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Your ref: Docket No. 52-006
Our ref: DCP_NRC_002696

November 18, 2009

Subject: AP1000 Response to Request for Additional Information (SRP 6)

Westinghouse is submitting a response to the NRC request for additional information (RAI) on SRP Section 6. This RAI response is submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in this response is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

Enclosure 1 provides the response for the following RAI(s):

RAI-SRP 6.4-SPCV-10
RAI-SRP 6.4-SPCV-11

Questions or requests for additional information related to the content and preparation of this response should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

John J. DeBlasio

Robert Sisk, Manager /for
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Enclosure

1. Response to Request for Additional Information on SRP Section 6

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ENCLOSURE 1

Response to Request for Additional Information on SRP Section 6

RAI Response Number: RAI-SRP 6.4-SPCV-10
Revision: 0

Question:
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.

Westinghouse Response:

1 & 2) Westinghouse intends to comply with Section 6.3 of Regulatory Guide 1.52, Revision 3 as indicated in the markup of Appendix 1A in RAI-SRP 6.4-SPCV-06 (Reference 0). The markup of the Technical Specifications that indicates combined penetration and leakage of less than 0.5% is an editorial error. Technical Specification 5.5.13 will be corrected as indicated below to indicate a leakage value of less than 0.05%.

3) Differential pressure testing across the HEPA filter banks is not necessary for the AP1000 passive filtration line. The filtration lines are not used during normal plant operation; therefore, it is unlikely that there will be any degradation of the filters that will cause an unpredicted differential pressure. Additionally, TS 5.5.13 requires the passive filtration line be tested to verify that filtration flow path produce a flow rate of atleast 600 cfm greater than the flow measured by VES-FT003A/B. The induced filtration flow rate of atleast 600 cfm requires that differential pressure through the filtration line be minimized. If the backpressure in the line at the discharge of the eductor is greater than 5 inches water gauge, a motive flow of 65 +/- 5 cfm will be

unable to induce a filtration flow of 600 cfm. Typical differential pressure testing for HEPA filters is completed to demonstrate that differential pressure across the filters is less than approximately 6 inches water gauge at flow rates of approximately 15,000 cfm. If differential pressure across the AP1000 HEPA filters in the passive air filtration line exceeds 6 inches water gauge, adequate filtration flow will not be induced. The existing technical specifications that measure VES flow through the passive filtration line are adequate to demonstrate HEPA filter performance. Addition filter testing would be redundant and is unnecessary. If 600 cfm of filtration flow rate is not generated using a motive flow of 65 +/- 5 cfm from the VES air storage tanks, the operator will be required to take the necessary actions to reduce differential pressure through the filtration line to ensure adequate filtration flow. As part of these actions, an operator would examine the HEPA filters for possible causes on increased differential pressure.

References:

1. RAI-SRP 6.4-SPCV-06 Revision 0
2. NRC Generic Letter 99-02
3. Regulatory Guide 1.52, "Design, Inspection, and Testing Criteria for Airfiltration and Adsorption Units of Post-Accident Engineered-Safety- Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants," Revision 2

Design Control Document (DCD) Revision: TS 5.5.13

5.5.13	Ventilation Filter Testing Program (VFTP) A program shall be established to implement the following required testing of Engineered Safety Feature (ESF) filter ventilation systems at the frequencies specified in accordance with Regulatory Guide 1.52, Revision 3, ASME N510-1989, and AG-1. a. Demonstrate for the ESF system that an inplace test of the high efficiency particulate air (HEPA) filters shows a penetration and system bypass ≤0.05% when tested in accordance with Regulatory Guide 1.52, Revision 3, and ASME N510-1989 at a flow rate at least 600 cfm greater than the flow measured by VES-003A/B. The flow rate being measured is a combination of the VES supply flow and the recirculation flow drawn through the eductor. Demonstrate for the ESF system that an inplace test of the charcoal adsorber shows a penetration and system bypass ≤0.~~05~~05% when tested in accordance with Regulatory Guide 1.52, Revision 3, and ASME N510-1989 at a flow rate at least 600 cfm greater than the flow measured by VES-003A/B. b. Demonstrate for the ESF system that a laboratory test of a sample of the charcoal adsorber, when obtained as described in Regulatory Guide 1.52, Revision 3, shows the methyl iodide penetration less than the value specified below when tested in accordance with ASTM D3803-1989 at a temperature of 30°C (86°F) and the relative humidity specified below. ESF Ventilation System — Penetration — RH VES — 35% — 95% The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the VFTP test frequencies.

PRA Revision: None

Technical Report (TR) Revision: None

RAI Response Number: RAI-SRP 6.4-SPCV-11
Revision: 0

Question:

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.

Westinghouse Response:

1. Westinghouse intends to comply with Section 6.3 of Regulatory Guide 1.52, Revision 3 (Reference 1) as indicated in the markup of Appendix 1A in RAI-SRP 6.4-SPCV-06 (Reference 2). The markup of the Technical Specifications that indicates combined penetration and leakage of less than 0.5% is an editorial error. Technical Specification 5.5.13 will be corrected as indicated below to indicate a leakage value of less than 0.05%.
2. The technical basis for assigning activated carbon decontamination efficiencies of 90% (elemental iodine) and 30% (organic iodine) for charcoal carbon efficiency at 35% penetration conditions should have been identified as Reference 1. Reference 1 identifies methodology developed in NRC Generic Letter 99-02 (Reference 3) to calculate the allowable penetration percentage based on assumed organic iodine efficiency and a defined safety factor. Using the provided methodology, a 35% penetration condition is calculated assuming a 30% organic iodine efficiency and a safety factor of 2.
3. Differential pressure testing across the adsorber banks is not necessary for the AP1000 passive filtration line. The filtration lines are not used during normal plant operation; therefore, it is unlikely that there will be any degradation of the adsorbers that will cause an unpredicted differential pressure. Additionally, TS 5.5.13 requires the passive filtration line be tested to verify that filtration flow path produce a flow rate of atleast 600 cfm greater than the flow measured by VES-FT003A/B. The induced filtration flow rate of atleast 600 cfm requires that differential pressure through the filtration line be minimized. If the backpressure in the line at the discharge of the eductor is greater than 5 inches water gauge, a motive flow of 65 +/- 5 cfm will be unable to induce a filtration flow of 600 cfm. Typical differential pressure testing for charcoal adsorbers is completed to demonstrate that differential pressure across the adsorbers is less than approximately 6 inches water gauge at flow rates of approximately 15,000 cfm. If differential pressure across the AP1000 adsorbers in the passive air filtration line exceeds 6 inches water gauge, adequate filtration flow will not be induced. The existing technical specifications that measure VES flow through the passive filtration line are adequate to demonstrate adsorber performance. Addition testing would be redundant and is unnecessary. If 600 cfm of filtration flow rate is not generated using a motive flow of 65 +/- 5 cfm from the VES air storage tanks, the operator will be required to take the necessary actions to reduce differential pressure through the filtration line to ensure adequate filtration flow. As part of these actions, an operator would examine the adsorbers for possible causes on increased differential pressure.

References:

1. Regulatory Guide 1.52, "Design, Inspection, and Testing Criteria for Airfiltration and Adsorption Units of Post-Accident Engineered-Safety- Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants," Revision 3
2. RAI-SRP 6.4-SPCV-06 Revision 0
3. NRC Generic Letter 99-02

Design Control Document (DCD) Revision: TS 5.5.13

5.5.13	Ventilation Filter Testing Program (VFTP) A program shall be established to implement the following required testing of Engineered Safety Feature (ESF) filter ventilation systems at the frequencies specified in accordance with Regulatory Guide 1.52, Revision 3, ASME N510-1989, and AG-1. a. Demonstrate for the ESF system that an inplace test of the high efficiency particulate air (HEPA) filters shows a penetration and system bypass ≤0.05% when tested in accordance with Regulatory Guide 1.52, Revision 3, and ASME N510-1989 at a flow rate at least 600 cfm greater than the flow measured by VES-003A/B. The flow rate being measured is a combination of the VES supply flow and the recirculation flow drawn through the eductor. Demonstrate for the ESF system that an inplace test of the charcoal adsorber shows a penetration and system bypass ≤0.05% when tested in accordance with Regulatory Guide 1.52, Revision 3, and ASME N510-1989 at a flow rate at least 600 cfm greater than the flow measured by VES-003A/B. b. Demonstrate for the ESF system that a laboratory test of a sample of the charcoal adsorber, when obtained as described in Regulatory Guide 1.52, Revision 3, shows the methyl iodide penetration less than the value specified below when tested in accordance with ASTM D3803-1989 at a temperature of 30°C (86°F) and the relative humidity specified below. ESF Ventilation System — Penetration — RH VES — 35% — 95% The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the VFTP test frequencies.

PRA Revision: None

Technical Report (TR) Revision: None