

October 19, 2006

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Subject: INTERMEDIATE MILESTONE NO. 20.06002.01.342.620, "A LITERATURE REVIEW OF LOW TEMPERATURE CREEP BEHAVIOR OF TITANIUM ALLOYS"

Dear Dr. Chowdhury,

We have received and reviewed the subject Intermediate Milestone Report "A literature Review of Low Temperature Creep Behavior of Titanium Alloys." This report summarizes currently available literature data on surrogate drip shield materials. Specifically, the report presents available constitutive predictive models considered for the creep behavior of surrogate titanium alloys Grades 7 and 24. Details include creep deformation mechanisms, factors affecting creep deformation, and the choice of surrogate Titanium alloys. Lastly it includes discussions on how the creep behavior could affect fracture toughness of the material and its failure modes. The report is comprehensive and well summarized and therefore acceptable with the following general and specific comments.

General Comments:

(1) Current U.S. Department of Energy considerations include titanium grade 29 in addition to or in place of grade 24. Accordingly, the report might require revisions to include available information on grade 29.

(2) If the data or mechanisms are not really based on the long-term behavior, an empirical or semi-empirical approach could be adopted. ASTM standard C1174-04 allows that in the long-term prediction of EBS materials if appropriate data/models are difficult to obtain.

Detailed Comments:

- p. iii, define "proportional limit" and "sustained load cracking."
- p. xv, give a range of high temperature in the 1st paragraph.
- p. 1-2, give a range of stress for SCC in the 1st paragraph.
- p. 2-6, give the applicable temperature range if available, for Eqs. (2-9) and (2-10).
- p. 2-13, explain or elaborate why hydrogen increases the creep strain ( first paragraph in p. 4-14).
- p. 4-1, explain how the recovery of cold work would occur (2nd paragraph of 4.1.1.).

A. Chowdhury

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- if possible, estimate how much creep strain could be expected based on the suggested two equations for the surrogate alloys.

The contractual obligations for this intermediate milestone are considered fulfilled. If you have any questions regarding the contents of this letter, you may contact me at (301) 415-6695 or via e-mail [msn1@nrc.gov](mailto:msn1@nrc.gov). No written response to this letter is required.

Sincerely,

/RA/

Mysore Nataraja,  
Project Officer, Mechanical Disruption of  
Engineered Barriers ISI  
Division of High-Level Waste Repository Safety

A. Chowdhury

-2-

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