April 13, 1963

WANL-TME-313

Program for the Alpha Particle Bombardment of Fuel Materials

(A) Introduction

Westinghouse Astronuclear Laboratory (WANL) wishes to expose samples of various alloy systems to alpha particles in the ANL cyclotron. The purpose of these irradiations is to inject the samples with helium so that WANL may study the kinetics of gas bubble growth in various nuclear fuel materials during heating.

(B) Samples

The following are the five alloy systems in question:

- a) 100% UC
- b) 20% UC - 80% NbC
- c) 20% UC - 80% ZrC
- d) 50% UC - 50% ZrC
- e) 100% W

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The requirements of the program are such that fourteen samples of each of the aforementioned alloy systems must be irradiated. Each sample will be in the form of a cylindrical wafer 0.291" in diameter and 0.030" thick. These will be cut from hot pressed stock.

(C) Sample Holders

All sample holders to be used in this program will be made by WANL to ANL specifications. Figure 1 shows the sample holder in question. Each sample holder will contain seven sample wafers; one in the center and six lining the periphery of the recess. The sample sizes are such that each wafer will contact all its neighbors and all peripheral wafers will contact the recess wall. The spaces between the wafers will be loaded with aluminum powder so as to further facilitate heat transfer. The samples will be held within the sample holder by aluminum foil (0.0005" thick) drawn tightly over the recess.

(D) Exposure

Each loaded sample holder is to be exposed to an integrated beam current of 54.6 μ a hours. It is imperative that the sample temperatures be maintained as low as is practically possible and never exceed 500°C. These conditions can probably be maintained by utilizing a beam current of approximately 10 μ a in conjunction with the ANL forced coolant system.

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REFERENCE

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(E) Disposition of the post-irradiated samples

Upon the completion of the irradiation of a given set of samples the loaded sample holder should be shipped, intact directly to WANL. Plans are such that the radioactivity induced in the foil and/or samples will be utilized to determine the integrated beam current to which each sample had been exposed. Consequently, the sample holders should be shipped to WANL as soon after irradiation as possible.

D. Jacobs
Materials Department

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