

GEOHERMAL



A publication of the State of California - Division of Oil and Gas

Volume 6, Number 1

June 1976

"Too much caution, too much rashness, both alike are harmful."

David N. Anderson, first editor of the HOT LINE and Geothermal Officer for the California Division of Oil and Gas has resigned to take a position with the R & D Division of the California Energy Resources Conservation and Development Commission. His new location is 1111 Howe Avenue, Sacramento, California 95825, Phone (916) 322-6476. Dave's new duties will include the preparation and management of a geothermal grant program to stimulate the development of geothermal energy resources. We will all miss Dave's spirit and energy in this office and hope for his continued success in his new endeavor. Mel Schrecongost will assume Dave's duties as editor of the Hot Line.

GEOHERMAL ENERGY PACT
SIGNED BY NORTHERN CALIFORNIA CITIES

On April 13, 1976, officials of the Northern California Power Agency (NCPA) announced completion of a preliminary agreement to develop and purchase geothermal steam from the Lake County area of The Geysers to produce electricity for its member cities.

NCPA cities are Alameda, Biggs, Gridley, Healdsburg, Lodi, Lompoc, Palo Alto, Redding, Roseville, Santa Clara and Ukiah, California. The Plumas-Sierra Rural Electric Cooperative is an Associate Member.

Chairman Gillmor said the agreement signed with Resource Funding, Ltd., (RFL) of Burbank and Denver, calls for NCPA to purchase geothermal steam and build power plants to generate 165,000 kilowatts of electricity hourly.

Eight of the cities and the Plumas-Sierra Cooperative have contributed to a multi-million dollar Development Fund to finance this program of which this agreement is one phase.

The land to be explored and developed by NCPA and RFL consists of 1,425 acres located about $1\frac{1}{2}$ miles northeast of producing steam wells drilled by Union Oil Company, Magna Power and Natomas Corp. at The Geysers.

Under terms of the agreement with RFL, the NCPA will manage the programs to drill exploratory and production steam wells on RFL's property and will build power plants when the steam is available. Their first power plant is expected to be in service by 1981.

Costa Rica

UPDATE: Geophysical Exploration (See Hot Line December, 1975)

Rogers Engineering Co., Inc. of San Francisco and their Costa Rica contractors, the Costa Rican Institute of Electricity (CRIE), will complete their geophysical exploration program in July. This is the initial step in an effort to develop Costa Rica's first geothermal electric power plant. They are encouraged by the preliminary results.

Iceland

UPDATE: Krasla (North Central Iceland - new 60MW Geothermal Power Plant); (See Hot Line December 1975)

Work on the Krasla 60 MW geothermal power plant is proceeding on schedule according to Rogers Engineering Co. in San Francisco. Next month, the turbine unit will be installed. No major problems have been encountered other than a volcanic eruption, a country-wide strike, miscellaneous earthquakes, and the usual blizzards. Unless additional minor problems arise, the October deadline will be met. The entire project will have taken less than 2 years.

Hawaii Geothermal Project

The first well (HHP-A) in the Hawaii Geothermal Project reached a T.D. of 6,445 feet on April 27, 1976. Temperature measurements in the hole have been obtained only as deep as 5,950 feet resulting in a maximum indicated temperature of 540°F at 4,600 feet. The well is to be completed with 7 inch liner to T.D. followed by static and flow testing which will continue into late summer. Until the liner is run and testing begins, (about mid June), the well will be monitored for temperature and mud fluid level. It will probably be late June or early July before it can be determined whether an economically developable geothermal reservoir exists.

Nevada

Geothermal Leases Awarded

Geothermal leases on more than 33,500 acres of national resource lands in Washoe and Pershing Counties were up for bid on January 20, 1976, in Reno. The leasing units are within three known Geothermal Resource Areas (KGRA's) identified as having a large potential for geothermal energy development. Three leasing units totaling 5,700 acres are in the Fly Ranch KGRA in the Granite Peak area north of Gerlach, Washoe and Pershing Counties; eleven leasing units totaling 22,600 acres are within the Gerlach KGRA surrounding the city of Gerlach; and three leasing units of land totaling 5,200 acres are within the San Emidio Desert KGRA about 20 miles south of Gerlach.

Oregon

Klamath Falls KGRA Leasing Units Offered

Fifteen leasing units totaling 4,954.34 acres within the Klamath Falls KGRA, in Klamath County, Oregon have been offered for geothermal leasing through sealed bids by the Oregon State Office of the Bureau of Land Management. Bids were due May 13, 1976.

California

Imperial County

TRW Imperial Valley Investigations Planned

On March 1, TRW Systems Inc. signed a contract with ERDA's Division of Geothermal Energy according to two TRW Managers: Bob Douglass, Manager of Ocean and Energy Systems Projects and Joe Kennedy, Manager of Geothermal Programs.

TRW will design limited geothermal testing facilities at East Mesa, California, to test subsystems and components. This limited general purpose test facility will not be a complete production loop.

TRW has signed, as well, a contract with Bureau of Reclamation. Under this contract, TRW will gather reservoir information at the same East Mesa site. The final goal of both investigations is to understand the production potential and longevity of the East Mesa field.

Imperial Valley contract awarded to Lawrence Livermore Laboratory

Lawrence Livermore Laboratory has received a \$500,000 contract from the Energy Research and Development Administration (ERDA) to provide technical assistance to a joint San Diego Gas & Electric (SDG&E) and ERDA sponsored geothermal project in the Imperial Valley of California.

The purpose of the joint project is to determine the technical and economic feasibility of harnessing the area's high saline geothermal brines and to gain information on the extent and characteristics of the geothermal reservoir at the site.

The project involves construction and operation of a 10 megawatt size system in which clean steam would be extracted from the brine in a series of four stages of separators and steam scrubbers. The steam would be passed through heat exchangers to vaporize a secondary fluid which could ultimately be used to drive turbogenerators.

Dr. Roy Austin, leader of the LLL geothermal program, said that the LLL effort will consist of relevant complementary research to develop basic information on the processes critical to system operation, and to provide technical assistance as needed.

In particular, LLL will conduct a major effort to evaluate the potential mechanisms governing precipitation and scaling, identification and characterization of the brine chemistry as it passes through the system, and identification of corrosion mechanisms of critical plant components. This effort will involve testing and evaluation of alternate approaches to potential problems.

In addition, the LLL program will include assisting SDGE in reservoir characterization, assessing reinjection of spent brines, and evaluating overall system performance.

Imperial County Grant

The planning study that is a result of the grant awarded to Imperial County by the National Science Foundation (Hot Line, December 1975) is proceeding close to schedule. The study, which began in June 1975, is slated for completion by June, 1977. The County has sub-contracted the research portion of the study to U.C. Riverside and Cal Tech. To date, progress reports on the research have been completed on management, resource assessment, engineering, geography, sociology, economics, and land use.

The ultimate goal of the study is to help the County Planning Commission plan for expected geothermal development in the Imperial Valley. This will hopefully facilitate geothermal development, mitigate undesirable impacts of geothermal development, and provide a basis for reasonable county regulation.

Salton Sea Geothermal Field Test Facility

The construction phase of the San Diego Gas and Electric Company's 10mw pilot test facility in the Salton Sea Geothermal Field (Hot Line, May and September 1975) was completed in March. The first component start-up and testing began in January and the testing of the last system, the brine handling facility, is scheduled for May. The first actual geothermal fluid throughput will take place late in May following completion of all testing.

The plant will utilize a 4-stage flash separation system which will deliver steam to an iso-butane heat exchange system. The pressurized, vaporized iso-butane will be passed across a throttling valve which simulates a turbine generator, causing the pressure drop.

Production will be from two Magma wells, "Magmamax" 1 and "Woolsey" 1, and spent fluids will be injected into "Magmamax" 2 and 3, located about three-fourths of a mile from the test plant.

East Mesa

A Geothermal Component Test Facility where private industry, universities and government agencies can test equipment and material for converting geothermal resources into useful forms of energy, is being built in the Imperial Valley on The Bureau of Reclamation site at East Mesa. The project is a joint undertaking of the Energy Research and Development Administration (ERDA) and the Department of the Interior's Bureau of Reclamation, with the Lawrence Berkeley Laboratory providing technical and administrative support.

The Bureau has developed the site since 1971 for investigation of the feasibility of desalting thermal fluids to provide a new source of fresh water for the Lower Colorado River Basin. The geothermal testing will not affect this continuing desalting investigation. The site now contains two pilot desalting plants, laboratories, warehouse and office space and support facilities. ERDA-financed construction will include a new shop and laboratory, roads and paving, pipelines and plumbing and test pads. ERDA also will rework three existing Bureau wells to provide higher yields.

Construction of the initial phase at the site will be completed by late summer. However, small-scale test operations may begin immediately, using existing Bureau of Reclamation facilities. Interested parties are asked to write or call Eric Festin, Facilities Coordinator, Lawrence Berkeley Laboratory, Berkeley, CA, 94720, (415) 843-2740, Ext. 5036, for further information and/or a copy of a User's General Information Booklet.

Lassen County

Funding Authorized for Susanville Program

On December 16, 1975, a geothermal energy system for the city of Susanville, California was approved as Public Law 94-156. Congress authorized a \$1 million program to conduct additional geoscientific research in the area, to select a site and to drill and test an exploration well.

The Geysers Geothermal Field

Deepest Well Drilled at The Geysers

The deepest well in The Geysers R.G.F.A. reached a drilled depth of 10,240' (3121m) on April 28, 1976. The total vertical depth was 10,181' (3109m). The well, "Davies Estate" 3 drilled by Burmah Oil and Gas Co. is presently shut-in. Formerly, "DX State"

24 was the record holder at 10,006' (3050m) T.V.D. and was completed to steam production during July 1975.

New Geysers Power Plants

Four power plants at The Geysers are currently in the planning and permitting process.

Power plants 12, 14, and 15 have received California P.U.C. "Certificates of Public Convenience and Necessity." Unit 13 approval was held up pending evaluation of reports from P.G.&E. and California Department of Fish and Game concerning nesting areas of the peregrine falcon. The C.P.U.C. will hold an additional hearing on June 21 and 22 on the falcon issue.

The Sonoma County Board of Supervisors has granted a land use permit for Unit 12. The Sonoma County Board of Zoning Adjustments hearing date for Units 14 and 15 is scheduled for June 24. If not contested, the Board of Zoning Adjustment's decision will be the final county permit for the 2 Units.

Another permit, the "Authority to construct" must be issued by the appropriate Air Pollution Control District. To date, only Unit 12 is under consideration, and a decision by the Northern Sonoma County Air Pollution Control District is expected about June 18.

P.G.&E. has the capability to construct all four plants simultaneously and hopes to begin the 2-year construction phase of Units 12, 14, and 15 this year before the rainy season. If all the permits are obtained, Unit 13 construction should begin in March of 1977. By late 1978 or early 1979, an additional 410MW capacity would be generated by these four units to bring the total electrical generating capacity at The Geysers to over 900MW.

Lake County

Air Pollution Study Planned

An agreement was reached February 23, 1976, between Lake County, California and Meteorology Research Inc. For \$14,025.00, a study of effects of geothermal development on air quality and pollution in the county will be undertaken.

Geysers Lease Sale Planned

A lease sale of tracts of land west of The Geysers' original KGRA is tentatively scheduled for next September according to Melvin Clausen, District Manager of the BLM's Ukiah office. Leases on four tracts of land, averaging 1,350 acres each, will probably be offered for sale. Land in this area, which will not be leased, includes habitat areas of the peregrine falcon, buffer zones along streams, and all land in Napa County.

San Bernardino County

BLM Studies Geothermal Leases

Three closely grouped areas of national resource lands in San Bernardino County, California, may be valuable for geothermal steam, according to the Bureau of Land Management. The USGS had identified a portion of the largest of the three as a Known Geothermal source Area. Subsurface temperatures in the KGRA have been measured at 125° centigrade.

The BLM has received 44 applications for leases in the three areas. Before the leases can be awarded, an environmental impact analysis of the impact of the leasing must be made. The BLM is now working on this analysis.

Open Records for Geothermal Wells in California

The records of many of California's producing geothermal wells on file with the Division of Oil and Gas become public records this summer. Senate Bill No. 345, passed during the last session of the Legislature, states that the records of any owner or operator on file with the Division, including production records, will become public records for the purposes of the California Public Records Act on July 1, 1976. The effect of this legislation will be to open the records of many wells at The Geysers Geothermal Field only. However, an owner or operator may delay this step by requesting confidentiality. In such a case, the records will not become public until five years from the date of commercial production.

The State Oil and Gas Supervisor may extend the period of confidentiality in increments of six months for two additional years, provided that a written request documenting extenuating circumstances is submitted for each six month increment.

A hearing on proposed Division of Oil and Gas regulations to govern the disclosure and inspection of public records was held on May 12, 1976.

Copies of the final regulations will be available from the Division of Oil and Gas, 1416 Ninth Street, Room 1316-35, Sacramento, California 95814, about mid-June.

University of California, Riverside

The Institute of Geophysics and Planetary Physics of the University of California at Riverside is sponsoring a topical conference on the Geothermal Resources of the Imperial Valley, California. The conference will be held on June 17th and 18th at the Lake Arrowhead Conference Center. The conference will be preceded by a two day field trip to the Imperial Valley on June 15th and 16th. If you are interested in presenting a paper, attending the conference and/or the field trip, call (714) 787-4507 or write Shawn Blehler, Institute of Geophysics and Planetary Physics, U.C. Riverside, Ca. 92502

Federal Government

Comments on ERDA Loan Program Available

Comments on the ERDA-proposed loan guaranty program are available to the public. The Federal Register for March 16, 1976, page 11076, lists ERDA offices where these comments can be read and copied. The California location is: San Francisco Operations Office, ERDA, 1333 Broadway, Wells Fargo Building, Oakland, California 94616.

Competitive Lease Sale Action Schedule as of: 3/17/76

The lease sale dates are those provided by the State Directors of BLM. Lease sale dates are tentative until public notice is issued 30 days prior to sale.

LOCATION OF KGRA	LATEST SALE DATE SCHEDULED	ORIGINAL SALE DATE
BRADY-HAZEN, BEOWAWE, HOT SPRINGS POINT, SAN EMILIO DESERT, NV	6/15/76	6/15/76
CRANE CREEK, CASTLE CREEK, MOUNTAIN HOME, ID	6/23/76	5/27/76
RANDBURG, CA	7/13/76	5/06/76
MONTE NEVA, COLORADO, RYE PATCH, RUBY VALLEY, NV	8/18/76	8/18/76
BOULDER, MARYSVILLE, MT	8/30/76	4/05/76
THE GEYSERS-CALISTOGA, RANDBURG, CA	9/15/76	3/25/75
SUMMIT LAKE, OR	9/23/76	7/22/76

LEACH HOT SPRINGS, NV	10/14/76	10/14/76
BACA LOCATION ONE, SAN YSIDRO, NM	10/27/76	10/21/75
RAFT RIVER, ID	11/17/76	11/17/76
BACA LOCATION ONE, NM	12/08/76	12/08/76
MONO-LONG VALLEY, CA	3/15/77	4/15/76
BACA LOCATION ONE, NM	3/30/77	3/30/77
PINTO HOT SPRINGS, NV	4/19/77	4/19/77
RADIUM SPRINGS, NM	5/25/77	5/25/77
LOWER FRISCO, GILA SPRING, NM	5/24/78	5/24/78
VULCAN, ID	10/12/78	7/15/76

1977 U.S.G.S. Geothermal Budget

In 1977, the United States Geological Survey Geothermal Resource Assessment budget will be reduced by \$6 million. The \$9 million allotted for this activity in 1976 has been cut back to \$3 million for 1977. This reduction will result in the elimination of U.S.G.S. extramural research programs funded at educational institutions throughout the country.

CONFERENCES

Electrochemical Society Symposia

The Electrochemical Society Symposia will meet from October 17-22, 1976, in Las Vegas, Nevada. Each Division of the Society will hold a separate Symposium. The theme of the Corrosion and Electrothermics and Metallurgy Divisions Symposium will be: Corrosion Encountered in Energy Extraction from Geothermal Brines and Steams. Special attention will be given to research on chloride-ion attack and pressures ranging from 15 to 500 psi. Keynote papers from invited speakers will be presented and contributed papers are solicited. Send suggestions and inquiries to the Symposium Chairman: P. B. Needham, Jr., U.S. Bureau of Mines, College Park Metallurgy Research Center, College Park, MD 20740.

Marysville Workshop Planned for Fall

Scheduled for sometime during the fall of 1976, is a workshop on scientific results of the Marysville drilling project. The workshop will be held under the auspices of the NSF and in conjunction with a university.

A final report has been issued on the geothermal anomaly at Marysville, Montana, near Helena. Because the down-hole temperature is near 200°F at this site, high temperature geothermal development is not feasible.

The NSF spent over \$2.2 million on research and drilling for the Marysville project. Drilling was done during the summer and fall of 1974.

Susanville Geothermal Energy Workshop

The Susanville Geothermal Energy Project Workshop is scheduled for July 14-16, at Lassen Community College Campus in Susanville, California. Because of limited accommodations, federal, state, and local government representatives should register early.

Publications

Long Valley Geothermal Papers Published

Several papers concerning the U.S. Geological Survey research in Long Valley, California, were presented at the American Geophysical Union meeting in December 1973. These papers, now expanded and improved, have been published in the February 10, 1976 issue of the *Journal of Geophysical Research*, v.81, n.5. This issue contains 12 papers on the geophysics, geochemistry, hydrology, and petrology of the geothermal area. Republic Geothermal is now drilling on a federal lease in Long Valley and will be able to test the Geological Survey predictions.

Evaluation of Geothermal Activity in Truckee Meadows, Washoe County, Nevada (Report 25)

Published by the Nevada Bureau of Mines and Geology in cooperation with the Center for Water Resources Research of the Desert Research Institute. Copies available from the Nevada Bureau of Mines and Geology, University of Nevada, Reno, Nevada 89507. Price \$2.50.

This report describes the geothermal waters of the Truckee Meadows, lists areas in which hot water occurs, and discusses present geothermal installations and factors involved in designing efficient heating systems.

Proceedings First Geopressured Geothermal Energy Conference, Texas

Edited by Myron H. Dorfman and Richard W. Deller, Center for Energy Studies and Energy Research and Development Administration. Available from the Center for Energy Studies, EMS 305, The University of Texas at Austin, Austin, Texas 78712, Attn: Mrs. Phyllis Smith. Price \$12.50 (Make checks payable to the University of Texas at Austin) 369p.

Engineering Geology of The Geysers Geothermal Resource Area; Lake, Mendocino, and Sonoma Counties, California

Special Report 122, by G. Forrest Bacon, Perry Y. Amimoto, Roger W. Sherburne, and James E. Slosson. Published by and available from the California Division of Mines and Geology, 1416 Ninth Street, Room 1341, Sacramento, California 95814. Price \$3.50, 35 pages.

Multipurpose Use of Geothermal Energy, Oregon

The International Conference on Geothermal Energy for Industrial, Agricultural, and Commercial-Residential Uses was held October 7-9, 1974, on the campus of the Oregon Institute of Technology. Copies of the proceedings are available. Called Multipurpose Use of Geothermal Energy, the book is 250 pages long and contains seventeen conference papers. To order, write the Campus Bookstore, Oregon Institute of Technology, Klamath Falls, Oregon 97601. The price, per copy, is \$9.50 postpaid. Make checks payable to the Campus Bookstore.

Publications Available From NTIS

The National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151, has the following publications for sale:

Economic Evaluation Manual

September 1975, by Scientific Software Corporation, PB 217-640/6WB, 337 p., \$10.00. This manual gives the documentation for the GUESS computer model used in the pre-sale

evaluation of federal lands in known geothermal resources areas. Scientific Software Corporation wrote this program under a contract from the U.S. Geological Survey, Conservation Division.

Two reports from Geothermal Energy issued by ERDA are also available:

ERDA-37 "Stimulation of Geothermal Energy Resources" \$4.00

ERDA-86 "Definition Report: Geothermal Energy Research Development and Demonstration Program" \$5.45

AEG Field Trip Available

1976 Field Trip, May 22, 1976. The Geysers Geothermal Field, Sonoma County is now available - \$3.00 each. Send requests to: Mr. Paul Weidig, Association of Engineering Geologists, Sacramento Section, P. O. Box 15422, Sacramento, Ca. 95813.

WHO TO CONTACT IN CALIFORNIA REGULATORY AGENCIES FOR GEOTHERMAL INFORMATION

Mr. George J. Taylor
Deputy Executive Officer
Air Resources Board
1709 Eleventh Street
Sacramento, Ca. 95814

Mr. Richard T. Forester
Associate Wildlife Manager - Biologist
Department of Fish & Game
1416 Ninth Street
Sacramento, Ca. 95814

Mr. Franklin Frank
Planning Coordinator
Division of Forestry
1416 Ninth Street
Sacramento, Ca. 95814

Mr. Mel Schrecongost
Acting Geothermal Officer
Division of Oil & Gas
1416 Ninth Street, Rm. 1316-35
Sacramento, Ca. 95814

Mr. William R. Johnson, Secretary
Public Utilities Commission
State Building
San Francisco, Ca. 94102

Mr. D. J. Everitts, Mgr.
Energy & Mineral Resources Development
State Lands Division
100 Ocean Gate - Suite 300
Long Beach, Ca. 90802

Mr. Robert H. Paschall
Senior Petroleum & Mining Appraisal
Engineer
Board of Equalization
1020 N Street
Sacramento, Ca. 95814

Mr. Irving Goldberg, Chief
Environmental Radiation Control Unit
Department of Health
714 P Street
Sacramento, Ca. 95814

Mr. Dave Chambers, Chief
Division of Industrial Safety
P. O. Box 603
San Francisco, Ca. 94101

Mr. Steve Larson, Chief
Office of Governmental Affairs
Energy Resources Conservation &
Development Commission
1111 Howe Avenue
Sacramento, Ca. 95825

Mr. Alvin L. Franks
State Water Resources Control Board
P. O. Box 100
Sacramento, Ca. 95801

71256 VINNOMTVO 'OLNEMWEDVS
66-9181 WOOH 'LSEHLS HEMIN 9171
DIVISION OF OIL AND GAS
STATE OF CALIFORNIA

GEOHERMAL HOT LINE

*A periodic publication of the
California Division of Oil and Gas*

Lewis A. Moran, Director
Department of Conservation

Harold W. Bertholf
Oil and Gas Supervisor

Mal Schrecongost, Editor
Don Lande, Asst. Editor
Jack Miller, Asst. Editor

1416 Ninth Street, Room 1316-35
Sacramento, CA 95814
(916) 445-9686