



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

December 22, 1995

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

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION (RAI) RELATED TO THE AP600
PROBABILISTIC RISK ASSESSMENT (PRA)

Dear Mr. Liparulo:

The Probabilistic Safety Assessment Branch (SPSB) is reviewing the revised Westinghouse AP600 shutdown PRA and Westinghouse's responses to draft safety evaluation report open items pertaining to shutdown risk. Based on this review, SPSB requests that Westinghouse provide a response to these RAIs within thirty days of receipt of this letter.

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 these questions and comments do 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 20 CFR 2.790, this letter will be placed in the NRC Public Document Room.

These followon questions affect nine or fewer respondents, and therefore is not subjected to review by the Office of Management and Budget under P.L. 96-511.

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Mr. Nicholas J. Liparulo

- 2 -

If you have any questions regarding this matter, you may contact me at (301) 415-8548.

Sincerely,

A handwritten signature in cursive script that reads "Diane T. Jackson". The signature is written in dark ink and is positioned above the typed name and title.

Diane T. Jackson, Project Manager
Standardization Project Directorate
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Docket No. 52-003

Enclosure: As stated

cc w/enclosure:
See next page

Mr. Nicholas J. Liparulo
Westinghouse Electric Corporation

Docket No. 52-003
AP600

cc: Mr. B. A. McIntyre
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Mr. S. M. Modro
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Enclosure to be distributed to the following addressees after the result of the proprietary evaluation is received from Westinghouse:

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Mr. Charles Thompson, Nuclear Engineer
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Washington, DC 20585

Mr. Nicholas J. Liparulo

- 2 -

If you have any questions regarding this matter, you may contact me at (301) 415-8548.

Sincerely,

Original signed by

Diane T. Jackson, Project Manager
Standardization Project Directorate
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Docket No. 52-003

Enclosure: As stated

cc w/enclosure:
See next page

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OFFICE	PM:PDST:DRPM	SC:PDST:DRPM	
NAME	DJackson:sg <i>DS</i>	RArchitzel <i>RA</i>	
DATE	12/21/95	12/20/95	

REQUESTS FOR ADDITIONAL INFORMATION

720.303

The following questions pertain to shutdown operation with the RCS open.

- a. According to the SSAR Chapter 6, Stages 1, 2, and 3 of ADS are manually opened PRIOR to initiating RCS draindown operations to midloop conditions. However, no information is provided in the shutdown PRA as to when ADS is opened prior to drain down operations. Please document in the shutdown PRA how this SSAR assumption will be met (i.e Tech. Specs., admin. controls, etc.)?
- b. During RCS draindown operation with Stages 1, 2, and 3 open, if Normal RHR cooling is lost, the operator has to manually initiate gravity injection from the IRWST. If the operator actuates gravity injection AFTER the RCS begins to boil, could surge line flooding occur and cause gravity injection to stop? The staff requests Westinghouse to provide analyses verifying that surge line flooding is not a problem, assuming any RCS level.

720.304

In the sensitivity study for test and maintenance outages during drained conditions, only electrical components from the AC and DC power system were included. The staff requests Westinghouse to evaluate through sensitivity studies the impact of unscheduled maintenance of components from the PMS system, Normal RHR, and Normal RHR's support systems.

720.305

In the shutdown PRA, many of the potential boron dilution initiating events are discussed and dropped as being not significant. However, since the shutdown core damage frequency is $5.5E-8$ per year, the staff cannot conclude that these initiators have frequencies less than this value. Based on previous screening calculations and the Surry shutdown PRA, the staff requests Westinghouse to quantify the following boron dilution events identified in the AP600 PRA:

- a. Chemical and Volume Control System (CVS) during hot shutdown using the DILUTE mode of operation.
- b. CVS water injection and boron dilution during plant startup.
- c. CVS water injection and boron dilution following a loss of offsite power event, with subsequent startup of the reactor coolant pumps.
- d. Steam generator tube rupture event with transfer of water to and from the primary circuit.

Enclosure

720.306

The PRA clearly states that containment integrity is maintained during modes 1 through 4. However, the status of containment during modes 5 and 6 is unclear in the PRA (Section 54.2.5). The PRA states that during midloop operation, containment "closure" is maintained. However, midloop operation is only a subset of shutdown operations in mode 5 with the RCS open. Also, the term "closure" is not defined. The staff assumes that "closure" is different from containment integrity. The staff is concerned that the results of the PRA do not include the risk impact of a potentially open containment given a core damage event during mode 5. The staff needs this information since events occurring during midloop/vessel flange operation account for over 90% of the shutdown core damage frequency. Therefore, Westinghouse is requested to provide the following information in the shutdown PRA:

- a. Westinghouse is requested to document in the PRA how the requirement for containment integrity will be maintained during Modes 1-4 (i.e. Tech. Specs., admin. controls, etc.).
- b. Westinghouse is requested to document in the shutdown PRA the status of containment during cold shutdown (mode 5) when the RCS is completely intact. This explanation should include the status of the equipment and personnel hatches, penetrations for operating systems, and temporary instrument and electrical penetrations. This explanation should also describe the operator's ability to close containment should a core damage event occur. Westinghouse is requested to document in the PRA how these assumptions will be met (i.e. Tech. Specs., admin. controls, etc.)
- c. Westinghouse is requested to document in the shutdown PRA the status of containment during cold shutdown up to when the refueling cavity is flooded with an open RCS (midloop operation/vessel flange operation is a subset of this phase of shutdown). This explanation should include the status of the equipment and personnel hatches, penetrations for operating systems, and temporary electrical and instrument penetrations. This explanation should also describe the operator's ability to close containment before steaming through an open RCS makes containment conditions intolerable to the operator. Westinghouse is requested to document in the PRA how these assumptions will be met (i.e. Tech. Specs., admin. controls, etc.)
- d. For both of the shutdown phases addressed above, Westinghouse is requested to identify in the shutdown PRA the probabilities assumed for containment isolation.
- e. For both of the shutdown phases addressed above, Westinghouse is requested to report the fraction of core damage scenarios occurring with an open containment and their combined frequencies.