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June 10, 1988

Docket No. 50-213
B12868
Re: 10CFR50, Appendix R

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

Gentlemen:

Haddam Neck Plant
Fire Protection-Response to
Request for Additional Information (TAC No. 66169)

By letter dated September 30, 1987(1), the NRC Staff provided Connecticut Yankee Atomic Power Company (CYAPCO) with a "Request for Additional Information (RAI)" concerning fire protection of safe shutdown capability. Subsequently, on February 8, 1988, a meeting was held between the NRC Staff and CYAPCO to discuss the questions included in the RAI. CYAPCO agreed at this meeting to provide the NRC Staff with written responses to the questions addressed at the February meeting. The purpose of this letter is to provide the NRC Staff with the requested information. The responses to the RAI are included as Attachment 1. In addition, the next revision to Haddam Neck's Appendix R Compliance Review, reflecting these responses, is expected to be submitted to the NRC Staff by December 31, 1988.

We trust you will find this information satisfactory and we remain available to answer any additional questions you may have.

Very truly yours,

CONNECTICUT YANKEE ATOMIC POWER COMPANY

E. J. Mroczka
Senior Vice President

cc: W. T. Russell, Region 1 Administrator
J. T. Shedlosky, Senior Resident Inspector, Haddam Neck Plant
A. B. Wang, NRC Project Manager, Haddam Neck Plant

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(1) Letter dated September 30, 1987, F. M. Akstulewicz to E. J. Mroczka, "Request for Additional Information Concerning Fire Protection of Safe Shutdown Equipment."

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Docket No. 50-213
B12868

Attachment 1

Response to Request for Additional Information (TAC No. 66169)

June, 1988

Attachment 1
Responses to Request for Additional Information

Question 1: Your recent submittals of September 16, 1985, February 6, 1986, April 30, 1986, June 10, 1986, June 13, 1986 and September 9, 1986 concerning post-safe and alternate shutdown do not address the following concerns:

(a) High/lo pressure interfaces
(b) Communication between operators
(c) Time required to attain cold shutdown
(d) Instrumentation for process monitoring
(e) Repairs required if any
(f) Emergency diesel generator fuel supply and replacement time
(g) Protection of reactor coolant pump seals
(h) Procedures for attaining hot standby and cold shutdown

Provide the above indicated information.

Response 1(a): The high/lo pressure interfaces for Haddam Neck have been evaluated by CYAPCO. This evaluation was included in the Reactor Coolant System (RCS) section of the Haddam Neck "Fire Protection Evaluation/Shutdown System Availability" Report, transmitted to the NRC Staff on June 13, 1986. This evaluation is titled "System Interfaces with the Reactor Coolant System."

1(b): After the June 16 - 20, 1986 Appendix R audit, additional information was requested by the NRC. Additional information was sent to the NRC on August 19, 1986, which clarified the availability of different communication systems.

In the last sentence of paragraph 2 of that letter, it stated that channel F1 has emergency backup power, which should have been independent of site power. This was corrected in a letter sent to the NRC on September 26, 1986.

On March 2, 1987, the NRC sent a summary of Appendix R issues, subject "Haddam Neck Inspection 50-213/87-05," and closed items. Paragraph 2.9.2 addresses communications saying that the subject of communications has been adequately addressed and is a closed item. Communications for the New Switchgear Room will be verified prior to start-up from the 1989 Refueling Outage.

1(c): The time required to reach cold shutdown was previously provided to the NRC in a letter dated August 19, 1986, "Haddam Neck Plant Actions Resulting From Appendix R Inspection of June 16-20, 1986." Item #12 of this letter states that cold shutdown is reached within 72 hours.

1(d): In a letter dated August 19, 1986, "Haddam Neck Plant Actions Resulting From Appendix R Inspection of June 16-20, 1986", CYAPCO committed to provide certain instrumentation to meet the requirements of Appendix R. Information concerning the method of implementation was provided to the NRC Staff in detail in a letter dated December 8, 1987, "Haddam Neck Plant, Bimonthly Progress Report No. 7, Design Information Submittal, New Switchgear Building Construction". The parameters to be monitored include the following:

1) RCS Hot Leg or CET (core exit thermocouple) Temperature (wide range)

2) RCS Cold Leg Temperature (wide range)

3) Steam Generator Wide Range Level (1 per steam generator)

4) Steam Generator Pressure (1 per steam generator)

5) Pressurizer Level

6) Pressurizer Pressure

7) RCS Wide Range Pressure

8) Neutron Count Rate

9) Demineralized Water Storage Tank (DWST) Level

10) Metering Pump Control and Indication

The design being implemented provides displays of key parameters at the Appendix R Instrument Panel (ARIP) by utilizing isolated outputs from existing or planned safety grade instrument signals normally feeding the control room. In the worst postulated series of events concerning fires in the Old Switchgear Room (OSR), Cable Vault (CV) or Control Room (CR), Train "B" of these parameters remains operable. Existing Train "A" instruments will be utilized for monitoring from the control room during a fire in the new switchgear building (SGB). During this fire, all Train "B" powered instruments are assumed lost with the loss of their normal power sources.

This set of RCS parameters has been reviewed and determined sufficient to meet Appendix R monitoring requirements to achieve cold shutdown during the postulated fires.

1(e): There are currently no repairs required, however this option may be used if warranted by future changes. The "Fire Protection Evaluation/Shutdown System Availability" will be revised if the need for this option arises from future changes.

1(f): The technical specification capacities of the fuel oil tanks are as follows:

Tank	Capacity
TK-33-2A/2B Underground Storage Tanks	3,250 gallons/ea.
Day Tanks	400 gallons/ea.

The Main Fuel Oil Storage Tank (TK-33-1A) is not identified in the technical specifications. This tank, while not credited for design basis accidents (DBA), has a storage capacity of 42,000 gallcns. For Appendix R scenarios, it is reasonable to assume this volume would be available.

The fuel consumption rate for the emergency diesels are specified for a full load condition where all the engineered safeguard components are in operation. For this condition, the fuel consumption rate is approximately 220 gallons per hour. This consumption rate is conservative for Appendix R conditions in that the emergency diesel generators are powering components limited to Appendix R safe shutdown. The diesels are at a low load condition, therefore, actual fuel consumption will be less than 220 gallons per hour.

The operating time capability of an emergency diesel generator, crediting only the technical specification capacity, can be calculated as follows:

$$\text{Operating Time} = \frac{\text{F/O Storage Capacity}}{\text{F/O Consumption Rate}}$$

$$= \frac{(3{,}250 + 400)\ \text{gallons}}{220\ \text{gallons per hour}}$$

$$= 16.6\ \text{hours}$$

If a single diesel is operating, the operating time capability is approximately 33 hours. Realistically assuming that part or all of the Main Fuel Oil Storage Tank capacity is available for any Appendix R shutdown scenario significantly lengthens the diesel generator operating time.

In the event that emergency diesel operation is required beyond the capacity of the on-site fuel oil storage, a supplier is readily available to replenish the supply. Specifically, Amerada Hess Company is the fuel oil distributor utilized. This distributor has branches located in New Haven and Glastonbury which are in close proximity to Haddam Neck. Under normal circumstances, Amerada Hess can provide fuel oil within 24 hours. Under emergency conditions such as an Appendix R scenario, this time can be reduced. This supplier will be contacted by Operations as required.

In addition, fuel oil may be transferred from the fuel oil storage tank to the underground tanks and the day tanks. The elevations of these tanks relative to each other facilitate gravity feed as a passive means to transfer fuel oil. The base elevation of the TK-33-1A is approximately 21′ 6" (site grade) while the maximum elevation of the underground tanks is approximately five feet below grade. The relative elevation of the day tanks is lower than TK-33-1A, therefore, gravity feed is available under all cases. Level control valves FO-LCV-1700A and B are the only active isolation components in the flowpath between the F/O storage tank and the underground tanks. These valves fail open upon loss of air or power, thus, the passive gravity feed flowpath can not be compromised by a loss of power or air. Potential fire induced spurious closure of these valves can readily be compensated for by having Operations physically vent the air supply of the valves.

The method by which fuel oil is transferred to the emergency generators has been reviewed for all fire areas. A method exists to transfer the fuel to the underground tanks via gravity feed. No fire induced failure of an active component can compromise this flowpath.

1(g): The Westinghouse Reactor Coolant Pump (RCP) functional requirements for normal operations state that seal injection flow should be maintained to the RCP whenever the RCS is being filled or when the RCS pressure is above atmospheric pressure. The intent is to provide a continuous source of cooling and flushing (preventing reactor coolant from entering the seal) during all modes of plant operation.

The RCP seals are normally protected by seal injection flow, with the RCP thermal barrier heat exchanger acting as a backup cooling source when seal injection flow is interrupted. The thermal barrier heat exchanger is cooled by the circulation of component cooling water. Both methods of seal cooling are typically in service when the RCP is running. Although both sources are required for normal operation, pump operation is permitted with the loss of either or both cooling sources for limited prescribed time periods.

RCP operation is permitted, under Westinghouse guidelines, for twenty-four hours with the loss of either seal injection flow or cooling water flow to the thermal barrier heat exchanger, but not the loss of both. However, in a non-design basis event, it is expected that seal integrity, under loss of all cooling due to a loss of all AC, will be maintained for many hours.

During normal plant operations, the No. 1 seal injection flow is provided by the Chemical and Volume Control System (CVCS) charging pumps. The charging pumps discharge into a common seal injection supply line that distributes flow to each individual RCP seal injection line. The injection flow enters the RCP below the No. 1 seal where the flow splits. The majority of the flow enters the RCS while a portion of the remaining flow passes up through the No. 1 seal and returns to the CVCS through the No. 1 seal leakoff line. The continuous seal injection flow provides a supply of filtered water to the No. 1 seal maintaining the seal faces cool and clean.

The injection flow enters the pump above the thermal barrier region. Here the flow splits with a portion passing through the pump radial bearing, the controlled leakage seal package and returning to the CVCS. The remaining portion passes through the thermal barrier heat exchanger and into the RCS where it constitutes a portion of the makeup flow. During Appendix R safe shutdowns, this is the pathway used to provide RCS makeup.

The second method of seal cooling is the RCP thermal barrier heat exchanger. The heat exchanger cools any reactor coolant which may enter the seal inlet chamber prior to the coolant passing through the seal area. The heat transfer medium for the thermal barrier heat exchanger is the Component Cooling Water System (CCWS). Thermal barrier cooling provides the required seal support function and satisfies the RCP auxiliary functional requirements.

From the above discussion, it can be concluded that, for Appendix R safe shutdown scenarios, that either RCP seal injection or RCP thermal barrier cooling must be available to protect the RCP seals. An evaluation on the availability of each method, evaluated on fire area basis, was performed and concluded that for all fire areas there is a method to protect RCP seals.

1(h): Haddam Neck's Appendix R Safe Shutdown procedures are on a fire area basis. The procedures are listed below.

Procedure No.	Title
AOP 3.2-8	Plant Operation Outside of the Control Room
AOP 3.2-6	Control Room Fire
AOP 3.2-34	PAB Fire
AOP 3.2-35	Diesel Generator Room Fire
AOP 3.2-36	Fire in Screenwell House or manway
AOP 3.2-37	Cable Vault Fire
AOP 3.2-38	Auxiliary Feed Pump Room Fire
AOP 3.2-39	Containment Fire
AOP 3.2-40	Switchgear Room Fire

New procedures will be added for fire scenarios in the new Switchgear Building prior to startup from the 1989 refueling outage.

Question 2: Provide examples of the results of your review of breaker coordination to ensure protection against associated circuit concerns.

Response 2: During the June 16-20, 1986 NRC Special Team Inspection, a review of breaker coordination to ensure protection against associated circuit concerns was performed.

In the NRC inspection report I/E Inspection Report 213/86-17, dated August 1, 1986, Section 7.3, Protection for Associated Circuits, Part 7.3.1, Common Bus Concern, it explains that on a sampling basis of a review of circuit breaker coordination was made for associated circuit concerns. Result was "All breaker settings were found to be properly coordinated."

Question 3: Your fire protection reanalysis (June 13, 1986 submittal) does not show that you have examined post-fire shutdown with and without offsite power available. Provide information to show that you have considered both cases.

Response 3: It was not directly stated in our June 13, 1986 submittal that our post-fire shutdown analysis examined the conditions of offsite power available and unavailable. Our electrical analysis considered both conditions. For equipment that we credited to be operational for various fire scenarios, the equipment is free from fire damage and powered by an emergency diesel generator. Normal offsite power is not relied upon to power equipment necessary in bringing the plant to hot and cold shutdown.

Question 4: In Appendix F of your letter of September 16, 1985, you noted that the atmospheric dump valve (ADV) had "limited heat removal capacity" and therefore, additional steam relief paths may be needed for the required hot shutdown heat removal service. You also noted that the ADV may not be available after a control room fire. However, in Section IV, subsection "Main Steam/Auxiliary feedwater," of your June 13, 1986 reanalysis no mention is made of loss of the ADV in a control room fire. There is also no definite statement as to what process is available to remove the steam generated during shutdown except in the paragraph discussing the Terry turbine in which you mention a heat sink via the turbine exhaust. Later, however, in the section related to a turbine building fire, you note the "--adequate capacity of the ADV, steam generator vents, and auxiliary feedwater steam turbine exhausts." Explain these apparent discrepancies and show any corrections, as necessary to the previous discussion.

Response 4: The secondary steam paths available to the operator following a fire are dependent on the fire location and the availability of offsite power. In order to determine the maximum time to reach cold shutdown and the maximum condensate requirement, the fire scenario which results in the minimum available steaming paths was analyzed. This is a fire in the control room with concurrent loss of offsite power. This fire results in the loss of the condenser steam paths and the ADV. The remaining steam paths are: the two steam driven auxiliary feedwater pumps, the four 1" steam generator vents, and the priming steam jet air ejector (hogger). The Appendix R Shutdown Report will reflect this information in the next revision

Questions 5: Your June 13, 1986 letter seems to lack explicitness. For example, in discussing blowdown trip valves (BDTV), you note that the operator has the option to close manual valves to eliminate blowdown in the case of a switchgear room fire. Further, for the RHR system, you note that one RHR pump must be available by protecting its cable or separating the cable from the other RHR pump's cable. In these and other cases you do not state, specifically, whether the blowdown from one or more lines must be stopped, nor do you mention which RHR pump will be protected against a switchgear room fire.

Provide more specific information regarding the particular train or system required to bring the plant to cold shutdown in the event of a fire.

Response 5: Under startup and normal operating conditions, blowdown of the steam generator (S/G) from the tube sheet region is maintained at a predetermined flowrate in order to ensure that proper chemistry conditions are maintained in the S/Gs. During Appendix R shutdown scenarios, it is necessary to maintain inventory and steaming capability in the S/Gs for decay heat removal, therefore, Operations will take action to isolate blowdown from all four S/Gs. This approach is documented in the Main Steam/Auxiliary Feed portion of the Shutdown Report.

The blowdown from each S/G is capable of being isolated by two methods. Each blowdown line has an air operated blowdown trip valve (BDTV) and a manual isolation valve. The BDTVs which are located in the Primary Auxiliary Building (PAB) (A-1A) are designed to automatically go closed upon loss of offsite power or a high containment pressure signal. A loss of control air or power will cause the BDTVs to fail closed. A hot short of the power/control cables for the solenoid of a BDTV would cause a valve to remain open.

Because of the potential for a spuriously opened BDTV, an operator will physically verify BDTV valve position in the PAB and take manual action to isolate the open blowdown line using the appropriate manual isolation valve. While at full power operation, blowdown is typically present and pre-set and maintained at approximately 10 gpm per S/G using the manual throttle valves, therefore, only a minimal amount of S/G inventory loss would result prior to isolation.

For a fire in the PAB manual action is also required. For this scenario, the PAB is inaccessible due to the fire for a period of approximately 30 minutes. After the fire has been extinguished, an operator will be dispatched to verify BDTV position and take manual action to isolate blowdown as required. Once again, at 10 gpm per S/G, the inventory loss is negligible and can be compensated for by auxiliary feedwater.

It is desirable to isolate S/G blowdown to maximize the heat removal potential of S/G inventory during the Appendix R safe shutdown scenario. It has been demonstrated that for all fire areas, a means to isolate S/G blowdown exists. For certain fire scenarios, there may be a short period of time for which S/G blowdown is not isolated. The S/G inventory loss that occurs before blowdown can be isolated has been determined to be negligible.

Operability of one residual heat removal (RHR) pump must be maintained for all fire areas in order to achieve cold shutdown conditions. Currently, both RHR pumps are powered from buses located within the switchgear room (S-2). Additionally, the power and control cables for the pumps run through common fire areas. Haddam Neck has requested, and has been granted, schedular exemptions in order to justify continued operation with this condition until modifications can be performed in 1989 to separate/protect the power sources and cable routings for the RHR pumps. Specifically, the B RHR pump will be re-powered from the new switchgear building and the cabling will be re-routed independent of the A RHR pump.

<u>Question 6:</u> Show that you have the ability to shut the plant down in the event a postulated control room fire damages each of the following individually:

a) Main control board
b) Auxiliary control boards,
c) Safety system lockout display panel (SSLD)

You should assume that the control room becomes uninhabitable for at least one hour after the postulated fire in each case.

<u>Response 6:</u> CYAPCO is not required to assume the Haddam Neck Control Room becomes uninhabitable for one hour after a postulated fire in the control room.

The NRC Staff evaluated and granted Haddam Neck's request for exemption from the requirements of 10CFR50 Appendix R Section III.G for the control room. This evaluation is documented in a letter dated November 14, 1987, "Exemption From the

Requirements of Appendix R to 10CFR50, Section III.G" (SER portion). In the NRC Staff's SER, it is concluded that:

> "in the event of a fire damaging the main control board panel, there is sufficient time and capability for operator action inside and outside the control room to assure safe shutdown".

The NRC Staff also concludes that:

> "in the event of a fire which damages the auxiliary control boards, there is sufficient time and capability for operator actions inside and outside the control room to assure safe shutdown."

With respect to a fire in the SSLD panel, the ability to override spurious operation of RCS pressure reliefs (PORVs) and the main steam isolation valves (MSIVs) will not be compromised. This conclusion is also stated in the SER.

Question 7: In your fire protection reanalysis of June 13, 1986, you do not discuss which systems are used to provide for the following needs throughout the shutdown process:

a) Reactor coolant inventory control,
b) Reactivity control,
c) Primary system pressure
d) Heat removal (hot and cold shutdown)
   (1) From primary system (RCS),
   (2) From secondary system,
e) Support system functions such as heating, ventilating and air conditioning, as required.

Provide this information for each area which contains equipment and cabling for which you take credit for bringing the plant to cold shutdown after a fire.

Response 7: In the June 13, 1986 submittal to the NRC, a systems approach to documentation of the Appendix R shutdown method was used. That is, each system utilized for the Appendix R safe shutdown was listed with a fire area circuit analysis for the components of that system utilized for safe shutdown. Additionally, components in those systems that could adversely impact safe shutdown capability were analyzed and documented.

Included in this document are descriptions of the systems utilized to achieve safe shutdown, however, an explicit breakdown of the systems used for each of the aforementioned functions was not provided. This is a recognized shortcoming of the format of the existing documentation for Haddam Neck.

As part of the 1989 Switchgear Project, a reformatting of the documentation package will be performed while the information for the project is being incorporated. Under the revised format, the systems and components used to fulfill each safe shutdown function will be explicitly listed. As a starting point for the reformatting effort, a summary worksheet has been developed. The worksheet provides a general summary of the systems utilized for safe shutdown. These systems are listed below and provide an interim response to this question.

SYSTEMS USED TO SUPPORT APPENDIX R SAFE SHUTDOWN

- o Reactivity Control
  - Scram reactor for hot shutdown
  - Boration with CVCS for cold shutdown
- o Reactor Coolant Inventory Control
  - Isolate PORVs
  - Isolate RCS letdown
  - All high/low pressure interfaces inherently isolated
  - Makeup to the RCS with CVCS via RCP seals
- o Reactor Coolant System Pressure Control
  - CVCS charging to maintain RCS pressure
  - Depressurization via manual actuation of CVCS auxiliary pressurizer spray MOV
- o Decay Heat Removal
  - a) Hot Shutdown
    -AFW system
  - b) Cold Shutdown
    -RHR system
- o Support Systems
  - Service water system
  - Diesel generators
  - Ventilation as required

Question 8: In Section 4.3.2 of your June 13, 1986 submittal relating to the CVCS, you state "---Essentially the same components are impacted by these fires as by a control room fire. --loss of operability for the majority of the components."

Use of the words "essentially" and "majority" do not contain sufficient information so as to permit a detailed review of this area. Provide detailed information in this section showing what failures occur as a result of a fire. Then, review your entire June 13, 1986 submittal and provide such detailed information as is necessary to permit the staff to review the entire submittal.

Response 8: The June 13, 1986 submittal equates the impact of control room and switchgear room fires on the CVCS by using such statements as "essentially the same" and "majority of components". This choice of wording is perhaps confusing in that the statements do not reflect the detailed analysis that was performed for each individual fire area. The narrative portion of the submittal was intended to summarize the detailed analysis that was performed and is documented in the body of the report and reflected in Haddam Neck's safe shutdown procedures.

To address the NRC's specific concern in Section 4.3.2, the circuit failure analysis matrix is provided in Attachment 2. This matrix reflects CVCS component availability on a fire area basis. This matrix demonstrates that the only difference between the switchgear room and control room fire area is availability of the charging pump main lube oil pumps, P-149-1A and 1B.

The NRC also requested that the entire June 13, 1986 submittal be reviewed to ensure that sufficient information is available to permit a detailed review by the NRC. CYAPCO is currently in the process of defining the shutdown scenario for the new switchgear building configuration. The new design and shutdown methodology will be incorporated in the Appendix R documentation package. During this revision and formatting process, CYAPCO will be reviewing the entire package and correcting any sections containing ambiguous statements such as noted in Section 4.3.2.

Question 9: In Section 4.3.8 of your June 13, 1986 submittal relating to the CVCS you state that manual action is required to open the pressurizer auxiliary spray MOV to collapse the pressurizer steam bubble during the cooldown process. Discuss at what point you plan to collapse the steam bubble in the event of a fire in the cable vault (FA-R-1) or containment (FA-R-3). Explain whether a fire in any other plant area would change the point at which bubble collapse initiation would occur.

Response 9: During the initial RCS cooldown, pressurizer pressure is maintained by controlling pressurizer level via the CVCS. This is true for all fire areas. Once RCS temperatures have been reduced to the RHR entry window, auxiliary pressurizer spray will be manually initiated from inside containment. The auxiliary spray valve will be operated using a handwheel, and will not be damaged by a fire inside containment. Manual operation of auxiliary pressurizer spray is only required immediately prior to RHR entry. For an inside containment fire, sufficient time exists to extinguish the fire prior to requiring operation of the auxiliary spray valve.

Question 10: In the sheet entitled "Summary of Circuit Failure Analysis by Fire Area" for the RHR system in your June 13, 1986 submittal, you show that RHR components fail in an area (Y-14) other than those which you discuss in Section 3.3, "Appendix R Fire Impact and Compensatory Measures." This appears to be true for other systems as well. Discuss where this applies and provide assurance that safe shutdown can be effected in all areas in which fires may occur.

Response 10: In the Cable Routing Matrixes and Circuit Failure Analysis, "Y" areas are indicated on various pages of the evaluation report. The "Y" was used to designate specific outside yard areas. This was done for two reasons. The routing of raceways, either in underground duct banks or in some cases above grade conduit, traverses outside yard areas to get from one building to another. This was documented to show complete raceway routing, rather than leaving a gap. Also, a "Y" indicator was used to show the location of a component when it was located in an outside area. The "Y's" are not fire areas and were only used as a means of providing a complete description of raceway routing. An example of using "Y" indicators would be in the routing of power cables for the service water pumps. In this example, the power cables go through yard area Y-16 in an underground duct bank to the screenwell building. Each power cable is in its own conduit in the underground duct bank. In summary, safe shutdown can be effected in all areas in which fires may occur once the new switchgear room is completed.

Question 11: Your approach to spurious signals/operation seems to be inconsistent with the staff position. On pages 3 and 4 of the section "Main Steam/Auxiliary Feedwater" of your June 13, 1986 submittal you state:

Page 3 "A fire in area S-2 causes MOV-160 to spuriously fail closed and MOV-35 to spuriously fail open."

Page 4 "The Terry turbine steam admission valves are manually opened by the operator at the Terry turbine to compensate for loss of operability or spurious actuation.

In the first case, you seem to be postulate a simultaneous detrimental spurious action (closure of MOV-160) and compensatory beneficial one (opening of MOV-35). The staff's position continues to be that no credit can be taken for a damage state resulting from a fire nor are two (2) or more simultaneous spurious signals postulated. In the second case you seem to equate loss of results in inoperability.

Spurious action would occur as a result of a hot short in a fire.

On the basis of the above, show that you have properly considered spurious action in all areas where a fire could affect equipment required for safe shutdown. Such consideration should include wire-to-wire and cable to cable faults.

Response 11: In our analysis, we examined all the effects of fire damage which included: hot shorts, open circuits, and shorts to ground. The results were documented. In respect to FW-MOV-35, we first described the normal position of the valve which is closed and the required position which is open. We then analyzed the fire areas that all the electrical conductors of the valve pass through and described all the effects of fire damage. The results were, in fire areas S-1, S-2, S-3A, R-1, and R-2 fire damage results in not being able to electrically operate the valve due to open circuits and shorts to ground. We also described that hot shorts could possibly open the valve in the following fire areas: S-1, S-2, S-3A, and R-1. Since the open circuit condition is the worst case, we have to assume manual operation of the MOV for a fire in fire areas S-1, S-2, S-3A, R-1 and R-2. We do not credit a hot short to place the valve in its desired position in fire areas S-1, S-2, S-3A, and R-1.

Question 12: In your August 19, 1986 submittal entitled, "Haddam Neck Plant - Action Items Resulting from Appendix R Inspection of June 16-20, 1986" you noted a temporary arrangement for monitoring the following plant parameters in the cable vault in the event of a control room fire:

Pressurizer Pressure
Pressurizer Level
Steam Generator 1, 2, 3 & 4 Pressure
Steam Generator 1, 2, 3 & 4 Level (wide range)
Reactor Coolant System 1, 2, 3 & 4 T_{hot}
Reactor Coolant System 1, 2, 3 & 4 T_{cold}

Does the use of this instrumentation require some means of transferring from control room circuits to the cable vault in order to effect suitable monitoring? If so, show that a control room fire would not affect such transfer. Show, also, how protection is afforded inadvertent transfer during normal operation. Further, show that a cable vault fire would not result in loss of sufficient control room instrumentation to achieve a safe shutdown.

Response 12: In a CYAPCO letter to the NRC, dated August 19, 1986, CYAPCO identified certain methods of connecting temporary instrumentation in the cable vault for Appendix R monitoring outside of the control room. This configuration was identified as an interim method for monitoring until completion of permanent modifications scheduled for completion in 1989.

Indication of key parameters in the cable vault is achieved by rewiring and re-powering circuits, which normally are powered and indicated in the control room, to a temporary local instrument panel. The details of accomplishing the retermination of these instruments is included in AOP 3.2-8, Plant Operation Outside Control Room. AOP 3.2-6, Control Room Fire, directs the use of AOP 3.2-8 if the Control Room must be abandoned. Since all activities concerning retermination of the circuits are accomplished in the cable vault, the control room will not effect the transfer. During normal operation, inadvertent transfer is not considered credible because of the nature of transfer (reterminating, by procedure, installed plant wiring), and the limited access to the cable vault as a vital area.

Loss of sufficient control room instrumentation to prevent safe shutdown in the event of a cable vault fire is not credible. The cable vault has fire detection and suppression systems to mitigate the onset of a cable vault fire. Also, the combination of: 1) location of cable in conduit (limited intervening combustibles); 2) separate routing of power and instrument cables; and 3) general physical separation of the penetrations for redundant trains, ensures that at least one redundant indication of key parameters would be available following a cable vault fire during this interim period.

Docket No. 50-213
B12868

Attachment 2

Response to Request for Additional
Information (TAC No. 66169)

June, 1988

Attachment # 2

Attachment to Response #8

CONNECTICUT YANKEE
SUMMARY OF CIRCUIT FAILURE ANALYSIS BY FIRE AREA

SYSTEM: CHEMICAL & VOLUME CONTROL SYSTEM - PAGE 1

COMPONENTS	FIRE AREA																					
	A-1A	A-1B	A-1C	A-1D	A-1E	A-2	D-1	D-2	R-1	R-2	R-3	S-1A	S-1B	S-1C	S-2	S-3A	S-3B	S-4	S-5	W-1	Y-14	Y-15
CH-MOV-257	SO		SOE									SO			SO	SO						
PU-SOV-250	SOE											SO			SO	SO						
P-149-1A	SO	SOE						SO							SO	SO						
P-149-1B	SO		SOE				SO								SO	SO						
P-10-1A	SO		SOE				SO															
P-10-1B	SO	SOE						SO														
LT-1806A	EO											0		0	0	0					0	
LT-1806B	EO											0		0	0	0					0	
DH-MOV-544									0		EO	SO			SO	0					0	
DH-MOV-534									0		EO	SO			SO	0					0	
DH-MOV-521									0		EO	SO			SO	0					0	
DH-MOV-507									0		EO	SO			SO	0					0	
DH-MOV-562									0		EO	SO			SO	0					0	
DH-MOV-310									0		EO	SO			SO	0					0	
DH-TV-1841	SOE											SO			SO	SO						
DH-TV-1847	SOE											SO			SO	SO						
LD-MOV-200	SO								SO		SOE	SO			SO	SO					SO	
LD-FCV-202	SOE								SO		SO	SO			SO	SO						
LD-FCV-203	SOE								SO		SO	SO			SO	SO						
LD-FCV-204	SOE								SO		SO	SO			SO	SO						
FH-MOV-578									0		EO	SO			SO	0					0	
FH-MOV-535									0		EO	SO			SO	0					0	

E - LOSS OF COMPONENT/EQUIPMENT
O - LOSS OF OPERABILITY
S - COMPONENT/EQUIPMENT SUBJECTED TO SPURIOUS ACTUATION

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Attachment #2

Attachment to Response #8

CONNECTICUT YANKEE
SUMMARY OF CIRCUIT FAILURE ANALYSIS BY FIRE AREA

SYSTEM: CHEMICAL & VOLUME CONTROL SYSTEM - PAGE 2

COMPONENTS	FIRE AREA																					
	A-1A	A-1B	A-1C	A-1D	A-1E	A-2	D-1	D-2	R-1	R-2	R-3	S-1A	S-1B	S-1C	S-2	S-3A	S-3B	S-4	S-5	W-1	Y-14	Y-1'
FH-MOV-522									O		EO	SO			SO	O					O	
CH-FCV-110	SOE											SO			SO	SO						
CH-FCV-110A	SOE											SO			SO	SO						
P-11-1A	O			EO								SO	O		SO	O						
CH-AOV-278	SO			SOE								SO			SO	SO						
BA-MOV-32	O	EO										SO			SO	O						
BA-MOV-373	SO	EO										SO			SO	SO						
SI-MOV-24	SOE											SO			SO	SO						
CH-TV-334	SOE											SO			SO	SO						
FH-MOV-508									O		EO	SO			SO	O					O	
FH-FCV-295	E																					
CH-MOV-308	E																					
FH-MOV-344	EO											SO			SO	O						
P-18-1A	SO	SOE						SO				SO	SO		SO	SO						
P-18-1B	SO		SOE				SO					SO	SO		SO	SO				SO		
CH-MOV-298									O		OE	SO			SO	O					O	
CH-MOV-292B	SO								SO		SOE	SO			SO	SO					SO	
CH-MOV-292C	SO								SO		SOE	SO			SO	SO					SO	
CH-MOV-290											E											

NOTES: 1. FH-RCV-295 & CH-MOV-308 ARE AIR OPERATED

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