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ARTHUR E. LUNDVALL, JR.
VICE PRESIDENT
SUPPLY

November 16, 1982

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Mr. Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing

Subject: Calvert Cliffs Nuclear Power Plant
Units Nos. 1 & 2; Dockets Nos. 50-317 and 50-318
I&E Bulletin 80-04

References: (a) NRC letter from R. A. Clark to A. E. Lundvall, Jr., dated January 20, 1982

(b) BG&E letter dated February 12, 1980 from A. E. Lundvall, Jr., to USNRC

(c) BG&E letter dated May 21, 1980 from A. E. Lundvall, Jr., to USNRC

Gentlemen:

Reference (a) forwarded a Request for Additional Information (prepared by your consultant, Franklin Research Center (FRC)) concerning our evaluation, references (b) and (c), of the potential impact of continued feedwater addition to the steam generators following a main steam line break (MSLB).

Since the receipt of reference (a) we have conducted engineering evaluations of the relationship of the main feedwater (MFW) system response to a MSLB accident and have had several discussions with consultants, other licensees, and members of your staff and ours in an attempt to ascertain the validity of applying safety-related criteria (e.g., the single-failure criterion) to systems which were designed, reviewed and licensed as non-safety-related systems. During that time our response to reference (a) was delayed so that we could ensure that we had a clear understanding of the assumptions being applied to the MSLB scenario by the NRC Staff and its consultants. Although we had indicated that we would provide our response by mid-October, we found that our fundamental disagreement with the implied application of the single-failure criterion would simply have resulted in the submittal of a response which did not fully address the questions raised by FRC.

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A telephone conference was held on October 27, 1982 with members of the NRC, FRC, and our staff to attempt to resolve the difference in interpretation of design criteria discussed above. As a result, we committed to make a submittal no later than November 16, 1982. We were to include schedules, where appropriate, for submitting the results of any reanalyses of the containment and reactor core responses to the postulated MSLB scenario. It should be noted that Questions #4 and #5 of Item 1 and Questions #4 and #5 of Item 2 of reference (a) were deleted in a previous telephone conversation with our NRC Project Manager, while Question #3 for each Item was modified to specify a justification for the assumptions/methods used.

Attachment (1) provides our responses to Item 1 (Questions 1, 2 and 3) and Item 2 (Questions 1, 2 and 3) based on the current status of our ongoing analytical efforts. Attachment (2) is a summary schedule for those efforts.

If you have any comments or questions concerning this matter, we will be happy to discuss them with you.

Sincerely,

H. H. Miller
for A. E. Lundvall, Jr.
Vice President-Supply

AEL/RCLO/gvg

Attachments: 1. Responses to NRC Request for Additional Information (1/20/82) Concerning I&E Bulletin 80-04.

2. Summary Schedule for Analysis of Additional Concerns Related to Bulletin 80-04.

cc: J. A. Biddison, Jr., Esquire
G. F. Trowbridge, Esquire
Messrs. D. H. Jaffe - NRC
P. W. Kruse - CE
J. C. Ventura - Bechtel

RESPONSES TO NRC REQUEST FOR ADDITIONAL INFORMATION CONCERNING I&E BULLETIN 80-04

ITEM 1

REQUEST

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

1. An evaluation of the MFW system components to determine whether a single active failure of the FWRV or an associated component would cause greater than 5% of full flow to the affected steam generator.

   Response

   During an October 27, 1982 telephone conversation, NRC stated that our MSLB analysis assumptions should have included a single active failure of the feedwater regulating valve (FWRV). According to the Franklin Research Center (FRC), such a failure would result in continuous runout feedwater flow to the affected steam generator. We stated that, on the contrary, runout flow would only occur for a relatively short period of time (approximately one minute) and would be terminated by closure of the main feedwater isolation valve (MFIV). At that point in the conversation, FRC (Messrs. Clyde Herrick and Fred Vosbury) indicated that they were unaware of the existence of the MFIV in our feedwater system. Considering the MFIV, the present concern is not the effect of continuous runout feedwater flow to the affected steam generator, but rather the effect of temporary runout flow (approximately one minute).

   To explicitly evaluate the effect on containment pressure and core reactivity of this additional feedwater flow, we have initiated an analysis of the MSLB event which assumes a failed-open FWRV. This analysis is currently underway and is being performed by Combustion Engineering with the assistance of Bechtel Power Corporation (for feedwater system performance characteristics).

2. A determination of the feedwater flow to the affected steam generator. This should be determined from the manufacturer's pump curves at zero backpressure, unless the system contains reliable anti-runout provisions or an actual backpressure value has been conservatively calculated.

   Response

   The feedwater system performance analysis mentioned above in Response (1) will utilize actual component design information and calculated values for backpressure. The product of this analysis will be feedwater flowrate to the affected steam generator versus time.

3. An evaluation of the potential for exceeding containment design pressure using the feedwater flowrate determined in Request 2, above. Include justification for assumptions and methods used.

   Response

   The containment pressure response to a MSLB will be reanalyzed using the feedwater flow profile developed as described above in Response (2).

(Questions 4 and 5 were deleted in a prior telephone conversation with our NRC Project Manager.)

ITEM 2

REQUEST

Please provide the following information concerning your analysis of the reactivity response which results from a MSLB with continued feedwater addition:

1. The results of a sensitivity study considering the effect of the loss of offsite power on the core reactivity response to a MSLB.

   Response

   The dominant effect of a loss of offsite power would be due to the tripping of reactor coolant pumps (RCP). The MSLB analysis performed for Calvert Cliffs includes a manual trip of RCP's upon receipt of a SIAS on low pressurizer flow. The reduced flow increases the temperature tilt at the reactor vessel inlet which, due to incomplete mixing of the coolant in the vessel inlet plenum, produces a severe radial temperature asymmetry in the core. The severe temperature asymmetry produced in the core requires that the moderator reactivity feedback be based on cold edge temperatures (i.e., the minimum coolant temperature). This results in the maximum positive reactivity insertion during the cooldown.

   The Calvert Cliffs Unit 1, Cycle 6 MSLB analysis shows that SIAS occurs at 15.3 seconds. At this time, the analysis assumed that RCP's are manually tripped and the RCP's start coasting down. If a loss of AC power on turbine trip were assumed in this analysis, the RCP's would have started coasting down at 3.9 seconds. Thus, a loss of AC power on turbine trip would have initiated RCP coastdown 11.4 seconds earlier than assumed in the Cycle 6 analysis. The slightly earlier RCP's coastdown would have negligible effect on the peak core reactivity, which does not occur until 109.3 seconds after the MSLB. Hence, the major effect of assuming a loss of AC power on turbine trip has been implicitly included in the Unit 1, Cycle 6 MSLB analysis, which has been reported to and accepted by the NRC.

2. A determination of the most restrictive single active failure of the safety injection system which causes the longest delay in the delivery of high concentration boric acid solution to the reactor coolant system.

   Response

   The Calvert Cliffs MSLB analysis considers a single failure in the safety injection system. The analysis assumes that, upon receipt of a Safety Injection Actuation Signal (SIAS), only one High Pressure Safety Injection (HPSI) pump starts although the Technical Specification requires both safety injection trains to be operable. In addition, the analysis included a 30.0 second time delay (Technical Specification limit) for the HPSI pump to reach full speed and explicitly modeled the time required to flush the safety injection lines prior to delivery of boron from the HPSI pump.

3. A quantitative analysis of the core reactivity response to a MSLB which incorporates the results of Item 1, Request 2; Item 2, Request 1; and Item 2, Request 2. The analysis should initially assume no operator action prior to 20 minutes from event initiation. Justify the methods and assumptions used in the analysis.

   Response

   A new analysis of the core reactivity response to a MSLB will be performed by Combustion Engineering following completion of the feedwater system performance analysis described in Responses (1) and (2) to Item 1 above.

(Questions 4 and 5 were deleted in a prior telephone conversation with our NRC Project Manager.)

SUMMARY SCHEDULE FOR ANALYSIS OF ADDITIONAL CONCERNS RELATED TO I&E BULLETIN 80-04 (MSLB WITH CONTINUED FEEDWATER ADDITION)

November 22, 1982	Bechtel commences analysis of feedwater system response to a MSLB with a failed open main feed regulating valve.
January 10, 1983	Bechtel feedwater system peformance analysis completed. Results forwarded to Combustion Engineering for analysis of steam generator blowdown, containment pressurization, and core reactivity response.
May 1, 1983	Letter submitted to NRC by BG&E forwarding evaluation of the results of all analyses. This letter will also address any need for corrective action.

(Estimated cost for analyses: $80,000)