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RBG-47404

November 4, 2013

U. S. Nuclear Regulatory Commission
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SUBJECT: License Amendment Request 2013-17
Revision of the Ventilation Filter Testing Program and Associated Surveillance Requirements
River Bend Station – Unit 1
Docket No. 50-458
License No. NPF-47

RBF1-13-0122

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Entergy Operations Inc. (EOI) hereby requests an amendment to the River Bend Station – Unit 1 (RBS) Operating License. The proposed amendment would revise Technical Specifications (TS) Sections 3.6.4.3, "Standby Gas Treatment System," 3.6.4.7, "Fuel Building Ventilation System," 3.7.2, "Control Building Fresh Air System, and 5.5.7, "Ventilation Filter Testing Program." This revision will eliminate the operability and surveillance requirements for the heaters in the safety-related charcoal filter trains in those systems, revise certain charcoal test specifications, and reduce the duration of the monthly surveillance test of the filter trains. EOI has evaluated the proposed changes in accordance with 10 CFR 50.92 and concluded that they involve no significant hazards consideration.

Attachment 1 contains the basis for the proposed change, including the significant hazards evaluation and the environmental assessment. Attachments 2 and 3 provide the marked-up TS and Bases pages, respectively. The Bases changes are being submitted for information only. This letter contains no regulatory commitments.

In accordance with the requirement of 10 CFR 50.91, a copy of this letter and all applicable attachments will be sent to the designated official of the Louisiana Department of Environmental Quality.

While this amendment request is neither emergency nor exigent, Entergy requests approval by November 4, 2014. The amendment will be implemented within 60 days of approval. If you have any questions regarding the information in this submittal, please contact Joseph A. Clark at 225-381-4177.

A001
NRR

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 4, 2013.

Eric W. Olson

EWO/dhw

Attachment 1: Description of proposed change
Attachment 2: Technical Specification mark-up of proposed change
Attachment 3: Technical Specification Bases mark-up of proposed change

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Attachment 1

Description of proposed changes

1.0 Description

The proposed change will revise the following Technical Specifications (TS), corresponding Technical Specification Bases (TSB), and specific Surveillance Requirements (SR):

- TS 3.6.4.3, Standby Gas Treatment System (SGT)
  - SR 3.6.4.3.1 (Operate each SGT subsystem for ≥ 10 continuous hours with heaters operating)
- TS 3.6.4.7, Fuel Building Ventilation System – Fuel Handling (FBVS)
  - SR 3.6.4.7.2 (Operate each fuel building ventilation charcoal filtration subsystem for ≥ 10 continuous hours with heaters operating)
- TS 3.7.2, Control Room Fresh Air System (CRFA)
  - SR 3.7.2.1 (Operate each CRFA subsystem for ≥ 10 continuous hours with the heaters operating)
- TS 5.5.7, Ventilation Filter Test Program (VFTP)
  - TS 5.5.7.c (penetration and relative humidity specifications for charcoal tests)
- TSB Sections 3.6.4.3, 3.6.4.7, and 3.7.2

The proposed changes will revise the SRs that currently require operating the charcoal filter trains in the three systems for a continuous 10 hour period every 31 days with the heaters operating. The SRs will be revised to require operation of the systems for 15 continuous minutes every 31 days. All operability requirements and other references to heaters in the charcoal filter trains in the three systems are to be deleted. TS 5.5.7.c will be revised to change the charcoal test conditions from 70% to 95% relative humidity, and to revise the allowable methyl iodide penetration in the FBVS.

The proposed changes are consistent with the guidance in ASTM D3803-1989 (Reference 1), and in Regulatory Guide (RG) 1.52, Revision 3 (Reference 2).

2.0 Background

Regulatory Guide (RG) 1.52, Revision 2 (Reference 2) was published in March 1978 to provide guidance and criteria acceptable to the NRC staff for licensees to implement the regulations in 10 CFR related to air filtration and adsorption systems. Regulatory Position 4.d of Revision 2 of RG 1.52 stated that "Each ESF [engineered safety feature] atmosphere cleanup train should be operated at least 10 hours per month, with the heaters on (if so equipped), in order to reduce the buildup of moisture on the adsorbers and HEPA filters." The purpose of this position is to minimize the moisture content in the system and thereby enhance efficiency in the event the system is called upon to perform its design basis function. SRs currently require operating the heaters in the respective

ventilation and filtering systems for at least 10 continuous hours every 31 days. The current Standard Technical Specification Bases explain that operation of heaters for 10 hours would dry out any moisture that may have accumulated on the charcoal adsorbers and HEPA filters.

As described in the model safety evaluation for TSTF-522 (Reference 5), the NRC staff subsequently determined that, although 10 continuous hours of system operation would dry out the charcoal adsorber for a brief period, the moisture level in adsorbers would rapidly return to the pre-test level. The NRC then issued GL 99-02, requesting that licensees confirm their charcoal testing protocols accurately reflect the adsorber gaseous activity capture capability. GL 99-02 also requested that licensees account for the effects of moisture accumulation in adsorbers. Revision 3 of Reg. Guide 1.52 was issued in June 2001, and the guidance concerning the acceptability of 15-minute monthly surveillance tests was incorporated. This test duration is recognized as sufficient to determine the functionality of the system.

The RBS VFTP was amended on December 20, 2000 (Amendment No. 115) to revise the standard by which charcoal adsorber materials are tested to ASTM D3803-1989 (Reference 1) . This amendment was consistent with actions requested in GL 99-02. The more stringent charcoal testing methodologies required by Reference 1 support the elimination of the requirement for the humidity control design function of the heaters. The heaters are no longer required to maintain charcoal efficiency.

An additional safety benefit of the proposed changes will be the margin gained in emergency diesel generator (DG) performance. The minimum TS-required power dissipation of the heaters in the three charcoal filter trains totals 125 kW on each division. Deletion of the operability requirements of these heaters will allow them to be deactivated, gaining significant margin to the design load limits on the Division 1 and 2 DGs.

3.0 Technical Analysis

3.1 Heater Deletion

The SGT system is required by 10 CFR 50, Appendix A, GDC 41, "Containment Atmosphere Cleanup." The function of the SGT System is to ensure that radioactive materials that leak from the primary containment into the secondary containment following a design basis accident are filtered and adsorbed prior to exhausting to the environment. The SGT System consists of two fully redundant subsystems, each with its own set of ductwork, dampers, charcoal filter train, and controls. The design basis for the SGT System is to mitigate the consequences of a loss of coolant accident. For all analyzed events, the SGT System is automatically initiated to reduce, via filtration and adsorption, the radioactive material released to the environment.

The FBVS is required by 10 CFR 50, Appendix A, GDC 41, "Containment Atmosphere Cleanup". The function of the FBVS is to ensure that radioactive materials that escape from fuel assemblies damaged following a design basis fuel handling accident are filtered and adsorbed prior to exhausting to the environment. The FBVS consists of two fully redundant subsystems, each with its own set of ductwork, dampers, charcoal filter train, and controls. The design basis for the FBVS is to mitigate the consequences of a

fuel handling accident. For all analyzed events, the FBVS is shown to reduce, via filtration and adsorption, the radioactive material released to the environment.

The CRFA system provides a protected environment from which the plant operators can control the unit following an uncontrolled release of radioactivity, hazardous chemicals, or smoke. The safety-related function of the CRFA system used to control radiation exposure consists of two independent and redundant high efficiency air filtration subsystems for treatment of recirculated air or outside supply air, and a control room envelope boundary that limits the inleakage of unfiltered air. The CRFA system is designed to maintain a habitable environment in the control room envelope for a 30-day continuous occupancy after a DBA, per the requirements of GDC 19 and 10 CFR 50.67.

The charcoal filter trains in each of the three systems consists of (in order of the direction of the air flow): a moisture separator, an electric heater, a prefilter, a high efficiency particulate air (HEPA) filter, a charcoal adsorber, a second HEPA filter, and a centrifugal fan.

The purpose of the activated charcoal adsorbent is to remove iodine in the form of methyl iodide and elemental iodine. The efficiency of the adsorption process erodes as moisture coats the surface of the charcoal. The electric heater therefore serves to enhance carbon efficiency by lowering the relative humidity (RH) to less than 70%. Analyses of design basis accidents assume certain carbon adsorption efficiency in the determination of off-site and control room doses. To protect this assumption, testing of the carbon efficiency must demonstrate a higher efficiency than that assumed in accident analysis calculations.

RBS Technical Requirements Manual (TRM) 5.5.7.c specifies the frequency of charcoal adsorbent testing as follows, and will remain unchanged:

> The testing requirements of Technical Specification 5.5.7.c will be performed at least once per 24 months or (1) after any structural maintenance on the HEPA filter or charcoal adsorber housings, (2) following painting, fire or chemical release in any ventilation zone communicating with the subsystem, or (3) every 720 hours of charcoal adsorber operation. The representative carbon sample will be tested within 31 days following removal.

The current SRs require that the charcoal filter trains be run monthly for a period of 10 hours with the electric heaters operating. The run time is based on reducing the moisture in the system. Following implementation of this amendment, the heater will no longer be a credited component of the charcoal filter trains. Laboratory testing of the carbon is already performed at the higher RH level (95%) to more accurately assess iodine adsorption capability at ambient steady-state conditions. Keeping the system dry with heater operation will therefore no longer be necessary. The revised run time of 15 minutes is sufficient to ensure that the associated controls are functioning properly and to check for abnormalities such as excessive vibrations, motor failures, and blockages.

3.2 Revision of Charcoal Penetration Specification

This amendment request proposes to revise TS 5.5.7.c to raise the allowable value for methyl iodide penetration during periodic charcoal testing from 0.5% to 5.0%.

In March 2003 (reference 6), NRC approved Amendment No. 113 to the RBS operating license to implement full-scope application of alternative source term insights. One of the changes made by that amendment was the removal of the fuel building from the operability requirements for secondary containment. Under a design basis LOCA, all potential leakage paths to the fuel building are now assumed to be released directly to the environment with no credit taken for holdup, dilution, or decay by the building or for filtration by the FBVS filters. Amendment No. 113 also revised the applicability for fuel building operability to require it only during movement of recently irradiated fuel (i.e., fuel that has occupied part of a critical core within the previous 24 hours).

RBS has both a licensing requirement and a physical limitation that preclude the handling of recently irradiated fuel in the fuel building. Technical Requirements Manual TR 3.9.10, Decay Time, requires that the reactor be subcritical for greater than 24 hours prior to movement of irradiated fuel in the reactor vessel. Also, cooldown and disassembly of the reactor vessel to the point that fuel handling may begin take significantly longer than 24 hours.

The purpose of the activated charcoal adsorbent is to remove iodine in the form of methyl iodide and elemental iodine. The efficiency of the adsorption process erodes as moisture coats the surface of the charcoal. The electric heater therefore serves to enhance carbon efficiency by lowering the relative humidity (RH) to less than 70%. Analyses of design basis accidents assume certain carbon adsorption efficiency in the determination of off-site and control room doses. To protect this assumption, testing of the carbon efficiency must demonstrate a higher efficiency than that assumed in accident analysis calculations.

The current penetration requirements in TS 5.5.7 are 5.0% for SGT, 0.5% for FBVS, and 1.0% for CRFA. ASTM D3803-1989 provides a guidance table for iodine penetration given a relative humidity. At 95% relative humidity, the average penetration is 0.56% ±0.11%. Therefore, the current penetration requirements for SGTS and CRFAS are met. The current minimum penetration value for FBVS is 0.5%, which is slightly better than the ASTM D3803-1989 minimum of 0.56% ±0.11%. Since the FBVS is no longer part of secondary containment and is no longer credited to mitigate the consequences of any design basis accident, raising the minimum charcoal efficiency to 5.0% will have no adverse effects on current operating and accident off site dose calculations.

4.0 Regulatory Analysis

Entergy requests a revision to sections of the RBS TS pertaining to surveillance tests of the safety-related charcoal filter trains. The proposed revision will (1) eliminate the operability requirements for heaters in each of the three affected system, and (2) reduce the duration of the monthly surveillance tests on each filter train from 10 hours to 15 minutes. Entergy has evaluated whether a significant hazards consideration is involved with the proposed amendment by focusing on three standards set forth in 10 CFR 50.92, "Issuance of Amendment," as discussed below:

Question: Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No. The SGT ensures that radioactivity leaking into the secondary containment from design basis accidents is treated and filtered before being released to

the environment. The FBVS ensures that radioactive materials that escape from fuel assemblies damaged following a design basis fuel handling accident are filtered and adsorbed prior to exhausting to the environment. The CRFA system is designed to maintain a habitable environment in the control room envelope for a 30-day continuous occupancy after a DBA. None of these systems involve any accident precursors or initiators. None of the proposed changes involve any reduction in the reliability of the systems.

This TS amendment request does not require or otherwise propose any physical changes to any system intended for the prevention of accidents or intended for the mitigation of accident consequences including the three systems. Neither does it involve any changes to the operation or maintenance of the three systems or to any other system designed for the prevention or mitigation of design basis accidents. This proposed TS change involves the elimination of the electric heater testing requirement and its concomitant increase in the testing criteria for relative humidity. The proposed revision to the allowable percent penetration through the FBVS filter carbon bed when challenged with methyl iodide during laboratory testing will have no adverse effects on current operating and accident off site dose calculations. With respect to the reduced duration of the monthly surveillance tests, the proposed duration of 15 minutes is adequate to ensure proper operation of the filter trains.

For the above reasons, this TS amendment request will not result in a significant increase in the probability of occurrence, or the consequences, of a previously evaluated event.

Question: Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No. This proposed change involves elimination of the testing requirements for the electric heaters in the three charcoal filter trains. This change is consistent with the charcoal test protocol already codified in the TS. However, no changes are being made to the way the filter trains, or any other system, are operated or maintained. Changes are being made to how the filter trains will be tested, but these changes will not result in the system being operated outside of its design basis. Since no new modes of operation are introduced, the probability of occurrence of an event different from any previously evaluated is not increased.

Question: Does the proposed amendment involve a significant reduction in the margin of safety?

Response: No. The operability requirements for the electric heaters in the three charcoal filter trains are eliminated by the proposed change. The laboratory testing criteria cited in TS 5.5.7.c for the relative humidity of the process air stream are being changed from 70% to 95%. This is consistent with the test protocol required by ASTM D3803-1983, which is already incorporated by reference in the TS. The capability of the charcoal filter trains to adsorb iodine in the process stream will remain unchanged. The proposed revision to the allowable percent penetration through the FBVS filter carbon bed when challenged with methyl iodide during laboratory testing will have no adverse effects on current operating and accident off site dose calculations. The proposed 15-minute duration of the monthly surveillance test provides adequate verification of the proper operation of the credited components. For these reasons, the margin of safety is

not significantly reduced. Additionally, the elimination of the filter train heaters will significantly improve the safety margin in the performance of the emergency diesel generators by reducing their post-accident loads.

Based on the above, Entergy concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

5.0 Environmental Analysis

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 Precedence

NRC has approved similar amendment requests to eliminate the operability requirements for charcoal filter train heaters and reduce the duration of monthly surveillance tests in at least three prior cases: Prairie Island Nuclear Generating Plant, approval date July 18, 2008 (ADAMS Accession No. ML081430161), Kewaunee Power Station, approval date December 30, 2008 (ADAMS Accession No. ML083290653), and Edwin I. Hatch Nuclear Plant, approval date April 15, 2009 (ADAMS Accession No. ML090340465)

7.0 References

1. American Society for Testing and Materials, Standard ASTM D 3803-1989, "Standard Test Method for Nuclear-Grade Activated Carbon"
2. Regulatory Guide 1.52, "Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered Safety-Feature Atmosphere Cleanup Systems in Light-Water Cooled Nuclear Power Plants.", Revision 2 and Revision 3.
3. TSTF-522, Revision 0, "Revise Ventilation System Surveillance Requirements to Operate for 10 Hours per Month, as approved in the Federal Register, September 20, 2102
4. NRC Generic Letter 99-02, "Laboratory Testing of Nuclear-Grade Activated Charcoal," dated June 3, 1999
5. Model Safety Evaluation of TSTF–522, Revision 0, (ADAMS Accession No. ML12158A464)
6. River Bend Station, Unit 1 – Issuance of Amendment re: Full-scope Application of Alternative Source Term Insights, dated March 14, 2003 (ADAMS Accession No. ML030760746

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Attachment 2

Technical Specifications mark-up of proposed changes

Pages: 3.6-52
3.6-59
3.7-7
5.0-12
5.0-13

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.4.3.1	Operate each SGT subsystem for ≥ ~~10 continuous hours with heaters operating~~.	31 days
SR 3.6.4.3.2	Perform required SGT filter testing in accordance with the Ventilation Filter Testing Program (VFTP).	In accordance with the VFTP
SR 3.6.4.3.3	Verify each SGT subsystem actuates on an actual or simulated initiation signal.	24 months
SR 3.6.4.3.4	Verify each SGT filter cooling bypass damper can be opened and the fan started.	24 months

15 continuous minutes

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.4.7.1	Verify one fuel building ventilation charcoal filtration subsystem in operation.	12 hours
SR 3.6.4.7.2	Operate each fuel building ventilation charcoal filtration subsystem for ≥ ~~10 continuous hours with heaters operating~~. 15 continuous minutes	31 days
SR 3.6.4.7.3	Perform fuel building ventilation charcoal filtration filter testing in accordance with the Ventilation Filter Testing Program (VFTP).	In accordance with the VFTP
SR 3.6.4.7.4	Verify each fuel building ventilation charcoal filtration subsystem actuates on an actual or simulated initiation signal.	24 months
SR 3.6.4.7.5	Verify each fuel building ventilation charcoal filtration filter cooling bypass damper can be opened and the fan started.	24 months

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Two CRFA subsystems inoperable during movement of recently irradiated fuel assemblies in the primary containment or fuel building, or during OPDRVs.	F.1 Suspend movement of recently irradiated fuel assemblies in the primary containment and fuel building.	Immediately
	AND	
OR	F.2 Initiate action to suspend OPDRVs.	Immediately
One or more CRFA subsystems inoperable due to inoperable CRE boundary during movement of recently irradiated fuel assemblies in the primary containment or fuel building, or during OPDRVs.		

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.2.1	Operate each CRFA subsystem for ≥ ~~10 continuous hours with the heaters operating~~.	31 days
SR 3.7.2.2	Perform required CRFA filter testing in accordance with the Ventilation Filter Testing Program (VFTP).	In accordance with the VFTP
SR 3.7.2.3	Verify each CRFA subsystem actuates on an actual or simulated initiation signal.	24 months

15 continuous minutes

(continued)

5.5 Programs and Manuals

5.5.7 Ventilation Filter Testing Program (VFTP) (continued)

b. Demonstrate for each of the ESF systems 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 2, and ASME N510-1989 at the system flowrate specified below ± 10%:

ESF Ventilation System	Flowrate
SGTS	12,500 cfm
FBVS	10,000 cfm
CRFAS	4,000 cfm

c. Demonstrate for each of the ESF systems that a laboratory test of a sample of the charcoal adsorber, when obtained as described in Regulatory Guide 1.52, Revision 2, 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 and the relative humidity specified below:

ESF Ventilation System	Penetration	RH
SGTS	5.0%	~~70%~~
FBVS	~~0.5%~~	~~70%~~
CRFAS	1.0%	~~70%~~

5.0% → ~~0.5%~~

95% → ~~70%~~, ~~70%~~, ~~70%~~

d. Demonstrate for each of the ESF systems that the pressure drop across the combined HEPA filters, the prefilters, and the charcoal adsorbers is less than the value specified below when tested in accordance with Regulatory Guide 1.52, Revision 2, and ASME N510-1989 at the system flowrate specified below ± 10%:

ESF Ventilation System	Delta P	Flowrate
SGTS	< 8" WG	12,500 cfm
FBVS	< 8" WG	10,000 cfm
CRFAS	< 8" WG	4,000 cfm

(continued)

5.5 Programs and Manuals

5.5.7 Ventilation Filter Testing Program (VFTP) (continued)

e. ~~Demonstrate that the heaters for each of the ESF systems dissipate the value specified below when tested in accordance with ASME N510-1989:~~

Deleted

~~ESF Ventilation System~~	~~Wattage~~
~~SGTS~~	~~≥ 61 kW~~
~~FBVS~~	~~≥ 49 kW~~
~~CRFAS~~	~~≥ 15 kW~~

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the VFTP test frequencies.

5.5.8 Explosive Gas and Storage Tank Radioactivity Monitoring Program

This program provides controls for potentially explosive gas mixtures contained in the main condenser offgas treatment system and the quantity of radioactivity contained in unprotected outdoor liquid storage tanks.

The program shall include:

a. The limits for concentrations of hydrogen in the main condenser offgas treatment system and a surveillance program to ensure the limits are maintained. Such limits shall be appropriate to the system's design criteria (i.e., whether or not the system is designed to withstand a hydrogen explosion); and

b. A surveillance program to ensure that the quantity of radioactive material contained in any unprotected outdoor tank is limited to ≤ 10 curies, excluding tritium and dissolved or entrained noble gases.

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Explosive Gas and Storage Tank Radioactivity Monitoring Program surveillance frequencies.

5.5.9 Diesel Fuel Oil Testing Program

A diesel fuel oil testing program to implement required testing of both new fuel oil and stored fuel oil shall be established. The

(continued)

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Attachment 3

Technical Specifications Bases mark-up of proposed changes

Pages: B 3.6-96
B 3.6-97
B 3.6-99
B 3.6-112
B 3.6-115
B 3.7-10
B 3.7-11
B 3.7-14

B 3.6 CONTAINMENT SYSTEMS

B 3.6.4.3 Standby Gas Treatment (SGT) System

BASES

BACKGROUND

The SGT System is required by 10 CFR 50, Appendix A, GDC 41, "Containment Atmosphere Cleanup" (Ref. 1). The function of the SGT System is to ensure that radioactive materials that leak from the primary containment into the secondary containment following a Design Basis Accident (DBA) are filtered and adsorbed prior to exhausting to the environment.

The SGT System consists of two fully redundant subsystems, each with its own set of ductwork, dampers, charcoal filter train, and controls.

Each charcoal filter train consists of (components listed in order of the direction of the air flow):

a. A moisture separator;

b. ~~An electric heater;~~ Deleted

c. A prefilter;

d. A high efficiency particulate air (HEPA) filter;

e. A charcoal adsorber;

f. A second HEPA filter; and

g. A centrifugal fan.

The SGT System serves as a backup non-ESF system to the Annulus Pressure Control System (APCS) during normal operation. Upon loss of the APCS, or upon an ESF signal (i.e., LOCA), the annulus air and air from the shielded compartments in the auxiliary building are automatically diverted through the SGT System filter trains.

(continued)

BASES

BACKGROUND (continued)

If the SGT System filter trains are not treating the annulus atmosphere or the exhaust air of the shielded compartments in the auxiliary building, the containment and drywell purge can be manually diverted through both SGT System filter trains. By utilizing both SGTS filter trains, a maximum of 25,000 cfm of containment/drywell purge air can be processed by the filter trains.

The SGT System is designed to maintain a negative pressure of at least 0.50 in W.G. in the annulus during post-LOCA operation. With the annulus at a negative pressure, any potential leakage is directed inward (away from the shield building). Therefore, if a primary containment DBA occurs, airborne radioactivity which exfiltrates the steel primary containment is collected and passed through a filter train of the SGT System before being released.

The SGT System is also designed to maintain a negative pressure of at least 0.25 in W.G. in the Auxiliary Building.

The moisture separator is provided to remove entrained water in the air~~, while the electric heater reduces the relative humidity of the airstream~~. The prefilter removes large particulate matter, while the HEPA filter is provided to remove fine particulate matter and protect the charcoal from fouling. The charcoal adsorber removes gaseous elemental iodine and organic iodides, and the final HEPA filter is provided to collect any carbon fines exhausted from the charcoal adsorber (Ref. 2).

APPLICABLE SAFETY ANALYSES

The design basis for the SGT System is to mitigate the consequences of a loss of coolant accident (Ref. 3). For all events analyzed, the SGT System is shown to be automatically initiated to reduce, via filtration and adsorption, the radioactive material released to the environment.

The SGT System satisfies Criterion 3 of the NRC Policy Statement.

LCO

Following a DBA, a minimum of one SGT subsystem is required to maintain the secondary containment at a negative pressure with respect to the environment and to process gaseous releases. Meeting the LCO requirements for two operable subsystems ensures operation of at least one SGT subsystem in the event of a single active failure.

(continued)

15 continuous minutes

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.4.3.1

Operating each SGT subsystem for ≥ ~~10 continuous hours~~ ensures that both subsystems are OPERABLE and that all associated controls are functioning properly. It also ensures that blockage, fan or motor failure, or excessive vibration can be detected for corrective action. ~~Operation with the heaters on (automatic heater cycling to maintain temperature) for ≥ 10 continuous hours every 31 days eliminates moisture on the adsorbers and HEPA filters.~~ The 31 day Frequency was developed in consideration of the known reliability of fan motors and controls and the redundancy available in the system.

SR 3.6.4.3.2

This SR verifies that the required SGT filter testing is performed in accordance with the Ventilation Filter Testing Program (VFTP). The SGT System filter tests are in accordance with Regulatory Guide 1.52 (Ref. 4). The VFTP includes testing HEPA filter performance, charcoal adsorber efficiency, minimum system flow rate, and the physical properties of the activated charcoal (general use and following specific operations). Specified test frequencies and additional information are discussed in detail in the VFTP.

SR 3.6.4.3.3

This SR requires verification that each SGT subsystem starts upon receipt of an actual or simulated initiation signal. The LOGIC SYSTEM FUNCTIONAL TEST in SR 3.3.6.2.5 overlaps this SR to provide complete testing of the safety function.

SR 3.6.4.3.4

This SR requires verification that the SGT filter cooling bypass damper can be opened and the fan started. This ensures that the ventilation mode of SGT System operation is

(continued)

B 3.6 CONTAINMENT SYSTEMS

B 3.6.4.7 Fuel Building Ventilation System-Fuel Handling

BASES

BACKGROUND

The Fuel Building Ventilation System is required by 10 CFR 50, Appendix A, GDC 41, "Containment Atmosphere Cleanup" (Ref. 1). The function of the Fuel Building Ventilation System is to ensure that radioactive materials that escape from fuel assemblies damaged following a design basis Fuel Handling Accident (FHA) are filtered and adsorbed prior to exhausting to the environment.

The Fuel Building Ventilation System consists of two fully redundant subsystems, each with its own set of ductwork, dampers, charcoal filter train, and controls.

Each charcoal filter train consists of (components listed in order of the direction of the air flow):

a. A moisture separator;

b. ~~An electric heater;~~ Deleted

c. A prefilter;

d. A high efficiency particulate air (HEPA) filter;

e. A charcoal adsorber;

f. A second HEPA filter; and

g. A centrifugal fan with inlet flow control vanes.

The moisture separator is provided to remove entrained water in the air~~, while the electric heater reduces the relative humidity of the airstream to less than 70% (Ref. 2)~~. The prefilter removes large particulate matter, while the HEPA filter is provided to remove fine particulate matter and protect the charcoal from fouling. The charcoal adsorber removes gaseous elemental iodine and organic iodides, and the final HEPA filter is provided to collect any carbon fines exhausted from the charcoal adsorber.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.6.4.7.2

Operating each fuel building ventilation charcoal filtration subsystem for ≥ ~~10 continuous hours~~ 15 continuous minutes ensures that both subsystems are OPERABLE and that all associated controls are functioning properly. It also ensures that blockage, fan or motor failure, or excessive vibration can be detected for corrective action. ~~Operation with the heaters operating (automatic heater cycling to maintain temperature) for ≥ 10 continuous hours every 31 days eliminates moisture on the adsorbers and HEPA filters.~~ The 31 day Frequency was developed in consideration of the known reliability of fan motors and controls and the redundancy available in the system.

SR 3.6.4.7.3

This SR verifies that the required fuel building ventilation charcoal filtration filter testing is performed in accordance with the Ventilation Filter Testing Program (VFTP). The fuel building ventilation charcoal filtration filter tests are in accordance with Regulatory Guide 1.52 (Ref. 4). The VFTP includes testing HEPA filter performance, charcoal adsorber efficiency, minimum system flow rate, and the physical properties of the activated charcoal (general use and following specific operations). Specified test frequencies and additional information are discussed in detail in the VFTP.

SR 3.6.4.7.4

This SR requires verification that each fuel building ventilation charcoal filtration subsystem starts upon receipt of an actual or simulated initiation signal. The LOGIC SYSTEM FUNCTIONAL TEST in SR 3.3.6.2.5 overlaps this SR to provide complete testing of the safety function.

(continued)

B 3.7 PLANT SYSTEMS

B 3.7.2 Control Room Fresh Air (CRFA) System

BASES

BACKGROUND

The CRFA System provides a protected environment from which occupants can control the unit following an uncontrolled release of radioactivity, hazardous chemicals, or smoke.

The safety related function of the CRFA System used to control radiation exposure consists of two independent and redundant high efficiency air filtration subsystems for treatment of recirculated air or outside supply air and a CRE boundary that limits the inleakage of unfiltered air. Each CRFA subsystem consists of a demister, ~~an electric heater,~~ a prefilter, a high efficiency particulate air (HEPA) filter, an activated charcoal adsorber section, a second HEPA filter, a fan, and the associated ductwork valves or dampers, doors, barriers, and instrumentation. Demisters remove water droplets from the airstream. Prefilters and HEPA filters remove particulate matter which may be radioactive. The charcoal adsorbers provide a holdup period for gaseous iodine, allowing time for decay.

The CRE is the area within the confines of the CRE boundary that contains the spaces that control room occupants inhabit to control the unit during normal and accident conditions. This area encompasses the control room, and may encompass other non-critical areas to which frequent personnel access or continuous occupancy is not necessary in the event of an accident. The CRE is protected for normal operation, natural events, and accident conditions. The CRE boundary is the combination of walls, floor, roof, ducting, doors, penetrations, and equipment that physically form the CRE. The OPERABILITY of the CRE boundary must be maintained to ensure that the inleakage of unfiltered air into the CRE will not exceed the inleakage assumed in the licensing basis analysis of design basis accident (DBA) consequences to CRE occupants. The CRE and its boundary are defined in the Control Room Envelope Habitability Program.

In addition to the safety related standby emergency filtration function, parts of the CRFA System are operated to maintain the CRE environment during normal operation. Upon receipt of the initiation signal(s) (indicative of conditions that could result in radiation exposure to CRE occupants, the CRFA System automatically switches to the isolation mode of operation to minimize infiltration of contaminated air into the CRE. A system of dampers isolates the CRE, and CRE air flow is recirculated and processed through either of the two filter subsystems.

The CRFA System is designed to maintain a habitable environment in the CRE for a 30 day continuous occupancy after a DBA, per the requirements of GDC 19 and 10CFR50.67. CRFA System operation in maintaining the CRE habitability is discussed in the USAR, Sections 6.4.1 and 9.4.1 (Refs. 1 and 2, respectively).

APPLICABLE SAFETY ANALYSES

The ability of the CRFA System to maintain the habitability of the CRE is an explicit assumption for the safety analyses presented in the USAR, Chapters 6

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

and 15 (Refs. 3 and 4, respectively). The isolation mode of the CRFA System is assumed to operate following a DBA. The radiological doses to CRE occupants as a result of the various DBAs are summarized in Reference 4. No single active or passive failure will cause the loss of outside or recirculated air from the CRE.

The CRFA System provides protection from smoke and hazardous chemicals to the CRE occupants. The analysis of hazardous chemical releases demonstrates that the toxicity limits are not exceeded in the CRE following a hazardous chemical release (Ref. 5). The evaluation of a smoke challenge demonstrates that it will not result in the inability of the CRE occupants to control the reactor either from the control room or from the remote shutdown panels (Ref. 6).

The CRFA System satisfies Criterion 3 of the NRC Policy Statement.

LCO

Two redundant subsystems of the CRFA System are required to be OPERABLE to ensure that at least one is available, if a single active failure disables the other subsystem. Total CRFA system failure, such as from a loss of both ventilation subsystems or from an inoperable CRE boundary, could result in a failure to meet the dose requirements of GDC 19 and 10CFR50.67 in the event of a DBA.

Each CRFA subsystem is considered OPERABLE when the individual components necessary to limit CRE occupant exposure are OPERABLE. A subsystem is considered OPERABLE when its associated:

a. Fan is OPERABLE;

b. HEPA filter and charcoal adsorber are not excessively restricting flow and are capable of performing their filtration functions; and

c. ~~Heater,~~ demister, ductwork, valves, and dampers are OPERABLE, and air circulation can be maintained.

In order for the CRFA subsystems to be considered OPERABLE, the CRE boundary must be maintained such that the CRE occupant dose from a large radioactive release does not exceed the calculated dose in the licensing basis consequence analyses for DBAs, and that CRE occupants are protected from hazardous chemicals and smoke.

The LCO is modified by a Note allowing the CRE boundary to be opened intermittently under administrative controls. This Note only applies to openings in the CRE boundary that can be rapidly restored to the design condition, such as doors, hatches, floor plugs, and access panels. For entry and exit through doors, the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls should be proceduralized and consist of stationing a dedicated individual at the opening who is in continuous communication with the operators in the CRE. This individual will have a method to rapidly close the opening and to restore the CRE boundary to a condition equivalent to the design condition when a need for CRE isolation is indicated.

(continued)

BASES

ACTIONS (continued)

F.1 and F.2

During movement of recently irradiated fuel assemblies in the primary containment or fuel building or during OPDRVs, with two CRFA subsystems inoperable, or with one or more CRFA subsystems inoperable due to an inoperable CRE boundary, action must be taken immediately to suspend activities that present a potential for releasing radioactivity that might require isolation of the CRE. This places the unit in a condition that minimizes the accident risk.

If applicable, movement of recently irradiated fuel assemblies in the primary containment and fuel building must be suspended immediately. Suspension of these activities shall not preclude completion of movement of a component to a safe position. If applicable, actions must be initiated immediately to suspend OPDRVs to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.

SURVEILLANCE REQUIREMENTS

SR 3.7.2.1

This SR verifies that a subsystem in a standby mode starts on demand from the control room and continues to operate with flow through the HEPA filters and charcoal adsorbers. Standby systems should be checked periodically to ensure that they start and function properly. As the environmental and normal operating conditions of this system are not severe, testing each subsystem once every month provides an adequate check on this system. ~~Monthly heater operation dries out any moisture accumulated in the charcoal from humidity in the ambient air. Systems with heaters must be operated for ≥ 10 continuous hours with the heaters energized to demonstrate the function of the system.~~ Furthermore, the 31 day Frequency is based on the known reliability ~~of~~ the equipment and the two subsystem redundancy available.

(continued)