

MEMO

State of Idaho

Department of Water Resources

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Date: December 16, 2009

To: Allen Merritt

From: Mike McVay 

cc: Jeff Peppersack, Rick Raymondi, and Sean Vincent

Subject: Evaluation of proposed DeVries transfer #75529.

Introduction

Per your request, I have evaluated the proposed transfer for the DeVries Dairy. This review has been conducted to answer the following question:

1. If the proposed well is pumped at a rate of 0.25 ft³/sec (cfs), what will be the likely impact to neighboring wells?
2. If the proposed well is pumped at a rate of 0.25 cfs, what will be the likely impact to surface water?

IDWR Review

The proposed point of diversion (POD) for transfer #75529 is located approximately 2.5 miles southwest of the Buhl city limits in an area known as the Twin Falls Tract (Figure 1). The application proposes to transfer 0.21 cfs of irrigation water rights from a point of diversion (POD) that is located approximately 24 miles east-southeast of the existing DeVries destination POD. This water is to be combined with an existing domestic and stock water right of 0.04 cfs to provide 0.25 cfs for commercial and stock water use at the dairy. This transfer has been protested due to concerns about negative impacts to a POD located approximately 5.5 miles south of the DeVries Dairy (Figure 1 – Protestant Well).

It appears that 0.21 cfs of water is actually being transferred. The impact analysis provided by Brockway Engineering evaluated the entire 0.25 cfs, which is a conservative approach to estimating the impacts due to this transfer.

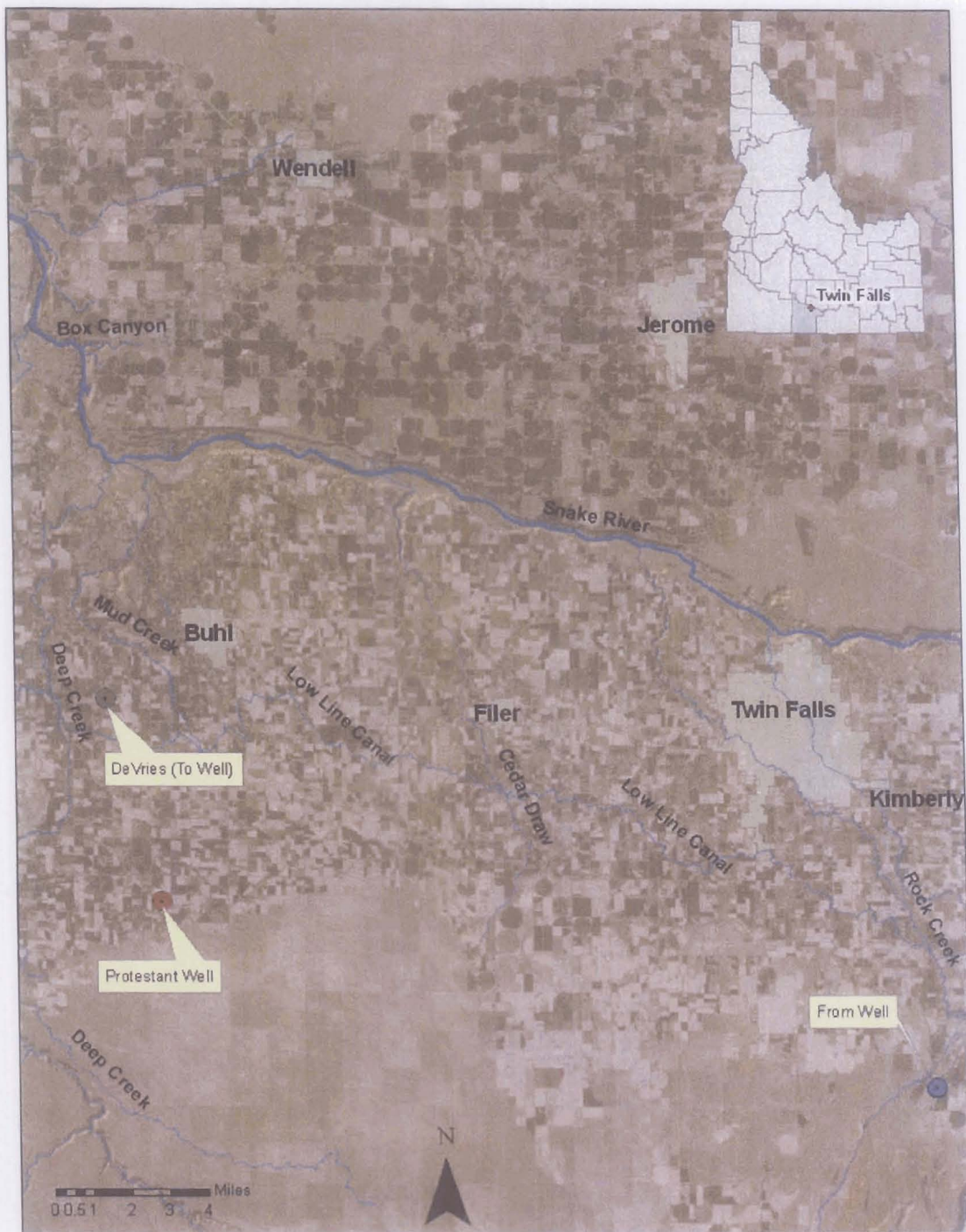


Figure 1. Location of the DeVries well ("To Well") in relation the Protestant's Well and the "From Well."

Ground Water Management on the Twin Falls Tract

The Twin Falls Tract is a predominantly agricultural area located on the south side of the Snake River. Although much of the area is irrigated with diverted Snake River water, it lies outside of the Eastern Snake Plain Aquifer Model (ESPAM version 1.1) boundary (Figure 2). Therefore, transfers in this area are not required to submit calculated depletions to the Snake River that are based on the ESPAM or ESPA Transfer Spreadsheet (IDWR, 2009).

The Twin Falls Tract also occupies the area encompassed by the Twin Falls Ground Water Management Area (TFGWMA). This ground water management area was created in 1984 due to concerns about declining heads in the low temperature, geothermal aquifer. The geothermal aquifer lies beneath the cold water aquifer which this transfer presumes to access. Because this transfer does not propose utilizing the geothermal aquifer, the associated moratorium on new rights and transfers does not apply (IDWR, 2008).

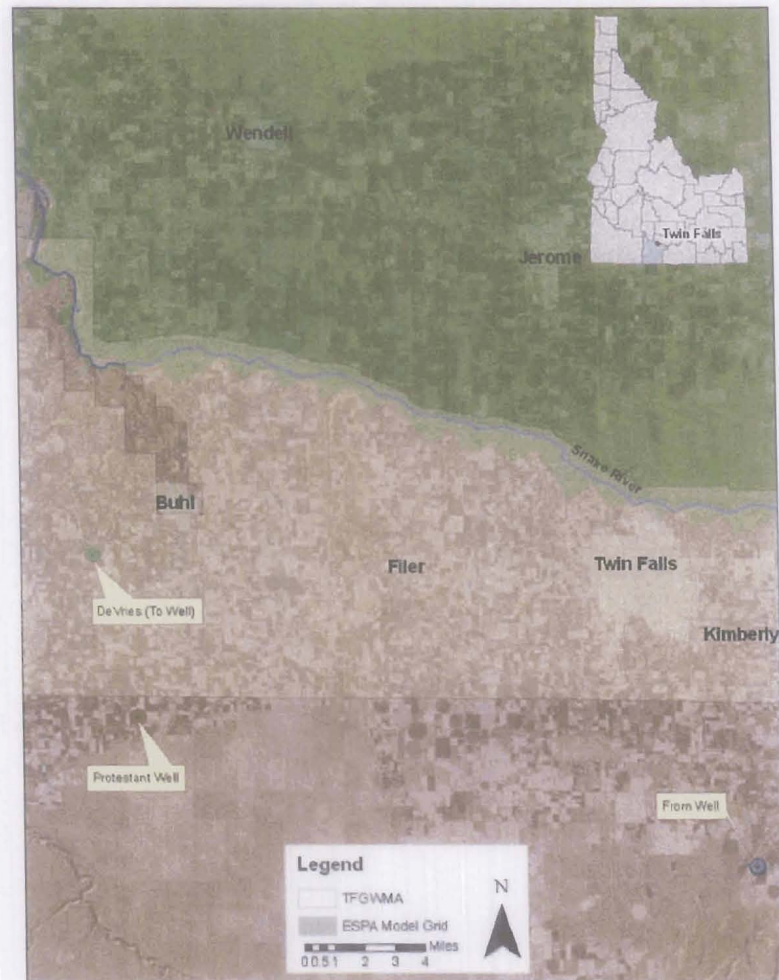


Figure 2. Map illustrating the wells involved in the proposed transfer in relation to the TFGWMA and the ESPAM boundary.

Hydrogeology

The regional aquifer underlying the Twin Falls Tract primarily comprises Tertiary and Quaternary basalts and the associated interbedded sediments (Cosgrove, 1997; Figure 3). Recharge to this water table aquifer occurs predominantly via surface water irrigation, and to a lesser degree, by precipitation and ground water underflow (Ralston, 1971). Discharge generally occurs through springs and man-made drains that discharge into surface water streams.

The basalt regional aquifer overlies a confined, geothermal aquifer that comprises Tertiary rhyolite (Cosgrove, 1997). The geothermal aquifer is generally more than 500 ft. below land surface, and does not exhibit significant communication with the overlying regional aquifer (Ralston, 1971; Cosgrove, 1997).

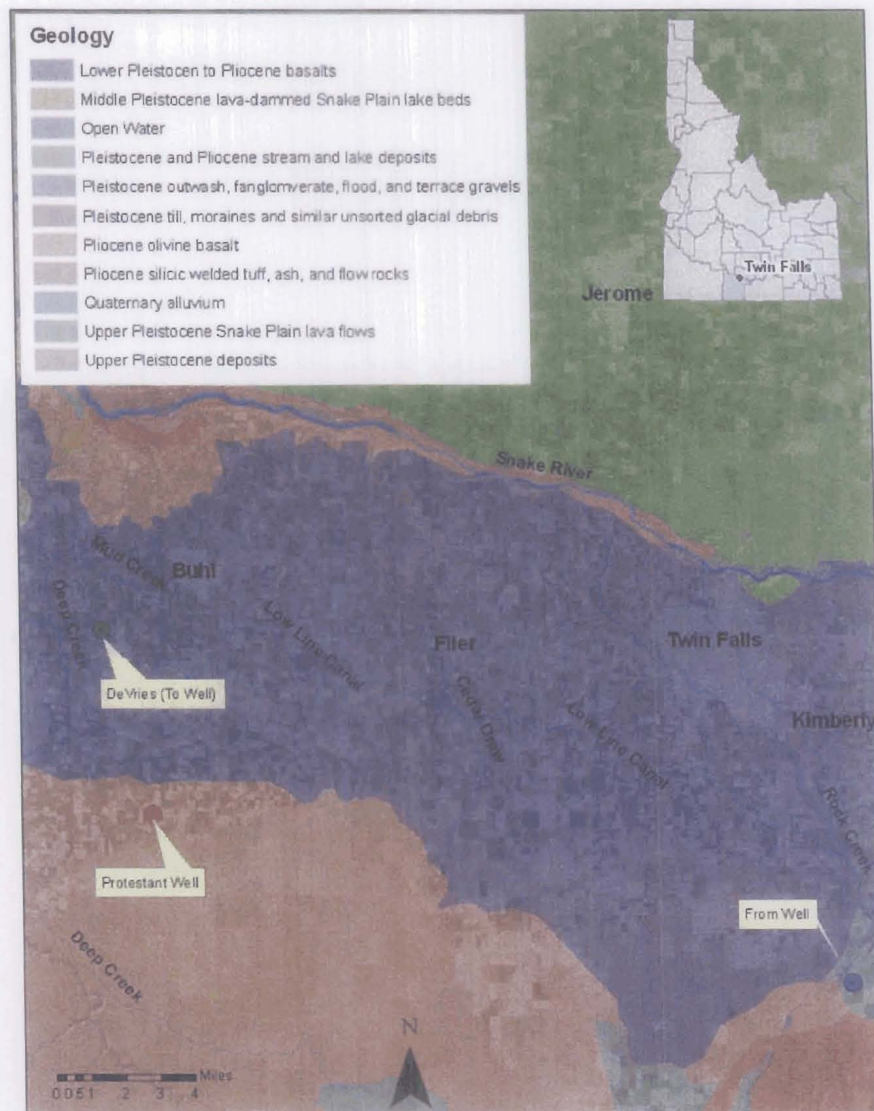


Figure 3. Surface geology map of the Twin Falls Tract (USGS, 1994).

Water Level Impacts

Because the transfer wells are located outside of the ESPAM boundary, a Theis (1935) analysis has been used to estimate potential impacts to neighboring wells as a result of pumping the DeVries well. The analysis assumes that the DeVries well pumps at 0.25 ft³/second for two years. It is important to note that the Theis analysis assumes the aquifer is confined. Although the regional aquifer is unconfined, the Theis analysis may be applied to unconfined aquifers if the drawdown is small compared to the saturated thickness of the aquifer (ASTM, 2008). Recharge is also not considered. Therefore, drawdown may be over-estimated for this scenario.

It should be noted that, although the only known reported storage coefficient values for this area range between 0.04 and 0.07, Brockway Engineering used a conservative 0.01 as the storage value in their Theis estimate (Cosgrove, 1998; Ralston, 1971). It is also important to note that IDWR could not replicate the drawdown values reported in the Brockway Engineering analysis using the given inputs and method (Tables 1 and 2).

Table 1. Brockway Engineering estimated drawdown at various distances (R) from the DeVries well.					
Pumping rate (Q)=112.2 gpm Storage Coefficient (S)=0.01 Time period = 2 yrs Transmissivity (T) =3,680 ft ² /day					
	R = 0.5 ft	R = 100 ft	R = 1,000 ft	R = 5,280 ft	R = 26,400 ft
Elapsed Time (days)	Drawdown (ft)	Drawdown (ft)	Drawdown (ft)	Drawdown (ft)	Drawdown (ft)
740	7.2	2.2	0.3	0.0	0.0

Table 2 shows the IDWR derived Theis estimates of drawdown at various distances from the DeVries well using the aquifer properties presented in the supporting documentation for this transfer (Brockway, 2009). After two years of pumping, the estimated drawdown in wells located 0.5 ft., 5,280 ft., and 26,400 ft. distant from the DeVries well is 10.8 ft., 1.45 ft., and 0.19 ft. respectively. The protestant's well is located approximately 29,000 ft. from the DeVries Dairy.

Table 2. IDWR estimated drawdown from the DeVries well pumping continuously for two years – utilizing Brockway Engineering derived aquifer properties.					
Time-drawdown at various time intervals calculations using Theis equation					
		Distance (ft)	0.5	5,280	26,400
Aquifer parameters		Time (days)	Drawdown (ft)	Drawdown (ft)	Drawdown (ft)
T ¹ = 3,680 ft ² /d S ¹ = 0.01		1	7.00	-	-
		3	7.52	0.00	-
Pumping rate		10	8.08	0.03	-
Q ² = 21,579 ft ³ /d		14	8.24	0.06	-
		31	8.61	0.21	-
		365	9.76	1.14	0.06
		730	10.08	1.45	0.19

¹Aquifer properties taken from Brockway, 2009. ²This pumping rate is equivalent to the 112.2 gpm used in Brockway, 2009.

¹Aquifer properties taken from Brockway, 2009. ²This pumping rate is equivalent to the 112.2 gpm used in Brockway, 2009.

Table 3 shows Theis estimates of drawdown at various distances from the DeVries well using the aquifer properties (transmissivity and storage) presented in Cosgrove, 1998. After two years of pumping, the estimated drawdowns in wells located 0.5 ft., 5,280 ft., and 26,400 ft. distant from the DeVries well are 8.6 ft., 0.59 ft., and 0.00 ft., respectively.

Table 3. IDWR estimated drawdown from the DeVries well pumping continuously for two years – utilizing aquifer properties presented in Cosgrove (1998).				
Time-drawdown at various time intervals calculations using Theis equation				
Distance (ft)		0.5	5,280	26,400
Aquifer parameters	Time (days)	Drawdown (ft)	Drawdown (ft)	Drawdown (ft)
$T^1 = 3,940 \text{ ft}^2/\text{d}$ $S^1 = 0.07$	1	5.72	-	-
	3	6.20	-	-
Pumping rate	10	6.73	0.00	-
$Q^2 = 21,579 \text{ ft}^3/\text{d}$	14	6.87	0.00	-
	31	7.22	0.00	-
	365	8.30	0.36	0.00
	730	8.60	0.59	0.00

¹Aquifer properties taken from Cosgrove et al., 1998. ²This pumping rate is equivalent to the 112.2 gpm used in Brockway, 2009.

Surface Water Impacts

The DeVries Dairy is located less than one mile north of the Low Line Canal and approximately 1.25 miles east of Deep Creek (Figure 1). Despite the proximity of the POD well from surface water bodies, a review of local driller's reports indicates that the depth to water in this area is at least 50 feet (Appendix A). Because of the vertical separation between surface water and the water table, flows in the canal and Deep Creek are most likely not affected by fluctuations in ground water levels. Therefore, surface water impacts associated with this transfer are assumed to be negligible.

It is important to note that any consumptive use on the Twin Falls Tract will ultimately result in depletions (or reduction in gains) to the Snake River that equal the consumptive use. However, the tract is outside of the ESPA Common Ground Water Area (Figure 2), and impacts to the Snake River have not been considered.

Conclusions

In an effort to evaluate the impacts of pumping the DeVries well, this review has been conducted to answer the following questions:

1. If the proposed well is pumped at a rate of 0.25 cfs, what will be the likely impact to neighboring wells?

Pumping the DeVries well continuously at 0.25 cfs for two years will produce an estimated drawdown of 8.60 ft. at the pumping well, 0.59 ft. of drawdown in wells 5,280 ft. away, and no measurable drawdown in wells at a distance of 26,400 ft. The protestant's well is approximately 29,000 ft. away from the DeVries POD, and would be

expected to show no measurable drawdown due to DeVries pumping based on this analysis.

2. If the proposed well is pumped at a rate of 0.25 cfs, what will be the likely impact to surface water?

Ground water near the DeVries Dairy is deep enough so that the flows in the Low Line Canal and Deep Creek likely will not change in response to ground water level fluctuations. Therefore, surface water impacts are assumed to be negligible due to pumping from the DeVries POD.

References

ASTM D4105 - 96(2008) Standard Test Method (Analytical Procedure) for Determining Transmissivity and Storage Coefficient of Nonleaky Confined Aquifers by the Modified Theis Nonequilibrium Method. DOI: 10.1520/D4105-96R08, www.astm.org.

Brockway Engineering, 2009. Multiple Well Effect Analysis of Transfer 75529.

Cosgrove, D.M., Johnson, G.S., Brockway, C.E., and Robinson, C.W., 1997. Geohydrology and development of a steady state ground-water model for the Twin Falls, Idaho area. IWRRI. Moscow, Idaho.

Cosgrove, D.M., Johnson, G.S., Brockway, C.E., and Robinson, C.W., 1998. Development of a transient ground-water model for the Twin Falls, Idaho area. IWRRI. Moscow, Idaho.

IDWR, 2008. Final order extending moratorium in the matter of the Twin Falls Ground Water Management Area moratorium, April 17, 2008. Idaho Department of Water Resources, Boise, ID.

IDWR, 2009. Administrator's memorandum: Transfer Processing Policies and Procedures, January 29, 2009. Idaho Department of Water Resources, Boise, ID.

Theis, C.V., 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using ground water storage. Trans American Geophysical Union Part 2, 16:519–524

USGS, 1994. 1:500,000 scale digital geology coverage of Idaho. USGS, Reno, NV.

APPENDIX A

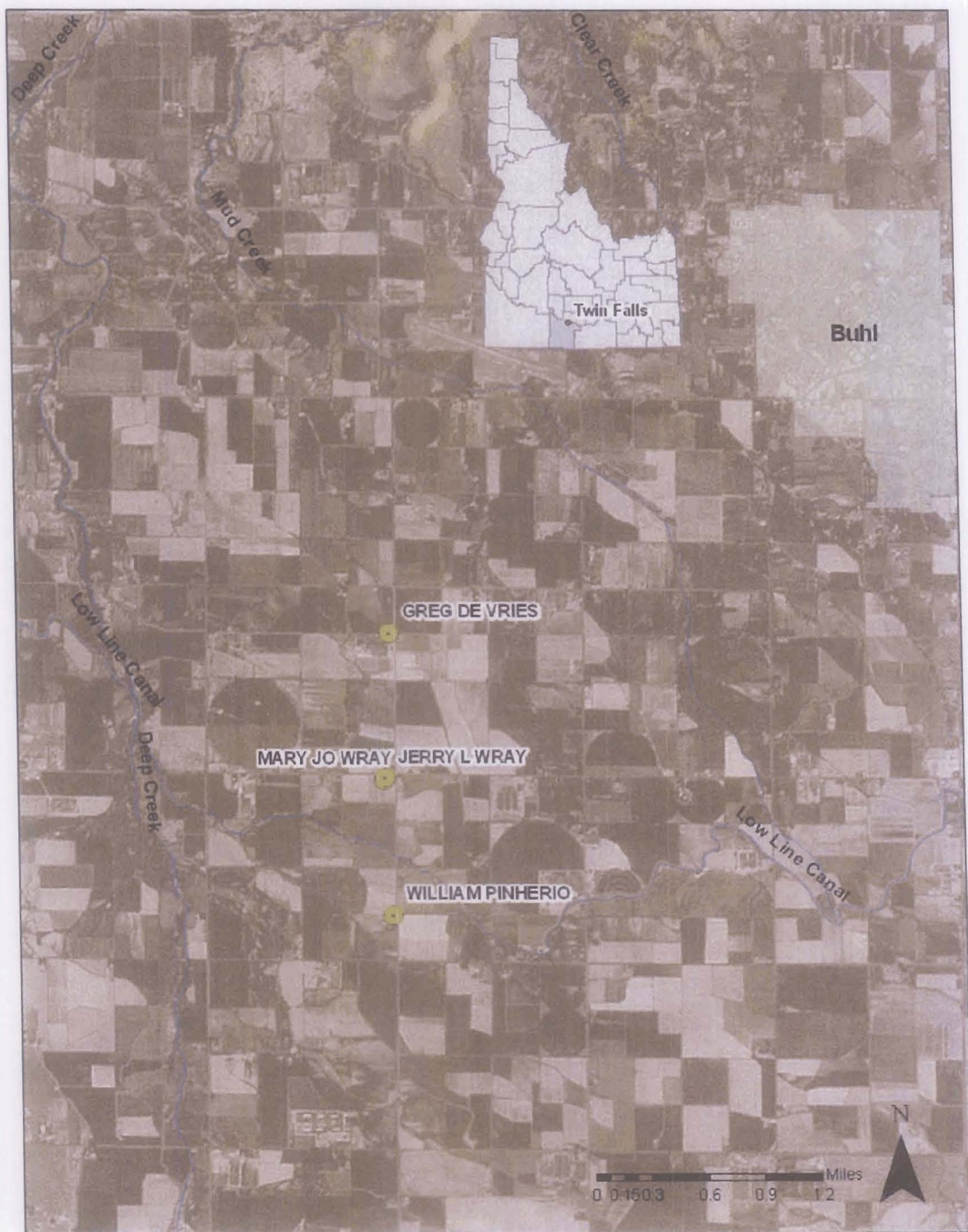


Figure A-1. Location Map for local driller's reports.

Form 238-7
6/02

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

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

1. WELL TAG NO. D DOC43040
DRILLING PERM NO _____
Water Right or Injection Well No _____

2. OWNER: GREG DEVRIES
Name _____
Address 8821 N 1200 E
City Buhl State ID Zip 83716

3. LOCATION OF WELL by legal description:
You must provide address or Lot, Blk, Sub or Directions to well.
Twp 10 North 14 or South 14
Rge 14 East 14 or West 14
Sec 9 1/4 SE 1/4 NE 1/4
Gov't Lot _____
County _____
Lat _____ Long _____
Address of Well Site same City _____

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

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

6. DRILL METHOD:
☐ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other C

7. SEALING PROCEDURES
Seal Material Bitumastic From 0 To 39 Weight/Volume 400# Seal Placement Method Grout/Pack

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 Enter Welded (Feet)
1 1/2 1 39 200 steel ☒ ☐ ☐ ☐
Length of Headpipe _____ Length of Tailpipe _____
Packer ☐ Y ☐ N Type _____

9. PERFORATIONS/SCREENS PACKER TYPE
Perforation Method _____
Screen Type & Method of Installation
From To Out Size Number Diameter Material Casing Enter

10. FILTER PACK
Filter Material _____ From _____ To _____ Weight/Volume _____ Placement Method _____

11. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
49 ft. below ground Artesian pressure _____ lb
Depth flow encountered _____ ft. Describe access point or control device: well cap

12. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian
Yield gal/min _____ Drawdown _____ Pumping Level _____ Time _____
Water Temp -85 Bottom hole temp _____
Water Quality test or comments: clear & no odor

13. LITHOLOGIC LOG: (Describe repairs or abandonment) Water
Bore Dia From To Remarks: Lithology Water Quality & Temperature Y N
8 0 5 Agassiz ☐ ☐
5 7 7 white shale ☐ ☐
7 39 39 Lava ☐ ☐
6 39 73 Lava ☐ ☐
73 101 101 Lava w/ water table ☒ ☐

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JUL 27 2006

DEPT. OF WATER RESOURCES
SOUTHERN REGION

Completed Depth 101 (Measurable)
Date Started 6/22/06 Completed 6/22/06

14. DRILLER'S CERTIFICATION
We certify that all minimum well construction standards were complied with at the time the log was removed.
Company Name Bishop Well Drilling Firm No 647
Principal Driller [Signature] Date 7/15/06
and _____
Driller or Operator II _____ Date _____
Operator I _____ Date _____
Principal Driller and Rig Operator Required.
Operator I must have signature of Driller/Operator II.

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Figure A-2. Existing Greg DeVries well.

Form 238-7 11/97

10348995

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Office Use Only
Inspected by _____
Two _____ Age _____ Sec _____
Lat _____ Long _____
Flowing Artesian _____

1. WELL TAG NO. D 0023129
DRILLING PERMIT NO 7-7-7-1 81
Other IDWR No _____

2. OWNER:
Name JERRY L. & MARY LO WRAY
Address 1291 ORACLE WAY
City BOISE State ID Zip 83709

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

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

SPLINTER PACK	From	To	AMOUNT Sacks of Pulver	METHOD
BENTONITE	+1	35'	10 SACKS	POUR

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	Liner	Weight	Installed
6"	+1	35'	250	STEEL				

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS

Perforations _____ Method _____
Screens _____ Screen type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Notes

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
SE _____ ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access point or control devices _____

11. WELL TESTS:
☐ Pump ☐ Bailor ☒ Flowing Artesian

Yield gal/min	Drawdown	Pumping Level	Time
30	C	80	2 HR

Water Temp _____ Bottom hole temp _____
Water Quality test or comments: _____ Depth first Water Encounter _____

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

Bore Dia	From	To	Remarks, Lithology, Water Quality & Temperature	Y	N
8"	0	30'	TOP SOILS		
8"	30'	35'	CLAY		
6"	35'	80'	ROCKEN CLAY		
	80'	82'	CLAY		
	82'	84'	CLAY		
	84'	96'	CLAY (RED)		
	96'	140'	CLAY		

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JUL 1 1997
Department of Water Resources

Completed _____ Depth _____ (Measured at) _____
Date Started 6-10 Completed 6-11

13. DRILLER'S CERTIFICATION
We certify that all minimum well construction standards were complied with at the time the rig was removed.
Company Name BISHOP DRILLING No. 540
Firm Official Bob Bishop Date 7-7-02
Driller or Operator SAVE Date _____
(Signature of Firm Official or Operator)

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Figure A-3. Wray well.

Form 238-7
11/97 JGE

App 882891

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D0034093

DRILLING PERMIT NO. 816022

Other IDWR No.

2. OWNER:

Name William Pincherio

Address 3740 N. 1300 E.

City Buhl

State ID Zip 83316

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.

Sketch map location must agree with written location.

Twp 10 North ☐ or South ☒
Rge 14 East ☒ or West ☐
Sec 16 1/4 SE 1/4 SE 1/4
Gov't of Twin Falls
County Long
Address of Well Site 3823 N. 1200 E.
City Buhl

(Use in event name of State is desired to record on land title)
1. Dik 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/Filter Pack	AMOUNT	METHOD
Material From To	Cycks or Pounds	
bentonite 0 18 200 lbs		dry pour

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	Line	Weight	Threads
8"	+2	18	250	steel	☒			

Length of Headpipe 2' Length of Tailpipe

9. PERFORATIONS/SCREENS:

☐ Perforations ☐ Method
☐ Screens ☐ Screen type

From	To	Slot Size	Number	Diameter	Material	Casing	Line

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

60 ft. below ground Artesian pressure b
Depth flow encountered ft. Describe access point or control devices well cap

Office Use Only

Inspected by
Twp Rge Sec
1/4 1/4 1/4
Lat Long

11. WELL TESTS:

☐ Pump ☐ Baker ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. <85

Bottom hole temp <85

Water Quality test or comments

Depth first Water Encounter 58

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Depth	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
8	0	3	top soil		
8	3	18	medium hard lava		
8	18	25	medium lava		
6	25	38	soft lava, ash & talc		
6	38	59	soft lava & small breaks	X	
6	59	65	medium lava		
6	65	71	soft lava, breaks & talc	X	
6	71	76	medium lava		
6	76	85	medium soft lava		
6	85	105	soft lava, ash & talc	X	

Completed Depth 105' (Measurable)
Date Started 5/27/2004 Completed 5/27/2004

13. DRILLER'S CERTIFICATION:

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

Company Name Eaton Drilling & Pump Firm No. 26

Firm Official [Signature] Date 5/27/2004

and [Signature] Date 5/27/2004

Driller or Operator [Signature] (Sign once if Firm Official & Operator)

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Figure A-4. Pincherio well.