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MFN 10-053

Docket No. 52-010

February 5, 2010

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Transmittal of ESBWR DCD Tier 2, Chapter 11 Markups Related to GEH Internal Corrective Action**

The purpose of this letter is to submit markups to the ESBWR DCD, Tier 2, Chapter 11, Revision 6, which are the result of GEH internal review. These markups will be incorporated into the DCD, Revision 7. The markup pages are contained in Enclosure 1. Changes associated with these corrective actions are enclosed within boxes on the markup pages. The changes are summarized below.

Affected Section	Description of Change
Table 11.1-5b, entry for Te-129m, under (MBq/gm)	Changed 7.1 to 1.0 to be consistent with referenced analysis documentation. Typographical error.
Subsection 11.3.1, 8th paragraph	Deleted: "-Effluent Treatment Systems Branch (ETSB)" to make Branch Technical Position (BTP) title consistent with documents being referenced. Editorial change.
Subsection 11.4.1, 7th bullet, 2nd and 4th sentences	Deleted: "-ETSB" to make BTP title consistent with documents being referenced. Editorial change.
Subsection 11.4.7, Reference 11.4-1	Deleted: "-ETSB" to make BTP title consistent with the latest NRC revision. Editorial change.

If you have any questions or require additional information, please contact me.

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

Enclosure:

1. Transmittal of ESBWR DCD Tier 2, Chapter 11 Markups Related to GEH Internal Corrective Action – DCD Markups

cc:	AE Cubbage	USNRC (with enclosure)
	JG Head	GEH/Wilmington (with enclosure)
	DH Hinds	GEH/Wilmington (with enclosure)
	TL Enfinger	GEH/Wilmington (with enclosure)
	eDRF Section	0000-0039-3381, Rev. 2 (supporting analysis for first change)

Enclosure 1

MFN 10-053

Transmittal of ESBWR DCD Tier 2, Chapter 11 Markups Related to GEH Internal Corrective Action

DCD Markups

Table 11.1-5b

Normal Operational Non-Volatile Fission Products In Reactor Water

Isotope*	Decay Constant (per hour)	Concentration	
		(MBq/gm)	(µCi/gm)
Rb-89	2.74E+0	9.9E-05	2.7E-03
Sr-89	5.55E-4	2.6E-06	7.0E-05
Sr-90	2.81E-6	1.8E-07	4.9E-06
Y-90	2.81E-6	1.8E-07	4.9E-06
Sr-91	7.31E-2	9.8E-05	2.7E-03
Sr-92	2.56E-1	2.3E-04	6.2E-03
Y-91	4.93E-4	1.0E-06	2.8E-05
Y-92	1.96E-1	1.4E-04	3.8E-03
Y-93	6.80E-2	9.9E-05	2.7E-03
Zr-95/Nb-95	4.41E-4	2.1E-07	5.6E-06
Mo-99/Tc-99m	1.05E-2	5.1E-05	1.4E-03
Ru-103/Rh-103m	7.29E-4	5.2E-07	1.4E-05
Ru-106/Rh-106	7.83E-5	7.8E-08	2.1E-06
Te-129m	8.65E-4	~~7.~~1.0E-06	2.8E-05
Te-131m	2.31E-2	2.5E-06	6.9E-05
Te-132	8.89E-3	2.6E-07	7.0E-06
Cs-134	3.84E-5	7.0E-07	1.9E-05
Cs-136	2.22E-3	4.7E-07	1.3E-05
Cs-137/Ba-137m	2.63E-6	1.9E-06	5.1E-05
Cs-138	1.29E+0	2.0E-04	5.4E-03
Ba-140/La-140	2.26E-3	1.0E-05	2.8E-04
Ce-141	8.88E-4	7.8E-07	2.1E-05
Ce-144/Pr-144	1.02E-4	7.8E-08	2.1E-06
Np-239	1.24E-2	2.1E-04	5.6E-03

* Nuclides shown as pairs are assumed to be in secular equilibrium. The parent decay constant and concentration are shown.

11.3 GASEOUS WASTE MANAGEMENT SYSTEM

11.3.1 Design Bases

The objective of the gaseous waste management system is to process and control the release of gaseous radioactive effluents to the environs so as to maintain the exposure of persons in unrestricted areas to radioactive gaseous effluents as low as reasonably achievable according to 10 CFR 50, Appendix I (Reference 11.3-1), 10 CFR 20, Appendix B Table 2 effluent concentration limits (Reference 11.3-2), 10 CFR 50.34a (Reference 11.3-20) and 10 CFR 52.47 (Reference 11.3-20). This is accomplished while maintaining occupational exposure as low as reasonably achievable without limiting plant operation or availability.

The two main sources of plant gaseous radioactive effluents are the building ventilation systems, which are discussed in Section 9.4, and the power cycle Offgas System (OGS) that is described and reviewed in this section.

The OGS provides for holdup, and thereby, decay of radioactive gases in the offgas from the main condenser air removal system (Subsection 10.4.2), and consists of process equipment along with monitoring instrumentation and control components.

The OGS minimizes and controls the release of radioactive material into the atmosphere by delaying release of the offgas process stream initially containing radioactive isotopes of krypton, xenon, iodine, nitrogen, and oxygen. This delay, using activated charcoal adsorber beds, is sufficient to achieve adequate decay before the process offgas stream is discharged from the plant.

The OGS design minimizes the explosion potential in the OGS through recombination of radiolytic hydrogen and oxygen under controlled conditions as required by GDC 3 (Reference 11.3-19). Additional GDC 3 requirements are addressed in Subsection 9.5.1, Appendix 9A and Appendix 9B.

The gaseous effluent treatment systems are designed to limit the dose to offsite persons from routine station releases to significantly less than the limits specified in 10 CFR 20 (Reference 11.3-2), and to operate within the relevant limits specified in the plant-specific Technical Specifications (TS).

As a conservative design basis for the OGS, an average annual noble radiogas source term (based on 30 minute decay) is assumed. The OGS System Design Parameters are shown in Table 11.3-1. The system is mechanically capable of processing three times the source term without affecting delay time of the noble gases. Table 11.3-5 lists the isotopic distribution at t = 0. Table 11.3-1 shows the xenon time delays with an assumed air in-leakage.

Design guidelines described in Branch Technical Position (BTP) ~~- Effluent Treatment Systems Branch (ETSB)~~ 11-5 (Reference 11.3-18) to minimize radiation and radiological consequences due to a single failure of an active component were considered in the design of the OGS.

Using the isotopic activities at the discharge of the OGS, the decontamination factor for each noble gas isotope can be determined. Section 11.1 presents source terms for normal operational and anticipated occurrence releases to the primary coolant. Tables in this section, if not designated otherwise, are based upon a design basis annual average offgas release rate (measured after 30 minutes decay from the core) of noble gases and as shown in Table 11.3-1. For normal

- The seismic and quality group classification and corresponding codes and standards that apply to the design of the SWMS components and piping, and the structures housing the SWMS are discussed in Section 3.2.
- On-site storage space for a six-month volume of packaged waste is provided in the radwaste building. Depending on the availability and accessibility of adequate waste repositories in the future, NUREG-0800, Standard Review Plan 11.4 and BTP ~~ETSB~~ 11-3 (Reference 11.4-1) Solid Waste Management System, Revision 3 March 2007, Appendix 11.4-A, Design Guidance for Temporary Storage of Low Level Radioactive Waste, provide guidance for construction and management of a temporary storage facility. This temporary storage facility and an associated overall site waste management plan is intended to allow the station to operate while methods for further waste minimization and volume reduction are considered, such as the design and construction of additional volume reduction facilities, as necessary, and then the processing of the wastes that may have been stored during the construction of those facilities. The inclusion of a temporary storage facility and an overall site management plan per NUREG-0800, Standard Review Plan 11.4 and BTP ~~ETSB~~ 11-3 (Reference 11.4-1), Revision 3 March 2007, Appendix 11.4-A, may be required (COL 11.4-4-A).
- All atmospheric collection and storage tanks are provided with an overflow connection at least the size of the largest inlet connection. The overflow is connected below the tank vent and above the high-level alarm setpoint. Each tank room is designed to contain the maximum liquid inventory in the event that the tank ruptures.

Isotopic activity in SWMS is presented in Tables 12.2-14a, b, c, d, and e. Any resultant gaseous and liquid wastes are routed to other plant sections. Gaseous radionuclides from the SWMS are processed by the monitored Radwaste Building ventilation system. The monitored ventilation system is described in Subsection 9.4.3 and Subsection 12.3.3.2.4. Liquid waste is processed by the monitored LWMS system as described in Section 11.2. Process and effluent radiological monitoring systems are described in Section 11.5.

Section 12.3 describes systems to detect conditions that may result in excessive radiation levels per 10 CFR Part 50, Appendix A, GDC 63 (Reference 11.4-14). Section 11.5 describes systems to monitor the effluent discharge paths for radioactive material per 10 CFR Part 50, Appendix A, GDC 64 (Reference 11.4-15).

A description of the SWMS design features addressing 10 CFR 20.1406 (Reference 11.4-7) requirements for permanently installed systems is in Subsection 12.3.1.5. The COL Applicant is responsible for including site-specific information describing how the implementation of operating procedures for the SWMS Processing Subsystem will address the requirements of 10 CFR 20.1406 (Reference 11.4-7). Specifically the operational procedures of the SWMS Processing Subsystem should minimize, to the extent practicable, contamination of the facility and the environment, facilitate decommissioning, and minimize the generation of radioactive wastes (COL 11.4-5-A). This information is placed in Subsection 12.3.1.5.

The Area Radiation Monitors for the Radwaste Building SWMS Collection Subsystem Area, the Radwaste Building Dry Solid Waste Accumulation and Conditioning Area and the Radwaste Building Container Storage Area are depicted on Figure 12.3-41 listed on Table 12.3-4 and

facility and the environment, facilitate decommissioning, and minimize the generation of radioactive wastes. This information is placed in Subsection 12.3.1.5 (Subsection 11.4.1).

11.4.7 References

11.4-1 NUREG-0800, Standard Review Plan, 11.4 "Solid Waste Management System," Rev. 3 – March 2007 and BTP ~~ETSB~~ 11-3 "Design Guidance for Solid Radioactive Waste Management Systems Installed in Light-Water-Cooled Nuclear Power Reactor Plants."

11.4-2 (Deleted)

11.4-3 Nuclear Regulatory Commission, Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants," Revision 2, November 2001.

11.4-4 Nuclear Regulatory Commission, Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be as Low as Is Reasonably Achievable," , Revision 3, June 1978.

11.4-5 Nuclear Regulatory Commission, Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as Is Reasonably Achievable," Revision 1-R, May 1977.

11.4-6 Title 10 Code of Federal Regulations, Part 20.1302 "Compliance with dose limits for individual members of the public."

11.4-7 Title 10 Code of Federal Regulations, Part 20.1406 "Minimization of contamination."

11.4-8 Title 10 Code of Federal Regulations, Part 20 Appendix B "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage."

11.4-9 Title 10 Code of Federal Regulations, Part 20 Appendix G " Requirements for Transfers of Low Level Radioactive Waste Intended for Disposal at Licensed Land Disposal Facilities and Manifests."

11.4-10 Title 10 Code of Federal Regulations, Part 50.34a "Design Objectives for Equipment to Control Releases of Radioactive Material in Effluents," and 52.47 "Contents of Applications; technical information."

11.4-11 (Deleted)

11.4-12 Title 10 Code of Federal Regulations, Part 50 Appendix A GDC 60 "General Design Criteria for Nuclear Power Plants, Control of Releases of Radioactive Materials to the Environment."

11.4-13 Title 10 Code of Federal Regulations, Part 50 Appendix A GDC 61 "General Design Criteria for Nuclear Power Plants, Fuel Storage and Handling and Radioactivity Control."

11.4-14 Title 10 Code of Federal Regulations, Part 50 Appendix A GDC 63 "General Design Criteria for Nuclear Power Plants, Monitoring Fuel and Waste Storage."