

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATIONPermit No: 57-11659Exam Date: 9/19/2012

1. Current Owner: MURIEL J ANDERSON
9434 BONANZA LN
MELBA ID 83641

Or

DANIEL P TEMPLE
1331 NE 30TH COURT
GRESHAM OR 97030
(503)669-1928

2. Accompanied by: Greg Clay

Phone No: (208) 570-1587Address: 9434 Bonanza LN, Melba, ID 83641Relationship to Permit Holder: Renter

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 NE1/4SW1/4 0Sec. 7, Twp 01N, Rge 03W, B.M. OWYHEE County

Method of Determination: Visual inspection and Garmin GPS Unit

2.

PLACE OF USE: HEATING

Twp	Rge	Sec	NE				NW				SW				SE				
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	Totals
01N	03W	7									X								

PLACE OF USE: DOMESTIC

Twp	Rge	Sec	NE				NW				SW				SE				
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	Totals
01N	03W	7									X								

Method of Determination: Visual Inspection and ArcGIS mapping

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

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

YES Photo of Diversion and System Attached

4.

Well or Diversion Identification No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
Cold Water Well	Unknown	3	2823028310	Unknown	2 ½ inch PVC pipeline

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

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date

2. Measurements: No measurement was possible. A theoretical calculation was performed. See Attached Sheet.

E. FLOW CALCULATIONS

X Additional Computation Sheets Attached

Measured Method:

(SEE ATTACHED DIVERSION RATE CALCULATIONS SHEET.

Theoretical Calculation = 0.10 cfs

This Permit Requests = 1.00 cfs

License recommended for 0.10 cfs

F. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

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

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

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

2. Volume Calculations for Other Uses:

(SEE ATTACHED HEATING MEMO FROM MICHELE ELD)

Heating Capacity = 11.7 acre feet

Domestic Capacity = 1.2 af for in-house use and ½ acre of yard irrigation.

G. NARRATIVE/REMARKS/COMMENTS

The water for this permit is diverted from a well south or behind the home into the home. This well has a bottom hole temperature of 78 degrees, so it is not a geothermal well. The water in the home goes to 2 pressure tanks. From the pressure tanks, the water splits and one line goes to the water heater, and the other lines goes to the domestic in-house cold water uses. This line also provided water to several spigots outside the home to provide water for livestock (horses) and to irrigate the yard, garden and trees. Another line comes off of the cold water line that goes to a heating unit used to heat a portion of the home. From the heating unit it appears as though the outflow from the heating unit is re-injected back into the same well. The outflow pipe is buried, so I can't be sure it goes back into the well, but there is no visible discharge point of this pipeline.

This permit originally included a geothermal well for the heating purposes. However, the geothermal well was not connected to power, had no power box, and all of the lines that appeared to be from that well were not in use. Please see the attached memo for additional information. I could not recommend this well, because I couldn't confirm that this well had ever been used for any legal purpose.

The aesthetic and the aesthetic storage components were not developed, so they were removed at licensing. I also removed the irrigation component. The only evidence of irrigation is an affidavit in the file that states that several trees were irrigated using the geothermal well. The permit clearly states that the heat value would need to be used prior to using the geothermal well for irrigation, so even if the geothermal well was used for irrigation, that would be an illegal use. I can't recommend an illegal use for licensing.

The permit also stated that there was a plan to use the geothermal well to heat several greenhouses. There was only one greenhouse on the property, and it was in really bad condition. I couldn't find any brackets or plumbing that would suggest that the greenhouse was heated, so I didn't include it in the consideration of the heating component. Therefore, the only uses I can recommend are heating of the home and the domestic use for the home. I sent out a licensing amendment to change the other uses that couldn't be recommended into a domestic use that is being diverted from the cold water well.

I included information in the amendment letter discussing the possible need of a well injection permit if this is a closed loop heating system with the water being injected back into the domestic well. At this time, this is the only reasonable possibility.

Since the geothermal well is being removed from the license, I also removed all conditions that refer to the geothermal water use. This license will not authorize any use of geothermal water. All conditions referring the aesthetic and aesthetic storage uses are also being removed from the license.

Have conditions of permit approval been met? X 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	0.100 CFS	11.70 AF
DOMESTIC	01/01 to 12/31	0.100 CFS	1.20 AF
<u>Totals:</u>		0.100 CFS	12.90 AF

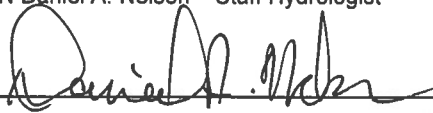
2. Recommended Amendments

☐ 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 Daniel A. Nelson – Staff Hydrologist

Field Examiner's Name



Date

0-19-2013

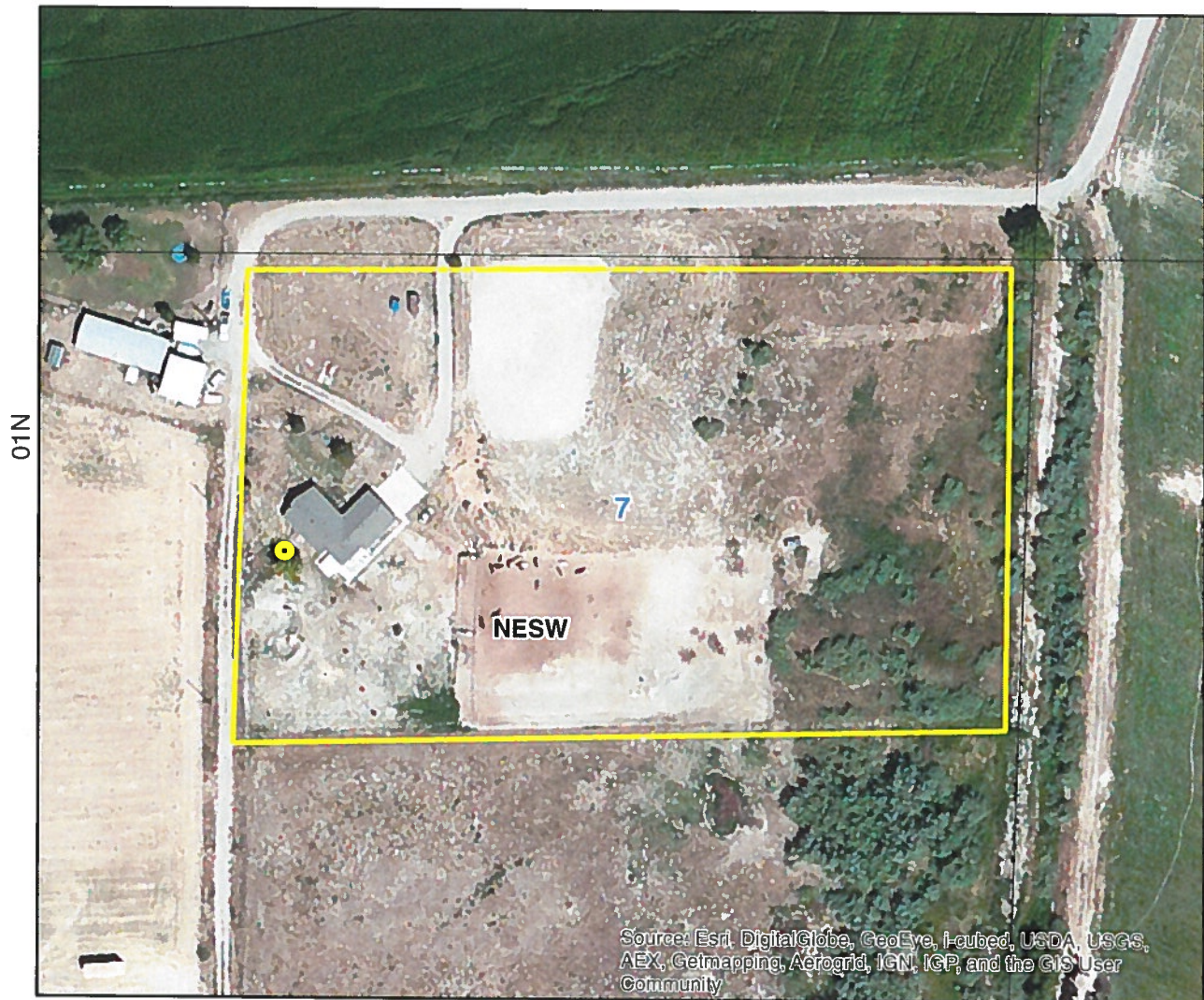
Reviewer

Date

State of Idaho
Department of Water Resources
Field Exam Map
57-11659

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.

03W



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

0 0.0175 0.035 0.07 Miles

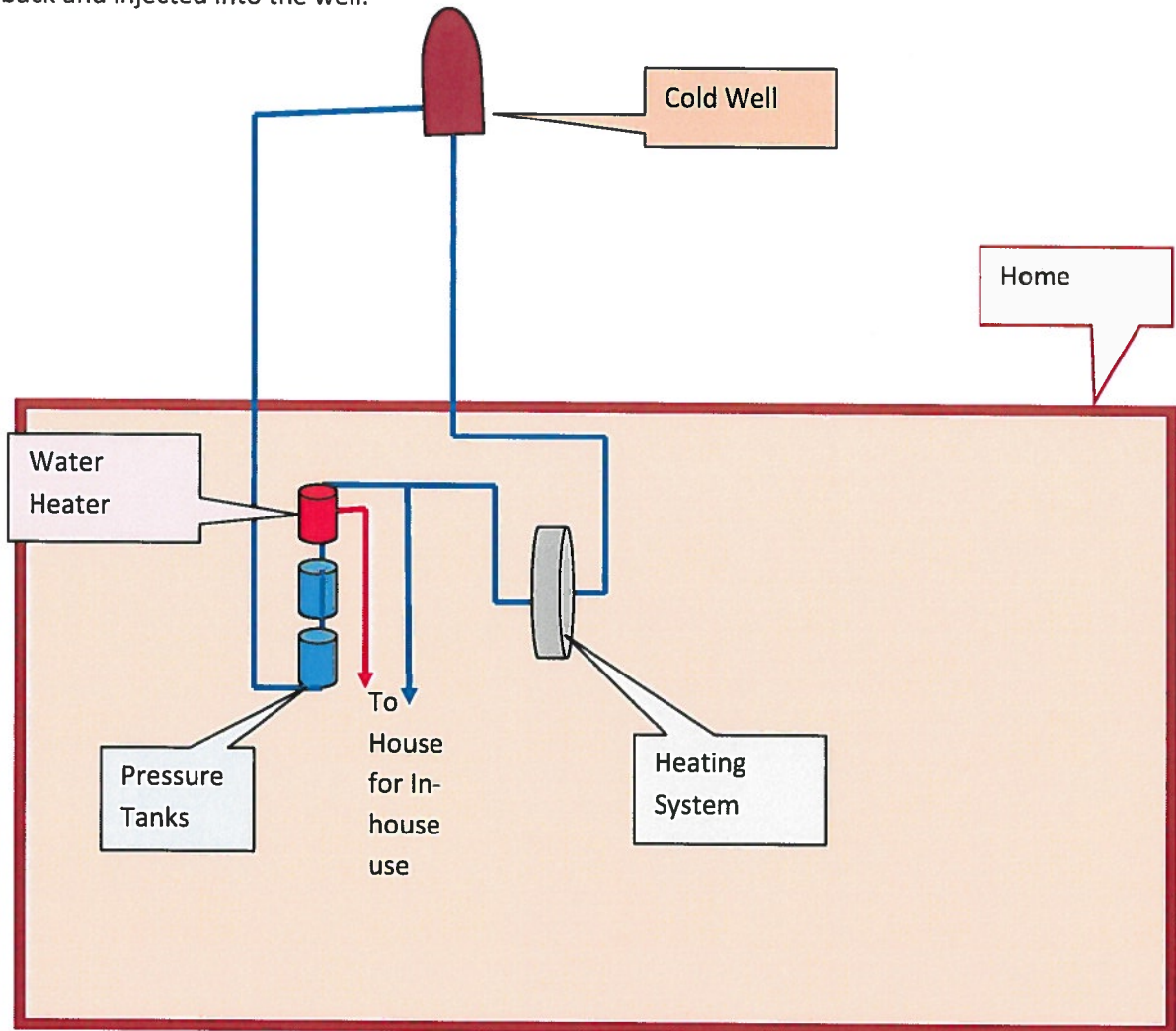


SYSTEM DIAGRAM

PERMIT 57-11659

BY DAN NELSON

Water for this permit is diverted from the 3Hp well south of the home into two pressure tanks. The water from the pressure tanks can go into the water heater or go around to provide water for the heating system or the cold water uses in the home. The water that goes through the heating system is looped back and injected into the well.



MEMORANDUM

TO: File 57-11659

FROM: Daniel Nelson – Staff Hydrologist

DATE: June 18, 2013

SUBJECT: Geothermal Well Investigation

I performed the field exam for water right 57-11659. Water right 57-11659 was filed for geothermal purposes for heating, irrigation, aesthetic, and aesthetic storage uses. The water right has a condition that states the following: “Low temperature geothermal water diverted under this right shall not be used for irrigation purposes unless it is first used for heating purposes.”

At the time of the field exam the Geothermal Well was not connected to the house, irrigation system, or power. The well was visible, but had obvious signs of damage. The power cables were in sprinkler box next to the well, but the ends of cables were exposed and not connected to anything. I could not find any power box that would control this well, or provide information as to the horse power of the well. Next to the well was a valve that was bent and broken and didn't work.

There was a mainline running from south to north through the property, but most of the valve heads were bent and/or broken. In looking at the heads, I couldn't see any signs of use or scale that would be evident on a system using geothermal water in this area. The geothermal well was drilled in 1995. The 1987 and 1992 aerial photos show that this property was irrigated from some other source in 1987 and 1992, which may explain the existing mainline. There is an affidavit in the file that states that 70 to 90 trees were irrigated using the geothermal well, but I couldn't find any evidence of these trails in the tax lot for this property. The aerial photos from 2006 and 2009 also do not show any evidence of the trees, but the trees could have been small trees that would not show up in the aerial photos.

There was also a $\frac{3}{4}$ inch plastic pipeline that came up in the green house, but it was plugged. The $\frac{3}{4}$ inch pipeline didn't show any signs of wear or scale from use with a geothermal well. The greenhouse didn't have any brackets or fixtures that would connect the pipeline to a heating system or an irrigation system in the greenhouse.

There was 2 $\frac{1}{2}$ inch pipe that came up by the hot tub on the porch, but it was clean cut and didn't appear to have ever been used. The hot tub pipe also didn't have any wear, scale, or joint compound that should be present if the pipeline had run geothermal water into the hot tub.

There was also a 2 $\frac{1}{2}$ inch pipeline in the crawl space under the house, but it hadn't been connected into the heating system, and I couldn't find anywhere where it had been connected into the house plumbing system. This pipeline was also free from any scale, wear or joint compound.

The cold water well mainline was the only line connected to the heating system and the pumping system in the house. The outflow from the heating system appeared to go back to the cold water well. This would make this a closed loop system, which is a common heating system. The heater in the home was a heating unit that is commonly used in greenhouses. It appears as though this unit was originally intended for the greenhouse, but was placed in the home instead.

CONCLUSION:

From what I could see, I cannot verify that the geothermal well was ever connected to the home or the greenhouse. The geothermal well may have been connected to the irrigation system, but it would have been illegal to use water directly from the geothermal well without using the heat value first. If the geothermal well was connected directly into the irrigation system, then it would have been an illegal use of the geothermal water. The affidavit from the neighbor in the file mentions trees that are no longer on the property. The neighbor also doesn't mention if the heat value was used first. The pond that was supposed to be developed to collect the used geothermal water to be mixed with the cold water from the house well or spring was never constructed, so I can't see any evidence that the geothermal well had been used at all.

The heating system is currently a closed loop system using the cold water well. The closed loop system that is currently in place suggests that the geothermal system was never connected into the heating system. It wouldn't make sense to divert the water from the geothermal well, and then discharge it into the cold water well. The system design just doesn't collaborate the use of the geothermal well. All of the pipelines to the home were cut cleanly, and had no signs of wear, joint glue, or scale found on geothermal wells in this area.

There is a real estate flier in the file that states that the home has electric, forced air, geothermal, radiant heating. The flier also states that the property has geothermal irrigation well. I don't understand what the flier is meant to portray. The current home has forced air electric heating, with the cold water well heating system. Both systems are used, but neither of the systems use the geothermal water.

Considering all of the above information, I am not able to include the geothermal well in water right license recommendation. The water right can still be licensed for heating use using the cold water well. There isn't a domestic use listed for this home, so I will contact the owner and ask if they would like to amend the water right to include domestic use for in-house use and up to ½ acre of irrigation from the cold water well.



2" pipeline in crawl space under house. Pipe not connected to anything.

2" pipeline to hot tub, but not connected to anything.

Please see the attached geothermal memo discussing the geothermal system for this permit.

Mainline - Heads are bent and haven't been used in some time.

3/4" plastic pipe in greenhouse, but not connected.

Geothermal Well - Power cables here, but not connected to anything, and no power box for the pump.

Bent and Broken Control Valve.

THEORETICAL HORSEPOWER EQUATION WORKSHEET (cjh 1/92)

Water Right No.: 57-11659
 Examiner: Dan Nelson
 Date of Field Exam: 9/19/2012

	Option 1	OPTION 2	OPTION 3	
P/D No.:				
PUMP HORSEPOWER	3	3	3	
BOOSTER HORSEPOWER	0	0	0	
PUMPING LEVEL	75	75	75	
DISCHARGE PRESSURE	40	50	60	
FRICTION	0	8	8	
RATE OF FLOW (cfs)	0.11	0.09	0.08	AVE
(gpm)	49.5	41.8	37.4	0.10

The above calculates the formula =

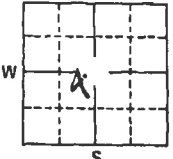
$$Q = \frac{8.8 * (\text{Efficiency}) * \text{hp}}{\text{depth to water} + 2.31 * (\text{psi}) + \text{friction}}$$

Assumptions: %70 efficiency.

Examiners Notes:

The pressure sensor ranges from 40 to 60 psi. The well depth and pumping level was attained from the well log. The well log states that static water level is 25 feet, but the pumping level during the pumping test was 75 feet. Therefore 75 feet was used for this calculation.

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORTState law requires that this report be filed with the Director, Department of Water Resources
within 30 days after the completion or abandonment of the well.RECEIVED
JUL 18 1988
DEPT. OF WATER RESOURCES
BOISE, IDAHO

1. WELL OWNER Name <u>Shingleton Post</u> Address <u>1279 Box 1066, Mula, Idaho</u> Owner's Permit No. <u>57-88-W-002</u>		7. WATER LEVEL Department of Water Resources Static water level <u>25</u> feet below land surface. Flowing? ☐ Yes ☒ No G.P.M. flow _____ Artesian closed-in pressure _____ p.s.i. Controlled by: ☐ Valve ☐ Cap ☐ Plug Temperature <u>78</u> °F. Quality _____ Describe artesian or temperature zones below.																																																																																																																	
2. NATURE OF WORK ☒ New well ☐ Deepened ☐ Replacement ☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)		8. WELL TEST DATA ☐ Pump ☐ Bailor ☒ Air ☐ Other _____ <table border="1"><thead><tr><th>Discharge G.P.M.</th><th>Pumping Level</th><th>Hours Pumped</th></tr></thead><tbody><tr><td><u>25</u></td><td><u>25</u></td><td><u>2</u></td></tr></tbody></table>		Discharge G.P.M.	Pumping Level	Hours Pumped	<u>25</u>	<u>25</u>	<u>2</u>																																																																																																										
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3. PROPOSED USE ☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal ☐ Industrial ☐ Stock ☐ Waste Disposal or Injection ☐ Other _____ (specify type)		9. LITHOLOGIC LOG <table border="1"><thead><tr><th rowspan="2">Bore Diam.</th><th colspan="2">Depth</th><th rowspan="2">Material</th><th colspan="2">Water</th></tr><tr><th>From</th><th>To</th><th>Yes</th><th>No</th></tr></thead><tbody><tr><td>8"</td><td>0</td><td>3</td><td>Top split</td><td></td><td></td></tr><tr><td>8"</td><td>3</td><td>11</td><td>Gravel (imbedded) in brown clay</td><td></td><td></td></tr><tr><td>8"</td><td>11</td><td>21</td><td>brown clay</td><td></td><td></td></tr><tr><td>8"</td><td>21</td><td>27</td><td>yellow clay</td><td></td><td></td></tr><tr><td>8"</td><td>27</td><td>40</td><td>blue clay</td><td></td><td></td></tr><tr><td>6"</td><td>40</td><td>128</td><td>blue clay</td><td></td><td></td></tr><tr><td>6"</td><td>128</td><td>152</td><td>sandy blue clay</td><td></td><td></td></tr><tr><td>6"</td><td>152</td><td>198</td><td>gray clay</td><td></td><td></td></tr><tr><td>6"</td><td>198</td><td>304</td><td>blue clay</td><td></td><td></td></tr><tr><td>6"</td><td>304</td><td>311</td><td>gray clay</td><td></td><td></td></tr><tr><td>6"</td><td>311</td><td>353</td><td>blue clay</td><td></td><td></td></tr><tr><td>6"</td><td>353</td><td>364</td><td>pea gravel, imbedded in blue clay</td><td></td><td></td></tr><tr><td>6"</td><td>364</td><td>380</td><td>sandy blue clay</td><td></td><td></td></tr><tr><td>6"</td><td>380</td><td>382</td><td>sandy stone</td><td></td><td></td></tr><tr><td>6"</td><td>382</td><td>414</td><td>sandy blue clay</td><td></td><td></td></tr><tr><td>6"</td><td>414</td><td>423</td><td>gray clay</td><td></td><td></td></tr><tr><td>6"</td><td>423</td><td>425</td><td>red clay</td><td></td><td></td></tr></tbody></table>		Bore Diam.	Depth		Material	Water		From	To	Yes	No	8"	0	3	Top split			8"	3	11	Gravel (imbedded) in brown clay			8"	11	21	brown clay			8"	21	27	yellow clay			8"	27	40	blue clay			6"	40	128	blue clay			6"	128	152	sandy blue clay			6"	152	198	gray clay			6"	198	304	blue clay			6"	304	311	gray clay			6"	311	353	blue clay			6"	353	364	pea gravel, imbedded in blue clay			6"	364	380	sandy blue clay			6"	380	382	sandy stone			6"	382	414	sandy blue clay			6"	414	423	gray clay			6"	423	425	red clay		
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4. METHOD DRILLED ☐ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary ☒ Cable ☐ Dug ☐ Other _____																																																																																																																			
5. WELL CONSTRUCTION Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____ Thickness _____ inches Diameter _____ inches + _____ feet From _____ feet To _____ feet Was casing drive shoe used? ☒ Yes ☐ No Was a packer or seal used? ☐ Yes ☒ No Perforated? ☐ Yes ☒ No How perforated? ☐ Factory ☐ Knife ☐ Torch Size of perforation _____ inches by _____ inches Number _____ From _____ To _____ _____ perforations _____ feet _____ feet _____ perforations _____ feet _____ feet _____ perforations _____ feet _____ feet Well screen installed? ☐ Yes ☒ No Manufacturer's name _____ Type _____ Model No. _____ Diameter _____ Slot size _____ Set from _____ feet to _____ feet Diameter _____ Slot size _____ Set from _____ feet to _____ feet Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____ Placed from _____ feet to _____ feet Surface seal depth <u>40</u> Material used in seal: ☐ Cement grout ☐ Bentonite ☒ Puddling clay ☐ _____ Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☐ Overbore to seal depth Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata Describe access port <u>Top of casing</u>																																																																																																																			
6. LOCATION OF WELL Sketch map location must agree with written description  Subdivision Name _____ Lot No. _____ Block No. _____ County _____ NE 1/4 SW 1/4 Sec. 7, T. 1 N, R. 3 E		10. DRILLERS CERTIFICATION Work started <u>4-29-88</u> finished <u>5-11-88</u> 11. DRILLERS CERTIFICATION I/We certify that all minimum well construction standards were complied with at the time the rig was removed. Firm Name <u>D. S. Wells Drilling</u> Firm No. <u>399</u> Address <u>837 West Town</u> Date <u>5-13-88</u> Signed by (Firm Official) _____ and _____ (Operator) <u>Same</u>																																																																																																																	

MEMORANDUM

Date: May 7, 2013
To: Water Right File 57-11659
From: Michele Edl
Re: heating use recommendations

Introduction

I was asked to review the field examiner's notes, and to make rate and volume recommendations for licensing the heating use. This memo provides my recommendations, and documents the logic and references I used to arrive at those recommendations.

POU

The examiner found space heating use in one home. The climate controlled space consists of a 2387 square foot, single story residence.

A use of water for space heating is accomplished through the direct use of warm groundwater in a water-to-air heat exchanger. The make, model and capacity of the heat exchanger is unknown.

POD and Loop Configuration

The point-of-diversion for this system appears to be a standing column well. Standing column wells are a specialized type of open-loop configuration where a single well serves for both the extraction and the injection of the groundwater. The well pump draws from the bottom of the well. The spent water is returned to the top of the well. (See attached schematic.)

Temperature Discussion

Two aspects of water temperature must be evaluated before considering use of the water in a heating system.

- 1) To be feasible for heating use, the temperature of the water entering the system must be above the desired temperature of the target process in order to transfer heat out of the water and into the process.

The industry's standard, inside, design temperature for home heating is 70 deg F.

According to the available Well Driller's Report, the source water is approximately 78 deg F. This water is cooler than 85 deg F, the temperature at which IDWR defines a geothermal water.

There is an eight degree difference between the source water temperature and the design inside temperature, so using this water to heat the space is feasible.

- 2) The temperature must be sufficiently above the target process to allow the system to be constructed with reasonably sized heat transfer equipment.

For direct use of geothermal water in a residential-sized, radiant heater, the source water should be ~110 deg F and the temperature difference between the heat source (the water) and the heat sink, (the house) should be ~45 deg F. In this case, the source water is cooler and the temperature differential is narrower. This water is not well suited for direct use.

For source water with a temperature in the range 70-80 deg F, the ideal heating appliance would be a groundwater-sourced, heat pump. Instead, the examiner found a 4-ft diameter, water-to-air, heat exchanger/radiant convector. From the examiner's photo, it appears to be an industrial-sized, unit heater which may have been originally intended for use in a commercial greenhouse.

Water Flow Rate

The examiner calculates three possible water flow rates using an accepted theoretical method. Lacking nameplate data or identification numbers, I'm not able to use the performance characteristics of the unit heater to improve on his recommendation. This is a non-consumptive use and system configuration and I concur with the examiner's method.

There is an inverse relationship between heat transfer rate and flow rate. Higher water flow rates yield lower heat transfer rates. This system is only marginally feasible at the 5 degree temperature difference which occurs at 37.4 gpm (0.08 cfs), the smallest of the three rates provided by the examiner. A temperature difference less than 5 degrees, (occurring at the two higher flowrates), is too small to be useful in this system.

Rate recommendation

I recommend 37.4 gpm or 0.08 cfs as the heating use rate for the license.

Heat Transfer Rate

Without temperature readings from the space or from the discharge water it is difficult to confirm that a heating use was occurring during the September 2012 site visit.

I can assume that the house was built to meet relevant building codes, but without equipment specs, it is difficult to determine whether the heater is competent to meet the heating load. My volume recommendation is based on what the warm water could do, not on what the heating unit could do. The calculations are much more precise than the information provided.

From the Kavanaugh spreadsheet tables for standard homes or the Sterling graph for an average house in Idaho, I estimate that the design or peak heating load for this home is 36 - 40 BTU/hr-square foot. I calculate that 78 deg F water flowing at 37.4 gpm can theoretically deliver 40.0 BTU/hr-square foot, losing ~ 5 degrees through a heat transfer to the space. The equation is:

$W = Q \times 500 \times \Delta T$ where

W = heat transfer rate (BTU/hr-ft²)

Q = 37.4 gpm

500 = conversion factor to correct for units (1 BTU/lb_m x 8.33 lb_m/gal x 60 min/hr)

Delta T = 5.0 deg F

The calculations are:

37.4 gpm x 500 x 5.1 deg F = 95480.0 BTU/hr and

95480 BTU/hr ÷ 2387 square ft = 40.0 BTU/hr-ft²

Water Volume

The volume of water beneficially used through this system is not available from an inline meter or pumping records. I rely on an additional calculation to estimate a volume based on the heat transfer rate.

I calculated the heating use volume based on an adaptation of an ASHRAE heating degree day, (HDD) energy estimation method. The design outdoor temp is 5 deg F. (This temperature is given in the greenhouse design in the file.) The nearest weather station is the Agrimet station, NMPI but its period of record does not include 1984-5 which are the coldest years on record. As a substitute, I used HDD from Nampa, Idaho (Co-op #106305) for 1984, the coldest year in that station's period-of-record. I calculated the volume of water that could be beneficially used for space heating using the following equation:

$Vol = (HL \times HDD \times 24 \times Cd) / (\Delta T_1 \times k \times C \times \Delta T_2)$, where

HL = 40 BTU/hr-ft² a rate based on Dr. Steve Kavanaugh's spreadsheet

HDD = 6749.67 (1984 data, Base 65 F maximum HDD, station 106305)

24 = 24 hr/day

Cd = 0.6 (factor to account for the construction standard)

$\Delta T_1 = 65 \text{ deg F}$ (design indoor temperature minus design outdoor temperature 5 deg F; design sheets)
 $k = 0.9$ (factor to account for losses)
 $C = 2.72 \times 10^6 \text{ BTU/AF-deg F}$ (constant to correct for units)
 $\Delta T_2 = 5 \text{ deg F}$ (estimated temperature of incoming water minus temperature of outgoing water; see heat transfer rate calculation)

My calculation of the volume of water for space heating is: 11.66 AF. (See attached spreadsheet.)

Volume Recommendation

I recommend a heating use volume = 11.7 AFA for the license.

Back-up Heating System

The calculations above do not address the quantity of air needed to meet the heating requirement. As the temperature difference between the source and the sink becomes less, the fan size becomes larger and fan power consumption can become excessive. In addition, when the air carries less heat (as a result of a narrower temperature differential) and approaches human skin temperature, the space being heated feels drafty. For these reasons, it is likely that a large portion of the home's heat is provided by a separate source. The examiner's notes show that electric heat system is available.

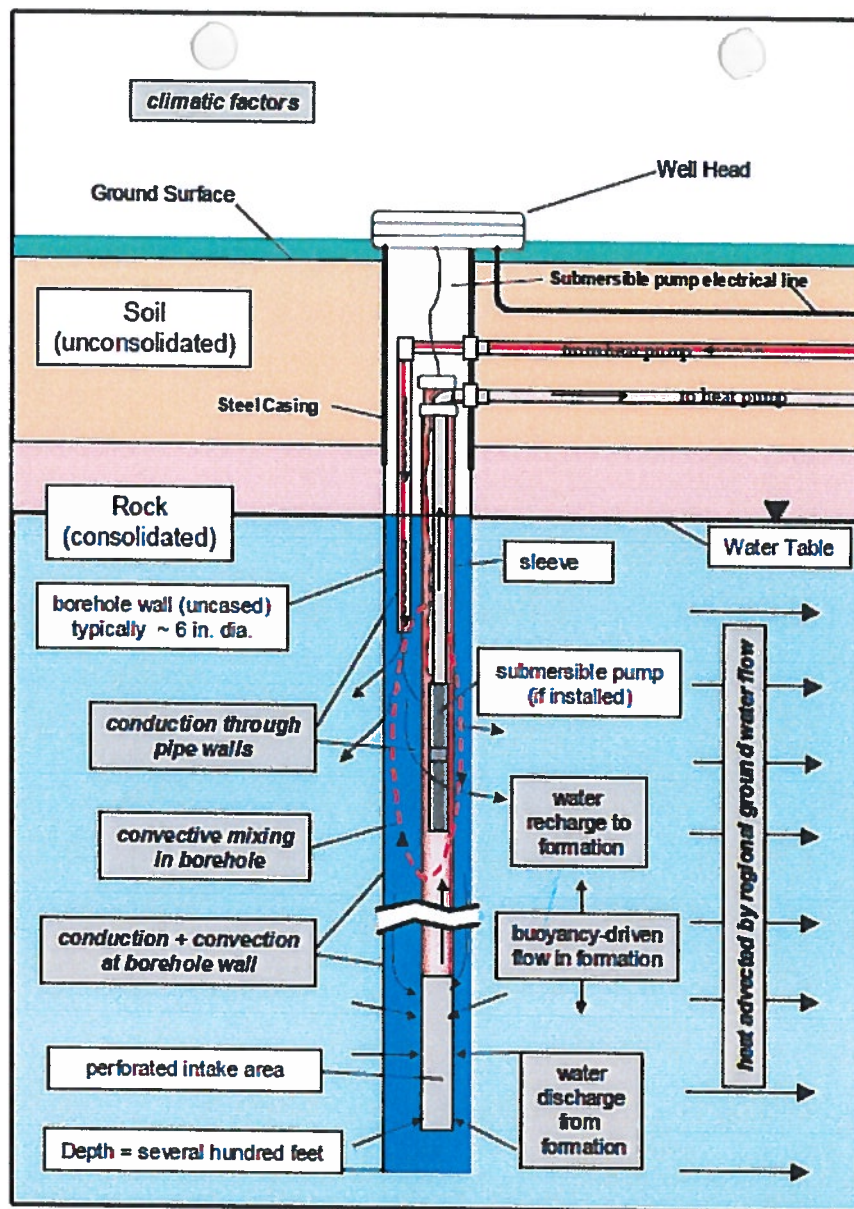


Figure 1 A schematic of a typical standing column well (<http://www.hvac.okstate.edu/>)

Sterling Method		V=(HL*DD*24*Cd)/(deltaT1*k*C*deltaT2)												
Parameter	Explanation													
V	heat value of the fuel ASHRAE or annual volume Sterling													
HL	peak heating load in BTU/hr										7163.72 HDD from 1985 Nampa			
DD	annual heating degree days										6749.67 max at Nampa			
24	24 hrs/day													
Cd	correction factor; for standard construction choose from ASHRAE fig 1													
deltaT1	design indoor temp minus design outdoor temp										5			
k	correction factor to account for losses. Use .90													
C	constant to correct for units													
deltaT2	temp of incoming geothermal water minus temp of outgoing													
Area of floor space	liveable floor space in ft ^2 given by assessor										2387			
Geo-Heat gives 5-20 BTU/hr per square ft of floor space														
Admin memo 23 suggests range 25-75 BTU/hr-sq.ft.														
Suggested Range BTU/hr-ft^2	HL(BTU/hr) design or peak heating load	DD	hr/day	Cd	delta t1	k	C	delta t2						
5	11935	6749.67	24	0.6	65	0.9	2720000	5						
10	23870	6749.67	24	0.6	65	0.9	2720000	5						
15	35805	6749.67	24	0.6	65	0.9	2720000	5						
20	47740	6749.67	24	0.6	65	0.9	2720000	5						
25	59675	6749.67	24	0.6	65	0.9	2720000	5						
43.55	103,953.85	6749.67	24	0.6	65	0.9	2720000	5	estimated peak load using admin memo 23/ Yenter spreadsheet					
30	71610	6749.67	24	0.6	65	0.9	2720000	5						
	77,438.03	6749.67							extrapolated peak load from Musgrove peak design day					
35	83545	6749.67	24	0.6	65	0.9	2720000	5						
36	85932	6749.67	24	0.6	65	0.9	2720000	5	estimated peak load based on R Sterling graph for normal home					
40	95480	6749.67	24	0.6	65	0.9	2720000	5						
45	107415	6749.67	24	0.6	65	0.9	2720000	5						
50	119350	6749.67	24	0.6	65	0.9	2720000	5						
55	131285	6749.67	24	0.6	65	0.9	2720000	5						
60	143220	6749.67	24	0.6	65	0.9	2720000	5						
65	155155	6749.67	24	0.6	65	0.9	2720000	5						
70	167090	6749.67	24	0.6	65	0.9	2720000	5						
75	179025	6749.67	25	0.6	65	1.9	2720000	5						
Range of calculated results														
V (AF)/yr	V= (HL x DD x24 x Cd)/(delt1 x k x C x delt2)										Musgrove extrapolation/reality check			
1.458050886											floor ft^2=	2824	2387	
2.916101772											BTU=	91615	x	94648 to 9887 computer printouts
4.374152658											BTU	x =	77,438.03	91615 w/de-rated garage
5.832203544														
7.29025443														
	12.69962322													
8.748305316														
	9.460292629													
10.2063562														
	10.49796638													
11.664														
13.12245797														
14.58050886														
16.03855975														
Admin memo 23/ Yenter spreadsheet														
Required data														
A	Area of liveable space ft squared										2387			
	if 2 story (0.8) if single (1)										1			
e	House efficiency factor (BTU/hr-ft^2-deg F)										0.67			
Ti	Inside design tempeature in deg F										70			
To	Average outside design temperature in deg F										5			
S	Source temperature in deg F										78			
D	Heating or cooling degree days per season										6749.67			
H	Hours/day system operates										24			
Calculations														
Ts= 0.3 x (S-Ti)	Temperature drop across the system										2.4			
E=[e x (Ti-To)] x A	Design heat load, BTU/hr										103953.85			
Q=E/((500 x Ts) x 448.8)	Flow rate required at given source temperture, cfs										0.193021855			
	Flow rate required at given source temperature, gpm										86.62820833			
	Diverted volume of season, afa													

Musgrove extrapolation/reality check			
floor ft^2=	2824	2387	
BTU=	91615	x	94648 to 9887 computer printouts
BTU	x =	77,438.03	91615 w/de-rated garage

NAMPA SUGAR FACTORY, IDAHO

Monthly Total Heating Degree Days

(106305)

Base Temperature = 65 F

File last updated on Apr 4, 2013

*** Note *** Provisional Data *** After Year/Month 201304

a = 1 day missing, b = 2 days missing, c = 3 days, ..etc.,

z = 26 or more days missing, A = Accumulations present

Long-term means based on columns; thus, the monthly row may not sum (or average) to the long-term annual value.

Months with 5 missing days or less use mean for missing day(s)

Individual Months not used for annual or monthly statistics if more than 5 days are missing.

Individual Years not used for annual statistics if any month in that year has more than 5 days missing.

YEAR (S)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1976	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	453.50	736.50	1153.50	2343.50
1977	1419.00	922.50	794.50	370.00	382.00	10.00	16.00	49.00	186.50	496.00	0.00z	901.50	5547.00
1978	942.00	805.50	0.00z	514.50	325.50a	94.00	3.62a	56.32a	220.50	455.18a	941.90a	1212.50	5571.51
1979	1550.52a	938.50	694.50	524.00	229.50	93.00	8.50	20.50	76.50	418.50	971.00	1028.50	6553.52
1980	1131.00	844.00	797.50	408.50	309.00	0.00z	7.50	66.00	263.00	562.00	895.50	1099.00	6383.00
1981	1032.00	847.50	723.50	520.50	329.50	135.00	25.50	0.50	126.00	523.00	642.00	914.00	5819.00
1982	1236.50	968.00	700.00	565.00	284.50	87.00	22.00	1.50	189.00	498.00	874.50	1052.50	6478.50
1983	1005.00	693.00	620.00	539.00	300.50	57.00	30.00	0.00	160.50	406.00	661.50	1235.00	5707.50
1984	1279.50	1012.00	680.00	519.00	309.50	133.00	0.00	0.00	218.00	565.50	757.00	1276.17a	6749.67
1985	1398.50	1084.22a	857.00	356.00	192.50	34.50	0.00	20.50	0.00z	549.00	1094.00	1577.50	7163.72
1986	1173.50	689.00	506.00	465.50	263.50	9.50	39.00	0.00	253.00	418.00	703.50	1115.50	5636.00
1987	1165.00	768.50	638.00	276.50	135.00	49.00	25.50	26.00	105.50	367.00	706.50	978.50	5241.00
1988	1224.50	840.00	667.50	378.50	256.00	53.50	8.50	5.00	193.50	216.00	719.00	1145.00	5707.00
1989	1305.50	1252.50	682.00	361.50	262.00	24.50	0.00	34.50	113.00	443.00	777.50	1004.00	6260.00
1990	932.50	871.00	637.00	289.00	271.00	88.50	13.50	8.00	27.50	468.50	765.00	1456.50	5828.00
1991	1263.50	705.50	684.50	489.50	316.00	95.50	0.50	0.00	95.50	407.00	843.50	1040.00	5941.00
1992	1020.00	699.50	508.00	338.00	112.00	43.50	13.50	39.50	137.50	364.50	882.50	1124.00	5282.50
1993	1219.50	988.50	747.50	502.00	153.50	140.50	28.00	45.50	122.50	379.50	944.50	947.50	6219.00
1994	988.00	876.00	566.50	368.00	176.00	74.50	5.50	2.00	35.00	446.50	942.00	1069.00	5549.00
1995	899.50	654.00	657.00	456.50	222.00	0.00z	4.00	27.00	86.00	481.50	631.50	973.00	5092.00
1996	969.00	853.00	614.00	431.50	265.00	57.50	0.00	18.50	196.00	450.00	704.50	885.00	5444.00
1997	975.00	767.50	615.00	469.50	136.50	29.50	23.50	0.00	86.50	452.00	685.50	1057.50	5298.00
1998	854.00	697.50	647.50	452.00	253.00	71.50	0.00	0.00	65.50	457.50	681.00	1086.00	5265.50
1999	916.50	798.50	657.50	534.00	297.50	87.50	9.00	7.00	118.00	366.00	578.50	972.00	5342.00
2000	957.50	673.00	671.00	304.00	162.00	48.62a	7.00	0.00	151.50	393.50	940.00	1026.50	5334.62
2001	1166.00	890.50	590.50	508.00	174.00	66.50	7.00	0.50	52.00	400.50	625.50	1042.50	5523.50
2002	1006.50	867.50	756.00	415.50	245.00	70.50	0.00	1.50	106.00	501.50	763.50	879.50	5613.00
2003	846.50	772.50	586.00	457.50	260.00	22.50	0.00	0.00	99.00	264.00	826.00	850.50	4984.50
2004	1136.50	889.50	517.00	345.00	214.50	44.00	0.00	12.00	112.50	369.50	789.00	934.50	5364.00
2005	998.00	804.00	591.50	440.00	213.50	102.00	2.50	3.50	0.00z	385.50	830.50	1141.00	5512.00
2006	876.00	851.00	684.00	418.50	189.00	8.50	0.00	7.50	132.50	440.50	685.50	1048.50	5341.50
2007	1111.50	746.00	532.00	418.00	142.00	47.50	0.00	1.50	115.50	438.50	755.00	1013.50	5321.00
2008	1116.00	838.00	740.00	584.00	203.50	94.00	0.00	4.00	85.50	423.50	671.50	1056.00	5816.00
2009	1044.50	800.50	730.00	444.50	212.50	33.00	0.00	16.69e	41.40e	540.00	734.50	1200.00	5797.59

THEORETICAL HORSEPOWER EQUATION WORKSHEET (cjh 1/92)

Water Right No.: 57-11659
 Examiner: Dan Nelson
 Date of Field Exam: 9/19/2012

P/D No.:	Option 1	OPTION 2	OPTION 3	
PUMP HORSEPOWER	3	3	3	
BOOSTER HORSEPOWER	0	0	0	
PUMPING LEVEL	75	75	75	
DISCHARGE PRESSURE	40	50	60	
FRICTION	0	8	8	
RATE OF FLOW (cfs)	0.11	0.09	0.08	AVE
(gpm)	49.5	41.8	37.4	0.10

The above calculates the formula =

$$Q = \frac{8.8 * (\text{Efficiency}) * \text{hp}}{\text{depth to water} + 2.31 * (\text{psi}) + \text{friction}}$$

Assumptions: %70 efficiency.

Examiners Notes:

The pressure sensor ranges from 40 to 60 psi. The well depth and pumping level was attained from the well log. The well log states that static water level is 25 feet, but the pumping level during the pumping test was 75 feet. Therefore 75 feet was used for this calculation.

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources
within 30 days after the completion or abandonment of the well.

RECEIVED
JUL 18 1988

1. WELL OWNER Name: <u>Shingleton Post</u> Address: <u>1079 Box 1066, Mulba Idaho</u> Owner's Permit No. <u>57-88-W-002</u>	7. WATER LEVEL Department of Water Resources Static water level <u>25</u> feet below land surface. Flowing? ☐ Yes ☒ No G.P.M. flow _____ Artesian closed-in pressure _____ p.s.i. Controlled by: ☐ Valve ☐ Cap ☐ Plug Temperature <u>78</u> °F. Quality _____ Describe artesian or temperature zones below.																																																																																												
2. NATURE OF WORK ☒ New well ☐ Deepened ☐ Replacement ☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)	8. WELL TEST DATA ☐ Pump ☐ Bailer ☒ Air ☐ Other _____ <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>Discharge G.P.M.</th> <th>Pumping Level</th> <th>Hours Pumped</th> </tr> <tr> <td style="text-align: center;">25</td> <td style="text-align: center;">75</td> <td style="text-align: center;">2</td> </tr> </table>	Discharge G.P.M.	Pumping Level	Hours Pumped	25	75	2																																																																																						
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3. PROPOSED USE ☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal ☐ Industrial ☐ Stock ☐ Waste Disposal or Injection ☐ Other _____ (specify type)	9. LITHOLOGIC LOG <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Bore Diam.</th> <th colspan="2">Depth</th> <th rowspan="2">Material</th> <th rowspan="2">Water Yes No</th> </tr> <tr> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr><td>8</td><td>0</td><td>2</td><td>Top soil</td><td></td></tr> <tr><td>8</td><td>2</td><td>11</td><td>gray (imbedded) in brown clay</td><td></td></tr> <tr><td>8</td><td>11</td><td>21</td><td>brown clay</td><td></td></tr> <tr><td>8</td><td>21</td><td>27</td><td>yellow clay</td><td></td></tr> <tr><td>8</td><td>27</td><td>40</td><td>blue clay</td><td></td></tr> <tr><td>6</td><td>40</td><td>128</td><td>blue clay</td><td></td></tr> <tr><td>6</td><td>128</td><td>152</td><td>sandy blue clay</td><td></td></tr> <tr><td>6</td><td>152</td><td>198</td><td>gray clay</td><td></td></tr> <tr><td>6</td><td>198</td><td>304</td><td>blue clay</td><td></td></tr> <tr><td>6</td><td>304</td><td>311</td><td>gray clay</td><td></td></tr> <tr><td>6</td><td>311</td><td>353</td><td>blue clay</td><td></td></tr> <tr><td>6</td><td>353</td><td>364</td><td>pea gravel imbedded in blue clay</td><td></td></tr> <tr><td>6</td><td>364</td><td>380</td><td>sandy blue clay</td><td></td></tr> <tr><td>6</td><td>380</td><td>382</td><td>sandy blue clay</td><td></td></tr> <tr><td>6</td><td>382</td><td>414</td><td>sandy blue clay</td><td></td></tr> <tr><td>6</td><td>414</td><td>423</td><td>gray clay</td><td></td></tr> <tr><td>6</td><td>423</td><td>425</td><td>red clay</td><td></td></tr> </tbody> </table>	Bore Diam.	Depth		Material	Water Yes No	From	To	8	0	2	Top soil		8	2	11	gray (imbedded) in brown clay		8	11	21	brown clay		8	21	27	yellow clay		8	27	40	blue clay		6	40	128	blue clay		6	128	152	sandy blue clay		6	152	198	gray clay		6	198	304	blue clay		6	304	311	gray clay		6	311	353	blue clay		6	353	364	pea gravel imbedded in blue clay		6	364	380	sandy blue clay		6	380	382	sandy blue clay		6	382	414	sandy blue clay		6	414	423	gray clay		6	423	425	red clay	
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4. METHOD DRILLED ☐ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary ☒ Cable ☐ Dug ☐ Other _____	10. Work started <u>4-29-88</u> finished <u>5-11-88</u>																																																																																												
5. WELL CONSTRUCTION Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____ <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Thickness</th> <th>Diameter</th> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr> <td>250 inches</td> <td>6 inches</td> <td>1'6"</td> <td>79 feet</td> </tr> </tbody> </table> Was casing drive shoe used? ☒ Yes ☐ No Was a packer or seal used? ☐ Yes ☒ No Perforated? ☐ Yes ☒ No How perforated? ☐ Factory ☐ Knife ☐ Torch Size of perforation _____ inches by _____ inches Number _____ perforations _____ feet _____ feet Well screen installed? ☐ Yes ☒ No Manufacturer's name _____ Type _____ Model No. _____ Diameter _____ Slot size _____ Set from _____ feet to _____ feet Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____ Placed from _____ feet to _____ feet Surface seal depth <u>40</u> Material used in seal: ☐ Cement grout ☒ Bentonite ☒ Puddling clay Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☒ Overbore to seal depth Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata Describe access port <u>Top of casing</u>	Thickness	Diameter	From	To	250 inches	6 inches	1'6"	79 feet	11. DRILLERS CERTIFICATION I/We certify that all minimum well construction standards were complied with at the time the rig was removed. Firm Name <u>D. S. Wells Drilling</u> Firm No. <u>399</u> Address <u>837 West Town</u> Date <u>5-13-88</u> Signed by (Firm Official) _____ and _____ (Operator) <u>Same</u>																																																																																				
Thickness	Diameter	From	To																																																																																										
250 inches	6 inches	1'6"	79 feet																																																																																										
6. LOCATION OF WELL Sketch map location must agree with written description Subdivision Name _____ Lot No. _____ Block No. _____ County _____ <u>NE</u> 1/4 <u>SW</u> 1/4 Sec. <u>7</u>, T. <u>1</u> N., R. <u>3</u> E., S. <u>3</u>	USE ADDITIONAL SHEETS IF NECESSARY - FORWARD THE WHITE COPY TO THE DEPARTMENT																																																																																												



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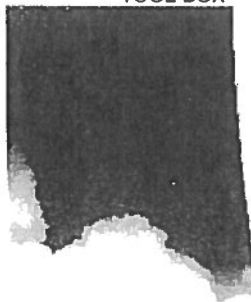
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Dan Bevins
63 W. Willowbrook Dr.
Meridian, ID 83642

PHONE: 208-888-3300
CELL: 208-573-2337
FAX: 208-888-6505

Boise, ID - 66°



Remarks: Call owners for appointment, tenants need 24 hours notice. Nice large family home. Possible 5th bedroom, large 30x32 garage. Some hardwood floors, large family & living rooms. Buried main line, irrigation equip., geo thermal irrigation well. Home



Office: Realty Executives of Treasure Valley
Agent: Dan Bevins
Phone: 208-888-3300
Cell: 208-573-2337
Fax: 208-888-6505
danbevins@yahoo.com

Information Courtesy of:
PETERSON & ASSOCIATES REALTORS

List Price: \$162,500.00
City: MELBA
Property Type: Single Family w/Acre

Beds: 4
Baths: 2.50
Garage: Two

Square Ft: 2387
Age: 31 - 50 Yr
Lot Size: 5 - 9.9 Acre

Air Cond: Central Air
Heating: Electric, Forced Air, Geothermal, Radiant
Fireplace:
Arch. Style: Frame, Stone

MLS Number: 98140849

School Dist: Marsing
Grade Sch: Marsing
Jr. High: Marsing
High Sch: Marsing

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EMAIL AGENT

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Newly listed Modine Hydronic Steam/Hot Water Unit Heater V-

247

9d 20h left
5/12, 9AM

\$675.00
or Best Offer

Dan
This may be the unit
that you saw @ 57-11459
without the shroud
We didn't discuss supply
& return pipe size but
the dimensions & noted hp
fit close enough to the
attached spec sheet
Michael

Showing 1 to 25 of 25 entries																
Search:																
Supply and Return Connection	Item	Type	Output @ 2 PSI Steam (Btu/h)	Output @ 200 F Water (Btu/h)	CFM	Motor HP	Voltage	Height (in.)	Width (in.)	Phase	Depth (in.)	For Use with Stock Number	Amps	Mounting Height (ft.)	Inlet/Outlet NPT (in.)	Mfr.#
1-1/2	Hydronic Unit Heater	Water/Steam	41,300	22,700	595	1/40	115 Volts	10-3/4	18-1/4	1	18-1/4	-	1.20	11	1-1/2	5PV
1-1/2	Hydronic Unit Heater	Water/Steam	65,500	39,600	989	1/20	115 Volts	11-1/8	21-1/4	1	21-1/4	-	2.10	12	1-1/2	5PV
1-1/2	Hydronic Unit Heater	Water/Steam	80,600	48,400	1200	1/20	115 Volts	11-5/8	21-1/4	1	21-1/4	-	2.10	15	1-1/2	5PV
1-1/2	Hydronic Unit Heater	Water/Steam	101,800	68,300	1490	1/8	115 Volts	12-1/8	25-1/4	1	25-1/4	-	1.20	14	1-1/2	5PV
1-1/2	Hydronic Unit Heater	Water/Steam	124,400	83,700	1790	1/6	115 Volts	12-3/4	25-1/4	1	25-1/4	-	2.30	16	1-1/2	5PV
2	Hydronic Unit Heater	Water/Steam	152,000	105,200	2220	1/6	115 Volts	13-5/8	29-1/2	1	29-1/2	-	2.30	16	2	5PV
2	Hydronic Unit Heater	Water/Steam	173,000	118,600	2620	1/6	115 Volts	14-1/8	29-1/2	1	29-1/2	-	2.30	18	2	5PV
2	Hydronic Unit Heater	Water/Steam	210,200	139,700	3200	1/4	115 Volts	16	29-1/2	1	29-1/2	-	3.60	22	2	5PV
2	Hydronic Unit Heater	Water/Steam	249,800	180,100	4180	1/4	115 Volts	5-1/8	37-1/2	1	37-1/2	-	3.60	20	2	5PV
2	Hydronic Unit Heater	Water/Steam	283,800	205,400	4430	1/2	115 Volts	15-1/4	37-1/2	1	37-1/2	-	5.40	21	2	5PV
2	Hydronic Unit Heater	Water/Steam	333,400	242,900	5210	3/4	230/460 Volts	16-3/4	37-1/2	3	37-1/2	-	3.20	24	2	5PV
2	Hydronic Unit Heater	Water/Steam	386,000	280,800	6140	3/4	230/460 Volts	17-5/8	37-1/2	3	37-1/2	-	3.20	28	2	5PV
2-1/2	Hydronic Unit Heater	Water/Steam	496,000	368,100	8020	1-1/2	230/460 Volts	17-1/4	42	3	42	-	5.00	29	2-1/2	5PV
2-1/2	Hydronic Unit Heater	Water/Steam	585,000	431,100	9450	1-1/2	230/460 Volts	20-3/4	42	3	42	-	5.00	34	2-1/2	5PV
2-1/2	Hydronic Unit Heater	Water/Steam	705,000	519,400	11,000	3	230/460 Volts	24-1/4	42	3	42	-	9.80	38	2-1/2	5PV
-	Diffuser	Downflow Radial Discharge	-	-	-	-	-	11-1/2	24-3/4	-	24-3/4	G1000185, G2786935, G0945323	-	-	-	5PV
-	Diffuser	Downflow Radial Discharge	-	-	-	-	-	8	17	-	17	G1186532, G3147365	-	-	-	5PV
-	Diffuser	Downflow Radial Discharge	-	-	-	-	-	9-3/4	21	-	21	G3355186, G1846783	-	-	-	5PV
-	Diffuser	Downflow Radial Discharge	-	-	-	-	-	13-3/4	31-1/2	-	31-1/2	G0959192, G3150086, G0474722, G1878213	-	-	-	5PV
-	OSHA Fan Guard	-	-	-	-	-	-	8	17	-	17	G1186532, G3147365	-	-	-	5PV
-	OSHA Fan Guard	-	-	-	-	-	-	13-3/4	31-1/2	-	31-1/2	G0959192, G3150086, G0474722, G1878213	-	-	-	5PV
-	OSHA Fan Guard	-	-	-	-	-	-	17	37-1/4	-	37-1/4	G1906852, G1804546, **5PV67**	-	-	-	5PV
-	OSHA Fan Guard	-	-	-	-	-	-	7	24-3/4	-	24-3/4	G1000185, G2786935, G0945323	-	-	-	5PV
-	OSHA Fan Guard	-	-	-	-	-	-	9-3/4	21	-	21	G3355186, G1846783	-	-	-	5PV
-	OSHA Fan	-	-	-	-	-	-	8-1/2	14-1/4	-	14-1/4	G0590852	-	-	-	5PV

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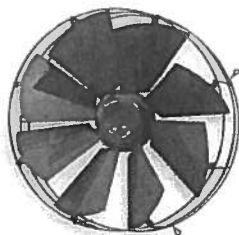
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Supply and Return Connection --

1-1/2 2 2-1/2

Motor HP --

1/40 1/20 1/8 1/6 1/4 1/2
3/4 1-1/2 3

Item --

-- select --

Voltage --

230/460 Volts 115 Volts

Type --

-- select --

Height (In.) --

-- select --

Output @ 2 PSI Steam (BtuH) --

41,300 65,500 80,600 101,800
124,400 152,000 173,000 210,200
249,800 283,800 333,400 386,000
496,000 585,000 705,000

Width (In.) --

14 1/4 17 18 1/4 21 21-1/4
24 3/4 25 1/4 29-1/2 31-1/2
37 1/4 37 1/2 42

Output @ 200 F Water (BtuH) --

22,700 39,600 48,400 68,300
83,700 105,200 118,600 139,700
180,100 205,400 242,900 280,800
368,100 431,100 519,400

Phase --

1 3

Depth (In.) --

14 1/4 17 18 1/4 21 21-1/4
24 3/4 25 1/4 29-1/2 31 1/2
31 1/2 37 1/4 37-1/2 42

CFM --

595 989 1200 1490 1790
2220 2620 3200 4180 4430
5210 6140 8020 9450 11,000

For Use with Stock Number --

-- select --

Amps --

1.20 2.10 2.30 3.20 3.60 5.00 5.40
9.80

Mounting Height (Ft.) --

11 12 14 15 16 18 20 21 22 24
28 29 34 38

Inlet/Outlet NPT (In.) --

1-1/2 2 2 1/2

Mfr.# --

-- select --

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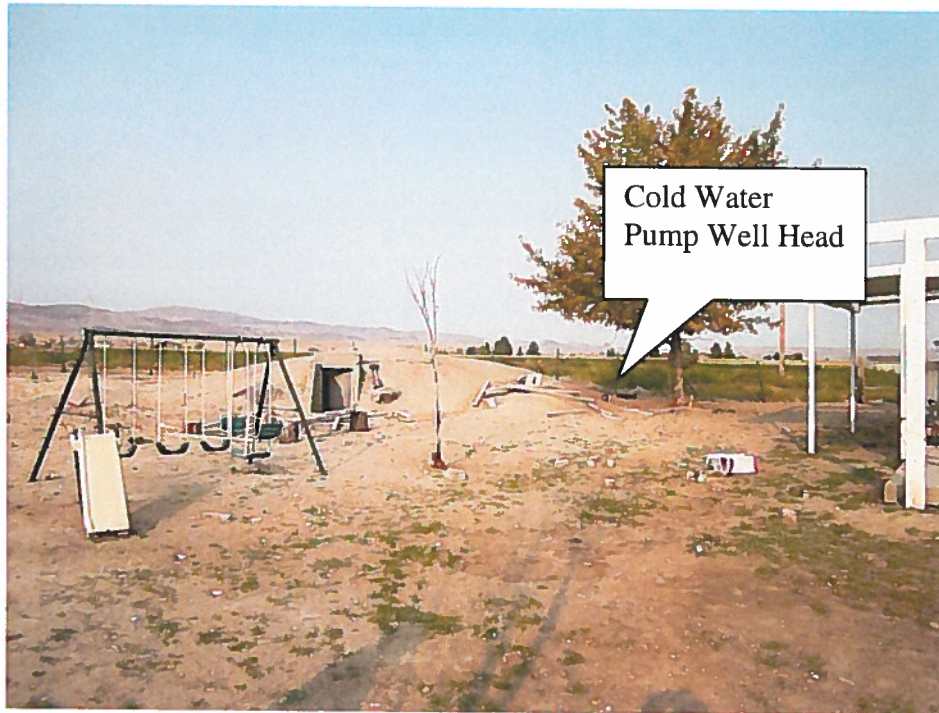
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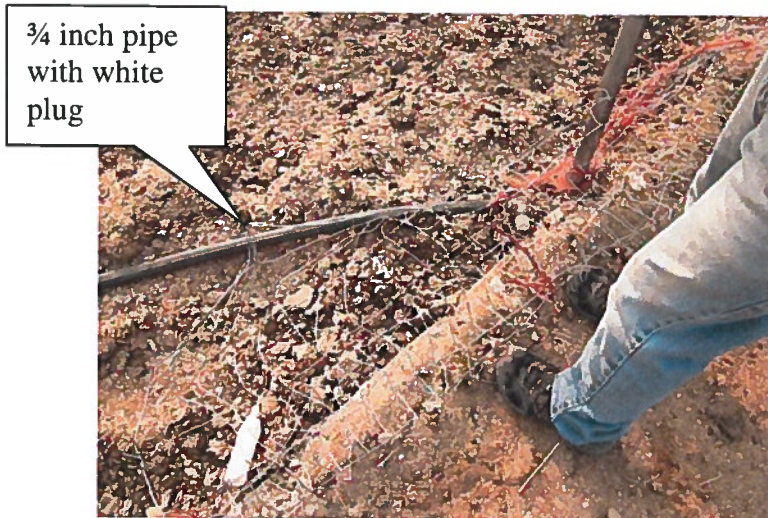
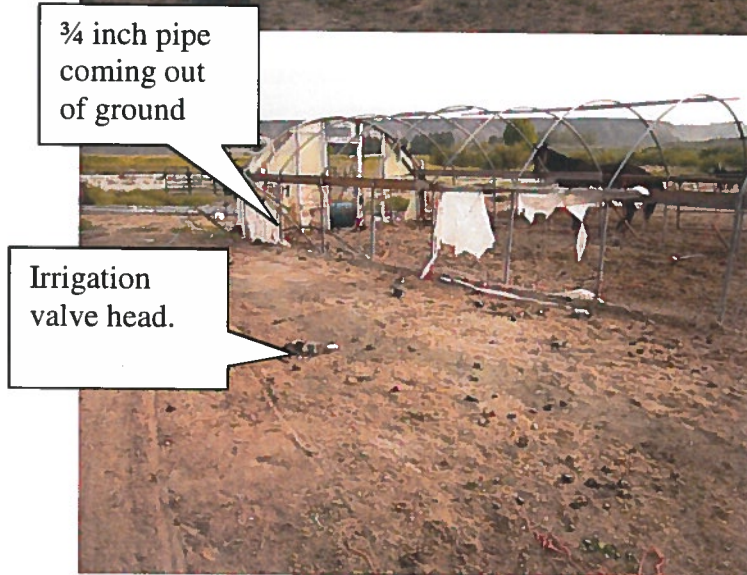
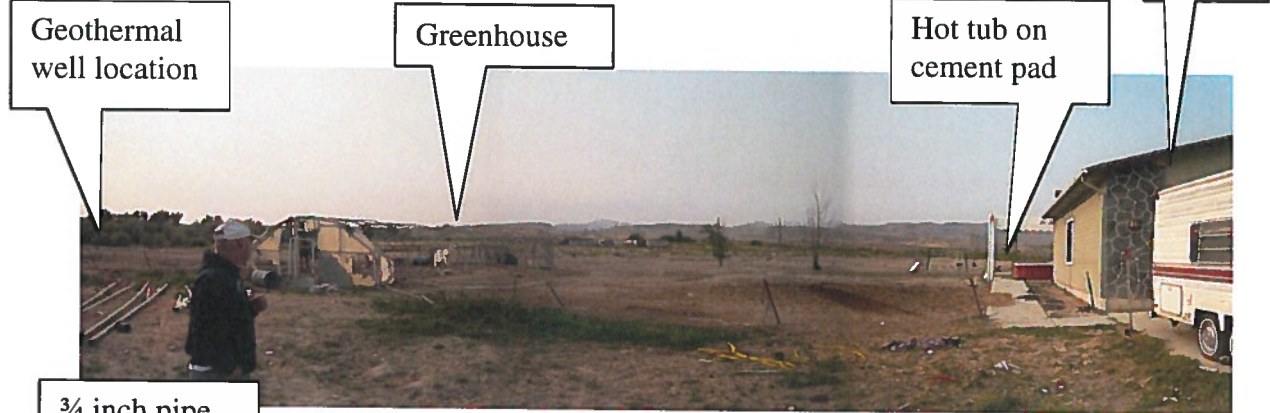
PHOTOGRAPHER AND DATE OF PHOTOS DANIEL A NELSON 9/19/2012
FILE NUMBER 61-11659



The photo above shows the location of the well behind the home. The photo below shows the pump panel with the horsepower designation.



PHOTOGRAPHER AND DATE OF PHOTOS DANIEL A NELSON 9/19/2012
FILE NUMBER 61-11659



The top photo shows the side yard between the house and the greenhouse. You can also see the hot tub on the porch that was not connected into the geothermal water system. The geothermal pipe that came up out the cement didn't show any signs of wear or joint compound, so I couldn't confirm any use.

The middle photo shows a close up angle of the greenhouse. You can see the 3/4 inch black plastic pipe coming out of the corner of the greenhouse. You can also see one of the irrigation valve heads for the irrigation system.

The bottom picture shows the end of the 3/4 inch black plastic pipe that came up in the green house. The hose was plugged as you can see with the white cap. There was no sign of any brackets or hangers in the greenhouse that would suggest that the geothermal water was ever connected to the system.

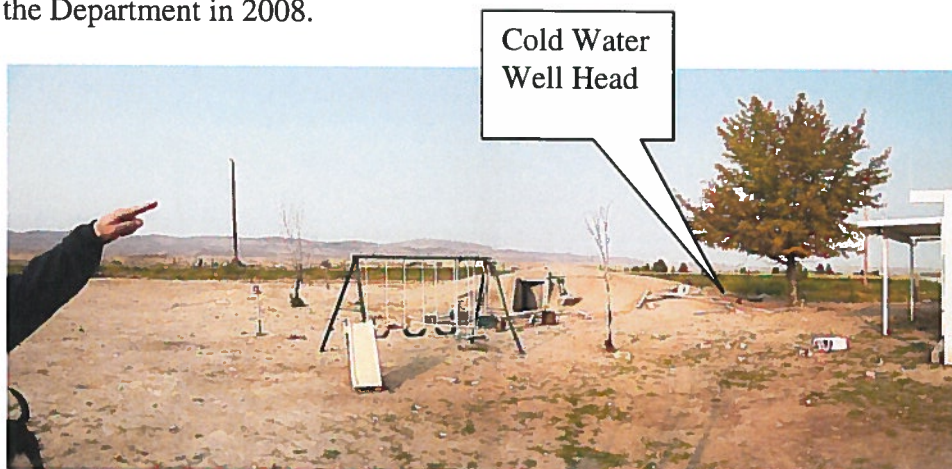
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This photo shows the pasture/arena area. There are irrigation valve heads running beside the greenhouse and between the driveway and the arena area.



This picture shows the front of the house. This picture matches almost identically to the picture shown on the real estate flyer in the file that was printed in 2003 and received by the Department in 2008.



This photo shows the back yard. According to the affidavit, approximately 90 trees were planted along the roadway by the telephone pole. There is no evidence of these trees now.