

# OPTIMIZATION BY LEVENBERG-MARQUARDT MINIMIZATION ALGORITHM

ITER	FUNCTION	TRANSMISS	STORTIVTY	SPEC_LEAK
1	.646E-03	.6875E+05	.4484E-04	.1461E-02
2	.590E-03	.6291E+05	.5169E-04	.2297E-02
4	.182E-03	.6374E+05	.5201E-04	.2537E-02
6	.178E-03	.6347E+05	.5223E-04	.2557E-02

TERMINATION DUE TO PARAMETER CONVERGENCE

## FINAL RESULTS

ITER	FUNCTION	TRANSMISS	STORTIVTY	SPEC_LEAK
6	.178E-03	.6354E+05	.5220E-04	.2557E-02

## FRACTIONAL COMPONENTS OF FUNCTION VALUE

WELL #	1	2	3	4
	1.000	.0000	.0000	.0000

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

## SENSITIVITY ANALYSIS

### TWO STANDARD DEVIATION CONFIDENCE INTERVALS

PARAMETER	VALUE	LOWER LIMIT	UPPER LIMIT
TRANSMISS	.6354E+05	0.6352E+05	0.6356E+05
STORTIVTY	.5220E-04	0.0000	0.5725E-03
SPEC_LEAK	.2557E-02	0.0000	0.3934E-01

TO CONTINUE ENTER "RETURN"

*Rogers Ranch 1*

*fully penetrating  
data windowed 0-180 m*

*T = 475,279 gpd/ft*

*S = 5.22 x 10<sup>-5</sup>*

*K/b = 2.557 x 10<sup>-3</sup> day<sup>-1</sup>*

# OPTIMIZATION BY LEVENBERG-MARQUARDT MINIMIZATION ALGORITHM

ITER	FUNCTION	TRANSMISS	STORTIVTY	SPEC_LEAK
1	.208E-01	.6354E+05	.5220E-04	.2557E-02
3	.252E-03	.7336E+05	.9265E-04	.3269E-02
4	.122E-03	.6413E+05	.1150E-03	.4526E-02
6	.327E-04	.6417E+05	.1147E-03	.4973E-02
7	.326E-04	.6413E+05	.1147E-03	.4990E-02

TERMINATION DUE TO PARAMETER CONVERGENCE

## FINAL RESULTS

ITER	FUNCTION	TRANSMISS	STORTIVTY	SPEC_LEAK
7	.326E-04	.6414E+05	.1147E-03	.4990E-02

## FRACTIONAL COMPONENTS OF FUNCTION VALUE

WELL #	1	2	3	4
	.0000	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	.6414E+05	0.6410E+05	0.6418E+05
STORTIVTY	.1147E-03	0.0000	0.1499E-02
SPEC_LEAK	.4990E-02	0.0000	0.8039E-01

TO CONTINUE ENTER "RETURN"

*Progers Branch 2*

*fully penetrating  
data windowed 0-181m*

$$T = 479,767$$

$$S = 1.147 \times 10^{-4}$$

$$K/b = 4.99 \times 10^{-3} \text{ day}^{-1}$$

# OPTIMIZATION BY LEVENBERG-MARQUARDT MINIMIZATION ALGORITHM

ITER	FUNCTION	TRANSMISS	STORTIVITY	SPEC_LEAK
1	.148E-02	.6414E+05	.1147E-03	.4990E-02
3	.520E-04	.6067E+05	.1512E-03	.6599E-02
5	.401E-04	.5803E+05	.1542E-03	.7430E-02
7	.380E-04	.5803E+05	.1536E-03	.7542E-02
8	.377E-04	.5779E+05	.1539E-03	.7612E-02
10	.376E-04	.5792E+05	.1537E-03	.7580E-02
12	.375E-04	.5797E+05	.1536E-03	.7565E-02
13	.375E-04	.5800E+05	.1536E-03	.7555E-02

TERMINATION DUE TO PARAMETER CONVERGENCE

## FINAL RESULTS

ITER	FUNCTION	TRANSMISS	STORTIVITY	SPEC_LEAK
13	.375E-04	.5801E+05	.1536E-03	.7555E-02

## FRACTIONAL COMPONENTS OF FUNCTION VALUE

WELL #	1	2	3	4
	.0000	.0000	1.000	.0000

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

## SENSITIVITY ANALYSIS

### TWO STANDARD DEVIATION CONFIDENCE INTERVALS

PARAMETER	VALUE	LOWER LIMIT	UPPER LIMIT
TRANSMISS	.5801E+05	0.5795E+05	0.5807E+05
STORTIVITY	.1536E-03	0.0000	0.2115E-02
SPEC_LEAK	.7551E-02	0.0000	0.1062

TO CONTINUE ENTER "RETURN"

*Rogers Ranch 3*

*fully penetrating  
data windowed 0-180*

*T = 433,915 gpd/ft*

*S = 1.536 x 10<sup>-4</sup>*

*K/b = 7.555 x 10<sup>-3</sup>*

# OPTIMIZATION BY LEVENBERG-MARQUARDT MINIMIZATION ALGORITHM

ITER	FUNCTION	TRANSMISS	STORTIVITY	SPEC_LEAK
1	.297E-03	.5801E+05	.1536E-03	.7551E-02
3	.382E-04	.5982E+05	.1781E-03	.7919E-02
5	.910E-05	.7463E+05	.1935E-03	.6436E-02
7	.329E-05	.8388E+05	.2003E-03	.5525E-02
9	.222E-05	.8265E+05	.2034E-03	.5547E-02
10	.221E-05	.8223E+05	.2031E-03	.5578E-02

TERMINATION DUE TO PARAMETER CONVERGENCE

## FINAL RESULTS

ITER	FUNCTION	TRANSMISS	STORTIVITY	SPEC_LEAK
10	.221E-05	.8227E+05	.2029E-03	.5578E-02

## FRACTIONAL COMPONENTS OF FUNCTION VALUE

WELL #	1	2	3	4
	.0000	.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	.8227E+05	0.8214E+05	0.8240E+05
STORTIVITY	.2029E-03	0.0000	0.4632E-02
SPEC_LEAK	.5578E-02	0.0000	0.1625

TO CONTINUE ENTER "RETURN"

*Rogers Ranch 4*  


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*fully penetrating*  
*data windowed 0-181*

$$T = 615,380 \text{ gpd/ft}$$

$$S = 2.029 \times 10^{-4}$$

$$K/b = 5.578 \times 10^{-3} \text{ day}^{-1}$$

# OPTIMIZATION BY LEVENBERG-MARQUARDT MINIMIZATION ALGORITHM

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ITER  FUNCTION  TRANSMISS  STORTIVTY  SPEC_LEAK
  1  .407E-02  .4777E+05  .1285E-03  .1124E-01
  3  .375E-02  .4930E+05  .1122E-03  .1050E-01
  4  .374E-02  .4902E+05  .1116E-03  .1061E-01
    
```

TERMINATION DUE TO PARAMETER CONVERGENCE

## FINAL RESULTS

```

ITER  FUNCTION  TRANSMISS  STORTIVTY  SPEC_LEAK
  4  .374E-02  .4909E+05  .1115E-03  .1061E-01
    
```

## FRACTIONAL COMPONENTS OF FUNCTION VALUE

WELL #	1	2	3	4
	.6519	.3481	.0000	.0000

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

## SENSITIVITY ANALYSIS

### TWO STANDARD DEVIATION CONFIDENCE INTERVALS

PARAMETER	VALUE	LOWER LIMIT	UPPER LIMIT
TRANSMISS	.4909E+05	0.4906E+05	0.4911E+05
STORTIVTY	.1115E-03	0.0000	0.9093E-03
SPEC_LEAK	.1062E-01	0.0000	0.8349E-01

TO CONTINUE ENTER "RETURN"

*Rogers Ranch 1+2 (deep wells)*

*fully penetrating  
data windowed D-181*

*T = 367,193 gpd/ft*

*S = 1.115 x 10<sup>-4</sup>*

*K<sub>h</sub> = 1.061 x 10<sup>-2</sup>*

# OPTIMIZATION BY LEVENBERG-MARQUARDT MINIMIZATION ALGORITHM

ITER	FUNCTION	TRANSMISS	STORTIVTY	SPEC_LEAK
1	.276E-01	.5801E+05	.1536E-03	.7551E-02
3	.809E-02	.4521E+05	.1386E-03	.1106E-01
5	.574E-02	.4833E+05	.1290E-03	.1108E-01
7	.567E-02	.4762E+05	.1290E-03	.1127E-01
8	.567E-02	.4779E+05	.1285E-03	.1125E-01

TERMINATION DUE TO PARAMETER CONVERGENCE

## FINAL RESULTS

ITER	FUNCTION	TRANSMISS	STORTIVTY	SPEC_LEAK
8	.567E-02	.4777E+05	.1285E-03	.1125E-01

## FRACTIONAL COMPONENTS OF FUNCTION VALUE

WELL #	1	2	3	4
	.5985	.1210	.1676	.1129

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

## SENSITIVITY ANALYSIS

### TWO STANDARD DEVIATION CONFIDENCE INTERVALS

PARAMETER	VALUE	LOWER LIMIT	UPPER LIMIT
TRANSMISS	.4777E+05	0.4775E+05	0.4779E+05
STORTIVTY	.1285E-03	0.0000	0.8872E-03
SPEC_LEAK	.1124E-01	0.0000	0.7078E-01

TO CONTINUE ENTER "RETURN"

*Rogers French all*

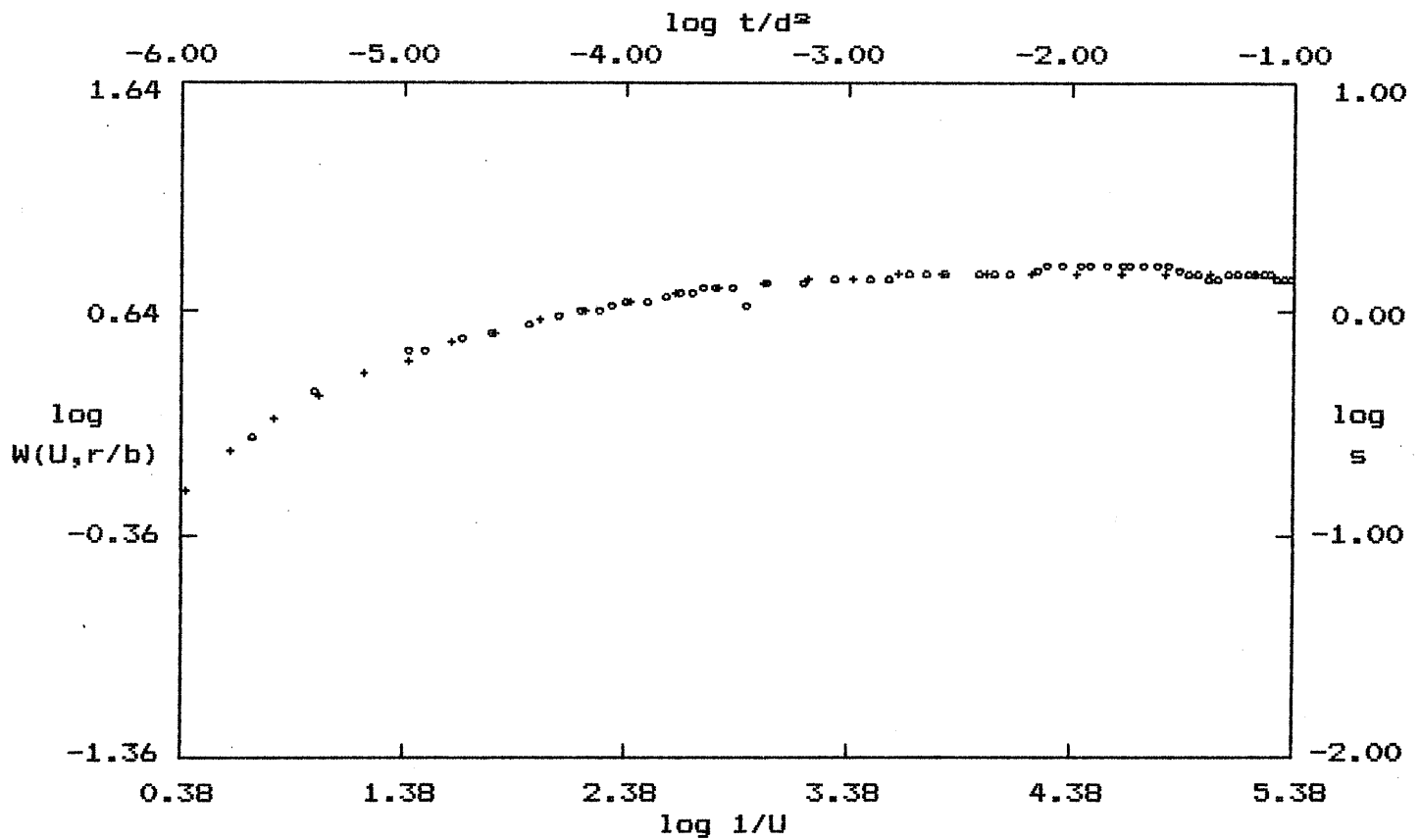
*fully penetrating  
data windowed 0-181*

*T = 357,320 gpd/ft*

*S = 1.285 x 10<sup>-4</sup>*

*k'/b = 1.125 x 10<sup>-2</sup> day<sup>-1</sup>*

# PUMP TEST DATA



o - Data

+ - Type Curve

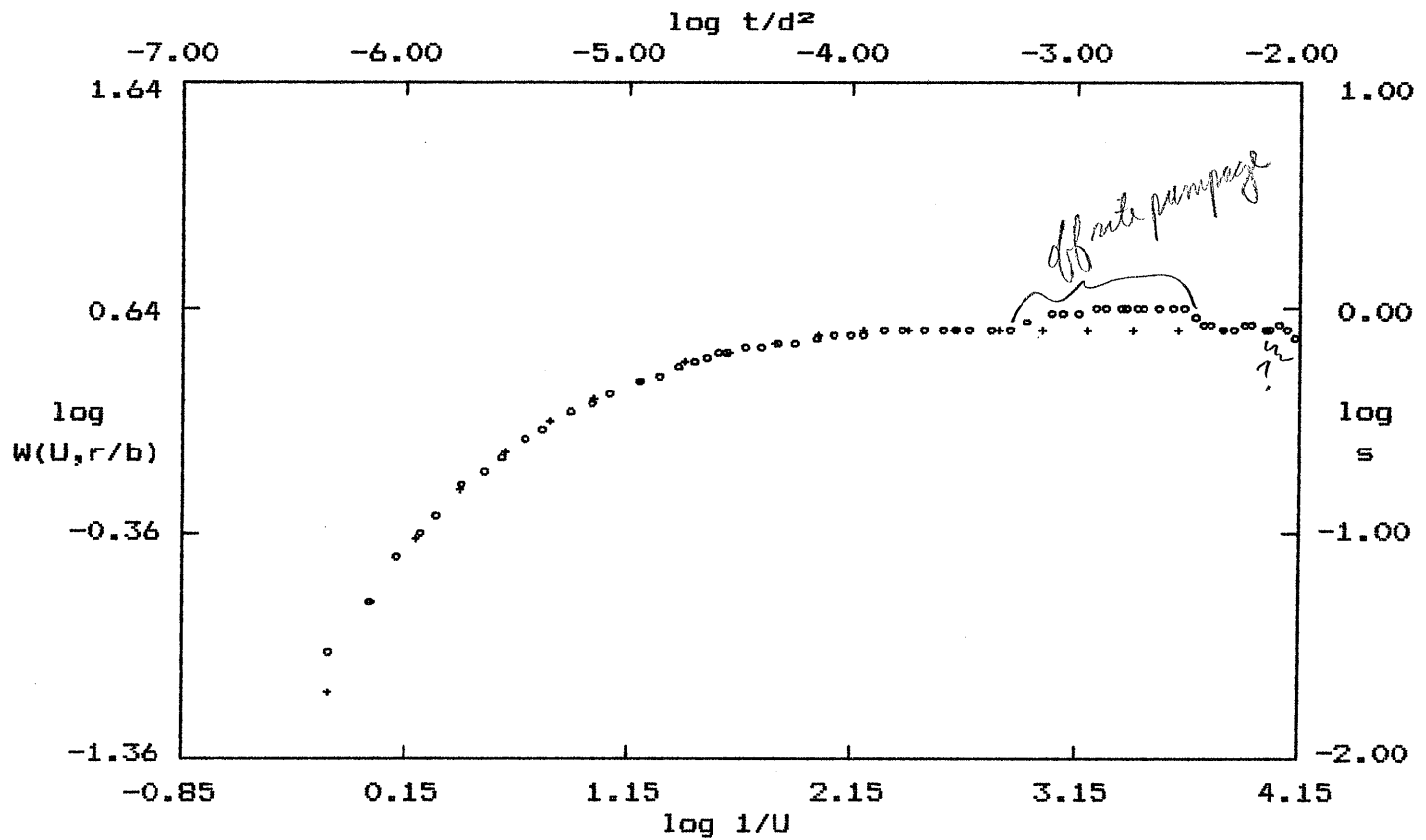
Confined Leaky:  $r/B = 0.05$

## SOLUTION

Transmissivity =  $4.096E+01$  ft.<sup>2</sup>/min. = 441,188 gpd/ft  
 Storativity =  $6.829E-05$

*Rogers Ranch 1 (HM 311)*

# PUMP TEST DATA



o - Data

+ - Type Curve

Confined Leaky:  $r/B = 0.20$

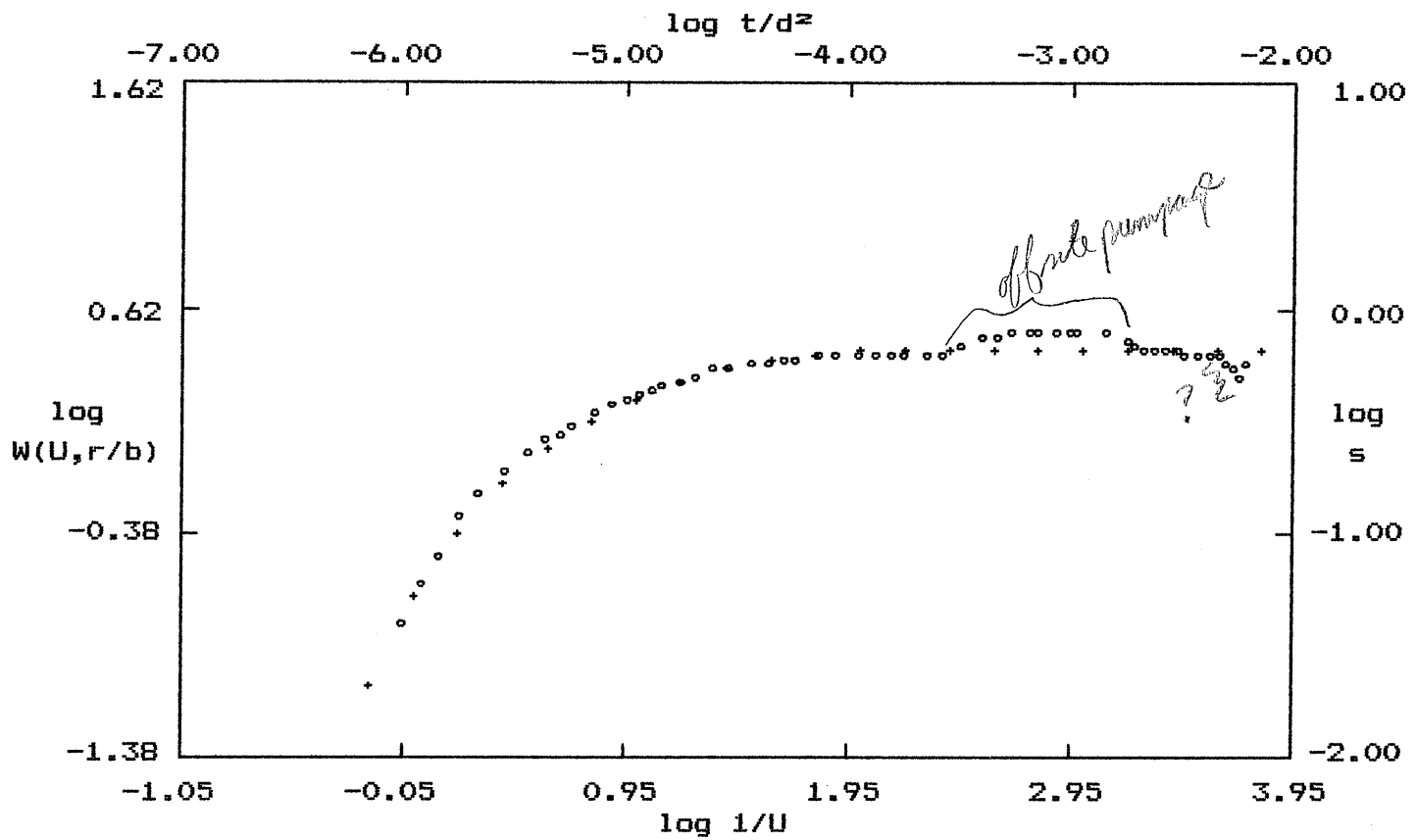
## SOLUTION

Transmissivity =  $4.096E+01$  ft.<sup>2</sup>/min. = 44,188 gpd/ft  
 Storativity =  $1.160E-04$

*Project Ranch 2 (HM 312)*



# PUMP TEST DATA



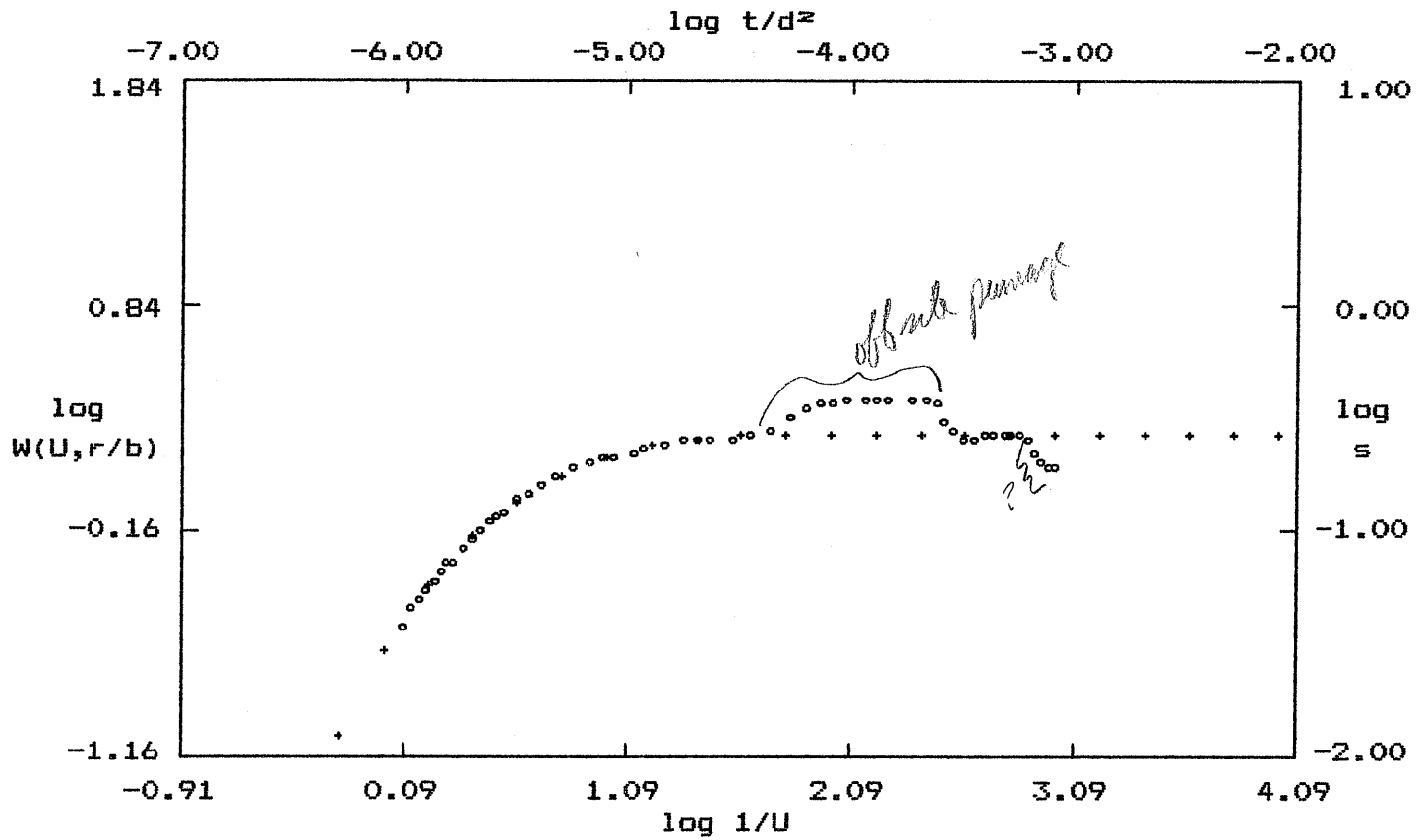
Confined Leaky:  $r/B = 0.30$

## SOLUTION

Transmissivity =  $3.911E+01$  ft.<sup>2</sup>/min. = 421,262 gpd/ft  
 Storativity =  $1.755E-04$

Progers Ranch 3 (HM319)

# PUMP TEST DATA



o - Data

+ - Type Curve

Confined Leaky:  $r/B = 0.50$

## SOLUTION

Transmissivity =  $6.491E+01$  ft.<sup>2</sup>/min. = 699,159 gpd/ft  
 Storativity =  $2.111E-04$

*Rogers Ranch 4 (HM320)*