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Project 711

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U. S Nuclear Regulatory Commission
OWFN – Mail Stop O 12 G15
Washington, D. C. 20555

Attention: Mr. Jerry N. Wilson

SUBJECT: Westinghouse Response to ACRS Letter on AP1000 Pre-Application Review

Dear Mr. Wilson,

This letter provides the Westinghouse response to the September 14, 2000 letter from the ACRS to the NRC regarding the pre-application review of the AP1000 Plant Design, Phase 1. Westinghouse appreciates the communication of recommendations and areas of concern as it contributes to our efforts to provide deliverables, which are responsive to the review needs of the staff and the ACRS. Westinghouse thanks the ACRS for their recommendations and for the discussion of their concerns. Some of the recommendations affect the Phase 2 pre-application review process, and some would affect Phase 3 - the review of the application for Design Certification for the AP1000. This letter provides our thoughts on when the issues will be addressed and provides some comments or clarifications on the concerns.

ACRS Recommendations:

1. PRA should address uncertainty on CDF, CCFP and LERF.

   Response: Westinghouse intends to defer the review of the PRA until Phase 3. A few comments may be appropriate on the concerns expressed by the ACRS. The use of PRA was an important design and licensing tool for the AP600. Design features were selected to improve the reliability of plant safety, and as a result, the AP600 calculated core damage frequencies (CDF) and large early release frequencies are extremely low. Analyses were performed to address uncertainties including:

   - Uncertainty analyses were performed in the PRA system level failure probabilities to quantify the CDF at a high confidence interval.

   - The Thermal-Hydraulic Uncertainty Evaluation identified low thermal-hydraulic margin success sequences in the level 1 PRA, quantified the sensitivity that these sequences would have on the CDF and LERF, and showed adequate margin in the success criteria definitions by demonstrating successful core cooling with conservative thermal-hydraulic assumptions.

   - In the level 2 PRA, phenomenological uncertainty was addressed by conservatively assuming containment failure for severe accident events where containment failure could be postulated.

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It is Westinghouse's intention to demonstrate that the AP1000 retains margin to failure for the PRA success criteria. Revalidation of the conclusions of these uncertainty analyses will be performed as part of the AP1000 PRA. With respect to the Conditional Containment Failure Probability (CCFP) goal that is discussed at-length in the ACRS letter, it is important to keep the CCFP goal in proper perspective for passive plants. As discussed in SECY-93-087, the CCFP approach was originally intended for Evolutionary ALWRs, and the limitations of the CCFP approach were recognized for plant designs where the CDF is significantly reduced such as passive ALWRs. For the AP600 and AP1000, the CCFP is not a good measure of containment margin or containment performance. For the AP600, the staff considered both deterministic and probabilistic Containment Performance Goals (CPG) in assessing the performance of the AP600 containment. As discussed in NUREG-1512, the AP600 meets both the deterministic and probabilistic CPG with a high degree of certainty. The use of sensitivity studies and uncertainty analyses demonstrated the large margin of safety provided by the performance of the AP600 containment. Westinghouse does not agree that the design changes along with the increased plant size and power rating of the magnitude proposed for AP1000 necessarily result in an increase in the LERF and the CCFP. For the AP1000, the margins for mitigating some severe accident phenomena may be different than AP600, but it is our intention to show that the AP1000 meets the requirements of SECY-93-087 with certainty.

2. Seismic analysis should not be entirely deferred to the COL applicant.

Response: Westinghouse is planning to provide preliminary results of seismic analysis for hard rock sites for AP1000 in Phase 2. This information will be provided in Phase 2, not for technical review, but to facilitate establishing the staff positions on structural and piping design acceptance criteria. In Phase 3, the final seismic analysis for a rock site will be provided for NRC review. It is intended that the seismic analyses for a soil site be performed in accordance with design acceptance criteria established during Design Certification. For soil sites, the seismic analysis would be reviewed as part of the application for a combined operating license.

3. Provide uncertainty assessments on design basis accidents.

Response: Westinghouse interprets the concern in the discussion as follows: To the extent that the scaling of phenomenon important to safety from the tests to the AP1000 does not achieve the standard of the AP600 scaling, there is a potential for an increase in the uncertainty of the margin assessment predicted by the code. In these instances it may be possible to assess margins by some diverse method or to parametrically vary those AP1000 scaled phenomenon to determine the sensitivity to changes from the code-predicted performance.

It is expected that this area of concern will be addressed in Phase 2, as it appears related to the acceptability of the codes and the need for testing. Further dialogue with the staff and the ACRS on the assessment of uncertainty on the design basis accident code predictions would be useful. It is not clear what methods and what phenomenon should be assessed for uncertainty. However, it is clear that an acceptable approach should be discussed and agreed among Westinghouse, ACRS and the staff prior to proceeding to assess uncertainties. It would appear that the assessment should concentrate on important phenomenon, which have scaling concerns.

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4. Staff should exercise Westinghouse codes.

Response: The staff's use of Westinghouse safety analysis codes is also a topic that needs further discussion. Westinghouse believes use of W codes by the staff should be done only where it can be demonstrated that it would be an efficient utilization of our collective resources. Alternatives include Westinghouse running additional or alternate analysis cases, as defined by the staff, to test sensitivities. On the AP600 Design Certification, the staff performed independent analyses using alternative codes, such as RELAP and CONTAIN, which enabled independent evaluation of plant performance. Use of these independent codes with the AP1000 model may be the most efficient method to provide independent evaluation and validation of the plant performance, since the staff is already familiar with the codes, capabilities, limitations and peculiarities. There is some additional independence of the results when diverse codes are used. Westinghouse is flexible in attaining an efficient resolution of this recommendation and supporting input and assumption development for whatever analyses are performed by the staff.

Westinghouse appreciates efforts by the staff and the ACRS to outline issues that are important in achieving the Phase 2 objectives. This has helped us develop deliverables for review, which are responsive to the concerns expressed.

Very truly yours,

M. M. Corletti
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