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From: "Gadzala, Jack" <Jack.Gadzala@nmcco.com>
To: "Harold K Chernoff (E-mail)" <hkc@nrc.gov>
Date: Fri, May 14, 2004 5:08 PM
Subject: RE: MRP-55 Crack Growth Rate Supplemental Info

Ok, now it's attached.

-----Original Message-----
From: Gadzala, Jack
Sent: Friday, May 14, 2004 2:04 PM
To: Harold K Chernoff (E-mail)
Cc: Michael R Morris (E-mail); 'msh@nrc.gov'
Subject: MRP-55 Crack Growth Rate Supplemental Info

Harold,

Attached is the letter that I faxed you.

CC: "Michael R Morris (E-mail)" <rmm3@nrc.gov>, <msh@nrc.gov>

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May 14, 2004
HLG-04-007

Mr. Brian Kemp
Nuclear Management Company
Point Beach Nuclear Plant
6600 Nuclear Road
Two Rivers, WI 54241-9516

Subject: IDTB weld repair to Nozzle 26 at Point Beach Unit 1

Reference: 1. SI Calculation PBCH-09Q-302, Revision 1

2. Minutes of EPRI-MRP PWSCC Crack Growth Expert Panel Meeting, October 3, 2003 – Gaithersburg, Maryland, EPRI Letter PWR-MRP 2003-38 by John Hickling, October 20, 2003

Dear Mr. Kemp:

In the reference [1] calculation, Structural Integrity Associates performed a PWSCC growth calculation to evaluate the time required for a hypothetical existing remnant crack to propagate through the subject repair weld in the axial direction, in the presence of overlap of the repair weld onto the existing Alloy 182 J-groove weld material. This analysis took no credit for the portion of the repair weld that overlapped the Alloy 182 material, and so as a result the repair weld ligament was considered to be reduced in length from the design value. The repair weld is Alloy 52 weld material applied by a GTAW process.

In the referenced calculation [1], crack growth correlations for Alloy 600 material were used, as presented in MRP-55, adjusted for actual head temperature at Point Beach 1 (592 degrees F). The crack growth calculation methods, assumptions, and bounding results were discussed with the NRC at a meeting on February 19, 2004, and the NRC staff was provided with a copy of the completed calculation for review at that time.

As noted above, the repair material is Alloy 52. Since chromium content has been shown to be a key contributor to nickel-based alloy PWSCC resistance, this material (Alloy 52, with a chromium content of 28-31%) will have significantly higher PWSCC resistance than will Alloy 600 (chromium content 14-17%) or its associated weld materials Alloy 182 (chromium content 13-17%) or Alloy 82 (chromium content 18-22 %). Alloy 600 is expected to have higher resistance than these two weld materials in general, because of differences between the wrought material (600) and the as deposited weld materials.

In the referenced calculation [1], Alloy 600 results were used because of the extensive test data available as compared to the weld materials, and because as noted above, it was expected to be very conservative compared to the actual performance of Alloy 52.

However, based on a recent NRC question, we performed the same growth analysis using a crack growth correlation for Alloy 82 material from recent MRP work [2]. The results show that using the Alloy 82 data, the time required to grow through the repair ligament (0.5 inch) is approximately 15200 effective full power hours (EFPH), or 1.73 EFPY. If the remaining ligament is assumed to be initially reduced to 0.4 inch, the growth time to bypass the repair weld is 12200 EFPH, or 1.39 EFPY. These values are as compared to the results assuming Alloy 600 data of 2.77 EFPY (ligament = 0.5 inch) and 2.23 EFPY (ligament = 0.4 inch), respectively, as reported in the referenced calculation.

The conclusion of the above discussion is that, even with the very conservative assumption of using Alloy 82 crack growth rates for Alloy 52 weld material, a hypothetical remnant weld crack will not grow through the IDTB weld ligament for essentially all of the remaining cycle of operation before the reactor vessel head is replaced during the next scheduled refueling outage.

Sincerely,

H L Gustin

H. L. Gustin, P. E.
Associate