

Diversification Keeps Spafford & Sons Stabilized – Part 1

Jeff Williams stresses taking advantage of new techniques and technologies
by John Vastyan



Spafford & Sons Inc. typically gets 6,000 hours to 7,000 hours of run time from its rigs before trading them in.

Jeff Williams is something of a maverick. He rarely takes “No” for an answer and enjoys a good challenge. He also is very resourceful and deliberate. In his 29 years of drilling, Williams’ deep commitment to work and his sense of ethics have borne fruit. He is vice president of Spafford & Sons Inc., based in Jericho, Vt., with offices also in Sudbury, Montpelier and Franklin, Vt. The company has been in business for 62 years, and has a solid reputation for all facets of drilling and water service, including water well and geothermal drilling, hydrofracturing, excavation, water hauling,

geothermal line insertion and fusion, and thermally enhanced grouting. Spafford’s slogan: “We do the whole job.”

Tom Williams, Jeff’s father, began his work for John and Norm Spafford in 1964. Jeff joined the company in 1980. In 1982, Jeff’s uncle, John Williams, joined them, and the next year, Jeff’s brother, Tim, followed suit.

Tools of the Trade

In 1984, Tom bought the company from the Spaffords; the Spafford name enjoyed regional equity, so it stayed.

Today, Tim is vice president of operations. Tom, now 67, continues to drill wells every day. Jeff says proudly, “He runs a 2007 Atlas Copco T4W for geothermal and water drilling with a 1,250/350 air package on it.”

The company recently bought a rig made by ChemGrout. “It’s a new, high-pressure geothermal grouter mounted on a trailer,” Jeff explains. Because of the widely varying geography and applications, the company also operates

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a Schramm T555 1,050/350 and a T450W Schramm with 900/350 air. The T4W allows for drilling deeper in geothermal applications – in some cases, more than 2,000 feet. “We’ll buy a new piece of equipment if we know that it can pay for itself in five years, meaning full depreciation,” says Jeff. “I once went six years on a drilling rig and really regretted it; I won’t do that again. It uses resources borrowed from other parts of the company. Our average turnover on a drilling rig is seven to eight years. Typically, that means 6,000 to 7,000 hours of run time. After that, we sell ‘em or trade ‘em in on new equipment. It’s tougher now; the current economy challenges that, but we’ll see how the concept holds up.”

Constant Pressure

“If there’s a customer need tied to a well water or geothermal application, there’s got to be a solution,” Jeff proclaims. “We’re always looking for ways to improve our offerings. New technology – we’re looking at it. Manufacturer training – we’re there. And just as importantly, we’re the place where all of the ideas and insights lead to, so it’s our responsibility to clients not only to be attuned to new techniques and technology, we’ve got to apply the knowledge skillfully. That’s how we assure our future in the business and stay in the lead.”

One of the technologies Spafford has embraced is con-



Cooper, a 5-year-old puggle, assists Williams in preparing an estimate.



Roger “Farmboy” Gagnon and Melissa “Diesel” Mullen drilling a 12-inch bore to set 8-inch casing.

stant-pressure well water pumping, a solution Jeff applies for a wide variety of well water and geothermal applications, whether for on- or off-grid use. “Jeff’s always thinking outside the box,” says Dan Fletcher, eastern regional sales manager for Grundfos Pumps. “He began to apply pumps in a different fashion years ago, working on a theory that he had a better solution for homes and businesses with needs for out-of-the-ground domestic water, and for geothermal HVAC. His formula evolved over time, and by now it’s played-out over dozens of successful applications.”

William’s best recipe for on-site domestic water and geothermal applications involves the use of, typically, a 1-HP to 5-HP, three-phase VFD submersible pump in the domestic water well. The water drawn from the well is used for both the domestic water and – with heat that’s exchanged from it – thermal energy for the geothermal HVAC system.

Though similar to a “pump and dump” geothermal well arrangement where water is harmlessly drawn from one source for the thermal energy it holds and then rejected back into another source, Jeff adds a new dimension to the water’s use. “The water is clean and unaltered,” he explains. “So why not use it for all domestic water needs while it’s in the system? This is something that Carl Orio (operator of Water & Energy Distributors in Hampstead, N.H., a geothermal sales and design firm that supplies ClimateMaster heat pumps) has been doing for years in New England. We work very closely with them and have integrated their designs into the work we do.”

Jeff has settled on a recipe for larger systems that includes these two key components – a Grundfos S-Series constant-pressure submersible pump system (typically a 3- or 5-HP pump with a CU321 controller) to handle the main task of pulling water from the well, and a Grundfos BMOE EZ-Boost pump.

The S-Series submersible pump is married to its variable-speed control center, which is set for any pressure between 40 psi and 100 psi. In an application where both geothermal water circulation and a home’s domestic water needs are met, Jeff may apply a 3-HP submersible S-Series pump, set at just 40 psi to meet the geothermal system’s call for a circulation rate of 50 gallons a minute. The EZ-Boost pump’s task is to throttle the pressure up to 50 psi or 60 psi for water use within the home. **ND**

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Diversification Keeps Spafford & Sons Stabilized – Part 2

by John Vastyan



When it comes to his customers' off-grid domestic water or irrigation needs, Jeff Williams, vice president of Spafford & Sons Inc., with headquarters in Jericho, Vt., has a novel solution that's been proven in several applications. His firm uses the soft-start SQ pumps for ease on the inverter and electrical system for these reasons:

- To handle light loads with no appreciable average draw above running amps.
- Soft-start technology – no in-rush of current.
- Service factor is 1 or 1.1, because the pumps are soft-start – they ramp-up quickly without the big amperage draw required by on-off pumps. A standard hard-start 3,450 rpm “sub-motor” may require 5 amps to run, but has a much more aggressive ser-

vice factor of 1.3 to 1.75 to start, so a lot of in-rush is needed to start it. This is tough on the pump and also uses a lot of electricity. For a solar-powered system, it'd be a huge, if not unbearable strain – creating too heavy a draw on the inverter.

“With off-grid applications,” Williams explains, “customers typically use a generator and batteries coupled with photovoltaic or wind, and a power inverter to change 24-volt DC current to 115-volt AC, and, at that point, we can use the Grundfos SQ pump successfully on these applications. This leads us into geothermal because of the very high flow rates required. We do dozens of systems each year. For these, a lot of water must be moved.”

Of the systems Spafford & Sons installs, the mechanical equipment handles two key stages:

1. Low-pressure stage, which satisfies the high-volume, low-pressure, 20-psi minimum geothermal requirements, and any irrigation requirements with 40-psi needs.

2. All domestic water. They use Grundfos BMQE/EZ-Boost pumps to boost domestic water to 60 psi, 70 psi or 80 psi within the home.

They also use 115-volt solar power with SQ pumps for off-grid applications, typically with an inverter and battery backup with an LP-gas generator.

“At one home, we move 10 gallons a minute, 24/7 from a pond on the property, bypassing the geothermal heat pumps,” Williams explains. “This is a low-pressure feed. The beauty of the system is in its simplicity. When the house calls for heat, a solenoid on the return valve back to the well opens up, and the bypass closes so that we can recirculate water back to the well through a bypass line, while also re-supplying the pond with 10 gallons a minute. In essence, the water goes through the heat pump on its way to the pond, extracting thermal energy in the process. This also keeps our water column in the well consistently above 50 degrees in temperature, year-round.”

According to Williams, it's a standing-column system with an open loop just to keep the pond topped off and the bore temperatures at 50-plus degrees F. The heat comes from the many fractures and fissures that surround the borehole.

“While pumping water out onto the ground is wasteful of this resource, many people use well water to irrigate and keep ponds seasonally full,” he adds. “Also – because of the multiple units – two 5-ton Tranquility 27 geothermal systems by ClimateMaster – it's easier to maintain pressure because one or both can activate, and by controlling the pressure, we don't have to stage them in any particular order. If we were using

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specific frequency for each unit, we would have to bring them on in order, and if the static level changes, we might be using too much energy or not supplying enough water to the heat pumps.”

In the simplest terms, because pressure equals watts of power (or lots of power, Williams says), he settled on a sensible mechanical system recipe for this home. He explains it this way: “If a ground source heat pump [GSHP] only needs 20 psi to 30 psi and we pump at 60 psi, we use significantly more energy than we need. Typically, standard VFDs don’t offer multiple pressure points. So, while 40 psi satisfies GSHP needs, the entire domestic water system is left with insufficient pressure. And if you meet domestic water-pressure needs, that’s overkill. That’s why we use the smaller, constant-pressure, 3-HP S-Series pump, because it provides 20-plus psi for ground source heating and cooling, and irrigation. The three-phase motor and controller make that possible. The 1-HP EZ-Boost pump supplies pressure for the home’s domestic water system.

“With the 3-HP S-Series pump, I need to be able to move 50 gallons a minute at 20 psi; that’s the low-pressure stage. If I’d need higher pressure, I couldn’t do it with the smaller pump because it exceeds the pump’s ability. The BMOE Easy Boost pump gives us that higher pressure without the cost and higher energy draw required by a



Mellisa “Diesel” Mullen handles a piece of 8-inch with a drive shoe to start setting the 60-foot casing required to get to competent rock.



Jeff Willams and Ian “Cracker” Labounty pulling a very deep pump.

larger submersible. It takes in 50 gallons a minute at 20 psi, domestic-pressure-boosted to 60 psi to 80 psi.”

Pumping Away

Lots less energy is required with this recipe; you can cut voltage requirements by 30 percent to 40 percent. Take, for example, Spafford’s use of the 3-HP submersible S-Series pump, vs. a 5-HP submersible. Nine amps per hour are required for the 3-HP pump as opposed to 16 amps per hour for the 5-HP pump. That’s a difference of 2 kilowatts per hour at \$0.15 for each. With an average use of 2,500 heating hours each year at 2 kilowatts per hour, that’s \$750 per year in savings. The additional cost of doing it this way – about \$3,000 – will be paid off in four years, and the systems are said to last 25 years.

Other Applications

“For a remote mountain location that serves a seven-home subdivision, we installed a 1,500-gallon tank in the ground with a wet well next to it,” Williams relates. “We used a 1-HP, fixed-speed submersible pump set at 700 feet in the drilled well, and a 3-HP, 40-gallon-per-minute submersible for the distribution from the wet well. We fit this up with an in-well tank and a NEMA 4X panel with climate control and an alarm panel, eliminating the need for a building or additional shel-

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No building required – a complete set of controls and an alarm for a deep well submersible and submersible booster pump with complete climate control for a seven-home subdivision.

ter. The system provides 40 gallons a minute with pressure set at 60 psi. We installed it four years ago and have had no challenge with it at all.”

Typically, Spafford & Sons installs SQE constant-pressure submersible systems for homes, and SQ pumps for places where in-rush current is a concern, such as off-grid locations or homes with marginal power supply, like an old house with fuse box or 100-amp panel with piggyback breakers.

They use 3-HP and 5-HP pumps for higher flow needs, such as for irrigation. “This really beats pressure tanks,” says Williams. “With these sys-

tems, only a 4-gallon drawdown tank is required. For a conventional, single-speed system of this size, an 80-gallon tank would otherwise be needed. That is a big expense and a waste of space. Three-phase operation is much more efficient, longer lasting and more reliable. We install dozens of these each year. We also do 10 to 15 off-grid or marginal applications each year.”

Ahead of the Curve

Today, Williams’ enterprise includes Spafford & Sons Waterwells, Johnson Artesian and E. B. Feeley Water Wells. The last of these is an acquisition he

made in 2008, chiefly to diversify the company’s customer base. “For the most part, here in Jericho, we’re an upscale, bedroom community with an economy driven mostly by IBM employment,” he explains. “Locally, we’re feeling the downturn. But it’s an agricultural territory 40 miles north of us in Franklin County, Vt., where we recently bought E. B. Feeley Water Wells. So, as new construction-driven water well drilling has dipped substantially here, it remains pretty steady up there.

“We did about \$2.5 million in business in 2008. Of that, \$400,000 has come from geothermal drilling and in-



Diversification has helped Jeff Williams keep Spafford & Sons busy.

stallation – that’s around 15 percent, and just about covering our loss in water well drilling business. We’ve now begun to sub-out geo work, so that’s become a source of revenue, as well. Acquisitions have added another 15 percent, stabilizing us nicely at a time we’d otherwise be down 20 percent or 30 percent.”

Giving Back

Williams contributes generously to the industry that he has come to know so well. He is the immediate past president of the Vermont Groundwater Association, now serving as the treasurer. Among other posts, he is chairman of the technical advisory committee for the Vermont Agency of Natural Resources, and, for the National Ground Water Association, is the chair for the rural water subcommittee and the affiliate states subcommittee. In addition, Williams is a licensed Vermont well contractor, was IGSHPA-certified 4 years ago, and recently passed his national certified well driller and pump installer exams (CWD/PI). He’s now taking all of the exams to become a master ground water contractor. Is it any surprise that Spafford & Sons Inc. is reaping the benefits of decades of hard work?

“Despite the slowed economy, we’re a few percentage points ahead of last year. With our diversification into geothermal, some creative solutions on tap, and the acquisition that helped us to broaden our customer base, we’ve grown a bit at a time when – without these – we’d be down a full 30 percent. It appears that the geo drilling has completely replaced the fall-off we saw when new construction took a nosedive 18 months ago. We’re getting calls from all over Vermont, and now New Hampshire and New York, too. I guess it’s a good problem to have.” **ND**



Dean Muniz installs a geothermal buffer tank.

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