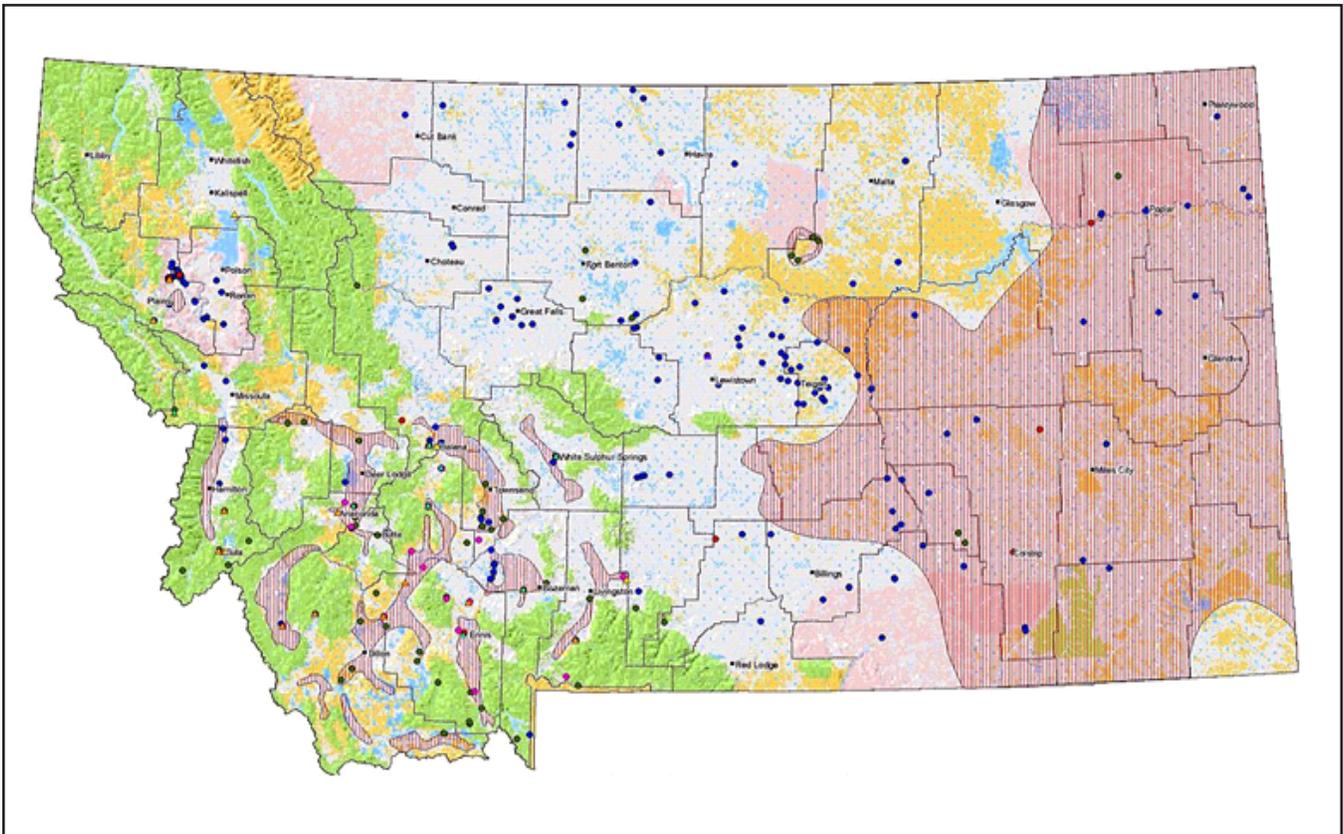


2. Where is Geothermal Energy Found in Montana?

Montana is one of 14 western states that have natural hot springs and hot water wells. In the western third of Montana, hot springs are usually located on the edges of mountain valleys. Rainwater finds its way down geologic faults on the sides of the valleys, where it circulates at great depth. The heated water then emerges along other faults as hot springs. There are a few hot springs in western Montana that occur higher in mountain ranges, but the majority of Montana's hot springs follow this pattern of emerging along the edges of valleys in the mountainous western portion of the state. The hottest natural hot springs in Montana, located just north of the town of Ennis, has been measured at 180 degrees F. But most of the hot springs in western Montana are in the range of 85 degrees to 140 degrees F.

Eastern Montana has a different geothermal pattern. There are few natural hot springs visible on the surface in the far eastern portion of the state. Instead of fault systems that allow water to circulate at depths, eastern Montana is underlain by a very deep layer of limestone called the Madison Formation. This porous rock is located at depths of 8,000 feet or more. The rock layer acts like a sponge, with tiny pores filled with water. The sheer depth of this rock layer in the earth causes the water to heat up to temperatures that in some cases exceed boiling — more than 250 degrees F in some areas near the town of Poplar in northeast Montana.

Montana Geothermal Resources



Map of Montana's Geothermal Resources. The dots on the map represent hot water wells and hot springs. Shaded and crosshatched portions represent areas of high potential for geothermal resources.

Image credit: <http://geothermal.inel.gov/maps/mt.jpg>

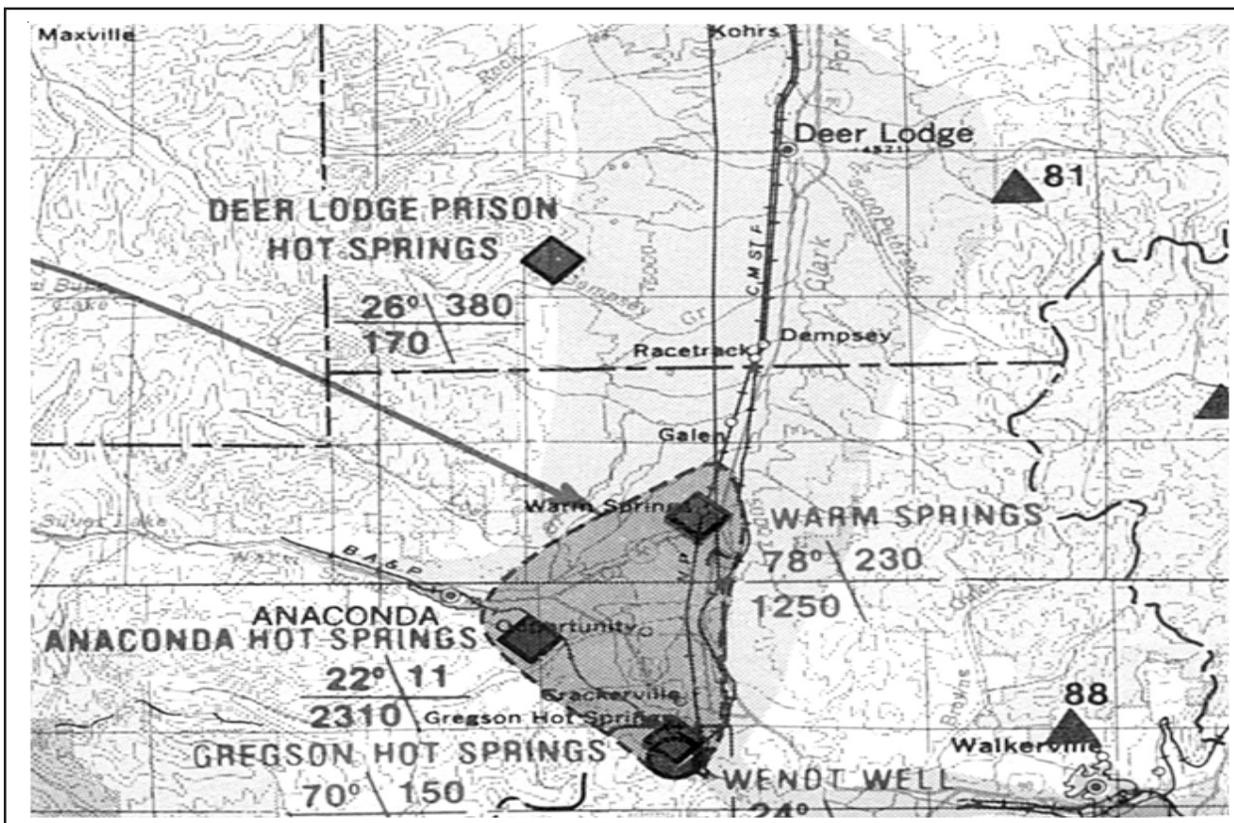
2. Where is Geothermal Energy Found in Montana? – continued

In several locations in central and eastern Montana, well drillers in the early 1900s struck this hot water by accident. Sometimes the hot water wells were left to flow onto the open prairie, such as a hot water well near Jordan, while in other cases such as Sleeping Buffalo resort near Malta, a well was converted for use in a hot springs resort. In the oil and gas fields in eastern Montana, oil wells often co-produce hot water at temperatures above boiling point.

The Montana Department of Environmental Quality (DEQ) has developed an online database of locations where geothermal resources have been identified. (The DEQ geothermal resource information, including the database, is available on the following website: www.deq.mt.gov/Energy/geothermal/default.mcp.x. The DEQ geothermal database for Montana shows at least 15 high-temperature sites, a few of them with estimated deep-reservoir temperatures exceeding 350 degrees F. Among these 15 sites are locations in the vicinity of Helena, Bozeman, Ennis, Butte, Boulder, and White Sulphur Springs.

Another state agency investigating the state’s geothermal resources is the Montana Bureau of Mines and Geology in Butte. The bureau has gathered temperature, depth, flow rates, and water chemistry for nearly 300 warm wells and springs throughout Montana. The bureau is currently updating and compiling a new geothermal database for Montana as part of a national geothermal database funded by the U.S. Department of Energy. Visit the Bureau of Mines and Geology geothermal website:

<http://mbmgwic.mtech.edu/sqlserver/v11/menus/menuProject.asp?mygroup=GEO THERM&>



A section of the Montana Geothermal Resources map produced by the Montana Bureau of Mines and Geology. Shown above are temperature and flow rate information for hot springs in the Deer Lodge Valley, east of the town of Anaconda.

*Sonderegger, J.L., Bergantino, R.N., 1981,
Geothermal Resources Map of Montana,
Montana Bureau of Mines and Geology: Hydrogeologic Map 4*