DOE/ET/27194--T7

G.R.I.P.S. COMMISSION

2628 MENDOCINO AVENUE, SANTA ROSA, CALIFORNIA 95401 (707) 527-2025

MASTER

FINAL REPORT
G.R.I.P.S. ACTIVITIES IN THE DEVELOPMENT OF
DIRECT USE OF GEOTHERMAL RESOURCES AND
SMALL-SCALE GEOTHERMAL-POWER DEVELOPMENT.

DOE/ET/27194--T7

DE82 002842

SUBMITTED TO
U.S. DEPARTMENT OF ENERGY

OCTOBER, 1981

BY

THE G.R.I.P.S. COMMISSION

WORK PERFORMED UNDER
COOPERATIVE AGREEMENT NO. DE-FC03-79ET27194

NOTICE

PORTIONS OF THIS REPORT ARE ILLEGIBLE.

It has been reproduced from the best
available copy to permit the broadest,
possible availability.

Geothermal Research, Information and Planning Services / A California Joint Powers Agency

Lake County
Mendocino County

Napa County
Sonoma County

REPRODUCTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

NOTICE

This report was prepared to document work sponsored by the United States Government. Neither the United States nor its agent, the Department of Energy, nor any Federal employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

ABSTRACT

This report describes the activities of the G.R.I.P.S. Commission staff in the four Geysers-Calistoga KGRA counties (i.e. Lake, Mendocino, Napa, Sonoma) in California in the development of direct use of geothermal resources in small-scale power generation. Activities in the G.R.I.P.S. information and outreach program, workshop presentations, pilot project development, permit processing improvements and Department of Energy reporting are described.

TABLE OF CONTENTS

Preface	i
Executive Summary	A-1
A. Information and Outreach	A-1
1. Direct Use Geothermal Resource Maps	A-2
a. Purpose of the Maps	A-2
b. Methodology	A-4
c. References Used	A-6
d. Map Uses	A-8
e. Future of the Map Series	A-9
2. Speaking Engagements/Film Presentations	A-11
3. Publications	A-12
4. Direct Use Library	A-14
B. Workshops	B-1
1. Water - The Energy Independence Medium	B-3
2. Water - The Energy Independence Resource for Development	B-5
3. The Public Agency Role in Development of Water as An Energy Resource	B-7
4. Water - An Energy Resource for Agriculture	B-10
5. Geothermal as a Small-Scale Power Source	B-12
C. Project Development Section	C-1
1. Direct Contact	C-1
2. Utilization of the Oregon Institute of Technology	C-3
D. Permitting Procedures	D-1
E. Status Reports to DOE	E-1

ATTACHMENTS

A G.R.I.P.S. Commission Direct Use Project Status Sheet Compilation, July 1, 1981	1-31
B Excerpts from "Direct Utilization of Geothermal Energy: A Technical Handbook"	1-2
C G.R.I.P.S. Brochure 81-1A	1-8
D Water - The Energy Independence Medium Workshop Invitation March 13, 1981	
E Water - The Energy Independence Medium Workshop Program March 13, 1981	

DISCLAIMER

This book was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

ATTACHMENTS (Continued)

- F Water - The Energy Independence Resource for Development Workshop Invitation, April 24, 1981
- G Water - The Energy Independence Resource for Development Workshop Program, April 24, 1981
- H The Public Agency Role in Development of Water as an Energy Resource Workshop Program, April 24, 1981
- I Water - An Energy Resource for Agriculture Workshop Invitation, July 17, 1981
- J Geothermal as a Small-Scale Power Source Workshop Program, October 2, 1981
- K California Assembly Bill 828

PREFACE

During the development of this project, the G.R.I.P.S. Commission membership has included the following people:

Lake County	1980 - Supervisor Ray Mostin
	1981 - Supervisor Jesse Combs
Mendocino County	1980 - Supervisor James Eddie
	1981 - Supervisor Norman deVall
Napa County	- Supervisor Dowell Martz
Sonoma County	- Supervisor Nick Esposti
California Energy Commission	- Commissioner, Suzanne Reed
	Staff, David Hill
U.S. Department of Energy	- Staff, John Crawford

The G.R.I.P.S. staff during the execution of this project have all been involved in varying ways and responsibilities. Executive Director Robert Van Horn was responsible for overall coordination of the project and took the primary role in development and coordination of the Workshops', speaking engagements and publications. Project Coordinator Douglas Caldwell had primary responsibility for project development and the review of the permitting procedures. Research Analyst, Paula Blaydes was responsible for the map development project including the research and design, and supervision of the cartographic work by Deborah Lukens. She was also responsible for coordinating the drafting and printing services provided by the Sonoma County Public Works and Printing Department and the printing of the Overview Map by Lithocraft, Inc. Ms. Blaydes was also responsible for coordinating development of the direct use library and preparation of the

Monthly Reports to the Department of Energy.

Secretary, Sue Ellen Bolt, participated in the research work for the Map Project, established the cataloging system for the direct use library and researched information sources for library materials and ordered them. Secretarial support was provided by Dorothy Ross.

The staff of the Oregon Institute of Technology provided considerable strong support for G.R.I.P.S. activities in project development and Workshop Programs. Gene Ryan and Charles Higbee provided helpful service and input under the strong leadership and participation by Gene Culver.

Agencies making important contributions to the map development program included the U.S. Geological Survey, California Division of Mines and Geology and California Department of Water Resources.

Numerous other agencies contributed to other activities in this program. Of particular note are the California Energy Commission, California Division of Oil and Gas and California State Lands Commission. The speakers on the Workshops are too numerous to list here but their contributions to the success of those programs was inestimable.

Staffs of the four county planning departments have all contributed to the success of the program. Special credit should be given to the Sonoma County Planning Department for the projects they referred to the G.R.I.P.S. Commission, particularly the Boyes Hot Springs project which appears likely to be the first privately financed residential heating district to be developed in the State of California. County Health Department staffs and Regional Water Quality Control Board staffs have all also made special contributions in the development of this program.

EXECUTIVE SUMMARY

This is the Final Report for Cooperative Agreement DE-AC03-03-79ET27194. The original Agreement was approved in August, 1979 and provided a 12-month program for geothermal commercialization activities in the Geysers Area. In August, 1980, the Agreement was amended to shift the area of concentration to the development of direct use of geothermal resources and small-scale geothermal power plants.

The required reports for the first year of activity have already been submitted to the Department of Energy and have been accepted. The report contained herein covers the period from September 1, 1980 to October 31, 1981.

Responsibilities under the Agreement for the past year have been broken into four major activity areas and one reporting area. These are as follows:

ACTIVITIES

1. Development of an information and outreach program
2. The carrying out of Workshops to stimulate interest in the direct use of geothermal resources and small-scale electrical development
3. The development of pilot projects in direct use of geothermal resources
4. The development of recommendations for improving the permitting process related to direct use of geothermal resources

REPORTS

1. Monthly reports to D.O.E. re geothermal activities in the Geysers-Calistoga Area

INFORMATION AND OUTREACH

A series of 21 maps were prepared on U.S.G.S. 15-minute quadrangles showing the locations of known geothermal resources or indicators and including available data regarding them. A small-scale summary map of the G.R.I.P.S. four-county area was also prepared summarizing the information from the 21 large scale maps. The maps will be useful for both the direct use and small scale power production.

Presentations were made to numerous professional and community groups in the four-county area including the City Administrators, engineers, well drillers, etc. These presentations frequently included the screening of the DOE-funded film on geothermal direct use development "A Gift from the Earth".

A handout sheet was prepared showing copies of tables listing potential geothermal uses at various temperatures. A detailed brochure, "Geothermal Direct Use - The Energy Independence Alternative" was prepared and copies distributed through mailings, attendance at the speaking engagements listed above, the G.R.I.P.S. Workshops and meetings of other organizations. This publication provides a brief description of geothermal energy use potential, factors affecting the development, assistance available, and limited descriptions of potential uses.

A library of publications on direct use of geothermal resources was assembled. This library was made available to engineers, well drillers, architects and other technicians involved in development as well as potential developers, researchers and governmental regulatory agencies.

WORKSHOPS

A series of five Workshops were held during the year. These included three devoted to direct use development, one as an orientation for public agencies and one devoted solely to development of small-scale geothermal power plants. Each of the first three had a cosponsoring organization: Sonoma County Drilling Contractors Association; Lake County Chamber of Commerce; and Napa County Farm Bureau. The California Energy Commission considered the Workshop on Small-Scale Geothermal Power Plants important enough to direct that its staff prepare a summary of the proceedings for public distribution.

PROJECT DEVELOPMENT

As a direct result of G.R.I.P.S. Commission activities, the Oregon Institute of Technology has let three contracts for technical assistance to potential project developers. These include: an eighty-four unit condominium development in Boyes Hot Springs, a public facilities heating district in the City of Sonoma and a block square pilot heating district in the City of Calistoga.

Additionally, a number of other projects have been explored some of which it is anticipated will be initiated after completion of the Agreement between the Department of Energy and the G.R.I.P.S. Commission. A description of each of the more significant such projects is included as Attachment A.

PERMITTING PROCESS

One of the Workshops described above provided an orientation for public agency permitting staffs in order to develop recommendations for improving the permitting process. As a result of that Workshop, recommendations were developed and submitted to the appropriate agencies. It appears that improvements in the permitting process will be initiated as a result of these recommendations.

REPORTS

The G.R.I.P.S. staff has provided the DOE Regional Office with monthly written reports on geothermal development in the four-county area. Additionally, as special information has been required, the G.R.I.P.S. staff has forwarded reports and telephone calls to appropriate DOE staff representatives.

G.R.I.P.S. ACTIVITIES IN THE DEVELOPMENT OF
DIRECT USE OF GEOTHERMAL RESOURCES AND
SMALL-SCALE GEOTHERMAL POWER DEVELOPMENT

A. INFORMATION AND OUTREACH

The information outreach activities of the G.R.I.P.S. Commission staff involved four major areas of activity:

1. Direct Use Geothermal Resource Maps
2. Speaking Engagements/Film Presentations
3. Publications
4. Direct Use Library

Each of these activities is explained and the actions taken discussed in the following pages. The following are additional outreach activities carried out under this Agreement.

The G.R.I.P.S. staff maintained an ongoing consulting and exchange of information role with a wide range of individuals and organizations. This included planning consultants, environmental consultants, engineers, well drillers, realtors, landowners, researchers, county and city planning departments, the Sonoma County Water Agency, etc.

There was regular interaction in coordination of project development, research, and planning activities with other DOE funded programs. These included the Earl Warren Legal Institute; the Oregon Institute of Technology Geo-Heat Center; the University of Utah Research Institute; the State of Hawaii Geothermal Assessment Program; Imperial County Geothermal Coordinator; etc.

The G.R.I.P.S. staff set up a meeting for a presentation to the cities and other public agencies in the area who might be involved in the development of heating districts. This meeting provided an orientation to to the DOE/HUD district heating grant program carried out earlier in 1981.

1. DIRECT USE GEOTHERMAL RESOURCE MAPS

a. Purpose of the Maps

There were two mapping projects developed by G.R.I.P.S. as a part of the Direct Use Contract with D.O.E. The objective of these map projects was to identify existing low-temperature resources in the four county area which, in G.R.I.P.S. outreach program to the public, would allow people to see the potential in the area for geothermal direct uses.

The first mapping project titled G.R.I.P.S. "Direct Use Geothermal Map Series" consists of a series of maps covering the G.R.I.P.S. four county region which show existing resource locations of 70°F (20°C) or greater at a scale of 1:62,500.

The second mapping project, titled "Overview of Potential Direct Use Geothermal Resources in Lake, Mendocino, Napa and Sonoma Counties, California", is an overview of all four counties on a single map sheet at a scale of 1:250,000. Large areas with high potential for resources suitable for direct uses were shaded pink and individual resource sites that lie outside of these generalized areas were shown in red with their accompanying identification number. This number corresponds to information of the 1:62,500 G.R.I.P.S. Map Series which is indexed on the Overview Map. This allows someone looking at the Overview Map who desires more detail to request the appropriate 1:62,500 sheet.

These map projects are unique because for the first time the information from previous maps and reports is combined onto one Map Series using a consistent scale. Much data had previously been published but many reports did not include maps, or the maps only showed

a portion of the study area. Most of the maps already published were each at a different scale. For instance, the California Division of Mines and Geology published an excellent map of the entire state, however, it included only the well-known resources of the area and was at the scale of 1:750,000. This was appropriate for their project but was not as detailed as was desirable for this project.

These maps were designed to be an educational tool which would illustrate the amount of potential low temperature resources within the four counties. It is hoped they will serve as a tool to encourage the development of resources for direct uses and small scale power production. By designing the maps in the blue-line or diazzo print method, it is easy to update as additional information becomes available. It also means it is extremely economical to reproduce in mass.

b. Methodology

Since these projects did not include field work, extensive research was conducted before the map work could be started. Although numerous leads for data were investigated, frequently the data was incomplete or its validity was questionable. Since there was

neither the equipment, personnel, or time available to field check this questionable data, it was not used to avoid misleading the users.

Existing wells in the Geysers steam field were not included in the map projects because the type of data we were interested in such as temperatures, depth, water quality, etc. is considered proprietary data by the operators. Also, the steam wells are not viable prospects for direct uses due to their remote and inaccessible location. For anyone interested in wells in the steam field, the Division of Oil and Gas has an excellent map series of the area showing the status and location of wells.

It was the intent to be as inclusive as possible in the G.R.I.P.S. Map Series, however, most of the information we were searching for comes from domestic water wells. Because few "geothermal" exploration wells have been drilled (with the exception of in Calistoga and "Wildcat" wells in Lake, Napa, and Mendocino counties) outside of the Geysers steam field, most of the data had to come from domestic water well drilling operations. Records are kept for domestic water wells by the State Department of Water Resources (DWR). However, water well drillers do not need to record temperatures, nor do they usually have the equipment to do so.

Hitting warm or hot water while drilling has been considered a nuisance to them in the past when they have been drilling for a domestic water supply. Therefore, after examining numerous DWR well records, the useable data obtained was minimal.

After G.R.I.P.S. staged a Workshop for the water well drillers which explained the potential for direct uses of geothermal, many of them recognized the value of warm water.

It was through the well drillers that information on a few previously unknown resources was discovered. They are an excellent ongoing source of information.

In order for these maps to continue to be a valuable source of resource information, they would need to be updated periodically. New information could be obtained for updates from the well drillers and county agencies now that they are aware of the value of the information.

c. References Used

The major sources of information used for preparation of the Map Series were the U.S. Geological Survey Geotherm Files, 1981, which are stored in the computerized data base in the U.S.G.S. office, Resource Analysis,

at Menlo Park, CA: and the California Division of Mines and Geology Map entitled "Geothermal Resources of California, 1980".

Those two sources represented a major portion of the data used for the Map Series. Additional information was obtained from Julie Donnelly-Nolan of the U.S.G.S. whose reports had not been included in the Geotherm Files of the U.S.G.S. The reports are: "Chemical Analysis of Waters from Springs and Wells from the Clearlake Volcanic Area, Northern California" by J.M. Thompson, F.E. Goff, J.M. Donnelly of the U.S. Geological Survey, Menlo Park, CA Open File Report 78-425 and a report which will be released as an open file report soon, "Compilation of Data for 249 Spring and Well Waters in the Geysers-Clear Lake Region, Northern California" by F.E. Goff, J.M. Donnelly and others, U.S.G.S., Menlo Park, CA. Another report and map from which additional data was used was the California Division of Mines and Geology San Francisco Office updating of the Santa Rosa 1:250,000 scale quadrangle of the State Geologic Map. The Department of Water Resources "Groundwater Survey of Sonoma County, Bulletin 118" provided listings for a few of the sites.

The G.R.I.P.S. Commission records include data obtained on specific locations in Sonoma County from the Sonoma County Water Agency Records. On a few of these sites, additional temperature data was verified by on-site temperature measurements conducted by staff from the Oregon Institute of Technology under their D.O.E. assistance contract.

It is noted that each of the sources listed was a cumulative source in itself. That is, data previously published are included in the sources such as Waring's work of 1915 and works done by Berkstresser, 1968, etc. so that the research conducted on the maps was much more complete than it appears. Much additional data was reviewed but not used because it was already included in the works that were listed above.

d. Map Uses

Both map projects have been distributed to all government agencies: local, state and federal; that are involved in geothermal development as well as major research organizations such as Lawrence Berkeley Labs and Los Alamos National Laboratory. However, the majority of the maps have been requested by private firms. Many of these firms have already worked in

geothermal (MCR Geothermal, Union, GRI Operator Corporation, etc.) others are interested in familiarizing themselves with the resources in the area for possible uses and/or work in the future. GRI Operator Corporation values the Map Series enough to pay for duplicates of the originals which they will use for in-house working maps. Many of the maps have gone to consulting firms; property owners; water well drillers; air conditioning, heating and ventilating contractors; architects; engineers and geologists.

The map projects have been an excellent aid for the G.R.I.P.S. staff in answering inquiries regarding resource locations, temperatures, water quality and depth.

e. Future of the Map Series

It is very possible the maps will become more valuable in the future as an information source if conventional energy costs continue rising and greater interest in utilizing the lower temperature resource develops. Again, it would be important to keep them updated to be as useful as possible.

They also make a valuable planning tool for the planning departments. The maps provide a way for the Planning Departments and other agencies to be aware of the location of resources for referral purposes. Sonoma County Planning Department has suggested that developers with projects located where there is a known resource consider utilizing it for space heating.

Each county planning department will receive a set of reproducible originals for the Map Series for their respective county. It is hoped the counties will choose to continue to update them when they have accumulated enough data from new wells or actual direct use projects to make it worth doing. However, it must be realized this will be a low priority for them so it would be better to have a state or federal agency take over the responsibility for updates.

It would be desirable for at least one set of the Map Series to remain in its entirety where it would be accessible for reproduction or reference. Although DOE paid for the development of the Map Series, it does not seem highly feasible for them to either have the inhouse capabilities to update them, nor the justification for allocating the funds for the job. The U.S.G.S. is another possibility for placement.

The logical place for a complete set to go would be to a state agency involved in geothermal development, particularly direct uses.

A full set of maps for reproduction will be placed with the Small-Scale Power Producers Section of the California Energy Commission and they can make them available to the Division of Oil and Gas or Mines and Geology if either agency wishes to pursue the project.

2. SPEAKING ENGAGEMENTS/FILM PRESENTATIONS

G.R.I.P.S. staff circularized information regarding the availability of staff and of the DOE sponsored film "Gift from the Earth" (which had been purchased by the G.R.I.P.S. Commission). As a result of these efforts, a number of organizations invited the G.R.I.P.S. Commission staff to either make presentations or present the film or both. These groups were varied as shown by the following list: Redwood Empire Civil and Mechanical Engineering Associations; the Farm/Ranch Conference; Sonoma County Economic Development Board; North Coast City Managers Association; Sonoma County Energy Commission; Mendocino County Alternate Energy Fair; Cloverdale Energy Fair; etc.

Members of the G.R.I.P.S. staff developed a scenario, visual aids, and selected excerpts from the film "Gift from the Earth" for an appearance on the local cable television program of the Sonoma County Public Information Office.

In response to a suggestion from the Regional Office, the Executive Director assisted a private consultant in the program planning and was a program participant for a Workshop on direct use which was carried out in Lake County in November, 1980.

The G.R.I.P.S. staff assisted the Project Coordinator in development of curriculum for a special training program on energy and man's environment which was developed by the Sonoma County School Superintendent's office under a grant from the Pacific Gas and Electric Company.

3. PUBLICATIONS

The G.R.I.P.S. staff printed two tables from the Geothermal Resources Council publication "Direct Utilization of Geothermal Energy: A Technical Handbook" for distribution to people interested in determining what uses were potential for the geothermal resource (see Attachment B).

The major publication of the Commission during this Agreement period has been the pamphlet entitled "Geothermal Direct Use - The Energy Independence Alternative, G.R.I.P.S. Commission Information Brochure 81-1 and 81-1A". This brochure provides general information to prospective direct use geothermal developers on the following topics: Geothermal Energy; Location of the Geothermal Resource; Modern Direct Use Applications; Energy Requirements; Permits; County Planning Departments and State and Federal Agencies; Environmental Requirements; Economic Feasibility; Financial Support; Additional Assistance; G.R.I.P.S. Commission Assistance and Outreach; and, Geothermal Direct Use Applications - Selected Temperature Ranges.

The brochure was first issued as Information Brochure 81-1 with a printing of 500 copies. This brochure was subsequently revised when it became necessary to order 1,000 more copies. The 81-1A version reflected changes that had occurred in policies and in informational and other resources available at different levels of government.

This brochure has proven very useful at meetings, planning department counters, and other locations where interested citizens may obtain copies.

4. DIRECT USE LIBRARY

Prior to the initiation of the current DOE direct use Cooperative Contract, the G.R.I.P.S. staff periodically picked up publications related to the direct use of geothermal resources. Subsequent to initiation of the Agreement, there was a concentrated effort to build a comprehensive library. This resulted in the development of a collection which includes over 120 books, pamphlets and documents.

These have been of considerable value as G.R.I.P.S. staff has provided information to people interested in developing their resources. Additionally it has been used as a "lending library" and users have included technical people such as engineers, architects and drilling contractors; property owners; researchers; environmental consultants; other public agencies; etc.

G.R.I.P.S. obtained extra copies of those publications of the Oregon Institute of Technology Geo-Heat Center which were made a part of the basic collection. These extra copies have been distributed on an as-needed basis both to people who have dropped into the office and to people who have attended meetings and Workshops and have requested them.

G.R.I.P.S. also acted as the "middle person" for distribution of publications of the Geothermal Resources Council which are useful to people who are developing direct utilization of geothermal resources. These have been particularly valuable to the architects, engineers, well drillers and other technical people.

G.R.I.P.S. COMMISSION

WORKSHOP REPORT

B. WORKSHOPS

Introduction:

Under the Cooperative Agreement with the U.S. Department of Energy, the G.R.I.P.S. Commission staff was directed to hold a series of Workshops in the four counties. The purpose of these Workshops was to bring together local developers, public officials, users, technical experts and the public to stimulate interest in profitable direct use and small-scale electrical geothermal applications. The following is a list of the Workshops:

1. Water - The Energy Independence Medium
2. Water - The Energy Independence Resource for Development
3. The Public Agency Role in Development of Water as an Energy Resource
4. Water - An Energy Resource for Agriculture
5. Geothermal as a Small-Scale Power Source.

The following report gives the details of each Workshop G.R.I.P.S. has held to date. Included, as attachments are the programs, invitations and brochures used for the Workshops.

In addition to the programs with speakers and visual aids, each Workshop featured publications the attendees could order from either the Geothermal Resources Council or the Oregon Institute of Technology. G.R.I.P.S. also prepared a brochure with the basics of direct uses, including historical uses; a guide to the permitting process; pertinent names, addresses and phone numbers (see Attachment C).

The Workshops provided an opportunity for outreach to the communities about direct uses of geothermal resources that would not have existed without the G.R.I.P.S. Commission activities.

G.R.I.P.S. COMMISSION
WORKSHOP REPORT

1. WATER - THE ENERGY INDEPENDENCE MEDIUM

Friday, March 13, 1981 - 1:00 - 4:30 PM
A Workshop on the Use of Well and Geothermal Water for
Heating and Air Conditioning

Location: El Rancho Tropicana
Vin Rose/Chablis Room
2200 Santa Rosa Avenue
Santa Rosa, CA 95402

The Workshop was cosponsored by the Associated Drilling
Contractors of Sonoma County.

Invitations were sent to all of the following organizations
listed in the phone books of Lake, Mendocino, Napa and
Sonoma counties (see Attachment D):

Water Well & Drilling Services
Pump Dealers
Architects
Heat Pump Distributors
Heating and Ventilating Contractors
Plumbing Contractors
Air Conditioning, Heating & Ventilating Engineers
Wholesale Manufacturers of Air Conditioning
Equipment and Systems, Supplies and Parts

The following people were invited in addition to those
already listed from phone directories:

Well Drillers used by the Industrial Geothermal Concerns
All Four County Planning Directors
All Four County Building Permit Inspectors
Health Inspectors from all Four Counties that
Inspect Water Wells
Representatives from the California Division of
Mines and Geology
Representatives of the Associated Drilling Contractors
of California

All together, approximately 500 invitations were sent.

GOALS: This Workshop targeted those who needed basic "how-to" information, such as questions on technical and regulatory details. Also, it was felt important for the attendees to hear the experiences from designers of local projects.

These goals were accomplished by:

Showing the film "A Gift from the Earth" (which provides a basic orientation to direct uses of geothermal resources); presentations from the designers of two local projects; three speakers with presentations on Technical Resources (G.R.I.P.S., California Division of Mines and Geology, Oregon Institute of Technology); and two speakers from government agencies with regulatory authority. Please see Attachment E for a copy of the program.

ATTENDANCE:

Approximately 80 people attended. The following numbers are an estimate of who attended the Workshop:

Well Drillers and/or Pump Co.	21
Misc. Private Businesses (unable to discern their type of business)	19
Government Representatives (elected and nonelected)	10
Engineers	5
Plumbing Contractors	5
Solar Companies	5
Organizations Associated with Electrical Generation from Geothermal	4
Air Conditioning, Heating & Ventilating	3
Architects	3
Mechanical Engineers	2
Contractors	2
Geothermal Resources Council	1
TOTAL	80

2. WATER - THE ENERGY INDEPENDENCE RESOURCE FOR DEVELOPMENT

Friday, April 24, 1981 - 1:00 - 4:30 PM

A Workshop on the Use of Well and Geothermal Water as an Energy Source in Residential, Industrial and Commercial Development

Location: Quail Run Fitness Center - Quail Room
1279 Craig Avenue
Lakeport, CA 95453

The Workshop was cosponsored by the Lake County Chamber of Commerce.

Invitations were sent to approximately three hundred people (see Attachment F). The list included (a number of committees from the Lake County Chamber of Commerce):

- Banks and Savings and Loans
- Lake County Officials
- News Media
- Retail Business Committee
- Industrial Business Committee
- Advertising Committee
- Geothermal Committee
- Lake County Chamber Board of Directors
- Lake County Board of Trade
- Lake County Real Estate Agencies
- Lake County Contractors Exchange
- Geothermal Development Companies
- Assorted Engineers from the Four Counties
- Geothermal Coordinating Committees
- Lake County Direct Use Utilization Committee
- D.O.E. State Commercialization Teams
- Construction Companies
- Lumber Companies
- Pool Companies
- U.S. Department of Energy

GOALS: The goal of this Workshop was to reach the business and professional people involved in residential, industrial and commercial development in the Lake County Area.

There were two major panels with each panel participant giving an individual presentation with an opportunity for the audience to direct questions to any, or all of the panel members after they had spoken. After the film, "A Gift From the Earth" was shown, the Project Development panel addressed: the Susanville developments; water source heat pumps; financing for district heating projects; and the basics of economic analysis for some existing direct use systems (for speaker details, see Attachment G).

"Development Assistance" was the title for the second panel. In addition to the G.R.I.P.S. Executive Director, the speakers for this panel included: a representative from Magma Power discussing the recycling of their well in Brady, Nevada for the vegetable dehydration plant; a representative from the California Energy Commission explaining their support programs; a representative from the Oregon Institute of Technology informing the audience of their assistance programs.

ATTENDANCE:

Over 40 people attended this Workshop. A rough estimate of the affiliations of the attendees are listed below:

Interested Citizens/Farmers	15
Government Representatives	12
Businesses Associated with Geothermal	3
Citizens Groups	3
Misc. Businesses	3
Geologists	2
Air Conditioning, Heating & Ventilating	
Businesses	3
Realtors	1
Engineers	<u>1</u>
TOTAL	43

3. THE PUBLIC AGENCY ROLE IN DEVELOPMENT OF WATER AS AN ENERGY RESOURCE

Friday, May 29, 1981 9:30 - 3:30 PM
A Workshop on Permitting, Planning and Administration
of Geothermal Direct Use Projects

Location: Napa County Administrative Bldg.
1195 Third Street
Napa, CA 94558

This Workshop was sponsored solely by the G.R.I.P.S. Commission. Invitations were sent to eighty-five individuals from all levels of government, local, state and federal (see Attachment H).

A summary of the organizations invited is listed below:

Sonoma County Water Agency
All Four County Health Departments
City Managers of Santa Rosa, Napa, Healdsburg
Clearlake, St. Helena, Sebastopol
Planning Directors of all Four Counties Plus
Staff from Healdsburg, Rohnert Park, Calistoga,
Ukiah, Santa Rosa, Sebastopol
County Supervisors with Geothermal Resources
in Their Districts
All Four G.R.I.P.S. Commissioners
U.S. Department of Energy
California State Energy Commission
State Water Resources Control Board
Central Valley Regional Water Quality Control Board
North Coast Regional Water Quality Control Board
State Lands Commission
Public Utilities Commission
Department of Water Resources
State Department of Health
Division of Oil and Gas
Department of Fish & Game
State Parks and Recreation
County Counsels for all Four Counties
City Attorneys of Santa Rosa, Sebastopol, Clearlake,
Ukiah, Calistoga and Healdsburg
Governor's Office of Planning and Research
Directors of Public Works or City Engineers from
Imperial County, City of Santa Rosa, City of
Sonoma, Lakeport

All Four County Administrators
Sonoma County Energy Coordinator
Earl Warren Legal Institute

GOAL: The purpose of this Workshop was to provide an opportunity for those officials responsible for permitting, planning and administering geothermal resources in the Lake, Mendocino, Napa and Sonoma County areas to receive an orientation in the direct use of geothermal resources and to address issues important to regulating the development of these resources.

Issues addressed were as follows:

WATER QUALITY

State and local agency roles in review and permitting of geothermal direct use projects
Cooperative arrangements for these processes

PLANNING

Review and permitting requirements
Long range responsibilities in resource development and protection

RESOURCE UTILITY REGULATION

PUC, city and county roles in district formation
Incorporation in a city or county system

The Workshop format included the film "A Gift from the Earth" preceeding the panel discussions in the morning and Work Sessions in the afternoon. For details regarding the individual speakers presentations, please see Attachment H. The speakers were representatives from the regulatory agencies pertinent to the topics listed above. The issue of water quality was covered by the California Division of Oil and Gas, the Central Valley Regional Water Quality Control Board and the Sonoma County Environmental Health Department. The topic of Planning was covered by representatives from the

Sonoma County Planning Department and the California Energy Commission. The topic of Resource Utility Regulation was addressed by representatives from the Earl Warren Legal Institute, the Public Utilities Commission, and the City Attorney from Santa Rosa.

Attendees at the Workshop numbered 21 plus the G.R.I.P.S. Staff. The levels of government were represented as follows:

State Agencies	10
County Government	5
City Government	5
Earl Warren Legal Institute	<u>1</u>
TOTAL	21

4. WATER - AN ENERGY RESOURCE FOR AGRICULTURE

Friday, July 17, 1981 - 1:00 - 4:30 PM
A Workshop on the Use of Well and Geothermal Water
as an Energy Source for Agribusiness Activities and
Heating and Cooling of Farm Facilities

Location: Robert Mondavi Winery - Wineyard Room
7801 Saint Helena Highway
Oakville, CA 94562

The Workshop was cosponsored by the Napa County Farm
Bureau. Approximately six hundred invitations were
mailed out to the following organizations (those listed
in the four county phone directories):

Water Well Drilling Services
Pumps
Architects
Heat Pumps
Contractors - Heating and Ventilating
Plumbing Contractors
Engineers - Air Conditioning, Heat & Ventilating
Air Conditioning Equipment and Systems, Supplies,
and Parts, Wholesale Manufacturers

Also,

Industrial Geothermal Segment Well Drillers
All Four County Planning Departments
All Four County Building Permits Inspectors
All Four County Environmental Health Inspectors
(Water Well Inspectors)
Representatives from the CA Division of Oil and Gas
Associated Drilling Contractors of CA

GOAL: To alert the agribusiness concerns of the Napa Valley
to the potential of using both groundwater with
heat pumps and low to medium temperature geothermal
water with heat exchangers or heat pumps as an
alternative energy system. These alternatives
could be used for agricultural growing, processing
and space conditioning activities.

The film "A Gift from the Earth" was followed by speakers from the Oregon Institute of Technology, a representative from the Bio-Mass Department of Brown and Caldwell, and the Vice President and General Manager of Biotherm Engineering (for further details, see Attachment I). The topics discussed covered: the potential for agribusiness uses in Napa County; geothermal heated greenhouses; the engineering aspects of using geothermal waters; using wine industry wastes for energy production; and the financial aspects of using geothermal.

Attendance at the Workshop numbered over 50 (not all attendees signed in). A breakdown of the attendees is listed below:

Misc. Businesses (unknown type)	8
Government Representatives	7
Ranchers/Farmers/Wineries	7
Heating, Refrigeration & Air Conditioning	7
Architects	4
Pump Suppliers/Drillers	4
Geothermal Industry	4
Citizens	4
Geologists	2
Engineers	<u>2</u>
TOTAL	49

5. GEOTHERMAL AS A SMALL-SCALE POWER SOURCE

Friday, October 2, 1981 - 9:30 - 5:00 PM

A Workshop on the Financing and Development of Alternative Approaches in the Use of Geothermal Resources to Operate a Small-Scale Electric Power Generating Plant - 100KW-10MG

Location: El Rancho Tropicana - Rainbow Room
2200 Santa Rosa Avenue
Santa Rosa, CA 95402

The Workshop was sponsored solely by the G.R.I.P.S. Commission. Approximately 800 invitations were mailed out. These included all members of the Geothermal Resources Council who are located in California; representatives of the following types of organizations: utility companies, geothermal developers, engineers, federal, state and local agencies, well drillers, state and federal legislators, State Lands Commission, United States Bureau of Land Management, the planning directors of all four county planning departments.

GOAL: To provide information on the current status of development of small-scale power geothermal power production and the problems associated with it, information regarding economic viability and relationship to development of large scale power production.

Following an opening session discussion of economic and financial factors by speakers from the Ben Holt Company and the Pacific Gas and Electric Company, there were presentations on six different small-scale projects by representatives of engineering firms, research organizations, a utility district, manufacturers and consulting firms (see Attachment J).

Attendance at the Workshop numbered over 110 (some attendees may not have signed in). A breakdown of the attendees follows:

G.R.I.P.S. COMMISSION
WORKSHOP REPORT (Continued)
Page 11

Exploration	16
Drilling and Completion	15
Reservoir Assessment	2
Engineering	40
Economics	3
Hardware Manufacturing	5
Financing	6
Management and Planning	12
Legal and Institutional	6
Resource Owners	2
Utilities	2
	<u>110</u>

B-14

C. PROJECT DEVELOPMENT SECTION

The G.R.I.P.S. staff has been involved in a number of efforts to initiate direct use pilot projects within the four county area during the period of this contract. These have taken two primary directions:

1. Direct contact with potential developers; and
2. Use of the services of the Oregon Institute of Technology Geo-Heat Center

1. DIRECT CONTACT

The G.R.I.P.S. office became aware of potential project opportunities by a number of methods: contacts following G.R.I.P.S. Workshops; contacts following presentations by G.R.I.P.S. staff to private groups such as engineers, well drillers, city managers, etc.; contacts from potential developers who read our brochures; follow-up on information developed in preparation of geothermal resource maps; referrals by county planning departments; etc.

In pursuing these contacts, G.R.I.P.S. Commission staff offered a number of services. These included assistance in contacting technicians such as well drillers, engineers, etc.; assistance in calculating heat and cooling load requirements; research into equipment potential; contact with permitting agencies; review of permitting requirements; information on how to determine availability and viability of the resource; etc.

The G.R.I.P.S. staff provided assistance to a Lake County pear farmer who proposed development an alcohol production plant utilizing biomass; set up appointments with processing system developers; provided information on alterantive financial resources; provided copies of materials from G.R.I.P.S. office library on geothermal and alcohol production; arranged meetings with potential resource agencies.

The various projects which were active as of July 1, 1981, are included in Attachment A, "G.R.I.P.S. Commission Direct Use Project Status Sheet Compilation - July 1, 1981".

2. UTILIZATION OF THE OREGON INSTITUTE OF TECHNOLOGY

The staff of the Oregon Institute of Technology was used in two ways:

- a. In the development of subcontracts for services; and
- b. Review of project potential.

As a direct result of contact initiated by the G.R.I.P.S. staff between the Oregon Institute of Technology and three potential project developers, OIT provided subcontracts for services related to development of these projects. These included: the City of Sonoma project for heating City and State Park buildings in the City Square; the Boyes Hot Springs construction of 84 units of condominiums; and the City of Calistoga one block downtown pilot heating district.

Among the other projects for which OIT has provided advice in response to G.R.I.P.S. Commission requests have been the following: the Maxwell Farms proposed development of 66 duplex units near the City of Sonoma; consideration of development of a heating district by the City of Sebastopol; heating and cooling of the Sonoma County Administration Center; development of the Fred Pritchard single family home heating system as a downhole heat exchanger pilot project; and consideration of development of geothermal resources in the 1,260 acre Fountain Grove Ranch

development which will include recreational,
industrial, commercial and residential construction.

All of these projects are in the developmental stage and culmination of the efforts will not occur until after completion of the G.R.I.P.S. contract with D.O.E. on October 31, 1981. It would be difficult if not impossible to project which of the projects will follow through in development of their geothermal resources.

D. PERMITTING PROCEDURES

A key element in the Cooperative Agreement has been our review of the permitting procedures for direct use of geothermal resources. Our activities have been concentrated in three main directions: the May 29, 1981, Workshop on "The Public Agency Role in Development of Water As An Energy Resource"; follow-up to the Workshop and development of specific recommendations of changes in well drilling permitting procedures; and, support for the passage of California Assembly Bill 828.

The Workshop brought together people responsible for permitting geothermal development from the state and local levels. The topics covered included: an Orientation by O.I.T. Representatives; Water Quality; Planning; Resource Utility Regulation.

The discussions at the Workshop provided the basis for the drafting of a proposal to set up a coordinated well drilling permit procedure among the state and local agencies involved in such permits. This draft was distributed in September, 1981, and a meeting was held on October 9, 1981, to review the proposal. Participants will be drafting an agreement during late October and it is anticipated that the State Energy Commission will work with them in the formalization of this agreement after the G.R.I.P.S./D.O.E. Agreement is terminated. That Agreement provided that G.R.I.P.S.

make recommendations in this area and it would appear that these recommendations will be acted upon within a short period after the completion of the Agreement.

The permitting procedures of the State Division of Oil and Gas have been oriented toward requirements to protect the public and the environment from the kinds of problems that can develop in the sinking of the deep wells seeking high temperature steam and water. As a result of our discussions with the California Division of Oil and Gas, they have had a Bill introduced in the State Legislature which will reduce the restraints for the development of low temperature resources for direct utilization. A copy of their Bill, AB 828, is enclosed as Attachment K. The G.R.I.P.S. Commission has gone on record as being in support of this legislation and it appears that it will receive approval when the State Legislature reconvenes in 1982.

E. STATUS REPORTS TO DOE

The Cooperative Agreement included a requirement for continuing review of all geothermal activities and reports to DOE on pertinent developments. We maintained a monthly reporting system to provide the primary basis for this activity.

In addition to the written reports, the G.R.I.P.S. Executive Director and other members of the G.R.I.P.S. staff have regularly made telephone reports to the DOE Contract Manager and other DOE staff. There have been at least weekly and sometimes more frequent calls.

ATTACHMENT A

G.R.I.P.S. COMMISSION DIRECT USE

PROJECT STATUS SHEET COMPILATION

JULY 1, 1981

G.R.I.P.S. COMMISSION DIRECT USE

PROJECT STATUS SHEET COMPILATION

JULY 1, 1981

<u>Name of Project</u>	<u>County</u>
Boyes Hot Springs	Sonoma
Brandy Storehouse Conversion	Sonoma
City of Calistoga - Heating District	Napa
Fountain Grove Ranch	Sonoma
Golden Residence	Sonoma
Kings Court	Napa
Konocti Harbor Inn - Heating System	Lake
Lake County Performing Arts Center	Lake
Maxwell Farms	Sonoma
Mount View Hotel	Napa
Pritchard Residence	Napa
Rohnert Park School District	Sonoma
Sebastopol Heating District	Sonoma
Sonoma Heating District	Sonoma
Sonoma County Administration Center	Sonoma
Sonoma Mission Inn	Sonoma
Timbercrest Farms	Sonoma
Warren Watkins Residence	Sonoma
W.H. Hill Company	Napa
Wine Valley Inn	Napa

(7/23/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT BOYES HOT SPRINGS
DEVELOPER --- NAME FRANK OMAN
FIRM Frank Oman Construction
ADDRESS 1860 Roca
CITY/STATE Santa Rosa, CA ZIP 95401
TELEPHONE(S) (415) 883-5921

PROJECT LOCATION: North Side of Boyes Blvd. on the east side of the Sonoma Creek

WELL CHARACTERISTICS: TEMPERATURE 150 ([°]F) 65 ([°]C) WILL BE DRILLING NEW WELL
DEPTH 128-140 (M) 420-460 (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/24/81) At the end of June or the beginning of July, I spoke to Dan Vandament to see if Frank Oman had given the go ahead for the drilling of a new well. Dan indicated that Frank had not been in contact with him in this matter and he assumed that Frank was waiting for more favorable interest rates before proceeding. I have not heard anything more recent than that.

Condominiums may be heated, cooled by geothermal steam

The county's first major use of geothermal heating and cooling may be at an 89-unit condominium development at 301 Boyes Blvd., Boyes Hot Springs.

The Sonoma County Board of Zoning Adjustments Thursday night approved developer Frank Oman's application for a use permit for the project and ruled that it will have no harmful effect on the environment.

The 12.69-acre site is the location of the former Boyes Hot Springs mineral water bottling plant and warm springs bath. While the developer is not bound to use the geother-

mal heat source by terms of the use permit, that use was strongly recommended by the planning staff.

The developer is investigating its feasibility.

The proposal is for 38 one-story, one-bedroom units, 20 split-level two-bedroom units and 31 two-story, two-bedroom units. Recreation areas will include a pool and warm water spa in a clearing beside the Sonoma Creek channel, which borders part of the parcel, and scattered picnic sites.

The clustered buildings were designed by Robert E. Eklund of Novato.

(7/23/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT Brandy Storehouse Conversion
DEVELOPER --- NAME J. T. Devine
FIRM Robert E. Anderson Associates, Architects
ADDRESS 138 Weeks Way
CITY/STATE Sebastopol, CA ZIP 95472
TELEPHONE(S) (707) 829-1323

PROJECT LOCATION: City of Sebastopol

WELL CHARACTERISTICS: TEMPERATURE 54 ([°]F) 12 ([°]C)
DEPTH 102 (M) 336 (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/23/81) On July 16, 1981, Gene Ryan and I met with J. T. Devine. Developing some rough figures, Gene Ryan estimated that it would take approximately 450 gallons per minute if we could put 5° into the water. He estimated that the 30,000 square foot structure could be cooled in this way by running water through coils in front of a fan. Gene suggested the possibility of getting a Westinghouse Templefier heat pump for the heating cycle alone since this is more efficient. We discussed the need for an injection well downstream from the production well. Also discussed was the desireability of linking a bank construction project next door to the Brandy Warehouse project in order to make the project more cost effective.

Work to Do (7/23/81) -- J. T. Devine was going to develop heating load calculations & recheck his cooling load calculations, and review the various approaches to the project suggested by Gene Ryan.

(7/23/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT City of Calistoga Heating District

DEVELOPER --- NAME City of Calistoga

FIRM City of Calistoga

ADDRESS 1232 Washington Street

CITY/STATE Calistoga, CA ZIP 94515

TELEPHONE(S) (707) 942-6215

PROJECT LOCATION: Central Business District, City of Calistoga

WELL CHARACTERISTICS: TEMPERATURE _____ (°F) _____ (°C)

DEPTH _____ (M) _____ (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/24/81) Doug Caldwell has had no recent contact with this project
as of this date.

Work to be Done (7/24/81) -- Obtain more recent information on the status of AB 1905
discretionary funds.

DIRECT USE PROJECT STATUS SHEET

NAME OF PROJECT Fountain Grove Ranch

DEVELOPER --- NAME (Owner Developer) Bob Fitzpatrick (Please see reverse side)

FIRM TMI Corporation

ADDRESS _____

CITY/STATE _____ ZIP _____

TELEPHONE(S) (714) 640-0123 or (707) 542-6737 or (707) 542-6451

PROJECT LOCATION: Mendocino Avenue at U.S. 101

WELL CHARACTERISTICS: TEMPERATURE _____ (°F) _____ (°C)

DEPTH _____ (M) _____ (FT)

G.R.I.P.S. STAFF ASSIGNED

STATUS -- DATE()

Other Information: Architect - Larry Simons

Rich Carlile (Brelje, Race, Cardini & Carlile)

PLANNERS ADVANCE IT TO CITY COUNCIL

Fountain Grove wins approval

By CLARK MASON

Fountain Grove — the huge housing, industrial, recreational and commercial development described as "practically a new city or town" — won the approval of Santa Rosa Planning Commissioners Thursday over the objections of environmentalists.

About 10 speakers urged the commission to postpone a decision until Fountain Grove can be studied in conjunction with the impacts it will have on Sonoma County along with similar-sized developments in Petaluma and Rohnert Park.

Opponents also said 400 acres of county land included in the 1,260-acre Fountain Grove Ranch development should be deleted from plans and not be annexed to the city, to lessen the growth-inducing impacts to the surrounding area.

Reflecting the feelings of the majority of speakers, Martha Bentley of the Madrone Audubon Society said Sonoma County is rapidly on its way to becoming another Santa Clara Valley, or "Silicon Valley North."

Fountain Grove will create a housing imbalance and gobble up agricultural land, Bentley said, causing "a terrible burden and dreadful problems" on all citizens in the county.

But the commission unanimously approved a

rezoning and annexation that clears the way for the project. Fountain Grove now needs approval of the City Council, which probably will consider it in about a month.

The only condition that received a noticeable objection from the developer was a provision that could give the city seven acres at Fountain Grove to develop low-income housing.

At the suggestion of Commissioner Ritch Burkart, the commission approved 4-3 the stipulation that if a seven-acre parcel the developer will donate for a school site is not actually needed for a school, then the city can have the parcel to develop low-income housing.

Affordable housing at Fountain Grove has been a prime issue, with an environmental impact report on the project stating that almost three-quarters of the 2,750 people employed at Fountain Grove businesses probably will not be able to afford the homes there.

The Association of Bay Area Governments also believes there should be 1,000 more homes than the 1,450 in the proposal.

Commissioners Marvin Hyman, Stuart Katte and Charles Evans voted against donating the seven-acre school site parcel to the city with the option of developing low-income housing. Besides

Burkart, commissioners Robert Zeni, Helen Bamber, and Bart Holmes voted for the provision.

Alan Butler, an engineer and planner with Brelje and Race, which represents the developer — Teachers Management & Investment — said later that the low-income housing stipulation on the school site smacks of "inclusionary zoning," or unfairly mandates a certain percentage of low-cost housing.

Judith Bauman, representing the National Association for the Advancement of Colored People, was among those advocating low-income housing on the site. The housing was also supported by Andrea Learned representing Citizens for Affordable Housing and Sonoma County People For Economic Opportunity.

But it was the growth-inducing potential of Fountain Grove, especially in conjunction with two other huge housing and industrial developments planned in Sonoma County, that worried most speakers.

Marty Robbins of Sonoma County Farmlands Group, said three proposed projects — the 581-acre Frates Ranch industrial park-residential development in Petaluma, the 314-acre Hewlett-

(Continued on Back Page)

Development

Packard electronics plant and housing community in Rohnert Park and Fountain Grove — will generate an estimated 50,000 new jobs, directly and indirectly. That will create more demand for housing than the area can support, she said. Robbins urged that all three projects be studied together instead of being approved piecemeal.

Her group, which is concerned with the preservation of farmland, maintains that for every new person moving to Sonoma County, one acre of farmland is taken out of production. She said 5,000 acres of farmland are lost every year in Sonoma County.

Other speakers said grazing land will be lost when Fountain Grove is developed. But Bruce Aspinall, a planning consultant for TMI, said the grazing potential is extremely limited at Fountain Grove and there is no productive farmland like that at the other two sites in Rohnert Park and Petaluma. Fountain Grove is "rocky, hilly and not arable," said Aspinall.

Robert Walter, former owner of the ranch, said the only reason the land is grazed is to reduce the fire potential.

"That kind of grass doesn't produce fattened animals. It's like trying to fatten up on green lettuce," said Walter.

Aspinall also pointed out that Fountain Grove does not involve any amendments to the city's general plan or altering of the ultimate urban boundaries, as with the other two projects.

City Planner Chuck Regalia said there is no

need to consider Fountain Grove in conjunction with the two other projects because it is consistent with the city general plan and county industrial study.

In actuality, officials say the real battle over Fountain Grove was fought in 1971 when it was originally approved. Developers are seeking approval for a slightly revamped project this time. The basic difference is the addition of a 208-acre resort/golf course. Originally approved plans included the industrial park, commercial uses, hotel and motels.

Barbara Meyn of Environmental Forum of Sonoma County argued that current city government should not feel obligated to the plan approved 10 years ago.

"I imagine some of you must feel a little as some of us feel," she told planners. "As if our parents had contracted us in marriage while we were still children to someone we haven't seen yet. It wasn't until 1979 that we met our spouse to be — TMI."

The most compelling reason against approving Fountain Grove, Meyn said, is the pressure for further growth and annexation it will create on adjacent Cloverleaf Ranch and the 500-acre Walter property. Both property owners will expect the same consideration as TMI, she said. Meyn added that pressures for development will be felt in the Mark West-Reibli area because the city limits will be extended virtually to Mark

West Springs Road.

Meyn, like others, said even though the city will have the capacity to treat the one million gallons a day of sewage generated by Fountain Grove, finding a way to dispose of the treated effluent, or wastewater, will be a challenge.

In the latest proposal, there are about 25 more acres of industrial land, for a total of 157 acres. That is intended for corporate headquarters and clean non-polluting manufacturing plants. TMI is being required to donate 37 acres to a lakeside public park site. There are 126 acres of commercial zoning, with the balance, about 730 acres, going to housing.

The housing density varies considerably from area to area on the huge ranch, however. On the 400 acres planned for annexation, only 59 homes are planned, plus a couple holes of the golf course. In contrast, there are 850 to 1,120 units of cluster housing planned on 166 acres.

Consultants say the hilly terrain hampers the development of less costly housing and lends itself to large-lot "custom" homes.

Newly seated Planning Chairman Bart Holmes said there is little the city can do to ensure low-cost housing anywhere. The responsibility rests with the federal government to lower interest rates, he said.

Holmes said the city could give away land but it would not necessarily mean low-cost housing could be financially feasible on it.

Map shows Fountain Grove development area

(7/23/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT (Single Family Dwelling)

DEVELOPER --- NAME Doris Golden and Carl

FIRM _____

ADDRESS 1355 Elysian Park Drive

CITY/STATE Los Angeles, CA ZIP 90026

TELEPHONE(S) (714) 299-9064

PROJECT LOCATION: South side of Dry Creek Road on West Side of Freeway 101 at
the western edge of Healdsburg.

WELL CHARACTERISTICS: TEMPERATURE 66 (^{°F}) 18.87 (^{°C})

DEPTH 853.01 (M) 260 (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/23/81) On June 25, 1981, I told Stan Keniston, the Architect for the project, that the main problem that had to be dealt with was the disposal of the water after it is used in the heat pump. I indicated to him that the North Coast Regional Water Quality Control Board needs to know what the proposed disposal system would be. I mentioned the possibility of using a decorative pond or swimming pool, and we discussed reinjection. Stan Keniston indicated that he would follow up in a discussion with Carl Golden, and would come forth with some sort of a proposal. I had a subsequent telephone conversation with Carl Golden, and he indicated that he was in the process of moving to Healdsburg to oversee construction of the house. He said he would let me know what his telephone number is once he arrives. Subsequent to that telephone conversation, the County Employees went on strike and I am sure the

(Continued on Reverse Side)

Work to Do (7/23/81) -- I am awaiting word from either Stan Keniston or Carl Golden as to what they propose in regard to the disposal of the water. Once we learn that, we can proceed to contact Dave Snetsinger at the Regional Water Quality Control Board to obtain their approval for pursuing the project.

Status of Project (Continued) (7/23/81) -- building plans have gotten delayed in the County Building Department. Therefore, Carl does not have a valid building permit to proceed with the construction.

(7/23/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT KINGS COURT

DEVELOPER --- NAME Paul T. Reynolds

FIRM ECM

ADDRESS 3000 Cleveland Avenue

CITY/STATE Santa Rosa, CA ZIP 95401

TELEPHONE(S) (707) 528-3222

PROJECT LOCATION: Brannon Street, Calistoga, CA 95451

WELL CHARACTERISTICS: TEMPERATURE _____ (°F) _____ (°C)

DEPTH _____ (M) _____ (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(4/22/81) The project is in the preliminary design state. They are interested in using geothermal to heat the units, want information on what is involved in this and information in regard to the resource in the immediate vicinity. Gene Culver met with Paul on 4/22/81 and gave him information on using geothermal. Douglas Caldow will provide information about the resource in the area.

(7/23/81) -- On July 16, 1981, Gene Ryan and I met with Paul Reynolds to discuss the project. The previous week Paul had obtained the necessary approvals and permits from the City of Calistoga to proceed with the project, and hoped to get underway shortly.

(Continued on Reverse Side)

Work to Do: (7/23/81) -- Paul was going to recheck the heat load calculations, and obtain cooling load calculations. Doug Caldow was to obtain info on the static water level of nearby wells and information on pump tests and hydraulic gradient. Gene would take this data and provide flow diagrams for heating and cooling cycles. He would also provide coil sizings. He estimated that this would take a couple of weeks after he received the information from Paul and Doug Caldow.

STATUS (Date) 7/23/81 Continued -- He said the total area of the six condominium units would be 7,200 square feet and they would be heavily insulated. He had heat load calculations, however, they appeared to be somewhat high. It was generally agreed that he would need a well 200-300 feet deep, that might have a 12 inch bore with a 10 inch steel casing, and perhaps a convection promoter pipe. Gene was optimistic about both heating and cooling the structures directly using the high temperature geothermal water in the area. The cooling might be handled through a lithium bromide cooler.

(7/23/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT KONOCTI HARBOR INN - HEATING SYSTEM RETROFIT
DEVELOPER --- NAME EARL WHITMORE
FIRM MGR. OF KONOCTI HARBOR INN
ADDRESS 8727 SODA BAY ROAD
CITY/STATE KELSEYVILLE, CA ZIP 95451
TELEPHONE(S) (707) 279-4281

PROJECT LOCATION: _____

WELL CHARACTERISTICS: TEMPERATURE 90 & 97 ([°]F) 32 & 36 ([°]C)
DEPTH _____ (M) _____ (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/24/81) In a letter from Douglas Caldow to Earl Whitmore, an outline of results of the examination of the Inn's heating and cooling systems were included. On the basis of that examination, it appeared that there could easily be a feasible project for heating the rooms in the Inn during the winter and for heating the swimming pools. In a follow-up telephone call by Robert F. Van Horn, Mr. Whitmore indicated that the Inn was having some financial difficulties at the moment and asked that we hold off until the financial situation was clarified. We have heard nothing since that time.

Work to Do (7/24/81) -- A follow-up telephone call to Mr. Whitmore is in order to determine whether the situation has changed.

(7/24/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT Lake County Performing Arts Center

DEVELOPER --- NAME Lyn Stanaitis

FIRM Lake County Performing Arts Council

ADDRESS 100 Forbes Street

CITY/STATE Lakeport, CA ZIP 95453

TELEPHONE(S) (707) 263-5911

PROJECT LOCATION: On the southside of Soda Bay Road in the vicinity of
Konocti Bay

WELL CHARACTERISTICS: TEMPERATURE _____ (°F) _____ (°C)

DEPTH _____ (M) _____ (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/24/81) In a telephone conversation with Lyn Stanaitis in mid-April, she indicated that Kip Neasham had donated the site to them and that it has a geothermal resource on it. They were about to initiate a preliminary economic study to evaluate what sort of facility they will build. They wanted to complete that work prior to getting into the question of using the geothermal resource.

WORK TO DO (7/24/81) -- A follow-up telephone call to Lyn Stanaitis would be in order to find out if the economic study has been completed.

(7/23/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT MAXWELL FARMS - 66 Duplex Units

DEVELOPER --- NAME Wm. Schlangen

FIRM Maxwell Farms

ADDRESS 306 Mendocino Avenue, Suite 512

CITY/STATE Santa Rosa, CA ZIP 95401

TELEPHONE(S) (707) 546-5753

PROJECT LOCATION: Southwest side of the intersection of Highway 12 and Verano Avenue
near Sonoma.

WELL CHARACTERISTICS: TEMPERATURE _____ (°F) _____ (°C) NO WELL

DEPTH _____ (M) _____ (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/23/81) The project was getting hung up over a disagreement
between the County Planning Department and the County Parks Department regarding access
to the development site. Bill has held off pursuing the geothermal heating aspect of
the project until this disagreement between the County Departments is solved, and until
he gets his necessary permit approvals. There is a hearing scheduled before the Planning
Commission today at 5 PM.

Work to Do (7/23/81) -- Follow up in a telephone call with Bill Schlangen to find out
what occurred at the Planning Commission Meeting and inquire what the next step as far
geothermal is concerned.

7/23/81

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT Mount View Hotel

DEVELOPER --- NAME Jack Fredrick

FIRM Aurora Solar

ADDRESS P.O. Box 6692

CITY/STATE Calistoga, CA ZIP 94515

TELEPHONE(S) (707) 942-0374

PROJECT LOCATION: Mount View Hotel, 1457 Lincoln Avenue, Calistoga, CA 94515

WELL CHARACTERISTICS: TEMPERATURE 190 (^oF) 88 (^oC) 7-23-81 Well is currently unused.
DEPTH 79 (M) 260 (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/23/81) Jack Fredericks feels that the project is basically to use the geothermal water for heating the hot water provided to the kitchens and to the rooms in the hotel as well as heating the swimming pool and spa. The hot water is currently heated by gas boilers and the hotel is on the City's Water Supply System. The facility was examined by Jack Fredricks, Gene Ryan and Doug Caldow on 7/16/81.

Work to Do (7/23/81) -- Jack will obtain information on what it takes to heat the pool including such information as pool size, number of gallons, etc. Jack will prepare some initial calculations on the peak January requirements for the hotel.

(7/23/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT SINGLE FAMILY HOUSE
DEVELOPER --- NAME Fred Pritchard
FIRM _____
ADDRESS 1706 Michael Way
CITY/STATE Calistoga, CA ZIP 94515
TELEPHONE(S) (707) 942-6052

PROJECT LOCATION: _____

WELL CHARACTERISTICS: TEMPERATURE 150 ([°]F) 65 ([°]C)
DEPTH 73 (M) 240 (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/23/81) On July 2, 1981, I asked him about the status of the project and he said he had put a 1 1/2 inch diameter black iron pipe loop into the well. At the water level to the surface is a 1 1/4 inch plastic pipe. This downhole heat exchanger has not been connected to the house yet, but he has run 80[°]F water through it and it boosts it from 110[°]-115[°]F. At that time he wondered if this would be sufficient temperature to heat the house. On July 7, 1981, I told him that Gene Culver thinks it is marginal whether there is sufficient heat and flow through the heat exchanger to heat the house and would need to see the make and model of the gas heater and ducting size. Mr. Pritchard will be on vacation until Mid-August.

Work to Do: (7/23/81) Provide information in regard to the make and model number of the gas heater and the ducting size.

(7/23/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT City of Rohnert Park School District

DEVELOPER --- NAME _____

FIRM _____

ADDRESS 6750 Commerce Blvd.

CITY/STATE Rohnert Park, CA ZIP 94928

TELEPHONE(S) (707) 795-2411

PROJECT LOCATION: City of Rohnert Park

WELL CHARACTERISTICS: TEMPERATURE 85-86 ($^{\circ}\text{F}$) 29-30 ($^{\circ}\text{C}$)

DEPTH 4,363 (M) 1,330 (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/24/81) Doug Caldow phoned Jim Davidson of the Rohnert Park School District in Mid-June who felt there was little if any possibility of utilizing the resource by the school district since the Junior High School may never be built & there are no funds to retrofit existing schools. He did indicate that he would get in touch with the Middletown School District since they use the same architects just to inquire about the nature of what would be involved in a geothermal installation in a school. The Division of Mines and Geology Geophysical Team is currently working in Rohnert Park doing the Resource Assessment work.

Work to Do (7/24/81) -- Follow up on the result of the Mines and Geology Geophysical work.

(7/23/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT City of Sebastopol Heating District
DEVELOPER --- NAME Melvin Davis, City Manager
FIRM City of Sebastopol
ADDRESS City Hall, 7120 Bodega Avenue
CITY/STATE Sebastopol, CA ZIP 95472
TELEPHONE(S) (707) 823-7863

PROJECT LOCATION: City of Sebastopol

WELL CHARACTERISTICS: TEMPERATURE 98 & 113 °F 37 & 45 (°C)
1,550 &
DEPTH 472 & 457 (M) 1,500 (FT)

G.R.I.P.S. STAFF ASSIGNED

STATUS -- DATE(7/24/81) Chuck Higbee has prepared figures that represent the present worth of fuel savings over a 20 year period discounted at 12% for a number of large heat using facilities in the City of Sebastopol. Overall not including operating and maintenance costs, it would appear that 8½ million dollars could be spent on a geothermal heating project. Since these are very rough figures, it was determined in a discussion with Gene Culver and myself that it would be worthwhile to attempt to refine the figures. I mentioned this to Mel Davis yesterday and he gave me the telephone numbers and names of the people in the various facilities that Gene could contact for further information. Mel and I have been working on Dave Hill at the California Energy Commission to encourage him to authorize the Division of Mines and

(Continued on Reverse Side)

Work to Do (7/24/81) -- I will send Gene Culver the names and addresses and telephone number of people in the various large energy consuming businesses so that he can contact them. It would probably be worthwhile to follow up with a telephone conversation with Dave Hill to see if he has made any determination about the Division of Mines and Geology Team. Mel is going to stop by Klamath Falls on his vacation and see if

(Continued on Reverse Side)

Status of Project (7/23/81) -- Geology Geophysical Team working in Rohnert Park to also do appropriate geophysical studies in the Sebastopol area.

Work to Do (Continued)(7/24/81) -- he can speak to someone in the City Administration regarding the Heating District they are setting up there and also talk to the people at OIT.

7/23/81

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT City of Sonoma District Heating
DEVELOPER --- NAME Brock Arner, City Manager
FIRM City of Sonoma
ADDRESS No. 1 The Plaza
CITY/STATE Sonoma, CA ZIP 95476
TELEPHONE(S) (707) 938-3681

PROJECT LOCATION: Extending from the City Hall in the center of the City Square
northward towards the new police station and including two or three
State Historical Buildings on the square as (continued on reverse side)

WELL CHARACTERISTICS: TEMPERATURE 75 ([°]F) 24 ([°]C)
DEPTH 76 (M) 250 (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/23/81) The project is still in the initial concept stage. The
City Manager has received authorization from the City Council to investigate the
feasibility of the Project. It is his feeling that it would be best initially
to limit the project to buildings owned by the City and the State rather than compli-
cate the project by bringing in privately owned buildings. In the course of the
meeting between Brock, Gene Ryan, Gene Culver, Chuck Higbee and Doug Caldow, it was
generally agreed that it would be necessary to have at least one or possibly two
production wells and a single injection well which might be located in the center of
the City Square.

WORK TO DO: (7/23/81) -- Brock will obtain the City's PG&E bills for winter months
for each of the City's buildings as well as description of the heating and cooling
systems within each of the buildings. He will also find out how each of the State
Buildings is heated and cooled and what their heating and cooling loads are. The

Present Location: as well as possibly the City Museum.

Work to Do: City also has energy audits for their buildings by PG&E, and he
will make these available to OIT.

(7/23/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT Sonoma County Administration Center

DEVELOPER --- NAME

FIRM County of Sonoma

ADDRESS

CITY/STATE ZIP

TELEPHONE(S)

PROJECT LOCATION: County Administration Center, County of Sonoma, 2555 Mendocino
Avenue, Santa Rosa, CA 95401.

WELL CHARACTERISTICS: TEMPERATURE (°F) (°C)

DEPTH (M) (FT)

G.R.I.P.S. STAFF ASSIGNED

STATUS -- DATE(7/24/81) In early June, a letter was sent to Debra Struhsacker at UURI requesting input on geological work that would be necessary to confirm the existance of the resource in the vicinity of the County Administration Center. Pertinent geologic and nearby well information was sent to Debra at that time. Earlier this week, Paula Blaydes (G.R.I.P.S.) heard that Debra was no longer with UURI.

WORK TO DO (7/24/81) -- Paula Blaydes (G.R.I.P.S.) will follow up next week with the person from UURI that she met in Calistoga earlier this week who will check on the status of our request for assistance.

(7/24/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT Sonoma Mission Inn

DEVELOPER --- NAME Phylis Newton (Project Manager)

FIRM Sonoma Mission Inn

ADDRESS 18140 Sonoma Highway

CITY/STATE Boyes Hot Springs, CA ZIP 95416

TELEPHONE(S) (707) 996-1041 or (707) 996-8132

PROJECT LOCATION: Sonoma Mission Inn near Sonoma, CA

WELL CHARACTERISTICS: TEMPERATURE _____ (°F) _____ (°C)

DEPTH _____ (M) _____ (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/24/81) It would appear that there is insufficient interest on the part of the Sonoma Mission Inn to locate a potential geothermal resource on the site for use to heat the health spa which is being created in an old Quonset hut or to heat the outdoor swimming pool hot tubs, or saunas.

(7/24/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT Timbercrest Farms

DEVELOPER --- NAME Ronald Waltenspiel

FIRM Timbercrest Farms

ADDRESS 4791 Dry Creek Road

CITY/STATE Healdsburg, CA ZIP 95448

TELEPHONE(S) (707) 433-8251

PROJECT LOCATION: On the northeast side of Dry Creek Road, 3-5 miles northwest of
Healdsburg

WELL CHARACTERISTICS: TEMPERATURE _____ (°F) _____ (°C) No well on the property.

DEPTH _____ (M) _____ (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/24/81) In a telephone conversation I had with George Lewis, Plant Foreman, he indicated that he would inquire about other wells in the area to determine if there are any warm wells. They wish to use the geothermal resource in their fruit drying machine in place of propane. Mr. Lewis has not gotten back in touch with us to let us know if there are any warm wells in the vicinity.

WORK TO DO (7/24/81) -- A follow up telephone call to Mr. Lewis would be in order to determine if he has learned anything.

(7/24/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT Warren Watkins Residence

DEVELOPER --- NAME Warren Watkins

FIRM _____

ADDRESS 4890 Bennett Valley Road

CITY/STATE Santa Rosa, CA ZIP 95404

TELEPHONE(S) (707) 545-5701

PROJECT LOCATION: _____

WELL CHARACTERISTICS: TEMPERATURE 70 ([°]F) 25 ([°]C)

DEPTH 85 (M) 280 (FT)

G.R.I.P.S. STAFF ASSIGNED _____

STATUS -- DATE(7/24/81) In a telephone conversation two or three months ago, Mr.

Watkins indicated to Gene Culver that he had an opportunity to acquire a used water
source heat pump and he wondered if Gene thought this would be an appropriate
approach. Gene encouraged Mr. Watkins to proceed with the water source heat pump
installation. We have not heard from Mr. Watkins since that point in time.

WORK TO DO (7/24/81) -- A telephone call to Mr. Watkins would be in order to determine
if he in fact installed the system.

DIRECT USE PROJECT STATUS SHEET

NAME OF PROJECT W. H. HILL COMPANY (WINERY) (William Henry Hill)

DEVELOPER --- NAME Bill Henri

FIRM W. H. Hill Company

ADDRESS P.O. Box 3989

CITY/STATE Napa, CA ZIP 94558

TELEPHONE(S) (707) 224-6565

PROJECT LOCATION: Foss Valley, Napa County - Directly East of Yountville

WELL CHARACTERISTICS: TEMPERATURE _____ (°F) _____ (°C)

DEPTH _____ (M) _____ (FT)

G.R.I.P.S. STAFF ASSIGNED

STATUS -- DATE(8/1/81) Would like to run air conditioner year round to cool the plant and if possible to use as the first stage for steam cleaning. A six acre reservoir within several hundred feet of winery - 1,000 acre foot reservoir within a quarter mile. FIRST PHASE - 20,000 Square Feet of Warehouse - 24 feet high. This warehouse may be doubled in the future. During August- September- October will need heat for steam cleaning.

7-31-81 - Bob Van Horn phoned OIT and discussed briefly. Gene Culver suggested they call Gene Ryan. I called and left a message for Bill Henri. Information is needed on nature of heat load in warehouse and depth of the large reservoir.

(7/24/81)

DIRECT USE PROJECT
STATUS SHEET

NAME OF PROJECT Wine Valley Inn

DEVELOPER --- NAME Dennis McNulty/Connie WILSON

FIRM Alan Nichol Architect (Project Manager)

ADDRESS P.O. Box 369

CITY/STATE Occidental, CA ZIP 95465

TELEPHONE(S) (707) 823-3446

PROJECT LOCATION: Calistoga - Highway 29 and Silverado

WELL CHARACTERISTICS: TEMPERATURE 170-180 (^{°F}) ^{76.59-}82.14 (^{°C})

DEPTH 1,082.68 (M) 330 (FT)

G.R.I.P.S. STAFF ASSIGNED Paula Blaydes

STATUS -- DATE(7/24/81) They will probably start to redrill existing well on September 2 to use as a test hole. Casing is too small to use as a production well, but it can be deepened to add to data about the site.

G.R.I.P.S. Commission, 2628 Mendocino Avenue, Santa Rosa, CA (707) 527-2025
6/1/80

DIRECT UTILIZATION OF GEOTHERMAL ENERGY: A TECHNICAL HANDBOOK*
A Joint Project of the Geothermal Resources Council and the
Geo-Heat Utilization Center, Oregon Institute of Technology, 1979

Edited by

David N. Anderson, Geothermal Resources Council

John W. Lund, Oregon Institute of Technology

Developed under Department of Energy Contract ET-78-G-06-1108

FIGURE 1. The approximate temperature required for various geothermal uses.

FIGURE 11. Application temperature range for some industrial processes and agricultural applications.

ATTACHMENT C

GEOHERMAL DIRECT USE **The Energy Independence Alternative**

G.R.I.P.S. COMMISSION

MEMBERS

Lake County	Supervisor Jesse Combs Alternate Howard D. Day
Mendocino County	Supervisor Norman de Vall Alternate John Cimolino
Napa County	Supervisor Dowell Martz
Sonoma County	Supervisor Nick Esposti
California Energy Commission	Commissioner Suzanne Reed Staff: David Hill
U.S. Department of Energy	Acting Regional Representative: Martin Domagala Staff: John Crawford

STAFF

Executive Director	Robert F. Van Horn
Project Coordinator	Douglas K. Caldwell
Research Analyst	Paula E. Blaydes
Secretary	Sue Ellen Bolt
Secretary	Dorothy A. Ross

This pamphlet was prepared as part of a U.S. Department of Energy Cooperative Agreement DE-FC-03-79ET27194.

Revised April, 1981

Geothermal Research, Information and Planning Services / A California Joint Powers Agency

Lake County
Mendocino County

Napa County
Sonoma County

GEOHERMAL ENERGY

Geothermal energy is the natural heat of the earth. This heat source is a result of the earth's magma coming within close proximity (5-10 miles) of the earth's surface. This hot magma heats water trapped in fractures of subsurface rock. Energy is extracted by drilling wells and bringing the hot water or steam to the surface or by injecting water or some other liquid or gas and circulating it in pipes through the underground geothermal resource.

The Geysers Area has two distinct types of geothermal energy: vapor dominated (steam) and liquid dominated (hot water). Steam, the rarest of the two, occurs when subsurface temperatures are so great that water cannot exist in its liquid form. Hot water occurs as a liquid entrapped in heated porous rocks and in fracture systems. Its temperature can reach 400°F under pressure. Both types of geothermal resources can be utilized as an energy source.

The two major uses of geothermal energy are in the production of electricity and in the extraction of the heat from the resource for direct applications. While the production of electricity has generally been the responsibility of utility companies and government agencies, a wide range of private entrepreneurs, local, state and national level public agencies and combinations thereof have been involved in the development of Direct Use Applications.

LOCATION OF THE GEOHERMAL RESOURCE

The Geysers-Calistoga K.G.R.A. (Known Geothermal Resource Area) has been designated by the U.S. Geological Survey as a major source of the high temperature steam or water required for the generation of power from geothermal energy. This K.G.R.A. extends under parts of Lake, Mendocino, Napa and Sonoma counties and there are several other smaller K.G.R.A.s in the Lake/Mendocino/Napa county area. The existence of water wells with higher than normal temperatures and hot springs in other areas of the four counties indicates that there are geothermal resources outside of the K.G.R.A.s.

Information regarding the K.G.R.A.s' boundaries and the locations of hot springs and warm water wells can be obtained from the

III G.R.I.P.S. Commission. However, the existence of a viable resource in a specific location can only be proven by the sinking of one or more wells.

MODERN DIRECT USE APPLICATIONS

Recent large increases in the cost of traditional fuel sources have focused attention on the two major benefits of Direct Use geothermal developments:

LOWER COSTS:

Viable geothermal projects produce energy below current costs for oil, natural gas or propane gas.

ENERGY INDEPENDENCE:

Use of a local resource (geothermal) shields the user from oil embargoes, changes of governmental policy on production and taxation, shortages, rising prices, etc.

These two factors have stimulated a resurgence in the development of the well-established use of geothermal resources for heating homes and commercial areas: Boise, Idaho since 1890; Klamath Falls, Oregon since 1930; Reykjavik, Iceland since 1928; Reno, Nevada since the 1940's.

These factors have also led to the development of new applications for direct use of geothermal resources. The range of these new projects include: heating of the Oregon Institute of Technology Campus, a wood fabricating plant, apartments and other buildings in Klamath Falls, Oregon; greenhouse cultivation of cucumbers and tomatoes in Susanville, California; pasteurization of milk in Klamath Falls, Oregon; growth of commercially marketed catfish in Buhl, Idaho; dehydration of onions and other vegetables in Brady Hot Springs, Nevada; chicken raising in Japan; timber, pulp and paper drying in New Zealand; heating and cleaning animal husbandry facilities in Hungary.

These projects use geothermal fluids at a variety of temperature ranges. Space heating and cooling utilizes geothermal fluids in the 110-212°F in conventional systems and can economically use

water with temperatures as low as 60°F with the installation of water-to-air or water-to-water heat pumps. Agricultural/aquacultural production use geothermal fluids with temperatures ranging from 70 to 180°F. Industrial processing generally requires temperatures in the higher ranges, 212-350°F.

Development of geothermal resources for Direct Heat Applications may occur on two levels:

- Small individual projects such as the heating of a single home, farm building or a small greenhouse;
- Larger, heavy energy or multiple user facilities such as dehydration of vegetables, a community space heating project, etc.

While the costs may vary between these two levels, there are certain characteristics basic to both. The project must:

- Be justified on the basis of ENERGY REQUIREMENTS
- Have a CONFIRMED RESOURCE
- Receive appropriate PERMITS
- Meet ENVIRONMENTAL REQUIREMENTS
- Have ECONOMIC FEASIBILITY
- Obtain sufficient FINANCIAL SUPPORT

ENERGY REQUIREMENTS

Once it is decided that an energy need might be met by a geothermal direct use application, the basic consideration is the nature of energy requirements. Some of the kinds of questions which must be asked are:

1. Annual requirement for oil, natural gas, propane, electricity
 - in \$
 - in gallons, therms, kilowatt hours, etc.
 - seasonal or other periodic high or low
2. The level of temperature required

: Striking a geothermal resource is like striking a gold vein. Wells sunk within several hundred feet of each other may come up with greatly varied temperature and pressure readings. Critical elements in determining viability include volume, pressure, temperature and chemical composition.

When owners of a major agricultural processing business in the Pacific Northwest chose to drill wells on land they already owned rather than on adjacent land recommended by their consulting geologists, dry holes resulted. The project lost considerable money and may never get started.

Chances of success on a project will be greatly enhanced if geologists, well drillers and other technicians who are competent and, hopefully, experienced in geothermal development, are used.

The Geothermal Resources Council is a professional association of people and organizations who have experience in the field. Their address and phone number are provided in this brochure.

PERMITS

Once the decision is made to begin development of the geothermal resource, several permits may be required in addition to those normally required for development. The magnitude and type of the geothermal operation will usually reflect the kinds of permits, the review time and whether the permits are required from federal and/or state as well as local agencies.

Requirements vary and can depend upon the involved property being on private, state or federal lands or on lands where mineral rights are owned by the State of California or the federal government:

- Drilling permits are required from the California State Division of Oil and Gas.
- Environmental quality agencies may require additional permits, establishing guidelines on air and/or water emissions.

Those who wish to initiate geothermal development should consult local city or county planning departments early in the planning of a project. Where mineral rights are owned by the federal or state governments, they should also be contacted. The California Division of Oil and Gas should also be contacted for any geothermal well development.

COUNTY PLANNING DEPARTMENTS:

Lake County:

255 North Forbes
Lakeport, CA 95453
(707) 263-2221

Mendocino County:

880 North Bush
Mendocino, CA 95482
(707) 468-4281

Napa County:

1195 3rd St., Rm. 210
Napa, CA 94558
(707) 253-4416

Sonoma County:

575 Administration Drive
Santa Rosa, CA 95401
(707) 527-2412

STATE AND FEDERAL AGENCIES:

Division of Oil and Gas:

2904 McBride Lane
Santa Rosa, CA 95401
(707) 525-0479

State Lands Commission:

1807 13th Street
Sacramento, CA 95814
(916) 322-7804

Bureau of Land Management:

P.O. Box 940
555 Leslie Street
Ukiah, CA 95482
(707) 462-3873

ENVIRONMENTAL REQUIREMENTS

The extent of impact on the existing environment will depend upon the size and complexity of a proposed geothermal project. Larger projects involving major construction may well require the preparation of an Environmental Impact Report which describes the project, identifies potential environmental problems and indicates how those problems will be met.

If no significant potential environmental problems are projected, small projects, where the majority of the effort is devoted to drilling a well, may be eligible for a Negative Declaration. This is a brief statement about the project which declares that it is of limited environmental consequence.

The local planning departments listed in the Permits section (page 5) will provide information on whether an Environmental Impact Report is to be required and who should be contacted regarding air or water quality issues.

ECONOMIC FEASIBILITY

Geothermal development projects involve consideration of a number of economic factors not always present in other development activities. Among these are:

- Costs associated with confirming the geothermal resource and making it productive.
- Projections of geothermal production costs as contrasted to projections of costs for other energy sources.
- Projections of how long the resource will be available.
- Estimates of potential for selling the resource either at the temperature it carries out of the ground if the volume is sufficient, or at the temperature left after use by the primary project if there is sufficient heat remaining.
- The cost of providing mitigation for possible environmental impacts.
- The delays which may occur in the resource confirmation, permitting or financing stages.

The developer must carry out a realistic and conservative review of these as well as other site-specific factors in determining an accurate cost assessment for the geothermal project. A feasibility study will help to identify issues, evaluate the project's potential, and provide a foundation for success.

FINANCIAL SUPPORT

Financial assistance and support services are available in the form of tax incentives and technical assistance.

Tax Incentives:

Indirect financial assistance is provided in the form of tax breaks in both federal and state law. These include: credits for residential and business installation costs (fed); depletion allowances (fed); credit on depreciable property (fed); and accelerated amortization (state).

Technical Assistance:

While a number of agencies provide limited, information assistance in the development of projects, D.O.E. has contracted with several universities to provide a maximum of 100 hours of technical assistance on various facets of project development including: resource definition; resource evaluation; engineering evaluations; engineering preconceptual design; material technology.

ADDITIONAL ASSISTANCE

With our nation's recent commitment to alternative energy development, a variety of public and private agencies have been established to provide technical assistance and information concerning geothermal resources. These agencies can provide the potential geothermal developer with invaluable material and are listed below:

FEDERAL: U.S. Department of Energy, Geothermal Division

John Crawford
333 Market Street
San Francisco, CA 94105
(415) 764-7084

DOE provides information and technical assistance for potential geothermal developers

Tom Heenan
1333 Broadway
Oakland, CA 94612
(415) 273-7943

STATE: California Energy Commission

1111 Howe Avenue, MS-66
Sacramento, CA 95825
(916) 920-6054

CEC administers state geothermal funding and can also be an information source

LOCAL: Geothermal Research, Information & Planning Services (G.R.I.P.S.)

Robert F. Van Horn
2628 Mendocino Avenue
Santa Rosa, CA 95401
(707) 527-2025

G.R.I.P.S. is responsible for assisting in geothermal development in the four geothermal resource counties (see next page)

PROFESSIONAL ASSOCIATION: Geothermal Resources Council

David Anderson
P.O. Box 98
Davis, CA 95617
(916) 758-2360

GRC is involved in educational research and can offer technical information concerning geothermal development

Literature is available that explores the application and development of geothermal resources. These suggested readings include:

Geothermal Resources Council, 1979 Special Report #7, Direct Utilization of Geothermal Energy: A Technical Handbook.

Geothermal Resources Council, Special Report #8, Direct Utilization of Geothermal Energy: A Layman's Guide.

Geothermal Resources Council, 1978 Direct Utilization of Geothermal Energy: A Symposium.

U.S. Department of Energy - 1979 Geothermal Investment and Policy Analysis with Evaluation of California and Utah Resource Areas.

G.R.I.P.S. COMMISSION ASSISTANCE AND OUTREACH:

Under contract with the U.S. Department of Energy, the G.R.I.P.S. Commission staff is currently responsible for a number of activities which can be helpful to those considering development of a geothermal direct use project. These include:

- Preparation and maintenance of a series of maps showing the locations of geothermal indicators (hot springs, warm or domestic wells, geothermal wells)
- Maintenance of an informational and technical library for public use
- Workshops on geothermal direct use development, agricultural and technical matters
- Assistance in the development of pilot projects
- A review of regulations and permitting procedures to expedite the process

GEOHERMAL DIRECT USE APPLICATIONS
SELECTED TEMPERATURE RANGES

OF	OC	
392	200	
374	190	
356	180	Refrigeration by ammonia; absorption digestion in paper pulp, Kraft
338	170	
320	160	Drying of fish meat; drying of timber
302	150	
284	140	Drying farm products at high rates; canning of food
266	130	Evaporation in sugar refining
248	120	Fresh water by distillation; most multiple effect evaporations, concentrations of saline solution; refrigeration by medium temperature
230	110	Drying and curing of light aggregate cement slabs
212	100	Drying of organic materials, seaweeds, grass, vegetables, etc. Washing and drying of wool
194	90	Drying of stock fish
176	80	Greenhouses by space heating
158	70	Refrigeration by low temperature
140	60	Animal husbandry; greenhouses by combined space and hotbed heating
122	50	Mushroom growing
104	40	
86	30	Swimming pools, biodegradation, fermentations; warm water for year-round mining in cold climates; de-icing
70	20	Hatching of fish; fish farming

*Space cooling may also be accomplished by using water source heat pumps with 60-80°F water.

Abridged from "Direct Utilization of Geothermal Energy: A Technical Handbook" a Joint Project of the Geothermal Resources Council and the Geo-Heat Utilization Center, Oregon Institute of Technology, 1979.

ATTACHMENT D

ASSOCIATED DRILLING CONTRACTORS

SONOMA COUNTY

G. R. I. P. S. COMMISSION

WATER - THE ENERGY INDEPENDENCE MEDIUM

A WORKSHOP ON THE USE OF
WELL AND GEOTHERMAL WATER
FOR
HEATING AND AIR CONDITIONING

DATE: FRIDAY, MARCH 13, 1981
TIME: 1:00 PM - 4:30 PM
PLACE: EL RANCHO TROPICANA
2200 SANTA ROSA AVENUE
SANTA ROSA, CA 95401
PHONE: (707) 542-3655
THE VIN ROSE/CHABLIS ROOM

The Associated Drilling Contractors of Sonoma County and the G.R.I.P.S. Commission have joined to sponsor this Workshop for business and professional people involved in the development of well water resources, heating and air conditioning in the Redwood Empire Area.

With the continuing steep increases in the cost of conventional energy resources, a great deal of interest has developed in alternative systems. One of the least understood and potentially best sources in the Redwood Empire is the underground water.

Groundwater has potential, both as normal temperature well water using heat pumps and as low to medium temperature geothermal water using heat pumps and or heat exchangers. Cooperation between the various trades, planners, and regulatory agencies could make it a major factor in reducing our needs for other forms of nonrenewable energy in the near future.

- The Associated Drilling Contractors of Sonoma County is a branch of a statewide association of well drilling and or pump contractors whose goals are to improve the industry standards, offer technical knowledge to regulatory agencies, and to protect and promote groundwater.
- The G.R.I.P.S. Commission is a four county Joint Powers Agency established by the Boards of Supervisors of Lake, Mendocino, Napa and Sonoma counties to provide assistance in the development of the geothermal resources which lie under the counties.

P R O G R A M

WELCOME

Warren Toomey, President, Associated Drilling Contractors,
Sonoma County Branch

Nick Esposti, Sonoma County Supervisor,
Chairman, G.R.I.P.S. Commission

WORKSHOP GOALS

Robert Van Horn, Executive Director, G.R.I.P.S. Commission
"A Gift from the Earth"

LOCAL PROJECTS

"Wine Valley Inn - Calistoga"
- John Lewis, Architect
Lewis & Nichol, Architects and Planners, Sebastopol, CA

"Smugglers Inn - Napa"
- Dan Vandamint, Mechanical Engineer, Mill Valley, CA

TECHNICAL RESOURCES

"Heat Pumps, Down Hole Heat Exchangers and Other Technology"
Gene Culver, Technical Assistance, Program Director
Oregon Institute of Technology, Klamath Falls, Oregon

"Geothermal Resource Identification in Redwood Empire Area"
Les Youngs, Principal Investigator - Calistoga Project
California Division of Mines and Geology

"Information, Outreach and Technical Assistance"
Robert Van Horn, Executive Director, G.R.I.P.S. Commission

PERMITS AND REGULATIONS

"Geothermal Well Drilling"
Ken Stelling, Geothermal District Engineer,
California State Division of Oil and Gas, Santa Rosa, CA

"Water Disposal Regulations"
David Snetsinger, Sanitary Engineering Associate
Regional Water Quality Control Board, Santa Rosa, CA

WATER - THE ENERGY INDEPENDENCE MEDIUM
WORKSHOP

Sponsored by: The Associated Drilling
Contractors of Sonoma County
Warren Toomey, President
(707) 433-3419

El Rancho Tropicana
Vin Rose-Chablis Room
2200 Santa Rosa Avenue
Santa Rosa, CA 95401

March 13, 1981
1:30 - 4:30 PM

and

The G.R.I.P.S. Commission
2628 Mendocino Avenue
Santa Rosa, CA 95401
(707) 527-2025

PLEASE RSVP: The G.R.I.P.S. Commission - (707) 527-2025

If you have any questions or require any additional information in regard to this
WORKSHOP, please contact either organization above.

FIRST CLASS MAIL

ATTACHMENT E

ASSOCIATED DRILLING CONTRACTORS

SONOMA COUNTY

G. R. I. P. S. COMMISSION

WATER - THE ENERGY INDEPENDENCE MEDIUM

PROGRAM SCHEDULE

A WORKSHOP ON THE USE OF WELL AND GEOTHERMAL WATER FOR
HEATING AND AIR CONDITIONING

FRIDAY, MARCH 13, 1981 - 1:00PM TO 4:00PM
EL RANCHO TROPICANA, SANTA ROSA, CA

The Associated Drilling Contractors of Sonoma County and the Geothermal Research, Information and Planning Services (G.R.I.P.S.) have joined to sponsor this Workshop for business and professional people involved in the development of well water resources, heating and air conditioning in the Redwood Empire Area.

With the continuing steep increases in the cost of conventional energy resources, a great deal of interest has developed in alternative systems. One of the least understood and potentially best sources in the Redwood Empire is the underground water.

Groundwater has potential, both as normal temperature well water using heat pumps as low to medium temperature geothermal water using heat pumps and or heat exchangers. Cooperation between the various trades, planners, and regulatory agencies could make it a major factor in reducing our needs for other forms of nonrenewable energy in the near future.

---The Associated Drilling Contractors of Sonoma County is a branch of a statewide association of well drilling and or pump contractors whose goals are to improve the industry standards, offer technical knowledge to regulatory agencies, and to protect and promote groundwater.

---The G.R.I.P.S. Commission is four county Joint Powers Agency established by the Boards of Supervisors of Lake, Mendocino, Napa and Sonoma counties to provide assistance in the development of the geothermal resources which lie under the counties.

INTRODUCTION

Robert F. Van Horn, Executive Director, G.R.I.P.S.
Commission - Film "A Gift from the Earth"

1:00 - 1:30

WELCOME

Warren Toomey, President, Associated Drilling Contractors, Sonoma County Branch

Toomey Pump, Inc.
103 Bailhache Avenue
Healdsburg, CA 95448
(707) 433-3419

Nick Esposti, Sonoma County Supervisor, Chairman
G.R.I.P.S. Commission

Sonoma County Board of Supervisors
575 Administration Drive
Santa Rosa, CA 95401
(707) 527-2241

1:30 - 1:35

LOCAL PROJECTS

"Wine Valley Inn - Calistoga", Alan Nichol,
Architect

1:35 - 2:05

Lewis and Nichol
Architects and Planners
876 Gravenstein Highway South
Sebastopol, CA 95472
(707) 829-2256

Paul Larkin, Mechanical Engineer
7206 Bodega Avenue
Sebastopol, CA 95472
(707) 823-1010

Dave Anderson
A & K Drilling
1975 Adobe Road
Petaluma, CA 94952
(707) 762-5264

"Smugglers Inn - Napa", Dan Vandamint, Mechanical
Engineer

2:05 - 2:35

527 Fairview Avenue
Mill Valley, CA 94941
(415) 388-4343

BREAK AND REFRESHMENTS

TECHNICAL RESOURCES

"Heat Pumps, Downhole Heat Exchangers and Other Technology", Gene Culver, Technical Assistance, Program Director, Oregon Institute of Technology

Klamath Falls, Oregon 97601
(303) 882-6321

2:50 - 3:20

"Geothermal Resource Identification in Redwood Empire Area", Les Youngs, Principal Investigator - Calistoga Project, California Division of Mines and Geology

2815 O Street
Sacramento, CA 95816
(916) 322-8078

3:20 - 3:40

"Information, Outreach and Technical Assistance", Robert Van Horn, Executive Director, G.R.I.P.S. Commission

2628 Mendocino Avenue
Santa Rosa, CA 95401
(707) 527-2025

3:40 - 3:55

PERMITS AND REGULATIONS

"Geothermal Well Drilling", Ken Stelling, Geothermal District Engineer, California State Division of Oil and Gas

2904 McBride Lane
Santa Rosa, CA 95401
(707) 525-0479

3:55 - 4:15

"Water Disposal Regulations", David Snetsinger, Sanitary Engineering Associate, North Coast Regional Water Quality Control Board

1000 Coddington Center
Santa Rosa, CA 95401
(707) 545-2620

4:15 - 4:35

ADJOURN

GEOHERMAL FACT SHEET

GEOHERMAL SPACE HEATING

Geothermal energy can make a significant contribution to the nation's energy budget through space heating applications. The most abundant geothermal resources have water temperatures in the range of 54 to 93°C (130 to 200°F), well-suited to residential and commercial heating applications. The United States consumes 14 quads of energy each year for space heating (1 quad is equivalent to 180 million barrels of oil), and geothermal energy could economically supply 4 quads, or nearly 30 percent of the total.

Conventional off-the-shelf equipment can be used with geothermal fluid to provide space heating with forced air, convection, or radiant slab heating systems. Available heat pumps may make it feasible to use domestic or thermally marginal geothermal water in the 10 to 32°C (50 to 90°F) range. Custom-design heat pumps can be used with source temperatures above 32°C (90°F) to bridge the gap between direct and indirect utilization concepts. For installations where the geothermal resource is available at or near the surface, a geothermal heating system is often cost competitive with conventionally fueled systems.

Operating costs of geothermal heating systems, together with annualized first costs, are very cost competitive today and are likely to be even more so in the future as costs of conventional energy continue to rise.

Space heating systems suitable for geothermal applications are shown on the reverse side of this page.

Space-heating systems suitable for geothermal applications
(source: EG&G Idaho, Inc.).

SCHEMATIC DIAGRAM

**FLOW DIAGRAM FOR GEOTHERMAL SYSTEM
INDIAN VALLEY HOSPITAL
GREENVILLE, CALIFORNIA**

**TURBINE PUMP
W/ VARIABLE SPEED DRIVE
91G 13 psig**

(Source: Gene Culver and Gordon Reistad - "Evaluation and Design of Downhole Exchangers for Direct Application".)

G. R. I. P. S. COMMISSION
2628 MENDOCINO AVENUE
SANTA ROSA, CALIFORNIA 95401

WATER - THE ENERGY INDEPENDENCE
RESOURCE FOR DEVELOPMENT

A WORKSHOP ON THE USE OF
WELL AND GEOTHERMAL WATER
AS AN ENERGY SOURCE IN
RESIDENTIAL, INDUSTRIAL AND
COMMERCIAL DEVELOPMENT

DATE : FRIDAY, APRIL 24, 1981

TIME : 1:00 - 4:30 PM

PLACE : QUAIL RUN FITNESS CENTER
QUAIL ROOM
1279 CRAIG AVENUE
LAKEPORT, CA 95453
(707) 263-7052

The Chamber of Commerce of Lake County and the G.R.I.P.S. Commission have joined to sponsor this Workshop for business and professional people involved in residential, industrial and commercial development in the Lake County area.

With the continuing steep increases in the cost of conventional energy resources, a great deal of interest has developed in alternative energy systems. One of the least understood and potentially best sources in the Redwood Empire is the underground water.

Groundwater has potential, both as normal temperature well water using heat pumps and as low-to-medium temperature geothermal water using heat pumps and or heat exchangers. Cooperation between the various professions, trades, planners and regulatory agencies could make it a major factor in reducing our needs for other forms of nonrenewable energy in the near future.

"The Lake County Chamber of Commerce is funded through tourist dollars and dwells on the promotion of Lake County. We speak up for business with government leaders regarding proposed and existing laws and regulations with an impact on business. We coordinate the talents of local business people in tackling basic issues such as planning, housing, taxes, industrial, agricultural, commercial, geothermal and tourist growth. We stand ready to pursue any matter which can make our area a better place to live and make a living. We maintain an office with a full time staff devoted to the civic, commercial, industrial, agricultural, geothermal and tourist development of Lake County."

"The G.R.I.P.S. Commission (Geothermal Research, Information and Planning Services) is a four county Joint Powers Agency established by the Boards of Supervisors of Lake, Mendocino, Napa and Sonoma counties to provide assistance in the development of the geothermal resources which lie under the counties."

P R O G R A M

WELCOME

Noel Knight, Jr., General Manager
Lake County Chamber of Commerce

Jesse Combs, Lake County Supervisor
Vice-Chairman, G.R.I.P.S. Commission

WORKSHOP GOALS

Robert F. Van Horn, Executive Director
G.R.I.P.S. Commission
"A Gift from the Earth"

PROJECT DEVELOPMENT PANEL

Susanville, California Geothermal Project

A Prototype Municipal Heating District & Commercial Park of Commerce
Fred Longyear, President, Lahontan, Inc., Alternative Energy Systems

Blueprint for Financing Geothermal District Heating in California

John Graton, Energy & Environmental Consultant

Water Source Heat Pumps in Residential & Commercial Development

Jim Paquin, Consultant, AAA Energy Systems

Geothermal Direct Use Developments in Other Areas

Charles Higbee, Research Associate, Engineering Economics
Analysis, Geo-Heat Center, Oregon Institute of Technology

DEVELOPMENT ASSISTANCE PANEL

Recycling Unused Geothermal Exploratory Wells - The Brady Hot Springs Experience

Ted Wilmsen, Magma Power Company

State of California Geothermal Development Support Programs

Justin Tierney, California Energy Commission

Geo-Heat Center Research and Assistance Programs

Gene Culver, Technical Assistance, Program Director
Oregon Institute of Technology, Klamath Falls, Oregon

Geothermal Direct Use Information and Technical Assistance

Robert F. Van Horn, Executive Director, G.R.I.P.S. Commission

WORKSHOP

Water - The Energy Independence
Resource for Development

Quail Run Fitness Center
1279 Craig Avenue
Lakeport, CA 95453
(707) 263-7052

Friday, April 24, 1981
1:00 - 4:30 PM

Sponsored by: Lake County Chamber of Commerce
875 Lakeport Boulevard
Lakeport, CA 95453
(707) 263-6131

and

The G.R.I.P.S. Commission
2628 Mendocino Avenue
Santa Rosa, CA 95401
(707) 527-2025

PLEASE RSVP: LAKE COUNTY CHAMBER OF COMMERCE (707) 263-6131

If you have any questions or require any additional information in regard to this program, please contact the Chamber of Commerce or the G.R.I.P.S. Commission.

G.R.I.P.S. COMMISSION
2628 Mendocino Avenue
Santa Rosa, CA 95401

FIRST CLASS MAIL

ATTACHMENT G

WATER - THE ENERGY INDEPENDENCE
RESOURCE FOR DEVELOPMENT
PROGRAM SCHEDULE

A WORKSHOP ON THE USE OF
WELL AND GEOTHERMAL WATER
AS AN ENERGY SOURCE IN
RESIDENTIAL, INDUSTRIAL AND
COMMERCIAL DEVELOPMENT

FRIDAY, APRIL 24, 1981 - 1:00 PM TO 4:30 PM
QUAIL RUN FITNESS CENTER, QUAIL ROOM
1279 CRAIG AVENUE, LAKEPORT, CA 95453

P R O G R A M

WELCOME

Noel Knight, Jr., General Manager
Lake County Chamber of Commerce
875 Lakeport Blvd.
Lakeport, CA 95453
(707) 263-5092

1:00 - 1:05 PM

Jesse Combs
Lake County Board of Supervisors
255 North Forbes
Lakeport, CA 95453
(707) 263-2367

WORKSHOP GOALS

"A Gift from the Earth"

1:05 - 1:30 PM

Robert F. Van Horn, Executive Director
G.R.I.P.S. Commission
2628 Mendocino Avenue
Santa Rosa, CA 95401

PROJECT DEVELOPMENT PANEL

Susanville, California Geothermal Project

1:30 - 3:00 PM

A Prototype Municipal Heating District &
Commercial Park of Commerce

Fred Longyear, President
Lahontan, Inc., Alternative Energy Systems
P.O. Box 630
Sacramento, CA 95803
(916) 441-4510

Blueprint for Financing Geothermal District Heating in California

John Grattan
Energy & Environmental Consultant
1136-A Cole Street
San Francisco, CA 94117
(415) 731-2103

P R O G R A M

(Continued)

Water Source Heat Pumps in Residential & Commercial Development

Jim Paquin, Consultant
AAA Energy Systems
5460 State Farm Drive
Rohnert Park, CA 94928
(707) 584-1154

Recycling Unused Geothermal Exploratory Wells - The Brady
Hot Springs Experience

Ted Wilmsen
Magma Power Company
1100 East Coddington Center
Santa Rosa, CA 95406
(707) 527-8947

BREAK AND REFRESHMENTS

3:00 - 3:15 PM

DEVELOPMENT ASSISTANCE PANEL

3:15 - 4:30 PM

Geothermal Direct Use Developments in Other Areas

Charles Higbee, Research Associate
Engineering Analysis
Geo-Heat Center
Oregon Institute of Technology
Klamath Falls, Oregon 97601
(503) 882-6321

State of California Geothermal Development Support Programs

Justin Tierney
California Energy Commission
1111 Howe Avenue, MS 66
Sacramento, CA 95825
(916) 924-2618

Geo-Heat Center Research and Assistance Programs

Gene Culver, Technical Assistance
Program Director
Geo-Heat Center
Oregon Institute of Technology
Klamath Falls, Oregon 97601
(503) 882-6321

Geothermal Direct Use Information and Technical Assistance

Robert F. Van Horn, Executive Director
G.R.I.P.S. Commission

ADJOURN

4:30 PM

SO YOU WANT A GEOTHERMAL ENERGY SYSTEM?

Three questions -

1. Is the community positive for development?
"Competitive institutional processes in place -
intervenor won't scare away users - positive
public attitude - economic development
expertise.
2. Is the geothermal direct use resource
economically adequate?
Adequate temperature and flow rate - economic
fluid chemistry - low supply system cost.
3. Is the energy use "load" economic?
Large enough to support required revenue
at attractive prices - loan concentration -
year around usage.

GEOTHERMAL DIRECT USE IS AN
ECONOMIC DEVELOPMENT PROJECT

Excerpted from presentation by Fred Longyear
"A Prototype Municipal Heating District &
Commercial Park of Commerce".

GEOHERMAL FACT SHEET

GEOHERMAL SPACE HEATING

Geothermal energy can make a significant contribution to the nation's energy budget through space heating applications. The most abundant geothermal resources have water temperatures in the range of 54 to 93°C (130 to 200°F), well-suited to residential and commercial heating applications. The United States consumes 14 quads of energy each year for space heating (1 quad is equivalent to 180 million barrels of oil), and geothermal energy could economically supply 4 quads, or nearly 30 percent of the total.

Conventional off-the-shelf equipment can be used with geothermal fluid to provide space heating with forced air, convection, or radiant slab heating systems. Available heat pumps may make it feasible to use domestic or thermally marginal geothermal water in the 10 to 32°C (50 to 90°F) range. Custom-design heat pumps can be used with source temperatures above 32°C (90°F) to bridge the gap between direct and indirect utilization concepts. For installations where the geothermal resource is available at or near the surface, a geothermal heating system is often cost competitive with conventionally fueled systems.

Operating costs of geothermal heating systems, together with annualized first costs, are very cost competitive today and are likely to be even more so in the future as costs of conventional energy continue to rise.

Space heating systems suitable for geothermal applications are shown on the reverse side of this page.

For more information, write to EG&G Idaho • Hydrothermal Commercialization P.O. Box 1625 Idaho Falls, Idaho 83415

Space-heating systems suitable
for geothermal applications
Source: EG&G Idaho, Inc.

Injection Well System

FLOW DIAGRAM FOR GEOTHERMAL SYSTEM INDIAN VALLEY HOSPITAL GREENVILLE, CALIFORNIA

TURBINE PUMP
W/ VARIABLE SPEED DRIVE

(Source: Gene Culver and Gordon Reistad - "Evaluation and Design of Downhole Exchangers for Direct Application".)

ATTACHMENT H

G.R.I.P.S. COMMISSION

THE PUBLIC AGENCY ROLE
IN DEVELOPMENT OF WATER AS AN ENERGY RESOURCE

A WORKSHOP ON PERMITTING, PLANNING
AND ADMINISTRATION OF GEOTHERMAL
DIRECT USE PROJECTS

DATE: Friday, May 29, 1981
TIME: 9:30 AM - 3:30 PM
PLACE: NAPA COUNTY ADMINISTRATIVE BUILDING
1195 Third Street
Napa, CA 94558

THE BOARD OF SUPERVISORS CHAMBERS
ROOM 305

The G.R.I.P.S. Commission is sponsoring this Workshop to provide an opportunity for those officials responsible for permitting, planning and administering geothermal resources in the Lake, Mendocino, Napa and Sonoma county areas to receive an orientation in the direct use of geothermal resources and to address issues important to regulating the development of these resources.

Among the issues to be addressed during the morning panel discussions and afternoon work sessions will be the following:

WATER QUALITY

- State and local agency roles in review and permitting of geothermal direct use projects?
- Cooperative arrangements for these processes?

PLANNING:

- Review and permitting requirements?
- Long range responsibilities in resource development and protection?

RESOURCE UTILITY REGULATION:

- PUC, city and county roles in district formation.
- Incorporation in a city or county system?

With the continuing steep increases in the cost of conventional energy resources, a great deal of interest has developed in alternative systems. One of the least understood and potentially best sources in the Redwood Empire is the underground water.

Groundwater has potential, both as normal temperature well water using heat pumps and as low to medium temperature geothermal water using heat pumps and or heat exchangers. Cooperation between the various planning and regulatory agencies could make it a major factor in reducing our needs for other forms of nonrenewable energy in the near future.

---- The G.R.I.P.S. Commission - Geothermal Research, Information and Planning Services is a four county Joint Powers Agency established by the Boards of Supervisors of Lake, Mendocino, Napa and Sonoma counties to provide assistance in the development of the geothermal resources which lie under the counties.

PROGRAM

8:30 - 9:00 REGISTRATION AND FILM on Geothermal Direct Use, "A Gift from the Earth"

9:00 WELCOME: Bob Van Horn, Executive Director, G.R.I.P.S. Commission, Santa Rosa
(707) 527-2025

9:00 - 10:00 GEOTHERMAL DIRECT USE - AN ORIENTATION, Gene Culver, Technical Assistance Program
Director, Oregon Institute of Technology, Geo-Heat Institute, Klamath Falls, Oregon
(503) 882-6321 ext. 267

10:00 - 10:30 WORKSHOP GOALS, Douglas Caldwell, Project Coordinator, G.R.I.P.S. Commission

10:30 - 10:45 COFFEE BREAK

PANEL DISCUSSIONS

10:45 - 11:15 WATER QUALITY

"California State Division of Oil and Gas Well Drilling Regulations" - Speaker to be
announced

"A Regional Water Quality Control Board Perspective" - Ed Crawford, Sacramento-Central
Valley Regional Water Quality Control Board (916) 445-0270

"Environmental Health Issues" - Don Smith, Supervising Sanitarian, Sonoma County
Environmental Health Department, Santa Rosa (707) 527-2727

11:15 - 11:45 PLANNING

"The Planning Role in Development of the Susanville, CA Geothermal Heating District" -
Phil Edwards, Geothermal Principal Investigator, City of Susanville (916) 257-7130

"Sonoma County Permitting Requirements" - Speaker to be announced

"Long Range Planning for the Geothermal Resource" - Speaker to be announced

11:45 - 12:15 RESOURCE UTILITY REGULATION

"A Survey of Alternative Organizational Structures for Resource Distribution" -
Sandra Bressler, Earl Warren Legal Institute (415) 642-8305

"The California PUC Role in Geothermal Heating District Regulation" - William Foley,
Attorney, California PUC (415) 557-0647

"The City Role in Geothermal Resource Distribution" - Richard Winnie, Assistant
City Attorney, Santa Rosa (707) 528-5261

12:15 - 1:30 LUNCH BREAK (Will have information at meeting in regard to locations)

1:30 - 3:00 CONCURRENT WORK SESSIONS

WATER QUALITY - Board of Supervisor's Chamber

PLANNING - Personnel Conference Room

RESOURCE UTILITY REGULATION - County Administrator's Conference Room

3:00 WORK SESSION REPORTS

3:00 - 3:10 WATER QUALITY

3:10 - 3:20 PLANNING

3:20 - 3:30 RESOURCE UTILITY REGULATION

3:30 WORKSHOP CONCLUSION

THE PUBLIC AGENCY ROLE
IN DEVELOPMENT OF WATER AS AN ENERGY RESOURCE

A WORKSHOP FOR
LOCAL GOVERNMENT ADMINISTRATORS, STATE AND LOCAL WATER REGULATORS, LOCAL PLANNERS AND
STATE AND LOCAL ATTORNEYS CONCERNED WITH UTILITY
DEVELOPMENT AND REGULATION

DATE: May 29, 1981
TIME: 9:30 AM
PLACE: Napa County Administrative Bldg.
1195 Third Street, Napa, CA
The Board of Supervisors Chambers
Room 305

Sponsored: The G.R.I.P.S. Commission
2628 Mendocino Avenue
Santa Rosa, CA 95401
(707) 527-2025

The G.R.I.P.S. Commission
2628 Mendocino Avenue
Santa Rosa, CA 95401

FIRST CLASS MAIL

FARM BUREAU
NAPA COUNTY

4075 SOLANO AVENUE · NAPA, CALIFORNIA 94558

ATTACHMENT I

G. R. I. P. S. COMMISSION
2628 MENDOCINO AVENUE
SANTA ROSA, CALIFORNIA 95401

WATER - AN ENERGY RESOURCE FOR AGRICULTURE

A WORKSHOP ON THE USE OF
WELL AND GEOTHERMAL WATER
AS AN ENERGY SOURCE
FOR
AGRIBUSINESS ACTIVITIES AND
HEATING AND COOLING OF FARM FACILITIES

DATE: Friday, July 17, 1981
TIME: 1:00 PM - 4:30 PM
PLACE: Robert Mondavi Winery
Vineyard Room
7801 Saint Helena Highway
Oakville, CA 94562
(707) 963-9611

NOTE: NO REGISTRATION FEE

PLEASE RSVP EITHER SPONSOR

The Napa County Farm Bureau and the G.R.I.P.S. Commission have joined to sponsor this Workshop for people involved in agribusiness in the Napa County area.

With the continuing steep increases in the cost of conventional energy resources, a great deal of interest has developed in alternative systems. One of the least understood and potentially best sources in the Redwood Empire is the underground water.

Groundwater has potential, both as normal temperature well water using heat pumps and as low to medium temperature geothermal water using heat pumps and or heat exchangers. It can be used in various agricultural growing, processing and space conditioning activities.

---- The Napa County Farm Bureau is a general farming organization made up of 1,600 member families. The Farm Bureau's main goal is to preserve and promote agriculture in Napa County.

---- The G.R.I.P.S. Commission is a four county Joint Powers Agency established by the Boards of Supervisors of Lake, Mendocino, Napa and Sonoma counties to provide assistance in the development of the geothermal resources which lie under the counties.

P R O G R A M

1:00 WELCOME

Robert Dwyer, Executive Director, Napa County Farm Bureau
4075 Solano Avenue
Napa, CA 94558
(707) 224-5403

Dowell Martz, Napa County Supervisor, Member of G.R.I.P.S. Commission
1195 Third Street, Room 310
Napa, CA 94558
(707) 253-4386

1:05-1:30 FILM ON GEOTHERMAL DIRECT USE

"A Gift from the Earth"

1:30 "Potentials for Agribusiness Development of Geothermal Resources
in the Napa County Area"

Gene Culver, Associate Director
Oregon Institute of Technology
Geo-Heat Center
Klamath Falls, Oregon 97601
(503) 882-6321 Ext. 267

2:00 "Greenhouse Heated by Geothermal Waters"

Ted Springer, Vice President & General Manager
Biotherm Engineering
611 Mountain View Avenue
Petaluma, CA 94952
(707) 763-4444

2:30 "Process and Construction Engineering in Geothermal Projects"

Gene Ryan, Mechanical Engineer
Oregon Institute of Technology
Geo-Heat Center
Klamath Falls, Oregon 97601
(503) 882-6321 Ext. 267

3:00-3:15 COFFEE BREAK

3:15 "Use of Wine Industry Wastes for Energy Production - A Potential
Utilization of Geothermal Resources"

Robert Spitzka, Supervisor, Biomass Department
Brown & Caldwell
1501 North Broadway
Walnut Creek, CA 94596
(415) 937-9010

3:45 "Cost Analysis, Financial Options and Tax Factors in Geothermal
Development"

Charles Higbee, Engineering Analysis Associate
Oregon Institute of Technology
Geo-Heat Center
Klamath Falls, Oregon 97601
(503) 882-6321 Ext. 267

WATER - AN ENERGY RESOURCE FOR AGRICULTURE

A WORKSHOP ON THE USE OF
WELL AND GEOTHERMAL WATER
AS AN ENERGY SOURCE
FOR

AGRIBUSINESS ACTIVITIES AND
HEATING AND COOLING OF FARM FACILITIES

DATE: Friday, July 17, 1981
TIME: 1:00 PM - 4:30 PM
PLACE: Robert Mondavi Winery
Vineyard Room
7801 Saint Helena Highway
Oakville, CA 94562
(707) 963-9611

RSVP: EITHER SPONSOR

Sponsors: G.R.I.P.S. Commission
2628 Mendocino Avenue
Santa Rosa, CA 95401
(707) 527-2025
and
Napa County Farm Bureau
4075 Solano Avenue
Napa, CA 94558
(707) 224-5403

G.R.I.P.S. COMMISSION
2628 Mendocino Avenue
Santa Rosa, CA 95401

FIRST CLASS MAIL

ATTACHMENT J

G. R. I. P. S. COMMISSION
2628 MENDOCINO AVENUE
SANTA ROSA, CALIFORNIA 95401

GEOHERMAL AS A SMALL-SCALE

POWER SOURCE

A WORKSHOP ON THE FINANCING AND DEVELOPMENT OF ALTERNATIVE APPROACHES
IN THE USE OF GEOTHERMAL RESOURCES TO
OPERATE SMALL-SCALE ELECTRIC POWER GENERATING
PLANTS - 100 KW TO 10 MW

FRIDAY, OCTOBER 2, 1981 - 9:30 AM - 5:00 PM
EL RANCHO TROPICANA, RAINBOW ROOM, SANTA ROSA, CA

P R O G R A M

9:30 AM

WORKSHOP GOALS

Robert F. Van Horn, Executive Director
G.R.I.P.S. Commission
2628 Mendocino Avenue
Santa Rosa, CA 95401
(707) 527-2025

9:35 AM

ECONOMIC AND FINANCIAL FACTORS

Ben Holt
The Ben Holt Company
201 South Lake Avenue
Pasadena, CA 91101
(213) 684-2541

Bruce Smith
Senior Rate Engineer
Supervisor of Contract Rate Analysis Group in Rate Department
Pacific Gas and Electric
77 Beale Street
San Francisco, CA 94102
(415) 781-4211 x 2933

10:30 AM

PROJECTS

Five Hundred KW Binary Direct Contact Heat Exchange
Pilot Plant - East Mesa, CA

Ken Nichols
Barber-Nichols Engineering
6325 W. 55th Avenue
Arvada, CO 80002
(303) 421-8111

Robert Fulton
Lawrence Berkeley Laboratory
1 Cyclotron Road, Bldg. 90, Room 2084
Berkeley, CA 94720
(415) 486-4664

11:15 AM

Ten MW NORNEV Binary Unit Project - Northern Nevada

Lee Keilman
Sacramento Municipal Utility District
6201 S Street
Sacramento, CA 95813
(916) 452-3211

11:45 AM

LUNCH BREAK/"One-On-One Project Inquiries"

*During the LUNCH BREAK, half of the Program Speakers will be available for individual discussions from 11:45-12:45 and the other half from 12:45-1:45.

P R O G R A M
(Continued)

- 1:45 PM Three MW Flash Steam Wellhead Generator -
 Hawaii Geothermal Project
- Herb Rogers, Jr.
Rogers Engineering Co., Inc.
111 Pine Street, Suite 600
San Francisco, CA 94111
(415) 986-6546
- Don Thomas
State of Hawaii Research Institute
2525 Correa Road
Honolulu, HI 96822
(808) 948-6482
- 2:30 PM Four MW Binary Down-Hole Gravity Head Generator -
 East Mesa, CA
- Hugh Mathews
Sperry Research Center
P.O. Box 501
Holtville, CA 92250
(714) 356-4833
- 3:00 PM REFRESHMENT BREAK
- 3:25 PM One Hundred KW Rankine Cycle Low-Temperature (150°F) Generator
 in Cascaded System, Wendel Hot Springs, CA
- Victor Warminger
SPS Inc.
P.O. Box 380006
Miami, Florida 33138
(305) 754-7766
- Roger DeNault
International Technology
P.O. Box 695
Ben Lomond, CA 95005
(408) 336-2321
TWX 910-598-4503
- 4:15 PM Efficient Power Production From Individual Wellhead Units
 in the 1 to 10 Megawatt Range
- Dr. William E. Amend
BiPhase Energy Systems
2800 Airport Avenue
Santa Monica, CA 90405
(213) 391-0691
- 4:45 PM CLOSING DISCUSSIONS

NORNEV 10 MW BINARY UNIT PROJECT - NORTHERN NEVADA

Sparsely populated Northern Nevada may become a source of electricity for the West if the Northern Nevada Geothermal Group (NORNEV) is able to tap the earth's boiler.

Officials at the Sacramento Municipal Utility District reported today that SMUD is continuing to work with other NORNEV member utilities on geothermal projects for 10 MW semiportable wellhead generator geothermal power plants. This unit would generate power using the energy in hot geothermal fluids from wells deep beneath the Nevada desert.

SMUD is joined in this Northern Nevada venture by Eugene Water and Electric Board, Pacific Power and Light, Portland General Electric and the Sierra Pacific Power Company.

Following preliminary studies, NORNEV members have agreed to expand efforts to develop Northern Nevada's geothermal hot water resources.

Plans for a small wellhead generator using a hydrocarbon fluid (probably isobutane) to accept the earth's heat are underway. Since the supply of geothermal fluid coming from the wells may diminish, this generator could be moved to a new location. NORNEV is presently evaluating such a unit developed by Howe-Baker Associates of Tyler, Texas.

All five NORNEV members have agreed to share equally in the cost of buying and installing the 10 MW generator and associated equipment. SMUD engineers estimate the project cost to be \$18 million.

SMUD anticipates that the semiportable power plant could go into commercial operation by as early as 1983.

Lee Keilman
Sacramento Municipal
Utility District

BIPHASE ENERGY SYSTEMS

EFFICIENT POWER PRODUCTION FROM INDIVIDUAL WELLHEAD UNITS

Figure 1. Photograph Showing 54-inch Diameter Rotors of 1.6MW Biphasic Wellhead Turbine

Figure 2. Schematic of Biphasic Wellhead System

The G.R.I.P.S. Commission (Geothermal Research Information and Planning Services) is a four county Joint Powers Agency established by the Boards of Supervisors of Lake, Mendocino, Napa and Sonoma counties to provide assistance in the development of geothermal resources which lie under the counties.

This Workshop is being carried out as a part of the U.S. Department of Energy Cooperative Agreement DE-FC03-79ET27194.

ATTACHMENT K

AMENDED IN ASSEMBLY APRIL 9, 1981

CALIFORNIA LEGISLATURE—1981-82 REGULAR SESSION

ASSEMBLY BILL

No. 828

Introduced by Assemblyman Bosco

March 9, 1981

An act to amend Section 3757.2 of the Public Resources Code, *and to amend Section 6353 of the Revenue and Taxation Code*, relating to geothermal resources *and the taxation thereof, to take effect immediately, tax levy.*

LEGISLATIVE COUNSEL'S DIGEST

AB 828, as amended, Bosco. Geothermal resources: low-temperature wells.

(1) Under existing law, the owner or operator of a geothermal well is required to appoint an agent who resides in the state and to notify the State Oil and Gas Supervisor of various transactions regarding the operation, sale, or transfer of any geothermal well and to submit to the supervisor monthly production statements regarding those wells *if used domestically or in a noncommercial manner.*

This bill would authorize the supervisor to approve the exemption of any low-temperature geothermal resource well from these requirements.

(2) Under existing law, the supervisor may approve, within geothermal resource areas, the drilling of low-temperature geothermal wells at whatever location deemed advisable, subject to provisos.

This bill would eliminate the restriction that the well be in a geothermal resource area.

(3) *The Sales and Use Tax Law exempts from state and local sales and use taxes gas, electricity, and water when delivered to consumers through mains, lines, or pipes.*

This bill would provide that that exemption does not apply to geothermal resources which are developed for purposes of electrical power generation.

(4) The bill would take effect immediately as a tax levy and would become operative as specified.

Vote: ~~majority~~ $\frac{2}{3}$. Appropriation: no. Fiscal committee: yes. State-mandated local program: no.

The people of the State of California do enact as follows:

1 SECTION 1. Section 3757.2 of the Public Resources
2 Code is amended to read:

3 3757.2. For the purpose of developing
4 low-temperature geothermal resources, the supervisor
5 may approve the exemption of any low-temperature
6 geothermal resource well from Sections 3721, 3722, 3723,
7 3723.5, and 3745, if the resource is used domestically or in
8 a noncommercial manner. The supervisor may also
9 approve the drilling of low-temperature geothermal
10 wells at whatever locations he deems advisable, if no well
11 is drilled or permitted to produce which is located within
12 15 feet of the outer boundary of the parcel of land on
13 which the well is situated or within 15 feet of a public
14 road, street, or highway dedicated prior to the
15 commencement of drilling.

16 SEC. 2. Section 6353 of the Revenue and Taxation
17 Code is amended to read:

18 6353. There are exempted from the taxes imposed by
19 this part the gross receipts from the sales, furnishing, or
20 service of and the storage, use, or other consumption in
21 this state of gas, electricity, and water when delivered to
22 consumers through mains, lines, or pipes, and water
23 when sold to an individual in bulk quantities of 50 gallons
24 or more for general household use in his residence if the
25 residence is located in an area not serviced by mains, lines
26 or pipes, and of exhaust steam, waste steam, heat, or
27 resultant energy, produced in connection with
28 cogeneration technology, as defined in Section 25134 of
29 the Public Resources Code.

30 *The exemptions provided for in this section shall not*

1 *apply to geothermal resources as defined in Section 6903*
2 *of the Public Resources Code which are developed for*
3 *purposes of electrical power generation.*

4 *SEC. 3. This act provides for a tax levy within the*
5 *meaning of Article IV of the Constitution and shall go into*
6 *immediate effect. However, Section 2 of this act shall*
7 *become operative on the first day of the first calendar*
8 *quarter commencing more than 90 days after the*
9 *effective date of this act.*

O