50-275/323

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 27, 1998

Mr. Richard Stevenson
92 Standish Road
Colchester, Connecticut 06415

Dear Mr. Stevenson:

I am responding to your letter of March 16, 1998, in which you raised a number of questions about the Diablo Canyon Nuclear Power Plant (DCNPP) and its ability to withstand the effects of an earthquake. Specifically, you were concerned that the plant, which is made to withstand an earthquake with a magnitude 7.0 on the Richter scale would crumble under the force of a 9.0 magnitude earthquake, which was the predicted magnitude of a future earthquake along the San Andreas fault. Our response to your concern is based on the fact that the U.S. Nuclear Regulatory Commission (NRC) is the Federal agency responsible for regulating nuclear reactor safety.

NRC granted an operating license to DCNPP Unit 1 in 1984 and to Unit 2 in 1985. In accordance with NRC regulations, as part of the licensing process, the Pacific Gas & Electric Company (the licensee) was required to obtain the geologic and seismic information for the DCNPP location, near San Luis Obispo, California, to determine if it was suitable to locate a nuclear plant there and to provide reasonable assurance that a nuclear power plant could be constructed and operated at this site without undue risk to the health and safety of the public.

Before a nuclear plant may be built, the NRC staff must review the characteristics of the site selected for plant construction. As part of the application for a license, an applicant must develop design bases for the plant to address a number of prescribed site parameters and to ensure that the plant can operate safely over its licensed life.

The design bases for each nuclear power plant must take into account the potential effects of earthquake ground motion. The seismic design basis, called the safe shutdown earthquake (SSE), defines the maximum ground motion for which certain nuclear plant structures, systems, and components necessary for safe shutdown are designed to remain functional. That is, the plant and all of its components must be able to experience the most severe earthquake that could reasonably be expected and still be able to be brought to a safe shutdown condition.

The DCNPP SSE is based on the assumed occurrence of a magnitude of 7.2 earthquake on the Hosgri fault, approximately four kilometers from the site. This is the closest known fault in the site area. This magnitude 7.2 event is larger than any earthquake known (or recorded) to have occurred on the Hosgri fault and the resulting ground motion estimate is larger than any that which could reasonably be expected at the DCNPP site from any other seismic source, including the San Andreas fault. The determination of the SSE was made following the criteria and procedures required by NRC regulations and using a multiple hypothesis approach in which several different methods were used to determine each parameter. Further, sensitivity studies were performed to account for the uncertainties in the earth sciences.

In addition, each unit has design margins (capability) well beyond the demands of the SSE. The ability of a nuclear power plant to resist the forces generated by the ground motion during an earthquake has been thoroughly incorporated in the design and construction. As a result, nuclear power plants are able to resist earthquake ground motions well beyond their design basis and far in excess of the ground motion that would damage residential and commercial buildings designed and built to standard building codes.

The geologic and seismic siting and the design of DCNPP were reviewed by the NRC staff, the U.S. Geologic Survey, the National Oceanic and Atmospheric Administration, and the Advisory Committee on Reactor Safeguards, and were litigated before the Atomic Safety Licensing Board and the Atomic Safety Licensing Appeal Board before being licensed by the Commission. The NRC continually monitors the adequacy of the design of nuclear power plants in order to protect public health and safety.

You expressed a concern about a magnitude 9 earthquake occurring on the San Andreas fault and causing damage to DCNPP. Although the geologic evidence appears to indicate that the largest event to have occurred on the San Andreas fault in the Quaternary Period (last 2 million years) was in the magnitude range of 7.5 to 8.0, to evaluate the potential ground motion at the DCNPP site from a large earthquake on the southern San Andreas fault, the NRC made the very conservative assumption of a magnitude 8.25 strike-slip earthquake at the closest distance of the San Andreas fault to the site, 80 kilometers. Using this information and the most recently published information on the attenuation of earthquake ground motion in California,[1,2,3,4] we found that the level of ground motion to which DCNPP was analyzed is much higher than the level of ground motion to be expected from a major earthquake (magnitude 8.25) on the San Andreas fault.

In summary, under the current tectonic regime, the San Andreas fault is not capable of being the source of a magnitude 9 earthquake and the DCNPP is designed to withstand earthquake ground motions higher than those that could be produced by the largest earthquake that could occur on the southern San Andreas fault.

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[1]Abrahamson, N. A. and W. J. Silva, "Empirical Response Spectral Attenuation Relations for Shallow Crustal Earthquakes," *Seismological Research Letters*, **68**, 1997, 94-127.

[2]Boore, David, M., William B. Joyner, and Thomas E. Fumal, "Equations for Estimating Horizontal Response Spectra and Peak Acceleration from Western North American Earthquakes: A Summary of Recent Work," *Seismological Research Letters*, **68**, 1997, 128-153.

[3]Campbell, Kenneth, W. "Empirical Near-Source Attenuation Relationships for Horizontal and Vertical Components of Peak Ground Acceleration, Peak Ground Velocity, and Pseudo-Absolute Acceleration Response Spectra," *Seismological Research Letters*, **68**, 1997, 154-179.

[4]Sadigh, K., C.-Y. Chang, J. A. Egan, F. Makdisi, and R. R. Yongs, "Attenuation Relationships for Shallow Crustal Earthquakes Based on California Strong Motion Data," *Seismological Research Letters*, **68**, 1997, 180-189.

I hope that you find this information responsive to your concern and recommend that you visit the NRC web site, WWW.NRC.GOV, for further information about NRC and its regulatory activities. We thank you for your interest in nuclear and public safety.

Sincerely,

Original Signed By

William H. Bateman, Director
Project Directorate IV-2
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

cc: The Honorable Christopher J. Dodd
United States Senate
Washington, D.C. 20510-0702

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