



Westinghouse  
Electric Corporation

Energy Systems

Box 355  
Pittsburgh Pennsylvania 15230-0355

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DCP/NRC0165  
Docket No.: STN-52-003

July 26, 1994

Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

ATTENTION: MK. R. W. BORCHARDT

SUBJECT: ADDITIONAL INFORMATION IN SUPPORT OF WESTINGHOUSE  
RESPONSE TO RAI 952.27

Dear Mr. Borchardt:

The attachment to this letter provides information in support of an NRC request for additional information on the AP600 design (Q952.27), which requests information on the AP600 testing being performed at the VAPORE facility in Cassacia, Italy.

The following information is enclosed:

Attachment 1 Additional Information in Support of Westinghouse Response to NRC Request for  
Additional Information on the AP600 (Q952.27) (Proprietary)

Attachment 2 Non Proprietary copy of Attachment 1

This submittal contains Westinghouse proprietary information consisting of trade secrets, commercial information or financial information which we consider privileged or confidential pursuant to 10CFR9.17(a)(4). Therefore, it is requested that the Westinghouse proprietary information attached hereto be handled on a confidential basis and be withheld from public disclosures.

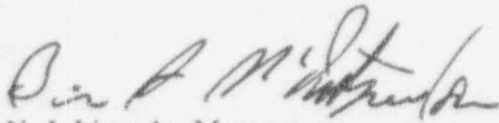
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Correspondence with respect to the application for withholding should reference AW-94-692, and should be addressed to N. J. Liparulo, Manager of Nuclear Safety Regulatory And Licensing Activities, Westinghouse Electric Corporation, P.O. Box 355, Pittsburgh, Pennsylvania, 15230-0355.

Please contact Brian A. McIntyre on (412) 374-4334 if you have any questions concerning this transmittal.



N. J. Liparulo, Manager  
Nuclear Safety Regulatory And Licensing Activities

/nja

Attachments

cc: T. Kenyon, NRC  
R. Hasselberg, NRC  
L. Shotkin, NRC  
B. A. McIntyre, Westinghouse (w/o Enclosures)

## ATTACHMENT 2

Attachment to Westinghouse Letter NTD-NRC-94-4240

### ADDITIONAL INFORMATION IN SUPPORT OF WESTINGHOUSE RESPONSE TO RAI 952.27

#### Question 952.27

The staff is concerned that the full range of possible conditions under which ADS may operate has not yet been considered. Justify your selection of operating conditions. A "map" of RCS behavior of the AP600 vs. ADS test facility operation would be useful in making this assessment.

#### Response (Revision 1):

The ADS Phase B test facility has been modeled using the NOTRUMP code and the WCOBRA/TRAC code. The purpose of the calculations is to determine the manner in which the test facility should be operated to obtain the test data of interest.

Plots have been developed of the calculated flow and quality through the ADS system from the SSAR plant calculations. The plant calculations were plotted as mass flow rate through the ADS system vs. flow quality just upstream of the ADS valves. The data from the plant calculations were separated into stages 1 and 2 ADS valves opening and for stages 1,2,3 ADS valves opening, as well as an inadvertent opening of a stage 2 ADS valve. The flow and quality values from the plant calculations are also a function of the system pressure. The highest pressures occur when the first stage ADS valve opens. As the other valves open, the pressure drops to lower values.

The test facility was modeled to choose initial pressure and 12-inch upstream valve settings to produce flows and qualities which are calculated for the AP600 plant. Flow and quality values were calculated for several different initial pressure conditions in the supply tank with different 12-inch valve settings and for different numbers of active ADS valve flow paths. The results are shown in Figures 952.27-1 through 952.27-3 for the ADS Phase B test facility. As these figures indicate, the test is a transient but it will reach quasi-steady state conditions at a calculated flow and quality over the duration of the test. By performing sensitivity calculations over a range of initial pressures and initial 12-inch valve settings, test points can be selected which will cover the desired range of mass flows and flow qualities to cover the AP600 calculated plant conditions. The calculations were fitted to a family of curves to choose the test matrix points. Figures 952.27-4 through 952.27-6 show the family of curves derived from the calculations and the location of the test matrix points. The test matrix is provided in the ADS Test Specification (WCAP-14112). While every point for every calculation will not be covered, the range will be covered such that the critical flow models in the codes can be verified as well as the two-phase pressure drop calculations. The possibility of multiple choke points will be determined from the data and can be compared to the code predictions.

The method outlined above has been used to set specific test conditions which best meet the calculated AP600 plant conditions, as well as address the engineering design requirements for obtaining data on the IRWST and sparger loads following ADS activation.

**SSAR Revision: NONE**

Mixture Mass Flow Rate (lbm/sec)

Quality

(a,c)

FIGURE 952.27-1 COMPARISON OF THE MASS FLOW RATE VERSUS QUALITY FOR THE AP600 PLANT AND THE AFS PHASE B TESTS WITH ADS STAGE 1 VALVE OPEN

Mixture Mass Flow Rate (lbm/sec)

FIGURE 952.27-2 COMPARISON OF THE MASS FLOW RATE VERSUS QUALITY FOR THE AP600 PLANT AND THE ADS PHASE B TESTS WITH ADS STAGES 1 AND 2 VALVES OPEN

Mixture Mass Flow Rate (lbm/sec)

Quality

(g, c)

FIGURE 952.27-3 COMPARISON OF THE MASS FLOW RATE VERSUS QUALITY FOR THE AP600 PLANT AND THE ADS PHASE B TESTS WITH ADS STAGES 1, 2 AND 3 VALVES OPEN



FIGURE 952.27-4 FAMILY OF CURVES AND TEST POINTS FOR ADS STAGE 1 AND 2 VALVES OPENING INCLUDES INADVERTENT STAGE 1 ADS AND LOCAS

Mixture Mass Flow Rate (lbm/sec)

Quality

(9, C)

FIGURE 952.27-5 FAMILY OF CURVES AND TEST POINTS FOR ADS STAGE 2 VALVE OPENING  
INADVERTANT STAGE 2 ACTIVATION FOR MAXIMUM LOAD



Mixture Mass Flow Rate (lbm/sec)

( $q_c$ )

Quality

FIGURE 952.27-6 FAMILY OF CURVES AND TEST POINTS FOR ADS STAGE1, 2, AND 3 VALVES OPENING