From: William Cullen / RES
To: Robert Tregoning / RES
Date: 10/21/02 12:41PM

Rob,

If you agree, change the phrases below in red to black, and send to Nilesh. What I put in is redundant with the second paragraph, and for additional emphasis. The business with the "top four inches" is only my guess, but I thought it read like **all** the LAS could be removed.

BC

>>> Robert Tregoning 10/21/02 11:57AM >>>
Bill:

Please take a look at this, make any necessary changes, and then forward to Nilesh (cc: me) so that he can send to Bill Dean. I've tried to capture the salient points of your earlier email to Nilesh.

Rob

NRC-RES currently has several ongoing testing programs which could benefit greatly from obtaining additional DB head material. The DB head and associated CRDM nozzles offers a unique opportunity to positively impact these programs. One program is being conducted jointly with ORNL to evaluate the material failure models utilized in earlier DB structural integrity analysis and also to investigate the effect of flaws on the predicted operating margin. The DB cladding represents the only readily available six-wire cladding found by RES. Also, the cladding of the primary DB cavity (between nozzles 3 and 11) is at least partially SMAW and the crack likely resides near or on the transition between the SMAW and six-wire SAW cladding. B&W drawings indicate that the SMAW region encompasses an approximately 17" radius circle from the apex of the head. Testing of both the SMAW and SAW cladding materials will be used to ensure the accuracy of the failure predictions for the DB margin assessment. Up to six tests on actual DB material are recommended: three from the SMAW cladding region and three from the six-wire SAW cladding region.

Another program is being conducted jointly with ANL to evaluate CRDM cracking evolution in susceptible material heats. The DB head contains Alloy 600 CRDM nozzle material which is expected to be highly sensitive to CRDM cracking. Specifically, heat number M3935, (used for nozzles 1 - 5) is a high-strength, low-carbon heat of Alloy 600 which is expected to be most susceptible to cracking. Heat C2649-1 (used for nozzles 7, 12, 16, 20, 22-25, 27-29, 38-44, 47-55, 57, 64, 65, 68, 69) is another relatively high-strength, high-carbon material that is also cracking, so grain boundary coverage is expected to be poor. For this testing program, the Alloy 600 portion of any two nozzles 1, 4 or 5 are requested along with the Alloy 600 portion of any three of the nozzles from Heat 2649-1 listed above. These materials will be used for crack growth rate, and crack initiation tests, supporting metallographic exams and tensile testing.

A third program is being conducted with ANL to investigate boric acid corrosion rates in ferritic steel and attempt to determine the phenomenology of cavity formation. The cavity which is associated with nozzle 2 would be extremely valuable for understanding this process. This cavity has been previously planned for removal, but the current request would also accomodate needs for this program.

In order to satisfy the needs of these various programs, the following DB material is requested.

1. All ferritic, cladding, and nozzle material inclusive of a 20" radius about the apex (nozzle 1) of the head. This should fully encompass nozzles 1 through 9, notwithstanding material previously removed.
2. All ferritic, cladding, and nozzle material inclusive of a 20" radius about nozzle 32 of the head. This material should fully encompass nozzles 11, 16, 23, 27, 32, 40, 47, 52, and 64, notwithstanding

H-20

material previously removed.

3. The affected nozzle material should be sawed off initially, capturing and saving only the Alloy 600 portion of the nozzles selected for retention.

4. The ~~slugs~~ dropouts can then be removed via flame cutting.

The following additional machining and cleaning will be eventually required to create final test specimens for the cladding testing:

A. Decontamination of the cladding surface and cleaning of the surrounding ferritic material surfaces.

B. Removal of the HAZ caused by the flame cut.

C. Removal of the top four inches of ferritic material backing to isolate the cladding within the specimen test section.

D. Machining to create the each test specimen geometry.

Any of these steps that the vendor would be willing to perform will be valuable.