

**United States Geological Survey**

National Earthquake Hazards Reduction Program

External Research Grants

Proposals for Grants

Program Announcement

**APPLICATIONS MUST BE SUBMITTED ELECTRONICALLY VIA THE  
GRANTS.GOV WEB SITE, AS WELL AS ON PAPER. SEE INSTRUCTIONS.**

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## ANNOUNCEMENT

### I. Application Submission Opening date: TBD

Application Submission Closing date: 4:15p.m. local time, TBD

### II. Application Delivery Instructions

The USGS follows a two-pronged approach for submission of proposals NEHRP grants. All applicants are required to submit hardcopy of their complete proposals AND the proposals also are to be submitted electronically using the Federal Government's Grants.gov website. The traditional hard copy method of submission will take precedence over the electronic submission; all proposals must be received in hard copy form by the due date noted above.

Please be aware that the electronic submission system is relatively complex for first-time users and involves several preliminary steps to be taken before the proposal information can actually be submitted (go to [www.grants.gov](http://www.grants.gov), and click on the “Get Started” tab for the steps). Be advised that it is virtually impossible to begin the process of electronic submission for the first time if you start less than 3 weeks prior to the due date. If you are from a university, contact your Office of Sponsored Programs. They may already have completed the registration process and should work with you to submit the application.

The due date for electronic submission will be the same as that for the hard copy of the proposals. Please note additional instructions and information below under heading “C. Applications submitted electronically.”

#### A. Applications delivered by mail.

1. The applicant must use the following address:

U.S. Geological Survey  
Office of Acquisition and Grants – MS 205, Room 6A331  
12201 Sunrise Valley Drive  
Reston, VA 20192

**Note:** 20192 is the correct zip code for the USGS. Do not allow express mail companies to change the zip code.

2. Applications will be accepted by the Office of Acquisition and Grants at the address specified on this page from April 4, 2006, to 4:15pm local time on the due date. Applications not received by 4:15pm local time on the due date, at the specified address on this page, will be late and the application will be returned to the applicant. It is the responsibility of the applicant to ensure that applications are received at the place and by the time specified.

Note: If the applicant can show with written documentation that delivery of his proposal was delayed due to mishandling by the delivery firm, courier service, or slower than anticipated mail delivery, late receipt of the application may be considered. It is in the applicant’s best interest to not depend on last-minute mailings to meet the closing date.

#### B. Applications delivered by hand.

1. An application that is hand delivered shall be taken to the USGS, Office of Acquisition and Grants – MS 205, Room 6A331, 12201 Sunrise Valley Drive, Reston, VA 20192.
2. The Office of Acquisition and Grants will accept hand delivered applications between 7:45a.m. and 4:15 p.m. daily, from the Opening Date under I., above, until the closing time of 4:15pm local time, on the closing date, except Saturdays, Sundays, and Federal holidays.
3. An application that is hand delivered will not be accepted by the Office of Acquisition and Grants after 4:15 p.m. on the closing date.

#### C. Applications submitted electronically

1. Electronic applications must be made through the [www.grants.gov](http://www.grants.gov) website.
2. The due date for electronic submission will be the same as that for the hard copy of the proposals. The requirements for the contents of the material submitted electronically are identical to that required by the hard copy detailed below, except that allowances for total number of pages can be made for figures.
3. Your electronic submission will consist of completion of forms SF-424, SF-424a and SF-424b plus your project narrative. Any information that is not contained in the SF-424 forms will be pasted together as one file and submitted in the Project Narrative Attachment section.
4. It is recommended that the application narrative be converted to PDF format for easiest submission. Also, when completing the SF-424 forms, all blocks in yellow must be filled out or the application submission will be rejected by grants.gov.

### **III. Funds and Start Dates**

Approximately \$5.5 million is available annually for support of research grants. We estimate that 90 to 120 new grants will be funded each fiscal year. In general, grants do not exceed \$100,000, with the majority of grants between \$15,000 and \$75,000. This estimate does not bind the USGS to a specified number of awards nor to the amount of any award unless that amount is specified by statute or regulation. At the time of the annual Announcement, Congress will not have appropriated funds for the next fiscal for this program. All projects must propose start dates between December 1 and September 1, within the federal fiscal year.

### **IV. Application Requirements**

- A. The majority, greater than 50 percent, of research activities must be conducted by the Applicant. The Applicant must retain administrative and technical control of project activities.
- B. Proposals for geologic investigations shall be clearly oriented toward earthquake hazard research and assessment. The program Research Emphasis and Priorities are described in Attachment A.
- C. Proposals to fund research in foreign countries will be considered when the research will provide knowledge or new techniques transferable to a U.S. seismogenic zone.
- D. Proposals to fund research in foreign countries must be based on cooperation with scientific

groups in the host countries, with host country personnel being used for operational functions, and host countries providing financial support for such personnel. Proposals for cooperative efforts with agencies of foreign governments may be subject to additional approvals within the U.S. Government.

- E. Applications submitted by foreign organizations must be submitted in English and in U.S. dollars. Awards involving foreign governments may require additional coordination and approval by the U.S. Department of State.
- F. The Metric Conversion Act of 1975, as amended by the Omnibus Trade and Competitiveness Act of 1988 (Public Law 100-418), states a policy preference for the use of the metric system of measurements, except where the use of the system is impractical or likely to cause significant ineffectiveness in the accomplishment of Federally funded activities. Accordingly, it is the National policy to encourage Recipients of Federally-funded grants and cooperative agreements to use the metric system of measurements in their grant related activities. Recipients and sub-recipients of Federal funds are encouraged to take similar appropriate affirmative actions to use the metric system of measurements.

## **V. Research Emphasis and Priorities**

See Attachment A.

## **VI. Collaborative Proposals**

Two types of collaborative proposals are acceptable: Collaboration between two or more external organizations that are seeking funding from the USGS/NEHRP External Research Program, and collaboration between an external organization seeking funding from the USGS/NEHRP External Research Program and a USGS/NEHRP internal project.

It is important to differentiate between proposals that simply support USGS internal research goals and objectives, and those that are true collaborative efforts. Collaborative research between a USGS internal project and external investigator(s) must be structured such that neither project could succeed without the other being funded. Many external research projects either directly or indirectly support or cooperate with ongoing internal USGS projects; these projects are considered collaborative projects under External Research because their research objectives can be pursued with or without the existence of the internal USGS research.

For collaborative proposals that propose work by two separate institutions or organizations, each individual organization must accept responsibility for specific parts of the work proposed. Each PI and his/her institution will receive a separate grant and must accept financial responsibility for administering the grant. Collaborative proposals are not instances where persons from a second organization are hired as consultants or other contractual agreements to conduct work on behalf of the grantee.

Collaborative proposals between an external organization and a USGS/NEHRP project may be funded as either a grant or as a cooperative agreement depending upon the extent and type of involvement of the USGS in the work. Discussion and coordination between internal and external researchers are encouraged; however, USGS personnel are prohibited from helping an external organization prepare

its proposal for competitive funding under External Grants.

Collaborative proposals and their preparation are one of the least understood aspects of the External Research Grants process: questions about technical portions of a collaborative proposal should be directed to the External Research Support Manager:

Elizabeth Lemersal  
(703) 648-6716 (Voice)  
(703) 648-6717 (FAX)  
[lemersal@usgs.gov](mailto:lemersal@usgs.gov)

- A. A separate proposal must be submitted from each external organization involved in collaborative studies. Major sections of each proposal shall be identical and each proposal must clearly define the tasks to be performed by each organization, and **each institution shall submit a separate budget, which clearly reflects their tasks and responsibilities.**
- B. Collaborative proposals must be clearly identified in the proposal title. The application title shall read “**Proposal Title: Collaborative Research with First Institution name, and Second Institution name.**”
- C. USGS/NEHRP External Research reserves the right to fund either some or all of the Applicants involved in a collaborative study.
- D. In the case of collaborative proposals involving external organizations and USGS scientists, two separate proposals must be prepared. The external proposal must describe the degree of collaboration and **must include a letter of support** from the internal USGS collaborator(s), attached to the external proposal. The USGS project chief will include the part of the proposed work being done by the USGS in his or her internal proposal for FY2007, and will include a description of the nature of the collaborative work being done with the external institution.

## VII. Multi-year Proposals

In certain situations, the USGS considers the support of a longer-term effort to be in the best interest of the Government. In the past, the submittal of two-year proposals was encouraged. Please note that two-year proposals are not preferable to one-year proposals. If the proposed work is such that two years are required to complete the research, then a two-year proposal is appropriate and applicants are strongly encouraged to write their proposals accordingly. All work that can be completed in one year should be proposed as a one-year project. Applicants should carefully consider their time commitments and request the required grant duration and funding to accomplish the project goals. Our Review Panels frequently recommend funding only the first year of two-year proposals when the proposed research is easily divided into two, one-year projects or when they feel that results from the first year’s proposed work will need to be evaluated before a second year of research can be considered.

The second year of funding of a two-year grant is contingent upon the availability of funds and satisfactory progress by the Recipient. Progress will be determined by the External Research Support Manager and the Regional or Topical Coordinator.

## VIII. Out-of-Cycle Awards

The USGS/NEHRP grants program may accept proposals outside of the normal competitive cycle under limited circumstances:

- A. Research proposals may be accepted and approved out-of-cycle (after the closing date) only in cases where there is compelling circumstance or emergency (*e.g.*, seismic event), which must be acted on before the next competitive review cycle. Proposers should contact the appropriate Regional or Topical Coordinator prior to submitting out-of-cycle proposals.
- B. Congress mandates directed awards to support activities that evaluate earthquake hazards and losses. In this case, the USGS will solicit applications.

## IX. Unsuitable Proposals

The following proposals are ineligible for consideration under this Announcement:

- A. Proposals for regional seismic monitoring or establishing Data Centers.
- B. Proposals for long-term operation of geodetic networks or instruments.
- C. Proposals from U.S. Government agencies or U.S. Government employees.
- D. Proposals from Federally Funded Research and Development Centers (FFRDC).
- E. Proposals in which there is a real or apparent conflict of interest.
- F. Proposals principally involving the direct procurement of a product, equipment, or service.
- G. Proposals having subcontracts for 50 percent or greater of total direct costs.

## X. Projects Previously Supported by the USGS/NEHRP

Lists of currently supported projects may be obtained from the External Research Support website at <http://erp-web.er.usgs.gov>.

## XI. Application Preparation Instructions

Applicants shall submit one stapled single-sided original application with an original signed SF424. In addition, submit **1 stapled double-sided** copy of the application with the SF424 as the cover page. In addition, one original and one copy of the NEHRP Proposal Information Summary, Abstract, and Budget Summary. The original application and copy should be in color as needed for review by regional and topical panel members. **The application shall not exceed 25 single-spaced pages** (including figures, tables, references, appendices, curriculum vitae, etc.), and the type size shall not be smaller than 11 point type. All text, figures, and tables shall be on 8½" by 11" paper; please do NOT submit A4 paper. The Assurances, Certifications, and the Indirect cost rate agreement shall be submitted with the original only and do not count against the 25-page total; color figures can be single-sided and count as one page. All pages of the application shall be numbered. Do not submit copies of published papers with the application. The application shall be assembled, **precisely**, in the following order:

- A. Application for Federal Assistance, Standard Form (SF) 424.
  1. Use the SF 424 (Attachment B) as the cover sheet for all applications. An authorized representative of the institution or company must sign and date the SF 424. The office of

- the authorized representative signing the SF 424 must fill out the SF 424.
2. The address provided in block 5 is the address that the USGS will issue potential awards to and correspond with. In most cases, this address should be the address for the authorized representative signing the SF 424 in block 18d.
  3. In block 6 complete the employer identification number (EIN) for the Dun and Bradstreet (DUNS) organizational number listed for the address specified in block 5. A new DUNS number can be obtained by contacting Dun & Bradstreet at 1-800-333-0505 or [www.dnb.com](http://www.dnb.com). **The DUNS number must correspond to the address provided in block 5.**
  4. Enter the two- or three-letter panel designation in the upper right hand block labeled "Applicant Identifier" to the left of the dash in the block.
- B. Assurances and Certifications. The authorized certifying official of the applicant shall certify Attachments C and D. **Include these forms with the original application only.**
- C. Proposal Information Summary. This summary is mandatory for all proposals and shall follow the same format as shown in Attachment F.
- D. Table of contents.
- E. Abstract. The abstract shall be no longer than one, single-spaced page. It shall include identification of the problem, a summary of the approach, project objectives, anticipated results, and the implications of the project results.
- F. Proposed budget. The proposed budget shall be presented in two parts: a one-page summary (with the format in Attachment E); and a detailed budget keyed to the summary sheet. **Place the budget summary, followed by the detailed budget, after the abstract.** Non-federal funds available to support the project may be reflected in the detailed budget or the SF 424 (line 15.b. -c.), as appropriate. The detailed budget must include the amount proposed for each of the following items in this order:
1. Salaries and wages. Identify individuals or categories of salaries and wages, estimated hours or percent of time, and the rate of compensation proposed for each person or category. Include an explanation of the amounts included for projected increases if the rate of pay shown is higher than the current rate of pay. Identify each person with a task in the project. Tuition remission and other forms of compensation paid as, or in lieu of, wages to students performing necessary work are allowable, provided that the tuition or other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of the work.
  2. Fringe benefits/labor overhead. Indicate the rates/amounts in conformance with normal accounting procedures. Explain what costs are covered in this category and the basis of the rate computations. Indicate whether rates are used for proposal purposes only or whether they are also fixed or provisional rates for billing purposes.
  3. Equipment. Show the cost of all special-purpose equipment necessary for achieving the objectives of the project. "Special-purpose equipment" means scientific equipment having a useful life of more than 1 year and having an acquisition cost of \$5,000 or more per item. Each item should be itemized and include a full justification and a dealer or manufacturer quote, if available. General-purpose equipment must be purchased from the applicant's operating funds. Title to non-expendable personal property shall be vested solely with the Recipient. **Under no circumstances shall property title be vested in a sub-tier recipient.**
  4. Supplies. Enter the cost for all tangible property. Include the cost of office, laboratory,



computing, and field supplies separately. Provide detail on any specific item, which represents a significant portion of the proposed amount. If fabrication of equipment is proposed, list parts and materials required for each and show costs separately from the other items.

5. Services or consultants. Identify the tasks or problems for which such services would be used. List the contemplated sub-recipients by name (including consultants), the estimated amount of time required, and the quoted rate per day or hour. If known, state whether the consultant's rate is the same as she/he has received for similar services or under Government contracts or assistance awards.
  6. Radiocarbon Age Dating. Include number of samples and cost per sample.
  7. Travel. State the purpose of the trip and itemize the estimated travel costs to show the number of trips required, the destinations, the number of people traveling, the per diem rates, the cost of transportation, and any miscellaneous expenses for each trip. Calculations of other special transportation costs (such as charges for use of applicant-owned vehicles or vehicle rental costs) should also be shown.
  8. Publication costs. Show the estimated cost of publishing the results of the research, including the final report. Include costs of drafting or graphics, reproduction, page or illustration charges, and a minimum number of reprints. If not included under direct labor or other direct costs, the cost of manuscript typing shall be included.
  9. Other direct costs. Itemize the different types of costs not included elsewhere; such as, shipping, telemetry, computing, equipment-use charges, age dating, or other services. Provide breakdowns showing how the cost was estimated; for example, computer time should show the type of computer, estimated time of use, and the established rates.
  10. Total direct costs. Total items 1 through 9.
  11. Indirect cost/general and administrative (G&A) cost. Show the proposed rate, cost base, and proposed amount for allowable indirect costs based on the cost principles applicable to the Applicant's organization. If the Applicant has separate rates for recovery of labor overhead and G&A costs, each charge should be shown. Explain the distinction between items included in the two cost pools. The Applicant should propose rates for evaluation purposes, which they are also willing to establish as fixed or ceiling rates in any resulting award. A copy of the indirect negotiated cost agreement with the Federal Government must be included. If one is not established, a letter from a Certified Public Accountant must be included to support the cost.
  12. Amount proposed. Total items 10 and 11.
  13. Total project cost. Total Federal and non-Federal amounts, if any.
  14. Multi-year projects. The Applicant shall provide summary information (see Attachment E) as well as a detailed budget for the second year. **The SF 424, however, shall reflect support for the one year only.**
- G. Proposal Body: The proposal body shall consist of the following parts:
1. Significance of the project. Discuss the specific problem addressed and its importance. Include a discussion of the significant contribution the project will make to the NEHRP. **Each proposal must include a description of how the expected results could be applied to reducing losses from earthquakes in the U.S.; this description should be included in a separate paragraph of the proposal. Scores of proposals that lack such a description will be reduced by the evaluation panel.**
  2. Project plan. Discuss the specific hypotheses or research questions, the conceptual

framework or model to be used, as well as the data collection and analysis plans, and continuing efforts. Plans should also include procedures to be used to insure objectivity and balance in the project.

3. Final report and dissemination. The U.S. Geological Survey considers dissemination of research data and results to potential users of those results to be an integral and crucial aspect of projects funded by this program. Beyond the requirements for a final report, describe your plan for dissemination of project data and results and the planned users of those results that will result in the greatest possible benefit to earthquake hazards reduction. Describe in detail your plans for dissemination of the project results and indicate the customers to whom the project is directed.
4. Related efforts. Describe significant, related studies conducted by members of the research team and discuss any planned coordination with other workers in the field. Include descriptions of current and recent NEHRP grants, the relationship of those grants to this proposal, and relevant results from previous grants.
5. Project personnel and bibliography of directly related work. Provide one-page curriculum vitae for the professional staff, summarizing education, experience, and the last five years' bibliographic information related to the proposed work. Curriculum vitae for post-doctoral researchers, who contribute significantly to the project, must also be included.
6. Institutional qualifications. State the resources available at, and the relevant experience of, the institution. Resources include personnel, computer and library facilities, and ties to both sources of data and potential users of the results.
7. Project management plan. Include project milestones and related due dates for the proposed work and required progress reports (see Attachment H, section 3). Time allocations and responsibilities for the project staff members should also be described.
8. Current support and pending applications. List all sources of support (in addition to the proposed effort) to which the senior research members have committed a portion of their time for the period covered by the proposal. The information should account for 100 percent of the work time of each investigator and include titles, annual budget levels, period of the awards, and the person-months committed in each case. This section must also list research being considered by, or that will be submitted to, other possible sponsors. This information will not affect the evaluation of the proposal; however, if identical or similar work is also proposed to another institution (e.g., NSF), an explanation of the relationship of such work to this proposal should be provided. Proposals submitted for funding to the Southern California Earthquake Center may not also be submitted to the USGS NEHRP External Research for funding.
9. Continuation projects. List the total amount of funding per year for which support was provided by the USGS, as well as the duration of each increment (including no-cost extensions), and the total number of person-months committed by each Principal Investigator each year.

## **XII. Evaluation of Applications**

- A. Proposals pertinent to one of the six NEHRP external program research areas will be evaluated by multi-disciplinary peer review panels. The panelists read all the proposals assigned to their panel prior to their meeting and at the panel meeting discuss each proposal according to the evaluation criteria. The panel members are scientists and engineers drawn from Federal, State,

local, and regional agencies; universities; non-profit organizations; and private industry. The panels will evaluate the technical merit of the proposals especially in the context of development of an integrated program of investigations for that region with attention to the program priorities (see Attachment A). The peer review panel's decisions on ranking of proposals are final within each panel. The panels include five regional panels (including international proposals) and a panel for earthquake physics and earthquake effects. Applicants shall indicate on their proposal cover sheet (SF 424) (Attachment B) which panel is most appropriate for their proposal. The panel designation shall be entered in the upper right hand block labeled "Applicant Identifier". The USGS will reassign proposals to a more appropriate panel if necessary.

The panels and their designations are as follows:

<b>Designation</b>	<b>Panel Name</b>
CEU	Central and Eastern United States
EP	Earthquake Physics and Effects Research
NC	Northern California
NIW	National and Intermountain West
PN	Pacific Northwest
SC	Southern California

**Note:** Do not submit the same or a similar proposal to more than one panel. If unsure of which panel is most appropriate, contact the External Research Manager or applicable Regional or Topical coordinator (see Contacts tab on the External Research Program web site, <http://erp-web.er.usgs.gov> and Attachment A).

B. All proposals are considered in accordance with the criteria set forth below:

1. Relevance and timeliness. This factor considers the relevance and timeliness of the proposed research activities as they relate to the USGS NEHRP program goals, including regional emphasis where appropriate (see Attachment A).
2. Technical quality of the proposal. This factor considers the scientific merit of the proposed approach and the probability of achieving positive results within the designated period.
3. Competence and Recent research performance of Principal Investigator(s) and research team. This factor considers experience and competence of the PI and coworkers; and promptness with which the research results were disseminated to the scientific community from previous funding. This factor includes performance records and capability to provide the necessary facilities and support that will insure satisfactory completion of the proposed work. The recent performance aspect is primarily concerned with the timely publication of project results and data in peer-reviewed scientific or technical journals, the impact of the report, and whether reporting requirements from previous USGS awards have been satisfied.
4. Appropriateness and reasonableness of the budget. This factor considers whether the proposed budget is commensurate with the level of effort needed to accomplish the project objectives and whether the cost of the project is reasonable relative to the value of the anticipated results.

- C. The assembled panels make recommendations and provide advice by ranking proposals into priority groupings, funding levels, and the length of the project. Panels include USGS personnel where necessary, to provide coordination with internal USGS/NEHRP elements. The results of the review will assist the USGS in making final award determinations under this Announcement.

### **XIII. Rejection of Applications after Initial Review**

If a proposal does not meet all requirements specified in the Announcement, as determined by the Contracting Officer in consultation with the External Research Support Manager, the proposal will be promptly returned to the applicant indicating the reason for its return.

### **XIV. Involvement of Federal Employees**

Federal employees including USGS employees are prohibited from serving in any capacity (paid or unpaid) on any application submitted under this Announcement. Proposals that have a real or apparent conflict of interest will not be processed for evaluation. This does not prohibit cooperation or collaboration between USGS and non-USGS scientists in information exchange and data collection. (See paragraph VI.)

### **XV. Award Terms and Conditions and General Provisions**

Award Recipients must comply with grant award Special Terms and Conditions (see Attachment H) and General Provisions (see Attachment I).

### **XVII. Paperwork Reduction Act Statement**

This information is being collected to determine the eligibility of the applicant and as a basis for approval or disapproval of the proposed research. The purpose of the program is to support research in earthquake hazards and earthquake prediction to provide earth science data and information essential to mitigate earthquake losses. Response to this request is required to obtain and retain a grant, under the Earthquake Hazards Reduction Act of 1977, Public Law 95-124. Public report burden for this collection is estimated to average 30 hours per grant application and 40 hours to prepare a final technical report (OMB No. 1028-0051) Direct comments regarding the burden estimate or any other aspect of this collection to: Bureau Clearance Officer, USGS, 807 National Center, Reston, VA 20192.

## RESEARCH PRIORITIES

The Research Priorities presented here reflect the FY 2004-2008 Earthquake Hazards Program Five Year Science Plan. The complete draft of the plan can be found at [erp-web.er.usgs.gov](http://erp-web.er.usgs.gov), and proposers are encouraged to look at the plan to see how the high-priority targets listed below for each region fit into the Plan. The Five-Year Plan describes four major Program Elements that are the focus of the U.S. Geological Survey's Earthquake Hazards Program (EHP). Following is a description of the EHP Program Elements as each is applicable for research done through External Grants.

### **ELEMENT I.** National and regional earthquake hazards assessments

The EHP prepares national and regional assessments, digital maps of the expected degree of ground shaking over various exposure times. These studies are the basis of the seismic safety elements of the model building codes upon which most local codes are based. The EHP also prepares long-term forecasts of future earthquake occurrences, and the shaking and ground deformation they may cause. These products are essential for development of cost-effective mitigation measures and practices in structure design, construction, and planning. The USGS is particularly interested in supporting research that contributes to improvements in the national hazards maps and to assessing earthquake hazards and reducing losses in urban areas. Other things being equal, preference will be given to qualified proposals addressing these interests.

### **ELEMENT II.** Earthquake information, monitoring, and notification

Carried out under a separate solicitation that funds seismic and geodetic network operations with three-year cooperative agreements.

### **ELEMENT III.** Research on earthquake occurrence, physics, and effects

With the goal of improving hazard assessments, earthquake forecasts, and earthquake monitoring products, the EHP supports research on earthquake processes and effects. This work is increasingly focused on developing models of earthquake and tectonic processes and of earthquake effects. Because large earthquakes occur infrequently, models have a central role in allowing lessons from one area to be applied in other areas and time frames. One important focus is the development of comprehensive, dynamic models of tectonic and earthquake processes and of the effects of earthquakes, *e.g.*, ground shaking (linear and non-linear), ground failure, and structural response. The EHP also supports efforts to improve algorithms and processes to provide information about earthquakes in near real time, including early warning, finite fault estimation, and refined seismic moment determinations.

### **ELEMENT IV.** Earthquake safety policy

The EHP produces a significant quantity of data and information on earthquakes and related hazards. Experience has shown that production of data and reports is not enough, and that the Program must take an active role with the "user community" in the application and interpretation of Program results. Additionally, active engagement with our user community provides opportunities for dialogue on modifications to our existing products and new products that make our work and results more relevant and applicable. Opportunities for engaging the user community take place at both the national and regional levels.

These Elements are cast in six areas: five regional and one topical area, listed below. The EHP places high priority on investigations in the five geographic areas where large populations are exposed to

significant seismic risk: Southern California, Northern California, the Pacific Northwest (including Alaska), the Intermountain West, and the Central and Eastern United States.

**The six areas are:**

1. Central and Eastern United States (CEU): The United States east of the Rocky Mountains, including Puerto Rico and the U.S. Virgin Islands
2. Earthquake Physics and Effects (EP): Basic and applied geographically broad research on the physics of earthquakes and their effects
3. National and Intermountain West (NIW): This panel is focused on seismically active regions of the Intermountain West and also addresses proposals specific to the National Seismic Hazard Maps and to the National Earthquake Information Center (NEIC)
4. Northern California (NC): From Cape Mendocino to the central creeping section of the San Andreas fault and the adjacent Coast Ranges, with particular emphasis on the greater San Francisco Bay Area
5. Pacific Northwest (PN): Washington, Oregon, Idaho, California north of Cape Mendocino (Cascadia), and Alaska
6. Southern California (SC): From the Carrizo Plain south to the international border with Mexico.

Proposals for research on earthquake occurrence and effects applicable to a specific region should be directed to the relevant regional panel. Proposals for research on generic earthquake occurrence and effects and for research related to the experiments at Parkfield, California should be directed to the EP panel. Proposals for short-term geodetic research or for research using the data from long-term studies should be submitted to the appropriate regional or topical panel. Proposals addressing earthquake research that is national in scope or in support of the National Seismic Hazard Maps should be directed to the NIW panel. Proposals for research to improve algorithms and processes to provide information about earthquakes in near real time should be directed to either the NIW or the SC panel. Proposals for research on foreign earthquakes should be directed to the regional panel for the U.S. seismogenic zone that will most benefit from the study's knowledge or new techniques transferable. Proposers are encouraged to discuss such proposals with the relevant regional coordinator in advance of submission.

External support for regional seismic network operations and for geodetic monitoring (e.g., borehole strainmeters, creep meters, and GPS networks) done in response to Element II, Earthquake Information, Monitoring, and Notification, is carried out under a separate program announcement that funds these network operations with three-year cooperative agreements. The three-year awards for both the seismic and geodetic networks currently cover FY2004-2006; a separate program announcement will be announced in a few months for funding for fiscal years 2007 to 2009.

Proposals submitted in response to this program announcement must indicate both the program elements and the regional or topical area the proposed research addresses. Regional and topical coordinators are available to assist applicants by describing related work being done internally within the USGS, identifying existing relevant data sets, and helping applicants establish contacts with USGS researchers working in similar areas. Coordinators are listed on the EHP Internet page, <http://erp-web.er.usgs.gov> and can be found under the "Contact Us" tab. Links to descriptions of USGS internal projects can be found on the same Internet page by clicking on "Current Projects". It is strongly

recommended that the applicant contact the appropriate regional or topical coordinator to ascertain how their proposed work can complement and help support the goals and objectives of these projects and efforts. Applicants targeting the NC panel should also note additional points of contact within the NC priorities section, below.

Proposers are encouraged to use seismic monitoring data, including structural monitoring data, from the Advanced National Seismic System (ANSS). Specific ANSS coordination needs are included in several of the regional or topical priority areas, below. Proposals for research using ANSS data should explicitly state data needs and uses. For example, within the area of earthquake effects research, the mission of earthquake response monitoring within the ANSS is to provide data and information products that will contribute to earthquake safety through improved understanding and predictive modeling of the earthquake response of engineered civil systems, or to aid in post-earthquake response and recovery.

The EHP strongly encourages proposals for collaborative research making use of NSF's Major Research Equipment Facilities, EarthScope and NEES, as long as these proposals address EHP goals and objectives as put forth in the 5-year Plan. This is particularly true for proposals addressing structural engineering topics. Such proposals should address specific Program Elements and the appropriate regional or topical area. Proposals for EarthScope- or NEES-related projects that are not directly related to EHP goals and objectives should be directed to NSF.

Following are high priority tasks for the EHP Program Elements for each geographical and topical area. We emphasize that this listing of Priority Tasks is not intended to discourage submission of proposals to accomplish other important tasks.

## **Priorities in the Central and Eastern United States (CEU)**

**Coordinator: Buddy Schweig, [schweig@usgs.gov](mailto:schweig@usgs.gov)**

- Projects that will directly improve the quality and usefulness of newly completed and developing urban seismic hazard maps for high-risk urban areas in the Central and Eastern US are encouraged. Studies involving the USGS, working groups, professional organizations, and regional consortia are especially encouraged that:
  - Characterize regional wave propagation, particularly using seismic data from ANSS stations.
  - Develop region-specific relationships for inferring seismic wave velocities from lithologic and other types of data.
  - Locate and characterize seismogenic faults.
  - Conduct experiments to provide ground motion, geophysical, and geotechnical data to investigate site response, particularly soil non-linearity and sedimentary basin effects.
- Develop products that transfer results of CEUS Earthquake Hazards Program research to potential user groups.
- Conduct collaborative studies to incorporate information generated by the CEUS Earthquake Hazards Program into HAZUS loss estimates.
- Infer source characteristics of damaging CEUS earthquakes using instrumental recordings of large intraplate earthquakes in analog regions and of small, local earthquakes in the CEUS.
- Conduct paleoseismological investigations to estimate the times, locations, and ground motion characteristics of large prehistoric earthquakes, particularly in highly populated, eastern U.S. urban

areas for which there is geologic or other evidence of such events and on regions on the peripheries of the New Madrid seismic zone. Conduct studies of modern liquefaction in regions with similar geology and where ground motion data exist, to constrain the causative loading and rheologic factors.

- Collect direct measurements of the physical properties of deep sediments of the Mississippi embayment and Coastal Plain and of ground motions affected by them. High-quality direct and/or laboratory measurement of the dynamic properties (modulus and damping) of soils at high strains using undisturbed samples is particularly encouraged. Conduct a comprehensive modeling study of non-linear processes appropriate to such thick sedimentary columns.
- Develop a collaborative project, with a funding strategy, to drill/log/instrument a deep borehole penetrating deep sediments of the Mississippi embayment and Coastal Plain.
- Develop synoptic, physical models of long-term deformation in intraplate areas. Proposals for such development should include strategies for using existing or collecting new data to constrain and validate models. Coordination with Earthscope research projects is particularly encouraged.
- Develop tools needed for accurate, rapid portrayal of shaking (e.g., ShakeMap) appropriate to sparsely recorded earthquakes in the CEUS. Quantified measures of hazard that are meaningful to the public need to be developed, both for rapid assessments and for more static hazard maps.
- Systematically evaluate the temporal and spatial distributions of foreshocks and aftershocks of intraplate earthquakes, particularly in the CEUS.

### **Priorities for Earthquake Physics and Effects (EP)**

As described in the 2003 National Research Council report *Living on an Active Earth: Perspectives on Earthquake Science*, continued progress toward understanding earthquake phenomena and evaluating earthquake hazards will increasingly require integrative, physics-based research involving theoretical studies of processes controlling earthquake phenomena, sophisticated numerical modeling, field observations, and laboratory studies. The EHP will pursue such research on earthquake processes for application to improved hazard assessment and risk-mitigation products throughout the Nation. Of particular interest are studies that utilize data collected by USGS and its partner organizations, including the ANSS, geodetic networks, surface and borehole instruments in the San Andreas fault system in central California, and the USArray, PBO and SAFOD components of the EarthScope facility (see [www.earthscope.org](http://www.earthscope.org)).

### **Priority Topics in Research on Earthquake Physics And Occurrence**

**Coordinator:** Michael Blanpied, [mblanpied@usgs.gov](mailto:mblanpied@usgs.gov)

- Develop and test reliable, predictive models of earthquake occurrence, failure, time-to-failure, and clustering, and the observational data sets needed to test such models. Perform research on the causes and timing of subduction zone earthquakes.
- Develop strategies for estimating time-dependent earthquake probabilities and shaking hazard, to include the time of the last earthquake on a fault segment, and reflecting complex phenomena such as non-uniform earthquake slip, fault interactions, transient deformation, cascading ruptures, and changeable or non-existent fault segment boundaries.
- Quantify processes controlling fault stress accumulation, transfer, and release. Apply findings to reconcile deformation rates inferred from geodetic, geologic, and seismicity observations.
- Refine and test fault constitutive laws, both at quasi-static and rapid fault slip rates, through laboratory, field, and seismic observations, heat flow studies, and numerical modeling. Utilize samples, core cutting analyses, downhole measurements and monitoring results from the San



Andreas Fault Observatory at Depth (SAFOD) and other fault-zone drilling projects, where possible.

- Refine and evaluate empirical approaches for modeling earthquake occurrence, including those for fault segmentation, the characteristic earthquake hypothesis, and shape of the recurrence probability density function. Develop improved data sets on past earthquakes and test frequency-magnitude relationships with respect to these models and data.
- Assess the predictability of large earthquakes by focusing on the underlying physical processes and continue fault-monitoring experiments in search of possible earthquake precursors. Develop reliable time-dependent, intermediate-term earthquake forecasting techniques; validate and test such techniques in coordination with the USGS–SCEC RELM project (<http://pasadena.wr.usg.gov/research/RELM>) and the Collaboratory for the Study of Earthquake Predictability (CSEP).
- Develop and test models of large or small earthquake occurrence at Parkfield using monitoring data, laboratory measurements on fault samples, and crustal property observations from SAFOD, borehole seismic networks, and other geophysical techniques. Proposals for fault monitoring in central California should be justified in light of the 2004 M6 Parkfield earthquake.
- Conduct field and laboratory studies to ascertain the mechanisms (e.g., fluid flow or fault rheology) responsible for non-volcanic tremor and periodic slip as observed in subduction zones and on the San Andreas fault. Determine whether such phenomena may act as triggers for large earthquakes.
- Augment PBO strain and GPS networks by developing and/or improving creepmeter technology. Priority will be given for systems offering improvements in cost, maintenance, reliability, long-term stability, and length of baseline, without sacrificing short-term precision.

### **Priority Topics in Research on Earthquake Effects**

**Coordinator: Art Frankel, [afrankel@usgs.gov](mailto:afrankel@usgs.gov)**

- Develop and improve methods for producing broadband (0.1-20 Hz) synthetic seismograms for large earthquakes, including near-source directivity pulses, fault fling, 3D basin effects, nonlinear soil response, scattering, and frequency-dependent radiation pattern. These methods should be validated in the time and frequency (spectral response) domains by comparison with observed strong-motion records.
- Improve observations relevant to the shaking behavior of near-surface materials in high-risk urban areas. Characterize relevant soil parameters, conduct observational experiments to provide ground motion data, and study non-linear processes relevant to the behavior of thick sediments.
- Improve site characterization for building code and other applications. In particular, develop recommendations for improving soil classification methods and code site amplification factors; revise ground-motion prediction equations for use in engineering design and probabilistic seismic hazard analysis; and develop regional ground motion attenuation models and investigate the causes of regional variations. Develop quick and inexpensive methods to determine the shear-wave velocity profile at a site to a depth of about 200m.
- Improve relationships between ground shaking and damage in buildings and other structures. Develop tools and design guidelines to account for the effects of soil-structure interaction, low-frequency long-duration surface waves, and near-field and impulsive ground motions; develop tools to use data from instrumented structures to predict earthquake response, monitor structural health, and assess level of damage. Develop probabilistic methods to describe building performance in response to strong shaking. Perform field measurement and analysis of structural

properties for ANSS buildings and develop baseline structural models for ANSS buildings.  
Coordinator: William U. Savage, wusavage@usgs.gov

- Document the occurrence, research the process, and determine the cause of earthquake-triggered ground failures including landslides and liquefaction, and improve techniques for ground-failure susceptibility and hazard assessment. Develop and apply methods for probabilistic mapping of liquefaction and other types of failure, using the results of probabilistic ground-motion mapping.
- Evaluate and test computer programs for calculating nonlinear response of soils, by comparing predicted seismograms with recorded data.
- Evaluate the variability and upper-bound limit of ground-motion distributions used in probabilistic seismic hazard assessment.

## **Priorities in the National and Intermountain West (NIW)**

**Coordinator: Mark Peterson, mpeterson@usgs.gov**

We encourage those who are interested in writing proposals for Utah or Nevada to review the region specific priorities described at the end of this section.

- Convene multi-institutional workshops to organize sub-discipline working groups or to obtain consensus information on fault parameters and ground motion characterization for different regions of the Intermountain West region. We strongly encourage proposals that will provide new information for use in future updates of the U.S. National Seismic Hazard Maps (NHSM).
- Collect shallow shear wave velocity, density, or attenuation data for inclusion in community velocity models and to characterize liquefaction potential. We encourage use of ANSS data to calibrate the relationship of these velocity models to site response. Priority will be given to projects in urban areas along the Wasatch front region of Utah; Reno, NV; Las Vegas, NV; and the Jackson Hole-Teton-Yellowstone region, WY.
- Conduct Quaternary geologic, geomorphic, and paleoseismic investigations to estimate the recurrence, locations, and magnitudes of large prehistoric earthquakes. Uncertainties of these parameters should be defined. Faults should generally have slip rates of at least 0.1 mm/yr near urban areas or 0.2 mm/yr in other areas. Priority will be given to projects located in urban areas along the Wasatch front region of Utah; Reno, NV; Las Vegas, NV; and the Jackson Hole-Teton-Yellowstone region, WY, and studies of the faults described at: <http://geohazards.cr.usgs.gov/eq>.
- Develop methods that use geodetic data for estimating slip rates along faults or across regions and recurrence of earthquakes that can be applied to seismic hazard analysis.
- Develop or improve attenuation relations for the Intermountain West that are needed for the U.S. National Seismic Hazard map and Shakemaps.
- Define uncertainties of parameters and equations used in developing the U.S. National Seismic Hazard map. Develop procedures for testing the hazard maps.
- In consultation with NEIC personnel, develop and implement practical methods for improving global earthquake location accuracy and integrate with routine NEIC operations. Use creative data processing to improve NEIC's global detection algorithms, including detection and identification of secondary phases, and recovery and relative relocation of early aftershock distributions for major earthquakes.
- Develop practical methods for routine, rapid source characterization, including regional and global moment tensors, finiteness, and slip distribution, that can be readily implemented and integrated into NEIC operations.

- Develop new products and procedures allowing NEIC to deliver rapid and/or more accurate post-earthquake information, for example, earthquake impact, ground shaking, landslide potential, or likelihood of surface rupture.

**Nevada and Utah State Priorities:** The following list of priority research activities were developed by the states of Nevada (Bureau of Mines and Geology, University of Nevada) and Utah (Utah Geological Survey and University of Utah) for earthquake hazard studies in those regions.

### **Nevada State Priorities for Earthquake Studies**

#### **Faults**

- Characterize high-hazard faults affecting Reno/Carson City and Las Vegas.
- Define fault geometry for sources used in the National Seismic Hazard maps. Develop geometries based on high-precision relocations of earthquakes near sources affecting Reno/Carson and Las Vegas.
- Use GPS data to constrain shear strains in the Reno-Carson/Las Vegas regions, resolve discrepancies between geological, geodetic, and seismic deformation rates
- Develop fault and earthquake parameter uncertainties for urban hazard maps of Nevada.

#### **Ground Shaking / Site Response**

- Utilize a variety of techniques to construct/improve 3D velocity models needed for waveform modeling of the effects of basin- and near-surface-geology for Reno-Carson City, and Las Vegas (including Vs30, tomography, correlations with geology, etc), and incorporate results into the Community Velocity Model.
- Use ANSS data in Reno/Carson City, and Las Vegas to find empirical site response, validate predictions of 3D velocity models, and improve ground motion prediction approaches.
- Evaluate whether stress drop for Intermountain West earthquakes differs from the more active California faults, and the implications of such differences for strong ground motions.
- Considering that most of the urban regions of the Intermountain West (including Salt Lake, Reno, Carson City, and Las Vegas) are on the hanging wall of normal faults, apply a range of techniques (including modeling, geological constraints, extrapolation from other regions and from small events) to estimate the ground motions in large earthquakes under these conditions.
- Prepare scenario ground motion models based on waveform modeling for earthquakes on major faults affecting Reno/Carson and Las Vegas.

#### **Workshops**

- Organize a Nevada Seismic Hazard Workshop to develop a preliminary Nevada Community Fault Model (CFM) and Community Velocity Model (CVM), and to prioritize future efforts.
- Organize a workshop to focus on ground motion estimation from normal faulting earthquakes.

#### **Modeling and Planning**

- Develop planning scenarios for Reno and Las Vegas.

### **Utah State Priorities for Earthquake Studies**

#### **Faults**

- Constrain earthquake timing on the West Valley fault zone.
- Resolve the timing of the most recent event on the Weber segment of the Wasatch fault zone.
- Extend the paleoseismic record back into the early Holocene/latest Pleistocene on the Weber segment of the Wasatch fault zone.
- Perform geophysical surveys and drilling of faults beneath Utah Lake to determine possible relation to Wasatch fault zone.

- Determine faulting history of various faults in southern Utah (Sevier/Toroweap, Washington, Paragonah, Enoch, and Red Hills faults).
- Determine earthquake timing on the Northern and Southern segments of the East Cache fault zone.
- Determine multiple earthquake record on the Clarkston fault
- Constrain earthquake timing on a Wasatch Range back-valley fault.

#### **Ground Shaking/Site Response**

- Finalize and maintain the Wasatch Front community velocity model (CVM); include latest shear-wave-velocity data.
- Use Wasatch Front CVM to evaluate the importance of basin structure (e.g., depth of unconsolidated and semi-consolidated sediment, basin edge effects, steep basin boundary effects, focusing) on strong ground motions.
- In cooperation with the USGS NSHM Project, plan and perform initial investigations to prepare large-scale probabilistic and scenario ground-shaking maps for the Wasatch Front.
- Characterize shear-wave velocities down to R1 (boundary between unconsolidated and semi-consolidated sediments) and R2 (boundary between semi-consolidated and consolidated bedrock) along the Wasatch Front.
- Use ANSS data in ground-motion studies along the Wasatch Front.

#### **Liquefaction**

- Compile geotechnical databases and map probabilistic liquefaction potential and permanent ground displacement for Wasatch Front valleys outside Salt Lake Valley.
- Perform field investigations in Wasatch Front valleys to characterize liquefaction hazards in surficial geologic units where existing data are inadequate.
- Review and synthesize reports of potentially seismically induced ground displacement in northern Salt Lake County to document liquefaction sites and revise liquefaction hazard maps.

### **Priorities in Northern California (NC)**

**Coordinator: Tom Brocher, [brocher@usgs.gov](mailto:brocher@usgs.gov)**

At current funding levels, emphasis in the Northern California hazards program will be on the highly-urbanized, greater San Francisco Bay region, extending from Gilroy in the south and Santa Rosa to the north, and from the Coast Range-Central Valley boundary on the east to the Pacific coast on the west. This region constitutes the greatest population density in Northern California and more than 25% of the nation's annualized risk (FEMA-366, February 2001: HAZUS99 Estimated Annualized Earthquake Loss for the United States, [http://www.fema.gov/hazus/li\\_pubs.shtm](http://www.fema.gov/hazus/li_pubs.shtm)). Seismic hazard assessment in the rapidly urbanizing San Joaquin-Sacramento delta region and the Sacramento River Delta levee system is also a priority.

- **Validate and improve a community 3D geologic and seismic velocity model for northern California.** Contact: Brad Aagaard ([baagaard@usgs.gov](mailto:baagaard@usgs.gov)). This model is being used for ground motion simulations, seismic event locations, source mechanism determinations, sedimentary basin response calculations, and the calculation of probabilistic hazard maps. Refinement of the velocity model in the San Joaquin-Sacramento delta is of high priority.
- **Contribute to a community Quaternary fault database that includes 3D information on fault locations and slip histories.** Contact: Russ

Graymer ([rgraymer@usgs.gov](mailto:rgraymer@usgs.gov)). Highest-priority will be given to known Holocene-active faults in or near urban centers and the Sacramento River delta that have not yet been restudied for the NCQFMD (e.g., Greenville Fault, southern Maacama Fault, Southern Midland Fault). Priority will also be placed on areas of complex fault connection (e.g. Greenville-Concord Faults, Calaveras-Hayward Faults, Rodgers Creek-Maacama Faults).

- **Conduct paleoseismological and geological investigations of the behavior and source character of active faults in northern California.** Contact: David Schwartz ([schwartz@usgs.gov](mailto:schwartz@usgs.gov)). A primary focus is an integrated effort to develop the earthquake recurrence history of the northern San Andreas fault (San Juan Bautista to Pt. Arena), especially of the Peninsula segment of the San Andreas fault and the northern segment of the Hayward fault, which dominate the seismic hazard of northern California. An additional priority is development of slip rate and recurrence information on faults in the eastern part of the Bay Area, which is seeing the largest population growth and where large earthquakes have potential to damage the Sacramento River Delta levee system.
- **Use crustal deformation measurements to constrain the regional deformation rates, fault slip rates, role of fault creep, fault mechanics, strain transients, and models of stress evolution for northern California.** Contact: Jessica Murray ([jrmurray@usgs.gov](mailto:jrmurray@usgs.gov)). Analysis of deformation along the Hayward and Rodgers Creek faults and the Peninsula segment of the San Andreas fault is of high priority, as is the application of new methods for analyzing high-rate GPS data both for real-time earthquake response and to obtain more accurate post-processed positions for use in deformation source modeling in the San Francisco Bay Area. A new priority is the refinement of deformation rates in the San Joaquin-Sacramento delta region, including the region containing the Greenville-Green Valley Faults and the Coast Range-West Great Valley boundary.
- **Develop NEHRP hazard products for Northern California.** Contact: Jack Boatwright ([boat@usgs.gov](mailto:boat@usgs.gov)). These products have the long-term goal of producing probabilistic hazard maps (shaking, liquefaction, and landslide) that include source directivity, 3D velocity effects, non-linearity, and complete recurrence models for faults. Although these products will be published by the USGS, research is needed on methodology development and validation. Simulations of ground motions produced by earthquakes on the Hayward fault, and using the 3D seismic velocity model, are a high priority. Simulations of ground motions in the Sacramento River Delta levee system produced by other East Bay faults, also based on the 3D seismic velocity model, are of high priority.
- **Capitalize on the acquisition of new information relevant for earthquake hazard analysis by the NSF-funded EarthScope program.** These include data acquired by the EarthScope MRE facility and GeoEarthscope acquisition of Lidar ([prentice@usgs.gov](mailto:prentice@usgs.gov)) and InSar (contact GeoEarthscope, [phillips@unavco.org](mailto:phillips@unavco.org)) data in Northern California. Proposals supporting the analysis of these data from an earthquake hazard perspective are encouraged.

## Priorities in the Pacific Northwest (PN)

Coordinator: Craig Weaver, [craig@geophys.washington.edu](mailto:craig@geophys.washington.edu)@USGS

- Conduct field investigations to determine if paleo-tsunami inundation areas and other tsunami effects on land can be determined for the Cascadia earthquake of 1700.
- Improve the vertical (elevation) accuracy and resolution of geologic estimates of land level changes from great Holocene plate boundary earthquakes in Cascadia or Alaska.
- Conduct field work to develop, date, and map evidence of strong ground shaking, coseismic uplift, ground failure, surface faulting, or tsunami deposits likely associated with late Holocene earthquakes throughout Puget Sound. Studies that seek to examine the possible extension of known fault systems, such as the Tacoma, Seattle, Boulder Creek, and South Whidbey Island are particularly encouraged. In King County where Lidar data is available, studies of the possible extension of the Seattle and South Whidbey Island faults eastward into the Cascade Range are also encouraged.
- Acquire Lidar data in the greater Portland urban area. Areas of particular interest include the Beaverton-Forest Grove area, the Gales Creek fault system, and the possible northern extension of the Portland Hills fault toward St. Helens. Surveys proposed must meet or exceed the quality of Lidar surveys already flown for the Portland area ([www.pugetsoundlidar.org](http://www.pugetsoundlidar.org)) in terms of such normal attributes as data point density, overlap of flight lines and vertical resolution. Any area proposed should show a logical extension of the existing area where Lidar data has been collected. Explain how data collection would be monitored for leaf-on/leaf-off conditions and detail how all data acquired will be made available in the public domain at the University of Washington library system.
- Conduct geological field studies that will help define the regional tectonic framework of the Portland and Tualatin basins, particularly with respect to the presence of the Columbia River basalts. The relation of the Portland Hills to the Portland and Tualatin basins is one topic of interest.
- Develop models to predict strong ground motions in western Oregon and Washington. The inclusion of the effects of long duration codas and long periods expected from plate-boundary earthquakes in Cascadia are encouraged.
- Improve our understanding of seismic hazards posed by Benioff-zone earthquakes. Topics of interest include determining whether large, Nisqually-type in-slab earthquakes are possible beneath southwestern Washington and the western Portland metropolitan area, efforts to explain the absence of significant aftershocks and/or the possibility of triggering activity in the overlying crust from these events, and studying the effects of the thermal structure and bending stresses of the subducted slabs on seismogenesis.
- Conduct fieldwork to continue characterizing site conditions at stations of the Advanced National Seismic System, the National Strong Motion Program, and the National Tsunami Hazard Mitigation Program in Oregon and Washington. Coordination with the Pacific Northwest ANSS region must be shown.
- Examine the regional earthquake catalog for Oregon and Washington to determine relations useful for reporting near-real time aftershock probabilities for crustal and Benioff zone earthquakes. Because the number of crustal earthquake sequences with mainshocks greater than magnitude 4 is very limited and larger Benioff zone events have very few aftershock, possible uncertainties and limitations in any relations developed should be carefully noted. Similar, but separate examinations are encouraged for Alaska, where potential investigations should discuss catalog completeness on the reliability of results.

## Priorities in Southern California (SC)

Coordinator: Lucile Jones, [jones@usgs.gov](mailto:jones@usgs.gov)

- Improve our products for emergency managers and planners to prepare for future earthquakes.
  - Compile and provide access to geotechnical, structural, and seismic databases that will provide useful information for mitigation and emergency response efforts.
  - Collaborate with the USGS and university-based seismic and geodetic networks to enhance tools needed for accurate and rapid portrayal of the severity and geographic distribution of strong ground shaking, surface rupture, and ground deformation. Develop software and pilot studies for seismic alert systems.
  - Cooperative projects with community decision makers are encouraged.
- Improve our estimates of fault characteristics, including:
  - Determine the activity of faults in southern California using paleoseismology, geomorphology, geologic mapping, and new dating techniques to develop long chronologies of past earthquakes and fault slip rates. Investigations of the San Andreas and San Jacinto fault zones and of the fault zones in the Transverse Ranges are of interest with the **southernmost San Andreas and Sierra Madre faults being of highest interest**. Establish baselines for post-earthquake investigations. Study evolution of faults in space and time.
  - Characterize the behavior of active fault segments and clarify differences between seismic and aseismic processes; evaluate seismogenic thicknesses and/or percentages of aseismic slip. The Los Angeles, Ventura, and San Bernardino basins are of particular interest.
- Improve predictions of ground shaking from future large earthquakes in southern California. **Of particular interest is research that will contribute to the Working Group on California Earthquake Probabilities**. These include:
  - Compile seismic, structural, geotechnical, and geologic data from surface and drill-hole observations necessary to predict regional ground motions and develop models to estimate variations in expected ground motions, accounting for bedrock excitation, nearby geologic structures, local topography, and soil-structure building interaction.
  - Use seismic data to determine earthquake source parameters and crustal structure, and state of the stress in the crust, including further development and testing of 2D and 3D Earth models for southern California.
  - Develop credible earthquake planning scenarios for the Los Angeles and San Bernardino regions.
  - Utilize data from recent large earthquakes in Alaska and foreign countries for the investigation of earthquake source, ground motions, and other issues relevant to hazards in southern California.
  - Develop and verify methods for calculating time histories of strong ground motion, paying close attention to the quantification and propagation of both modeling and parametric uncertainties.
- Develop regional models of fault interactions and velocity structures, including:
  - Examine intermediate term (month to years) variations in deformation and seismicity rates.
  - Investigate Quaternary faulting, and develop regional models of active deformation and fault and earthquake interaction, **with particular interest in the southern San Andreas system**.
  - Contribute to the development of regional earthquake likelihood models in any of the following ways: develop workable models of the spatial and temporal distribution of

earthquakes; quantify known and speculative faults in 3D space; contribute to a fault activity database of slip rates and other parameters; contribute to the historical earthquake catalog (e.g., quantify uncertainties of pre-instrumental events or provide focal mechanisms for instrumental events); or update magnitude versus area (or length) regressions.

- o Conduct geodetic and modeling studies, with particular emphasis on interpretation of the SCEC Crustal Motion Map, as well as modeling to optimize placement of future PBO instrumentation.
- o Develop methods for improved analysis and modeling of precise geodetic data such as continuous GPS data, interferometric SAR data, and airborne laser swath mapping data.

In addition to publication in a peer-reviewed forum expected of all USGS-funded research, results that improve our understanding of the crustal structure or deformation field should be contributed to the SCEC Community Modeling environment. Further information can be found at

<http://epicenter.usc.edu/cmeportal/cmodels.html>



**Attachment B**

**Application for Federal Assistance SF 424  
See Grants.Gov Template Package**

**Attachment C**

**Certifications for Federal Assistance  
See Grants.Gov Template Package**

**Attachment D**

**Assurances, SF 424 B  
See Grants.Gov Template Package**

## BUDGET SUMMARY <sup>1</sup>

Project Title: \_\_\_\_\_

Principal Investigator(s): \_\_\_\_\_

Proposed Start Date: \_\_\_\_\_

Proposed Completion Date: \_\_

<b>COST CATEGORY</b>	<b>Federal First Year</b>	<b>Federal Second Year<sup>2</sup></b>	<b>TOTAL Both years<sup>2</sup></b>
1. Salaries and Wages	\$	\$	\$
<b>Total Salaries and Wages</b>	\$	\$	
2. Fringe Benefits/Labor Overhead	\$	\$	\$
3. Equipment	\$	\$	\$
4. Supplies	\$	\$	\$
5. Services or Consultants	\$	\$	\$
6. Radiocarbon Dating Services	\$	\$	\$
7. Travel	\$	\$	\$
8. Publication Costs	\$	\$	\$
9. Other Direct Costs	\$	\$	\$
<b>10. Total Direct Costs (items 1-9)</b>	\$	\$	\$
11. Indirect cost/General and Administrative (G&A) cost	\$	\$	\$
12. Amount Proposed (items 10&11)	\$	\$	\$
<b>13. Total Project Cost (Total of Federal and non-Federal)</b>	\$	\$	\$

amounts)			
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<sup>1</sup> This form shows the format of the budget summary. Use this sheet for the Budget Summary, which precedes the detailed budget. The detailed budget must be keyed directly to the Budget Summary page.

<sup>2</sup> These Columns only for multi-year projects

### PROPOSAL INFORMATION SUMMARY

**You must submit a Proposal Information Summary with your proposal. Use the format below to provide the information in the order requested. Do not type on this page.**

1. Panel Designation: Use two or three letter code as listed in XII A
2. Project Title: If a collaborative proposal, the title of the proposal must appear as follows: **"Title of Proposal: Collaborative Research with First Institution Name, and Second Institution Name"**.
3. Principal Investigator(s): (Name)  
(Institute/Organization Name)  
(Street Address/P.O. Box)  
(City, State, Zip Code)  
  
(Telephone Number), (FAX Number), (E-mail Address)
4. Authorized Institutional Representative: (Name)  
(Institute/Organization Name)  
(Organizational Unit)  
(Street Address/P.O. Box)  
(City, State, Zip Code)  
  
(Telephone Number), (FAX Number), (E-mail Address)
6. Program Element Designation See Attachment A
7. Amount Requested: (List amount requested for Fiscal Year 2007 support)  
(Two year projects list requests for FY 2007 and 2008)
8. Proposed Start Date: (The date you would like to start work; between  
December 1, 2006 and September 1, 2007)
9. Proposed Duration: (12 or 24 months, No awards are issued for less  
than 12 months)
10. New Proposal (If submitting a proposal for renewed funding of a current  
USGS grant, indicate current USGS award number) and  
Renewed Funding (Title of Prior Year Proposal) **Such Proposals must  
Proposal is a continuation of: retain the same Title as the Previous Grant**
11. Active Earthquake-related (List project title and funding source for all active

awards)  
Research Grants, and Level  
of Support:

12. Has this proposal been submitted (List name of agency, and program or division to which  
to any other agency for funding, this proposal was submitted)  
if so, which?
13. Proposal Abstract (From this proposal on separate sheet)
14. Proposal Budget Summary (From this proposal on a separate sheet)

Attachment G

#### APPLICATION CHECKLIST

1. Is one **stapled original single-sided** application included with the original signed SF424?
2. Is **1 additional stapled double-sided** copy of this application enclosed with SF424 as each cover page? (See XI)
3. Is the original copy of the SF 424 signed and dated by an authorized representative of the applicant? (See XI A)
4. Is the following information entered properly on form SF 424?
  1. Panel Designation in the Applicant Identifier box to the left of the dash.
  2. Title in box 11. If this is a collaborative proposal, is it clearly identified as such in the title? The correct format is: **Proposal Title: Collaborative Research (Names of Institutions Involved)**.
5. Are the original copies of the Certifications signed by an authorized representative of the applicant and included with the original application only? (see XI B)
6. Have you limited the length of your application to 25 pages? (See XI)
7. Is your application assembled in the proper order? (See XI)
8. Is one copy of your organization's indirect cost rate agreement included with the **original** application only? (See XI F 10)
9. For collaborative proposals with a USGS/NEHRP internal project, is a letter of support from the internal USGS collaborator(s) attached?
10. Are continuation proposals submitted for renewal identified? (See Attachment F, line 10)
11. Are 8 copies of the NEHRP Proposal Information Summary (Attachment F), with the Abstract, and 1 page Budget Summary (Attachment E) included separately?

**Please note additional requirements pertaining to  
electronic submission via grants.gov**

QUESTIONS?

For Technical issues, contact:

External Research Grants  
703-648-6716  
FAX: 703-648-6716

For

Administrative issues, contact:  
Maggie Eastman, Contracting Officer  
703-648-7366  
FAX: 703-648-7901

**Special Terms and Conditions**

**1. Method of Payment**

The U.S. Geological Survey (USGS) is using the Department of Health and Human Services (DHHS) Payment Management System (PMS) to provide electronic invoicing and payment for assistance award recipients. The Recipient either must have or will establish an account with PMS. With the award of each grant/cooperative agreement, a sub-account will be set up from which the Recipient can draw down funds. The sub-account number will be shown in block 4 of the face page of each award or modification.

Payments will be made available through the PMS. The PMS is administered by the DHHS, Division of Payment Management of the Financial Management Service, Program Support Center. The DHHS will forward instructions for obtaining payments to the recipients. Inquiries regarding payment should be directed to:

Division of Payment Management  
Department of Health and Human Services  
P.O. Box 6021  
Rockville, MD 20852

The Division of Payment Management web address is [www.dpm.psc.gov](http://www.dpm.psc.gov). Problems or questions with electronic draw down procedures should be directed to Fran Odgers at (301) 443-2090.

Payments may be drawn in advance only as needed to meet immediate cash disbursement needs.

**2. Definitions**

**A. Grant Agreement**

A grant agreement is the legal instrument reflecting a relationship between the Federal Government and a State or local government or other recipient whenever:

- (1) the principal purpose of the relationship is the transfer of money, property, services, or

anything of value to the State or local government or other recipient in order to accomplish a public purpose of support or stimulation authorized by Federal statute, rather than acquisition, by purchase, lease, or barter, of property or services for the direct benefit or use of the Federal Government; and

- (2) no substantial involvement is anticipated between the executive agency, acting for the Federal Government, and the State or local government or other recipient during performance of the contemplated activity.

#### B. Cooperative Agreement

A cooperative agreement is the legal instrument reflecting a relationship between the Federal Government and a State or local government or other recipient whenever:

- (1) the principal purpose of the relationship is the transfer of money, property, services, or anything of value to the State or local government or other recipient to accomplish a public purpose of support, or stimulation authorized by Federal statute, rather than acquisition, by purchase, lease, or barter, of property or services for the direct benefit or use of the Federal Government; and
- (2) substantial involvement is anticipated between the executive agency, acting for the Federal Government, and State or local government or other recipient during performance of the activity.

#### C. Grantee / Cooperator

Grantee or cooperator means the nonprofit corporation or other legal entity to which a grant or cooperative agreement is awarded and which is accountable to the Federal Government for the use of the funds provided. The grantee or cooperator is the entire legal entity even if only a particular component of the entity is designated in the award document. For example, a grant or cooperative agreement award document may name as the grantee one school or campus of a university. In this case, the granting agency usually intends, or actually requires, that the named component assume primary or sole responsibility for administering the grant-assisted project or program. Nevertheless, the naming of a component of a legal entity as the grantee or cooperator in a grant or cooperative agreement award document shall not be construed as relieving the whole legal entity from accountability to the Federal Government for the use of the funds provided.

The term “grantee” or “cooperator” does not include secondary recipients such as sub grantees, contractors, etc., who may receive funds from a grantee pursuant to a grant.

#### D. Recipient

Recipient means grantee or cooperator.

#### E. Principal Investigator

The Principal Investigator is the individual designated by the Recipient (and approved by the USGS) who is responsible for the technical direction of the research project. The Principal Investigator cannot be changed or become substantially less involved than was indicated in the Recipient's proposal, without the prior written approval of the Contracting Officer.

F. Grants Program Manager

- (1) The Grants Program Manager will work closely with the Principal Investigator to ensure that all technical requirements are being met. The Grants Program Manager's responsibilities include, but are not limited to, providing technical advice on the accomplishment of the proposal's objectives; reviewing the technical content of reports and the other information delivered to the USGS; determining the adequacy of technical reports; and conducting site visits, in coordination with the Regional Coordinator and the Contracting Officer, as frequently as practicable.
- (2) The Grants Program Manager is Elizabeth Lemersal, External Research Grants Manager, U.S. Geological Survey, 905 National Center, 12201 Sunrise Valley Drive, Reston, VA 20192. The Grants Program Manager does not have the authority to issue any technical direction which constitutes an assignment of additional work outside the scope of the award; in any manner causes a change in the total cost or the time required for performance of the award; or change any of the terms, conditions, or general provisions of the award.

G. Regional Coordinator

- (1) Regional Coordinators are in charge of conducting the peer review panels to evaluate both internal USGS and external research proposals in their region or area of expertise. A Regional Coordinator will work closely with the Grants Program Manager and the Principal Investigator to ensure coordination with other appropriate Principal Investigators and appropriate USGS project scientists working in the same region for overall conformance with USGS program goals and objectives within that region. The Regional Coordinator's responsibilities include, but are not limited to, providing technical advice on the accomplishment of the proposal's objectives; reviewing the technical content of reports and other information delivered to the USGS; determining the adequacy of the technical reports; and conducting site visits, in coordination with the Grants Program Manager and contract personnel, as frequently as practicable.
- (2) The Regional Coordinator does not have the authority to issue any technical direction which constitutes an assignment of additional work outside the scope of the award; in any manner causes a change in the total cost or the time required for performance of the award; or changes any of the terms, conditions, or general provisions of the award.

H. Contracting Officer (CO)

Contracting officers are individuals who have been delegated in writing by the USGS Office of Acquisition and Grants as the sole authority designated to obligate Federal funds and create

terms and conditions of awards. They are the only individuals who have authority to negotiate, enter into, and administer awards resulting for this program. Contracting officers have responsibility to ensure the effective use of Federal funds.

Functions of the contracting officer include but are not limited to:

- (1) Issuing the grant program announcement in coordination with the grants program manager.
- (2) Receiving grant proposals and related documents in response to a grant program announcement. The contracting officer as receiving official shall mark all proposals with a control number and the date officially received. He shall notify each applicant of the receipt of its proposal.
- (3) Approving the grant program manager's Technical Evaluation Plan, which describes in detail the evaluation process for a competitive grant/cooperative agreement program. The contracting officer shall ensure the openness and fairness of the evaluation and selection process.
- (4) Serving in an advisory capacity at peer review panel meetings. He shall interpret grant management policies to panel members.
- (5) Notifying grant program applicants whether or not they were selected for funding or of any other disposition of their application.
- (6) Negotiating, as necessary, the final grant/cooperative agreement budget.
- (7) Issuing grant/cooperative agreement awards and revisions to awards.
- (8) Approving invoice payments.
- (9) Receiving all requests for changes to an award. The contracting officer shall serve as the mandatory control point for all official communications with the grantee which may result in changing the amount of the grant/cooperative agreement, the grant/cooperative agreement budget, or any other terms and conditions of the grant.
- (10) Receiving financial reports required by the terms and conditions of the award.
- (11) Closing out grant/cooperative agreement awards when all applicable award requirements have been complied with.

### **3. Dissemination of Results and Reporting Requirements**

The Principal Investigator is strongly encouraged to disseminate research results promptly to the scientific community and appropriate professional organizations; local, state, regional and federal



agencies; and the general public. The Government may publish, reproduce, and use all technical data developed as a result of this award in any manner and for any purpose, without limitation, and may authorize others to do the same.

Data generated as a part of work funded under this program is not subject to proprietary period of exclusive data access. Any data generated must be made available to the USGS as soon as it is available. The USGS reserves a royalty-free, nonexclusive and irrevocable license to reproduce, publish, or otherwise use, and to authorize others to use the data for Government purposes. Any project funded in whole or part with funds obtained under this program shall fall under this clause. The USGS Contracting Officer is the sole person to decide which data falls in this category should any question arise.

A. Required reports/documents. The Principal Investigator or Director, Sponsored Research Office is required to submit the following reports or documents:

<b>Report/ Document</b>	<b>No. of Copies and Method of Transmittal</b>	<b>Submit To</b>	<b>When Due</b>
(1) Publication*	3 reprints	Grants Program Manager	Immediately following publication. <b>See Section B(1) below.</b>
(2) Final Technical Report	1 unbound original plus 2 bound copies. Also, send Adobe Acrobat PDF file as an email attachment; Maximum size: 10MB	Grants Program Manager	Within 90 calendar days after the end of each 12-month budget period. <b>See details of formatting in section B(4) below.</b>
(3) SF 272 Federal Cash Transactions Report	Original + 1	Contracting Officer	Required quarterly of each PMS sub- account. Quarterly reports are due 15 working days after the end of each awardees fiscal quarter.
(4) SF 269 Financial Status Report	Original + 1	Contracting Officer	Required annually and is due 30 calendar days after the end of the annual budget period.
(5) Final SF 269 Financial Status Report	Original + 1	Contracting Officer	The recipient will liquidate all obligations incurred under the award and submit a final SF 269 no later

			than 90 calendar days after the grant agreement completion date. Recipient will promptly return any unused federal cash advances or will complete a final draw from PMS to obtain any remaining amounts due.
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\* Publication means any book, report, photograph, map, chart, or recording published or disseminated to the scientific community. Preprints of articles submitted for publications may be accepted as final reports.

B. **Report preparation instructions.** The Recipient shall prepare the reports/documents in accordance with the following instructions:

**Note: Paper copies of all Summaries and Technical Reports should be submitted on paper containing at least 50% recycled waste paper materials.**

(1) **Publications.** All publications that contain work performed during the project period shall include the following statements:

“Research supported by the U.S. Geological Survey (USGS), Department of the Interior, under USGS award number (*Recipient, insert award number*). The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.”

(2) **Final Technical Report.**

Final Technical Reports shall describe in detail the work performed and results obtained during the grant period. Final Technical Reports are due 90 days after the conclusion of the project period.

(a) Prepare the Final Technical Report as an Adobe Acrobat PDF file with all figures, photographs, maps, and illustrations embedded. Submit the report in both hard copy and via email (10 MB maximum size). Send all hard copies and electric formatted media to:

**External Research-Annual/Final Report**  
 U.S. Geological Survey  
 905A National Center  
 12201 Sunrise Valley Drive  
 Reston, VA 20192.

Send electronic files as follows:

Email attachments: [gd-erp-coordinator@usgs.gov](mailto:gd-erp-coordinator@usgs.gov)

(b) The original copy of the report shall be unbound.

(c) Final Technical reports shall consist of the following sections:

- (1) **Cover page** with the following information:
  - Award Number
  - Title. For collaborative projects the title should be in the form "Title: Collaborative Research with First Institution name, and Second Institution name."
  - Author and Affiliation with Address and zip code
  - Author's Telephone numbers, fax numbers and E-mail address.
  - Term cover by the award (start and end dates)
- (2) **Abstract**
- (3) **Main body of the report.** The main body of the report shall be single-spaced on 8 ½" x 11" paper. The main body of the report shall be printed double-sided, including figures and bibliography (see 2.B.(5)(d) below). Oversized (larger than 8 ½" x 11") pages shall be placed in a pocket at the end of the report; not collated or bound with the report. Oversized pages should be used only if they are critical to convey data or conclusions. Electronic versions of oversized illustrations are also required to be sent with the electronic version of reports.
- (4) **Bibliography** of all publications resulting from the work performed during each 12-month period and at the conclusion of the project. Copies of publications are required if the Recipient has not previously submitted them to the Grants Program Manager.

#### **Financial Reporting**

- (3) **SF 272, Federal Cash Transactions Report** is required quarterly for each PMS sub-account. Quarterly reports are due 15 working days after the end of each fiscal quarter and will be submitted to the Contracting Officer, unless otherwise instructed.
  - (4) **SF 269, Financial Status Report.** The standard form 269 is required annually and is due 30 calendar days after the end of the annual budget period and will be submitted to the Contracting Officer. Instructions are on the back of the SF 269.
  - (5) **Final SF 269, Financial Status Report.** The recipient will liquidate all obligations incurred under the award and submit a final SF 269 Financial Status Report due no later than 90 calendar days after the grant completion date and will be submitted to the Contracting Officer. Recipient will promptly return any unused federal cash advances or will complete a final draw from PMS to obtain any remaining amounts due. This report is subject to audit.
- C. **Adherence to reporting requirements. A Recipient's failure to submit the required reports/documents, in a timely manner, may result in the withholding of payment, in termination of the award, or in delay or non-issuance of a new award.**

#### **4. Adherence to Original Research Objective and Budget Estimate**

- A. Any commitments or expenditures incurred by the Recipient in excess of the funds provided by this award shall be the responsibility of the Recipient. Expenditures incurred prior to the effective date of this award cannot be charged against award funds unless provided for in this award.
- B. The following requests for change **require advance written approval by the Contracting**

**Officer shown on your award. Your request must be submitted to the Contracting Officer at least 45 calendar days prior to the requested effective date of the change:**

- (1) Changes in the scope, objective, or key personnel referenced in the Recipient's proposal.
  - (2) Request for supplemental funds.
  - (3) Transfer of funds between direct cost categories when the cumulative amount of transfers during the project period exceeds 10 percent of the total award.
  - (4) Foreign travel not approved at time of award.
  - (5) Acquisition of nonexpendable personal property (equipment) not approved at time of award.
  - (6) Creation of any direct cost line item not approved at time of award.
  - (7) Any other significant change to the award.
  - (8) No-cost Extensions to the Project Period. **No cost extensions are discouraged.** The Earthquake Hazards Program (EHP) awards grants and cooperative agreements for research that extends or supplements ongoing research within the Geological Survey. The timely conduct of funded projects is of great importance to the achievement of EHP goals. Applicants should consider their time commitments at the time of application for a grant. Requests for no cost extensions will be considered on a case-by-case basis. The USGS reserves the right to limit the length of time and number of no-cost extensions. Please note that no-cost extensions are not intended to be used merely for the purpose of expending unobligated balances. Applicants must supply documentation supporting their request for an extension.  
The Recipient **shall include** in the request the cause of the needed extension, a description of the remaining work to be completed, the proposed date of completion, the amount of funds remaining, and a revised budget for the remaining funds. If all funds have been disbursed to the Recipient, this must be indicated in the request. A request for an extension that is received by the Contracting Officer after the expiration date shall **not** be honored. Requests for no-cost extensions shall be submitted to the Contracting Officer **at least 45 days** before the grant end date.
- C. The Contracting Officer will notify the Recipient in writing within 30 calendar days after receipt of the request for revision or adjustment whether the request has been approved.

##### **5. Nonexpendable Personal Property**

Title to nonexpendable personal property acquired wholly or in part with Federal funds shall be vested in the Recipient unless otherwise specified in the award document. The Recipient shall retain control and maintain a property inventory of such property as long as there is a need for such property to accomplish the purpose of the project, whether or not the project continues to be supported by Federal funds. When there is no longer a need for such property to accomplish the

purpose of the project, the Recipient shall use the property in connection with other Federal awards the Recipient has received. Under no circumstances shall title to such property be vested in a sub-tier recipient. Disposal of nonexpendable personal property shall be in accordance with the applicable OMB circular.

**6. Record Retention Period**

Unless a longer period is requested by the award, a Recipient shall retain all records for 3 years after the end of the project period for which it uses USGS award funds.

**7. Pre-agreement Costs**

Pre-agreement costs are not authorized under this program. Costs must be obligated during the project period.

**8. Site Visits**

Site visits may be made by U.S. Geological Survey representatives to review program accomplishments and management control systems and to provide technical assistance, as required.

**9. Metric Conversion Requirements**

All progress and final reports, other reports, or publications produced under this award shall employ the metric system of measurements to the maximum extent practicable. However, the recipient may use non-metric measurements to the extent the recipient has supporting documentation that the use of metric measurements is impracticable or is likely to cause significant inefficiencies or loss of markets to the recipient, such as when foreign competitors are producing competing products in non-metric units.

**10. Violation of Award Terms**

If a Recipient materially fails to comply with the terms of the award, the Contracting Officer may suspend, terminate, or take such other remedies as may be legally available and appropriate in the circumstances.

**11. Award Closeout**

Awards will be closed out once all requirements have been met. Technical and financial reports must be submitted on time as specified in Item 2 of these Special Terms and Conditions. Failure to adhere to the reporting requirements may result in the non-payment of your final award invoice or in other adverse action.

**12. Partnership with Grantees/Cooperators**

The U.S. Geological Survey, through its federal grant/cooperative agreement awards, will collaborate with universities, federal state, local and tribal governments, and private organizations and businesses to provide relevant, timely, objective knowledge and information on natural resources, hazards, and the environment.

**13. Buy American Act Requirements**

**Notice:** Pursuant to Section 307(b) of the Department of the Interior (DOI) and Related Agencies Appropriations Act, FY 2000, Public Law 106-113, please be advised on the following:

In the case of any equipment or product that may be authorized to be purchased with financial assistance provided using funds made available in FY 2000 and thereafter, it is the sense of the Congress that entities receiving the assistance should, in expending the assistance, purchase only American-made equipment and products.

**14. Anti-Lobbying Requirements**

Recipient shall not use any part of the Department of the Interior funds provided hereunder for any activity or the publication or distribution of literature that in any way tends to promote public support or opposition to any legislative proposal on which Congressional action is not complete.

**15. Seat Belt Provision**

Recipient of grants/cooperative agreements and/or sub-awards are encouraged to adopt and enforce on-the-job seat belt use policies and programs for their employees when operating company-owned, rented, or personally owned vehicles. These measures include, but are not limited to, conducting education, awareness, and other appropriated programs for their employees about the importance of wearing seat belts and the consequences of not wearing them.

**16. Endorsement Provision**

Recipient shall not publicize or otherwise circulate, promotional material (such as advertisements, sales brochures, press releases, speeches, still and motion pictures, articles, manuscripts or other publications) which states or implies governmental, Departmental, bureau, or government employee endorsement of product, services, or position which the recipient represents. No release of information relating to this award may state or imply that the Government approves of the recipient's work products, or considers the recipient's work product to be superior to other products or services.

**End of Special Terms and Conditions**

## GENERAL PROVISIONS

The Recipient shall be subject to the following OMB circulars/regulations, as amended, which are incorporated herein by reference:

1. Educational Institutions
  - A. OMB Circular A-21, Cost Principles for Educational Institutions.
  - B. OMB Circular A-110, Uniform Administrative Requirements for Grants and other Agreements with Institutions of Higher Education, Hospitals and Other Non-Profit Organizations.
  - C. OMB Circular A-133, Audits of States, Local Governments, and Non-Profit Organizations.
2. State and Local Governments
  - A. OMB Circular A-87, Cost Principles for State, Local and Indian Tribal Governments.
  - B. OMB Circular A-102, Grants and Cooperative Agreements With State and Local Governments.
  - C. OMB Circular A-133, Audits of States, Local Governments, and Non-Profit Organizations.
3. Nonprofit Organizations
  - A. OMB Circular A-110, Uniform Administrative Requirements for Grants and other Agreements with Institutions of Higher Education, Hospitals and Other Non-Profit Organizations.
  - B. OMB Circular A-122, Cost Principles for Nonprofit Organizations.
  - C. OMB Circular A-133, Audits of States, Local Governments, and Non-Profit Organizations.
4. Profit-Making Organizations
  - A. General administrative requirements will be in accordance with the Federal Acquisition Regulations (FAR), subchapter E, parts 28, 29, and 30.
  - B. Principles for determining the allowability of cost will be in accordance with the FAR, subchapter E, part 31.2.
5. Patents--Small Businesses and Nonprofit Organizations

Subject to the provisions set forth in 37 CFR 401 and 35 U.S.C. 203, a Recipient may retain the entire right, title, and interest throughout the world to each subject invention. With respect to any subject invention in which the Recipient retains title, the Federal Government will have a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the subject invention throughout the world.
6. Code of Federal Regulations (CFR)
  - A. 2 CFR Part 215 (new location for OMB A-110 Uniform Administrative Requirements for Grants and other Agreements with Institutions of Higher Education, Hospitals and Other Non-Profit Organizations)
  - B. 43 CFR Part 12, Subpart A: Admin, Audit and Cost Principles
  - C. 43 CFR Part 12, Subpart D: Government Debarment and Suspension (Nonprocurement) and Government wide Requirements for Drug Free Workplace.
  - D. 43 CFR Part 12, Subpart E: Buy American Requirements for Assistance Programs
  - E. 43 CFR Part 12, Subpart F: Admin – Higher Education Hospitals, and Other Non-Profit Organizations
  - F. 43 CFR Part 17, Subpart A: Nondiscrimination of the Basis of Race, Color, or National Origin.
  - G. 43 CFR Part 17, Subpart B: Nondiscrimination of the Basis of Handicap.
  - H. 43 CFR Part 17, Subpart C: Nondiscrimination of the Basis of Age.
  - I. 43 CFR Part 18, Lobbying