



HITACHI

GE Hitachi Nuclear Energy

Richard E. Kingston
Vice President, ESBWR Licensing

P.O. Box 780
3901 Castle Hayne Road, M/C A-65
Wilmington, NC 28402 USA

T 910.819.6192
F 910.362.6192
rick.kingston@ge.com

MFN 09-751

Docket No. 52-010

December 13, 2009

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

Subject: **Response to Portion of NRC RAI Letter No. 386 Related to ESBWR Design Certification Application – DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Number 3.9-255 S02**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to a portion of the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) letter number 386 sent by NRC letter dated November 2, 2009 (Reference 1). RAI Number 3.9-255 S02 is addressed in Enclosure 1.

Enclosure 2 contains the DCD changes to Tier 2 as a result of GEH's response to this RAI. Verified DCD changes associated with these RAI responses are identified in the enclosed DCD markups by enclosing the text within a black box.

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

Sincerely,

Richard E. Kingston
Vice President, ESBWR Licensing

Reference:

1. MFN 09-688 Letter from U.S. Nuclear Regulatory Commission to J. G. Head, GEH, *Request For Additional Information Letter No. 386 Related to ESBWR Design Certification* dated November 2, 2009

Enclosures:

1. Response to Portion of NRC RAI Letter No. 386 Related to ESBWR Design Certification Application - DCD Tier 2 Section 3.9 – Mechanical Systems and Components; RAI Number 3.9-255 S02
2. Response to Portion of NRC RAI Letter No. 386 Related to ESBWR Design Certification Application - DCD Markups for RAI Number 3.9-255 S02

| | | |
|-----|--------------|----------------------------------|
| cc: | AE Cabbage | USNRC (with enclosures) |
| | JG Head | GEH/Wilmington (with enclosures) |
| | DH Hinds | GEH/Wilmington (with enclosures) |
| | HA Upton | GEH/San Jose (with enclosures) |
| | eDRF Section | 0000-0110-8668 (RAI 3.9-255 S02) |

Enclosure 1

MFN 09-751

Response to Portion of NRC Request for

Additional Information Letter No. 386

Related to ESBWR Design Certification Application

**DCD Tier 2 Section 3.9 – Mechanical Systems and
Components**

RAI Number 3.9-255 S02

NRC RAI 3.9-255 S02

A) In response to the staff's RAI 3.9-254 and 255, GEH indicated that it used computer codes PISYS07 (an updated version of PISYS) and ANSI713D (an updated version of ANSI) in the ESBWR Design Certification for piping analyses. GEH also stated that all computer codes identified in DCD Appendix 3D.4 are available for COL applicants who incorporate by reference the computer codes in the DCD. On October 26, 2009, the staff conducted an audit of ANSI7 computer code for fatigue analysis of ESBWR safety related Class 1 piping at GEH Washington DC's office. The purpose of the audit is to review the ANSI7, Revision 13, verification and validation benchmark documentation, to ensure that this revision has adequately incorporated environmental effects in the fatigue analysis of Class 1 piping, in accordance with RG 1.207 and NUREG/CR-6909. As a result, the staff finds that ANSI7 Revision 13, documented in the GEH design record file (DRF) DRF-A12-0166-00 does not incorporate the environmental effects as it states in DCD Appendix 3D.4. GEH is requested to confirm whether the computer code ANSI713D is used for ESBWR design certification for the fatigue usage factors and discuss how the environmental effects on the fatigue usage of Class 1 piping and components were taken into account for the ESBWR design when using ANSI713D. If ANSI713D is referenced in the DCD, then GEH is requested to update the DCD to specify the requirement for additional analysis to account for the environmental effects on fatigue and the method that will be used for this analysis. Alternatively GEH may update the DCD to reference a validated version of the ANSI7 code that includes the effects of environmental fatigue.

B) During the October 26, 2009 audit, the staff discussed with GEH personnel knowledgeable to the ANSI7 program and learned that GEH modified ANSI713D program in March 2007 to incorporate environmental effects on the fatigue design based on the guidelines from NRC Regulatory Guide 1.207 and NUREG/CR-6909. GEH also indicated that the modified ANSI7 program became ANSI714 (Revision14) and the benchmarking of the ANSI714 program is documented in its electronic document management system, eDRF section 0000-0066-3117. On October 26, the staff reviewed the GEH preliminary ANSI714 users manual, the verification document and a PVP paper PVP2007-26143, Application Of Draft Regulatory Guide DG-1144 Guidelines For Environmental Fatigue Evaluation To A BWR Feedwater Piping System, By Har Mehta and Henry Hwang. Appendix B to 10 CFR Part 50 requires design control measures to verify the adequacy of the design of safety related components and piping. On the basis of its review, the staff concludes that ANSI714 is preliminary and invalidated and is, therefore, not adequate for use of the design of Class 1 piping. GEH is requested to confirm whether the computer code ANSI714 is used for ESBWR design certification and if necessary, discuss how and when it will complete the ANSI14 documentation for use in the design certification and for COL applicants including the V&V package and the User's Instruction Manual.

C) In response to the staff's RAI 3.9-254 and 255, GEH identified it used computer codes PISYS07 (an updated version of PISYS) and ANSI713D (an updated version of ANSI) in the ESBWR Design Certification for piping analyses. GEH also stated that all computer codes identified in DCD Appendix 3D.4 are available for COL applicants who

incorporate by reference the computer codes in the DCD. During the October 26, 2009 audit, the staff reviewed the GEH provided draft ANSI714 User's Manual and found that PISYS08 was used in lieu of PISYS07 for generation of loads and stresses for input to ANSI714 to perform resulting stresses for various load combinations and fatigue usage factors. GEH is requested to confirm whether the PISYS08 has been used or will be used for ESBWR design certification. If used, confirm whether the PISYS08 has been reviewed and approved by the NRC staff and provide V&V packages for staff review, as necessary.

GEH Response

A & B) As identified in the audit of ANSI7, this computer program has been updated as version 13D to include the effects of environmental fatigue as specified in RG 1.207; however, complete documentation is not in place to fully qualify this program to perform production work for ESBWR. GEH will use a two-step process to complete the qualification of this program. The first step will be to document and verify all the software procedural documents including the validation test report, an executable file and the user's manual in a design record file. This step has been completed, and the documentation is contained in eDRF 0000-0109-2927. At this stage in the GEH quality program, the use of the program would require that an alternate calculation be performed in order to complete verification of a calculation that uses the program, and this process is in compliance with 10 CFR 50 Appendix B. However, it is our intention to not use the program for production use until step 2 has been completed. The second step involves full qualification of the program to Level 2 status in the GEH quality program where the program can be used without alternate calculations. This step has not been completed, but will be completed by March 15, 2010, and prior to issuing DCD Revision 7. The final version of ANSI7 for ESBWR use will be version 14. Since Table 3D.1-1 in DCD revision 6 was premature in specifying version 14, Corrective Action Request (CAR) # 50082 has been written to document the correction of this problem.

C) It is confirmed that PISYS version 08 will be used for ESBWR, but similar to the response provided for ANSI7, the Level 2 documentation is not yet complete. Version 07 contains ASME code data that is consistent with the 1989 edition of Section III of the ASME code and PISYS needs to be updated in version 08 to include data pertaining to ASME codes that are applicable for the ESBWR licensing basis. Using the same process as for ANSI7, PISYS step 1 has been completed and the documentation is contained in eDRF 0000-0110-7837. The second step for the Level 2 program qualification will also be complete by March 15, 2010. CAR# 50082 is also applicable to PISYS.

DCD Impact

DCD Tier 2, Table 3D.1-1 will be revised as shown in the attached markup to clarify that all users of ANSI7 will use Version 14 and all users of PISYS will use Version 8.

Enclosure 2

MFN 09-751

**Response to Portion of NRC Request for
Additional Information Letter No. 386
Related to ESBWR Design Certification Application
DCD Markups for RAI Number 3.9-255 S02**

Table 3D.1-1
Computer Program User Details

| Program | Company – Location | Version⁽¹⁾ | Facility⁽¹⁾ |
|---------------------------|---------------------------|--|---|
| ANSYS | Hitachi – Japan | 5.6 | PC (WINDOWS 2000, XP) |
| ANSYS | GE – San Jose, Sunol | v8.1, v8.1A1, v9.0, v9.0A1, v10.0, and v10.0A1 | SGI Server |
| ANSYS | GE – Wilmington | v8.1 | LINUX server |
| ANSYS | ENSA – Spain | 10 | IBM Intellistation |
| ANSYS | EA | 10 | Workstation & PC |
| ASHSD2 | Hitachi – Japan | 0 | Engineering Work Station 3050RX/230 |
| EVAST | Hitachi – Japan | 0 | Engineering Work Station 3050RX/230 |
| TACF | Hitachi – Japan | 0 | Engineering Work Station 3050RX/230 |
| ABAQUS | Hitachi – Japan | 6.5 | PC (WINDOWS 2000, XP) |
| FEMFL | Hitachi – Japan | 0 | Engineering Work Station 3050RX/230 |
| SEISM | GE – All locations | 03V, October 1998 | VAX Mainframe |
| | | | |
| PISYS | GE – All locations | 08, July 2007 | PC |
| PISYS(Deleted) | EA | May 2007 | PC Windows 2000 & Windows XP |
| ANSI7 | GE – All locations | 14, September 2000 | PC |
| ANSI7(Deleted) | EA | December 2006 | PC Windows 2000 & Windows XP |
| | | | |
| RVFOR | GE – All locations | 06D, January 1998 | DEC Alpha workstation |
| TSFOR | GE – All locations | 01D, January 1998 | DEC Alpha workstation |
| ERSIN | GE – All locations | 03V, October 1998 | VAX Mainframe |
| RINEX | GE – All locations | 01V, October 1998 | VAX Mainframe |
| PDA | GE – All locations | 01 | PC |
| LION | GE – All locations | 401, March 1994 | Workstation and PC |
| EZPYP | GE – All locations | 07D, January 1998 | DEC Alpha workstation |
| E/PD STRUDL | WGI - Princeton | 0707 | PC |
| SAP4G | GE – All locations | 07V, December 1995 | VAX Mainframe |
| ABAQUS | Toshiba – Japan | 6.5-1 | Mainframe via PC |
| PVElite | ENSA – Spain | 2008 | IBM Intellistation |
| ANSYS Workbench | GE – All locations | 11.0 | LINUX Server |
| ANSYS CFX | GE – All locations | 11.0 | PC (WINDOWS 2000, XP), Linux |
| RELAP5/MOD3.3 | EA-Spain | 3.3 | PC (WINDOWS 2000, XP) |

(1) Later software versions and alternate facilities may be used as long as the software and facility are qualified for use.