

**National Earthquake Hazards Reduction Program
Advisory Committee on Earthquake Hazards Reduction
National Institute of Standards and Technology
Gaithersburg, Maryland
April 10–11, 2008**

Meeting Summary

Advisory Committee Members:

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| Chris D. Poland, Chair | Degenkolb Engineers |
| Walter J. Arabasz | University of Utah |
| Jonathan D. Bray | University of California, Berkeley |
| Lloyd S. Cluff* | Pacific Gas and Electric Company |
| David E. Cook* | The Boeing Company |
| Richard K. Eisner* | Fritz Institute |
| Ronald O. Hamburger | Simpson Gumpertz & Heger, Inc. |
| James R. Harris | J.R. Harris and Company |
| Howard Kunreuther | University of Pennsylvania |
| Thomas D. O'Rourke | Cornell University |
| Paul Somerville* | URS Corporation |
| Kathleen J. Tierney* | University of Colorado, Boulder; Natural Hazards Center |
| Anne R. vonWeller | Chief Building Official, Murray City, Utah |
| Yumei Wang | Oregon Department of Geology and Mineral Industries |
| Sharon L. Wood | University of Texas at Austin |
| Mark D. Zoback | Stanford University (SESAC ex-officio liaison) |

*not in attendance

NEHRP ICC Member-Agency Representatives and NIST Support:

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| James M. Turner | NIST, Acting Director |
| Shyam Sunder | NIST, Building and Fire Research Laboratory Director, ACEHR Designated Federal Official |
| Jack Hayes | NIST, NEHRP Director |
| Tina Faecke | NIST, NEHRP Secretariat |
| Heather Meagle | NIST |
| Deborah Ingram | FEMA |
| Edward Laatsch | FEMA |
| Anita Vollmer | FEMA |
| Joy Pauschke | NSF |
| David Applegate | USGS |
| Ugo Morelli | NEHRP Secretariat |
| Francoise Arsenault | NEHRP Secretariat |

Guests:

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|----------------|-----------------|
| April Burke | Caltech |
| Bridget Glynn | Caltech |
| Norman Hester | CUSEC |
| Martin Hight | ASCE |
| Jerry Kashatus | URS Corporation |
| Ray Willemann | IRIS Consortium |

Summary of Discussions**I. Review Meeting Goals and Agenda**

Chris Poland, Chair of the Advisory Committee on Earthquake Hazards Reduction (ACEHR), welcomed attendees and reviewed the meetings goals and agenda. The meeting goals include the development of the Committee's first annual report and providing input to the National Institute of Standards and Technology (NIST) on the NEHRP annual report for Fiscal Year (FY) 2007 and the draft NEHRP Strategic Plan for FY 2008-2012.

II. Welcome and Opening Remarks

Shyam Sunder, Director of the NIST Building and Fire Research Laboratory, welcomed the members. He reported that Poland attended the April 3 meeting of the Interagency Coordinating Council (ICC), which went very well. John Marburger, Director of the Office of Science and Technology Policy, also attended the ICC meeting, as well as officials from the other NEHRP agencies.

Sunder reported that three members will be leaving ACEHR: Lloyd Cluff, Kathleen Tierney, and David Cook. He stated that NIST is very grateful for their contributions and will work diligently to find appropriate replacements for them from the nominations submitted.

III. Meeting Logistics

NEHRP Director Jack Hayes reviewed the meeting logistics. Members will be given time on site to review both the NEHRP annual report and the draft Strategic Plan, the substance of which has not changed dramatically since it was last seen by the members.

IV. Presentation of Grand Challenges and SESAC Report**A. Grand Challenges**

David Applegate from the U.S. Geological Survey (USGS) distributed copies of the Grand Challenges for Disaster Reduction, A Report of the Subcommittee on Disaster Reduction (SDR). Two years ago, the SDR generated the Grand Challenges report. On February 1, 2008, 14 hazard-specific implementation plans for the Grand Challenges were published, including plans for earthquakes, landslide and debris flow, and tsunamis. The implementation plans underwent an 18-month clearance process by all of the agencies, including the Office of Management and Budget (OMB). The implementation plans, which are linked to NEHRP goals, are intended to be used by the agencies as they develop their program requirements and budgets.

Poland asked about aligning the ACEHR annual report with the Grand Challenges. Applegate stated that the Grand Challenges are in essence a “bully pulpit” that should feed into a high level focus on hazards for budgeting priorities. Poland noted that the alignment of the ACEHR report with the Grand Challenges would strengthen the case for NEHRP support. Poland also asked how the short-term and medium-term actions and long-term effort phases were determined for the implementation plans. According to Applegate, short-term actions are those that can be undertaken immediately. Long-term efforts are those that will not take place anytime soon. The phases are entirely temporal. In a perfect world, all of the actions and efforts, some of which build upon others, would be undertaken.

Poland asked the members to take 10 minutes to review the earthquake implementation plan for its applicability to the ACEHR report.

A member commented that understanding how the built environment responds to an earthquake appears to be missing from the implementation plan. Applegate responded that Grand Challenges #3 and #4 address aspects of the built environment. Another member commented that Grand Challenges #2 and #3 are very important and highlight assumptions being made with respect to methodologies. However, there should be a closer linkage between Grand Challenge #6, Promote risk-wise behavior, to the entire set of Grand Challenges. In particular, the role of insurance and land use planning is not addressed. Applegate acknowledged the comments. He stated that the implementation plans recognize the broader world, but are focused on science and technology. Poland reiterated that the purpose of the discussion is to align the ACEHR report with the Grand Challenges, if feasible.

A member asked Applegate how the NEHRP agencies will promote the Grand Challenges and benefit from them, and whether the document will be viable after Director Marburger leaves. According to Applegate, alignment in itself is a benefit. All the NEHRP agencies can state that priorities have been identified and mapped to the Grand Challenges, which have received OMB approval. Moreover, the Committee that develops the Grand Challenges is non-partisan. The documents are actually seen as critical to the transition. Sunder noted that the Grand Challenges are used by NIST in its budgets, along with other documents such as the American Competitiveness Initiative. Joy Pauschke stated that the National Science Foundation (NSF) will reference the document and will use it as guidance for research.

B. SESAC Report

Applegate reported that the Scientific Earthquake Studies Advisory Committee (SESAC) report for 2007 was delivered to Director Myers on April 7. He reviewed the recommendations, including full funding for the Advanced National Seismic System (ANSS); support for a multi-hazard demonstration project in Southern California; and research on episodic tremor and slip events, a very exciting new area of exploration. The fourth recommendation relates to the significant challenge faced by USGS as a mission agency with a slowly decreasing workforce. The report also mentions the geodesy program and the importance of earthquake early warning, USGS national seismic hazard maps, and the Parkfield experiment.

Mark Zoback expanded on episodic tremor and slip, a very fascinating phenomenon that has emerged in the last two decades. Before it is revealed to the public, the phenomenon must be better understood. However, USGS finds itself almost watching from the outside because of staffing issues. The SESAC wanted to elevate this to a very high level so that the Director would recognize the need for a program in this area. He also discussed the recommendation to continue research on early warning systems, which is a very controversial field, but not at the expense of other important research. There is a significant “push and pull” in terms of what to do with the information. One algorithm resulted in 50,000 false alarms. A very important goal is to engage stakeholders. He reiterated that it is not clear if early warning systems will ever be of great value.

A member commented that good studies are needed on what people do with warning information. This also relates to predictions. These are areas in which it will be critical to involve the community in risk perception. The members then discussed warnings and predictions, and how easy it is for the public to confuse the two. One member commented that the field is moving away from the term “prediction” to “forecast.” However, the NEHRP Strategic Plan (page 18) mentions “prediction,” as does the Grand Challenges. Applegate noted that the USGS has a statutory mandate for “predictions.” Another member commented that the recommendation in the SESAC report for further work on earthquake early warning systems could pose problems if products cannot be delivered because of “threadbare” staffing at USGS.

V. Presentation of 2008 NEHRP Annual Report

A. Overview

Hayes remarked that NIST is very pleased that the 2008 NEHRP annual report was completed 2.5 months earlier than last year. He acknowledged the contributions of John Filson, a primary author of the annual report and the Strategic Plan, who was unable to attend the meeting.

Hayes then reviewed some changes from last year’s report, such as adhering to the general format of the Strategic Plan. This should assist Congress in using the Strategic Plan as a road map. Another important change is that NEHRP agency accomplishments are portrayed in a more collaborative manner, similar to the Strategic Plan.

A member asked if ACEHR will have the opportunity to review future annual reports. Sunder responded that the annual report is submitted to Congress, which is very different from the Strategic Plan. NIST will take the issue under consideration. He noted the timing concerns related to expanding reviewers of the annual report.

B. Discussion

One member commented that the collaborative efforts described in the Introduction made the report exciting to read. Another member noted that the NSF section in Program Highlights is limited to engineering. For next year’s report, NSF may want to broaden this to include geosciences. One member commented that the report is very useful, and liked that it is aligned with the Strategic Plan. One minor comment relates to the acronym “ICC.” Because the acronym refers to both the Interagency Coordinating Committee and the International Code Council, the recommendation was made to always spell out International Code Council to avoid confusion. There also was a recommendation to use a better graphic, such as the USGS “Do You Feel It,”

on page 35. Hayes stated that the USGS graphic can be used in the Strategic Plan. An error was noted in the description of the Utah State Capitol project. This description will be corrected.

VI. Presentation of Draft NEHRP Strategic Plan for FY 2008-2012

A. Overview

Hayes reported that the draft Strategic Plan was sent to the ACEHR in January. The feedback received from 11 members was very positive; approximately 90 percent of the comments were addressed in the next draft. The most significant changes to the Plan were to add utilities and lifelines and to modify the strategic priorities. There also were numerous comments related to funding. The current draft of the Plan attempts to address these comments at the appropriate level. The OMB representative to the ICC has reviewed the Plan and approves of the way funding is addressed. The Strategic Plan is now undergoing public comment and has been posted on the NIST NEHRP web site. There are three ways to comment on the Plan: through an electronic form; e-mail; and by writing directly to NIST. The comment period closes on May 9.

Hayes then reviewed some of the comments from the 11 reviewers. He mentioned that the wording of Goal C was not changed as FEMA believed strongly that the wording should stay as is. In addition, a table was not included to link the strategic priorities to the goals and objectives. Other comments related to the HAZUS open-source code, which was not considered appropriate for the Strategic Plan, *i.e.*, this should be taken up directly with FEMA, and a recommendation for NIST to acquire geotechnical capability. This was also not considered appropriate for the Plan. ACEHR can advise NIST directly of the need.

B. Discussion

Poland asked the members to review the draft Strategic Plan. After the review, the members made the following comments:

- Reference the NIST NEHRP web site.
- Consider changing Figure 7; it is not interesting.
- Add ShakeCast and PAGER to page 6.
- At the bottom of page 6, refer readers to SeismicWave issues for more recent achievements.
- On page 9, edit the NEHRP mission to delete “interagency” before “partnerships.”
- Consider moving the strategic principles before the goals and objectives.
- Consider replacing “evolutionary” approach on page 11 with “integrated” approach.
- Consider adding “thrust areas” in parentheses to Chapter 4, lines 20 and 21.
- On page 42, line 10, include the title of the report in the narrative and include the full title in the footnote.

The members discussed at length whether the Grand Challenges should be cross-referenced in the Strategic Plan; the report is mentioned twice but not cross-referenced in the draft. NIST will take the suggestion under advisement. Poland stated that it is not clear if budget offices will look at the Grand Challenges or the Strategic Plan when determining the allocation of funds. Sunder stated that OMB is part of the ICC and, consequently, the Strategic Plan has more force. The Strategic Plan is also much more detailed than the Grand Challenges.

Two members agreed that there should be an acknowledgment of the linkage between the goals and objectives and the Grand Challenges. Another member commented that it would not be feasible to link the two documents at this late date. Moreover, the Strategic Plan is tied to the reauthorization, unlike the Grand Challenges. A suggestion was made to mention the Grand Challenges in the Executive Summary. Sunder stated that references to the Grand Challenges can be included in the narrative under the appropriate objectives in Chapter 3 where the linkage is very clear, similar to the way the strategic priorities are linked. The members agreed, and recommended that the Plan state at the outset that it is consistent with the Grand Challenges. The ACEHR also discussed adding a principle on the responsibility for paying for earthquake losses. One member thought that the issue should be addressed in the NEHRP Management Plan, and another remarked that the payment issue does not constitute a guiding principle. An alternative may be to include a paragraph on shared responsibility for payment in the Introduction. Sunder agreed, noting that the issue of payment is covered under Objective 12. Hayes clarified that the strategic planning principles discussed in the Plan actually guided how the Plan was written.

Poland commented that social and economic issues are not adequately addressed in NEHRP and should be identified as a planning principle. He asked Howard Kunreuther to write a paragraph on social and economic issues that could be included in the Plan. Yumei Wang offered to help develop the paragraph. When the paragraph was submitted to the members for review, Hayes commented that he did not see the paragraph as a strategic planning principle. Sunder advised changing the title to “Sharing the Responsibility” from “Sharing the Cost” because the responsibility for payment is outside the scope of the Plan and the language would not be approved. A member agreed with both points and recommended including the paragraph on page 15. The members agreed that the issue also should be addressed in the ACEHR annual report.

Poland asked for clarification on the reference to ACEHR on page 11. Hayes stated that ACEHR input will be requested on all of the activities mentioned in the paragraph.

The members discussed the use of “prediction” versus “forecast” in the Plan (page 18). One member remarked that “predictions” are made all the time and the Plan should not adopt awkward language that does not accurately depict what is occurring. Another member stated that the public does not understand the meaning of “prediction” and that confusion could be avoided by using the term “forecast.” A comment was made that a better job should be done to correct the public misunderstanding instead of changing language. Poland stated that the use of “prediction” is acceptable to him; sooner or later, predictions will be possible. The members voted in favor of retaining the term “prediction.”

The ACEHR next discussed Goal B and Goal C successes. One member stated that the NEHRP agencies have been very effective in accomplishing work under Goal B. Work under Goal C, however, has been less effective. The same member commented that the private sector, such as the Applied Technology Council (ATC) and the Building Seismic Safety Council (BSSC), could do a much better job in this area. Hayes responded that the NEHRP agencies do not envision giving these activities over entirely to the private sector. A member stated that it would be impractical for NEHRP to exit this forum, particularly as many activities are mandatory. It was agreed that an important goal is obtaining private sector buy-in, which can only be accomplished

with an understanding by the public of the significance of the risk. Poland remarked that Objective 11 appears to cover this area. As a result, a change may not be needed to the Plan.

The members talked about how best to convey information to the public. One member mentioned the scenarios that will take place in the near future. How can this information be conveyed to the people who really matter? Ed Laatsch stated that FEMA has contracted with Safe America to engage the Chambers of Commerce in six communities to focus on earthquake awareness.

Hayes pointed out that there is no ranking to the order of the strategic priorities in the Plan; the priorities appear in the order in which they are first discussed in Chapter 3. A member stated that the priorities should be ranked for decision-making purposes as there will not be enough funds to pay for all of the activities. Hayes noted that the issue has been discussed at length, with varying conclusions. He stated that funds can be lost if priorities are ranked. Poland responded that the NEHRP programs have been cut without input so perhaps some is needed. Sunder suggested addressing this in the ACEHR annual report.

VII. ACEHR Annual Report Development

A. Overview

Poland thanked the members for preparing their assigned sections of the annual ACEHR report and described the process that will be followed to complete the report before the ACEHR adjourns. He then asked the members to review the draft sections.

B. Discussion of Draft Sections

After review of the draft sections, the ACEHR agreed to combine Section 3, Effectiveness of NEHRP by Agency, with Section 4, Need to Revise NEHRP, to avoid redundancy. The ACEHR also agreed to move Section 2, Trends and Developments in Science and Engineering, to the Appendix. With regard to Section 2, a recommendation was made to include early warning systems under Section 2.6, Disaster Response. There was agreement that Section 2.1, Social Science, must be significantly shortened.

In response to a comment on Section 3.1, NIST, Sunder indicated that NIST may have funds to hire two research employees. Hayes stated that the ATC/Consortium of Universities for Research in Earthquake Engineering contract language provides for appropriate expertise when funding becomes available.

The author of the section on NSF stated that the greatest concern identified was the level of funding. One member stated that it will be important to highlight that Principal Investigators cannot be found when funding is so low. A member asked about tying the other NSF subprograms into NEHRP. Pauschke stated that only the Geosciences Directorate and the Engineering Directorate receive NEHRP funding.

The ACEHR also discussed post-earthquake investigations. One member stated that NSF is not committed to this activity and there may be problems if the activity goes back to NSF. Another member stated that the reports developed by the Earthquake Engineering Research Institute

(EERI) are satisfactory but pale in comparison to those done years ago. A member took issue with this perception of the EERI reports. He stated that some of the more recent reports have taken advantage of new technologies and provide good quantitative assessments.

The ACEHR discussed how to address the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES). One member stated that the best approach may be to say nothing about NEES. Another member stated that the report should not assign blame for the way NEES turned out. One recommendation was to improve outreach so that research findings make their way to industry. It was noted that some research has had a very positive impact. Hayes stated that the NEHRP legislation requires all the NEHRP agencies to support NEES. Sunder recommended scheduling a briefing on NEES for the next ACEHR meeting.

After further discussion, the members agreed to revise their sections and submit them to NIST for consolidation into a first complete draft

VIII. Public Comments

Norman Hester, Technical Director of the Association of Central U.S. Earthquake Consortium (CUSEC) State Geologists, provided an update on the Catastrophic Disaster Response Planning Initiative for the New Madrid Seismic Zone (NMSZ). FEMA is providing about \$20 million a year for the Initiative. The Mid-America Earthquake (MAE) Center has the lead and is handling HAZUS-MH work for earthquake loss estimation. All eight states in the NMSZ region have held workshops and regional workshops are now being scheduled. The interaction with the state and local emergency management community has been very positive. There is a lot of interest in ANSS and in the potential for bringing it to the Central United States. As part of the Initiative, a post-earthquake technical information clearinghouse is planned for the eight NMSZ states. The clearinghouse will be located in Memphis, although there may be a clearinghouse set up in each state. The exercise will be held in 2011, to coincide with the 200th anniversary of the earthquakes that struck near New Madrid, Missouri during the winter of 1811-1812. At the conclusion of his remarks, Dr. Hester encouraged representation on the ACEHR from the Central United States.

IX. ACEHR Annual Report Development (Continued)

A. Review of First Draft Report

After the conclusion of the first day's session, the revised sections were consolidated into a draft report. The members reviewed the draft at the start of the session and made the following observations:

- The draft report is comprehensive and reads well now that it has been shortened.
- The Executive Summary captures key elements and the Introduction is well written.
- The Trends and Development section is uneven and can be edited.
- The report can be condensed in places. However, the report should not be shortened merely for the sake of editing; valuable information should be retained.
- The agency sections would benefit from a closing statement.
- The recommendations for each agency should be included in the Executive Summary and at the start of each agency's section, followed by an explanation. General recommendations for the Program should be included in Section 3.
- More discussion is needed on where to go with social sciences. Although the Trends and

Developments section includes information on social sciences, the body of the report includes very little on integration of social sciences and engineering. If the Executive Summary includes only brilliant research ideas, this will not help NEHRP.

Poland summarized the remaining work to complete the agency sections (now Section 2) of the report. The Trends and Development sections can be revised after the meeting as no group deliberation is required. A member recommended that agreement be reached on the scope of the Trends and Developments section. Poland concurred, and pointed out that agreement also is needed on general recommendations, the Executive Summary, and how to address social sciences.

B. Review of Second Draft Report

The members revised Section 2 of the report based on the comments from the earlier session. After reading the revised sections, the ACEHR discussed final changes to Section 2 and to other sections of the report.

1. NIST

The members agreed that the last paragraph (recommendation on funding) should be moved to the start of the section as it is the most important recommendation. A member commented that the social sciences are not discussed in this section. Sunder stated that NIST's Office of Applied Economics focuses on the social sciences. Another member remarked that more integration is needed with social sciences in this area. There may be a real need to address risk communication and economic incentive issues. If social science issues are being addressed, visibility has been very low. Poland stated that it would be beneficial to craft a recommendation that NIST develop the capability in the social science area to achieve certain specific outcomes.

The comment was made that social sciences may not be a good fit for NIST, and that FEMA may be a more logical choice to address this area. Sunder stated that NIST focuses on economic issues while FEMA focuses on policy. A member remarked that FEMA may not be the best venue for social sciences right now given the way it is structured. Sunder suggested holding a workshop to address the issue. After further discussion, the members agreed that cross-cutting issues affecting all the agencies, such as social sciences, should be addressed in Section 3.

2. FEMA

The members agreed that recommendations for FEMA include a dedicated program for state grants, including pilot studies, funding, and staffing. Transferring the code development responsibility to the private sector was raised. One member stated that any transfer should be evolutionary. Poland noted that there should be a recommendation for FEMA to fund the American Lifelines Alliance and to continue to support existing building standards by funding the American Society of Civil Engineers and/or BSSC. Another member stated that lifelines should be broadened; including ALA specifically may be too restrictive. The concept must be reshaped so that it is more transparent. All the members agreed that the language on FEMA funding should be very strong, *i.e.*, FEMA has had an "extraordinary" decrease in funding.

3. NSF

The members discussed the term “curiosity-based” research and whether it should be included in the report; the majority agreed it should. One member commented that the first priority for NSF should be curiosity-based research, and that it should be tied to the next generation of engineers. It was agreed that the reference to the success rate for the approval of proposals at NSF (10 to 20 percent) discourages students from even entering the earthquake field.

Poland stated that the comments on NEES should be broad in scope, and not addressed only to the management structure. This is too limiting. One recommendation should be for the NEES facilities to be fully funded. A member stated that caution is needed with this recommendation because Congress may allocate all of the funds to NEES. Another member stated that investing in the NEES infrastructure was a great idea. However, NEES was never funded at anticipated levels, which has affected utilization of NEES and curiosity-based research. It was suggested that this results from an internal, systemic problem at NSF in how they launch their projects. When construction funds are awarded, NSF does not fund the O&M.

4. USGS

The members discussed how best to cite the SESAC recommendations in the ACEHR annual report so as to make the recommendations those of ACEHR, such as by adding a discussion on the recommendations. One member stated that ANSS is by far the most important recommendation for USGS. Staffing is second in importance. These two areas are the mechanisms for realizing all of the other priorities for USGS, such as PAGER and ShakeMap. Sunder stated that staffing is a cross-cutting global issue that can be addressed in Section 3. A member stated that language should be included on bringing together USGS with social sciences. The question was posed as to whether each NEHRP agency must have a social science component. The consensus was that not all of the agencies must have this component. Poland stated that USGS should determine how best to communicate risk in its public outreach work.

The members then talked about whether USGS should delegate post-earthquake investigations to NIST. One member stated that there should be a recommendation for all of the agencies to develop a coordinated approach for addressing post-earthquake investigations. Revisiting Circular 1242 is also a need. Poland agreed to write this up for Section 3 and to add language in Section 3 on the reauthorization.

X. ACEHR Closing Discussion

Sunder stated that he liked the open discussion format of the meeting because it provided an opportunity for very good discussions. He also stated that he has taken away topics for three workshops: risk communication; post-earthquake investigations; and social sciences. The members agreed that the less scheduled format of the meeting was very productive.

Poland stated that ACEHR would like the opportunity to review the NEHRP annual reports before they are published. He also noted that there have been some difficulties with the travel arrangements for ACEHR members. Sunder stated that NIST will look into this.

For the final review of the ACEHR annual report, NIST will work with Poland and the members to schedule a conference call meeting in about 1 month.

XI. Adjournment

Poland thanked the members for their attendance and contributions to this meeting. The meeting was adjourned at 3:00 p.m.