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September 6, 2012

Registration and Contact Information
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NOTES FROM IGSHPA
By Jim Bose
Executive Director: IGSHPA

Schools and Geo - A Really Great Opportunity

GEO Schools are this industry’s premier program. School Board members look at the long term advantages and make informed decisions. Successful school designers will realize that the beauty of a mechanical equipment room is soon forgotten and school board members will talk about more dollars going into books, improved services and salaries. The key is marketing green technologies to a public that may or may not be aware of the economic benefits. School superintendents need more classrooms and board members desire more efficiency.

The architect/engineering team needs to know as much about competing technologies as their own GEO. Most of you reading this already know about what is claimed for GEOs. But nothing sells better than real data about operating and maintenance costs. Don Penn (donpenn.com) references 20 different types of delivery systems in his 2010 talk at the IGSHPA Annual Conference and GEO stood out among these. Mechanical costs were also very competitive when compared to designs being used in the industry.

The old KISS principle of keeping it simple and safe cannot be overemphasized. Is it really necessary to have DDC controls for a school building with distributed pumping? Go to Kirk Mescher’s paper presented at the last IGSHPA 2010 Annual Conference (www.igshpa.okstate.edu) and read about his take of VFD’s. You’ll find this under the past conference drop down menu.

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Since 1970, Skillings has been designing, installing and maintaining water systems in a three-state geographic region including New Hampshire, Massachusetts and Maine, where drilling is often more demanding than nearly any where else in the country.

With the rising cost of fossil fuels and their environmental impact, for the last twenty years, Skillings has also drilled for geothermal applications. They offer the same high quality service for residential or commercial projects. Skillings has completed projects for banks, public libraries, condominium complexes, a U.S. Border Crossing facility, a trauma center, the Tilton, N.H. Veterans Home, the U.S. Air Force Base in Portsmouth, N.H., and many others.

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Supply and demand – engines that drive the marketplace and the economy. The current push for alternative energy and sustainable living has increased the demand for geothermal technology. Its reputation for energy savings, efficiency and comfort plus tax incentives have boosted its use and popularity in all sectors from businesses and governmental and educational institutions to homeowners.

To supply the increasing demand for trained geothermal professionals and in response to the national trend for alternative energies, Mid-Michigan Community College (MMCC), located in Harrison, Michigan, recently upgraded its Heating, Refrigeration and Air Conditioning (HRA) program. New coursework includes geothermal and solar technologies, which will help match industry demand with employment opportunities for graduates. MMCC was established in 1965 and offers more than 50 technical programs for skilled technicians and semi-professional positions in business, industry and health services.
A $1 million retrofit renovated approximately 5,500 square feet of the Technical Education Center (M-TEC) to support coursework in the new technologies. The renovation includes three geothermal fields and a solar array. For the first time in 10 years, all HRA programs are housed in the same building.

The solar array will partially provide heat for the center’s boiler system as well as training for students. The fully functioning geothermal field will give students a hands-on lab experience in the technology. Students will be able to use computerized sensors to research and analyze efficiency of the systems under a variety of conditions.

Mark Todd, HRA instructor with 30 years’ experience as an HVACR mechanical contractor, anticipates the program will make MMCC a leader in the growing geo-technology field. “There are very few programs across the country that take a close look at the functionality of alternative energy systems from a research perspective. We will be able to do new research into cutting edge ideas and research on our own ideas – something that is not common in community colleges.”
MMCC’s geo system includes standard features, but teaching and lab requirements drove the final design, instead of building needs, said IGSHPA member, Wayne Kerbelis, project engineer at Peter Basso Associates (PBA), Troy, Michigan. The ASHRAE multi-award company has been in business 22 years. During that time, PBA has completed the design and implementation for 3.9 million-square-feet of geothermal heat pump systems serving educational facilities, the majority for building renovation projects.

Kerbelis explained that three separate systems - a closed loop, spiral horizontal and open loop - were installed to demonstrate the technology and to en-
hance the students’ learning experience from theory to application. Each system is 10-ton capacity and uses 200psi SDR11 with 4710 piping to circulate 30-percent propylene glycol.

The closed loop system required five 8-foot deep trenches with a 6-pipe horizontal system. Each trench was 100-feet long with a total of 600 feet of heat exchanger pipe per trench. The slinky system also required 8-foot deep trenches. Ten trenches, 50-feet long with 600 feet of pipe per trench make up the system. The system has 10 sets of 36-inch diameter coils with a 12-inch pitch.

The 10-ton open loop system required a vertical well pump and horizontal header pipe to connect the active student lab water-to-water heat pumps. After leaving the heat pump, the ground-source water discharges to a pond located in the green space behind the HRA building.

Each system has connections for four HydroHeat heat pump units. Each heat pump connection includes temperature sensing points and manually adjustable ground-source flow valve and flow meters. Students can connect various heat pumps and adjust flows to observe the impact on capacities and efficiencies.

To circulate the glycol water mixture through the loops, the closed loop and slinky systems both use Bell & Gossett variable-flow pumps equipped with variable-speed drives.

Currently the college is connecting six different HydroHeat units that include the following models and sizes: 03-026-WTARW-HM (2-1/4 ton), 03-037-WTARW-HN-L-C (3 ton), 03-042-WTARW-MT (3-1/2 ton), 03-047-WTAR-HE-L-C (4 ton), 03-047-WTARW-HE-L-C (4 ton), and 03-056-WTAR-TS-MT-L-C (5 ton). The total current connected capacity is 21-3/4 tons. The school will have the capability of adding six more units and plans to do so in the near future, according to Kerbelis.

The entire system is monitored from a digital building control system by Schneider Electric, which is displayed on an interactive screen in the classroom. Students can observe and trend live data as a tool for understanding system operations. Data will also be available live on the Internet.

Marcus DeJong, also an IGSHPA member from Geothermal Loop Pros LLC, Jenison, Michigan, was the installer. Although the company is
young - in business for 2-1/2 years - it brought considerable prior experience to the project with installations including a brewery, an automotive museum, several schools, and a variety of residences ranging from apartment complexes to mansions.

“Trenching for horizontal systems requires more space than vertical systems. The available space for installation was tight and used the majority of the landscape. Our challenge was not to remove any trees or disturb site utilities,” DeJong said.

When the geothermal field is complete, the students will come – that’s the intent of MMCC’s faculty. Still in the development stage is an add-on certification in geothermal. Students who have completed an HRA degree will be eligible for the certification program, which requires an additional 20 credits. The six-course program will offer in-depth study and application in theory and design and includes the IGShpa
installer course. Only eight community colleges in Michigan currently offer associates programs in HRA. None offer geothermal certification. Professionals in the geo industry are endorsing MMCC’s foresight.

“Michigan has long winters and warm, humid summers. Much of Michigan has clean clay or clean sand and there is a significant amount of precipitation. Taken together, this makes Michigan a great location from a practical and financial perspective for the installation of geothermal systems. I think it is great that M-TEC is taking the initiative to ensure its students are on the cutting edge of this technology as it becomes more mainstream,” said DeJong.

MMCC received a Rural Business Enterprise Grant to conduct intensive IGSHPA certifications. The three-day trainings will be offered by MMCC before the 2012 fall semester and will focus on geology, structure and installation of geothermal loops.

Executive Director of Workforce and Economic Development, Scott Govitz, believes MMCC’s HRA program and alternative energy courses will place the college at the forefront of geothermal research and application.

“The college is constantly trying to assess where industry growth and employment opportunities lie, and we respond to those opportunities so that we provide our students the best chances to find meaningful employment in Michigan. These changes to our HRA program will do just that,” Govitz said.

Students will be able to have hands-on lab experience using computerized sensors to study the efficiency of the geothermal system and gain experience in loop field practices.

(Photos courtesy of Mid Michigan Community College)
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5. International Ground Source Heat Pump (IGSHPA)
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CERTIFIED GEOEXCHANGE DESIGNERS Plus
The International Ground Source Association has developed an expanded version of its Certified GeoExchange Designer course - the CGD Plus course. This three day workshop will be held at various locations throughout the country including industry trade shows. It features an expert instructor who is both certified by the Association of Energy Engineers (AEE) as a CGD and accredited by IGSHPA as a trainer.

“Students receive the same material as those participating in the distance learning course but get the plus advantage of being taught in-person by an experienced professional,” said Gerald McClain, IGSHPA Distance Learning Coordinator. “We found some students prefer a classroom setting and wanted to accommodate a variety of learning styles.”

This advanced training in ground source heat pump system design was created for professional engineers, registered architects, installers and contractors to allow them to work toward certification as a CGD. Topics covered include GSHP residential and commercial system design, closed loop ground heat exchanger configurations and layout, soil and rock classification and conductivity, borehole grouting, heat exchanger software and system performance.

The distance learning course includes a 20 hour instructional DVD plus manuals developed by IGSHPA and ASHRAE. Students in the distance learning course have the opportunity to ask questions and discuss system design via monthly webinars or by attending a one day question and answer seminar.

For more information on both the CGD distance learning and CGD Plus course visit www.igshpa.okstate.edu/training/cgd.htm or call 1-800-626-4747.
TEACHING GREEN

Oklahoma CareerTech Gains First LEED® Certification

By Janet F. Reeder

Oklahoma CareerTech’s first U.S. Green Building Council Leadership in Energy and Environmental Design (LEED®) certified building is in Oklahoma City.

(Photos courtesy of Jennifer Parker; Parker PR, Inc.)

Oklahoma’s CareerTech system, long a leader in career and technology education, is working toward implementing geothermal at many of their campuses. Metro Career Academy (MCA), a new award winning facility at Metro Technology Centers’ Springlake campus near Oklahoma City, is a recent success story.

The skillful and thoughtful blending of MCA’s commitment to renewable energy into an actual brick and mortar
structure has not gone unnoticed. A school for at-risk high school students, and the latest of Metro Technology Centers’ new buildings, MCA has led the district to an impressive award for the state’s CareerTech system.

Oklahoma CareerTech’s first U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED®) certified project has brought MCA a coveted LEED® Gold rating. Ground source heat pump technology used at MCA was a major factor in receiving that award.

Schools are now one of the fastest growing building areas adopting geothermal, as educational facilities are recognizing the promise of savings in energy costs as well as the technology’s reasonable return on investment timeframe and many other school friendly benefits.

MCA’s 60,000 square-foot facility was designed and built to include a number of energy efficient, cost saving and sustainable features. Those features are likewise incorporated into the educational experience for MCA’s students. Metro Technology Centers’ Superintendent, Dr. James Branscum, says the building, in addition to providing classrooms, is itself a learning tool. Students now have important hands-on examples to go with their training to create a greener future.

Architect Fred Quinn, of Quinn and Associates, designed the facility for energy efficiency and sustainability. His design also incorporates measures that highlight the energy saving and sustainable features in a way that students can understand. Quinn says he is pleased to see his work used as a tool to teach students sustainable building practices.

Multiple locations around the MCA building have touch screen or kiosk type informational modules that explain about products and technologies. Some are in the form of life-size standup replicas of tradesmen who worked on the school. From the beginning, these modules were part of the larger plan to increase awareness and knowledge about sustainable features such as the geothermal installation, special lighting and even rainwater recycling.

A green roof garden and landscaping are integral to the water conservation effort, and include native Oklahoma plants. The rainwater collection system uses a 500-gallon cistern with sophisticated controls. It allows captured water to be utilized when available to save on municipal water usage and expense. All of these features, along with a concentrated effort to recycle building material waste and the incorporation of construction materials available within 500 miles of the site, were key parts of the plan that brought the facility LEED® certification.

Students can see the mechanical workings of the geothermal system and learn about sustainable building practices in MCA’s program.

(Photos courtesy of Jennifer Parker, Parker PR, Inc.)
Two brothers and their companies were also instrumental in both the overall construction and the geothermal installation for Metro Career Academy.

CMSWillowbrook President, Cary DeHart, was construction manager for the project. He says his firm understood the importance of the MCA project. He is proud the facility provides students a welcome and

The mechanical room holds equipment to support 175 tons of HVAC capacity in a very accessible area.

(Photo courtesy of Jennifer Parker, Parker PR, Inc.)
healthy environment with the bonus of learning about sustainable building practices.

“We do a tremendous amount of CareerTech work. I think we have done over 40 CareerTech projects,” Cary says. “We have been told this is the first CareerTech LEED® project in Oklahoma.” Cary, who runs a fourth-generation family business, says the project went well.

“The neatest part of it is what it does for the students really,” he said.

Mark DeHart, general manager of operations with DeHart Air Conditioning and Mechanical in Chickasha, Okla., was also on the MCA project. “On this particular job,” DeHart says, “It was total mechanical. We did plumbing, controls, test and balance—everything on the mechanical side.”

Mark, who like his brother Cary, also runs a fourth-generation business, says that his company’s main focus was the air-side of the project. “We set all of the equipment, installed all ductwork, and got all the units ready for running,” he said.

“We’re not a plumbing company, so we teamed up with a plumbing outfit,” DeHart said. For the geothermal loop side, DeHart teamed up with B&H Construction.

B&H Construction Project Manager, Scott Munday says everything on the Metro Career Academy project was “pretty straightforward.” He commends CMSWillowbrook, for being great to work with.

“We did all of the well drilling, all of the bores, and any of the hydronic piping that had to do with the geothermal and the heat pumps. So we did all of the piping outside, the vault, and all of the interior piping that went to each heat pump,” Munday said. “We installed all of the pumps that pump water to the hydronic system. Pretty much, we did everything that had to do with the geothermal water-side.”

B&H also built a poured-in-place steel-lined custom concrete vault on site for the system’s connecting pipe, circuit flow control valves and monitoring equipment. The system is tied at the vault with two 6-inch high-density polyethylene (HDPE) pipes buried at 4-feet deep.

Munday says B&H Construction employs about 150 workers based out of Goldsby, Oklahoma, which he boasts is “the geothermal capital of Oklahoma.” Munday said that they have five
drilling rigs and are seeing their geothermal business increase.

The well field is comprised of 121 bores each 300-foot-deep, a 610-foot vertical loop, and nearly 80,000 feet of HDPE. The design allows for accommodation of 175 tons of HVAC capacity and 17 tons of hot water heating for the facility. Steve Crossland, with B&H Construction, was the on-site drilling coordinator.

ClimateMaster units were chosen for the project and supplied by Scott Beller at Air Products Supply, a regional ClimateMaster supplier in Oklahoma City. The 49 ClimateMaster units include 40 smaller-tonnage rooftop systems to deliver heating and air conditioning to each individual classroom, and larger rooftop units to accommodate heating and

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cooling needs for the facility’s common areas and kitchen. All ClimateMaster rooftop units also feature enthalpy-controlled economizers and exhaust fans.

In addition, seven ClimateMaster Tranquility® 20 horizontal package units were used for the facility’s data communications and computer rooms. Installed above the ceiling of these rooms, the units provide individual climate control capabilities to accommodate the critical temperature needs of the sensitive equipment. Two ClimateMaster Tranquility® TMW 360 and TMW 170 modular water-to-water series hot water generators complete the HVAC system configuration.

To link the ClimateMaster units to the building’s state-of-the-art energy management controls system, DeHart Air Conditioning and Mechanical utilized ClimateMaster’s factory-installed Direct Digital Controls (DDC). ABS Mechanical, a specialty control company, installed the energy management system on the building, and made sure the ClimateMaster units and their control systems worked seamlessly with other building control systems.

Mark DeHart says, while it was his first LEED® experience, his company had done LEED® training previously. “That impacted the project tremendously as far as coordination and scheduling. There was just another layer of management. We had regular meetings. The LEED® people wanted to be sure everyone was coordinating with each other.”

He feels that the most unusual aspect of the project was the design to use as many energy efficient eco-friendly products and technologies as possible.

“The facade on the building, if you drive by, looks like a brick building, and it is not brick,” DeHart says. The building’s exterior is clad with Outsulation®, an exterior insulation and finish system (EIFS) that is manufactured by Dryvit Systems. The idea is that by placing insulation on the outside of the building, hot or cool air is kept inside the structure, aiding energy savings.
Using geothermal to stay ahead in their effort to provide the finest educational facility has been a winning choice for Oklahoma CareerTech’s Metro Career Academy.

(Photo courtesy of Jennifer Parker, Parker PR, Inc.)

The product, applied in coats, was chosen because it met the need while requiring less structural steel and besting the price brick would have cost for the project by nearly $175 thousand, according to Melanie Stinnett, chief officer for environmental safety and regulatory affairs at Metro Technology Centers’ Springlake campus. Dryvit Systems Inc., based in West Warwick, R.I., has a plant in Sand Springs, Okla.

Using geothermal to stay ahead in their effort to provide the finest educational facility has been a winning choice for Oklahoma CareerTech’s Metro Career Academy.

Editor’s Note: B&H Construction co-owner, Rocky Beller and his cousin, Scott Beller, co-owner of Air Products Supply, were killed in a small airplane crash in Oklahoma on December 9, 2011. Both will be greatly missed.

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Way Out Front on Energy Savings

By Justin Yearwood
As the 1990s approached, it was clear that The Richard Stockton College of New Jersey needed to change more than just a calendar on the wall. The need to replace an out-dated and inefficient heating, ventilation and cooling system for the entire Stockton College campus in Galloway Township, New Jersey, stirred real interest in geothermal technology.

A lot of numbers were considered in Stockton College’s decision to invest in a geothermal system, but a number that stood out among the rest was persuasive and represented the short time it would take the school to see their return on investment. Following the retrofit, it took the college about three-and-a-half years to recover the extra costs associated with a geothermal system through annual energy savings.

Stockton College Energy Planner Alice Gitchell, says that Stockton investigated a number developing technologies instead of just looking for a straight replacement of their aging system. The school wanted to be certain an environmentally sound decision was made.

“Stockton College had just passed its twentieth year and equipment was starting to go down hill. Your heating and cooling systems hit 20 years and you start thinking okay, am I going to fix it or I am going to replace it with something better that wasn’t available 20 years ago,” Gitchell said.
Aerial photography shows the secluded location of Richard Stockton College. A 4-acre parking lot was selected for the 400 wells for the well field during the school’s energy retrofit.

(Photo courtesy of Lynn Stiles, Stockton)
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To address replacing the original units installed in the 1970s, a study was commissioned in order to examine all of the college’s options. Vinokur-Pace, a New Jersey engineering firm, was contracted to conduct the investigation.

Along with the desire for a more efficient system, an alternative was necessary for the campus because Nesbitt, the company that had sold Stockton part of the campus’s first system, was out of business and Lennox no longer manufactured the same units. The study showed that a geothermal system would cost $1.2 million more at installation than a direct replacement with a traditional system, but also projected more than $300,000 in annual energy savings.

Following the comprehensive analysis, a contract was awarded in 1993 for a retrofit system consisting of rooftop heat pumps connected to a closed loop system of wells buried underneath a major parking lot.

Howard Alderson of Alderson Associates designed the well field for the closed loop system. Alderson drew up 400 wells at 425 feet deep each underneath a 4-acre parking lot on the campus for the well field design.

“The ground here is sandy so digging a well is easy,” Gitchell said. “They hired multiple drillers and turned it into a competition and got to the point where each of them was capable of punching a 400-foot well, installing the heat exchange loop and grouting it up in a day.” The wells were then connected in a cinder block manifold house at the east side of the well field.

Military-type helicopters were brought in to lift the custom heat pumps that were mounted on the Stockton roof. In less than two days during the school’s 1993 winter break, the old units were removed and the 61 helicopter-delivered units were lifted to the roof.

January 1994 not only marked the beginning of a new semester, but a new energy era as well with the running of the geothermal system.

While multiple drillers and helicopters were responsible for physically carrying out the project, the system, which at the time was one of the largest in the world, was made possible through unique cooperation.

Stockton Public Relations Director Tim Kelly, says the level of cooperation among private entities, the college and the state was one of the most remarkable characteristics of the large project. “That was actually one of the more exciting aspects of putting the project together, besides the project itself, because of everything that had to happen,” Kelly said.

“You hear a lot now about public private partnerships but back at that time a public private partnership of that magnitude was sort of unheard of,” says Kelly, “so we were pioneers not just with geothermal.”

Due to the electrical demand change for the Atlantic Electric Company as a result of the geothermal system, the utility awarded an $800/ton rebate on the 1,600-ton system to the college. In addition to the rebate, Stockton received additional funding from the State of New Jersey.

Gitchell said that the timing of the heating and cooling evaluation in the early ‘90s aligned with new interest from the state of New Jersey to begin spending money on alternative energy initiatives. “This was a very fortunate overlap of people and circumstances,” Gitchell said.

Along with support from the state, the project progressed largely because of the level of interest and cooperation among both faculty and administration.

“It really had a lot to do with personality. On the faculty, there was physics professor Dr. Lynn Styles. He has always enjoyed being ahead of the curve on energy and was involved in all kinds of interesting projects,” Gitchell said.

“So we had people interested in energy issues and willing to get out in public and try to do things as well as possible. Vice President for Administration and Finance, Charles Tantillo, was also willing to think outside the box. The geothermal project was way outside the box for its time,” Gitchell recalls.

“Tantillo was the kind of person whose idea of excitement was to pursue something outside the box and see how many people he could get to jump on board. So that’s how it happened,” he said.

“The technical side of things actually came from a professor, which is not usually how things are done in colleges,” Gitchell says. “And you had an administrator who believed in the art of the deal, so for him, putting together something was an interesting challenge.”

Although the system was installed in 1993 and became operational in 1994, it is still much more than an afterthought at Stockton.

“You don’t notice the wells, obviously, because they are buried underneath a parking lot, but we have signage up that talks about it so our students are aware and we do talk about it whenever we can,” Kelly said.
“Being environmentally conscious has been a big part of our identity so to have a geothermal heating and cooling system, which at one time was the largest in the world, it is very much a part of our history here. It’s a big deal for us.” Kelly said the geothermal system is not Stockton’s only green initiative.

“What we hang our hat on is environmental sensitivity, which you don’t always associate with New Jersey, but it’s a big part of who we are,” Kelly said. Along with the large geothermal system, Stockton also is involved with research in fuel cells and solar energy, has hosted a sustainability academy, and participates in extensive environmental audits. The school also boasts dedication to environmental studies and marine biology programs.

Saving energy is not a new thing for Stockton. Reaping the financial reward of their early adoption of geothermal continues at the school. Sharing their experience with others is also ongoing at the small but innovative college.
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I was talking with a good friend about customer service and he gave me his four point approach to addressing any situation – negative or positive. Its good advice, and is easily applied to our industry’s sales, installation, or service activity. Check it out!!

SHOW UP: Be ready and on time for meetings, appointments, or service calls. If something unavoidable happens that will make you late, call and tell them when you will arrive. Return voice messages or e-mails that require a response promptly. Always listen to or read the message – what you need may already be waiting for you. And remember, almost everyone now has caller ID – if you don’t pick up a call because of a conflict, return the call as soon as possible, but only after listening to their voice mail (if they left a message).

PAY ATTENTION: Information is valuable. It can come in documents, words, attitudes, behavior, etc. The client may tell you more than you want, providing minor details that are simple and already understood by you but that may be very important to them – remember – it’s their decision and their money. And finally – everyone in the discussion should believe that you think they matter – especially the decision maker.

TELL THE TRUTH: Ground source heat pump systems are a great technology that provides outstanding operating and maintenance cost savings, as well as an extended life cycle for both the equipment and the ground heat exchanger. There’s no need to overstate the benefits. When discussing construction, there’s no need to soften what the client should expect during the ground heat exchanger installation – it’s a mess that is easily corrected after loop field completion. Also, do your best to avoid change orders by gathering the necessary information and clarifying any questions during the “PAY ATTENTION” phase. Finally, schedules matter – plan your work and work you plan – on time.

BE PREPARED FOR THE RESULTS: Develop your cost and pricing carefully, cover your overhead and make a profit – that’s what it’s all about. Include a contingency if you want, but sell and perform the project for the contract price. You’ll win some and loose some. And yes, we do have rebates and incentives at this time that are a consideration, not a license to “gold plate” the system. I have written about overly aggressive profit levels before, but instances still occur and give the industry a black eye – and – we have new winner – small relatively standard but well insulated new construction house with a 2.5 ton water-to-water system with horizontal loop field. The distribution is radiant floor heating and air handler with ductwork for cooling plus utilizing a desuperheater. The radiant floor is by the plumber and not in the HVAC bid. The price quoted for the ground source heat pump system was $60,000+. And, it was for the head of purchasing for a branch of the military that controls all of their bases in a multi-state region. Good plan…..

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.
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