

November 6, 2003

MEMORANDUM TO: Michael E. Mayfield, Director  
Division of Engineering Technology  
Office of Nuclear Regulatory Research

THRU: Nilesch C. Chokshi, Chief **/RA/**  
Materials Engineering Branch  
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Office of Nuclear Regulatory Research

FROM: James A. Davis, Senior Materials Engineer **/RA/**  
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SUBJECT: TRIP REPORT ON THE AMERICAN SOCIETY OF MECHANICAL  
ENGINEERS (ASME) BOILER AND PRESSURE VESSEL CODE WEEK  
IN SCOTTSDALE, AZ, AUGUST 25-29, 2003

I attended the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Week in Scottsdale, AZ during the week of August 25-29, 2003. I attended the Task Group Temper Bead Welding Meeting and the Working Group Welding and Special Repair Processes Meeting as the NRC representative, and the Subgroup Repair and Replacement Activities as the alternate.

There were two areas where extended discussions were held that require follow-up by the NRC Staff. The first area involves the new Code Case N-666, "Weld Overlay of Defects in Socket Welds." Dixon Kerr presented his understanding of the NRC Staff's objection to this new Code Case and would like the Staff to develop a position on the proposed resolution on these issues. The issues Mr. Kerr presented were:

- 1) Hydrogen embrittlement in ferritic steels due to welding on wet surfaces;
- 2) Incorporation of "crud" such as boric acid into the weld and the effect of this crud on structural integrity of the weld;
- 3) How will the Owner demonstrate that they can make an acceptable weld qualification for cracked or leaking socket welds;
- 4) This Code Case does not have criteria for determining the rate or extent of degradation of the repair on surrounding base metal and the root cause may not be mitigated and reinspection requirements are not provided to verify structural integrity;

5) How does the Owner evaluate the potential for separation of the pipe since the extent of cracking is unknown;

6) The Code Case states that it is not applicable to systems that contain petroleum products such as lubricating oil or fuel or other substances that create a fire or explosion hazard. Is PWR water at 2200 psi and 600°F an explosion hazard?;

7) If allowed as a permanent repair, do the operational and residual stress effects increase the likelihood of other failure mechanisms such as low cycle fatigue or stress corrosion cracking of austenitic materials or reduced toughness of ferritic materials;

8) Why are there two different acceptance criteria in the code case; and

9) The Japanese testing of weld joints with defects indicates a substantial reduction in weld joint fatigue strength (Higuchi, et. al.).

Mr. Kerr thinks he has adequately addressed items 2 through 8 with the staff. He proposes conducting a demonstration repair on a socket weld at around 600°F and 2200 psi if the Staff agrees that demonstration will address concern 1. He says he will have to do some more work on Item 9.

Code Cases N-561, N-561-1, "Alternative Requirements for Wall Thickness Restoration of Class 2 and High Energy Class 3 Carbon Steel Piping, Section XI, Division 1," and N-562, and N-562-1, "Wall Thickness Restoration of Class 3 Moderate Energy Carbon Steel Piping, Section XI, Division 1," have been rejected by the Staff because, according to Mr. Kerr, "Neither the ASME Code nor the Code Cases have criteria for determining the rate or extent of degradation of the repair on the surrounding base metal. Reinspection requirements are not provided to verify structural integrity since the root cause may not be mitigated." Mr. Kerr has requested that the Staff develop an official position on these code cases and communicate the position back to him. I will set up meetings to discuss these issues and arrange to communicate back to Mr. Kerr and the appropriate Working Group Welding and Special Repair Processes members.

The voting sheets for the meetings are attached.

Attachment: As stated

Distribution: K. Manoly    W. Bateman    E. Imbro    W. Norris    E. Sullivan.  
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