

**National Earthquake Hazards Reduction Program  
Advisory Committee on Earthquake Hazards Reduction  
National Institute of Standards and Technology  
December 20, 2011**

**Conference Call Meeting Summary**

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**Advisory Committee Members:**

Chris Poland, Chair	Degenkolb Engineers
Norman Abrahamson	Pacific Gas and Electric Company
James Beavers	University of Tennessee
Richard Eisner	Fritz Institute
John Hooper*	Magnusson Klemencic Associates
Michael Lindell	Texas A&M University
Jack Moehle	University of California, Berkeley
Thomas O'Rourke*	Cornell University
Susan Tubbesing	Earthquake Engineering Research Institute
Anne vonWeller	vonWeller Associates
Yumei Wang	Oregon Department of Geology and Mineral Industries
Brent Woodworth	Global Crisis Services, Inc.
Ralph Archuleta**	University of California, Santa Barbara

\*not in attendance

\*\*Chair of USGS SESAC, serves as ex-officio member of ACEHR

**NEHRP ICC Member-Agency Representatives and NIST Support:**

Shyam Sunder	NIST, EL Director, ACEHR Designated Federal Official
William Grosshandler	NIST, EL Deputy Director for Building and Fire Research
Jack Hayes	NIST, NEHRP Director
Steve McCabe	NIST, NEHRP Deputy Director
Joy Pauschke	NSF
John Filson	USGS
Tina Faecke	NIST, NEHRP Secretariat
Brian Garrett	BRI Consulting Group, NEHRP Secretariat support

**Abbreviations Used Above**

ACEHR—Advisory Committee on Earthquake Hazards Reduction  
NEHRP—National Earthquake Hazards Reduction Program  
NIST—National Institute of Standards and Technology  
SESAC—Scientific Earthquake Studies Advisory Committee

EL—Engineering Laboratory  
ICC—Interagency Coordinating Committee  
NSF—National Science Foundation  
USGS—U.S. Geological Survey

## Summary of Discussions

### I. Call to Order

Chris Poland, Chair of the Advisory Committee on Earthquake Hazards Reduction (ACEHR), welcomed attendees. He reviewed the agenda for the meeting and asked Tina Faecke to conduct the roll call of committee members.

### II. Feedback from NEHRP ICC on ACEHR Recommendations

Shyam Sunder presented information provided by the National Earthquake Hazards Reduction Program (NEHRP) Interagency Coordinating Committee (ICC) in response to recommendations made by ACEHR in its May 4, 2010 annual report on the effectiveness of NEHRP. Sunder apologized for not getting back to the committee sooner, explaining that it had taken a while to obtain and integrate input from the NEHRP agencies. The ICC decided to respond in a slightly different manner than in past years, by having their feedback verbally presented directly to the assembled committee. This is how ICC plans to respond in future years, as well.

The ICC identified six broad themes in the recommendations made by ACEHR in its reports, papers, and meetings during 2010, which include:

- NEHRP program resources
- the development, adoption, and enforcement of effective seismic codes and standards
- effective mitigation programming for lifelines
- a roadmap to community resilience
- improved earthquake hazard identification tools
- partnerships with (non-NEHRP) Federal and State agencies to promote NEHRP.

Within these six areas, ACEHR has provided traditional recommendations pertaining to the seismic performance of individual structures and their components, as well as a newer class of recommendations that concern community-scale performance referred to as earthquake resilience. Social and economic issues play a more important role in the recommendations concerning community resilience than they do in the individual structures, requiring that NEHRP evolve to address these newer issues.

Sunder discussed each theme in turn, describing the ICC's interpretation of and response to ACEHR's recommendations. ACEHR has recommended that program resources be sufficient to achieve true mitigation. The Administration's position on program resources is that the funding levels prescribed in NEHRP's congressional reauthorizations should be consistent with the levels of agency funding that are allocated to NEHRP. Although NEHRP must compete with other programs for appropriated funds within each NEHRP agency, the outcomes of these efforts are funding levels that reflect agency priorities. These priorities, in turn, must be consistent with administration priorities that are reflected in budget requests to Congress.

While acknowledging that developing, adopting, and enforcing more effective seismic design provisions within building codes and standards is critical for the mitigation of earthquake risks, the ICC recognizes that the Federal role in this area is limited. The work of state and local officials and the education of building owners will be key to progress in this area. The ICC is

committed to continuing the efforts of the Federal Emergency Management Agency (FEMA) and other NEHRP agencies to facilitate, support, and promote the development and implementation of more effective codes and standards.

The ICC agrees with ACEHR that lifeline mitigation is critical to the resilience of modern communities. Progress achieved in the development of building mitigation techniques now allows for increased attention to lifelines, and that to date, lifeline research has been a relatively low priority within NEHRP. Consequently, a lifelines workshop is being planned for fiscal year (FY) 2012 or 2013 to assess the current state of knowledge and to develop a plan for advancing this knowledge. Program planning related to lifelines can proceed once this workshop has been held.

ACEHR's emphases on the importance of determining how to achieve—and on achieving—community resilience are shared by the ICC. This led the NEHRP Secretariat to commission the report published earlier this year by the National Research Council (NRC) entitled "National Earthquake Resilience: Research, Implementation, and Outreach." The NRC report identifies 18 tasks that need to be accomplished over the next 20 years in order to achieve national earthquake resilience. The NEHRP Secretariat has commissioned a workshop for FY 2012 to plan how NIST will contribute to NEHRP's efforts to carry out work recommended in the NRC report. NIST is also working with the U.S. Department of Homeland Security (DHS) and others to define the key elements of community and national resilience in a way that can help guide future research and implementation efforts. The other NEHRP agencies will also use the NRC report to help focus their activities related to resilience.

The Chair asked Sunder whether, in assessing the NRC report, it would be useful for the committee to focus on its implications for the NEHRP agencies individually rather than collectively. Sunder responded that because the agencies may be at different stages in the evolution of their activities toward the new focus on resilience, agency-specific guidance from ACEHR would be useful for the ICC and the NEHRP Program Coordination Working Group.

The ICC agrees with ACEHR that continued development of improved earthquake hazard identification tools should remain a priority for NEHRP. These efforts, including further progress toward completion of the U.S. Geological Survey's (USGS) Advanced National Seismic System (ANSS), are providing the improved data that are essential for advancing the seismic design tools available to engineers.

NEHRP has been proactive in partnering with other (non-NEHRP) Federal agencies to coordinate mutually beneficial efforts and leverage non-NEHRP resources. Ongoing partnerships have been established with the Federal Highway Administration, the Nuclear Regulatory Commission, and other agencies. Through a contract with the Building Seismic Safety Council, NEHRP is currently updating the seismic design standards for Federal buildings (ICSSC RP 6, "Standards of Seismic Safety for Existing Federally Owned and Leased Buildings").

In concluding, Sunder noted that NEHRP is already successfully implementing a number of recommendations made by ACEHR. Examples include the development of a state-of-the-art online data repository for information related to disaster and failure studies and earthquake reconnaissance surveys; the development and maintenance of improved guideline documents,

and ongoing efforts to ensure that the technical literature developed with NEHRP funding remains available to engineers, standards developers, and policy makers; and the expansion of problem-focused research designed with input from standards developers and the practitioner community, such as the current study on the costs of providing appropriate seismic performance for selected structures in the Central and Eastern United States. The ICC is grateful for ACEHR's valuable assessments of what the NEHRP agencies have been and should be doing to strengthen earthquake resilience. It believes that NEHRP's current and planned activities address most of ACEHR's recent recommendations, in spirit if not literally, and will move the country to a more resilient footing. The ICC remains committed to working with ACEHR to make NEHRP more effective.

Sunder was asked how the ICC has used ACEHR's New Madrid bicentennial statement in guiding NEHRP activities in the Central United States. He reported that the ICC was briefed on the statement and was supportive of its content, and that the statement was subsequently published on the NEHRP website. The NEHRP agencies have integrated the thrust of the statement into their program activities, such as the study mentioned earlier on the costs of appropriate seismic performance among structures in the New Madrid region. NEHRP also published and distributed two consecutive *SeismicWaves* articles in May and June of 2011 that were focused on information promoted in the bicentennial statement.

Sunder was also asked how the ICC responded to the committee's assertions that the pace of implementation allowed by current NEHRP funding levels is too slow to ensure that program goals will be met. He noted that the ICC is not able to respond individually to each specific committee input. Generally, however, their view is that program funding is likely to remain flat at best in the current, resource-constrained Federal fiscal environment, and consequently, that adjusting program priorities is the primary means presently available for influencing the pace of implementation.

This prompted some discussion of the current status of NEHRP priorities. They were most recently assessed and established for the current NEHRP strategic plan, and NEHRP annual reports have subsequently provided information about how these priorities have influenced program activities. The NRC report has provided a new set of potential priorities, which can be evaluated in relation to NEHRP's existing priorities.

### **III. Discussion of the NRC Report**

The committee devoted much of the remaining time at this meeting to a discussion of the NRC report and the 18 tasks that it sets forth for achieving national earthquake resilience over the next 20 years. The discussion began with some general comments about the report. One member praised the depth of the report and the appropriateness of the tasks identified. Another commented that the 18 tasks appear to be the same needs that have been repeatedly articulated and prioritized over the past decade, and that rather than simply saying that all 18 need to be done (as does the NRC report), ACEHR should identify which tasks are of higher or lower priority. A third committee member noted that while many of the tasks involve work that has been and will continue to be pursued (e.g., monitoring seismicity, improving the seismic performance of buildings), some are new (e.g., operational earthquake forecasting, earthquake early warning).

The Chair was asked whether there may be value in prioritizing the 18 tasks from a cost-benefit standpoint. This would entail weighing the time and resources required to accomplish the tasks against their economic and behavioral-change benefits. The Chair responded that cost-benefit assessment would be a logical and possible tool with which to prioritize the tasks. A member cautioned that prioritizing the NRC tasks, through cost-benefit analyses or other methods, could hamper their effectiveness. The NRC viewed each of the tasks as an essential component of a cohesive effort that will be required to achieve resilience over 20 years. The report indicates that all of the tasks need to be pursued throughout the 20-year period, although because there are interrelationships and interdependencies among the tasks, the tasks that are emphasized will vary from year to year.

It was suggested, however, that in an era of static or declining resources, it may be unrealistic to expect that the entire program of NRC tasks can or will be pursued as recommended in the report. Rather than picking which tasks should be pursued first or given priority over others, a member commented that it may be better to identify the tasks that, if omitted or postponed, will result in the least damage to the overall effort to achieve resilience.

Attendees were reminded that in spite of the potential risks involved in labeling tasks as either high or low priority, the NEHRP agencies and other organizations will likely be forced to do some prioritization, and it would be better if NEHRP did so with input from ACEHR. Other members countered that by prioritizing the tasks and recommending how limited funds should be allocated, the committee would perhaps implicitly signal that current funding levels are workable, or that it is not important to try to implement the entire NRC program. One member advised that it may be advantageous to focus on a more specific task, such as the mitigation of existing schools, that could serve as a gateway, not only into community resilience, but also into a number of the broader NRC tasks. Another urged that however the committee evaluates the NRC tasks and whatever priorities emerge, the resulting recommendations need to be balanced between the higher-level focus on community resilience versus the basic tools and data-collection processes that support progress in all earthquake risk reduction endeavors.

After additional discussion, the committee decided to proceed by having each member identify the three (or more) tasks that they feel are most important for achieving short-term (over the next 5 years) progress toward national earthquake resilience. Members' choices are summarized in table 1. Following are some of the criteria that members said they used in making their selections:

Tasks that—

- provide the most bang for the buck
- address the most immediate problems
- produce benefits that can be highly leveraged
- can be carried out together
- serve practical, ongoing needs that require uninterrupted attention
- require levels of coordination that make them unlikely to be performed without strong support
- do not already have strong, ongoing support

**Table 1—NRC tasks picked as being of high priority**

Task		Committee Member										No. Picks
No.	Title	A	B	C	D	E	F	G	H	I <sup>1</sup>	J	
1	Physics of EQ <sup>2</sup> processes							X			X	2
2	ANSS			X			X			X	X	4
3	EQ early warning											0
4	National seismic hazard model						X			X		2
5	Operational EQ forecasting											0
6	EQ scenarios					X						1
7	EQ risk assessments & applications											0
8	Post-EQ social science response & recovery research					X					X	2
9	Post-EQ information management											0
10	Socioeconomic research on hazard mitigation & recovery	X		X	X	X					X	5
11	Observatory network on community resilience & vulnerability		X			X			X		X	4
12	Physics-based simulations of EQ damage & loss											0
13	Techniques for evaluation & retrofit of existing buildings		X									1
14	Performance-based EQ engineering for buildings						X	X		X	X	4
15	Guidelines for EQ-resilient lifeline systems		X		X						X	3
16	Next-generation sustainable materials, components, & systems											0
17	Knowledge, tools, & technology transfer to public & private practice	X		X	X				X		X	5
18 <sup>3</sup>	EQ-resilient communities & regional demonstration projects	X	X			X		X	X	X	X	7

<sup>1</sup> Also identified a group of low-priority tasks consisting of tasks 1, 3, 5, 6, 7, 9, 12, and 16.

<sup>2</sup> Earthquake is abbreviated as EQ in this table.

<sup>3</sup> Several members described task 18 as an activity that could provide an organizational framework for a number of the other tasks.

Following the selection of high-priority tasks by the members in attendance, it was pointed out that these selections apply to NEHRP and not to all organizations that are involved in earthquake risk reduction and the pursuit of resilience. While all 18 tasks are important for the Nation to carry out, ACEHR’s selections suggest that some of the tasks are more (or less) important for NEHRP to pursue, at least in the short term. The fact that some tasks were not selected, however, should not be interpreted as an absence of ACEHR support for NEHRP involvement in those tasks, since if members had been asked to choose more than three tasks, some of them likely would have been selected.

Several members again warned about the potential danger of ACEHR identifying only some of the NRC tasks as priorities—this information could be misconstrued and interpreted as a lack of support for tasks not selected. Given that the chosen priorities would be announced in an environment of flat budgets, they could also generate unintended consequences if the NEHRP agencies are forced to reduce some current efforts in order to bolster their support for ACEHR’s priorities. If the priorities are reported to the ICC, ACEHR should perhaps accompany them with the recommendation that the priorities not be used in agency budgeting unless and until additional funding becomes available for NEHRP. A member noted that regardless of funding levels, some of the NRC tasks (e.g., tasks 11, 17, 18) may be unlikely to be performed unless they are given special emphasis by ACEHR. If ACEHR advocates for those tasks, it should perhaps be expressed as “there is a need to find some way to add these tasks into current NEHRP efforts, but not at the cost of reducing current efforts.” In other words, ACEHR should identify

those tasks that are not receiving the attention they need to fulfill their essential roles in the overall effort to achieve resilience.

The Chair proposed that NEHRP is using its available funding for a necessary and appropriately balanced mix of tasks, ACEHR's NRC-task priorities could be provided as recommendations and justifications for how current efforts should be augmented, when and if additional funding becomes available. Several members responded that NEHRP's current efforts are not adequately balanced, citing insufficient emphases on implementation, lifelines, performance-based earthquake engineering, and post-earthquake reconnaissance. Members were reminded that the individual NEHRP agencies have very different funding streams flowing from Congress, and in making any recommendations with respect to rebalancing current tasks or adding new tasks, the committee should consider which agencies would be involved and the constraints they are facing. (The NRC report correlates its tasks with the objectives in the NEHRP strategic plan, and the strategic plan indicates which agencies are involved in each objective.)

Some discussion followed about the fiscal constraints facing FEMA, which has traditionally had considerable involvement in many of the tasks that the committee regards as priorities. These constraints were addressed in ACEHR's 2011 annual report on NEHRP effectiveness, and could be highlighted again in the 2012 report. The NRC report could be cited as evidence of broader support (beyond ACEHR) for the contention that these tasks are essential to achieving earthquake-resilient communities.

To conclude the discussion about the NRC report, the Chair suggested an approach for integrating the NRC findings into ACEHR's 2012 annual report. He proposed that the committee convey full support for the NRC report because it identifies the level of funding necessary to achieve the goals of the NEHRP strategic plan. ACEHR can recognize the work currently under way and planned in the NEHRP agencies as a baseline level of effort, and make recommendations about the work that the committee would like to see added to the agencies' current efforts (focusing on NRC tasks 10, 11, 15, 17, and 18) when the Federal Government begins to implement the tasks described in the NRC report. This should help NEHRP contribute in the most effective way to the program of work prescribed by the NRC, which ACEHR believes should be fully implemented.

When the committee endorsed this approach, the Chair sought volunteers to draft agency-specific recommendations for inclusion in ACEHR's 2012 report. The resulting assignments were as follows: for FEMA, Brent Woodworth (lead), Rich Eisner, Jack Moehle, Susan Tubbesing, and Yumei Wang; for NIST, Susan Tubbesing (lead), Anne vonWeller, and Jim Beavers; for USGS, Jim Beavers, and Norman Abrahamson (lead); and for the National Science Foundation, Michael Lindell (lead) and Jack Moehle. The Chair advised the volunteers to look back at the last NEHRP annual report, as well as the program update presentations made by each NEHRP agency representative at recent ACEHR meetings, so that they can approach this with a clear understanding of their assigned agency's current efforts.

#### **IV. Structure of the 2012 ACEHR Annual Report on NEHRP Effectiveness**

The Chair presented two options for structuring the committee's next annual report. They were (a) updating the complete set of recommendations made in ACEHR's last comprehensive report,

which was written in 2010, or (b) including only the recommendations that the committee is developing related to the NRC report (discussed above). He asked the committee for their opinions on whether one of these options, or some other approach, should be adopted for the report. The committee recommended that both options be used, that is, that the content of the 2010 report be updated (including the appendix on trends and developments in science and engineering) and combined with the committee’s new agency-specific recommendations related to the NRC report. The 2012 report could also reiterate or reference the statement about NEHRP funding levels that was the focus of ACEHR’s 2011 annual report.

The Chair enlisted volunteers to develop updated versions of the sections included in the 2010 report. The resulting assignments are listed below in table 2. Tina Faecke agreed to send an MS Word copy of the 2010 report to all committee members.

**Table 2—Writing assignments for ACEHR 2012 annual report**

<b>Section / Subsection</b>	<b>Lead Author</b>
Program Effectiveness and Needs*	
Management, Coordination, and Implementation of NEHRP	Susan Tubbesing
Federal Emergency Management Agency	Rich Eisner
National Institute of Standards and Technology	John Hooper
National Science Foundation	Jack Moehle
U.S. Geological Survey	Norman Abrahamson
Trends and Developments in Science and Engineering	
Social Science	Michael Lindell
Earth Science	Norman Abrahamson and Ralph Archuleta
Geotechnical Earthquake Engineering	Tom O’Rourke
Structural Earthquake Engineering	Jim Beavers
Building Codes and Quality Assurance	Anne vonWeller
Lifeline Earthquake Engineering	Yumei Wang
Disaster Preparedness, Response, and Recovery	Brent Woodworth and Rich Eisner

\* This section is to include the agency-specific recommendations related to the NRC report.

## **V. Plans for Future Meetings**

The committee decided that, rather than discussing their draft NRC-related recommendations and 2012 report sections in another teleconference, they would discuss them at ACEHR’s spring (face-to-face) meeting to be held at NIST in March or April 2012. The Chair asked Tina Faecke to poll attendees on potential meeting dates, and to begin with dates during the first week of April. A schedule will be established for the submission of draft sections to Tina Faecke prior to this meeting, and the committee will be informed of the schedule via e-mail.

## **VI. Adjournment**

No further issues were raised for discussion, so the Chair thanked attendees for making this session so productive and wished everyone a great holiday season.