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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 114 Related to ESBWR Design Certification Application, Process Radiation Monitoring System ITAAC, RAI Number 14.3-154**

Enclosure 1 contains GEH's response to the subject NRC RAI transmitted via the Reference 1 letter.

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

Sincerely,

James C. Kinsey

James C. Kinsey
Vice President, ESBWR Licensing

D068
NRO

Reference:

1. MFN 07-598, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request For Additional Information Letter No. 114 Related To ESBWR Design Certification Application*, dated November 1, 2007

Enclosure:

1. MFN 07-647 - Response to Portion of NRC Request for Additional Information Letter No. 114, Related to ESBWR Design Certification Application, Process Radiation Monitoring System ITAAC, RAI Number 14.3-154

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	0000-0078-3411

Enclosure 1

MFN 07-647

Response to Portion of NRC Request for Additional Information Letter No. 114 Related to ESBWR Design Certification Application

Process Radiation Monitoring System ITAAC

RAI Number 14.3-154

NRC RAI 14.3-154:

Confirm that appropriate ITAACs will be assigned to radiation monitoring systems used to comply with the requirements of Part 20 and Part 50 Appendix I.

A review of DCD ESBWR DCD Tier 2, Rev. 4, Section 14.2.8.1.16; DCD Tier 1, Rev. 4, Section 2.3.1, Process Radiation Monitoring System Preoperational Test and Table 2.3.1-2 of the same section; and DCD Tier 1, Rev. 4, Section 2.2.15, ITAACs for nonsafety-related systems, indicates that the treatment of the ITAACs has been divided in two groups of PRMS subsystems, safety and nonsafety-related subsystems. For the nonsafety-related systems, the acceptance criteria of Table 2.3.1-2 stipulate that inspections only document the "existence" of each specific type of radiation monitor. Given that the nonsafety-related subsystems are used to monitor and/or control radioactivity releases in the environment, provide the technical and regulatory justifications as to why:

(a) an ITAAC confirming only the existence of a radiation monitoring subsystem provides assurance that the requirements of Part 20 effluent concentration limits and doses to members of the public will be met?

(b) an ITAAC confirming only the existence of a radiation monitoring subsystem provides assurance that the limiting conditions for operations of Part 50, Appendix I, Sections II.A, II.B, and II.C will be met?

(c) this approach is consistent with DCD Tier 2, Rev. 4, Section 14.3.7.3, which indicates that ITAACs are included for non-safety systems used to control offsite doses below 10 CFR Part 20 limits, and that ITAACs shall be included in design descriptions and assigned with the appropriate design characteristics, features and functions?

(d) the design description for the PRMS does not include in its listing [2.3.1(4)] automatic termination or isolation functions for safety-related systems?

Accordingly, address the above and update the DCD Tier 1, Section 2.3.1, to ensure that appropriate ITAACs are assigned to radiation monitoring systems used to comply with the requirements of Part 20 and Part 50 requirements.

GEH Response:

(a), and (b)

GE agrees that the nonsafety related PRMS design should conform with 10CFR Part 20 and Part 50, Appendix I. As described in Chapter 11 Section 11.5 and Chapter 14 Section 14.2, the ESBWR nonsafety related PRMS design, system functional test, integration test and pre-operational test provide assurance that the limiting conditions

requirements specified in 10CFR Part 20 and Part 50, Appendix I are met. Consistent with Standard Review Plan 14.3.8, the nonsafety-related PRMS subsystems are included in Tier 1, but only a verification that they exist based on the graded approach commensurate with the safety significance of these PRMS subsystems.

Therefore, there will be no change made in the existing DCD Tier 1 Revision 4. However, " 'Exists', when used in the Acceptance Criteria, means that the item is present and meets the design description." will be added in Tier 1 Chapter 1 Revision 5 as shown on the attached markup for clarity.

(c) GE agrees an inconsistency exists between Subsection 2.3.1 and Subsection 14.3.7.3. To be consistent between the two subsections, and for reasons stated in the responses in (a) and (b) above, we will revise Subsection 14.3.7.3 in Revision 5 as shown on the attached markup.

(d) This is answered in the Response to RAI 14.3-139 S01.

DCD Impact:

The following sentence will be added into Tier 1 Revision 5 Chapter 1 Subsection 1.1.1 as shown on the following markups:
"Exists," when used in the Acceptance Criteria, means that the item is present and meets the design description.

Tier 2 Subsection 14.3.7.3 ITAAC commitment descriptions regarding nonsafety related PRMS subsystems will be revised in Revision 5 as shown on the following Tier 2 markups.

1. INTRODUCTION

This document provides the Tier 1 material of the ESBWR Design Control Document (DCD).

1.1 Definitions and General Provisions

1.1.1 Definitions

The definitions below apply to terms which may be used in the Design Descriptions and associated Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC).

Acceptance Criteria means the performance, physical condition, or analysis results for a structure, system, or component that demonstrates a design commitment is met.

Analysis means a calculation, mathematical computation, or engineering or technical evaluation. Engineering or technical evaluations could include, but are not limited to, comparisons with operating experience or design of similar structures, systems, or components.

As-built means the physical properties of the structure, system or component, following the completion of its installation or construction activities at its final location at the plant site.

Cold shutdown means a *safe shutdown* with the average reactor coolant temperature $\leq$ 93.3°C (200°F).

Containment means the Primary Containment System, unless explicitly stated otherwise.

Design Commitment means that portion of the Design Description that is verified by ITAAC.

Design Description means that portion of the design that is certified.

Division (for electrical systems or equipment) is the designation applied to a given safety-related system or set of components that is physically, electrically, and functionally independent from other redundant sets of components.

Equipment Identification Number as used in Tier 1 means the designation on a Tier 1 figure and is not representative of an actual equipment number or tag number.

Equipment Qualification

For purposes of ITAAC:

> ***Environmental Qualification:*** Type tests, or type tests and/or analyses, of the safety-related mechanical components and electrical equipment demonstrate qualification to applicable normal, abnormal and design basis accident conditions without loss of the safety-related function for the time needed to perform the safety-related function. These harsh environmental conditions, as applicable to the bounding design basis accident(s), are as follows: expected time-dependent temperature and pressure

profiles, humidity, chemical effects, radiation, aging, submergence, and their synergistic effects which have a significant effect on equipment performance.

As used in the associated ITAAC, the term "safety-related electrical equipment" constitutes the equipment itself, connected instrumentation and controls, connected electrical components (such as cabling, wiring, and terminations), and the lubricants necessary to support performance of the safety-related functions of the safety-related electrical components identified as being subject to the environmental qualification requirements.

As used in this paragraph, "safety related mechnical components" refers to mechanical parts, subassemblies or assemblies that are categorized as Quality Group A, B or C. Mechanical components qualification also may be by type tests, analyses or a combination of tests and analyses of individual parts or subassemblies or of complete assemblies rather than by testing the individual parts or subassemblies separately.

Safety-related equipment located in a mild environment will be qualified for their environmental requirements through specifications and certifications to the environments; however, for a mild environment, only safety-related digital instrumentation and control equipment will be addressed by ITAAC in Tier 1, consistent with NRC guidance in NUREG-0800, Section 14.3. Additionally, EMI susceptibility and emissions qualification is performed by type testing for the safety-related digital instrumentation and control equipment and is not specifically addressed in an ITAAC. ITAAC address analyses of material data for safety-related mechanical equipment located in a harsh environment.

Seismic Qualification: Type tests, analyses, or a combination of type tests and analyses of the Seismic Category I mechanical and electrical equipment (including connected instrumentation and controls) may be used to demonstrate that the as-built equipment, including associated anchorage, is qualified to withstand design basis dynamic loads without loss of its safety-related function.

Exists, when used in Acceptance Criteria, means that the item is present and meets the design description.

Functional Arrangement/Physical Arrangement (for a Building) means the arrangement of the building features (e.g., floors, ceilings, walls, basemat and doorways) and of the structures, systems, or components within, as specified in the building Design Descriptions.

Functional Arrangement (for a System) means the physical arrangement of systems and components to provide the service for which the system in intended, and which is described in the system Design Description.

Hot shutdown means a *safe shutdown* with the average reactor coolant temperature > 215.6°C (420°F).

Hot standby means a subcritical or critical condition (1) with thermal power (including decay heat) ≤ 5% of rated, (2) in which reactor temperatures and pressures are near

14.3.7.3 Criteria and Application Process

Each system addressed in Tier 2 shall be addressed in Tier 1 to the appropriate level of detail. The following graded three-level approach is used to determine the general level of detail in each Tier 1 system description.

(1) General Tier 1 Content Determination:

a. Systems with system-level or component-level safety-related, RTNSS, Infrequent Event and/or Special Event (e.g., ATWS, Station Blackout and Safe Shutdown Fire in Tier 2, Chapter 15) mitigation functions or have a DCFF required for meeting a regulation shall have Tier 1 inputs that include DD and ITAAC.

b. For nonsafety-related systems with design functions or features that:

(i) Prevent or mitigate AOOs analyzed in Tier 2,

(ii) Perform fuel protection or cooling (inside or outside the reactor vessel) functions, and/or

(iii) Are included in the plant to actively/automatically control offsite doses below 10 CFR 20 limits.

For these nonsafety-related systems, Tier 1 shall include DDs, but ITAAC are not required. However, some ITAAC are included for functions/values specifically modeled in the AOO safety analyses, specific fuel protection and cooling functional criteria, and/or active/automatic offsite release prevention functions. The ITAAC may simply verify that the equipment is provided and "exists" in the plant. According to NRC guidance in NUREG-0800, Section 14.3, the term "exists," when used in the Acceptance Criteria for ITAAC, means that the item is present and meets the design description. Detailed supporting information on what should be present to conclude that an item "exists" and meets the design description is contained in the appropriate sections of the DCD. The approach stated herein also is consistent with the graded approach for Tier 1 content and ITAAC described in the NRC guidance.

c. The Tier 1 content of those systems that do not qualify under Items (1)a or (1)b generally need not include DDs or ITAAC. (These systems generally will be included in Tier 1 only by subject [i.e., title], and include a "no entry" statement.)

DD Content Determination:

For each Item (1)a system, the following DCFFs shall be included in the Tier 1 DDs. (The level of detail of each DCFF should be such that it is not expected to change, and DCD Tier 2 should referenced for the additional details needed to verify the ITAAC.)

a. Purpose and functions