

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 43-13745

Exam Date: 03/31/2021

1. Current Owner:

CLAIR TEETER
AND/OR
JUDY TEETER
1355 E 1750 S
ELBA ID 83342-8652

2. Accompanied by: Clair Teeter
Phone No: 208-312-0259
Address: Same as above
Relationship to permit Holder: Permit Holder

3. SOURCE: GROUND WATER

Method of Determination: Observed well head with pipe attached; water was issuing from pipe in artesian flow.

B. OVERLAP REVIEW

1. Other water rights with the same place of use: Several irrigation rights owned by permit holder for adjacent farm ground.

Water Right No.	Source	Purpose of Use		Basis

Comments:

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

Water Right No.	Source	Purpose of Use	Basis
43-2531	Ground water	Irrigation	Decree

Comments: Irrigation right with POD decreed in the adjacent Section & QQ, but is diverted from this same well.

C. DIVERSION AND DELIVERY SYSTEM

1. LOCATION OF POINT(S) OF DIVERSION:

GROUND WATER SW¼ NW¼, Sec. 22, Twp 13S, Rge 25E, B.M. CASSIA County

Method of Determination: Applicant had the well surveyed and included the survey in his original application for permit.

PLACE OF USE: HEATING

[illegible]

PLACE OF USE: DOMESTIC

Twp	Rng	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
13S	25E	22							X										

PLACE OF USE: 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	
13S	25E	22							X										

PLACE OF USE: STOCKWATER

Twp	Rng	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
13S	25E	22							X										

Method of Determination: ArcMap aerial imagery and field exam.

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 ID No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date
Bucket, stopwatch						

2. Measurements: Measurement was made by shutting off flow to all of the uses and using the 'bucket and stopwatch' method to measure the resulting overflow. Piping is underground, so direct measurement of all uses is not possible. No measurement is required per Beneficial Use Examination Rules.

E. FLOW CALCULATIONS

Additional Computation Sheets Attached

Measured Method: Performed three tests with the bucket and stopwatch, with times of 7 seconds, 8 seconds, and 7 seconds. The average time of 7.3 seconds yields a flow rate of 41.1 gpm (0.092cfs) which is enough to cover the permitted 0.09 cfs.

F. VOLUME CALCULATIONS

1. Volume Calculations for irrigation: NA

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

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

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

2. Volume Calculations for Other Uses:

For heating purposes for the home, shop, and barn I used the 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* (see attached volume calculation printouts). The volumes were calculated as 6.3 AF for the shop, 5.6 AF for the home, and 5.2 AF for the barn. The heating use for the garage and the driveway was calculated by figuring constant use from November 1 until May 15, the period that Mr. Teeter said the artesian well is flowing. This is because the garage and driveway are plumbed together and the piping in the driveway concrete would freeze if it were shut off. The calculated volume for the garage and driveway is 7.8 AF. The case is the same for the hot tub, which is outside. It flows for the same time period as the garage and driveway for a volume of 7.8 AF. Stockwater use is based on 6 horses that Mr. Teeter said he keeps year round, which yields a volume of 0.1 AF, and is included in the barn volume, as it is the discharge water from the barn heating use.

CALCULATIONS

Shop	see attached Shop Heating Calculation Spreadsheet	6.3 AF
House	see attached House Heating Calculation Spreadsheet	5.6 AF
Barn	see attached Barn Heating Calculation Spreadsheet	5.2 AF
Garage and Driveway	0.02 cfs x 1.9835 AF/day x 196 days =	7.8 AF
Hot Tub	0.02 cfs x 1.9835 AF/day x 196 days =	7.8 AF
Domestic	see Application Processing Memo #22, domestic use w/ no irrigation	0.6 AF
Stockwater	6 horses x 12 gpd x 365 = 26280 gal/325850 gal/AF =	
	0.08, round to 0.1 AF included within Barn Volume	0.1 AF

TOTAL VOLUME**33.3 AF**

G. NARRATIVE/REMARKS/COMMENTS

The field exam for permit 43-13745 was completed on March 31, 2021 with permit holder Clair Teeter in attendance. The water for the permit is provided by an artesian (when it's not being pumped for irrigation purposes) well located near the Teeter home and was flowing from the well at a temperature of 90° F. on the day of the exam. Most of the piping for the system is located underground, so to measure the flow from the well, Mr. Teeter shut off the flow to the various uses on the property, which forced the water to flow from the overflow pipe where the flow rate was measured with the 'bucket and stopwatch' method. Three tests were run, with times of 7, 8, and 7 seconds, with an average of 7.3 seconds. This produced a flow rate of 41.1 gallons per minute, which is sufficient to cover the permitted rate of 0.09 cfs, or 40.4 gpm, which is the licensing recommendation. Mr. Teeter indicated that the irrigation water is normally pumped from the middle of May to the first of November. During that time period he only infrequently uses the water for heating purposes, but does have a line from the irrigation system to his home for domestic use, and if the irrigation pump is shut off, pressure again builds up in the system, allowing for artesian flow. Therefore, recognizing a year round period of use is appropriate.

The water is run in pipelines for heating purposes to a 40'x40' shop, a 24'x60' home, a 19'x38' barn, and a detached 30'x32' garage with a heated 24'x30' concrete driveway. The supply lines and discharge lines are 2" plastic and the piping in the floors of the buildings is 1" PEX pipe. The domestic water for the home is supplied in a separate pipeline from the well. Water to the hot tub is run in a 2" plastic pipe and is discharged directly into the well overflow ditch. The water from the heating uses is discharged into the overflow ditch or onto the ground, where it sinks. The exception to this is the water used to heat the barn, which is discharged onto the surface in a 1' diameter vertical concrete pipe where it flows onto the ground and is utilized by cattle for drinking purposes or sinks into the ground.

The annual volume requirements for the uses were 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* (see attached volume calculation printouts). The calculated volumes for the various uses are: Shop, heating – 6.3 AF; Home, heating – 5.6 AF; Barn, heating – 5.2 AF; Garage and Driveway, heating – 7.8 AF; Hot Tub, Recreational – 7.8 AF; and Home, domestic – 0.6 AF for a total volume of 33.3 AF, which is recommended for licensing. The stockwater volume of 0.1 AF is included within the overall volume, as it is water that was used for heating of the barn, and is run through a standpipe, then out onto the ground.

The shop was built in 2019 and 2020 and straddles the section line, so its place of use is in T13S, R25E, Section 21, SENE as well as the permitted Section 22, SWNW, so an amendment of permit will be mailed to the permit holders. It appears that all conditions have been complied with.

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

H. RECOMMENDATIONS**1. Recommended Amounts**

Beneficial Use	Period of Use	Rate of Diversion	Annual Volume
HEATING	01/01 to 12/31	0.09 CFS	24.9 AF
DOMESTIC	01/01 to 12/31	0.04 CFS	0.6 AF
RECREATION	01/01 to 12/31	0.09 CFS	7.8 AF
STOCKWATER	01/01 to 12/31	0.09 CFS	0.1 AF

Totals:**0.09 CFS****33.3 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 ☐ None

I. AUTHENTICATION

Field Examiner's Name Jim Bitzenburg Date 4-27-21

Jim Bitzenburg - Senior Water Resource Agent

Reviewer _____ Date _____

**Legend**

- Township/Range
- Sections
- QQ

- Supply Lines
- Discharge Lines

Line from barn to stockwater POU is both a supply line and a discharge line

0 0.01 0.02 0.04 Miles



43-13745 Places of Use & Point of Diversion Map



Legend

- | | | |
|----------------|---------------------------|------------------|
| Township/Range | Stockwater Use | Recreational Use |
| Sections | Point of Diversion (well) | Heating Use |
| QQ | Heating & Domestic Use | |

0 0.01 0.02 0.04 Miles





Point of Diversion – Artesian Well

Place of Use – Heating - Shop



43-13745 Teeter



Place of Use – Heating - Garage and Heated Slab

Place of Use – Heating - Barn



43-13745 Keeter



Place of Use – Heating and Domestic - Teeter Home

Place of Use – Recreational - Hot Tub



43-13745 Teeter



Place of Use – Stockwater

House Heating Calculation Spreadsheet

Volume calculation WR 43-13745 House (1440 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 1440 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 78 °F. The temperature of the geothermal source was reported to be 90 °F. The temperature in the home is expected to be 70 °F. The annual heating degree days were taken from the **Malta 2 E** 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:

$$\begin{aligned} e &= 0.67 \text{ BTU/hr ft}^2 \text{ °F} \\ \Delta t_1 &= 78 \text{ °F} \\ A &= 1,440 \text{ ft}^2 \end{aligned}$$

$$E = [e \times \Delta t_1] 0.8 \times A = \boxed{60,204} \text{ BTU/hr}$$

*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:

$$\begin{aligned} S &= 90 \text{ °F} \\ T &= 70 \text{ °F} \end{aligned}$$

$$\Delta T_s = 0.3(S - T) = \boxed{6.0} \text{ °F}$$

Permit 43-13745 Teeter

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 = 60,204 BTU/hr

DD = 7,063 °F

24 = 24 hrs/day

C_D = 0.63

Δt_1 = 78 °F

k = 0.9

C = 2,720,000 BTU/AF-°F

Δt_2 = 6 °F

$$V = \frac{HL \times DD \times 24 \times C_D}{\Delta t_1 \times k \times C \times \Delta t_2} = \boxed{5.6} \text{ afa}$$

Barn Heating Calculation Spreadsheet

Volume calculation WR 43-13745 Barn (722 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 barn has a total of 722 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 78 °F. The temperature of the geothermal source was reported to be 90 °F. The temperature in the barn is expected to be 60 °F. The annual heating degree days were taken from the **Malta 2 E** 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:

$e = 1.11 \text{ BTU/hr ft}^2 \text{ °F}$
 $\Delta t_1 = 78 \text{ °F}$
 $A = 722 \text{ ft}^2$

$$E = [e \times \Delta t_1] 0.8 \times A = \boxed{62,511} \text{ BTU/hr}$$

*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:

$S = 90 \text{ °F}$
 $T = 60 \text{ °F}$

$$\Delta T_s = 0.3(S - T) = \boxed{9.0} \text{ °F}$$

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 = 62,511 BTU/hr

DD = 7,063 °F

24 = 24 hrs/day

C_D = 0.85

Δt_1 = 78 °F

k = 0.9

C = 2,720,000 BTU/AF-°F

Δt_2 = 9 °F

$$V = \frac{HL \times DD \times 24 \times C_D}{\Delta t_1 \times k \times C \times \Delta t_2} = \boxed{5.2} \text{ afa}$$

Shop Heating Calculation Spreadsheet

Volume calculation WR 43-13745 Shop (1600 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 shop has a total of 1600 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 78 °F. The temperature of the geothermal source was reported to be 90 °F. The temperature in the shop is expected to be 70 °F. The annual heating degree days were taken from the **Malta 2E** 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:

$$\begin{aligned} e &= 0.67 \text{ BTU/hr ft}^2 \text{ °F} \\ \Delta t_1 &= 78 \text{ °F} \\ A &= 1,600 \text{ ft}^2 \end{aligned}$$

$$E = [e \times \Delta t_1] 0.8 \times A = \boxed{66,893} \text{ BTU/hr}$$

*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:

$$\begin{aligned} S &= 90 \text{ °F} \\ T &= 70 \text{ °F} \end{aligned}$$

$$\Delta T_s = 0.3(S - T) = \boxed{6.0} \text{ °F}$$

Permit 43-13745 Teeter

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 = 66,893 BTU/hr

DD = 7,063 °F

24 = 24 hrs/day

C_D = 0.63

Δt_1 = 78 °F

k = 0.9

C = 2,720,000 BTU/AF-°F

Δt_2 = 6 °F

$$V = \frac{HL \times DD \times 24 \times C_D}{\Delta t_1 \times k \times C \times \Delta t_2} = \boxed{6.3} \text{afa}$$