ENVIRO-PRO
PROFESSIONAL CORPORATION

February 1, 2007

Mr. Brian Wootton
North Carolina DENR
Solid Waste Section
Division of Waste Management
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Received
FEB 2007
Waste Management

RE: Slug Test Data for Permanent Groundwater Monitor Wells
North Mecklenburg C&D Landfill – Expansion Area II
15300 Holbrooks Road
Huntersville, North Carolina

Dear Mr. Wootton:

Per your request please find the attached in-situ permeability field test data sheets for the six permanent type II groundwater monitoring wells installed for the North Mecklenburg Land Fill Expansion Area II

Please contact me at (803) 547-4955 if you have any questions or comments concerning this matter.

Sincerely,
ENVIRO-PRO, P.C.

Thomas H. Bolyard

NORTH CAROLINA LICENSED SEAL 492 GEOLOGIST THOMAS H. BOLYARD

Thomas H. Bolyard, P.G.
Senior Hydrogeologist

cc: Mr. Mike Griffin, Griffin Brothers Companies, LLC.

2646 Farmlake Lane • Fort Mill, SC 29708 • (803) 547-4955 • Fax (803) 548-2233

SLUG TEST DATA SHEET

PROJECT NAME	N.Meck LF Phase II	DATE	1/11/2007
PROJECT NUMBER	EP-1278	PERSONNEL	TRB/THB

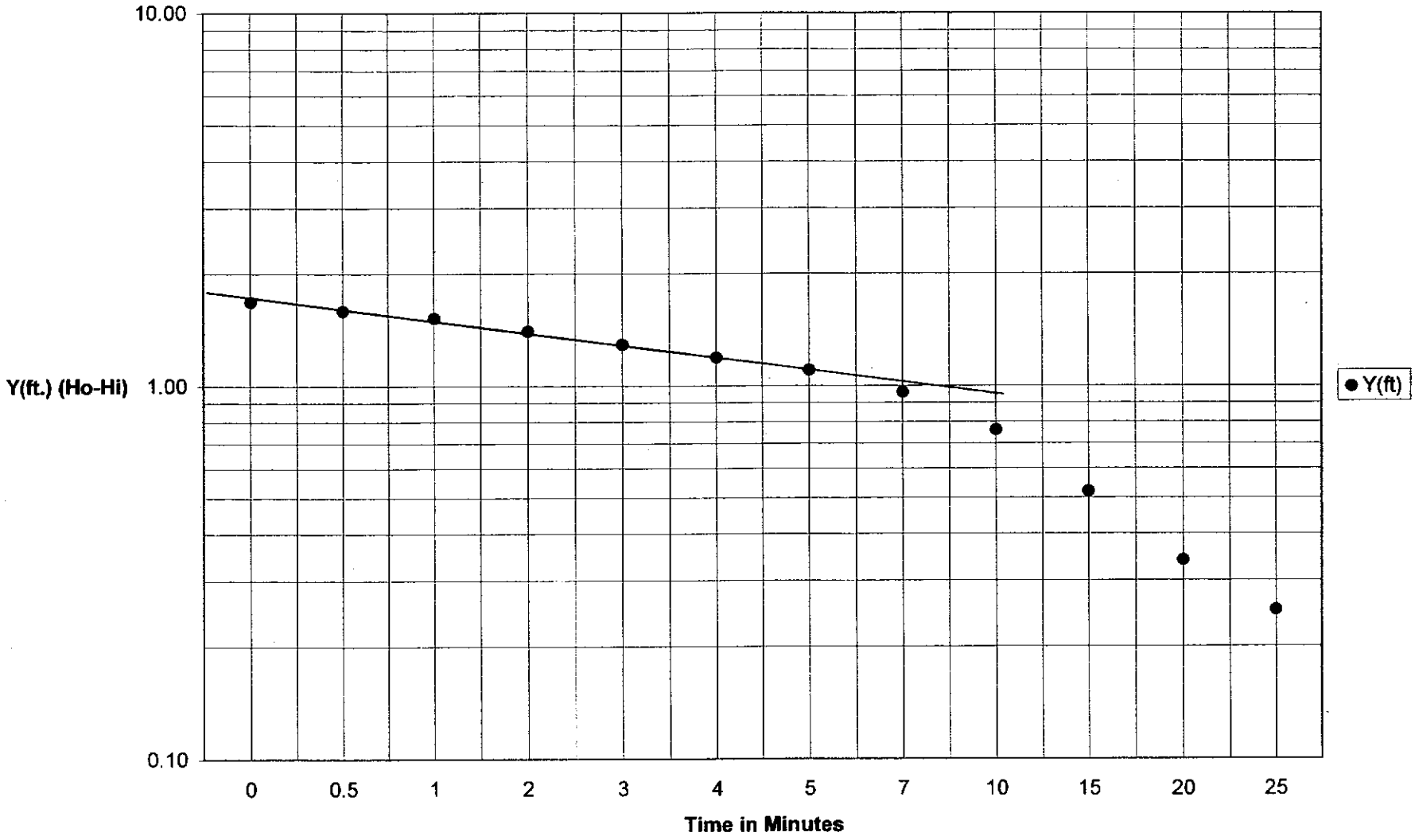
METHOD USED: BAIL X SLUG

DEPTH OF WELL (ft)	60	WELL I.D.	MW-1
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	50.67
SCREEN INTERVAL (ft)	45-60	WATER LEVEL @ t=0 (Ho)	52.35
SCREEN DIAMETER (in)	2	MP DESCRIPTION	T.O.C.
BORING DIAMETER (in)	6	STICKUP AGS (ft)	3.1
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (ft BGS)	72
FULLY PENETRATING		AQUIFER THICKNESS (ft)	18.23

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	52.35	1.68	
1	0.5	52.26	1.59	
2	1	52.19	1.52	
3	2	52.07	1.40	
4	3	51.96	1.29	
5	4	51.86	1.19	
6	5	51.77	1.10	
7	7	51.63	0.96	
8	10	51.43	0.76	
9	15	51.19	0.52	
10	20	51.01	0.34	
11	25	50.92	0.25	

Plot of Slug Test Data for MW-1



Bouwer Rice Method/Slug (Bail out) Testing Analysis

Site Information

Project Number:	EP-1278
Site Location:	Huntersville, NC
Client:	Griffin Brothers, LLC
Site Name:	N.Meck LF-Phase II

Well and Aquifer Information

Well Number:	MW-1
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	60
Boring Radius (rw) (ft):	0.25
Length of Intake(L) (ft):	6.23
Static WT - Bottom of Intake (H) (ft):	6.23
Saturated Aquifer Thickness (D) (ft):	18.23

Worksheet Generated Values

L/rw:	24.92
D-H:	12.00
H/rw:	24.92

Analysis Input (From Coefficient Curves)

Coefficient A	2.35
Coefficient B	0.4

Coefficient C(if necessary)
If H<D then use A & B
If fully penetrating H=D, then use C
Note:must change worksheet formula if using C

Analysis Input (From Recovery Graph)

Initial Drawdown (Yo) (ft):	1.8
Drawdown at time t (Yt) (ft):	1.25
Time (t) (min):	4

Analysis

ln Re/rw= [1.1/ln(H/rw)+(A+Bln[(D-H)/rw]/(L/rw))]-1

= **2.01**

K= rc^2ln(Re/rw)/2L *1/t*ln(Yo/Yt)
= **1.01E-04** **Ft/min**
= **0.15** **Ft/day**

T= Kb
= **2.65** **Ft^2/day**

SLUG TEST DATA SHEET

PROJECT NAME	N.Meck LF-Phase II	DATE	1/11/2007
PROJECT NUMBER	EP-1278	PERSONNEL	TRB/THB

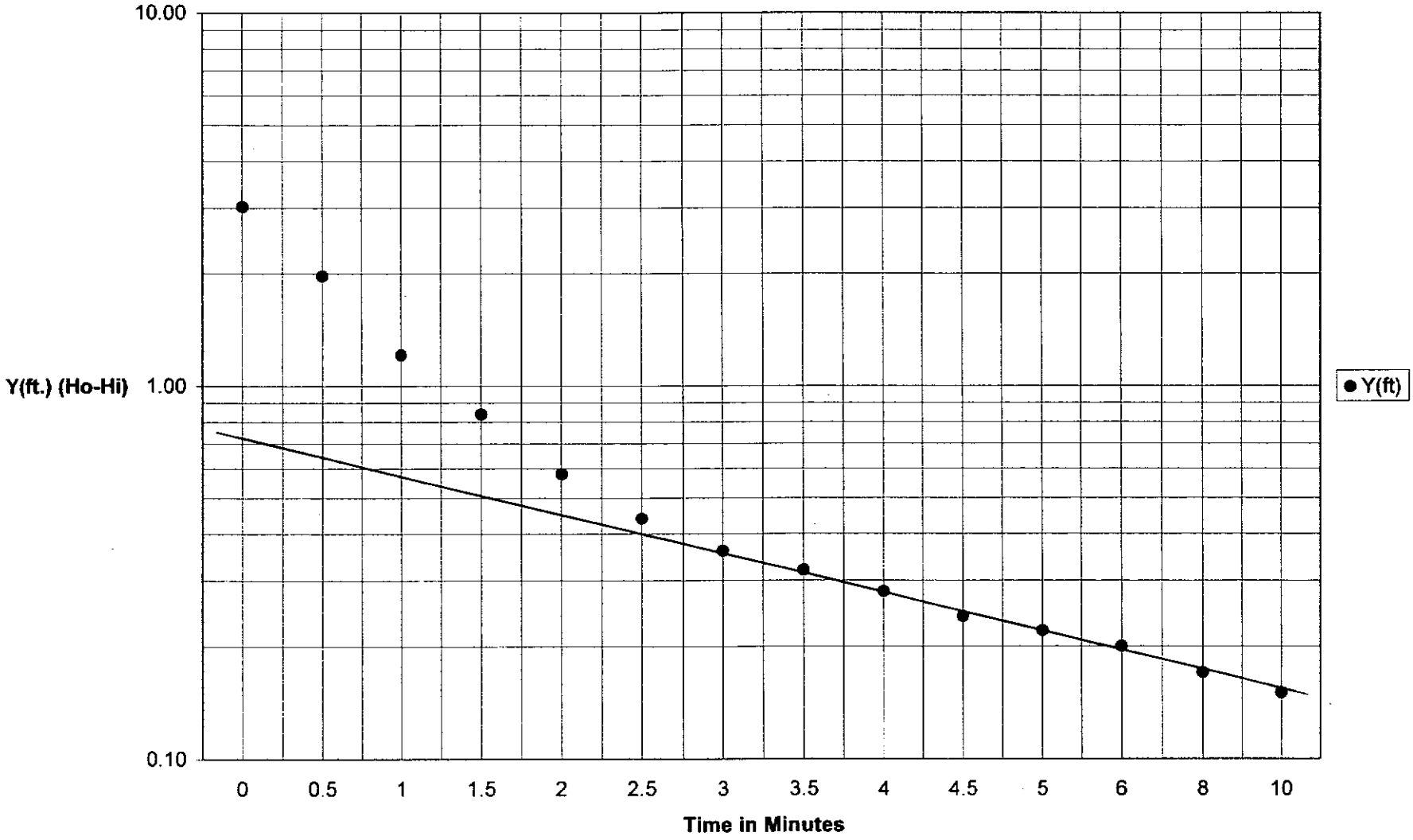
METHOD USED: BAIL X SLUG

DEPTH OF WELL (ft)	20	WELL I.D.	MW-2
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	9.03
SCREEN INTERVAL (ft)	5-20'	WATER LEVEL @ t=0 (Ho)	12.05
SCREEN DIAMETER (in)	2	MP DESCRIPTION	T.O.C.
BORING DIAMETER (in)	6	STICKUP AGS (ft)	2.1
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (ft BGS)	39
FULLY PENETRATING		AQUIFER THICKNESS (ft)	29.97

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	12.05	3.02	
1	0.5	11.00	1.97	
2	1	10.24	1.21	
3	1.5	9.87	0.84	
4	2	9.61	0.58	
5	2.5	9.47	0.44	
6	3	9.39	0.36	
7	3.5	9.35	0.32	
8	4	9.31	0.28	
9	4.5	9.27	0.24	
10	5	9.25	0.22	
11	6	9.23	0.20	
12	8	9.20	0.17	
13	10	9.18	0.15	

Plot of Slug Test Data for MW-2



Bouwer Rice Method/Slug (Bail out) Testing Analysis

Site Information

Project Number:	EP-1278
Site Location:	Huntersville, NC
Client:	Griffin Brothers, LLC
Site Name:	N.Meck LF-Phase II

Well and Aquifer Information

Well Number:	MW-2
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	20
Boring Radius (rw) (ft):	0.25
Length of Intake(L) (ft):	10.97
Static WT - Bottom of Intake (H) (ft):	10.97
Saturated Aquifer Thickness (D) (ft):	29.97

Worksheet Generated Values

L/rw:	43.88
D-H:	19.00
H/rw:	43.88

Analysis Input (From Coefficient Curves)

Coefficient A	2.9
Coefficient B	0.4

Coefficient C(if necessary)
If H<D then use A & B
If fully penetrating H=D, then use C
Note:must change worksheet formula if using C

Analysis Input (From Recovery Graph)

Initial Drawdown (Yo) (ft):	0.73
Drawdown at time t (Yt) (ft):	0.4
Time (t) (min):	2.5

Analysis

ln Re/rw= [1.1/ln(H/rw)+(A+Bln[(D-H)/rw]/(L/rw))]-1

= **2.52**

K= rc^2ln(Re/rw)/2L *1/t*ln(Yo/Yt)
= **1.91E-04** **Ft/min**
= **0.27** **Ft/day**

T= Kb
= **8.22** **Ft^2/day**

SLUG TEST DATA SHEET

PROJECT NAME	N.Meck LF-Phase II	DATE	1/11/2007
PROJECT NUMBER	EP-1278	PERSONNEL	TRB/THB

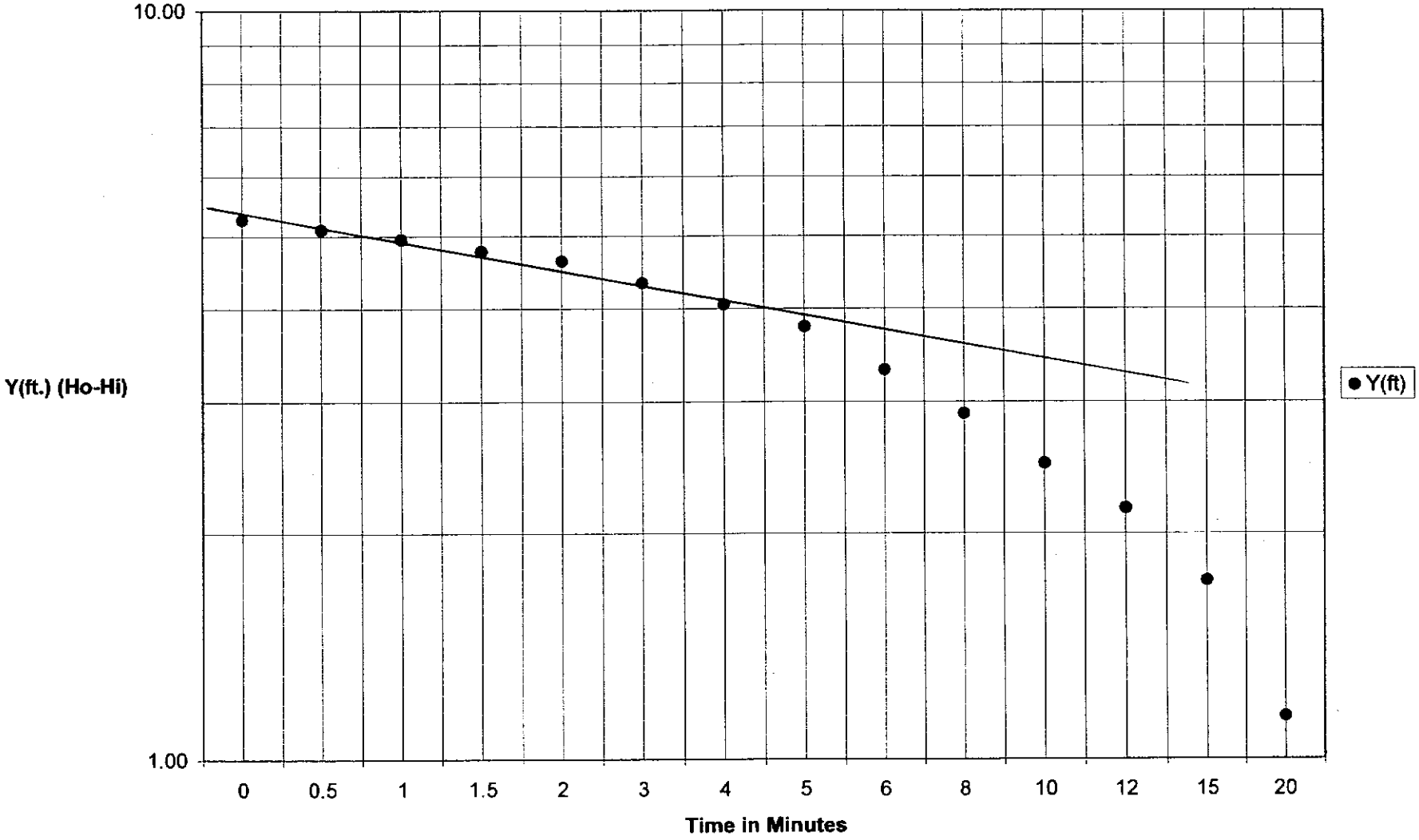
METHOD USED: BAIL X SLUG

DEPTH OF WELL (ft)	20	WELL I.D.	MW-3
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	8.28
SCREEN INTERVAL (ft)	5-20'	WATER LEVEL @ t=0 (Ho)	13.54
SCREEN DIAMETER (in)	2	MP DESCRIPTION	T.O.C.
BORING DIAMETER (in)	6	STICKUP AGS (ft)	1.9
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (ft BGS)	38
FULLY PENETRATING		AQUIFER THICKNESS (ft)	29.72

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	13.54	5.26	
1	0.5	13.38	5.10	
2	1	13.23	4.95	
3	1.5	13.05	4.77	
4	2	12.91	4.63	
5	3	12.61	4.33	
6	4	12.33	4.05	
7	5	12.06	3.78	
8	6	11.59	3.31	
9	8	11.17	2.89	
10	10	10.76	2.48	
11	12	10.44	2.16	
12	15	10.01	1.73	
13	20	9.42	1.14	

Plot of Slug Test Data for MW-3



Bouwer Rice Method/Slug (Bail out) Testing Analysis

Site Information

Project Number:	EP-1278
Site Location:	Huntersville, NC
Client:	Griffin Brothers, LLC
Site Name:	N.Meck LF-Phase II

Well and Aquifer Information

Well Number:	MW-3
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	20
Boring Radius (rw) (ft):	0.25
Length of Intake(L) (ft):	11.72
Static WT - Bottom of Intake (H) (ft):	11.72
Saturated Aquifer Thickness (D) (ft):	29.72

Worksheet Generated Values

L/rw:	46.88
D-H:	18.00
H/rw:	46.88

Analysis Input (From Coefficient Curves)

Coefficient A	3
Coefficient B	0.4

Coefficient C(if necessary)
If H<D then use A & B
If fully penetrating H=D, then use C
Note:must change worksheet formula if using C

Analysis Input (From Recovery Graph)

Initial Drawdown (Yo) (ft):	5.4
Drawdown at time t (Yt) (ft):	4
Time (t) (min):	4.5

Analysis

ln Re/rw= [1.1/ln(H/rw)+(A+Bln[(D-H)/rw]/(L/rw))]-1

= **2.59**

K= rc^2ln(Re/rw)/2L *1/t*ln(Yo/Yt)
= **5.07E-05** **Ft/min**
= **0.07** **Ft/day**

T= Kb
= **2.17** **Ft^2/day**

SLUG TEST DATA SHEET

PROJECT NAME	N.Meck LF-Phase II	DATE	1/11/2007
PROJECT NUMBER	EP-1278	PERSONNEL	TRB/THB

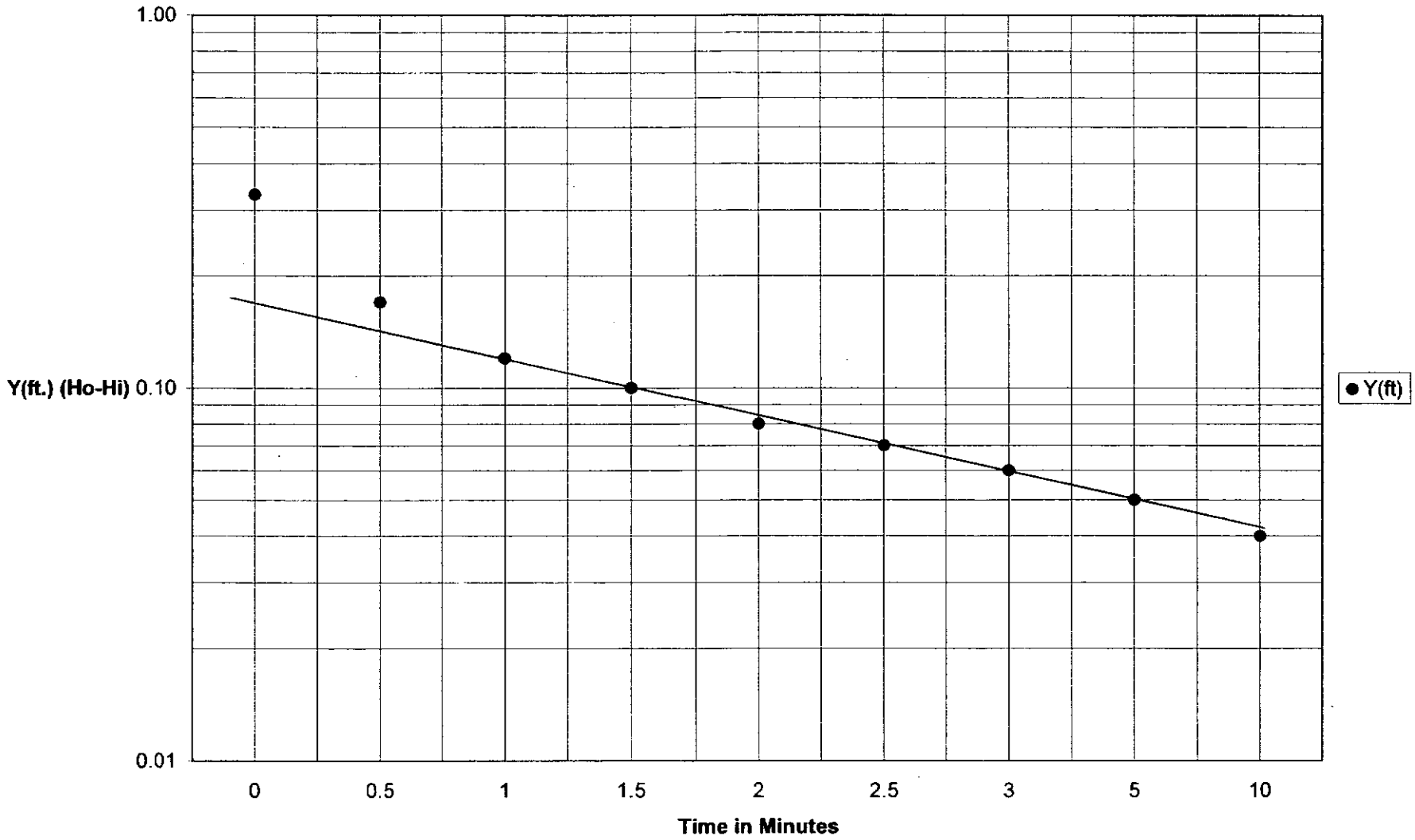
METHOD USED: BAIL X SLUG

DEPTH OF WELL (ft)	20	WELL I.D.	MW-4
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	8.41
SCREEN INTERVAL (ft)	5-20'	WATER LEVEL @ t=0 (Ho)	8.74
SCREEN DIAMETER (in)	2	MP DESCRIPTION	T.O.C.
BORING DIAMETER (in)	6	STICKUP AGS (ft)	2.2
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (ft BGS)	30
FULLY PENETRATING		AQUIFER THICKNESS (ft)	21.59

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	8.74	0.33	
1	0.5	8.58	0.17	
2	1	8.53	0.12	
3	1.5	8.51	0.10	
4	2	8.49	0.08	
5	2.5	8.48	0.07	
6	3	8.47	0.06	
7	5	8.46	0.05	
8	10	8.45	0.04	

Plot of Slug Test Data for MW-4



Bouwer Rice Method/Slug (Bail out) Testing Analysis

Site Information

Project Number:	EP-1278
Site Location:	Huntersville, NC
Client:	Griffin Brothers, LLC
Site Name:	N.Meck LF-Phase II

Well and Aquifer Information

Well Number:	MW-4
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	20
Boring Radius (rw) (ft):	0.25
Length of Intake(L) (ft):	11.59
Static WT - Bottom of Intake (H) (ft):	11.59
Saturated Aquifer Thickness (D) (ft):	21.59

Worksheet Generated Values

L/rw:	46.36
D-H:	10.00
H/rw:	46.36

Analysis Input (From Coefficient Curves)

Coefficient A	3
Coefficient B	0.4

Coefficient C(if necessary)
If H<D then use A & B
If fully penetrating H=D, then use C
Note:must change worksheet formula if using C

Analysis Input (From Recovery Graph)

Initial Drawdown (Yo) (ft):	0.175
Drawdown at time t (Yt) (ft):	0.06
Time (t) (min):	3

Analysis

ln Re/rw= [1.1/ln(H/rw)+(A+Bln[(D-H)/rw]/(L/rw))]-1

= **2.61**

K= rc^2ln(Re/rw)/2L *1/t*ln(Yo/Yt)
= **2.77E-04** **Ft/min**
= **0.40** **Ft/day**

T= Kb
= **8.60** **Ft^2/day**

SLUG TEST DATA SHEET

PROJECT NAME	N.Meck LF-Phase II	DATE	1/11/2007
PROJECT NUMBER	EP-1278	PERSONNEL	TRB/THB

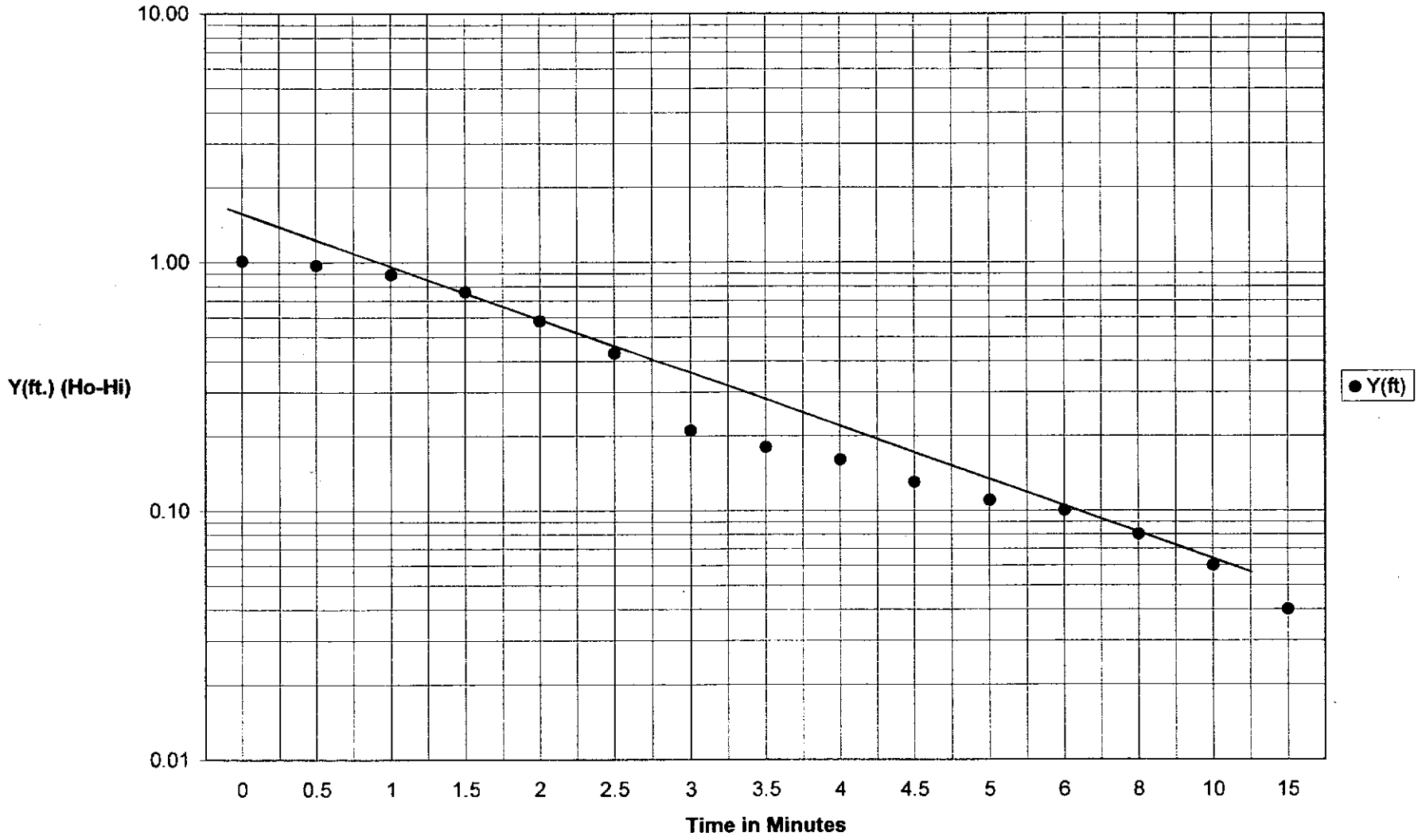
METHOD USED: BAIL X SLUG

DEPTH OF WELL (ft)	20	WELL I.D.	MW-5
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	7.29
SCREEN INTERVAL (ft)	5-20'	WATER LEVEL @ t=0 (Ho)	8.30
SCREEN DIAMETER (in)	2	MP DESCRIPTION	T.O.C.
BORING DIAMETER (in)	6	STICKUP AGS (ft)	2
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (ft BGS)	30
FULLY PENETRATING		AQUIFER THICKNESS (ft)	22.71

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	8.30	1.01	
1	0.5	8.26	0.97	
2	1	8.18	0.89	
3	1.5	8.05	0.76	
4	2	7.87	0.58	
5	2.5	7.72	0.43	
6	3	7.50	0.21	
7	3.5	7.47	0.18	
8	4	7.45	0.16	
9	4.5	7.42	0.13	
10	5	7.40	0.11	
11	6	7.39	0.10	
12	8	7.37	0.08	
13	10	7.35	0.06	
14	15	7.33	0.04	

Plot of Slug Test Data for MW-5



Bouwer Rice Method/Slug (Bail out) Testing Analysis

Site Information

Project Number:	EP-1278
Site Location:	Huntersville, NC
Client:	Griffin Brothers, LLC
Site Name:	N.Meck LF-Phase II

Well and Aquifer Information

Well Number:	MW-5
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	20
Boring Radius (rw) (ft):	0.25
Length of Intake(L) (ft):	12.71
Static WT - Bottom of Intake (H) (ft):	12.71
Saturated Aquifer Thickness (D) (ft):	22.71

Worksheet Generated Values

L/rw:	50.84
D-H:	10.00
H/rw:	50.84

Analysis Input (From Coefficient Curves)

Coefficient A	3
Coefficient B	0.5

Coefficient C(if necessary)
If H<D then use A & B
If fully penetrating H=D, then use C
Note:must change worksheet formula if using C

Analysis Input (From Recovery Graph)

Initial Drawdown (Yo) (ft):	1.7
Drawdown at time t (Yt) (ft):	0.4
Time (t) (min):	2.75

Analysis

ln Re/rw= [1.1/ln(H/rw)+(A+Bln[(D-H)/rw]/(L/rw))]-1

= **2.66**

K= rc^2ln(Re/rw)/2L *1/t*ln(Yo/Yt)
= **3.80E-04** **Ft/min**
= **0.55** **Ft/day**

T= Kb
= **12.43** **Ft^2/day**

SLUG TEST DATA SHEET

PROJECT NAME	N.Meck LF-Phase II	DATE	1/11/2007
PROJECT NUMBER	EP-1278	PERSONNEL	TRB/THB

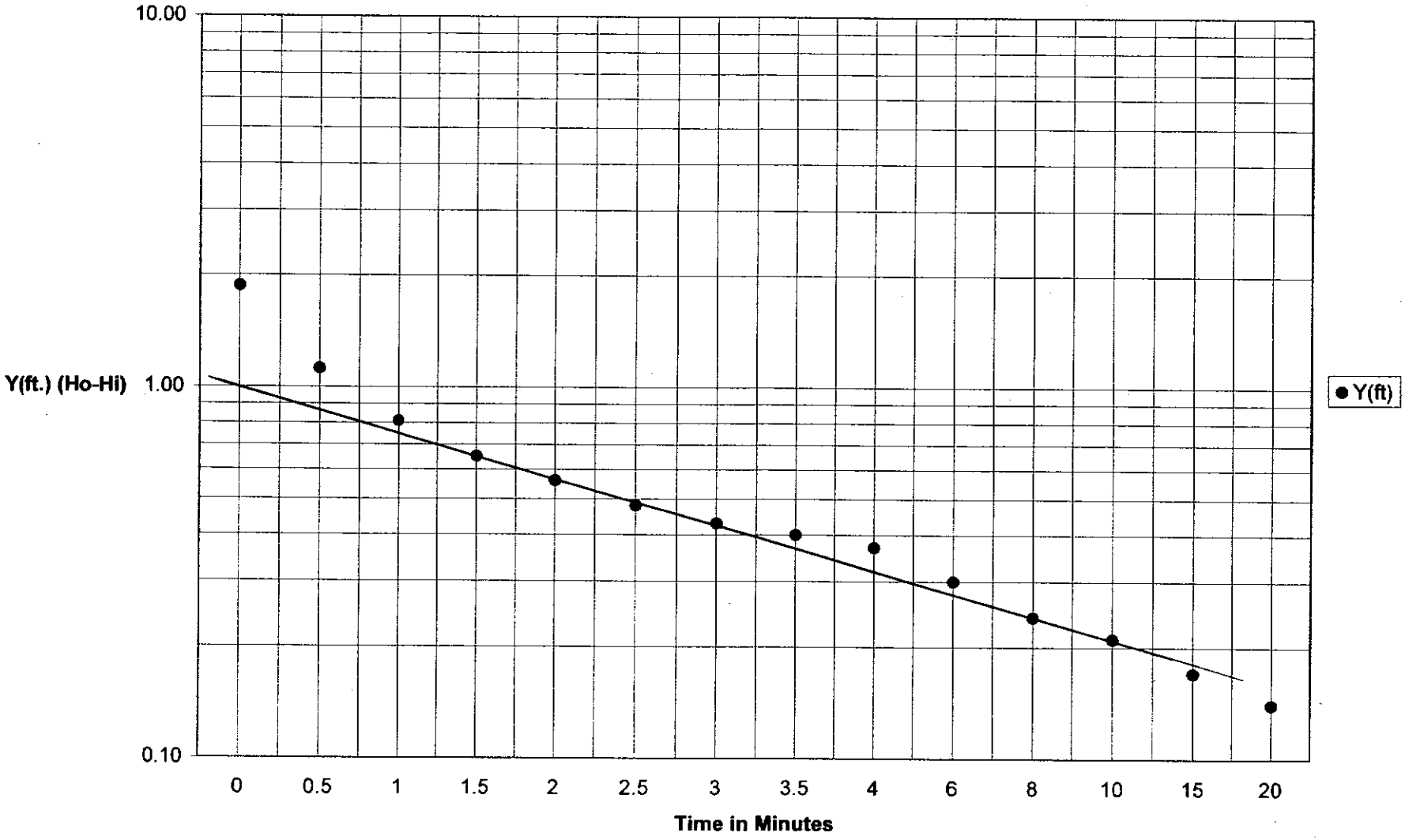
METHOD USED: BAIL X SLUG

DEPTH OF WELL (ft)	25	WELL I.D.	MW-6
SCREEN LENGTH (ft)	15	STATIC WATER LEVEL (Hi)	8.85
SCREEN INTERVAL (ft)	10-25'	WATER LEVEL @ t=0 (Ho)	10.72
SCREEN DIAMETER (in)	2	MP DESCRIPTION	T.O.C.
BORING DIAMETER (in)	6	STICKUP AGS (ft)	1.8
PARTIALLY PENETRATING	X	DEPTH TO BEDROCK (ft BGS)	32
FULLY PENETRATING		AQUIFER THICKNESS (ft)	23.15

REMARKS

READING #	TIME (min)	DEPTH TO WATER (ft bmp)	HEAD CHANGE (Ho-Hi) (ft)	REMARKS
0	0	10.72	1.87	
1	0.5	9.97	1.12	
2	1	9.66	0.81	
3	1.5	9.50	0.65	
4	2	9.41	0.56	
5	2.5	9.33	0.48	
6	3	9.28	0.43	
7	3.5	9.25	0.40	
8	4	9.22	0.37	
9	6	9.15	0.30	
10	8	9.09	0.24	
11	10	9.06	0.21	
12	15	9.02	0.17	
13	20	8.99	0.14	

Plot of Slug Test Data for MW-6



Bouwer Rice Method/Slug (Bail out) Testing Analysis

Site Information

Project Number:	EP-1278
Site Location:	Huntersville, NC
Client:	Griffin Brothers, LLC
Site Name:	N.Meck LF-Phase II

Well and Aquifer Information

Well Number:	MW-6
Well Casing Radius (rc) (ft):	0.083
Well Depth from TOC (ft):	25
Boring Radius (rw) (ft):	0.25
Length of Intake(L) (ft):	15
Static WT - Bottom of Intake (H) (ft):	16.15
Saturated Aquifer Thickness (D) (ft):	23.15

Worksheet Generated Values

L/rw:	60.00
D-H:	7.00
H/rw:	64.60

Analysis Input (From Coefficient Curves)

Coefficient A	3.4
Coefficient B	0.5

Coefficient C(if necessary)
If H<D then use A & B
If fully penetrating H=D, then use C
Note:must change worksheet formula if using C

Analysis Input (From Recovery Graph)

Initial Drawdown (Yo) (ft):	1
Drawdown at time t (Yt) (ft):	0.4
Time (t) (min):	3.25

Analysis

ln Re/rw= [1.1/ln(H/rw)+(A+Bln[(D-H)/rw]/(L/rw))]-1

= **2.87**

K= rc^2ln(Re/rw)/2L *1/t*ln(Yo/Yt)
= **1.86E-04** **Ft/min**
= **0.27** **Ft/day**

T= Kb
= **6.20** **Ft^2/day**