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MFN 08-086 Supplement 41

Docket No. 52-010

April 25, 2008

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

Subject: Response to Portion of NRC Request for Additional Information Letter No. 126 Related to ESBWR Design Certification Application, RAI Number 14.3-160

The purpose of this letter is to submit the GE Hitachi Nuclear (GEH) response to the U. S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by NRC Letter dated December 20, 2007 (Reference 1).

The GEH response to RAI Number 14.3-160 is addressed in Enclosure 1. The enclosed changes will be incorporated in the upcoming DCD Revision 5 submittal.

Verified DCD changes associated with this RAI response are identified in the enclosed DCD markups by enclosing the text within a black box. The marked-up pages may contain unverified changes in addition to the verified changes resulting from this RAI response. Other changes shown in the markup(s) may not be fully developed and approved for inclusion in DCD Revision 5.

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

Sincerely,

James C. Kinsey
Vice President, ESBWR Licensing

D068
NRO

Reference:

1. MFN 07-718, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request For Additional Information Letter No. 126 Related To ESBWR Design Certification Application*, dated December 20, 2007.

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 126 Related to ESBWR Design Certification Application RAI Number 14.3-160

cc:

AE Cubbage	USNRC (with enclosure)
GB Stramback	GEH/San Jose (with enclosure)
RE Brown	GEH/Wilmington (with enclosure)
DH Hinds	GEH/Wilmington (with enclosure)
eDRF	0000-0084-7621 (RAI 14.3-160)

Enclosure 1

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Response to Portion of NRC Request for

Additional Information Letter No. 126

Related to ESBWR Design Certification Application

RAI Number 14.3-160

Note: Verified DCD changes associated with this RAI response are identified in the enclosed DCD markups by enclosing the text within a black box. The marked-up pages may contain unverified changes in addition to the verified changes resulting from this RAI response. Other changes shown in the markup(s) may not be fully developed and approved for inclusion in DCD Revision 5.

NRC RAI 14.3-160:

NRC Summary:

Provide ITAAC to verify presence of steel liners in tank cubicles to preclude accidental releases of radioactivity to the environment

NRC Full Text:

DCD Tier 2, Revision 4, Section 11.2.1 provides a commitment to install steel liners to preclude accidental releases of radioactivity to the environment, but DCD Tier 1, Revision 4, Section 2.16.9 does not include an ITAAC to confirm the installation of steel liners in tank cubicles. GEH committed to install steel liners (MFN 06-226, Supplement 1) in complying with effluent concentration limits of Part 20, Appendix B, Table 2 in the event of a LWMS component failure. The lack of an ITAAC is not consistent with the criteria and application process described in DCD Tier 2, Revision 4, Section 14.3.7.3 on design features used to comply with NRC regulations. Accordingly, revise DCD Tier 1, Section 2.16.9 to include the appropriate ITAAC to confirm the installation of steel liners in LWMS tank cubicles located in the Radwaste Building.

GEH Response:

The installation of the tank cubicle liner was an add-on structure for the Liquid Waste Management System (LWMS) in order to comply with the intent of NUREG-0800, BTP 11-6, "Postulated Radioactive Releases Due to Liquid-Containing Tank Failures," March 2007. Previously, GEH performed an analysis of the postulated failure of all the tanks in the LWMS in accordance with the Standard Review Plan (SRP) 15.7.3 and classified it as an infrequent event. Before March 2007, when the most recent SRP revisions were issued, the postulated tank failure evaluation was considered an infrequent accident assessed in Chapter 15, Safety Analyses. GEH recognizes that the 10CFR Part 20 effluent limits are used in assessing whether a complete tank failure results in exceeding said limits; however, the liner only mitigates the affect of this postulated failure, and performs no automatic function as the shutoff valve from the LWMS, or removes radioactive constituents from the liquid waste stream as the demineralized resin beds.

BTP 11-6 states: "LWMS design features and characteristics differ among plants, but the most important common characteristic among plants is that designs incorporate the guidance of Regulatory Guide 1.143. As a result, a gross failure of the LWMS is considered highly unlikely, e.g., such as a failure involving the near total loss of the system's inventory of radioactive materials." The LWMS has been designed in accordance with the latest revision of RG 1.143 (see DCD Section 11.2).

The controls to maintain offsite doses below 10CFR Part 20 limits are assured by sampling of the tank to be discharged prior to release. In addition, there is a radiation monitor with an automatic shutoff valve (currently ITAAC 2.10.1-2 addresses this requirement), which provides additional assurance that offsite doses are maintained below 10 CFR Part 20 limits. The 10 CFR Part 20 limits must be met regardless of the presence of the tank and whether it actually performs any mitigation function.

In accordance with the guidance provided by SRP 14.3, and the graded approach identified in the SRP that has been incorporated into the ITAAC determination process for the ESBWR, GEH reviewed previously certified designs for similar ITAAC requirements. Previously certified designs (AP-1000 and ABWR) and current operating plants Final Safety Analysis Reports do not specify similar requirements. DCD Section 14.3.7.3, item b. 3) (which identifies the graded approach delineated in the SRP) states that nonsafety systems that have ITAACS include: "...actively/automatically control offsite doses below 10 CFR Part 20 limits." Liquid effluent from mixed bed demineralizers cannot be discharged to the environment until sample testing verifies the acceptability of said effluent to be discharged in accordance with the Offsite Dose Calculation Manual and typically the state issued National Pollutant Discharge Elimination System (NPDES) permit limit. The development and adherence to the ODCM and the NPDES permit ensure that 10 CFR Part 20 limits are met. A passive tank liner ensures that accidental spills or leaks are contained within the tank cubicle and not released ultimately to the environment and does not function as a required feature for meeting the limits of Part 20.

BTP 11-6 has established guidance that new plants consider installation of a liner to preclude complete tank failure releases to the environment, and the ESBWR has followed the guidance by specifying a liner for the tank to mitigate a tank failure. However, the tank cubicle liner is not required to remain within the Part 20 limits for liquid effluent releases. Therefore, GEH disagrees that installation of the passive tank cubicle liners requires an ITAAC in order to meet 10CFR Part 20 liquid effluent release limits.

However, since the safety evaluation performed in DCD Tier 2, Section 15.3.16, in accordance with SRP 15.7.3 was classified as an infrequent event, and DCD Tier 2, Section 14.3.7.3 (1) a. requires an ITAAC for infrequent events, GEH agrees to provide an ITAAC for the installation of the LWMS tank cubicle liners in DCD Tier 1, Section 2.10.1.

DCD Tier 1, Section 2.10.1 has been revised to reflect the requirement for "Reports document that the as-built LWMS conforms to the functional arrangement description in the Design Description of this Section 2.10.1." Further, Table 2.10.1-1 has been revised to reflect that the tank cubicle steels liners are major equipment to be verified during construction. DCD Tier 2, Section 11.2.4 currently contains the requirement under the heading "Tanks" for the tank cubicle liners.

DCD Impact:

DCD Tier 1, Section 2.10.1, and Table 2.10.1-1, will be revised as noted in the attached markup.

2.10 RADIOACTIVE WASTE MANAGEMENT SYSTEM

2.10.1 Liquid Waste Management System

Design Description

The ESBWR Liquid Waste Management System (LWMS) is designed to control, collect, process, handle, store, and dispose of liquid radioactive waste generated as the result of normal operation, including anticipated operational occurrences. The LWMS is designed to process liquid prior to release and ensure compliance with Part 20 effluent concentration and dose limits, and Part 50, Appendix I dose objectives for liquid effluents when the plant is operational.

The LWMS neither performs nor ensures any safety-related function, and is not required to achieve or maintain safe shutdown.

The functional arrangement of the LWMS is that it has components in four subsystems ~~which~~ that receive and store radioactive or potentially radioactive liquid waste. The four LWMS subsystems are as follows:

- Equipment (low conductivity) drain subsystem;
- Floor (high conductivity) drain subsystem;
- Chemical drain subsystem; and
- Detergent drain subsystem.

Table 2.10.1-1 describes the major components in each of these four subsystems. Other equipment includes piping, pumps, and valves for transferring the process flow. The LWMS processing equipment is located in the Radwaste Building. ~~The permanent LWMS will connect to non-permanent mobile systems that process radioactive waste (actual mobile system unit operations and chemical reactors may differ based on improvements in radwaste technology).~~ The LWMS is operated and monitored from the Radwaste Building Control Room. Main control room alarms are provided for key parameters of the LWMS. The LWMS either returns processed water to the condensate system or discharges to the circulating water system.

(1) The LWMS functional arrangement ~~of the LWMS~~ is as described in Subsection 2.10.1 and Table 2.10.1-1.

(2) The LWMS piping systems retain their pressure boundary integrity under internal pressures that will be experienced during service.

(3) LWMS discharge flow ~~to circulating water~~ is monitored for high radiation. Discharge flow is terminated on receipt of a high radiation signal from this monitor. A radiation monitor provides an automatic closure signal to the discharge line isolation valve.

(4) LWS demineralizers have sufficient filtration and demineralizer media specified by design specifications.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.10.1-2 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria for the Liquid Waste Management System. ITAAC, for the liquid

Table 2.10.1-1

Major Equipment in LWMS

Equipment	Number of Equipment Items
Equipment (Low Conductivity) Drain Subsystem	
Collection tanks	3
Collection tank cubicle steel liner	3 (one per cubicle)
Collection pumps	3
~~Mobile p~~Processing Subsystem: • Filtration system • Reverse osmosis • Deep-bed ion exchanger • Plumbing • Instrumentation Electrical System	1
Sample tanks	2
Sample tank cubicle steel liner	2 (one per cubicle)
Sample pumps	2
Floor (High Conductivity) Drain Subsystem	
Collection tanks	2
Collection tank cubicle steel liner	2 (one per cubicle)
Collection pumps	2
~~Mobile p~~Processing Subsystem • Filtration system • Reverse osmosis • Deep-bed ion exchanger • Plumbing • Instrumentation Electrical System	1
Sample tanks	2
Sample tank cubicle steel liner	2 (one per cubicle)

Table 2.10.1-1

Major Equipment in LWMS

Equipment	Number of Equipment Items
Sample pumps	2
Chemical Drain Subsystem	
Collection tank	1
Collection tank cubicle steel liner	1
Collection pump	2
Detergent Drain Subsystem	
Collection tanks	2
Collection tank cubicle steel liner	2 (one per cubicle)
Collection pumps	2
~~Mobile p~~Process~~ing~~ Subsystem: • Filtration system • Organic pre-treatment equipment • Plumbing • Instrumentation Electric system	1
Sample tanks	2
Sample tank cubicle steel liner	2 (one per cubicle)
Sample pumps	2

Table 2.10.1-2

ITAAC For The Liquid Waste Management System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the LWMS is as described in Subsection 2.10.1 and Table 2.10.1-1.	Inspections of the as-built system will be performed.	Reports document that the as-built LWMS conforms to the functional arrangement description in the Design Description of this Subsection 2.10.1 and Table 2.10.1-1.
2. The LWMS piping systems retain their pressure boundary integrity under internal pressures that will be experienced during service.	A hydrostatic test in accordance with ASME/ANSI B31.3 will be conducted on the LWMS piping systems, except (1) at atmospheric tanks where no isolation valves exist, (2) when such testing would damage equipment, and (3) when such testing could seriously interfere with other system or component required to be hydrostatically tested by the ASME Code per Regulatory guide 1.143 Revision 2.	The reports document that the results of the hydrostatic test of the LWMS piping systems in accordance with ASME/ANSI B31.3 conform with the requirements in the API or ASME Code per Regulatory Guide 1.143 Revision 2 indicate no unacceptable pressure boundary leakage.
3. LWMS discharge flow ~~to circulating water~~ is monitored for high radiation.A radiation monitor provides an automatic closure signal to the discharge line isolation valve. Discharge flow is terminated on receipt of a high radiation signal from this monitor.	a. Tests will be conducted by using a standard radiation source or portable calibration unit that exceeds a setpoint value that is preset for the testing. b. Inspections will be conducted to confirm that the as-built indication, alarm, and automatic initiation functions are met.~~Tests will be conducted on the as-built LWMS using a simulated high radiation signal~~.	Reports document that the discharge flow terminates upon receipt of a simulated high radiation signal.