

Project No. 1288-01-2014

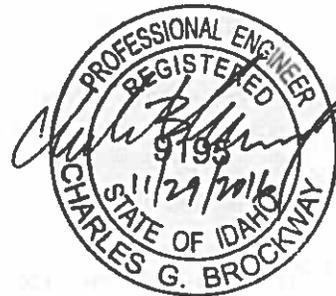
# Water Supply Adequacy Report for the Animal Shelter of the Wood River Valley Expansion Project, Hailey, Idaho

Prepared for:

Animal Shelter of the Wood River Valley  
Hailey, ID

November 29, 2016

For information concerning this report, contact  
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Zach Latham, M.S.



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2016 NORTH WASHINGTON, SUITE 4  
TWIN FALLS, IDAHO 83301



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Zach Latham, M.S., Hydrologist  
Charles G. Brockway, P.E.

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## **A. Overview**

This report describes an evaluation of water supply adequacy with respect to the proposed expansion of the Animal Shelter of the Wood River Valley ("Shelter"), west of Hailey, Idaho. Currently, the Shelter is located east of Croy Creek Road and proposes an expansion to additional new facilities west of the road. Water supply for the proposed expansion will be provided by a new well to be located on the expansion lot, and one existing groundwater well (located at the existing Shelter) if needed.

## **B. Existing Water Rights**

Currently, the Shelter owns groundwater right 37-11960 which allows for domestic and stockwater use at the facility. This water right has a priority date of 12/31/1981 and authorizes a diversion rate of 0.04 cubic feet per second (cfs) or 18 gallons per minute (gpm), which includes 0.02 cfs/9 gpm for domestic use and 0.02 cfs/9 gpm for stockwater use. Diversion is authorized year round from an existing 8" well at the existing Shelter. Total daily use is limited to 2,500 gallons under this water right.

Additionally, water right permit 37-22436 was assigned to the Shelter from the Croy Canyon Ranch Foundation in June of 2014. Water right permit 37-22436 currently allows for the diversion of 0.64 cfs from two wells for year-round municipal use on the Shelter property. An extension of time was filed with the Idaho Department of Water Resources (IDWR) in June of 2014 and was granted which allows development under the permit to occur up until 8/1/2019. Water right permit 37-22436 may be amended to cover the proposed uses and would be sufficient to meet the total estimated peak demand as described below.

## **C. Existing Domestic Well Supply**

A controlled pumping test was performed on the existing 8" domestic well on November 11, 2016. The well is situated on the edge of the valley, outside of the valley-fill alluvial formations, and is drilled into rock to a depth of 110 ft deep. The static water level at the time of the test was 40.8 ft below ground surface. An average discharge of 16.8 gpm was observed with a drawdown of 20.8 ft over a 3-hour test. The predicted 24-hour drawdown in

the well is 24.8 feet. Currently, this well meets the demand for the existing facility and has been a reliable source. This well will be used in conjunction with the proposed well if necessary.

#### **D. Demand Estimation**

An analysis was made of water demands for the proposed Shelter facility. Peak demand for commercial facilities such as the Shelter is best estimated using the standard fixture-unit approach. 2020 Engineering has completed a comprehensive analysis based on current applicable building code requirements (Appendix A) and calculated a peak demand of 65 gpm. This value represents a code-required maximum value for plumbing system design purposes. The actual peak instantaneous demand will likely be considerably less, but is difficult to quantify. For planning purposes 65 gpm was assumed to be the peak in-house demand.

This peak flow would only occur when the occupancy at the proposed facility is at a maximum. Irrigation will be minimal around the facility and may occur during operating hours; therefore, it is appropriate to add an irrigation demand of 18 gpm, representing a typical single-circuit design value. The total estimated peak demand for the facility is 83 gpm (0.18 cfs). No firefighting flow will be derived directly from the well source.

Water usage within the facility will be largely non-consumptive. Data for in-house restroom and sink usage indicates that only 5% to 10% of the water is consumptive. The irrigation portion of the water use will be a consumptive use. Assuming a maximum of 0.5 acres of irrigation of turf, the consumptive use at Hailey is estimated to be 0.98 acre-feet per year<sup>1</sup>. Total groundwater underflow from the Croy Creek basin is estimated to be at least 30 ac-ft/year<sup>2</sup>. The consumptive portion of the water usage may be subject to curtailment in a conjunctive management scenario.

#### **E. New Well Site Suitability**

A proposed new well will be designed to supply a target minimum yield of 83 gpm. No storage will be provided for the commercial use other than a pressure tank to provide a minor amount of buffering capacity during the few seconds that a variable frequency drive (VFD) required to ramp up to speed. Both the existing well and the proposed well locations are shown on the attached Figure 1 and will be located outside of the mapped floodplain. The well site will meet all regulatory setbacks including 50 feet from the nearest surface water source (Croy Creek). Surrounding land uses include open space to the south and east, farming ground to the west and the existing Shelter facility to the north. No known sources of contamination are present in the vicinity of the well.

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<sup>1</sup> Allen, Richard G. and Clarence W. Robison, 2012. Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho: Supplement updating the Time Series through December 2008, Research Technical Completion Report, Kimberly Research and Extension Center, University of Idaho, Moscow, ID.

<sup>2</sup> Brockway (2009). Development of a Groundwater Flow Model for the Big Wood River Aquifer: East Fork to Bellevue.

## **F. Source Sufficiency**

Although the existing Shelter well is drilled into bedrock (brown and black shale) per the well's drilling log, it is located near the mountainside on the north side of Croy Canyon. The proposed well will be located near the middle of the valley, on the Shelter's southern parcel, and is proposed to be completed in the alluvial formation (sands, gravels and cobbles). The new well will intercept ground water underflow which is tributary to the Big Wood River Valley. Available data on the lithology of the aquifer at the new well site is limited. A review of well drilling records west of the site confirmed that the aquifer upstream of the new well location is alluvial in nature, comprised primarily of gravel and sand with varying degrees of fine-grained (clay) content. Groundwater flow is from west to east in Croy Canyon. Selected well logs are provided in Appendix B.

Existing well logs report static water levels ranging from 15 feet to 36 feet below ground; the expected ground water level at the new well location is approximately 20 feet below ground surface. The alluvium is likely underlain by bedrock near the center of the valley. At the new well location, bedrock is expected at a depth of approximately 120 feet. On the neighboring upstream property and properties east of Colorado Gulch Road, the aquifer has been demonstrated to be a prolific water source; for example, irrigation wells have been developed with flow rates exceeding 450 gpm and the two domestic wells for the Sage Springs subdivision yield 250 gpm and approximately 120 gpm, respectively. Some areas of the valley exhibit greater fine-grained alluvial content and are lower-yielding. However, the aquifer is expected to generally increase in permeability moving closer to the valley mouth. The City of Hailey recently developed a well at Lions Park which yielded 300 gpm with 15 feet of drawdown; however, this well is located in the Big Wood alluvial gravels and may not be representative of the Shelter site. In summary, obtaining a well to provide the design peak demand of 83 gpm in combination with the existing well (16.8 gpm) will likely be easily achievable at this location.

Data for wells in the vicinity indicates that specific capacity of the formation will likely range from 0.5 to 10 gpm per foot of drawdown, depending on the construction of the well. Most wells from which data is derived are domestic wells, open minimally to the aquifer or sometime open only at the bottom. The proposed well will be properly designed and fully-penetrating, and is conservatively expected to have a specific capacity of at least 5 gpm/ft. The corresponding estimated hydraulic conductivity of the aquifer formation is 8 ft/day, based on a Theis analysis for a fully-penetrating well with an assumed storativity of 0.15, which is a typical value for water-table aquifers (Appendix C).

A projection of drawdown due to the well pumping was made using the above parameters. After continuous pumping at 75% of the peak instantaneous demand for 24 hours (an ultra-conservative assumption), the drawdown in the well bore is projected to be 14.0 feet. Drawdowns at 100 feet and 200 feet from the well are projected to be 0.72 feet and 0.07 feet, respectively. These drawdowns are minimal and will not adversely affect the existing Shelter well or other wells which may be drilled adjacent to the property in the future.

## **G. Well Design**

The proposed well will be designed to deliver at least 83 gpm with a completed diameter of 8 inches. The well will be drilled by the air-rotary method. A 12-inch overbore will be completed to a depth of 38 feet to allow the surface seal to be placed. If significant water bearing strata are encountered below 18 feet but above 38 feet, the surface seal may be reduced in order to intercept upper waters. The total depth of the finished 8" well is anticipated to be 120 feet (steel casing running the entire depth with perforations at the water-bearing zones) if the well provides the design yield. If the design yield of the well is not obtained, the well may be cased to bedrock and drilled as an open hole into bedrock to approximately 200 ft or until a point when the design yield is met. Based on production zones encountered during drilling, field-perforation using an air perforator will be completed. After well completion, a controlled pumping test will be performed with a submersible pump in order to determine the yield-drawdown characteristics of the well.

The pump will be a 4-inch or 6-inch stainless-steel submersible unit capable of supplying the design yield at a minimum pressure of 60 psi at the surface, accounting for anticipated drawdown in the well. The static water level will be approximately 20 feet. At a peak discharge of 83 gpm, the estimated drawdown is 19 feet for a pumping level of 39 feet. Losses in the pump column will be approximately 5 feet. The total dynamic head of the pump must therefore be 182 feet. To meet this performance specification, a SHP pump will be required. A variable-speed drive will be installed to provide constant pressure of 60 psi to the facility.

There will be no well house for the system. The well casing will extend a minimum of 24 inches above finished grade and be capped with an approved, vented cast-iron sanitary seal. Pump discharge will occur via an approved weld-on pitless adapter directly to the buried supply pipeline.

## **G. Water quality**

The system for the Shelter will not be classified as a "public water system" by the Idaho Department of Environmental Quality. Nevertheless, the well and system will be designed using accepted engineering practices in order to protect water quality for the facility.

There is no publicly-available water quality data for the aquifer in the vicinity of the proposed site. Water quality in the Big Wood and tributary valleys is generally excellent, and no detrimental factors are present at the site. The well will be located up-gradient of the proposed septic drainfield. The new well will be tested for a suite of inorganic compounds and coliform during the pumping test. If any water quality deficiencies are found, additional evaluation will be performed to determine the proper course to ensure that water quality is suitable within the facility.

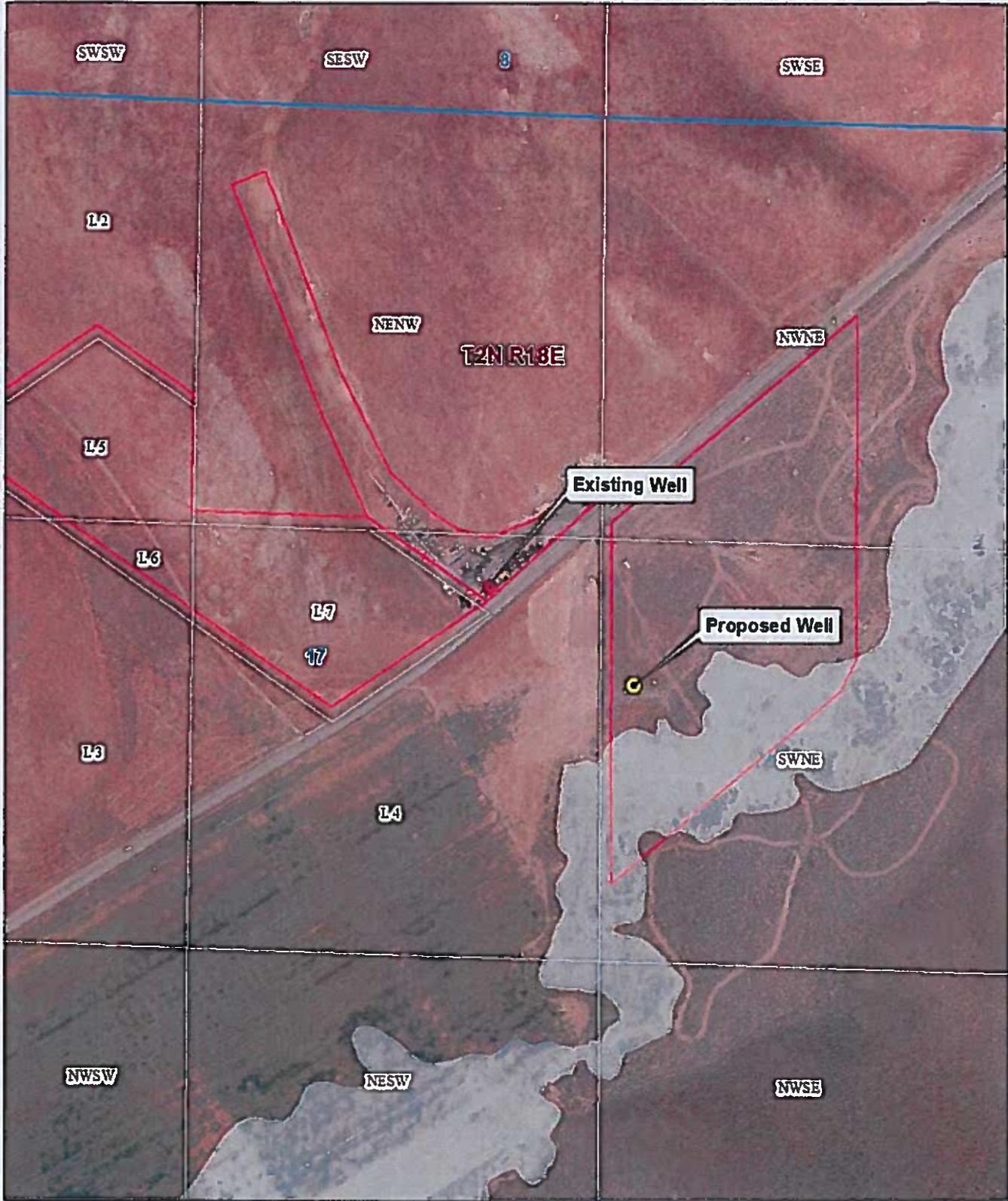
## **H. Closed-loop geothermal potential**

The Shelter is exploring the possibility of utilizing a closed-loop geothermal system for heating and cooling. If feasible, this approach would involve a high-yielding well (or wells) and an injection well for return to the aquifer. Systems of this nature are gaining favor throughout the Big Wood valley for their very high efficiency and long-term payoff. In the course of developing the potable water supply well, a determination will be made regarding potential maximum yield and whether the system is feasible with or without an additional supply well.

The injection well would be located no more than 100 feet from the pumping well. Since the system would be closed, the rate of injection would always be the same as the rate of pumping. Thus, the net impact on aquifer levels would be essentially zero except in the immediate vicinity of the pumping-injection well pair. For the same reason, the quality of the injected water would be unchanged and no degradation of the aquifer would occur.

## **I. Conclusion**

Based on the above-described data and analysis, it is concluded that the water supply for the proposed Shelter facility is adequate in terms of yield, quality, and impact on the aquifer system.



0 125 250 500 Feet

**ANIMAL SHELTER OF THE WOOD RIVER VALLEY**

FIGURE 1  
NAIP 2015 AERIAL

- Proposed Well
- Existing Well
- ▭ Parcel boundary
- ▭ Flood plain



**Appendix A**  
**Water demand by fixture-unit method**

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Prepared by 20/20 Engineering, Inc.



# Plumbing Data Sheet - 2012 IPC

11/22/2018

Project **Wood River Valley Shelter**

Job No. **16014**

Date **8/22/16** By: **SLC**

TANK		Water Fixture Units						Waste Fixture Units		Hot Water Load	
Quantity	Fixture Type	C/H	Total	COLD	Total	HOT	Total	Public	Total	GPH Ea.	Total GPH
0	Bath/Shwr Combination	3	0	2.25	0	2.25	0	2	0	30	0
0	Bathtub, Public	4	0	3	0	3	0	2	0	40	0
0	Bidet	1.4	0	1.5	0	1.5	0	1	0	10	0
0	Clothes Washer (Private)	1.4	0	1	0	1	0	2	0	20	0
0	Clothes Washer (Public)	3	0	2.25	0	2.25	0	3	0	20	0
3	Clothes Washer (Public, LG)	4	12	3	9	3	9	3	9	30	90
0	Dishwasher, Commercial	10	0	0	0	10	0	1	0	50	0
1	Dishwasher, Domestic	1.4	1.4	0	0	1.4	1.4	2	2	10	10
2	Electric Water Cooler	0.25	0.5	0.25	0.5	0	0	0.5	1	0	0
33	Floor Drains, 2"	0	0	0	0	0	0	2	88	0	0
0	Floor Sinks, 2"	0	0	0	0	0	0	2	0	0	0
0	Floor Sinks, 3"	0	0	0	0	0	0	5	0	0	0
0	Floor Sinks, 4"	0	0	0	0	0	0	6	0	0	0
0	Garbage Disposal w/ Spray Rns	4	0	2	0	2	0	3	0	0	0
0	Garbage Disposal, Commercial	0	0	0	0	0	0	3	0	0	0
10	Hose Bibb	2.5	25	2.5	25	0	0	0	0	0	0
1	Laundry Sink	1.4	1.4	1	1	1	1	2	2	20	20
8	Lavatory (Private)	0.7	5.6	0.5	4	0.5	4	1	8	2	18
0	Lavatory (Public)	2	0	1.5	0	1.5	0	1	0	6	0
3	Mop Service Basin	4	12	2.25	6.75	2.25	6.75	2	6	20	60
1	Shower (Per Head, Private)	1.4	1.4	1	1	1	1	2	2	30	30
0	Shower (Per Head, Public)	4	0	3	0	3	0	2	0	30	0
0	Sink, 1 Compartment (Res)	1.4	0	1	0	1	0	2	0	20	0
0	Sink, 2 Compartment (Res)	1.4	0	1	0	1	0	2	0	20	0
10	Sink 1 or 2 Compartment (Comm)	4	40	3	30	3	30	2	20	20	200
0	Sink, 3 Compartment (Comm)	8	0	4	0	4	0	0	0	0	0
2	Sink, Hand (Clinic)	4	8	3	6	3	6	2	4	6	12
1	Sink, Scrub	4	4	3	3	3	3	2	2	0	0
0	Sink, Kitchen, w/Disposal &/or DW	4	0	3	0	3	0	2	0	20	0
3	Sink, Service	4	12	2.25	6.75	2.25	6.75	2	6	30	90
0	Urinal, Flush Tank	3	0	3	0	0	0	4	0	0	0
0	Urinal, Flush Valve, 1"	10	0	10	0	0	0	4	0	0	0
1	Urinal, Flush Valve, 3/4"	5	5	5	5	0	0	4	4	0	0
0	Water Closet, Flush-o-meter Tank	2	0	2	0	0	0	4	0	0	0
0	Water Closet, Tank, Private	2.2	0	2.2	0	0	0	3	0	0	0
11	Water Closet, Tank, Public	5	55	5	55	0	0	4	44	0	0
0	Water Closet, Valve, Private	6	0	6	0	0	0	4	0	0	0
0	Water Closet, Valve, Public	10	0	10	0	0	0	4	0	0	0
0	Commercial Ice Maker	3	0	3	0	0	0	0	0	0	0
4	Grooming Table/tub table	4	16	3	12	3	12	2	8	30	120
	<b>Total F.U. From Abv</b>		<b>199.3</b>		<b>165</b>		<b>80.9</b>	<b>Total F.U.</b>	<b>184</b>	<b>Total GPH</b>	<b>648</b>
	Other Existing F.U.		0					Existing F.U.	0	Demand Factor	0.5
	Other Future F.U.		0					GARAGE F.U.	0	Recovery Factor	1
	<b>Grand Total F.U.</b>		<b>199.3</b>					<b>Grand Total F.U.</b>	<b>184</b>		
	Table E103.3, IPC appendix E		F.U. to GPM					Building Drain Size	SEE BELOW	Recovery	324
			Make-up Water GPM							Storage	324
	After Hours		Irrigation GPM								
			Water Meter Size					4" MAIN		BS&H Input at Altitude	481950
			Water Service size							KW Input	79

Note: Building Service Sizing is as follows: (per AWWA)

0-16 GPM: 5/8" x 3/4"	41-80 GPM: 1-1/2"	241-400 GPM: 4" Compound
17-24 GPM: 3/4"	81-128 GPM: 2"	401-800 GPM: 6" Compound
25-40 GPM: 1"	129-240 GPM: 3"	

**Appendix B**  
**Selected Well Drilling Records**

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DEPARTMENT OF WATER RESOURCE  
WELL DRILLER'S REPORT

Official Use Only  
Inspected by \_\_\_\_\_  
Twp. \_\_\_\_\_ Rge. \_\_\_\_\_ Sec. \_\_\_\_\_  
1/4 \_\_\_\_\_ 1/4 \_\_\_\_\_ 1/4 \_\_\_\_\_  
Lat. : : Long. : :

1. WELL TAG NO. D - 0044472  
DRILLING PERMIT NO. 898657

Other IDWR No. \_\_\_\_\_  
2. OWNER appt. 901660

Name KOONCE, JIM  
Address P.O. BOX 2015  
City HAILEY State ID Zip 83330

3. LOCATION OF WELL by legal description:  
Sketch map location must agree with written location

Map grid showing Twp. 2 Rge. 18 Sec. 19 1/4 NW 1/4 NE 1/4  
Gov't Lot \_\_\_\_\_ County BLAINE  
Lat. : : Long. : :  
Address of Well Site 251 CROY CREEK ROAD  
City HAILEY

(Give at least name of road - Distance to Road or Landmark)  
Lt. \_\_\_\_\_ Blk. \_\_\_\_\_ Sub. Name \_\_\_\_\_

4. USE:  
 Domestic  Municipal  Monitor  Irrigation  
 Thermal  Injection  Other

5. TYPE OF WORK check all that apply (replacement ect.)  
 New Well  Modify  Abandonment  Other replacement

6. DRILL METHOD  
 Air Rotary  Cable  Mud Rotary  Other

7. SEALING PROCEDURES

Seal/Filter Pack		Amount		Method
Material	From To	Sacks or Pounds		
BENT	0 18	250 LBS		OVERBORE

Was drive shoe used?  Y  N Shoe depth(s) \_\_\_\_\_  
Was drive shoe seal tested?  Y  N How? \_\_\_\_\_

8. CASING/LINER

Dia.	From To	Gauge	Material	Casing	Liner	Welded	Threaded
65/8	1 1/2	130	250 SEEL	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Length of Headpipe \_\_\_\_\_ Length of Tailpipe \_\_\_\_\_  
9. PERFORATIONS/SCREENS  
Perforations \_\_\_\_\_ Methods AIR KNIFE  
Screens \_\_\_\_\_ Screen Type \_\_\_\_\_

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
90	100	1/4	± 40	6	STEEL	<input checked="" type="checkbox"/>	<input type="checkbox"/>
110	120	1/4	± 40	6	STEEL	<input checked="" type="checkbox"/>	<input type="checkbox"/>

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:  
36 ft below ground Artesian pressure \_\_\_\_\_  
depth flow encountered \_\_\_\_\_ ft Describe access port  
or control devices WELL CAP

11. WELL TESTS:  
 Pump  Bailor  Air  Flowing Artesian

Yield gpm	Drawdown	Pumping Level	Time
± 200			

Water Temp. 46° Bottom hole temp. \_\_\_\_\_  
Water Quality test or comments: \_\_\_\_\_  
Depth first water encounter \_\_\_\_\_

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water
6	0	12	GRAVEL	
	12	30	SILTY CLAY	
	30	40	COARSE GRAVEL	X
	40	60	COARSE GRAVEL LITTLE CLAY	X
	60	65	BROWN GRAVEL & BLACK	X
	65	70	COARSE GRAVEL	X
	70	72	CLAY BED	
	72	80	BLACK & BROWN GRAVEL	X
	80	85	BLACK & GRAY GRAVEL	X
	85	88	THICK CLAY CUT WATER OFF	
	88	90	MEDIUM COARSE GRAVEL	X
	90	110	SAND & GRAVEL	
	110	115	SMALL GRAVEL BLACK LIME	X
	115	125	WEATHERED BLACK LIME	X
	125	130	WEATHERED BLACK LIME W/CLAY	

Completed depth 130 ft. (measurable)  
Date: Started August 27, 2007 Completed August 28, 2007

13. DRILLERS CERTIFICATION  
We certify that all minimum well construction standards were complied with at the time the rig was removed.  
Company Name WALKER WATER SYSTEMS Firm No. 15  
624 PIERCE ST. TWIN FALLS, ID 83301  
Firm Official [Signature] Date 9/11/07  
and  
Driller or Operator [Signature] Date 9/11/07  
(Sign once if Firm Official & Operator)

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

USE TYPEWRITER OR  
BALLPOINT PEN

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.

<p><b>1. WELL OWNER</b></p> <p>Name <u>G.M.M.K.</u></p> <p>Address <u>Box 1814 Hailey, Id. 83333</u></p> <p>Owner's Permit No. <u>37-90-S-046</u> <i>OK</i> <i>well #2</i></p>	<p><b>7. WATER LEVEL</b></p> <p>Static water level <u>23</u> feet below land surface.</p> <p>Flowing? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No G.P.M. flow _____</p> <p>Artesian closed-in pressure _____ p.s.i.</p> <p>Controlled by: <input type="checkbox"/> Valve <input type="checkbox"/> Cap <input type="checkbox"/> Plug</p> <p>Temperature _____ of. Quality <u>good</u></p> <p><i>Describe artesian or temperature zones below.</i></p>																																																																																																										
<p><b>2. NATURE OF WORK</b></p> <p><input checked="" type="checkbox"/> New well <input type="checkbox"/> Deepened <input type="checkbox"/> Replacement</p> <p><input type="checkbox"/> Well diameter increase</p> <p><input type="checkbox"/> Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)</p>	<p><b>8. WELL TEST DATA</b></p> <p><input type="checkbox"/> Pump <input type="checkbox"/> Bailor <input checked="" type="checkbox"/> Air <input type="checkbox"/> Other _____</p> <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;">120</td> <td style="text-align: center;">120</td> <td style="text-align: center;">1</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	Discharge G.P.M.	Pumping Level	Hours Pumped	120	120	1																																																																																																				
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STATE OF IDAHO  
DEPARTMENT OF WATER RESOURCES  
**WELL DRILLER'S REPORT**

USE TYPEWRITER OR  
BALLPOINT PEN

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**  
DEC 4 1981

**1. WELL OWNER**  
Name George Arkoosh  
Address Gooding, Idaho 83330  
Owner's Permit No. \_\_\_\_\_

**7. WATER LEVEL**  
Static water level 24 feet below land surface.  
Flowing?  Yes  No G.P.M. flow \_\_\_\_\_  
Artesian closed-in pressure \_\_\_\_\_ p.s.i.  
Controlled by:  Valve  Cap  Plug  
Temperature 51 °F. Quality \_\_\_\_\_

**2. NATURE OF WORK**  
 New well  Deepened  Replacement  
 Abandoned (describe method of abandoning) \_\_\_\_\_

**8. WELL TEST DATA**  
 Pump  Baller  Air  Other \_\_\_\_\_

Discharge G.P.M.	Pumping Level	Hours Pumped
30		2 1/2

**3. PROPOSED USE**  
 Domestic  Irrigation  Test  Municipal  
 Industrial  Stock  Waste Disposal or Injection  
 Other \_\_\_\_\_ (specify type)

**9. LITHOLOGIC LOG** 88478

Hole Diam.	Depth		Material	Water	
	From	To		Yes	No
	0	31	Clay & gravel		
	31	35	Gravel	X	
	35	38 1/2	Gravel & clay	X	
	38 1/2	50	Clay & gravel		T
	50	52	Gravel (5 GPM water)	X	
	52	71	Clay & gravel		
	71	73	Gravel & clay (5 GPM)	X	
	73	76	Brown sand & clay	X	
	76	83	Gravel (10 GPM)	X	
	83	89	Clay & gravel		
	89	97	Brown clay		
	97	98 1/2	Gravel (30 GPM)	X	

**4. METHOD DRILLED**  
 Rotary  Air  Hydraulic  Reverse rotary  
 Cable  Dug  Other \_\_\_\_\_

**5. WELL CONSTRUCTION**  
Casing schedule:  Steel  Concrete  Other \_\_\_\_\_

Thickness	Diameter	From	To
1/2 inches	6 inches	18 feet	98 1/2 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ 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 \_\_\_\_\_ 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  
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Gravel packed?  Yes  No  Size of gravel \_\_\_\_\_  
Placed from \_\_\_\_\_ feet to \_\_\_\_\_ feet  
Surface seal depth 18 Material used in seal:  Cement grout  
 Puddling clay  Well cuttings  
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 \_\_\_\_\_

**10.** Work started 8-24-81 finished 8-30-81

**11. DRILLERS CERTIFICATION**  
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.  
Firm Name Walker Water Systems, Inc. Firm No. 15  
624 Pierce Street  
Address Twin Falls, Idaho 83301 Date 10/12/81  
Signed by (Firm Official) Paul Walker  
and  
(Operator) Melton H Rollins

**6. LOCATION OF WELL**  
Sketch map location must agree with written location.

Subdivision Name \_\_\_\_\_  
Lot No. \_\_\_\_\_ Block No. \_\_\_\_\_  
County Blaine  
NW 1/4 NE 1/4 Sec. 19, T. 2N, R. 19E

**10.** Work started 8-24-81 finished 8-30-81

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**Appendix C**  
**Drawdown Analysis by the Theis Method**

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**WELL DRAWDOWN ESTIMATION  
ANIMAL SHELTER OF WOOD RIVER  
11/21/2016**

Drawdown estimated using Theis approach  
Brockway Engineering, PLLC

Hydraulic conductivity            8 ft/day  
Saturated thickness            100 feet  
Transmissivity            5984 gpd/ft            Pumping rate            0.14 cfs or            63 gpm  
Storage coefficient            0.15            Pumping time            24 hrs

Time (hrs)	R = 0.33 feet			R = 100 feet			R = 200 feet		
	u	W(u)	z (feet)	u	W(u)	z (feet)	u	W(u)	z (feet)
0	--	--	0.00	--	--	0.00	--	--	0.00
0.25	4.9E-04	7.044	8.50	4.5E+01	0.000	0.00	1.8E+02	0.000	0.00
0.5	2.5E-04	7.737	9.34	2.3E+01	0.000	0.00	9.0E+01	0.000	0.00
0.75	1.6E-04	8.143	9.82	1.5E+01	0.000	0.00	6.0E+01	0.000	0.00
1	1.2E-04	8.430	10.17	1.1E+01	0.000	0.00	4.5E+01	0.000	0.00
2	6.1E-05	9.123	11.01	5.6E+00	0.001	0.00	2.3E+01	0.000	0.00
3	4.1E-05	9.529	11.50	3.8E+00	0.005	0.01	1.5E+01	0.000	0.00
4	3.1E-05	9.816	11.84	2.8E+00	0.017	0.02	1.1E+01	0.000	0.00
5	2.5E-05	10.040	12.11	2.3E+00	0.035	0.04	9.0E+00	0.000	0.00
6	2.0E-05	10.222	12.33	1.9E+00	0.058	0.07	7.5E+00	0.000	0.00
7	1.8E-05	10.376	12.52	1.6E+00	0.085	0.10	6.4E+00	-0.001	0.00
8	1.5E-05	10.510	12.68	1.4E+00	0.115	0.14	5.6E+00	0.001	0.00
9	1.4E-05	10.627	12.82	1.3E+00	0.146	0.18	5.0E+00	0.001	0.00
10	1.2E-05	10.733	12.95	1.1E+00	0.179	0.22	4.5E+00	0.002	0.00
11	1.1E-05	10.828	13.06	1.0E+00	0.211	0.25	4.1E+00	0.003	0.00
12	1.0E-05	10.915	13.17	9.4E-01	0.244	0.29	3.8E+00	0.005	0.01
13	9.4E-06	10.995	13.27	8.7E-01	0.276	0.33	3.5E+00	0.007	0.01
14	8.8E-06	11.069	13.36	8.0E-01	0.309	0.37	3.2E+00	0.010	0.01
15	8.2E-06	11.138	13.44	7.5E-01	0.340	0.41	3.0E+00	0.013	0.02
16	7.7E-06	11.203	13.52	7.0E-01	0.372	0.45	2.8E+00	0.017	0.02
17	7.2E-06	11.263	13.59	6.6E-01	0.402	0.49	2.6E+00	0.021	0.02
18	6.8E-06	11.320	13.66	6.3E-01	0.432	0.52	2.5E+00	0.025	0.03
19	6.4E-06	11.375	13.72	5.9E-01	0.462	0.56	2.4E+00	0.030	0.04
20	6.1E-06	11.426	13.79	5.6E-01	0.490	0.59	2.3E+00	0.035	0.04
21	5.8E-06	11.475	13.84	5.4E-01	0.519	0.63	2.1E+00	0.040	0.05
22	5.6E-06	11.521	13.90	5.1E-01	0.546	0.66	2.0E+00	0.046	0.06
23	5.3E-06	11.566	13.95	4.9E-01	0.573	0.69	2.0E+00	0.052	0.06
24	5.1E-06	11.608	14.01	4.7E-01	0.600	0.72	1.9E+00	0.058	0.07

### Predicted Drawdown vs. Time and Radial Distance from Pumping Well

Q=63 gpm, K=8 ft/d, T=5984 gpd/ft, S=0.15

