

LEAD INDUSTRIES ASSOCIATION

420 LEXINGTON AVENUE

NEW YORK 17, N. Y.

THE LEAD INDUSTRY IN AUSTRALIA

Frank A. Green, Works Manager
The Broken Hill Associated Smelters Proprietary Ltd.,
Port Pirie, Australia

Before presenting my subject, I should like to convey, through you Mr. Chairman, greetings to this gathering from all those who, in their various vocations, make up the lead industry in Australia. I understand that we have not been previously directly represented at this convention, and I feel honoured to have been chosen to come and take part in your discussions.

Before turning our attention particularly to lead, I should like to say something about Australia as it is today. We are a large country physically - close in area to the U.S.A. - but our entire population is no more than that of the City of New York. Moreover, of our 8 1/2 million inhabitants, no less than 4 million are concentrated in the capital cities of the 6 states. Although large tracts of northern and central Australia are practically uninhabited, it is obvious that the balance of our population is thinly scattered over very wide areas. This brings its special problems of long and expensive lines of communication, transportation and defence difficulties and rural holdings of immense size manned by little more than half a million working people. These factors, together with our other features of climate, topography, natural resources, and the manner in which our national development has taken place, have a direct bearing on the production and consumption of essential commodities, including lead.

Our basic wealth has been built up on wheat growing and wool production, but, in recent years, we have seen a great industrial development designed to make Australia largely self-sufficient and capable of supporting a greatly expanded population. Our numbers are being steadily built up, aided by a vigorous scheme of immigration, which in time should go far towards solving Australia's manpower problem to meet its changing needs.

We have participated in two world wars at a very great cost both financially and of manpower. The last war alone cost us over 8 billion dollars in direct expenditure. Today we are faced with the problems of maintaining our trade balances and of obtaining the capital requirements particularly needed in a young and expanding nation.

Presented at the 24th Annual Meeting, Lead Industries Association, April 18-19, 1952, Chicago, Illinois.



Frank A. Green

-4-

Lead, because Nature has endowed us with two immensely rich ore-bodies, makes a substantial contribution to Australia's earning capacity. Over 75% of the total mined production of lead is available for export, and in the year 1950-51 it followed next in order to the agricultural exports, totalling some \$45 million.

The Broken Hill field has been worked for about 70 years, and has produced in that time approximately 8,000,000 tons of lead. This year, production at Port Pirie, where the full output of the Broken Hill lead concentrate is treated, will be about 185,000 tons of refined lead. There is great developmental activity at both ends of the field, where the ore-body is being pursued at depth and, to date, work proves the continuance of the lode as regards tone per vertical foot and grade, but probably the southerly plunge is flattening. At the northern end a new main shaft is being sunk by North Broken Hill Ltd., which will eventually be taken to 5,000 feet depth, and the centre of gravity of this Company's operations will move towards this shaft. Present output of this Mine will be maintained in the future, and no marked expansion is planned with the new developments.

It is only recently that the full importance of the southern extension of the Broken Hill lode has been appreciated. Full development of these extensions will be completed in about seven years' time, when the total production from the whole field may well exceed 225,000 tons of lead a year. The richness of this ore-body is phenomenal, and a fair average value over the field would be about 1½% for both lead and zinc.

Mt. Isa is a newer field, coming into production in 1931, and due credit must be given to the American Smelting and Refining Company, for its initiative and energy in helping to bring it into production. The scale of lead output is about 39,000 tons of lead a year, and though this field has suffered through labour shortages and transportation difficulties, as indeed Broken Hill has also, indications are that, with the reserves in sight, and new discoveries particularly the locating of one entirely new lead-zinc deposit, production on the present scale will be maintained for many years. In fact, neither in the case of Broken Hill nor of Mt. Isa can any limitation to the expected life of the ore-body be given today. Suffice to say that both are expected to be still in production at the end of this century.

Further useful contributions, which total about 10% of Australia's lead output, are made from the Road-Rosebery Mine of the Electrolytic Zinc Company in Tasmania, from the Lake George Mine at Captain's Flat in New South Wales, and from the Northampton field in Western Australia. In Tasmania, too, Zeehan Mines are continuing development of the Oceana lode where results are encouraging.

Summarising output then, the mine production of lead in Australia this year will be some 245,000 tons, of which 75% will be smelted and refined at Port Pirie (the only plant producing refined lead in Australia); 16% will be smelted to bullion at Mt. Isa and exported to Great Britain for refining, while the remaining 9% will be smelted abroad, chiefly in this country.

Note: All tons quoted are short tons.

Frank A. Green

-3-

What are the markets for the Australian production? Home consumption is about 55,000 tons per annum of refined metal, and of the balance available for export, some 70% is purchased by the United Kingdom through the British Ministry of Materials. This includes both refined metal from Port Pirie and Mt. Isa bullion refined in Great Britain. Australia also supplies the full lead requirements of New Zealand, and part of the requirements of India, Pakistan, South Africa and Europe, and substantial tonnages of refined metal are being received in this country. As you are aware, large tonnages of Australian lead have also recently been purchased for the U. S. stockpile. In view of the now reduced lead stocks in Great Britain these sales are unlikely to recur, but apart from this no major departure in the pattern of sales is expected.

It may be of interest to you now to have an analysis of the various uses of lead in Australia, although we must qualify this analysis by saying that we have not the same detailed check on lead uses that you have in the U.S.A.

In 1950 lead was distributed approximately as follows, and a useful comparison, I will mention corresponding figures for U.S.A. As I said just now, our lead statistics are not as plentiful as yours, and the Australian figures refer to refined lead only.

Uses	U.S.A. (total lead)		Australia (refined lead only)	
	tons	%	tons	%
Storage Batteries	406,800	34	5,700	13
Cable Covering	136,800	11	7,000	15
Tetracthyl	111,100	9	-	-
Rod Lead and Lithargo	75,900	6	6,000	13
Construction	61,500	5	8,800	19
White Lead	34,000	3	8,800	19
Ammunition	32,800	3	400	1
Other	353,100	29	9,100	20
TOTAL	1,212,000	100	45,800	100

Some of these figures are of great interest. White lead consumption in Australia is particularly high, partly due to the relatively low domestic price of which I shall have more to say later. The large consumption by the building trades, although also affected by the price, is due principally to the low usage of copper and to different building specifications. There is no tetracthyl production in Australia.

Frank A. Green

Taken overall, the consumption of virgin lead in Australia is 11-lbs. per head of population, compared with a virgin lead consumption of 11-lbs. per head, out of a total lead consumption of 16-lbs. per head, in U.S.A. A parallel comparison exists in the case of slab zinc, where the respective figures are 12-lbs. and 10-lbs. for Australia and U.S.A.

These relatively high consumption figures in Australia are influenced by the fact that the price of refined lead for domestic consumption has been fixed by the various Governments at 265 Australian per ton, i.e., 6½ cents per lb. With lead available at this price, there is less incentive to seek lower priced substitutes than where the metal has to be purchased for, say, 19 cents per lb. as in Great Britain and U.S.A. On the other hand it can lead to extravagant and inefficient uses of the metal.

The Government exercises another control on the lead industry - and a very useful one - in its regulations governing the handling of lead materials. These have had a salutary effect in reducing health hazards, and minimising lead poisoning, and no doubt you have corresponding legislation here.

As there are many metallurgists here today, it may be of interest to say a little about the operations of The Broken Hill Associated Smelters Pty. Ltd., at Port Pirie. Port Pirie is situated on Spencer Gulf in South Australia, and is 250 miles distant from Broken Hill by rail.

As I have said before, our plant treats the whole of the Broken Hill output of lead concentrates, and our main operations comprise the standard treatment of sintering of concentrates, blast furnace smelting of sinter, and refining of lead bullion.

Some of our processes and equipment are rather unique in lead metallurgy; e.g., our sintering plant consists of two large Dwight & Lloyd machines, each of 10' width and 50' wind-box length, and the whole output from the plant is treated over these machines. We have paid a great deal of attention to the development of the lead blast furnaces, and many of you are aware that we have standardized on a completely water-jacketed furnace with semi-circular ends, and two super-imposed rows of tuyeres, the lower row being set at 5' apart horizontally, opening out to a shaft width of 10', where the second row of tuyeres is placed.

Our new standard furnace is 25' in active length, and, based on new refined lead output, will produce about 280 tons of new lead a day.

For the last 20 years we have been using the continuous process of refining which was invented by Dr. O. K. Williams, former Works Manager of my Company. This has been mainly satisfactory, and, of course, is particularly suited to our conditions of tonnages and composition of lead bullion, but at the same time, it is of great interest to us that certain companies in America have successfully adopted certain parts of the continuous refining process on a different scale of production and composition of bullion from ours.

Frank A. Green

At the present time we are experimenting with a large scale pilot plant for the continuous treatment of desilverized lead by the vacuum desinching process originally established on the batch scale by the St. Joseph Lead Company, and we are very hopeful, from the encouraging results so far obtained, that this will fit into our continuous refinery system very well.

Our latest project, which will take some time to complete, is the construction of a new large sintering machine, which will be very novel in operation in that it will use an upward blast of air through the sinter bed, instead of the standard down-draught principle. We feel from our test work that it offers special advantages in strength of gas, better continuity of operation and improved speed of roasting, and we are planning to take gas from this machine through a purification plant, which is now being built, for final manufacture into contact acid in a conversion plant, which is now approaching completion.

In Mt. Isa's case, their metallurgy is largely determined by their own ore and milling problems. Their lead concentrate contains about 35% lead, and is high in sulphur, and they have developed a unique sintering operation, whereby the raw concentrate is mixed under pressure in a ratio of one part of new charge to three and a half parts of returned crushed and screened sinter, to make the sinter plant feed. After copper dressing, Mt. Isa lead bullion, as I have said, is exported to Great Britain for refining.

Returning to the general picture Mr. Chairman, we have seen that a large and assured supply of lead can be expected from Australia for many years to come - a supply that will be largely available for export. There is no reason for us to think that the present fields represent the limit of our lead resources, since Australia is a vast country, with boundless possibilities for further mineral discoveries.

There may be other Broken Hill's and Mt. Isa's awaiting the prospector's hammer, or instrumental survey to bring them into our ken, and, of course, suitable economic conditions to permit their development.

In recent years, a great deal of mineral exploration work has been carried out in Australia, and in due time the results obtained may be the means of adding new tonnages to Australia's lead output. The discovery of the great copper ore-body in the footwall of the Mt. Isa lead lode, and the discovery of the new lead ore-body at what is known as "Eleven and a Half Miles North" are examples of what exploration can lead to even within the close proximity of a known lode.

I feel I cannot let this opportunity pass without a reference to the part the U.S.A. has played in the development of our lead resources. As one who has been actively engaged for over a quarter of a century in the metal production side of the lead industry, I should like to pay a sincere tribute to the help and inspiration we have received from the mining engineers and metallurgists of your country.

Frank A. Green

-6-

In our early industrial years we drew heavily on their knowledge and technical skill. These were always freely placed at our disposal, and throughout the years that fine spirit of co-operation has continued, and has resulted in many lasting friendships between your technical officers and our own. Without the constant assistance and advice that we have received we should have been unable to do what we have done to develop the production of lead in Australia. American capital and American 'know how' will and must play a big part in Australia's further mineral development, and recent moves in the study of our uranium fields point that way.

I would like, in conclusion, to place on record my appreciation of the cordial reception my officers and I have always received at your hands, and which we have tried to reciprocate when your people have visited Australia.