



HITACHI

GE Hitachi Nuclear Energy

Richard E. Kingston
Vice President, ESBWR Licensing

PO Box 780 M/C A-65
Wilmington, NC 28402-0780
USA

T 910 819 6192
F 910 362 6192
rick.kingston@ge.com

MFN 10-216

Docket No. 52-010

August 2, 2010

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

Subject: **Transmittal of ESBWR Tier 2, Section 3.6.2.3 DCD Markups Related to GEH/NRC Interactions**

The purpose of this letter is to submit markups to the ESBWR DCD, Tier 2, Section 3.6.2.3 - Jet Impingement Analyses and Effects on Safety-Related Components, which are the result of interactions between GEH and the staff initiated by Reference 1. In Reference 2, the staff agreed to GEH's wording changes to the section. These changes will be incorporated into DCD Revision 8.

Enclosure 1 contains the revision to Section 3.6.2.3 Rev 7. The verified changes are enclosed in a box and identified by blue underlined text additions in Enclosure 1.

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

Sincerely,

Richard E. Kingston
Vice President, ESBWR Licensing

References:

1. eMail from Zahira Cruz to Hugh Upton dated 6/23/2010 RE: Section 3.6.2.3 Revision 8
2. eMail from David Misenhimer to Hugh Upton dated 7/16/2010 RE: Staff Questions on DCD Section 3.6.2.3 R8

Enclosure:

1. NRC Requested Changes to DCD Tier 2 Section 3.6.2.3 - Jet Impingement Analyses and Effects on Safety-Related Components DCD Markups

cc: AE Cabbage USNRC (with enclosures)
J G Head GEH/Wilmington (with enclosures)
DH Hinds GEH/Wilmington (with enclosures)
HA Upton GEH/San Jose (with enclosures)
eDRF Section 0000-0121-1661

MFN 10-216

Enclosure 1

NRC Requested Changes to DCD Tier 2 Section 3.6.2.3 –

**Jet Impingement Analyses and Effects on Safety-Related
Components**

DCD Markups

3.6.2.3 *Dynamic Analysis Methods to Verify Integrity and Operability*

3.6.2.3.1 Jet Impingement Analyses and Effects on Safety-Related Components

The criteria used for evaluating the effects of fluid jets on safety-related SSCs are as follows:

- Safety-related SSCs are not impaired so as to preclude safety-related functions. For any given postulated pipe break and consequent jet, those safety-related SSCs needed to safely shut down the plant are identified.
- Safety-related SSCs which are not necessary to safely shut down the plant for a given break are not protected from the consequences of the fluid jet.
- Safe shutdown of the plant caused by postulated pipe ruptures within the RCPB is not aggravated by sequential failures of safety-related piping and the required emergency cooling system performance is maintained.
- Offsite doses comply with 10 CFR 52.47(a)(2)(iv).
- Postulated breaks resulting in jet impingement loads are assumed to occur in high-energy lines at 102% power operation of the plant.
- Through-wall leakage cracks are postulated in moderate-energy lines and are assumed to result in wetting and spraying of safety-related SSCs.
- Reflected jets are considered only when there is an obvious reflecting surface (such as a flat plate) which directs the jet onto safety-related equipment. Only the first reflection is considered in evaluating potential targets.
- Potential targets, or portions of targets adjacent to the jet boundary, are assumed to be impinged upon when reasonable variations in jet geometry or pipe movement are considered.

The analytical methods used to determine which targets could be impinged upon by a fluid jet and the corresponding jet impingement load include:

- | |
|---|
| <ul style="list-style-type: none"> • The direction of the fluid jet is based on the arrested position, including reasonable variations of the broken pipe end movement during steady-state blowdown. |
|---|
- The impinging jet proceeds along a straight path.
 - The total impingement force acting on any cross-sectional area of the jet is time and distance invariant with a total magnitude equivalent to the steady-state fluid blowdown force given in Subsection 3.6.2.2 and with jet characteristics shown in Figure 3.6-1.
 - The jet impingement thrust force on the target is calculated for certain cases according to ANSI/ANS 58.2 (Reference 3.6-4).
 - For cases where the magnitude of a jet thrust force is only important for pipe reaction load, a detailed jet evaluation is not necessary. Simple load calculation may be applicable for a pipe break where the absence of an energy reservoir upstream or downstream of the break does not result in a continuous jet blowdown. A detailed jet impingement analysis is not significant for smaller pipe breaks if the design or analysis of larger size pipe break loads envelops these pipe break jet impingement loads affecting the