

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 36-17000

Exam Date: 6/19/2014

1. Current Owner: LARREY ANDERSON JR
732 FALLS VIEW DR
TWIN FALLS ID 83301
(208) 736-4480
2. Accompanied by: Larrey Anderson Sr.
Relationship to Permit Holder: Father and neighbor

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: 36-16999

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

GROUND WATER

L9 NW1/4SW1/4

Sec. 31, Twp 09S, Rge 18E, B.M.

JEROME County

Method of Determination: GPS 42 35.891/114 24.065

2. PLACE OF USE:

HEATING

Twp	Rge	Sec	NE				NW				SW				SE				Totals
09S	18E	31	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
												X							
												L 9							

PLACE OF USE:

DOMESTIC

Twp	Rge	Sec	NE				NW				SW				SE				Totals
09S	18E	31	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
												X							
												L 9							

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

Artesian well drilled in 1993 under permit 712258.

D. FLOW MEASUREMENTS

Bucket and stopwatch at outflow of system running at full capacity.
5 gallons in 19 seconds = **0.04 cfs**

E. FLOW CALCULATIONS

F. VOLUME CALCULATIONS

Domestic – in-house use = **0.6 AFA**

Heating – see attached calculations, 6.1 AF + 0.7 AF = **6.8 AFA**

G. NARRATIVE/REMARKS/COMMENTS

Water right permits 36-16999 and 36-17000 are associated with a low temperature geothermal well drilled in March of 1993 for Larrey Anderson. At that time the well was drilled the Department allowed for exempt domestic use from low temperature geothermal wells. In April of 2008 the Department signed administrative memorandum Adjudication No. 54, Application Processing No. 69, and Well Construction No. 7, with the requirement that all domestic low temperature geothermal uses would require a water right. Permits 36-16999 and 36-17000 have been filed for domestic uses that were developed prior to the April 2008 Memorandum.

The field exam was conducted on 6/19/2014 at which time the temperature of the well was measured at 105 degrees Fahrenheit. A flow measurement of 0.04 cfs was taken at the output while the system was running at full capacity. The volume for in-house domestic use is recommended as 0.6 AF and the volume for heating of the home and sidewalk was calculated to be 6.8 AF based on low temperature geothermal heating calculations. The owner is aware the maximum daily use for the residence is 13,000 gallons. It recommended that the permit be licensed with the above mentioned flow rate and volume.

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>
HEATING	01/01 to 12/31	0.040 CFS	6.8 AF
DOMESTIC	01/01 to 12/31	0.040 CFS	0.6 AF
<u>Totals:</u>		0.040 CFS	7.4 AF

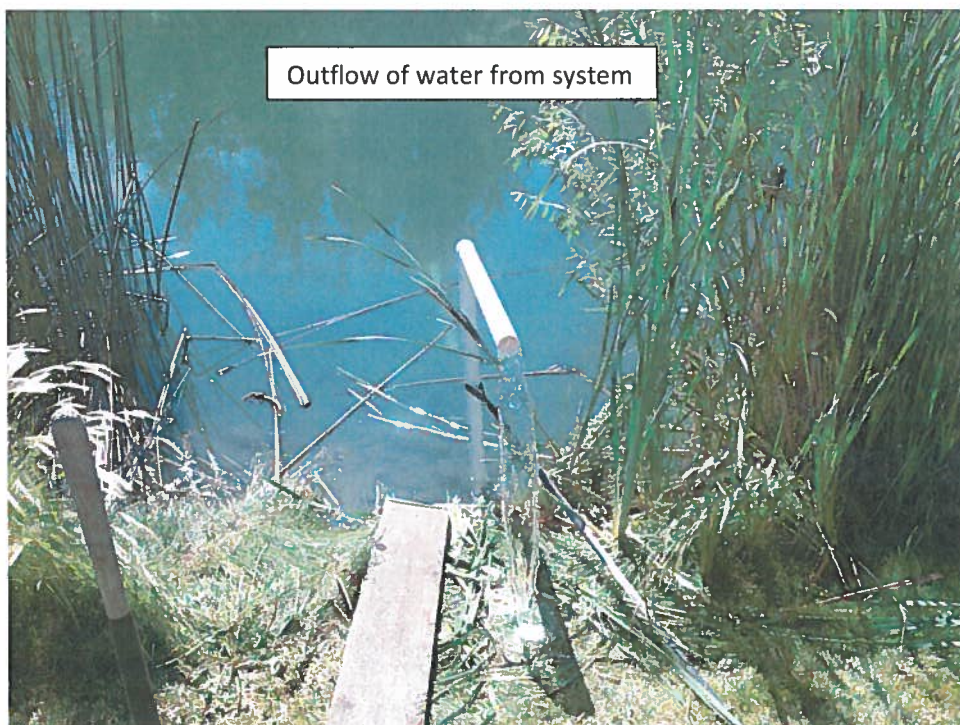
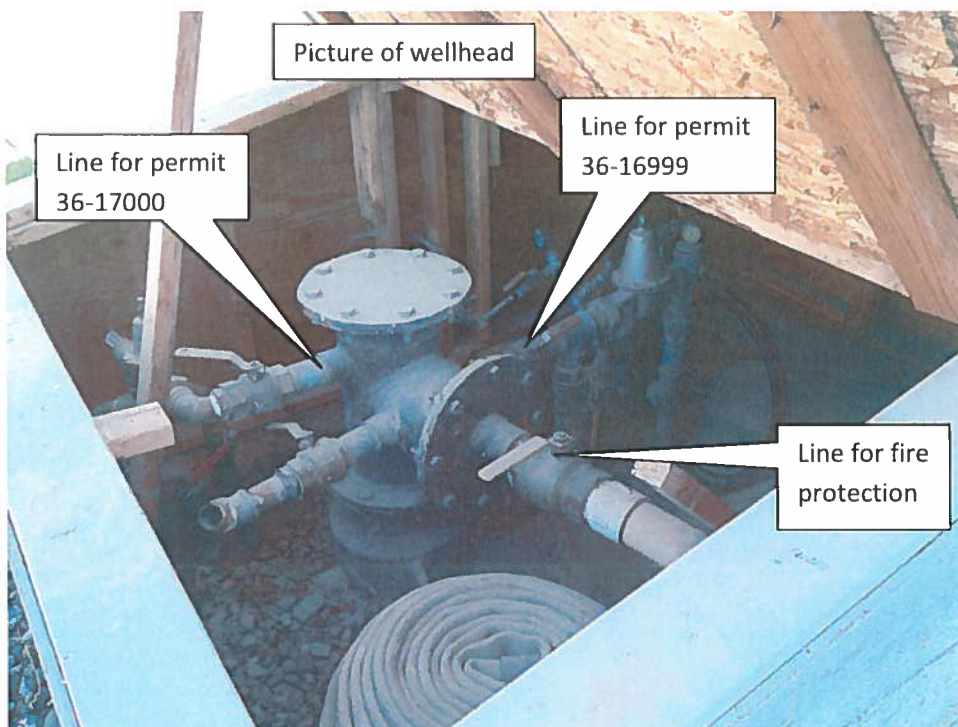
2. Recommended Amendments

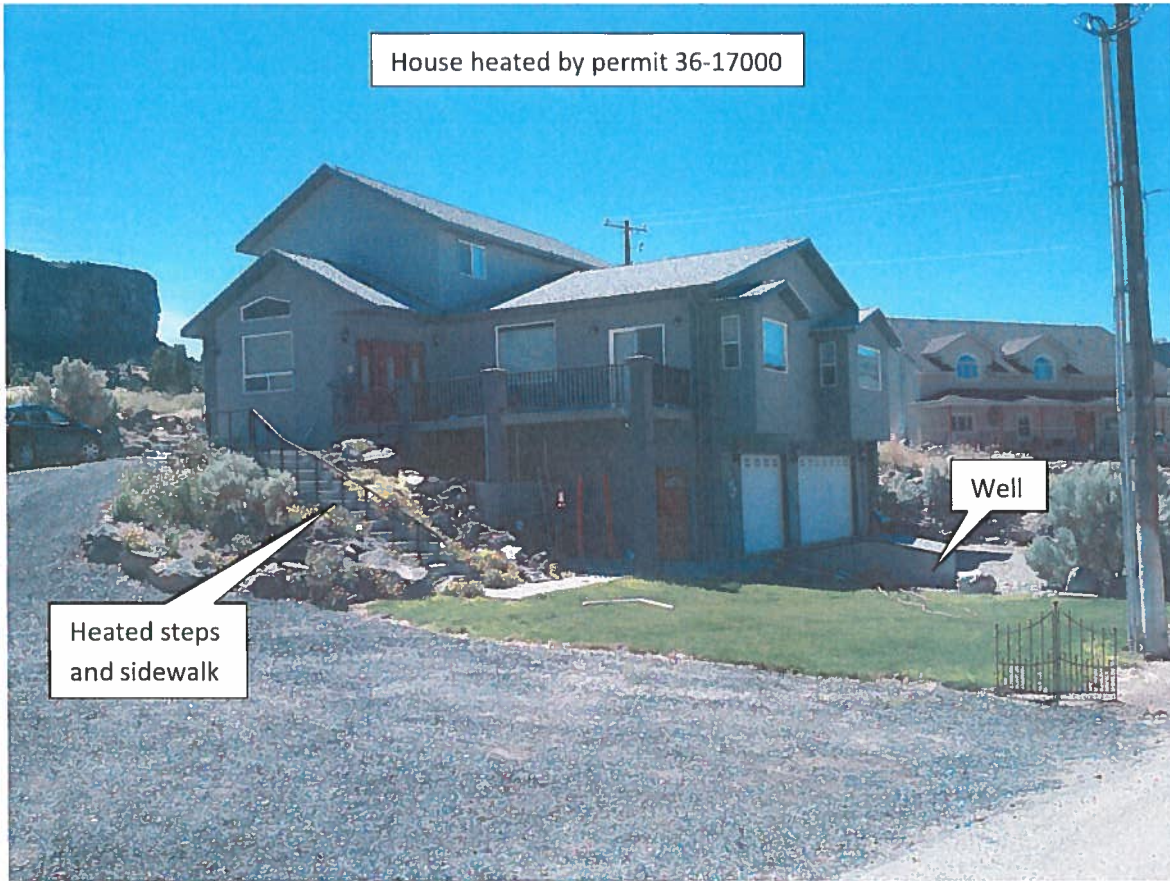
☐ Change P.D. as reflected above ☐ Add P.D. as reflected above ☐ None

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

I. AUTHENTICATION

Field Examiner's Name Matt Erich Date 7/1/14
Reviewer [Signature] Date 9/10/14





Volume calculation WR 47-17000 House (3,784 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 3,784 ft², the efficiency factor was assumed to have a *better energy efficiency* or 0.44 BTU/hr ft² °F. The Design temperature difference for the area is 73 °F. The temperature of the geothermal source was reported to be 105 °F. The temperature in the home is expected to be 70 °F. The annual heating degree days were taken from the **Twin Falls WSO** 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:

$$\begin{aligned} e &= 0.44 \text{ BTU/hr ft}^2 \text{ °F} \\ \Delta t_1 &= 73 \text{ °F} \\ A &= 3,784 \text{ ft}^2 \end{aligned}$$

$$E = [e \times \Delta t_1] 0.8 \times A = \boxed{97,234} \text{ BTU/hr}$$

*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:

$$\begin{aligned} S &= 105 \text{ °F} \\ T &= 70 \text{ °F} \end{aligned}$$

$$\Delta T_s = 0.3(S - T) = \boxed{10.5} \text{ °F}$$

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:

$HL = 97,234$ BTU/hr

$DD = 7,609$ °F

$24 = 24$ hrs/day

$C_D = 0.64$

$\Delta t_1 = 73$ °F

$k = 0.9$

$C = 2,720,000$ BTU/AF-°F

$\Delta t_2 = 10.5$ °F

$$V = \frac{HL \times DD \times 24 \times C_D}{\Delta t_1 \times k \times C \times \Delta t_2} = \boxed{6.1} \text{ afa}$$

Volume calculation WR 36-17000 Heated steps and sidewalk (250 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 property has a **250 ft²** portion of outdoor sidewalk and steps that are heated with water. To determine a volume of water that could represent what might be needed for this use the following inputs were used. The efficiency factor was assumed to have an *poor energy efficiency* or 1.11 BTU/hr ft² °F. The expected temperature for the cement to avoid freezing was 40 °F. The temperature of the geothermal source was reported to be **105 °F**. The annual heating degree days were taken from the **Twin Falls WSO** 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:

$$e = 1.11 \text{ BTU/hr ft}^2 \text{ }^\circ\text{F}$$

$$\Delta t_1 = 40 \text{ }^\circ\text{F}$$

$$A = 250 \text{ ft}^2$$

$$E = [e \times \Delta t_1] 0.8 \times A = \boxed{11,100} \text{ BTU/hr}$$

*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:

$$S = 105 \text{ }^\circ\text{F}$$

$$T = 40 \text{ }^\circ\text{F}$$

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

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:

$HL = 11,100$ BTU/hr

$DD = 7,609$ °F

$24 = 24$ hrs/day

$C_D = 0.64$

$\Delta t_1 = 40$ °F

$k = 0.9$

$C = 2,720,000$ BTU/AF-°F

$\Delta t_2 = 19.5$ °F

$$V = \frac{HL \times DD \times 24 \times C_D}{\Delta t_1 \times k \times C \times \Delta t_2} = \boxed{0.7} \text{ afa}$$

State of Idaho
Department of Water Resources
Attachment To Water Right License
36-17000

This map depicts the HEATING and DOMESTIC place of use boundary for this water right at the time of this approval and is attached to the approval document solely for illustrative purposes.



- Point of Diversion
- Place Of Use Boundary
- Townships
- PLS Sections
- Quarter Quarters

0 0.0075 0.015 0.03 Miles

