July 16, 1992

Docket No. 52-001

Mr. Patrick W. Marriott, Manager
Licensing & Consulting Services
GE Nuclear Energy
175 Curtner Avenue
San Jose, California 95125

Dear Mr. Marriott:

SUBJECT: CONFIRMATORY AND OPEN ITEMS IDENTIFIED IN THE FINAL SAFETY EVALUATION REPORT (FSER) FOR CHAPTERS 2, 4, 5, 11, AND 15 OF THE ADVANCED BOILING WATER REACTOR (ABWR)

The staff is developing the FSER for Chapters 2, 4, 5, 11, and 15 of the GE Nuclear Energy (GE) ABWR Standard Analysis Report (SSAR). We have identified 6 preliminary confirmatory items where the staff and GE have reached tentative agreement. We also identified 16 preliminary open items where the staff and GE have not reached consensus. For each item, an amendment to the SSAR or revised inspections, tests, analyses and acceptance criteria, or additional information is required for complete closure.

Enclosed for your information is a summary of these confirmatory and open items.

Please contact me at (301) 504-1125 if you need additional information on these issues.

Sincerely,
Original Signed By:
Son Q. Ninh, Project Engineer
Standardization Project Directorate
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and License Renewal
Office of Nuclear Reactor Regulation

Enclosure:
As stated

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Docket No. 52-001

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2.3.1 Regional Climatology

GE has agreed to change the design-basis tornado characteristics for the ABWR to reflect the data included in Table 1.4-1. This is acceptable to the staff subject to the revision of the SSAR and resolves DSER open item #146 in SECY-91-355. This is a confirmatory item.

2.3.6 Design Certification Material

1. Section 2.10.1 Turbine Main Steam System

The staff has reviewed Section 2.10.1, Turbine Main Steam System in the Tier 1 Design Certification Material (TDCM) and finds that the design description and its related ITAAC (Table 2.10.1) should include (1) the operability requirement of main steam drain valve from main control room via essential power supply (Class 1E), (2) the structural integrity requirement for main steam lines, drain lines, and main condenser for their leak-tightness following a postulated LOCA. The main steam lines from MSIV to the main condenser, including the drain lines, should ba analyzed, and (3) using a seismic analysis to demonstrate appropriate structural integrity for leak-tightness under SSE loading conditions. The staff has provided a credit for iodine removal in the main steam lines, drain lines, and condenser following a postulated LOCA and accepted the ABWR design without a MSIV leakage control system. This is an open item.

2. Section 2.15.5 Control Room Habitability Area HVAC System

The staff has reviewed Section 2.15.5, Control Room Habitability Area HVAC System in the TDCM and finds (1) that it should have been stated that the radiation monitors at the control room emergency air intakes would permit automatic selection of "less-contaminated air," rather than "non-contaminated air" as stated. In addition, (2) this section should clarify that the redundant control room habitability area HVAC system consists of two subsystems; the control building recirculation unit (CBRU) and the control-building emergency recirculation unit (CBERU). It should further clarify (3) that each CBRU will consist of "redundant supply fans, pre-filters, 80 percent efficiency filter..." as stated, and that each CBERU will consist of, among other things, redundant HEPA filters and a 2-inch thick charcoal absorber with 95 percent iodine removal efficiency. This is an open item.

Table 2.15.5b (page 2.15-14) should include the following ITAAC items as certified design commitments:

1. Control room is physically located underground with a sufficient distance from the main steam lines to provide an acceptable direct gamma radiation to the control room operators during and following an accident. (4)

2. In the event that significant concentrations of air radioactivity or toxic chemicals are detected at the normal control room HVAC system air intake, it would be automatically isolated and automatic control room pressurization would immediately occur with filtered air taken in by either of two separate air intakes. (5)

3. Each CBERU will consist of redundant HEPA filters and a 2-inch thick charcoal absorber with 95 percent iodine removal efficiency. (6)

4. Two control room emergency air intakes are widely separated with redundant radiation intake. (7)

5. Radiation monitors at emergency air intakes would permit automat selection of less-contaminated air at either intake. (8)

6. The CBERU is designed to meet single-failure criterion. (9)

4.2 Fuel System Design

GE has agreed to provide a description of the reference control rod blade design by reference to a specific design in NEDE-31756P. However, this report has not been officially issued by GE, and the specific design has not as yet been indicated by GE. Thus, the control rod design is a confirmatory issue.

4.4 Thermal Hydraulic System

The ATWS stability problem remains an open issue to be resolved either by generic demonstration or solution by the NRC/BWROG interaction or by GE providing satisfactory analyses or solution directly related to the ABWR.

This ITAAC is acceptable, except that Certified Design Commitment 1 should be expanded to explicitly state that the LPMS design is consistent with RG 1.133. The staff considers this an open item.

The staff has requested, however, to see existing flow test results for part pump operation which demonstrate there are no significant problems. We have not received this information as yet. thus this is a confirmatory issue.

4.6 Functional Design of Fine Motion Control Rod Drive System (FMCRD)

The ITAAC for control rod drive system is being reviewed by the staff. We will provide a supplemental SER. This item is considered an open it

5.2.2 Overpressure Protection

GE has submitted proposed ITAACs for SRVs and fuel, which are under staff review. This is an open item.

5.2.5

GE has submitted proposed ITAAC for RCS pressure leakage detection, which is under staff review. This is an open item.

5.3.2 Pressure-Temperature Limit

GE predicted the neutron fluence at end of life to be $6x10^{17}$ neutrons per square centimeter (n/cm^2), which is low in comparison to that of the existing BWR. GE will have to submit additional information during the final design approval review to show how $6x10^{17}$ n/cm^2 was predicted. This is an open item.

5.4.1 Reactor Recirculation System

GE has submitted the proposed ITAAC for recirculation flow control system, which is under staff review. This is an open item.

5.4.5 Reactor Core Isolation Cooling (RCIC) System

GE has submitted the proposed ITAAC for RCIC system, which is under staff review. This is an open item.

5.4.7 Residual Heat Removal (RHR) System

GE has submitted the proposed ITAAC for RHR system, which is under staff review. This is an open item.

GE is currently assessing other interfaces in the design. The staff will evaluate the acceptability of GE's resolution to GI 105, Interface LOCA. This is an open item.

15.1 Anticipated Operational Occurrences

During January 1992, the staff with the technical assistance of BNL, audited ODYNA and REDYA at GE offices in San Jose, California. Our evaluation consisted of three major areas: (1) formulation and models, (2) quality assurance procedures, and (3) verification and validation. We concluded that the modifications performed for ODYN and REDY for ABWR were adequately justified. The staff therefore found the changes to ODYN and REDY to be acceptable. However, there was no documentation to verify that the coding changes to implement new models were independently checked. GE should confirm that the implementation of the code modifications have been independently verified as correct. This is a confirmatory action item for GE.

15.3 Accidents

The staff has recently been notified by the 10 CFR Part 21 process that in BWR/6 designs that a fuel misorientation event may lead to fuel damage. We don't know at this time whether a similar conclusion applies to the ABWR. We require GE to evaluate the applicability of the issue for ABWR. This is an open issue.

15.7 Anticipated Transient Without SCRAM

15.7.1 Design Features

The ABWR design also provides Recirculation runback for all scram signals and Feedwater runback on Reactor high pressure and Start-up Range Neutron Monitoring System (SRNM) not downscale for 2 minutes. Automatic Depressurization System (ADS) automatic inhibit is also provided on Reactor high pressure and SRNM not downscale for 2 minutes or Reactor water level 2 and SRNM not downscale for 25 seconds.

The ABWR complies with prescriptive design requirements of the ATWS rule 10 CFR 50.62 as discussed above and is designed to mitigate the effects of an ATWS event. However, as discussed in Section 4, large power oscillations resulting from thermal-hydraulic instability associated with ATWS events might invalidate the analyses and basic conclusions that were the basis for the prescriptive ATWS rule. Evaluation of this contingency for operating reactors is nearing conclusion, and is an open issue for ABWR.

15.7.2 Analysis

The results of TRACG calculations to evaluate the thermal hydraulic stability of ABWR under the recirculation runback and feedwater runback conditions associated with ATWS events have not been provided for staff review. Therefore, ATWS must remain an open issue until it has been demonstrated that ABWR design response to ATWS enables avoidance of large oscillations and the staff audit of TRACG qualifications for stability calculations is complete.

11 RADIOACTIVE WASTE MANAGEMENT

ITAAC: GE has submitted Radwaste System Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) for staff review. The results of this review will be provided in a supplement to this report. This is an open item.

11.2.2 Evaluation and Findings

IE Bulletin No. 80-05, "Vacuum Conditions Resulting in Damage to Chemical and Volume Control System (CVCS) Tanks," identified an issue concerning the release of radioactive material or other detrimental effects as a result of tank buckling due to low vacuum conditions. The low vacuum condition is created due to cooling of hot water in the low-pressure tank. Per fax dated May 21, 1992, GE stated that several low-pressure tanks that could contain primary system water have vents to prevent the development of a low vacuum condition. This satisfies the tank failure concern in IE Bulletin 80-05, subject to confirmation of the above information in the SSAR. This is a confirmatory item.

11.5.2 Evaluation and Findings

Amendment 20 shows the RIP control panel room HVAC subsystem as a closed cooling HVAC subsystem with no outside air supply to the room or exhaust from the room to the environs (Figure 9.4-5). Further, GE has provided by telefax dated June 9, 1992, a proposed revision to SSAR Subsection 11.5.2.2.4 that states that the exhausts from the areas serviced by the HVAC systems mentioned above are not monitored since the subject areas do not contain any radioactive systems and that the only releases to the environment by these systems would first have to be brought into the areas by their own HVAC system's supply fans. Based on the above, the staff finds the lack of monitoring provision for the above exhausts acceptable. Therefore, this open item is resolved pending revision of the SSAR. This is a confirmatory item.