



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

ACRSR-1414

December 12, 1990

The Honorable Kenneth M. Carr
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Chairman Carr:

SUBJECT: WESTINGHOUSE'S APPLICATION FOR PRELIMINARY DESIGN
APPROVAL FOR THE RESAR SP/90 DESIGN

During the 367th meeting of the Advisory Committee on Reactor Safeguards, November 8-10, 1990, we completed our review of Westinghouse's application for Preliminary Design Approval (PDA) for the Westinghouse Reference Safety Analysis Report (RESAR SP/90) nuclear power block (NPB). We heard presentations from the NRC staff and the applicant concerning the staff's draft Safety Evaluation Report (SER) (NUREG-1413) for this PDA during our meeting. Representatives of the staff and of the Office of the General Counsel (OGC) discussed the related draft PDA document. Our Subcommittee on the Advanced Pressurized Water Reactors has held a series of meetings with the staff and representatives of the applicant regarding this matter over the past two and a half years. We also had the benefit of the documents referenced.

1.0 Scope and History of RESAR SP/90 Application

The RESAR SP/90 is an evolutionary (as contrasted with passive) Advanced Light-Water Reactor (ALWR) design for a single-unit NPB, rated at a reactor power of 3800 MWt. Although many basic design decisions were made by Westinghouse prior to completion of the EPRI ALWR Utility Requirements Document, the design of this four-loop pressurized water reactor generally conforms to the EPRI requirements for such designs.

RESAR SP/90 NPB contains preliminary design information for the portion of the design that encompasses NPB buildings, structures, systems, and components. Specifically excluded from the scope are the turbine building, the waste disposal building, the service building, the administration building, the service water/cooling water structure, and the ultimate heat sink. These features will be the design responsibility of an applicant proposing to build a facility referencing the RESAR SP/90 design. Interface information addressing the pertinent safety-related design requirements necessary to ensure the compatibility of the referenced system with

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the plant-specific portion of the facility has been included in the RESAR SP/90 application.

On October 24, 1983, Westinghouse submitted an application for a PDA for RESAR SP/90 NPB design in accordance with 10 CFR Part 50, Appendix O, "Standardization of Design: Staff Review of Standard Designs," which was the then existing regulatory basis for this type of application. The application was docketed on November 30, 1983 (Docket No. 50-601). The RESAR SP/90 application describing the design of the NPB was submitted in modular form during the period from October 23, 1983 to March 9, 1987. In addition, the information in RESAR SP/90 has been supplemented by 47 amendments to these modules.

2.0 Regulatory Background

Before the promulgation of 10 CFR Part 52 in May of 1989, the review of RESAR SP/90 had been performed by the staff pursuant to Appendix O to 10 CFR Part 50, using a procedure similar to that used for custom plant reviews for which guidance to staff reviewers is provided in the Standard Review Plan. This evaluation was analogous to a construction permit (CP) licensing review for a specific facility and conducted with the intent that, following satisfactory completion of the reviews performed by the staff and the ACRS, a PDA could be issued by the staff. The promulgation of 10 CFR Part 52 resulted in the transfer of Appendix O to 10 CFR Part 52; hence a PDA can now be issued for this application pursuant to 10 CFR Part 52. A PDA is optional for a Final Design Approval (FDA) and/or Design Certification under the provisions of 10 CFR Part 52.

3.0 The Staff's SER and the PDA

The SER and PDA represent the first stage of the staff's review of the design, construction, and operation of the RESAR SP/90 design. During our meetings, we learned that there is no prospective CP applicant nor does Westinghouse intend to apply for an FDA and/or Design Certification of the RESAR SP/90 design until there is a proven interest on the part of a domestic or foreign utility. The staff's SER summarizes the results of the staff's radiological safety review of the RESAR SP/90 NPB design and delineates the scope of the technical details considered in evaluating the proposed design. This review took place over the period of October 1983 to October 1989 (the date on which the staff decided to close its review). Environmental aspects were not considered in the staff review of RESAR SP/90, but would be addressed in a utility's plant-specific application.

3.1 Comments on the Staff's SER

There are 170 open items that will require resolution during the review of a plant-specific application for an Operating License (OL). Most of these appear to be the kind of open issues expected at this stage of the design. Of the 170 open items, 17 are site specific, 110 involve information in the scope of an OL or FDA and/or Design Certification application, and 43 had not been resolved by the staff when it closed its review in October 1989. (Westinghouse submittals on many of these 43 open items, including its proposed resolution of Generic Safety Issues, Unresolved Safety Issues, post-TMI regulatory requirements, and outstanding PRA issues are yet to be reviewed by the staff.) In view of these open items and our concerns regarding the SER and the many unresolved severe accident issues, we indicated to the staff that its conclusions on page 25-1 of the draft SER were stated too strongly. The staff agreed to revise this language.

The Committee is not of one mind regarding the issuance of a PDA for the RESAR SP/90. On the one hand, there is merit to the argument that Westinghouse's application for the RESAR SP/90 PDA was made in good faith in 1983 under a different set of regulations and that it is now appropriate to document the reviews that have taken place to date and issue the PDA for potential future use as a reference design for an individual plant CP application or as the starting point for an FDA and/or Design Certification application. Both Westinghouse and the staff advocate this approach; neither believes that it can devote further resources to this effort.

On the other hand, we view the RESAR SP/90 SER as a mixed bag of staff evaluations that were performed over the seven-year period since the application was filed. Some are current and well done; others are poorly done and/or were performed years ago and do not meet the standards that we believe should be applied to a current SER. A major contributor to this problem appears to be the staff's reliance on the July 1981 Standard Review Plan (SRP) (NUREG-0800) in performing this review. This SRP needs updating to reflect the current situation for the licensing of ALWRs.

Some examples of our concerns with the staff's SER are:

- 3.1.1 SER Chapter 7, Instrumentation and Controls, references a staff review that was performed in 1979 for the Westinghouse RESAR 414 design. The staff concluded that the computer based integrated reactor protection system design for RESAR SP/90 is acceptable for a PDA on the basis of the "similarity" of the RESAR 414 design to that proposed for RESAR SP/90. It is our view that the staff should have developed improved standards for the review of such systems during this 11-year period. We are

particularly concerned about the verification and validation of the software employed with computer based reactor protection systems. It appears that there is a need to augment existing staff resources with expertise in the computer science area so that appropriate standards can be developed for the review of computer based reactor protection systems. All of the proposed evolutionary and passive ALWRs employ such systems.

3.1.2 For materials used in the fabrication of pressure boundary components, Westinghouse has committed to follow applicable codes, standards, and regulatory guides. Many of these are not representative of current industry practice for such materials. We learned that Westinghouse has developed internal specifications for pressure boundary materials that presumably do reflect current industry practice. These were not submitted for the staff's review.

3.1.3 The proposed design employs water displacer control rods and associated control rod drive mechanisms, which is a new feature for Westinghouse plants. The SER describes the function of and strategy for use of these control rods. The SER, however, does not discuss the pressure boundary integrity of these new control rod drive mechanisms or the potential for reactivity insertion accidents that could result from misoperation of these control rods. Although Westinghouse submitted information on these subjects, the staff has not completed its review of this information. In general, we believe that new features of this kind should be thoroughly reviewed at an early stage of review.

3.1.4 Our review, which represents only a sampling effort, revealed a number of factual errors and inconsistencies in the SER; the staff has agreed to correct these errors. We believe that a review of the draft SER by Westinghouse, which has not yet had access to this predecisional document, would reveal additional errors that should be corrected. We recommend that this be done.

3.2 Comments on the PDA Document

The PDA states that the preliminary design information contained in RESAR SP/90 "complies with the requirements of 10 CFR Part 52, Appendix O . . . and is acceptable for incorporation by reference in applications for individual construction permits . . ." The PDA does not describe how this preliminary design information would be used in a future FDA and/or Design Certification application.

We were told by OGC that this results from the fact that Westinghouse has not made an application under 10 CFR Part 52.

Given the quality of the SER for this PDA, we are concerned with the language of the PDA that requires the staff and ACRS to utilize and rely on the "approved preliminary design" in their reviews of any individual facility construction permit application " . . . unless significant information which substantially affects the determination set forth in this PDA, or other good cause, is present." OGC advised us that this requirement would apply only to the staff and ACRS reviews of a CP application and that both entities would be able to revisit any issue in their review of any type of application that would lead to an OL. This is satisfactory to us but could present problems for the staff in dealing with a contested CP application.

4.0 Comments on the SP/90 Design

We have two concerns regarding SP/90 design features:

- 4.1 Our review of the NPB layout indicates that Westinghouse has provided many desirable features from the standpoint of separation of equipment trains for protection against fires and industrial sabotage. However, we are concerned about the location of the emergency diesel generators (EDGs) on the same floor and corridor from the control room. We believe that another location for the EDG room should be specified in view of the potential for fire and/or explosions associated with the operation of large diesel generators.
- 4.2 The proposed RESAR SP/90 design employs a spherical containment. To deal with core/concrete interaction, the layout of the containment employs a cavity floor area beneath the reactor vessel that is based on the EPRI requirement of 0.02 m² per MWt. If a larger area is required, major changes to the containment sizing and layout may be needed. Timely development of a Commission position on this issue is important not only to this design but also to the design of all of the ALWRs.

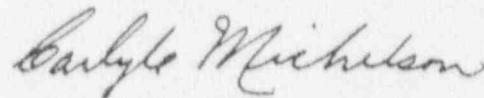
5.0 ACRS Recommendations on the Issuance of a PDA

We believe, subject to the above comments, that the proposed design of the RESAR SP/90 NPB can be successfully completed and used in an application for an individual plant CP. Accordingly, we recommend that a PDA be issued for the proposed Westinghouse RESAR SP/90 NPB.

6.0 Concluding Remarks

Finally, we wish to commend the Westinghouse Electric Corporation, the Japanese APWR program participants, the EPRI ALWR Utility Steering Committee, and the EPRI staff for the effort they have expended in the development of this evolutionary design. The RESAR SP/90 design represents an important step forward in providing improved LWR designs that incorporate many of the lessons related to safety, performance, and reliability that have been learned by the nuclear power industry over the past 30 years.

Sincerely,



Carlyle Michelson
Chairman

References:

1. U.S. Nuclear Regulatory Commission, Draft NUREG-1413, "Safety Evaluation Report Related to the Preliminary Design of the Standard Nuclear Steam Supply Reference System, RESAR SP/90" (Predecisional)
2. Draft Westinghouse Electric Corporation, Docket No. 50-601, Reference Safety Analysis Report (RESAR SP/90 Nuclear Power Block Standard Design), Preliminary Design Approval (PDA) (Predecisional) (Discussed during the November 8-10, 1990 ACRS full Committee meeting)
3. Letter NS-EPR-2675 dated November 1, 1982 from E. P. Rahe, Jr., Westinghouse Electric Corporation, to F. Miraglia, U.S. Nuclear Regulatory Commission, Subject: Westinghouse Advanced Pressurized Water Reactor Licensing Control Document