



Enhance Your Career – Continue Learning

Trainers interested in helping define the continuing education criteria, should attend the Training Committee Meeting at the IGSHPA May Technical Conference & Expo on Sunday, May 20, 2001.

American consumers have been accustomed for decades to hearing the phrase, “lifetime guarantee” and “for as long as you own the product.” Careers and degree designations were marketed on the delivery of educational certificates that are “good for life.” Today, with ever-changing technology and developing industries, professionals and their associations recognize the need for continuing education.

With the goals of raising the professional standards and encouraging a high degree of industry knowledge in the quickly expanding geothermal industry, the Training Committee of IGSHPA voted to set up a continuing education mechanism for Accredited Installers and Trainers. The Certified GeoExchange Designers (CGD) program was designed with built in continuing education objectives.

Based on reviews of other associations and their educational programs, the IGSHPA Training Committee and Advisory Council voted to enact the following modifications to the Installers program:

- Accredited Installers – Accreditation is now valid for three years:
 - For those accredited prior to January 2001, your accreditation will be valid from January 2001 to January 2004. You have this time period to achieve eight (8) points.
 - Installers, who have been accredited since January 2001, please note the expiration date on your Installer’s card (not your membership card). You have that time period to achieve your points.
- Activities for achieving points:
- 4 points over three years = continued employment in the combined geothermal heat pump installation,

- heating, ventilation, and air-conditioning field
- 3 points over three years = continuous membership in a ground source heat pump society (1 year of membership = 1 point)
- 2 points = continuing education or professional activities in the combined geothermal heat pump and HVAC field (two points per other CEU, college credit hour, or 10 contact hours for seminars during the three year period) **For example:** 10 classroom contact hours = 1.0 CEU (Continuing Education Credit) / 5 classroom contact hours = .5 CEU / IGSHPA Technical Conference = 20 contact hours or 2.0 CEUs)

An example of how to achieve 8 points over three years and retain your accreditation, an installer might do the following:

- | | |
|--|----------------|
| • Continued employment as noted above | 4 points |
| • Continued membership in IGSHPA, GHPC, ASHRAE, etc. = | 3 points |
| • Attend a workshop relating to geothermal technology (20 hours) or other as noted above = | 2 points |
| | 9 Points Total |

The educational points must be submitted to IGSHPA following an activity. An official form can be mailed or faxed to you by calling the IGSHPA office. An administrative processing fee will be assessed every three years as follows:

IGSHPA members = \$25.00
 Non-members of IGSHPA = \$75.00

This processing fee will need to be submitted with your application for renewal of accreditation.

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GeoKitten Wins Award

Congratulations to Kensa Engineering Ltd of Tregonigge Industrial Estate in Cornwall, England on receipt of the Product of the Year for its GeoKitten geothermal heat pump system. The award, sponsored by Mitsubishi and Toshiba, is given for any new air conditioning product launched in a given year at the International Convention Centre in Birmingham. GeoKitten was competing in the most hotly contested of ten categories for this highly competitive global industry competition.

Kensa Managing Director Richard Freeborn said, "... GeoKitten is designed and optimized for heating; its ability to cool is a byproduct." The award received by this new product is a good indication of that technology of geothermal energy is becoming accepted by the traditional HVAC industry.

To learn more about GeoKitten visit Kensa Engineering's website - www.kensaengineering or contact Robin Curtis, GeoScience Ltd. at 01326 211070.

Sachs to Serve ACEEE

Harvey M. Sachs, Ph.D., has accepted a position of Director, Buildings Programs, effective March 1 for The American Council for Energy Efficient Economy (ACEEE). The program includes a wide range of efforts focused on standards and market transformation for the residential and commercial sectors. Market transformation activities include evaluating emerging technologies as

candidates for sustained market transformation programs, and specific programs to spur the market acceptance of energy-saving technologies.

Dr. Sachs brings to ACEEE an impressive background in energy and environmental programs. He has long been a supporter of ground source heat pump technology. Dr. Sachs can be contacted via gloria_mcintosh@aceee.org.

IGSHPA Membership Directory Available to Non-Members

For the first time, IGSHPA is making available its Membership Directory to non-members. This comprehensive directory lists the names, addresses, phone numbers and websites of all member manufacturers, utilities, product distributors, contractors, architects and engineers. Also included are listings for member Accredited Installers and Certified GeoExchange Designers, making it an indispensable tool for anyone involved in the HVAC industry.

All IGSHPA members receive one free copy. Additional copies are available for \$12.00 for members and \$18.00 for non-members. To order call 1-800-626-4747.

Enhance Your Career

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Geothermal professionals who have been trained by IGSHPA to teach Installers will also need to meet continuing education criteria. The Training Committee and Advisory Council additionally voted a policy in which Trainers must retain membership in IGSHPA. Trainers interested in helping define the continuing education criteria, should attend the Training Committee Meeting at the IGSHPA May Technical Conference & Expo on Sunday, May 20, 2001.

For forms and other information on these changes, contact Heath Chelesvig, Conference & Training Coordinator or Shelly Fitzpatrick, Conference & Training Assistant at 1-800-626-4747. If you have suggested agenda items for the upcoming Training Committee Meeting, contact Howard Newton, Training Committee Chairman (hnewton@trane.com) or Lisa McArthur, Assistant Director (mcarthl@okstate.edu).



Research Activities to Advance GSHP Applications

By Dr. Marvin Smith

There is a range of applications for ground source heat pump systems; only a small sample is discussed in this article. Independent of the particular application, there is a need to know the response to the combined elements of the system and what tools and methods are required to successfully put it in operation. In this brief overview, we will discuss some specific applications, development of heat exchanger systems, in-situ testing concepts, and vertical borehole performance.

Smart Bridge System

Singular or multi-car accidents often result because of preferential icing on bridges while the adjacent roadways remain clear. With safety issues and the extension of a bridge's life in mind, the Oklahoma congressional delegation secured funds for OSU through the U.S. Department of Transportation. A bridge was designed and built at the OSU ground source heat pump test site, formerly the Petroleum Outdoor Laboratory. This 60-ft long by 20-ft wide bridge had radiant floor type pipe placed at 3.5 inches below the surface level and in a serpentine configuration. The system is operating with water in the source side (loop field side) and propylene glycol in the load side (bridge side). Controls maintain the bridge deck at 40° F and shut off the heat pump when the IWT (leaving water temperature) reaches 125° F.

The heated part of the bridge is snow free and the unheated end of the bridge has the total accumulation of snow.

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Richard Simmons Drilling Co., Inc.

Specializing in air rotary drilling and installation of vertical closed loop heat exchangers for water-source heat pumps.

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Research Activities

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Refining Ground Loop Heat Exchanger Design

One of the tasks of the Smart Bridge project is to further refine ground loop heat exchanger design. So, an experiment was performed to compare the loop performance of some of the bridge heat exchangers to a double loop heat exchanger with clips (GeoClips by Rick Nash) and thermal enhanced grout in the 5 1/4-inch boreholes. The following figure (Figure 1) shows that in comparison to the average of the thermal resistance for four of the single loop heat exchangers, the double loop heat exchanger is 25 % more effective. This comparison is only valid for the case of clips and enhanced grout in the borehole surrounding 1-inch HDPE pipe loops.

In-situ Thermal Conductivity Testing Concepts

The key feature from the graph (Figure 2) is to determine the slope of the curve at the appropriate time span to use in the equation for the line source theory. It is best to obtain good information about the formation thermal conductivity early in the test. As seen from the previous graph, the borehole with the thermal enhanced grout and clips has a relatively straight line from an early time to its end point. This implies that information is obtained early about the formation. The other configurations had to overcome the effects of grout before formation data could be obtained. With the pipes against the wall and high thermal conductivity grout in the borehole, the effects of the formation can be assessed early. It is our recommendation that for all in-situ thermal conductivity tests that the clips and thermal enhanced grouts be used in the placement of the loops in the borehole. This holds true even if they are not used in the remainder of the heat exchanger field on that job.

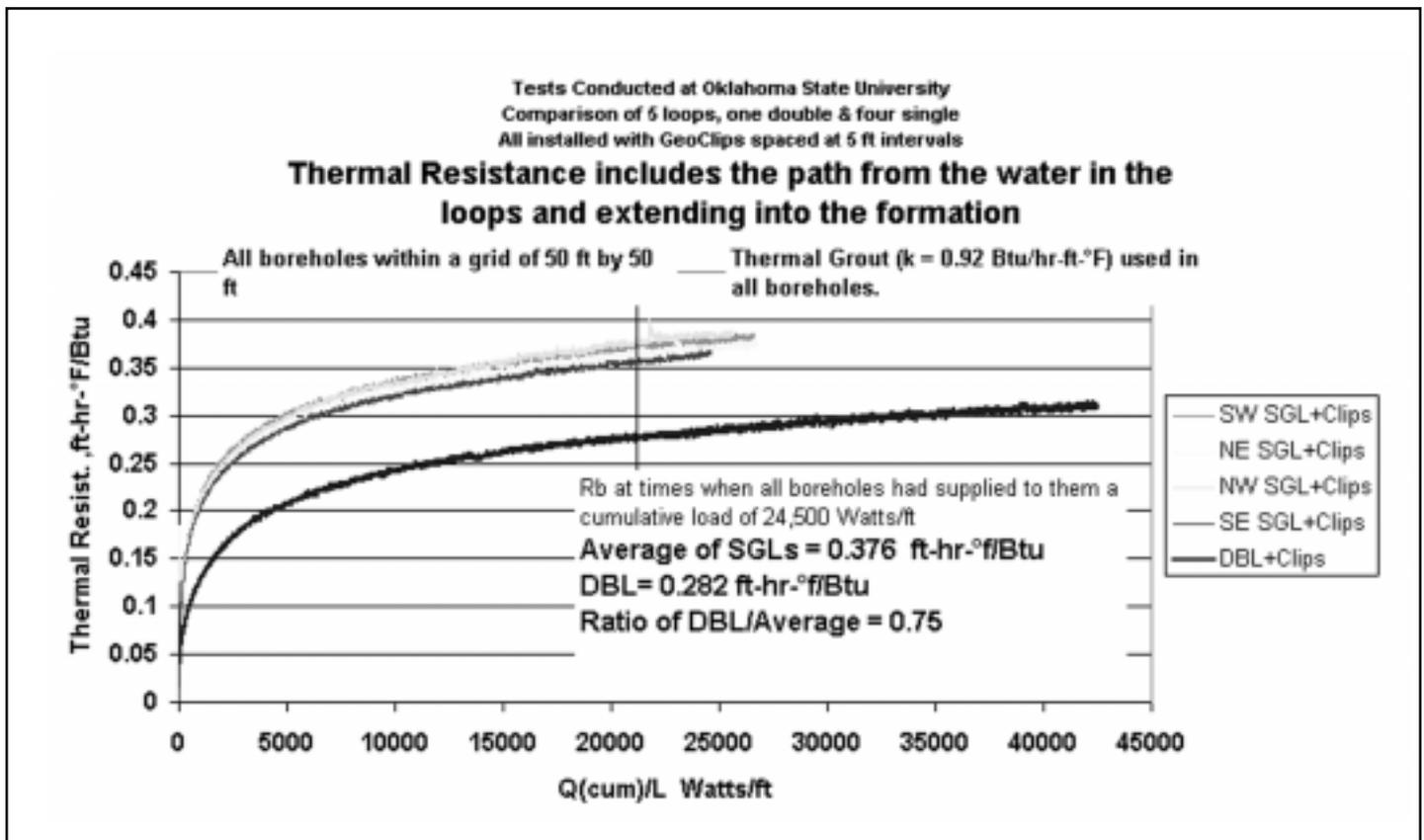


Figure 1

One of the premises for evaluating data from an in-situ thermal conductivity test is that the temperature of the formation radially outward from the borehole is constant. In other words, it has not been disturbed by absorbing or rejecting heat into it. This is a requirement independent of the method of analyzing the data.

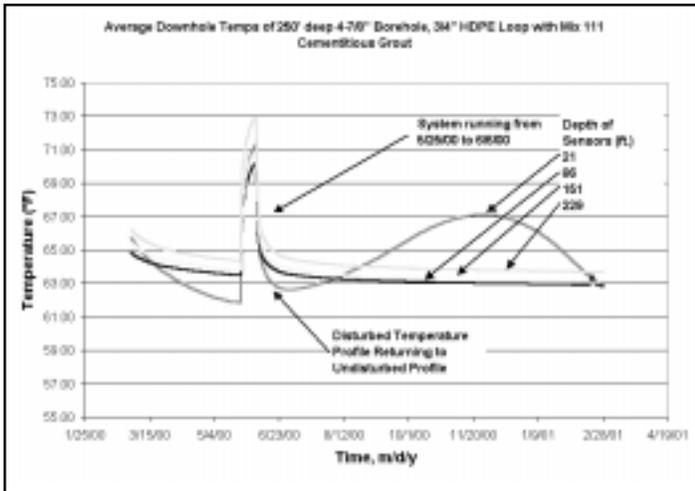


Figure 2

Grout, Pipe Placement and Performance

Grout creates a seal for environmental purposes. However, it can be of higher resistance than the surrounding formation, so the efficiency in ground heat exchangers is reduced. To overcome this, thermal enhanced grout mixtures were developed and then cementitious grouts were refined. Clips were developed to further reduce the effect of the grout on thermal performance of the loop. For a given heat input to a

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GHP SYSTEMS

GeoClip U-Bend Installation vs. Standard U-Bend Installation

- | | | |
|---|--|--|
| <p>GeoClip</p> <ul style="list-style-type: none"> • Optimum pipe positioning • Optimum pipe separation • Superior heat transfer | | <p>Standard</p> <ul style="list-style-type: none"> • Random pipe positioning • Random pipe separation • Inferior heat transfer |
|---|--|--|

The GeoClip was specifically designed to maximize borehole thermal conductivity, yet facilitate superior borehole grouting to protect the environment in Vertical closed loop heating and cooling wells. Research indicates that positioning up-bend pipes at the borehole wall directly across from one another significantly increases the heat transfer rate of the vertical heat exchanger over a standard installation, regardless of the backfill or grouting material used.



Geothermal Bore Technologies, Inc.
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| ◆ Chevron Phillips Pipe | ◆ Polyethylene Headers |

Research Activities

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borehole, the best heat exchange will yield the lowest return temperature to the unit. The figure below (Figure 3) shows that the standard loop placement with bentonite is the lowest performer (highest temperature). The best of all is with clips spaced at 5-ft intervals using thermal enhanced grout. The decision to use any one of these is based upon available

equipment and economics. Often the use of the enhancing of clips and grout type is the most economic course of action. In other situations, different combinations are best. Each job must be assessed individually.

Conclusions

What has been covered briefly in this article is just a portion of what is being done at OSU. To see and get more information, we invite you to come to the May Technical Conference on May 21 through 23, 2001.

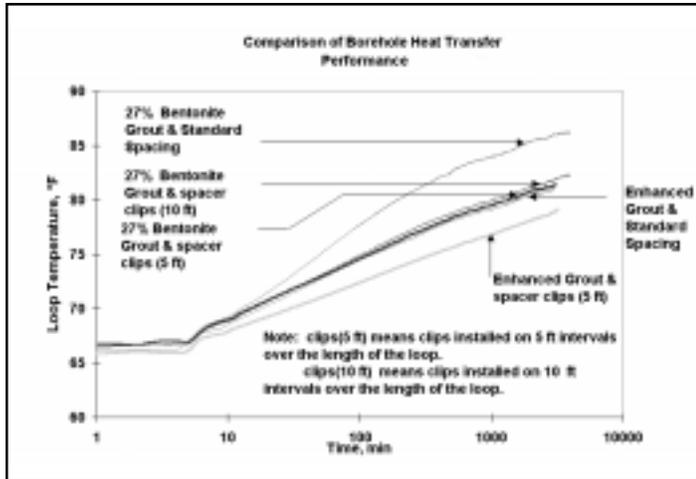


Figure 3

**Play
Dirty!**

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Call 1-800-626-4747

for more information or to register.

Or visit our website at www.igshpa.okstate.edu for information and a registration form.

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Calendar of Events

April 11

EPA Refrigerant Compliance Management
Environmental Support Solutions (Environ.com)
Charlotte, NC
www.environ.com
800-289-6116

April 17-19

IGSHPA Installation Workshop
Sound Geothermal
Westminster, CO
www.soundgt.com
435-722-5877 or 970-240-6018

May 1-4

The 23rd National Industrial Energy
Technology Conference
National Industrial Energy Technology
Houston, TX
www.esl.tamu.edu/ietc
979-845-1508

May 21-23

IGSHPA Technical Conference & Expo
International Ground Source Heat Pump Association
Stillwater, OK
www.igshpa.okstate.edu
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May 28-30

Russian Technologies for Industrial
Applications
Russian Foundation for Basic Research
Ioffe Physical-Technical Institute, St. Petersburg, Russia
IERFRI@pop.ioffe.rssi.ru
www.ioffe.rssi.ru/IWRFRI
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June 3-5

EI Annual Conference/Expo
Edison Electric Institute
New Orleans, LA
www.eei.org

Water Furnace

Hydro Pump

TJ Ogden