AP1000DCDFileNPEm Resource

From: Adams II, Samuel L. [adamssl@westinghouse.com]
Sent: Tuesday, May 06, 2008 3:50 PM
To: Perry Buckberg
Cc: Rhonda Carmon
Subject: FW: RAIs SRP 10.2.3
Attachments: RAI-SRP-10.2.3-CIB1 1_2.doc

Hi Perry,

I acknowledge receipt of the attached RAIs on SRP 10.2.3.

I will let you know as soon as possible if a clarification call is necessary.

THanks.

Sam

From: Perry Buckberg [mailto:Perry.Buckberg@nrc.gov]
Sent: Tuesday, May 06, 2008 1:14 PM
To: Adams II, Samuel L.
Cc: Eileen McKenna; Rhonda Carmon; David Jaffe
Subject: RAIs SRP 10.2.3

Sam,

Attached are RAIs 1 and 2 for SRP section 10.2.3 from CIB1. Please acknowledge receipt of the attached and let me know ASAP if a phone conference will be needed.

Thanks,

Perry Buckberg
Senior Project Manager
Nuclear Regulatory Commission
Office of New Reactors
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Hearing Identifier: AP1000_DCD_Review
Email Number: 8

Mail Envelope Properties (9950B72C4C6D8D43958795C414DE477A05F21702)

Subject: FW: RAIs SRP 10.2.3
Sent Date: 5/6/2008 3:49:54 PM
Received Date: 5/6/2008 3:49:57 PM
From: Adams II, Samuel L.

Created By: adamssl@westinghouse.com

Recipients:
"Rhonda Carmon" <Rhonda.Carmon@nrc.gov>
Tracking Status: None
"Perry Buckberg" <Perry.Buckberg@nrc.gov>
Tracking Status: None

Post Office: SWEC9910.w-intra.net

Files	**Size**	**Date & Time**
MESSAGE	774	5/6/2008 3:49:57 PM
RAI-SRP-10.2.3-CIB1 1_2.doc	33344	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

RAI SRP 10.2.3-CIB1-01

Section 10.2.3.6 of the AP1000 DCD, Revision 16 states that the maintenance and inspection program for the turbine assembly is based on turbine missile probability calculations. This turbine missile probability analysis was original documented in Westinghouse report WCAP-15783-P, "Analysis of the Probability of the Generation of Missiles from Fully Integral Nuclear Low Pressure Turbines," Revision 2, August 2003. However, Westinghouse Technical Report (TR-86), "Alternate Steam and Power Conversion Design," Revision 1 dated June 2007, provided a revised turbine missile probability analysis in Westinghouse Report WCAP-16650-P, "Analysis of the Probability of the Generation of Missiles from Fully Integral Nuclear Low Pressure Turbines," Revision 0, dated February 2007. It should be noted that Section 3.5.1.3 of the AP1000 DCD states that the potential for a high-trajectory missile to impact safety-related areas of the AP1000 is less than 10^{-7}. However, it is not clear to the NRC staff that WCAP-16650-P addresses high trajectory missiles. Therefore, the NRC staff requests confirmation that WCAP-16650-P includes an analysis for both low and high trajectory missiles. If report WCAP-16650-P does not include the analysis for high-trajectory missiles, provide this analysis which supports the conclusion that the potential of a high-trajectory missile impacting safety-related equipment is less than 10^{-7} to ensure the requirements of GDC 4 concerning missile protection are met.

RAI SRP10.2.3-CIB1-02

The staff needs the information listed below in order to complete its review of the reduction in valve testing frequency from quarterly to semi-annually proposed in Section 10.2.3.6 of Rev. 16 of the AP1000 DCD. This information refers to the Westinghouse report submitted to support the semi-annual test interval, WCAP-16651-P, Rev. 0, “Probabilistic Evaluation of Valve Test Frequency,” February 2007. The report concludes that a six-month valve test frequency is justified for the turbine generator based on analysis of the operating experience with Toshiba Corporation nuclear steam turbines. A quarterly valve test frequency was approved by the staff in NUREG-1793 for the turbine originally specified in the AP1000 DCD when it was certified. The quarterly valve testing frequency was supported with WCAP-15785, dated April 2002, which is similar to WCAP-16651. The staff needs the information requested below to ensure the proposed DCD reduction in valve test frequency complies with the missile protection requirement of GDC 4.

a) According to SRP Section 3.5.1.3, the probability of generating a turbine missile should be less than 10^{-4} per year for a favorably oriented turbine and 10^{-5} for an unfavorably oriented turbine. It is the staff’s understanding that the AP1000 turbine will be favorably oriented. Please explain why WCAP-16651 uses a criterion of 10^{-5} per year.
b) What is the basis for multiplying the probability of system separation, Q_{ss}, by five “in order to make the evaluation conservative”? In WCAP-15785, Q_{ss} was multiplied by a factor of 10 in order to make the evaluation conservative. It is not clear to the staff how these factors are selected, particularly when a smaller (less conservative) factor is being applied to the analysis of fewer operating units (9 units in WCAP-16651 vs. 23 units in WCAP-15785) and fewer operating hours (1.1 million vs. 2.8 million).
c) According to the Conclusions in Section 8, the calculated turbine missile probability was greater than the acceptance criteria of 10^{-5} (i.e., unacceptable) with a 6-month testing interval, but it was below the criteria (i.e., acceptable) if the operating experience through 2004 was extrapolated through 2009 assuming a number of annual operating hours and

no failures. What is the basis for making this projection and assuming zero failures over a five-year period?

d) To justify a six-month test frequency on the basis of only the existing operating data, Conclusion 8A indicates a factor of five was applied to Q_{ss} for conservatism, but it also states a factor of three can be applied to result in a six-month test interval with $P < 10^{-5}$. Please explain the basis for applying multiplication factors and for selecting these particular values.

e) According to Conclusion 8B, using the mean value instead of 95% confidence value will also give a 6-month valve test interval with $P < 10^{-5}$, and that this is a reasonable alternative since there has been only one control valve control failure. If the 95% confidence value had been used, what test interval would be justified?