From: Billone, Michael C. [billone@anl.gov]
Sent: Thursday, November 06, 2008 10:22 AM
To: Harold Scott; Robert Einziger
Subject: RE: presentation for Germany
Attachments: SNF Matrices_061308.pdf; SNF Matrices_110708.doc

Dear Harold and Bob,

We had a SNF program review meeting at ANL on June 12, 2008.

The enclosed file (SNF Matrices_061308), along with my overview presentation, was distributed to meeting participants from NRC, EPRI, Anatech, and Westinghouse.

The enclosed word file (SNF Matrices_110708) includes the new work we have completed since the June 12, 2008 program review.
I have used red to indicate new work since June 12, 2008. I am in the process of documenting the results in the tables, along with metallographic images. Please give some thought as to whether the enclosed 110708 tables should be distributed to the meeting participants.

The simplified tables in Slides 19 and 20 for the Hannover presentation are based on the enclosed detailed tables.
The plots in slides 21 and 22 are based on the data in the simplified tables.
Also, metallographic images shown in Slides 16 and 17 were generated since the June 12, 2008 meeting.

We are doing a small amount of work to complete and/or firm up the information in the Tables:

1. Determine crack depth (as percentage of wall thickness) for impact rings crushed at 2 m/s

2. Measure hydrogen content for two of these rings

3. Measure hydrogen content for a few ring-compressed rings for which approximate values based on interpolation are listed.

4. Evaluate correlation between radial hydride metrics and embrittlement

4.1 Radial hydride fraction (RHF): I really do not like this metric and it is very time consuming to determine from metallography for >250 wppm hydrogen. Obviously, RHF decreases with increase in total hydrogen content, but ductility and/or embrittlement do not correlate well with RHF.

4.2 Radial hydride length (RHL) and radial hydride continuity fraction (RHCF): these are relatively easy to measure. There is a stronger correlation between RHL (maximum length as a fraction of wall thickness) and RHCF (effective length of radial hydrides within a circumferential band, as a fraction of wall thickness) and embrittlement. (a few days)

5. Compare results of impact tests (2 m/s) to high-displacement-rate ring-compression tests (0.1-0.5 m/s)

I would like to eliminate the impact tests for defueled cladding. The current impact apparatus is limited to RT and non-irradiated samples. It tends to give overly pessimistic results fro displacement-limited tests because of overshoot and rebound.

The Instron 8511 already has the capabilities for testing irradiated rings at elevated temperature. It also allows for better data acquisition and maximum displacement control.

We need a few more tests to complete this comparison and justify elimination of the crush-impact tests for defueled cladding. However, we do believe that crush-impact tests are important for fueled cladding.

Mike

From: Robert Einziger
Sent: Wednesday, November 05, 2008 1:01 PM
To: Harold Scott
Cc: Robert Einziger; Matthew Gordon
Subject: presentation for Germany

Harold,

Attached is my presentation for Germany. Bill Brach wants me to touch base with you that you have no problems, and make sure all the information is in the public domain especially the tables 19 and 20. and Figures 15-18. The rest of the material comes from the program test plan that is in Adams.

I will be out of the office between tomorrow and Nov 17th, so if you have a problem please contact Matt Gordon.

Thanks