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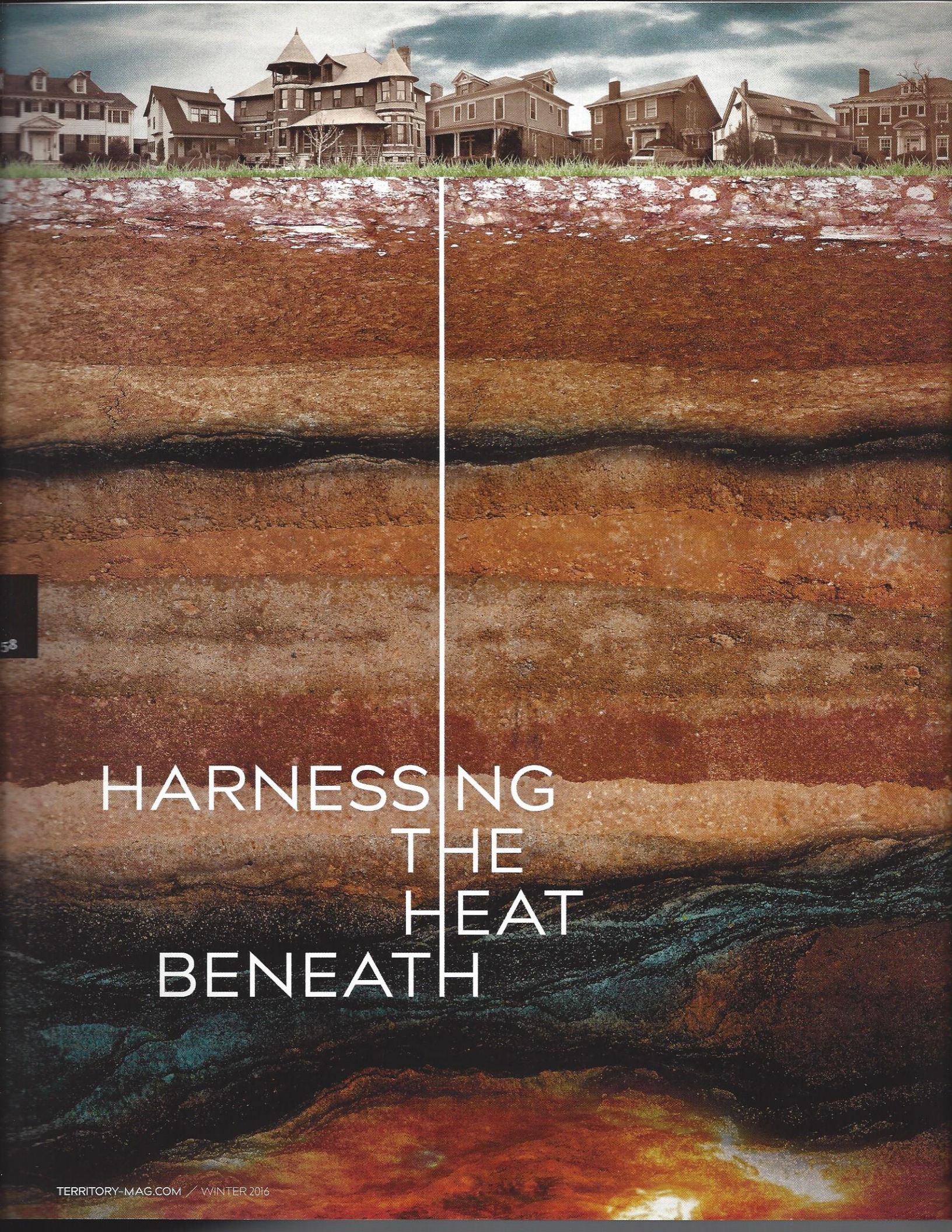


HARNESSING THE HEAT BENEATH

Awash in Hot Water

How the heat of the earth helped develop a city

By Patti Murphy

More than 100 years ago, Boise's Warm Springs Avenue got into hot water, and you could say that it was one of the best things that could have happened for the development of Boise.

It all started with an unemployed well driller named Mr. Grumbling who, in the 1890s, paid numerous visits to two local businessmen, Hosea Eastman and William Ridenbaugh, trying to convince them to invest in drilling for hot water. Grumbling insisted that an area east of town "did not freeze around the spot in the winter, seemed warm near the surface and cattle had stepped in the soft earth never to appear again."

Finally, his pestering paid off and Eastman and Ridenbaugh sunk two 400-foot wells that hit water registering 170 degrees Fahrenheit. It wasn't long until water lines were constructed to bring hot water from the wells and houses began to spring up on an undeveloped road in east Boise, which we know today as Warm Springs Avenue. Soon, this new geothermal water was being pumped into homes as a method of heating in the winter.

This was the early beginnings of today's Boise Warm Springs Water District (BWSWD), the nation's first district geothermal system that today supplies natural hot water to about 300 homes in the Warm Springs area for home heating.

How geothermal heating works

Del Eytchison, manager of the BWSWD, explained that heating with geothermal water is a fairly simple process once the equipment is installed. The water district brings the water to the surface and pumps it through distribution lines to the property. The homeowner is responsible for installing piping, a heat pump exchanger or radiators in the house.

"The water flows into the heat exchanger, through the coils, and a fan blows the hot air through the ducts in the house, just like a furnace," said Eytchison.

Or, in many older houses, the hot water flows directly through radiators in each room, heating the house through convection heat.

Eytchison said that the district charges about $1.50 per 1,000 gallons of water, and it supplies around 244 million gallons per season. "The water temperature stays consistent at 177 degrees, which is not more than one degree different from when the Warm Springs district first started pumping in 1893," he said.

Geothermal water creates a tropical microenvironment

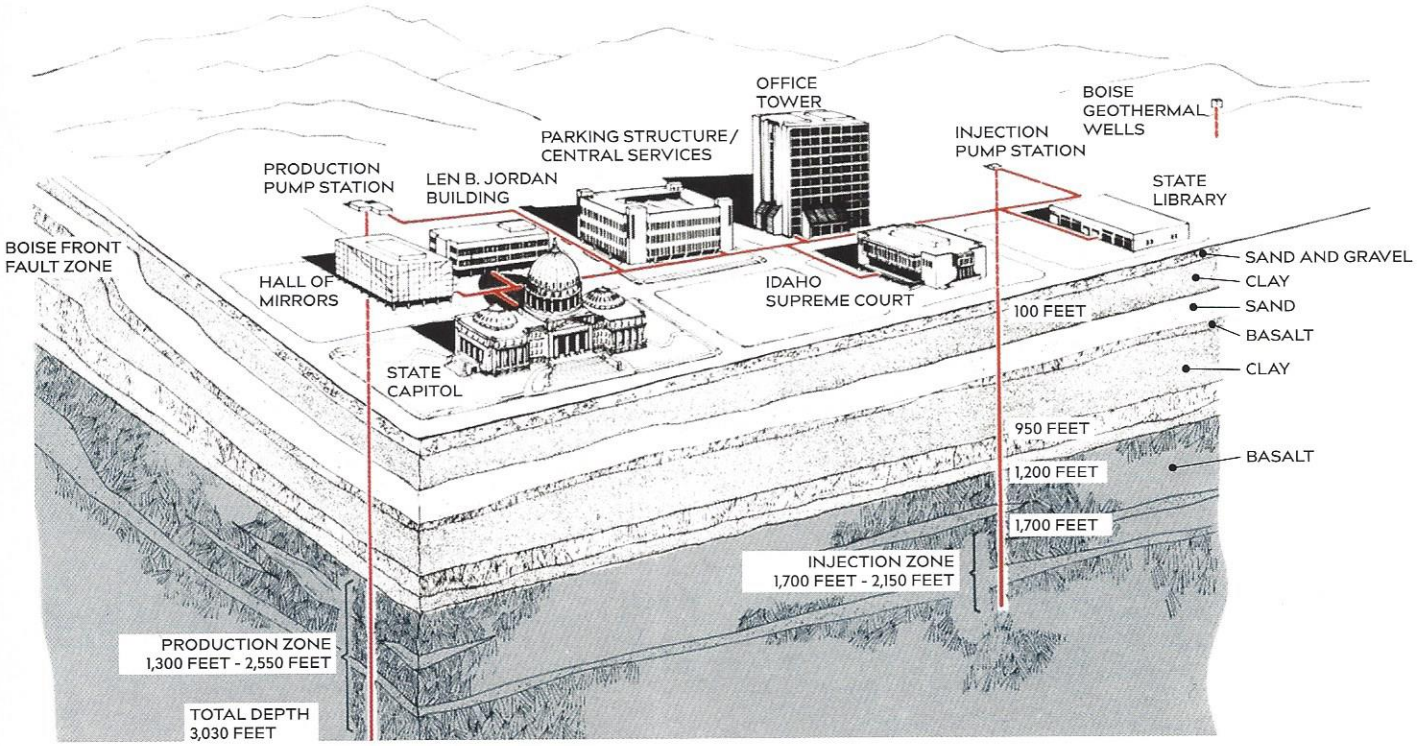
Once the water's heat has been used, many homeowners on the Warms Springs system simply eject the water into the canal, creating sort of a tropical microenvironment.

"If you go down to the ditch in January or February, the whole canal is flowing and steamy and you've got bamboo and elephant ears and all these tropical plants growing next to it in the middle of January," Eytchison said. "And it just creates its own microclimate because all the wasted geothermal water is being let out into the canal, which they've been doing for more than 100 years."

Warm Springs resident Betty Munis agreed. "We always have fish in the canal yearround, and ducks that just love it, and raccoons who are always down there taking a bath."

Munis, whose house on Warm Springs was built in 1894, heats her house by running geothermal water through radiators in each room. She said the system is both efficient and saves money.

"When we went to redo our home, we saw that inside the walls there was hardly any insulation," she said. "We have stone, which keeps the house cool in the summer, and with the geothermal heat in winter you hardly need anything else." She said that the spent water that heats her house then flows out to heat a freestanding garage, and over to their greenhouse. "I can start everything much earlier, and, in the fall, keep everything going later," she said of her vegetable gardening. "Finally, our used hot water goes down to our neighbor's pond.



"The Capitol Mall Geothermal Energy Project" published by the State of Idaho, Department of Administration

They always have a lot of critters down there, especially in the winter."

One year a pipe broke and Munis had her own Old Faithful by the front entryway. "When we went to replace a broken pipe, we found it was the original wooden pipe laid more than 100 years ago. It's amazing that it held up that long."

Other geothermal sources in Boise

While BWSWD is the oldest geothermal district in the nation, it is one of four districts in the Boise area. The other three other are managed by the City of Boise, the Veterans Administration and the State of Idaho, and provide approximately 775 million gallons of geothermal water to more than 85 government buildings and businesses in the downtown core and Boise State University each year. The different systems function independently, and operate their own wells and unique distribution system.

The water temperatures for these systems range from 155 to 175 degrees Fahrenheit and the wells range in total depth from 400 to over 3,100 feet.

Jon Gunnerson, geothermal coordinator with the Boise City Public Works Department, the largest geothermal district in the country, said that Boise City is set up a bit different from the Warm Springs district. "Boise has a two-pipe system, where once a facility uses the water for heating, we collect it again and reinject the water back into the same well we pumped it out of, making a truly sustainable, renewable resource."

He said that in the early 1980s, when the Boise system was first being developed, it didn't have an injection well and the used water was sent into the Boise River. "Year after year the aquifer kept declining and we started getting sued by other users of geothermal who said wells were drying up," Gunnerson explained. "In 1999, we drilled an injection well and the very next year it started coming back up. In 2013, we exceeded pre-1983 levels and the levels still continue to climb. We took the right steps to find a solution and now the resource is better and healthier than ever. A lot of downtown Boise would not have developed the way it did if it wasn't for this natural hot water source being available," he added.

Boise City heats 5.5 million square feet of buildings every year, and the only costs are to run a pump at the production well and injection well. "We're paying maybe $1,000 per month in the wintertime for power to heat the biggest buildings here in downtown Boise," Gunnerson said. "It's a very simple and unique natural resource. We don't have to put any energy into heating this water. We pump it out at 177 degrees and we reinject it back into the aquifer at about 120 degrees so there is still a lot of heat and potential when we are reinjecting it."

However, the farther away the water is pumped from the aquifer, the cooler it gets. "Right now, we get at as far as the farthest end of BSU. We pump it out at 177 degrees and they receive it at 165 degrees," Gunnerson added.

Where does the heat come from?

Gunnerson said there is a debate as to where the source of heat is coming from. "The Idaho central mountains are our nation's largest batholith, meaning it used to be magma underground and, as it was cooling, it was forced through some tectonic plates to the surface. There are two schools of thought: One is that this big ball of magma is still hot in the middle and any water that comes in contact with it heats up and finds the path of least resistance and comes up to the surface as the hot springs. The second school of thought is this batholith is pretty old and it's in the decay process in which energy is released. I just like to say that there are hot rocks beneath us.

"It's just one of those wonderful hidden resources that we have available." ■