

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 43-13723
Exam Date: 08/29/2019

1. Current Owner:
RED ROCK FARMS LLC 2038 S HWY 81 MALTA ID 83342
AND
WARM SPRINGS DAIRY LLC 2038 S HWY 81 MALTA ID 83342
AND
NORTHWEST FARM CREDIT SERVICES FLCA 1408 POMERELLE AVE STE B BURLEY ID 83318-2068
AND
NORTHWEST FARM CREDIT SERVICES PCA 1408 POMERELLE AVE STE B BURLEY ID 83318-2068
2. Accompanied by: Kallan Rex
Phone No: (208) 431-1644
Address: 2038 S HWY 81 MALTA ID 83342
Relationship to permit Holder: Dairy & Farm Manager for Red Rock Farms and Warm Springs Dairy

3. SOURCE:
GROUND WATER

Method of Determination: On-site inspection and GPS reading

B. OVERLAP REVIEW

1. Other water rights with the same place of use: No Overlap

Water Right No.	Source	Purpose of Use	Basis
N/A			

Comments: The heating POU for this right does not overlap, but is used in combination with the heating portion of 43-7308

2. Other water rights with the same point-of-diversion: NO Overlap

Water Right No.	Source	Purpose of Use	Basis
43-7308	Ground Water	Commercial, Heating, Recreation	License

Comments: This is a Low Temperature Geothermal well (approximately 140° F)

C. DIVERSION AND DELIVERY SYSTEM

1. **LOCATION OF POINT(S) OF DIVERSION:**
GROUND WATER SE¼ NW¼, Sec. 1, Twp 14S, Rge 26E, B.M. CASSIA County

Method of Determination:

PLACE OF USE: HEATING

[illegible]

Method of Determination: On-site inspection and aerial imagery

3.

X Delivery System Diagram Attached (required). Indicate all major components and distances between components. Indicate weir size/pipe as applicable.

X Map Attached Showing Location(s) of point(s) of diversion and place(s) of use (required). Scale must be 1:24,000 or greater.

X Aerial Photo Attached (required for irrigation of 10+ acres).

X 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
A0019742		15			

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date
N/A						

2. Measurements: No measurement required; this permit is for additional volume only for heating use established under water right 43-7308. Flow rate for heating use was determined to be 0.37 cfs when 43-7308 was licensed (6/6/2014).

E. FLOW CALCULATIONS

 Additional Computation Sheets Attached

Measured Method: See Beneficial Use Field Report for license 43-7308 for flow rate calculations.

F. VOLUME CALCULATIONS

1. Volume Calculations for irrigation: N/A

$V_{IR} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) =$

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

$V = \text{Smaller of } V_{IR} \text{ and } V_{DR} =$

2. Volume Calculations for Other Uses: Heating Calculator spreadsheet for low temperature geothermal water was used to calculate volumes for the following (see attachments 1,2 and 3):

Apartments = 14.0 af

Shop Addition = 9.9 af

Home = 3.5 af

Total = 27.4 af

G. NARRATIVE/REMARKS/COMMENTS

On 8/29/2019 I met with Kallan Rex at the Warm Springs Dairy/Red Rock Farms Office. He verified which properties were to be licensed for heating use under this water right. Mr. Rex then looked up the square footage of all associated buildings, which I later used to calculate the volumes in the heating spreadsheet. Afterwards, we went out to look at the properties associated with this permit and the point of diversion.

There are three apartment buildings, one shop addition and one home licensed for heating use under this water right. This corresponds with the information provided with the application for permit. This application for permit was filed because the associated properties were developed after proof of beneficial use was submitted in 1998 for water right 43-7308. This water right is for additional volume only with no additional flow rate.

The heating system extracts the heat value from the water utilizing a closed loop system and the water is returned to the source well for reinjection into the aquifer.

The efficiency factors and other data used in the spreadsheet were based on information provided by Mr. Rex and information provided in the Beneficial Use Field Report for water right 43-7308.

Recommend licensing a diversion rate of 0.37 cfs and an annual volume of 27.4 af.

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>Annual Volume</u>
HEATING	01/01 to 12/31	0.37 CFS	27.4 AF

Totals: 0.37 CFS 27.4 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 ☒ None

I. AUTHENTICATION

Bill Mills - Water Resource Agent, Senior

Field Examiner's Name Bill Mills Date 9-9-2019

Reviewer _____ Date _____



Figure 1: The well



Figure 2: The shop addition



Figure 3: The apartment buildings



Figure 4: The home

43-13723 System Diagram



Volume calculation WR 45-43-13723 Apartment Buildings

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 three apartment buildings with four apartments in each building have a total of 13,500 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 140 °F. The temperature in the apartments 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:

$$\begin{aligned} e &= 0.44 \text{ BTU/hr ft}^2 \text{ °F} \\ \Delta t_1 &= 73 \text{ °F} \\ A &= 13,500 \text{ ft}^2 \end{aligned}$$

$$E = [e \times \Delta t_1] 0.8 \times A = \boxed{433,620} \text{ BTU/hr}$$

*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:

$$\begin{aligned} S &= 140 \text{ °F} \\ T &= 70 \text{ °F} \end{aligned}$$

$$\Delta T_s = 0.3(S - T) = \boxed{21.0} \text{ °F}$$

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:

$HL = 433,620$ BTU/hr

$DD = 7,807$ °F

$24 = 24$ hrs/day

$C_D = 0.65$

$\Delta t_1 = 73$ °F

$k = 0.9$

$C = 2,720,000$ BTU/AF-°F

$\Delta t_2 = 21$ °F

$$V = \frac{HL \times DD \times 24 \times C_D}{\Delta t_1 \times k \times C \times \Delta t_2} = \boxed{14.0} \text{ afa}$$

Volume calculation WR 45-43-13723 Shop Addition

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 addition has a total of 7200 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 140 °F. The temperature in the Shop is expected to be 60 °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:

$$\begin{aligned} e &= 0.67 \text{ BTU/hr ft}^2 \text{ °F} \\ \Delta t_1 &= 73 \text{ °F} \\ A &= 7,200 \text{ ft}^2 \end{aligned}$$

$$E = [e \times \Delta t_1] 0.8 \times A = \boxed{352,152} \text{ BTU/hr}$$

*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:

$$\begin{aligned} S &= 140 \text{ °F} \\ T &= 60 \text{ °F} \end{aligned}$$

$$\Delta T_s = 0.3(S - T) = \boxed{24.0} \text{ °F}$$

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:

$HL = 352,152$ BTU/hr

$DD = 7,807$ °F

$24 = 24$ hrs/day

$C_D = 0.65$

$\Delta t_1 = 73$ °F

$k = 0.9$

$C = 2,720,000$ BTU/AF-°F

$\Delta t_2 = 24$ °F

$$V = \frac{HL \times DD \times 24 \times C_D}{\Delta t_1 \times k \times C \times \Delta t_2} = \boxed{9.9} \text{ afa}$$

Volume calculation WR 45-43-13723 Two Story Home

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 two story home has a total of 4500 ft², the efficiency factor was assumed to have a *best energy efficiency* or 0.28 BTU/hr ft² °F. The Design temperature difference for the area is 73 °F. The temperature of the geothermal source was reported to be 130 °F. The temperature in the home 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:

$$\begin{aligned} e &= 0.28 \text{ BTU/hr ft}^2 \text{ °F} \\ \Delta t_1 &= 73 \text{ °F} \\ A &= 4,500 \text{ ft}^2 \end{aligned}$$

$$E = [e \times \Delta t_1] 0.8 \times A = \boxed{73,584} \text{ BTU/hr}$$

*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:

$$\begin{aligned} S &= 140 \text{ °F} \\ T &= 70 \text{ °F} \end{aligned}$$

$$\Delta T_s = 0.3(S - T) = \boxed{18.0} \text{ °F}$$

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:

$HL = 91,980$ BTU/hr

$DD = 7,807$ °F

$24 = 24$ hrs/day

$C_D = 0.65$

$\Delta t_1 = 73$ °F

$k = 0.9$

$C = 2,720,000$ BTU/AF-°F

$\Delta t_2 = 18$ °F

$$V = \frac{HL \times DD \times 24 \times C_D}{\Delta t_1 \times k \times C \times \Delta t_2} = \boxed{3.5} \text{ afa}$$