

MEMO

State of Idaho

Department of Water Resources

322 E Front Street, P.O. Box 83720, Boise, Idaho 83720-0098

Phone: (208) 287-4800 Fax: (208) 287-6700

Date: November 27, 2007

To: Shelley Keen

From: Dennis Owsley, Hydrology Section, State Office 

cc: Sean Vincent, Rick Raymondi

Subject: Hydrogeologic Assessment of Water Right Permit Application 15-7285

Introduction

Per your request, this memo summarizes my hydrogeologic assessment of the subject water right permit application. The subject application is proposing to divert 3.6 cfs of ground water for irrigation purposes annually (4/1 – 10/31) from a ground water well in Administrative Basin #15 (Malad Basin).

The proposed well is 10" in diameter and 200 feet deep. Details regarding the construction and production rates for the well are currently not available. The proposed location of the well is in the southeast quarter of the northeast quarter of Section 4, Township 15 South, Range 35 East, in Oneida County. The well is proposed to irrigate 180 acres within the same section as the well location.

A hydrogeologic assessment was conducted to investigate potential impacts to existing water rights near the subject application. The assessment was conducted in four phases:

1. Literature review
2. Development of hydrogeologic conceptual model
3. Analysis of aquifer test data
4. Analysis of potential impacts

Literature Review

A literature review was conducted that included well driller's reports for the closest wells to the application point of diversion (POD), related hydrogeologic reports, and geologic maps of the area. Based on the Idaho Department of Water Resources (IDWR) database, it appears that there are nearly 800 wells in the Malad Basin. Of the 800 wells in the entire basin, impacts to the closest 11 wells were evaluated (Attachment 1). The locations of these wells with respect to the POD range from 1,000 feet to approximately

1.5 miles. The range of depths for these wells range from 106 to 354 feet, which overlaps the proposed depth of 200 feet for the well associated with the application. Two historical USGS reports and geologic maps of the Malad Basin were reviewed to develop a hydrogeologic conceptual model of the area.

Hydrogeologic Conceptual Model

A thick sequence of unconsolidated deposits of gravel, sand, silt, and clay underlies the Malad Valley and its primary tributaries. These deposits (primarily sands and gravels) form the principal aquifer for the region and extend nearly 400 feet below ground surface (Pluhowski, 1970).

The uplands surrounding the Malad Valley are composed of limestone, sandstone, shale, and siltstone. These geologic units are not considered productive aquifers, and form restrictive barriers to ground water flow. Nearly all of the wells in Basin 15 are completed within the Malad Valley, penetrating the alluvial aquifer underlying the basin.

The aquifer underlying the Malad Valley is considered a productive aquifer, with hydraulic conductivity values estimated as high as 200 ft/day (7×10^{-2} cm/sec) and aquifer storage estimates ranging from 0.01 to 0.3 (Burnham, 1969). Ground water exists under both water table and artesian conditions within the basin. Due to the presence of low permeability sediments overlying the aquifer, artesian conditions exist in the central and southern portions of the basin. Ground water in the northern portion and along edges of the basin is found under water table conditions. The location of the well associated with the subject application is along the western edge of the basin, where both water table and semi-confined conditions exist. Water table elevations in the vicinity of the POD range from approximately 4,500 to 4,450 feet above mean sea level, similar to the elevation of the Malad River in the area. This correlation between the elevations of the river and the water table suggests that the aquifer and the river are in hydraulic communication.

Ground water flow direction within the basin is generally to the south and down the valley (Attachment 2). Recharge for the aquifer primarily comes from losses from the Malad River and its tributary streams, with additional contributions from precipitation, percolating water through bedrock fractures and solution openings, and irrigation practices.

Analysis Of Aquifer Test Data

Only two of the well logs provide well test (specific capacity) data. Specific capacity is the ratio of the pumping rate to the total drawdown. As summarized in Table 1, estimates of aquifer transmissivity and hydraulic conductivity were calculated using specific capacity data from the well logs and the series approximation of the Theis (1935) solution. Aquifer thickness was assumed equal to the open/screened interval for purposes of calculating hydraulic conductivity.

Table 1. Summary of specific capacity data analyses

Well	Distance from POD (feet)	Well depth (feet)	Aquifer Thickness (feet) ¹	Pumping Rate (gpm)	Pumping Duration (hours)	Drawdown (feet)	Transmissivity (ft ² /day)	Hydraulic conductivity (ft/day)
Wight	3,000	106	6	18	3	5	695	116
Wight/Thomas	1,000	230	35	1,000	18	20	9,485	271

¹ Aquifer thickness is assumed equal to the open/screened interval for each well

For comparison, Burnham (1969) presents hydraulic conductivity estimates of 100 to 200 ft/day based on analysis of regional ground water flow in the Malad Basin.

Analysis of potential impacts

Due to the strong agreement between the specific capacity-derived hydraulic conductivity estimates with those presented in Burnham (1969) and the proximity of the Wight/Thomas well to the proposed POD, the hydraulic conductivity estimate obtained from analysis of specific capacity data for the Wight/Thomas well was selected for use in the analysis of potential impacts. Assuming an aquifer thickness equal to the screened interval of the Wight/Thomas well (35 feet) results in a transmissivity of 9,485 ft²/day.

Published estimates of the storage coefficient range from 0.01 to 0.3, based on lithologic descriptions of driller's logs (Burnham, 1969). The range of published storage coefficients was used in this analysis due to the uncertainty of this parameter and the fact that the proposed well location is in the transition zone between unconfined and confined aquifer conditions.

In accordance with guidance for determining yield for public drinking water supply wells (IDEQ, 2007), a pumping duration of 1 year was used to estimate potential impacts to water levels in nearby wells. A constant pumping rate of 3.6 cfs (the withdrawal rate on the permit application) was assumed. Assuming an infinite aquifer, the following drawdown values were predicted at wells in the vicinity of the proposed pumping well that are completed in the gravel aquifer:

Table 2. Predicted drawdown values for selected wells assuming an infinite aquifer.

Well Owner	Water Right Number	Distance from POD (feet)¹	Drawdown (feet)² S = 0.3	Drawdown (feet)² S = 0.01
Wight/Thomas	15-2063	1,000	8.63	17.57
Scott	15-7014	1,400	6.91	15.8
Bybee	Unknown	2,700	3.73	12.33
Amy	Unknown	2,900	3.41	11.96
Wight	Unknown	3,000	3.26	11.78
Christiansen	Unknown	3,000	3.26	11.78
Montgomery	Unknown	4,800	1.46	9.32
Seamons	Unknown	5,500	1.06	8.61
Shaw	Unknown	6,000	0.84	8.16
Jenkins	15-7270	6,000	0.84	8.16
Daniels	Unknown	8,000	0.31	6.69

¹ Approximate distances based on IDWR database locations (see attached map)

² Drawdown values estimated using the series approximation of the Theis (1935) solution with all applicable assumptions (Fetter, 1994, pp. 198-200).

Figures 1 and 2 are plan views showing the predicted drawdown distributions after one year of continuous pumping for storage coefficients of 0.01 and 0.3, respectively. Figure 3 presents the same data in graphical format. As shown on these figures, drawdown decreases with radial distance from the pumping well. The cone of depression is radially symmetric because the aquifer is assumed to be homogenous, isotropic, and infinite. The closest well to the application POD (Wight/Thomas) is approximately 1,000 feet due east, with an estimated drawdown after one year of ranging from 8.6 to of 18 feet after one year. Predicted drawdown values in the Warm Springs and Malad River areas (approximately 6,000 feet away) are considerably less, ranging from 0.31 to 6.7 feet.

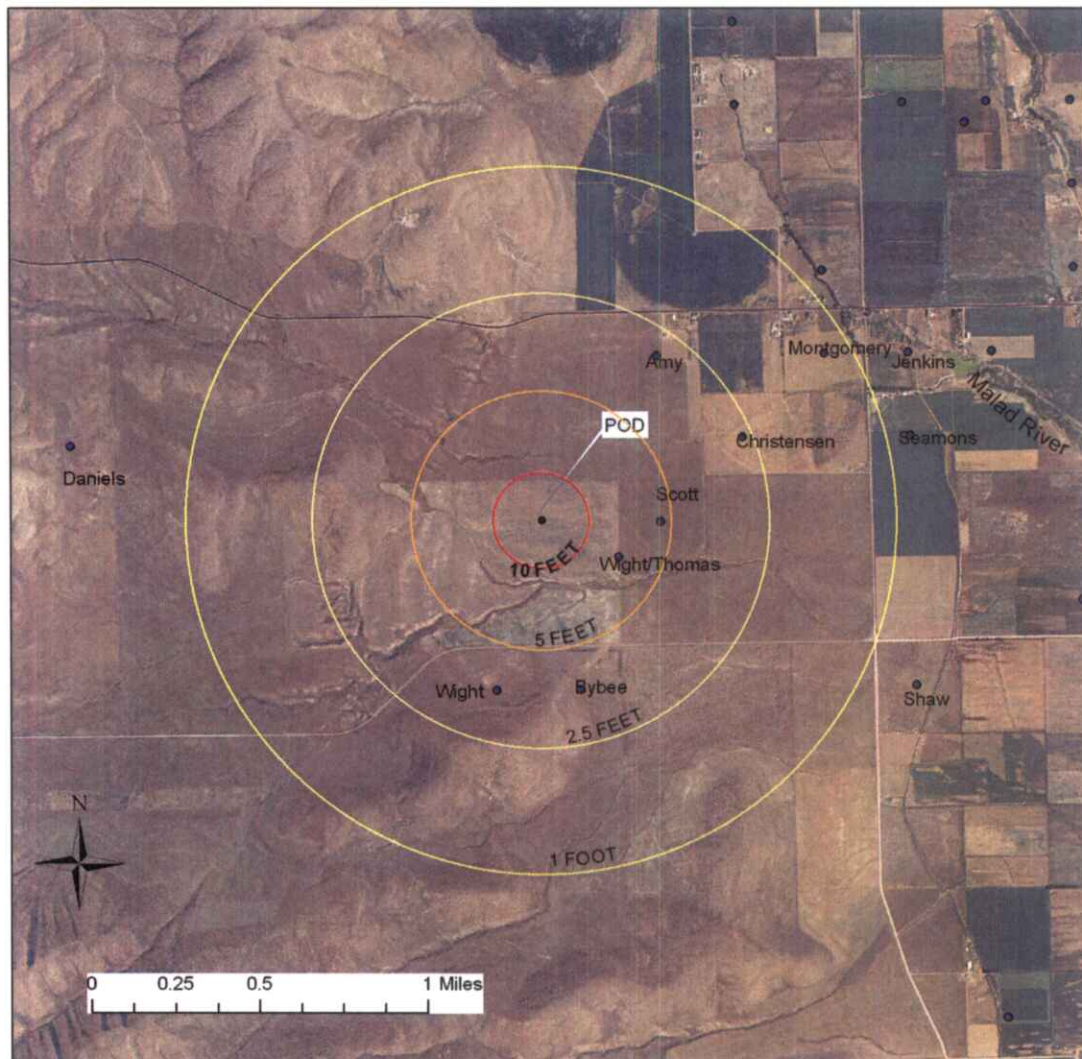


Figure 1. Map showing predicted drawdown after one year of continuous pumping assuming infinite aquifer and an aquifer storage coefficient of 0.3.

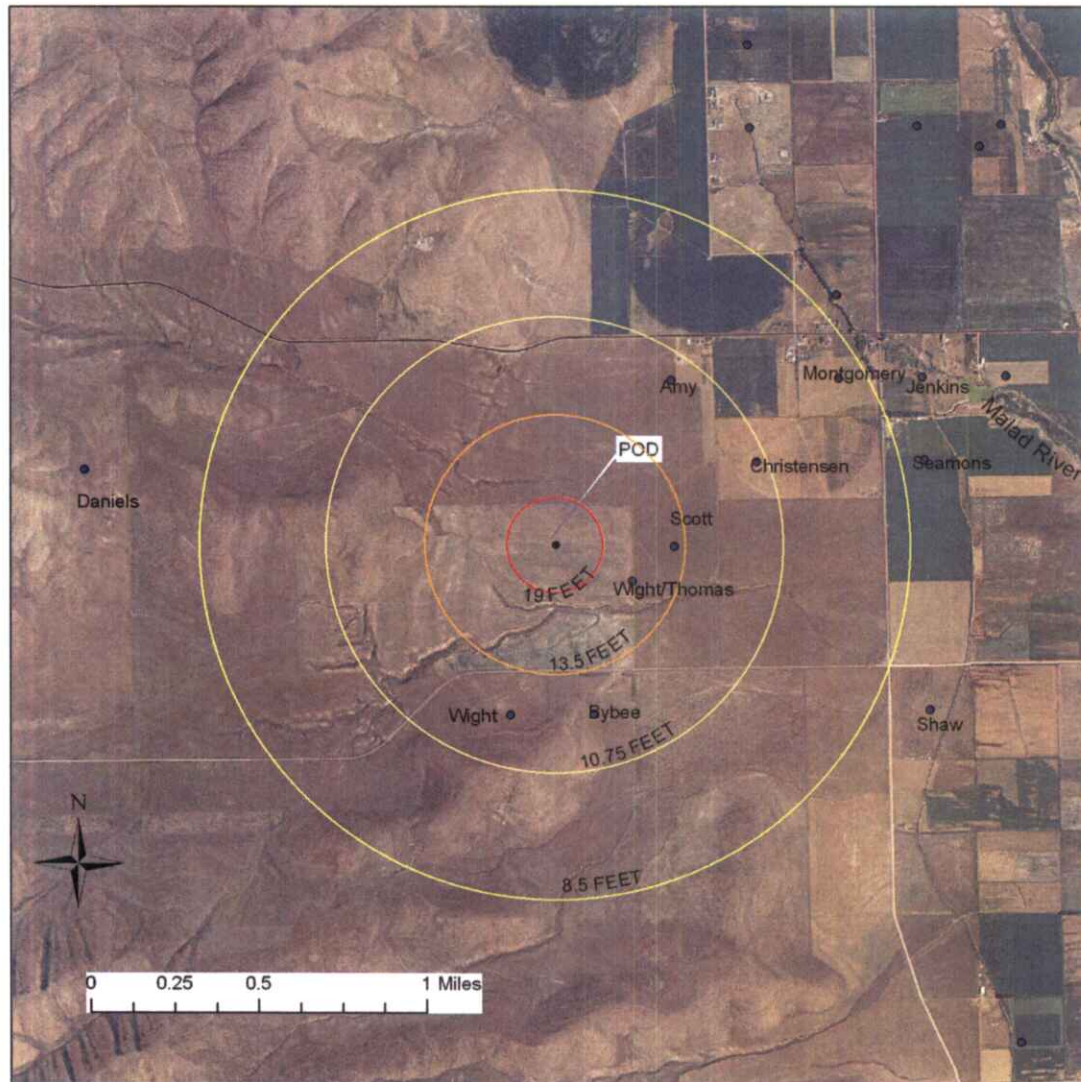


Figure 2. Map showing predicted drawdown after one year of continuous pumping assuming infinite aquifer and an aquifer storage coefficient of 0.01.

The above drawdown estimates are based on the best available estimates for aquifer parameters transmissivity and storage, a pumping time frame of 1 year, and the assumption that the Theis (1935) solution for a confined, infinite aquifer is appropriate for the purpose of estimating drawdown. Deviations from the assumptions affect the validity of the predictions, however.

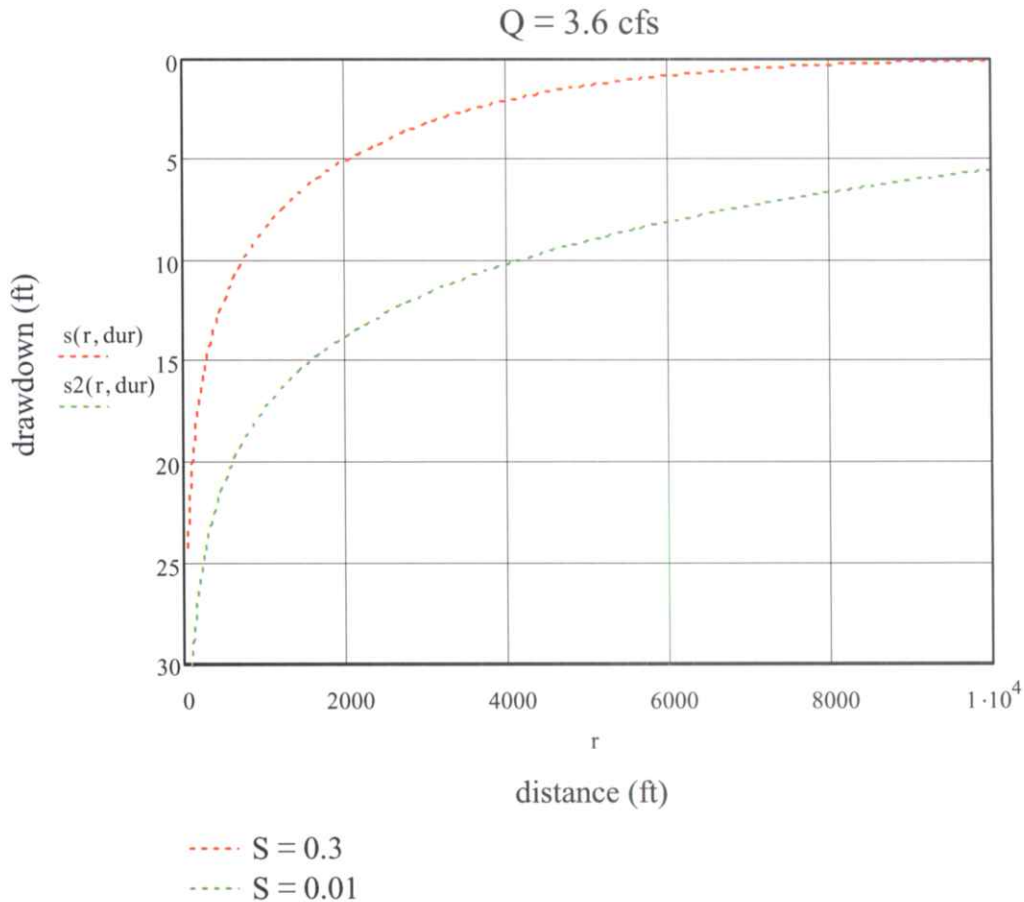


Figure 3. Plot of drawdown versus distance after 1 year of pumping at the proposed application rate.

As previously described, the well penetrates an aquifer that is not in reality of infinite areal extent. In this case, the Malad River likely represents a positive boundary that will provide water to the well and the bedrock/alluvium contact at the valley margin likely represents a negative boundary that, once encountered by the cone of depression, will cause additional drawdown.

As shown in Figure 4, the nonlinear geometries of the suspected positive and negative aquifer boundaries were approximated as linear features to facilitate calculation of the theoretical impacts using image well theory (see, for example, Freeze and Cherry, 1979, p. 330). A strict application of image well theory requires that the real well be reflected across both aquifer boundaries and the resulting image wells also be reflected across both boundaries and so on resulting in an infinite, imaginary well field. In practice, however, the negligible effects of distant image wells are often ignored in order to evaluate drawdown affected by multiple boundaries (Freeze and Cherry, 1979). By making this simplifying assumption, the distribution of drawdown resulting from pumping in the bounded aquifer can be estimated by adding the cones of depression and impression

associated with the image pumping and injection wells to the cone of depression caused by the real pumping well.

For this analysis, only the nearest two image wells (one for each boundary) were considered. In accordance with theory, each image well was placed on the opposite side of the corresponding boundary at a distance equal to the distance from the pumping well to the boundary (Figure 4). The image well used to evaluate the negative western valley-margin boundary had a positive pumping rate equal to the pumping rate of the pumping well and the image well used to evaluate the positive river boundary had a negative pumping rate (injection) of equal magnitude. The eastern valley margin boundary was ignored due to its proximity to the POD being approximately eight miles away. The distribution of drawdown for the entire bounded system was estimated by adding up all of the component drawdown terms (Table 3).

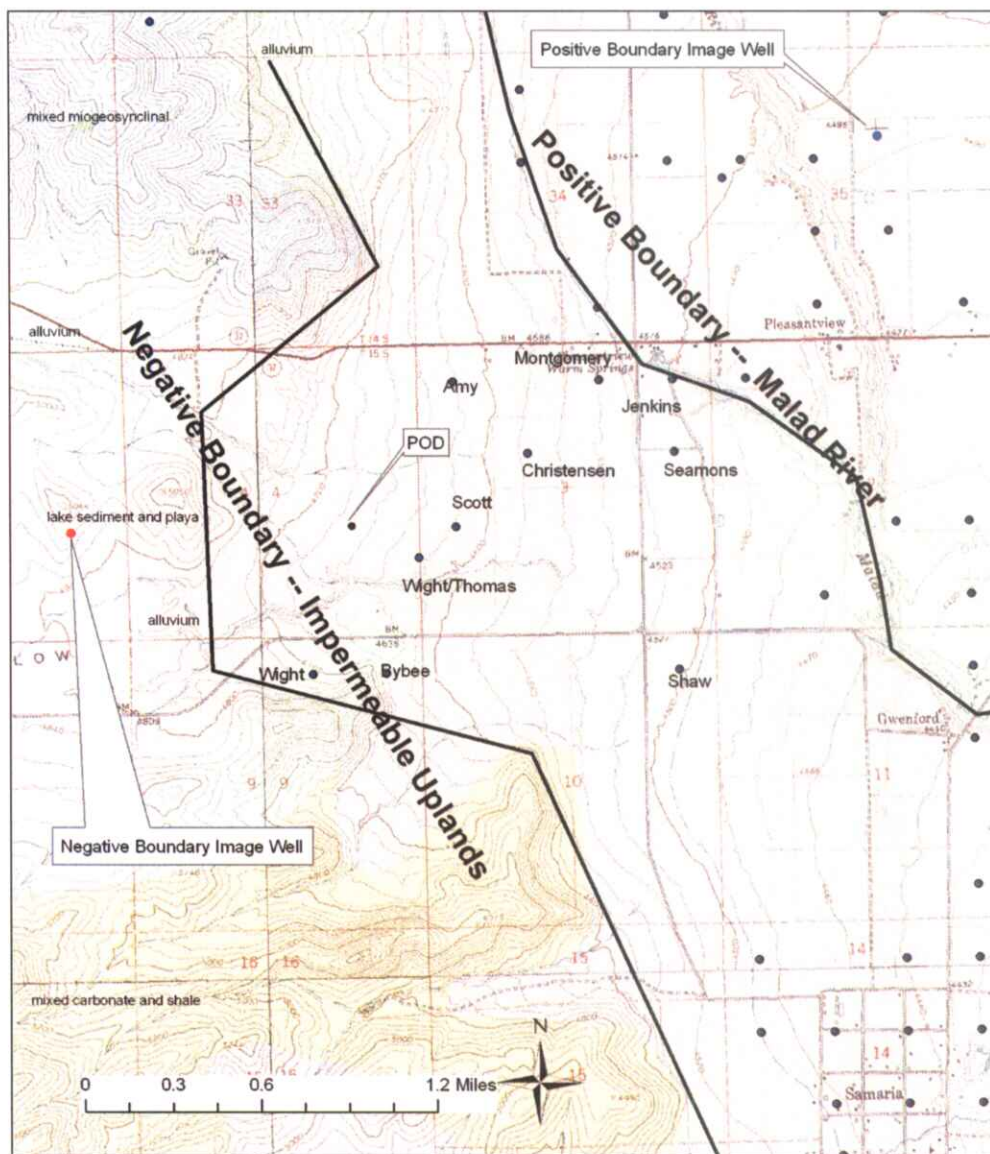


Figure 4. Location of Image Wells for boundary condition analysis.

As shown in Table 3, impacts from the boundary conditions are greatest at wells that are within close proximity to each of the aquifer boundaries. In particular, the drawdown is increased for wells located along the edges of the valley and decreased for wells located in proximity to the Malad River. In addition, whether the aquifer is confined or unconfined has a significant impact in the results of the image well analysis. Only unconfined conditions ($S = 0.3$) were simulated for the positive river boundary as water table conditions must exist for the river to act as a positive boundary to the aquifer. The location of each well is significant in the estimated drawdown calculations with respect to not only the distance from each aquifer boundary, but also with respect to whether the aquifer is confined or unconfined at that particular location.

Table 3. Image Well Drawdown¹

Well Owner	Distance from Positive River Image Well (feet)	Drawdown from Positive River Image Well (feet)	Distance from Negative Valley-Margin Image Well (feet)	Drawdown from Negative Valley-Margin Image Well (feet)		Net Change in Drawdown (feet) [% Change]	
		S=0.3 (Unconfined)		S=0.3 Unconfined	S=0.01 ³ Semi-Confined	S=0.3 Unconfined	S=0.01 ³ Semi-Confined
1) Wight/Thomas	11,350	0.04	6,730	0.73	7.85	0.69 [8%]	7.85 [45%]
2) Scott	10,845	0.06	5,980	0.59	7.52	0.53 [8%]	7.52 [48%]
3) Bybee	13,665	8E-3	7,225	0.85	8.12	0.84 [23%]	8.12 [66%]
4) Amy	9,335	0.15	4,820	0.46	7.16	0.31 [9%]	7.16 [60%]
5) Wight	14,611	4E-3	8,170	1.45	9.23	1.45 [44%]	9.23 [78%]
6) Christiansen	8,960	0.18	9,730	0.28	6.54	0.1 [3%]	6.54 [56%]
7) Montgomery	7,150	0.47	10,775	0.12	5.68	-0.35 [24%]	5.68 [61%]
8) Seamons	7,250	0.45	10,985	0.06	5.19	-0.39 [37%]	5.19 [60%]
9) Shaw	10,730	0.08	11,015	0.06	5.09	-0.02 [2%]	5.09 [62%]
10) Jenkins	6,220	0.76	2,920	0.05	5.08	-0.71 [84%]	5.08 [62%]
Daniels ²	18,360	2E-4	2,920	NA	NA	-2E-4 [<1%]	NA

¹The drawdown values listed above were calculated assuming a continuous, constant pumping rate of 3.6 cfs for one year and a transmissivity of 9,485 ft²/day.

²This well is located within tributary channel that transects along the negative boundary. The impact of the negative boundary was therefore ignored for the purpose of predicting drawdown for the well.

³This analysis assumes no communication between the aquifer and the river.

The storage coefficient used in the analysis has a significant impact on drawdown estimates as shown in Table 4. More drawdown is predicted for confined aquifer conditions because of the lower effective storage coefficient and because only a negative boundary condition is assumed. As touched on previously, a range of storage coefficients was evaluated in this analysis because the aquifer in the vicinity of the proposed well is in a transition zone from unconfined to confined conditions.

Table 4. Drawdown Values Adjusted with Image Well Analysis

Well Owner	Adjusted Drawdown with Image Well Analysis (feet) S= 0.3	Adjusted Drawdown with Image Well Analysis (feet) S= 0.01
Wight/Thomas	9.32	25.42
Scott	7.44	23.32
Bybee	4.57	20.45
Amy	3.72	19.12
Wight	4.71	21.01
Christiansen	3.36	18.32
Montgomery	1.11	15
Seamons	0.67	13.8
Shaw	0.82	13.25
Jenkins	0.13	13.24
Daniels	0.31	6.69

The analysis of the boundary conditions was presented to address the potential for impacts to be greater near the valley margins and less near the central portions of the valley. As shown in Table 4, boundary impacts for a confined aquifer are more significant than for an unconfined aquifer. This is because the aquifer has a lower storage coefficient under confined conditions and it was assumed that there was no hydraulic communication with the river. The location of each well with respect to the aquifer boundaries also has significant impact on the estimated drawdown.

Results from the image well analysis for a confined aquifer indicate that all drawdown estimates will increase from 45 to 78% of the original drawdown calculations. The results from the image well analysis for the unconfined situation indicate boundary impacts will be less significant, as the cone of depression is smaller and both positive and negative boundary conditions are imposed.

Analysis of Impacts to the Malad River

As described above, the conceptual model of the area assumes the Malad River is in hydraulic communication with the underlying aquifer. When the pumping well associated with the proposed application begins to pump, water will be drawn from the aquifer in the vicinity of the well. The zone in which water is being drawn propagates radially from the well with time. If pumped long enough, the zone of influence will reach the Malad River and the subject well will take a portion of its supply from the river. For

this analysis, the percentage of water pumped from the well that is withdrawn from the river is presented using a theoretical formula (Glover and Balmer, 1954).

The theoretical formula estimates the amount of flow drawn from the river at any time after the pumping begins. For this analysis, a seven month pumping period (growing season) was used as the time of pumping. Additional inputs required for the analysis include aquifer properties and distance from the well to the river. Table 5 summarizes the parameters used in the analysis and the results. An aquifer storage coefficient of 0.3 was used in this analysis to simulate an unconfined aquifer in direct hydraulic communication with the river. The hydraulic conductivity used in the analysis was 271 feet/day, the same value used in the drawdown analysis presented above.

Table 5. Analysis of impacts to the Malad River

Distance from well to Malad River (feet)	Time since pumping began	Hydraulic Conductivity (ft/day)	Aquifer Storage	Aquifer depth (feet)	Percentage of flow from river (%)
6,120	7 months	271	0.3	35	9.3

As shown in Table 5, approximately 9% of the water pumped from the well will be withdrawn from the river after seven months of continuous pumping at 3.6 cfs. Assumptions in this analysis include: 1) the river flows in a straight course which extends considerable distances both upstream and downstream from the well location; 2) the aquifer and the river are in direct hydraulic connection; 3) the aquifer is isotropic, homogenous, semi-infinite in areal extent; 4) the stream and the pumping well fully penetrate the aquifer; and 5) the pumping rate and aquifer properties do not change over time (Jenkins, 1968). With several of these assumptions being violated in this particular analysis, the presented percentage should be viewed as an estimate. If the estimate presented is valid and this well is pumped continuously for seven months, then approximately 0.33 cfs of the Malad River flow would be withdrawn through this well at the end of the irrigation season.

Conclusions

The transition from unconfined to confined conditions near the proposed well plays a significant role in the predicted impacts as described above. If the aquifer is confined, than impacts to nearby wells will be higher due to the lower storage coefficient propagating the zone of depression further from the pumping well. In addition, negative impacts (increased drawdown) will be more prominent for confined conditions as the river will not act as a positive boundary for this type of aquifer. For the unconfined situation, both positive and negative boundary conditions are imposed which provide positive (reduced drawdown) and negative (increased drawdown) impacts which tends to counteract one another. In addition, the higher storage coefficient of the unconfined aquifer provides more water to be drawn from the water stored in the pore spaces of the aquifer material, significantly reducing the lateral and vertical extent of the cone of depression.

The analysis presented herein predicts that, in the absence of recharge, the nearest well to the proposed application would experience drawdown values ranging from approximately 9 to 25 feet, depending on whether the aquifer is confined or unconfined. These predicted drawdown values also assume the applicant's well was pumped continuously for one year at a rate of 3.6 cfs (Table 4). This analysis of drawdown values for nearby wells also investigated potential impacts from the nearby impermeable uplands as well as recharge from the Malad River.

Potential impacts to the Malad River were also investigated using a theoretical formula. The stream depletion analysis indicates that up to 9% of the total pumpage will be derived from the Malad River, after continuously pumping the well at 3.6 cfs for seven months and assuming an unconfined aquifer in direct hydraulic communication with the aquifer. These impacts would result in approximately 0.33 cfs of the Malad River flow being withdrawn from this well at the conclusion of the irrigation season.



The predicted impacts to the flows of Warm Springs (Samaria Irrigation Company) cannot be assessed due to the unknown nature of the source of the springs. However, predicted impacts to the wells in the area of the springs have drawdown values on the order of approximately 1 to 13 feet. With the location of the second protestant's well unknown, the impacts to that well cannot be estimated.

References

- Burnham, W.L., Harder, A.H., and Dion, N.P., 1969. Availability of Ground Water for Large Scale use in the Malad Calley-Bear River Areas of Southeastern Idaho – An Initial Assessment. United States Department of the Interior Geological Survey, Water Resources Division Open-File Report.
- Fetter, C.W., 1994. Applied Hydrogeology, Third Edition. Prentice Hall, New Jersey, 691 pp.
- Freeze, R.A. and Cherry, J.A., 1979. Groundwater. Prentice Hall, Englewood Cliffs, New Jersey.
- Glover, R.E. and Balmer, G.G., 1954. River Depletion From Pumping a Well Near a River. Transactions, American Geophysical Union, Volume 35, Number 3, pgs 468-470.
- IDEQ – see Idaho Department of Environmental Quality
- IDWR – see Idaho Department of Water Resources
- Idaho Department of Environmental Quality, 2007. *Testing Guidance for Determining Adequate Yield of New Public Drinking Water System Wells (Draft)*, February, 11 pp.

Idaho Department of Water Resources, 2000. Large Scale Ground Water Development in the Malad Basin, IDWR internal memorandum produced by Bill Ondrechen and Shane Bendixsen.

Jenkins, C.T., 1968. Techniques of Water-Resources Investigations of the United States Geological Survey – Computation of Rate and Volume of Stream Depletion by Wells, Book 4, Chapter D1.

Pluhowski, E. J., 1970. Hydrology of the Upper Malad River Basin, Southeastern Idaho, Geological Survey Water Supply Paper 1888, 85pp.

Theis, C.V., 1935. *The Relation Between the Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage*, Trans. Amer. Geophysical Union, v. 16, pp. 519-524.

ATTACHMENT 1
WELL DRILLER'S REPORTS

RECEIVED
SEP 6 1966

REPORT OF WELL DRILLER
State of Idaho

Department of Reclamation

State law requires that this report shall be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

WELL OWNER:
Name Bert J. Wight & Charlotte Thomas
Address Malad Idaho

Owner's Permit No. G-31605
NATURE OF WORK (check): Replacement well ☐
New well ☐ Deepened ☒ Abandoned ☐

Water is to be used for: Irrigation

METHOD OF CONSTRUCTION: Rotary ☐ Cable ☒
Dug ☐ Other ☐

(explain)
CASING SCHEDULE: Threaded ☐ Welded ☒
16" Diam. from 105 ft. to 230 ft.
"Diam. from _____ ft. to _____ ft.
"Diam. from _____ ft. to _____ ft.
"Diam. from _____ ft. to _____ ft.
Thickness of casing: 250 wall x 1/2" Material:
Steel ☒ concrete ☐ wood ☐ other ☐

(explain)
PERFORATED? Yes ☒ No ☐ Type of
perforator used: Miller 16"

Size of perforations: 3" by 1/4"
8 perforations from 146 ft. to 146 ft.
12 perforations from 170 ft. to 180 ft.
perforations from 190 ft. to 205 ft.
perforations from 215 ft. to 225 ft.

WAS SCREEN INSTALLED? Yes ☐ No ☒

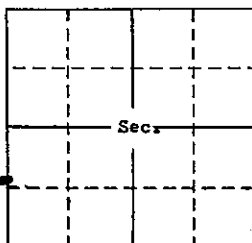
Manufacturer's name _____
Type _____ Model No. _____
Diam. Slot size Set from _____ ft. to _____ ft.
Diam. Slot size Set from _____ ft. to _____ ft.

CONSTRUCTION: Well gravel packed? Yes ☐
No ☒ size of gravel _____ Gravel
placed from _____ ft. to _____ ft. Surface seal
provided? Yes ☐ No ☐ To what depth?
_____ ft. Material used in seal: _____

Did any strata contain unusable water? Yes ☐
No ☒ Type of water: _____
Depth of strata _____ ft. Method of sealing
strata off: _____

Surface casing used? Yes ☐ No ☐
Cemented in place? Yes ☐ No ☐

Locate well in section



LOCATION OF WELL: County Oreida
NW 1/4 Sec. 3 T. 15 N. 35 E. 1/4

Use other side for additional remarks

Size of drilled hole: 16" Total
depth of well: 230 Standing water
level below ground: 130 ft Temp.
Fahr. 55 Test delivery: 1000 gpm
or 2.1 S&P's Pump? ☒ Bail ☐
Size of pump and motor used to make test:
8" Column 16" 5 stage bowler
Length of time of test: 47 Hrs. 10 Min.
Drawdown: 20 ft. Artesian pressure: ft.
above land surface Give flow _____ cfs
or _____ gpm. Shutoff pressure:
Controlled by: Valve ☐ Cap ☐ Plug ☐
No control ☐ Does well leak around casing?
Yes ☐ No ☒

DEPTH MATERIAL WATER
FROM TO 4332 YES OR NO

FEET	FEET	
110	115	Sandy Clay with gravel
115	127	sand with clay
127	137	sandy clay with fine gravel
137	147	large gravel and fine gravel with a little water
147	157	sandy clay and gravel
157	167	Big rocks & gravel
167	180	fine gravel with water
180	190	red clay
190	205	Coarse gravel with water
205	212	sandy clay & gravel
212	230	gravel and water

Work started: Apr 25 1966
Work finished: June 12 1966
Well Driller's Statement: This well was
drilled under my supervision and this report
is true to the best of my knowledge.
Name: M. Davis
Address: 154 E. Main Fremont Id.
Signed by: Mr M. Davis
License No. 249 Date: Aug 31 1966

(over) was

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Office Use Only
Inspected by _____
Twp _____ Rge _____ Sec _____
1/4 _____ 1/4 _____ 1/4 _____
Lat : : Long : : :

1. WELL TAG NO. D 0014087
DRILLING PERMIT NO. 7.64843
Other IDWR No. _____

2. OWNER Don Scott
Name _____
Address P.O. Box 151
City Malad State Id Zip 83252

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.

North _____ or South _____
East _____ or West _____
Twp. 15 North _____ or South _____
Rge. 35 East _____ or West _____
Sec. 3 _____
Gov't Lot _____ County Oneida
Lat _____ Long _____
Address of Well Site Highway 38
City Malad

LL _____ Blk _____ Sub. Name _____

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____
5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____
6. DRILL METHOD
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

Material	From	To	Amount Sacks or Pounds	METHOD
Bentonite	0	20	85 sacks	Overbore

Was drive shoe used? ☐ Y ☐ N Shoe Depth(s) _____
Was drive shoe seal tested? ☐ Y ☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Linear	Welded	Threaded
6"	±2	181'	20	Steel	☒	☐	☒	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS

Perforations _____ Method NA
Screens _____ Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Linear
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

97 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: _____

11. WELL TESTS:

Yield gal/min.	Drawdown	Pumping Level	Time
NA			

Water Temp. _____ Bottom hole temp. _____

Water Quality test or comments: _____

12. LITHOLOGIC LOG: (Describe repairs or abandonment) Water

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
8"	0	20	Clay		☒
6"	20	58	Clay		☒
6"	58	60	Gravel		☒
6"	60	75	Clay		☒
6"	75	80	Gravel		☒
6"	80	95	Clay		☒
6"	95	100	Gravel		☒
6"	100	165	Clay		☒
6"	165	175	Mtn Rock - Sandstone		☒
6"	175	183	Mtn Rock		☒

RECEIVED

JUN 29 2000

Department of Water Resources
Eastern Region

Completed _____ Depth 183 (Measurable)
Date: Started 6-7-00 Completed 6-13-00

13. DRILLER'S CERTIFICATION

We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Vollmer Well Drilling Firm No. 383

Firm Official [Signature] Date 06/25/00

and _____

Driller or Operator [Signature] Date 6/25/00

(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

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.

[illegible]

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Office Use Only			
Well ID No.			
Inspected by			
Twsp	Rge	Sec	
1/4	1/4	1/4	
Lat:	:	Long:	:

1. WELL TAG NO. D 2026596
DRILLING PERMIT NO. 15
Water Right or Injection Well No. _____

2. OWNER:

Name Quincy + Lillian Asey
Address 3120 W. 2000 N
City Malad State Id Zip 83252

3. LOCATION OF WELL by legal description:

You must provide address or Lot, Blk, Sub. or Directions to well.

Twp. 15 North ☐ or South ☒
Rge. 35 East ☒ or West ☐
Sec. 3 1/4 NW 1/4 NW 1/4
Gov't Lot 4 10 acres Orinda 160 acresLat: : : Long: : :
Address of Well Site 5910 W Hwy 38
City Malad

(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 etc.)

☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD:

☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

Seal Material	From	To	Weight / Volume	Seal Placement Method
Bentonite	0	20	8 Bags	overbore

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 227Was drive shoe seal tested? ☐ Y ☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	0	227	0.25	Steel	☒	☐	☒	☐

Length of Headpipe _____ Length of Tailpipe _____

Packer ☐ Y ☐ N Type _____

9. PERFORATIONS/SCREENS PACKER TYPE

Perforation Method Touch

Screen Type & Method of Installation _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
197	227	1/4"	30	6"	Steel	☒	☐

10. FILTER PACK

Filter Material	From	To	Weight / Volume	Placement Method

11. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

110 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: _____

12. WELL TESTS:

☐ Pump ☐ Bailor ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
35			

Water Temp. cold Bottom hole temp. coldWater Quality test or comments: goodDepth first Water Encounter 115

13. LITHOLOGIC LOG: (Describe repairs or abandonment)

Water

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
8 1/2"	0	70	Dark Brown clay gravel		X
8 1/2"	70	95	lt. Brown clay & gravel		X
8 1/2"	95	115	gravel clay		X
8 1/2"	115	190	clay gravel	X	
8 1/2"	190	220	gravel clay		X
6"	220	227	Broken lim	X	X
6"	227	230	Solid lim	X	

RECEIVED
JUL 07 2003
Department of Water Resources
Eastern Region

Completed Depth 230 (Measurable)
Date: Started 5-27-03 Completed 5-28-03

14. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Mtn. West Well Drilling Firm No. 543Principal Driller Michael Frandsen Date 5-31-03and Driller or Operator II Mike Frandsen Date 5-31-03

Operator I _____ Date _____

Principal Driller and Rig Operator Required.
Operator I must have signature of Driller/Operator II.

WELL DRILLER'S REPORT

quoting the report be filed with the State Reclamation Engineer
within 30 days after completion of construction of the wall.

RECEIVED

JAN 21 1964

[illegible]

USE ADDITIONAL SHEETS IF NECESSARY

54

Use Typewriter
or
Ball Point Pen

093824

1. DRILLING PERMIT NO. 15-96E 0008

Other IDWR No. _____

2. OWNER:
Name Bruce Christensen
Address 2444 South 2000 West
City Salt Lake State UT

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.

N
W
E
S

T. 15 North ☐ or South ☒
E. R. 35 East ☒ or West ☐
Sec. 3 SE $\frac{1}{4}$ NW $\frac{1}{4}$ $\frac{1}{4}$
Gov't Lot _____ County _____

10 acres 40 acres 160 acres

Address of Well Site

(Give at least Direction + Distance to Road or Landmark)

Lot No. _____ Block No. _____ Subd. Name _____

4. PROPOSED USE:

☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK

☐ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD

☐ Mud Rotary ☒ Air Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK			AMOUNT	METHOD
Material	From	To	Fraction of Pounds	
<i>Cotton wick</i>	<i>0</i>	<i>40</i>	<i>8</i>	<i>soak bone</i>

Was drive shoe seal tested? Y ☐ NO ☐ How?

8. CASING/LINER:

Diameter	From	To	Gauge	Casing	Liner	Steel	Plastic	Welded	Threaded
6	0	90	25	✓		☒	☐	☒	☐
						☐	☐	☐	☐
						☐	☐	☐	☐
						☐	☐	☐	☐

Final location of shoes

Top Packer or Headpipe _____ Bottom Tailpipe _____

9. PERFORATIONS/SCREENS

☐ Perforations Method _____

☐ Screens Type _____ Material _____

From	To	Slot Size	Number	Diameter	Taper Pipe Size	Casting	Line
None						☐	☐
						☐	☐
						☐	☐
						☐	☐

10. WELL TESTS:

☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal/min.	Drawdown	Pumping Depth	Time
12-15			

Temperature of water _____ Was a water analysis done? Yes ☐ No ☐

By whom?

Water Quality (odor, etc.)

Bottom Hole Temperature

11. STATIC WATER LEVEL:

70 ft. below surface Depth artesian flow found _____

Artesian pressure _____ lb. Describe access port _____

Describe Controlling Devices:

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	GPM	SWL
8	0	5	Dark Brown Clay		
	5	10	Tan Clay		
	10	55	Gray clay		
	55	70	Green Salt Sandstone		
	70	90	" "		
	90	120	Very Hard Brown Sandstone well fractured Inter Bedded		
R	ECEIVED	JUN 17 1996	RECEIVED	JUN 27 1996	
Department of Water Resources			Department of Water Resources		
			Eastern District Office		
	SEP 11 1996	MAY 10	Completed MAY 26-		

13. DRILLER'S CERTIFICATION

1/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Frost & Wells File No. 118

Film Official James L. Jackson Date May 26 1968

Supervisor or Operator _____ Date _____

(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Office Use Only
Inspected by _____
Twp _____ Rge _____ Sec _____
_____ 1/4 _____ 1/4 _____ 1/4
Lat : : Long: : :

FORWARD WHITE COPY TO : WATER RESOURCES

Office Use Only
Inspected by _____
Twp _____ Rge _____ Sec _____
_____ 1/4 _____ 1/4 _____ 1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO. 15-99-E-0040-000
Other IDWR No. 00004185

2. OWNER:
Name Seth Seamons
Address 2223 So. 5400 W.
City Malden State MD Zip 83252

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.


 Twp. 15 North ☐ or South ☒
 Rge. 35 East ☒ or West ☐
 Sec. 3 1/4 SE 1/4 NE 1/4
 Gov't Lot _____ County Ondaga
 Lat: : : Long: : :
 Address of Well Site Same as above City _____

 (Give at least name of road - Distance to Road or Landmark)

4. USE:

☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply

☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD

☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other

7. SEALING PROCEDURES

SEAL/FILTER PACK			AMOUNT	METHOD
Material	From	To	Sacks or Pounds	
Bentonite	0	18	4	OverBore

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 195
Was drive shoe seal tested? ☐ Y ☐ N How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	0	195	250	Steel	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS

☒ Perforations Method Air Perforator
☐ Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
190	195	1 1/2"	40	2.50	Steel	☒	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

20 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or
control devices:

11. WELL TESTS:

☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
30			

Water Temp. cold Bottom hole temp cold
Water Quality test or comments: _____

12. LITHOLOGIC LOG: (Describe repairs or abandonment.)

[illegible]

13. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Mountain West Well Drilling Firm No. 543

Firm Official Mike Frandsen Date 10-3-97

Supervisor or Operator _____ Date _____

(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Form 2287
6/02

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D 0026590
DRILLING PERMIT NO. 797967
Water Right or Injection Well No. _____

2. OWNER:
Name Robert Shaw
Address 10080 W 10th St
City Tremonton State UT Zip 84337

3. LOCATION OF WELL by legal description:
You must provide address or Lot, Blk, Sub. or Directions to well.
Twp. 15 North ☐ or South ☒
Rge. 35 East ☒ or West ☐
Sec. 10 1/4 NE 1/4 NE 1/4
Gov't Lot _____
County Oneida
Lat: _____ Long: _____
Address of Well Site 5400 West 3000 S
City _____
Blk. _____ Sub. Name _____

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD:
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

Seal Material	From	To	Weight / Volume	Seal Placement Method
Bentonite	0	20	6 Bags	Over Pipe

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 155
Was drive shoe seal tested? ☐ Y ☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	0	155	25	Steel	☒	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe _____
Packer ☐ Y ☐ N Type _____

9. PERFORATIONS/SCREENS PACKER TYPE
Perforation Method Torch
Screen Type & Method of Installation

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
145	155	1/16"	25	6"	Steel	☒	☐

10. FILTER PACK

Filter Material	From	To	Weight / Volume	Placement Method
-----------------	------	----	-----------------	------------------

11. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
55 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: _____

Office Use Only
Well ID No. _____
Inspected by _____
Twp _____ Rge _____ Sec _____
1/4 _____ 1/4 _____ 1/4 _____
Lat: _____ Long: _____

12. WELL TESTS:
☐ Pump ☐ Bailor ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
20			

Water Temp. cold Bottom hole temp. cold
Water Quality test or comments: _____

13. LITHOLOGIC LOG: (Describe repairs or abandonment) Water

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
8"	0	10	Brown clay		X
8"	10	20	Gravel & Brown clay	X	
6"	20	28	Brown clay		X
6"	28	78	Brown clay & gravel	X	
6"	78	100	Brown clay		X
6"	100	120	clay & gravel	X	
6"	120	135	Brown clay		X
6"	135	139	Gravel	X	
6"	139	150	Brown clay		X
6"	150	155	Brown clay & gravel	X	

Completed Depth _____ (Measurable)
Date: Started 4-8-03 Completed 4-9-03

14. DRILLER'S CERTIFICATION
We certify that all minimum well construction standards were complied with at the time the rig was removed.
Company Name Mountain West Well Drilling Firm No. 543
Principal Driller Michael Frandsen Date 4-12-03
and _____ Date _____
Driller or Operator II _____ Date _____
Operator I _____ Date _____

FORWARD WHITE COPY TO WATER RESOURCES

Form 239-7
6/02

IDAHO DEPARTMENT OF WATER RESOURCES WELL DRILLER'S REPORT

15

Office Use Only			
Well ID No.			
Inspected by			
Twp	Rge	Sec	
1/4	1/4	1/4	
Lat: : :	Long: : :		

1. WELL TAG NO. D 0036074
 DRILLING PERMIT NO. _____
 Water Right or Injection Well No. _____

2. OWNER:
 Name John Jenkins Trust
 Address P.O. Box 21
 City Maeda State ID Zip 83252

3. LOCATION OF WELL by legal description:
 You must provide address or Lot, Blk, Sub. or Directions to well.
 Twp. 15 North ☐ or South ☒
 Rge. 35 East ☒ or West ☐
 Sec. 3 1/4 NE 1/4 NE 1/4
 Gov't Lot _____
 Lat: : : Long: : :
 Address of Well Site 2121 S 4300 W City Pleasant View
 (Check at least one of road - Distance to Road or Landmark)
 Lt. 15 Blk. _____ Sub. Name _____

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD:
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

Seal Material	From	To	Weight / Volume	Seal Placement Method
<u>Bentonite</u>	<u>0</u>	<u>20</u>	<u>8 bags</u>	<u>Overbore</u>

 Was drive shoe used? ☒ ☐ N Shoe Depth(s) 243
 Was drive shoe seal tested? ☐ ☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
<u>6</u>	<u>0</u>	<u>243</u>	<u>20</u>	<u>steel</u>	☒	☐	☒	☐

 Length of Headpipe _____ Length of Tailpipe _____
 Packer ☐ Y ☐ N Type _____

9. PERFORATIONS/SCREENS PACKER TYPE
 Perforation Method Forch
 Screen Type & Method of Installation _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
<u>223</u>	<u>243</u>	<u>1/4</u>	<u>6</u>	<u>30</u>	<u>steel</u>	☒	☐

10. FILTER PACK

Filter Material	From	To	Weight / Volume	Placement Method

11. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
6 ft. below ground Artesian pressure _____ lb.
 Depth flow encountered _____ ft. Describe access port or control devices: _____

12. WELL TESTS:
☐ Pump ☐ Bailor ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
<u>400-500</u>			

 Water Temp. cold Bottom hole temp. cold
 Water Quality test or comments: _____

13. LITHOLOGIC LOG: (Describe repairs or abandonment) Water

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
<u>10</u>	<u>0</u>	<u>10</u>	<u>clay Bm</u>		☒
<u>10</u>	<u>10</u>	<u>20</u>	<u>gravel clay</u>		☒
<u>6</u>	<u>20</u>	<u>40</u>	<u>gravel clay</u>		☒
<u>6</u>	<u>40</u>	<u>60</u>	<u>clay Bm</u>		☒
<u>6</u>	<u>60</u>	<u>100</u>	<u>clay w/ gravel sand</u>	☒	
<u>6</u>	<u>100</u>	<u>130</u>	<u>Bm clay</u>		☒
<u>6</u>	<u>130</u>	<u>150</u>	<u>Bm clay gravel</u>		☒
<u>6</u>	<u>150</u>	<u>160</u>	<u>gravel Bm clay</u>		☒
<u>6</u>	<u>160</u>	<u>178</u>	<u>Bm clay</u>		☒
<u>6</u>	<u>178</u>	<u>200</u>	<u>gravel</u>		☒
<u>6</u>	<u>200</u>	<u>210</u>	<u>Broken lime</u>		☒
<u>6</u>	<u>210</u>	<u>220</u>	<u>Solid lime</u>		☒
<u>6</u>	<u>220</u>	<u>240</u>	<u>lime w/ Broken areas</u>		☒
<u>6</u>	<u>240</u>	<u>245</u>	<u>Broken lime clay sand</u>		☒
<u>6</u>	<u>245</u>	<u>300</u>	<u>Solid lime</u>		☒

RECEIVED
 JUN 30 2005
 Department of Water Resources
 RECEIVED
 JUN 14 2005
 Department of Water Resources
 Eastern Region
 SCANNED
 JUN 22 2005

Completed Depth 300 (Measurable)
 Date: Started 4-25-05 Completed 4-27-05

14. DRILLER'S CERTIFICATION
 I/we certify that all minimum well construction standards were complied with at the time the rig was removed.
 Company Name Mt. West Well Drilling Firm No. 543
 Principal Driller Michael Zanderson Date 5-2-05
 and Driller or Operator II Theresa Zanderson Date 4-27-05
 Operator I _____ Date _____
 Principal Driller and Rig Operator Required.
 Operator I must have signature of Driller/Operator II.

FORWARD WHITE COPY TO WATER RESOURCES

11/25/07 *DMB*

IDAHO DEPARTMENT OF WATER RESOURCES WELL DRILLER'S REPORT

15

1 WELL TAG NO. D 0021128
DRILLING UNIT NO 769103
OWNER L/WH NO _____

2 OWNER: Pete Daniels
Name _____
Address Malad
City MD State DE Zip 83252

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

Top 15 North to South
Rise 35 East to West
Sec 5 SW 1/4 NW 1/4
Twp 35 N R. 14 E S. 14 E
County Blaine
Address of Well Site 400 L. Wat
City MD

4. USE:
☒ Domestic ☐ Irrigation ☐ Industrial
☐ Thermal ☐ Injection ☐ Other Stock

5. TYPE OF WORK check all that apply (Hydrofracture etc.)
☒ New Well ☐ Re-drilling ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☒ Rotary ☐ Cable ☐ Air ☐ Other _____

SPERMUM	DATE	REASON	USING
<u>Ben Seal</u>	<u>0</u>	<u>58</u>	<u>Trim</u>

Was this shoe used? ☒ Yes ☐ No
Was this shoe tested? ☒ Yes ☐ No

Depth	From	To	Depth	Material	Depth	Material	Depth	Material
<u>0</u>	<u>0</u>	<u>34</u>	<u>34</u>	<u>Prime</u>	<u>34</u>	<u>Prime</u>	<u>34</u>	<u>Prime</u>

Length of Headpipe _____ Length of Tailpipe _____

9 PERFORATIONS/SCREENS
Particulars _____
Screen _____ Screen Type _____

From	To	Screen	Material	Depth	Material
<u>0</u>	<u>0</u>	<u>34</u>	<u>Prime</u>	<u>34</u>	<u>Prime</u>

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
Below ground Artesian pressure 7.5 ft
Depth from encounter 58 ft Describe access point of control devices: well head by Cde

11. WELL TESTS:

Test	Pressure	Flow	Artesian
<u>160</u>	<u>0</u>	<u>0</u>	<u>0</u>

Water Temp 61 Bottom hole temp. 61
Water Quality zone alk

12 LITHOLOGIC LOG: (Describe depths or abandonment)

Depth	Material	Water Quality & Temperature
<u>0</u>	<u>58</u>	<u>pulled 60' of 6"</u>
<u>58</u>	<u>58</u>	<u>Casing out, that</u>
<u>58</u>	<u>58</u>	<u>was put in before.</u>
<u>58</u>	<u>58</u>	<u>Casing was reused</u>
<u>58</u>	<u>58</u>	<u>in top of bore, which</u>
<u>58</u>	<u>58</u>	<u>was cut out.</u>
<u>10</u>	<u>0</u>	<u>3</u>
<u>3</u>	<u>58</u>	<u>Blue clay</u>
<u>58</u>	<u>58</u>	<u>gravel flowed @ 160'</u>
<u>58</u>	<u>160</u>	<u>Blue clay</u>
<u>160</u>	<u>195</u>	<u>Gravel</u>
<u>195</u>	<u>310</u>	<u>Blue clay & Black</u>
<u>310</u>	<u>336</u>	<u>Gravel & sand w/ gravel</u>
<u>336</u>	<u>344</u>	<u>Gravel clean bedrock</u>
<u>344</u>	<u>344</u>	<u>ascs. paved for 1/2</u>
<u>344</u>	<u>344</u>	<u>of well</u>

RECEIVED

NOV 15 2007

Department of Water Resources

Completed Depth 338
Date: Started 5-22-07 Completed 12-30-07

13. DRILLER'S CERTIFICATION

I/we certify that all minimum well construction standards were complied with and the final log was removed.

Company Name Gardner Drilling (firm No. 454)

Dr. Official JC Gardner Date March 14 06

Dr. Date _____
Dr. Date _____

DRILLING REPORT ~ BASIN 13 01/1998 - PRESENT

	<u>AP</u>	<u>PERMIA</u>	<u>APP.</u>	<u>TOTAL</u>
1997	53	54	-	107
1998	49	50	1	100
1999	44	42	-	86
2000	40	109	57	116
2001	39	20	54	113
2002	44	31	79	154
2003	109	24	73	206
2004	51	3	52	106
2005	39	-	35	74
2006	52	-	41	93
2007	36	-	33	69

$$\Sigma = 556$$

$$\bar{X} = 50.5$$

$$\text{Max} = 109$$

$$\text{Min} = 36$$

$$\Sigma = 1224$$

$$\bar{X} = 111$$

$$\text{Max} = 206$$

$$\text{Min} = 69$$