JUN 1 9 1984

Docket No.: 50-423

Mr. William G. Counsil
Senior Vice President
Nuclear Engineering and Operations
Northeast Nuclear Energy Company
P. O. Box 270
Hartford, Connecticut 06141-0270

Dear Mr. Counsil:

Subject: Request for Additional Information for Millstone Nuclear Power Station, Unit 3

Enclosed are requests for additional information which have resulted from the staffs review of the information contained in Amendment 2 to the Millstone 3 Probabilistic Safety Study.

It is requested that you provide written responses to these questions and be prepared to discuss your responses within six weeks from the date of this transmittal.

For further information or clarification, please contact the Licensing Project Manager, Elizabeth L. Doolittle (301-492-4911).

Sincerely,

B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing

Enclosures:
As stated

cc: See next page

CONCURRENCES:

DL:LB#1	DL:LB#1
ELDoolittle:es	BJYoungblood
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DIST:

Docket File	OELD, Attorney
NRC PDR	ACRS (16)
Local PDR	EJordan
PRC System	NGrace
NSIC	
LB#1 Rdg	
MRushbrook	
ELDoolittle	

MILLSTONE

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Request for Additional Information
Millstone Nuclear Power Station, Unit 3
Docket No.: 50-423

JUN 0 8 1984

Questions on Millstone Unit 3 Probabilistic Safety Study
External Events Analysis

720.0 Reliability and Risk Assessment Branch

720.74 1) As reported in the Dames and Moore seismic hazard report, two ground acceleration attenuation equations were derived from MM intensity attenuation using the relationship of Klimkiewicz (1982). The staff questions the validity of these relationships. These ground acceleration relationships predict lower near source accelerations for the same magnitude when compared to those of Campbell (1981a) whose near source eastern United States values are determined using near source western United States strong motion data.

a) Why would near source ground motion (for the same m_b) be systematically lower in the east compared to the west, as you have assumed for these two equations?

b) The staff is concerned that the intensity attenuation of Klimiewicz, (1982) is strongly influenced by intensities less than MMI=IV. It is likely that ground motion is not linear with MM intensity (see for example actual results of Trifunac and Brady, 1975, Murphy and O'Brien, 1978). Weston Geophysical has noted in the New Brunswick earthquake report (pg. 138) that the intensity attenuation model may be low for near epicentral distances. If intensities less than MMI=IV were removed from the intensity-distance set, would the intensity attenuation equation and thus the two ground acceleration attenuation equations result in higher seismic hazard curves compared to those assumed? If so, revise your seismic hazard curves accordingly.

c) Why were relationships such as Battis (1981), which would predict more severe strong motion in the east compared to the west, excluded from your hazard analysis?

720.75 2) As noted in the attached internal staff memorandum (Enclosure 2), the staff questions the validity of the Weston (1982) epicentral intensity to magnitude equation. This equation is given a weight of 50% in your hazard analysis. Provide a response to the concerns in the attached memorandum, and if necessary, revise the seismic hazard curves assumed in your analysis.

720.76 3) As part of an ongoing joint NRC Office of Research and Office of Reactor Regulation effort, the staff is assessing the seismic hazard for all nuclear power plants east of the Rocky Mountains. The Millstone site is included in the first ten sites. Results are discussed and displayed in NUREG/CR-3756, a copy of which was forwarded to you. The hazard results in NUREG/CR-3756 are significantly more conservative than you have assumed in the PSS.

(a) The staff requests your comments on the above report, particularly with respect to differences between LLNL seismic hazard assumptions and those which you have used.

(b) If there is any information in this report which would alter your hazard assumptions provide revised seismic hazard curves.

720.77 4) a) You have assumed in your fragility analysis that the majority of seismic risk results from earthquakes that have magnitudes between 5.3 and 6.3. What is the basis for this assumption? Note that Dames and Moore only states that for accelerations around 0.17g, magnitudes around 5.6 dominate the hazard; while page 2.5-12 of the PSS indicates that over 95% of the total core melt frequency is from accelerations in excess of 0.60g. Considering that the contribution to accelerations of 0.60g and greater is likely to be from large earthquakes would you alter your value of C_D which is used to calculate effective ductility, and if so, revise Table 2.5.1-1A accordingly. If you would not alter your value of C_D, provide justification considering the above comments.

b) You have also assumed that the median scale factors averaged over four model structure frequencies in Table 4-4 and 4-5 are applicable to Millstone. Considering that typical fundamental frequencies are in excess of 8 Hz, and that the scale factors for 8 Hz are systematically lower than you have assumed, justify the value of C_D you have selected. Would this, in addition to 4a alter your value of C_D and if so, revise Table 2.5.1-1A accordingly.

c) What is your best estimate of C_D for 8.54 Hz model structure frequency due to 6.5-7.5 Richter magnitude earthquakes?

720.78 5) The staff questions the validity of using a peak bedrock velocity of 28 in/sec/g for the calculation of sliding-induced failure. This value is inconsistent with both that recommended by Newmark and Hall (NUREG/CR-0098, 1978), and that calculated directly for the Millstone site reported in NUREG/CR-3756 (see question 3). Additionally the value of 28 in/sec/g based upon only a few western United States strong motion records may not be appropriate for the Eastern United States where attenuation characteristics are different. Provide a response to these concerns, and if necessary, revise your estimates of fragilities due to sliding-induced failure.

720.79 6) We are unable to verify the fragility of the diesel generator system based on the information you have provided to date. Expand on what methodology was used, how you developed fragility parameter values (and what values were used in your analysis) based on the report

Colt Industries Operating Corporation, "Seismic Analysis For Emergency Diesel Generator Systems, Millstone Unit No. 3 of NUSCO," Fairbanks Morse Engine Div., Analytical Engineering Dept., Approved by Stone & Webster Engineering, B. A. Bolton, February 14, 1979.

720.80 7) With respect to structure sliding induced failures of attached piping systems, Section 4.1.1.8 of Appendix 2-I of the PSS states that because piping systems are very ductile, the median relative end displacement necessary to cause piping failure was taken to be 4 inches. Provide additional information to justify the basis of considering failure of attached piping systems to be at relative displacement of 4 inches.

720.81 8) It does not appear that your seismic analysis of the service water pump house considers the failure of the adjacent safety-related retaining wall.

(a) Determine the effect on the pumphouse, its piping, or contents if the wall fails.

(b) If failure of the wall can fail the service water system function, estimate the median ground acceleration capacity (and B_R and B_U) of this wall.

720.82 9) You appear to have used test data from the SAFEGUARD shock test program as part of your nuclear plant equipment fragility data base.

(a) Since this program's test motions were of relatively shorter duration, the longest being about two seconds, and of different wave form than those used in nuclear power plant equipment seismic qualification, justify the inclusion of this data in your database.

(b) If upon review you believe the SAFEGUARD data is not admissible, revise your data base.

720.83 10) We believe seismically induced failure of circulating water pipelines may deteriorate the foundation support of the service water pipelines and the electric duct bank to the extent that the pipeline and duct bank may fail. Either modify your analysis to consider such an event or justify that this failure mode of the service water pipelines and the electric duct bank is without merit.

720.84 11. You assumed symmetrical resistance for all sliding analyses. However, for some structures the shear resistance in the two directions may be different and the displacement may be larger than that calculated by assuming symmetrical resistance. We believe this assumption is inappropriate for the intake structure and the emergency generator enclosure. Reanalyze sliding displacement for the intake structure and the emergency generator enclosure, or justify the use of symmetrical resistance.

720.85 12. Your sliding analysis assumed the median sliding coefficient of friction between concrete and rock equals 1.1 but no test data or basis for this value was provided. Either provide a basis for a coefficient of 1.1 or reanalyze your sliding analysis using the 0.7 value recommended in NAVFAC DM-7 when no test data is available.

720.86 13. Your sliding analyses of the control building and the emergency generator enclosure may be nonconservative. We believe you assumed the shear resistance equals the arithmetic sum of the soil friction resistance and the flexural strength of the shear keys. Provide a basis for such an assumption or reanalyze using a failure plane developed along the bases of the shear keys which cut through the soil.

720.87 14) We believe your analysis of the emergency generator enclosure assumed the foundation was anchored in till. We understand the enclosure actually has a foundation partly on till, partly on fill, and partly on till and fill. We believe a new analysis taking into account as-built conditions may show your analysis is optimistic. Demonstrate your analysis is not overly optimistic.

720.88 15) In the seismic analysis, in Section 2.5.1.3 of the Millstone PSS, the probabilities of the various plant damage states, conditional on a given peak ground acceleration, are calculated. These probabilities are uncertain, and the uncertainty distribution for these plant damage state probabilities are obtained by propagating the uncertainties associated with the basic event probabilities on the fault trees. It is our understanding that the uncertainty distributions for the basic events were assumed to be log-normal in the calculations performed in the PSS. However, the correct distribution for the probability (failure fraction, in the terminology of SMA) is given by eq (A-13) of the SMA report, Appendix 2-I of the PSS, and is not log-normal. As an example, the staff, using eq (A-13) of the SMA report, calculates that the mean probability of plant damage state V3, given peak ground acceleration of .8g, is .03, considering only the containment wall failure [illegible] neglecting the failure of the steam generator tubes. In contrast, the mean probability of plant damage state V3 given a peak ground acceleration of .8g is .005, according to the PSS, Table 2.5.1 - 21EE. Similar discrepancies will likely affect other plant damage states (e.g., TE or SE) in the neighborhood of .45g.

Justify using a distribution for the failure fraction different than that given by eq (A-13) of the SMA report, or correct the analysis.

720.89 16) We believe that generic fragility values were used to represent primary system large bore piping in your PSS seismic analysis. Most nuclear power plant seismic design analyses combine SSE and LOCA loads. We believe a less conservative combination of loads was used in the Millstone 3 design process. Therefore, we believe the use of generic fragilities to represent large bore primary system piping may be optimistic. Justify the use of generic fragilities for primary piping or modify your seismic analysis.

720.90 17) If necessary, provide revised estimates of both core melt and public risk due to changes in seismic hazard and/or seismic fragilities resulting from question 720.79-720.89.

720.91 18) Storms of lesser severity than the PMH can have wave run-up which exceeds the height of the door threshold for the service water (SW) pump rooms inside the pumphouse. We understand that due to the design of the circulating water system, water will rise inside of the circulating water pump bays as the water level increases outside.

(a) Estimate the annual frequency that the water level, due to wave action from a storm including run-up, is above the door threshold of the intake structure SW pump rooms.

(b) Estimate the probability that these doors (which provide entry into the SW pump room) will not function as water-tight barriers due for example to door seal leakage or improper door closure.

20.92 19) The intake structure has hatches over the service water pumps. Each service water pump room has two service water pumps. We believe that failure of the two pumps in a pump room due to roof leakage is completely coupled.

(a) What is the probability that the service water pump hatch seals leak during a severe storm and disable the pumps?

(b) Estimate the common cause failure probability for loss of service water pumps in both rooms due to roof leakage.