

April 06, 2006

MEMORANDUM TO: Michele G. Evans, Deputy Director  
Engineering Research Applications  
Division of Fuel, Engineering & Radiological Research  
Office of Nuclear Regulatory Research

THRU: Anthony H. Hsia, Branch Chief **/RA/**  
Mechanical and Structural Engineering Branch  
Engineering Research Applications

FROM: Vaughn V. Thomas, Project Manager **/RA/**  
Mechanical and Structural Engineering Branch  
Engineering Research Applications

SUBJECT: SUMMARY OF MARCH 24, 2006, CATEGORY 2 PUBLIC MEETING  
WITH NUCLEAR ENERGY INSTITUTE (NEI) TO DISCUSS SEISMIC  
ISSUES RELATED TO FUTURE REACTOR SITING

On March 24, 2006, a public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and Nuclear Energy Institute (NEI) at NRC Headquarters in Rockville, MD. The purpose of this meeting was to discuss (1) an NEI recommended target value for seismic core damage frequency (SCDF) that could be used to establish the safe shutdown earthquake (SSE) design response spectrum (DRS) and (2) NEI preliminary reports related to early site permit (ESP) seismic issues. A list of meeting attendees is included as Enclosure 1. The meeting agenda is provided as Enclosure 2. The PowerPoint presentations are enclosed as Enclosure 3.

After introductions, Bob Kassawara, from Electric Power Research Institute (EPRI), stated NEI's objectives of the meeting: 1) to discuss a target SCDF goal for the performance-based method; 2) to have closure on the implementation of results of task G1.2 report, "Use of Cumulative Absolute Velocity (CAV) in Determining Effects of Small Magnitude Earthquakes on Seismic Hazard Analyses," and task G1.3 report, "Truncation of the Lognormal Distribution and Value of the Standard Deviation for Ground Motion Models in the Central and Eastern United States"; 3) to agree on a schedule for future interactions. Copies of NEI presentations can be accessed through the Agencywide Documents Access and Management System (ADAMS) under Accession No. Pkg. 060950621.

#### Summary of the Meeting

Adrian Heymer, from NEI, proposed to the NRC that a seismic core damage frequency target value of  $5 \times 10^{-6}$  would be adequate for establishing the safe shutdown earthquake (SSE) design response spectrum (DRS). NEI indicated that they would like to inquire whether the NRC would endorse the SCDF approach or the frequency of onset inelastic deformation (FOSID) performance-based approach. The NRC staff indicated that they were not in a position to recommend a target value or to decide on a performance-based approach at this meeting. NEI agreed to provide, at the NRC staff's request, a letter stating their position and

the technical basis for selecting  $5 \times 10^{-6}$  as the SCDF target value.

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Dr. Norman Abrahamson, consultant to NEI, proceeded with the discussion on task G1.2 report. The G1.2 report provides the technical basis for establishing the appropriate distribution of low magnitude earthquakes for use in probabilistic seismic hazard computations for nuclear power plant applications. NEI determined that the CAV was the best parameter for use in predicting the threshold of potential damage and a cut-off value of 0.16 g-sec was found to be a conservative characterization of the threshold between damaging earthquake motions and non-damaging earthquake motions for buildings of good design and construction as defined by the Modified Mercalli Scale (measures earthquake intensity). The staff is continuing to evaluate the supporting data and the assumptions used in the CAV model.

Dr. Abrahamson continued with the discussion on task G1.3 report which provides a technical basis for selecting the maximum epsilon value to be used on empirical ground motion data and numerical simulations. Dr. Abrahamson gave a brief presentation by which he justified a limit to the epsilon (number of standard deviation) and the value of the sigma (standard deviation) for the eastern United States. NRC staff asked Dr. Abrahamson to clarify key technical issues during his presentation. The staff informed NEI that the methodology in the task G1.3 report was difficult to evaluate and that NEI should clarify its basis.

At the end of the meeting, the NRC staff caucused and asked NEI to provide a response to the six items listed below to aid the staff in its review of the reports.

1. For use in on going early site permit (ESP) applications, utilities should provide  $10^{-4}$ ,  $10^{-5}$ , and  $10^{-6}$  soil amplification runs for all 28 sites; staff will interpolate results when a target value is selected.
2. NEI should write a letter and justify their position for establishing an SCDF target value of  $5 \times 10^{-6}$ .
3. To support review of task G1.3 report, NEI should provide the hazard curves with CAV.
4. Industry to conduct a peer review of S2.2 report, "Effect of Negligible Inelastic Behavior on High Frequency Response" results (high frequency knock-down) and underlying assumptions by equipment vendors.

NRC will develop a set of request for additional information (RAIs) on reports for task G1.2 and G1.3 that will be sent to NEI in three to four weeks

5. NRC staff requests clarification on 'peer review' of NEI reports (i.e. What reports have been peer reviewed and identify the peer reviewers ).
6. NRC staff requests submittal of the integration report before issuance of draft regulatory guide.
7. NRC to inform NEI on what the NRC considers an acceptable performance-based approach and target goal.

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The staff and industry proposed to meet in May 2006 to discuss the structural tasks S2.1a, "Spatial Coherency Models for Soil-Structure Interaction," S2.1b, "Effect of Seismic Wave Incoherence Foundation and Building Response," and S2.2. In June 2006, NRC and industry plan to review all seismic issues related to tasks G1.2, G1.3, S2.1 and S2.2.

After asking for public comments or questions, the meeting was adjourned.

Enclosures:

1. List of Attendees
2. Meeting Agenda
3. Presentation Material

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Herman Graves	Eugene Embo	Michael Mayfield	Bret Tegeler
Yong Li	Anthony Hsia	Donald Harrison	
Mahendra Shah	Rebecca Karas	Clifford Munson	

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DATE	04/03 /06	04/03 /06	04/03/06	04/04/06

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DATE	04/05/06	04/06/06

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**NRC-NEI Meeting: ESP/COL Seismic Issue Resolution  
March 24, 2006 at 09:00 – 15:00**

- Meeting Objective: The meeting objectives are to discuss:
- A) NEI/Industry proposal on a target value for seismic CDF
  - B) the following industry reports:
    - G1.2 Use of CAV in Determining Effects of Small Magnitude Earthquakes on Seismic Hazard Analyses
    - G1.3 Truncation of the Lognormal Distribution and Value of the Standard Deviation for Ground Motion Models in the CEUS
- Industry Participants: NRC staff  
NEI Seismic Issues Task Force
- Agenda:
- 09:00 am 1. Introductions and opening remarks – NRC and NEI
- 09:10 am 2. Industry Proposal on a Target Value for Seismic CDF
- o Basis for Proposed Target Value (NEI)
  - o Discussion of resulting CEUS spectra (NEI/Industry)
  - o NRC Staff comments/feedback
  - o Recommendations
- 10:15 am Break
- 10:30 am 3. Report G1.2: 'Use of CAV in Determining Effects of Small Magnitude Earthquakes on Seismic Hazard Analyses'
- o NRC staff comments/identification of issues
  - o NEI/Industry responses and plans to address NRC comments
  - o General discussion/Recommendations
- 12:30 pm Lunch
- 1:15 pm 4. Report G1.3 'Truncation of the Lognormal Distribution and Value of the Standard deviation for Ground Motion Models in

the CEUS

**Enclosure 2**

- o NRC staff comments/identification of issues
- o NEI/Industry responses and plans to address NRC comments
- o General discussion/ Recommendations

3:15 pm

Break

3:30 pm

Summary of meeting action items (NRC/NEI)

3:15 pm

Adjourn

**Enclosure 2**