CT-1515
PDR 11/26/82

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October 15, 1982

Dr. David Okrent
Advisory Committee on Reactor Safeguards
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Dr. Okrent:

Subject: Design Margin Above Safe Shutdown Earthquake (SSE)

My remarks on design margins above the SSE for plants under the Systematic Evaluation Program (SEP) and Near Term Operating Licenses (NTOL) are limited to Class 1E electrical systems.

In NUREG-0821, Integrated Plant Safety Assessment SEP for R. E. Ginna, May 1982, the NRC staff stated: "The ability of all safety-related electrical equipment to function as well as the structural integrity of internal components of all safety-related electrical equipment is being evaluated through the SEP Owners Group program. This program is scheduled for completion by the end of 1982." "Qualification of electrical cable trays is being evaluated by testing through the SEP Owners Group program. This program is scheduled for completion by June 1982." The report went on to state that the SEP Owners Group programs will be considered in the development of the USI A-46, Seismic Qualification of Equipment in Operating Plants, criteria which will be finalized January 15, 1984.

There are two Institute of Electrical and Electronics Engineers (IEEE) standards which cover seismic qualification of Class 1E equipment:

1. IEEE 344-1975, IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.

2. IEEE 501-1978, IEEE Standard Seismic Testing of Relays.

Each of the above standards covers fragility testing. IEEE-344 points out: "Such information is often proprietary but may be used to prove adequacy for a given requirement."

NRC Regulatory Guide 1.100, Seismic Qualification of Electric Equipment for Nuclear Power Plants, accepts IEEE-344 as providing an adequate basis for verifying the seismic adequacy of electrical equipment subject to four NRC recommendations.

The approach for SEP and NTOL plants would be the same. The fragility level of all Class 1E equipment should be determined. Judgment would have to be used, based on risk assessment and cost/benefit analysis, to decide whether the weakest link equipment should be improved to satisfy a higher level of seismic qualification.

Regulatory Guide 1.75, Physical Independence of Electrical Systems, endorses, with certain exceptions, IEEE Std. 384-1974, Standard Criteria for Separation of Class 1E Equipment and Circuits. The following exception noted in Regulatory Guide 1.75 is pertinent to seismic risk:

1. Section 3, "Isolation Device," should be supplemented as follows: "(Interrupting devices actuated only by fault current are not considered to be isolation devices within the context of this document.)"

   Basis: Logical extension of the standard's provisions. The standard defines "isolation device" in terms of preventing malfunctions in one section of a circuit from causing unacceptable influences in other sections of the circuit or other circuits. Under the postulated conditions of a loss-of-coolant accident, loss of offsite power, and a cable tray fire, the proximity of circuits energized from redundant Class 1E power sources could led to concurrent high fault currents (e.g., seismic events) could similarly threaten the redundant main circuit breakers. Tripping of the main circuit breakers would cause the loss of emergency power to redundant "divisions" of equipment. It is recognized that proper breaker or fuse coordination would preclude such an event. However, because the main breakers are in series with the fault and could experience momentary currents above their setpoints, it is prudent to preclude the use of interrupting devices actuated only by fault current as acceptable devices for isolating non-Class-1E circuits from Class 1E or associated circuits.

   Breakers that trip on receipt of a signal other than one derived from the fault current or its effects (e.g., an accident signal) are acceptable since the downstream circuits would already be isolated from their respective power sources under accident conditions and could pose no threat to these sources.

For loss-of-coolant accidents (LOCA), load shedding of non-Class-1E loads from Class 1E busses is automatic. For seismic events, where a loss of offsite power occurs but a LOCA does not develop, it is conceivable that faults could develop in non-Class-1E circuits and loads connected to Class 1E power sources. An analysis should be conducted to determine whether non-Class 1E loads should be automatically disconnected from Class 1E power sources when a Safe Shutdown Earthquake (SSE) occurs.

Sincerely,

Walter C. Lipinski

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WCL/at

cc: R. Savio