

MEMORANDUM

Date: March 19, 2014
To: Water Right File 36-8094
From: Michele Edl
Re: heating use

I was asked to provide a generic heating use volume for multiple living spaces associated with the above water right.

I made the following assumptions:

The livable space totaled 3000 square feet.

The peak heating load was 36 BTU/hr-ft² based on the heat flux of a "normally" insulated home constructed circa 1990.

The geothermal water is at least 130 deg F, a temperature suitable for in-house culinary use.

The heating water loses 30 deg F from entrance to exit. The temperature drop for a direct use of geothermal water depends on the type of heating equipment installed. The range is 15 to 50 deg F.

The HDD for the site is equivalent to HDD for Twin Falls, ID.

The method I used is an adaptation of an ASHRAE heating degree day, energy estimation method. It employs this equation:

$$\text{Vol} = (\text{HL} \times \text{HDD} \times \text{hr/day} \times \text{Cd}) / (\text{deltaT1} \times \text{K} \times \text{C} \times \text{deltaT2})$$

Where:

HL = design heat load (108000 BTU/hr = 36 BTU/hr-ft² x 3000 ft²)

HDD = heating degree day (8258 the max annual HDD for Twin Falls; occurred in 1985)
Hr/day (24)

Cd = correction factor for standard construction and HDD range (0.65)

deltaT1 = design indoor temperature minus design outdoor temperature (70 - 2 = 68 deg F)
(2 is the design temperature that the Geo Heat Center has used for Twin Falls)

K = correction factor to account for losses (0.9)

C = constant to correct for units (2.72 x 10⁶ BTU/AF-deg F)

deltaT2 = temperature of incoming geothermal water minus temperature of outgoing (130 - 100 = 30 deg F).

The calculation result is 2.78 AF. Therefore the estimated space heating volume that I can recommend for this water right is 2.8 AF.

If any true values can be found to replace my assumptions, I would be happy to recalculate.