AUG 3 1 1983

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Docket No.: 50-352/353

APPLICANT: Philadelphia Electric Company

FACILITY: Limerick Generating Station

SUBJECT: MEETING SUMMARY - SEVERE ACCIDENT RISK ASSESSMENT (SARA): SEISMIC RISK

A meeting was held on July 8, 1983, at the offices of Structural Mechanics Associates (SMA) in Newport Beach, CA to discuss the seismic risk segment of the Limerick SARA study performed by Philadelphia Electric Company and its consultants, NUS, SMA, and Dames & Moore. The meeting focused on a discussion of concerns of the NRC staff and its consultant, Jack Benjamin Associates (JBA), resulting from their recent review of the SARA study. A list of attendees and a summary of the major topics of discussion are provided in Attachments 1 and 2, respectively.

Original signed by:

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Division of Licensing

Attachments:
As stated

cc: See next page

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DATE	8/31/83	8/31/83					

MEMO DATED: AUG 3 1 1983

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Attachment 1

MEETING ATTENDEES

Harvey Abelson	NRC
Yueh-Li C. Li	NRC
Howard Hansell	PECO
Garett Parry	NUS
Robin McGuire	Dames & Moore
Bob Kennedy	SMA
Bob Campbell	SMA
Bob Narver	SMA
Don Wesley	SMA
John Reed	JBA
Martin McCann	JBA

SUMMARY OF DISCUSSIONS

1. The median capacity of the Reactor Building/Control Building (RB/CB) structure was discussed. It was agreed that a more rational capacity is 0.90g (as opposed to 1.05g) which is obtained by ratioing the original calculated capacity of 0.74g (before adjustment to 1.05g) as follows:

$$\text{Better Capacity} = \frac{1.46}{1.2} \times 0.74g = 0.90g$$

where 1.46 is the average capacity factor of the lower-story walls in the north-south direction and 1.2 is the original capacity factor associated with the 0.74g median capacity.

The question of diaphragm strength and the capability of the RB/CB structure to transfer loads to the resisting shear walls was discussed. SMA did not do an analysis for Limerick; however, they stated that they did do an analysis for Susquehanna which is almost identical) and found that the slabs had very high capacity.

2. Potential impact between the RB/CB and the Containment was discussed. The gap between the two structures varies between one (1) inch at the base to three (3) inches at the top of the building. SMA said that impact would begin at 0.45g (median level) at elevation 289'. JBA agreed that because of the size of the massive concrete elements in these buildings, structural failure is not a problem. There is a potential for an effect on safety-related electrical/mechanical equipment near the impact location. This issue was not resolved. During the Limerick plant visit on July 15, 1983, the safety-related equipment will be located and this issue will subsequently be reconsidered by JBA.

3. The issue of the correspondence between the hazard and fragility ground acceleration factor was discussed at length. The LGS SARA has three adjustments pertinent to this issue: (1) peak acceleration to effective peak acceleration (1/1.23), (2) ductility factor as given by Riddel and Newmark, (3) a duration factor of 1.4. Two ways of looking at the total effect of all adjustments were given by Wesley and Kennedy of SMA. JBA agreed that for magnitudes less that M6.0 the total effect given in the LGS SARA appears to be reasonable (JBA is continuing to review this issue). The factor of 1/1.23 is inconsistent with the duration factor of 1.4 and should be eliminated; however, the assumed ductility of 2.5 for flexure is low and a value of 3.5 to 4.0 is more is more realistic. The effect of these two adjustments cancel each other.

The issue of the Decollement and Piedmont, M6.3, hazard curves was discussed relative to the hazard/fragility ground acceleration factor. JBA believes that the adjustment between the large and small magnitude events which is the duration factor is not applicable for "large" magnitude events. This issue was discussed but not resolved. JBA requested that data on average magnitude ($\bar{M}$) and average source-site distance ($\bar{I}$) as a function of acceleration for each of the hazard curves used in the LGS SARA be provided by Dames & Moore. This will be made available to NRC and JBA shortly.

4. The capacity of the reactor internals, CRD guide tube, and the reactor pressure vessel includes a damping adjustment factor of 1.3 for an assumed damping of 10 percent in the containment structure as opposed to 5 percent damping used in the dynamic analysis performed in the design. This issue was discussed at length, but was not resolved. JBA feels that a modal damping of 10 percent may be too high. JBA will reconsider problem and make a recommendation to resolve this issue.

5. The buried diesel generator fuel oil tanks were discussed. It was stated by NUS that these tanks are not important components to the important sequences or the final risk; however this will be confirmed and formally stated to the NRC.

6. The fact that the effect of SRV discharge loads on the piping system fragility was not considered in developing the capacity parameters was discussed. SMA explained that these loads are relatively small when compared to the median seismic capacity.

7. The issue of functionability of piping (i.e. constriction of the flow area) at capacity ductility levels was used. Test data shows that at ductility of 10 or greater the reduction of flow area is small.

8. The response factor for values on page 5-60 of Appendix B of the LGS SARA appears to be incorrect. SMA will review and will provide an explanation to the NRC via PECO.

9. The capacity the MSIV was discussed. This is a rugged valve with very high capacity. JBA will visually inspect this valve during the plant visit. Purge and vent valve fragilities were not developed.

These are isolation valves on the containment and probably have high seismic capacities. JBA will also visually inspect these valves during the site visit.

10. The seismic hazard curve for the Decollement source was not computed beyond 1.0g(A_{ps}). The curve was extrapolated beyond 1.0g to make risk calculations.

11. The question of how the possibility of an M=7.0 event should be handled in the hazard analysis was raised. JBA suggested that the Decollement was not necessarily the most appropriate source description to allow an M=7.0 to occur in the east. Rather, modeling source zones based on seismicity patterns and identifiable zones of weakness was preferred. Dames and Moore agreed this was a reasonable approach. However, they felt the total probability associated with the hypothesis that an M=7.0 event could occur was 0.10. The impact of this on risk is not known exactly, however it would increase the number of unbounded curves from 1 to 3, as well as increase the probability weight assigned to the other source zones. JBA will discuss this matter with the staff.

12. The issue of the Crustal Block source hypothesis was raised. The point was made by JBA that the Crustal Block zones do not correlate very well with the patterns of seismicity in the Northeast. In particular, Zone 8 (which is the most seismically active), at its closest point, is approximately 40 miles from LGS. It was pointed out that the boundaries of Zone 8 are questionable in view of the seimicity pattern in the area. Dames & Moore stated that the northwest boundary was coincident with the boundary of the Triassic Basin, and not necessarily based on seismicity patterns. JBA made the point that drawing the boundary exactly coincident with the crustal block boundary implied all earthquakes occur exactly on this zone of weakness, when in fact they may occur in the volume of crust around the boundary. JBA will discuss this matter with the staff.

13. Based on comments by Prof. A. Kafka, JBA's consultant, JBA made the point that if the 1982 New Brunswick, Canada event is to be included in the Piedmont province, there is no reason to exclude the earthquakes near Cape Ann. The reason for this is summarized in a number of recent papers that question the existence of a Boston-Ottawa seismic belt, which might be the basis for restricting the Cape Ann events to New England. If the 1755 Cape Ann event was a 6.0, this could change the estimate of Mmax for the Piedmont. JBA will discuss this matter with the staff.

14. Differences in activity rates between the Indian Point PRA and the LGS SARA were discussed. Dames & Moore agreed to provide either coordinates or a plot of the boundaries used for the Piedmont Source Zone.