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Docket No. 50-213
A02497

Mr. Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

References: (1) W. G. Counsil letter to D. G. Eisenhut, dated March 1, 1982.

(2) W. G. Counsil letter to Commissioner Hendrie, dated March 19, 1981.

(3) H. R. Denton letter to W. G. Counsil, dated May 10, 1982.

(4) R. C. Haynes letter to W. G. Counsil, dated July 2, 1982.

Gentlemen:

HADDAM NECK PLANT
ADDDITIONAL INFORMATION SUPPORTING
EXEMPTION REQUEST FROM APPENDIX R

Connecticut Yankee Atomic Power Company (CYAPCO) provided to the NRC Staff in Reference (1) an assessment of the fire protection features at the Haddam Neck Plant for conformance to the requirements of 10 CFR 50.48 and Appendix R. In addition, our evaluation of the deviations from Appendix R for each fire zone and proposed design modifications or proposed exemptions from the requirements of Appendix R were also provided. CYAPCO had previously requested an exemption from the schedular requirements of 10 CFR 50.48(c), specifically for additional time to complete the actions described above, in Reference (2).

The Staff granted the exemption request as documented in Reference (3) conditional upon a requirement that the submittal be complete as defined in Reference (3). Reference (3) provided CYAPCO a grace period of 60 days in which to provide any supplemental information to that of Reference (1) in order to comply with the requirements of the exemption.

In addition to the information transmitted via Reference (3), a meeting was held in your Bethesda Office on May 13, 1982 between our respective Staffs for the purposes of discussing the Reference (1) document. This meeting was considered beneficial in that it provided for a fruitful information exchange during which our respective positions regarding the proposed exemption requests for the Haddam Neck Plant could be discussed openly. Several action items resulted from the May 13 meeting.

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The purpose of this document is twofold. First, supplemental information is provided to complement that contained in Reference (1) such that the conditions accompanying the Reference (3) exemption are fulfilled. Secondly, the information requested during the May 13 meeting by the Staff is hereby provided.

Specifically, the following information is provided within this document:

- Section I - Additional narrative and bases regarding the PRA study and the treatment of the control room and switchgear room.
- Section II/Appendix A - Revised and expanded discussions of each of the 15 original exemption requests.
- Section III - Administrative controls.
- Section IV - Discussion of intervening combustibles.
- Section V - Shutdown outside control room.
- Section VI - A revised compliance summary including a discussion of the schedule for proposed modifications.
- Appendix A - Revised safe shutdown Fire Zone Analyses.
- Appendix B - Kerite flame test results for cable coated with Flamemastic.
- Appendix C - Intervening combustibles.
- Appendix D - Haddam Neck Plant Procedure No. AOP 3.2-8, Plant Operation Outside Control Room.
- Appendix E - Compliance status.

Condition (1)a of Reference (3) is fulfilled in that concise statements of CYAPCO's exemption requests are provided in Appendix A. Regarding the revised discussion on the exemption requests, the information provided is intended to fulfill conditions (1) b, and (1) c of Reference (3). Condition (2) does not apply as alternative or dedicated shutdown systems are not being proposed.

I. Probabilistic Risk Assessment -
Treatment of Control Room and Switchgear Room

Probabilistic Risk Assessment (PRA) methodology was utilized combining state of the art fire modeling techniques with probabilistic techniques to determine the overall probability of the Haddam Neck Plant failing to achieve a safe shutdown condition due to a postulated fire. Additional details of the study are provided in Reference (1).

The PRA evaluated every fire zone containing equipment credited for safe shutdown in the Plant. Specific fire zones were determined to dominate the overall fire vulnerability of the plant and were termed key fire zones. The bases for this segregation included an evaluation of:

- The likelihood of fire initiation in the zone.
- The probability of fire propagation in the zone.
- The amount of safe shutdown equipment located within the zone.

The four key fire zones at the Haddam Neck Plant are the switchgear room, the cable spreading area, the primary auxiliary building and the diesel rooms. These key fire zones were analyzed in more detail as discussed in Reference (1).

The control room was not determined to be a key fire zone. The control room is characterized by the following:

- continuously manned,
- low combustible loading,
- ionization fire detectors,
- readily available fire suppression equipment, and
- proposed customized administrative controls including dedicated fire watches for handling flammable liquids.

These features limit both the probability of fire occurrence and the extent of fire propagation should one occur. The result is that any control room fire which may occur would be small, localized and quickly extinguished. The data base of all light - water reactor fires supports this contention. In addition, the two fires which have occurred were small and inconsequential.

It is CYAPCO's contention that with the customized administrative controls proposed for the control room at the Haddam Neck Plant together with the features listed above, control room fire probabilities are extremely low. Furthermore the consequences of such a fire would likely be negligible. In the unlikely event of loss of control room control for a limited number of components, operator actions can be taken to manually control the affected equipment outside the control room. These actions are discussed in more detail within the control room exemption discussion in Appendix A.

Fire vulnerability is determined by the product of the probability of a postulated fire and the consequences of the fire. As discussed above, the probability of a control room fire is remote. Further, due to its size and duration, the resulting consequences would be minor. This results in the control room not being a major contributor to the fire vulnerability at the Haddam Neck Plant, and therefore it is not considered a key fire zone in the Reference (1) PRA.

In this context, the probability of a fire in the control room causing the loss of safe shutdown capability is well below 1x10-5 per reactor year.

The attachments to this letter include the justification for exemption requests on a fire-zone specific basis. Their collective significance with respect to plant-wide fire safety has been assessed via Probabilistic Risk Assessment (PRA) techniques, which were described in Reference (1). This PRA evaluation was instrumental in formulating CYAPCO's revised proposal to modify the switchgear room, as noted below.

One finding of the PRA evaluation was the expected result that the switchgear room is in fact a "key" fire zone. Since its current configuration is more susceptible to damaging fires than desirable using a target safety goal as the criterion, CYAPCO developed conceptual modifications designed to rectify this situation. The resulting improvement in fire safety was quantified, as presented in Reference (1), to be approximately two orders of magnitude.

Subsequent to the docketing of Reference (1), further investigation revealed that the modifications proposed for the switchgear room would not necessarily result in the full enhancement identified, but only a partial improvement. This determination was made as a result of a more conservative interpretation of the methodology associated with the PRA. Once having identified that more extensive modifications would be required to assure the validity of the PRA, CYAPCO developed the modifications for the switchgear room presented herein.

While the PRA is but one element of the justifications for the requested exemptions, CYAPCO opines that this technique is useful in implementing the concept of equivalent protection. Literal compliance with Appendix R is but one method to assure fire safety. Alternate techniques are also acceptable. We have found that the PRA complements the engineering judgement utilized on a fire zone specific basis to result in a cost effective method of assuring overall fire protection safety.

II. Fire Zone Analysis

Section VII of Reference (1) provided an evaluation of each fire zone at the Haddam Neck Plant for compliance with the provisions of Appendix R. Where compliance with Appendix R did not exist, modifications were proposed to bring the fire zone into compliance or an exemption from specific requirements of III.G.2 of Appendix R was and is being requested pursuant to 10CFR 50.48 (c)(6) and 10CFR 50.12(a).

The meeting of May 13, 1982 between our respective Staffs afforded the opportunity to discuss the Reference (1) exemption requests in great detail. Since the Reference (1) submittal, each exemption request has been re-evaluated. Several revised modifications have been engineered which have resulted in compliance for several fire zones. Each exemption request is described in Appendix A with additional discussions to support CYAPCO's remaining exemption requests. It should be noted that out of the original fifteen fire zones for which CYAPCO had requested an exemption from the specific requirements of Appendix R, re-evaluations have resulted in the need for exemptions in only eight specific fire zones.

The fire zone analysis for each exemption is presented in a format identical to that of Reference (1). This will facilitate comparison of the discussions for each fire zone between Reference (1) and this document. Appendix A provides specific fire zone analyses for the following areas:

o Control Room	Area S-1		
o Switchgear Room	Area S-8		
o Cable Spreading Room	Area S-17		
o Diesel Fuel Oil Forwarding Pumps	Area S-21	S-25	
	S-22	S-26	
	S-23	T-2	
	S-24		
o Cable Vault	Area R-1		
o Containment	Area R-2		
o Containment - General	Area R-4		
o Auxiliary Feedwater Pump	Area R-5		
o Screenwell Pumphouse	Area P-1/P2		
o Service Water Pump Cable Duct			

Eight exemption requests are described herein and supersede the exemption requests of Reference (1). The eight areas for which CYAPCO requests exemptions from specific requirements of section III.G.2 of Appendix R are:

1. Switchgear Room
2. Control Room
3. Cable Spreading Room
4. Cable Vault
5. Auxiliary Feedwater Pump Room
6. Screenwell Pumphouse
7. Service Water Cables - Fire Zone S-9

One non specific area has also been added. This area is:

8. Service Water Pump Cable Duct

No additional information concerning Fire Zone S-9, Men's Locker Room, is provided. The information contained in Reference (1) concerning this area and CYAPCO's exemption request for the area is considered full and complete.

III. Administrative Controls

Currently, administrative controls are used to ensure proper performance of safety systems and compliance with NRC regulations. Examples include:

- o maintaining proper boron concentrations and levels in various tanks for safety-related applications,
- o mitigating actions in the event of undervoltage conditions,
- o personnel radiation exposure limitations, and
- o implementing the security plan and the safeguards contingency plan.

CYAPCO proposes to add a customized administrative Technical Specification to control the quantity and use of flammable liquids in specific fire areas at the Haddam Neck Plant. This proposal was discussed at great length during the May 13, 1982 meeting with the Staff at which time the advantages and disadvantages were reviewed.

CYAPCO proposes to restrict flammable liquids from the control room and the cable spreading area. Specifically, Technical Specifications would require written permission from the shift supervisor or supervising control operator prior to introducing flammable liquids in excess of one-half pint into the two areas described above. The Technical Specifications would also require that these liquids be contained in suitable containers which would be non-spillable and have flame arrestors in the nozzles. Container volume would be limited to one quart, independent of the safety features of the containers.

The key provision of these administrative controls would be the requirement to post a dedicated fire watch with appropriate fire fighting equipment to monitor the activity which utilizes the flammable liquids.

Signs would be posted at all entrance ways to the fire areas for which these requirements apply providing additional assurance that the flammable liquid restriction will be adhered to.

Elevating flammable liquid controls to the level of Technical Specifications will provide for higher visibility to both CYAPCO personnel as well as NRC personnel. As such, they would be more readily enforceable. Controls such as proposed herein effectively reduce the potential for fire in the four fire areas described above and add another layer of fire protection defense-in-depth to these zones. Limiting the quantity of flammable liquids available to a fire as well as providing a dedicated fire watch would limit any potential damage which may occur should a fire initiate during the use of such materials.

As stated during the meeting, the Staff's major concern in granting any credit for such a proposal is the difficulty associated with quantifying the reduction in risk associated with the use of such controls. We recognize that the rate of success in the implementation of such controls is highly variable throughout the industry. We note that several reviews have recently been conducted at the Haddam Neck Plant which focused on personnel performance. The Systematic Assessment of License Performance (SALP) as well as Institute of Nuclear Power Operations (INPO) audits have been completed. The results of these audits support CYAPCO's proposal that credit for administrative controls at the Haddam Neck Plant should be granted. Specifically, the following comments were taken from the SALP report for CYAPCO issued in Reference (4).

> 5.b (3) "The licensee has a comprehensive, well organized and effective system of plant procedures."
>
> 6.b (1) "Fire Protection
>
> The resident inspector observed fire protection controls during routine inspections. No items of noncompliance were identified."

6.b (2) "Housekeeping

The licensee has a program which requires that site managers perform a plant tour at weekly intervals to observe equipment material conditions and housekeeping activities and practices. This program has been particularly effective."

In addition, the transmittal letter of Reference (4) states:

"Overall, we find that management attention at your facilities is aggressively oriented toward nuclear safety. Effective use of ample resources has resulted in a high performance in operational safety and construction activities."

In further support of our proposal, we advance our view that the credit being requested in this regard is not conceptually different from that granted by the Staff for other safety-related applications identified above. It would be incongruous for the Staff to accept this approach for certain applications and reject it for others.

CYAPCO's proposed administrative controls for flammable liquids will add another level of fire protection to the control room, switchgear room cable spreading room and cable vault. This added control on flammable liquid introduction into these areas together with the existing and proposed fire protection features described in Appendix A for these areas, will provide equivalent protection to that achieved by fulfilling the requirements of Section III.G.2 of Appendix R to 10CFR50. CYAPCO proposes these additional restrictive administrative controls to support the exemption requests for fire areas S-1, S-8, S-17 and R-1. A formal license amendment application will be docketed upon resolution of the exemption requests for fire areas S-1, S-8, S-17 and R-1.

IV Intervening Combustibles

Section III.G.2 of Appendix R to 10CFR50 specifies the means for ensuring that redundant trains of safe shutdown equipment, located in the same fire area, remain free of fire damage. Item b identifies detection, automatic suppression and separation of safe shutdown equipment by 20 feet with no intervening combustible or fire hazards as one means of compliance with Section III.G.2.

Recognizing that all materials are combustible at sufficiently elevated temperatures, the provision "no intervening combustible or fire hazards" of Section III.G.2.b of Appendix R is subject to interpretation. To ensure Staff cognizance of the approach utilized in our fire hazard evaluations, CYAPCO presents a discussion in Appendix C regarding the interpretation of intervening combustibles in the context of compliance with Section III.G.2.b of Appendix R.

The basis for the definition presented in Appendix C is a consideration of the credible fire which would be expected to occur in any given fire area at the Haddam Neck Plant as well as testing results conducted by the Kerite Company for fire retardant coatings utilized by CYAPCO.

Several of the conclusions presented both in Reference (1) and in Appendix A have been based on an evaluation of intervening combustibles present in each fire zone. CYAPCO has requested exemptions in several fire zones from the requirement of Section III.G.2.b of Appendix R for "no intervening combustibles". In these instances, the evaluation of the specific fire zone concluded that the intervening combustibles present do not compromise the integrity of the redundant safe shutdown equipment in the zone. Details are provided in the discussion sections for individual fire zone analyses.

V. Shutdown Outside the Control Room

At the request of the NRC Staff during the May 13, 1982 meeting in Bethesda, CYAPCO hereby provides Abnormal Operating Procedure No. AOP 3.2-8 for the Haddam Neck Plant. This procedure outlines those actions required to maintain the Plant in a safe condition should the control room become uninhabitable.

This procedure has been reviewed by the NRC Staff under the SEP Topic VII-3, Systems Required for Safe Shutdown. NRC comments will be reviewed by CYAPCO and revisions to AOP 3.2-8 will be made if warranted.

CYAPCO has reviewed this procedure and a walkdown of the procedure has previously been performed.

The current complement of on-shift operations personnel is capable of completing the actions described in AOP 3.2-8. This procedure can be implemented without utilizing members of the site fire brigade. However, fire brigade personnel will be utilized as appropriate upon completion of their fire brigade functions.

VI. Compliance Summary

To complement the information presented in the Fire Zone Analyses presented in Section II above, a revised synopsis of the current compliance status on a fire zone specific basis is provided as Appendix E. It is CYAPCO'S intention to provide the Staff with a revised schedule for the completion of the modifications identified in the attached summary after a review of all fire protection modifications at the Haddam Neck Plant and Millstone Unit Nos. 1 and 2 can be accomplished. This review will establish an optimum fire protection modification implementation schedule for all three of the Northeast Utilities operating nuclear power plants which is compatible with each of the plant's scheduled outages.

This approach will enable Northeast Utilities to better utilize its engineering and construction manpower such that the proposed fire protection modifications can be implemented on a timely and cost effective schedule. The schedules for the fire protection modifications will be provided to the Staff following the completion of supplemental submittals for both operating Millstone Units. As a result of completing this integrated evaluation, we anticipate that additional schedular exemption requests will be necessary.

With the docketing of this submittal, CYAPCO concludes that the requirements of 10CFR50.48(c)(5) for submitting plans to comply with 10CFR50.48(c)(2) and 50.48(c)(3) have been fulfilled. Given the extensive interrelationship between modifications resulting in compliance and those associated with exemption requests, it is not practical to provide detailed implementation schedules at this time. For those modifications associated with fire zones involving exemption requests, we interpret 10CFR to mean that the schedule is tolled pursuant to 50.48(c)(6). For those modifications identified which would result in compliance with 10CFR50.48 and Appendix R, a schedular exemption from the requirements of 10CFR50.48(c)(5) is requested pursuant to 10CFR50.48(c)(6) and 10CFR50.12(a). We are confident that reasonable schedules can be developed promptly after the Staff responds to the proposals contained herein. Such schedules would reflect the results of an integrated evaluation of previously committed plant modifications and other resource considerations in concert with recently articulated Commission policy in this regard.

Subsequent to submitting the enclosed report, CYAPCO will continue verification of the information provided to the Staff. In the event that any clarification of this information is found to be necessary, CYAPCO will provide such clarification as expeditiously as possible.

We remain prepared to interact with the Staff as necessary to bring this issue to resolution.

Very truly yours,

CONNECTICUT YANKEE ATOMIC POWER COMPANY

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FIRE PROTECTION APPENDIX R REVIEW HADDAM NECK PLANT

SUPPLEMENTAL INFORMATION

NORTHEAST UTILITIES
BERLIN, CONNECTICUT

JULY 1982