

**Summary of February 12, 2007 meeting of the
Scientific Earthquake Studies Advisory Committee (SESAC)
USGS National Headquarters, Reston, Virginia**

Meeting Participants

SESAC Members

Lloyd Cluff, *Chair*, Pacific Gas & Electric

Jim Dieterich, University of California at Riverside and Chair, National Earthquake Prediction Evaluation Committee

Art Lerner-Lam, Center for Hazards and Risk Research, The Earth Institute, Columbia University

Vicki McConnell, Oregon Department of Geology & Mineral Industries

Jonathan Price, Nevada Bureau of Mines and Geology

Paul Somerville, URS Corporation

Sharon Wood, University of Texas at Austin

Tom Jordan (University of Southern California) unable to attend.

USGS Staff

David Applegate, Earthquake Hazards Program (EHP), Reston VA

Rufus Catchings, Earthquake Hazards Team, Menlo Park CA

Linda Gundersen, Chief Scientist for Geology

Pat Leahy, Associate Director for Geology

Bill Leith, EHP, Reston

Elizabeth Lemersal, EHP, Reston

Jill McCarthy, Geologic Hazards Team, Golden

Mike Blanpied, EHP, Reston

Invited guests

Ralph Archuleta, Department of Earth Science, University of California at Santa Barbara

Jack Hayes, National Earthquake Hazards Reduction Program, National Institute of Standards and Technology

Stuart Nishenko, Pacific Gas & Electric

John Parrish, California Geological Survey

Ellen Rathje, Department of Civil, Architectural, and Environmental Engineering, University of Texas at Austin

Garry Rogers, Geological Survey of Canada

Mark Zoback, Department of Geophysics, Stanford University

Attendees

Abou-Bakr Ibrahim, Division of Waste Management, Nuclear Regulatory Commission

Gary Ehrlich, Structural Codes and Standards, National Association of Home Builders

The meeting agenda is appended to this summary with annotations indicating that a Powerpoint presentation is included in the Presentations folder provided on a separate CD.

February 12, 2007 (Open Session)

Call to Order and Introductions

SESAC Chairman Lloyd Cluff began the meeting at 9:00 a.m., and attendees introduced themselves. Cluff noted that this is the 16th meeting of SESAC. Cluff saluted Pat Leahy for his role as acting director and his fine decision making.

State of the USGS Geologic Discipline

Pat Leahy, Associate Director for Geology, provided a summary of the state of the USGS Geologic Discipline, first thanked SESAC for their advice and recognized Cluff, Jordon, Price, and Wood for their service on SESAC. Leahy presented SESAC service plaques to Cluff and Price and both SESAC and ANSS Steering Committee service plaques to Wood. He expressed regrets from new USGS Director Mark Myers who was unable to attend the meeting, and encouraged SESAC members to visit Myers, noting that a March meeting with Myers is planned for Cluff.

FY 2007 funding is up in the air, with a series of continuing resolutions possible; LANDSAT 8 and a plus-up for the multi-hazards initiative as well as taking the Minerals cut off the table may be funded by the House; uncertainties remain as the Senate has not acted. The 2008 President's request includes increases for coastal monitoring in support of the Ocean Action Plan. Hazards are missing from FY 2008 budget. The Secretary's priorities do not include an increase for multi-hazards initiative, which is a big challenge for this new initiative. In response to a question, it was noted that one USGS Director's commitment does not bind a future director. The Director's priorities are included in the bureau's Science Strategy's six areas of interest, with hazards, global change, and energy issues having the most importance. Senior leadership is having monthly retreats to discuss implementation and advisory groups will be consulted.

The committee discussed increasing the focus on hazards within the bureau, other federal and state agencies, and the public. It was noted that levees are a top hazard and could provide for a shift in focus—levee failures can cripple economic viability. There should be a focus on water availability combined with hazards. Cluff noted that Barbara Boxer asked (at the field hearing in April 2006) how much funding would be needed to deal with water availability and earthquake hazards related to the Sacramento-San Joaquin delta: Cluff answered \$250 million. Leahy noted that focus within the CALFED Bay-Delta Program has been on ecosystem issues, not water availability. The efficacy of the Department of Homeland Security and NEHRP to promote hazards awareness and to collaborate with the USGS was discussed, noting that DHS's Science and Technology directorate has been directed to deal with hazards and has been represented at OSTP meetings. The importance of scenarios to possibly increase urgency to deal with hazards was noted.

Leahy and Cluff stated that ANSS will stall in the next couple of years if it cannot be funded at the authorized level. Wood emphasized the importance of building instrumentation and made an analogy that such instrumentation is as important to an understanding of earthquake effects as the

black box from aircraft is to the FAA and air safety. It was noted that NEIC's ability to identify the recent North Korean nuclear test might be used a way to "market" ANSS.

Update on Earthquake Hazards Program activities

Dave Applegate provided an update on current and future activities within the Earthquake Hazards Program (EHP). Applegate stated that USGS is the only NEHRP agency that has a specific line item in the annual budgets for NEHRP (two, including the GSN program). One of the USGS responsibilities within NEHRP is to implement research findings through outreach, partnerships, and other means. Under the Stafford Act, USGS is to provide notifications and warnings for earthquakes, volcanoes, and landslides. USGS supports NOAA in providing warnings for other hazards. The coastal and marine geology program works closely with NOAA on tsunami hazards—these activities are under review and evaluation by OMB as part of the evaluation of geologic hazards programs.

Performance is tracked and evaluated under three authorities: DOI's strategic plan; OMB's program assessment rating tool (PART); and the PART improvement plan, which identifies a series of milestones each fiscal year to assure the hazard programs are improving their ability save lives and improve loss estimation.

While no specific cuts have been made to EHP budgets, the erosion of capability has been due to flat funding and inflation. Following the Indian Ocean tsunami, supplemental funds were made available and the base funding for EHP has been increased as a result, which has meant considerable additional commitment of effort. For FY 2007 the series of continuing resolutions has meant that funding has remained at the FY 2006 levels, but costs have risen.

ANSS has two performance measures under PART. ShakeMap is now available in Google Earth. The NRC's economic benefit report, *Improved Seismic Monitoring Improved Decision-Making*, has been important in our discussions with OMB. Our largest effort currently for seismic hazard assessments is the development of the next version of the national seismic hazard maps, due out this Fall. OMB is concerned with the delivery of seismic hazard maps for urban areas and the identification of liquefaction susceptibility. All publications are now included in the PART performance measure for "systematic analyses"; this is the first measure that we have had to include EHP research, which makes much more of EHP visible. Over time OMB may be looking for ways to measure how progress is made with regard to research.

Parkfield and SAFOD are on-going efforts. The external part of EHP is unique within USGS, in the extent to which funds go to external researchers as grants, which ensure the independence of the research, and to collaborators with USGS researchers as cooperative agreements. Within GSN, 32 stations have been upgraded; these upgrades are tied to NOAA's work in establishing a tsunami detection system in the Indian Ocean. There are 3 performance measures for GSN. The EHP office also manages the National Geomagnetism Program, which is not within SESAC's purview.

Archuleta inquired if layoffs would be needed as a result of flat budgets in 07 and 08. Applegate stated that GHT and EHT have dealt with flat budgets by seeking outside resources to fund staff.

Gundersen added that incentives to encourage early out retirements were offered to try to deal with the shortfall issue, which worked well for the Geologic Discipline; normally there are 28 retirements per year and last year there were 80. Dieterich asked if it would be helpful for SESAC to provide assistance to EHP in determining priorities, which seems especially important in the current flat funding and erosion-by-inflation situation. Cluff said this will be discussed during the executive session. Somerville noted that SCEC's efforts are enhanced as the USGS funds to SCEC are leveraged by NSF and other SCEC funding sources; the community that SCEC has built has been very effective. Cluff discussed a possible tie-in for EHP using PG&E's CRADA to work with the National Park Service related to last year's landslide that blocked the main route into Yosemite National Park. PG&E re-routed the main transmission line and there is a possibility that the entire highway will need to be relocated as the entire ridge in the area has evidence of paleo landslides. Nishenko wondered if OMB is seeing USGS as operational for networks in addition to research activities. Applegate stated that more needs to be done to present and ask for support for operational components in addition to how they are tied to research. Gundersen pointed out that ANSS is a priority for USGS. Within NEHRP, OMB and OSTP have been supportive of ANSS; however, DOI's funding cap severely limits additional spending. Rathje noted that the erosion of funding has affected internal research; the USGS scientists that she has worked with have time only for operational work.

ANSS Steering Committee Report

Bill Leith summarized activities of ANSS, as part of a report by SESAC's only subcommittee: the ANSS Steering Committee. Monitoring stations have been gradually increasing; we are 10% of the way to the goal for capital funding for station increases and upgrades. There are numerous ANSS products that have been completed or are in development. ANSS 2006 accomplishments include upgrades funded by the tsunami supplemental to improve post-earthquake notifications. A special session was held at the SSA annual meeting on next generation monitoring methods; development of these new methods is moving ahead.

For 2007, the regional seismic networks funded by ANSS/EHP are implementing standard formats and will be using standard tools. Four structures have been instrumented and 12 additional structures (9 buildings and 3 bridges) have been chosen for instrumentation. The U.S. Center for Engineering Strong Motion Data has been established and allows data searches via the web, and the data can be mapped on Google Earth. The earthquake early warning test of algorithms is progressing well using CISN real data. The budget outlook is for flat funding; this means that ANSS development will come to a stop by the end of FY08, which is not acceptable.

The committee discussed the funding shortfall issue. Nishenko noted that the emergency management community uses ANSS information to do their jobs. Leith noted that ANSS will soon be in a position of having to determine which partner or user to disappoint. Cluff noted that how to focus ANSS efforts with no new funding should be discussed by the committee and noted that Taiwan puts research funds into installing sensors. Wood noted that ANSS has accomplished a great deal with very little funding, which has created an expectation that cannot continue to be met. She provided the regional seismic networks as an example: outside of California, most cannot respond the way we want them to and the funding that ANSS/EHP provides is not sufficient. Somerville described the boom in construction of very tall buildings on the West coast

and the likelihood that building officials will require the buildings to be instrumented; there is a possibility for partnerships for instruments with no ANSS investment. Leith noted a similar partnership with the Veterans Administration for instrumented hospitals. Archuleta asked if cost per installation is increasing due to slow implementation. Leith said that operational costs are going up; on the capital side increases are generally offset by improved technology, but personnel costs are going up.

Leith discussed other issues and challenges. USGS is not able to leverage *EarthScope*, especially the USArray transportable array stations, due to a lack of funds. Similarly, NSF's Network for Earthquake engineering Simulation (NEES) facilities could be a huge boon to ANSS by, for example, developing engineering metadata, but the resources cannot be used without funds. ANSS performance standards are being used to weigh internal projects and are being used proactively by most regional seismic networks to evaluate themselves. Alaskans remain concerned about the different standards proposed for their region. Leith showed what the ANZA network has added to southern California detection. The ANSS revised planning document was discussed. A draft is to go to the Steering Committee for review in June (Circular 1188 is not to be replaced).

Cluff noted that Sharon Wood has done a terrific and important job as the steering committee chair and has brought engineers in so that they will be able to take advantage of ANSS data.

Update on National Earthquake Prediction Evaluation Council (NEPEC) activities

Jim Dieterich discussed the four major points of NEPEC's January letter to Mark Myers: the time-dependent model of California should agree with the national model; the time-dependent and time-independent models should be the same; there is a bulge at M6.5 due to probabilities being added; and the Scientific Review Panel of the Working Group on California Earthquake Probabilities is reviewing the product and their recommendations should be followed. There will be a 3-day workshop in March to kick-off the time-dependent part of the study. In May, NEPEC will review the Pacific Northwest creep and tremor episodes, what is known about creep events, and what the impact of creep and loading is on probabilities. Dieterich stated that NEPEC is concerned about appropriate inputs to the Building Seismic Safety Councils's process, not in influencing their process.

Status of Western Region Earthquake Hazards Team

Rufus Catchings provided an overview of projects and office locations for his team. Eleven people took the buy-out last year (likely to replace 3); the team remains deeply in the red, so there will be little or no hiring this year. About 85% of salaries are covered by the program; only 5 or 6 staff are under the age of 40. The team is very productive. McConnell asked if project members are dedicated to one project or work across a number of projects. The needs of the project and abilities of the people are taken into account to make this determination. Archuleta expressed concern about the overall age of the staff as the team needs to be able to plan for the future of projects so that USGS can be seen in a good light. Gundersen discussed the work force strategy developed 2 years ago after an evaluation of staff by team chief scientists, program coordinators, and line managers. Staffing was forecast and the buy-outs were designed to

eventually allow new staff to be hired. Rathje inquired about urging older staff to overlap with new hires. The emeritus program is designed to do that. Parrish asked about impact of retirements on NSMP. Catchings stated that there is not enough financial flexibility to replace, so more contracting will be done. Archuleta asked why the NSMP is separate from ANSS. This is because technicians are in NSMP. McCarthy stated that NSMP has obligations that pre-exist ANSS, so it is still maintained. Applegate noted that EHP is trying to find efficiencies to deal with monitoring stations and coordinate with California monitoring, which is a bit of a challenge to be worked on over time. Wood inquired about hiring of an engineer. Catchings stated that a structural engineer is likely to be hired in southern California.

Status of Central Region Geologic Hazards Team

Jill McCarthy provided an overview of projects for her team. The team covers earthquakes, landslides, and geomagnetism and operates GSN in partnership with NSF (USGS operates about 2/3 of network). The team has 170 people, 106 are government employees. In the last 2-4 years about 30 staff have turned over; most newer people are operational and are at lower grades. The Team has been successful in following workforce plan written 2-3 years ago; filled positions were identified as high priority. Hiring for research staff is moving forward, but slowly; are using emeritus to mentor new hires. There is a good balance of scientists, operations, and support staff, so scientists have the support they need. It is exciting to be in Golden and see the change. Earthquake base funding covers 95% of earthquake staff. Contractors and related costs have gone up with tsunami initiative funding increase. Two positions are to be filled in Memphis. Have found it useful to bring in students and post-docs so team can choose from a small pool to find the best match for the very small number of permanent positions that team can hire. FY07 deliverables were discussed, including plans to release the public version of PAGER, now in prototype as ProtoPAGER, in September or October.

Garry Rogers noted that the Canadian Survey has dealt with similar personnel issues and made difficult decisions; decisions have been increasingly bureaucratic, which is difficult for staff. Many have left for other opportunities. Cluff stated that he hears from USGS researchers that they are not looking to remain for a long time. Rogers asked why there are 2 teams. Gundersen stated that 3 regional offices are USGS legacy. McCarthy said that each team has many distinct responsibilities, so there is little overlap and coordination is done. USGS has a cost-center system. Dieterich stated that western teams have shrunk from 3 teams totaling 450 down to 190; there is a tendency when times are tough to spread the pain and get through it by cutting from every project, but everybody starves—it is better to put your money where you want your successes to be. Archuleta noted that there is a big difference in the cost of living between Menlo and Golden. Catchings stated that next year will be better; GHT has gone through the bulge of older staff that retired before EHT because of different and older staff; reimbursables have gotten us through without layoffs. McCarthy stated that GHT is trying to focus staff on science and products to keep up productivity, but there is little time for evaluation; staff is not so much frustrated as tired. Archuleta asked how NEIC is different from GSN. McCarthy noted that NEIC is under ANSS, GSN is run out of Albuquerque and the datastream from GSN goes to NEIC. Lerner-Lam noted that there is no International EIC, but NEIC is the *de facto* IEIC—this should be a point of discussion in future, with PAGER as a good leverage point.

McCarthy discussed the GHT science crews. The ANSS products fact sheet that Leith showed describes products and tools mostly developed within NEIC and nearly all feed in to PAGER. Global ShakeMap, ProtoPAGER, and ShakeCast were described. The National Seismic Hazard Assessment is being updated; Urban Seismic hazards maps were discussed. In order to be able to give a more rapid evaluation of what the impact of an event will be, EHP is moving toward risk. Earthquake scenarios are being developed as inputs to HAZUS and are displayed using ShakeMap. NEIC and hazard assessment groups work together on scenarios and the boundaries melt away. A library of scenarios used for the 2002 hazard maps is being generated—not sure yet how to provide these publicly. U.S. seismic risk maps will be developed and will combine hazard curves and fragility curves to create map with probability of exceedance for low-rise moment frame buildings. There has not been much use of remotely sensed and geodetic data—this will likely be a growth area and if can get data in near real time then could do more. Such data would be useful for landslide studies. Zoback asked about connection with Geo-EarthScope. Applegate noted that Geo-EarthScope does not focus on urban areas where fault surfaces have been disrupted by human activity, but USGS has interest in those areas for seismic hazard assessment. Consequently, EHP has been able to add funding to get lidar data for the entire Hayward fault. McCarthy discussed earthquake response noting that there has not been much aftershock deployment in the recent past as events have not required it. Catchings noted that many of the topics McCarthy covered include EHT efforts and represent good coordination.

Update on NEHRP partnership activities

Jack Hayes presented an update of recent NEHRP activities. Hayes has now been at NIST in his NEHRP lead position for 1 year. There have been 3 meetings of the Interagency Coordinating Committee (ICC), which enables follow-up from agency leadership so that working-level issues move forward. OMB and the OSTP Director have been represented at these meetings as well as the 4 agency leads and the meetings have been productive and positive. The Advisory Committee for Earthquake Hazards Reduction membership will be announced soon—there were 90 nominees. The Program Coordination Working Group is in the process of starting to revise the NEHRP strategic plan. Based on feedback at the Quake 06 meeting and on the NEHRP website, the update will be more substantive than originally planned. The ICC asked for a gap analysis of the current strategic plan. The first annual report for Congress, which will include budget numbers for all 4 agencies, is nearly complete. NIST's earthquake budget went to zero 5 years ago; the modest reinstatement in FY07 will grow to roughly half the FEMA funding, so earthquake research capability at NIST is reconstituting (40% in-house and 60% extramural). Hayes described priority areas of interest for NEHRP.

McConnell asked if NIST increases would go to fulfill its NEHRP responsibilities. Hayes replied that support from Bill Jeffrey, NIST Director, has been strong. Nishenko noted that lifelines are not included in the areas of interest. Hayes said that all important items could not be included because very little new funds. Ibrahim asked who is working on PBS. FEMA is working to develop code-like language without bridging research to implementation. Somerville noted that NRC did very good work in PBS. Ibrahim commented that NEHRP should build on what is existing. Lerner-Lam asked how overlapping research agendas would be managed. Budgets will be coordinated in future, as legislation requires. Cluff noted that PEER gets funds from CalTrans and utilities for lifelines research, which is a result of engaging end users with researchers so that research can fill specific needs of practitioners. Joint workshops are a way to set joint research

agenda and show that NEHRP is greater than the sum of its parts. Cluff noted that post-earthquake information infrastructure has been diminished as NSF has reduced funding for the collection of post-earthquake data. It was noted that other agencies have an interest in earthquake R&D--NRC, EPA, Corps of Engineers. Archuleta asked if there is a strategy to increase budget for NEHRP; will increase for one agency result in decrease for others? Hayes stated that no increase will come at the expense of other NEHRP partners because each agency's funding is in a different budget bill; hope is that NEHRP leadership can serve to influence on agency budgets. Price noted that the most effective scenarios involve a number of local jurisdictions and state agencies. Nishenko stated that scenarios make real the fact that in post-event will have limited information, so scenarios key for immediate response, too. Cluff said that scenarios need to be based on case histories of actual events and use visuals from those events.

Update on the Working Group on California Earthquake Probabilities and the National Seismic Hazard Mapping Project

Mike Blanpied provided background and a summary of current activities by WGCEP, which is to provide the California Earthquake Authority (CEA) with a statewide time-dependent earthquake rupture forecast that uses best available science and endorsed by USGS, California Geological Survey, and SCEC. Zoback asked what aspect of time dependence is being dealt with. Blanpied stated that stress changes in a fault system and between faults have both been dealt with in the past and noted that there is no intent to change long-standing California fault probabilities that are time-independent.

Archuleta noted that USGS may receive blame if those insured by CEA are not happy with the resultant rates and the rates changing each year. Blanpied noted that CEA will be using a contractor to make rate determinations. Price and Cluff noted that CEA's rates are regional; the latest readjustment resulted in some rates increasing significantly and some reduced significantly. The rates are quite high and the deductible is 20%. Rathje asked if there are any plans to incorporate crustal deformation modeling from InSAR. Blanpied said Ned Field is working on this component.

Blanpied summarized the updating of the national seismic hazard maps. Draft maps are due February 15, followed by three months of expert review. Public comment will be available through the web from June 1 to August 1. Regional changes and issues were discussed. Cluff stressed that working with practicing engineers is key. Applegate stated that USGS is cautious about incorporating changes into the assessments so that the maps are appropriately conservative and avoid dramatic shifts that would undermine their credibility with the engineering and planning communities.

Southern California Multi-Hazards Demonstration Project

Applegate provided a summary of the demonstration project. SoSAFE, a targeted research effort being funded through SCEC, is a key component. New products are focused on all aspects: from rupture to recovery. The Earthquake Country Alliance has been very active. Early in 2008 the Great Southern California Shake Out is planned, which will use a scenario to feed into California's Golden Guardian emergency management exercise. Planning committee is lead by Lucy Jones with four working groups; much of the work of these groups cannot be completed

without additional funds. Cluff urged that the planning committee to work with the emergency preparedness community and practicing engineers so that the Shake Out presents appropriate and credible examples.

EHP Strategic Planning

Applegate described several plans and strategies that EHP takes into account in order to ensure that activities support relevant government and consensus priorities. Presented as examples: the National Science and Technology Council's *Grand Challenges for Disaster Reduction* and the implementation strategies being developed for each hazard; United States Group on Earth Observations (US GEO), the Subcommittee on Disaster Reduction's near-term opportunity plan that highlights societal benefits, *Improved Observations for Disaster Reduction*; and the USGS Strategic Science Strategy, currently in draft form. Applegate asked the committee's how they would like to be involved in the upcoming update of the 5-year plan and in EHP priority setting. Cluff stated that the day's presentations gave the committee good information that they will use to make recommendations for EHP. Some SESAC members have been asked to develop white papers on key aspects, with focus on positive. Applegate noted that the white papers can serve to inform discussions at the next meeting. The 5-year plan is especially important to guide internal and external priorities. Applegate asked several questions of the committee on specific EHP activities and asked for a discussion regarding each current priority.

Zoback noted that the partnerships and efforts related to the demonstration project are huge; he asked how this huge effort fits when EHP is already spread so thin and wondered if the initiative is directed at DOI as a means to focus on hazards. Applegate noted several areas of the project that provide a nexus with other bureaus: environment, public lands, debris flow; wildfire; flash flooding. While the project does not focus solely on earthquakes, he felt that it was a way to build the Earthquake Hazards Program within a broader context that could be sold to DOI and Congress. Nishenko asked about funding so far for the initiative. In 2007, \$2.2M in new funds plus \$2.7M redirected across five programs. In 2008 there will be funds for stream gages. In southern California there has been some erosion of capability within EHP. Price noted that the use of the time-dependent model will identify a locale to focus on for the next big earthquake, but the next big earthquake may be where we don't think it will be. Lerner-Lam noted the lesson from Hurricane Katrina that social vulnerability is very important and asked if there is a focus on this issue within the demonstration project. Applegate stated that the interface with UCLA's School of Public Health is strong, which covers one aspect of social vulnerability, and *Putting down Roots...* has been distributed in Spanish. Wood noted Gavin Newsome's statement that a large percentage of San Francisco area population did not go through Loma Prieta. Parrish noted that the Governor is very concerned about any issues that may represent an economic concern for businesses in the state; scenario and exercise must be presented in a positive light--should focus on the need for preparedness. Nishenko stated that tsunami warning seems to be the only aspect of tsunamis to be addressed; the plans do not deal with marine geology aspects.

Regarding geodetic monitoring, Archuleta asked if the USGS intends to keep collecting GPS data in light of the efforts that NSF is funding; what is the purpose of active GPS program—to feed into tectonics and/or deformation? It seems that USGS should move away from monitoring and only use the data that others collect. Applegate stated that this is an important and timely

issue that needs answers; EHP is currently partnering with NASA to get real-time signals. Cluff noted that USGS and PG&E are partnering on GPS monitoring so that uncertainties can be lowered. Catchings indicated that campaigns may be a good method. Archuleta stated that campaign method seems less expensive, but over time has proven to be about the same cost as continuous method.

Zoback noted that the \$180 million being spent for PBO and US Array stations under EarthScope will need \$23 million annually for long-term operations and maintenance support. NSF has not traditionally funded long-term monitoring operations, so it seems unlikely that their funding will continue beyond the 10-year timeframe of the EarthScope initiative, so there is a need at the Director's level to look at where this support will come from beyond that timeframe. Applegate stated that USGS long-term involvement needs to be very strictly based on our needs. Nishenko asked who would be responsible for a nationwide permanent GPS array. Archuleta answered that it should be the organization that has the satellites as they are used to handling lots of data. Price noted that NASA has different priorities right now (going to Mars) and their earth science component is not well funded at this time—convincing them would be quite difficult. Archuleta stated that if NASA is not going to be responsible, then it should be USGS as NSF is likely to abandon PBO GPS stations and look to USGS to take them over. Wood stated that the ANSS Steering Committee has discussed incorporating GPS, but it is not in the original Circular 1188 plan and there are no funds, so the committee decided not to take on an additional need. Price stated that it is possible that geodesy can play a key role, so don't resist exploring that possibility. He noted that technology changes quickly so there may be technology advances and efficiencies that could allow USGS to take on more GPS—efficiencies in instruments in future may enable this. Applegate stated that NASA does like to discuss these issues, but they are having funding difficulties now too. Archuleta asked if USGS wants to take over GPS stations when PBO is done. He noted that stations give only capabilities for crustal deformation and are not good for 1-year type strain (need ~100 stations for 1km of strain area). Applegate wondered how much can be determined now to try to discern what the promise of the future might be; if not now, how long will it be before we see the promise more clearly? Price noted that GPS monitoring for volcanoes and tsunamis represent potential partnerships with earthquake monitoring. Archuleta noted that a very small number of stations control a great deal of data. If they are biased or leave out components then all assumptions are based on possibly faulty data. Zoback noted that Brad Aagard's models not only make the earthquake real but also allow users to learn something about the science. Somerville noted that Japan is producing lots of great products such as 3-D ground motion maps and deep boreholes; why can't the U.S. be as advanced? The EERI research plan says we need three times the funding that is now available.

Agenda
Scientific Earthquake Studies Advisory Committee (SESAC)

February 12, 2007
USGS National Center
Reston, Virginia

Monday, February 12th (Open Session except where noted)

<i>Time</i>	<i>Topic</i>	<i>Presenter/Participants</i>
8:30am	<i>Continental breakfast</i>	
9:00	Welcome and introductions	Lloyd Cluff, Chairman
9:15	State of the USGS Geologic Discipline	Pat Leahy
9:45	Update on Earthquake Hazards Program activities (PP)	Dave Applegate
10:35	ANSS Steering Committee report (PP)	Bill Leith
11:15	Executive Session: Committee Discussion regarding priorities of EHP	
11:45	<i>Lunch (USGS Cafeteria)</i>	
12:30pm	Update on NEPEC activities	Jim Dieterich, Chair
1:00	Status of teams supported by Earthquake Hazards Program	
	• Western Region Earthquake Hazards Team (PP)	Rufus Catchings
	• Central Region Geologic Hazards Team (PP)	Jill McCarthy
2:30	Update on NEHRP partnership	Jack Hayes, NIST
3:15	<i>Break</i>	
3:30	Update on WGCEP and national seismic hazard maps (PP)	Mike Blanpied
4:30	Update on Southern Cal. Multi-Hazards Demonstration Project (PP)	Applegate
5:15	Program strategic planning and prioritization (PP)	Applegate
6:15	Adjourn for the day	