

MEMORANDUM

Date: January 5, 2012
To: Water Right File 65-13912
From: Michele Edl
Re: draft license overview

I was asked to review the field examiner's report, recommendations and draft license for this permit. This memo documents my suggested modifications two areas: combined use conditioning and recommended volume.

Combined Use

The permit holder has other rights which share the point-of-diversion and distribution system used by this right. Rights 65-1972 and 65-1973 were claimed as domestic rights in the SRBA. The permit holder resumed use of those rights in 2006. They sum to 0.05 cfs and 2.4 AF. The field examiner found 0.06 cfs beneficially used by the system common to all three rights. Therefore only 0.01 cfs of additional beneficial rate can be attributed to this permit. A condition should be added to the license to limit the combined use of 65-1972, 65-1973 and 65-13912.

Volume Recommendations

The volume of water beneficially used through this system is not available from measurements. Both the examiner and I rely on mathematical calculations to estimate a volume for the license.

Space heating

Bill Carter P.E., an engineer with Musgrove Engineering, provided the design heating load for the MacGregor residence. The total design load is 91,615 BTU and was based on design outside temp of -12 deg F and an inside design temp of 72 deg F. I use Mr. Carter's design load in my volume calculation.

I calculated the volume based on an adaptation of ASHRAE heating degree day, (HDD) energy estimation method. I used the HDD from the nearest airport station McCall for 1985, the coolest year in the period-of-record. I calculated the volume of water beneficially used for space heating using the following equation:

$$\text{Vol} = (\text{HL} \times \text{HDD} \times 24 \times \text{Cd}) / (\text{deltaT1} \times k \times C \times \text{deltaT2}), \text{ where}$$

- HL = 91615 BTU (provided by Musgrove Engineering)
- HDD = 10474 (from McCall airport 1985)
- 24 = 24 hr/day
- Cd = 0.65 (factor to account for construction standard)
- DeltaT1 = 84 deg F (design indoor temp minus design outdoor temp)
- K = 0.9 (factor to account for losses)
- C = 2.72×10^6 BTU/AF-deg F (constant to correct for units)
- DeltaT2 = 11.8 deg F (temp of incoming geothermal water minus temp of outgoing)

My recommended space heating volume = 6.17 AF

Spa/pool heating

1985 was an unusually cool year and space heating would have been required every day of that year. I understand that the system developed for this permit, channels the geothermal water through the heat exchanger first before cascading it to the spa/pools. And that the geothermal water exits the heat exchanger at 108 degrees F.

The spa use (given as approximately 60 days per year) would overlap the HDDs used to estimate the space heating volume. The heat demand of the indoor spa/pool is negligible compared to the space heating use and outdoor spa but some additional volume can be attributed to the use of the outdoor spa/pool.

I recommend an additional 0.3 AF for filling the outdoor spa/pool at 0.06 cfs, 60 times. Once filled, a refresh rate of as little as 0.03 cfs would be sufficient to keep the outdoor spa/pool at 104 deg F in wintertime weather conditions (0 deg F and 5 mph wind speed). Because the refresh water use is cascaded water use covered by the space heating rate and volume already recommended, I do not recommend additional rate or volume for refreshing the spa/pool.

Industry standards for spa/pools discourage soak times longer than 15 minutes in pools with this target temperature (104 deg F). Longer soak times in water at this temperature can be hazardous to the bather's health. I do not believe that the spa/pool will be continuously occupied during the 60 days of potential spa use.

My recommended spa/pool heating volume = 0.3 AF.

My total volume recommendation is 6.47 AF = 6.17 AF + 0.3 AF.