NORTHEAST UTILITIES

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NORTHEAST UTILITIES SERVICE COMPANY
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March 18, 1986

Docket No. 50-423
B12024

Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Phillips Building
7920 Norfolk Avenue
Bethesda, Maryland 20014

Dear Mr. Denton:

Millstone Nuclear Power Station, Unit No. 3
Response to Information Requested Regarding Station Blackout

Introduction

In its letter of December 18, 1985,(1) the NRC Staff requested, pursuant to 10CFR50.54(f), that within 30 days Northeast Nuclear Energy Company (NNECO) furnish an evaluation of the Staff's analysis and conclusions regarding the risk of a station blackout at Millstone Unit No. 3. NNECO, in a December 26, 1985 letter,(2) requested an additional 60 days (until March 18, 1986) in which to respond. By letter of January 13, 1986,(3) the Staff granted NNECO's request for an extension. Subsequently, on January 23 and February 19, 1986, representatives of NNECO met with the Staff to discuss NNECO's evaluation.

This letter transmits the results of NNECO's evaluation of the Staff's analysis and conclusions regarding the risks associated with station blackout at Millstone Unit No. 3. As set forth more fully below, NNECO concludes that this issue does not warrant immediate and individual action on the Millstone Unit No. 3 docket in advance of the thorough and deliberate generic resolution of this issue in the context of Unresolved Safety Issue (USI) A-44 and Generic Issue 23. Accordingly, NNECO concurs with the Staff that the appropriate course of action for addressing this issue is Alternative 5, as specified in the December 18, 1985 letter.

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(1) H. R. Denton letter to J. F. Opeka, dated December 18, 1985.

(2) J. F. Opeka letter to H. R. Denton, dated December 26, 1985.

(3) T. M. Novak letter to J. F. Opeka, dated January 13, 1986.

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Discussion

NNECO's evaluation of the Staff's analysis and conclusions includes the following:

1. an analysis of the Draft Millstone Unit No. 3 Risk Evaluation Report (RER), NUREG-1152, which in a large measure provided the technical basis for the Staff's conclusions,

2. probabilistic calculations using the Staff's methodology with revised data inputs,

3. preliminary evaluation of the Staff's value/impact analysis provided in the December 18, letter and

4. a review of alternatives in light of the evaluations noted above.

Technical:

The risk level perceived by the Staff and reported in its December 18 letter was in part due to assumptions and calculations contained in the Draft Millstone Unit No. 3 RER. Accordingly, NNECO conducted a technical review of this draft report. NNECO's technical review considered pertinent new data, test results and analyses, and the Staff's draft reports on PRA insights transmitted on January 9, 1986.[4] The conclusions drawn from NNECO's evaluation are summarized below.

- A significant portion of the core melt frequency predicted in NUREG-1152 is attributable to an apparent error in interpreting the frequency of loss of offsite power events of various time durations from NUREG-1032. Correction of this apparent error alone reduces the core melt frequency by almost 50%.

- The NRC Staff estimate of Station AC Blackout core melt frequency (8.2×10^{-5}/yr) documented in Appendix B of NUREG-1152 was rounded upwards to 1×10^{-4}/yr resulting in an increase of 22%.

- In terms of the current state of knowledge, the NUREG-1152 assumptions related to physical considerations are overly conservative. Specific examples include:

  (1) Assuming 4 RCP seal LOCAs after 30 minutes without RCP seal cooling. Current experiments sponsored by the Westinghouse Owner's Group and run for as long as 20 hours indicate this type of failure scenario is unrealistic.

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[4] A. C. Thadani and C. I. Grimes letter to J. F. Opeka, dated January 9, 1986. We note that station blackout was not identified as an "insight" in this Staff effort.

(2) Assuming RCP seal leakages of 300 gpm/RCP over the long term given seal failure. This is significantly greater than current analysis and experimental data would indicate.

(3) Given a 300 gpm/RCP leak, assuming core uncovery in 1 hour. This is twice as fast as physically possible because it ignores the impacts of the RCP seal leakage causing long-term depressurization of the RCS. Millstone Unit No. 3 plant-specific best estimate analysis indicates a minimum of roughly 2 hours (assuming no secondary side depressurization).

(4) Assuming the station batteries are depleted in 3 hours. Use of recent Millstone Unit No. 3 start-up test data considering actual loads and battery depletion rates indicates a minimum of 8 hours available before battery depletion.

- In terms of currently available data, the assumptions in NUREG-1152 related to RCP seal degradation rates, RCP seal leak rates, core uncovery times, station battery depletion times, containment performance, and source terms are overly conservative. We believe that it is more appropriate to use best estimate values and have factored these values into our analysis.

- Consideration of new information derived from the work of the Westinghouse Owner's Group on Reactor Coolant Pump Seals would result in a significant decrease in the risk associated with station blackout and should be factored into the Staff's calculations.

- The analytical models used to predict the frequency of core melt contain a number of errors related to time-phasing in the convolution integrals.

NNECO also reviewed the Staff's risk calculations and has provided, in the attached Technical Review, revised calculations using updated/revised data and assumptions. The updated/revised data and assumptions were discussed with the Staff on February 19, 1986. During the February 19, 1986 meeting, the Staff questioned NNECO's assumption regarding diesel generator unavailability (q_f). The Staff questioned whether NNECO's assumed (qf) value of 6.7×10^{-3}/yr, which results in a station blackout contribution to core melt frequency of 1.9×10^{-6}/yr (median value), was based solely on test data which might represent idealized conditions compared to an actual event. NNECO advised the Staff that the Millstone Unit No. 3 diesels have a warmed pre-lube system such that actual emergency starts are not different from planned surveillance testing. Additionally, NNECO noted that diesel unavailability is not the single most significant factor with regard to station blackout contribution to core melt frequency. To further address the Staff's concern, NNECO agreed to perform a sensitivity study with an assumed diesel generator unavailability factor of 2.5×10^{-2}/yr NNECO has determined that, if a factor of 2.5×10^{-2}/yr (which is 3.7 times larger than expected) is used for (q_f), the resulting station blackout contribution to core melt frequency is 3.38×10^{-6}/yr (median value).

NNECO considers the technical discussion provided above sufficient to resolve this issue. However, in an effort to provide as complete a record as possible, we reviewed the Staff's value impact analysis and offer the following comments:

Cost Estimates:

In the Staff's December 18, 1985 letter, the costs associated with the proposed alternatives for reducing station blackout risk at Millstone Unit No. 3 were estimated. NNECO reviewed the methodology and data sources used in NUREG/CR-3840, the report from which the Staff's cost estimates were developed, and performed plant-specific estimates of the costs associated with the Staff's proposed alternatives. NNECO's reviews indicate that the Staff's cost estimates contained in the December 18, 1985 letter underestimate costs by a minimum of a factor of three.

Impact Area:

In the Staff's Regulatory Analysis (Enclosure 1 to the Staff's December 18, 1985 letter) the Staff develops estimated mean dose per reactor year (due to a station blackout) at distances of 50 miles and 150 miles from the plant. The Staff implies that in a station blackout backfit analysis value-impact assessment, doses out to 150 miles might be significant for the Millstone site. However, as noted in the Commission Policy Statement on Safety Goals (48FR10772, March 14, 1983), "the population generally considered subject to significant risk be taken as the population within 50 miles of the plant site." Also, as the Staff recognizes in the Regulatory Analysis, ordinarily CRAC calculations out to only 50 miles would be used in a backfit analysis value-impact assessment.

The NRC proposed 10CFR20, Section 20.304 - Collective Dose Evaluations states:

> "Doses to individual members of the public receiving 0.001 rem or less in a year may be omitted in collective dose evaluations to prevent an unwarranted commitment of resources for controlling or regulating exposures to levels where calculated risks are negligibly small."

The basis behind this proposed section is that 0.001 rem is less than 1% of natural background, and hence, even though large populations may be involved, the additional risk is negligible compared to the existing risk from background. In the Staff's analysis, Millstone Unit No. 3 doses are much less than 0.001 rem to an individual beyond 50 miles and hence, based on the rationale for the proposed revision to 10CFR20, should not be included.

Finally, NNECO does not believe doses out to 150 miles should be considered in a value-impact assessment. As with all sites, Millstone Unit No. 3 meets applicable Part 100 siting criteria. Consideration of doses beyond the normal 50 mile radius used in CRAC calculations (50 miles also coinciding with the limit of Part 50 emergency planning zones) is inconsistent with these Part 100 requirements.

Averted Costs:

We note that the Staff apparently did not use assumed cost savings from accident avoidance in its value-impact ratio and NNECO considers this an appropriate course of action. The technical and legal constraints regarding use of cost savings from accident avoidance in NRC decision making are

subjects currently being addressed by the Commission. Accordingly, NNECO considers any attempt to address and resolve averted costs on this docket inappropriate.

Conclusion

As shown in the attached report, if currently available data, and "realistic" or "best estimate" assumptions were used in NUREG-1152, significantly different results would have been obtained. This would lead to a conclusion that the Station AC Blackout risk at Millstone Unit No. 3 was significantly lower than predicted in NUREG-1152 and that no further plant-specific actions are warranted pending full generic resolution of the Station AC Blackout Unresolved Safety Issue (USI A-44) and other related generic safety issues.

In summary, based on our review of your December 18, 1985 letter and associated NUREGs, NNECO concludes that the Station AC Blackout risk at Millstone Unit No. 3 is significantly lower than predicted in NUREG-1152; also, that the Staff's cost estimates of their proposed modification alternatives are underestimated by at least a factor of three; and that no further plant-specific actions are warranted pending full generic resolution of the Station Blackout Unresolved Safety Issue (USI A-44) and other related generic safety issues. Further, with the current contribution to core melt frequency due to station blackout, major, plant-specific actions may not be warranted following generic resolution of USI A-44.

Accordingly, NNECO concludes that Alternative 5, of the alternatives the Staff identified as "possible fixes" to reduce station blackout contribution to total core melt frequency and risk, is the appropriate approach for the Staff to pursue. This conclusion is consistent with the Staff's recommendation in the RER where the Staff concluded (pages 105 - 106):

> The Staff proposes to await resolution of A-44 and not to implement any of these alternatives now. We believe requirements will be introduced in the near future to resolve A-44 which should reduce the estimated frequency of station blackout induced core melts (from non-earthquake induced events) by about an order of magnitude.

We trust you will find this information satisfactory and sufficient to resolve this issue. As always, we are available to address any questions you or your staff may have.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

J. F. Opeka 3/18/86

J. F. Opeka
Senior Vice President

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

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

Lorraine J. D'Amico
Notary Public

My Commission Expires March 31, 1988