

LEAD INDUSTRIES ASSOCIATION

430 LEXINGTON AVENUE

NEW YORK 17, N. Y.

February 15, 1954

SUBJECT: NICKEL-CADMIUM BATTERIES

To Members of the Lead Industries Association:

The press in recent months has given a lot of publicity to announcements made by the Sonotone Corp. concerning the nickel-cadmium storage battery. It is reported that Sonotone had made 600,000 batteries of this type and they were now intent upon applying this battery to the automotive field and certain other industrial uses.

Claims have been made concerning the lightness in weight, electrical characteristics, long life, and resistance to abuse of the nickel-cadmium battery. Somewhere the statement was made that cadmium was plentiful and that only "two or more" pounds of nickel would be required per battery. A service life of 10 to 20 years was claimed. The cost of a nickel-cadmium battery was estimated at two to five times that of the lead storage battery.

The publicity also included a statement that the Sonotone Corp. was licensing American Bosch Corp. and Canadian Aviation Electronics to manufacture nickel-cadmium storage batteries.

L.I.A. INVESTIGATES

Naturally, your Association would be quite concerned with any new product which, by implication or otherwise, might threaten the future of our major lead consumer - the storage battery industry. An investigation was begun and this report is intended to keep you informed to the extent that we are able to assemble information.

BATTERY CONSTRUCTION

Both positive and negative plates of this battery are made by pressing and sintering nickel powder. The plates are then activated by treating one with nickel nitrate and the other with cadmium nitrate or chloride. The electrolyte is alkaline and is said to be merely a conductor, not becoming a part of the reaction.

Connectors or other fittings may be made of nickel or some other current-carrying metal which has been nickel-plated.



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The earlier descriptions of this battery, as referred to in news items, speak of a 60 ampere-hour size as being capable of cranking an automobile engine. This size was used by a Sonotone engineer in his private automobile, but the remark was added that some larger ampere-hour size would probably be chosen for practical purposes. Cranking ability is only a part of the automobile battery's job and the Society of Automotive Engineers take cognizance of this fact by classifying batteries according to ampere-hour capacity as well as cranking ability.

According to information we have received, the "two pounds of nickel" referred to constitutes only the active material for a 60 ampere-hour five-cell (6-volt) battery. This does not take into consideration the nickel for grids and for plating parts. A conventional 60 ampere-hour (6-volt) five-cell battery will also require about 8 lb. of nickel for grid structure, plating, etc., making a total of 10 lb. of nickel.

If the size of nickel-cadmium battery chosen is equivalent to the conventional 100 ampere-hour class, it is estimated that 16 lb. of nickel and 3.9 lb. of cadmium will be required.

ECONOMICS

Assuming that the claim of 10 to 20 year life for the nickel-cadmium battery is correct, to capture the entire automotive battery market would require some 6,000,000 batteries per year. This would use about 48,000 tons of nickel and 12,000 tons of cadmium. The following statistics on nickel are from the U. S. Bureau of Mines:

U. S. NICKEL STATISTICS
(In Short Tons)

	<u>U.S. Supply</u> <u>(Net) *</u>	<u>Est. U.S.</u> <u>Consumption</u>	<u>Difference</u>
1945	120589	96248	/24341
1946	98543	80105	/18438
1947	79258	80757	- 1499
1948	100639	93558	/7081
1949	94345	68326	/26019
1950	95003	98904	- 3901
1951	98981	86416	/12565
1952	112131	101047	/11084
1953		Not yet available.	

* U.S. production plus imports minus exports.

From the above statistics it will be noted that there were no years when the increased demand for batteries could have been satisfied. Also, the U. S. Government was taking its requirements for stockpile and other purposes out of the above differences leaving no free supply. In fact, nickel was under government allocation until November, 1953. Since then the shortage continues and because of the government's take in 1954, industrial customers have been notified that their January allotment of nickel has been cut 26 percent. A larger cut is promised for February.

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NICKEL-CADMIUM BATTERIES

The United States produces over 80 percent of the world's supply of cadmium. U.S. production averages slightly over 4,000 tons per year. During the past seven years, the demand has exceeded the supply on alternate years. Each excess was responsible for a price increase so that the cost per pound rose in 10 years from 90¢ to \$2.55. It is now \$1.75 per lb. During the same period of time the price of nickel rose from 31.5¢ to 60¢ per pound.

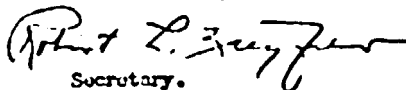
COMMENTS

If the information we have on raw material requirements is nearly correct, any more comment would be superfluous. Perhaps additional imports might be coaxed into this country but with such a precarious supply-demand balance, the price would be subject to rather wide swings.

There is apparently considerable difference of opinion as to whether the nickel-cadmium battery actually has any real advantage at low temperatures.

It is also known that at a price, lead storage batteries of considerable longer life than the current average can be, and even are, being manufactured. It is estimated that batteries bought by car-owners are purchased at a median price of \$18.25, including trade-in allowance. The general feeling seems to be that the average automobile buyer or operator is not interested in paying approximately \$75.00 based on the possibility that he has acquired a longer life battery in view of the average relatively short ownership of American automobiles.

Very truly yours,


Secretary.

FOOTNOTE: Since the foregoing report was prepared, the New York papers of February 12, 1954 have reported a talk by Mr. L. Grant Hector, vice president of the Sonotone Corp. In this talk Mr. Hector substantiates the findings of this report in that he says he does not believe that the nickel-cadmium battery will come into general automotive use for many years to come because of its high cost. He does mention its use for special purposes such as: trucks, taxis, and Diesel locomotives, but he does not discuss the availability of the raw materials. Mr. Hector's talk greatly modifies the publicity previously given the nickel-cadmium battery.