

ONCE UPON A BROKEN HEAT PUMP

By Lloyd Agte
603 Agte Road
Plummer, Idaho 83851

It was already August, winter just around the corner, and our Water Furnace water-to-water heat pump was not working. It made a sloshing sound of ground water circulating in and out of the unit, but no compressor engagement. In July I had twice called the company in Coeur d'Alene that had installed it eight years before but had gotten no response. Frustrated, I finally went in person to see what it took to get a service call. This worked, but the technician came at a time when unfortunately I was tied up getting my computer hard drive replaced in Coeur d'Alene. The service person wrote on my bill that my ground loop was without pressure, and that he had filled it but that it might last a week or some months as apparently I had a leaking ground loop. He thought it was futile to look for an underground leak, so the whole system might be toast. I had personally laid the 4000 feet of ground loops in trenches 5 ft. deep, and the installer who came to fuse the underground manifolds had said the ground loop installation I had done was "as good a job as I have ever seen." And there were no rocks turned up in all that digging—just good old Harrison Clay. Thus, I did not think I had an underground leak.

As it was hot in late August, and as my wife and I were off to her class reunion in Michigan, I did not have motive or time to test the heat pump. When we returned near mid-September a cold snap had set in so at 1:00 a.m., following the trip from the airport, I fired up the heat pump, and it was its old fickle self. It defaulted to FP (freeze protection) and took a half-dozen restarts until it finally ran. This was an old scenario that I had been repeating off and on for the past couple of years. We went to bed at 3:00 a.m. with it running, but we awoke to a cold house and a non-functioning heat pump.

So I did an internet search for Geothermal in Coeur d'Alene, ran off a copy and went to Spokane on other business, figuring if I got ahold of someone who could come down I could drive over and talk to a repairman personally to see if I thought he was up on my particular Water Furnace geothermal unit.

I called a company near Coeur d'Alene, but it was not encouraging. They suggested it needed a flushing of the ground loop system—that it would take

two people a full day as the equipment was heavy, and there would be charges for transportation each way (I'm about 40 miles away from Coeur d'Alene), and so on. It seemed they did not really want to do it, that I would be gambling a pile of money for questionable results. When I said the unit was 8 years old, the woman on the phone said it probably was too old to repair.

I called another company on my list but got only an answering machine. Another said they did not do geothermal, just air-to-air and air-to-water. One serviced only its own brand. And another call with no answer.

My list nearly exhausted, my blood pressure climbing rapidly, I called Northwest Geothermal in Hayden. By then, I had a pretty good head of steam up. Jason Bartel answered and my frustration unfairly spilled out on him. But he calmly answered that yes, he was quite familiar with the Water Furnace whose I.D. numbers I quoted to him. And as to my being informed by others that it was too old to mess with, he calmly told me that was his specialty, getting the old ones running like new again. Whew, seems like I might have struck gold. And yes, he could come Monday at 9:00.

At 9:00 Monday morning I went to the front door to keep an eye out for his arrival so I could tell him the unit was in the garage and that he could back up to the door. Good lord! There he was exactly on time and backing up to the door.

He squeezed the rubber flex-hoses that tied the ground feed lines to the heat pump and said that yes, the pressure was low, so there must be a leak. He asked me if I had ever squeezed these pipes but I had not, and he showed me how they crackled under the squeeze like thin ice cracking. We were mystified.

He pressurized the ground loop with water. We went into the crawl to see if there was leakage there, as the ground inlet and outlet pipes run 70 feet along the floor of the crawl, the length of the house. Finding nothing we emerged to find when we entered the garage a minor flood. Aha. Our leak!

I tore off the plywood and foam from the 1" copper pipes that transitioned from the 2" ground loop supply and return lines and discovered two black iron elbows that adapted onto male copper fittings (a no-no that the original

installers apparently did not know). Galvanic corrosion had eaten into the iron elbows and one had sprung the leak.

Jason came the next day with brass elbows, installed them, charged the ground loop and we tried to start the compressor but it would not start. He diagnosed that the capacitor on the compressor motor had crapped out. Luckily, he had a somewhat universal fit one on his truck that while a bit under-size temporarily did the job, and we had heat again. But not for long. The Water Furnace kept defaulting to FP—the old freeze protection default which had plagued it for a couple of years off and on. That's when he concluded it must be a faulty electronic board, and so Jason pulled it and sent it in to Water Furnace (all components have a 10 year warranty).

The new board arrived as well as the new capacitor. They were installed and the heat pump activated and ran but after a cycle or two defaulted to FP again. After checking figures with his volt meter. Checking temperatures and checking the results against charts, Jason concluded that the heat exchanger was operating inefficiently--that the iron and copper deterioration from the galvanic corrosion had coated the heat exchanger, making it inefficient.

On his next trip with new flexible pipes to install and after flushing the heat exchanger, we discovered that there was not much sediment or even tinting in the continuous-loop flushing fluid. He switched to a to a different gallon of flushing fluid, and after an hour or two some sediment and some flakes of corroded metal showed up in the fluid. Jason called Water Furnace and the technician recommended a third flushing fluid, which was not available in Coeur d'Alene, but was shipped to him from Spokane a day later.

That flushing was to run all day and night, and he would be back in the morning, but in late afternoon his electric flush pump I had been monitoring gave out and so we got in about a six-hour flush. But this liquid was now quite dark, with bits and flakes of deposited metal--a seemingly successful flush. A call to Water Furnace technical confirmed that this flush was probably sufficient and a check with his meters confirmed that it was running up to optimum factory efficiency.

And it ran happily ever after.

The End

Well, we have not quite reached “ever after” but we have reached four months later, as I am writing this in mid-February (2017) during one of the coldest, frozen snowy winters in the past twenty years, and the Water Furnace heat pump has not skipped a beat. What a wonderful, miraculous job Jason did. And there was not just one thing wrong with it—there were four things wrong: leaking iron elbow on the ground loop; weak electronic board; failed capacitor; and an inefficient heat exchanger coated with metal oxides. And we learned that the FP default, which one might assume is telling the system to shut down because ice might be forming down-stream from the compressor. After the pump takes in the ground-temperature water (c. 50 degrees here), extracts the heat, sends the heated water to storage tanks and sends the cooled water back to the underground loop at somewhere near (but definitely above) freezing. We assume heat pump defaults to FP because the outgoing water is way to cold—approaching freezing. Well, all good layman logic, but what the system is actually doing is taking a reading off of the heat exchanger, not the downstream water. And in my case, the oxide coating was preventing correct temperature from transferring through the heat exchanger, and thus the erroneous reading was shutting down the compressor.

So not only did Northwest Geothermal L.L.C. save the day, they saved the whole winter. Ah yes, and as to Jason’s prompt arrival time on his first visit, which I mentioned earlier. Did he keep it up? Well, not quite. He blew his perfect arrival-time-record on the last of the five days he was here—he was 15 minutes early.