



UNITED STATES NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555
REQUEST REPLY BY 6-14-94

May 31, 1994

MEMORANDUM FOR: The Chairman
Commissioner Rogers
Commissioner Remick
Commissioner de Planque

COMSECY-94-024

FROM: James M. Taylor
Executive Director for Operations

SUBJECT: IMPLEMENTATION OF DESIGN CERTIFICATION AND LIGHT-WATER
REACTOR DESIGN ISSUES

The staff is in the process of completing the final safety evaluation reports (FSERs) for both the GE Advanced Boiling Water Reactor (ABWR) and the ABB-Combustion Engineering (ABB-CE) System 80+ designs. The staff will request Commission approval for each FSER before it is published and the associated final design approval (FDA) before it is issued. Coincident with the Commission's review of the FSERs, the staff is requesting Commission approval of its positions and safety findings addressed in each FSER. In addition, approval of the FSER will indicate Commission acceptance of the staff's implementation of specific issues (such as those discussed in SECY-93-087, "Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs"), as well as other policy issues relating to the general implementation of 10 CFR Part 52. This memorandum identifies the key issues and areas of interest that the Commission will be requested to approve as part of the FSER and FDA reviews.

For several issues such as Tier 2*, living PRA, and Reliability Assurance Program (RAP), the staff has not received formal Commission approval of its positions. Many of the staff's technical safety findings were based, in part, on the assumption that the Commission would find the staff's positions on these issues to be acceptable. Should the Commission disagree with the staff's positions or provide alternative guidance, it is likely that certain review areas and safety conclusions will need to be reassessed by both the staff and the design certification applicants.

PART 52 IMPLEMENTATION ISSUES

Level of Detail and Design Acceptance Criteria

Determining the acceptable level of design detail necessary for the staff to make its safety findings on the evolutionary designs was one of the most challenging aspects of the staff's review. The staff requirements memorandum (SRM) for SECY-90-377, "Requirements for Design Certification Under 10 CFR Part 52," set forth the Commission's guidance on the level of design information that is required for a certification application, and the staff has

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followed that guidance in its reviews. To accommodate evolving technology, these applications do not include detailed design information in the areas of instrumentation and controls and control room design. To accommodate the absence of procurement and as-built information, detailed design information was not complete in the areas of piping design and radiation protection. The staff based its safety decisions for these areas on the use of design acceptance criteria (DAC) as discussed in SECY-92-196, "Development of Design Acceptance Criteria for the Advanced Boiling Water Reactor (ABWR)," and SECY-92-299, "Development of Design Acceptance Criteria for the Advanced Boiling Water Reactor (ABWR) in the Areas of Instrumentation and Controls (I&C) and Control Room Design." The staff requests that the Commission approve the staff's implementation of the level of design detail including DAC as part of its review of the FSERs.

Two-Tiered Certification Rule

The Commission also approved the concept of the use of a two-tiered design certification rule structure in its SRM on SECY-90-377. The staff (and design certification applicant) determined what information should reside in each tier, as part of its review of the evolutionary designs. During the implementation of the two-tiered structure and DAC, the staff determined that certain Tier 2 information (referred to as "Tier 2*") would need the approval of the Office of Nuclear Reactor Regulation before it could be changed by a combined license (COL) applicant or licensee. This information is identified in Chapter 1 of the evolutionary FSERs and was initially brought to the Commission's attention in SECY-92-287, "Form and Content for a Design Certification Rule."

The staff requests that the Commission approve the staff's implementation of the two-tiered structure and the identification of Tier 2* information as part of its review of the FSERs. If the Commission finds the staff's use of Tier 2* unacceptable, it will require a reevaluation of the current content of Tier 1 information. In general, the staff believes that Tier 2* information is more appropriate for inclusion in Tier 1 than Tier 2 if the Tier 2* category is eliminated.

Final Design Approval (FDA)

The staff is currently developing the form and content of an FDA for design certification. The FDA for certification is intended to signal the completion of the staff's review of the application and readiness for the rulemaking phase of design certification. The staff will submit the FDA for each design to the Commission for its review before issuance.

Living Probabilistic Risk Assessment (PRA)

The staff is preparing a Commission paper in which it will request Commission approval of a staff position that COL applicants and licensees be required to maintain and update a PRA throughout the life of the facility. This Commission paper will be completed in the near future. The staff's current position

on the appropriate amount of PRA information to be included in the design control document (DCD) is based on the assumption that COL applicants and licensees will be required to maintain and update the PRA throughout the life of the facility. Should COL applicants and licensees not be required to update and maintain the PRA, the staff believes significantly more PRA information should be included in the DCD. Commission approval of this approach is an important key to the issuance of the FSER and FDA for both evolutionary designs.

Applicable Regulations and Exemptions

In the SRM for SECY-91-262, "Resolution of Selected Technical and Severe Accident Issues for Evolutionary Light Water Reactor Designs," the Commission approved the staff's recommendation to proceed with design-specific rule-makings through individual design certifications to resolve selected technical and severe-accident issues for the ABWR and System 80+ standard designs. These issues included staff positions that deviate from or are not embodied in current regulations that are applicable to the evolutionary designs. These policy issues were discussed in various Commission papers. The staff is preparing general design criteria-type language that will provide the new requirements, which are specific to each evolutionary design, in the design certification rule. The staff refers to these requirements as "applicable regulations." Chapter 1 of each evolutionary plant FSER contains a listing of the applicable regulation issues as well as a listing of proposed exemptions.

The standards identified in 10 CFR 52.48, including the applicable regulations and exemptions, form the regulatory framework for certification of the evolutionary designs in accordance with 10 CFR 52.54. As such, Commission approval of the FSERs will necessarily include consideration of the applicable regulations and exemptions. Final Commission action on applicable regulations will take place in connection with promulgation of the design certification rules.

Regulatory Treatment of Non-Safety Systems (RTNSS)

The staff issued SECY-94-084 "Policy and Technical Issues Associated With the Regulatory Treatment of Non-Safety Systems in Passive Designs," on March 28, 1994. In this Commission paper, the staff gives its positions on eight issues relating to passive LWR designs. The staff position on the reliability assurance program (RAP) is also applicable to the evolutionary designs. Receipt of Commission guidance on the issues discussed in SECY-94-084 will enable the staff to proceed with the passive design reviews and will provide the vendors with final agency positions.

The staff evaluated the evolutionary vendors' implementation of the staff's RAP position in its FSERs. Enclosure 1 provides OGC views on an alternative for implementing the design RAP. The staff requests that the Commission approve the implementation of the RAP issue as part of its review of the

FSERs. Should the Commission disagree with the staff's resolution or provide alternative guidance, it is likely that this review area will need to be reassessed by both the staff and design certification applicants.

GE ABWR ISSUES

The staff provided information specific to the ABWR in a memorandum to the Commission dated March 4, 1994. The staff does not believe that these issues are policy matters requiring a specific Commission action. However, it requested that the Commission give guidance on any issue discussed in the SER where the Commission disagrees with the staff position.

The first issue is the design power level of the ABWR, which is described in Section 1.2.7 of the SER. The ABWR power level exceeds the guidance in Regulatory Guide (RG) 1.49, "Power Levels of Nuclear Power Plants," which states that licensed power levels should be limited to a reactor core power level of 3800 MWt or less until January 1, 1979, at the earliest. The intent of this regulatory guidance was to stabilize the maximum size of nuclear plants until sufficient experience was gained with the design, construction, and operation of large plants. Since the issuance of RG 1.49, Revision 1, in 1973, the staff has reviewed sufficient operating experience and has determined that licensing the ABWR at a rated power of 3926 MWt is acceptable. In addition, the Commission licensed the Grand Gulf Nuclear Station (NPF-29) for 3833 MWt on November 1, 1984.

The next issue is the design of the emergency core cooling system (ECCS) suction strainers located in the suppression pool. For this issue, the staff has proposed a resolution that is different from that used for operating plants. In Section 6.2.1.9 of the advance copy of the ABWR SER, the staff proposed that GE size the strainers in accordance with RG 1.82, Revision 1, but that it provide a factor of 3 sizing margin (surface area) to account for the uncertainty in the synergetic effects of strainer clogging from insulation, corrosion products, and other debris. This is needed to preclude the excessive accumulation of debris on the strainer heads and the resulting loss of net positive suction head and failure of the ECCS pumps. The staff discussed its resolution of this issue in a memorandum to the Commission dated May 13, 1994.

In the advance copy of the ABWR SER, the staff identified 14 open items that required final resolution with GE. The resolution of those open items has been completed, and revised sections of the FSER have been prepared by the staff. The revised SER sections were forwarded to the Commission in a memorandum dated May 13, 1994.

ABB-CE SYSTEM 80+ ISSUES

The staff forwarded the advance FSER to the Commission on March 3, 1994. There are a number of unique or first-time review issues that were addressed as part of the System 80+ design review. The staff believes that these areas

are of interest to the Commission and has briefly listed them in the following paragraphs. Commission approval of the ABB-CE System 80+ FSER will indicate Commission approval of the staff positions on these issues.

The power level to be certified for System 80+ is 3914 Mwt. This is 114 Mwt more than the 3800 Mwt addressed in Regulatory Guide 1.49, Revision 1, 1973. The rationale for the staff's acceptance of this power level for System 80+ is the same as that discussed above for the ABWR.

The new accident source term of NUREG-1465 is being used for both design-basis accident and severe-accident analyses.

NUPLEX 80+ advanced control complex features a new digital approach for both control and display of indications and alarms. This approach features multiplexers with fiber optic connected networks and microprocessor-based digital equipment to perform the safety-related and non-safety-related instrumentation and control functions. Protection against common mode failure includes additional hard-wired controls and analog indication for one set of equipment needed for safe shutdown.

The use of leak-before-break methodology has been extended to lines inside the containment beyond the reactor coolant system, including the main steam lines.

Severe-accident design features such as a reactor cavity flooding system, manual depressurization system, and hydrogen igniters, are recommended for approval (see SER Chapter 19).

An in-containment refueling water storage tank is provided for the first time for a pressurized water reactor. This design removes the need for switching the suction for the safety injection and containment spray systems. In addition, the safety valves, reactor head vent, and safety depressurization system all discharge underwater in the tank.

SUMMARY

The staff has developed positions on a wide range of technical and policy issues relating to the implementation of 10 CFR Part 52. The staff is requesting Commission approval for the generic use of the following for future application on advanced reactor design reviews: the staff's implementation of the (1) level of design detail, including DAC; (2) two-tiered design certification rule structure; (3) Tier 2* information category; and (4) RAP. These staff positions are documented in the appropriate evolutionary plant FSERs. Commission approval of these FSERs and the associated FDAs will be viewed as

The Commissioners

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Commission approval of the staff positions for these two designs. Any alternative Commission guidance on these issues is requested, as soon as possible. In addition, advance indication of any other disagreements with any other staff positions in the evolutionary FSERs or any of the issues associated with the proposed rule will enable the staff to address these concerns and minimize schedule impacts.

SECY, please track.


James M. Taylor
Executive Director
for Operations

Enclosure:
As stated

cc: SECY
OGC
OCA
OPA



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

MAY 20 1994

MEMORANDUM FOR: The Chairman
Commissioner Rogers
Commissioner Remick
Commissioner de Planque

FROM: William C. Parler
General Counsel

SUBJECT: DESIGN RELIABILITY ASSURANCE PROGRAM (D-RAP)

In a Staff memorandum, "Implementation of Design Certification and Light-Water Reactor Design Issues," the Staff requests that the Commission approve the Staff proposal in SECY 94-084, "Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems" (March 28, 1994), that a design certification rule contain an "applicable regulation" requiring the combined license applicant to develop "ITAAC" for verifying establishment of an acceptable design reliability assurance program (D-RAP), among other subjects. Successful completion of D-RAP "ITAAC" would be required prior to operation under Section 52.103(g).

The Staff's position is based on the goal of developing ITAAC that are as specific and objective as possible, so that there is reasonable assurance that the ITAAC can be implemented correctly by the combined license licensee. Since the combined license applicant will be responsible for developing the detailed D-RAP implementing procedures, the Staff believes that the combined license applicant should also be responsible for developing the ITAAC that verifies acceptable D-RAP implementation, in order to ensure that the ITAAC reflect each utility's specific procedures for implementing D-RAP. Since all of the ITAAC that are necessary and sufficient to verify successful construction of the plant, including the ITAAC for D-RAP, will be specified when the combined license is issued, the Staff believes that its proposal is consistent with Section 52.97(b), which requires that the combined license include necessary and sufficient ITAAC.

OGC believes that the Staff proposal is inconsistent with the regulatory structure established by the Commission in Part 52, but that a variation of the proposal, described below, would be consistent. Under Section 52.79(c), the only design-related ITAAC that would be developed by the combined license applicant would be for the site-specific portion of the design (including the interface portions of the plant). Where a certified design is referenced in the combined license application, Section 52.79(c) states that the "test, inspections, analyses and acceptance criteria contained in the certified design [i.e., those required by Section 52.47(vi)] must apply to those portions of the facility

design which are covered by the design certification." *Id.*, second sentence. Section 52.47(vi) envisions that all ITAAC relative to the design certification would be developed and approved as part of the design certification rulemaking, and requires these ITAAC be sufficient such that compliance with the ITAAC will ensure that the plant will be built in accordance with the design certification. Thus, under the regulatory framework established by Part 52, all matters relating to the certified design would be developed and resolved as part of the design certification rulemaking, leaving only the site-specific and applicant design matters to be addressed in the proceeding for issuance of the combined license. The Staff's proposal that D-RAP ITAAC be developed by the combined license applicant, instead of the design certification applicant, would appear to be inconsistent with this regulatory framework¹.

One way of avoiding the problem would be to include a general ITAAC in the design certification rule merely requiring the combined license applicant to develop and implement satisfactory D-RAP. As an ITAAC, adequate development and implementation of D-RAP would be a prerequisite for operation under Section 52.103(g). To eliminate the uncertainty associated with such a vaguely-worded ITAAC, the detailed requirements for D-RAP could be developed either by the combined license applicant or (in order to enhance the marketability of the design certification) by the design certification applicant, and included in Tier 2 of the certified design at a later date coincident with the COL application. This could be done by rulemaking to supplement Tier 2 of the original certified design rule, or by a specific provision in the combined license. The Staff agrees that a general ITAAC can be developed at the design certification stage. However, as discussed above the Staff believes that the combined license applicant should prepare the detailed D-RAP procedures and ITAAC verifying acceptable implementation at the combined license application stage in order to achieve the necessary specificity in the ITAAC for each utility referencing the certified design.


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¹ The Staff's proposal to develop an "applicable regulation" which would require post-certification development of D-RAP ITAAC, can be considered an amendment to the requirements of Part 52 itself. Since design certification is itself a rulemaking, there is no legal impediment to the Commission including a new "applicable regulation" in a design certification rulemaking which modifies Part 52. However, it raises some policy matters with respect to the stability and predictability of the Part 52 process if the Commission routinely departs from the Part 52 strictures in individual design certification rulemakings.