



December 4, 2012

Mr. James Cefalo
Idaho Department of Water Resources
900 North Skyline Drive, Suite A
Idaho Falls, ID 83402-1718

RE: AQUIFER TEST FOR EVANS WATER RIGHTS APPLICATION

Dear Mr. Cefalo:

A groundwater impact assessment is provided in this letter report for Dan Evans Water Right Application. He has approximately 70 acres of farm land south of Samaria, Idaho (Figure 1) and his application is for 1.06 cfs. A pumping test was conducted on April 23, 2011 in an existing well about 600 ft north of the propose drill site, labeled the Davis Irrigation Well in Figure 1. The parameters from the aquifer test are used in a computer simulation to predict the potential impacts to neighboring wells within ½ mile of the proposed point of diversion (POD). The results of the computer analysis show that the proposed diversion rate will have a minimal or negligible impact on neighboring wells.

Nearby PODs

The proposed well location is 15S, 35E, 14 SW SE as shown in Figure 2. A search was made for all existing points of diversions (PODs), i.e. water rights near the Evans property. In Figures 3 and 4 a red circle is shown with a ½ mile radius centered on the proposed Evans well location. The circle encompasses portions of sections 13, 14, 23, and 24, T15S, R35E. A search of the IDWR on-line data base for PODs in these sections indicates that there is one active groundwater permit in Section 13, four surface water rights and four groundwater rights in Section 14, five groundwater rights in Section 23 and four surface water rights in Section 24. The results of the water right search are provided in Tables 1 through 4. All of the PODs for springs and streams and ground water greater than 0.3 cfs are plotted in Figure 5. It is noted that the single stream POD in this four section area is small (0.2 cfs) and for spring runoff water. A deep aquifer well as proposed by Mr. Evans will not interfere with this ephemeral stream because of the intervening layers of low permeability clay and unsaturated sediments. Impact to this surface stream are not considered further in this assessment.

Nearby Wells

A search was performed of the IDWR drillers' log database for wells within ½ mile of the proposed well location. Eight representative well logs are provided in Attachment 1 to show the local hydrogeology. The average depth of the wells in Sections 13, 14, 23 and 24 is 130 ft and the average depth to water is 42 ft. One well within a mile of the Evans location is artesian (Tom Flinders, Figure 1-5).

Hydrogeology

The lithology in this area is a series of unconsolidated sands, gravels and clays. There is not a marker layer or geologic unit that can be correlated over distances between wells (~ ½ mile), at



least, as described in the lithology on the well logs. The inability to correlate geologic layers is consistent with the area being situated in a cut and fill sequence of the Malad River. It is further complicated by waxing and waning cycles of Lake Bonneville. For the purposes of this investigation it is assumed that the aquifer thickness is 200 ft in this area. This is based on driller logs for three irrigations wells in Section 30, T15S, R36E about two miles southeast of the proposed POD and regional considerations of the hydrogeology. It should be noted that the aquifer is not one homogenous layer but a sequence of permeable lens of sand and gravel stringers, which are primarily confined. However, it is anticipated that locally the shallow sequences of the aquifer are unconfined.

Nearby POD's most sensitive to impacts from pumping

The survey of POD's in the surrounding area indicates that the neighboring water right holders most sensitive to impacts are the springs and the artesian well (Figures 5 and 6). This is because the pressure that drives water from artesian wells and springs is generally relatively low. Once the pressure or head is decreased below ground surface, free flow will cease. The distance to the artesian well is 0.25 miles north of the proposed Evans well location. Therefore, the target drawdown for the impact analysis will be to maintain a minimal aquifer drawdown at the location of the artesian well. There is no set limit on how much a pressure drop is allowable for an artesian system, but based on my professional judgment, a pressure drop of 0.86 psi (or 2 ft) reasonable and protective. This seems to be especially conservative here where much of the aquifer is unconfined or confined but not flowing and the water bearing zones are in discontinuous stringers and lens of sand and gravel and it is very unlikely that the proposed well would be in direct hydraulic communication with the artesian well or springs. Because the springs are further away from the proposed well location the drawdown will be diminished due to the sloped nature of the cone of depression.

Pumping Test

The test well is an irrigation well owned by Mr. Jeff Davis and it is located about 600 ft north of the location of the proposed Evans POD (see Figure 1). The Davis irrigation well is 140 ft deep, having an open bottom completion in gravel at 140 ft. The well log for the Davis Irrigation well is provided in Attachment 1, Figure 1-7. For the pumping test, the Davis Irrigation Well was equipped with an INSITU brand downhole pressure transducer to collect automated water levels during the pumping test. The pumping test began at 11:20 AM on April 23, 2011 and the well was pumped at a steady rate of 140 gpm for 24 hours. A plot of the data can be found in Attachment 2.

Curve matching methods were conducted using the AQTESOLV aquifer test software. Output plots from the AQTESOLV analyses are presented in Attachment 3. Figure 3-1 shows the match of the early time data to the Theis confined solution corrected for partial penetration. The calculated transmissivity is $9.5 \times 10^4 \text{ ft}^2/\text{day}$ and the storativity is unreliable because there is no observation well. The match of the late time data is presented in Figure 3-2 and the calculated transmissivity is $7.7 \times 10^4 \text{ ft}^2/\text{day}$. A third calculation is performed using the Hantush method for a leaky confined aquifer and the match to the type curve is presented in Figure 3-3. The match to the leaky confined type curve is excellent and the calculated transmissivity is $6.24 \times 10^4 \text{ ft}^2/\text{day}$. Based on the good match to the leaky confined solution the aquifer appears to be leaky confined in the area of the Jeff Davis Well. However, it is known that artesian conditions exist elsewhere



due to artesian flow in some wells, in particular the Flinder Well. For long term pumping calculations it is appropriate to use 6.24×10^4 ft²/day for the transmissivity with a confined solution for predicting drawdown. This transmissivity is consistent with another pumping test conducted in the Davis Stock Well located about 1 mile west of the Davis Irrigation Well (Section 22), which had a measured transmissivity of 5.1×10^4 ft²/day. The storativity cannot be measured reliably with a single well pumping test, so an estimated value of 0.01 is used, which is typical for these types of unconsolidated aquifer materials (Freeze and Cherry, 1979).

Impact Assessment

Mr. Evans wishes to irrigate 70 acres per IDWR estimates of usage this should require 0.02 cfs per acre or 630 gpm or 1.4 cfs. To estimate the long-term drawdown and impact to neighboring wells from pumping of the proposed Evans Well, the forward solution capabilities of the AQTESOLV program were employed. The input parameters to the model are listed in Table 4-1 (see Attachment 4). Boundaries in AQTESOLV were enabled as shown in Figure 4-1 to represent Malad Valley. As depicted in Figure 4-1 and listed in Table 4-2 the model is 32,000 ft wide and 50,000 ft long. Because the Malad Valley is bounded by mountains consisting of Paleozoic and Mesozoic sedimentary rock that do not provide much water compared to the unconsolidated valley fill, the east, west and south boundaries are set as impermeable or “no flow” boundaries. Water is allowed to enter the model domain only through the north boundary.

In the model domain the proposed POD well is located 4750 ft east of the west boundary and 6500 ft north of the south boundary. This represents the proximity of the proposed POD to the nearby mountains and the no flow southern boundary, which will have the effect of increasing drawdown.

Figure 4-2 shows the AQTESOLV[®] output plot of the forward calculation for the proposed well pumping at 1.4 cfs (620 gpm) constantly for 6 months (April 15 to Oct 15). At the end of the time period the predicted drawdown is estimated to be 4.5 feet in the proposed POD. The calculated drawdown for a well ¼ mile north of the POD is predicted to be 2.5 ft. Since the impact to the artesian well exceeds our target objective of 2 ft or less of decline, the flow rate was reduced to 475 gpm (1.05 cfs) and the computer model was run again. At the end of 6 months of pumping 24/7 the drawdown in the proposed POD is 3.7 and the drawdown ¼ mile to the north is 1.95 ft. This satisfies our target objective of creating less than 2.0 feet of drawdown.

It is my professional opinion that Mr. Evan’s water right application will not excessively impact his neighbors’ right to divert water. I believe that the calculated drawdown over estimates the actual drawdown to be expected for the following reasons: 1) Mr. Evans will never pump continuously at the maximum rate for 180 days to consume 378 acre – ft in a single year; 2) the Paleozoic/Mesozoic rocks of the mountains are not totally impermeable and will provide some water to the system, thus reducing drawdown, 3) several canals and the Malad River are within the domain of the model and no credit for recharge/leakage is taken in the model, and 4) the calculated impact used confined aquifer conditions for the entire domain, while it is known that unconfined conditions exist over large parts of the area. All of these factors will reduce the predicted drawdown presented here.



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Ground Water Development and Exploration

Please do not hesitate to call me if you have any questions about this letter or the calculations presented.

Respectfully,

A handwritten signature in black ink, appearing to read "Thomas R. Wood".

Thomas R. Wood, PhD, PG



cc

Mr. Daniel Evans, 5071 South 4600 West, Malad, ID 83252

References

Freeze, R.A. and J.A. Cherry, 1979, Groundwater, ISBN 0-13-365312-9, Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632.



Figure 1. Map showing locations of the Proposed Riches well, the Davis Irrigation Well and the Davis Stock Well.



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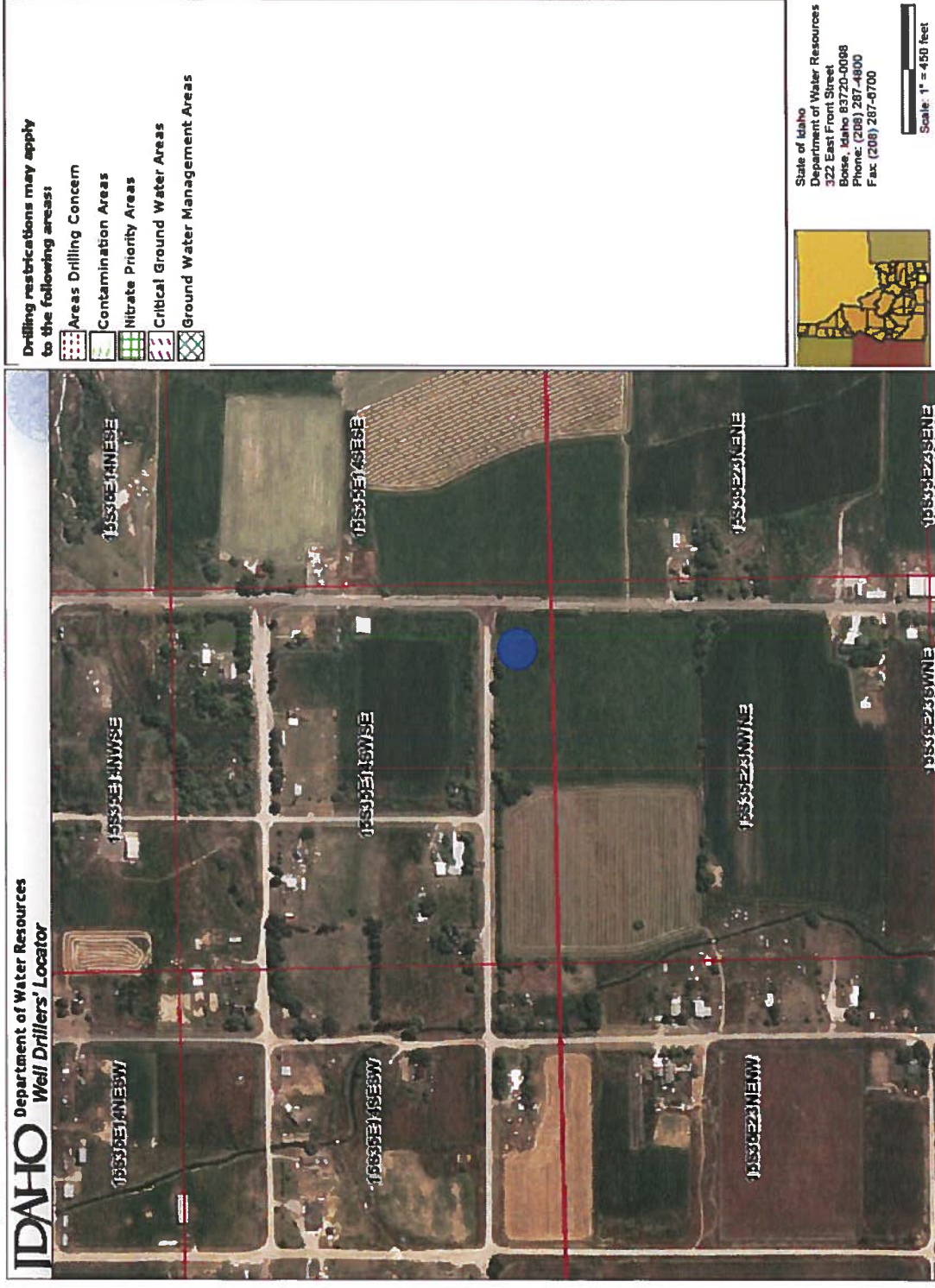


Figure 2 IDWR map area showing the township range section coordinates and the proposed well location as a blue dot.

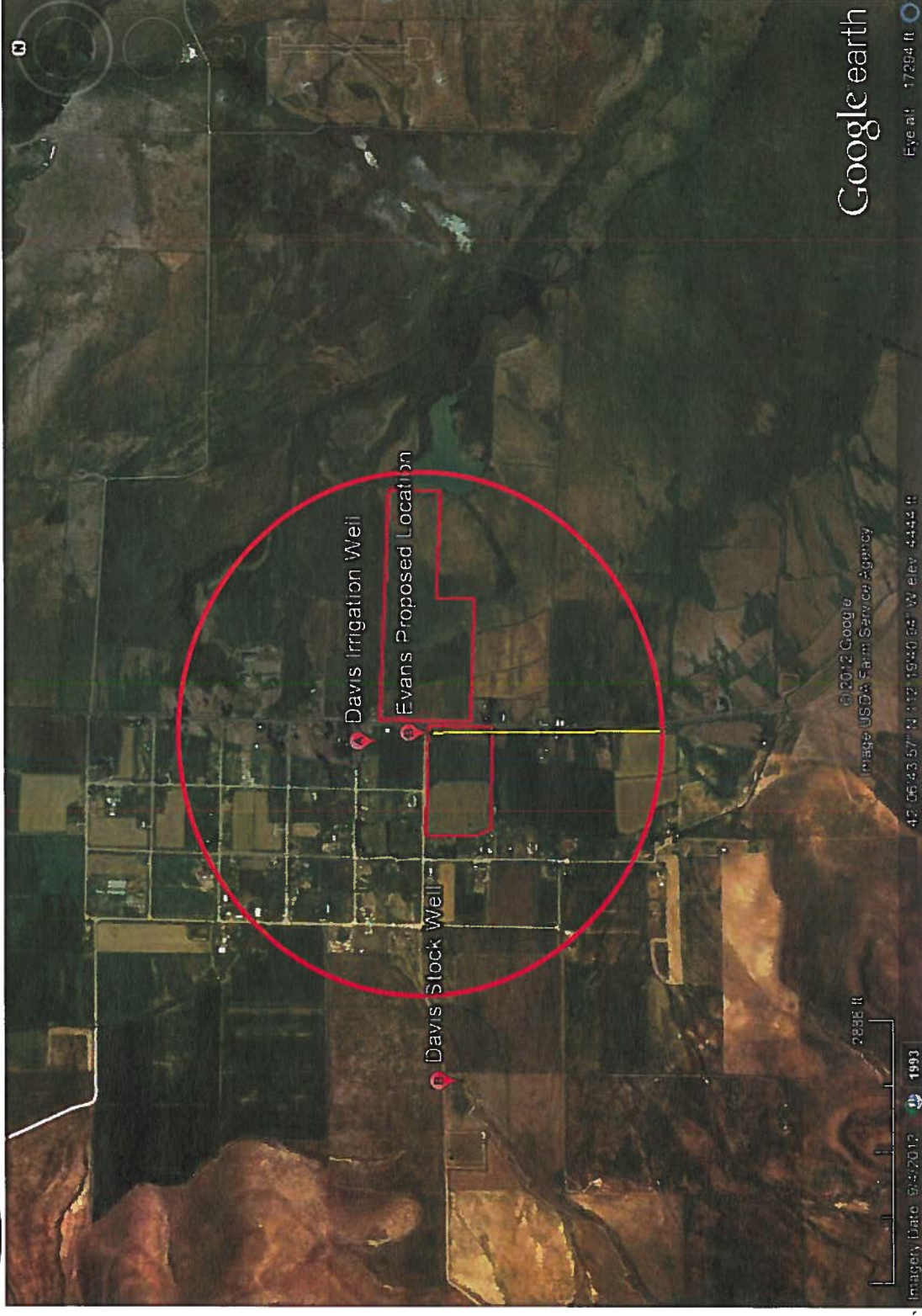


Figure 3 Evans property with aquifer test wells and red circle showing approximate 1/2 mile radius.



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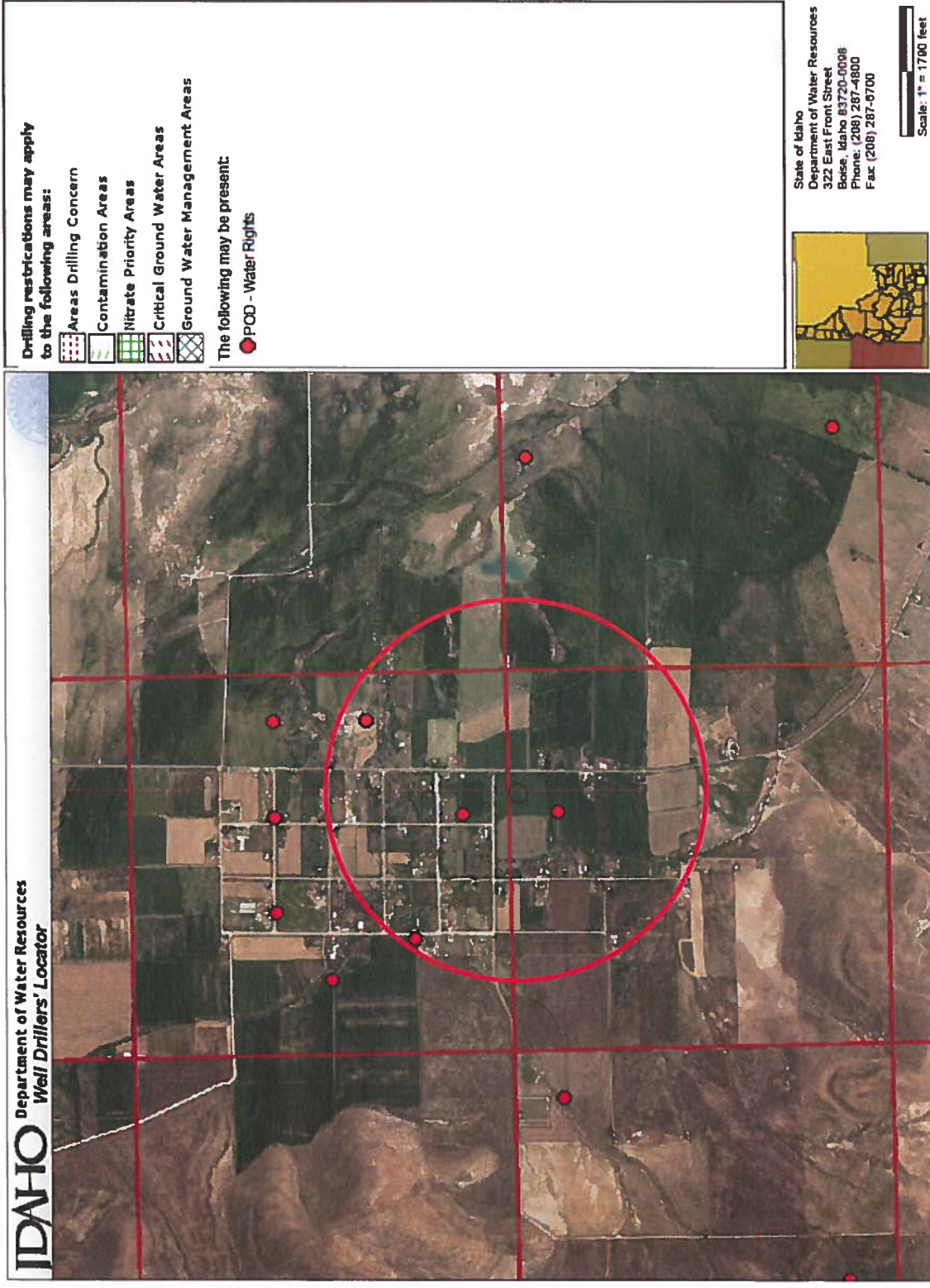


Figure 4 Existing PODs; from IDWR website and red circle 1/2 mile diameter.

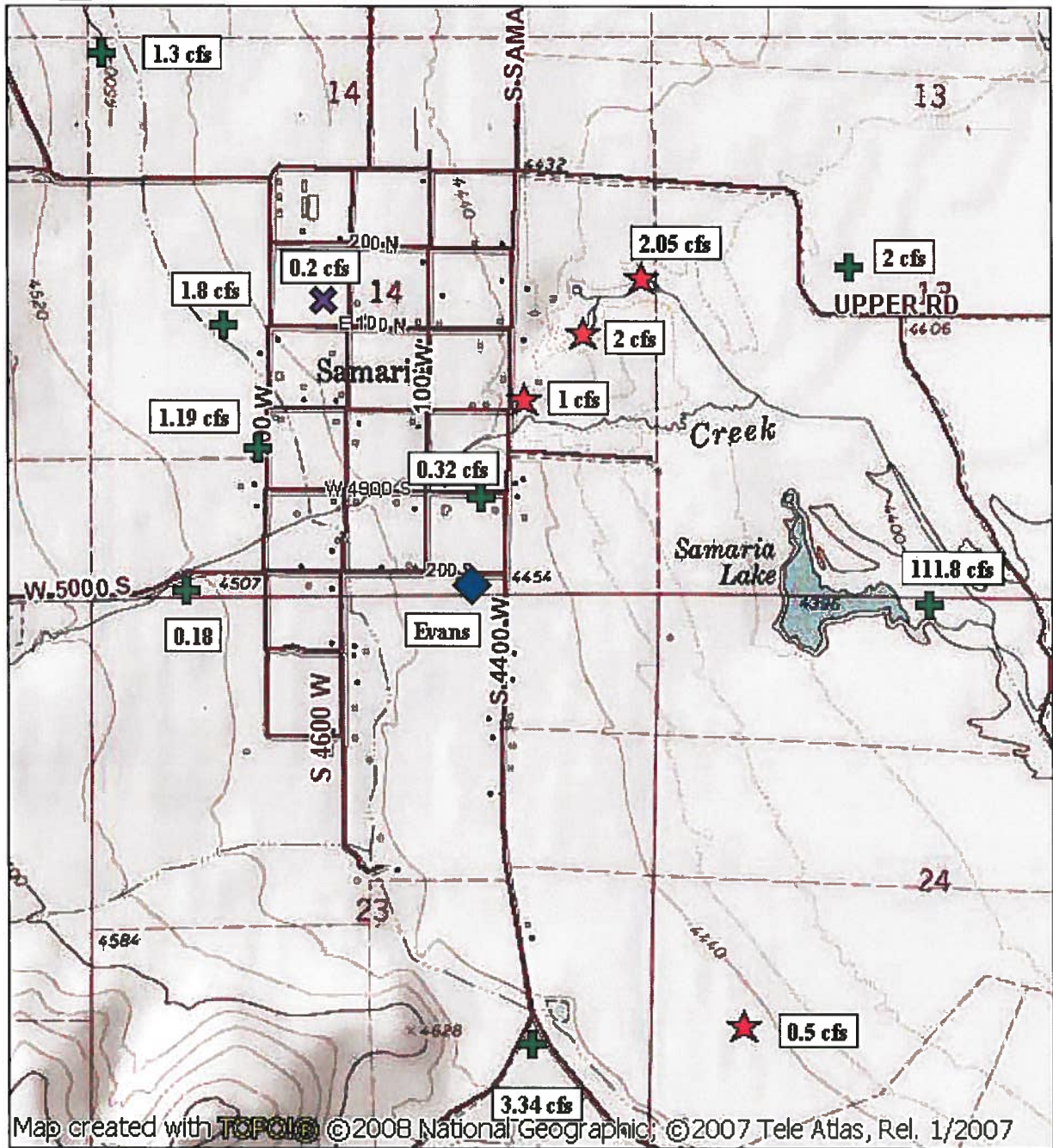


Figure 5 POD for all springs and steams and wells equal or greater than 0.3 cfs in Sections 13, 14, 23 and 24. Red stars are springs, purple X's are streams and green crosses are wells,

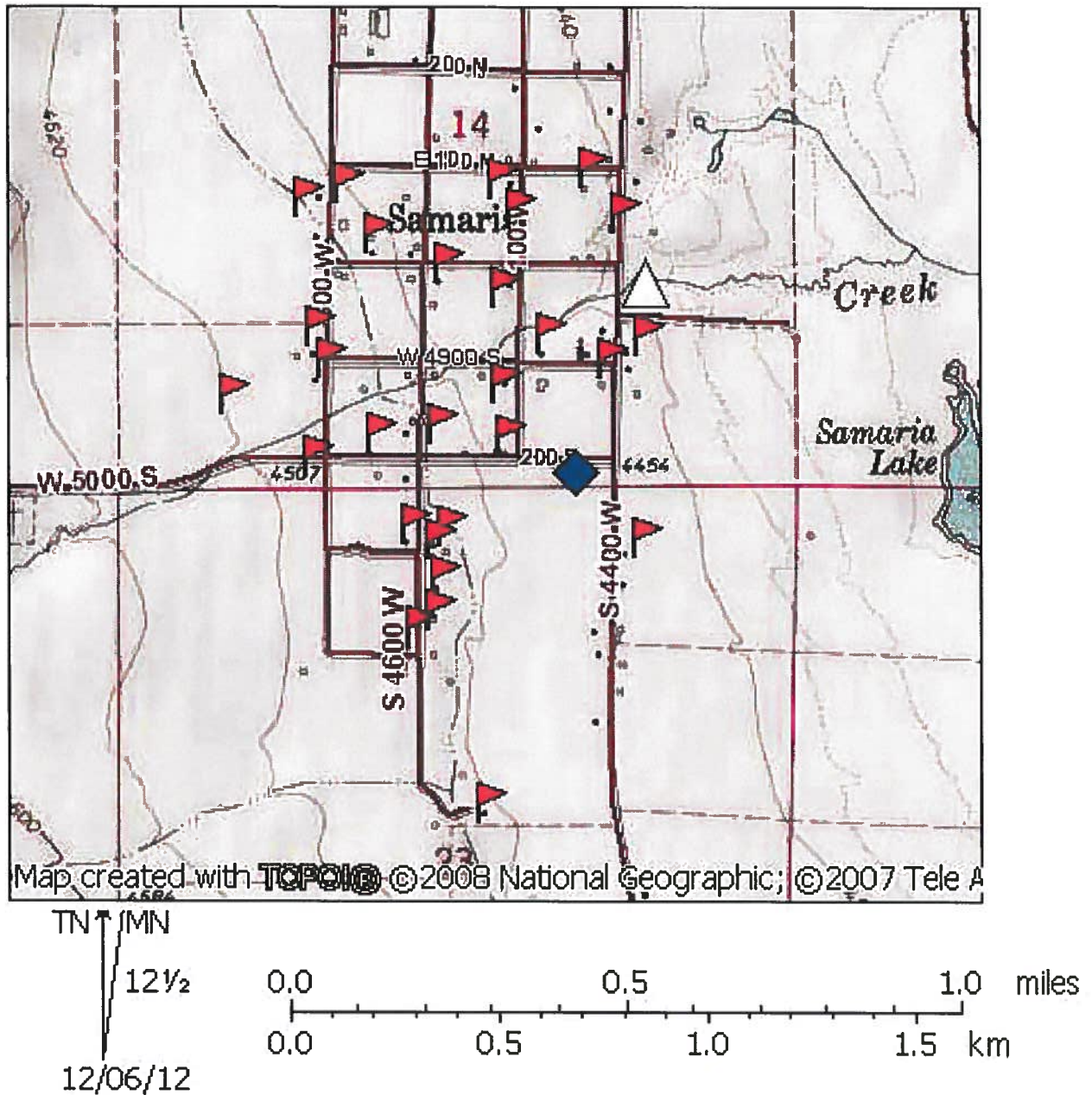


Figure 6 Estimated well locations (red flags) within ½ mile of Evans proposed location. Evans shown as blue diamond and estimated location where one driller's log indicated flowing artesian conditions.



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Table 1 IDWR Search results for point of diversions in T15S, R35E, Section 13

Type	Basin	Sequence	Suffix	Application Number	Basis	Status	Priority Date	Div. Rate (cfs)	Source	Water Use	Owner
Water Permit	15	7320				Active	3/3/2009	2	GROUND WATER	IRRIGATION	FLINDERS SAMARIA RANCH, LC

Table 2 IDWR Search results for point of diversions in T15S, R35E, Section 14

Type	Basin	Sequence	Suffix	Application Number	Basis	Status	Priority Date	Div. Rate (cfs)	Source	Water Use	Owner
Water Right	15	2005			License	Active	3/16/1911	0.2	UNNAMED STREAM	DOMESTIC, IRRIGATION	WILLIAMS, DANIEL M
Water Right	15	4031			Statutory Claim	Active	5/12/1920	0.04	GROUND WATER	DOMESTIC, IRRIGATION, STOCKWATER	JOHN, DEVERL
Water Right	15	4138			Statutory Claim	Active	4/1/1900	2.05	SPRINGS	IRRIGATION	FLINDERS SAMARIA RANCH LC
Water Right	15	4139			Statutory Claim	Active	4/1/1900	2	THORPE SPRINGS	IRRIGATION	THORPE, S GRANT; THORPE, WILLIAM D
Water Right	15	4187			Statutory Claim	Active	5/19/1959	1	SPRING	IRRIGATION	WARD, J MORONI
Water Right	15	7094			License	Active	6/7/1983	0.06	GROUND WATER	DOMESTIC, IRRIGATION	WALDRON, REX P
Water Right	15	7154			License	Active	8/12/1996	1.19	GROUND WATER	IRRIGATION	ATKINSON, DELON
Water Right	15	7267			License	Active	6/4/2008	1.8	GROUND WATER	IRRIGATION	GLEED, JULIA



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Table 3 IDWR Search results for point of diversions in T15S, R35E, Section 23

Type	Basin	Sequence	Suffix	Application Number	Basis	Status	Priority Date	Div. Rate (cfs)	Source	Water Use	Owner
Water Right	15	4018			Statutory Claim	Active	6/1/1908	0.03	GROUND WATER	DOMESTIC	THOMAS, ALVIN J; THOMAS, GRACE B
Water Permit	15	7179				Active	4/10/2000	0.18	GROUND WATER	DOMESTIC, IRRIGATION	M J DAVIS MEMORIAL LTD PARTNERSHIP
Water Permit	15	7347				Active	8/22/2011	3.34	GROUND WATER	IRRIGATION	RICHES JR, LAWRENCE VICTOR
Water Application	15	7179		26557		Closed	4/10/2000	0.18	GROUND WATER	DOMESTIC, IRRIGATION	M J DAVIS MEMORIAL LTD PARTNERSHIP
Water Application	15	7347		77477		Closed	8/22/2011	3.34	GROUND WATER	IRRIGATION	RICHES JR, LAWRENCE VICTOR

Table 4 IDWR Search results for point of diversions in T15S, R35E, Section 24

Type	Basin	Sequence	Suffix	Application Number	Basis	Status	Priority Date	Div. Rate (cfs)	Source	Water Use	Owner
Water Right	15	2105			License	Active	2/16/1949	0.01	SPRING	STOCKWATER	UNITED STATES OF AMERICA ACTING THROUGH
Water Right	15	4034			Statutory Claim	Active	07/30/1880	0.5	SPRING	IRRIGATION	DURBIN, ILENE J; HUGHES, LEVI
Water Right	15	7277			Statutory Claim	Active	02/15/1875	111.8	SAMARIA CREEK, SPRING	IRRIGATION, IRRIGATION FROM STORAGE, IRRIGATION STORAGE	SAMARIA LAKE IRRIGATION CO
Water Application	15	2105		955		Closed	2/16/1949	0.01	SPRING	STOCKWATER	UNITED STATES OF AMERICA ACTING THROUGH



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Table 5 IDWR Search results for wells in T15S, R35E, Section 13

Contact	Use	TWP	RNG	SEC	Tract	WellAddress	Gallons Per Minute	Static Water Level	Total Depth	Casing Depth	CSG. DIA.	Construction Date
FLINDERS, LINDA, FLINDERS, THOMAS E	Irrigation	15S	35E	13	NWNW	RURAL AREA		0	180	180	16	11/26/2002

Table 6 IDWR Search results for wells in T15S, R35E, Section 14

Contact	Use	TWP	RNG	SEC	Tract	Well Address	Gallons Per Minute	Static Water Level	Total Depth	Casing Depth	CSG. DIA.	Construction Date
BRADFORD, ROGER	Stockwater	15S	35E	14	NENE	4523 S 4500 W		7	160	160	6	10/20/2003
WALDRON, LUKE	Domestic-Single Residence	15S	35E	14	NWNE		30	25	100	100	6	4/27/1999
DELANEY, ANN	Domestic-Single Residence	15S	35E	14	NWNE	4575 WEST	20	18	255	140	6	4/15/1998
BRAKER, SANDRA	Domestic-Single Residence	15S	35E	14	SWNE	SAMIRA	100	20	111	111	6	5/22/1996
WILLIAMS, ALVIN T	Domestic-Single Residence	15S	35E	14	SWNE	1ST N 150 W	75	24	105	105	6	9/2/1995
MARTENSEN, VERLA	Domestic-Single Residence	15S	35E	14	SWNE	SAMARIA	50	31	117	117	6	11/8/2008
ZUNDEL, DAVID	Domestic-Single Residence	15S	35E	14	SWNE	4700 S 4500 W NW CO		27	110		6	11/29/2011
JONES, ALBERT	Domestic	15S	35E	14	SENE		60	12	80			3/8/1974
HUDD EXCAVATION & CONSTRUCTION	Domestic-Single Residence	15S	35E	14	NWNW	4500 S. 4700	20	27	140	140	6	10/11/1999
JOHN, ELDON, JOHN, MIKE	Irrigation	15S	35E	14	NWNW	62 S MAIN S	300	62	180	180	10	12/11/2003
GLEED, JULI A	Irrigation	15S	35E	14	SESWNW	4700 W 4700	1000	52	300	300	10	11/28/2005
US DEPARTMENT OF ENERGY	Domestic-Single Residence, Irrigation	15S	35E	14	SESWNW	MALAD		0	0		0	9/28/2004
OLSEN, SHIRLEY	Domestic-Single Residence	15S	35E	14	SENW	4655 W 4700	30	43	114	114	6	9/27/2004
BOGGESE, CHRIS	Domestic-Single Residence	15S	35E	14	NESW	4600 W 4750 S		45	111		6	9/3/2010
EVANS, MICHAEL J	Domestic-Single Residence	15S	35E	14	NESW	4643 W 4800 S		50	140	-140	8	8/4/2000
ATKINSON, SPENCER	Domestic	15S	35E	14	NESW		0	40	104			12/5/1983
HULSE, VERNON	Domestic-Single Residence	15S	35E	14	SWSW	4920 SOUTH	20	51	120	120	8	6/18/1998
ATKINSON, FARRELL D	Irrigation	15S	35E	14	SWSW		0	60	200	200	10	5/20/1997
TOLMAN, DEE	Domestic-Single Residence	15S	35E	14	SWSW	4680 WEST	20	56	140	-124	6	11/18/2000
JENSEN, NEIL	Domestic-Single Residence	15S	35E	14	SESW	4655 WEST	10	48	120	120	6	7/8/2001
HULSE, VERNON	Domestic	15S	35E	14	SESW		9999	75	147			3/28/1979
FLINDERS, THOMAS, FLINDERS, LINDA	Domestic-Single Residence	15S	35E	14	NESE	SAMARIA R	100	Above Gro	175	174	6	11/20/1996
JONES, ALBERT	Domestic-Single Residence	15S	35E	14	NWSE		100	50	123	123	6	6/9/1997
HIGLAY, LIN	Domestic-Single Residence	15S	35E	14	NWSE	Malad	40	33	120	-120	6	11/27/2000
BERRY, MARVIN	Domestic-Single Residence	15S	35E	14	NWSE	4716 S 4500	30	30	116	116	6	7/14/2008
EVANS, JOHN J	Domestic-Single Residence	15S	35E	14	SWSE	5071 S 4600	50	44	135	135	6	9/29/2007
TOLMAN, DEE	Domestic-Single Residence	15S	35E	14	SWSE	4921 S 4500	40	36	120	120	6	4/15/2006
ANDERSON, BILLY J	Domestic-Single Residence	15S	35E	14	SWSE	128 SOUTH	25	36	140	-140	6	11/23/2000
M J DAVIS MEMORIAL LTD PARTNERSHIP	Irrigation	15S	35E	14	SWSE	130 S MAIN	180	21	140	-140	8	6/29/2000



Table 7 IDWR Search results for wells in T15S, R35E, Section 23

Contact	Use	TWP	RNG	SEC	Tract	Well Address	Gallons Per Minute	Static Water Level	Total Depth	Casing Depth	CSG. DIA.	Construction Date
HUGHS, DAVID EARL	Domestic	15S	35E	23	NENE		15	50	175			3/11/1969
WARREN, ROBERT	Domestic-Single Residence	15S	35E	23	SWNE		40	40	140	140	6	6/15/1999
M J DAVIS MEMORIAL LTD PARTNERSHIP	Irrigation	15S	35E	23	NENW	5054 S 4600 W	40	51	140	-121	8	10/25/2000
RAWLINGS, REBECCA, RAWLINGS, TOM	Domestic-Single Residence	15S	35E	23	NWNW		7.5	130	181	179	6	11/23/1998
RAWLINGS, TOM	Domestic-Single Residence	15S	35E	23	NWNW		0	130	126		3	
TUBBS, DON	Domestic-Single Residence	15S	35E	23	NWNW	375 MAIN ST	15	24	125	103	6	11/5/1994
WARREN, ROBERT	Domestic-Single Residence	15S	35E	23	SENW		50	50	300	236	6	7/13/1998
SORTER, LLOYD	Domestic-Single Residence	15S	35E	23	SENW	5121 S 4600 W	0	50	160	159	6	9/7/1996
EVANS, DANIAL	Domestic-Single Residence	15S	35E	23	SENW	5065 S 4600 W		52	156		6	3/19/2009
HUCKABY, TRAVIS	Domestic-Single Residence	15S	35E	23	SWSESW	4677 W 4900 S		60	120		6	9/14/2011
PEOA RIVER VALLEY RANCH	Domestic-Single Residence	15S	35E	23	NWSE	1/2 M SOUTH OF SAMARIA		44	117		6	9/12/2011

Table 8 IDWR Search results for wells in T15S, R35E, Section 24

Contact	Use	TWP	RNG	SEC	Tract	Well Address	Gallons Per Minute	Static Water Level	Total Depth	Casing Depth	CSG. DIA.	Construction Date
HIGLEY, WILLARD J	Domestic-Single Residence	15S	35E	24	SWSW	411 S SAMARIA RD	0	Above Ground Level	67	67	6	12/17/1996
PETERSON, MARK	Domestic-Single Residence	15S	35E	24	SESW	50 S 3100 W		384	503	503	6	12/24/2002



Attachment 1

REPRESENTATIVE WELL LOGS



Clearwater Geosciences, LLP
Ground Water Development and Exploration

Form 238-7
6/07

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D 0048575

Drilling Permit No. _____

Water right or injection well # _____

2. OWNER: John Evans

Name 5071 S 9600 W

Address _____

City Samaria State ID Zip 83252

3. WELL LOCATION:

Twp 15 North ☐ or South ☒ Rge. 35 East ☒ or West ☐

Sec 14 1/4 SW 1/4 SE 1/4

Gov't Lot _____ County Oneida

Lat. _____ (Deg. and Decimal minutes)

Long. _____ (Deg. and Decimal minutes)

Address of Well Site 4595 W 5000 S

City _____

Lot _____ Blk _____ Sub. Name _____

(Give at least name of road - 1/4 mile to Road or Landmark)

4. USE:

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

☐ Other _____

5. TYPE OF WORK:

☐ New well ☒ Replacement well ☐ Modify existing well

☐ Abandonment ☐ Other _____

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal material _____ From (ft) _____ To (ft) _____ Quantity (lbs or ft³) _____ Placement method/procedure _____

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 60 Static water level (ft) 414

Water temp. (°F) cold Bottom hole temp. (°F) cold

Describe access port _____

Well test:

Drawdown (feet) _____ Discharge or yield (gpm) 50 Test duration (minutes) _____

Test method: Pump ☐ Bafer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: good

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in) From (ft) To (ft) Remarks, lithology or description of repairs or abandonment, water temp.

Water Y N

10 0 20 Brown clay ☐ ☒

20 30 40 Brown clay ☐ ☒

40 45 45 gravel Hardpan ☐ ☒

45 45 45 Brown clay ☐ ☒

60 70 70 Brown clay/gravel ☒ ☒

70 77 77 Brown clay ☐ ☒

77 85 85 gravel Brown clay ☒ ☒

85 95 95 Brown clay ☐ ☒

95 100 100 gravel Brown clay ☒ ☒

100 115 115 silt Brown clay ☐ ☒

115 135 135 gravel sandstone ☒ ☒

RECEIVED

OCT 16 2007

IDAHO DEPARTMENT OF WATER RESOURCES

Eastern Region

Completed Depth (Measurable): 135

Date Started: 9-28-07 Date Completed: 9-29-07

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 Mr. West Well Drilling Co. No. 543

*Principal Driller Michael Frandson Date 10-6-07

*Driller Triles Frandson Date 10-6-07

*Operator II _____ Date _____

Operator I _____ Date _____

* Signature of Principal Driller and rig operator are required.

Figure 1-1 Well log for John Evans.



Clearwater Geosciences, LLP
Ground Water Development and Exploration

Form 236-7
11/87

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

054647

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

1. WELL TAG NO. D 0006940
DRILLING PERMIT NO. 15-99-E-0018
Other IDWR No. _____

2. OWNER:
Name Brad Warren
Address 5199 S. 14600 W
City Malad State ID Zip 83252

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

North
Twp. 15 North ☐ or South ☒
Rge. 35 East ☒ or West ☐
Sec. 23 1/4 ASH 1/4 NE 1/4
Gov't Lot _____ County Oneida 160 acres
Lat. _____ Long. _____
Address of Well Site Someria City _____
(One of last name of road or 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/FILTER PACK	AMOUNT	METHOD
Material From To	Sacks or Pounds	
<u>Bentonite</u> <u>0</u> <u>20</u>	<u>4</u>	<u>Over Bore</u>

Was drive shoe used? ☒ N Shoe Depth(s) 140'
Was drive shoe seal tested? ☐ Y ☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Linear	Welded	Threaded
<u>6"</u>	<u>0</u>	<u>140</u>	<u>22</u>	<u>Steel</u>	☐	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS

Perforations Method _____
Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Linear
		<u>None</u>				☐	☐

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

11. WELL TESTS:

☐ Pump	☐ Bailor	☒ Air	☐ Flowing Artesian
Yield gal./min	Drawdown	Pumping Level	Time
<u>40</u>			

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

Depth first Water Encounter 25'

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
<u>6"</u>	<u>0</u>	<u>20</u>	<u>Brown clay + Gravel</u>		☒
<u>6"</u>	<u>20</u>	<u>85</u>	<u>Brown clay</u>		☒
<u>6"</u>	<u>85</u>	<u>90</u>	<u>Gravel</u>	☒	
<u>6"</u>	<u>90</u>	<u>98</u>	<u>Brown clay + Gravel</u>		☒
<u>6"</u>	<u>98</u>	<u>100</u>	<u>Gravel + clay</u>	☒	
<u>6"</u>	<u>100</u>	<u>135</u>	<u>Brown clay</u>		☒
<u>6"</u>	<u>135</u>	<u>140</u>	<u>Gravel + Fine sand</u>	☒	
<u>6"</u>	<u>135</u>	<u>140</u>	<u>Gravel Pack</u>		

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SEP 13 1999
Department of Water Resources
Eastern Region

RECEIVED
SEP 20 1999
MICROFILMED
NOV 30 1999
Department of Water Resources

Completed _____ Depth 135 (Measurable)
Date: Started 6-12-99 Completed 6-15-99

13. DRILLER'S CERTIFICATION

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

Company Name Mr. Westfield Drilling Firm No. 543

Firm Official Michael Brandon Date 7-15-99

and
Driller or Operator _____ Date _____
(Sign once if Firm Official & Operator)

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Figure 1-2 Well log for Brad Warren.



Clearwater Geosciences, LLP
Ground Water Development and Exploration

Form 238-7
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Dm/gle

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Use Typewriter or Ballpoint Pen

68171

Office Use Only
Inspected by _____
Twp _____ Rge _____ Sec _____
1/4 _____ 1/4 _____ 1/4 _____
Lat. : : Long. : :
☐ Pump ☐ Baller ☐ Air ☐ Flowing Artesian

1. DRILLING PERMIT NO. 15-97-0019-000
Other IDWR No. 15-7154

2. OWNER:

Name Farrell Atkinson
Address 738 W Hwy 38
City Malad State ID Zip 83252

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.

N
W
E
S
Twp. 15 North ☐ or South ☒
Rge 35 East ☒ or West ☐
Sec. 14 1/4 SW 1/4 SW 1/4
Gov't Lot _____ County Oneida
Lat. : : Long. : :
Address of Well Site Samira
City _____
(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/FILTER PACK			AMOUNT Sacks or Pounds	METHOD
Material	From	To		
Bentonite	0	20	5	OverBore

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 200'
Was drive shoe seal tested? ☐ Y ☒ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
10"	0	200	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
120	125	1"	100	1/4"	Steel	☒	☐
130	135	1"	100	1/4"	()	☒	☐
140	145	1"	100	1/4"	()	☒	☐
165	175	1"	200	1/2"	()	☒	☐
177	195	1"	150	1/2"	()	☒	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

60 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

Water Temp. Cold Bottom hole temp _____
Water Quality test or comments: good
Depth first Water Encountered 50'

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
12"	0	20	Clay		☒
10"	20	30	Clay + Gravel		☒
10"	30	50	Clay		☒
10"	50	65	Gravel	☒	
10"	65	100	Clay + Gravel	☒	
10"	100	110	Gravel	☒	
10"	110	120	Clay + little Gravel	☒	
10"	120	123	Gravel	☒	
10"	123	130	Clay + Gravel	☒	
10"	130	135	Gravel	☒	
10"	135	140	Clay + Gravel	☒	
10"	140	145	Gravel	☒	
10"	145	160	Gravel + clay	☒	
10"	160	163	Gravel + Sand	☒	
10"	163	170	Gravel	☒	
10"	170	187	Gravel + Sand	☒	
10"	187	193	Gravel	☒	
10"	193	198	Clay	☒	
10"	198	200	Gravel	☒	

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JUN 23 1997

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Department of Water Resources JUN 10 1997

Department of Water Resources
Eastern Region

Completed Depth 200 (Measurable)
Date: Started 5-12-97 Completed 5-20-97

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 Drilling Firm No. 543

Firm Official Mike Frandson Date 5-20-97

and
Supervisor or Operator _____ Date _____

(Sign once if Firm Official & Operator)

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Figure 1-3 Well log for Farrell Atkinson Well.



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1818 East 49th South, Idaho Falls, ID 83404, Ph. 208-589-5555 Fax 542-1489



Clearwater Geosciences, LLP
Ground Water Development and Exploration

✓ Firm 238-7
3/95
JMD

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT 057767
Use Typewriter or Ballpoint Pen

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

1. DRILLING PERMIT NO. 15-94-E-0030-000
Other IDWR No _____

2. OWNER:
Name THOMAS FLINDERS
Address 5850 OLD LANCH RD.
City PAZZO CAN State UT Zip 84098

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

N
W E S
Twp. 15 North ☐ or South ☒
Rge. 35 East ☒ or West ☐
Sec. 14 NE 1/4 SE 1/4 1/4
Gov't Lot _____ County BLAINE 160 acres
Lat: _____ Long: _____
Address of Well Site SAMARIA RD.
City SAMARIA
(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/FILTER PACK			AMOUNT		METHOD
Material	From	To	Sacks or Pounds		
<u>Bentonite</u>	<u>0</u>	<u>20</u>	<u>5</u>		<u>over Bore</u>

Was drive shoe used? ☒ N Shoe Depth(s) 174"
Was drive shoe seal tested? ☐ Y ☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
<u>6"</u>	<u>0</u>	<u>174</u>	<u>20</u>	<u>Steel</u>	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS

☐ Perforations Method _____
☐ Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

_____ ft. below ground Artesian pressure 0 lb.
Depth flow encountered 174 ft. Describe access port or control devices: Valve

11. WELL TESTS:

Yield gal/min.	Drawdown	Pumping Level	Time
<u>100</u>			

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

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

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
<u>8 1/2"</u>	<u>0</u>	<u>20</u>	<u>Clay</u>		☒
<u>6 1/2"</u>	<u>20</u>	<u>40</u>	<u>Clay + Gravel</u>	☒	
<u>6 1/2"</u>	<u>40</u>	<u>63</u>	<u>Clay + Gravel</u>		☒
<u>6 1/2"</u>	<u>63</u>	<u>74</u>	<u>Clay</u>		☒
<u>6 1/2"</u>	<u>74</u>	<u>81</u>	<u>Gravel + Water</u>	☒	
<u>6 1/2"</u>	<u>81</u>	<u>123</u>	<u>Clay</u>		☒
<u>6 1/2"</u>	<u>123</u>	<u>148</u>	<u>Clay + Gravel</u>		☒
<u>6 1/2"</u>	<u>148</u>	<u>152</u>	<u>Clay + Gravel + Sand</u>		☒
<u>6 1/2"</u>	<u>152</u>	<u>160</u>	<u>Gravel + Sand</u>	☒	
<u>6 1/2"</u>	<u>160</u>	<u>173</u>	<u>Clay</u>		☒
<u>6 1/2"</u>	<u>173</u>	<u>175</u>	<u>Gravel + Water</u>	☒	

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NOV 22 1996

Department of Water Resources
Eastern Region

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DEC 05 1996

MICROFILMED

FEB 05 1997

Department of Water Resources

Completed Depth 174 (Measurable)
Date: Started 11-16-96 Completed 11-20-96

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 Drilling Firm No. 543

Firm Official Mike Frandsen Date 11-20-96

and
Supervisor or Operator _____ Date _____

(Sign once if Firm Official & Operator)

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Figure 1-5 Well log for Tom Flinders well (artesian).



Clearwater Geosciences, LLP
Ground Water Development and Exploration

REPORT OF WELL DRILLER
State of Idaho

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 David Carl Hughes
Address Lamar, ID

Owner's Permit No. _____

NATURE OF WORK (check): Replacement well ☒
New well ☐ Deepened ☐ Abandoned ☐

Water is to be used for: _____

METHOD OF CONSTRUCTION: Rotary ☒ Cable ☐
Dug ☐ Other _____ (explain)

CASING SCHEDULE: Threaded ☐ Welded ☒
"Diam. from _____ ft. to _____ ft.
"Diam. from _____ ft. to _____ ft.
"Diam. from _____ ft. to _____ ft.
"Diam. from _____ ft. to _____ ft.
Thickness of casing: 1/4" Material: _____
Steel ☒ concrete ☐ wood ☐ other ☐

(explain)
PERFORATED? Yes ☒ No ☐ Type of
perforator used: acetylene torch

Size of perforations: 1/8" by 5"
60 perforations from 167 ft. to 185 ft.
perforations from _____ ft. to _____ ft.
perforations from _____ ft. to _____ ft.
perforations from _____ ft. to _____ ft.

WAS SCREEN INSTALLED? Yes ☐ No ☒

Manufacturer's name _____ Model No. _____
Type _____
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?
20 ft. Material used in seal: Benmore
and clay for 1 ft. down on back
Did any strata contain unusable water? Yes ☒
No ☐ Type of water: Warm & bitter
Depth of strata 54-60 ft. Method of sealing
strata off: Thin Benmore down to the
Clay below the strata

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

Locate well in section

LOCATION OF WELL: County Oneida
N 22 1/2 W 16 S 23 T 15 R 35 E 1 M 3 M

Use other side for additional remarks

Size of drilled hole: 6" Total
depth of well: 175 Standing water
level below ground: 50 Temp. _____
Fahr. 50 Test delivery: 15 gpm
or _____ cfs Pump? ☒ Bail ☐
Size of pump and motor used to make test:
1 1/2 hp submersible
Length of time of test: 7 Hrs. Min. _____
Drawdown: 40 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 43320 WATER
FROM TO YES OR NO
FEET FEET

1	10	Top soil	
10	32	White Clay	
32	36	Consolidated Gravel	
36	46	Brown Clay	
46	51	Consolidated Gravel	
51	54	Brown Clay	
54	60	Gravel	Bitter water yes
60	87	White Clay	
87	98	Brown Clay	
98	112	soft silt	little water
112	118	red Clay	
118	121	Gravel & Rock	
121	163	red Clay	
163	167	Gravel & water	
167	175	White Clay	

Work started: Nov 23, 1968
Work finished: Mar 11, 1969
Well Driller's Statement: This well was
drilled under my supervision and this report
is true to the best of my knowledge.
Name: Ralph J. Howell
Address: Postage (Litch) 84331
Signed by: Ralph J. Howell
License No. 162 Date: Apr 17, 1969

USGS

Figure 1-6 Well log for David Hughes Well.



Clearwater Geosciences, LLP
Ground Water Development and Exploration

Form 238-7
11/97

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 200 11 9 44
DRILLING PERMIT NO. 764121
Other IDWR No. _____

2. OWNER:
Name M. J. McVernon, Ltd Partnership
Address 2525 Himsley Ave
City Colorado Springs Colorado Zip 80918

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

North
Twp. 15 North ☐ or South ☒
Rge. 35 East ☒ or West ☐
Sec. 14 SW 1/4 SE 1/4
Gov't Lot _____ County ONEIDA
Lat _____ Long _____
Address of Well Site 130 South Main
City SAMARIA
(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/FILTER PACK	AMOUNT	METHOD
Material From To	Sacks or Pounds	
Bentonite 0 20		OVERBONE

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
8 1/2	140	250		Steel	☒	☐	☒	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS

Perforations Method _____
Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Linear
NONE							

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

21 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
120-130		140	1 1/2

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
10	0	20	d lay f		
8	20	40	C lay		
4	40	80	CLAY & GRAVEL		
4	80	100	GRAVEL		
4	100	110	SAND GRAVEL		
4	110	120	LARGE GRAVEL		
4	120	140	" "		

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SEP 18 2000

Department of Water Resources

RECEIVED

SEP 06 2000

Department of Water Resources
Eastern Region

Completed Depth 140 (Measurable)
Date: Started 6-21-00 Completed 6-29-00

13. DRILLER'S CERTIFICATION

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

Company Name Lundstrom Well Drilling Firm No. 118

Firm Official Anna Lundstrom Date 6-29-00

and
Driller or Operator _____ Date _____
(Sign once if Firm Official & Operator)

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Figure 1-7 Well log for Jeff Davis Irrigation Well.



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1818 East 49th South, Idaho Falls, ID 83404, Ph. 208-589-5555 Fax 542-1489



Attachment 2

DATA PLOTS



Pumping Test of Davis Well for Vik Riches Impact Assessment
140 gpm April 23, 2011

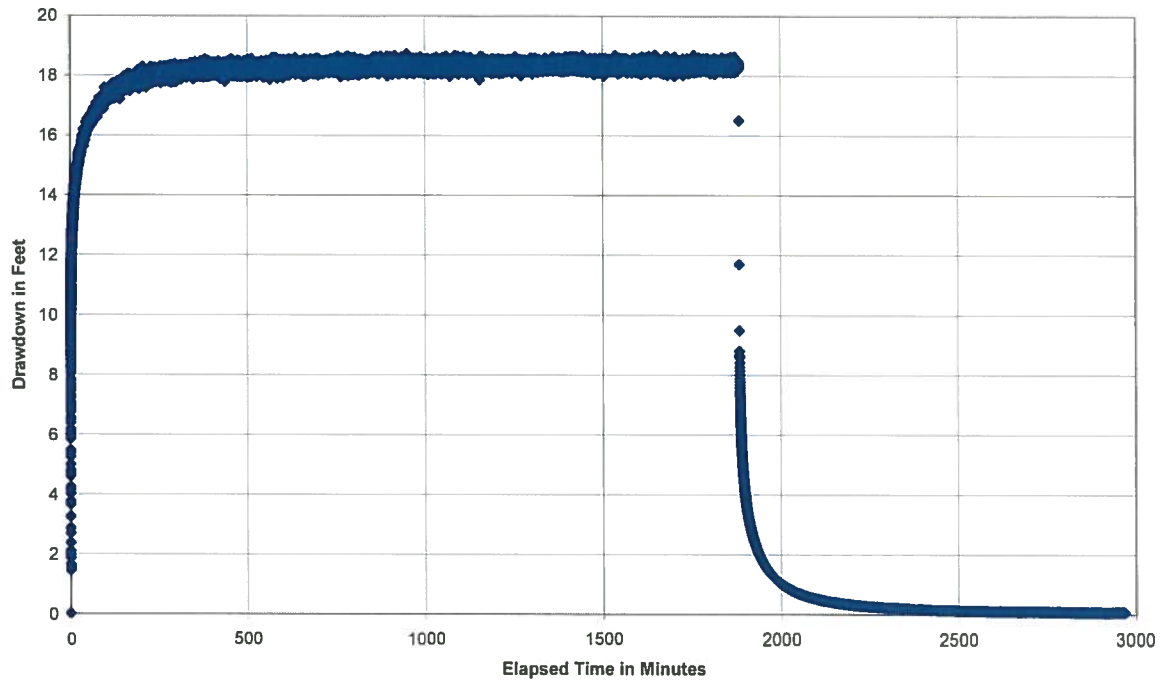


Figure 2-1. Plot of entire data set for pumping test of the Jeff Davis Irrigation well.



Attachment 3

AQTESOLV PLOTS

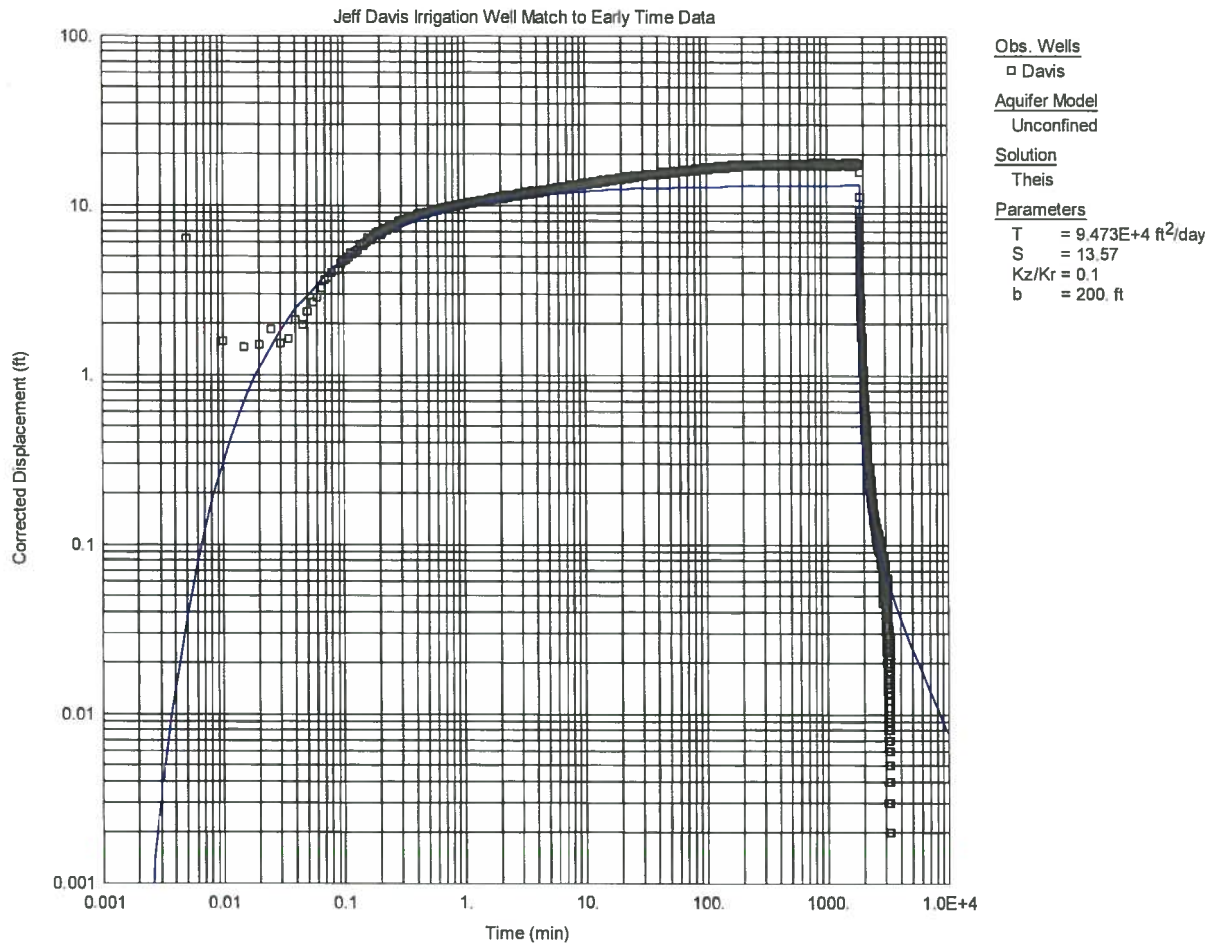


Figure 3-1 Theis unconfined solution matched to early time well data in Jeff Davis Test.

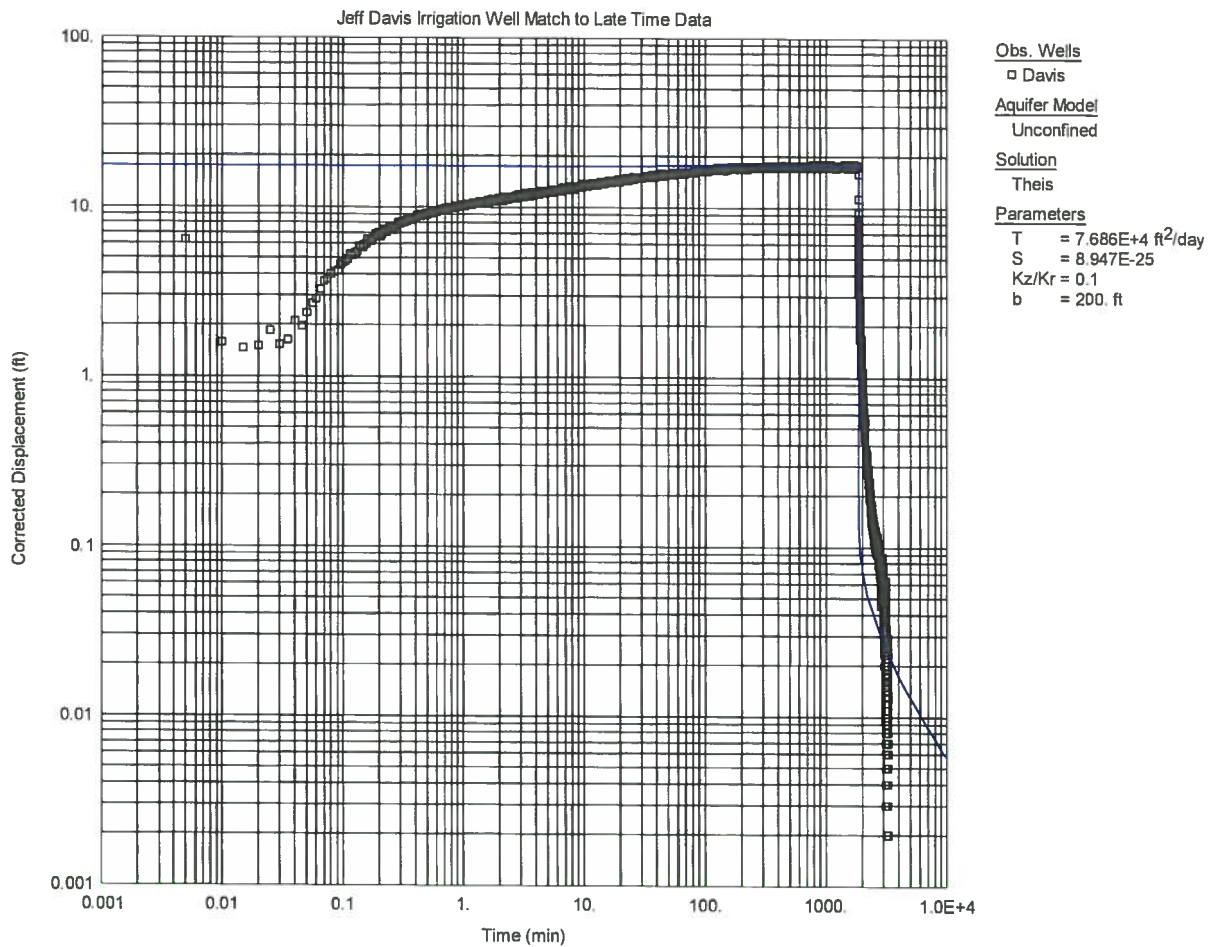


Figure 3-2 Theis unconfined solution matched to late time well data in Jeff Davis Test.

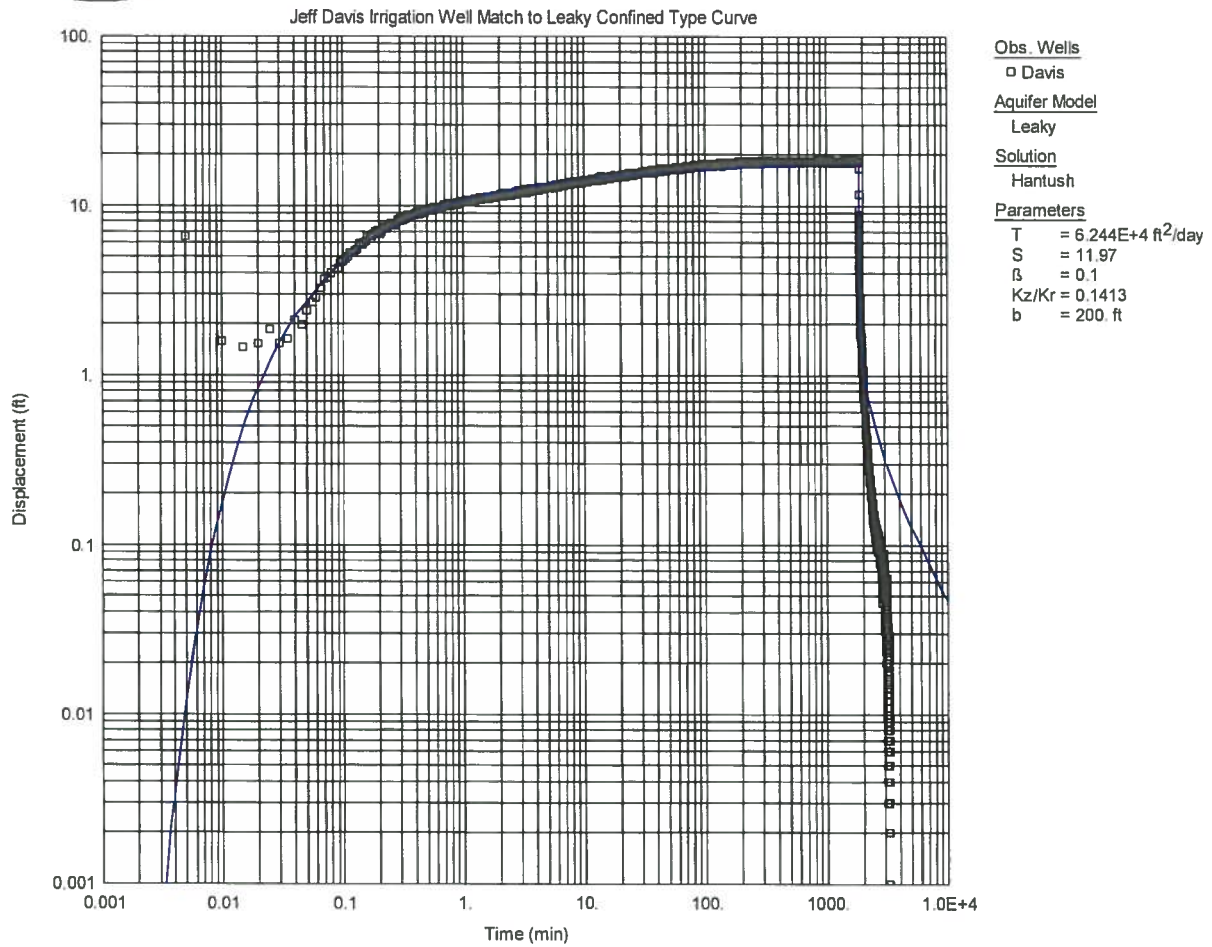


Figure 3-3 Hantush leaky confined solution matched to well data Jeff Davis Test.



Attachment 4

AQUIFER IMPACT ANALYSIS



Table 4-1 Table of values used in AQTESOLV simulation.

Parameter	Value	Unit
Transmissivity	78,000	ft ² /d
Storativity	0.1	unitless
Flow Rate	1500	gpm
Duration	259,200	min
Total volume	1,193	ac-ft
aquifer thickness (b)	200	ft
kz/Kr	0.1	na

Table 4-2 Table of locations for various boundary corners and wells used in the AQESOLV simulation.

Location	x	y
NW Corner	0	50000
NE Corner	32000	50000
SW Corner	0	0
SE Corner	32000	0
Evans POD	4750	6500
Well 1/4 mile North	4850	7820

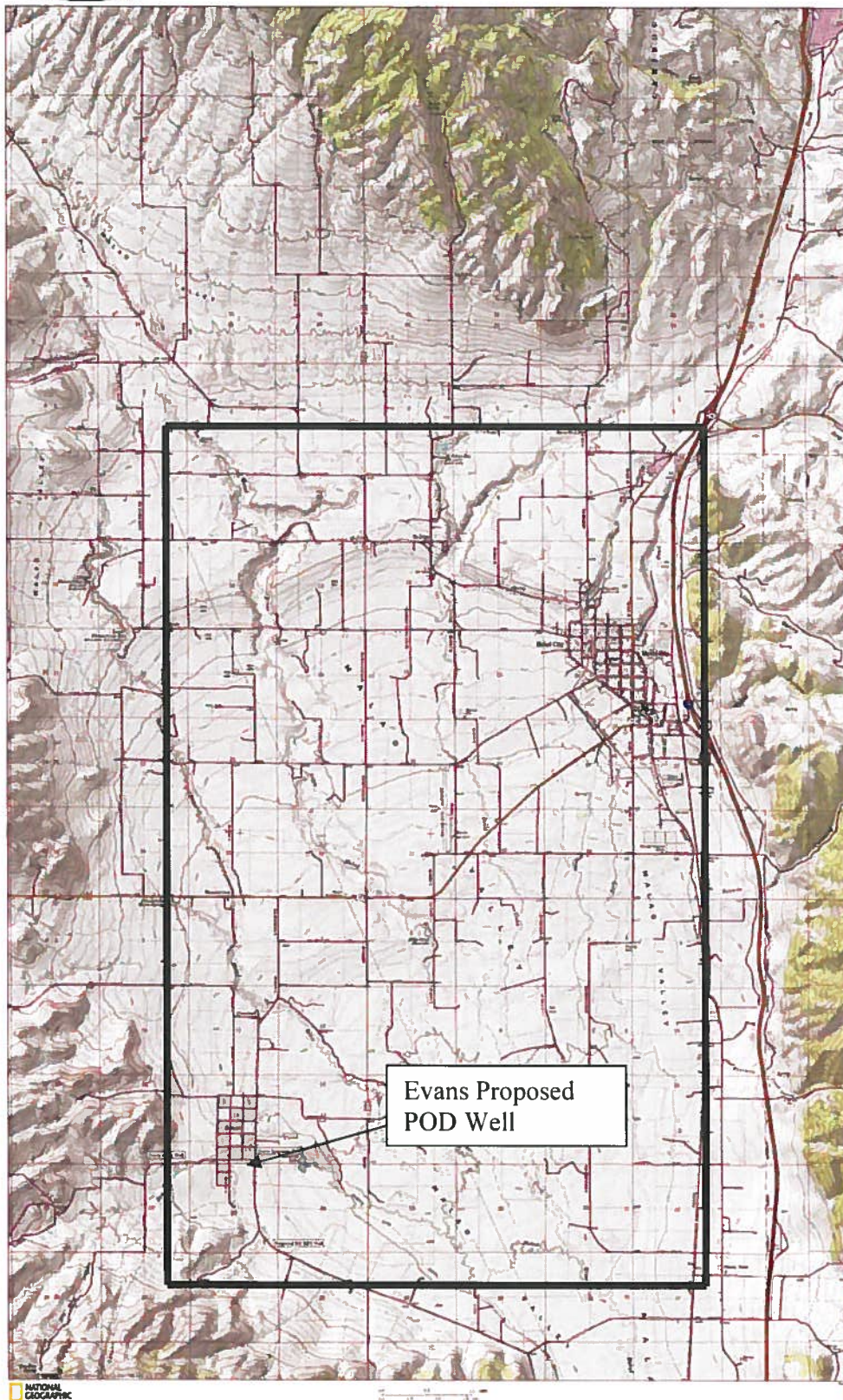


Figure 4-1 Outline of the boundaries used in the AQTESOLV forward solution calculation.

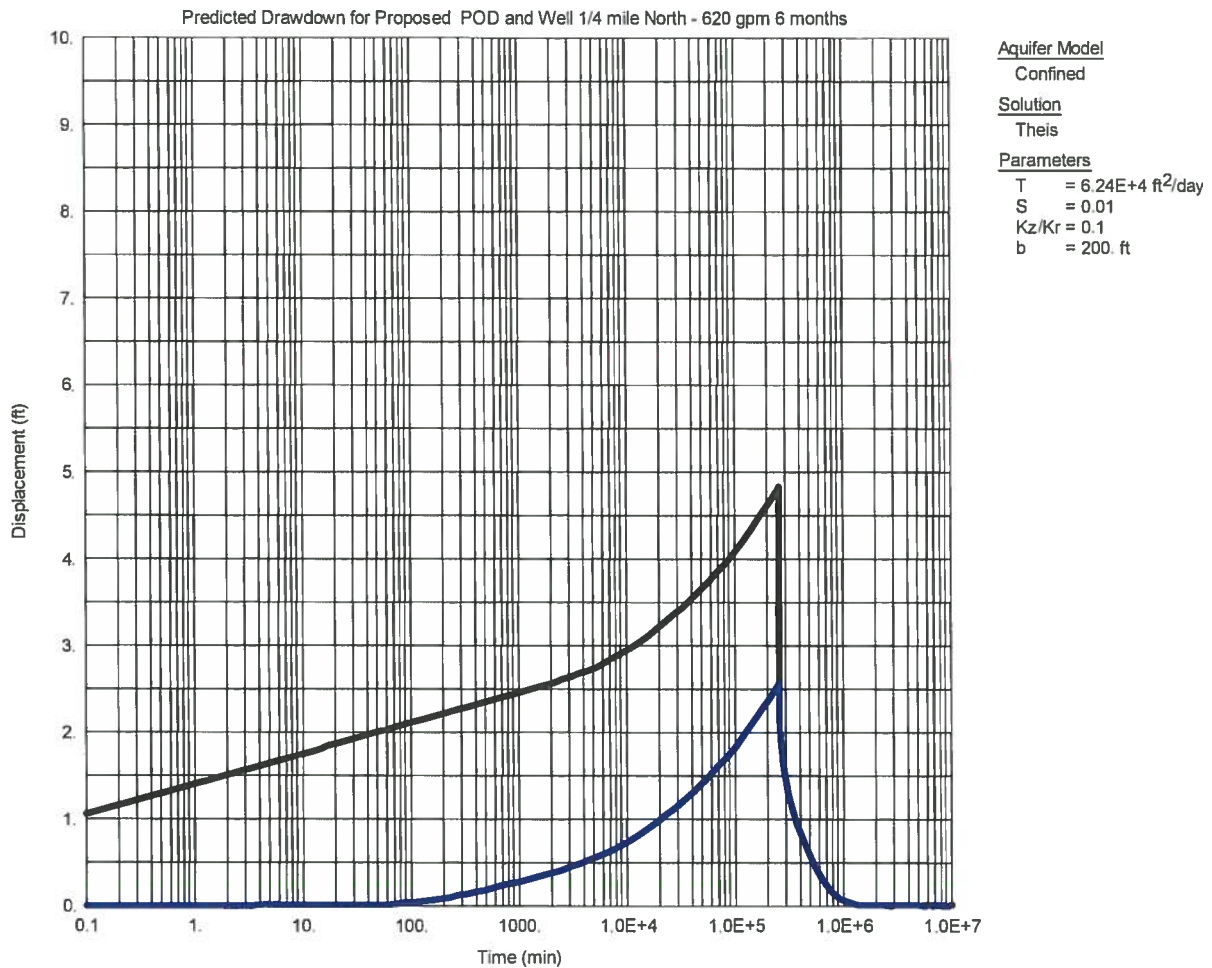


Figure 4-2 Predictive plot of drawdown at **620 gpm or 1.4 cfs for the full period of use 180 days**. The black line is for the water level in the proposed Evans Well pumping and the blue line is the water level predicted in a well 1/4 mile north of the proposed Evans Well.

Key to line colors

- Blue Imaginary well 1/4 mile north of the proposed POD
- Black Proposed POD for Evans

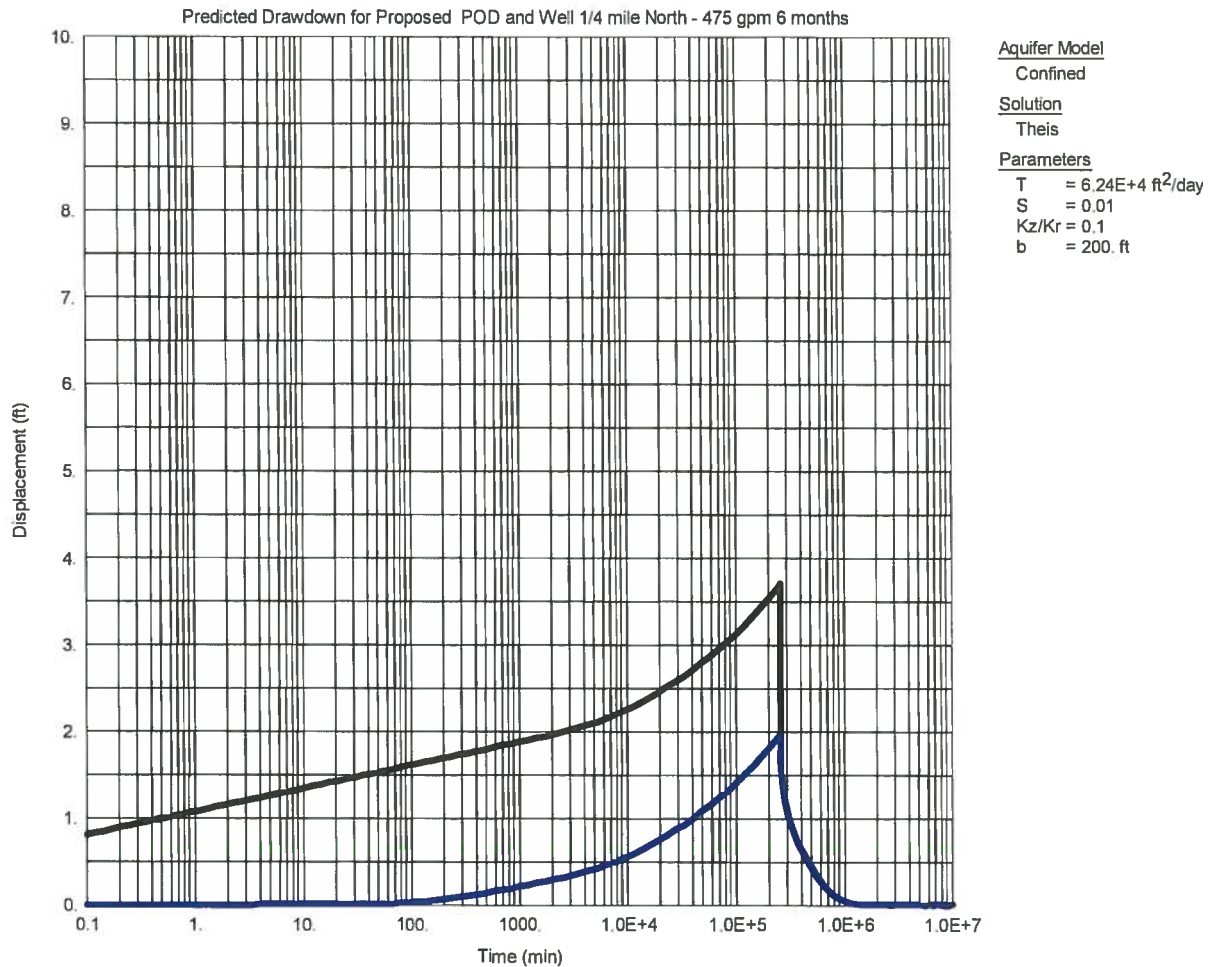


Figure 4-4 Predictive plot of drawdown at **475 gpm or 1 cfs for 180 days**. The red line is for the water level in the proposed Evans Well pumping and the blue line is the water level predicted in a well 1/4 mile north of the proposed Evans Well.

Key to line colors

Blue Imaginary well 1/4 mile north of the proposed POD
Black Proposed POD for Evans