recently in the potential importance of sound insulation as an outlet for thin lead sheet. This has been used so far in only a few buildings where special considerations have governed its use. It can be used in various ways in internal partitioning, by bonding it to various types of building board. Whether there will prove to be any large commercial market has still to be proved but a lot of promotional work is being done to build a new channel of lead consumption. In this connection it is hoped that the continuous sheet casting machine developed in Australia will be a helpful factor.

Speaking on the uses of lead and lead alloys in the chemical industry, mainly in the form of pipe or sheet, Mr. H. Besserer (Bleiwerk Goslar GmbH) showed the close connection between lead consumption in the chemical industry and the production and consumption of sulphuric acid. He claimed that lead has succeeded against many competitive materials. To meet the requirements of the chemical industry a number of special lead alloys have been developed and different methods of fabrication devised. Problems arising because of high processing costs were also discussed.

Leaded Fuels

With the development of the high compression internal combustion engine and the need for high octane fuels a new and important outlet developed for lead in the form of the fuel additive, lead tetraethyl. The use of this grew rapidly, first in the United States and then in Europe, with the UK ranking as a producer and a large consumer. In this instance the metal is used to destruction so that there is no scrap return factor. In 1961 America used some 155,000 tons of lead in this form and the UK 25,250 tons, though some of the latter figure probably represents exports. There is now some production on the Continent which may be reflected in a smaller UK lead offtake for this purpose, although in total an upward trend is expected. The growing use of jet engines in aircraft is reducing considerably the use of high octane fuels in that direction and therefore of lead tetraethyl. But the growing number of motor cars in use throughout the world leads one to expect an upward trend in the over all consumption of lead, even though there are, of course, alternative, or competitive methods of producing high octane petrol, especially from certain types of crude oil.

To keep pace with the more volatile petrols in general use the trend is for lead tetra-methyl to be substituted for lead tetra-ethyl but as far as lead consumption is concerned this represents little or no change. In the USA and the UK probably 90 per cent or more of the petrol used in motor cars is leaded but in many other countries there is room for further growth. In Russia, for example, although the use of leaded fuel is growing it is probably not more than 25 per cent of the total so far.

Alloys

A great deal of lead is, of course, used in alloy form. Battery plates are one big outlet for antimonial lead, and, as indicated elsewhere, 4 per cent antimonial lead is a common alloy in nuclear shielding. The other main alloys absorbing lead include solder, typemetal and bearings.

The starting point for lead alloys is very largely scrap and residues but there is naturally also a considerable consumption of new metal. In solder there is a certain amount of downward pressure on individual items of consumption due to such factors as competition from plastics in body solder for car repairs, although in the new models solder is still mostly preferred. The growth of printed circuits and the miniaturisation of much electric and electronic equipment also tends to limit the amount of solder used per unit, but with the overall use of such products steadily growing the aggregate demand for solder still trends upwards.

Lead is also, of course, a substantial constituent of typemetals, but the outlet in this direction is limited as typemetal has a very long life. In bearings the lead tin babbitts are subject to quite a bit of competition from other metal bearings, and from plastics. However, although they are currently taking a rather smaller percentage of the total trade, it is a smaller percentage of a larger and still growing market so that in total lead consumption in this direction is expanding rather than shrinking.

Lead in Steel

A use of lead that is at present of limited importance as regards tonnage but which has considerable potentialities, is the addition of a quarter to a third per cent of lead to bright steel bar to improve its machining qualities. If tellurium is also added to leaded steel even faster cutting speeds can be achieved, but tellurium being a by-product metal and in limited supply, there are difficulties in the way of building up this development. Alternatively selenium can be used instead of tellurium, but although this is in rather easier supply at the present time, it is also a by-product metal.

Pigments

Lead pigments have, of course, a long history and still consume quite a lot of lead, though not nearly as much as they did thirty or forty years ago. In 1961 the UK consumption in white lead, lead oxides and compounds (other than for batteries) amounted to some 32,000 tons whilst the American annual offtake in pigments is of the order of 80,000 tons to 85,000 tons a year. (See also table on page xxiv).

Miscellaneous

There are, of course, many other less substantial uses of lead such as lead shot, bullet lead, collapsible tubes, foil, lead yarn, window lead, ornamental lead castings, etc. Variations in the level of demand for such products, however, is unlikely to be of sufficient importance to affect the broad position of the metal.

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