

Overview of Activities of the Great Basin Center for Geothermal Energy

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ABSTRACT

The Great Basin Center for Geothermal Energy was established at the University of Nevada, Reno in May 2000 to promote research on and utilization of geothermal resources in the Great Basin. The Center received funding through congressional appropriation to promote increased geothermal development in the Great Basin. Most of this funding is used to fund peer-reviewed research, and approximately ten percent of the funding is for stakeholder outreach and information dissemination.

This paper provides an overview of the Great Basin Center for Geothermal Energy and the research projects being supported by the Center. Background of the Center's establishment and activities is presented, followed by an introduction to the new research programs that were initiated in March 2002. Greater detail of the research projects are documented in the subsequent seven papers contained in these Transactions.

Background

In May 2000 the University of Nevada, Reno (UNR) informally organized the Great Basin Center for Geothermal Energy within the Mackay School of Mines in response to new congressional initiatives for accelerated development of renewable energy sources in the western United States. The Director of the Great Basin Center for Geothermal Energy, Dr. James V. Taranik, was appointed in June of 2000, and Dr. Lisa Shevenell was appointed Associate Director in Fall 2001. In July 2000 a *Geothermal Energy in Nevada and the West* conference was held at UNR as a kickoff for Senator Harry Reid's GeoPowering the West program. Former UNR President Crowley officially recognized the UNR Great Basin Center for Geothermal Energy in his opening remarks at the July 2000 conference. In FY 02, with Senator Harry

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Reid's assistance, Congress added \$936,000 to DOE's budget for the Center at UNR. An increased level of funding is currently being sought for future years. Federal funding for the Center is expected to grow, not only from Congressional initiatives to stimulate the research engine in the University and Community College System of Nevada, but from competitively acquired grants and contracts from DOE, other agencies, and industry. Over the next few years, the Center's geothermal programs should expand to a sustainable level of between \$2 and \$3 million per year.

Funding for the Center has been divided between stakeholder outreach and web-based information system development for GeoPowering the West ($\approx 10\%$), and collaborative research to promote geothermal development by faculty in the Mackay School of Mines, College of Engineering at UNR and faculty at the Desert Research Institute. In March 2002, seven research proposals were selected for funding, and work began on the projects in early April 2002.

The Nevada Congressional delegation, notably Nevada's Senator Harry Reid, have taken a leadership role in seeing that federal agencies realize the large potential Nevada has for developing geothermal energy as a clean, environmentally friendly power source. The Great Basin Center for Geothermal Energy will further these aims through its public outreach and stakeholder information programs. As such, part of the DOE contract to the Great Basin Center for Geothermal Energy is in support of GeoPowering the West activities in which the Center is to hold workshops and conferences, and to develop a web-based information system for stakeholders in geothermal energy development. Workshops that have been or will be conducted as part of the GeoPowering the West activities include the following:

1. In May 2001 the Center organized a *Joint UNR/USGS Geothermal Science Workshop* on the UNR campus to define areas of common interest in geothermal research and facilitate collaboration.
2. A second workshop, *Geothermal Opportunities in Nevada*, involved over 200 representatives from Nevada's geothermal industry, academia, and state and federal government agencies, and was organized by the Center and held on January 11, 2002.
3. A third workshop was held January 17, 2002 at UNR to discuss and initiate Center collaboration with researchers from Lawrence Berkeley National Laboratory and Lawrence Livermore National Laboratory.
4. A fourth workshop was held on April 18 and 19 at the Desert Research Institute in Reno. The title of this workshop was *Introduction to Geothermal Energy* and it was cosponsored with the Geothermal Resources Council (GRC) and the U.S. Department of Energy GeoPowering the West Program.
5. A fifth workshop was being organized as of this writing and is to be held in Reno June 12 and 13, 2002 to highlight *DOE sponsored research at the Dixie Valley Geothermal Area*.

Purpose

The mission of the Great Basin Center for Geothermal Energy is to work in partnership with U.S. industry to establish geothermal energy as a sustainable, environmentally sound, economically competitive contributor to energy supply in the western United States by:

- Providing needed and timely information on geothermal resources;
- Identifying key policy, regulatory, economic, social/cultural, and environmental issues;
- Identifying and evaluating new and emerging technologies for geothermal energy production, storage, transmission, and use;
- Fostering new scientific and technological developments; and
- Facilitating outreach, training and communication between geothermal energy stakeholders, while interfacing with GeoPowering the West activities

The Center has several goals, some of which overlap and complement the goals of the GeoPowering the West program. These goals are:

- To accelerate the acquisition, organization, cataloging, and linking of critical data and information on the geothermal resources of the Great Basin.
- To provide rapid and easy access to geothermal data and information for stakeholders involved in geothermal development.
- To promote the conduct of collaborative geothermal research between academic organizations and industry to accelerate applications.
- To stimulate public awareness of geothermal energy and the advantages of its use.

In order to attain these goals, in particular the third bullet, the Center issued a request for proposals in January 2002. Twenty-six proposals were received from researchers at the University of Nevada, Reno and the Desert Research Institute that proposed \$3.5 million in research for geothermal assessment and development. These proposals were peer reviewed by external volunteers with professional interests in geothermal studies, and seven proposals were selected for awards totaling approximately \$750,000.

Approach

Initially, the Center is pursuing three program areas directed at stimulating geothermal development in the Great Basin. These research areas are:

- (1) *Geothermal Resource Exploration and Assessment* (emphasizing location of “blind” resources),
- (2) *Geothermal Resource Characterization* (emphasizing development of geological models to help locate new resources), and
- (3) *Geothermal Reservoir Processes* (emphasizing reservoir management strategies).

Proposals were solicited and selected based on addressing these research areas.

Proposal Selection

Research proposals were submitted to the Center in mid-February and the proposals were subsequently peer reviewed by numerous individuals. The reviewers with expertise in science and engineering included DOE representatives from the DOE Idaho Operations Office and the Idaho National Engineering Laboratory, some of the Center's advisory board members, and over 30 volunteers in the geothermal community from national laboratories, the private sector, industry, the USGS, and several other universities. All reviewers rated the proposal based on a rating sheet designed to assess the research in the context of the Center's goals and priorities. Each reviewer ranked the proposals into one of three categories: fund priority 1 (score of 1), fund priority 2 (score of 2), do not fund (score of 3). The scores from these fund priority categories were averaged among all reviewers for a particular proposal, and those with the highest scores were selected for funding, subject to the research topic being consistent with the mission of and furthering the goals of the Center. In most cases budgets for the individual projects were negotiated following selection for funding. The selected proposals are located at: <http://www.unr.edu/geothermal/projects.html> .

Results

The Center selected seven research proposals from a total of 26 submitted. The selected projects address three questions relevant to geothermal development:

1. Why are geothermal resources in the Great Basin where they are?
2. What techniques can be used to find geothermal resources in the Great Basin?
3. Where are the geothermal resources in the Great Basin and how large are they?

The titles of the newly funded projects are listed here, followed by the name of the principal investigators in parentheses. Titles of the subsequent papers in this series may vary from these project titles.

Geochemical characterization of magmatic-related vs. extension-related geothermal systems in the Great Basin: Implications for exploration, exploitation, and environmental issues (Greg B. Arehart, Mark F. Coolbaugh, Simon R. Poulson)

Targeting potential geothermal resources in the Great Basin from regional relationships between geodetic strain and geological structures (Geoff Blewitt)

Testing unique surface identifiers for geothermal site characterization from remote sensing imagery (Wendy Calvin, Mark F. Coolbaugh)

Structural and geophysical analysis and characterization of the Desert Peak-Brady Geothermal Field: Implications for understanding linkages between northeast-trending structures and geothermal anomalies (James Faulds, Larry Garside)

Assembly of a crustal seismic velocity and density database for the western Great Basin (John Louie)

Geochemical sampling of thermal and nonthermal waters in Nevada: Evaluation of geothermal resources for electrical power generation and direct-use applications (Lisa Shevenell, Larry Garside)

Regional assessment of exploration potential for geothermal systems in Nevada using a geographic information system (GIS) (James Taranik, Mark Coolbaugh, Gary Raines, Lisa Shevenell, Tim Minor, Don Sawatzky, Richard Bedell)

The selected projects address various aspects of resource exploration, assessment and characterization. These projects are being collaboratively conducted by researchers from the Department of Geological Sciences, Nevada Bureau of Mines and Geology (both at UNR), the Desert Research Institute, SUNY Stony Brook, Harvard-Smithsonian Center for Astrophysics, Lawrence Berkeley National Laboratory, and the U.S. Geological Survey, Reno Field Office. All database construction and GIS activities of the individual projects are being coordinated through the Center to avoid any duplication of efforts and to assist researchers in obtaining complementary data sets being developed under other projects. Preliminary results of these projects are included in the subsequent seven papers in these GRC Transactions.

The Center is currently developing a web page to help disseminate geothermal information (<http://www.unr.edu/geothermal>). Development of comprehensive geothermal databases coupled with web-based information access will promote research by University and Community College System of Nevada faculty not only in geothermal energy related fields, but in other science and engineering disciplines as well. Links to results from the seven funded research projects will also be available on this web page as the projects progress. More detailed and complete results of the Center's funded research projects will be provided at the end of the funded period (following March 19, 2003) on this web page, through refereed journal articles, and future GRC Transactions.

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