

Method of Determination: Tracks were collected with a Garmin GPSmap 60CSx receiver and downloaded into an ArcMap shapefile that corresponds with 2009 and 2011 aerial photography and verified the place of use is located as recorded. See attached map.

3. ☒ Delivery System Diagram Attached (required). Indicate all major components and distances between components. Indicate weir size/pipe as applicable.
- ☐ Map Attached Showing Location(s) of point(s) of diversion and place(s) of use (required). Scale must be 1:24,000 or greater.
- ☐ Aerial Photo Attached (required for irrigation of 10+ acres).
- ☐ Photo of Diversion and System Attached

4.

<u>Well or Diversion ID No.*</u>	<u>Motor Make</u>	<u>Hp</u>	<u>Motor Serial No.</u>	<u>Pump Make</u>	<u>Pump Serial No. or Discharge Size</u>
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A0003171		1.5 Hp			
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*Code to correspond with No. on map and aerial photo

D. FLOW MEASUREMENTS

1.

<u>Measurement Equipment</u>	<u>Type</u>	<u>Make</u>	<u>Model No.</u>	<u>Serial No.</u>	<u>Size</u>	<u>Calib. Date</u>
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5 gallon bucket and Stop watch

2. Measurements:

Effluent from system into Salmon Falls Creek; 3 measurements: 9.27s; 9.41s and 9.44s for an approximate flow rate of **0.07 cfs**.

E. FLOW CALCULATIONS

_____ Additional Computation Sheets Attached

Measured Method: Measured Method: Theoretical yield:

$$Q = \frac{8.8 \times (Hp) \times (Eff)}{H}$$

Where: Hp = 1.5 Hp pump

Eff = efficiency = 70% assumed

H = total head = pumping level = (2.31 x system pressure)

assume pumping level of 10 feet (per Nathan Olsen)

assume system pressure = 40 psi

$$H = 10 + (40 \times 2.31) = 102.4$$

$$Q = \frac{8.8 \times 1.5 \times .70}{102.4} = 0.09 \text{ cfs}$$

F. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation: N/A

$$V_{I.R.} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) =$$

$$V_{D.R.} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 =$$

$$V = \text{Smaller of } V_{I.R.} \text{ and } V_{D.R.} =$$

2. Volume Calculations for Other Uses:

Heating: **7.0 AFA** (see attached volume calculation)

Recreation: swimming pool: 93' L x 8' W x 4.5' Avg. Depth x 7.4805 = 25,045 gallons/325,850 = 0.08 AF

Pump runs 24/7 365 days a year: 0.07cfs x 365 days x 1.9835 AF/day = **50.68 AFA**

G. NARRATIVE/REMARKS/COMMENTS

Permit was permitted for 0.1 cfs Heating and 0.1 cfs Recreation.

Application for permit was submitted by Nathan Olsen on February 8, 2012 and proof of beneficial use was submitted on April 29, 2013.

Water is pumped from a 126° spring source that also supplies water to Miracle Hot Springs. The water is delivered approximately 1150' to the west to a 5,000 ft² home for heating and to a swimming pool for recreational use. Water is run continuously through the system at 0.07 cfs. Water is diverted directly to the pool during the non-heating season and then is diverted to the heating system with the effluent discharging to the pool during the heating season. The used water is then discharged from the pool into Salmon Falls Creek after use and as such, can be considered a non-consumptive use of water under current Department guidelines.

Point of diversion supplies water to two other water rights, 47-2242 and 47-17613, but there is no overlap with other recorded water rights at the place of use.

Recommend licensing 0.07 cfs with an annual volume of 7.0 AF for Heating; and 0.07 cfs with an annual volume of 50.7 AF for Recreation; and a total combined diversion rate of 0.07 cfs with an annual volume of 50.7 AFA.

Have conditions of permit approval been met? ☒ Yes ☐ No

H. RECOMMENDATIONS

1. Recommended Amounts

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
RECREATION	01/01 to 12/31	0.070 CFS	50.70 AF
HEATING	01/01 to 12/31	0.070 CFS	7.00 AF
<u>Totals:</u>		0.070 CFS	50.70 AF

2. Recommended Amendments

☐ Change P.D. as reflected above ☐ Add P.D. as reflected above ☒ None

☐ Change P.U. as reflected above ☐ Add P.U. as reflected above ☐ Other

I. AUTHENTICATION

Field Examiner's Name Bill Mott Date 10-25-2013

Reviewer [Signature] Date 10/28/13



Figure 1: Pool



Figure 2: Pool and home

Volume calculation WR 45-17574

The annual volume requirement was calculated using a Memorandum from Rick Sterling to Terry Blau dated March 25, 1988 and Administrative Memorandum from Norm Young dated September 28, 1992 titled Rate of flow for heating use. The memorandums contain equations for calculating the annual water requirements for geothermal heating. The equations are listed below with an explanation of the variables; data was taken from the field exam and the National Oceanic and Atmospheric Administration (NOAA).

Explanation of values used in calculations:

The home has a total of 5000 ft², the efficiency factor was assumed to have a *Average energy efficiency* or 0.67 BTU/hr ft² °F. The Design temperature difference for the area is 73 °F. The temperature of the geothermal source was reported to be 126°F. The temperature in the home is expected to be 70 °F. The annual heating degree days were taken from the Hagerman 2 sw weather station because it is closest in elevation and proximity.

Design Heat Load Calculation: $E = [e \times \Delta t_1] 0.8 \times A$

Where:

E = BTU/hr required

e = House efficiency factor

Δt_1 = Design temperature difference

0.8 = Adjustment factor for two story homes

A = Area of heated space

Values used:

$$\begin{aligned} e &= 0.67 \text{ BTU/hr ft}^2 \text{ }^\circ\text{F} \\ \Delta t_1 &= 73 \text{ }^\circ\text{F} \\ A &= 5,000 \text{ ft}^2 \end{aligned}$$

$$E = [e \times \Delta t_1] 0.8 \times A = \boxed{244,550} \text{ BTU/hr}$$

*If calculation is not for a two story home the 0.8 factor in the equation is not used.

Temperature Drop Across System Calculation: $\Delta T_s = 0.3(S - T)$

Where:

ΔT_s = Temperature drop across system

S = Geothermal source temperature

T = Temperature required by system

Values used:

$$\begin{aligned} S &= 126 \text{ }^\circ\text{F} \\ T &= 70 \text{ }^\circ\text{F} \end{aligned}$$

$$\Delta T_s = 0.3(S - T) = \boxed{16.8} \text{ }^\circ\text{F}$$

Volume Calculation:

$$V = \frac{HL \times DD \times 24 \times C_D}{\Delta t_1 \times k \times C \times \Delta t_2}$$

Where:

V = Annual volume of geothermal water required

HL = Peak heating load in BTU/hr

DD = Annual heating degree-days

24 = 24 hrs/day

C_D = Empirical correction factor for heating effect vs. 65 °F degree-days

Δt_1 = Design temperature difference

k = Correction factor to account for losses, use 0.90

C = Constant to correct for desired units, 2.72×10^6 BTU/AF-°F

$\Delta t_2 = \Delta T_s$ = Temperature drop across system (calculated above)

Values used:

$HL = 244,550$ BTU/hr

$DD = 5,832$ °F

$24 = 24$ hrs/day

$C_D = 0.61$

$\Delta t_1 = 73$ °F

$k = 0.9$

$C = 2,720,000$ BTU/AF-°F

$\Delta t_2 = 16.8$ °F

$$V = \frac{HL \times DD \times 24 \times C_D}{\Delta t_1 \times k \times C \times \Delta t_2} = \boxed{7.0} \text{ afa}$$

08S14E30SWSW

08S14E30SESW

08S14E30SWSE

08S14E31NWNW

08S14E31NENW

08S14E31NWNW

08S14E31SWNW

08S14E31SESW

08S14E31SWNE

08S14E31NWSW

08S14E31NESW

08S14E31NWSE

08S14E31SWSW

08S14E31SESW

08S14E31SWSE

Home Site

Spring

Existing water line

47-17514