

FINAL REPORT

**U.S. DEPARTMENT OF ENERGY
GRANT: DE-FG36-01SF22362**

**GEOHERMAL ENERGY PROGRAM;
INFORMATION DISSEMINATION AND OUTREACH**

REPORTING PERIOD: January 1, 2002 - December 31, 2005

**GEO-HEAT CENTER
OREGON INSTITUTE OF TECHNOLOGY
KLAMATH FALLS, OR 97601**

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January 1, 2002 to December 31, 2005

PROJECT OVERVIEW

Award Number: DE-FG36-01SF22362

Project Title: Geothermal Energy Program: Information Dissemination & Outreach

Project Period: 8/31/2001 thru 8/30/2004 (extended to 12/31/05)

Recipient Organization: Geo-Heat Center, Oregon Institute of Technology, Klamath Falls, OR 97601

Partners: Geo-Heat Center staff

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OBJECTIVES

The objective of this project is to continue on-going work by the Geo-Heat Center to develop and disseminate information; provide educational materials; develop short courses and workshops; maintain a comprehensive geothermal resource database; respond to inquiries from the public, industry and government; provide engineering, economic and environmental information and analysis on geothermal technology to potential users and developers; and provide information on market opportunities for geothermal development. These efforts are directed towards increasing the utilization of geothermal energy in the United States and developing countries, by means of electric power generation and direct-use.

The principal benefits arising from the objectives listed above are:

- Developing an infrastructure that can better develop, design, operate and maintain geothermal energy projects;
- Increasing the use of a domestic, renewable energy resource, thus reducing fuel import dependence;
- Getting more geothermal projects “on-line”;
- Reducing emissions of harmful greenhouse gases and other pollutants;
- Implementing the *GeoPowering the West* initiatives in the western states;
- Enhancing the awareness of the public and decision makers to the benefits of geothermal energy use;
- Increasing export of U.S. geothermal goods and services; and
- Helping developing countries meet their growing need for power with clean, sustainable geothermal energy.

DESCRIPTION OF ACTIVITIES PERFORMED

This report includes the time from January 1, 2002 to December 31, 2005. The period from August 31, 2001 to December 31, 2001 was included in a previous report submitted to USDOE under Grant No. DE-FG01-99-EE35098 (April 1, 1999 to December 31, 2001).

A summary of the work can be illustrated by the attached bar-graphs for:

1) average users per day of the Geo-Heat Center website, and 2) PDF download files from the Geo-Heat Center website. As can be seen from the bar graphs, the number of average users per day and PDF downloaded files have increased substantially over the past four years. Downloaded files increased 44% compound annually (from 81,213 per quarter to 344,378 per quarter), and the average users per day increased 14% per year (from 1269 to 2,134 per day).

Website Activity:

The Geo-Heat Center website (<http://geoheat.oit.edu>), maintained by Tonya “Toni” Boyd and consisting of approximately 1,900 files, provided a variety of services to potential developers and users. The following website activity from January 1, 2002 to December 31, 2005 is as follows:

Total Users:	2,008,685	Average user per day: 1,376 Peaking at 1,787 in 2005
Total Hits:	13,204,896	Average hits per day: 9,044 Peaking at 10,441 in 2005
Total Downloaded Files:	2,637,760	Average files per day: 1,807 Peaking at 2,745 in 2005

Approximately 85 technical papers covering all aspects of geothermal energy along with 279 GHC Quarterly Bulletin articles are available on our website, either as htm or pdf files. The following were our top 15 downloaded files from July 2003 to December 2005. Since, there were few files to access prior to July 2003, the earlier numbers were

not included. Approximately 75% of the users were from the U.S., 10% from international users, and 15% unknown locations.

<u>Top downloaded files:</u>	<u>(Session downloads)</u>
GHP Owner Information Survival Kit	15,920
Absorption Refrigeration, Chapter 13 of Design Manual	13,587
Ground-Coupling with WSHP	10,136
Domestic Hot Water Heating, Bulletin 22/3	9,542
Drilling and Well Construction, Chapter 6	8,355
Piping, Chapter 10 of Design Manual	7,625
Specifications of Water Wells	7,589
GHP - Trends and Comparisons	7,556
Fairmont Hot Springs, Vol. 24, No. 2	7,105
Small Geothermal Power - Design Performance & Economics Vol. 20 No. 2	7,156
Power Generation - A Primer	7,107
A Capital Cost Comparison of Commercial Ground- Source Heat Pump Systems	6,960
Well Pumps and Piping, Vol. 2, No. 3	6,858
Energy and Demand Study of HVAC Equipment	6,738
Heat Exchanger Temperature Spreadsheet	6,269

Library:

During this period, no new volumes were added to the library; however, a number of journals and magazine articles were added from subscriptions. The library's total is 5,749 volumes cataloged. The entire GHC library can be accessed from the Geothermal Resources Council library database – by title and author only.

Quarterly Bulletin:

The Geo-Heat Center staff completed and published 15 issues of the Quarterly Bulletin (Vol. 23 No. 1 through, Vol. 26, No. 3). Vol. 26, No. 4 for December 2005 was not published due to lack of funding. A total of 118 articles were published, of which 66 (56%) were written by Geo-Heat Center staff. A total of 492 pages were printed, averaging 33 pages and 8 articles per issue. Almost 2,000 issues were mailed each quarter, of which approximately 25 went to international libraries.

Two special issues were prepared on geothermal resources and uses in New Mexico (Vol. 23, No. 2 – December 2002) and Utah (Vol. 25, No. 4 – December 2004). A summary of direct-use geothermal sites in California was published in Vol. 24, No. 1 (March 2003).

Publication Distribution:

The GHC provided 4,987 publications to individuals and organizations according to the following topics:

<u>Topics</u>	<u>No. of Publications</u>
Geothermal Heat Pumps	427
Space Heating/Cooling	98
Greenhouses	247
Aquaculture	318
Equipment	258
Resource/Wells	1,523
Spas/Swimming Pools	44
General	<u>2,072</u>
TOTAL	4,987

Patents: None

Maintain a Comprehensive Technology Database:

Our current U.S. direct-use database consists of 429 entries from 1304 projects in 28 states. We completed a 16-state well and spring database for the western states of AK, WA, OR, CA, NV, ID, MT, UT, AZ, NM, TX, CO WY, SD, ND and NE that is available on CD-ROM. These CD-ROMS are available either for the entire 16 states or by individual states. We have sold approximately 100 and given away 15 complimentary copies.

Publication/Presentations/Meetings Attended:

Geo-Heat Center staff members were involved in the following activities over the past four years:

- Attended 95 meeting/conferences/workshops
- Made 85 technical presentations
- Published 56 technical papers
- Gave 14 tours to 74 persons of geothermal systems on campus and in Klamath Falls
- Exhibited our booth at 5 trade shows.
- Gave 4 interviews to radio stations and newspapers

The details of these activities can be found in our quarterly reports.

In-Kind Service Contributions:

The following was contributed as in-kind services during the four-year period:

- 750 hours from outside authors contributing to Quarterly Bulletin articles

- 1,800 hours contributed by Director, John Lund who is only paid half-time
- The above hours equate to \$245,650 of in-kind service contributions

In addition, a total of \$86,072 was contributed as a cash amount by Oregon Institute of Technology.

Thus, the total contributed by the Geo-Heat Center/Oregon Institute of Technology was \$331,722. This exceeds the contract amount of \$199,848 by 66%. The total project expenditure for the contract was \$872,319 (including the in-kind) of which \$672,471 was the federal share.

CONCLUSIONS

The Geo-Heat Center staff was extremely active in many aspects of geothermal information dissemination and outreach. The following are some of the high points:

- Members of the Geothermal Resources Council and two being members of the Board of Directors and one being the President. Active in presenting papers, reviewing papers, staffing our booth and contributing as speakers for workshops, seminars and at their annual meeting.
- Member of the American Society of Heating, Refrigerating and Air-Conditioning Engineers. Active on several committees and presenting papers at their annual meetings.
- Members of the International Geothermal Association and one person now the President.
- Providing speakers for many workshops/seminars/training sessions throughout the western states, often in conjunction with *GeoPowering the West* activities.
- Supporting the goals and objectives of the U.S. Department of Energy, Office of Geothermal Technologies by providing input into their funded projects.
- Maintaining an extensive website, with use greater than all the other geothermal websites put together. Much of the information dissemination on geothermal energy to the public and potential users was made through our website.
- Publication of our Quarterly Bulletin which included many case studies of successful geothermal projects throughout the country and the world.

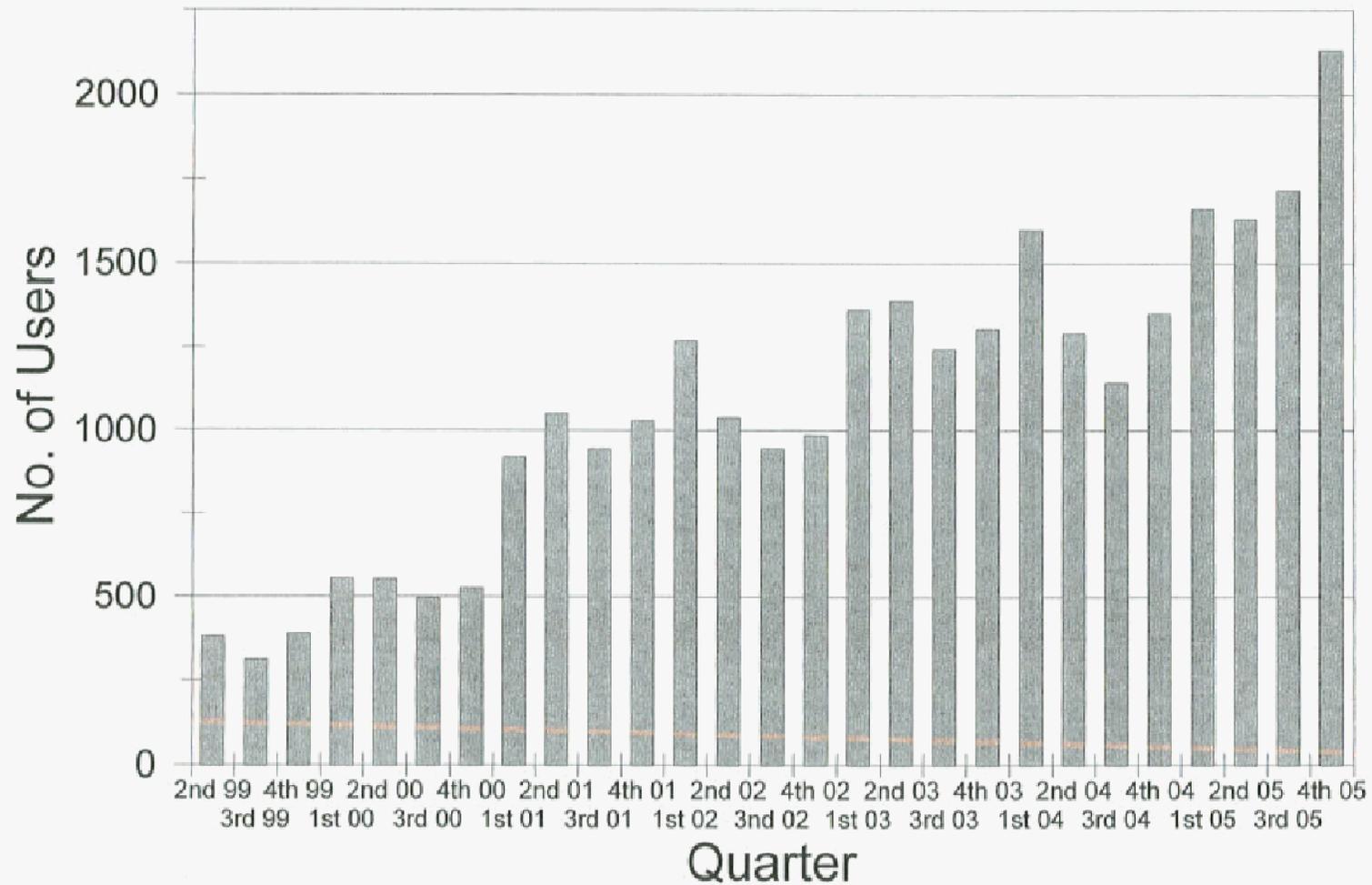
RECOMMENDATIONS AND LESSONS LEARNED

The following are the main activities that should be continued and increased to enhance the dissemination of the advantages of developing and using geothermal energy:

- Speaking and presenting papers to geothermal technical organizations is a worthwhile activity – especially in the exchange of information. However, speaking to the “choir” has limitations as to getting the word about geothermal energy out to the public and other organizations.

- Making presentations to architects, engineers and economic development community leaders may have a larger impact, as they are the ones who initially make the decision to use geothermal energy. We have been in contact with these people and organizations, but, this activity should be expanded.
- Giving tours of geothermal use on the Oregon Institute of Technology campus, of the space heating and snow melting uses in Klamath Falls, and the greenhouse and aquaculture pond heating projects in the surrounding area have a great impact on potential users and for an understanding of geothermal energy potential to the public. "Seeing is believing".
- Publishing case studies or success stories in our Quarterly Bulletin, and also placing these studies on our website appears to be a good promotion tool for illustrating the advantages of geothermal energy.
- Finally, even though technical assistance was not part of this grant, and was funded instead by an NREL grant, the direct benefit of this activity is great in helping potential developers and users to get energy on line.

Average Users per Day



PDF Downloaded Files

