AP1000DCDFileNPEm Resource

From: Loza, Paul G. [lozapg@westinghouse.com]
Sent: Thursday, October 15, 2009 3:17 PM
To: Donnelly, Patrick
Cc: Behnke, Donald H.; Peck, Donald E.
Subject: FW: AP1000 - New Draft RAIs - RAI-SRP6.4-SPCV-09-14

Patrick,

I acknowledge receipt for Westinghouse of RAI-SRP6.4-SPCV-09 through -14.

Thanks,

Paul Loza

From: Donnelly, Patrick [mailto:Patrick.Donnelly@nrc.gov]
Sent: Thursday, October 01, 2009 1:32 PM
To: Loza, Paul G.; Behnke, Donald H.
Cc: Butler, Rhonda; McKenna, Eileen; Hebbar, Sudha; Snodderly, Michael; Chien, Nan
Subject: AP1000 - New Draft RAIs - RAI-SRP6.4-SPCV-09-14

Don & Paul,

Below are six new draft RAIs on SRP6.4. Please let me know whether they are accepted or whether a conference call is desired.

Regards-

Patrick

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RAI-SRP6.4-SPCV-09 Eductor in the Passive Filtration Line

There is limited operational experience and maintenance experience on the eductor in nuclear power plant applications. The frequency of the Technical Specifications surveillance test on the eductor should be based on experience on eductor system degradation. However, the frequency chosen for the surveillance was not supported by a technical rationale or data on the degradation of eductors. The applicant needs to justify the surveillance frequency with a technical rationale that is based on data associated with eductor degradation.

RAI-SRP6.4-SPCV-10 HEPA Filter in the Passive Filtration Line

1) In USNRC, "Design, Inspection, and Testing Criteria or Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants," Regulatory Guide 1.52, Revision 3, June 2001 (RG 1.52), Section 6.3 for HEPA Filter in-place leak testing, the acceptable combined penetration and leakage (or bypass) is shown to be less than 0.05% of the challenge

aerosol. The applicant proposed TS 5.5.13 shows this value to be 0.5%. In a letter dated May 4, 2009, the applicant states that the each HEPA filter cell is individually shop tested to verify an efficiency of at least 99.97 percent in accordance with ASME AG-1, Section FC (RAI-SRP 6.4-SPCV-06, page 28). The applicant needs to provide technical basis to credit 99.97% HEPA Filter efficiency at 0.5% penetration and system bypass conditions.

2) Per RG 1.52, Section 6.3, to be credited with 99% removal efficiency for particular matter in accident dose evaluation, a HEPA filter bank should demonstrate an aerosol leak test result of less than 0.05% of the challenge aerosol. In a letter dated May 4, 2009, the applicant states that the HEPA filters will remove 99% of particulates consistent with Regulatory Guide 1.52 (RAI-SRP6.4-SPCV-06, page 3). The applicant needs to provide technical basis to credit 99% HEPA Filter efficiency for particular matter in accident dose evaluation at 0.5% penetration and system bypass conditions.

3) Regulatory Guide 1.52 Section 6, ASME N510, Section 9.5 and ASME N511, Section 5.7 specify differential pressure (dP) test across HEPA filter bank. The dP test across HEPA filter bank was not specified in the proposed TS 5.5.13. The applicant needs to provide the rationale the dP test across HEPA filter bank was not specified in the TS.

RAI-SRP6.4-SPCV-11 Adsorber in the Passive Filtration Line

1) In USNRC, "Design, Inspection, and Testing Criteria or Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants," Regulatory Guide 1.52, Revision 3, June 2001 (RG 1.52), Section 6.4 for adsorbers in-place leak testing, the acceptable combined penetration and leakage (or bypass) is shown to be less than 0.05% of the challenge gas. The applicant proposed TS 5.5.13 shows this value to be 0.5%. In a letter dated May 4, 2009, the applicant states that the charcoal adsorber is designed, constructed, qualified, and tested in accordance with ASME AG-1 and RG 1.140 (RAI-SRP6.4-SPCV-06, page 28). Both RG 1.52 and RG 1.140 specify a combined penetration and leakage (or bypass) in-place leak test criteria of adsorber of 0.05% or less of the challenge gas. The applicant needs to provide technical basis the exception taken to relax the adsorber penetration and system bypass criteria from 0.05% to 0.5%.

2) In RG 1.52 Revision 3 Section 7 for laboratory testing of charcoal samples, for maximum assigned credit for active carbon decontamination efficiencies 95% (elemental iodine and organic iodide), the acceptable penetration is shown less than 2.5% for 2-inches deep charcoal bed, and for maximum assigned credit for active carbon decontamination efficiencies 99% (elemental iodine and organic iodide), the acceptable penetration is shown less than 0.5% for a 4-inches bed. In a letter dated May 4, 2009, the applicant states that the charcoal filters would remove 90% of the elemental iodine and 30% of the organic iodine claiming to be consistent with Regulatory Guide 1.52 Revision 2 (RAI-SRP6.4-SPCV-06, page 3). In RG 1.52, Revision 2, Section 6 for laboratory testing criteria for activated carbon, the assigned activated carbon decontamination efficiencies 90% (elemental iodine) and 30% (organic iodide), the acceptable laboratory testing criteria is shown for a methyl iodide penetration of less than 10% for 2-inches deep charcoal bed. The applicant proposed TS 5.5.13 shows a value of 35%. The 35% allowable penetration must be calculated from a safety factor of two recommended by NRC Generic Letter 99-02: (100% - Organic Iodide Efficiency)/Safety Factor = (100% - 30%)/2 = 35%. The applicant needs to provide technical basis to assign a credit for active carbon decontamination efficiencies of 90% (elemental iodine) and 30% (organic iodide) charcoal carbon efficiency at 35% penetration conditions.

3) Regulatory Guide 1.52, Revision 3, Section 6, ASME N510-2007 Section 10.5 and ASME N511-2007 Section 5.8 specify differential pressure (dP) test across adsorber banks. The dP test across adsorber bank was not specified in the proposed TS 5.5.13. The applicant needs to provide the rationale the dP test across Charcoal filter bank was not specified in the TS.

RAI-SRP6.4-SPCV-12 Safety Class of Passive Filtration Flow Instrumentation

ANSI/ANS-51.1-1983 subsection 3.3.1.3 states that "safety class 3 (SC-3) shall apply to equipment, not included in SC-1 or -2, that is designed and relied upon to accomplish the following nuclear safety functions:

k. Ensure nuclear safety functions provided by SC-1,-2, or -3 equipment

m. Provide information or controls to ensure capability for manual or automatic actuation of nuclear safety functions required of SC-1, -2, or -3 equipment

The two flow instruments in the filtration line provide information to ensure the capability of the eductor to draw at least of 600 cfm so the VES system safety function (MCR habitability during radiological accidents) can be achieved. The existing VES safety flow instrumentation to indicate whether there is sufficient flow (65 cfm) coming from the compressed air tanks to induce the passive filtration is not a direct indication of the performance of the eductor.

The operators will rely on this instrumentation during an accident to ensure the safety-related filtration train is functioning. Based on ANSI/ANS-51.1-1983, at least one flow instrument in the passive air filtration line should be safety related. The applicant needs to provide additional justification that the operators will not rely on this instrumentation during an accident or make one of the instruments safety-related.

RAI-SRP6.4-SPCV-13 Single Failure of Passive Filtration Line

ANSI/ANS-51.1-1983 subsection 3.2.1.c states that "fluid systems required to support, directly or indirectly, the three nuclear safety functions stated above shall be capable of performing their nuclear safety functions as provided in American National Standard Single Failure Criteria for light Water Reactor Safety-Related Fluid Systems, ANSI/ANS-58.9-1981.

ANSI/ANS-58.9-1981 defines passive failure as "a failure of a component to maintain its structural integrity or the blockage of a process flow path". In this standard the term refers to a random failure and its consequential effects assumed in addition to an initiating event and its consequential effects for the purpose of safety-relayed fluid system design and analysis. This standard defines rules for application of the Single Failure Criteria as:

During short term, the single failure considered may be limited to an active failure.

During long term, assuming no prior failure during short term, the limiting single failure considered can be either active or passive.

Long term is defined as that period of safety-related fluid system operation following the short term, during which the safety function of the system is required. Short term is defined as that period of operation up to 24 hours following an initiating event.

Additionally, TSTF-448 Revision 3 both "MCREC system" Technical Specifications section and "CRFA system" Technical Specifications section have the following statement:

"No single active or passive failure will cause the loss of outside or re-circulated air from the CRE."

The VES passive filtration line is required to meet single failure criteria. The single active or passive failure of a component in the VES passive filtration line, assuming a loss of outside power, shall not impair the ability of the system to perform its design function. If the present passive filtration design proposed by applicant has a

passive failure, e.g., the nozzle section of the eductor fails to induce the minimum 600 cfm, the safety function of the filtration may not be achievable. The proposed VES passive filtration line does not have independent, redundant trains to re-circulate and filter the CRE. Therefore, it does not appear to meet the single failure criteria. The applicant needs to provide a justification that the described system meets the single failure criteria or to provide a redundant filter train.

RAI-SRP6.4-SPCV-14 Air Tanks Technical Specifications Changes

The Technical Specification 3.7.6 Condition for 'VES inoperable' has been modified to specify a condition for 'One bank of VES air tanks (8 tanks) inoperable.' The completion time to increase pressure in the Operable tanks to the upper portion of the system operating band is 12 hours. The completion time is 7 days to restore VES to operable status.

At 75% VES air capacity (54 hours), the system no longer accomplishes the safety function for 72 hours. The VBS supplemental filtration is not safety-related. The applicant's RTNSS systems (ancillary fans) may not be available in 54 hours. Increasing the pressure in the OPERABLE tanks is not a reviewed operating condition and may not be advisable with a degraded system. Additionally, restoring or replacing an inoperable tank is a relatively simple evolution and it is not clear why 7 days is needed to complete this action.

The applicant needs to explain why such a long completion time is appropriate for the loss of a safety function and explain why such a long completion time is needed to restore the operability.

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