



UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON 25, D.C.

C O P Y

July 8, 1964

Mr. C. C. Whelchel  
Vice-President  
Pacific Gas and Electric Company  
245 Market Street  
San Francisco, California

Dear Mr. Whelchel:

Question #4 of our letter of May 19, 1964 referred to the need for clarification of the procedures and criteria Pacific Gas and Electric Company proposes to use in the design of the structures and components to withstand oscillations and vibrations from major earthquakes. At the meeting on June 17, 1964 between representatives of the company, of the ACRS and of our staff, we attempted to amplify this question and its relation to Question #1 of our previous letter.

As we pointed out at the meeting, the opinion is held by some that the spectrum of ground motions in case of another major earthquake on the San Andreas fault may be more severe than that which occurred in the El Centro Earthquake. Further, such an earthquake might be accompanied by shear displacement up to a possible 3 feet, and would likely be followed by aftershocks which might be as large as the El Centro earthquake of 1940.

Against the possibility of earthquakes of these dimensions, we would like to explore the design arrangements and their feasibility in protecting the plant against damage which would result in hazards to the health and safety of the public. At the meeting, we requested Pacific Gas and Electric Company to consider these questions:

1. Assume an earthquake having a vibration spectrum similar to that of El Centro but with maximum acceleration of  $2/3 g^*$ ; velocities up to  $2\ 1/2$  ft./sec.; ground displacements up to 3 ft.; shear displacement (faulting) of 2 ft. in the foundations of the plant, and with the occurrence of an aftershock equal to El Centro before remedial action could be taken. What plant arrangements, design criteria and procedures could be developed to prevent impairment of functions of structures, equipment and systems important to safety? This should include method of analysis indicating the margins to allowable stress or deformation limits.

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2. Assume an earthquake having a vibration spectrum similar to that of El Centro but with accelerations generally up to  $2/3$  g plus intermittent pulses of acceleration up to  $1$  g\*; velocities up to  $2\ 1/2$  ft./sec.; ground displacements up to  $3$  ft.; shear displacement (faulting) in the plant foundations of  $3$  ft.; and with the occurrence of an after-shock equal to El Centro before remedial action could be taken. What plant arrangements, design criteria and procedures could be developed which would assure shutdown and maintenance of the plant in safe shutdown condition?

Sincerely yours,

/s/

Harold L. Price  
Director of Regulation

\*The maximum of acceleration, velocity and displacement would not occur for the same periods of vibrations.