TRIP REPORT

TR: 6640

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Date: May 20, 1971

Unclassified

Trip to: General Dynamics,
Fort Worth, Texas

Duration of Trip: May 10-12, 1971

Security Classification

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PURPOSE OF TRIP: To Monitor the Fracture Toughness Testing of Irradiated Cu-18 v/o B Specimens

SUMMARY:

Various NERVA materials have been recently irradiated at the Nuclear Aerospace Research Facility of the Fort Worth Division of General Dynamics. Two of these materials were copper-boron-10 and copper-boron-natural composites which were tested in the form of 2-inch wide center-crack sheet specimens to determine the effect of radiation damage on the crack damage parameter K . The specimens were irradiated to fluence levels of 8×10^{17} and 8×10^{18} n/cm², $E > 1$ Mev and were subsequently tested in a rising load test at -320°, 75°, and 480°F. The purpose of the trip was to monitor these fracture toughness tests.

Preliminary test results indicate that the damage parameter K at the point of crack initiation is more than twice as high after irradiation than the parameter for the unirradiated condition. A slight decrease in the crack damage parameter, K , due to annealing at 480°F was noted.

The increase in the crack initiation damage parameter, K , in irradiated specimens is the result of a large increase in the gross fracture strength due to irradiation damage. Irradiated specimens fractured in a brittle manner with little slow crack growth as compared to unirradiated specimens. The latter generally showed substantial slow crack growth and stable fractures.

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Testing of the Cu-B materials is complete except for the spare specimens.

The test order for the remaining fracture toughness tests is as follows:

- 1) 6061-T651 Al plate,
- 2) BATH material, and
- 3) TZM-Molybdenum.

It is estimated that all fracture toughness tests will be completed by June 15.

SIGNATURE

L. Albert

APPROVED

E. L. Layland