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

ATTENTION: T. R. QUAY

SUBJECT: AP600 CONTAINMENT DESIGN BASIS ANALYSIS (BREAK SPECTRUM ANALYSIS)

Dear Mr. Quay:

During the July 27, 1995 meeting between Westinghouse and the Containment Systems and Severe Accident Branch, Westinghouse took an action to provide information to assist the staff review of the WGOTHIC computer code. Attachment 1 to this letter provides information which investigates the AP600 containment peak pressure response for a spectrum of primary system break sizes. This information supports the limiting primary system break releases presented in Section 6.2 of the AP600 SSAR.

Please contact John C. Butler (412) 374-5268 if you have any questions concerning this transmittal.

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/nja

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AP600 Containment Design Basis Analysis
Break Spectrum Analysis

A containment integrity analysis includes an assessment of a specturm of reactor coolant system breaks and main steamline break. A spectrum of main steamline break were analyzed and are discussed in Chapter 6 of the AP600 SSAR. The results for a full double ended cold leg guillotine break (discharge coefficient = 1.0) and a full double ended hot leg guillotine break (discharge coefficient = 1.0) are also presented in the AP600 SSAR. The full double ended cold leg guillotine break provides the limiting primary system mass and energy releases to containment with respect to peak containment pressure.

To support this to additional cases were analyzed. These two cases consist of a double ended cold leg break with a discharge coefficient of 0.6 and a small 7 inch diameter break occuring high above the operating deck. The containment response for these break cases were analyzed using the same WGOTHIC models used to calculate the results presented in the July 1995 SSAR markups (Reference 1).

The containment pressure response for each case are presented in the following Figures:

Figure 1 Containment Pressure Response, Double Ended Cold Leg Break, C_D = 1.0
Figure 2 Containment Pressure Response, Double Ended Cold Leg Break, C_D = 0.6
Figure 3 Containment Pressure Response, Double Ended Hot Leg Break, C_D = 1.0
Figure 4 Containment Pressure Response, 7" Diameter Elevated Break

Each of these cases were analyzed using the WGOTHIC distributed parameter model to predict preak pressure. The hot leg case was not analyzed beyond blowdown because the reverse heat transfer from the steam generators, an additional heat source for cold leg breaks, is effectively eliminated due to the reactor coolant pumps locking when the coolant flow reverses. The makes the cold leg break releases bounded during the post blowdown period. The peak containment pressures are tabulated in Table 1.

The results of these analyses indicate that the limiting loss of cooling accident with respect to peak containment pressure is the double ended cold leg break assuming a discharge coefficient of 1.0. This is expected since the full double ended cold leg break quickly cools down the steam generators and results in the fastest release of the reactor coolant system inventory into the containment.

AP600

Table 1 AP600 Peak Containment Pressure LOCA Break Spectrum

Break Spectrum	Peak Pressure (psig)
Cold leg, C_D = 1.0, Distributed Parameter Model	41.4
Cold leg, C_D = 0.6, Distributed Parameter Model	41.2
Hot leg, C_D = 1.0, Distributed Parameter Model	38
7" Diameter Elevated Break, Distributed Parameter Model	28.9

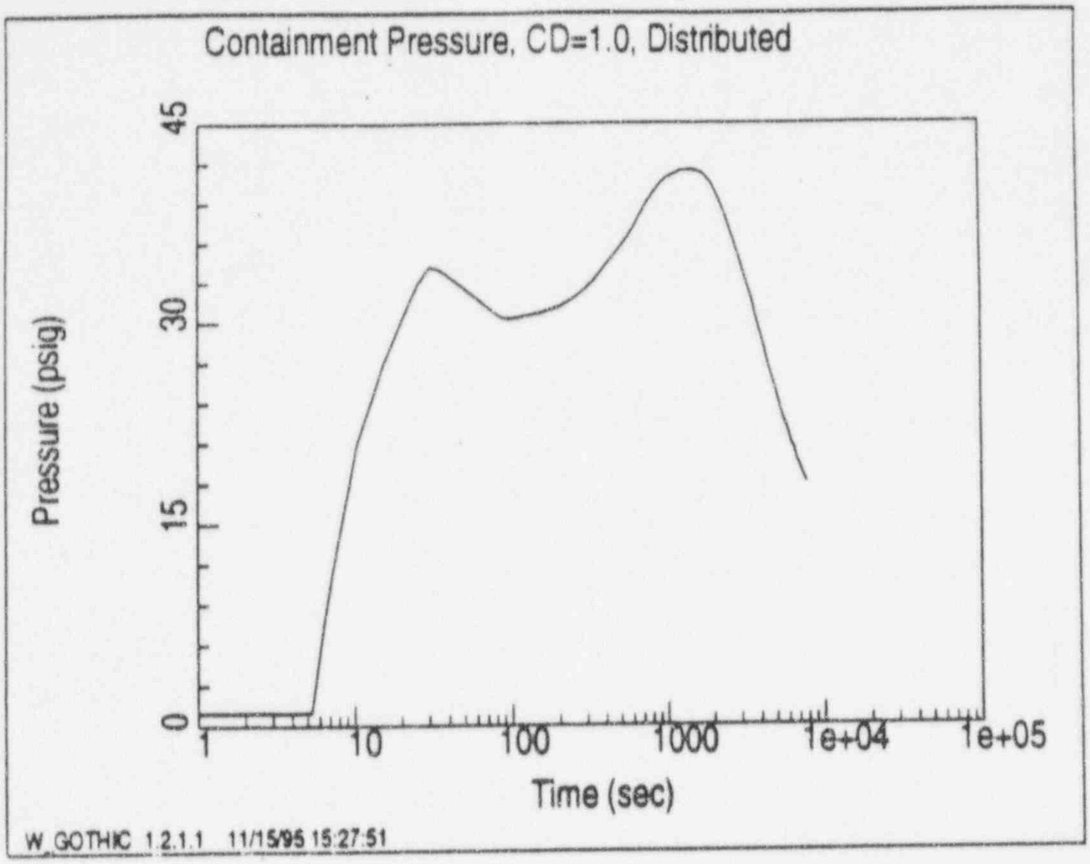

Figure 1 Containment Pressure Response, Double Ended Cold Leg Break, C_D = 1.0

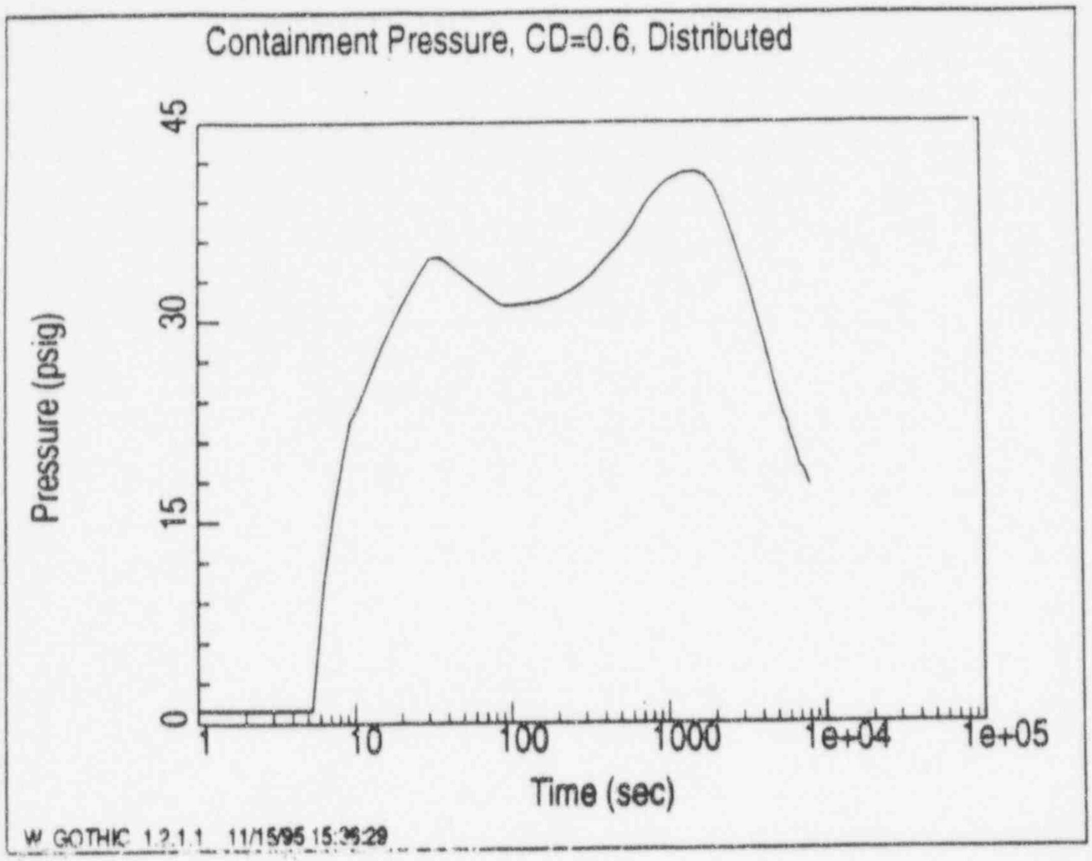

Figure 2 Containment Pressure Response, Double Ended Cold Leg Break, C_D = 0.6

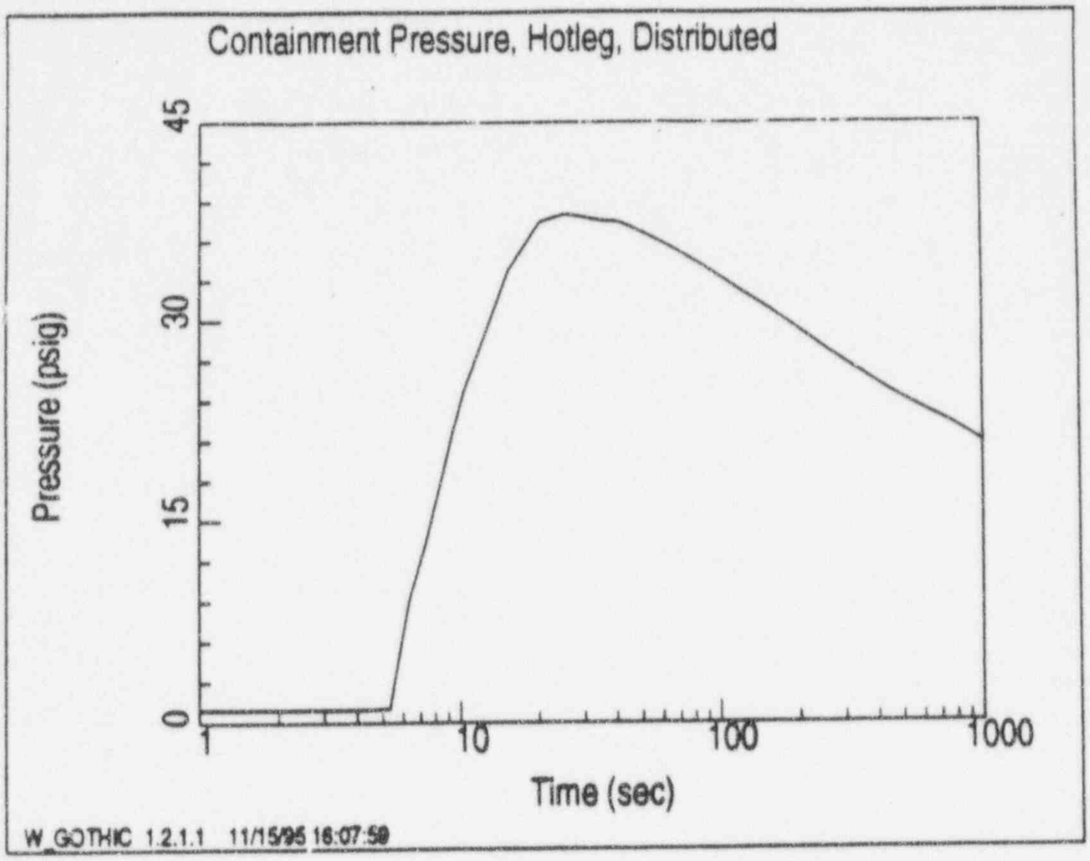

Figure 3 Containment Pressure Response, Double Ended Hot Leg Break, C_D = 1.0

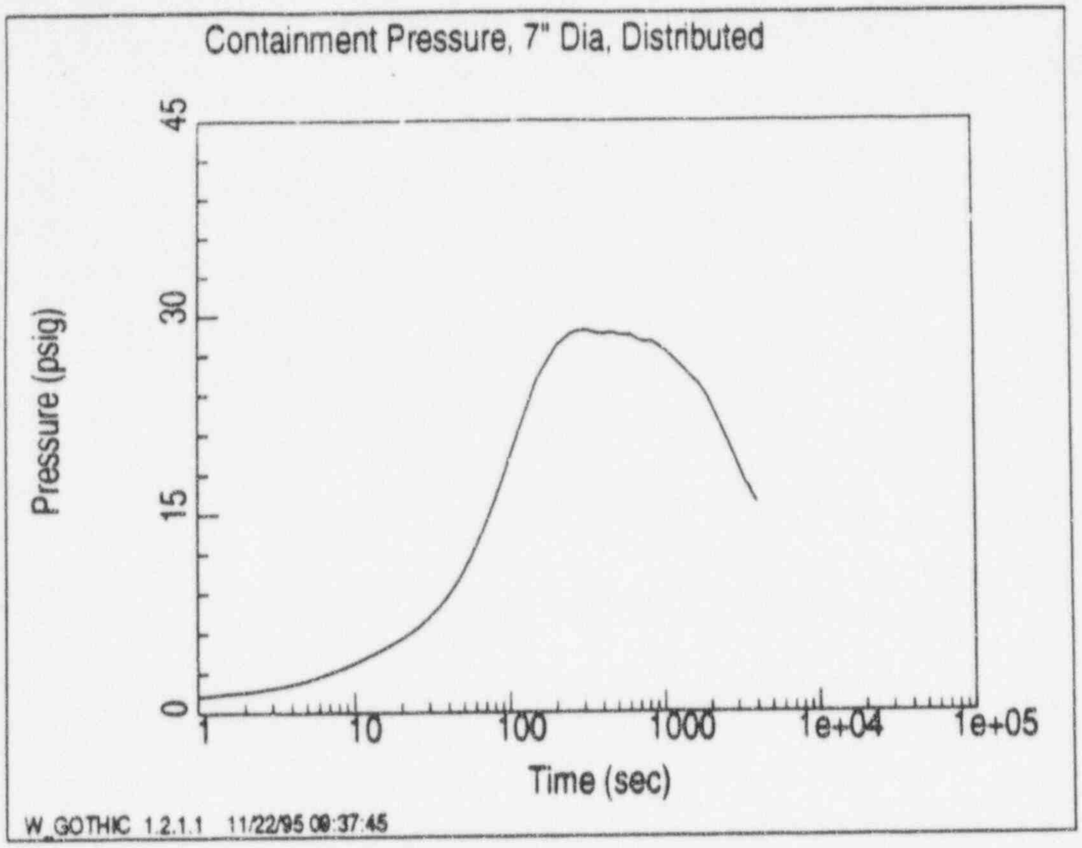

Figure 4 Containment Pressure Response, 7" Diameter Elevated Break