



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

August 13, 1997

52-003

Mr. Nicholas J. Liparulo, Manager
Nuclear Safety and Regulatory Analysis
Nuclear and Advanced Technology Division
Westinghouse Electric Corporation
P.O. Box 355
Pittsburgh, PA 15230

SUBJECT: FOLLOWON QUESTIONS REGARDING THE AP600 INSPECTIONS, TESTS, ANALYSES,
AND ACCEPTANCE CRITERIA (ITAAC)

Dear Mr. Liparulo:

As a result of its review of the June 1992, application for design certification of the AP600, the staff has determined that it needs additional information. Specifically, the enclosure to this letter contains requests for additional information concerning Revision 3 of the AP600 Certified Design Material including the ITAAC, and Standard Safety Analysis Report Section 14.3 which supports the ITAAC.

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 the followon questions 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 10 CFR 2.790, this letter will be placed in the NRC Public Document Room.

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Mr. Nicholas J. Liparulo

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August 13, 1997

If you have any questions regarding this matter, you may contact me at (301) 415-1132.

Sincerely,

original signed by:

Joseph M. Sebrosky, Project Manager
Standardization Project Directorate
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Docket No. 52-003

Enclosure: As stated

cc w/encl: See next page

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Westinghouse Electric Corporation

Docket No. 52-003
AP600

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Request for Additional Information for the AP600 ITAAC

640.60 In AP600 SSAR Revision 14 dated June 27, 1997, Westinghouse provided Tables 14.3-2 through 14.3-8, which identified important design features that were credited in various analyses to their treatment in Tier 1. However, these tables do not contain a disposition column which makes it difficult for a reviewer to determine what ITAAC verifies the important design features. Therefore, the staff requests that Westinghouse provide a more detailed cross reference that provides a disposition column (i.e., verifying ITAAC) for the important design features. General Electric and ABB-CE provided this type of information to the staff for their ITAAC in a March 31, 1994, letter, and a June 10, 1994 letter, respectively.

The following RAIs are from the Instrumentation and Control Branch

640.61 CDM Section 2.5.1, Diverse Actuation System

- a) Additional design features as follows from SSAR Section 7.7.1.11, "Diverse Actuation System" should be included in CDM Section 2.5.1, item 3 (item 3 is the design features of DAS):
- The signal processing block and the output signal conditioning block both have barriers against electro-magnetic and radio frequency interference.
 - The DAS uses sensors that are separate from those being used by the PMS and PLS.
 - The DAS actuation devices are isolated from the PMS actuation devices to avoid adverse interactions between the two systems.
 - The DAS and PMS use independent and separate uninterruptible power supplies.
 - The manual actuation function of the diverse actuation system is implemented by wiring the controls located in the main control room directly to the final loads in a way that bypasses the control room multiplexers and the DAS logic.
 - The DAS is provided with the capability for channel calibration and testing while the plant is operating.
- b) Add an Item 5: "The DAS is designed to meet the quality guidelines established by Generic Letter 85-06, "Quality Assurance Guidelines for ATWS Equipment that is not Safety-related" in CDM.

Enclosure

640.62 CDM Section 2.5.2, "Protection and Safety Monitoring System"

- a) Figure 2.5.2-1 should be of the PMS system as the title of the figure indicates and not of the PMS cabinets.
- b) Item 1 of the Design Description should be modified as follows: "The PMS has four divisions of Reactor Trip and Engineered Safety Features Actuation. Each PMS division is powered from its respective Class 1E dc division. The PMS has the equipment identified in Table 2.5.2-1."
- c) Add the following sentence at the end of item 4: "The design of the protection and safety monitoring system equipment has additional margin to accommodate a loss of the normal HVAC."
- d) Add the following sentence at the end of item 8.a: "The PMS has redundant divisions of safety-related post-accident parameter display."

640.63 The following "Design Features" identified in the referenced SSAR sections were credited in the "Design Basis Accident Analysis" and should be treated as Tier 1 Material. Verification of these design features may be performed by the plant test program, however, the reference test report, analysis document, or simulator verification results should be listed in the ITAAC Table.

- a) Section 7.3.1.2.2, "The in-containment refueling water storage tank is aligned for injection upon actuation of the fourth stage automatic depressurization system via the protection and safety monitoring system."
- b) Section 7.3.1.2.3, "The core makeup tanks are aligned for operation on a safeguards actuation signal or on a low pressurizer level signal via the protection and safety monitoring system."
- c) Section 7.1.4.1.6, "The ability of the protection and safety monitoring system to initiate and accomplish protective functions is maintained despite degraded conditions caused by internal events such as fire and flooding."
- d) Section 7.3.1, "The ADS valves are powered from class 1E dc power."
- e) Section 7.3.1.2.4, "The fourth stage valves of the automatic depressurization system receive a signal to open upon the coincidence of a low core makeup tank water level and low reactor coolant system pressure following a preset time delay"

after the third stage depressurization valves receive a signal to open via the protection and safety monitoring system."

- f) Section 7.3.1.2.4, "The first stage valves of the automatic depressurization system open upon receipt of a signal generated from a core makeup tank injection alignment signal coincident with core makeup tank water level less than the low-1 set point in either core makeup tank via the protection and safety monitoring system."
- g) Section 7.3.1.2.4, "The second and third stage valves open on time delays following generation of the first stage actuation signal via the protection and safety monitoring system."
- h) Section 7.3.1.2.5, "The reactor coolant pumps are tripped upon generation of a safeguards actuation signal or upon generation of a low pressurizer water level signal."
- i) Section 7.3.1.2.7, "The passive residual heat removal heat exchanger control valves are opened on low steam generator water level or on a CMT actuation signal via the protection and safety monitoring system."
- j) Section 7.3.1.2.9, "The containment recirculation isolation valves are opened on a safeguards actuation coincident with low in-containment refueling water storage tank water level via the protection and safety monitoring system."
- k) Section 7.3.1.2.14, "The demineralized water system isolation valves close on a signal from the protection and safety monitoring system derived from either a reactor trip signal, a source range flex doubling signal, low input voltage to the 1E dc and uninterruptible power supply battery chargers, or a safety injection signal."
- l) Section 7.3.1.2.15, "The chemical and volume control system makeup line isolation valves automatically close on a signal from the protection and monitoring system derived from either a high-2 pressurizer level, high steam generator level signal, or a safeguards signal coincident with high-1 pressurizer level."
- m) Section 7.4.3.1, "If temporary evacuation of the main control room is required because of some abnormal main control room condition, the operators can establish and maintain safe shutdown conditions for the plant from outside the main control room through the use of controls and monitoring located at the remote shutdown workstation."

- n) Section 7.4.3.1.1, "The remote shutdown workstation equipment is similar to the operator workstations in the main control room and is designed to the same standards. One remote shutdown workstation is provided."
- o) Section 7.4.3.1.3, "The remote shutdown workstation achieves and maintains safe shutdown conditions from full power conditions and maintains safe shutdown conditions thereafter."
- p) Section 7.5.4, "The protection and safety monitoring system provides signal conditioning, communications, and display functions for Category 1 variables and for Category 2 variables that are energized from the Class 1E uninterruptible power supply system."
- q) Section 7.6.1.1, "An interlock is provided for the normally closed motor-operated normal residual heat removal system inner and outer suction isolation valves. Each valve is interlocked so that it cannot be opened unless the reactor coolant system pressure is below a preset pressure."
- r) Section 5.4.1.2.1, "Resistance temperature detectors (RTD) monitor motor cooling circuit water temperature. These detectors provide indication of anomalous bearing or motor operation. They also provide a system for automatic shutdown in the event of a prolonged loss of component cooling water."
- s) Section 5.4.1.3.4, "A safety-related pump trip occurs on high bearing water temperature."
- t) Section 5.4.5.2.3, "Power to the pressurizer heaters is blocked when the core makeup tanks are actuated."
- u) Section 6.3.3.2.1, "For a loss of main feedwater event, the passive residual heat removal heat exchanger is actuated. If the core makeup tanks are not initially actuated, they actuate later when passive residual heat exchanger cooling sufficiently reduces pressurizer level."
- v) Section 6.3.3.2.2, "For a feedwater system pipe failure event, the passive residual heat removal heat exchanger and the core makeup tanks are actuated."
- w) Section 6.3.3.3.1, "For a steam generator tube rupture event, the nonsafety-related makeup pumps are automatically actuated when reactor coolant system inventory decreases and a reactor trip occurs, followed by actuation of the startup feedwater pumps. Makeup pumps automatically function to maintain the

programmed pressurizer level, if they are not already actuated. Actuation of the core markup tanks automatically actuates the passive residual heat removal system heat exchanger."

- x) Section 10.3.2.3.2, "In the event of a large steam line break, the main steam isolation valves with associated main steam isolation bypass valves automatically close."
- y) Section 10.4.7.1.1, "Double valve main feedwater isolation is provided via the main feedwater control valve and main feedwater isolation valve. Both valves close automatically on main feedwater isolation signals."
- z) Section 10.4.7.1.2, "The booster/main feedwater pumps are tripped simultaneously with the feedwater isolation signal to close the main feedwater isolation valves." The same isolation signal closes the isolation valve in the cross connect line between the main feedwater pump discharge header and the startup feedwater pump discharge header."
- aa) Section 10.4.7.3, "For a main feedwater line break inside the containment or a main steam line break, the MFIVs and the main feedwater control valves automatically close upon receipt of a feedwater isolation signal."
- bb) Section 10.4.7.3, "For a steam generator tube rupture event, positive and redundant isolation is provided for the main feedwater (MFIV and MFCV) with isolation signals generated by the protection and safety monitoring system (PMS)."
- cc) Section 10.4.8.2.2.7, "Blowdown system isolation is actuated on low steam generator water levels. The isolation of steam generator blowdown provides for a continued use of the steam generator as a heat sink for decay heat removal in conjunction with operation of the passive residual heat removal system and the startup feedwater system."
- dd) Section 10.4.9.1.1, "Double valve startup feedwater isolation is provided by the startup feedwater control valve and the startup feedwater isolation valve. Both valves close on a startup feedwater isolation signal, an engineered safeguards features signal, within the time established in the Technical Specifications."
- ee) Section 10.4.9.1.1, "For a steam generator tube rupture event, positive and redundant isolation is provided for the startup feedwater system, with isolation signals generated by the protection and safety monitoring system."

- ff) Section 10.2.2.4.3, "The flow of the main steam entering the high-pressure turbine is controlled by four stop valves and four governing control valves. The stop valves are closed by actuation of the emergency trip system devices."