NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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November 9, 1984

Docket No. 50-423
B11361

Director of Nuclear Reactor Regulation
Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

References: (1) W. G. Counsil to B. J. Youngblood, NRC-CMEB Review Meeting (May 10, 1984), dated October 9, 1984.

Dear Mr. Youngblood:

Millstone Nuclear Power Station, Unit No. 3
Attachment II - Probabilistic Safety Assessment of
Cable Spreading Room Fires at Millstone Unit No. 3

In Reference (1) Northeast Nuclear Energy Company (NNECO) submitted to the NRC the information that will allow the NRC Staff to act favorably on the request for a deviation from the BTP CMEB 9.5-1 Section C.7.c. Attachment II to Reference (1) provided a discussion of a probabilistic risk assessment for a fire in the cable spreading room at Millstone Unit No. 3. An error has been identified in Attachment II concerning the fire related core melt frequency number. The error has been corrected in the revised Attachment II and the entire Attachment II is enclosed with this letter.

If there are any questions, please contact our licensing representative directly.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY
et. al.

BY NORTHEAST NUCLEAR ENERGY COMPANY
Their Agent

W. G. Counsil

W. G. Counsil
Senior Vice President

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STATE OF CONNECTICUT)
) ss. Berlin
COUNTY OF HARTFORD)

Then personally appeared before me W. G. Counsil, who being duly sworn, did state that he is a Senior Vice President of Northeast Nuclear Energy Company, an Applicant herein, that he is authorized to execute and file the foregoing information in the name and on behalf of the Applicants herein and that the statements contained in said information are true and correct to the best of his knowledge and belief.

Jennifer Flowers
Notary Public
My Commission Expires March 31, 1989

Attachment II

Probabilistic Safety Assessment of Cable Spreading Room Fires at Millstone Unit No. 3

Probabilistic Safety Assessment of Cable Spreading Room Fires at Millstone Unit No. 3

Detailed analyses of fire induced core melt accident sequences can be found in the Millstone Unit 3 Probabilistic Safety Study (P.S.S.) in Section 2.5. Each critical fire area in the plant was systematically analyzed to determine frequency of loss of safe shutdown systems. For a hypothetical fire to result in core melt the following chain of events must all occur:

- a fire must be initiated leading to a manual shutdown or automatic scram due to an out of tolerance condition
- the automatic CO_2 fire suppression system must fail to extinguish the fire
- there must be a failure of manual fire suppression
- the fire must then spread to the extent that all cables within the cable spreading room are affected and one entire train of safe shutdown systems is disabled.
- there must be additional random failures or unavailabilities in the redundant train of safe shutdown systems

It is essential to recognize that there are no fire zones in the Millstone-3 design which by a single fire will damage both redundant trains of equipment and result in core damage. This is why additional random failures (not caused by fire) must also occur. This feature was taken credit for in the P.S.S. analysis of fires.

Table I shows the dominant core melt accident sequences which are initiated by fires, their best estimate (mean) frequency of occurrence, and percentage contribution to total fire initiated core melt frequency. To provide a perspective on the significance of these numbers it is important to note the following overall results of the P.S.S.:

- The total core melt frequency due to internally initiated events is: 4.5×10^{-5}/yr.
- The total core melt frequency due to all seismic initiated events is 0.91×10^{-5}*.
- The total core melt frequency due to all fire initiated events is: 0.48×10^{-5}/yr.

Summation of the total core melt frequency from all causes yields: 5.89×10^{-5}/yr. The fire related core melt frequency amounts to 8.15 % of total core melt frequency. The incorporation of a water sprinkler system in the cable spreading room would impact only sequence No. 4 of Table I. It should be noted however that this particular sequence is only 1% of the total core melt frequency. It REV.1

*Recently updated from 1.7×10^{-5}/yr as a result of NRC/LLNL review comments.

should also be noted that incorporation of a water sprinkler system does not assure the total elimination of this 1% contributor to the core melt frequency. Two additional factors must also be considered:

- o No matter what the design is, it is not possible to assure perfect reliability in the operation of water sprinkler systems to automatically actuate given the existence of a fire. American Nuclear Insurers reliability data (documented in Appendix 2-K of the P.S.S.) indicates a mean failure rate of local water sprinkler systems as 4.7×10^{-2}/demand.

- o Additionally, given that a local water sprinkler head successfully actuates given the heat from a cable tray fire, it is not possible to assure that the water will extinguish the fire prior to significant damage to the cables. This is because the density and physical location of individual cable trays may prevent the water from reaching a local fire until it has become more general in location.

When one recognizes these facts, it becomes readily apparent that for the specific case of the Millstone 3 cable spreading room there is no significant difference between net reliability of a CO_2 fire suppression system and a water sprinkler fire suppression system when both automatic actuation and overall fire suppression capability are considered.

Summary and Conclusions

Based on insights gained from the Millstone 3 P.S.S., NNECO has concluded the following regarding the merits of CO_2 vs. water sprinkler fire suppression systems in the cable spreading room.

- o Because of the separation of cabling for the redundant trains of safe shutdown systems in the Millstone 3 cable spreading room, a single fire by itself cannot disable redundant trains of safe shutdown systems regardless of which type of local fire suppression system is used.

- o The only way such a fire can result in a core melt accident sequence is if there are additional random failures, human error, or unavailabilities in the redundant trains of safe shutdown equipment.

- o The probabilities of such additional failures are low enough that when combined with the historical frequency of cable spreading room fires, the overall core melt frequency amounts to only 1% of the total core melt frequency.

- o The only way in which addition of a water sprinkler based fire protection system could provide any benefit in core melt risk reduction would be if the water sprinkler system had essentially perfect reliability in actuating and suppressing fires.

- If such perfect reliability were achievable, which is clearly not possible, the maximum impact would be a 1% reduction in total core melt frequency.

- In view of the fact that perfect reliability is not achievable, the benefits of backfitting a water sprinkler system in the cable spreading room are relatively insignificant.

- In view of the fact that the benefits are relatively insignificant even if the costs were insignificant, conversion to a water sprinkler system could not be justified from value/impact assessment.

- When one realizes that the costs associated with the conversion are in fact significant and substantial it is clearly evident that the impact is not outweighed by the value.

TABLE I

DOMINANT ACCIDENT SEQUENCES CONTRIBUTING TO FIRE INDUCED CORE MELT

Sequence Description	Mean Annual Frequency	Percent Contribution to Fire Core Melt Frequency
1. Fire induced loss of Charging and RPCCW pumps, failure of Water Curtain System and Manual Suppression, RCP Seal LOCA, failure of High Pressure Recirculation	8.E-7	16.7
2. Fire in Switchgear Room, failure of CO_2 Fire Suppression System, failure of Emergency Switchgear, failure of Auxiliary Feedwater, failure of Feed and Bleed (loss of PORVs)	7E-7	14.6
3. Fire in Electrical Tunnels, failure of CO_2 Fire Suppression System, failure of Emergency Switchgear Cables, Failure of Auxiliary Feedwater, failure of Feed and Bleed (loss of PORVs)	6E-7	12.5
4. Fire in Cable Spreading Room failure of CO_2 Fire Suppression System, failure of Auxiliary Shutdown Panel (failure of Manually Sequence Loads onto Emeregency Buses)	6E-7	12.5
5. Fire in Control Room, failure of Manual Fire Suppression, failure of Auxiliary Shutdown Panel (failure to Manually Sequence Loads onto Emergency Bases)	4E-7	8.3