LEAD INDUSTRIES ASSOCIATION
420 LEXINGTON AVENUE
NEW YORK 17, N. Y.

May 17, 1950

SUBJECT: SUBSTITUTION FOR LEAD CABLE SHEATHING

To Members of the Lead Industries Association:

At a meeting of the Board of Directors of the Association, held on December 9, 1949, the secretary was instructed to investigate the nature and extent of substitution of other materials for lead cable sheathing.

As a result he submitted the attached interim report to the Board at its meeting on April 14, 1950. The Board ordered that the interim report be circulated to all members of the Association. At the suggestion of the secretary the study will be carried further. It is hoped that the final report may be submitted before long.

Very truly yours,

Secretary

Survey of Substitution for Lead Cable Sheath

Part I - Power Cable

Power cable in recent years has accounted for perhaps one-third of the total amount of lead used for cable sheathing.

In surveying the developments with respect to sheaths for power cable, the following have been interviewed:

Mr. Dave Allen, sales manager, Anaconda Wire and Cable Co.
Mr. Edward P. Dunlaevy, vice president, Phelps Dodge Copper Products Co.
Mr. Pettee, General Cable Co.
Messrs. R. K. Spofford, purchasing agent, and Richard Hays, advertising manager, Okonite Co.
Mr. C. T. Hatcher, assistant chief distribution engineer, Consolidated Edison Co.
Mr. J. A. Pulsford, Public Service Companies of New Jersey, Sponsor, Underground Group of Transmission and Distribution Committee of the Edison Electric Institute.

For the purpose of this survey it is well to divide power cable into four separate classifications:

(1) low voltage net work cable up to and including 600 volts,
(2) medium voltage cable from 600 up to and including 5,000 volts,
(3) high voltage cable over 5,000 and up to and including 69,000 volts, and
(4) very high voltage cable 69,000 volts and higher.

In Group 1, substitution has been developing over the last 20 years or so. First rubber and more recently neoprene have been substituted for combinations of rubber and lead and impregnated paper and lead. This substitution was the result of lower cost for the substitutes which have been found largely satisfactory for these low voltages. Some utilities are still using lead sheathed cables in this field for very special reasons, such as New Orleans, under extremely wet conditions. It is roughly estimated that this class of cable amounts to about 20% of the total volume.

In Group 2 the same type of substitution has been proceeding for some years but here the substitution is not yet as complete. This group accounts for a smaller volume than Group 1.

In Group 3 there has as yet been little or no substitution for impregnated paper insulation and it is still recognized that a lead sheath must be used where impregnated paper is used for insulation. This is because metal provides the only absolutely impervious sheath. It is probably the most important field tonnagewise. It appears that there is likely to be little, if any, substitution until some more economical and effective dielectric is found than paper, or until some metal is found which may be economically substituted for lead. Experiments are being made in Europe on aluminum sheath but they have not penetrated to this country as yet. Alpeth, a combination of aluminum and polyethylene has been tried with unsatisfactory results to date because of the effect of the heat generated in the cable on the polyethylene and the tendency of the aluminum joints to open up.

The only loss of lead business in this group would be through a reduction of the thickness of the lead sheath and this is taking place to some extent. Reductions of from 20 to 33% in the lead thickness have been tried, the reduced lead sheath being jacketed with neoprene. There are differences of opinion as to the advisability of this reduction. The neoprene supplies additional corrosion resistance but some manufacturers and utilities feel that such reduction in the cable sheath may cause failures where the cable is bent. Some utilities are still insisting on the full lead thickness even though they also use a neoprene jacket for corrosion protection and protection against scoring.

In Group 4 steel pipe, filled with oil or gas under high pressure, is rapidly substituting for lead sheathed cable because of the high oil and gas pressures involved. The trend here will probably be a continued displacement of lead.

In summary, it appears that until better insulation than paper, or a better cable sheath than lead is developed, such substitution as will take place in power cable has already very largely taken place. In the low voltage field some utilities still use lead, particularly if the price differential is not too much higher than the non-lead cable.

Since there are some differences of opinion and practice both among cable makers and users, there is a possibility that some carefully prepared technical promotion might be developed to keep the present lead sheath business and perhaps to regain some of the lost market. Since this is an engineering problem and will be decided by engineering facts, it is recommended that we continue our survey to develop, if possible, points which might be brought to the attention of users of power cable to convince them that they should use lead sheathed cable. This would require interviews with a fairly large number of utility engineers who are still convinced that they should use lead, to develop in detail their reasons. These might then in turn be used to convince others.

Part II - Telephone Cable

The situation with respect to telephone cable is quite clearly outlined in the papers to be presented by representatives of the Western Electric Co. at the Lead Industries Association Annual Meeting on April 13, 1950.

Briefly it appears that Alpeth sheath has displaced approximately 25% of all telephone cable lead requirements and that Alpeth production capacity is being increased to displace about another 10%.

Lead is competitive with Alpeth at varying prices depending upon the particular size and type of cable the price at which lead is competitive varying from as low as 6½¢ per lb. to as high as 11¢ per lb.

Western Electric Co. frankly admits that they do not know how long Alpeth sheathed cable will last but their research leads them to believe that it will last a satisfactory length of time. Because there is a possibility of moisture working through the polyethylene jacket and the joints in the aluminum sheath, they are developing a new cable, Stalpeth, which has a corrugated terne coated steel sheath over the aluminum and polyethylene over the steel. The joint in the terne metal is soldered and lead sleeves and wiped solder joints are used for connections. This cable will be a little more expensive than Alpeth so probably lead will be competitive at slightly higher prices than for Alpeth. Shipping of both Alpeth and Stalpeth is considerably less expensive than lead.

Unofficial opinions expressed indicate that there will be a continuing trend towards the Alpeth or Stalpeth sheaths but that lead will also be an important part of the business for a long time to come.

It does not seem likely that the lead industry can do anything to promote lead in telephone cable because of the extensive research facilities and the close coordination of all units of the Bell Telephone System.