Appendix L: Hydraulic Conductivity Test Data

- L.1 – Slug Tests Conducted as Part of Current Study
- L.2 – Table 4-2 from January 2010 Feasibility Report Addendum, Proposed East Expansion, SCS BT Squared, July 26, 2012
- L.3 – Table 4-1 from Feasibility Report, Southern Expansion, MWH Americas, Inc., April 2003
- L.4 – Table 6 from Remedial Investigation Report, Boundary Road Landfill, Warzyn, Inc., July 1993
- L.5 – Hydraulic Conductivity Test Procedures, Analysis, and Results, Technical Memorandum, Earth Tech, Inc., July 31, 2000

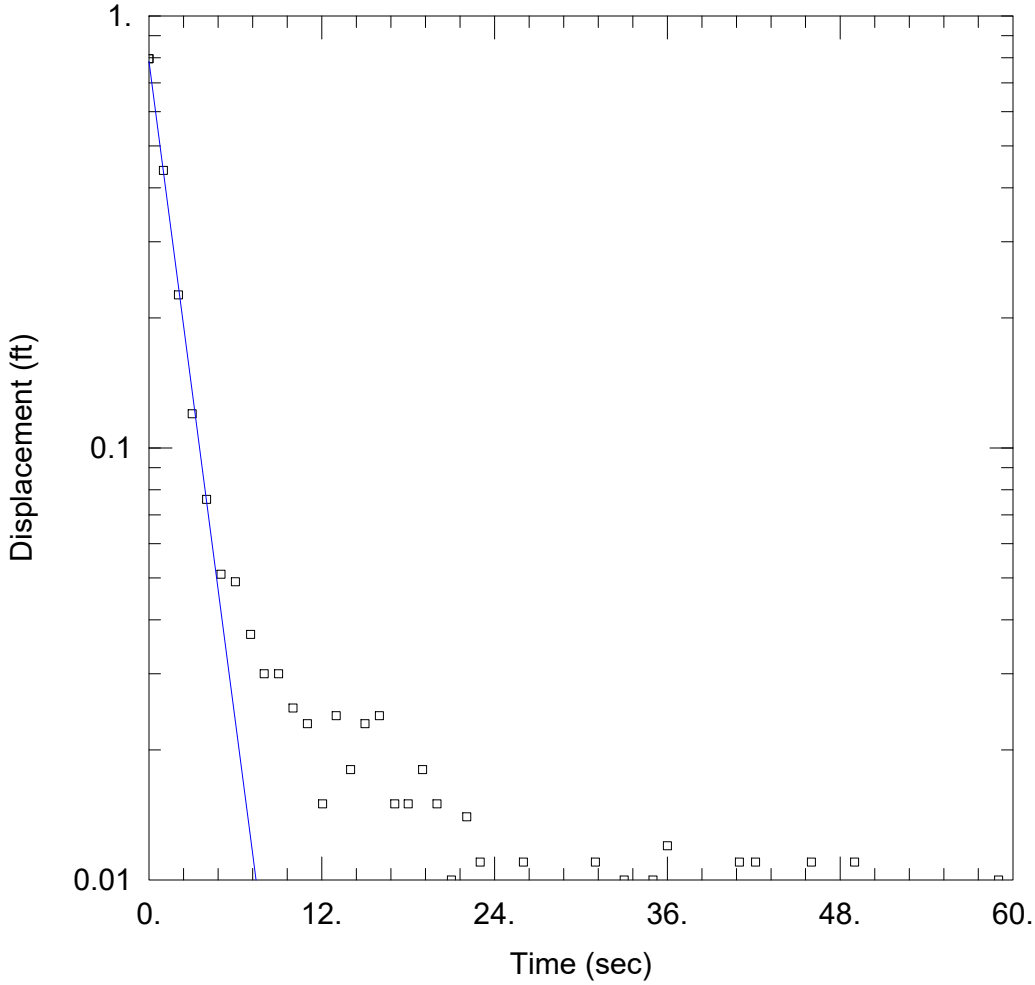
L.1
Slug Tests Conducted as Part of Current Study

Summary of Slug Test Analyses
Data Collection for Feasibility Report
Orchard Ridge RDF - Eastern Expansion, Southern Unit
Menomonee Falls, Waukesha County, Wisconsin

Parameter	Description	Units	Source/notes	MW107		P117		S401A		S402B	S403A		S403B	S404A	S404B	S405A	S405B	S406A
				Rising 1	Rising 2	Rising 1	Rising 2	Rising 1	Rising 2	Rising 1	Rising 1	Rising 2	Rising 1	Rising 1	Rising 1	*	*	Rising 1
				4-Dec		4-Dec		3-Dec		3-4-Dec	3-Dec		3-4-Dec	3-Dec	3-4-Dec	3-4-Dec	8-Oct to 4-Dec	4-Dec
Well/Boring Data																		
TOC	top of casing elevation	ft amsl		763.36		758.20		754.17		751.36	754.19		753.65	753.9	753.91	758.40	758.23	760.86
	ground surface elevation	ft amsl		760.86		755.70		751.61		749.35	751.36		751.74	751.47	751.57	755.87	755.82	758.25
	stickup height	ft	well construction form/estimated fo	2.50		2.50		2.56		2.01	2.83		1.91	2.43	2.34	2.53	2.41	2.61
	constructed depth to top of screen	ft bgs		5		78		37		54	37		57	37	57	41	61.5	43
	screen length	ft bgs		10		5		5		5	5		5	5	5	5	5	5
	constructed depth to bottom of screen	ft bgs		15		83		42		59	42		62	42	62	46	66.5	48
	inside radius of well casing	in	well construction form	2.05		2.05		2.07		2.07	2.07		2.07	2.05	2.05	2.07	2.05	2.07
	borehole diameter	in	well construction form	8		8		6		8.5	6		6	6	8.5	8.5	6	6
	soil type in screened interval	-	boring log	sand and silty sand		sand		clay and sand		clay	clay and sand		clay	clay and sand	clay and sand	clay	clay, 0.5 ft sand	clay
DTW	depth to water	ft btoc	field notes	9.43		10.74		-3.55		0.5	-0.32		2.61	6.52	6.68	9.71	10*	10.52
Input parameters																		
H(0)	observed initial displacement	ft	data logger file	0.796	0.779	0.40	1.368	0.789	1.557	7.70	1.232	1.153	2.585	0.647	0.956	36.39*	58.5*	0.901
H	static water column height	ft	height of water above bottom of we	8.07		74.76		48.11		60.51	45.15		61.30	37.91	57.66	38.82	58.91	40.09
b	saturated thickness of aquifer		sand thickness based on boring log, clay thickness estimated	8.07		8		11.5		15	3		15	7.5	15	15	15	15
Kv/Kh	vertical-to-horizontal hydraulic conductivity anisotropy		estimated based on soil type(s) at s	1		1		1		1	1		1	1	1	1	1	1
d	depth to top of well screen from static water level (unconfined) depth to top of well screen from bottom of impermeable unit (confined)	ft	d=0 if top of well screen is above the water table (unconfined) or above the bottom of the confining unit (confined)	0		1		9		5	0		5	0	5	5	5	5
L	length of well screen	ft	saturated length of well screen	8.07		5		5		5	5		5	5	5	5	5	5
r(c)	inside radius of well casing	ft	radius of casing from well construc	0.085		0.085		0.086		0.086	0.086		0.086	0.085	0.085	0.086	0.085	0.086
r(eq)	radius of downhole equipment	ft	radius of transducer	0.005		0.005		0.005		0.005	0.005		0.005	0.005	0.005	--	--	0.005
r(w)	radius of well (including filter pack)	ft	well construction form	0.33		0.33		0.25		0.35	0.25		0.25	0.25	0.35	0.35	0.25	0.25
	aquifer type		interpreted from boring logs	Unconfined		Confined		Confined		Confined	Confined		Confined	Confined	Confined	Confined	Confined	Confined
Results for Bouwer-Rice Solution																		
y0	initial head	ft	manual/automatic fit solution in AQ	0.7843	0.7975	0.3963	1.272	0.7736	1.51	7.365	1.211	1.113	2.491	0.4719	0.9217	38.51	59.18	0.8774
K	hydraulic conductivity	cm/sec	manual/automatic fit solution in AQ	1.9E-02	2.1E-02	1.8E-03	2.8E-03	1.6E-03	1.6E-03	1.9E-07	1.3E-03	1.2E-03	1.3E-07	3.7E-04	4.7E-07	1.0E-06	3.1E-08	1.4E-07
K	geometric mean hydraulic conductivity	cm/sec	geometric mean if multiple slug tes	2.0E-02		2.3E-03		1.6E-03		-	1.2E-03		-	-	-	-	-	-
Results for Hvorslev Solution																		
y0	initial head	ft	manual/automatic fit solution in AQ	0.7853	0.7633	0.3964	1.272	0.7736	1.51	7.379	1.211	1.113	2.485	0.4825	0.915	38.57	60.76	0.8811
K	hydraulic conductivity	cm/sec	manual/automatic fit solution in AQ	4.3E-02	4.3E-02	2.7E-03	3.7E-03	2.1E-03	2.0E-03	2.7E-07	3.0E-03	2.9E-03	1.8E-07	7.1E-04	6.9E-07	1.4E-06	4.3E-08	2.1E-07
K	geometric mean hydraulic conductivity	cm/sec	geometric mean if multiple slug tes	4.3E-02		3.2E-03		2.0E-03		-	2.9E-03		-	-	-	-	-	-

Prepared by: L. Auner, 1/30/2020
Updated by: L. Auner, 2/12/2020
Checked by: S. Sellwood, 2/27/2020

NOTES:
Stickup heights for MW107 and P117 were estimated based on the stickup heights of other wells on site.
The depth to water for S402B is estimated at 0.5 ft btoc due to the presence of ice at this approximate depth. Ice was removed manually before bailing the well for the slug test.
The volume of water removed for S402B is estimated at 2.6 liters based on the removal of two bailer volumes, each ~1.3 L.
Although the boring log for S404B notes sand in the screened interval, the slow recovery of the slug test indicates low permbeability soil (more likely to be clay than sand).
For wells screened in clay, the saturated thickness of the aquifer was estimated at 15 ft and d was estimated at 5 ft.
Transducer cable thickness of 0.01 ft was used for determining the radius of downhole equipment.
* For S405A and S405B, slug test analyses were conducted using data from water level measurements. For S405A, these measurements were collected after bailing the well for well devopment. The water level before bailing was assumed to be the static water level.



MW107 RISING 1

Data Set: P:\...\MW107 Rising 1.aqt
Date: 02/27/20 Time: 08:35:43

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: MW107
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 8.07 ft Anisotropy Ratio (Kz/Kr): 1.

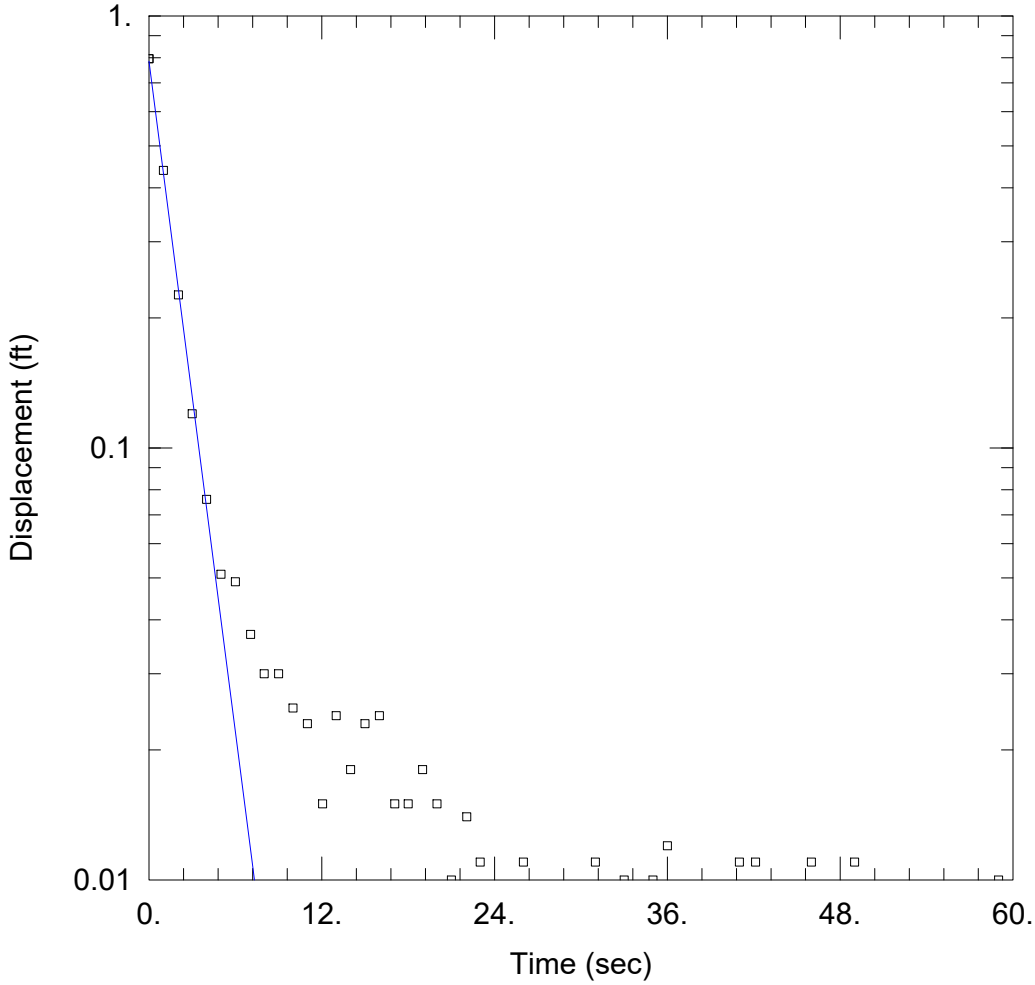
WELL DATA (MW107)

Initial Displacement: 0.796 ft Static Water Column Height: 8.07 ft
Total Well Penetration Depth: 8.07 ft Screen Length: 8.07 ft
Casing Radius: 0.085 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0191 cm/sec y0 = 0.7843 ft



MW107 RISING 1

Data Set: P:\...\MW107 Rising 1.aqt
Date: 02/27/20 Time: 08:37:57

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: MW107
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 8.07 ft Anisotropy Ratio (Kz/Kr): 1.

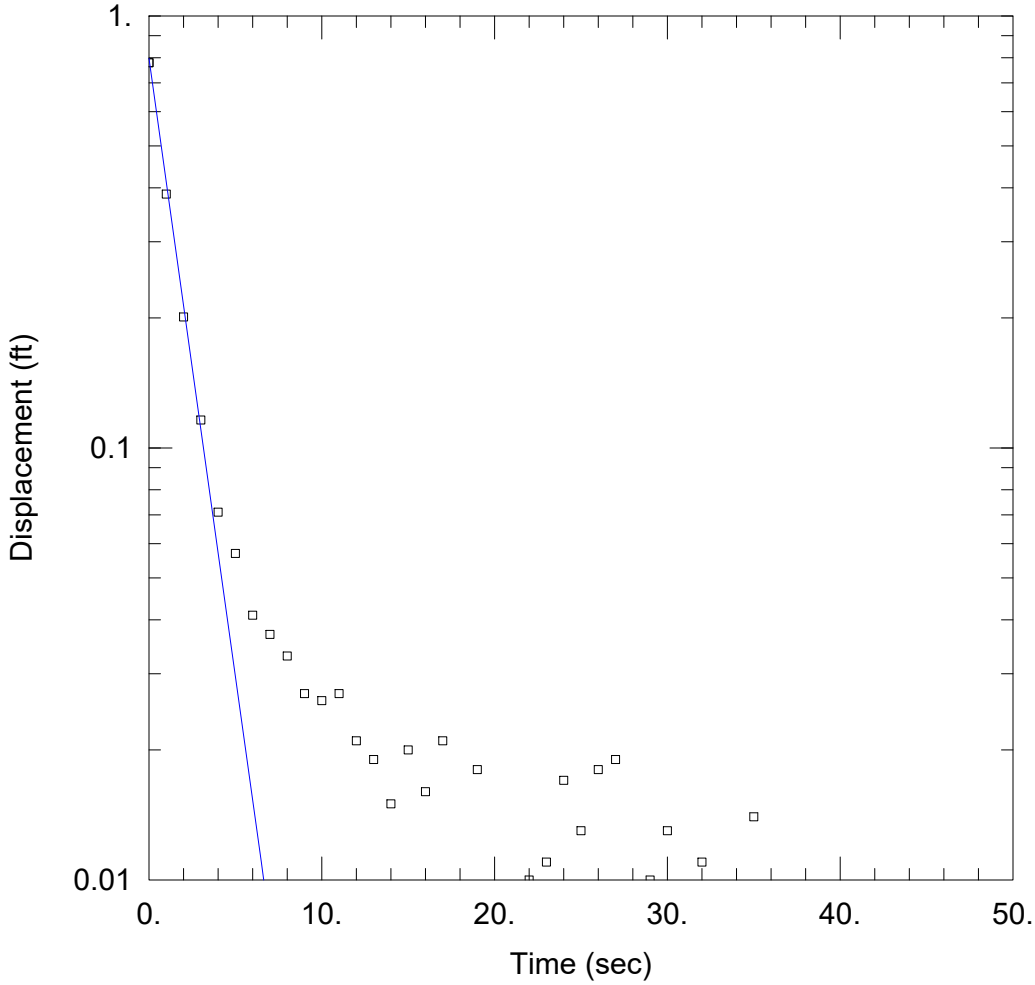
WELL DATA (MW107)

Initial Displacement: 0.796 ft Static Water Column Height: 8.07 ft
Total Well Penetration Depth: 8.07 ft Screen Length: 8.07 ft
Casing Radius: 0.085 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 0.04291 cm/sec y0 = 0.7853 ft



MW107 RISING 2

Data Set: P:\...\MW107 Rising 2.aqt
Date: 02/27/20 Time: 08:40:33

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: MW107
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 8.07 ft Anisotropy Ratio (Kz/Kr): 1.

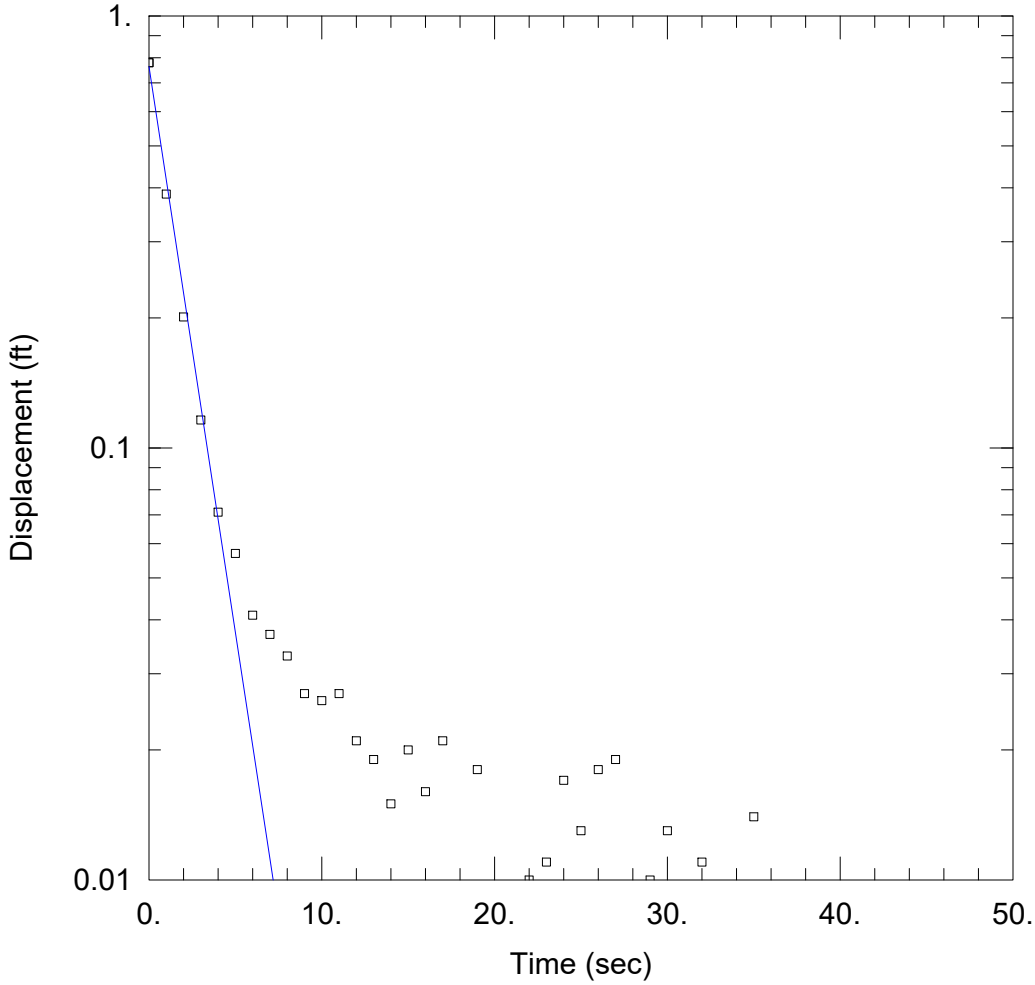
WELL DATA (MW107)

Initial Displacement: 0.779 ft
Total Well Penetration Depth: 8.07 ft
Casing Radius: 0.085 ft
Static Water Column Height: 8.07 ft
Screen Length: 8.07 ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.02146 cm/sec
y0 = 0.7975 ft



MW107 RISING 2

Data Set: P:\...\MW107 Rising 2.aqt
Date: 02/27/20 Time: 08:42:18

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: MW107
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 8.07 ft Anisotropy Ratio (Kz/Kr): 1.

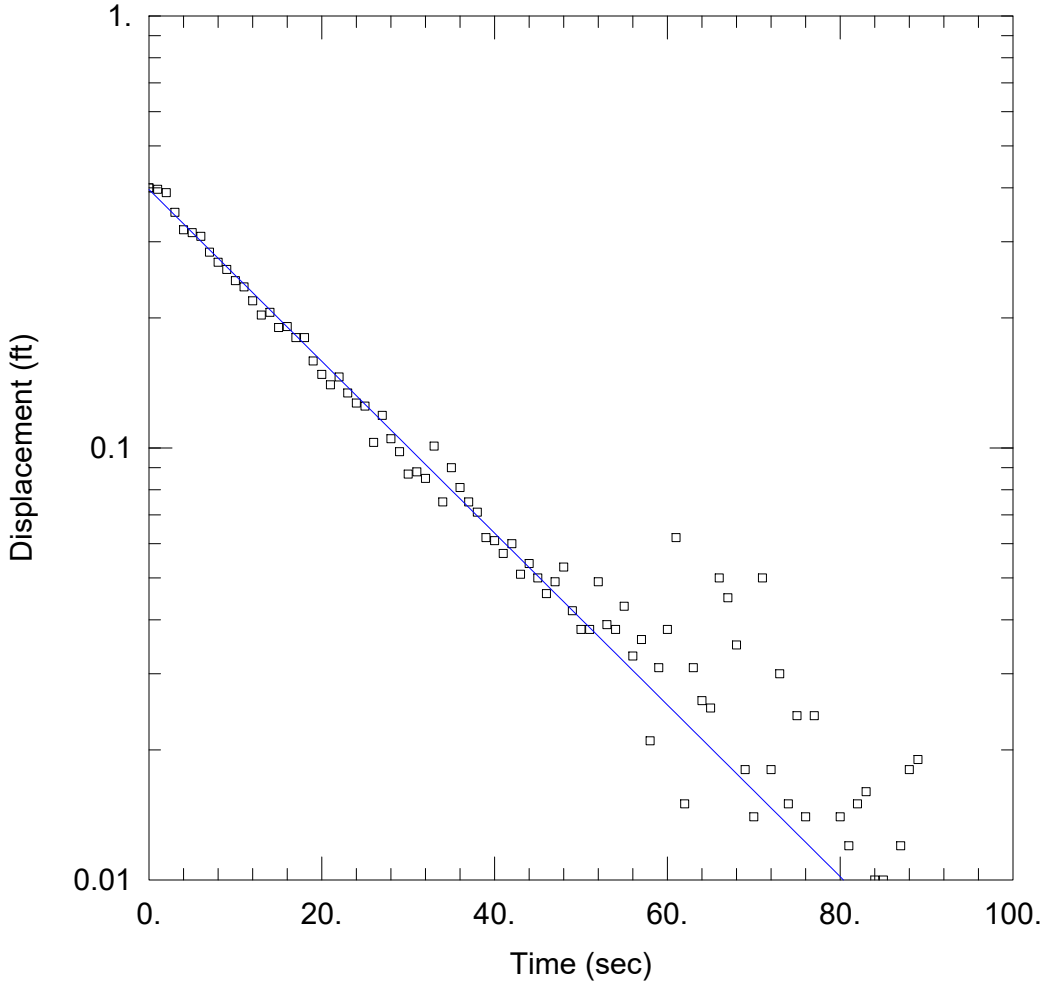
WELL DATA (MW107)

Initial Displacement: 0.779 ft Static Water Column Height: 8.07 ft
Total Well Penetration Depth: 8.07 ft Screen Length: 8.07 ft
Casing Radius: 0.085 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 0.04346 cm/sec y0 = 0.7633 ft



P117 RISING 1

Data Set: \...\P117 Rising 1.aqt
Date: 02/12/20 Time: 09:53:27

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: P117
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 8. ft Anisotropy Ratio (Kz/Kr): 1.

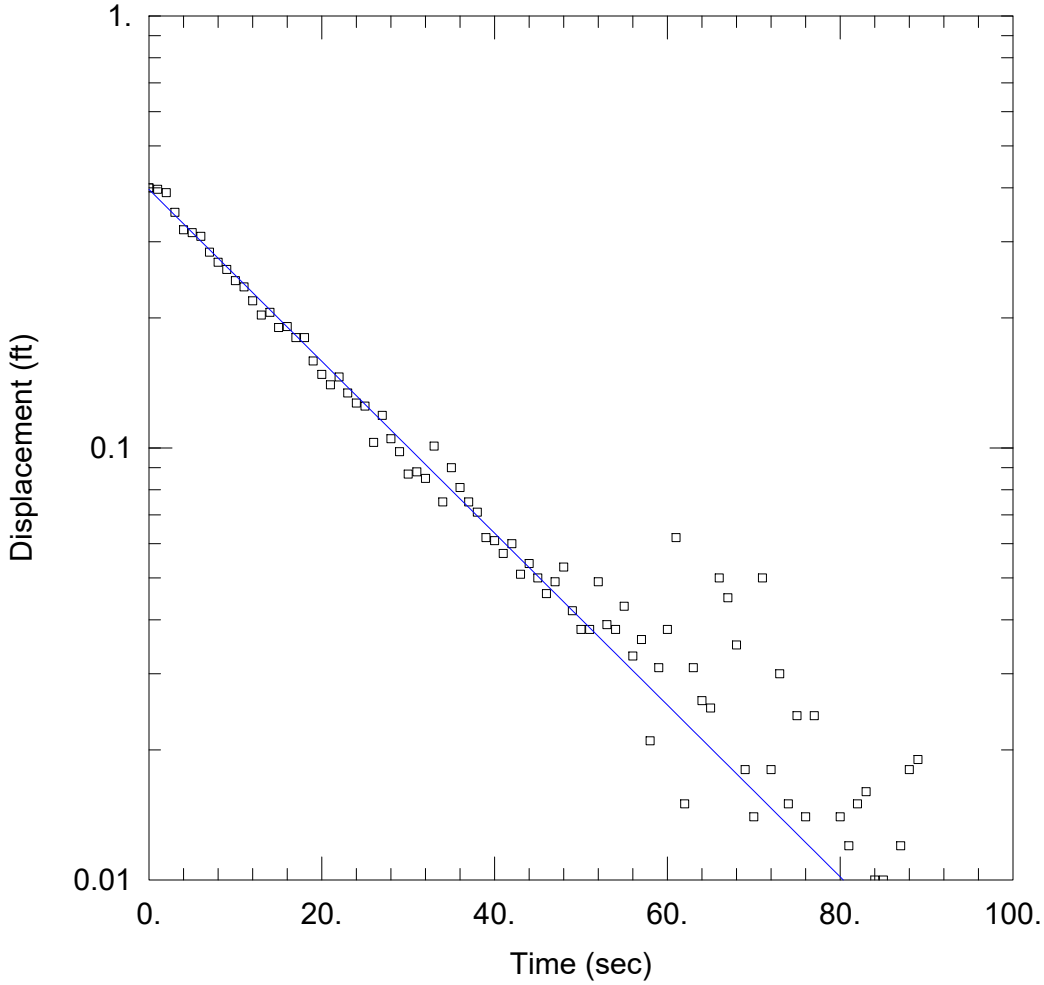
WELL DATA (P117)

Initial Displacement: 0.4 ft Static Water Column Height: 74.76 ft
Total Well Penetration Depth: 6. ft Screen Length: 5. ft
Casing Radius: 0.085 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.001831 cm/sec y0 = 0.3963 ft



P117 RISING 1

Data Set: \...\P117 Rising 1.aqt
Date: 02/12/20 Time: 09:43:39

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: P117
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 8. ft Anisotropy Ratio (Kz/Kr): 1.

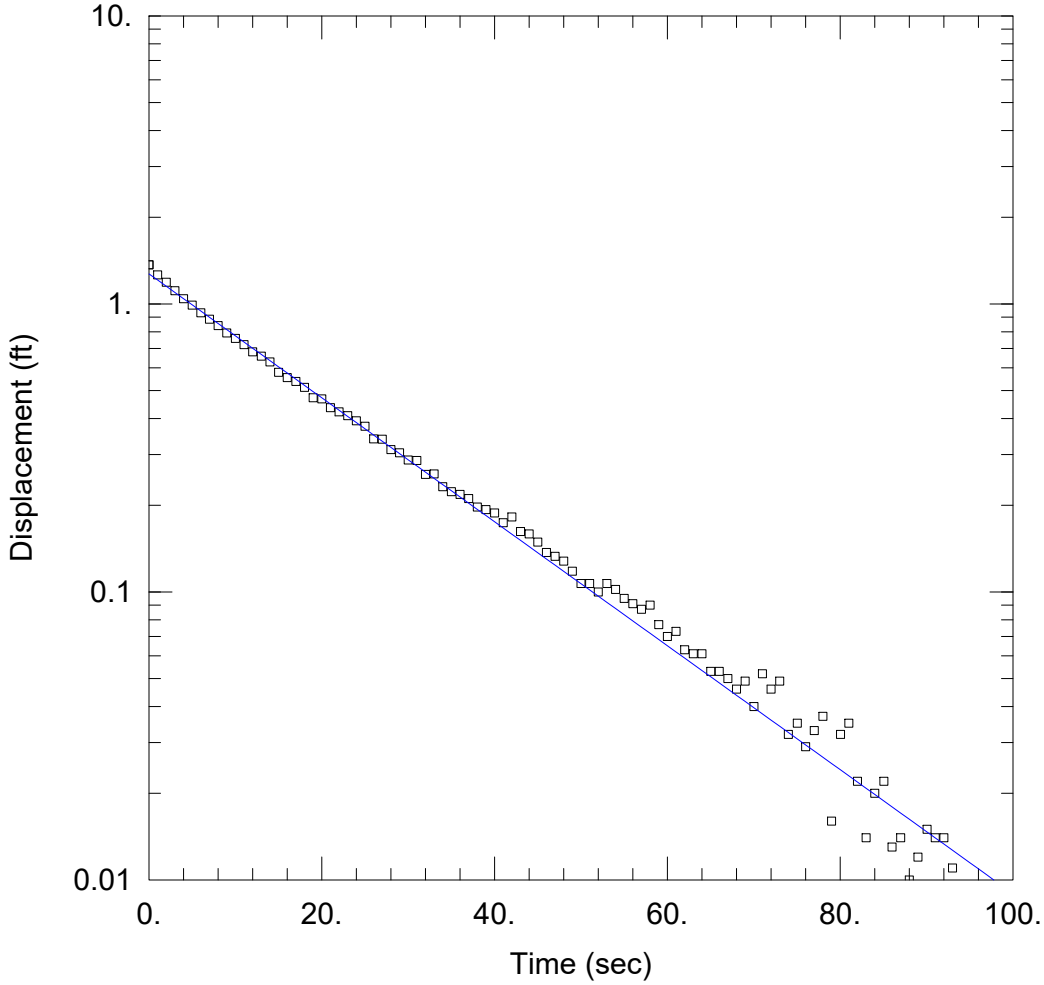
WELL DATA (P117)

Initial Displacement: 0.4 ft Static Water Column Height: 74.76 ft
Total Well Penetration Depth: 6. ft Screen Length: 5. ft
Casing Radius: 0.085 ft Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 0.002736 cm/sec y0 = 0.3964 ft



P117 RISING 2

Data Set: \...\P117 Rising 2.aqt
Date: 02/12/20 Time: 09:52:50

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: P117
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 8. ft Anisotropy Ratio (Kz/Kr): 1.

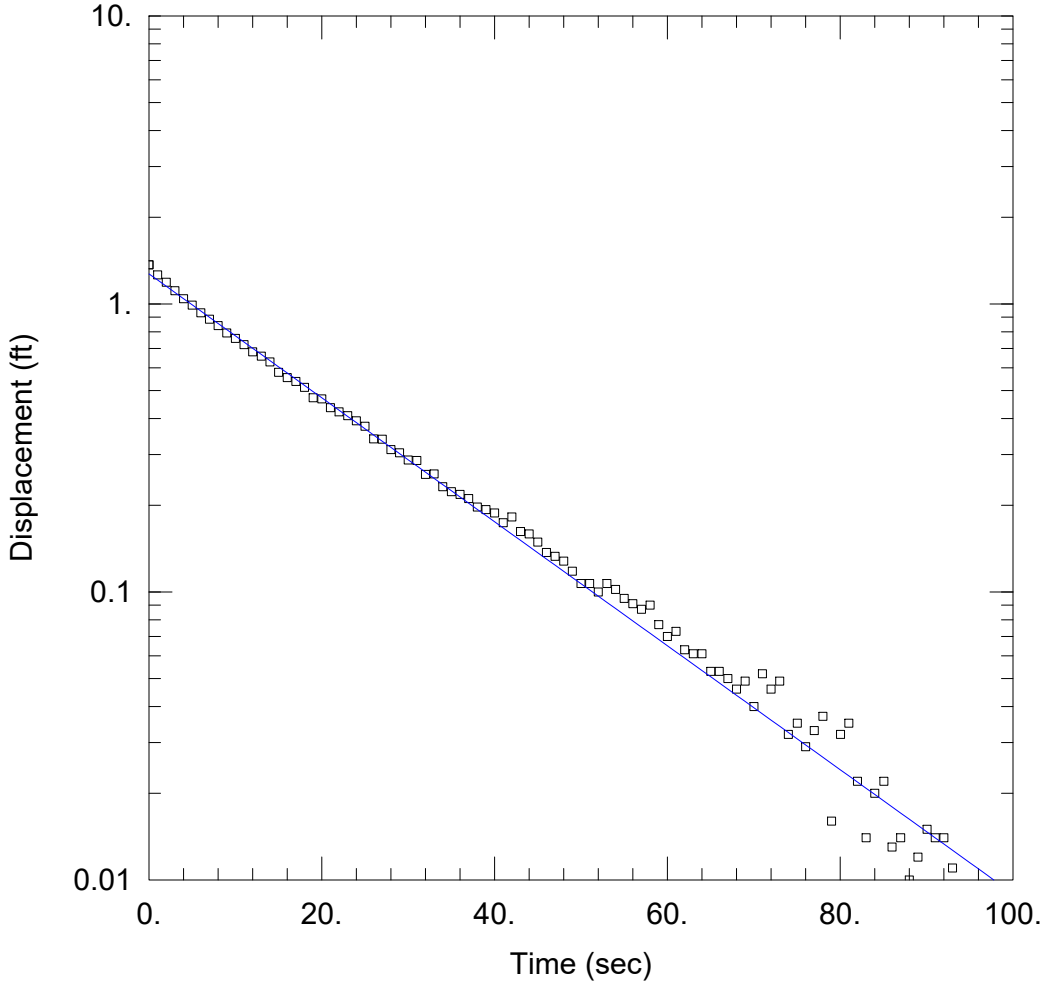
WELL DATA (P117)

Initial Displacement: 1.368 ft
Total Well Penetration Depth: 14. ft
Casing Radius: 0.085 ft
Static Water Column Height: 74.76 ft
Screen Length: 5. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.002769 cm/sec
y0 = 1.272 ft



P117 RISING 2

Data Set: \...\P117 Rising 2.aqt
Date: 02/12/20 Time: 09:54:12

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: P117
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 8. ft Anisotropy Ratio (Kz/Kr): 1.

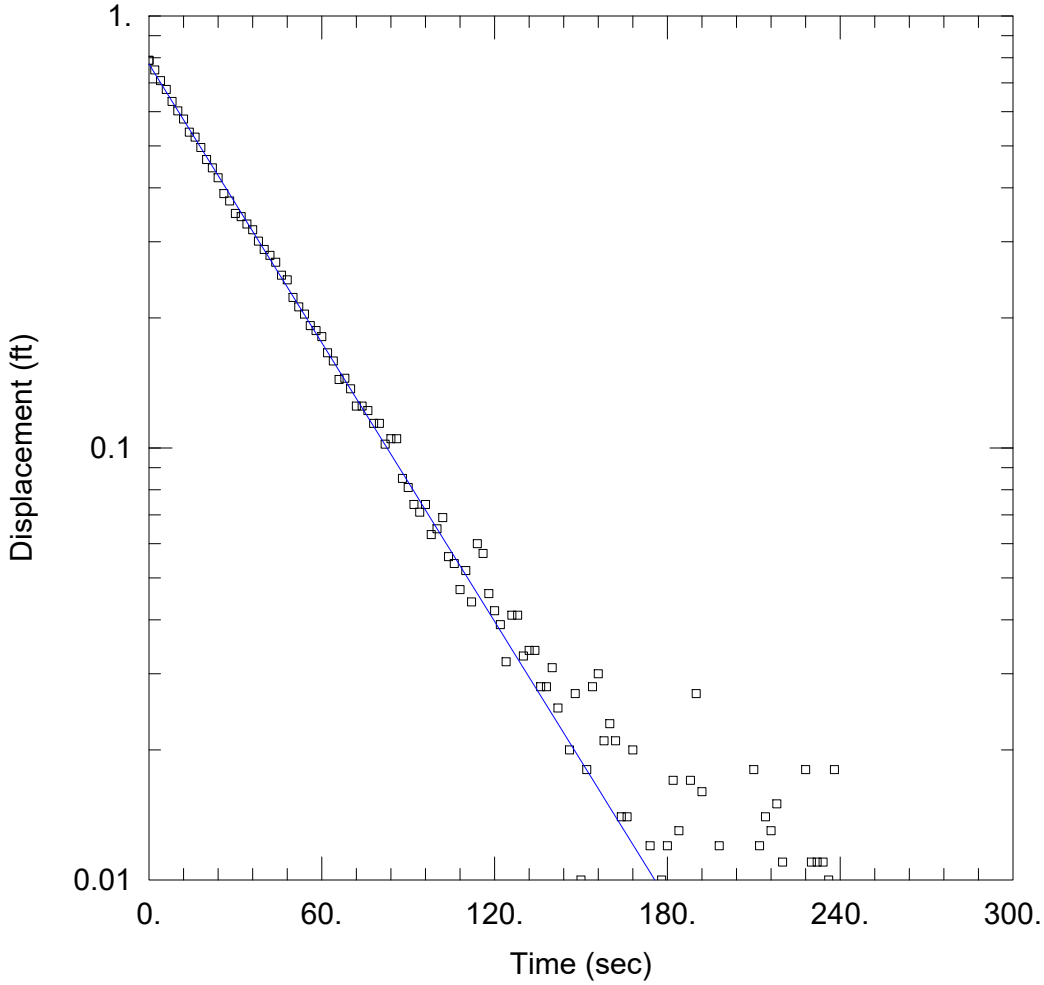
WELL DATA (P117)

Initial Displacement: 1.368 ft
Total Well Penetration Depth: 14. ft
Casing Radius: 0.085 ft
Static Water Column Height: 74.76 ft
Screen Length: 5. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.003711 cm/sec
y0 = 1.272 ft



S401A RISING 1

Data Set: \...\S401A Rising 1.aqt
Date: 02/12/20 Time: 09:55:47

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S401A
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 11.5 ft Anisotropy Ratio (Kz/Kr): 1.

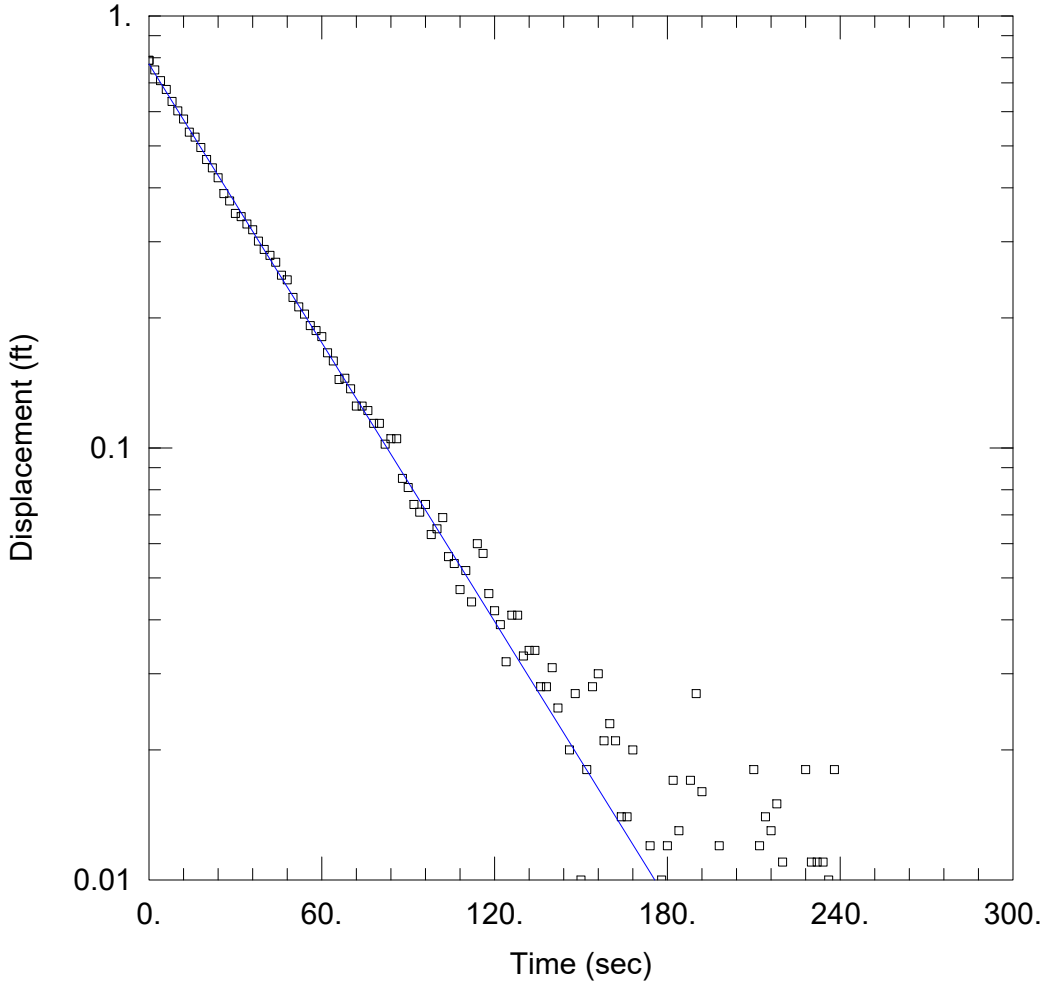
WELL DATA (S401A)

Initial Displacement: 0.789 ft Static Water Column Height: 48.11 ft
Total Well Penetration Depth: 14. ft Screen Length: 5. ft
Casing Radius: 0.086 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.001561 cm/sec y0 = 0.7736 ft



S401A RISING 1

Data Set: \...\S401A Rising 1.aqt
Date: 02/12/20 Time: 09:55:01

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S401A
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 11.5 ft Anisotropy Ratio (Kz/Kr): 1.

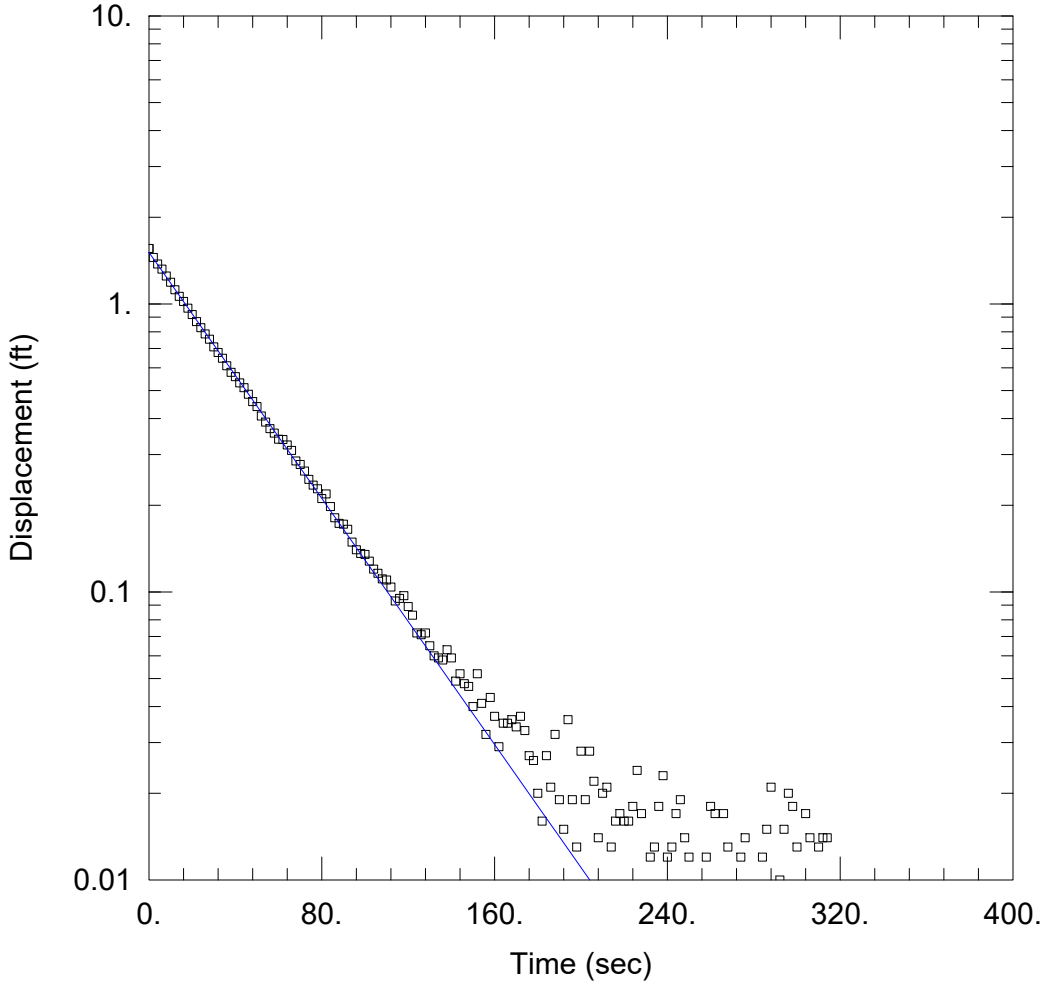
WELL DATA (S401A)

Initial Displacement: 0.789 ft Static Water Column Height: 48.11 ft
Total Well Penetration Depth: 14. ft Screen Length: 5. ft
Casing Radius: 0.086 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 0.002052 cm/sec y0 = 0.7736 ft



S401A RISING 2

Data Set: \...\S401A Rising 2.aqt
Date: 02/12/20 Time: 09:57:59

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S401A
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 11.5 ft Anisotropy Ratio (Kz/Kr): 1.

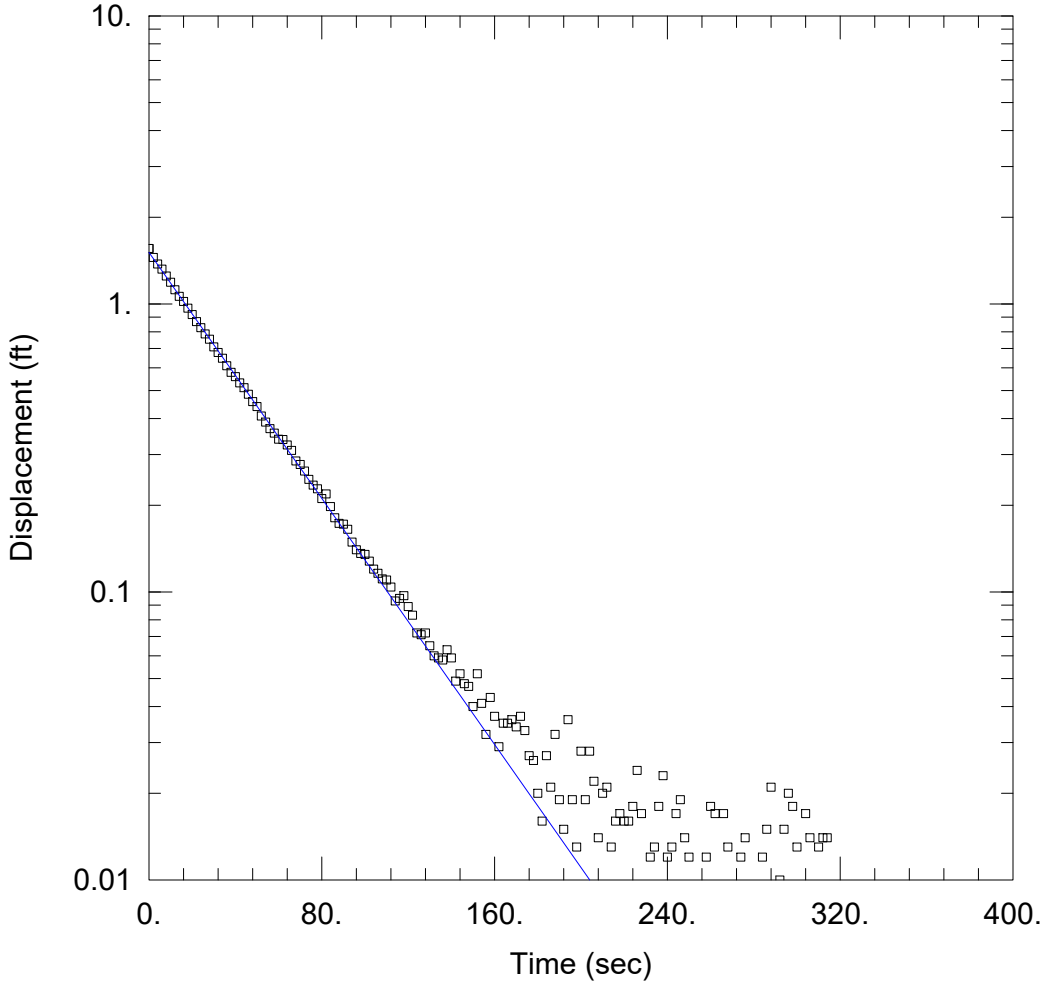
WELL DATA (S401A)

Initial Displacement: 1.557 ft
Total Well Penetration Depth: 14. ft
Casing Radius: 0.086 ft
Static Water Column Height: 48.11 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.001551 cm/sec
y0 = 1.51 ft



S401A RISING 2

Data Set: \...\S401A Rising 2.aqt
Date: 02/12/20 Time: 09:58:28

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S401A
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 11.5 ft Anisotropy Ratio (Kz/Kr): 1.

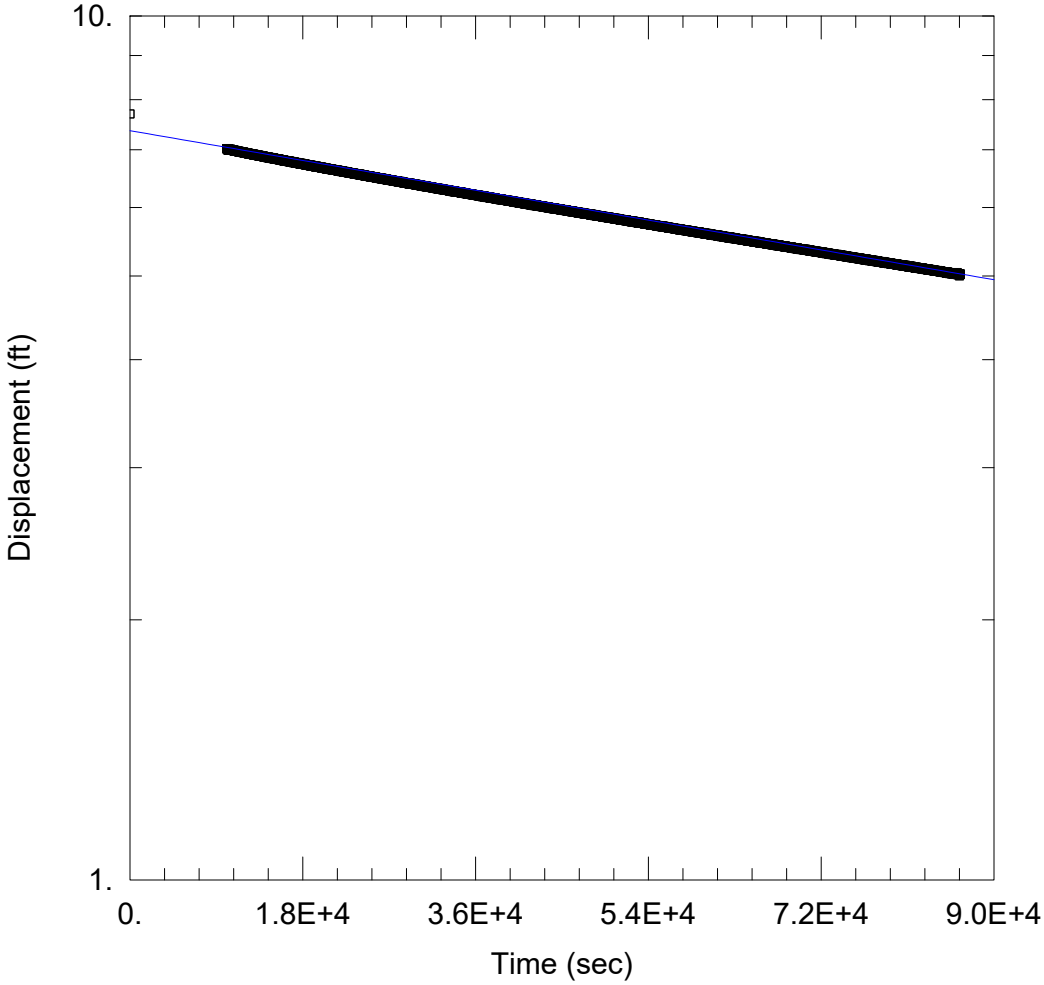
WELL DATA (S401A)

Initial Displacement: 1.557 ft
Total Well Penetration Depth: 14. ft
Casing Radius: 0.086 ft
Static Water Column Height: 48.11 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.002038 cm/sec
y0 = 1.51 ft



S402B RISING 1

Data Set: \...\S402B Rising 1.aqt
Date: 02/12/20 Time: 11:03:48

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S402B
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

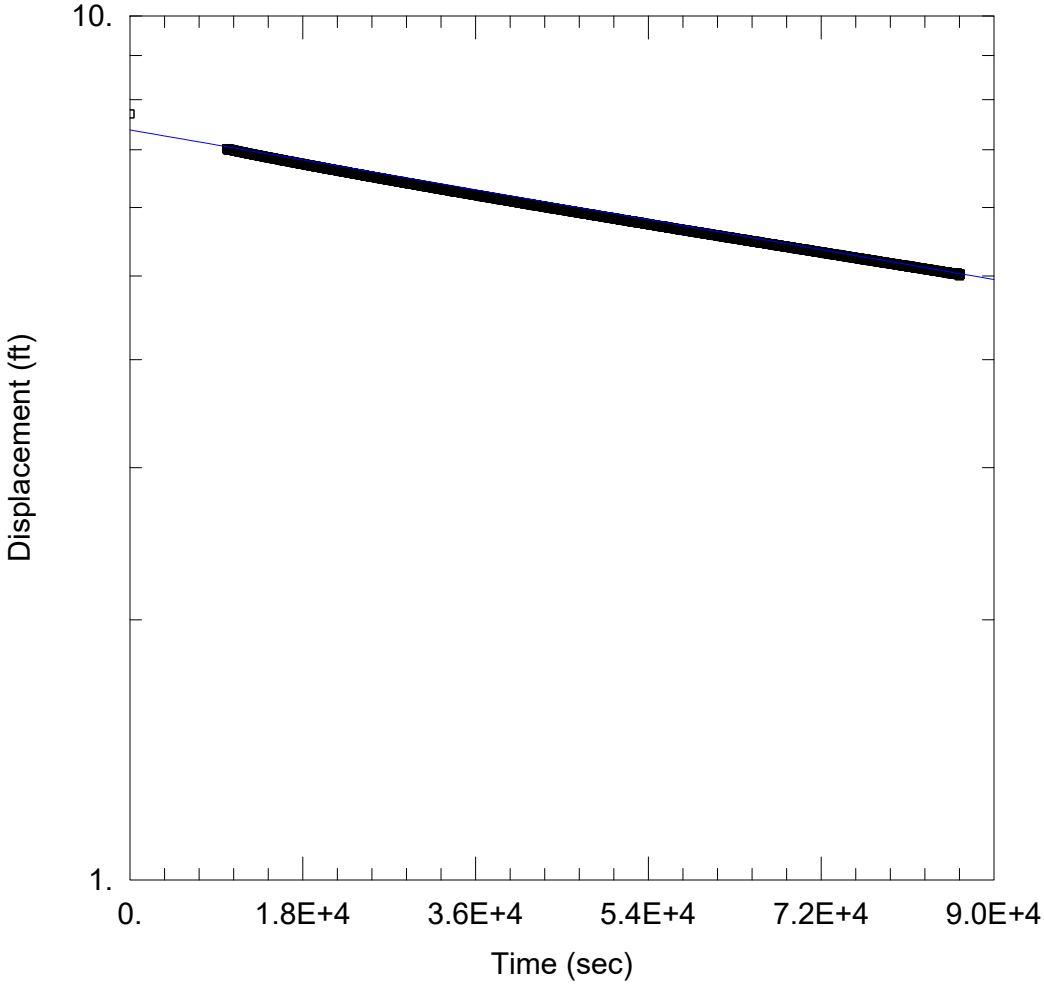
WELL DATA (S402B)

Initial Displacement: 7.7 ft Static Water Column Height: 60.51 ft
Total Well Penetration Depth: 10. ft Screen Length: 5. ft
Casing Radius: 0.086 ft Well Radius: 0.35 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 1.895E-7 cm/sec y0 = 7.365 ft



S402B RISING 1

Data Set: \...\S402B Rising 1.aqt
Date: 02/12/20 Time: 11:02:47

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S402B
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

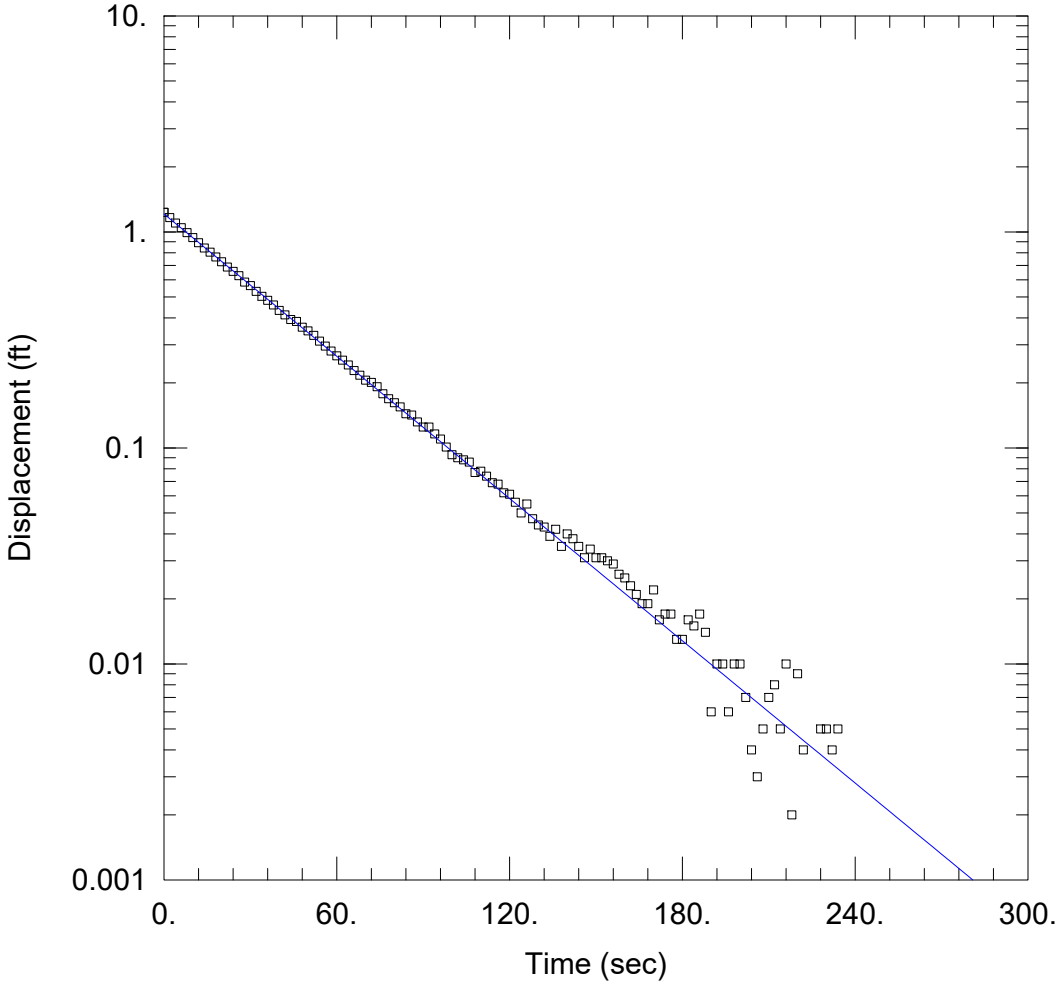
WELL DATA (S402B)

Initial Displacement: 7.7 ft Static Water Column Height: 60.51 ft
Total Well Penetration Depth: 10. ft Screen Length: 5. ft
Casing Radius: 0.086 ft Well Radius: 0.35 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 2.65E-7 cm/sec y0 = 7.379 ft



S403A RISING 1

Data Set: \...\S403A Rising 1.aqt
Date: 02/12/20 Time: 11:06:17

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S403A
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 3. ft Anisotropy Ratio (Kz/Kr): 1.

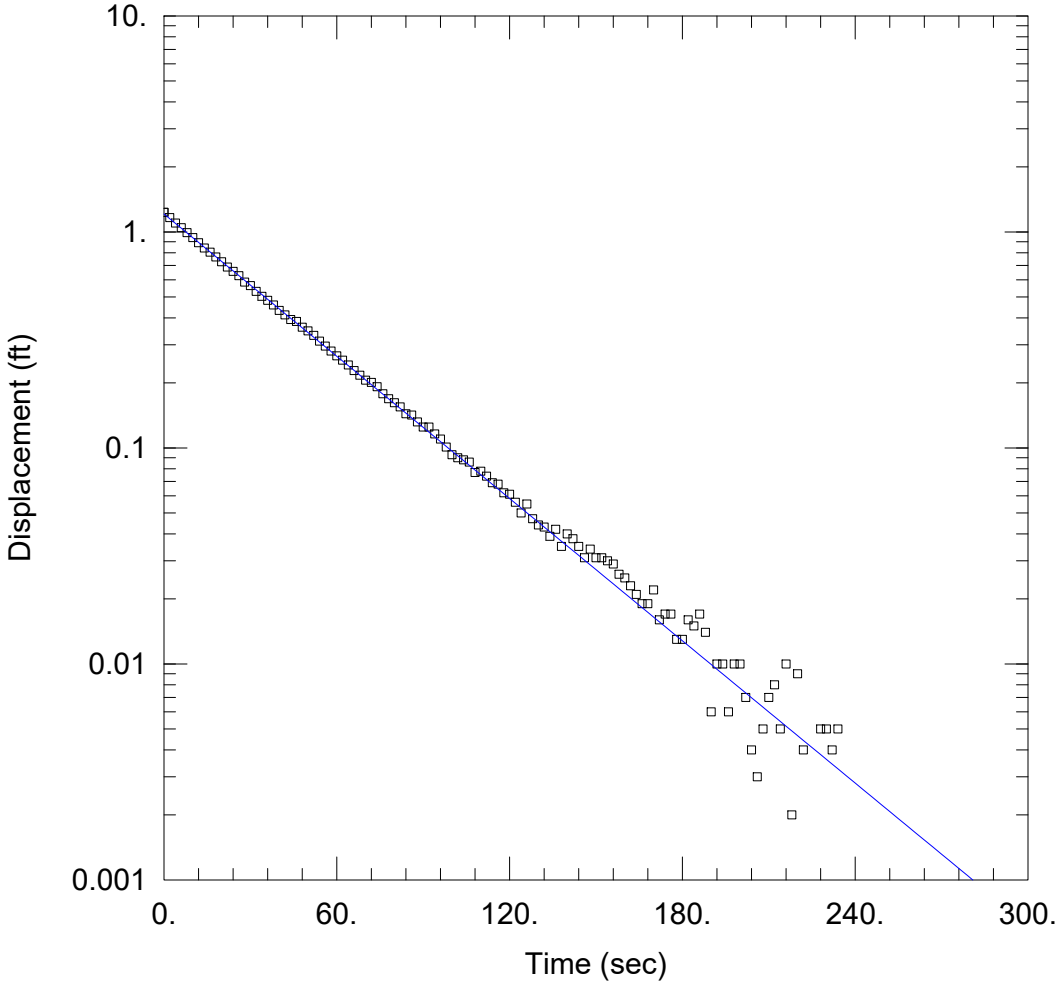
WELL DATA (S403A)

Initial Displacement: 1.232 ft Static Water Column Height: 45.15 ft
Total Well Penetration Depth: 5. ft Screen Length: 5. ft
Casing Radius: 0.086 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.001261 cm/sec y0 = 1.211 ft



S403A RISING 1

Data Set: \...\S403A Rising 1.aqt
Date: 02/12/20 Time: 11:05:18

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S403A
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 3. ft Anisotropy Ratio (Kz/Kr): 1.

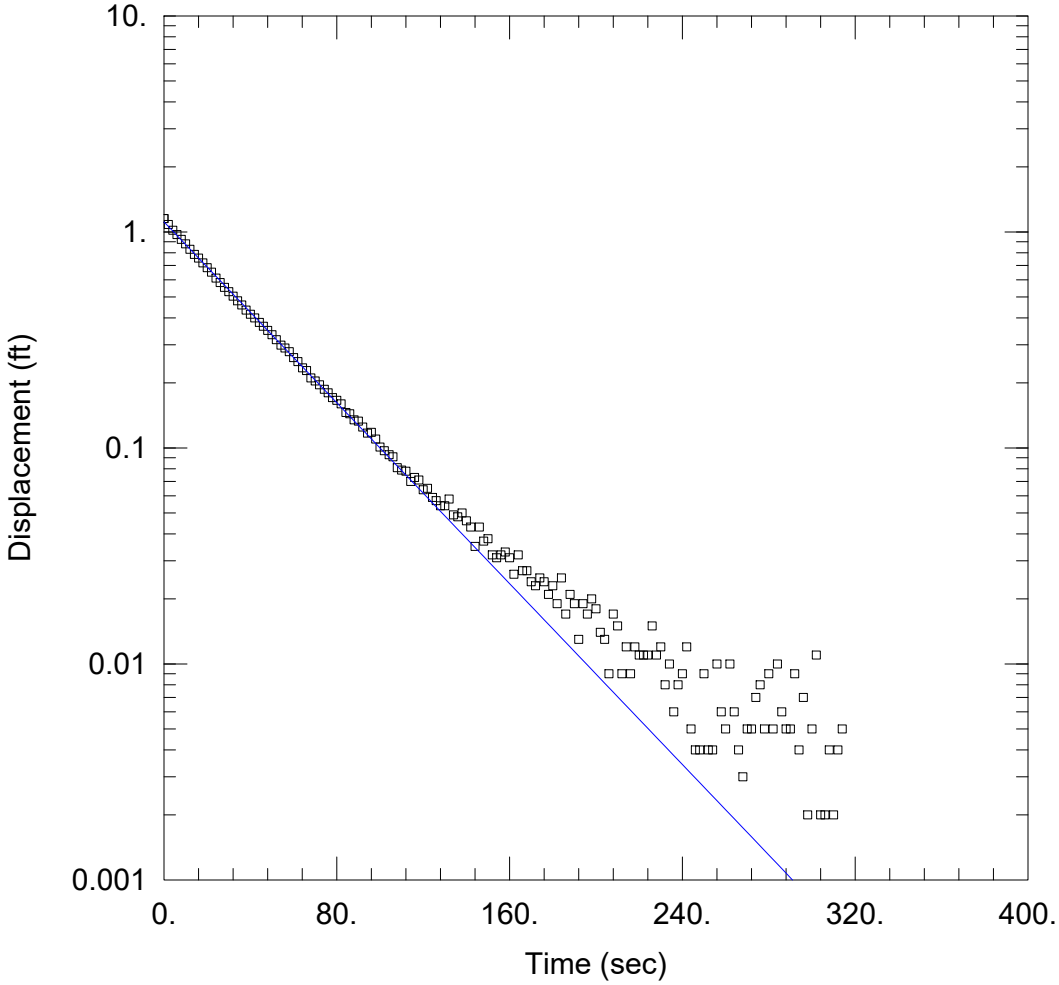
WELL DATA (S403A)

Initial Displacement: 1.232 ft Static Water Column Height: 45.15 ft
Total Well Penetration Depth: 5. ft Screen Length: 5. ft
Casing Radius: 0.086 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 0.003009 cm/sec y0 = 1.211 ft



S403A RISING 2

Data Set: \...\S403A Rising 2.aqt
Date: 02/12/20 Time: 11:07:59

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S403A
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 3. ft Anisotropy Ratio (Kz/Kr): 1.

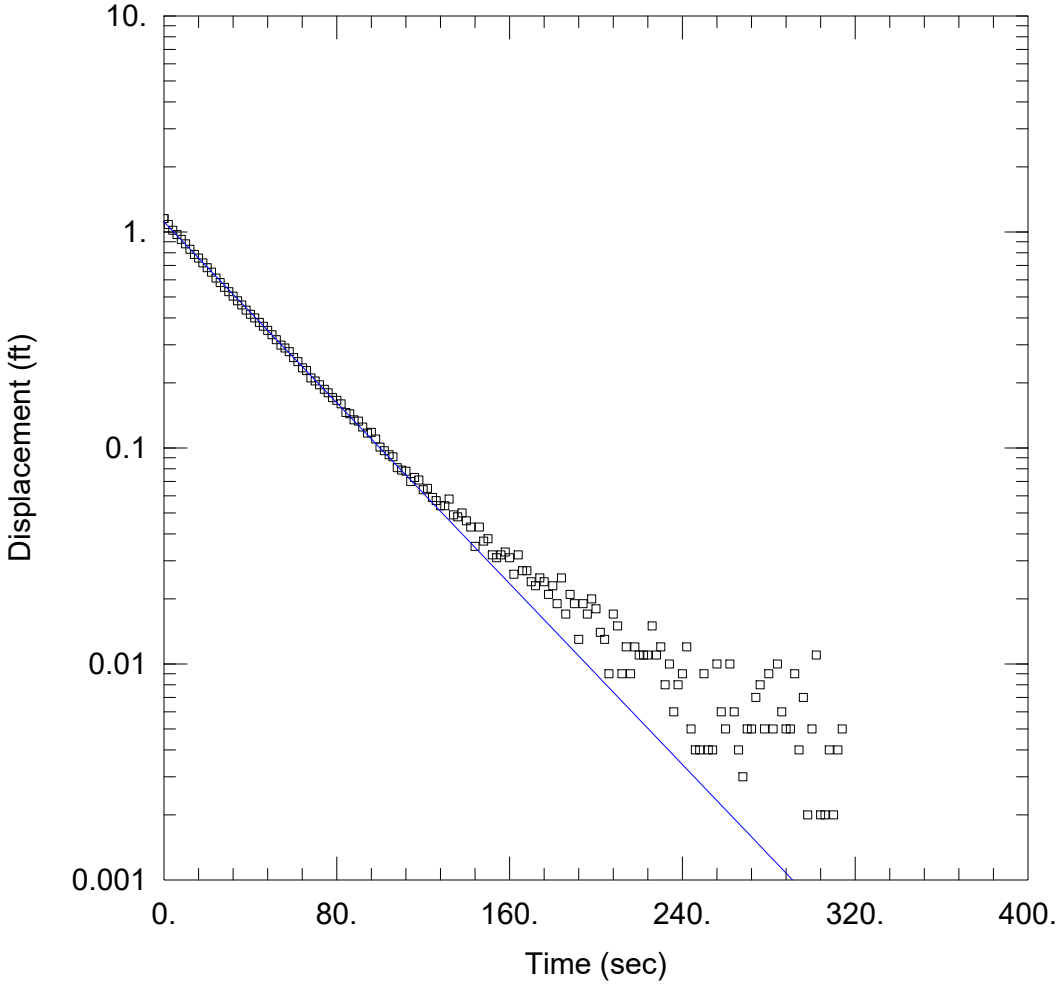
WELL DATA (S403A)

Initial Displacement: 1.153 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.086 ft
Static Water Column Height: 45.15 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.001203 cm/sec
y0 = 1.113 ft



S403A RISING 2

Data Set: \...\S403A Rising 2.aqt
Date: 02/12/20 Time: 11:07:28

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S403A
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 3. ft Anisotropy Ratio (Kz/Kr): 1.

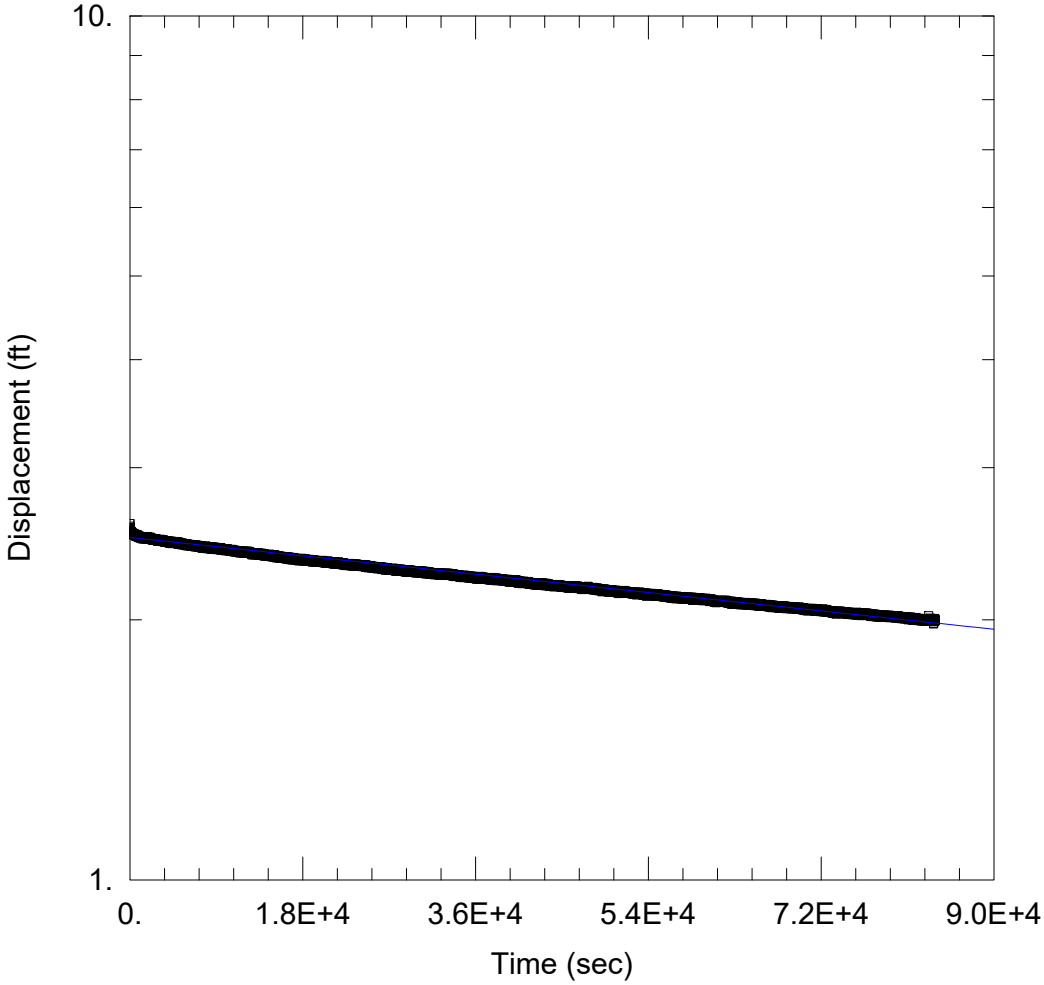
WELL DATA (S403A)

Initial Displacement: 1.153 ft Static Water Column Height: 45.15 ft
Total Well Penetration Depth: 5. ft Screen Length: 5. ft
Casing Radius: 0.086 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 0.002869 cm/sec y0 = 1.113 ft



S403B RISING 1

Data Set: \...\S403B Rising 1.aqt
Date: 02/12/20 Time: 11:09:16

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S403B
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

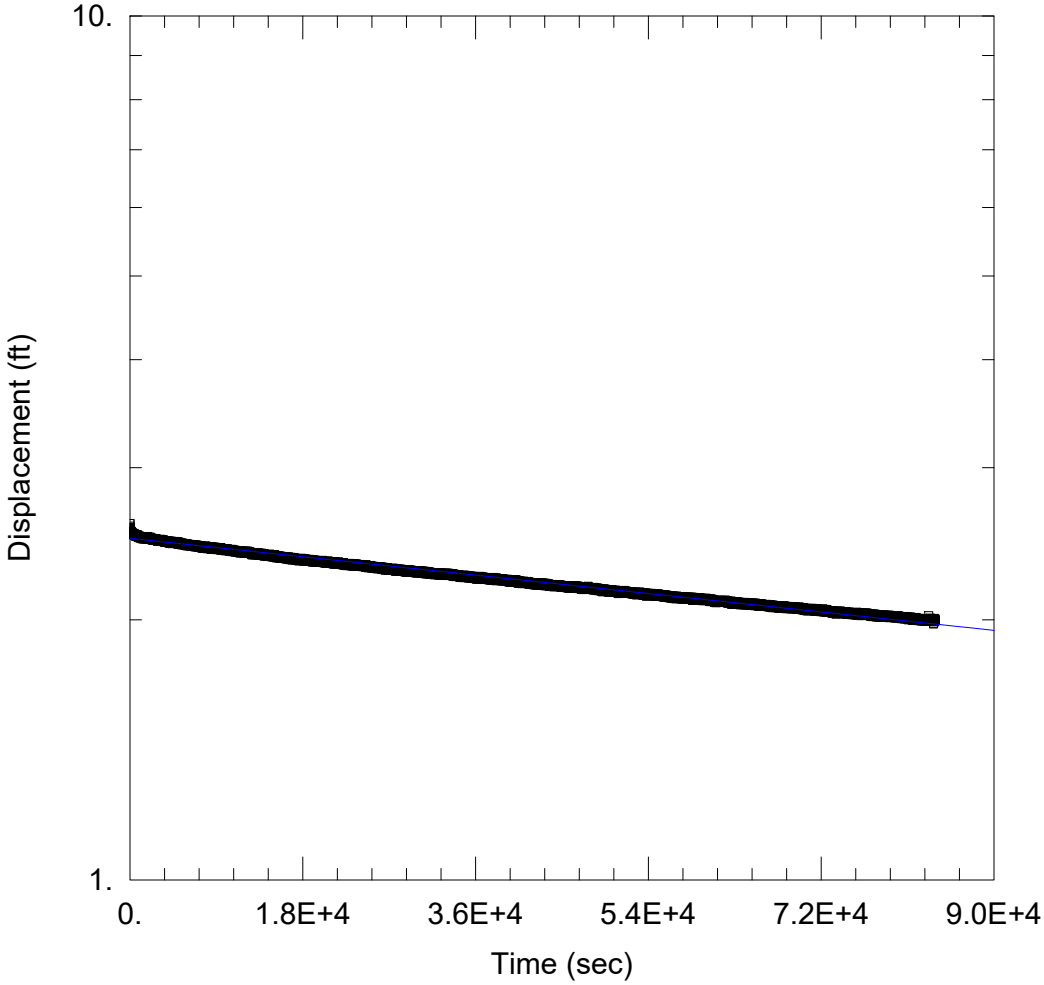
WELL DATA (S403B)

Initial Displacement: 2.585 ft Static Water Column Height: 61.3 ft
Total Well Penetration Depth: 10. ft Screen Length: 5. ft
Casing Radius: 0.086 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 1.339E-7 cm/sec y0 = 2.491 ft



S403B RISING 1

Data Set: \...\S403B Rising 1.aqt
Date: 02/12/20 Time: 11:10:08

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S403B
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

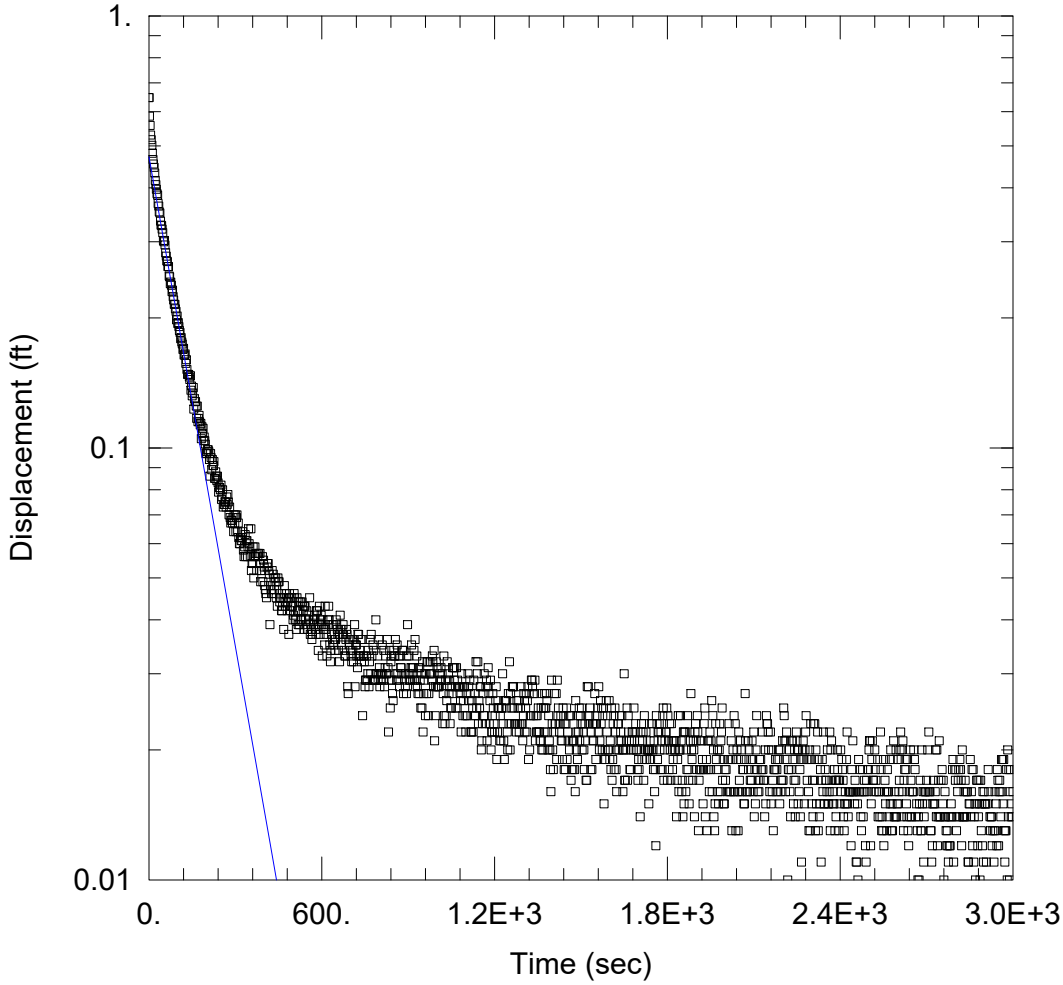
WELL DATA (S403B)

Initial Displacement: 2.585 ft Static Water Column Height: 61.3 ft
Total Well Penetration Depth: 10. ft Screen Length: 5. ft
Casing Radius: 0.086 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 1.834E-7 cm/sec y0 = 2.485 ft



S404A RISING 1

Data Set: \...\S404A Rising 1.aqt
Date: 02/26/20 Time: 16:56:27

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S404A
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 7.5 ft Anisotropy Ratio (Kz/Kr): 1.

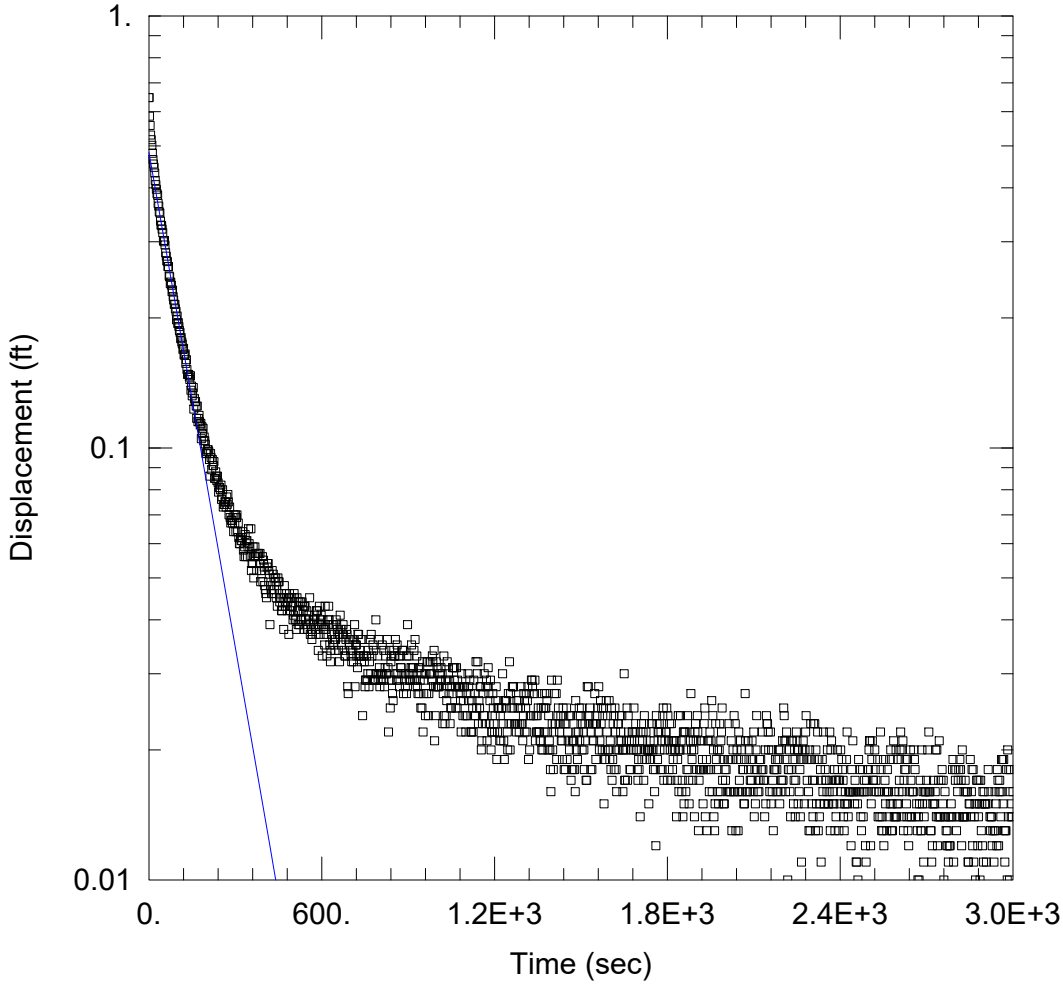
WELL DATA (S404A)

Initial Displacement: 0.647 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.085 ft
Static Water Column Height: 37.91 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.0003718 cm/sec
y0 = 0.4719 ft



S404A RISING 1

Data Set: \...\S404A Rising 1.aqt
Date: 02/26/20 Time: 17:00:11

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S404A
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 7.5 ft Anisotropy Ratio (Kz/Kr): 1.

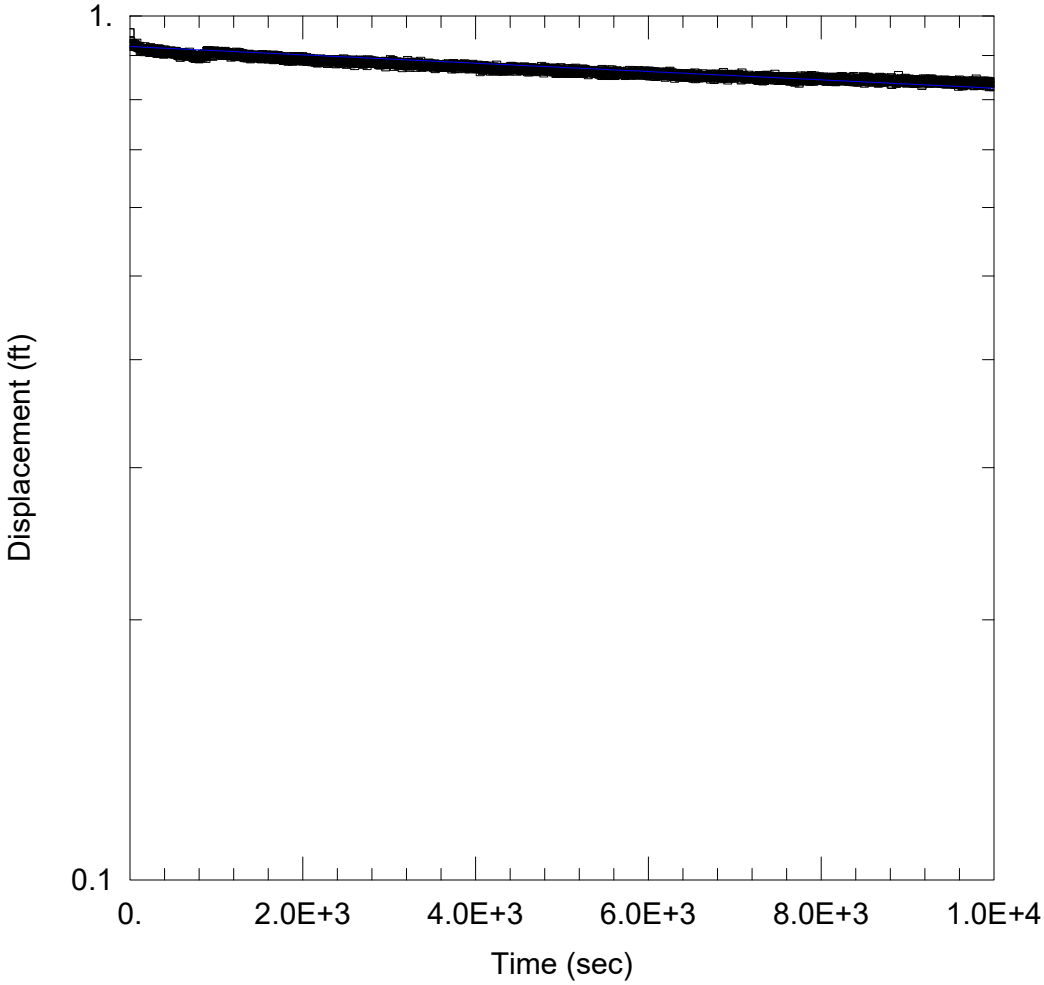
WELL DATA (S404A)

Initial Displacement: 0.647 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.085 ft
Static Water Column Height: 37.91 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 0.0007125 cm/sec
y0 = 0.4825 ft



S404B RISING 1

Data Set: P:\...\S404B Rising 1.aqt
Date: 02/27/20 Time: 08:59:10

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S404B
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

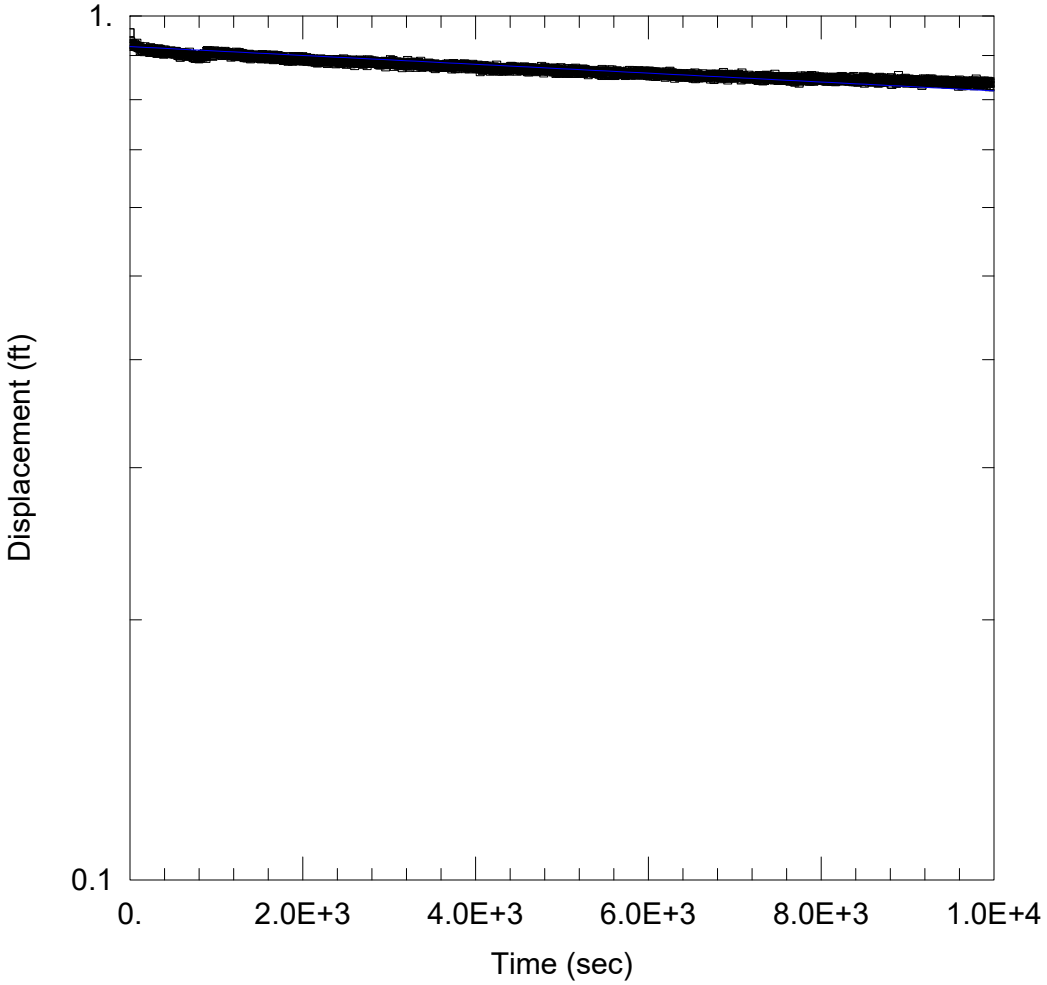
WELL DATA (S404B)

Initial Displacement: 0.956 ft Static Water Column Height: 57.66 ft
Total Well Penetration Depth: 10. ft Screen Length: 5. ft
Casing Radius: 0.085 ft Well Radius: 0.35 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 4.671E-7 cm/sec y0 = 0.9217 ft



S404B RISING 1

Data Set: P:\...\S404B Rising 1.aqt
Date: 02/27/20 Time: 08:57:54

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S404B
Test Date: 12/3/2019

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

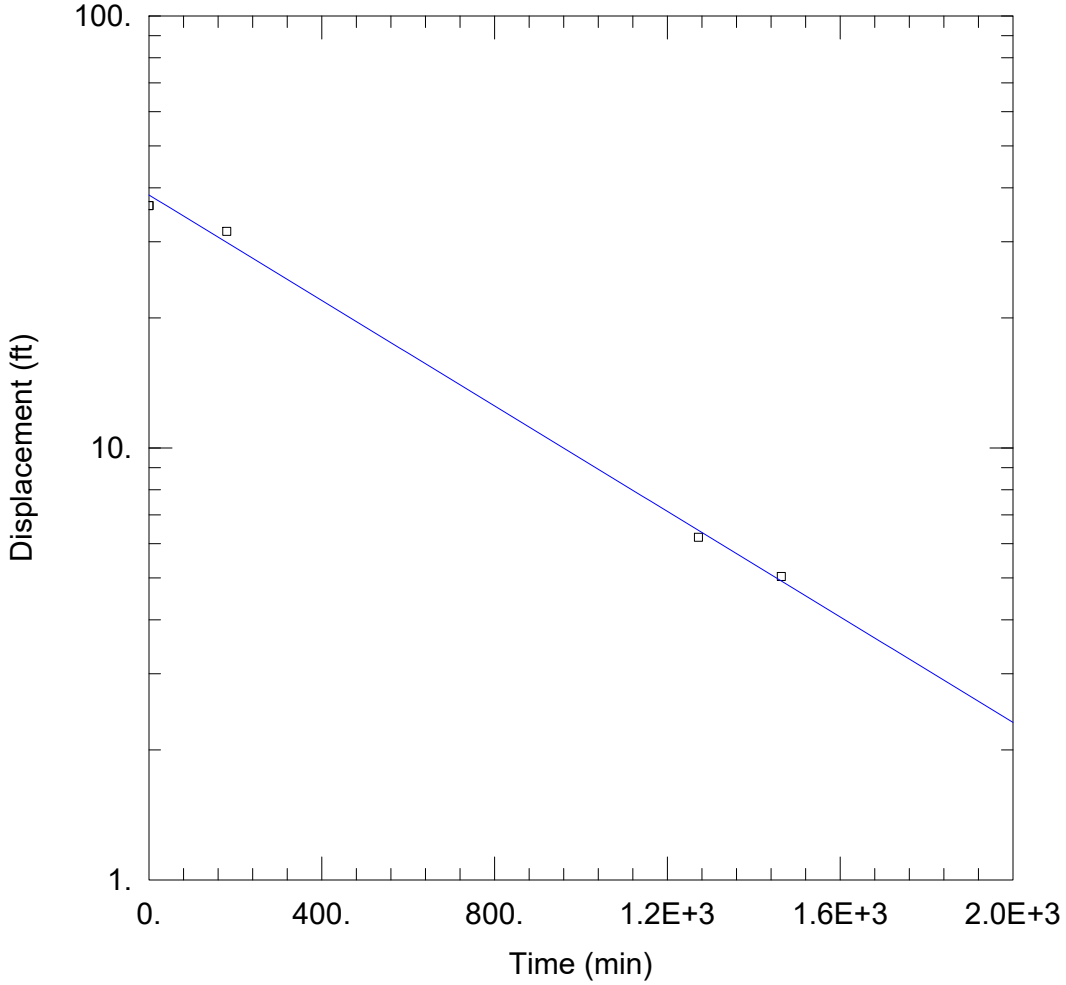
WELL DATA (S404B)

Initial Displacement: 0.956 ft Static Water Column Height: 57.66 ft
Total Well Penetration Depth: 10. ft Screen Length: 5. ft
Casing Radius: 0.085 ft Well Radius: 0.35 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 6.923E-7 cm/sec y0 = 0.9215 ft



S405A RISING 1

Data Set: \...\S405A Rising 1.aqt
Date: 02/12/20 Time: 13:02:41

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S405A
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

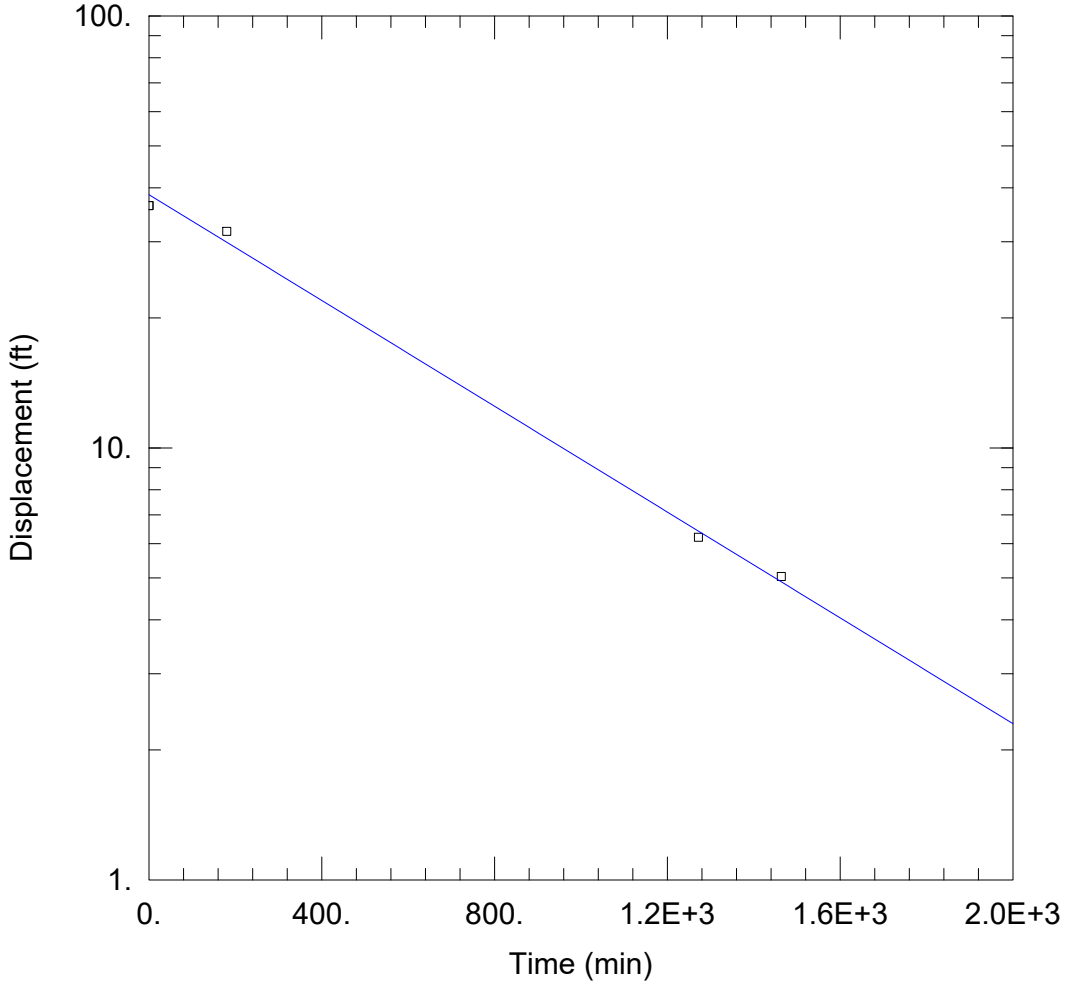
WELL DATA (S405A)

Initial Displacement: 36.4 ft Static Water Column Height: 38.82 ft
Total Well Penetration Depth: 10. ft Screen Length: 5. ft
Casing Radius: 0.086 ft Well Radius: 0.35 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 1.009E-6 cm/sec y0 = 38.51 ft



S405A RISING 1

Data Set: \...\S405A Rising 1.aqt
Date: 02/12/20 Time: 13:05:48

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S405A
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

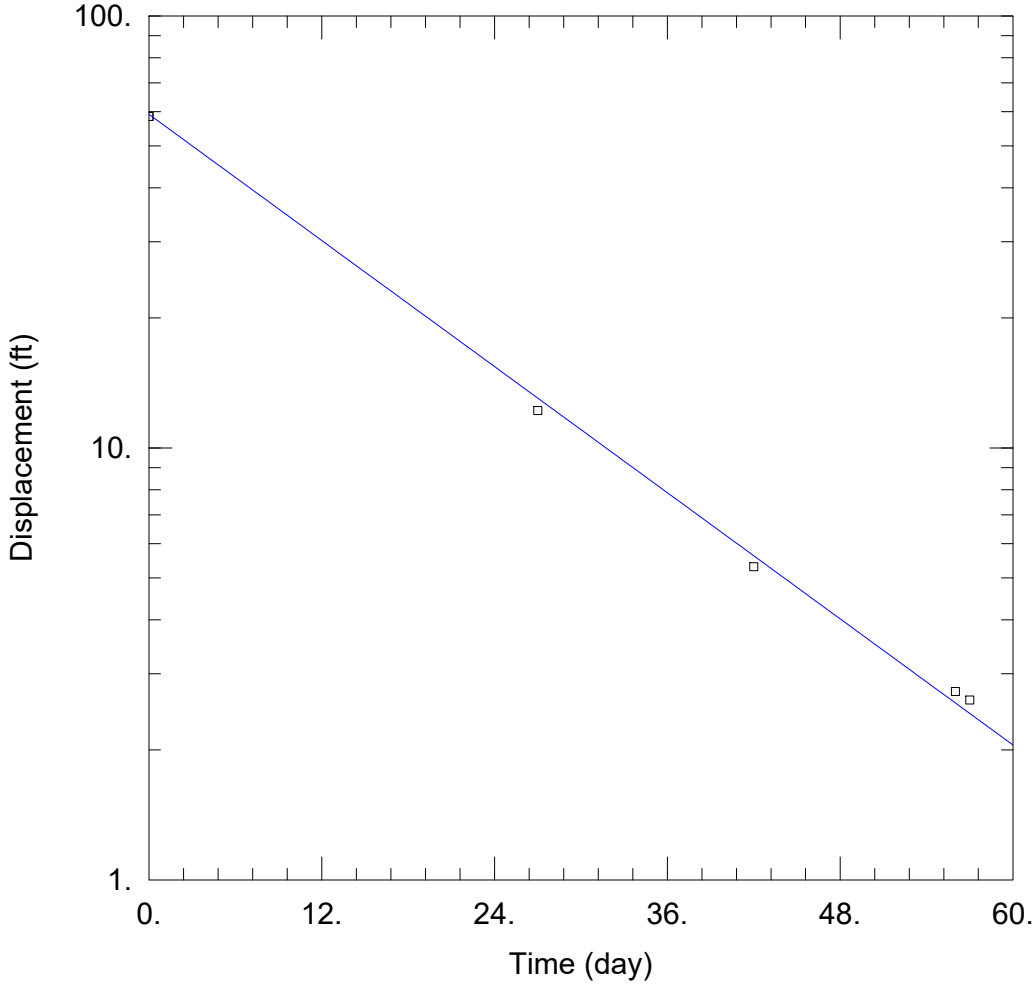
WELL DATA (S405A)

Initial Displacement: 36.4 ft Static Water Column Height: 38.82 ft
Total Well Penetration Depth: 10. ft Screen Length: 5. ft
Casing Radius: 0.086 ft Well Radius: 0.35 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 1.411E-6 cm/sec y0 = 38.57 ft



S405B RISING 1

Data Set: P:\...\S405B Rising 1.aqt
Date: 02/26/20 Time: 17:03:46

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S405B
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

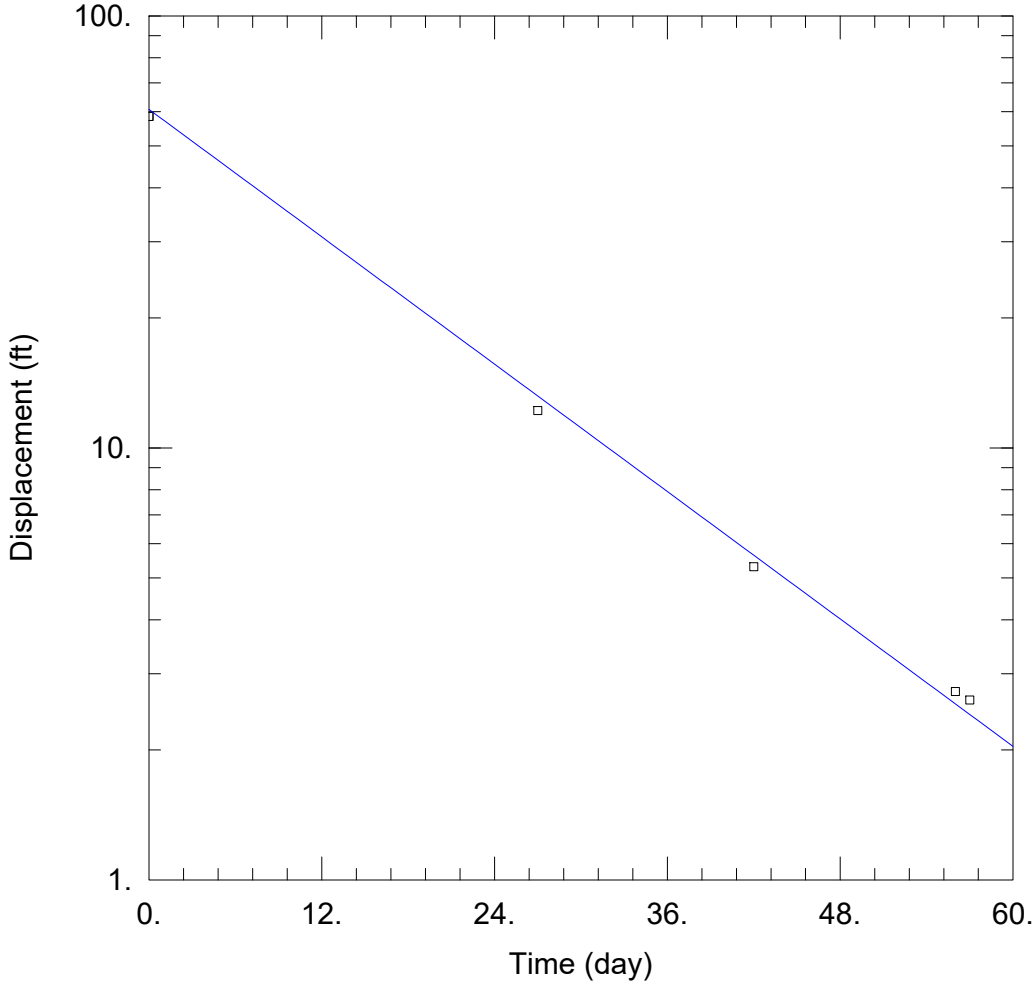
WELL DATA (S405B)

Initial Displacement: 58.5 ft Static Water Column Height: 58.91 ft
Total Well Penetration Depth: 10. ft Screen Length: 5. ft
Casing Radius: 0.085 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 3.13E-8 cm/sec y0 = 59.18 ft



S405B RISING 1

Data Set: P:\...\S405B Rising 1.aqt
Date: 02/26/20 Time: 17:02:14

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S405B
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

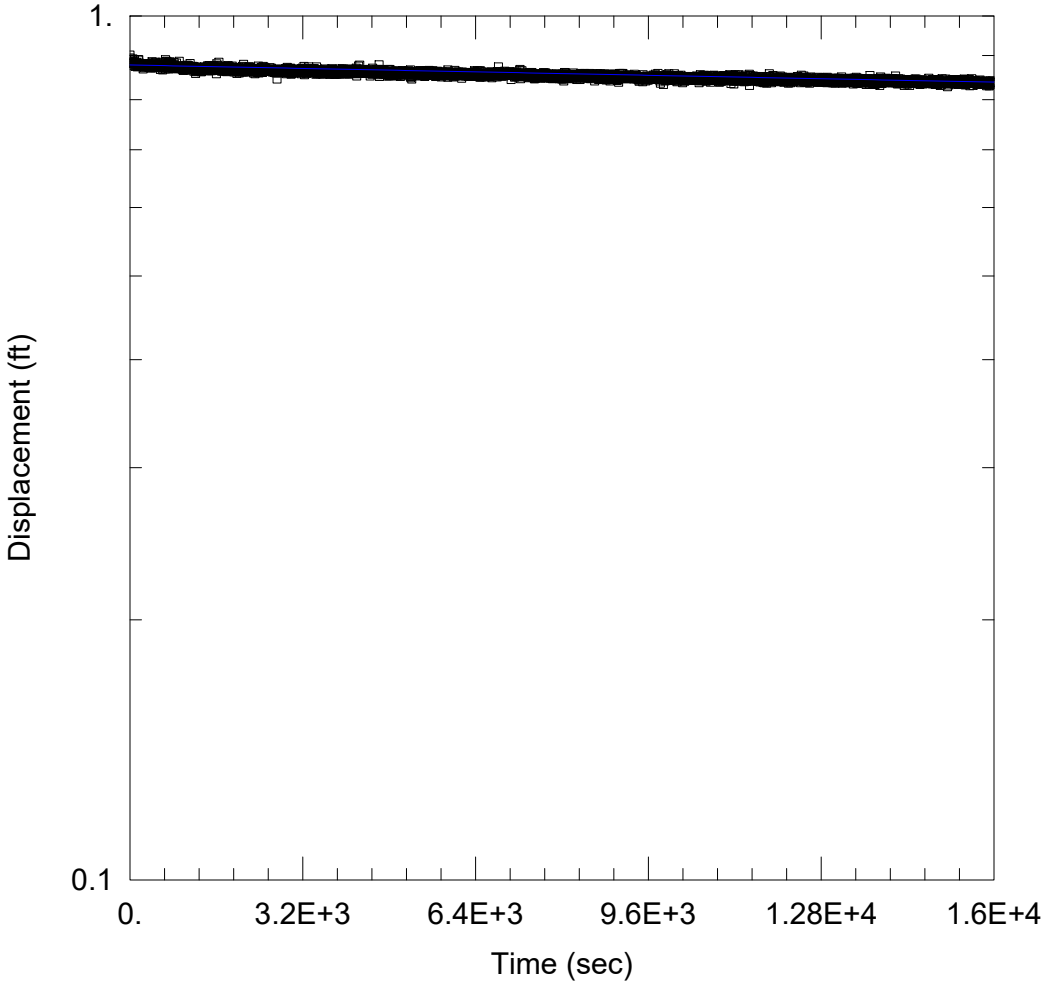
WELL DATA (S405B)

Initial Displacement: 58.5 ft Static Water Column Height: 58.91 ft
Total Well Penetration Depth: 10. ft Screen Length: 5. ft
Casing Radius: 0.085 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 4.324E-8 cm/sec y0 = 60.76 ft



S406A RISING 1

Data Set: \...\S406A Rising 1.aqt
Date: 02/12/20 Time: 11:23:58

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S406A
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

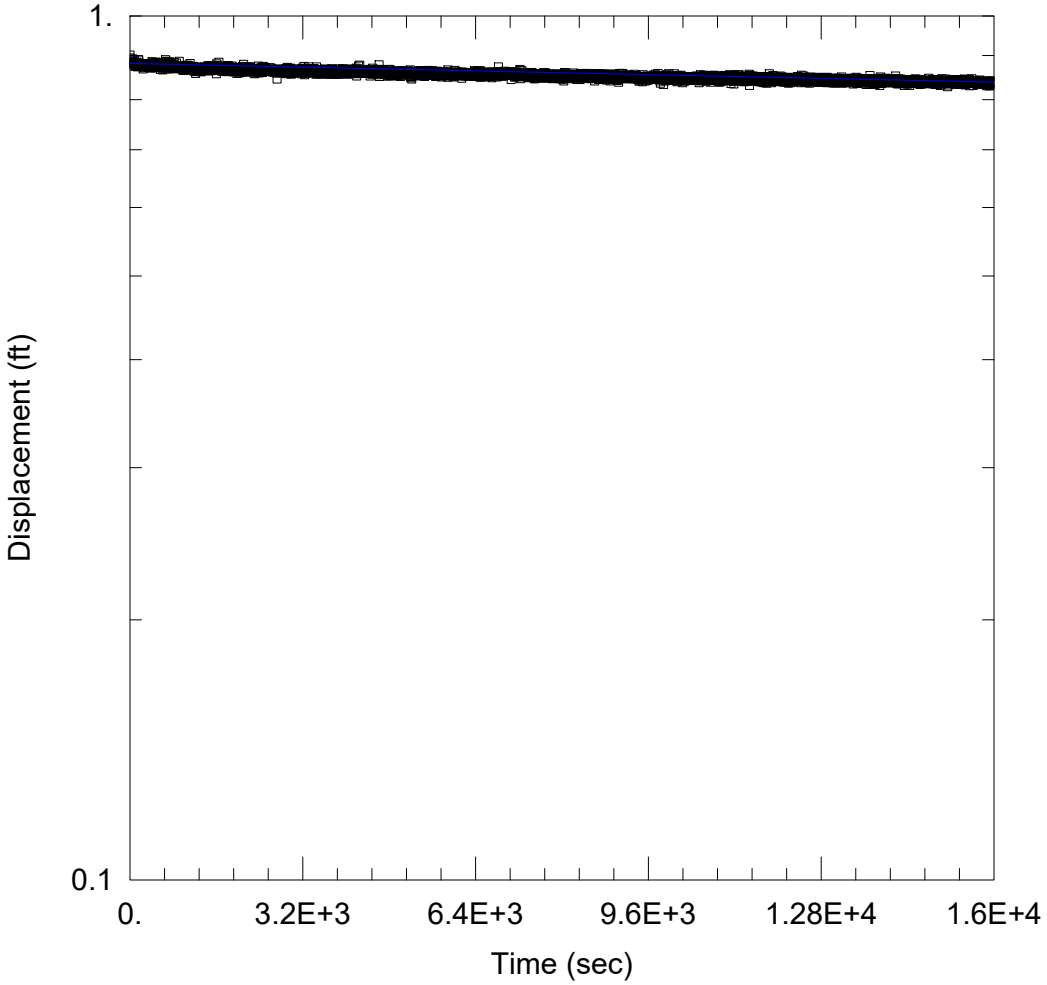
WELL DATA (S406A)

Initial Displacement: 0.901 ft Static Water Column Height: 40.09 ft
Total Well Penetration Depth: 10. ft Screen Length: 5. ft
Casing Radius: 0.086 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 1.413E-7 cm/sec y0 = 0.8774 ft



S406A RISING 1

Data Set: \...\S406A Rising 1.aqt
Date: 02/12/20 Time: 11:24:48

PROJECT INFORMATION

Company: TRC
Client: WM
Project: 324442.0003
Location: Menomonee Falls, WI
Test Well: S406A
Test Date: 12/4/2019

AQUIFER DATA

Saturated Thickness: 15. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (S406A)

Initial Displacement: 0.901 ft Static Water Column Height: 40.09 ft
Total Well Penetration Depth: 10. ft Screen Length: 5. ft
Casing Radius: 0.086 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 2.104E-7 cm/sec y0 = 0.8811 ft

L.2
Table 4-2 from January 2010 Feasibility Report Addendum, Proposed East Expansion, SCS BT Squared, July 26, 2012

Source 2: SCS BT Squared. 2012. January 2010 Feasibility Report Addendum, Proposed East Expansion, Orchard Ridge Recycling and Disposal Facility, Village of Menomonee Falls, Waukesha County, Wisconsin. July 2012.

Table 4-2
Summary of Groundwater Velocity Calculations
East Expansion - Orchard Ridge RDF
Feasibility Report Addendum

Well Name	WI Unique Well No	Hydraulic Conductivity[1] (cm/sec)	Horizontal Gradient[2] (ft/ft)	Aquifer Porosity[3] (%)	Material Description at Screened Interval	Calculated Velocity (cm/sec)	Calculated Velocity (ft/day)
Fine-Grained Environment							
S301	VT565	7.131E-07	0.0056	0.45	CL	8.87E-09	2.52E-05
S301A	PI346	3.843E-06	0.0070	0.40	CL, CL/ML	6.73E-08	1.91E-04
S302	VT566	6.164E-07	0.0088	0.45	CL, ML	1.21E-08	3.42E-05
S303	OY098	7.431E-07	0.0056	0.45	CL	9.25E-09	2.62E-05
S308	OY204	8.361E-06	0.0032	0.40	CL, CL/ML	6.69E-08	1.90E-04
S310	OY208	8.074E-05	0.0072	0.45	CL	1.29E-06	3.66E-03
S311A	OY202	2.319E-05	0.0062	0.40	CL, ML	3.59E-07	1.02E-03
S318	OY209	7.611E-06	0.0103	0.40	CL, SM, ML/CL	1.96E-07	5.56E-04
S321A	OY210	1.373E-05	0.0053	0.45	CL	1.62E-07	4.58E-04
S328A	VY446	1.110E-05	0.0007	0.45	CL	1.60E-08	4.54E-05
S330A	VY412	4.042E-05	0.0006	0.45	CL	5.66E-08	1.60E-04
	Mean	1.74E-05				2.04E-07	5.79E-04
	Standard Deviation	2.30E-05				3.59E-07	1.02E-03
	Maximum	8.07E-05				1.29E-06	3.66E-03
	Minimum	6.16E-07				8.87E-09	2.52E-05
	Geometric Mean	6.53E-06				6.28E-08	1.78E-04
Coarse-Grained Environment							
S300A	VT561	2.819E-03	0.0016	0.40	CL,SM	1.1E-05	3.20E-02
S300	VT564	1.724E-03	0.0192	0.35	GP/GM, CL	9.46E-05	2.68E-01
S301B	VT563	3.707E-03	0.0008	0.45	SP/SM	6.75E-06	1.91E-02
S302A	VT567	1.838E-01	0.0055	0.30	SP	3.37E-03	9.55E+00
S302B	VT568	1.419E-03	0.0005	0.40	SM	1.88E-06	5.33E-03
S303A	OY099	4.215E-03	0.0023	0.40	CL, SP/SM	2.42E-05	6.87E-02
S303B	OY100	9.051E-03	0.0025	0.40	SP/SM, SM, ML/CL	5.66E-05	1.60E-01
S308A	OY205	9.627E-03	0.0053	0.30	GP, SP	1.70E-04	4.82E-01
S308B	OY206	7.400E-03	0.0027	0.35	SP, SP/SM	5.71E-05	1.62E-01
S311	OY201	1.930E-05	0.0101	0.35	SC/SM, CL	5.57E-07	1.58E-03
S311B	OY203	1.632E-03	0.0011	0.30	SP/SM	5.98E-06	1.70E-02
S321	OY058	1.676E-02	0.0059	0.30	CL, SP	3.30E-04	9.34E-01
S321B	OX651	1.485E-03	0.0011	0.30	SP/SM	5.45E-06	1.54E-02
S328	VY447	3.295E-04	0.0014	0.40	CL, SP/SM	1.15E-06	3.27E-03
S328B	VY448	1.127E-02	0.0002	0.30	SP/SM	7.51E-06	2.13E-02
S330	VY411	4.145E-02	0.0015	0.30	SP/SM	2.07E-04	5.87E-01
S330B	VY413	9.053E-03	0.0008	0.30	SP/SM	2.41E-05	6.84E-02
	Mean	1.80E-02				2.57E-04	7.29E-01
	Standard Deviation	4.25E-02				7.83E-04	2.22E+00
	Maximum	1.84E-01				3.37E-03	9.55E+00
	Minimum	1.93E-05				5.57E-07	1.58E-03
	Geometric Mean	3.95E-03				2.31E-05	6.56E-02

FOOTNOTES:
1) Refer to **Appendix F** for in-field hydraulic conductivity test results.
2) Horizontal gradients for water table wells S328 and S330 were calculated using the January 6, 2012 high water table map; horizontal gradients for all other water table wells were calculated using the April 14, 2008 high water table map. Horizontal gradients for piezometers S328A, S328B, S330A, and S330B were calculated using the January 6, 2012 high potentiometric map; horizontal gradients for all other piezometers were calculated using the April 14, 2008 high potentiometric map.
3) Porosity estimated using Table 5.1, page 67, Driscoll, Groundwater and Wells, 1986.

Created by:	TLR	Date:	2/9/09
Revised by:	MED	Date:	3/20/12
Checked by:	JMM	Date:	3/23/12

I:\3185\Reports\2011 Revised East Expansion\Addendum to FR\Addendum Tables\[Table 4-2 Velocity Calcs_East Expansion.xls]Table_4-2

L.3
Table 4-1 from Feasibility Report, Southern Expansion, MWH Americas, Inc., April 2003

Source 3: MWH Americas, Inc. 2003. Feasibility Report, Southern Expansion, Orchard Ridge Recycling and Disposal Facility, April 2003.

Table 4-1
Summary of Groundwater Velocity Calculations
Southern Expansion
Orchard Ridge RDF
Waukesha County, Wisconsin

Well Name	WI Unique Well No	Hydraulic Conductivity (1) (cm/sec)	Horizontal Gradient (2) (ft/ft)	Aquifer Porosity (3) (%)	Material Description at Screened Inteval	Calcuated Velocity (cm/sec)	Calcuated Velocity (ft/day)
Fine-Grained Environment							
S209	JI871	3.14E-06	0.11	0.45	CL	7.75E-07	2.20E-03
S211	JI875	1.80E-07	0.06	0.45	CL	2.50E-08	7.09E-05
S213	JI923	5.31E-06	0.02	0.45	CL	2.62E-07	7.43E-04
S214	JI930	6.13E-05	0.75	0.45	CL	1.02E-04	2.90E-01
S220	JI877	2.91E-06	0.11	0.45	CL	7.18E-07	2.04E-03
S225	PO611	7.69E-05	0.08	0.45	CL	1.42E-05	4.04E-02
S225A	PO612	5.72E-06	0.08	0.45	CL	1.02E-06	2.88E-03
S227	JI874	2.85E-04	0.05	0.45	CL	3.43E-05	9.71E-02
S229	JI924	3.36E-04	0.03	0.45	CL	2.34E-05	6.62E-02
S230	JI872	6.48E-07	0.05	0.45	CL	7.20E-08	2.04E-04
S234	JI925	3.08E-05	0.06	0.45	CL	3.81E-06	1.08E-02
S235	JI879	8.02E-07	0.06	0.45	CL	1.11E-07	3.16E-04
S237	JI922	2.08E-04	0.05	0.45	CL	2.31E-05	6.55E-02
S238	PF596	4.30E-06	0.05	0.45	CL	4.78E-07	1.35E-03
Mean		**7.29E-05**				**1.46E-05**	**4.14E-02**
Standard Deviation		**1.16E-04**				**2.76E-05**	**7.83E-02**
Maximum		**3.36E-04**				**1.02E-04**	**2.90E-01**
Minimum		**1.80E-07**				**2.50E-08**	**7.09E-05**
Geometric Mean		**1.09E-05**				**1.68E-06**	**4.77E-03**
Coarse-Grained Environment							
S211A	JI876	9.13E-04	0.003	0.30	SP/SM	8.23E-06	2.33E-02
S218	JI928	1.56E-04	0.032	0.30	SP	1.67E-05	4.73E-02
S219	JI929	2.08E-06	0.750	0.30	SM	5.20E-06	1.47E-02
S220A	JI878	5.11E-04	0.005	0.30	SP	8.52E-06	2.41E-02
S224	JI926	7.16E-04	0.04	0.45	SM	6.63E-05	1.88E-01
S224A	JI927	5.85E-06	0.010	0.30	SP/SM	1.95E-07	5.53E-04
S224X (4)	--	2.22E-03	0.04	0.45	SM	2.06E-04	5.83E-01
S224AX (4)	--	1.66E-03	0.010	0.30	SP/SM	5.53E-05	1.57E-01
S227A	JI873	1.47E-03	0.004	0.30	SM	2.04E-05	5.79E-02
S238A	JI921	5.65E-04	0.012	0.30	SM	2.21E-05	6.28E-02
Mean		**8.22E-04**				**4.09E-05**	**1.16E-01**
Standard Deviation		**7.48E-04**				**6.18E-05**	**1.75E-01**
Maximum		**2.22E-03**				**2.06E-04**	**5.83E-01**
Minimum		**2.08E-06**				**1.95E-07**	**5.53E-04**
Geometric Mean		**2.68E-04**				**1.45E-05**	**4.10E-02**

Footnotes:
(1) Refer to Appendix for in-field hydraulic conductivity test results.
(2) Water table hydraulic gradients were determined using high water table maps from July 10, 2002.
(3) Porosity estimated using Table 5.1, page 67, Driscoll, Groundwater and Wells, 1986.
(4) Monitoring wells S224X and S224AX were abandoned and replaced by S224 and S224A.

L.4
Table 6 from Remedial Investigation Report, Boundary Road Landfill, Warzyn, Inc., July 1993

Source 4: Warzyn, Inc. 1993. Remedial Investigation Report, Remedial Investigation/Feasibility Study, Boundary Road Landfill Site, Waukesha County, Wisconsin. July 1993.

TABLE 6

In-Situ Hydraulic Conductivity Results
Boundary Road Landfill RI/FS

Well No.	Saturated Test Interval (msl)	Saturated Thickness (ft)	Hydraulic Conductivity (cm/s)	Material Screened (USCS)
LHG101	751.2-741.1[1]	10.1	$1x10^{-2}$	Refuse
LHG102	754.4-745.8[1]	8.6	$1x10^{-2}$	Refuse
LHG103	755.2-744.5[1]	10.7	$1x10^{-2}$	Refuse
LHG104	---	---	---	---
LHG105	753.8-741.0[1]	12.8	$1x10^{-2}$	Refuse
LHG106	751.9-745.6[1]	6.3	$1x10^{-2}$	Refuse
LHG107	750.6-742.4[1]	8.2	$1x10^{-2}$	Refuse
MW108	746.4-746.1	0.3	$4.1x10^{-6}$	SM
MW109	751.0-746.8	4.2	$2x10^{-5}$	GM-SP
MW110	744.8-735.8	9.0	$4.1x10^{-3}$	SP-SM
MW111	753.7-743.7[1]	10.0	$2x10^{-3}$	SM-GM
MW112	742.5-736.5	6.0	$8.8x10^{-4}$	SM
MW113	746.4-737.1	9.3	$1x10^{-2}$	SP-SM
P101	691.0-677.0	14.0	$1.5x10^{-3}$	SP-SM
P102	664.2-659.7	4.5	$4.7x10^{-3}$	SP
P103	679.7-673.2	6.5	$3.8x10^{-3}$	SM
P104	684.6-676.6	8.0	$3.8x10^{-3}$	SP
P105A	744.0-742.0	2.0	$2.6x10^{-3}$	GM-SM
P105B	723.0-722.0	1.0	$4.5x10^{-4}$	SM
P105C	714.5-712.0	2.5	$4.7x10^{-3}$	SP-SM
P106A	745.0-735.0	10.0	$1.0x10^{-2}$	GW-GM/SW-SM
P106B	715.0-698.0	17.0	$7.1x10^{-5}$	ML
P106C	685.0-675.0	10.0	$2.6x10^{-3}$	SM/CL-ML
TW-1	N/A	N/A	$1x10^{-3}$	SW/SP-GP/CL-ML
TW-2	N/A	N/A	$3x10^{-5}$	SW/SM/CL-ML
TW-3	N/A	N/A	$5x10^{-6}$	CL/ML-CL
TW-4	N/A	N/A	$1x10^{-2}$	Refuse
TW-5	N/A	N/A	$1x10^{-7}$	CL
TW-6	N/A	N/A	$2x10^{-5}$	No log
TW-7	N/A	N/A	---	CL
TW-8	747.0-735.9	11.1	$2x10^{-3}$	CL
TW-9	747.8-735.2	12.6	---	CL/CL-ML/SM/GM
TW-10A	749.2-739.6	9.6	$5x10^{-5}$	SP/ML
TW-10B	755.3-715.3	40.0	$2x10^{-4}$	ML/SP
TW-11	748.3-739.0	9.3	$5x10^{-5}$	CL
TW-13	746.1-734.3	11.8	$5x10^{-4}$	CL/CL-ML
TW-14	751.5-738.4	13.1	$1x10^{-2}$	SP/ML/CL
TW-15R	752.0-735.9	16.1	$2x10^{-3}$	Refuse
TW-16	746.3-734.3	12.0	$3x10^{-4}$	SM-SC/CL-ML
TW-18	747.3-735.3	12.0	$3x10^{-4}$	Fill/CL-ML
TW-19	748.3-733.1	15.2	$2x10^{-2}$	CL-ML
TW-20	746.3-740.1	6.2	$2x10^{-4}$	Refuse/CL-ML
TW-21	748.3-739.7	8.6	---	Refuse/CL-ML
TW-22	748.3-734.8	13.5	$2x10^{-4}$	CL-ML
TW-23	747.4-734.1	13.3	$3x10^{-4}$	SP/GP/CL-ML
TW-24	748.0-733.4	14.6	$5x10^{-3}$	SM/CL-ML
TW-25	748.3-737.2	11.1	$3x10^{-5}$	SM/CL-ML

TABLE 6

FOOTNOTE:

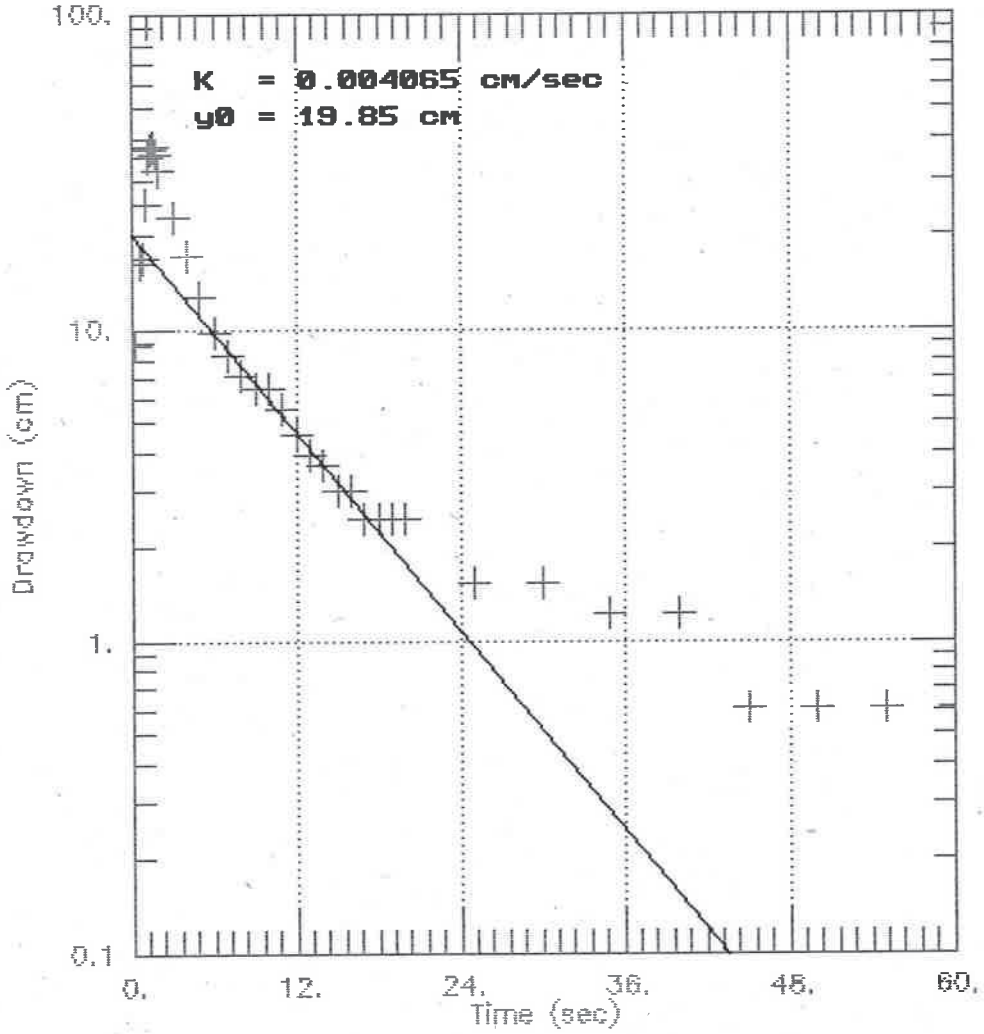
(1) Top of saturated interval is liquid surface elevation measured on day of conductivity test.

NOTES:

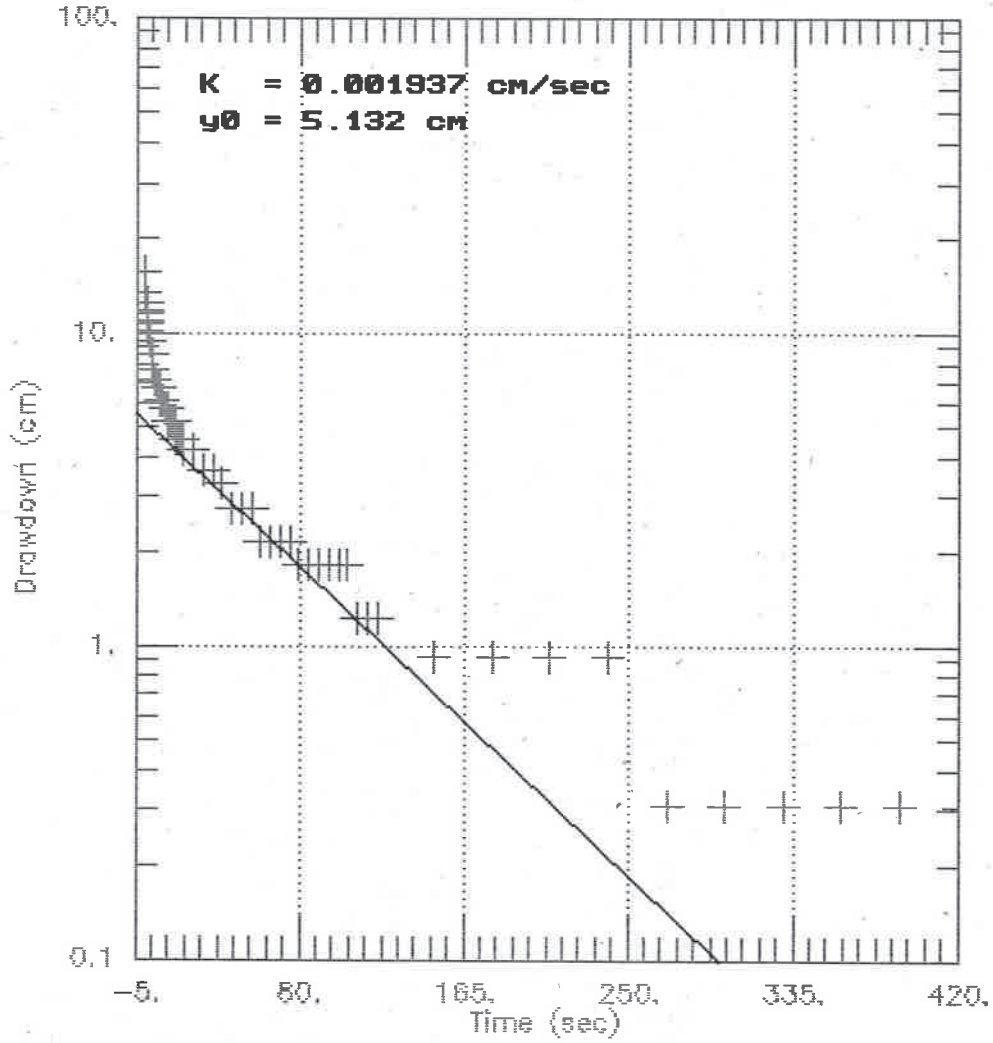
1. This table is an update of Table 6 from Technical Memorandum No. 1.
2. Well LHG104 could not be tested due to the presence of a very low leachate level within the well.
3. N/A means not available.
4. Hydraulic conductivity data and calculations are contained in Appendix J.
5. Available borehole logs and well construction summaries are contained in Appendices A and B, respectively.

RJR/ms/TJK/RJK/AJS
[mad-407-256d]
1537101/42220

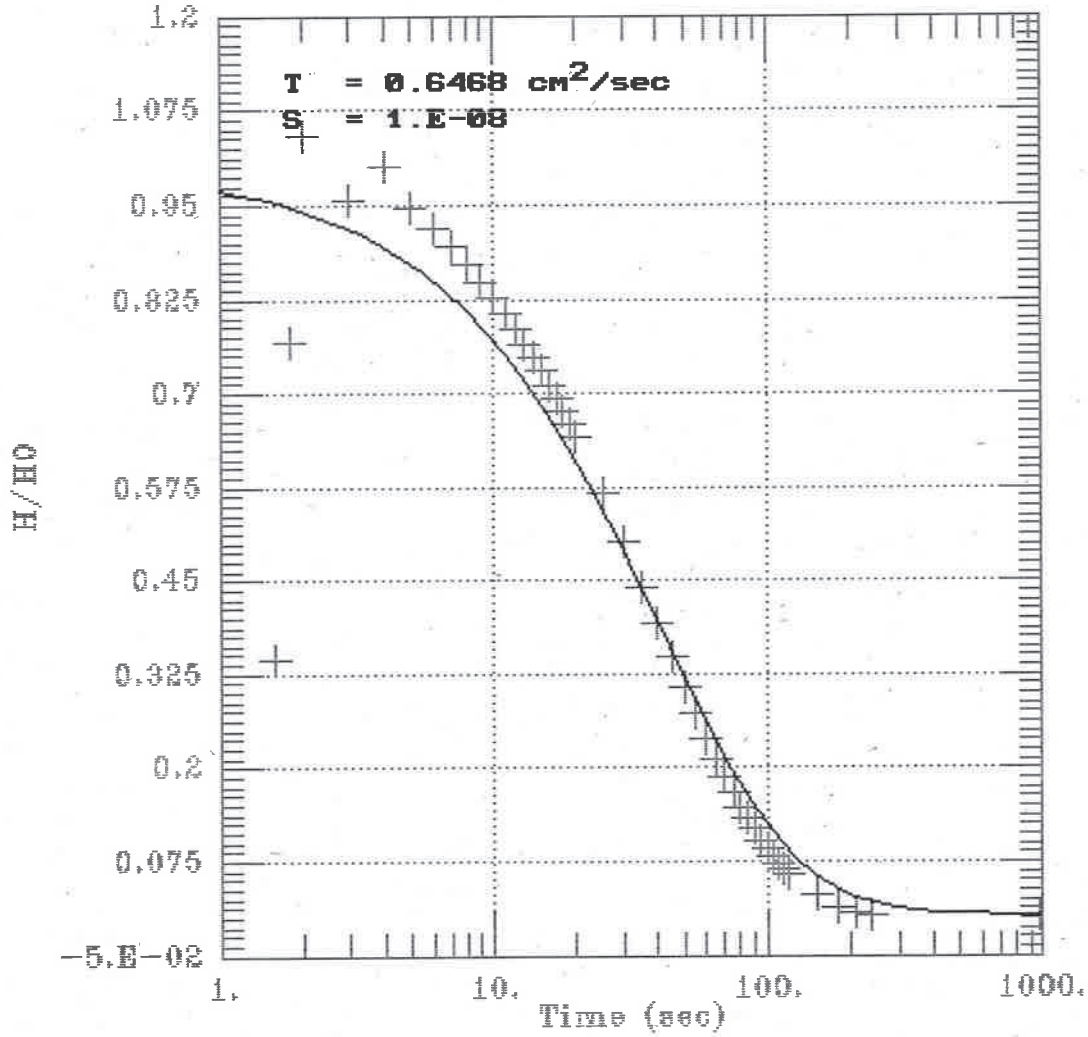
BOUNDARY ROAD - MW110



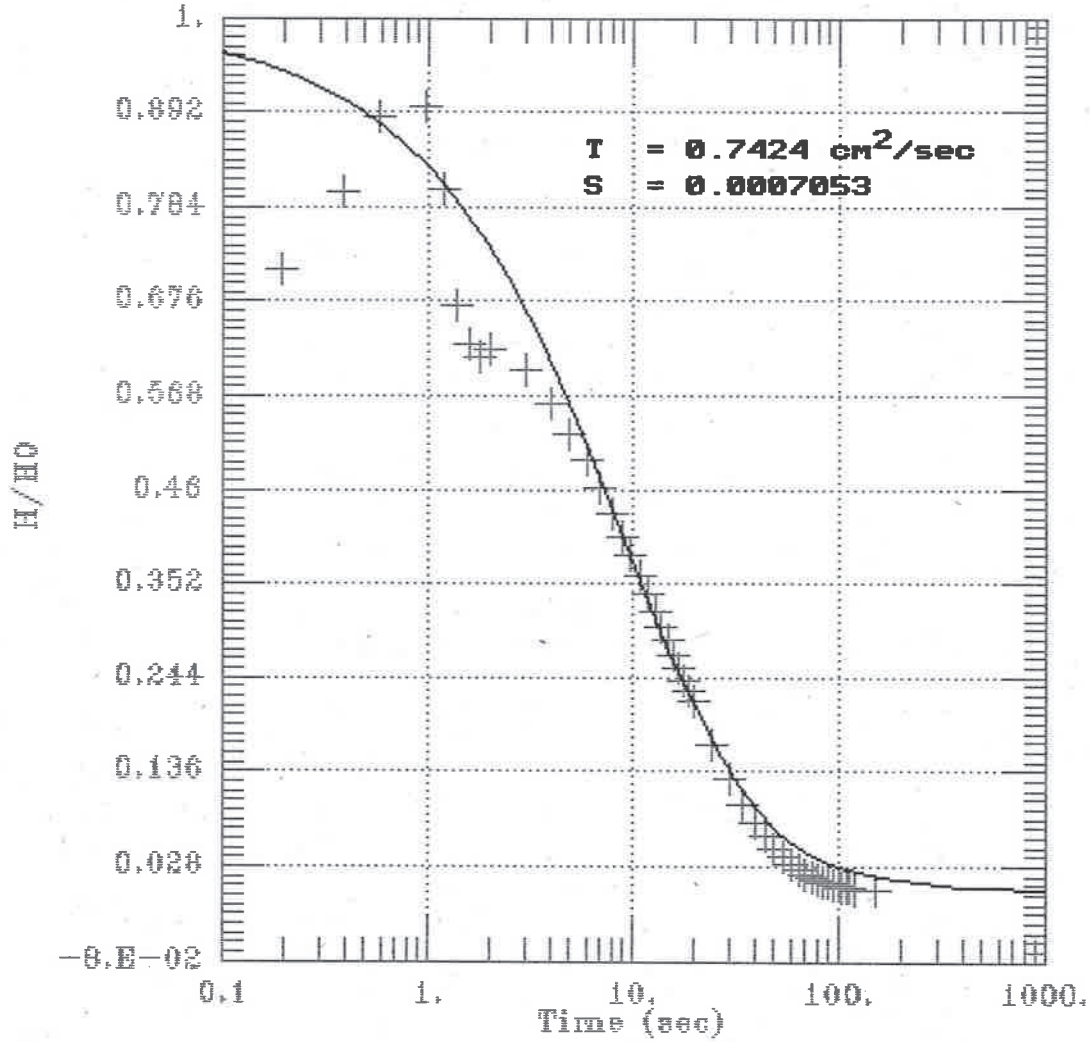
BOUNDARY ROAD - MW111

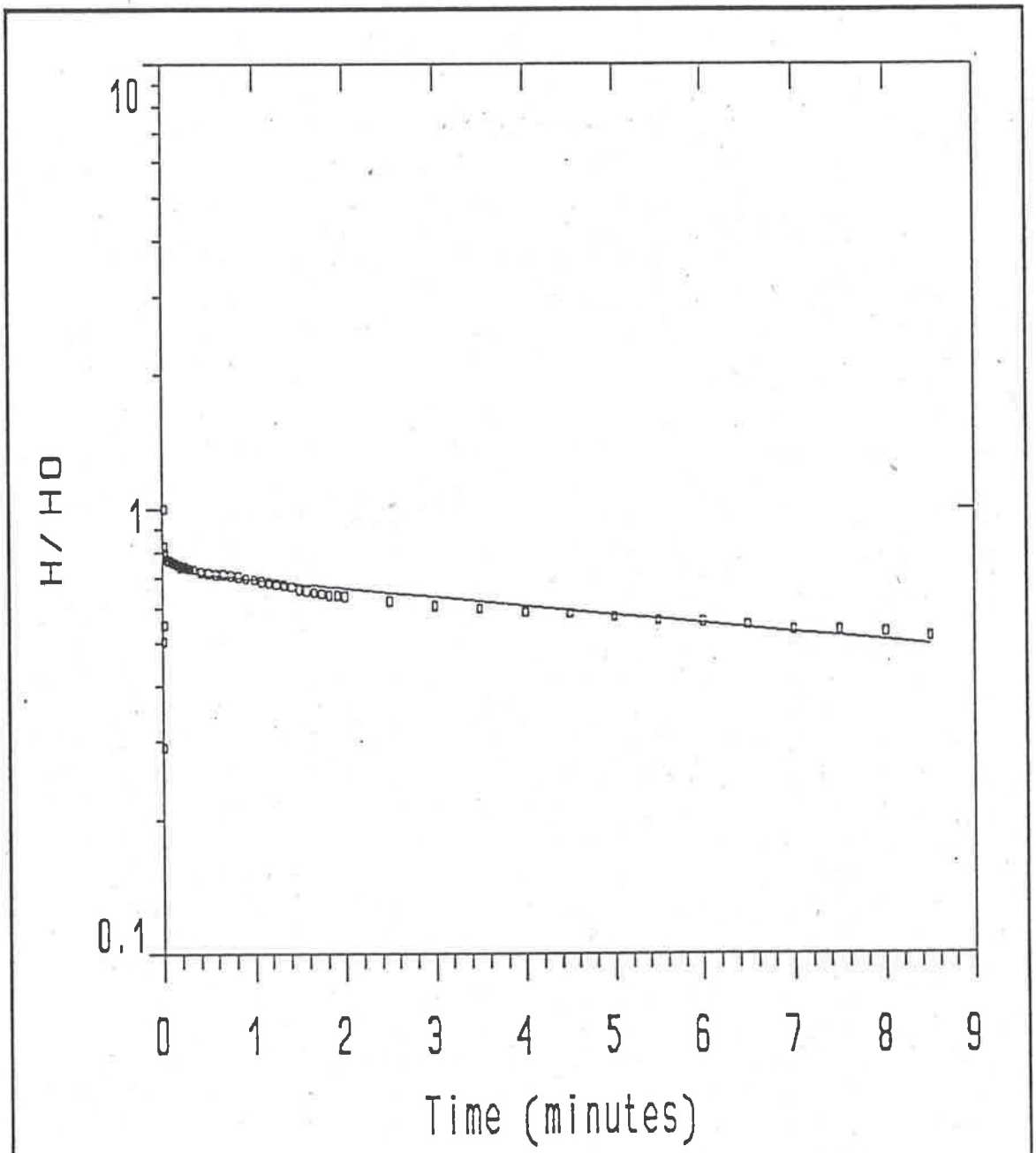


BOUNDARY ROAD - P102

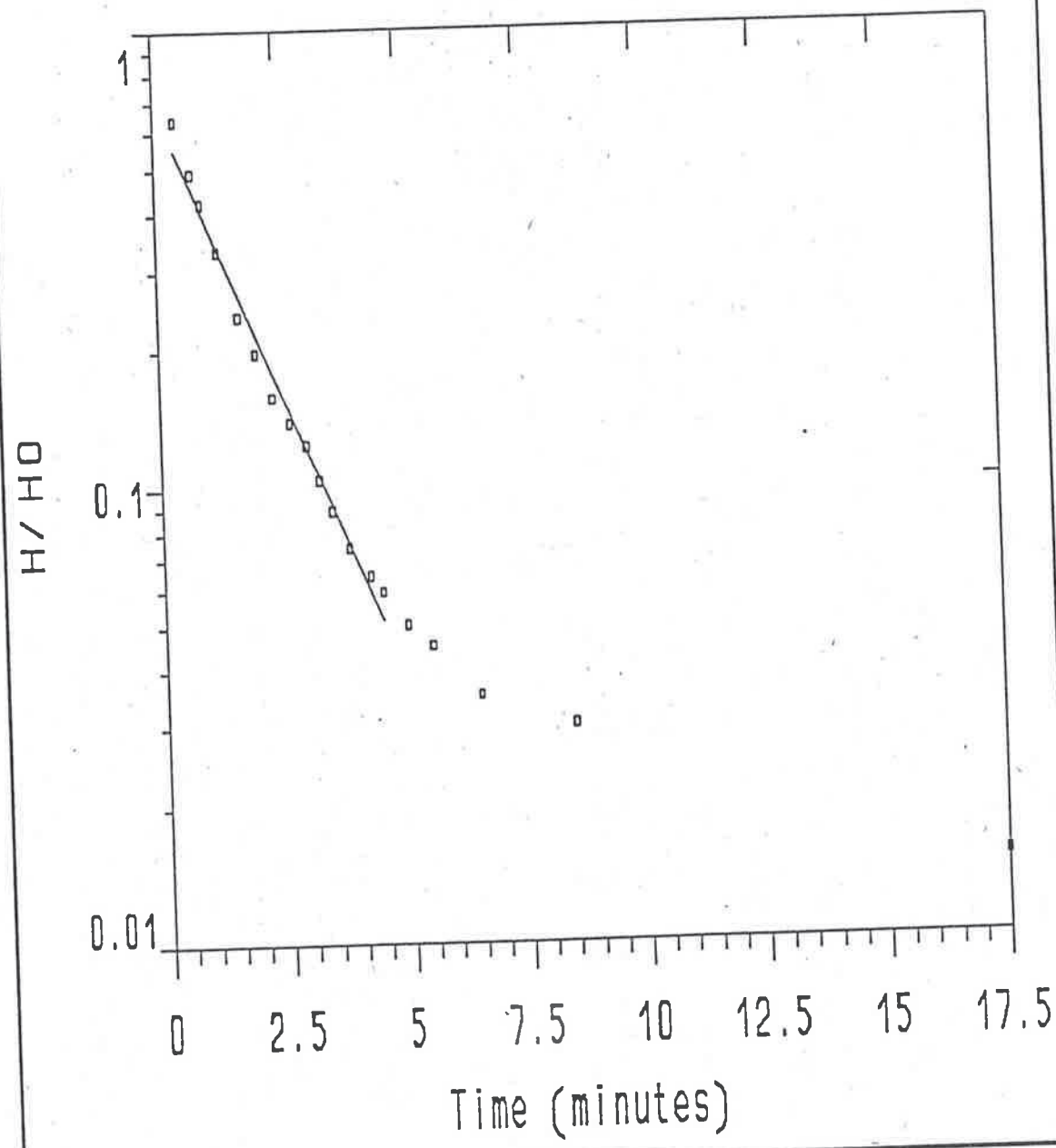


BOUNDARY ROAD - P103

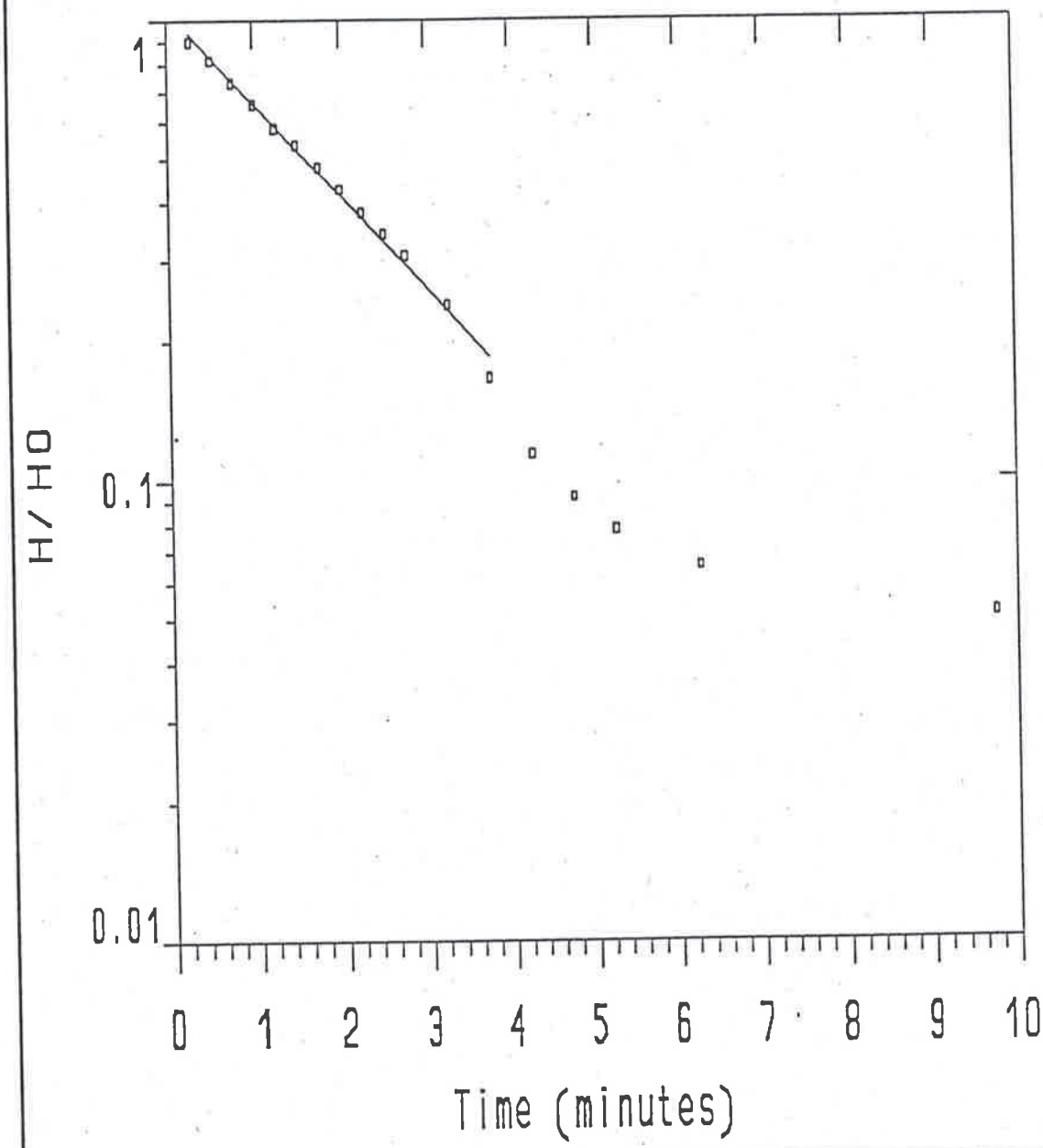




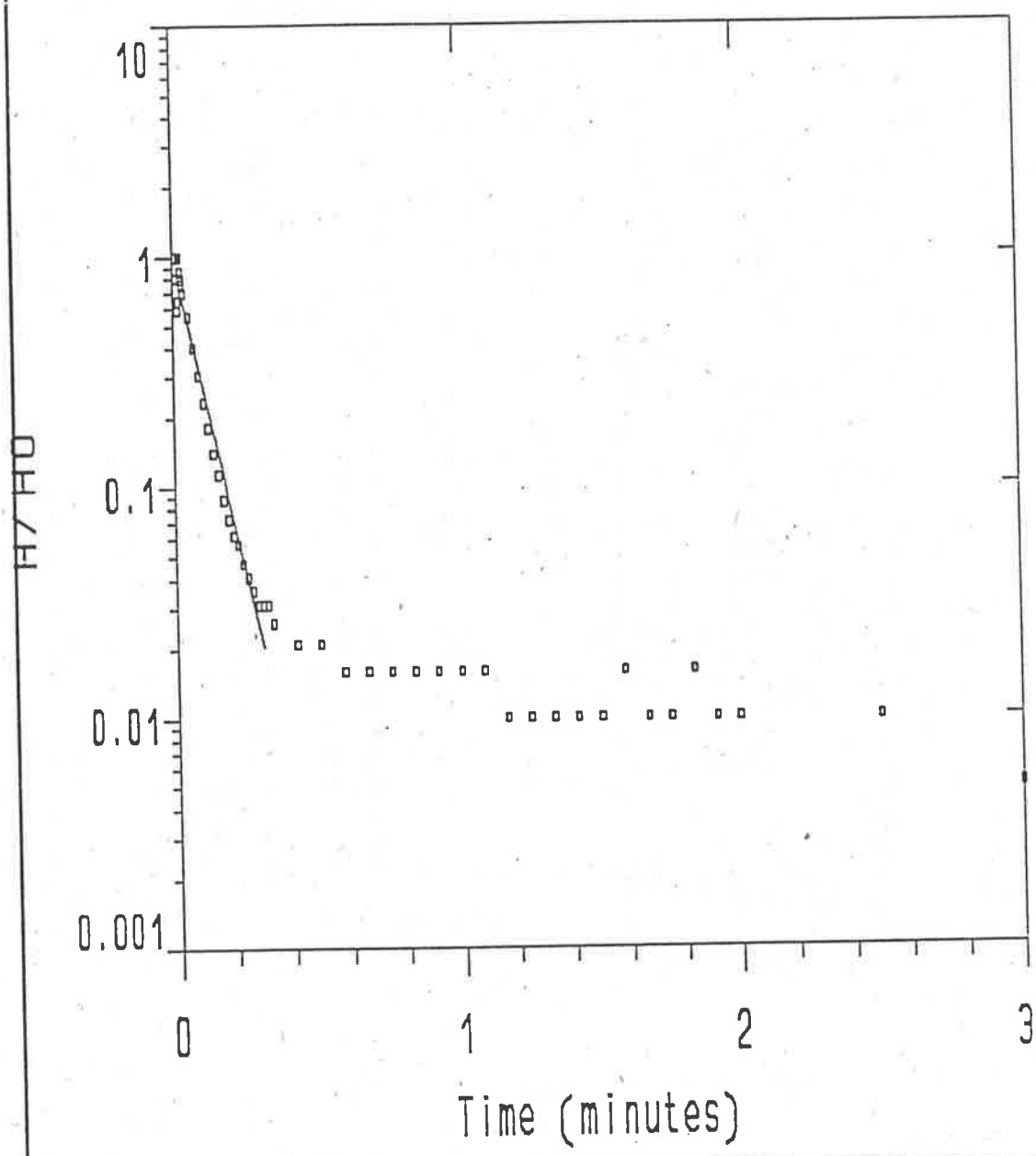
MODEL TYPE: BOUWER and RICE	for: BOUNDARY ROAD LANDFILL	WELL RECOVERY DATA
CONDUCTIVITY: 4.753E-5 ft/min	by: Hydro-Search, Inc.	Well: TW-2
TRANSMISSIVITY: .04748 sq. ft/min	WELL DATA: Units: ft	MENOMONEE FALLS
INITIAL HEAD: 1.000 ft	AQUIFER: Endless	WAUKASHA, WI
Data Set: TW-2 / Date: 01/23/91	THICKNESS: 999.0	
	SCREEN: top: 11.50 base: 17.89	
	DIAMETER: casing: .1250 intake: .6666	
	DEPTH: Water Table: 7.760 TD: 21.50	



MODEL TYPE: BOUWER and RICE	for: BOUNDARY ROAD LANDFILL	WELL RECOVERY DATA
CONDUCTIVITY: .0006083 ft/min	by: Hydro-Search, Inc.	Well: TW-16
TRANSMISSIVITY: .6077 sq. ft/min	WELL DATA: Units: ft	MENOMONEE FALLS
INITIAL HEAD: 1.000 ft	AQUIFER: Endless	WAUKESHA, WI
Data Set: TW-16 / Date: 01/21/91	THICKNESS: 999.0	
	SCREEN: top: 10.00 base: 17.57	
	DIAMETER: casing: .1666 intake: .6666	
	DEPTH: Water Table: 6.520 TD: 18.50	



MODEL TYPE: BOUWER and RICE	for: BOUNDARY ROAD LANDFILL	WELL RECOVERY DATA
CONDUCTIVITY: .0003508 ft/min	by: Hydro-Search, Inc.	Well: TW-22
TRANSMISSIVITY: .3504 sq. ft/min	WELL DATA: Units: ft	MENOMONEE FALLS
INITIAL HEAD: 1.000 ft	AQUIFER: Endless	WAUKESHA, WI
Data Set: TW-22 / Date: 01/22/91	THICKNESS: 999.0	
	SCREEN: top: 10.00 base: 19.37	
	DIAMETER: casing: .1666 intake: .6666	
	DEPTH: Water Table: 8.450 TD: 20.00	



MODEL TYPE: BOUWER and RICE	for: BOUNDARY ROAD LANDFILL	WELL RECOVERY DATA
CONDUCTIVITY: .009965 ft/min	by: Hydro-Search, Inc.	Well: TW-24
TRANSMISSIVITY: 9.955 sq. ft/min	WELL DATA: Units: ft	MENOMONEE FALLS
INITIAL HEAD: 1.000 ft	AQUIFER: Endless	WAUKESHA, WI
Data Set: TW-24 / Date: 01/22/91	THICKNESS: 999.0	
	SCREEN: top: 10.00 base: 20.18	
	DIAMETER: casing: .1666 intake: .6666	
	DEPTH: Water Table: 5.600 TD: 20.18	

L.5
Hydraulic Conductivity Test Procedures, Analysis, and Results, Technical Memorandum, Earth Tech, Inc., July 31, 2000

Source 5

TECHNICAL MEMORANDUM

DATE: July 31, 2000

TO: Jeff Maletzke - Project Files

FROM: Kristen Gunderson

SUBJECT: Hydraulic Conductivity Test Procedures, Analysis, and Results
Waste Management – Boundary Road RDF, Menomonee Falls, Wisconsin
Project No. 35361

INTRODUCTION

In-situ hydraulic conductivity tests were performed on 7 wells installed in March 2000, at the Boundary Road RDF in Menomonee Falls, Wisconsin. The tests were performed to determine the hydraulic conductivity of the formation materials in the vicinity of each well screen interval. The tests were performed on March 22 and 23, 2000. The field and analytical methods are consistent with procedures as described in Bouwer and Rice, (1976), Freeze and Cherry, (1979), and Domenico and Schwartz, (1990). A brief summary of the conceptual model, the field procedure, analysis, and test results are explained below.

CONCEPTUAL MODEL

The conceptual groundwater flow model in the vicinity of the property is described as silty clays and silty sands (fill and outwash deposits) overlying a clay diamicton confining unit. Beneath the clay confining unit, there is an outwash deposit consisting of well graded sand with trace fine to coarse gravel. Therefore, for purposes of analyzing hydraulic conductivity test data wells screened below the clay diamicton are considered confined (P-107) and wells screened above the clay diamicton are considered unconfined (TW-8R, TW-9RR, TW-16R, TW-24R, MW-116 and MW-117).

FIELD PROCEDURE

In-situ hydraulic conductivity tests at the Boundary Road RDF were conducted by the slug test method. A 4-foot long by 1-1/4 inch diameter stainless steel slug with rope, 10 psi pressure transducer, HERMIT 2000 Data Logger, and electronic water level indicator were used to complete the tests. A computer was used to download the data from the data logger and to analyze the data with the use of AQTESOLV for Windows, an aquifer test analysis software package (HYDROSOLVE, 1996).

Before running the field tests a static water level and depth to bottom were recorded with an electronic water level indicator. Next a transducer was lowered into the well and the static transducer level was recorded on the field form (see attachments). Rising and falling head tests were performed on each well. To initiate a falling head test, the slug was lowered into the well to displace

the water level upward. The HERMIT 2000 data logger recorded the falling water levels at specific time intervals as measured by the transducer. Readings were taken until the water level had recovered to approximately 90 percent of the initial head change. To initiate a rising head test, the slug was raised out of the water in the well to displace the water level downward. The HERMIT 2000 data logger recorded the rising water levels at specific time intervals as measured by the transducer. Readings were taken until the water level had recovered to approximately 90 percent of the initial head change. Decontamination procedures for the slug test equipment consisted of an Alconox wash and tap water rinse, followed by several distilled water rinses.

SLUG TEST DATA ANALYSIS

Displacement/drawdown (feet) versus time (minutes) data were analyzed following the Bouwer and Rice (1976) method for unconfined and confined aquifers. The Bouwer and Rice analyses were completed using AQTESOLV computer software (HYDROSOLVE, 1996). The AQTESOLV results and plots are attached. Falling head tests were not analyzed for the MW and TW well series because the water levels intersected the screens. Falling head tests were not analyzed because the flow of water takes place in the vadose and saturated zone. Flow into the saturated zone can overestimate the overall in-situ hydraulic conductivity value.

Bouwer and Rice Method

Well and aquifer parameters

Before analyzing the hydraulic conductivity test data, several well and aquifer parameters need to be determined. For the Bouwer and Rice Method the parameters include: radius of borehole (r_w), radius of well casing (r_c), aquifer thickness (b), effective well screen length (L), and static height of water in the well (D). The parameters vary based on the hydrogeologic conditions in the vicinity of the well.

Radius of well casing (r_c) is radius of the PVC screen. Radius of borehole (r_w) varies depending on the hydraulic contrast between the well filter pack and the formation. If the filter pack and the screened formation are hydraulically similar, then r_w is equal to the radius of the well casing (HYDROSOLVE, 1996). If the filter pack and the screened formation are hydraulically dissimilar, then r_w is equal to the radius of the borehole. All wells assumed the filter pack to be hydraulically dissimilar to the formation being screened, therefore for these analyses, r_w is equal to the radius of the borehole.

Aquifer thickness (b) is the estimated saturated thickness of the aquifer being tested. Aquifer thickness (b) for the water table wells was determined to be the length of the water column. The aquifer thickness for the piezometer was calculated to be the thickness of the sand deposits.

Effective well screen length (L) varies depending on the hydraulic contrast between the well filter pack and the formation. If the filter pack and the screened formation are hydraulically similar, then L is equal to the length of the well screen (Bouwer and Rice, 1976, Bouwer, 1989). If the filter pack and the screened formation are hydraulically dissimilar, then L is equal to the length of the filter pack

interval. Although, if the water level intersects the well screen at the time of field testing, L equals the length from the bottom of the well to the water level. All wells assumed the filter pack to be hydraulically dissimilar to the formation being screened, therefore, the effective screen length (L) was the length of the filter pack if the water column extended above the top of the filter pack, or was calculated from the bottom of the well to the water level intersection if the water level was within the screen.

Static height of water in the well (D) is the length from the bottom of the well to the water level.

Application

The wells tested by the Bouwer and Rice method for unconfined and confined aquifers and associated Unified Soil Classification System (USCS) designation, test results and geometric means for each well are included in the attached table.

The underlying assumptions involved with the Bouwer and Rice method include: 1) Drawdown of the water table around the well is negligible; 2) Flow above the water table (capillary fringe) can be ignored; 3) Well losses are negligible; 4) The aquifer is homogeneous and isotropic. Of these assumptions, Nos. 2 and 3 are typically met. Assumption No. 1 is met if the amount of initial drawdown is small. Assumption No. 4 is more difficult to meet since a geologic formation is rarely homogeneous and isotropic. Freeze and Cherry (1979) note that geologic formations are usually heterogeneous and anisotropic, and the K values should be viewed as "best estimates".

Selection of the segment of the data plot of the natural logarithm of displacement/drawdown versus time to be used for the calculation of hydraulic conductivity is based on the fit of a straight line to the data, (Bouwer and Rice, 1976). The straight-line portion of a plot of recovery versus time is the valid data to be used in the analysis. Several of the wells (i.e. TW-9RR, TW-16R, and MW-116) illustrated two straight lines; the first straight-line portion is representative of filter pack dewatering and the second straight line portion is representative of the in-situ deposits near the well screen interval.

RESULTS

The estmated hydraulic conductivity values are listed in the attached table. The stratigraphy in the seven wells tested consisted mainly of silty clays, silty sands, gravels and sands. The hydraulic conductivities range from 4.1×10^{-4} cm/s to 8.0×10^{-1} cm/s. Representative values from literature (Freeze and Cherry, 1979; Domenico and Schwartz, 1990) of hydraulic conductivities for sands are 2.0×10^{-5} cm/s to 1.0×10^{2} cm/s and silty sands are 1.0×10^{-5} cm/s to 1.0×10^{-1} cm/s. Literature values for silty clays were not found. The geometric mean (calculated using the geometric mean of each of the six individual wells tested) for the water table wells (MW and TW series) is 2.1×10^{-2} cm/sec. The geometric mean (based on six tests on a single well) for the piezometer (P series) is 3.0×10^{-1} cm/sec.

The calculated hydraulic conductivity values for the corresponding lithologies are within the literature range of values and are representative of the hydrostatigraphic units beneath the site.

REFERENCES

Bouwer, H., and Rice, 1976. A slug Test Method for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells. Water Resources Research, 12:3, pp. 423-428.

Bouwer, H., 1989. The Bouwer and Rice Slug Test - An update, Groundwater, V. 27, No. 3, pp. 304-309.

Domenico and Schwartz, 1990. Physical and Chemical Hydrogeology. John Wiley and Sons, New York.

Freeze and Cherry, 1979. Groundwater. Prentice Hall, Englewood Cliffs, New Jersey.

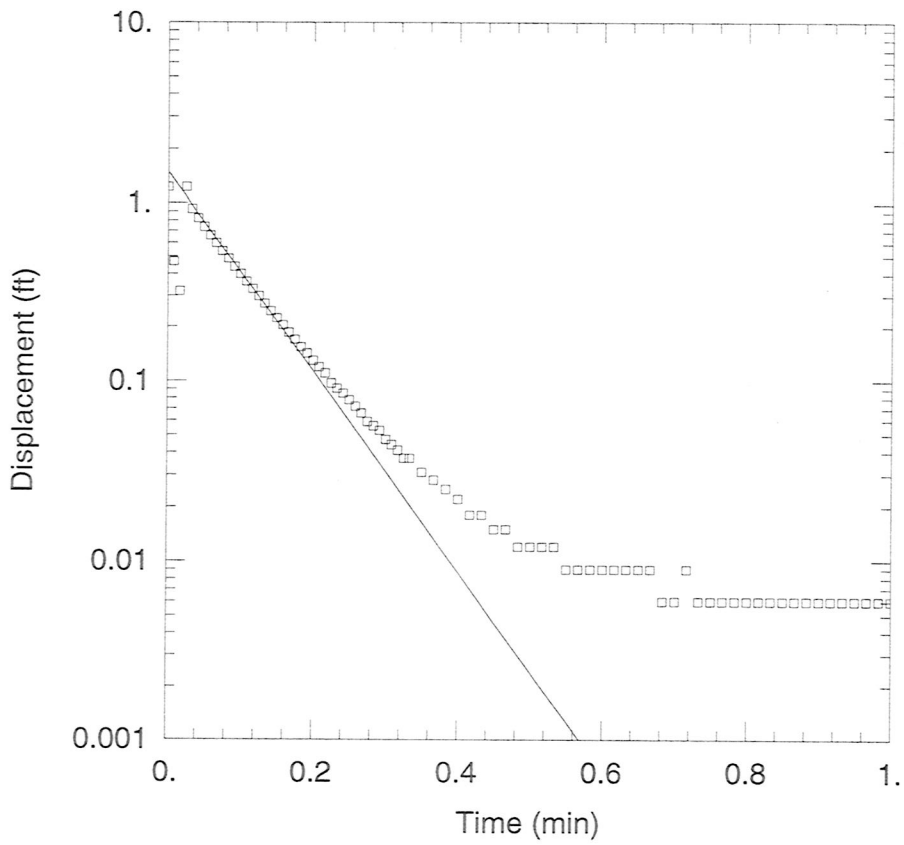
HYDROSOLVE, 1996. AQTESOLV, Reston, Virginia.

Boundary Road RDF
Menomonee Falls, Wisconsin

In-situ Hydraulic Conductivity Analysis

Well Name	USCS	Geometric Mean	# of Tests	Rising Test 1	Rising Test 2	Rising Test 3	Falling Test 1	Falling Test 2	Falling Test 3
Water table wells		2.06E-02							
TW-8R	SM	8.10E-02	3	8.546E-02	8.460E-02	7.345E-02			
TW-9RR	SM	3.95E-02	3	4.137E-02	3.761E-02	3.954E-02			
TW-16R	GW, CL	4.81E-02	3	5.043E-02	4.772E-02	4.625E-02			
TW-24R	SM, ML, CL	1.66E-03	1	1.664E-03					
MW-116	GM, GW, CL	7.15E-01	3	8.058E-01	6.544E-01	6.918E-01			
MW-117	ML	4.14E-04	1	4.136E-04					
Piezometer		2.99E-01							
P-107	SW,SM	2.99E-01	6	2.132E-01	1.97E-01	2.131E-01	4.923E-01	5.250E-01	3.081E-01

Notes:
All results in cm/sec.
Results are from data collected 3/2000.



TW-8R RISING HEAD TEST #1

Data Set: L:\WORK\boundr01\eng\Slug Test\Tw8r-r1.aqt
Date: 06/07/00 Time: 08:18:51

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: TW-8R
Test Date: 3/23/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.08546 cm/sec
y0 = 1.475 ft

AQUIFER DATA

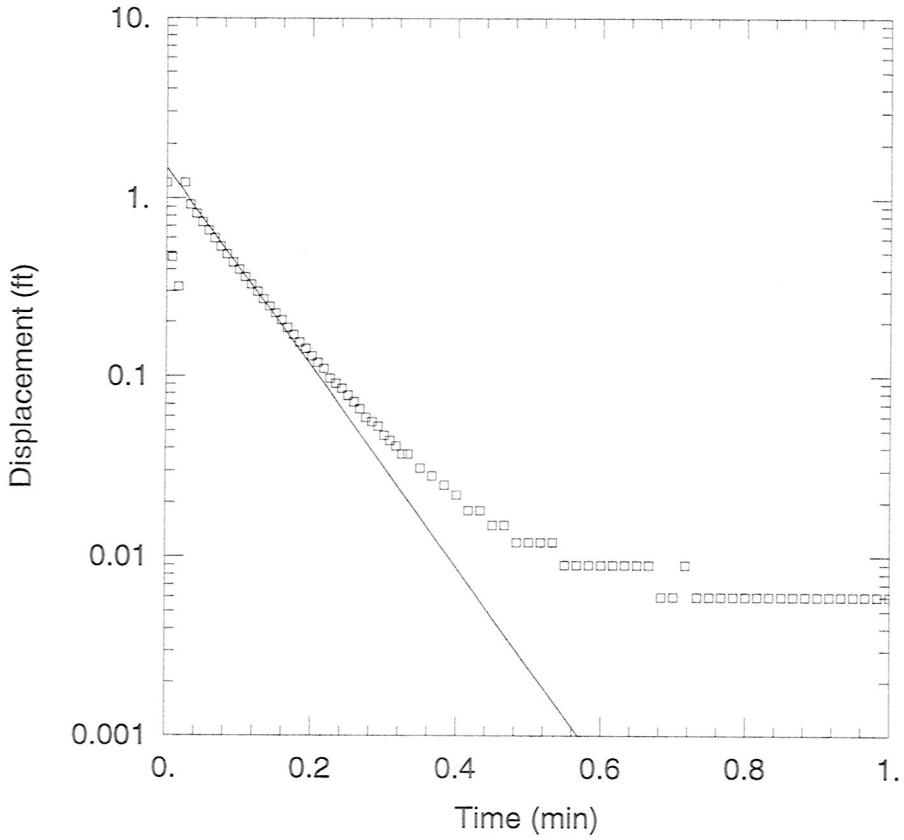
Saturated Thickness: 10.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (TW-8R)

Initial Displacement: 1.218 ft
Casing Radius: 0.0833 ft
Screen Length: 10.8 ft

Water Column Height: 10.95 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



TW-8R RISING HEAD TEST #2

Data Set: L:\WORK\boundr01\eng\Slug Test\Tw8r-r2.aqt
Date: 06/07/00 Time: 08:21:30

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: TW-8R
Test Date: 3/23/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.08546 cm/sec
y0 = 1.475 ft

AQUIFER DATA

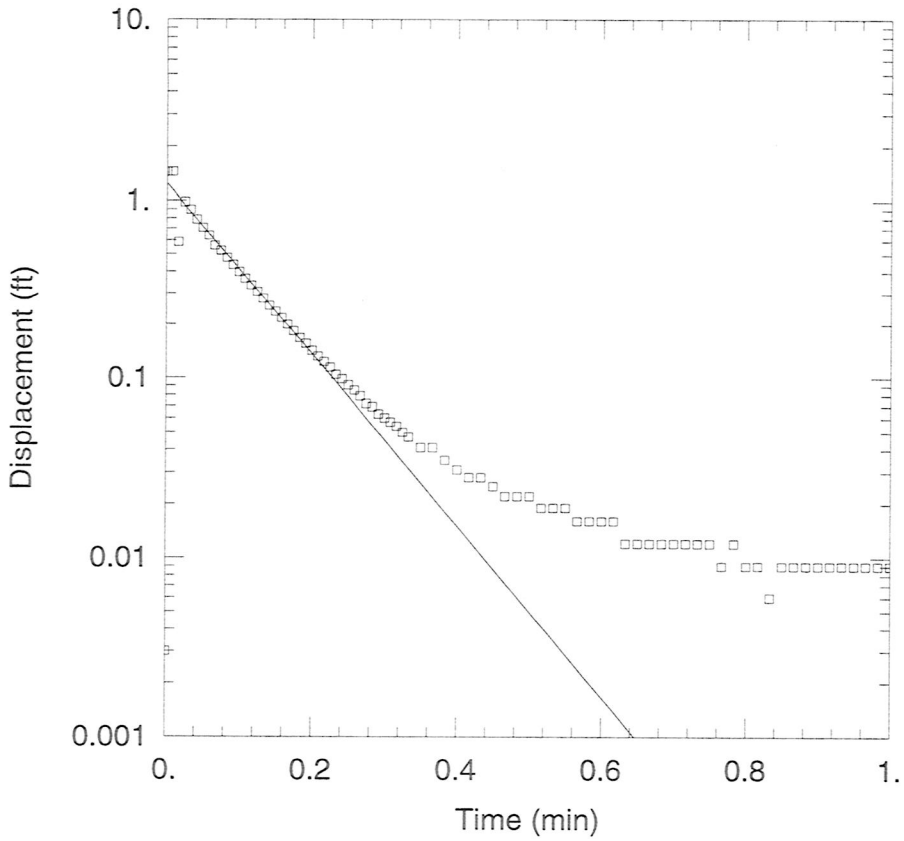
Saturated Thickness: 10.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (TW-8R)

Initial Displacement: 1.218 ft
Casing Radius: 0.0833 ft
Screen Length: 10.8 ft

Water Column Height: 10.95 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



TW-8R RISING HEAD TEST #3

Data Set: L:\WORK\boundr01\eng\Slug Test\Tw8r-r3.aqt
Date: 06/07/00 Time: 08:20:00

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: TW-8R
Test Date: 3/23/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.07345 cm/sec
y0 = 1.24 ft

AQUIFER DATA

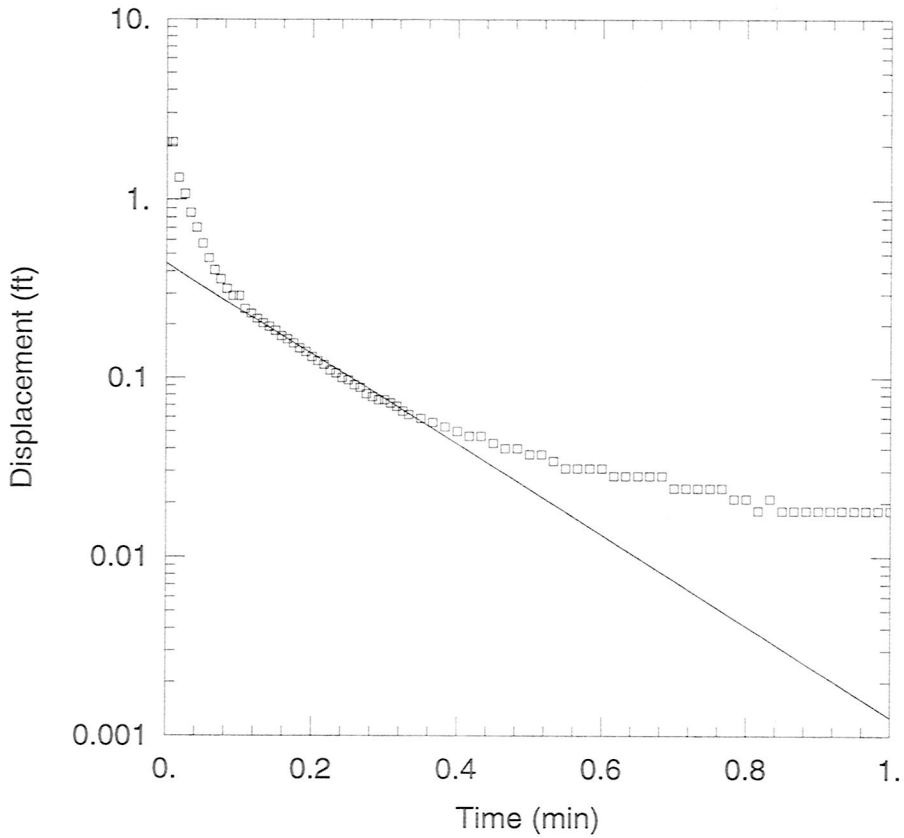
Saturated Thickness: 10.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (TW-8R)

Initial Displacement: 1.436 ft
Casing Radius: 0.0833 ft
Screen Length: 10.8 ft

Water Column Height: 10.95 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



TW-9RR RISING HEAD TEST #1

Data Set: L:\WORK\boundr01\eng\Slug Test\Tw9rr-r1.aqt
Date: 06/20/00 Time: 08:04:22

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: TW-9RR
Test Date: 3/23/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.04137 cm/sec
y0 = 0.4421 ft

AQUIFER DATA

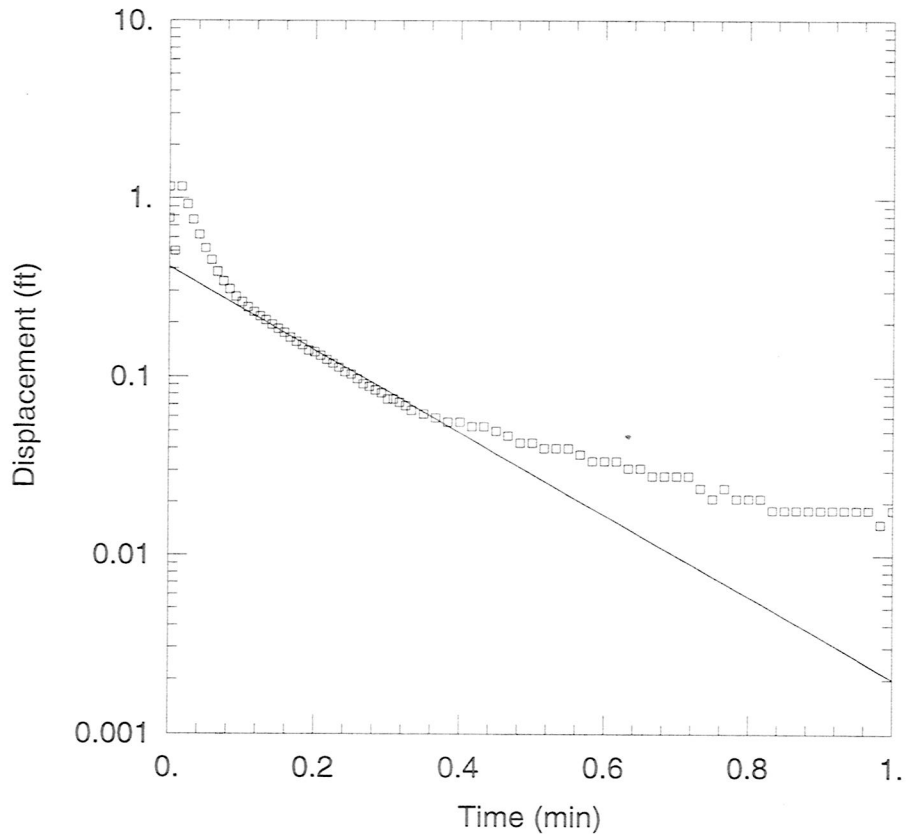
Saturated Thickness: 9.67 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (TW-9RR)

Initial Displacement: 2.065 ft
Casing Radius: 0.0833 ft
Screen Length: 9.67 ft

Water Column Height: 9.67 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



TW-9RR RISING HEAD TEST #2

Data Set: L:\WORK\boundr01\eng\Slug Test\Tw9rr-r2.aqt
Date: 06/20/00 Time: 08:05:05

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: TW-9RR
Test Date: 3/23/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.03761 cm/sec
y0 = 0.4097 ft

AQUIFER DATA

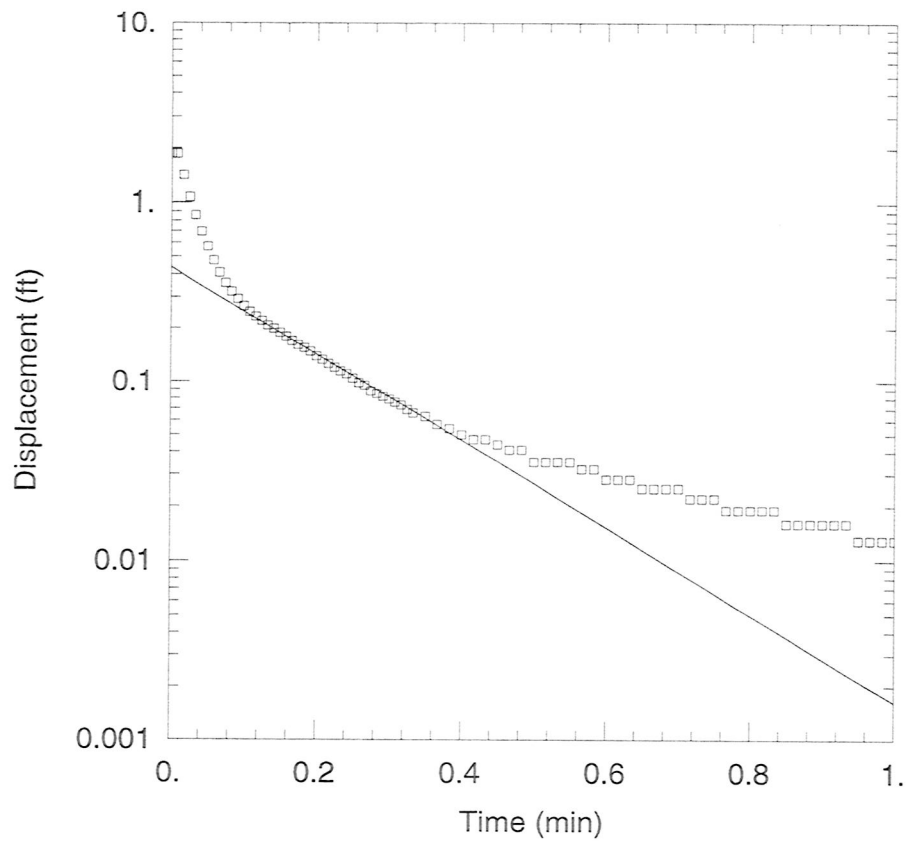
Saturated Thickness: 9.67 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (TW-9RR)

Initial Displacement: 1.148 ft
Casing Radius: 0.0833 ft
Screen Length: 9.67 ft

Water Column Height: 9.67 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



TW-9RR RISING HEAD TEST #3

Data Set: L:\WORK\boundr01\eng\Slug Test\Tw9rr-r3.aqt
Date: 06/20/00 Time: 08:05:30

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: TW-9RR
Test Date: 3/23/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.03954 cm/sec
y0 = 0.4367 ft

AQUIFER DATA

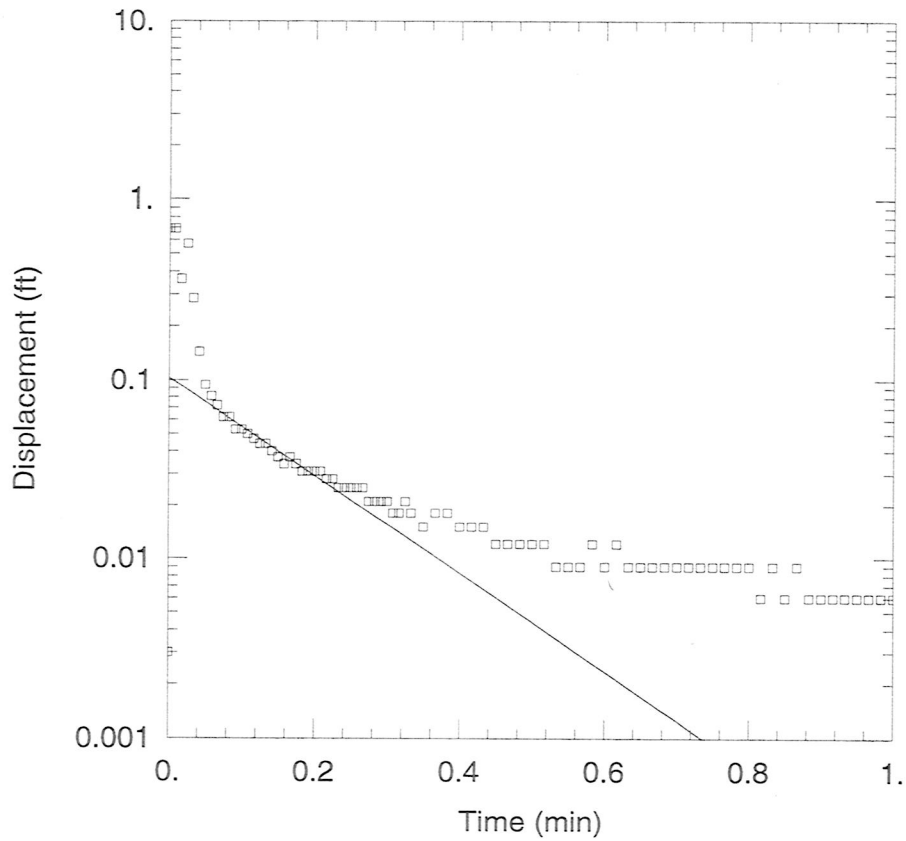
Saturated Thickness: 9.67 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (TW-9RR)

Initial Displacement: 1.864 ft
Casing Radius: 0.0833 ft
Screen Length: 9.67 ft

Water Column Height: 9.67 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



TW-16R RISING HEAD TEST #1

Data Set: L:\WORK\boundr01\eng\Slug Test\Tw16r-r1.aqt
Date: 06/07/00 Time: 08:13:06

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: TW-16R
Test Date: 3/23/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.05043 cm/sec
y0 = 0.1033 ft

AQUIFER DATA

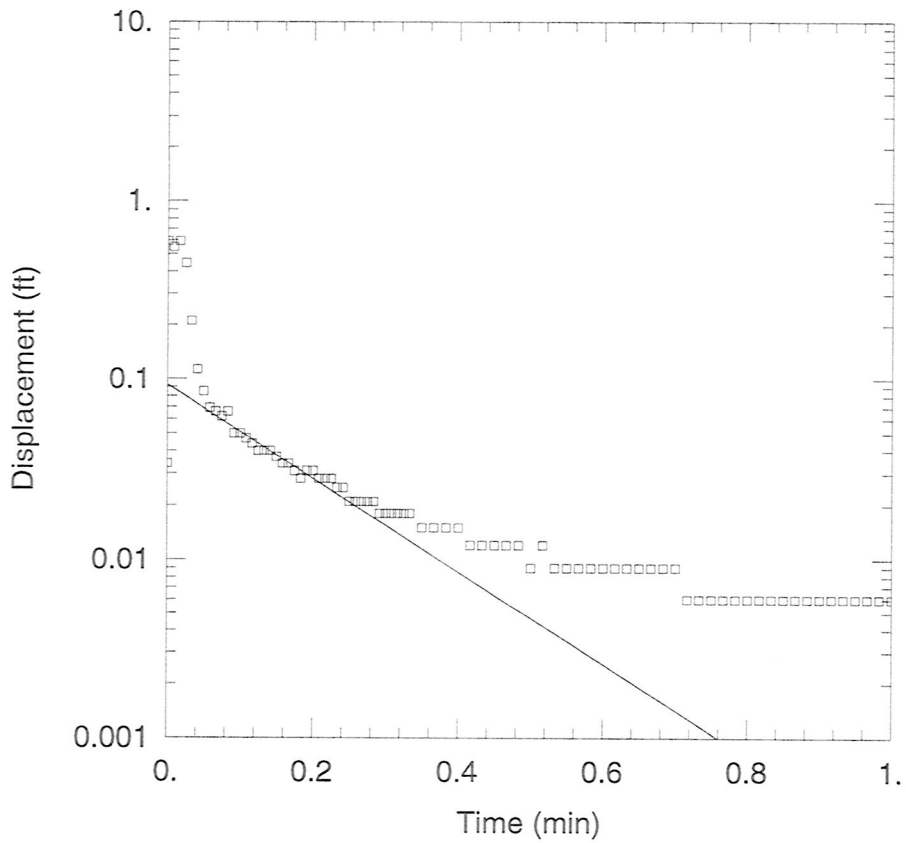
Saturated Thickness: 7.77 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (TW-16R)

Initial Displacement: 0.693 ft
Casing Radius: 0.0833 ft
Screen Length: 7.77 ft

Water Column Height: 7.77 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



TW-16R RISING HEAD TEST #2

Data Set: L:\WORK\boundr01\eng\Slug Test\Tw16r-r2.aqt
Date: 06/07/00 Time: 08:12:21

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: TW-16R
Test Date: 3/23/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.04772 cm/sec
y0 = 0.09271 ft

AQUIFER DATA

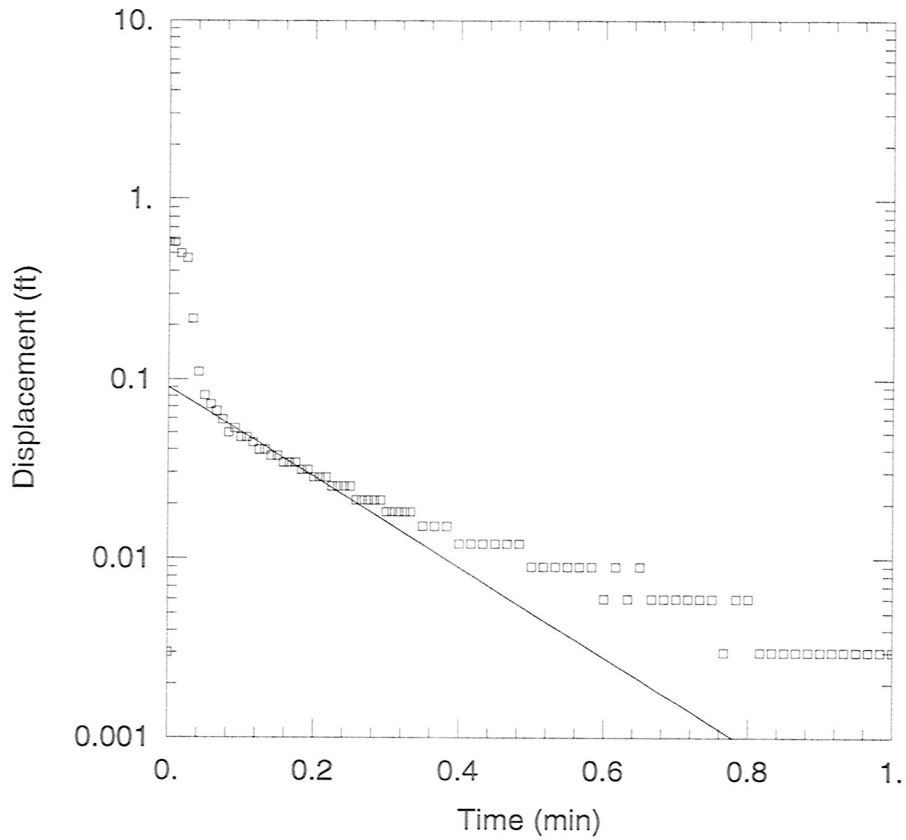
Saturated Thickness: 7.77 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (TW-16R)

Initial Displacement: 0.592 ft
Casing Radius: 0.0833 ft
Screen Length: 7.77 ft

Water Column Height: 7.77 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



TW-16R RISING HEAD TEST #3

Data Set: L:\WORK\boundr01\eng\Slug Test\Tw16r-r3.aqt
Date: 06/07/00 Time: 08:14:12

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: TW-16R
Test Date: 3/23/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.04625 cm/sec
y0 = 0.0902 ft

AQUIFER DATA

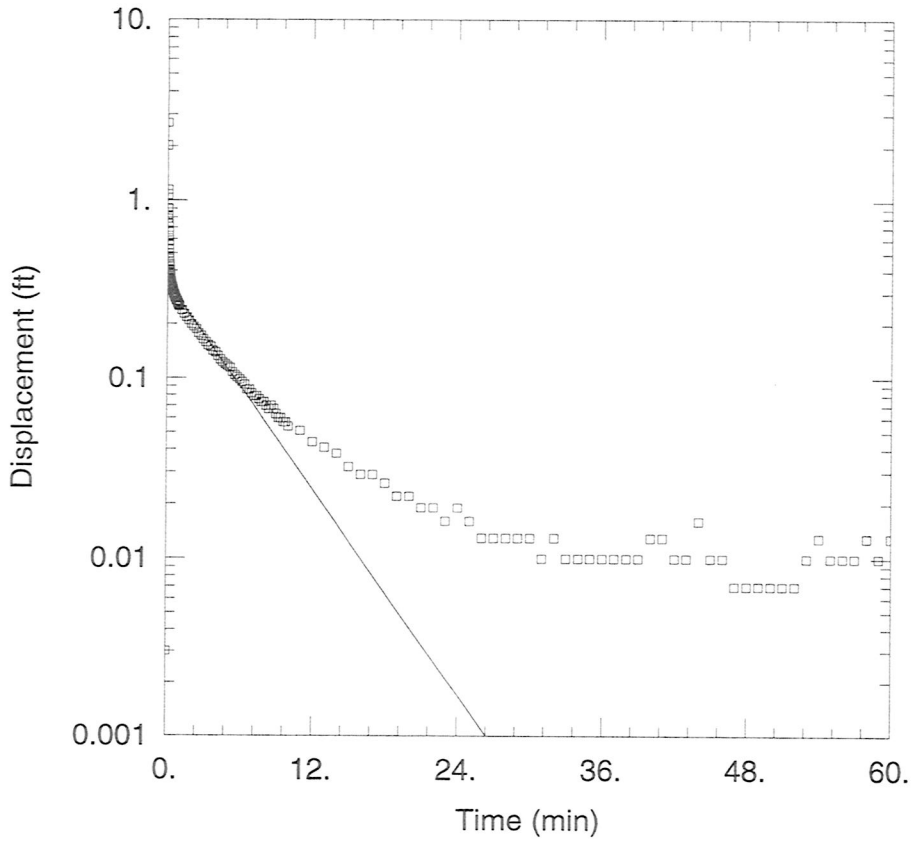
Saturated Thickness: 7.77 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (TW-16R)

Initial Displacement: 0.58 ft
Casing Radius: 0.0833 ft
Screen Length: 7.77 ft

Water Column Height: 7.77 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



TW-24R RISING HEAD TEST #1

Data Set: L:\WORK\boundr01\eng\Slug Test\Tw24r-r1.aqt
Date: 06/07/00 Time: 08:17:57

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: TW-24R
Test Date: 3/23/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.001664 cm/sec
y0 = 0.3423 ft

AQUIFER DATA

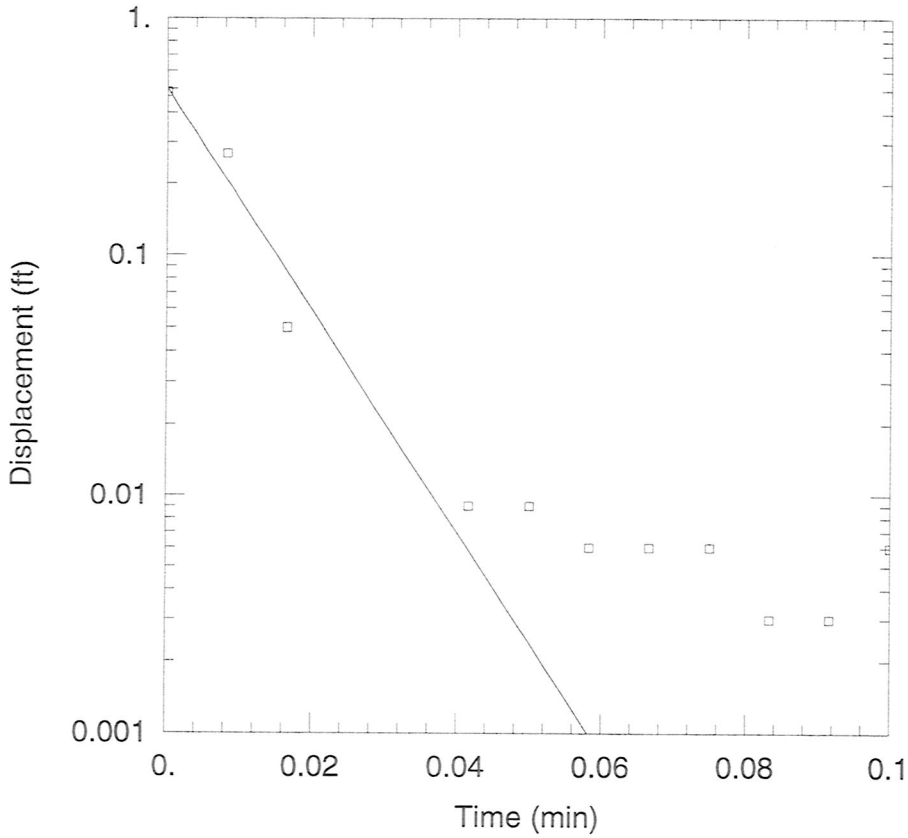
Saturated Thickness: 8.64 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (TW-24R)

Initial Displacement: 2.673 ft
Casing Radius: 0.0833 ft
Screen Length: 8.64 ft

Water Column Height: 8.64 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



MW-116 RISING HEAD TEST #1

Data Set: L:\WORK\boundr01\eng\Slug Test\Mw116-r1.aqt
Date: 06/07/00 Time: 08:04:01

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: MW-116
Test Date: 3/22/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.8058 cm/sec
y0 = 0.5007 ft

AQUIFER DATA

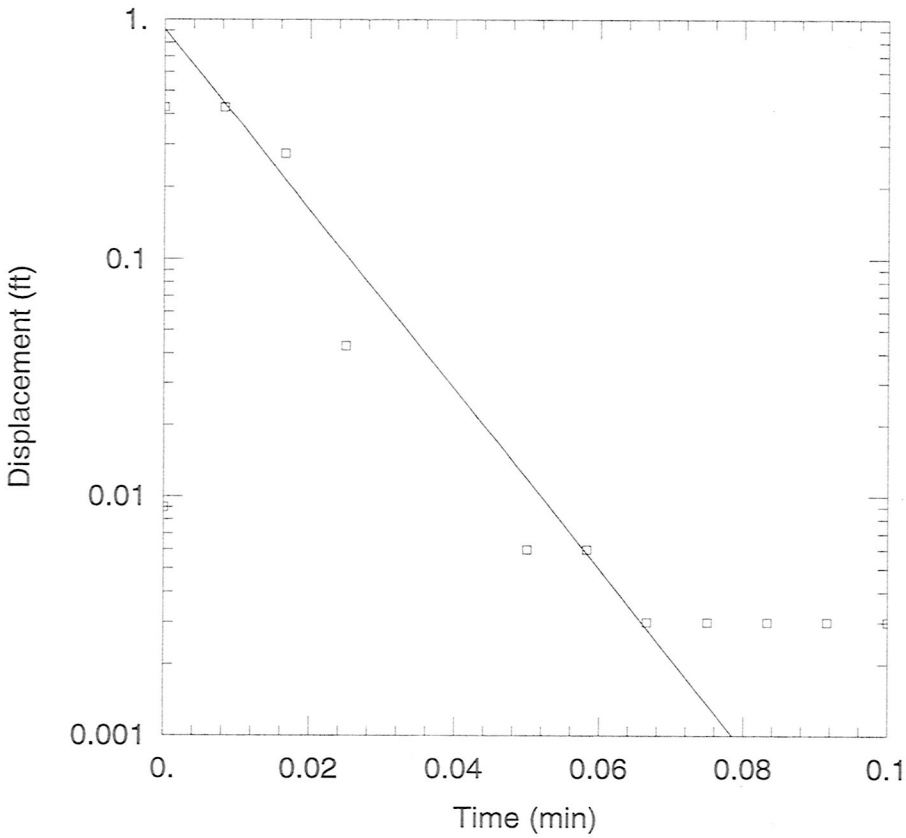
Saturated Thickness: 8.64 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-116)

Initial Displacement: 0.485 ft
Casing Radius: 0.0833 ft
Screen Length: 8.64 ft

Water Column Height: 8.64 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



MW-116 RISING HEAD TEST #2

Data Set: L:\WORK\boundr01\eng\Slug Test\Mw116-r2.aqt
Date: 06/07/00 Time: 08:03:50

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: MW-116
Test Date: 3/22/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.6544 cm/sec
y0 = 0.9107 ft

AQUIFER DATA

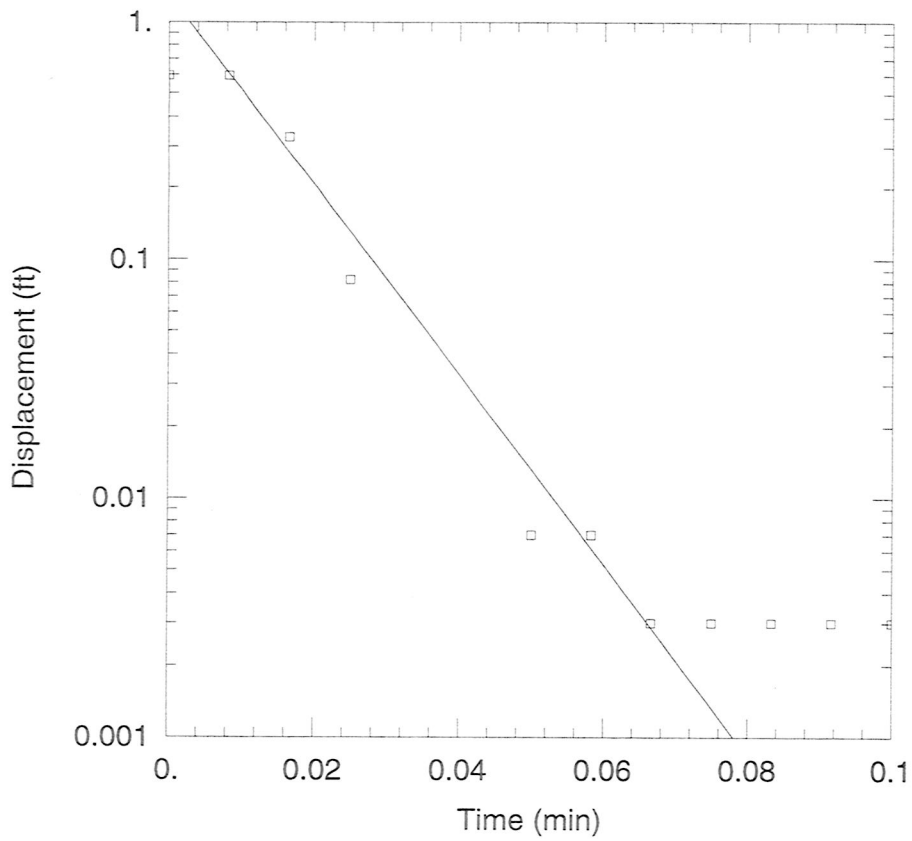
Saturated Thickness: 8.64 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-116)

Initial Displacement: 0.428 ft
Casing Radius: 0.0833 ft
Screen Length: 8.64 ft

Water Column Height: 8.64 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



MW-116 RISING HEAD TEST #3

Data Set: L:\WORK\boundr01\eng\Slug Test\Mw116-r3.aqt
Date: 06/07/00 Time: 08:08:00

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: MW-116
Test Date: 3/22/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.6918 cm/sec
y0 = 1.296 ft

AQUIFER DATA

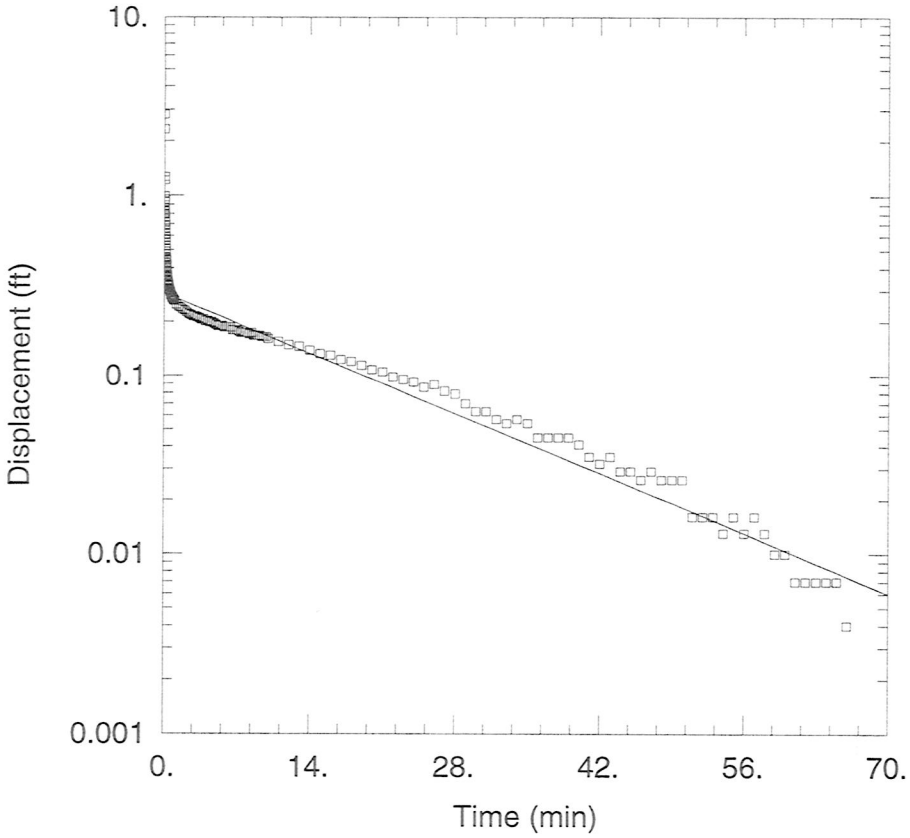
Saturated Thickness: 8.64 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-116)

Initial Displacement: 0.594 ft
Casing Radius: 0.0833 ft
Screen Length: 8.64 ft

Water Column Height: 8.64 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



MW-117 RISING HEAD TEST #1

Data Set: L:\WORK\boundr01\eng\Slug Test\Mw117-r1.aqt
Date: 06/07/00 Time: 08:09:02

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: MW-117
Test Date: 3/22/00

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0004136 cm/sec
y0 = 0.289 ft

AQUIFER DATA

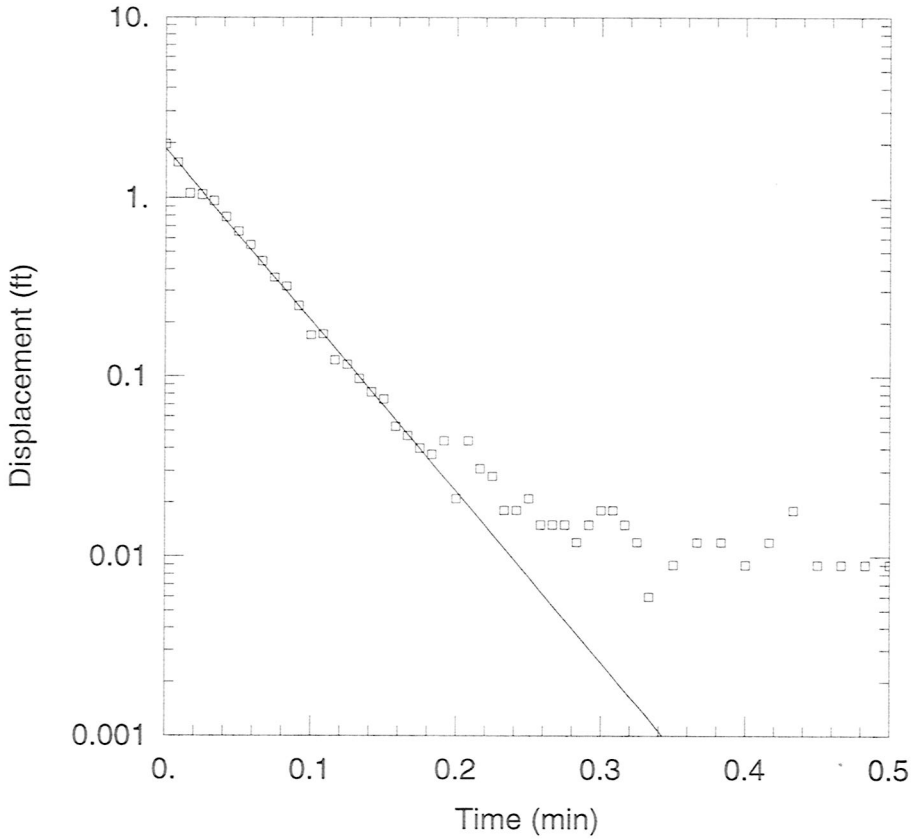
Saturated Thickness: 8.78 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-117)

Initial Displacement: 2.808 ft
Casing Radius: 0.0833 ft
Screen Length: 8.78 ft

Water Column Height: 8.78 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



P-107 RISING HEAD TEST #1

Data Set: L:\WORK\boundr01\eng\Slug Test\P107-r1.aqt
Date: 06/07/00 Time: 07:58:34

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: P-107
Test Date: 3/22/00

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.2132 cm/sec
y0 = 1.862 ft

AQUIFER DATA

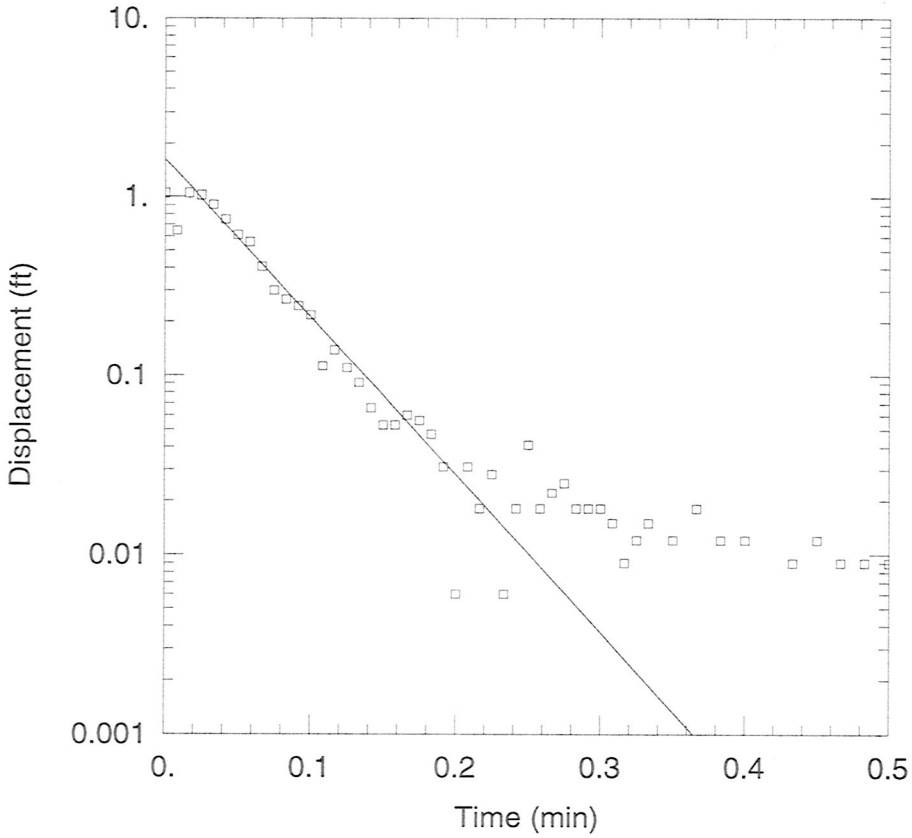
Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P-107)

Initial Displacement: 1.969 ft
Casing Radius: 0.0833 ft
Screen Length: 11. ft

Water Column Height: 72.1 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



P-107 RISING HEAD TEST #2

Data Set: L:\WORK\boundr01\eng\Slug Test\P107-r2.aqt
Date: 06/07/00 Time: 07:59:49

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: P-107
Test Date: 3/22/00

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.197 cm/sec
y0 = 1.621 ft

AQUIFER DATA

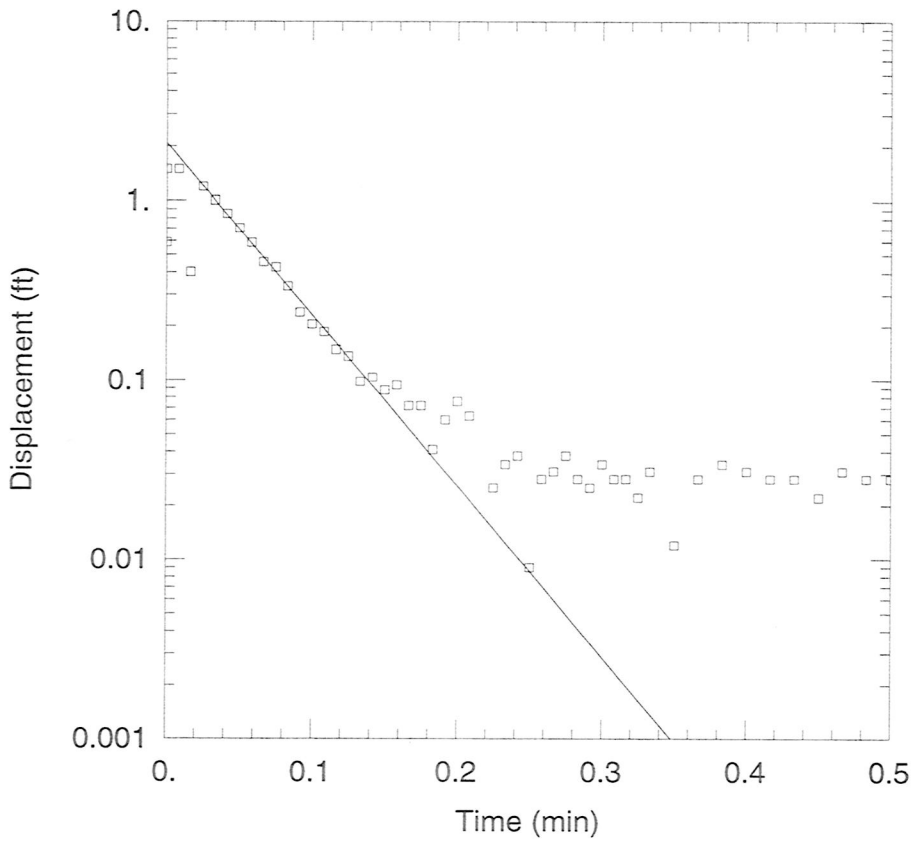
Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P-107)

Initial Displacement: 1.043 ft
Casing Radius: 0.0833 ft
Screen Length: 11. ft

Water Column Height: 72.1 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



P-107 RISING HEAD TEST #3

Data Set: L:\WORK\boundr01\eng\Slug Test\P107-r3.aqt
Date: 06/07/00 Time: 07:59:59

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: P-107
Test Date: 3/22/00

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.2131 cm/sec
y0 = 2.08 ft

AQUIFER DATA

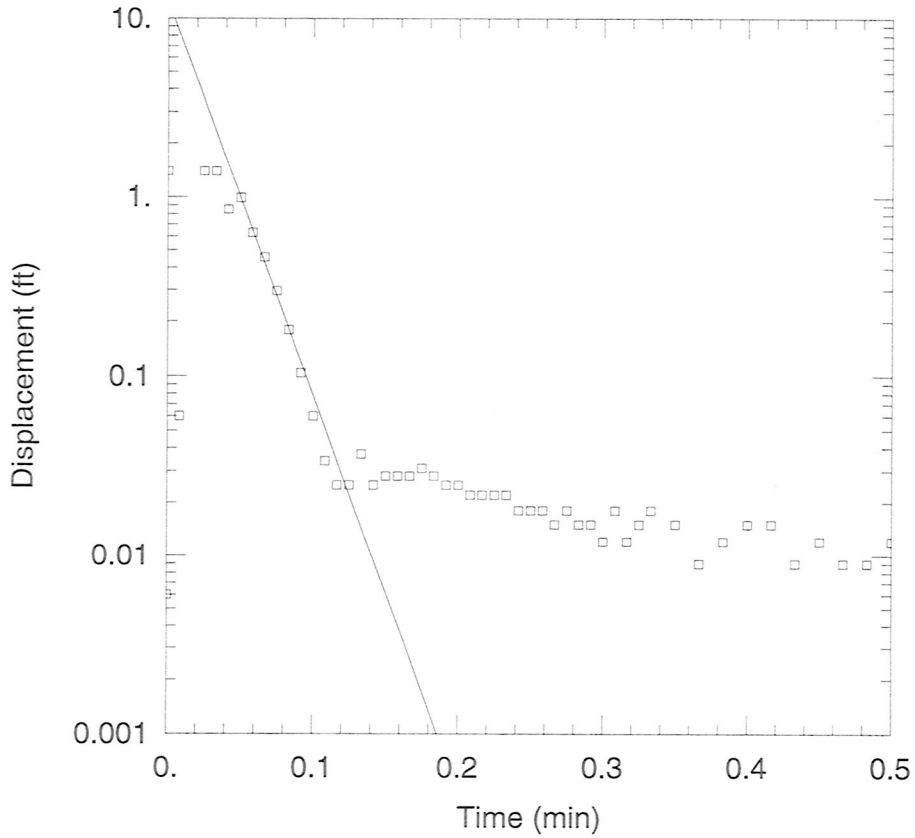
Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P-107)

Initial Displacement: 1.495 ft
Casing Radius: 0.0833 ft
Screen Length: 11. ft

Water Column Height: 72.1 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



P-107 FALLING HEAD TEST #1

Data Set: L:\WORK\boundr01\eng\Slug Test\P107-f1.aqt
Date: 06/07/00 Time: 07:58:52

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: P-107
Test Date: 3/22/00

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.4923 cm/sec
y0 = 12.5 ft

AQUIFER DATA

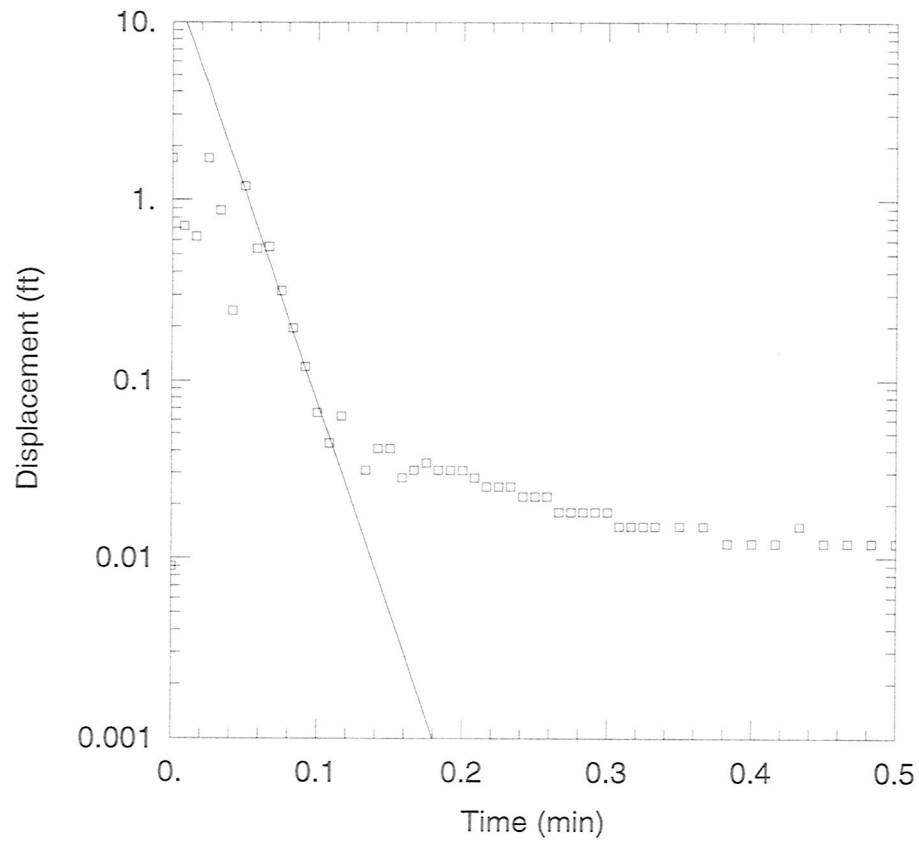
Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P-107)

Initial Displacement: 1.391 ft
Casing Radius: 0.0833 ft
Screen Length: 11. ft

Water Column Height: 72.1 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



P-107 FALLING HEAD TEST #2

Data Set: L:\WORK\boundr01\eng\Slug Test\P107-f2.aqt
Date: 06/07/00 Time: 07:59:13

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: P-107
Test Date: 3/22/00

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.525 cm/sec
y0 = 16.77 ft

AQUIFER DATA

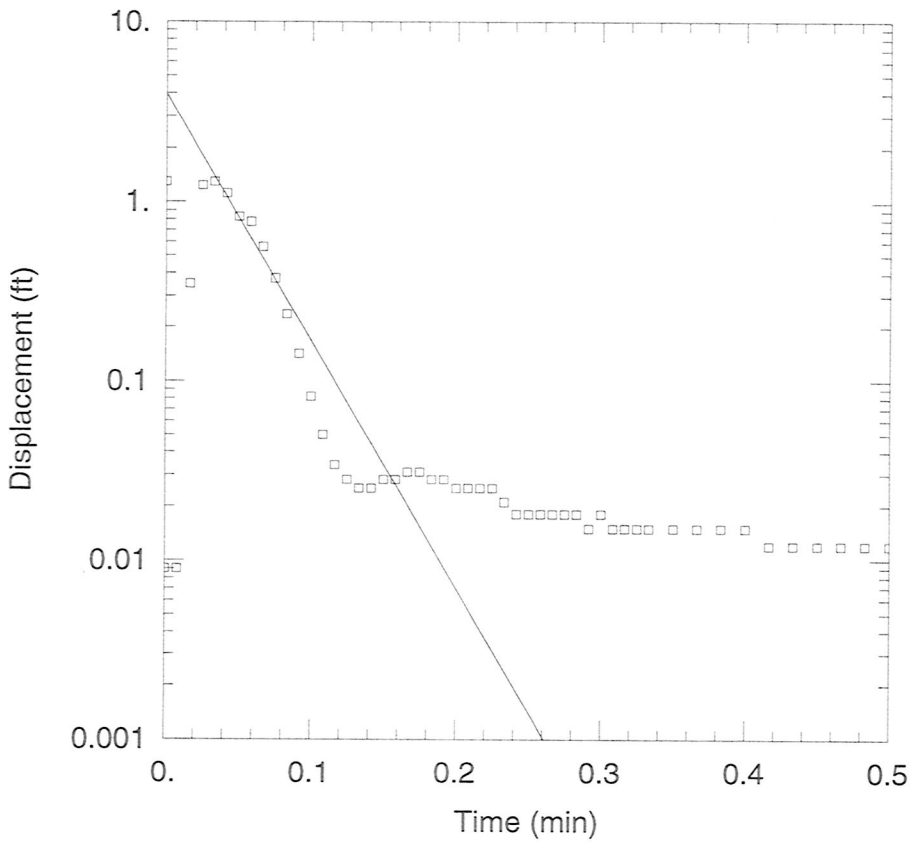
Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P-107)

Initial Displacement: 1.711 ft
Casing Radius: 0.0833 ft
Screen Length: 11. ft

Water Column Height: 72.1 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3



P-107 FALLING HEAD TEST #3

Data Set: L:\WORK\boundr01\eng\Slug Test\P107-f3.aqt
Date: 06/07/00 Time: 08:01:36

PROJECT INFORMATION

Company: Earth Tech, Inc.
Client: Waste Management
Project: 35361
Test Location: Boundary Road Landfill
Test Well: P-107
Test Date: 3/22/00

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.3081 cm/sec
y0 = 3.991 ft

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (P-107)

Initial Displacement: 1.293 ft
Casing Radius: 0.0833 ft
Screen Length: 11. ft

Water Column Height: 72.1 ft
Wellbore Radius: 0.6667 ft
Gravel Pack Porosity: 0.3