

WELL TEST ANALYSIS

Data Set: \\...\CH-MW019 RH2 BR.aqt

Date: 10/16/18

Time: 14:05:34

PROJECT INFORMATION

Company: AECOM

Location: Camp Hero

Test Well: CH-MW018

Test Date: 6/22/2017

AQUIFER DATA

Saturated Thickness: 8.44 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (CH-MW019 RH2)

Initial Displacement: 1.826 ft

Static Water Column Height: 7.44 ft

Total Well Penetration Depth: 7.44 ft

Screen Length: 7.44 ft

Casing Radius: 0.083 ft

Well Radius: 0.25 ft

Gravel Pack Porosity: 0

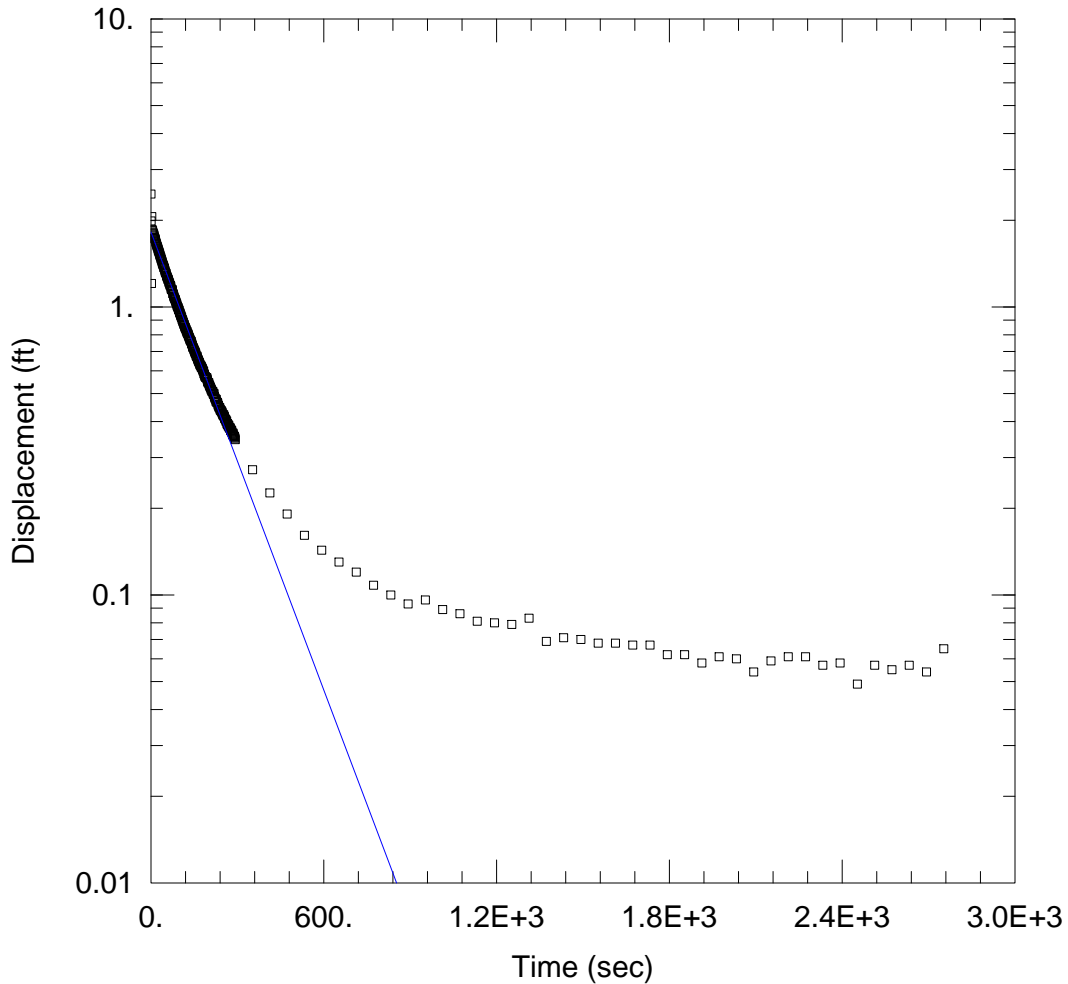
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bower-Rice

K = 0.001454 ft/day

y0 = 0.7606 ft



WELL TEST ANALYSIS

Data Set: C:\...\CH-MW020 FH1 BR.aqt
 Date: 12/07/17

Time: 14:55:01

PROJECT INFORMATION

Company: AECOM
 Location: Camp Hero
 Test Well: CH-MW020
 Test Date:

AQUIFER DATA

Saturated Thickness: 19.13 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (CH-MW020 FH1)

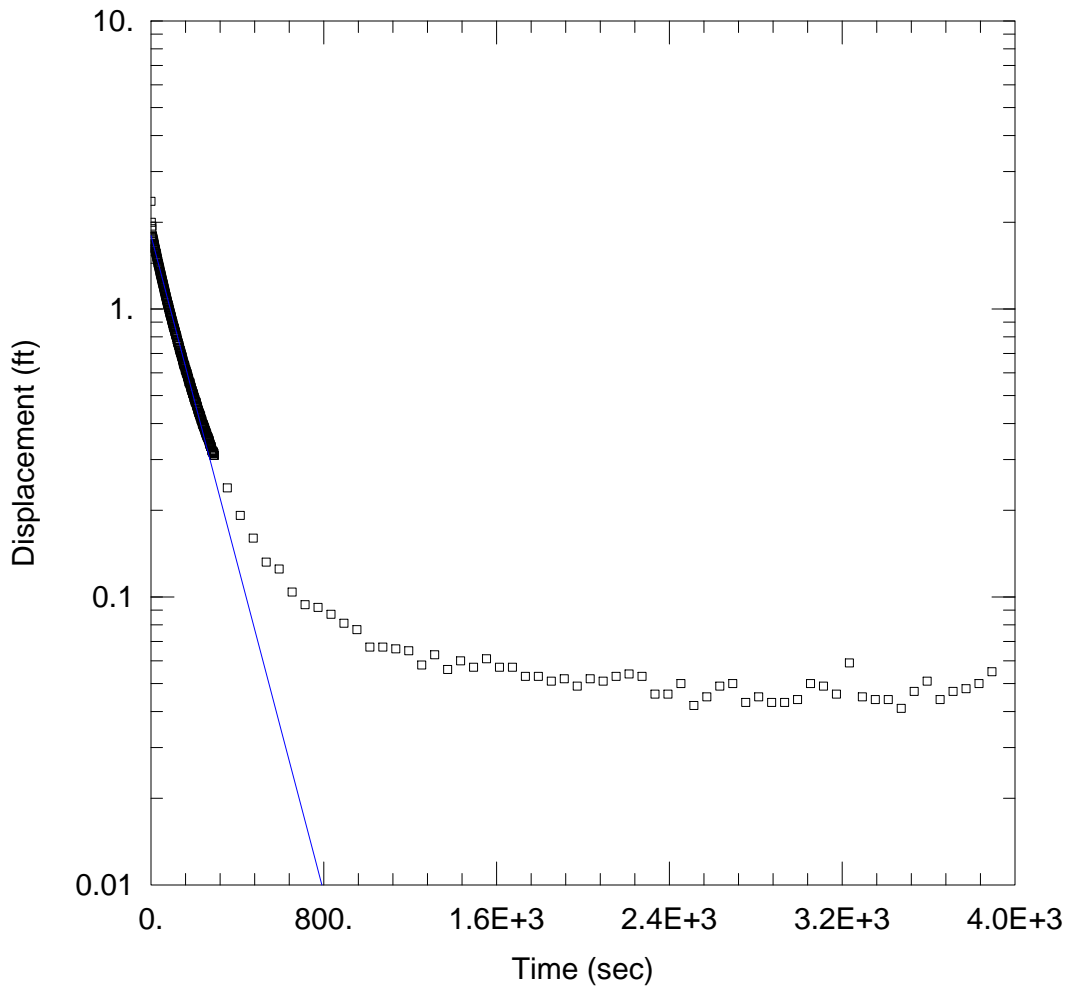
Initial Displacement: 2.466 ft
 Total Well Penetration Depth: 18.13 ft
 Casing Radius: 0.083 ft

Static Water Column Height: 18.13 ft
 Screen Length: 15. ft
 Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
 K = 0.4866 ft/day

Solution Method: Bouwer-Rice
 y0 = 1.819 ft



WELL TEST ANALYSIS

Data Set: C:\...\CH-MW020 FH2 BR.aqt
 Date: 12/07/17

Time: 14:55:11

PROJECT INFORMATION

Company: AECOM
 Location: Camp Hero
 Test Well: CH-MW020
 Test Date:

AQUIFER DATA

Saturated Thickness: 19.13 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (CH-MW020 FH2)

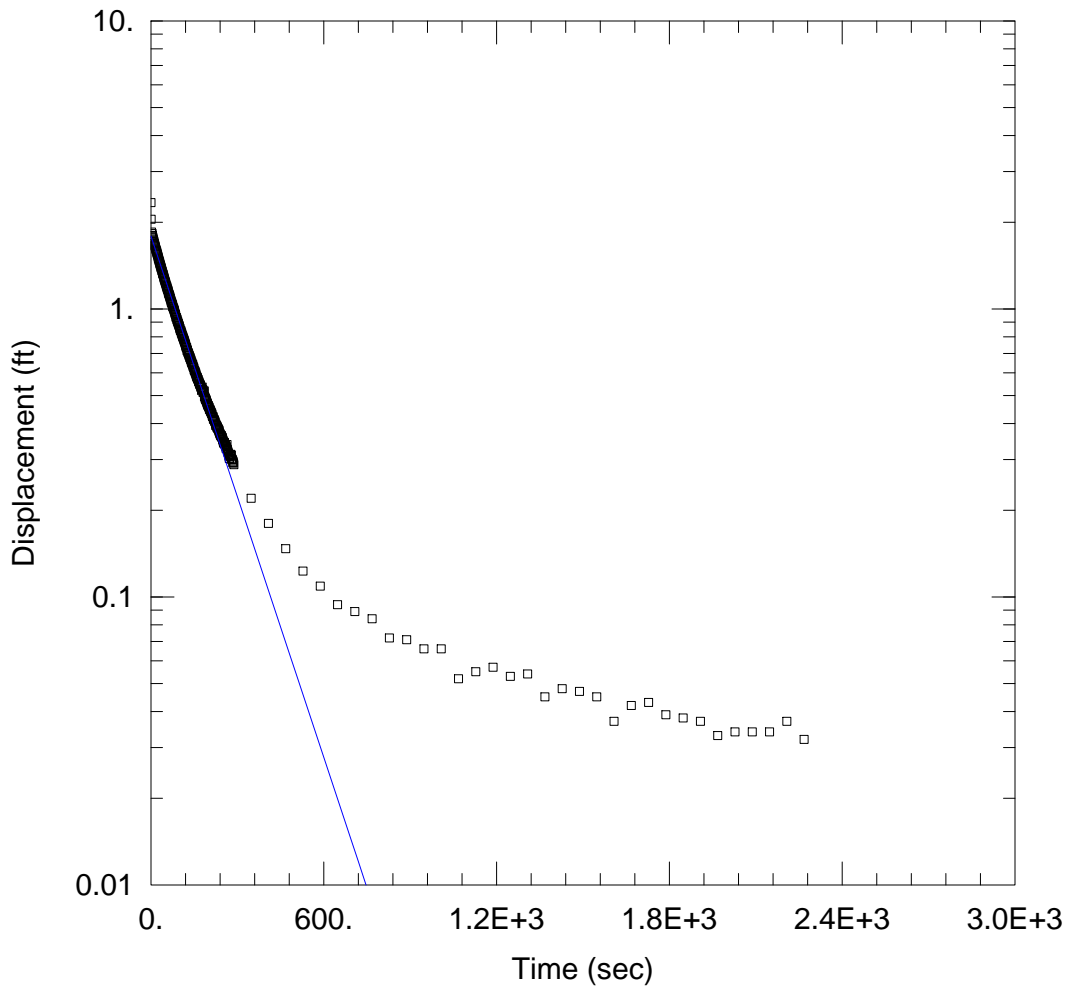
Initial Displacement: 2.363 ft
 Total Well Penetration Depth: 18.13 ft
 Casing Radius: 0.083 ft

Static Water Column Height: 18.13 ft
 Screen Length: 15. ft
 Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
 K = 0.5232 ft/day

Solution Method: Bouwer-Rice
 y0 = 1.797 ft



WELL TEST ANALYSIS

Data Set: C:\...\CH-MW020 FH3 BR.aqt
 Date: 12/07/17

Time: 14:55:22

PROJECT INFORMATION

Company: AECOM
 Location: Camp Hero
 Test Well: CH-MW020
 Test Date:

AQUIFER DATA

Saturated Thickness: 19.13 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (CH-MW020 FH3)

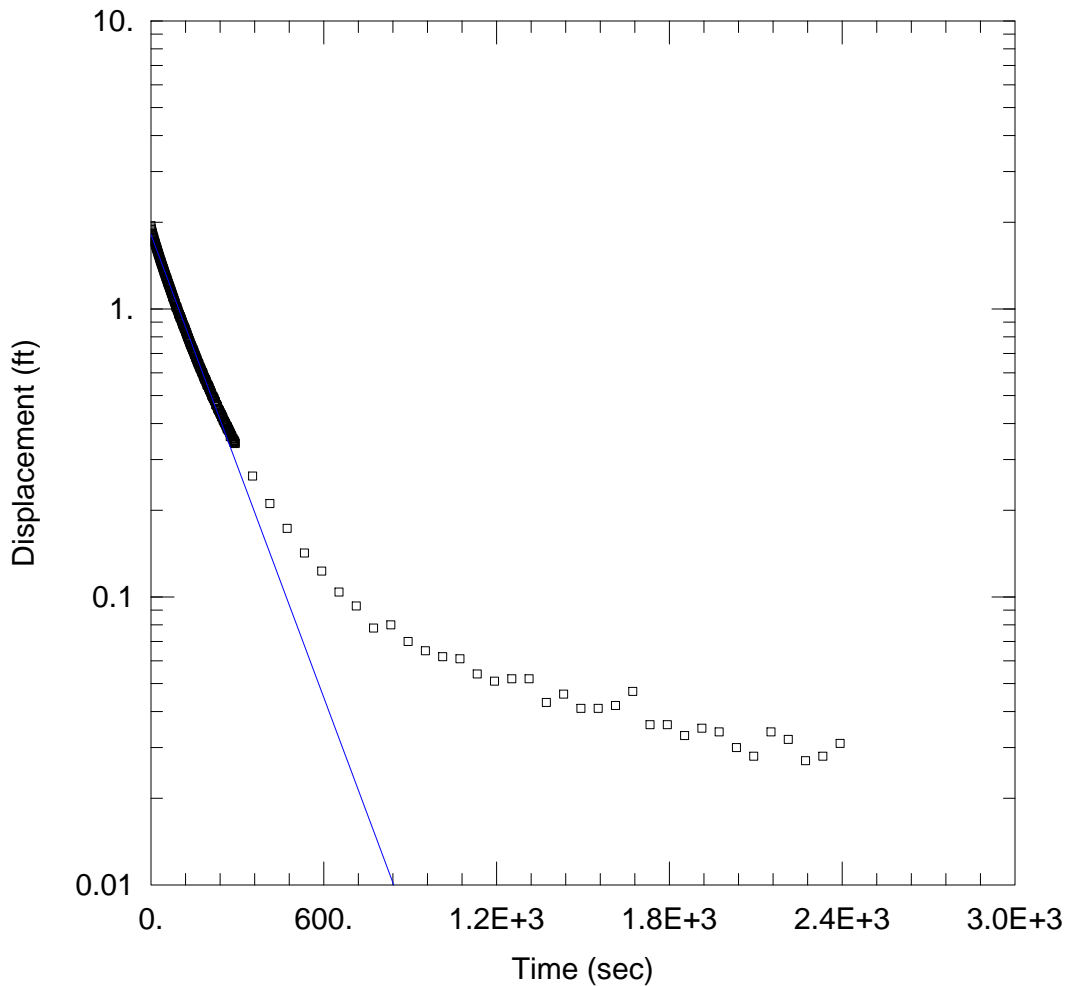
Initial Displacement: 2.339 ft
 Total Well Penetration Depth: 18.13 ft
 Casing Radius: 0.083 ft

Static Water Column Height: 18.13 ft
 Screen Length: 15. ft
 Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
 K = 0.5538 ft/day

Solution Method: Bouwer-Rice
 y0 = 1.789 ft



WELL TEST ANALYSIS

Data Set: C:\...\CH-MW020 RH1 BR.aqt
 Date: 12/07/17

Time: 14:55:35

PROJECT INFORMATION

Company: AECOM
 Location: Camp Hero
 Test Well: CH-MW020
 Test Date:

AQUIFER DATA

Saturated Thickness: 19.13 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (CH-MW020 RH1)

Initial Displacement: 1.946 ft

Static Water Column Height: 18.13 ft

Total Well Penetration Depth: 18.13 ft

Screen Length: 15 ft

Casing Radius: 0.083 ft

Well Radius: 0.25 ft

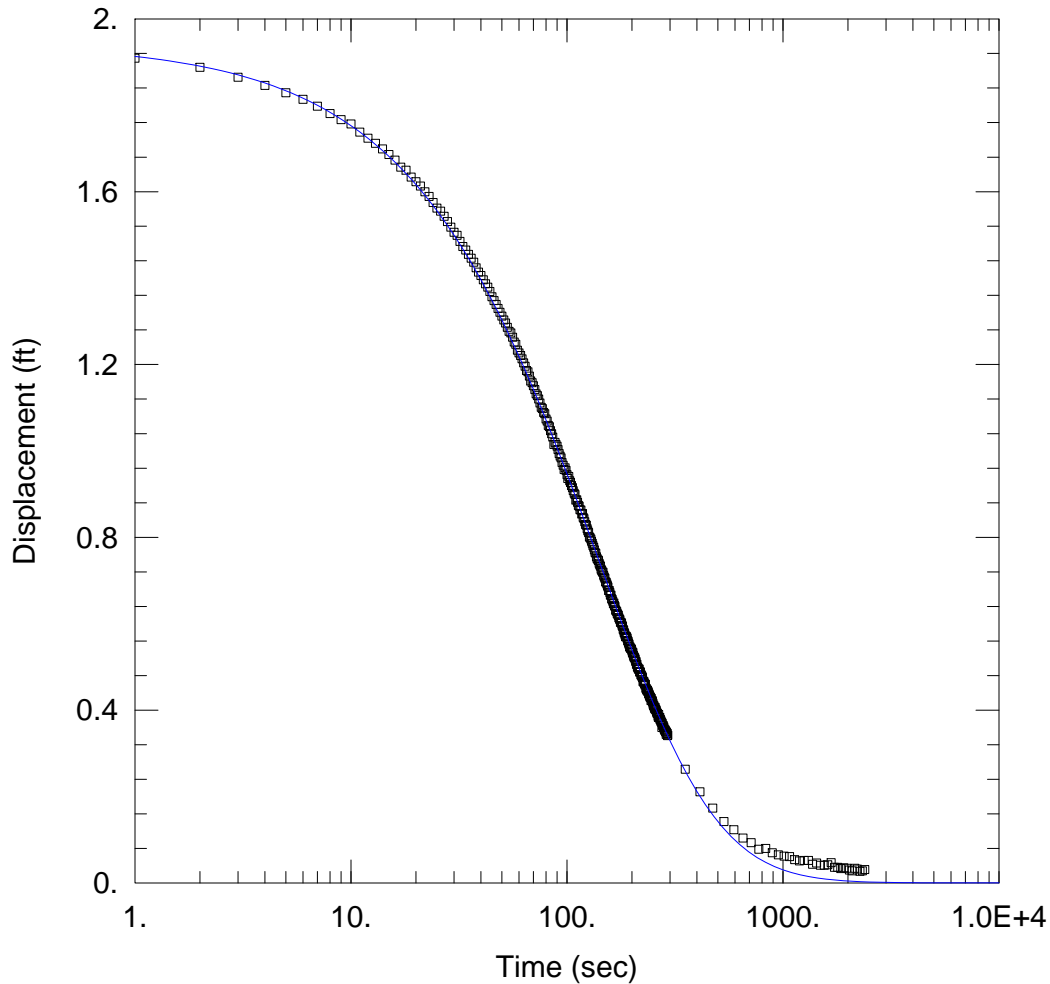
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.492 ft/day

y0 = 1.812 ft



WELL TEST ANALYSIS

Data Set: C:\...\CH-MW020 RH1 KGS.aqt
 Date: 12/07/17

Time: 14:57:05

PROJECT INFORMATION

Company: AECOM
 Location: Camp Hero
 Test Well: CH-MW020
 Test Date:

AQUIFER DATA

Saturated Thickness: 19.13 ft

WELL DATA (CH-MW020 RH1)

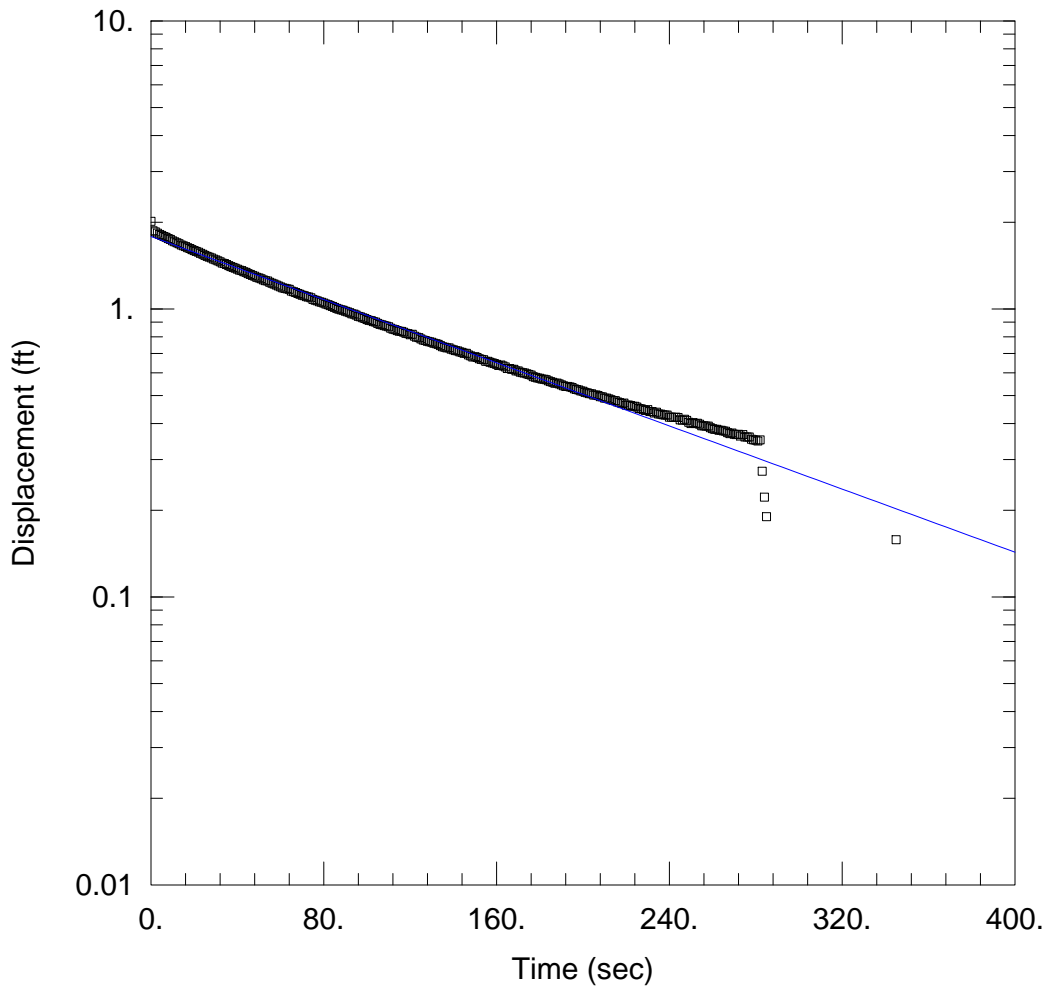
Initial Displacement: 1.946 ft
 Total Well Penetration Depth: 18.13 ft
 Casing Radius: 0.083 ft

Static Water Column Height: 18.13 ft
 Screen Length: 15. ft
 Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
 Kr = 0.54 ft/day
 Kz/Kr = 0.1

Solution Method: KGS Model
 Ss = 5.143E-6 ft⁻¹



WELL TEST ANALYSIS

Data Set: C:\...\CH-MW020 RH2 BR.aqt
 Date: 12/07/17

Time: 14:55:46

PROJECT INFORMATION

Company: AECOM
 Location: Camp Hero
 Test Well: CH-MW020
 Test Date:

AQUIFER DATA

Saturated Thickness: 19.13 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (CH-MW020 RH2)

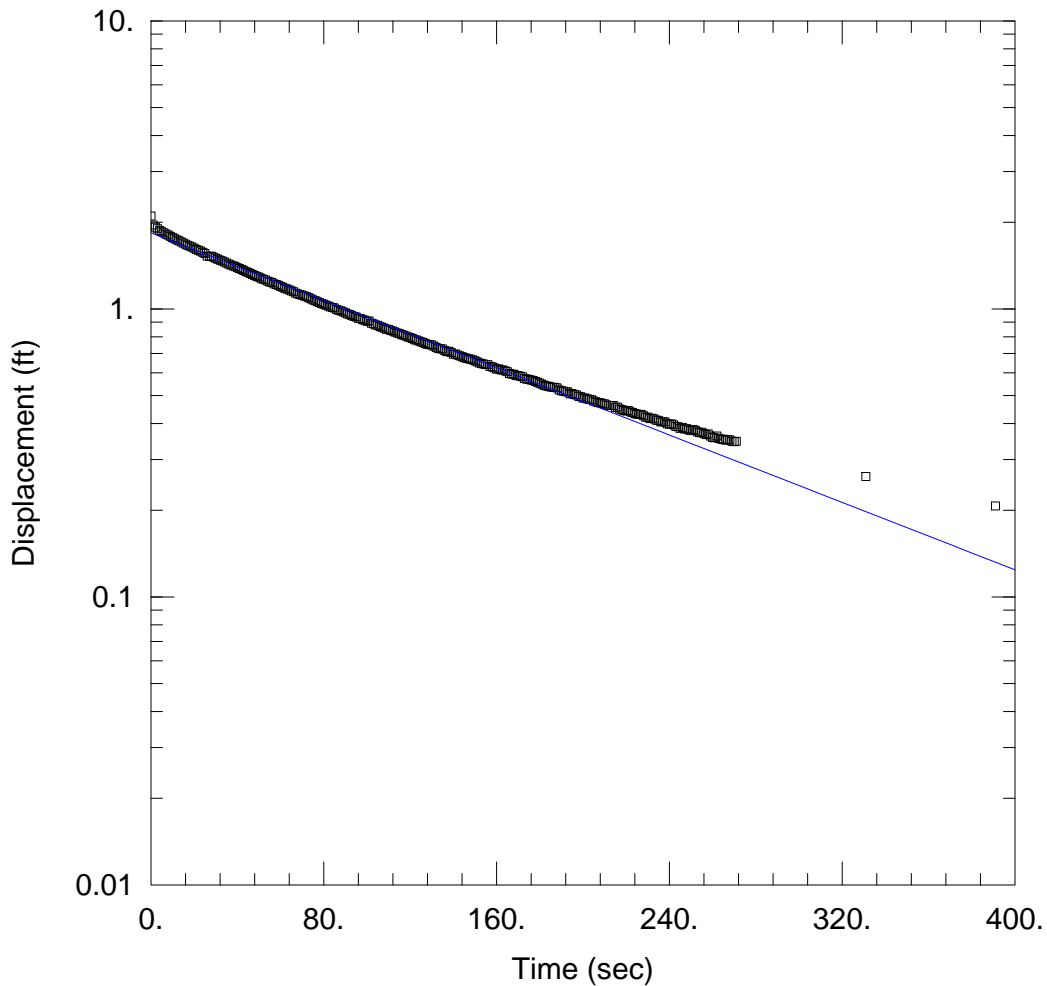
Initial Displacement: 2.015 ft
 Total Well Penetration Depth: 18.13 ft
 Casing Radius: 0.083 ft

Static Water Column Height: 18.13 ft
 Screen Length: 15. ft
 Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
 K = 0.5034 ft/day

Solution Method: Bouwer-Rice
 y0 = 1.785 ft



WELL TEST ANALYSIS

Data Set: C:\...\CH-MW020 RH3 BR.aqt
 Date: 12/07/17

Time: 14:55:58

PROJECT INFORMATION

Company: AECOM
 Location: Camp Hero
 Test Well: CH-MW020
 Test Date:

AQUIFER DATA

Saturated Thickness: 19.13 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (CH-MW020 RH3)

Initial Displacement: 2.101 ft

Static Water Column Height: 18.13 ft

Total Well Penetration Depth: 18.13 ft

Screen Length: 15 ft

Casing Radius: 0.083 ft

Well Radius: 0.25 ft

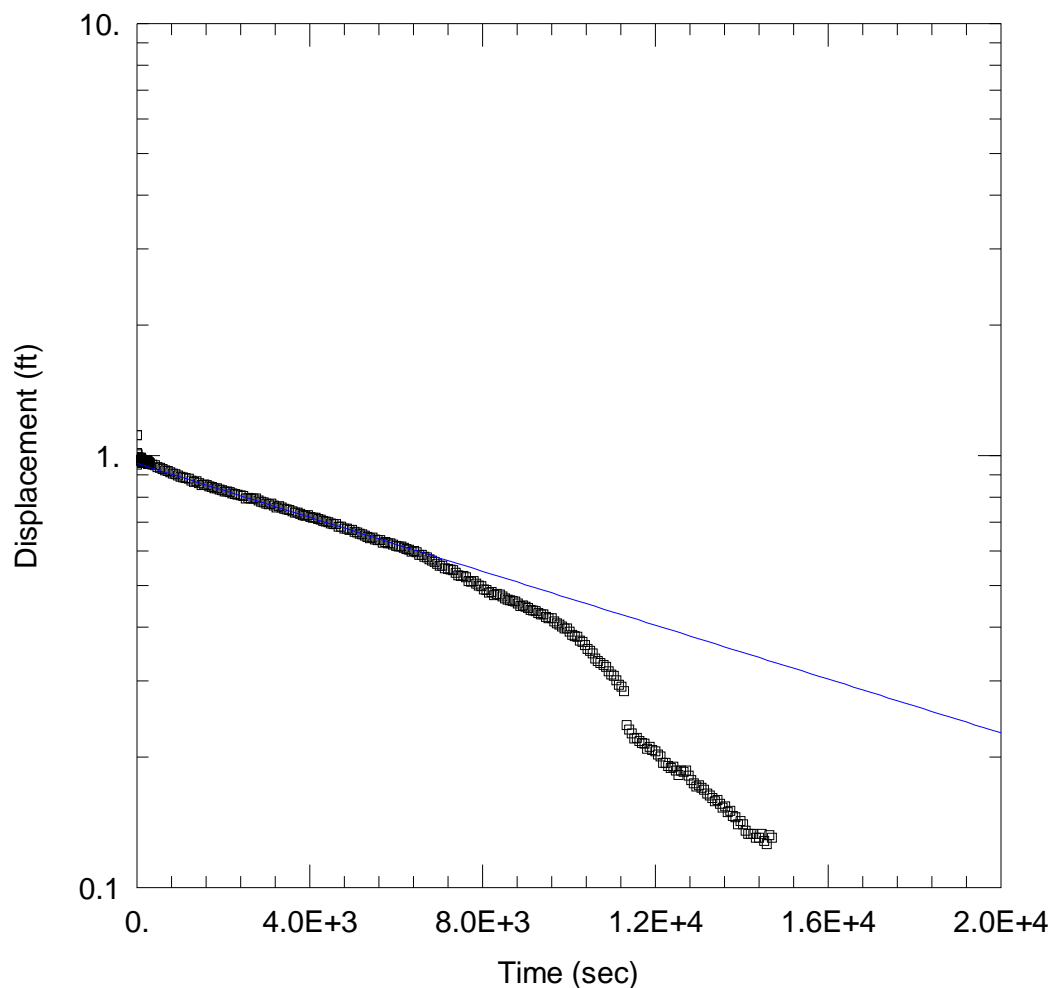
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.5371 ft/day

y0 = 1.837 ft



WELL TEST ANALYSIS

Data Set: \\...\CH-MW021 FH1 BR.aqt

Date: 10/16/18

Time: 14:07:14

PROJECT INFORMATION

Company: AECOM

Location: Camp Hero

Test Well: CH-MW021

Test Date: 6/22/2017

AQUIFER DATA

Saturated Thickness: 7.74 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (CH-MW021 RH1)

Initial Displacement: 1.113 ft

Static Water Column Height: 6.74 ft

Total Well Penetration Depth: 6.74 ft

Screen Length: 6.74 ft

Casing Radius: 0.083 ft

Well Radius: 0.25 ft

Gravel Pack Porosity: 0.

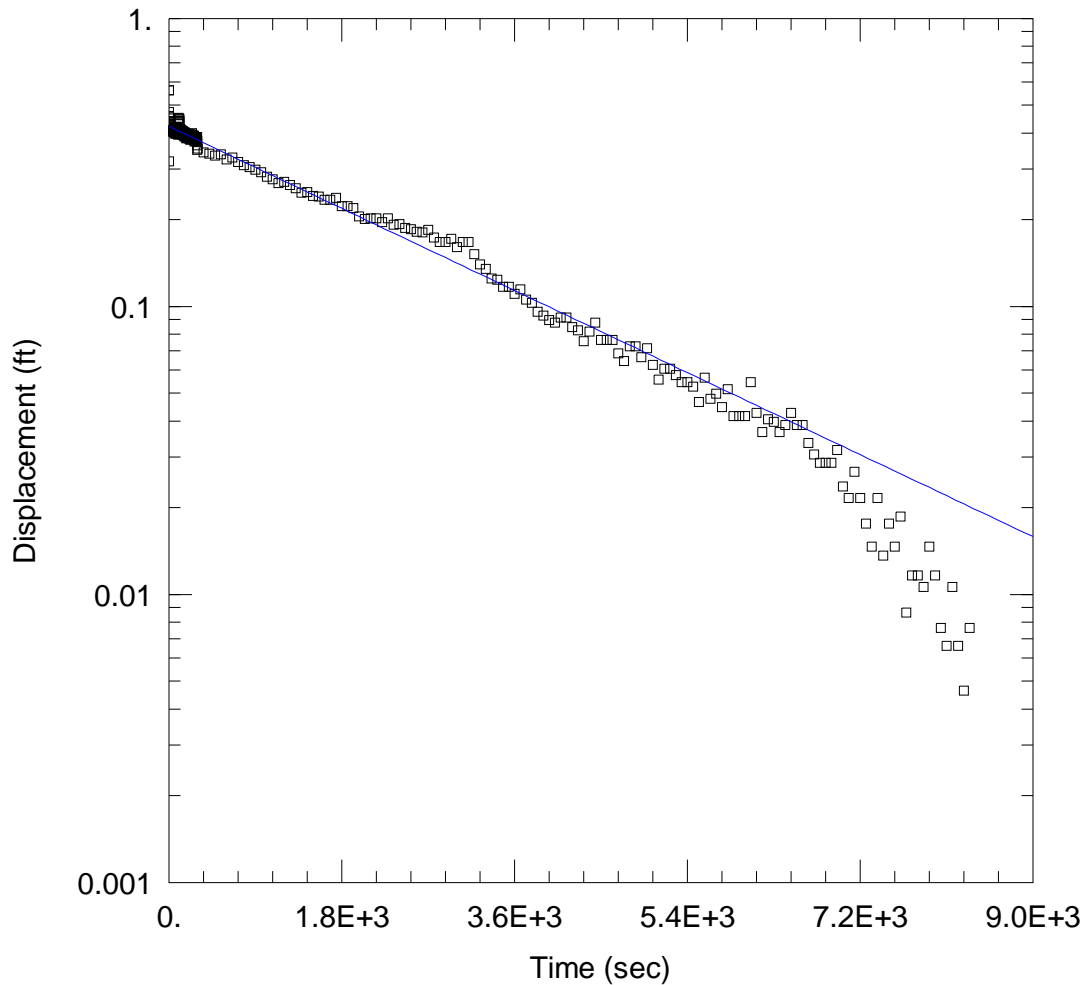
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bower-Rice

K = 0.007369 ft/day

y0 = 0.9577 ft



WELL TEST ANALYSIS

Data Set: \\...\CH-MW021 FH2 BR.aqt
 Date: 10/16/18

Time: 14:59:45

PROJECT INFORMATION

Company: AECOM
 Location: Camp Hero
 Test Well: CH-MW021
 Test Date: 6/22/2017

AQUIFER DATA

Saturated Thickness: 7.74 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (CH-MW021 FH2)

Initial Displacement: 0.5616 ft
 Total Well Penetration Depth: 6.74 ft
 Casing Radius: 0.083 ft

Static Water Column Height: 6.74 ft
 Screen Length: 6.74 ft
 Well Radius: 0.25 ft
 Gravel Pack Porosity: 0.

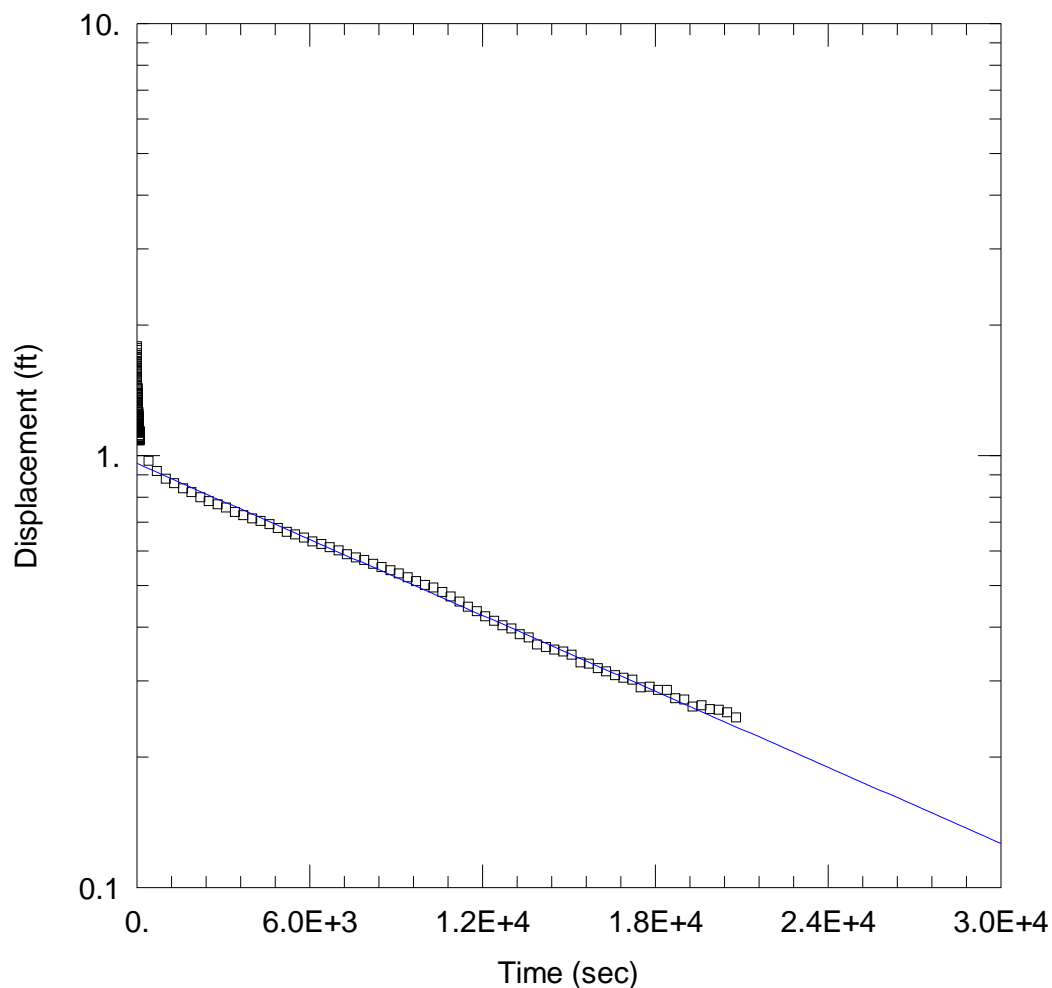
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bower-Rice

K = 0.08493 ft/day

y0 = 0.4218 ft



WELL TEST ANALYSIS

Data Set: \\...\CH-MW021 RH1 BR.aqt

Date: 10/16/18

Time: 14:48:55

PROJECT INFORMATION

Company: AECOM

Location: Camp Hero

Test Well: CH-MW018

Test Date: 6/22/2017

AQUIFER DATA

Saturated Thickness: 7.74 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (CH-MW021 RH1)

Initial Displacement: 1.79 ft

Static Water Column Height: 6.74 ft

Total Well Penetration Depth: 6.74 ft

Screen Length: 6.74 ft

Casing Radius: 0.083 ft

Well Radius: 0.25 ft

Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined

Solution Method: Bower-Rice

K = 0.006923 ft/day

y0 = 0.9576 ft

Appendix J2

LNAPL Bail-down Test Results

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CH-MW017

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Well Designation:	12/11/2016	Beckett and Lyverse (2002)
Date:	11-Dec-16	

Ground Surface Elev (ft msl)	0.0	Enter These Data	Drawdown
Top of Casing Elev (ft msl)	0.0		
Well Casing Radius, r_c (ft):	0.083		
Well Radius, r_w (ft):	0.250		
LNAPL Specific Yield, S_y :	0.175		
LNAPL Density Ratio, ρ_r :	0.780		
Top of Screen (ft bgs):	15.0		
Bottom of Screen (ft bgs):	30.0	Calculated Parameters	Adjustment (ft)
LNAPL Baildown Vol. (gal.):	0.3		
Effective Radius, r_{e3} (ft):	0.129		
Effective Radius, r_{e2} (ft):	0.085		
Initial Casing LNAPL Vol. (gal.):	0.46		
Initial Filter LNAPL Vol. (gal.):	0.64		0

	Enter Data Here					Water Table	LNAPL	LNAPL				
	Time (min)	DTP (ft btoc)	DTW (ft btoc)	DTP (ft bgs)	DTW (ft bgs)	Depth (ft)	Drawdown s_n (ft)	Average Time (min)	Discharge Q_n (ft ³ /d)	s_n (ft)	b_n (ft)	r_e (ft)
Initial Fluid Levels:	0	25.26	28.08	25.26	28.08	25.88					2.82	
Enter Test Data:	0.0	27.32	27.32	27.32	27.32	27.32	2.06				0.00	
	5.0	27.00	27.18	27.00	27.18	27.04	1.74	2.5	2.720	1.90	0.18	0.129
	8.0	26.90	27.11	26.90	27.11	26.95	1.64	6.5	0.754	1.69	0.21	0.129
	9.0	26.88	27.10	26.88	27.10	26.93	1.62	8.5	0.754	1.63	0.22	0.129
	18.0	26.83	27.06	26.83	27.06	26.88	1.57	13.5	0.084	1.60	0.23	0.129
	20.0	26.8	27.06	26.80	27.06	26.86	1.54	19.0	1.131	1.56	0.26	0.129
	25.0	26.77	27.06	26.77	27.06	26.83	1.51	22.5	0.452	1.53	0.29	0.129
	35.0	26.74	27.06	26.74	27.06	26.81	1.48	30.0	0.226	1.50	0.32	0.129
	40.0	26.73	27.06	26.73	27.06	26.80	1.47	37.5	0.151	1.48	0.33	0.129
	50.0	26.69	27.06	26.69	27.06	26.77	1.43	45.0	0.302	1.45	0.37	0.129
	60.0	26.66	27.06	26.66	27.06	26.75	1.40	55.0	0.226	1.42	0.40	0.129
	70.0	26.63	27.06	26.63	27.06	26.72	1.37	65.0	0.226	1.39	0.43	0.129
	90.00	26.57	27.06	26.57	27.06	26.68	1.31	80.0	0.226	1.34	0.49	0.129
	100.00	26.55	27.06	26.55	27.06	26.66	1.29	95.0	0.151	1.30	0.51	0.129
	110.00	26.53	27.06	26.53	27.06	26.65	1.27	105.0	0.151	1.28	0.53	0.129
	120.00	26.5	27.06	26.50	27.06	26.62	1.24	115.0	0.226	1.26	0.56	0.129
	150.00	26.43	27.06	26.43	27.06	26.57	1.17	135.0	0.176	1.21	0.63	0.129
	180.00	26.35	27.07	26.35	27.07	26.51	1.09	165.0	0.226	1.13	0.72	0.129
	210.00	26.33	27.07	26.33	27.07	26.49	1.07	195.0	0.050	1.08	0.74	0.129
	240.00	26.28	27.10	26.28	27.10	26.46	1.02	225.0	0.201	1.05	0.82	0.129
	1205.00	25.53	27.10	25.53	27.10	25.88	0.27	722.5	0.059	0.65	1.57	0.129
	1530.00	25.38	27.11	25.38	27.11	25.76	0.12	1367.5	0.037	0.20	1.73	0.129
	1693.00	25.34	27.18	25.34	27.18	25.74	0.08	1611.5	0.051	0.10	1.84	0.129
	2880.00	25.55	27.65	25.55	27.65	26.01	0.29	2286.5	0.017	0.19	2.10	0.129
	5425.00	25.39	28.08	25.39	28.08	25.98	0.13	4152.5	0.017	0.21	2.69	0.129
	6675.00	25.27	28.08	25.27	28.08	25.89	0.01	6050.0	0.007	0.07	2.81	0.129

Figure 1

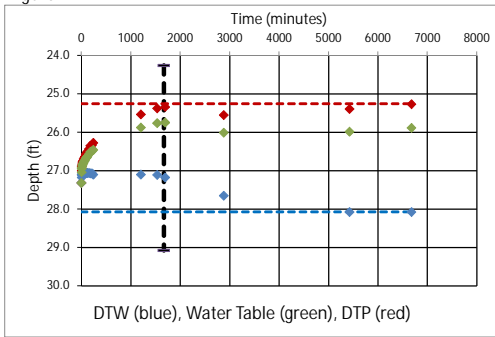


Figure 2

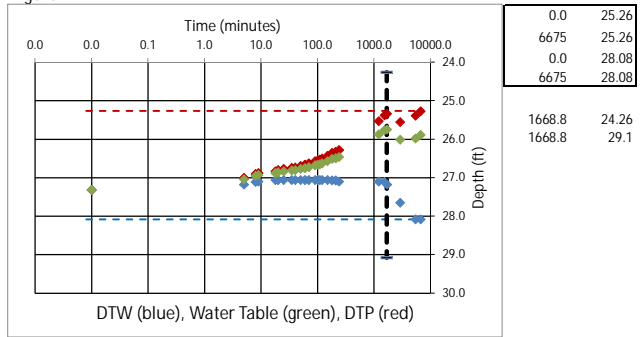


Figure 3

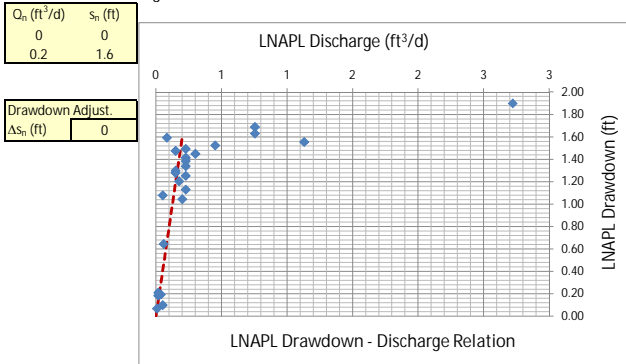


Figure 4

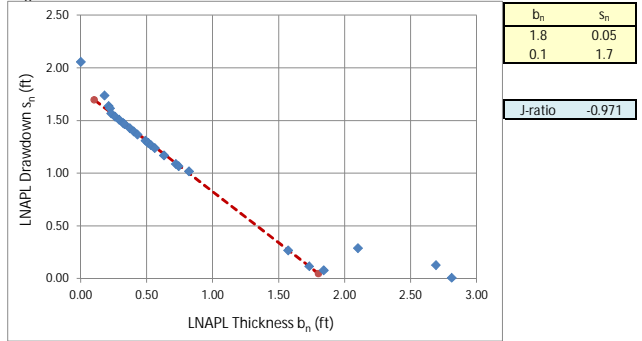


Figure 5

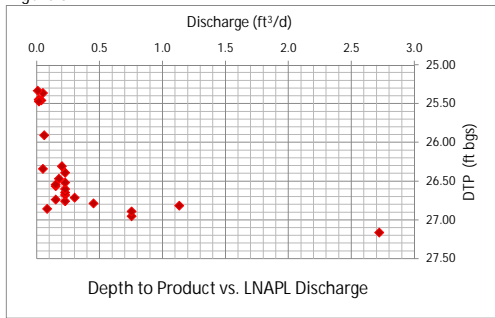


Figure 6

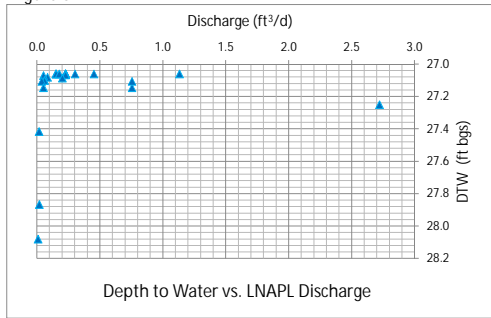


Figure 7

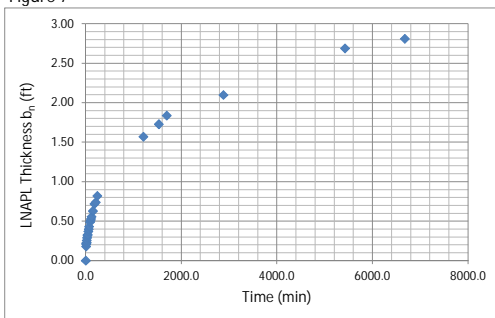


Figure 8

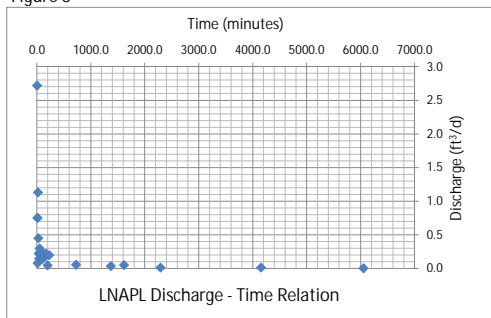


Figure 9

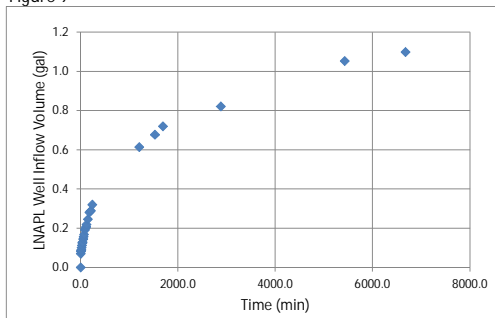
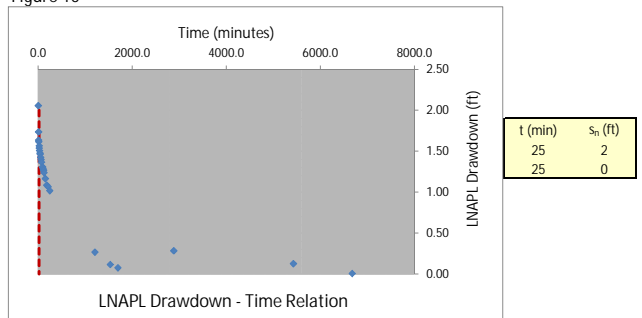


Figure 10



Generalized Bouwer and Rice (1976)

Well Designation:	42715
Date:	11-Dec-16

$$T_n = \frac{r_e^2 \ln(R/r_e) \ln(s_n(t_1)/s_n(t))}{2(-J)(t-t_1)}$$

Enter early time cut-off for least-squares model fit

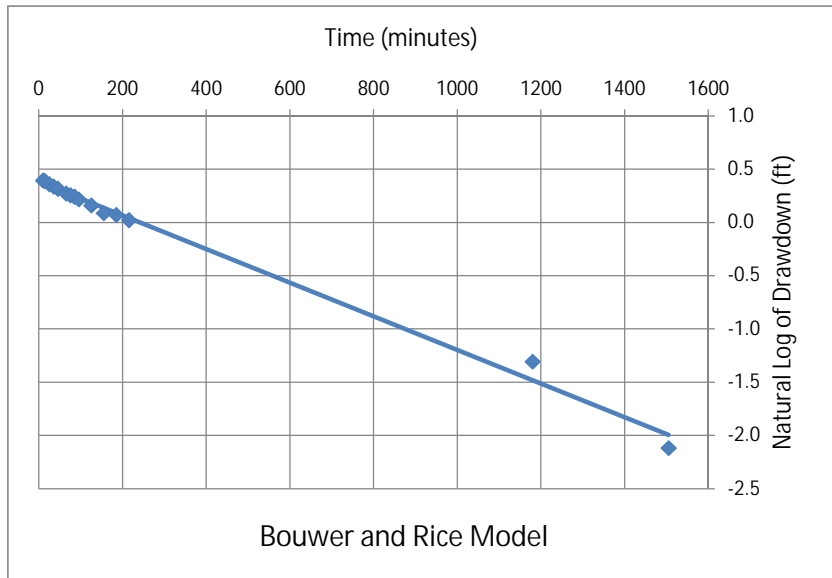
Time_{cut} <- Enter or change value here

Model Results: T_n (ft²/d) = +/- ft²/d

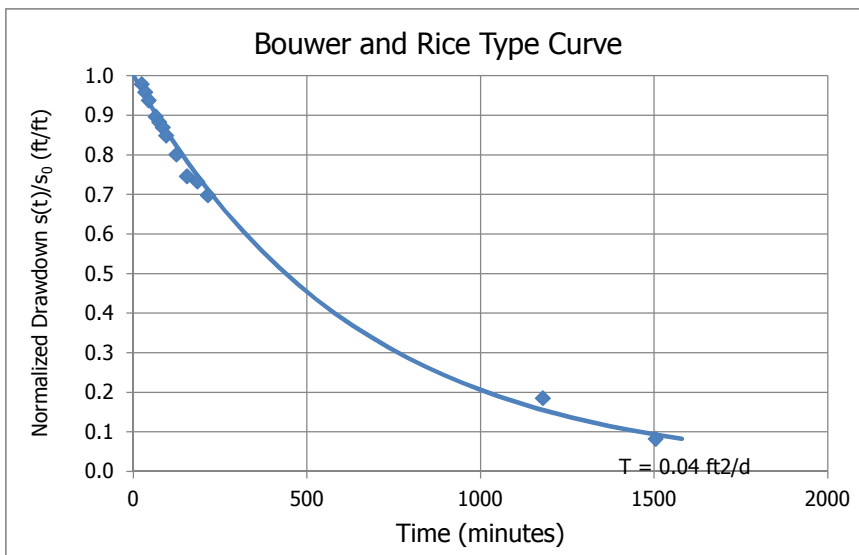
L_e/r_c	21.8
C	1.66
R/r_c	10.07

J-Ratio	-0.971
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Coef. Of Variation	0.02
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C coefficient calculated from Eq. 6.5(c) of Butler, The Design, Performance, and Analysis of Slug Tests, CRC Press, 2000.



Cooper and Jacob (1946)

Well Designation:	42715
Date:	11-Dec-16

$$V_n(t_i) = \sum_j^i \frac{4\pi T_n s_j}{\ln\left(\frac{2.25 T_n t_j}{r_e^2 S_n}\right)} \Delta t_j$$

Enter early time cut-off for least-squares model fit

Time _{cut} (min):	25	<- Enter or change values here
Time Adjustment (min):	16.67	

Trial S_n: <- Enter d for default or enter S_n value

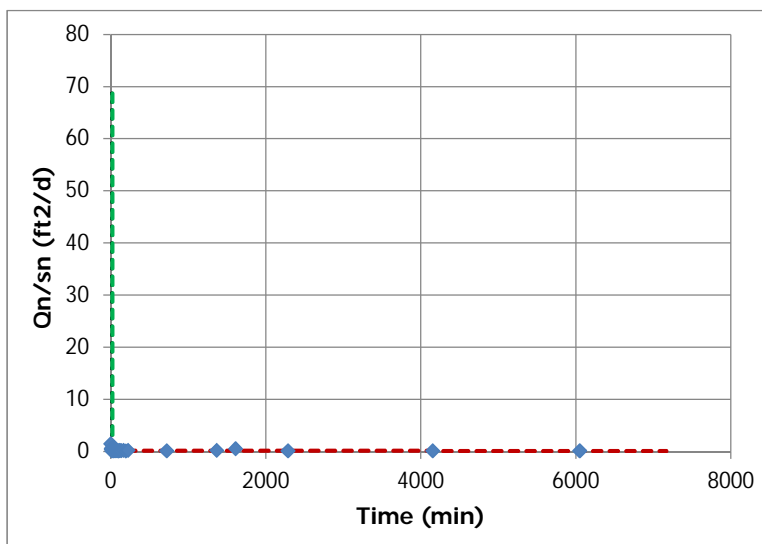
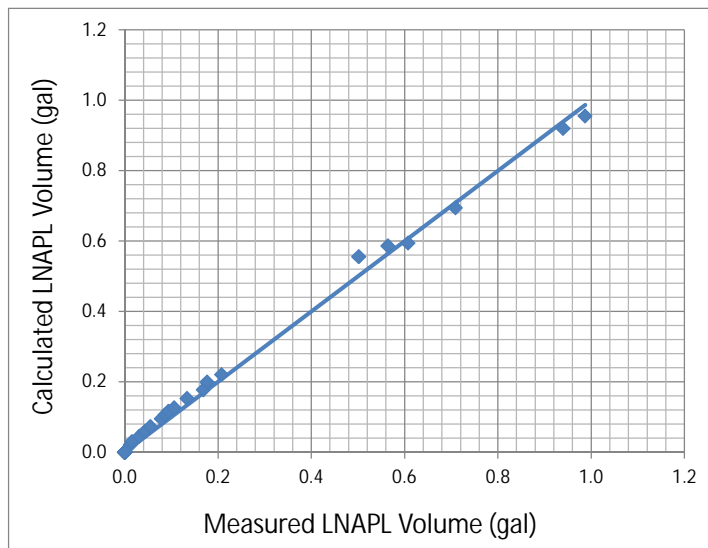
Root-Mean-Square Error: <- Minimize this using "Solver"

<- Working S_n

Trial T_n (ft²/d): <- By changing T_n through "Solver"

Add constraint T_n > 0.00001

Model Result:



Height

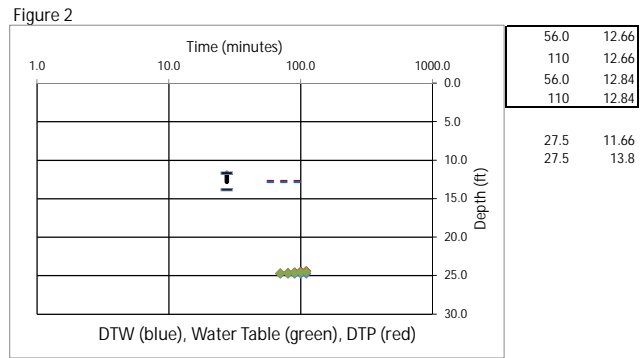
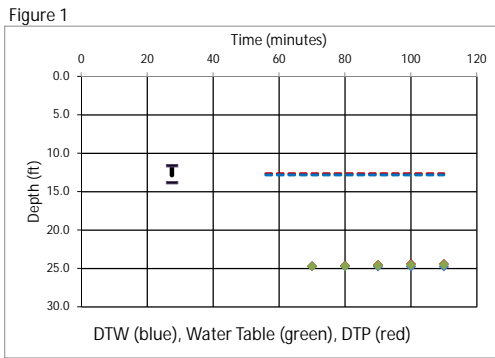
PZ-3

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Well Designation:	PZ-3	Beckett and Lyverse (2002)
Date:	11-Dec-16	

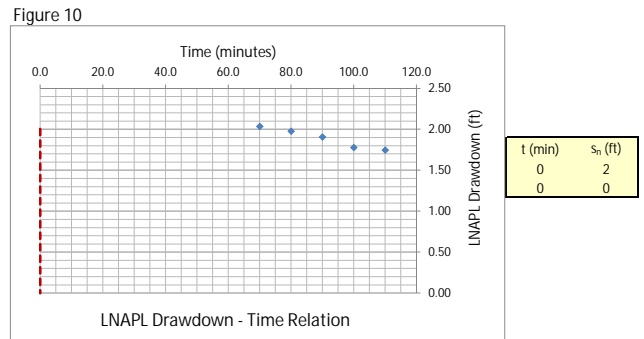
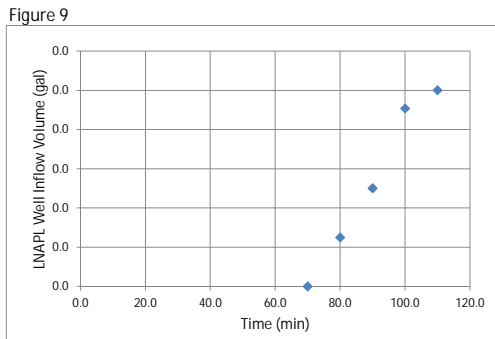
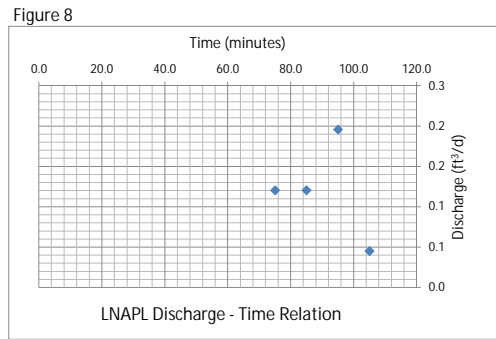
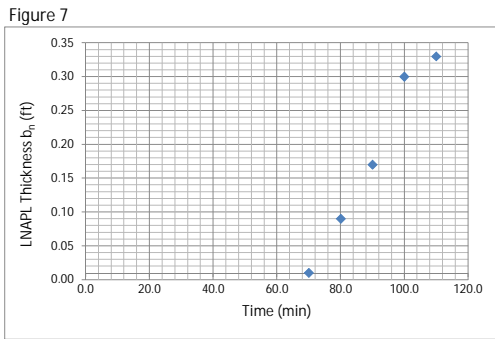
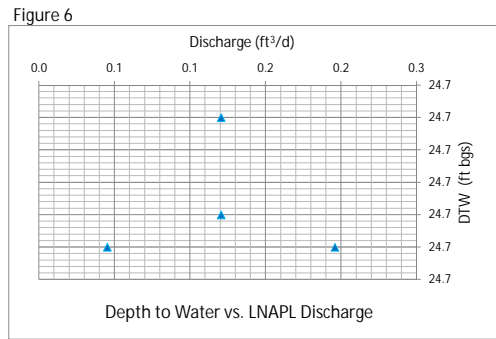
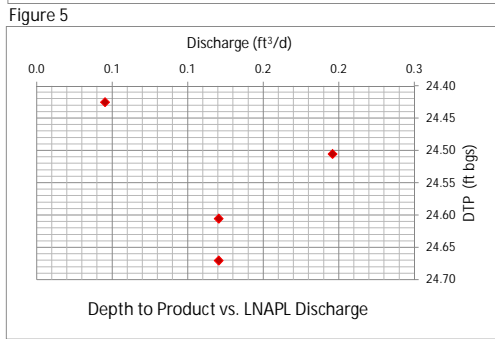
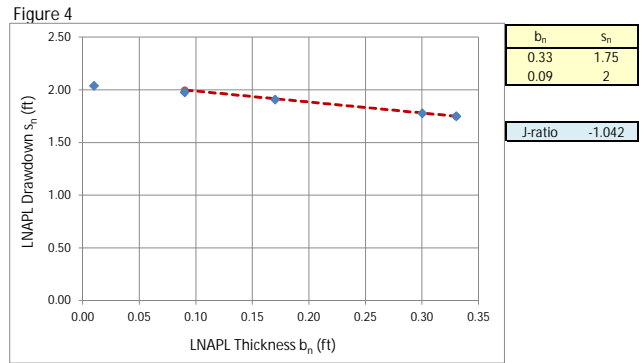
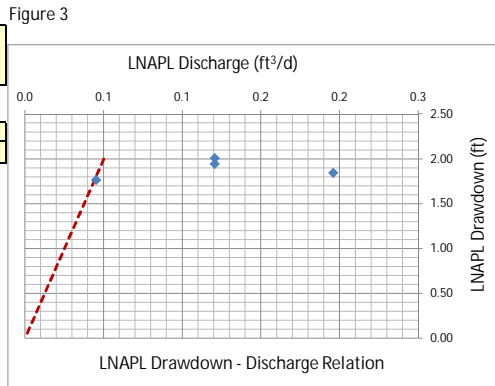
Ground Surface Elev (ft msl)	0.0	Enter These Data	r_{e1}	<table border="1"> <tr><td>Drawdown</td></tr> <tr><td>Adjustment (ft)</td></tr> <tr><td>10</td></tr> </table>	Drawdown	Adjustment (ft)	10
Drawdown							
Adjustment (ft)							
10							
Top of Casing Elev (ft msl)	0.0						
Well Casing Radius, r_c (ft):	0.042						
Well Radius, r_w (ft):	0.104						
LNAPL Specific Yield, S_y :	0.175						
LNAPL Density Ratio, ρ_r :	0.780						
Top of Screen (ft bgs):	9.4	Calculated Parameters					
Bottom of Screen (ft bgs):	25.0						
LNAPL Baildown Vol. (gal.):	0.3						
Effective Radius, r_{e3} (ft):	0.058						
Effective Radius, r_{e2} (ft):	0.041						
Initial Casing LNAPL Vol. (gal.):	0.01						
Initial Filter LNAPL Vol. (gal.):	0.01						

	Enter Data Here					Water Table Depth (ft)	LNAPL Drawdown s_n (ft)	Average Time (min)	LNAPL Discharge Q_n (ft ³ /d)	s_n (ft)	b_n (ft)	r_e (ft)
	Time (min)	DTP (ft btoc)	DTW (ft btoc)	DTP (ft bgs)	DTW (ft bgs)							
Initial Fluid Levels:	0	12.66	12.84	12.66	12.84	12.70					0.18	
Enter Test Data:	70.0	24.70	24.71	24.70	24.71	24.70	2.04				0.01	
	80.0	24.64	24.73	24.64	24.73	24.66	1.98	75.0	0.121	2.01	0.09	0.058
	90.0	24.57	24.74	24.57	24.74	24.61	1.91	85.0	0.121	1.95	0.17	0.058
	100.0	24.44	24.74	24.44	24.74	24.51	1.78	95.0	0.196	1.85	0.30	0.058
	110.0	24.41	24.74	24.41	24.74	24.48	1.75	105.0	0.045	1.77	0.33	0.058



Q_c (ft ³ /d)	s_n (ft)
0.05	2
0	0

Drawdown Adjust.	
Δs_n (ft)	10



Generalized Bouwer and Rice (1976)

Well Designation:	PZ-3
Date:	11-Dec-16

$$T_n = \frac{r_e^2 \ln(R/r_e) \ln(s_n(t_1)/s_n(t))}{2(-J)(t-t_1)}$$

Enter early time cut-off for least-squares model fit

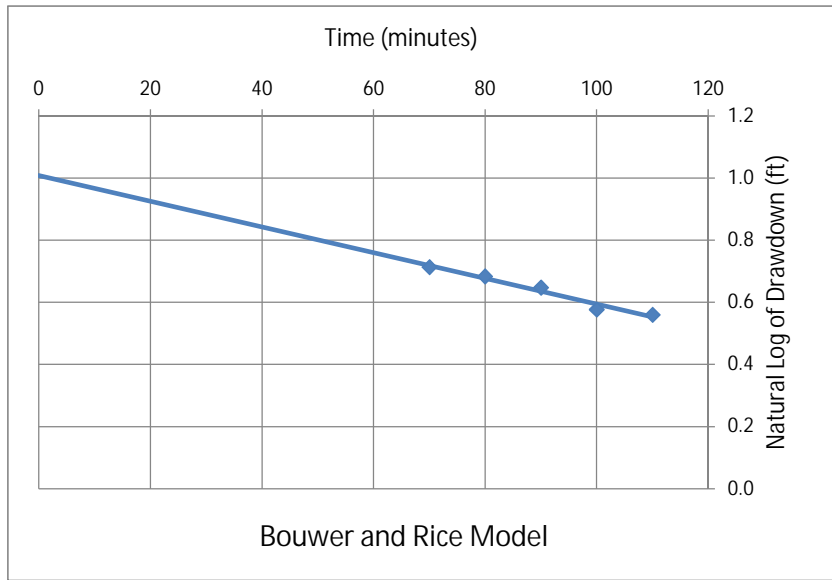
Time_{cut} <- Enter or change value here

Model Results: +/- ft²/d

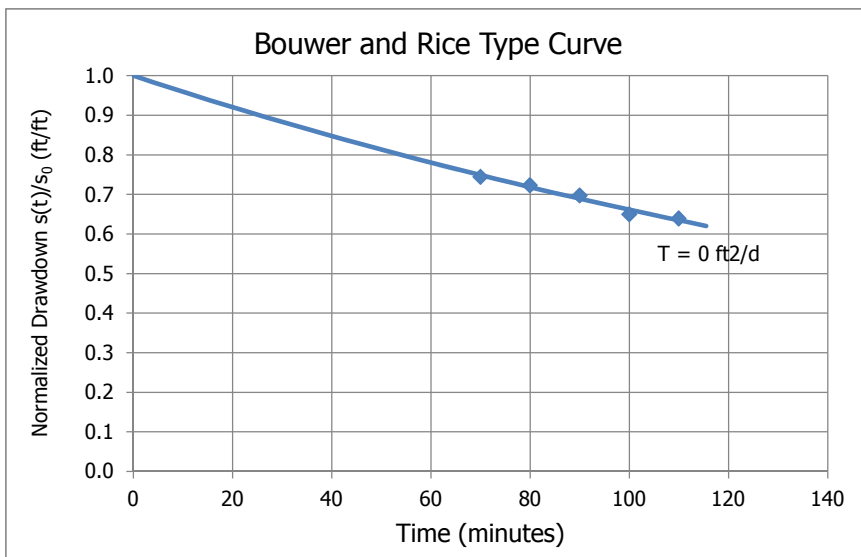
L _e /r _c	3.1
C	0.92
R/r _c	2.21

J-Ratio	-1.042
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Coef. Of Variation	0.10
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C coefficient calculated from Eq. 6.5(c) of Butler, The Design, Performance, and Analysis of Slug Tests, CRC Press, 2000.



Cooper and Jacob (1946)

Well Designation:	PZ-3
Date:	11-Dec-16

$$V_n(t_i) = \sum_j^i \frac{4\pi T_n s_j}{\ln\left(\frac{2.25 T_n t_j}{r_e^2 S_n}\right)} \Delta t_j$$

Enter early time cut-off for least-squares model fit

Time _{cut} (min):	0	<- Enter or change values here
Time Adjustment (min):	0.00	

Trial S_n: d <- Enter d for default or enter S_n value

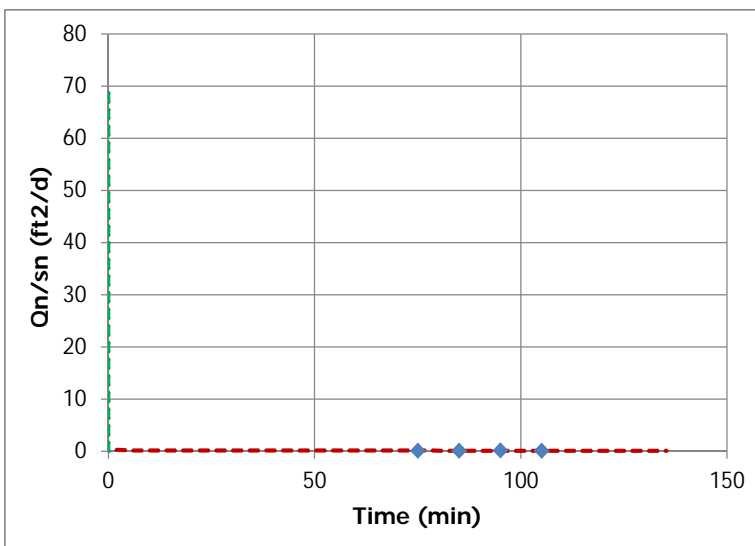
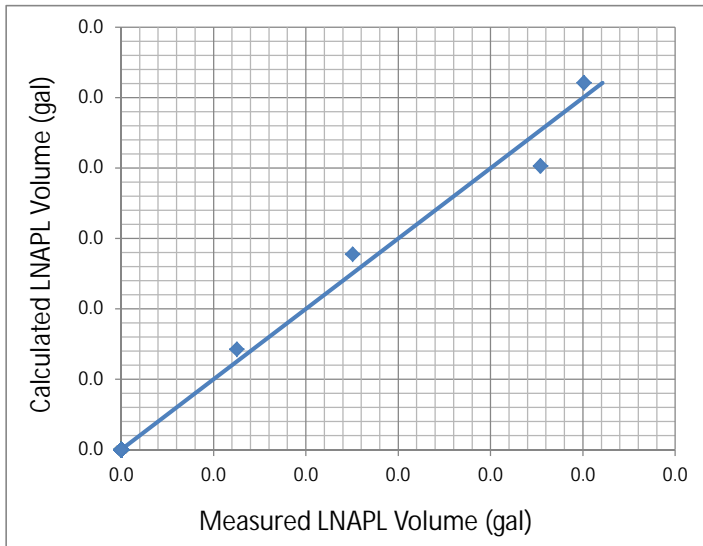
Root-Mean-Square Error: 0.003 <- Minimize this using "Solver"

0.004 <- Working S_n

Trial T_n (ft²/d): 0.030 <- By changing T_n through "Solver"

Add constraint T_n > 0.00001

Model Result: T_n (ft²/d) = 0.03



Height
70