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April 14, 1982


Mr. H. R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. NUCLEAR REGULATORY COMMISSION
Washington, D. C. 20555

Attention: Mr. R. A. Clark, Chief
Operating Reactors, Branch 3

Gentlemen:

DOCKET NOS. 50-266 AND 50-301
ADDITIONAL INFORMATION - IE BULLETIN NO. 80-04
ANALYSIS OF PWR MAIN STEAM LINE BREAK
WITH CONTINUED FEEDWATER ADDITION
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

Please find attached the additional information which you requested in your February 26, 1982 letter. We trust the foregoing explains the rationale presented in our original April 25, 1980 submittal, and satisfactorily addresses the concerns expressed in your February 26 letter.

If you have any questions on the attached information, please let us know.

Very truly yours,

C. W. Fay

Assistant Vice President

C. W. Fay

Attachment

Copy to NRC Resident Inspector

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ADDITIONAL INFORMATION REQUEST
IE BULLETIN NO. 80-04
ANALYSIS OF PWR MAIN STEAM LINE BREAK
WITH CONTINUED FEEDWATER ADDITION

REQUEST

Please provide the following information concerning your analysis of containment pressure response to a MSLB with continued feedwater addition:

1. The assumptions used and a justification of the quantities determined for the following:

   a. The instantaneous energy and mass release to the containment for the MSLB analysis.

   b. The energy release to the containment from the continued addition of feedwater.

2. If you feel that you cannot provide adequate justification for using the above mentioned assumptions and the original assumptions need to be reconsidered, reevaluate the potential for exceeding containment design pressure using the new assumptions.

RESPONSE

1.a. As stated in our response of April 25, 1980, an instantaneous energy and mass release to the containment of 140 x $10^6$ BTU's and 165,000 lbs. respectively (page 14.2.5-10 of the Point Beach Nuclear Plant Final Facility Description and Safety Analysis Report) was assumed for comparison with the results of the containment response to a LOCA incident. These are calculated values obtained from the main steam line break (MSLB) analyses for the break inside the containment at the exit of the steam generator (upstream of the flow nozzle). Figure 14.2.5-8 (attached) from the Point Beach Nuclear Plant Final Facility Description and Safety Analysis Report (FFDSAR) depicts the blowdown transient, for the two-loop operation loss of off-site power case, for which the above energy and mass release values were calculated. Conservatively assuming that this energy and mass release occurs instantaneously leads to the calculated containment pressure of 52 psig, taking no credit for containment safeguards systems, as stated in the FFDSAR.

1.b. For the continued addition of feedwater a flow rate of 400 gpm at 100°F was used because the auxiliary feedwater flow lines contain restrictions which limit their flow to 400 gpm. This flow rate is equivalent to 198,900 lb/hour.

For purposes of the comparison it was assumed that this flow of 198,900 lb/hour flashed to steam and was continuously released to the containment at the maximum saturation enthalpy value of about 1205 BTU/lb (450°F). The product of 198,900 lb/hour and 1205 BTU/lb leads to a continuous energy addition of about 240 x $10^6$ BTU per hour or 4.0 x $10^6$ BTU/minute and, by comparison, demonstrates that about 7-1/2 minutes of continued feedwater addition following the initial blowdown could be accommodated without exceeding the LOCA analysis assumptions of more than 170 x $10^6$ BTU's for the LOCA containment evaluation (Table 14.3.4-4 of the Point Beach FFDSAR) as explained in our letter of April 25, 1980.

This assumed enthalpy for the continued feedwater flow blowdown is conservative. Taking no credit for containment safeguards actuation the maximum pressure in the containment, conservatively assuming instantaneous blowdown as discussed above, is calculated at 52 psig, which corresponds to a lower enthalpy. More importantly the actual transient pressure in the containment due to the initial blowdown will be much lower because of the cooling and condensation which will take place in the containment. The reduced heat transfer taking place in the affected steam generator will also ensure that the enthalpy of the blowdown due to continuous feedwater addition will be less than the maximum saturation value. Figure 14.2.5-8 from the FFDSAR shows that the primary system coolant average temperature has dropped from its nominal zero power value to about 300°F at about two minutes into the initial blowdown. The heat transfer area of the hot metal in the steam generator is much less than that of the tubes and therefore the heat transferred to the continued feedwater flow will be much less than that occurring during the initial blowdown transient. Although the assumed enthalpy of the additional feedwater contribution to the transient is unrealistically high, it is conservative and valid for purposes of comparing the energy discharge to the containment and its resulting pressure transient with that of the LOCA evaluation.

REQUEST

If you wish to take credit for operator action either using your original assumptions or new assumptions (and subsequent reanalyis), please answer the following questions:

3. Your submittal of April 25, 1980 alludes to operator action but does not state what actions are required to

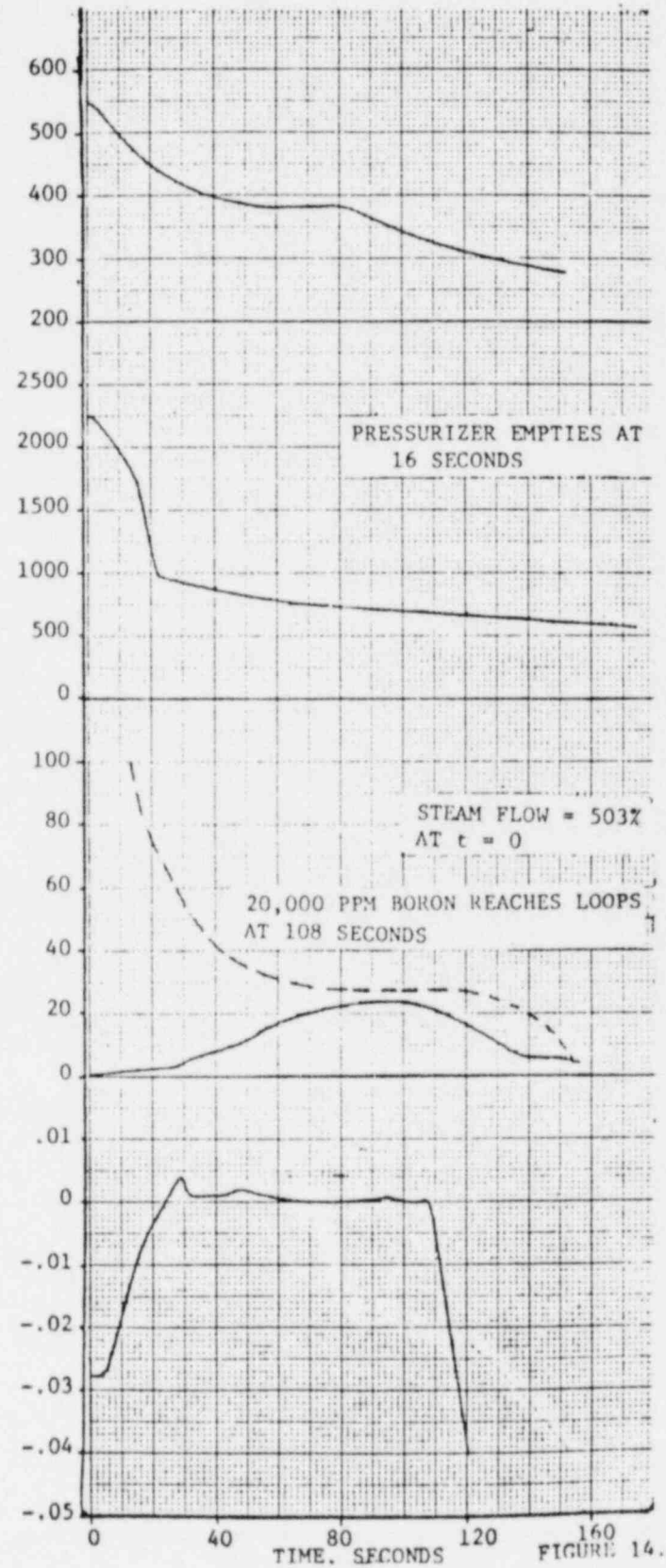
be taken and at what time the action is required. Provide this information and the justification for the time assumed for operator actions.

4. If your analyses requires operator action to mitigate the containment pressure consequences of the MSLB, provide the time when containment design pressure will be exceeded, if no operator action is taken. Provide also the magnitude of the peak pressure and the time at which the peak occurs.

RESPONSE

Direct operator action is not required to prevent overpressurization of the containment. As discussed in the Point Beach FFDSAR analysis for the MSLB, safety injection would be automatically initiated early in the transient as a result of low steam line pressure (Technical Specification setpoint is $\geq$500 psig), well in advance of the time where the additional feedwater flow becomes important. Safety injection would also automatically initiate operation of the containment air recirculation fan coolers. Figure 14.3.4-1 (attached) of the Point Beach FFDSAR demonstrates that the fan cooler heat removal is more than adequate to remove the additional energy discharged into the containment by continued auxiliary feedwater addition, at the conservative rate discussed above, for an indefinite period of time. Also the containment spray system is automatically initiated when containment pressure reaches 25 psig during the initial blowdown transient. Operator action is not required to prevent containment pressure from exceeding its design value of 60 psig. However, as stated in our April 25, 1980 letter, operational procedures call for isolation of the auxiliary feed flow to the affected steam generator.

STEAM LINE BREAK INSIDE THE CONTAINMENT (AT EXIT OF STEAM GENERATOR) 2 LOOPS IN OPERATION, LOSS OF OUTSIDE POWER AT T = 0




December 23, 1970

FIGURE 14.2.5-8

CONTAINMENT AIR RECIRCULATION FAN-COOLER HEAT REMOVAL RATE AS A FUNCTION OF CONTAINMENT ATMOSPHERE PRESSURE

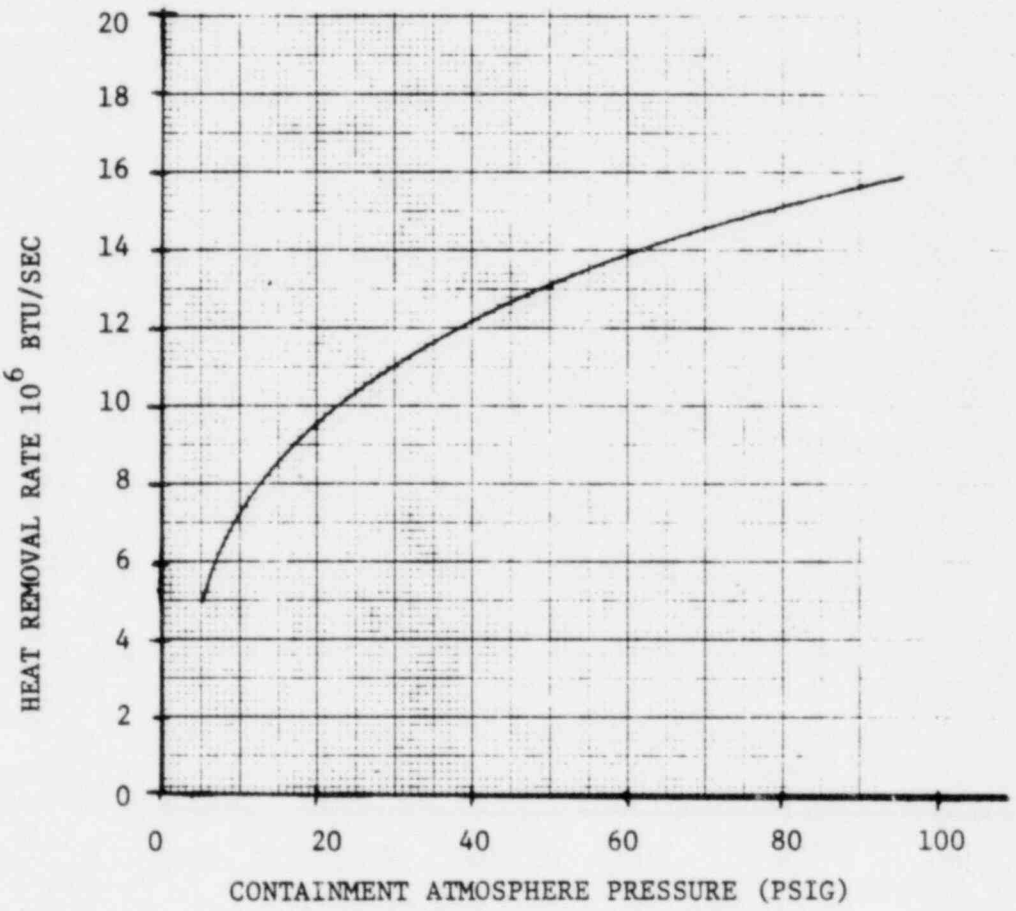



FIGURE 14.3.4-1