From: Nilesh Chokshi RES
To: William Dean
Date: 10/21/02 1:02PM
Subject: DB material

Bill,

The attached file contains our request for the DB vessel head material. The first three programs describe our programs and provide justification for the request. Itemized items 1 through 4 identify specific requests. Technical contacts for our projects are Bill Cullen and Rob Tregoning. Please let me know if you need any other information.

Nilesh

CC: Bill Bateman; Deborah Jackson; Edwin Hackett; Michael Mayfield; Robert Tregoning; William Cullen

H-23

MEB DAVIS BESSE (DB) VESSEL HEAD REQUEST

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 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 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.