



## **ANNUAL REPORT FOR AWARD # 0331241**

Scott W Tinker ; *U of Texas Austin*

Support for the Curation of Academic Research Cores, Samples, and Collections in the Geosciences

### **Participant Individuals:**

CoPrincipal Investigator(s) : Shirley P Dutton

Other -- specify(s) : Beverly DeJarnett; Laura Zahm

Technician, programmer(s) : John Els; Randy McDonald

Other -- specify(s) : Darrell Haynes; Marcus Hafford; David Jordan

### **Participants' Detail**

### **Partner Organizations:**

### **Other collaborators:**

We have worked closely with the SAMPLES Working Group (Sample Archive and Management PLanning for the Earth Sciences).

We have interacted extensively with Steven Goldstein of Lamont-Doherty Earth Observatory of Columbia University. The need for a facility to archive and distribute important terrestrial petrology-geochemistry and structural geology samples was recognized at the GERM (Geochemical Earth Reference Model) meeting in La Jolla, California in March 2001 and by the SAMPLES Working Group (Sample Archive and Management PLanning for the Earth Sciences) at the Workshop on Cyberinfrastructure (CI) for the Integrated Solid Earth Sciences (ISES) held in Lawrence, Kansas in March 2003. Dr. Goldstein, as head of the SAMPLES group, has been actively involved with the HRC project this year to insure that the HRC meets the needs of the hard-rock academic research community for storage and curation. Dr. Goldstein is co-Principal Investigator of the proposal 'Facility Support: Curation of Academic Research Cores, Samples, and Collections in the Geosciences,' which was submitted to NSF in 2005 for continuing support for curation at the HRC of material procured by research projects funded through the NSF Division of Earth Sciences (NSF/EAR).

Dr. Kirsten Lehnert of Lamont-Doherty Earth Observatory of Columbia University has interacted with our curators and database manager and offered suggestions for insuring compatibility of the HRC sample database with the geoscience cyberinfrastructure systems currently being developed. She has kept the Bureau informed about the Solid Earth SAMple Registry (SESAR) project and has sought input from the HRC curators in designing the system for unique identification of geoscience samples.

Greg Anderson (PBO Data Products Manager at UNAVCO) contacted the HRC about the possibility of storing cores collected for the Plate Boundary Observatory (PBO) component of EarthScope at the HRC. The PBO

project will drill and core about 150 boreholes to depths of 200-300 m in the western U.S. and Canada. UNAVCO has agreed to store all its borehole strainmeter cores at the HRC, and the first cores should arrive during summer 2005.

Dr. Gerta Keller at Princeton University is sending a core across the K/T boundary from the Brazos River site to the HRC for curation. The core will arrive at HRC on May 27, 2005.

We have had contact with Dennis Nielson (University of Utah) about the future needs of the DOSECC program for core storage and curation. We have also been in contact with Mitchell Lyle of the Center for Geophysical Investigation of the Shallow Subsurface at Boise State University about the Deep-Time Geosystems initiative. This potential new program would include extensive continental coring and could recover five to six 1,000-m cores per year.

## **Activities and findings:**

### **Research and Education Activities:**

We have established space within the Bureau of Economic Geology's Houston Research Center (HRC) for storage and curation of terrestrial scientific cores, rock samples, and collections acquired by NSF-funded research projects. The HRC curates this material and facilitates continued access to, and use of, the material by researchers in the academic community. Geological curators, core handlers, and a database manager are responsible for storing and curating cores and other samples, responding to requests by researchers for samples, assisting visiting researchers at the facility, and maintaining metadata associated with the samples in a database compatible with geoscience cyberinfrastructure systems. The HRC was staffed this year by two on-site geologist/curators and three full-time core handlers; the facility is open from 8 a.m. to 5 p.m. Monday through Friday. Researchers can find information at the following Web site: <http://www.beg.utexas.edu/crc/houston.htm>, under the heading NSF Cores and Samples.

Principle investigators of two NSF-funded research programs have arranged to send cores to the HRC this summer. Dr. Gerta Keller at Princeton University is sending a 100-m core that crosses the K/T boundary from the Brazos River site; the core will arrive at HRC on May 27, 2005. Greg Anderson (PBO Data Products Manager at UNAVCO) will send cores collected for the Plate Boundary Observatory (PBO) component of EarthScope to the HRC. The PBO project will drill and core about 150 boreholes for strainmeters to depths of 200-300 m in the western U.S. and Canada. UNAVCO has agreed to store all its cores at the HRC, and the first cores should arrive during summer 2005.

We have acquired equipment needed by visiting researchers for examining and sampling materials stored at the HRC. Two high-quality petrographic microscopes and five binocular microscopes are available for use. A digital camera has been also been purchased for use by visiting scientists. A slab saw, two trim saws, a rock splitter, and a rock crusher are now operational, and a saw room was refurbished, plumbed, and wired for electricity. The geoscience and petroleum engineering library that was donated last year has been set up in the

HRC. The donation includes books, journals, monographs, maps, and State and Federal geological reports primarily in the areas of geology, geochemistry, geophysics, and petroleum engineering. The library is open to the public on Monday through Friday, 8 am-5pm; researchers and students visiting the HRC are currently benefiting from the availability of this resource, valued at nearly \$5 million.

September 2004 - B. Blakeney DeJarnett presented the talk 'The Bureau of Economic Geology, University of Texas at Austin Core and Sample Repositories' at the 5th Annual International Meeting of Data Repositories, Washington D. C.

Major educational activities of the project this year were the following:

September, 2004 - S. P. Dutton presented the talk 'The University of Texas Bureau of Economic Geology Houston Research Center' at the Curators of Marine and Lacustrine Geological Samples meeting, Lamont-Doherty Earth Observatory, Palisades, New York.

October 2004, March 2005, and April 2005 - University of Houston and Halliburton held short courses and core workshops at the HRC.

January, 2005 - S. P. Dutton presented the talk 'Bureau of Economic Geology-Houston Research Center' at NSF Workshop 'Designing Interoperability for Sample-Based Data Management via the International GeoSample Number IGSN,' La Jolla, California.

March, 2005 - Louisiana State University researchers visited the HRC to view cores

### **Findings:**

The goal of this project is to provide a facility for the preservation and curation of cores, samples, and collections that result from NSF-funded research. Contacts with members of the academic community confirm the need for such a facility, comparable to those in place at Texas A&M University for marine sediment cores from the Ocean Drilling Program (ODP) and at the University of Minnesota Limnological Research Center (LacCore) for lacustrine sediment cores. The public preservation of terrestrial cores and samples will make them available for later research studies beyond the projects that originally collected the material.

An Advisory Committee consisting of four to six members of the academic community is currently being established to review operations and policies and advise the Bureau on NSF-curation activities at the HRC. The Advisory Committee will guide policy for NSF core acquisition and deacquisition and sampling of the cores.

Contacts with the research community indicate that the main equipment needs for the facility are saws and pluggers for collecting samples, petrographic and binocular microscopes for core and sample examination, and digital cameras for core and thin-section photography. Shelving will have to allow for flexibility in storage because the cores and samples are not uniform in size and shape.

Development of a database that is compatible with the current

initiatives in Geoinformatics is essential. The database is a web-based curation-information system that includes essential metadata associated with the cores and samples. HRC curators have closely followed the current efforts underway in the academic community to create unique sample identifications for materials stored at the HRC (SESAR).

#### **Training and Development:**

Training and development meetings held at the HRC include the following:

##### **August 2004**

Drilling Engineers Association Annual Meeting  
University of Kansas/Kansas Geological Survey meeting  
PTTC workshop

##### **September 2004**

Eight different oil and gas companies utilized facility to view cores  
Geophysical short course for geoscientists (led by Dr. R. Hardage)  
Gulf Coast Carbon Center meeting

##### **October 2004**

Gulf Coast Carbon Center workshop  
DOE-sponsored workshop for CO2 sequestration  
ConocoPhillips core workshop  
University of Houston and Halliburton short course and core workshop

##### **November 2004**

Houston Energy Council Meeting  
American Association of Petroleum Geologists Technical Planning Committee meeting  
Anadarko Petroleum Corp. core workshop

##### **December 2004**

Halliburton short course  
ConocoPhillips core workshop  
UNAVCO visits as part of NSF initiative to curate cores from Earthscope PBO project  
Petroleum Technology Transfer Council Seminar

##### **January 2005**

Baker Energy holds 3-week training for ExxonMobil and Pride Energy  
Gulf Coast Carbon Center - 2 workshops  
AAPG Technical Planning Committee meeting for 2006 AAPG convention

##### **February 2005**

Houston Geological Society all day short course (100 attendees)  
BEG Deep Shelf Gas Consortium meeting  
BEG ILRIS consortium meeting

##### **March 2005**

AAPG Technical Planning Committee meeting for AAPG 2006 Convention  
Petroleum Technology Transfer Council seminar  
University of Houston-Halliburton core workshop  
Gulf Coast Section-SEPM meeting  
Louisiana State University researchers visit to view cores

April 2005

PEICE one-week long geological short course  
ConocoPhillips New Hire Training  
ConocoPhillips core workshop  
University of Houston and Halliburton core workshop

May 2005

Carbon Trading Credit Forum (95 attendees)  
SEPM Planning Committee for 2006 AAPG  
Halliburton core workshop

Number of participants in above events (as of 5-05)  
Approximately 2550

#### **Outreach Activities:**

February 2005 - B. DeJarnett spoke to all of 3rd grade (120 students) at Coulson Tough K-6, The Woodlands, TX on 'The Importance of Geology and Earth Science in our Everyday Lives'

February 2005 - Laura Zahm spoke to several preschools on Earth Science, Fossils, and Dinosaurs

March 2005 - B. DeJarnett spoke to all of 5th grade (150 students) at Coulson Tough K-6, The Woodlands, TX on 'The Importance of Geology and Earth Science in our Everyday Lives'

Numerous tours of the HRC to geoscientists visiting the facility for training or research

#### **Journal Publications:**

DeJarnett, B. B. and Zahm, L. C., "Cores and cuttings: an extraordinary resource (abs)", *American Association of Petroleum Geologists Annual Convention Abstracts Volume*, vol. v. 13, (2004), p. p. A15. Published

Zahm, L. C., and DeJarnett, B. B., "Dramatic carbonate reservoir facies illustrated in cores from the Bureau of Economic Geology's teaching collection (abs.)", *American Association of Petroleum Geologists Annual Convention Abstracts Volume*, vol. 13, (2004), p. A153. Published

Berman, A. E., "The Bureau of Economic Geology: An Interview with Director Scott Tinker and Staff and a New Houston Research Center", *Houston Geological Society Bulletin*, vol. , (2004), p. 37. Published

Blakeney DeJarnett, B. and L. C. Zahm, "World-Class Public Core, Cuttings and Sample Facility right here in Houston, Texas", *Houston Geological Society Bulletin*, vol. , (2003), p. 39. Published

Fisher Mallick, J., Blakeney DeJarnett, B., and Zahm, L. C., "Big rocks found in Houston", *Houston Geological Society Bulletin*, vol. 47, 11, (2004), p. 66. Published

#### **Book(s) of other one-time publications(s):**

#### **Other Specific Products:**

#### **Web site access**

[https://www.fastlane.nsf.gov/cgi-bin/NSF\\_PrjRpt?@@@\\_\\_229\\_\\_NUicw3jOPUhhb%3AI%3ArCWQ5...](https://www.fastlane.nsf.gov/cgi-bin/NSF_PrjRpt?@@@__229__NUicw3jOPUhhb%3AI%3ArCWQ5...) 8/1/2005

The NSF Workshop on Curation of Terrestrial Scientific Cores, Samples, and Collections is summarized at:

<http://www.beg.utexas.edu/crc/nsf-workshop.htm>. Copies of the PowerPoint presentations given at the workshop can be accessed from this page.

Visitors to the Bureau web site can link to NSF workshop information through the Houston Research Center home page.

## **Technical Presentations**

### **Technical Presentations**

September, 2004 - Invited speaker - B. Blakeney DeJarnett: ?The Bureau of Economic Geology, University of Texas at Austin Core and Sample Repositories? ? presented to 5th International Meeting, National Geoscience Data Repositories, USGS, Reston, Virginia.

September, 2004 ? Invited Speaker ? S. P. Dutton: ?The University of Texas Bureau of Economic Geology Houston Research Center:? presented to Curators of Marine and Lacustrine Geological Samples, Lamont-Doherty Earth Observatory, Palisades, New York.

January, 2005 ? Invited Speaker ? S. P. Dutton: ?Bureau of Economic Geology?Houston Research Center:? presented at NSF Workshop ?Designing Interoperability for Sample-Based Data Management via the International GeoSample Number IGSN,? La Jolla, California.

## **Internet Dissemination:**

<http://www.beg.utexas.edu/crc/houston.htm>

Information about the availability of space at the HRC for storage and curation of terrestrial cores, samples, and other collections is given at this site.

The Web site will be extensively expanded this summer.

## **Contributions:**

### **Contributions within Discipline:**

To the development of the principal discipline(s) of the project?

The facility at the HRC for storage and curation of terrestrial scientific cores, rock samples, and collections acquired by NSF-funded research projects will become a key resource for researchers in the Earth Sciences. As a result of the project, invaluable geologic samples can be professionally preserved and made accessible to the academic community.

Acquisition of terrestrial cores, rock samples, and fossils is critical for conducting much of the geologic research supported by the NSF Division of Earth Sciences (NSF/EAR). Because of the volume

involved, long-term storage, preservation, and curation of these materials are beyond the resources of most NSF/EAR-funded academic researchers. Most researchers have a place where cores, samples, and fossils can be accessed during the initial stages of research and sampling but lack an adequate facility where these materials can be permanently preserved, accessed, and sampled/resampled as needed by the wider academic community. This project establishes a facility for the permanent storage and curation of terrestrial rock cores, samples, and paleontologic collections acquired during NSF/EAR-funded research for continental-based projects.

It has been recognized on the national level that this is a legacy in peril and that a system needs to be instituted in order to preserve terrestrial samples and cores and make them easily accessible to researchers, in a manner similar to the way deep sea cores are stored and distributed. In 2002, the National Research Council published a report titled *Geoscience Data and Collections: National Resources in Peril*. The report documents the types and volumes of geologic materials that are at risk of being lost because of lack of space and resources to store and curate them. The report concluded that valuable geoscience data and collections may be lost through mismanagement, neglect, or outright disposal unless immediate action is taken. As a follow-up to the NRC Report, NSF sponsored a workshop in which the academic research community addressed the issues of long-term storage and curation of valuable scientific research materials. The workshop 'Preservation of Geoscience Research Cores and Collections: The View from Academic Researchers' was held in Bloomington, Indiana in January 2003 and chaired by Dr. Christopher Maples. The goals of the workshop were to (1) evaluate need of the academic community for storage space for geoscience research cores and collections and (2) propose a solution, so that those data and collections could be maintained and be easily accessible to the academic community (Maples, 2004). Of particular concern are cores and samples that were acquired at great expense, require a significant amount of space to store, and may be difficult or impossible to reacquire if lost. A specific recommendation from the workshop was that NSF support a facility that can accommodate the storage of terrestrial cores, rock samples, and paleontologic collections that were procured during NSF/EAR-funded academic research projects (Maples, 2004).

The need for a facility to archive and distribute important terrestrial samples for the academic research community was independently recognized and forwarded by the geochemistry community at the GERM (Geochemical Earth Reference Model) Meeting in La Jolla, California in March 2001 (Goldstein and Melson, 2001) and by the broader Solid Earth Science community at the Workshop on Cyberinfrastructure for the Integrated Solid Earth Sciences (ISES-CI) held in Lawrence, Kansas in March 2003. Both of these groups are supported by NSF/EAR. The ISES-CI workshop formed the SAMPLES Working Group (Sample Archive and Management PLanning for the Earth Sciences) with the mandate to explore the options to save precious samples and to make them readily available to researchers (c.f. section by Goldstein and Kimberley in the ISES-CI Report: Walker and Carlson, 2003). As summarized by the report of the SAMPLES working group, there is a need to develop a systematic approach to archiving and distributing important terrestrial petrology-geochemistry and structural geology samples.

Archived samples must be accompanied by metadata and be accessible to

the research community through a database compatible with emerging GeoInformatics and cyberinfrastructure protocols. As part of proposals to NSF/EAR, researchers must state their plans for permanent storage of samples, cores, and other data collected during the project within a short time frame of the end of the project (see NSF Division of Earth Sciences Guidelines for Geoscience Data and Collections Preservation and Distribution, 2002). In the developing Geosciences Cyberinfrastructure, information about the location and condition of samples should be linked to sample-based data and information systems.

The geologic core-storage and research facility operated by the Bureau of Economic Geology in Houston, Texas fills an important need of the Earth science community. The HRC has dedicated space to curate terrestrial cores and samples and facilitate continued access to, and use of, the material. The HRC provides a means to implement the NSF/EAR guidelines in a way that will allow the entire research community to access important information about the samples as well as the samples themselves.

### **Contributions to Other Disciplines:**

The rock materials curated at the HRC are likely to be useful data sources for other fields of science and engineering. For example, samples of sedimentary rocks may be used by climate modelers to gather data on earth conditions through time. Cores from shallow boreholes may be of particular use to civil engineers, such as the cores to be collected in a large area of the western U.S. and Canada for the Plate Boundary Observatory (about 150 boreholes to depths of 200-300 m).

### **Contributions to Education and Human Resources:**

Field trips and opportunities to see and touch rocks are popular educational activities that can lead K-12 students to consider earth science as a career. Outreach activities provide all students with a better understanding of the importance of earth science to society. The two geologists at the HRC have visited several schools this year to talk about the importance of geology in our every day lives. The HRC staff has also conducted many tours of the HRC for professional geoscientists and geoscience students at the collegiate level.

The HRC facilities and collections have also been used by classes for undergraduate and graduate students, as well as professional classes. Rock material curated at the HRC can be viewed, described, and sampled for teaching and educational purposes. Materials that are abundant in the collection are available to educators for sampling.

### **Contributions to Resources for Research and Education:**

Shared support provides the research community with this

state-of-the-art facility for curation of geologic materials. This facility will have a major effect on the way research in the Earth Sciences is conducted by providing an easy means for researchers to access extensive collections of terrestrial rock samples that have been previously investigated. Major advances in Earth Science are commonly the result of many stages of analyses over long periods of time by different research groups. This is only possible to the extent that rock material is preserved and made available to the research community in a timely manner and at a reasonable cost. The HRC facility will also enhance the infrastructure for education by making samples available for student research. Rock material curated at the HRC can be viewed, described, and sampled for teaching and educational purposes.

The HRC offers a broad and successful outreach program to both K-12 and university students in the Houston area that will continue be expanded and will continue to be a resource for furthering the appreciation of the importance of the geosciences to the general public.

### **Contributions Beyond Science and Engineering:**

Earth science research contributes to public welfare and national need. The cores and samples that are preserved for future use at the HRC may be used to investigate topics including earthquake science; geological hazards; energy, mineral, and water resources; global climate change; land-use planning; and public education.

### **Special Requirements for Annual Project Report:**

**Unobligated Funds:** \$209202.84

### **Categories for which nothing is reported:**

**Participants:** Partner organizations

**Products:** Book or other one-time publication

**Special Reporting Requirements**

**Animal, Human Subjects, Biohazards**

[Submit](#)[Return](#)[View Attached PDF File](#)

We welcome [comments](#) on this system

## Project Participants

**Tinker W Scott : Principal Investigator**

**Has worked for more than 160 hours : No**

**Contribution to project :** Coordinated project and interacted with academic community.

**Dutton P Shirley : CoPrincipal Investigator**

**Has worked for more than 160 hours : Yes**

**Contribution to project :** Coordinated project, including interaction with academic community and supervision of NSF-project activities at the Houston Research Center (HRC). Represented the HRC at the Conference of Curators of Marine and Lacustrine Geological Samples at Lamont-Doherty Earth Observatory, Palisades, New York, and at the NSF Workshop on 'Designing Interoperability for Sample-Based Data Management via the International GeoSample Number IGSN' in La Jolla, California.

**Els John : Technician, programmer**

**Has worked for more than 160 hours : No**

**Contribution to project :** Programmed HRC database system, including online access. Interacted with the developers of the PetDB database to insure compatibility of the HRC sample database with the geoscience cyberinfrastructure systems currently being developed.

**McDonald Randy : Technician, programmer**

**Has worked for more than 160 hours : No**

**Contribution to project :** Supervised and led effort to organize and reshelve new and existing legacy cores at the HRC and dedicate space for the NSF core and sample collections.

**DeJarnett Beverly : Geological Curator**

**Has worked for more than 160 hours : Yes**

**Contribution to project :** Geological curator at the HRC for NSF project. Interacted with the academic community relative to curation needs; assisted researchers using the HRC facility; coordinated equipment acquisition and maintenance; conducted community education and outreach. Represented The University of Texas at Austin at the 5th Annual International Data Repository meeting in Washington DC. Represented The University of Texas at Austin at the AAPG annual meeting, Calgary, AB

**Zahm Laura : Geological Curator**

**Has worked for more than 160 hours : No**

**Contribution to project :** Geological curator at the HRC for NSF project. Interacted with the academic community relative to curation needs; assisted researchers using the HRC facility; conducted community education and outreach. Assisted in developing HRC database system. Interacted with the developers of the PetDB database to insure compatibility of the HRC sample database with the geoscience cyberinfrastructure systems currently being developed.

**Haynes Darrell : Core handler**

**Has worked for more than 160 hours : No**

**Contribution to project :** Reshelved new and existing legacy cores at the HRC to dedicate space

for the NSF core and sample collections.

**Hafford Marcus** : Core handler

**Has worked for more than 160 hours** : No

**Contribution to project** : Reshelfed new and existing legacy cores at the HRC to dedicate space for the NSF core and sample collections.

**Jordan David** : GIS Specialist

**Has worked for more than 160 hours** : Yes

**Contribution to project** : Created GIS interface for NSF database; interacted with developers of NSF database

[Return](#)



We welcome [comments](#) on this system

**Lana Dieterich**

---

**From:** Steve Laubach  
**Sent:** Friday, August 12, 2005 11:29 AM  
**To:** patty@utig.ig.utexas.edu  
**Cc:** Claudia Gerardo; Lana Dieterich  
**Subject:** JSG presentations cal

Here are some additional abstracts/presentations for the JSG site. Lana, these should all be in the BEG listing. Can you confirm that they are?

**AAPG Paris**

S. E. Laubach, J. E. Olson, R. Lander, K. Milliken: Structural Diagenesis—Linked Chemical and Mechanical Processes in Sedimentary Basins Invited presentation.

S. E. Laubach, J. E. Gale, R. Marrett, J. E. Olson: Linked Diagenesis and Fracture Patterns and Their Effect on Fluid Flow in Fractured Carbonate Rocks

**AAPG 2005 Rocky Mountain Section Meeting in Jackson, Wyoming**

"Fractured Sandstone Outcrops in Northeast Mexico: Guides to the Attributes of Fractures in Tight Gas Sandstones" Meghan Ward, Steve Laubach

"Regional Subthrust Fracture Arrays in Outcrop: Guide to Attributes of Tight Gas Sandstones" Kira Diaz Tushman, Steve Laubach

**AAPG SW Regional Meeting Fredericksburg 2005**

"Opening History and Porosity Evolution of Fractures in Sandstone Beneath an Evaporate Detachment, Gulf of Mexico Basin" Meghan E. Ward, and Stephen E. Laubach

**GSA South-Central Section San Antonio 2005**

FRACTURE ARRAYS IN A SUBTHRUST SETTING: CAMBRIAN ERIBOLL GROUP SANDSTONES, NW SCOTLAND

Kira Diaz Tushman, Steve Laubach

GSA Abstracts with Programs Vol. 37, No. 3

Researchers and students:

Please check out <http://www.ig.utexas.edu/jsg/index.htm>.

We want to make sure all presentations, workshops, field trips, awards, etc. by all JSG people are listed for all the upcoming fall meetings where JSG will have a booth and/or alumni event.

Please send updates to Patty Ganey-Curry [patty@utig.ig.utexas.edu](mailto:patty@utig.ig.utexas.edu)

Thanks, Nancy

Nancy Ewert  
Administrative Associate  
Bureau of Economic Geology  
The University of Texas at Austin  
John A. and Katherine G. Jackson School of Geosciences

8/12/2005

**Lana Dieterich**

---

**From:** Jeff Paine  
**Sent:** Tuesday, August 16, 2005 11:24 AM  
**To:** Lana Dieterich  
**Subject:** resume item

Principal Investigator: Delineating salinity sources along segments of the Colorado River and Petronila Creek, phase 2: Texas Commission on Environmental Quality (2004–2005, \$364,629).

\*\*\*\*\*

Jeffrey G. Paine, PhD  
Research Scientist, Bureau of Economic Geology  
Jackson School of Geosciences  
The University of Texas at Austin  
10100 Burnet Road  
Austin, Texas 78758-4445  
(512) 471-1260 (v) 471-0140 (fax)  
[jeff.paine@beg.utexas.edu](mailto:jeff.paine@beg.utexas.edu)  
[www.beg.utexas.edu/staffinfo/paine01.htm](http://www.beg.utexas.edu/staffinfo/paine01.htm)

\*\*\*\*\*

8/16/2005