

MAR 18 1986

Docket No. 50-461

Mr. Frank A. Spangenberg
Manager - Licensing and Safety
Clinton Power Station
P.O. Box 306
Mail Code V920
Clinton, Illinois 61727

Dear Mr. Spangenberg:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RELATED TO CONTROL SYSTEM
FAILURES (OUTSTANDING LICENSING ISSUE 15) - CLINTON POWER STATION

Section 7.7.3.1 of the Clinton SER addresses two electrical, instrumentation and control systems issues (Outstanding Licensing Issue 15). The specific issues are multiple control system failures due to common electrical power source or sensor (including sensor impulse lines) malfunctions and multiple control system failures resulting from individual high energy line breaks. These issues are related to staff concerns that failures or malfunctions of nonsafety-related control systems could result in transient or accident consequences more severe than originally considered in the plant's safety analyses.

After reviewing your response to the above concerns, we have determined that the additional information identified in the enclosure is required to complete our review.

If you have any questions concerning this matter, please contact our project manager for your application.

Sincerely,

/s/

Ralph Caruso

for Walter R. Butler, Director
BWR Project Directorate No. 4
Division of BWR Licensing

Enclosure:
As stated

cc: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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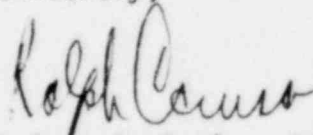
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Walter R. Butler, Director
BWR Project Directorate No. 4
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As stated

cc: See next page

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Illinois Power Company

Clinton Power Station
Unit 1

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ENCLOSURE

CLINTON - CONTROL SYSTEM FAILURES
REQUEST FOR ADDITIONAL INFORMATION

In order to complete our review of the applicant's response to staff concerns related to control system failures (SER Outstanding Issue No. 15), we require that the applicant provide the information identified below.

1. Information related to power sources whose failure or malfunction could lead to malfunctions of multiple control systems was reviewed by the staff. The methodology information states that commonality of power supplies to control systems was determined through the load centers. However, the subject information also indicates that the analysis did not consider 480V load center power supplies. The applicant should verify that their review considered all higher level power sources such that the loss of the next higher level bus initiates an event already bounded by the FSAR Chapter 15 Analyses (e.g., loss of a 480V load center which supplies multiple 480V motor control centers). If not, the effects of failure or malfunction of these higher level power sources on multiple control systems should be analyzed. If the consequences of these failures are bounded by the Chapter 15 analyses, a positive statement to that effect should be provided with specification of the Chapter 15 analysis. If not bounded, then information should be provided to justify the issue.
2. The approach taken by the Clinton applicant appears not to meet the intent of the control systems failures question. The applicant considered the effects of postulated control system failures on Chapter 15 events and modified the event analysis to include the nonsafety control system failures. The intent of the control system failures issue was not to require modifications to the FSAR analyses but to determine whether combined potential multiple control system failures resulting from

(1) common power source or sensor (including impulse lines) malfunctions or (2) each postulated potential high energy line break could result in consequences more severe than those previously analyzed for in FSAR Chapter 15 (could such failures result in an unanalyzed event). If it is determined that all possible combinations of simultaneous malfunctions of control systems are bounded by the previous FSAR Chapter 15 analyses, then a positive statement to that effect should be provided including specification of the bounding FSAR analyses. If the Chapter 15 event analyses were modified to compensate for the multiple control system failure consequences or if conservatism was not included in the HELB, common power source, sensor or sensor impulse line evaluations consistent with those assumed for FSAR Chapter 15 analyses, details should be provided for staff review. If no modifications to the FSAR analyses were made or reduction in conservatism accounted for, then it should be so stated.

3. The response states that the limiting HELB is a line break in the turbine building. This break was examined for its effects on the loss of feedwater heating (LOFH) event. It is not clear whether this is the limiting break in terms of the most severe consequences resulting from the turbine building HELB (i.e., worst-case line break at Clinton which creates most severe combined effects that could occur from multiple control system failures) or the most limiting in terms of making the LOFH event itself more severe. Thus, the staff is not assured that the effects of each postulated HELB event were considered. The applicant should provide information to clarify the issue. The information should include a description of the procedure by which the location of nonsafety-related control system components that could be affected by high energy line breaks was determined (i.e., zone analysis and plant walkdown, etc.).
4. The applicant should verify that a single active failure in the safety systems used to mitigate the consequences of high energy line breaks was assumed in the analysis performed.

5. The applicant should provide a description of the harsh environments assumed in the analysis performed, including a discussion on the effects of pressure, temperature, and humidity in addition to pipe whip and jet impingement.
6. The applicant addressed pipe breaks within the turbine building which could impact the FSAR analyses for various events (loss of feedwater heating, feedwater controller failure, and recirculation pump trip). It appears that credit is being taken for the reactor vessel water level (L8) trip of the feedwater pumps to mitigate the events in combination with manual actions in some cases if required. The L8 trip on most BWRs is nonsafety-related. Information should be provided to discuss the design criteria (i.e., compliance with IEEE 279, IEEE 338, etc.) associated with the L8 trip including details on Technical Specification surveillance requirements. This information should provide correlation with the dependence upon manual operator actions (i.e., discuss the extent of reliance on manual operator action for these events and justify its reliability based on currently acceptable models).

The above information is required to address the potential development of the following situation. Assuming a failure of the L8 trip (nonsafety-related) and no operator action, reactor power and vessel water level would continue to rise until a turbine trip (and subsequent reactor trip) will occur due to high vibration caused by moisture in the steam lines. For the worst-case, this could occur before the reactor power level reaches the APRM high power level reactor trip setpoint. The staff is concerned that this could lead to a turbine trip without bypass event from a higher power level than previously analyzed for in the FSAR. If it is concluded that such a condition could develop, the applicant should verify that the consequences are bounded by the Chapter 15 analyses.

As related to this same issue, the applicant should address the possible consequences resulting from water entering the steam lines. The LOFH

event assumes steam to be discharged to the suppression pool via the safety relief valves (SRVs) as a result of main condenser failure. However, with a failure of the turbine bypass system and the main turbine and feedwater pump trips, it is conceivable that water could flow into the steam lines. The staff is concerned that the SRVs and their discharge lines are not qualified for the passage of high pressure liquid. Failure of the SRVs or associated discharge lines could lead to higher containment pressures than previously analyzed.

7. It should be verified that the consequences of the worst-case event combination considered in the HELB analysis are bounded by a small fraction ($<10\%$) of 10 CFR Part 100 guidelines.
8. Information should be provided to clarify the utilization of nonsafety-related equipment for the mitigation of the effects of high energy line breaks and consequential control system failures. If nonsafety-related equipment is being utilized for accident mitigation purposes, then details should be provided for each case with justification.
9. It does not appear that all the Chapter 15 FSAR events were evaluated in conjunction with worst-case consequences resulting from high energy line break effects (i.e., turbine trip without bypass event, MSIV closure events, etc.). The turbine trip without bypass event is often the limiting Chapter 15 event for a BWR. Provide information to verify that all Chapter 15 FSAR events were considered in conjunction with the HELB analyses.
10. It appears that credit is being taken for reactor vessel water level trip signals L2, L3, and L4 to mitigate the loss of feedwater flow and feedwater line break events. Provide a description of the design criteria (compliance with IEEE 279, IEEE 338, etc.) associated with these

subject trip signals. This information should include details on Technical Specification surveillance requirements.

11. It appears that credit is being taken for operator actions required to mitigate the consequences of an instrument line break event. Information should be provided to clarify this understanding and to describe the details of the extent that manual action is required. This should include justification for reliance on operator action based on currently acceptable models.
12. In Part B of the feedwater controller failure event verify whether "Turbine Trip Failure" refers to turbine trip failure @ L8. If so, provide a response consistent with Question No. 2. If not, please clarify the basis for the turbine trip failure.
13. The reference to FSAR Chapter 15.2-48 in Part A of the failure of RHR shutdown cooling event is incorrect. Provide information to clarify this.