

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 47-7451A

Exam Date: 5/21/2014

1. Current Owner: GARY N NELSON
5422 N 400 E
HAGERMAN ID 83332
(208)837-6313
2. Accompanied by: Emery Webster (New property owner)
Phone No: (208) 241-4005

3. SOURCE

GROUND WATER

B. OVERLAP REVIEW

1. Other water rights with the same place of use: None
2. Other water rights with the same point of diversion: 47-7451B

C. DIVERSION AND DELIVERY SYSTEM**1. LOCATION OF POINT(S) OF DIVERSION:**

GROUND WATER

NE1/4SE1/4

Sec. 30, Twp 08S, Rge 14E, B.M.

TWIN FALLS County

Method of Determination: GPS 42 42.038/114 51.166 (A0003174)

2.

PLACE OF USE:

DOMESTIC

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
08S	14E	30													X				

PLACE OF USE:

RECREATION

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
08S	14E	30													X				

PLACE OF USE:

HEATING

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
08S	14E	30													X				

Method of Determination:

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. Well or Diversion

A0003174 Artesian low temperature geothermal well.

D. FLOW MEASUREMENTS

Field exam for water right 47-7451B measured the total capacity of the system to be 0.07cfs. Information in the file indicates that 47-7451A is supposed to have 2/3 of the flow from the well and 47-7451A is allowed 1/3 of the flow. There are only the two water rights associated with the well.

47-7451A = **0.05 cfs**

47-7451B = 0.02 cfs

E. FLOW CALCULATIONS**F. VOLUME CALCULATIONS**

Heating: See attachment A = **2.5 AFA**

Domestic:

First home, RP08S14E307325 (W 2.634A of Lot 1)

in-house use standard annual volume = 0.6 AFA

Second home (not constructed), RP08S14E307321 (E 2.508A of Lot 1)

300 gallons per day (per 3/16/1993 Order) x 365 days = 0.4 AFA

Domestic total = **1.0 AFA**

Recreation: Hot tub was estimated to be 1,000 gallons (134 ft³)

52 wks/yr x 1 change/wk x 134 ft³/change x 1acre-ft/43560 ft³ = 0.16 AFA = **0.2 AFA**

G. NARRATIVE/REMARKS/COMMENTS

Permit 47-7451A was developed from a low temperature geothermal well for domestic, recreation and heating uses. The well also supplies water for water right 47-7451B. The well was agreed to supply 33% of the flow for permit 47-7451B and the remaining flow for permit 47-7451A. In July of 1988 the field exam for permit 47-7451B was completed at which time the capacity of the well was measured to be 0.07 cfs. Based

on the original flow measurement and the amount allotted for this permit it is recommended that the flow rate for this permit be licensed for 0.05 cfs.

This permit was developed with the ability to supply water for two domestic residences. The primary residence (W 2.634A of Lot 1) has been established with the associated water uses, while the second residence (E 2.508A of Lot 1) has a shop and is only stubbed in for use of the hot water. This permit does have an order that was issued 3/16/1993 which identifies the hot water used on W 2.634A of Lot 1 as the primary use of the water and the E 2.508A of Lot 1 is able to use the wastewater from the W 2.634A of Lot 1 plus an additional 300 gallons per day for domestic use. The volume recommended for heating (2.5 afa) and recreation (0.2 afa) are based on the water used on the W 2.634A of Lot 1. The total domestic volume for both lots is 1 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>
DOMESTIC	1/01 to 12/31	0.05 CFS	1.0 AF
RECREATION	1/01 to 12/31	0.05 CFS	0.2 AF
HEATING	1/01 to 12/31	0.05 CFS	2.5 AF
<u>Totals:</u>		0.05 CFS	3.7 AF

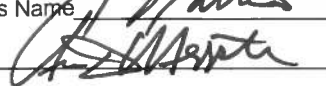
2. Recommended Amendments

☐ 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  Date 6/18/14

Reviewer  Date 6/18/14



Volume calculation WR 47-7451A House (1,902 ft²)

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 1,902 ft², the efficiency factor was assumed to have an *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 135 °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:

$$e = 0.67 \text{ BTU/hr ft}^2 \text{ } ^\circ\text{F}$$

$$\Delta t_1 = 73 \text{ } ^\circ\text{F}$$

$$A = 1,902 \text{ ft}^2$$

$$E = [e \times \Delta t_1] 0.8 \times A = \boxed{93,027} \text{ BTU/hr}$$

*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:

$$S = 135 \text{ } ^\circ\text{F}$$

$$T = 70 \text{ } ^\circ\text{F}$$

$$\Delta T_s = 0.3(S - T) = \boxed{19.5} \text{ } ^\circ\text{F}$$

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:

$HL = 93,027$ BTU/hr

$DD = 6,208$ °F

$24 = 24$ hrs/day

$C_D = 0.62$

$\Delta t_1 = 73$ °F

$k = 0.9$

$C = 2,720,000$ BTU/AF-°F

$\Delta t_2 = 19.5$ °F

$$V = \frac{HL \times DD \times 24 \times C_D}{\Delta t_1 \times k \times C \times \Delta t_2} = \boxed{2.5} \text{ afa}$$