

**National Earthquake Hazards Reduction Program
Advisory Committee on Earthquake Hazards Reduction
National Institute of Standards and Technology
April 20, 2012**

Conference Call Meeting Summary

Advisory Committee Members:

Chris Poland, Chair
Norman Abrahamson
James Beavers
Richard Eisner
John Hooper*
Michael Lindell
Jack Moehle
Thomas O'Rourke*
Susan Tubbesing
Anne vonWeller
Yumei Wang
Brent Woodworth
Ralph Archuleta, Ex-officio member of ACEHR as Chair of USGS SESAC

*not in attendance

NEHRP ICC Member-Agency Representatives and NIST Support:

Shyam Sunder	NIST, EL Director, ACEHR Designated Federal Official
Jack Hayes	NIST, NEHRP Director
Eric Letvin	NIST, Disaster and Failure Studies Program Director
Ed Laatsch	FEMA
Joy Pauschke	NSF
Tina Faecke	NIST, NEHRP Secretariat
Nathan Walker	NIST, Budget Division
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. Briefing on NIST's New Resilience Initiative

Shyam Sunder delivered a presentation describing a proposed new initiative that the National Institute of Standards and Technology (NIST) has included in the President's budget request for fiscal year (FY) 2013. He accompanied his remarks with PowerPoint slides that attendees could access through the National Earthquake Hazards Reduction Program (NEHRP) website at http://www.nehrp.gov/pdf/ACEHRApr2012_Sunder.pdf.

The initiative, called "Resilience Strategies for the Built Environment," reflects a growing consensus among public- and private-sector leaders about the importance of advancing the disaster resilience of U.S. communities. Federal agencies and the private sector have come to NIST for leadership in defining disaster resilience and in determining how resilience can be measured and enhanced in communities. NIST determined that this work would align well with its core functions, and subsequently developed the proposed initiative.

NIST's intent is to lead a multiyear, public-private effort to accelerate the development and application of critical science-based metrics, tools, standards, and other innovations that are essential for achieving infrastructure resilience. The agency plans to engage stakeholders across all hazards and disciplines relevant to disaster resilience in the formation of a private-sector-led panel modeled upon the Smart Grid Interoperability Panel (SGIP). This group will engage and represent their constituencies in developing both a framework for assessing and improving community resilience and associated model standards and policies.

The President's budget for FY 2013 asks Congress for \$5 million to start the resilience initiative. Sunder noted that the earthquake community, as one of the most experienced and accomplished hazard constituencies, should play a key role in the initiative, both in developing generic, all-hazards resilience standards and in adapting and applying these standards to seismic risk reduction.

Sunder was asked about who, specifically, will develop the resilience framework. He explained that although the panel of stakeholders will ultimately determine how the framework is developed, the approach used by the SGIP provides a possible model. The SGIP, whose membership includes approximately 500 organizations and 1,500 volunteers, has contracted (through NIST) with consultants and contractors to develop specific pieces of the smart grid framework. As they are completed, contract deliverables are assessed by the SGIP under a consensus approach at the panel's meetings, which are held three or four times a year.

An ACEHR member asked about whether and how the initiative will include the non-technical (e.g., political, economic, social) perspectives that are critical to achieving community resilience. Sunder responded that these perspectives will be represented on the stakeholder panel by local

officials, social scientists, and others who will consider the public policies that can encourage implementation of technical resilience standards.

Sunder also spoke about how the initiative would be managed within NIST. He explained that personnel from the earthquake, wind, fire, structures, and disaster studies programs will have shared responsibility, along with a small staff dedicated to the project, for ensuring that the resilience framework reflects their perspectives and is compatible with NEHRP and other relevant programs.

The committee expressed its support for the initiative and suggested that this support be noted in ACEHR's forthcoming annual report on NEHRP effectiveness. It was also suggested that the report recommend that, when moving ahead with the initiative, NIST consider the findings of the 2011 National Research Council (NRC) report "National Earthquake Resilience: Research, Implementation, and Outreach."

III. Review of the Draft 2012 ACEHR Report on NEHRP Effectiveness

The Chair led a section-by-section review of ACEHR's draft 2012 report on NEHRP effectiveness. Committee members had submitted drafts of most of the sections planned for the report to the NEHRP Office at NIST prior to the meeting. These submissions, which constituted updated versions of corresponding sections included in the committee's 2010 report (the last full report on NEHRP effectiveness prepared by ACEHR), had been compiled into a single document for online viewing at the meeting.

The Chair asked the authors of each successive section to describe how they had revised the 2010 text for the 2012 report. In addition, they were asked to describe how they had incorporated into their section the committee's recent findings related to the 2011 NRC report. During its previous meeting in December 2011, ACEHR had discussed the NRC report and the 18 tasks that it presents for achieving national earthquake resilience over the next 20 years. While committee members had determined that all of the tasks must be performed to fully implement the NEHRP strategic plan and achieve earthquake resilience, they recognized 5 of the tasks (NRC tasks 10, 11, 15, 17, and 18), in particular, for focused effort.

Section on Management, Coordination, and Implementation of NEHRP

Susan Tubbesing described how she and Anne vonWeller had reexamined the recommendations included in the management section in 2010. One recommendation had concerned the need for a more adequate level of funding for the program. In their revised version of this section, the authors observed that NEHRP funding has not improved since 2010 and that this recommendation consequently remains of primary importance. Another 2010 recommendation concerned the need for road maps on how to improve both community resilience and the resilience of lifeline networks. In their update, the authors noted the progress being made in this area through the NRC report and NEHRP's planned 2012 workshop on research needs related to lifelines.

The updated section points out the NEHRP agencies' heavy involvement in the five NRC tasks emphasized by ACEHR, and the NEHRP Office's important role in advancing work on the NRC tasks. The update also comments on the NEHRP reauthorization legislation under consideration

in Congress, particularly its failure so far to authorize funds for NIST's important lead-agency responsibilities and for transferring the coordination of post-earthquake investigations from the U.S. Geological Survey (USGS) to NIST.

The Chair asked the committee for questions, comments, or suggestions related to this section. Several attendees described, for possible inclusion in the section, the latest developments in Congress related to NEHRP's reauthorization legislation. In the House, H.R. 3479 does not transfer post-earthquake investigations from USGS to NIST, while this change is authorized in Senate Bill 646. Both bills have been reported out by the cognizant committees and are awaiting floor action and subsequent reconciliation in a House-Senate conference committee.

The Chair suggested that a brief introduction to the NRC report be added to the section. He also asked the authors to insert a recommendation to the effect that NEHRP should focus on the five NRC tasks recognized by ACEHR, in addition to rather than in lieu of existing program efforts.

Section on the Federal Emergency Management Agency (FEMA)

Before describing how he, along with Richard Eisner and Yumei Wang, had updated the section on FEMA, Brent Woodworth mentioned that in early May, FEMA will begin soliciting applications from local agencies and organizations for Community Resilience Innovation Challenge grant awards. Projects designed to develop sustainable improvements to local hazard resilience will compete for one-time awards of up to \$35,000. The Chair suggested that this program be mentioned in the trends and developments section on disaster preparedness, response, and recovery.

Woodworth summarized the four recommendations presented in the draft section on FEMA. The recommendations concerned (1) expanding the involvement of local stakeholders in disaster preparedness, mitigation, response, and recovery; (2) improving safety in schools vulnerable to earthquakes and other natural hazards; (3) strengthening the seismic resistance of essential facilities and infrastructure; and (4) incorporating lessons learned from recent earthquakes into the continuous improvement of community resilience measures.

The committee discussed the draft FEMA section at length, focusing primarily on the format and level of detail in the recommendations and on the relatively large amount of attention given to schools as opposed to other types of facilities. There was general agreement that, in comparison to the recommendations in other sections of this report and in past ACEHR reports, the recommendations in this section were overly specific. Committee members also noted that the highly bulleted format used in this section reflected and contributed to this excessive specificity. The authors agreed to generalize the recommendations and convert them from bulleted to narrative formats.

Schools were the exclusive subject of the second draft recommendation and were also mentioned in the third recommendation as one of the types of essential community facilities that merit special protection. The committee discussed whether the second (schools) recommendation should remain separate or be combined into the third (essential facilities) recommendation. Although schools are not carved out for special attention in the NEHRP strategic plan, it was decided that the separate recommendation for schools should be retained after several members commented on the unique attributes of school facilities. Schoolchildren, a vulnerable population,

are required by law to frequent public school buildings, which are generally renovated less frequently than other essential facilities. Schools provide learning environments that are integral to building a culture of preparedness. Disaster-induced damage to schools is particularly abhorrent to communities and efforts to lessen risks to schools are generally able to attract greater support than are other preparedness measures, especially during tough economic times. In the past, schools have commonly been a focus of mitigation efforts following seismic events, and these efforts have sometimes served as stepping-stones to broader community resilience initiatives.

There was also some discussion about the meaning of the fourth recommendation relating to lessons learned from recent disasters. Should it ask FEMA to support planning and design for extreme seismic events (i.e., low-probability, high-consequence events that unleash forces stronger than those the built environment is currently designed to withstand)? The committee generally felt that this should not be what is asked for in the fourth recommendation, in view of the huge implications that this would have for current building design standards and practices.

Jack Hayes commented that in this and other sections of the report, it would be helpful to NEHRP if ACEHR would clarify whether the activities recommended should be undertaken in addition to or in lieu of current program efforts. Members agreed that FEMA should regard the recommendations in this section as additions to, rather than substitutes for, the agency's existing NEHRP-related work.

The Chair suggested that the FEMA section include something about FEMA's role with respect to the five NRC tasks highlighted by ACEHR. He also asked the authors to insert language that describes how the recommendation on schools relates to the new school-safety framework (Safe@School—Protecting Children from Natural Hazards) being developed by the Asia-Pacific Economic Cooperation (APEC) Emergency Preparedness Working Group (www.apec.org).

Section on NIST

The author of the section on NIST, John Hooper, was unable to attend and describe the approach he had taken to updating this section of the report. The Chair invited comments and suggestions on the draft section, but none were offered by the committee. The Chair noted that he would ask the author to add information about NIST's role in relation to the five NRC tasks emphasized by ACEHR.

Section on the National Science Foundation (NSF)

Jack Moehle summarized the three recommendations included in the updated section on NSF. The first two recommendations were modified versions of those included in ACEHR's 2010 report. Noting that in recent years NSF's support for post-earthquake reconnaissance has focused largely on the provision of RAPID grants to individual researchers, the first recommendation urged NSF to supplement this support with greater support for coordinated reconnaissance efforts and for research and technology transfer tied to those efforts. The second recommendation acknowledged the substantial and unique contributions to earthquake engineering made possible by NSF's past decade of support for the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES). Noting that NSF is currently evaluating its support for NEES and other large-scale experimental facilities, this recommendation urged NSF to continue or increase its current level of support for NEES, at least

for those components that have demonstrated their effectiveness.

The final recommendation for NSF concerned the agency's approach to soliciting and coordinating research related to earthquakes. Moehle noted that in recent years, NSF has shifted its NEHRP-related support away from coordinated, multidisciplinary research mechanisms, such as earthquake engineering research centers (EERCs) and coordinated research on directed topics, toward awards for research topics proposed by individual investigators. It is uncertain whether this change will accelerate or slow NEHRP's progress in executing its strategic plan and in contributing to the NRC tasks, given the extraordinary progress made through coordinated research in the past and the complex, interdisciplinary nature of the factors that affect resilience. Consequently, this recommendation asks NSF to assess the relative effectiveness of its current and past approaches to soliciting earthquake-related research, and based upon this assessment, to design and implement a future approach that maximizes progress toward resilience objectives.

This last recommendation triggered a discussion about the need for more balance in the kinds of earthquake-related research that NSF stimulates through its support, both before and after earthquakes occur. Committee members generally felt that there is need for both coordinated, multidisciplinary research efforts and individual-investigator-initiated research projects. In the past, the EERCs and other large coordinated efforts have sometimes tended to exclude some potentially beneficial areas of inquiry, particularly in the social sciences. And while RAPID grants have successfully supported investigator-initiated research following specific earthquakes (including important social science research), they have not addressed the ongoing need for more coordinated, comprehensive reconnaissance efforts.

There was general agreement that NSF does need to consider how to achieve more balance—between coordinated research and investigator-initiated research, and between engineering and the social sciences—in the earthquake-related research that it supports. Several members noted that the observatory network recommended in NRC task 11 could be a promising mechanism for improving this balance.

Another member commented that the second recommendation, regarding future NSF support for NEES and other earthquake-related, large-scale experimental facilities, appeared focused on engineering facilities. He suggested that the recommendation be broadened to ask NSF to also consider support for the large-scale facilities needed to advance earthquake science, such as rock mechanics laboratories.

Also discussed was a suggestion to recommend that NSF support a grand challenge related to seismic safety in schools. Although the committee felt that this could be a good topic for a grand challenge, the consensus was that a grand-challenge recommendation would be too specific to address in the ACEHR report, and is something that instead would need to be pursued through discussions with NSF program directors.

Section on USGS

A draft of the updated section on USGS was not yet available for the committee to review, but Norman Abrahamson described what he was planning to include in the section. He planned to recommend that in addition to continuing its existing NEHRP activities, USGS begin to work on the question of how earthquake hazards change, in areas where a large event has occurred,

during the aftershock period following the event. He explained that a large event can change the earthquake hazard for up to tens of years afterward, and that regulators need to determine whether and how building codes should be altered during that period. This issue has become more urgent internationally in the wake of the recent earthquakes in New Zealand and Japan, where it has delayed reconstruction.

The committee agreed that a recommendation on this issue should be included in the section. The Chair suggested that the section also address the issue of “black swan” events, ACEHR’s support for the earth science-related tasks in the NRC report, and the committee’s reaction to the latest recommendations to USGS being issued by the Scientific Earthquake Studies Advisory Committee (SESAC).

Appendix on Trends and Developments in Science and Engineering

Noting that some of the updated trends and developments sections were not yet available for review, the Chair invited comments on the sections submitted to date. An author of the section on lifeline earthquake engineering reported that the only significant update to this section related to the earthquake early warning system that was successfully used in Japan in 2011. She asked whether earthquake early warning would also be addressed in the section on USGS or in the SESAC recommendations to USGS. Other members indicated that this topic will be addressed in both places.

The Chair asked the committee to read through the trends and developments sections following the meeting to ensure that they touch on all significant developments. The committee will discuss these sections in more detail during the next ACEHR meeting scheduled for April 27, 2012.

IV. Adjournment

The Chair invited remarks from any members of the public who may be attending. Faecke reported that no such individuals had registered to attend, and no remarks were presented.

The Chair asked for suggestions about what topics he should include in the “call to action” portion of the report’s executive summary. He noted that he was already planning to address NEHRP funding and the five NRC tasks emphasized by the committee. A member volunteered to provide some language about how good engineering and good public education can change earthquake outcomes, as evidenced by the outcomes experienced in the 2011 event in Japan. Another suggestion was to highlight the urban structural damage and the liquefaction-induced damage experienced in the recent event in Christchurch, New Zealand.

The Chair concluded the meeting by asking that all revisions discussed during this session, and all newly completed report sections, be submitted to Faecke at NIST by next Wednesday night (April 25), so that a new and complete draft could be distributed to the committee on April 26. Members should review this draft and make note of any suggested edits that they would like to discuss during the next teleconference on Friday, April 27.