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STANFORD, CALIFORNIA 94305

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10 June 1980

DEPARTMENT OF GEOLOGY  
School of Earth Sciences

Att: Mr. Righam skv16

Dr. David Okrent  
Chairman, Seismic Subcommittee, ACRS  
ACRS, Nuclear Regulatory Commission  
Washington, D.C. 20555

NUCLEAR REG. COMM.  
DISCRECY COMMITTEE ON  
REACTOR SAFEGUARDS

Dear Dave:

As you know, I attended the recent meeting which you chaired, June 4, on "Extreme External Phenomena". Many of the discussions were beyond my sphere of competence, but they were nevertheless valuable to me. Several of the topics did involve geological factors, and I will comment on one or two of these subjects.

I think the Site Specific Spectrum Project (Tera Corp.), described by Dr. Larry Wight at the June 4 meeting, is an important advance in the design and application of probabilistic methods. It embodies the sort of subjective judgments that have always entered into the selection and approval of SSE's, but it does so in a more systematic, balanced way, producing a quantitative result with weighted ingredients.

It should be noted that the results of the attractive procedure just mentioned, despite their authoritative appearance, suffer from some of the same input-deficiencies as other methods, and therefore should not be automatically accepted as the ultimate truth. These deficiencies include lack of assurance that we have observed or correctly postulated the strongest earthquake that will ever occur in the source zones, the possibility that known source zones will be enlarged in the future more than any expert has anticipated, and the likelihood that earthquakes of Intensity VI or VII can occur almost anywhere outside the source zones, from coast to coast. In areas of low seismicity the data are still too sparse to allow the testing of these possibilities.

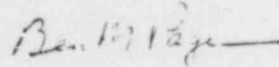
Because I think earthquakes of Intensity VI or VII might occur almost anywhere in the country, albeit at long intervals, I favor increasing the minimum SSE which would be imposed on any nuclear power plant which might otherwise be designed for a smaller event. If expressed in terms of the acceleration due to gravity, it should certainly be greater than the present minimum of .1 g.

The adoption of a stronger minimum SSE should not warrant a waiver of meticulous investigation of any site, and the careful calculation of an SSE value for each case.

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The reason I think we should assume that earthquakes of Intensity VI or VII might occur anywhere is that successive annual maps of epicenters show epicenters appearing almost randomly in areas that were previously blank, and occasionally the intensities are as high as I have indicated. Measurements of crustal stress seem to indicate that most or all of North America is under triaxial compressive stress, either induced by forces which move the lithospheric plates composing the outer part of the earth, or perhaps residual from earlier conditions. Although the stress level is not very high, apparently it is sufficient to activate old faults once in a while. Old faults are widely distributed in ancient "basement" rocks, and since most are covered by younger rock layers, there is no way at present to guess which ones might be appropriately oriented for reactivation. Fortunately, the movement of these old faults must be infrequent; otherwise accrued displacements would become visible at the surface. Nevertheless, prudence demands the recognition of this possible hazard.

Sincerely,



Benjamin M. Page