Westinghouse Owners Group

Domestic Utilities
Alabama Power
American Electric Power
Carolina Power & Light
Commonwealth Edison
Consolidated Edison
Duquesne Light
Duke Power
Georgia Power
Florida Power & Light
Houston Lighting & Power
Kansas Gas & Electric
New York Power Authority
Northeast Utilities
Northern States Power
Pacific Gas & Electric
Portland General Electric
Public Service Electric & Gas
Public Service of New Hampshire
Rochester Gas & Electric
South Carolina Electric & Gas
Southern California Edison
Tennessee Valley Authority
Texas Utilities Electric
Union Electric
Virginia Power
Wisconsin Electric Power
Wisconsin Public Service
Yankee Atomic Electric
Foreign Utilities
Belgian Utilities
ENEL
Kansai Electric Power
Korea Electric
Spanish Utilities
Swedish State Power Board
Taiwan Power

OG-87-35

August 3, 1987

Mr. James Lyons, Chief
Technical & Operations Support Branch
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Attention: Mr. Jerry L. Mauck, Acting Chief, Instrumentation & Control System Branch Division of Engineering & Systems Technology

Subject: Westinghouse Owners Group
Transmittal of Topical Report: WCAP-10858-P-A Revision 1: "AMSAC Generic Design Package"

References: 1. WOG letter OG-87-10, dated February 26, 1987
2. WCAP-8330, "Westinghouse Anticipated Transients Without Trip Analysis," August 1974.

Dear Mr. Lyons:

Enclosed are:

1. Twenty-three(23) copies of the Westinghouse Topical Report WCAP-10858-P-A Revision 1: "AMSAC Generic Design Package" (Proprietary), and

2. Twenty-three(23) copies of the Westinghouse Topical Report WCAP-10858-P-A Revision 1: "AMSAC Generic Design Package" (Non-Proprietary).

Also enclosed are:

1. One(1) copy of Proprietary Information Notice,
2. One(1) copy of Application for Withholding, CAW-87-069,
3. One(1) copy of Affidavit. AW-80-27.

Reference 1 transmitted to you Addendum 1 to WCAP-10858-P-A. That Addendum provided the basis for the AMSAC C-20 setpoint, which is applicable to all Westinghouse plants, and described justification to lower the AMSAC low

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feedwater flow setpoint for logic of WCAP-10858-P-A. The WOG letter also states that a second addendum would be provided describing the AMSAC variable time delay. This variable time delay is necessary to avoid AMSAC actuation prior to the reactor protection system (RPS) actuating during a loss of heat sink event at less than full power for logics 2 and 3.

Currently, AMSAC logics 2 and 3, AMSAC actuation on low feedwater flow or actuation on feedwater pump status, has a 25 second delay timer to allow the reactor protection system to provide the first out signal. One of the design goals of AMSAC, as discussed in the preamble to the ATWS rule, is to minimize spurious actuations. Since an AMSAC signal based on the feedwater system is anticipatory to a loss of heat sink, a 25 second delay timer was included in the design. This time delay was based on a loss of heat sink ATWS occurring at full power.

It has been pointed out if a loss of heat sink were to occur at less than full power, AMSAC would provide the first out signal. There are several event initiators where this could occur. For example,

> A complete loss of normal feedwater with the plant at 60 percent power. Generally, the first RPS signal generated would be the low-low system generator water level. This would not occur for approximately 80 seconds whereas AMSAC would have tripped the turbine at 30 seconds causing a reactor trip (if the reactor trip on turbine trip signal is armed).

Thus, as power decreases from 100%, the time delay should increase.

Since AMSAC is armed by the Turbine Impulse Chamber Pressure (TICP), it is desired to program the timer as a function of the TICP. Because a loss of load is one of the events for which AMSAC mitigation is required, the timer must recognize that a loss of the turbine impulse chamber pressure has occurred and yet maintain the timer at the value prior to the event. To do this, a lag function is required. The lag is necessary to maintain input to the timer until the AMSAC low feed flow setpoint (or pump/valve status) is reached. At that time, the value of the timer is "sealed in." The ATWS analysis (Reference 2) assumed that on a loss of load, the main feedwater decreased linearly to zero in 4 seconds.

The TICP input to the variable timer must be close to what it was at the time of the turbine trip. Also, the value of the timer must be close to the desired value during a power increase should a loss of turbine occur during the power ascension. Thus the lag must not be too large but yet not too small.

Based on calculations to determine the time a reactor trip signal would be reached during a loss of heat sink ATWS, the minimum length of the timer is shown in Figures 2-4 and 3-8 of the enclosed WCAPs. Since AMSAC is not armed until 40% of nominal load turbine, the timer is constant at the 40% load value for loads less than 40%. From 40% to 100% load, the minimum value of the timer decreases to 25 seconds at full load.

Two criteria, consistent with those historically imposed on ATWS, were used to determine the maximum time delay at the different power levels. Specifically, the peak reactor coolant system (RCS) pressure was limited to the ASME Service Level C Stress Limit and the quality in the hot leg did not exceed that predicted previously. The upper curve on Figure 1 shows the maximum length for the time delay to satisfy those two criteria. Thus, it is acceptable for the time delay to be between the upper and lower curves of Figures 2-4 and 3-8 of the enclosed WCAPs.

To determine the lag value, the output signal from different lags were examined for different input signals. Based on those studies, a lag of 60 seconds was selected. This lag setting will maintain the TICP long enough during a loss of load event to allow AMSAC to function properly. It will also permit AMSAC to function during power ascension.

Since the AMSAC signal is delayed up to 300 seconds at 40% power, it is necessary for the C-20 permissive to be armed for at least as long as the length of the variable timer. Thus, the length of the C-20 delay should also be increased because the AMSAC low steam generator level signal during an ATWS occurring at 40% power would not be reached till approximately 150 seconds.

While it was originally intended to submit the details of the variable timer as Addendum 2 to WCAP-10858-P-A, it was later decided to do it as Revision 1. The attached revision includes the changes to WCAP-10858-P-A for the variable timer and Addendum 1. Changes from the original topical report are noted by bars in the right hand margin of the pages.

This submittal contains Proprietary Information of Westinghouse Electric Corporation. In conformance with the requirements of 10CFR Section 2.790, as amended, of the Commission's regulations, we are enclosing with this submittal an Application for Withholding from Public disclosure and an Affidavit. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission.

Correspondence with respect to the proprietary aspects of this application for withholding should reference CAW-87-069 and should be addressed to R.A. Wiesemann, Manager of Regulatory & Legislative Affairs, Westinghouse Electric Corporation, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

It is requested that you review and approve Revision 1 as soon as possible. Should you have any questions, please contact Mr. Gregg Sinders, WOG Technical Specification Subcommittee Chairman. He can be reached at Carolina Power and Light Company, Raleigh, North Carolina. His telephone number is (919) 362-3260.

Very truly yours,

Roger A. Newton, Chairman
Westinghouse Owners Group

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enclosure
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cc: WOG Primary Representatives
Tech Spec Subcommittee
J.A. Triggiani
S.A. Binger
J.L. Little - EC 4-17 E (w/o enclosure)
M.A. Adler - EC 4-09 E (w/o enclosure)
M.P. Osborne - EC 4-09 E (w/o enclosure)
D.N. Katz - ITTC 34 (w/o enclosure
W.L. Miller - ITTC 34 (w/o enclosure)
B.L. Gongaware - EC 4-03 E (w/o enclosure)

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