

June 2, 2005

Dr. Robert E. Gamble
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1989 Little Orchard Street, M/C 365
San Jose, CA 95125-1030

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING NEDO-33175,
REVISION 1, "CLASSIFICATION OF ESBWR ABNORMAL EVENTS AND
DETERMINATION OF THEIR SAFETY ANALYSIS ACCEPTANCE CRITERIA"

Dear Dr. Gamble:

By letter dated March 1, 2005, General Electric (GE) submitted NEDO-33715, Revision 1, "Classification of ESBWR Abnormal Events and Determination of their Safety Analysis Acceptance Criteria," Errata and Addenda Number 1. The Nuclear Regulatory Commission (NRC) staff is performing a detailed review of this topical report to ensure that the information is sufficiently complete to enable the NRC staff to reach a conclusion on the acceptability of this report.

The NRC staff has determined that additional information is necessary to continue the review. Enclosure 1 contains requests for additional information (RAIs). These RAIs were discussed with your staff on April 14 and 23, 2005, via telecon. Please provide the requested information by June 30, 2005, so that the review can be completed in a timely manner.

If you have any questions or comments concerning this matter, you may contact me at (301) 415-2875 or aec@nrc.gov.

Sincerely,

/RA/

Amy E. Cabbage, Senior Project Manager
New Reactors Section
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Project No. 717

Enclosure: As stated

cc: See next page

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Request for Additional Information (RAI)
"Classification of ESBWR Abnormal Events and Determination of
Safety Analysis Acceptance Criteria" NEDO-33175, Revision 1
ESBWR Pre-Application Review
General Electric Company

1. In Tables 4 and 9, you listed 18 abnormal events under a new "accident" category. When you submit an application for design certification of the ESBWR design, you will be required to provide the U.S. Nuclear Regulatory Commission (NRC) with the radiological consequence analysis for each of these events to ensure they meet the radiological dose acceptance criteria. Each analysis should include, but not be limited to, the source term, release point, release pathway to the environment, and the associated atmospheric dispersion factor (χ/Q values) for the control room air intake.
2. The radiological consequence acceptance criteria for the waste gas system leak or failure should be 0.1 rem total effective dose equivalent (TEDE) at the exclusion area boundary (EAB) and low-population zone (LPZ), and 5 rem TEDE in the control room. This is consistent with the guidance contained under Item B.1.(a), of Branch Technical Position (BTP), Effluent Treatment Systems Branch (ETSB) 11-5 in NUREG-0800, "Standard Review Plan (SRP)" Section 11.3 (July 1981). In the BTP, it states:

"... the resulting total body exposure to an individual at the nearest exclusion boundary will not exceed 0.5 rem. This is consistent with the guidelines of 10 CFR Part 20 and is substantially below the guidelines of 10 CFR Part 100."

The criterion in BTP 11-5 was written prior to the present Part 20 being expressed in terms of TEDE dose. Rather, the criterion was based upon the Part 20 doses which were in effect at the time (the total body dose). Application of the present Part 20 dose criteria (TEDE) to BTP ETSB 11-5 equates to a dose criterion of 0.1 rem TEDE.
3. The radiological acceptance criteria for all abnormal events classified in the new "accident" category (except the liquid-containing tank failure) should be 0.1 rem TEDE. The radiological acceptance criterion for the liquid-containing tank failure should remain as 10 CFR Part 20, Appendix B, Table 2, Column 2 as proposed.
4. We recommend that the new category of events titled "accidents" be renamed "infrequent events" or "infrequent incidents" consistent with a dose acceptance criteria of 0.1 rem which is associated with normal operation.
5. The spent fuel cask drop accident in Tables 4 and 9 should be classified as a design-basis accident with its radiological acceptance criteria of 6.3 rem TEDE at the EAB and LPZ, and 5 rem TEDE control room. This accident is described in SRP Section 15.7.5.

Enclosure

6. Review of the liquid-containing tank failure involves the groundwater and surface water environment to delay, disperse, dilute, or concentrate accidental radioactive liquid effluent releases (due to spills, leakages, or rupture of radwaste tanks), with emphasis on relating the effects of such releases to existing and known future uses of groundwater and surface water resources. This issue involves both site-specific hydrologic characteristics as well as radiological dose to the public. The radiological consequence analysis should include consideration of tank volumes, processing and decay of tank content (source term), and potential pathways of radioactive liquid to the environment. This is a design- and site-specific issue that should be classified as a Combined License Action item (e.g., AP1000 design certification).
7. In Table 9, you stated that the resulting control room doses from all abnormal events for meeting General Design Criteria (GDC) 19 are bounded by the loss-of-coolant accident (LOCA). The staff does not agree with this note based on its past review experience. The control room χ/Q values for each event (accident) differ depending upon its release point relative to the control room air intake. Thus, the control room dose resulting from the LOCA may not necessarily bound GDC 19 criteria for all other accident events.
8. Note “++” in Table 9 pertaining to the liquid-containing tank failure should be deleted. These tanks contain insignificant amounts of gaseous activity because they are normally either open to the atmosphere or the gaseous activities are continually released through the monitored plant vent (typically). Therefore, the gaseous activity release pathway from the liquid-containing tank failure is no longer required in the SRP.
9. Even though the ESBWR is a new design, we understand that the ESBWR design is based on current BWR technology and extensive BWR operating experience around the world. The development of initiating events is a complex task needing the use of operational experience, engineering judgement, PRA studies and deterministic analysis of transients and accidents. Please describe how deterministic analysis and BWR operating experience will be used with the PRA results to classify ESBWR abnormal events. It is expected that the ESBWR design control document (DCD) will include a design-specific justification for each event that is classified in the new “accident” category of events.
10. GE proposes to classify the “Fuel Assembly Loading Error, Mislocated Bundle” and “Fuel Assembly Loading Error, Misoriented Bundle” as “Accidents” for the ESBWR. By letter dated May 17, 2004, Global Nuclear Fuels (GNF) submitted proposed Amendment 28 to GESTAR II to change the acceptance criteria for these events for operating BWRs. By letter dated May 17, 2004, the staff requested additional information regarding proposed Amendment 28. The staff is waiting for the response to these RAIs from GNF. GE should classify these events as anticipated operational occurrences (AOOs) pending completion of the staff’s review of GESTAR II Amendment 28.
11. Section 15.0 of the SRP states that “for new applications, loss of offsite power should not be considered as a single failure event; rather it should be assumed in the analysis of each event without changing the event category. The applicant’s Safety Analysis Report should discuss each transient and analysis to justify that it conforms to GDC 17 requirements. This position is based upon interpretation of GDC 17, as documented in the FSER for the ABB-CE System 80+ design certification. Please confirm that GE will follow this guidance in the transient and accident analysis for Chapter 15 events for the ESBWR.

12. GE has proposed to categorize "Overpressure Protection" as a "Special Event."
Overpressure protection is considered by the staff to be a protection feature rather than an event. Please provide additional clarification of the basis for GE's proposed categorization.
13. Please describe how uncertainties in the determination of the event frequencies will be accounted for the in the classification of events.
14. GE provided interpretations of several NRC regulations in the topical report. Please note that the NRC staff does not necessarily agree with all of the interpretations provided.

ESBWR

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