Clean Harbors Environmental Services, LLC
Lone Mountain Facility
Waynoka, Oklahoma

RCRA/HSWA Permit Renewal Application

Volume 4

October 1, 2020

VOLUME 4

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APPENDIX 3.4

CLAYSTONE VEINLET FREQUENCY ANALYSIS

coverage by the mottles (i.e., "with bluish green mottle" indicates greater mottle coverage than does "with some bluish green mottle").

Some discrepancies existed in the way each logger reported color. However, color was reported in the final core descriptions as the loggers observed it. A standard wording for reporting color was adopted for the final core descriptions (i.e., blue-green" was changed to "bluish green" and "red-brown" was changed to "reddish brown").

Frequency Analysis of Gypsum Veinlets

The number of gypsum veinlets was also determined for the same intervals as those used for hydraulic conductivities. The data were generated by counting the number of veinlets for each interval using cores data. The number of veinlets were also averaged by ten foot intervals since some of the intervals used in reference to intervals A through C were variable in thickness.

These data are represented graphically in Figures E-3.7 through E-3.11. The data are also represented in tabular form in Appendix G, Site Characterization Study. There does not appear to be a statistically significant separation of the data. Therefore, it can be concluded that the frequency of gypsum veinlets as described in the core appear to be random. This randomness is also noted in the hydraulic conductivity data.

Geophysical Log Analysis

Geophysical Logs were also used to determine the relative potential for preferential ground-water flow. Four depth intervals were identified for purposes of comparison: A-(25-35 ft.), B-(55-65 ft.), C-(80-90 ft.), and D-(138-148 ft.). These intervals were chosen based on geophysical signatures from the logs of the Test Borings. The geophysical signatures were similar

DISTRIBUTION OF GYPSUM VEINLETS IN INTERVALS 1–10 IN TEST BORINGS

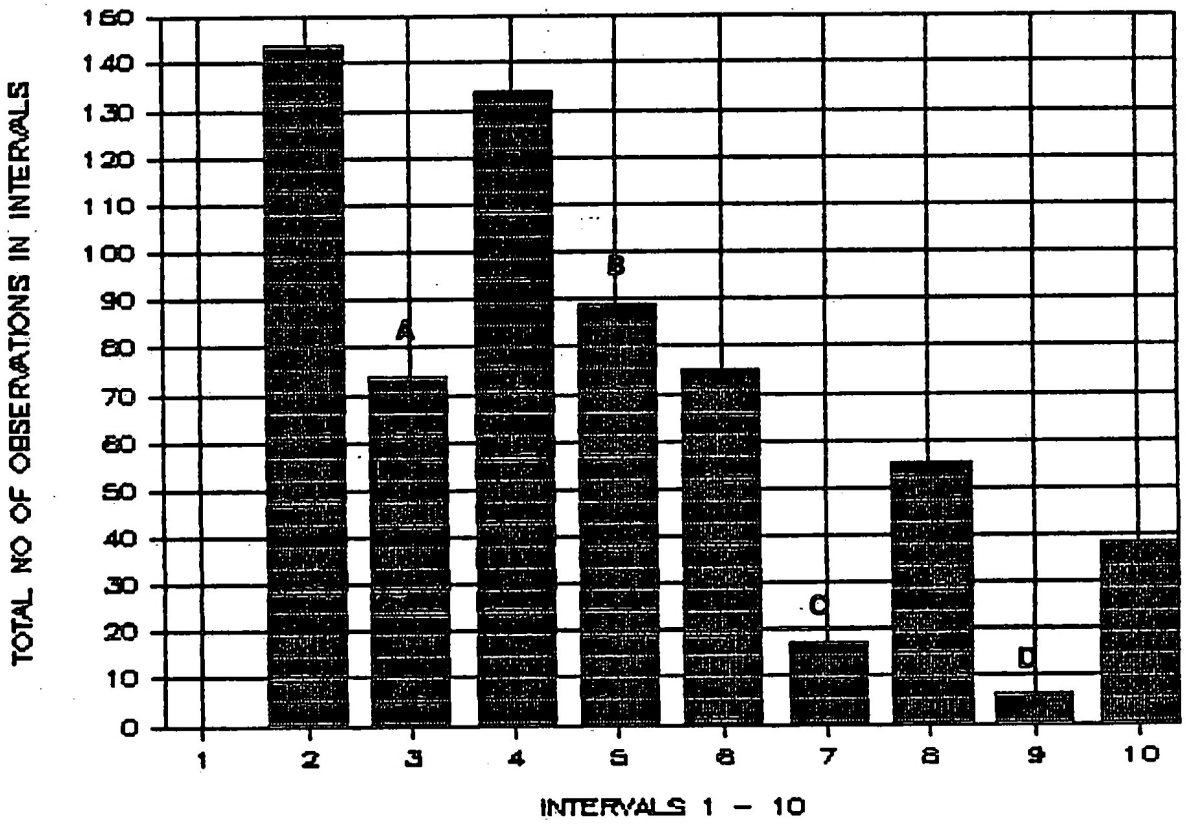


FIG. E-3.7

DISTRIBUTION OF GYPSUM VEINLETS PER 10ft. INTERVAL IN TEST BORINGS

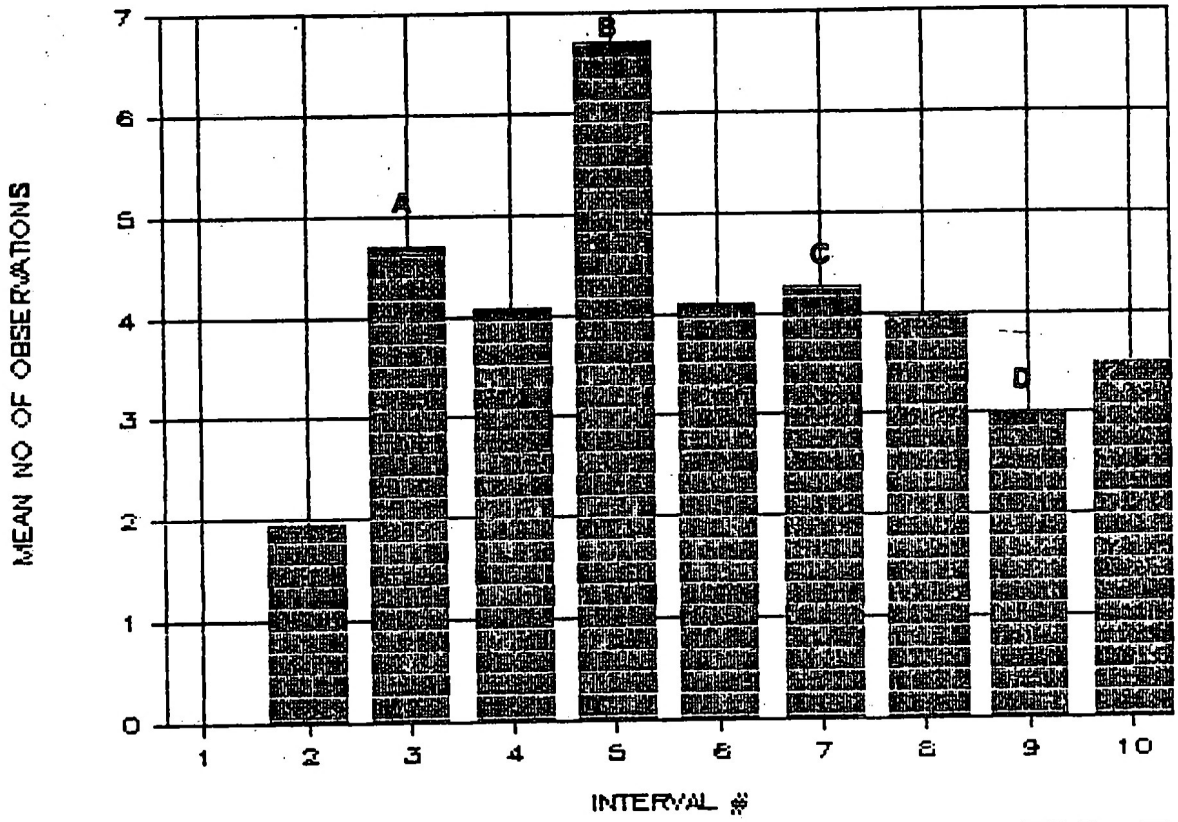


FIG. E-3.8

DISTRIBUTION OF GYPSUM VEINLETS IN INTERVALS 1–10 IN TEST BORINGS

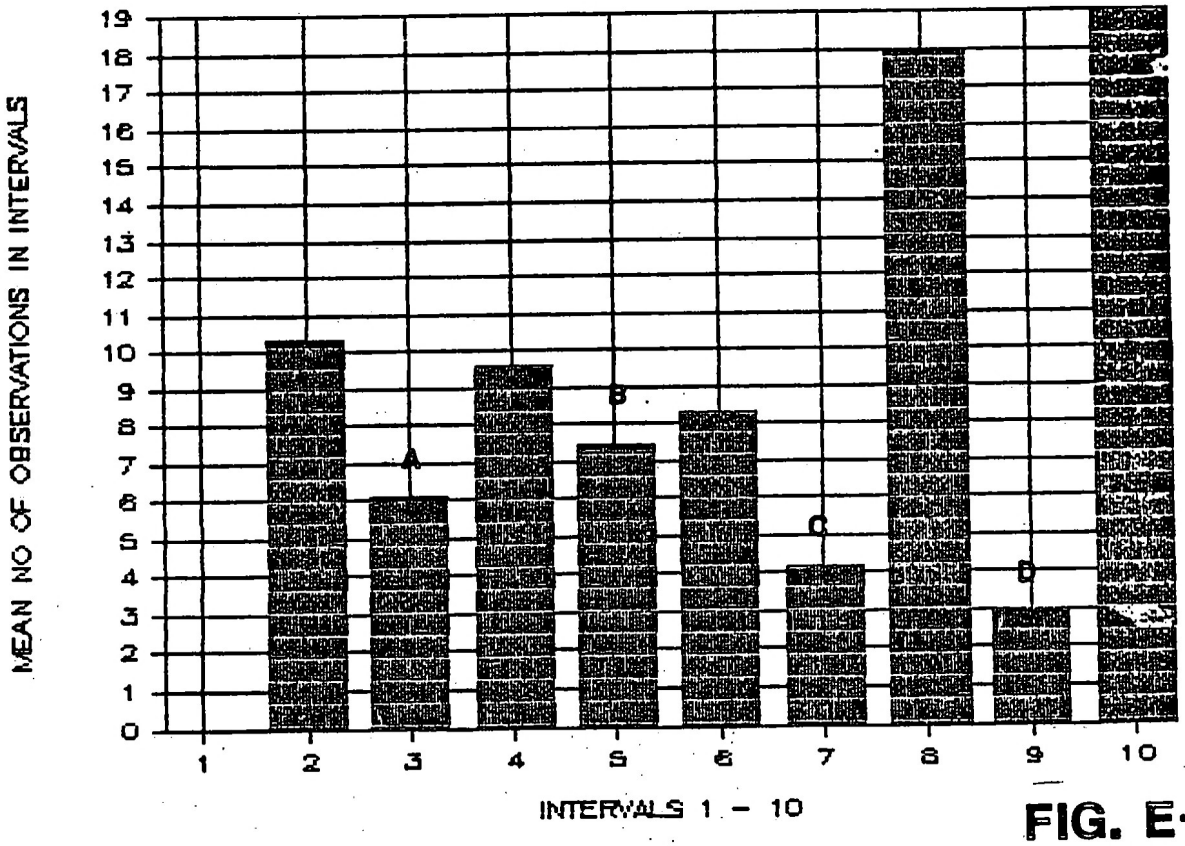


FIG. E-3.9

DISTRIBUTION OF GYPSUM VEINLETS IN TEST BORINGS 1–15

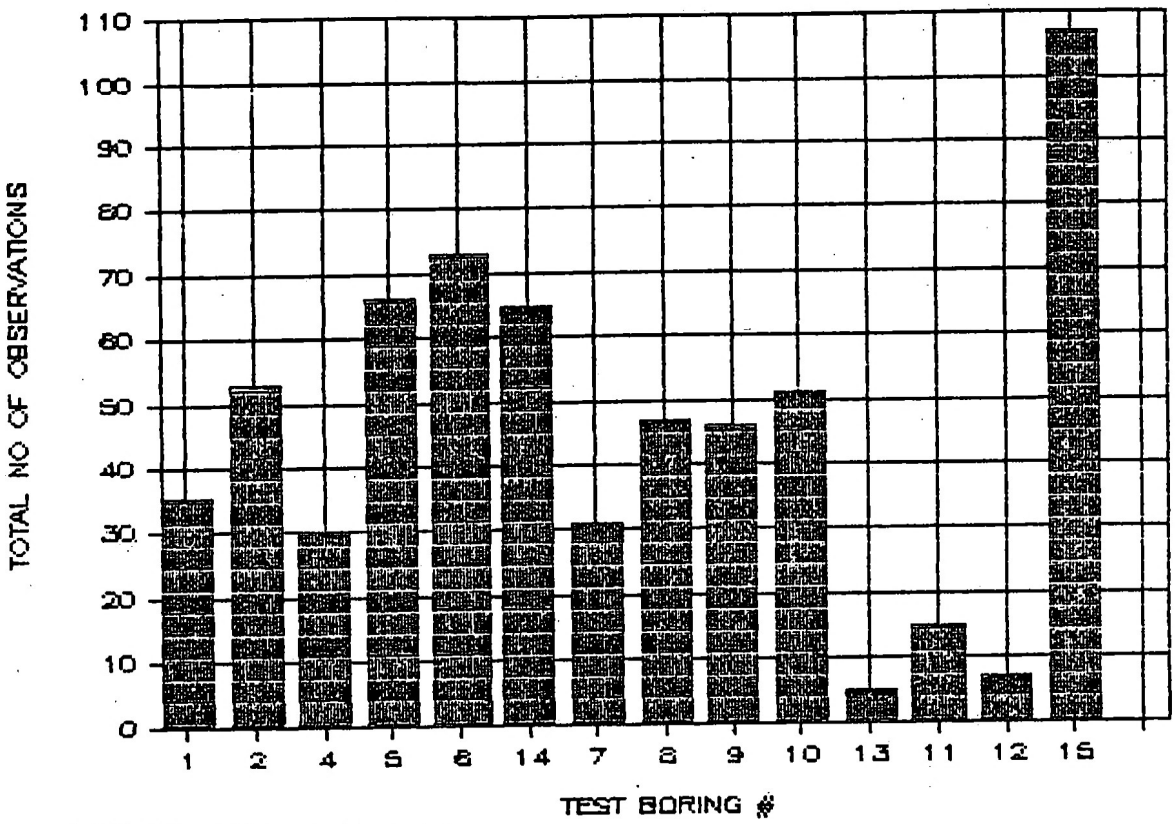


FIG. E-3.10

DISTRIBUTION OF GYPSUM VEINLETS IN TEST BORINGS 1–15

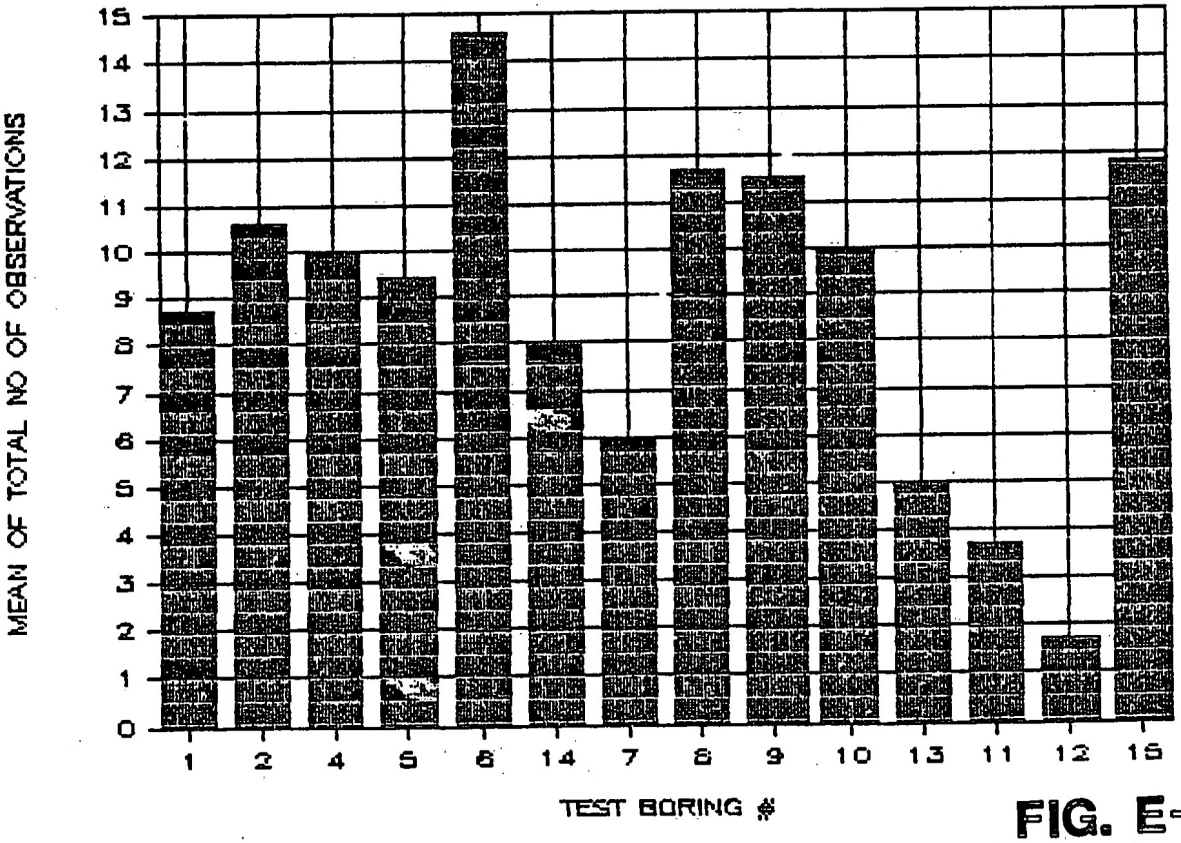


FIG. E-3.11

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Total Number of Gypsum Veinlets

V = Vertical Fractures
All other numbers represent horizontal or near horizontal fractures.

TEST BORING	TB 1	TEST BORING	TB 2
DEPTH INTERVALS		DEPTH INTERVALS	
1.	No Data	1.	No Data
2.	9	2.	13+1V
3.	5	3.	No Data
4.	17	4.	17
5.	No Data	5.	12
6.	4	6.	6
7.	no data	7.	4
8.	no data	8.	No Data
9.	no data	9.	No Data
10.	no data	10.	No Data
Mean	35/4 =9	Mean	53/6 = 11
Standard Deviation	5.9	Standard Deviation	18.0

Standard Deviation 18.0

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS
BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Total Number of Gypsum Veinlets

V = Vertical Fractures
All other numbers represent horizontal or near horizontal fractures.

TEST BORING	TEST BORING
TB 3	TB 4
DEPTH INTERVALS	DEPTH INTERVALS
1. thru 10 No Data	1. No Data
	2. 19
	3. 6
	4. 5
	5. thru 10 No Data
	Mean 30/3 = 10
	Standard Deviation 7.8

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Total Number of Gypsum Veinlets

V = Vertical Fractures
All other numbers represent horizontal or near horizontal fractures.

TEST BORING

TB 5

DEPTH INTERVALS

1. No Data
2. 3+1V
3. 7+4V
4. 17+3V
5. 14
6. 10
7. 3
8. 4
9. No Data
10. No Data

Mean 66/7 = 9

Standard Deviation 6.2

TEST BORING

TB 6

DEPTH INTERVALS

1. No Data
2. 23+4V
3. 8
4. 19
5. 5
6. 14
7. thru 10 No Data

Mean 73/5 = 15

Standard Deviation 8.8

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Total Number of Gypsum Veinlets

V = Vertical Fractures
All other numbers represent horizontal or near horizontal fractures.

TEST BORING	TEST BORING
TB 7	TB 8
DEPTH INTERVALS	DEPTH INTERVALS
1. No Data	1. No Data
2. 6+2V	2. 13+7V
3. 2-V	3. 10
4. 10	4. 9
5. 7	5. 8
6. 4	6. thru 10 No Data
7. thru 10 No Data	
Mean 30/5 = 6	Mean 47/4 = 12
Standard Deviation 3.2	Standard Deviation 5.5

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Total Number of Gypsum Veinlets

V = Vertical Fractures
All other numbers represent horizontal or near horizontal fractures.

TEST BORING	TEST BORING
TB 9	TB 10
DEPTH INTERVALS	DEPTH INTERVALS
1. No Data	1. No Data
2. 16	2. 10+1V
3. 8	3. 9
4. 9	4. 11
5. 13	5. 11
6. thru 10 No Data	6. 9
	7. thru 10 No Data
Mean 46/4 = 12	Mean 51/5 = 10
Standard Deviation 3.7	Standard Deviation 1.1

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Total Number of Gypsum Veinlets

V = Vertical Fractures
All other numbers represent horizontal or near horizontal fractures.

TEST BORING	TB 11	TEST BORING	TB 12
DEPTH INTERVALS		DEPTH INTERVALS	
1.	No Data	1.	No Data
2.	8	2.	0
3.	1	3.	3
4.	2	4.	3
5.	4	5.	1
6.	thru 10 No Data	6.	thru 10 No Data
Mean	15/4 = 4	Mean	7/4 = 2
Standard Deviation	3.1	Standard Deviation	1.5

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Total Number of Gypsum Veinlets

V = Vertical Fractures
All other numbers represent horizontal or near horizontal fractures.

TEST BORING	TEST BORING
TB 13	TB 14
DEPTH INTERVALS	DEPTH INTERVALS
1. No Data	1. No Data
2. 5	2. 1
3. 0	3. No Data
4. 0	4. 1
5. 0	5. 5
6. 0	6. 8
7. thru 10 No Data	7. 1
	8. 19
	9. 4
	10. 26
Mean 5/5 = 1	Mean 65/8 = 8
Standard Deviation 9.1	Standard Deviation 9.4

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS
BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Total Number of Gypsum Veinlets

V = Vertical Fractures
All other numbers represent horizontal or near horizontal fractures.

TB 15

1. No Data

2. 2

3. 10

4. 11

5. 9

6. 20

7. 9

8. 32

9. 2

10. 12

Mean 107/9 = 12

Standard Deviation 9.2

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS BY DEPTH INTERVAL FOR ALL TEST BORINGS (TB)

TOTAL NO. OF OBSERVATIONS	MEAN	STANDARD DEVIATION
1. No Data		
2. 144/14	144/14 = 10	8.0
3. 72/12	72/12 = 6	3.7
4. 134/14	134/14 = 10	6.8
5. 89/12	89/12 = 7	4.6
6. 75/9	75/9 = 8	5.9
7. 17/4	17/4 = 4	3.4
8. 55/3	55/3 = 18	14.01
9. 6/2	6/2 = 3	1.41
10. 38/2	38/2 = 19	9.9

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Number of Gypsum Veinlets
Per 10 ft. Intervals

TEST BORING	DEPTH INTERVALS		TEST BORING	DEPTH INTERVALS	
TB 1 -A 50 ft.	1.	No data	TB 2 -A 50 ft.	1.	No Data
	2.	2		2.	3
A 10 ft.	3.	5	A 10 ft.	3.	No Data
A-B 20 ft.	4.	9	A-B 20 ft.	4.	9
B 10 ft.	5.	No Data	B 10 ft.	5.	12
B-C 20 ft.	6.	2	B-C 20 ft.	6.	3
C 10 ft.	7.	No Data	C 10 ft.	7.	4
C-D 45 ft.	8.	No Data	C-D 45 ft.	8.	No Data
D 10 ft.	9.	No Data	D 10 ft.	9.	No Data
D+ 50 ft.	10.	No Data	D+ 50 ft.	10.	No Data

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Number of Gypsum Veinlets
Per 10 ft. Intervals

TEST BORING	DEPTH INTERVALS	
TB 3	1 thru 10	No Data

TEST BORING	DEPTH INTERVALS	
TB 4	1.	No Data
-A 50 ft.	2.	4
A 10 ft.	3.	6
A-B 20 ft.	4.	3
B 10 ft.	5.	thru 10 No Data

TEST BORING	DEPTH INTERVALS	
TB 5	1.	No Data
-A 50 ft.	2.	1
A 10 ft.	3.	11
A-B 20 ft.	4.	10
B 10 ft.	5.	14
B-C 20 ft.	6.	5
C 10 ft.	7.	3
C-D 45 ft.	8.	1
D 10 ft.	9.	No Data
D+ 50 ft.	10.	No Data

TEST BORING	DEPTH INTERVALS	
TB 6	1.	No Data
-A 50 ft.	2.	5
A 10 ft.	3.	8
A-B 20 ft.	4.	10
B 10 ft.	5.	5
B-C 20 ft.	6.	7
C 10 ft.	7.	No Data
C-D 45 ft.	8.	No Data
D 10 ft.	9.	No Data
D+ 50 ft.	10.	No Data

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Number of Gypsum Veinlets
Per 10 ft. Intervals

TEST BORING	DEPTH INTERVALS		TEST BORING	DEPTH INTERVALS	
TB 7	1.	No Data	TB 8	1.	No Data
-A 50 ft.	2.	2	-A 50 ft.	2.	4
A 10 ft.	3.	2	A 10 ft.	3.	10
A-B 20 ft.	4.	5	A-B 20 ft.	4.	5
B 10 ft.	5.	7	B 10 ft.	5.	8
B-C 20 ft.	6.	2	B-C 20 ft.	6.	No Data
C 10 ft.	7.	No Data	C 10 ft.	7.	No Data
C-D 45 ft.	8.	No Data	C-D 45 ft.	8.	No Data
D 10 ft.	9.	No Data	D 10 ft.	9.	No Data
D+ 50 ft.	10.	No Data	D+ 50 ft.	10.	No Data

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Number of Gypsum Veinlets
Per 10 ft. Intervals

TEST BORING	DEPTH INTERVALS		TEST BORING	DEPTH INTERVALS	
TB 9	1.	No Data	TB 10	1.	No Data
-A 50 ft.	2.	3	-A 50 ft.	2.	2
A 10 ft.	3.	8	A 10 ft.	3.	9
A-B 20 ft.	4.	5	A-B 20 ft.	4.	6
B 10 ft.	5.	13	B 10 ft.	5.	11
B-C 20 ft.	6.	No Data	B-C 20 ft,	6.	5
C 10 ft.	7.	No Data	C 10 ft.	7.	No Data
C-D 45 ft.	8.	No Data	C-D 45 ft.	8.	No Data
D 10 ft.	9.	No Data	D 10 ft.	9.	No Data
D+ 50 ft.	10.	No Data	D+ 50 ft.	10.	No Data

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS
BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Number of Gypsum Veinlets
Per 10 ft. Intervals

TEST BORING	DEPTH INTERVALS		TEST BORING	DEPTH INTERVALS	
TB 11	1.	No Data	TB 12	1.	No Data
-A 50 ft.	2.	2	-A 50 ft.	2.	0
A 10 ft.	3.	1	A 10 ft.	3.	3
A-B 20 ft.	4.	1	A-B 20 ft.	4.	2
B 10 ft.	5.	4	B 10 ft.	5.	1
B-C 20 ft.	6.	No Data	B-C 20 ft.	6.	No Data
C 10 ft.	7.	No Data	C 10 ft.	7.	No Data
C-D 45 ft.	8.	No Data	C-D 45 ft.	8.	No Data
D 10 ft.	9.	No Data	D 10 ft.	9.	No Data
D+ 50 ft.	10.	No Data	D+ 50 ft.	10.	No Data

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Number of Gypsum Veinlets
Per 10 ft. Intervals

TEST BORING	DEPTH INTERVALS		TEST BORING	DEPTH INTERVALS	
TB 13	1.	No Data	TB 14	1.	No Data
-A 50 ft.	2.	1	-A 50 ft.	2.	.2
A 10 ft.	3.	0	A 10 ft.	3.	0
A-B 20 ft.	4.	0	A-B 20 ft.	4.	.5
B 10 ft.	5.	0	B 10 ft.	5.	5
B-C 20 ft.	6.	No Data	B-C 20 ft.	6.	4
C 10 ft.	7.	No Data	C 10 ft.	7.	1
C-D 45 ft.	8.	No Data	C-D 45 ft.	8.	4
D 10 ft.	9.	No Data	D 10 ft.	9.	4
D+ 50 ft.	10.	No Data	D+ 50 ft.	10.	5

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS
BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

Number of Gypsum Veinlets
Per 10 ft. Intervals

TEST BORING	DEPTH INTERVALS	
TB 15 -A 50 ft.	1.	No Data
	2.	.4
A 10 ft.	3.	10
A-B 20 ft.	4.	6
B 10 ft.	5.	9
B-C 20 ft.	6.	10
C 10 ft.	7.	9
C-D 45 ft.	8.	7
D 10 ft.	9.	2
D+ 50 ft.	10.	2

FREQUENCY OF OCCURRENCE OF GYPSUM VEINLETS BY DEPTH INTERVAL FOR EACH TEST BORING (TB)

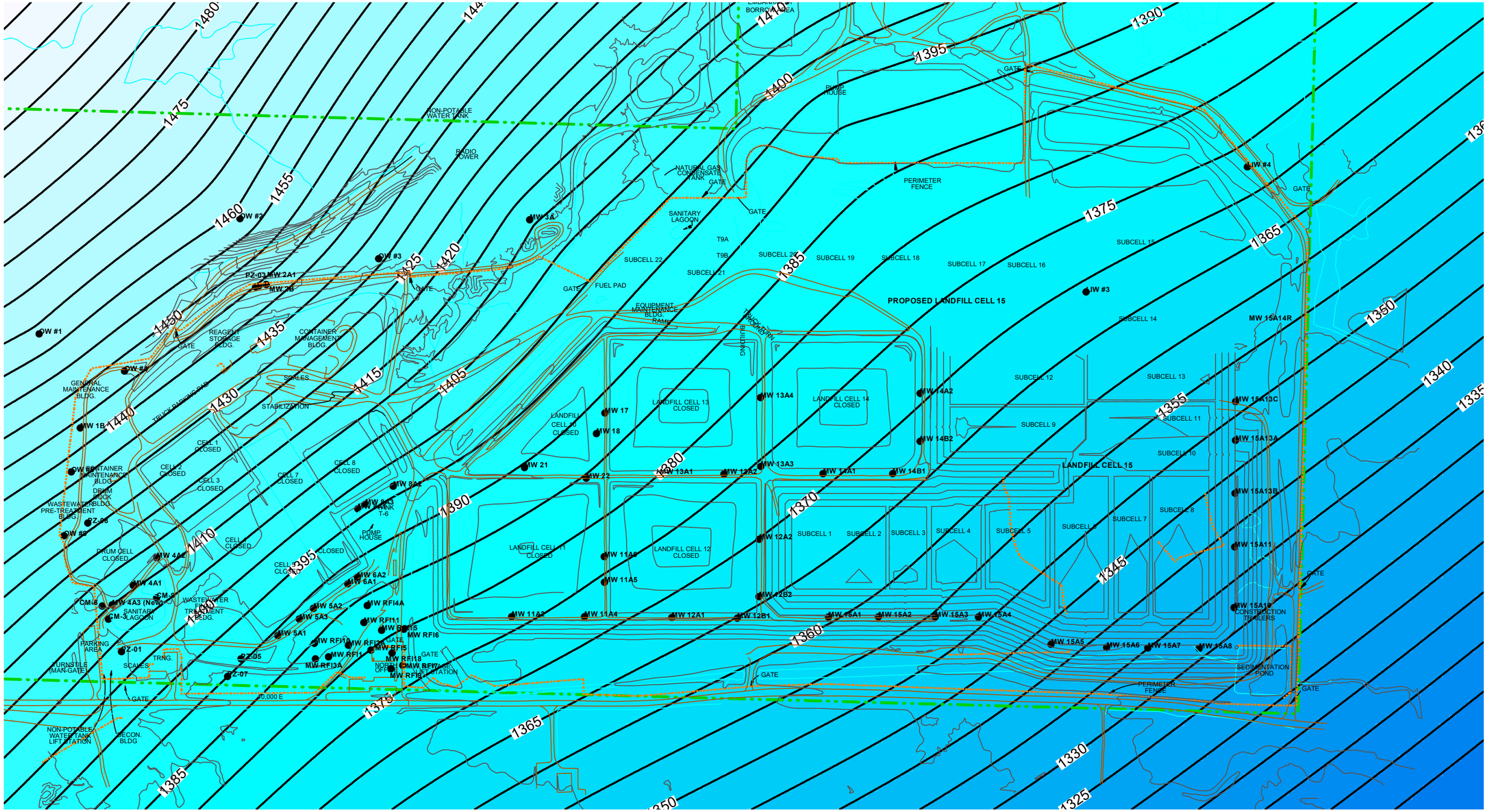
Number of Gypsum Veinlets Per 10 ft. Intervals

TOTAL	1.	No Data	MEAN	1.	No Data
-A 50 ft.	2.	30.0	-A 50 ft.	2.	2/15
A 10 ft.	3.	73	A 10 ft.	3.	5/14
A-B 20 ft.	4.	67	A-B 20 ft.	4.	4/15
B 10 ft.	5.	89	B 10 ft.	5.	7/13
B-C 20 ft.	6.	38	B-C 20 ft.	6.	4/9
C 10 ft.	7.	8	C 10 ft.	7.	4/4
C-D 45 ft.	8.	12	C-D 45 ft.	8.	4/3
D 10 ft.	9.	6	D 10 ft.	9.	3.0/2
D+ 50 ft.	10.	7	D+ 50 ft.	10.	4/2

APPENDIX 3.5

POTENTIOMETRIC MAPS OF UPPER UNCONFINED WATER-BEARING UNIT

(2009-2019)



Legend

Scale:

0 250 500 750

(feet)

N

- Site Surface Feature
  i.e. - Building, Road, Concrete Pad, etc.
- Fenceline
- Lease Boundary
- Surface Water Feature
- Landfill Cell Boundary
- Site Topographic Features of Interest

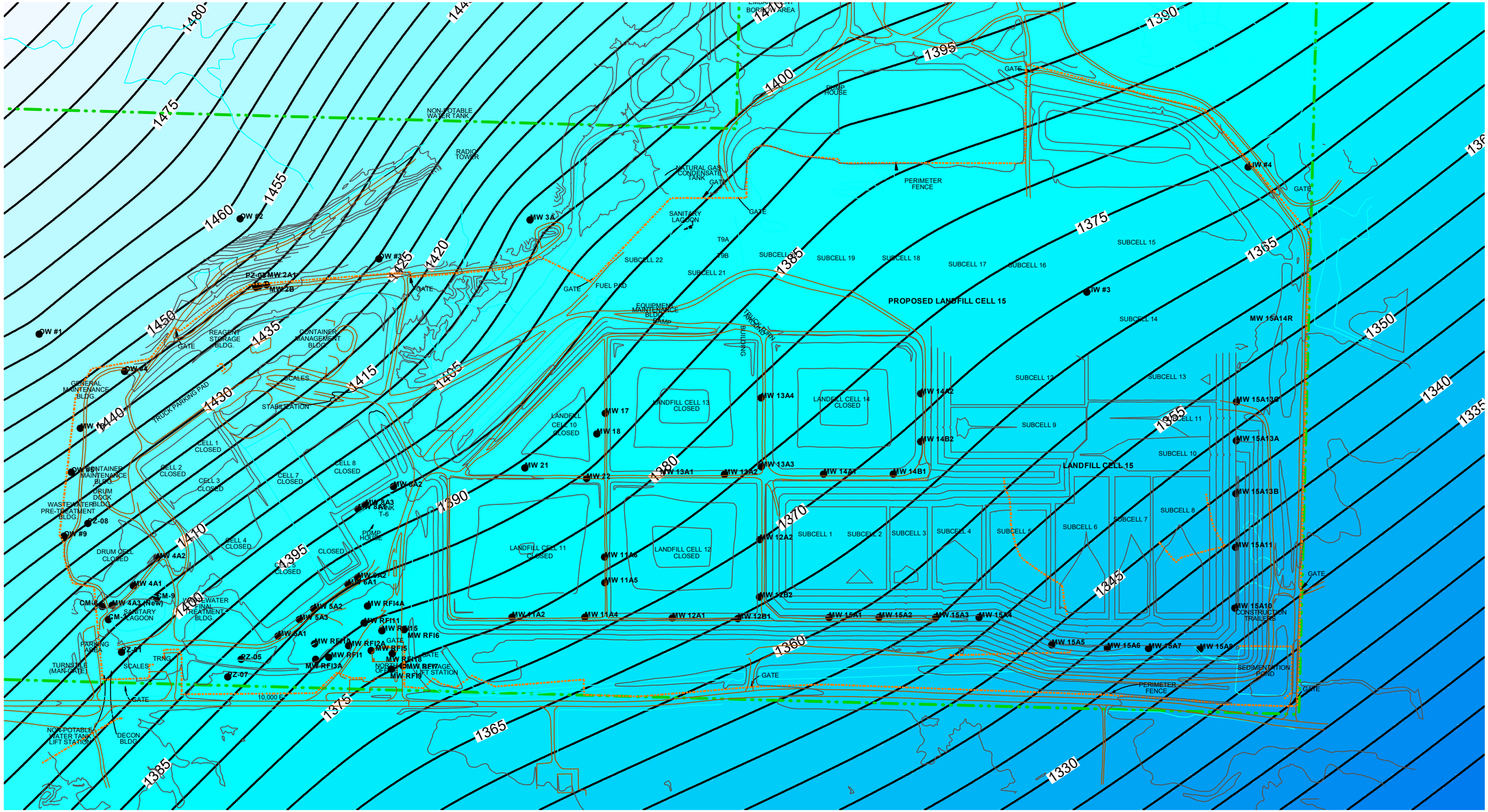
Elevations reported in feet above MSL.

Figure A3.5-1: Potentiometric Surface Map April 2009

Clean Harbors Lone Mountain Facility

Drawn By:
AJE
08/28/2020
Apr2009-PotSurf.lpk

Leppert Associates



Legend

Scale:

0 250 500 750

(feet)

N

- Site Surface Feature
  i.e. - Building, Road, Concrete Pad, etc.
- Fenceline
- Lease Boundary
- Surface Water Feature
- Landfill Cell Boundary
- Site Topographic Features of Interest

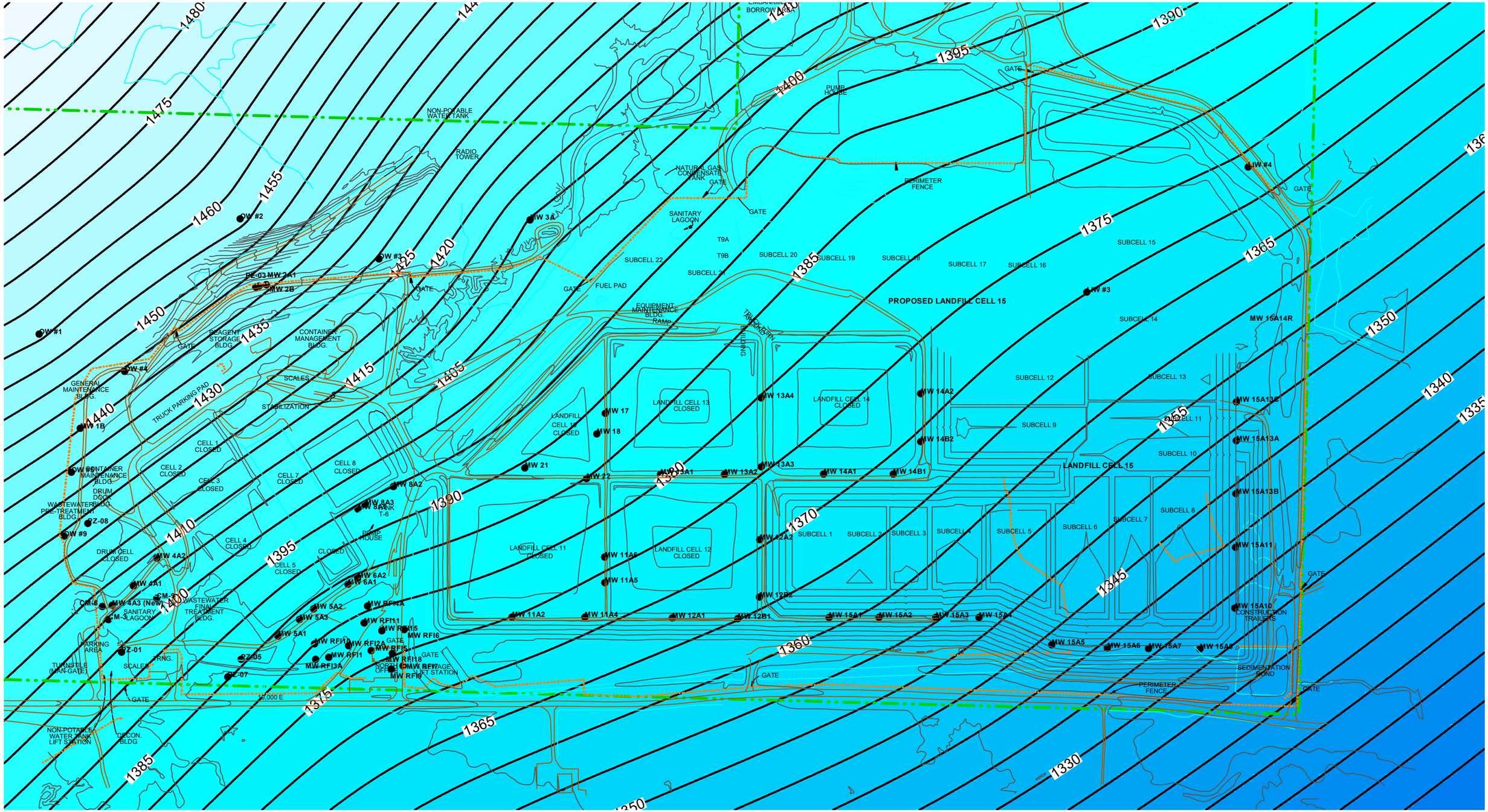
Elevations reported in feet above MSL.

Figure A3.5-2: Potentiometric Surface Map April 2010

Clean Harbors Lone Mountain Facility

Drawn By:
AJE
08/28/2020
Apr2010-PotSurf.lpk

Leppert Associates



Legend

Scale:

0 250 500 750

(feet)

N

- Site Surface Feature
  i.e. - Building, Road, Concrete Pad, etc.
- Fenceline
- Lease Boundary
- Surface Water Feature
- Landfill Cell Boundary
- Site Topographic Features of Interest

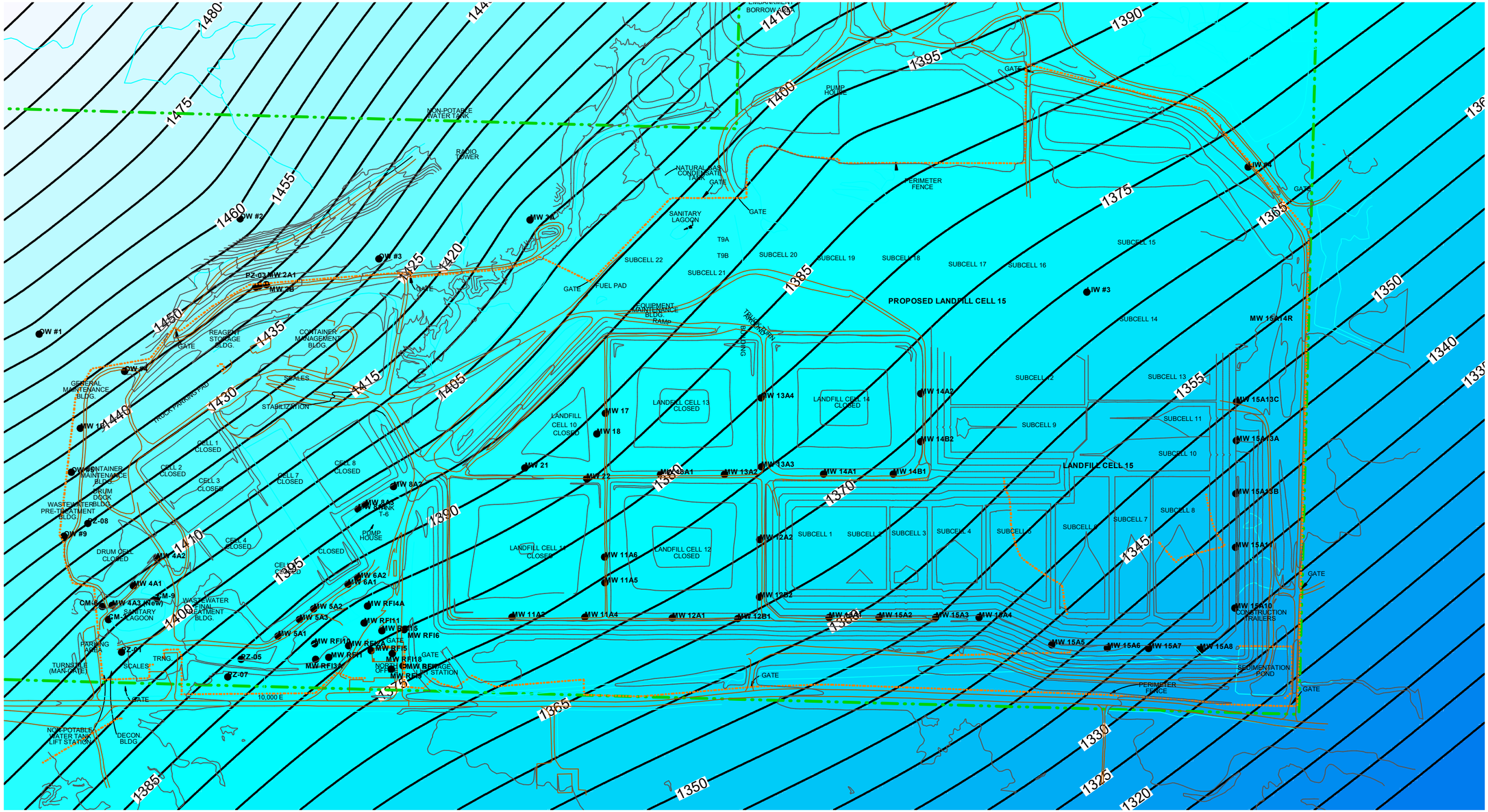
Elevations reported in feet above MSL.

Figure A3.5-3: Potentiometric Surface Map April 2011

Clean Harbors Lone Mountain Facility

Drawn By:
AJE
08/28/2020
Apr2011-PotSurf.lpk

Leppert Associates



Legend

Scale:

0 250 500 750

(feet)

N

- Site Surface Feature
  i.e. - Building, Road, Concrete Pad, etc.
- Fenceline
- Lease Boundary
- Surface Water Feature
- Landfill Cell Boundary
- Site Topographic Features of Interest

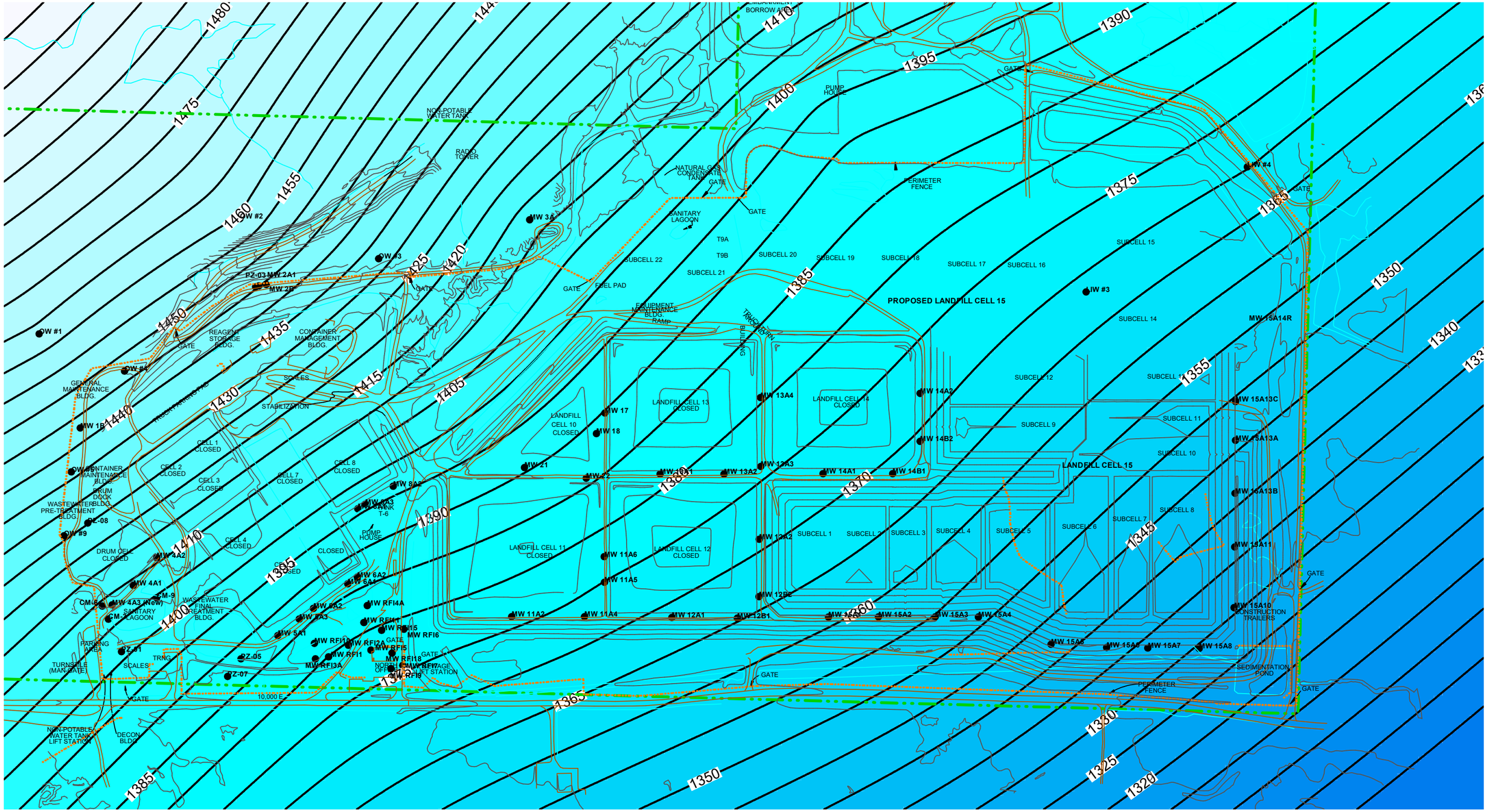
Elevations reported in feet above MSL.

Figure A3.5-4: Potentiometric Surface Map April 2012

Clean Harbors Lone Mountain Facility

Drawn By:
AJE
08/28/2020
Apr2012-PotSurf.lpk

Leppert Associates



Legend

Scale:

0 250 500 750

(feet)

N

- Site Surface Feature
  i.e. - Building, Road, Concrete Pad, etc.
- Fenceline
- Lease Boundary
- Surface Water Feature
- Landfill Cell Boundary
- Site Topographic Features of Interest

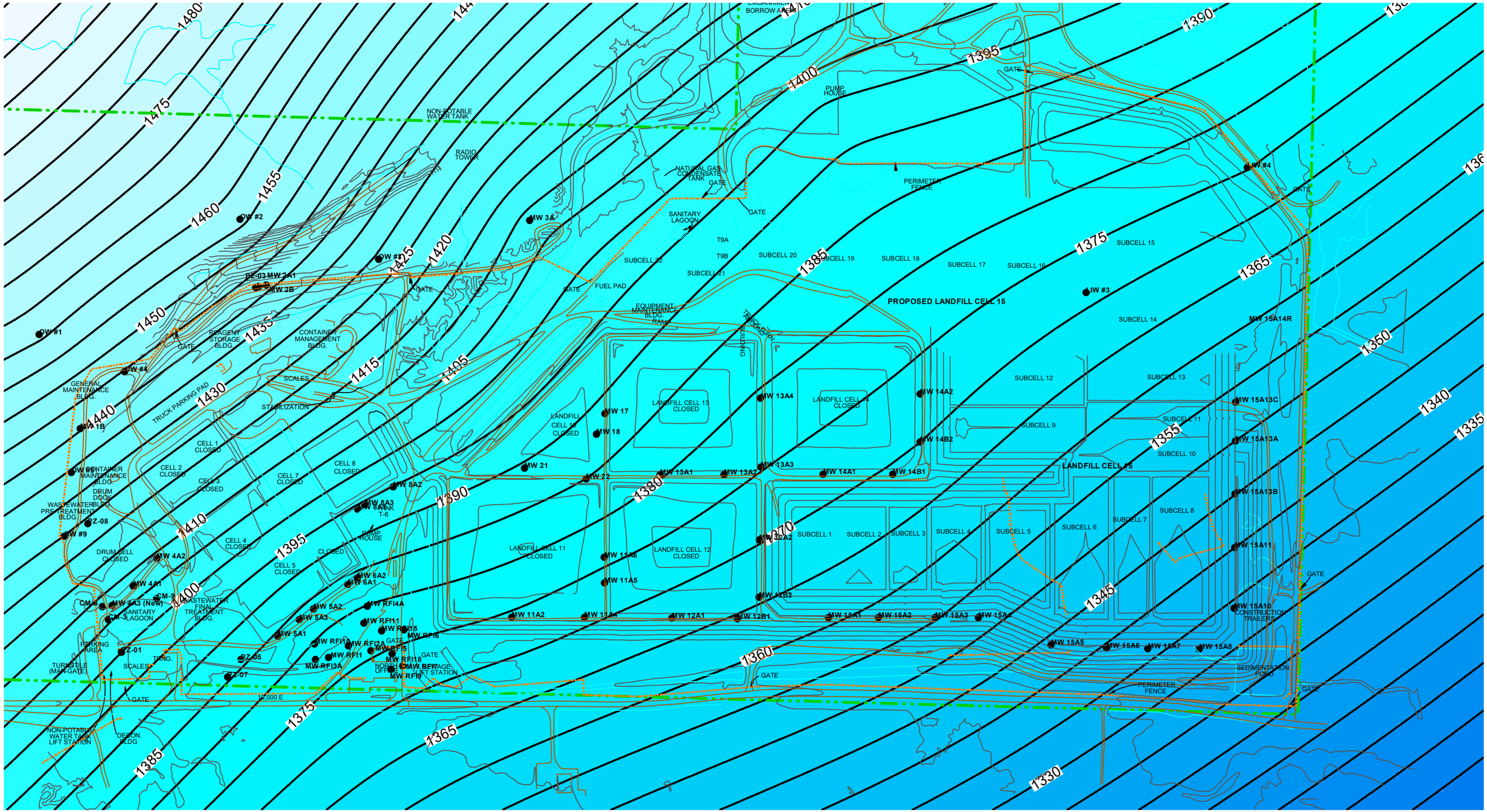
Elevations reported in feet above MSL.

Figure A3.5-5: Potentiometric Surface Map April 2013

Clean Harbors Lone Mountain Facility

Drawn By:
AJE
08/28/2020
Apr2013-PotSurf.lpk

Leppert Associates



Legend

Scale:

0 250 500 750

(feet)

N

- Site Surface Feature
  i.e. - Building, Road, Concrete Pad, etc.
- Fenceline
- Lease Boundary
- Surface Water Feature
- Landfill Cell Boundary
- Site Topographic Features of Interest

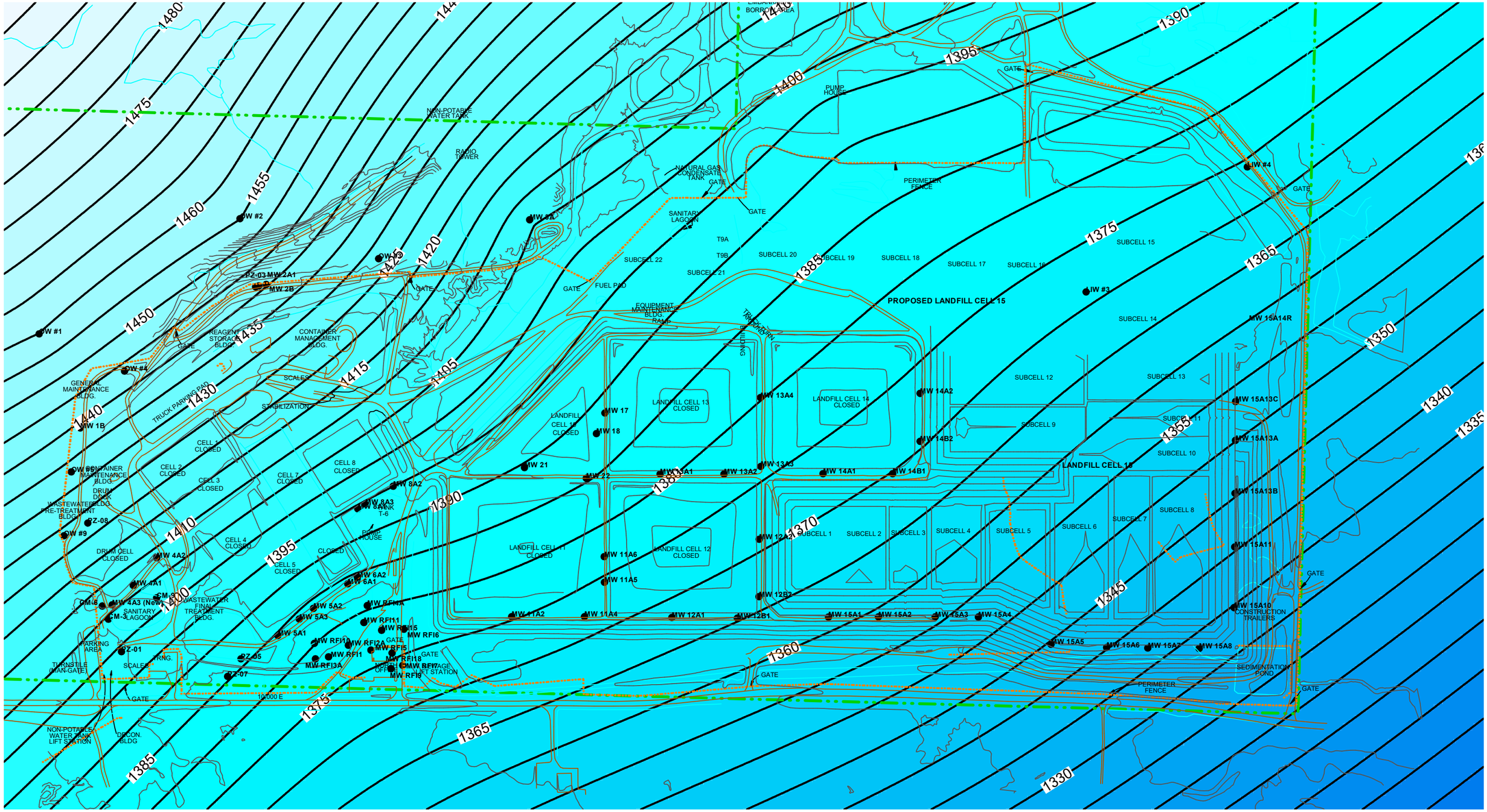
Elevations reported in feet above MSL.

Figure A3.5-6: Potentiometric Surface Map April 2014

Clean Harbors Lone Mountain Facility

Drawn By:
AJE
08/28/2020
Apr2014-PotSurf.lpk

Leppert Associates



Legend

Scale:

0 250 500 750

(feet)

N

- Site Surface Feature
  i.e. - Building, Road, Concrete Pad, etc.
- Fenceline
- Lease Boundary
- Surface Water Feature
- Landfill Cell Boundary
- Site Topographic Features of Interest

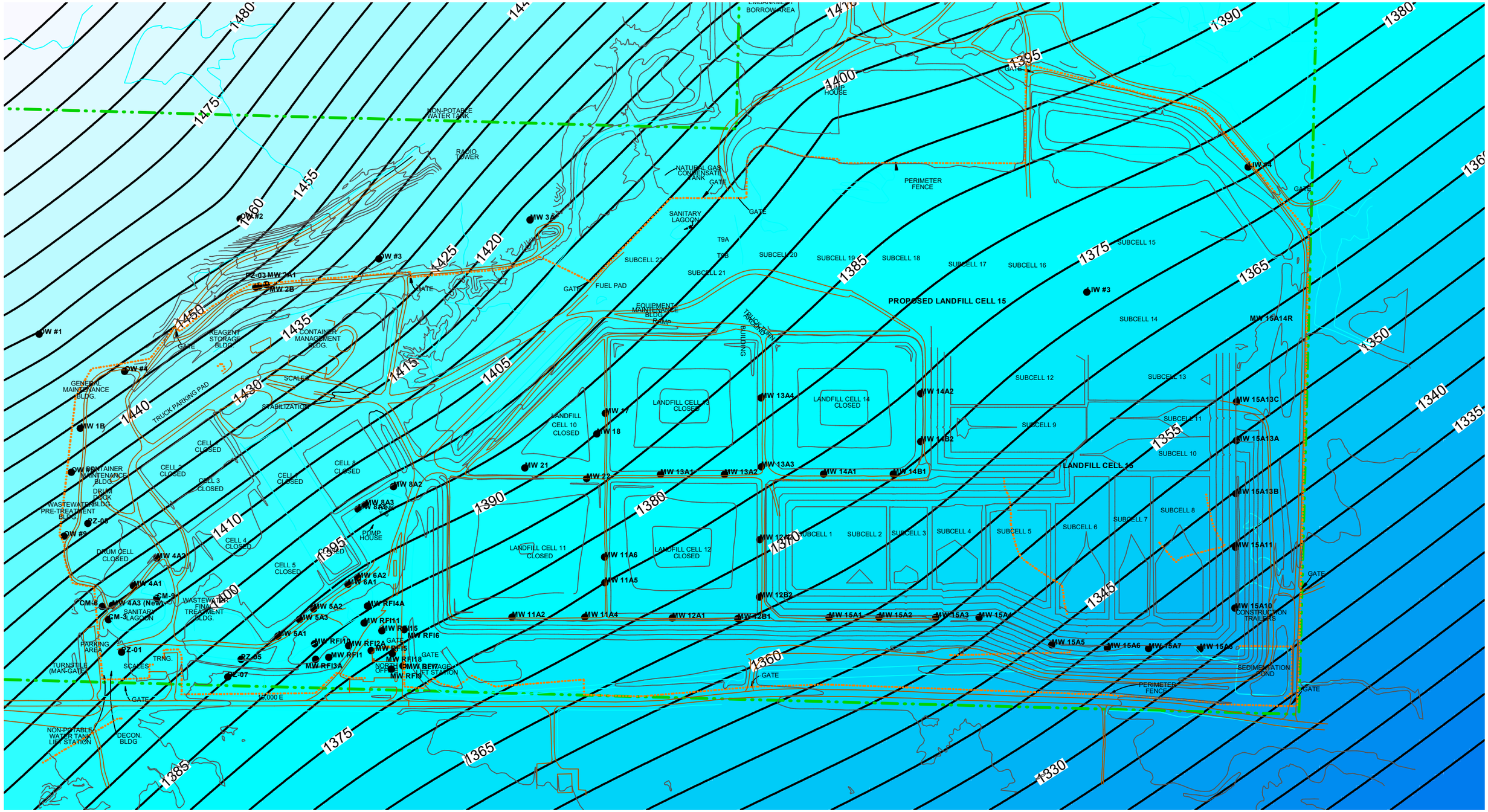
Elevations reported in feet above MSL.

Figure A3.5-7: Potentiometric Surface Map April 2015

Clean Harbors Lone Mountain Facility

Drawn By:
AJE
08/28/2020
Apr2015-PotSurf.lpk

Leppert Associates



Legend

Scale:

0 250 500 750

(feet)

N

- Site Surface Feature
  i.e. - Building, Road, Concrete Pad, etc.
- Fenceline
- Lease Boundary
- Surface Water Feature
- Landfill Cell Boundary
- Site Topographic Features of Interest

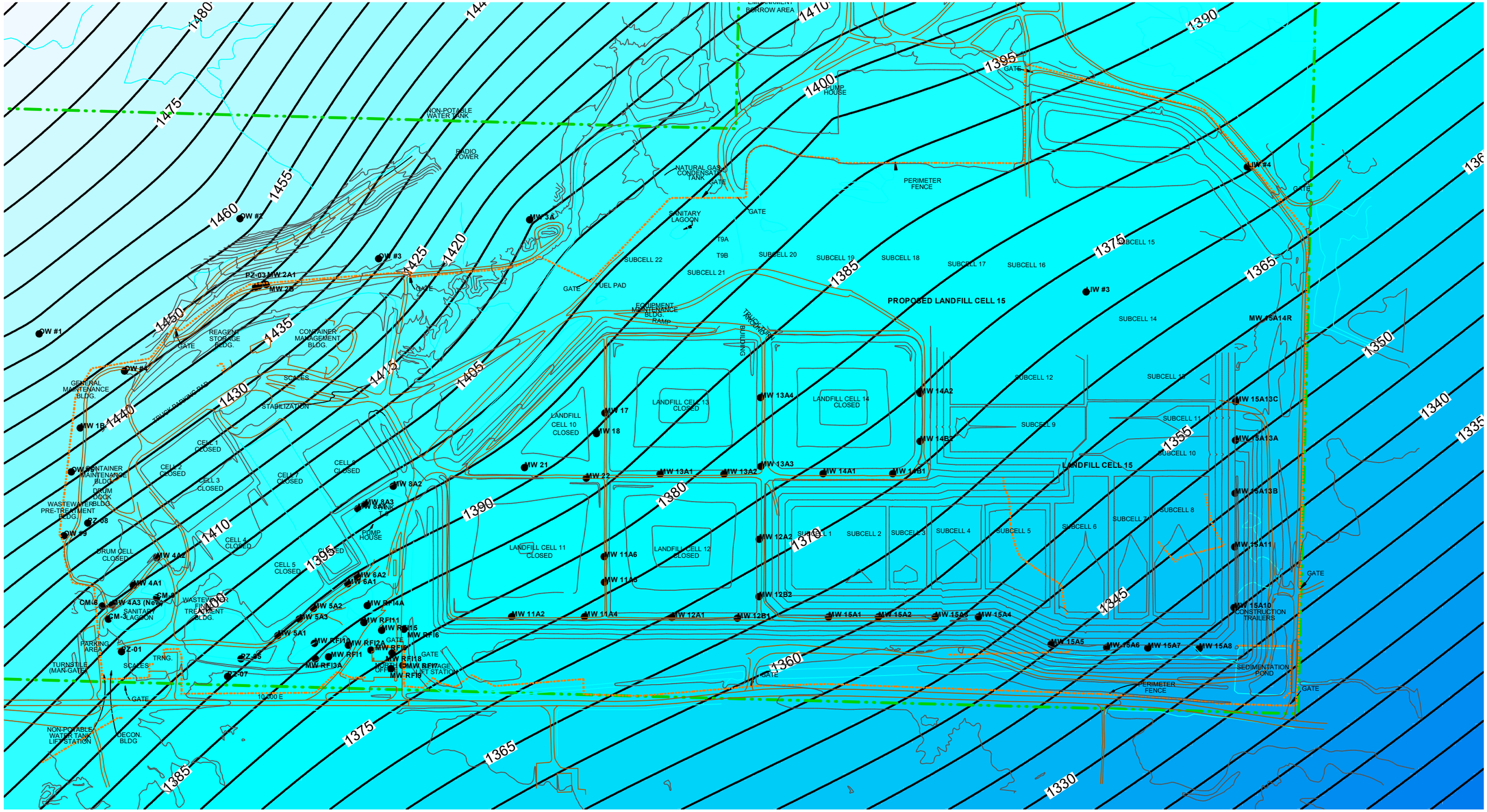
Elevations reported in feet above MSL.

Figure A3.5-8: Potentiometric Surface Map April 2016

Clean Harbors Lone Mountain Facility

Drawn By:
AJE
08/28/2020
Apr2016-PotSurf.lpk

Leppert Associates



Legend

Scale:

0 250 500 750

(feet)

N

- Site Surface Feature
  i.e. - Building, Road, Concrete Pad, etc.
- Fenceline
- Lease Boundary
- Surface Water Feature
- Landfill Cell Boundary
- Site Topographic Features of Interest

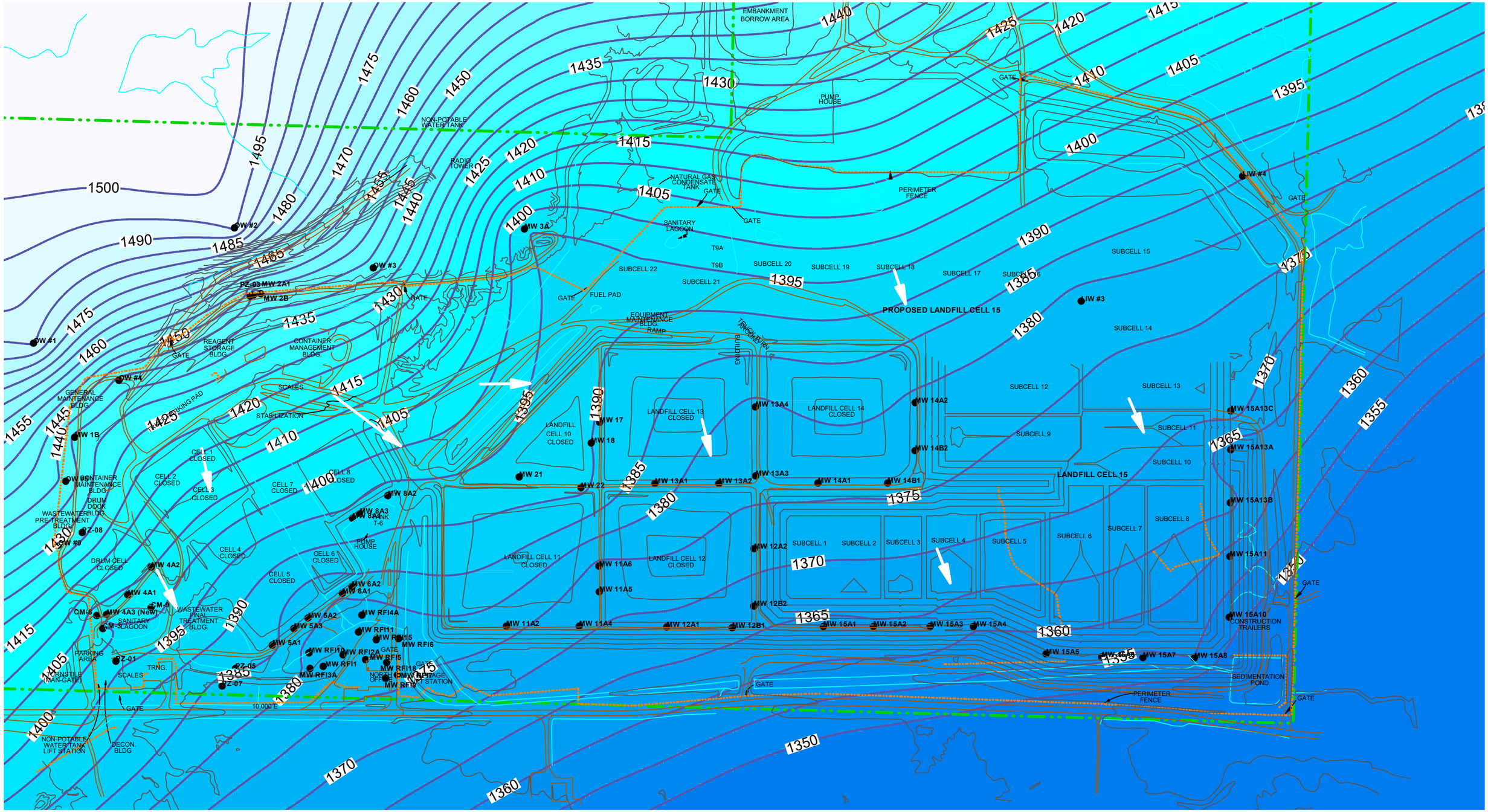
Elevations reported in feet above MSL.

Figure A3.5-9: Potentiometric Surface Map April 2017

Clean Harbors Lone Mountain Facility

Drawn By:
AJE
08/28/2020
Apr2017-PotSurf.lpk

Leppert Associates



Legend

Scale:

0 250 500 750

(feet)

N

- Site Surface Feature
  i.e. - Building, Road, Concrete Pad, etc.
- Fenceline
- Lease Boundary
- Surface Water Feature
- Landfill Cell Boundary
- Site Topographic Features of Interest

Elevations reported in feet above MSL.

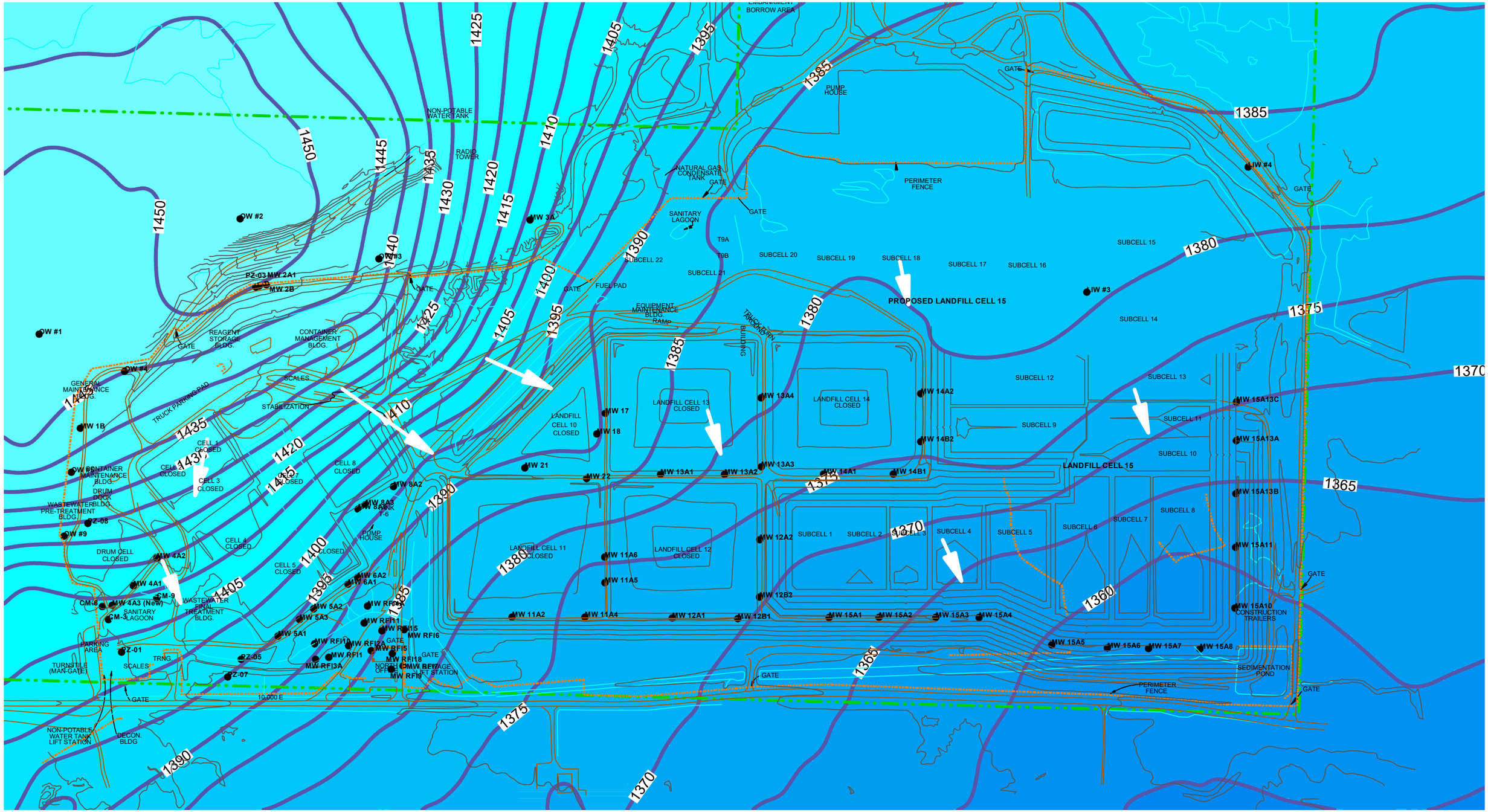
Groundwater Velocity:
Min = 0.046 ft/year
Max = 0.236 ft/year
Average = 0.088 ft/year, 46.44° East of North

Figure A3.5-10: Potentiometric Surface Map April 2018

Clean Harbors Lone Mountain Facility

Drawn By:
AF
8/11/18
Fig3-PotMap v4.lpk

Leppert Associates



Legend

Scale:

0 250 500 750

(feet)

N

- Site Surface Feature
  i.e. - Building, Road, Concrete Pad, etc.
- Fenceline
- Lease Boundary
- Surface Water Feature
- Landfill Cell Boundary
- Site Topographic Features of Interest

Elevations reported in feet above MSL.

Groundwater Velocity:
Min = 0.033 ft/year
Max = 0.35 ft/year
Average = 0.054 ft/year, 50.45° East of North

Figure A3.5-11: Potentiometric Surface Map April 2019

Clean Harbors Lone Mountain Facility

Drawn By:
RRR
8/14/19
Fig3-PotMap.lpk

Leppert Associates

APPENDIX 3.6

SLUG TEST RESULTS

PERMEABILITY CALCULATIONS

INSITU-SLUG TEST

12-87 thru 02-88

(Lone Mountain - U.S.P.C.I. Project)

EXPLANATION

The data curve is superimposed on the type curve and the transmissivity is computed using:

$$T = (1.0)(r_c^2)/t$$

where:

r_c = radius of casing

t = time since removal of slug

T = transmissivity, $ft^2/sec.$

Permeability: $K = T/b$ where: b = thickness

WELL CH F (02-24-88)

The data curve (see Figure) is superimposed on the type curve (see Figure). From the best fit position, $t = 3,400$ seconds and $Tt/r_c^2 = 1.0$. Hence, the transmissivity is computed to be:

$$T = (1)(r_c^2)/t = \frac{(1)(2/12)^2}{3,400} = 8.17 \times 10^{-6}\ ft^2/sec.$$

Permeability: $K = T/b$ where: $b = 17$

$$= \frac{8.17 \times 10^{-6}}{17} = 4.8 \times 10^{-7}\ ft/sec.$$

$$= 1.46 \times 10^{-5}\ cm/sec.$$

WELL CH C (01-88)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 40,000 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(2/12)^2}{40,000} = 6.94 \times 10^{-7}\ ft^2/sec.$$

Permeability: K = T/b where: b = 12

$$= \frac{6.94 \times 10^{-7}}{12} = 5.78 \times 10^{-8}\ ft/sec.$$

$$= 1.76 \times 10^{-6}\ cm/sec.$$

WELL CH A (01-88)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 400,000 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(2/12)^2}{400,000} = 6.94 \times 10^{-8}\ ft^2/sec.$$

Permeability: K = T/b where: b = 17 ft.

$$= \frac{6.94 \times 10^{-8}}{17} = 4.08 \times 10^{-9}\ ft/sec.$$

$$= 1.24 \times 10^{-7}\ cm/sec.$$

WELL CH D (01-88)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 2,600 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(2/12)^2}{2,600} = 1.068 \times 10^{-5}\ ft^2/sec.$$

Permeability: K = T/b where: b = 17 ft.

$$= \frac{1.068 \times 10^{-5}}{17} = 8.9 \times 10^{-7}\ ft/sec.$$

$$= 2.71 \times 10^{-5}\ cm/sec.$$

WELL CH D (02-17-88) (PUMPING TEST - SLUG TEST)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 300 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(2/12)^2}{300} = 9.26 \times 10^{-5}\ ft^2/sec.$$

Permeability: K = T/b where: b = 17 ft.

$$= \frac{9.26 \times 10^{-5}}{17} = 5.45 \times 10^{-6}\ ft/sec.$$

$$= 1.66 \times 10^{-4}\ cm/sec.$$

WELL CH E (12-05-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 21,000 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(2/12)^2}{21,000} = 1.32 \times 10^{-6}\ ft^2/sec.$$

Permeability: K = T/b where: b = 17

$$= \frac{1.32 \times 10^{-6}}{17} = 7.76 \times 10^{-8}\ ft/sec.$$

$$= 2.36 \times 10^{-6}\ cm/sec.$$

WELL MW 1A (10-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 2,500 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{2,500} = 2.78 \times 10^{-6}\ ft^2/sec.$$

Permeability: K = T/b where: b = 12 ft.

$$= \frac{2.78 \times 10^{-6}}{12} = 2.32 \times 10^{-7}\ ft/sec.$$

$$= 7.07 \times 10^{-6}\ cm/sec.$$

WELL MW 1A (01-88)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 6,000 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{6,000} = 1.16 \times 10^{-6}\ ft^2/sec.$$

Permeability: K = T/b where: b = 12 ft.

$$= \frac{1.16 \times 10^{-6}}{12} = 9.65 \times 10^{-8}\ ft/sec.$$

$$= 2.94 \times 10^{-6}\ cm/sec.$$

WELL MW 1B (10-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 1,300,000 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{1,300,000} = 5.34 \times 10^{-9}\ ft^2/sec.$$

Permeability: K = T/b where: b = 17 ft.

$$= \frac{5.34 \times 10^{-9}}{17} = 3.14 \times 10^{-10}\ ft/sec.$$

$$= 9.58 \times 10^{-9}\ cm/sec.$$

WELL MW 1C (01-88)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 1,000,000 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{1,000,000} = 6.94 \times 10^{-9}\ ft^2/sec.$$

Permeability: $K = T/b$ where: b = 12 ft.

$$= \frac{6.94 \times 10^{-9}}{12} = 5.78 \times 10^{-10}\ ft/sec.$$

$$= 1.76 \times 10^{-8}\ cm/sec.$$

WELL MW 1D (01-88)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 220,000 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{220,000} = 3.16 \times 10^{-8}\ ft^2/sec.$$

Permeability: $K = T/b$ where: b = 12 ft.

$$= \frac{3.16 \times 10^{-8}}{12} = 2.63 \times 10^{-9}\ ft/sec.$$

$$= 8.02 \times 10^{-8}\ cm/sec.$$

WELL MW 2B (01-88)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 70,000 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{70,000} = 9.92 \times 10^{-8}\ ft^2/sec.$$

Permeability: K = T/b where: b = 12 ft.

$$= \frac{9.92 \times 10^{-8}}{12} = 8.26 \times 10^{-9}\ ft/sec.$$

$$= 2.52 \times 10^{-7}\ cm/sec.$$

WELL MW 3A (06-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 14,600 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{14,600} = 4.76 \times 10^{-7}\ ft^2/sec.$$

Permeability: K = T/b where: b = 17 ft.

$$= \frac{4.76 \times 10^{-7}}{17} = 2.79 \times 10^{-8}\ ft/sec.$$

$$= 8.4 \times 10^{-7}\ cm/sec.$$

WELL MW 3A (10-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 12,000 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{12,000} = 5.79 \times 10^{-7}\ ft^2/sec.$$

Permeability: K = T/b where: b = 17 ft.

$$= \frac{5.79 \times 10^{-7}}{17} = 3.4 \times 10^{-8}\ ft/sec.$$

$$= 1.04 \times 10^{-6}\ cm/sec.$$

WELL MW 3B (06-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 7,000 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{7,000} = 9.9 \times 10^{-7}\ ft^2/sec.$$

Permeability: K = T/b where: b = 17 ft.

$$= \frac{9.9 \times 10^{-7}}{17} = 5.84 \times 10^{-8}\ ft/sec.$$

$$= 1.78 \times 10^{-6}\ cm/sec.$$

WELL MW 3B (10-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 85,000 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{85,000} = 8.17 \times 10^{-8}\ ft^2/sec.$$

Permeability: K = T/b where: b = 17 ft.

$$= \frac{8.17 \times 10^{-8}}{17} = 4.81 \times 10^{-9}\ ft/sec.$$

$$= 1.47 \times 10^{-7}\ cm/sec.$$

WELL MW 3C (10-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 45,000 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{45,000} = 1.54 \times 10^{-7}\ ft^2/sec.$$

Permeability: K = T/b where: b = 17 ft.

$$= \frac{1.54 \times 10^{-7}}{17} = 9.06 \times 10^{-9}\ ft/sec.$$

$$= 2.76 \times 10^{-7}\ cm/sec.$$

WELL MW 4A (10-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 130 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{130} = 5.34 \times 10^{-5}\ ft^2/sec.$$

Permeability: $K = T/b$ where: b = 17 ft.

$$= \frac{5.34 \times 10^{-5}}{17} = 3.14 \times 10^{-6}\ ft/sec.$$

$$= 9.58 \times 10^{-5}\ cm/sec.$$

WELL MW 4A (01-88)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 5,000 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{5,000} = 1.39 \times 10^{-6}\ ft^2/sec.$$

Permeability: $K = T/b$ where: b = 17 ft.

$$= \frac{1.39 \times 10^{-6}}{17} = 8.17 \times 10^{-8}\ ft/sec.$$

$$= 2.49 \times 10^{-6}\ cm/sec.$$

WELL MW 5A (01-88)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 3,500 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{3,500} = 1.98 \times 10^{-6}\ ft^2/sec.$$

Permeability: K = T/b where: b = 12 ft.

$$= \frac{1.98 \times 10^{-6}}{12} = 1.65 \times 10^{-7}\ ft/sec.$$

$$= 5.02 \times 10^{-6}\ cm/sec.$$

WELL MW 6A (10-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 300 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{300} = 2.31 \times 10^{-5}\ ft^2/sec.$$

Permeability: K = T/b where: b = 12 ft.

$$= \frac{2.31 \times 10^{-5}}{12} = 1.93 \times 10^{-6}\ ft/sec.$$

$$= 5.88 \times 10^{-5}\ cm/sec.$$

WELL MW 6B (10-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 48,000 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{48,000} = 1.45 \times 10^{-7}\ ft^2/sec.$$

Permeability: K = T/b where: b = 12 ft.

$$= \frac{1.45 \times 10^{-7}}{12} = 1.21 \times 10^{-8}\ ft/sec.$$

$$= 3.67 \times 10^{-7}\ cm/sec.$$

WELL MW 8A (10-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 60,000 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{60,000} = 1.16 \times 10^{-7}\ ft^2/sec.$$

Permeability: K = T/b where: b = 17 ft.

$$= \frac{1.16 \times 10^{-7}}{17} = 6.81 \times 10^{-9}\ ft/sec.$$

$$= 2.08 \times 10^{-7}\ cm/sec.$$

WELL MW 8A (01-88)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 180,000 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{180,000} = 3.86 \times 10^{-8}\ ft^2/sec.$$

Permeability: K = T/b where: b = 12 ft.

$$= \frac{3.86 \times 10^{-8}}{12} = 3.22 \times 10^{-9}\ ft/sec.$$

$$= 9.80 \times 10^{-8}\ cm/sec.$$

WELL MW 9 (06-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 8,000 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{8,000} = 8.68 \times 10^{-7}\ ft^2/sec.$$

Permeability: K = T/b where: b = 22 ft.

$$= \frac{8.68 \times 10^{-7}}{22} = 3.95 \times 10^{-8}\ ft/sec.$$

$$= 1.2 \times 10^{-6}\ cm/sec.$$

WELL MW 10 (06-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 450,000 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{450,000} = 1.54 \times 10^{-8}\ ft^2/sec.$$

Permeability: K = T/b where: b = 27 ft.

$$= \frac{1.54 \times 10^{-8}}{27} = 5.7 \times 10^{-10}\ ft/sec.$$

$$= 1.74 \times 10^{-8}\ cm/sec.$$

WELL MW 10A (10-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 170 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{170} = 4.08 \times 10^{-5}\ ft^2/sec.$$

Permeability: K = T/b where: b = 17 ft.

$$= \frac{4.08 \times 10^{-5}}{17} = 2.40 \times 10^{-6}\ ft/sec.$$

$$= 7.32 \times 10^{-5}\ cm/sec.$$

WELL MW 18 (01-88)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 11,000 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{11,000} = 6.31 \times 10^{-7}\ ft^2/sec.$$

Permeability: K = T/b where: b = 22 ft.

$$= \frac{6.31 \times 10^{-7}}{22} = 2.87 \times 10^{-8}\ ft/sec.$$

$$= 8.74 \times 10^{-7}\ cm/sec.$$

WELL MW 19 (06-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 16,000 seconds and $Tt/r_c^2 = 1.0$. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{16,000} = 4.34 \times 10^{-7}\ ft^2/sec.$$

Permeability: K = T/b where: b = 22 ft.

$$= \frac{4.34 \times 10^{-7}}{22} = 1.97 \times 10^{-8}\ ft/sec.$$

$$= 6.05 \times 10^{-7}\ cm/sec.$$

WELL MW 20 (06-87)

Superimposing the data curve (see Figure) on the type curve (see Figure), t = 10,400 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{10,400} = 6.68 \times 10^{-7}\ ft^2/sec.$$

Permeability: K = T/b where: b = 22 ft.

$$= \frac{6.68 \times 10^{-7}}{22} = 3.04 \times 10^{-8}\ ft/sec.$$

$$= 9.25 \times 10^{-7}\ cm/sec.$$

WELL MW 20 (01-88)

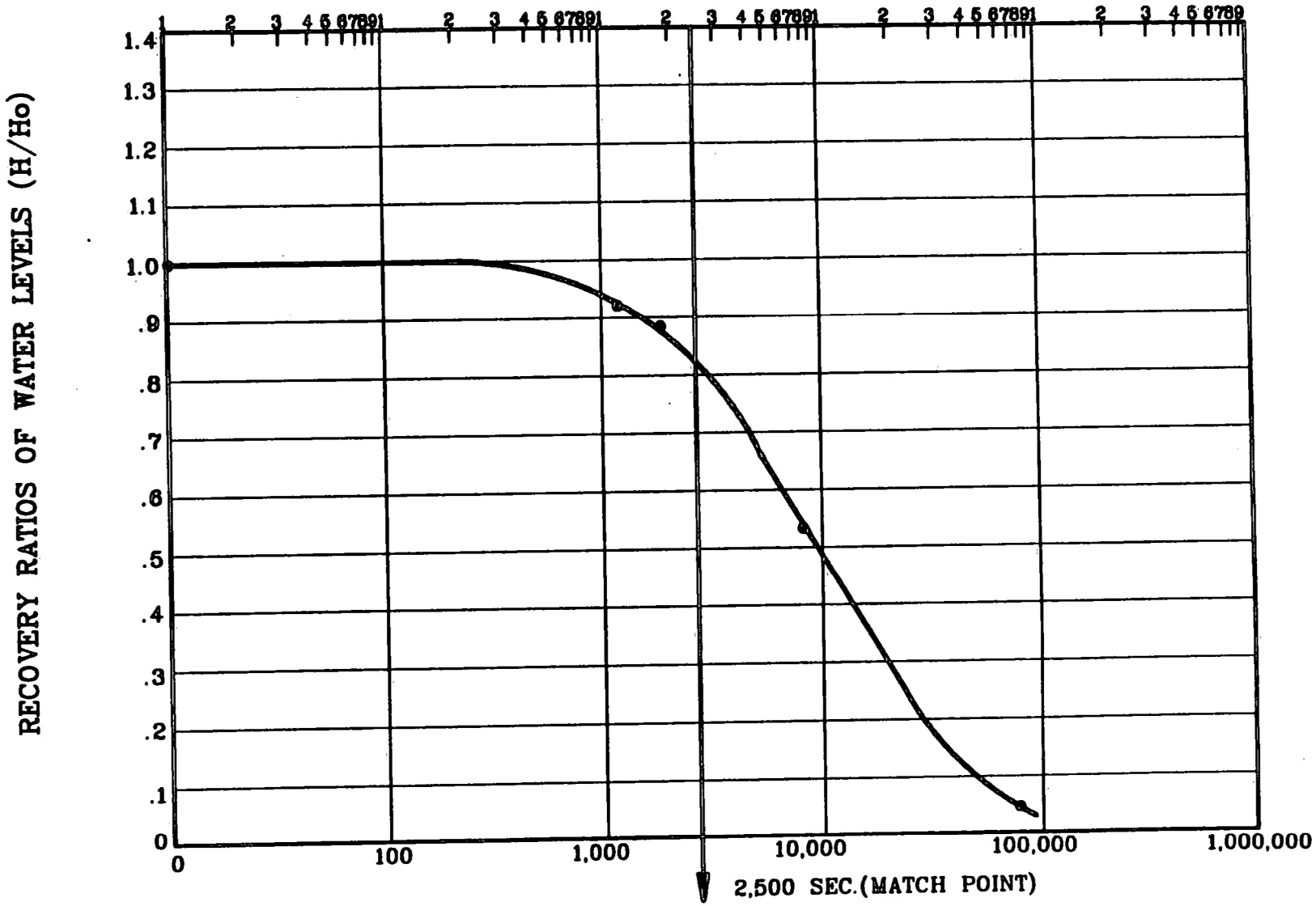
Superimposing the data curve (see Figure) on the type curve (see Figure), t = 385,000 seconds and Tt/r_c^2 = 1.0. Therefore:

$$T = (1)(r_c^2)/t = \frac{(1)(1/12)^2}{385,000} = 1.8 \times 10^{-8}\ ft^2/sec.$$

Permeability: K = T/b where: b = 12 ft.

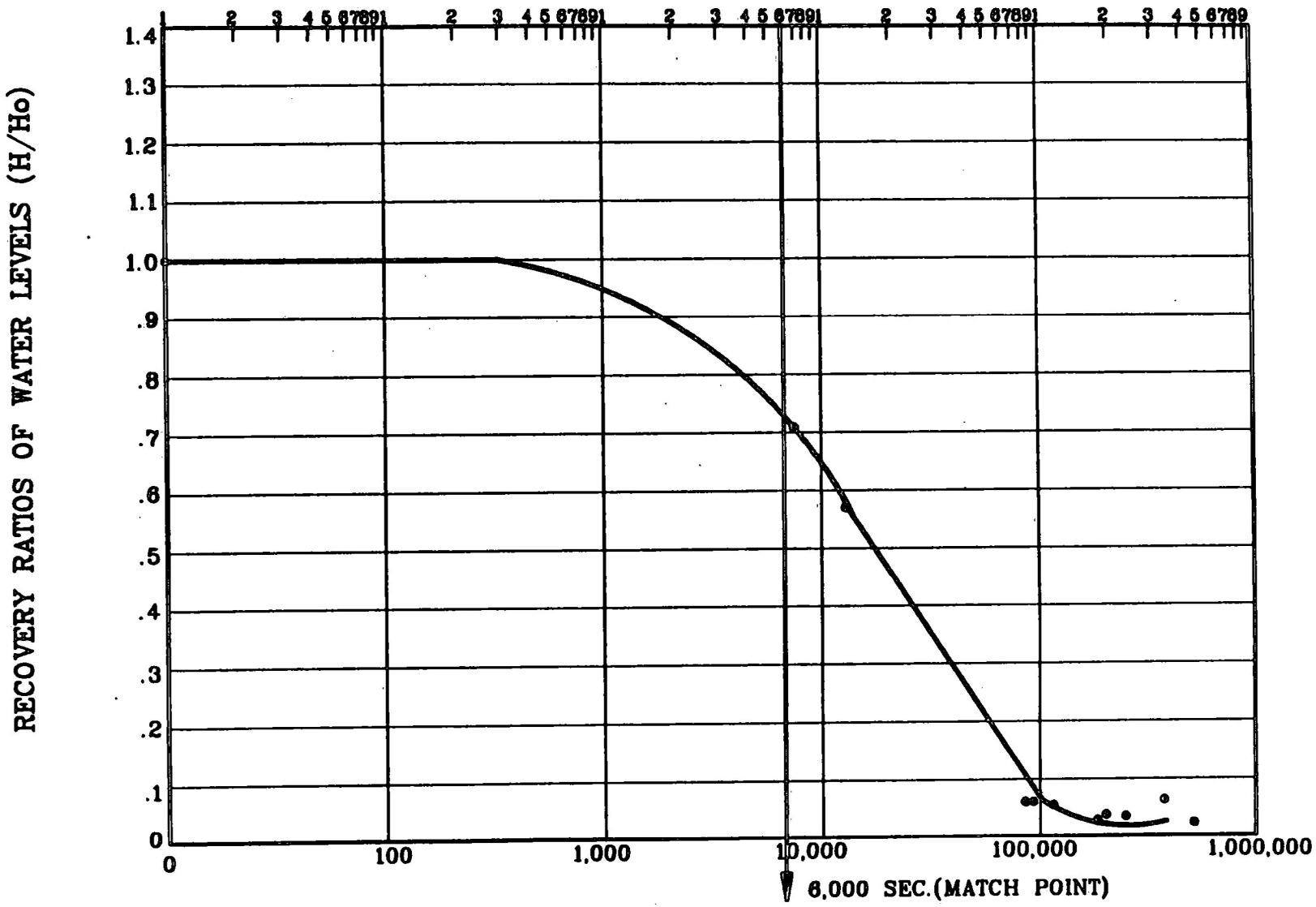
$$= \frac{1.8 \times 10^{-8}}{12} = 1.5 \times 10^{-9}\ ft/sec.$$

$$= 4.58 \times 10^{-8}\ cm/sec.$$



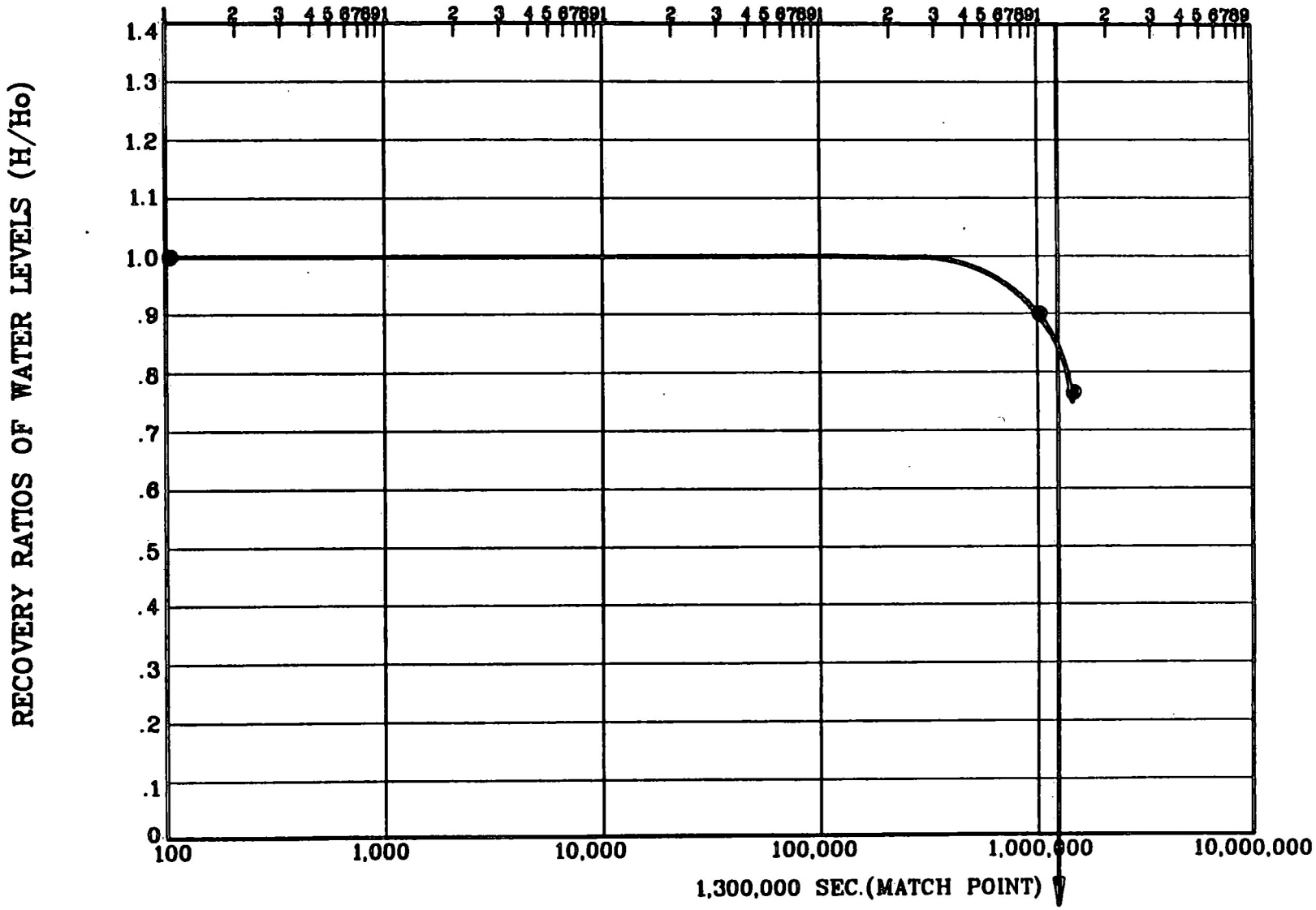
t=2,500 sec.
K=7.07 x 10^{-6} (cm/sec.)

MW-1A 10/87



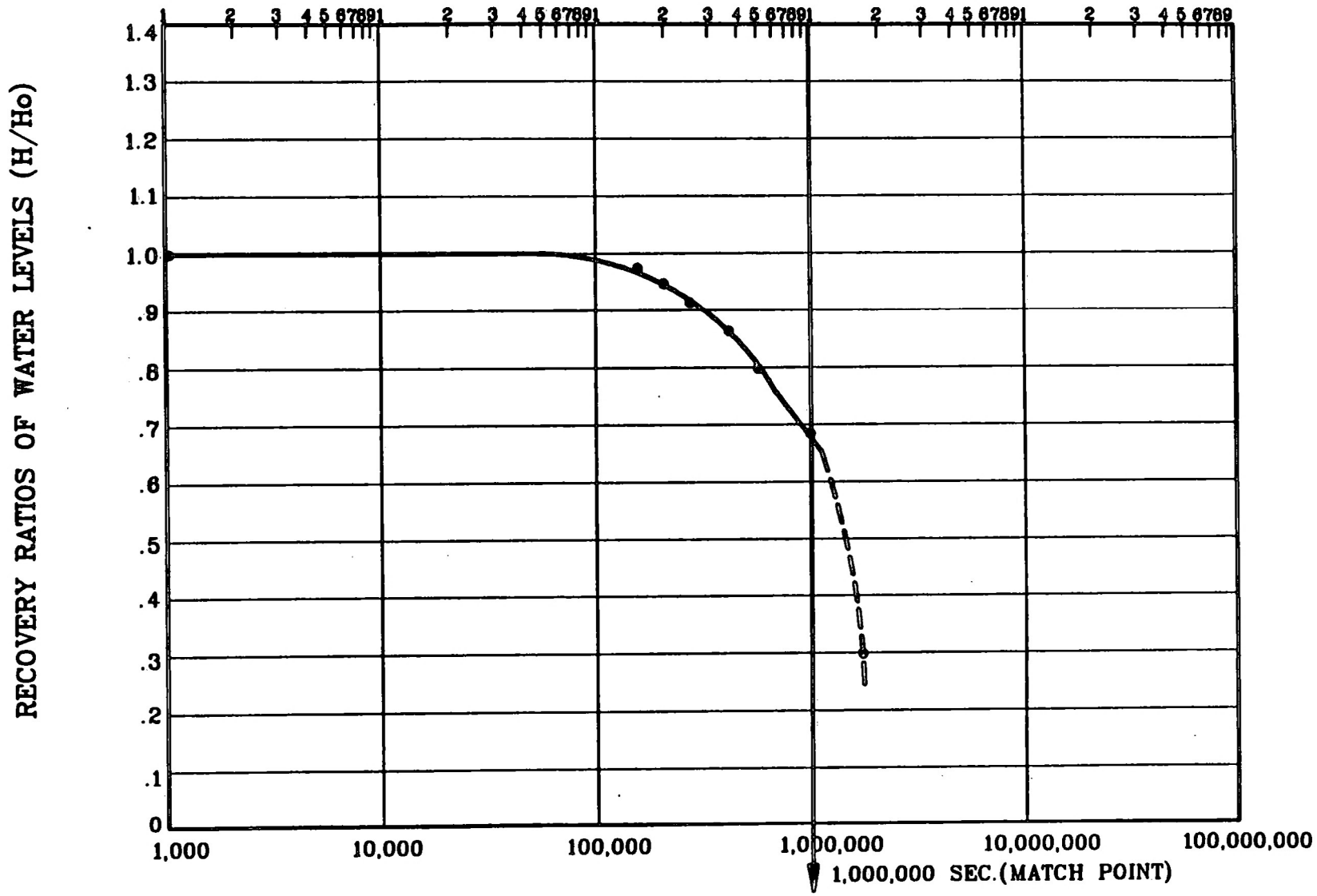
t=6,000 sec.
K=2.94 x 10^{-6} (cm/sec.)

MW-1A·1/88



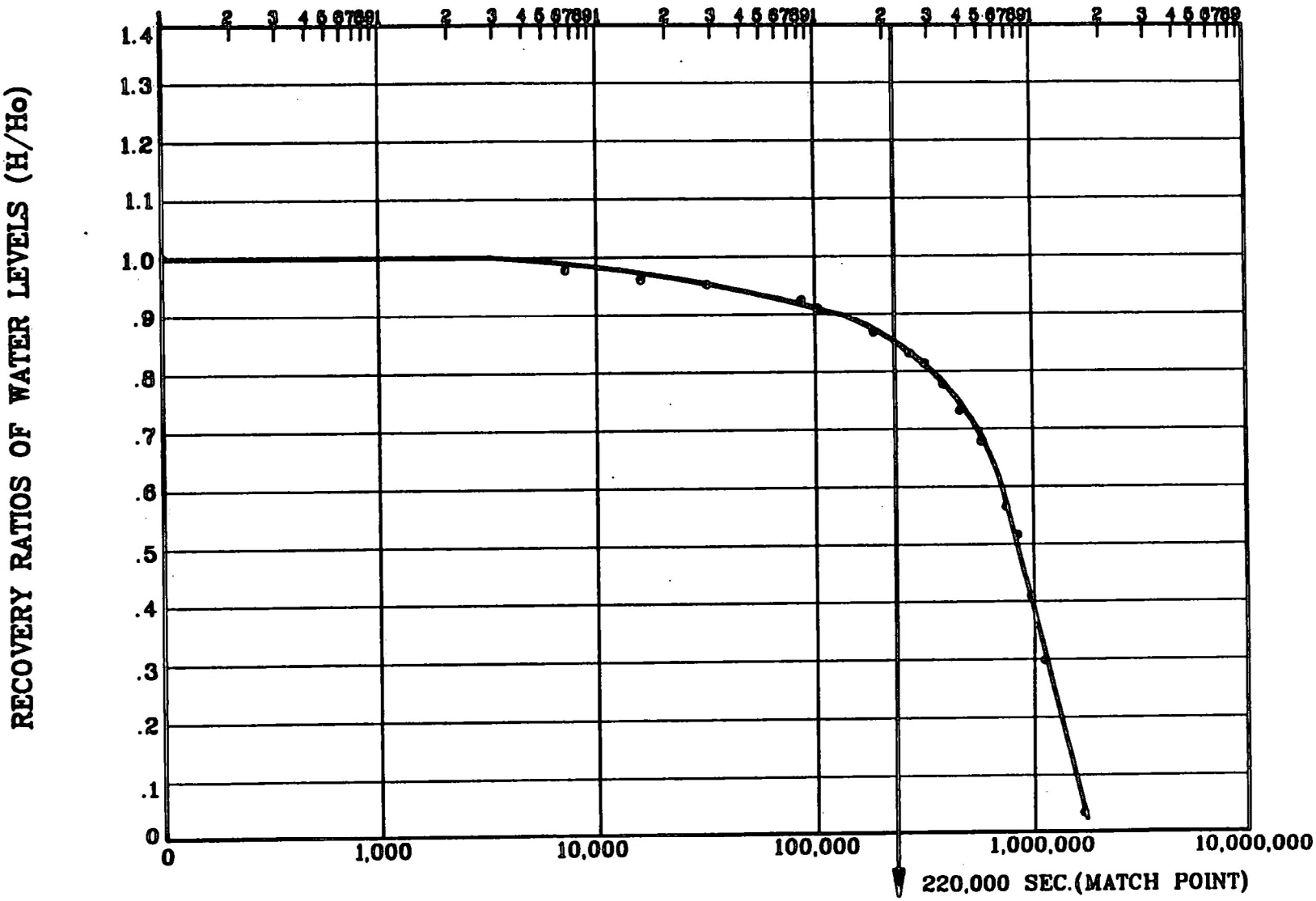
t=1,300,000 sec.
K=9.58 x 10^{-9} (cm/sec.)

MW-1B 10/87



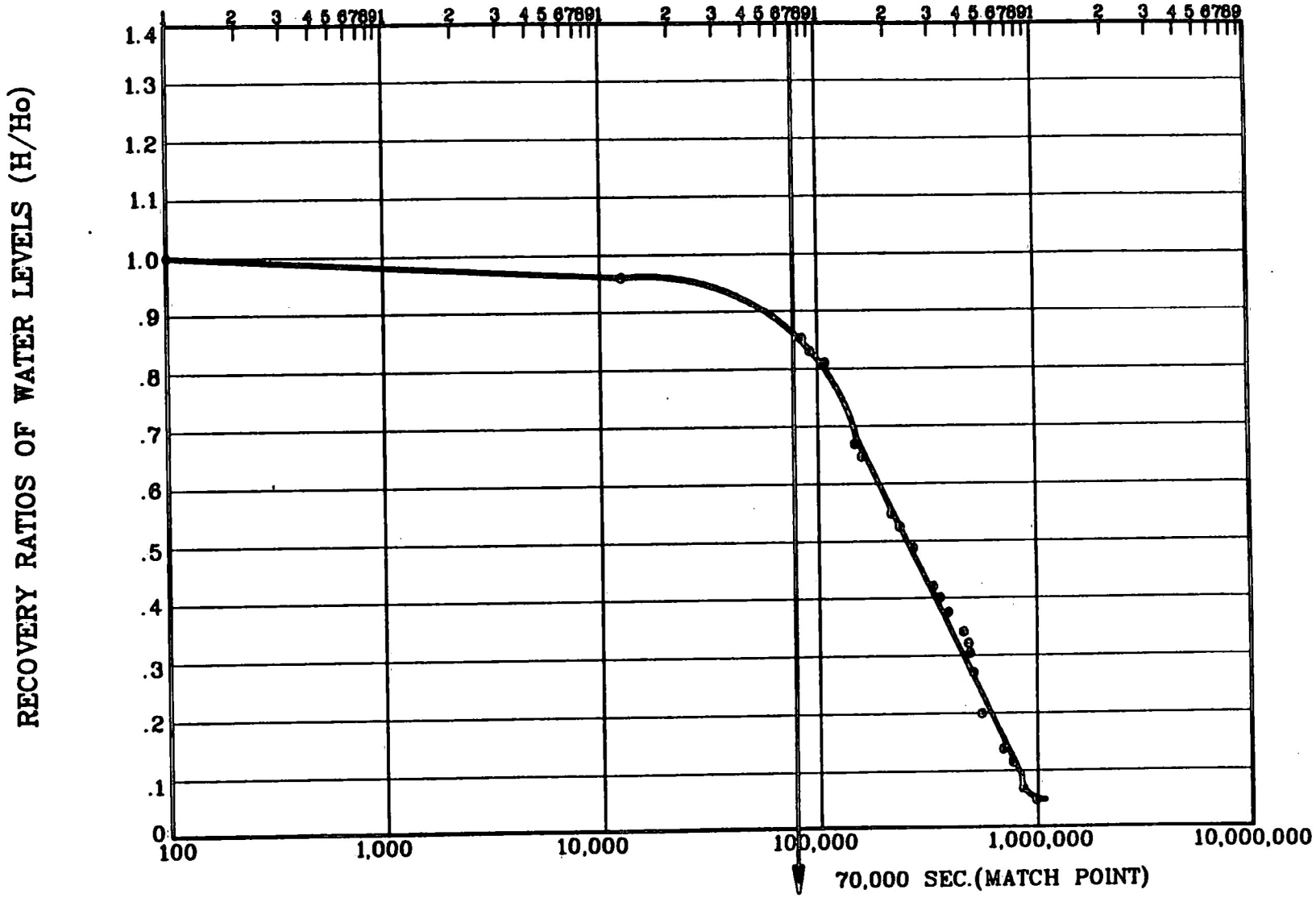
t=400,000 sec.
K=1.76 x 10^{-8} (cm/sec.)

MW 1-C 1/88



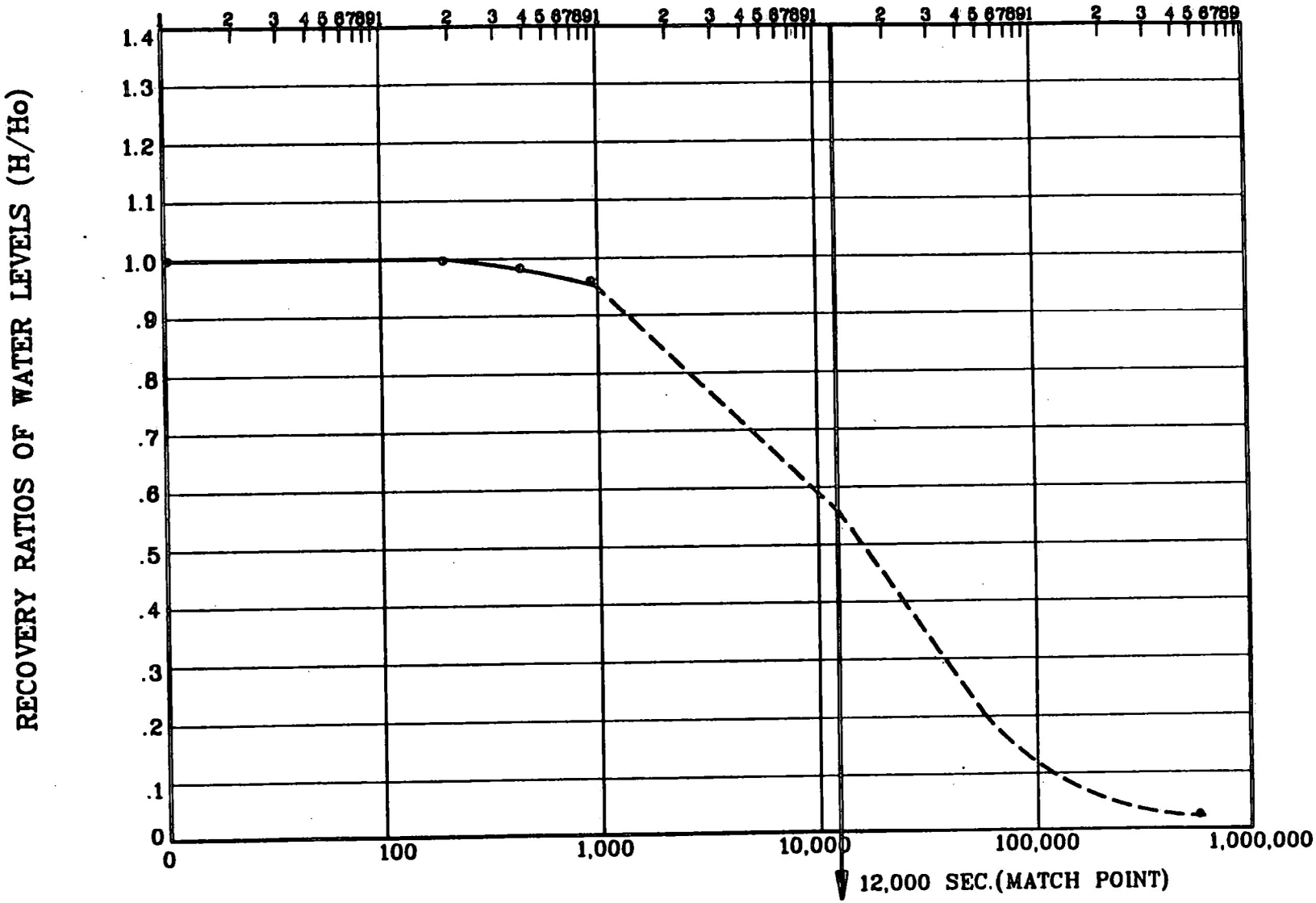
t=220,000 sec.
K=8.02 x 10^{-8} (cm/sec.)

MW 1-D. 1/88



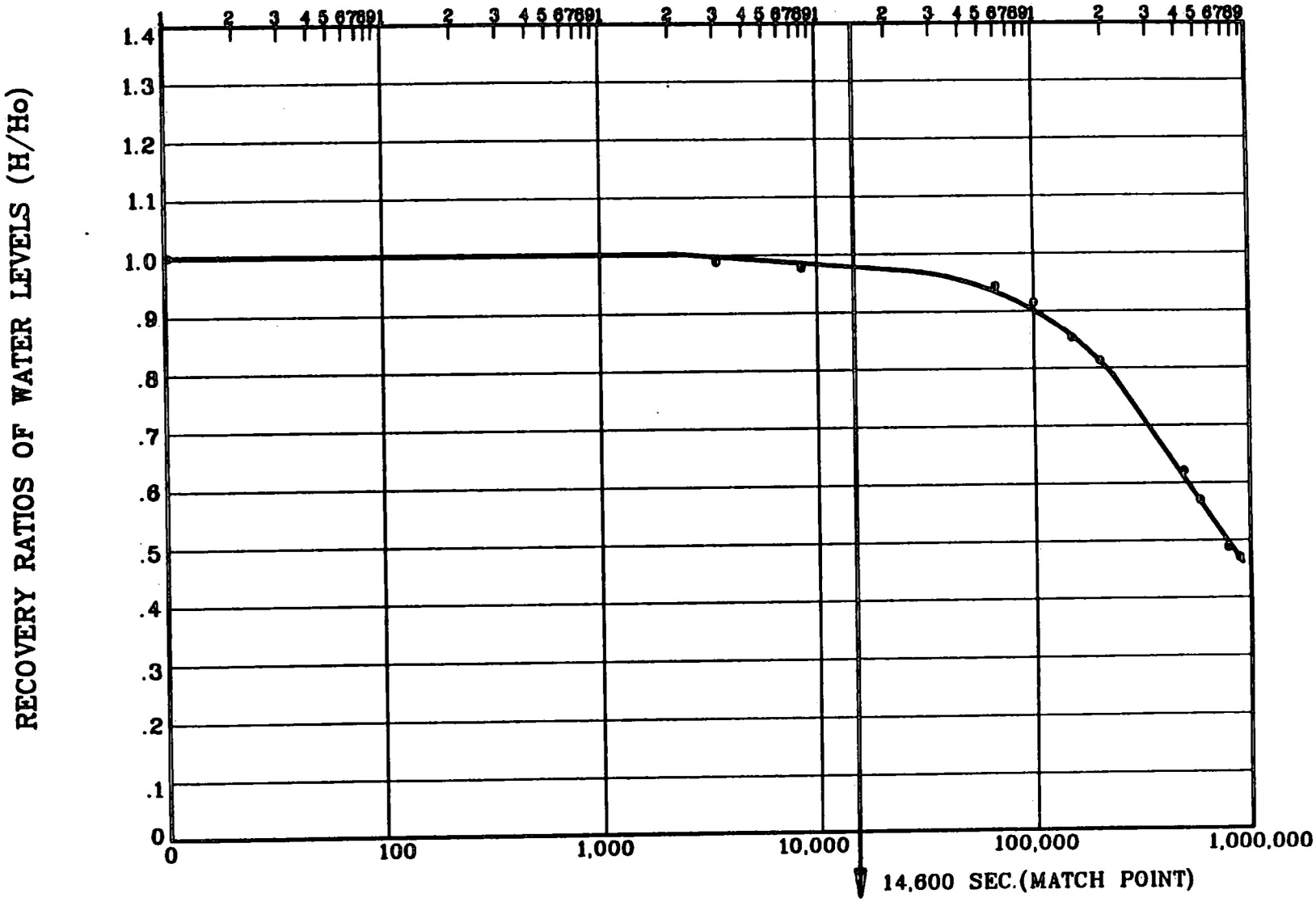
t=70,000 sec.
K=2.52 x 10^{-7} (cm/sec.)

MW-2B·1/88



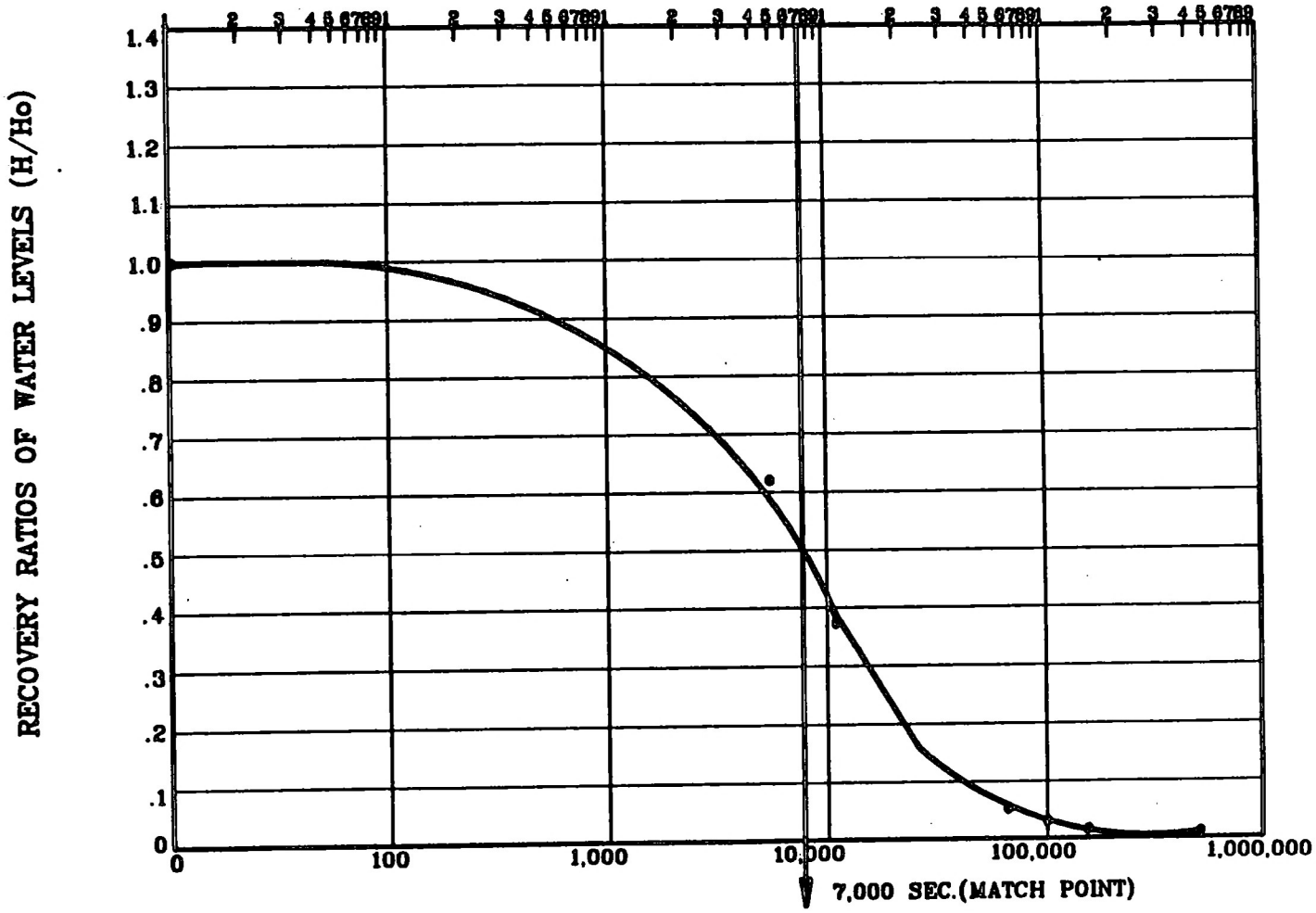
t=12,000 sec.
K=1.04 x 10^{-6} (cm/sec.)

MW-3A 10/87



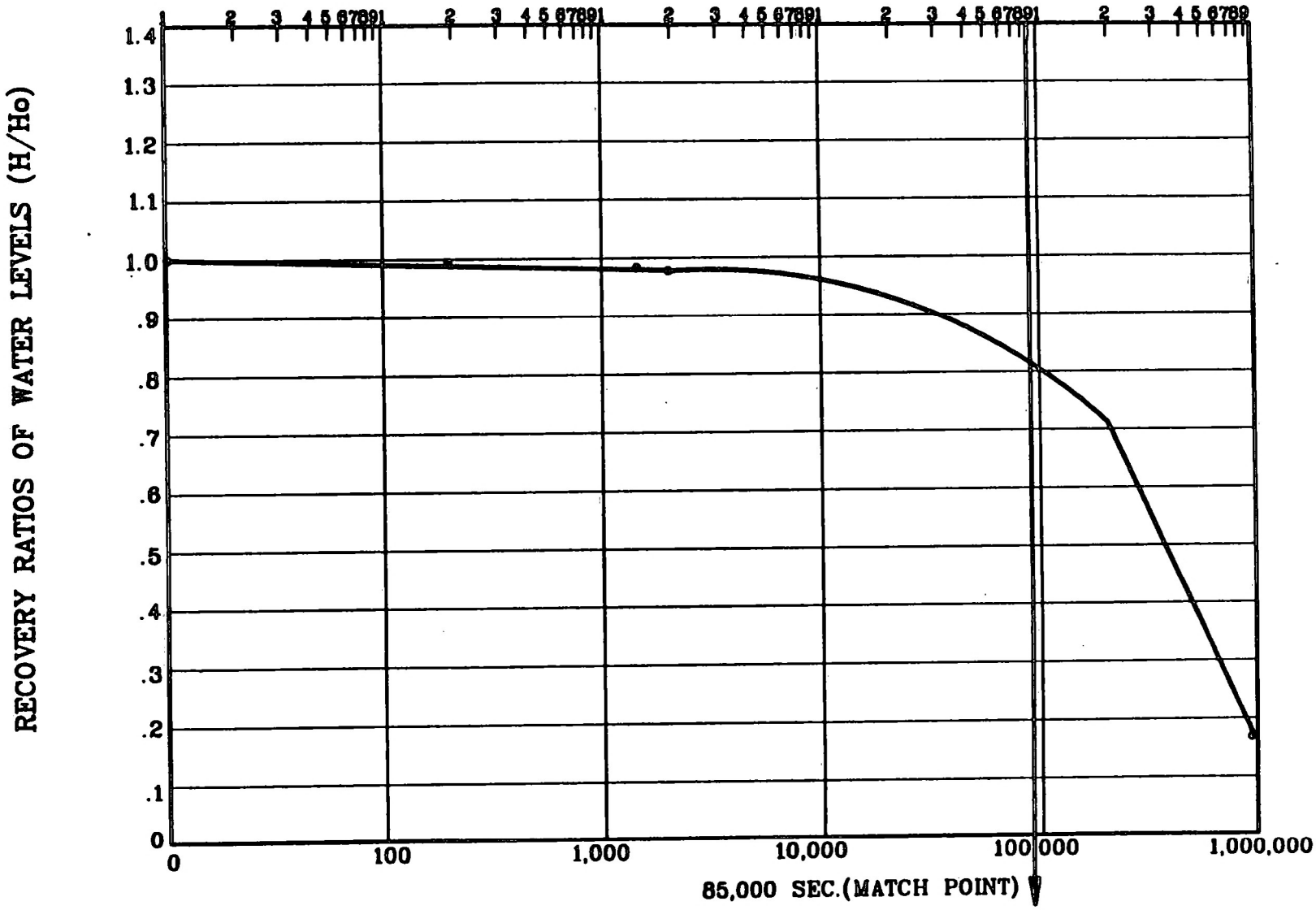
t=14,600 sec.
K=8.4 x 10 $^{-7}$(cm/sec.)

MW-3A 6/87



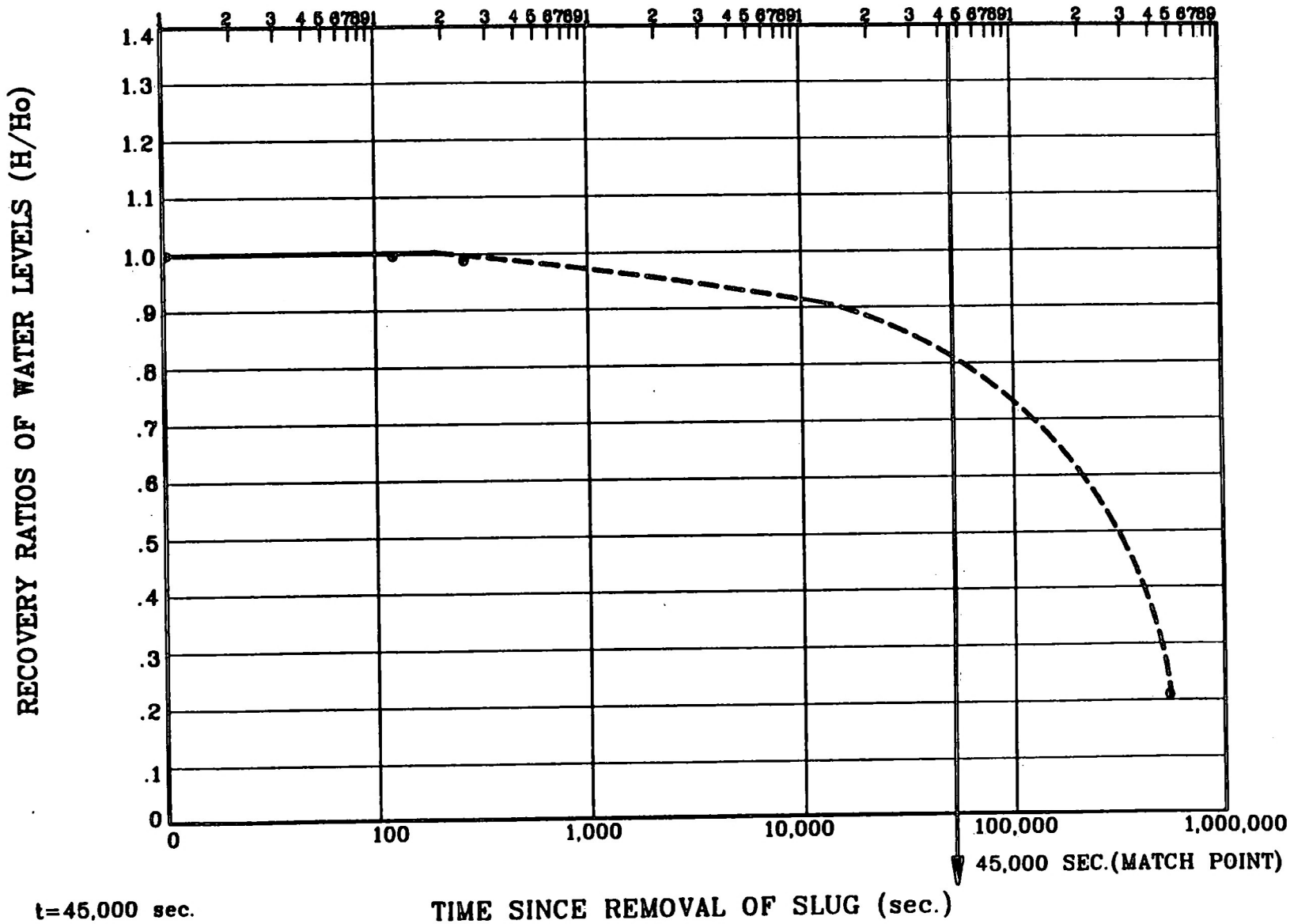
t=7,000 sec.
K=1.78 x 10^{-6} (cm/sec.)

MW-3B 6/87



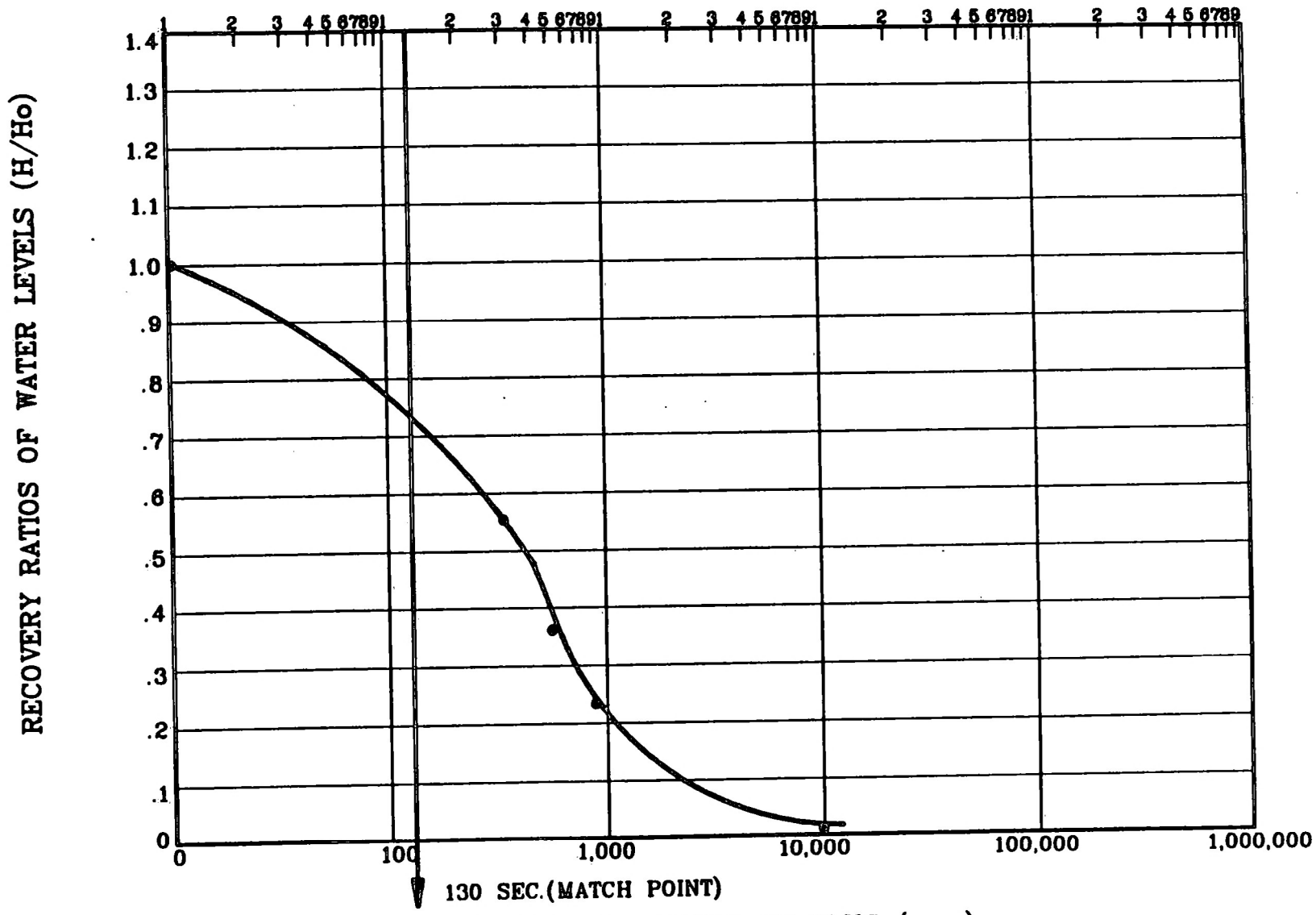
t=85,000 sec.
K=1.47 x 10^{-7} (cm/sec.)

MW-3B ·10/87



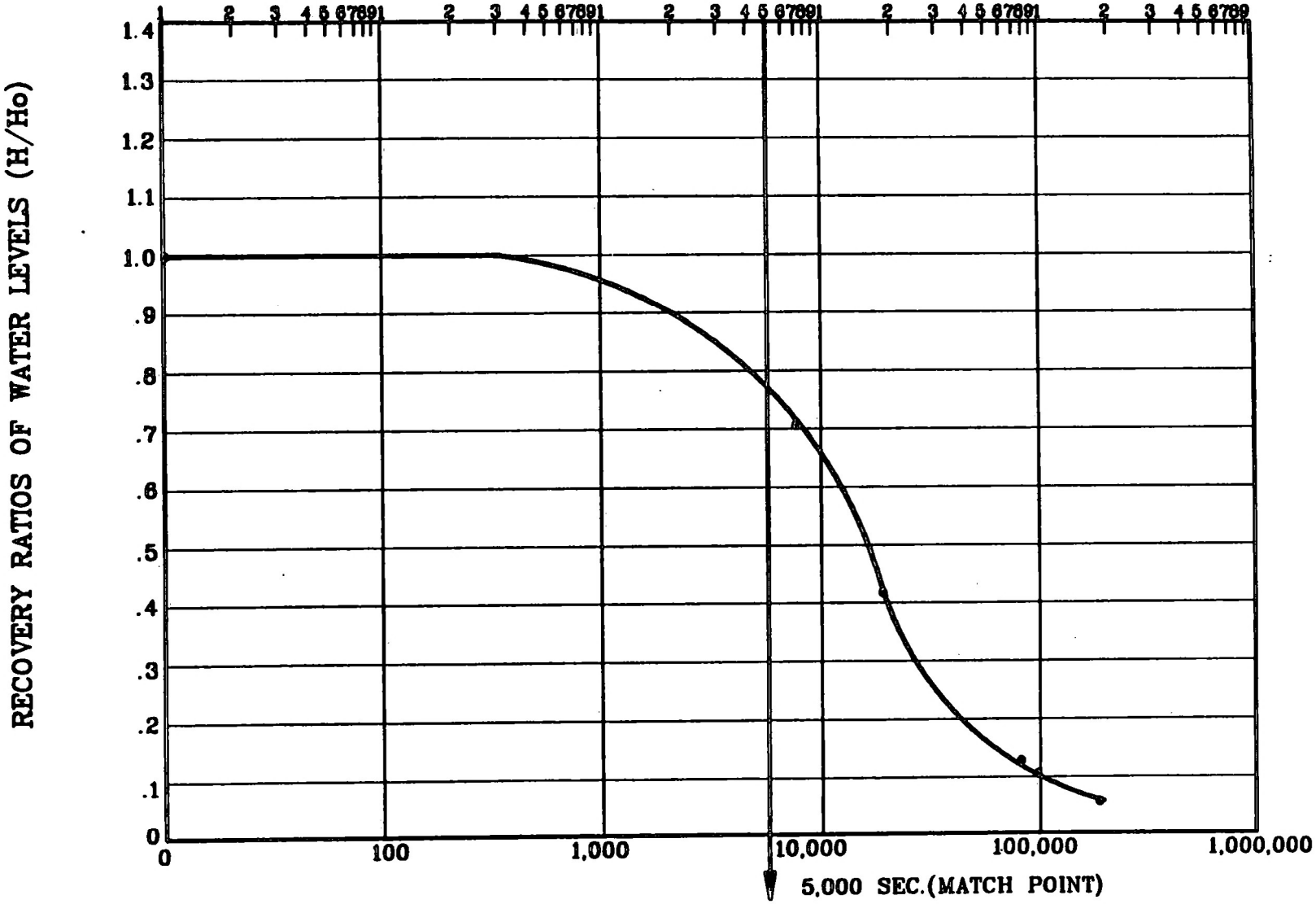
t=45,000 sec.
K=2.76 x 10^{-7} (cm/sec.)

MW-3C 10/87



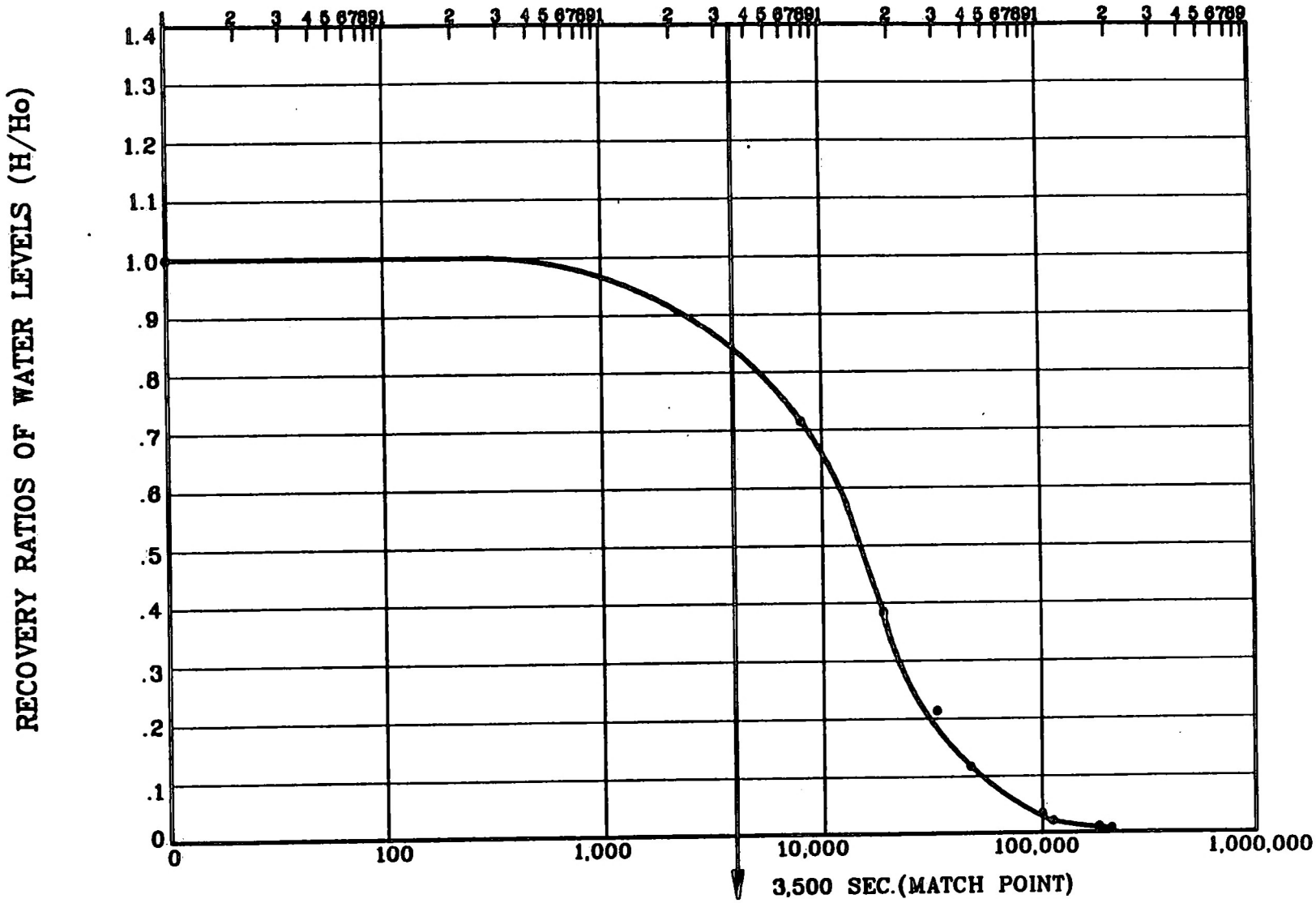
t=130 sec.
K=9.58 x 10^{-5} (cm/sec.)

MW-4A.10/87



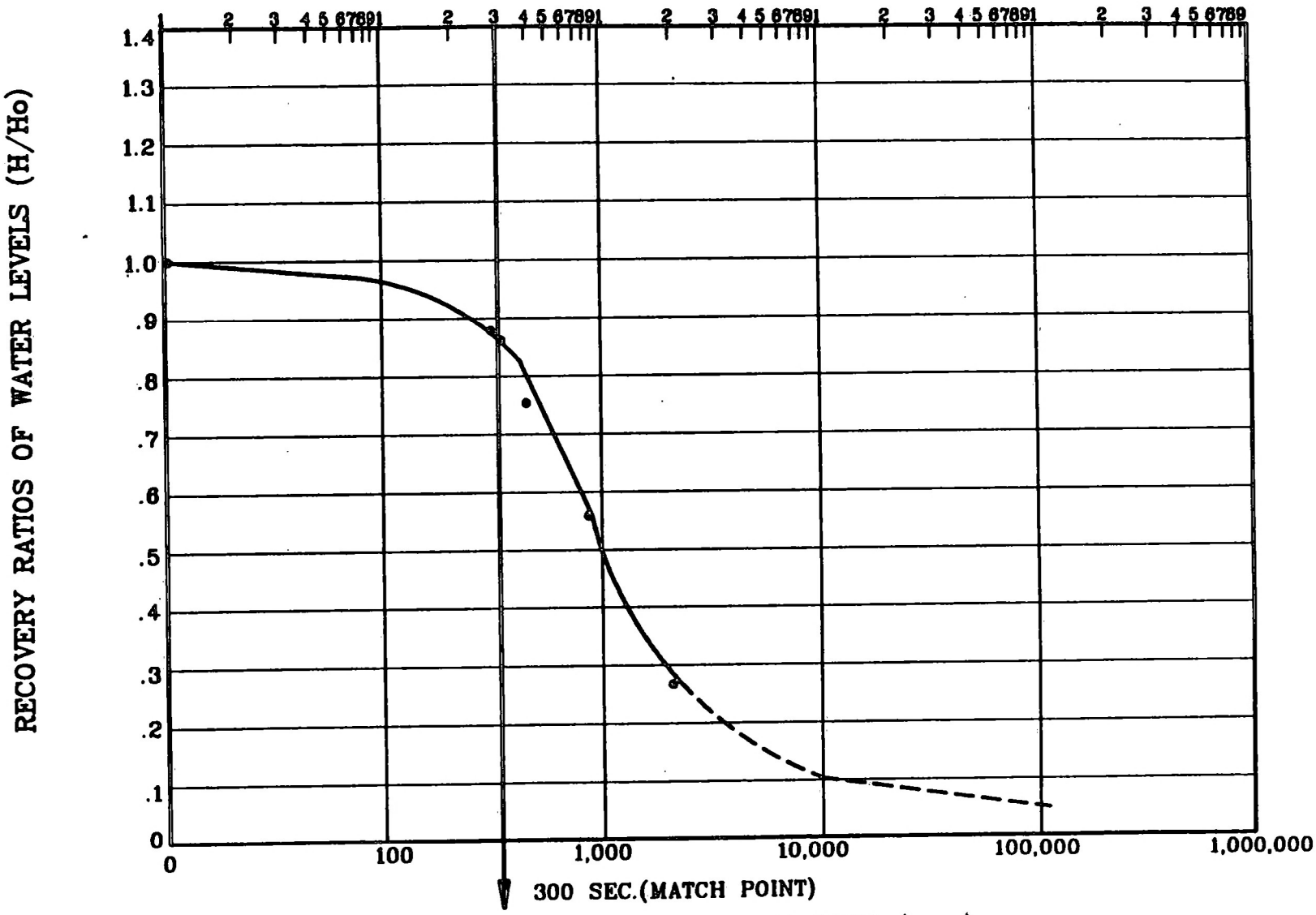
t=5,000 sec.
K=2.49 x 10^{-6} (cm/sec.)

MW-4A 1/88



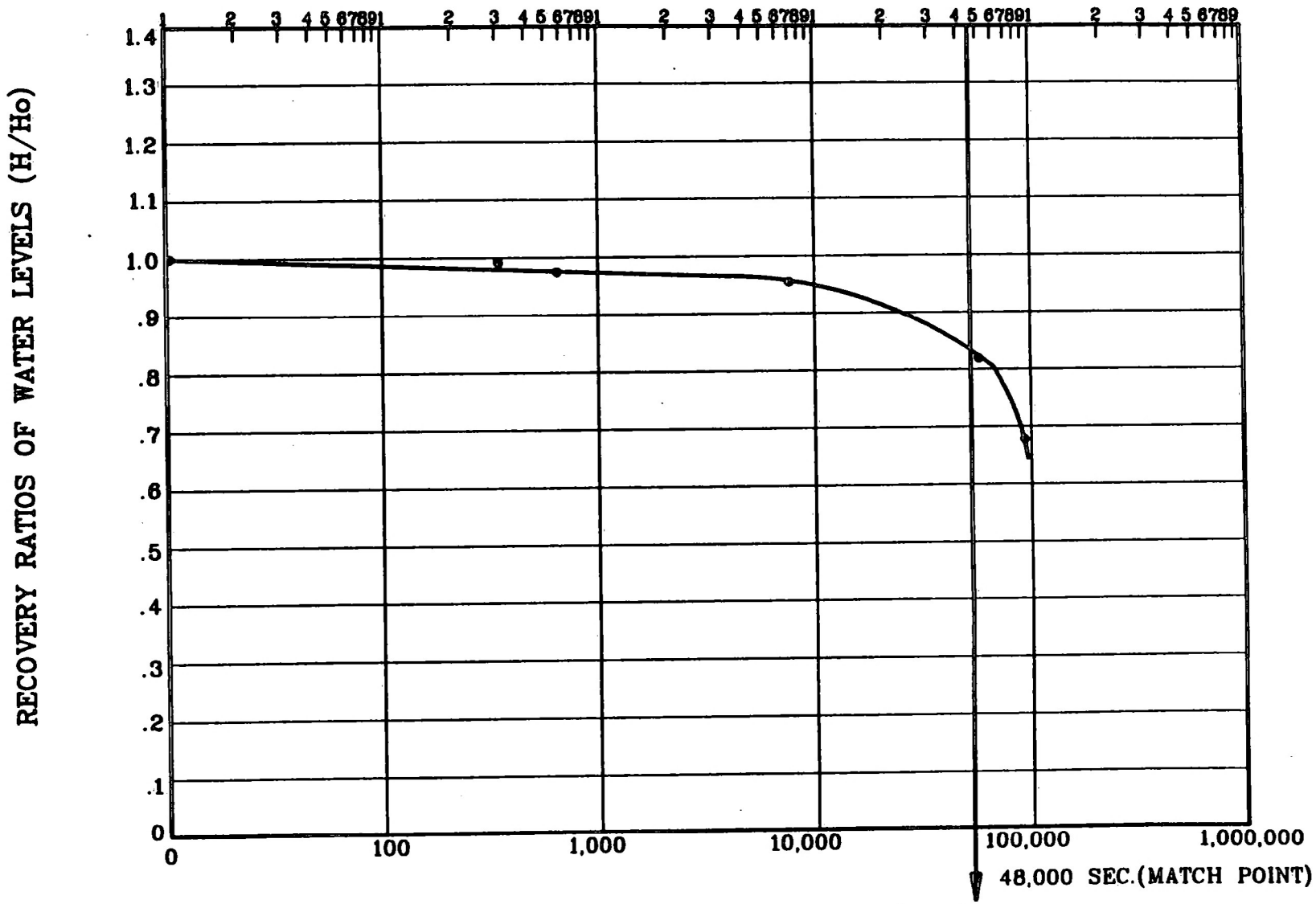
t=3,500 sec.
K=5.02 x 10^{-6} (cm/sec.)

MW-5A. 1/88



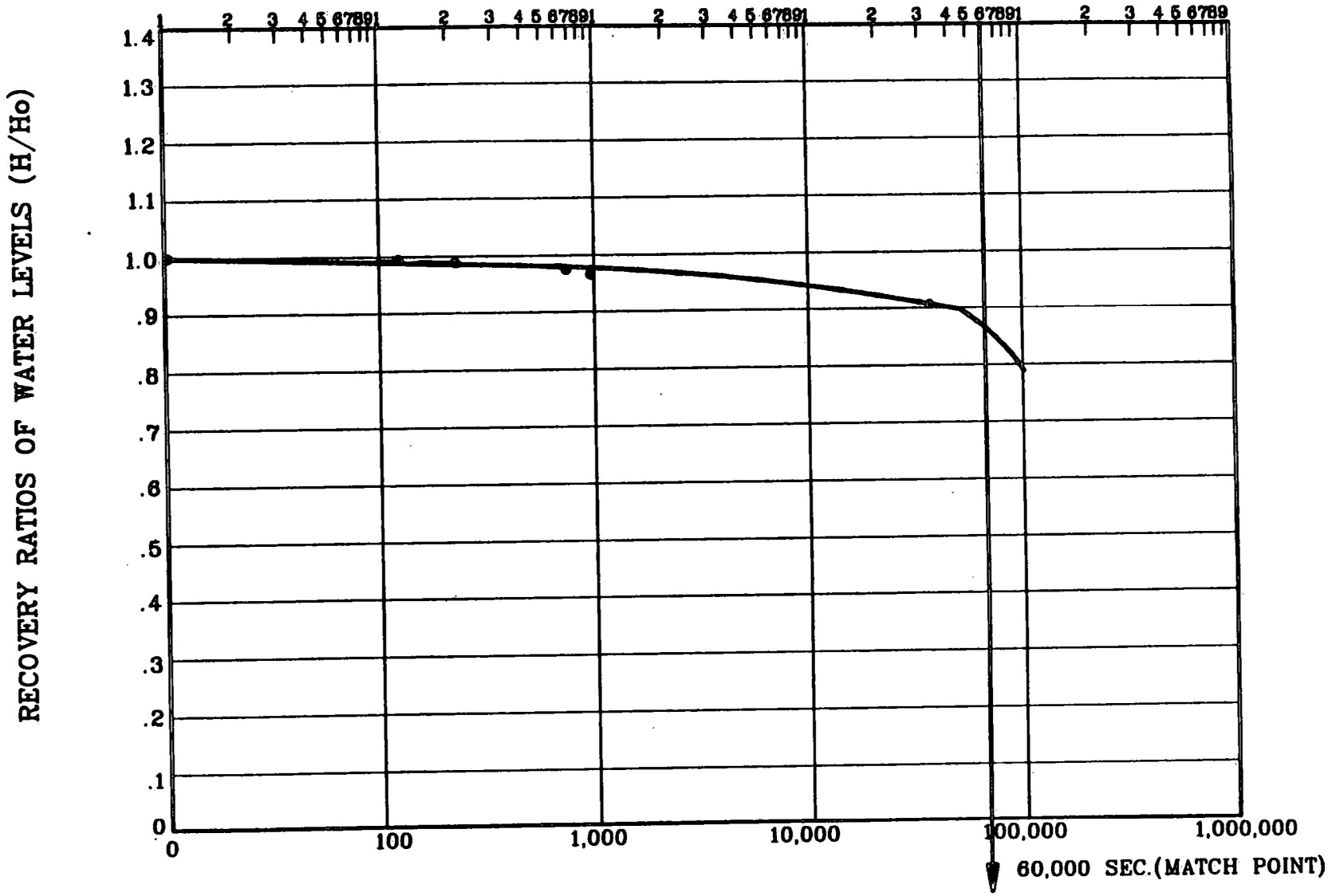
t=300 sec.
K=5.88 x 10^{-5} (cm/sec.)

MW-6A·10/87



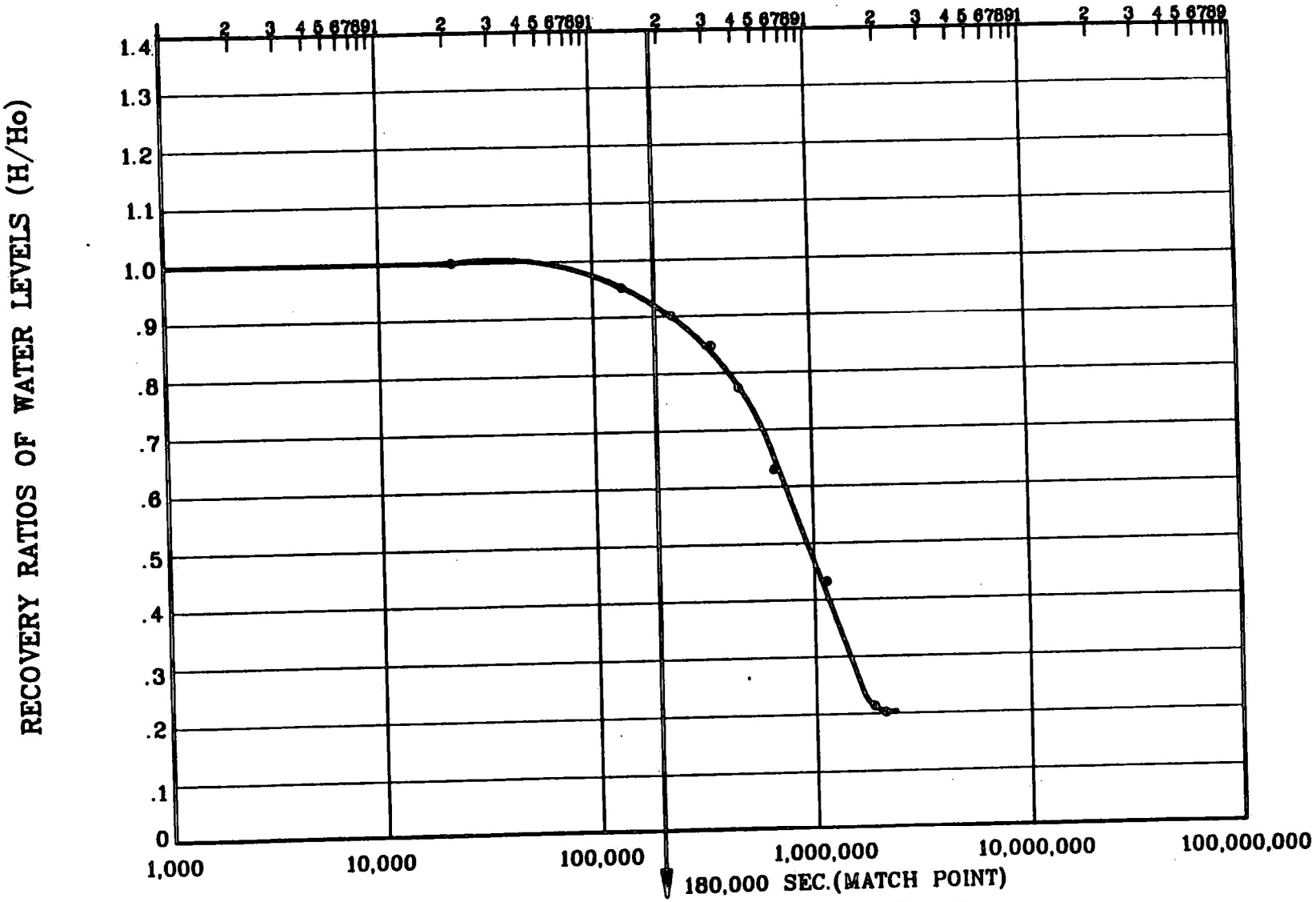
t=48,000 sec.
K=3.67 x 10^{-7} (cm/sec.)

MW-6B 10/87



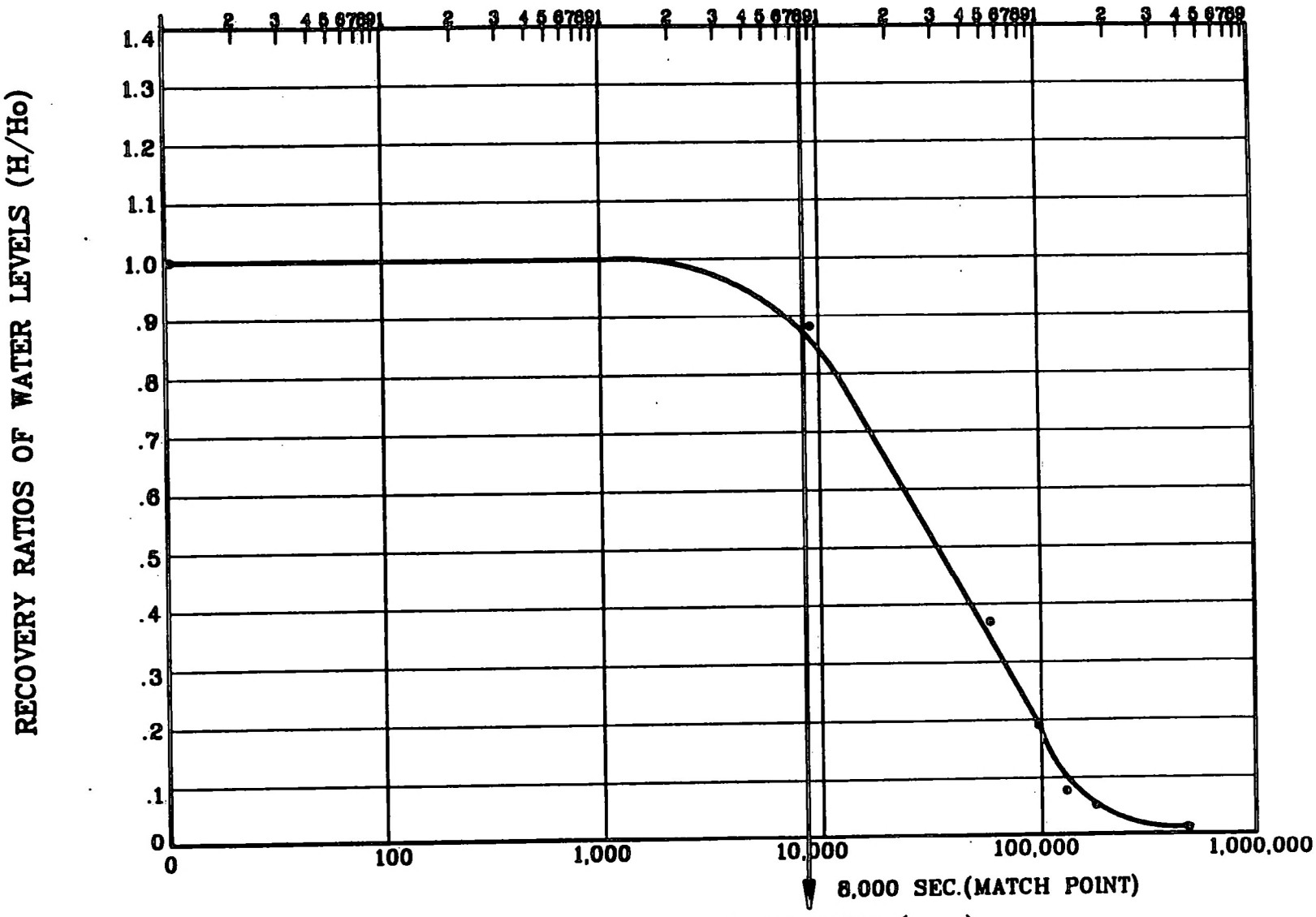
t=60,000 sec.
K=2.08 x 10^{-7} (cm/sec.)

MW-8A ·10/87



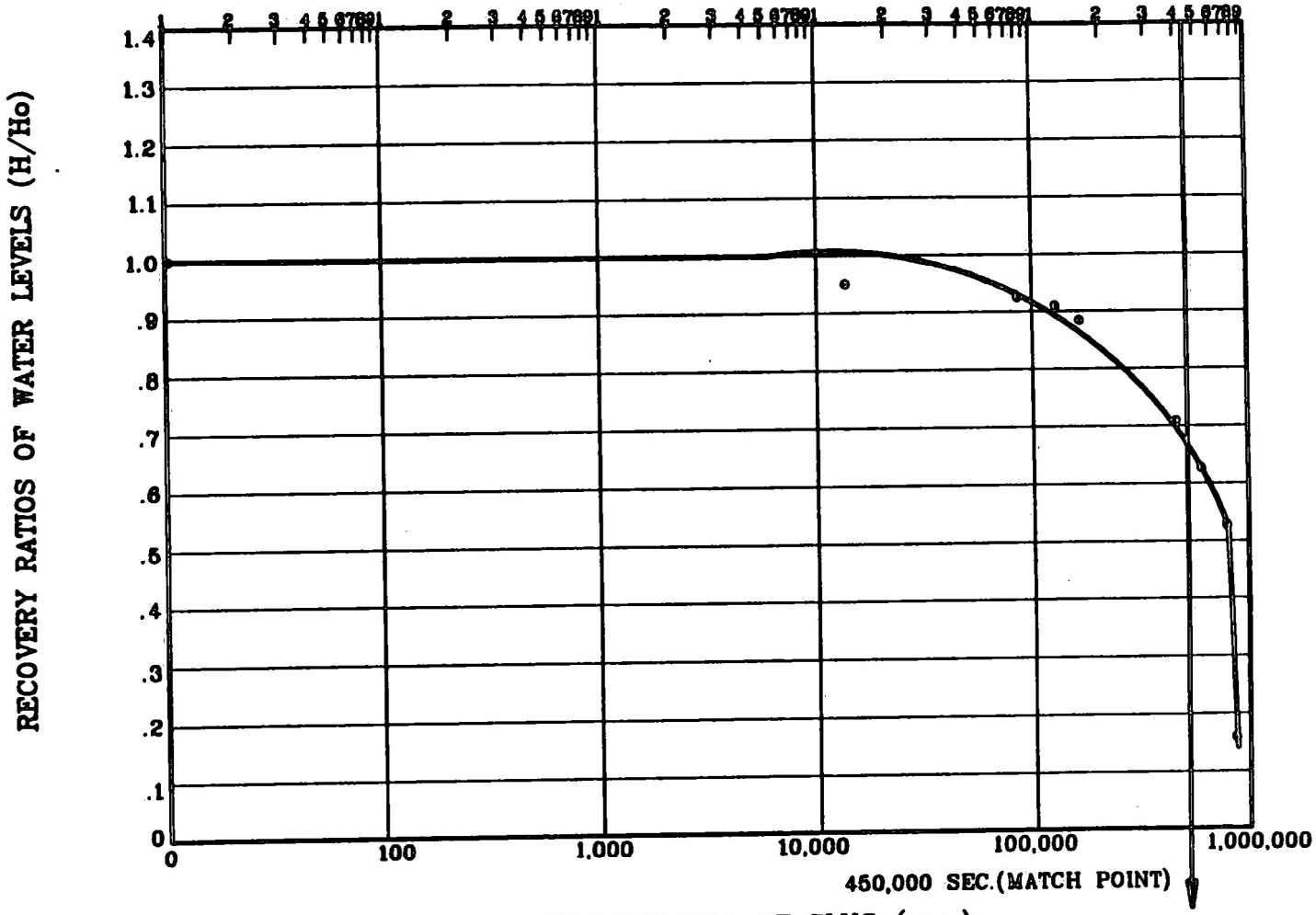
t=180,000 sec.
K=9.7 x 10^{-8}(cm/sec.)

MW-8A·1/88



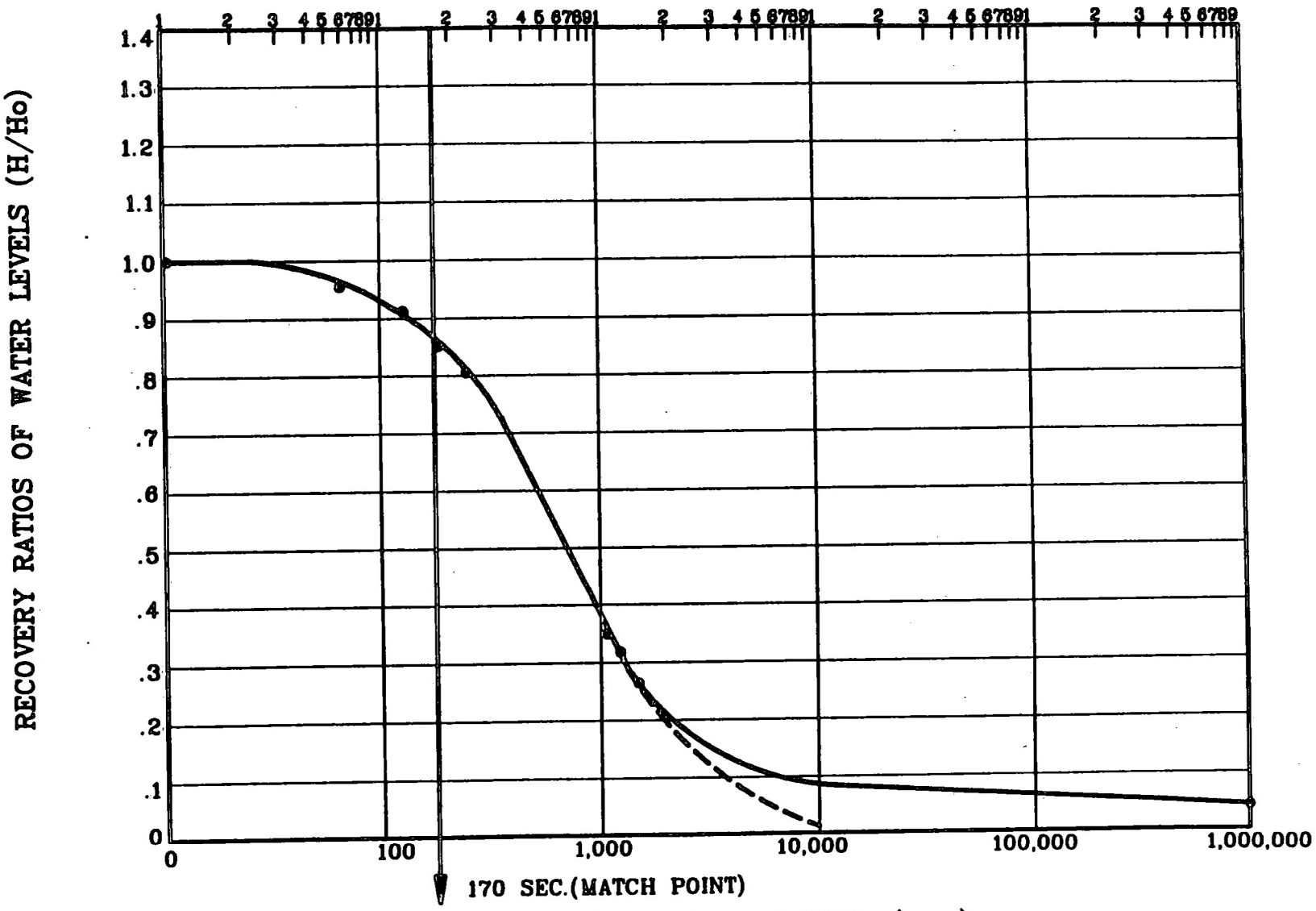
t=8,000 sec.
K=1.2 x 10^{-6} (cm/sec.)

MW-9·6/87



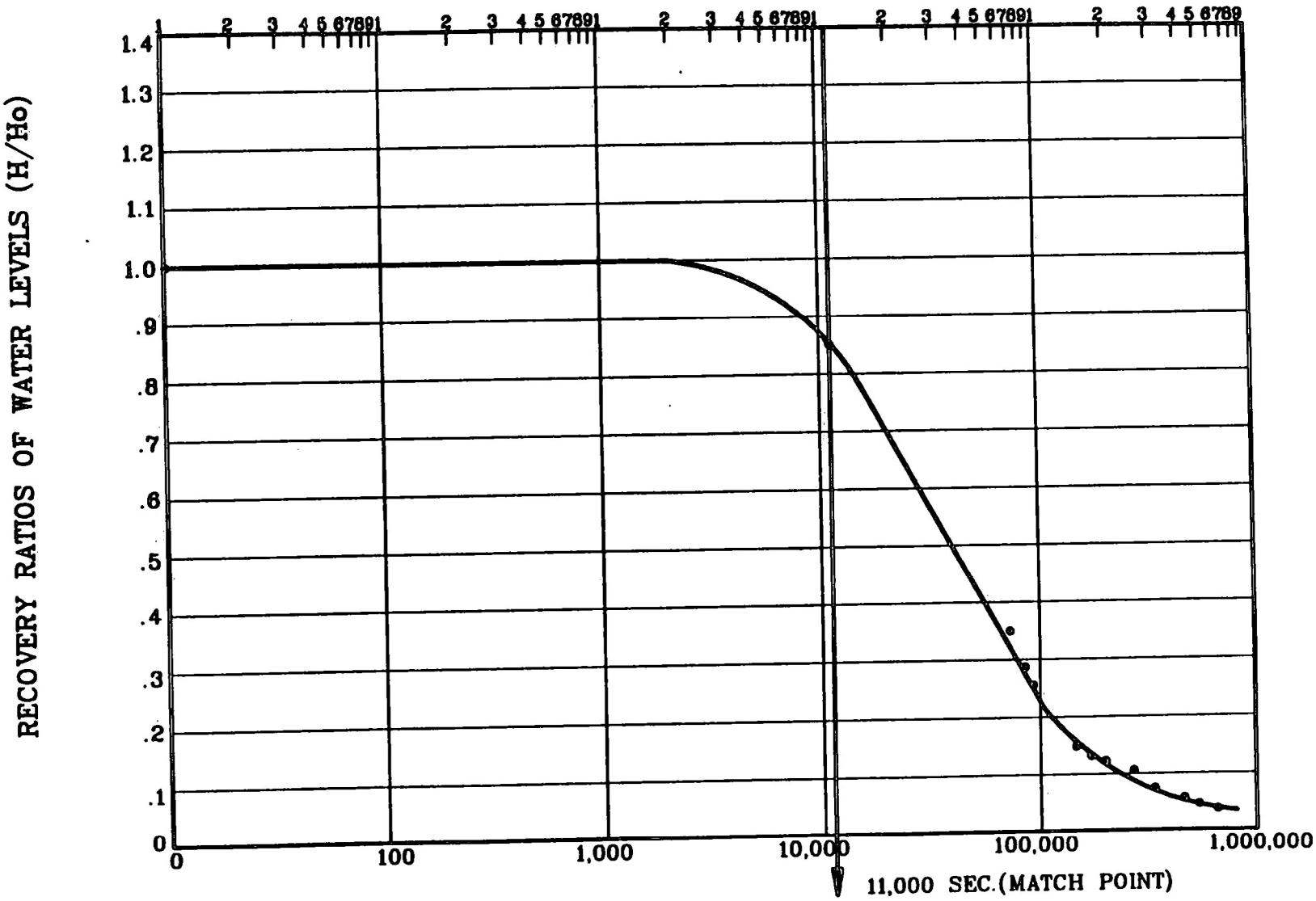
t=450,000 sec.
K=1.74 x 10^{-6} (cm/sec.)

MW-10 6/87



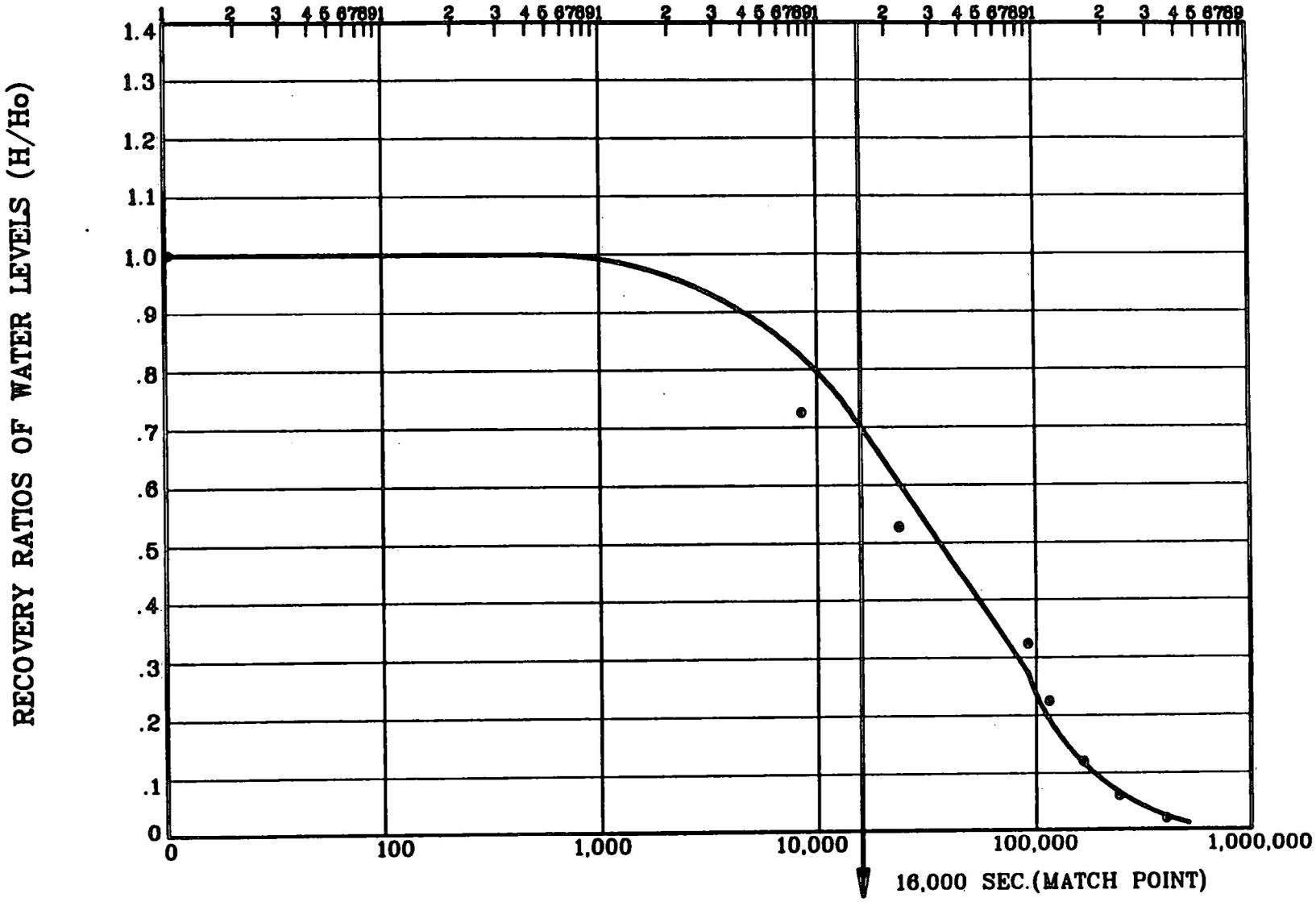
t=170 sec.
K=7.32 x 10^{-5} (cm/sec.)

MW-10A.10/87



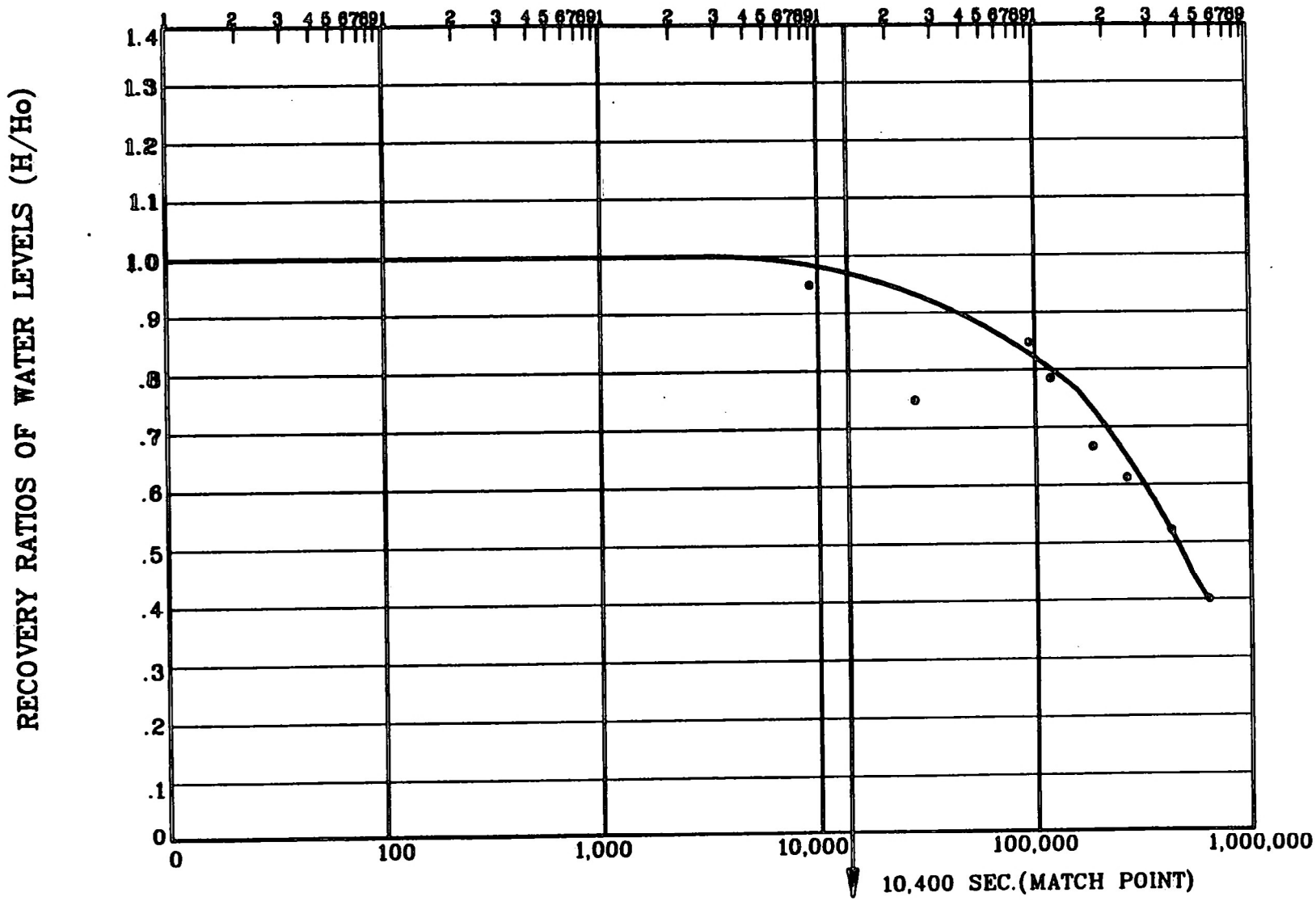
t=11,000 sec.
K=8.71 x 10^{-7} (cm/sec.)

MW-18 ·1/88



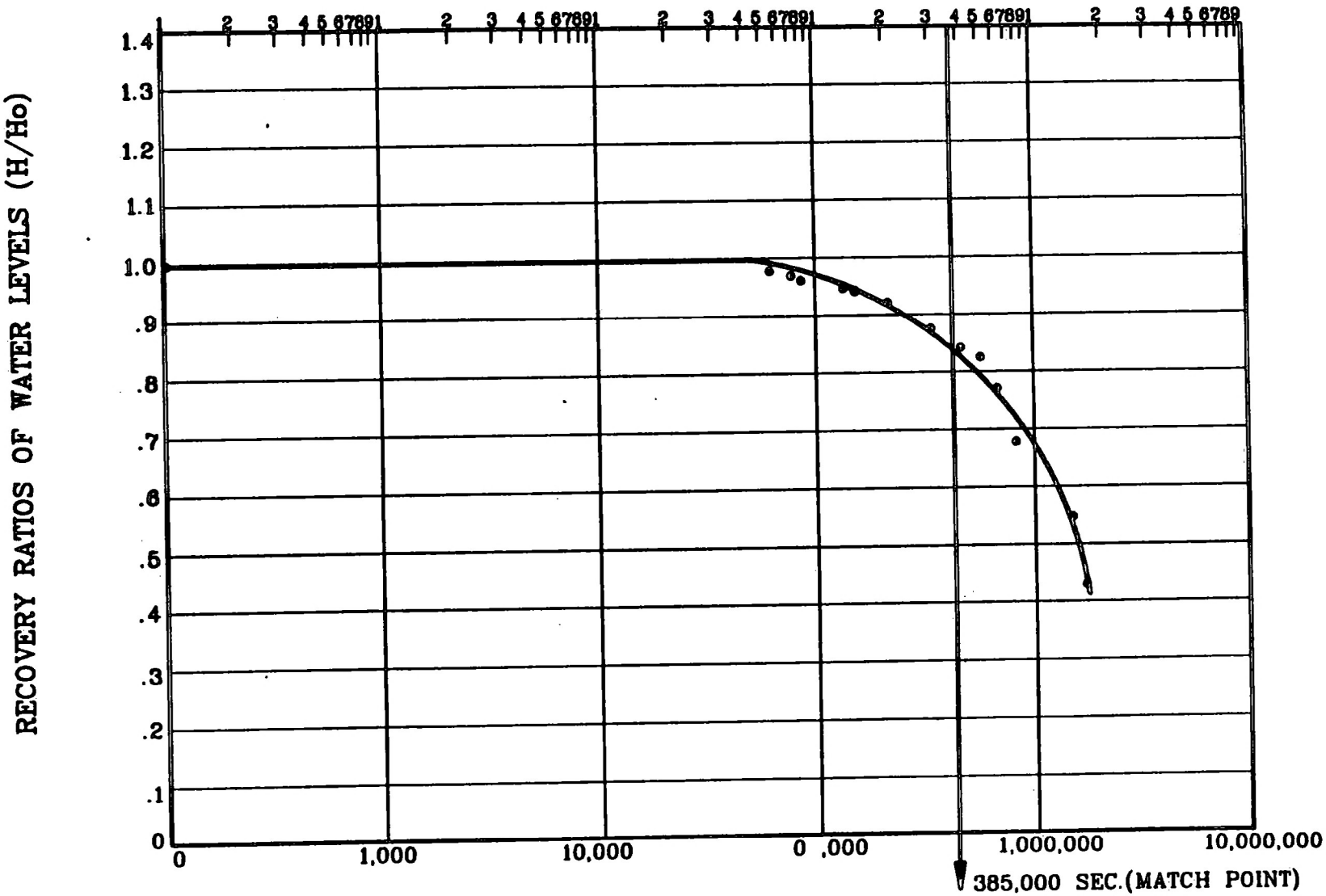
t=16,000 sec.
K=6.05 x 10^{-7} (cm/sec.)

MW-19 · 6/87



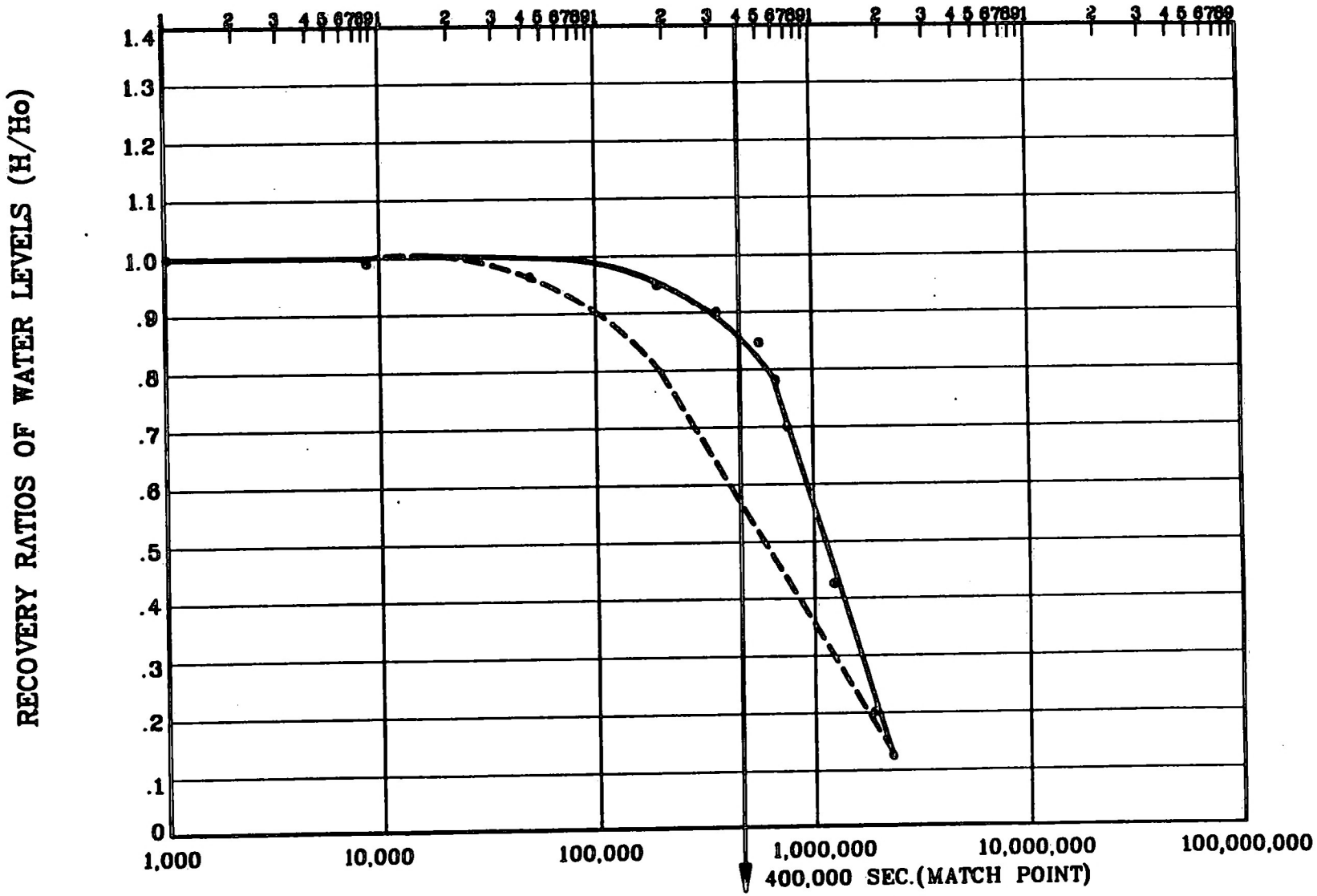
t=10,400 sec.
K=3.04 x 10^{-8} (cm/sec.)

MW-20· 6/87



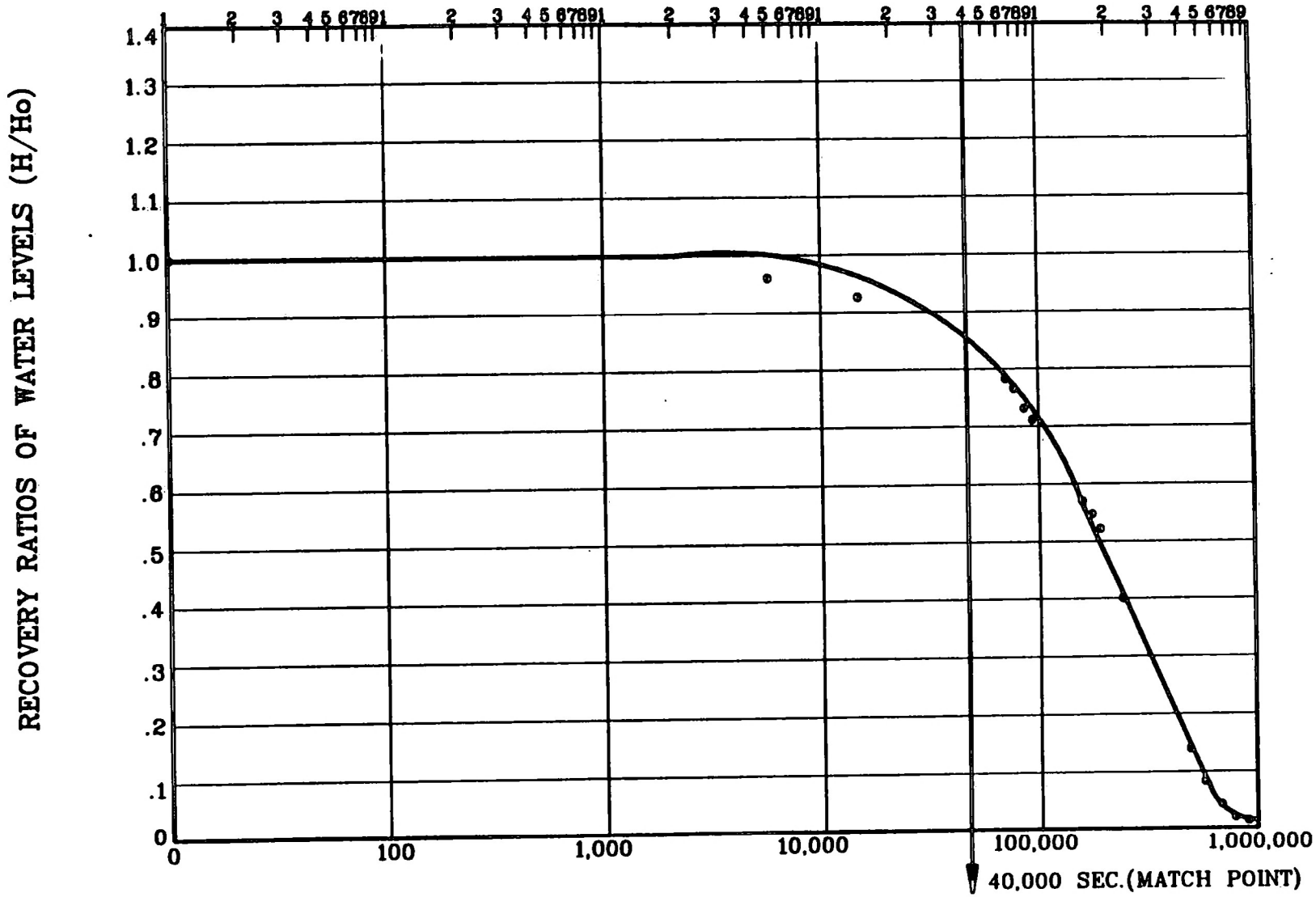
t=385,000 sec
K=4.58 x 10^{-8} (cm/sec.)

MW 20 1/88



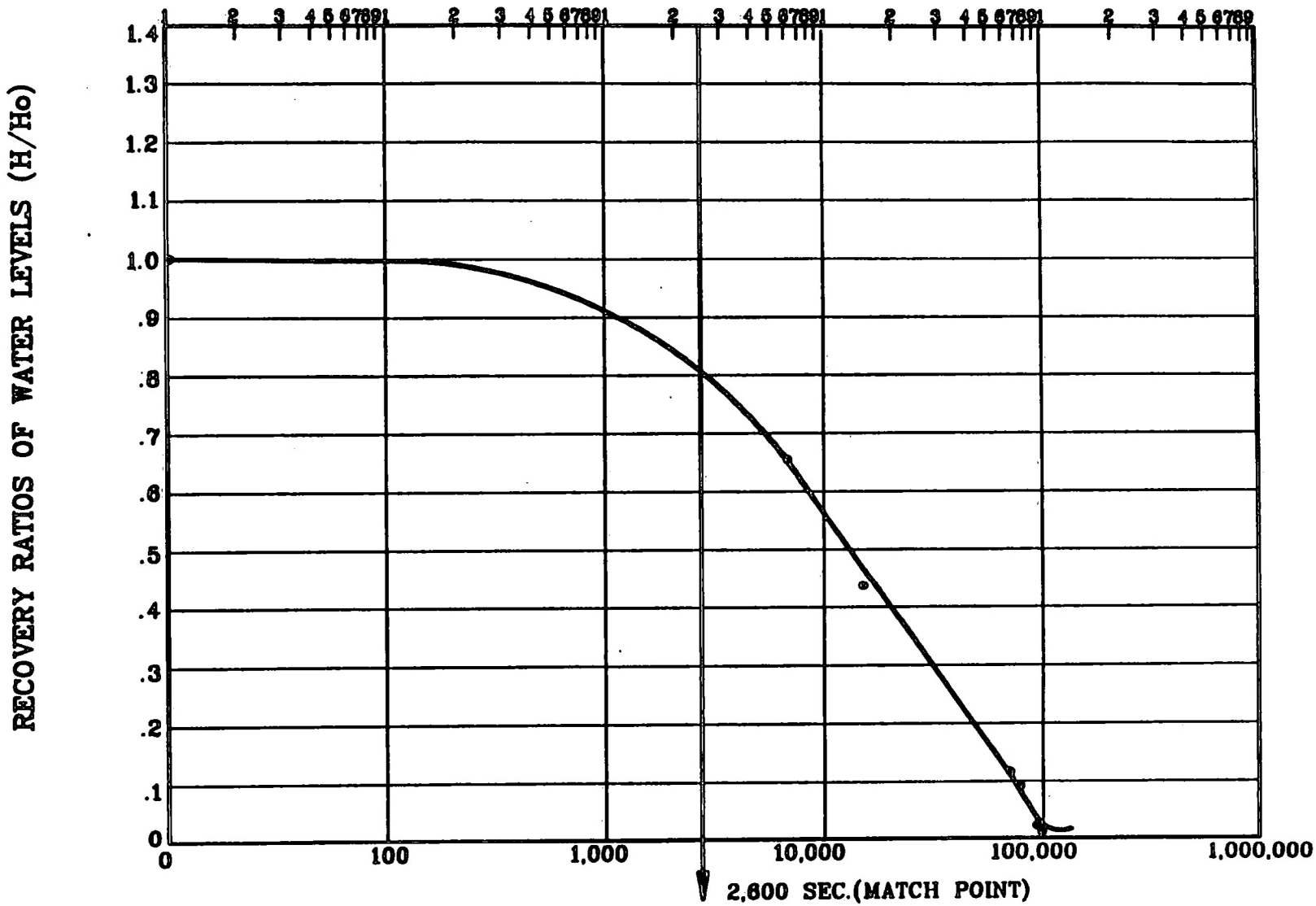
t=400, 00 sec.
K=1.24 x 10^{-7} (cm/sec.)

MW CH-A 1/88



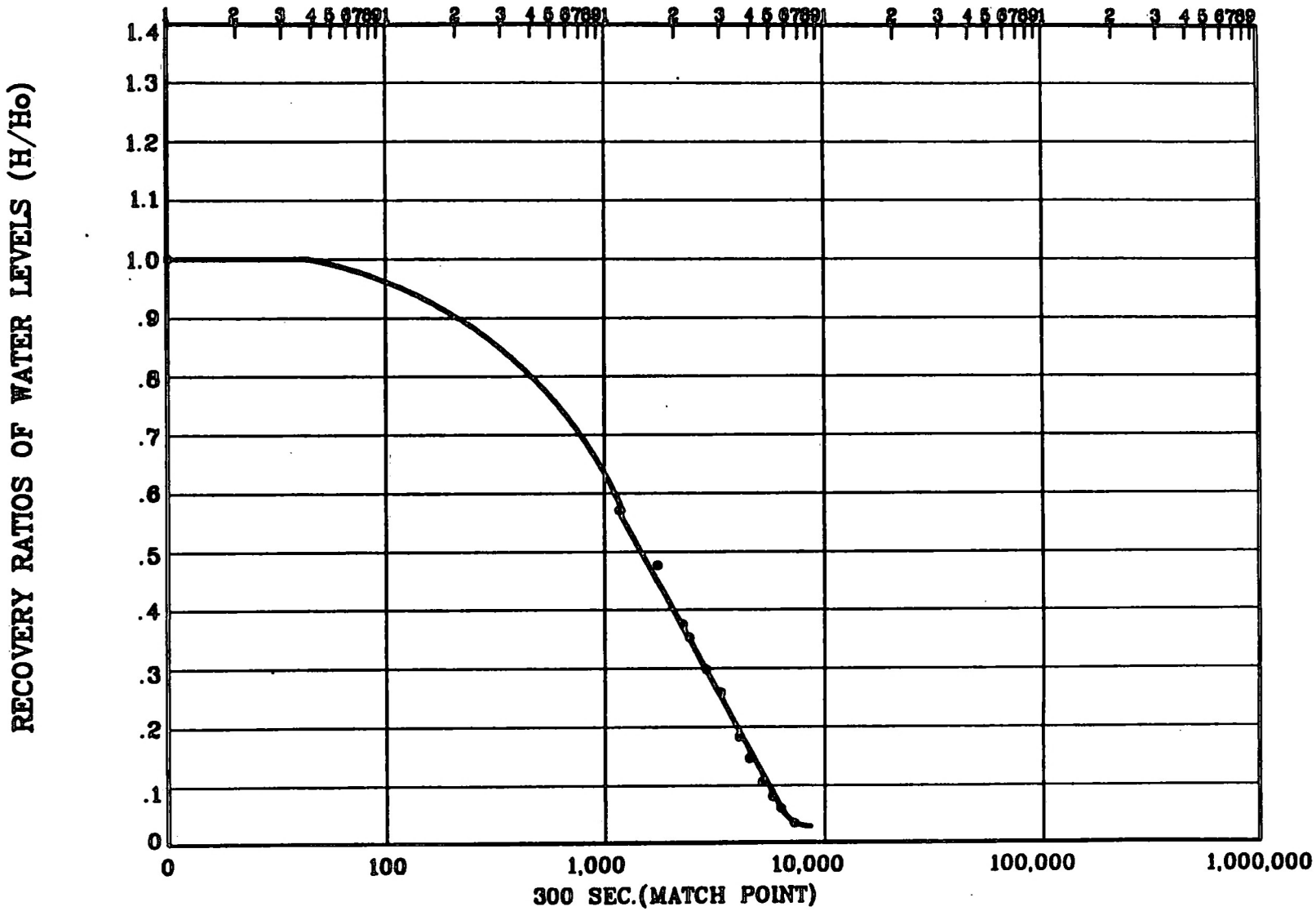
t=40,000 sec.
K=1.76 x 10^{-6} (cm/sec.)

MW CH-C 1/88



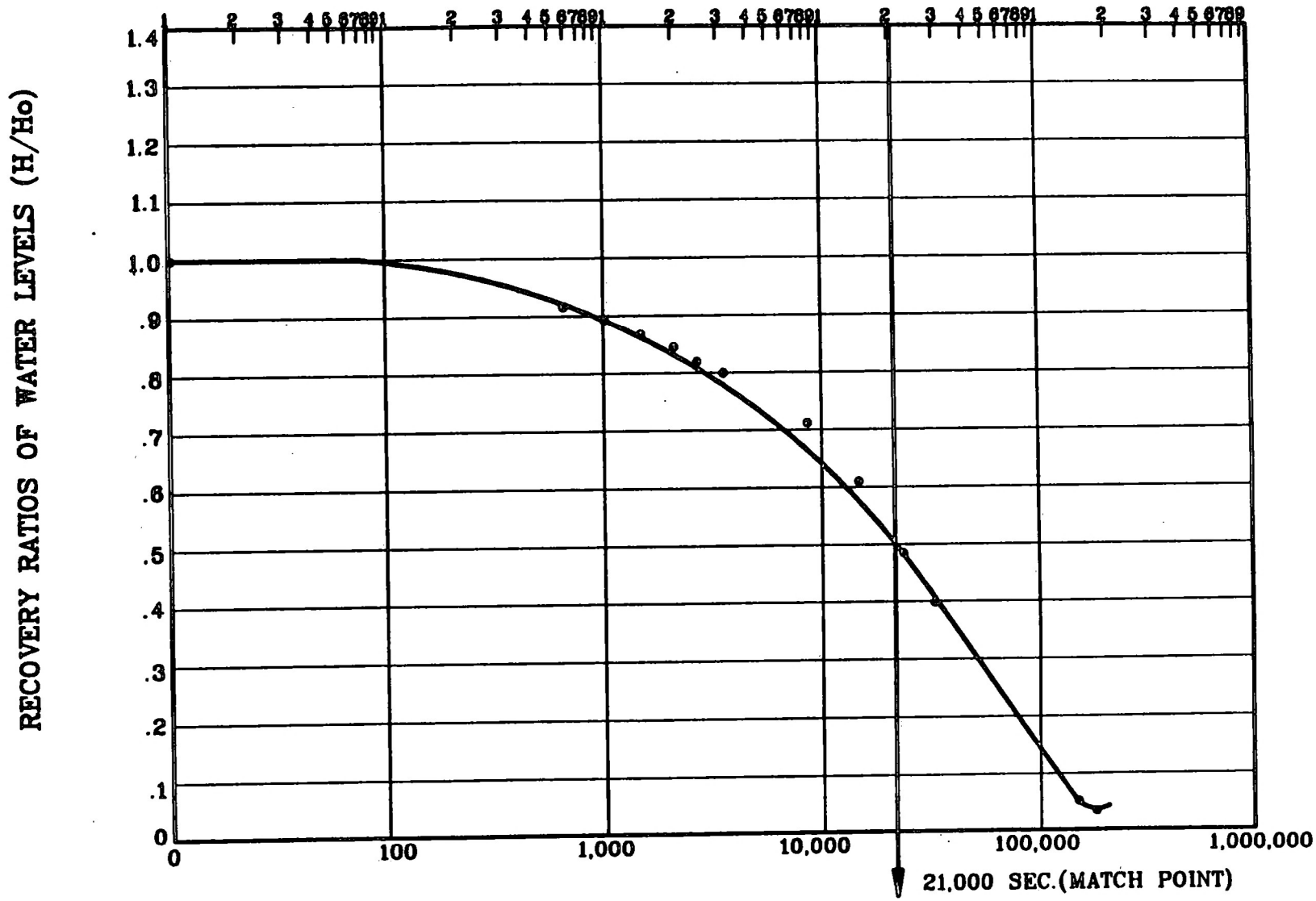
t=2,600 sec.
K=2.71 x 10^{-5} (cm/sec.)

MW CH-D 1/88



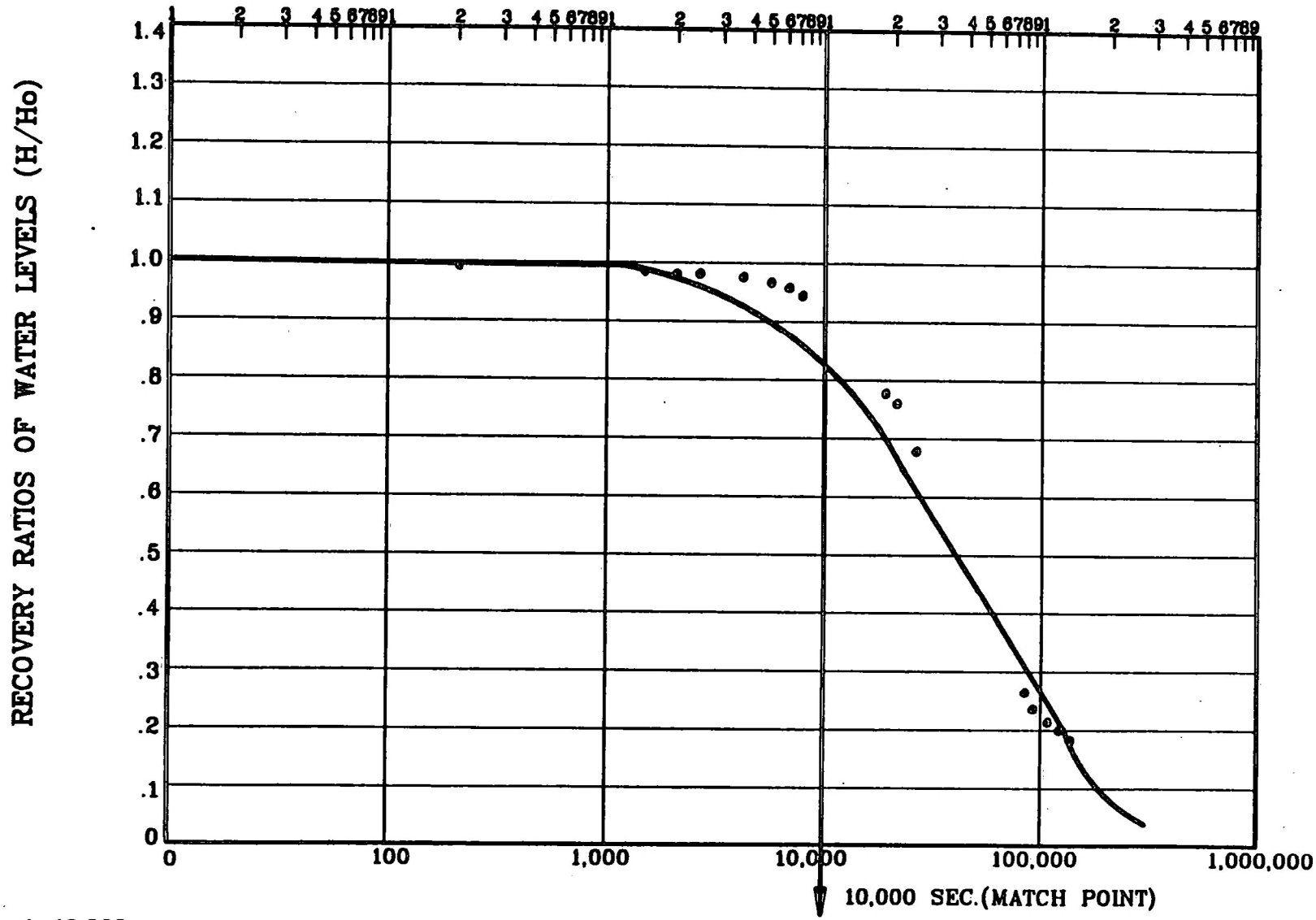
t=300 sec.
K=1.66 x 10^{-4} (cm/sec.)

MW CH-D 2/88



t=21,000 sec.
K=3.41 x 10^{-4} (cm/sec.)

MW CH-E 12/87



t=10,000 sec.
K=2.74 x 10^{-8} (cm/sec.)

MW CH-E 2/88

SLUG TEST DATA
01-19-88 thru 02-15-88
(Lone Mountain - U.S.P.C.I. Project)

WELL MW 1 A Static water level @ 10:34 a.m., 01-18-88 = 6.55

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-21-88	12:03 p.m.	0	13.55	7.00	1.00
	1:55 p.m.	6,720	11.55	5.00	0.71
	3:28 p.m.	12,300	10.51	3.96	0.57
01-22-88	9:10 a.m.	76,020	7.00	0.45	0.06
	12:20 p.m.	87,420	7.00	0.45	0.06
	6:17 p.m.	105,240	7.02	0.47	0.07
01-23-88	9:47 a.m.	161,040	6.65	0.10	0.01
	1:50 p.m.	175,620	6.68	0.13	2.00
01-24-88	10:12 a.m.	248,940	6.80	0.25	0.03
01-26-88	1:55 p.m.	348,720	6.95	0.40	0.06
01-27-88	5:01 p.m.	446,280	6.70	0.15	0.02
01-28-88	12:57 p.m.	518,040	6.62	0.07	0.01
01-30-88	2:37 p.m.	698,640	6.49	-0.06	*
02-01-88	4:30 p.m.	878,220	6.68	0.13	*
02-07-88	12:50 p.m.	1,383,420	7.09	0.54	*

WELL MW 1 C Static water level @ 10:29 a.m., 01-18-88 = 20.22

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-25-88	9:53 a.m.	0	43.26	23.04	1.00
01-26-88	1:49 p.m.	100,560	42.53	22.31	0.97
01-27-88	5:07 p.m.	198,840	41.86	21.64	0.94
01-28-88	12:59 p.m.	270,360	41.35	21.13	0.92
01-30-88	2:40 p.m.	362,820	40.20	19.98	0.87
02-01-88	4:23 p.m.	541,800	38.66	18.44	0.80
02-07-88	12:56 p.m.	1,047,780	36.18	15.96	0.69
02-15-88	5:22 p.m.	1,754,940	27.82	7.60	*

WELL MW 1 D Static water level @ 10:25 a.m., 01-18-88 = 78.02

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-19-88	10:45 a.m.	0	124.34	46.32	1.00
	12:34 p.m.	6,540	123.85	45.83	0.98
	3:10 p.m.	15,900	122.91	44.89	0.97
	6:50 p.m.	29,100	122.42	44.40	0.96
01-20-88	10:29 a.m.	85,440	120.90	42.88	0.93
	4:34 p.m.	107,340	120.30	42.28	0.91
01-21-88	12:10 p.m.	177,900	118.53	40.51	0.87
	2:07 p.m.	184,920	118.32	40.30	0.87
01-22-88	9:20 p.m.	254,100	116.59	38.57	0.83
	12:12 p.m.	264,420	116.50	38.48	0.83
	6:22 p.m.	286,620	115.78	37.76	0.82
01-23-88	9:55 a.m.	342,600	114.10	36.08	0.78
01-24-88	10:05 a.m.	429,600	111.80	33.78	0.73
01-25-88	9:58 a.m.	508,380	109.48	31.46	0.68
01-27-88	5:10 p.m.	707,100	103.69	25.67	0.55
01-28-88	1:02 p.m.	778,620	101.71	23.69	0.51
01-30-88	2:42 p.m.	957,420	96.85	18.83	0.41
02-01-88	4:17 p.m.	1,135,920	92.00	13.98	0.30
02-07-88	12:59 p.m.	1,642,380	78.77	0.75	0.02
02-15-88	5:25 p.m.	2,351,100	60.45	-17.57	*

WELL MW 2 B Static water level @ 11:18 a.m., 01-18-88 = 29.04

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-19-88	3:41 p.m.	0	54.00	24.96	1.00
	7:11 p.m.	12,600	53.07	24.03	0.96
01-20-88	10:51 a.m.	69,060	50.75	21.71	0.87
	1:30 p.m.	78,600	50.39	21.35	0.86
	4:10 p.m.	88,200	50.08	21.04	0.84
	8:37 p.m.	104,220	49.14	20.10	0.81
01-21-88	11:39 a.m.	154,740	45.96	16.92	0.68
	2:24 p.m.	164,640	45.43	16.39	0.66
01-22-88	9:37 a.m.	233,820	42.52	13.48	0.54
	12:08 p.m.	242,880	42.17	13.13	0.53
	6:14 p.m.	264,840	41.34	12.30	0.49
01-23-88	9:41 a.m.	320,460	39.31	10.27	0.41
	1:46 p.m.	331,560	38.90	9.86	0.40
	4:57 p.m.	343,020	38.60	9.56	0.38
01-24-88	9:54 a.m.	404,040	37.30	8.26	0.33
	2:29 p.m.	420,540	36.93	7.89	0.32
	4:30 p.m.	427,800	36.78	7.74	0.31
01-25-88	9:44 a.m.	489,840	35.71	6.67	0.27
01-26-88	1:39 p.m.	547,140	34.07	5.03	0.20
01-27-88	4:50 p.m.	644,460	32.90	3.86	0.15
01-28-88	12:50 p.m.	716,460	32.35	3.31	0.13
01-30-88	2:33 p.m.	809,040	30.77	1.73	0.07
02-01-88	4:04 p.m.	987,300	30.27	1.23	0.05
02-09-88	3:10 p.m.	1,502,460	29.05	0.01	*
02-15-88	5:10 p.m.	2,028,060	28.54	-0.50	*

WELL MW 3 C ** Static water level @ 12:20 p.m., 01-18-88 = 29.93

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-21-88	10:38 a.m.	0	111.58	81.65	1.00
	3:04 p.m.	15,960	111.24	81.31	1.00
01-22-88	9:53 a.m.	83,700	109.27	79.34	0.97
	6:08 p.m.	113,400	108.38	78.45	0.96
01-23-88	9:35 a.m.	169,020	106.61	76.68	0.94
01-24-88	9:49 a.m.	256,260	103.85	73.92	0.91
01-25-88	9:39 a.m.	342,060	97.82	67.89	0.83
01-26-88	1:32 p.m.	446,040	85.26	55.33	0.68
01-27-88	4:47 p.m.	544,140	73.82	43.89	0.54
01-28-88	12:45 p.m	616,260	65.95	36.02	0.44
01-30-88	2:25 p.m.	708,660	49.85	19.92	0.24
02-01-88	3:50 p.m.	886,560	40.23	10.30	0.13
02-07-88	12:46 p.m.	1,393,920	29.51	-0.42	*
02-09-88	3:00 p.m.	1,574,760	27.96	-1.97	*
02-15-88	6:06 p.m.	2,104,320	26.31	-3.62	*

WELL MW 4 A Static water level @ 1:51 p.m., 01-18-88 = 9.33

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-19-88	2:30 p.m.	0	12.30	2.97	1.00
	4:32 p.m.	7,320	11.43	2.10	0.71
	7:29 p.m.	17,940	10.56	1.23	0.41
01-20-88	10:02 a.m.	70,320	9.72	0.39	0.13
	4:55 p.m.	95,100	9.65	0.32	0.11
01-21-88	3:47 p.m.	177,420	9.50	0.17	0.06
01-22-88	10:00 a.m.	243,000	9.55	0.22	0.07
01-23-88	10:34 a.m.	331,440	9.12	-0.21	*
01-24-88	10:40 a.m.	418,200	9.43	0.10	*
02-01-88	3:00 p.m.	1,125,000	9.04	-0.29	*
02-09-88	3:34 p.m.	1,818,240	9.09	-0.24	*

WELL MW 5 A Static water level @ 4:08 p.m., 01-18-88 = 11.21

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-20-88	9:34 a.m.	0	25.49	14.28	1.00
	12:01 p.m.	8,820	21.68	10.47	0.73
	2:37 p.m.	18,180	16.70	5.49	0.38
	5:33 p.m.	28,740	14.17	2.96	0.21
	8:46 p.m.	40,320	12.96	1.75	0.12
01-21-88	12:56 p.m.	98,520	11.60	0.39	0.03
	3:56 p.m.	109,320	11.46	0.25	0.02
01-22-88	10:11 a.m.	175,020	11.46	0.25	0.02
	6:28 p.m.	204,840	11.37	0.16	0.01
01-23-88	11:42 a.m.	266,880	11.11	-0.10	*
	2:28 p.m.	276,840	11.14	-0.07	*
02-01-88	2:17 p.m.	1,053,780	11.17	-0.04	*

SLUG TEST DATA (CONT.)

ELL MW 6 A ** Static water level @ 9:09 a.m., 01-19-88 = 10.75

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-20-88	11:36 a.m.	0	13.28	2.53	1.00
	2:31 p.m.	10,500	12.22	1.47	0.58
	5:37 p.m.	21,660	12.10	1.35	0.53
	8:49 p.m.	33,180	12.00	1.25	0.49
01-21-88	12:50 p.m.	90,840	11.56	0.81	0.32
	4:09 p.m.	102,780	11.50	0.75	0.30
01-22-88	10:17 a.m.	168,060	11.20	0.45	0.18
	6:30 p.m.	183,240	10.99	0.24	0.09
01-23-88	10:45 a.m.	241,740	10.77	0.02	0.01
	2:31 p.m.	255,300	10.78	0.03	0.01
02-01-88	2:31 p.m.	1,032,900	10.99	0.24	*
02-09-88	3:56 p.m.	1,729,200	10.87	0.12	*

WELL MW 8 A Static water level @ 9:35 a.m., 01-19-88 = 11.85

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-23-88	10:52 a.m.	0	27.03	15.18	1.00
	5:08 p.m.	22,260	26.82	14.97	0.99
01-24-88	10:59 a.m.	129,720	26.22	14.37	0.95
01-25-88	10:33 a.m.	214,560	25.52	13.67	0.90
01-26-88	2:43 p.m.	315,960	24.70	12.85	0.85
01-28-88	12:03 p.m.	392,760	23.57	11.72	0.77
02-01-88	2:43 p.m.	575,160	21.28	9.43	0.62
02-07-88	12:32 p.m.	1,085,700	18.48	6.58	0.43
02-09-88	3:45 p.m.	1,269,300	18.15	6.30	0.23
02-15-88	3:45 p.m.	1,787,700	15.04	3.19	*

WELL MW 10 A ** Static water level @ 8:02 p.m., 01-20-88 = 10.64

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-22-88	10:39 a.m.	0	11.15	0.51	1.00
	12:03 p.m.	5,040	10.95	0.31	0.61
	1:30 p.m.	10,260	10.74	0.10	0.20
	3:00 p.m.	15,660	10.72	0.08	0.16
	6:59 p.m.	30,000	10.71	0.07	0.14
01-23-88	11:02 a.m.	87,780	10.69	0.05	0.10
	2:43 p.m.	101,040	10.69	0.05	0.10
02-01-88	4:47 p.m.	799,680	10.91	0.27	*

SLUG TEST DATA (CONT.)

WELL MW 18 Static water level @ 2:08 p.m., 01-20-88 = 36.01

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-22-88	3:50 p.m.	0	44.19	8.18	1.00
	6:49 p.m.	10,740	42.98	6.97	0.85
01-23-88	10:22 a.m.	66,720	38.90	2.89	0.35
	2:05 p.m.	80,100	38.42	2.41	0.29
	5:19 p.m.	91,740	38.13	2.12	0.26
01-24-88	10:22 a.m.	153,120	37.26	1.25	0.15
	12:35 p.m.	161,100	37.22	1.21	0.15
	2:40 p.m.	168,600	37.12	1.11	0.14
	4:15 p.m.	174,300	37.11	1.10	0.13
01-25-88	10:05 a.m.	238,500	36.89	0.88	0.11
01-26-88	2:06 p.m.	296,160	36.57	0.56	0.07
01-27-88	5:20 p.m.	394,200	36.43	0.42	0.05
01-28-88	12:29 p.m.	463,140	36.30	0.29	0.04
01-29-88	4:45 p.m.	564,900	36.28	0.27	0.03
01-30-88	3:42 p.m.	647,520	35.91	-0.10	*
02-01-88	5:57 p.m.	828,420	36.24	0.23	*
02-09-88	3:20 p.m.	1,513,800	36.10	0.09	*
02-15-88	4:20 p.m.	2,035,800	35.89	-0.12	*

WELL MW 19 ** Static water level @ 2:01 p.m., 01-20-88 = 36.86

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-22-88	3:55 p.m.	0	55.64	18.78	1.00
	6:45 p.m.	10,200	55.35	18.49	0.98
01-23-88	10:20 a.m.	66,300	53.70	16.84	0.90
	2:08 p.m.	79,980	53.05	16.19	0.86
	5:22 p.m.	91,620	52.07	15.21	0.81
01-24-88	10:27 a.m.	153,120	50.95	14.09	0.75
	12:38 p.m.	160,980	50.75	13.89	0.74
01-25-88	10:08 p.m.	231,180	46.64	9.81	0.52
01-26-88	2:09 p.m.	288,840	43.00	6.14	0.33
01-27-88	5:22 p.m.	343,620	41.07	4.21	0.22
01-28-88	12:31 p.m.	412,560	40.34	3.48	0.19
01-30-88	3:44 p.m.	510,540	39.20	2.34	0.12
02-01-88	6:00 p.m.	605,100	39.05	2.19	0.12
02-07-88	12:20 p.m.	1,103,100	38.36	1.50	0.08
02-09-88	3:23 p.m.	1,286,880	38.04	1.18	*

WELL MW 20 Static water level @ 1:58 p.m., 01-20-88 = 36.52

DATE	TIME	SECONDS	DEPTH	CHANGE.	H/Ho
01-19-88	*	*	*	*	*
01-20-88	*	*	*	*	*
01-21-88	*	*	*	*	*
01-22-88	3:58 p.m.	*	dry	*	*
	6:43 p.m.	0	60.09	23.57	1.00
01-23-88	10:14 a.m.	55,260	59.49	22.97	0.97
	2:13 p.m.	69,600	59.35	22.83	0.97
	5:25 p.m.	81,120	59.26	22.74	0.96
01-24-88	10:31 a.m.	142,680	58.73	22.21	0.94
	12:42 p.m.	150,540	58.67	22.15	0.94
01-25-88	10:12 a.m.	217,140	58.03	21.51	0.91
01-26-88	2:14 p.m.	310,860	57.16	20.64	0.87
01-27-88	5:26 p.m.	408,780	56.35	19.83	0.84
01-28-88	12:34 p.m.	477,660	55.78	19.26	0.81
01-29-88	*	*	*	*	*
01-30-88	3:46 p.m.	575,580	54.25	17.73	0.75
02-01-88	6:09 p.m.	760,560	52.86	16.34	0.69
02-07-88	12:25 p.m.	1,257,360	49.39	12.87	0.55
02-09-88	3:28 p.m.	1,441,140	46.63	10.11	0.43
02-15-88	3:50 p.m.	1,960,860	24.33	*	*

WELL MW 21 ** Static water level @ 1:56 p.m., 01-20-88 = 38.82

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-19-88	*	*	*	*	*
01-20-88	*	*	*	*	*
01-21-88	*	*	*	*	*
01-22-88	4:00 p.m.	0	39.06	0.24	1.00
	6:36 p.m.	9,360	39.09	0.27	*
01-23-88	10:06 a.m.	65,160	38.71	*	*
	2:20 p.m.	80,400	38.74	*	*
	5:30 p.m.	91,800	38.77	*	*
01-24-88	10:35 a.m.	153,300	39.08	*	*
	12:44 p.m.	161,040	39.06	*	*
	2:44 p.m.	168,240	39.03	*	*
	4:11 p.m.	173,460	39.05	*	*
01-25-88	*	*	*	*	*
01-26-88	*	*	*	*	*
01-27-88	*	*	*	*	*
01-28-88	*	*	*	*	*
01-29-88	*	*	*	*	*
01-30-88	*	*	*	*	*
02-01-88	6:15 p.m.	872,100	38.28	*	*
02-07-88	*	*	*	*	*
02-09-88	*	*	*	*	*
02-15-88	*	*	*	*	*

SLUG TEST DATA (CONT.)

WELL MW 21 ** Static water level @ 1:56 p.m., 01-20-88 = 38.82

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-22-88	4:00 p.m.	0	39.06	0.24	1.00
	6:36 p.m.	9,360	39.09	0.27	*
01-23-88	10:06 a.m.	65,160	38.71	-0.11	*
	2:20 p.m.	80,400	38.74	-0.08	*
	5:30 p.m.	91,800	38.77	-0.05	*
01-24-88	10:35 a.m.	153,300	39.08	0.26	*
	12:44 p.m.	161,040	39.06	0.24	*
	2:44 p.m.	168,240	39.03	0.21	*
	4:11 p.m.	173,460	39.05	0.23	*
02-01-88	6:15 p.m.	872,100	38.28	-0.54	*

WELL CH A ** Static water level @ 11:08 a.m., 01-21-88 = 16.09

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-23-88	9:14 a.m.	0	55.84	39.75	1.00
	11:37 a.m.	8,580	55.70	39.61	1.00
	4:07 p.m.	24,780	55.41	39.32	0.99
	5:37 p.m.	30,180	55.34	39.25	0.99
01-24-88	9:28 a.m.	87,240	54.55	38.46	0.97
	12:05 p.m.	96,660	54.50	38.41	0.97
	3:26 p.m.	108,720	54.39	38.30	0.96
01-25-88	9:20 a.m.	173,160	53.81	37.72	0.95
01-26-88	12:06 p.m.	226,320	52.95	36.86	0.93
01-27-88	5:31 p.m.	332,220	51.65	35.56	0.89
01-28-88	1:09 p.m.	402,900	51.21	35.12	0.88
01-29-88	4:28 p.m.	508,440	49.93	33.84	0.85
01-30-88	1:30 p.m.	584,160	47.95	31.68	0.79
02-01-88	3:19 p.m.	677,100	43.81	27.72	0.70
02-07-88	1:08 p.m.	1,187,640	33.75	17.66	0.44
02-09-88	12:00 p.m.	1,356,360	31.05	14.96	0.38
02-15-88	3:15 p.m.	1,886,460	24.27	8.18	*

SLUG TEST DATA (CONT.)

WELL CH C Static water level @ 11:05 a.m., 01-21-88 = 5.20

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-22-88	3:30 p.m.	0	86.30	81.10	1.00
	5:17 p.m.	6,420	83.83	78.63	0.97
	7:42 p.m.	14,940	80.96	75.76	0.93
01-23-88	9:16 a.m.	63,780	68.98	63.78	0.79
	11:42 a.m.	72,540	67.10	61.90	0.76
	4:14 p.m.	84,060	63.65	58.45	0.72
	5:38 p.m.	89,100	62.61	57.41	0.71
01-24-88	9:36 a.m.	146,580	51.97	46.77	0.58
	12:14 p.m.	152,460	50.42	45.22	0.56
	3:30 p.m.	164,220	48.49	43.29	0.53
01-25-88	9:28 a.m.	228,900	37.93	32.79	0.40
01-26-88	12:10 p.m.	328,620	25.00	19.80	0.24
01-27-88	5:33 p.m.	438,000	16.36	11.16	0.14
01-28-88	1:10 p.m.	508,620	12.45	7.25	0.09
01-29-88	4:30 p.m.	607,020	8.73	3.53	0.04
01-30-88	2:16 p.m.	685,380	7.21	2.01	0.02
02-01-88	3:29 p.m.	772,560	6.69	1.49	0.02
02-07-88	1:15 p.m.	1,275,720	6.75	1.55	0.02
02-09-88	12:30 p.m.	1,445,820	6.59	1.39	*
02-15-88	3:25 p.m.	1,974,720	6.43	1.23	*

WELL CH D Static water level @ 11:02 a.m., 01-21-88 = 5.34

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
01-22-88	3:25 p.m.	0	27.20	21.86	1.00
	5:16 p.m.	6,660	19.81	14.47	0.66
	7:39 p.m.	15,240	14.98	9.64	0.44
01-23-88	9:17 a.m.	64,320	7.85	2.51	0.11
	11:45 a.m.	73,200	7.61	2.27	0.10
	4:09 p.m.	89,040	5.95	0.61	0.03
	5:40 p.m.	94,380	5.63	0.29	0.01
01-24-88	9:33 a.m.	151,560	5.31	-0.03	*
	12:10 p.m.	160,980	5.14	-0.20	*
	2:27 p.m.	169,200	5.97	0.63	*
01-26-88	12:08 p.m.	333,660	5.26	-0.08	*
01-30-88	2:18 p.m.	687,060	5.84	0.50	*
02-01-88	3:25 p.m.	777,480	5.88	0.54	*
02-09-88	12:25 p.m.	1,457,880	5.97	0.63	*
02-15-88	3:22 p.m.	1,979,700	6.10	0.76	*

SLUG TEST DATA (CONT.)

'ELL CH D Static water level @ 5:15 a.m., 02-18-88 = 6.72

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
02-18-88	5:15 a.m.	0	22.41	15.69	1.00
	8:30 a.m.	11,700	15.59	8.87	0.57
	9:24 a.m.	17,340	14.10	7.38	0.47
	10:16 a.m.	22,860	12.86	6.14	0.39
	10:36 a.m.	24,060	12.50	5.78	0.37
	11:34 a.m.	27,540	11.45	4.73	0.30
	12:30 p.m.	30,900	10.69	3.97	0.25
	2:00 p.m.	36,300	9.64	2.92	0.19
	2:52 p.m.	39,420	9.14	2.42	0.15
	4:20 p.m.	44,700	8.42	1.70	0.11
	5:46 p.m.	49,860	7.90	1.18	0.08
	6:28 p.m.	52,380	7.67	0.95	0.06
	7:00 p.m.	54,300	7.54	0.82	0.05
02-19-88	9:00 a.m.	61,500	5.66	-1.06	*
	11:30 a.m.	70,500	5.50	-1.22	*

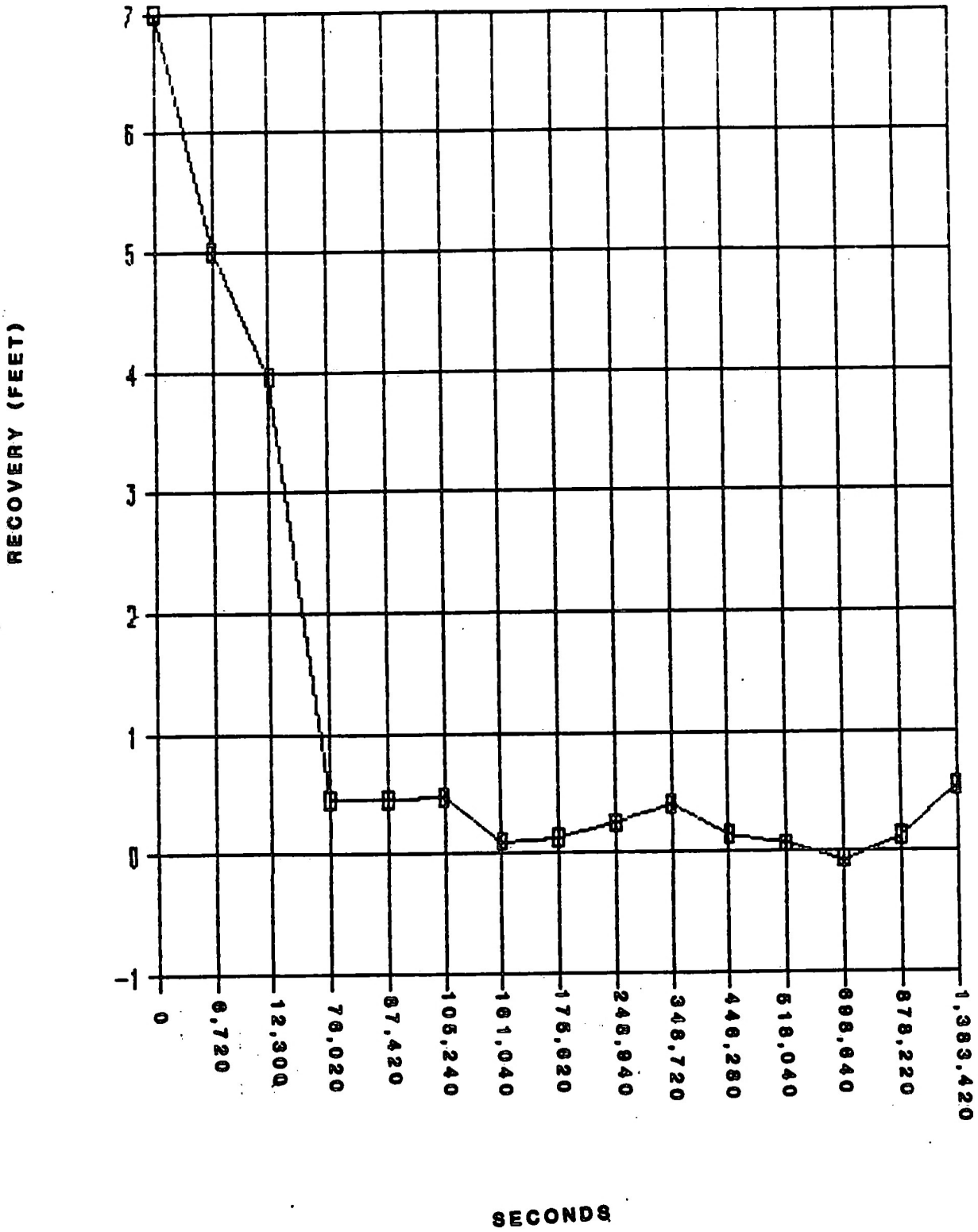
WELL CH E Static water level @ 3:50 p.m., 12-05-87 = 1.71

DATE	TIME	SECONDS	DEPTH	CHANGE	H/Ho
12-05-87	3:50 p.m.	0	190.99	189.28	1.00
	4:00 p.m.	600	175.29	173.58	0.92
	4:06 p.m.	960	170.79	169.08	0.89
	4:16 p.m.	1,560	165.09	163.38	0.86
	4:22 p.m.	1,920	161.51	159.80	0.85
	4:32 p.m.	2,520	156.79	155.08	0.82
	4:45 p.m.	3,300	151.10	149.39	0.79
	6:10 p.m.	8,400	137.87	136.16	0.72
	7:43 p.m.	13,980	114.13	112.42	0.60
	9:42 p.m.	21,120	93.48	91.77	0.49
	11:50 p.m.	28,800	77.00	75.29	0.40
12-06-87	11:45 a.m.	71,700	23.69	21.98	0.12
12-07-87	9:40 a.m.	150,600	7.93	6.22	0.04
	4:40 p.m.	175,800	5.57	3.86	0.03

* - No data collected

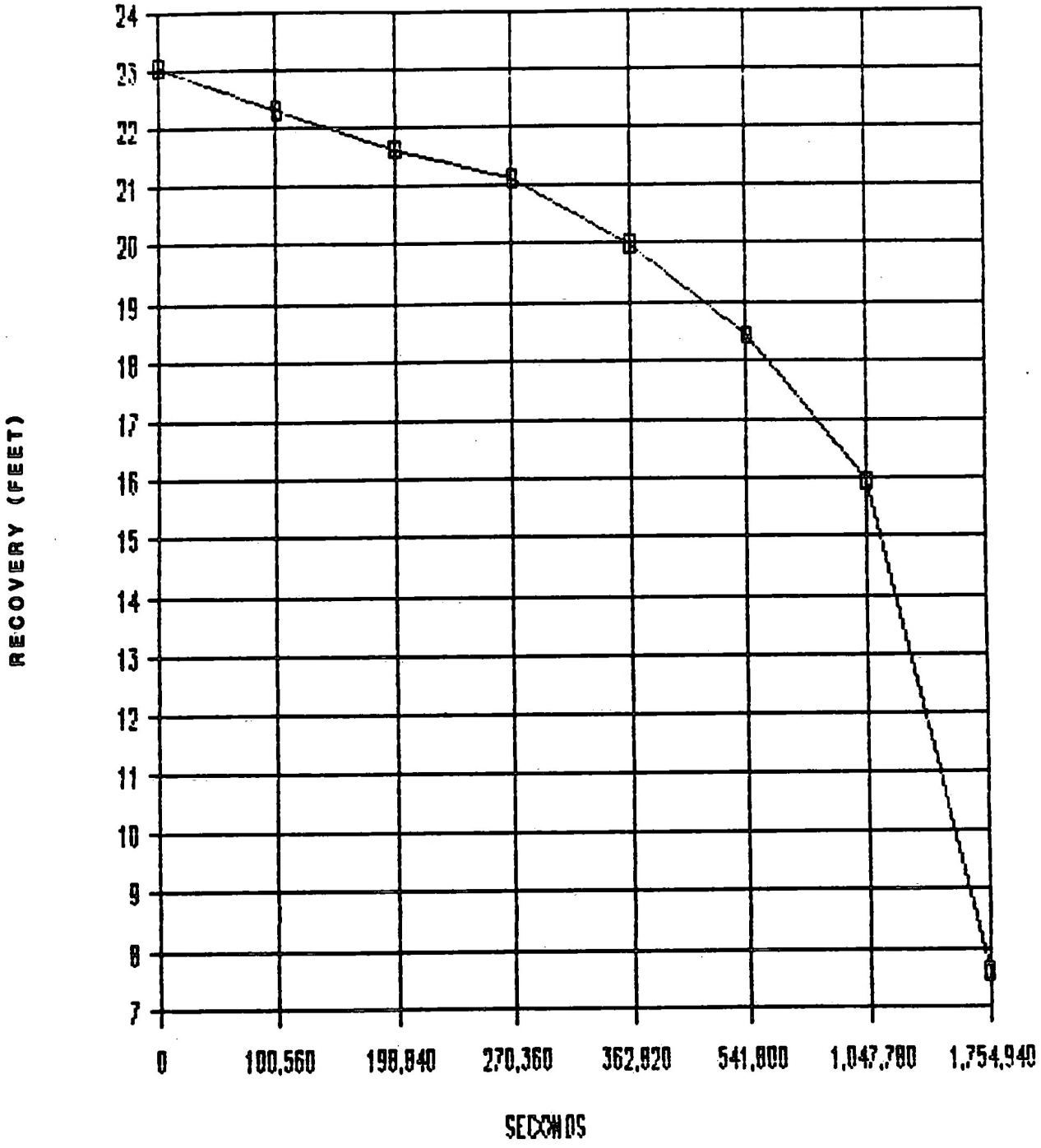
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL MW 1 A



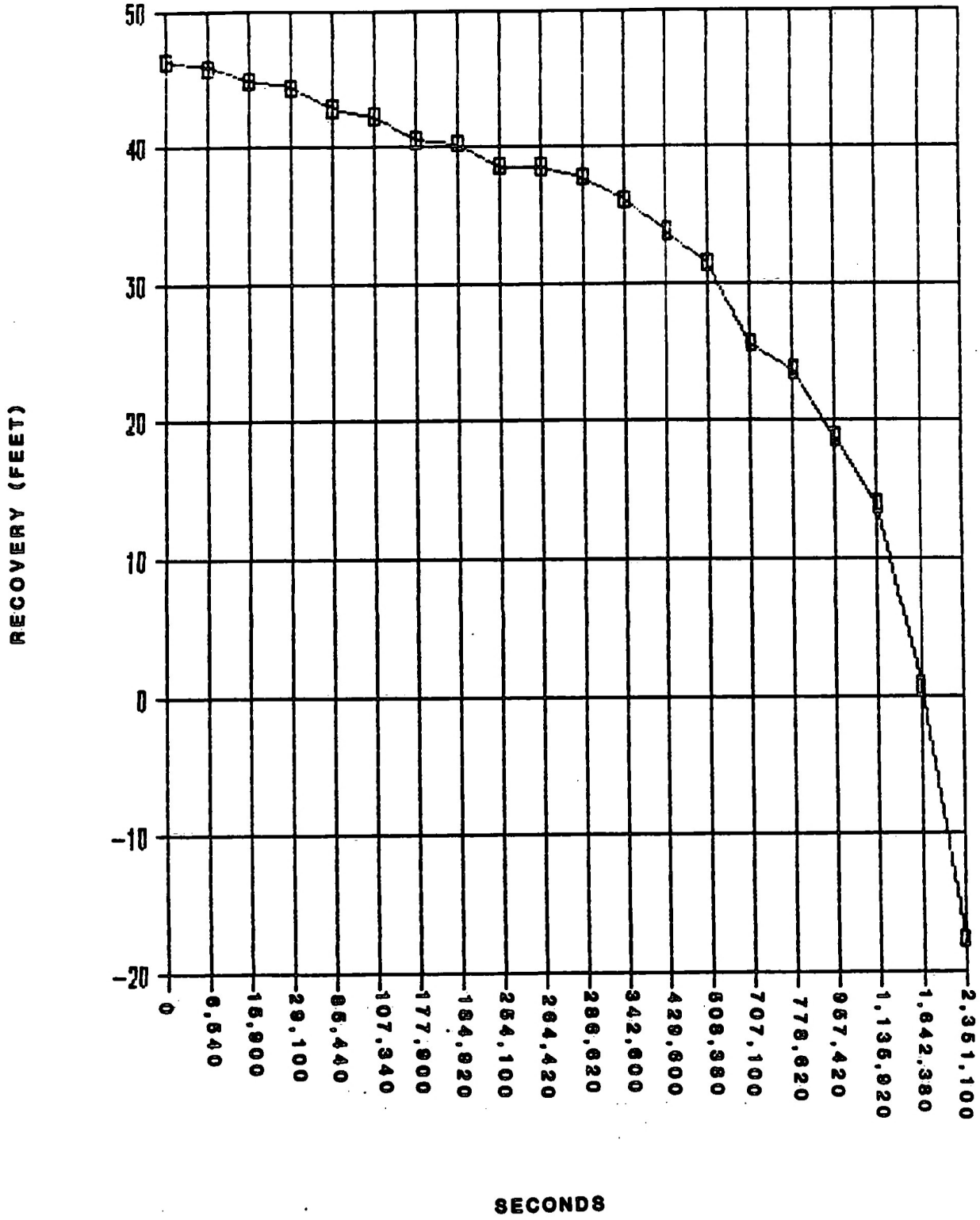
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL MW 1 C



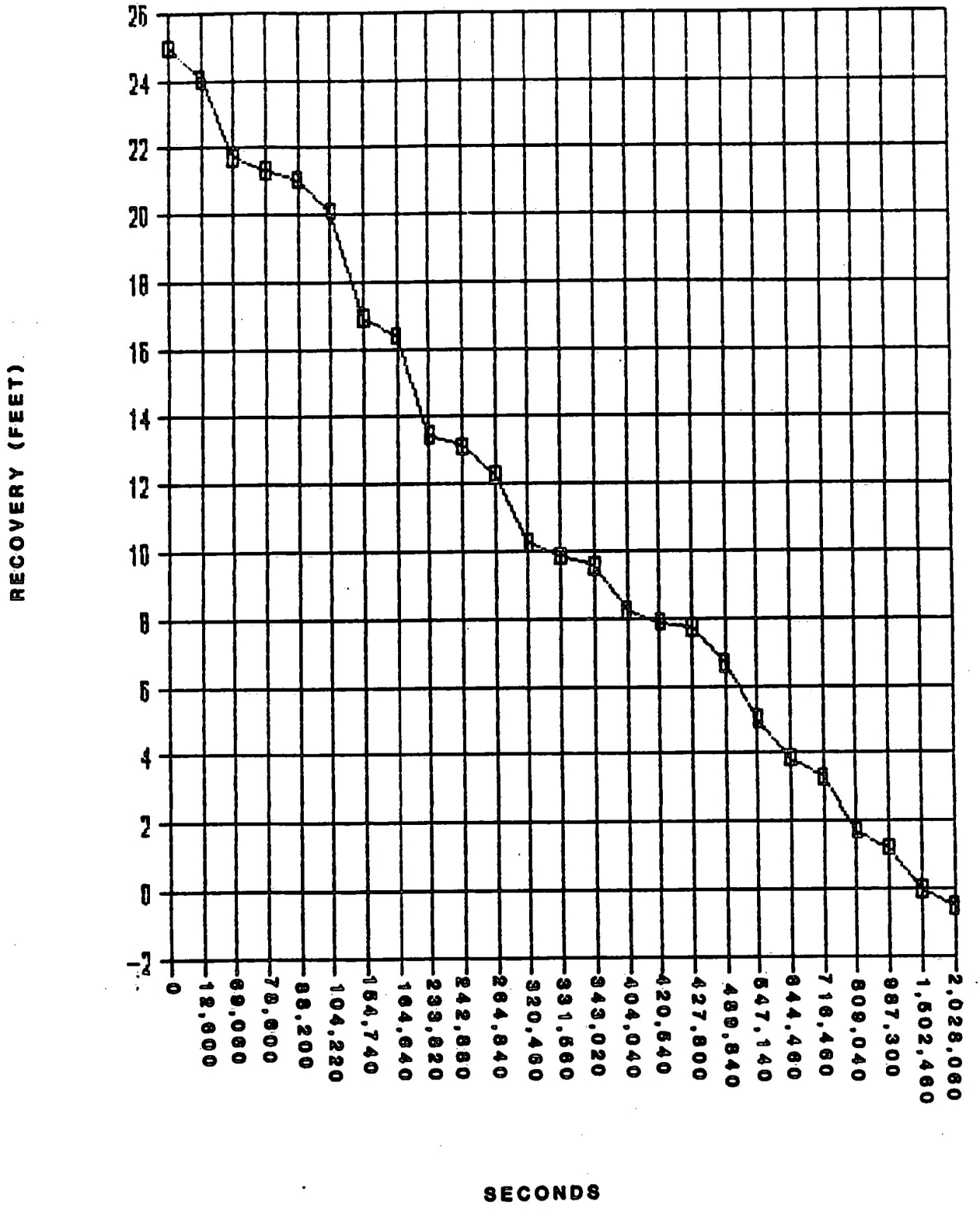
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL MW 1 D



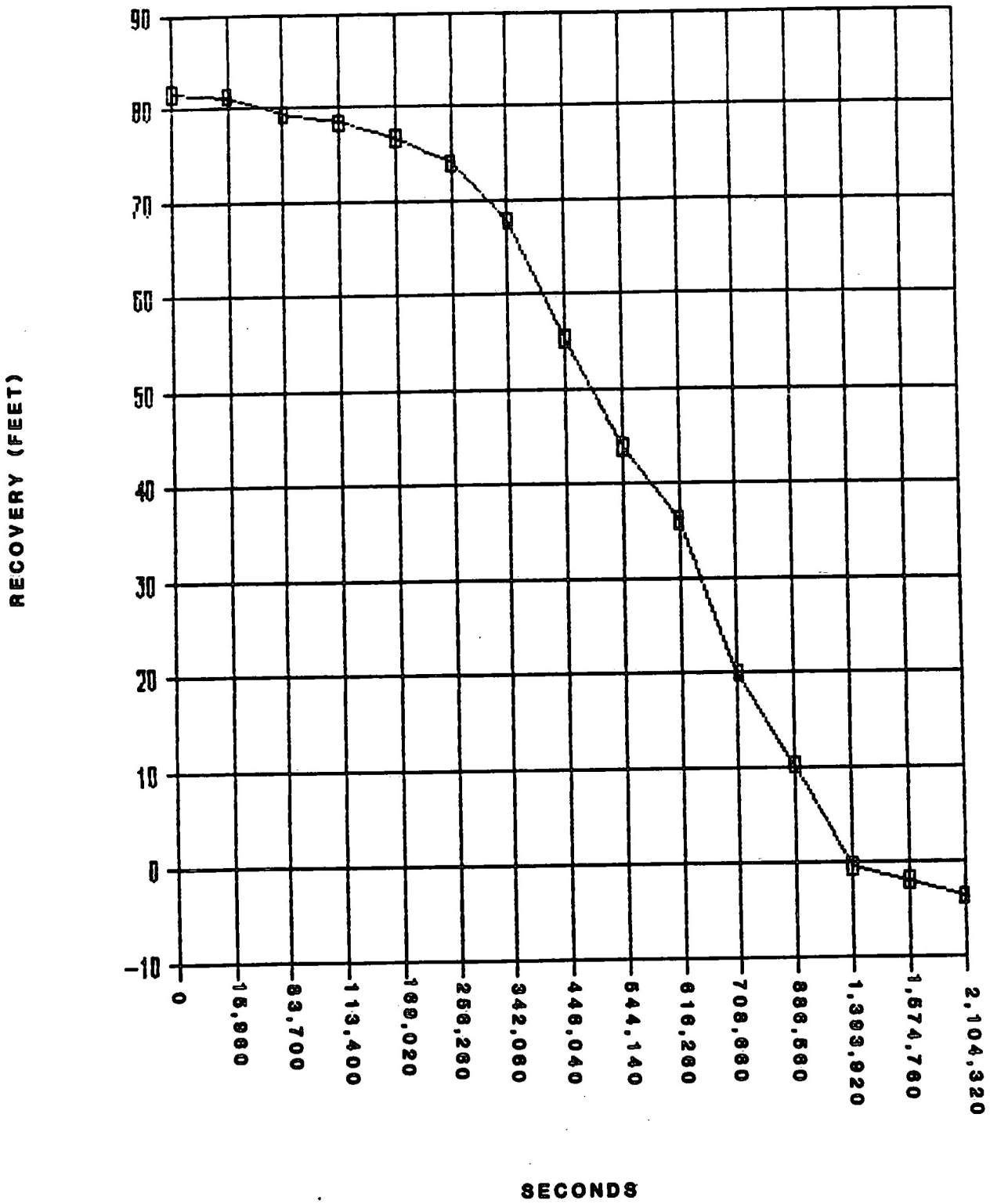
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL MW 2 B



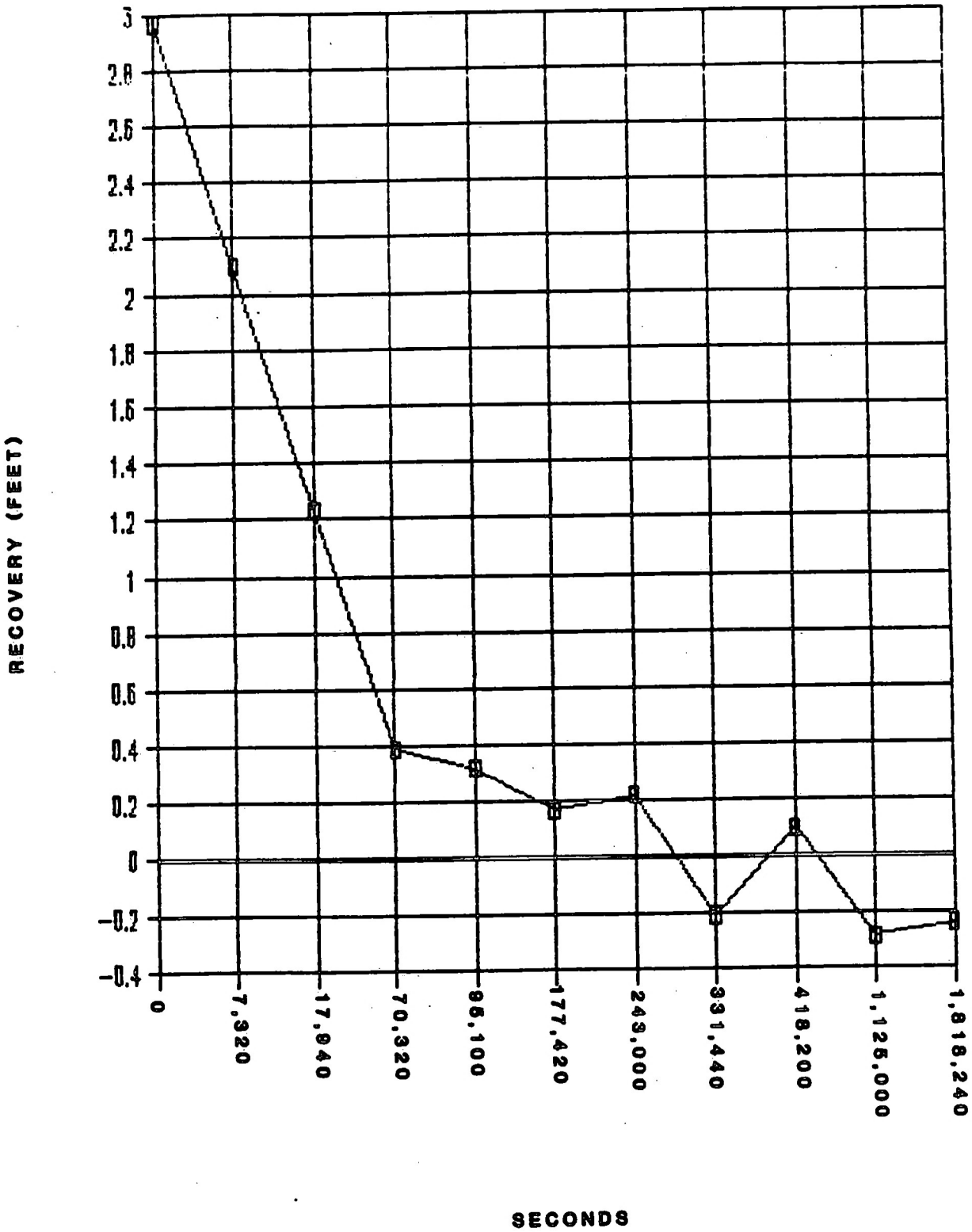
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL MW 5 C



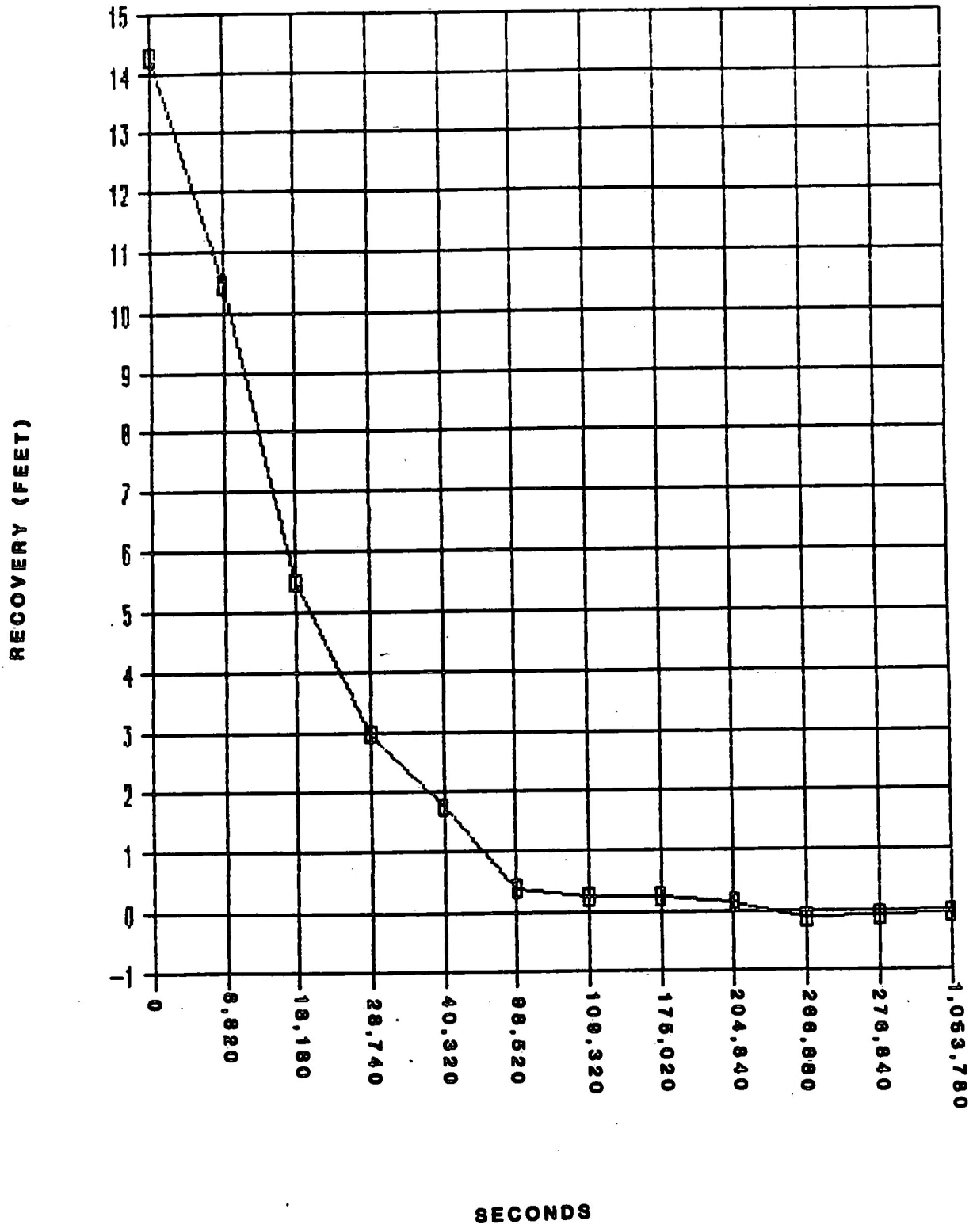
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL MW 4A



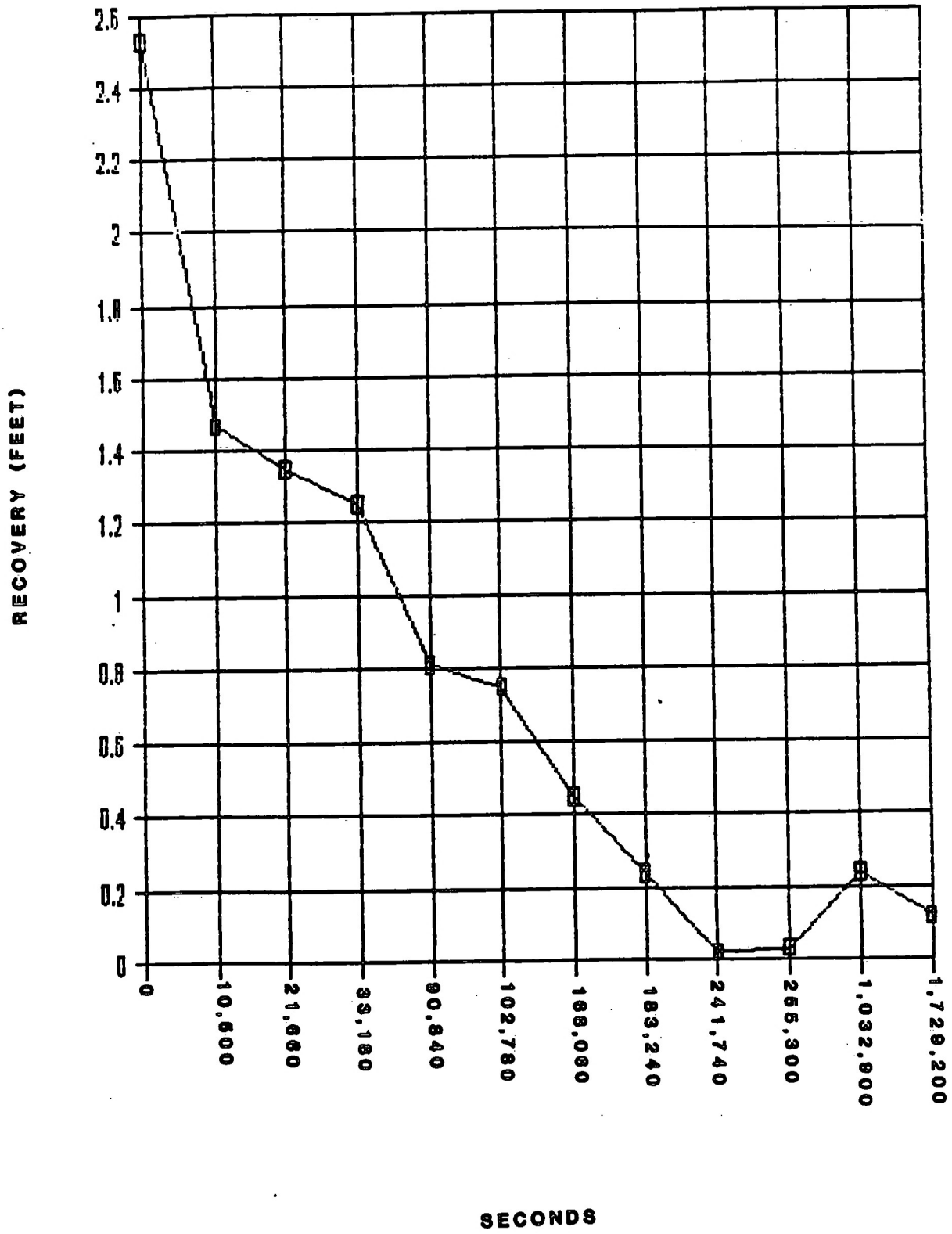
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL MW 5 A



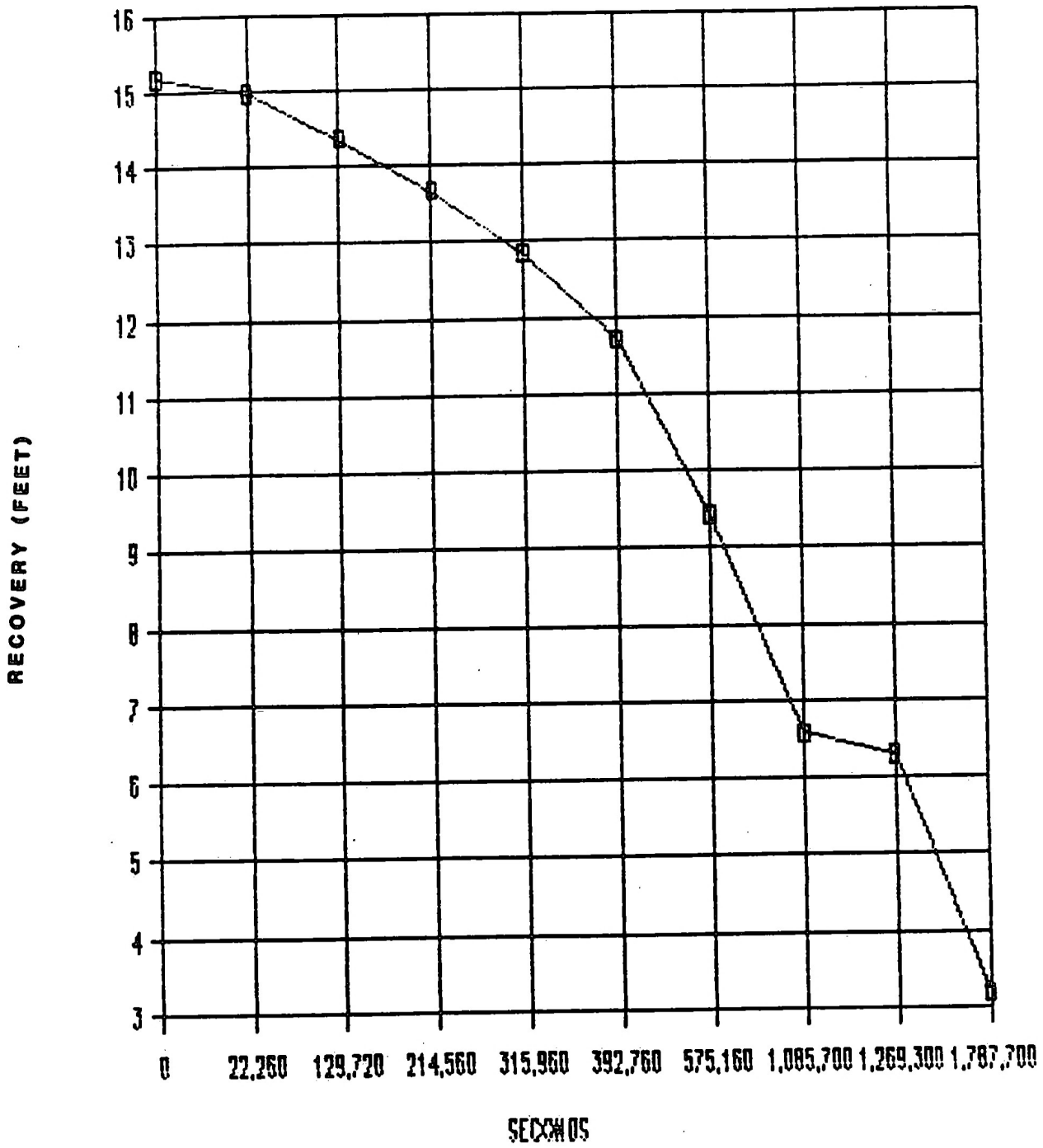
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL MW 6 A

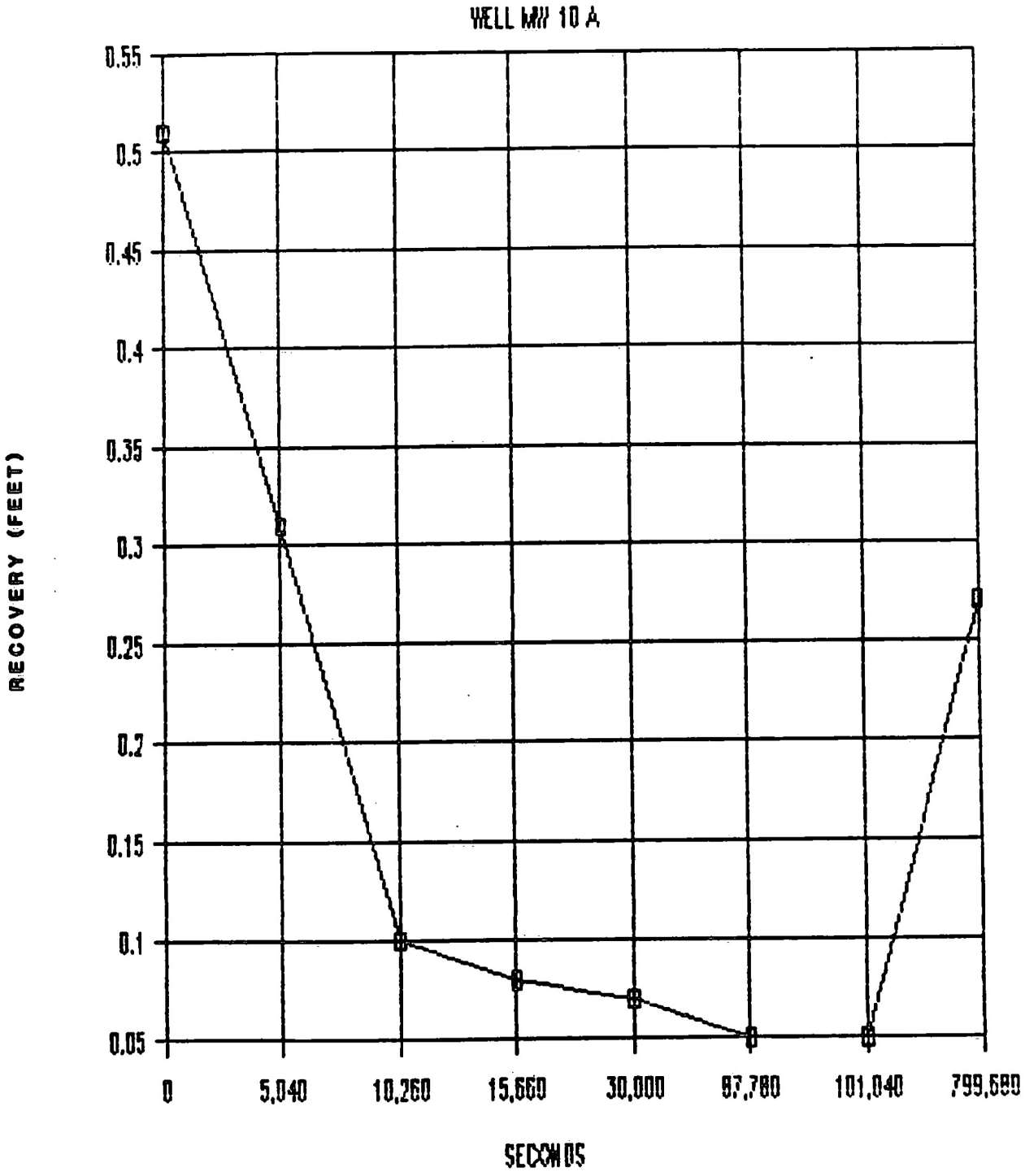


SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL MW 8 A

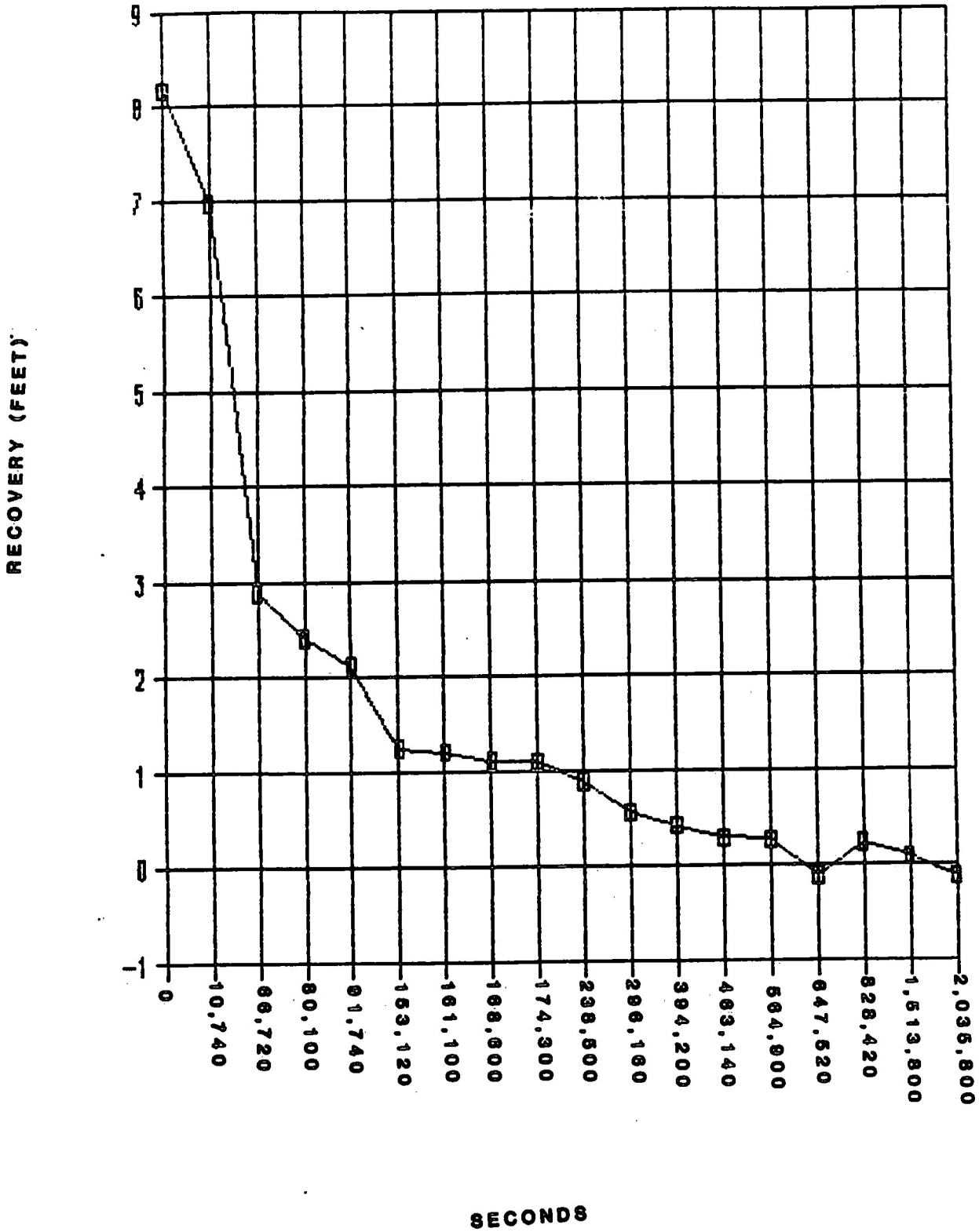


SLUG TEST DATA 01-19-88 THRU 02-15-88



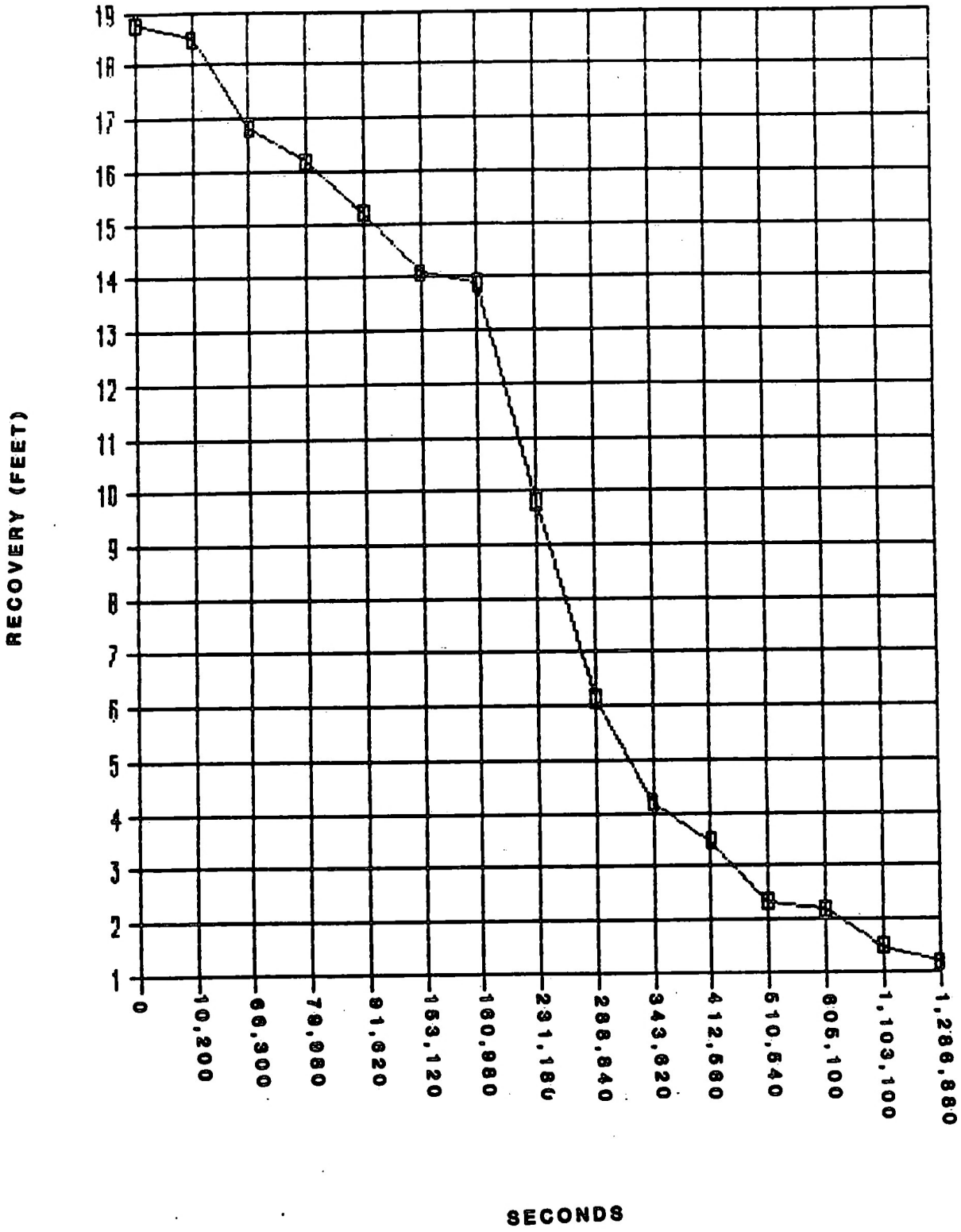
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL MW 18



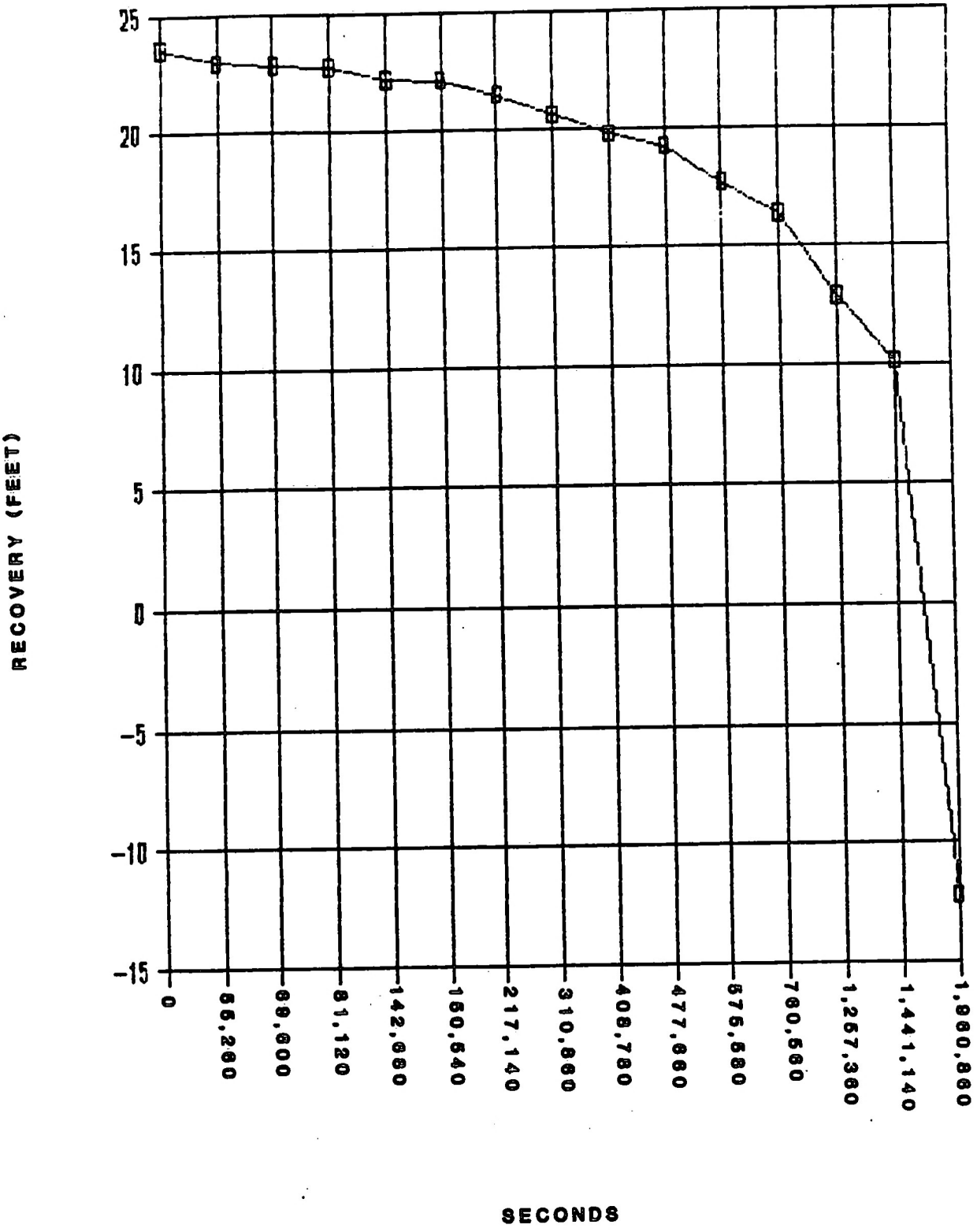
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL MW 19



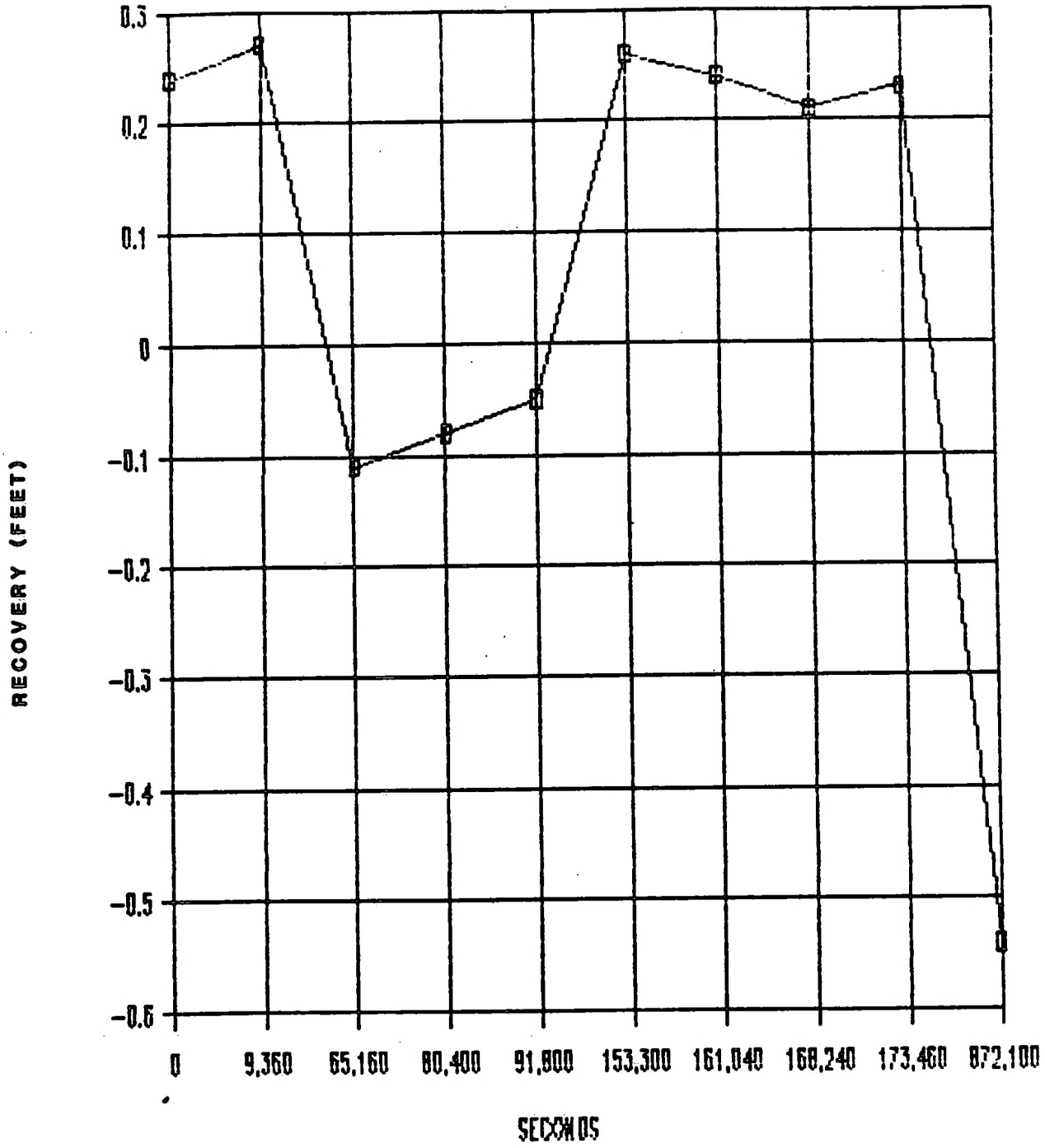
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL MW 20



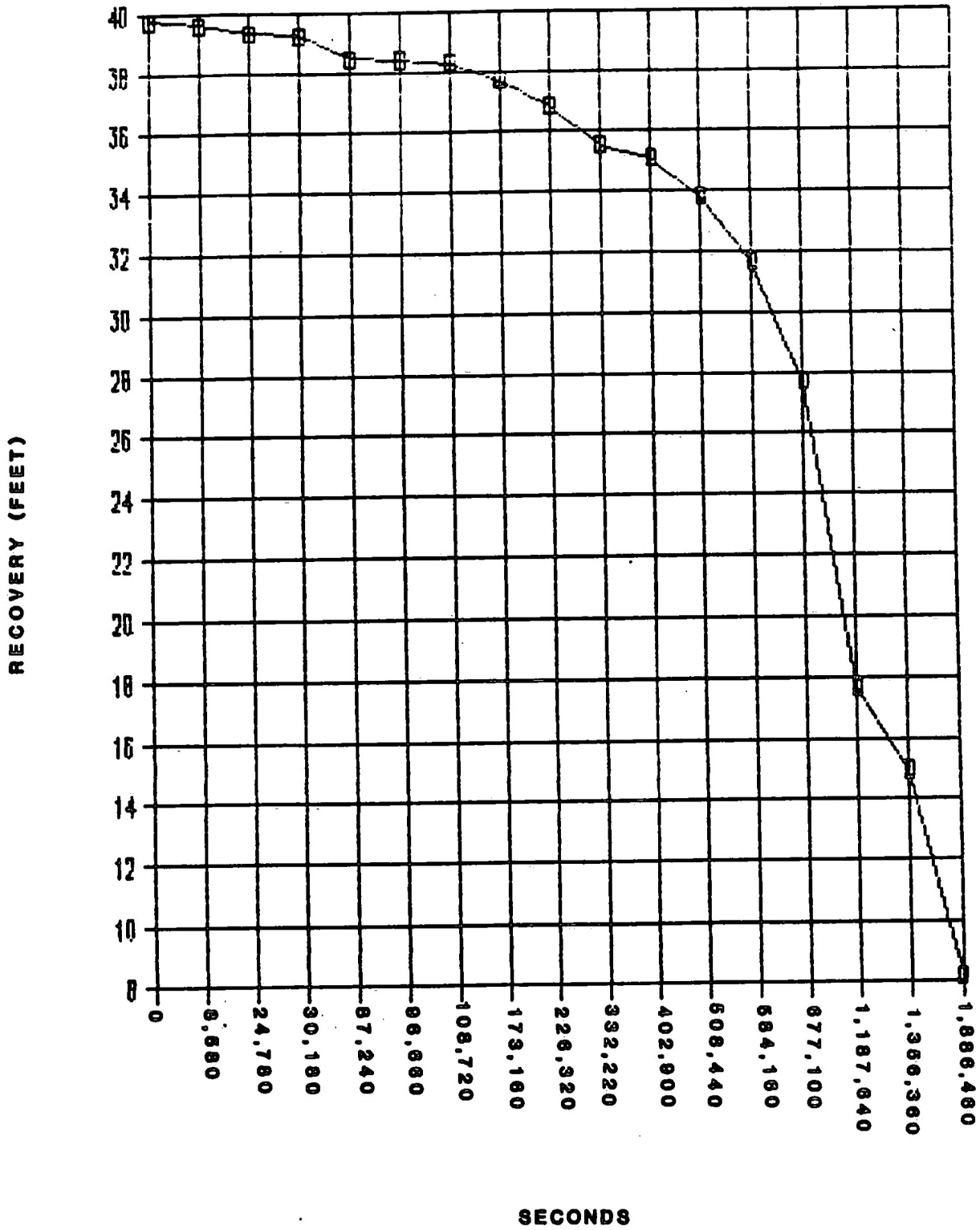
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL MW 21



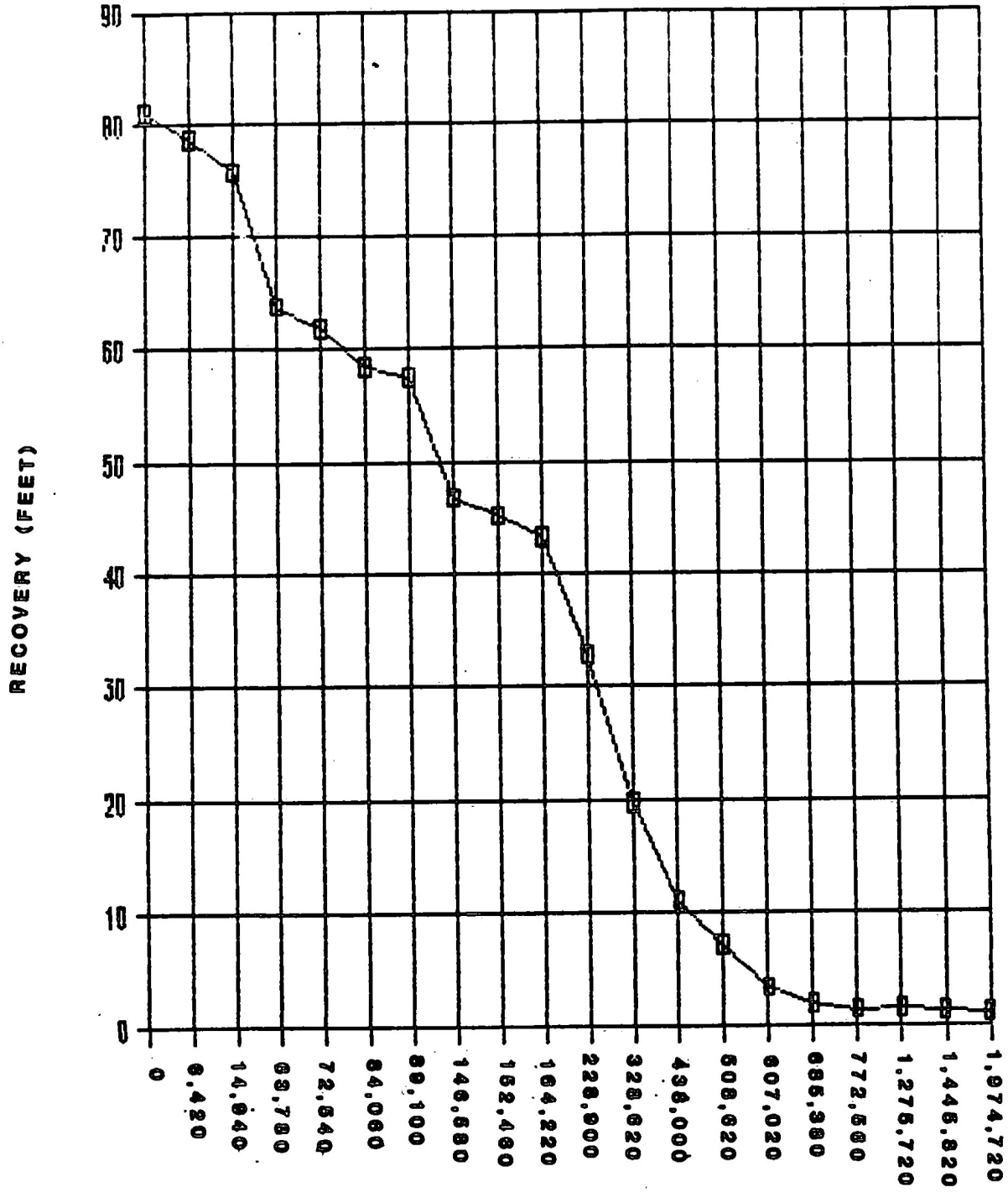
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL CH A



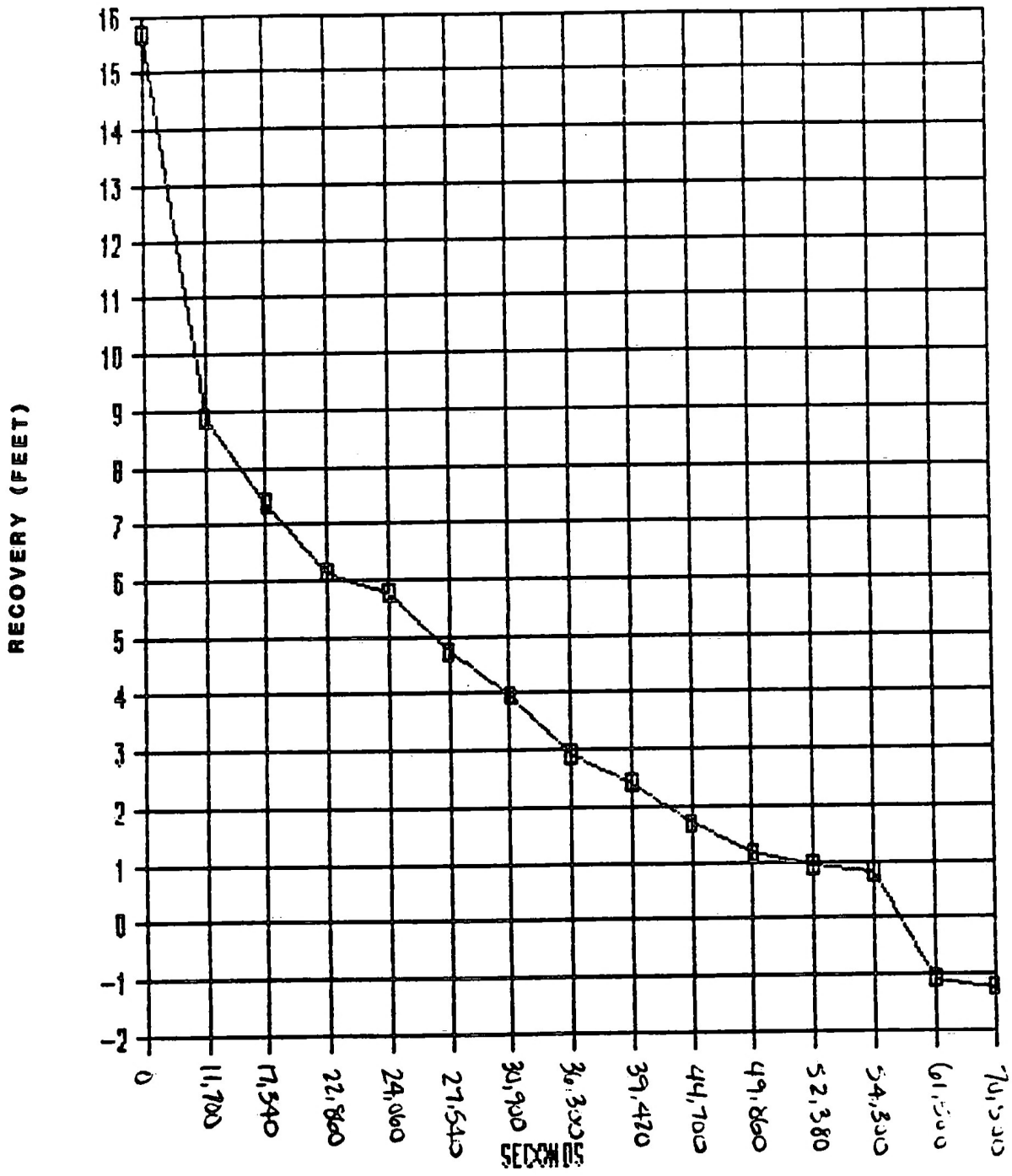
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL CH C



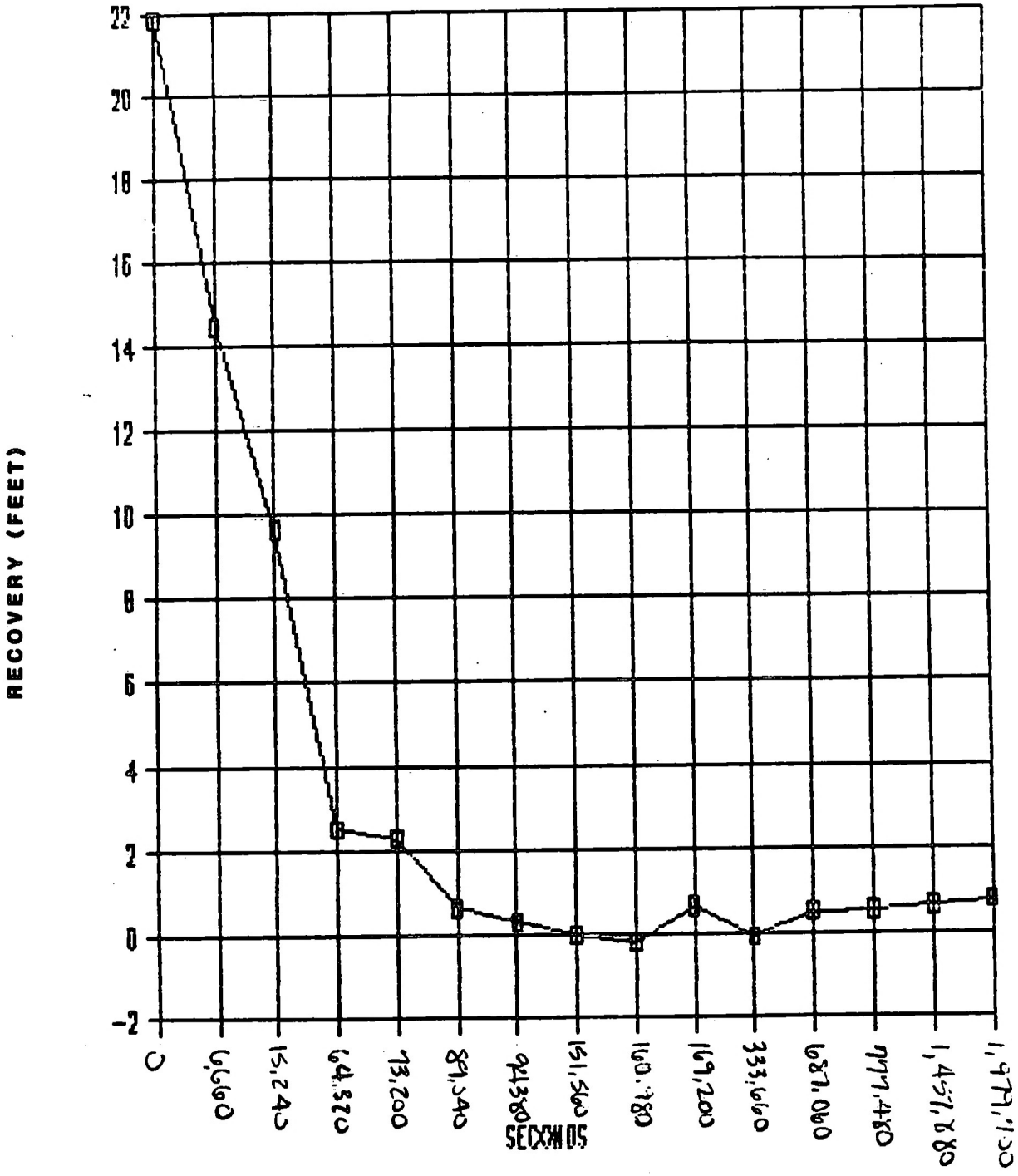
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL CH D



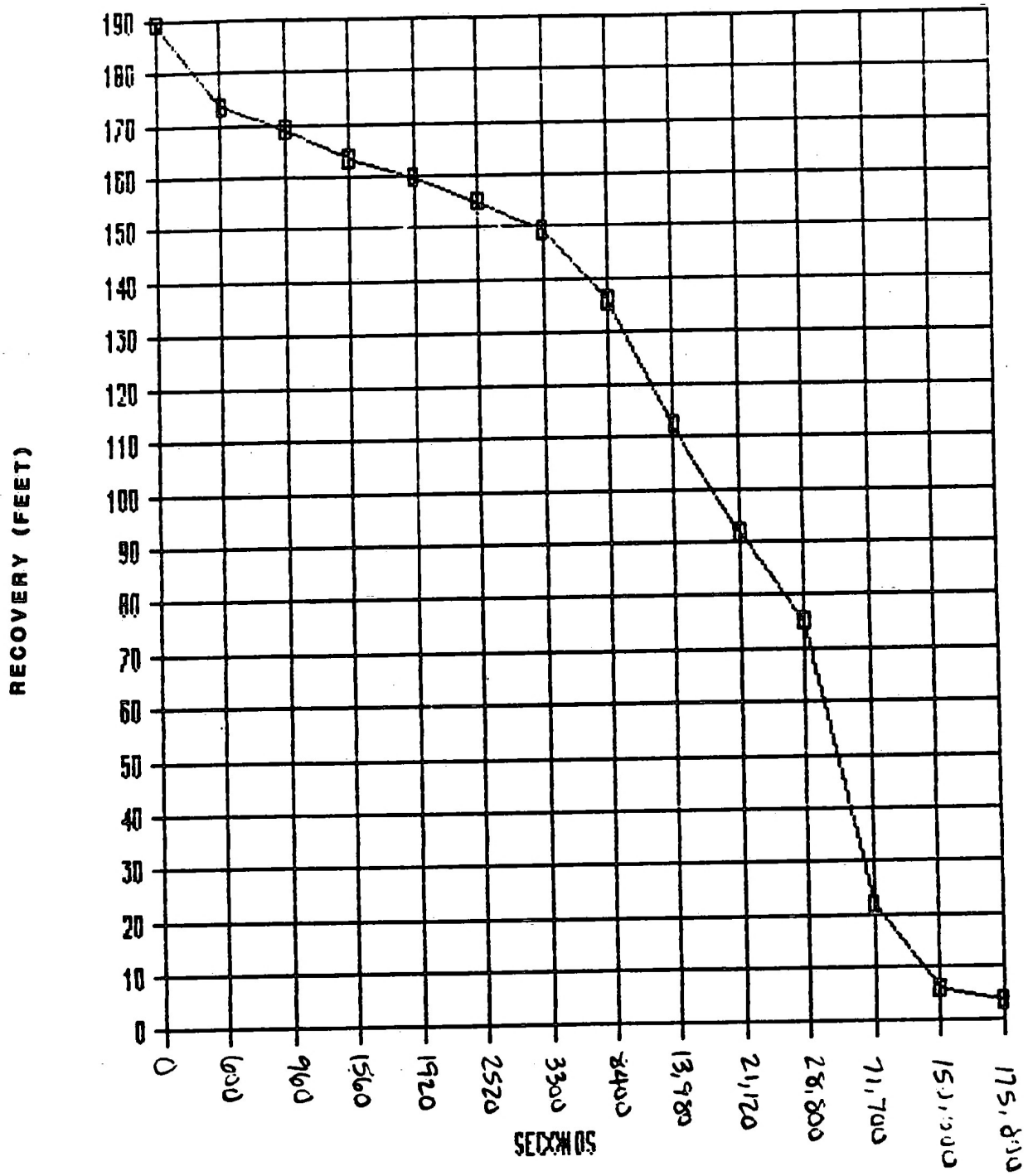
SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL CH 0



SLUG TEST DATA 01-19-88 THRU 02-15-88

WELL CH E



APPENDIX 3.7

TRACE TEST RESULTS

Ground-Water Hydraulic Data

Background

Slug tests (using a method described by Cooper, Bredehoft, and Papadopulus, 1967) were performed in old wells LB-1B, LB-3A, and LB-1A that showed hydraulic conductivity ranging from 5.3 x 10E-6 to 2.1 x 10E-6 cm/second. The corresponding Darcian Velocities are 8.4 x 10E-8 to 2.1 x 10E-7 cm/second.

A bromide tracer test was conducted by USPCI personnel in 1984. A boring (HLB-4) was filled with a saturated solution of sodium bromide. Three gallons of the solution were added to the pipe on October 20, 1984. Two more gallons were introduced on November 15, 1984. Bi-monthly samples were taken from other borings and analyzed for the presence of bromide, which does not naturally occur in noticeable amounts at the site. Boring LB-3 showed bromide on 4/20/85. The two borings are 220 feet apart and a connecting line was reasoned to be parallel to the ground-water gradient. The resulting Darcy velocity for the ground-water flow was thus determined to be between 1.27 ft/day and 1.40 ft/day; by conversion, this is between 4.52×10^{-4} cm/sec and 4.94×10^{-4} cm/sec, or for pore velocity, 1.4×10^{-3} cm/sec. The much faster rate of flow than expected given by this tracer test may indicate that flow took place along a fracture, or by production of an artificially high gradient by the wells not being at equilibrium. Fracturing did occur between wells when USPCI installed a new tracer nest in August.

Hydraulic measurements were previously reported in the Geocon Report (January, 1984) and include level measurements, log analysis (Volan by Schlumberger), laboratory measurements (Core Labs), and in-situ tests (slug and tracer tests). These data are summarized on Table 5.

The Volan log analysis is a computer analysis of borehole geophysical logs and yields a graphic display of hydraulic conductivity, saturation, and bound water for several test holes. The graphs in the Geocon Report, January 1, 1984, show a consistency of values for hydraulic conductivity both throughout the section in each well and between wells. The values for hydraulic conductivity were calculated to range from 3.5 x 10E-6 cm/second to 8.9 x 10E-5 cm/second. This results in a Darcian Velocity of 1.4 x 10E-7 cm/second to 3.5 x 10E-6 cm/second. The logs indicate saturated conditions.

Core Labs, a testing service company, tested samples from holes HLB4 and HLB7 and found water saturations between 81 and 95%. Some water is thought to be lost in handling; therefore, it is assumed that the cored interval was saturated. Hydraulic conductivities in the cores ranged from 5.2 x 10E-7 to 2.6 x 10E-7 cm/second with resulting Darcian Velocities of 3.1 x 10E-8 to 1.04 x 10E-8 cm/second.

The best agreement in values of hydraulic conductivity are between the logs, lab tests and slug tests. The higher values from the old tracer test may be due to the presence of a bed of horizontally oriented, gypsum filled fractures, as well as granular and nodular gypsum that occur at the same level in the screened intervals of both wells. If this hypothesis is true, the bed may have provided an open conduit for ground-water flow due to shrinkage of clay around the nodules. However, induced pressure due to overpressure (>50 psi) by drilling fluids is highly probable. This problem will be addressed later when the tracer tests are completed.

A pattern of wells has been installed to perform a more rigorous series of tracer tests, but as yet these wells have not equilibrated. The tests cannot begin until such time as the gradient between wells has stabilized. Results of this testing will be given at a later date.

TABLE 5

HYDRAULIC CONDUCTIVITY MEASUREMENTS

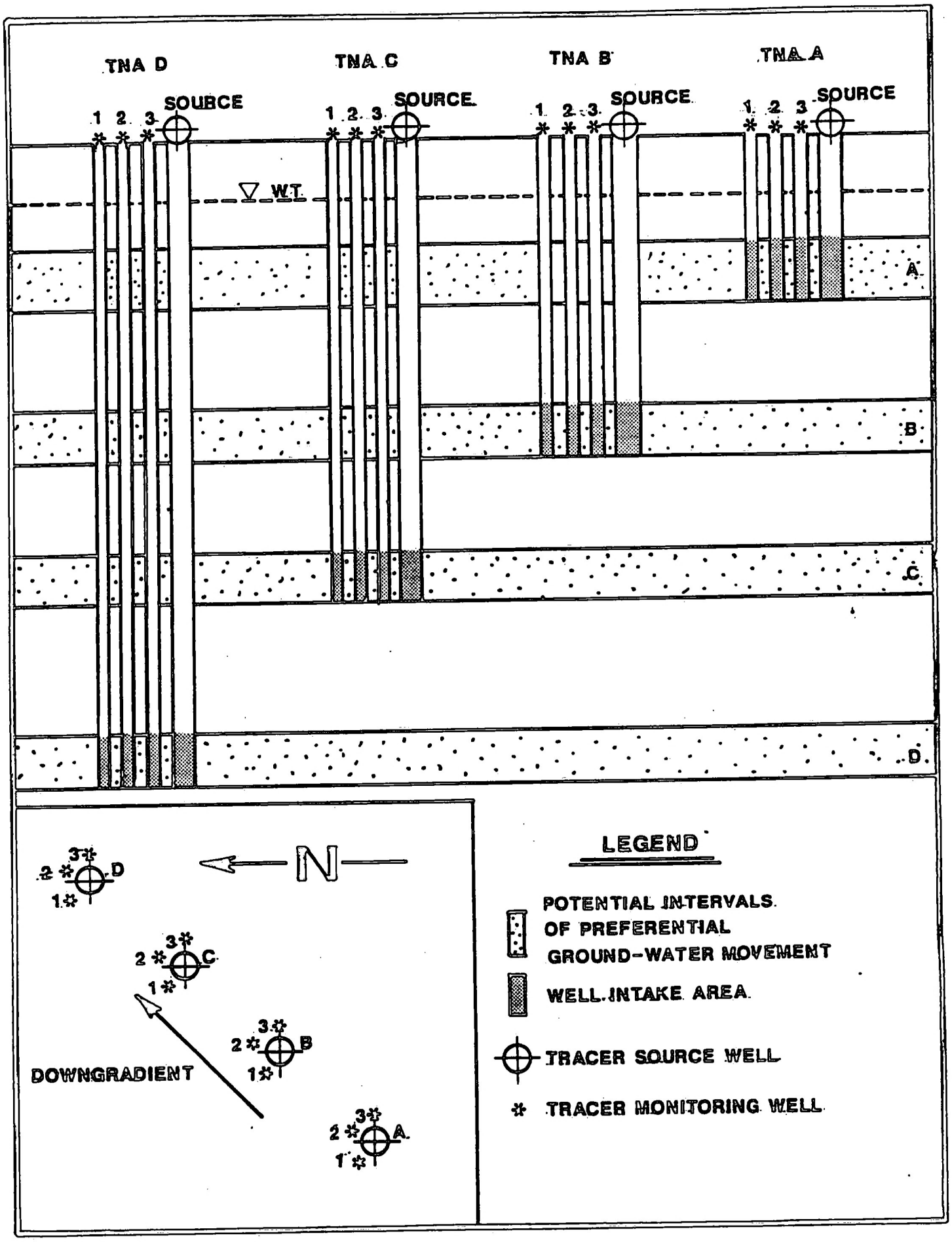
WELL	TEST	HYDRAULIC CONDUCTIVITY (K)(cm/sec)	GRADIENT ($^{dh}/dl$)	=K($^{dh}/dl$) DARCIAN VELOCITY (cm/sec)
LB-1B	Slug	2.10×10^{-6}	0.04	8.40×10^{-8}
LB-3A	Slug	5.30×10^{-6}	0.04	2.10×10^{-7}
LB-1A	Slug	4.71×10^{-6}	0.04	1.90×10^{-7}
HLB-4	Lab	2.60×10^{-7}	0.04	1.04×10^{-8}
HLB-7	Lab	5.20×10^{-7}	0.06	3.10×10^{-8}
LB-1	Log Calculations	3.50×10^{-6}	0.04	1.40×10^{-7}
LB-2	Log Calculations	8.90×10^{-6}	0.15	1.30×10^{-6}
LB-3	Log Calculations	8.90×10^{-5}	0.04	3.50×10^{-6}
LB-3				1.55×10^{-4}
HLB-4	Tracer		0.12	*4.70×10^{-4}
				*Seepage Velocity

*Seepage velocity is the velocity of ground-water flow within the voids or fractures. The tracer test results were assumed to represent seepage velocity. Darcian Velocity is averaged over both the solids and voids and/or fractures and is derived by multiplying seepage velocity by the porosity (33% as measured by Core Lab).

TABLE 6

NEW TRACER NESTS
LOCATION AND ELEVATION

EX. WELL	LOCATION	SECTION	TOWNSHIP/RANGE	NORTH	EAST	TOP OF PVC PIPE	GROUND ELEV.+
TNA-1	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	13952.1	9271.9	1373.83	1370.6
TNA-2	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	13950.5	9275.6	1373.75	1370.6
TNA-3	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	13946.8	9276.9	1373.66	1370.6
TNA-S	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	13947.1	9272.0	1373.62	1370.8
TNA-1A	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	13959.0	9279.4	1373.66	1370.7
TNB-1	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	13976.2	9297.4	1372.45	1370.6
TNB-2	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	13974.7	9300.9	1372.38	1370.4
TNB-3	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	13970.4	9302.5	1372.37	1370.5
TNB-S	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	13971.3	9297.3	1372.58	1370.4
TNC-1	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	13993.4	9315.6	1372.67	1370.3
TNC-2	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	13991.6	9319.1	1372.33	1370.2
TNC-3	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	13988.6	9320.4	1371.81	1370.4
TNC-S	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	13988.4	9315.4	1373.25	1370.4
TND-1	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	14010.8	9333.1	1372.52	1369.9
TND-2	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	14009.4	9336.9	1372.15	1370.2
TND-3	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	14004.9	9338.2	1372.25	1370.1
TND-S	E/2-NE/4-SW/4-SE/4-SE/4	28	T23N-R15W I.M.	14005.7	9333.5	1371.52	1370.1



TRACER STUDY

RELATIONSHIP BETWEEN SOURCE AND RECEPTOR WELLS

FIG. E-6.4

TRACER TESTS
December, 1987 thru February, 1988
(Lone Mountain - USPCI Project)

WELL TNA-S

DATE	Br	I	K
12-09	760,000.0	745,000.0	1,170,000.0
12-21	94,000.0	7,900.0	20,850.0
12-29	55,000.0	77,500.0	17,700.0
01-04	77,500.0	99,500.0	16,300.0
01-13	89,500.0	77,500.0	13,000.0
01-19	100,000.0	73,000.0	12,350.0
01-27	47,500.0	74,500.0	9,950.0
02-01	45,000.0	67,000.0	7,900.0
02-15	56,500.0	50,500.0	37,400.0
02-29	49,000.0	63,000.0	10,500.0

WELL TNA-1

DATE	Br	I	K	Br - C/Co
12-09	100.0	14.5	46.0	0.000
12-21	10.0	1.0	45.0	0.000
12-29	415.0	550.0	214.5	0.008
01-04	32.5	20.5	360.0	0.000
01-13	68.5	2.0	38.0	0.000
01-19	20.5	35.5	50.0	0.000
01-27	38.5	55.0	39.2	0.001
02-01	42.0	25.0	56.5	0.001
02-15	45.0	2.2	85.0	0.001
02-29	55.0	22.0	36.0	0.001

WELL TNA-1A

DATE	Br	I	K	Br - C/Co
12-09	110.0	10.0	47.0	0.000
12-21	14.0	1.0	49.5	0.000
12-29	19.0	2.5	51.0	0.000
01-04	40.0	1.4	50.0	0.000
01-13	25.0	2.0	38.0	0.000
01-19	10.0	1.6	44.0	0.000
01-27	25.0	1.0	49.2	0.001
02-01	33.0	5.5	49.5	0.001
02-15	40.0	10.0	86.0	0.001
02-29	48.0	1.5	35.0	0.001

TRACER TESTS
December, 1987 thru February, 1988
(Lone Mountain - USPCI Project)

WELL TNA-2

DATE	Br	I	K	Br - C/Co
12-09	115.0	10.0	48.5	0.000
12-21	14.5	2.5	58.5	0.000
12-29	13.0	7.8	55.0	0.000
01-04	40.0	6.5	43.0	0.000
01-13	38.5	40.0	43.0	0.000
01-19	10.0	5.0	41.5	0.000
01-27	28.0	1.0	48.2	0.001
02-01	36.0	4.0	60.5	0.001
02-15	40.0	5.0	89.0	0.001
02-29	43.0	3.6	36.0	0.001

WELL TNA-3

DATE	Br	I	K	Br - C/Co
12-09	117.0	10.0	47.0	0.000
12-21	17.0	1.0	49.0	0.000
12-29	14.5	2.6	60.5	0.000
01-04	32.5	2.0	49.0	0.000
01-13	26.5	9.2	46.0	0.000
01-19	10.0	2.0	42.0	0.000
01-27	28.0	1.0	47.2	0.001
02-01	36.0	1.0	64.0	0.001
02-15	48.0	1.0	89.0	0.001
02-29	45.0	1.2	43.0	0.001

WELL TNB-S

DATE	Br	I	K
12-09	22,000.0	2,800.0	77,000.0
12-21	9,200.0	1,750.0	11,150.0
12-29	5,500.0	2,500.0	4,700.0
01-04	10,000.0	3,550.0	5,950.0
01-13	10,000.0	1,900.0	4,700.0
01-19	1,750.0	2,050.0	5,650.0
01-27	10,000.0	2,000.0	7,200.0
02-01	10,000.0	1,000.0	2,850.0
02-15	13,000.0	1,500.0	5,000.0
02-29	12,000.0	1,500.0	5,645.0

TRACER TESTS
December, 1987 thru February, 1988
(Lone Mountain - USPCI Project)

WELL TNB-1

DATE	Br	I	K	Br - C/Co
12-09	205.0	10.0	97.5	0.009
12-21	26.5	1.2	72.0	0.003
12-29	26.5	4.0	89.5	0.005
01-04	62.5	4.4	70.0	0.006
01-13	40.0	4.8	61.0	0.004
01-19	14.5	2.5	73.5	0.008
01-27	42.0	1.0	37.2	0.004
02-01	50.0	1.0	80.5	0.005
02-15	63.0	1.8	89.0	0.005
02-29	57.0	2.3	47.0	0.005

WELL TNB-2

DATE	Br	I	K	Br - C/Co
12-09	205.0	10.0	71.5	0.009
12-21	14.0	1.0	52.0	0.002
12-29	18.0	2.6	49.5	0.003
01-04	62.0	3.6	65.0	0.006
01-13	22.0	3.2	45.5	0.002
01-19	10.0	2.1	51.0	0.006
01-27	42.0	1.0	25.0	0.004
02-01	41.0	1.0	64.0	0.004
02-15	61.0	1.3	86.0	0.005
02-29	52.0	1.0	40.0	0.004

WELL TNB-3

DATE	Br	I	K	Br - C/Co
12-09	160.0	10.0	50.0	0.007
12-21	14.5	1.0	53.0	0.002
12-29	19.0	2.5	65.0	0.003
01-04	55.0	2.0	53.5	0.006
01-13	19.0	3.0	52.5	0.002
01-19	14.0	2.0	41.0	0.008
01-27	32.0	1.0	24.5	0.003
02-01	40.0	1.0	60.5	0.004
02-15	57.0	1.0	87.0	0.004
02-29	50.0	1.0	39.0	0.004

TRACER TESTS
December, 1987 thru February, 1988
(Lone Mountain - USPCI Project)

WELL TNC-S

DATE	Br	I	K
12-09	13,000.0	1,000.0	47,000.0
12-21	1,900.0	1,000.0	1,290.0
12-29	3,000.0	1,000.0	4,850.0
01-04	5,500.0	2,050.0	2,600.0
01-13	3,250.0	1,000.0	2,500.0
01-19	1,000.0	1,000.0	1,830.0
01-27	1,800.0	1,000.0	3,150.0
02-01	5,000.0	1,000.0	2,100.0
02-15	7,300.0	700.0	2,515.0
02-29	4,500.0	2,000.0	3,155.0

WELL TNC-1

DATE	Br	I	K	Br - C/Co
12-09	985.0	11.5	162.5	0.080
12-21	745.0	100.0	155.0	0.400
12-29	28.0	100.0	180.5	0.009
01-04	475.0	50.0	145.0	0.090
01-13	385.0	100.0	148.0	0.120
01-19	130.0	100.0	103.0	0.013
01-27	190.0	10.0	145.5	0.110
02-01	100.0	10.0	173.0	0.020
02-15	235.0	13.0	215.0	0.030
02-29	190.0	12.0	115.0	0.040

WELL TNC-2

DATE	Br	I	K	Br - C/Co
12-09	970.0	11.5	202.0	0.070
12-21	490.0	100.0	170.0	0.300
12-29	16.0	100.0	196.5	0.005
01-04	385.0	50.0	178.0	0.070
01-13	400.0	100.0	144.0	0.120
01-19	130.0	100.0	135.0	0.013
01-27	220.0	10.0	146.0	0.120
02-01	105.0	10.0	165.0	0.020
02-15	235.0	14.0	216.0	0.030
02-29	185.0	10.0	114.0	0.040

TRACER TESTS
December, 1987 thru February, 1988
(Lone Mountain - USPCI Project)

WELL TNC-3

DATE	Br	I	K	Br - C/Co
12-09	980.0	11.5	287.5	0.080
12-21	210.0	100.0	175.0	0.100
12-29	12.0	100.0	238.0	0.004
01-04	325.0	50.0	271.0	0.060
01-13	325.0	100.0	163.0	0.100
01-19	100.0	100.0	142.0	0.010
01-27	220.0	10.0	181.0	0.120
02-01	265.0	10.0	204.0	0.100
02-15	265.0	14.5	224.0	0.040
02-29	200.0	13.0	128.0	0.040

WELL TND-S

DATE	Br	I	K
12-09	12,000.0	1,000.0	47,000.0
12-21	2,100.0	1,000.0	5,100.0
12-29	2,000.0	1,000.0	5,650.0
01-04	5,500.0	1,000.0	4,200.0
01-13	3,850.0	1,000.0	4,200.0
01-19	1,000.0	1,000.0	3,800.0
01-27	1,700.0	1,000.0	4,050.0
02-01	4,000.0	1,000.0	3,200.0
02-15	7,300.0	650.0	4,875.0
02-29	4,000.0	300.0	3,325.0

WELL TND-1

DATE	Br	I	K	Br - C/Co
12-09	925.0	43.0	215.0	0.080
12-21	535.0	44.5	230.0	0.300
12-29	565.0	92.5	246.0	0.280
01-04	775.0	16.5	203.0	0.140
01-13	625.0	55.0	188.0	0.160
01-19	355.0	50.5	180.0	0.040
01-27	655.0	59.5	181.0	0.390
02-01	520.0	37.0	215.0	0.130
02-15	550.0	48.0	390.0	0.080
02-29	430.0	59.0	151.0	0.110

TRACER TESTS
December, 1987 thru February, 1988
(Lone Mountain - USPCI Project)

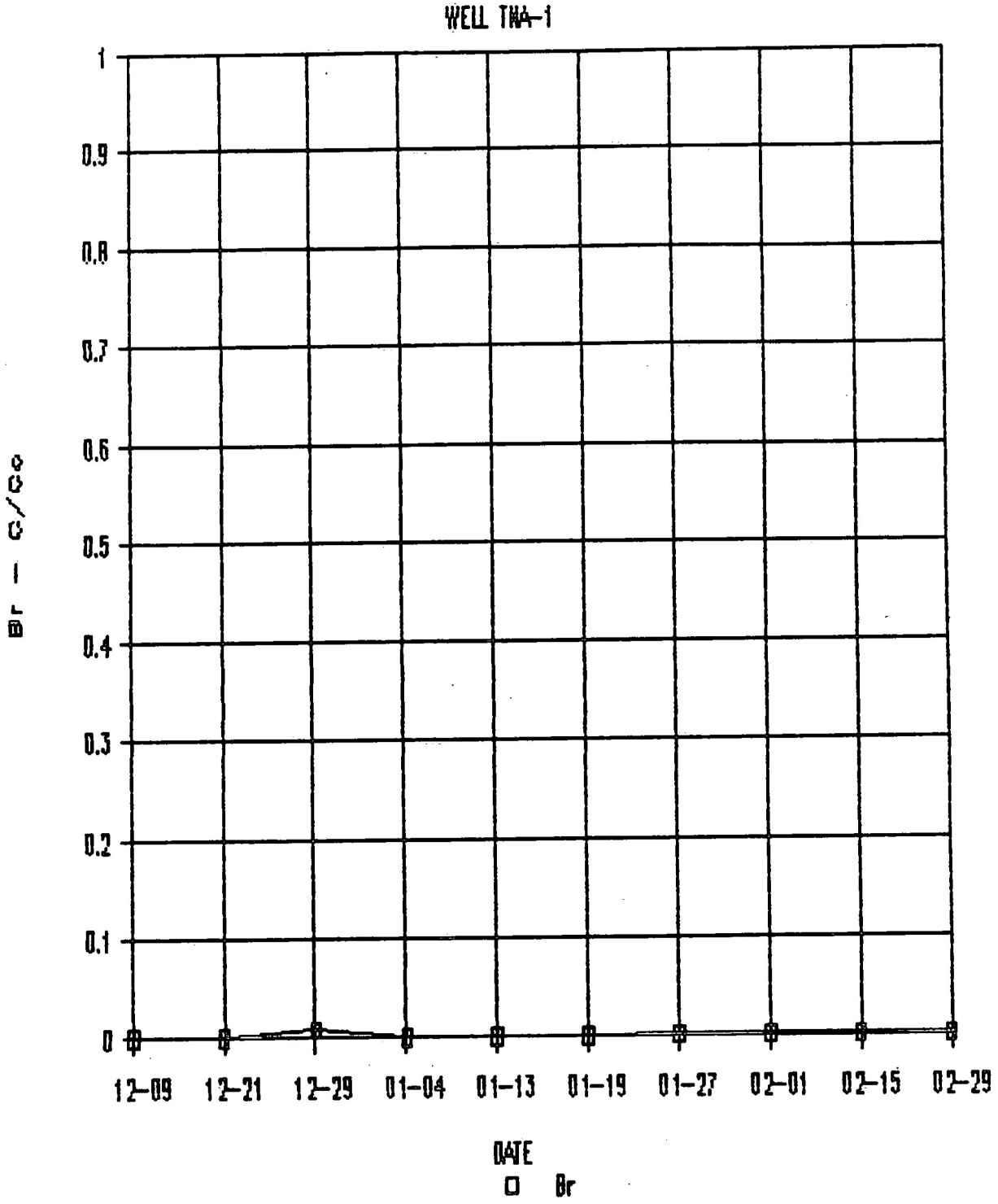
WELL TND-2

DATE	Br	I	K	Br - C/Co
12-09	850.0	47.5	248.0	0.070
12-21	535.0	55.0	230.0	0.300
12-29	565.0	92.5	288.0	0.280
01-04	700.0	16.5	206.0	0.130
01-13	625.0	54.0	180.0	0.160
01-19	355.0	40.0	173.0	0.040
01-27	655.0	65.5	197.0	0.390
02-01	520.0	40.0	236.0	0.130
02-15	550.0	55.0	416.0	0.080
02-29	400.0	55.0	146.0	0.100

WELL TND-3

DATE	Br	I	K	Br - C/Co
12-09	150.0	160.0	413.0	0.100
12-21	715.0	160.0	465.0	0.300
12-29	640.0	175.0	448.0	0.320
01-04	775.0	145.0	420.0	0.140
01-13	700.0	115.0	465.0	0.180
01-19	400.0	82.0	352.5	0.040
01-27	775.0	79.0	244.0	0.460
02-01	540.0	74.0	323.0	0.140
02-15	565.0	55.0	430.0	0.080
02-29	450.0	63.0	190.0	0.110

TRACER TESTS 12-87 THRU 02-88 Br - C/Co



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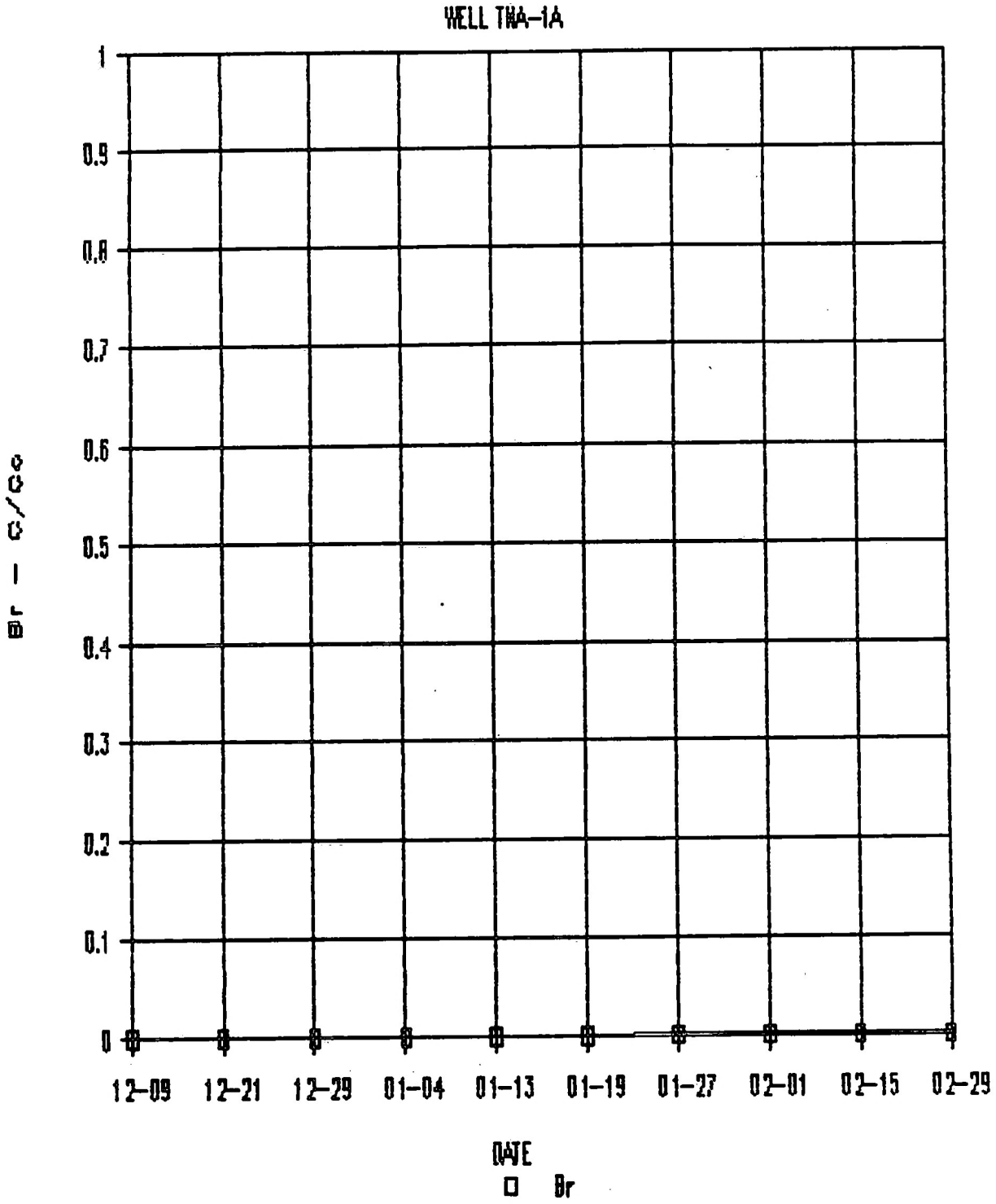

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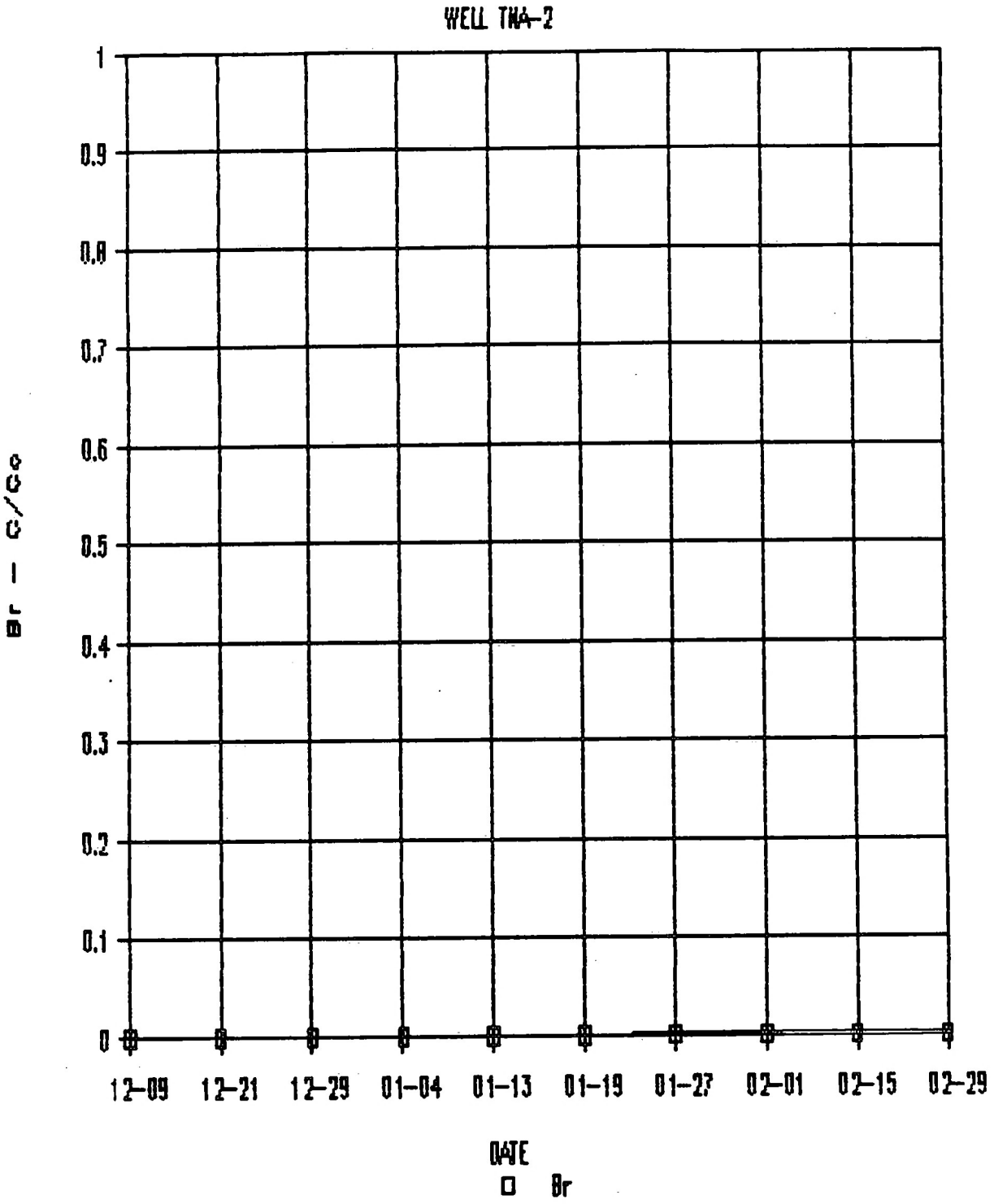

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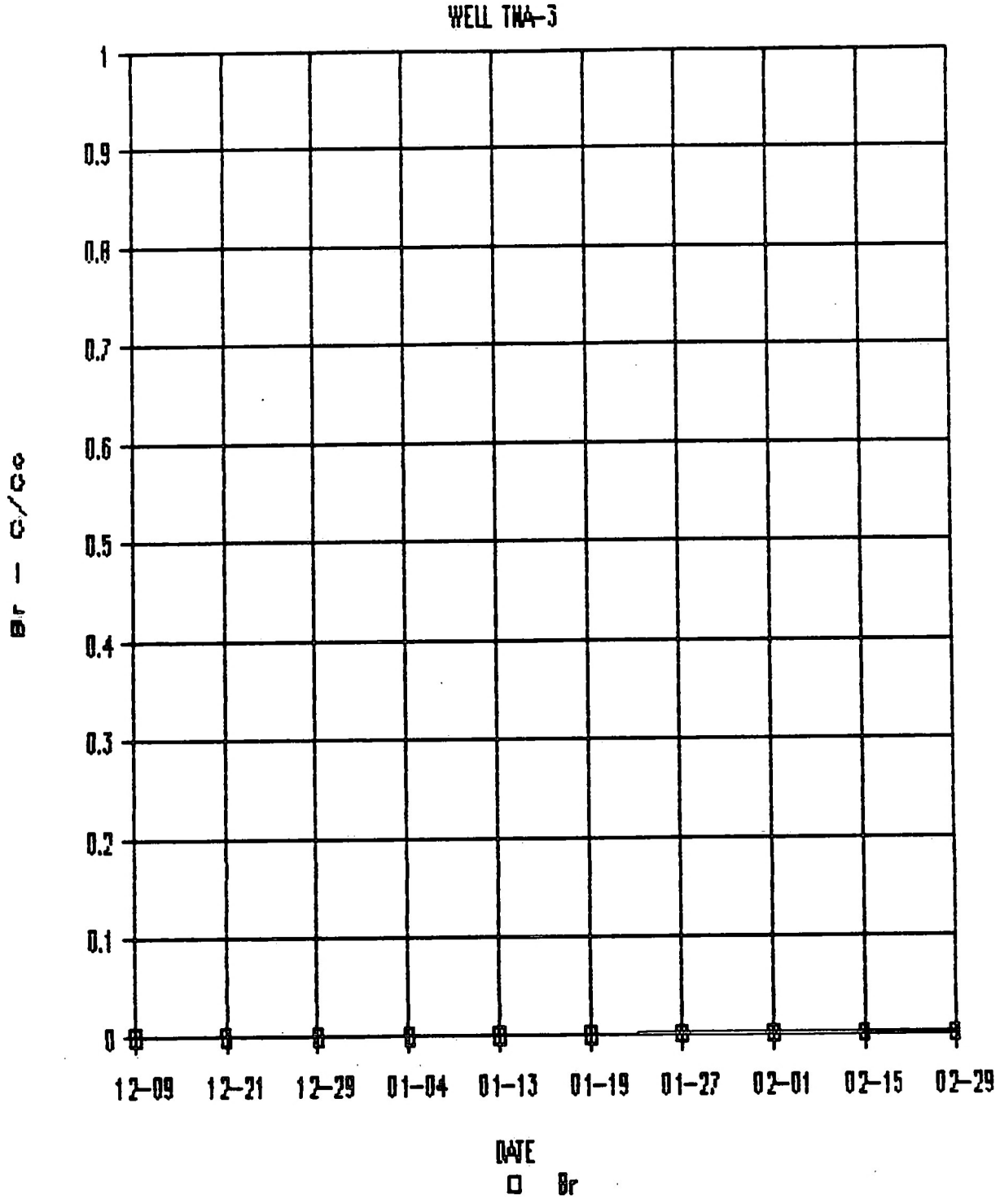

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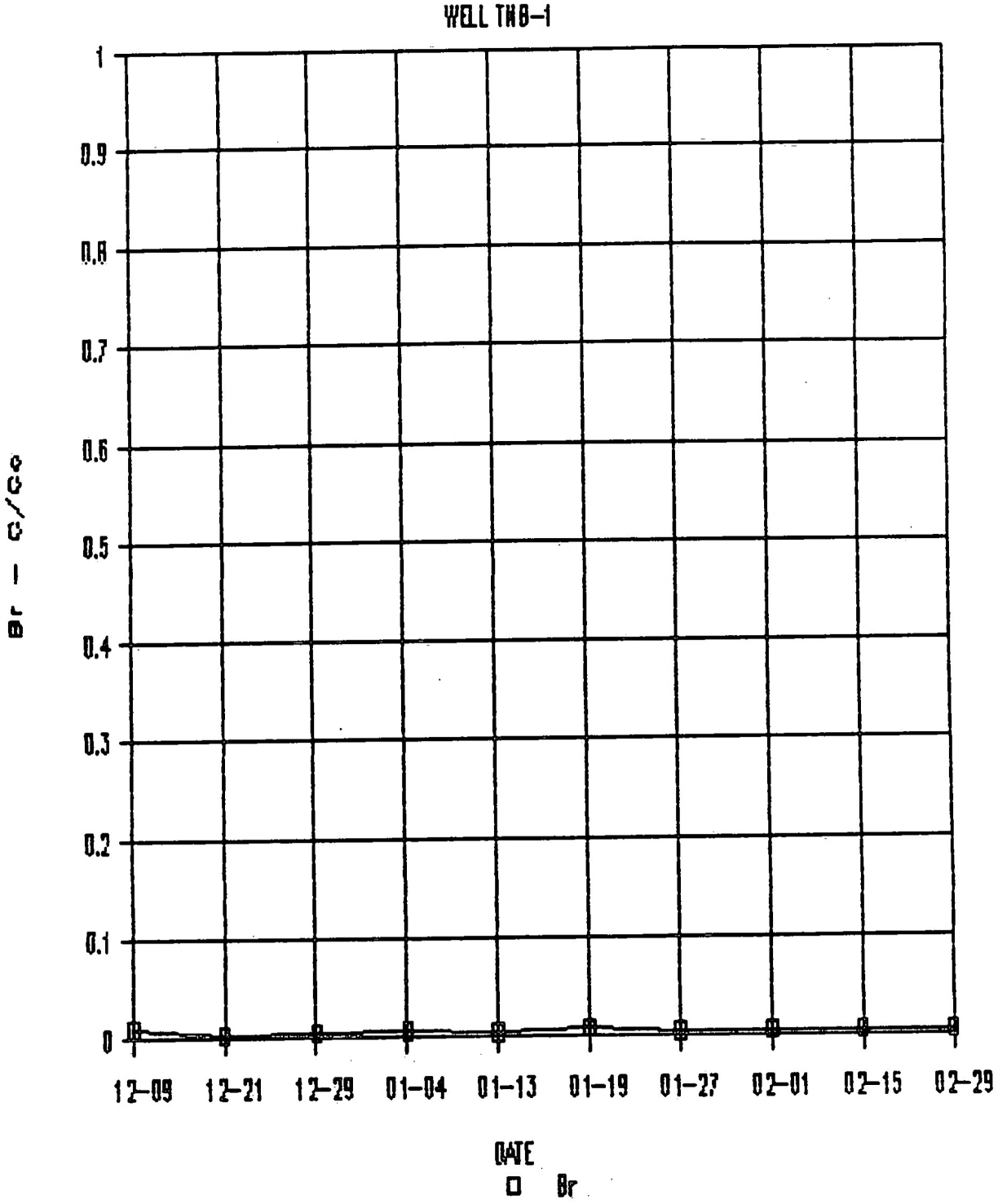

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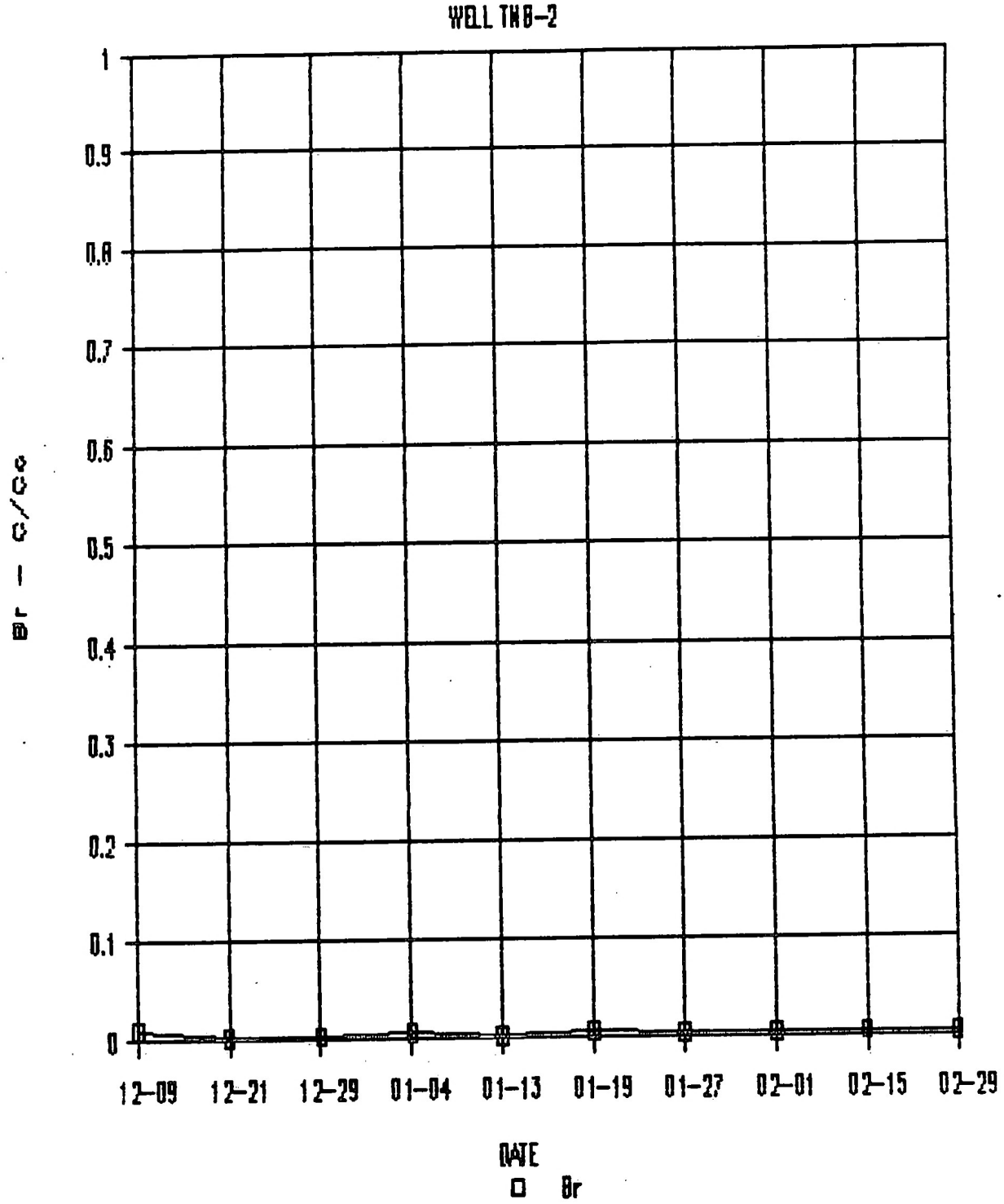

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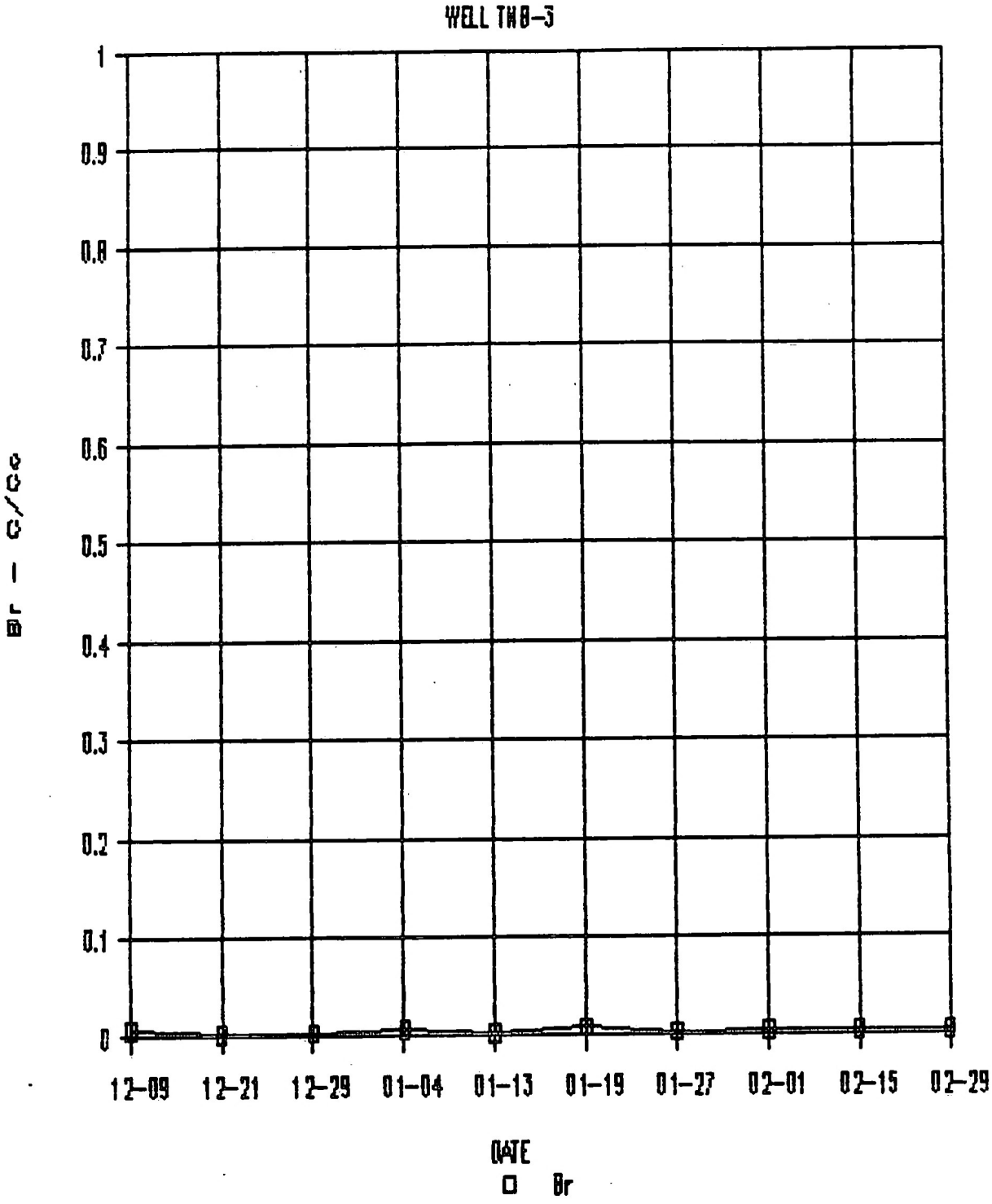

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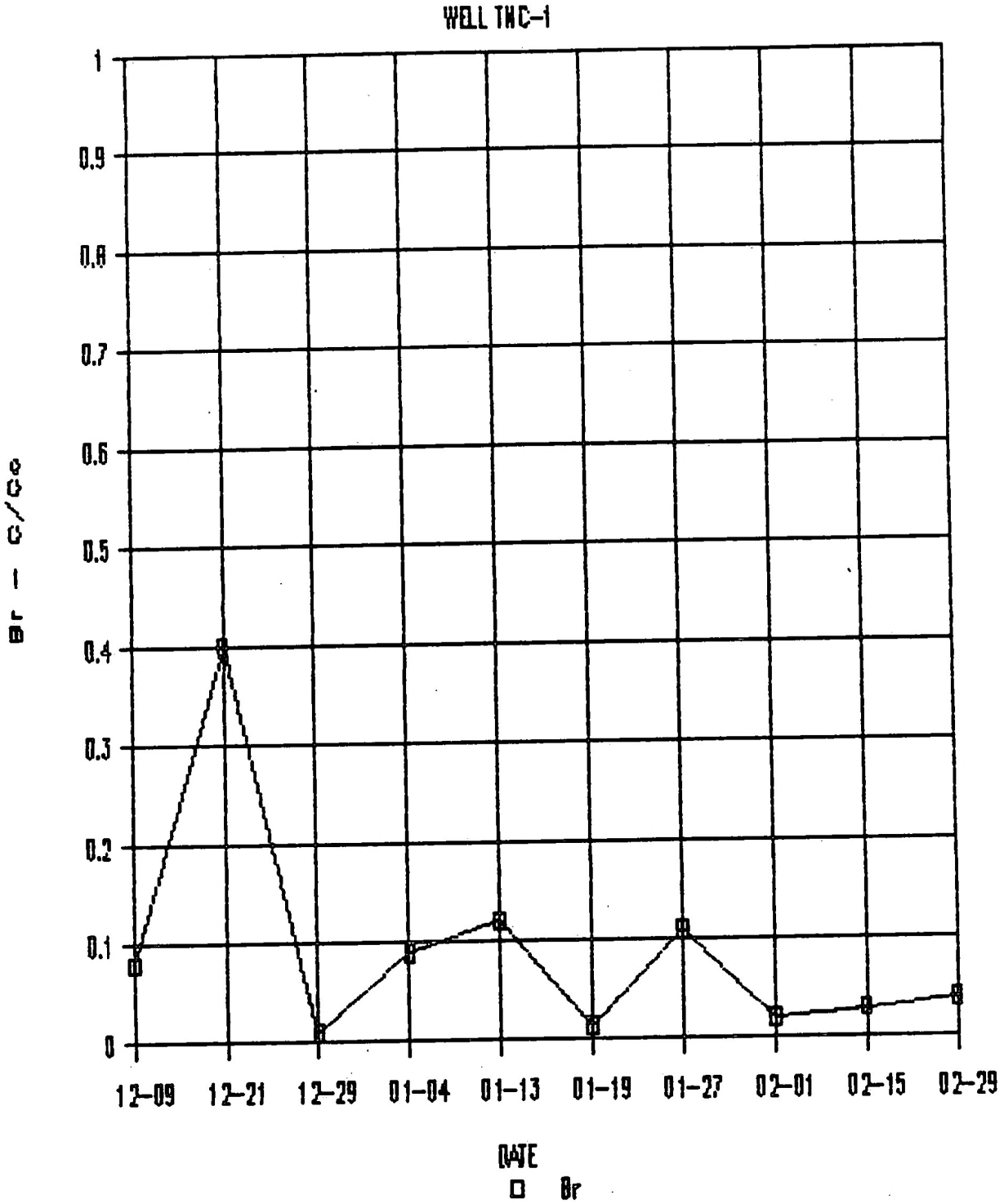

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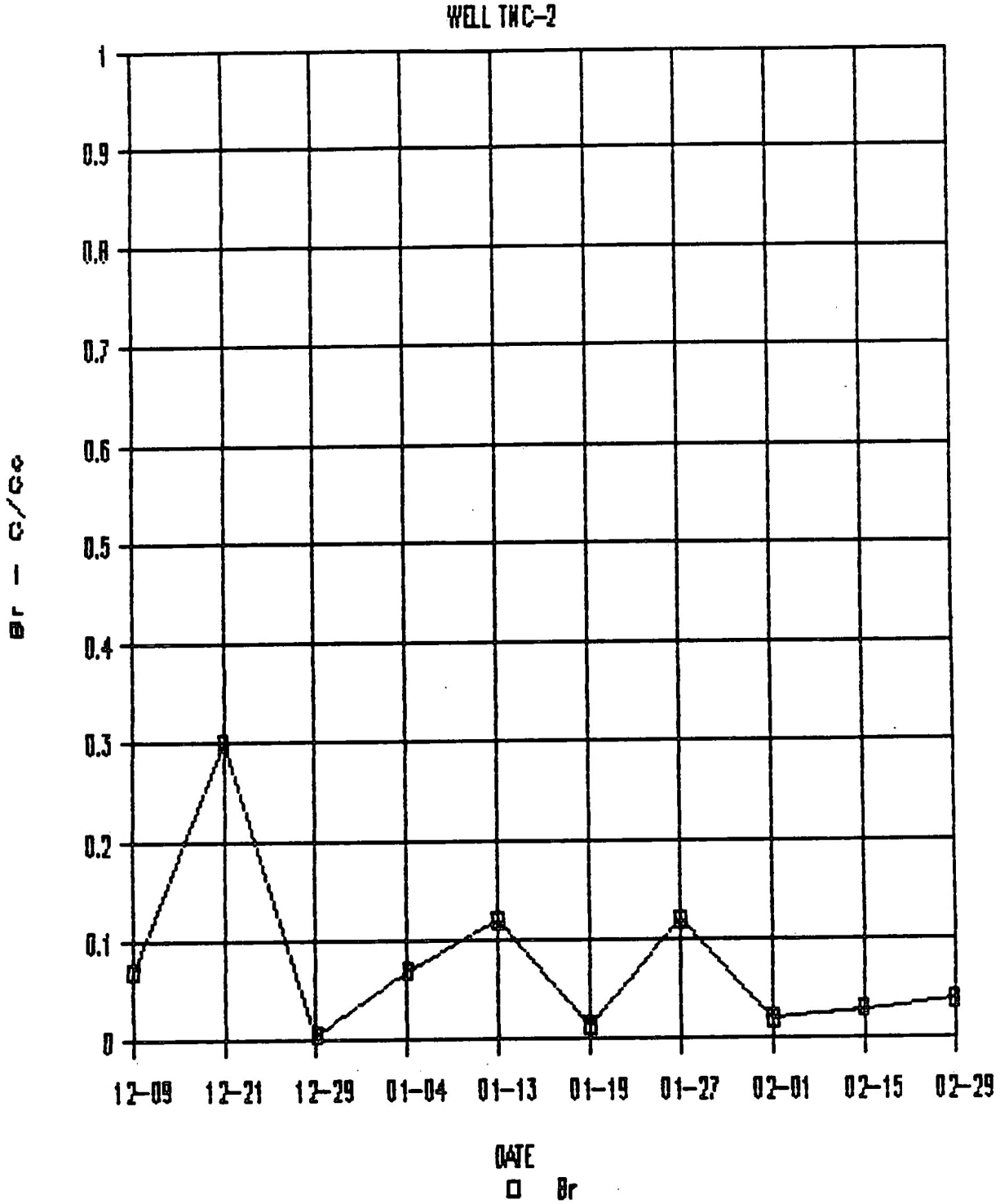

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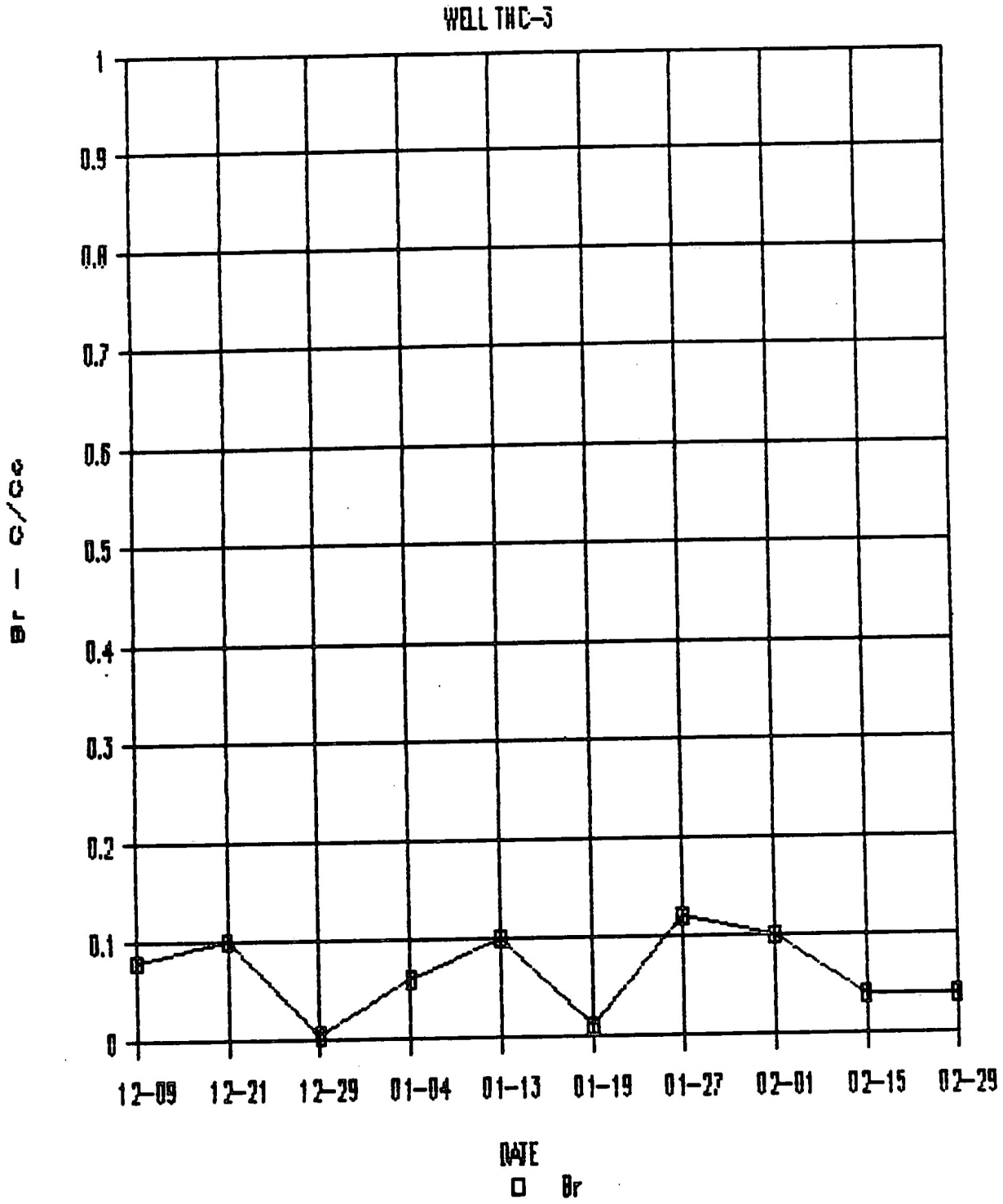

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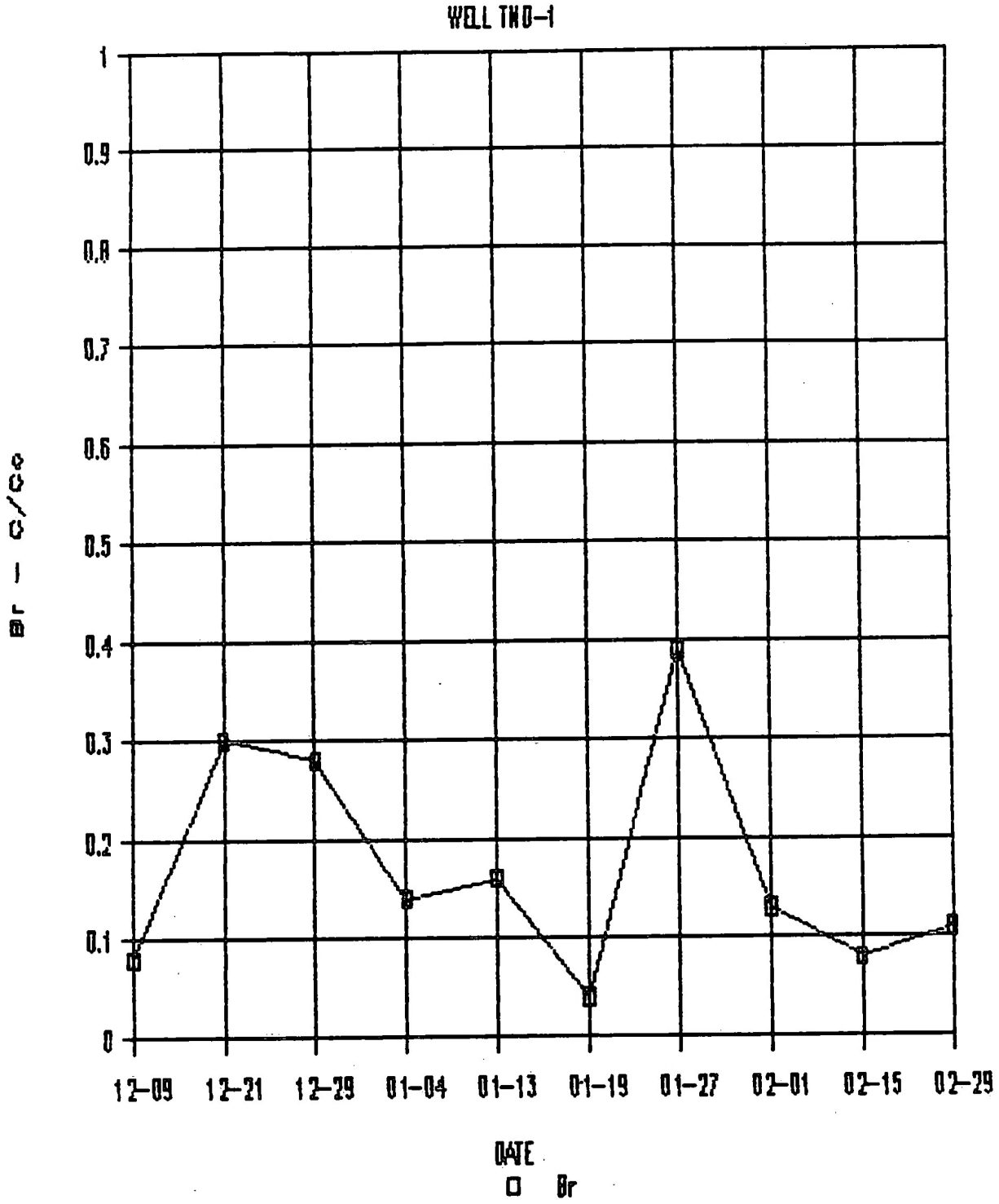

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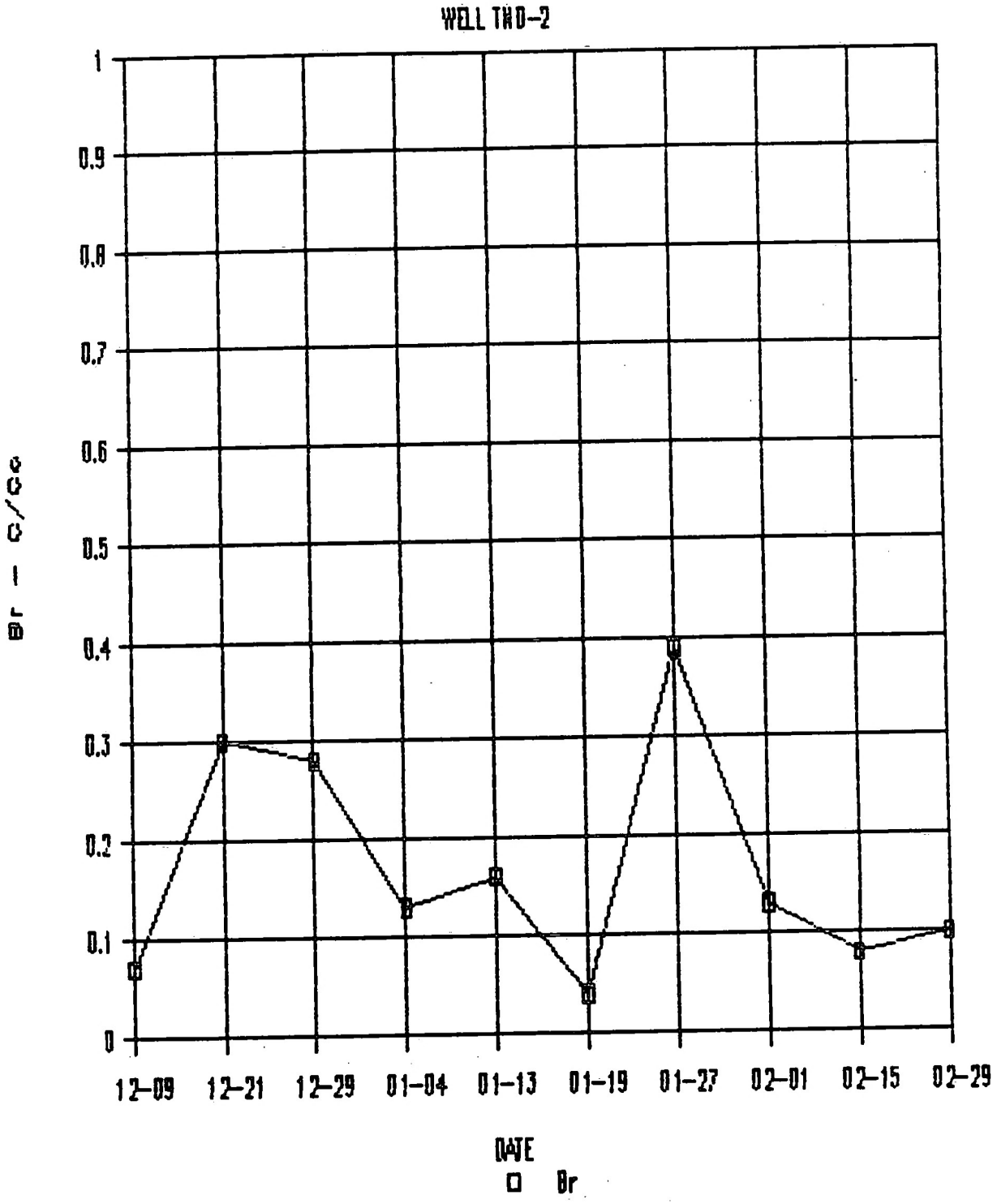
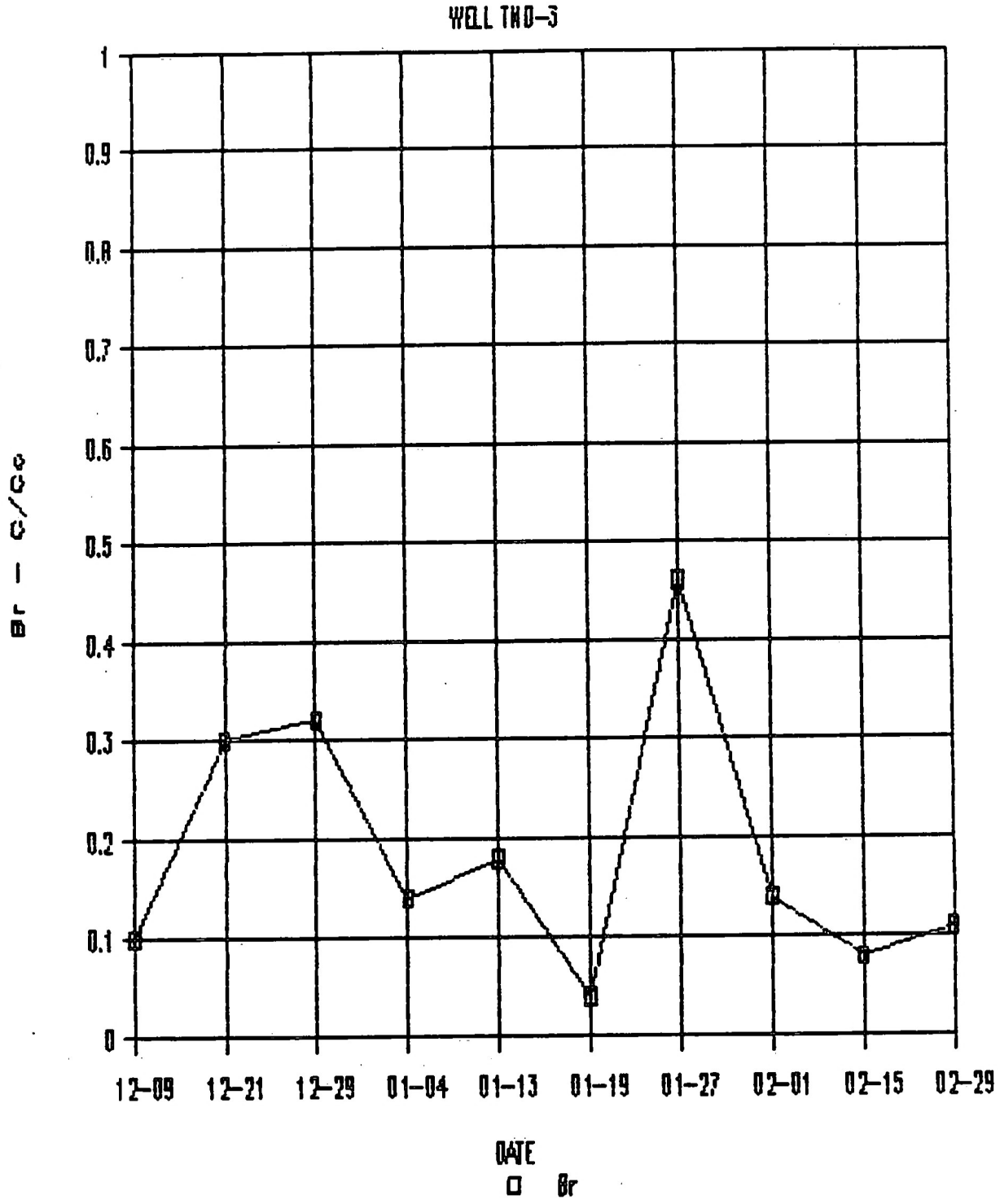


TRACER TESTS 12-87 THRU 02-88 Br - C/Co



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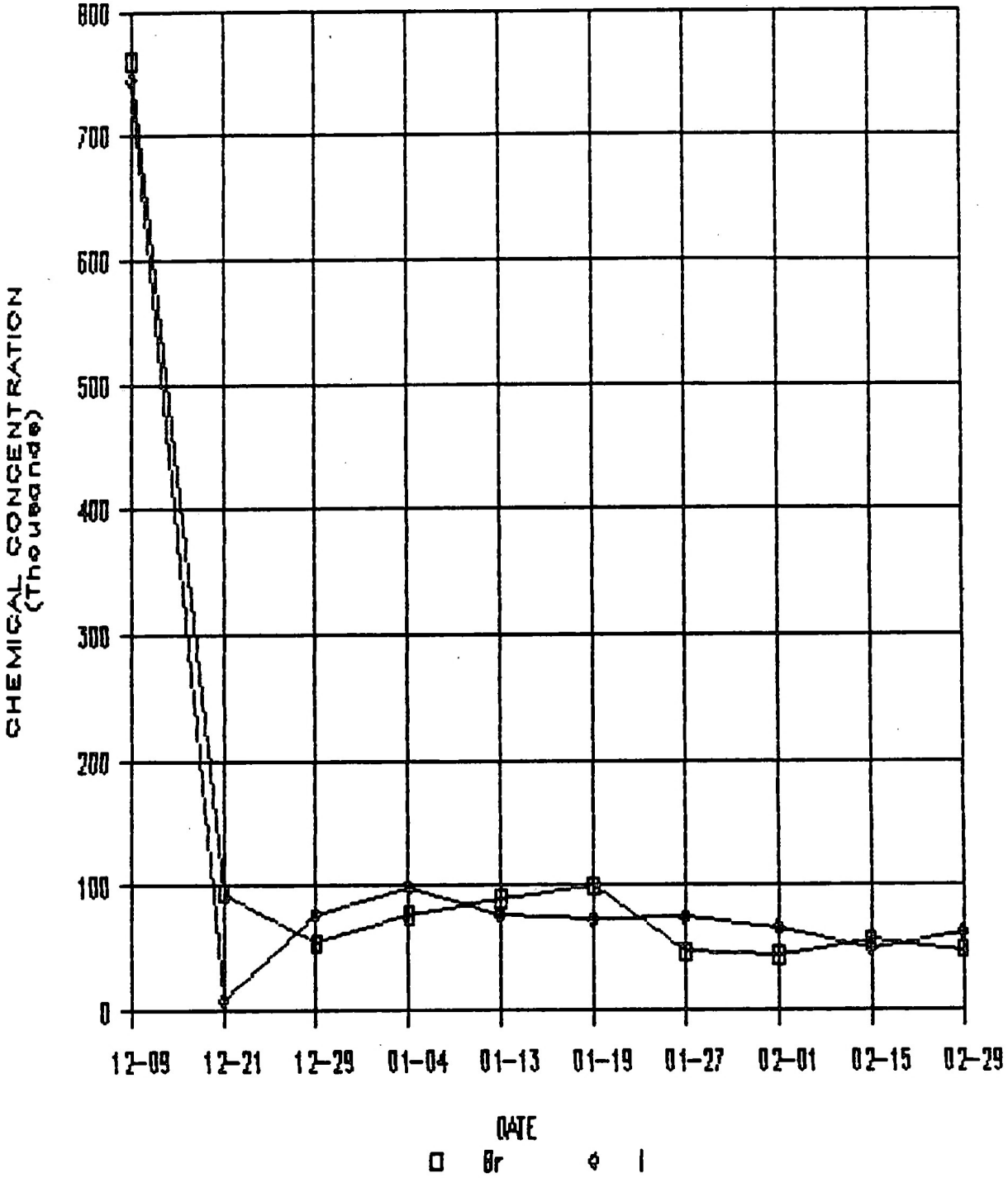
WELL TWA-5



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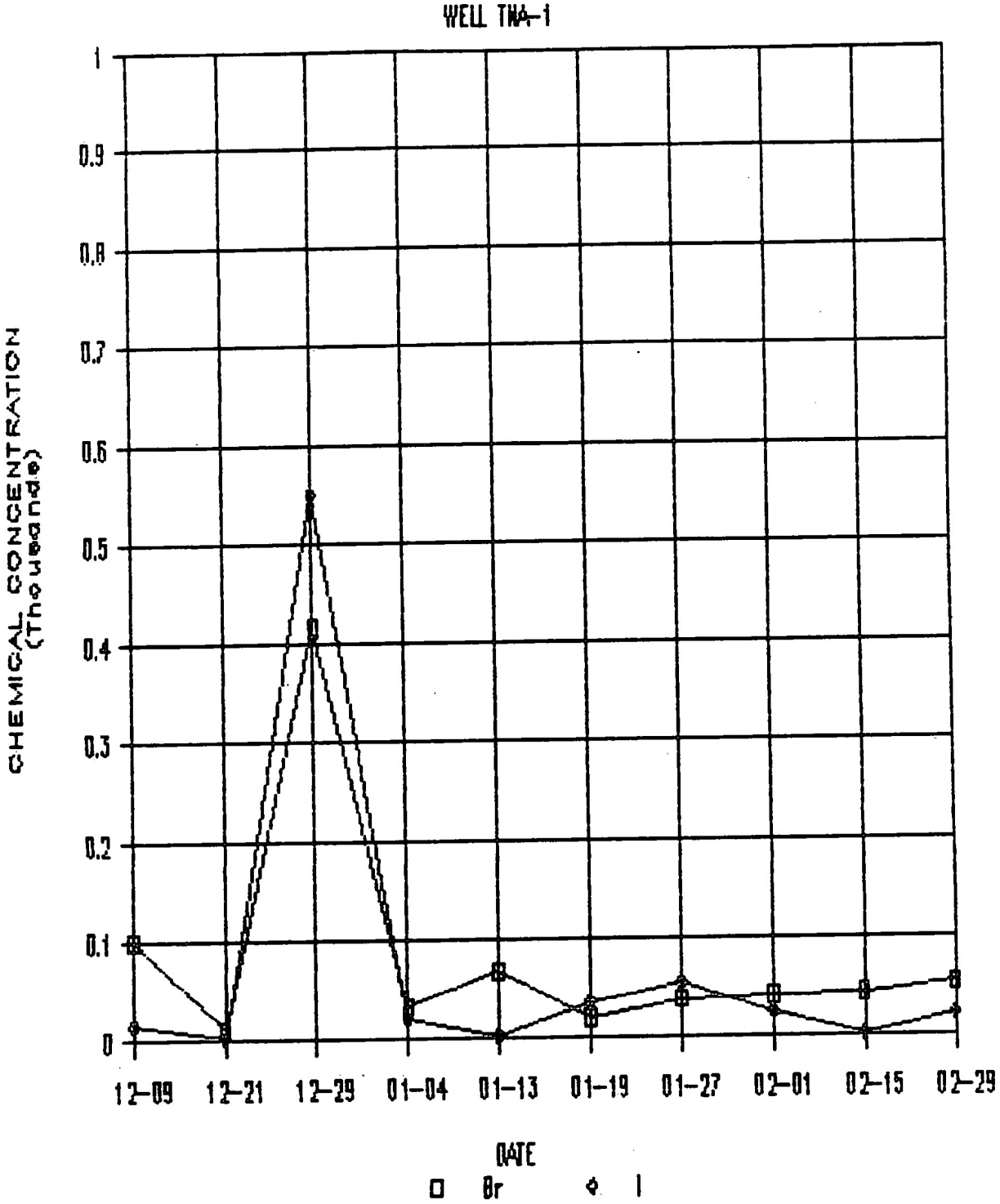

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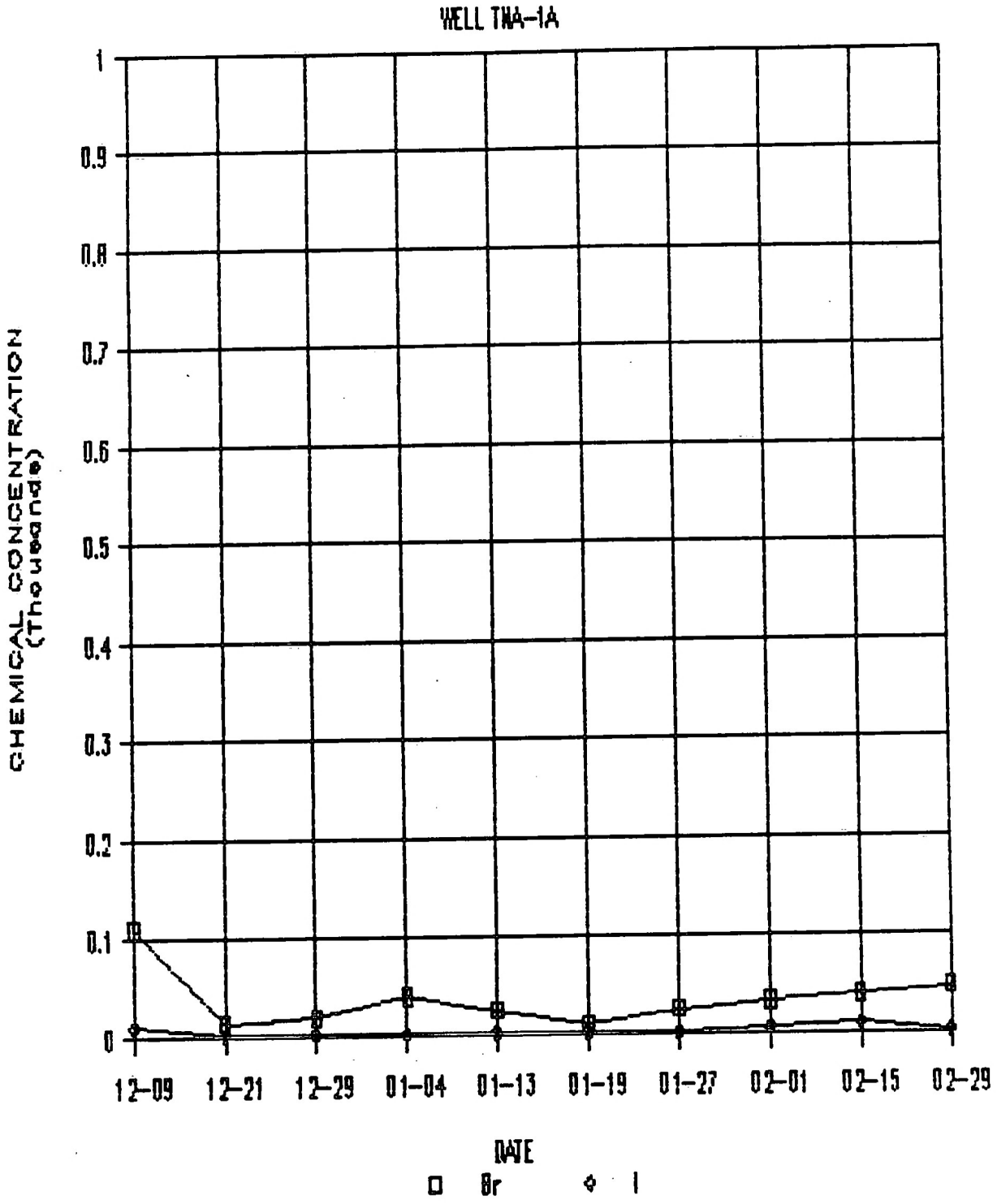

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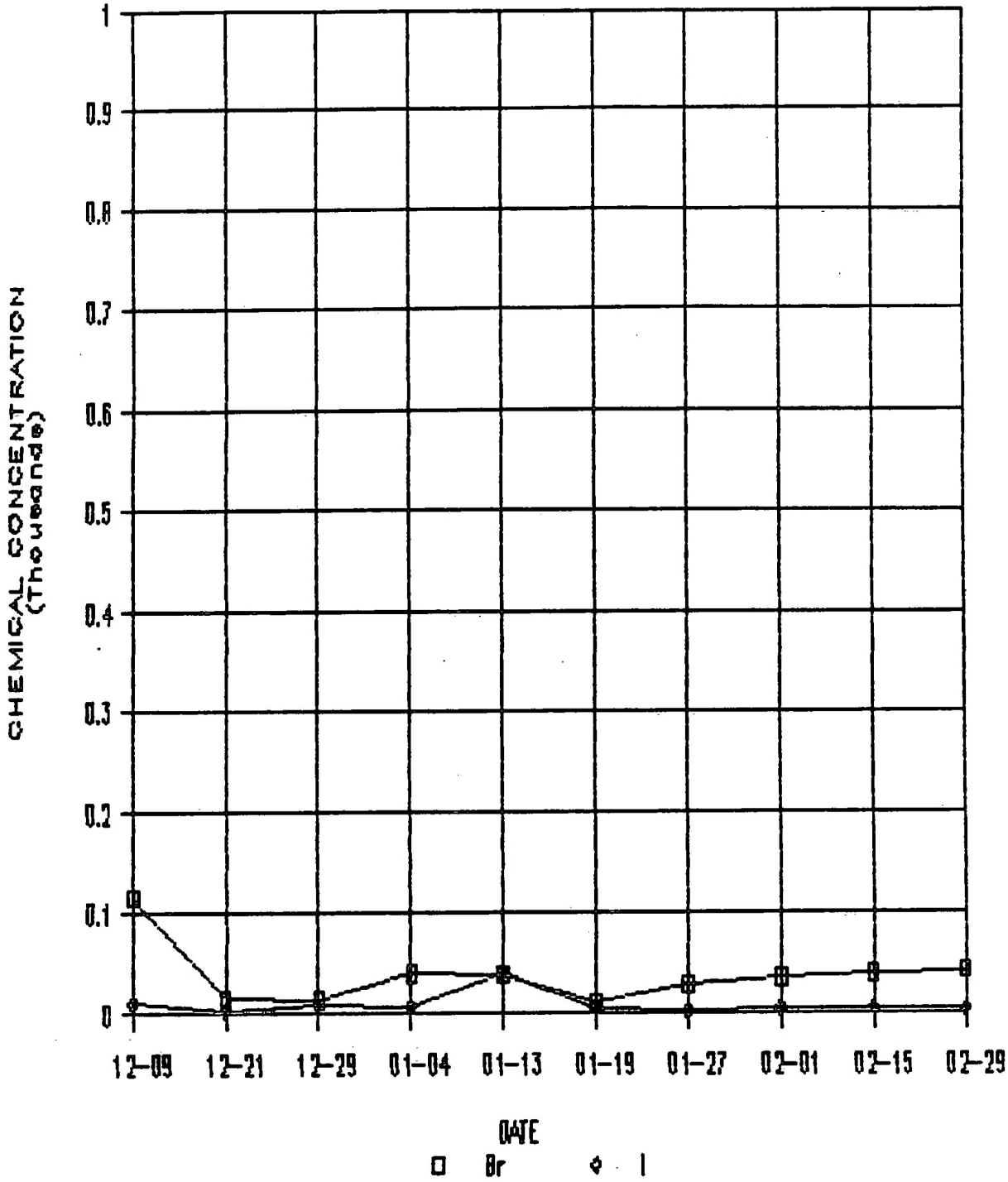
WELL TWA-2



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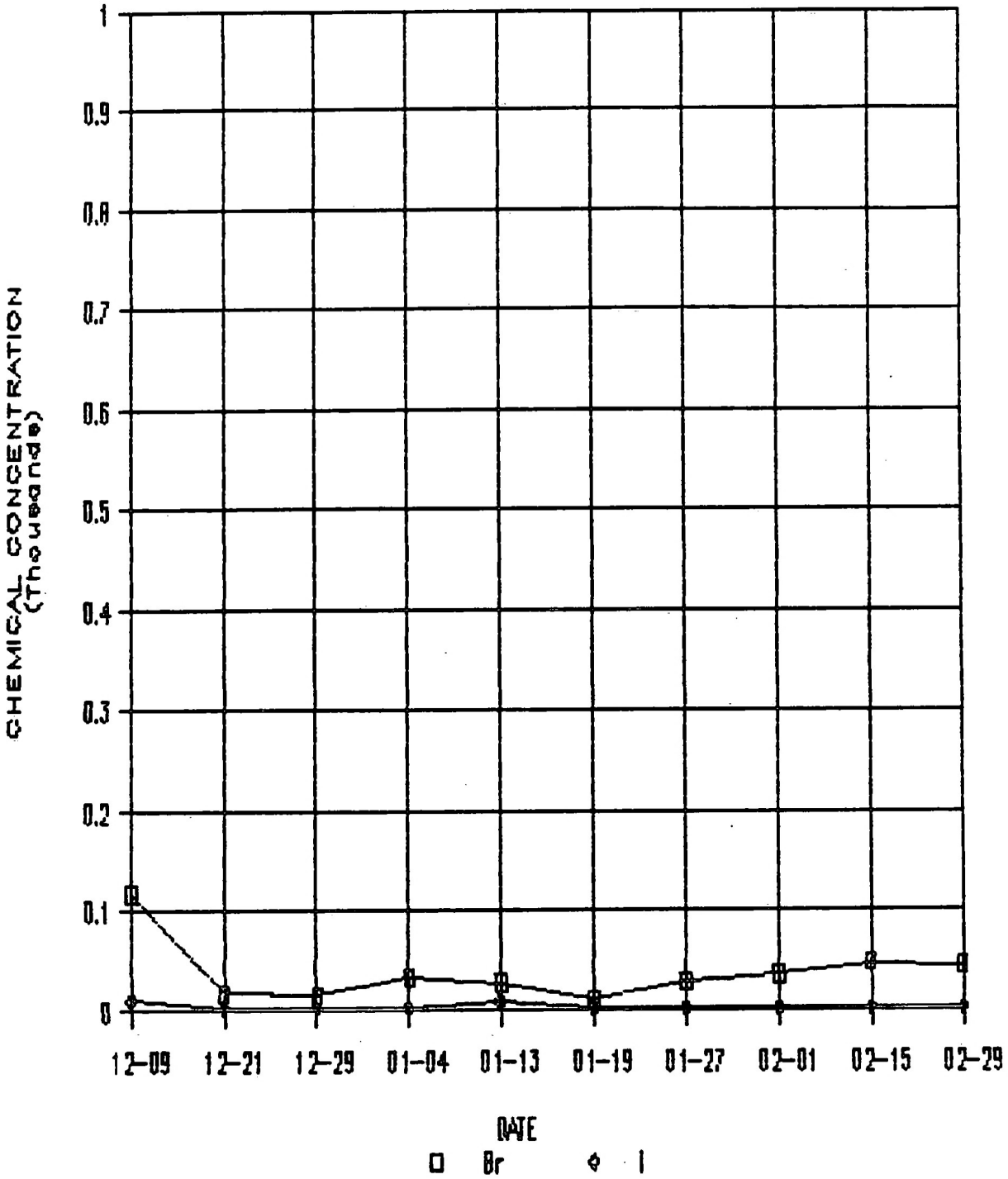
WELL TWA-3



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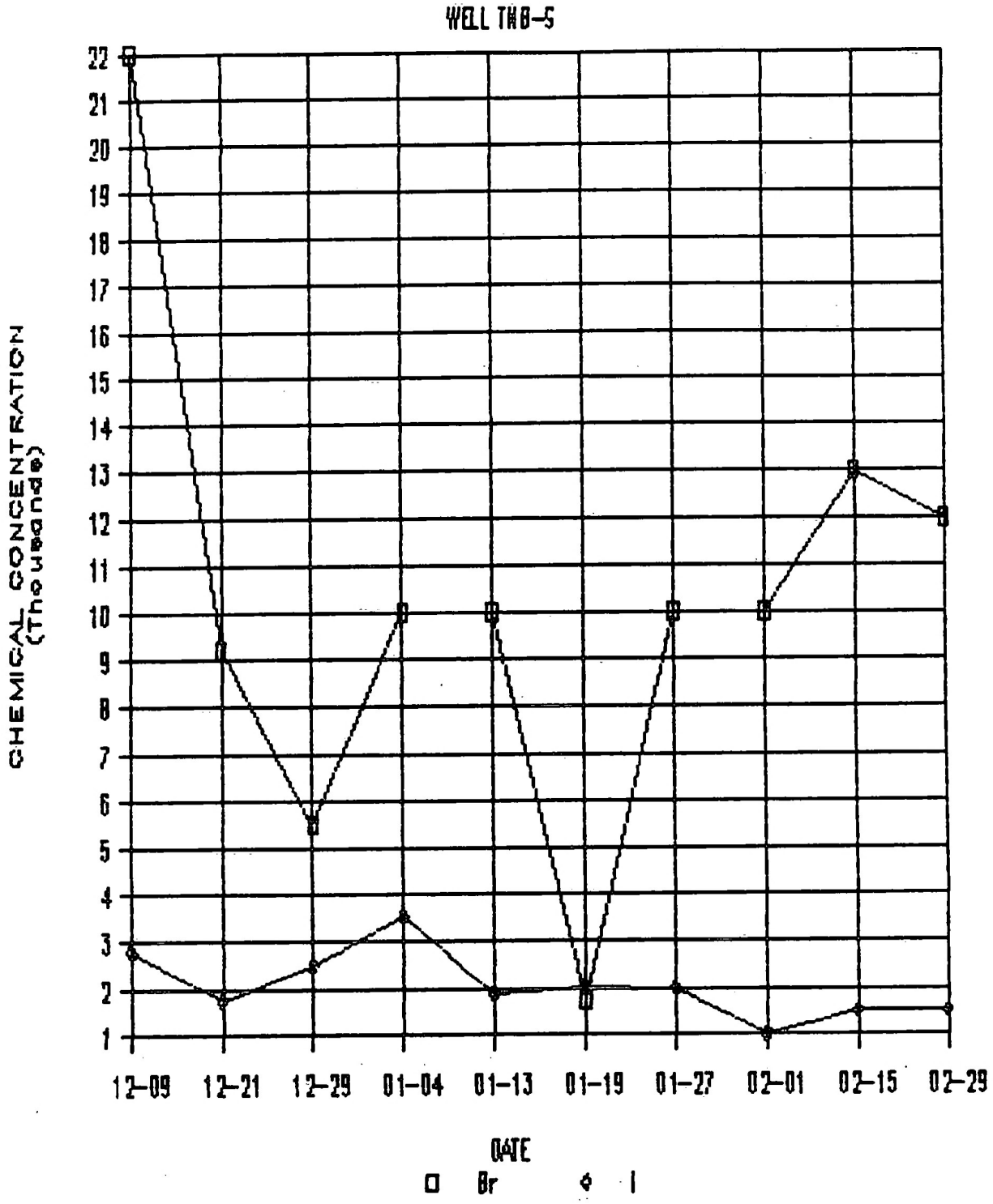

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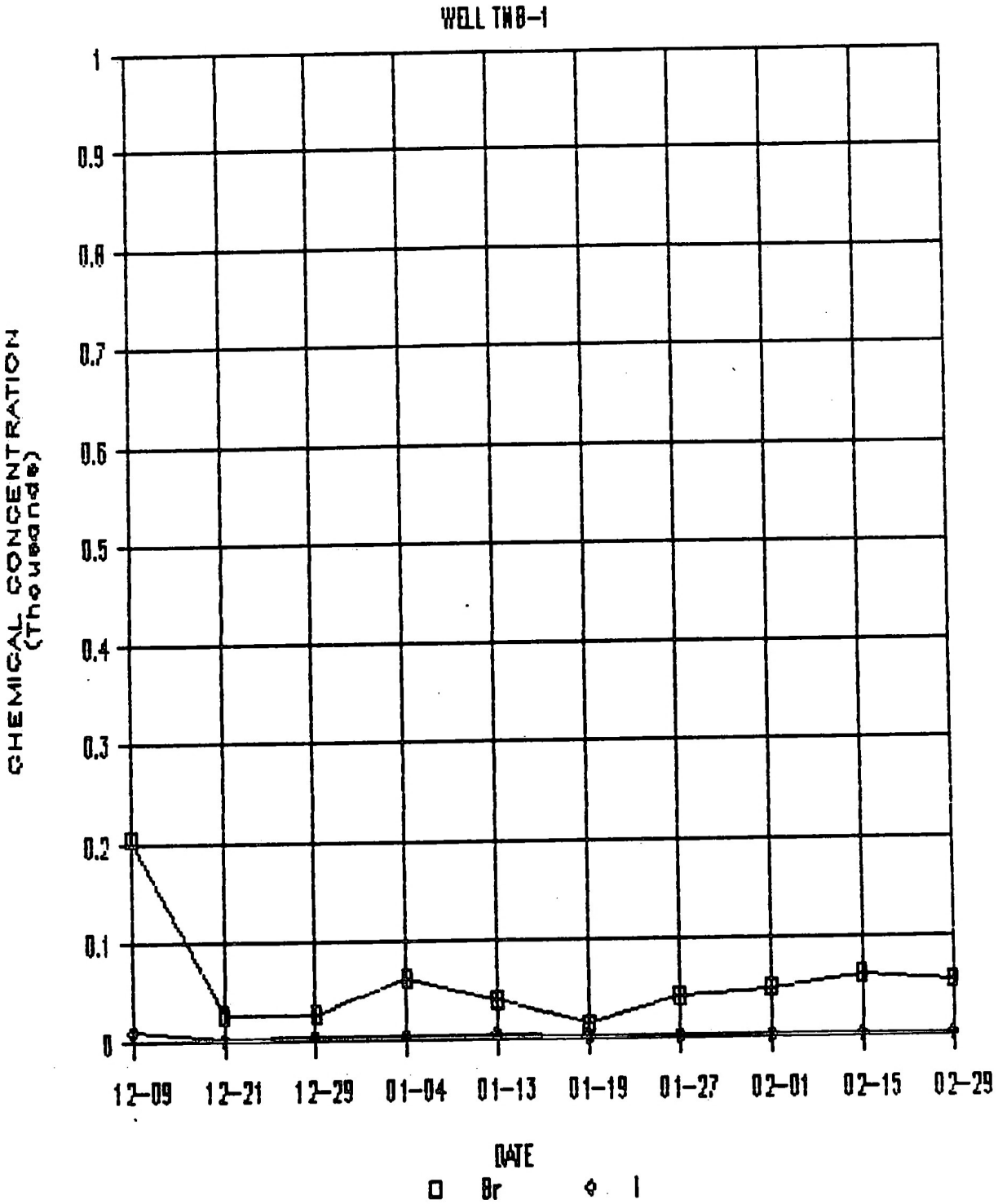

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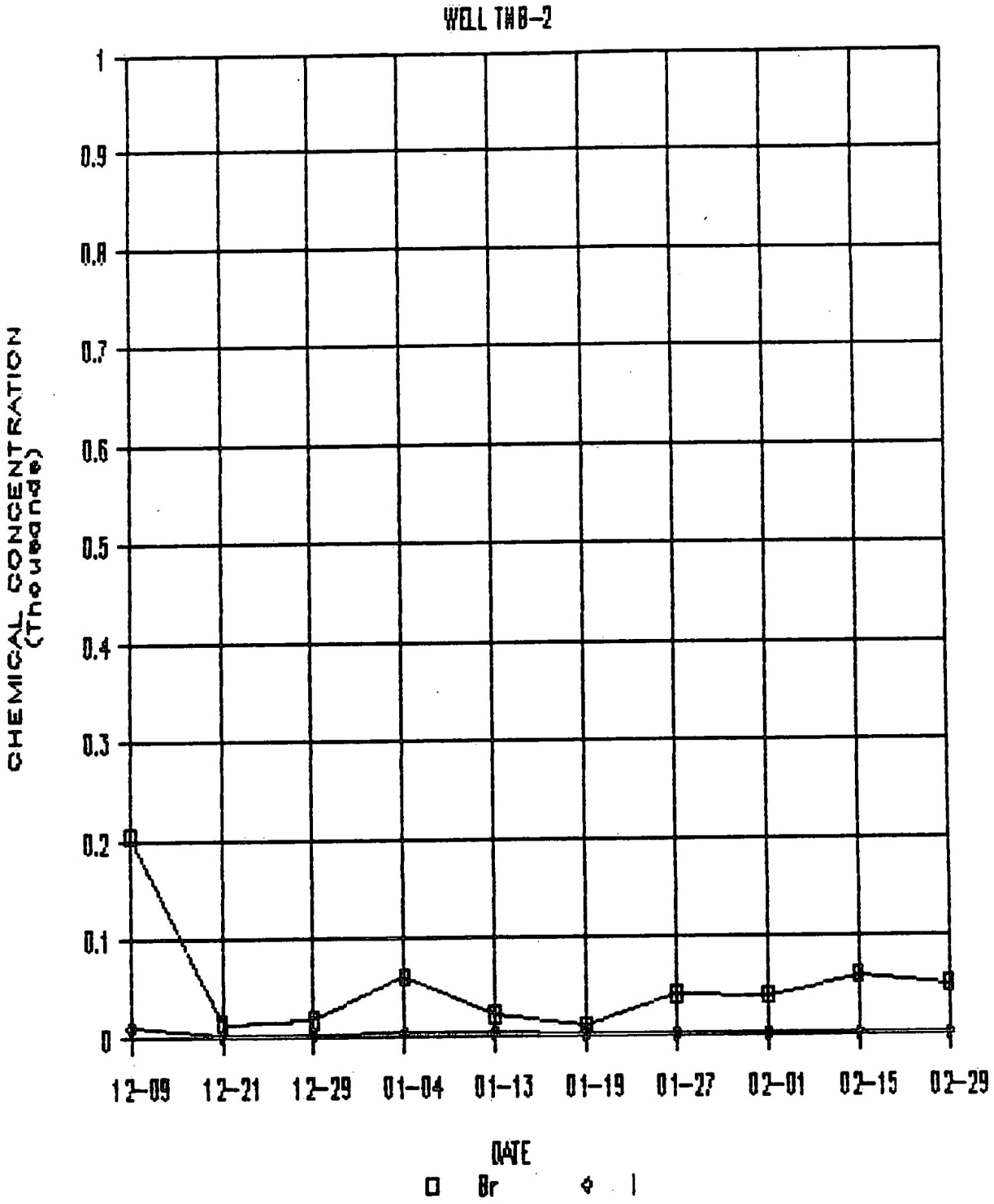

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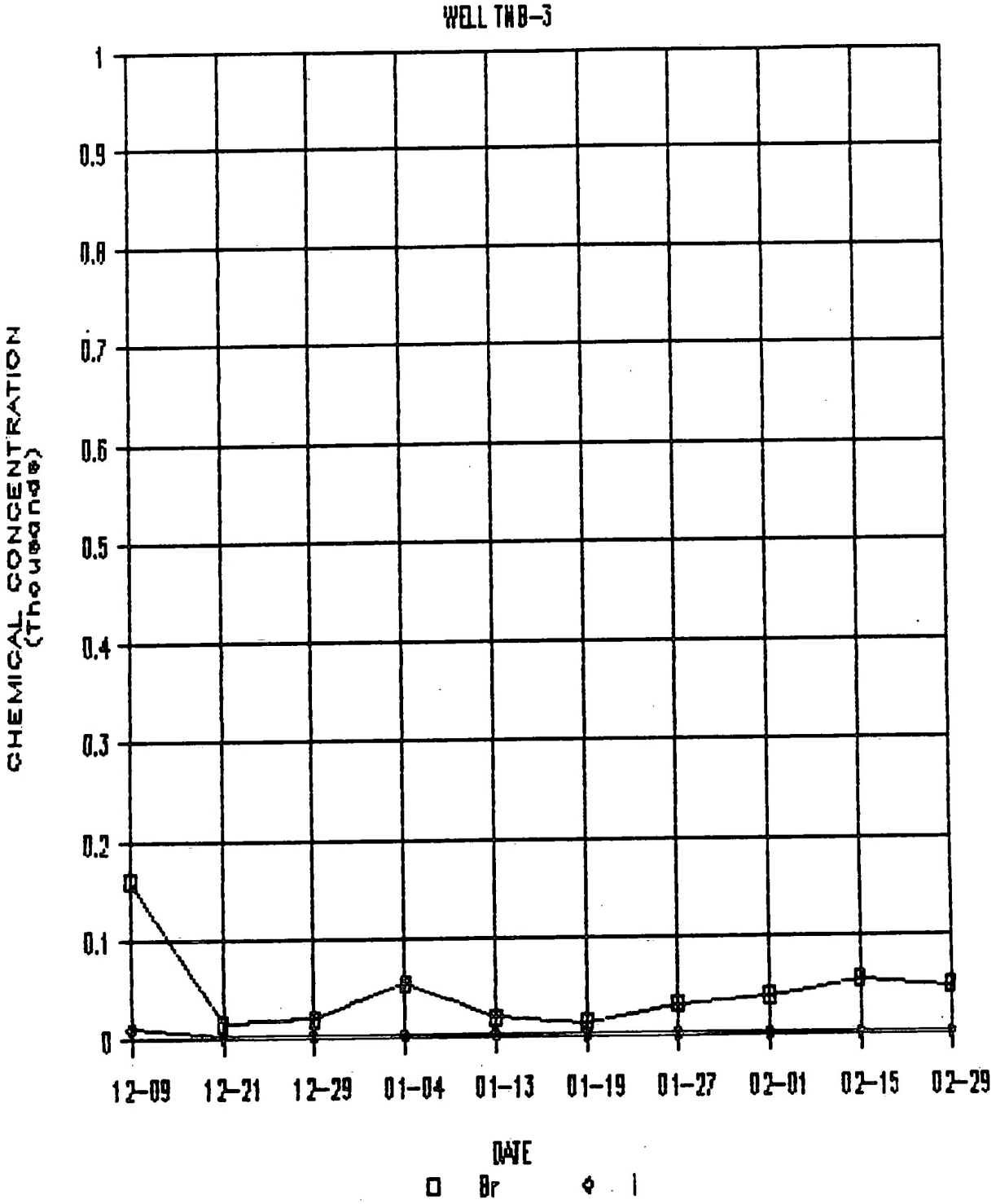

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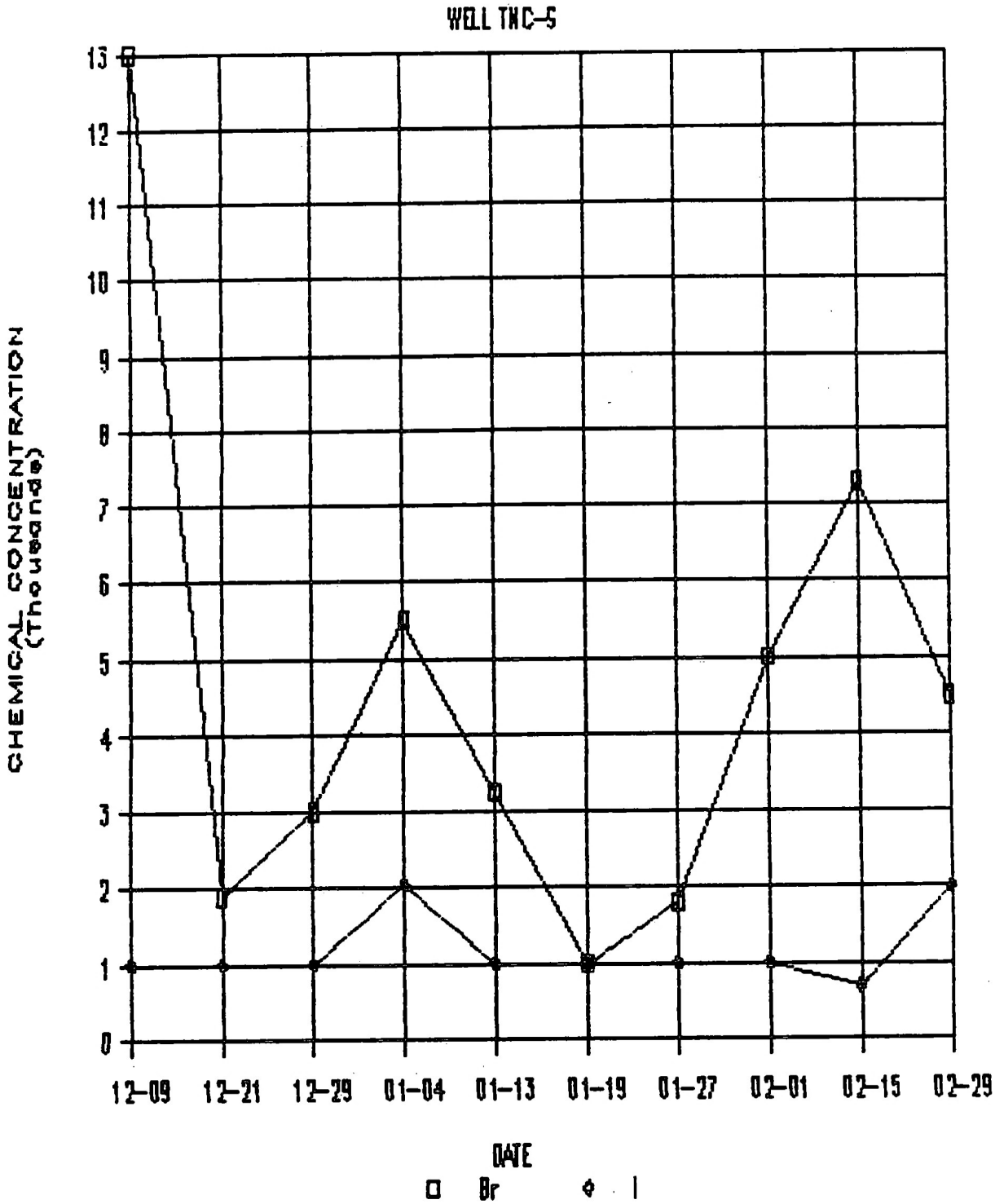

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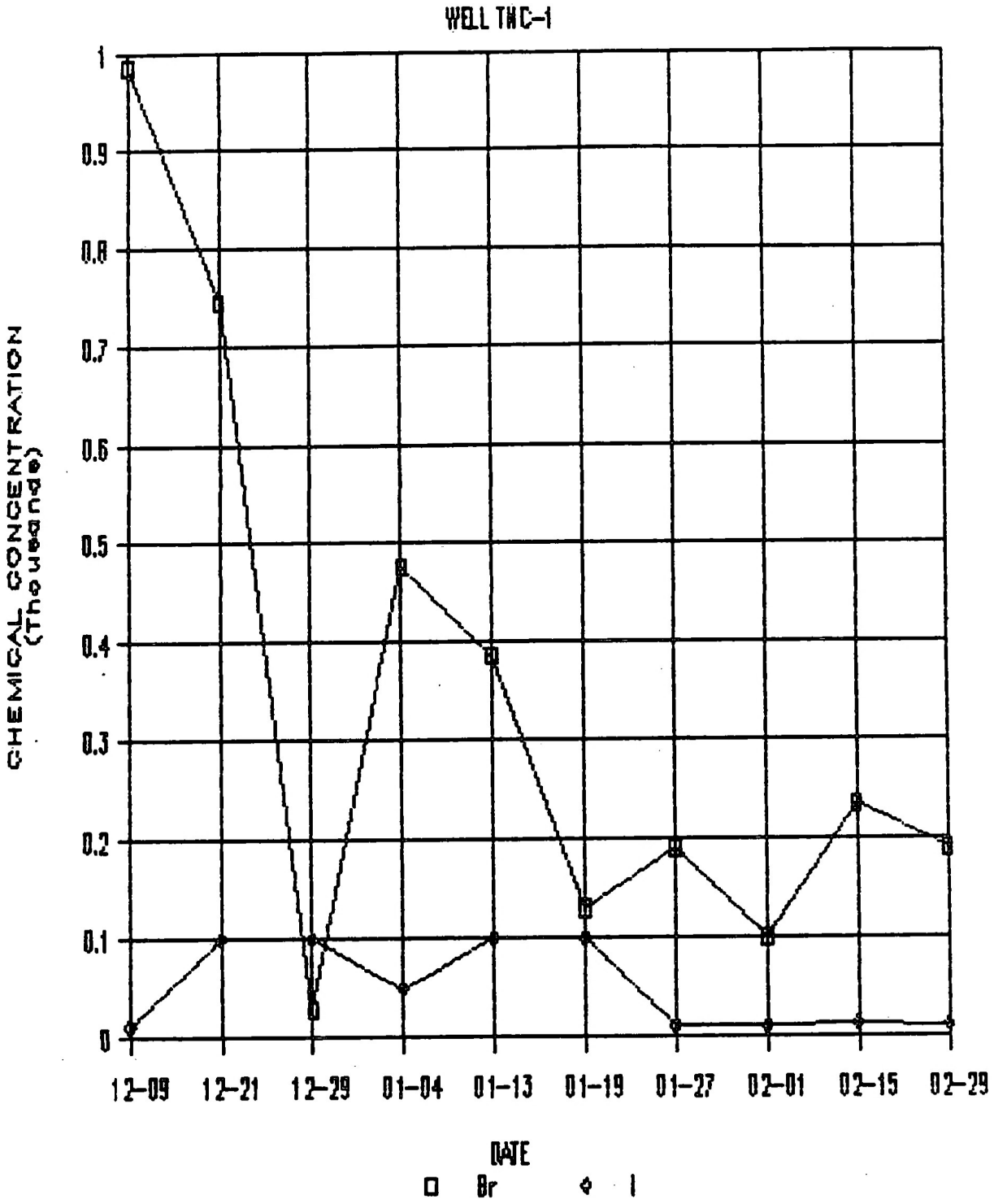

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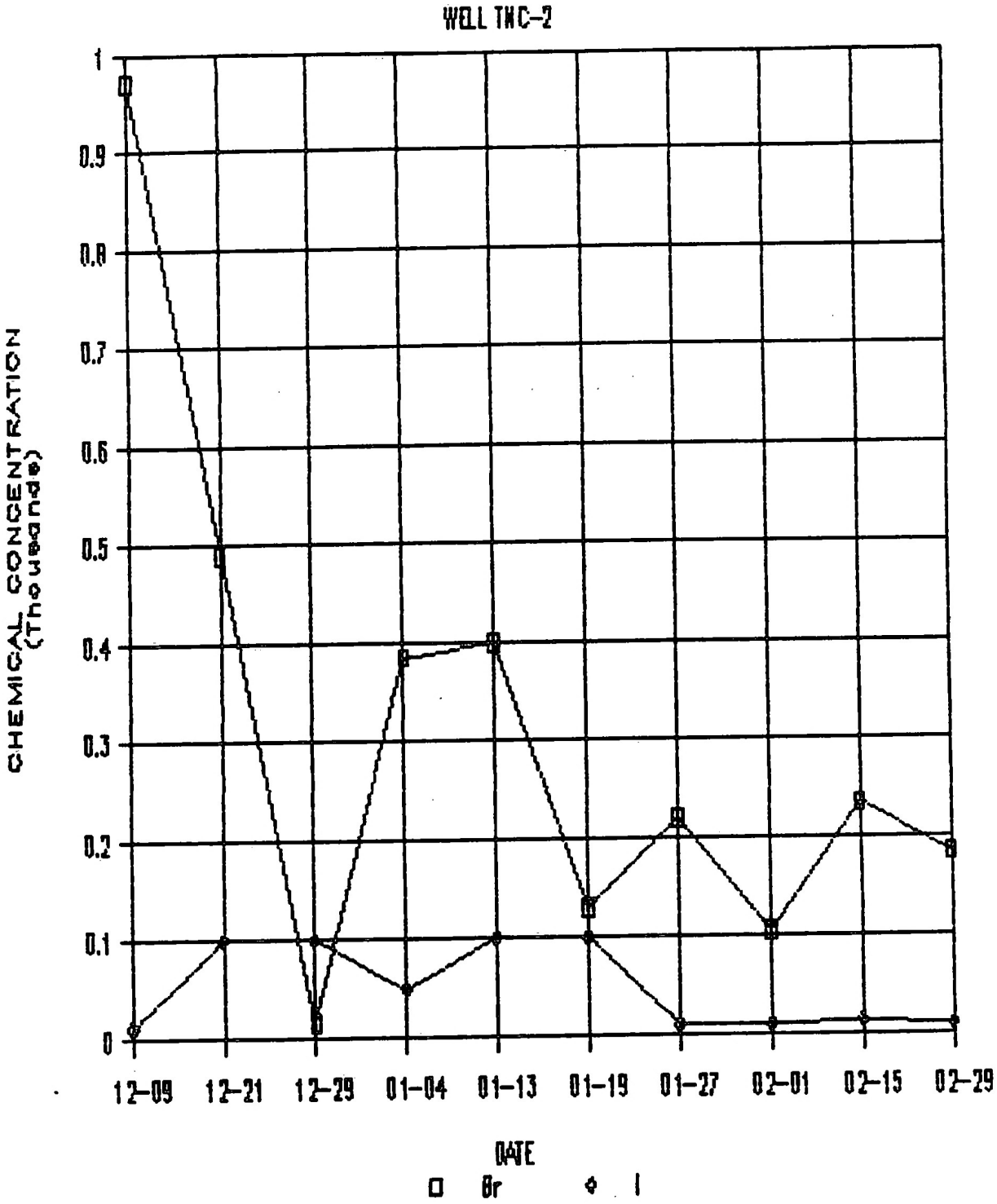

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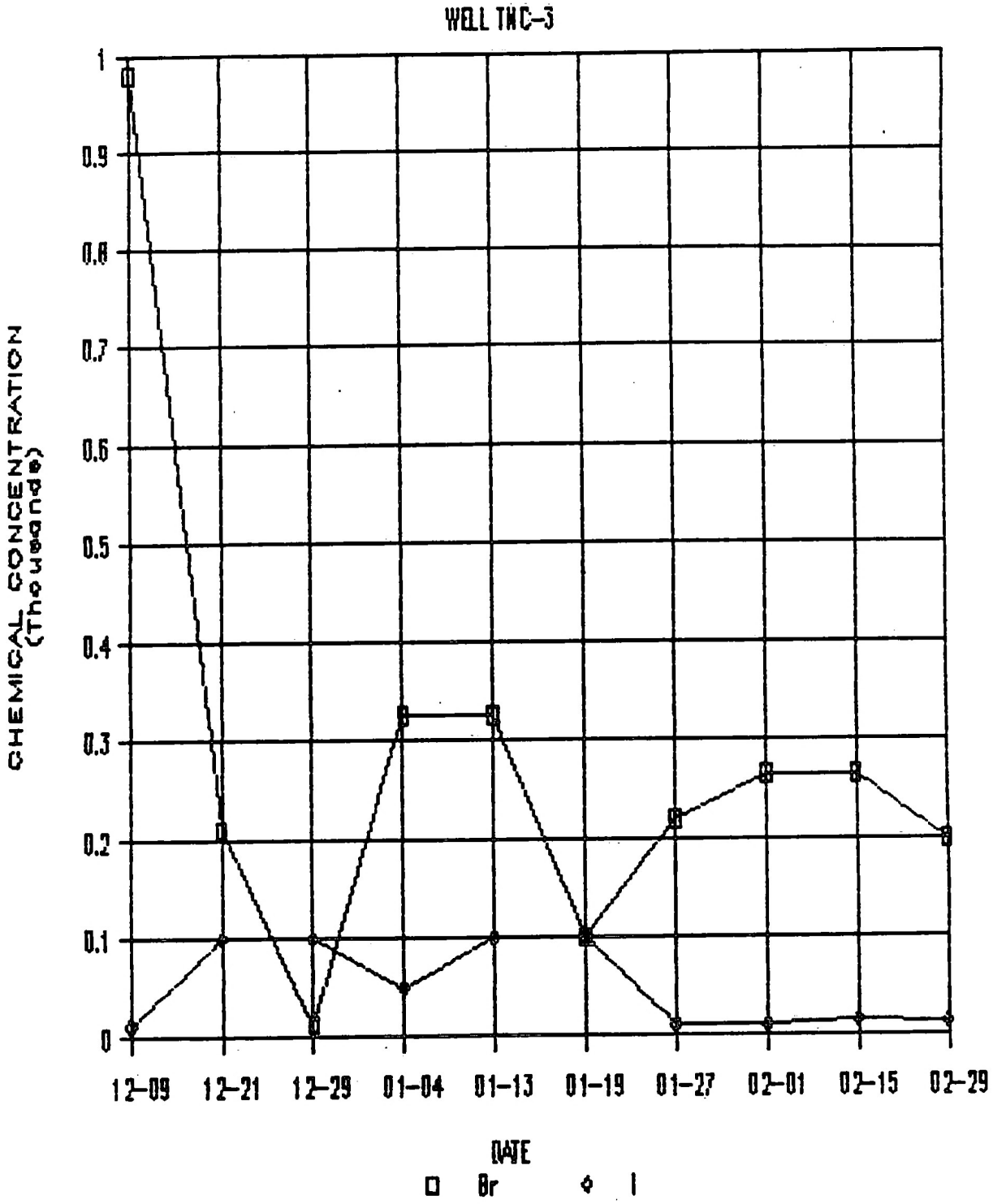

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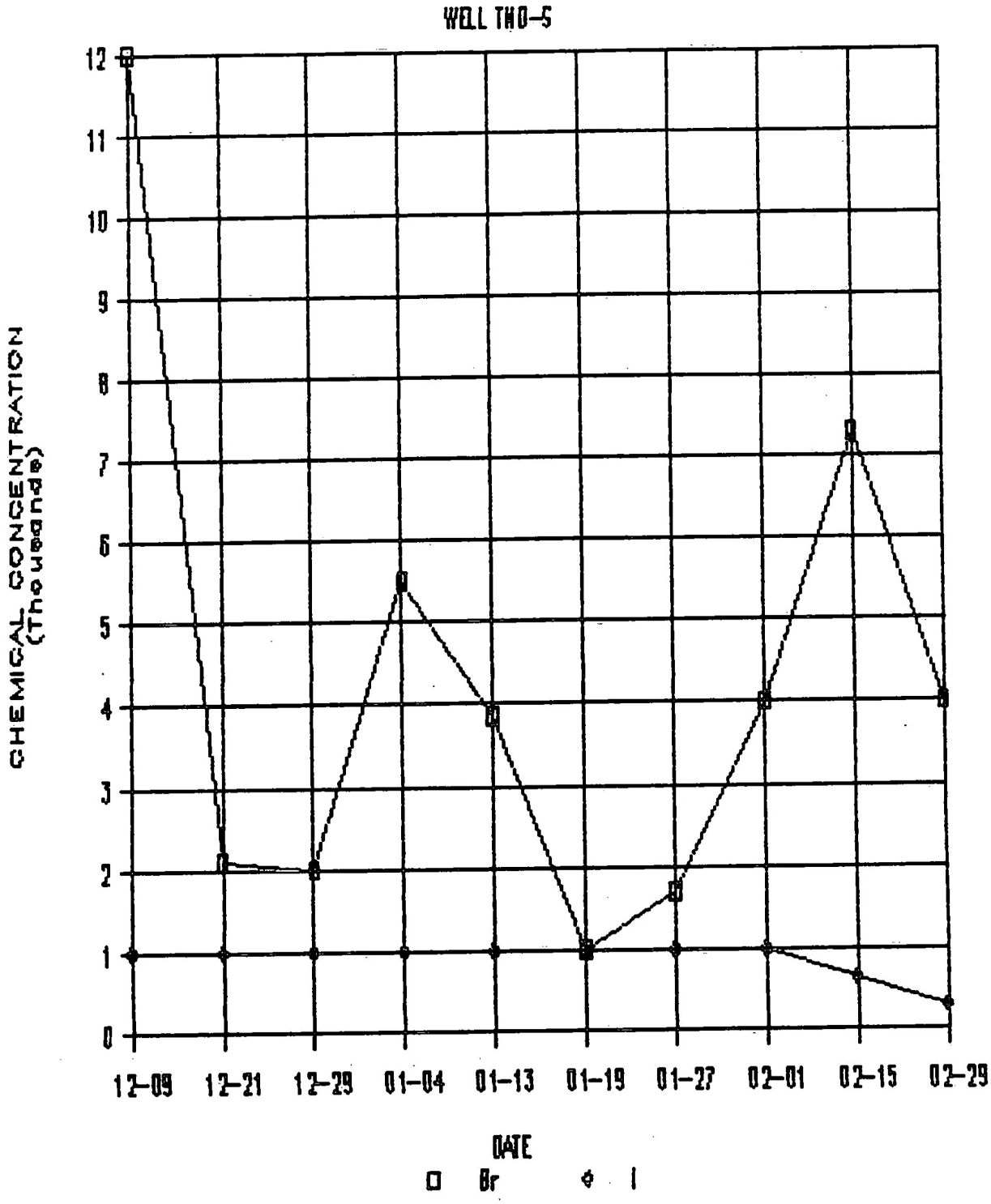

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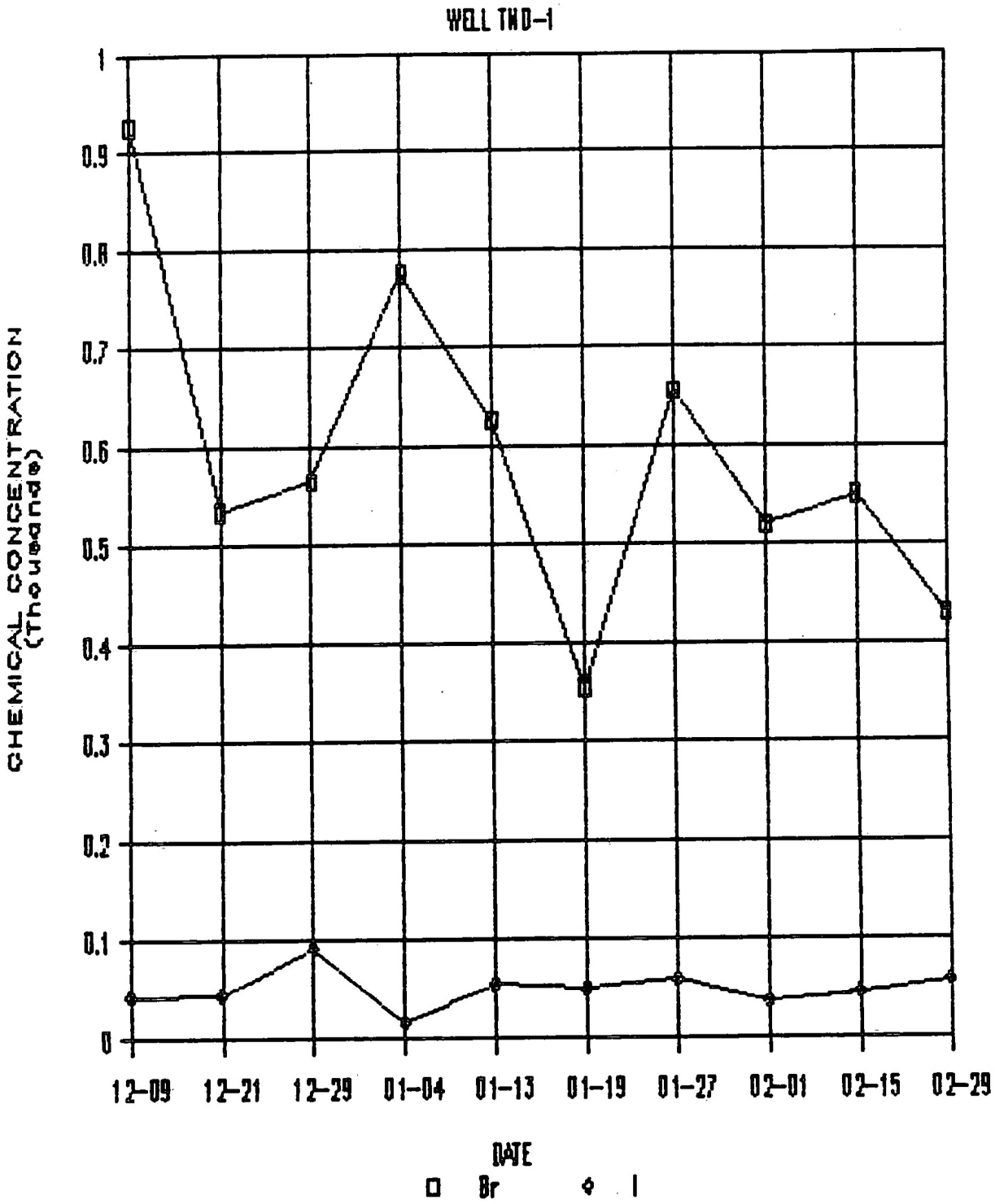

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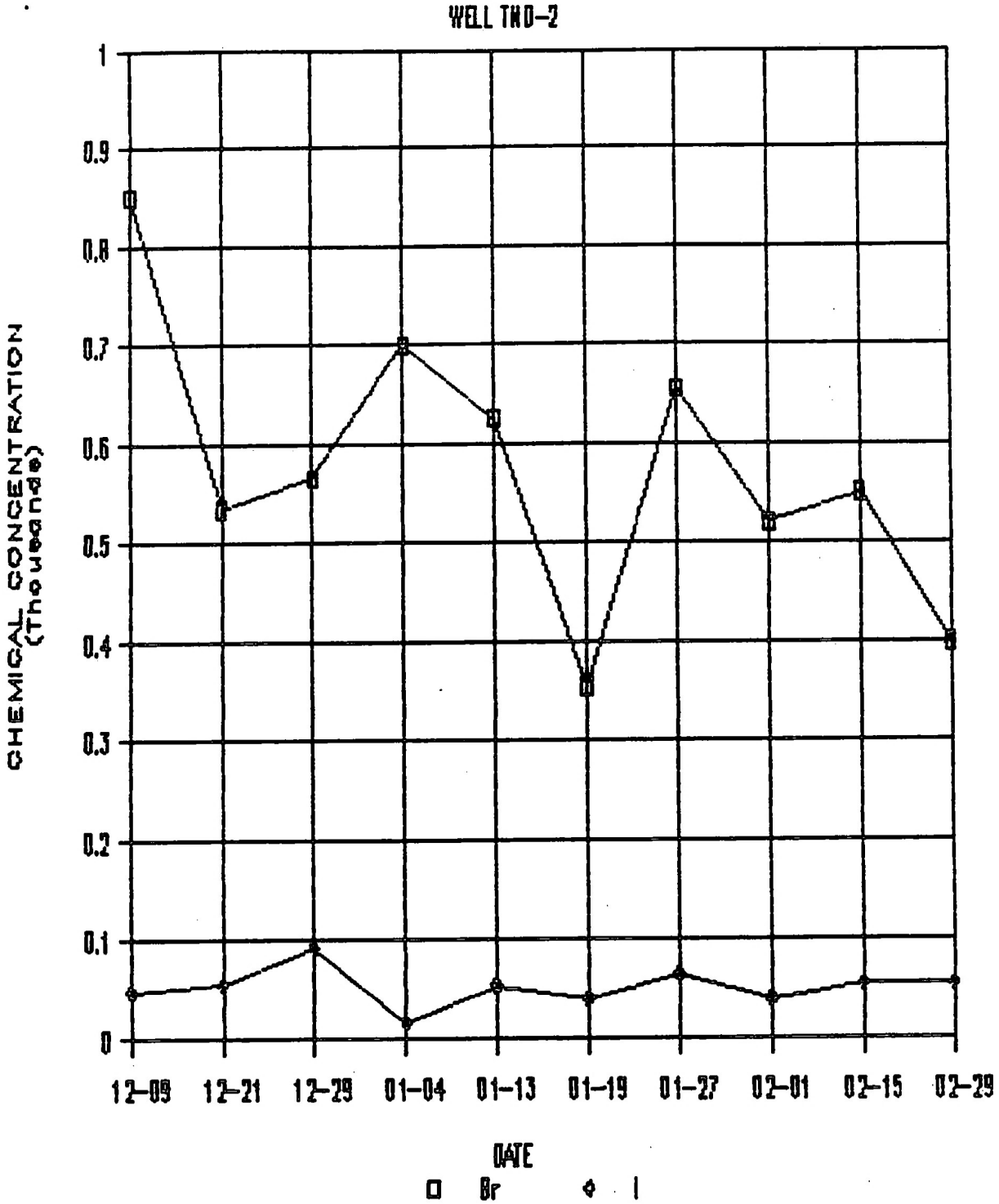

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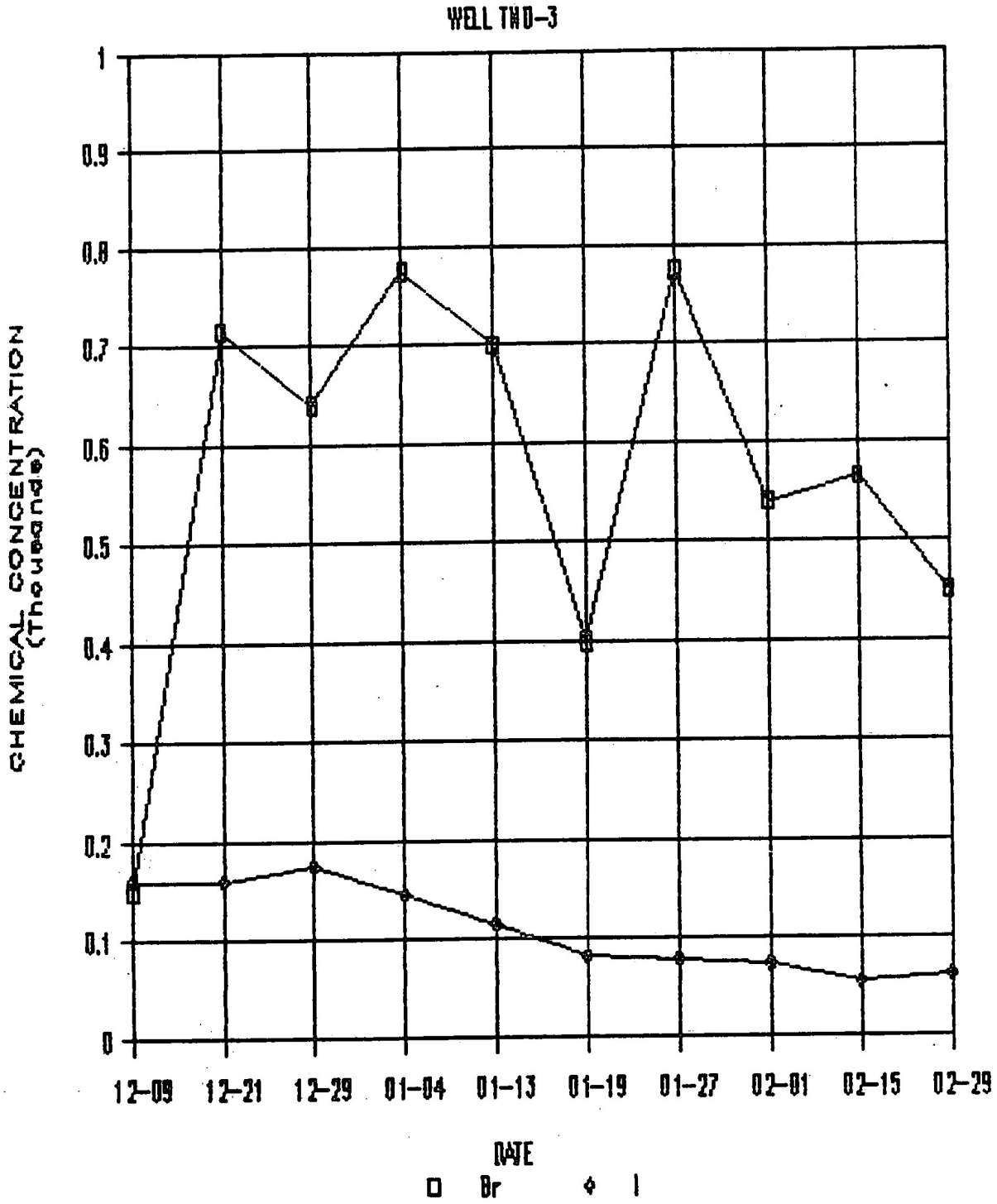

APPENDIX 3.8

PACKER TEST RESULTS

Packer Test (1987)

Packer Tests

Packer tests were performed in most of the Test Borings and described earlier. The packer test is based on a principle similar to that of a laboratory falling head permeability test. Gradient is established by the total head (water column and pressure head) above the water table distributed over the length of the test interval. The Packer Test computations are based on those reported on Pages 576 to 578 in The Earth Manual (U.S. Bureau of Reclamation, 1974). Results are shown on Table 3 of Appendix E of the Monitoring Well Design Installation and Completeness Report of 4 September, 1987, and Appendix E-6.2.

Laboratory Tests

Cores were randomly selected from Packer Test intervals and wrapped with aluminum foil. These were taken to Core Laboratories in Tulsa, Oklahoma. Hydraulic conductivity, total porosity and bulk density were measured. Procedures and results are presented in a Core laboratory Report which was given as appendix H in the Well Design Installation and Completeness Report of 4 September, 1987. Test results from this report are reproduced as Appendix E-6.3.

In-situ Slug Test Data

In-situ slug test data were measured in several "old" monitoring wells prior to their abandonment. In addition, several of the new monitoring wells have been tested. Results can be noted in Appendix E-6.4. Slug tests were performed by removing water to a point where recovery measurements were initiated. These data are plotted on semi-log paper. The data curve is superimposed onto a set of type curves developed by Cooper, Bredehoeft, and Papadopulos (1973). These type curves are shown in Fig. E-6.3. A match point is located and the coordinates are used in calculations to determine

TABLE 3

LONE MOUNTAIN PACKER TEST DATA

* Method of analysis from U.S. Bureau of Reclamation Earth Manual, 1974, Designation E-18, pp. 573-578.

EQUATION: $$K = Cp \frac{Q}{(Ho + H)}$$ (K in feet/year)

$$= \frac{1\ gal}{1\ min} \times \frac{30.48\ cm}{1\ ft} \times \frac{1\ yr}{360\ days} \times \frac{1\ day}{24\ hr} \times \frac{1\ hr}{60\ min} \times \frac{1\ min}{60\ sec}$$

$$= \frac{cm}{sec}$$

where: K = Hydraulic conductivity

Cp = Constant, value depends on length of test section and diameter of hole

Ho = Height of water column above the ground surface (ft) plus applied pressure in feet of water

H = Depth to water table from ground surface (ft)

BORING	INTERVAL (ft)	PRESSURE (psi)	H (ft)	Ho (ft)	Cp	Q (gpm)	K (cm/se
TB-1	197.5-206.5	10	175.0	8.5	5300	7.5 E-3	1.8 E-
	197.5-206.5	14	UNSUCCESSFUL				
	254.0-256.0	8	175.0	9.0	13000	7.1 E-1	4.5 E-
	254.0-256.0	10	175.0	9.0	13000	1.6 E-1	1.1 E-
	312.0-318.0	10	175.0	9.0	9700	2.1 E-1	9.5 E-
TB-2	132.5-141.0	10	147.3	3.0	5500	1.1 E-1	3.1 E-
	161.5-170.2	10	147.3	3.0	5500	7.8 E-2	2.4 E-
	209.9-220.6		UNSUCCESSFUL				
	268.5-280.7	10	147.8	3.5	4737	1.8 E-2	4.8 E-

BORING	INTERVAL (ft)	PRESSURE (psi)	H (ft)	Ho (ft)	Cp	Q (gpm)	K (cm/sec)
TB-3	18.0-22.8		UNSUCCESSFUL				
	43.2-53.4	30	147.0	10.6	4900	1.9 E-1	1.1 E-5
	70.0-77.0	20	147.0	6.0	6400	4.7 E-1	4.7 E-5
TB-4	41.5-44.5	10	7.0	10.6	4900	1.3 E-2	2.6 E-6
	63.5-73.5	10	7.0	2.5	4900	3.1 E-2	4.4 E-6
TB-5	97.5-102.5	10	41.6	9.5	8200	N.C	<1.0 E-7
TB-6	28.5-36.0	10	6.0	6.3	5800	1.1 E-1	1.1 E-6
	28.5-36.0	30	6.0	6.3	5800	2.3 E-1	1.6 E-5
	37.5-43.0	10	6.0	8.5	7200	3.3 E-2	6.2 E-6
	37.5-43.0	30	6.0	8.5	7200	2.6 E-2	2.2 E-6
	49.0-59.0		UNSUCCESSFUL				
	58.5-80.0	10	6.0	6.2	15500	1.9 E-1	1.4 E-5
	68.5-70.0		UNSUCCESSFUL				
	94.5-103.5	10	6.0	11.1	7200	3.0 E-3	1.0 E-7
	103.5-115.0	10	6.0	9.4	4000	2.3 E-1	2.6 E-5
TB-7	36.7-47.3	10	55.0	23.1	4750	1.5 E-1	8.9 E-6
	107.6-117.6	10	55.0	5.0	4900	4.3 E-2	2.5 E-6
TB-8	35.0-41.0		UNSUCCESSFUL				
	63.4-70.9	10	4.0	10.1	6100	1.2 E-1	1.9 E-5
	65.4-70.9		UNSUCCESSFUL				
TB-9	15.5-18.3	10	2.0	10.5	13280	N.C.	<1.0 E-7
	30.2-35.0		UNSUCCESSFUL				
	32.5-35.0	10	2.0	3.2	13650	5.8 E-2	2.7 E-5
	49.2-53.0	10	2.0	3.3	10120	N.C.	<1.0 E-7
	85.0-87.6	10	2.0	11.1	19400	5.3 E-5	2.8 E-6
TB-10	16.0-22.6	10	14.0	6.3	6720	N.C.	<1.0 E-7
	16.0-22.6	20	UNSUCCESSFUL				
	85.0-92.0	10	14.0	6.3	6400	1.5 E-2	2.2 E-6
	85.0-92.0	20	14.0	6.3	6400	9.9 E-2	1.4 E-5
TB-11	33.0-41.0	10	4.0	10.0	5800	2.8 E-2	1.6 E-4
TB-12	11.5-25.9	10	3.5	10.5	3800	6.8 E-3	8.7 E-6
	26.0-38.0	10	3.5	10.5	9700	N.C.	<1.0 E-7
	26.0-38.0	20	3.5	10.5	9700	1.5 E-1	9.7 E-6
	48.0-52.0	55	3.5	10.5	9700	1.5 E-1	3.1 E-5
TB-13	42.0-52.3	10	5.0	3.0	4900	9.5 E-2	1.5 E-5
	42.0-52.3	30	5.0	3.0	4900	8.9 E-2	5.5 E-6
	63.5-73.4	30	5.0	12.4	4900	5.7 E-2	3.1 E-6

TB-14	63.2-73.2	10	4.0	4.0	4900	6.0 E-3	1.0 E-7
	72.5-82.5	10	UNSUCCESSFUL				
	85.5-96.5	10	4.0	10.0	5000	2.8 E-2	2.9 E-6
	163.0-168.5	10	4.0	13.0	8200	N.C.	<1.0 E-7
	163.0-168.5	15	4.0	13.0	8200	3.2 E-1	5.1 E-5
	255.5-260.8	10	UNSUCCESSFUL				
	286.5-318.5	10	UNSUCCESSFUL				
	290.5-318.5	20	UNSUCCESSFUL				
	360.0-370.0	10	4.0	6.0	4900	N.C.	<1.0 E-7
	360.0-370.0	15	4.0	6.0	4900	4.3 E-2	4.7 E-6
	380.0-390.0		UNSUCCESSFUL				
TB-15	14.5-19.5	10	3.2	11.0	8200	3.5 E-2	7.4 E-6
	14.5-19.5	30	3.2	11.0	8200	6.4 E-2	6.2 E-6
	30.0-32.5	10	3.2	5.8	13650	1.3 E-2	4.1 E-6
	61.5-67.0	10	3.2	6.0	7700	6.6 E-3	1.3 E-6
	61.5-67.0	20	3.2	6.0	7700	6.6 E-3	1.3 E-6
	70.0-78.0	10	3.2	5.1	5800	1.2 E-2	5.4 E-6
	70.0-78.0	20	3.2	5.1	5800	3.3 E-2	3.4 E-6
	84.0-91.0	10	3.2	5.6	6400	3.1 E-2	6.6 E-6

TABLE 1

NEW WELL RECOVERY RATES

WELL #	DH (ft)	Dt (min)	RATE (ft/min)	INITIAL WATER LEVEL (ft)	DEPTH TO TOP OF SCREEN (ft)	HEIGHT OF WATER ABOVE SCREEN (ft)	PROJECTED TIME FOR EFFECTIVE RECOVERY OF ONE FULL VOL. (days)	ESTIMATED WELL YIELD Gallons/day
MW-1A	0.35	71	4.9×10^{-3}	1.53	7.2	5.67	0.8	1.15
MW-1B	0.09	74	1.2×10^{-3}	4.17	17.8	13.63	6.5	0.28
MW-1C	0.08	82	9.7×10^{-4}	7.92	42.0	34.08	24.4	0.23
MW-1D	0.03	16	1.8×10^{-3}	4.67	122.0	117.33	44.0	0.42
MW-2A	0.06	23	2.6×10^{-3}	14.54	7.2	*(2.48)	0.7	0.60
MW-2B	0.67	37	1.8×10^{-2}	25.62	47.0	21.38	0.8	4.25
MW-2C	0.07	21	3.3×10^{-3}	11.32	133.0	121.68	25.0	0.79
MW-3A	0.13	271	4.8×10^{-4}	10.27	7.8	*(12.73)	18.4	0.11
MW-3B	0.09	196	4.6×10^{-4}	11.25	72.8	61.55	92.9	0.11
MW-3C	0.01	145	6.9×10^{-5}	5.70	99.3	93.6	942.0	0.01
MW-4A	3.74	14	2.6×10^{-1}	7.25	13.5	6.25	0.02	62.70
MW-4B	0.16	17	9.4×10^{-3}	5.32	57.8	52.48	3.9	4.40
MW-4C	17.46	163	1.1×10^{-1}	3.93	78.8	74.87	0.5	25.00
MW-5A	5.75	203	2.8×10^{-2}	12.27	20.0	7.73	0.2	6.50
MW-5B	0.08	35	2.2×10^{-3}	4.97	59.0	54.03	17.05	0.52
MW-6A	1.45	302	4.8×10^{-3}	12.20	13.0	0.8	0.1	0.82
MW-6B	0.41	277	1.5×10^{-3}	4.5	29.5	25.0	12.3X	0.35
MW-6C	0.02	252	7.9×10^{-5}	2.23	59.5	57.27	503.0	0.02
MW-8A	0.65	290	2.2×10^{-3}	8.16	14.8	6.64	2.1	0.53
MW-8B	0.58	339	1.7×10^{-3}	6.09	59.5	53.41	21.8	0.40
MW-10A	6.94	185	3.7×10^{-2}	9.57	1.9	7.43	0.1	8.82
MW-10B	0.15	202	7.4×10^{-4}	8.55	48.0	39.45	37.0	0.18
MW-CHD	2.05	350	5.8×10^{-3}	4.50	155.0	150.0	17.8	1.38

* Height of water taken above the bottom of the screen.

Estimated well yield: gallon/min; $\pi \times r^2 \times Dh/Dt = Ft^3/min$

Dh, Dt = change in height or time.

TABLE 2

EXISTING WELL RECOVERY DATA

WELL #	Dh (ft)	Dt (min)	A RATE Ft/min.	B INITIAL WATER LEVEL	C DEPTH TO TOP OF SCREEN	D = C - B HEIGHT OF WATER ABOVE SCREEN	E = D -- A PROJECTED RECOVERY TIME (DAYS)	EST. WELL YIELD gal/day
MW-3A(OW8)	14.92	12780	1.2×10^{-3}	1.67	18.0	16.33	9.5	1.71
MW-13(OW3)	5.70	11724	4.9×10^{-4}	44.63	110.0	65.37	93.4	0.10
MW-14(OW4)	NO DATA							
MW-15(OW5)	NO DATA							
MW-18(MW18)	8.34	1483	5.6×10^{-3}	35.54	41.5	5.96	0.7	1.19
MW-19(MW19)	5.31	5898	9.0×10^{-4}	36.88	43.5	6.62	5.1	0.19
MW-20(MW20)	7.27	5914	1.2×10^{-3}	36.71	43.5	6.79	3.9	0.25
MW-21(MW21)	6.82	5934	1.1×10^{-3}	35.08	44.0	8.92	5.4	0.24

Note: Each well also shows in parenthesis the new designation.

Packer Test (1994)

Golder Associates Inc.

3730 Chamblee Tucker Road
Atlanta, GA USA 30341
Telephone (404) 496-1893
Fax (404) 934-9476

Golder Associates

943-3628

June 16, 1994

USPCI, Inc.
5665 Flatiron Parkway
Boulder, Colorado 80301

Attn: Mr. Daniel A. Giffin, P.G.
Senior Hydrogeologist

RE: REPORT ON FORMATION PACKER TESTING AT THE
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

Gentlemen:

Golder Associates Inc. (Golder Associates) is pleased to present this report to USPCI regarding formation packer testing at the Lone Mountain Facility (LMF) near Waynoka, Oklahoma. This report provides Golder Associates' interpretation of the hydrogeologic data obtained during the recent packer testing performed at the LMF. Included in this report are:

- A brief description of test procedures and equipment;
- Arithmetic data and plots collected during testing;
- Estimates of hydraulic conductivity for each core hole interval tested; and
- A discussion of the formation packer testing results.

HYDROLOGIC PACKER TESTING

Hydrologic packer testing was conducted by Golder Associates between April 26 and April 29, 1994 in the core holes designated PT-1 and PT-2, drilled to determine hydrogeologic characteristics of bedrock at the LMF. This investigation was designed to evaluate the in-situ hydraulic conductivity of rock intervals as identified from rock core removed from the core holes. Fractures infilled with gypsum to varying degrees within red claystone were observed in some of the test intervals. Two massive non-fractured green claystone intervals were also observed within both core holes. These zones were tested within each borehole to determine hydraulic conductivity and whether the green clay horizon may act as a groundwater flow barrier. Hydraulic conductivity values from rock zones at different depths were evaluated to determine whether fractures may provide preferential flow paths for groundwater. This hydraulic conductivity information is important in deciding how groundwater flow through the Flower Pot Shale behaves as a flow system.

The packer assembly was connected to the surface assembly using drill rods. The drill rods were also used to lower the packer assembly into each core hole and provide a conduit for water injection. Pipe joints were threaded and wrapped with Teflon tape to prevent leakage during pressurized flow periods. The downhole packer assembly was raised and lowered within the core hole using a air drill rig owned and operated by A.W. Poole Company under the supervision of Golder Associates.

High-pressure nitrogen cylinders were used to inflate the packers with a inflation time of about 10 minutes. The packers were inflated to a pressure of 150 psi to 200 psi above the static water pressure at the top of the tested interval. Each packer has a gland length of 5 feet before inflation and an estimated gland length of about three feet after inflation. The test interval between the two packers, including the perforated pipe section, is approximately six feet in length after inflation.

Three downhole vibrating wire pressure transducers were used to monitor the pressure above the top packer, in the test interval, and below the bottom packer. The three transducers were physically located above the top packer. However, the middle transducer (in the test interval) and lower transducer (below the bottom packer) were ported to the prescribed location using water-filled tubing open at one end, as depicted on Figure 1. The transducer readings were recorded using a multi-channel datalogger in conjunction with a portable laptop computer. The frequency of the readings (scan rate) could be varied, but was held constant at 30 seconds or less for the constant head tests and at 30 seconds or more for the pressure slug decay test. Transducer calibration was verified prior to each test to ensure readings were consistent with the calculated downhole water pressure. Because the water levels in the PT core holes had not reached equilibrium prior to testing, each core hole was filled with water prior to calibration and testing.

Constant Head Test Methodology

The constant head test can be performed in less than a few hours, even for media of low hydraulic conductivity such as the Flower Pot shales and clays. To apply this test method, the test interval is pressurized by injecting water, while the flow response, as well as the pressure response (head) in the test interval are monitored. A general description of the field testing procedure that was employed is summarized below:

- Measure tool assembly and drill rod lengths;
- Lower packer assembly to the prescribed depth;
- Measure drill rod stick-up to ensure packers are centered at the test zone;
- Circulate fresh water into core hole through the packer assembly;
- Connect pressure transducers and check observed pressures to verify calibration. Re-calibrate transducers, if necessary;
- Inflate packers with downhole valve open and surface flow valves closed (approximately 200 psi for 5.5-inch diameter hole);

- Open valve, deflate packers and stop test.

The pressure decay test was performed following the completion of the constant head test without moving the test assembly. In this case, the packers were already inflated and pressure pulse within the test interval created by injection was used for the pressure decay test.

Analysis Methodology

Constant Head Analysis

An arithmetic plot of the pressure transducer readings for each test is provided in Attachment 1 of this report. During testing, water was injected until a constant flow rate was established and, stabilized pressures (or head) within the test intervals could be predicted. Under these conditions, a steady state flow analysis method is applicable (Logan, 1964), and:

$$T = C_s Q/H$$

where:
- T = Transmissivity (L^2/T);
- C_s = Shape factor (L/L)(a function of the flow geometry);
- Q = Steady state flow rate (L^3/T); and
- H = Constant head differential (constant head above static) imposed on the interval (L).

Using the steady state flow equation for radial laminar flow with a constant head boundary at radius R, the shape factor is:

$$C_s = (1/2\pi)\ln(R/r_w)$$

where:
- R = radius of the pressure boundary (L); and
- r_w = Radius of the well (L).

therefore:

$$T = \frac{Q}{2\pi H} \cdot \ln (R/r_w)$$

or:

Both α and ß, above, are dimensionless parameters. The set of type curves are produced by plotting $F(\alpha,ß)$ versus ß for various values of α.

Transmissivity is determined by plotting observed values of h/h_o versus log-t and superimposing the plot on the type-curves. The plot is matched with a particular type-curve by keeping ß and log-t axes coincident and moving the plot horizontally. The ß and t values from a match point are used to determine the transmissivity using the following equation:

$$T = \beta_m VCdg/\pi t_m$$

where: T = Transmissivity (L^2/T);
$ß_m$ = (Dimensionless) and $t_m(T)$ = Match points;
V = Volume of water in the pressurized test interval (L^3);
C = Compressibility of water (LT^2/M);
d = Density of water (M/L^3); and
g = Gravitational acceleration (L/T^2).

The method results in an estimate of transmissivity, which is divided by the length of the test interval to obtain an average hydraulic conductivity for the tested zone.

Results and Discussion

A total of eight tests were conducted in core holes PT-1 and PT-2. Of these, seven tests were conducted and analyzed using the constant head test method, and one was analyzed using the pressure slug decay test method. A summary of the packer test analyses, including the estimated hydraulic conductivity values for each test, is presented in Table 1. Transducer data, pressure plots and spreadsheets for each test are included in Attachment 1.

The constant head test analysis resulted in maximum hydraulic conductivity values ranging from 4.1×10^{-7} centimeters per second (cm/s) (PT-1; Test 2) to 6.7×10^{-6} cm/s (PT-1; Test 1). This range of low hydraulic conductivity values suggests that the bedrock exhibits low permeability and that fractures intersected by each of the core holes are not connected to a major fracture or joint system within the bedrock since the fractured zones only exhibited about one order of magnitude greater permeability than the unfractured zones. These calculated values were derived using an interpolated water level from nearby wells of 5 ft-BGS. The one test interval (PT-2; Test 4), which could not be tested by the constant head test method, was analyzed using the pressure slug decay analysis discussed above and yielded a hydraulic conductivity value of 4.0×10^{-9} cm/s.

JUNE 1994

TABLE 1
SUMMARY OF CONSTANT HEAD AND PRESSURE SLUG DECAY TEST ANALYSES
(PAGE 1 OF 1)

COREHOLE NO.	PT-1	PT-1	PT-1	PT-1	PT-2	PT-2	PT-2	PT-2**
TEST #	1	2	3	4	1	2	3	4
TYPE OF PACKER	Double	Double	Double	Double	Double	Double	Double	Double
BOREHOLE DIA. (in)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
PRE-TEST W.L. * (ft. BGS)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
TOP OF TESTED INTERVAL (ft. BGS)	10.0	20.0	34.0	68.0	11.0	16.0	29.0	66.0
BOT OF TESTED INTERVAL (ft. BGS)	16.0	26.0	40.0	74.0	17.0	22.0	35.0	72.0
VERTICAL GAUGE DEPTH (ft. BGS)	13.0	23.0	37.0	71.0	14.0	19.0	32.0	69.0
H(gravity) -ft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H(pressure) -psi	8.4	13.6	10.5	14.4	3.4	8.9	19.3	NA
Q (gpm)	0.0220	0.0022	0.0066	0.0280	0.0088	0.0032	0.0365	NA
K (ft/min)	1.3E-05	8.1E-07	3.2E-06	9.7E-06	1.3E-05	1.8E-06	9.5E-06	NA
K (cm/sec)	6.7E-06	4.1E-07	1.6E-06	5.0E-06	6.6E-06	9.2E-07	4.8E-06	4.0E-08

NOTES:

1. The formula used for the packer test analysis is:

$$K = [Q/(2\pi LH)] * Ln(L/r)$$

Where

K= permeability
Q= constant rate of flow into test interval
L= length of the test interval (feet)
H= differential head of water applied in excess of static = H(gravity) + H(pressure)
r= radius of hole interval tested
*= A pre-test water level of 5 Ft-BGS. has been interpolated for analyses.
**= Hydraulic conductivity value calculated using pressure slug decay analysis.

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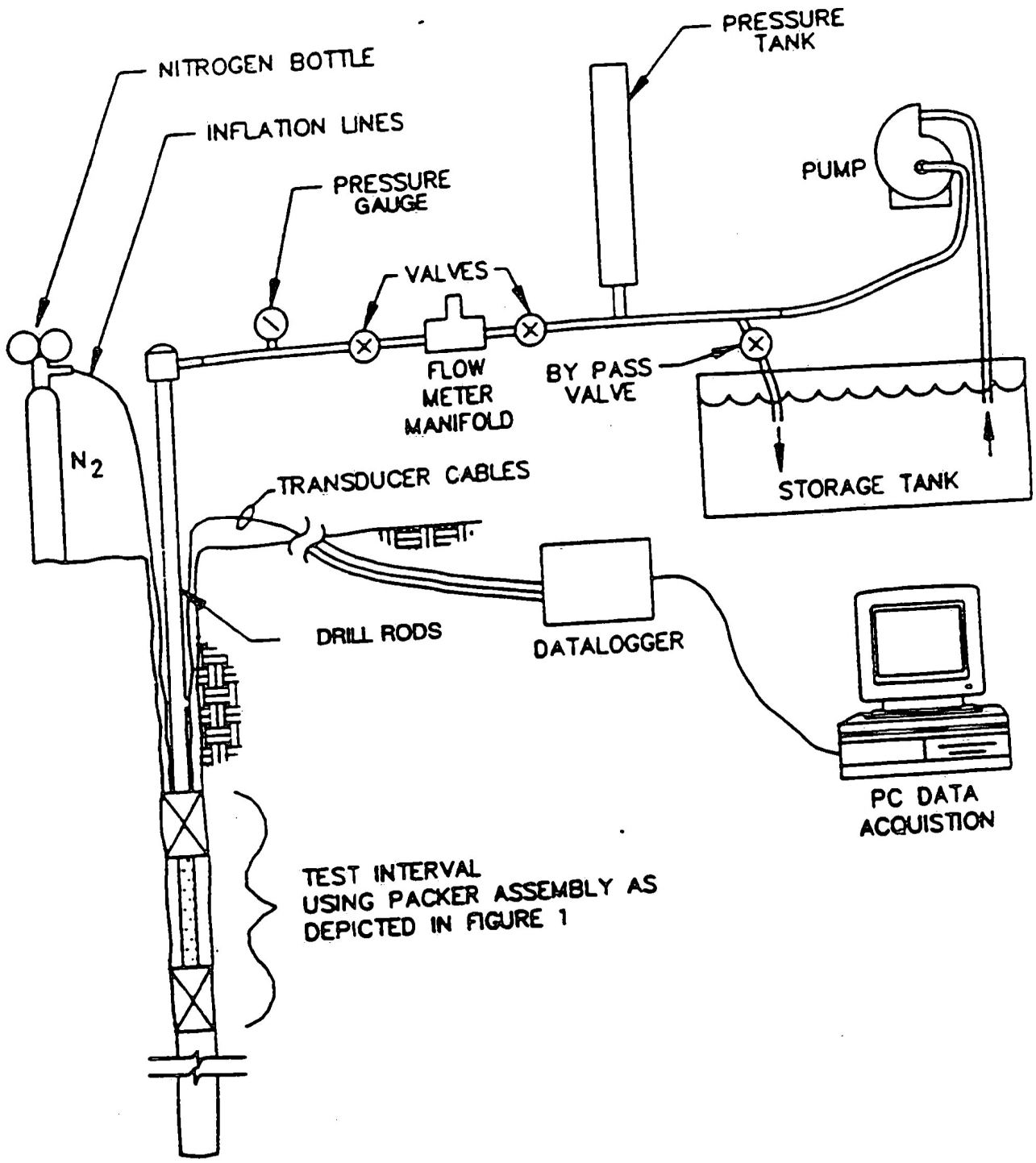


NOTE:
PRESSURE TANK IS NECESSARY TO MAINTAIN STEADY FLOW.

DISCONTINUITY STUDY

R73307

Golder Associates — Atlanta, Georgia

CLIENT/PROJECT: USPCI — A Subsidiary of Union Pacific Corporation

TITLE: SCHEMATIC OF PACKER TEST SURFACE ASSEMBLY

DRAWN JC	DATE 5/25/94	JOB NO. 943-3628	
CHECKED DSS	SCALE N.T.S.	DWG NO./REV. NO. 154 / REV.	
REVIEWED	FILE NO. 913-3026	FIGURE NO. 2	

ATTACHMENT 1

CONSTANT HEAD AND PRESSURE SLUG TEST DATA

MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-1
TEST #: 1
DEPTH INTERVAL: 10 FT - 16 FT
MANUAL FLOW METER READING: 8.30E-02 L/MIN 0.022 GAL/MIN

24 HOUR CLOCK HR-MIN		SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
118	1603	0	12.591	4.833	NA	NA	NA	NA
118	1603	10	11.583	5.000	NA	NA	NA	NA
118	1603	20	11.523	5.167	NA	NA	NA	NA
118	1603	30	11.682	5.333	NA	NA	NA	NA
118	1603	40	11.158	5.500	NA	NA	NA	NA
118	1603	50	11.099	5.667	NA	NA	NA	NA
118	1604	0	11.757	5.833	NA	NA	NA	NA
118	1604	10	11.279	6.000	NA	NA	NA	NA
118	1604	20	11.326	6.167	NA	NA	NA	NA
118	1604	30	11.291	6.333	NA	NA	NA	NA
118	1604	40	12.186	6.500	NA	NA	NA	NA
118	1604	50	11.950	6.667	NA	NA	NA	NA
118	1605	0	12.781	6.833	NA	NA	NA	NA
118	1605	10	12.051	7.000	NA	NA	NA	NA
118	1605	20	12.737	7.167	NA	NA	NA	NA
118	1605	30	13.023	7.333	NA	NA	NA	NA
118	1605	40	12.932	7.500	NA	NA	NA	NA
118	1605	50	12.706	7.667	NA	NA	NA	NA
118	1606	0	13.336	7.833	NA	NA	NA	NA
118	1606	10	13.396	8.000	NA	NA	NA	NA
118	1606	20	12.744	8.167	NA	NA	NA	NA
118	1606	30	13.360	8.333	NA	NA	NA	NA
118	1606	40	13.409	8.500	NA	NA	NA	NA
118	1606	50	12.848	8.667	NA	NA	NA	NA
118	1607	0	13.229	8.833	NA	NA	NA	NA
118	1607	10	13.020	9.000	NA	NA	NA	NA
118	1607	20	12.958	9.167	NA	NA	NA	NA
118	1607	30	13.447	9.333	NA	NA	NA	NA
118	1607	40	13.074	9.500	NA	NA	NA	NA

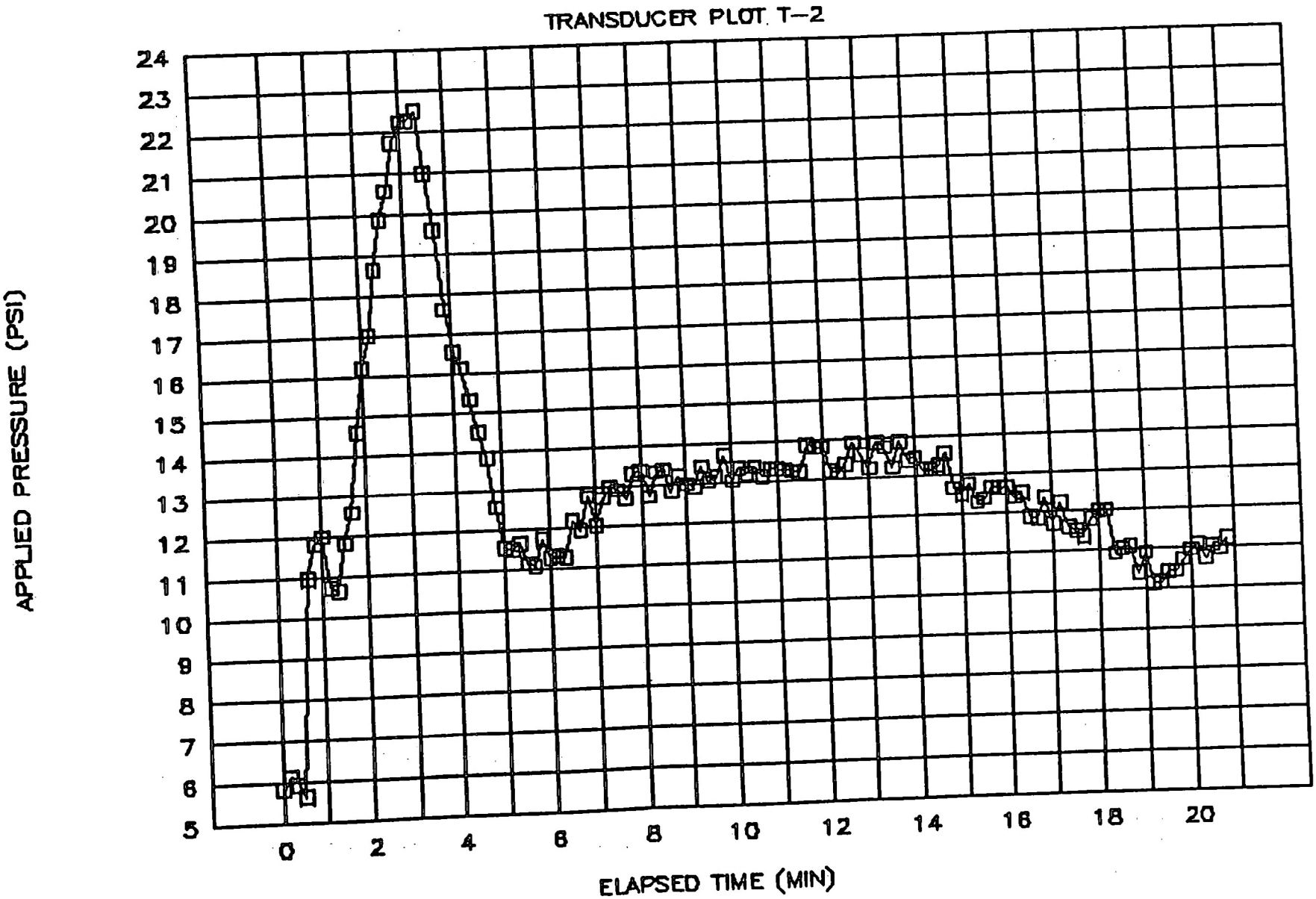
MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-1
TEST #: 1
DEPTH INTERVAL: 10 FT - 16 FT
MANUAL FLOW METER READING: 8.30E-02 L/MIN 0.022 GAL/MIN

24 HOUR CLOCK HR-MIN	SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
118 1612	40	13.286	14.500	NA	NA	NA	NA
118 1612	50	13.571	14.667	NA	NA	NA	NA
118 1613	0	12.697	14.833	NA	NA	NA	NA
118 1613	10	12.527	15.000	NA	NA	NA	NA
118 1613	20	12.777	15.167	NA	NA	NA	NA
118 1613	30	12.299	15.333	NA	NA	NA	NA
118 1613	40	12.407	15.500	NA	NA	NA	NA
118 1613	50	12.699	15.667	NA	NA	NA	NA
118 1614	0	12.657	15.833	NA	NA	NA	NA
118 1614	10	12.673	16.000	NA	NA	NA	NA
118 1614	20	12.405	16.167	NA	NA	NA	NA
118 1614	30	12.512	16.333	NA	NA	NA	NA
118 1614	40	11.912	16.500	NA	NA	NA	NA
118 1614	50	11.843	16.667	NA	NA	NA	NA
118 1615	0	12.374	16.833	NA	NA	NA	NA
118 1615	10	11.717	17.000	NA	NA	NA	NA
118 1615	20	12.234	17.167	NA	NA	NA	NA
118 1615	30	11.623	17.333	NA	NA	NA	NA
118 1615	40	11.524	17.500	NA	NA	NA	NA
118 1615	50	11.383	17.667	NA	NA	NA	NA
118 1616	0	11.809	17.833	NA	NA	NA	NA
118 1616	10	11.987	18.000	NA	NA	NA	NA
118 1616	20	12.027	18.167	NA	NA	NA	NA
118 1616	30	10.937	18.333	NA	NA	NA	NA
118 1616	40	11.048	18.500	NA	NA	NA	NA
118 1616	50	11.082	18.667	NA	NA	NA	NA
118 1617	0	10.418	18.833	NA	NA	NA	NA
118 1617	10	10.926	19.000	NA	NA	NA	NA
118 1617	20	10.146	19.167	NA	NA	NA	NA

COREHOLE PT-1 (10 FT TO 16 FT)



MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-1
TEST #: 2
DEPTH INTERVAL: 20 FT - 26 FT
MANUAL FLOW METER READING: < 8.30E-03 L/MIN 0.002 GAL/MIN

24 HOUR CLOCK HR-MIN	SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
118 1650	30	11.116	4.833	NA	NA	NA	NA
118 1650	40	10.372	5.000	NA	NA	NA	NA
118 1650	50	10.372	5.167	NA	NA	NA	NA
118 1651	0	11.140	5.333	NA	NA	NA	NA
118 1651	10	10.439	5.500	NA	NA	NA	NA
118 1651	20	11.133	5.667	NA	NA	NA	NA
118 1651	30	11.376	5.833	NA	NA	NA	NA
118 1651	40	10.883	6.000	NA	NA	NA	NA
118 1651	50	11.042	6.167	NA	NA	NA	NA
118 1652	0	11.459	6.333	NA	NA	NA	NA
118 1652	10	10.396	6.500	NA	NA	NA	NA
118 1652	20	10.357	6.667	NA	NA	NA	NA
118 1652	30	10.972	6.833	NA	NA	NA	NA
118 1652	40	10.312	7.000	NA	NA	NA	NA
118 1652	50	10.306	7.167	NA	NA	NA	NA
118 1653	0	10.454	7.333	NA	NA	NA	NA
118 1653	10	10.429	7.500	NA	NA	NA	NA
118 1653	20	10.920	7.667	NA	NA	NA	NA
118 1653	30	11.262	7.833	NA	NA	NA	NA
118 1653	40	11.031	8.000	NA	NA	NA	NA
118 1653	50	14.828	8.167	NA	NA	NA	NA
118 1654	0	14.913	8.333	NA	NA	NA	NA
118 1654	10	12.760	8.500	NA	NA	NA	NA
118 1654	20	13.206	8.667	NA	NA	NA	NA
118 1654	30	13.285	8.833	NA	NA	NA	NA
118 1654	40	12.928	9.000	NA	NA	NA	NA
118 1654	50	13.124	9.167	NA	NA	NA	NA
118 1655	0	12.346	9.333	NA	NA	NA	NA
118 1655	10	13.170	9.500	NA	NA	NA	NA

MAY 1994

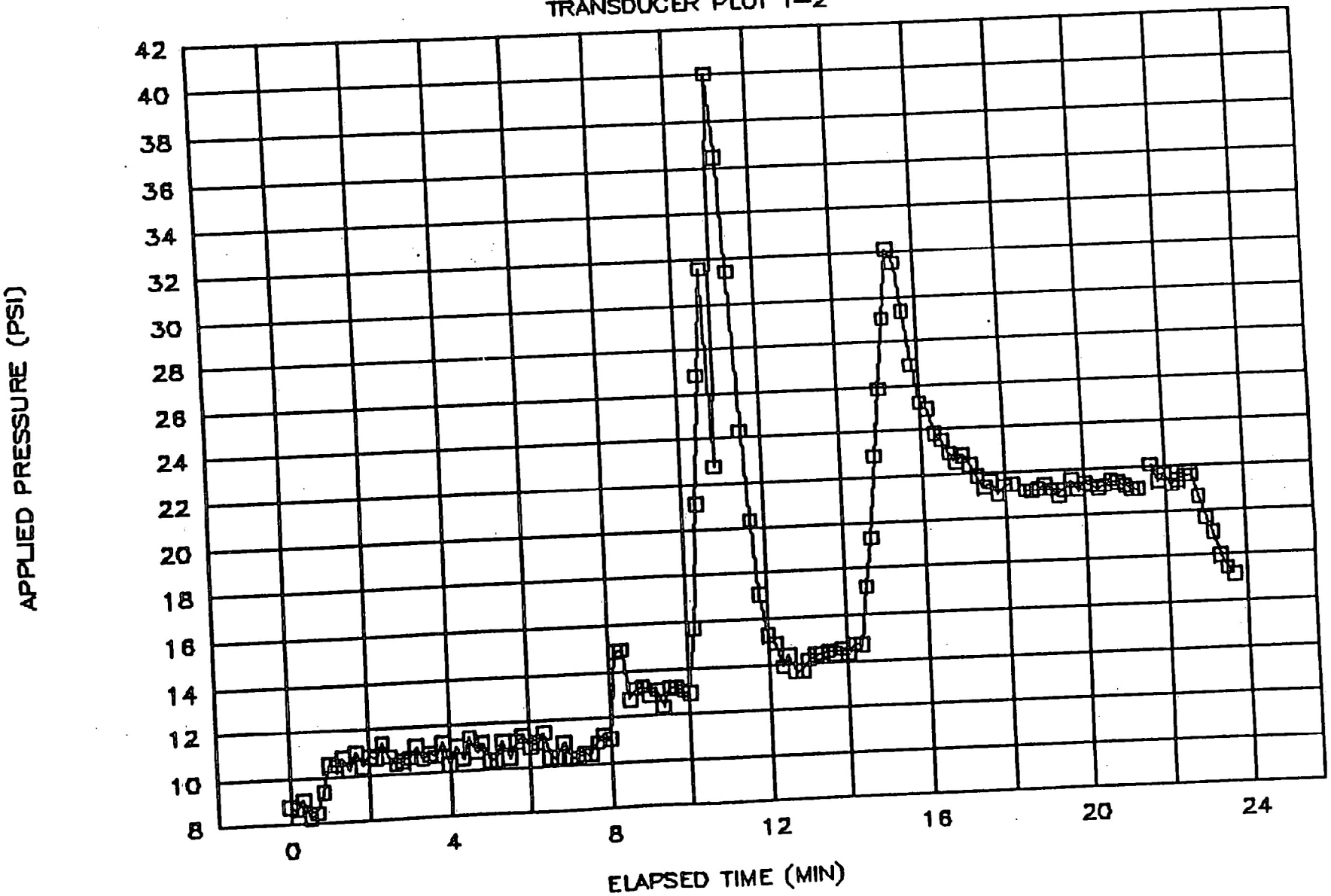
USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-1
TEST #: 2
DEPTH INTERVAL: 20 FT - 26 FT
MANUAL FLOW METER READING: < 8.30E-03 L/MIN 0.002 GAL/MIN

24 HOUR CLOCK HR-MIN	SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
118 1700	10	17.163	14.500	NA	NA	NA	NA
118 1700	20	19.316	14.667	NA	NA	NA	NA
118 1700	30	22.930	14.833	NA	NA	NA	NA
118 1700	40	25.909	15.000	NA	NA	NA	NA
118 1700	50	29.033	15.167	NA	NA	NA	NA
118 1701	0	32.113	15.333	NA	NA	NA	NA
118 1701	10	31.483	15.500	0.02124	NA	0.006	NA
118 1701	20	29.337	15.667	0.00708	NA	0.002	NA
118 1701	30	26.914	15.833	NA	NA	NA	NA
118 1701	40	25.219	16.000	NA	NA	NA	NA
118 1701	50	24.911	16.167	NA	NA	NA	NA
118 1702	0	23.810	16.333	NA	NA	NA	NA
118 1702	10	23.538	16.500	NA	NA	NA	NA
118 1702	20	22.921	16.667	NA	NA	NA	NA
118 1702	30	22.548	16.833	NA	NA	NA	NA
118 1702	40	22.819	17.000	NA	NA	NA	NA
118 1702	50	22.411	17.167	NA	NA	NA	NA
118 1703	0	21.864	17.333	NA	NA	NA	NA
118 1703	10	21.377	17.500	NA	NA	NA	NA
118 1703	20	21.618	17.667	NA	NA	NA	NA
118 1703	30	21.005	17.833	NA	NA	NA	NA
118 1703	40	21.424	18.000	NA	NA	NA	NA
118 1703	50	21.479	18.167	NA	NA	NA	NA
118 1704	0	NA	18.333	NA	NA	NA	NA
118 1704	10	21.144	18.500	NA	NA	NA	NA
118 1704	20	21.138	18.667	NA	NA	NA	NA
118 1704	30	21.207	18.833	NA	NA	NA	NA
118 1704	40	21.421	19.000	NA	NA	NA	NA
118 1704	50	21.145	19.167	NA	NA	NA	NA

COREHOLE PT-1 (20 FT TO 26 FT)

TRANSDUCER PLOT T-2



943-3628

MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-1
TEST #: 3
DEPTH INTERVAL: 34 FT - 40 FT
MANUAL FLOW METER READING: 2.47E-02 L/MIN 0.007 GAL/MIN

24 HOUR CLOCK HR-MIN	SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
.. 1734	40	16.626	4.833	NA	NA	NA	NA
.. 1734	50	16.771	5.000	NA	NA	NA	NA
.. 1735	0	16.940	5.167	NA	NA	NA	NA
.. 1735	10	16.799	5.333	NA	NA	NA	NA
.. 1735	20	16.767	5.500	NA	NA	NA	NA
.. 1735	30	15.934	5.667	NA	NA	NA	NA
.. 1735	40	16.928	5.833	NA	NA	NA	NA
.. 1735	50	15.935	6.000	NA	NA	NA	NA
.. 1736	0	16.880	6.167	NA	NA	NA	NA
.. 1736	10	16.592	6.333	NA	NA	NA	NA
.. 1736	20	16.305	6.500	NA	NA	NA	NA
.. 1736	30	16.947	6.667	NA	NA	NA	NA
.. 1736	40	16.855	6.833	NA	NA	NA	NA
.. 1736	50	16.236	7.000	NA	NA	NA	NA
.. 1737	0	16.970	7.167	NA	NA	NA	NA
.. 1737	10	18.808	7.333	NA	NA	NA	NA
.. 1737	20	25.385	7.500	NA	NA	NA	NA
.. 1737	30	32.456	7.667	NA	NA	NA	NA
.. 1737	40	40.251	7.833	NA	NA	NA	NA
.. 1737	50	49.122	8.000	NA	NA	NA	NA
.. 1738	0	48.958	8.167	NA	NA	NA	NA
.. 1738	10	39.355	8.333	NA	NA	NA	NA
.. 1738	20	33.287	8.500	NA	NA	NA	NA
.. 1738	30	32.861	8.667	NA	NA	NA	NA
.. 1738	40	35.312	8.833	NA	NA	NA	NA
.. 1738	50	36.960	9.000	NA	NA	NA	NA
.. 1739	0	37.458	9.167	0.111	NA	0.029	NA
.. 1739	10	37.903	9.333	0.248	NA	0.065	NA
.. 1739	20	36.573	9.500	0.133	NA	0.035	NA

MAY 1994

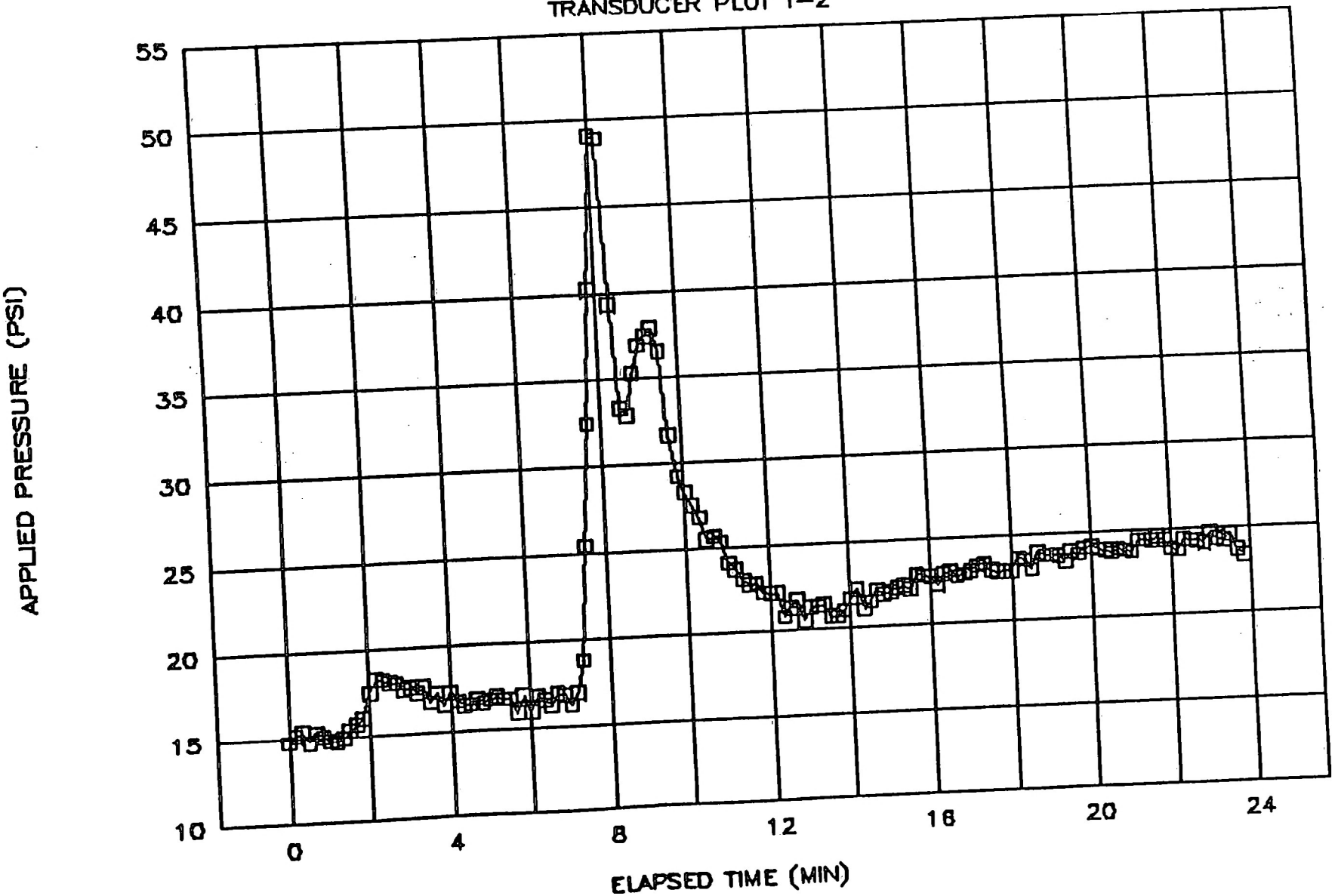
USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-1
TEST #: 3
DEPTH INTERVAL: 34 FT - 40 FT
MANUAL FLOW METER READING: 2.47E-02 L/MIN 0.007 GAL/MIN

24 HOUR CLOCK HR-MIN	SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
•• 1744	20	21.501	14.500	0.035	NA	0.009	NA
•• 1744	30	22.169	14.667	0.035	NA	0.009	NA
•• 1744	40	21.875	14.833	0.035	NA	0.009	NA
•• 1744	50	22.003	15.000	0.035	NA	0.009	NA
•• 1745	0	22.189	15.167	0.037	NA	0.010	NA
•• 1745	10	22.302	15.333	0.035	NA	0.009	NA
•• 1745	20	22.088	15.500	0.033	NA	0.009	NA
•• 1745	30	22.909	15.667	0.031	NA	0.008	NA
•• 1745	40	22.810	15.833	0.028	NA	0.007	NA
•• 1745	50	22.737	16.000	0.030	NA	0.008	NA
•• 1746	0	22.299	16.167	0.028	NA	0.007	NA
•• 1746	10	22.869	16.333	0.031	NA	0.008	NA
•• 1746	20	23.031	16.500	0.031	NA	0.008	NA
•• 1746	30	22.684	16.667	0.032	NA	0.008	NA
•• 1746	40	22.809	16.833	0.033	NA	0.009	NA
•• 1746	50	23.020	17.000	0.032	NA	0.008	NA
•• 1747	0	23.259	17.167	0.032	NA	0.008	NA
•• 1747	10	23.413	17.333	0.031	NA	0.008	NA
•• 1747	20	22.954	17.500	0.028	NA	0.007	NA
•• 1747	30	22.872	17.667	0.027	NA	0.007	NA
•• 1747	40	22.882	17.833	0.028	NA	0.007	NA
•• 1747	50	22.884	18.000	0.027	NA	0.007	NA
•• 1748	0	23.629	18.167	0.027	NA	0.007	NA
•• 1748	10	23.502	18.333	0.027	NA	0.007	NA
•• 1748	20	22.909	18.500	0.030	NA	0.008	NA
•• 1748	30	23.904	18.667	0.030	NA	0.008	NA
•• 1748	40	23.714	18.833	0.028	NA	0.007	NA
•• 1748	50	23.715	19.000	0.031	NA	0.008	NA
•• 1749	0	23.668	19.167	0.030	NA	0.008	NA

COREHOLE PT-1 (34 FT TO 40 FT)

TRANSDUCER PLOT T-2



943-3628

MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-1
TEST #: 4
DEPTH INTERVAL: 68 FT - 74 FT
MANUAL FLOW METER READING: 1.05E-01 L/MIN 0.028 GAL/MIN

24 HOUR CLOCK HR-MIN	SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
.. 1828	50	37.633	4.833	NA	NA	NA	NA
.. 1829	0	37.662	5.000	NA	NA	NA	NA
.. 1829	10	38.155	5.167	NA	NA	NA	NA
.. 1829	20	38.737	5.333	NA	NA	NA	NA
.. 1829	30	36.111	5.500	NA	NA	NA	NA
.. 1829	40	37.253	5.667	NA	NA	NA	NA
.. 1829	50	31.031	5.833	NA	NA	NA	NA
.. 1830	0	31.448	6.000	NA	NA	NA	NA
.. 1830	10	31.665	6.167	NA	NA	NA	NA
.. 1830	20	31.582	6.333	NA	NA	NA	NA
.. 1830	30	31.701	6.500	NA	NA	NA	NA
.. 1830	40	31.362	6.667	NA	NA	NA	NA
.. 1830	50	31.122	6.833	NA	NA	NA	NA
.. 1831	0	31.497	7.000	NA	NA	NA	NA
.. 1831	10	31.818	7.167	NA	NA	NA	NA
.. 1831	20	32.032	7.333	NA	NA	NA	NA
.. 1831	30	31.698	7.500	NA	NA	NA	NA
.. 1831	40	31.757	7.667	NA	NA	NA	NA
.. 1831	50	31.636	7.833	NA	NA	NA	NA
.. 1832	0	32.096	8.000	NA	NA	NA	NA
.. 1832	10	31.796	8.167	NA	NA	NA	NA
.. 1832	20	31.548	8.333	NA	NA	NA	NA
.. 1832	30	31.794	8.500	NA	NA	NA	NA
.. 1832	40	31.696	8.667	NA	NA	NA	NA
.. 1832	50	31.927	8.833	NA	NA	NA	NA
.. 1833	0	31.973	9.000	NA	NA	NA	NA
.. 1833	10	31.453	9.167	NA	NA	NA	NA
.. 1833	20	31.370	9.333	NA	NA	NA	NA
.. 1833	30	31.662	9.500	NA	NA	NA	NA

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MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-1
TEST #: 4
DEPTH INTERVAL: 68 FT - 74 FT
MANUAL FLOW METER READING: 1.05E-01 L/MIN 0.028 GAL/MIN

24 HOUR CLOCK HR-MIN	SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
•• 1838	30	38.777	14.500	0.096	NA	0.025	NA
•• 1838	40	38.769	14.667	0.092	NA	0.024	NA
•• 1838	50	38.767	14.833	0.091	NA	0.024	NA
•• 1839	0	39.041	15.000	0.092	NA	0.024	NA
•• 1839	10	38.774	15.167	0.096	NA	0.025	NA
•• 1839	20	38.737	15.333	0.098	NA	0.026	NA
•• 1839	30	38.954	15.500	0.097	NA	0.026	NA
•• 1839	40	38.919	15.667	0.092	NA	0.024	NA
•• 1839	50	38.907	15.833	0.094	NA	0.025	NA
•• 1840	0	39.050	16.000	0.096	NA	0.025	NA
•• 1840	10	39.040	16.167	0.098	NA	0.026	NA
•• 1840	20	39.050	16.333	0.100	NA	0.026	NA
•• 1840	30	39.013	16.500	0.096	NA	0.025	NA
•• 1840	40	38.791	16.667	0.093	NA	0.025	NA
•• 1840	50	39.380	16.833	0.096	NA	0.025	NA
•• 1841	0	38.909	17.000	0.099	NA	0.026	NA
•• 1841	10	39.294	17.167	0.103	NA	0.027	NA
•• 1841	20	39.416	17.333	0.097	NA	0.026	NA
•• 1841	30	39.276	17.500	0.094	NA	0.025	NA
•• 1841	40	39.276	17.667	0.096	NA	0.025	NA
•• 1841	50	39.487	17.833	0.100	NA	0.026	NA
•• 1842	0	39.578	18.000	0.103	NA	0.027	NA
•• 1842	10	39.394	18.167	0.098	NA	0.026	NA
•• 1842	20	39.639	18.333	0.096	NA	0.025	NA
•• 1842	30	39.614	18.500	0.097	NA	0.026	NA
•• 1842	40	39.631	18.667	0.100	NA	0.026	NA
•• 1842	50	39.618	18.833	0.103	NA	0.027	NA
•• 1843	0	39.935	19.000	0.098	NA	0.026	NA
•• 1843	10	39.900	19.167	0.096	NA	0.025	NA

MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-1
TEST #: 4
DEPTH INTERVAL: 68 FT - 74 FT
MANUAL FLOW METER READING: 1.05E-01 L/MIN 0.028 GAL/MIN

24 HOUR CLOCK HR-MIN	SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
•• 1848	10	42.800	24.167	0.105	NA	0.028	NA
•• 1848	20	42.766	24.333	0.107	NA	0.028	NA
•• 1848	30	43.088	24.500	0.114	NA	0.030	NA
•• 1848	40	43.175	24.667	0.109	NA	0.029	NA
•• 1848	50	42.994	24.833	0.104	NA	0.027	NA
•• 1849	0	42.987	25.000	0.107	NA	0.028	NA
•• 1849	10	43.278	25.167	0.112	NA	0.030	NA
•• 1849	20	43.449	25.333	0.106	NA	0.028	NA
•• 1849	30	43.743	25.500	0.103	NA	0.027	NA
•• 1849	40	43.327	25.667	0.106	NA	0.028	NA
•• 1849	50	43.840	25.833	0.111	NA	0.029	NA
•• 1850	0	43.444	26.000	0.101	NA	0.027	NA
•• 1850	10	43.725	26.167	0.101	NA	0.027	NA
•• 1850	20	44.013	26.333	0.109	NA	0.029	NA
•• 1850	30	43.937	26.500	0.110	NA	0.029	NA
•• 1850	40	44.080	26.667	0.101	NA	0.027	NA
•• 1850	50	44.272	26.833	0.104	NA	0.027	NA
•• 1851	0	43.839	27.000	0.110	NA	0.029	NA
•• 1851	10	43.762	27.167	0.107	NA	0.028	NA
•• 1851	20	43.938	27.333	0.099	NA	0.026	NA
•• 1851	30	44.401	27.500	0.104	NA	0.027	NA
•• 1851	40	43.888	27.667	0.019	NA	0.005	NA
•• 1851	50	42.746	27.833	0	NA	0.000	NA
•• 1852	0	42.044	28.000	0	NA	0.000	NA

MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 1
DEPTH INTERVAL: 11 FT - 17 FT
MANUAL FLOW METER READING: 3.30E-02 L/MIN 0.009 GAL/MIN

24 HOUR CLOCK HR-MIN	SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119 934	20	0.838	0.000	NA	NA	NA	NA
119 934	30	1.625	0.167	NA	NA	NA	NA
119 934	40	1.215	0.333	NA	NA	NA	NA
119 934	50	0.985	0.500	NA	NA	NA	NA
119 935	0	1.014	0.667	NA	NA	NA	NA
119 935	10	1.576	0.833	NA	NA	NA	NA
119 935	20	1.468	1.000	NA	NA	NA	NA
119 935	30	1.529	1.167	NA	NA	NA	NA
119 935	40	1.297	1.333	NA	NA	NA	NA
119 935	50	1.195	1.500	NA	NA	NA	NA
119 936	0	1.120	1.667	NA	NA	NA	NA
119 936	10	1.554	1.833	NA	NA	NA	NA
119 936	20	1.034	2.000	NA	NA	NA	NA
119 936	30	1.435	2.167	NA	NA	NA	NA
119 936	40	1.117	2.333	NA	NA	NA	NA
119 936	50	1.028	2.500	NA	NA	NA	NA
119 937	0	1.040	2.667	NA	NA	NA	NA
119 937	10	1.236	2.833	NA	NA	NA	NA
119 937	20	1.277	3.000	NA	NA	NA	NA
119 937	30	0.962	3.167	NA	NA	NA	NA
119 937	40	1.395	3.333	NA	NA	NA	NA
119 937	50	1.703	3.500	NA	NA	NA	NA
119 938	0	1.523	3.667	NA	NA	NA	NA
119 938	10	1.529	3.833	NA	NA	NA	NA
119 938	20	1.041	4.000	NA	NA	NA	NA
119 938	30	1.328	4.167	NA	NA	NA	NA
119 938	40	1.549	4.333	NA	NA	NA	NA
119 938	50	1.060	4.500	NA	NA	NA	NA
119 939	0	1.017	4.667	NA	NA	NA	NA

MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 1
DEPTH INTERVAL: 11 FT - 17 FT
MANUAL FLOW METER READING: 3.30E-02 L/MIN 0.009 GAL/MIN

24 HOUR CLOCK HR-MIN		SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119	1000	50	2.674	26.500	NA	NA	NA	NA
119	1001	0	2.768	26.667	NA	NA	NA	NA
119	1001	10	3.700	26.833	NA	NA	NA	NA
119	1001	20	3.812	27.000	NA	NA	NA	NA
119	1001	30	3.709	27.167	NA	NA	NA	NA
119	1001	40	4.314	27.333	NA	NA	NA	NA
119	1001	50	3.678	27.500	NA	NA	NA	NA
119	1002	0	3.993	27.667	NA	NA	NA	NA
119	1002	10	4.424	27.833	NA	NA	NA	NA
119	1002	20	3.741	28.000	NA	NA	NA	NA
119	1002	30	4.373	28.167	NA	NA	NA	NA
119	1002	40	4.597	28.333	NA	NA	NA	NA
119	1002	50	4.475	28.500	NA	NA	NA	NA
119	1003	0	3.665	28.667	NA	NA	NA	NA
119	1003	10	4.055	28.833	NA	NA	NA	NA
119	1003	20	3.837	29.000	NA	NA	NA	NA
119	1003	30	3.859	29.167	NA	NA	NA	NA
119	1003	40	4.517	29.333	NA	NA	NA	NA
119	1003	50	4.120	29.500	NA	NA	NA	NA
119	1004	0	4.427	29.667	NA	NA	NA	NA
119	1004	10	4.302	29.833	NA	NA	NA	NA
119	1004	20	4.384	30.000	NA	NA	NA	NA
119	1004	30	4.128	30.167	NA	NA	NA	NA
119	1004	40	4.560	30.333	NA	NA	NA	NA
119	1004	50	5.118	30.500	NA	NA	NA	NA
119	1005	0	4.526	30.667	NA	NA	NA	NA
119	1005	10	4.764	30.833	NA	NA	NA	NA
119	1005	20	5.040	31.000	NA	NA	NA	NA
119	1005	30	4.945	31.167	NA	NA	NA	NA

MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 1
DEPTH INTERVAL: 11 FT - 17 FT
MANUAL FLOW METER READING: 3.30E-02 L/MIN 0.009 GAL/MIN

24 HOUR CLOCK HR-MIN		SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119	1010	30	5.839	36.167	NA	NA	NA	NA
119	1010	40	5.337	36.333	NA	NA	NA	NA
119	1010	50	5.273	36.500	NA	NA	NA	NA
119	1011	0	5.826	36.667	NA	NA	NA	NA
119	1011	10	5.840	36.833	NA	NA	NA	NA
119	1011	20	5.913	37.000	NA	NA	NA	NA
119	1011	30	5.389	37.167	NA	NA	NA	NA
119	1011	40	5.665	37.333	NA	NA	NA	NA
119	1011	50	6.018	37.500	NA	NA	NA	NA
119	1012	0	5.596	37.667	NA	NA	NA	NA
119	1012	10	5.456	37.833	NA	NA	NA	NA
119	1012	20	5.321	38.000	NA	NA	NA	NA
119	1012	30	5.671	38.167	NA	NA	NA	NA
119	1012	40	5.391	38.333	NA	NA	NA	NA
119	1012	50	12.426	38.500	NA	NA	NA	NA
119	1013	0	25.505	38.667	NA	NA	NA	NA
119	1013	10	40.908	38.833	NA	NA	NA	NA
119	1013	20	37.563	39.000	NA	NA	NA	NA
119	1013	30	35.496	39.167	NA	NA	NA	NA
119	1013	40	32.976	39.333	NA	NA	NA	NA
119	1013	50	30.052	39.500	NA	NA	NA	NA
119	1014	0	27.633	39.667	NA	NA	NA	NA
119	1014	10	25.737	39.833	NA	NA	NA	NA
119	1014	20	24.597	40.000	NA	NA	NA	NA
119	1014	30	22.888	40.167	NA	NA	NA	NA
119	1014	40	21.251	40.333	NA	NA	NA	NA
119	1014	50	20.402	40.500	NA	NA	NA	NA
119	1015	0	19.886	40.667	NA	NA	NA	NA
119	1015	10	18.669	40.833	NA	NA	NA	NA

MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 1
DEPTH INTERVAL: 11 FT - 17 FT
MANUAL FLOW METER READING: 3.30E-02 L/MIN 0.009 GAL/MIN

24 HOUR CLOCK HR-MIN		SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119	1020	10	8.181	45.833	NA	NA	NA	NA
119	1020	20	7.828	46.000	NA	NA	NA	NA
119	1020	30	7.731	46.167	NA	NA	NA	NA
119	1020	40	7.670	46.333	NA	NA	NA	NA
119	1020	50	8.150	46.500	NA	NA	NA	NA
119	1021	0	8.037	46.667	NA	NA	NA	NA
119	1021	10	8.145	46.833	NA	NA	NA	NA
119	1021	20	8.098	47.000	NA	NA	NA	NA
119	1021	30	7.502	47.167	NA	NA	NA	NA
119	1021	40	7.602	47.333	NA	NA	NA	NA
119	1021	50	7.741	47.500	NA	NA	NA	NA
119	1022	0	6.651	47.667	NA	NA	NA	NA
119	1022	10	7.145	47.833	NA	NA	NA	NA
119	1022	20	6.749	48.000	NA	NA	NA	NA
119	1022	30	7.561	48.167	NA	NA	NA	NA
119	1022	40	7.320	48.333	NA	NA	NA	NA
119	1022	50	6.883	48.500	NA	NA	NA	NA
119	1023	0	7.024	48.667	NA	NA	NA	NA
119	1023	10	7.083	48.833	NA	NA	NA	NA
119	1023	20	7.045	49.000	NA	NA	NA	NA
119	1023	30	6.957	49.167	NA	NA	NA	NA
119	1023	40	7.252	49.333	NA	NA	NA	NA
119	1023	50	7.207	49.500	NA	NA	NA	NA
119	1024	0	6.553	49.667	NA	NA	NA	NA
119	1024	10	6.177	49.833	NA	NA	NA	NA
119	1024	20	6.717	50.000	NA	NA	NA	NA
119	1024	30	6.729	50.167	NA	NA	NA	NA
119	1024	40	6.773	50.333	NA	NA	NA	NA
119	1024	50	6.793	50.500	NA	NA	NA	NA

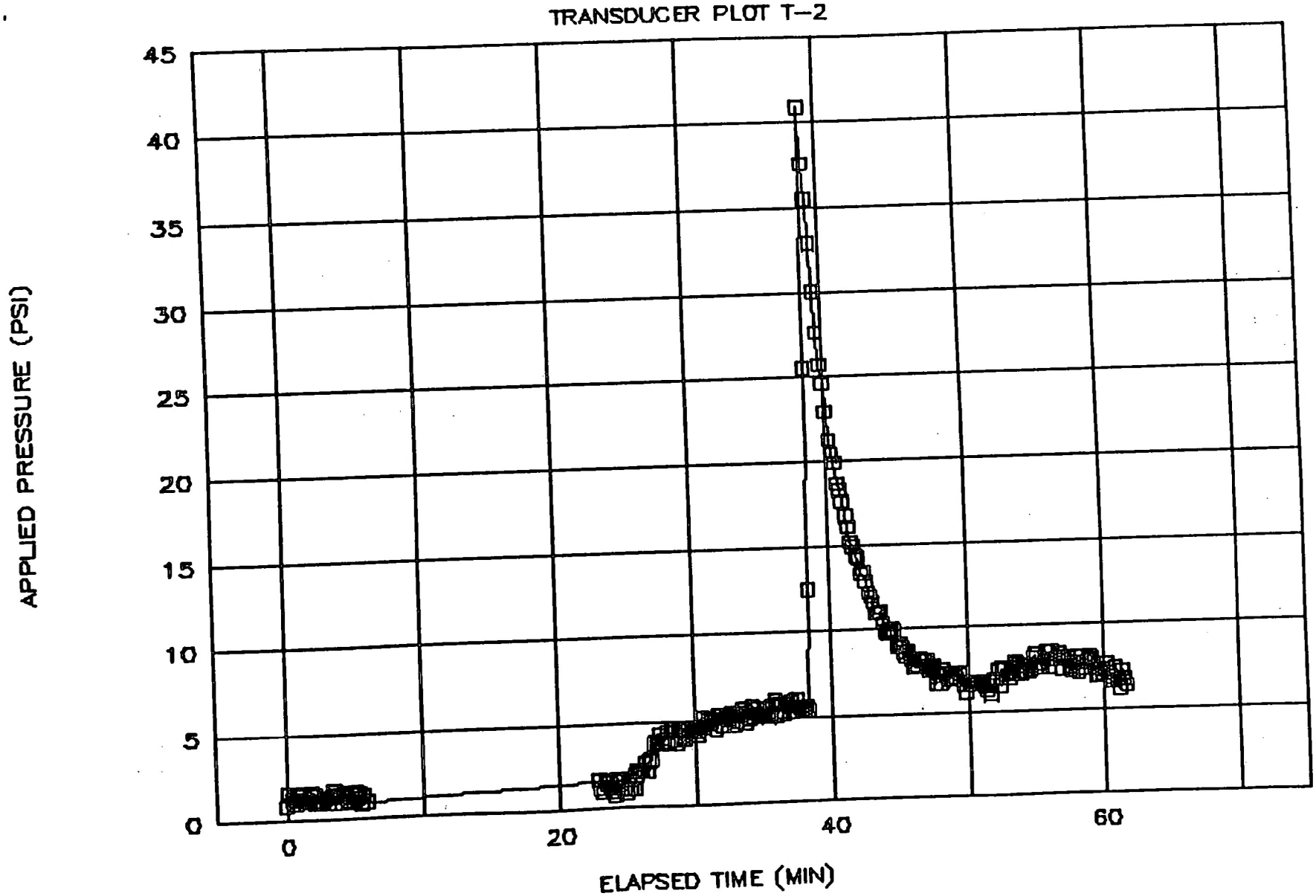
MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 1
DEPTH INTERVAL: 11 FT - 17 FT
MANUAL FLOW METER READING: 3.30E-02 L/MIN 0.009 GAL/MIN

24 HOUR CLOCK HR-MIN		SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119	1029	50	7.497	55.500	NA	NA	NA	NA
119	1030	0	8.003	55.667	NA	NA	NA	NA
119	1030	10	8.393	55.833	NA	NA	NA	NA
119	1030	20	7.534	56.000	NA	NA	NA	NA
119	1030	30	8.384	56.167	NA	NA	NA	NA
119	1030	40	7.926	56.333	NA	NA	NA	NA
119	1030	50	7.884	56.500	NA	NA	NA	NA
119	1031	0	8.286	56.667	NA	NA	NA	NA
119	1031	10	8.072	56.833	NA	NA	NA	NA
119	1031	20	7.391	57.000	NA	NA	NA	NA
119	1031	30	7.907	57.167	NA	NA	NA	NA
119	1031	40	8.122	57.333	NA	NA	NA	NA
119	1031	50	7.492	57.500	NA	NA	NA	NA
119	1032	0	7.200	57.667	NA	NA	NA	NA
119	1032	10	7.791	57.833	NA	NA	NA	NA
119	1032	20	8.058	58.000	NA	NA	NA	NA
119	1032	30	7.168	58.167	NA	NA	NA	NA
119	1032	40	7.752	58.333	NA	NA	NA	NA
119	1032	50	7.335	58.500	NA	NA	NA	NA
119	1033	0	7.366	58.667	NA	NA	NA	NA
119	1033	10	7.902	58.833	NA	NA	NA	NA
119	1033	20	8.130	59.000	NA	NA	NA	NA
119	1033	30	7.995	59.167	NA	NA	NA	NA
119	1033	40	7.323	59.333	NA	NA	NA	NA
119	1033	50	6.887	59.500	NA	NA	NA	NA
119	1034	0	6.902	59.667	NA	NA	NA	NA
119	1034	10	7.090	59.833	NA	NA	NA	NA
119	1034	20	7.290	60.000	NA	NA	NA	NA
119	1034	30	7.618	60.167	NA	NA	NA	NA

COREHOLE PT-2 (11 FT TO 17 FT)



MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 2
DEPTH INTERVAL: 16 FT - 22 FT
MANUAL FLOW METER READING: 1.10E-02 L/MIN 0.003 GAL/MIN

24 HOUR CLOCK HR-MIN		SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119	1104	50	7.723	4.833	NA	NA	NA	NA
119	1105	0	7.658	5.000	NA	NA	NA	NA
119	1105	10	7.655	5.167	NA	NA	NA	NA
119	1105	20	7.731	5.333	NA	NA	NA	NA
119	1105	30	7.674	5.500	NA	NA	NA	NA
119	1105	40	7.864	5.667	NA	NA	NA	NA
119	1105	50	8.674	5.833	0.002	NA	0.001	NA
119	1106	0	8.633	6.000	0.000	NA	0.000	NA
119	1106	10	8.638	6.167	0.005	NA	0.001	NA
119	1106	20	8.763	6.333	0.024	NA	0.006	NA
119	1106	30	8.002	6.500	0.026	NA	0.007	NA
119	1106	40	8.179	6.667	0.249	NA	0.066	NA
119	1106	50	8.781	6.833	1.080	NA	0.285	NA
119	1107	0	10.170	7.000	0.673	NA	0.178	NA
119	1107	10	9.385	7.167	0.071	NA	0.019	NA
119	1107	20	10.180	7.333	0.000	NA	0.000	NA
119	1107	30	10.329	7.500	0.001	NA	0.000	NA
119	1107	40	9.930	7.667	0.005	NA	0.001	NA
119	1107	50	9.925	7.833	0.002	NA	0.001	NA
119	1108	0	9.587	8.000	NA	NA	NA	NA
119	1108	10	9.801	8.167	NA	NA	NA	NA
119	1108	20	9.760	8.333	NA	NA	NA	NA
119	1108	30	10.086	8.500	NA	NA	NA	NA
119	1108	40	10.049	8.667	NA	NA	NA	NA
119	1108	50	10.487	8.833	NA	NA	NA	NA
119	1109	0	10.633	9.000	0.004	NA	0.001	NA
119	1109	10	10.636	9.167	NA	NA	NA	NA
119	1109	20	10.544	9.333	NA	NA	NA	NA
119	1109	30	10.775	9.500	NA	NA	NA	NA

MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 2
DEPTH INTERVAL: 16 FT - 22 FT
MANUAL FLOW METER READING: 1.10E-02 L/MIN 0.003 GAL/MIN

24 HOUR CLOCK HR-MIN		SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119	1114	30	9.767	14.500	NA	NA	NA	NA
119	1114	40	9.831	14.667	NA	NA	NA	NA
119	1114	50	9.641	14.833	NA	NA	NA	NA
119	1115	0	10.428	15.000	NA	NA	NA	NA
119	1115	10	9.207	15.167	NA	NA	NA	NA
119	1115	20	9.949	15.333	NA	NA	NA	NA
119	1115	30	9.179	15.500	NA	NA	NA	NA
119	1115	40	9.643	15.667	NA	NA	NA	NA
119	1115	50	9.252	15.833	NA	NA	NA	NA
119	1116	0	9.969	16.000	NA	NA	NA	NA
119	1116	10	9.814	16.167	NA	NA	NA	NA
119	1116	20	9.856	16.333	NA	NA	NA	NA
119	1116	30	9.094	16.500	NA	NA	NA	NA
119	1116	40	9.270	16.667	NA	NA	NA	NA
119	1116	50	9.661	16.833	NA	NA	NA	NA
119	1117	0	9.165	17.000	NA	NA	NA	NA
119	1117	10	9.352	17.167	NA	NA	NA	NA
119	1117	20	8.791	17.333	NA	NA	NA	NA
119	1117	30	9.802	17.500	NA	NA	NA	NA
119	1117	40	8.865	17.667	NA	NA	NA	NA
119	1117	50	9.835	17.833	NA	NA	NA	NA
119	1118	0	9.995	18.000	0.002	NA	0.001	NA
119	1118	10	9.911	18.167	0.030	NA	0.008	NA
119	1118	20	9.379	18.333	0.078	NA	0.021	NA
119	1118	30	9.967	18.500	0.091	NA	0.024	NA
119	1118	40	10.148	18.667	0.067	NA	0.018	NA
119	1118	50	9.905	18.833	0.053	NA	0.014	NA
119	1119	0	10.001	19.000	0.041	NA	0.011	NA
119	1119	10	10.438	19.167	0.034	NA	0.009	NA

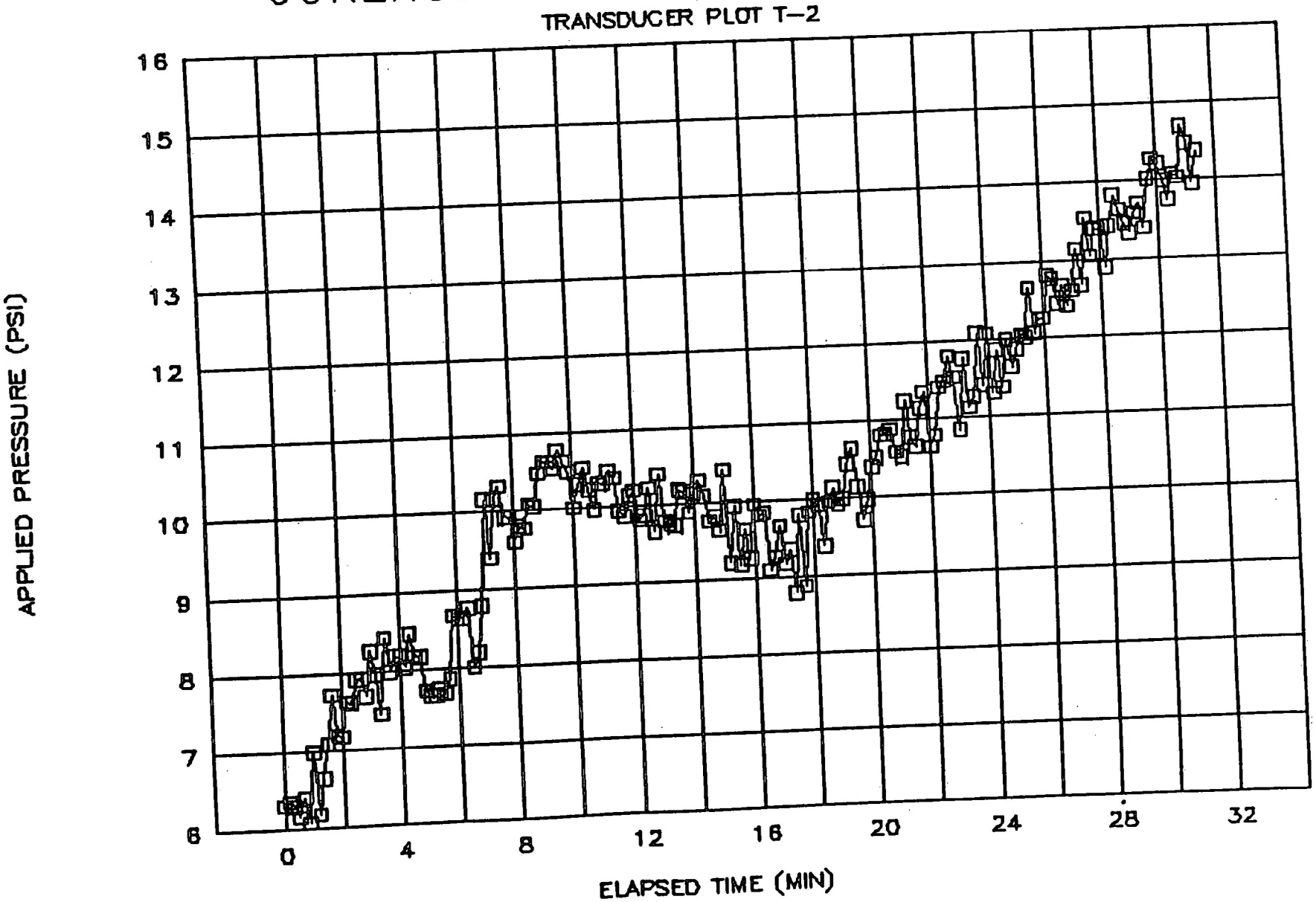
MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 2
DEPTH INTERVAL: 16 FT - 22 FT
MANUAL FLOW METER READING: 1.10E-02 L/MIN 0.003 GAL/MIN

24 HOUR CLOCK HR-MIN		SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119	1124	10	11.307	24.167	0.006	NA	0.002	NA
119	1124	20	11.857	24.333	0.008	NA	0.002	NA
119	1124	30	11.373	24.500	NA	NA	NA	NA
119	1124	40	11.986	24.667	0.006	NA	0.002	NA
119	1124	50	11.635	24.833	0.008	NA	0.002	NA
119	1125	0	11.861	25.000	0.009	NA	0.002	NA
119	1125	10	12.047	25.167	0.008	NA	0.002	NA
119	1125	20	12.016	25.333	0.011	NA	0.003	NA
119	1125	30	12.646	25.500	0.013	NA	0.003	NA
119	1125	40	12.062	25.667	0.007	NA	0.002	NA
119	1125	50	12.249	25.833	0.008	NA	0.002	NA
119	1126	0	12.249	26.000	0.006	NA	0.002	NA
119	1126	10	12.804	26.167	0.009	NA	0.002	NA
119	1126	20	12.753	26.333	0.009	NA	0.002	NA
119	1126	30	12.430	26.500	0.011	NA	0.003	NA
119	1126	40	12.671	26.667	0.011	NA	0.003	NA
119	1126	50	12.400	26.833	0.006	NA	0.002	NA
119	1127	0	12.597	27.000	0.007	NA	0.002	NA
119	1127	10	13.140	27.167	0.008	NA	0.002	NA
119	1127	20	12.663	27.333	0.007	NA	0.002	NA
119	1127	30	13.543	27.500	0.008	NA	0.002	NA
119	1127	40	13.037	27.667	0.012	NA	0.003	NA
119	1127	50	13.397	27.833	0.011	NA	0.003	NA
119	1128	0	13.389	28.000	0.007	NA	0.002	NA
119	1128	10	12.888	28.167	0.011	NA	0.003	NA
119	1128	20	13.433	28.333	0.011	NA	0.003	NA
119	1128	30	13.821	28.500	0.011	NA	0.003	NA
119	1128	40	13.642	28.667	0.009	NA	0.002	NA
119	1128	50	13.450	28.833	0.013	NA	0.003	NA

COREHOLE PT-2 (16 FT TO 22 FT)



MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 3
DEPTH INTERVAL: 29 FT - 35 FT
MANUAL FLOW METER READING: 1.38E-01 L/MIN 0.036 GAL/MIN

24 HOUR CLOCK HR-MIN		SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119	1155	10	13.909	4.833	0.038	NA	0.010	NA
119	1155	20	14.443	5.000	0.060	NA	0.016	NA
119	1155	30	14.229	5.167	0.059	NA	0.016	NA
119	1155	40	14.047	5.333	0.080	NA	0.021	NA
119	1155	50	14.763	5.500	0.105	NA	0.028	NA
119	1156	0	14.670	5.667	0.123	NA	0.032	NA
119	1156	10	14.827	5.833	0.151	NA	0.040	NA
119	1156	20	15.044	6.000	0.170	NA	0.045	NA
119	1156	30	15.743	6.167	0.179	NA	0.047	NA
119	1156	40	15.885	6.333	0.189	NA	0.050	NA
119	1156	50	15.398	6.500	0.175	NA	0.046	NA
119	1157	0	16.207	6.667	0.119	NA	0.031	NA
119	1157	10	15.756	6.833	0.101	NA	0.027	NA
119	1157	20	16.458	7.000	0.117	NA	0.031	NA
119	1157	30	16.543	7.167	0.125	NA	0.033	NA
119	1157	40	15.910	7.333	0.131	NA	0.035	NA
119	1157	50	16.499	7.500	0.133	NA	0.035	NA
119	1158	0	17.163	7.667	0.135	NA	0.036	NA
119	1158	10	17.332	7.833	0.136	NA	0.036	NA
119	1158	20	17.223	8.000	0.140	NA	0.037	NA
119	1158	30	17.357	8.167	0.145	NA	0.038	NA
119	1158	40	16.882	8.333	0.148	NA	0.039	NA
119	1158	50	17.362	8.500	0.148	NA	0.039	NA
119	1159	0	17.615	8.667	0.149	NA	0.039	NA
119	1159	10	17.672	8.833	0.150	NA	0.040	NA
119	1159	20	18.135	9.000	0.150	NA	0.040	NA
119	1159	30	18.528	9.167	0.149	NA	0.039	NA
119	1159	40	18.192	9.333	0.149	NA	0.039	NA
119	1159	50	18.301	9.500	0.150	NA	0.040	NA

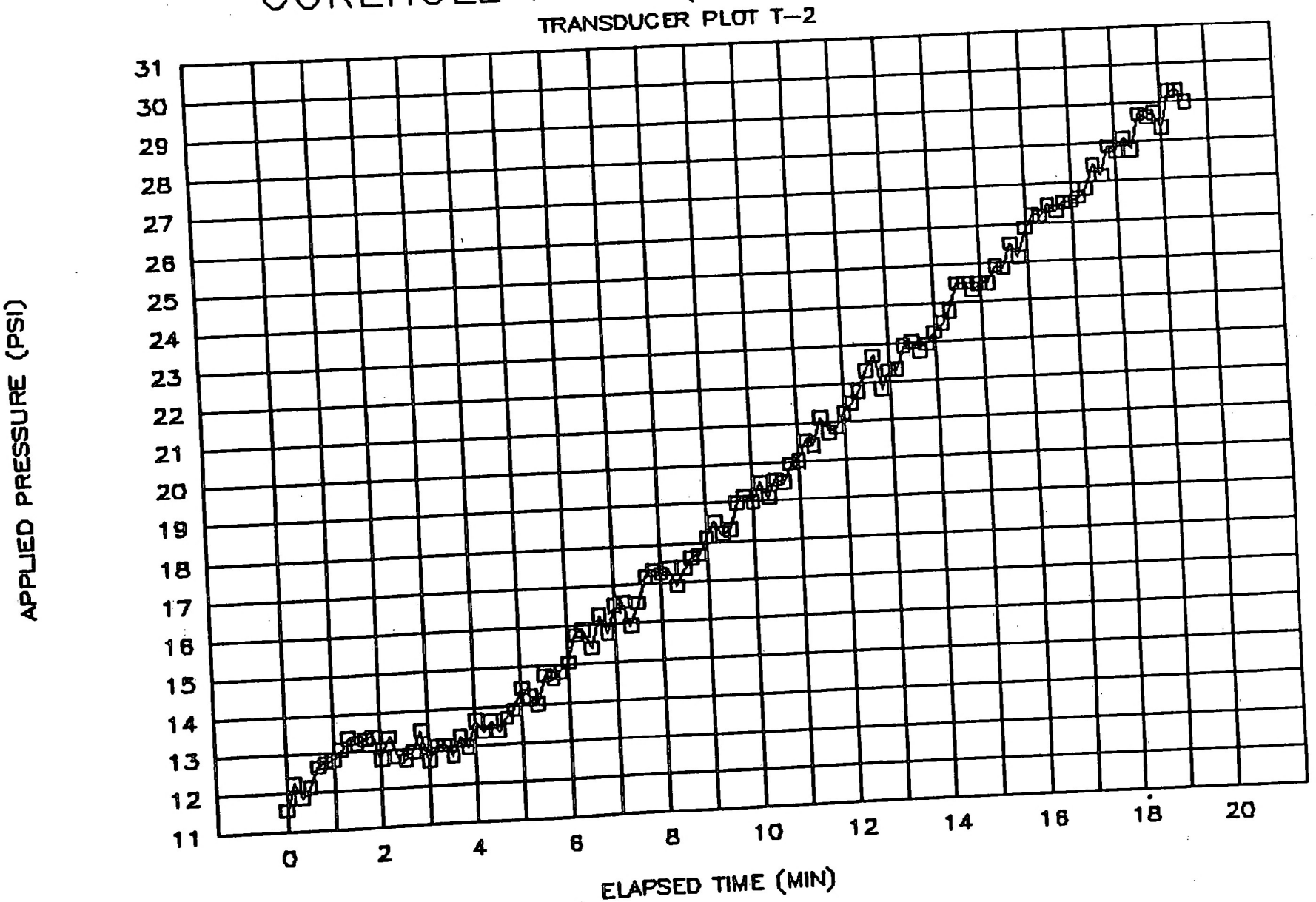
MAY 1994

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 3
DEPTH INTERVAL: 29 FT - 35 FT
MANUAL FLOW METER READING: 1.38E-01 L/MIN 0.036 GAL/MIN

24 HOUR CLOCK HR-MIN	SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119 1204	50	24.491	14.500	0.143	NA	0.038	NA
119 1205	0	24.502	14.667	0.143	NA	0.038	NA
119 1205	10	24.299	14.833	0.142	NA	0.037	NA
119 1205	20	24.452	15.000	0.143	NA	0.038	NA
119 1205	30	24.469	15.167	0.143	NA	0.038	NA
119 1205	40	24.905	15.333	0.143	NA	0.038	NA
119 1205	50	24.851	15.500	0.142	NA	0.037	NA
119 1206	0	25.488	15.667	0.142	NA	0.037	NA
119 1206	10	25.125	15.833	0.142	NA	0.037	NA
119 1206	20	25.891	16.000	0.142	NA	0.037	NA
119 1206	30	26.208	16.167	0.139	NA	0.037	NA
119 1206	40	26.186	16.333	0.140	NA	0.037	NA
119 1206	50	26.455	16.500	0.142	NA	0.037	NA
119 1207	0	26.275	16.667	0.139	NA	0.037	NA
119 1207	10	26.508	16.833	0.139	NA	0.037	NA
119 1207	20	26.522	17.000	0.140	NA	0.037	NA
119 1207	30	26.632	17.167	0.138	NA	0.036	NA
119 1207	40	26.863	17.333	0.138	NA	0.036	NA
119 1207	50	27.453	17.500	0.139	NA	0.037	NA
119 1208	0	27.163	17.667	0.139	NA	0.037	NA
119 1208	10	27.929	17.833	0.138	NA	0.036	NA
119 1208	20	27.757	18.000	0.139	NA	0.037	NA
119 1208	30	28.100	18.167	0.139	NA	0.037	NA
119 1208	40	27.804	18.333	0.138	NA	0.036	NA
119 1208	50	28.704	18.500	0.138	NA	0.036	NA
119 1209	0	28.633	18.667	0.138	NA	0.036	NA
119 1209	10	28.736	18.833	0.138	NA	0.036	NA
119 1209	20	28.337	19.000	0.136	NA	0.036	NA
119 1209	30	29.279	19.167	0.137	NA	0.036	NA

COREHOLE PT-2 (29 FT TO 35 FT)



USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 4
DEPTH INTERVAL: 66 FT - 72 FT
MANUAL FLOW METER READING: NA L/MIN NA GAL/MIN

24 HOUR CLOCK HR-MIN		SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119	1252	50	125.660	5.000	NA	NA	NA	NA
119	1253	0	125.230	5.167	NA	NA	NA	NA
119	1253	10	NA	5.333	NA	NA	NA	NA
119	1253	20	123.680	5.500	NA	NA	NA	NA
119	1253	30	121.360	5.667	NA	NA	NA	NA
119	1253	40	121.070	5.833	NA	NA	NA	NA
119	1253	50	121.480	6.000	NA	NA	NA	NA
119	1254	0	121.420	6.167	NA	NA	NA	NA
119	1254	10	119.310	6.333	NA	NA	NA	NA
119	1254	20	113.920	6.500	NA	NA	NA	NA
119	1254	30	101.030	6.667	NA	NA	NA	NA
119	1254	40	111.080	6.833	NA	NA	NA	NA
119	1254	50	111.270	7.000	NA	NA	NA	NA
119	1255	0	108.340	7.167	NA	NA	NA	NA
119	1255	10	110.840	7.333	NA	NA	NA	NA
119	1255	20	109.100	7.500	NA	NA	NA	NA
119	1255	30	106.970	7.667	NA	NA	NA	NA
119	1255	40	106.510	7.833	NA	NA	NA	NA
119	1255	50	106.280	8.000	NA	NA	NA	NA
119	1256	0	105.690	8.167	NA	NA	NA	NA
119	1256	10	106.210	8.333	NA	NA	NA	NA
119	1256	20	103.450	8.500	NA	NA	NA	NA
119	1256	30	101.850	8.667	NA	NA	NA	NA
119	1256	40	103.190	8.833	NA	NA	NA	NA
119	1256	50	104.410	9.000	NA	NA	NA	NA
119	1257	0	103.460	9.167	NA	NA	NA	NA
119	1257	10	103.520	9.333	NA	NA	NA	NA
119	1257	20	103.780	9.500	NA	NA	NA	NA
119	1257	30	103.500	9.667	NA	NA	NA	NA
119	1257	40	101.170	9.833	NA	NA	NA	NA

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 4
DEPTH INTERVAL: 66 FT - 72 FT
MANUAL FLOW METER READING: NA L/MIN NA GAL/MIN

24 HOUR CLOCK HR-MIN		SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119	1302	50	97.786	15.000	NA	NA	NA	NA
119	1303	0	97.331	15.167	NA	NA	NA	NA
119	1303	10	98.088	15.333	NA	NA	NA	NA
119	1303	20	98.223	15.500	NA	NA	NA	NA
119	1303	30	96.977	15.667	NA	NA	NA	NA
119	1303	40	97.468	15.833	NA	NA	NA	NA
119	1303	50	97.779	16.000	NA	NA	NA	NA
119	1304	0	96.676	16.167	NA	NA	NA	NA
119	1304	10	97.104	16.333	NA	NA	NA	NA
119	1304	20	97.096	16.500	NA	NA	NA	NA
119	1304	30	96.717	16.667	NA	NA	NA	NA
119	1304	40	97.183	16.833	NA	NA	NA	NA
119	1304	50	95.749	17.000	NA	NA	NA	NA
119	1305	0	96.855	17.167	NA	NA	NA	NA
119	1305	10	97.226	17.333	NA	NA	NA	NA
119	1305	20	96.459	17.500	NA	NA	NA	NA
119	1305	30	96.490	17.667	NA	NA	NA	NA
119	1305	40	96.439	17.833	NA	NA	NA	NA
119	1305	50	96.560	18.000	NA	NA	NA	NA
119	1306	0	96.904	18.167	NA	NA	NA	NA
119	1306	10	96.513	18.333	NA	NA	NA	NA
119	1306	20	96.187	18.500	NA	NA	NA	NA
119	1306	30	96.300	18.667	NA	NA	NA	NA
119	1306	40	95.242	18.833	NA	NA	NA	NA
119	1306	50	96.010	19.000	NA	NA	NA	NA
119	1307	0	96.037	19.167	NA	NA	NA	NA
119	1307	10	95.958	19.333	NA	NA	NA	NA
119	1307	20	96.118	19.500	NA	NA	NA	NA
119	1307	30	95.556	19.667	NA	NA	NA	NA
119	1307	40	95.115	19.833	NA	NA	NA	NA

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 4
DEPTH INTERVAL: 66 FT - 72 FT
MANUAL FLOW METER READING: NA L/MIN NA GAL/MIN

24 HOUR CLOCK HR-MIN		SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119	1312	50	91.998	25.000	NA	NA	NA	NA
119	1313	0	91.970	25.167	NA	NA	NA	NA
119	1313	10	92.249	25.333	NA	NA	NA	NA
119	1313	20	92.224	25.500	NA	NA	NA	NA
119	1313	30	91.956	25.667	NA	NA	NA	NA
119	1313	40	91.861	25.833	NA	NA	NA	NA
119	1313	50	92.315	26.000	NA	NA	NA	NA
119	1314	0	92.183	26.167	NA	NA	NA	NA
119	1314	10	91.850	26.333	NA	NA	NA	NA
119	1314	20	91.695	26.500	NA	NA	NA	NA
119	1314	30	92.122	26.667	NA	NA	NA	NA
119	1314	40	91.488	26.833	NA	NA	NA	NA
119	1314	50	91.658	27.000	NA	NA	NA	NA
119	1315	0	91.516	27.167	NA	NA	NA	NA
119	1315	10	91.593	27.333	NA	NA	NA	NA
119	1315	20	91.353	27.500	NA	NA	NA	NA
119	1315	30	90.638	27.667	NA	NA	NA	NA
119	1315	40	91.006	27.833	NA	NA	NA	NA
119	1315	50	90.504	28.000	NA	NA	NA	NA
119	1316	0	91.161	28.167	NA	NA	NA	NA
119	1316	10	91.564	28.333	NA	NA	NA	NA
119	1316	20	90.777	28.500	NA	NA	NA	NA
119	1316	30	91.075	28.667	NA	NA	NA	NA
119	1316	40	91.426	28.833	NA	NA	NA	NA
119	1316	50	90.588	29.000	NA	NA	NA	NA
119	1317	0	90.494	29.167	NA	NA	NA	NA
119	1317	10	90.763	29.333	NA	NA	NA	NA
119	1317	20	90.243	29.500	NA	NA	NA	NA
119	1317	30	91.072	29.667	NA	NA	NA	NA
119	1319	0	90.428	31.167	NA	NA	NA	NA

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 4
DEPTH INTERVAL: 66 FT - 72 FT
MANUAL FLOW METER READING: NA L/MIN NA GAL/MIN

24 HOUR CLOCK HR-MIN		SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119	1350	0	45.368	62.167	NA	NA	NA	NA
119	1351	0	45.696	63.167	NA	NA	NA	NA
119	1352	0	45.694	64.167	NA	NA	NA	NA
119	1353	0	45.757	65.167	NA	NA	NA	NA
119	1354	0	45.728	66.167	NA	NA	NA	NA
119	1355	0	45.827	67.167	NA	NA	NA	NA
119	1356	0	46.133	68.167	NA	NA	NA	NA
119	1357	0	45.889	69.167	NA	NA	NA	NA
119	1358	0	45.850	70.167	NA	NA	NA	NA
119	1359	0	45.859	71.167	NA	NA	NA	NA
119	1400	0	45.883	72.167	NA	NA	NA	NA
119	1401	0	45.989	73.167	NA	NA	NA	NA
119	1402	0	45.946	74.167	NA	NA	NA	NA
119	1403	0	46.408	75.167	NA	NA	NA	NA
119	1404	0	45.955	76.167	NA	NA	NA	NA
119	1405	0	45.721	77.167	NA	NA	NA	NA
119	1406	0	45.852	78.167	NA	NA	NA	NA
119	1407	0	45.958	79.167	NA	NA	NA	NA
119	1408	0	45.774	80.167	NA	NA	NA	NA
119	1409	0	45.347	81.167	NA	NA	NA	NA
119	1410	0	45.251	82.167	NA	NA	NA	NA
119	1411	0	45.321	83.167	NA	NA	NA	NA
119	1412	0	45.297	84.167	NA	NA	NA	NA
119	1413	0	45.226	85.167	NA	NA	NA	NA
119	1414	0	45.106	86.167	NA	NA	NA	NA
119	1415	0	45.140	87.167	NA	NA	NA	NA
119	1416	0	45.243	88.167	NA	NA	NA	NA
119	1417	0	45.174	89.167	NA	NA	NA	NA
119	1418	0	45.126	90.167	NA	NA	NA	NA
119	1419	0	45.142	91.167	NA	NA	NA	NA

USPCI PACKER TESTING
LONE MOUNTAIN FACILITY
WAYNOKA, OKLAHOMA

COREHOLE: PT-2
TEST #: 4
DEPTH INTERVAL: 66 FT - 72 FT
MANUAL FLOW METER READING: NA L/MIN NA GAL/MIN

24 HOUR CLOCK HR-MIN	SEC	TRANS T2 (PSI)	ELAPSED TIME (MIN)	FLOW METER 1 (L/MIN)	FLOW METER 2 (L/MIN)	FLOW METER 1 (GAL/MIN)	FLOW METER 2 (GAL/MIN)
119 1450	0	43.278	122.167	NA	NA	NA	NA
119 1451	0	43.316	123.167	NA	NA	NA	NA
119 1452	0	43.308	124.167	NA	NA	NA	NA
119 1453	0	43.148	125.167	NA	NA	NA	NA
119 1454	0	43.275	126.167	NA	NA	NA	NA
119 1455	0	43.021	127.167	NA	NA	NA	NA
119 1456	0	43.039	128.167	NA	NA	NA	NA
119 1457	0	42.791	129.167	NA	NA	NA	NA
119 1458	0	41.943	130.167	NA	NA	NA	NA
119 1459	0	41.514	131.167	NA	NA	NA	NA

TEST NO. : PT-2 SHUT-IN # 1
TESTED ZONE (BOS): 66.00 FT. TO 72.00 FT.
LENGTH TESTED : 0.0 FT.
ELEV TOC/OS : #N/A #N/A FT.MSL
DEPTH TO WATER : 6.00 FEET BELOW TOC
ELEVATION WATER : #N/A FT MSL
ANGLE FROM VERTICAL : 0.00 DEGREES

UCER NUMBER	ANGLE DEPTH	DEPTH (FEET)	(FT-BOS)	ELEVATION (FT MSL)
1 ABOVE TOP PACKER		61.00	61.00	#N/A
2 BETWEEN PACKERS		72.00	72.00	#N/A
3 BELOW BOTTOM PACKER		77.00	77.00	#N/A

TEST STATUS	DAY	HR	MIN	SEC
0. TEST SETUP	1	12	47	0
1. VALVE CLOSED	1	12	48	0
2. PACKER INFLATED	1	12	48	0
3. VALVE OPEN	1	12	48	0
4. VALVE CLOSE	1	12	48	0
5. VALVE OPEN	1	12	48	0
6. VALVE CLOSED	1	12	48	0
7. VALVE OPEN	1	15	0	0
8. PACKER DEFLATED	1	15	0	0

FIRST FLOW PERIOD = #N/A min
SECOND FLOW PERIOD = #N/A min

MATCH POINT VALUES:

ALPHA	LOG BETA	F(A,B)	H/Ho	LOG t (sec)
1.00E-08	0.30	0.70	0.70	2.70

HYDRAULIC CONDUCTIVITY = 4.0E-09 CM/SEC

MIDDLE TRANSDUCER
PRESURE SLUG
ANALYSIS

95.0 = STATIC HEAD (FT,MSL)
5.00 = TIME OF PRESSURIZATION (MIN)
273.27 = INITIAL DRIVING HEAD Ho, (FT)

TEST STATUS	DAY	HR-MIN	SEC	T2 (psi)	ELAPSED TIME (MIN)	H2 (FT)	TIME SINCE PRESSURIZATION (T) (sec)	LOG (T) (sec)	DRIVING HEAD, H (FT)	H/Ho (FT/FT)
0	1	1247	50	27.313	0.000	#N/A	.	.	.	.
0	1	1248	0	27.674	0.167	#N/A	.	.	.	.
0	1	1248	10	27.358	0.333	#N/A	.	.	.	.
0	1	1248	20	27.209	0.500	#N/A	.	.	.	.
0	1	1248	30	27.202	0.667	#N/A	.	.	.	.
0	1	1248	40	27.002	0.833	#N/A	.	.	.	.
0	1	1248	50	27.088	1.000	#N/A	.	.	.	.
0	1	1249	0	27.092	1.167	#N/A	.	.	.	.
0	1	1249	10	27.308	1.333	#N/A	.	.	.	.
0	1	1249	20	27.497	1.500	#N/A	.	.	.	.
0	1	1249	30	27.304	1.667	#N/A	.	.	.	.
0	1	1249	40	27.561	1.833	#N/A	.	.	.	.
0	1	1249	50	33.124	2.000	#N/A	.	.	.	.
0	1	1250	0	42.196	2.167	#N/A	.	.	.	.
0	1	1250	10	62.761	2.333	#N/A	.	.	.	.
0	1	1250	20	72.717	2.500	#N/A	.	.	.	.
0	1	1250	30	72.813	2.667	#N/A	.	.	.	.
0	1	1250	40	77.160	2.833	#N/A	.	.	.	.
0	1	1250	50	78.102	3.000	#N/A	.	.	.	.
0	1	1251	0	78.608	3.167	#N/A	.	.	.	.
0	1	1251	10	83.266	3.333	#N/A	.	.	.	.
0	1	1251	20	96.207	3.500	#N/A	.	.	.	.
0	1	1251	30	116.530	3.667	#N/A	.	.	.	.
0	1	1251	40	114.900	3.833	#N/A	.	.	.	.
0	1	1251	50	117.400	4.000	#N/A	.	.	.	.
0	1	1252	0	110.100	4.167	#N/A	.	.	.	.
0	1	1252	10	121.170	4.333	#N/A	.	.	.	.
0	1	1252	20	118.430	4.500	#N/A	.	.	.	.
0	1	1252	30	121.600	4.667	#N/A	.	.	.	.
0	1	1252	40	123.530	4.833	#N/A	.	.	.	.
0	1	1252	50	125.960	5.000	#N/A	.	.	.	.
0	1	1253	0	126.230	5.167	299.26	10	1.000	194.291	0.970
0	1	1253	10	#N/A	5.333	#N/A	20	1.301	#N/A	#N/A
0	1	1253	20	123.660	5.500	295.70	30	1.477	190.701	0.954
0	1	1253	30	121.360	5.667	293.34	40	1.602	188.342	0.930
0	1	1253	40	121.070	5.833	270.87	50	1.699	184.072	0.927
0	1	1253	50	121.480	6.000	260.62	60	1.778	185.819	0.931
0	1	1254	0	121.420	6.167	260.46	70	1.845	185.480	0.931
0	1	1254	10	110.310	6.333	275.61	80	1.903	180.606	0.909
0	1	1254	20	113.070	6.500	263.16	90	1.954	168.156	0.753
0	1	1254	30	101.030	6.667	233.38	100	2.000	138.379	0.620
0	1	1254	40	111.060	6.833	256.59	110	2.041	161.595	0.724
0	1	1254	50	111.270	7.000	257.03	120	2.079	162.034	0.726
0	1	1255	0	106.340	7.167	250.27	130	2.114	155.295	0.695
0	1	1255	10	110.840	7.333	256.04	140	2.146	161.040	0.721
0	1	1255	20	106.100	7.500	252.02	150	2.176	157.021	0.703
0	1	1255	30	100.970	7.667	247.10	160	2.204	152.101	0.681
0	1	1255	40	100.510	7.833	246.04	170	2.230	151.038	0.676
0	1	1255	50	100.260	0.000	245.51	180	2.255	150.507	0.674
0	1	1256	0	105.660	0.167	244.14	190	2.279	149.144	0.668
0	1	1256	10	106.210	0.333	245.35	200	2.301	150.345	0.673
0	1	1256	20	103.450	0.500	239.97	210	2.322	143.970	0.645
0	1	1256	30	101.950	0.667	235.27	220	2.342	140.274	0.628
0	1	1256	40	103.190	0.833	239.37	230	2.362	143.369	0.642
0	1	1256	50	104.410	0.000	241.19	240	2.380	146.187	0.655
0	1	1257	0	103.400	0.167	239.09	250	2.398	143.993	0.645
0	1	1257	10	103.570	0.333	239.13	260	2.415	144.131	0.646
0	1	1257	20	103.760	0.500	239.73	270	2.431	144.732	0.648
0	1	1257	30	103.500	0.667	239.00	280	2.447	144.066	0.645

MIDDLE TRANSDUCER
PRESURE BLUG
ANALYSIS

06.0 = STATIC HEAD (FT,MSL)
6.00 = TIME OF PRESSURIZATION (MIN)
223.27 = INITIAL DRIVING HEAD Ho, (FT)

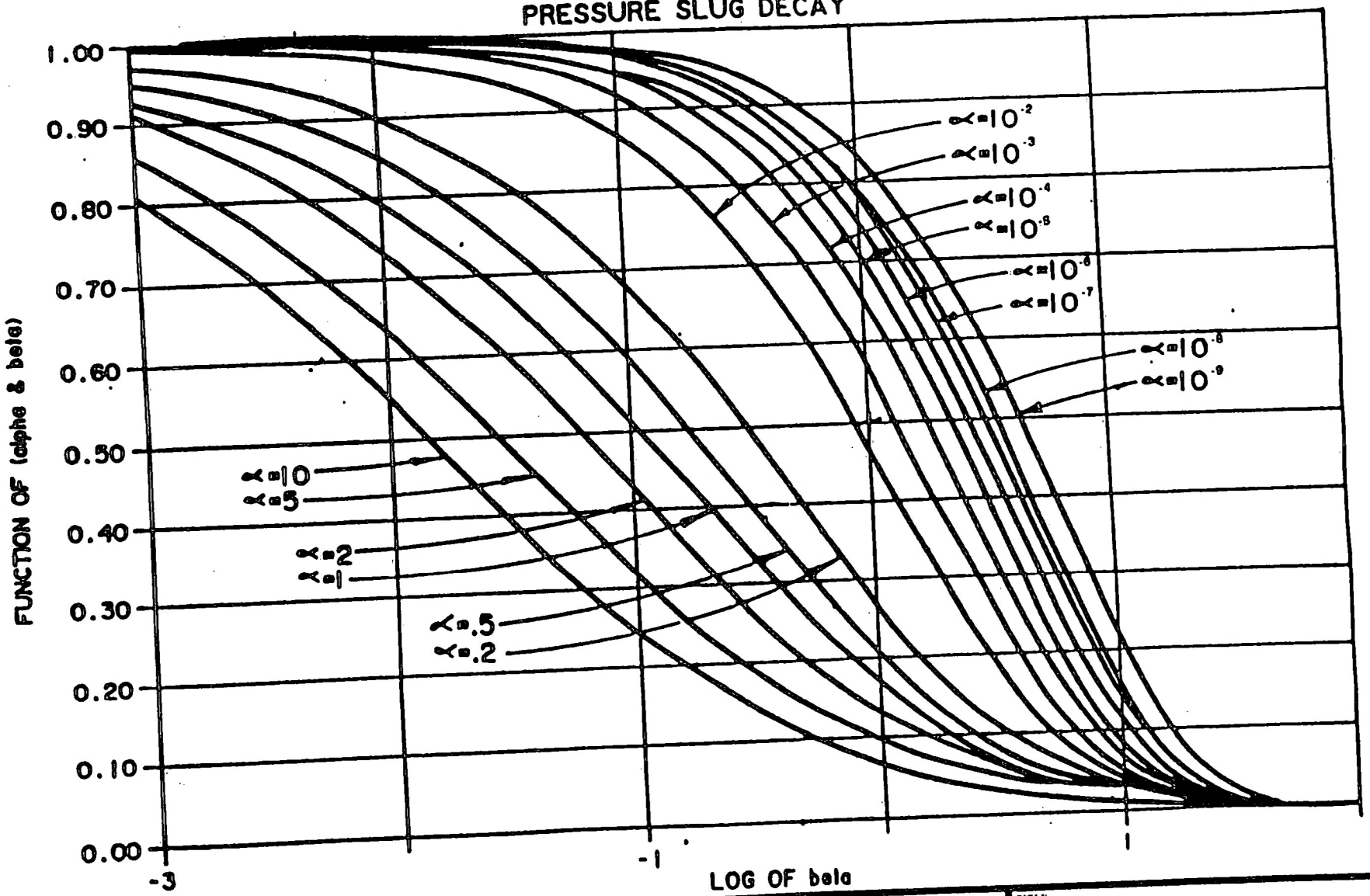
TEST STATUS	DAY	HR MIN	SEC	T2 (psi)	ELAPSED TIME (MIN)	H2 (FT)	TIME SINCE PRESSURIZATION (T) (sec)	LOG (T) (sec)	DRIVING HEAD, H (FT)	H/Ho (FT/FT)
0	1	1307	30	95.550	10.067	220.73	660	2.044	125.734	0.563
0	1	1307	40	95.116	10.833	219.72	650	2.040	124.718	0.559
0	1	1307	50	94.510	20.000	218.32	600	2.954	123.318	0.552
0	1	1308	0	95.148	20.167	219.79	610	2.959	124.792	0.559
0	1	1308	10	95.472	20.333	220.54	620	2.964	125.540	0.562
0	1	1308	20	94.227	20.500	217.66	630	2.968	122.664	0.549
0	1	1308	30	94.578	20.667	218.47	640	2.973	123.471	0.553
0	1	1308	40	95.083	20.833	219.64	650	2.978	124.642	0.558
0	1	1308	50	94.970	21.000	219.40	660	2.982	124.399	0.557
0	1	1309	0	93.802	21.167	216.69	670	2.987	121.683	0.545
0	1	1309	10	93.982	21.333	217.05	680	2.991	122.052	0.547
0	1	1309	20	94.283	21.500	217.76	690	2.996	122.794	0.550
0	1	1309	30	93.671	21.667	216.38	1000	3.000	121.380	0.544
0	1	1309	40	94.164	21.833	217.52	1010	3.004	122.510	0.549
0	1	1309	50	94.132	22.000	217.44	1020	3.009	122.445	0.549
0	1	1310	0	93.501	22.167	216.20	1030	3.013	121.195	0.543
0	1	1310	10	94.130	22.333	217.46	1040	3.017	122.461	0.548
0	1	1310	20	94.120	22.500	217.42	1050	3.021	122.417	0.548
0	1	1310	30	93.396	22.667	215.74	1060	3.025	120.742	0.541
0	1	1310	40	93.765	22.833	216.64	1070	3.029	121.643	0.545
0	1	1310	50	93.709	23.000	216.68	1080	3.033	121.678	0.545
0	1	1311	0	91.607	23.167	211.62	1090	3.037	118.820	0.523
0	1	1311	10	92.400	23.333	213.44	1100	3.041	118.444	0.530
0	1	1311	20	92.898	23.500	214.63	1110	3.045	119.826	0.537
0	1	1311	30	92.960	23.667	214.74	1120	3.049	119.738	0.536
0	1	1311	40	92.943	23.833	214.70	1130	3.053	119.698	0.536
0	1	1311	50	93.380	24.000	215.72	1140	3.057	120.722	0.541
0	1	1312	0	92.632	24.167	213.76	1150	3.061	118.740	0.532
0	1	1312	10	92.208	24.333	213.00	1160	3.064	117.996	0.528
0	1	1312	20	92.027	24.500	212.67	1170	3.068	118.088	0.533
0	1	1312	30	92.436	24.667	213.53	1180	3.072	118.527	0.531
0	1	1312	40	92.638	24.833	213.90	1190	3.076	118.894	0.533
0	1	1312	50	91.898	25.000	212.52	1200	3.079	117.515	0.526
0	1	1313	0	91.870	25.167	212.45	1210	3.083	117.451	0.526
0	1	1313	10	92.249	25.333	213.10	1220	3.086	118.095	0.529
0	1	1313	20	92.224	25.500	213.04	1230	3.090	118.037	0.529
0	1	1313	30	91.056	25.667	212.42	1240	3.093	117.418	0.526
0	1	1313	40	91.661	25.833	212.20	1250	3.097	117.199	0.525
0	1	1313	50	92.315	26.000	213.26	1260	3.100	118.248	0.530
0	1	1314	0	92.183	26.167	212.94	1270	3.104	117.943	0.528
0	1	1314	10	91.860	26.333	212.17	1280	3.107	117.174	0.525
0	1	1314	20	91.695	26.500	211.82	1290	3.111	116.815	0.523
0	1	1314	30	92.122	26.667	212.80	1300	3.114	117.802	0.528
0	1	1314	40	91.466	26.833	211.34	1310	3.117	116.337	0.521
0	1	1314	50	91.858	27.000	211.73	1320	3.121	116.730	0.523
0	1	1315	0	91.510	27.167	211.40	1330	3.124	116.402	0.521
0	1	1315	10	91.583	27.333	211.58	1340	3.127	116.580	0.522
0	1	1315	20	91.353	27.500	211.03	1350	3.130	116.025	0.520
0	1	1315	30	90.638	27.667	209.37	1360	3.134	114.374	0.512
0	1	1315	40	91.006	27.833	210.22	1370	3.137	115.224	0.516
0	1	1315	50	90.504	28.000	209.06	1380	3.140	114.064	0.511
0	1	1316	0	91.101	28.167	210.58	1390	3.143	115.582	0.518
0	1	1316	10	91.564	28.333	211.51	1400	3.146	116.513	0.522
0	1	1316	20	90.777	28.500	209.60	1410	3.149	114.696	0.514
0	1	1316	30	91.075	28.667	210.38	1420	3.152	115.383	0.517
0	1	1316	40	91.420	28.833	211.18	1430	3.155	116.194	0.520
0	1	1316	50	90.566	29.000	209.28	1440	3.158	114.268	0.512
0	1	1317	0	90.494	29.167	209.04	1450	3.161	114.041	0.511
0	1	1317	10	90.763	29.333	209.66	1460	3.164	114.683	0.514

MIDDLE TRANSDUCER
PRESURE SLUG
ANALYSIS

96.0 = STATIC HEAD (FT,MSL)
5.00 = TIME OF PRESSURIZATION (MIN)
223.27 = INITIAL DRIVING HEAD Ho, (FT)

TEST STATUS	DAY	HR MIN	SEC	T2 (psi)	ELAPSED TIME (MIN)	H2 (FT)	TIME SINCE PRESSURIZATION (T) (sec)	LOG (T) (sec)	DRIVING HEAD, H (FT)	H/Ho (FT/FT)
0	1	1416	0	45.243	88.167	104.51	4990	3.698	9.511	0.043
0	1	1417	0	45.174	89.167	104.35	5050	3.703	9.352	0.042
0	1	1418	0	45.126	90.167	104.24	5110	3.708	9.241	0.041
0	1	1419	0	45.142	91.167	104.28	5170	3.713	9.278	0.042
0	1	1420	0	45.093	92.167	104.18	5230	3.718	9.185	0.041
0	1	1421	0	45.073	93.167	104.12	5290	3.723	9.119	0.041
0	1	1422	0	45.017	94.167	103.99	5350	3.728	8.989	0.040
0	1	1423	0	44.969	95.167	103.88	5410	3.733	8.878	0.040
0	1	1424	0	44.912	96.167	103.75	5470	3.738	8.747	0.039
0	1	1425	0	44.914	97.167	103.75	5530	3.743	8.751	0.039
0	1	1426	0	44.919	98.167	103.76	5590	3.747	8.763	0.039
0	1	1427	0	44.862	99.167	103.68	5650	3.752	8.677	0.039
0	1	1428	0	44.868	100.167	103.64	5710	3.757	8.640	0.039
0	1	1429	0	44.588	101.167	102.99	5770	3.761	7.994	0.036
0	1	1430	0	44.718	102.167	103.30	5830	3.766	8.299	0.037
0	1	1431	0	44.773	103.167	103.43	5890	3.770	8.428	0.038
0	1	1432	0	44.753	104.167	103.38	5950	3.775	8.379	0.038
0	1	1433	0	43.630	105.167	100.79	6010	3.779	5.785	0.026
0	1	1434	0	43.655	106.167	100.84	6070	3.783	5.843	0.026
0	1	1435	0	43.492	107.167	100.47	6130	3.787	5.467	0.024
0	1	1436	0	43.442	108.167	100.35	6190	3.792	5.351	0.024
0	1	1437	0	43.108	109.167	99.58	6250	3.796	4.579	0.021
0	1	1438	0	43.330	110.167	100.09	6310	3.800	5.002	0.023
0	1	1439	0	43.040	111.167	99.42	6370	3.804	4.427	0.020
0	1	1440	0	43.060	112.167	99.47	6430	3.808	4.480	0.020
0	1	1441	0	43.226	113.167	99.85	6490	3.812	4.860	0.022
0	1	1442	0	43.440	114.167	100.35	6550	3.816	5.348	0.024
0	1	1443	0	43.444	115.167	100.36	6610	3.820	5.358	0.024
0	1	1444	0	43.081	116.167	99.52	6670	3.824	4.517	0.020
0	1	1445	0	43.138	117.167	99.65	6730	3.828	4.648	0.021
0	1	1446	0	42.882	118.167	99.06	6790	3.832	4.067	0.018
0	1	1447	0	#N/A	119.167	#N/A	6850	3.836	#N/A	#N/A
0	1	1448	0	43.324	120.167	100.09	6910	3.839	5.078	0.023
0	1	1449	0	#N/A	121.167	#N/A	6970	3.843	#N/A	#N/A
0	1	1450	0	43.276	122.167	99.97	7030	3.847	4.972	0.022
0	1	1451	0	43.310	123.167	100.06	7090	3.851	5.060	0.023
0	1	1452	0	43.308	124.167	100.04	7150	3.854	5.041	0.023
0	1	1453	0	43.148	125.167	99.67	7210	3.858	4.672	0.021
0	1	1454	0	43.276	126.167	99.97	7270	3.862	4.965	0.022
0	1	1455	0	43.021	127.167	99.38	7330	3.865	4.379	0.020
0	1	1456	0	43.039	128.167	99.42	7390	3.869	4.420	0.020
0	1	1457	0	42.701	129.167	98.65	7450	3.872	3.647	0.017
0	1	1458	0	41.943	130.167	96.89	7510	3.876	1.888	0.008
0	1	1459	0	41.514	131.167	95.90	7570	3.879	0.897	0.004

TYPE CURVE
PRESSURE SLUG DECAY



CLIENT/PROJECT: USPCI A Subsidiary of Union Pacific Corporation	Golder Associates, Atlanta, Georgia	TITLE: TYPE CURVES FOR PRESSURE SLUG DECAY	
DRAWN: JC	CHECKED:	REVIEWED:	
DATE: 5-12-92	SCALE: AS SHOWN	FILE NO. 913-3026	JOB NO. 913-3343
DWG. NO./REV. NO. 155	FIGURE:		

APPENDIX 3.9

BOREHOLE GROUNDWATER RECOVERY RATE RESULTS

APPENDIX E-7

RFI PHASE II
GROUNDWATER RECOVERY RATES IN BORINGS

SAMPLE NO.	BORING	DEPTH (FEET)	DRY	OVERNIGHT	2 HRS	1 HR	INSTANT
P2-T1-1.25	P2-T1-1	25				XX	
N/S	P2-T1-1	50	XX				
P2-T1-1.60	P2-T1-1	60				XX	
P2-T1-1.65	P2-T1-1	65		XX			
P2-T1-1.70	P2-T1-1	70				XX	
P2-T1-1.80	P2-T1-1	80				XX	
P2-T2-3.15	P2-T2-3	15				XX	
P2-T2-3.25	P2-T2-3	25				XX	
P2-T2-3.35	P2-T2-3	35		XX			
P2-T2-3.45	P2-T2-3	45				XX	
N/S	P2-T2-3	55	XX				
N/S	P2-T2-3	65	XX				
N/S	P2-T2-3	75	XX				
P2-T2-3B.15	P2-T2-4	15					XX
P2-T2-3A.15	P2-T2-5	15					XX
P2-T3-2.20	P2-T3-2	20					XX
P2-T2-6.20	P2-T2-6	20				XX	
P2-T2-6.30	P2-T2-6	30		XX			
P2-T2-6.40	P2-T2-6	40					XX
N/S	P2-T3-4	20	XX				
P2-T3-4.30	P2-T3-4	30			XX		
N/S	P2-T3-4	40	XX				
N/S	P2-T3-4	70	XX				
P2-T2-7.15	P2-T2-7	15					XX
N/S	P2-T2-7	25	XX				
N/S	P2-T2-7	35	XX				
P2-T2-7.45	P2-T2-7	45		XX			
P2-T2-8.15	P2-T2-8	15					XX
P2-T3-1.30	P2-T3-1	30					XX
P2-T3-1.40	P2-T3-1	40				XX	
P2-T3-1.50	P2-T3-1	50		XX			
P2-T2-9.20	P2-T2-9	20				XX	
P2-T2-9.30	P2-T2-9	30		XX			
P2-T2-10.20	P2-T2-10	20				XX	
N/S	P2-T2-10	30	XX				
P2-T2-11.17	P2-T2-11	17					XX
P2-T2-12.20	P2-T2-12	20			XX		
P2-T2-14.20	P2-T2-14	20		XX			
N/S	P2-T2-13	20	XX				
P2-T2-16.30	P2-T2-16	30		XX			
P2-T2-15.30	P2-T2-15	30		XX			
P2-T3-3.20	P2-T3-3	20				XX	
P2-T2-2.20	P2-T2-2	20			XX		
P2-T3-6.20	P2-T3-6	20				XX	
N/S	P2-T3-5	20	XX				
P2-T3-5.30	P2-T3-5	30			XX		
P2-T2-17.20	P2-T2-17	20		XX			
P2-T2-18.20	P2-T2-18	20				XX	
P2-T3-7.30	P2-T3-7	30				XX	
N/S	P2-T3-7	40	XX				
N/S	P2-T3-7	50	XX				

APPENDIX E-7

RFI PHASE II
GROUNDWATER RECOVERY RATES IN BORINGS

SAMPLE NO.	BORING	DEPTH (FEET)	DRY	OVERNIGHT	2 HRS	1 HR	INSTANT
P2-T2-1.20	P2-T2-1	20					XX
N/S	P2-T2-1	30	XX				
N/S	P2-T2-1	40	XX				
P2-T2-1.50	P2-T2-1	50		XX			
P2-T3-8.20	P2-T3-8	20					XX
P2-T4-1.20	P2-T4-1	20			XX		
P2-T4-1.30	P2-T4-1	30		XX			
N/S	P2-T4-1	40	XX				
N/S	P2-T4-1	50	XX				
N/S	P2-T4-1	60	XX				
N/S	P2-T2-20	18	XX				
P2-T2-20.20	P2-T2-20	18.5		XX			
P2-T2-21.20	P2-T2-21	20			XX		
P2-T3-9.43	RFI-3B	43		XX			
P2-T3-9A.43	P2-T3-9	43		XX			
P2-T3-9B.23	RFI-3A	23		XX			
PT-1.80	PT-1	80		XX			
PT-2.25	PT-2	25		XX			
PT-2.80	PT-2	80		XX			
RFI-4A.20.5	RFI-4A	20.5				XX	
RFI-4B.41	RFI-4B	41				XX	
RFI-7.18	RFI-7	18		XX			
RFI-5.20	RFI-5	20		XX			
RFI-2A.25	RFI-2A	25			XX		
N/S	P2-T6-1	20	XX				
P2-T6-1.30	P2-T6-1	30		XX			
P2-T6-1.40	P2-T6-1	40				XX	
P2-T6-1.50	P2-T6-1	50				XX	
P2-T6-1.60	P2-T6-1	60				XX	
P2-T6-1.70	P2-T6-1	70				XX	
P2-T6-1.80	P2-T6-1	80				XX	
P2-T3-10.20	P2-T3-10	20				XX	
P2-T3-11.20	P2-T3-11	20				XX	
P2-T2-12.20	P2-T3-12	20					

NS = Not Samples

TABLE SUMMARIZING-
DARCIAN AND SEEPAGE VELOCITIES

TABLE E-6.11

WELL	ID	RECOVERY FEET	RECOVERY DAYS	RECOVERY RATE FT/DAY	RECOVERY RATE GL/DAY	GRADIENT	K (CM/SEC)	DARCIAN VELOCITY (CM/SEC)	DARCIAN VELOCITY (FT/YEAR)	SEEPAGE VELOCITY (CM/SEC)	SEEPAGE VELOCITY (FT/YEAR)
MW-1A	SHALLOW (UNCONFINED AQUIFER)	6.75	3	2.25	0.330	0.15	2.94E-06	4.41E-07	0.46	1.76E-06	1.83
MW-1B	SHALLOW (UNCONFINED AQUIFER)	1.00	31	0.03	0.004	0.15	9.58E-09	1.44E-09	< 0.01	5.75E-09	0.01
MW-1C	SHALLOW (UNCONFINED AQUIFER)	4.77	31	1.59	0.234	0.15	1.76E-08	2.64E-09	< 0.01	1.06E-08	0.01
MW-1D	INTERMEDIATE (UNCONFINED AQUIFER)	23.66	31	0.76	0.112	< 0.15	8.02E-08	1.20E-08	0.01	4.81E-08	0.05
MW-2A	SHALLOW (UNCONFINED AQUIFER)					0.18					
MW-2B	SHALLOW (UNCONFINED AQUIFER)	23.23	11	2.11	0.310	0.18	2.52E-07	4.54E-08	0.05	1.81E-07	0.19
MW-2C	INTERMEDIATE (UNCONFINED AQUIFER)	1.49	51	0.03	0.004	< 0.18					
-3A	SHALLOW (UNCONFINED AQUIFER)	DRY	42			0.13	1.04E-06	1.35E-07	0.14	5.41E-07	0.56
MW-3B	INTERMEDIATE (UNCONFINED AQUIFER)	9.38	29	0.32	0.047	< 0.13	1.47E-07	1.91E-08	0.02	7.64E-08	0.08
MW-3C	INTERMEDIATE (UNCONFINED AQUIFER)	71.35	10	7.14	1.050	< 0.13	2.76E-07	3.59E-08	0.04	1.44E-07	0.15
MW-4A1	SHALLOW (UNCONFINED AQUIFER)	2.58	1	2.58	0.379	0.12	2.49E-06	2.99E-07	0.31	1.20E-06	1.24
MW-4B1	INTERMEDIATE (UNCONFINED AQUIFER)	1.02	9	0.11	0.016	< 0.12					
MW-4C	INTERMEDIATE (UNCONFINED AQUIFER)	0.10	3	0.03	0.004	< 0.12					
MW-4A2	SHALLOW (UNCONFINED AQUIFER)					0.07					
MW-4A3	SHALLOW (UNCONFINED AQUIFER)					0.07					

TABLE SUMMARIZING-
DARCIAN AND SEEPAGE VELOCITIES

TABLE E-6.11

WELL	ID	RECOVERY FEET	RECOVERY DAYS	RECOVERY RATE FT/DAY	RECOVERY RATE GL/DAY	GRADIENT	K (CM/SEC)	DARCIAN VELOCITY (CM/SEC)	DARCIAN VELOCITY (FT/YEAR)	SEEPAGE VELOCITY (CM/SEC)	SEEPAGE VELOCITY (FT/YEAR)
MW-4B2	INTERMEDIATE (UNCONFINED AQUIFER)					< 0.07					
MW-5A1	SHALLOW (UNCONFINED AQUIFER)					0.03					
MW-5B1	INTERMEDIATE (UNCONFINED AQUIFER)					< 0.03					
MW-5A2	SHALLOW (UNCONFINED AQUIFER)	14.03	2	7.01	1.030	0.03	5.02E-06	1.51E-07	0.16	6.02E-07	0.62
MW-5B2	INTERMEDIATE (UNCONFINED AQUIFER)	12.19	42	0.29	0.043	< 0.03					
MW-6A	SHALLOW (UNCONFINED AQUIFER)	2.50	3	0.83	0.122	0.03	5.88E-05	1.76E-06	1.83	7.06E-06	7.30
MW-6B	SHALLOW (UNCONFINED AQUIFER)	9.13	9	1.01	0.148	0.03	3.67E-07	1.10E-08	0.01	4.40E-08	0.05
-6C	INTERMEDIATE (UNCONFINED AQUIFER)	4.51	40	0.11	0.016	< 0.03					
MW-8A1	SHALLOW (UNCONFINED AQUIFER)	12.63	26	0.49	0.072	0.03	2.80E-07	8.40E-09	0.01	3.36E-08	0.04
MW-8B1	INTERMEDIATE (UNCONFINED AQUIFER)	1.88	40	0.05	0.007	< 0.03					
MW-8A2	SHALLOW (UNCONFINED AQUIFER)					0.06					
MW-8B2	INTERMEDIATE (UNCONFINED AQUIFER)					0.06					
MW-10A	SHALLOW (UNCONFINED AQUIFER)	0.46	1	0.46	0.067	0.02	7.32E-05	1.46E-06	1.52	5.86E-06	6.06
MW-10B	INTERMEDIATE (UNCONFINED AQUIFER)	DRY	40	<	.0003	< 0.02					
MW-18	SHALLOW (UNCONFINED AQUIFER)	7.89	6	1.32	0.194	0.01	8.74E-07	8.74E-09	0.01	3.50E-08	0.04

TABLE SUMMARIZING-
DARCIAN AND SEEPAGE VELOCITIES

TABLE E-6.11

WELL	ID	RECOVERY FEET	RECOVERY DAYS	RECOVERY RATE FT/DAY	RECOVERY RATE GL/DAY	GRADIENT	K (CM/SEC)	DARCIAN VELOCITY (CM/SEC)	DARCIAN VELOCITY (FT/YEAR)	SEEPAGE VELOCITY (CM/SEC)	SEEPAGE VELOCITY (FT/YEAR)
MW-19	SHALLOW (UNCONFINED AQUIFER)	18.39	27	0.68	0.100	0.05	6.05E-07	3.03E-08	0.03	1.21E-07	0.13
MW-20	SHALLOW (UNCONFINED AQUIFER)	21.26	27	0.79	0.116	0.07	4.58E-07	3.21E-08	0.03	1.28E-07	0.13
MW-21	SHALLOW (UNCONFINED AQUIFER)	0.29	1	0.29	0.043	0.10					
CH- A	SHALLOW (UNCONFINED AQUIFER)	33.13	25	1.33	0.865	0.04	1.24E-07	4.96E-09	0.01	1.98E-08	0.02
CH- B	INTERMEDIATE (UNCONFINED AQUIFER)	4.80	6	0.80	0.520	< 0.04					
CH- C	DEEP (UPPER CONFINED AQUIFER)	79.09	8	9.99	6.490						
SLUG						0.014	1.76E-06	2.46E-08	0.03	9.84E-08	0.10
PUMP						0.014	6.40E-06	8.96E-08	0.09	3.58E-07	0.37
CH- D	DEEP (UPPER CONFINED AQUIFER)	21.25	1	21.25	13.81						
SLUG						0.012	2.71E-05	3.25E-07	0.34	1.30E-06	1.35
PUMP						0.012	6.40E-06	7.68E-08	0.08	3.07E-07	0.32
CH- E	DEEP (LOWER CONFINED AQUIFER)	190.00	2.2	86.36	56.13						
SLUG						0.012	3.41E-04	4.09E-06	4.24	1.64E-05	16.94
PUMP						0.012	3.04E-05	3.65E-07	0.38	1.46E-06	1.51
CH- F	DEEP (LOWER CONFINED AQUIFER)										
SLUG						0.012	1.46E-05	1.75E-07	0.18	7.00E-07	0.73
PUMP						0.012	3.04E-05	3.65E-07	0.38	1.46E-06	1.51