

U.S. Department of Energy

Programs in Utility Technologies

**GEOTHERMAL ENERGY
CONTRACT LIST
FISCAL YEAR 1990**

MASTER

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Contents

FY 1990 Contract List—Hydrothermal	1
FY 1990 Contract List—Geopressed-Geothermal	6
FY 1990 Contract List—Hot Dry Rock	9
FY 1990 Contract List—Magma Energy	12
Index of Current Contractors	14

Introduction

The Geothermal Division of the U.S. Department of Energy (DOE) is charged with the lead federal role in the research and development (R&D) of technologies that will assist industry in economically exploiting the nation's vast geothermal resources. The Geothermal Energy R&D Program represents a comprehensive, balanced approach to establishing all forms of geothermal energy as significant contributors to the nation's energy supply. The program is structured both to maintain momentum in the growth of the existing hydrothermal industry and to develop long-term options offering the greatest promise for practical applications.

The *Geothermal Energy Contract List, Fiscal Year 1990* is a tabulation of geothermal R&D contracts that were begun, ongoing, or completed during FY 1990 (October 1, 1989, through September 30, 1990). The R&D activities are performed by national laboratories or industrial, academic, and nonprofit research institutions. The contract list is organized in accordance with the Geothermal Division R&D work breakdown structure. The structure hierarchy consists of Resource Category (hydrothermal, geopressed-geothermal, hot dry rock, and magma energy), Project (hard rock penetration, reservoir technology, etc.), and

Task (lost circulation control, rock penetration mechanics, etc.). For each contract, the contractor, the FY 1990 funding, and a brief description of the milestones planned for FY 1991 are provided.

For additional information on the DOE Geothermal Energy R&D Program, the reader is encouraged to consult the *Geothermal Energy Program Overview, Fiscal Year 1991* (DOE/CH10093-95). Copies of the program overview and this contract list may be obtained by writing the National Renewable Energy Laboratory, Technical Inquiry Service, 1617 Cole Boulevard, Golden, Colorado 80401-3393.

Organizational Relationships

The Geothermal Energy R&D Program is conducted by the U.S. DOE and is assigned to the Assistant Secretary for Conservation and Renewable Energy. Actual implementation of the geothermal research program is performed by contractors, including the national laboratories, universities, and industry. The participating contractors are responsible for the conduct and day-to-day management of the research activities.

DOE/CH/10093--96

DE91 002173

FY 1990 Contract List

Hydrothermal

Hydrothermal

Contract No. Contract Period Title	Contractor (Principal Investigator) Contact	Funding \$ (Source)	Selected FY 1991 Milestones (Contact has more information)
Hard Rock Penetration			
0728.000 10/17/83-Open Lost Circulation Control	Sandia National Laboratories (D.A. Glowka) P.O. Box 5800 Albuquerque, NM 87185 G.P. Tennyson	FY86-FY90 Funding \$3,185,000 (DOE) FY90 Funding \$700,000 (DOE)	Complete testing of lost circulation packers and injectors (March 1991). Complete flow-loop testing of velocity-level transducers (April 1991). Test cementitious muds (June 1991).
0728.000 10/17/83-Open Rock Penetration Mechanics	Sandia National Laboratories (J.T. Finger) P.O. Box 5800 Albuquerque, NM 87185 G.P. Tennyson	FY86-FY90 Funding \$2,085,000 (DOE) FY90 Funding \$200,000 (DOE)	Complete systems analysis of geothermal drilling (April 1991).
0728.000 10/17/83-Open Instrumentation	Sandia National Laboratories (P.C. Lysne) P.O. Box 5800 Albuquerque, NM 87185 G.P. Tennyson	FY86-FY90 Funding \$2,790,000 (DOE) FY90 Funding \$600,000 (DOE)	Conduct high-temperature logging in geothermal wells (September 1991).
0728.000 10/17/83-Open Geothermal Drilling Organization	Sandia National Laboratories (J.C. Dunn) P.O. Box 5800 Albuquerque, NM 87185 G.P. Tennyson	FY86-FY90 Funding \$1,134,000 (DOE) FY90 Funding \$344,000 (DOE)	Transfer borehole televiewer to Unocal (April 1991).
Reservoir Technology			
DE-AC07-85ID12489 07/01/85-02/28/91 Reservoir Analysis	University of Utah Research Institute (P.M. Wright, D.L. Nielson) 391 Chipeta Way, Suite C Salt Lake City, UT 84108 R.J. Creed	Total Funding \$1,560,000 (DOE) FY90 Funding \$290,000 (DOE)	Complete alteration study of The Geysers reservoir (September 1991). Complete fluid inclusion/geochemistry study of The Geysers reservoir (September 1991). (Work to be performed under new contract.)
AC05-84OR21400 04/01/84-03/31/94 Reservoir Analysis	Oak Ridge National Laboratory (R.E. Mesmer, J.M. Simonson, D.A. Palmer) Oak Ridge, TN 37831 R.J. Creed	Total Funding \$160,000 (DOE) FY90 Funding \$160,000 (DOE)	Submit manuscript on gibbsite solubilities in base media (March 1991). Submit manuscript on gibbsite solubilities in acidic media (May 1991). Complete volatility measurements on HCl (aqueous) (September 1991).

Contract No. Contract Period Title	Contractor (Principal Investigator) Contact	Funding \$ (Source)	Selected FY 1991 Milestones (Contact has more information)
AC03-76SF00098 10/17/83-Open Reservoir Analysis	Lawrence Berkeley Laboratory Earth Science Division (M.J. Lippmann) Building 50E Berkeley, CA 94720 P.A. Brookshier	Total Funding N/A FY90 Funding \$290,000 (DOE)	Complete initial field testing of Lawrence Berkeley Laboratory's 6-liter downhole fluid sampler (September 1991). Identify and describe conceptual models for high-temperature zones at NW Geysers (August 1991). Issue user's manual for multi-feedzone wellbore model (August 1991).
AC03-76SF00098 10/17/83-Open Exploration Technology	Lawrence Berkeley Laboratory Earth Science Division (M.J. Lippmann) Building 50E Berkeley, CA 94720 P.A. Brookshier	Total Funding N/A FY90 Funding \$140,000 (DOE)	Install multicomponent, high- frequency, borehole microearth- quake monitoring array in the SE Geysers (May 1991). Obtain base- line seismic velocity model for the SE Geysers (July 1991). Moni- tor injection processes in the NW Geysers to understand relations between seismicity and injection (September 1991).
DC-AC07-85ID12489 07/01/85-02/28/91 Exploration Technology	University of Utah Research Institute (P.M. Wright, D.L. Nielson) 391 Chipeta Way, Suite C Salt Lake City, UT 84108 R.J. Creed	Total Funding \$760,000 (DOE) FY90 Funding \$95,000 (DOE)	Complete technical report on self- potential geophysical method (September 1991). Complete status report on compilation of low- and moderate-temperature hydrothermal resources in the United States (September 1991). (Work to be per- formed under new contract.)
DC-AC07-85ID12489 07/01/85-02/28/91 Brine Injection Technology	University of Utah Research Institute (P.M. Wright, D.L. Nielson) 391 Chipeta Way, Suite C Salt Lake City, UT 84108 R.J. Creed	Total Funding \$2,333,536 (DOE) FY90 Funding \$203,600 (DOE)	Complete interpretation of Geysers tracer test (September 1991). Complete status report on autoclave testing of vapor-phase tracers (September 1991). (Work to be performed under new contract.)
AS07-84ID12529 09/27/84-09/30/90 Brine Injection Technology	Stanford University Department of Petroleum Engineering (H.J. Ramey, Jr.; R.N. Horne) 360 Mitchell Building Stanford, CA 94305 P.A. Brookshier	Total Funding \$1,622,000 (DOE) FY90 Funding \$299,727 (DOE)	Complete computer program for modeling adsorption effects in transient flow (December 1990). Complete preliminary runs on United States Geological Survey adsorption equipment and then move it to Stanford University (March 1991). Complete Palinpinon reinjection optimization project (June 1991). (Work to be per- formed under new contract.)

Hydrothermal

Contract No. Contract Period Title	Contractor (Principal Investigator) Contact	Funding \$ (Source)	Selected FY 1991 Milestones (Contact has more information)
W-7405-ENG-48 10/01/82-09/30/92 Brine Injection Technology	Lawrence Livermore National Laboratory (P.W. Kasameyer) P.O. Box 808 Livermore, CA 94550 R.J. Creed	Total Funding N/A FY90 Funding \$30,000 (DOE)	Complete report on NE Geysers velocity and attenuation image (January 1991). Complete scoping study for gas phase modeling at The Geysers (July 1991).
AC03-76SF00098 10/17/83-Open Brine Injection Technology	Lawrence Berkeley Laboratory Earth Science Division (M.J. Lippmann) Building 50E Berkeley, CA 94720 P.A. Brookshier	Total Funding N/A FY90 Funding \$250,000 (DOE)	Initiate a cooperative project with industry to analyze the effects of liquid injection in the SE Geysers area (January 1991). Issue a report on a conceptual and numerical model for injection effects at Northern California Power Agency well Q-2 (September 1991).
AC07-76IDO1570 10/76-09/91 Brine Injection Technology	Idaho National Engineering Laboratory (J.L. Renner) P.O. Box 1625 Idaho Falls, ID 83415 R.J. Creed	Total Funding N/A FY90 Funding \$425,000 (DOE)	Initiate evaluation of the effects of injection at The Geysers (November 1990). Publish results of initial injection studies at The Geysers (September 1991).
AC07-76IDO1570 10/76-09/91 Geothermal Technology Organization	Idaho National Engineering Laboratory (J.L. Renner) P.O. Box 1625 Idaho Falls, ID 83415 R.J. Creed	Total Funding \$200,000 (DOE) FY90 Funding \$100,000 (DOE)	Complete negotiations for additional cooperative research with the Geothermal Technology Organization (November 1990 and July 1991).
Conversion Technology			
AC07-76IDO1570 10/76-09/91 Heat Cycle Research	Idaho National Engineering Laboratory (G.L. Mines) P.O. Box 1625 Idaho Falls, ID 83415 K. Taylor	Total Funding N/A FY90 Funding \$674,000 (DOE)	Complete retubing Heat Cycle Research Facility heat exchangers (December 1990). Issue a report on performance limits of binary power cycles (February 1991). Complete fouling investigations with polymer-concrete lined tubes (August 1991). Complete super-critical cycle testing with isobutane working fluids (September 1991).

Hydrothermal

Contract No. Contract Period Title	Contractor (Principal Investigator) Contact	Funding \$ (Source)	Selected FY 1991 Milestones (Contact has more information)
AC02-76CH00016 01/88-12/93 Materials Research	Brookhaven National Laboratory (L.E. Kukacka) Upton, NY 11973 K. Taylor	Total Funding N/A FY90 Funding \$372,000 (DOE)	Complete downhole testing of best candidate lightweight CO ₂ (December 1990). Complete field test of HX-2 (December 1990). Complete mud displacement test with industry (April 1991). Initiate field test of HX-3 (June 1991). Complete characterization of metal/ bonding agent/elastomer interfaces (August 1991). Issue interim and peer-reviewed reports (September 1991).
AC02-76CH00016 01/88-12/93 Advanced Brine Chemistry	Brookhaven National Laboratory (E.T. Premuzic) Upton, NY 11973 K. Taylor	Total Funding N/A FY90 Funding \$220,000 (DOE)	Initiate preparation of a peer- reviewed paper dealing with high temperature/pH bioprocess con- ditions (February 1991). Submit Annual Operating Plan (April 1991). Complete analysis and recommendations based on the first generation of modified bioreactors (July 1991). Subject to information gained above, consider options for the construction of a model process system (September 1991).
AC07-88SF17712 06/29/88-12/01/91 Advanced Brine Chemistry	University of California at San Diego (N. Moller, J. Weare) 9500 Gilman Drive La Jolla, CA 92093 K. Taylor	Total Funding \$561,000 (DOE) FY90 Funding \$250,000 (DOE)	Update model to include additional species (June 1991). Finish revi- sions of the preliminary Macintosh version of the code (July 1991). Develop and document a set of test solubility data (July 1991). Develop documentation for Tequil including sample problem sets and solutions (August 1991). Finish documenta- tion of the Macintosh version of the code (August 1991). Conduct modeling workshop with the geo- thermal community (September 1991).

FY 1990 Contract List

Geopressured-Geothermal

Geopressured-Geothermal

Contract No. Contract Period Title	Contractor (Principal Investigator) Contact	Funding \$ (Source)	Selected FY 1991 Milestones (Contact has more information)
Well Operations			
AC07-85ID12578 10/01/85-09/30/93 Gladys McCall Reservoir	Eaton Operating Company, Inc. (B. Eaton) 1240 Blalock, Suite 100 Houston, TX 77055 K. Taylor	Total Funding \$2,857,000 (DOE) FY90 Funding \$472,000 (DOE)	Complete pressure buildup (August 1991). Complete National Environmental Policy Act documentation (September 1991). Complete final testing (September 1991). Plug and abandon well or turn over to industry (September 1991). Continue environmental monitoring and compliance (September 1991).
AC07-85ID12578 10/01/85-09/30/93 Pleasant Bayou Reservoir	Eaton Operating Company, Inc. (B. Eaton) 1240 Blalock, Suite 100 Houston, TX 77055 K. Taylor	Total Funding \$6,212,000 (DOE) FY90 Funding \$1,124,000 (DOE)	Run bottomhole pressure and temperature log (May 1991). Increase flow rate to 40,000 barrels per day, if possible (September 1991). Continue environmental monitoring and compliance (September 1991).
AC07-85ID12578 10/01/85-09/30/93 Hulin Reservoir	Eaton Operating Company, Inc. (B. Eaton) 1240 Blalock, Suite 100 Houston, TX 77055 K. Taylor	Total Funding \$5,099,000 (DOE) FY90 Funding \$1,028,000 (DOE)	Complete construction of surface facilities (September 1991). Continue environmental monitoring and compliance (September 1991). Provide maintenance, security, and insurance for site (September 1991).
Geoscience and Engineering Support			
DE-AS07-83NV10338 01/01/83-12/31/89 Liquid Hydrocarbons	University of Southwestern Louisiana (D.F. Keeley) P.O. Box 44250, USL Lafayette, LA 70504 K. Taylor	Total Funding \$740,862 (DOE) FY90 Funding -0-	None.
DE-FC07-90ID12945 01/90-12/92 Liquid Hydrocarbons	University of Southwestern Louisiana (D.F. Keeley) P.O. Box 44250, USL Lafayette, LA 70504 K. Taylor	Total Funding \$160,000 (DOE) FY90 Funding \$160,000 (DOE)	Complete final report on cryocondensate production in geopressured wells (September 1991). Complete final report on pH probe (September 1991).

Geopressured-Geothermal

Contract No. Contract Period Title	Contractor (Principal Investigator) Contact	Funding \$ (Source)	Selected FY 1991 Milestones (Contact has more information)
DE-FC07-85NV10412 10/01/85-12/31/92 Logging and Reservoir Engineering	University of Texas at Austin (M. Dorfman) C.P.E. 2.502 Austin, TX 78712 K. Taylor	Total Funding \$3,403,344 (DOE) FY90 Funding \$545,000 (DOE)	Complete report on boron and aluminum (September 1991). Complete report on reservoir engineering and Gladys McCall reservoir modeling (September 1991). Complete report on rock mechanics data (September 1991). Complete report on collocation of brine and oil and relationship to thermal-enhanced oil recovery (September 1991).
DE-FC07-85NV10425 12/01/85-12/31/92 Environmental Effects	Louisiana State University Louisiana Geological Survey (C.G. Groat) P.O. Box G University Station Baton Rouge, LA 70893 K. Taylor	Total Funding \$2,631,866 (DOE) FY90 Funding \$525,000 (DOE)	Continue environmental monitoring of microseismic activity, subsidence, and water quality, and complete associated reports (September 1991). Prepare report on collocation of brine and oil in Louisiana (September 1991).
Energy Conversion			
AC07-85ID12578 10/15/85-10/15/91 Pleasant Bayou Hybrid Power System	Eaton Operating Company, Inc. (B. Eaton) 1240 Blalock, Suite 100 Houston, TX 77055 K. Taylor	Total Funding \$2,729,000 (DOE) FY90 Funding \$729,000 (DOE)	Deliver final report (April 1991).
Management Support			
DE-AC07-NV10412 10/01/85-09/30/91 General Administration and Technology Exchange	Idaho National Engineering Laboratory (J. Negus-de Wys) P.O. Box 1625, MS 3526 Idaho Falls, ID 83415 K. Taylor	FY88-FY90 Funding \$1,453,000 (DOE) FY90 Funding \$505,000 (DOE)	Complete National Environmental Policy Act documentation for Gladys McCall site (August 1991). Issue four feasibility reports (September 1991). Complete reservoir engineering report on Pleasant Bayou site (September 1991). Complete first draft of the Geopressured Habitat Review (September 1991). Complete color brochure on the geopressured resource (September 1991).

FY 1990 Contract List

Hot Dry Rock

Hot Dry Rock

Contract No. Contract Period Title	Contractor (Principal Investigator) Contact	Funding \$ (Source)	Selected FY 1991 Milestones (Contact has more information)
Fenton Hill Operations			
W-7405-ENG-36 10/01/83-Open Phase II Energy Extraction System	Los Alamos National Laboratory (D. Duchane) P.O. Box 1663 Los Alamos, NM 87545 G.P. Tennyson	FY84-FY90 Funding \$20,529,000 (DOE) Total International Funding \$4,826,000 (Japan and Germany) FY90 Funding \$1,674,000 (DOE)	Deliver high-pressure injection pumps (November 1990). Complete foundation work; install piping (December 1990). Install injection pumps (February 1991). Complete high-back-pressure flow test (May 1991). Install gas/particle separator (June 1991). Complete installation for long-term flow test (September 1991).
W-7405-ENG-36 10/01/83-Open Phase II Ancillary Activities	Los Alamos National Laboratory (D. Duchane) P.O. Box 1663 Los Alamos, NM 87545 G.P. Tennyson	FY84-FY90 Funding \$4,330,000 (DOE) Total International Funding \$798,000 (Japan and Germany) FY90 Funding \$320,000 (DOE)	Assure adequate water supply to conduct long-term flow test (July 1991).
W-7405-ENG-36 10/01/83-Open Test Site Support and Utilities	Los Alamos National Laboratory (D. Duchane) P.O. Box 1663 Los Alamos, NM 87545 G.P. Tennyson	FY84-FY90 Funding \$4,064,000 (DOE) Total International Funding \$674,000 (Japan and Germany) FY90 Funding \$553,000 (DOE)	None.
Scientific and Engineering Support			
W-7405-ENG-36 10/01/83-Open Tools and Instrumentation	Los Alamos National Laboratory (D. Duchane) P.O. Box 1663 Los Alamos, NM 87545 G.P. Tennyson	FY84-FY90 Funding \$6,730,000 (DOE) Total International Funding \$2,166,000 (Japan and Germany) FY90 Funding -0-	None.

Hot Dry Rock

Contract No. Contract Period Title	Contractor (Principal Investigator) Contact	Funding \$ (Source)	Selected FY 1991 Milestones (Contact has more information)
W-7405-ENG-36 10/01/83-Open Engineering and Development Activities	Los Alamos National Laboratory (D. Duchane) P.O. Box 1663 Los Alamos, NM 87545 G.P. Tennyson	FY84-FY90 Funding \$7,333,000 (DOE) Total International Funding \$1,404,000 (Japan and Germany) FY90 Funding \$688,000 (DOE)	Place order for gas/particle separator system (January 1991). Complete reservoir engineering analysis of high-back-pressure experiment and reach decision regarding high-back-pressure operation during long-term flow test (LTFT) (June 1991). Complete LTFT experimental and operational plan (August 1991). Complete report on the geology of the Phase II reservoir (September 1991).
W-7405-ENG-36 10/01/83-Open Technology Application	Los Alamos National Laboratory (D. Duchane) P.O. Box 1663 Los Alamos, NM 87545 G.P. Tennyson	FY84-FY90 Funding \$1,791,000 (DOE) Total International Funding \$132,000 (Japan and Germany) FY90 Funding \$92,000 (DOE)	None.

FY 1990 Contract List

Magma Energy

Contract No. Contract Period Title	Contractor (Principal Investigator) Contact	Funding \$ (Source)	Selected FY 1991 Milestones (Contact has more information)
Long Valley Operations			
AC04-76DP00789 10/20/83-Open Drilling and Engineering	Sandia National Laboratories (J.T. Finger) P.O. Box 5800 Albuquerque, NM 87185 G.P. Tennyson	FY85-FY90 Funding \$2,494,000 (DOE) FY90 Funding \$812,000 (DOE)	Initiate drilling contract (April 1991). Mobilize drill rig (June 1991). Purchase 13-1/2" casing (June 1991). Begin Phase II drilling (July 1991). Complete Phase II well (September 1991).
AC04-76DP00789 10/20/83-Open Supporting Science	Sandia National Laboratories (J.C. Dunn) P.O. Box 5800 Albuquerque, NM 87185 G.P. Tennyson	FY85-FY90 Funding \$975,000 (DOE) FY90 Funding \$150,000 (DOE)	Obtain core at bottom of well (September 1991). Support on-site scientific experiments (September 1991).
Laboratory and Engineering Support			
AC04-76DP00789 10/20/83-Open Drilling Techniques	Sandia National Laboratories (J.T. Finger) P.O. Box 5800 Albuquerque, NM 87185 G.P. Tennyson	FY85-FY90 Funding \$458,000 (DOE) FY90 Funding -0-	None.
AC04-76DP00789 10/20/83-Open Geochemistry and Materials	Sandia National Laboratories (J.G. Eichelberger) P.O. Box 5800 Albuquerque, NM 87185 G.P. Tennyson	FY85-FY90 Funding \$1,523,000 (DOE) FY90 Funding \$100,000 (DOE)	None.
AC04-76DP00789 10/20/83-Open Energy Extraction	Sandia National Laboratories (J.C. Dunn) P.O. Box 5800 Albuquerque, NM 87185 G.P. Tennyson	FY85-FY90 Funding \$1,550,000 (DOE) FY90 Funding \$102,000 (DOE)	None.

Index of Current Contractors

Brookhaven National Laboratory	5
Eaton Operating Company, Inc.	7, 8
Idaho National Engineering Laboratory	4, 8
Lawrence Berkeley Laboratory	3, 4
Lawrence Livermore National Laboratory	4
Los Alamos National Laboratory	10, 11
Louisiana State University	8
Oak Ridge National Laboratory	2
Sandia National Laboratories	2, 13
Stanford University	3
University of California at San Diego	5
University of Southwestern Louisiana	7
University of Texas at Austin	8
University of Utah Research Institute	2, 3