

[illegible]

Method of Determination: Place of use determined using 2011 aerial photography and verified the place of use is located as recorded. See attached map.

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 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 Size</u>
D0043328		40			
D0043327		40			

D. FLOW MEASUREMENTS

1.

<u>Measurement Equipment</u>	<u>Type</u>	<u>Make</u>	<u>Model No.</u>	<u>Serial No.</u>	<u>Size</u>	<u>Calib. Date</u>
Flow Meter	Sonic	Fuji	Portaflow	7K0085TB		March 2013

2. Measurements: Flow meter measured a rate 485.6 gpm or 1.08 cfs from the wells.

E. FLOW CALCULATIONS

_____ Additional Computation Sheets Attached

Measured Method:

Theoretical Yield:

$$Q = \frac{8.8 \times (Hp) \times (Eff)}{H}$$

Where: Hp = 2(40) Hp (Per Troy Fletcher)

Eff = efficiency = 70% assumed

H = total head = pumping level = (2.31 x system pressure)

assume pumping level of 252 feet (based on Well Drillers Report)

assume system pressure = 40 psi

$$H = 252 + (40 \times 2.31) = 344.4$$

$$Q = \frac{8.8 \times 80 \times .70}{344.4} = 1.43 \text{ cfs}$$

F. VOLUME CALCULATIONS**1. Volume Calculations for Other Uses:**

Heating/Cooling: The system is utilized year round for both summer school and regular fall& spring school sessions.

According to totalizer data collected from the flow meter, 90.65 AF of water was pumped through the system and reinjected into the aquifer in 2013. Climate data provided by Weather Underground reports Heating Degree Days (HDD) at 6758 and Cooling Degree Days (CDD) at 904 in Jerome for 2013 (<http://www.wunderground.com/history>). According to the Western Regional Climate Center The maximum HDD and CDD reported for Jerome are 7990 HDD and 1025.69 CDD (<http://www.wrcc.dri.edu/summary/Climsmsid.html>).

If I divide the total acre feet reported by HDD and CDD for the same period, this theoretically represents the amount of water used per Degree Day. Then if I multiply the result by the maximum Degree Days reported for that area, I should be able to calculate a reasonable volume for licensing that accounts for heating and cooling requirements in extremely cold or hot years:

$$(90.65 \text{ AF}/6758 \text{ HDD}) \times 7990 \text{ HDD} = 107.18 \text{ AF}$$

$$(90.65 \text{ AF}/904 \text{ CDD}) \times 1025.69 \text{ CDD} = 102.85 \text{ AF}$$

$$\text{Cooling season: } 5/1 - 9/30 = 42\% \text{ of year; } 0.42 \times 102.85 \text{ AF} = \mathbf{43.2 \text{ AF Cooling}}$$

$$\text{Heating Season } 10/1 - 4/30 = 58\% \text{ of year; } 0.58 \times 107.18 \text{ AF} = \mathbf{62.2 \text{ AF Heating}}$$

$$\mathbf{105.4 \text{ AF Combined Volume}}$$

G. NARRATIVE/REMARKS/COMMENTS

Application for permit 36-16440 was submitted by the Jerome Joint School District on 7/10/2006, with a corrected application submitted on 8/16/2006 and proof of beneficial use submitted 7/22/2009.

The developed system is a closed loop heat exchange system used to heat and cool the approximately 88,600 ft² middle school. The system utilizes two wells equipped with 40 Hp pumps that supply water into the building through two separate lines that are merged into a single 6" water line equipped with a Seametrics flow meter. The water is then passed through a heat exchanger then back out to an injection well where it is returned to the aquifer.

On 7/9/2013, I visited the school to obtain a flow measurement for this field exam. The majority of information needed to complete the field exam had already been collected by the Watermaster for WD 130. Using a Fuji Portaflow ultrasonic meter, I was able to obtain a flow measurement of 485.6 gpm which is equivalent to 1.08 cfs with the system running at full capacity. The permit had been permitted with a requested flow rate of 1.07 cfs. This non-consumptive system is completely on-demand and each classroom can call for heating/cooling independent of other classrooms on the system, which would make estimating an accurate volume difficult. Therefore, volumes were collected from Water District 130 totalizer readings in order to obtain a full year of actual volume data for licensing purposes.

The actual volume recommended is slightly higher, as the obtained volume needed to be adjusted to compensate for extremely cold and/or hot years. The method used to adjust the volume was derived from a method suggested to me by Michele Edl, Staff Engineer at the State Office, in a memo that is attached to this field exam.

The original application for permit requested heating from 01/01 to 12/31 with no cooling use listed on the permit. The only difference between heating and cooling with the heat exchanger on this system is whether the exchanger is extracting heat from the water or adding heat to the water. Since this system is used for cooling and heating and each classroom can call for cooling or heating independent of other classrooms, I am recommending this be licensed as heating from 01/1 – 12/31 and cooling from 1/01 – 12/31. This ensures the water use is licensed in a manner that accounts for the potential to either cool or heat a classroom any time of year.

Recommend licensing 1.07 cfs flow rate; a cooling volume of 43.2 AF; a heating volume of 62.2 AF, with a combined volume of 105.4 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>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
HEATING	01/01 to 12/31	1.070 CFS	62.2 AF
COOLING	01/01 to 12/31	1.070 CFS	43.2 AF
<u>Totals:</u>		1.070 CFS	105.4

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

Date

Reviewer

Date



Figure 1: Production Wells just west of middle school

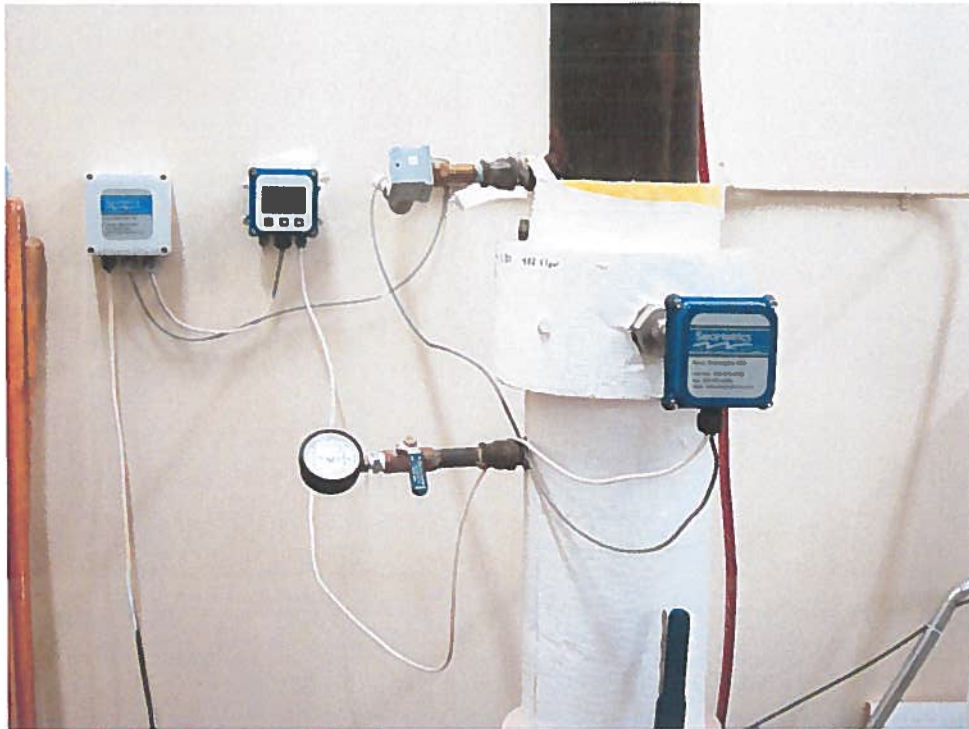


Figure 2: Seametrics Flow Meter



Figure 3: Pumps on internal distribution system

System Diagram



JSD Middle School
No. 03
LOG NAME:JS2
START :07-09 10:20
END :07-09 10:30
INTERVAL:00:01:00

7/9/2013 10:25
+5.218E+0 ft/s
+4.863E+2 gal/m
+TOTAL 0002423 gal
NORMAL

7/9/2013 10:20
+5.133E+0 ft/s
+4.783E+2 gal/m
+TOTAL 0000000 gal
NORMAL

7/9/2013 10:26
+5.234E+0 ft/s
+4.878E+2 gal/m
+TOTAL 0002911 gal
NORMAL

7/9/2013 10:21
+5.269E+0 ft/s
+4.910E+2 gal/m
+TOTAL 0000478 gal
NORMAL

7/9/2013 10:27
+5.140E+0 ft/s
+4.790E+2 gal/m
+TOTAL 0003399 gal
NORMAL

7/9/2013 10:22
+5.205E+0 ft/s
+4.851E+2 gal/m
+TOTAL 0000965 gal
NORMAL

7/9/2013 10:28
+5.232E+0 ft/s
+4.876E+2 gal/m
+TOTAL 0003884 gal
NORMAL

7/9/2013 10:23
+5.142E+0 ft/s
+4.792E+2 gal/m
+TOTAL 0001450 gal
NORMAL

7/9/2013 10:29
+5.245E+0 ft/s
+4.888E+2 gal/m
+TOTAL 0004370 gal
NORMAL

7/9/2013 10:24
+5.170E+0 ft/s
+4.818E+2 gal/m
+TOTAL 0001938 gal
NORMAL

7/9/2013 10:30
+5.246E+0 ft/s
+4.888E+2 gal/m
+TOTAL 0004856 gal
NORMAL

485.6 gpm
1.08 cfs

Idaho Department of Water Resources

WMIS

Water Management Information System



Quick Search:

For
assistance,
email WMIS
Info

Search Method:

WMIS Number

WMIS Number

1000451

Search

You are logged in as wmls

Point Of Diversion PCC Flow Meter Time Clock Alternate Contacts Data Summary Other Logout

Flow Meter Water Usage

You are viewing 1000451; D0043328

[Click here to insert a new record.](#)

Edit	Delete	Report Year 2013	Totalizer Start 9879119.00	Acre Feet Volume 90.65	Max Flow Rate (CFS)	Comments end of year reading collected by staff. jjr
		Validated	Totalizer End 39417640.00	Adjusted Acre Feet 90.65	Adjusted Max Flow Rate	
		Calibration Data		Acre Feet Qualifier Monthly Recordings	Preferred Method FM	
		Date:	1/1/2011 12:00:00 AM			
		Factor	1.00			
		Vol. Multiplier:	1.0000			
		Vol. Unit	GAL			
Edit	Delete	Report Year 2012	Totalizer Start 0.00	Acre Feet Volume 30.32	Max Flow Rate (CFS)	Comments meter operating since Aug 15 with new totalizer, cy
		Validated Validated by Water Master	Totalizer End 9879119.00	Adjusted Acre Feet 30.32	Adjusted Max Flow Rate	
		Calibration Data		Acre Feet Qualifier Partial Year Measurement	Preferred Method FM	
		Date:	1/1/2011 12:00:00 AM			
		Factor	1.00			
		Vol. Multiplier:	1.0000			
		Vol. Unit	GAL			
		Report Year 2011	Totalizer Start	Acre Feet Volume	Max Flow Rate (CFS)	Comments meter not reading.
		Validated Not Validated	Totalizer End	Adjusted Acre Feet	Adjusted Max Flow Rate	
		Calibration Data		Acre Feet Qualifier Erroneous Measurement	Preferred Method FM	
		Date:	1/1/2011 12:00:00 AM			
		Factor	1.00			
		Vol. Multiplier:	1.0000			
		Vol. Unit	GAL			
		Report Year	Totalizer Start	Acre Feet Volume	Max Flow Rate (CFS)	Comments

2010	0.00	0.00	0.00	meter not reading at end of year. cy
Validated	Totalizer End	Adjusted Acre Feet	Adjusted Max Flow Rate	
Validated by Water Master	0.00	0.00	0.00	
Calibration Data		Acre Feet Qualifier	Preferred Method	
Date:	1/1/2011 12:00:00 AM	Erroneous Measurement	FM	
Factor	1.00			
Vol. Multiplier:	1.0000			
Vol. Unit	GAL			
Report Year	Totalizer Start	Acre Feet Volume	Max Flow Rate (CFS)	Comments
2009	0.00	0.00	0.00	flow meter was not operating when I checked. cy
Validated	Totalizer End	Adjusted Acre Feet	Adjusted Max Flow Rate	
Validated by Water Master	0.00	0.00	0.00	
Calibration Data		Acre Feet Qualifier	Preferred Method	
Date:	1/1/2011 12:00:00 AM	Erroneous Measurement	FM	
Factor	1.00			
Vol. Multiplier:	1.0000			
Vol. Unit	GAL			

Weather History for Jerome, ID

January 1, 2013 through December 31, 2013

January 1, 2013 through December 31, 2013

January 1 2013 - TO - December 31 2013

	Max	Avg	Min	Sum
Temperature				
Max Temperature	103 °F	61 °F	7 °F	
Mean Temperature	85 °F	49 °F	2 °F	
Min Temperature	69 °F	37 °F	-8 °F	
Degree Days				
Heating Degree Days (base 65)	63	19	0	6758
Cooling Degree Days (base 65)	20	2	0	904
Growing Degree Days (base 50)	36	8	0	2803
Dew Point				
Dew Point	65 °F	31 °F	-10 °F	
Precipitation				
Precipitation	0.38 in	0.01 in	0.00 in	3.62 in
Snowdepth	-	-	-	-
Wind				
Wind	46 mph	10 mph	0 mph	
Gust Wind	60 mph	25 mph	16 mph	
Sea Level Pressure				
Sea Level Pressure	30.86 in	30.06 in	29.40 in	

TO: Bill Mills

FROM: Michele Edl

REVISED: August 13, 2013

RE: Heating and Cooling Volume

Questions have arisen as to how to calculate a volume for a heating or cooling use. IDWR staff and consultants have attempted to estimate those volumes based on a long-standing method outlined in Admin Memo 23. That method should only be used as a last resort when nothing is known about the equipment or system. It is appropriate when the equipment/system no longer exist and a license volume is necessary. But it is a misapplication of the procedure to use it for existing equipment and systems. There is often a simpler way to calculate the volume from the actual system usage.

In many instances (e.g. in districts requiring totalizers or for large-scale systems, where a well or well pump is dedicated to the heating and cooling system) the estimation exercise should be unnecessary and certainly no better representation than the method I propose.

I am recommending that you use a method which relates the system readings to the HDD and CDD. You need to collect

1. information from the operator's handwritten log books, or the computer controller's system archive, or from the in-line totalizer and
2. the heating and cooling degree days from a weather station nearest to your POU.

System data

I understand that your field exams are for the Jerome School District. I also understand that there are totalizers on the systems but they have been adjusted by the operator. Although a year's worth of data is nice to have, it's not absolutely necessary. 24 hours worth of data may not be enough and data from the heating season can't really be used to represent the cooling season. So, you do need to collect enough data to characterize both heating and cooling use if that is what the permit authorizes. I like to see several days in a row, in the respective season, totalized so that we know that we are seeing a representative response of the building and the occupants to the weather.

DD data

The nearest weather station to your system may be the Jerome airport. I like the information provided by this website <http://www.wrcc.dri.edu/summary/Climsmsid.html> because they do the HDD and CDD calculations for us and they calculate the maximum HDD and CDD. You will find Jerome listed in the left panel.

To compare with this source, you will need a year's worth of system data.

I use a different website to collect HDD and CDD for shorter time periods. It is less official but again, they do the calculations for us. For Jerome I would use

<http://www.wunderground.com/history/airport/KJER/2013/8/13/CustomHistory.html>

The season or part season that we are measuring may not be the worst weather season that the heating or cooling system will see in its lifetime. IDWR has found that it is reasonable to issue a license in excess of the measured amount for these non-consumptive uses, if we can understand what an extreme weather year looks like. For heating and cooling use, the extreme years can be summarized as the maximum HDD and CDD respectively.

The method

Once I have system water use data; the totalizer readings, and the HDD and or CDD data for the **same time period** I make a comparison which calculates a volume.

I compare the system water use data with the DD data and reduce the ratio to cfs-d, gpm or AF per DD. This tells me how much water was used by the system for each DD.

To calculate the heating or cooling volume for licensing, I multiply the AF per DD found above by the maximum HDD or CDD given on WRCC's website.

Worked example

Suppose the heating system for the elementary school in the Jerome School District has a totalizer and from Jan 1 to Feb 1, 2012, the readings show that 200,880 gallons have passed through. In that same 31 days, there were 1066 HDDs. That reduces to 1884 gallons per HDD. For Jerome, the most extreme HDD is 7990 HDD. This system would require 15,053,160 gallons or 46.2 AF for an extreme winter. And this is what I would recommend for the license volume.

A similar calculation could be worked with pump motor hours. The additional assumption is that the pump runs constantly at the rate recommended for license.

Conclusions/recommendations

The system use data tells us all that we need to know. It's not necessary to ask for insulation or square footage. We assume that a building was built to code, but if it hasn't been IDWR cannot correct that. And we can't mandate efficiency. We only recognize beneficial use.

Unfortunately, IDWR doesn't ask that system records be provided with the Proof statement. It's up to the examiner to ask for it. And if the permit holder hasn't kept past system records then you will need to collect them going forward.

Energy efficiencies applied after the Proof will impact how the system responds and may reduce the licensed volume. So if possible, collect and compare data from the development period of the permit rather than from an operation period afterward.