

[illegible]

Method of Determination: Place of use determined using 2013 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</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>
D0062109	Grundfos	3Hp		Grundfos	

D. FLOW MEASUREMENTS

1. Measurements: No measurement required per current beneficial use examination rules.

E. FLOW CALCULATIONS

☐ Additional Computation Sheets Attached

Measured Method:

Theoretical Yield:

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

Where:

Hp = 3 Hp (pump information from permit)

Eff = efficiency = 70% assumed

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

assume pumping level of 6 feet (based on Well Drillers Report)

assume system pressure = 30 psi

$$H = 6 + (30 \times 2.31) = 75.3$$

$$Q = \frac{8.8 \times 3 \times .70}{75.3} = 0.24 \text{ cfs}$$

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

According to Jami Andersen, Reclamation Water Right Specialist, the system has an average flow rate of 74 gpm but can run up to 90 gpm. During the coldest days of the year the heating system will run 24/7, but on average the system is estimated to be in operation and pumping water 35-40% of the time:

$$0.17 \text{ cfs} \times 723.98 \text{ af} \times 0.40 = \mathbf{49.23 \text{ afa}}$$

Since this is an estimated average volume, it should be adjusted to allow additional volume for extremely hot and cold years. Climate data provided by Weather Underground reports Heating Degree Days (HDD) at 5840 and Cooling Degree Days (CDD) at 546 in the Burley area for 2012 (<http://www.wunderground.com/history>). According to the Western Regional Climate Center, the maximum HDD and CDD reported for the Burley area are 7580.50 HDD and 960.50 CDD (<http://www.wrcc.dri.edu/summary/Climsmsid.html>).

If I divide the average acre feet calculated by HDD and CDD for 2012, this theoretically represents the amount of water used per Degree Day for that year. If I then 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:

$$(49.23 \text{ AF}/5840 \text{ HDD}) \times 7580.50 \text{ HDD} = 63.90 \text{ AF}$$

$$(49.23 \text{ AF}/546 \text{ CDD}) \times 960.50 \text{ CDD} = 86.60 \text{ AF}$$

$$\text{Cooling season: } 5/1 - 9/30 = 42\% \text{ of year; } 0.42 \times 86.60 \text{ AF} = \mathbf{36.4 \text{ AF Cooling}}$$

$$\text{Heating Season } 10/1 - 4/30 = 58\% \text{ of year; } 0.58 \times 63.90 \text{ AF} = \mathbf{37.1 \text{ AF Heating}}$$

$$\mathbf{73.5 \text{ AF Combined Volume}}$$

G. NARRATIVE/REMARKS/COMMENTS

Permit 36-16928 was permitted for 0.20 cfs for Heating/Cooling from 1/01 to 12/31.

Application for permit was submitted by the Bureau of Reclamation (B.O.R.) on 2/1/2012 and proof of beneficial use was filed on 4/1/2013.

As this permit is for a flow rate < 0.24 cfs an on-site examination and direct measurement are not required under current beneficial use examination rules and because I was able to obtain sufficient information from the B.O.R. staff, this field report was completed in-house.

The system consists of a well with a 3 Hp pump that supplies water for the heating and cooling of a 10,000 ft² building by distributing the water through a series of 18 heat pumps. Once the water has been used for heating and/or cooling, it is then circulated through this closed loop system out to an injection well where it is returned to the aquifer.

After coordinating with the staff at the B.O.R.'s Upper Snake River Field Office, I was able to obtain a piping schematic and a mechanical schedule for the heat pumps, along with estimates of run times and flow rates. Since the B.O.R. had requested and obtained a measuring device waiver and have no measuring device installed, they had no information available in regards to an actual volume utilized. However, the reported run time for the system seems reasonable based on similar field exams I've completed and research I've done on heat exchange systems. Reported flow rates are in keeping with rates provided on the application for permit and the flow calculated using the theoretical yield equation for a system equipped with a 3 Hp pump. Since the initial volume I calculated was based on an average flow rate and an average run time, I added additional volume to account for extremely cold and/or hot years based on a method used to adjust the volume 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.

From the mechanical schedule I was able to calculate a 245,500 BTU/HR rating for heating and 229,300 BTU/HR for cooling. Compare this to the Department's equation for design heat load:

$$E = [e \times \Delta T] \times \text{Area}$$

E for the building = 0.28 (best energy efficiency, based on information provided by B.O.R. staff)

$$\Delta T = (t_1 - t_0) = (70^\circ - (-3^\circ)) = 73^\circ \text{ Fahrenheit } (-3^\circ \text{ is the suggested outside design temperature for Burley})$$

$$E = [0.28 \times 73^\circ] \times 11,000 \text{ ft}^2 = 224,840$$

With a calculated 245,500 BTU/HR, the system design appears to be about 8% higher than the calculated design heat load BTU/HR rating.

Conditions 212 and 213 were placed on the approved permit, but the B.O.R. requested a measuring device waiver and an order was issued dropping condition 212 which required the measuring device. Condition 197 was placed on the permit stating that "upon specific notification by the Department, the right holder shall install and maintain acceptable measuring device(s), including data logger(s), at the authorized point(s) of diversion, in accordance with Department specifications" as per instructed by the order. Condition 213 was left on the permit and it states "upon specific notification of the Department, the right holder shall install and maintain data loggers to record water usage information at the authorized point(s) of diversion in accordance with Department specifications." With the addition of condition 197, condition 213 becomes redundant and since condition 197 leaves the door open for the Department to request both measuring devices and/or data loggers upon request, I'm dropping condition 213 from the subsequent license.

Recommend licensing 0.200 cfs for Heating/Cooling with an annual volume of 73.5 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	0.200 CFS	36.4 AF
COOLING	01/01 to 12/31	0.200 CFS	37.1 AF
<u>Totals:</u>		0.200 CFS	73.5 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 Bill Mills Date 5-29-2014

Reviewer [Signature] Date 6/6/2014

State of Idaho
Department of Water Resources

Attachment To Water Right License

36-16928

This map depicts the HEATING 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.

23E

10S



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

0 0.0325 0.065 0.13 Miles



State of Idaho
Department of Water Resources
Attachment To Water Right License
36-16928

This map depicts the COOLING 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.

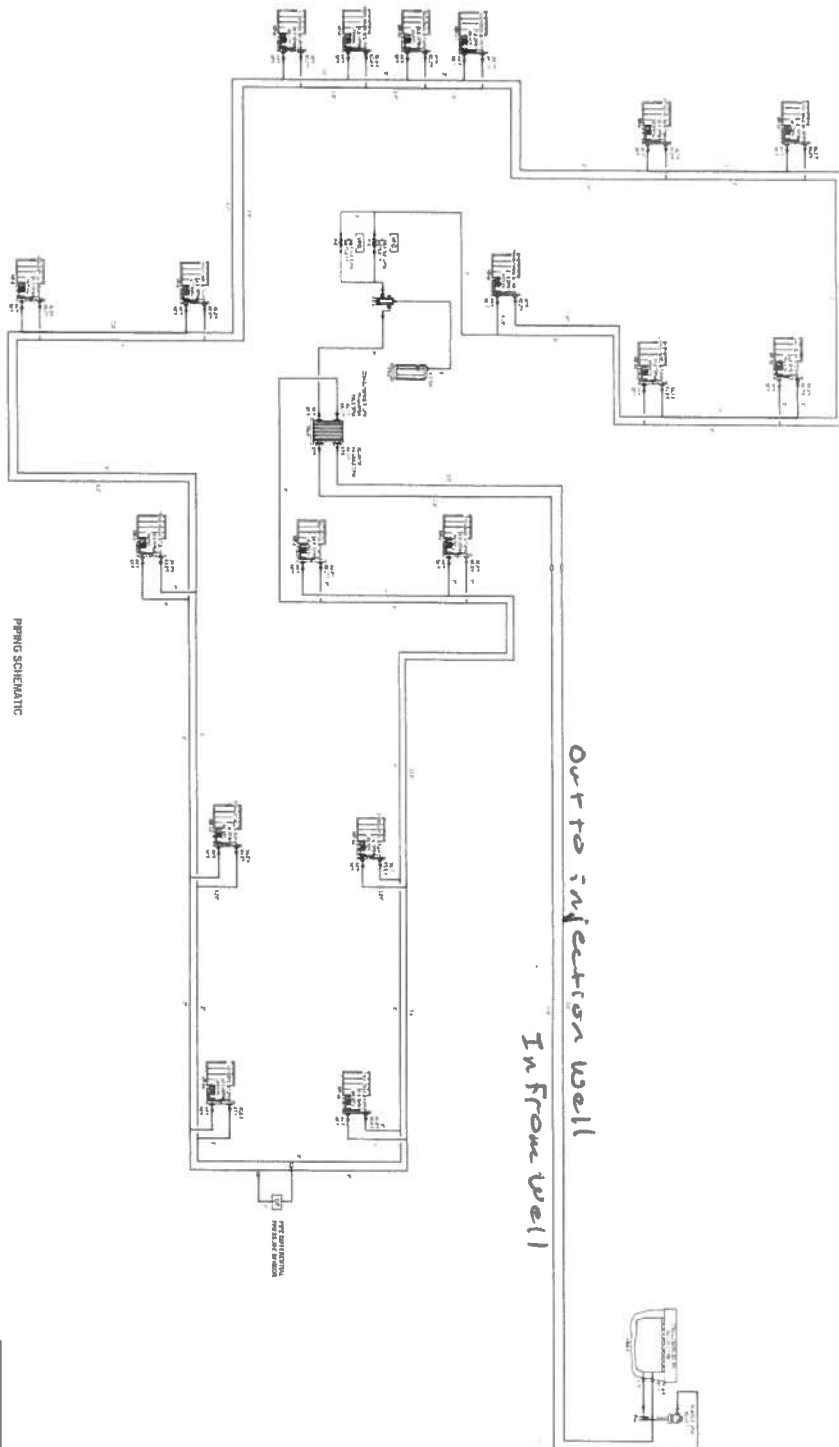


-  Point of Diversion
-  Place Of Use Boundary
-  Townships
-  PLS Sections
-  Quarter Quarters

0 0.0275 0.055 0.11 Miles



Out to injection well
In From well



PIPING SCHEMATIC

[illegible]

RECORD DRAWINGS

MA-701

PIPING
SCHEMATIC



1.4. 2.2. 2.3. 2.4. 2.5. 2.6. 2.7. 2.8. 2.9. 2.10. 2.11. 2.12. 2.13. 2.14. 2.15. 2.16. 2.17. 2.18. 2.19. 2.20. 2.21. 2.22. 2.23. 2.24. 2.25. 2.26. 2.27. 2.28. 2.29. 2.30. 2.31. 2.32. 2.33. 2.34. 2.35. 2.36. 2.37. 2.38. 2.39. 2.40. 2.41. 2.42. 2.43. 2.44. 2.45. 2.46. 2.47. 2.48. 2.49. 2.50. 2.51. 2.52. 2.53. 2.54. 2.55. 2.56. 2.57. 2.58. 2.59. 2.60. 2.61. 2.62. 2.63. 2.64. 2.65. 2.66. 2.67. 2.68. 2.69. 2.70. 2.71. 2.72. 2.73. 2.74. 2.75. 2.76. 2.77. 2.78. 2.79. 2.80. 2.81. 2.82. 2.83. 2.84. 2.85. 2.86. 2.87. 2.88. 2.89. 2.90. 2.91. 2.92. 2.93. 2.94. 2.95. 2.96. 2.97. 2.98. 2.99. 3.00. 3.01. 3.02. 3.03. 3.04. 3.05. 3.06. 3.07. 3.08. 3.09. 3.10. 3.11. 3.12. 3.13. 3.14. 3.15. 3.16. 3.17. 3.18. 3.19. 3.20. 3.21. 3.22. 3.23. 3.24. 3.25. 3.26. 3.27. 3.28. 3.29. 3.30. 3.31. 3.32. 3.33. 3.34. 3.35. 3.36. 3.37. 3.38. 3.39. 3.40. 3.41. 3.42. 3.43. 3.44. 3.45. 3.46. 3.47. 3.48. 3.49. 3.50. 3.51. 3.52. 3.53. 3.54. 3.55. 3.56. 3.57. 3.58. 3.59. 3.60. 3.61. 3.62. 3.63. 3.64. 3.65. 3.66. 3.67. 3.68. 3.69. 3.70. 3.71. 3.72. 3.73. 3.74. 3.75. 3.76. 3.77. 3.78. 3.79. 3.80. 3.81. 3.82. 3.83. 3.84. 3.85. 3.86. 3.87. 3.88. 3.89. 3.90. 3.91. 3.92. 3.93. 3.94. 3.95. 3.96. 3.97. 3.98. 3.99. 4.00. 4.01. 4.02. 4.03. 4.04. 4.05. 4.06. 4.07. 4.08. 4.09. 4.10. 4.11. 4.12. 4.13. 4.14. 4.15. 4.16. 4.17. 4.18. 4.19. 4.20. 4.21. 4.22. 4.23. 4.24. 4.25. 4.26. 4.27. 4.28. 4.29. 4.30. 4.31. 4.32. 4.33. 4.34. 4.35. 4.36. 4.37. 4.38. 4.39. 4.40. 4.41. 4.42. 4.43. 4.44. 4.45. 4.46. 4.47. 4.48. 4.49. 4.50. 4.51. 4.52. 4.53. 4.54. 4.55. 4.56. 4.57. 4.58. 4.59. 4.60. 4.61. 4.62. 4.63. 4.64. 4.65. 4.66. 4.67. 4.68. 4.69. 4.70. 4.71. 4.72. 4.73. 4.74. 4.75. 4.76. 4.77. 4.78. 4.79. 4.80. 4.81. 4.82. 4.83. 4.84. 4.85. 4.86. 4.87. 4.88. 4.89. 4.90. 4.91. 4.92. 4.93. 4.94. 4.95. 4.96. 4.97. 4.98. 4.99. 5.00. 5.01. 5.02. 5.03. 5.04. 5.05. 5.06. 5.07. 5.08. 5.09. 5.10. 5.11. 5.12. 5.13. 5.14. 5.15. 5.16. 5.17. 5.18. 5.19. 5.20. 5.21. 5.22. 5.23. 5.24. 5.25. 5.26. 5.27. 5.28. 5.29. 5.30. 5.31. 5.32. 5.33. 5.34. 5.35. 5.36. 5.37. 5.38. 5.39. 5.40. 5.41. 5.42. 5.43. 5.44. 5.45. 5.46. 5.47. 5.48. 5.49. 5.50. 5.51. 5.52. 5.53. 5.54. 5.55. 5.56. 5.57. 5.58. 5.59. 5.60. 5.61. 5.62. 5.63. 5.64. 5.65. 5.66. 5.67. 5.68. 5.69. 5.70. 5.71. 5.72. 5.73. 5.74. 5.75. 5.76. 5.77. 5.78. 5.79. 5.80. 5.81. 5.82. 5.83. 5.84. 5.85. 5.86. 5.87. 5.88. 5.89. 5.90. 5.91. 5.92. 5.93. 5.94. 5.95. 5.96. 5.97. 5.98. 5.99. 6.00. 6.01. 6.02. 6.03. 6.04. 6.05. 6.06. 6.07. 6.08. 6.09. 6.10. 6.11. 6.12. 6.13. 6.14. 6.15. 6.16. 6.17. 6.18. 6.19. 6.20. 6.21. 6.22. 6.23. 6.24. 6.25. 6.26. 6.27. 6.28. 6.29. 6.30. 6.31. 6.32. 6.33. 6.34. 6.35. 6.36. 6.37. 6.38. 6.39. 6.40. 6.41. 6.42. 6.43. 6.44. 6.45. 6.46. 6.47. 6.48. 6.49. 6.50. 6.51. 6.52. 6.53. 6.54. 6.55. 6.56. 6.57. 6.58. 6.59. 6.60. 6.61. 6.62. 6.63. 6.64. 6.65. 6.66. 6.67. 6.68. 6.69. 6.70. 6.71. 6.72. 6.73. 6.74. 6.75. 6.76. 6.77. 6.78. 6.79. 6.80. 6.81. 6.82. 6.83. 6.84. 6.85. 6.86. 6.87. 6.88. 6.89. 6.90. 6.91. 6.92. 6.93. 6.94. 6.95. 6.96. 6.97. 6.98. 6.99. 7.00. 7.01. 7.02. 7.03. 7.04. 7.05. 7.06. 7.07. 7.08. 7.09. 7.10. 7.11. 7.12. 7.13. 7.14. 7.15. 7.16. 7.17. 7.18. 7.19. 7.20. 7.21. 7.22. 7.23. 7.24. 7.25. 7.26. 7.27. 7.28. 7.29. 7.30. 7.31. 7.32. 7.33. 7.34. 7.35. 7.36. 7.37. 7.38. 7.39. 7.40. 7.41. 7.42. 7.43. 7.44. 7.45. 7.46. 7.47. 7.48. 7.49. 7.50. 7.51. 7.52. 7.53. 7.54. 7.55. 7.56. 7.57. 7.58. 7.59. 7.60. 7.61. 7.62. 7.63. 7.64. 7.65. 7.66. 7.67. 7.68. 7.69. 7.70. 7.71. 7.72. 7.73. 7.74. 7.75. 7.76. 7.77. 7.78. 7.79. 7.80. 7.81. 7.82. 7.83. 7.84. 7.85. 7.86. 7.87. 7.88. 7.89. 7.90. 7.91. 7.92. 7.93. 7.94. 7.95. 7.96. 7.97. 7.98. 7.99. 8.00. 8.01. 8.02. 8.03. 8.04. 8.05. 8.06. 8.07. 8.08. 8.09. 8.10. 8.11. 8.12. 8.13. 8.14. 8.15. 8.16. 8.17. 8.18. 8.19. 8.20. 8.21. 8.22. 8.23. 8.24. 8.25. 8.26. 8.27. 8.28. 8.29. 8.30. 8.31. 8.32. 8.33. 8.34. 8.35. 8.36. 8.37. 8.38. 8.39. 8.40. 8.41. 8.42. 8.43. 8.44. 8.45. 8.46. 8.47. 8.48. 8.49. 8.50. 8.51. 8.52. 8.53. 8.54. 8.55. 8.56. 8.57. 8.58. 8.59. 8.60. 8.61. 8.62. 8.63. 8.64. 8.65. 8.66. 8.67. 8.68. 8.69. 8.70. 8.71. 8.72. 8.73. 8.74. 8.75. 8.76. 8.77. 8.78. 8.79. 8.80. 8.81. 8.82. 8.83. 8.84.

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SNAKE RIVER AREA FIELD OFFICE
 LOT 2, MCBRIDE II COMMERCIAL SUBDIVISION HEYBURN,
 IDAHO
 U.S. DEPARTMENT OF THE INTERIOR

design west architects

273 SOUTH KEE WIST	435 752 7231
10004 4110 9437	435 752 7232
705 WADSWORTH AVE SE	435 752 7233
2471 LAUREL CIRCLE NORTH	435 752 7234

P/PMC SCHEMATIC M-701	1920-100-103
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 ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE ARMY
BUREAU OF RESEARCH
CAND PROJECT

UPPER SNAKE FIELD OFFICE-BURLEY, IDAHO
NEW FIELD OFFICE BUILDING
PIPING SCHEMATIC M-701

RECLAMATION

FLUID-TO-AIR HEAT PUMP SCHEDULE														
NO.	UNIT	TYPE	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
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RECORD DRAWINGS

MECHANICAL SCHEDULES

1920-100-101

Snake River Area Field Office

Lot 2, McBride II Commercial Subdivision Heyburn, Idaho

U.S. Department of the Interior

design west architects

100 South 100 West

100 South 100 West

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR

NEW PROJECT

RECLAMATION

Upper Snake Field Office-Burley, Idaho

New Field Office Building

Mechanical Schedules M-602

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.

X

Field Inspection Report

Permit No. 864148

Metal Tag No. D0062109,

Well ID # 433215

Relationship: Owner/Operator

Name: US DEPT OF INTERIOR Phone: (208) 378-5306

Address: BUREAU OF RECLAMATION

1150 N CURTIS RD STE 100

BOISE ID 83706-1234

Well Location: Township 10S, Range 23E, Section 10, SW, SE
COUNTY MINIDOKA

Address of Well Site: 470 22ND ST
HEYBURN ID
42 33.810
113.49.984

Use of Well: Heat Pump

Activity: New Well

Application Type: Drilling Permit

Region: Southern

Construction Method: Air Rotary,

Const Start Date: Aug 23 2012 Const End Date:

Well Drilling Company: APEX DRILLING LLC (No. 667)

Card Hold Name:

Certifying Official:

Date Received:

Date Approved: Aug 13 2012

Date Inspected:

Completed Depth: Drilled Depth: 27 FT Surface Diameter: 8 inches

Primary Flow Depth: Overall Temp: Static Water Level:

Head Pipe Length: Tail Pipe Length Production Rate:

Closed in Pressure: Bottom Hole Temp: Low Temp Geothermal: NO

Control Device Desc:

Access Port Desc:

42°33.803

113°44.985

9/11/12

TAGGED 12'

TREMSED CEMENT 1 YD

By: mciscell 2013-10-17

De 7148