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P.O. Box 224, Stone Ridge, New York 12484

December 3, 1982

Prof. David Okrent
Chairman, Extreme External Phenomena Sub-Committee
Advisory Committee on Reactor Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Prof. Okrent:

At the invitation of Mr. Richard Savio, I attended the November 30-December 1, 1982 meeting of the USGS-NRC on the Charleston earthquake. This letter constitutes my report on that meeting and, of course, contains my recommendations covering future ACRS action in this matter. With one exception, I will not review the scientific presentations since, in essence, the state of knowledge regarding Charleston has not changed significantly since the ACRS Sub-Committee meeting on January 28-29, 1982. The USGS assessment of the current state of their studies in the Charleston area is contained in Attachment 1 to this letter.

The one scientific presentation which I want to summarize was by Dr. Zoback, USGS, who presented a discussion on stress measurements that contained a positive and a negative element.

a. On the negative side, he indicated that the interpretation of the Charleston seismic data by Prof. Pradeep Talwani (based on a few focal mechanisms with very sparse data) had changed his opinion on the orientation of principal compressive stress along the southeastern seaboard. He now favors a NE-SW orientation for the stress in that area with NW-SE direction in the remainder of the eastern seaboard. (He was not aware of the data presented by Statton at the recent SSA meeting which indicates a NE-SW direction in the New York area.) This change 'muddles' the picture as far as uniform stress direction along the eastern seaboard and indicates that small areas may contain different stress regimes. There is, however, a paucity of good stress measurements.

b. On the positive side, he suggested two methodologies for significantly enhancing the stress orientation data set at a low cost of using two existing data sets:

1. The NGS triangulation data set which covers the eastern and central United States. The measurements are of angles (not vertical elevations) and could indicate recent movement directions. He indicated that the data exists for 1929 and 1955 in the New Madrid area and might exist for even earlier periods in the Charleston area.

2. Well bore breakout data probably exists for hundreds of bore holes in the eastern and central United States and, if available, could provide a 100 fold increase in our knowledge of stress orientation, according to Dr. Zoback.

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In view of the importance in understanding stress distribution and in view of our meager knowledge of stress, as indicated by the radical change at Charleston and the entire southeastern seaboard mentioned above, it would appear vital to test the feasibility of utilizing these additional data sets.

Turning to the implications of the meeting, the 'clarification' letter from the USGS suggested that "deterministic and probabilistic studies of seismic hazard should be made for individual sites in the eastern seaboard..." and that "...although there is no recent or historical evidence that other regions have experienced strong earthquakes, the historical record is not, of itself, sufficient grounds for ruling out the occurrence in these other regions of strong seismic ground motions similar to those experienced near Charleston in 1886." Dr. Jackson of the NRC Staff indicated that he foresaw no need for immediate action but he indicated that NRR was working on an overall approach to the problems associated with the deterministic and probabilistic studies suggested by the USGS. That plan, as tentatively formulated, would involve several elements including:

- 1) establish priority in research programs to continue seismicity studies and test hypotheses for eastern United States seismicity
- 2) complete the L³ Seismic Hazard evaluation program using expert opinions
- 3) identify large scale tectonic features in other areas--assessment by the affected utilities may be required
- 4) probabilistic risk studies should be carried out by the utilities
- 5) notifications to hearing boards will be sent out where appropriate.

Dr. Jackson indicated that this plan would be finalized within two months.

I strongly recommend that the ACRS Sub-Committee on Extreme External Phenomena meet when NRR's plan is finalized (perhaps late February 1983) to discuss the impact of the USGS 'clarification' with the Staff, the USGS, and the utilities. Jim Devine, USGS, indicated his and his USGS colleagues willingness to meet with the sub-committee or the ACRS to explain their position in detail and I feel that their presence would be vital at such a meeting. I think that RES representatives should participate as well and that a few utilities or utility groups should be represented. The utility position perhaps was articulated by a representative of the Atomic Industrial Forum (AIF) who indicated that they felt the former NRC position was valid: namely, that Charleston is confined and that, until there are valid reasons, there is no need to consider it elsewhere. Furthermore, the AIF said that it would be premature to require industry to carry out expensive programs until industry peer review could be carried out.

In private conversations, several industry representatives indicated an apprehension that the hearing boards and/or intervenors would move to apply Appendix A criteria in a strict sense using the Intensity X Charleston earthquake

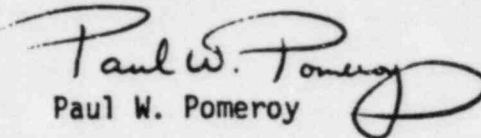
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as the controlling event. In my opinion, the USGS letter brings into sharp perspective the inherent difficulties associated with a strict application of Appendix A criteria and the difficulties associated with the incorporation of probabilistic studies in the licensing decision making process.

I concur with a position of Dr. Jackson, NRR, that this really is a problem not of Charleston but of eastern United States seismicity. Dr. Jackson also described the USGS letter as a major turning point. Perhaps for different reasons, I concur with that evaluation and would urge that the sub-committee evaluate the position and the proposed solutions in both the research and licensing areas in a timely manner.

I trust that this letter will be useful to you in your consideration.

Sincerely yours,


Paul W. Pomeroy

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