

Issue Paper

Analysis of Earthquake Impact on NPP EP

PURPOSE:

The purpose of this paper is to delineate the staff position on analysis of earthquake impact on nuclear plant emergency preparedness (EP) in support of the State of the Art Consequence Analysis project (SOARCA).

BACKGROUND:

The SOARCA staff identified earthquake as a credible severe accident initiator within the project guidelines. The staff realistically modeled offsite emergency response and public evacuation to more accurately estimate consequences. The analyses did not model the potential for an earthquake to disrupt emergency response and public evacuation efforts. The ACRS has challenged the staff regarding the need for a detailed technical analysis of the impact of earthquake on offsite EP.

CONTACT: Randolph L. Sullivan, NSIR/DPR
(301) 415-1123

J/20

DISCUSSION:

The Commission addressed the issue of earthquake impact on EP during licensing of the Diablo Canyon and San Onofre nuclear plants. In 1984 the Commission published proposed amendments to its EP requirements that stated that neither emergency response plans nor evacuation time estimates need consider the impact on EP of earthquakes which cause, or occur proximate in time with, an accidental release of radioactive material from a nuclear power reactor. These amendments proposed to adopt by rule the Commission's interpretation of its existing EP rules in the Commission's decisions in the San Onofre and Diablo Canyon licensing cases. (CLI-81-33 and CLI-84-12)

The Commission's decision in Diablo Canyon was based on the view that for earthquakes up to and including the Safe Shutdown Earthquake (SSE), the seismic design of the plant rendered extremely small the probability that such an earthquake would result in a radiological release. All nuclear plants are required to be designed to safely shutdown for all earthquakes up to and including an SSE which is selected for each site based on a review of site geology and seismicity. While the regulations do not specifically address the effects of earthquakes on EP, the regulations do go into great detail about how seismic considerations are to be accounted for in plant siting and design.

The Commission stated that while a radiological release might result from an earthquake greater than the SSE, the probability of such an earthquake was extremely low and emergency response would have marginal benefit because of its impairment by offsite damage. In addition, the Commission stated that the likelihood of a contemporaneous occurrence of both a radiological release from the plant caused by an event other than an earthquake, and an earthquake that would complicate emergency response was believed to be extremely low. The Commission noted that emergency plans have considerable flexibility to handle the disruptions caused by natural phenomena which occur with far greater frequency than do damaging earthquakes and this implicitly includes some flexibility to handle disruptions from earthquakes as well.

An en banc decision of the US Court of Appeals for DC affirmed the Commission's interpretation of its EP rules. (D.C. Cir. 1986)

The Commission decided that a rulemaking which would simply make explicit the Commission's interpretation of its rules was unnecessary, and thus withdrew the proposed amendment to Part 50 which would have explicitly incorporated into the NRC regulations the decision reached in the San Onofre and Diablo Canyon licensing proceedings that no specific EP measures need be established for earthquakes. The Commission withdrew its proposed amendment to the EP regulations in October 1986.

In its response to comments on the proposed rule, the Commission made the following Points in SECY-86-268:

- The Commission found that emergency response plans, as required by NRC regulations, generally have considerable flexibility to respond to a variety of adverse conditions including those resulting from earthquakes.

- The Commission noted that the EP requirements and guidance have been developed thru the coordinated efforts of NRC and FEMA, and that FEMA shared the NRC's view that emergency plans have considerable flexibility to respond to a wide variety of adverse conditions.
- The Commission recognized that the actual amount of flexibility is difficult to establish with certainty and cannot be quantified.
- While the regulations are intended to provide emergency plans which respond to a range of serious accidents, the Commission stated that it was never the intent of the regulations and it is not reasonable to expect that the response to every accident will be the same. In an extremely severe seismic emergency situation, reconnaissance would ascertain the actual offsite damage, and an actual emergency response that takes advantage of the flexibility inherent in approved emergency plans would still retain some effectiveness in reducing radiological effects.

In view of the above history, the staff is concerned that a limited technical analysis of earthquake impact on offsite emergency response and public evacuations may conflict with Commission policy that is rooted in plant design criteria and established emergency response capability. Additionally, publication of SOARCA reports with such an analysis may unnecessarily confuse stakeholders or perhaps reopen legal proceedings on difficult licensing issues without any new substantial information that would warrant a challenge of the current ruling.

STAFF RECOMMENDATIONS:

While the staff views the technical work to be possible, it would need to be done on a conservative and bounding basis that can result in potentially unwarranted challenges to the established licensing decision. Therefore, the staff recommends that a sensitivity analysis be performed to determine the impact of a delayed or slower evacuation upon health effect consequences. This analysis represents the potential effects of earthquake as well as other factors that could degrade emergency response and would address the ACRS's concern.