December 18, 1990

Docket No. 50-213

Mr. Edward J. Mroczka
Senior Vice President
Nuclear Engineering and Operations
Connecticut Yankee Atomic Power Company
Northeast Nuclear Energy Company
P.O. Box 270
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Dear Mr. Mroczka:

SUBJECT: HADDAM NECK PLANT - APPENDIX R POST-FIRE ALTERNATIVE SHUTDOWN REVIEW, REQUEST FOR ADDITIONAL INFORMATION (TAC #66169)

The NRC has reviewed Connecticut Yankee Atomic Power Company's (CYAPCO/licensee) January 18, 1990, revision to the April 28, 1989, 10 CFR 50 Appendix R Compliance Report and your March 29, 1990, response to our request for additional information dated January 22, 1990. Based on our review of the above documents the staff has determined that additional information is necessary to complete our review. Enclosed are additional questions regarding your submittals. In addition the staff is proposing a working meeting/site visit for the week of February 18, 1991. During this meeting, the staff would like to discuss the responses to the requested additional information and review and perform a plant walkdown of the Appendix R fire protection and alternative safe shutdown features of the site. Please respond to the enclosed questions to allow for a reasonable review time prior to the site visit.

The requirements contained in this letter affect fewer than 10 respondents and, therefore, is not subject to Office of Management and Budget review under P.L. 96-511.

Sincerely,

/s/

Alan Wang, Project Manager
Project Directorate I-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc w/enclosure:
See next page

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REQUEST FOR ADDITIONAL INFORMATION

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

APPENDIX R, POST-FIRE SAFE SHUTDOWN CAPABILITY

HADDAM NECK PLANT

DOCKET NO. 50-213

Information Requested pertaining to the January 18, 1990 submittal:

1. Section 1.3.2, Common Power Source with Shutdown Equipment, you stated that operator actions will be taken to compensate for the effects of multiple high impedance faults. It is our understanding that these actions will be performed in accordance with procedure AOP 3.2-57. In order for us to get a better understanding of the manual operations involved to isolate high impedance faults, please summarize the actions required to preclude the effects of high impedance faults on safe shutdown, the manpower required to perform these actions, and the timelines associated with carrying out these actions for each of the fire areas discussed in Section 3.7 of the subject submittal.

2. Section 3.1.2, Main Steam System, you propose to isolate/close the main steam trip valves (MS-1211-1, 2, 3, and 4) via a kill switch in the control room. In addition, you propose to use this concept to isolate other critical safe shutdown components (i.e. Pressurizer PORVs and their associated block valves). In order to get an understanding of this concept, please explain how this design will preclude spurious operation of those components isolated by a kill switch with a fire in the control room.

3. Section 3.1.3, Auxiliary Feedwater (AFW) System, you indicated that, using the preferred flow path, the AFW flow to the steam generators will be throttled via manual isolation valves. Please explain how this operation will be accomplished, the location of the valves required to be throttled, and how these actions will assure that an adequate balance in feedwater flow is maintained during post-fire cooldown operations.

4. In section 3.1.4, Chemical and Volume Control System, you indicated that the charging metering pump will be utilized under certain conditions (i.e. fire in the control room, old switchgear room, etc.) for alternative post-fire shutdown operations. Please explain how the metering pump is capable of maintaining reactor coolant inventory under all potential design basis plant transients conditions discussed in GL 86-10, Enclosure 2, Question/Position 5.3.10.

5. Section 3.7, Summary of Shutdown Methods by Fire Area, Fire Area A, Fire Zone 1A, Primary Auxiliary Building, you discuss the shutdown methodology for the subject Fire Area/Zone. In order to assure reactor coolant system (RCS) inventory control, your shutdown summary indicates that Chemical Volume and Control System (CVCS) letdown, realignment of the metering pump suction to the Refuling Water Storage Tank (RWST), and isolation of the

Volume Control Tank (VCT) from the charging pumps will be accomplished from the control room. In reviewing your method of assuring RCS inventory, we are concerned, with a fire in Fire Area A, the above RCS inventory functions associated with Zones 1C, 1B, and 1D could be damaged by fire/combustion by-products. We request that you provide an explanation on how the RCS inventory functions located in Fire Area A are protected in accordance with Appendix R against fire damage. In your explanation you should identify the required RCS cables, their associated shutdown function, and the raceway they are routed in within Fire Area A. In addition, plant layout drawings depicting the cable routings for the RCS inventory control functions in Fire Area A along with the fire protection features (i.e. 1-hour cable fire barrier wraps, 20 ft separation, area of sprinkler coverage, etc.) should be provided in this explanation.

6. Section 3.7, Summary of Shutdown Methods by Fire Area, Fire Area R, Fire Zone 1, Cable Vault, you indicate that the Containment Air Recirculation (CAR) Fans 3 and 4 can be manually repowered from switchgear room "B" via a transfer switch in the cable vault. Explain, with a fire in the cable vault, how the transfer switch and its associated function survives the fire environment and remains operable.

7. In section 3.7, Summary of Shutdown Methods by Fire Area, Fire Area S, Fire Zone 1, Control Room, you indicate that the fire in this area could cause a loss of three out of four CAR fans. In order to provide cooling to equipment/components inside the containment your analysis indicates that one additional CAR fan is required to be repaired and made operable within five (5) hours. This is inconsistent with the Operator Activity Matrix for this area. The matrix requires transfer switch operation in the Cable Vault (Fire Area/Zone R-1). In order for us to get an understanding of the CAR repowering scheme, please summarize the actions required to restore this function.

8. In section 3.7, Summary of Shutdown Methods by Fire Area, Fire Area S, Fire Zone 1, Control Room, you indicated that RC-MOV-501, 512, 513, 524, 526, 537, 538, and 546 could spuriously operate and isolate the steam generators in all four RCS loops. The spurious operation of any of these valves could impact natural circulation and RCS temperature indication. Please explain how these valve functions are protected against fire damage and the potential affects leading to the spurious valve operations. This condition also exists in the Old Switchgear Room (Fire Area/Zone S-2) and Cable Spreading Room (Fire Area/Zone S-3A) and should also be addressed by your response.

9. Section 3.7, Summary of Shutdown Methods by Fire Area, Fire Area S, Fire Zone 1, Control Room, indicates that spurious operation SW-MOV-1, 2, 3, or 4 could cause runout of the available service water pump P-37-D. This section also indicates that in order to assure the operability of the service water pump, the operator is required to operate the MCC breakers powering these valves and manually close them. Our review indicates that there appears to be a discrepancy associated with the positioning of SW-MOV-3 and 4. According to your safe shutdown equipment list in section

3.4, the required position for these valves is open. In order to complete our review of the service water system and its ability to support post-fire safe shutdown operations, please describe the proper system alignment required to support post-fire safe shutdown operations, the actions necessary to prevent pump runout, and demonstrate that these actions can be achieved prior to pump runout occurring. This condition also occurs in the Cable Spreading Room (Fire Area/Zone S-3A) and should also be addressed in your response.

10. Section 3.7, Summary of Shutdown Methods by Fire Area, Fire Area S, Fire Zone 1, Control Room, indicates that the metering pump will be utilized to achieve and maintain hot standby conditions and the RWST will be aligned to the suction of the pump. Our review indicates that there is a discrepancy between the shutdown summary and the operator activity matrix on how this alignment is accomplished. In addition, your worst case fire failure analysis does not address worst case effect on shutdown as a result of a fire causing spurious operation or the loss of function for RWST to charging pump suction valve BA-MOV-373 and/or RWST to metering pump suction valve CH-AOV-278. Your, analysis also did not address any operator actions associated with RWST to charging/metering pump suction valve BA-MOV-32. In order to complete our review of the CVCS post-fire shutdown capability, please describe how the suction to the metering pump is going to be assured, what operator actions will be taken to preclude valve movement resulting from fire induced spurious signals, and what actions will be taken to assure these valves are in the proper position for post-fire shutdown.

11. In section 3.7, Summary of Shutdown Methods by Fire Area, Fire Area S, Fire Zone 1, Control Room, Operator Activity Matrix, you indicate that in order to prevent spurious operation of safe shutdown components a Station Blackout (SBO) condition is imposed. In addition, there is some doubt that service water to the "B" EDG (on-site power source for fire in the control room) can be assured without performing valve realignment prior to starting the diesel. It is our position that imposing a SBO, for up to 30 minutes, concurrently with a fire in the control room is not acceptable and does not meet the performance criteria of Appendix R, Section III.L. In addition, it appears that your alternative shutdown scheme, for a fire in the Control Room, does not meet the guidance provided in GL 86-10, Enclosure 2, Question/Position 5.3.10. Based on our concern that the intentional imposition of an SBO with a fire in the Control Room, places the plant in a more unsafe condition than the fire alone, we request that you reanalyze your alternative shutdown scheme and verify that you have the capabilities to overcome spurious signals and equipment operations without imposing a SBO. In addition, for a fire in the Old Switchgear Room (Fire Area/Zone S-1) and Cable Spreading Room (Fire Area/Zone S-3A) you also intentionally impose an SBO to overcome spurious signals. Your response should also verify that you have the capabilities to overcome spurious signals and equipment operations resulting from a fire in these areas without imposing an SBO.

12. Section 3.7, Summary of Shutdown Methods by Fire Area, Fire Area S, Fire Zone 2, Old Switchgear Room, indicates that it is possible a fire in this area could cause the loss of RCS charging capability and spurious operation of the main feed pumps resulting in overfilling the steam generators. Please explain how this scenario occurs, the RCS level response, including timelines, to this cooldown event, and how you would overcome this transient and maintain RCS inventory within acceptable limits within the pressurizer. This condition also occurs in the Cable Spreading Room (Fire Area/Zone S-3A) and should also be addressed in your response.

13. Section 3.7, Summary of Shutdown Methods by Fire Area, Fire Area S, Fire Zone 2, Old Switchgear Room, Operator Activity Matrix, indicates that the timeline for reestablishing Reactor Coolant Pump (RCP) seal injection is 15 minutes. This appears to be in conflict with the 30 minute timeline specified in your March 29, 1990 submittal. Please explain this discrepancy and justify the correct timeline to reestablish RCP seal injection.

14. In section 3.7, Summary of Shutdown Methods by Fire Area, Fire Area S, Fire Zone 2, Old Switchgear Room, Operator Activity Matrix, you indicate that in order to cooldown to RHR entry level conditions a backup air supply must be aligned to the atmospheric dump valves. Please explain how this is accomplished and describe the adequacy of the backup air supply with respect to supporting cooldown operations to cold shutdown.

15. Section 3.7, Summary of Shutdown Methods by Fire Area, Fire Area S, Fire Zone 3A, Cable Spreading Room, indicates that the isolation functions of all RCP seal return valves (CH-TV-240, 241, and 334) would be damaged by fire. This could cause the seal return flow path to remain open. Please explain what impact this would have on the metering pump's ability to provide RCS makeup.

16. In section 6.1, Emergency Lighting, you explain the illumination levels, design, and the placement of the Appendix R emergency lighting units. This section did not explain how these lighting units are going to be maintained. Please explain your emergency lighting preventative maintenance program and how you intend to routinely demonstrate lighting unit operability and "as found" illumination performance.

17. In section 6.5, Ventilation, you indicated that your ventilation analysis took into account human factors with regard to exposing operators to excessive temperatures. Your analysis indicates that the temperature with a loss of ventilation is not expected to exceed 145 F in the Primary Auxiliary Building, 130 F in the RHR pit, and 150 F in the Old Switchgear Room. We find these temperatures with respect to human factors and an operators ability to carry out manual actions, without special protective equipment, to be excessive, especially under stressful conditions such as a fire requiring reactor shutdown outside the control room. In order for us to complete our review, please provide the appropriate timelines associated with the performance of manual operator actions and repairs and the temperature profiles for all plant areas where manual operator actions

and/or repairs are required to be performed concurrently with the loss of ventilation. These profiles should identify the expected temperature in the compartment at the time plant personnel start the manual action/repair and depict the temperature rise over the period of time required to perform and complete the shutdown tasks.

Information Requested pertaining to the March 29, 1990 submittal:

18. In your response to NRC Question No. 7, you indicated that hot standby can be achieved and maintained with three operators; however, after 8 hours additional operator actions requiring manpower beyond the post-fire shutdown crew will be required to bring the plant to cold shutdown. Your response indicates that by the time long term cooldown actions are required, the fire will have been extinguished and the operators assigned to the fire brigade will be free to assume their norral duties. We do not agree with this position. The operators assigned to the fire brigade could be severely exhausted or may be injured as a result of the severity and complexity of the fire fighting activities. In addition, in the event of a serious fire, smoke control, protection of areas exposed to the fire, and coordination with local fire fighting authorities may continue for a considerable period of time. With a fire condition in a plant area which requires the implementation of alternate shutdown capability, please explain the following: how the site emergency plan is initiated; how offsite communications are established; how call backs for operations personnel who are qualified to supplement the post-fire shutdown crew with the long term cooldown operations are initiated; and how long into the fire event, under worst case conditions, would it take to have supplemental operations personnel in place to bring the plant to cold shutdown.

19. Your response to NRC Question No. 8, indicates that you would use the fire water system to refill the DWST. In addition, your response indicated that this action would be required 3.5 hours into the fire/shutdown event. We are concerned that complete extinguishment of the fire may not have been fully accomplished and that demands on the fire system for cleanup fire-fighting activities may still be required. Please explain, the demand which would be placed on the fire system to support the DWST demand, and explain your position on why another water source (i.e. Primary Water) can not be aligned to support DWST demands.

20. In response to NRC Question No. 10, you indicated that no new technical specifications are being proposed to address alternative shutdown capability. In order to get a better understanding of how you intend to demonstrate operability of your alternative shutdown capability, please explain your preventive maintenance, routine testing and calibration program, and your program for establishing compensatory measures for conditions where your alternative shutdown capability is rendered inoperable.

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