

## DAVID BURTON SLEMMONS

CONSULTING GEOLOGIST  
2995 GOLDEN VALLEY ROAD  
RENO, NEVADA 89506

(702) 972-4965

October 21, 1984

Dr. Steve Brocoum  
Geosciences Branch  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Steve:

This letter provides comments on my trip from Reno to Washington, D.C. for the NRC, USGS, and PG&E meeting on the Diablo Canyon Operating License Seismic Condition. The following observations are based on this meeting, background knowledge of this site, and the general requirements needed for licensing. These impressions may need to be modified and expanded as more detailed information becomes available to me.

October 2, 1984 (8:00a PDT to 10:45p EDT): Travel from Reno to Washington, D.C.

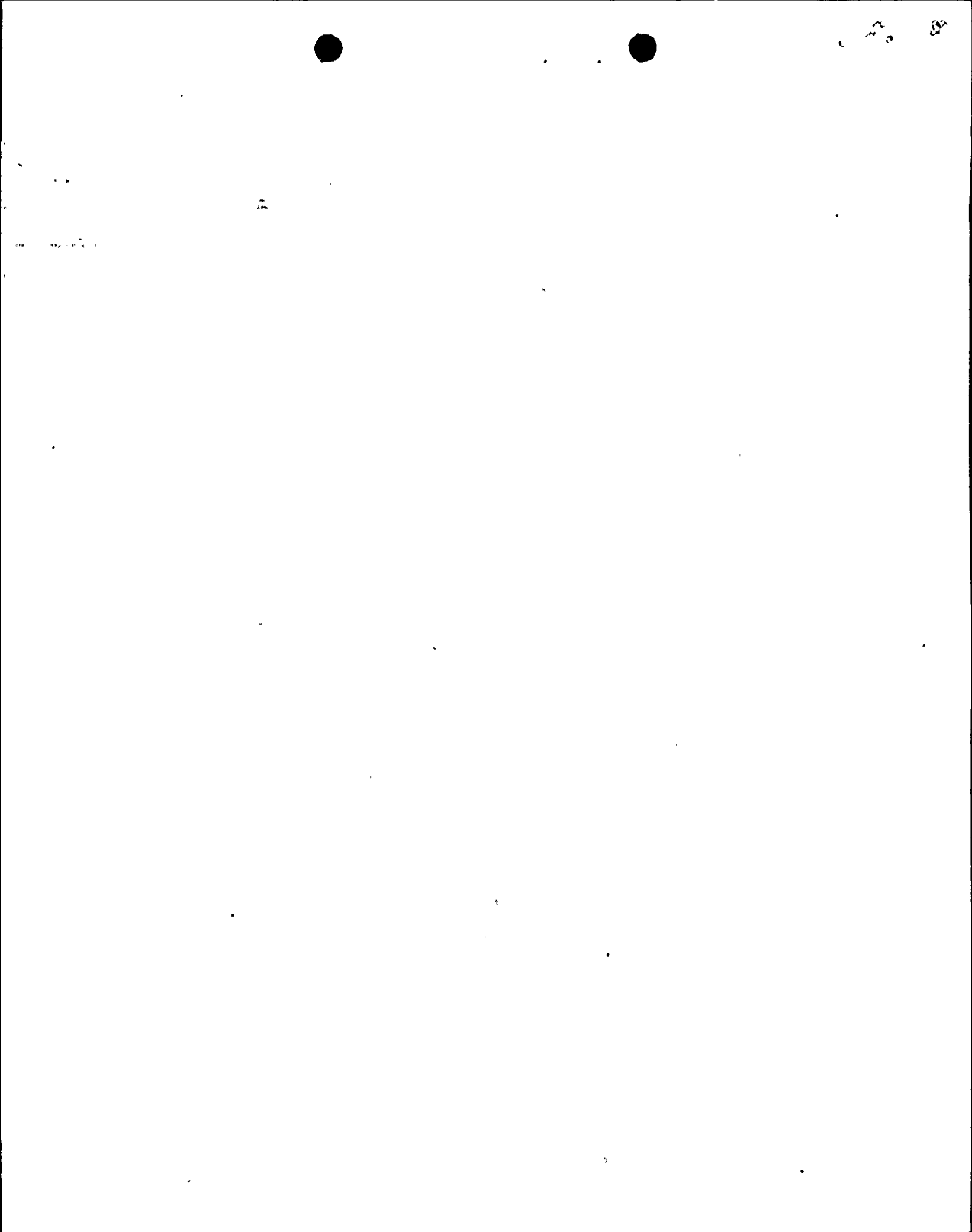
October 3, 1984 (8:00a to 5:30p): Pre-meeting preparations with NRC staff, including review and discussion of the PG & E, NRC, USGS, and University of Nevada-Reno (UNR) future research programs.

October 4, 1984 (9:00a to 8:00p, PDT): Pre-meeting discussions, meeting, and travel to San Francisco.

1. The meeting showed a flexible and cooperative spirit between the various parties represented at this meeting. The viewgraphs and material organized by PG&E and NRC provided a good basis for discussions during the meeting.

2. The internal PG&E decision-making process for handling conflicts of opinion, priorities, and procedures was discussed during the early part of the meeting. I perceive that there is concern about the future need for guidance and full time contributions from a broad gauge leader, that is familiar with the global and interdisciplinary fields of plate tectonic, neotectonic, structural geology and earthquake source mechanisms. This type of role was partly filled, by Dr. Dick Jahns. I believe the PG&E effort would be much more effective by addition of an individual of this caliber, to spearhead this critical type of activity. The use of a panel of experts should assist in this challenging and difficult task, but their input would be intermittent rather than continuous. This leads to my suggestion of a need and is not offered to suggest specific "how-to" responses, or to indicate specific individuals that might be available or suitable for this type of role.

8411260612 841114  
PDR ADDCK 05000275  
P PDR



3. Hosgri fault zone: Future studies will need to evaluate the seismic potential by characterizing the offshore zone of deformation and the adjoining basin boundaries. This will require a major new analysis of selected offshore seismic reflection profiles with proper enhancement and by correlation to wells and surficial geology. The gap in seismic reflection data along the 3 mile zone near the coastline indicates a need for new offshore profiles, and these should be acquired, if possible, for this zone. I believe that the postulated listric behavior of the Hosgri fault should be tested by both geological and geophysical methods. To prepare an adequate analysis, it may be necessary to correlate between offshore seismic profiles and COCORP-like profiles of the land areas.

The Hosgri fault needs to be reevaluated, not only for its connections to the north, but for relation to faults and folds of the Transverse Ranges. This should include compilations and new data acquisition that relate to:

- o relation of faulting to folding,
- o fold and fault geometry along the Hosgri fault zone and within the Transverse Ranges,
- o segmentation, barriers and asperities for the Hosgri fault zone,
- o slip directions of the Hosgri and other faults of the region and relation to stress axes,
- o dip, prevalence, and cause of reverse-slip components along the Hosgri-Palo Coronado-San Gregorio fault zone,
- o relation of the Hosgri fault to minor folds, branches, and Riedels, etc.
- o relation to other faults of the region, including the San Miguelito, Edna, East and West Hausa, La Panza, and San Andreas faults.

An understanding of these tectonic relations may require use of reanalysis of older remotely sensed data. Abundant and diverse types of data are available for this region and their analysis is important to the the final detection, delineation and definition of character of seismotectonic structures. These types of imagery should be examined or reexamined for interrelations of folding and faulting.

The exposures and soil-stratigraphic relations of the marine terraces should be reevaluated and reexamined to gain maximum data on deformation or non-deformation of geologic structures near the site. Other studies along the coastline of southern California have shown that terrace features provide excellent records of the timing and style of deformation. The terraces of this area have not been the focus of recent studies and careful reanalysis could

1. 1. 1.

2. 2. 2.

3. 3. 3.

4. 4. 4.

provide important information on Quaternary rates and styles of tectonic activity.

4. Tectonic Relations of the Transverse Ranges to Adjoining Provinces: The tectonic relations between the Transverse Ranges and the adjoining provinces has been examined by many workers in the region. One recent study has indicated that the Transverse Ranges are the most prominent P wave feature in southern California and that it has deep structural control. The geological and geophysical interrelationships are important to an understanding of the seismogenic capability of the Hosgri and other faults of the site area. The PG&E analysis will depend on a new and more complete synthesis of relevant geological, geophysical and seismological data. To attain this goal, it will be necessary to understand the seismotectonic significance of the character and position of province boundaries, the current and late Tertiary stress regimes, the interrelationships of brittle and plastic failure both areally and with depth. These relationships need to be synthesized in terms of plate and microplate deformation. This phase of effort will require integration with worldwide seismotectonic data. This phase of the effort will supplement the site geological setting with regional and global correlations.

5. Relations between Plastic vs. Brittle Failure: The recently noted tectonic and seismogenic relations between folds and faults has been noted for the Coalinga, El Asnam, Tabas, and other areas. Other analogs to this area may exist in parts of China, Iran, Japan (e.g. Niigata), New Zealand, and elsewhere. There is an apparent interrelation of folds and faults near the site, as shown in cross sections of noted +by Crouch and others in 1984, and is suggested by microfolds shown in 35 mm slides that you have taken at the site. This is also indicated in seismic reflection profiles of the offshore areas. The limits and character of folding to faulting, and aseismic vs. seismic folding should be evaluated both horizontally and vertically in the site region.

6. Stress Analysis: The orientation of stress can be accomplished by many methods (Zoback and Zoback, 1980). Analysis can include compilations of existing data from various sources. These data need to be integrated with the site and regional tectonic studies.

7. Neotectonic Setting: The plate tectonic and microplate relations of the Coast Ranges, Transverse Ranges, offshore zone, and the Hosgri fault zone need to be assessed in relation to the many models that have been proposed for this region. Many of these models are old, or have incomplete data bases, and each should be reassessed in terms of the data base that will be present by the end of the current studies. This analysis can lead to a preferred model, or to preferred models. These models need to be synthesized into both deterministic and probabilistic earthquake models for maximum credible earthquakes, seismic sources, and recurrence intervals.



11-11-11  
11-11-11  
11-11-11  
11-11-11

11-11-11

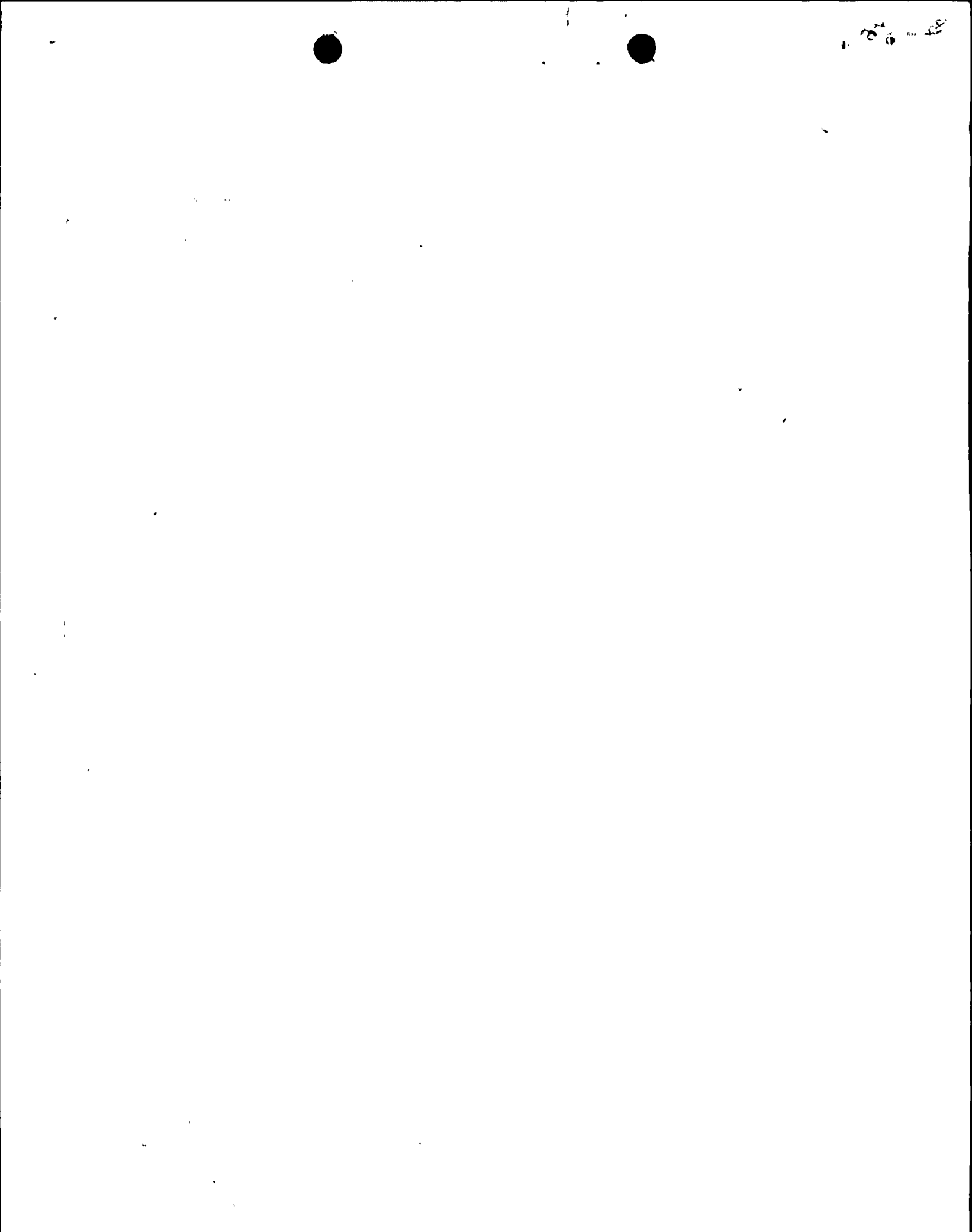
8. Multiple Approaches: The search for maximum earthquake sources should emphasize use of as many methods as possible. At the present time about five or six methods have been used to determine the maximum credible earthquakes for faults and provinces. Some of these methods may be inappropriate or difficult to apply for this site, but there should be a focus on accumulation of appropriate data of this type.

The above comments summarize my impressions of this meeting and views of some of the types of data that may be needed to determine the earthquake potential for the site.

Sincerely yours,



D. Burton Slemmons





Meeting Summary Distribution

Docket File

NRC PDR  
Local PDR  
PRC System  
NSIC  
LB#3 Reading  
Attorney, OELD  
GWKnighton  
H. Schierling  
JLee  
JPKnight  
GLear  
PTKuo  
HPolk  
JKane  
JMcKinley (ACRS)  
RSavio (ARCS)  
ATHadani

NRC Participants

S. Brocoum  
L. Reiter  
R. Rothman  
R. McMullen  
L. Ong  
B. Slemmons, Consultant  
P. Thenthaus, USGS  
D. Perkins, USGS

bcc: Applicant & Service List

