

# OPTIMIZATION BY LEVENBERG-MARQUARDT MINIMIZATION ALGORITHM

ITER	FUNCTION	TRANSMISS	STORTIVTY	SPEC_LEAK
1	.159E-02	.1001E+06	.3290E-03	.1590E-01
4	.154E-02	.9567E+05	.3554E-03	.2026E-01
5	.134E-02	.8757E+05	.3947E-03	.3319E-01
7	.853E-03	.8730E+05	.4130E-03	.3953E-01
9	.851E-03	.8718E+05	.4157E-03	.4026E-01
10	.850E-03	.8726E+05	.4151E-03	.4015E-01

TERMINATION DUE TO PARAMETER CONVERGENCE

## FINAL RESULTS

ITER	FUNCTION	TRANSMISS	STORTIVTY	SPEC_LEAK
10	.850E-03	.8723E+05	.4152E-03	.4015E-01

## FRACTIONAL COMPONENTS OF FUNCTION VALUE

WELL #	1	2	3
	1.000	.0000	.0000

DO YOU WANT A SENSITIVITY ANALYSIS ? (Y/N)

## SENSITIVITY ANALYSIS

### TWO STANDARD DEVIATION CONFIDENCE INTERVALS

PARAMETER	VALUE	LOWER LIMIT	UPPER LIMIT
TRANSMISS	.8723E+05	0.8694E+05	0.8752E+05
STORTIVTY	.4152E-03	0.0000	0.9604E-02
SPEC_LEAK	.4016E-01	0.0000	0.5087

TO CONTINUE ENTER "RETURN"

*Gallagher 1D*

$$T = 652,480 \text{ gpd/ft}$$

$$S = 4.152 \times 10^{-9}$$

$$K'/b = 4.015 \times 10^{-2} \text{ day}^{-1}$$

# OPTIMIZATION BY LEVENBERG-MARQUARDT MINIMIZATION ALGORITHM

ITER FUNCTION TRANSMISS STORTIVITY SPEC\_LEAK  
 1 .190E-02 .1267E+06 .1229E-03 .2892E-02  
 2 .190E-02 .1267E+06 .1228E-03 .2888E-02

TERMINATION DUE TO PARAMETER CONVERGENCE

## FINAL RESULTS

ITER FUNCTION TRANSMISS STORTIVITY SPEC\_LEAK  
 2 .190E-02 .1267E+06 .1228E-03 .2888E-02

## FRACTIONAL COMPONENTS OF FUNCTION VALUE

WELL #	1	2	3
	.0000	1.000	.0000

DO YOU WANT A SENSITIVITY ANALYSIS ? (Y/N)

*Gallagher 20*

$T = 947,716 \text{ gpd/ft}$

$S = 1.228 \times 10^{-4}$

$K/b = 2.888 \times 10^{-3} \text{ day}^{-1}$

## SENSITIVITY ANALYSIS

### TWO STANDARD DEVIATION CONFIDENCE INTERVALS

PARAMETER	VALUE	LOWER LIMIT	UPPER LIMIT
TRANSMISS	.1267E+06	0.1266E+06	0.1268E+06
STORTIVITY	.1228E-03	0.0000	0.2773E-02
SPEC_LEAK	.2887E-02	0.0000	0.6048E-01

TO CONTINUE ENTER "RETURN"

# OPTIMIZATION BY LEVENBERG-MARQUARDT MINIMIZATION ALGORITHM

ITER	FUNCTION	TRANSMISS	STORTIVITY	SPEC_LEAK
1	.274E-02	.1267E+06	.1228E-03	.2887E-02
3	.219E-02	.1047E+06	.1538E-03	.5411E-02
4	.217E-02	.9099E+05	.1773E-03	.1031E-01
6	.129E-02	.8866E+05	.1892E-03	.1421E-01
8	.125E-02	.8791E+05	.1919E-03	.1548E-01
10	.125E-02	.8807E+05	.1917E-03	.1550E-01

TERMINATION DUE TO PARAMETER CONVERGENCE

## FINAL RESULTS

ITER	FUNCTION	TRANSMISS	STORTIVITY	SPEC_LEAK
10	.125E-02	.8804E+05	.1917E-03	.1550E-01

## FRACTIONAL COMPONENTS OF FUNCTION VALUE

WELL #	1	2	3
	.0000	.0000	1.000

DO YOU WANT A SENSITIVITY ANALYSIS ? (Y/N)

## SENSITIVITY ANALYSIS

## TWO STANDARD DEVIATION CONFIDENCE INTERVALS

PARAMETER	VALUE	LOWER LIMIT	UPPER LIMIT
TRANSMISS	.8804E+05	0.8793E+05	0.8815E+05
STORTIVITY	.1917E-03	0.0000	0.3794E-02
SPEC_LEAK	.1550E-01	0.0000	0.2157

TO CONTINUE ENTER "RETURN"

*Gallagher 3D*

*T = 658,539 gpd/ft*

*S = 1.917 x 10<sup>-4</sup>*

*K<sub>b</sub>/b = 1.55 x 10<sup>-2</sup> day<sup>-1</sup>*

# OPTIMIZATION BY LEVENBERG-MARQUARDT MINIMIZATION ALGORITHM

ITER	FUNCTION	TRANSMISS	STORTIVITY	SPEC_LEAK
1	.452E-01	.8804E+05	.1917E-03	.1550E-01
2	.958E-02	.1374E+06	.1112E-03	.1814E-02
3	.789E-02	.1242E+06	.9697E-04	.3007E-02
5	.651E-02	.1291E+06	.9402E-04	.3065E-02
7	.644E-02	.1279E+06	.9443E-04	.3055E-02

TERMINATION DUE TO PARAMETER CONVERGENCE

## FINAL RESULTS

ITER	FUNCTION	TRANSMISS	STORTIVITY	SPEC_LEAK
7	.644E-02	.1282E+06	.9425E-04	.3055E-02

## FRACTIONAL COMPONENTS OF FUNCTION VALUE

WELL #	1	2	3
	.3102	.3373	.3525

DO YOU WANT A SENSITIVITY ANALYSIS ? (Y/N)

## SENSITIVITY ANALYSIS

### TWO STANDARD DEVIATION CONFIDENCE INTERVALS

PARAMETER	VALUE	LOWER LIMIT	UPPER LIMIT
TRANSMISS	.1282E+06	0.1282E+06	0.1283E+06
STORTIVITY	.9425E-04	0.0000	0.1388E-02
SPEC_LEAK	.3054E-02	0.0000	0.3653E-01

TO CONTINUE ENTER "RETURN"

Gallagher (all)

$T = 958,936 \text{ gpd/ft}$

$S = 9.425 \times 10^{-4}$

$K_{1/2} = 3.055 \times 10^{-3} \text{ day}^{-1}$

# PUMPTEST DATA REDUCTION SUBMITTAL SHEET




NAME OF PUMPTEST DATA TAPE: A Gallagher

METHOD OF COLLECTION:

1. INITIAL WATER LEVEL SET TO ZERO
2. INITIAL WATER LEVEL IS ACTUAL DEPTH TO WATER FROM TOP OF CASING

PLEASE ENTER NUMBER: 2

## INSITU TRANSDUCER INFORMATION:

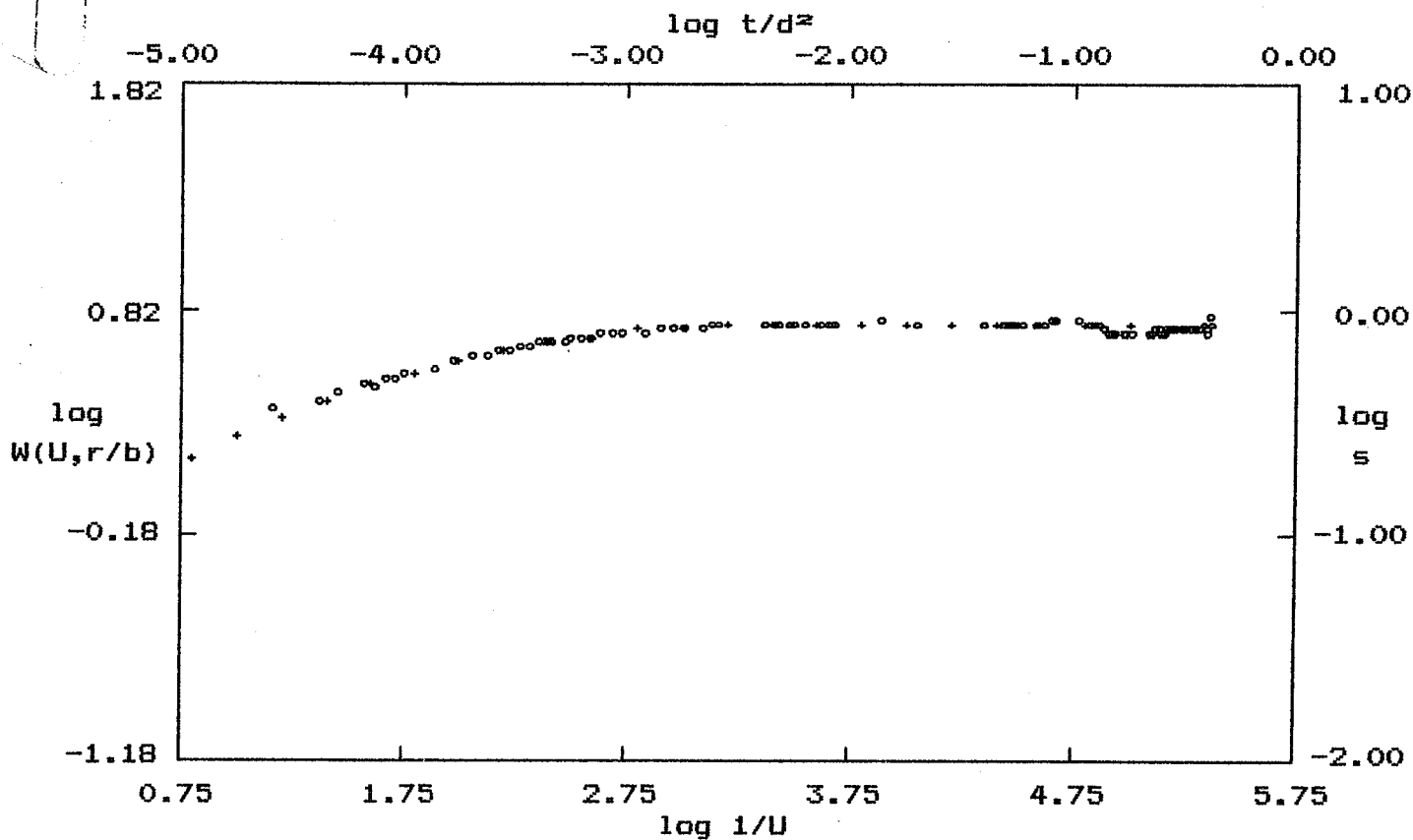
INPUT #	WELL NAME	WELL RADIUS	PUMPAGE QUANTITY	STATIC LEVEL	PLOTTING SCALING FACTOR(1.0)
1	1S	98.9	700	0	1.0
2	1d	100.5			
3	shallow production	15			
4	2S	55			
5	2d	54.5			
6	3d	250.9			
7	canal	450			
8	constand head	2			
9					
10					
11					
12					
13					
14					
15					
16					

HERMIT INFORMATION:

Please check the run no(s) used.

[illegible]

# PUMP TEST DATA



o - Data

+ - Type Curve

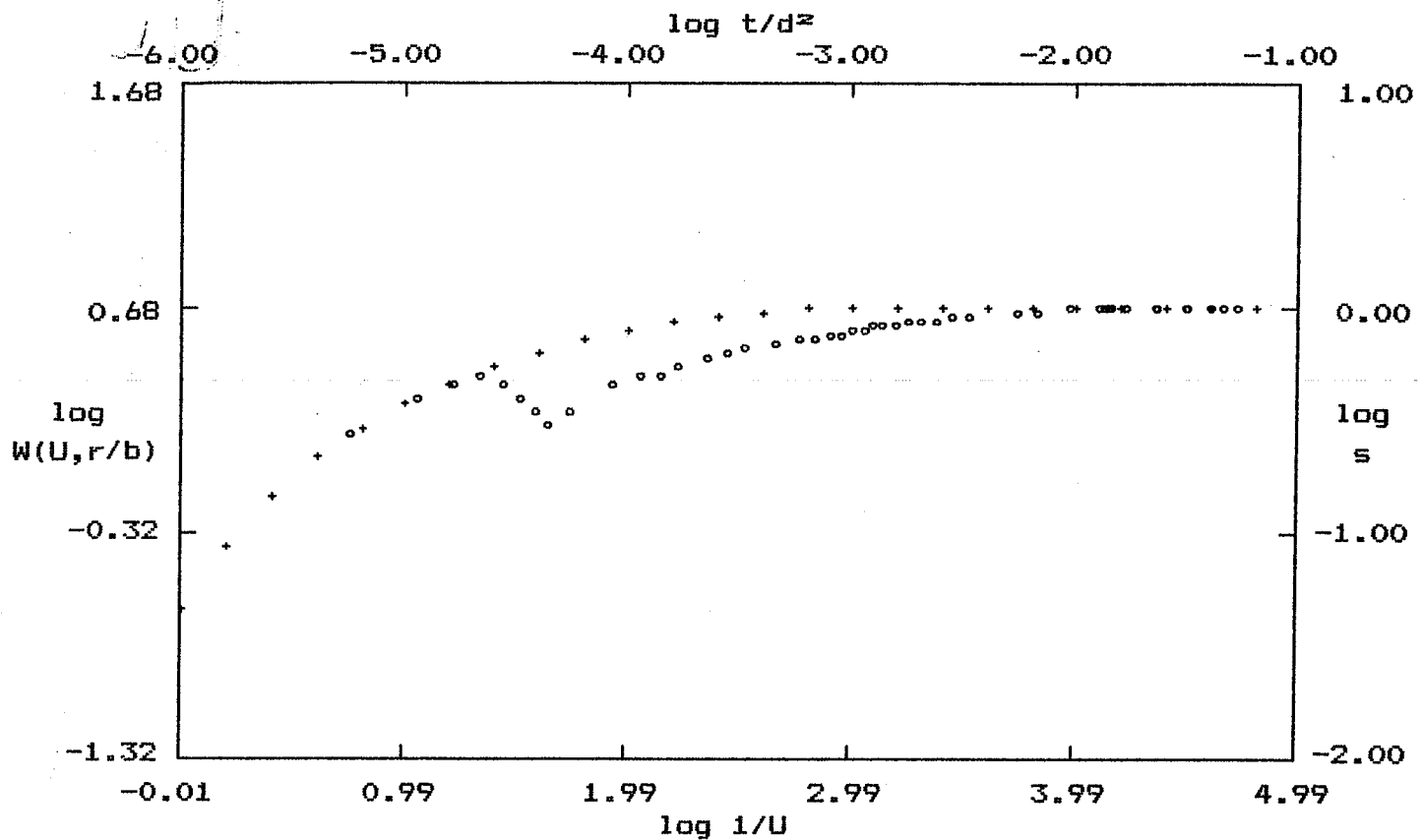
Confined Leaky:  $r/B = 0.06$

## SOLUTION

Transmissivity =  $6.108E+01$  ft.<sup>2</sup>/min. = 657,905 gpd/ft  
 Storativity =  $4.344E-04$

*galley 10*

# PUMP TEST DATA



o - Data

+ - Type Curve

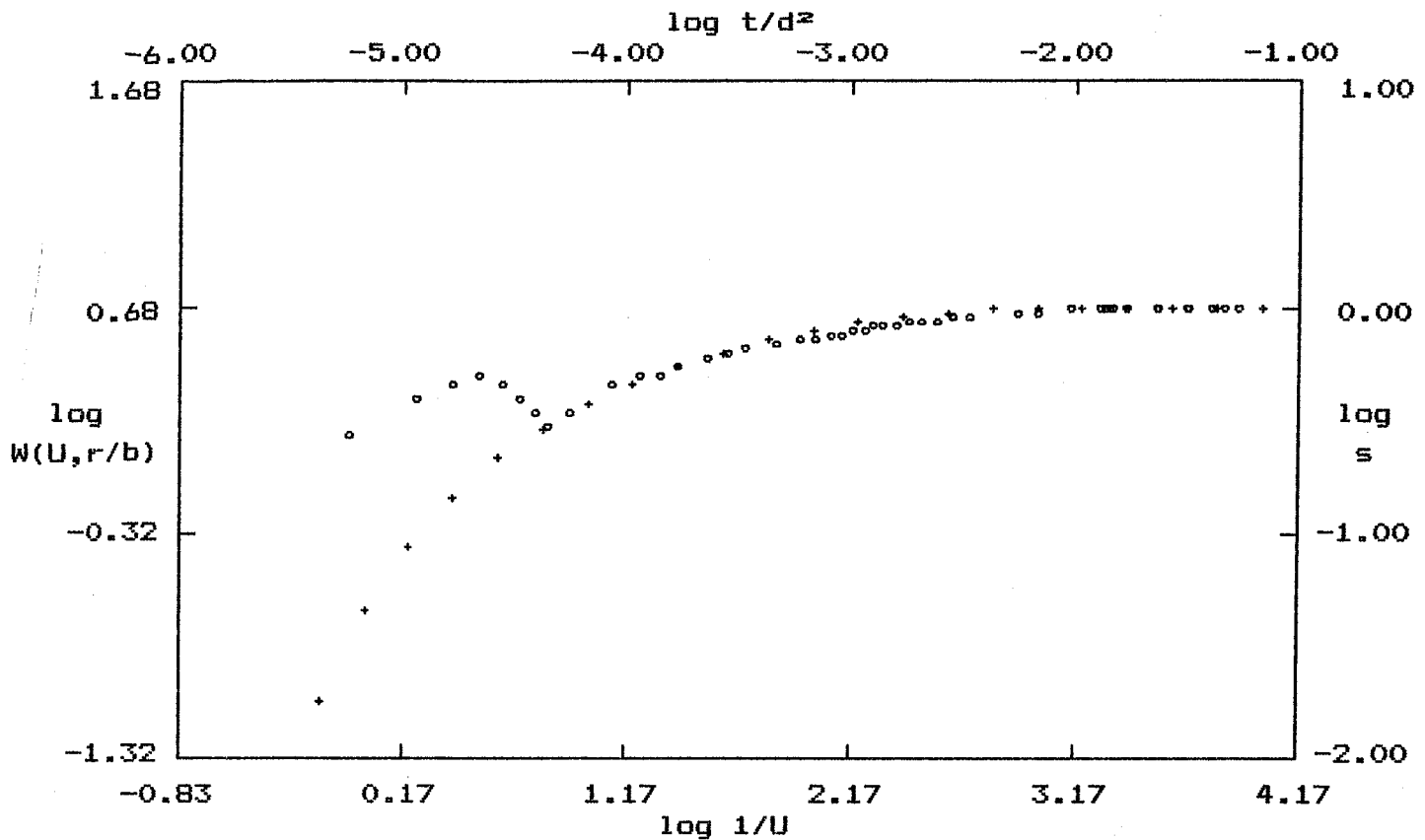
Confined Leaky:  $r/B = 0.10$

## SOLUTION

Transmissivity =  $4.425E+01$  ft.<sup>2</sup>/min. = 476,626 gpd/ft  
 Storativity =  $1.811E-04$

*Gallagher 2.0*

# PUMP TEST DATA



o - Data

+ - Type Curve

Confined Leaky:  $r/B = 0.10$

## SOLUTION

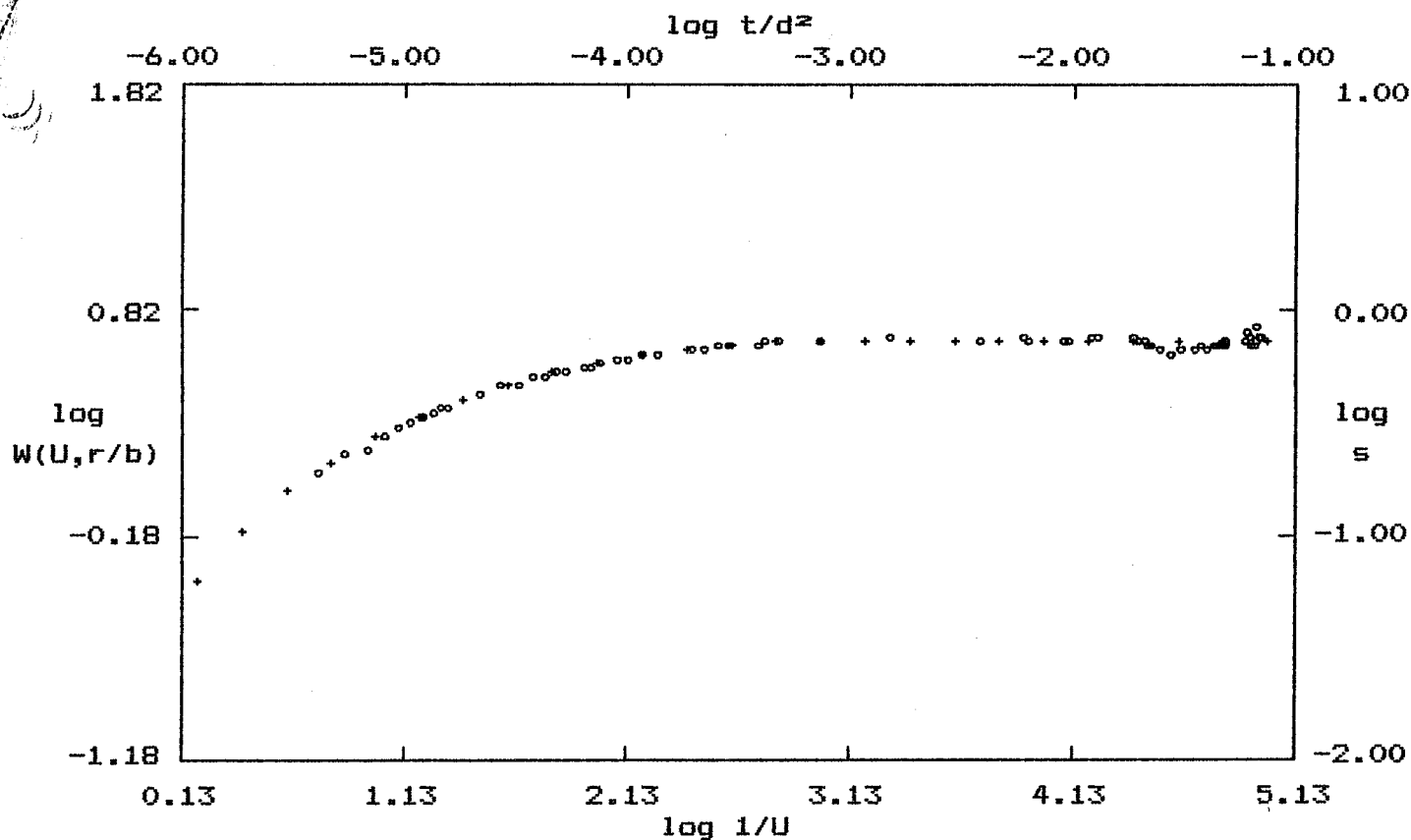
Transmissivity =  $4.425E+01$  ft.<sup>2</sup>/min.  $\approx 476,626$  gpd/ft  
 Storativity =  $1.197E-03$

*Gallagher 20*

*use other match (better S)*



# PUMP TEST DATA



o - Data

+ - Type Curve

Confined Leaky:  $r/B = 0.10$

## SOLUTION

Transmissivity =  $6.108E+01$  ft.<sup>2</sup>/min = 657,905 gpd/ft  
 Storativity =  $1.811E-04$

Gallagher 3D



WMD

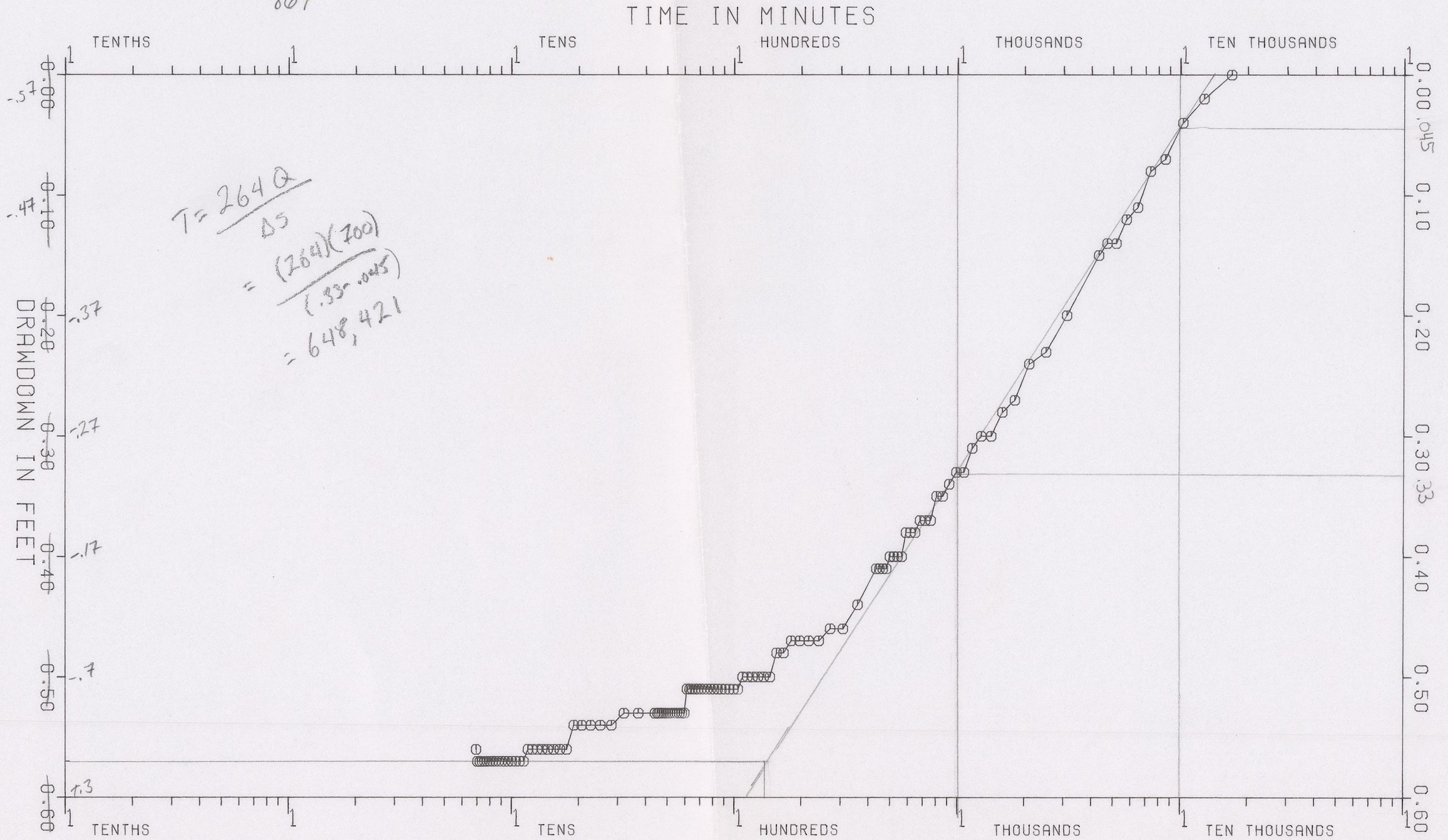
TAPEN0 6097 PLOT NO 0008  
USER NO KSMITH DATE 87/03/03 TIME 08:46

GALLAGHER PROPERTY

OBSERVATION WELL: DEEP PRODUCTION WELL H-308D GAL6

R=250.9 Q= ~~700~~

869





$$T = \frac{1440 Q L_{uv}}{4\pi s 7.48}$$

$$= \frac{(1440)(869)(10)}{4\pi(1.51)(7.48)}$$

$$= 88164 \text{ ft}^2/\text{day}$$

$$= 659470 \text{ gpd}/\text{ft}$$

$$S = \frac{4T}{\frac{1}{u}} \frac{t}{r^2}$$

$$= \frac{(4)(88164) \left( \frac{3.75 \times 10^{-4}}{250.9^2} \right)}{10}$$

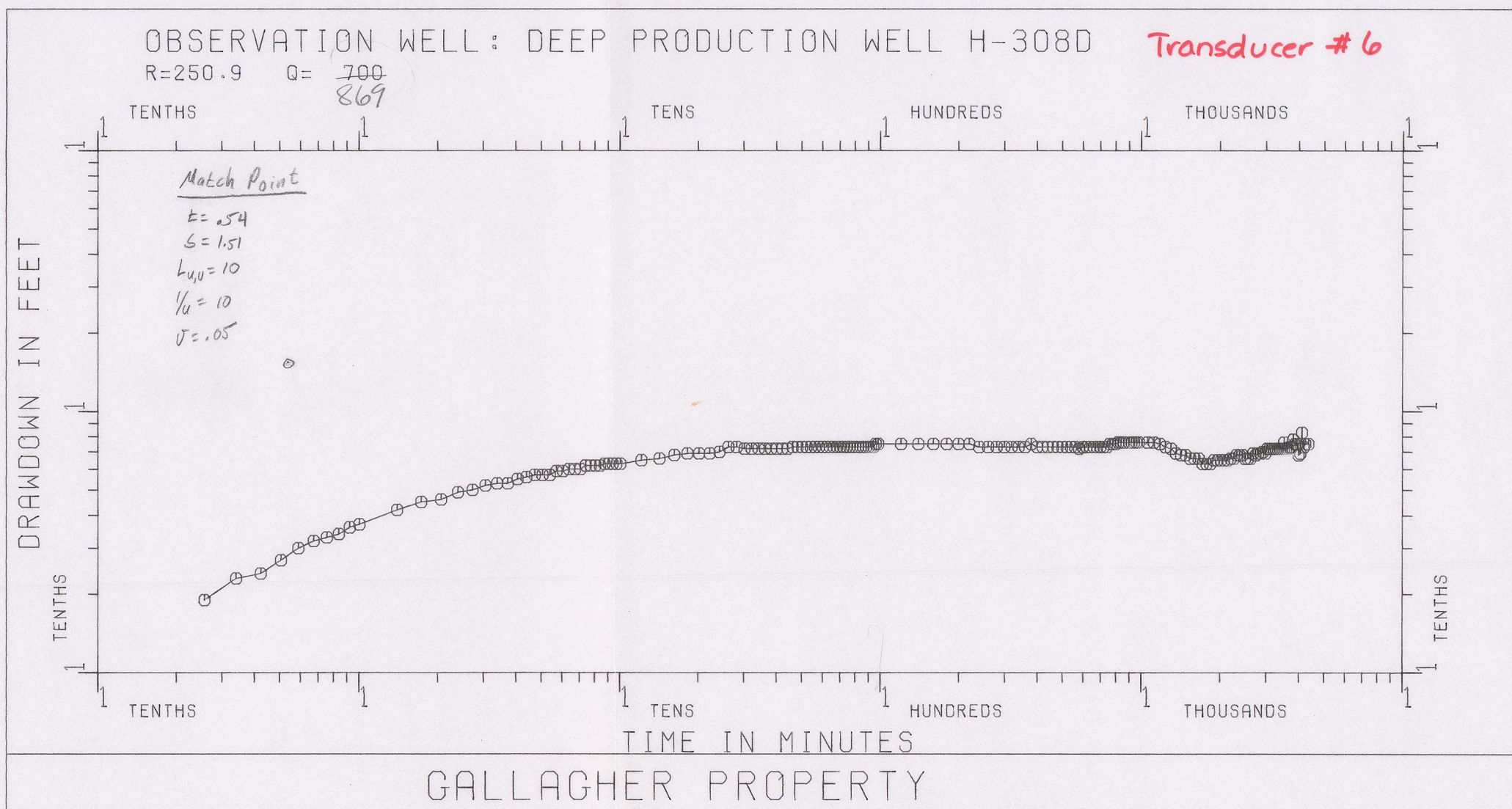
$$= 2.12 \times 10^{-4}$$

$$\frac{K'}{b'} = 4T \frac{u^2}{r^2}$$

$$= (4)(88164) \frac{.05^2}{250.9^2}$$

$$= 1.40 \times 10^{-2}$$

$$b' = 40 \text{ ft}$$



TAPEN0.6097 PLOT NO 0020  
 USER NO NELMS DATE 87/03/03 TIME 09:15

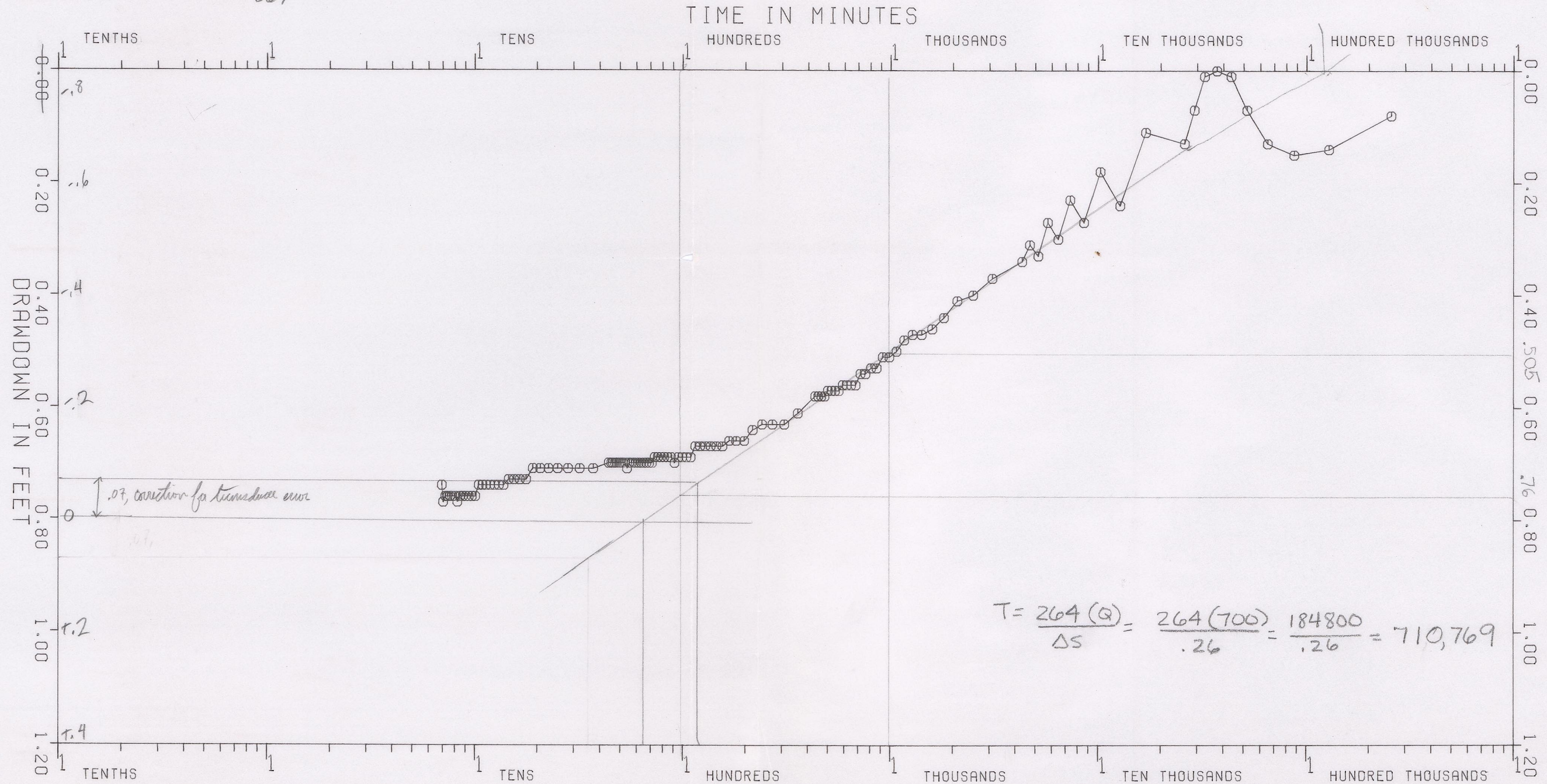
WMD



GALLAGHER PROPERTY

OBSERVATION WELL: DEEP PRODUCTION WELL H-308D

GALS

R= 54.5 Q= ~~700~~  
869



$$T = \frac{1440 Q L_w}{4\pi s 7.48}$$

$$= \frac{(1440)(700)(10)}{4\pi(2.15)(7.48)}$$

$$= 49878 \text{ ft}^2/\text{d}$$

$$= 373089 \text{ gpd}/\text{ft}$$

Early

$$S = \frac{4T t/r^2}{1/4}$$

$$= \frac{(4)(49878)(\frac{2.43 \times 10^{-5}}{54.5^2})}{10}$$

$$= 1.63 \times 10^{-4}$$

$$\frac{K'}{b'} = 4T \frac{v^2}{r^2}$$

$$= \frac{(4)(49878)(.05^2)}{54.5^2}$$

$$= 1.68 \times 10^{-1}$$

$$b' = 40$$

$$K' = 6.72$$

Late

$$T = \frac{1440 Q L_w}{4\pi s 7.48}$$

$$= \frac{(1440)(869)(10)}{4\pi(1.5)(7.48)}$$

$$= 88752 \text{ ft}^2/\text{day}$$

$$= 663867 \text{ gpd}/\text{ft}$$

$$S = \frac{4T t/r^2}{1/4}$$

$$= \frac{(4)(88752)(\frac{5.97 \times 10^{-5}}{54.5^2})}{10}$$

$$= 7.13 \times 10^{-4}$$

$$\frac{K'}{b'} = 4T \frac{v^2}{r^2}$$

$$= \frac{(4)(88752)(.02^2)}{54.5^2}$$

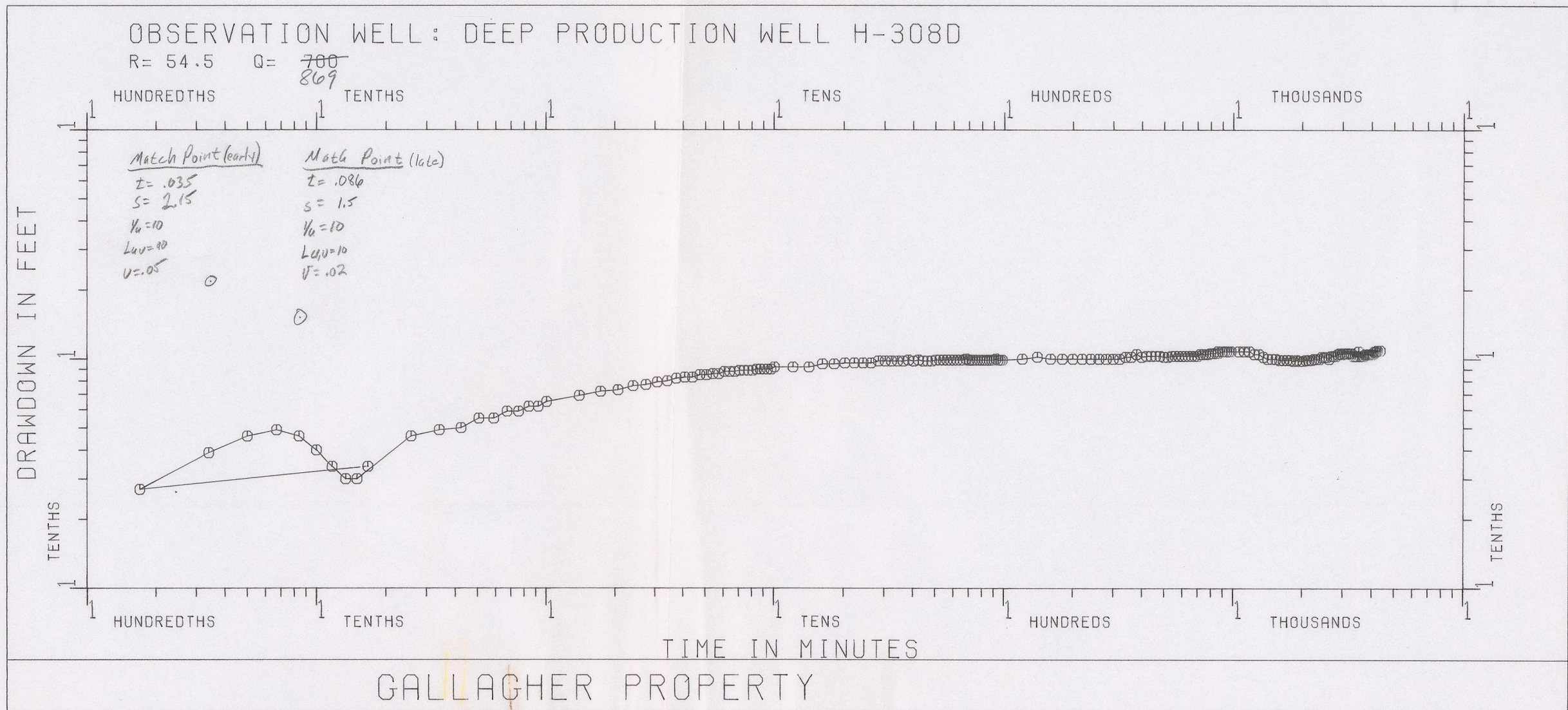
$$= 4.78 \times 10^{-2}$$

$$b' = 40$$

$$K' =$$

very large - probably due to storage in confining zone

WMD TAPEN0 6097 PLOT NO 0017 DATE 87/03/03 TIME 09:14 USER NO NELMS





$$T = \frac{1440 Q (L_{uv})}{4\pi s (7.48)}$$

$$= \frac{(1440)(869)(10)}{4\pi (1.33)(7.48)}$$

$$= 100096 \text{ ft}^2/\text{d}$$

$$= \underline{748718 \text{ gpd}/\text{ft}}$$

$$S = \frac{4T \frac{t}{r^2}}{\frac{1}{4}}$$

$$= \frac{(4)(100096) \left( \frac{8.3 \times 10^{-5}}{100.5^2} \right)}{\frac{1}{4}}$$

$$= \underline{3.29 \times 10^{-4}}$$

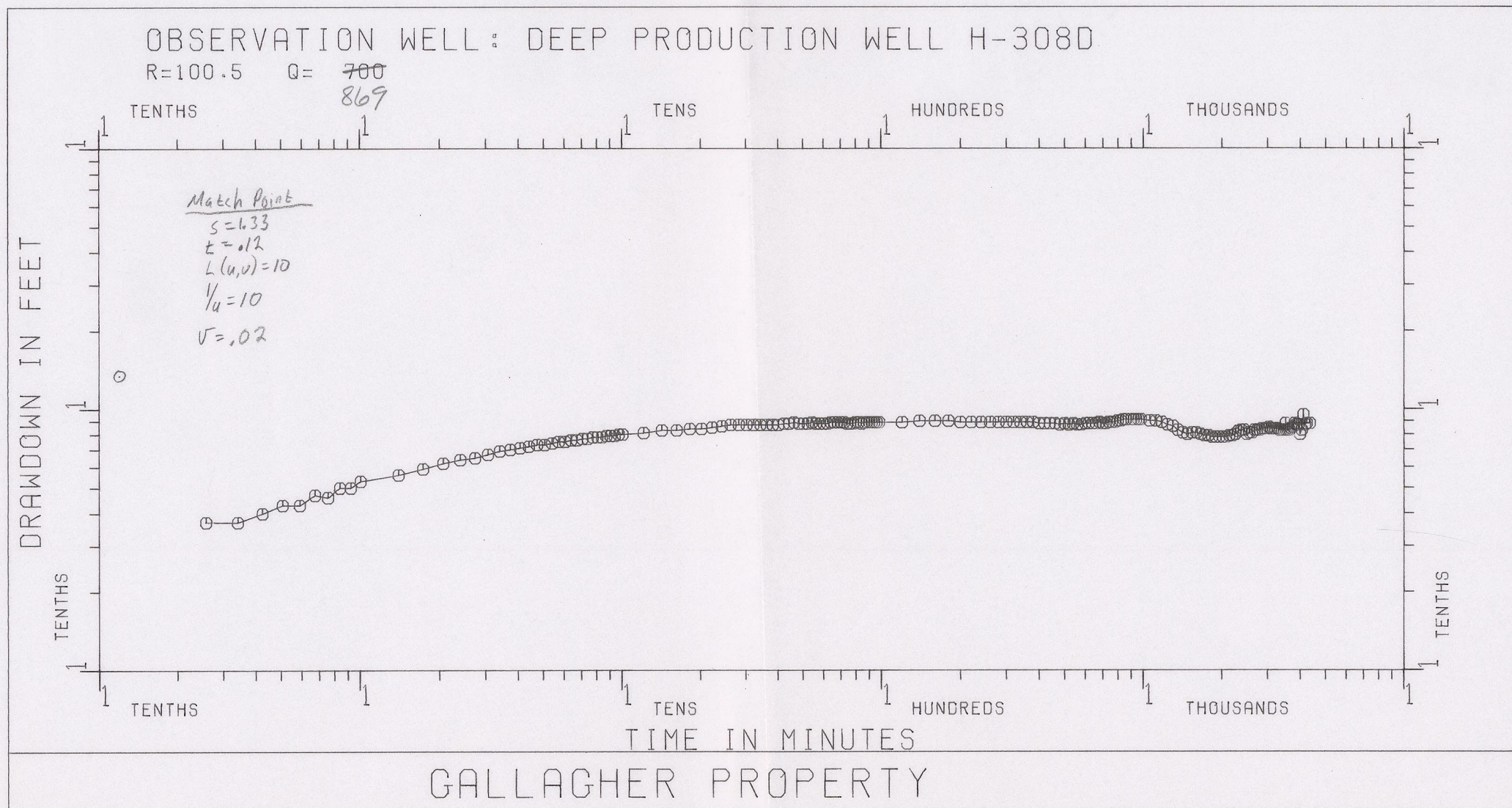
$$K' \frac{b'}{r^2} = 4T \frac{v^2}{r^2}$$

$$= (4)(100096) \left( \frac{.02^2}{100.5^2} \right)$$

$$= 1.59 \times 10^{-2}$$

$$b' = 40'$$

↳ large - probably due to storage in confining zone





GAL2

GALLAGHER PROPERTY

OBSERVATION WELL: DEEP PRODUCTION WELL H-308D

R=100.5 Q= 700

