

DOE'S GEOTHERMAL DIVISION: A PERIOD OF TRANSITION

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ABSTRACT

The transition that the Department of Energy's geothermal research program is undergoing is discussed. This transitional period began last year and will continue at least through final implementation of the Department's reorganization and downsizing. Current and recently completed R&D programs are reviewed. New initiatives are outlined. The foci and direction of the Division's activities of particular interest to the geothermal research community are addressed.

INTRODUCTION

The Department of Energy's Geothermal Division began a transition last year with the retirement of Dr. John E. "Ted" Mock, its long-time Director, in January 1995. In September, Dr. Allan J. Jelacic was appointed Director amid Secretary O'Leary's announced plans to "realign" the Department of Energy (DOE) into a more effective and efficient organization.

Part of the response by the Office of Energy Efficiency and Renewable Energy has been to take a more corporate approach towards its organization. Priorities include a more customer oriented focus, better integration of headquarters and field operations, and greater flexibility in program management. The new organizational structure is expected to go into effect in April 1996. Hopefully, it will result in the Geothermal Division being able to better serve the geothermal community in these times of decreasing federal funds and increasing competition faced by industry in both the domestic and international markets.

Keeping in mind the concerns voiced by industry, researchers and academia, we intend to leverage available resources towards near-term and long-term goals that will

bring about wider use of all forms of geothermal energy. A balanced mix of R&D activities will continue to address the pressing needs of industry while still moving towards long-term goals such as the design and commercialization of an advanced rock penetration system for the twenty-first century.

This paper summarizes the Geothermal Division's recent accomplishments and current activities, focusing on those relating to reservoir characterization and evaluation. Completion of The Geysers research program is briefly discussed and the status of The Geysers effluent pipeline is reported. Results of industry's meetings with, and recommendations to, officials of DOE regarding how DOE can better meet industry needs are summarized.

THE GEYSERS

The Geothermal Division completed a successful 5-year joint research program with industry at The Geysers geothermal field in 1995. The final three projects were selected by DOE-convened Working Groups as critical to identifying and/or implementing field and reservoir management techniques to stabilize and prolong the field's useful life. The projects were:

- a core retrieval and analysis project to gather better data on the physical properties of the reservoir rock and caprock
- a 3-year injection test that will end in 1997
- an isotope geochemistry study to better understand the origin and circulation of the reservoir's fluids.

In 1995, the Division also contributed funds towards the Southeast Geysers Pipeline and Injection Project. The 29-mile, 20-inch diameter buried pipeline will carry 7.8 million gallons of treated wastewater and lake make-up water to three Geysers steam suppliers: Unocal Corporation, Calpine Corporation, and the Northern

California Power Agency (NCPA). These steam suppliers will distribute the effluent to geothermal injection wells. Power plants operated by NCPA and Pacific Gas & Electric Company will receive steam created by the injection. Up to 70 megawatts of additional power will result, providing a long-term, environmentally-superior method of waste water disposal. The Department of Energy is one of eleven entities funding the project. Ground was broken on October 6, 1995 with the pipeline expected to become operational in early 1997.

INDUSTRY RECOMMENDATIONS

As an outcome to roundtable discussions with Secretary O'Leary during the 1995 World Geothermal Conference in Florence, Italy, the Geothermal Energy Association (GEA) sponsored two workshops (U.S. DOE, in press). Their purpose was to prioritize technical areas where industry would most benefit from federal R&D and to recommend how the Geothermal Division can better serve its constituency.

The industry recognizes its need for new and improved technology and acknowledges its severely limited research capabilities. Federal geothermal R&D programs continue to be an important resource as exemplified by the joint research program at The Geysers and numerous other projects relating to developing improved drilling, production and conversion technologies. The GEA workshops identified and prioritized industry's chief technology concerns as those related to drilling, exploration and subsurface mapping, reservoir assessment, corrosion and scaling prevention, and energy conversion. Of lesser priority were cost-shared exploration drilling, geothermal heat pumps and heat mining or hot dry rock.

GEA's recommendations (U.S. DOE, in press) for DOE's geothermal program were to:

- more sharply focus project goals and efforts by individual researchers
- allow more industry oversight of the R&D programs
- establish more effective industry review of "controversial" R&D such as hot dry rock
- provide more funding and mechanisms for cost-shared R&D with industry.

The Geothermal Division welcomes greater involvement by industry in the federal R&D program. We look forward to working together in partnership on technological problems of common concern. In this regard, we endorse GEA's plans to conduct a series of

review workshops in 1996 on various elements of the R&D program.

THE INTERNATIONAL ARENA

An additional concern expressed by industry during the roundtable discussions with Secretary O'Leary was for help in opening foreign markets to U.S. products and services, notwithstanding successful bids by U.S. companies for international power projects. The Division is already involved in a number of activities and is looking for means to expand its role. Three international projects in which DOE currently participates are:

- a pre-feasibility study for small-scale power plant operation in Indonesia's rural electrification program
- a bottoming-cycle project in Costa Rica
- a conference on geothermal energy in Nicaragua.

NEW RESERVOIR TECHNOLOGY R&D PROGRAM

The Geothermal Division has just begun a two year solicitation for reservoir technology projects. The solicitation is competitive and has peer review panels which include industry participants. Total funding levels for the whole program are not yet determined, but the program is anticipated to be ongoing during the two year period with shortened review periods and awards of up to \$500,000.

NATIONAL ADVANCED DRILLING AND EXCAVATION TECHNOLOGY (NADET) PROGRAM

The first R&D awards under NADET were made in 1995 for advanced drilling technology projects. NADET is a cost-shared R&D program whose long-term goal is to create an integrated, efficient, and economic rock penetration system for the next century. Concurrently, incremental improvements to conventional drilling technologies are being pursued with the intention of incorporating these technologies in the final system.

The first NADET solicitation was through DOE's Small Business Innovative Research (SBIR) program and sought proposals in "smart" drilling to:

- expand downhole measurements for bit wear and mud properties
- improve technologies for detecting fractures and downhole formation evaluation
- investigate new concepts for determining bit position and for steering the bit

- develop new downhole sensing systems to determine borehole stability.

The second NADET solicitation is currently underway through the SBIR program, and seeks projects in hard rock drilling technologies.

A third, more broadly based solicitation for R&D projects will be through the NADET Institute, located at the Massachusetts Institute of Technology. This call for proposals will be open to all researchers and is anticipated to be released early this year.

HOT DRY ROCK PROGRAM

DOE's Hot Dry Rock (HDR) program is a long-term multifaceted effort aimed at developing technologies that will enable the generation of electricity from hot dry rock resources. At the annual meeting of the Geothermal Resources Council in October 1995, Karl R. Rábago, Deputy Assistant Secretary for Utility Technologies at DOE, announced the withdrawal of a solicitation seeking an industrial partner to build a commercial prototype HDR plant. However, he also endorsed the continued development of technology that would make future use of the enormous HDR resource. He called on industry to work with the government in determining the content of a revamped HDR program.

In December of 1995, as a follow-up to Mr. Rábago's announcement, the GEA convened a panel of industry

experts to assess the current status of the HDR program and develop recommendations for revising it. Those recommendations will be presented to DOE for consideration in early 1996. In the meantime, planning is underway for the decommissioning of the HDR test site at Fenton Hill, New Mexico.

SUMMARY

The Geothermal Division is in a transitional period, as is the Office of Energy Efficiency and Renewable Energy and the Department of Energy as a whole. The Division intends to maintain programs of high-priority interest to the geothermal community, such as The Geysers research, conventional drilling R&D, and the new reservoir technology program. We also plan to review and possibly restructure longer-term programs, such as NADET and the HDR program, so that they will produce tangible results with foreseeable benefits to our industrial partners. To accomplish these goals, the Division will continue to seek and incorporate the input of industry in its planning.

REFERENCES

U.S. DOE, Assistant Secretary of Energy Efficiency and Renewable Energy, Geothermal Division (in press), "Geothermal Progress Monitor." Report No.17.