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SEISMICITY RELATED TO THE HOSGRI FAULT ZONE

By John C. Maxwell

High quality reflection seismic surveys covering the Hosgri Fault zone southwest of the Diablo Canyon Nuclear Plant site clearly show a dominant pattern of easterly dipping thrust faults which are steep near the surface and flatten with depth (Crouch, Bachman and Shay, 1984). There is no evidence in this data for a through going major strike slip fault such as that postulated in arranging the SSE for the plant. Small, subsidiary vertical faults locally displace the ocean bottom sediments demonstrating recent faulting. Some amount of strike slip motion may be involved in this part of the fault zone, but it has not been large enough to generate a through going master fault.

Evidence for strike slip faulting on the Hosgri zone is indirect, depending mainly on an assumed connection to the San Simeon - Point Sur San Gregoria fault zones to the north. Seismic studies of earthquakes along this trend (Eaton, §1984) show right lateral horizontal slip on vertical northwesterly trending planes within the Point Sur-San Simeon trends, with oblique faulting near San Simeon, while to the south near Point Sal and Santa maria, deformation along the Hosgri and parallel trends occurred by southwesterly directed overthrust faults. Eaton's observations support the interpretation of their seismic data by Crouch, et al.

Questions

Given that faulting offshore from the Diablo Canyon plant is dominantly by thrusting rather than strike-slip displacement:

- (1) What magnitude of earthquakes might be generated here?
- (2) What faults, if any, continue beneath the plant site? Do the faults die out within a sub-horizontal sedimentary section (possibly somewhat broken at depth), or do they cut into basement rocks?

- (3) What is the nature of the basement beneath the plant site?
Are Basement rocks rigid (Salinian crystalline rocks), broken (Franciscan melange) or layered (Great Valley or Coastal Facies Franciscan)?
- (4) Is there evidence indicating upthrusting of basement rocks beneath the plant site?

Opinion

The SSE of 7.5 was based on the presumed presence of a major strike slip along the Hosgri zone. It does not seem likely that a fault of this magnitude would result from the thrust faults and folds mapped seismically by Crouch, et al.

The question of possible basement involvement in the thrusting is crucial. A magnitude 6.4 (San Fernando, 1971) to 7.3 (Lompoc, 1927 (?)) may be anticipated if rigid basement is involved. Only smaller earthquakes would be anticipated if faults are confined to overlying sediments and do not displace rigid basement rocks.

Faults near the plant site have been determined to be not capable. Therefore, no active segment of an underlying thrust fault appears to be present beneath or adjacent to the plant site. An SSE of mag 7.5 does indeed seem to be adequately conservative.

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