Ground Motion Workshop

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Theme

Current and evolving issues and trends in the selection of seismic input for the design of reactor and non-reactor facilities

Objective

Assess the way organizations are addressing issues related to the engineering characterization of seismic input for design, reevaluation, margin, and risk analyses.

Background

In recent years strong ground motion recording networks in a number of regions of the world have greatly expanded the number of recording instruments. As a consequence there has been a significant increase in the number of strong ground motion recordings available for engineering evaluation of ground motion for a range of earthquake magnitudes, distances, regional and site geology, and local soil conditions. Even with the large increase in the number of strong motion recordings, however, significant uncertainties remain and must be accounted in making engineering estimates of ground motions input for design, reevaluation, and risk analyses. Methods for developing engineering estimates of ground motion are either deterministic or probabilistic. Each employs different procedures for incorporating and quantifying uncertainty in the ground motion estimate involving different technical decision criteria and different framing of safety policies. In the past decade many countries have developed new or revised criteria for characterizing seismic input for reactor and non-reactor facilities. In addition, many countries are completing research that will form the technical bases to support siting policy changes.

Scope, Content, and Outline of the Workshop

The workshop will review current issues and address questions with respect to the development of criteria and policies for characterizing ground motion input for seismic design, reevaluation, and risk analyses of reactor and non-reactor critical facilities. Each panel member will address key questions and provide perspective with respect to implication for engineering estimation of ground motion. It is intended that these presentations by the panel members will stimulate extensive discussion and exchange of views among participants in the workshop about the appropriate implementation of recent advances in technology to characterize seismic inputs for design of nuclear facilities.

Agenda

Introduction to the Workshop (Part 1)	Roger Kenneally
Questions 1 and 3	Norman Abrahamson
Questions 4 and 6	Pierre Labbe
Questions 2 and 10	Takaaki Konno
Questions 5 and 7	Walter Silva
Introduction to the Workshop (Part 2)	J. Carl Stepp
Questions 2 and 4	Peter Zwicky
Questions 2 and 9	Carl Costantino
Questions 8 and 10	Pierre Sollogoub
Questions 4 and 10	Prabir Basu

Issues and Questions

1. Are probabilistic seismic hazard assessment (PSHA) methods adequately tested and mature to be used alone as the method for estimating ground motion inputs for reactor and non-reactor seismic design, reevaluation, and risk assessment in all regions of the world?

2. When ground motion inputs for seismic design of a facility are determined using deterministic methods, considering recent technical advances, are changes in guidelines and criteria needed to properly quantify uncertainty; e.g., use of weighted multiple ground motion relationships, or other approaches?

3. How should empirical ground motion estimation models based entirely or primarily on strong motion recordings in a single seismotectonic environment be modified to make them applicable in another seismotectonic environment? How should the epistemic uncertainty be quantified?

4. Where strong ground motion recordings are not available or are inadequate to permit development of empirical ground motion estimation relationships in a seismotectonic environment, how should corrected empirical relationships from analogous seismotectonic environments be combined with theoretical models to estimate ground motion inputs and quantify uncertainty in inputs? How should epistemic uncertainty be quantified using probabilistic methods, deterministic methods?

5. What are appropriate guidelines for defining "rock outcrop" for the purpose of developing ground motion estimation relationships in a seismotectonic environment?

6. What are appropriate guidelines and criteria for determining appropriate levels of ground motion for input to seismic design, reevaluation, or risk assessment – when using probabilistic methods, when using deterministic methods?

7. What are appropriate guidelines and criteria for performing site response analyses to correct rock motions for local geology and soil properties – when deterministic methods are used, when probabilistic methods are used?

8. What are appropriate guidelines for developing ground motion spectral shapes for magnitude, distance, seismotectonic environment, and site geology – when probabilistic methods are used, when deterministic methods are used?

9. What are appropriate guidelines and criteria for developing vertical spectra that are compatible with horizontal ground motion spectra for a site?

10. What are the key developments needed to significantly advance the practice of determining ground motion inputs for seismic design, reevaluation, and risk assessment of reactor and non-reactor critical facilities?