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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 103 Related to ESBWR Design Certification Application - Control Building Ventilation - RAI Numbers 6.4-5 and 6.4-10**

Enclosure 1 contains the GE Hitachi Nuclear Energy (GEH) response to the subject NRC RAIs transmitted via the Reference 1 letter.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,

R. E. Brown for /

James C. Kinsey
Vice President, ESBWR Licensing

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NRO

Reference:

1. MFN 07-414, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 103 Related to ESBWR Design Certification Application*, July 23, 2007

Enclosure:

1. MFN 08-219 - Response to Portion of NRC Request for Additional Information Letter No. 103 Related to ESBWR Design Certification Application - Control Room Ventilation - RAI Numbers 6.4-5, and 6.4-10

cc:	AE Cubbage	USNRC (with enclosures)
	DH Hinds	GEH (with enclosures)
	RE Brown	GEH (with enclosures)
	eDRF	0000-0081-1973 (section)

Enclosure 1

MFN 08-219

Response to Portion of NRC Request for

Additional Information Letter No. 103
Related to ESBWR Design Certification Application

Control Building Ventilation

RAI Numbers 6.4-5 and 6.4-10

NRC RAI 6.4-5:

DCD, Tier 2, Revision 3, Section 12.3.3.2.1, Control Room Ventilation, references bottled air as being supplied during the first 72 hours and that the Control Building is maintained at 0.5 inches Hg.

Staff's understanding is that main control room bottled system has been completely removed from the design. Please reconcile this discrepancy in the DCD. Also, confirm the 0.5 inches Hg value.

GEH Response:

The Control Room Ventilation air bottles are no longer an integrated function of the Control Room Habitability Area (CRHA) HVAC Subsystem (CRHAVS) design. The Emergency Breathing Air System (EBAS) has been deleted from the CRHAVS by a previous design change.

DCD Tier 2, Subsection 12.3.3.2.1 will be revised and cross-referenced to Subsection 9.4.1 and 6.4 where a detailed description of the CRHAVS is included.

A CRHA positive pressure of > 31 Pa (>1/8" wg) is maintained by the CRHAVS as stated in DCD Tier 2, Table 9.4-1. The 0.5" Hg stated in Subsection 12.3.3.2.1 is in error, and will be revised to reflect >31 Pa (>1/8" wg).

DCD Impact:

DCD Tier 2, Subsection 12.3.3.2.1, will be revised as shown in the attached markup.

NRC RAI 6.4-10:

DCD, Tier 2, Revision 3, Section 6.4.3 under Component Descriptions, states that the emergency filter units (EFUs) are designed to ASME AG-1 but addenda AG-1a-92 is not mentioned. Addenda AG-1a-92 is part of acceptance criterion no. 4 in Standard Review Plan (SRP) Section 6.4, Revision 3, March 2007, and was also included in SRP Section 6.4, Draft Revision 3, June 1996.

Refer to the addenda in the DCD or provide a reason why it is not applicable.

GEH Response:

DCD Tier 2, Revision 4 Table 1.9-22 and Table 9.4-17, provide Industrial Codes and Standards Applicable to ESBWR (HVAC). ASME AG-1 contains all codes and requirements associated with Nuclear Air and Gas Treatment which includes all addenda.

DCD Impact:

DCD, Tier 2, Table 1.9-22 is revised in Revision 5, as marked up in the attachment.

Table 1.9-22

Industrial Codes and Standards[2] Applicable to ESBWR

Code or Standard Number	Year	Title
52.2-1999	1999	Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size
62-2001	2001	Ventilation for Acceptable Indoor Air Quality
American Society of Mechanical Engineers (ASME)		
A17.1-2004	2004	Safety Code for Elevators and Escalators
AG-1-2003	2003	Code on Nuclear Air and Gas Treatment – including Addenda
B1.20.1-1983	1983 (R 2001)	Pipe Threads, General Purpose (Inch)
B16.5-2003	2003	Pipe Flanges and Flanged Fittings NPS ½ Through NPS 24 Metric/Inch Standard – Revision of ASME B16.5-1996
B16.10-2000	2000 (R 2003)	Face-to-Face and End-to-End Dimension of Valves
B16.11-2005	2005	Forged Steel Fittings, Socket-Welding and Threaded
B16.25-2003	2003	Buttwelding Ends
B16.34-1996	1996	Valves – Flanged, Threaded and Welding End
B16.42-1998	1998	Ductile Iron Pipe Flanges and Flanged Fittings, Classes 150 and 300
B19.1	1995	Safety Standard for Air Compressor Systems
B30.2-2001	2001	Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)
B30.9-2003	2003	Slings
B30.10-1999	1999	Hooks
B30.11-1998	1998	Monorail and Underhung Cranes – Addenda A – July 15, 1999
B30.16-2003	2003	Overhead Hoists (Underhung)
B31.1-2004	2004	Power Piping
B31.3-2002	2002	Process Piping
B31.5-2001	2001	Refrigeration Piping and Heat Transfer Components
B36.10-2004	2004	Welded and Seamless Wrought Steel Pipe
B36.19M-2004	2004	Stainless Steel Pipe
B96.1-1999	1999	Welded Aluminum-Alloy Storage Tanks
MFC-3M-1989	1989 (R 1995)	Measurement of Fluid Flow in Pipes using Orifice, Nozzle and Venturi – Errata – September 1990
N45.2-1977	1977	QA Program Requirements for Nuclear Facilities (ANSI/AICHE N46.2-1977 see also NQA-1 and NQA-2)

shielding to limit the direct-shine exposure of control room personnel following a LOCA to a fraction of the 5 Rem limit as is required by 10 CFR 50 Appendix A, Criterion 19.

Main steam tunnel - The main steam tunnel extends from the primary containment boundary in the Reactor Building up to the turbine stop valves. The primary purpose of the steam tunnel is to shield the plant complex from N-16 gamma shine in the main steam lines. The tunnel walls provide sufficient shielding to limit the direct-shine exposure from the main steam lines in any point that may be inhabited during normal operations.

12.3.3 Ventilation

The HVAC systems for the various buildings in the plant are discussed in Section 9.4, including the design bases, system descriptions, and evaluations with regard to the heating, cooling, and ventilating capabilities of the systems. This Subsection discusses the radiation control aspects of the HVAC systems.

12.3.3.1 Design Objectives

The following design objectives apply to all building ventilation systems:

- The systems shall be designed to make airborne radiation exposures to plant personnel and releases to the environment ALARA. To achieve this objective, the guidance provided in Regulatory Guide 8.8 shall be followed.
- The concentration of radionuclides in the air in areas accessible to personnel for normal plant surveillance and maintenance will be below the concentrations that define an airborne radioactive area in 10 CFR 20 during normal power operation. This is accomplished by establishing in each area a reasonable compromise between specifications on potential airborne leakages in the area and HVAC flow through the area. Appendix 12.A to this chapter outlines the methodology by which such calculations are made.

12.3.3.2 Design Description

In the following subsections, the design features of the various ventilation systems that achieve the radiation control design objectives are discussed. For all areas potentially having airborne radioactivity, the ventilation systems are designed such that during normal and maintenance operations, airflow between areas is always from an area of low potential contamination to an area of higher potential contamination.

12.3.3.2.1 Control Room Ventilation

The control building atmosphere is maintained at ~~a slightly~~ positive pressure >31 Pa. (>1/8"wg) at all times in order to prevent infiltration of contaminants. When offsite power is available, fresh air may be taken in via the single inlet system, which has its intake structure on the side of the building. During an isolation event, if offsite or backup power is not available, ~~bottled~~ air can be supplied by the operation of an Emergency Filter Unit (EFU)~~a redundant supply system~~ for up to 7 days~~72 hours prior to requiring recharging~~ following loss of preferred power. The EFUs provide emergency ventilation and pressurization for the Control Room Habitability Area (CRHA). The EFUs are part of the Control Room Habitability Area HVAC subsystem described in Subsection 9.4.1 and 6.4. ~~Under conditions when offsite or backup power is available, either~~

~~bottled or filtered air may be used. The operator has manual control in the event filtered air is used to either run under filtered air or bottled air.~~

~~Outside a particulate filter normally filters air that enters the intake. Under contamination conditions, however, if external air is selected, the airflow is diverted through an adsorber system having:~~

- ~~a particulate filter~~
- ~~a HEPA filter~~
- ~~a charcoal filter~~
- ~~another HEPA filter~~

~~The outdoor cleanup unit is located in a closed room that helps prevent the spread of any radiation during maintenance.~~ The EFUs are located in closed rooms that help prevent the spread of any radioactive contamination during maintenance. Adequate space is provided for maintenance activities. The particulate and HEPA filters can be bagged when being removed from the unit. Before removing the charcoal, any radioactivity is allowed to decay to minimal levels, and is then removed through a connection in the bottom of the filter by a pneumatic transfer system. Air used in the transfer system goes through a HEPA filter before being exhausted. Facemasks can be worn during maintenance activities, if necessary.

For a complete description of the control room HVAC system see Subsection 9.4.1.

12.3.3.2.2 Containment

Access into the containment drywell is not permitted during normal operation. The ventilation system inside merely circulates, without filtering, the air. The only airflow out of the drywell into accessible areas is minor leakage through the wall. During maintenance, the drywell air is purged before access is allowed.

12.3.3.2.3 Reactor Building

The reactor building HVAC system is divided into two major components: the contaminated and the clean areas. The clean area system conditions and circulates air through all the clean areas of the reactor building. The contaminated area system conditions and circulates air through the contaminated areas of the building. Flow into both areas is directed from the corridors (point of highest pressure) to the equipment alcove rooms, then to the rooms themselves, and finally to the external wall pipe chases and from the pipe chases back to the HVAC system. The clean area system dumps circulated air to the environment through building vents, while the contaminated air system directs flow through the HVAC system to the plant stack. Under isolation conditions, the HVAC system isolates to localize any contamination until operations and health physics personnel determine the best decontamination method.

For a description of the reactor building HVAC system, see Subsection 9.4.6.

12.3.3.2.4 Radwaste Building

The radwaste building is divided into two zones for ventilation purposes. The control room is one zone, and the remainder of the building is the other zone. The air pressure in the first zone is maintained slightly above atmospheric, while the air pressure in the second zone is maintained