

THE GEOTHERMAL INDUSTRY BECKONS

– Part 2

Drilling for geothermal projects offers a solid opportunity

by John Vastyen

Direct-exchange (DX) and water-sourced geothermal air conditioning and heating systems usually run about the same installed cost, and several thousand dollars more than a conventional, air-to-air heat pump. Though, with DX you'd see much better operating efficiencies and something akin to "surgical insertion" of the ground loops where holes are drilled diagonally from a central pit. Regardless of which type of "geo field" is chosen – horizontal (trench or pit), vertical or diagonal (drilled holes) – the process of getting the tubing in place for a DX system is fast and minimally invasive to the property, making it possible to retrofit homes with mature landscaping.



The geothermal industry has been coming on strong.



Drilling contractors would do well to look into the geothermal market. Photo courtesy of John Tipton, photo editor of the *Porterville Recorder*, serving the Porterville, Calif., area.

Glenn Bland owns Bland Air Conditioning and Heating Inc. in Bakersfield, Calif., and he stresses that HVAC firms should avoid the temptation to think that the drilling part of the operation is something that they can handle themselves. "We thought for a while that we could handle both the HVAC and the drilling," he explains. "We bought a compact, Beretta T-41 self-contained, tracked drilling rig that could squeeze through a 3½-foot opening with the outriggers in. It was a great little machine for small-bore drilling, but we lost a lot of time ... and drill bits."

Bland says that the allure of doing it all, and having the drilling capabilities in-house, drew him to the idea of drilling. "But, within a year's time, we learned why drilling is very specialized and takes a lot of time and investment to do effectively and efficiently. It's an art." Bland now relies on the drilling expertise of David Harris, owner of Consolidated Testing Laboratories Inc., a full-service drilling, soils engineering and construction inspection and testing

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service firm with locations in Porterville and Visalia, Calif. "We sold the Beretta T-41 to David," explained Bland, "and – for the past year – Consolidated has drilled holes for all of our direct-exchange installations."

About 65 percent of Consolidated's \$3 to \$3.5 million in annual billings is related to drilling for water wells and geothermal, geotechnical and environmental purposes. Harris' drilling equipment inventory includes an IR TH-60, IR-T3, and an IR-A2000, all truck-mounted, self-contained air percussion mud rotary systems. The company also has a Failing F-10 and a Mobile B80, both high-torque auger rigs; a limited-access trailer-mounted deep rock drill rig, and the Beretta T-41 that it purchased from Bland.

Harris' territory of operation spans from Sacramento to Los Angeles, staying within the state, but chiefly focuses on business within the San Joaquin Valley. "Thanks to Glenn, we're doing more small-bore drilling these days," says Harris. "We prefer to use the continuous and hollow-stem auger drilling equipment for these. The site conditions determine whether to put the manifold pit in before or after drilling."

That's just one of the many insights that Harris offers relating to small bore drilling. "Drilling is very specialized work, as any reader of *National Driller* knows," says Harris. "It's taken us years and years to learn the craft, and we're still smarter at the end of every day. We've learned from experience that one wrong move can cost a lot of money." As Glenn learned from experience, it's a tough sport. "Even here where much of what we do is drilling, it's hard enough to train and prepare drillers for the many variables and unexpected challenges seen routinely on any jobsite," he notes.

But one expert who takes a different approach to that is Gemma (pronounced jem-ma) McKee-Tiller, owner of Air Brokers HVAC LLC, based in Branson, Mo. McKee-Tiller has been selling and installing direct-exchange geothermal systems for years and is recognized as one of the country's leading experts in the field.

"When the demand for DX systems increased dramatically – a shift that really gained speed in 2003 – I became concerned about my friends and



Where ground space is limited, diagonal configurations are common.

associates at Bandimere Geothermal Drilling Systems being able to meet my drilling needs along with their own growing business," says McKee-Tiller. "Although I had jokingly said I may become a driller myself, I really had no intention of adding drilling to my résumé at that time. But as sales increased sharply, I decided to go through testing and certification for the Missouri Heat

Pump Well Driller's license and have had it for over a year now.

"While I certainly agree with the Bandimeres that not all HVAC contractors are cut out for DX drilling, I feel better knowing that when the increased business justifies the commitment to buy or lease a drilling rig, I'll be ready," she adds. "And based on current sales, I'd have to say that next step is coming quickly. But when the time comes, I wouldn't consider buying from anyone but Sam Bandimere (yes, the company sells drill rigs, too). With a rig purchased from Bandimere Drilling, you get Sam's expertise with it. There's simply no one better in our industry for that. I expect to be in the drilling business by this fall."

Although not yet familiar to everyone, ground-source heat pumps have been installed for more than 30 years and are recognized by EPA and DOE as the most highly efficient heating and cooling systems available today. "Geothermal heat pump technology offers a renewable energy solution that's right for almost any home," says McKee-Tiller. "Thermal energy of sufficient temperatures anywhere in the United States and Canada is harvested from the earth and transferred into buildings by a heat pump that provides heating and cooling."

A ground-source unit works like a conventional heat pump to cool a home in the summer, and heat it in the winter. "The key difference between an air source heat pump – which can't heat a building efficiently when outdoor temperatures dip below 35 degrees F – and ground-source is that the ground-source unit harvests the stable and renewable heat from beneath the earth's surface," explains Dan Bandimere.

"The equipment transfers virtually endless thermal energy (heat) from the earth into the home during the winter months and transfers excess heat from interior spaces into the earth where it's stored during the summer," adds Sam Bandimere.

As a result, a ground-source unit saves energy, which reduces greenhouse gas emissions and can cut utility bills by up to 70 percent. And, very little maintenance is required. Surveys of ground-source owners conducted by the Geothermal Heat Pump Consortium show that they rank their systems higher in comfort than do the owners of other heating and cooling systems. And more than 95 percent



Dan Bandimere's rig, custom-made by his cousin Sam Bandimere.

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Builders and homeowners appreciate the efficiency of geothermal systems.



Earth loop installations need to be at least 50 feet away from a water well.



Basic diagonal earth loop system.

state that they would recommend ground-source to friends and family members.

Typically, any geothermal system provides service for up to 25 or 30 years. This is because the stable heat source avoids thermal stresses to the compressor, and the enclosed unit is out of the weather.

All-in-one System

Geothermal heat pump systems do the work that typically requires two appliances – the heating unit (furnace or boiler) and an air conditioner. Many geo systems can provide a third function, which is to heat a home's domestic water by one of two means: through integrated full-time water preheating, or through "desuperheating" water heating.

The first step in selecting a unit of

HVAC industry.

Site evaluation is another very important consideration. "It not only impacts the type of earth loop best suited to their project, but also plays a key role in determining the overall cost of the system," notes Sam Bandimere. Depending on the location and existing geological conditions, it may be possible to select from among all types of DX geo field installations – vertical, horizontal or diagonal. According to McKee-Tiller, the horizontal earth loop application is the least expensive to install, chiefly because it's less expensive to excavate and backfill. In areas where rock layers are formidable, the drilled boreholes of the diagonal and vertical applications may be required.

But Sam Bandimere adds that, in his part of the country, drilling often

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the correct size is performing a *Manual J* load calculation. This analyzes the building envelope and materials used in its construction, and determines the heating and cooling loads. Most HVAC contractors are intimately familiar with *Manual J* load calculations, though sadly too few of them perform one when sizing a system. It's a fairly complex process, but should always be done — especially in the case of geothermal system sizing. "Without doing a *Manual J* load calculation, the risk is that the system will be oversized or undersized, each presenting a different set of problems," explains McKee-Tiller. An undersized system struggles to maintain comfortable indoor temperatures and will run continuously to meet the demand for heating or cooling and will most likely shorten the life of the system. An oversized system will result in excessive cycling of the system and have cold or hot spots throughout the building. These problems are not unique to geothermal applications but become the key reason a *Manual J* load calculation is so critical throughout the

is the best answer. "It's true, the direct-exchange loops can be placed in horizontal positions at depths of 5 to 6 feet, but look a little deeper and the decision is clear. By the time you do all the excavation work that's subject to any type of on-site challenge, lay the loops and bed them with imported materials, sacrifice the thermal conductivity of the water that you usually get with drilling, and tie up a considerable amount of land, you may have saved just \$800 to \$1,000 on the total job. That's not real attractive, is it? And, with small-bore drilling, you disturb the smallest amount of earth.

"It only makes sense for the HVAC contractor to have a good drilling contractor drill in the loops," continues Sam. "Then they can focus their skills at what they do best and let the driller deal with all the loop installation issues as a subcontractor to them." ■

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