USGS
Earthquake Hazards Program

Summary of October 30-31, 2006 meeting of the
Scientific Earthquake Studies Advisory Committee (SESAC)
USGS Albuquerque Seismological Laboratory
Albuquerque, New Mexico

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
Committee member Tom Jordan (Univ. of Southern California) unable to attend.

USGS Staff

David Applegate, Earthquake Hazards Program (EHP), Reston VA
Rufus Catchings, Earthquake Hazards Team, Menlo Park CA
Lind Gee, Albuquerque Seismological Laboratory (ASL)
Bob Hutt, ASL
Bill Leith, EHP, Reston (by phone)
Elizabeth Lemersal, EHP, Reston
Jill McCarthy, Geologic Hazards Team, Golden

Guest speakers

Kent Anderson, IRIS Consortium, Socorro NM
David Green, NOAA Tsunami Program, Silver Spring MD (by phone)
David Russell, AFTAC, Cape Canaveral FL (by phone)

The meeting agenda is appended to this summary with annotations for file names of Powerpoint presentations in the Presentations folder and other files in the Background folder provided on a separate CD.

October 30, 2006 (Open Session)

Call to Order and Introductions

SESAC Chairman Lloyd Cluff began the meeting at 9:00 a.m., and attendees introduced themselves. Cluff provided a draft outline of the committee's report for 2006 with writing assignments for later discussion.

The USGS Role in the Global Seismographic Network

Albuquerque Seismological Laboratory and GSN

Lind Gee, Scientist-in-Charge at the Albuquerque Seismological Lab (ASL) gave a presentation on the history and role of ASL in the Global Seismographic Network (GSN). She was joined by Bob Hutt, who was scientist-in-charge for 17 years and is currently a senior scientist at the lab.

ASL is located on Isleta Pueblo land accessible through Kirtland Air Force Base. Originally opened in 1961 as part of the U.S. Coast & Geodetic Survey, it was transferred to USGS in 1972. The 32 staff include 24 contractors. Honeywell is the latest in a series of contractors, which have always provided a significant number of staff. ASL had its start with the World-Wide Standardized Seismographic Network (WWSSN) in 1962, which operated 100 stations in 60 countries, providing data for monitoring nuclear tests and seismological research. ASL has supported a number of networks over the years, including the USGS U.S. National Seismographic Network and, starting in the 1980's, the GSN. Most recently, ASL has been installing the ANSS Backbone stations through support from the National Science Foundation's EarthScope initiative USArray component as well as Caribbean stations as part of the President's tsunami warning initiative. Installation of the 39 ANSS Backbone stations was completed in September 2006.

ASL responsibilities include installation and testing; equipment design and development; site surveys; and training of local station operators. Local contacts perform a wide variety of tasks, reducing the need to send engineers to the field. Long-term operations include equipment repair and replacement, technical support, and on-site maintenance and training. ASL has responsibilities to collect, archive and distribute digital waveform data. ASL has a long tradition of instrument testing, one reason why ASL is so valuable to USGS. Testing vaults are located in granite foothills, the site having been chosen by Jim Devine for its quietness. Hutt has focused on seismometer evaluation and data acquisition system evaluation, collaborating with Sandia National Laboratory located on adjacent Kirtland AFB.

GSN includes 141 stations, 88 of which are operated by USGS out of ASL. The rest are operated by the IDA group at UC San Diego with funding from the National Science Foundation through the IRIS Consortium. GSN is a cooperative facility between USGS, NSF and IRIS providing data for a variety of purposes, built on the foundation of WWSSN, using many sites that were originally constructed for that earlier network. There is a positive working relationship between USGS and NSF through IRIS, jointly agreeing on siting plans and procedures. NSF is responsible for capital equipment, installation and upgrades to the GSN; USGS is responsible for the operation and maintenance of the stations it installed.

GSN is part of a larger federation of global networks (Federation of Digital Broadband Seismic Networks), which helps fill in some of the gaps in GSN's coverage. Real-time is an ongoing challenge; China has reduced the delay with which it provides data from 60 minutes to 30 minutes. A wide variety of users rely on GSN.

Projects on board for ASL in FY07 include installing four remaining GSN stations funded by IRIS (Canary Islands relocation; Baja California, which has been a long-term pursuit; and two stations in the Republic of Kirabasi that have been under negotiation for 10 years); finishing the President's tsunami warning initiative telemetry upgrade efforts (last 4 of 39) and Caribbean installations (6 of 9); and integrating new datalogger systems (Quanterra Q330) selected by a blue-ribbon committee as the next-generation hardware for all GSN stations, part of a broader GSN integration effort in part driven by the need for standardization to achieve cost savings.

Price asked about the current role being played by the Department of Defense, which provided significant capital investments for worldwide seismology in the past. The Air Force Technical Applications Center (AFTAC) maintains eight arrays and a number of individual stations as part of the GTSN.

IRIS/NSF Role in GSN

Kent Anderson, the GSN Operations Manager at IRIS, gave a presentation providing the IRIS perspective on what he described as a very successful partnership with USGS in a complex task. Before coming to IRIS last year, Anderson spent 13 years at ASL working with the field operations group. IRIS is an NSF-funded university consortium with over 100 member institutions, created with the recognition that a single university would be unable to support large instrument facilities, which today include PASSCAL instrument pool, the IRIS Data Management Center, Education & Outreach Program, the USArray component of EarthScope and GSN. Oversight is provided by the GSN Standing Committee chaired by Jeffrey Park, Yale University. There is strong USGS representation on the Standing Committee including Bill Leith as a voting member and a number of observers from ASL and ANSS. The NSF/USGS/IRIS partnership is defined in a GSN annex to the MOU between USGS and NSF. GSN is a cornerstone of the FDSN, and international collaboration is essential with local hosts in 62 nations fundamental to its success. There are a number of joint stations with FDSN partners. The new Caribbean stations are GSN affiliates, and data from a number of AFTAC stations are available from the IRIS DMC.

GSN is a multi-use, interagency, international facility established for scientific research. The initial need for real-time data availability was to provide quick awareness of station outages. An outgrowth was the value for earthquake and nuclear test monitoring; and today GSN is used for earthquake reporting by USGS NEIC and for tsunami warning by NOAA's tsunami warning centers and the Japan Meteorological Agency. Many of the GSN stations obtained telemetry for the first time or achieved improved robustness through USGS funding from the President's tsunami warning initiative. In addition, three additional stations now feed data directly through NOAA's Pacific Tsunami Warning Center with three more to come in the next year. Telemetry upgrades went to both USGS and IDA operated sites. GSN relies on many different communication providers, including VSAT, Internet, dial-up, and even mail. In the case of China, VSAT transmissions are delayed. Efforts to obtain data from India have so far been unsuccessful.

GSN represents an investment of over $100 million over 20 years, not including taking advantage of the earlier WWSSN investment at a number of GSN sites. NSF provided much of

the early capitalization and operational costs with DOD contributing spikes of funding in 1991, 1994, and 1996 to accelerate installation of GSN to support test-ban treaty monitoring. The first line-item support from USGS came in 1998, freeing up funds to improve telemetry and maintenance, resulting in a large improvement in data availability. The most recent spike in funding came from the President's tsunami warning initiative with USGS providing $8 million in FY05, up from $3.4 million in FY04. Today, USGS and NSF provide roughly equal levels of funding of around $4 million. NSF support to IRIS over the out years is expected to grow slowly from just under to just over $4 million.

Performance goals are 140 stations, high-fidelity recordings, strong motion recorded near large events, real-time telemetry, robust equipment, high data return, capability to operate in extreme environmental conditions, achieving more uniform coverage through ocean-bottom deployments, and free and open access to data via the Internet. Examples of difficult environmental situations include the ocean-bottom H2O site halfway between Hawaii and California, which is currently down, but IRIS is hoping for NSF Ocean Sciences funds to cover the very high cost to repair the site. Another is the SPRESSO site located eight kilometers from the South Pole for which ASL performed work on cold-temperature design.

When GSN was established, the approach was taken of having two station operators as an opportunity to look at two different approaches to the same problem. For the past 20 years, the ASL and IDA groups worked independently, both coming up with viable station designs and capabilities. Based on a GSN review a few years ago, it was decided that now was the time to come up with more standardized design based on lessons learned, a single system sharing interfaces and protocols. The new system will have lower power requirements, allowing for more autonomous operation in remote areas.

Lerner-Lam asked whether the International Oceanographic Commission had requested GSN support for regional tsunami warning networks. Anderson noted that a number of other countries had made seismic station installations in the Indian Ocean region and that the big challenge was coordination. Price asked whether an effort was being made to work with other FDSN partners on standardization. Leith discussed a proposed workshop at the Spring 2007 AGU meeting in Mexico on improving coordination across global and national networks for improving system performance. Cooperation opportunities extend beyond seismic as GSN has become a platform for other geophysical observations including gravimeters, barographs, magnetomometers, GPS, and meteorological systems.

Sustaining the network in the future will require implementing a next-generation integrated system to keep the data flowing and the network from becoming obsolete. Amortization budgets are currently 5%, which needs to rise to 10-20%, the higher figure representing a five-year replacement cycle, recognizing the rapid pace of change in technology. With additional funding, IRIS would like to see expanded observations through oceanic and the south polar regions, in the former case possibly through co-location with NOAA's DART buoys. Improving telemetry robustness and ensuring future sensor capabilities are key to future success. Gee noted that the STS-1 and KS-54000 are the standard sensors for both IDA and ASL. The STS-1 has not been made for some time, and research efforts are underway into refurbishing STS-1's. Although the KS-54000 is still being made, they have seen negative changes in quality with high failure rates

(a big problem for the ANSS Backbone); AFTAC has concluded that they need to move to a new sensor due to these quality concerns. Bob Hutt has been experimenting with new installation procedures so that the current STS-2 sensors can approach STS-1 capability. A major problem is that there is such a small market for very broadband seismometers with the potential to sell perhaps 100, hence the focus on refurbishment and redistribution of existing STS-1's to sites with the lowest noise. They are also looking into swapping with other users who do not need full STS-1 capability.

Catchings asked about the inability to get stations in north and central Africa, a major hole for GSN. Politics and logistics are both factors with the Italians having tried and failed to maintain MEDNET in northern Africa but could not do it. There is, however, a remaining infrastructure from that network, and Leith described a new political opening in Libya with UNESCO funding a seven-station broadband network. Phase data is coming out, and there is an opportunity to offer upgrading one site to GSN quality then get data out in real time. The State Department is anxious to explore this possibility. Cluff asked what became of a Cyprus meeting several years ago that appeared to make progress on Mediterranean seismic cooperation.

GSN Role in Global Earth Observation System of Systems

By phone, Leith described the role of GSN in the efforts to establish a Global Earth Observation System of Systems (GEOSS). Back in 2001, the US hosted a ministerial-level Earth Observation Summit with its goal being to build an Integrated Earth Observation System over 10 years. Out of this summit came the notion of GEOSS as a mechanism to bring together existing and to-be-developed systems to benefit the global society. To date, 66 countries and 43 participating organizations have joined, one of which is FDSN.

The Indian Ocean tsunami struck just before the third summit, held in February 2005, which resulted in a spike in the effort to build GEOSS. A Group on Earth Observations (GEO) Secretariat was established in Geneva to provide international coordination and carry out a formal implementation plan with countries proposing their systems for inclusion. The main US entities contributing systems were NASA, NOAA, EPA and a few others represented in the U.S. Group on Earth Observations (USGEO), including USGS. The US elected to contribute GSN as one of its systems; this has been done in close collaboration with IRIS and with FDSN. In August 2005, the USGS and IRIS jointly hosted an international workshop on the role of GSN in GEOSS, bringing in experts from all around the world to discuss what they were doing and how GEOSS could facilitate expansion of data sharing among these networks. Russia, China, Japan, FDSN, and others gave briefings from which it was clear that these networks are growing quickly around the world yet problems remain with coordination and data exchange, and GEOSS could be a mechanism for facilitating coordination. The primary result of the workshop was the designation of FDSN as a participating organization in GEO. Also in 2005, a GEOSS work plan was assembled with GSN contributed as one of 100 tasks for building GEOSS. The GSN task was in the societal benefit area of reducing loss of life and property from natural and human-induced disasters. The specific task is to promote coordination and development of global seismology, which is essentially what we do anyway. IRIS's Rhett Butler and USGS's Bill Leith are co-leads for this task, which has a dozen subtasks.

Currently, USGEO is preparing for the GEO-3 plenary in Germany, the purpose of which is to promote accomplishments, one of the major ones being the work that has been done to improve tsunami warning and hazard mitigation. Butler and Leith intend to use this as an opportunity to promote expansion of open data availability and possibly seek high-level attention for export-import issues that have hampered cooperation.

At this point, it is difficult to say what effect the GEOSS effort will have on GSN. The efforts to include GSN in the GEOSS planning has been a considerable time sink without the prospect of additional funding since GEOSS is not intended to be a funding mechanism. Systems are to be contributed by individual countries, and the US has not committed to new investments, just existing support levels. On the positive side, global seismology has received high-level recognition for being well coordinated in comparison to most other earth observation systems. Some basic issues like data availability can be raised to ministerial-level attention through the accomplishment-touting for the GEO-3 plenary. On the whole, the greater risk seems to be on the side of not engaging, particularly given the heavy involvement of the meteorological community in GEOSS and the potential that organizations like the WMO would seek to take more and more of a role in seismology and therefore potentially diminish role of FDSN and IASPEI. There is a broader challenge to maintain the role of in situ networks given the dominant focus on space-based systems. USGS needs to make a decision about what kind of effort to put into this coordination activity given that there is no promise of additional funding to support that coordination effort, and the Earthquake Hazards Program faces constrained finances.

McConnell asked whether any other areas covered by GEOSS had received additional funding. Leith was not aware of any US agency receiving new funds as a result of their participation in GEOSS. There is, however, a small amount of coordination money available through the GEO Secretariat in Geneva for convening international workshops such as one in South Asia for countries affected by the tsunami disaster; USGS and IRIS plan to seek such funds for the proposed AGU workshop.

GSN Role in Tsunami Warning Systems

NOAA Tsunami Program Manager David Green, participating by conference call, updated the committee on the ongoing collaboration between USGS and NOAA on tsunami issues. NOAA's performance in tsunami warning is inherently linked to the seismic network reliability, timeliness and expert analysis done at USGS and the GSN partnership with NSF and USGS. In the next three weeks, NOAA expects to see the remaining Caribbean tsunameter and tide-gauge sensors coming online making it possible to turn on tsunami warnings for the first time in that region with a critical amount of data to make appropriate decisions. Green described his recent visits to ASL and NEIC, and the greater appreciation it had given him of the underlying effort that goes into sensor installation and operation, pressing NOAA to look at what other datasets might be available and the need to improve its own infrastructure to make it more reliable. There is so much more data coming in that enhancing bandwidth and reliability of the network is crucial; NOAANet in the Pacific and Caribbean is intended to be a more robust network for real-time analysis and reporting. These are the models to go forward for GEOSS discussions.

Cluff asked about NOAA's expectations for warning times for locally generated tsunamis. Green noted that for local tsunamis, timeliness of warnings is sometimes considered moot because we hope people are educated to know to run to high ground from coastal areas that experience strong shaking. The partnership with USGS on mapping, modeling, inundation and outreach is crucial. In general, NOAA seeks to deliver warnings in 2-5 minutes, which requires having the right sensors and right analysis in place at warning centers. There is an ongoing effort to follow that initial warning with more thorough analysis with USGS. Cluff also asked what was being done to address the political issue of how governments choose to issue warnings, citing the experience of the Jongakarta earthquake in which NOAA a warning but the government of Indonesia chose not to disseminate it. Green agreed that this event underscored the need to have someone at the other end who knows what to do, citing the importance of working locally to identify individual responsibilities as well as globally through GEO about need for real-time data flow.

Somerville asked how NOAA was trying to address the problem of so-called tsunami earthquakes that generate unusually large waves given their magnitude. Green noted that from the technical side NOAA is trying to make pre-determinations of areas with an increased likelihood of such quakes. NOAA is working with NEIC to improve assessments as well as data streams, software and analysis; NOAA has also pushed on the research community for more work on source studies. McCarthy noted that an upcoming NEIC workshop on future research directions will include individuals from NOAA's tsunami warning centers.

GSN Cooperation with Air Force Technical Applications Center

David Russell, participating by phone, described ongoing efforts with NEIC to remove logjams in data distribution, primarily from International Monitoring System and Air Force stations. Russell emphasized that AFTAC is less a customer of GSN than a contributor. AFTAC is responsible for primary treaty stations and provides data to augment GSN capability. After Sumatra, AFTAC was able to argue that NEIC represented an integral part of US data center, making it possible to send data from all 37 treaty stations (including arrays) to NEIC. Although AFTAC is required by public law to make all treaty station seismic data available to US researchers, the State Department and Office of the Secretary of Defense only allow delivery of data from 16 US-controlled stations to be made publicly available through the IRIS DMC. AFTAC looks to NEIC to do distribution to IRIS or other appropriate organization as stations become available and looks forward to them being used as an integral part of GSN for research and operational monitoring. AFTAC is also working with USGS to establish new joint non-treaty stations, re-opening the station in Kabul in the very near future.

McCarthy expressed appreciation for the cooperation and support from AFTAC, noting that the long history of collaboration had been strengthened after the Sumatra event, facilitating NEIC use of IMS data. Leith indicated that he sees quite a future for NEIC use of array data and a bright future for collaboration with AFTAC.

Lerner-Lam asked whether the increased availability of data from the treaty stations would affect the GSN planning process for future site distribution with Russell suggesting that it should. McCarthy suggested that the GEOSS process could be used to suggest that more IMF data be made available if host countries wished to participate. Price asked about the ability of the

military networks to produce accurate locations, citing his experience at a Nevada meeting on mine explosions in which the data from the earthquake locations were off by as much as 100 kilometers from the mine locations.

NEIC Use of GSN Data

Jill McCarthy provided a presentation on how NEIC uses GSN data for global seismic monitoring. The network makes it possible to deliver real-time earthquake locations with a magnitude-5 detection threshold globally. The new Hydra system allows NEIC to use the richness of GSN data with automatic association of secondary phases. NEIC is building a suite of capabilities moving toward higher-order source parameters with moment-tensor solutions computed within 8-16 minutes of origin time; Centroid Moment Tensor (CMT) solutions within 30-45 minutes; finite-fault modeling of all M7+ quakes (through collaboration with academic researchers); and a surface-wave event detector/locator system to help discriminate smaller events that would otherwise fall below detection thresholds (also useful for slow earthquakes). She also discussed the location and modeling of "special events" using the example of the North Korean test. Lerner-Lam asked what difference having the AFTAC array data available had made, and McCarthy indicated that NEIC was still developing the software to make the most use of it, but that it had provided some additional discrimination capability.

Future Directions for ASL

Following lunch, Lind Gee gave a presentation on future directions for ASL. USGS has decided to expand ASL's role in station operations, taking advantage ASL's facilities and the combined expertise from GSN and the ANSS Backbone. Two ANSS field engineers are joining ASL this month. The Q330 datalogger is common to both networks. USGS is also exploring a role for ASL as an ANSS equipment depot, making it possible to centralize spares currently distributed among regional networks and USGS centers; also would further develop capability for equipment testing and repair.

Price asked whether ANSS Backbone were maintained by regional seismic networks; response was that they are maintained by USGS personnel at Albuquerque and Golden.

Gee discussed challenges meeting GSN Five-Year Goals enumerated in GSN five-year plan:

1. Improve station reliability with several components: timely maintenance, spare parts, standardization, and replacement of obsolete equipment. In terms of maintaining high reliability, target is 90%; has been in the mid to high 80's. Real-time telemetry helps to identify the problems quickly. Telemetry is up to 96% of GSN as a whole. Problems include:

- Aging equipment. Roll-out of new systems should help since will involve trip to each site, allowing hardening of communications infrastructure; timing depends on how quickly the Q330's become available. So far enough purchased for 24 stations.

- Maintain spares inventory. Serious problem for GSN.

- Timely maintenance. Trying to develop an autonomous station with low-power system so can leave for five years, but that has not been the historical experience. Key for remote locations like Johnston Island and Wake Island, where Air Force is trying to excess the island; critical location for tsunami warning.

2. Incorporate GSN into the GEOSS effort; cooperation with IRIS, NSF and other agencies to continue to use GSN as a platform for geophysical observations.

3. Improve network's utility for hazard warning. Ties to GSN contributions to NEIC and NOAA for tsunami warning. Will prioritize stations based on partner needs.

4. Enhancing network performance through relocating noisy stations to quieter sites and through the use of new seismometer and installation technologies. Going back and evaluating station performance using noise statistics collected at Harvard and NEIC. Hutt working on new installation methodologies.

5. Enhance data quality control operations. Seeking to automate system to clear healthy stations automatically and focus on problems.

Rising costs is a major challenge given flat budget projections. A new Honeywell contract went into place October 2005 increased overhead significantly; also face rising salary and operational costs. ASL has hired two Honeywell contractors as USGS staff and also plans to take advantage of temporary deployment of Honeywell staff. Aging equipment is failing with increased frequency so seeing increased number of station failures. There is no replacement for the primary GSN sensor, the STS-1 very broadband seismometer, in sight.

Cluff asked whether putting in new equipment will give GSN the potential to record accelerations up to 2g. Most but not all USGS GSN sites have accelerometers, which will be replaced. Also looking to deploy second broadband sensor at each site for redundancy so that some broadband data is recorded at each site.

Catchings asked whether GSN could reduce costs using government employees rather than contractors. Using contractors doubles the cost but avoids FTE cap issues and provides greater flexibility. There is a salary problem with hiring Honeywell people because USGS is so degree- and publication-conscious. Contracting also makes it possible for USGS to carry over supplemental funds and avoid some country-clearance issues for overseas work.

McCarthy noted that the Geologic Hazards Team is trying to bring all the capabilities and skills together whether in Albuquerque or Golden but still have a way to go. Gee noted that ASL is working to maintain good relationships with the Isleta Pueblo leaders.

Price asked whether the large number of EarthScope sensors were useful for getting vendor leverage. The response was that the principal impact has been creating delivery delays. The USArray’s Transportable Array uses the Q330 data acquisition system and is run out of New Mexico Tech, so their staff came to ASL and talk about their experience using the STS-2 sensor. The shipment time for STS-2's is now two years since IRIS made an order for 400, so in the

Caribbean, USGS ordered 18 STS-2's in order to have a fully spared network; of those, only 7 have been delivered. The Backbone installations are also STS-2's. Anderson also noted the strong interaction on instrumentation among USGS, IRIS, and others. Lerner-Lam added that Guralp is being stressed by acquisitions from China, which ordered 600. Anderson added that they have seen problems where quality vs. timeliness come into collision in instrumentation.

Committee Discussion

Cluff announced that the committee's next meeting is February 12-13, 2007 in Reston VA.

Applegate brought up the issue of a SESAC response to a letter from Kentucky State Geologist Jim Cobb, who presented his concerns about the USGS treatment of seismic hazards in Kentucky at the committee's Memphis meeting in June 2004. USGS also received a letter, and a draft response from Mark Petersen, head of the national seismic hazard mapping project, was circulated. It was agreed that SESAC would base its response

Wood pointed out the need to make clear that the decisions on which probabilities and timeframes to use for the hazard to use in design codes were made by the engineering community through the Building Seismic Safety Council and ASCE 7 processes that feed into the model building codes, and that there are a lot of people who could be influenced in both those processes.

Somerville noted that the seismic hazard maps represent a consensus process and need to operate that way. McConnell pointed out that the USGS response noted the need for further work on northern end of the New Madrid fault system and encouraged proposals to external grants program for that.

Applegate also brought up the issue of committee membership, describing the process for identifying new committee members and soliciting input on expertise needs and other considerations. He also noted the challenge that the program was facing with renewal of the committee's charter, which was holding up the member nomination process.

Tour of ASL Facilities

Bob Hutt led a tour of ASL's testing tunnels, vault farm, boreholes, machine shop, and chip library, which contains millions of film chips from the 1960's and 1970's, which are in need of scanning and digital preservation.

Committee Discussion of Annual Report

The committee discussed targeting the report as it will be the first one directed at a new USGS Director. Applegate noted that Myers has visited NEIC and Menlo Park; in his presentations to the staff, Myers emphasized that objective science is paramount, and he wants to be a champion for the organization. He does not appear to be a proponent of reorganization for its own sake based on his experience in the oil industry, where constant reorganizations adversely impacted productivity. Cluff emphasized the need to ensure that the new USGS Director understands how

important hazards and the Survey's Hazards Initiative are. Price noted that Myers and Secretary of the Interior Dirk Kempthorne are both looking for issues that can show quick success before the end of the Administration.

For the report, Lerner-Lam agreed to write a paragraph on the committee's discussion of USGS involvement in risk assessments. McConnell agreed to draft the geohazard program coordination section based on the draft letter that the committee prepared at the request of the USGS as part of the OMB improvement plan for the geologic hazards programs.

Price noted that the report should recognize the 1906 centennial, and all the good things done in conjunction with that event in which USGS was a major player; he suggested recommending that the momentum be kept up.

Dieterich agreed to cover Working Group on California Earthquake Probabilities activities in the NEPEC summary, a big issue there being the BSSC deadlines. McConnell agreed to cover tsunami warning initiative progress.

Price noted that a take-home message from the day's discussion of GSN was gaps in global seismic network in terms of locations (e.g. Africa, polar regions, oceans), a lack of funds to cover equipment amortization, and the problem of equipment supply. McConnell also noted the role of GSN in GEO and GEOSS.

Lerner-Lam stated that USGS is de facto the leading international earthquake authority, that no other network has the scope or technical capacity of GSN to capture very large earthquakes in full fidelity. The way that NEIC has begun to incorporate the academic research community into its operations is taking advantage of the technical capabilities of GSN and allowing exploration of improvements to tsunami warnings and earthquake alerts; also relative to international activities supported by USAID and others; USGS is consistently on the side of open data exchange.

Tuesday, October 31, 2006 (Open Session)

The committee spent the morning drafting the 2006 committee report.

Agenda for
Scientific Earthquake Studies Advisory Committee (SESAC) Meeting
October 30-31, 2006
USGS Albuquerque Seismological Laboratory

Monday, October 30th (Open Session)

8:00 am	Depart hotel in vans for meeting site	
Time	*Topic*	*Presenter/Participants*
9:00 am	Welcome and review of agenda	Lloyd Cluff, SESAC Chair

The USGS role in the Global Seismographic Network

9:15 am	Albuquerque Seismological Laboratory and GSN (PP: Gee_ASL&GSN.ppt)	Lind Gee, ASL Chief
10:00 am	IRIS/NSF role in GSN (PP: Anderson_IRIS_GSN.ppt)	Kent Anderson, IRIS
10:45 am	Break	
11:00 am	Key user communities for GSN	
	• Global earthquake alerts (PP: McCarthy_GSN_NEIC.ppt)	Jill McCarthy, USGS
	• Tsunami warning	David Green, NOAA
	• Nuclear test-ban monitoring	David Russell, AFTAC
11:45 am	GSN role in Global Earth Observation System of Systems	Bill Leith, USGS
12:00 pm	*Lunch*	
1:00 pm	Future directions for ASL (PP: Gee_ASL Future.ppt) • ANSS Backbone • Maintaining GSN	Gee
1:30 pm	Committee discussion	
2:30 pm	Tour of ASL led by Bob Hutt, USGS	
3:30 pm	Committee annual report discussion and writing	
5:00 pm	Adjourn for the day/Depart ASL	

Tuesday, October 31st (Open Session)

9:00 am	Committee annual report discussion and writing
2:00 pm	Adjourn