52-003

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

November 9, 1995

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

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

Dear Mr. Liparulo:

To support the Probabilistic Safety Assessment Branch (SPSB) review of the revised Westinghouse AP600 shutdown PRA and Westinghouse's responses to draft safety evaluation report (DSER) open items pertaining to shutdown risk, attached are RAIs in response to DSER open items that cannot be closed given the existing level of information in the revised shutdown PRA. Additional RAIs are also enclosed. You are requested to provide a response to these questions and comments within sixty 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 enclosure be withheld from public disclosure in accordance with 10 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.

November 9, 1995

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: See next page

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Mr. Nicholas J. Liparulo
Westinghouse Electric Corporation

Docket No. 52-003
AP600

cc: Mr. B. A. McIntyre
Advanced Plant Safety & Licensing
Westinghouse Electric Corporation
Energy Systems Business Unit
P.O. Box 355
Pittsburgh, PA 15230

Mr. M. D. Beaumont
Nuclear and Advanced Technology Division
Westinghouse Electric Corporation
One Montrose Metro
11921 Rockville Pike
Suite 350
Rockville, MD 20852

Mr. John C. Butler
Advanced Plant Safety & Licensing
Westinghouse Electric Corporation
Energy Systems Business Unit
Box 355
Pittsburgh, PA 15230

Mr. S. M. Modro
Nuclear Systems Analysis Technologies
Lockheed Idaho Technologies Company
Post Office Box 1625
Idaho Falls, ID 83415

Enclosure to be distributed to the following addressees after the result of the proprietary evaluation is received from Westinghouse:

Mr. Ronald Simard, Director
Advanced Reactor Programs
Nuclear Energy Institute
1776 Eye Street, N.W.
Suite 300
Washington, DC 20006-3706

Mr. James E. Quinn, Projects Manager
LMR and SBWR Programs
GE Nuclear Energy
175 Curtner Avenue, M/C 165
San Jose, CA 95125

Barton Z. Cowan, Esq.
Eckert Seamans Cherin & Mellott
600 Grant Street 42nd Floor
Pittsburgh, PA 15219

Mr. Frank A. Ross
U.S. Department of Energy, NE-42
Office of LWR Safety and Technology
19901 Germantown Road
Germantown, MD 20874

Mr. Ed Rodwell, Manager
PWR Design Certification
Electric Power Research Institute
3412 Hillview Avenue
Palo Alto, CA 94303

Mr. Charles Thompson, Nuclear Engineer
AP600 Certification
U.S. Department of Energy
NE-451
Washington, DC 20585

STS, Inc.
Attn: Lynn Connor
Suite 610
3 Metro Center
Bethesda, MD 20814

Mr. John E. Leatherman, Manager
SBWR Design Certification
GE Nuclear Energy, M/C 781
San Jose, CA 95125

Mr. Sterling Franks
U.S. Department of Energy
NE-42
Washington, DC 20585

REQUEST FOR ADDITIONAL INFORMATION

1. Open item 19.1.3.3-1 requested Westinghouse to justify the low human error rate for inadvertent draining of reactor vessel inventory though the Normal Residual Heat Removal (RHR) system. In response, Westinghouse quantified the likelihood of the operator overdraining the reactor coolant system during drain down operations to reach midloop conditions. Westinghouse also quantified the likelihood that a LOCA could occur by inadvertent opening of Normal RHR valve V024. The staff needs the following information to conclude that the frequency of overdraining the reactor vessel to reach midloop conditions is on the order of E-6 per year, which is much lower than current operating experience.

   a. Westinghouse should use operating experience to determine the frequency of the operator inadvertently overdraining the RCS during midloop, or justify that current operating experience is not applicable by describing any AP600 design improvements over current plants.

   b. Westinghouse needs to add more information in the shutdown PRA about the available level instrumentation during the drain down process. A description of how the pressurizer wide range level instrumentation is connected to the RCS would be helpful.

   c. Westinghouse needs to clarify in the PRA how the two hot leg instruments are connected and clarify whether they share common reference legs.

   d. Westinghouse needs to document in the PRA the basis for the beta factor of 0.05 for the hot leg instruments. This value is not listed in Chapter 29 or Section 54.7 of the PRA.

   e. For drain down scenario 2, Westinghouse needs to justify the likelihood that the air operated valves fail to close on demand. Westinghouse needs to (1) document the testing interval for these valves and (2) calculate valve unavailability using ((standby failure rate)*(testing interval)/2) or a demand failure rate (such as 1E-3 listed in Table 54-58).

2. With respect to Open Item 19.1.3.3-2, Westinghouse responded in Section 54.3.2 of the PRA that the core damage contribution from the cool down period to 350F and 400 psig is negligible compared to hot/cold shutdown and midloop/vessel flange operations. In Section 54.3.2, Westinghouse justifies this assumption based on (1) the cool down period to hot shutdown of 350F and 400 psig lasts only eight hours, and (2) all mitigating systems available when the reactor is at power are available except the accumulators. In order for the staff to conclude that this shutdown period does not need to be quantitatively evaluated, the staff is asking Westinghouse to:

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a. Modify this argument to indicate that the risk is low compared to the at-power risk. The argument that Westinghouse gave does not directly lead to the conclusion that the core damage risk is low compared to the risk from hot/cold shutdown and midloop/vessel flange operations.

b. Clarify in Section 54.3.2 of the PRA if all actuating signals that are available at full power are also available during this time period. In Table 54-2, it would be helpful if an additional column was created for full power operation to allow for a simple comparison of available signals.

c. Document in Section 54.3.2 of the PRA and Table 54-8 if any maintenance can be performed on any system during this period. Document how these maintenance assumptions will be met (i.e., Technical Specifications, administrative controls, etc.).

3. In reference to open item 19.1.3.3-4, the shutdown PRA still does not clearly identify when automatic injection is available from the IRWST and when only manual injection is available (i.e., during draindown to midloop conditions). In Section 54.2.5 of the PRA, the PRA states, "The low hot leg level signal, used to monitor and control the reactor vessel water level during the drain down of the reactor coolant system for the midloop/vessel flange shutdown phase, is available." The PRA goes on to state, "This instrumentation automatically actuates the IRWST MOVs on low level during the midloop/vessel flange shutdown phase." However, the staff identified that in event tree RCS-OD (overdraining of the RCS during draindown to mid-loop), only manual actuation of the IRWST was credited. The IRWST success criteria summary for this event tree (IW2AO and IWRNS) stated that there were no automatic injection signals. The staff also identified that following a loss of offsite power without grid recovery, automatic IRWST injection was not credited. To resolve this inconsistency, the staff is asking Westinghouse to:

a. Document in Section 54.2.5 of the PRA (Actuating Signals and Systems Available) when IRWST automatic injection is available and when only manual IRWST injection is available during midloop/vessel flange operation.

b. Document in Table 54-2 (Systems Availability and Actuating Signals Type) when IRWST automatic injection is available and when only manual IRWST injection is available during midloop/vessel flange operation.

c. Document in Table 54-2 for each available actuation signal what instrumentation is used to deliver the signal (PMS and/or DAS).

4. In reference to open item 19.1.3.3-6 regarding shutdown maintenance, the staff asked Westinghouse to document all maintenance assumptions and provide cross-reference to the SSAR. Westinghouse responded by clearly documenting testing and maintenance assumptions for specific systems in

Table 54-8. In addition, Westinghouse stated that no test and maintenance activities will be conducted during midloop/vessel flange conditions (Section 54.10.2 of the PRA). However, the staff found that Westinghouse provided no cross references to the SSAR. The staff also concluded that maintaining equipment availability (particularly the IRWST) during shutdown is necessary to achieve the low shutdown core damage frequency estimates. Therefore, the staff is requesting Westinghouse to:

a. State in Table 54-8, the maintenance assumptions individually for PMS and DAS. Justify and document in the PRA how these maintenance assumptions will be met (i.e., Technical Specifications, etc.)

b. Justify and document in the PRA how each maintenance assumption for each system in Table 54-8 will be met (i.e., Technical Specifications, etc.).

c. Justify and document in the PRA how the requirement for no test and maintenance activities during midloop/flange operation will be met (i.e., Technical Specifications, etc.).

d. Define and document the assumed "allowed" time to return to a filled condition given a Normal RHR component failure during midloop/vessel flange operation. Document how this "allowed" time will be met (i.e., Technical Specifications, etc.).

e. Clarify and document in the PRA if the "Normal RHR component failure" during midloop/flange operation includes Normal RHR support systems such as CCS and SWS.

720.286 The staff is requesting Westinghouse to document in the PRA what AP600 auxiliary and passive systems were examined to identify shutdown initiating events (Section 54.2.1, p. 54-2) and the results of this evaluation.

720.287 The staff is requesting Westinghouse to explain the screening process in more detail (Section 54.2.4, p. 54-4). Several screening criteria are mentioned. However, the staff would like Westinghouse to document in the PRA how each of the "at power" initiating events was screened out.

720.288 The staff agrees that losses of Normal RHR during refueling are expected to have a negligible addition to the total core damage frequency (Section 54.2.4 of the PRA). However, the concluding statement in that paragraph mentions all losses of water inventory rather than just boil off. Westinghouse needs to evaluate and document in the PRA the potential for LOCA and draining events applicable to the refueling mode.