



A collaboration of **The University of California at Santa Barbara,**  
**The University of Southern California** and  
**Brigham Young University**

**nees@UCSB**

The George E. Brown, Jr. Network for Earthquake Engineering Simulation

## **Research Proposal Guidelines**

**NEES@UCSB**

A Collaboration of

Brigham Young University

The University of California at Santa Barbara

The University of Southern California

Revision 1.0

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## Overview

The NEES@UCSB equipment site provides two permanently instrumented field laboratories for the study of soil-foundation-structure-interaction (SFSI), liquefaction, and ground deformation. Leveraging previous capital investments at existing, well-studied, and well-characterized seismic array sites, NEES@UCSB has enhanced two sites in southern California; the Wildlife Liquefaction Array (WLA) and the Garner Valley Downhole Array (GVDA). These enhanced sites are available for both active and passive experiments, including a reconfigurable SFSI test structure with shaker and structural instrumentation at the GVDA site.

## General Applications of NEES@UCSB

Permanently instrumented field sites for the study of SFSI and soil failure address one of the identified research needs for earthquake engineering equipment sites. There is need to further study SFSI in real structures under seismic input, but there are always complexities with real structures that can mask understanding of the SFSI phenomena. Study of soil failure is also complicated in urban or geologically-complex settings. Simple, well-characterized test sites are needed to increase understanding of the physics behind SFSI and soil failure in earthquakes. The NEES@UCSB program adds a unique pair of permanently instrumented sites that address these research needs.

The WLA site provides a test facility for active and passive measurement of soil response and soil failure under dynamic loading. The GVDA site provides a simple site with a simple reconfigurable instrumented steel framed structure for active and passive study of SFSI and soil response. The two field sites will provide research opportunities for those developing tools for site characterization and for the evaluation of soil properties and how they change with time during and after seismic disturbance. Students and educators will be able to participate in the active experiments through teleparticipation as well as on-site workshops and multi-disciplinary experiments and demonstrations.

An example of a field experiment conducted at the GVDA site in August 2004 and associated outreach can be found at the following web site [hank – add link here to project page and news articles. In fact we should have links to the news articles on the project page for the field experiment. I noticed the UCR in the news articles, but not the newspaper articles. The EERI newsletter page should go here too. Remind me to get you my power point presentation from the FALL 2004 AGU meeting. ]

Other considerations for potential users:

- Researchers proposing to use the NEES@UCSB field sites must familiarize themselves with all of the documentation available at the Site Specifications Database (<http://http://www.nacse.org/neesSiteSpecs>) in order to fully understand the capabilities and resources available at UCSB and the remote field sites. In particular, documentation that describes the available instrumentation and data acquisition systems, its operations, functionality, and specifications are available.
- Documentation regarding the University of California policies on safety, risk management, scheduling guidelines, site usage policies, and field safety guidelines must be reviewed prior to working at NEES@UCSB sites. These documents can be found on the site specifications database or can be obtained by contacting the site operations manager.

- Potential researchers should see the frequently asked question section available on line at the nees.ucsb.edu website. Many of the questions that potential users of the sites have when proposing to use the sites are addressed in this FAQ:  
[http://nees.ucsb.edu/pre/about\\_sfsi/faq](http://nees.ucsb.edu/pre/about_sfsi/faq) .

## **Available Resources**

### **Field Laboratory Resources**

#### **Computing Resources**

Local computing resources are available for personal/direct use at the UCSB campus. These systems run seismic tools, such as Antelope, PASSCAL and SCEC, and office productivity software such as MS Word, Excel and Powerpoint. They include:

- Sun Blade 150 running Solaris 9, with integrated PC running Windows2000
- Sony Viao Laptop running Windows 2000 and Linux

These systems are able to run modest sized programs and provide a software development in C, Perl and Java.

You will need to access other systems occasionally to run utility programs NEESgrid, and various other systems are available, although they are primarily dedicated to data acquisition.

You must agree to the local Institute for Crustal Studies “Computing Policies” as well as the “University of California Electronic Communications Policy” in order to apply for an account on the local systems:

- <http://www.crustal.ucsb.edu/ics/services/policies>
- <http://www.ucop.edu/ucophome/policies/ec>

Grid computing systems are available through the NEESit support infrastructure of the San Diego Supercomputer Center. Separate from the resource sharing “grid infrastructure,” grid computing services take the place of single supercomputer resources allowing processing intensive applications to scale as necessary.

#### **NEESgrid Resources**

The collaboration environment requires that you obtain a security certificate that validates your identity through a public key. You do this by logging into the NEESpop server and running the “RequestCert” script. The script automatically generates a “Globus” certificate request and forwards it to the NEESit in San Diego. Once the application has been approved, you will receive a certificate that you must place on all the systems within the NEESgrid that you intend to use, including shared system experiments. The Globus certificate is, so to speak, your ticket to the shared computing resources of the NEESgrid.

## **NSF and Consortium Requirements**

### **Viewing and Collecting Data**

Various real time and archival viewing and evaluation tools are available to monitor seismic waveform data as well as SFSI motion/deformation.

### **Data and Metadata Requirements**

A major goal of the NEESgrid collaborative effort is the data and metadata repositories. These provide all collaborators access to the results and specifications of all experiments conducted at NEES equipment sites. As the body of experiment data grows the repository will become extremely valuable as a basis for simulation development and testing.

For this reason, the NEES Consortium requires complete metadata descriptions for experiments. Fortunately, these are “Permanent” field sites and most of the experiment variables remain constant. One major exception is the bracing on the SFSI structure. Borehole soil samples, while a permanent metadata may not accurately measure seasonal variations in the water table and liquid saturation of the soil.

Details for using the Metadata Browser and other tools are provided elsewhere. Researchers at UCSB or your peer review committee may suggest methods to insure more complete metadata results. These may require extensions to the Metadata model.

### **Publishing and Sharing Results**

As mentioned, all data (seismic waveforms, etc.) and metadata will eventually be uploaded to the NEESgrid, system-wide, repository. The regulations of the Data/Metadata Committee of the NEES Consortium require that all results – intermediate, final, published or unpublished – be available through the data and metadata repositories within two years of the completion of the funding period or the formal publication of results. This requirement leaves little room for undetermined equipment operation.

The staff of NEES@UCSB are dedicated to the success of your research experiment and look forward to working with.

### **Educational and Outreach Component**

Researchers are asked to consider how their experiments or results can be used to further this outreach effort. For example, the 2004 Joint USGS – University of Texas – UCSB experiment provided an opportunity for local high school students to [TODO: complete]