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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 70 Related to ESBWR Design Certification Application, Software Life Cycle Process Planning Documents, RAI 14.3-74**

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

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

Sincerely,

Kathy Sedney for

James C. Kinsey
Vice President, ESBWR Regulatory Affairs

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NRO

Reference:

1. MFN 06-382, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 70 Related to ESBWR Design Certification Application,* October 10, 2006.

Enclosure:

1. MFN 07-437, Response to a Portion of NRC Request for Additional Information Letter No. 70, Related to ESBWR Design Certification Application, Software Life Cycle Process Planning Documents, RAI Number 14.3-74.

cc:	AE Cubbage	USNRC (with enclosures)
	DH Hinds	GEH (with enclosures)
	RE Brown	GEH (w/o enclosures)
	eDRF	0000-0071-5156 R1

ENCLOSURE 1

MFN 07-437

Response to a Portion of NRC Request for,

Additional Information Letter No. 70,

Related to ESBWR Design Certification Application,

Software Life Cycle Process Planning Documents,

RAI Number 14.3-74

NRC RAI 14.3-74

DCD Tier 1, Revision 1, Section 3.2 stated that the ESBWR software life cycle process planning documents, based on Section 2.1 of BTP-14, were developed and submitted to the NRC for review in support of DCD certification. The applicant should provide an overview of the ESBWR I&C system design process that includes the planning phase, the implementation phase, and the product output phase. The detailed interface with NRC inspection/verification checkpoints should be identified.

The application document should address life cycle activities in the following three areas:

(1) Software Life Cycle Process Planning

1. *Software management plan*
2. *Software development plan*
3. *Software test plan*
4. *Software quality assurance plan*
5. *Integration plan*
6. *Installation plan*
7. *Maintenance plan*
8. *Training plan*
9. *Operations plan*
10. *Software safety plan*
11. *Software verification and validation plan*
12. *Software configuration management plan*

(2) Software Life Cycle Process Implementation

1. *Safety analyses*
2. *Verification and validation analysis and test reports*
3. *Configuration management reports*
4. *Requirement traceability matrix One or more sets of these reports should be available for each of the following activity groups:*
    1. *Requirements*
    2. *Design*
    3. *Implementation*
    4. *Integration*
    5. *Validation*
    6. *Installation*

7. *Operations*
8. *Maintenance*

(3) Software Life Cycle Process Design Outputs

1. *Software requirements specifications (SRS)*
2. *Hardware and software architecture descriptions (SAD)*
3. *Major hardware component description and qualifications*
4. *Software design specifications (SDS)*
5. *Code listings*
6. *System Build documents*
7. *Installation configuration tables*
8. *Operations manuals*
9. *Maintenance manuals*
10. *Training manuals*

The application should address the computer system development process, which typically consists of the following computer lifecycle phases:

- *Concepts*
- *Requirements*
- *Design*
- *Implementation*
- *Test*
- *Installation, Checkout and Acceptance Testing*
- *Operation*
- *Maintenance*
- *Retirement*

The activities during the lifecycle phases are summarized as:

- *Creating the conceptual design of the system, translation of the concepts into specific system requirements*
- *Using the requirements to develop a detailed system design*
- *Implementing the design into hardware and software functions*
- *Testing the functions to assure the requirements have been correctly implemented*
- *Installing the system and performing site acceptance testing*

- Operating and maintaining the system

- Retiring the system

Standard Review Plan BTP 7-14, Revision 4 - June 1997, describes the characteristics of a software development process that the NRC staff evaluates when assessing compliance with the quality criteria of the Clause 5.3 "Quality" of IEEE Std 7-4.3.2-2003.

Update DCD Tier 1 Section 3.2, "Software Development," to include all life cycle activities.

This topical report should be part of Tier 2 material. Any change to Tier 2* documents should be approved by NRC.*

Response to RAI 14.3-74

The Software Management Plan [NEDE-33226P] and Software Quality Assurance Plan [NEDE-33245P] Licensing Topical Reports (LTRs) provide the framework for the ESBWR I&C software design processes. Software Life cycle phases are defined in Section 5.0 of the Software Management Plan.

Independent Verification and Validation, Software Safety Analyses, and Quality Control check points are defined in the Software Management Plan (SMP) Section 5.0. The definitions of responsible organizations and specific QC activities are further defined in the Software Quality Assurance Plan (SQAP) Table 2.

The Software Life Cycle Process Planning is outlined in the SMP Section 5.0.

The following plans are addressed in the various sections of the LTR's as indicated.

1. The Software management plan is addressed in SMP Section 3.0
2. The Software development plan is addressed in SMP Section 5.0
3. Software test plans are integrated with the phases of the software development life cycle as described in Section 5.0 of the SMP
4. The Software quality assurance plan is addressed in the SQAP
5. The Integration plan is addressed in the SMP Section 6.0
6. The Installation plan is addressed in the SMP Section 7.0
7. The Maintenance plan is addressed in the SMP Section 8.0
8. The Training plan is addressed in the SMP Section 9.0
9. The Operations plan is addressed in the SMP Section 8.0
10. The Software safety plan is addressed in the SQAP Section 9.0
11. The Software verification and validation plan is addressed in the SQAP Section 7.0
12. The Software configuration management plan is addressed in the SQAP Section 10.0

The Software Life Cycle Process Implementation includes;

1. Performance of Safety analyses – This is addressed in the SQAP Section 9.0
2. Performance of Verification and validation analyses and development of test reports – This is addressed in the SQAP Section 7.0
3. Development of Configuration management reports - This is addressed in the SQAP Software Configuration Management Plan Section 10.0
4. Development of Requirements Traceability Matrices - Performance of Requirements Traceability Analyses including Matrices development and updates are defined in the SMP Section 5.0

A Requirements Traceability Analysis has been performed to determine the degree of compliance between the SMP and SQAP to the Associated IEEE standards including IEEE 7-4.3.2-2003. Exceptions to the standards are documented in Appendix A of the LTR documents.

The aspects of the ESBWR I&C Software Development Life Cycle including Life Cycle Phase Activities are defined in section 5.0 of the SMP. Software Life cycle inputs and outputs are defined in the 5.7 tables. V&V and SSA Tasks are defined in the Table 2 of the SQAP.

ESBWR Software Lifecycle activities are not defined in the DCD Tier 1. It states that the ESBWR software life cycle process planning documents, based on Section 2.1 of BTP-14, will be developed and submitted to the NRC for review in support of DCD Certification. This has been accomplished via submittal of the SMP and SQAP LTR's to the NRC.

Informational note: DCD Tier 2 Appendix 7B is being deleted, and various sections of the DCD are being modified to reference the LTR's for the SMP and SQAP. The License Topical Reports for Software Development have been submitted to the NRC for approval. These DCD changes are not affected by, nor do they impact this RAI response.

DCD Impact:

No DCD change will be made in response to this RAI.