89

From: Bill Bateman NRR
To: Terence Chan
Date: Thu, Jul 5, 2007 8:05 AM
Subject: Fwd: Attached PWR Head Cavity Letter

Looks like you now have a pen pal.

>>> Matthew Mitchell 07/05/2007 6:53 AM >>>
Bill, Jay -

From Tom Gurdziel.

Matt

>>> "Tom Gurdziel" < tgurdziel@twcny.rr.com > 07/05/2007 12:08 AM >>>
Good morning Scott,

Please send the attached letter to Mr. Grobe, Michele Evans, and Jay Collins.

Thanks again,

Tom

CC: Jay Collins; Matthew Mitchell; Michele Evans

1 of 89

9 Twin Orchard Drive
Oswego, NY 13126
July 4, 2007

Mr. John A. Grobe
Associate Director for Engineering and Safety Systems
Office of Nuclear Reactor Regulation
US Nuclear Regulatory Commission
Washington, DC

Dear Mr. John A. Grobe:

It has been a while, hasn't it?

Thank you for your June 27, 2007 letter. I read it carefully, including the enclosed Assessment of the Exponent Report. As a result, I am comfortable agreeing with you that the NRC currently has appropriate inspection requirements for the situation where two, (or more), through-wall primary water stress corrosion cracks (PWSCC) form and support each other in accelerated cavity formation in a PWR vessel head with alloy 600 CRDM nozzles.

There are, however, a few more things that I want to bring to your attention. The first is the analysis logic that was used. We should have asked, what are (all?) the ways that can cause the reactor head to dissolve? What we asked was, would the 2001, (or earlier) FirstEnergy boric acid inspection procedure, if followed, have found (not necessarily prevented), the 2002 Davis-Besse problem?

The appearance (existence) of a sufficient amount of boric acid solution for a sufficient period of time in a favorable location is my present best guess of one way to dissolve the reactor head (without regard to the type of steel used in the PWR CRDM nozzles.) Please note that PWSCC is not mentioned here. The words "through-wall" are not used either. Well, how can that be?

During fabrication, if the holes cut through the reactor head for the CRDM nozzles are slightly too big, an annular space is going to be left from the top surface of the reactor head all the way down to the upper surface of that J-weld at the bottom. Now you don't need to dissolve 6 ½ inches of steel to get there, you are there as soon as you get the boric acid. It would come from leaking gaskets on CRDM nozzles, which started to leak just after their last inspection (if there even is such a thing.)

Alternatively, the holes through the head for the CRDM nozzles could be the exactly correct diameter but the CRDM nozzles might be out of round. For the oval-shaped nozzles to fit, although the maximum diameter would be correct, the minimum diameter would allow two non-circular pieces of annular space. Actually, although I only quickly scanned through just a few parts of the Exponent report, I think that I did see justification

for this line of thinking in a sketch of the cavity at nozzle 2 of the failed, original Davis-Besse head. It was shaped as a rectangle, the height greater than the width.

Would a visual surface inspection of the PWR head show 4 or 5 inches of concentrated boric acid in an annular space eating away the steel of the reactor head? Or, would testing of the CRDM nozzles on the inside diameter show the same cavity beyond the outside diameter?

I find this failure mode to be particularly interesting because non-alloy 600 steel nozzles are not a defense. In other words, all PWRs would be susceptible.

(At this point, let me point out that at the Demand For Information meeting, one of the FirstEnergy people, in response to a statement, said something like, "well, if it didn't come from a through-wall crack, it would have to come from someplace else." Would a leaking CRDM gasket be that someplace else?)

Another thing I want to mention is the reliance on CRDM nozzle repair as a solution to the head cavity formation problem. It may not be. For example, IF the rigging was not inept at Davis-Besse for nozzle 3 and the nozzle did not tilt, I think that the reactor head would have been placed back on the reactor vessel and, a short time later, (I don't remember the estimate anymore), there would have been a loss of coolant accident in a USA plant. Why: because the acid would still have been in the cavity. Even though the through-wall flaw may have been repaired, the acid was not removed.

The through-wall crack is not the cause, it is simply an enabler. Thus, fixing the crack without taking other action does not solve the problem.

The third thing I want to mention is the shape of the cavity for nozzle 3. Didn't it bother you seeing that part at the top pointing back to the nozzle? If the pool started on the top, wouldn't it more likely have flowed down the head? I think that this shape may be a clue that the acid pool actually started from the bottom (just above the J-weld) and eventually worked its way up.

Finally, FirstEnergy, back in the days of the 0350 committee, when they wanted to start up Davis-Besse, said they would buy another, (a third), reactor head so the Midland one could be replaced? On what date will they fulfill this promise?

Conclusion

I don't believe the NRC can safely say that PWR head cavities will not occur in the future if the NRC, (not the industry), has not identified ALL modes of failure (cavity formation), and specified sufficient inspection requirements for each.

Thank you,

Tom Gurdziel