

Southern California Earthquake Center Outreach Report, 1998: Public Awareness, Education and Knowledge Transfer Programs and Fiscal Year 1998 Activities

October 1, 1998

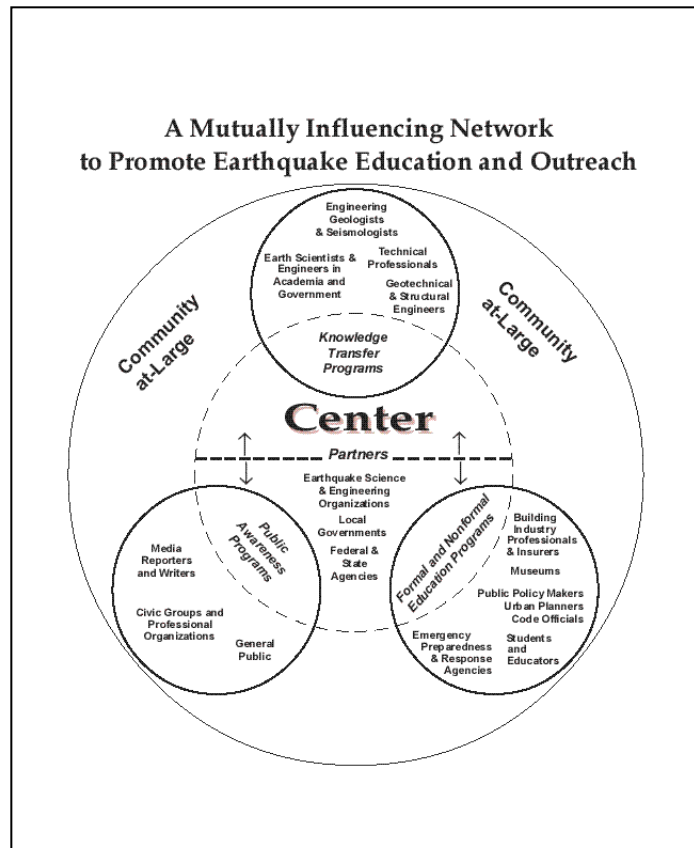
By Jill Andrews, Director for Outreach
With Mark Benthien and Sara Tekula, Outreach Specialists

Background In February 1998, the SCEC Board of Directors discussed ways to continue the education and outreach efforts in an efficient manner that would provide outreach products with the most impact and sustainability, and still fulfill our commitments in education and knowledge transfer to our funders. Tom Henyey and Jill Andrews recommended to the Board that for SCEC's final years (1998-2001), outreach projects should be already well-established, have short-term (4 years or less) results or products, and the potential for a lasting impact. The Board unanimously approved an outreach work plan for FY 1998 that combined education and knowledge transfer into an integrated program that represents and serves all SCEC institutions. We merged the missions, strategic goals, and objectives of the education and knowledge transfer programs under a single director for outreach (Andrews), thereby cutting some costs and reducing some overlap, while still keeping all important elements of the two programs intact.

Outreach Team Our team is an effective broker of information between the academic community and practitioners, between earth scientists and engineers, between technical professionals and public officials, and between scientists and educators. The Center is known for its partnerships with local, state, and national government entities, academic institutions, industry, and the media. Our outreach efforts have evolved from concepts on paper to a multi-dimensional enterprise that provides notoriety to the Center while engaging all sectors of the community at large.

SCEC's Outreach staff is a results-oriented team that manages an array of activities consisting of workshops, publications, web sites, education modules, partnerships in industry and education, and database development and management. We organize the growing knowledge bases of academic scientists, engineers, and social scientists and make sure that their work is applied to reducing earthquake-related risks. We are committed to the notion that SCEC's outreach programs should complement -- not eclipse -- the science.

Mission and Goals The SCEC Outreach mission is *to promote earthquake loss reduction and lifelong learning by engaging the public at large in activities that focus on earthquake-related education, research-based technology development and transfer, and systemic reform.* We have divided our efforts into three programmatic categories: *Public Awareness, Education, and Knowledge Transfer* (see Figure 1, *A Mutually Influencing Network to Promote Earthquake Education and Outreach*).



Our public awareness programs target civic groups and professional organizations, media reporters and writers, and the general public.

The SCEC Web site (www.scec.org) has undergone a major renovation during the last year. As with most Web sites, changes will occur frequently to keep information up to date and visual appeal interesting. Several sections of the site have been expanded to include much more information. To benefit university researchers, students and practicing professionals, we will expand our Web-based activities.

With ~50 other earthquake information providers, we continue our contribution to the Earthquake Information Providers' (EqIP) Web site (www.eqnet.org). Jill Andrews now chairs the EqIP Steering Committee and Ed Hensley, Hensley

Communications Services, provides maintenance and support with NSF funds.

We plan to form an assessment team to periodically review the outreach programs of all SCEC affiliates. The team will identify SCEChub participants who share a common vision to minimize duplication; tabulate and document their existing resources, strengths, and weaknesses; and produce a report comparing study results to a consensus *ideal*. To reduce unnecessary competition we will continue to establish agreements to resolve duplicate programs and share each others' products.

An essential SCEC asset and marketing tool is the SCEC Quarterly Newsletter (SQN). More than 4,400 copies are mailed out each year and an electronic version is mounted on the SCEC Web site. SQN features research and activities sponsored by the Center, abstracts from the latest scientific and technical articles written by SCEC scientists, researchers, and staff, and news and articles from other organizations emphasizing research on earthquake phenomena. Readers include representatives of the U.S. government, California state, county, and city agencies; business and industry leaders interested in earthquake hazard mitigation; academic institutions, including pre-college teachers and students; the media; and the general public. To view on-line, go to:

<http://www.scec.org/news/newsletter/index.html>. We distribute other print and electronic public awareness materials such as seismic hazard reports, general awareness publications, abstracts of SCEC author publications, and media advisories for researchers, educators, practicing professionals, building and safety and insurance industries, government officials and the general public. Before submitting a research paper for publication, SCEC scientists visit the SCEC Web site at <http://www.scec.org/research/papers.html> to receive a SCEC Contribution Number and NSF/USGS

grant numbers. Authors use an on-line form to mount information and receive their numbers. This process is required by NSF and is also a requirement for SCEC funding. The result is a database of SCEC research papers, now available interactively online on the same page.

We encourage earthquake loss reduction through acknowledgement and support of the California State Seismic Safety Commission's Loss Reduction Plan and the National Mitigation Strategy. Many SCEC projects fall under the geosciences and education and information elements contained in the California Earthquake Loss Reduction Plan. The State Seismic Safety Commission endorses our actions and has committed to support our research and educational outreach programs that help achieve the plan's objectives.

As part of our commitment to an outreach effort funded by the USC Neighborhood Outreach Grant program, we completed a local Neighborhood Earthquake Watch program earlier this year. This project included presentations on urban earthquake hazards, a preparedness survey, Spanish translation of the (currently under development) *LA Underground* publication, and provision for installation of automatic gas shut off valves and a neighborhood earthquake safety fair. A community guidebook has been developed and is in final preparation and review. The handbook offers instructions on:

1. Creating a community-preparedness plan: where to start
2. How to partner with earthquake-related educational organizations (like SCEC)
3. Elements of a community plan (meetings, educational activities, fund raisers, guest speakers program, preparedness fair, follow-up)
4. How to run an earthquake fair
5. How to share the experience with other communities
6. Information on intergenerational issues within a community

We provide speakers for public presentations (Center scientists and engineers as well as educators and outreach professionals) and experts who lead field trips and conduct workshops on local seismicity. Professional organizations, civic groups, museums, and schools have all been served by our speakers. We sustain established relationships with local media organizations (print, radio and television) to educate and inform the public about earthquake-related issues. One of the most exciting projects this year was the *Care and Prepare* earthquake awareness and preparedness campaign with Los Angeles-based television station KTLA Channel 5 during the month of April. KTLA printed excerpts from *Putting Down Roots in Earthquake Country* in both English and Spanish, and aired three half-hour specials (two for adults and one for children) during California's earthquake preparedness month. A video tape of the specials and morning news show interviews with SCEC representatives will be on continuous display at the Outreach poster during the SCEC Annual Meeting in Palm Springs.

We are planning to create Web-based materials that can be used by reporters and writers following damaging events. In partnership with IRIS's Outreach staff, we are launching plans to create these materials as part of a joint *Teachable Moment Initiative*.

With the State of California Office of Emergency Services, we plan to launch *Earthquake Studies and the Civic Scientist*, a series of mini-workshops to educate earth scientists, earthquake engineers and Public Information Officers on how to better communicate with reporters, writers, and the public.

Our education programs target students and educators, museums, building industry professionals, insurers, urban planners and code officials, public policy makers, and emergency planners and responders.

Education activities at the undergraduate and graduate level promote career development of earth science students, with special attention to minorities and women. We are continuing with our career oriented programs for undergraduates by supporting earth science undergraduate student research projects through the SCEC Summer Intern Initiative. All interns present papers or posters at SCEC's Annual Meeting and have the opportunity to attend regular seminars conducted at Caltech as part of that institution's Summer Undergraduate Research Fellowship (SURF) program. Eight undergraduate scholars were chosen for SCEC's Summer Internship Program for 1998, the fifth year of this successful program. SCEC Internships allow undergraduate students to earn valuable experience through conducting a research project with a SCEC scientist.

We are using the Internet to facilitate communication among researchers and students. For example, we have added to the on-line database of SCEC participants a new student demographics reference resource to aid tracking capability of all graduate students, post-doctorals, and interns. The database enables users to simply click a button on the database to view principal investigators' and others' outreach project descriptions, research project descriptions, group affiliations, publications links, and speakers by categories.

SCEC institutions recruit highly qualified students in all disciplines. Nationwide, the percentage of females pursuing advanced natural science degrees is typically well below 30%; those studying earth science is but a fraction of that. SCEC investigators have managed to keep their female graduate population at an admirable 26% (see Summary Chart below). SCEC P.I.s have not previously attracted as many underrepresented minority graduate students; however, the summer undergraduate internship program has consistently achieved very high marks in attracting both women and minorities—an important goal of the program. In 1998 half the eight interns were female and most ethnic groups were represented. To increase these numbers, we plan to work with SCEC institutions' minority-serving programs to attract underrepresented minority and women students by contacting institutional student advisors and initiating poster and flier campaigns that target colleges with large underrepresented populations and have excellent science, math, and engineering curricula. We will recruit them as undergraduate (transfer), graduate, and post-graduate students within SCEC universities. California's community college system, for example, has significant African American and Hispanic populations and is the state's primary *feeder* to its universities. We will encourage SCEC scientists and students to visit these institutions and make presentations to science faculty and students on SCEC programs, internships and opportunities for graduate work.

M.S. AND PH.D. DEGREES COMPLETED, 1994-97 UNDER DIRECTORSHIP OF CERC PERSONNEL

DEGREE: 39 M.S. TIME TO DEGREE: 3.07 YEARS (AVERAGE)	
GENDER	14 FEMALE
RACE/NATIONALITY	1 ASIAN (US)
	2 HISPANIC (US)
	11 WHITE (1 HOLLAND; 1 UK; 9 US)
GENDER	25 MALE
RACE/NATIONALITY	4 ASIAN (1 INDIA; 2 JAPAN; 1 PRC)
	21 WHITE (1 HOLLAND; 20 US)

DEGREE: 75 PH.D. TIME TO DEGREE: 5.85 YEARS (AVERAGE)	
GENDER	16 FEMALE
RACE/NATIONALITY	3 ASIAN (1 INDIA; 2 PRC)
	13 WHITE (1 ISRAEL; 1 RUSSIA; 11 US)
GENDER	59 MALE
RACE/NATIONALITY	17 ASIAN (1 HOLLAND; 1 INDIA; 1 JAPAN; 12 PRC; 1 TAIWAN; 1 US)
	2 HISPANIC (1 ARGENTINA; 1 US)
	40 WHITE (1 FRENCH; 3 GERMAN; 1 HOLLAND; 1 ISRAEL;
	2 NEW ZEALAND; 1 ROMANIA; 1 SERBIA; 1 SWEDEN; 1
	SWITZERLAND; 2 UK; 26 US)

To increase diversity in our graduate programs, we are designing a cooperative agreement with the Incorporated Research Institutions in Seismology (**IRIS**). We will work with IRIS to create a program in association with college science and engineering professors who are not affiliated with SCEC to help us identify and attract top tier undergraduate students.

Our collaborators in the K-16 sector stand ready to establish mentoring programs for teachers and students. A cascading network with our partner school districts involves scientist-to-teacher-to-student instruction, with SCEC as a scientific resource for the community. We also have fostered a mentoring network to connect SCEC researchers with teachers through participation in teacher training workshops, special field trips, and provision of resources via the SCEC Webservice. Through SCIGN and TriNet facilities siting programs, contact with teachers and students has grown significantly.

SCEC's former Education director formed high school partnerships. Early in the spring of 1998, we conducted a survey of our three partnership schools (Palos Verdes, La Cañada, Rialto, and other schools that host detection equipment sites for our various research projects). Responses regarding the following categories were gathered. We have determined that SCEC's Outreach program can best serve its partners in education through continuing the programs outlined above.

We support attention to and alignment with the national science education standards and California state education standards (especially in our K-12 programs and materials). We distribute throughout the nation our original educational products (i.e., our earth science education modules) that highlight SCEC scientific research. We have formed working agreements with professional educators from groups such as the K-12 Alliance, California Science Implementation Network (CSIN), Los Angeles Educational Partnership (LAEP), and Los Angeles County Office of Education (LACOE), which serve California state teachers and students in the K-12 sector.

We contribute to science curriculum development and enhancement, for example, through participation in LACOE's South East Educational Technology Consortium (**SEETC**), which covers a student population of about 200,000 and makes up 13% of Los Angeles County's total student body. SEETC is also a Community of Excellence (**CoE**) focusing on science. SCEC, in collaboration with curriculum developers and teachers, is helping design a *storyline* for an earth science unit in a middle school classroom. A historical approach has been taken, telling the story of science instead of an outline of factoids. Instead of memorization methods and multiple-guess testing styles, students will learn to think like the scientists who first tested the theory of plate tectonics. Instead of matching proper definitions in a testing situation, students will be asked to re-tell the story of how the theory was born. To encourage communication outside the biweekly

meetings, LACOE secured a virtual room on the TAPPED IN on-line professional development Web site. A SEETC CoE Room hosts the group for on-line meetings, posted documents to be shared, to tour Web sites and provide a place to leave ongoing work for group members to review.

When the DESC On-line (see below) modules have been modified for the middle school level, the same teachers that were trained on the modules will have a familiar teaching tool from which to pull activities, lessons, interactive real-time maps, GPS and seismic data, and information about local faults. The middle school SCEC modules will mirror the storyline framework developed with SEETC.

With help from these and other dedicated educators in the community, we have continued the process of creating the on-line education modules for K-12 students. This project has been dubbed the Development of Earth Science Curricula On line (**DESC On-line**). We have assembled a group of scientists and educators to measure the impact and implementation of current products. With an advisory group drawn from this group of professionals, we are conducting a formal scientific and education standards review of the modules, and the products are now on line. See the Regional Seismicity module at:

<http://www.scecdc.scec.org/Module/module.html>

See the GPS module at:

<http://scign.jpl.nasa.gov/learn/>

Our community-based activities include field trips to local faults, museum lectures and exhibits, civic group presentations, and participation at annual conventions and conferences. We help improve exhibits and patron programs with the California Science Centers. SCEC has already influenced the development of an earthquake exhibit at the California Science Center (CASC) in Exposition Park, and based on its success, they have requested our assistance with compiling earthquake data and graphics for a new *Technopolis* interactive exhibit. We have formed an advisory group to aid Mr. Robert de Groot of CASC's display development. Mr. de Groot is working toward his Ph.D. in Science Education (with an emphasis in Earth Sciences) at USC. We have recently contracted with him to launch a project to update the Tremor Troop teacher's package for K-6 students. We have recently agreed to furnish speakers for CASC's museum-based children's programs, including the grand opening of the *Powers of Nature* exhibit that features earthquakes, and to recruit our scientists to lead museum patrons to local trips to active faults. In January 1999, we led a group of Denver Museum of Natural History patrons to a series of local faults and conduct a tour of the Caltech-USGS seismic network and seismological laboratory displays in Pasadena. Finally, we are conducting meetings with the Santa Barbara Museum of Natural History to plan an exhibit and walking tour of the museum's grounds, which boast local fault formations.

We recruit SCEC researchers to participate as speakers and mentors for the Los Angeles Educational Partnership (**LAEP**). SCEC links to LAEP Web sites (and vice versa). Together we plan to develop virtual tours since they have already mounted this type of Internet learning tool on the Web and can provide assistance. LAEP is an independent non-profit public education fund working to improve public education for the children of Los Angeles. Since 1984, LAEP has invested more than \$35

million in the efforts of educators and community members to develop, test and implement new strategies for strengthening classrooms, schools and communities. Its work ranges from supporting the innovative efforts of individual teachers to the development of comprehensive designs for the schools of the future.

We have initiated contact with the Los Angeles Physics Teachers Alliance (LAPTAG) program to support undergraduate Geophysics Curriculum enhancement; and with the Future Scientists and Engineers of America (FSEA) project to support after school technology clubs in K-12 schools.

Our Knowledge Transfer programs target technical professionals, geotechnical and structural engineers, engineering geologists and seismologists, and scientists and engineers in academia and government.

We have formed partnerships to facilitate societally-based systemic reform (e.g., better building practices, code upgrades, introduction of legislative initiatives) through interactive workshops, symposia, and continuing education programs for the community of scientists and technical professionals working in related fields.

With the State of California Office of Emergency Services, we participate in the Post-Earthquake Technical Clearinghouse working group following damaging earthquakes in California. In the event of a damaging urban earthquake in California, we will simultaneously station SCEC staff at computer sites at Caltech and the OES Clearinghouse, who will serve to coordinate communication via the Internet, telephone, and in person among scientists, engineers and response and recovery groups. Information will also be packaged to accommodate the needs of writers and reporters.

We produced a proceedings volume and convened a working committee to address the outcomes of the *Earthquakes and Urban Infrastructure* workshop held in late January 1998, in partnership with the Los Alamos National Laboratory's Urban Security group. To address end users' needs and gather input, we held a second workshop collocated with the Western States Seismic Policy Council's Annual Meeting in September 1998. We are collaborating with the Los Alamos National Laboratory Urban Security Team and others to provide data for a set of science- and technology-based computational tools analogous to the computer game *Sim City*. The tools may include real-time feedback for disaster planning, training, and management in time of crisis and long-term recovery.

We are continuing with our sponsorship of the Los Angeles City / SCEC / SEAOSC Ground Motion Joint Task Force monthly workshops. The task force is made up of structural engineers, civil engineers, geotechnical engineers, building officials, planners and earth scientists and is providing recommendations regarding earthquake ground motion hazards to the Los Angeles City Department of Building and Safety for determining public policy related to design of new buildings and seismic retrofit of existing structures. FEMA is underwriting production and printing of two public awareness booklets aimed at owners and occupants of the two types of vulnerable buildings. The booklets have been written by leaders from the task force and are currently under review.

Currently in the planning stages is a joint SCEC and Pacific Earthquake Engineering Research Center (PEER) Workshop to compile a referenced Ground Motions and Time Histories Library.

We are planning a series of workshops to address the needs of the Los Angeles County Urban Search and Rescue (US&R) teams. The first in the series will be conducted in mid-January 1999 to commemorate the 1994 Northridge event. We are working with US&R chief for County of Los Angeles Larry Collins to recruit speakers for the January workshop. Topics of interest that will be covered are hazardous local faults and probable damage to buildings and infrastructure; prediction capabilities; early warning capabilities; engineering issues; and using new technologies to enhance response and recovery.

We co-sponsored with the Western States Seismic Policy Council and the Council of State Governments WEST a Summit on Earthquake Insurance in Sacramento in June. The summit provided a platform for Exposition, Clarification, and Commentary by all constituents regarding issues and variables involved in earthquake insurance. A book with abstracts and papers by presenters and panelists with general proceedings has been published and is now available through WSSPC.

SCEC will continue to organize workshops for insurers to address topics such as an update on the California Earthquake Authority; outcomes of the WSSPC Insurance Summit; and how to use new hazard maps and other mapping products (HAZUS, DMG, EPEDAT, ZOD depictions with an overview of recent studies and research results in simple language). One goal is to receive insurers' and risk assessment professionals' input on usefulness of these and other tools; and solicit their opinions regarding usefulness of existing products.

Another alliance SCEC Outreach has formed is with the California Universities for Research in Earthquake Engineering (CUREe). We have designed the *CUREe/SCEC Lectures*, a seminar for earthquake engineering and earth science students and professionals that address the joint concerns and issues relating to state-of-the-art practice in both disciplines. The first workshop was held November 5, 1998. The second, to be held in the Bay Area, is in the planning stages.

A September 1998 FEMA grant through the State of California's Office of Emergency Services will support a three-year study by CUREe called *Earthquake Hazard Mitigation of Woodframe Construction*. SCEC's Outreach director has been appointed as Associate Manager for Outreach for the project. SCEC Outreach was featured at the September 28, 1998 press conference to announce commencement of the project at Caltech. Over the next three years, Andrews will oversee four outreach projects plus media production beginning winter 1999, including:

- House retrofitting
- retrofit of multi-story residences
- wood engineering seminars; and
- construction quality.

We also expect to update, in collaboration with local cities and counties, existing short course curricula and materials using results from the research.

Electronic-based Outreach projects include:

A SCEC science seminar to be hosted by UCSB to acquaint SCEC scientists with the digital library systems statewide and discuss how SCEC's own archives and databases might be integrated.

International Projects

SCEC's Outreach program was a participant and cosponsor in the planning and convening of the Fourth International Conference on Corporate Earthquake Programs, held in Shizuoka, Japan, November 11-13, 1998. SCEC's Outreach projects, including its community-based programs, were featured through Andrews' participation in 2 panel discussions and one formal presentation.

Past activities include:

1995: SCEC was represented in several presentations and 2 small workshops by the Knowledge Transfer director and several SCEC scientists at 11th Course, Active Faulting Studies for Seismic Hazard Assessment, in Erice, Sicily. There were 150 representatives from 75 countries in attendance.

1997: SCEC Knowledge Transfer convened a one-day workshop at the Int'l Association for the Study of Physics of the Earth's Interior (IASPEI) in Thessaloniki, Greece, August, 1997. *Educating the Public About Earthquake Hazards and Risk* was co-convened by representatives from China and Greece.

Projects to Launch through Funds to be Raised

We hope to raise funds this year to host a First Annual Non-Technical Summit in partnership with local engineering firms. *The Real Meaning of Seismic Risk*, an idea formed during discussions at a CLA / SEAOSC / SCEC Joint Task Force meeting, will be a summit panel consisting of well-informed experts with differing or opposing views on urban seismic risk issues. The summit would feature a lively, compelling exchange among earth scientists, earthquake engineers, building officials, public policymakers, architects, insurers, developers and the media. Five or six topics could be addressed by the panel: possibilities include a critique of methods used to interpret the earthquake threat; vulnerability of tall buildings and other structures located near faults; whether the *life safety* design code is the best practice given what we now know from Northridge; cost-benefit analyses of various retrofitting techniques and strengthened codes for new construction; perceived socio-economic impacts of earthquakes and secondary hazards in California vs. other natural hazards outside the State; etc. A product of the summit would be a SCEC report for the public, with audio and video tapes of the proceedings.