

*Installation...*

# A Higher Calling down on the Farm

Shortly after their marriage, young farmers Keith and Jenessa Frey learned that the property next to the family's farm was up for sale; so they jumped at it. For the Freys, buying the land was a rare opportunity.

The new 60-acre parcel now adjoined land that the family has owned in Lancaster County, PA since 1895—bringing the total tillable ground to 154 acres, with another 30+ for pasture and buildings plus 30 acres of woods. Keith is now a fifth-generation farmer there.

On the now-larger farmstead, the Freys plant field corn, soybeans and a variety of grain. Keith's parents still live in the old farmhouse, so they combine efforts during the growing and harvesting seasons. The Freys also manage a 15-cow calf/beef operation and a 35-head dairy herd.

The house they planned to build would be the focal point of their new property. Jenessa's long-time dream was for a log home, loads of sunlight and a roomy kitchen. Keith wanted radiant heat, geothermal energy for the home and a big fireplace with a mantle to hang Christmas stockings on for all the hoped-for small Frey.

## Dream home comes to life

Keith and Jenessa's dream took form in a 3,000 sq. ft., three bedroom log home with space for two additional bedrooms. Jenessa's kitchen occupies one end of the large open area on the main floor, blending easily into the great room with a tall stone fireplace.

Heating and cooling equipment was much smaller than the Freys expected, because of their insistence on heavy insulation. "That meant less cost to buy the HVAC gear and also a lot less energy to operate the equipment," said Keith Frey. "I grew up in a drafty old farmhouse; we learned that a dollar spent on insulation goes a long way."

It was also a giant help that Jay Weaver, Keith's father-in-law, is an electrician who was eager to help.

## Piped dream

The Freys spent a lot of time doing online research about all facets of the home. Also, a local Watts Water Technologies representative spoke with them about the significance of bundling offerings across the company's many brands to provide overall value. "That made real sense to me," said Keith Frey.

"Our mechanical contractor was impressed by the volume of equipment and material we could source through a single company purchased through wholesalers near here," he added. So he and Kurt Shreiner, co-owner of Lancaster County-based Mountain View Heating & Cooling, LLC, chosen by the Freys to do most of the mechanical system installations, tapped Watts for a wide range of material and equipment.

Last spring, Mountain View technicians installed 1,900 lineal feet of ½-inch Watts PEX



radiant heat tubing in the lower concrete slab and 3,160 feet of 3/8-inch Onix synthetic rubber tubing for the under-floor areas in a five-zone system that would warm most of the home's floors. They also hung three, prefabricated, pre-engineered Watts Hydronex panels to manage hydronic system flow.

Meanwhile, the Frey's excavator trenched the geoexchange field behind the house. Four, 300-foot long trenches were dug to a depth of 10 feet and were piped as they were completed—each line feeding into a large manifold pit.

"A key surprise was Watts' new solution for joining geoexchange tubing," said Keith Frey. "We used Watts' Triton HDPE pipe fusion technology."

Triton pipe fusion uses radio frequency (RF) electromagnetic technology to improve pipe joining. There's no hot iron involved, so it removes the risk of burns. There's no need for adhesives or muscle-straining pressure, and all joints can be dry-fit. Shreiner explained that the Triton system creates durable welds offering unobstructed flow and decreased pressure drop.

### Mechanical systems, connected

Within a single day, as the excavator completed trenching, Keith Frey and Shreiner fused the pipe.

Kevin Hul, Mountain View technician, made many of the final Triton connections inside the home, completing fluid circuits to and from the five-ton, water-to-air Modine geothermal unit.

According to Shreiner, the Modine heat pump was a perfect match for the tekmar controls chosen to integrate management of the homes forced air geothermal heating and cooling equipment, and the five-zone radiant heat system.

"The geo system allowed easy integration to the tekmar 557 thermostats and controls," said Roger Prevost, hydronics general manager for Millersville, MD-based ROI Marketing, a



Watts' Triton HDPE pipe fusion technology

manufacturer's representative firm. "The controls included two 557 t-stats; five 552 t-stats and a setpoint and wiring center."

"The tekmar controls are key components of the Hydronex panels," said Watts Regional Manager Rich McNally. "Installers simply hang them, make connections, add power and water." The preassembled, pre-engineered panels are factory wired and tested. The three modular Hydronex panels, ready for off-the-shelf delivery, were ordered by Mountain View a few weeks before they arrived.

The first, primary panel moves hot water from the boiler-fed buffer tank; it includes outdoor sensors and interior thermostats. Injection panels two and three parcel-out heated supply to feed the home's different-temp radiant heat zones. Taco zone controls govern a bevy of Taco pumps, mounted at a 45-degree angle on the panels to control flow within the mile-long network radiant tubing.



120-gallon Bradford White tanks and Taco circulators

### All the comforts of home

Shreiner chose a 125 MBH, wall-hung Laars LX mod-con boiler as the main source of heat for the home. "I especially like the system for its high efficiency (95% Annual Fuel Utilization Efficiency [AFUE]) and that the New Hampshire company makes the boiler here in the U.S., even their own stainless steel heat exchangers. It's got an advanced control system and outdoor reset, a condensate trap, zero clearance installation and allows venting up to 150 feet," said Shreiner. "And it's so danged quiet."

He added that the boiler is paired with two 120-gallon Bradford White tanks, one of which had a large stainless steel coil inside. "We chose these for their very low standby loss," added Shreiner. "One of them is a buffer tank for the

hydronic system. The hydronic panels pull from this large volume of water to meet the home's space heating needs. The other tank is an indirect water heater with a large stainless steel coil inside to heat domestic water.

"The buffer tank is kept at temperatures between 110 and 140°F and is the first tank met by the boiler; temperatures in the tank vary according to ambient temperatures as monitored by the outdoor reset control," Shreiner continued. "The hydronic panels pull from this large volume of water to meet the home's heat needs. The other tank is an indirect water heater in the truest sense, for domestic water."

Populating the Hydronex control panels and managing flow for all of the home's five radiant heat zones are Taco 0015, 3-speed circulators (circs). The circulators also control flow to and from both of the indirect water heaters. A Taco 4900 air separator posts quality control guard duty for the entire hydronic system. Taco zone controls interface easily with the tekmar components.

"We've installed Taco circs, pumps, zone valves and zone controls for years," added Shreiner. "With a system as robust as this one, there was no way we'd use anything but the products we've come to trust."

The Freys also installed a small HeatWeave electric radiant mat below the tile in their guest bathroom—complete with its own programmable thermostat. "I didn't want my guests to experience cold feet here. It was a very small splurge," said Jenessa Frey.



Kurt Shreiner, co-owner of Lancaster County-based Mountain View Heating & Cooling

### Water quality, assured

The Freys have a good, on-site well. However—common to many agricultural areas—coliform bacteria and nitrates are present. After testing for water-borne minerals, sediment and other contaminants, it was clear to the Freys they'd need water treatment systems.

Well water now passes through a sediment filter; it then flows through a Watts ultraviolet unit to kill bacteria. Water then moves through a Watts Pure Water non-chemical iron removal system. Domestic water then makes its way through a Watts OneFlow scale prevention system to control water hardness; the system's scale media operates catalytically without salt or chemicals and doesn't produce wastewater.

"It doesn't even require electricity," said an amazed Matt Woodcraft, President of Lifeflow Plumbing, who installed the water treatment, filtration and plumbing systems.

"The scale prevention is effective at preventing over 98% of the scale produced by the hard water," said Woodcraft. "The only maintenance required on the system is a simple media replacement after three years of service."

The final water treatment happens in Jenessa's kitchen where Woodcraft installed an under-sink reverse osmosis system by Watts.

"You might say the Freys took on a challenge or two in solving the problems they encountered with the groundwater," added Woodcraft. "But we learned quickly that there's a solution for every variety of need."

A Taco Plum n' Plug hot water recirculation system and dedicated return line were installed to continuously circulate hot water to showers and fixtures.

### Delayed gratification

By June 2014, the Frey's excavated trenches were invisible, covered by a robust crop of soybeans. The field now serves two purposes with equal vigor: farmland and geothermal exchange. Fall came and the soybeans were harvested and sold. The Modine geothermal system switched between cooling to heating modes effortlessly while harvesting subterranean BTUs.

The Freys moved into their new home in February 2015. "Being my own [general contractor] added substantial time to complete the home," said Keith Frey. "But, we saved a bundle, most of which allowed us to improve the home's carbon footprint.

"The geothermal, radiant heat systems and water quality equipment are facets of the home we're most proud of," he added.

"We never imagined having a home as comfortable as this one," added Jenessa Frey. "The floors were cozy warm all winter long, even with record low temps. We were so comfortable that we almost forgot about the fireplace."

"We invested in comfort and efficiency," said Keith Frey. "Our home was worth the extra effort, the investment and the wait. We learned a thing or two about delayed gratification. We'll build on that sense of happiness for years to come." **ICM**