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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 331 Related to ESBWR Design Certification Application – Technical Specifications – RAI Number 16.2-101 S01**

Enclosures 1 and 2 contain the GE Hitachi Nuclear Energy (GEH) response to 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,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

Reference:

1. MFN 09-278, Letter from U.S. Nuclear Regulatory Commission to Jerald G. Head, *Request for Additional Information Letter No. 331 Related to ESBWR Design Certification Application,* April 20, 2009

Enclosures:

1. MFN 09-344 – Response to Portion of NRC Request for Additional Information Letter No. 331 Related to ESBWR Design Certification Application – Technical Specifications – RAI Number 16.2-101 S01
2. MFN 09-344 – DCD Markups for RAI Number 16.2-101 S01

cc:

AE Cubbage	USNRC (with enclosures)
JG Head	GEH (with enclosures)
DH Hinds	GEH (with enclosures)
eDRF	101-7116

Enclosure 1

MFN 09-344

Response to Portion of NRC Request for

Additional Information Letter No. 331

Related to ESBWR Design Certification Application

- Technical Specifications -

RAI Number 16.2-101 S01

NRC RAI 16.2-101 S01

After further consideration, and the fact that ABWR GTS 3.9.6, "RPV Water Level," and BWR/6 STS 3.9.6, "RPV Water Level - [Irradiated fuel]" both include an Applicability of

ABWR

During movement of new fuel assemblies or handling of control rods within the RPV, when irradiated fuel assemblies are seated within the RPV.

BWR/6

[During movement of new fuel assemblies or handling of control rods within the [RPV], when irradiated fuel assemblies are seated within the [RPV].]

GEH should restore this Applicability condition to ESBWR GTS 3.9.6, "RPV Water Level."

The fuel handling accident (FHA) analysis for ABWR and BWR/6 both assume dropping irradiated fuel in the RPV, just like the ESBWR. So potential radiological consequences of the FHA would bound the consequences of dropping a new fuel assembly or a control rod on irradiated fuel in the RPV. GEH's proposal to omit this Applicability condition from ESBWR GTS 3.9.6 may have merit, but doing so would depart from STS for BWR/6. Lacking an ESBWR-design specific basis for this omission, CTSB will not agree to it unless an STS generic change request is submitted to NRR by GEH through the TSTF using the TSTF traveler process, and approved by NRR. Therefore, GEH should restore this Applicability condition to ESBWR GTS 3.9.6, consistent with the STS 3.9.6 Bases Background, Applicable Safety Analyses, and Applicability Sections:

BACKGROUND

The movement of ~~[irradiated]~~ fuel assemblies ~~[~~or handling of control rods~~]~~ within the RPV requires a minimum water level of [22 ft 8 inches] above the top of the RPV flange.

APPLICABLE SAFETY ANALYSES

During movement of ~~[irradiated]~~ fuel assemblies ~~[~~or handling of control rods~~]~~ the water level in the RPV is an initial condition design parameter in the analysis of a fuel handling accident in containment postulated by Regulatory Guide 1.25 (Ref. 1).

APPLICABILITY

LCO 3.9.6 is applicable when moving ~~[irradiated]~~ fuel assemblies ~~[~~or handling control rods (i.e., movement with other than the normal control rod drive)~~]~~ within the

RPV. The LCO minimizes the possibility of a fuel handling accident in containment that is beyond the assumptions of the safety analysis. [If irradiated fuel is not present within the RPV, there can be no significant radioactivity release as a result of a postulated fuel handling accident.] ~~[Requirements for handling of new fuel assemblies or control rods (where water depth to the RPV flange is not of concern) are covered by LCO 3.9.7, "RPV Water Level - New Fuel or Control Rods."]~~ Requirements for fuel handling accidents in the spent fuel storage pool are covered by LCO 3.7.7, "Fuel Pool Water Level."

----------REVIEWER'S NOTE----------

LCO 3.9.6 is written to cover new fuel and control rods as well as irradiated fuel. ~~If a plant adopts LCO 3.9.7, however, the second bracketed portion of this Applicability is adopted in lieu of the first bracketed portion. Additional modifications would also be made to the title and Required Action A.1.~~

GEH Response

GTS 3.9.6 and the associated Bases will be revised as requested to be consistent with NUREG-1434, Standard Technical Specifications General Electric Plants, BWR/6, Revision 3.1.

DCD Impact

DCD Tier 2, Chapter 16, Sections 3.9.6 and B 3.9.6 will be revised as shown in Enclosure 2.

Enclosure 2

MFN 09-344

DCD Markups for

RAI Number 16.2-101 S01

3.9 REFUELING OPERATIONS

3.9.6 Reactor Pressure Vessel (RPV) Water Level

LCO 3.9.6 RPV water level shall be ≥ 7.01 m (23.0 ft) over the top of the RPV flange.

APPLICABILITY: During movement of irradiated fuel assemblies within the RPV, ~~.~~
During movement of new fuel assemblies or handling of control rods within the RPV, when irradiated fuel assemblies are seated within the RPV.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. RPV water level not within limit.	A.1 Suspend movement of ~~irradiated~~ fuel assemblies and handling of control rods within the RPV.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.6.1	Verify RPV water level is ≥ 7.01 m (23.0 ft) above the top of the RPV flange.	24 hours

B 3.9 REFUELING OPERATIONS

B 3.9.6 Reactor Pressure Vessel (RPV) Water Level

BASES

BACKGROUND

The movement of ~~irradiated~~ fuel assemblies or handling of control rods within the RPV requires a minimum water level of 7.01 m (23.0 ft) above the top of the RPV flange. During refueling, this maintains a sufficient water level above the RPV to retain iodine fission product activity in the water in the event of a fuel handling accident (Ref. 1). Sufficient iodine activity would be retained to limit offsite doses from the accident to < 0.063 Sv (6.3 rem) total effective dose equivalent (TEDE) at the exclusion area boundary and < 0.05 Sv (5 rem) TEDE in the control room as required by 10 CFR 52.47(a)(2)(iv) (Ref. 2) and Regulatory Guide 1.183 (Ref. 3) acceptance criteria.

APPLICABLE SAFETY ANALYSES

During movement of irradiated fuel assemblies, which bounds movement of new fuel assemblies and handling of control rods, the water level in the RPV is an initial condition design parameter in the analysis of a fuel handling accident (Ref. 1). A minimum water level of 7.01 m (23.0 ft) allows a decontamination factor of 200 (Ref. 3) to be used in the accident analysis for iodine. This relates to the assumption that 99.5% of the total iodine released from the pellet to cladding gap of all the dropped fuel assembly rods is retained by the refueling cavity water. The fuel pellet to cladding gap is assumed to contain 8% of the total fuel rod iodine inventory (Refs. 1 and 2). A fuel handling accident is assumed to damage all of the fuel rods in two (2) fuel assemblies as discussed in Reference 1.

Analysis of the fuel handling accident inside the reactor building is described in Reference 1. With a minimum water level of 7.01 m (23.0 ft) and a minimum decay time of 24 hours prior to fuel handling, the analysis demonstrates that the iodine release due to a postulated fuel handling accident is adequately captured by the water, and that offsite doses are maintained within < 0.063 Sv (6.3 rem) TEDE and < 0.05 Sv (5 rem) TEDE in the control room as required by 10 CFR 52.47(a)(2)(iv) (Ref. 2) and Regulatory Guide 1.183 (Ref. 3) acceptance criteria.

BASES

APPLICABLE SAFETY ANALYSES (continued)

While the worst case assumptions include the dropping of the irradiated fuel assembly being handled onto the reactor core, the possibility exists of the dropped assembly striking the RPV flange and releasing fission products. Therefore, the minimum depth for water coverage to ensure acceptable radiological consequences is specified from the RPV flange. Since the worst case event results in failed fuel assemblies seated in the core, as well as the dropped assembly, dropping an assembly on the RPV flange will result in reduced releases of fission gases.

RPV Water Level satisfies Criterion 2 of 10 CFR 50.36(d)(2)(ii).

LCO

A minimum water level of 7.01 m (23.0 ft) above the top of the RPV flange is required to ensure that the radiological consequences of a postulated fuel handling accident are within acceptable limits, as provided by the guidance of Reference 4.

APPLICABILITY

LCO 3.9.6 is applicable during movement of irradiated fuel assemblies within the RPV and during movement of new fuel assemblies or handling of control rods (i.e., movement with other than the normal control rod drive) within the RPV when irradiated fuel assemblies are seated within the RPV. The LCO minimizes the possibility of a fuel handling accident in the reactor building that is beyond the assumptions of the safety analysis. If irradiated fuel is not being moved and is not present within the RPV, there can be no significant radioactivity release as a result of a postulated fuel handling accident. Requirements for fuel handling accidents in the spent fuel storage pool are covered by LCO 3.7.5, "Fuel Pool Water Level."

ACTIONS

A.1

When the initial conditions for an accident cannot be met, steps should be taken to preclude the accident from occurring. If the water level is < 7.01 m (23.0 ft) above the top of the RPV flange, the movement of ~~irradiated~~ fuel assemblies and handling of control rods in the RPV is immediately suspended. Suspension of this activity shall not preclude completion of movement of a component~~an irradiated fuel assembly~~ to a safe position. This effectively precludes a fuel handling accident from occurring.