United States Nuclear Regulatory Commission Official Hearing Exhibit			
In the Matter of:	CROW BUTTE RESOURCES, INC. (Marsland Expansion Area)		
	ASLBP #: 13-926-01-MLA-BD01		
	Docket #: 04008943		
	Exhibit #: OST021-00-BD01	**Identified:**	11/01/2018
	Admitted:	**Withdrawn:**	
	Rejected: 11/01/2018	**Stricken:**	
	Other:		

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of CROW BUTTE RESOURCES, INC. (Marsland Expansion Area)	Docket No. 40-8943-MLA-2 ASLBP No. 13-926-01-MLA-BD01

Hearing Exhibit

Exhibit Number: OST021

Exhibit Title: Kreamer Powerpoint Slides

From Kruseman, G.P. and de Ridder, N.A. (2000) Analysis and Evaluation of Pumping Test Data. 2nd Edition, International Institute for Land Reclamation and Improvement, 372.

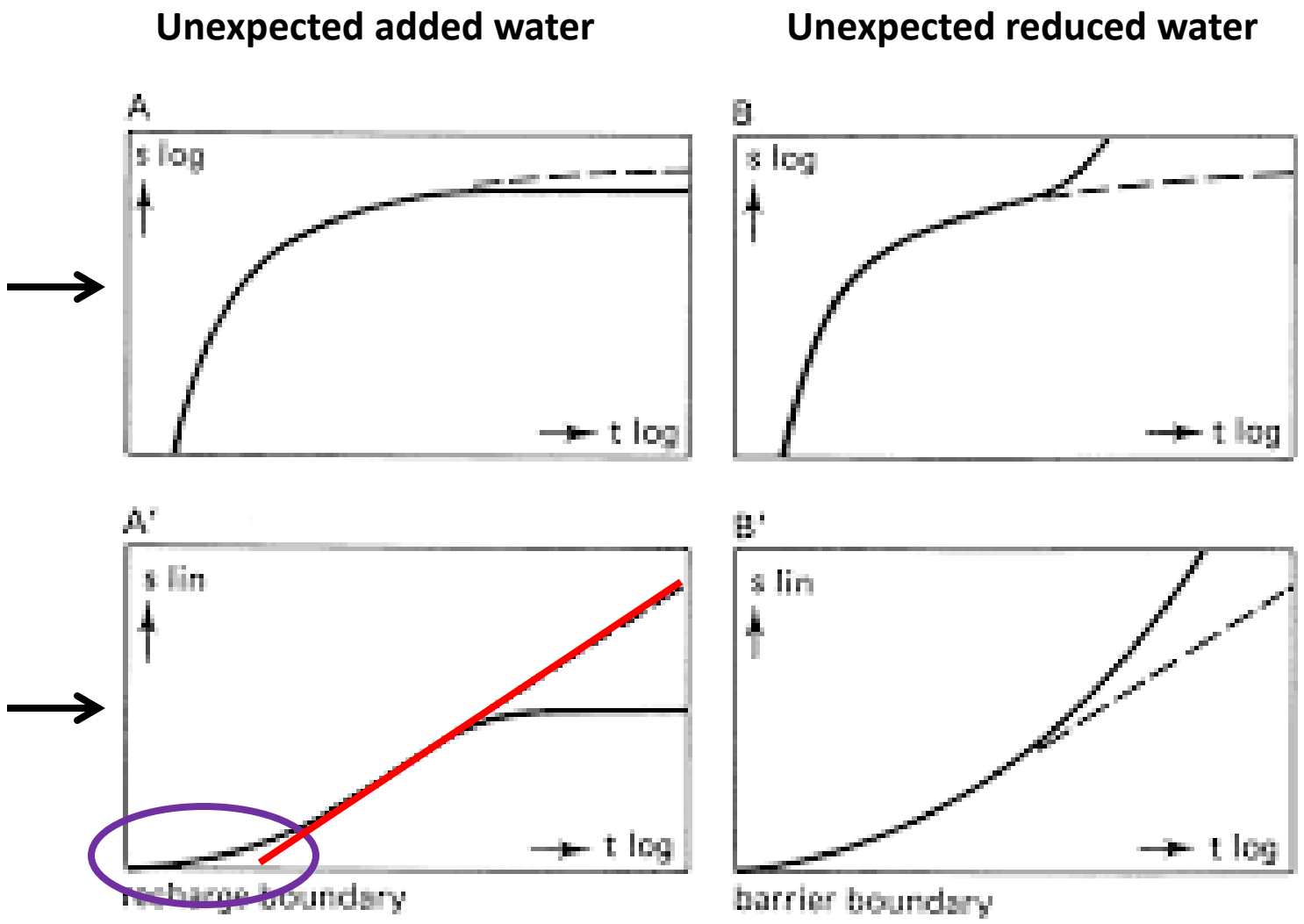
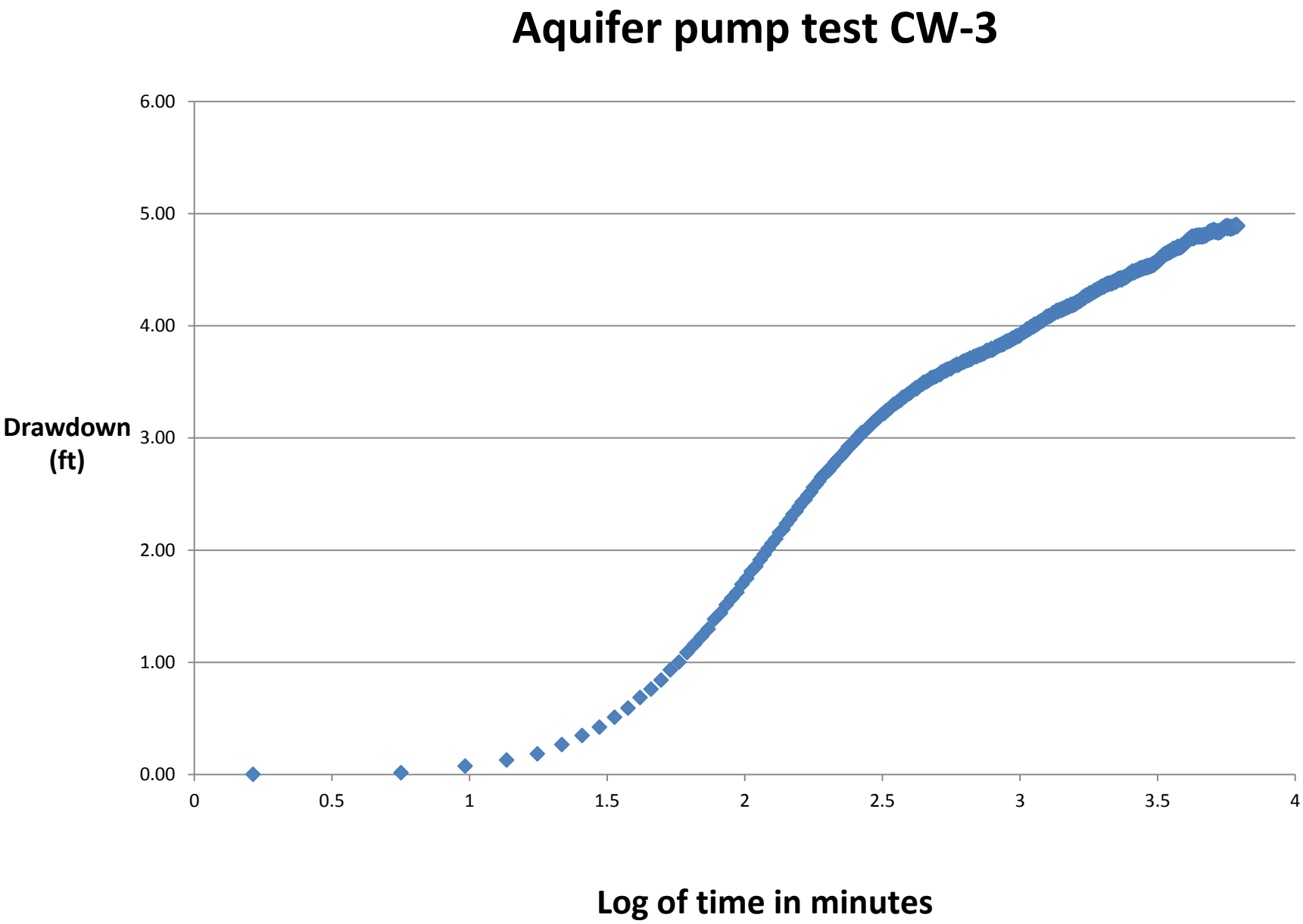
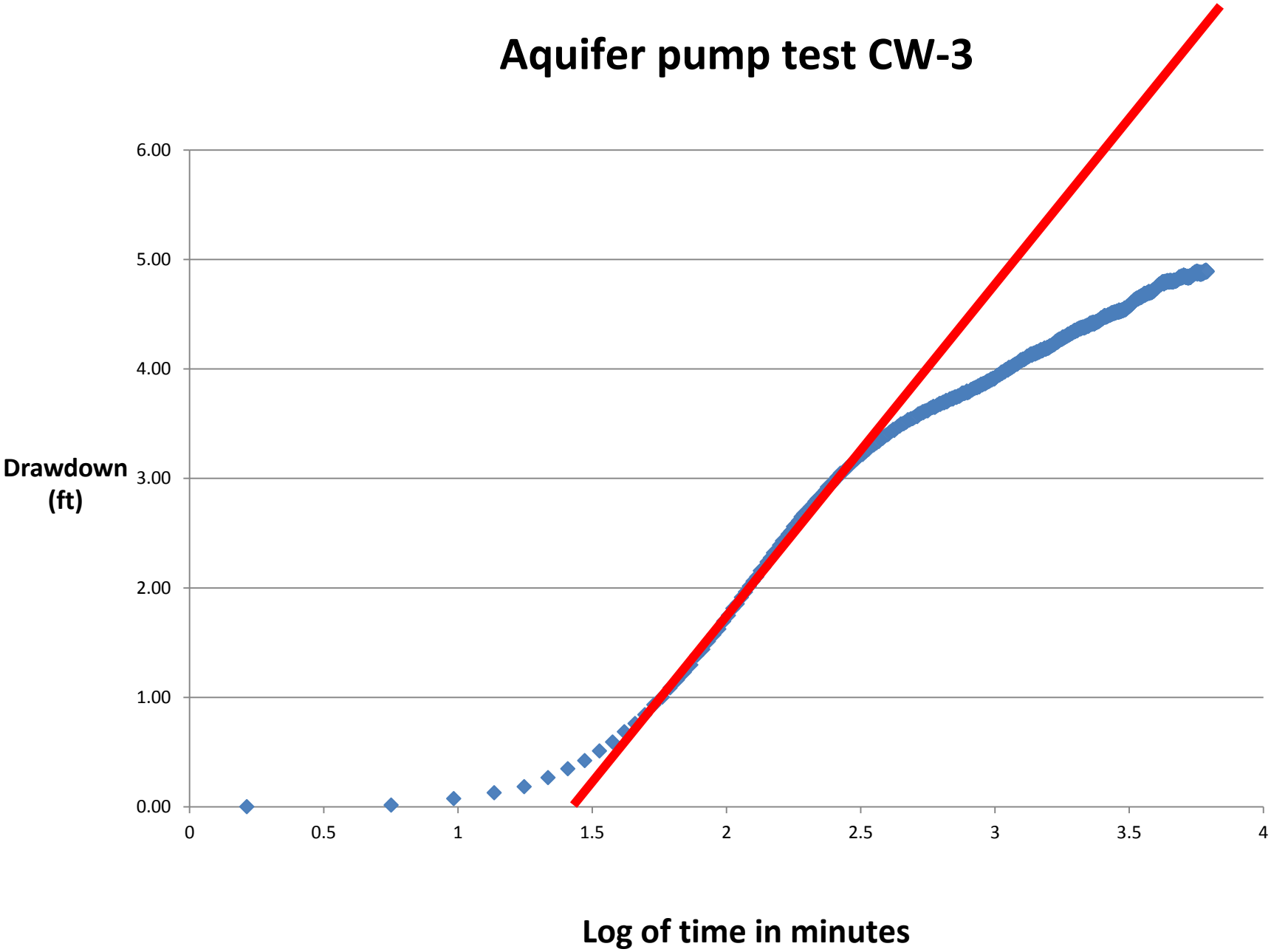
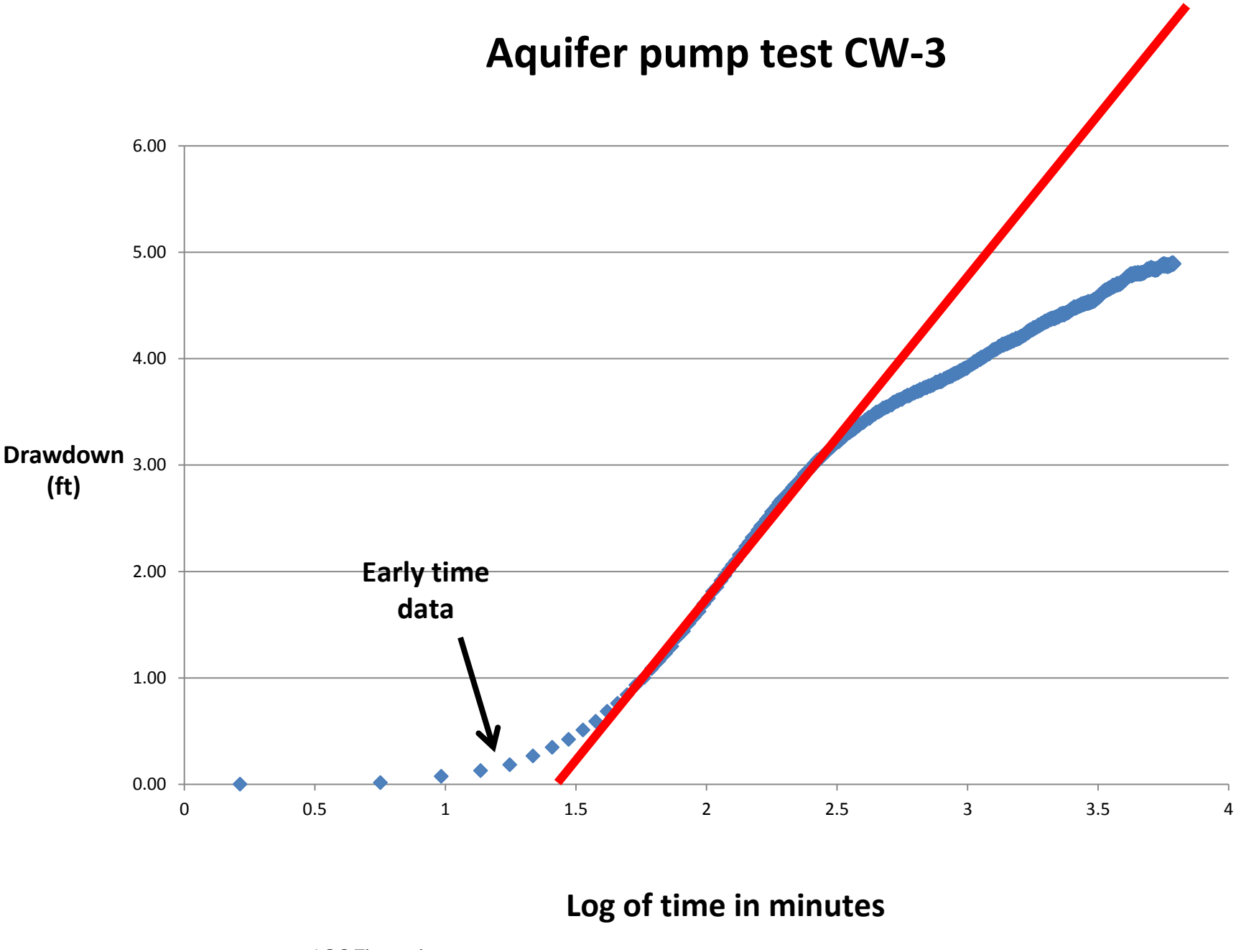
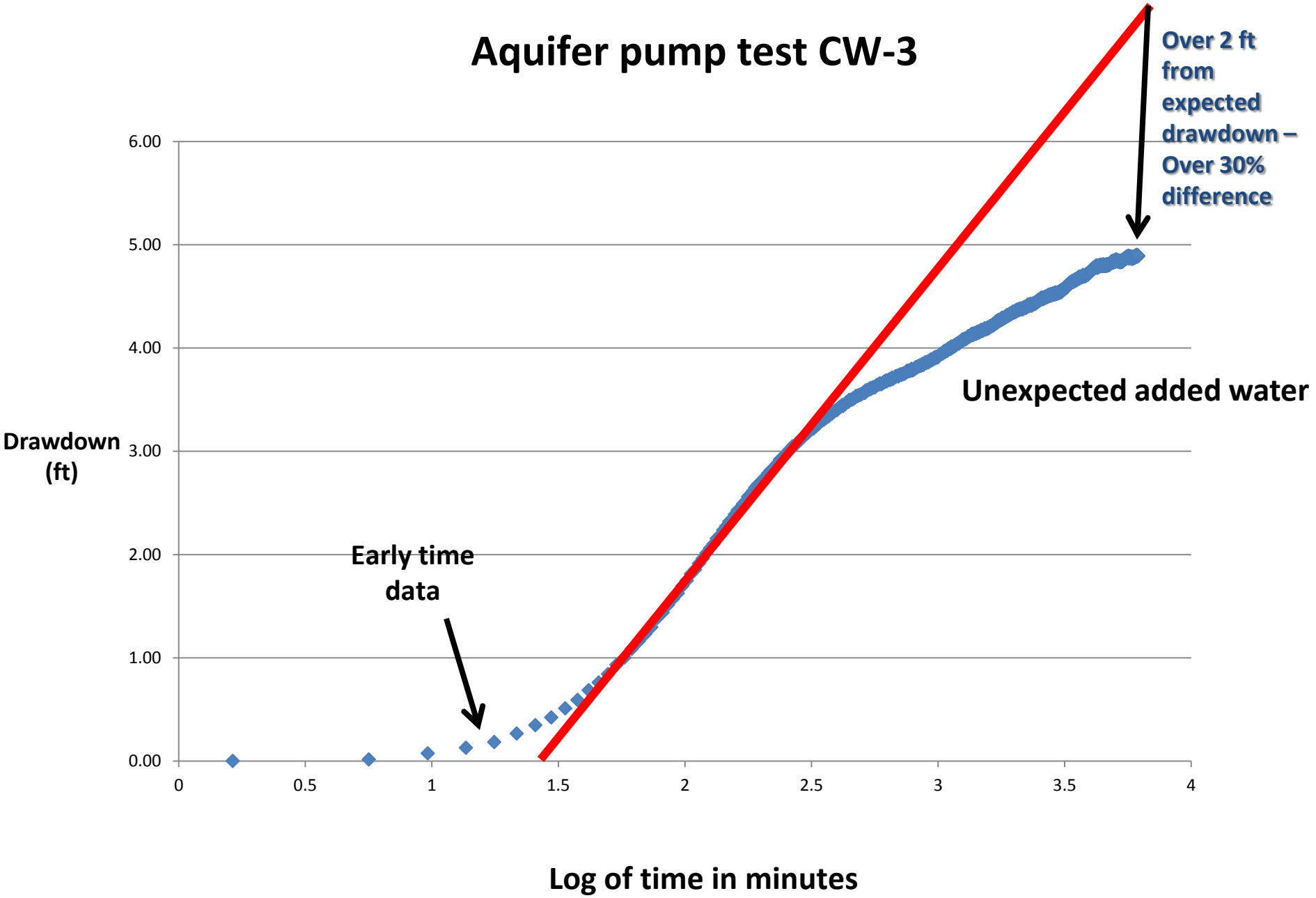


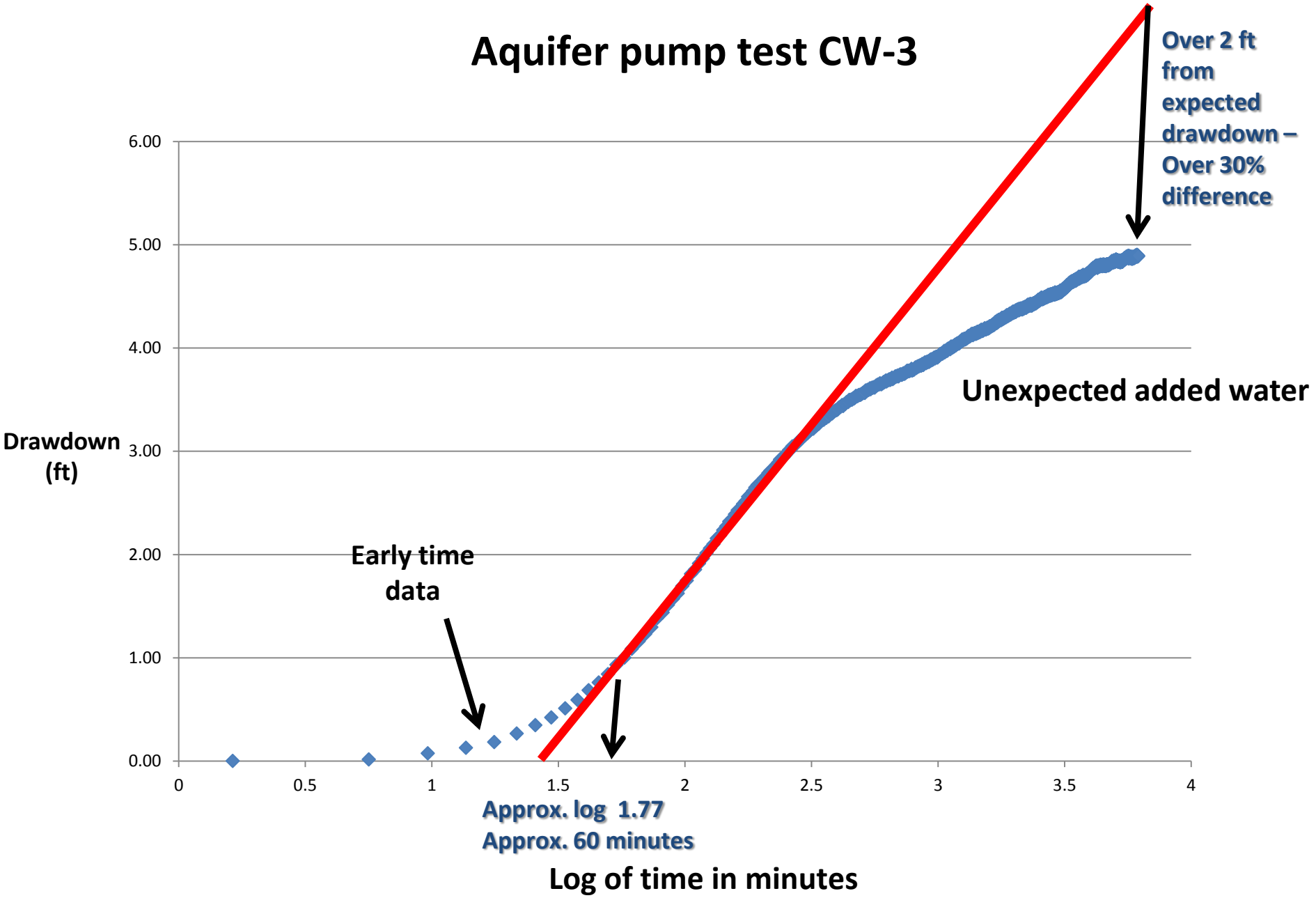
Exhibit number CBR016 - Appendix F - Marsland Pumping Test_Final_REVISED_102815"apparent higher boundary condition"
Note : The report by the MEA consultants include CW-3 as a viable analysis




Aquifer pump test CW-3
Drawdown (ft)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
0.5
1
1.5
2
2.5
3
3.5
4
Log of time in minutes


Aquifer pump test CW-3
Drawdown (ft)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
0.5
1
1.5
2
2.5
3
3.5
4
Early time data
Log of time in minutes


Aquifer pump test CW-3
Over 2 ft from expected drawdown – Over 30% difference
Unexpected added water
Early time data
Drawdown (ft)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
0.5
1
1.5
2
2.5
3
3.5
4
Log of time in minutes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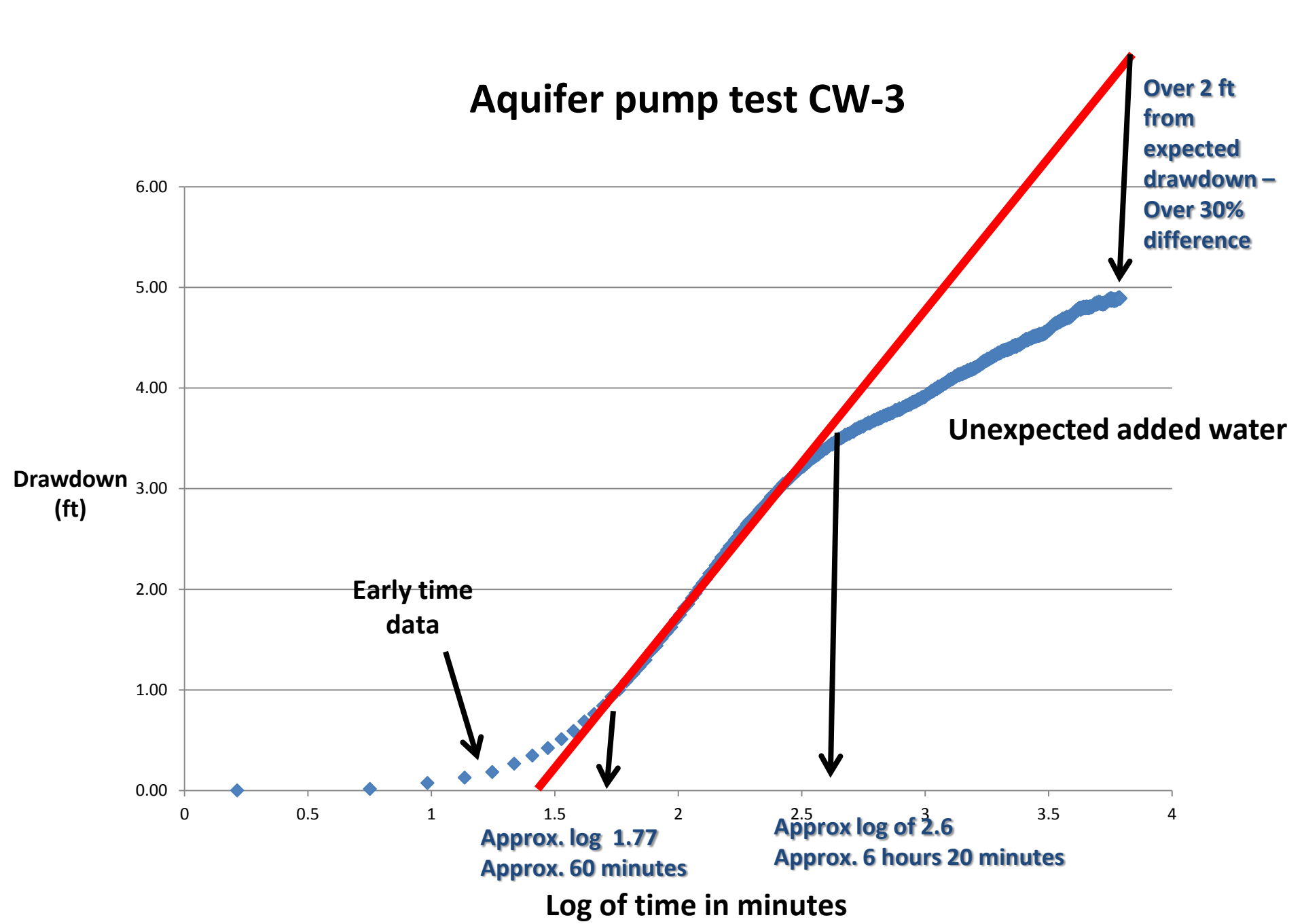
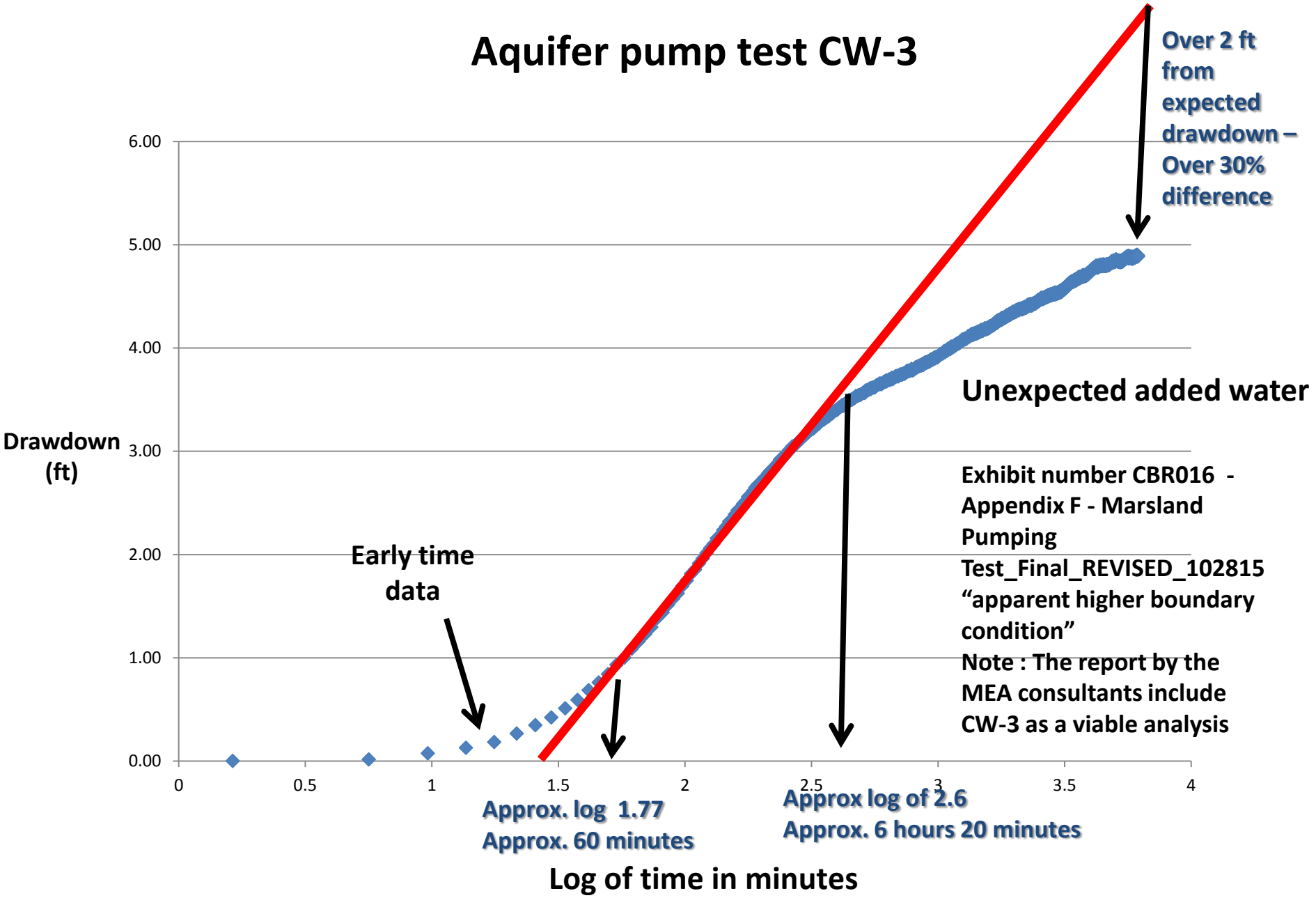
Over 2 ft from expected drawdown – Over 30% difference
Unexpected added water
Drawdown (ft)
Early time data
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
0.5
1
1.5
2
2.5
3
3.5
4
Approx. log 1.77
Approx. 60 minutes
Log of time in minutes


Aquifer pump test CW-3
Over 2 ft from expected drawdown – Over 30% difference
Unexpected added water
Early time data
Drawdown (ft)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
0.5
1
1.5
2
2.5
3
3.5
4
Approx. log 1.77
Approx. 60 minutes
Approx log of 2.6
Approx. 6 hours 20 minutes
Log of time in minutes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Over 2 ft from expected drawdown – Over 30% difference
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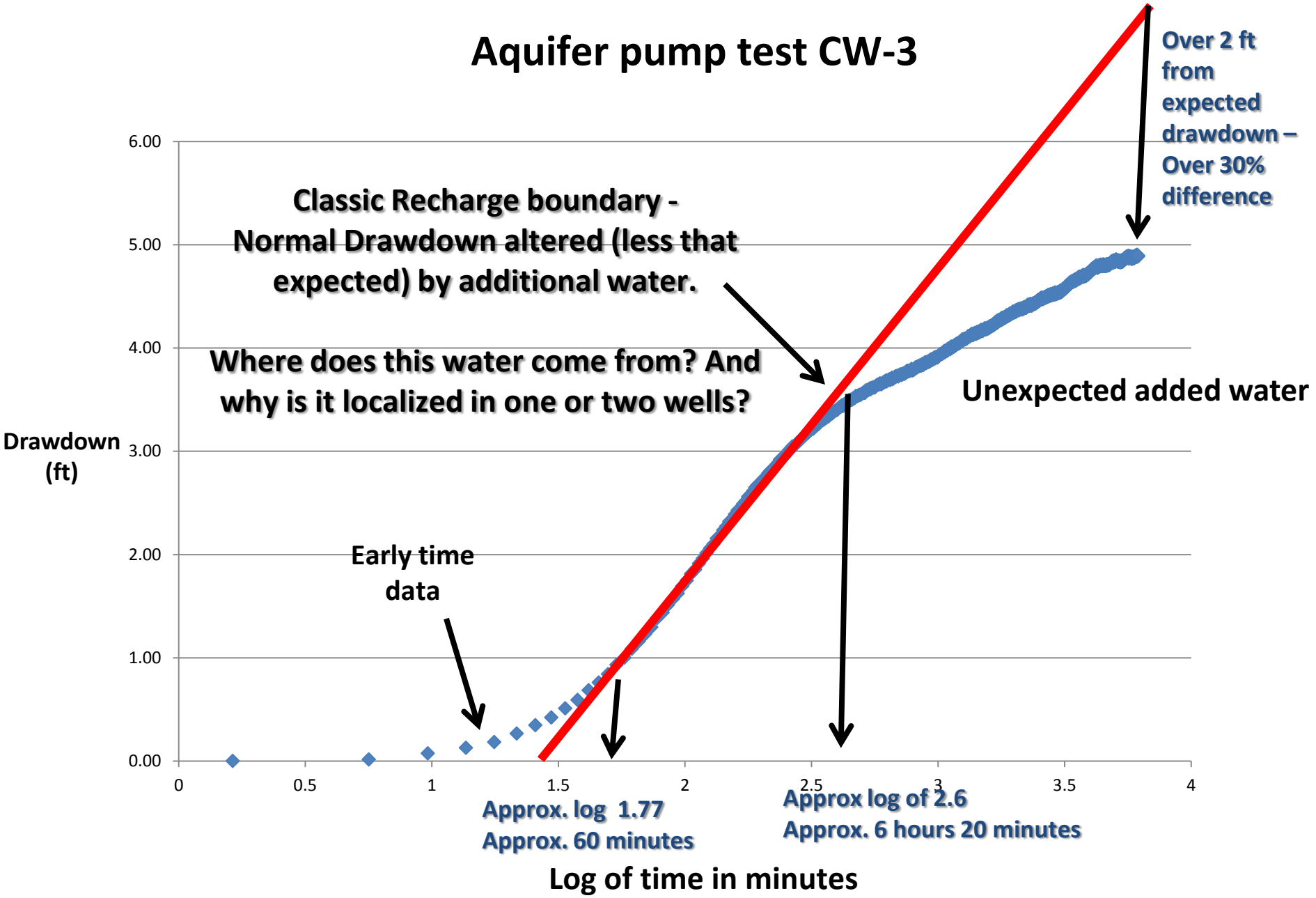
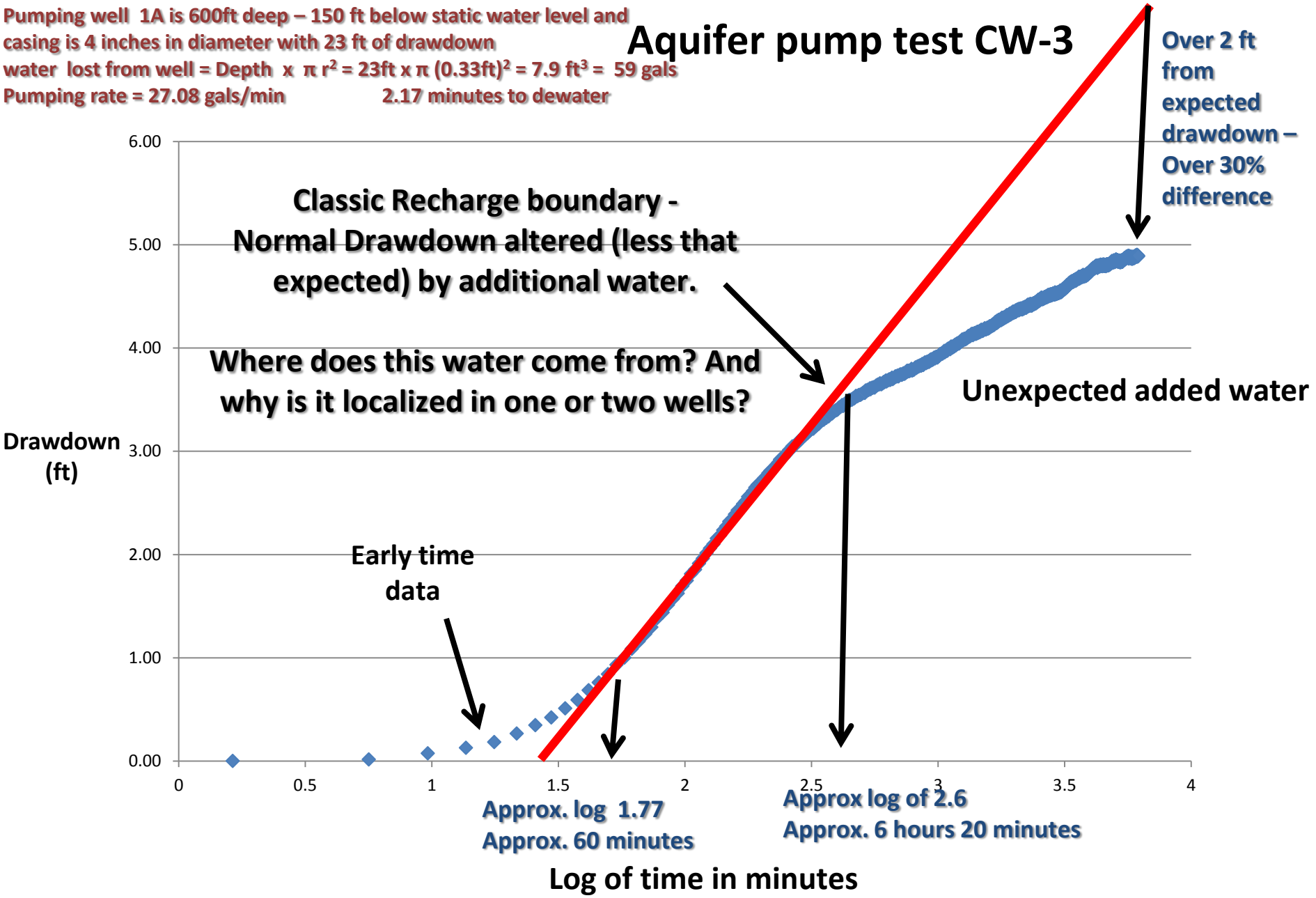
Note : The report by the MEA consultants include CW-3 as a viable analysis
Early time data
Approx. log 1.77
Approx. 60 minutes
Approx log of 2.6
Approx. 6 hours 20 minutes
Drawdown (ft)
Log of time in minutes
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
0.5
1
1.5
2
2.5
3
3.5
4


Aquifer pump test CW-3
Over 2 ft from expected drawdown – Over 30% difference
Classic Recharge boundary - Normal Drawdown altered (less that expected) by additional water.
Where does this water come from? And why is it localized in one or two wells?
Unexpected added water
Early time data
Drawdown (ft)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
0.5
1
1.5
2
2.5
3
3.5
4
Approx. log 1.77
Approx. 60 minutes
Approx log of 2.6
Approx. 6 hours 20 minutes
Log of time in minutes

Pumping well 1A is 600ft deep – 150 ft below static water level and casing is 4 inches in diameter with 23 ft of drawdown

water lost from well = Depth x πr^2 = 23ft x π $(0.33ft)^2$ = 7.9 ft^3 = 59 gals

Pumping rate = 27.08 gals/min 2.17 minutes to dewater



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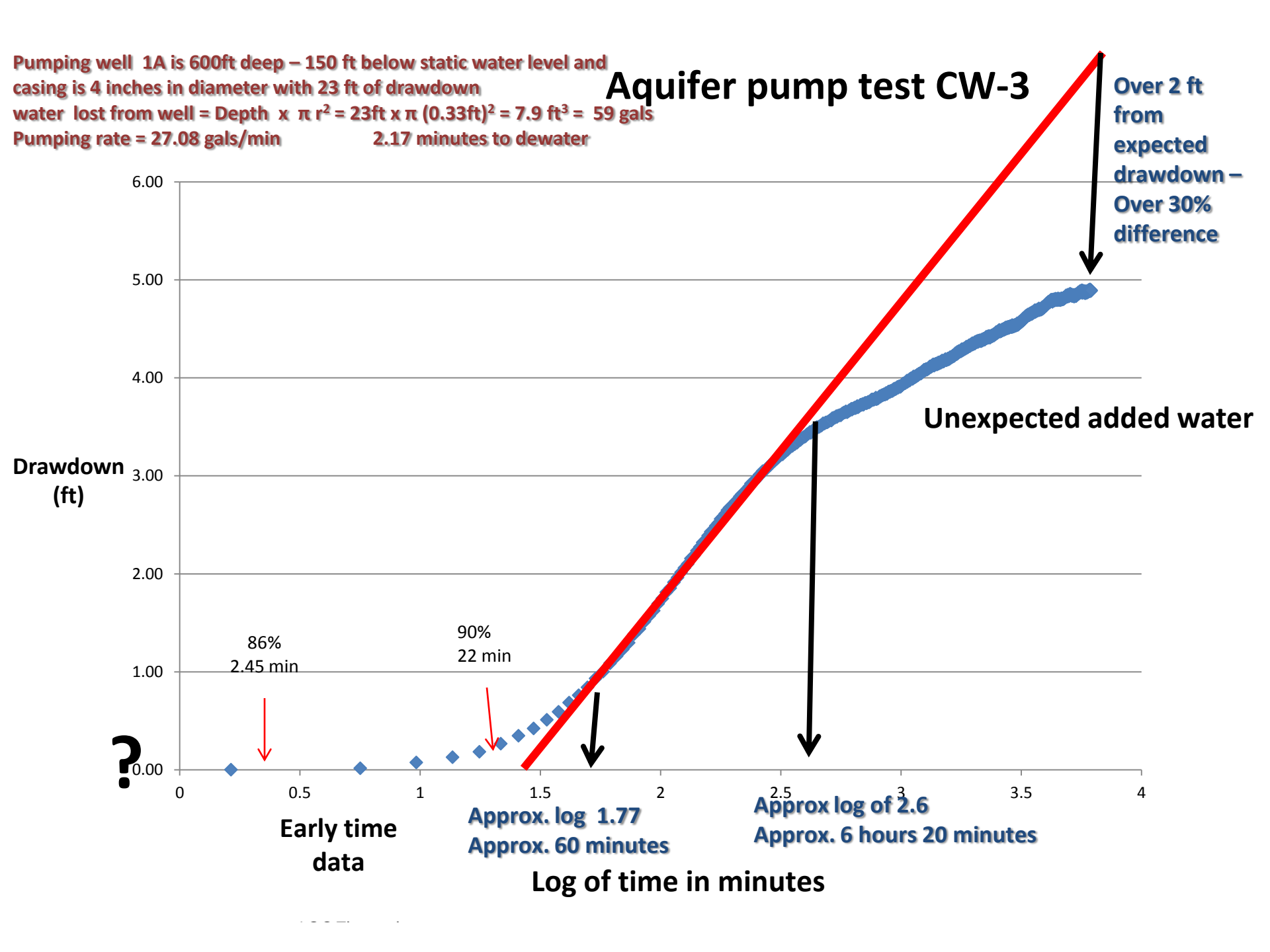

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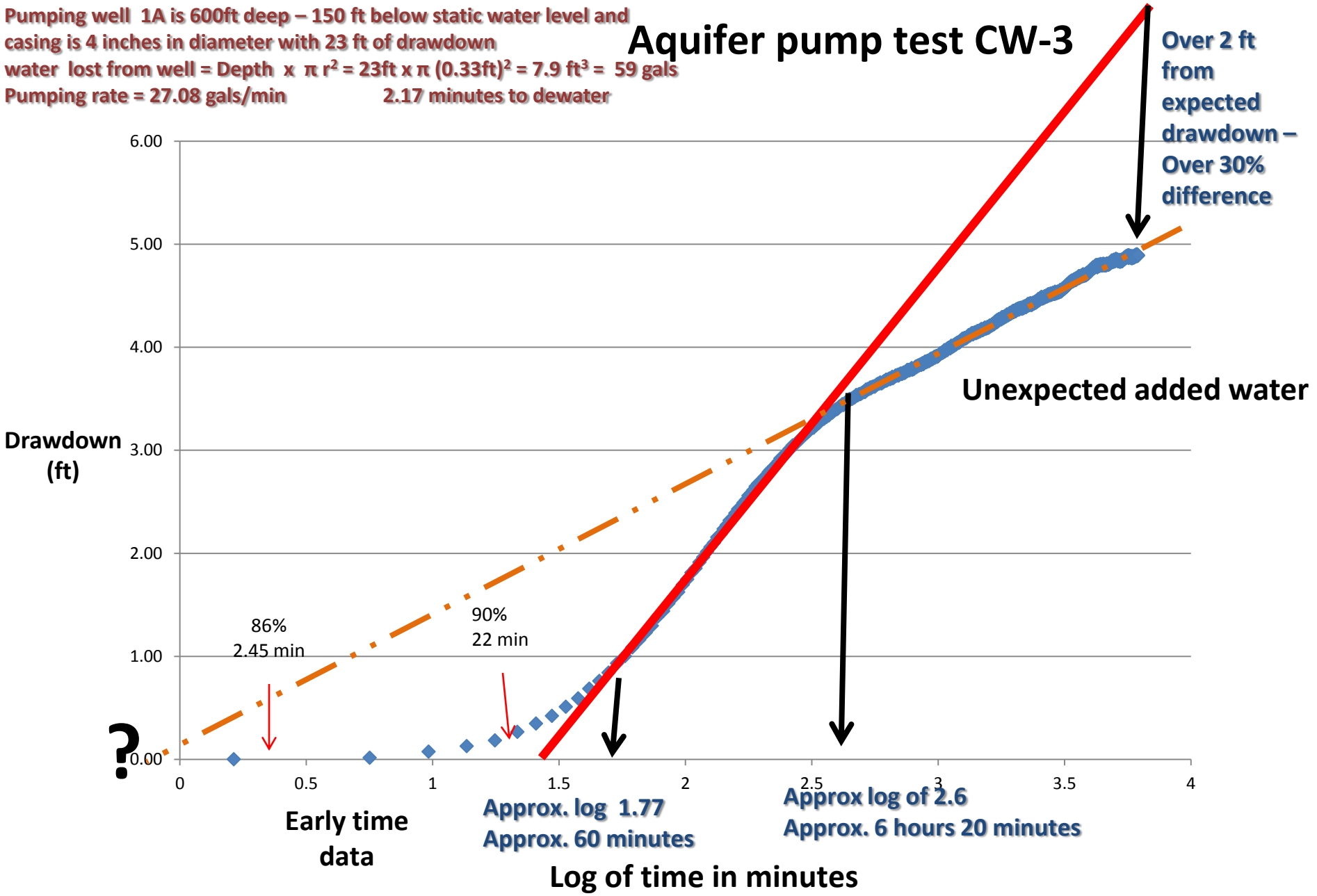

Small values of u (u < 0.01)
$u = r^2S/4Tt$

- U values at 0.01 allow calculation of time element
- $t = r^2S/4Tu$
- Cooper Jacob valid for u < 0.01
- NRC has contended in testimony at CBR that this method is invalid if u > 0.01
- Kruseman and de Ritter (2000)

"an error less than	1%	2%	5%	10%
for u smaller than	0.03	0.05	0.1	0.15"

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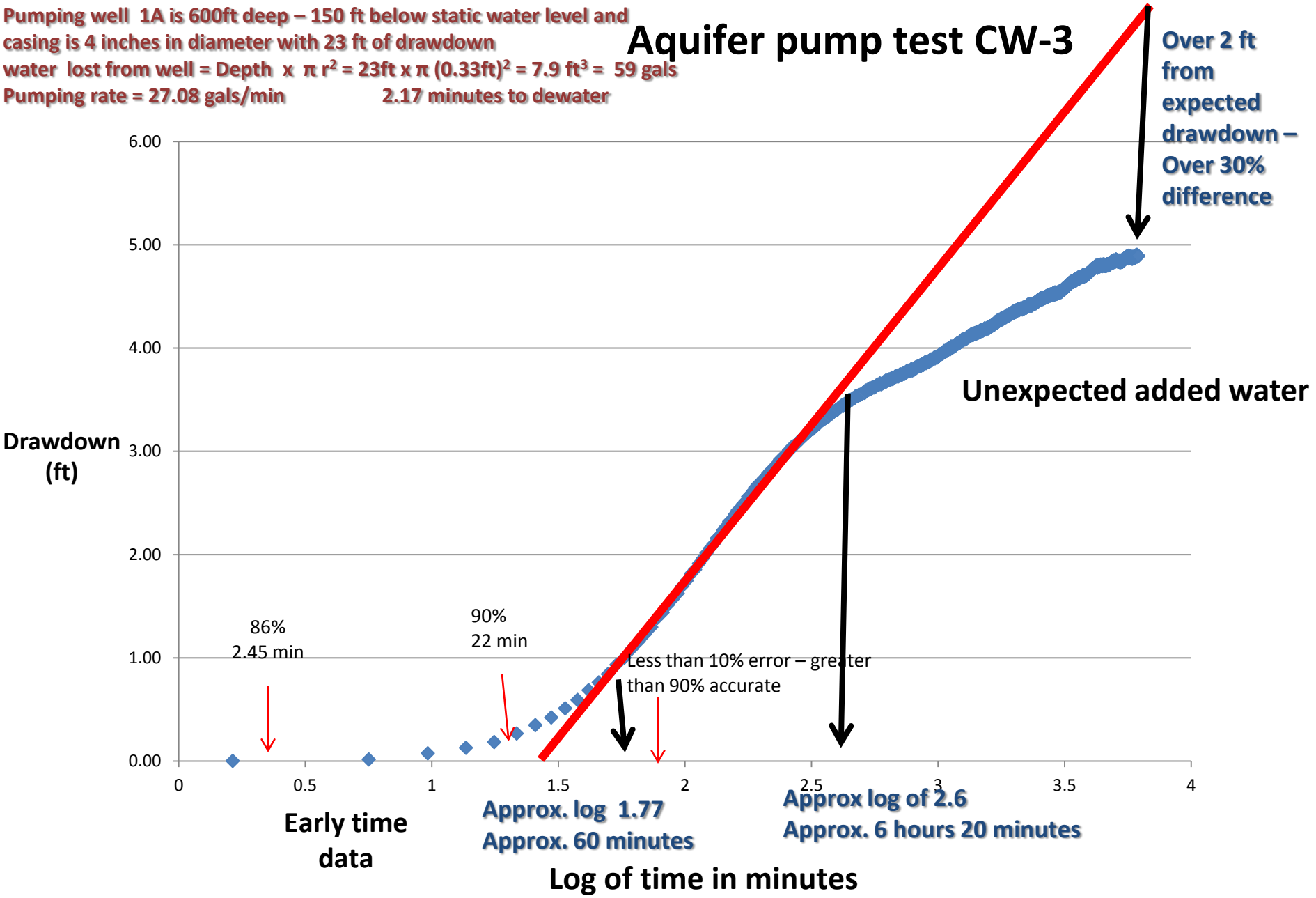

Within 1000ft of CW 3

- Top of underlying Pierre shale varies more than 40ft in elevation – Fig. 10
- Top of BCCPF varies more than 80 ft in elevation – Fig. 9
- Thickness of BCCPF varies more than 80 ft – Fig. 11