

All's Well That Ends Well

Pennsylvania home receives water quality & energy efficiency overhaul

By John Vastyan

A few years ago, a realtor in central Pennsylvania eagerly showed a three-bedroom, “move-in-ready” bi-level home to a young couple who quickly met the offer and moved in. It turned out to be a costly mistake.

A few new sheets of drywall, a smattering of spackle, some paint and a commercial carpet cleaning had made for a fine deception. After dismissing the idea of a home inspection, the buyers quickly found themselves “throwing money into a bonfire.”

“It all began with a puddle in the mechanical room,” said homeowner Tim Slusser. Two weeks later, the home had a new roof. Water had found its way inside and destroyed part of an exterior wall and part of the second-story subfloor.

Apparently, a queen bee also took a shine to the little hole where the rain got in. The pest control professional the homeowners hired apologized for the large up-front fee, saying, “The nest has been active for a year or two; it’s a big one.” The estimated 250,000 bees occupied an entire attic knee-wall, hidden from view.

Within several months, ‘80s-era bathrooms, mustard-yellow aluminum siding and carpets that had hidden slicks of cat urine all were replaced to update the home.

Throughout the remodeling process, the homeowners wanted to boost the home’s energy efficiency and fix

A technician prepares to install the new equipment in the Slusser home.



Life Is Hard; So Is Water

When Slusser learned, among so many other expensive troubles, that his home had hard water in its onsite well, he asked a lot of questions.

He learned from Yates that when water contains a lot of calcium and magnesium, it is considered hard. Water softening, he was told, removes magnesium and calcium ions.

"The equipment to deal with the water problems can be costly, but the benefits far outweigh the cost," Yates said.

People who have never experienced the benefits of a softener may wonder how having one can improve their lives.

But when water quality experts take the time to explain the impact of this technology—especially when combined with ultraviolet (UV) and reverse osmosis (RO) equipment—home and business owners become engaged buyers.

Longer Life

Slusser had just spent a bundle on a new boiler and water heater, but Yates told him that without treatment, the water from the well could threaten this new equipment. Slusser was not taking any chances: If he needed—not just wanted—a new sediment filter, water softener, UV system and under-sink RO unit, then it was time to bite the bullet and get it done.

Slusser learned from Yates that the old boiler's domestic water heater coil was completely calcified (he said it "looked like a big mineralized tumor"), and that the new equipment would be susceptible to the same conditions. Hard water was not something to ignore, but neither were the coliform bacteria and high nitrates present in the well water.

Slusser also was surprised to learn that his new coffee maker, dishwasher and other appliances would last longer with a water softening system, and that many maintenance issues (or replacement needs) for this equipment are tied to the quality of the incoming water.

Save Money, Too

Slusser learned that the Watts water softening system Yates installed would reduce the need for cleaning products—soft water helps prevent the buildup of troublesome soap scum. This makes cleaning faster and easier.

The Slussers quickly verified another claim made by Yates: that they would save money on soap and shampoo products, too. Soft water lathers more easily than hard water, so less soap is needed.

Hard water is also hard on the skin and hair. Soften the water for cleaner, silkier hair, and skin that does not become irritated by showering or bathing.

Yates uses a tablet to enter the correct operating parameters into the new circulator.



another cranky problem: poor water quality from the deep onsite well. The attic, newly free of angry bees, had only 4 in. of fiberglass insulation. An additional 30 in. of blown-in fiberglass made an immediate improvement. The block walls of the basement were covered in foam insulation, then pine tongue-and-groove. Some of the windows and doors also were replaced.

"At every turn we heard 'cha-ching, cha-ching,'" Slusser said. "Money was moving into the home at a clip I'd never imagined."

The last remaining project—a job Slusser knew he would hire a team of professionals to handle—was to replace the home's mechanical systems with problems that related, in part, to a lack of water treatment.

Yates and technician Larry Lawrence disassemble the original oil-fired boiler.

Leviathan Boiler

The home's original mechanical equipment had been replaced in 2006. A large oil-fired boiler with an internal domestic hot water (DHW) coil provided for the home's



heating needs. Sure enough, the coil was badly calcified and barely warmed the water.

"A heat load calculation at the 2,200-sq-ft home resulted in [a] demonstrated need for 48,000 BTUH heat loss, with an outdoor temperature of 10°F and an indoor temperature of 70°F," said Dave Yates, owner of York, Pa.-based F.W. Behler Inc., the company Slusser hired to do the retrofit.

"Using Taco's FloPro Designer software, I learned quickly that the old boiler was rated for an output nearly three times what the house needed," Yates said. The boiler was oversized and short-cycling, to say nothing of the oil it burned while attempting to heat the DHW. So, in early 2014, with oil prices hiking feverishly, it was time to downsize.

The big boiler was evicted. An old water softener that had been sold to the new buyers had actually stopped working years earlier. The ultraviolet (UV) light in the existing water treatment system "hadn't seen an electrical charge in years," Slusser said.

Groundwater in that area of Pennsylvania often contains coliform bacteria, high levels of nitrate and moderate levels of hardness, so Slusser could only guess what the previous owners had consumed via their drinking water over the years. "The old couple that lived there [was not] healthy, that's for sure," he said.

Good Things, Small Package

The system Yates chose included a 64,000-BTUH boiler and a 75-gal Bradford White indirect water heater with onboard electronic anode and thermostatic scald-guard valve to ensure both longevity and bather protection. "We've installed Bradford White equipment for years and have never been disappointed," he said.

Yates built his parts list carefully. An energy-efficient Taco ECM circulator was set as the hydronic system's main pump. The circulator provides ideal flow to the upstairs and downstairs zones of the house. At each loop, the system uses a 1-W Taco Zone Sentry zone valve.

Yates included a 1/2-in. Watts residential boiler fill fitting to ensure the system stays full, and a Taco 4900 air and dirt separator to keep the fluid pure.

"I've since learned from the Slussers that they've used less than half of the heating oil previously consumed, while maintaining optimal comfort," Yates said. "And, [they have] reduced power consumption."

The Devil Is in the Details

The Slussers did not want to expose the new water fixtures to scale, even if it meant using a dual-tank softening system. A twin-tank Watts water treatment system was installed; while one tank is recharging, the other conditions incoming water.

No reserve capacity is required to carry the tanks until a recharge can happen. There is no possibility of the bypass



The water treatment and softening system ensure water is safe to drink and appliances are protected.

valve opening while one tank recharges. The new system can be used in a timer or metered configuration, and when set to meter, uses less salt than the previous, timer-only tank.

A new 12-gal-per-minute Watts whole-house UV disinfection system accompanies a media filter on the wall above the water softener. If power is lost to the house, a solenoid valve closes; no contaminated water slips by the UV light to re-seed freshly sterilized domestic water.

The final assurance of water quality for the Slussers is a Watts Premier under-sink reverse osmosis (RO) system. "Though water quality in the home was already greatly improved with the new gear, nothing cleans and polishes water like RO," Yates said.

A Good Fit

The large-volume indirect tank helped lengthen boiler runtime while also reducing boiler size overall, improving energy efficiency and promoting a clean burn cycle.

Bradford White tanks can be ordered with a tempering valve atop the tank so that water exits at safe temperatures. "We can store 140°F or higher water while the outgoing supply temp is only 120°F," Yates said. "That's a great deterrent to germ growth."

"What started out as a nasty money-pit problem led to huge improvements here, and got us easily through some of the worst winter weather we've seen in a century," Slusser said. "We plan to be here for a long, long time." **WQP**

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