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Office Memorandum • UNITED STATES GOVERNMENT

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TO : File

DATE: February 20, 1957

FROM : J. F. Weissenberg, Chemical Engineer, Technical Branch  
Lockland Area Office

SUBJECT: STATUS OF WORK ON SUBCONTRACT AT-32 WITH TITANIUM ALLOY MANUFACTURING  
DIVISION OF NATIONAL LEAD COMPANY THIS DOCUMENT CONSISTS OF 21 PAGES

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The purpose of this memorandum is to summarize the status of work under the subject subcontract between GE-ANPD and the Titanium Alloy Manufacturing Division of National Lead Company. This subcontract covers research and development relating to solid metallic hydride moderators.

As the result of a meeting between GE-ANPD and TAM personnel on October 18, 1955, the production phase of the program was discontinued and the program was reduced to a research and development effort. The present scope of work consists of the following major activities:

1. Determination of hydriding cycles to achieve an  $N_H$  greater than 4.0, aiming for 4.5 or higher.
2. Bonding of cladding materials to hydrided cores, and evaluation of bonding produced.
3. Determination of methods for producing an effective barrier to prevent diffusion of hydrogen along the length of the moderator section.

Under Phase 1, TAM has come up with a hydriding cycle which looks rather promising. Basically, the procedure consists of hydriding to an  $N_H$  of about 3.0 at 1620°F, cooling in argon to room temperature, and re-hydriding. This procedure may be repeated several times, and each time a higher  $N_H$  is obtained. One piece of zirconium was hydrided to an  $N_H$  of 5.2 after five such cycles. No cracking of the material was observed. The apparent explanation is that each time the metal is hydrided, a distortion takes place in the metal lattice which does not recover upon the cooling portion of the cycle.

Under Phase 2, work is just getting under way at the American Bearings Division of National Lead Company in Indianapolis. They will study various methods of hot forming to achieve a bond between hydrided zirconium and cladding.

SPECIAL REREVIEW  
FINAL DETERMINATION  
UNCLASSIFIED

~~RESTRICTED DATA~~

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By: *J. F. Weissenberg* 10/1/57  
Date: *2nd Draft*  
*9/24/57*

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Present efforts on transverse barriers consist of spraying a coating of molybdenum on the individual segments. Canning of the segments will also be tried.

TAM is preparing a new proposal covering the period following March 31, 1957, the present expiration date of the subcontract. The proposal will include work on yttrium and yttrium-zirconium alloys.

Special Review  
Final Determination  
Unclassified  
By: K. A. Walter  
Date: 1980  
T. F. Davis

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