

STATE OF IDAHO  
DEPARTMENT OF WATER RESOURCES  
**BENEFICIAL USE FIELD REPORT**

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NOV 21 2019

DEPT OF WATER RESOURCES  
SOUTHERN REGION

A Beneficial Use Field Report is prepared by a water right examiner as the result of an examination to clearly confirm and establish the extent of the beneficial use of water established in connection with a permit during the development period authorized by the permit and any extensions of time previously approved.

**A. GENERAL INFORMATION**Permit No. 37-228701. Owner Terrence Daniels Phone No. \_\_\_\_\_Current address 259 Yellow Mountain Road Greenwood VA 229432. Examiner's name G. Erick Powell EXAM DATE 6/25/20193. Accompanied by Karol Ward Email karolwardsv@gmail.com

Address \_\_\_\_\_

Relationship to permit holder Property Manager Phone No. 208-309-01684. Source Ground Water tributary to N/A**B. OVERLAP REVIEW**1. Other water rights with the same place of use None.2. Other water rights with the same source and point of diversion None.**C. DIVERSION AND DELIVERY SYSTEM**

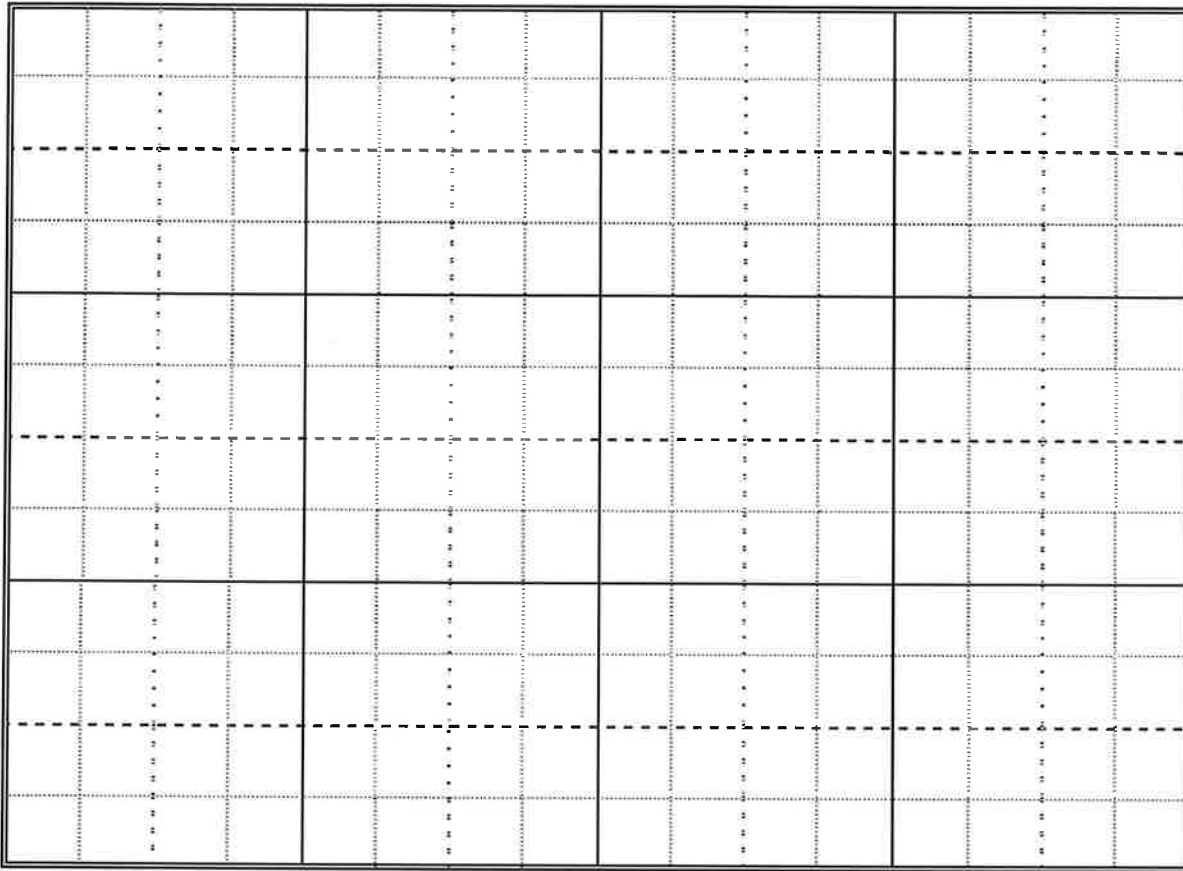
## 1. Point(s) of Diversion:

| Ident. No. | Gov't Lot | ¼  | ¼  | ¼  | Sec | Twp | Rge | County | Method of Determination/Remarks |
|------------|-----------|----|----|----|-----|-----|-----|--------|---------------------------------|
|            |           | NW | SW | SW | 3   | 03N | 18E | BLAINE | IDWR PLSS / Site Inspection     |
|            |           |    |    |    |     |     |     |        |                                 |
|            |           |    |    |    |     |     |     |        |                                 |
|            |           |    |    |    |     |     |     |        |                                 |

2. Place(s) of Use: Method of determination Historical and IDWR (NAIP) aerial imagery.

| Twp | Rge | Sec | NE |    |    |    | NW |    |    |    | SW |    |     |    | SE |    |    |    | Totals |
|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|--------|
|     |     |     | NE | NW | SW | SE | NE | NW | SW | SE | NE | NW | SW  | SE | NE | NW | SW | SE |        |
| 03N | 18E | 3   |    |    |    |    |    |    |    |    |    |    | H,G |    |    |    |    |    |        |
|     |     |     |    |    |    |    |    |    |    |    |    |    |     |    |    |    |    |    |        |
|     |     |     |    |    |    |    |    |    |    |    |    |    |     |    |    |    |    |    |        |
|     |     |     |    |    |    |    |    |    |    |    |    |    |     |    |    |    |    |    |        |
|     |     |     |    |    |    |    |    |    |    |    |    |    |     |    |    |    |    |    |        |
|     |     |     |    |    |    |    |    |    |    |    |    |    |     |    |    |    |    |    |        |
|     |     |     |    |    |    |    |    |    |    |    |    |    |     |    |    |    |    |    |        |
|     |     |     |    |    |    |    |    |    |    |    |    |    |     |    |    |    |    |    |        |

3. **Delivery System Diagram:** Indicate all major components and distances between components. Indicate weir size/ditch size/pipe diameter (inside), as applicable. Use the space provided or ☒ see attached.



Scale: 1" = \_\_\_\_\_

- ☒ Copy of USGS Quadrangle attached showing location(s) of point(s) of diversion and place(s) of use (required)  
☒ Aerial photo attached (required for irrigation of 10+ acres)  
☒ 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 |
|---------------------------------------|------------|----|------------------|-----------|-----------------------------------|
| Pump for G,H                          | Goulds     | 3  | 08-01800C        | Goulds    | F1457312                          |
|                                       |            |    |                  |           |                                   |
|                                       |            |    |                  |           |                                   |

\*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 |
|--------------------------------|------------|------|-----------|------------|------|-------------|
| Fuji Ultrasonic Portable Meter | Ultrasonic | Fuji | S2011     | N5L3138    |      | Spring 2019 |
|                                |            |      |           |            |      |             |

2. **Measurements:** \_\_\_\_\_  
 Portable Fuji Ultrasonic Meter was attached to heating and cooling discharge line. See attached narrative for details.

### E. NARRATIVE/REMARKS/COMMENTS

See attached narrative for details.

[illegible]

Has the permit holder met all conditions of permit approval, including any mitigation requirements and/or measuring device installation requirements? ☒ Yes ☐ No If no, what must be done to meet the permit requirements?

See attached narrative.

[illegible]

**F. FLOW CALCULATIONS**☐ Additional computation sheets attached

Measured Method:

Portable Fuji Ultrasonic Meter Measurement, See Narrative;

Average system operation discharge rate- 25.9 gpm or 0.06 cfs.

Total Recommended Discharge Rate: 0.06 cfs.

**G. VOLUME CALCULATIONS**

## 1. Volume Calculations for Irrigation:

$$V_{I,R} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) = \underline{N/A.}$$

$$V_{D,R} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation Season}) \times 1.9835 = \underline{N/A.}$$

$$V = \text{Smaller of } V_{I,R} \text{ and } V_{D,R} = \underline{N/A.}$$

## 2. Volume Calculations for Other Uses:

\*\*Calculations below taken from BU Exam Associated with 37-22685; William Mills of IDWR Southern Region Office:

5 year average daily temperatures observed at NWS Ketchum Ranger Station:

$$(0.06 \text{ cfs}) \times 250 \text{ days} \geq \text{freezing in Ketchum}^* (0.30 \text{ avg system operation time}) \times 1.983 \text{ AF/cfs} = 8.9 \text{ AF.}$$

$$(0.06 \text{ cfs}) \times 115 \text{ days} \leq \text{freezing in Ketchum}^* (0.50 \text{ avg system operation time}) \times 1.983 \text{ AF/cfs} = 6.8 \text{ AF.}$$

Total recommended diversion volume = 8.9 AF for cooling, 6.8 AF for Heating, 15.7AF total volume.

**H. RECOMMENDATIONS**

## 1. Recommended Amounts

| Beneficial Use | Period of Use |       | Rate of Diversion<br>Q (cfs) | Annual Volume<br>V (afa) |
|----------------|---------------|-------|------------------------------|--------------------------|
|                | From          | To    |                              |                          |
| Heating        | 01/01         | 12/31 | 0.06 cfs                     | 6.8 AFA                  |
| Cooling        | 01/01         | 12/31 | 0.06 cfs                     | 8.9 AFA                  |
|                |               |       |                              |                          |
|                |               |       |                              |                          |
|                |               |       |                              |                          |
| <b>Totals:</b> |               |       | 0.06 cfs                     | 15.7 AFA                 |

## 2. Recommended Amendments

☐ Change P.D. as reflected on page 1☐ Add P.D. as reflected on page 1☒ None☐ Change P.U. as reflected on page 1☐ Add P.U. as reflected on page 1☐ Other**I. AUTHENTICATION**

Field Examiner's Signature



Date

11/14/12

Reviewer

Date



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DEPT OF WATER RESOURCES  
SOUTHERN REGION

**TERRENCE DANIELS**

**Narrative in Support of Beneficial Use Exam; Permit 37-22870**

Brockway Engineering PLLC

November 13<sup>th</sup>, 2019

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Idaho Department of Water Resources (IDWR) water right permit 37-22870 was approved on April 21<sup>st</sup>, 2014, with proof due on May 1<sup>st</sup> of 2019. An extension of time for filing proof of beneficial use was filed in April of 2019 and was approved by IDWR on 5/21/19 as a result of sand clogging the heating and cooling system in the permit holder's residence. The system has since been cleared and this narrative explains the beneficial use exam associated with permit 37-22870. For the field exam, a site visit was made to the Daniels property by Brockway Engineering staff on June 25<sup>th</sup> 2019. This exam attempts to substantiate the degree of beneficial use associated with the permit at the time of the proof filing.

Leading up to the exam site visit, sands and clays had entered the heating and cooling system through the production well associated with 37-22870. On June 7<sup>th</sup> 2019, the production well's pump was pulled and air was forced into the well in an effort to rid the well of the fine particulate matter (Figure 1) in the well bore. The production well was then pumped for a period of time long enough to remove a very large portion of the particulate sediment. The production pump is manufactured by Goulds, model 40GS30432, serial number F1457312 and the production motor (also manufactured by Goulds) is a model 234-3162-604, serial number 08-01800C.

For heating and cooling system operation under 37-22870, water is diverted from the production well (IDWR Tag #D0066499), run through 2" HDPE pipe into the residence's crawl space, through the heating and cooling system and then returned to the aquifer in the injection well (IDWR Tag#D0066500). A separate domestic well on the property serves domestic use to the residence as authorized under Idaho Statute 42-111A. The heating and cooling system is comprised of three identical Bosch water source heat pumps, and example of one of the units is shown in Figures 2 and 3. For reference, unit #1 as shown has a serial number of 2940-453-000001-7735011418, model number; SM060-1CFN-SRBATA-DHG-XXXXXX7XXXX8XXXXSBA, model numbers for the additional two units are identical.

During the June 25<sup>th</sup> 2019 field exam, a portable Fuji Ultrasonic S2011 Flow Meter (S/N: N5L3138) was used to determine the maximum flow rate through the system. The flow meter is owned by Brockway Engineering and was most recently calibrated by IDWR at the Kimberly Research Field Station in March of 2019. The FLD12 transducer was attached to both the Ultrasonic unit and to the 2" HDPE pipe where the pipe exits the residence en-route to the injection well, as the inlet pipe configuration had no suitable location for a measurement to be performed. Because the system is a closed loop system and there is no water lost in the system, all water entering the residence for heating and cooling leaves the residence (Figure 4).

When the three heating and cooling units were turned up to a point where discharge through the system was maximized, the Ultrasonic Meter registered an average flow rate of 25.9 gallons per minute (gpm) or 0.06 cubic feet per second (cfs). An example of an instantaneous flow rate as shown on the meter readout screen can be seen in Figure 5. This flow rate represents the most the heating and cooling system would use under normal operation. The heating and cooling system was run at this maximum output level for approximately an hour, the pressure registered at the inlet end of the system

near the pump control was approximately 64 pounds per square inch (psi). Over the duration of the 57 minute test, the system pumped 1,477 gallons for an average flow rate of 25.9 gpm or 0.06 cfs.

The annual volume estimation for the residence is calculated using IDWR's methodology that was applied to heating and cooling permit 37-22685 wherein Mr. Bill Mills (IDWR Southern Region Senior Water Resource Agent calculated yearly volumes likely used based on the number of days both above and below freezing using a nearby weather station, an assumed rate that water would be diverted for each heating and cooling uses and the flow rate observed in the system. For this analysis, the U.S. Forest Service's Ketchum Ranger District weather station data was used to calculate daily average temperatures for the years 2015 through 2019. The number of days in each year both above and below freezing was then calculated (Table 1).

| Year: | Temp (oF) ><br>32 | Temp (oF) <<br>32 |
|-------|-------------------|-------------------|
| 2015  | 256               | 109               |
| 2016  | 261               | 105               |
| 2017  | 247               | 118               |
| 2018  | 254               | 111               |
| 2019  | 231               | 134               |
| AVG:  | 250               | 115               |

Table 1: Daily average temperatures per year, number above and below freezing at USFS Ketchum Ranger District.

Using the average of days both above and below freezing, a percentage of time that a heating system is on was assumed to be associated with actual diversion of water for each use, 30% for cooling and 50% for heating. For the heating use, if the discharge rate of 0.06 cfs is allowed to run at 50% of the time when temperatures are below freezing, the resultant diversion volume for that 115 days is 6.8 AF ((0.06 cfs) x 115 days  $\leq$  freezing in Ketchum\* (0.50 avg system operation time) x 1.983 AF/cfs = 6.8 AF). Likewise for the cooling use, if the discharge rate of 0.06 cfs is allowed to run at 30% of the time when temperatures are above freezing, the resultant diversion volume for that 250 days is 8.9 AFA ((0.06 cfs) x 250 days  $\geq$  freezing in Ketchum\* (0.30 avg system operation time) x 1.983 AF/cfs = 8.9 AF). Therefore, the total heating and cooling diversion volume recommended for licensing should be 15.7 acre-feet annually.

#### **Condition Review and Recommendations:**

1. *Proof of application of water to beneficial use shall be submitted on or before May 01, 2019.*
  - a. Condition has been met, extension of time granted through May 01, 2020, recommend removing from license.
2. *Subject to all prior water rights.*
  - a. Recommend condition remain on license.
3. *Heating and cooling uses are for one household.*
  - a. Condition has been met, recommend condition remain on license.
4. *Use of water under this right for heating and cooling shall be non-consumptive.*
  - a. Condition has been met, recommend condition remain on license.

5. *Return flow discharged to a subsurface system must be authorized by a separate injection well permit.*
  - a. Condition has been met, injection well permit has been issued by IDWR, recommend condition remain on license.
6. *Use of water under this right will be regulated by a Watermaster with responsibility for the distribution of water among appropriators within a water district. At the time of this approval, this water right is within State Water District No.37*
  - a. Condition has been met, recommend condition remain on license.
7. *When notified by the Department, the right holder shall install and maintain a measuring device of a type acceptable to the Department as part of the diverting works.*
  - a. Recommend removal of condition prior to license approval, beneficial uses are non-consumptive and no water is actually lost/un-accounted for as a result of use under the right.
8. *Right holder shall comply with the drilling permit requirements of Section 42-235, Idaho Code and applicable Well Construction Rules of the Department.*
  - a. Condition has been met, recommend condition remain on license.
9. *Any license issued by IDWR pursuant to the right or portion thereof for the use of trust water is subject to a term review of 20 years after the date of this approval to determine availability of water for the use and to re-evaluate the public interest at the end of the term.*
  - a. Recommend removal of condition prior to license approval. Water diverted under this right is non-consumptive and therefore condition is not warranted.
10. *Project construction shall commence within one year from the date of permit issuance and shall proceed diligently to completion unless it can be shown to the satisfaction of the Director of the Department of Water Resources that delays were due to circumstances over which the permit holder had no control.*
  - a. Condition has been met; recommend removal of condition prior to license approval.



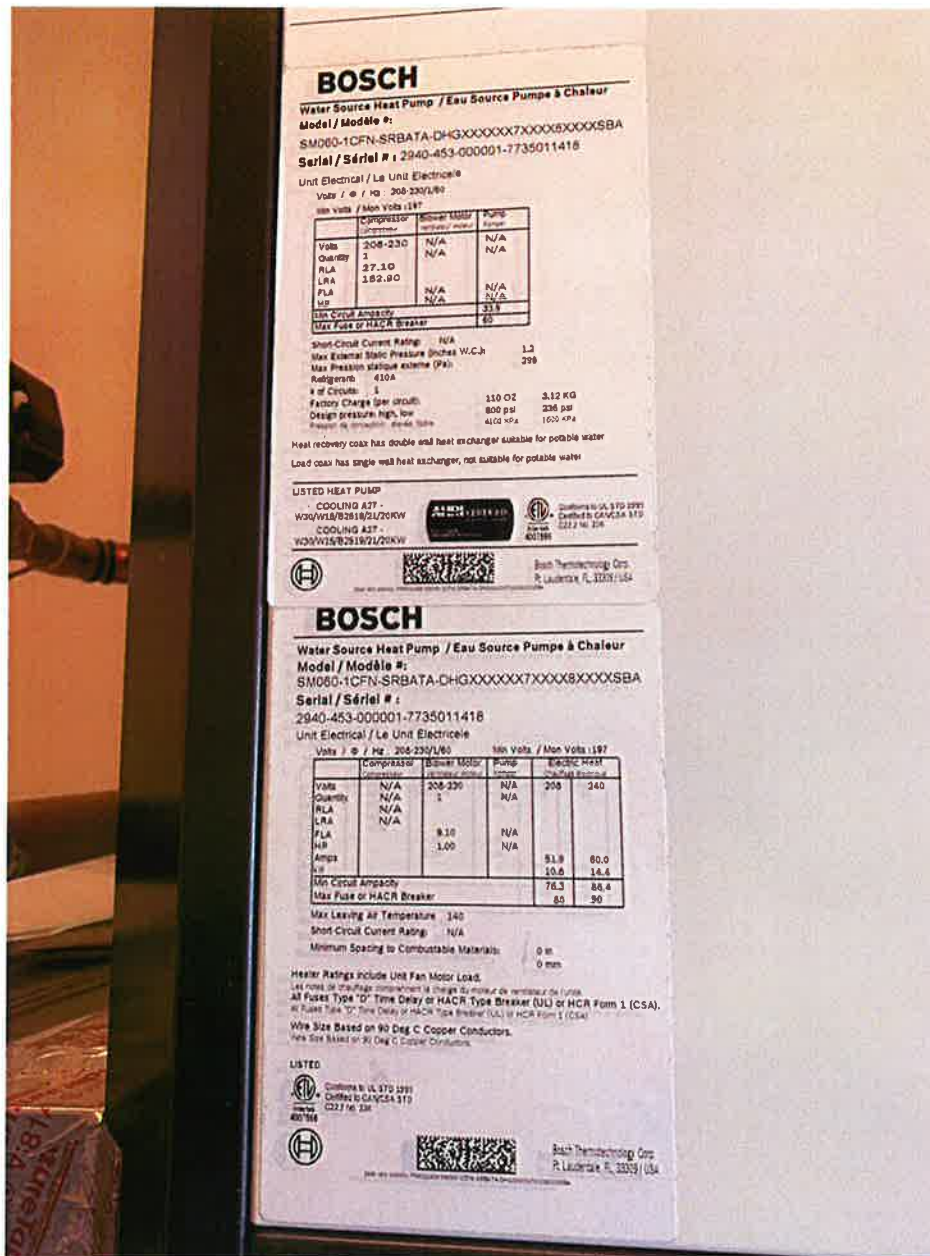


Figure 3: Heating and Cooling Unit #1, Continued.



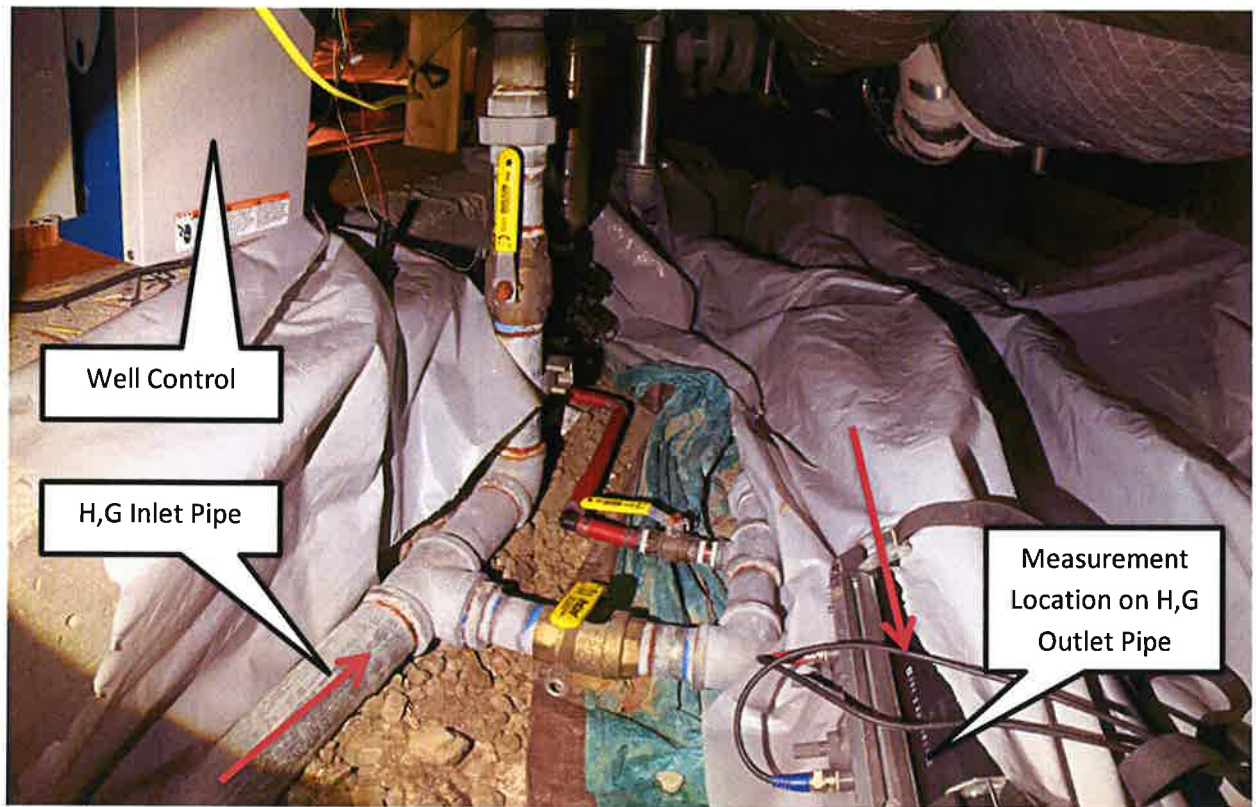


Figure 4: Heating and Cooling Measurement Location.



Figure 5: An example of an instantaneous flow rate on the meter readout screen.





Figure 1: Production Well Being Cleared of Sands and Clays.



Figure 2: Heating and Cooling Unit #1.