

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 43-7318
Exam Date: 8/14/2019

1. Current Owner:
RANDALL JAY FARLEY 2931 NARROWS RD MALTA ID 83342
LINDA DIANE FARLEY 2931 NARROWS RD MALTA ID 83342
2. Accompanied by: Jed Heaton (Mountain Meadow Distributing LLC / present owner)
Phone No: (208) 430-8789
Relationship to permit Holder: current property owner

3. **SOURCE:**
GROUND WATER

B. OVERLAP REVIEW

1. Other water rights with the same place of use:

Water Right No.	Source	Purpose of Use	Basis
43-4098A	Ground water	Domestic, Heating	Decree
43-10655	Ground water	Aesthetic storage, aesthetic, recreation storage, recreation, wildlife storage, wildlife	Decree
43-10382	Ground water	Domestic	Decree

2. Other water rights with the same point-of-diversion:

Water Right No.	Source	Purpose of Use	Basis
43-4098A	Ground water	Domestic, Heating	Decree
43-10655	Ground water	Aesthetic storage, aesthetic, recreation storage, recreation, wildlife storage, wildlife	Decree

C. DIVERSION AND DELIVERY SYSTEM

1. **LOCATION OF POINT(S) OF DIVERSION:**

GROUND WATER SW¼ NW¼ NW¼, Sec. 23, Twp 15S, Rge 26E, B.M. CASSIA County

Method of Determination: aerial imagery in ArcMap, GPS

PLACE OF USE: HEATING, DOMESTIC, RECREATION

Twp	Rng	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
15S	26E	23			X														

Method of Determination: aerial imagery in ArcMap

3. ATTACHMENTS

- ☒ 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 INFORMATION

Well or Diversion ID No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
	N/A – artesian well				

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date
NONE						

2. Measurements: No measurement required per IDAPA 37.03.02 Beneficial Use Examination Rules as the permitted flow rate of 0.08 cfs falls below the measurement threshold of 0.24 cfs.

E. FLOW CALCULATIONS

_____ Additional Computation Sheets Attached

Measured Method:

Per IDAPA 37.03.02 Beneficial Use Examination Rules, no measurement was required for this permit. The permit was issued with a diversion rate of 0.08 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:

RECREATION

The permit notes the recreational use is for a pool. Mr. Heaton indicated that the pool is 20' X 35' with an average depth of 3.5'. This equates to a volume of 2450 ft³. Mr. Heaton indicated that the pool is drained and filled approximately 45 times per year. It is not kept full other than when it is being actively used so evaporation is assumed to be negligible. The pool is lined with an impermeable barrier no seepage is assumed. This results in an annual use of 2.5 ac-ft.

$$2450 \text{ ft}^3 \times \frac{1 \text{ ac} - \text{ft}}{43560 \text{ ft}^3} \times 45 = 2.5 \text{ ac} - \text{ft}$$

DOMESTIC

The permit indicates the domestic use is for 1 home. Mr. Heaton indicated that the hot water will be used in 2 bathrooms. At the time of the field exam, the stub-ins for the bathroom plumbing were observed. I recommend the standard domestic volume for in-home use of 0.6 AF be licensed.

HEATING

Mr. Heaton explained that the heating system consists of approximately 500 feet of coiled pipe laid under concrete floor providing radiant heating for the home. It is controlled with a thermostatic valve, which controls the flow of water into the system as a function of temperature. I calculated an annual volume of 4.6 AF. See the attached spreadsheet for additional detail.

G. NARRATIVE/REMARKS/COMMENTS

I visited this property on two occasions. The first time was on July 16, 2019 with the Watermaster of Water District 143. The second time was on August 14, 2019 with the current owner of the property, Mr. Jed Heaton. Note that the permit remains in the name of the previous property owners, Randall & Linda Farley. I recommend licensing the permit in the original permit holder's name; after licensing, Mr. Heaton can submit a Notice of Ownership Change along with proper conveyance documents to update the ownership of the right in IDWR's records.

The Point of Diversion is an artesian geothermal well. For this permit, water flows from the well through a 2" pipe which lays in a ditch that runs approximately ½ mile to the place of use. The ditch conveys decreed water right 43-10655 which allows for aesthetic storage, aesthetic, recreation storage, recreation, wildlife storage, and wildlife uses in a pond on Mr. Heaton's property. Near the place of use, the pipe splits into 2 directions with 1 portion flowing into a swimming pool/hot tub and the other portion flowing to a home for heating and domestic use. Return flows from the swimming pool and heating system flow back into a pond on the property.

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

H. RECOMMENDATIONS**1. Recommended Amounts**

<u>Beneficial Use</u>	<u>Period of Use</u>	<u>Rate of Diversion</u>	<u>Diversion Volume</u>
RECREATION	1/01 to 12/31	0.04 CFS	2.5 AFA
DOMESTIC	1/01 to 12/31	0.04 CFS	0.6 AFA
HEATING	9/01 to 6/01	0.04 CFS	4.6 AFA

Totals: 0.08 CFS 7.7 AFA

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 ☒ None

I. AUTHENTICATION Allison Inouye - Water Resource Agent, Senior

Field Examiner's Name Allison Inouye Date 8/23/2019

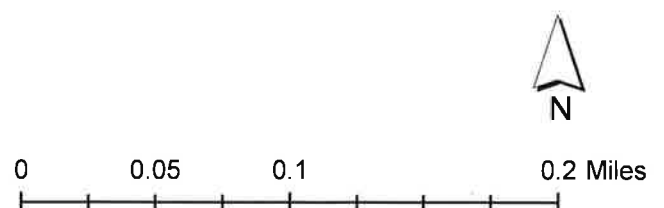
Reviewer _____ Date _____

Attachment to 43-7318 Beneficial Use Field Report: System Diagram, Map, & Aerial Photo

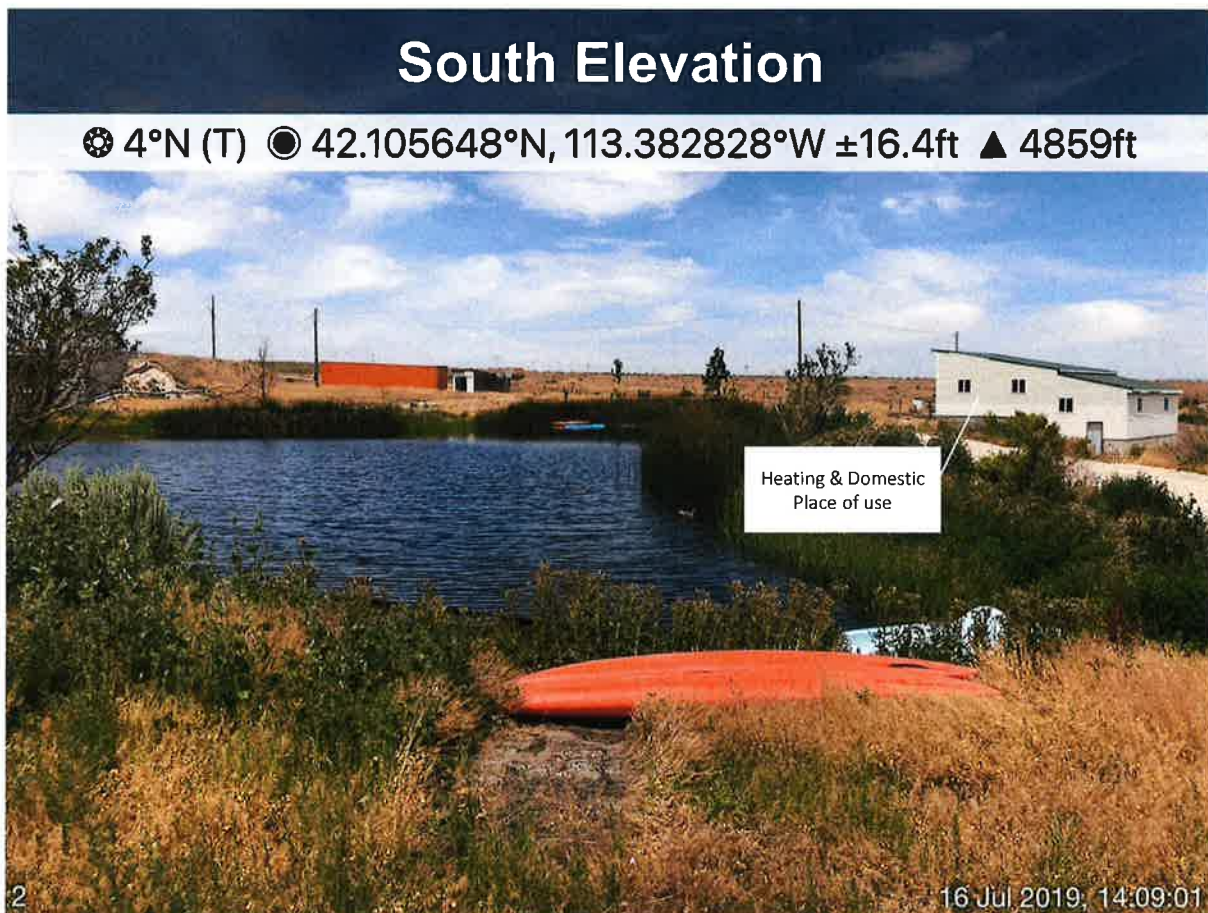


Legend

- Township/Range
- Sections
- QQ



Attachment to 43-7318 Beneficial Use Field Report - Photographs



North East Elevation

⊗ 232°SW (T) ● 42.107819°N, 113.391808°W ±16.4ft ▲ 4920ft

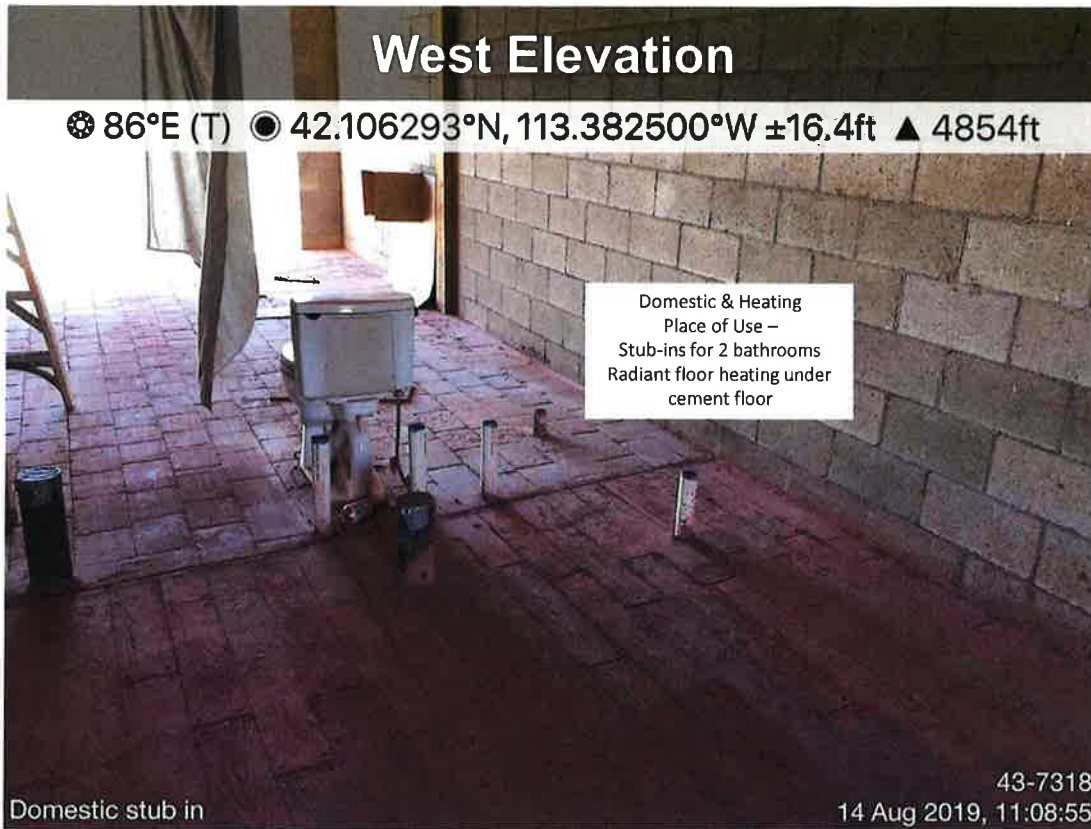


North West Elevation

⊗ 126°SE (T) ● 42.107788°N, 113.391823°W ±16.4ft ▲ 4920ft

2" pipe from POD to POU





Heating Volume Calculation Permit 43-7318 House (1,600 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 1,600 ft², the efficiency factor was assumed to have poor energy efficiency or 1.11 BTU/hr ft² °F. The Design temperature difference for the area is 80 °F. The temperature of the geothermal source was assumed to be 115 °F*. The temperature in the home is expected to be 70 °F. The annual heating degree days were taken from the Malta 4 ESE 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:

$$\begin{aligned} e &= 1.11 \text{ BTU/hr ft}^2 \text{ °F} \\ \Delta t_1 &= 80 \text{ °F} \\ A &= 1,600 \text{ ft}^2 \end{aligned}$$

$$E = [e \times \Delta t_1] 0.8 \times A = \boxed{113,664} \text{ BTU/hr}$$

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:

$$\begin{aligned} S &= 115 \text{ °F} \\ T &= 70 \text{ °F} \end{aligned}$$

$$\Delta T_s = 0.3(S - T) = \boxed{13.5} \text{ °F}$$

* temperature at well has been reported to be much hotter, approx. 190°F. Assumed a temp. of 115°F when water enters heating system. This is based on the fact that the water can be touched briefly w/o being burned.

Heating Volume Calculation Permit 43-7318 House (1,600 ft²), cont.

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:

$HL = 113,664$ BTU/hr

$DD = 7,063$ °F

$24 = 24$ hrs/day

$C_D = 0.63$

$\Delta t_1 = 80$ °F

$k = 0.9$

$C = 2,720,000$ BTU/AF-°F

$\Delta t_2 = 13.5$ °F

$$V = \frac{HL \times DD \times 24 \times C_D}{\Delta t_1 \times k \times C \times \Delta t_2} = \boxed{4.6} \text{ afa}$$