McClain Home Provides Learning Example for IGSHPA
Savings, comfort, peace of mind. What’s your destination?

GeoComfort Compass Series, where efficiency meets elegance.

✦ Field convertible cabinet – upflow, downflow, right or left return
✦ Eye-level controls for simplified installation and service
✦ Ultra quite operation
✦ Award winning design – inside and out

GeoComfort Geothermal Systems
Live comfortably.™

www.geocomfort.com
CONTENTS

DEPARTMENTS
4 Geo Outlook Staff
6 Directors’ Forum
8 Industry Leaders
40 Product Showcase
42 Earth Insights

FEATURES
10 Cover Story:
McClain Home Provides Learning Example for IGSHPA
By Janet F. Reeder

16 Dream Retirement Home Includes Indoor Pool
By Dara McCoy

24 Desert Home An Energy Saving Oasis
By Davod Nematpour

32 Old and New Working Together for Utah Green Home
By Kendra Mann

40 IGSHPA Partners in Geothermal Research
By Janet F. Reeder

10 McClain Home Provides Learning Example

24 Desert Home An Energy Saving Oasis
Cover photo by Janet F. Reeder.

Geo Outlook is published quarterly by Oklahoma State University and the International Ground Source Heat Pump Association (IGSHPA), 374 Cordell South, Stillwater OK 74078-8018. Geo Outlook is a joint venture of the Geothermal Exchange Organization (GEO) and IGSHPA. Send questions, story ideas, photos and comments to Editor, Geo Outlook, c/o IGSHPA, or call 800-626-4747. Visit our Web site at www.igshpa.okstate.edu.

Copyright 2010 by the Board of Regents for the Oklahoma State University Agricultural and Mechanical College, IGSHPA and GEO all rights reserved.

Articles written by third parties reflect the opinions of the writer and are not necessarily the opinions or views held by GEO, IGSHPA or Oklahoma State University (OSU). GEO, IGSHPA and OSU make no claims to the accuracy of statements made in such articles.
Innovative systems with profit built in.

DEALER TRAINING • MARKETING SUPPORT • INDUSTRY LEADERSHIP

You work hard to build your business. ClimateMaster, the leader in geothermal heating and air conditioning systems, gives you a clear path to profits. Geothermal systems are one of the fastest growing product lines around, and with ClimateMaster’s unmatched dealer training, multimillion-dollar national marketing support and broad array of innovative products, you don’t have to dig very deep to make the sale. Call 800-299-9747 or visit climatemaster.com and join other successful dealers today.
NOTES FROM GEO
By John Kelly
Chief Operating Officer:
GEO

The residential housing market may still be struggling, but it’s a great
time to install a ground source heating and cooling system. Whether for
new construction or retrofit, a ground source heat pump (GSHP) makes
a home stand out from all the others. The comfort, lower utility bills and
lower maintenance of GSHPs are just a few of their advantages. A GSHP
is also one of the best investments you can make. The 30% Federal income
tax credit for GSHPs is a great start, and many States and electric utility
companies have programs to help with energy efficiency and renewable
energy installations. In addition, interest rates are at historic lows, making
home improvements even more affordable. With a 400% efficient GSHP,
cash flow can be positive from the beginning, because savings on the utility
bill is often greater than the monthly payment on a loan to install the sys-
tem. And with utility rates projected to keep going up, the savings are likely
to be even greater in the future. Plus, maintenance bills go down, with no
furnace or outside air conditioning condensor to service.

Residential GSHPs can be tailored to just about any conceivable set-
ting, including forced air distribution, radiant floor heat and domestic hot
water heating. With 20-plus year GSHP service life, and 50-year service
life of ground heat exchangers, owning a GeoExchange system means
long-term worry-free operation and added home value.

NOTES FROM IGSHPA
By Jim Bose
Executive Director:
International Ground Source Heat
Pump Association

It’s hard to know what’s next. The financial people will say that
past performance is no measure of what’s to come. The residential
market acts like that at times. When a person sits back and starts
thinking what to do, there is no shortage of advice coming from ev-
everywhere. Government agencies with efficiency in mind may be en-
couraging zero, near zero, high performance building methods, etc.
But you don’t have to read long before you come to the conclusion
that the best money is on the ground source heat pump. The big chal-
lenge is getting people to join in the fun.

I don’t know what to think when I hear for about the tenth time,
we need to study this a little more and get some good hard numbers
on performance. One would think that about the time the total num-
bers are approaching a million systems installed, that maybe the key
might be in looking at past history to maybe conclude that the future
can be predicted. Stillwater, Oklahoma is a small community, and
news travels fast, especially bad news. Not hearing any, I’m assuming
that maybe we should mine this data and give them some numbers.
There are many programs around the country that are excellent
sources of information. This information is valuable if we take the
time to do the work.
The “Award Winning” Zephyrus utilizes R410A refrigerant and advanced, integrated controls for the utmost in efficient, clean, reliable performance.

For inquiries, please contact: T: 1.866.213.0742
www.geofinitymanufacturing.com
Alan Watts has over 29 years experience in the GeoExchange industry. In 1974 Alan founded Alan Watts Service, Inc., was bitten by the geothermal bug in 1981 and has been dedicated to the industry ever since.

He is an IGSHA Accredited Installer, a Certified GeoExchange Designer, owner and CEO of Alan Watts Service Inc. He is also owner and CEO of AWEB Supply Co., Inc. a wholesale distributorship dedicated solely to the geo-exchange industry, which he founded in 1984. Watts is responsible for the design, manufacture and distribution of the SLIM JIM® and GEO LAKE PLATE®, a pond loop in a package, both nationally and internationally, the success of which he credits to his wife Barbara. She left her job of 20 years and joined forces with him in 1999.

The SLIM JIM® and GEO LAKE PLATE® have become widely accepted within the industry with numerous applications across North America and Canada as well as other parts of the world. The largest application of its kind outside North America is in England at Kings Mill Hospital with 1,400 tons of exchanger in the lake across the street. Alan is dedicated to making Geo Exchange, with pond loops, As Simple As It Gets!

John Shonder began his career in the geothermal field through his analysis of the Fort Polk retrofit of 4,000 residences with geothermal heat pumps. His series of technical reports and ASHRAE papers proved the benefits of geothermal equipment to the military and the federal government at large, leading to more widespread application of the technology.

John is Chair of the Research Subcommittee of ASHRAE’s Technical Committee 6.8, Geothermal Energy Utilization, and previously served as Committee Chair and Vice Chair. At ORNL, John supports the Department of Energy’s Federal Energy Management Program, assisting federal installations in implementing geothermal heat pump projects. He also works with the DOE’s Office of Energy Efficiency and Renewable Energy to promote the use of geothermal heat pumps in other countries, and he was instrumental in the formation of a chapter of the International Ground Source Heat Pump Association in India. John holds a B.S. and M.S. in engineering from the University of Illinois at Urbana-Champaign.
SLIM JIM®—GEO LAKE PLATE®
“POND LOOP IN A PACKAGE”
The Smart Choice of Geothermal Contractors Around the World
GEOTHERMAL—AS SIMPLE AS IT GETS!

Distributed Exclusively by AWEB Supply • www.slimjim.com • 888-277-2932
United Kingdom & European Union Distributor • Geothermal International, Ltd. • www.geoheat.co.uk
McClain Home Provides Learning Example for IGSHPA

By Janet F. Reeder
Gerald McClain advocated using geothermal heat pump technology for years before actually building a new home that uses the practical ground-source system for heating and cooling.

McClain, a retired Oklahoma State University mechanical design engineering technology department head, now heads up a distance learning effort for the International Ground Source Heat Pump Association.

Retiring from the mechanical engineering department brought other valuable opportunity and experience for McClain. Before he came on board with IGSHPA, he spent 11 years working at the forefront of distance learning as the vice president of e-Learning Innovations. As vice president of that company, a company focused on providing training to those who needed to train and educate others away from a main location, McClain taught and promoted the new distant learning technology during the late 1990s through 2006.

“We went all over the world teaching people the techniques of teaching at a distance,” he says. He also was involved in designing distance teaching studios for clients, as well as a wide range of teaching materials used here in the U.S. and overseas. “We brought people through our training institute here as well as going to different sites,” he said.
McClain and e-Learning Innovations taught the U.S. Post Office, the National Weather Service and the FBI how to train at a distance. They also worked to help the Veterans Administration set up supervision training using a learning management system.

McClain’s spacious 5,970-square-foot home sets at the top of a hill on 2 1/2 acres in a secluded gated community near Stillwater, Oklahoma. The year McClain thought it would take to build after pouring the foundation in late December of 2008, turned into over a year-and-a-half, with the couple finally moving into their home in the spring of 2010. Familiarity with computer assisted design programs coupled with a wife who is an artist, allowed the McClains to be the primary designers of the home.

“Everything really started when Muna and I started using some CAD software to design homes,” he says. “She laid out this home numerous times.” She then hired an architect just to build a model of the original design.

The artist’s eye is evident throughout the layout and appointments of the home as well as in the use of materials selected for the floor and woodwork. The gracious hospitality of McClain’s wife Muna, who was born in Lebanon, can be seen in the amount of space given to hosting and meeting the dining needs of their guests. Her art hangs throughout the home.

Muna admits copying some of her design ideas from many hotels where they stayed while travelling overseas. The kitchen fireplace for cooking is a favorite feature for her. A long one-sided breakfast table with a serving area along the facing wall in a carefully planned hallway near the kitchen, also exemplifies the strong interest in hospitality Muna has incorporated into the home.

McClain says that he was aware when Dr. James Bose was involved in researching
the feasibility and efficiency of geothermal heat pump technology in the mid 1970s at OSU, but he was not involved. Bose later called on him to help fill a mechanical engineering faculty spot temporarily after he had retired from e-Learning Innovations. McClain said that turned into an opportunity to work part time with IGSHPA designing and implementing web and internet training materials about ground-source heat pump technology.

“One of the first things that I did was to develop training materials about ground-source heat pumps. I worked on an educational package that could be used at a distance for homeowners, schools and other institutions.” McClain also develops video training materials for IGSHPA trainers. He has 19 videos on U Tube for IGSHPA. “I also converted some of Bose’s early videos for web,” he said. “We get over 17,000 hits on that material and emails every day wanting information and descriptions of the technology.”

McClain took bids for the geothermal part of the mechanical systems for their new home. He chose ComfortWorks, Inc., of Goldsby, Okla., for drilling, ground loop design and GHP unit installation. The company could bid for the whole project since they do their own drilling, McClain said. Chris Ellis of ComfortWorks said he drilled six ground loops to a 300-foot depth and used 1-inch high density polypropylene (HDP) pipe.

The system is comprised of one 4-ton unit to service the kitchen, dining room, gallery and living areas; one 3-ton unit to service the four bedrooms, bathrooms and study; and one 2-ton unit to service the upstairs area. Two of the units have desuperheaters attached to the GHP system and supply hot water for the bathrooms, kitchen and laundry room. During the summer, the desuperheater system provides the McClains with free hot water. The local utility has a reduced electrical rate for the use of the GHP system.

“Top of the line units were used,” Ellis says of the ClimateMaster TTVO series heat pumps. A total of 9-tons capacity was installed with the three units, Ellis said. He said there wasn’t anything unusual about the project for his company.

McClain however recalls that he was tasked with relocating a number of skids of brick that had been left beside the house for the masons to start the brick work, when he discovered they had been put in the area next to the house where the drilling unit would need to set up. It was a planning lesson he says he learned well. McClain thoroughly documented the drilling and loop installation to use for examples in training instruction for IGSHPA.

The geothermal part of the project was put in late in the construction of the home, McClain said. Accommodation for the drilling runoff on the sloped property was another issue McClain had to deal with. He said a number of barrier techniques were incorporated to keep the property entry area open, and to keep him from having to repeatedly clean the street below the site.

Calculating the incentives and rebates for the project’s GHP installation shows a $13,599 tax credit for 30-percent, plus $1,800 from the local power company for a $200 per ton rebate. McClain says he expects the cost for operating the GHP system will be somewhere around $100 a month. That cost is far below the cost of natural gas for heating, a proposition McClain’s wife, Muna, would not consider for safety reasons, and the additional cost of using electricity for cooling.

Western Mechanical of Stillwater, Okla., contracted the non-geothermal parts of the project and then tied-in the hot water tanks to the heat pump system desuperheater. Kevin Dean of Western Mechanical said the system was well thought out and “a nice install.”

Johnny Horner, a local builder, was selected as the general contractor for the project. David Kulick was architect.

Other energy saving measures the McClain’s selected for the home include the use of low-E windows
throughout, the incorporation of an aluminum backed radiant barrier for decking sheathing and 6-inch walls in parts of the home for added insulation. Ductwork was also carefully wrapped and sealed and mechanical areas were located inside in the attic area and in a closet space in the garage.

McClain says the largest challenge he feels homeowners are facing when considering implementing ground-source heat pump technology is the location of the ground loop. He said one of the most important aspects is to identify the loop location.

“It should be put in the abstract with a GPS location for the wells,” he said. “After several years and especially if a home is sold, the location may be forgotten.” McClain strongly suggests using location tape when putting in the loop fields.

The loop obviously adds additional cost. In McClain’s case $15,000 of the $45,000 installation expense was for the loop. He is quick to point out that the 30-percent tax credit compensates for that extra expense in the system for him. In the future McClain plans to install solar panels to power the GHP system and potentially allow them to go off grid.

McClain predicts the GHP industry will see the most growth ever in the next five years as knowledge of the benefits and the incentives reach interested consumers. He says the technology is affordable for new homes and he expects developers will be more interested in proposing and installing it in the future.

Christian Science Monitor’s weekly publication featured the McClain home in their August 9, 2010 issue in a geothermal energy sidebar titled “HVAC straight from the earth,” as part of their “Off the Grid” cover story about American homeowners looking to achieve energy self-sufficiency.
Geo-Trio™ multi-position geothermal heating and cooling system.

The Geo-Trio’s A-Coil, Blower, and Compressor are each self contained allowing for multiple configurations.

- Fewer SKU’s with more product offering
- Ideal for retrofitting air to air systems
- Backed by a tradition of Bard reliability

The advantages of the Geo-Trio just stack up. Visit www.bardhvac.com to learn more!
Dream retirement home includes indoor pool

By Dara McCoy

A geothermal system was the most efficient and economical option for the Reeses’ indoor 12-foot by 24-foot pool. (Photo provided by Kim and Donna Reese)
As the United States slowly crawls out of what has been called the Great Recession—highlighted by the housing bust, the lending freeze, “too big to fail,” high unemployment and the stock market crash—just about everyone in this country has been impacted. Kim and Donna Reese of Tyrone, Pa., were no different.

Kim, who just retired in mid-June from his career as a professional engineer for the State of Pennsylvania, married Donna in 2007. When Kim, 56, and Donna, 46, decided to build their retirement home together, they knew they would have to find a way to sell three homes in one of the worst seller’s markets in decades. They each owned homes and the property they planned to build on also had a home that they would subdivide from their property and sell.

Donna’s house sold before their wedding day and Kim managed to sell his home shortly after their marriage. Fortune shined upon them again when they got an offer on the home they were living in, but it was six months before their new home would be completed.
Knowing that buyers were rare in the current down econ-
omy, the Reeses seized the opportunity to sell and bit the
bullet on personal comfort—moving into their 28-foot
camper during the construction of their home.

The couple put a tremendous amount of thought and research into the design and construction of their家
1,950-square-foot, one-story ranch style home and at-
tached indoor poolroom. Kim’s engineering background
understandably gave him knowledge and interest in sev-
eral aspects of the process, but they were purposefully
building the last home they ever planned to live in. It was
natural for them to pursue high standards for their ideal
retirement home.

“We spent a good two years researching and planning,” Donna said. “We spent hours poring over house plans. We
wanted everything to be efficient and easy to use down the
road.” That included the heating and cooling system selec-
tion. The Reeses considered several options, including
wood burning systems, which would have been economical
given that the couple owned wooded property giving them
access to plentiful fuel supplies. However, lumberjacking
was not a retirement hobby Kim was eagerly anticipating.

The Reeses, who vacation frequently, needed a system
that could maintain itself for a few weeks at a time. As
avid scuba divers, the couple also wanted an indoor pool
attached to the house that they could enjoy year round,
regardless of Pennsylvania’s weather.

“The biggest challenge was the swimming pool struc-
ture being connected to the house,” Kim said. “Having a
good dehumidifier in the structure is absolutely essential.
There’s no way to have an inside swimming pool and not
have structural damage to the home if you don’t dehu-
midify the air.” Quotes for a conventional dehumidifica-
tion system came in around $26,000 and promised high-
energy usage.

“With my engineering background, I thought geother-
mal should really have the capacity to do dehumidification
on a fairly large scale,” Kim said. The Reeses went through
seven HVAC contractors before they found one who confi-
dently agreed with Kim’s estimation.
“As we got our bids coming in, they varied,” Kim said. “There was a range of 100 percent in costs and capacities for the house and indoor pool structure. One contractor did say they would incorporate dehumidification in the system, but they would not give any warranty and they weren’t sure of the capacity, whether it would do the job. That was, of course, unacceptable.”

Just before they were about to give up on geothermal, Donna remembered a family she knew from high school who owned Natcher’s Drilling and an HVAC distribution company, Natcher’s Way. Fortunately, they were able to stop seeking bids at contractor number seven.

“Natcher’s Way might have been the most expert on the systems,” Kim said. “They understood the principles and had experience putting them in, so we were pretty comfortable with their level of expertise.”

An engineer from GeoFurnace talked directly with Kim to be sure he understood their needs and modified the equipment to fit their poolroom requirements. The couple found the equipment to be reasonably priced. They were pleased with the stainless steel cabinetry, which seemed more durable for the poolroom area. With the geothermal system’s energy costs estimated at one-fourth the cost of conventional systems and a 30 percent federal tax rebate, the Reeses were ready to put a geothermal system in their home.

Donna was impressed that Larry Natcher and Ed Lipnic, co-owners of Natcher’s Way, and Jeff Ball, the HVAC contractor, came to their house to visit with them. Natcher’s Way, which works directly with their equipment manufacturer, GeoFurnace, in South Dakota, reassured the Reeses that the geothermal equipment could handle the dehumidification and HVAC in the poolroom and heat the pool water.
Lipnic realized he was dealing with informed customers when Kim requested a horizontal trench installation for the loop field. “He had an old creek bed location that had narrowed down through the years,” Lipnic said. “It was ideal conditions geologically. We had some really good, moist soil, and he knew that. Being an engineer, he was pretty well in touch with what would be the best performance and how they’d get the most bang for their buck.”

Larry Natcher and his drilling company, Natcher’s Drilling, completed the slinky loop field design and set up the installation process for eight, 140-foot long trenches at seven feet deep and 40 inches wide. To be even more economical, the Reeses wrote themselves into the contract to do some manual labor in the loop field.

“We both ran wheelbarrow loads of sand,” Donna said. “We were right out there in the trenches.” Kim and Donna, with the help of some friends, spread 150 tons of limestone sand by hand and with their own equipment. Kim, who owns a track loader and backhoe, did a lot of the backfilling, leveling, and grading for the field.

On December 15, 2009, the Reeses were happy to relieve their 5th wheel camper from primary residence duties and move into their new home. Less than two weeks later, Donna tested out her open floor plan—designed with her penchant for entertaining in mind—and their geothermal system, with a Christmas dinner for 30-plus guests.

“We have an open living room, kitchen and dining area,” Donna said. “I was a little concerned that there are not a lot of places for vents, but we don’t have any hot or cold spots. It’s a very consistent heat.” With four tons of HVAC equipment for the house and four tons dedicated to the poolroom, Kim has found the capacities to work well. “I’m amazed that we...
never had the electric backup heat kick on this winter,” Kim said. “We’re comfortable at 68 degrees and set the thermostat at 68. It doesn’t go to 69 or 67 and move back. That thermostat doesn’t move.” The Reeses keep the pool water temperature and air temperature at about 82 degrees and set the relative humidity at 55, which sometimes ranges up to 60.

“That’s quite adequate,” Kim said. “The swimming pool area has more variables—taking the pool cover off and splashing around warm water. The temperatures stay fairly consistent, and the dehumidification system has been outstanding.”

After all the research, planning and involvement the Reeses put into their retirement dream home, it was surely a relief to move out of a camper trailer and into a place that met their thoughtfully considered expectations.

“We have not come across anything we’d want to change in the house,” Donna said. That includes their geothermal system and they both extend gratitude to the people who helped make it happen for them. “Natcher’s Way was outstanding to work with, very carefully answering all our questions, fine tuning things, and following up,” Kim said. The praise is made even more meaningful from customers as deliberate as the Reeses.

“That’s the nature of what Donna and I do, we over analyze,” Kim said. Pleasing well-informed, involved customers like the Reeses means a lot to Lipnic, who spends a lot of time traveling to promote Natcher’s Way. “Word of mouth is the best or worse advertising,” Lipnic said.

The Reese’s home was one of the first projects for Natcher’s Way, which incorporated in 2009. Lipnic said the company is on track to achieve $1 million in sales for 2010. With happy campers like the Reeses in their client portfolio, Lipnic’s job gets a little bit easier and those sales numbers come as no surprise.
SAFE-T-THERM®
Inhibited Propylene Glycol
Heat Transfer Fluid

GeoSafe®
Inhibited Ethyl Alcohol
Geothermal Fluid

Harnessing Earth’s Energy

Houghton Chemical Corporation
www.houghton.com
1-800-777-2466
Residential Flexibility

Products and solutions for all of your residential geothermal projects

Geo-Flo’s complete line of flow centers are perfect for all of your residential ground loop pumping needs. These foam insulated modules feature Grundfos’ whisper quiet wet rotor circulators and Geo-Flo’s unique full-flow flushing and service valves. From single pump GPM-1 modules with 1” valves to our SuperBrute XL and VersaFlo modules with 2” valves, Geo-Flo provides solutions for all of your residential installations.

Geo-Flo Products Corporation - (800) 784-8069
DESERT HOME

AN ENERGY SAVING OASIS

BY DAVID NEMATPOUR
When a young Santa Fe couple began plans to build a new home, they were inspired by their parents to build a house that was healthy for them and their three children. They were already planning to create a healthy home free of VOC paints and other toxins and wanted to be even more innovative. While doing research, the husband found information about the U. S. Green Building Council’s Leadership in Environmental Energy and Design, LEED®, building rating program.
“As we were doing our research, we came across the LEED® guidelines and felt they pretty much fit the model of the way of living we were looking to achieve,” he said, “We decided to take that route. It was a lot more work than we anticipated, but in the end it was definitely worth it.”

The couple first learned about geothermal energy when they were looking for efficient and environmentally sound ways of heating and cooling their new home. They were already working with Dahl Santa Fe for the home’s HVAC system. At first, they were interested in installing a solar thermal heating system, but Jay Maze, with Dahl Plumbing, sat them down and explained the benefits and savings of geothermal energy.

Most of the energy benefits included in the construction of their home come from their geothermal system as well as support from their photovoltaic system. With the photovoltaic system, they receive a 30 percent federal tax credit along with a 10 percent break from the state of New Mexico. With the geothermal system, they gained a 30 percent federal tax credit, along with a state tax credit of 30 percent with a $9,000 cap. They figure building the LEED® friendly home cost 10 to 15...
percent more than a regular home. The homeowner estimates the system should pay for itself in five or six years.

The powerful view of the New Mexican desert, along with the dry environment, suited the family and made the location perfect. With the vistas of the desert and surrounding vegetation, they will enjoy the desert without having to step outside of their home. Those same desert surroundings on the site helped the architect, John Covert Watson, design and build the home.

“Every project I design is based on the site and the client. We always hope that whatever we are doing is the perfect solution for the climate, the client and local requirements,” said Watson, who studied under Frank Lloyd Wright. “Most of my buildings, if not all, are based on that. We call it organic architecture, which is based on the site environment and the people it is designed to accommodate.”

Watson’s first steps are to walk and investigate the site. This specific site was different in that the house would be built on an escarpment—a long cliff or steep slope. Even though Watson says the site is not exactly an escarpment, the city of Santa Fe has recorded it as an escarpment zone. The designation added very specific building codes, in addition to the normal city building codes. While the city of Santa Fe was hesitant to let the family proceed with the project, they were won over when the future homeowners pointed out there had been a building on the site in the past, and that instead of building just a single-level house on the site, they could build multi-level structures on other areas of the land.

The 4,750-square-foot adobe and pueblo style home is conditioned using two 5-ton NSW060 WaterFurnace units. Since using a forced air system would further decrease the humidity in the already dry environment, the homeowners opted for a radiant hydronic system that circulates throughout the house. To help with needed humidity for their home they also installed air exchangers for the additional humidification.
“We have something called a Nordic humidifier that kicks on when our air exchangers kick on. We have two air exchangers. One leads into the bedroom and kicks on at 7 p.m., and turns off at 7 a.m. About every 15 minutes it pumps humid air through the exchanger,” the husband said. The other exchanger services the main part of the house.

The loop, designed by Maze, and installed by Universal Plumbing, is a vertical loop system with 11 bore holes, each at
200 feet deep. A water and ethanol mixture is used through the 3/4 inch U-bend pipe to extract the energy from the earth. With all the LEED® friendly aspects of their home, the savings have been rolling in.

“We had one of the coldest winters we have had here for, I think 20 to 30 years, and our gas bill was coming in at $11. Our electric bill was right around $350 or so.” While they have not used the cooling feature of their geothermal system, they hope to recover the costs during the summer to the point that, after averaging costs over the year, their bill to heat and cool the home would average $75 a month.

Another feature that makes the home LEED® friendly is the use of radiant cooling and heating. According to Maze, the project loop designer, one of the benefits of radiant heating and cooling is the quietness of the system, which does not move air around while changing the temperature in the home. Radiant cooling cools occupants and unheated objects such as the mass of a building, he said. The building’s mass could be stone or concrete, anything that can hold energy.

“By installing the cooling in the ceiling, the warm air is cooled when it rises and contacts the cool ceiling,” Maze explained. While radiant cooling is an energy saving feature,
climates unlike New Mexico may not be suited for the feature. Dew points in the area must be lower then 50 degrees or dehumidification needs to be used so that condensation does not form in the system.

In March of 2010, the home was awarded LEED® Gold Certification. According to the LEED® website, to achieve LEED® status, the building in question must support sustainability in the following areas: sustainable site, water efficiency, energy and atmosphere, materials and resources, indoor environment quality, locations and linkages, awareness and education, innovation in design and the regional environmental priority. For Gold LEED® status, the building must be awarded 39 to 51 points in the preceding criteria.

With the LEED® award, the home qualifies for an additional rebate from the State of New Mexico based on the home’s square footage. The rebate offers $6.85 per square foot for the first 2,000 square feet, and $3.40 for an additional 1,000 square feet, they are expecting to be credited about $17,100 on their taxes. ☞

ReBearth FTC Site Testing Trailer

Everything you need to conduct a Formation Thermal Conductivity Test installed in one custom trailer.

Features Include:
- Custom 5’ x 8’ Enclosed Trailer
- Generator with External Gas Tank
- Completely Lockable for On-site Equipment Security
- Side Ventilation Fans
- Aluminum Floor & Vinyl Walls for Easy Cleaning
- Options Available for Testing Unit to Provide Professional Reports
- Testing Equipment Designed for up to 500’ Bore Depth/Length

The ReBearth FTC Trailer is Available Exclusively At:
ReBearth Products, Inc. 641.765.4781
www.rebearthproducts.com | us@rebearthproducts.com
OLD AND NEW WORKING TOGETHER FOR UTAH GREEN HOME

BY KENDRA MANN
When Bill and Mary Andolsek first started their new home project, they thought they wanted to have a contemporary Mediterranean home, said Robert Pinon, architect at MHTN Architects, of Salt Lake City, Utah.

Shortly after the start of planning, the Andolseks began asking the architect his opinions about sustainable design and going green. They knew they were building a large home and the couple wanted to be responsible both to their community and the environment.

The family selected property that had an existing home and other structures that would play into the design of their project. They wanted to reuse anything they could from the old home located in the St. Mary’s neighborhood of Salt Lake City.

“It was important for them to lead by example and show that even a home with 6,700 square feet can take advantage of opportunities to save the environment,” Pinon said.

The couple chose to build their new home using an existing 25-foot-tall stone tower as a main architectural feature. The tower was built in the 1920s as the entrance to a golf course that was never finished. First they had to raze the existing home except for the tower. The site would present a number of interesting challenges for the design and engineering aspects of the family’s new home.

Because the home was located in the foothills of Utah’s Wasatch Mountains, the area’s history of water problems and flooding due to underground springs became an important factor in planning and design. Pinon found methods to meet the challenge presented by the history of water problems for the property.

“There was about an inch of water in the basement, and there was a lot of mold and a crumbling foundation.” Pinon said, of the previous structure. The problem became more obvious when the old home was torn down.

Instead of seeing the underground springs as a problem, Pinon along with Scott Deakins, mechanical engineer of SMD Engineering, out of Salt Lake City, sought to come up
with a workable plan to take advantage of the available constant 55 degree water.

Together they approached the family and suggested the possibility of building an underground cistern for cooling the house and dealing with the flooding. The environmentally conscious Andolseks agreed to the idea after they understood it would act much like an aquifer and assist their new geothermal system in cooling their home.

Deakins also had to deal with the old stone golf course tower saved from destruction when the other home was removed. He knew the Andolseks wanted to highlight it because of the history behind it. The situation created a need for careful planning, he said.

“There was a turret outlook feature that was built around the turn of the century and we had to make sure all of our drainage and tubing did not disturb it,” Deakins said. Through careful planning and patience they were able to successfully work around the obstacle the interesting feature presented.

Saving the tower structure gave an opportunity to create an openness that works well with the materials the Andolseks used for their stairway. (Photo provided by MHTN Architects)
Carl Pond, owner of Carl Pond Plumbing and Heating, Inc., North Salt Lake, Utah, also installed French drains around the home’s basement and first floor.

A sump pump was used to fill a 4-foot by 18-foot cistern holding close to 1,200 gallons on the lot’s northwest corner. A Slim Jim® Geo Lake Plate heat exchanger was installed in the cistern vertically. The heat exchanger is 8 feet in diameter and 13 feet deep. Also, to assist in cooling the Andolsek home, a separate closed-loop filled with a biodegradable 30 percent propylene glycol mixture is run through the heat exchanger to the heat pumps, Deakins said.

“Any water left over goes into another collection system for a large water feature in their backyard,” Pinon said. “This allows for good cooling just from the evaporation.” If both of these areas are full, the remaining excess water trickles down into the storm drain system.

The glycol mixture is cooled by the underground cistern, and is then used as a chilled-water cooling system for the home, said Pond. An extra compressor was installed in case the glycol mixture would need to be colder.
The home’s cooling system also uses three Lifebreath Heat Recovery Ventilators (HRVs). These move stale, contaminated air from inside the house to the outside. At the same time, the HRVs draw fresh oxygen-laden air from outside and deliver it into all areas of the house. The Andolseks appreciate the work of the ventilation system in keeping their new home comfortable.

“In the basement three 5,000 gallon containers are full of fluids stored for heat,” Pinon said. Due to cold winters solar collectors were also built on the roof. The solar heated water is connected to an Uponor radiant floor heating system with 1/2-inch PEX and copper tubing, Deakins said.

There are 15 zones throughout the house with room-to-room separation possible with the system. The home’s insulation is made from recycled jeans, Pinon said. The recycling aspect appealed to the Andolsek’s desire to reuse materials and fit the need for insulating the home.

Total tonnage of the geothermal system is 15 tons, Deakins said. The system is comprised of two heat pump units, a 5-ton and a 10-ton, both manufactured by Florida Heat Pump.
“By using a geothermal system, it is estimated the couple will see a savings of 60 percent on the cooling costs for the house,” Pinon said. There should be similar savings in heating costs for the family.

Construction on the home began June 2008 and was completed in September 2009, Deakins said. The house is seeking LEED® Platinum rating, Pinon said.

The Andolsek’s awareness of the environment and their desire to create a home they could live in forever led them to take advantage of every opportunity to be eco-friendly, Pinon said. The intent is to show the homeowners put forth the effort to do the right thing and benefit the environment. They share their knowledge about building efficiently at every opportunity.

Other energy and ecological features in the home include Forest Stewardship Council wood products, double-flush toilets, LED lighting, low-flow faucets and refurbished furniture. Carpets throughout the home are also made of recycled materials.

The family opted for a large water feature in the back yard to also assist with drainage issues on the property. (Photo provided by Carl Pond Plumbing and Heating, Inc.)
The home was also built with accessibility in mind. It includes an elevator, extra wide hallways and wheelchair accessible bathrooms. Their plans included the needs of a number of relatives and friends they knew needed the assistance when visiting.

The Andolsek’s home has received a lot of attention statewide. It has also been written about in several publications, including ED+C Magazine where it was highlighted as responsible and practical. It was also featured on the Utah Clean Energy site and touted by local television KSL Channel 5 as Utah’s greenest home. The home was the first home on Salt Lake City’s 2009 Parade of Homes.
The EarthPro Geothermal Drills feature a single operator setup providing ease of use and solid job profitability.

These features ensure the toughest jobs are tackled with ease:

• Automated pipeloader system allows a single operator to drill and trip out up to 600 ft (183 m) of pipe without assistance.

• Central ergonomic controls include a dual multi-function joystick that is console mounted and adjustable for height and angle to reduce operator fatigue. LCD display provides data on drill operation in easy-to-understand terms.

• Dual rack and pinion design with three-speed drive motors that allow quick trip times with 45,000lbs. pullup and 22,000lbs. pulldown. There are no chains, cables or hydraulic cylinders to replace.

When you need dependable productivity and profitability, look no further than Astec. For more information on EarthPro Geothermal Drills and other Astec products, go to astecunderground.com or call (800) 527-6020.
PARTNERS IN HORIZONTAL BORE RESEARCH EFFORT

BY JANET F. REEDER
A horizontal borehole research study has been undertaken by IGSHPA in partnership with Charles Machine Works Inc., Ditch Witch® and Halliburton Baroid®. Work began in early spring with start of drilling on May 10.

“The horizontal borehole project is studying the effects of different types of grout and drilling fluids on the thermal response of horizontal ground loops,” said Rick Beier.

Beier is working with IGSHPA and the other partners in conducting the study. He is an associate professor in the mechanical engineering technology department at Oklahoma State University in Stillwater, Okla. Bill Holloway, senior research engineer with the electrical engineering technology electronics lab at OSU, is conducting the testing with Beier.

“Most governmental agencies require grout to be used in vertical boreholes to block water and contaminants from traveling along the vertical borehole path,” Beier said. “Bentonite grout has a lower thermal conductivity than many soils so that the grout filling a borehole impacts its thermal performance,” Beier said.

“But horizontal boreholes are usually shallow at 5 to 12 foot, so that the same environmental concerns may not apply,” Beier said. Instead, he said, the decision to use grout is determined by the effects it has on thermal performance, if local governments do not require it. During horizontal drilling, unless the borehole is drilled dry, at the end of the drilling process a mixture of drilling fluid and soil cuttings is left in the borehole. A U-tube loop needs to be placed in the borehole. While inserting the U-tube, grout may be pumped into the borehole to displace the drilling mud. If grout is not used, Beier says, the drilling mud and the cuttings will be left in the borehole.

Beier said that enhanced grouts have been developed and are being used in vertical boreholes that have higher thermal conductivities and enhance the borehole thermal performance.

The drilling crew from Ditch Witch® started early on Monday morning, May 10, after having located equipment to the site on the Friday before. The group met in early April to discuss plans for the research effort. They also visited the site, on land near the OSU Manufacturing Development Lab, formerly the Petroleum Building, a facility IGSHPA has used for training and research.

The group planned for 10 horizontal boreholes 200-foot in length with a 4 1/2-inch to 5 1/2-inch diameter. Plans called for the drilling depth to be 10-feet or deeper. Grouting methods varied among the boreholes for the purposes of the study. The type of drilling mud also varies among the boreholes. Six of the boreholes were done using grout and four were done without grout. The drilling path of the boreholes was marked at 30-foot to 50-foot intervals on the surface.

A small diameter vertical hole at least 3-foot deeper than the bore was made about 50 feet from the end between two of the horizontal boreholes to insert temperature sensors contained in a 1-inch tube.

Holloway and Beier will conduct the in-situ testing over the summer to evaluate the variation in thermal
performance among the boreholes and will record the results. The tests are expected to be completed by the end of August. A year from these tests, testing will be repeated to see if changes occur over time.

Two in-situ thermal conductivity test units were built by Holloway and are being run on two boreholes simultaneously for data collection. The units are powered by a 70-kilowatt generator. In phase one, the odd number loops were tested. The ground was allowed to rest for two weeks before phase two testing began, which consisted of the even numbered loops. In addition, ambient air and earth temperature data is being collected at depths of 12-feet, 9-feet, 6-feet, 3-feet, and 6-inches.

Each borehole undergoes a continuous 48 to 72 hour test to understand its thermal performance characteristics. The portable testing equipment is moved from one borehole to another during testing. Thermal conductivity testing is also being performed on samples of the grout and drilling mud with a thermal conductivity probe test unit.

Thermal conductivity methods for in-situ or ‘in-place’ testing and grout samples were developed in the mid 1990’s by the OSU Ground Source Heat Pump Research Group in conjunction with Ewbanks and Associates of Fairview, Oklahoma.

The 205-foot U-tubes for the boreholes were purchased by IGSHPA. Baroid BORE-GROUT™ was used as the grouting material and was provided by Halliburton Baroid® with drilling mud and equipment for grouting. Tom Tiber and Lyndon Pence from Baroid assisted with the project.

Richard Levings, Joe Smith Sr. and others were on the project from Ditch Witch® during the drilling.

IGSHPA Director Jim Bose says the research will help determine the benefits and necessity of grouting in horizontal bores. “Hopefully, we will be able to understand horizontal bores better,” Bose said. He says there are a lot of people interested in horizontal drilling because it can be done in areas where there are existing structures or established landscaping.
GIVE YOUR GSHP COMPANY THE ENERGY BOOST IT NEEDS

INTERNATIONAL GROUND SOURCE HEAT PUMP ASSOCIATION
CONFERENCE & EXPO 2010
DENVER, COLORADO
OCTOBER 27-28

PRE-CONFERENCE TRAINING BEGINS OCTOBER 25
WWW.IGSHPACONFERENCE.COM
Astec EarthPro Geothermal Drills
Astec Underground

Astec EarthPro Geothermal drill rigs are built to harness the earth’s energy. The new Astec EarthPro Geothermal 4550 (truck-mounted) and 4550X (track-mounted) drill rigs feature reliable dual rack & pinion design, an automated pipe loader system, safe and efficient hydraulic key/vise table design, and central ergonomic controls. The three-speed drive motors allow quick trip times with strong 45,000 lbs. pull up and 22,000 lbs. pull down. With the automated pipe loader system, a single operator can drill and trip out up to 600 feet (183 m) of pipe without winch assistance.

Visit www.astecunderground.com to learn more.

Glen Liford
gliford@astecunderground.com
865-408-2116
www.astecunderground.com

Blue Diamond Geothermal HDPE
Blue Diamond Industries, LLC

Blue Diamond Industries is a leading manufacturer of HDPE (High Density Polyethylene) innerduct and conduit. Blue Diamond manufactures conduit for telecommunications, power, UL listed, OIC (Cable in Conduit) and PE 3408 pressure applications in sizes up to 6” in diameter. Blue Diamond now manufactures Geothermal HDPE. Geothermal exchange is a clean energy method of heating and cooling commercial and residential buildings. Blue Diamond manufactures Geothermal coils in sizes from ¾” to 2” and u-bend coils from ¾” to 1.25”. Blue Diamond is also a member of the IGSHPA (International Ground Source Heat Pump Association). Contact our corporate office for details.

Kelly Shelton
kelly@bdiky.com
(859) 224-0415
www.bdikey.com

AMASOND
New generation of earth loop system.

The AMASOND system supports various installation methods: vertical and horizontal heat exchangers, energy geoexchange baskets, energy piles, as well as angular coaxial heat exchangers for heating and cooling.

Characteristics and advantages of the AMASOND system:
- corrugated pipe technology
- increased surface
- turbulent flow
- coaxial heat exchanger
- modular plug-in system
- various combination possibilities
- one system – versatile installation methods
- high quality standard
- fastest installation
- no fusing/welding on construction site

“More intelligent use of geothermal energy – high performance, lowest investment and lowest operating costs.”

info@amasond.com
+43 5572 3944550
lvarga@alternativeenergygroup.com
303-794-0972
www.amasond.com

Blue Diamond
Geothermal HDPE
Blue Diamond Industries, LLC

Blue Diamond Industries is a leading manufacturer of HDPE (High Density Polyethylene) innerduct and conduit. Blue Diamond manufactures conduit for telecommunications, power, UL listed, OIC (Cable in Conduit) and PE 3408 pressure applications in sizes up to 6” in diameter. Blue Diamond now manufactures Geothermal HDPE. Geothermal exchange is a clean energy method of heating and cooling commercial and residential buildings. Blue Diamond manufactures Geothermal coils in sizes from ¾” to 2” and u-bend coils from ¾” to 1.25”. Blue Diamond is also a member of the IGSHPA (International Ground Source Heat Pump Association). Contact our corporate office for details.

Kelly Shelton
kelly@bdiky.com
(859) 224-0415
www.bdikey.com

AMASOND
New generation of earth loop system.

The AMASOND system supports various installation methods: vertical and horizontal heat exchangers, energy geoexchange baskets, energy piles, as well as angular coaxial heat exchangers for heating and cooling.

Characteristics and advantages of the AMASOND system:
- corrugated pipe technology
- increased surface
- turbulent flow
- coaxial heat exchanger
- modular plug-in system
- various combination possibilities
- one system – versatile installation methods
- high quality standard
- fastest installation
- no fusing/welding on construction site

“More intelligent use of geothermal energy – high performance, lowest investment and lowest operating costs.”

info@amasond.com
+43 5572 3944550
lvarga@alternativeenergygroup.com
303-794-0972
www.amasond.com

Blue Diamond
Geothermal HDPE
Blue Diamond Industries, LLC

Blue Diamond Industries is a leading manufacturer of HDPE (High Density Polyethylene) innerduct and conduit. Blue Diamond manufactures conduit for telecommunications, power, UL listed, OIC (Cable in Conduit) and PE 3408 pressure applications in sizes up to 6” in diameter. Blue Diamond now manufactures Geothermal HDPE. Geothermal exchange is a clean energy method of heating and cooling commercial and residential buildings. Blue Diamond manufactures Geothermal coils in sizes from ¾” to 2” and u-bend coils from ¾” to 1.25”. Blue Diamond is also a member of the IGSHPA (International Ground Source Heat Pump Association). Contact our corporate office for details.

Kelly Shelton
kelly@bdiky.com
(859) 224-0415
www.bdikey.com

AMASOND
New generation of earth loop system.

The AMASOND system supports various installation methods: vertical and horizontal heat exchangers, energy geoexchange baskets, energy piles, as well as angular coaxial heat exchangers for heating and cooling.

Characteristics and advantages of the AMASOND system:
- corrugated pipe technology
- increased surface
- turbulent flow
- coaxial heat exchanger
- modular plug-in system
- various combination possibilities
- one system – versatile installation methods
- high quality standard
- fastest installation
- no fusing/welding on construction site

“More intelligent use of geothermal energy – high performance, lowest investment and lowest operating costs.”

info@amasond.com
+43 5572 3944550
lvarga@alternativeenergygroup.com
303-794-0972
www.amasond.com

Blue Diamond
Geothermal HDPE
Blue Diamond Industries, LLC

Blue Diamond Industries is a leading manufacturer of HDPE (High Density Polyethylene) innerduct and conduit. Blue Diamond manufactures conduit for telecommunications, power, UL listed, OIC (Cable in Conduit) and PE 3408 pressure applications in sizes up to 6” in diameter. Blue Diamond now manufactures Geothermal HDPE. Geothermal exchange is a clean energy method of heating and cooling commercial and residential buildings. Blue Diamond manufactures Geothermal coils in sizes from ¾” to 2” and u-bend coils from ¾” to 1.25”. Blue Diamond is also a member of the IGSHPA (International Ground Source Heat Pump Association). Contact our corporate office for details.

Kelly Shelton
kelly@bdiky.com
(859) 224-0415
www.bdikey.com
ChemGrout CG500/031
High-Capacity Geothermal Grout Plant
ChemGrout, Inc.

With over 45 years of experience, ChemGrout has added the CG500/031 to its Geothermal Series. These high-capacity grout plants offer even higher pressures and outputs, increasing your productivity for the installation of energy efficient geothermal loops. Twin 70-gallon mix tanks and a patented single action piston pump provide outputs of up to 550 psi and 16 gallons per minute. The ChemGrout Geothermal Series offers reliability and durability, and is quickly becoming an industry standard for geothermal professionals.

Joe Schatz
info@chemgrout.com
(708) 354-7112
www.chemgrout.com

Sonic Probe 200
Sonic Drill Corporation

When it comes to geothermal installations or environmental investigations, the Sonic Probe 200 is one of the fastest drilling methods on earth and it’s the only method that can easily “buzz” through challenging conditions where layers of silt, clay, sand and boulders are combined in one hole. Because of its exceptional performance, small size and lightweight footprint, the Sonic Probe 200 makes an ideal tool for fast, cost-effective geothermal drilling. And, with its unique ability to drill, case, loop and grout in one easy step, the Sonic Probe 200 can significantly reduce on-site time and per-foot costs.

Tom Savage
tom.savage@sonic-drill.com
604-854-1383
www.sonic-drill.com

GRANUSIL®
UNIMIN Corporation

GRANUSIL® industrial grade silica exceeds all performance specifications for down hole thermal grout fillers. With silica content in excess of 90%, GRANUSIL maximizes the thermal conductivity of cementitious and bentonite modified grouts. Round grain geometry and broad particle size distribution produces desired mechanical and shrinkage properties for a durable and impervious installation. A complete range of GRANUSIL grades is available nationwide to optimally match gradation with downhole design, mixing and pumping equipment. For product information and local availability contact: inquiries@unimin.com or 800-243-9004.

John Goosman
eopera@unimin.com
817-640-6622
Verification of Efficient Long Term Performance

While recently doing some research, I reviewed the two reports done by Patrick Hughes and John Shonder of Oak Ridge National Laboratory on the geothermal heat pump conversion of 4003 Family Housing units at Fort Polk, Louisiana. Besides being the largest geothermal heat pump project of its time (4,003 heat pumps with desuperheaters installed tied to over 8,000 boreholes) and one of the largest, if not the largest geothermal heat pump Energy Savings Performance Contract (ESPC) projects, it is perhaps the most thoroughly studied major geothermal heat pump projects ever done. The first units were installed beginning in ’95; the project was completed in ’96. The original Oak Ridge performance verification study – The Evaluation of a 4000-Home Geothermal Heat Pump Retrofit at Fort Polk, Louisiana: Final Report (ORNL/CON-160) – was issued in ’98. Subsequent Oak Ridge case study documentation published very successful initial performance (7.5 MW demand decrease, eliminated 260,000 therms of natural gas consumption, and reduced electricity consumption approximately 26,000,000 kWh). Quite an achievement considering the efficiency levels of the geothermal heat pumps of that era as compared to those of today.

In the 15 or so years since the first geothermal heat pumps were installed in Fort Polk Family Housing, they have been maintained by an on-site maintenance and service contractor. Also, the profile of family housing stock has changed. For one thing, family housing has been privatized, and as a result some of the original project housing has been demolished. But that’s not the end of the story. After the turn of the century, Fort Polk’s geothermal Family Housing was studied again to verify that the original energy savings were continuing. That’s where the second ORNL report – Seeing Savings from an ESPC Project in Fort Polk’s Utility Bills (ORNL/TM 2004/294) – issued in February of 2005 comes in to play.

I know; you don’t need a history lesson. I agree, and now comes the very useful information that I discovered. The second report contains absolute verification of the long term (’95 to ’04) continued superior performance of properly maintained closed loop geothermal heat pumps.

As we all compete with air source equipment, we have claimed superior initial and long term performance, but now it is verified by the following excerpt from page C-6 of the 2005 Report.

“Based on this analysis of a large sample of Fort Polk’s housing, we conclude that there have been only small increases in electricity use in Fort Polk’s family housing since the retrofits were installed. The 0.3% annual increase is smaller than housing load growth predicted in the 1998 evaluation based on national averages at the time for plug load growth. Since in ESPC projects the ESCO is not accountable for plug load growth, it follows that the ESPC energy savings have persisted.”

That’s right – hard data that after 9 years the closed loop geothermal heat pumps are still performing at their original level. To account for the 0.3% increase, think about the proliferation of electronics by 2004 versus 1995 – computers, TVs, electronic device battery charging, etc. As for the 0.3% increase itself, as an example, that equates to a 3 kWh increase in usage on a house that was averaging 1,000 kWh per month originally.

Just one more proof that our industry’s performance claims are fact, not fiction.

Mr. Rawlings has more than 30 years experience in the geothermal industry. He is a Certified GeoExchange Designer (CGD) and an IGSHPA Accredited Installer and Trainer.
Imagine being able to harness the energy of the earth to heat and cool in an environmentally friendly and cost effective manner.

Geothermal Systems Can!

CENTRAL OUTDOOR AAON UNIT(S) can supply from 2 tons up to 230 tons of cooling capacity with only a single geothermal water connection. The air from this high capacity central GSHP rooftop unit can be ducted through conventional VAV or CV ductwork or the air can be used to supply smaller interior GSHP units that serve individual zones.

AAON GSHP SPLIT-SYSTEMS allow the refrigerant-to-water heat exchanger, along with the compressor, to be located in a mechanical room or on the exterior of the building and only a quiet operating indoor fan and coil remain in the occupied space. This removes compressor noise and maintenance requirements from the occupied space.

VARIABLE CAPACITY DIGITAL COMPRESSOR systems improve comfort and efficiency in areas where heating and cooling loads are quite different by varying the capacity of the compressor to match the instantaneous heating or cooling requirement of the space. The compressor continuously adjusts its capacity to match the precise air temperature, or leaving water temperature, setpoint. During much of the season, the compressor operates at a reduced energy level but during periods of heavier demand the compressor ramps up its capacity to maintain a constant temperature.

ADVANTAGE:
- Energy Efficient
- Low Operating Costs
- Low Maintenance Costs
- Individual Room Heating/Cooling Control
- Durability
- Space Savings
- Integrated Systems
- Environmentally Friendly

Geothermal Systems

Closed Loop Horizontal Well System
Closed Loop Vertical Well System
Closed Loop Surface Water System
Open Loop Groundwater Well System


www.AAON.com 918.583.2266
www.GEO-ENTERPRISES.com 918.379.0193
MORE GREEN FOR THE PLANET.
MORE GREEN IN YOUR WALLET.

FHP’s commercial - residential geothermal and water source heat pumps are setting a new standard across the industry for quality, efficiency and environmental innovation that also conserves more of your financial resources. At FHP, we’ve made it our mission to deliver a world of new ideas and create a better future, every day.

WWW.FHP-MFG.COM