

PRIVATE DRINKING WATER IN CONNECTICUT

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Introduction

Geothermal wells have been used for several decades as an adjunct to existing heating and cooling systems. The systems are designed to use the Earth's relatively constant subsurface temperature along with a heat exchanger to either add to or remove heat from a dwelling. Geothermal wells (also known as geexchange systems) have two basic designs; open looped and closed looped systems.

In an open looped system groundwater is pumped from a water well into a heat exchanger located in a surface dwelling. The water drawn from the Earth is then pumped back into the aquifer through a different well, or in some cases the same well. Alternatively the groundwater could be discharged to a surface water body. In the heating mode cooler water is returned to the Earth, while in the cooling mode warmer water is returned.

In a closed looped system, an opening (either a borehole or trench) is made in the Earth. A series of pipes are installed into the opening and connected to a heat exchange system in the dwelling. The pipes form a "closed loop" (hence the name) and are filled with a heat transfer fluid. The fluid is circulated through the piping from the opening into the heat exchanger and back. The system functions in the same manner as the open looped system, except there is no pumping of groundwater.

Types of Geothermal Systems

Geothermal exchange processes can be very efficient. They can be arranged in five types of loops. The length of the loop depends on heating and cooling requirements of the building, soil conditions, climate, and landscaping. The types of units are as follows:

- Horizontal ground closed loops: trenches are dug three to six feet below grade and the pipe filled with exchange media winds around the yard.
- Vertical ground closed loops: boreholes drilled can be 150 to 450 feet or more. (Should be located similar to domestic well)
- Pond closed loops: pipe runs in and through pond, coiled slinky-like shape.
- Open loop systems: water extracted from well or borehole to be used as it transfers heat to a heat pump. Discharge may require permit from CT Department of Environmental Protection (DEP).



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Location of Geothermal Wells

All open loop systems are considered water supply wells and must meet the proper separating distances as outlined in the CT Public Health Code Section 19-13-B51. You must locate the open loop geothermal well in the same way that a domestic well is located. Wells improperly located, constructed or protected may contaminate the aquifer and other potable wells. If it is necessary to abandon the well, it must be properly abandoned according to PHC Section 25-128-56.



Closed loop geothermal systems are not considered water supply wells, however it is essential that these systems be treated carefully because they may function as conduits for pollution to enter the aquifer. The DPH recommends all closed loop systems be permitted by the local health authorities. Refer to DPH [Circular Letter 2008-58](#).

When there are insufficient protective measures to locate a geothermal well on the homeowner's property, the homeowner should evaluate the other geothermal options available or consider an alternative heating/cooling system.

Currently the Departments of Consumer Protection, Public Health and Environmental Protection are evaluating how geothermal and boreholes (wells) become regulated.

It is current DPH policy that any geothermal borehole should have a permit to document its existence and its proper siting location.

References – National Ground Water Association – www.ngwa.org or the National Well Owners www.wellowner.org

For more information please click on the following links:

EPA Office of Groundwater and Drinking Water

<http://www.epa.gov/ogwdw/>

EPA New England

<http://www.epa.gov/region01/>

Adapted from *Healthy Drinking Waters for Rhode Islanders*, University of Rhode Island Cooperative Extension, April 2003.