RAIO-1117-57301

November 21, 2017

Docket No. 52-048

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: NuScale Power, LLC Response to NRC Request for Additional Information No. 140 (eRAI No. 8887) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 140 (eRAI No. 8887)," dated August 05, 2017

The purpose of this letter is to provide the NuScale Power, LLC (NuScale) response to the referenced NRC Request for Additional Information (RAI).

The Enclosure to this letter contains NuScale's response to the following RAI Question from NRC eRAI No. 8887:

- 09.04.02-1

This letter and the enclosed response make no new regulatory commitments and no revisions to any existing regulatory commitments.

If you have any questions on this response, please contact Carrie Fosaaen at 541-452-7126 or at cfosaaen@nuscalepower.com.

Sincerely,

Zackary W. Rad
Director, Regulatory Affairs
NuScale Power, LLC

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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 8887

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NuScale Response to NRC Request for Additional Information eRAI No. 8887

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NuScale Power™

Response to Request for Additional Information
Docket No. 52-048

eRAI No.: 8887
Date of RAI Issue: 08/05/2017

NRC Question No.: 09.04.02-1

Question (i):

10 CFR 52.47(a)(2) requires sufficient information to permit understanding of the system designs and their relationship to the safety evaluations. NuScale FSAR 9.4.2 states that the Reactor Building Ventilation system general area exhaust subsystem receives and filters air from the Radioactive Waste Building HVAC system and the Annex Building HVAC system. However, in FSAR 9.4.3 describes Radioactive Waste Building HVAC but there is no FSAR section describing Annex Building HVAC system. As one of the NuScale auxiliary systems, the applicant is requested to provide an description in the FSAR on Annex Building HVAC system. Proposed changes to the FSAR are requested with the response.

Question (ii):

10 CFR 50.2 indicates that one of the definitions of safety-related SSCs is to assure the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the applicable guideline exposures. NRC SRP BTP 3-3, Section B.3.(4), indicates that only seismically qualified systems should be assumed to be available to mitigate the consequences of the postulated piping failure. NuScale FSAR 9.4.2 states that to prevent pressurization in the UHS area of the RXB, credit is taken for a passive vent path (RXB exhaust ventilation system). The system filters and controls the release of airborne radioactive material from inside of the RXB, including from pool water evaporation for loss of normal power supply (see Section 9.4.2). The affected exhaust path includes ductwork, low efficiency filter, HEPA filter, fan, dampers, exhaust stack, and instrumentation.

After reviewing NuScale TOM and RXB Pool Room HELB calculations, for exemple: TR EC-0000-4720, Rev 1, NuScale High Energy Line Break Scenario Definition – Top of Module, the staff found that in these calculations: To maintain building pressure within “reasonable limits”, the ductwork of the RBVS SFP exhaust sub-system is credited in all GOTHIC TOM/pool room HELB cases as a passive ventilation path to ambient for the purpose of pressure relief within the pool room. The applicant is requested to clarify the current credited use, safety function, and system classfiication (e.g., seismic Cat I or other) of the NuScale design and update the FSAR accordingly. Proposed changes to the FSAR are requested with the response.

NuScale Response:

Response to question (i)

FSAR Table 3.2-1 identifies the Annex Building as conceptual design information with a classification of B2 (non-safety related and not risk significant). The supporting systems for the Annex Building, including the HVAC system, do not perform any safety-related or risk significant functions. The annex building HVAC system exhausts to the RBVS, which, as described in FSAR Section 9.4.2, does not perform any safety-related or risk-significant functions. No sections of NUREG-0800 are applicable to the annex building HVAC system. For these reasons, the annex building HVAC system does not need to be described in detail in the FSAR. FSAR Section 9.4.2 has been modified to provide a brief description of the interaction of the annex building HVAC system with the reactor building HVAC system.

Response to question (ii)

The exhaust ductwork from the spent fuel pool area of the Reactor Building is credited as a passive relief path for pressure resulting from a high energy line break as a means to protect the Reactor Building and its contents. This information has been added to FSAR Section 9.4.2.

This ductwork does not need to be designed to Seismic Category I standards, as the provisions of Branch Technical Position (BTP) 3-3 do not apply. Section A of BTP 3-3 states, in part, that the intent of the BTP is "that postulated piping failures in fluid systems should not cause a loss of function of essential safety-related systems and that nuclear plants should be able to withstand postulated failures of any fluid system piping outside containment, taking into account the direct results of such failure and the further failure of any single active component, with acceptable offsite consequences" (emphasis added).

BTP 3-3 defines essential systems and components as those necessary to shut down the reactor and mitigate the consequences of a postulated pipe rupture without offsite power. The Reactor Building does not meet this definition of an essential safety-related system. As stated in NuScale Topical Report TR-0915-17565, Accident Source Term Methodology, no credit is taken for the Reactor Building for meeting offsite dose limits. Therefore, leakage from the Reactor Building due to a HELB will not result in unacceptable offsite consequences. For these reasons, the provisions of BTP 3-3 do not apply to the RBVS, and the ventilation path does not need to be designed to Seismic Category I standards.

As a passive ventilation path for a HELB, the spent fuel pool exhaust ductwork of the RBVS provides a protective function for the safety-related, Seismic Category I Reactor Building. In accordance with the intent of RG 1.29, this portion of the RBVS is, therefore, designed to Seismic Category II standards.

FSAR Table 3.2-1 and FSAR Section 9.4.2 have been revised to show that the ductwork and associated components of the spent fuel pool exhaust subsystem of the RBVS are designed to Seismic Category II standards.

NuScale is currently re-evaluating the plant response to high energy line breaks as a result of RAI 9063. If the results of that analysis change the requirements for the passive ventilation path NuScale will update this response.

Impact on DCA:

FSAR Section 9.4.2 and Table 3.2-1 have been revised as described in the response above and as shown in the markup provided in this response.

Areas served by the RBVS include:

- reactor pool area
- SFP area
- dry dock area
- new fuel area
- battery, battery equipment, and input and output rooms
- galleries
- telecommunications rooms
- hot lab
- remote shutdown station
- elevator machine room

The supply subsystem includes four main supply air handling units (AHUs), AHUs for the input and output rooms, battery room, and battery charger rooms (two per operating NPM), and two remote shutdown station AHUs. There are ten telecommunications rooms, each of which is served by two fan coil units (FCUs). The elevator machine room is served by two FCUs. The reactor pool area also includes two supplemental recirculation AHUs that provide the additional cooling capacity to meet the heat loads in this area.

The general area exhaust subsystem includes HEPA filter units and exhaust fans. The SFP exhaust subsystem includes two charcoal and HEPA filter units and exhaust fans.

Both the general area and SFP exhaust subsystems have a standby fan and filter set, and each fan and filter set has isolation dampers that can be closed to isolate the equipment for inspection, testing, and maintenance while the remaining sets are in operation. Airflow through each exhaust filter is limited to approximately 30,000 cfm to ensure reliable in-place testing in accordance with RG 1.140. The RBVS filters all exhaust air in order to reduce radioactivity release to the environment.

RAI 09.04.02-1, RAI 21.0-1

~~The general area exhaust subsystem collects exhaust air from all areas of the RXB. The exhaust ducts are routed and connected to a main exhaust duct. Exhaust from the RWBVS (Section 9.4.3) then joins exhaust from the RBVS and the ANBVS, and the combined flow enters the RBVS exhaust filter units, and exits the plant through the plant exhaust stack.~~The general exhaust subsystem collects exhaust air from the non-spent fuel areas on each level of the RXB, including the battery rooms. The exhaust ducts are all routed and connected to a main general exhaust duct at the 75 ft level of the RXB. Exhaust from the RWBVS (Section 9.4.3) and the ABVS then joins exhaust from the RBVS. Radiation monitors are provided in the exhaust ductwork of the RWBVS and the ABVS upstream of the point at which these systems tie into the RBVS exhaust ductwork.

RAI 09.04.02-1

The combined exhaust from the RBVS, RWBVS, and the ABVS is then ducted to the RWB where it is distributed to multiple HEPA filter units, each of which is in series with a centrifugal exhaust fan. These RBVS general exhaust filter units are located on the 100 ft level on the north side of the RWB. The discharge from the RBVS general exhaust fans is then collected into a single discharge duct that connects to the plant exhaust stack, which is located in the northwest corner of the RWB.

RAI 09.04.02-1

The SFP exhaust subsystem draws air through vents located just above the water level around most of the SFP perimeter. This exhaust is ducted to one of two HEPA filtration units with associated exhaust fans. The fan and filter units operate in a lead and stand-by arrangement in which one unit is in operation and the redundant unit is in stand-by. The SFP exhaust filter units utilize HEPA filters and charcoal adsorbers to minimize radioactivity contained in the SFP exhaust. The exhaust is normally filtered through the HEPA filters, but also passes though charcoal adsorbers if high radiation is detected upstream of the SFP filter unit. The SFP exhaust proceeds directly to the plant exhaust stack. The spent fuel exhaust subsystem is designed for continuous operation during all modes of plant operation. All portions of the SFP exhaust subsystem that are located inside the RXB are designed to Seismic Category II standards. This includes the SFP exhaust filter units and fans.

Each NPM bay has an exhaust air vent that incorporates a fire damper and a blast damper.

Condensation from RBVS equipment is directed to the radioactive waste drain system.

9.4.2.2.1 Component Description

Outside Air Intakes

The RBVS supply air intakes are located so that they are clear from the steam generator atmospheric dump valves, any relief valves, diesel tractor parking areas, the plant exhaust stack, and other gas emitters that may present a hazard to personnel or operations in the RXB.

RAI 19.05 Aircraft Impact Assessment (APR1400)-1

~~Air intake openings have tornado missile protection in the form of hardened shrouds. These shrouds also protect from aircraft impact.~~ Outdoor air intake openings are equipped with louvers, bird screens, security and debris screens, blast dampers, and fire dampers to minimize the effects of high winds, rain, snow, ice, trash, and other external forces on the operation of the system, including aircraft impact. Air intake openings are provided with hardened shrouds to protect the dampers from external events. The shrouds protecting the HVAC intakes are constructed of 7000 psi concrete with four #11 bars at 12" on center each way, top and bottom. In addition, the horizontal portion of the awning protection has two #6 shear ties at 12" on center.

Supply Air Handling Units and Fans

The SFP exhaust fans can be restarted using the auxilliary AC power source for power. In this alignment, the RXB is maintained at a lower pressure than its surroundings, air flow within the building is from typically lower contamination areas to areas that may be more contaminated, and all exhaust passes through the SFP exhaust filter units. This design controls release of radioactive contaminants to the environment, satisfying GDC 60.

The SFP is located within the RXB, which is a controlled-leakage building. Exhaust from the SFP area passes through the RBVS exhaust charcoal and HEPA filter units. The exhaust normally bypasses the charcoal filter, but passes through the charcoal when a high radiation level is detected in the ductwork downstream of the SFP area. In this condition, the general exhaust subsystem fans reduce capacity and maintain the design exhaust airflows for the RWB and ANB. The RBVS supply system reduces its capacity to provide ventilation air while maintaining the RXB at negative pressure relative to the atmosphere. Based on these design considerations, the RBVS satisfies GDC 61.

RAI 09.04.02-1

All HVAC exhaust from the RXB, RWB, and ANB is monitored for radioactivity by sensors in the plant exhaust stack. Radiation monitors are also provided in the general exhaust ductwork from the RWB, RXB, and the Annex Building.The functions of these monitors constitute compliance with GDC 64.

The RBVS is designed to move air from areas of typically lower radioactive contamination to areas that are potentially more contaminated. The RBVS is designed with ducting runs as short as practical and that do not have sudden directional changes. Interior and exterior duct surfaces are relatively smooth. The SFP area exhaust subsystem removes air from this potentially contaminated area and filters the exhaust. These design measures help to prevent localized buildup of radioactive contamination and facilitate the eventual decommissioning of the plant in accordance with10 CFR 20.1406.

9.4.2.4 Inspection and Testing

A system air balance test and adjustment to design conditions is conducted in the course of the plant preoperational test program (Section 14.2). Airflow rates are measured and balanced in accordance with the guidelines of HVAC system testing, adjusting, and balancing guidance (Reference 9.4.2-13). Initial in-place testing of the RBVS is performed in accordance with Section TA of Reference 9.4.2-3. Periodic, in-place testing of normal atmosphere cleanup systems and components is performed in accordance with Reference 9.4.2-2.

Duct and housing leak tests are performed following equipment installation in accordance with Section TA of Reference 9.4.2-3 with maximum total leakage rate as defined in Article SA-4500.

For ease of inspection and maintenance, there is a minimum of three feet between mounting frames of component banks.

RAI 03.02.01-2, RAI 03.02.01-3, RAI 03.02.02-2, RAI 03.02.02-6, RAI 06.02.04-2, RAI 09.02.02-1, RAI 09.02.04-1, RAI 09.02.05-1, RAI 09.02.06-1, RAI 09.02.07-4, RAI 09.02.07-5, RAI 09.02.09-2, RAI 09.04.02-1, RAI 11.02-1, RAI 19-14

Table 3.2-1: Classification of Structures, Systems, and Components

SSC (Note 1)	Location	SSC Classification (A1, A2, B1, B2)	RTNSS Category (A,B,C,D,E)	QA Program Applicability (Note 2)	Augmented Design Requirements (Note 3)	Quality Group / Safety Classification (Ref RG 1.26 or RG 1.143) (Note 4)	Seismic Classification (Ref. ~~RG 1.189 or~~ RG 1.29 or RG 1.143) (Note 5)
CNTS, Containment System							
All components (except as listed below)	RXB	A1	N/A	Q	None	A	I
• RXM Lifting Lugs • Top Auxiliary Mechanical Access Structure • Top Auxiliary Mechanical Access Structure Diagonal Lifting Braces	RXB	B1	None	AQ-S	• ANSI/ANS 57.1-1992 • ASME NOG-1 • NUREG-0554	N/A	I
CFDS Piping in containment	RXB	B2	None	AQ-S	None	B	II
Piping from (CES, CFDS, CVCS, FWS, MSS, and RCCWS) CIVs to disconnect flange (outside containment)	RXB	B2	None	AQ-S	None	D	I
~~Hydraulic Skid for valve reset~~	~~RXB~~	~~B2~~	~~None~~	~~None~~	~~None~~	~~D~~	~~III~~
CIV Close and Open Position Sensors: • CES, Inboard and Outboard • CFDS, Inboard and Outboard • CVCS, Inboard and Outboard PZR Spray Line • CVCS, Inboard and Outboard RCS Discharge • CVCS, Inboard and Outboard RCS Injection • CVCS, Inboard and Outboard RPV High-Point Degasification • FWS, Supply to SGs and DHR HXs FWIV • RCCWS, Inboard and Outboard Return and Supply • SGS, Steam Supply CIV/MSIVs and CIV/MSIV Bypasses	RXB	B2	None	AQ-S	IEEE 497-2002 with CORR 1	N/A	I
Containment Pressure Transducer (Wide Range)	RXB	B2	None	AQ-S	IEEE 497-2002 with CORR 1	N/A	~~II~~
• Containment Air Temperature (RTDs) • FW Temperature Transducers	RXB	B2	None	AQ-S	None	N/A	II
SGS, Steam Generator System							
• SG tubes • Feedwater plenums • Steam plenums • ~~SG tube supports~~	RXB	A1	N/A	Q	None	A	I
• SG tube supports	RXB	A1	N/A	Q	None	N/A	I
• Steam piping inside containment • Feedwater piping inside containment • Feedwater supply nozzles • Main steam supply nozzles • Thermal relief valves	RXB	A2	N/A	Q	None	B	I
Flow restrictors	RXB	A2	N/A	Q	None	N/A	I
RXC, Reactor Core System							
Fuel assembly (RXF)	RXB	A1	N/A	Q	None	N/A	I
Fuel Assembly Guide Tube	RXB	A2	N/A	Q	None	N/A	I
Incore Instrument Tube	RXB	B2	None	AQ-S	None	N/A	I
CRDS, Control Rod Drive System							
• Control Rod Drive Shafts • Control Rod Drive Latch Mechanism	RXB	A1	N/A	Q	None	N/A	I
CRDM Pressure Boundary (Latch Housing, Rod Travel Housing, Rod Travel Housing Plug)	RXB	A2	N/A	Q	None	A	I
CRDS Cooling Water Piping and Pressure Relief Valve	RXB	B2	None	AQ-S	None	B	II
Rod Position Indication (RPI) Coils	RXB	B2	None	AQ-S	None	N/A	I
• Control Rod Drive Coils • CRDM power cables from EDN breaker to MPS breaker • CRDM power cables from MPS breaker to CRDM Cabinets	RXB	B2	None	AQ-S	None	N/A	II

Table 3.2-1: Classification of Structures, Systems, and Components (Continued)

SSC (Note 1)	Location	SSC Classification (A1, A2, B1, B2)	RTNSS Category (A,B,C,D,E)	QA Program Applicability (Note 2)	Augmented Design Requirements (Note 3)	Quality Group / Safety Classification (Ref RG 1.26 or RG 1.143) (Note 4)	Seismic Classification (Ref. ~~RG 1.189 or~~ RG 1.29 or RG 1.143) (Note 5)
• Condenser Outlet Pressure Instrumentation (3 per side) • Condenser Outlet Temperature Instrumentation (2 per side) • Valve Position Indicator (2 for open, 2 for close per side)	RXB	B2	None	AQ-S	IEEE 497-2002 with CORR 1	N/A	I
Level Instrument (2 per side)	RXB	B2	None	AQ-S	None	N/A	II
CRHS, Control Room Habitability System							
All components (except as listed below)	CRB	B2	None	AQ-S	None	N/A	I
• Air Supply Isolation Solenoid Valve Position Indicators • CRE Pressure Relief Isolation Valve Position Indicators	CRB	B2	None	AQ-S	IEEE 497-2002 with CORR 1	N/A	I
• CRE Differential Pressure Transmitters • CRH Bottle Pressure Instruments • Flow Transmitters • Pressure Reducing Valve Pressure Indicators	CRB	B2	None	AQ-S	None	N/A	II
Air compressor and dryer	CRB	B2	None	None	None	N/A	III
CRVS, Normal Control Room HVAC							
All components (except as listed below)	CRB	B2	None	None	None	N/A	III
CRE Isolation Damper Position	CRB	B2	None	AQ-S	IEEE 497-2002 with CORR 1	N/A	I
• CRE Isolation Dampers • Fire and Smoke Dampers supporting the MCR • Radiation Monitors (Downstream of charcoal filter unit)	CRB	B2	None	AQ-S	None	N/A	I
Outside Air intake Smoke Detectors	CRB	B2	None	AQ-S	None	N/A	I
• Outside air Isolation Damper Position • Toxic gas detectors	CRB	B2	None	AQ-S	RG 1.78	N/A	I
Outside Air Isolation Dampers for CRV Recirculation Mode	CRB	B2	None	AQ-S	• RG 1.78 • RG 1.140 • Backup diesel powered • Charcoal and HEPA filtered • Maintain Positive Pressure	N/A	II
Ductwork and Associated Components (grilles, etc.) associated with the outside air intake up to the radiation monitors downstream of the filter unit	CRB	B2	None	AQ-S	• RG 1.78 • RG 1.140 • Charcoal and HEPA filtered • Maintain Positive Pressure	N/A	II
Radiation Monitors (upstream of charcoal filter unit)	CRB	B2	None	AQ	• Backup diesel powered • Charcoal and HEPA filtered • Maintain Positive Pressure	N/A	III
• CRV Filter Unit • CRV Supply Air Handling Unit A/B • Ductwork and Associated Components (dampers, grilles, etc.) associated with the MCR or TSC • Isolation Dampers for CRV Filter Unit Bypass	CRB	B2	None	AQ	• RG 1.140 • Backup diesel powered • Charcoal and HEPA filtered • Maintain Positive Pressure	N/A	III
• CRV Battery Exhaust Fan A/B • Temperature Sensors, Room Mounted	CRB	B2	None	AQ	None	N/A	III
RBVS, Reactor Building HVAC							
All components (except as listed below)	RXB	B2	None	None	None	N/A	III
• RBV Supply AHUs • RBV General Area Exhaust Fans • RBV General Area Exhaust Filter Units • Hot Lab Exhaust Fan • ~~RBV SFP Exhaust Fan~~ • ~~RBV SFP Charcoal Filter Units~~	RXB	B2	None	AQ	• RG 1.140 • RG 1.52	N/A	III
Ductwork and Associated Components (Dampers, grilles, etc) (except for SFP exhaust components)	RXB	B2	None	AQ	None	N/A	III
• RBV SFP Exhaust Ductwork and associated components (dampers, grills, etc.) • RBV SFP Exhaust Filter Units, including fans	RXB	B2	None	AQ	• RG 1.140 • RG 1.52	N/A	II

9.4.2 Reactor Building and Spent Fuel Pool Area Ventilation System

The Reactor Building (RXB) contains a single air volume encompassing the reactor pool, the refueling pool, spent fuel pool (SFP), dry dock, new fuel storage, the NuScale Power Modules (NPMs) and their handling equipment. The Reactor Building HVAC system (RBVS) is designed to maintain acceptable ambient conditions in the RXB to support personnel and equipment, and to control airborne radioactivity in the area during normal operation and following events that have the potential to release radioactivity in the RXB, such as a fuel handling accident.

RAI 21.0-1

The RBVS includes three subsystems: the supply subsystem, the general area exhaust subsystem, and the SFP exhaust subsystem. During normal operation, the RBVS provides conditioned and filtered outside air to the RXB, high-efficiency particulate air (HEPA)-exhaust from RXB, and HEPA-filtered exhaust from the SFP area. The two exhaust subsystems deliver air to the plant exhaust stack for discharge from the plant. In addition to air from the RXB, the RBVS general area exhaust subsystem receives and filters air from the Radioactive Waste Building HVAC system (RWBVS) and the Annex Building HVAC system (A~~N~~BVS).

9.4.2.1 Design Bases

This section identifies the RBVS required or credited functions, the regulatory requirements that govern the performance of those functions, and the controlling parameters and associated values that ensure the functions are fulfilled. Together, this information represents the design bases, defined in 10 CFR 50.2, as required by 10 CFR 52.47(a) and (a)(3)(ii).

RAI 09.04.02-1

The RBVS serves no safety-related or risk significant function, is not credited for mitigation of design basis accidents, and has no safe shutdown function. The exhaust ductwork from the spent fuel pool area is credited as a passive vent path for high energy line breaks in the Reactor Building. General Design Criteria (GDC) 2, 3, and 5 were considered in the design of the RBVS. Components of the RBVS whose structural failure could affect the operability of safety-related SSC are designed as Seismic Category II. The remainder of the RBVS is Seismic Category III (nonseismic). Consistent with GDC 3, the RBVS is designed to limit hydrogen concentration in battery rooms in accordance with Regulatory Position 6.1.7 of Regulatory Guide (RG) 1.189 by using guidance in section 52.3.6 of NFPA 1. Consistent with GDC 5, the RBVS is common for the NPMs and is designed to operate during an accident on one unit without significantly affecting the capability to conduct a safe and orderly shutdown and cooldown on the remaining units. See Section 9.4.2.3 for the safety evaluation.

The RBVS is designed to remove radioactive contaminants from the exhaust streams of RXB general area, the radioactive waste building general area, and the annex building (ANB). The exhaust from the RBVS is monitored for radioactive contamination consistent with GDC 60. The RBVS includes air filtration and utilizes automatic realignment of the SFP area subsystem to limit release of airborne radioactive

The combined exhaust from the RBVS, RWBVS, and the ABVS is then ducted to the RWB where it is distributed to multiple HEPA filter units, each of which is in series with a centrifugal exhaust fan. These RBVS general exhaust filter units are located on the 100 ft level on the north side of the RWB. The discharge from the RBVS general exhaust fans is then collected into a single discharge duct that connects to the plant exhaust stack, which is located in the northwest corner of the RWB.

RAI 09.04.02-1

The SFP exhaust subsystem draws air through vents located just above the water level around most of the SFP perimeter. This exhaust is ducted to one of two HEPA filtration units with associated exhaust fans. The fan and filter units operate in a lead and stand-by arrangement in which one unit is in operation and the redundant unit is in stand-by. The SFP exhaust filter units utilize HEPA filters and charcoal adsorbers to minimize radioactivity contained in the SFP exhaust. The exhaust is normally filtered through the HEPA filters, but also passes though charcoal adsorbers if high radiation is detected upstream of the SFP filter unit. The SFP exhaust proceeds directly to the plant exhaust stack. The spent fuel exhaust subsystem is designed for continuous operation during all modes of plant operation. All portions of the SFP exhaust subsystem that are located inside the RXB are designed to Seismic Category II standards. This includes the SFP exhaust filter units and fans.

Each NPM bay has an exhaust air vent that incorporates a fire damper and a blast damper.

Condensation from RBVS equipment is directed to the radioactive waste drain system.

9.4.2.2.1 Component Description

Outside Air Intakes

The RBVS supply air intakes are located so that they are clear from the steam generator atmospheric dump valves, any relief valves, diesel tractor parking areas, the plant exhaust stack, and other gas emitters that may present a hazard to personnel or operations in the RXB.

RAI 19.05 Aircraft Impact Assessment (APR1400)-1

~~Air intake openings have tornado missile protection in the form of hardened shrouds. These shrouds also protect from aircraft impact.~~ Outdoor air intake openings are equipped with louvers, bird screens, security and debris screens, blast dampers, and fire dampers to minimize the effects of high winds, rain, snow, ice, trash, and other external forces on the operation of the system, including aircraft impact. Air intake openings are provided with hardened shrouds to protect the dampers from external events. The shrouds protecting the HVAC intakes are constructed of 7000 psi concrete with four #11 bars at 12" on center each way, top and bottom. In addition, the horizontal portion of the awning protection has two #6 shear ties at 12" on center.

Supply Air Handling Units and Fans

the requirements of Reference 9.4.2-1, Section 4.11 and Reference 9.4.2-3, Section FE-4600 and Table IA-C-1000.

Fire or Smoke Detection Alarm

If smoke is detected, an alarm is initiated on the fire detection system in the MCR. The stairwells and elevator are pressurized by dedicated pressurization fans to minimize smoke infiltration. In accordance with Reference 9.4.2-8, when smoke is detected in the ductwork downstream from an air handler, the air handler fan automatically stops. The fan can be manually reactivated to aid with smoke removal.

Fire Detection Alarm

In the event of a fire occurring within the RXB, duct-mounted fire dampers prevent the spread of fire through duct penetrations of fire-rated floors and partitions. Operators isolate smoke-filled areas by manually closing the appropriate smoke dampers, and isolating the supply and exhaust ductwork for an area. The RBVS subsystems remain in operation unless plant operators determine that there is a need to manually shut down the subsystems.

9.4.2.3 Safety Evaluation

RAI 09.04.02-1

The RBVS is nonsafety-related and does not perform a function to prevent a design basis accident, nor is it credited to mitigate the consequences of a fuel handling accident or any other design basis accident, such as a fuel handling accident. The exhaust subsystem from the spent fuel pool area is credited as a passive vent path for high energy line breaks in the Reactor Building. Section 15.0.3 describes the radiological consequences of design basis accidents.

General Design Criterion 2 was considered in the design of the RBVS. In accordance with RG 1.29, position C.2, portions of the RBVS whose structural failure could affect the operability of safety-related SSC are designed to Seismic Category II standards. Other portions of the RBVS are designed to Seismic Category III (nonseismic).

General Design Criterion 3 was considered in the design of the RBVS. The RBVS prevents explosive levels of hydrogen from forming in RXB battery rooms.

General Design Criterion 5 was considered in the design of the RBVS. The RBVS does not have a function relative to shutting down an NPM or maintaining it in a safe shutdown condition. Operation of the RBVS does not interfere with the ability to operate or shut down an NPM.

All exhaust from the RXB passes through HEPA filters. Exhaust from the SFP area also passes through charcoal filter banks when radiation is detected. On a loss of the normal power supply to the RBVS, all of the RBVS fans stop and dampers re-align so that all exhaust passes through the HEPA filter section of the SFP exhaust filter units.