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Sent: Friday, May 28, 2010 11:56 PM
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Subject: FENOC Follow-up Clarifications for the Davis-Besse RPV Head Penetration
Nozzle 50.55a Request
Attachments: 20100528093714771.pdf; 20100526154647573.pdf; Nozzle 4 - 52M Deposit
Depth.pdf

Follow Up Flag: Follow up
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Mike:

In response to the telecon conducted on May 24, 2010, FENOC provides the following
clarifications regarding the subject relief request. :

1. The NRC has received the proprietary calculations that were submitted by FENOC on May
17, 2010 and they have been forwarded to the appropriate technical reviewers. No further
action is required by FENOC.

2. As a result of a question from the NRC Special Inspection Team it was discovered that the
post-weld PT examinations for ten nozzles did not have sufficient coverage in bands of the
examination area due to the field of view on the camera vs the spacer size used. This post weld
PT examination overlap issue affected nozzles. 10, 24, 28, 43, 51, 55, 58, 59, 61 and 67.
This is documented in the site corrective action program under FENOC CR 10-77201 (Areva CR 2010-3544). As a result, the post weld PTs for these nozzles are being
reperformed. For nozzles 51, 55, 58, 59, 61 and 67, since abrasive water jet machining
remediation has already been completed, the PT will now be performed after water jet
remediation. This is contrary to the process overview provided in our April 1, 2010, 10 CFR
50.55a request. Specifically, on page 4 of 20 of the Enclosure, FENOC provided an overview of
the basic steps of the repair process. Step 6 and 7 will now be reversed for these six nozzles.
As discussed on the telecon yesterday and, in part, in our April 16, 2010 response to RAI
Question 2(4), the order of these two steps can be interchanged, as the material removed by the
water jetting is minimal (approximately 0.030 inches) and the abrasive water jet machining
remediation will not interfere with the subsequent surface examination (i.e., the abrasive water jet

machining remediation is not considered a peening process).

3. As provided in our May 17, 2010 response to RAI Question 3(2), the examination area for the preservice examination following repair and for future inservice inspections shall include the wetted surface of the new weld from the toe of the weld up through 0.5 inches above the rolled region of the nozzle remnant. In accordance with Figure 3 of Attachment 1 of the April 1, 2010 relief request, during the post-weld PT examination following repairs, the examination includes the area 1/2 inch below the toe of the weld. This PT will also serve as the preservice examination.

As noted in the 50.55a request, FENOC plans to use a surface examination method for future inservice inspections. If PT is used, the examination will be in accordance with Code Case N-729-1 and the 50.55a request. In addition, the DB "ISI database" has been updated (see attached) to ensure the PT will include the area 1/4 inch below the toe of the weld. If other surface or volumetric examination techniques (e.g. eddy current or UT) are developed and qualified per Code Case N-729-1, the qualified examination area would include, as a minimum the wetted surface of the new weld from the toe of the weld up through 0.5 inches above the rolled region of the nozzle remnant.

(See attached file: 20100528093714771.pdf)

4. As requested, the subject DB nozzle 4 repair weld NDE results are attached.

(See attached file: 20100526154647573.pdf)

Subsequent to the May 24, 2010 telecon, the NRC provided the following additional question via email on May 25, 2010 (question highlighted in bold):

By letters dated April 1, 2010 and May 17, 2010, the licensee submitted the half nozzle repair relief request for the control rod drive mechanism (CRDM) nozzles at Davis Besse. In response to RAI Question number 2 in Attachment 3 to the May 17, 2010, submittal, the licensee stated that Code Case N-416-3 will be used to satisfy pressure testing requirements subsequent to the CRDM nozzle repair. In the teleconference dated May 24, 2010, the licensee indicated that it will perform a visual (VT-2) examination from outside the service structure of the reactor pressure vessel without any direct view of the surface of the head in the areas that were repaired during the system leakage test. In general, the NRC accepts this type of indirect visual (VT-2) examination. However, it may not

be appropriate for Davis-Besse CRDM nozzle repairs based on the following:

1) A larger number of repaired CRDM nozzles increases possibility for fabrication defects that may be missed by nondestructive examination.
2) Several unsuccessful repairs on CRDM nozzle 4 create the possibility for unforeseen fabrication defects.
3) Inability of a visual (VT-2) examination from the outside service structure to detect small leakage from a through-wall fabrication defect in a repaired nozzle.

For these reasons, the staff requests a direct viewing of the bare metal head surface through one or more access hole penetrations during the system leakage test to provide an additional defense in-depth and increase confidence in these nozzle repairs. Alternatively, the licensee needs to justify why the proposed indirect visual (VT-2) examination is acceptable.

5. As noted in the 50.55a request, the CRDM nozzle repair weld is a partial penetration weld. ASME Code NB-5245 requires a progressive surface examination of partial penetration welds. In lieu of the progressive surface examination, a surface examination and an ultrasonic examination, qualified to detect flaws in the new weld and base material is performed on the partial penetration weld as described in the 50.55a request, Figure 3. This UT examination, exceeds construction code requirements and along with the liquid penetrant examination of the weld area provides a high degree of confidence in the integrity of the repair weld.

Pressure testing requirements will be met by the completion of a VT-2 examination that will be conducted in accordance with the requirements of IWA-5000 and Code Case N-416-3 which is endorsed in NRC Regulatory Guide 1.147 Revision 15 with no conditions noted. IWA-5000 permits a VT-2 visual examination with insulation installed. As specified in IWA-5242, the VT-2 examination will be conducted at the lowest elevation where leakage may be detectable. Examination of the surrounding area such as floor areas, equipment surfaces or underneath components is required. A remote VT-2 examination will be conducted by examining the refueling canal floor in the area of the reactor vessel flange. A direct VT-2 examination of the reactor vessel insulation joints from under the reactor vessel will also be performed. Together, the NDE and pressure test visual examination will provide a high level of confidence in the integrity of the CRDM repairs.

The CRDM penetrations are located within the service structure below the

reactor vessel head's insulation package. Access to this area is available through inspection ports, however, during the system leakage test, the Reactor Coolant System is at normal operating temperature and pressure (approximately 532 degrees Fahrenheit and 2150 psig) with all insulation in place as permitted by IWA-5000. This insulation covers the inspection ports. Opening the inspection ports would require removal of the insulation and the hot inspection ports. Air emitted from the ports could approach 500 degrees Fahrenheit. Inspection would be difficult and access would require personnel to be in close proximity to the hot surfaces creating an industrial safety hazard. The benefit of this direct visual examination is considered to be limited given the additional level of NDE and pressure test visual examination noted above. However, In addition to the VT-2 examination discussed above, FENOC intends to perform a visual inspection for leakage from the reactor vessel head through an inspection port to the extent that access and environmental conditions permit.

Why is it not necessary to perform AWJ conditioning of the repair made to CRDM penetration #58?

6. The purpose for Abrasive Water Jet (AWJ) machining is to mitigate the initiation of pressurized water stress corrosion cracking (PWSCC) in PWSCC susceptible materials. Of the three materials that are part of the RVCH CRDM penetration modification [RVCH Low Alloy Steel base metal (SA-533, Gr. B, Cl 1), CRDM Nozzle (Alloy 600), and weld filler material (Alloy 52M)] only the CRDM nozzle Alloy 600 material is known to be susceptible to PWSCC. The weld repair to the IDTB weld in penetration #58 was limited to the Alloy 52M weld material. The machining hard stop, acting as a plug, was positioned so that the lower end extended down to just below the upper weld toe (the Alloy 600 / Alloy 52M interface). The position of the hard stop prevented repair activities (cavity grinding and post-weld grinding) from contacting the Alloy 600 nozzle material.

This response clarifies the scope of AWJ for nozzle 58 as described in the FENOC response to RAI #3 dated April 16, 2010.

The "as-built" nozzle 4 weld plan is also attached for information:

7. PS0139 required five layers of Alloy 52M weld filler metal to adequately cover the Alloy 82 filler metal. The five layers of Alloy 52M was to clearly communicate to the welding operators the amount of Alloy 52M to be deposited over the Alloy 82 . The

intention was to achieve a
minimum of five layers cover of Alloy 52M over the Alloy 82 in the as-welded condition. This
would allow for the machining and abrasive water jet material removal operations and still
maintain a minimum of 0.125 inch thickness of Alloy 52M covering the Alloy 82 filler metal to
avoid reactor coolant exposure of the Alloy 82 filler metal that is susceptible to PWSCC.
The average Alloy 82 and Alloy 52M layer thickness is 0.08 inches. Therefore, this would provide a cover thickness of Alloy 52M filler metal of significantly more
than 0.125 in. over the Alloy 82 filler metal after final machining and abrasive waterjet
remediation.

(See attached file: Nozzle 4 - 52M Deposit Depth.pdf)

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| MESSAGE | 4758649 | 5/28/2010 |
| 20100528093714771.pdf | 176228 | |
| 20100526154647573.pdf | 4532624 | |
| Nozzle 4 - 52M Deposit Depth.pdf | 24252 | |

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