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THE COMPETITIVE POSITION OF LEAD

by

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I propose to speak to you today mainly about the competitive position of lead. As a rule prospectors and mining men are so completely absorbed on the many problems involved in finding and producing lead that they usually have only limited time to study the economic forces constantly at work on the lead market and which determine whether or not the price of lead is high enough for a mine to be operated profitably, whether additional prospecting is warranted, or whether a going mine must shut down. On the supply side, the effect of hundreds of individual lead mining operations all over the world leave their stamp on the price of lead in a free market, but it is the other side of the economic picture which I wish to discuss, namely, the demand for lead and the competition it must meet, with a word or two about the future. This critical period in our economic history, now that Government controls on price and imports have been lifted, is a good time to make the survey I have in mind.

The current lead shortage has been so widely advertised that it would be quite easy to obtain the impression that little lead is going to industry these days. On the contrary about 800,000 tons of lead will be consumed by American industry in 1946, despite labor shortages and recent restrictive

Government regulations. This is a larger tonnage of lead than was consumed annually in the United States in 1936, 1937, 1938, 1939 or 1940. The shortage today is created by a deficiency in production and imports in meeting the great postwar increase of lead requirements in every direction, demands which are estimated to total over 1,000,000 tons per year.

We are apt to forget that the United States is still growing and that our standard of living requires a constantly increasing supply of all metals.

Every metal has certain qualities that give it a preferred position in some markets, iron because it is relatively inexpensive and structurally strong has immense application in construction of all types. Copper, because of its remarkably high conductivity is immediately thought of in the electrical field. Zinc, because of its unique protective qualities on ferrous products, preempts the coated metal field, aluminum, because of its lightness serves the airplane industry.

When we come to lead, we have a somewhat different situation. Lead has many qualities that give it unique and wide application in industry but with no single quality dominant. Such characteristics as its weight, unusually high atmospheric and chemical corrosion resistance, softness, ease of forming useful chemical compounds such as white lead, red lead and litharge, and even its toxicity, all provide large markets for the metal. In fact, you might well say that every quality that lead possesses finds some application in industry just as, it is said, in slaughtering pigs, they even use the "squeal."

When we analyze the outlets for lead, however, we are struck by the fact that three or four uses are of outstanding significance and I want to devote a little time to discussing them, and their significance to your lead mining operations.

First of all, we have the storage battery industry which consumes about 300,000 tons of lead per year. At the same time, however, from a conservation standpoint, the storage battery consumer returns to industry a large proportion of the metal converted to storage batteries each year so that we must consider the storage battery industry as merely borrowing the major portion of the lead it uses. We made a survey some time ago to ascertain how much metal was ultimately recovered from the storage battery industry and came to the conclusion that 80% of the lead used in storage batteries is ultimately recovered as scrap. The storage battery industry is, of course, firmly tied in with automotive construction and use. It has that field exclusively for its own. There is no competition worth mentioning unless it would be the hand cranking of automobiles. From time to time other batteries are invented, and the nickel-iron battery is well known to my listeners, but to serve the automotive industry, a low cost metal in plentiful supply must be selected and the field is narrowed down very speedily when those two important requirements are examined. Therefore, I look to the continued use of large amounts of lead for storage batteries for an indefinite period as one of the fundamental outlets for the lead miners and smelters in the United States. Let us chalk up, therefore, at least 300,000 tons of lead as the amount the storage battery industry will need per annum for the next year.

The second largest use of lead is by the electric cable industry, both for telephone toll cable, which is so well known in our metropolitan centers and may be found stretched on poles alongside railroads through the United States, or buried in the ground, and also electric power conductors for underground high-tension power communication. The large growth in the use of telephones in the United States, and the prospect of still further growth, will require extraordinarily large amounts of lead.

The American Telephone & Telegraph Company recently announced that it would expend about $2,000,000,000 to enlarge its facilities in the United States and that, within the next three to five years, some 20,000 miles of toll cable will be required, 12,000 miles of it coaxial cable for television purposes, as well as for phone messages. I am reliably informed that this program alone will necessitate a consumption of about 135,000 tons of lead per year for telephone cable sheathing. This estimate does not take into consideration the requirements of the power cable industry for high tension underground installations. An estimate I received from qualified experts leads me to believe that about 75,000 tons of lead a year could be utilized for power cable construction next year. Substitution for lead in cable manufacture can only be done with great difficulty.

All in all it looks as if the cable industry will require for the next few years some 210,000 tons or more per year. Although 200,000 tons of lead may appear record-breaking, it is approximately the tonnage consumed by cable manufacturers back in 1929 and 1930 but it is far greater than the cable requirements of recent years when construction of all kinds fell off.

Now let us pass on to the third important market for lead, namely the requirements of the building construction industry. If we include in building construction, both residential and industrial structures, and also the lead products such as paint used in the maintenance, as well as in the actual construction of buildings, we again arrive at a large demand for lead. If, in addition, we also consider another great building outlet - chemical plant construction, the total reaches impressive proportions and becomes the second largest collective outlet for the metal.

Wherever sulphuric acid is used, lead is in demand but it meets competition of rubber, glass, plastics and stainless steel. Fortunately for lead, the current higher price should not prove too much of a barrier to its continued selection as a preferred material with sulphuric acid because chemical

installations of lead can generally be salvaged in toto, and the salvage value of lead must be deducted from its first cost. The salvage value, too, will rise as the price of virgin lead advances, or vice versa. Approximately 50,000 tons of chemical lead are used per year in chemical operations.

Lead finds wide application in plumbing, and as a calking material. These are also highly competitive fields. In plumbing, lead meets the competition of the other metals, copper, zinc and iron. In calking, it competes with cement, sulphur and sand compounds. No one can tell at this moment just what the ultimate outcome for lead will be. It depends somewhat on how much all of the metals and materials advance in price during the postwar reconversion period. When we touch the plumbing industry, and this applies to any metal or material used in building construction, we touch an industry that is surrounded by building codes and plumbing regulations. The lead industry must be eternally watchful in seeing that its metal is not discriminated against in these local laws and promulgations. I might say that this field of operations has occupied the Lead Industries Association for many years and will continue to do so indefinitely as long as the present situation prevails. It is the sort of a job primarily in the province of a trade association and absolutely necessary if the lead mining industry is to protect this useful outlet.

Incidentally, in the field of lead plumbing, we have developed a type of unit plumbing construction which can be assembled in the shop by skilled plumbers and erected on the job very much easier than rigid plumbing because lead is more readily adjustable. Successful installations have been pioneered right here in Spokane.

I have a picture of it here. In the future, this type of installation will depend upon the price of lead compared with competitive metals, the cost of labor and possible further improvements in lead plumbing design. Given an ample supply of lead, it has most interesting possibilities.

Calking lead is used in large quantities, as you well know, for both water main construction and for interior soil or waste lines in plumbing systems. In recent years, some 35,000 tons of lead per year have been used for that purpose. Despite strong competition from cement and sulphur and sand compounds, lead continues to maintain its superiority and, even at higher prices today, should preserve this field because of its durability, softness and ease of making repairs.

Sheet lead is also used in building construction as a flashing and waterproofing material, not to mention its application as a barrier to x-rays. The largest outlet for sheet lead, however, is doubtless in chemical construction for lining tanks and vats. This will continue to be an important outlet for lead but, as I said before, it is highly competitive and we must leave no stone unturned to learn all we can about the use of lead in this field to maintain our competitive position.

We now come to another element in the construction field where lead gives unparalleled service and that is in the protection and maintenance of structures with paint. Here both white lead and red lead perform a service that began centuries ago. In fact, up to a few years ago (1924), the use of white lead occupied the premier position in the list of applications for lead. It was the principal outlet of the miners. Newer uses in recent years have eclipsed it, notably storage batteries and cable manufacture, and during the war, even ethyl gasoline, but only because of severe wartime restrictions on the use of lead in paint. White lead still remains an important use of the metal and one of the most interesting.

Despite all the developments that have taken place in paint technology over the last fifty years, white lead is still indispensable in the manufacture of a good exterior paint. However, because of its relatively high cost compared with other paint pigments, there is a distinct tendency for paint manu-

facturers to use as little as possible in their formulations and, to digress a moment, I would like to show you what our industry has had to contend with in maintaining the position of white lead, or improving it, in the paint industry.

I have here a booklet which shows the analysis of some paints and varnishes sold in the State of North Dakota, where the regulations require the formulas to be printed on the can, a practice which numerous other states have since followed. The reason for such a regulation is obvious. So many abuses occurred in the marketing of inferior paint among the farmers that, in self defense, North Dakota passed labeling laws and occasionally publishes results of its paint investigations. Here, for example, is an exterior paint manufactured by a large paint manufacturing company that contains water and excessive amounts of extenders. Here is another — and another.

I think you will see from this brief exposé how important it is to acquaint the American public with the merits of white lead and why hundreds upon thousands of people insist on having nothing but pure white lead on their homes because they know by experience that white lead provides durability in paint. It is my conviction that we must do a lot more to educate the people of the United States to the merits of white lead and the responsibility in part must rest upon the mining industry for, after all, the paint manufacturer can use other and cheaper ingredients in his paint.

In this connection, you will be interested to know that the Lead Industries Association has been working closely with the U.S. Office of Education and the State educational departments of nearly every state in the United States, seeking to assist them in establishing courses on paint instruction which would help the universities, colleges and high schools of the United States in procuring the proper appreciation of what constitutes a good paint.

Here is a manual entitled, "Painting Farm Buildings and Equipment" which was prepared with the cooperation of the U.S. Office of Education, and which has been widely distributed in the United States.

Here is another manual entitled, "Instructor's Manual for Teaching Exterior Painting of Farm Buildings and Equipment," designed specifically for the use of instructors and prepared for us by Professor G.A. Schmidt of the Colorado A & M College.

As a result of all of these efforts, I am glad to say that many technical courses and text books used throughout the United States for instructional purposes have been improved in their treatment of paints and painting.

The job will be a continuing one, however, and we cannot afford to relax our efforts even though currently we may be tempted to do so because of the ease with which any lead product can be sold. Our cooperative work has also led us into close cooperation with the great lumber industry of the northwest for years, because, as you can realize, lumber and paint have so much in common. If home owners become dissatisfied with the use of lumber construction because of the high cost of painting, they naturally turn to the use of substitutes such as cement, or asphalt shingles, or brick, which do not require our product and we both lose. The lumber industry also has done an excellent job in acquainting its users with the necessity of using only high quality paints on lumber structures, through leaflets and booklets.

As soon as restrictions on its manufacture have been removed and the lead procurable, it is reasonable to assume the production of white lead, would run around 100,000 tons of lead a year at least. Even more white lead will be necessary at the start to fill up the practically empty pipe line to the retail stores. It is difficult nowadays to find any white lead available to the consumer.

Last, but not least, in the construction field, is the use of red lead on steel work. This remains the standard metal protective paint. Nothing has been discovered to equal it so far as our own investigation is concerned. Recently improvements have taken place, however, in special formulations for marine application that need not concern us here. Competition in the field is intense and promises to be more so with the development of newer pigments. Our industry mobilized its technical resources a few years ago whereby research is constantly going on looking towards even better performance from red lead formulated paint. Recently some of the results of this research have been disclosed to the paint industry for its use. Red lead for paints and for storage battery and other purposes requires about 45,000 tons of lead per year.

All in all, if we survey the number of lead products that go into the construction industry, and include paint, we find that the total demand would be perhaps 250,000 tons of lead a year.

Now, let us examine one of the most spectacular new uses of lead of recent years, namely the manufacture of tetraethyl lead. During the war, the consumption of lead for this purpose reached a peak of about 95,000 tons in 1944, due largely to huge military requirements. From time to time one hears of substitutes for ethyl fluid and of course, the refining industry has developed many hydrocarbons of high antiknock value, but the fact remains that the cheapest way for the petroleum industry to increase the antiknock value of the gasoline used by the automotive industry is to add tetraethy lead. Indeed, a great many refineries cannot get along without it. This fact was forcefully brought to our attention during the acute shortage of lead. The use of tetraethyl lead in gasoline eliminates the redesigning of refinery equipment, which would be extremely costly. The future of ethyl gasoline looks bright but I do not think we can anticipate the use of the large tonnages witnessed in the last few years. Even so, I should not be surprised to see it remain well over 50,000

tons of lead a year, perhaps 70,000 tons.

Now, let us see where we stand with the analysis we made of the lead situation so far.

To recapitulate, we need roughly:

300,000 tons of lead for storage batteries
250,000 tons of lead for construction and maintenance
210,000 tons of lead for cable
60,000 tons of lead for ethyl gasoline
820,000

Before we examine any of the other major uses of lead, let us see what this potential demand alone means to the lead mining industry of the United States. Our domestic lead production last year was about 350,000 tons. Next year we hope it will be 450,000 tons. Scrap lead production will total, say, 350,000 tons. The two together are 800,000 tons. You can see at a glance that we have already anticipated an outlet for lead that will more than take care of the estimated potential domestic supply. However, there are a great many other uses of importance equal to those I have already described. Although the volume of lead they consume is not so striking, we cannot afford to neglect them.

For example, we have the requirements of the ammunition industry to meet for peacetime ammunition, which should consume about 40,000 tons of lead per year.

Then there is the use of lead by the printing industry, a fairly steady volume, amounting to some 25,000 tons of lead a year.

Then there is the vast tonnage of lead used in the compounding of bearing metals for railroads and automobiles and other machinery, which probably runs about 30,000 tons of lead per year.

Solder alone, which has too many applications for me to list here, should consume another 50,000 tons of lead per year. In this connection, it is

significant that during the war, the amount of tin available for solder was sharply decreased and the role lead could play as a substitute was correspondingly increased. Field reports indicate that techniques have been developed to use high lead content solders at considerable saving over high tin content solder, so that I do not look for much change in the use of lead in the solder industry.

There are still other important uses, for example insecticides. Lead arsenate, which is so important in the economy of the northwest apple and fruit industry, should consume about 25,000 tons of lead per year. When I recently spoke to the convention of the Agricultural Insecticide and Fungicide Association in New Jersey, and told them about the lead shortage, I felt that perhaps here was one use which we would have to kiss goodby because of the advent of DDT but, to my surprise, I was informed that DDT is not a complete answer to coddling moth control and we may look for a continued use of large tonnages of lead arsenate. This brings up the question of toxicity of lead, on which I expect to comment briefly in a moment.

Another use of lead which grew to substantial proportions during the war for lack of tin and aluminum, was the manufacture of collapsible tubes. About 15,000 to 16,000 tons of lead were used for that purpose. No doubt this use will be affected by the growing competition of aluminum, but as entirely different equipment is needed for the manufacture of aluminum tubes, it is quite likely that the collapsible tube industry will continue to use a goodly portion of lead, particularly as the cost of the ingredient in a collapsible tube is generally far more than the cost of the container.

We have so far neglected to mention lead foil which could have been used in huge tonnages during the war but Government prohibitions prevented. Here lead will meet strong competition from aluminum and may lose a large part of the market but lead foil will find some application in industry for an indefinite

period, perhaps to the tune of 15,000 tons per year.

Let us skip quickly over such other important items as the use of lead in brass manufacture, the manufacture of lead headed nails, as well as coating of steel and wire and sheets, the use of lead in the manufacture of rubber and in the ceramic industry, in brake linings, and dozens of other uses. In the aggregate, they run into an impressive tonnage and would account for perhaps an additional demand of 35,000 to 40,000 tons.

And now for a grand recapitulation. If you add other uses I have mentioned to our first sub-total of 820,000 tons, the grand total becomes about 1,055,000 tons — a fair estimate of the supply of lead needed next year to keep the consuming industries contented. With only about 800,000 in sight from domestic mine production plus scrap it is easy to see why we shall have to intensify our efforts to increase production and exploration in the meantime depending upon our neighbors in Canada, Mexico and Australia and Peru to fill up the gap.

Please note, however, that some of the uses I have listed are competitive and, if the price of lead should remain high, lead will undoubtedly be displaced, exactly where and at what point I would hesitate to say, but this is a possibility the lead mining industry must never lose sight of and must be prepared to face. We know by bitter experience that markets can evaporate quicker than they grow. We must not be lured into any position of complacency by today's comforting outlook for lead. Markets once lost are difficult to regain. The current period of intense demand for lead therefore should be utilized to obtain more and more fundamental information about the use of various lead products old and new so that in times of adversity our knowledge can be used to help sustain the demand for lead and keep the mines operating.

It is also the new demands for lead now appearing on the horizon which should make us a bit apprehensive about an adequate future supply. I refer to

the atomic power age. Anyone here in the northwest who ponders on the scientific developments at Hanford or at Oak Ridge knows that they portend large uses of lead for shielding human beings from dangerous radiation of nearly all kinds. The practical use of atomic power is in part a shielding problem. Hanford and Oak Ridge used hundreds of tons of lead in shields. Nothing is better for the purpose. A good illustration of the job lead can do in this respect was told me only a few days ago by a representative of a company manufacturing betatrons - one of the latest devices for generating high voltage x-rays. The betatron can deliver x-rays of 20,000,000 v. whereas heretofore a 1,000,000 or 2,000,000 v. machine was considered tops. To shield the operator, it is necessary to use either 7 in. of lead, or 60 inches of concrete about 20 ft. from the machine. Space saving through the use of lead, is, therefore, great. Atomic power developments promise to make important new demands on our metal.

One of the problems faced by the lead mining industry, moreso than others, is the fact that lead is admittedly toxic and often receives unfavorable publicity in newspapers and magazines that undoubtedly do the industry serious damage. The Lead Industries Association for many years has conducted fundamental research on lead and lead poisoning, and is continuing to do all it can to help correct mistaken hygienic impressions about lead. It is cooperating closely with the American Medical Association in this field. How mistaken these impressions can be I would like to show you through a few examples to illustrate the type of investigations we have made.

Here follow a few examples:

Here is an article which appeared in a National Safety Education magazine entitled, "Lead Toys - Lead Paint - Lead Poisoning," which was shown to be entirely erroneous, and was later retracted.

Here again is another case which appeared in the syndicated columns of Dr. Defoe, a few years ago, on the danger to children from lead in toys. It was based on an article entitled, "Toy Dishes and Acute Plumbism," which appeared in the Journal of the American Medical Association, wherein a child was alleged to have contracted lead poisoning from drinking orange juice out of an aluminum cup. It seems incredible and authorities tell me it is. Yet it was seriously accepted and needlessly alarmed millions.

Last, but not least, the magazine, TIME, two years ago, published in its column on medicine, an article describing the latent effects of lead poisoning in children who had contracted the illness from chewing paint off toys and cribs. Not even the paint was shown to be lead nor was the lead poisoning proven.

These few examples show how important it is for us to be alert in correcting erroneous impressions about lead. Here again, the job is never complete. We must continue to study our metal from its hygienic standpoint so that it will be used intelligently, for there is no reason why any, man, woman or child need be made ill from contact with lead from mine to finished product.

I have tried to sketch, briefly to be sure, some of the broader markets of the lead industry. I hope that I have left with you a picture which shows how important it is for all of us to redouble our efforts to find new lead mines, and to work existing deposits intensively. I think this is most essential because, even if the demand for lead is unusually pressing just now, there is no guarantee that this will always be so, and we do not want to see any market lost by lead if we can possibly help it. I personally would not like to see lead rise to such high prices that it will be thrown out of application indiscriminately. It is difficult to recapture lost markets. At the same time, I hope that this analysis has shown you why I think lead has such a bright future and why it is such a fascinating industry with which to be associated.

This great mineral province of the northwestern United States and British Columbia, one of the world's most important sources of lead, now has new responsibilities thrust upon it to help cure the lead shortage. I am confident that under our free enterprise system it will more than do its part and disprove the view that all the lead in the United States has been discovered and show that the mineral belt of the Northwest contains much hidden wealth awaiting the mining geologists' attention and skill, or the miners' pick. I have unbounded faith that here as elsewhere in the United States the lead mining industry's resourcefulness under the restoration of free markets will help to cure the lead and other metal shortages.