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NOV 02 2010

Department of Water Resources
Eastern Region

October 31, 2010

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

RE: AQUIFER TEST FOR OLIN HANNUM WATER RIGHT 15-7332, MALAD BASIN

Dear Mr. Dunn:

A pumping test was conducted on October 30, 2010 to evaluate aquifer characteristics for the water right permit application (Attachment 1) for Mr. Olin Hannum. The purpose of the pumping test was to either confirm or deny that the aquifer has sufficient capacity to provide water to Mr. Hannum's proposed well without causing excessive drawdown to neighboring wells if the 207 gpm (0.46 cfs) water right is approved. The pumping test was conducted on a neighbor's well, Mr. Donald Vaughen (Well Log in Attachment 2), approximately 950 feet from the location of the proposed well for Mr. Hannum (Figure 1). This letter transmits the results of my analysis.

Four irrigation wells are known within about 1 ½ miles of Mr. Hannum's property that produce between 1200 and 2400 gpm, which gives some encouragement that the aquifer is high yielding in this area. Access was approved by owners for using three wells nearby the Hannum property, the Donald Vaughen irrigation well, the Steve Vaughen domestic well and the Tandi Camp domestic well as shown in Figure 1. Only the well log for the Donald Vaughen irrigation well could be found. The other two domestic wells are obviously old, both being constructed in well pits and showing signs of age. Sheldon Vaughen reported the Steve Vaughen well is about 60 ft deep but that could not be confirmed. Several attempts were made to install automated INSITU brand downhole pressure transducers and data loggers for collecting automated water levels in the two observation wells. However, physical access to both wells could not be obtained. In the Steve Vaughen well something in the well prevented the probe from getting past a level of about 15 ft below land surface. For the Tandi Camp well, removal of the cap for the well access port could not be achieved without threatening to break the well head itself due to rust and age. The access port on the Donald Vaughen Irrigation well was limited in diameter and the downhole pressure transducer could not be installed. Therefore, water levels for the pumping test were collected by hand using a Solinst Brand electronic water level probe (e-line) marked at increments of hundredths of a foot.

The pumping test began at 9:30 AM on October 30, 2010 and the D. Vaughen well was pumped at a steady rate of 1200 gpm for 3 hours. The pumping test was terminated after three hours because of concerns about the discharge water eroding Mr. Vaughen's field. Nevertheless, the data are sufficient to indicate that Mr. Hannum's water right will not cause excessive drawdown in the neighbor's wells. Plots of the raw data for all wells can be found in Attachment 3. The D. Vaughen well experienced about 50 ft of drawdown from static during the test.

On the basis of the D. Vaughen well log and a regional understanding, the aquifer was assumed to be 200 ft thick for the analysis. Several curve matching methods were conducted using the AQTESOLV aquifer test software. Output plots from the AQTESOLV analyses are presented in Attachment 4. Figure 4-1 shows the match of the late time data to the drawdown curve for the Theis confined solution. The calculated transmissivity is about $7 \times 10^3 \text{ ft}^2/\text{day}$ and the storativity 2×10^{-5} , which is unreliable because it is a match to only a pumping well. However, it is on the low range of representative storativity values for this type of aquifer and it will therefore be used. Figure 4-2 is the match of the data to the unconfined



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solution, which indicates a higher transmissivity of 1.2×10^4 ft²/day. The match to a semi-confined solution is presented in Figure 4-3, which is the best match to the data and suggests the aquifer is leaky confined in this area. Transmissivity for this case is 1.7×10^3 ft²/day and the storativity is 0.12.

To estimate the long-term drawdown and impact to neighboring wells from pumping of the proposed Hannum well, I used the forward solution capabilities of the AQTESOLV program in a similar manner as has been presented to you in the past. Two cases are presented, the leaky confined case and the confined case, Figures 4-4 and 4-5, respectively. The AQTESOLV plot for the leaky confined aquifer scenario indicates there will be no impact to the closest well, Tandi Cook. This is unrealistic because the leaky confined solution, although appropriate for a short term pumping test, provides an infinite source of water for the 6 months of steady pumping at 207 gpm (0.46 cfs). The confined solution is conservative because it does not allow leakage from an overlying aquifer, thus will over predict the actual impacts from pumping of the Hannum Well. As seen in Figure 4-5, the forward solution indicates the Hannum well will have about 12 ft of drawdown in the well itself, the Tandi Cook well will have about 5 ft of drawdown (red line) and a well at a radius of ½ mile from the new water will have less than 3 ft of drawdown (green line).

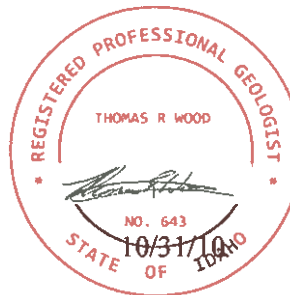
I also considered another solution with aquifer boundaries that representative of edges of the Malad Basin. No flow boundaries are 6000 ft to east and 12000 to west and a constant head boundary is located 20000 ft north. This solution indicates the Hannum well will have about 14 ft of drawdown, the Tandi Cook well will have about 7 ft of drawdown (red line) and a well at a radius of ½ mile from the new water will have about 6 ft of drawdown (green line).

It is my professional opinion that Mr. Hannum's water right will not excessively impact his neighbors' right to divert water. For several reasons I believe that the calculated drawdown over estimates the actual drawdown to be expected. This is because no one pumps continuously during the irrigation season (thus 6 months continuous pumping is too high) and that leaky confinement will abate drawdown significantly as shown by the comparison between the confined and leaky confined cases.

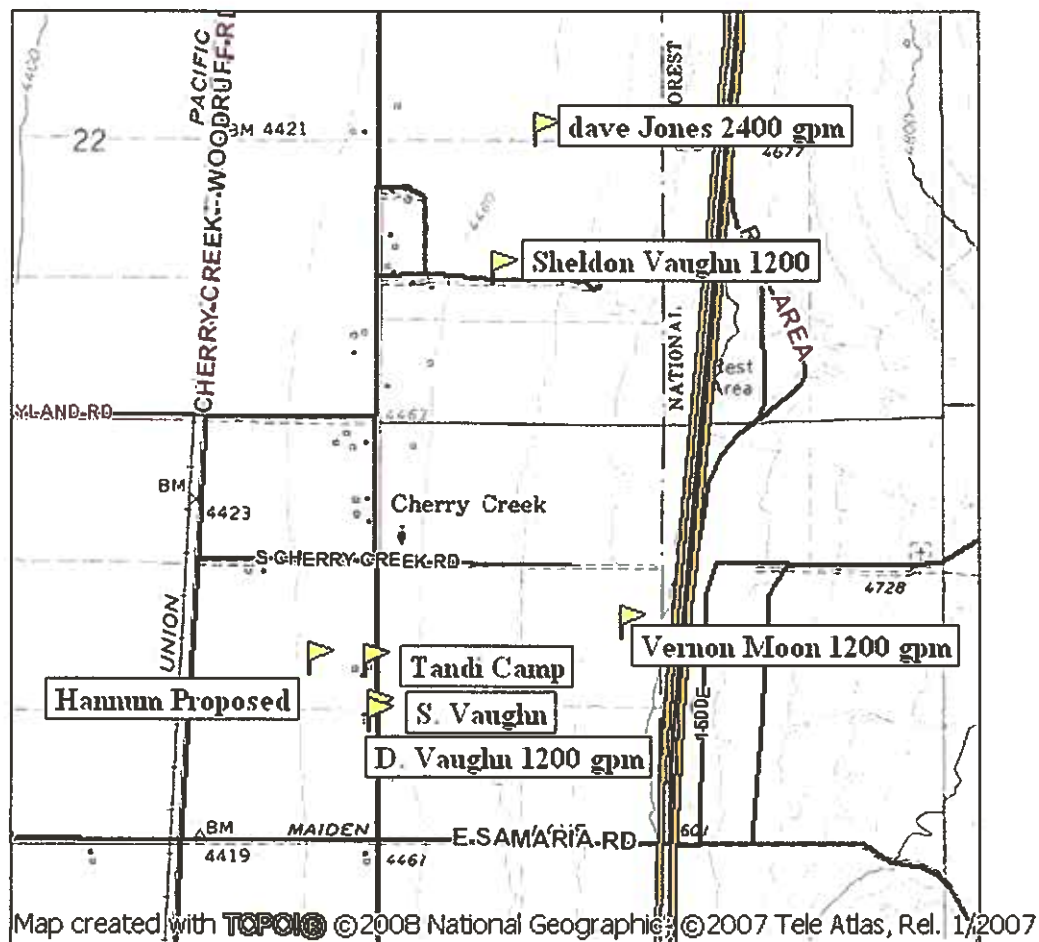
On behalf of the Mr. Hannum I request that you expedite approval of their water right application PERMIT 15-7332. Please do not hesitate to call me if you have any questions about this letter or the calculations presented herein. I will transmit to you electronically the data files collected during the test and the processed data.

Respectfully,

Thomas R. Wood, PhD, PG



cc Olin Hannum, 8001 South Old Hwy 91, Malad, ID 83252



0.0 0.5 1.0 miles
0.0 0.5 1.0 1.5 km

TN MN
12 1/2
10/31/10

Figure 1. Map of pumped well (D. Vaughn), other nearby wells and the proposed location for the Hannum Well.



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Attachment 1

WATER RIGHT APPLICATION

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IDAHO DEPARTMENT OF WATER RESOURCES
Water Application Report

10/5/2010

WATER RIGHT NO. 15-7332

<u>Owner Type</u>	<u>Name and Address</u>
Current Owner	OLIN HANNUM 2449 SOUTH 2300 WEST WEST HAVEN, ID 84401 (801) 510-0125

Priority Date: 09/28/2009
Status: Active

<u>Source</u>	<u>Tributary</u>
GROUND WATER	

Beneficial Use	From	To	Diversion Rate	Volume
IRRIGATION	04/01	10/31	0.46 CFS	
Total Diversion			0.46 CFS	

Location of Point(s) of Diversion:

GROUND WATER	SESENE	Sec. 27	Township 15S	Range 36E	ONEIDA County
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Place(s) of use:

Place of Use Legal Description: IRRIGATION ONEIDA County

[illegible]

<http://www.idwr.idaho.gov/apps/ExtSearch/RightReportAJ.asp?BasinNumber=15&Sequen...> 10/5/2010



Township	Range	Section	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres
15S	36E	27		SWNE	5.5		SENE	15						

Total Acres: 20.5

Dates:

Date Application Received: 09/24/2009

Date Application Denied:

Last Date of Beneficial Use:

Extension End Date:

Protest Deadline Date: 5/3/2010

Number of Protests: 0

Enlargement Use Priority Date:

Enlargement Statute Priority Date:

Other Information:

State or Federal:

Owner Name Connector:

Water District Number:

Generic Max Rate per Acre:

Generic Max Volume per Acre:

Application Type: New Appropriation

Applicant Remarks: Drill irrigation well for 23 acres of ground for pasture and hay.

Other Water Rights:

Time to Complete Works: 2

Transfer Affected Description:

Transfer Affected Contracts:

Old Transfer Number:

Transfer Reason:

Transfer Return Flows:

Swan Falls Trust or Nontrust:

Swan Falls Dismissed:

DLE Act Number:

Cary Act Number:

Mitigation Plan: False

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Attachment 2

WELL LOG



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R LIVE U
MAR 20 1987

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 DONALD S. VAUGHAN
Address CHERRY CREEK, IDAHO
Malad Idaho 832457

Owner's Permit No. _____
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 ☒
14" O.D. "Diam. from 0 ft. to 269 ft.
"Diam. from _____ ft. to _____ ft.
"Diam. from _____ ft. to _____ ft.
"Diam. from _____ ft. to _____ ft.
Thickness of casing: 250 Material: _____

Steel ☒ concrete ☐ wood ☐ other ☐

(explain) _____

PERFORATED? Yes ☒ No ☐ Type of

perforator used: MILLS

ALL GRAVEL BELOW 90' PERFORATED HOLES

Size of perforations: 3/8" by 4"

perforations from _____ ft. to _____ ft.

perforations from _____ ft. to _____ ft.

perforations from _____ ft. to _____ ft.

perforations from _____ ft. to _____ 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: _____

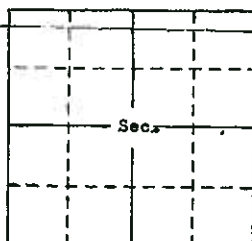
Depth of strata _____ ft. Method of sealing

strata off: _____

Surface casing used? Yes ☐ No ☒

Cemented in place? Yes ☐ No ☐

Locate well in section



LOCATION OF WELL: County Oscila

NE 1/4 Sec. 27 T. 15 N/S R. 36 E/W

Use other side for additional remarks

Size of drilled hole: 14" Total
depth of well: 269 Standing water
level below ground: 51' Temp. _____
Fahr. 54 ° Test delivery: 1000 gpm
or _____ cfs Pump? ☐ Bail ☐
Size of pump and motor used to make test:
80WLS-12" 200 H.P. GASOLINE MOTOR
Length of time of test: 2 Hrs. Min.
Drawdown: 59 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 43316 WATER
FROM TO YES OR NO

FEET	FEET		
0	1	SOIL	
1	6	CLAY	
6	15	GRAVEL	NO
15	28	CLAY	
28	35	GRAVEL CLAY	
35	69	CLAY	
69	71	GRAVEL	YES
71	82	CLAY	
82	86	GRAVEL	YES
86	90	CLAY	
90	96	GRAVEL	YES
96	100	CLAY	
100	101	GRAVEL	YES
101	111	CLAY	
111	119	GRAVEL	YES
119	132	CLAY	
132	141	GRAVEL	YES
141	152	CLAY	
152	157	GRAVEL CLAY	
157	181	CLAY	
181	192	GRAVEL	YES
192	196	CLAY	
196	198	GRAVEL CLAY	
198	212	GRAVEL	YES
212	216	CLAY	
216	231	GRAVEL	YES
231	242	CLAY	
242	269	GRAVEL	YES

Work started: _____

Work finished: _____

Well Driller's Statement: This well was drilled under my supervision and this report is true to the best of my knowledge.

Name: Bernard H. Hardner

Address: Malad, Idaho

Signed by: Bernard H. Hardner

License No. 332 Date: Mar 23 1987

USGS

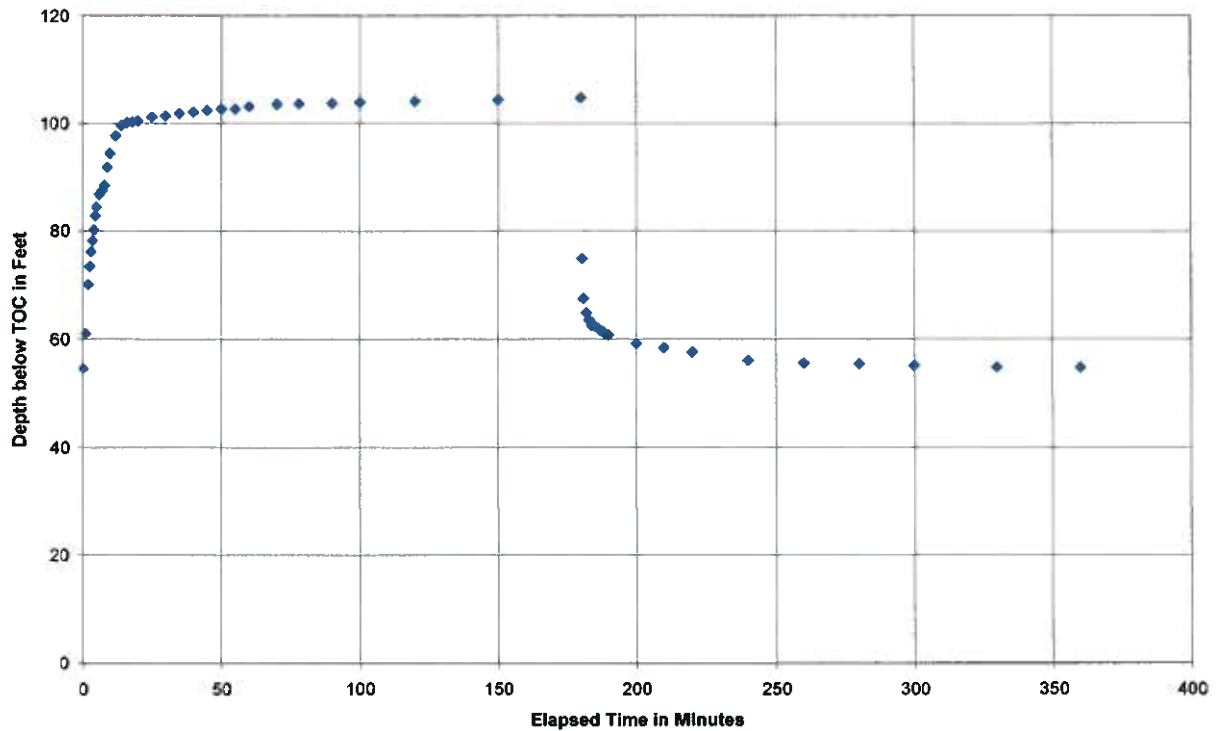


Attachment 3

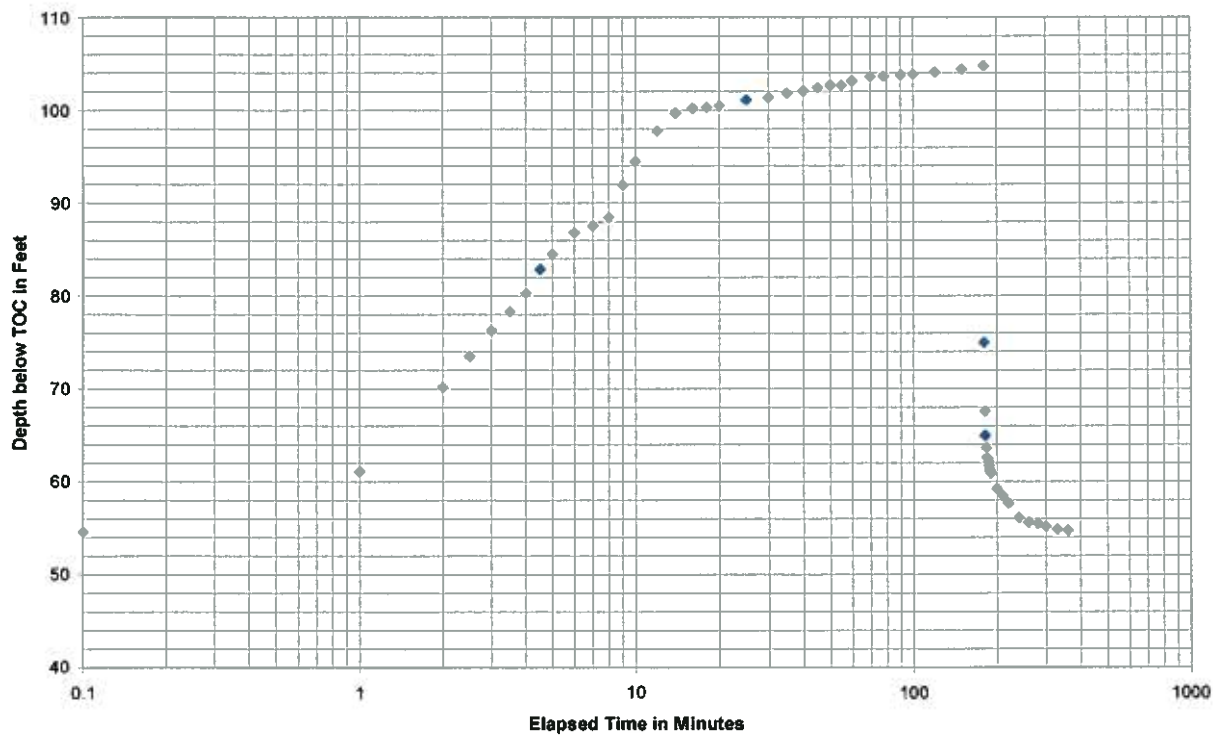
DATA PLOTS



Pumping Test for Olin Hannum - Donald Vaughn Well October 30, 2010 1200 gpm



Pumping Test for Olin Hannum - Donald Vaughn Well October 30, 2010 1200 gpm





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Attachment 4

AQTESOLV PLOTS

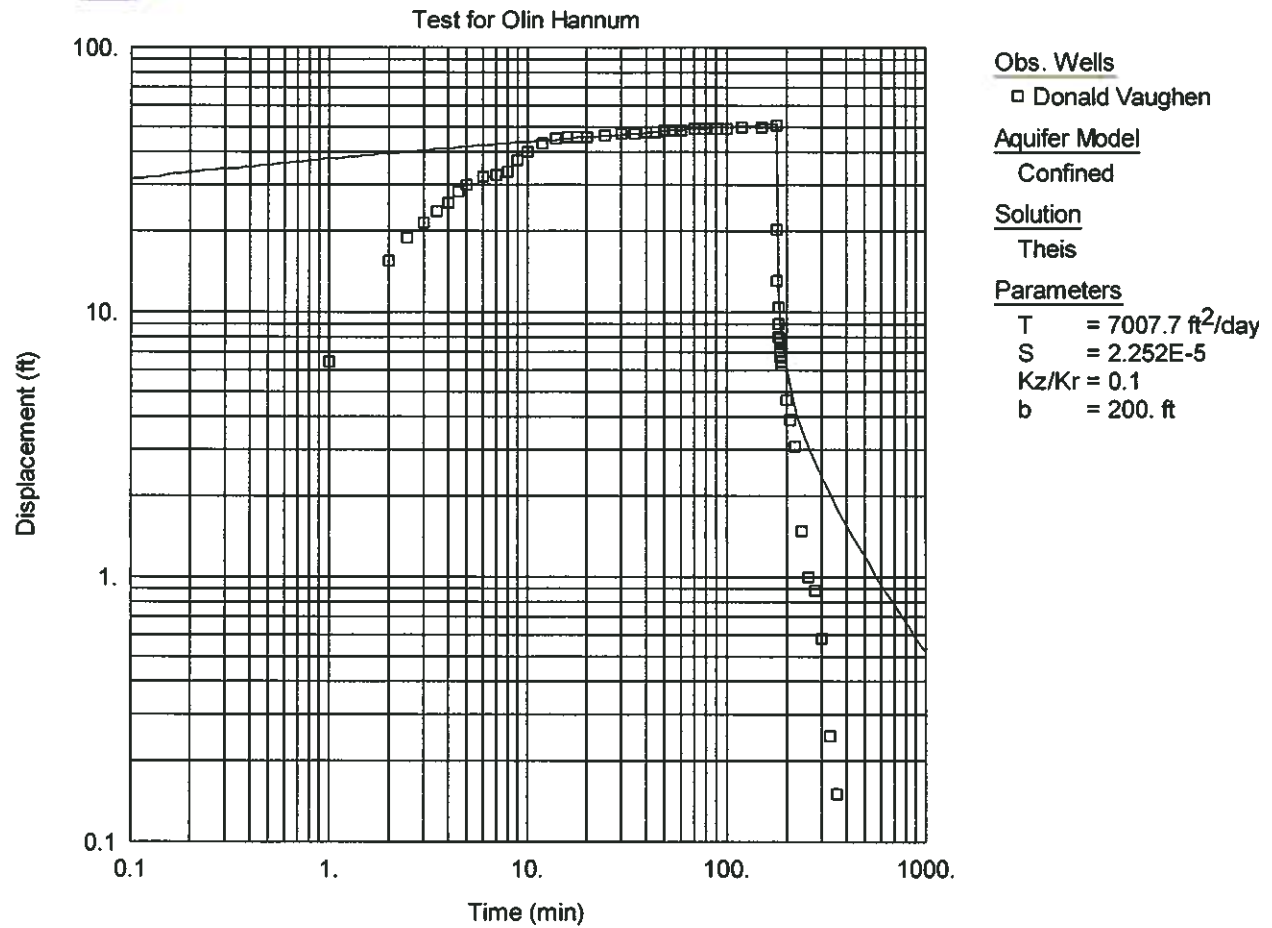


Figure 4-1 Theis confined solution match.

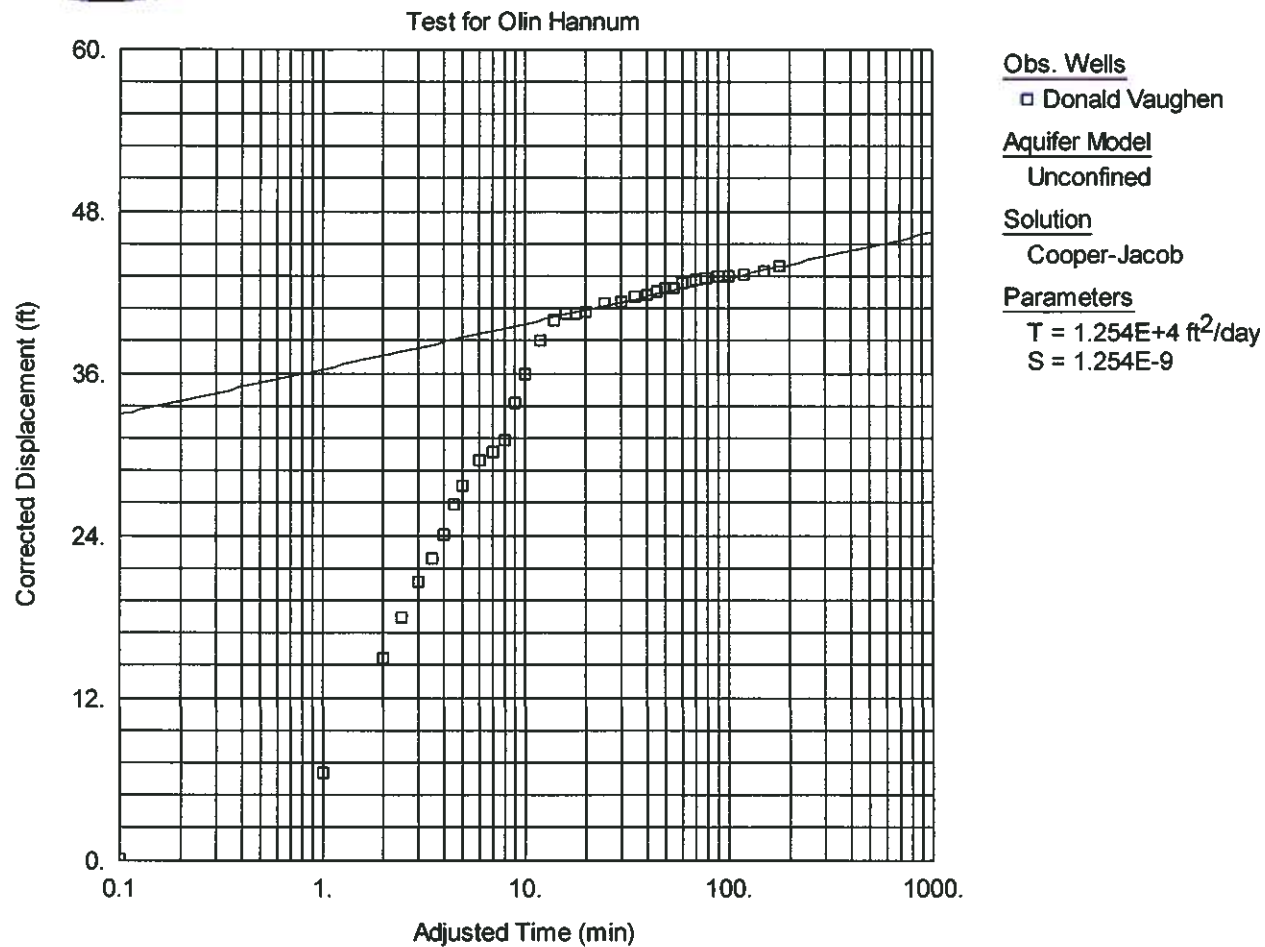


Figure 4-2 Unconfined solution match to data.

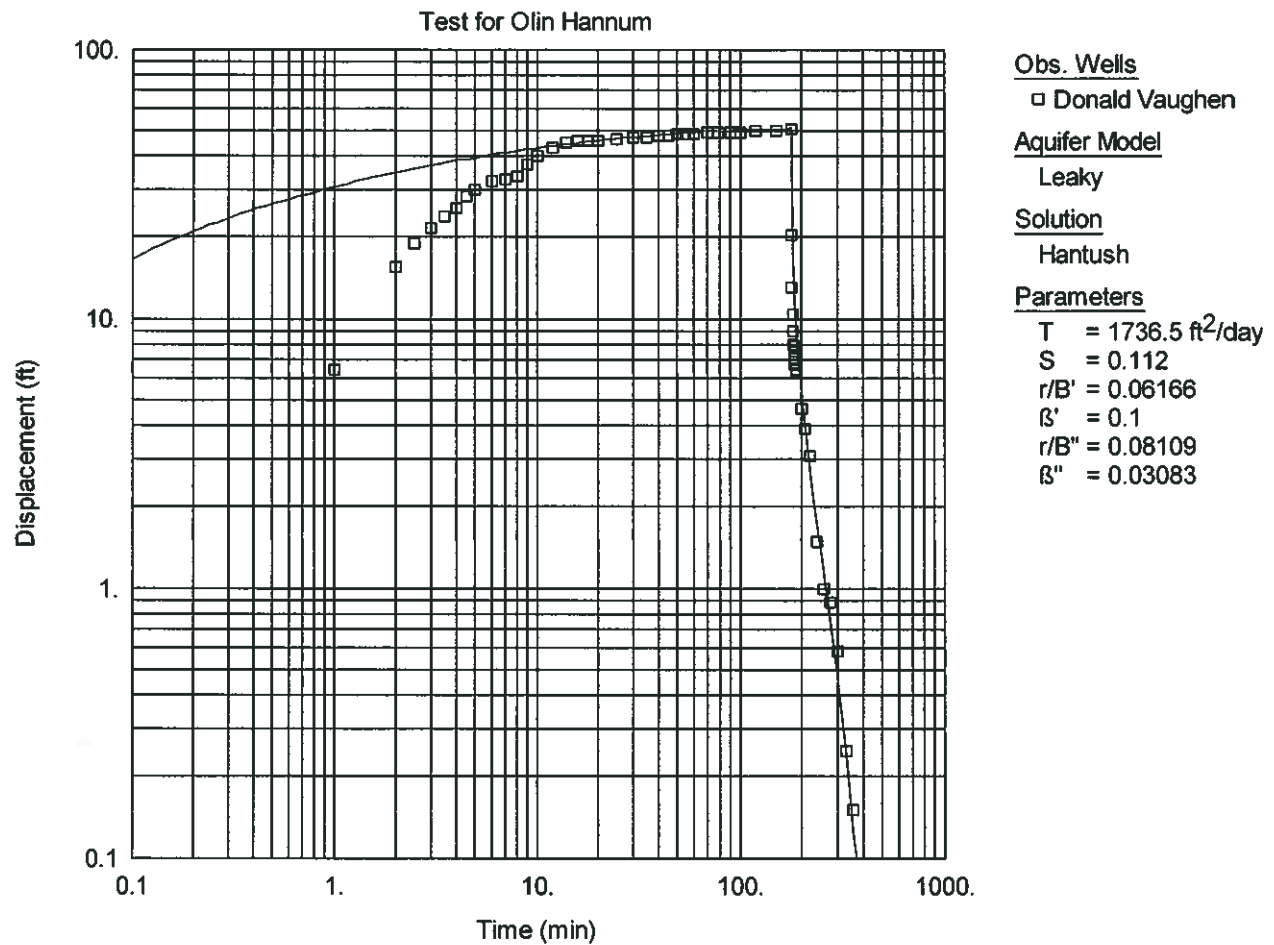


Figure 3-3 Leaky confined solution match to data.

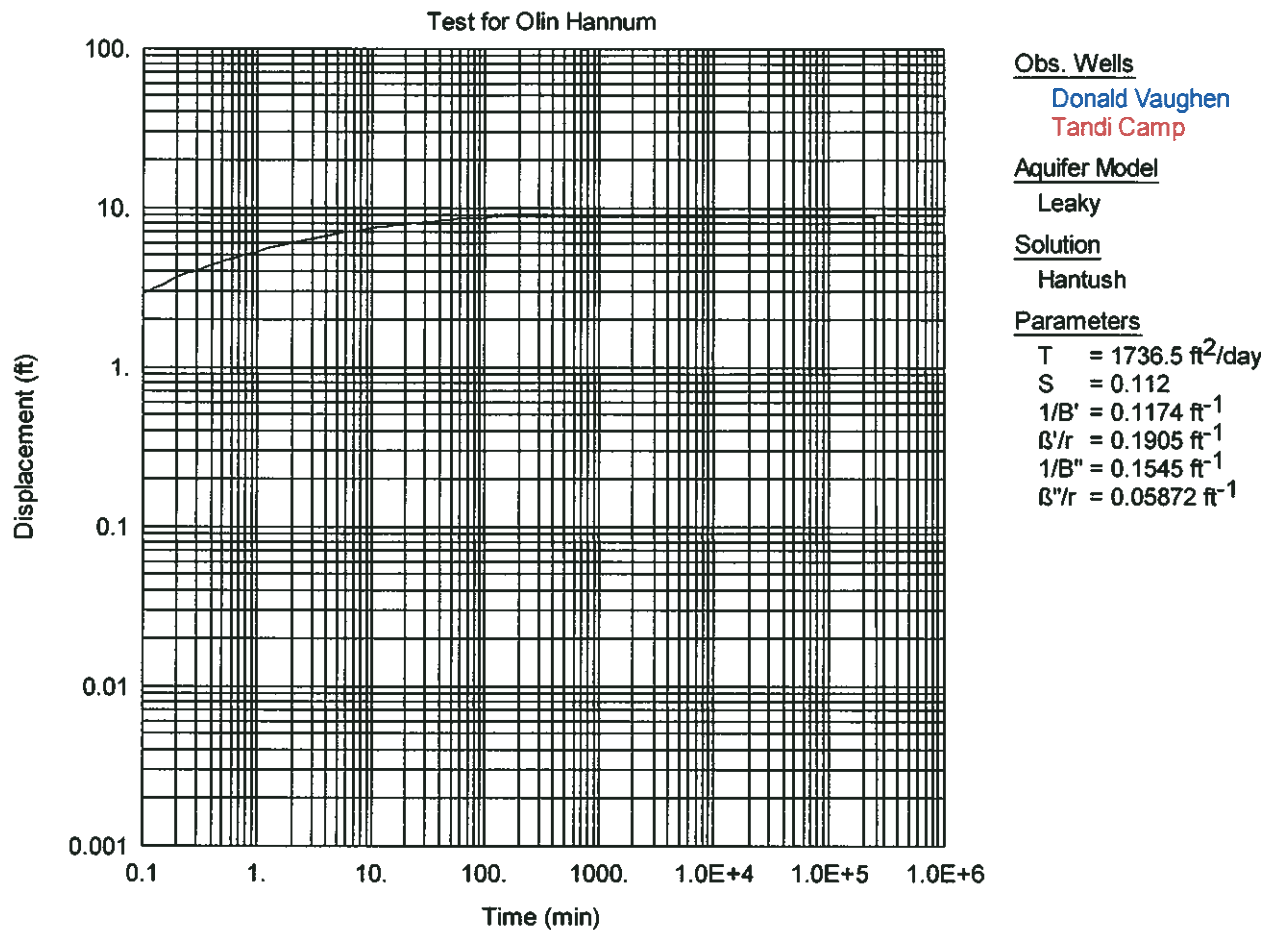


Figure 4-4 Forward solution for Hannum using a proposed 207 gpm well pumping continuously for 6 months using the leaking confined solution. This solution indicates the nearest well, Tandi Cook, will have no measurable impact from the new water right.

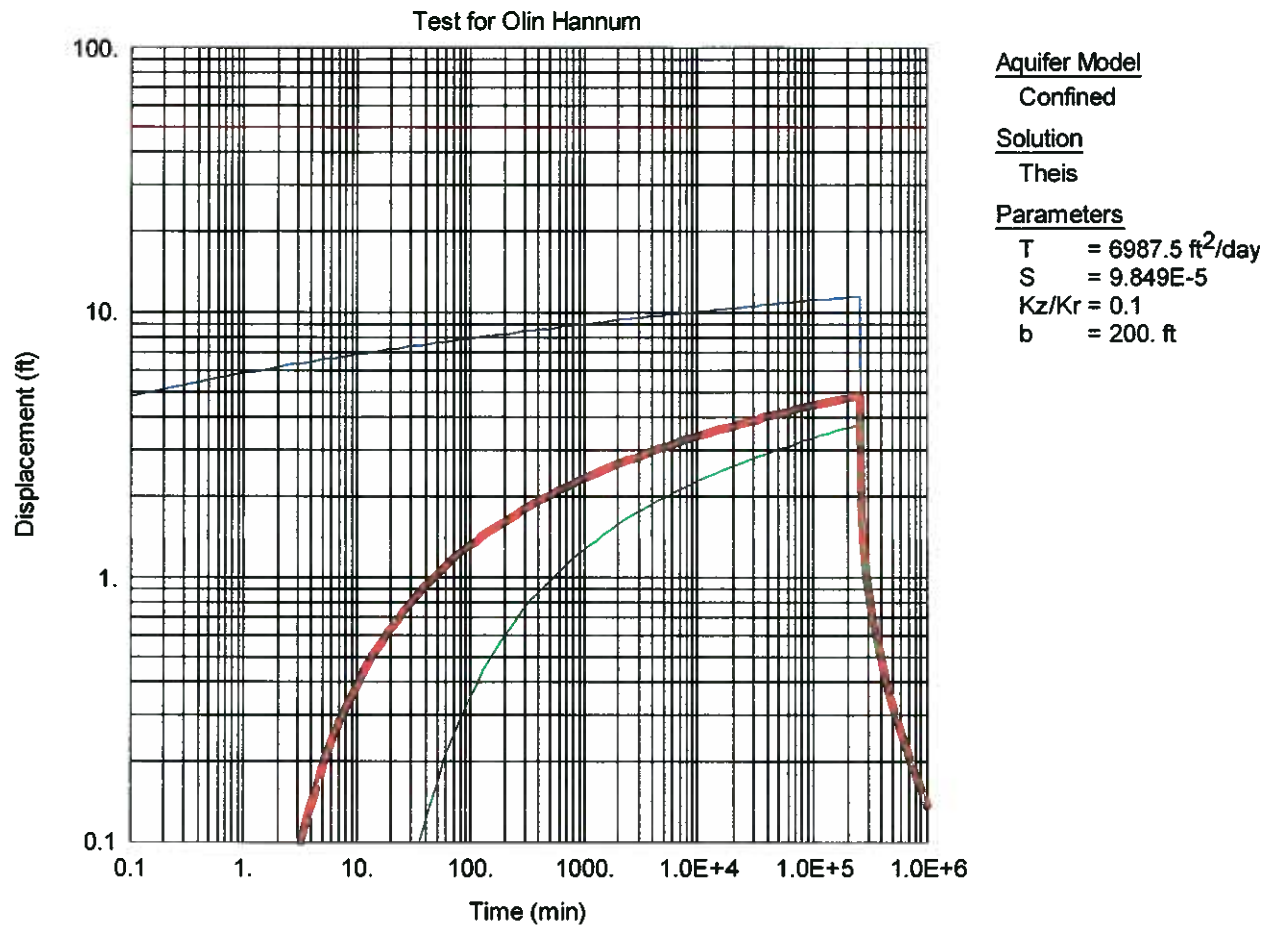


Figure 4-5 Forward solution for proposed Hannum well pumping at 207 gpm well for 6 months using the Theis confined solution. This solution indicates the Hannum well will have about 12 ft of drawdown, the, Tandi Cook well will have about 5 ft of drawdown (red line) and the wells greater than ½ mile of the new water will have less than 3 ft of drawdown (green line).

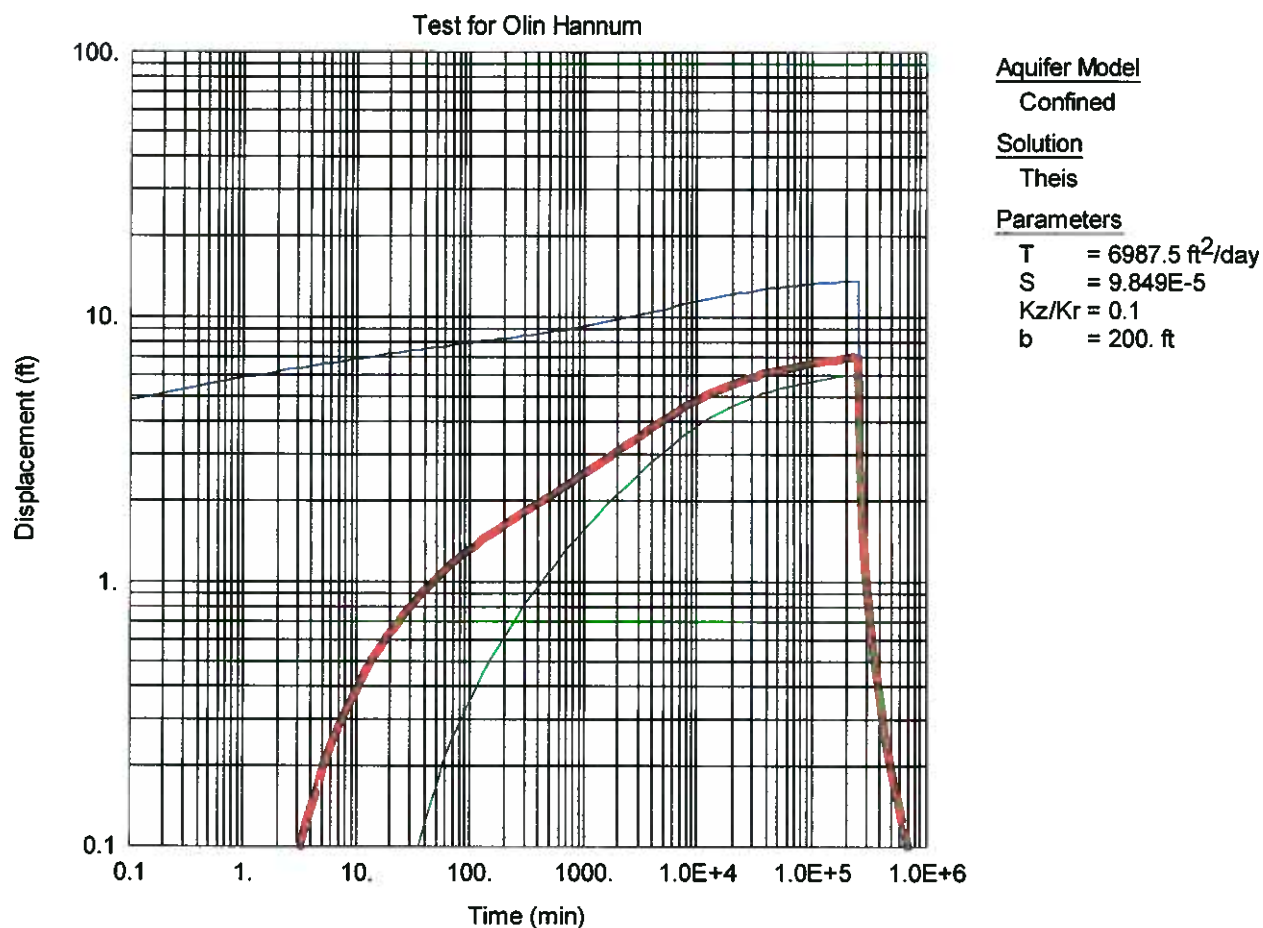


Figure 4-6 Forward solution for the proposed Hannum well in an aquifer having boundary conditions, pumping continuously at 207 gpm for 6 months and using the Theis confined solution. No flow boundaries are 6000 ft to east and 12000 to the west and a constant head boundary is located 20000 ft north. This solution indicates the Hannum well will have about 14 ft of drawdown, the Tandi Cook well will have about 7 ft of drawdown (red line) and the wells at greater than ½ mile from the new water will have less than 6 ft of drawdown (green line).