

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 47-7492
Exam Date: 10/12/2007

1. Current Owner: MICHAEL KESTLER
PO BOX 1183
TWIN FALLS ID 83301
2. Accompanied by: Michael Kestler
Phone No: 734-2388
Address: PO Box 1183 Twin Falls, ID 83301
Relationship to Permit Holder: Owner

3. **SOURCE** **TRIBUTARY**
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: None

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

GROUND WATER L4 NW1/4NW1/4 Sec. 6, Twp 10S, Rge 18E, B.M.
TWIN FALLS County

Method of Determination: GPS 2467068/1265764

2. PLACE OF USE: IRRIGATION

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
10S	17E	1	.7																.7
			L 1																
10S	18E	6					1.8												1.8
							L 4												

Total Acres: 2.5

HEATING same as IRRIGATION
RECREATION same as IRRIGATION

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.

<u>Well or Diversion</u> <u>ID No.*</u>	<u>Motor Make</u>	<u>Hp</u>	<u>Motor Serial No.</u>	<u>Pump Make</u>	<u>Pump Serial No. or Discharge</u> <u>Size</u>
Well	Artesian				

*Code to correspond with No. on map and aerial photo

D. FLOW MEASUREMENTS

1.

<u>Measurement</u> <u>Equipment</u>	<u>Type</u>	<u>Make</u>	<u>Model No.</u>	<u>Serial No.</u>	<u>Size</u>	<u>Calib. Date</u>
Fuji Meter						
5 Gallon Bucket						

2. Measurements:

Fuji Meter – Measurement was taken on a 4 inch pvc pipe by Jana Jones. The measurement recorded the flow between 147 to 150 gpm.

5 Gallon Bucket – Measurement was taken with 5 gallon bucket and stopwatch. Approximately 10 measurements were taken, ranging from taking 1.8 seconds to 2.1 seconds to fill the bucket. The average time was 2.0 seconds, which calculates to 150 gpm.

E. FLOW CALCULATIONS0 Additional Computation Sheets Attached

$$150 \text{ gpm} / 448.83 \text{ gpm/cfs} = .334 \text{ cfs}$$

Permit was for **0.310 cfs**

F. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$$V_{I.R.} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) = 2.5 \text{ acres} \times 4 \text{ af} = 10 \text{ afa}$$

$$V_{D.R.} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 = 0.075 \text{ cfs} \times 245 \text{ days} \times 1.9835 = 36 \text{ afa}$$

$$V = \text{Smaller of } V_{I.R.} \text{ and } V_{D.R.} = 10 \text{ afa}$$

2. Volume Calculations for Other Uses:

HEATING: See attachment

RECREATION: Recreation use is for two 500 gallon hot tubs that use water from same system as heating. Volume for the hot tubs was based on filling them three times a week/year.

$$2 \text{ (hot tubs)} \times 500 \text{ gallons} \times 3 \text{ (fills/week)} \times 52 \text{ weeks} = 156,000 \text{ gallons} = 0.50 \text{ afa}$$

G. NARRATIVE/REMARKS/COMMENTS

The field exam for water right 47-7492 was conducted on October 12th 2007. During the exam the owner (Michael Kestler) showed that his low temperature geothermal well is used for heating his home, 3 shops, 2 hot tubs, and a greenhouse. At the time of the exam the heating system was turned on to full capacity as if it were to be operated during the coldest time of winter. All water is piped into each of the buildings or hot tubs and is discharged to a single line that exits at the north east of the property. We took flow measurements at the discharge pipe, the measurement from the Fuji meter and 5 gallon bucket and stop watch both showed the flow to be 0.334 cfs. The permit is for **0.31 cfs**, the permitted rate was used for the license.

The volume of water required for heating was calculated based on Administrative Memos (see attachment). The calculations used empirical formulas to calculate the design heat load and temperature drop across the system to then calculate the volume. The combined area of the 3 shops, 2 hot tubs, and a greenhouse was determined to be around 5,000 ft² with an average residency efficiency. The temperature of the water from the well was 107.6 °F with an expected 11.3 °F temperature drop across the system. Using the annual heating degree-days and other variables it was found that the volume required for this system is **12.5 afa**. Also in connection with the heating system were two hot tubs used for recreation. If the hot tubs were both filled three times a week it is estimated the volume requirement would be **0.5 afa**.

The owner identified on a map where his irrigation system was located. We walked around the property and observed that garden hoses and drip lines were used for irrigation; the majority of the irrigated vegetation was trees. The permitted irrigated acreage was 6 acres, using an aerial photo from 2004 and GIS the irrigated acreage that was digitized calculated as **2.5 acres**.

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>
IRRIGATION	03/15 to 11/15	0.080 CFS	10.00 AF
HEATING	01/01 to 12/31	0.310 CFS	12.5 AF
RECREATION	01/01 to 12/31	0.020 CFS	0.5 AF
<u>Totals:</u>		0.310 CFS	22.5 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

Matthew Enich

Date

2/11/08

Reviewer

Date

Volume calculation WR 47-7492

The annual volume requirement for water right 47-7492 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).

Design Heat Load Calculation:

$$E = [e \times \Delta t_1] A$$

Where:

E = BTU/hr required

e = House efficiency factor

Δt_1 = Design temperature difference

A = Area of heated space

Values used:

$e = 0.67$ BTU/hr ft² °F (average residence efficiency)

$\Delta t_1 = 73$ °F (Indoor temp. (70°F) minus design outdoor temp. (-3°F))

$A = 5,000$ ft² (area includes house, shops, and greenhouse)

Heat load required:

$$E = [0.67 \times 73] 5,000 = \mathbf{244,550 \text{ BTU/hr}}$$

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:

$S = 107.6$ °F

$T = 70$ °F

Temperature drop across system:

$$\Delta T_s = 0.3(107.6 - 70) = \mathbf{11.3 \text{ °F}}$$

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 in, use 0.90

C = Constant to correct for desired units, 2.72×10^6 BTU/AF-°F

$\Delta t_2 = \Delta T_s$ (Calculated above)

Values used:

HL = 244,550 BTU/hr (Recorded in 1985 field exam)

DD = 6,715 (NOAA, Average number of degree days 1971-2000)

24 = 24 hrs/day

C_D = .64 (Taken from table based on degree days)

Δt_1 = 73 °F (Indoor temp. (70°F) minus design outdoor temp. (-3°F))

k = 0.90

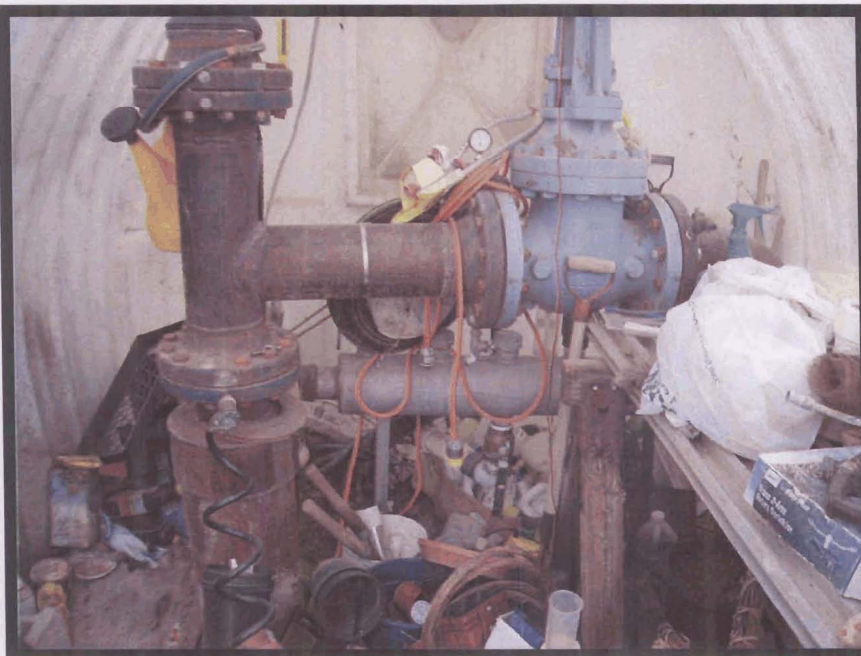
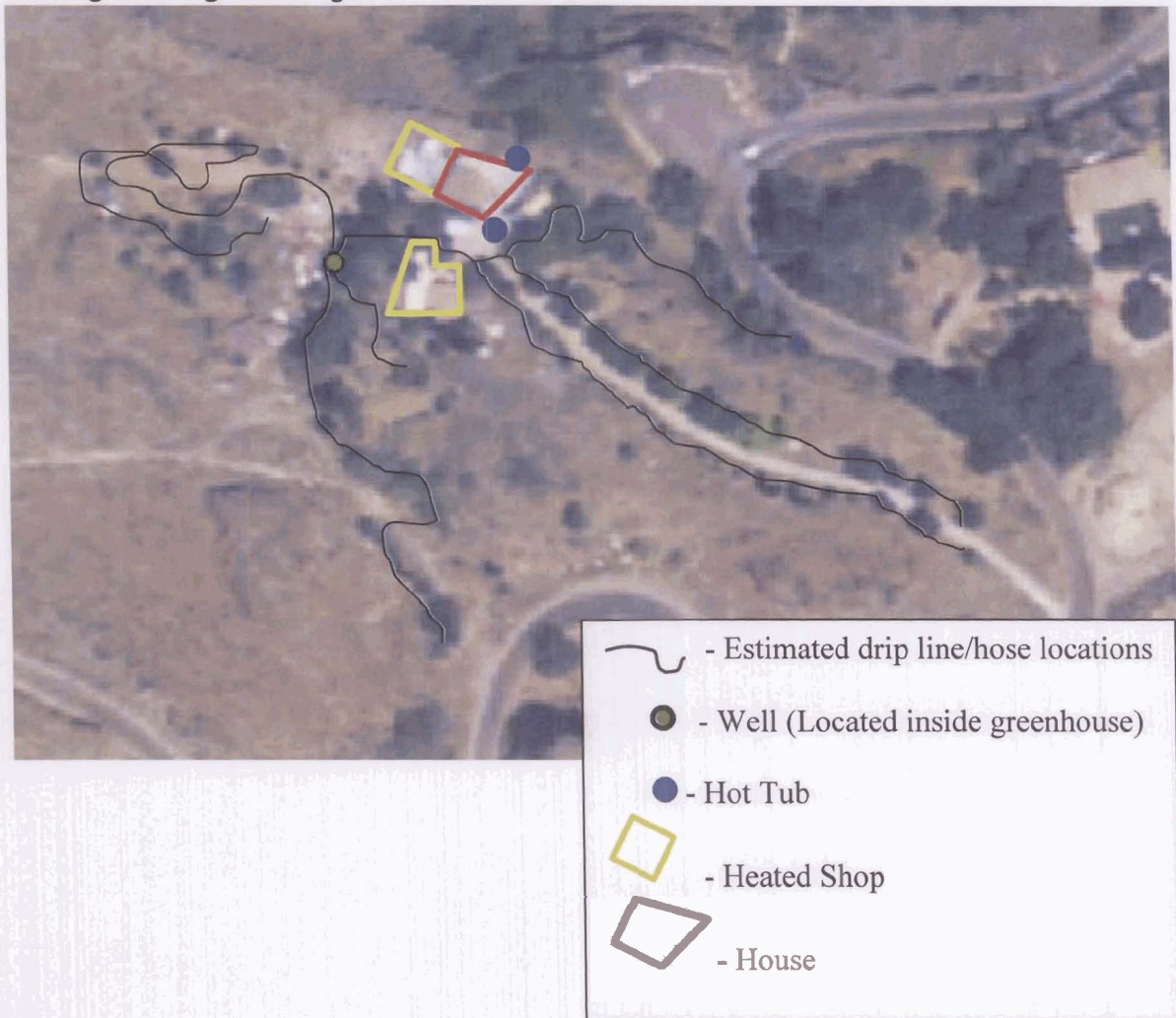
C = 2.72×10^6 BTU/AF-°F

Δt_2 = 11.3 °F (calculated above)

Volume of water required for heating:

$$V = \frac{244,550 \times 6,715 \times 24 \times .64}{73 \times 0.90 \times 2,720,000 \times 11.3} = \mathbf{12.5 \text{ af}}$$

Heating and irrigation diagram.



Well head



Greenhouse



Shop #1 uses well to heat.



Shops #2 and #3 also make use of the well for heating.

Hot tub 1



Hot tub 2



House heated by well



Pictures of irrigation lines

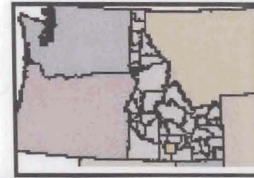


Discharge pipe where measurements were taken.

The lat/long you provided was 42° 35.495' N; 114° 24.083' W

Here are the results:

NW quarter of the **NW** quarter of Section **6**, Township **10S**, Range **18E**
IDTM NAD83 coordinates: Easting=2467068; Northing=1265764



Choose the map-display background:



☒ Wells ☐ Water Rights ☐ Water Right Permits ☐ Adjudication Claims ☐ Adjudication Recommendations

* Positions of wells/headgates may be based upon the center of a quarter-quarter section; those obtained by GPS or survey are accurate.



A - Green House
B - Shop
C - House
D - Plot 103



Water right 47-7492

Location and point of diversion



0.5 0 0.5 Miles

 Township/Range

 Sections

 POD (WELL)

 POU



Water right 47-7492

Point of diversion and Irrigation



100 0 100 200 300 400 Feet

 Township/Range
POD
 IRRIGATED LAND



SCANNED
FEB 19 2008