State Water Survey Division

Illinois Institute of Natural Resources

605 East Springfield
Champaign, IL 61820
Mail: Box 232, Urbana, IL 61801
217/333-2210

November 7, 1980

Mr. Roger Geiken
Beling Consultants, Inc.
1001 16th Street
Moline, IL 61265

Dear Mr. Geiken:

We are enclosing a copy of data collected by Mr. Robert D. Olson of the State Water Survey during the well production test conducted October 10, 1980, on Princeton Well No. 6.

The specific capacity (yield per foot of drawdown) of the well for a pumping period of 180 minutes and a pumping rate of 1200 gallons per minute (gpm) was 44.76 gpm/ft. Based on available information the well appears capable of sustaining the desired 1000 gpm production rate on a long-term basis with a pump setting of approximately 210 feet below ground surface.

The chemical analysis of water collected from the well during the production test will be mailed to you as soon as it is completed.

ENG/CON

JPG

Very truly yours,
ILLINOIS STATE WATER SURVEY

Adrian P. Visocky
Hydrologist
Phone: (217) 333-1724

APV:psl
Enclosure

cc: Albrecht Well Drilling, Inc.
City of Princeton
IEPA (2)

State Water Survey Division

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November 7, 1980

WELL PRODUCTION TEST
CITY OF PRINCETON, WELL NO. 6
BUREAU COUNTY, ILLINOIS

By

Robert D. Olson, Hydrology Assistant

Well Owner:	City of Princeton
Consulting Engineers:	Roger Geiken, Beling Consultants, Inc., 1001 16th Street, Moline, IL 61265
Well Location:	Approx. 1800 ft E. and 1170 ft S. of the NW corner Sec. 16.6g, T.16N., R.9E., Bureau County
Date Well Completed:	October, 1980
Date of Production Test:	October 10, 1980
Length of Production Test:	180 min., constant rate
No. of Observation Wells:	One
Aquifer:	Sand and Gravel

PUMPED WELL DATA

Well No.:	6
Depth:	299 ft
Drilling Contractor:	Albrecht Well Drilling, Inc., R.R. #1, Ohio, IL
Drill Cuttings:	to ISGS
Drilling Method:	Reverse Rotary
Hole Record:	34 in., 0 to 299 ft.
Casing Record:	16 in. O.D., +1 to 259 ft.
Screen Record:	16 in. P.S. Johnson Stainless Steel, 40 ft. long, set from 259 to 299 ft.; top 20 ft. 60 slot; bottom 20 ft. 80 slot
Annulus and Gravel Pack Record:	No. 3 Muscatine from 274 to 299 ft.; No. 2 Muscatine from 174 to 274 ft.; Concrete from 172 to 174 ft.; Backfill from 45 to 172 ft.; and Concrete from 0 to 45 ft.
Ground Elevation at Well:	±701 ft. MSL, taken from 7.5 min. topographic quad.
Measuring Point:	Notch inside of steel casing approx. 0.5 ft. above lsd

PUMPED WELL DATA (Cont'd)

Nonpumping Water Level:	167.79 ft. below MP
Measuring Equipment:	SWS 8 in. orifice tube with plate no. 5, electric dropline, folding ruler
Test Pump and Power:	Goulds turbine, 14 in. bowls, 8 in. column pipe, 4 stages, w/90° gear head and J.D. 5020 diesel tractor, no check valve on pump
Test Pump Setting:	Intake at 257 ft.
Time Water Sample Collected:	2:15 p.m.
Temperature of Water:	54° F

Remarks:

Production wells nos. 3, 4, and 5 were turned off at 10:50 a.m. and remained off for the length of the test. Well no. 4, the farthest well from the pumped well was used as an observation well. Two closer wells could not be used as they both had oil floating on top of the water.

DRILLERS LOG
Well No. 6

Formation	From	To
Loess	1 ft.	10 ft.
Sandy loess	10	15
Clay	15	120
Clay, sandy	120	175
Fine sand	175	195
Sand, 10 slot	195	235
Sand, 10 to 12 slot, 50% 3/8 gravel	235	260
Sand, 10 slot	260	264
Sand, 10 to 12 slot, 50% gravel up to 4 in.	264	267
Fine sand (under 10 slot)	267	280
Sand, 15 to 20 slot, with 20% gravel	280	303
Clay	303	

TD 299 ft.

White Copy – Ill. Dept. of Public Health
Yellow Copy – Well Contractor
Blue Copy – Well Owner

INSTRUCTIONS TO DRILLERS

FILL IN ALL PERTINENT INFORMATION REQUESTED AND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, CONSUMER HEALTH PROTECTION, 535 WEST JEFFERSON, SPRINGFIELD, ILLINOIS, 62761. DO NOT DETACH GEOLOGICAL/WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH
WELL CONSTRUCTION REPORT

1. Type of Well
   a. Dug____. Bored____. Hole Diam. 16 in. Depth 299' ft. 6"
   Curb material _____. Buried Slab: Yes_____ No_____
   b. Driven _____. Drive Pipe Diam. _____in. Depth _____ft.
   c. Drilled X. Finished in Drift X. In Rock _____.
   Tubular _____. Gravel Packed X.
   d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)
Puddled Clay	0	259

2. Distance to Nearest:
   Building _____ Ft. Seepage Tile Field _____
   Cess Pool _____ Sewer (non Cast iron) _____
   Privy _____ Sewer (Cast iron) _____
   Septic Tank _____ Barnyard _____
   Leaching Pit _____ Manure Pile _____
3. Well furnishes water for human consumption? Yes X No_____
4. Date well completed October 16, 1980
5. Permanent Pump Installed? Yes___ Date _____ No X
   Manufacturer _____ Type _____ Location _____
   Capacity_____gpm. Depth of Setting _____Ft.
6. Well Top Sealed? Yes X No_____ Type welded
7. Pitless Adapter Installed? Yes_____ No X
   Manufacturer _____ Model Number _____
   How attached to casing? _____
8. Well Disinfected? Yes X No _____
9. Pump and Equipment Disinfected? Yes X No _____
10. Pressure Tank Size_____gal. Type _____
    Location _____
11. Water Sample Submitted? Yes_____ No_____

REMARKS:

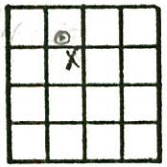
ISWS P# 405639-01 COUNTY No.: 21763

Fac# 01190850 Pt# 6

IDPH 4.065
1/74 – KNB-1
(59571—12½M Sets—6-74)

GEOLOGICAL AND WATER SURVEYS WELL RECORD

10. Property owner City of Princeton Well No. 2464
    Address Princeton, IL
    Driller S. Dean Albrecht License No. 102-120
11. Permit No. 95941 Date September 9, 1980
12. Water from sand (Formation)
    at depth 280 to 299 ft.
13. County Bureau
    Sec. 16 69
    Twp. 16N
    Rge. 9E
    Elev. 701
14. Screen: Diam. 16 in 80
    Length: 20 ft. Slot 60
    40 ft total



15. Casing and Liner Pipe

Diam. (in.)	Kind and Weight	From (Ft.)	To (Ft.)
16	Steel	0	259

SHOW LOCATION IN SECTION PLAT
~~NE SE NW~~ 1170'S + 1800'E NW/C (municipal supply)

16. Size Hole below casing: 34 in.
17. Static level _____ft. below casing top which is _____ ft. above ground level. Pumping level _____ ft. when pumping at _____ gpm for _____ hours.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
loess	10	10
loess and sand	5	15
pink gray sandy clay	105	120
grayer sandy clay	55	175
very fine sandy sankety	20	195
10 slot sand	40	235
10-12 slot sand w/50% gravel	25	260
10 slot sand and finer	4	264
12-20 slot w/ 50% gravel	13	277
very fine sand	3	280
15-20 slot sand w/gravel slightly greenish	19	299

(CONTINUE ON SEPARATE SHEET IF NECESSARY)

SIGNED Harold D Albrecht DATE 11/29/80

#6

location corrected on consultant 10/10/80

$\alpha = \frac{40}{135.71} = .2947$; $C_\alpha = .2947\left[1+7\sqrt{\frac{2/3}{80}}\cos 26.53\right] = .2947[1+7(.0913)(.8947)]$

$C_\alpha = .463$

Princeton Well No. 6 (10-10-80)

t	$s - s_w$	s'	$s - s_{pp}$	t	$s - s_w$	s'	$s - s_{pp}$
1	18.92	17.60	8.15	150	23.35	21.34	9.88
2	20.76	19.17	8.88	165	23.53	21.49	9.95
3	21.22	19.56	9.06	180	23.45	21.42	9.92
4	21.59	19.87	9.20				
5	21.81	20.06	9.29				
7	22.12	20.32	9.41				
8	22.17	20.36	9.43				
9	22.14	20.33	9.41				
10	22.17	20.36	9.43				
12	22.51	20.64	9.56				
14	22.56	20.68	9.57				
16	22.65	20.76	9.61				
20	22.76	20.85	9.65				
25	22.87	20.94	9.70				
30.5	23.13	21.16	9.80				
35	23.25	21.26	9.84				
40	23.26	21.27	9.85				
45	23.31	21.31	9.87				
50	23.35	21.34	9.88				
60	23.39	21.37	9.89				
70	23.49	21.46	9.94				
81	23.39	21.37	9.89				
90.5	23.46	21.43	9.92				
105	23.35	21.34	9.88				
120	23.38	21.37	9.89				
135	23.37	21.36	9.89				

Let's look at screen:

Open area:

Section	L	Slot	A	A_{total}
1	20	60	.640	12.8
2	20	80	.766	15.3
				28.1

$Q = 7.48\,LAV$

$Q = (7.48)(28.1)(16)$

$Q = 1260$ gpm — Looks OK, if they want to pump at 1200

Max allowable $s_{act} = 37\frac{1}{2}\%$ of $m = 50.89$ ft

$s - s_{pp} = .463 \times 50.89 = 23.56$ ft

$Q_{allowable} = 1200 \times \frac{23.56}{11.44}$

$= 2471$ gpm — too high for screen

At 1000 gpm: $s_{aq} = \frac{1000}{1200} \times 11.44 = 9.53$ ft

$s + s_{pp} = \frac{9.53}{.463} = 20.6$ ft

$s_{wT} = 22.12$ ft ; $s_w = .47\left(\frac{1000}{448.8}\right)^2 = 2.33$ ft

$s = 24.45$ ft

NO. 340-L310 DIETZGEN GRAPH PAPER
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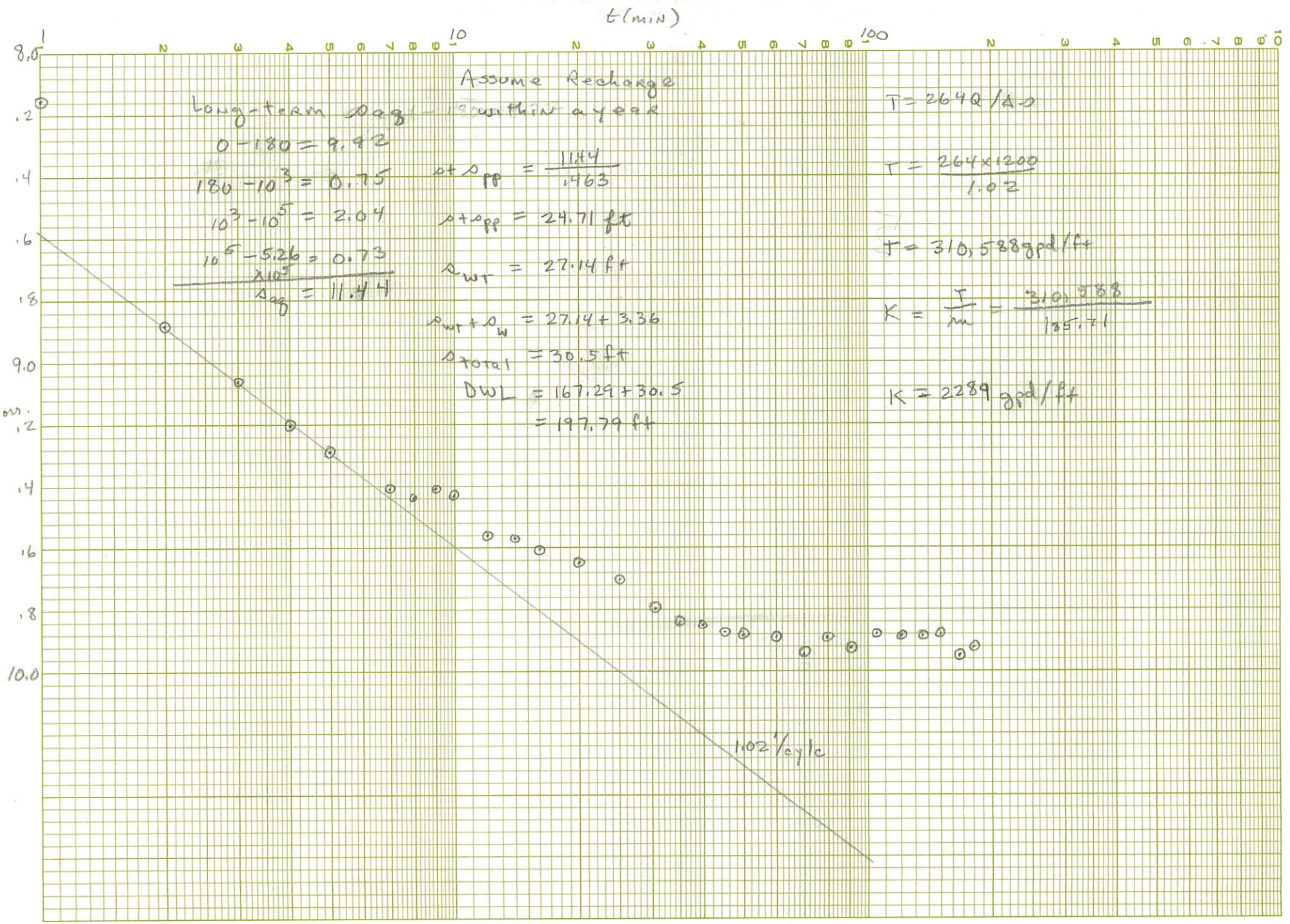
3 CYCLES X 10 DIVISIONS PER INCH

DIETZGEN CORPORATION
MADE IN U.S.A.



Long-term pump test

$0 - 180 = 9.42$

$180 - 10^3 = 0.75$

$10^3 - 10^5 = 2.04$

$10^5 - 5.26 = 0.73$

$\Delta_{aq} = 11.44$

Assume Recharge within a year

$\Delta + \rho_{pp} = \frac{11.44}{.1463}$

$\rho + \rho_{pp} = 24.71$ ft

$\rho_{wt} = 27.14$ ft

$\rho_{wt} + \rho_w = 27.14 + 3.36$

$\rho_{total} = 30.5$ ft

DWL $= 167.29 + 30.5$

$= 197.79$ ft

$T = 264 Q / \Delta s$

$T = \frac{264 \times 1200}{1.02}$

$T = 310,588$ gpd/ft

$K = \frac{T}{m} = \frac{310,588}{135.71}$

$K = 2289$ gpd/ft

City of Princeton
Well No. 4

November 7, 1980
Observation Well

OBSERVATION WELL DATA

Observation Well No.:	Production well no. 4
Depth:	267 ft.
Hole Record:	Information not available
Casing Record	18 in. I.D. concrete casing, 0 to 237 ft.; 12 in. I.D. steel pipe, +1 to 237 ft.
Screen Record:	12 in. P.S. Johnson 30 slot screen, 30 ft. long, set 237 to 267 ft.
Measuring Equipment:	Electric dropline, folding ruler
Ground Elevation:	700 ft.
Measuring Point:	Hole in well cap approx. 3.0 ft. above lsd (2.0 ft. above powerhouse floor)
Nonpumping Water Level:	168.68 ft. below MP
Distance and Direction from Pumped Well:	393 ft. (calculated from locations) southwest from pumped well no. 6

DRILLERS LOG

Formation	From	To
Clay	0	35 ft.
Sand	35	37
Clay	37	60
Clay and hardpan	60	178
Sand and gravel	178	267

City of Princeton
Well No. 4

November 7, 1980
Observation Well

MEASUREMENTS

Date	Hour	Time (min)	Depth to water (ft)	Draw-down (ft)	Piez. tube (ft)	Pump rate (gpm)	Remarks
10/10/80	10:57 AM		169.21				Electric dropline meas could not get steel tape down well
	10:59		169.08				
	11:15		168.70				
	11:24		168.68				
	11:25	0					Start Pump
	11:26	1	168.68	0.00			Electric dropline was occasionally hanging up in well making readings difficult to obtain
	11:27	2	168.72	0.04			
	11:28	3	168.73	0.05			
	11:29	4	168.75	0.07			
	11:30	5	168.78	0.10			
	11:31	6	168.85	0.17			
	11:32	7	168.87	0.19			
	11:33	8	168.85	0.17			
	11:34	9	168.83	0.15			
	11:35	10	168.84	0.16			
	11:37	12	168.83	0.15			
	11:39	14	168.92	0.24			
	11:41	16	168.87	0.17			
	11:45	20	168.89	0.21			
	11:50	25	168.93	0.25			
	11:55	30	168.93	0.25			
	12:00 PM	35	169.01	0.33			
	12:05	40	168.94	0.26			
	12:10	45	168.94	0.26			
	12:15	50	168.90	0.22			
	12:25	60	168.90	0.22			
	12:35	70	168.90	0.22			
	12:45	80	168.89	0.21			
	12:55	90	168.88	0.20			
	1:13	108	168.83	0.15			
	1:30	125	168.80	0.12			
	1:42	137	168.79	0.11			
	1:55	150	168.79	0.11			
	2:10	165	168.78	0.10			
	2:25	180	168.77	0.09			Stop Pump
	2:26	1	168.67				Recovery
	2:27	2	168.62				
	2:28	3	168.55				
	2:29	4	168.48				
	2:30	5	168.43				
	2:31	6	168.41				
	2:32	7	168.37				
	2:33	8	168.36				
	2:34	9	168.32				

City of Princeton
Well No. 4

November 7, 1980
Observation Well

MEASUREMENTS (Continued)

Date	Hour	Time (min)	Depth to water (ft)	Draw-down (ft)	Piez. tube (ft)	Pump rate (gpm)	Remarks
10/10/80	2:35 PM	10	168.29				
	2:37	12	168.25				
	2:39	14	168.22				
	2:41	16	168.18				
	2:45	20	168.12				
	2:50	25	168.07				
	2:55	30	168.02				

NO. 340-L3TO DIETZGEN GRAPH PAPER
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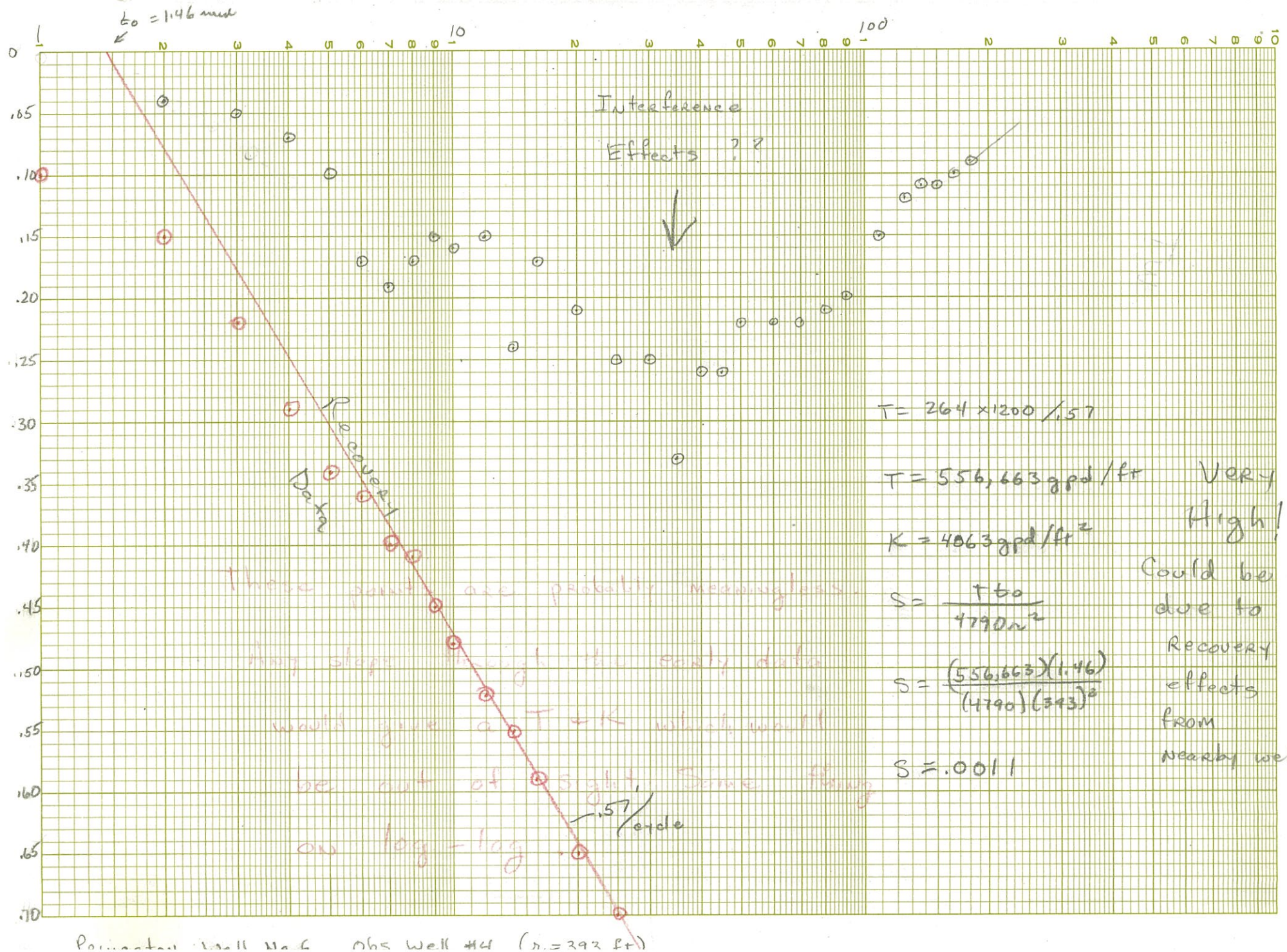

$T = 264 \times 1200 / 1.57$

$T = 556,663$ gpd/ft

$K = 4063$ gpd/ft^2

$S = \frac{T t_o}{4790 r^2}$

$S = \frac{(556,663)(1.46)}{(4790)(343)^2}$

$S = .0011$

Very High! Could be due to Recovery effects from nearby wells

Pumping Well No. 6 Obs Well #4 (r = 343 ft)