



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

April 30, 1996

MEMORANDUM TO: Chairman Jackson
Commissioner Rogers
Commissioner Dicus

FROM: James M. Taylor
Executive Director for Operations

SUBJECT: ADVANCED BOILING WATER REACTOR DESIGN REVIEW

The staff sent its plans for completing the design certification rulemakings for the Advanced Boiling Water Reactor (ABWR) and System 80+ designs to the Commission in a memorandum dated April 3, 1996. On April 15, 1996, the staff submitted the final design certification rules for these two evolutionary designs, for the Commission's consideration, in SECY-96-077, "Certification of Two Evolutionary Designs. In both of these papers, the staff stated that the design control documents (DCDs) for the ABWR and System 80+ designs must be revised to conform with the final rules before the Office of the Federal Register (OFR) can determine the acceptability of the DCDs for incorporation by reference. In a letter dated April 19, 1996, the staff requested OFR to perform a preliminary review of the ABWR DCD. The staff also stated in SECY-96-077 that it is preparing a supplement to the final safety evaluation report (FSER) that would address, among other things, changes to the ABWR design resulting from first-of-a-kind engineering (FOAKE).

In the attached letter, GE Nuclear Energy (GE) submitted markups to its DCD, indicating proposed changes to Tier 1 and Tier 2 of the ABWR DCD resulting from its FOAKE work. GE stated that some of these changes were necessary in order to bring its DCD into conformance with the regulations that are applicable to the ABWR design and other changes were due to design errors or design improvements. The staff will review these changes and determine whether GE has taken adequate corrective action to assure that other errors are not present in its DCD. After the Commission issues its staff requirements memorandum on SECY-96-077, GE will need to submit the final changes to its DCD, including conforming changes to the final design certification rule.

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The staff will provide the FSER supplement, which will address all changes, to the Commission before the final rule for certification of the ABWR design is published in the *Federal Register*. The ACRS is planning to review SECY-96-077 at its June 1996, meeting.

Original signed by
James M. Taylor
James M. Taylor
Executive Director for Operations

Attachment: As stated

cc: SECY
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ACRS

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GE Nuclear Energy

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April 16, 1996

MFN 050-96
Docket No. 52-001

Mr. Dennis M. Crutchfield
Associate Director for Advanced Reactors
and License Renewal
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Crutchfield:

Transmitted herewith, in the form of markups to pages of the ABWR Design Control Document (DCD), are ten proposed changes to the ABWR design description which result from information developed in the course of the ABWR First-Of-A-Kind Engineering (FOAKE) program. Ten copies are enclosed for review by the NRC staff. The need for the proposed changes prior to completion of rulemaking has only recently been determined from an updated analysis of FOAKE detailed design information. The background for that analysis and this submittal is set forth below.

GE undertook the ABWR FOAKE activity pursuant to a June 1993 contract with the Advanced Reactor Corporation (ARC) to perform detailed design of the ABWR for its use in the United States. The basic approach of the GE FOAKE activity is to develop the design details of the ABWR consistent with the requirements of the design undergoing NRC certification, a key objective being the development and maintenance of a highly standardized design. This means that the certified design and the FOAKE design must be consistent, with the FOAKE design being much more detailed in its description.

The FOAKE design activity may identify changes which would result in a substantial benefit to safety, reliability or economy. Their consideration, however, is done under an approach which is closely controlled. Any proposed design change to the DCD is processed in accordance with rigorous internal GE review procedures; and proposed changes are only accepted for compelling reasons, in the spirit of maintaining the detailed ABWR design as close as practicable within the boundaries of the DCD. In December of 1995, two design changes were identified that were needed to bring the DCD into compliance with NRC regulations in effect at the time of FDA issuance. In order to take full advantage of the thoroughness of the FOAKE activity, it was then decided to re-evaluate all the FOAKE Engineering Change Authorizations (ECAs) for purposes of determining if any other proposed DCD changes should accompany the two that were initially identified. Enclosed is a summary description of the resulting proposed DCD changes and of the screening criteria used by GE to evaluate whether the FOAKE information requires, or otherwise merits, change to Tier 1 or Tier 2 of the DCD.

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Five of the changes proposed herewith are to Tier 1 (and corresponding portions of Tier 2) of the DCD and five are to Tier 2 only. None of the proposed changes are necessary to assure adequate protection of the public health and safety. Rather, as described in the enclosure, two are proposed to bring Tier 1 or Tier 2 into compliance with regulations in effect at the time the ABWR FDA was issued, four are proposed to make the design described in the DCD functionally operable as intended, one is proposed to effect a change to technical specifications, and three would effect design improvements which require minor modifications and which GE believes should be incorporated in the DCD at this time.

We believe the six changes proposed to assure regulatory compliance and functional operability need to be made prior to completion of design certification. As respects the change to technical specifications and the three design improvement changes, we believe it desirable, though not essential, that these changes be made now; we are, however, prepared to defer them if their present consideration would delay timely completion of staff review of the six required changes.

The FOAKE program has identified a number of additional desirable design improvements; however, the implementing design changes need not be made at this time since they qualify for post-certification §50.59-type change treatment (i.e., they do not affect Tier 1 or Tier 2* or technical specifications, or result in an unreviewed safety question). Those changes will be made in accordance with governing procedures as established by the Commission.

We will, of course, cooperate fully with the staff in completing early review of and action on the proposed design changes submitted herewith.

Sincerely yours,

J. F. Quirk FOR

Joseph F. Quirk

cc: (w/o attachments)

WT Russell	(NRC)
FJ Miraglia	(NRC)
TH Boyce	(NRC)
SM Franks	(DOE)



ABWR Design Change Assessment Review of FOAKE Design Changes

Change No.	Description	Tier 1 Impact	Screen (Notes)	Remarks
1	Change the Reactor Building and Radwaste Building HVAC Systems to use electric heating in place of hot water heating, split the single intake configuration into three to provide redundancy, and use high efficiency filters in place of medium grade bag-type filters. Use of electric heating will avoid in-service freezing. The change will provide air intake redundancy to satisfy system maintenance needs.	Yes	4	This change addresses a reliability & maintainability issue, rather than a safety concern. The change results in a minor modification to Tier 1, although there is no functional Tier 1 impact.
2	Add an additional chiller/pump set to the HVAC Emergency Cooling Water System. This provides functional redundancy to avoid the loss of cooling for the Control and Reactor Building Safety-Related Electrical Equipment Area HVAC Systems, potentially challenging electrical equipment environmental qualification temperature limits. The added redundancy will also satisfy system maintenance needs.	No	4	The change does not impact Tier 1 because Tier 1 does not specify divisional equipment quantity and logic.
3	Change the smoke removal method for three HVAC systems (for Reactor Building Safety-Related Electrical Equipment, Control Room Habitability Area, and Control Building Safety-Related Equipment Area) to comply with the accepted method prescribed by the industrial standards (ASHRAE and NFPA) referenced in Tier 2. Further, replace centrifugal fans with vaneaxial type fans as necessary for space conservation. Finally, provide service to the FMCRD Panel Rooms from Divisions A and B of the Reactor Building Safety-Related Electrical Equipment HVAC System, instead of Divisions B and C.	Yes	3	The change ensures functionality and compliance with Tier 2 commitments.
4	Reassign the Main Control Room HVAC exhaust fans ("B" as "C," and "C" as "B") according to their respective divisional space. This change will avoid a potential divisional cross-over of cooling and power.	Yes	4	The change has no safety significance and no impact on the safety functions described in Tier 1. However, it does impact designations on Tier 1 and Tier 2 figures.



ABWR Design Change Assessment Review of FOAKE Design Changes

5	This change package identifies various Tier 1 and Tier 2 inconsistencies, such as the radiation zone classification of a room shown in figure, "Reactor Building Radiation Zone Maps, Elevation 12300 mm."	Yes	3	Tier 1 and Tier 2 figures and text are modified.
6	Provide power for each pair of motor operated isolation dampers in series (total four pairs in a division) for the Control Room Habitability Area HVAC System from two independent Class 1E divisions, instead of powering both dampers from a single division. Also, reflecting the Tier 2 arrangement, a cross-tie is added between the two inlet ducts of the Emergency Filtration Unit on the Tier 1 figure. All of this assures necessary alignment of dampers and prevention of infiltration of unfiltered air in case of emergency and loss of one division of power.	Yes	1	The change is necessary to ensure compliance with single failure criteria.
7	Delete the rupture disks originally intended to protect the low pressure exhaust side of the RCIC turbine case and exhaust line from overpressurization. Existence of the rupture disks is not consistent with interfacing system LOCA (ISLOCA) requirements. Removal of the rupture disks and upgrading of the associated piping and valves corrects a SSAR inconsistency regarding ISLOCA.	No	3	The change is necessary for conformance to Tier 2 commitments on ISLOCA.
8	Upgrade the FMCRD and scram piping design pressures based on tests and evaluations of water hammer effects. The changes are consistent with the ASME Code which requires use of equipment events rather than plant events in determining the design pressure.	No	1	A change in design pressure is needed due to new design information. The change ensures compliance with ASME Code per 10CFR50.55a.
9	Use a higher strength material for the cladded shells of the lower drywell access tunnels and RPV pedestal. This change is identified based on considerations of cladability of the material and strength to withstand high thermal stresses predicted by detailed analyses performed subsequent to the SSAR review stage of the licensing process.	No	3	Based on detailed design evaluations, the materials specified in the DCD are not adequate.
10	Correction of inconsistencies in technical specifications (Chapter 16 and related Tier 2 sections).	No	2	Based on detailed design evaluation and review of technical specifications.



ABWR Design Change Assessment Review of FOAKE Design Changes

Notes:

Screening Criteria: GE will not propose to change its DCD during the period from FDA issuance to Design Certification unless:

- 1.) The change corrects an error or deficiency necessary to assure adequate protection of the public health and safety, or to bring the DCD (Tier 1 or Tier 2) into compliance with regulations in effect at the time the ABWR FDA was issued;
- 2.) The change affects a technical specification;
- 3.) The change is necessary to make the DCD design functionally operable (as intended); or
- 4.) The change is a design improvement which GE determines should be incorporated into the design at this time.

All changes which satisfy Criteria 1, 2 or 3 shall be incorporated into the DCD prior to Design Certification. Any Tier 1 or Tier 2 changes which satisfy Criterion 4 should be addressed on a case-by-case basis.