

**National Earthquake Hazards Reduction Program
Advisory Committee on Earthquake Hazards Reduction
National Institute of Standards and Technology
Gaithersburg, Maryland
May 10–11, 2007**

Summary

Advisory Committee Members:

Chris D. Poland, Chair	Degenkolb Engineers
Walter J. Arabasz	University of Utah
Jonathan D. Bray	University of California, Berkeley
David E. Cook	The Boeing Company
Lloyd S. Cluff	Pacific Gas and Electric 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
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

NEHRP ICC Member-Agency Representatives and NIST Support:

James M. Turner	NIST Deputy Director
Shyam Sunder	NIST, Acting Director, Building & Fire Research Laboratory, ACEHR Designated Federal Official
Melissa Brandt	Office of Management and Budget
Matthew Heyman	NIST Chief of Staff
Jack Hayes	NIST-NEHRP Director
Melissa Lieberman	Deputy Chief Counsel for Technology Office of NIST Counsel
Jeff Clegg	NIST Budget Division
Edward Laatsch	FEMA
Joy Pauschke	NSF
Eva Zanzierka	NSF
William Leith	USGS
Tina Faecke	NIST-NEHRP Secretariat
John Filson	NEHRP Secretariat
Ugo Morelli	NEHRP Secretariat
Francoise Arsenault	BRI-NEHRP Secretariat
Brian Garrett	BRI-NEHRP Secretariat

Guests:

Thomas Anderson	MCEER
Jay Berger	NEES
John Blair	NIST
Melissa Brandt	OMB
Joannie Chin	NIST
Jeff Clay	NIST
Claret Heider	NIBS
Norm Hester	Association of CUSEC State Geologists
Martin Hight	ASCE-NEHRP Coalition
Deborah Ingram	FEMA
Leslie Linn	IRIS
Bernard Murphy	NIBS
Anita Vollmer	FEMA
John Whitmer	NEES
Susan Zielinski	AGU

Summary of Discussion Topics

I. Review Agenda

Chris Poland, Chair of the Advisory Committee on Earthquake Hazards Reduction (ACEHR), reviewed the agenda (<http://www.nehrp.gov/pdf/ACEHRAgendaMay2007.pdf>).

II. Committee Charge and Member Introductions

Poland reviewed the charge of the Committee and asked the members to introduce themselves (<http://www.nehrp.gov/committees/members.htm>).

III. Welcome and Expectations

James M. Turner, Deputy Director of the National Institute of Standards and Technology (NIST), welcomed the members on behalf of the Director of NIST, William A. Jeffery (<http://www.nehrp.gov/acehr/pdf/ACEHRWelcomeMay2007.pdf>).

Committee members asked about the frequency of feedback to NIST. NIST representatives stated that the NEHRP reauthorization provides for a report to be submitted by the Committee “at least once every two years.” This is a minimum requirement. NIST will welcome more frequent feedback and will ensure that action is taken as a result of the Committee’s reports. Dr. Jeffrey will stay apprised of the Committee’s work and recommendations.

A member commented that the NEHRP legislation authorizes substantially higher funding levels than appropriated funds. Turner stated that NIST will take an aggressive stance on NEHRP funding to the Department of Commerce, to the Office of Management and Budget (OMB), and to the White House.

IV. NEHRP Overview

A. Presentation

Jack Hayes acknowledged members of the NEHRP team and public guests. He then presented an overview of NEHRP (http://www.nehrp.gov/pdf/nehrrp_acehr_ppt.pdf).

B. Questions and Answers

The Committee asked about the schedule for the next NEHRP annual report. Hayes stated that the final draft of the next NEHRP annual report must be submitted to OMB for review and clearance significantly earlier than was done for the report that is currently under review. The agencies are now working on a schedule that will accomplish this.

The members agreed that the Committee needs to better understand the budget process so that members can effect movement in the appropriate direction. Agency representatives explained that the Administration budget planning for FY 2008 has already been completed (the President's FY 2008 budget was submitted to Congress in early February 2007). The agencies are also well along in their preparation of proposed FY 2009 budgets now. As a result, the FY 2010 budget cycle is the earliest budget cycle for which advice from the Committee could be considered.

NIST representatives, in explaining the basic aspects of the budget preparation cycle, used NIST as an example. In setting budget priorities, NIST looks for traceable documents, such as reports from the National Science and Technology Council Subcommittee on Disaster Reduction (SDR), and the National Academy of Sciences. NIST begins with the current budget and then analyzes traceable national needs and gaps, including elements of the gaps that can be accomplished with existing funds and those elements that cannot be accomplished with existing funds. NIST then makes a case for funding those priorities, compared to other national priorities. For FY 2008, tentative budget allocations within NIST's Operating Units (e.g., Building and Fire Research Laboratory) will begin in July 2007, conditioned on Congressional appropriations based on the President's budget submitted in February 2007. It was noted that the Administration sets total Government and individual agency budget targets and caps every year.

The Committee also discussed possible increases in the FY 2008 NIST earthquake research-related budget that are contained in the President's FY 2008 budget request. A number of factors resulted in the increase, such as the "ATC Roadmap," the American Competitiveness Initiative, and the statutory authority that gave NIST leadership of NEHRP.

Members asked about the Committee's role in the budgeting process. Hayes stated that as an Advisory Committee, there are numerous activities the Committee can undertake to shape decision-making in the budget process, such as recommendations on establishing program priorities. Hayes noted that NIST has met with Congressional staff three times in the last year – the last meeting included representatives from all NEHRP agencies. These meetings are an indication that there is now more extensive dialogue with Congress on NEHRP than in the past.

A member remarked that partnering with the states should be emphasized, and that sources outside of NEHRP should be sought to support these efforts. Agency representatives noted that

partnering with the states is already occurring to a large extent, particularly in activities undertaken by the Federal Emergency Management Agency (FEMA). Partnerships, both formal and informal, such as those with the National Oceanic and Atmospheric Administration, will be documented on a regular basis in the NEHRP annual report.

A Committee member commented that more attention must be paid to improving the resilience of the built environment. Agency representatives stated that the agencies intend to address community-wide disaster resilience and embed social sciences in all appropriate aspects of NEHRP. Engaging the National Science and Technology Committee's Subcommittee on Disaster Reduction (SDR) also was discussed. Agency representatives observed that the SDR has identified community resilience as an important issue and that NEHRP agencies are working closely with the SDR. An important aspect of the SDR role is its ability to bring new initiatives to the attention of the Administration.

A member asked about restraints on sharing information provided to the Committee. NIST representatives explained that there are no restraints, except on proposed budget information that has not yet been made public.

V. FEMA Overview

A. Presentation

Ed Laatsch presented an update on FEMA's NEHRP activities (http://www.nehrp.gov/pdf/fema_acehr_ppt.pdf).

B. Questions and Answers

A member asked about FEMA's enforcement of building codes. Laatsch stated that FEMA is working with the other NEHRP agencies to develop recommended building code provisions and other technical guidance. The recommended provisions are passed to the American Society of Civil Engineers and ultimately to the International Code Council and National Fire Protection Association, for possible inclusion in national model building codes. As there are no statutory National building code requirements, there is no FEMA enforcement role. The NEHRP agencies are about to produce a *Seismic Waves* article that will explain the code development process.

FEMA's Pre-Disaster Mitigation Grant (PDMG) program also was discussed. About \$400 million has been provided over the course of the program. In FY 2007, the program received \$100 million. The states control the PDMG, which is not geared to disaster response. These are state grants, although state grant recipients can contract out retrofit projects to private industry. The FEMA web site (www.fema.gov) lists the projects awarded.

A member asked about the topics selected for the FEMA Risk Management Series (RMS) publications. Laatsch explained that FEMA develops the topic list with community partners, the Department of Homeland Security (DHS), the Department of Defense, and other organizations. Some training in the use of RMS products is provided. Many of the RMS publications are in the top 20 downloaded from the FEMA web site. FEMA has conducted surveys (approved by the Office of Management and Budget) of customer satisfaction and is in the process of obtaining OMB approval for a continuing assessment of the effectiveness of its publications.

Laatsch also discussed FEMA's HAZUS (Hazards U.S.) program. FEMA will make available HAZUS program staff for additional information and documentation at future ACEHR meetings, should the ACEHR desire such interaction.

VI. USGS Overview

A. Presentation on USGS NEHRP Activities

William Leith presented an update on the role of the U.S. Geological Survey (USGS) in NEHRP (http://www.nehrp.gov/pdf/usgs_acehr_ppt.pdf).

B. Briefing on SESAC Activities

Following Leith's presentation, Lloyd Cluff discussed activities of the USGS Scientific Earthquake Studies Advisory Committee (SESAC) (http://www.nehrp.gov/pdf/sesac_acehr_ppt.pdf).

C. Questions and Answers

A member commented that the USGS ground motion prediction maps are of great value, and urged that this work continue. The Committee also discussed how the USGS estimates the cost of its proposed earthquake early warning project and how early the warning should be given.

A member commented that USGS has a small effort to move its work into the risk area. Leith explained that USGS is working with very specific users, such as FEMA, in earthquake risk assessment, and that the USGS has participated in the development of several earthquake scenarios. The Committee also discussed the predictions of Professor Keilis-Borak and real-time earthquake warnings. One member commented that earthquake predictions were once believed to be useless; billions of dollars were lost in Peru and in Mexico because of predictions. It was suggested that the Committee review the National Academy of Sciences report on the social implications of earthquake prediction and other relevant literature on the science of earthquake prediction.

VII. NSF Overview

A. Presentation

Joy Pauschke and Eva Zanzerkia presented an update on the role of the National Science Foundation (NSF) in NEHRP (http://www.nehrp.gov/pdf/nsf_acehr_ppt.pdf).

B. Questions and Answers

A member asked about NSF's plans for addressing social science issues. Pauschke stated that NSF has a program on infrastructure management and hazard response that funds social science issues related to natural hazards. The NSF-funded Earthquake Engineering Research Centers (EERCs) have also had a social science component, as does the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES).

Members asked about the ability of ACEHR to influence funding decisions at NSF and whether NSF could bring all of its NEHRP projects under one umbrella. Pauschke noted that this might

be difficult as two Directorates at NSF fund research that fall under NEHRP, while a few other NEHRP projects are located in other Directorates. NSF-funded research should also be distinguished from research at other NEHRP agencies: the NSF-funded projects are driven by Principal Investigators and the proposals they submit whereas projects at FEMA, NIST, and USGS are more targeted in nature.

One member commented that the NSF Civil and Mechanical Systems Directorate now represents a smaller voice in a larger Division as a result of the NSF reorganization, and asked how the Committee can respond to the changes. Pauschke observed that the Committee will be advised of organizational changes as they occur.

VIII. NIST Overview

A. Presentation

Hayes presented an update on the NIST's role in NEHRP (http://www.nehrp.gov/pdf/nist_acehr_ppt.pdf).

B. Questions and Answers

A member asked why experimental research will be limited to NEES sites. Hayes noted that the NEHRP reauthorization encourages the use of NEES and NIST is supporting that intent.

A member asked Hayes about his day-to-day interaction with his NEHRP colleagues. He stated that the collaboration is working very well. He keeps work flowing through working level meetings with NEHRP staff and attending as many earthquake-related meetings as possible. He added that relationships are vital to accomplishing goals. Sunder commented that there are requirements in the reauthorization, such as the annual report and the NEHRP Strategic Plan. Synergy, however, is also required. Synergy has no relevance to a statute; it is derived from people, their interactions, and their agreement on a common mission. There is a now the sense that Program participants must work to communicate with each other, to act together effectively, and to solicit and heed input from ACEHR.

The Committee agreed that the American Competitiveness Initiative is important to the growth of NEHRP. NIST reported that the Initiative calls for the combined doubling of budgets for NSF and NIST (and Department Of Energy's Office of Science) over 10 years. The House has already passed NIST's FY 2008 reauthorization, which reaffirmed the doubling of the budget in real terms. NIST's Building and Fire Research Laboratory (BFRL) operating budget is just over \$40 million. This year, BFRL received a 12 percent increase. Over the two year period from FY 2007 to FY 2008, the BFRL operating budget is projected to increase by 40 percent if Congress approves the President's budget request.

The members also discussed the interim performance measures for NEHRP. This project was completed while FEMA still had the lead of NEHRP. The document, *Interim Report on NEHRP Performance Measures*, December 2005, is available online at www.nehrp.gov and www.fema.gov. NIST stated that the NEHRP performance measures will be revisited.

IX. Public Comments

Norm Hester, Technical Director of the Association of Central U.S. Earthquake Consortium (CUSEC) State Geologists, stated that a number of groups in the Central United States were disappointed that the region was not represented on the Committee. NIST responded that there were many nominations and that balance was required because of numerous competing factors. Hester was asked to submit his comments in writing for inclusion in the minutes.

X. Consensus Feedback on Briefings

In response to the briefings, Committee members listed the following topics for further consideration, review, and discussion by the ACEHR. These topics are organized by the statutory NEHRP activities:

Improve Understanding of Earthquakes and their Effects

- Earthquake reconnaissance and coordination of efforts
- Earthquake prediction: what we know and do not know
- The effectiveness of the EERCs: the multi-disciplinary approach in a post-Center world
- Outreach to the public and translation/promulgation of knowledge for general audiences
- Regional hazard maps and disseminating maps to the public
- Public perception of risk and evaluation of the public understanding of risk
- Progress in the policy arena
- Interagency communication and coordination
- Need to fully implement the Advanced National Seismic System (ANSS)
- Strategies for disaster response, relief, and recovery
- Continued promotion of Performance-Based Seismic Engineering (PBSE)
- Better understanding of interdependencies of all aspects of NEHRP and related activities
- Better understanding of downstream effects on community, economy, lifelines and supply lines
- Relation of earthquake hazard studies to multi-hazards
- Importance of fundamental research

Develop Effective Measures for Earthquake Hazards Reduction

- Realistic scenarios to transmit earthquake information and facilitate decision-making
- Cost-effective retrofit and implementation of retrofit techniques
- Seismic hazard mapping
- Better methods for assessing vulnerabilities
- Cost-effective techniques for improvements in soil and stability
- Prioritization of high-risk infrastructure
- More initiatives and cooperation with the insurance industry
- Non-structural mitigation
- Cost benefits (direct and indirect) of mitigation measures, including retrofit
- Land-use, preparedness, and improved response: measures to reduce losses and risk
- Evaluation research on effectiveness
- Private sector techniques for risk mapping

- Cross-sensitivity to the elements of multi-hazard analysis
- Smart mitigation: identification of the real beneficiaries of programs and the payers
- Promotion of public/private partnerships to leverage additional funds)

Promote Adoption of Earthquake Hazards Reduction Measures

- Involvement of the insurance industry and better communication/partnering with insurers
- Economic incentives tied to building codes and standards
- Limited effectiveness of the BSEGS/ISO program and the need to educate high-risk states
- Useable and enforceable building codes; raising qualification standards for building inspectors
- Realistic scenarios for earthquake hazards
- Success stories on buildings that have performed well
- Improved transmission of information on earthquake effects studies, from case histories to the public
- Status of the health of the earthquake program in every state with moderate to high risk
- Evaluation of the success of efforts to promote adoption of measures
- Use of model processes and documentation to assist with establishing State Earthquake Seismic Safety Commissions
- Education of structural design professionals
- Evaluation of the cost-effectiveness of building retrofitting
- Effectiveness of preparedness and outreach measures
- Code adoption versus implementation
- Effectiveness in reviewing the exposure and vulnerability of the entire infrastructure inventory of a community

Develop, Operate, and Maintain ANSS, NEES, and GSN

- Broaden the outreach to public utilities for the contribution of data
- Encourage full funding for ANSS
- Revisit the evolving and increased expectations for ANSS, which may be unrealistic
- ANSS was an opportunity to secure funding; pursue other sources and initiatives for ANSS funding
- Reach out to other agencies and private industry to support NEES and expand use of NEES facilities

The Committee agreed that FEMA is meeting expectations in its work with national standards and model building code organizations, but that limited progress has been made in implementing comprehensive earthquake education and public awareness programs. One member recommended that the NEHRP agencies provide additional information to the Committee on how they are carrying out their legislative responsibilities and measuring performance/outcomes.

A member asked about FEMA's benchmarks for meeting performance measures. Laatsch replied that FEMA's Mitigation Division had, in the past, one primary goal. This has evolved and FEMA's Mitigation Division now has a series of measures, including lives saved and dollars

saved (referenced the *Interim Report on NEHRP Performance Measures* and mentioned the Benefits of Mitigation cost study).

Another Committee member remarked that FEMA has unfairly taken a lot of criticism for Hurricane Katrina. Response is largely a state and local responsibility. However, as a result of Hurricane Katrina, FEMA is being held to a higher standard than other agencies. It does not appear that FEMA is ready to perform at this higher standard. FEMA should work more with state agencies to make them aware of available resources. In addition, the Post-Katrina Reform Act has changed FEMA's position yet again. Under the National Response Plan, FEMA had responsibilities but could not carry them out. A member reiterated that the responsibility ultimately rests with the states, and that the perceived gap between state and federal responsibilities for response must be addressed.

One member expressed concern over FEMA's declining budget. If FEMA is the frontline for state-federal coordination, resources must be identified that are actually allocated for this purpose. Greater transparency of the resources devoted by FEMA to NEHRP is needed.

Because of time constraints, the Committee did not discuss the other NEHRP agencies.

XI. Trends and Developments in Science and Engineering

Before the discussion on trends and developments, the members were asked to send NIST their ideas for research projects/studies that can be funded with the approximately \$1 million that will be available from NIST for research. Post-earthquake investigations and the development, update, and testing at experimental facilities continue to be issues of importance.

The Chair asked the members to discuss the papers they submitted to NIST on trends and developments (http://www.nehrp.gov/acehr/pdf/trends_developments.pdf). The following section summarizes the remarks of the members that are not included in the papers and the Committee's discussion of the remarks.

During the discussion of **Lloyd Cluff's** recommendation on the consideration of extreme, multi-hazard disasters, a member stated that the New Madrid Seismic Zone scenario should consider multiple events occurring at the same time.

In discussing the trends and developments identified by **Thomas O'Rourke**, Committee members agreed that interdependencies are very critical and have not been sufficiently addressed. There also will be challenges to getting industries to adopt mitigation measures.

Richard Eisner commented that lifelines, resiliency, and making tools more sophisticated are partnership issues. The trend to more robust tools is a good one, but better and more robust data is needed. It was suggested that the Committee consider a full briefing on USGS work in California for its next meeting. One member commented that there must be a focus on where tsunamis fit in the earthquake picture. An organizational basis and strategy for post-disaster shelter and housing also are needed.

Howard Kunreuther stated the Committee is ideally suited to address risk perception and risk management strategies. One member noted that USGS is engaged in exactly this activity with the Southern California Earthquake Center. Another member commented that NEHRP must address the issue of government post-disaster subsidies, which make mitigation redundant.

David Cook stated that one challenge is communicating the bottom line to industry executives. The Committee agreed that training of regulators is an important issue.

In response to the trends and developments identified by **Sharon Wood**, a Committee member agreed that seismic rehabilitation of existing buildings is a very important issue, and recommended that NIST take the lead in this area.

Anne vonWeller discussed the recent trend toward eliminating basic construction code requirements from the text of the building codes and moving them into multiple reference standards. vonWeller emphasized that she is not recommending simplification, only the development of a useful tool to access and implement the tools that already exist.

James Harris stated that NIST should support research that is targeted to making building regulations more rational. He also commented that the EERCs have done a good job of stimulating research; however, there is concern that the resources are diminishing for supporting unsolicited research. Another issue is putting basic criteria on a more consistent risk basis. Broader participation in this area is needed. A member commented that NSF is not making much funding available for innovative research. NEHRP should promote this.

Ronald Hamburger emphasized PBEE, the trend toward green and sustainability, and the need for the earthquake community to collaborate with the green community.

At the conclusion of the session, the Chair distributed a paper entitled *Managing Risk in Earthquake Country, Earthquake Professionals' Top Ten Actions for Northern California* (http://www.nehrp.gov/acehr/pdf/trends_developments.pdf).

XII. Future Agenda Items

The Committee members identified the following specific agenda items for future meetings:

- Transparency with regard to the NEHRP budgeting process
- Self-evaluation from the NEHRP agencies on how each agency is accomplishing its legislative mandates
- Measurements used by the NEHRP agencies for evaluating outcomes related to the legislative mandates
- Visions for the future from experts in the field.
- Multidisciplinary work in Southern California
- Addressing the needs of the lifelines industry, *e.g.* American Lifelines Alliance
- The future direction of the graduating EERCs
- Updated Strategic Plan for the NEHRP
- Research/study projects to recommend to NIST for FY 2008

A member asked if the Committee would be able to attend the ICC meeting on May 31, 2007. Tentative arrangements have been made for O'Rourke to attend and to provide the ICC members with a report. (Post-meeting note: the ACEHR Chair reported on the ACEHR meeting to the ICC via telephone at the ICC meeting.) The ICC meeting agenda will include providing a review of the NEHRP budgeting process for the next ACEHR meeting.

The members discussed the critical points in time at which the Committee should provide input to NIST. NIST representatives stated that the Committee can provide valuable contributions to NIST at any time, and that the timing of those contributions is at the discretion of the Committee.

The members again discussed the timeframe for the NEHRP agencies to coordinate and structure their budgets. NIST will complete its initial budget for FY 2009 by May 2007. By September, budget proposals are submitted to OMB. Feedback is received from OMB around Thanksgiving. NIST is on a "continuing resolution" for FY 2007 but this situation is not expected for the entire FY 2008. A member asked about the OMB decision-making process. The OMB representative replied that OMB decision-making processes for specific agency budgets are not public. NIST made a commitment to provide the Committee with an overview of the budgeting process.

One member asked if there could be a brief closed Executive Session at every Committee meeting. NIST representatives replied that closed sessions are prohibited unless approved and announced in advance and based on statutory factors, for example when proprietary information or personnel issues are to be discussed. Other than that situation, Advisory Committee meetings must be open.

The Committee then discussed the framework for the updated Strategic Plan for NEHRP. Some public input for future strategic direction of NEHRP was received at a NEHRP "town meeting" held at the Quake '06 conference in San Francisco. A common theme to the input was that NEHRP needs to change and improve but it is not broken. John Filson, who, as a member of the NEHRP Secretariat is working on the new Strategic Plan, commented that it must be realistic in terms of funding and must be capable of implementation; balance must be struck between vision and reality. The four existing NEHRP goals may be used or revised goals may be included that better define the future of NEHRP. Expected outcomes will be listed under each program activity or objective in the Strategic Plan. A Committee member emphasized that the Strategic Plan should address the links between science and policy. This should be a NEHRP activity in its own right. One member suggested that a goal in the Strategic Plan can be "linking risk assessment with risk management for reducing earthquake losses and promoting community resilience." It was noted that work must progress quickly on the Strategic Plan because it is overdue.

The ICC will have the primary role in approving the updated Strategic Plan because it is an ICC deliverable. The ICC also will decide the role of the Committee in the development of the Strategic Plan. A member stated that the Committee should comment on the Strategic Plan, with an emphasis on goals, objectives, and principles. It was noted that NIST has recorded very valuable input for the updated Strategic Plan from the Committee over the course of this meeting. The Committee's role in updating the Strategic Plan can be included on the upcoming ICC meeting agenda.

XIII. Draft Report to the Director of NIST

The Chair stated that the Committee has several tasks to address. Important among these tasks are: to assess the effectiveness of the NEHRP agencies in carrying out their mandated activities and to identify needs to revise NEHRP. One member commented that a brief report from each of the NEHRP agencies would assist the Committee in this task. The Committee agreed that it can make a recommendation that the ICC address any problems that are identified. The Chair asked the members to edit/rewrite their Trends and Developments papers, if necessary, by May 21.

The Committee discussed next April as a possible due date for the first report from the Committee. One member noted that if April is selected as the due date, some members may not be able to provide input as their terms will expire in February. NIST will check on extending the members' terms so that they all end on April 30th of the appropriate year to allow members to fully participate in preparation of the report. The members agreed to hold the next meeting in August or September, and then meet in February 2008 to draft the report to the Director of NIST.

XIV. Adjourn

The Chair thanked all of the members for their participation and valuable contributions. The meeting was adjourned at 2:30 p.m.