



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

March 18, 1994

Docket No. 52-003

Mr. Nicholas J. Liparulo
Nuclear Safety and Regulatory Activities
Westinghouse Electric Corporation
P.O. Box 355
Pittsburgh, Pennsylvania 15230

Dear Mr. Liparulo:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION ON THE AP600

The staff has reviewed Westinghouse's methodology that is described in your response to Q720.158(R1) for performing a risk-based seismic margins analysis, and has determined that we need additional information in order to complete its review. Enclosed are the staff's questions (Q720.262-Q720.281).^{*} We request that your responses to these questions are incorporated into your seismic margins analysis. In addition, the staff believes that it is appropriate that the seismic margins analysis, and the seismic margins methodology described in response to Q720.158, be included in the Probabilistic Risk Assessment (PRA) for the AP600.

The staff has reviewed other PRA-based seismic margins analyses and found them to be acceptable, including the one developed in support of GE Nuclear, Inc.'s Advanced Boiling Water Reactor (discussed in Chapters 19.4.3 and 19I of the Standard Safety Analysis Report). We recommend that your staff review this document for additional insights into developing this analysis for the AP600.

You have requested that portions of the information submitted in the June 1992, application for design certification be exempt from mandatory public disclosure. While the staff has not completed its review of your request in accordance with the requirements of 10 CFR 2.790, that portion of the submitted information is being withheld from public disclosure pending the staff's final determination. The staff concludes that this request for additional information does not contain those portions of the information for which exemption is sought. However, the staff will withhold this letter from public disclosure for 30 calendar days from the date of this letter to allow Westinghouse the opportunity to verify the staff's conclusions. If, after that time, you do not request that all or portions of the information in the enclosures be withheld from public disclosure in accordance with 10 CFR 2.790, this letter will be placed in the NRC's Public Document Room.

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^{*}The numbers in parentheses designate the tracking numbers assigned to the questions.

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Mr. Nicholas J. Liparulo

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This request for additional information affects nine or fewer respondents, and therefore, is not subject to review by the Office of Management and Budget under P.L. 96-511.

If you have any questions regarding this matter, you can contact me at (301) 504-1120.

Sincerely,

(Original signed by)

Thomas J. Kenyon, Project Manager
Standardization Project Directorate
Associate Director for Advanced Reactors
and License Renewal
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc w/enclosure:
See next page

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Mr. Nicholas J. Liparulo
Westinghouse Electric Corporation

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AP600

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REQUEST FOR ADDITIONAL INFORMATION
ON THE SEISMIC MARGINS ANALYSIS FOR THE AP600

- 720.262 Provide a detailed explanation of the spectrum shape used in the AP600 seismic margins analysis. If the risk-based seismic analysis in the AP600 PRA does not bound the site-specific parameters of the actual site chosen, an applicant for a combined construction/operating license will have to provide a new, site-specific risk-based seismic analysis.
- 720.263 Provide a list of structure, system, and component fragilities and HCLPFs. The list should include the median capacity, B_C , and HCLPF, as discussed below:
- a. Provide the mathematical definition of HCLPF.
 - b. Provide fragility/HCLPF information for plant essential structures (e.g., containment and auxiliary buildings) that house safety-related systems and functions credited in the seismic analysis (e.g., passive RHR and DC power), including passive and active systems.
 - c. Provide the fragilities/HCLPFs for all systems (passive and active) evaluated in the AP600 PRA seismic analysis, including RCS primary equipment and supports.
 - d. Provide the component fragilities/HCLPFs for the individual components modelled in the AP600 seismic analysis.
 - e. For each of the above, (1) indicate if the fragility estimate is based on a design-specific Westinghouse analysis, or if Westinghouse used a generic fragility, and (2) where generic fragilities were used, provide a basis for their use in the AP600 design with special attention provided to unique design components in the AP600 design (such as the core, check valves, and core makeup tanks).
- 720.264 Provide the AP600 plant HCLPF based on those sequences leading to core damage.
- 720.265 Provide a reference in the AP600 PRA to the ITAAC requirement that failure of non-seismically qualified structures, systems, and components will not physically damage or inhibit the operation of seismically qualified equipment.
- 720.266 Provide an evaluation in the AP600 risk-based margins analysis of the effect of seismic failure of non-seismic equipment that interfaces with Seismic Category I equipment (e.g., mainsteam line rupture).

Enclosure

- 720.267 Provide an ITAAC that requires that the AP600 design will not contain relays that are subject to relay chatter, or provide an analysis of seismic-induced relay chatter for these relays. As an example, the relay chatter analysis should look at the possibility of spurious opening and closing of non-safety grade valves.
- 720.278 The description of the methodology for the seismic margins analysis does not specify how to treat seismic events during shutdown. During shutdown, the safety systems may not be able to function following a seismic event (e.g., due to maintenance), depending on the status of the plant. In addition, the non-safety systems may have been disabled by the same seismic event. Provide a risk-based evaluation of the plant HCLPF during shutdown, including the use of non-safety grade equipment for prevention and mitigation of core damage, containment failure, or offsite releases.
- 720.279 Revise the seismic margins methodology to include seismically-induced ATWS events.
- 720.280 Provide diagrams of the systems modelled in the seismic margins analysis that show what is and is not seismic Category I (e.g., piping, isolation valves, etc.). These should be included in the analysis.
- 720.281 Expand the seismic margins analysis to include initiating events that are greater than 0.5g (e.g., up to 0.75g). One of the purposes of performing a risk assessment of the AP600 design is to develop a better understanding of the response of the plant to severe accidents and any potential weak links in the design. Core damage sequences with HCLPFs greater than 0.5g will not contain any vulnerabilities, but these sequences may provide important information about the balance of prevention and mitigation in the design and may provide vital information about SSCs that should be included in the RAP or ITAAC. An extreme example of a potential sequence of interest is represented by the following:

(Initiator: 0.55g HCLPF) * (Injection: 0.2g HCLPF) *
(Depressurization: 0.35g HCLPF)

Although failure of injection or depressurization would occur at a low HCLPF value, the initiator's HCLPF is so high that the sequence would not constitute a vulnerability. In this case, the designer and the NRC must ensure that the initiator HCLPF was 0.5g or higher when an AP600 plant is completed, and must ensure that this information is maintained for use by a future COL applicant so that they would not modify the plant design in a manner that lowers the HCLPF of this initiator in the as-built plant.