CCNPP3eRAIPEm Resource

From: Arora, Surinder
Sent: Wednesday, September 14, 2011 7:36 AM
To: Infanger, Paul
Cc: CCNPP3eRAIPEm Resource; Honcharik, John; Terao, David; Colaccino, Joseph; Miernicki, Michael; Wilson, Anthony; Vrahoretis, Susan
Subject: FINAL RAI 318 CIB1 4196
Attachments: FINAL RAI 318 CIB1 4196.doc

Paul,

Attached please find the subject request for additional information (RAI). The draft of this RAI was sent to you on August 30, 2011. Based on the discussions during the clarification phone call held on September 9, 2011, and your review of the draft RAI questions, the wording of the draft Question 0.3.05.01.03-21, Part c, has been modified slightly to make all questions in this RAI free from any sensitive or proprietary information. Accordingly, this Final RAI will be made publicly available.

The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a schedule date for submitting your technically correct and complete response will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the review schedule of the applicable FSAR Chapter.

Your response letter should also include a statement confirming that the response does or does not contain any sensitive or proprietary information.

Thanks.

SURINDER ARORA, PE
PROJECT MANAGER,
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Request for Additional Information No. 318 (eRAI 4196)

9/13/2011

Calvert Cliffs Unit 3
UniStar
Docket No. 52-016
SRP Section: 03.05.01.03 - Turbine Missiles
Application Section: 3.5.1.3

QUESTIONS for Component Integrity, Performance, and Testing Branch 1 (AP1000/EPR Projects) (CIB1)

03.05.01.03-19

Section 7.1.3 of the Alstom Report TSDMF 07-018 D, dated May 30, 2007, implies that the turbine rotors have both a fir tree blade attachment and pin-root blade attachment. In addition, Section 8.1.1 of the Alstom Report TSDMF 07-018 D, dated May 30, 2007, states that the operating experience of welded LP rotors is mainly of reaction type with circumferential blade grooves. The operating experience of welded rotors of impulse type with pin-root blade attachments is significant, but smaller than the operating experience of welded LP rotors of reaction type with circumferential blade grooves. This section also states that no stress corrosion cracks have ever been found in pin-root attachment of welded rotor.

a. Clarify the specific types of blade attachments for the LP and HIP rotors.
b. Provide the number of welded rotors with circumferential blade grooves and the number of welded rotors with pin-root blade attachments.
c. Discuss why the probabilities of crack initiation for each type of blade attachment is based on the total number of LP flows in lieu of total number of rotors.
d. Discuss why the probabilities of crack initiation for each type of blade attachment is not based on the corresponding operating experience of the specific blade attachment. (i.e., number of blade groove attachment is used to determine the probability of crack initiation for a groove blade attachment, and the number of pin-root blade attachment is used to determine the probability of crack initiation for a pin-root blade attachment).
e. Discuss how the stress corrosion cracks were detected and the locations in the operating rotors (i.e., visual inspection, surface inspection or ultrasonic inspection, etc.).
f. Provide operating experience for these types of welded rotors. Also provide operating experience for each type of blade attachment used, since this is the area where the stress corrosion cracking is predicted to initiate and propagate.

03.05.01.03-20

Section 8.1.1 of the Alstom Report TSDMF 07-018 D, dated May 30, 2007, states that ALSTOM Power has designed the UNISTAR LP and HIP rotors according to the Threshold Stress Approach (TSA) to prevent stress corrosion cracking. Discuss what the TSA approach is and how it was applied to this rotor design.

03.05.01.03-21

Section 8.3 of the Alstom Report TSDMF 07-018 D, dated May 30, 2007, specifies that volumetric inspection is not necessary for detecting stress corrosion cracking. However, SRP Section 3.5.1.3, Paragraph II.3, specifies that the applicant should demonstrate the capability to perform visual, surface and volumetric (ultrasonic) examinations suitable for inservice inspection of turbine rotors for NRC review and approval.

a. Provide information to demonstrate the capability to perform these inservice inspections to maintain the reliability of the turbine rotors.
b. Discuss why volumetric inspection in not necessary for determining whether internal defects/cracks or internal surface cracks at the weld root or other location that may not have been detected would not propagate by another mechanism (i.e., fatigue, etc.) to a critical size leading to rupturing of the rotor.
c. Discuss in detail the first sentence in Section 8.3, taking into account the statement in Section 5.3 which describes the stress distribution within the rotor.

03.05.01.03-22

Clarify and provide justification for using the maximum yield strength in lieu of the minimum yield strength for calculating the critical crack size and the turbine missile probability in Section 9 of the Alstom Report TSDMF 07-018 D, dated May 30, 2007.