October 5, 2000

MEMORANDUM TO: Lakshminaras Raghavan, Section Chief
Project Directorate II, Section 1
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: Eric W. Weiss, Section Chief **/RA/**
Fire Protection Engineering and Special Projects Section
Plant Systems Branch
Division of Systems Safety and Analysis
Office of Nuclear Reactor Regulation

SUBJECT: CATAWBA -TECHNICAL SPECIFICATION AMENDMENT REGARDING THE VENTILATION SYSTEMS FOR THE REACTOR BUILDING ANNULUS, AUXILIARY BUILDING, AND FUEL HANDLING BUILDING (TAC NOS. MA9380 &MA9381)

Attached is a safety evaluation report (SER) prepared by the Plant Systems Branch for the technical specification (TS) amendment for Catawba Nuclear Station, Units 1 & 2. The proposed TS changes would modify a portion of the TS regarding the ventilation systems for the reactor building annulus, auxiliary building, and fuel handling building. The staff has completed its review of licensee's submittal and concludes that the proposed changes to the TS are acceptable. We consider our efforts on TAC NOS. MA9380 and MA9381 to be complete.

Docket Nos.: 50-413
50-414

Attachment: As stated

CONTACT: Jin-Sien Guo, SPLB/DSSA/NRR
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ATTACHMENT

SAFETY EVALUATION BY THE
OFFICE OF NUCLEAR REACTOR REGULATION
PLANT SYSTEMS BRANCH
TECHNICAL SPECIFICATION CHANGES REGARDING
VENTILATION SYSTEMS FOR THE REACTOR BUILDING ANNULUS
AUXILIARY BUILDING AND FUEL HANDLING BUILDING
CATAWBA NUCLEAR STATION, UNITS 1 AND 2
DOCKETS 50-413 AND 50-414

1.0 INTRODUCTION

By letter dated June 1, 2000, the licensee requested changes to a portion of the technical specifications (TS) in accordance with 10 CFR 50.90 for Catawba Nuclear Station, Units 1 and 2. The proposed changes would modify TS 3.6.10, "Annulus Ventilation System," TS 3.6.16, "Reactor Building," TS 3.7.12, "Auxiliary Building Filtered Ventilation Exhaust System," TS 3.7.13, "Fuel Handling Ventilation Exhaust System," and TS 5.5.11, "Ventilation Filter Testing Program." The purpose of this amendment is to: (1) enhance the ability to determine reactor building annulus outside air in-leakage that should be within the maximum assumed design values for the dose analysis, (2) describe the alignment of the auxiliary building filtered ventilation exhaust units during normal and accident conditions that should be tested for its functions, and (3) modify the TS bases for the fuel handling ventilation exhaust system. The changes in TS 5.5.11 for the bypass leakage criteria involve the charcoal filtered flow paths for the three building ventilation systems. The licensee provided in its submittal the marked changes, the reprinted pages of the affected TS and Bases, and its justification for the changes.

2.0 BACKGROUND

The annulus ventilation system (AVS) is designed to limit both offsite and operator dose within 10 CFR 100 and 10 CFR 50, Appendix A, GDC 19 guidelines following a design basis LOCA or rod ejection accident. The AVS performs the following safety functions:

- Produce and maintain a negative pressure with respect to the atmosphere of at lease 0.25 inches water gauge throughout the annulus

- Reduce the concentration of radioactivity in the air within and discharged from the annulus. This is accomplished through filtration and recirculating of the annulus air

- Provide long term fission product removal capability within the annulus through holdup (i.e., decay) and filtration

The AVS consists of two separate and redundant trains. Each train includes a heater, a pre-heater/moisture separator, upstream and downstream high efficiency particulate air (HEPA) filters, an activated carbon adsorber section, and a fan. Duct-work, valves and/or dampers, and instrumentation also form part of the system. The system initiates and maintains a negative air pressure in the reactor building annulus by means of filtered exhaust ventilation of the reactor building annulus following receipt of a safety injection (SI) signal. A negative pressure in the

annulus will ensure that the leakage of airborne radioisotopes from the containment into the secondary containment (reactor building) following a LOCA or rod ejection accident are adsorbed prior to exhausting that leakage to the environment. The TS require the reactor building in-leakage to be checked periodically.

The auxiliary building filtered ventilation exhaust system (ABFVES) is designed as a non-safety, non-redundant system with a subset of the system being designed as an ESF. Its ESF function is to ensure that the ECCS pump rooms maintain a negative pressure when in the ECCS alignment. This ensures the leakage of airborne products within the pump rooms is filtered before being discharged through the unit vent. The ABFVES in its ECCS alignment performs the following safety functions:

- Isolate the filter unit bypass and direct air flow through the filter.
- Isolate the non-safety portions of the system on receipt of an ESF signal.
- Ensure that the ECCS pump rooms are kept at a negative pressure with respect to adjacent non-ECCS areas.
- Ensure that the air from the ECCS pump rooms is filtered in a manner that supports the dose analysis assumption of 95% filter efficiency.
- Direct the fan inlet vortex damper to a throttled position so that the fan will operate in a stable manner at the reduced flow rates (nominal 6500 cfm).
- Perform the above functions with onsite or offsite power only, assuming a single failure.

The ABFVES in its normal alignment performs the following functions:

- Maintains the auxiliary building at a slight negative pressure by drawing more air out of the building than is supplied to it.
- Maintains air flow direction within the auxiliary building from radiological effluents that require filtration.
- Maintains an auxiliary building environment suitable for reliable long-term operation of the components in the building, and for personnel access for equipment maintenance.

The ABFVES consists of two independent and redundant trains. Each train includes a heater demister section and a filter unit section. The heater demister section consists of a pre-filter/moisture separator and an electric heater. The filter unit section consists of a pre-filter, an upstream HEPA filter, an activated carbon adsorber, a downstream HEPA filter, and a fan. Duct-work, valves or dampers, and instrumentation also form part of the system. Following receipt of a SI signal, the system isolates the non-safety portion of the ABFVES and exhausts air only from the ECCS pump rooms.

The fuel handling ventilation exhaust system (FHVES) is designed to filter airborne radioactive particulate from the area of the fuel pool following a fuel handling accident. The FHVES, in conjunction with other normally operating systems, also provides environmental control of temperature and humidity in the fuel pool area. The FHVES does not actuate on any ESF

actuation signal. One train is required to operate whenever irradiated fuel is being moved in the fuel handling building. The operating train ensures, if a fuel handling accident occurs, that ventilation exhaust will be filtered before being released to the environment. The pre-filters remove any large particles in the air and any entrained water droplets present. The system may be used for normal as well as atmospheric cleanup functions after a fuel handling accident in the spent fuel pool area.

The FHVES consists of two independent and redundant trains with two filter units per train. Each filter unit consists of a heater, a pre-filter, HEPA filter, an activated carbon adsorber section, and a fan. Duct-work, valves or dampers, and instrumentation also form part of the system. A second bank of HEPA filter is installed downstream of the adsorber section to collect carbon fines. The second HEPA filter is not credited in dose analysis. The FHVES initiates filtered ventilation of the fuel handling building following receipt of a high radiation signal.

3.0 EVALUATION

The proposed TS amendment actually involves three separate TS changes for: (1) the reactor building annulus ventilation system, (2) auxiliary building filtered ventilation exhaust system, and (3) the fuel handling building ventilation exhaust system. They are submitted as one license amendment because the changes in TS 5.5.11 on ventilation filter testing program (VFTP) are required for all of them.

3.1 Reactor Building Annulus Ventilation System

<u>Changes for TS 3.6.10 Bases</u>

In the Background section on page B3.6.10-1, paragraph 3, the licensee proposed to delete the second statement: “Reactor building operability is required to ensure retention of primary containment leakage and proper operation of the AVS.” Reactor building operability is discussed in TS 3.6.16, Bases. This statement was found to be redundant.

In the Background section on pages B3.6.10-1, B3.6.10-2, and B3.6.10-3 and Surveillance Requirements on page B3.6.10-4, the licensee proposed to change the term “charcoal adsorber” to “carbon adsorber”. The licensee stated that the carbon is manufactured from a charcoal type porous material. The charcoal material is carbonized and chemically treated to improve its retention of radioactive iodine compounds. The licensee considers that carbon is the correct terminology for nuclear grade activated charcoal filter media. The staff finds that the change of terminology does not affect the media used for the filter and, therefore, is acceptable.

In the Background section on page B3.6.10-1, paragraph 4, the licensee proposed to delete the portion of a sentence “provide backup in case of failure of the main HEPA filter bank” after “a second bank of HEPA filters follows the adsorber section to collect carbon fines.” The words pertaining to the second filter bank as a backup to the main filter bank was deleted for the reason that the second filter bank is not included in any safety analyses.

In the Background section on page B3.6.10-2, paragraph 5, the licensee proposed to rewrite the first two statements to read: “the pre-filters/moisture separators remove large particles in the air and entrained water droplets to prevent excessive loading of the HEPA filters and carbon absorbers. Heaters are included to reduce the relative humidity of the airstream, although no credit is taken in the safety analysis.” The licensee clarified that the role of the heaters is to

reduce the relative humidity and also indicated that the heater is not included in the safety analysis.

In the Applicable Safety Analyses section on page B3.6.10-2, paragraph 2, the licensee proposed to rewrite the last two sentences to read: “the output from the CANVENT computer code is used to determine the total time required to achieve a negative pressure in the annulus under accident conditions, the response time considers signal delay, diesel generator startup and sequencing time, system startup time, and the time for the system to attain the required pressure.” The proposed change describes the AVS performance under accident conditions and clarify the current computer code used for analyzing the AVS.

In the LCO statement of TS 3.6.10 on page B3.6.10-2, the licensee proposed to delete the word “particulate” from the sentence that states: “in the event of a DBA, one AVS train is required to provide the minimum particulate iodine removal assumed in the safety analysis.” The change is to clarify that the filter train also removes other radio-iodine in addition to particulate iodine, such as organic and elemental. The staff finds that the proposed change is justified and acceptable.

In the Surveillance Requirements of SR 3.6.10.2 on page B3.6.10-4, the licensee deleted the word “minimum” prior to “system flow rate”. The licensee stated that the minimum system flow rate for the AVS filter test is not correct. The SR verifies the flow rate to be within an acceptable range in accordance with the VFTP. The staff finds that the proposed change is justified and acceptable.

In the Surveillance Requirements of SR 3.6.10.4 on page B3.6.10-5, the licensee proposed to replace the phrase “manually opened” with a phrase “opened from the control room” for the AVS filter cooling electric motor operated bypass valves. The change clarifies the intent of the surveillance and describes the way the bypass valves to be actuated.

<u>Changes for TS 3.6.16.2 Surveillance Requirements</u>

The licensee proposed to revise SR 3.6.16.2 on page 3.6.16-2 to read: “verify each annulus ventilation train produces a pressure equal to or more negative than -0.88 inch water gauge at/or above elevation 564 feet.” The licensee proposed to change the design basis annulus pressure to -0.88 inch water gauge from -0.5 inch water gauge. The -0.88 inch water gauge pressure is the minimum value of -0.25 inch water gauge plus a correction of -0.63 inch water gauge for the outside air temperature induced hydrostatic pressure gradient. The value of -0.63 inch water gauge was determined by the licensee’s calculation. The licensee stated that the use of the -0.88 inch water gauge annulus pressure will reduce the positive pressure time period modeled in the dose analyses, thereby allowing credit for the AVS filters to be taken earlier in the dose analyses and effectively reducing calculated offsite and operator doses. The staff finds that the change is consistent with the bypass leakage guidelines in SRP 6.2.3 (BTP 6-3) and SRP 6.5.3 and, therefore, is acceptable.

In SR 3.6.16.2, the licensee deleted the 1-minute time restriction for the annulus pressure draw-down. The licensee stated, based on its calculation, that the AVS cannot draw the annulus pressure down to -0.88 inch water gauge within 1 minute following a design basis LOCA. The 1-minute draw-down time is not conservative with respect to the dose analysis. Also the existing 1-minute annulus pressure draw-down time was not used in any safety analyses. Therefore, the annulus pressure draw-down time restriction is deleted. The staff finds that the change is

justified and acceptable.

In the surveillance frequency of SR 3.6.16.2, the licensee proposed to delete “on a staggered test basis.” The staggered test basis requirement in SR 3.6.16.2 was for testing the leak tightness capability of the reactor building. As such, either AVS train could be used to perform this surveillance. Actually, SR 3.6.16.2 verifies the functional capability of the AVS. The requirement for a staggered test is not appropriate for verifying the functional capability of the AVS. The staff finds that the change is acceptable. The licensee will test each AVS train every 18 months.

The licensee proposed to add a new SR 3.6.16.3 to read as follows:

“Verify that during the annulus vacuum decay test, the vacuum decay time (the time required for the pressure in the annulus to increase from -3.5 inch water gauge to -0.5 inch water gauge) is greater than or equal to 87 seconds.”

The purpose of the annulus vacuum decay test is to quantify the reactor building air in-leakage as an input to the dose analyses. The annulus vacuum decay test measures the time for the negative pressure generated in the annulus from -3.5 to -0.5 inch water gauge, which corresponds to a measure of annulus in-leakage. This surveillance is more representative of the reactor building annulus in-leakage characteristics. The licensee’s calculation determined the annulus pressure decay time of 87 seconds based on a design outside air annulus in-leakage rate of 2000 cfm at a nominal differential pressure of 1 inch water gauge. The test is to verify the annulus vacuum decay time that should be greater than or equal to 87 seconds. A longer annulus vacuum decay time indicates that the reactor building has less in-leakage rate. This new surveillance is required to support the computer analysis with CANVENT computer code. The staff finds that the added SR 3.6.16.3 is acceptable. The SR requires a surveillance frequency of 18 months.

The existing SR 3.6.16.3 is renumbered to new SR 3.6.16.4.

<u>Changes for TS 3.6.16 Bases</u>

In the Applicability statement of TS 3.6.16 on page B3.6.16-2, the licensee proposed to delete the phrase “steam line break” that could release radioactive material to the containment atmosphere. The AVS is not required to mitigate the consequences of a main steam line break and the accident analysis does not take credit for the AVS to mitigate a main steam line break accident. The staff finds that the change is acceptable because it corrects the design basis accidents that may result in the release of significant radioactive materials to the containment atmosphere.

In the Surveillance Requirements of 3.6.16.2 on page B3.6.16-3, the licensee proposed to replace the content of the SR with the following statements:

“The ability of the AVS train to produce the required negative pressure of at least -0.88 inch water gauge at/or above elevation 564 feet ensures that the annulus negative pressure is at least -0.25 inch water gauge everywhere in the annulus. The -0.88 inch water gauge annulus pressure includes a correction of -0.63 inch water gauge for an outside air temperature induced hydrostatic pressure gradient. The negative pressure prevents unfiltered leakage from the reactor building, since outside air will be drawn into the annulus by the negative pressure

differential.

The CANVENT computer code was used to model the thermal effects of a LOCA on the annulus and the ability of the AVS to develop and maintain a negative pressure in the annulus after a design basis accident. The annulus pressure drawn-down time during normal plant conditions is not an input to any dose analysis. Therefore, the annulus pressure draw-down time during normal plant conditions is insignificant.

The -0.88 inch water gauge annulus pressure does not need to be error analyzed because sufficient margin is included in the conservative methodology used to calculate the hydrostatic pressure gradient.

The AVS train are tested every 18 months to ensure each train will function as required. Operating experience has shown that each train usually passes the surveillance when performed at the 18 month frequency. Furthermore, the SR interval was developed considering that the AVS equipment operability is demonstrated at a 31 day frequency by SR 3.6.10.1. Therefore, the frequency was concluded to be acceptable from a reliability standpoint."

The new bases of SR 3.6.16.2 describe the role of the AVS in minimizing radioactive release during a design basis LOCA or rod ejection accident. The existing bases of SR 3.6.16.2 for producing a negative pressure of -0.5 inch water gauge within 1 minute and testing the AVS every 18 months on a staggered test basis are deleted. Both AVS trains are required to be tested every 18 months to ensure their function as required. The annulus pressure draw-down time during normal plant conditions is not an input to the dose analyses. The staff finds that the new basis is acceptable.

The licensee proposed to add a new SR 3.6.16.3 to read as follows:

"The annulus vacuum decay test is performed to verify that the reactor building is operable. A minimum annulus vacuum decay time of 87 second ensures that the reactor building design outside air in-leakage rate is $\leq$2000 cfm at an annulus differential pressure of -1.0 inch water gauge. Higher reactor building annulus outside air in-leakage rates correlate to less holdup, mixing, and filtration of radiological effluents which increase offsite and operator doses.

The vacuum decay test is performed by isolating the pressure transmitter and starting the AVS fan to draw down the annulus pressure to a significant vacuum. Isolating the transmitter enables the fan to reduce the annulus pressure below the normal set-point. The fan is then secured and the time it takes for the annulus pressure to decay or increase from -3.5 inch water gauge to -0.5 inch water gauge is measured.

The reactor building annulus outside air in-leakage was an input to the CANVENT computer code, which provides input to the dose analysis. The CANVENT computer code was used to model the thermal effects of a LOCA on the annulus and the ability of the AVS to develop and maintain a negative pressure in the annulus after a design basis accident. The results of the CANVENT analysis for annulus conditions and AVS response to the LOCA were used for the rod ejection accident.

The reactor building annulus outside air in-leakage rate of 2000 cfm at -1.0 inch water gauge is conservatively corrected for ambient temperature and pressure as well as annulus differential pressure conditions prior to use as an input to the CANVENT computer code. The CANVENT

results are then used as an input to the dose analysis.

Neither the annulus vacuum decay time nor test parameters are required to be error analyszed because sufficient margin is included in the conservative methodology used to calculate the annulus vacuum decay time. The reactor building pressure boundary is tested every 18 months. The 18 month frequency is consistent with the guidance provided in NUREG-0800."

The new bases of TS SR 3.6.16.3 describe in detail how the reactor building annulus outside air in-leakage is used as an input to the dose analysis for a LOCA. The annulus vacuum decay test is to verify the reactor building annulus operability. A minimum annulus vacuum decay time of 87 seconds ensures that the reactor building design outside air leakage rate is $\leq$2000 cfm at an annulus differential pressure of -1.0 inch water gauge. The results of the computer analysis for annulus conditions and AVS response to the LOCA are also used for analyzing the rod ejection accident. The reactor building pressure boundary is tested every 18 months. The staff finds that the changes are consistent with the SRP 6.5.3 guidelines and are acceptable.

Due to the addition of new SR 3.6.16.3, the existing SR3.6.16.3 is renumbered to new SR3.6.16.4.

<u>Changes in TS 5.5.11 for the AVS</u>

In TS 5.5.11a and 5.5.11b on page 5.5-14, regarding the ventilation Filter Test Program, the licensee proposed to change the Unit 2 criteria for the AVS carbon and HEPA filter penetration bypass leakage from $<$0.05% to $<$1%. The change is required to be consistent with Unit 1 which has assumed 1% bypass leakage since the plant was licensed. Regulatory Guide (RG) 1.52, Rev. 2, "Design, Testing, and Maintenance Criteria for Post Accident Engineered-Safety-Feature Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Plants," allows 0.05% bypass leakage when a HEPA filter or charcoal adsorber has a 99% removal efficiency for 4-inch filter beds and 95% removal efficiency for 2-inch filter beds. NRC Generic Letter (GL) 83-13, "Clarification of Surveillance Requirements for HEPA Filters and Charcoal Adsorber Units in Standard Technical Specifications on ESF Cleanup Systems," further clarifies that 1% bypass leakage is applicable when a HEPA filter or charcoal adsorber removal efficiency of 95% or less is assumed in the NRC staff's safety evaluation. The change is to be consistent with the GL 83-13 guidelines.

The AVS filter units for unit 1 and Unit 2 are designed at 95% filtration efficiency for a 2-inch nominal bed (actual 2.27 inches). The dose analysis has assumed 95% filtration efficiency for the filters. The licensee stated that the change does not impact the current dose analysis. In a conference call dated September 19, 2000, the staff verified the licensee's assumptions regarding the dose analysis. The licensee assumed 95% filtration efficiency for the particulate and elemental iodine and 80% for the organic iodine for the dose analysis. For the laboratory test, less than 4% methyl iodine penetration and 95% relative humidity were assumed. The licensee has considered 1% bypass leakage in its laboratory test. Based on the staff's evaluation, a safety factor of 4 was achieved in its analysis that is conservative. The staff finds that the change of bypass leakage from 0.05% to 1% has no impact on dose analysis and is acceptable.

The licensee proposed to change the word "charcoal" to "carbon" in Sections 5.5.11b, 5.5.11c, and 5.5.11d. The licensee's justification for the change is addressed in TS 3.6.10, Bases.

3.2 Auxiliary Building Filtered Ventilation Exhaust System

Changes for TS 3.7.12 Bases

In the Background section on page B3.7.12-1, the licensee proposed to change ECCS area to ECCS pump rooms. The change is to clarify that the ECCS pumps are in separate rooms.

In the Background section on page 3.7.12-1, paragraph 2, the licensee proposed to delete the phrases “to prevent excessive loading of the carbon adsorber” and “to back up the upstream HEPA filter should it develop a leak.” The licensee stated that the statement about the function of the pre-filter/moisture separator section was inaccurate. Because its function is to remove entrained water droplets from the air. The deletions also clarify the function of the downstream HEPA filter, which serves to collect carbon fines, not a back up for the upstream HEPA filter. The staff finds that the change is justified and acceptable.

In the Background section on page B3.7.12-1, paragraph 3, the licensee proposed to replace the entire paragraph with the following:

“The ABFVES is normally in operation with flow directed through the HEPA filters and carbon adsorbers. During emergency operation, the ABFVES dampers are realigned to isolate the non-safety portions of the system and only draw air from the ECCS pump rooms.”

The new paragraph defines the ABFVES alignment during normal and accident conditions. The statement regarding the ABFVES exhausting air from the ECCS pump rooms through the pump room heater demister was deleted. The licensee stated that the filter units are not allowed to operate in a bypass alignment due to single failure concern. Because the bypass damper could fail to open during a potential design basis accident. The licensee removed the ability of the filter units to operate in a bypass mode during its previous plant modification. The ECCS alignment isolates the safety and non-safety portions of the ABFVES to ensure that the ECCS pump rooms are maintained at a negative pressure with respect to adjacent non-ECCS areas. The staff finds that the change is justified and acceptable.

In the Background section on page B3.7.12-1, paragraph 4, the licensee proposed to replace the last sentence with the following:

“The heaters are not required for operability, since the laboratory test of the carbon is performed at 95% relative humidity, but have been maintained in the system to provide additional margin (Ref. 9).”

The description of the heater function to maintain the relative humidity at an acceptable level was deleted. Regulatory Guide 1.52, Rev.2 requires a heater to maintain the relative humidity at $\leq$70% during testing. ASTM D3803-1989 does not require heaters to operate on carbon filter testing since the laboratory test of the carbon is performed at 95% relative humidity. Laboratory testing experience indicated that the most conservative testing is at low temperature and high humidity. NRC Generic Letter (GL) 99-02, “Laboratory Testing of Nuclear-Grade Activated Charcoal,” June 1999, requires that the filter test be performed in accordance with ASTM D3803-1989 method instead of the method addressed in RG1.52,Rev. 2. Therefore, the staff finds that the change meets the NRC guidelines and is acceptable.

In the Applicable Safety Analysis section of TS 3.7.12 on page 3.7.12-2, paragraph 1, the

licensee proposed to replace the phrase “passive failure of the ECCS outside containment, such as an SI pump seal failure, during the recirculation mode” with “constant leak rate of 1 gpm in the ECCS pump rooms throughout the accident.” The licensee also deleted the last sentence in paragraph 1 and entire Paragraph 2 regarding small break LOCA and system failure types. The changes clarify the design basis accident evaluation for the ABFVES which is established by a large break LOCA assuming a constant leak rate of 1 gpm in the ECCS pump rooms throughout the accident. The staff finds that the change is justified and acceptable.

In the LCO statement of TS 3.7.12 on page B3.7.12-2, the licensee proposed to change “ECCS pump room” to “ECCS pump rooms” and added “a” prior to “loss of offsite power.” In Item b, changed “filter” to “filters” and deleted the phrase “not excessively restricting flow, and are.” These changes are made to clarify the LCO statement concerning HEPA filters and carbon adsorbers for an ABFVES train.

In TS 3.7.12, Action statement, SR 3.7.12.1, and SR 3.7.12.3 on page B3.7.12-4, the licensee proposed to change the word “charcoal” to “carbon.” This change was justified in TS 3.6.10, Bases.

In SR 3.7.12.2 on page B3.7.12-4, the licensee proposed to delete the word “minimum” prior to “system flow rate” and added two new paragraphs to read as follows:

The system flow rate determination and in-place testing of the filter unit components is performed in the normal operating alignment with both trains in operation. Flow through each filter unit in this alignment is approximately 30,000 cfm. The normal operating alignment has been chosen to minimize normal radiological protection concerns that occur when the system is operated in an abnormal alignment for an extended period of time. Operation of the system in other alignment may alter flow rates to the extent that the 30,000 cfm ± 10% specified in TS 5.5.11 will not be met. Flow rates outside the specified band under these operating alignment will not require the system to be considered inoperable.

Certain postulated failures and post accident recovery operational alignment may result in post accident system operation with only one train of ABFVES in a normal alignment. Under these conditions system flow rate is expected to increase above the normal flow band specified in TS 5.5.11. An analysis has been performed which conservatively predicts the maximum flow rate under these conditions is approximately 37,000 cfm. 37,000 cfm corresponds to a face velocity of approximately 48 ft/min that is significantly more than the normal 40 ft/min velocity specified in ASTM D3803-1989 (Ref 10). Therefore, the laboratory test of the carbon penetration is performed in accordance with ASTM D3803-1989 and Generic Letter 99-02 at a face velocity of 48 ft/min. These test results are to be adjusted for a 2.27 inch bed using the methodology presented in ASTM D3803-1989 prior to comparing them to the TS 5.5.11 limit.”

These changes require the filter test to be performed in accordance with ASTM D3803-1989 except that it must be done at the limiting flow rate face velocity. In order to minimize the number of carbon bed replacement, the licensee proposed to take credit for the actual filter depth. The actual filter depth is 2.275 inches. The test results are to be adjusted for a 2.27 inch bed prior to comparing them to the TS limit in accordance with the guidance provided in ASTM D3803-1989. The staff finds that the change meets the NRC guidelines and is acceptable.

In SR 3.7.12.4 on page B3.7.12-5, the licensee proposed to revise the first paragraph by adding the following statement:

"This SR verifies the pressure boundary integrity of the ECCS pump rooms. The following rooms are considered to be the ECCS pump rooms (with respect to the ABFVES): the centrifugal charging pump rooms, safety injection pump rooms, residual heat removal pump rooms, and the containment spray pump rooms. Although the containment spray system is not normally considered as an ECCS system, it is included in this ventilation boundary because of its accident mitigation function which requires the pumping of post-accident containment sump fluid."

The change specifically names the ECCS pump rooms in the pressure boundary and describes the ABFVES function of maintaining the ECCS pump rooms at a negative pressure with respect to unfiltered adjacent areas. The ability of the system to maintain the ECCS pump rooms at a negative pressure is tested at a frequency of18 month on a staggered test basis. There is no change on test frequency. The staff finds that the change is justified and acceptable

<u>Changes in TS 5.5.11 for the ABFVES</u>

In TS 5.5.11a and 5.5.11b on page 5.5-14, the licensee proposed to change the Unit 2 criteria for the ABFVES filter units bypass leakage from $<$0.05% to $<$1%. The change is required to be consistent with the Unit 1 ABFVES which has assumed 1% bypass leakage for a 2.27-inch bed. Both units assume 95% filtration efficiency for these filters. The change is to be consistent with GL 83-13. The dose analyses have assumed 95% filtration efficiency for both units. The licensee stated that this change does not impact the current dose analysis. The change was found acceptable as addressed for the changes in TS 5.5.11 for the AVS in Section 3.1 of this report.

In TS 5.5.11a, 5.5.11b, on pages 5.5-14 and TS 5.5.11d on page 5.5-15, the licensee proposed to add "2 fans" after "Aux Bldg Filtered Exhaust" and changed the flow-rate entry for the system from 30,000 cfm to 60,000 cfm. The change is to clarify that two filtered exhaust fans are required to operate in parallel with a total flow-rate of 60,000 cfm for each unit. The staff finds that the change is justified and acceptable.

In TS 5.5.11c on page 5.5-14, the licensee proposed to add Note 1 after "auxiliary building filtered exhaust." Note 1 reads as follows:

"the auxiliary building filtered exhaust system carbon adsorber sample shall be tested at a face velocity of 48 ft/min instead of the 40 ft/min specified in ASTM D3803-1989. 48 ft/min is the nominal limiting velocity the carbon adsorber may be exposed to under post accident conditions as a result of certain postulated failures. The results from this test shall then be corrected to a 2.27 inch bed in accordance with the guidance provided in ASTM D3803-1989 prior to comparing them to the TS criteria. 2.27 inches is the actual bed depth for the filter unit."

Note 1 requires the filter test to be performed in accordance with ASTM D3803-1989 except that it must be done at the limiting flow rate face velocity. The test results are to be adjusted for a 2.27 inch bed prior to comparing them to the TS limit. The change is consistent with the GL 99-02 guidelines and is acceptable.

3.3 Fuel Handling Building Ventilation Exhaust System

Changes for TS 3.7.13 Bases

In the Background section on page B3.7.13-1, paragraph 2, the licensee proposed to delete "provide backup in case the main HEPA filter bank fails" and "but serves to collect carbon fines, and to back up the upstream HEPA filter should it develop a leak." The change is to remove the redundant statements and to clarify the function of the second bank of the HEPA filters which are used to collect carbon fines. The staff finds that the change is acceptable.

In the background section on page B3.7.13-1, paragraph 3, the licensee proposed to add a phrase "Engineered Safety Feature Actuation System" to the first sentence and deleted the phrase "to prevent excessive loading of the HEPA filters and carbon adsorbers" from the last sentence for the pre-filters. The change is to clarify that the FHVES does not automatically actuate on any ESF actuation signal and clarify the function of the pre-filters. However, the FHVES train is initiated following receipt of a high radiation signal.

In the Background section on page B3.7.13-1, paragraph 4, the licensee proposed to add the following statement at the end of the paragraph:

"The heaters are not required for operability, since the laboratory test of the carbon is performed at 95% relative humidity, but have been maintained in the system to provide additional margin (Ref. 9)." The change is based on the laboratory test method per ASTM D3803-1989, which does not require the heaters in operation. Because the test method does not assume maintaining the relative humidity at $\leq$70%. Testing at low temperature and high humidity is more conservative. The test is performed at 95% relative humidity and 30 $^{\circ}$C. The staff finds that the change meets the NRC guidelines and is acceptable.

In the LCO statement of TS 3.7.13 on page B3.7.13-2, paragraph 2, the licensee proposed to delete "not excessively restricting flow, and are" and changed "function" to "functions." The changes clarify the LCO statement concerning HEPA filters and carbon adsorbers for a FHVES train. The staff finds that the change is justified and acceptable.

In the Action statement and Surveillance Requirements of TS 3.7.13 on page B3.7.13-3, the licensee proposed to change the word "charcoal" to "carbon." This change was justified in TS 3.6.10, Bases and was found to be acceptable.

In SR 3.7.13.3 on page B3.7.13-4, the licensee proposed to delete the word "minimum" before "system flow rate." The change is to clarify the surveillance requirement, which verifies the flow-rate within an acceptable range in accordance with the VFTP.

In SR 3.7.13.4 on page B3.7.13-4, the licensee proposed to revise the second sentence to read: "the ability of the system to maintain the fuel building at a negative pressure with respect to atmosphere pressure is periodically tested to verify proper function of the FHVES." The change is to clarify the surveillance requirements and is found to be acceptable.

Changes in TS 5.5.11 for the FHVES

In TS 5.5.11a and 5.5.11b, the licensee proposed to change the Unit 2 criteria for the HEPA and carbon filter penetration bypass leakage for the FHVES from **0.05%** to **1%** . This change is required to be consistent with Unit 1 which has assumed 1% bypass leakage. The FHVES filters for Unit 1 and Unit 2 are designed at 95% filtration efficiency for a 2.27-inch bed. The

licensee stated that the change does not impact the dose analysis. The justification for the change was found acceptable as addressed in TS 5.5.11 for the AVS in Section 3.1 of this report.

4.0 CONCLUSION

The staff has completed its review of the licensee's submittal and related documentation. On the basis of its review, the staff concludes that the licensee proposed TS changes are acceptable. The bases for the staff acceptance are that:

- the proposed changes are justified by the licensee with technical bases that have been reviewed by the staff.
- the proposed changes have improved the TS with updated calculations.
- the proposed changes conform with the NRC position on HEPA filter and charcoal adsorber testing addressed in Generic Letters 99-02 and 83-13.
- the design and operation of the systems are not being modified by this proposed TS amendment. There will be no impact on any accident probability or consequences.
- the changes to the AVS surveillance will improve the ability to determine the annulus in-leakage that will ensure the safety margin for the dose analyses.

Therefore, the staff concludes that the proposed TS amendment is acceptable.