TABLE 1

Test No.	Description	Duration Hours	Production Well No.	Flow Rate gpm	Pressure Gage in Well No.	Depth, feet	Maximum Pressure drop Well No.	Δp, psi
1	Short Term Test on RRGE #2	715	RRGE #2	210	RRGE #2	5200	RRGE #2	39
2	Long Term Test on RRGE #2	615-1/2	RRGE #2	400	RRGE #1	1000	RRGE #1	3.6
3	Short Term Test on RRGE #1	30	RRGE #1	26	RRGE #1	4700	RRGE #1	1.1

GL07302

INTERPRETATION

RRGE # 2 Short Term Test # 1 Sept 12 to Sept 13, 1975

Flow commenced: 2125 hrs. on 9/12
Flow shutdown: 1225 hrs. on 9/13
Duration of Flow: 15 hours
Flow Rate : 210 gpm

I. Computation of Permeability and storage:

	Drawdown Data		Recovery Data	
	Jacob's Method (Asymptote solution)	Theis Method	Asymptote solution	
Transmissivity gal/ft at 296°F)	4667	4696	4718	
k H md-feet	44,134	44,442	44623	
orage ff. S	1.134×10^{-2}; r_w = 1 foot	1.09×10^{-2}; r_w = 1 foot	-	
c H ority x compressibility x Thickness)	2.82×10^{-2} ft/psi, r_w = 1 ft.	2.71×10^{-2}; r_w = 1 foot	-	

II. Nature of Boundaries Present:

Drawdown Data:

The semilog plot (Jacob's plot) of drawdown data indicates the presence of more than one barrier boundary, as evidenced by three distinct straight line segments. The ΔP_{10} intercepts of these straight line segments are:

Line 1 0 to 800 seconds ΔP_{10} = 4.75 Psi/cycle
Line 2 800 to 20,000 seconds ΔP_{10} = 11.3 Psi/cycle
Line 3 20,000 to 40,000 seconds ΔP_{10} = 20 Psi/cycle.

If line 2 were to be controlled by only one boundary it should have ΔP_{10} equal to 2 x ΔP_{10} of line 1 = 2 x 4.75 = 9.50 Psi/cycle.

Roger, Please Note
e interpretation
low is valid,
y we may qualify
interpretation with
statement that
re exists some possibility
at the slope changes
The semi-log plot
y be due to other causes
complex processes
giving on the
immediate vicinity of
a producing
well

The fact that the ΔP_{10} of line 2 is found to be greater than 9.50 psi/cycle, suggests that ~~probably~~ the data beyond 800 seconds is probably controlled by more than one barrier boundary.

The log-log plot of drawdown data also indicates the presence of more than one barrier boundary. It is seen from the plot that the data beyond 800 seconds departs from the Theis curve and cuts across the type curves for $r_i' = 50\, r_w$ and $r_i' = 20\, r_w$. This too suggests the presence of more than one boundary with the first image well about 50 effective radii away from pumped well.

The calculation of distance to boundary depends on r_w in the case of the present test. Using the Jacob's plot, the following results have been obtained

Assumed r_w feet	r_i' feet (Dist. to image well)	Distance to boundary = $\frac{1}{2} r_i'$ (feet)
	23.5	11.75
1		
3	70.5	35.25
~~3~~		~~58.75~~
5	117.5	58.75

III Analysis of Build up data:

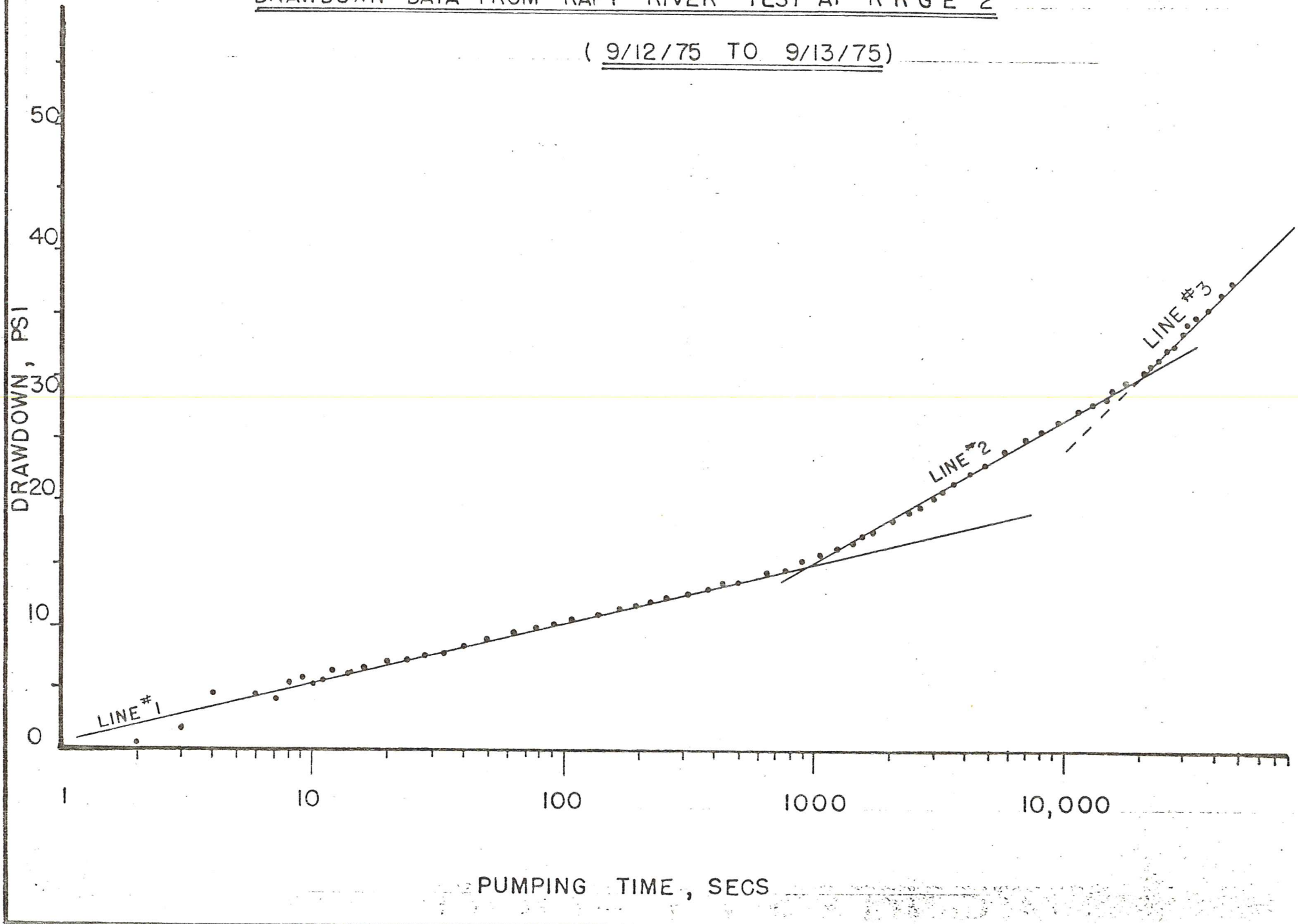
a) Log-log plot does not reveal any unit-slope or half slope segments. This indicates neither wellbore storage nor large fractures has influenced build up data.

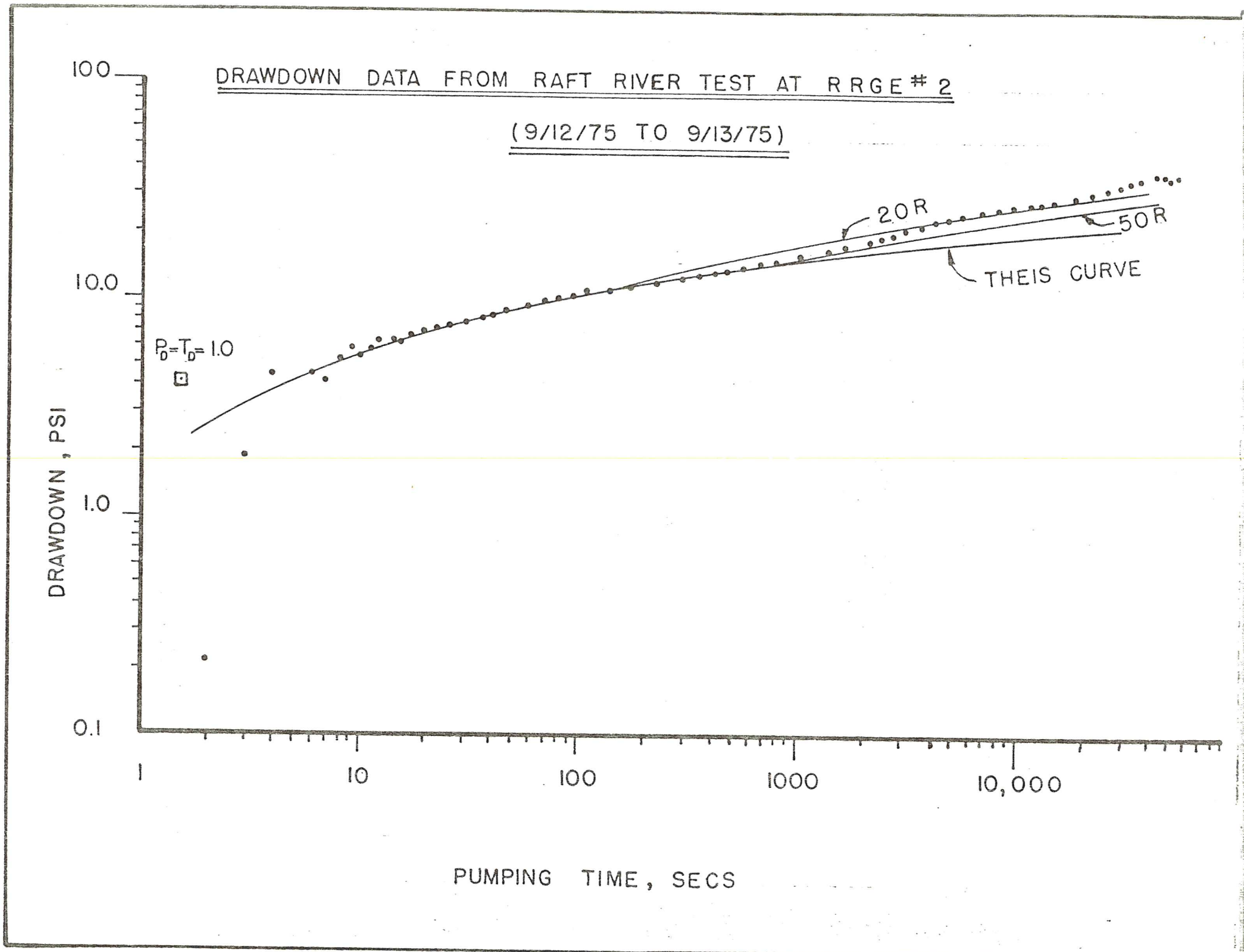
b) It is hard to recognize any well defined segment in the log-log plot of build up ratios $(t+\Delta t)/\Delta t$. The build up data probably is complicated by boundary and other effects.

c) For whatever it is worth, the build up data yields T and kh values obtained by Jacob's Method. The build up data also suggests positive skin effect

DRAWDOWN DATA FROM RAFT RIVER TEST AT R R G E #2

(9/12/75 TO 9/13/75)




DRAWDOWN DATA FROM RAFT RIVER TEST AT RRGE # 2
(9/12/75 TO 9/13/75)
100
10.0
1.0
0.1
DRAWDOWN, PSI
$P_D = T_D = 1.0$
20R
50R
THEIS CURVE
1
10
100
1000
10,000
PUMPING TIME, SECS

Summary of Flow Test Interpretation

RRGE # 1

Drawdown Data

	Preliminary Test Sept. 14 to Sept. 17, 1975		Long Duration Test Sept. 20 to Oct. 16, 1975	
	Theis' Curve Matching Procedure	Asymptotic solution (Jacob's Method)	Theis' curve matching procedure	Asymptotic solution (Jacob's Method)
kH, md feet	2.25×10^{5}	2.22×10^{5}	2.28×10^{5}	2.28×10^{5}
$\phi c H$, ft/psi	5.74×10^{-4}	5.39×10^{-4}	1.19×10^{-3}	9.38×10^{-4}
Transmissibility gpd/ft at 296°F	2.37×10^{4}	2.34×10^{4}	2.41×10^{4}	2.37×10^{4}
S	2.31×10^{-4}	2.16×10^{-4}	4.78×10^{-4}	3.77×10^{-4}

1. Note that we get fairly consistent numbers for the permeability of the reservoir. The average permeability characteristic appears to be

$$kH \approx 2.25 \times 10^{5} \text{ md feet} \approx 23{,}700 \text{ gpd/ft at } 296^{\circ}\text{F}$$

2. Although the preliminary test and the long duration test give the same order of numbers for S and $\phi c H$, we see that the preliminary test gives S and $\phi c H$ values about 50% of those yielded by the long duration test. This may be because during the early part of this test the flow rate varied between 400 and 900 gpm.

3. Analysis of barrier boundary effects.

The total duration of production during the preliminary test was about 70 hrs. Neither the Theis plot nor the Jacob's plot of this test indicate the effects of any barrier boundary.

The Theis (log-log) plot of the long duration test data shows clear evidence of barrier boundary effects commencing from about 80 hours. Comparison with barrier boundary type-curves indicate that the radius to the image well from the obs. well (RRGE # 1) is between 2 and 5 times the distance r_2 (≈4000 feet) to the real well (RRGE # 2).

The comparison also shows that the observed data gradually shifts towards and cuts across the type curve for $r_1 = 2r_2$. This suggests that there is possibly more than one barrier boundary existing.

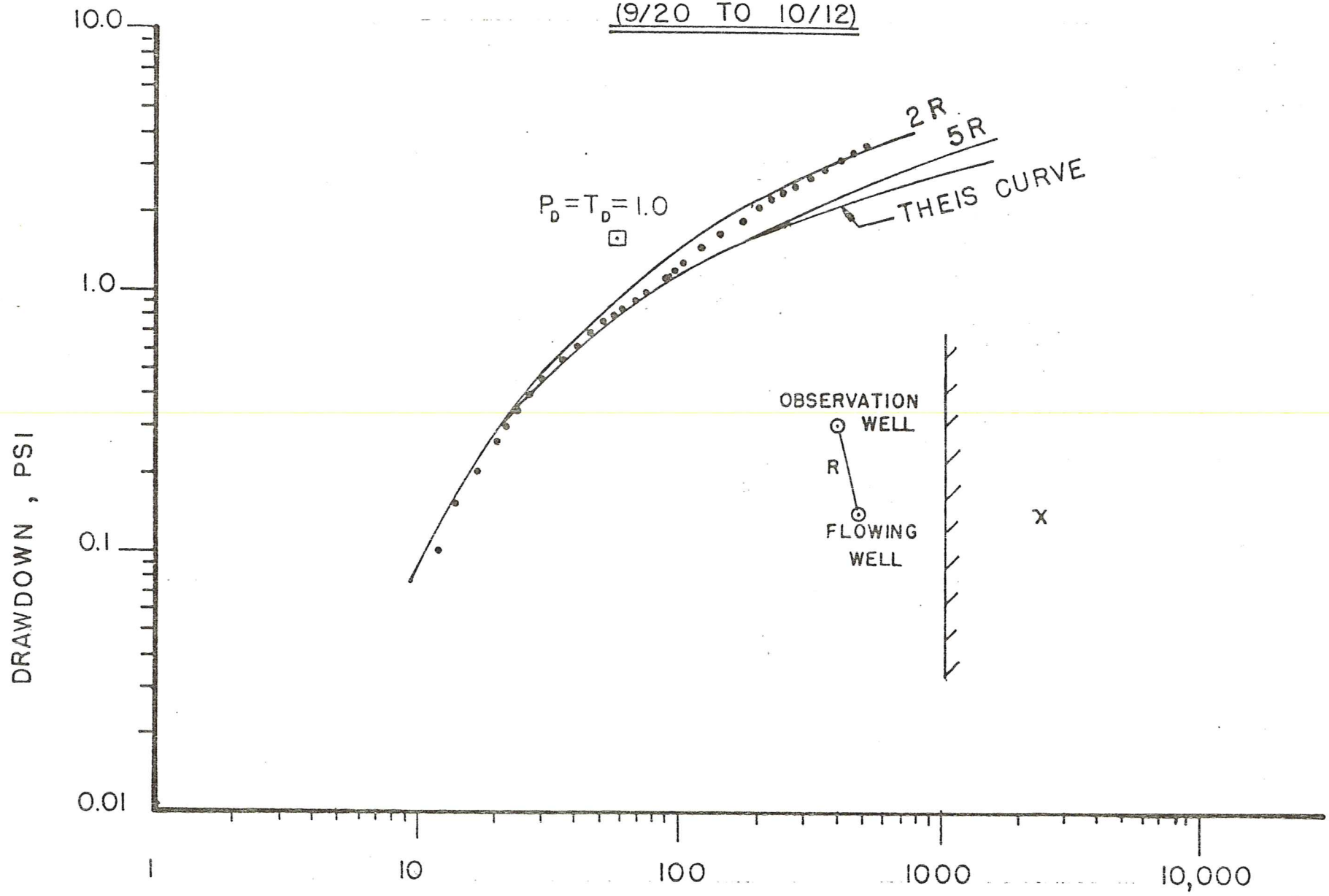
The semi-log plot (Jacob's plot) also shows the effects of barrier boundaries. The first barrier boundary manifests itself as a change in st. line slope after about 80 hours. The slope of this line is 3.58 psi/log cycle whereas the slope of the reservoir itself is 1.75 psi/log cycle. The fact that the ratio 3.58/1.75 > 2 also suggests that probably more than 1 boundary is present. If only one boundary were present, the slope of line 2 should be twice that of line 1.

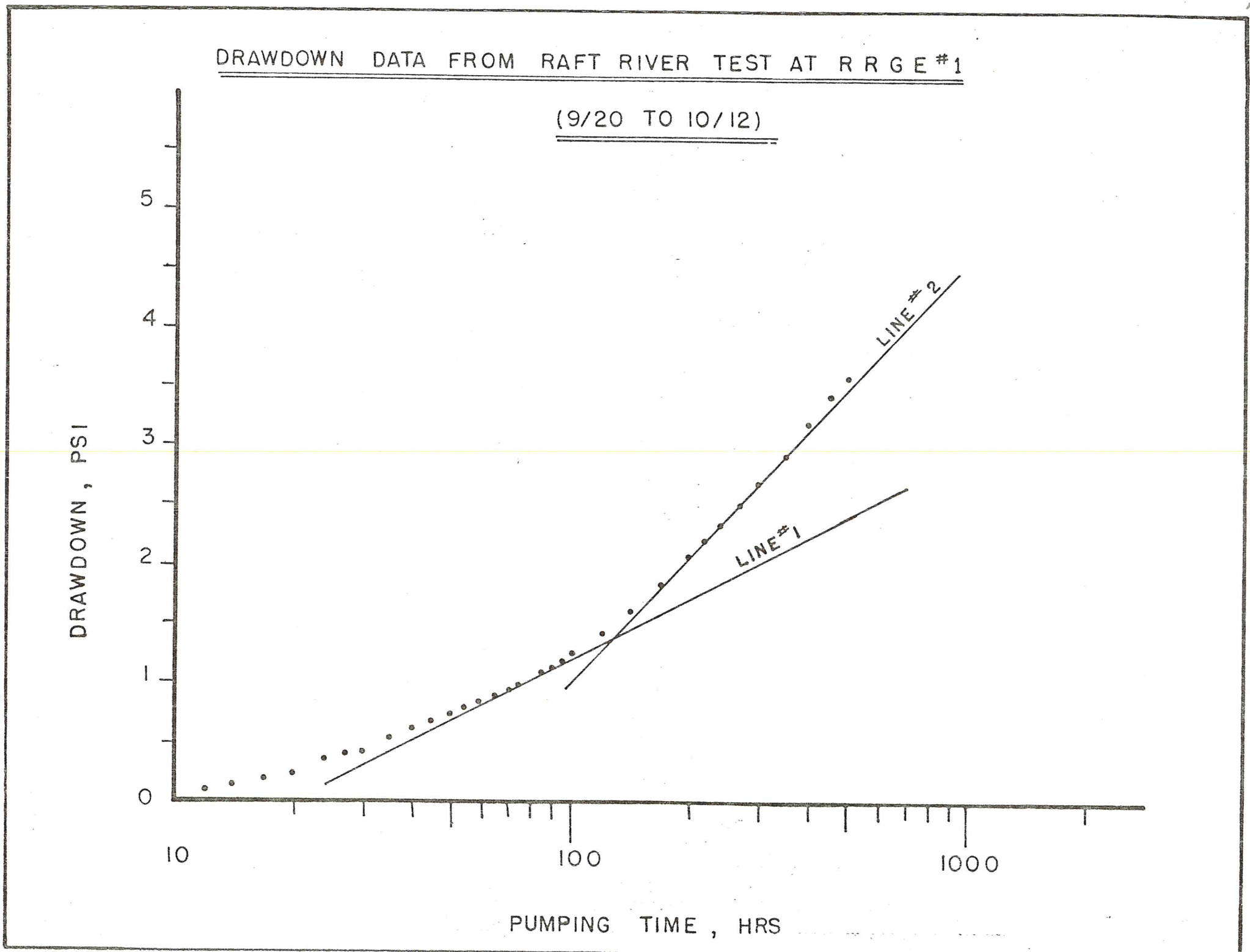
The straight line plot also indicates the possible effect of more boundaries after 400 hrs.

Calculation with the Jacob's plot data shows that the image well is located about 10,600 feet (≈ 2 miles) from RRGE # 1. However, with only two wells (RRGE # 1 and # 2) it is not possible to fix the location of the image well and hence it is only possible to fix the location of the boundary.

DRAWDOWN DATA FROM RAFT RIVER TEST AT R R GE #1

(9/20 TO 10/12)




DRAWDOWN DATA FROM RAFT RIVER TEST AT R R G E #1
(9/20 TO 10/12)
DRAWDOWN , PSI
0
1
2
3
4
5
10
100
1000
PUMPING TIME , HRS
LINE #2
LINE #1

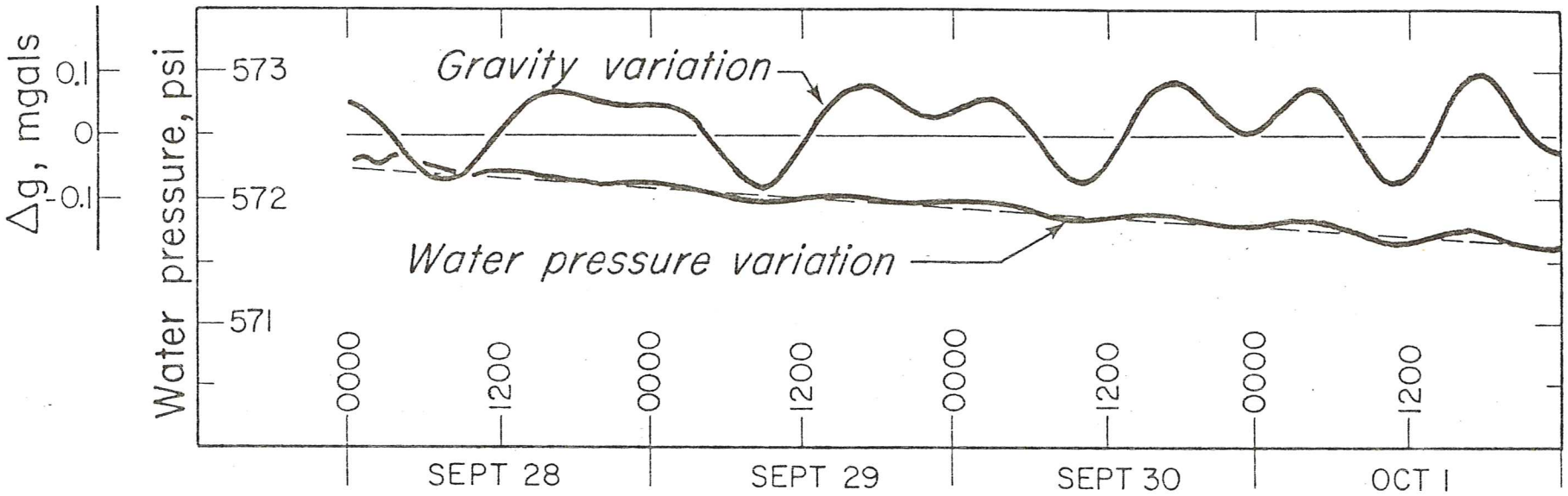
Short Term Test on RRGE #1

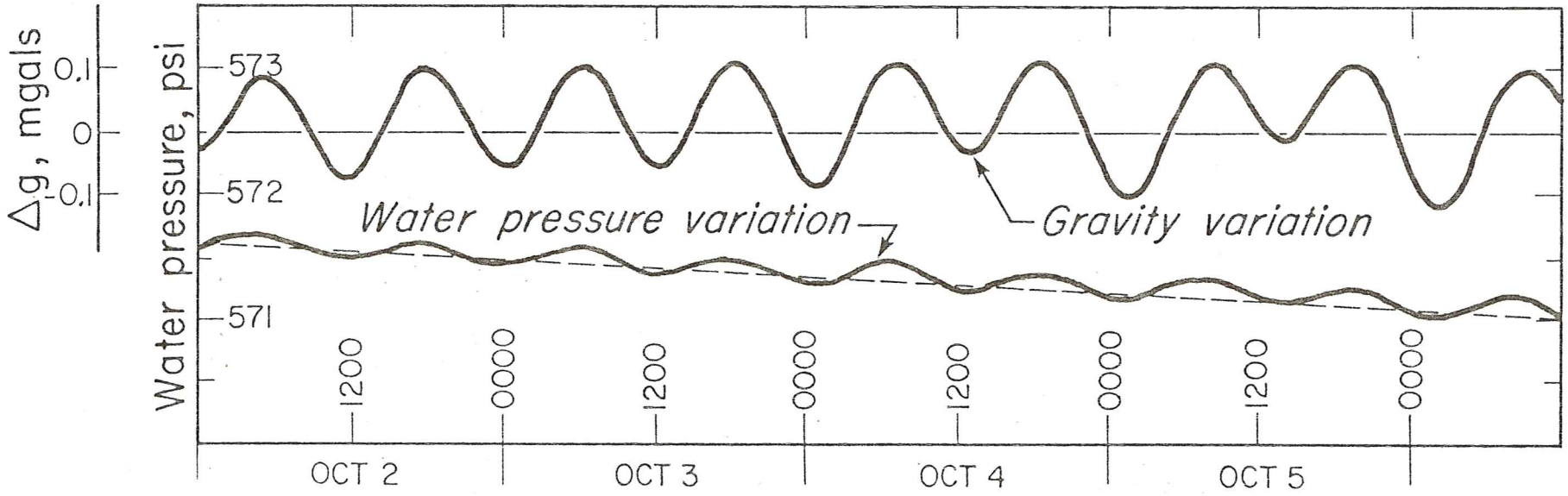
Duration of flow	30 hrs.
Flow rate	26 gpm
Total pressure drop in producing well	1.1 psi

Calculated Parameters

kH	=	~~11,500 md feet~~ 115,000 md feet
T	=	12,300 gpd/ft at 296°F
ϕCH	=	0.0022 ft/psi
S	=	8.1×10^{-4}

This figure is an example of the tidal effect.





EFFECT OF LUNAR ATTRACTION ON WATER PRESSURE IN GEOTHERMAL RESERVOIR, RAFT RIVER VALLEY, IDAHO