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To: C. Siess and D. Okrent, ACRS Subcommittees on Diablo Canyon and Extreme External Phenomena

From: George A. Thompson, ACRS consultant

Subject: May 24 meeting in Los Angeles and my evaluation of the new technical data on the Hosgri fault

Two important new sets of data bear on the tectonic setting of the Diablo plant: (1) high resolution seismic reflection sections which show east-dipping thrusts along the Hosgri trend (Crouch et al, 1984) and (2) earthquake focal mechanisms that show thrusting at the latitude of the plant, right-oblique thrusting near San Simeon, and right-lateral slip north of San Simeon (J. Eaton, USGS, manuscript, as quoted at the meeting but not yet available). I had the privilege of inspecting several of Crouch's seismic sections (as opposed to the line drawings in his published paper), and I believe that his interpretation of thrusts in the Hosgri fault zone is substantially correct.

In the light of the new evidence we now need a reexamination of the regional tectonic movements and we need a reassessment of details near the plant. My preliminary analysis is as follows: (1) North of the Monterey Bay evidence is strong for more than 100 km of horizontal displacement west of the San Andreas fault. The paper by Clark et al, 1984, in the same volume with the Crouch et al paper, develops the evidence from Pt. Reyes to Monterey. I think this zone of displacement might extend southward west of the Santa Maria basin instead of connecting with the Hosgri fault. The Hosgri zone always looked too segmented to be a major strike-slip fault, and that interpretation was accepted as a worst case. (2) The M 7.3, 1927 Lompoc earthquake was debated at length in earlier reviews, and I concluded (partly on evidence of sea-bottom offset in reflection records) that it was most likely associated with the Transverse Range structures and not with the Hosgri fault. Because the earthquake data are old and not totally convincing, it was possible to assume that the Lompoc earthquake occurred on the Hosgri fault -- again a worst-case assumption. Both points (1) and (2) add a measure of reassurance for Diablo Canyon.

I recommend (1) a critical review and evaluation of the regional tectonic questions such as those noted in the preceding paragraph, (2) independent examination of the relevant seismic reflection records, (3) review and reconsideration of all onshore and near-offshore faults in light of the new evidence that they may connect with an underlying thrust fault (at what depth?) (I consider this to be potentially the biggest problem.), (4) analyze the engineering consequences of the new fault geometry. I am not sufficiently

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expert to make any independent prediction of the outcome of an engineering restudy recommended in point (4).

To put some perspective on the new developments at Diablo Canyon, I agree with James Devine of the U.S. Geological Survey who was quoted by the NRC staff as regarding the new information to be "not startling". It's reassuring that the Hosgri does not appear to be a major strike-slip fault. We have always known that there were reverse faults and therefore a component of compression perpendicular to the San Andreas fault in the region. We also know that regionally the maximum principal stress in California is oriented north-south to slightly clockwise of that direction, and this explains the dominant movements such as the San Andreas. Preliminary staff estimates of the design consequences of the new findings suggest that the changes will not be drastic. I tend to agree in the sense that most of the geologic factors will likely make hazard estimates smaller, but the geometry of the underlying thrust fault still needs to be evaluated in detail. And, as stated before, I am not prepared to make any estimate regarding the engineering calculations.

In summary, my information so far as it goes, indicates that Diablo Canyon could be safely allowed to operate while review and re-study is continued. In forming this opinion, however, I must rely heavily on preliminary statements of the NRC staff and U.S. Geological Survey consultants.