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Forsmark site investigation

Single-hole injection tests in borehole KFM08C

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January 2007

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Abstract

Borehole KFM08C is a deep core-drilled borehole within the site investigations in the Forsmark area. The borehole is about 950 m long and it is cased and grouted to about 12 m. The inclination of the borehole is c 60 degrees from the horizontal plane at the surface. The borehole diameter is about 77 mm.

This report presents injection tests performed using the pipe string system PSS3 in borehole KFM08C and the test results.

The main aim of the injection and pressure pulse tests in KFM08C was to characterize the hydraulic conditions of the rock adjacent to the borehole on different measurement scales (100 m, 20 m and 5 m). Hydraulic parameters such as transmissivity and hydraulic conductivit were determined using analysis methods for stationary as well as transient conditions together with the dominating flow regime and possible outer hydraulic boundaries. In addition, a comparison with the results of previously performed difference flow logging in KFM08C was made.

The injection tests gave consistent results on the different measurement scales regarding transmissivity. For almost 70% of the tests, some period with pseudo-radial flow could be identified making a relatively straight-forward transient evaluation possible. The sections 451.0–461.0, 476.0–481.0 and 496.0–501.0 m contribute most to the total transmissivity in KFM08C.

The results of the injection tests were generally consistent with the previous difference flow logging in KFM08C. However, the injection test may in some cases have a tendency to provide higher estimated transmissivity values than the difference flow logging. This may partly be due to a number of tests showing effects of apparent no-flow boundaries by the end of the injection period in KFM08C. Such tests may indicate flow features of limited extension or decreasing hydraulic properties away from the borehole. It may be assumed that sections with such characteristics result in a lower transmissivity for the difference flow logging than for the injection tests since the former predominantly measure interconnected, conductive fracture networks reaching further away from the borehole while the injection tests also may sample fractures with limited extension, close to the borehole. This is due to the rather long preceding flow period for the difference flow logging while the flow period for the injection test is rather short.

The injection tests provide a database for statistical analysis of the hydraulic conductivity distribution along the borehole on the different measurement scales. Basic statistical analysis has been made within this project and basic statistical parameters are presented in this report.

Sammanfattning

Borrhål KFM08C är ett djupt kärnborrhål borrat inom ramen för platsundersökningarna i Forsmarksområdet. Borrhålet är ca 950 m långt och det är försett med foderrör samt har injekterats till ca 12 m. Lutningen i borrhålet är ca 60 grader från horisontalplanet vid ytan och borrhålsdiametern är ca 77 mm.

Denna rapport beskriver genomförda injektionstester med rörgångssystemet PSS3 i borrhål KFM08C samt resultaten från desamma.

Huvudsyftet med injektionstesterna var att karaktärisera de hydrauliska förhållandena i berget i anslutning till borrhålet i olika mätskalor (100 m, 20 m och 5 m). Hydrauliska parametrar såsom transmissivitet och hydraulisk konduktivitet tillsammans med dominerande flödesregim och eventuella yttre hydrauliska randvillkor bestämdes med hjälp av analysmetoder för såväl stationära som transienta förhållanden. En jämförelse med resultaten av den tidigare utförda differensflödesloggningen i KFM08C gjordes också.

Injektionstesterna gav samstämmiga resultat för de olika mätskalorna beträffande transmissivitet. Under närmare 70 procent av testen kunde en viss period med pseudoradiellt flöde identifieras vilket möjliggjorde en standardmässig transient utvärdering. Sektionerna 451,0–461,0, 476,0–481,0 samt 496,0–501,0 bidrar mest till den totala transmissiviteten i KFM08C.

Samstämmigheten var bra mellan resultaten från injektionstesterna och den tidigare utförda differensflödesloggningen i KFM08C. Injektionstesterna hade dock en tendens att indikera generellt högre transmissiviteter än differensflödesloggningen. Detta kan bero på att ett antal tester uppvisade en tydlig negativ hydraulisk gräns i slutet på injektionsfasen i KFM08C. Sådana test indikerar att de hydrauliska egenskaperna minskar med ett ökat avstånd från borrhålet. Det kan antas att sektioner med sådana egenskaper resulterar i lägre transmissivitet för differensflödesloggningen än för injektionstesterna eftersom den förra huvudsakligen mäter konnekterade, konduktiva spricknätverk som sträcker sig längre ut från borrhålet medan injektionstesterna också kan mäta sprickor med begränsad utbredning nära borrhålet. Detta beror i sin tur på att flödesperioden för differensflödesloggningen är mycket längre än för injektionstesterna.

Resultaten från injektionstesterna utgör en databas för statistisk analys av den hydrauliska konduktivitetens fördelning längs borrhålet i de olika mätskalorna. Viss statistisk analys har utförts inom ramen för denna aktivitet och grundläggande statistiska parametrar presenteras i rapporten.

Contents

1 Introduction

Injection tests were carried out in borehole KFM08C at Forsmark, Sweden, in October 2006, by Geosigma AB. Borehole KFM08C is a deep, cored borehole within the on-going site investigation in the Forsmark area. The location of the borehole is shown in Figure 1-1. The borehole is about 950 m long, cased and grouted to c 12 m and at the ground inclined c 60 degrees from the horizontal plane. The borehole is designed as a so called telescopic borehole, with an enlarged diameter in the upper approximately 102 m, below which the borehole diameter is c 77 mm.

In KFM08C, difference flow logging was previously performed during June 2006. According to the results of this investigation, 21 flowing fractures were detected and the most high-transmissive fracture was found at 102.4 m. This fracture was not measured due to the location adjacent to the casing in the borehole making it impossible to seal off this section. Fractures with a relatively high transmissivity were also found at 455.9 m, 456.8 m, 460.5 m, 480.0 m and 499 m. Below 683.6 m, no flowing fractures were identified (Väisäsvaara et al. 2006) /1/.

This document reports the results obtained from the injection tests in borehole KFM08C. The activity is performed within the Forsmark site investigation. The work was carried out in compliance with the SKB internal controlling documents presented in Table 1-1. Data and results were delivered to the SKB site characterization database, SICADA, where they are traceable by the Activity Plan number.

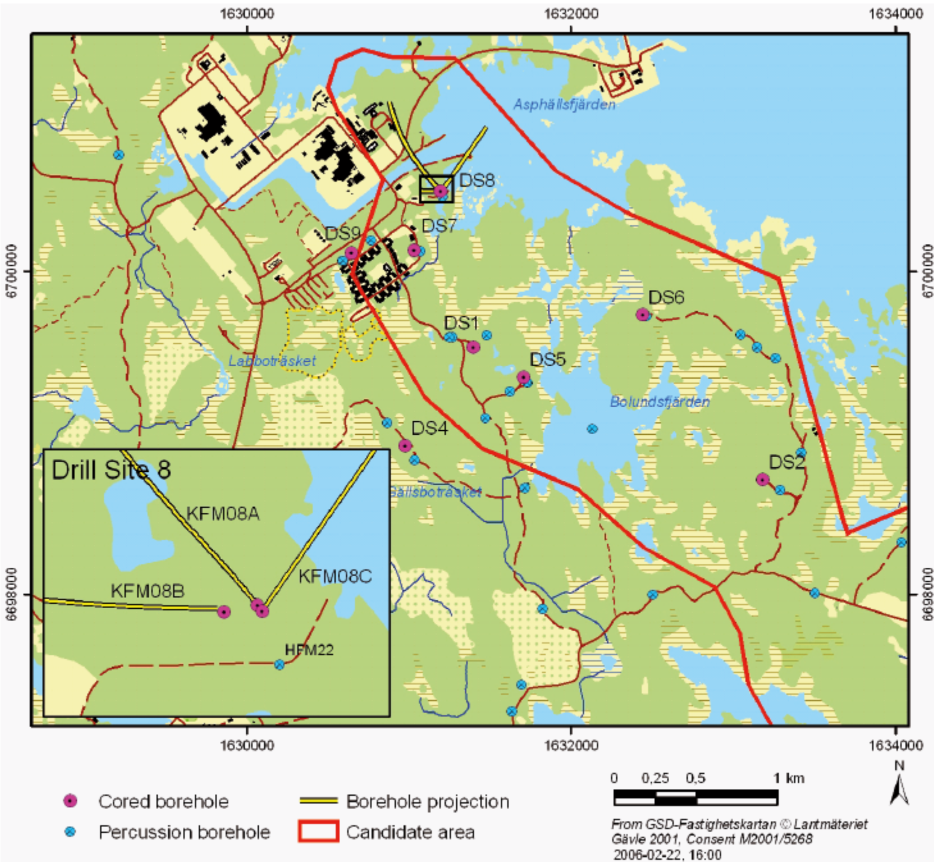

Figure 1-1. The investigation area at Forsmark including the candidate area selected for more detailed investigations. Borehole KFM08C is situated at drill site DS8. The borehole bearings in the figure are approximate since adjustments due to borehole deviation have not been made.

Table 1-1. SKB internal controlling documents for performance of the activity.

Activity plans	Number	Version
Hydraulic injection tests in borehole KFM08C with PSS3	AP PF 400-06-085	1.0
Method documents	**Number**	**Version**
Mätsystembeskrivning (MSB) – Allmän del. Pipe String System (PSS3)	SKB MD 345.100	1.0
Mätsystembeskrivning för: Kalibrering, PSS3	SKB MD 345.122	1.0
Mätsystembeskrivning för: Skötsel, service, serviceprotokoll, PSS3	SKB MD 345.124	1.0
Metodbeskrivning för hydrauliska injektionstester	SKB MD 323.001	1.0
Instruktion för analys av injektions- och enhålspumptester	SKB MD 320.004	1.0
Instruktion för rengöring av borrhålsutrustning och viss markbaserad utrustning	SKB MD 600.004	1.0

2 Objectives

The main aim of the injection tests in borehole KFM08C was to characterize the hydraulic properties of the rock adjacent to the borehole on different measurement scales (100 m, 20 m and 5 m). The primary parameter to be determined was hydraulic transmissivity from which hydraulic conductivity can be derived. The results of the injection tests provide a database which can be used for statistical analyses of the hydraulic conductivity distribution along the borehole on different measurement scales. Basic statistical analyses are presented in this report.

Other hydraulic parameters of interest were flow regimes and outer hydraulic boundaries. These parameters were analysed using transient evaluation on the test responses during the flow- and recovery periods.

A comparison with the results of the previously performed difference flow logging in KFM08C was also included in the activity, as a check of the plausibility of the test results. Further, the combined analysis of the injection tests and the difference flow logging provides a more comprehensive understanding of the hydraulic conditions of boreholes KFM08C.

3 Scope

3.1 Borehole data

Technical data of the tested borehole are shown in Table 3-1 and in Appendix 4. The reference point of the borehole is defined as the centre of top of casing (ToC), given as "Elevation" in the table below. The Swedish National coordinate system (RT90) is used for the horizontal coordinates together with RHB70 for the elevation. "Northing" and "Easting" refer to the top of the boreholes.

3.2 Tests performed

The injection tests in borehole KFM08C, performed according to Activity Plan AP PF 400-06-085 (see Table 1-1), are listed in Table 3-2. The injection tests were carried out with the Pipe String System (PSS3). The test procedure and the equipment are described in the measurement system description for PSS (SKB MD 345.100) and in the corresponding method descriptions for hydraulic injection tests (SKB MD 323.001, Table 1-1).

Table 3-1. Pertinent technical data of borehole KFM08C (printout from SKB database, SICADA).

Borehole length m):	951.08				
Drilling Period(s):	**From Date**	**To Date**	**Secup (m)**	**Seclow (m)**	**Drilling Type**
	2005-04-13	2005-04-26	0.00	100.48	Percussion drilling
	2006-01-30	2006-05-09	100.48	951.08	Core drilling
Starting point coordinate:	**Length (m)**	**Northing (m)**	**Easting (m)**	**Elevation**	**Coord System**
	0.00	6700495.88	1631187.57	2.47	RT90–RHB70
	3.00	6700497.07	1631188.43	–0.14	RT90–RHB70
Angles:	**Length (m)**	**Bearing**	**Inclination (– = down)**		**Coord System**
	0.00	35.88	–60.46		RT90-RHB70
Borehole diameter:	**Secup (m)**	**Seclow (m)**	**Hole Diam (m)**		
	0.19	12.06	0.339		
	12.06	74.00	0.193		
	74.00	100.44	0.191		
	100.44	100.48	0.161		
	100.48	102.23	0.086		
	102.23	951.08	0.077		
Core diameter:	**Secup (m)**	**Seclow (m)**	**Core Diam (m)**		
	100.48	951.08	0.051		
Casing diameter:	**Secup (m)**	**Seclow (m)**	**Case In (m)**	**Case Out (m)**	
	0.00	12.06	0.200	0.208	
	0.16	11.78	0.310	0.323	
	11.78	11.86	0.281	0.339	

Some of the tests were not performed as intended because the time required for achieving a constant head in the test section was judged to be too long or, in other cases, equipment malfunctions caused pressure and/or flow rate disturbances. Whenever such disturbances were expected to affect data evaluation, the test was repeated. Test number (Test no in Table 3-2) refers to the number of tests performed in the actual section. For evaluation, data from the last test in each section were generally used.

The upper and lower packer positions for the injection test sections were, whenever possible, as close as possible to the section limits used during the previous difference flow logging in 5 m sections in KFM08C (Väisäsvaara et al. 2006) /1/. Injection tests performed with 100 and 20 m test sections used the corresponding section limits as in the previous difference flow logging whereas about half of the 5 m injection tests had deviating section limits. These limits were intentionally shifted from the section limits used during the difference flow logging in order to avoid cavities and major fractures in the borehole. Therefore, the section limits used for the injection tests and difference flow logging respectively differed with a maximum of 2.49 m along the borehole. However, for about half the number of test sections, the maximum difference was less than 0.31 m.

Table 3-2. Single-hole injection tests performed in borehole KFM08C.

Borehole Bh ID	Test section secup	seclow	Section length	Test type[1]) (1–6)	Test no	Test start date, time YYYYMMDD hh:mm	Test stop date, time YYYYMMDD hh:mm
KFM08C	108.50	208.50	100.00	3	1	2006-10-04 08:30	2006-10-04 10:23
KFM08C	108.50	208.50	100.00	3	2	2006-10-06 08:14	2006-10-06 10:04
KFM08C	208.50	308.50	100.00	3	1	2006-10-04 11:21	2006-10-04 14:02
KFM08C	308.50	408.50	100.00	3	1	2006-10-04 14:58	2006-10-04 16:39
KFM08C	408.50	508.50	100.00	3	1	2006-10-04 18:14	2006-10-04 19:53
KFM08C	508.50	608.50	100.00	3	1	2006-10-04 20:54	2006-10-04 22:32
KFM08C	608.50	708.50	100.00	3	1	2006-10-05 06:07	2006-10-05 07:57
KFM08C	708.50	808.50	100.00	3	1	2006-10-05 08:52	2006-10-05 09:52
KFM08C	738.50	838.50	100.00	3	1	2006-10-05 10:17	2006-10-05 11:19
KFM08C	838.50	938.50	100.00	3	1	2006-10-05 14:24	2006-10-05 16:16
KFM08C	108.50	128.50	20.00	3	1	2006-10-09 12:42	2006-10-09 13:56
KFM08C	128.50	148.50	20.00	3	1	2006-10-09 14:20	2006-10-09 15:34
KFM08C	148.50	168.50	20.00	3	1	2006-10-09 15:51	2006-10-09 17:09
KFM08C	168.50	188.50	20.00	3	1	2006-10-10 06:21	2006-10-10 07:36
KFM08C	188.50	208.50	20.00	3	1	2006-10-10 07:56	2006-10-10 08:54
KFM08C	208.50	228.50	20.00	3	1	2006-10-10 09:08	2006-10-10 10:24
KFM08C	228.50	248.50	20.00	3	1	2006-10-10 10:45	2006-10-10 12:51
KFM08C	248.50	268.50	20.00	3	1	2006-10-10 13:09	2006-10-10 13:53
KFM08C	268.50	288.50	20.00	3	1	2006-10-10 14:08	2006-10-10 15:24
KFM08C	288.50	308.50	20.00	3	1	2006-10-10 15:47	2006-10-10 16:31
KFM08C	408.50	428.50	20.00	3	1	2006-10-10 17:51	2006-10-10 19:08
KFM08C	428.50	448.50	20.00	3	1	2006-10-12 16:47	2006-10-12 17:45
KFM08C	431.50	451.50	20.00	3	1	2006-10-10 19:29	2006-10-10 20:19
KFM08C	448.50	468.50	20.00	3	1	2006-10-10 20:56	2006-10-10 22:09
KFM08C	468.50	488.50	20.00	3	1	2006-10-10 22:26	2006-10-10 23:40
KFM08C	488.50	508.50	20.00	3	1	2006-10-11 07:30	2006-10-11 08:45
KFM08C	508.50	528.50	20.00	3	1	2006-10-11 09:44	2006-10-11 10:59
KFM08C	528.50	548.50	20.00	3	1	2006-10-11 12:38	2006-10-11 13:55
KFM08C	548.50	568.50	20.00	3	1	2006-10-11 16:12	2006-10-11 17:04
KFM08C	568.50	588.50	20.00	3	1	2006-10-11 19:42	2006-10-11 20:49
KFM08C	588.50	608.50	20.00	3	1	2006-10-11 21:22	2006-10-11 22:24
KFM08C	608.50	628.50	20.00	3	1	2006-10-11 22:47	2006-10-11 23:37
KFM08C	628.50	648.50	20.00	3	1	2006-10-12 06:55	2006-10-12 07:47
KFM08C	648.50	668.50	20.00	3	1	2006-10-12 08:07	2006-10-12 08:59

Borehole Bh ID	Test section secup	seclow	Section length	Test type[1]) (1–6)	Test no	Test start date, time YYYYMMDD hh:mm	Test stop date, time YYYYMMDD hh:mm
KFM08C	668.50	688.50	20.00	3	1	2006-10-12 09:18	2006-10-12 10:14
KFM08C	668.50	688.50	20.00	3	2	2006-10-12 12:37	2006-10-12 13:53
KFM08C	688.50	708.50	20.00	3	1	2006-10-12 10:40	2006-10-12 11:54
KFM08C	148.50	153.50	5.00	3	1	2006-10-13 14:45	2006-10-13 16:02
KFM08C	153.50	158.50	5.00	3	1	2006-10-13 16:12	2006-10-13 17:02
KFM08C	158.50	163.50	5.00	3	1	2006-10-16 08:17	2006-10-16 09:32
KFM08C	163.50	168.50	5.00	3	1	2006-10-16 09:42	2006-10-16 10:36
KFM08C	168.50	173.50	5.00	3	1	2006-10-16 10:48	2006-10-16 12:43
KFM08C	173.50	178.50	5.00	3	1	2006-10-16 12:54	2006-10-16 13:34
KFM08C	178.50	183.50	5.00	3	1	2006-10-16 13:43	2006-10-16 15:01
KFM08C	183.50	188.50	5.00	3	1	2006-10-16 15:17	2006-10-16 16:33
KFM08C	208.50	213.50	5.00	3	1	2006-10-17 08:16	2006-10-17 08:57
KFM08C	213.50	218.50	5.00	3	1	2006-10-17 09:12	2006-10-17 09:55
KFM08C	218.50	223.50	5.00	3	1	2006-10-17 10:07	2006-10-17 11:25
KFM08C	223.50	228.50	5.00	3	1	2006-10-17 12:29	2006-10-17 13:46
KFM08C	228.50	233.50	5.00	3	1	2006-10-17 14:02	2006-10-17 15:17
KFM08C	233.50	238.50	5.00	3	1	2006-10-17 15:30	2006-10-17 16:44
KFM08C	238.50	243.50	5.00	3	1	2006-10-18 08:21	2006-10-18 09:35
KFM08C	243.50	248.50	5.00	3	1	2006-10-18 10:02	2006-10-18 10:45
KFM08C	268.50	273.50	5.00	3	1	2006-10-18 11:06	2006-10-18 12:27
KFM08C	273.50	278.50	5.00	3	1	2006-10-18 12:45	2006-10-18 13:26
KFM08C	278.50	283.50	5.00	3	1	2006-10-18 13:36	2006-10-18 14:50
KFM08C	283.50	288.50	5.00	3	1	2006-10-18 15:02	2006-10-18 15:43
KFM08C	448.50	453.50	5.00	3	1	2006-10-19 08:48	2006-10-19 09:36
KFM08C	451.00	456.00	5.00	3	1	2006-10-19 09:53	2006-10-19 11:11
KFM08C	456.00	461.00	5.00	3	1	2006-10-19 11:25	2006-10-19 13:21
KFM08C	461.00	466.00	5.00	3	1	2006-10-19 13:34	2006-10-19 14:51
KFM08C	466.00	471.00	5.00	3	1	2006-10-19 15:04	2006-10-19 16:28
KFM08C	471.00	476.00	5.00	3	1	2006-10-19 16:41	2006-10-19 17:24
KFM08C	476.00	481.00	5.00	3	1	2006-10-20 08:44	2006-10-20 10:03
KFM08C	481.00	486.00	5.00	3	1	2006-10-20 10:16	2006-10-20 11:03
KFM08C	486.00	491.00	5.00	3	1	2006-10-20 12:29	2006-10-20 13:12
KFM08C	491.00	496.00	5.00	3	1	2006-10-20 13:28	2006-10-20 14:15
KFM08C	496.00	501.00	5.00	3	1	2006-10-20 14:27	2006-10-20 15:45
KFM08C	501.00	506.00	5.00	3	1	2006-10-23 08:31	2006-10-23 09:14
KFM08C	506.00	511.00	5.00	3	1	2006-10-23 09:30	2006-10-23 10:12
KFM08C	511.00	516.00	5.00	3	1	2006-10-23 10:23	2006-10-23 11:04
KFM08C	516.00	521.00	5.00	3	1	2006-10-23 11:13	2006-10-23 13:18
KFM08C	521.00	526.00	5.00	3	1	2006-10-23 13:29	2006-10-23 14:47
KFM08C	526.00	531.00	5.00	3	1	2006-10-23 14:57	2006-10-23 16:12
KFM08C	531.00	536.00	5.00	3	1	2006-10-23 16:23	2006-10-23 17:36
KFM08C	536.00	541.00	5.00	3	1	2006-10-24 08:16	2006-10-24 08:59
KFM08C	541.00	546.00	5.00	3	1	2006-10-24 09:09	2006-10-24 09:49
KFM08C	543.50	548.50	5.00	3	1	2006-10-24 10:03	2006-10-24 10:46
KFM08C	668.50	673.50	5.00	3	1	2006-10-24 13:18	2006-10-24 14:04
KFM08C	671.00	676.00	5.00	3	1	2006-10-24 14:14	2006-10-24 15:29
KFM08C	676.00	681.00	5.00	3	1	2006-10-24 15:40	2006-10-24 16:26
KFM08C	681.00	686.00	5.00	3	1	2006-10-24 16:43	2006-10-25 09:07
KFM08C	686.00	691.00	5.00	3	1	2006-10-25 09:15	2006-10-25 09:56
KFM08C	691.00	696.00	5.00	3	1	2006-10-25 10:06	2006-10-25 11:20
KFM08C	697.00	702.00	5.00	3	1	2006-10-25 12:16	2006-10-25 12:56
KFM08C	702.00	707.00	5.00	3	1	2006-10-25 13:05	2006-10-25 13:45
KFM08C	703.50	708.50	5.00	3	1	2006-10-25 13:51	2006-10-25 14:32

[1]) 3: Injection test.

3.3 Equipment checks

The PSS3 equipment was serviced, according to SKB internal controlling documents (SKB MD 345.124, service, and SKB MD 345.122, calibration), in January 2006.

Functioning checks of the equipment were performed during the installation of the PSS equipment at the test site. In order to check the function of the pressure sensors, the air pressure was recorded and found to be as expected. While lowering, the sensors showed good agreement with the total head of water (p/ρg). The temperature sensor displayed expected values in the water.

Simple functioning checks of down-hole sensors were done at every change of test section interval. Checks were also made continuously while lowering the pipe string along the borehole.

4 Description of equipment

4.1 Overview

4.1.1 Measurement container

All of the equipment needed to perform the injection tests is located in a steel container (Figure 4-1). The container is divided into two compartments; a data-room and a workshop. The container is placed on pallets in order to obtain a suitable working level in relation to the borehole casing.

The hoisting rig is of a hydraulic chain-feed type. The jaws, holding the pipe string, are opened hydraulically and closed mechanically by springs. The rig is equipped with a load transmitter and the load limit may be adjusted. The maximum load is 22 kN.

The packers and the test valve are operated hydraulically by water filled pressure vessels. Expansion and release of packers, as well as opening and closing of the test valve, is done using magnetic valves controlled by the software in the data acquisition system.

The injection system consists of a tank, a pump and a flow meter. The injection flow rate may be manually or automatically controlled. At small flow rates, a water filled pressure vessel connected to a nitrogen gas regulator is used instead of the pump.

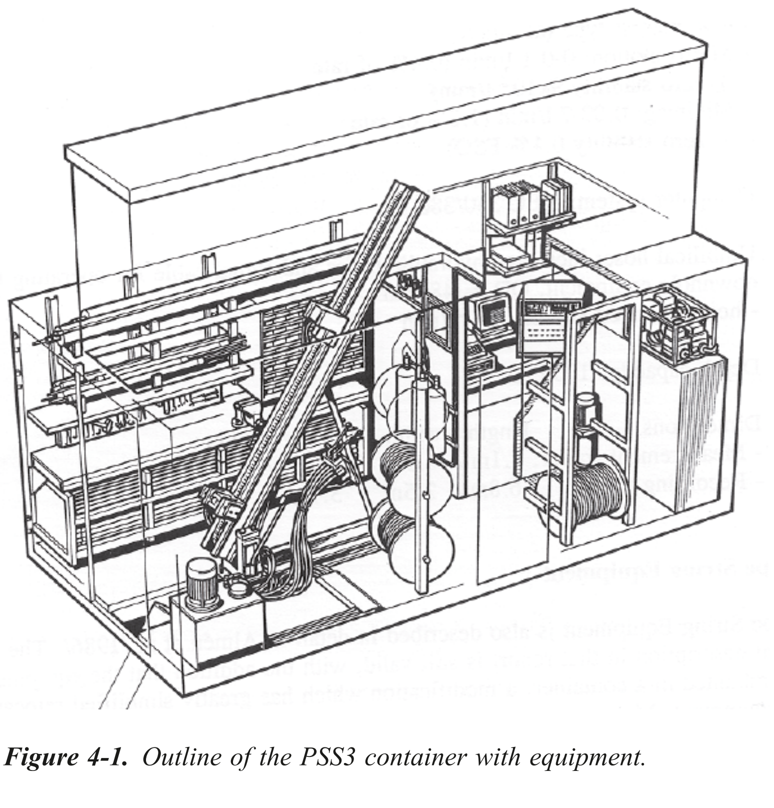

Figure 4-1. *Outline of the PSS3 container with equipment.*

4.1.2 Down-hole equipment

A schematic drawing of the down-hole equipment is shown in Figure 4-2. The pipe string consists of aluminium pipes of 3 m length, connected by stainless steel taps sealed with double o-rings. Pressure is measured above (P_a), within (P) and below (P_b) the test section, which is isolated by two packers. The groundwater temperature in the test section is also measured. The hydraulic connection between the pipe string and the test section can be closed or opened by a test valve operated by the measurement system.

At the lower end of the borehole equipment, a level indicator (calliper type) gives a signal as the reference depth marks along the borehole are passed.

The length of the test section may be varied (5, 20 or 100 metres).

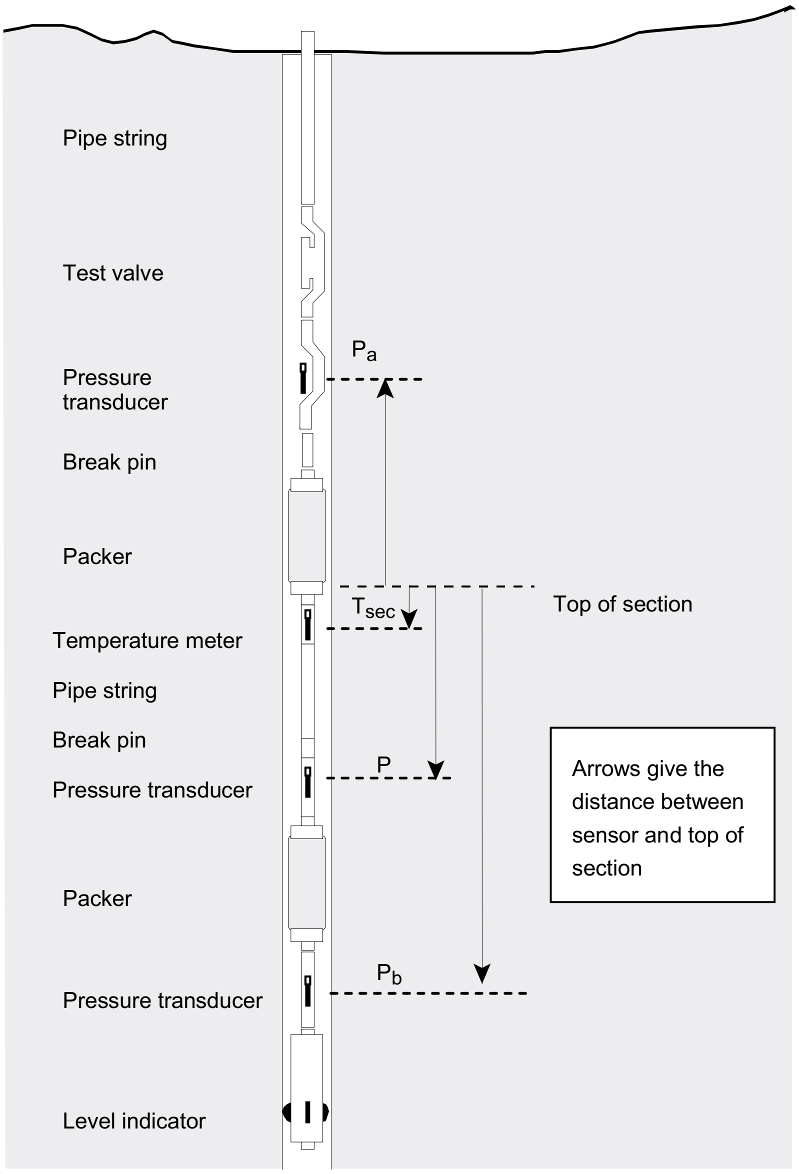

Figure 4-2. *Schematic drawing of the down-hole equipment in the PSS3 system.*

4.2 Measurement sensors

Technical data for the measurement sensors in the PSS system together with corresponding data of the system are shown in Table 4-1. The sensors are components of the PSS system. The accuracy of the PSS system may also be affected by the I/O-unit, cf Figure 4-3, and the calibration of the system.

The sensor positions are fixed relative to the top of the test section. In Table 4-2, the position of the sensors is given with top of test section as reference (Figure 4-2).

Table 4-1. Technical data for sensors together with estimated data for the PSS system (based on current experience).

Technical specification Parameter		Unit	Sensor	PSS	Comments
Absolute pressure	Output signal Meas. range Resolution Accuracy[1]	mA MPa kPa % F.S	4–20 0–13.5 < 1.0 0.1		
Differential pressure, 200 kPa	Accuracy	kPa		< ± 5	Estimated value
Temperature	Output signal Meas. range Resolution Accuracy	mA °C °C °C	4–20 0–32 < 0.01 ± 0.1		
Flow Qbig	Output signal Meas. range Resolution Accuracy[2]	mA m^3/s m^3/s % O.R	4–20 $1.67 \cdot 10^{-5}$–$1.67 \cdot 10^{-3}$ $6.7 \cdot 10^{-8}$ 0.15–0.3	< 1.5	The specific accuracy is depending on actual flow
Flow Qsmall	Output signal Meas. range Resolution Accuracy[3]	mA m^3/s m^3/s % O.R	4–20 $1.67 \cdot 10^{-8}$–$1.67 \cdot 10^{-5}$ $6.7 \cdot 10^{-10}$ 0.1–0.4	0.5–20	The specific accuracy is depending on actual flow

[1] 0.1% of Full Scale. Includes hysteresis, linearity and repeatability.

[2] Maximum error in % of actual reading (% o.r.).

[3] Maximum error in % of actual reading (% o.r.). The higher numbers correspond to the lower flow.

Table 4-2. Position of sensors in the borehole and displacement volume of equipment in the test section in borehole KFM08C.

Parameter	Length of test section (m) 5 (L)	5 (m)	20 (L)	20 (m)	100 (L)	100 (m)
Equipment displacement volume in test section[1]	3.6		13		61	
Total volume of test section[2]	23.5		93.9		469.3	
Position for sensor P_a, pressure above test section, (m above secup)[3]		1.88		1.87		1.88
Position for sensor P, pressure in test section, (m above secup)[3]		–4.12		–19.12		–99.12
Position for sensor T_{sec}, temperature in test section, (m above secup)[3]		–0.98		–0.98		–0.98
Position for sensor P_b, pressure below test section, (m above secup)[3]		–6.99		–21.99		–101.99

[1] Displacement volume in test section due to pipe string, signal cable, sensors and packer ends (in litres).

[2] Total volume of test section (V= section length*π*d²/4) (in litres).

[3] Position of sensor relative top of test section. A negative value indicates a position below top of test section, (secup).

4.3 Data acquisition system

The data acquisition system in the PSS equipment contains a standard office PC connected to an I/O-unit (Datascan 7320). Using the Orchestrator software, pumping and injection tests are monitored and borehole sensor data are collected. In addition to the borehole parameters, packer and atmospheric pressure, container air temperature and water temperature are logged. Test evaluation may be performed on-site after a conducted test. An external display enables monitoring of test parameters.

The data acquisition system may be used to start and stop the automatic control system (computer and servo motors). These are connected as shown in Figure 4-3. The control system monitors the flow regulator and uses differential pressure across the regulating valve together with pressure in test section as input signals.

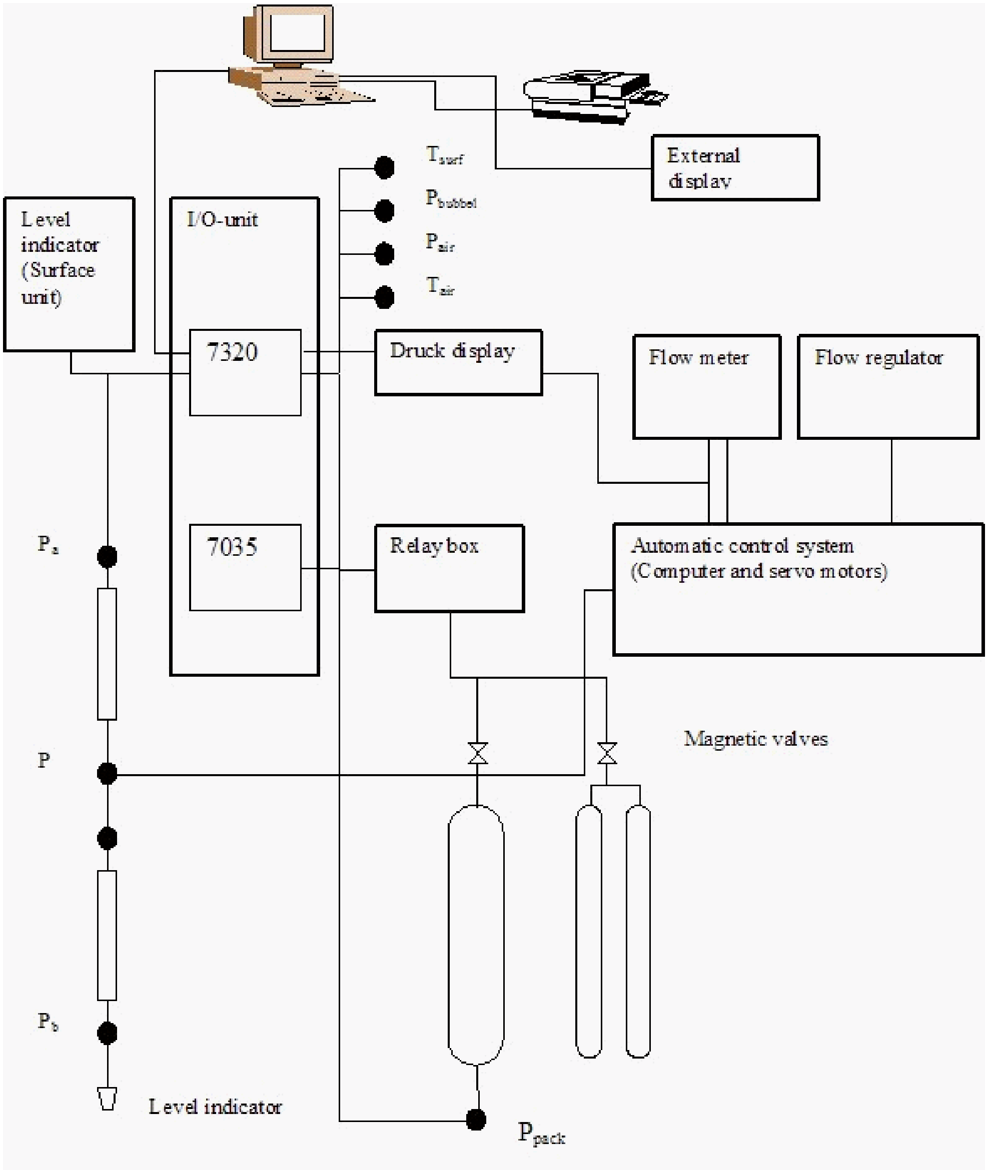

Figure 4-3. *Schematic drawing of the data acquisition system and the automatic control system in PSS.*

5 Execution

5.1 Preparation

5.1.1 Calibration

All sensors included in PSS are calibrated at the Geosigma engineering service station in Uppsala. Calibration is generally performed at least every year. Results from calibration, e.g. calibration constants, of sensors are kept in a document folder in PSS. If a sensor is replaced at the test site, calibration constants are altered as well. If a new, un-calibrated, sensor is to be used, calibration may be performed afterwards and data re-calculated.

5.1.2 Functioning checks

Equipment functioning checks were performed during the establishment of PSS at the test site. Simple function checks of down-hole sensors were done at every change of test section length, as well as while lowering the pipe string along the borehole.

5.1.3 Cleaning of equipment

Cleaning of the borehole equipment was performed according to the cleaning instruction SKB MD 600.004 (see Table 1-1), level 1.

5.2 Test performance

5.2.1 Test principle

The injection tests in KFM08C were carried out while maintaining a constant head of generally 200 kPa (20 m) in the test section. Before start of the injection period, approximately steady-state pressure conditions prevailed in the test section. After the injection period, the pressure recovery was measured.

For injection tests in KFM08C the injection phase was interrupted if the injection flow was clearly below the measurement limit. Thereafter, the recovery was measured for at least 5 minutes to verify the low conductivity of the section.

5.2.2 Test procedure

Generally, the tests were performed according to the Activity Plan AP PF 400-06-085. Exceptions to this are presented in Section 5.5.

A test cycle of a standard injection test includes the following phases: 1) Transfer of down-hole equipment to the next section, 2) Packer inflation, 3) Pressure stabilisation, 4) Injection, 5) Pressure recovery and 6) Packer deflation.

The estimated times for the various phases are presented in Table 5-1. Regarding the packer inflation times and actual injection and recovery times, slightly different procedures were used for the tests in 100 m sections compared to the tests in 20 m and 5 m sections in accordance with AP PF 400-06-085. Furthermore, slightly longer test times were used for the tests in 100 m sections, cf Table 5-1.

Table 5-1. Packer inflation times, pressure stabilisation times and test times used for the injection tests in KFM08C.

Test section length (m)	Packer inflation time (min)	Time for pressure stabilisation (min)	Injection period (min)	Recovery period (min)	Total time/test (min)[1)]
100	30	15	30	30	105
20	25	5	20	20	70
5	25	5	20	20	70

[1)] Exclusive of trip times in the borehole.

5.2.3 Test strategy

Firstly, tests in 100 m sections were performed within the interval 108.5–938.5 m. The limits of the test sections were, as far as possible, the same as were used by the difference flow logging, to facilitate comparison of the results.

Secondly, the 100 m sections with a definable flow rate were measured in five successive injection tests using 20 m section length. The tests in 20 m sections were carried out with the same intervals as the 100 m sections.

Finally, tests with 5 m section length were conducted in the 20 m sections which had a definable flow rate. In order to avoid cavities in the borehole some of the section limits were intentionally shifted compared to the original 20 m test section limits.

Since the results of the tests in 100 m sections have a strong effect on the continued test program (i.e. whether a 100 m section would be measured with shorter sections as well), it was particularly important to ensure accurate results of these tests, including sections close to the lower measurement limit.

The total number of injection tests was thus dependent on the results of the previous tests.

5.3 Data handling

With the PSS system, primary data are handled using the Orchestrator software (Version 2.3.8). During a test, data are continuously logged in *.odl-files. After the test is finished, a report file (*.ht2) with space separated data is generated. The *.ht2-file (mio-format) contains logged parameters as well as test-specific information, such as calibration constants and background data. The parameters are presented as percentage of sensor measurement range and not in engineering units. The report file in ASCII-format is the raw data file delivered to the data base SICADA.

The *.ht2-files are automatically named with borehole id, top of test section and date and time of test start (as for example _KFM08C_0108.50_200610040830.ht2). The name differs slightly from the convention stated in Instruction for analysis of injection and single-hole pumping tests, SKB MD 320.004. Using the IPPLOT software (Version 3.0), the *.ht2-files are converted to parameter files suitable for plotting using the code SKB-plot and analysis with the AQTESOLV software.

A backup of data files was created on a regular basis by CD-storage and by sending the files to the Geosigma office in Uppsala by a file transfer protocol. A file description table is presented in Appendix 1.

5.4 Analysis and interpretation

5.4.1 General

As described in Section 5.2.1, the injection tests in KFM08C were performed as transient constant head tests followed by a pressure recovery period. From the injection period, the (reciprocal) flow rate versus time was plotted in log-log and lin-log diagrams together with the corresponding derivative. From the recovery period, the pressure was plotted versus Agarwal equivalent time in lin-log and log-log diagrams, respectively, together with the corresponding derivative. The routine data processing of the measured data was done according to the Instruction for analysis of injection and single-hole pumping tests (SKB MD 320.004).

For evaluation of the test data, no corrections of the measured flow rate and absolute pressure data (e.g. due to barometric pressure variations or tidal fluctuations) have been made. For short-time single-hole tests, such corrections are generally not needed, unless very small pressure changes are applied. No subtraction of the barometric pressure from the measured absolute pressure has been made, since the length of the test periods are short relative to the time scale for barometric pressure changes. In addition, pressure differences rather than the pressure magnitudes are used by the evaluation.

5.4.2 Measurement limit for flow rate and specific flow rate

The estimated standard lower measurement limit for flow rate for injection tests with PSS is c 1 mL/min ($1.7 \cdot 10^{-8}$ m^3/s). However, if the flow rate for a test was close to, or below, the standard lower measurement limit, a test-specific estimate of the lower measurement limit of flow rate was made. The test-specific lower limit was based on the measurement noise level of the flow rate before and after the injection period. The decisive factor for the varying lower measurement limit is not identified, but it might be of both technical and hydraulic character.

The lower measurement limit for transmissivity is defined in terms of the specific flow rate (Q/s). The minimum specific flow rate corresponds to the estimated lower measurement limit of the flow rate together with the actual injection pressure during the test, see Table 5-2. The intention during this test campaign was to use a standard injection pressure of 200 kPa (20 m water column). Still, the injection pressure can be considerably different (see Section 6.2.3). An apparently low injection pressure is often the result of a test section of low conductivity due to a pressure increase, caused by packer expansion, before the injection start. A highly conductive section may also result in a low injection pressure due to limited flow capacity of PSS.

Whenever the final flow rate (Q_p) was not defined (i.e. not clearly above the measurement noise before and after the injection period), the estimated lower measurement limit for specific flow rate was based on the estimated lower measurement limit for flow rate for the specific test and a standard injection pressure of 200 kPa. This is done in order to avoid excessively high, apparent estimates of the specific flow rate for these low conductivity sections, which would have resulted if the actual pressure difference at start of injection had been used as injection pressure.

The lower measurement limits for the flow rate correspond to different values of steady-state transmissivity, T_M, depending on the section lengths used in the factor C_M in Moye's formula, as described in the Instruction for analysis of injection and single-hole pumping tests (SKB MD 320.004), see Table 5-2.

The practical upper measurement limit of hydraulic transmissivity for the PSS system is estimated at a flow rate of c 30 L/min ($5 \cdot 10^{-4}$ m^3/s) and an injection pressure of c 1 m. Thus, the upper measurement limit for the specific flow rate is $5 \cdot 10^{-4}$ m^2/s. However, the practical upper measurement limit may vary, depending on e.g. depth of the test section (friction losses in the pipe string).

Table 5-2. Estimated lower measurement limit for specific flow rate and steady-state transmissivity for different injection pressures, measurement scales and estimated lower measurement limits for flow rate for the injection tests in borehole KFM08C.

r_w (m)	L_w (m)	Q-measl-L (m^3/s)	Injection pressure (kPa)	Q/s-measl-L (m^2/s)	Factor C_M in Moye's formula	T_M-measl-L (m^2/s)
0.0387	100	1.67E–08	100	1.64E–09	1.30	2.13E–09
0.0387	100	1.67E–08	200	8.18E–10	1.30	1.06E–09
0.0387	100	1.67E–08	300	5.45E–10	1.30	7.09E–10
0.0387	100	1.15E–08	100	1.13E–09	1.30	1.47E–09
0.0387	100	1.15E–08	200	5.64E–10	1.30	7.33E–10
0.0387	100	1.15E–08	300	3.76E–10	1.30	4.89E–10
0.0387	100	5.00E–09	100	4.91E–10	1.30	6.38E–10
0.0387	100	5.00E–09	200	2.45E–10	1.30	3.19E–10
0.0387	100	5.00E–09	300	1.64E–10	1.30	2.13E–10
0.0387	20	1.67E–08	100	1.64E–09	1.04	1.71E–09
0.0387	20	1.67E–08	200	8.18E–10	1.04	8.53E–10
0.0387	20	1.67E–08	300	5.45E–10	1.04	5.69E–10
0.0387	20	1.20E–08	100	1.18E–09	1.04	1.23E–09
0.0387	20	1.20E–08	200	5.89E–10	1.04	6.14E–10
0.0387	20	1.20E–08	300	3.93E–10	1.04	4.10E–10
0.0387	20	5.00E–09	100	4.91E–10	1.04	5.12E–10
0.0387	20	5.00E–09	200	2.45E–10	1.04	2.56E–10
0.0387	20	5.00E–09	300	1.64E–10	1.04	1.71E–10
0.0387	5	1.67E–08	100	1.64E–09	0.82	1.35E–09
0.0387	5	1.67E–08	200	8.18E–10	0.82	6.73E–10
0.0387	5	1.67E–08	300	5.45E–10	0.82	4.49E–10
0.0387	5	1.20E–08	100	1.18E–09	0.82	9.69E–10
0.0387	5	1.20E–08	200	5.89E–10	0.82	4.84E–10
0.0387	5	1.20E–08	300	3.93E–10	0.82	3.23E–10
0.0387	5	5.00E–09	100	4.91E–10	0.82	4.04E–10
0.0387	5	5.00E–09	200	2.45E–10	0.82	2.02E–10
0.0387	5	5.00E–09	300	1.64E–10	0.82	1.35E–10

5.4.3 Qualitative analysis

Initially, a qualitative evaluation of actual flow regimes, e.g. wellbore storage (WBS), pseudo-linear flow regime (PLF), pseudo-radial flow regime (PRF), pseudo-spherical flow regime (PSF) and pseudo-stationary flow regime (PSS), respectively, was performed. In addition, indications of outer boundary conditions during the tests were identified. The qualitative evaluation was mainly interpreted from the log-log plots of flow rate and pressure together with the corresponding derivatives.

In particular, time intervals with pseudo-radial flow, reflected by a constant (horizontal) derivative in the test diagrams, were identified. Pseudo-linear flow may, at the beginning of the test, be reflected by a straight line of slope 0.5 or less in log-log diagrams, both for the measured variable (flow rate or pressure) and the derivative. A true spherical flow regime is reflected by a straight line with a slope of –0.5 for the derivative. However, other slopes may indicate transitions to pseudo-spherical (leaky) or pseudo-stationary flow. The latter flow regime corresponds to almost stationary conditions with a derivative approaching zero.

The interpreted flow regimes can also be described in terms of the distance from the borehole:

- **Inner zone:** Representing very early responses that may correspond to the fracture properties close to the borehole which may possibly be affected by turbulent head losses. These properties are generally reflected by the skin factor.
- **Middle zone:** Representing the first response from which it is considered possible to evaluate the hydraulic properties of the formation close to the borehole.
- **Outer zone:** Representing the response at late times of hydraulic structure(s) connected to the hydraulic feature for the middle zone. Sometimes it is possible to deduce the possible character of the actual feature or boundary and evaluate the hydraulic properties.

Due to the limited resolution of the flow meter and pressure sensor, the derivative may some times indicate a false horizontal line by the end of periods with pseudo-stationary flow. Apparent no-flow (NFB) and constant head boundaries (CHB), or equivalent boundary conditions of fractures, are reflected by an increase/decrease of the derivative, respectively.

5.4.4 Quantitative analysis

Injection tests

A preliminary steady-state analysis of transmissivity according to Moye's formula (denoted T_M) was made for the injection period for all tests in conjunction with the qualitative analysis according to the following equations:

$$T_M = \frac{Q_p \cdot \rho_w \cdot g}{dp_p} \cdot C_M \qquad (5\text{-}1)$$

$$C_M = \frac{1 + \ln\left(\frac{L_w}{2r_w}\right)}{2\pi} \qquad (5\text{-}2)$$

Q_p = flow rate by the end of the flow period (m^3/s)

ρ_w = density of water (kg/m^3)

g = acceleration of gravity (m/s^2)

C_M = geometrical shape factor (–)

dp_p = injection pressure $p_p - p_i$ (Pa)

r_w = borehole radius (m)

L_w = section length (m)

From the results of the qualitative evaluation, appropriate interpretation models for the quantitative evaluation of the tests were selected. When possible, transient analysis was made on both the injection and recovery periods of the tests.

The transient analysis was performed using a special version of the test analysis software AQTESOLV, which enables both visual and automatic type curve matching. The quantitative transient evaluation is generally carried out as an iterative process of manual type curve matching and automatic matching. For the injection period, a model based on the Jacob and Lohman (1952) /2/ solution was applied for estimating the transmissivity and skin factor for an assumed value on the storativity when a certain period with pseudo-radial flow could be identified. The model is based on the effective wellbore radius concept to account for non-zero (negative) skin factors according to Hurst, Clark and Brauer (1969) /3/.

In borehole KFM08C, the storativity was calculated using an empirical regression relationship between storativity and transmissivity, see Equation 5-3 (Rhén et al. 1997) /4/.

$$S = 0.0007 \cdot T^{0.5} \qquad (5\text{-}3)$$

S = storativity (–)

T = transmissivity (m^2/s)

Firstly, the transmissivity and skin factor were obtained by type curve matching on the data curve using a fixed storativity value of 10^{-6}, according to the instruction SKB MD 320.004. From the transmissivity value obtained, the storativity was then calculated according to Equation 5-3 and the type curve matching was repeated. In most cases the change of storativity did not significantly alter the calculated transmissivity by the new type curve matching. Instead, the estimated skin factor, which is strongly correlated to the storativity using the effective borehole radius concept, was altered correspondingly.

For transient analysis of the recovery period, a model presented by Dougherty-Babu (1984) /5/ was used when a certain period with pseudo-radial flow could be identified. In this model, a variety of transient solutions for flow in fractured porous media are available, accounting for e.g. wellbore storage and skin effects, double porosity etc. The solution for wellbore storage and skin effects is analogous to the corresponding solution presented in Earlougher (1977) /6/ based on the effective wellbore radius concept to account for non-zero (negative) skin factors. However, for tests in isolated test sections, wellbore storage is represented by a radius of a fictive standpipe (denoted fictive casing radius, r(c)) connected to the test section, cf Equation 5-6. This concept is equivalent to calculating the wellbore storage coefficient C from the compressibility in an isolated test section according to Equation 5-5. The storativity was calculated using Equation 5-3 in the same way as described above for the transient analysis of the injection period. In addition, the wellbore storage coefficient was estimated, both from the simulated value on the fictive casing radius r(c) and from the slope of 1:1 in the log-log recovery plots.

For tests characterized by pseudo-spherical (leaky) flow or pseudo-stationary flow during the injection period, a model by Hantush (1959) /7/ for constant head tests was adopted for the evaluation. In this model, the skin factor is not separated but can be calculated from the simulated effective borehole radius according to Equation 5-4. This model also allows calculation of the wellbore storage coefficient according to Equation 5-6. In addition, the leakage coefficient K'/b' can be calculated from the simulated leakage factor r/B. The corresponding model for constant flow rate tests, Hantush (1955) /8/, was applied for evaluation of the recovery period for tests showing pseudo-spherical- or pseudo-stationary flow during this period.

$$\zeta = \ln(r_w/r_{wf}) \qquad (5\text{-}4)$$

ζ = skin factor

r_w = borehole radius (m)

r_{wf} = effective borehole radius

Some tests showed fracture responses (initial slope of 0.5 or less in a log-log plot). A model for an equivalent single fracture was then used for the transient analysis as a complement to standard models for pseudo-radial flow. The model presented in Ozkan-Raghavan (1991a) /9/ and (1991b) /10/ for a uniform-flux vertical fracture embedded in a porous medium was employed. With this model the hydraulic conductivity of the rock perpendicular (K_x) and parallel (K_y) to the fracture can be estimated. In this case, the quotient K_x/K_y was assumed to be 1.0 (one). Type curve matching provided values of K_x and L_f assuming a value on the specific storativity S_s based on Equation. (5-3), where L_f is the theoretical fracture length. The test section length was then used to convert K_x and S_s to transmissivity $T = K_x \cdot L$ and to storativity $S = S_s \cdot L$, respectively of the rock in analysis by fracture models. Such estimates of transmissivity from fracture models may be compared with corresponding values from models for pseudo-radial flow in the same test section.

The different transient estimates of transmissivity from the injection and recovery period, respectively, were then compared and examined. One of these was chosen as the best representative value of the transient transmissivity of the formation adjacent to the test section. This value is denoted T_T. In cases with more than one pseudo-radial flow regime during the injection or recovery period, the first one is in most cases assumed as the most representative for the hydraulic conditions in the rock close to the tested section.

Finally, a representative value of transmissivity of the test section, T_R, was chosen from T_T and T_M. The latter transmissivity is to be chosen whenever a transient evaluation of the test data is not possible or not being considered as reliable. If the flow rate by the end of an injection period (Q_p) is too low to be defined, and thus neither T_T nor T_M can be estimated, the representative transmissivity for the test section is considered to be less than T_M based on the estimated lower measurement limit for Q/s (i.e. $T_R < T_M$=Q/s-measl-L·C_M).

Estimated values of the borehole storage coefficient, C, based on actual borehole geometrical data and assumed fluid properties are shown in Table 5-3 together with the estimated effective C_{eff} from laboratory experiments (Ludvigsson et al. 2006) /11/. The net water volume in the test section, V_w, has in Table 5-3 been calculated by subtracting the volume of equipment in the test section (pipes and thin hoses) from the total volume of the test section. For an isolated test section, the wellbore storage coefficient, C, may be calculated as by Almén et al. (1986) /12/:

$$C = V_w \cdot c_w = L_w \cdot \pi \cdot r_w^2 \cdot c_w \qquad (5\text{-}5)$$

V_w = water volume in test section (m^3)

r_w = nominal borehole radius (m)

L_w = section length (m)

c_w = compressibility of water (Pa^{-1})

When appropriate, estimation of the actual borehole storage coefficient C in the test sections was made from the recovery period, based on the early borehole response with 1:1 slope in the log-log diagrams. The coefficient C was calculated only for tests with a well-defined line of slope 1:1 in the beginning of the recovery period. In the most conductive sections, this period occurred during very short periods at early test times. The latter values may be compared with the net values of C based on geometry and the value of C_{eff} based on laboratory experiments /11/, (Table 5-3).

Furthermore, when using the model by Dougherty-Babu (1984) /5/ or Hantush (1955) /8/, a fictive casing radius, r(c), is obtained from the parameter estimation of the recovery period. This value can then be used for calculating C as by Almén et al. (1986) /12/:

$$C = \frac{\pi \cdot r(c)^2}{\rho \cdot g} \qquad (5\text{-}6)$$

Although this calculation was not done regularly and the results are not presented in this report, the calculations corresponded in most cases well to the value of C obtained from the line of slope 1:1 in the beginning of the recovery period.

The estimated values of C from the tests may differ from the net values in Table 5-3 based on geometry. For example, the effective compressibility for an isolated test section may sometimes be higher than the water compressibility due to e.g. packer compliance, resulting in increased C-values.

Table 5-3. Calculated net values of C, based on the actual geometrical properties of the borehole and equipment configuration in the test section (C_{net}) together with the effective wellbore storage coefficient (C_{eff}) for injection tests from laboratory experiments /11/.

r_w (m)	L_w (m)	Volume of test section (m^3)	Volume of equipment in section (m^3)	V_w (m^3)	C_{net} (m^3/Pa)	C_{eff} (m^3/Pa)
0.0387	100	0.469	0.061	0.408	1.9E–10	1.9E–10
0.0387	20	0.094	0.013	0.081	3.7E–11	4.4E–11
0.0387	5	0.023	0.004	0.019	9.0E–12	1.6E–11

The radius of influence at a certain time may be estimated from Jacob's approximation of the Theis' well function, Cooper and Jacob (1946) /13/:

$$r_i = \sqrt{\frac{2.25Tt}{S}} \qquad (5\text{-}7)$$

T = representative transmissivity from the test (m^2/s)

S = storativity estimated from Equation 5-3

r_i = radius of influence (m)

t = time after start of injection (s)

If a certain time interval of pseudo-radial flow (PRF) from t_1 to t_2 can be identified during the test, the radius of influence is estimated using time t_2 in Equation 5-7. If no interval of PRF can be identified, the actual total flow time t_p is used. The radius of influence can be used to deduce the length of the hydraulic feature(s) tested.

Furthermore, an r_i-index (–1, 0 or 1) is defined to characterize the hydraulic conditions by the end of the test. The r_i-index is defined as shown below. It is assumed that a certain time interval of PRF can be identified between t_1 and t_2 during the test.

- r_i-index = 0: The transient response indicates that the size of the hydraulic feature tested is greater than the radius of influence based on the actual test time ($t_2 = t_p$), i.e. the PRF is continuing at stop of the test. This fact is reflected by a flat derivative at this time.
- r_i-index = 1: The transient response indicates that the hydraulic feature tested is connected to a hydraulic feature with lower transmissivity or an apparent barrier boundary (NFB). This fact is reflected by an increase of the derivative. The size of the hydraulic feature tested is estimated as the radius of influence based on t_2.
- r_i-index = –1: The transient response indicates that the hydraulic feature tested is connected to a hydraulic feature with higher transmissivity or an apparent constant head boundary (CHB). This fact is reflected by a decrease of the derivative. The size of the hydraulic feature tested is estimated as the radius of influence based on t_2.

If a certain time interval of PRF cannot be identified during the test, the r_i-indices –1 and 1 are defined as above. In such cases the radius of influence is estimated using the flow time t_p in Equation 5-7.

In some tests there may be signs of a pressure interference in the section above or below the test section due to a hydraulic interconnection of the sections. This kind of pressure interference may result in an overestimation of the transmissivity in the test section. If pressure interference is detected during a test, a qualitative evaluation is performed to determine if it is likely that the estimated transmissivity of the test section is overestimated or not. The qualitative evaluation includes a comparison of the injection pressure and evaluated transmissivity of the test section with the corresponding pressure interference and transmissivity of the borehole interval in which interference is observed. Furthermore, a comparison with transmissivity from tests with other section lengths is made to detect deviating results. The type of dominating flow regime in the test section may also support the qualitative evaluation whether the interference is likely to affect the evaluated transmissivity or not.

5.5 Nonconformities

The test program in KFM08C was carried out according to the Activity Plan AP PF 400-06-085 with the following exceptions:

- During tests with the 20-m section a leakage in the pipe-string occurred. This leakage started at about 400 m. Each time this leakage was detected, the pipe-string was lifted and the pipes replaced. No signs of damage or leakage were spotted on the removed pipes, and therefore the leakage was assumed to be located further up the pipe string. The leakage was however not assumed to affect the tests in any significant matter, and the remaining tests were conducted according to plan. However, when evaluating tests with a detectable leakage, this was adjusted for in the test data as well as in the measurement limits.
- Two of the tests listed in Table 3-2 were not used for analysis due to various reasons. The tests were re-performed when lifting the pipe string again to ensure that the section was undisturbed from the previous, failed, test. These tests were:
  - 108.5–208.5 m (test no 1) which was considered to provide uncertain information,
  - 668.5–688.5 m (test no 1) which was incomplete due to technical reasons.
- The test at 431.5–451.5 (test no 1 as listed in Table 3-2) was not used for analysis since it was performed at an incorrect position.
- According to the Activity Plan AP PF 400-06-085 the length reference marks from 450 m and downwards were not detected after completion of drilling. The only detected reference marks below 450 m while lowering the 100 m test section were at 750 and 800 m.
- Due to measurement equipment failure the reference mark at 200 m was not detected while lowering the 5 m test section.
- Due to major fractures in the borehole, some of the positions of the test sections were shifted. This resulted in some partly overlapping sections as follows: 708.5–808.5 and 738.5–838.5; 448.5–453.5 and 451.0–456.0; 541.0–546.0 and 543.5–548.5; 668.5–673.5 and 671.0–676.0; 702.0–707.0 and 703.5–708.5.
- Major fractures in the borehole made it impossible to measure the interval 696.0–697.0 m with the 5 m test section. Since this interval was measured with 100 and 20 m test sections and no visible fracture was seen in the interval, this gap in the measurement was assumed to not affect the results of the tests.

6 Results

6.1 Nomenclature and symbols

The nomenclature and symbols used for the results of the injection tests in KFM08C are in accordance with the Instruction for analysis of injection and single-hole pumping tests (SKB MD 320.004). Additional symbols are explained in the text and in Appendix 5. Symbols used by the AQTESOLV software are explained in Appendix 3.

6.2 Routine evaluation of the single-hole injection tests

6.2.1 General test data

General test data and selected pressure and flow data from all tests are listed in Appendix 2.1 and 2.2, respectively.

6.2.2 Length corrections

The down-hole equipment is supplied with a level indicator located c 3 m below the lower packer in the test section, see Figure 4-2. The level indicator transmits a signal each time a reference mark in the borehole is passed. In KFM08C, reference marks were milled into the borehole wall at approximately every 50 m.

During the injection tests in KFM08C with the PSS, length reference marks were detected as presented in Table 6-1. As commented in the Acivity Plan, AP PF 400-06-085, no reference marks below 450 m were detected after completion of drilling. During the injection tests, as seen in the table, no length reference marks were detected below 450 m, except for the 750 and 800 m marks when lowering the 100 m test section. Furthermore, due to electrical measurement equipment failure, the 200 m reference mark was not detected while lowering the 5 m test section. At each detected mark, the length scale for the injection tests was adjusted according to the reported length to the reference mark.

Table 6-1. Detected reference marks during the injection tests and after drilling in KFM08C.

Borehole length (m)	Detected during the injection tests in 100 m sections	Detected during the injection tests in 20 m sections	Detected during the injection tests in 5 m sections	Detected after drilling
150.0	Yes	Yes	Yes	Yes
200.0	Yes	Yes	–	Yes
250.0	Yes	Yes	Yes	Yes
300.0	Yes	Yes	Yes	Yes
350.0	Yes	Yes	Yes	Yes
398.0	Yes	Yes	Yes	Yes
450.0	No	No	No	No
500.0	No	No	No	No
550.0	No	No	No	No
600.0	No	No	No	No
650.0	No	No	No	No
700.0	No	No	No	No
750.0	Yes	–	–	No
800.0	Yes	–	–	No
850.0	No	–	–	No
900.0	No	–	–	No

The largest difference between the reported and measured lengths at the reference marks during the injection tests was 0.20 m, at the 800 m reference mark. The difference between two consecutive measurements over a 50 m borehole interval was 0.04 m or less in all cases. A comparison of the measurements performed with different section lengths results in a maximum difference of 0.01 m.

Since the length scale was adjusted in the field every time a reference mark was detected and since the difference between consecutive marks were small, it was not found worthwhile to make any further adjustments after the measurements, e.g. by linear interpolation between reference marks.

6.2.3 General results

For the injection tests, transient evaluation was conducted, whenever possible, both on the injection and recovery periods (e.g. transmissivity T_f and T_s, respectively) according to the methods described in Section 5.4.4. The steady-state transmissivity (T_M) was calculated by Moye's formula according to Equation 5-1. Injection tests with a final flow rate below the measurement limit, Q_p, or with a non-definable flow regime were only evaluated by the steady-state method. All other tests were evaluated with both transient and steady-state methods. The quantitative analysis was conducted using the AQTESOLV software. A summary of the results of the routine evaluation of the injection tests can be seen in Table 6-2.

The dominating transient flow regimes during the injection and recovery periods, as interpreted from the qualitative test evaluation, are listed in Table 6-2 and further commented on in Section 6.2.4. The transmissivity considered as the most reliable from the transient evaluation of the flow- and recovery periods of the tests was selected as T_T, see Table 6-2.

For 39 out of 45 tests with a definable final flow rate in KFM08C, the transient evaluation of the injection period was considered to give the most representative transient transmissivity value. The corresponding number for the recovery period was 4. Several of the responses during the recovery period were strongly influenced by wellbore storage effects. On the other hand, during the injection period a certain time interval with pseudo-radial flow could, in more than half of the tests, be identified. Consequently, standard methods for single-hole tests with wellbore storage and skin effects were commonly used for the routine evaluation of the tests. The approximate start and stop times of the pseudo-radial flow regime used for the transient evaluation are also listed in Table 6-2.

For those tests where transient evaluation was not possible or not considered representative, T_M was chosen as the representative transmissivity value, T_R. In 2 out of 45 tests with a definable final flow rate in KFM08C the steady-state transmissivity, T_M, was chosen as the most representative value. If the final flow rate Q_p was below the actual test-specific measurement limit, the representative transmissivity value was assumed to be less than the estimated T_M, based on Q/s-measl-L.

The estimated standard lower measurement limit for flow rate for injection tests with PSS is c 1 mL/min ($1.7 \cdot 10^{-8}$ m^3/s). However, for approximately 62% of the injection tests in KFM08C, the lower measurement limit was close to, or below, the standard lower measurement limit. Hence a test-specific estimate of the lower measurement limit of flow rate was made which ranged from $3.1 \cdot 10^{-9}$ m^3/s to $7.2 \cdot 10^{-9}$ m^3/s. The lower measurement limit for transmissivity is defined in terms of the specific flow rate (Q/s), and the overall estimated test specific lower measurement limit for the specific flow rate in KFM08C ranged from $1.5 \cdot 10^{-10}$ m^2/s to $3.6 \cdot 10^{-10}$ m^2/s (see Section 5.4.2).

Selected test diagrams are presented in Appendix 3. In general, one linear diagram showing the entire test sequence together with lin-log and log-log diagrams from the injection and recovery periods, respectively, are presented for the injection tests. The quantitative analysis was performed from such diagrams using the AQTESOLV software. From injection tests with a flow rate below the estimated lower measurement limit for the specific test, only the linear diagram is presented. The results of the routine evaluation of the tests in borehole KFM08C are also compiled in appropriate tables in Appendix 5 to be stored in the SICADA database.

For a few tests, a type curve fit is displayed in the diagrams in Appendix 3 despite the fact that the estimated parameters from the fit are judged as ambiguous or non-representative and not included in the result tables in SICADA. For these tests, the type curve fit is presented as an example, e.g. to illustrate that an assumption of pseudo-radial flow regime is not justified for the test and some other flow regime is dominating or, alternatively, to show one possible fit in the case of unambiguous evaluation. For example, for test responses showing only wellbore storage or no flow boundary response, no unambiguous transient evaluation is possible.

Some of the tests in KFM08C showed unusual responses when tested. During the first phase of the injection period of these tests the flow rate decreased rapidly, indicating apparent no-flow boundaries (NFB). Then the flow turns into a more stabile phase indicating a transition towards an apparent pseudo-radial flow regime (PRF). One possible explanation to these responses is flow in a rather high-conductive fracture close to the borehole with decreasing aperture away from the borehole followed by a more constant aperture of the fracture. Some other tests showed initial pseudo-radial flow (PRF) transitioning to flow in an apparent no-flow boundary, followed by slow and limited pressure recovery after the stop of the injection. These tests also indicate a flow in fractures of limited extension or decreasing aperture away from the borehole.

In Figure 6-1, a comparison of calculated transmissivities in 5 m sections from steady-state evaluation (T_M) and transmissivity values from the transient evaluation (T_T) is shown. The agreement between the two populations is in general considered as good. Steady-state analysis of transmissivity according to Moye's formula (denoted T_M) may slightly overestimate the transmissivity if steady-state conditions do not prevail in the borehole. This fact is likely to be the main explanation to the predominance of points below the 1:1 curve since steady-state conditions are normally not attained during the injection period. In addition, skin effects (both positive and negative) may cause discrepancies between transient and steady-state evaluation. For example, a test showing a strong negative skin factor (fracture response) with an interpreted PLF from the transient evaluation of the injection period may result in a much higher (circa one order of magnitude) steady-state transmissivity. For low values of transmissivity, discrepancies in transmissivity may also occur due to the definition of the lower measurement limit in transient and steady-state evaluation, respectively. In the latter evaluation the measurement limit is based on the test-specific flow rate while in transient evaluation, the transmissivity is based on the change of the (inverse) flow rate during the injection period.

In cases where apparent no-flow boundaries appear at the end of the injection period and transient evaluation is performed on the early part of the data curve, the steady-state transmissivity T_M may be low in comparison with the transient estimate of transmissivity. In this case, two different zones of the bedrock are measured during the early and late parts of the injection period, respectively.

The lower standard measurement limit of steady-state transmissivity in 5 m sections based on a flow rate of 1 mL/min and an injection pressure of 20 m is indicated in Figure 6-1. However, for some test sections in KFM08C, the actual injection pressure was considerably different, as previously denoted in Section 5.4.2. The highest injection pressure during the tests in KFM08C was 26.94 m, and for five of the tests the injection pressure was below 10 m in the transient evaluation.

The wellbore storage coefficient, C, was calculated from the straight line with a unit slope in the log-log diagrams from the recovery period, see Table 6-2. The coefficient C was only calculated for tests with a well-defined line of unit slope in the beginning of the recovery period. In the most conductive sections, this period occurred during very short intervals at very early times and is not visible in the diagrams. In sections with a very low transmissivity, the estimates of C may be uncertain due to difficulties in defining an accurate time for the start of the recovery period. Furthermore, the resolution of the pressure sensors causes the recovery to be quite scattered in sections of low transmissivity. The values of C presented in Table 6-2 may be compared with the net values of C, C_{net} (based on geometry) and the value of C obtained from laboratory experiments, C_{eff} /11/, both found in Table 5-3.

The number of injection tests with a well-defined line of unit slope from which it was possible to calculate C was 3 out of 9 tests with a definable Q_p, when using the 100 m test section. The corresponding numbers for the 20 m tests were 4 out of 25, and for the 5 m tests; 8 out of 50. Table 6-2 shows that there is, in general, a relatively good agreement between the calculated C-values from the tests and those listed in Table 5-3, although the calculated values from the tests tend to be slightly higher. The higher C-values observed in the tests may partly be explained by the compressibility contribution of the rock formation and water in good hydraulic connection (i.e. open fractures or cavities) with the section and partly by uncertainties in the determination of C from the tests.

When constructing 95% confidence intervals (using a t-distribution) from calculated values of C from the tests, the values of C listed in Table 5-3 are within these confidence intervals for all section lengths. The wellbore storage coefficient was also calculated from the simulation of the recovery responses in AQTESOLV based on the estimated radius of the fictive standpipe, r(c), to the test section according to Equation 5-6.

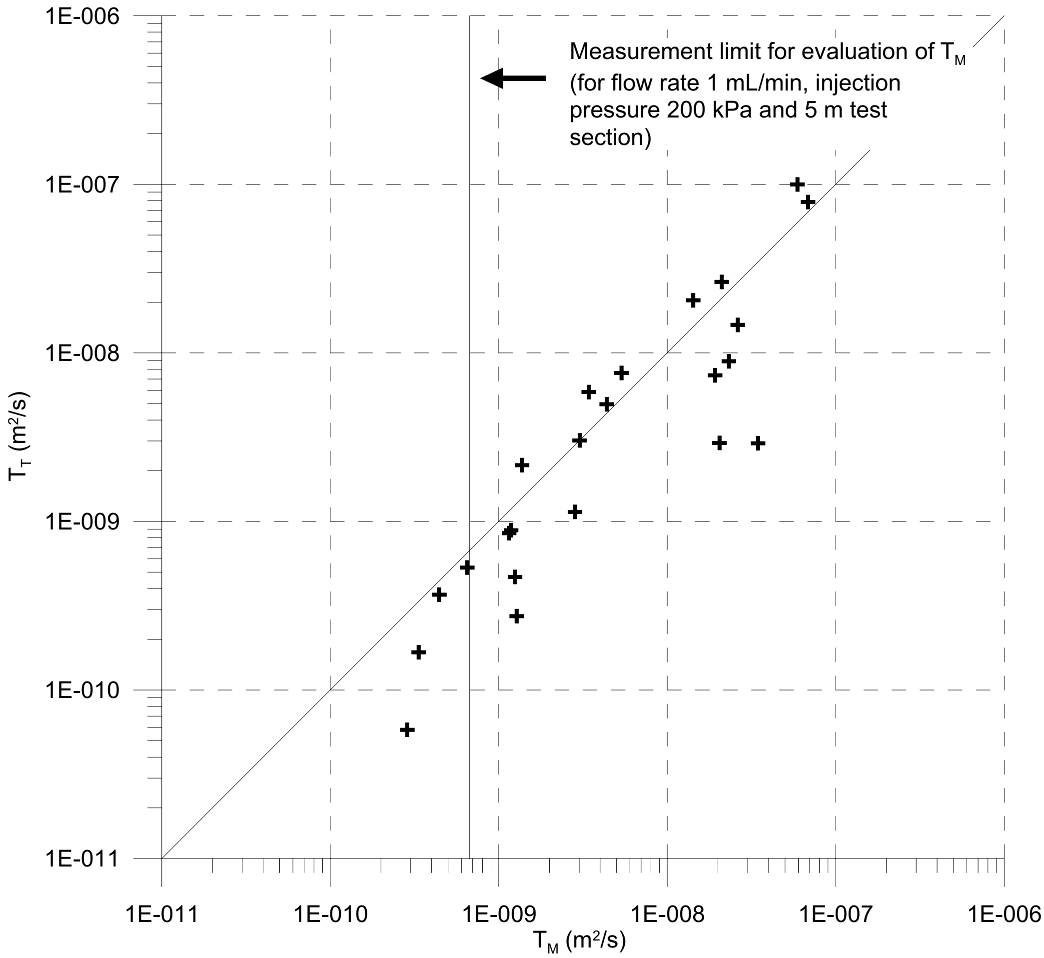

Figure 6-1. *Estimated transmissivities in 5 m sections from steady-state (T_M) and transient (T_T) evaluation for the injection tests in KFM08C.*

Table 6-2. Summary of the routine evaluation of the single-hole injection tests in borehole KFM08C.

Secup (m)	Seclow (m)	Test start YYYY-MM-DD hh:mm	b (m)	Flow regime[1)] Injection	Recovery	T_M (m^2/s)	T_f (m^2/s)	T_s (m^2/s)	T_T (m^2/s)	T_R[2)] (m^2/s)	ξ (–)	t_1 (s)	t_2 (s)	dte_1 (s)	dte_2 (s)	C (m^3/Pa)	r_i (m)	r_i-index (–)
108.50	208.50	2006-10-06 08:14	100.0	PRF–> NFB	WBS–> PRF–> (NFB)	5.65E–08	2.99E–08	3.97E–08	2.99E–08	2.99E–08	–3.15	50	300	500	900	3.06E–11	12.91	1
208.50	308.50	2006-10-04 11:21	100.0	NFB–> PRF	PLF	4.20E–08	5.96E–09		5.96E–09	5.96E–09		300	1,800				21.13	0
308.50	408.50	2006-10-04 14:58	100.0	PLF/NFB	WBS– >	4.67E–10				4.67E–10						4.36E–10	11.23	–
408.50	508.50	2006-10-04 18:14	100.0	PLF–> (PRF)–> NFB	WBS– > (PRF)–> NFB	3.19E–07	1.00E–07	9.93E–08	1.00E–07	1.00E–07	–5.18	60	150	100	200		12.35	–1
508.50	608.50	2006-10-04 20:54	100.0	PLF–> PRF	(PLF)–> PRF	4.95E–08	8.96E–09	9.19E–09	8.96E–09	8.96E–09	–5.32	200	1,800	600	1,400		23.40	0
608.50	708.50	2006-10-05 06:07	100.0	PRF	WBS–>	1.21E–08	5.75E–09	5.54E–09	5.75E–09	5.75E–09	–2.52	200	1,800			2.83E–10	20.95	0
708.50	808.50	2006-10-05 08:52	100.0	–	–	< 3.08E–10				< 3.08E–10							–	–
738.50	838.50	2006-10-05 10:17	100.0	–	–	< 3.99E–10				< 3.99E–10							–	–
838.50	938.50	2006-10-05 14:24	100.0	PLF	WBS(PLF)–>	5.24E–10				5.24E–10							11.61	–
108.50	128.50	2006-10-09 12:42	20.0	–	–	< 3.76E–10				< 3.76E–10							–	–
128.50	148.50	2006-10-09 14:20	20.0	PLF–> NFB	WBS–>	4.03E–10	1.76E–10	1.34E–10	1.76E–10	1.76E–10		30	150				2.53	1
148.50	168.50	2006-10-09 15:51	20.0	PSF	WBS–>	4.69E–09	2.62E–09	3.80E–09	2.62E–09	2.62E–09	–1.84					1.32E–10	14.17	–1
168.50	188.50	2006-10-10 06:21	20.0	PRF–> NFB	WBS–> (PRF)–> NFB	4.44E–08	2.48E–08	4.28E–08	2.48E–08	2.48E–08	–3.27	50	300				12.32	1
188.50	208.50	2006-10-10 07:56	20.0	–	–	< 3.11E–10				< 3.11E–10							–	–
208.50	228.50	2006-10-10 09:08	20.0	PRF	WBS–>	1.02E–08	4.28E–09	6.26E–09	4.28E–09	4.28E–09	–3.19	100	1,200				15.89	0
228.50	248.50	2006-10-10 10:45	20.0	NFB–> PRF?	WBS–>	2.24E–09	3.48E–10		3.48E–10	3.48E–10	–4.96	100	1,500				9.49	0
248.50	268.50	2006-10-10 13:09	20.0	–	–	< 3.11E–10				< 3.11E–10							–	–
268.50	288.50	2006-10-10 14:08	20.0	NFB–> PRF?	PLF	2.57E–08	3.18E–09		3.18E–09	3.18E–09							14.88	0
288.50	308.50	2006-10-10 15:47	20.0	–	–	< 3.23E–10				< 3.23E–10							–	–
408.50	428.50	2006-10-10 17:51	20.0	PLF–> (NFB)	WBS–>	4.55E–10	1.93E–10	1.16E–10	1.93E–10	1.93E–10	–3.66	20	200			3.30E–11	2.99	1
428.50	448.50	2006-10-12 16:47	20.0	–	–	< 2.47E–10				< 2.47E–10							–	–
448.50	468.50	2006-10-10 20:56	20.0	PRF	WBS–> PSF	1.89E–07	2.47E–07	1.97E–07	2.47E–07	2.47E–07	1.51	60	1,200				43.79	0
468.50	488.50	2006-10-10 22:26	20.0	PRF	PSF	2.22E–08	2.98E–08	3.58E–08	2.98E–08	2.98E–08	2.29	200	1,200				25.80	0
488.50	508.50	2006-10-11 07:30	20.0	(PLF)–> NFB	PLF–> PRF–> NFB	7.57E–08		8.91E–08	8.91E–08	8.91E–08	–5.04			100	700		25.91	1
508.50	528.50	2006-10-11 09:44	20.0	PLF–> PRF	PLF–> PRF	4.29E–08	9.26E–09	6.71E–09	9.26E–09	9.26E–09	–5.23	200	1,200	600	900		19.26	0
528.50	548.50	2006-10-11 12:38	20.0	(PLF)–> NFB	WBS–> PRF–> NFB	2.76E–09	2.23E–09	1.81E–09	1.81E–09	1.81E–09	–3.00	20	100	100	500	6.62E–11	8.27	1
548.50	568.50	2006-10-11 16:12	20.0	–	–	< 2.47E–10				< 2.47E–10							–	–
568.50	588.50	2006-10-11 19:42	20.0	–	–	< 2.47E–10				< 2.47E–10							–	–

Secup (m)	Seclow (m)	Test start YYYY-MM-DD hh:mm	b (m)	Flow regime[1)] Injection	Recovery	T_M (m^2/s)	T_f (m^2/s)	T_s (m^2/s)	T_T (m^2/s)	T_R[2)] (m^2/s)	ξ (–)	t_1 (s)	t_2 (s)	dte_1 (s)	dte_2 (s)	C (m^3/Pa)	r_i (m)	r_i-index (–)
588.50	608.50	2006-10-11 21:22	20.0	–	–	< 3.22E–10				< 3.22E–10							–	–
608.50	628.50	2006-10-11 22:47	20.0	–	–	< 3.11E–10				< 3.11E–10							–	–
628.50	648.50	2006-10-12 06:55	20.0	–	–	< 3.11E–10				< 3.11E–10							–	–
648.50	668.50	2006-10-12 08:07	20.0	–	–	< 3.11E–10				< 3.11E–10							–	–
668.50	688.50	2006-10-12 12:37	20.0	PRF	PRF	9.35E–09	5.06E–09	4.10E–09	5.06E–09	5.06E–09	–2.66	100	1,200	200	700		16.57	0
688.50	708.50	2006-10-12 10:40	20.0	PRF	WBS–>	1.37E–09	3.12E–09		3.12E–09	3.12E–09	–2.15	20	1,200			5.31E–11	14.67	0
148.50	153.50	2006-10-13 14:45	5.0	PLF–> (PRF)	WBS–>	2.87E–10	5.81E–11		5.81E–11	5.81E–11		200	1,200				5.42	0
153.50	158.50	2006-10-13 16:12	5.0	–	–	< 2.45E–10				< 2.45E–10							–	–
158.50	163.50	2006-10-16 08:17	5.0	PSF	WBS–> PSF?	3.02E–09	3.02E–09		3.02E–09	3.02E–09	–0.21					9.18E–11	14.65	–1
163.50	168.50	2006-10-16 09:42	5.0	–	–	< 2.45E–10				< 2.45E–10							–	–
168.50	173.50	2006-10-16 10:48	5.0	PRF	WBS–> (PRF)	6.50E–10	5.33E–10	5.75E–10	5.33E–10	5.33E–10	–1.64	10	1,200			2.13E–11	9.44	0
173.50	178.50	2006-10-16 12:54	5.0	–	–	< 2.03E–10				< 2.03E–10							–	–
178.50	183.50	2006-10-16 13:43	5.0	PSF	WBS–> PSF?	2.32E–08	8.91E–09		8.91E–09	8.91E–09	–3.83						19.19	–1
183.50	188.50	2006-10-16 15:17	5.0	PRF–> (NFB)	WBS–> PRF–> NFB	2.62E–08	1.47E–08	1.42E–07	1.47E–08	1.47E–08	–3.78	100	500				13.95	1
208.50	213.50	2006-10-17 08:16	5.0	–	–	< 2.03E–10				< 2.03E–10							–	–
213.50	218.50	2006-10-17 09:12	5.0	–	–	< 1.95E–10				< 1.95E–10							–	–
218.50	223.50	2006-10-17 10:07	5.0	PRF	WBS–>	5.35E–09	7.60E–09	1.24E–08	7.60E–09	7.60E–09	1.03	200	1,200				18.34	0
223.50	228.50	2006-10-17 12:29	5.0	PRF	WBS–> PRF–> NFB	2.84E–09	1.14E–09	2.16E–09	1.14E–09	1.14E–09	–3.93	10	1,200	40	300		11.41	0
228.50	233.50	2006-10-17 14:02	5.0	PRF	WBS–>	1.18E–09	8.88E–10	2.25E–09	8.88E–10	8.88E–10	–1.92	20	1200			2.76E–11	10.72	0
233.50	238.50	2006-10-17 15:30	5.0	PRF	WBS–>	3.35E–10	1.68E–10	2.79E–10	1.68E–10	1.68E–10	–2.81	10	1,200				7.07	0
238.50	243.50	2006-10-18 08:21	5.0	NFB–> PRF?	PLF	1.28E–09	2.74E–10		2.74E–10	2.74E–10		200	1,200				7.99	0
243.50	248.50	2006-10-18 10:02	5.0	–	–	< 2.45E–10				< 2.45E–10							–	–
268.50	273.50	2006-10-18 11:06	5.0	–	–	< 1.95E–10				< 1.95E–10							–	–
273.50	278.50	2006-10-18 12:45	5.0	–	–	< 2.45E–10				< 2.45E–10							–	–
278.50	283.50	2006-10-18 13:36	5.0	NFB–> PRF?	PLF	2.04E–08	2.92E–09		2.92E–09	2.92E–09							14.52	0
283.50	288.50	2006-10-18 15:02	5.0	–	–	< 2.54E–10				< 2.54E–10							–	–
448.50	453.50	2006-10-19 08:48	5.0	–	–	< 2.45E–10				< 2.45E–10							–	–
451.00	456.00	2006-10-19 09:53	5.0	PSF	PRF–> PSF	6.86E–08	7.85E–08	7.63E–08	7.85E–08	7.85E–08	–0.27			50	200		33.07	–1
456.00	461.00	2006-10-19 11:25	5.0	PRF	WBS–> PRF?	1.03E–07	2.07E–07	4.03E–07	2.07E–07	2.07E–07	3.32	60	1,200				41.88	0
461.00	466.00	2006-10-19 13:34	5.0	PSF	PSF–> PSS	1.43E–08	2.05E–08	5.49E–08	2.05E–08	2.05E–08	1.45						23.66	–1

Secup (m)	Seclow (m)	Test start YYYY-MM-DD hh:mm	b (m)	Flow regime[1] Injection	Recovery	T_M (m^2/s)	T_f (m^2/s)	T_s (m^2/s)	T_T (m^2/s)	T_R[2] (m^2/s)	ξ (–)	t_1 (s)	t_2 (s)	dte_1 (s)	dte_2 (s)	C (m^3/Pa)	r_i (m)	r_i-index (–)
466.00	471.00	2006-10-19 15:04	5.0	PLF–> PRF	(WBS)–> PLF–> PRF	1.25E–09	4.69E–10	2.60E–10	4.69E–10	4.69E–10	–3.81	100	1,200	500	900		9.14	0
471.00	476.00	2006-10-19 16:41	5.0	–	–	< 2.55E–10				< 2.55E–10							–	–
476.00	481.00	2006-10-20 08:44	5.0	PRF	PSS	2.11E–08	2.64E–08		2.64E–08	2.64E–08	–0.15	200	1,200				25.02	0
481.00	486.00	2006-10-20 10:16	5.0	–	–	< 2.45E–10				< 2.45E–10							–	–
486.00	491.00	2006-10-20 12:29	5.0	–	–	< 2.45E–10				< 2.45E–10							–	–
491.00	496.00	2006-10-20 13:28	5.0	–	–	< 2.45E–10				< 2.45E–10							–	–
496.00	501.00	2006-10-20 14:27	5.0	NFB	(PLF)–> PRF–> NFB	5.92E–08		9.99E–08	9.99E–08	9.99E–08	–4.85			100	1,000		31.87	1
501.00	506.00	2006-10-23 08:31	5.0	–	–	< 1.95E–10				< 1.95E–10							–	–
506.00	511.00	2006-10-23 09:30	5.0	–	–	< 1.95E–10				< 1.95E–10							–	–
511.00	516.00	2006-10-23 10:23	5.0	–	–	< 1.95E–10				< 1.95E–10							–	–
516.00	521.00	2006-10-23 11:13	5.0	PRF	WBS–> PRF	1.93E–08	7.36E–09	7.42E–09	7.36E–09	7.36E–09	–4.46	40	1,200	300	800	3.08E–10	18.19	0
521.00	526.00	2006-10-23 13:29	5.0	PLF–> PSF	PLF–> PSF	3.46E–08	2.91E–09	1.09E–08	2.91E–09	2.91E–09	–5.96						14.50	–1
526.00	531.00	2006-10-23 14:57	5.0	PRF	WBS–> PSF?	4.44E–10	3.68E–10	2.04E–10	3.68E–10	3.68E–10	–1.00	20	1,200			1.55E–11	8.60	0
531.00	536.00	2006-10-23 16:23	5.0	PRF–> NFB	WBS–> PRF–> NFB	1.38E–09	1.98E–09	2.16E–09	2.16E–09	2.16E–09	–0.31	10	100	150	300	1.99E–11	6.69	1
536.00	541.00	2006-10-24 08:16	5.0	–	–	< 2.06E–10				< 2.06E–10							–	–
541.00	546.00	2006-10-24 09:09	5.0	–	–	< 2.06E–10				< 2.06E–10							–	–
543.50	548.50	2006-10-24 10:03	5.0	–	–	< 2.47E–10				< 2.47E–10							–	–
668.50	673.50	2006-10-24 13:18	5.0	–	–	< 2.47E–10				< 2.47E–10							–	–
671.00	676.00	2006-10-24 14:14	5.0	PRF1–> PRF2	WBS–> PRF1–> PRF2	4.38E–09	4.95E–09	4.68E–09	4.95E–09	4.95E–09	–1.64	20	70	40	150		3.98	1
676.00	681.00	2006-10-24 15:40	5.0	–	–	< 2.47E–10				< 2.47E–10							–	–
681.00	686.00	2006-10-24 16:43	5.0	PSF	WBS–> PSF	3.42E–09	5.86E–09	5.91E–09	5.86E–09	5.86E–09	3.31					1.99E–11	17.29	–1
686.00	691.00	2006-10-25 09:15	5.0	–	–	< 2.45E–10				< 2.45E–10							–	–
691.00	696.00	2006-10-25 10:06	5.0	PSF	WBS–> PSF	1.15E–09	8.52E–10	8.18E–10	8.52E–10	8.52E–10	–1.17					1.79E–11	10.69	–1
697.00	702.00	2006-10-25 12:16	5.0	–	–	< 1.95E–10				< 1.95E–10							–	–
702.00	707.00	2006-10-25 13:05	5.0	–	–	< 1.95E–10				< 1.95E–10							–	–
703.50	708.50	2006-10-25 13:51	5.0	–	–	< 1.95E–10				< 1.95E–10							–	–

[1] The acronyms in the column "Flow regime" are as follows: wellbore storage (WBS), pseudo-linear flow (PLF), pseudo-radial flow (PRF), pseudo-spherical flow (PSF), pseudo-stationary flow (PSS) and apparent no-flow boundary (NFB). The flow regime definitions are further discussed in Section 5.4.3 above.

[2] For the tests where Q_p was not detected, T_R was assumed to be less than T_M based on the estimated Q/s-measl-L

6.2.4 Comments on the tests

Short comments on each test follow below. Tests were performed within the interval 108.5–938.5 m in KFM08C. Flow regimes and hydraulic boundaries, as discussed in Section 5.4.3, are in the text referred to as:

WBS = Wellbore storage

PRF = Pseudo-radial flow regime

PLF = Pseudo-linear flow regime

PSF = Pseudo-spherical flow regime

PSS = Pseudo-stationary flow regime

NFB = No-flow boundary

CHB = Constant-head boundary

108.50–208.50 m

The injection period displays a PRF followed by a transition to an apparent NFB. The PRF starts after about 50 s lasting until 300 s. The recovery period begins with WBS followed by a transition into an approximate PRF starting after c 400 s. After c 900 s the derivative increases slightly which may possibly indicate an apparent NFB. The result from the injection period was considered to be the most representative for this section. It is supported by the transient evaluation of the recovery period as well as the stationary evaluation of the injection period. This test is a reperformance of an earlier test. The flow in the preceding test in this position dropped rapidly in the beginning followed by a sudden increase in the middle of the test, causing the pressure to drop. Due to the unstable pressure and the strange behaviour of the flow, the test was reperformed. The same behaviour of the flow did not occur this time, indicating that some obstacle in the fractures was flushed away in the previous test. Plots from the first test on this position are also presented in Appendix 3 referred to as test 1.

208.50–308.50 m

The injection period initially displays a rather fast decrease in the flow rate indicating an apparent NFB. After c 300 s, a PRF is indicated throughout the period. The recovery period only shows a PLF. Only a limited pressure recovery (c 10 m) was achieved during this period. No unambiguous transient evaluation was possible of the recovery period since the PLF does not display sufficient character. An example evaluation is shown assuming the same transmissivity and storativity as were obtained from the injection period. Transient evaluations using the Hurst-Clark-Brauer model and the Ozkan-Raghavan model give rather consistent results for the injection period. The results from the injection period were considered to be the most representative for this section.

308.50–408.50 m

The flow rate is low, very close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. The injection period is assumed to be dominated by a PLF/NFB. No unambiguous transient evaluation was possible of the injection period. The recovery period showed an initial WBS with a transition to some other flow regime. The total recovery in the test section is only c 1.1 m. The Dougherty-Babu model showed an apparently good fit to the recovery data but, due to the very small recovery and scattered pressure data, this evaluation is also considered as uncertain and not unambiguous. Hence, the stationary evaluation was considered to give the most representative transmissivity value for this section. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit as well as the flow data were manually lowered by $1.02 \cdot 10^{-9}$ m^3/s.

408.50–508.50 m

The injection period indicates a PLF transitioning towards an approximate PRF between c 60–150 s. After c 150 s, a transition into an apparent NFB is indicated. Towards the end of the injection period, the derivative decreases slightly. However, this is probably an artefact caused by the small sudden change in flow rate at c 1,500 s. It is unclear if this is a true characteristic of the rock formation. The recovery period displays WBS followed by a short approximate PRF. After c 200 s, a transition into an apparent NFB is indicated. The transient evaluation of the early phase of the injection period with the Hurst-Clark-Brauer model is regarded as the most representative for this section.

508.50–608.50 m

During the injection period a PLF transitioning to a PRF is observed. The recovery period indicates a PRF preceded by a possible PLF. The Hurst-Clark-Brauer model and the Ozkan-Raghavan model for the injection period and the Dougherty-Babu model for the recovery period give consistent results. The transient evaluation of the injection period is regarded as the most representative for this section.

608.50–708.50 m

The flow rate during the injection period is quite scattered due to the automatic pressure regulation on this relatively low flow rate. Still, the injection period clearly shows a dominating PRF. The recovery period only displays a WBS and a transition period towards a possible PRF. The transient evaluation from the injection period was considered to be the most representative for this section. Transient evaluation of the recovery period using the Dougherty-Babu model supports the transmissivity from the injection period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit as well as the flow data was manually lowered by $2.27 \cdot 10^{-9}$ m^3/s.

708.50–808.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered by $3.48 \cdot 10^{-9}$ m^3/s.

738.50–838.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Since the measurement noise with a zero flow was centred slightly below zero, the flow rate measurement limit was manually elevated by $2.27 \cdot 10^{-9}$ m^3/s.

838.50–938.50 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. The injection period is assumed to be dominated by a PLF. However, no unambiguous transient evaluation was possible of the injection period since the PLF does not display sufficient character. The recovery period showed initial WBS, or possibly a PLF, followed by a transition period. The total recovery in the test section is only c 1.2 m. Both the Ozkan-Raghavan model and the Dougherty-Babu model showed a good fit with the recovery data and gave consistent results. However, due to the very small recovery and scattered pressure data, these evaluations are considered as uncertain and not unambiguous. Hence, the stationary evaluation was considered to give the most representative transmissivity value for this section.

108.50–128.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

128.50–148.50 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. Still, the injection period indicates an early PLF transitioning to an apparent NFB after c 150 s. Transient evaluation was made with the Ozkan-Raghavan model for an equivalent single fracture. The recovery period only displays WBS and a transition period. The transient evaluation from the injection period is regarded to provide the most representative transmissivity value for the section. The Dougherty-Babu model for the recovery period supports the estimated transmissivity value from the injection period.

148.50–168.50 m

Due to a rather low flow rate and the automatic pressure regulation system used, the data, especially the flow derivative, are quite scattered. Still, a PSF is indicated to dominate from c 100 s and throughout the injection period. The recovery period is dominated by initial WBS and a transition period. The transient evaluation from the Hantush model, assuming PSF, of the injection period is regarded as the most representative. It is supported by the transient evaluation of the recovery period.

168.50–188.50 m

During the injection period a PRF is indicated after c 50 s. After c 300 s there are indications of an apparent NFB. The recovery period indicates WBS initially transitioning towards an approximate PRF. At the end, an apparent NFB is indicated. The Hurst-Clark-Brauer model for the first part of the injection period and the Dougherty-Babu model for the recovery period give consistent results. The transient evaluation from the injection period is regarded as the most representative for the test section.

188.50–208.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

208.50–228.50 m

Although scattered flow rate data, the injection period indicates a PRF from c 100 s throughout the period. The recovery period only displays a WBS and a transition period. Transient evaluation with the Hurst-Clark-Brauer model for the injection period is regarded as the most representative for this section. It is supported by the model by Dougherty-Babu for the recovery period.

228.50–248.50 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. The flow rate decreased rapidly during the beginning of the injection period indicating an apparent NFB. An apparent PRF is indicated after c 100 s throughout the injection period. The recovery period only displays WBS and a transition period. Transient evaluations using the Hurst-Clark-Brauer model and the Ozkan-Raghavan model for the injection period give consistent results. No unambiguous transient evaluation is possible on the recovery period. An example is shown. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit as well as the flow data were manually lowered by $1.65 \cdot 10^{-9}$ m^3/s.

248.50–268.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

268.50–288.50 m

The injection period initially displays a fast decrease in the flow rate indicating an apparent NFB. At the end, an apparent PRF is indicated. The recovery period is dominated by a PLF. No unambiguous transient evaluation was possible of the recovery period since the PLF does not display sufficient character. Transient evaluations using the Hurst-Clark-Brauer model and the Ozkan-Raghavan model give rather consistent results for the injection period. However, the evaluation with the latter model for a single fracture was considered more appropriate. Hence, it was considered to provide the most representative transmissivity value for this section.

288.50–308.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Due to a small leakage in the pipe string, the measurement noise with a zero flow was centred slightly above zero, and hence the flow rate measurement limit was manually lowered by $1.02 \cdot 10^{-9}$ m^3/s.

408.50–428.50 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. Still, the injection period indicates an early PLF. After c 200 s, the derivative increases which may indicate an apparent NFB. The recovery period only displays WBS and a transition period. The model by Dougherty-Babu for the recovery period supports the estimated transmissivity value from the Hurst-Clark-Brauer model for the injection period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit as well as the flow data were manually lowered by $3.49 \cdot 10^{-9}$ m^3/s.

428.50–448.50 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Due to a small leakage in the pipe string the measurement noise with a zero flow was centred slightly above zero. Hence the flow rate measurement limit was manually lowered by $1.58 \cdot 10^{-9}$ m^3/s.

448.50–468.50 m

The injection period is dominated entirely by a PRF that begins after about 60 s and continues for the rest of the period. The recovery, on the other hand, displays an obvious PSF preceded by a short period of WBS. The transient evaluation of the injection period is regarded as the most representative. It is supported by the transient evaluation of the recovery as well as the stationary evaluation. Due to a small leakage in the pipe string the measurement noise with a zero flow was centred slightly above zero, and hence the flow data were manually lowered by $7.21 \cdot 10^{-9}$ m^3/s.

468.50–488.50 m

Due to a poor initial regulation, the time to achieve a stable injection pressure was unusually long for this test. The actual position on the pressure regulation valve was unfavourable, causing the injection pressure and hence the flow to be somewhat unstable throughout the injection period. Still, the injection clearly indicates a dominating PRF that begins after about 200 s and lasts throughout the period. The start of the recovery period is somewhat unusual. During the first few seconds the pressure decreases normally. However, it is followed by a sudden pressure increase. After c 10 s the recovery displays a normal behaviour again. This might be an effect of a poor closure of the test valve. Otherwise, the recovery only displays a dominating PSF throughout the period. Transient evaluations using the Hurst-Clark-Brauer model for the injection period and the Hantush model for the recovery period give consistent results. Since there are uncertainties about the start of the recovery period, the transient evaluation of the injection period is regarded as the most representative for this section. Due to a small leakage in the pipe string the measurement noise with a zero flow was centred slightly above zero. Hence the flow rate measurement limit as well as the flow data were manually lowered by $1.58 \cdot 10^{-9}$ m^3/s.

488.50–508.50 m

The injection period indicates a dominating apparent NFB, possibly preceded by a short PLF. No unambiguous transient evaluation was possible of the injection period since the PLF does not display sufficient character. The recovery period displays a PLF transitioning to a PRF. After c 700 s the recovery seems to be affected by an apparent NFB. Transient evaluations using the Dougherty-Babu model and the Ozkan-Raghavan model give consistent results for the recovery period. Due to a small leakage in the pipe string the measurement noise with a zero flow was centred slightly above zero. Hence the flow rate measurement limit as well as the flow data were manually lowered by $1.58 \cdot 10^{-8}$ m^3/s.

508.50–528.50 m

Both the injection and recovery period shows an initial PLF transitioning to a PRF. The Hurst-Clark-Brauer model for the injection period and the Dougherty-Babu model for the recovery period as well as the Ozkan-Raghavan mode for both periods give consistent results. The transient evaluation of the injection period with the Hurst-Clark-Brauer is regarded to provide the most representative values for this section. Due to a small leakage in the pipe string the measurement noise with a zero flow was centred slightly above zero. Hence the flow rate measurement limit as well as the flow data were manually lowered by $8.42 \cdot 10^{-9}$ m^3/s.

528.50–548.50 m

The injection period is dominated by an apparent NFB. It is possibly preceded by a short PLF. The recovery period displays, after initial WBS, a clear PRF transitioning to an apparent NFB. The Hurst-Clark-Brauer model for the injection period and the Dougherty-Babu model for the recovery period give consistent results. The transient evaluation of the recovery period was considered as the most representative. Since the measurement noise with a zero flow was centred slightly above zero due to a small leakage in the pipe string, the flow rate data were manually lowered by $1.3 \cdot 10^{-9}$ m^3/s.

548.50–568.50 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Due to a small leakage in the pipe string, the measurement noise with a zero flow was centred slightly above zero, and hence the flow rate measurement limit was manually lowered by $1.46 \cdot 10^{-9}$ m^3/s.

568.50–588.50 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Due to a small leakage in the pipe string, the measurement noise with a zero flow was centred slightly above zero, and hence the flow rate measurement limit was manually lowered by $1.71 \cdot 10^{-9}$ m^3/s.

588.50–608.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Due to a small leakage in the pipe string, the measurement noise with a zero flow was centred slightly above zero. Hence the flow rate measurement limit was manually lowered by $1.71 \cdot 10^{-9}$ m^3/s.

608.50–628.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Due to a small leakage in the pipe string, the measurement noise with a zero flow was centred slightly above zero. Hence the flow rate measurement limit was manually lowered by $1.58 \cdot 10^{-9}$ m^3/s.

628.50–648.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Due to a small leakage in the pipe string, the measurement noise with a zero flow was centred slightly above zero. Hence the flow rate measurement limit was manually lowered by $1.71 \cdot 10^{-9}$ m^3/s.

648.50–668.50 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Due to a small leakage in the pipe string, the measurement noise with a zero flow was centred slightly above zero, and hence the flow rate measurement limit was manually lowered by $1.71 \cdot 10^{-9}$ m^3/s.

668.50–688.50 m

Both the injection- and the recovery period are dominated by a PRF. The Hurst-Clark-Brauer model for the injection period and the Dougherty-Babu model for the recovery period give consistent results. The transient evaluation of the injection period is regarded as the most representative for this section. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit as well as the flow data were manually lowered by $2.32 \cdot 10^{-8}$ m^3/s.

688.50–708.50 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. Still, there are signs of a dominating PRF from c 20 s and throughout the period. The recovery only displays WBS and a transition to some other flow regime. No unambiguous transient evaluation of the recovery period is possible. Since the measurement noise with a zero flow was centred above zero, the flow rate measurement limit as well as the flow data were manually lowered by $1.58 \cdot 10^{-8}$ m^3/s. The transient evaluation of the injection period is regarded as the most representative for this section.

148.50–153.50 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. Still, there are indications of a PLF transitioning to an apparent PRF using a single-fracture model during the injection period. The recovery period only displays WBS and a transition period. No unambiguous transient evaluation of the recovery period is possible. Transient evaluations using the Hurst-Clark-Brauer model and the Ozkan-Raghavan model give consistent results for the injection period. Although very low estimated transmissivity, the transient evaluation from the injection period is selected as representative for the test section.

153.50–158.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

158.50–163.50 m

The injection period indicates a PSF throughout the period. At the end of the injection period, the derivative seemingly increases. This may be an artefact due to the scattered flow rate data and not a true characteristic of the rock formation. During the recovery period only WBS and a transition to some other flow regime, possibly a PSF, is displayed. The transient evaluation of the recovery period is regarded as uncertain. Nevertheless, the Hantush model for the injection period and recovery period, respectively give consistent results. The transient evaluation from the injection period is selected as representative for the test section.

163.50–168.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

168.50–173.50 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. Still, the injection period clearly indicates a dominating PRF throughout the period. The recovery only displays WBS and a transition to some other flow regime, possibly a PRF. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit as well as the flow data were manually lowered by $1.02 \cdot 10^{-9}$ m^3/s. The model by Dougherty-Babu for the recovery period supports the estimated transmissivity value from the injection period by Hurst-Clark-Brauer model.

173.50–178.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit as well as the flow data were manually lowered by $2.27 \cdot 10^{-9}$ m^3/s.

178.50–183.50 m

The injection period is dominated by a PSF. The recovery only displays WBS and a transition to a possible PSF. However, no unambiguous transient evaluation of the recovery period is possible. An example evaluation using the same transmissivity and storativity as were estimated from the injection period is shown. Hence, the transient evaluation of the injection period was regarded to provide the most representative transmissivity value for this section. The pressure in the section below the test section increased by c 3.6 kPa during the injection period. The transmissivity considered to be the most representative for this section was derived by using the Hantush model, which to some degree compensates for leakage. Since the transmissivity in the section below is higher than in the section 178.5–183.5 m, this relatively small pressure interference may have resulted in an overestimation of the transmissivity in this section. The result in Figure 6-2 shows, contradictory, that no significant overestimation of the transmissivity is made. Also this 5 m section is not the dominating one when compared with corresponding 20 and 100 m sections.

183.50–188.50 m

Due to a poor initial pressure regulation, the time to achieve a stable injection pressure was unusually long for this test. The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. Still, the injection period displayed an initial PRF from c 100–500 s followed by a possible NFB. The pressure recovery in the section is rather fast and begins with a WBS. From c 20 s to c 100 s the derivative is rather flat which could indicate a PRF. However, a fit to the Dougherty-Babu model for this period results in a very high skin factor which possibly may indicate turbulence or other head losses during recovery. After c 100 s there are indications of an apparent NFB. The transient evaluation of the injection period is considered as representative for the section.

208.50–213.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Since the measurement noise with a zero flow was centred slightly below zero, the flow rate measurement limit was manually elevated by $1.45 \cdot 10^{-9}$ m^3/s.

213.50–218.50 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

218.50–223.50 m

The automatic pressure regulation, and hence the flow rate, during the injection period is irregular due to an unfortunate position on the pressure regulation valve. The injection period is assumed to be dominated by a PRF from c 200 s lasting throughout the entire injection period. The recovery period only displays WBS and a transition period. The transient evaluation of the injection period is regarded as the most representative for the section.

223.50–228.50 m

Although the flow rate data are rather scattered, a PRF is indicated during the injection period. After an initial WBS the recovery period also indicated an early PRF followed by an increase in the derivative which is interpreted as an apparent NFB. The Hurst-Clark-Brauer model for the PRF during the injection period and the Dougherty-Babu model for the recovery period give consistent results. Since the measurement noise with a zero flow was centred slightly below zero, the flow rate measurement limit as well as the flow data were manually elevated by $3.49 \cdot 10^{-9}$ m^3/s. The transient evaluation of the injection period is regarded as the most representative for the section.

228.50–233.50 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. Still, the injection displays a PRF from c 20 s and throughout the period. The recovery only displays WBS and a transition period. The transient evaluation of the injection period is regarded as the most representative for the section.

233.50–238.50 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. During the injection period a PRF is assumed to dominate. The recovery period only displays WBS and a transition to some other flow regime. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit as well as the flow data were manually lowered by $1.02 \cdot 10^{-9}$ m^3/s. The Dougherty-Babu model for the recovery period supports the evaluation with the Hurst-Clark-Brauer model for the injection period.

238.50–243.50 m

The injection period initially displays a rather fast decrease in the flow rate indicating an apparent NFB, e.g. restriction of the extent of a fracture. After c 200 s an apparent PRF is indicated lasting throughout the period. The recovery period is dominated by a PLF. No unambiguous transient evaluation was possible of the recovery period since the PLF does not display sufficient character. Transient evaluations using the Hurst-Clark-Brauer model and the Ozkan-Raghavan model for a single fracture give consistent results for the injection period. The evaluation with the latter model was considered as the most representative for this section.

243.50–248.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

268.50–273.50 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

273.50–278.50 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

278.50–283.50 m

The injection period initially displays a rather fast decrease in the flow rate indicating an apparent NFB, e.g. restriction of the extent of a fracture. After c 300 s an apparent PRF is indicated lasting throughout the period. Transient evaluation was made according to the Ozkan-Raghavan model for the injection period. The recovery period is dominated by an apparent PLF. No unambiguous transient evaluation was possible of the recovery period since the PLF does not display sufficient character. The transient evaluation of the injection period was considered to be the most representative for this section.

283.50–288.50 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered by $1.02 \cdot 10^{-9}$ m^3/s.

448.50–453.50 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

451.00–456.00 m

The injection period clearly indicated a PSF from c 100 s lasting throughout the entire period. During the recovery period a flat derivative was observed from c 50 to 200 s pointing to an intermediate short PRF. After c 200 s a transition to a PSF was indicated lasting throughout the entire recovery period. The Hantush model for both periods gives consistent results. The transient evaluation of the injection period is regarded as the most representative for the section. The pressure in the section below the test section increased by c 5.5 kPa during the injection period. Since transmissivity in the section below is higher than the transmissivity in the section 451.0–456.0 m, this pressure interference may have resulted in an overestimation of the transmissivity in this section. On the other hand, the transmissivity considered to be the most representative for this section was derived by using the Hantush model, which to some degree compensates for leakage.

456.00–461.00 m

The injection period displays a rather flat derivative that points to a dominating PRF throughout the period. A fit with the Hurst-Clark-Brauer model results in a positive skin factor. The recovery period displays a rather fast decrease in the derivative. After initial WBS, transition to a possible PRF by the end is indicated when the derivative tends to flatten out. The possible PRF by the end is associated with a high positive skin factor which may possibly indicate presence of turbulence or other head losses. The transient evaluation of the injection period is regarded as the most representative for the section.

461.00–466.00 m

The flow rate during the injection period was close to the end position of regulation valve 2 and hence the data, especially the flow derivative, are quite scattered. Still, there are indications of a dominating PSF during the injection period. The recovery period displays a PSF transitioning to a PSS towards the end of the period. The Hantush model for both the injection and the recovery period give consistent results, even though the transient evaluation of the recovery results in a rather high skin factor. Hence, the transient evaluation of the injection period is regarded as the most representative.

466.00–471.00 m

Both the injection and the recovery period display a PLF transitioning to a PRF by the end. During the recovery period, the PLF is preceded by a very short period of WBS. The Hurst-Clark-Brauer model for the injection period and the Dougherty-Babu model for the recovery period as well as the Ozkan-Raghavan model for both periods give consistent results. The Hurst-Clark-Brauer model for the injection period is considered to provide the most representative transmissivity value.

471.00–476.00 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered by $1.02 \cdot 10^{-9}$ m^3/s.

476.00–481.00 m

The injection period is assumed to be dominated by an approximate PRF, even though the derivative displays a slightly increasing trend. The pressure recovery is very fast and the only visible flow regime is PSS during the recovery period. Since there is no obvious explanation found for the fast recovery related to the equipment, it should reflect a true characteristic of the tested section, possibly turbulence or other head losses. Although transient evaluation with the Hantush model results in rather reasonable values for the recovery period, this evaluation is regarded as very uncertain and not unambiguous. The Hurst-Clark-Brauer model for the injection period is considered to provide the most representative transmissivity value for the section.

481.00–486.00 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered by $1.02 \cdot 10^{-9}$ m^3/s.

486.00–491.00 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

491.00–496.00 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

496.00–501.00 m

The injection period only indicates an apparent NFB. The recovery period points to a possible PLF transitioning to a PRF after c 100 s. After c 1,000 s of the recovery period, an apparent NFB is indicated. Only a limited pressure recovery (c 6.5 m) was achieved in this rather high-transmissive section, which possibly may indicate flow in a fracture of limited extent or decreasing aperture away from the borehole. No unambiguous transient evaluation was possible of the injection period. The single-fracture model by Ozkan-Raghavan supports the estimated transmissivity value from the Dougherty-Babu model for the recovery period. The transient evaluation of the recovery period is considered to provide the most representative transmissivity value for the section.

501.00–506.00 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

506.00–511.00 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly below zero, the flow rate measurement limit was manually elevated by $1.02 \cdot 10^{-9}$ m^3/s.

511.00–516.00 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly below zero, the flow rate measurement limit was manually elevated by $1.02 \cdot 10^{-9}$ m^3/s.

516.00–521.00 m

During the injection period a PRF is dominating. The recovery displays WBS and a transition to a PRF. The small decrease in the derivative at the end of the recovery may be an artefact of the shortened scan interval and is not necessarily a true characteristic of the tested rock formation. The Hurst-Clark-Brauer model for the injection period and the Dougherty-Babu model for the recovery period give consistent results. The transient evaluation of the injection period is regarded as the most representative. The pressure in the section below the test section increased by c 18 kPa during the injection period. Since transmissivity in the section below is higher than the transmissivity in the section 516.0–521.0 m, this relatively large pressure interference may have resulted in an overestimation of the transmissivity in this section.

521.00–526.00 m

The injection period indicates an initial PLF transitioning into a PSF from c 200 s and throughout the period. The recovery period also indicates an initial PLF transitioning to a PSF starting after c 400 s of the recovery period. Transient evaluation was made according to the Hantush model for both periods. No unambiguous transient evaluation was possible from the recovery period. An example evaluation of the recovery period is shown. The transient evaluation from the injection period is considered as the most representative for the section. The pressure in the section below the test section increased by c 3.2 kPa during the injection period. Though the transmissivity in the section below is higher than the transmissivity in the section 521.0–526.0 m, this relatively small pressure interference should not have a major impact of the test performed in the section.

526.00–531.00 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. Still, the injection period indicates a dominating PRF. The recovery only displays WBS and a transition to some other flow regime, possibly a PSF. The Hurst-Clark-Brauer model for the injection period and the Hantush model for the recovery period give consistent results. The transient evaluation of the injection period is regarded as the most representative.

531.00–536.00 m

The injection period indicates a short PRF in the beginning of the period followed by a period of increasing derivative which possibly corresponds to a flow feature with decreasing fracture aperture away from the borehole, i.e. an apparent NFB. The recovery period shows initial WBS transitioning to a short period of PRF. At the end of the recovery period an apparent NFB is displayed. Consistent results were obtained from transient evaluation of the injection and recovery period, respectively. The transient evaluation from the recovery period is regarded as the most representative for the section.

536.00–541.00 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

541.00–546.00 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

543.50–548.50 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

668.50–673.50 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Since the measurement noise with a zero flow after the injection was centred slightly above zero, the flow rate measurement limit was manually lowered by $2.27 \cdot 10^{-9}$ m^3/s.

671.00–676.00 m

During the last 10 s of the injection period an unknown disturbance (scatter) in the flow rate can be seen. This test was performed without using the automatic pressure regulation system. However, this fact is not considered to affect the evaluation of the test. The injection period displays an increasing derivative that gradually flattens out. An early PRF is assumed, transitioning to a late PRF at the end of the period. Also the recovery period indicates an early PRF after initial WBS transitioning to a late PRF. The transient evaluations of the injection and recovery period give consistent results. The transient evaluation of the injection period is regarded as the most representative for the section.

676.00–681.00 m

The test section has a low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Since the measurement noise with a zero flow was centred slightly below zero, the flow rate measurement limit was manually elevated by $1.65 \cdot 10^{-9}$ m^3/s.

681.00–686.00 m

Both the injection and the recovery period indicate a dominating PSF. During the recovery period PRF is preceded by WBS. Transient evaluation of the recovery period with the Hantush model with an assumed leakage factor (from the injection period) supports the evaluation of the injection period with the same model. Since the measurement noise with a zero flow was centred slightly above zero, the flow data were manually lowered by $3.49 \cdot 10^{-9}$ m^3/s. The transient evaluation of the injection period is regarded as the most representative for the section.

686.00–691.00 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered by $3.49 \cdot 10^{-9}$ m^3/s.

691.00–696.00 m

Both the injection and recovery period display a PSF although the flow rate data during the injection period are scattered. The PSF during the recovery period is preceded by WBS. The Hantush model for both the injection and the recovery period give consistent results with the stationary evaluation of transmissivity. The transient evaluation of the injection period is regarded as the most representative. Since the measurement noise with a zero flow was centred slightly above zero, the flow data was manually lowered by $2.27 \cdot 10^{-9}$ m^3/s.

697.00–702.00 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly below zero, the flow rate measurement limit was manually elevated by $3.49 \cdot 10^{-9}$ m^3/s.

702.00–707.00 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow after the injection was centred slightly above zero, the flow rate measurement limit was manually lowered by $4.74 \cdot 10^{-9}$ m^3/s.

703.50–708.50 m

The test section has a very low transmissivity. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. Hence, in accordance with AP PF 400-06-085, the injection time was shortened. As a result T_M, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow after the injection was centred slightly above zero, the flow rate measurement limit was manually lowered by $1.02 \cdot 10^{-9}$ m^3/s.

6.2.5 Flow regimes

A summary of the frequency of identified flow regimes on different scales is presented in Table 6-3, which shows all identified flow regimes during the tests. For example, a pseudo-radial flow regime (PRF) transitioning to a pseudo-spherical flow regime (PSF) will contribute to one observation of PRF and one observation of PSF. The numbers within parenthesis denote the number of tests where the actual flow regime is the only one present.

It should be noted that the interpretation of flow regimes is only tentative and just based on visual inspection of the data curves. It should also be observed that the number of tests with a pseudo-linear flow regime during the beginning of the injection period may be underestimated due to the fact that a certain time is required for achieving a constant pressure, which fact may mask the initial flow regime.

Table 6-3. Interpreted flow regimes during the injection tests in KFM08C. The figure within the parenthesis shows the number of tests with only one interpreted flow regime.

Section length (m)	Number of tests	Borehole interval (m)	Number of tests with definable Q_p	Injection period					Recovery period					
				PLF	PRF	PSF	PSS	NFB	WBS	PLF	PRF	PSF	PSS	NFB
5	50	148.5–708.5	24	3(0)	16(10)	7(6)	0(0)	5(1)	17(4)	5(2)	10(0)	8(0)	2(1)	4(0)
20	25	108.5–708.5	14	5(0)	9(5)	1(1)	0(0)	7(0)	9(6)	3(1)	5(1)	2(1)	0(0)	3(0)
100	9	108.5–938.5	7	4(1)	5(1)	0(0)	0(0)	4(0)	5(2)	3(1)	3(0)	0(0)	0(0)	2(0)

Table 6-3 shows that a certain period of pseudo-radial flow could be identified from the injection period in c 67% of the tests with a definable final flow rate for KFM08C. For the recovery period, the corresponding result is c 40%. It should be observed that the measured borehole intervals with 5 m, 20 m and 100 m sections are slightly different in KFM08C, see Table 6-3.

For c 40% of the tests in the borehole, more than one flow regime during the injection period could be identified. The following transitions in KFM08C during the injection period were most common: from NFB to PRF? (i.e. an uncertain PRF), from PLF to PRF and from PRF to NFB. During the recovery period the most common transitions were from WBS to PRF followed by WBS to PSF, PRF to NFB and PLF to PRF.

6.3 Comparison of transmissivity values on different test scales

The transmissivity values considered the most representative, T_R, from the injection tests in KFM08C in the tested sections of 100 m, 20 m and 5 m length, respectively, are shown in Figure 6-2. This figure demonstrates a fairly good agreement between results obtained from tests on different scales in KFM08C. However, some tests in short section lengths display a higher transmissivity than the corresponding longer section length. This discrepancy may be caused by interference with adjacent sections. A consistency check of the transmissivity values on the different scales was made by summation of calculated values from smaller scales (20 m and 5 m) and comparing with the estimated values in longer sections (100 m and 20 m). The total transmissivity of KFM08C is dominated by the intervals between 451.0–461.0, 476.0–481.0 and 496.0–501.0 m.

In Table 6-4, estimated transmissivity values in 100 m and 20 m test sections in KFM08C according to steady-state (T_M) and most representative evaluation (T_R) are listed together with summed transmissivities in 20 m and 5 m sections over the corresponding 100 m and 20 m sections. Also, the corresponding sum of transmissivity values from the difference flow logging in 5 m sections is shown. When the transmissivity values are below the measurement limit (Q_p could not be defined), the most representative transmissivity value, T_R, was considered to be less than T_M, based on Q/s-measl-L, for the test section. The measurement limit values are included in the summed values in Table 6-4. This leads to overestimated values of the summed transmissivities.

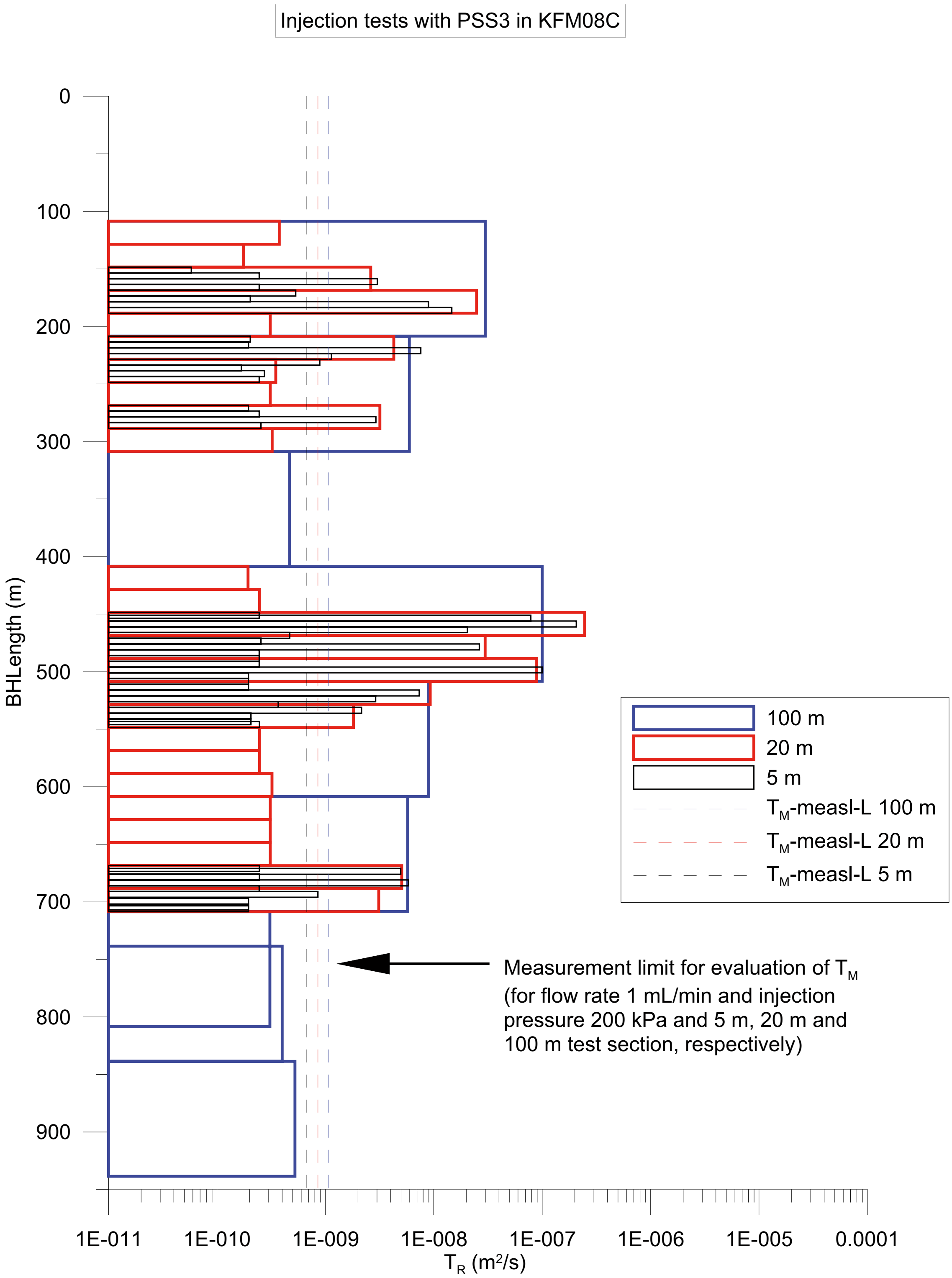

Figure 6-2. *Estimated best representative transmissivity values (T_R) from injection tests for sections of 100 m, 20 m and 5 m length in borehole KFM08C. Estimated transmissivity values for the lower standard measurement limit from stationary evaluation (T_M-measl-L) for different test section lengths are also shown.*

Table 6-4. Estimated transmissivity values in 100 m and 20 m test sections together with summed up transmissivity values in 20 m and 5 m sections in the corresponding borehole intervals from the injection tests in KFM08C. In addition, the corresponding sum of transmissivity values from the difference flow logging in 5 m sections is shown.

Borehole Idcode	Secup inj/pulse (m)	Seclow inj/pulse (m)	L_w (m)	T_M inj. tests (m²/s)	T_R inj/pulse (m²/s)	SUM T_M (20 m) inj. tests (m²/s)	SUM T_R (20 m) inj/pulse (m²/s)	SUM T_M (5 m) inj. tests (m²/s)	SUM T_R (5 m) inj/pulse (m²/s)	Secup Diff-flow log (m)	Seclow diff-flow log (m)	SUM-T_D (5 m) diff-flow log (m²/s)
KFM08C	108.50	208.50	100.00	5.65E–08	2.99E–08	5.02E–08	2.83E–08	5.40E–08 [1)]	2.79E–08 [1)]	108.16	208.20	2.51E–08
KFM08C	208.50	308.50	100.00	4.20E–08	5.96E–09	3.88E–08	8.44E–09	3.27E–08 [1)]	1.43E–08 [1)]	208.19	308.33	2.78E–08
KFM08C	308.50	408.50	100.00	4.67E–10	4.67E–10	n.m 20 m	n.m 20 m	n.m 5 m	n.m 5 m	308.36	408.44	1.69E–08
KFM08C	408.50	508.50	100.00	3.19E–07	1.00E–07	2.87E–07	3.66E–07	2.69E–07 [1)]	4.34E–07 [1)]	408.44	508.52	1.82E–07
KFM08C	508.50	608.50	100.00	4.95E–08	8.96E–09	4.65E–08	1.19E–08	5.68E–08 [1)]	1.38E–08 [1)]	508.53	608.63	2.54E–08
KFM08C	608.50	708.50	100.00	1.21E–08	5.75E–09	1.16E–08	9.11E–09	1.03E–08 [1)]	1.30E–08 [1)]	608.66	708.76	2.23E–08
KFM08C	708.50	808.50	100.00	< 3.08E–10	< 3.08E–10	n.m 20 m	n.m 20 m	n.m 5 m	n.m 5 m	708.76	808.87	1.68E–08
KFM08C	738.50	838.50	100.00	< 3.99E–10	< 3.99E–10	n.m 20 m	n.m 20 m	n.m 5 m	n.m 5 m	738.80	838.89	1.69E–08
KFM08C	838.50	938.50	100.00	5.24E–10	5.24E–10	n.m 20 m	n.m 20 m	n.m 5 m	n.m 5 m	838.90	939.10	1.69E–08
KFM08C	108.50	128.50	20.00	< 3.76E–10	< 3.76E–10			n.m 5 m	n.m 5 m	108.16	128.18	3.46E–09
KFM08C	128.50	148.50	20.00	4.03E–10	1.76E–10			n.m 5 m	n.m 5 m	128.18	148.19	3.44E–09
KFM08C	148.50	168.50	20.00	4.69E–09	2.62E–09			3.80E–09	3.57E–09	148.19	168.19	5.35E–09
KFM08C	168.50	188.50	20.00	4.44E–08	2.48E–08			5.02E–08	2.43E–08	168.20	188.20	9.48E–09
KFM08C	188.50	208.50	20.00	< 3.11E–10	< 3.11E–10			n.m 5 m	n.m 5 m	188.18	208.20	3.34E–09
KFM08C	208.50	228.50	20.00	1.02E–08	4.28E–09			8.59E–09	9.14E–09	208.19	228.19	6.17E–09
KFM08C	228.50	248.50	20.00	2.24E–09	3.48E–10			3.04E–09	1.58E–09	228.19	248.26	3.34E–09
KFM08C	248.50	268.50	20.00	< 3.11E–10	< 3.11E–10			n.m 5 m	n.m 5 m	248.29	268.31	3.35E–09
KFM08C	268.50	288.50	20.00	2.57E–08	3.18E–09			2.11E–08	3.62E–09	268.31	288.32	1.15E–08
KFM08C	288.50	308.50	20.00	< 3.23E–10	< 3.23E–10			n.m 5 m	n.m 5 m	288.32	308.33	3.44E–09
KFM08C	408.50	428.50	20.00	4.55E–10	1.93E–10			n.m 5 m	n.m 5 m	408.44	428.45	3.40E–09
KFM08C	428.50	448.50	20.00	< 2.47E–10	< 2.47E–10			n.m 5 m	n.m 5 m	428.42	448.46	3.40E–09
KFM08C	448.50	468.50	20.00	1.89E–07	2.47E–07			1.86E–07 [1)]	3.06E–07 [1)]	448.47	468.48	1.35E–07
KFM08C	468.50	488.50	20.00	2.22E–08	2.98E–08			2.28E–08 [1)]	2.73E–08 [1)]	468.49	488.51	2.34E–08

Borehole Idcode	Secup inj/pulse (m)	Seclow inj/pulse (m)	L_w (m)	T_M inj. tests (m^2/s)	T_R inj/pulse (m^2/s)	SUM T_M (20 m) inj. tests (m^2/s)	SUM T_R (20 m) inj/pulse (m^2/s)	SUM T_M (5 m) inj. tests (m^2/s)	SUM T_R (5 m) inj/pulse (m^2/s)	Secup Diff-flow log (m)	Seclow diff-flow log (m)	SUM-T_D (5 m) diff-flow log (m^2/s)
KFM08C	488.50	508.50	20.00	7.57E–08	8.91E–08			5.99E–08[1)]	1.01E–07[1)]	488.51	508.52	1.65E–08
KFM08C	508.50	528.50	20.00	4.29E–08	9.26E–09			5.43E–08[1)]	1.07E–08[1)]	508.53	528.54	1.21E–08
KFM08C	528.50	548.50	20.00	2.76E–09	1.81E–09			2.48E–09[1)]	3.19E–09[1)]	528.55	548.56	3.32E–09
KFM08C	548.50	568.50	20.00	< 2.47E–10	< 2.47E–10			n.m 5 m	n.m 5 m	548.56	568.58	3.32E–09
KFM08C	568.50	588.50	20.00	< 2.47E–10	< 2.47E–10			n.m 5 m	n.m 5 m	568.60	588.61	3.30E–09
KFM08C	588.50	608.50	20.00	< 3.22E–10	<3.22E–10			n.m 5 m	n.m 5 m	588.61	608.63	3.32E–09
KFM08C	608.50	628.50	20.00	< 3.11E–10	< 3.11E–10			n.m 5 m	n.m 5 m	608.66	628.66	3.32E–09
KFM08C	628.50	648.50	20.00	< 3.11E–10	< 3.11E–10			n.m 5 m	n.m 5 m	628.66	648.66	3.31E–09
KFM08C	648.50	668.50	20.00	< 3.11E–10	< 3.11E–10			n.m 5 m	n.m 5 m	648.67	668.68	3.31E–09
KFM08C	668.50	688.50	20.00	9.35E–09	5.06E–09			5.12E–09[1)]	5.69E–09[1)]	668.68	688.73	8.99E–09
KFM08C	688.50	708.50	20.00	1.37E–09	3.12E–09			5.01E–09[1)]	7.15E–09[1)]	688.74	708.76	3.32E–09

[1)] Measured intervals not identical
n.m. = not measured

In Figure 6-3, transmissivity values considered as the most representative for 100 m and 20 m sections (T_R-100 m and T_R-20 m, respectively) in KFM08C are plotted versus the sum of the transmissivity values considered most representative in 5 m sections in the corresponding intervals (SUM T_R-5 m). The lower measurement limit of T_M for the different section lengths (Q_p=1 mL/min and an assumed pressure difference of 200 kPa) together with the cumulative measurement limit for the sum of 5 m sections are also shown in the figure.

Figure 6-3 indicates a rather good agreement between estimated transmissivity values in longer sections and summed transmissivity values in corresponding 5 m sections for the injection tests. However, generally data points are located slightly below the straight line. This indicates that the sum of the transmissivity from the shorter sections is slightly higher than the estimated transmissivity in longer sections. Hydraulic interference between adjacent sections may contribute to an overestimation of the sum of transmissivity when summing the transmissivity from several sections together. Since the measurement limit values also are summed up, the sum of transmissivity in shorter sections can become higher than the estimated transmissivity value in the longer section for very low conductive sections. There might also be other reasons for discrepancies.

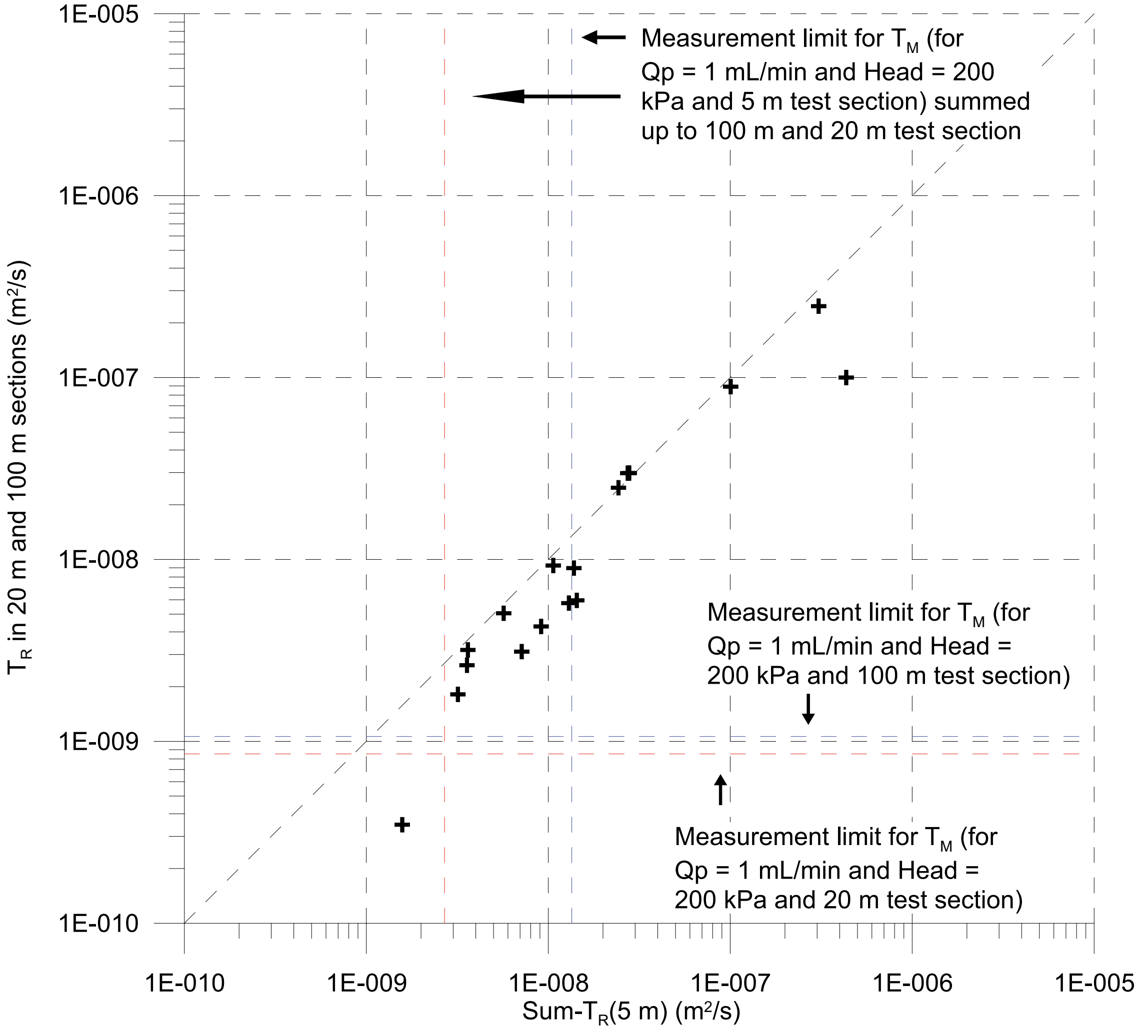

Figure 6-3. *Transmissivity values considered most representative (T_R) for 100 m and 20 m sections versus the sum of most representative transmissivity values (T_R) in 5 m sections in the corresponding borehole intervals from the injection tests in KFM08C together with the standard lower measurement limit at different scales.*

6.4 Comparison with results from the difference flow logging in KFM08C

As discussed in Section 3.2, the position of the measured 5 m sections for the injection tests and the difference flow logging respectively, deviated up to 2.49 m in KFM08C. However, for most of these tests the difference flow logging reported a transmissivity below the measurement limit. In sections where the section limits deviated significantly the sections were shifted so that a reasonable comparison between the difference flow logging and the injection tests could be made. Especially where the transmissive fractures were found during difference flow logging of the anomalies, deviating sections were shifted in order to achieve a reasonable comparison.

Figure 6-4 shows a comparison of the calculated steady-state- (T_M) and most representative transmissivity (T_R) from the injection tests in 5 m sections with the calculated transmissivity values in the corresponding 5 m sections from the difference flow logging (T_D) in KFM08C. In Figure 6-5, T_R and T_D are plotted versus borehole length. The presented measurement limit for the difference flow logging is the practical lower measurement limit (varying along the borehole) in KFM08C which for most sections was between $6.6 \cdot 10^{-10}$ to $9.2 \cdot 10^{-9}$ m²/s, cf Figure 6-5. This limit is higher than the corresponding test-specific measurement limit for the injection tests in KFM08C, cf Table 6-2. This is clearly seen in Figure 6-4 as a difference between T_D, T_M and T_R, respectively, for low transmissivity values.

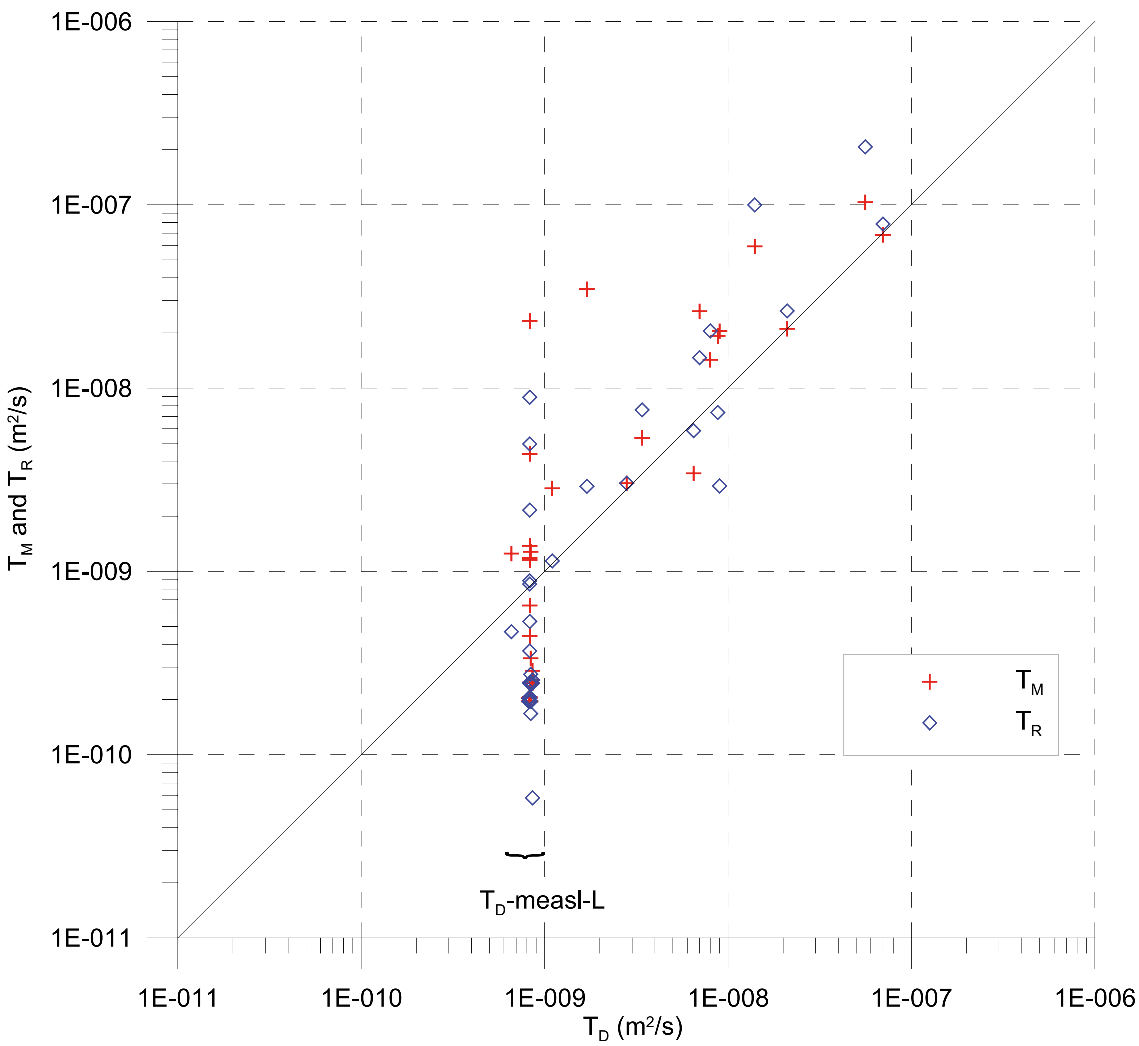

__Figure 6-4.__ Comparison of estimated steady-state (T_M) from the injection tests and most representative (T_R) transmissivity values from the injection tests in 5 m sections with estimated transmissivity values in the corresponding 5 m sections from the previous difference flow logging (T_D) in KFM08C.

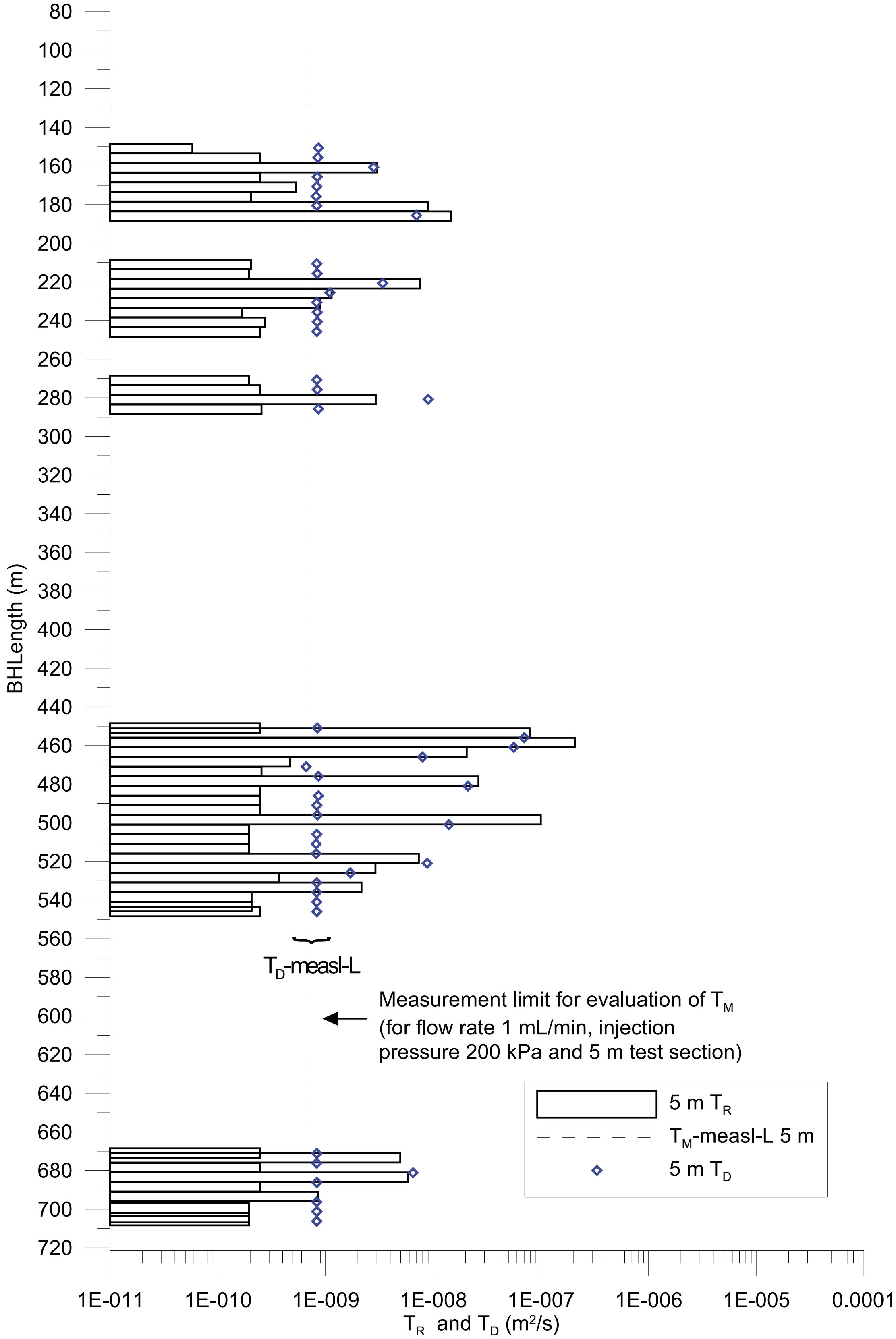

Figure 6-5. *Comparison of most representative (T_R) transmissivity values from the injection tests in 5 m sections with estimated transmissivity values in the corresponding 5 m sections from the previous difference flow logging (T_D) in KFM08C.*

Figure 6-6 shows a comparison of the estimated steady-state transmissivity values from the injection tests in 100 m and 20 m test sections with summed transmissivity values for 5 m sections from the difference flow logging (SUM T_D(5 m)) in the corresponding borehole intervals. The latter sums are shown in Table 6-4. Figure 6-6 demonstrates that the estimated transmissivity values from the injection tests in 100 m and 20 m sections are distributed over a wider range than the sum of transmissivity values from the difference flow logging. This is partly a result of the lower measurement limit values being included in the sum for the difference flow logging. In Figure 6-7, T_R and SUM T_D(5 m) are plotted versus the borehole length for the injection test intervals in 20 m and 100 m sections.

Figures 6-4, 6-5, 6-6 and 6-7 show that the result of the injection tests, in most cases, reveal higher estimated transmissivities than the results from the difference flow logging. This fact has also been observed in a few other boreholes in Forsmark, cf /14/, /15/, /16/ and /19/. For the difference flow logging, the preceding flow period in the borehole before the flow measurements was much longer than the short flow period for the injection tests. Therefore, the difference flow logging is assumed to predominantly measure interconnected, conductive fracture networks reaching further away from the borehole while the injection tests also may sample fractures with limited extension, close to the borehole. This fact may possibly explain the significantly higher T_R from the injection tests than T_D from difference flow logging in some sections, assuming that the fractures in these sections are of limited extent or with decreasing aperture away from

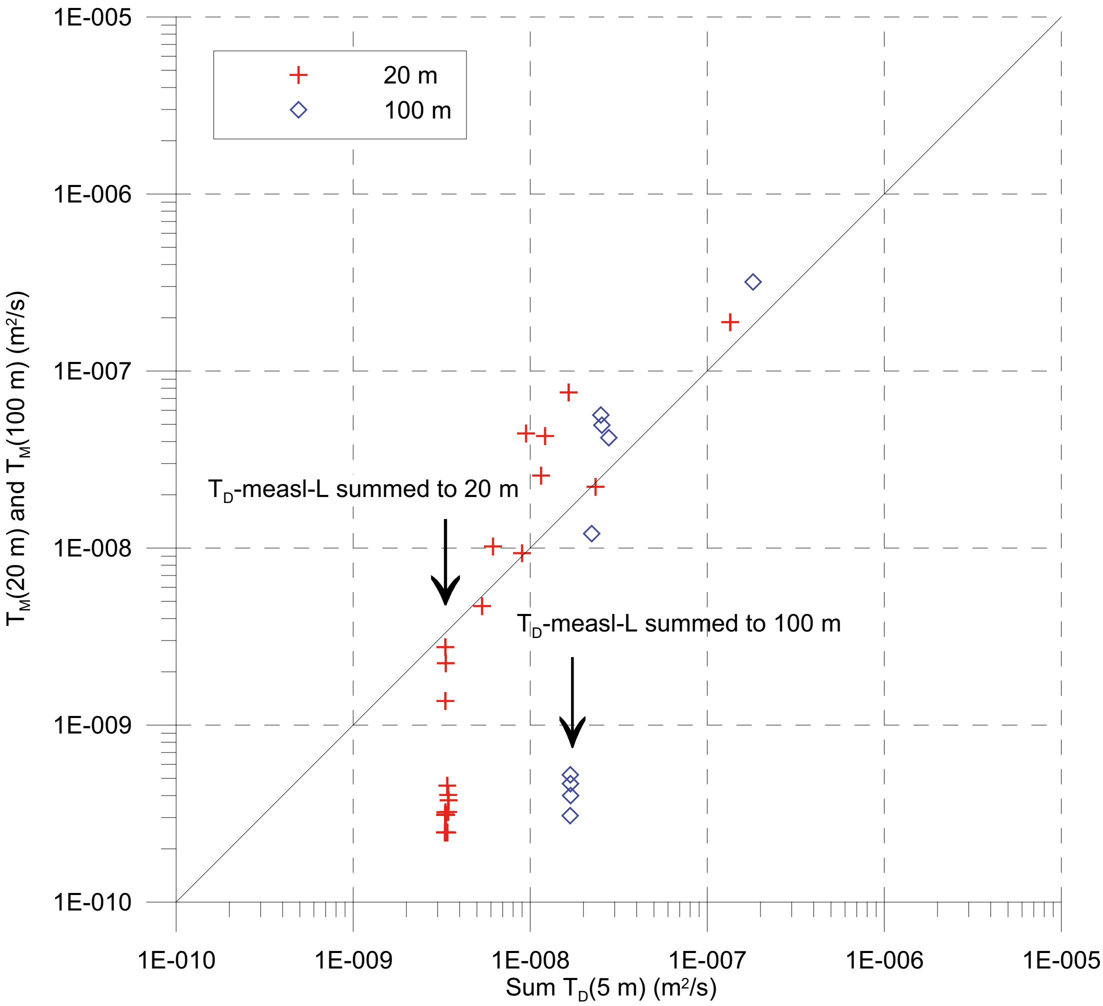

Figure 6-6. *Comparison of estimated steady-state transmissivity values from injection tests in 20 m and 100 m sections with summed transmissivity values in 5 m sections in the corresponding borehole intervals from difference flow logging in KFM08C.*

the borehole and not connected to a larger fracture network. Thus, the transmissivity of such fractures is assumed to decrease with increasing flow times, eventually reflected by effects of apparent no-flow boundaries during the injection tests. However, during short injection tests, such effects may not always be seen. It should also be noted that the two methods differ regarding assumptions and associated uncertainties. Potential uncertainties for difference flow logging results are discussed in Ludvigson et al. (2002) /17/ and for injection tests in Andersson et al. (1993) /18/.

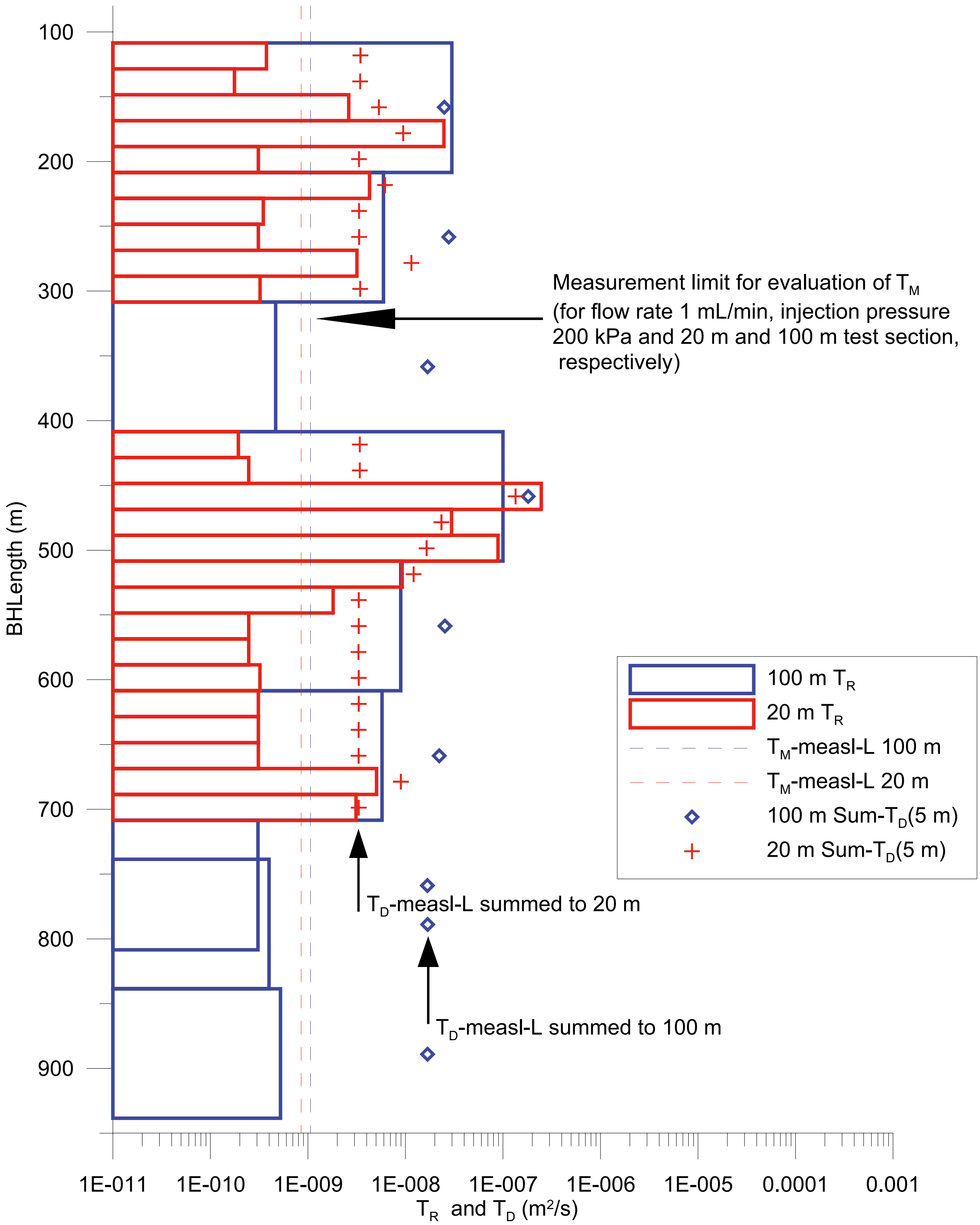

Figure 6-7. *Comparison of most representative (T_R) transmissivity values from injection tests in 20 m and 100 m sections with summed transmissivity values in 5 m sections in the corresponding borehole intervals from difference flow logging in KFM08C.*

6.5 Basic statistics of hydraulic conductivity distributions in different scales

Some basic statistical parameters were calculated for the steady-state hydraulic conductivity (K_M) distributions in different scales (100 m, 20 m and 5 m) from the injection tests in borehole KFM08C. The hydraulic conductivity is obtained by dividing the transmissivity by the section length, in this case T_M/L_w. Results from tests where Q_p was below the estimated test-specific measurement limit were not included in the statistical analyses of K_M. The same basic statistical parameters were derived for the hydraulic conductivity considered most representative ($K_R=T_R/L_w$), including all tests. In the statistical analysis, the logarithm (base 10) of K_M and K_R was used. Selected results are shown in Table 6-5. It should be noted that the statistics for the different section lengths is based on different borehole intervals.

6.6 Comparison of results from different hydraulic tests in KFM08C

In Table 6-6 a comparison of the sum of estimated transmissivity values from different hydraulic tests with different section lengths in KFM08C is presented. It should be observed that the summed transmissivity values only include the tests actually performed for each section length. However, the most conductive sections are measured. It is also important to point out that this is a very rough way of comparing the tests in different test scales, since no consideration to overlapping sections are made. The sum of transmissivity from shorter sections is slightly higher than corresponding transmissivity for longer sections. This tendency can be seen between 100 m, 20 m and 5 m sections on T_R in Table 6-6.

Table 6-6 shows that the transmissivity evaluated from the difference flow logging is lower than the transmissivity evaluated from the injection tests, see Section 6.4.

Table 6-5. Basic statistical parameters for steady-state hydraulic conductivity (K_M) and hydraulic conductivity considered most representative (K_R) in borehole KFM08C. L_w=section length, m=arithmetic mean, s=standard deviation.

Parameter	Unit	KFM08C L_w=100 m	KFM08C L_w=20[2] m	KFM08C L_w=5 m[3][4]
Measured borehole interval	m	108.5–938.5	108.5–708.5	148.5–708.5
Number of tests	–	9	25	50
N:o of tests below E.L.M.L.[1]	–	2	11	26
m (Log10 (KM))	Log10 (m/s)	–9.85	–9.37	–9.00
s (Log10 (KM))	–	1.08	0.82	0.78
m (Log10 (KR))	Log10 (m/s)	–10.51	–10.16	–9.79
s (Log10 (KR))	–	0.91	0.91	0.86

[1] Number of tests where Qp could not be defined (E.L.M.L. = estimated test-specific lower measurement limit).

[2] Sections with very low or non-detectable flow (with 100 m section length) are not measured with 20 m section length.

[3] Sections with very low or non-detectable flow (with 20 m section length) are not measured with 5 m section length.

[4] Sections 448.5–453.5 and 451.0–456.0, 541.0–546.0 and 543.5–548.5 and 702.0–707.0 and 703.5–708.5 m are partly overlapping.

Table 6-6. Comparison of calculated transmissivity values from different hydraulic tests in borehole KFM08C.

Hydraulic test method		Sum of T (m^2/s)
Injection tests	$\sum T_M$ (100 m)	4.81E–07
	$\sum T_R$ (100 m)	1.52E–07
	$\sum T_M$ (20 m)[1)]	4.22E–07
	$\sum T_R$ (20 m)[1)]	4.19E–07
	$\sum T_M$ (5 m)[2)]	4.23E–07
	$\sum T_R$ (5 m)[2)]	5.03E–07
Difference flow logging	$\sum T_D$ (5 m)[3)]	3.38E–07
	$\sum T_{Df}$ (flow anomalies)[3)]	1.97E–07

1) Actual measured intervals were 108.5–188.5, 248.5–308.5 and 408.5–708.5 m.

2) Actual measured intervals were 148.5–188.5, 208.5–248.5, 268.5–288.5, 448.5–548.0, 668.5–696.0 and 697.0–708.5 m.

3) Within interval 108.16–939.10, actual measured intervals 83.16–944.10 m.

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APPENDIX 1. File description table

Bh id	Test section		Test type	Test no	Test start Date, time	Test stop Date, time	Data files of raw and primary data	Parameters in file	Comments
idcode	(m)	(m)	(1-6)[1]		YYYYMMDD hh:mm	YYYYMMDD hh:mm	__Borehole id_secup_date and time of test start		
KFM08C	108.50	208.50	3	1	2006-10-04 08:30	2006-10-04 10:23	__KFM08C_0108.50_200610040830.ht2	P, Q, Te	Interrupted[2]
KFM08C	108.50	208.50	3	2	2006-10-06 08:14	2006-10-06 10:04	__KFM08C_0108.50_200610060814.ht2	P, Q, Te	Reperformed
KFM08C	208.50	308.50	3	1	2006-10-04 11:21	2006-10-04 14:02	__KFM08C_0208.50_200610041121.ht2	P, Q, Te	
KFM08C	308.50	408.50	3	1	2006-10-04 14:58	2006-10-04 16:39	__KFM08C_0308.50_200610041458.ht2	P, Q, Te	
KFM08C	408.50	508.50	3	1	2006-10-04 18:14	2006-10-04 19:53	__KFM08C_0408.50_200610041814.ht2	P, Q, Te	
KFM08C	508.50	608.50	3	1	2006-10-04 20:54	2006-10-04 22:32	__KFM08C_0508.50_200610042054.ht2	P, Q, Te	
KFM08C	608.50	708.50	3	1	2006-10-05 06:07	2006-10-05 07:57	__KFM08C_0608.50_200610050607.ht2	P, Q, Te	
KFM08C	708.50	808.50	3	1	2006-10-05 08:52	2006-10-05 09:52	__KFM08C_0708.50_200610050852.ht2	P, Q, Te	
KFM08C	738.50	838.50	3	1	2006-10-05 10:17	2006-10-05 11:19	__KFM08C_0738.50_200610051017.ht2	P, Q, Te	
KFM08C	838.50	938.50	3	1	2006-10-05 14:24	2006-10-05 16:16	__KFM08C_0838.50_200610051424.ht2	P, Q, Te	
KFM08C	108.50	128.50	3	1	2006-10-09 12:42	2006-10-09 13:56	__KFM08C_0108.50_200610091242.ht2	P, Q, Te	
KFM08C	128.50	148.50	3	1	2006-10-09 14:20	2006-10-09 15:34	__KFM08C_0128.50_200610091420.ht2	P, Q, Te	
KFM08C	148.50	168.50	3	1	2006-10-09 15:51	2006-10-09 17:09	__KFM08C_0148.50_200610091551.ht2	P, Q, Te	
KFM08C	168.50	188.50	3	1	2006-10-10 06:21	2006-10-10 07:36	__KFM08C_0168.50_200610100621.ht2	P, Q, Te	
KFM08C	188.50	208.50	3	1	2006-10-10 07:56	2006-10-10 08:54	__KFM08C_0188.50_200610100756.ht2	P, Q, Te	
KFM08C	208.50	228.50	3	1	2006-10-10 09:08	2006-10-10 10:24	__KFM08C_0208.50_200610100908.ht2	P, Q, Te	
KFM08C	228.50	248.50	3	1	2006-10-10 10:45	2006-10-10 12:51	__KFM08C_0228.50_200610101045.ht2	P, Q, Te	
KFM08C	248.50	268.50	3	1	2006-10-10 13:09	2006-10-10 13:53	__KFM08C_0248.50_200610101309.ht2	P, Q, Te	
KFM08C	268.50	288.50	3	1	2006-10-10 14:08	2006-10-10 15:24	__KFM08C_0268.50_200610101408.ht2	P, Q, Te	
KFM08C	288.50	308.50	3	1	2006-10-10 15:47	2006-10-10 16:31	__KFM08C_0288.50_200610101547.ht2	P, Q, Te	
KFM08C	408.50	428.50	3	1	2006-10-10 17:51	2006-10-10 19:08	__KFM08C_0408.50_200610101751.ht2	P, Q, Te	
KFM08C	428.50	448.50	3	1	2006-10-12 16:47	2006-10-12 17:45	__KFM08C_0428.50_200610121647.ht2	P, Q, Te	
KFM08C	431.50	451.50	3	1	2006-10-10 19:29	2006-10-10 20:19	__KFM08C_0431.50_200610101929.ht2	P, Q, Te	Incorrect position, interrupted[3]
KFM08C	448.50	468.50	3	1	2006-10-10 20:56	2006-10-10 22:09	__KFM08C_0448.50_200610102056.ht2	P, Q, Te	
KFM08C	468.50	488.50	3	1	2006-10-10 22:26	2006-10-10 23:40	__KFM08C_0468.50_200610102226.ht2	P, Q, Te	
KFM08C	488.50	508.50	3	1	2006-10-11 07:30	2006-10-11 08:45	__KFM08C_0488.50_200610110730.ht2	P, Q, Te	
KFM08C	508.50	528.50	3	1	2006-10-11 09:44	2006-10-11 10:59	__KFM08C_0508.50_200610110944.ht2	P, Q, Te	
KFM08C	528.50	548.50	3	1	2006-10-11 12:38	2006-10-11 13:55	__KFM08C_0528.50_200610111238.ht2	P, Q, Te	
KFM08C	548.50	568.50	3	1	2006-10-11 16:12	2006-10-11 17:04	__KFM08C_0548.50_200610111612.ht2	P, Q, Te	
KFM08C	568.50	588.50	3	1	2006-10-11 19:42	2006-10-11 20:49	__KFM08C_0568.50_200610111942.ht2	P, Q, Te	
KFM08C	588.50	608.50	3	1	2006-10-11 21:22	2006-10-11 22:24	__KFM08C_0588.50_200610112122.ht2	P, Q, Te	
KFM08C	608.50	628.50	3	1	2006-10-11 22:47	2006-10-11 23:37	__KFM08C_0608.50_200610112247.ht2	P, Q, Te	
KFM08C	628.50	648.50	3	1	2006-10-12 06:55	2006-10-12 07:47	__KFM08C_0628.50_200610120655.ht2	P, Q, Te	
KFM08C	648.50	668.50	3	1	2006-10-12 08:07	2006-10-12 08:59	__KFM08C_0648.50_200610120807.ht2	P, Q, Te	
KFM08C	668.50	688.50	3	1	2006-10-12 09:18	2006-10-12 10:14	__KFM08C_0668.50_200610120918.ht2	P, Q, Te	Interrupted[2]

Bh id	Test section		Test type	Test no	Test start Date, time	Test stop Date, time	Data files of raw and primary data	Parameters in file	Comments
idcode	(m)	(m)	(1-6)[1)]		YYYYMMDD hh:mm	YYYYMMDD hh:mm	__Borehole id_secup_date and time of test start		
KFM08C	668.50	688.50	3	2	2006-10-12 12:37	2006-10-12 13:53	__KFM08C_0668.50_200610121237.ht2	P, Q, Te	Reperformed
KFM08C	688.50	708.50	3	1	2006-10-12 10:40	2006-10-12 11:54	__KFM08C_0688.50_200610121040.ht2	P, Q, Te	
KFM08C	148.50	153.50	3	1	2006-10-13 14:45	2006-10-13 16:02	__KFM08C_0148.50_200610131445.ht2	P, Q, Te	
KFM08C	153.50	158.50	3	1	2006-10-13 16:12	2006-10-13 17:02	__KFM08C_0153.50_200610131612.ht2	P, Q, Te	
KFM08C	158.50	163.50	3	1	2006-10-16 08:17	2006-10-16 09:32	__KFM08C_0158.50_200610160817.ht2	P, Q, Te	
KFM08C	163.50	168.50	3	1	2006-10-16 09:42	2006-10-16 10:36	__KFM08C_0163.50_200610160942.ht2	P, Q, Te	
KFM08C	168.50	173.50	3	1	2006-10-16 10:48	2006-10-16 12:43	__KFM08C_0168.50_200610161048.ht2	P, Q, Te	
KFM08C	173.50	178.50	3	1	2006-10-16 12:54	2006-10-16 13:34	__KFM08C_0173.50_200610161254.ht2	P, Q, Te	
KFM08C	178.50	183.50	3	1	2006-10-16 13:43	2006-10-16 15:01	__KFM08C_0178.50_200610161343.ht2	P, Q, Te	
KFM08C	183.50	188.50	3	1	2006-10-16 15:17	2006-10-16 16:33	__KFM08C_0183.50_200610161517.ht2	P, Q, Te	
KFM08C	208.50	213.50	3	1	2006-10-17 08:16	2006-10-17 08:57	__KFM08C_0208.50_200610170816.ht2	P, Q, Te	
KFM08C	213.50	218.50	3	1	2006-10-17 09:12	2006-10-17 09:55	__KFM08C_0213.50_200610170912.ht2	P, Q, Te	
KFM08C	218.50	223.50	3	1	2006-10-17 10:07	2006-10-17 11:25	__KFM08C_0218.50_200610171007.ht2	P, Q, Te	
KFM08C	223.50	228.50	3	1	2006-10-17 12:29	2006-10-17 13:46	__KFM08C_0223.50_200610171229.ht2	P, Q, Te	
KFM08C	228.50	233.50	3	1	2006-10-17 14:02	2006-10-17 15:17	__KFM08C_0228.50_200610171402.ht2	P, Q, Te	
KFM08C	233.50	238.50	3	1	2006-10-17 15:30	2006-10-17 16:44	__KFM08C_0233.50_200610171530.ht2	P, Q, Te	
KFM08C	238.50	243.50	3	1	2006-10-18 08:21	2006-10-18 09:35	__KFM08C_0238.50_200610180821.ht2	P, Q, Te	
KFM08C	243.50	248.50	3	1	2006-10-18 10:02	2006-10-18 10:45	__KFM08C_0243.50_200610181002.ht2	P, Q, Te	
KFM08C	268.50	273.50	3	1	2006-10-18 11:06	2006-10-18 12:27	__KFM08C_0268.50_200610181106.ht2	P, Q, Te	
KFM08C	273.50	278.50	3	1	2006-10-18 12:45	2006-10-18 13:26	__KFM08C_0273.50_200610181245.ht2	P, Q, Te	
KFM08C	278.50	283.50	3	1	2006-10-18 13:36	2006-10-18 14:50	__KFM08C_0278.50_200610181336.ht2	P, Q, Te	
KFM08C	283.50	288.50	3	1	2006-10-18 15:02	2006-10-18 15:43	__KFM08C_0283.50_200610181502.ht2	P, Q, Te	
KFM08C	448.50	453.50	3	1	2006-10-19 08:48	2006-10-19 09:36	__KFM08C_0448.50_200610190848.ht2	P, Q, Te	
KFM08C	451.00	456.00	3	1	2006-10-19 09:53	2006-10-19 11:11	__KFM08C_0451.00_200610190953.ht2	P, Q, Te	
KFM08C	456.00	461.00	3	1	2006-10-19 11:25	2006-10-19 13:21	__KFM08C_0456.00_200610191125.ht2	P, Q, Te	
KFM08C	461.00	466.00	3	1	2006-10-19 13:34	2006-10-19 14:51	__KFM08C_0461.00_200610191334.ht2	P, Q, Te	
KFM08C	466.00	471.00	3	1	2006-10-19 15:04	2006-10-19 16:28	__KFM08C_0466.00_200610191504.ht2	P, Q, Te	
KFM08C	471.00	476.00	3	1	2006-10-19 16:41	2006-10-19 17:24	__KFM08C_0471.00_200610191641.ht2	P, Q, Te	
KFM08C	476.00	481.00	3	1	2006-10-20 08:44	2006-10-20 10:03	__KFM08C_0476.00_200610200844.ht2	P, Q, Te	
KFM08C	481.00	486.00	3	1	2006-10-20 10:16	2006-10-20 11:03	__KFM08C_0481.00_200610201016.ht2	P, Q, Te	
KFM08C	486.00	491.00	3	1	2006-10-20 12:29	2006-10-20 13:12	__KFM08C_0486.00_200610201229.ht2	P, Q, Te	
KFM08C	491.00	496.00	3	1	2006-10-20 13:28	2006-10-20 14:15	__KFM08C_0491.00_200610201328.ht2	P, Q, Te	
KFM08C	496.00	501.00	3	1	2006-10-20 14:27	2006-10-20 15:45	__KFM08C_0496.00_200610201427.ht2	P, Q, Te	
KFM08C	501.00	506.00	3	1	2006-10-23 08:31	2006-10-23 09:14	__KFM08C_0501.00_200610230831.ht2	P, Q, Te	
KFM08C	506.00	511.00	3	1	2006-10-23 09:30	2006-10-23 10:12	__KFM08C_0506.00_200610230930.ht2	P, Q, Te	
KFM08C	511.00	516.00	3	1	2006-10-23 10:23	2006-10-23 11:04	__KFM08C_0511.00_200610231023.ht2	P, Q, Te	
KFM08C	516.00	521.00	3	1	2006-10-23 11:13	2006-10-23 13:18	__KFM08C_0516.00_200610231113.ht2	P, Q, Te	

Bh id	Test section		Test type	Test no	Test start Date, time	Test stop Date, time	Data files of raw and primary data	Parameters in file	Comments
idcode	(m)	(m)	(1-6)[1)]		YYYYMMDD hh:mm	YYYYMMDD hh:mm	__Borehole id_secup_date and time of test start		
KFM08C	521.00	526.00	3	1	2006-10-23 13:29	2006-10-23 14:47	__KFM08C_0521.00_200610231329.ht2	P, Q, Te	
KFM08C	526.00	531.00	3	1	2006-10-23 14:57	2006-10-23 16:12	__KFM08C_0526.00_200610231457.ht2	P, Q, Te	
KFM08C	531.00	536.00	3	1	2006-10-23 16:23	2006-10-23 17:36	__KFM08C_0531.00_200610231623.ht2	P, Q, Te	
KFM08C	536.00	541.00	3	1	2006-10-24 08:16	2006-10-24 08:59	__KFM08C_0536.00_200610240816.ht2	P, Q, Te	
KFM08C	541.00	546.00	3	1	2006-10-24 09:09	2006-10-24 09:49	__KFM08C_0541.00_200610240909.ht2	P, Q, Te	
KFM08C	543.50	548.50	3	1	2006-10-24 10:03	2006-10-24 10:46	__KFM08C_0543.50_200610241003.ht2	P, Q, Te	
KFM08C	668.50	673.50	3	1	2006-10-24 13:18	2006-10-24 14:04	__KFM08C_0668.50_200610241318.ht2	P, Q, Te	
KFM08C	671.00	676.00	3	1	2006-10-24 14:14	2006-10-24 15:29	__KFM08C_0671.00_200610241414.ht2	P, Q, Te	
KFM08C	676.00	681.00	3	1	2006-10-24 15:40	2006-10-24 16:26	__KFM08C_0676.00_200610241540.ht2	P, Q, Te	
KFM08C	681.00	686.00	3	1	2006-10-24 16:43	2006-10-25 09:07	__KFM08C_0681.00_200610241643.ht2	P, Q, Te	
KFM08C	686.00	691.00	3	1	2006-10-25 09:15	2006-10-25 09:56	__KFM08C_0686.00_200610250915.ht2	P, Q, Te	
KFM08C	691.00	696.00	3	1	2006-10-25 10:06	2006-10-25 11:20	__KFM08C_0691.00_200610251006.ht2	P, Q, Te	
KFM08C	697.00	702.00	3	1	2006-10-25 12:16	2006-10-25 12:56	__KFM08C_0697.00_200610251216.ht2	P, Q, Te	
KFM08C	702.00	707.00	3	1	2006-10-25 13:05	2006-10-25 13:45	__KFM08C_0702.00_200610251305.ht2	P, Q, Te	
KFM08C	703.50	708.50	3	1	2006-10-25 13:51	2006-10-25 14:32	__KFM08C_0703.50_200610251351.ht2	P, Q, Te	

[1)] 3: Injection test
[2)] The tests were interrupted for various reasons or did not provide satisfying data for the evaluation and were hence re-performed later
[3)] The test was performed at an incorrect position and therefore not evaluated.

Appendix 2.1. General test data

Borehole:	KFM08C
Testtype:	CHir (Constant Head injection and recovery)
Field crew:	C. Hjerne, J. Harrström, E. Gustavsson, E. Walger, J. Florberger
General comment:	

Test section secup	Test section seclow	Test start	Start of flow period	Stop of flow period	Test stop	Total flow time t_p	Total recovery time t_F
(m)	(m)	YYYYMMDD hh:mm	YYYYMMDD hh:mm:ss	YYYYMMDD hh:mm:ss	YYYYMMDD hh:mm	(min)	(min)
108.50	208.50	2006-10-06 08:14	2006-10-06 09:01:40	2006-10-06 09:31:53	2006-10-06 10:04	30	30
208.50	308.50	2006-10-04 11:21	2006-10-04 13:00:23	2006-10-04 13:30:32	2006-10-04 14:02	30	30
308.50	408.50	2006-10-04 14:58	2006-10-04 15:36:59	2006-10-04 16:07:15	2006-10-04 16:39	30	30
408.50	508.50	2006-10-04 18:14	2006-10-04 18:50:41	2006-10-04 19:20:53	2006-10-04 19:53	30	30
508.50	608.50	2006-10-04 20:54	2006-10-04 21:29:35	2006-10-04 21:59:44	2006-10-04 22:32	30	30
608.50	708.50	2006-10-05 06:07	2006-10-05 06:54:32	2006-10-05 07:24:41	2006-10-05 07:57	30	30
708.50	808.50	2006-10-05 08:52	2006-10-05 09:39:01	2006-10-05 09:44:39	2006-10-05 09:52	6	5
738.50	838.50	2006-10-05 10:17	2006-10-05 11:03:49	2006-10-05 11:11:59	2006-10-05 11:19	8	5
838.50	938.50	2006-10-05 14:24	2006-10-05 15:14:25	2006-10-05 15:44:58	2006-10-05 16:16	31	30
108.50	128.50	2006-10-09 12:42	2006-10-09 13:14:21	2006-10-09 13:34:36	2006-10-09 13:56	20	20
128.50	148.50	2006-10-09 14:20	2006-10-09 14:52:17	2006-10-09 15:12:30	2006-10-09 15:34	20	20
148.50	168.50	2006-10-09 15:51	2006-10-09 16:26:59	2006-10-09 16:47:19	2006-10-09 17:09	20	20
168.50	188.50	2006-10-10 06:21	2006-10-10 06:53:41	2006-10-10 07:13:57	2006-10-10 07:36	20	20
188.50	208.50	2006-10-10 07:56	2006-10-10 08:29:22	2006-10-10 08:46:52	2006-10-10 08:54	18	5
208.50	228.50	2006-10-10 09:08	2006-10-10 09:41:50	2006-10-10 10:02:11	2006-10-10 10:24	20	20
228.50	248.50	2006-10-10 10:45	2006-10-10 12:04:07	2006-10-10 12:28:52	2006-10-10 12:51	25	20
248.50	268.50	2006-10-10 13:09	2006-10-10 13:41:27	2006-10-10 13:45:32	2006-10-10 13:53	4	5
268.50	288.50	2006-10-10 14:08	2006-10-10 14:41:50	2006-10-10 15:02:11	2006-10-10 15:24	20	20
288.50	308.50	2006-10-10 15:47	2006-10-10 16:17:27	2006-10-10 16:24:15	2006-10-10 16:31	7	5
408.50	428.50	2006-10-10 17:51	2006-10-10 18:26:19	2006-10-10 18:46:40	2006-10-10 19:08	20	20
428.50	448.50	2006-10-12 16:47	2006-10-12 17:25:43	2006-10-12 17:28:49	2006-10-12 17:45	3	15
448.50	468.50	2006-10-10 20:56	2006-10-10 21:26:33	2006-10-10 21:46:43	2006-10-10 22:09	20	20
468.50	488.50	2006-10-10 22:26	2006-10-10 22:58:05	2006-10-10 23:18:06	2006-10-10 23:40	20	20
488.50	508.50	2006-10-11 07:30	2006-10-11 08:03:03	2006-10-11 08:23:14	2006-10-11 08:45	20	20
508.50	528.50	2006-10-11 09:44	2006-10-11 10:17:22	2006-10-11 10:37:35	2006-10-11 10:59	20	20
528.50	548.50	2006-10-11 12:38	2006-10-11 13:13:22	2006-10-11 13:33:37	2006-10-11 13:55	20	20
548.50	568.50	2006-10-11 16:12	2006-10-11 16:51:50	2006-10-11 16:56:58	2006-10-11 17:04	5	5
568.50	588.50	2006-10-11 19:42	2006-10-11 20:22:13	2006-10-11 20:27:03	2006-10-11 20:49	5	20
588.50	608.50	2006-10-11 21:22	2006-10-11 22:03:30	2006-10-11 22:07:11	2006-10-11 22:24	4	15
608.50	628.50	2006-10-11 22:47	2006-10-11 23:24:03	2006-10-11 23:27:42	2006-10-11 23:37	4	7
628.50	648.50	2006-10-12 06:55	2006-10-12 07:29:12	2006-10-12 07:39:52	2006-10-12 07:47	11	5
648.50	668.50	2006-10-12 08:07	2006-10-12 08:41:33	2006-10-12 08:51:53	2006-10-12 08:59	10	5
668.50	688.50	2006-10-12 12:37	2006-10-12 13:11:20	2006-10-12 13:31:39	2006-10-12 13:53	20	20
688.50	708.50	2006-10-12 10:40	2006-10-12 11:12:14	2006-10-12 11:32:37	2006-10-12 11:54	20	20
148.50	153.50	2006-10-13 14:45	2006-10-13 15:20:16	2006-10-13 15:40:33	2006-10-13 16:02	20	20
153.50	158.50	2006-10-13 16:12	2006-10-13 16:51:01	2006-10-13 16:55:07	2006-10-13 17:02	4	5
158.50	163.50	2006-10-16 08:17	2006-10-16 08:49:24	2006-10-16 09:09:38	2006-10-16 09:32	20	20
163.50	168.50	2006-10-16 09:42	2006-10-16 10:14:17	2006-10-16 10:28:33	2006-10-16 10:36	14	5
168.50	173.50	2006-10-16 10:48	2006-10-16 12:00:19	2006-10-16 12:21:25	2006-10-16 12:43	21	20
173.50	178.50	2006-10-16 12:54	2006-10-16 13:25:15	2006-10-16 13:26:35	2006-10-16 13:34	1	5
178.50	183.50	2006-10-16 13:43	2006-10-16 14:18:25	2006-10-16 14:38:39	2006-10-16 15:01	20	20
183.50	188.50	2006-10-16 15:17	2006-10-16 15:50:35	2006-10-16 16:10:46	2006-10-16 16:33	20	20
208.50	213.50	2006-10-17 08:16	2006-10-17 08:47:55	2006-10-17 08:49:51	2006-10-17 08:57	2	5
213.50	218.50	2006-10-17 09:12	2006-10-17 09:46:16	2006-10-17 09:48:01	2006-10-17 09:55	2	5
218.50	223.50	2006-10-17 10:07	2006-10-17 10:42:59	2006-10-17 11:03:15	2006-10-17 11:25	20	20
223.50	228.50	2006-10-17 12:29	2006-10-17 13:03:49	2006-10-17 13:24:05	2006-10-17 13:46	20	20
228.50	233.50	2006-10-17 14:02	2006-10-17 14:35:23	2006-10-17 14:55:39	2006-10-17 15:17	20	20
233.50	238.50	2006-10-17 15:30	2006-10-17 16:01:52	2006-10-17 16:22:09	2006-10-17 16:44	20	20
238.50	243.50	2006-10-18 08:21	2006-10-18 08:53:06	2006-10-18 09:13:20	2006-10-18 09:35	20	20
243.50	248.50	2006-10-18 10:02	2006-10-18 10:36:30	2006-10-18 10:38:20	2006-10-18 10:45	2	5
268.50	273.50	2006-10-18 11:06	2006-10-18 12:13:57	2006-10-18 12:16:38	2006-10-18 12:27	3	9
273.50	278.50	2006-10-18 12:45	2006-10-18 13:17:42	2006-10-18 13:19:13	2006-10-18 13:26	2	5
278.50	283.50	2006-10-18 13:36	2006-10-18 14:08:18	2006-10-18 14:28:32	2006-10-18 14:50	20	20
283.50	288.50	2006-10-18 15:02	2006-10-18 15:33:40	2006-10-18 15:36:00	2006-10-18 15:43	2	5
448.50	453.50	2006-10-19 08:48	2006-10-19 09:21:20	2006-10-19 09:24:12	2006-10-19 09:36	3	10
451.00	456.00	2006-10-19 09:53	2006-10-19 10:29:09	2006-10-19 10:49:23	2006-10-19 11:11	20	20
456.00	461.00	2006-10-19 11:25	2006-10-19 12:38:20	2006-10-19 12:59:25	2006-10-19 13:21	21	20
461.00	466.00	2006-10-19 13:34	2006-10-19 14:09:14	2006-10-19 14:29:31	2006-10-19 14:51	20	20

Test section secup	Test section seclow	Test start	Start of flow period	Stop of flow period	Test stop	Total flow time t_p	Total recovery time t_F
(m)	(m)	YYYYMMDD hh:mm	YYYYMMDD hh:mm:ss	YYYYMMDD hh:mm:ss	YYYYMMDD hh:mm	(min)	(min)
466.00	471.00	2006-10-19 15:04	2006-10-19 15:46:11	2006-10-19 16:06:28	2006-10-19 16:28	20	20
471.00	476.00	2006-10-19 16:41	2006-10-19 17:13:40	2006-10-19 17:17:09	2006-10-19 17:24	3	5
476.00	481.00	2006-10-20 08:44	2006-10-20 09:20:34	2006-10-20 09:40:50	2006-10-20 10:03	20	20
481.00	486.00	2006-10-20 10:16	2006-10-20 10:47:19	2006-10-20 10:50:56	2006-10-20 11:03	4	10
486.00	491.00	2006-10-20 12:29	2006-10-20 13:02:23	2006-10-20 13:05:05	2006-10-20 13:12	3	5
491.00	496.00	2006-10-20 13:28	2006-10-20 14:04:49	2006-10-20 14:07:30	2006-10-20 14:15	3	5
496.00	501.00	2006-10-20 14:27	2006-10-20 15:02:25	2006-10-20 15:22:41	2006-10-20 15:45	20	20
501.00	506.00	2006-10-23 08:31	2006-10-23 09:03:33	2006-10-23 09:06:59	2006-10-23 09:14	3	5
506.00	511.00	2006-10-23 09:30	2006-10-23 10:02:05	2006-10-23 10:04:48	2006-10-23 10:12	3	5
511.00	516.00	2006-10-23 10:23	2006-10-23 10:54:45	2006-10-23 10:56:47	2006-10-23 11:04	2	5
516.00	521.00	2006-10-23 11:13	2006-10-23 12:36:14	2006-10-23 12:56:28	2006-10-23 13:18	20	20
521.00	526.00	2006-10-23 13:29	2006-10-23 14:05:13	2006-10-23 14:25:25	2006-10-23 14:47	20	20
526.00	531.00	2006-10-23 14:57	2006-10-23 15:30:13	2006-10-23 15:50:29	2006-10-23 16:12	20	20
531.00	536.00	2006-10-23 16:23	2006-10-23 16:54:15	2006-10-23 17:14:23	2006-10-23 17:36	20	20
536.00	541.00	2006-10-24 08:16	2006-10-24 08:48:31	2006-10-24 08:51:43	2006-10-24 08:59	3	5
541.00	546.00	2006-10-24 09:09	2006-10-24 09:40:50	2006-10-24 09:42:15	2006-10-24 09:49	1	5
543.50	548.50	2006-10-24 10:03	2006-10-24 10:36:06	2006-10-24 10:38:49	2006-10-24 10:46	3	5
668.50	673.50	2006-10-24 13:18	2006-10-24 13:53:13	2006-10-24 13:57:06	2006-10-24 14:04	4	5
671.00	676.00	2006-10-24 14:14	2006-10-24 14:46:33	2006-10-24 15:06:50	2006-10-24 15:29	20	20
676.00	681.00	2006-10-24 15:40	2006-10-24 16:11:06	2006-10-24 16:19:15	2006-10-24 16:26	8	5
681.00	686.00	2006-10-24 16:43	2006-10-25 08:24:46	2006-10-25 08:45:02	2006-10-25 09:07	20	20
686.00	691.00	2006-10-25 09:15	2006-10-25 09:47:16	2006-10-25 09:48:57	2006-10-25 09:56	2	5
691.00	696.00	2006-10-25 10:06	2006-10-25 10:37:33	2006-10-25 10:57:50	2006-10-25 11:20	20	20
697.00	702.00	2006-10-25 12:16	2006-10-25 12:47:17	2006-10-25 12:49:07	2006-10-25 12:56	2	5
702.00	707.00	2006-10-25 13:05	2006-10-25 13:36:44	2006-10-25 13:38:28	2006-10-25 13:45	2	5
703.50	708.50	2006-10-25 13:51	2006-10-25 14:22:46	2006-10-25 14:24:57	2006-10-25 14:32	2	5
108.50[1)]	208.50	2006-10-04 08:30	2006-10-04 09:21:25	2006-10-04 09:51:34	2006-10-04 10:23	30	30
431.50[2)]	451.50	2006-10-10 19:29	2006-10-10 20:06:50	2006-10-10 20:27:09	2006-10-10 20:19	20	5
668.50[1)]	688.50	2006-10-12 09:18	2006-10-12 09:52:07	2006-10-12 10:11:48	2006-10-12 10:14	20	1

[1)] The tests were interrupted for various reasons or did not provide satisfying data for the evaluation and were hence re-performed later
[2)] The test was perfomed at an incorrect position and therefore not evaluated

Appendix 2.2 Pressure and flow data

Summary of pressure and flow data for all tests in KFM08C

Test section		Pressure			Flow		
secup	seclow	p_i	p_p	p_F	Q_p 1)	Q_m 1)	V_p 1)
(m)	(m)	(kPa)	(kPa)	(kPa)	(m^3/s)	(m^3/s)	(m^3)
108.50	208.50	993.25	1198.57	1042.23	9.093E-07	1.23E-06	2.24E-03
208.50	308.50	1826.5	2038.02	1939.48	6.972E-07	1.66E-06	3.00E-03
308.50	408.50	2656.2	2858.35	2829.03	7.4E-09	4.42E-08	7.97E-05
408.50	508.50	3464.41	3677.6	3505.01	5.332E-06	7.86E-06	1.43E-02
508.50	608.50	4283.77	4490.06	4337.31	0.0000008	1.19E-06	2.15E-03
608.50	708.50	5082.07	5346.44	5109.60	2.5E-07	3.33E-07	6.02E-04
708.50	808.50	5898.28	6074.01	6074.01			
738.50	838.50	6133.46	6339.2	6336.59			
838.50	938.50	6903.57	7123.79	7094.02	9.048E-09	4.79E-08	8.60E-05
108.50	128.50	1016.37	1198.33	1133.62			
128.50	148.50	1185.36	1368.66	1327.92	7.21E-09	2.55E-08	3.07E-05
148.50	168.50	1345.54	1546.87	1356.00	9.23E-08	1.15E-07	1.40E-04
168.50	188.50	1511.77	1727.01	1558.01	9.336E-07	1.22E-06	1.49E-03
188.50	208.50	1693.43	1913.07	1886.10			
208.50	228.50	1846.05	2050.55	1880.59	2.04E-07	2.69E-07	3.28E-04
228.50	248.50	2013.26	2208.39	2096.92	4.26E-08	8.65E-08	1.29E-04
248.50	268.50	2188.17	2371.6	2368.29			
268.50	288.50	2346.69	2535.09	2474.55	4.724E-07	1.42E-06	1.74E-03
288.50	308.50	2517.2	2720.05	2714.54			
408.50	428.50	3506.79	3701.52	3621.70	8.65E-09	2.74E-08	3.30E-05
428.50	448.50	3710.47	3847.95	3861.71			
448.50	468.50	3820.84	4038.95	3825.92	4.023E-06	4.36E-06	5.28E-03
468.50	488.50	3985.02	4138.65	3985.02	3.33E-07	3.67E-07	4.42E-04
488.50	508.50	4154.97	4370.74	4304.83	1.595E-06	4.3E-06	5.21E-03
508.50	528.50	4316.39	4521.85	4372.53	8.608E-07	1.31E-06	1.59E-03
528.50	548.50	4487.58	4680.8	4559.14	5.2E-08	8.59E-08	1.05E-04
548.50	568.50	4665.93	4841.25	4844.28			
568.50	588.50	4821.71	5014.79	5017.12			
588.50	608.50	4981.08	5178.27	5176.76			
608.50	628.50	5139.74	5339.15	5339.70			
628.50	648.50	5300.2	5497.69	5464.10			
648.50	668.50	5467.96	5659.52	5662.27			
668.50	688.50	5607.78	5806.63	5628.14	1.816E-07	2.42E-07	2.95E-04
688.50	708.50	5772.09	5975.2	5783.92	2.71E-08	5.68E-08	6.96E-05
148.50	153.50	1223.06	1406.09	1281.69	6.5E-09	1.08E-08	1.31E-05
153.50	158.50	1269.02	1449.58	1426.46			
158.50	163.50	1303.57	1494.16	1307.01	7.133E-08	8.51E-08	1.03E-04
163.50	168.50	1348.71	1539.71	1465.54			
168.50	173.50	1391.23	1590.5	1411.59	1.605E-08	2.18E-08	2.74E-05
173.50	178.50	1439.95	1631.51	1575.64			
178.50	183.50	1465.54	1655.45	1473.80	5.46E-07	6.35E-07	7.73E-04
183.50	188.50	1512.19	1710.91	1543.15	6.444E-07	7.87E-07	9.54E-04
208.50	213.50	1734.72	1911.97	1909.21			
213.50	218.50	1783.7	1956.83	1967.56			
218.50	223.50	1799.67	1997.29	1816.74	1.31E-07	1.74E-07	2.11E-04
223.50	228.50	1844.26	2070.5	1893.25	7.95E-08	1.21E-07	1.47E-04
228.50	233.50	1885.55	2113.44	1904.26	3.34E-08	4.27E-08	5.20E-05
233.50	238.50	1938.25	2155.28	1959.31	9E-09	1.47E-08	1.78E-05
238.50	243.50	1972.79	2197.66	2090.32	3.557E-08	8.14E-08	9.90E-05
243.50	248.50	2023.16	2207.57	2180.60			
268.50	273.50	2230.68	2416.74	2430.50			
273.50	278.50	2269.49	2458.03	2459.13			
278.50	283.50	2300.45	2503.71	2439.31	5.14E-07	1.54E-06	1.87E-03
283.50	288.50	2352.33	2550.51	2553.25			
448.50	453.50	3857.86	3913.18	4026.29			
451.00	456.00	3716.93	3914.55	3719.68	1.678E-06	1.74E-06	2.11E-03
456.00	461.00	3758.08	3958.31	3760.97	2.557E-06	2.72E-06	3.45E-03
461.00	466.00	3799.64	3993.82	3799.50	3.429E-07	3.62E-07	4.40E-04
466.00	471.00	3844.92	4048.86	3872.72	3.157E-08	4.56E-08	5.55E-05
471.00	476.00	3893.22	4091.25	4081.34			
476.00	481.00	3922.12	4116.3	3921.70	5.066E-07	5.47E-07	6.66E-04
481.00	486.00	4005.52	4166.67	4159.51			
486.00	491.00	4112.03	4210.01	4323.54			

Test section		**Pressure**			**Flow**		
secup	**seclow**	**p_i**	**p_p**	**p_F**	**Q_p 1)**	**Q_m 1)**	**V_p 1)**
(m)	(m)	(kPa)	(kPa)	(kPa)	(m^3/s)	(m^3/s)	(m^3)
491.00	496.00	4073.63	4252.4	4246.48			
496.00	501.00	4088.36	4293.27	4231.62	1.503E-06	4.05E-06	4.93E-03
501.00	506.00	4171.48	4342.95	4379.68			
506.00	511.00	4214.01	4384.23	4458.96			
511.00	516.00	4232.58	4425.39	4434.74			
516.00	521.00	4250.34	4453	4289.97	4.832E-07	6.71E-07	8.16E-04
521.00	526.00	4293.68	4497.1	4310.33	8.726E-07	1.07E-06	1.30E-03
526.00	531.00	4332.34	4553.09	4334.00	1.214E-08	1.75E-08	2.11E-05
531.00	536.00	4381.89	4594.37	4446.85	3.619E-08	4.86E-08	5.90E-05
536.00	541.00	4431.85	4636.75	4677.50			
541.00	546.00	4593.27	4675.84	4886.11			
543.50	548.50	4548.55	4697.31	4839.87			
668.50	673.50	5519.7	5706.86	5710.16			
671.00	676.00	5506.49	5727.36	5541.72	1.197E-07	1.53E-07	1.87E-04
676.00	681.00	5562.77	5771.68	5705.20			
681.00	686.00	5585.76	5815.85	5586.86	9.754E-08	1.06E-07	1.29E-04
686.00	691.00	5746.9	5843.24	5935.30			
691.00	696.00	5684.56	5883.65	5689.79	2.84E-08	3.37E-08	4.07E-05
697.00	702.00	5837.6	5932.13	6027.77			
702.00	707.00	5861.13	5972.32	6043.19			
703.50	708.50	5821.63	5985.94	6030.53			
108.50 2)	208.50	992.97	1200.77	1034.53	8.504E-07	1.01E-06	1.83E-03
431.50 3)	451.50	3711.57	3891.98	3885.93	5.651E-09		
668.50 2)	688.50	5607.91	5837.87	5760.25			

1) No value indicates a flow below measurement limit (measurement limit is unique for each test but nominally 1.67 E-8 m^3/s).
2) The tests were interrupted for various reasons or did not provide satisfying data for the evaluation and were hence re-performed later.
3) The test was performed at an incorrect position and therefore not evaluated.

p_i	Pressure in test section before start of flow period
p_p	Pressure in test section before stop of flow period
p_F	Pressure in test section at the end of recovery period
Q_p	Flow rate just before stop of flow period
Q_m	Mean (arithmetic) flow rate during flow period
V_p	Total volume injected during the flow period

Appendix 3. Test diagrams – Injection tests

In the following pages the selected test diagrams are presented for all test sections. A linear diagram of pressure and flow rate is presented for each test. For most tests are lin-log and log-log diagrams presented, from injection and recovery period respectively. From the pulse tests and tests with a flow rate below the estimated lower measurement limit for the specific test, only the linear diagram is presented. Additionally, for a few tests, a type curve fit is displayed in the diagrams despite the the fact that the estimated parameters from the fit are judged as non- representative. For these tests, the type curve fit is presented, as an example, to illustrate that an assumption of a certain flow regime is not justified for the test. Instead, some other flow regime is likely to dominate.

Nomenclature for Aqtesolv:

T	=	transmissivity (m^2/s)
S	=	storativity (-)
K_z/K_r	=	ratio of hydraulic conductivities in the vertical and radial direction (set to 1)
Sw	=	skin factor
r(w)	=	borehole radius (m)
r(c)	=	effective casing radius (m)
C	=	well loss constant (set to 0)
r/B	=	leakage factor (-)

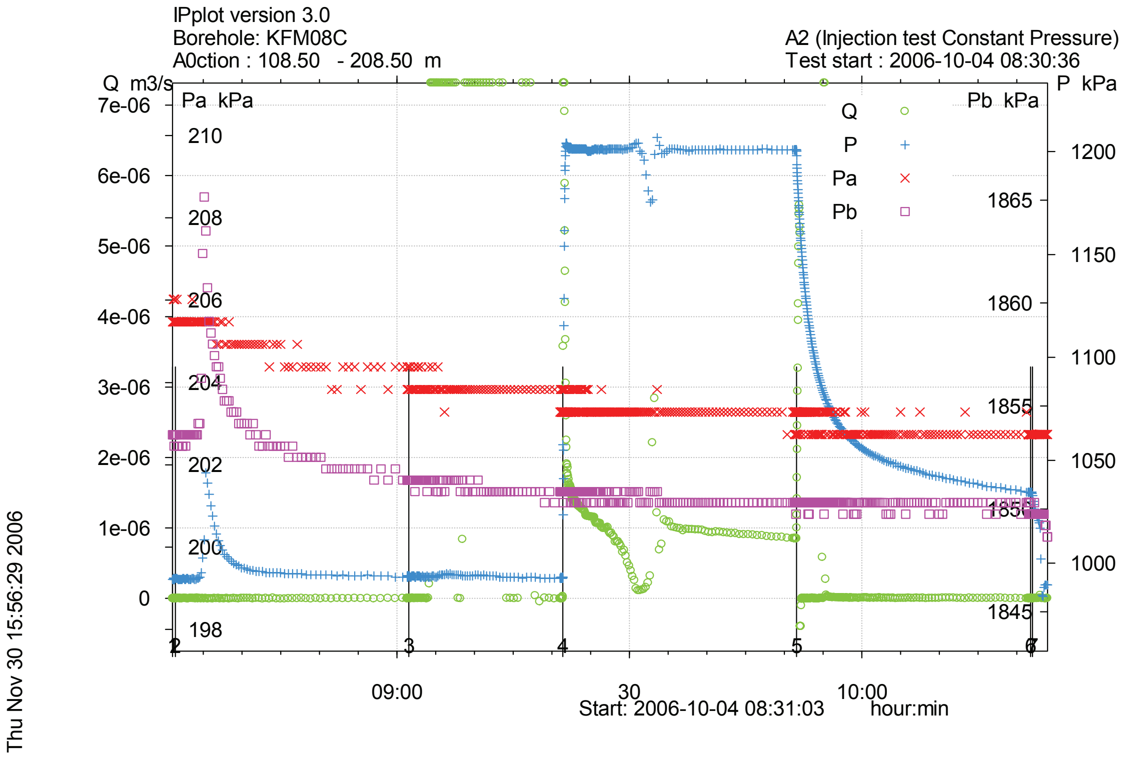


Figure A3-1. Linear plot from test 1 of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 108.5-208.5 m in borehole KFM08C.

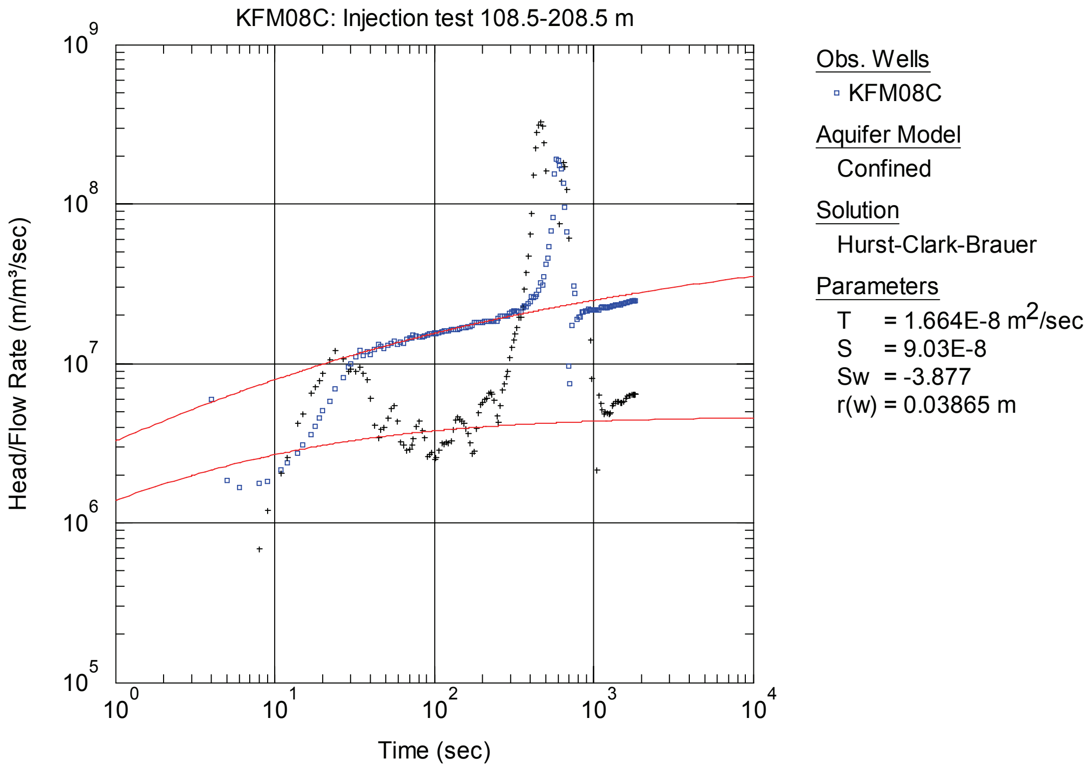


Figure A3-2. Log-log plot from test 1 of head/flow rate (□) and derivative (+) versus time, from the first injection test in section 108.5-208.5 *m in KFM08C*

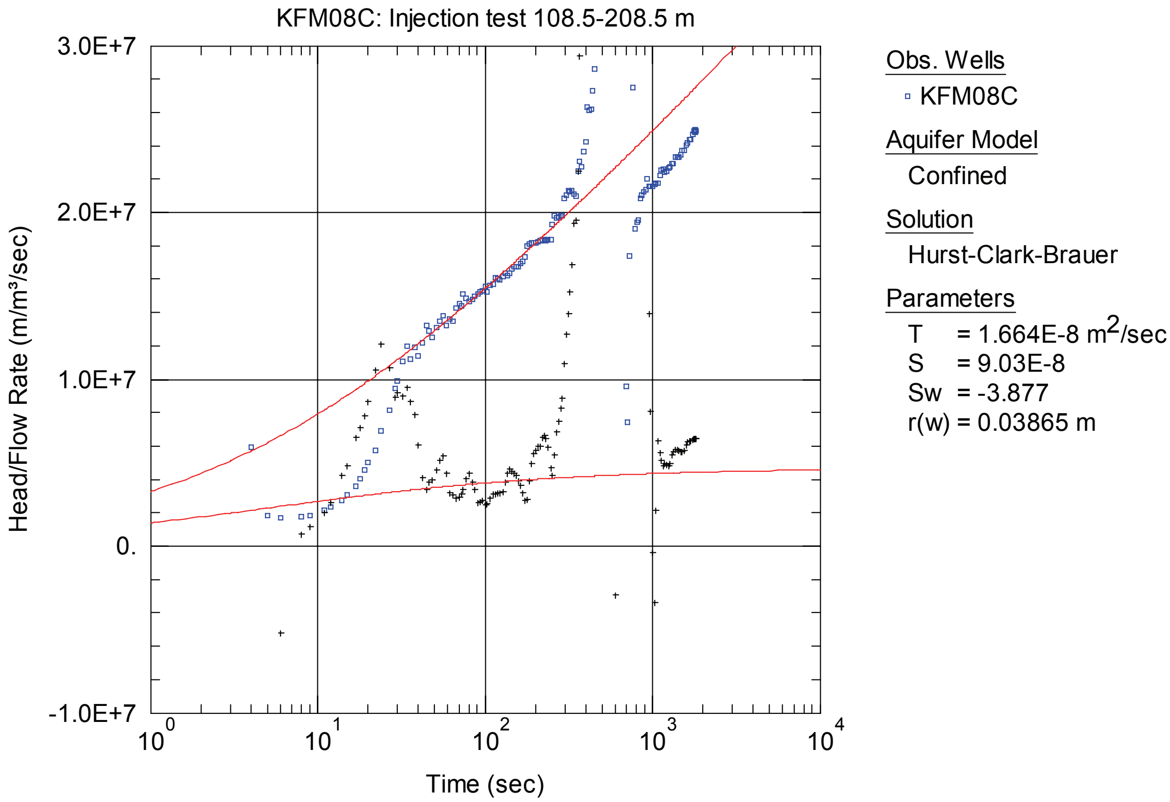


Figure A3-3. *Lin-log plot from test 1 of head/flow rate (□) and derivative (+) versus time, from the first injection test in section* 108.5-208.5 *m in KFM08C*

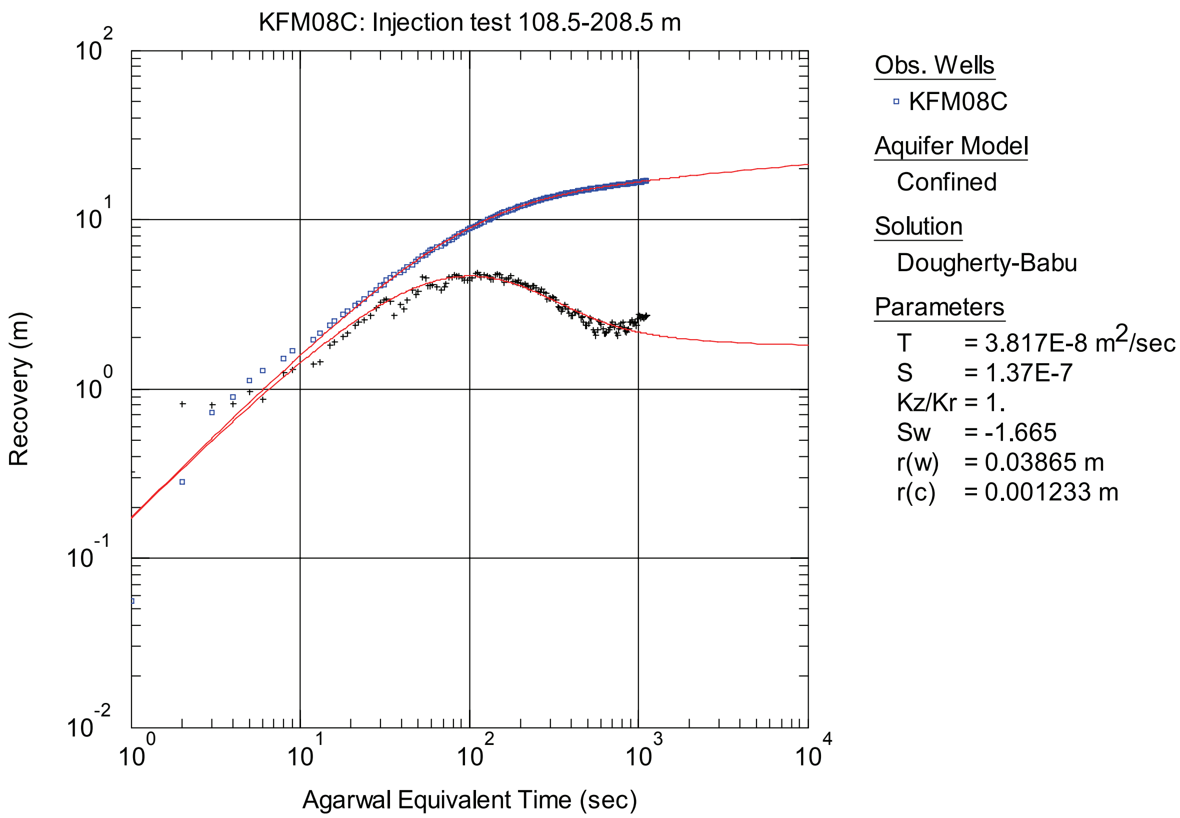


Figure A3-4. *Log-log plot from test 1 of recovery (□) and derivative (+) versus equivalent time, from the first injection test in section 108.5-208.5 m in KFM08C.*

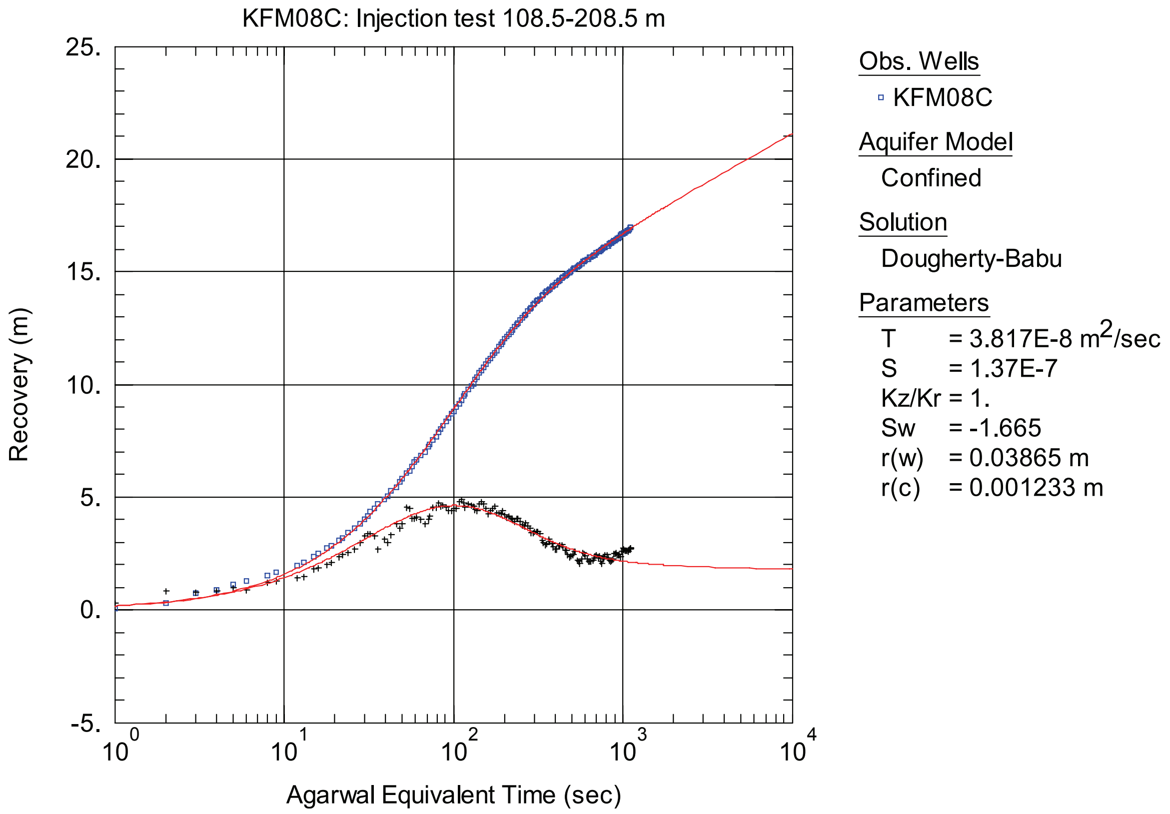


Figure A3-5. *Lin-log plot from test 1 of recovery (□) and derivative (+) versus equivalent time, from the first injection test in section 108.5-208.5 m in KFM08C.*

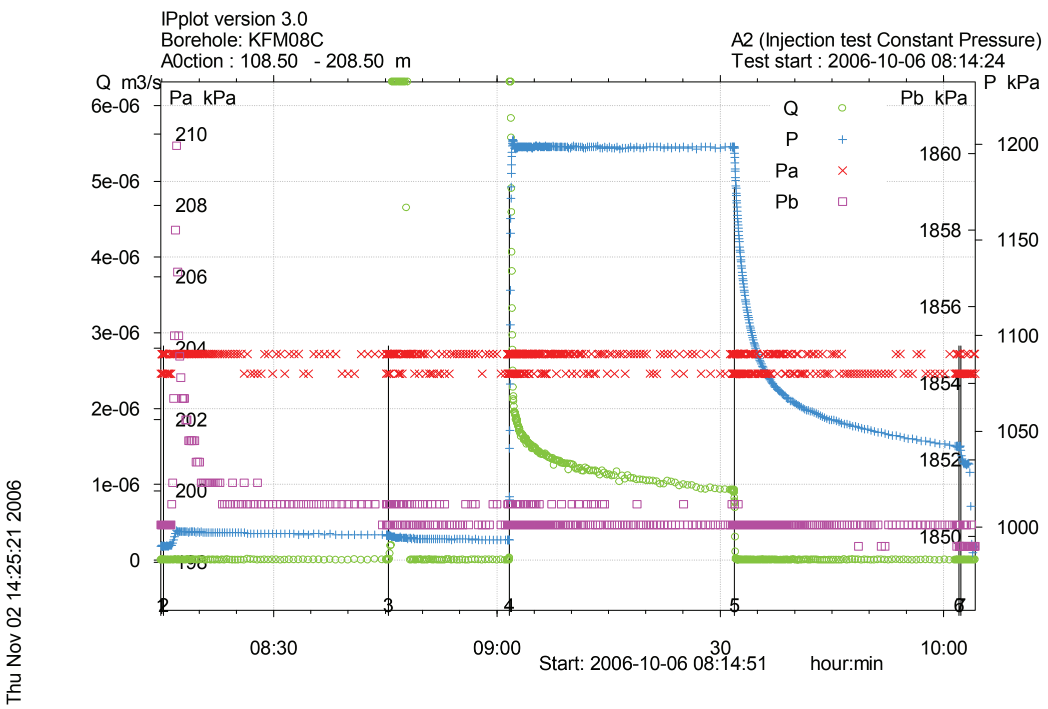


Figure A3-6. *Linear plot from test 2 of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 108.5-208.5 m in borehole KFM08C.*

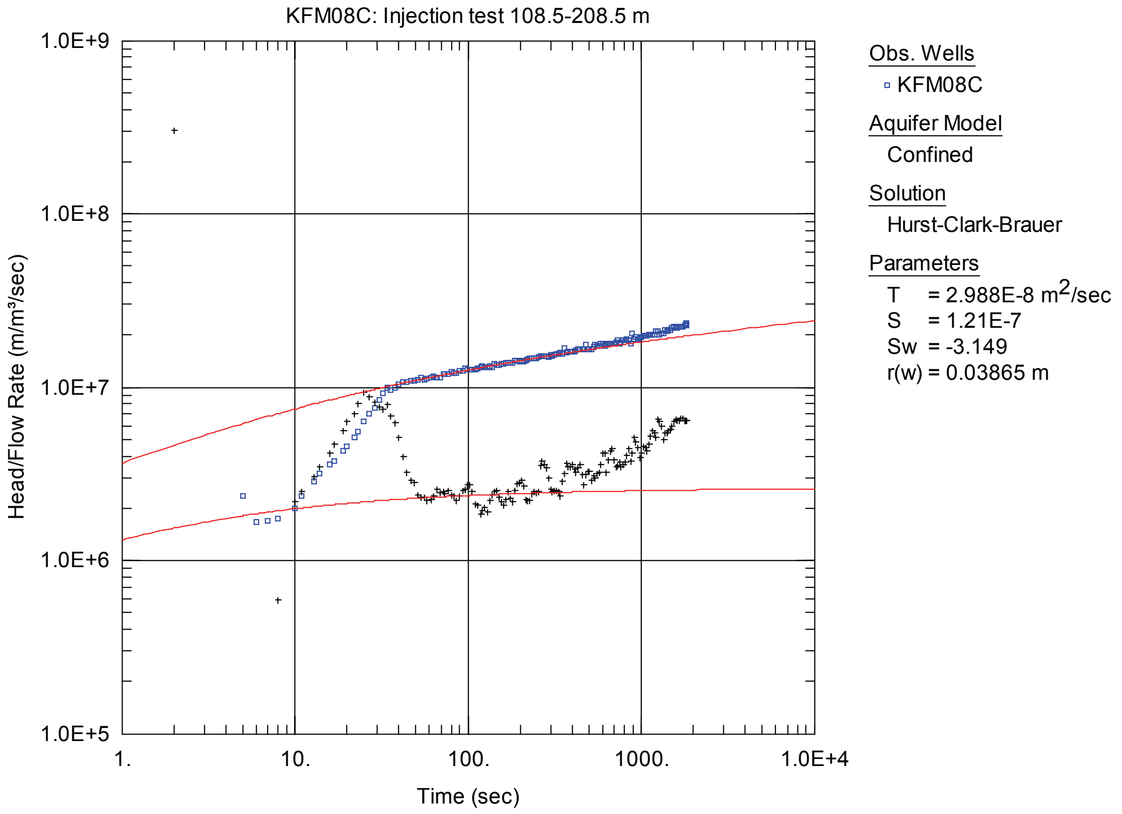


Figure A3-7. *Log-log plot from test 2 of head/flow rate (□) and derivative (+) versus time, from the second injection test in section* 108.5-208.5 *m in KFM08C*

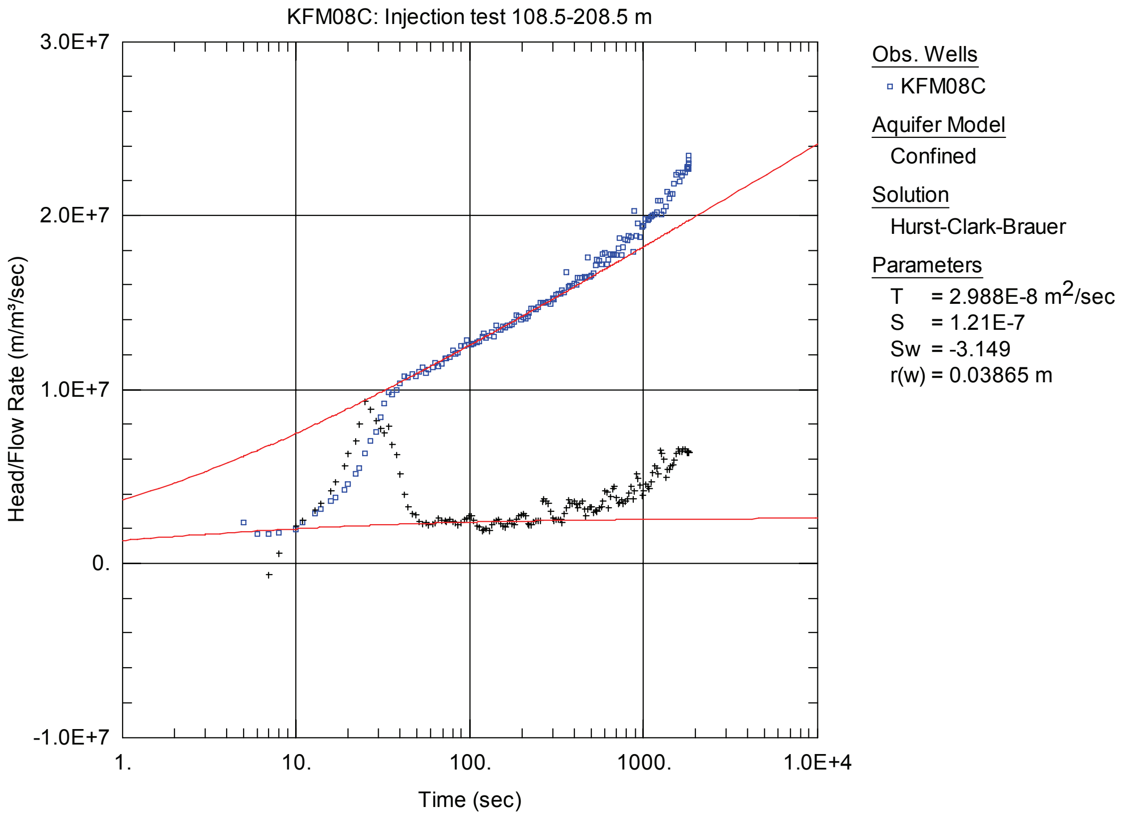


Figure A3-8. *Lin-log plot from test 2 of head/flow rate (□) and derivative (+) versus time, from the second injection test in section 108.5-208.5 m in KFM08C*

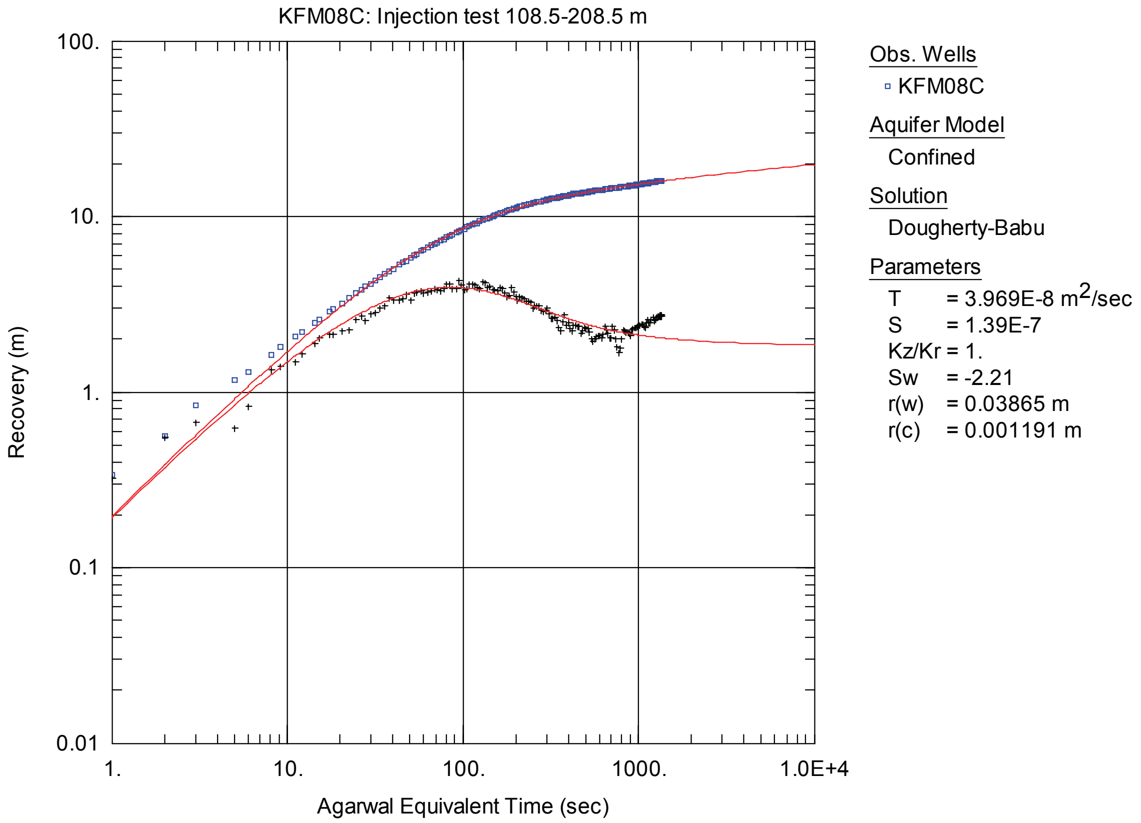


Figure A3-9. *Log-log plot from test 2 of recovery (□) and derivative (+) versus equivalent time, from the second injection test in section 108.5-208.5 m in KFM08C.*

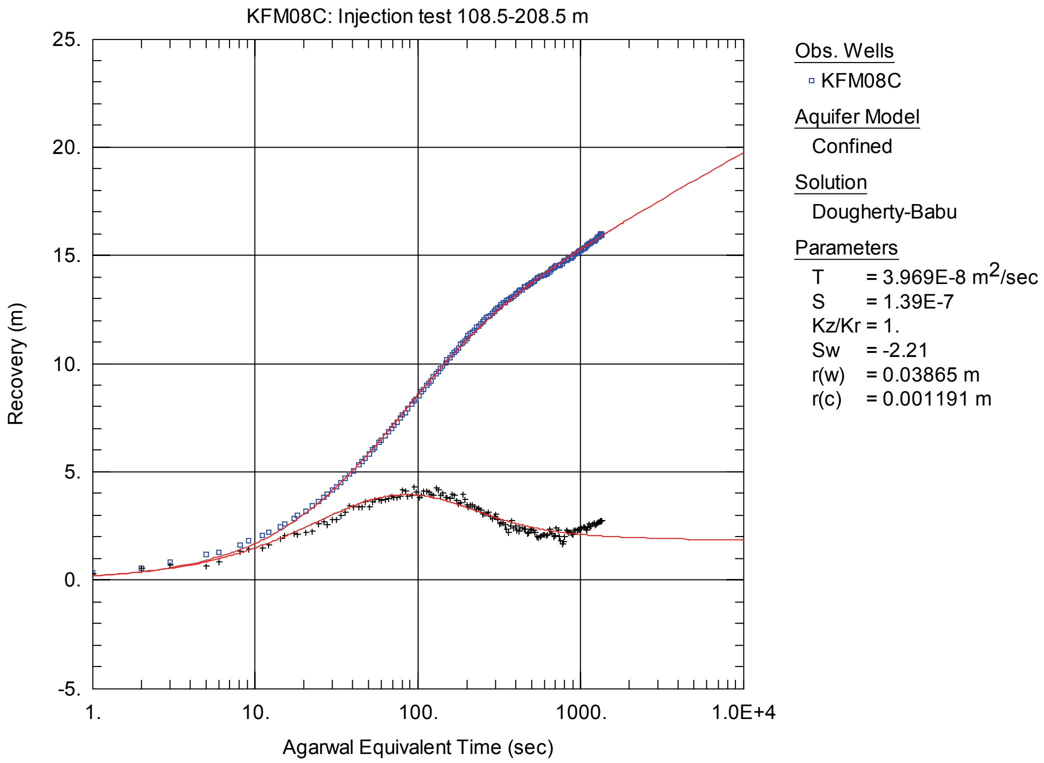


Figure A3-10. *Lin-log plot from test 2 of recovery (□) and derivative (+) versus equivalent time, from the second injection test in section 108.5-208.5 m in KFM08C.*

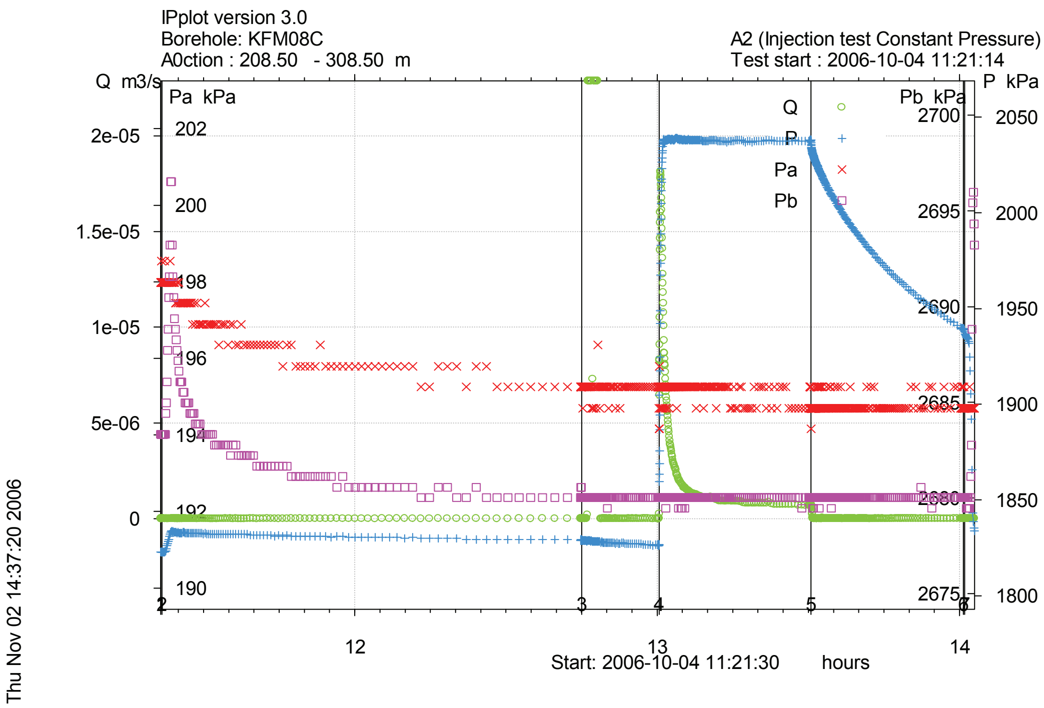


Figure A3-11. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 208.5-308.5 m in borehole KFM08C.*

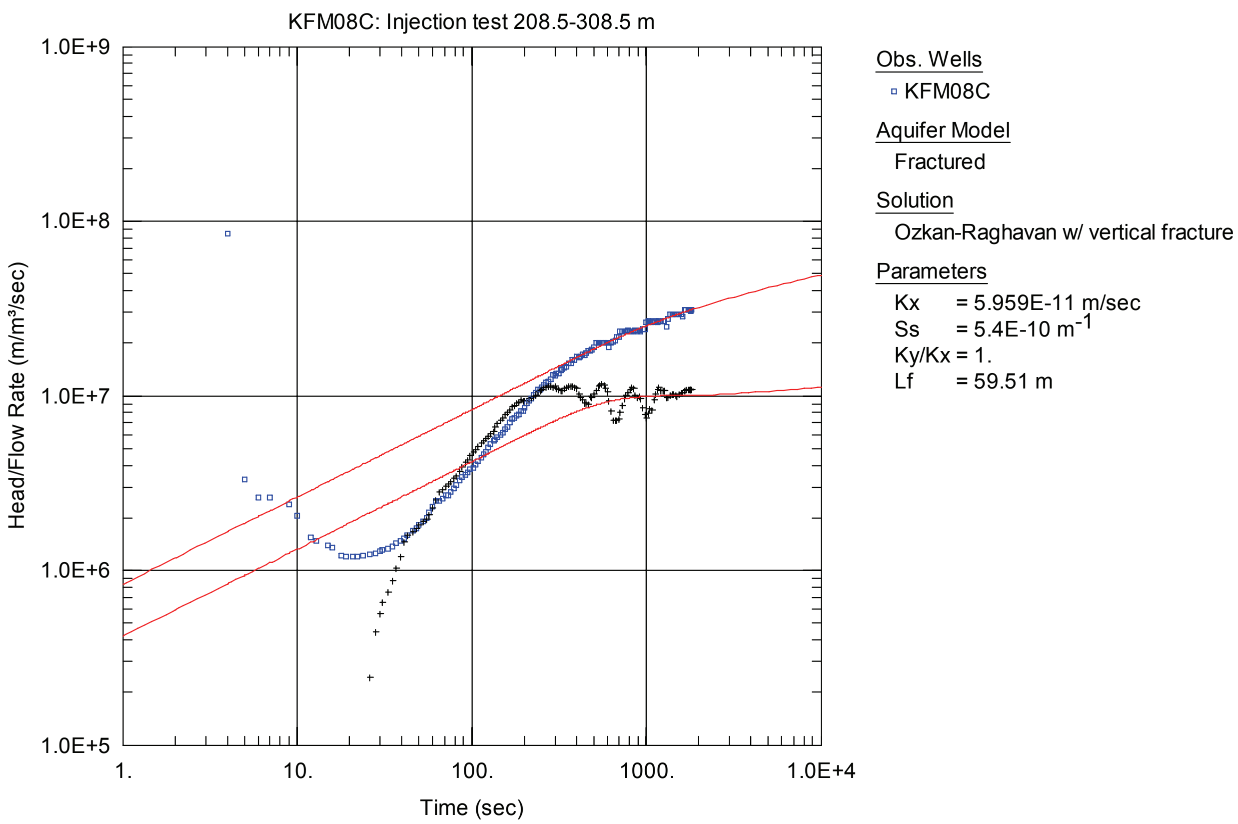


Figure A3-12. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 208.5-308.5 m in KFM08C.*

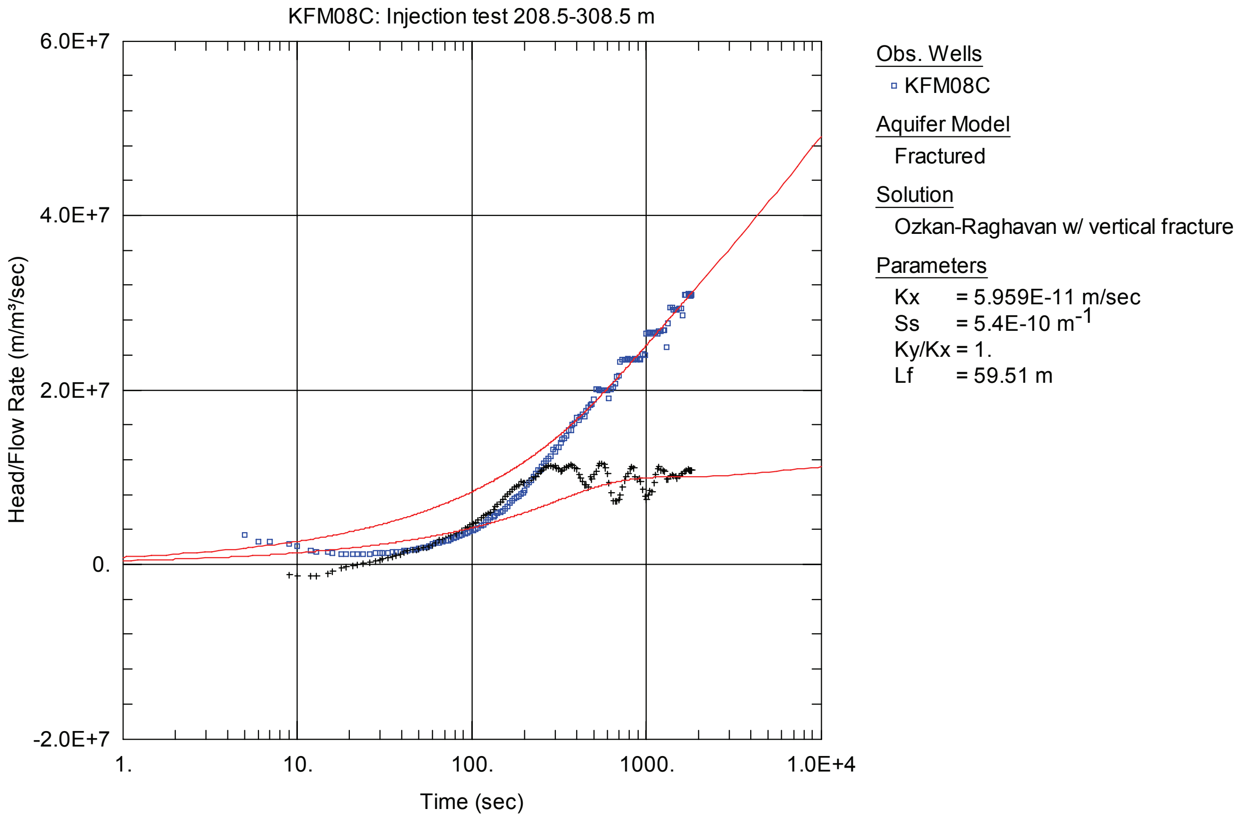


Figure A3-13. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 208.5-308.5 m in KFM08C.*

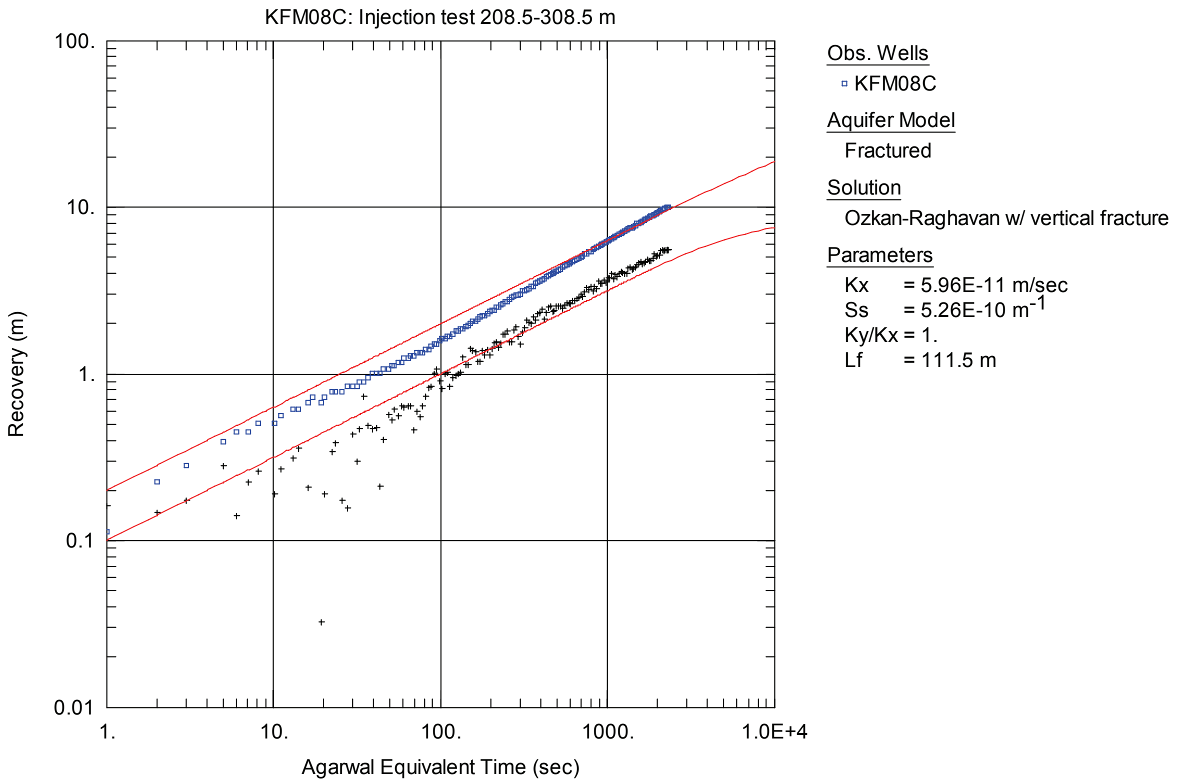


Figure A3-14. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 208.5-308.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

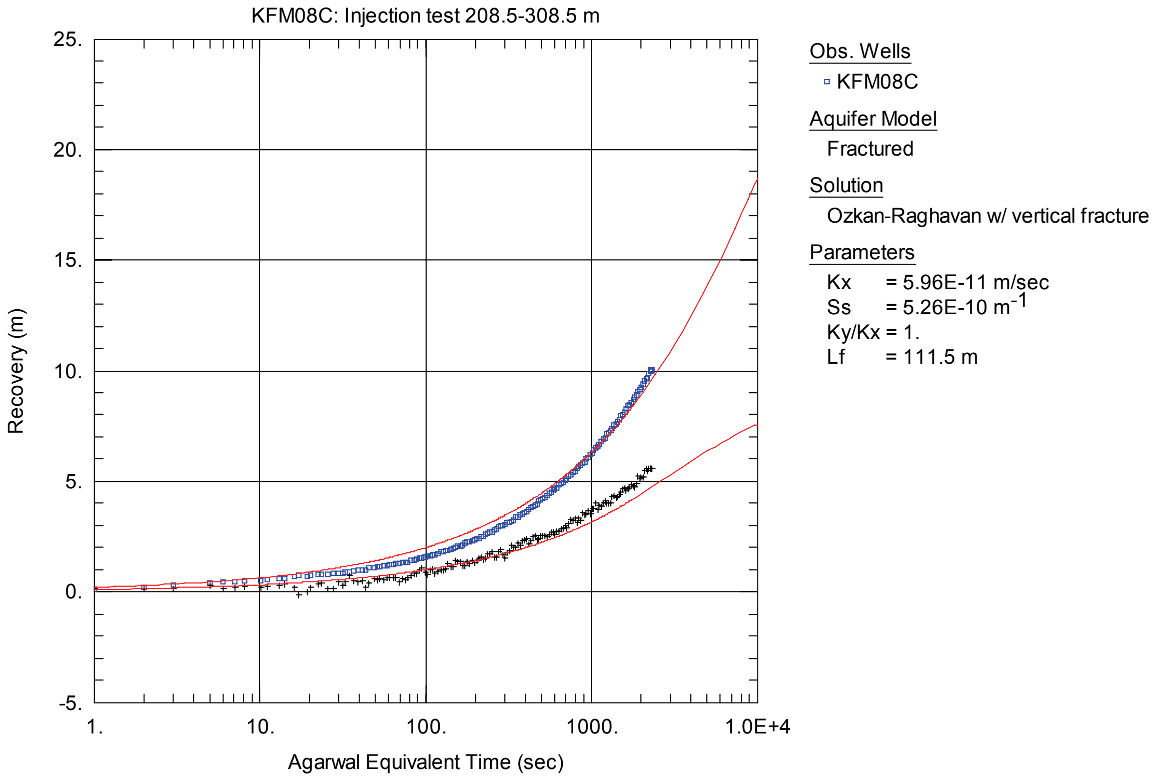


Figure A3-15. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 208.5-308.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

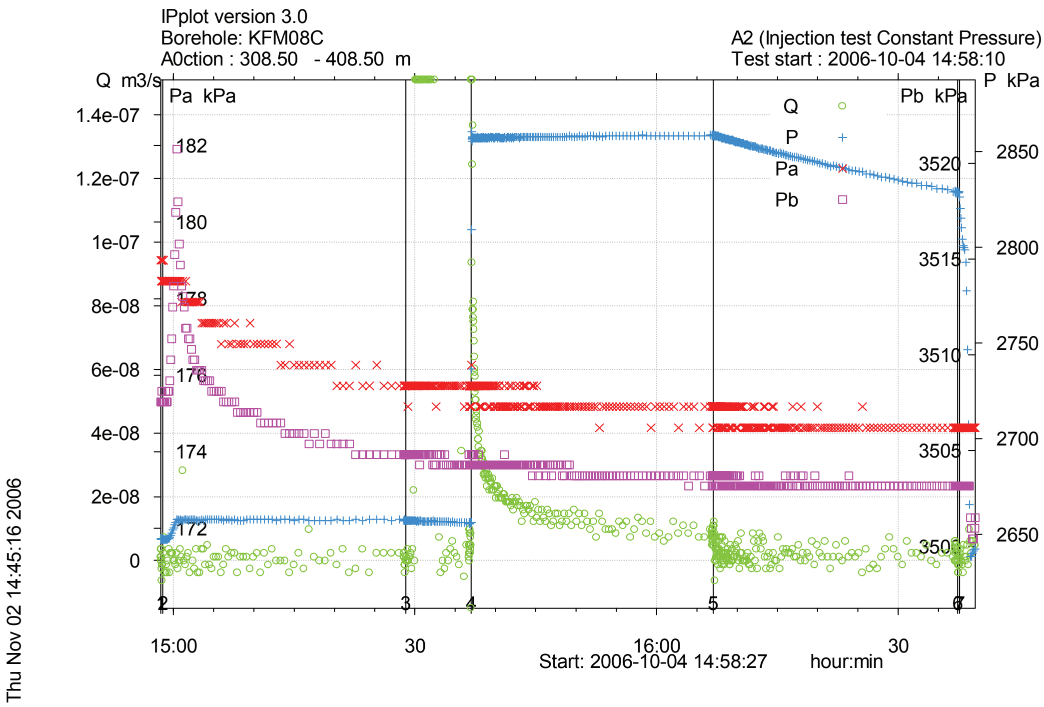


Figure A3-16. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 308.5-408.5 m in borehole KFM08C.*

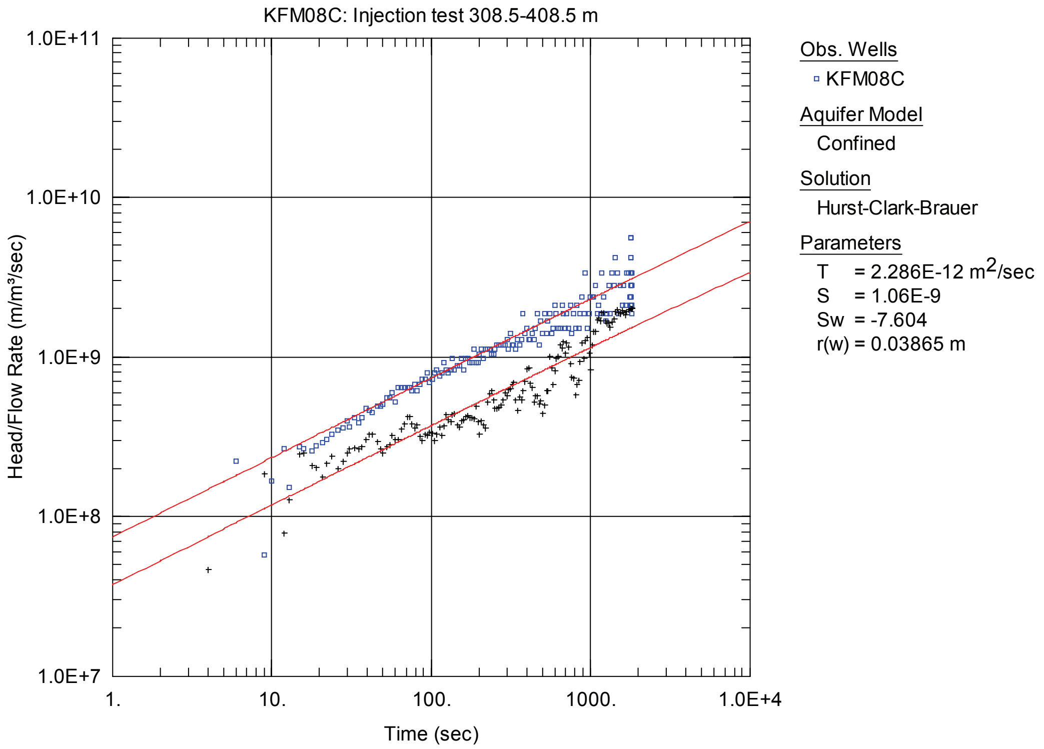


Figure A3-17. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 308.5-408.5 m in KFM08C. The type curve fit is only to show that an assumption of PRF is not valid.*

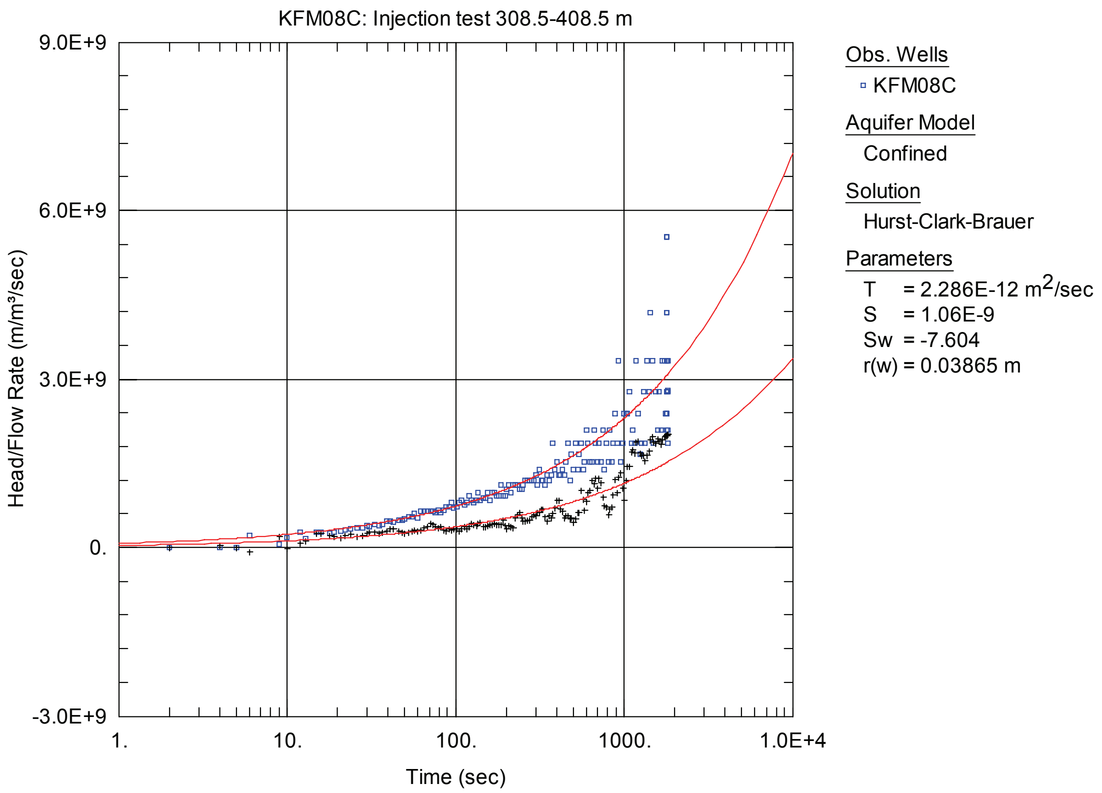


Figure A3-18. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 308.5-408.5 m in KFM08C. The type curve fit is only to show that an assumption of PRF is not valid.*

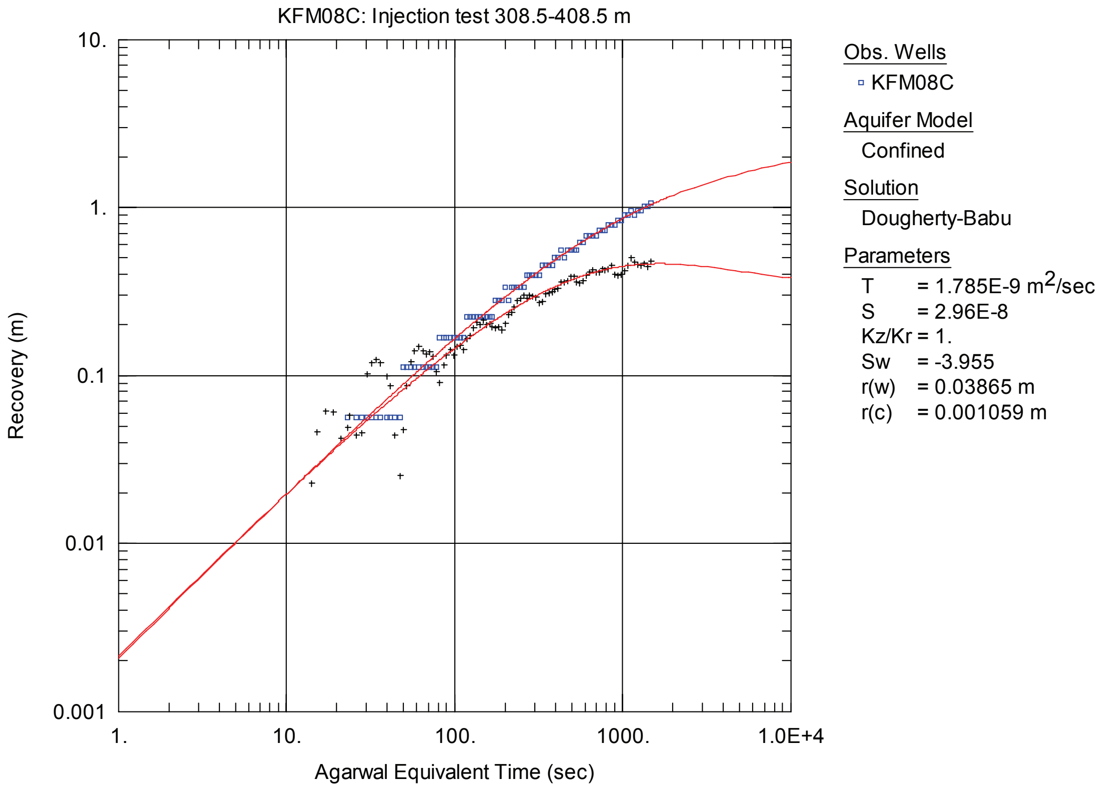


Figure A3-19. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 308.5-408.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

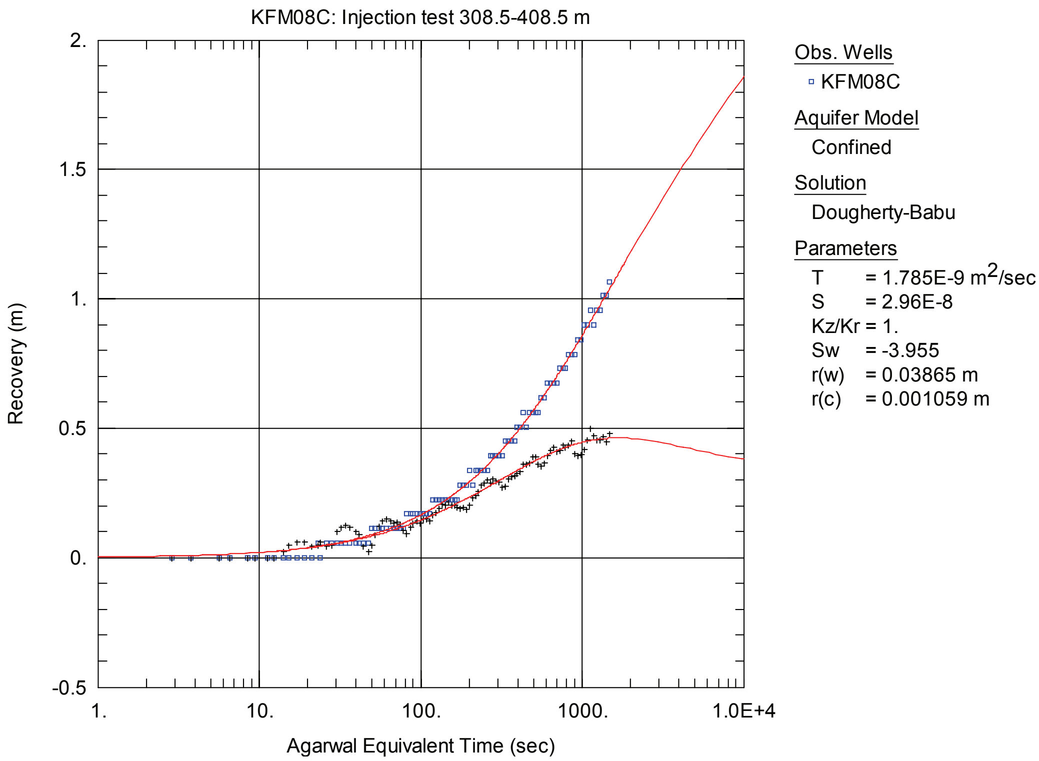


Figure A3-20. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 308.5-408.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

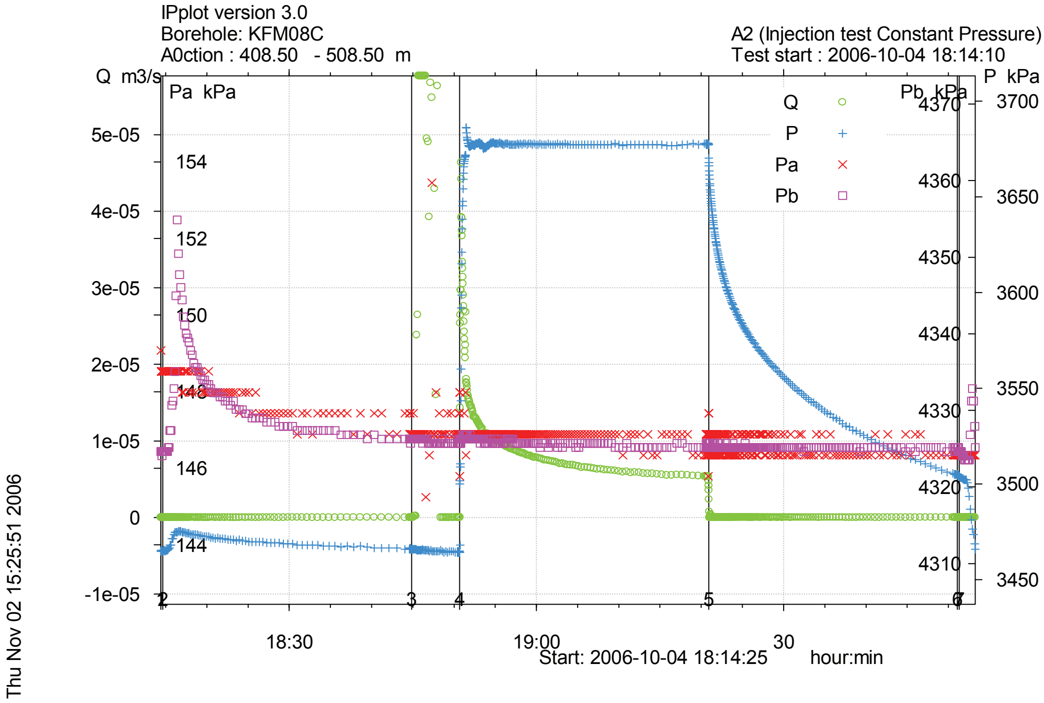


Figure A3-21. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 408.5-508.5 m in borehole KFM08C.*

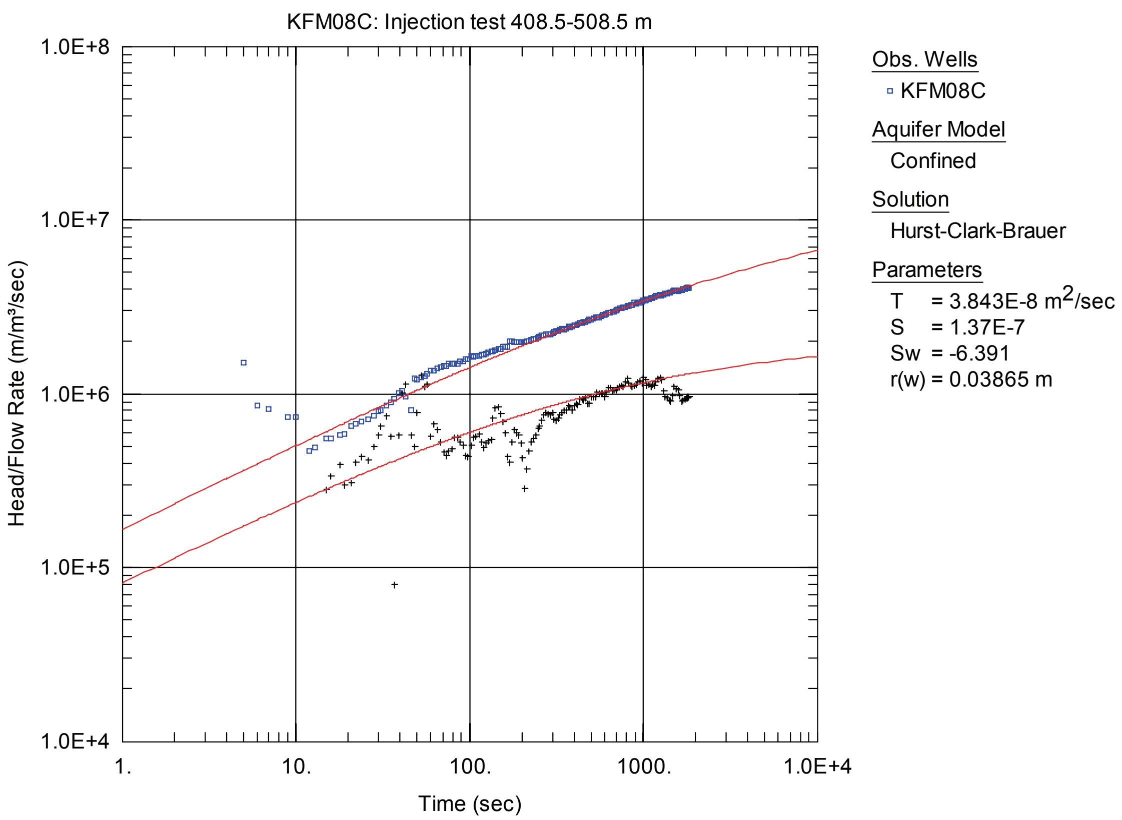


Figure A3-22. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 408.5-508.5 m in KFM08C.*

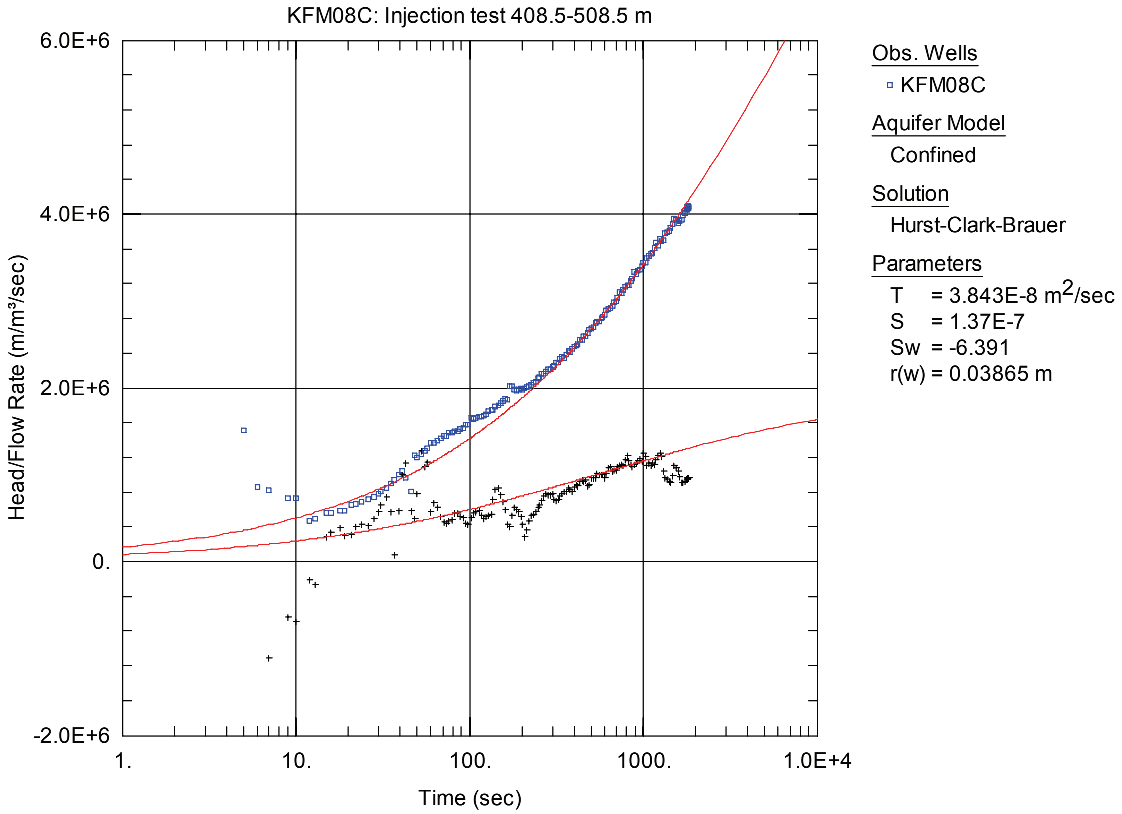


Figure A3-23. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 408.5-508.5 m in KFM08C.*

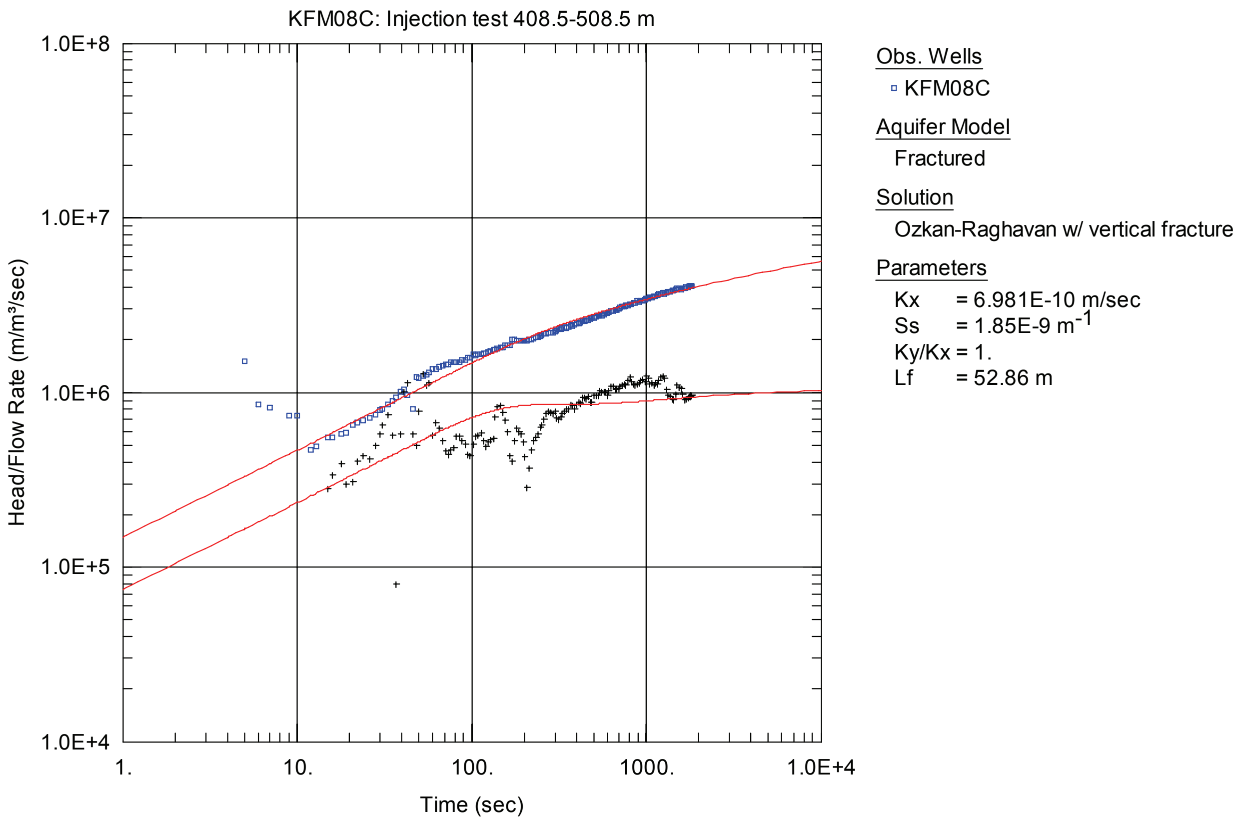


Figure A3-24. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Ozkan solution, from the injection test in section 408.5-508.5 m in KFM08C.*

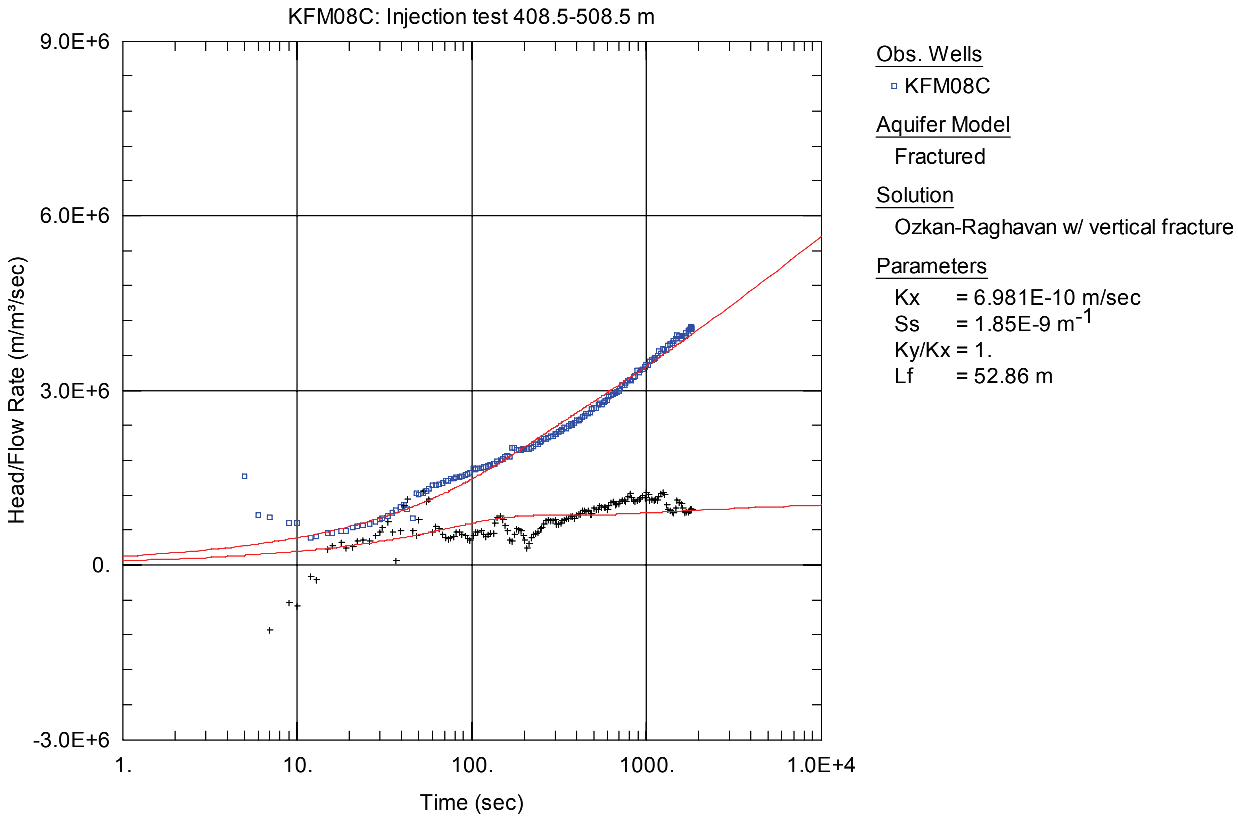


Figure A3-25. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Ozkan solution, from the injection test in section 408.5-508.5 m in KFM08C.*

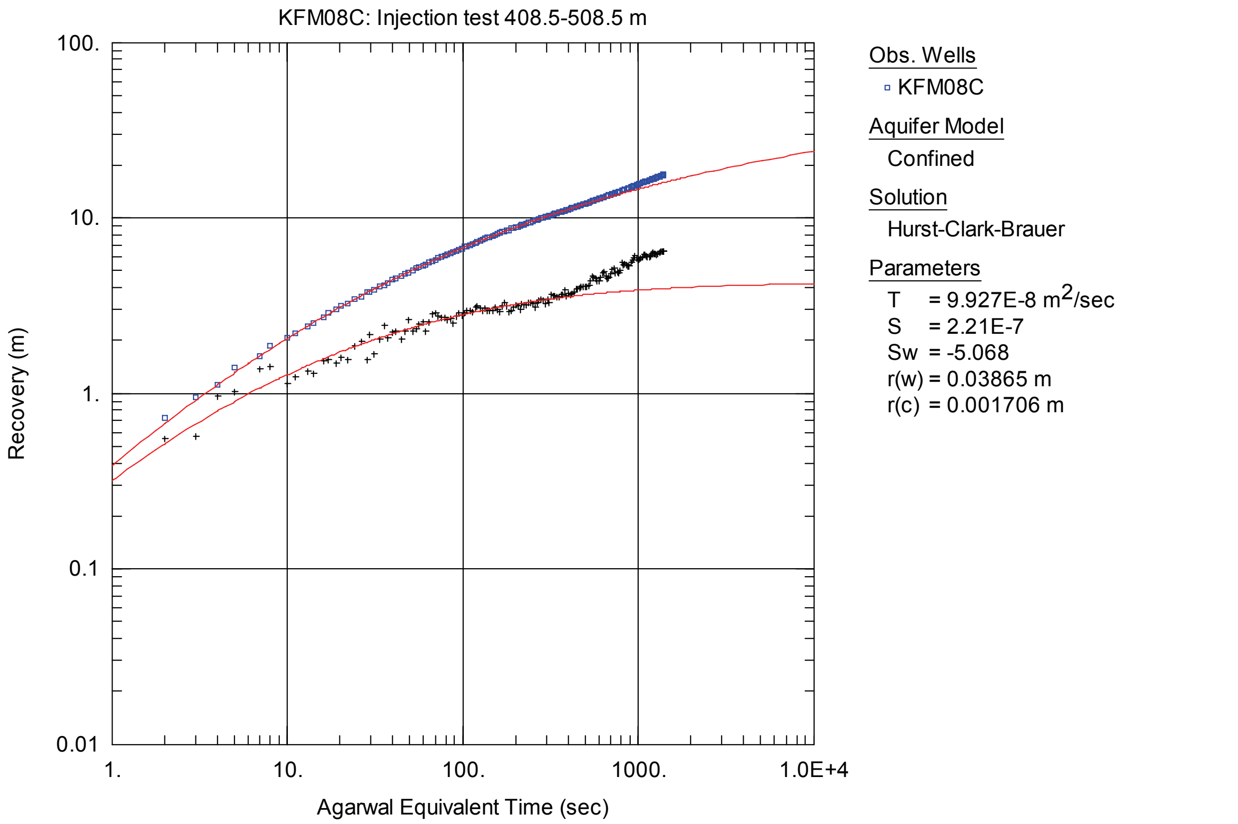


Figure A3-26. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 408.5-508.5 m in KFM08C.*

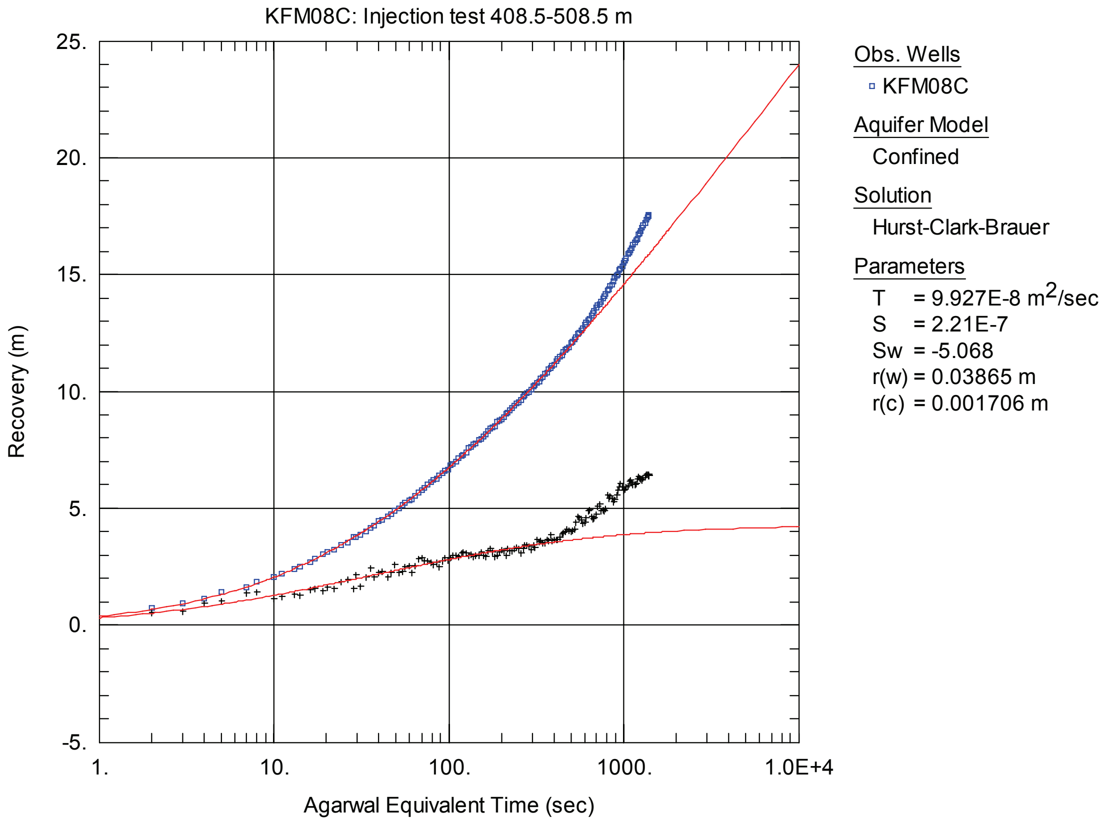


Figure A3-27. Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 408.5-508.5 m in KFM08C.

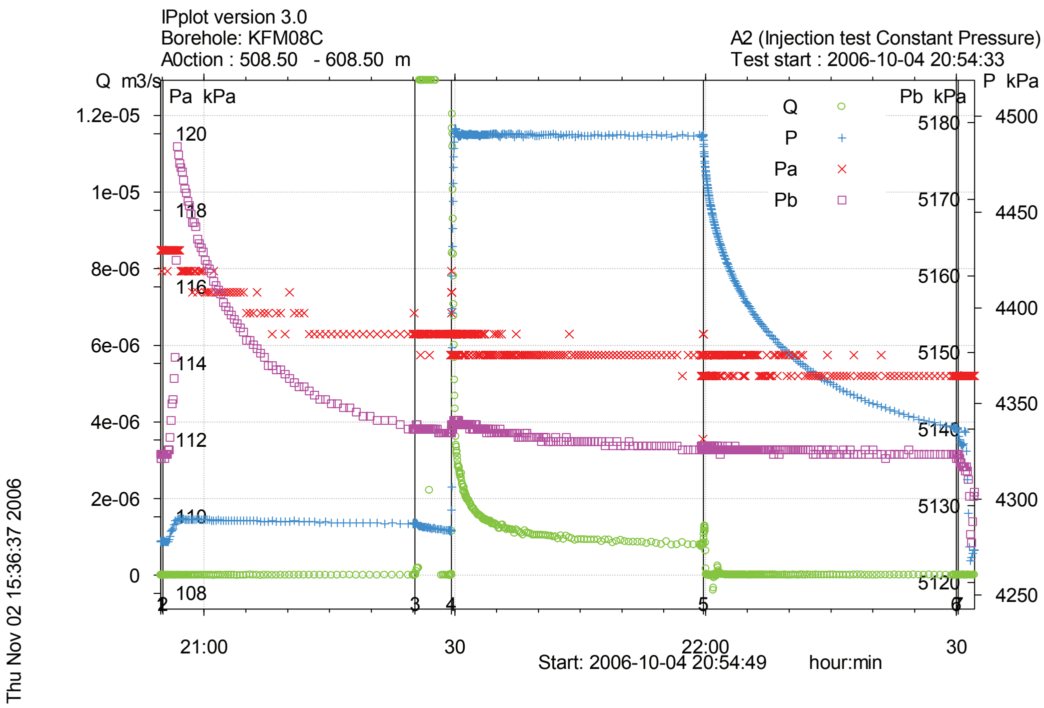


Figure A3-28. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 508.5-608.5 m in borehole KFM08C.

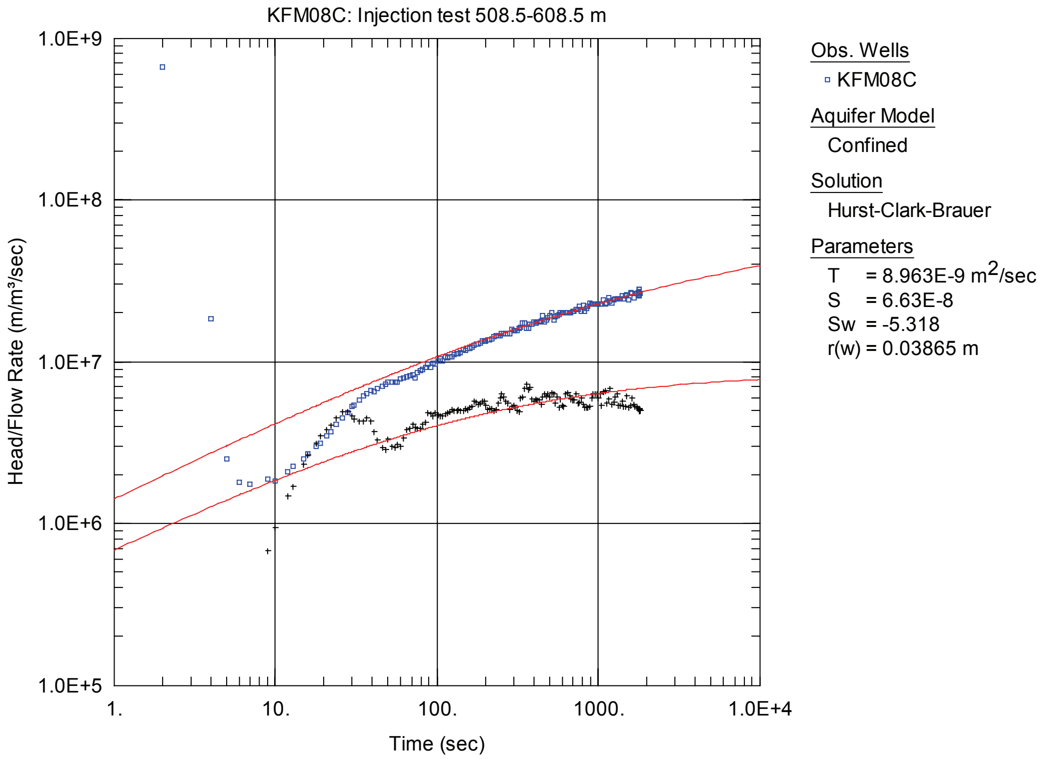


Figure A3-29. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 508.5-608.5 m in KFM08C*

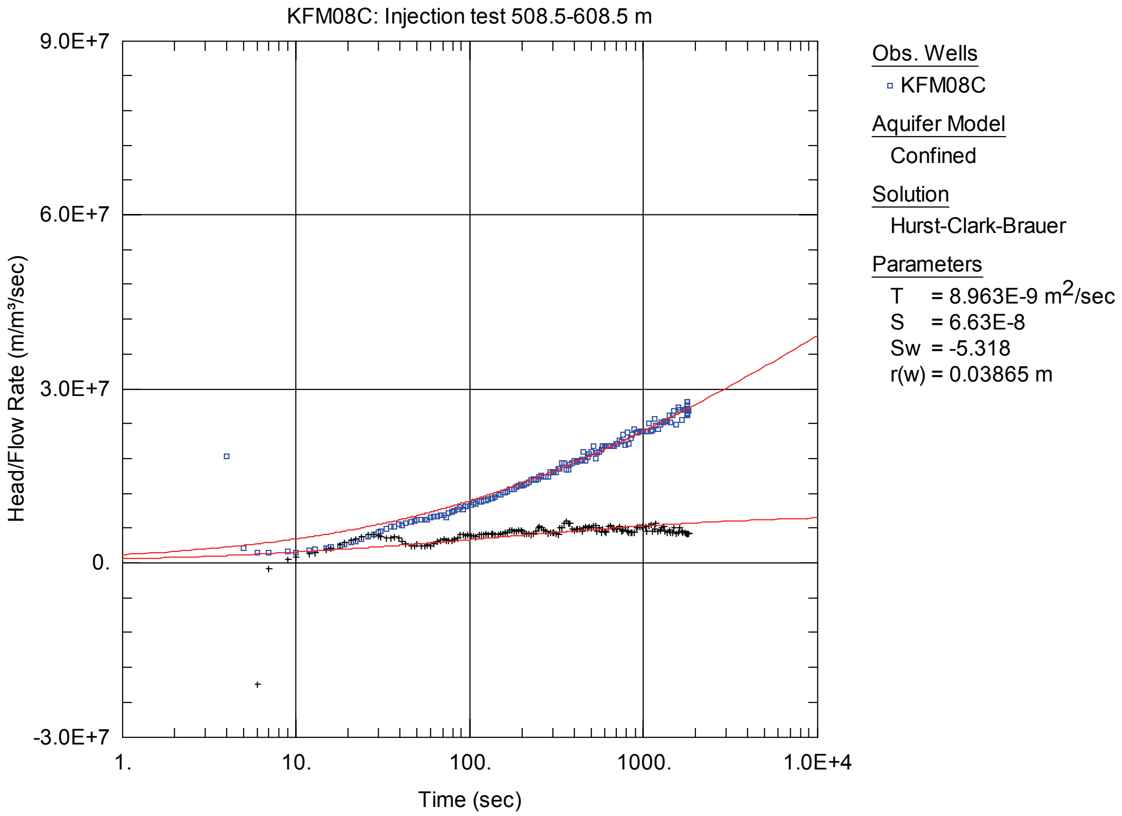


Figure A3-30. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 508.5-608.5 m in KFM08C*

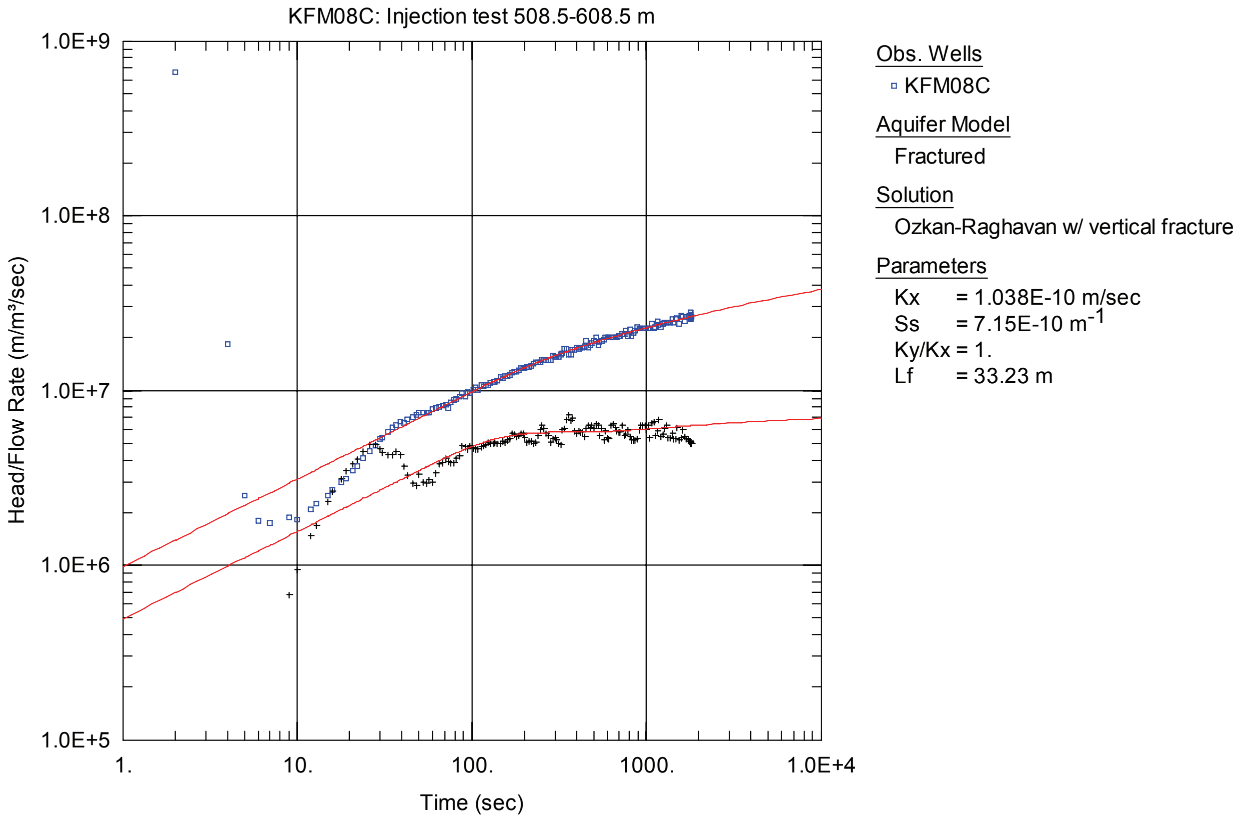


Figure A3-31. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Ozkan solution, from the injection test in section 508.5-608.5 m in KFM08C*

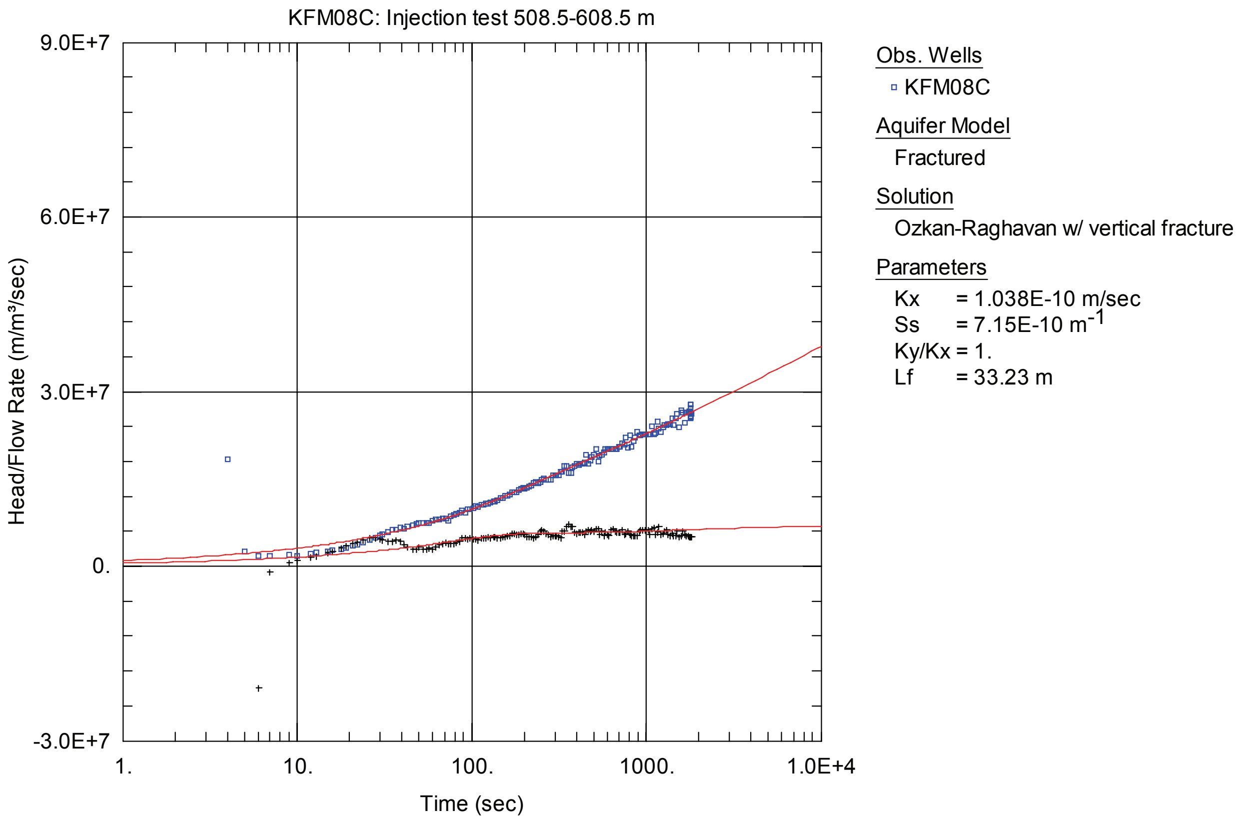


Figure A3-32. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Ozkan solution, from the injection test in section 508.5-608.5 m in KFM08C*

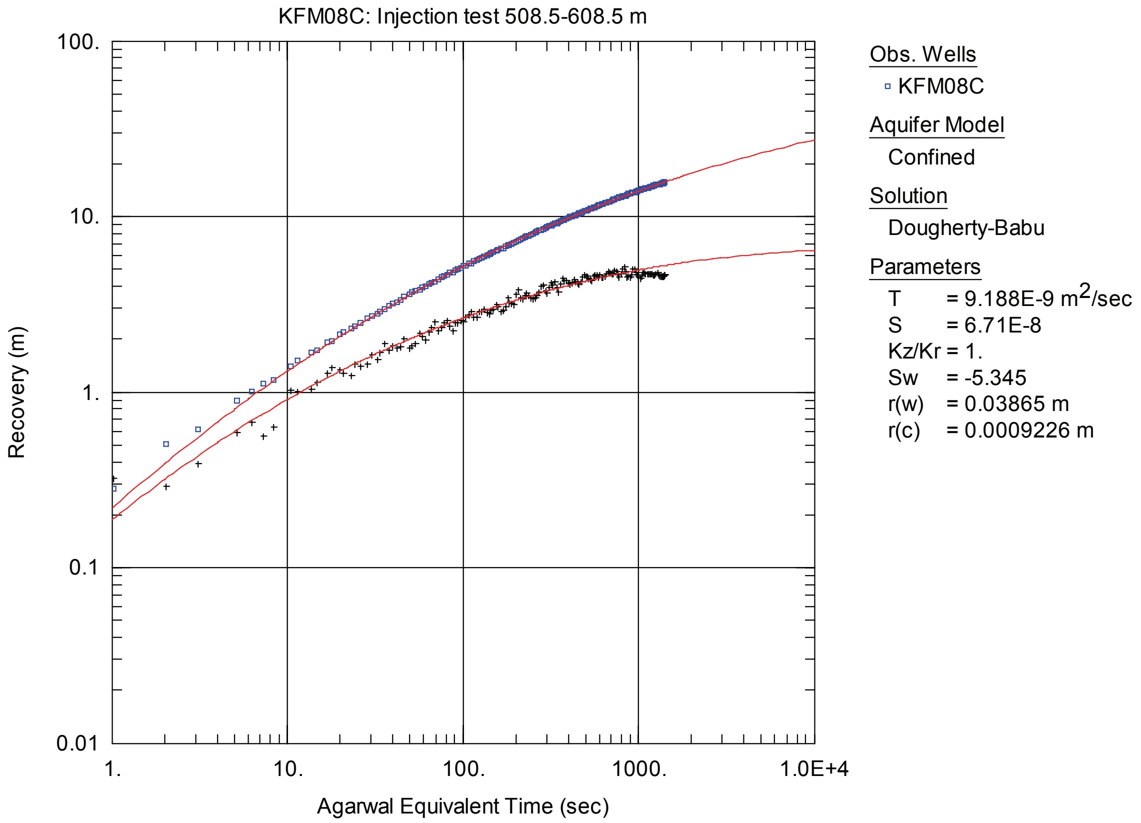


Figure A3-33. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 508.5-608.5 m in KFM08C.*

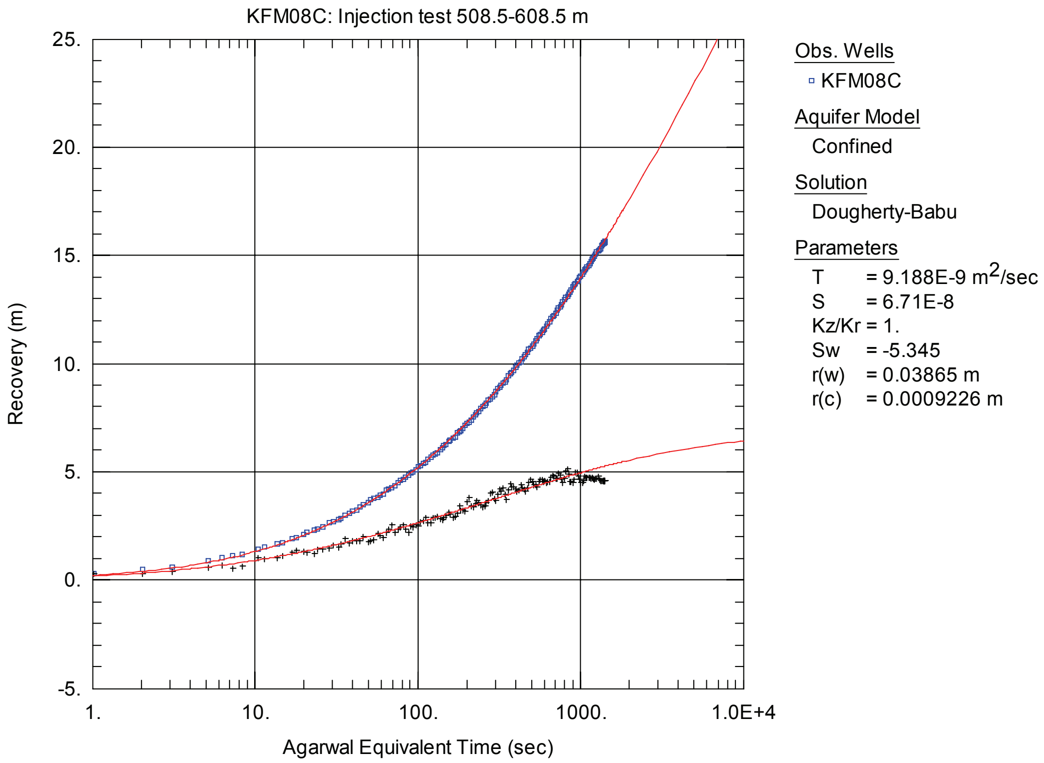


Figure A3-34. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 508.5-608.5 m in KFM08C.*

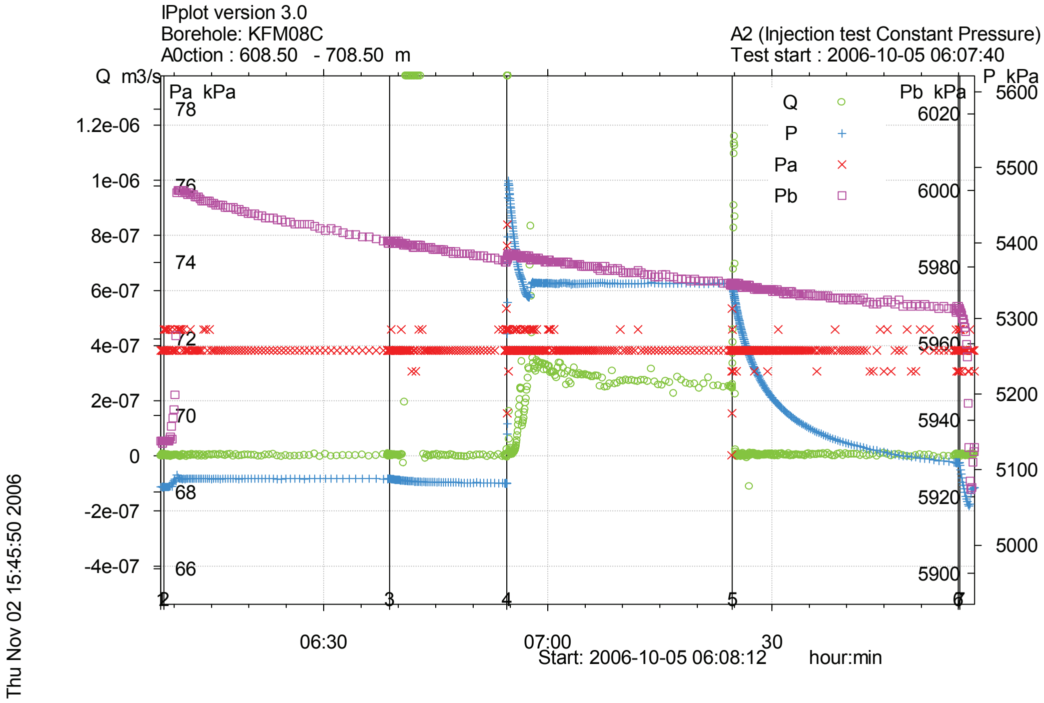


Figure A3-35. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 608.5-708.5 m in borehole KFM08C.*

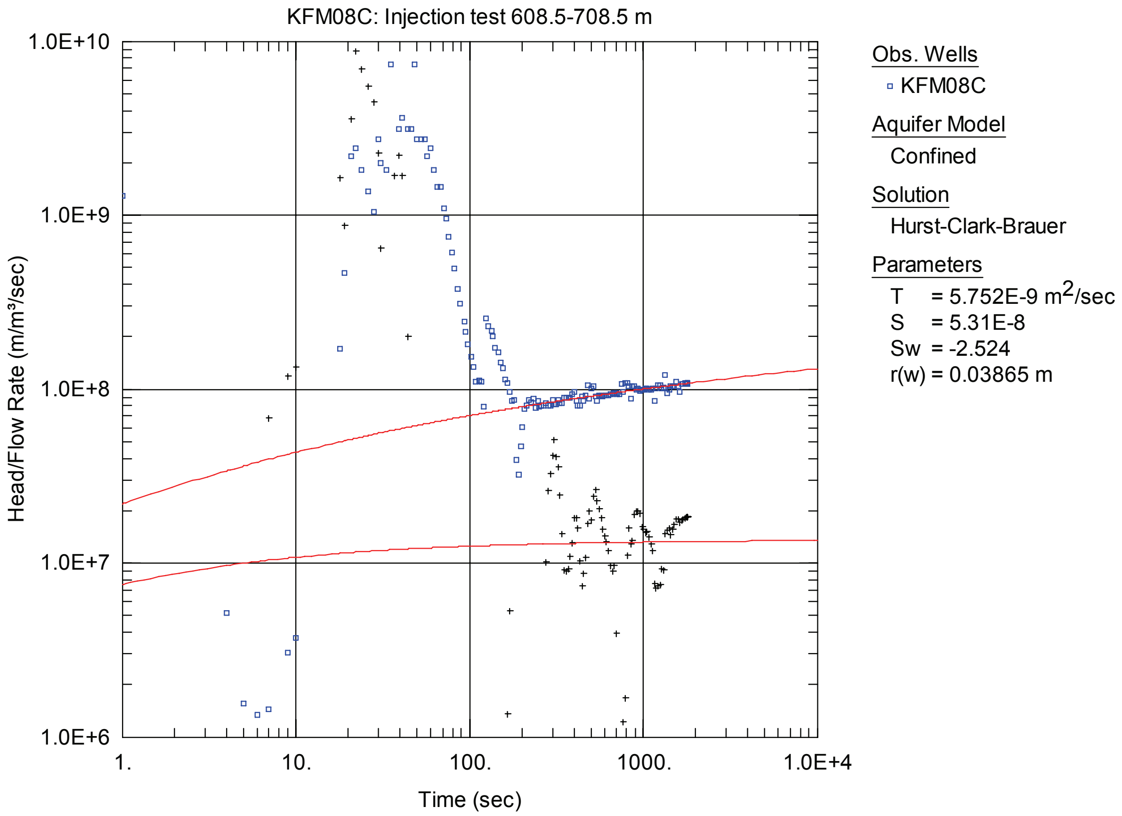


Figure A3-36. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 608.5-708.5 m in KFM08C.*

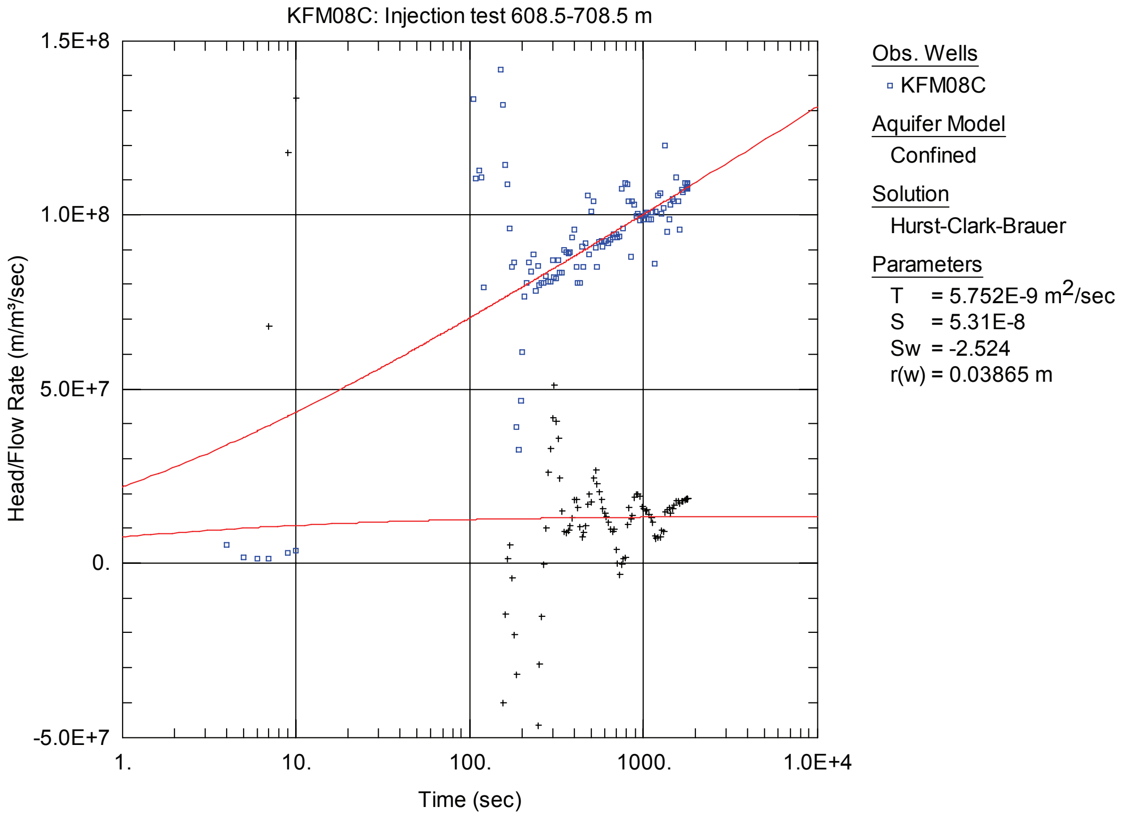


Figure A3-37. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 608.5-708.5 m in KFM08C.*

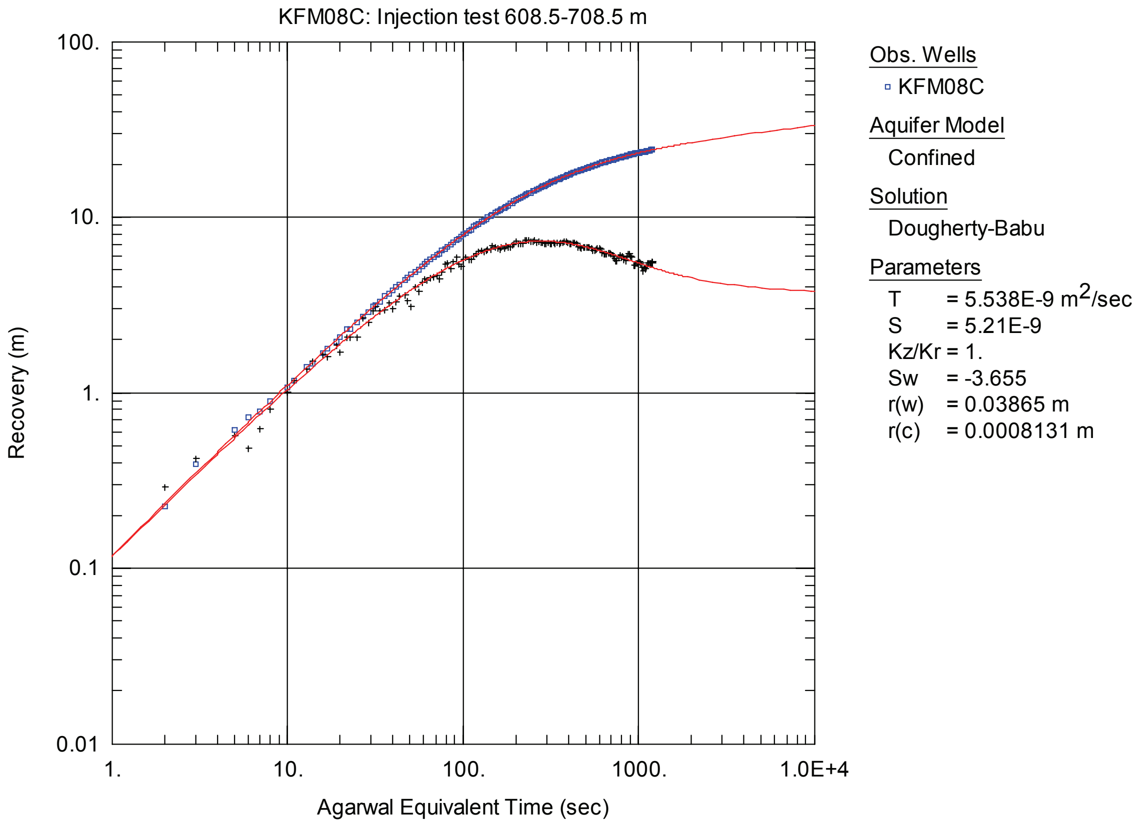


Figure A3-38. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 608.5-708.5 m in KFM08C.*

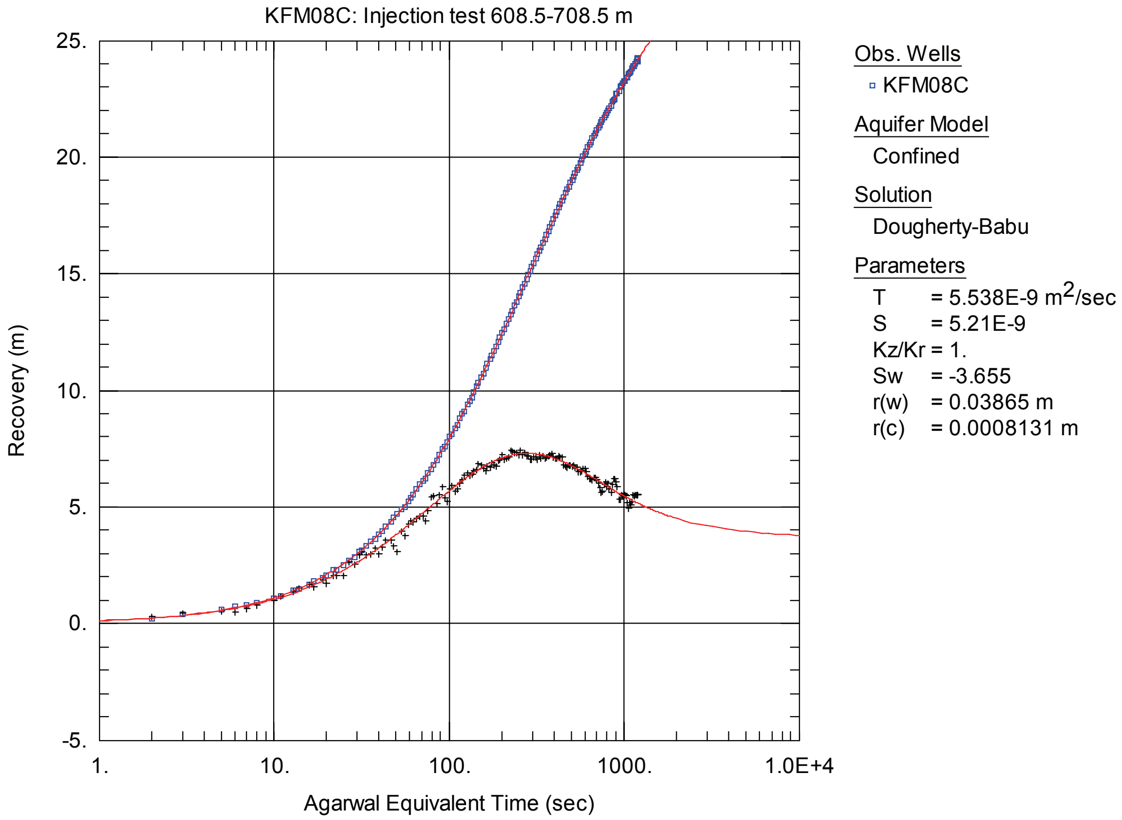


Figure A3-39. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 608.5-708.5 m in KFM08C.*

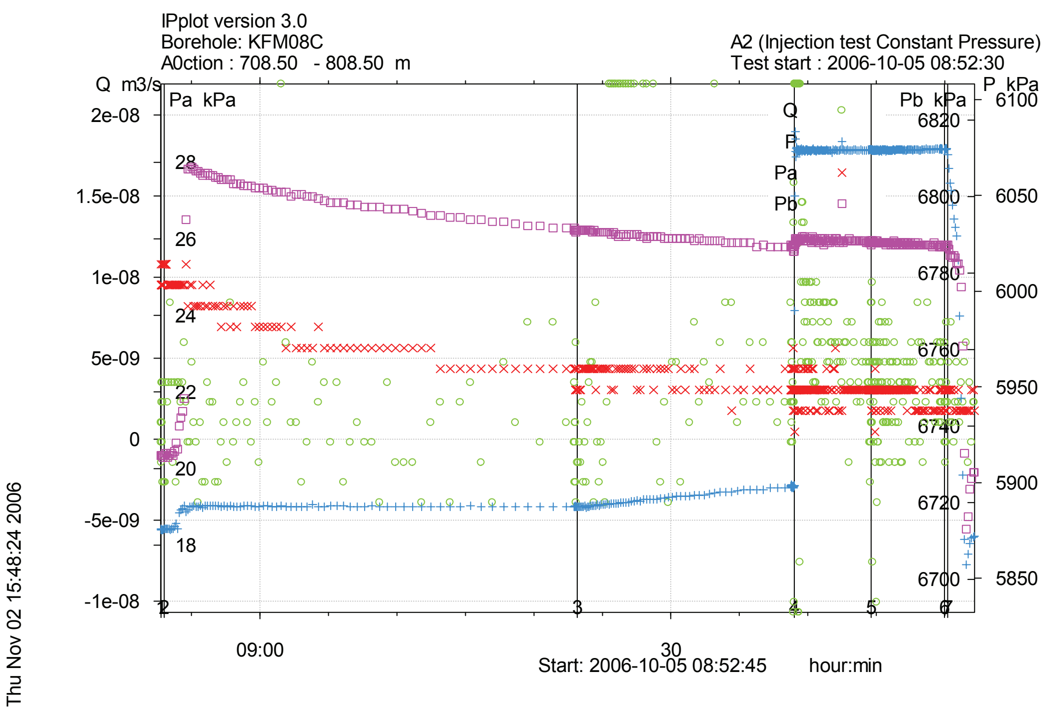


Figure A3-40. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 708.5-808.5 m in borehole KFM08C.*

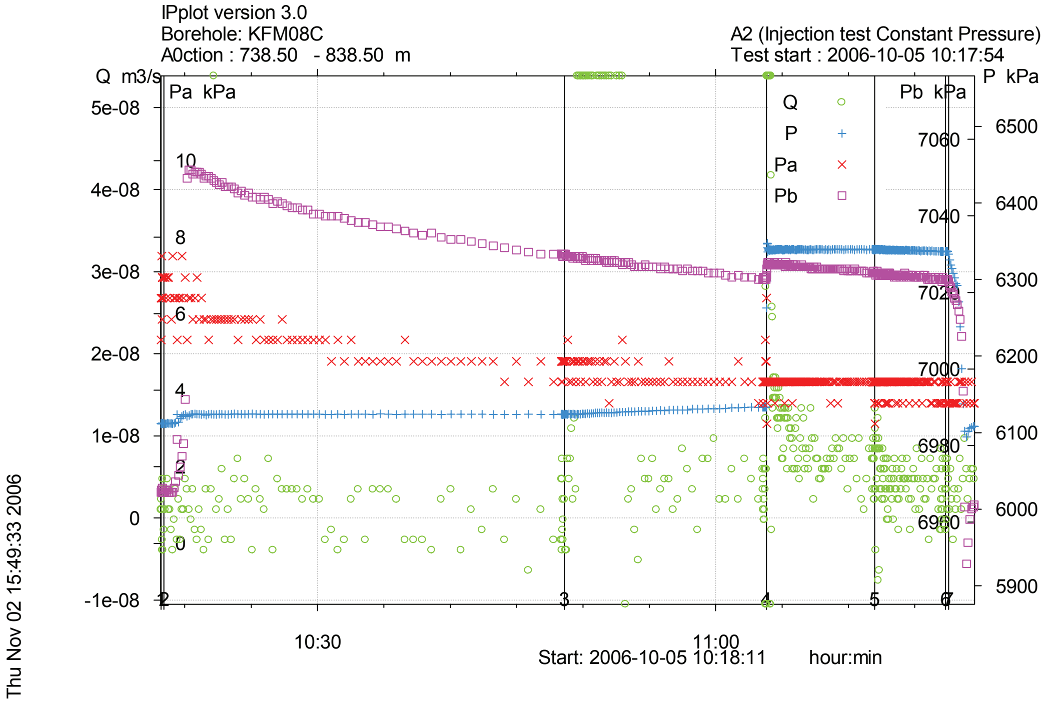


Figure A3-41. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 738.5-838.5 m in borehole KFM08C.*

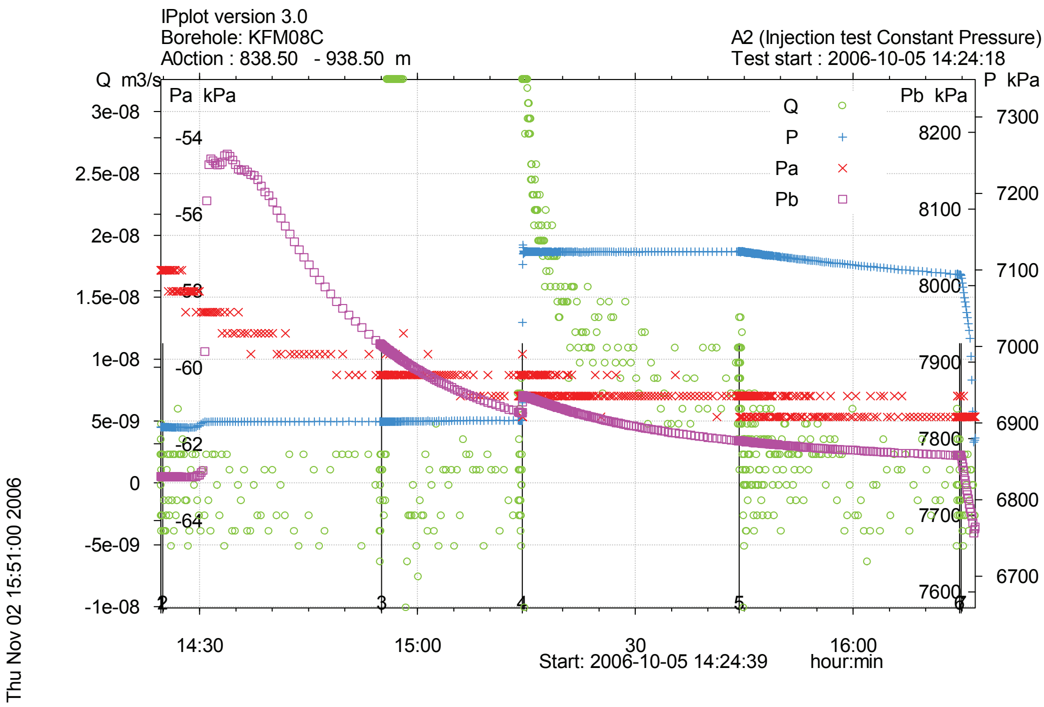


Figure A3-42. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 838.5-938.5 m in borehole KFM08C.*

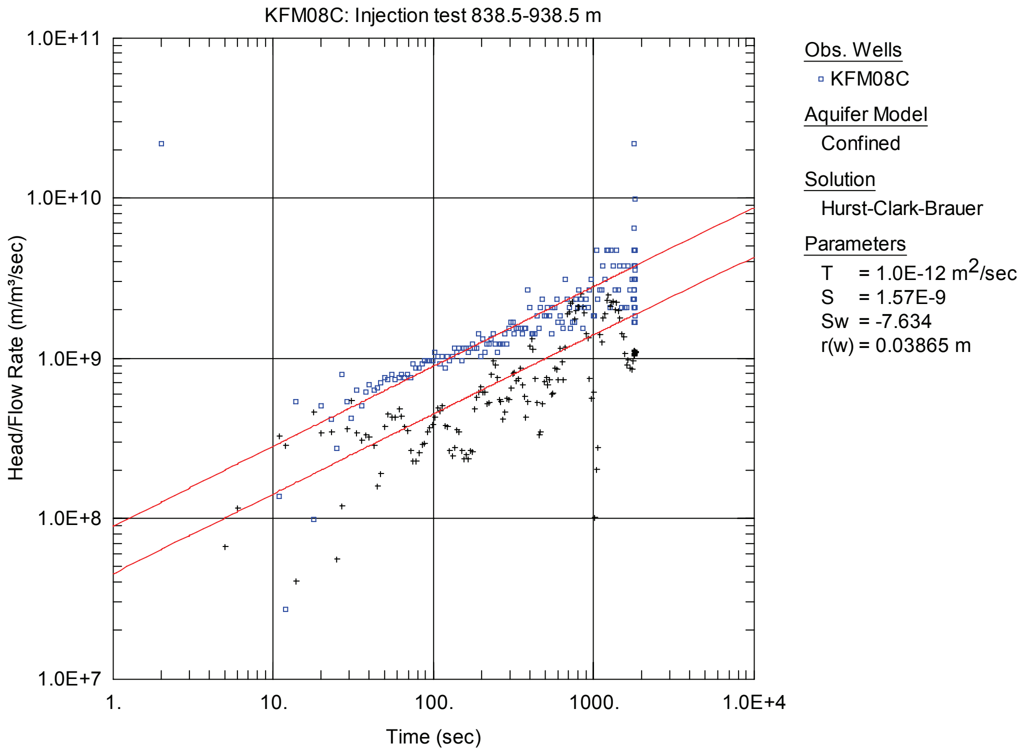


Figure A3-43. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 838.5-938.5 m in KFM08C. The type curve fit is only to show that an assumption of PRF is not valid.*

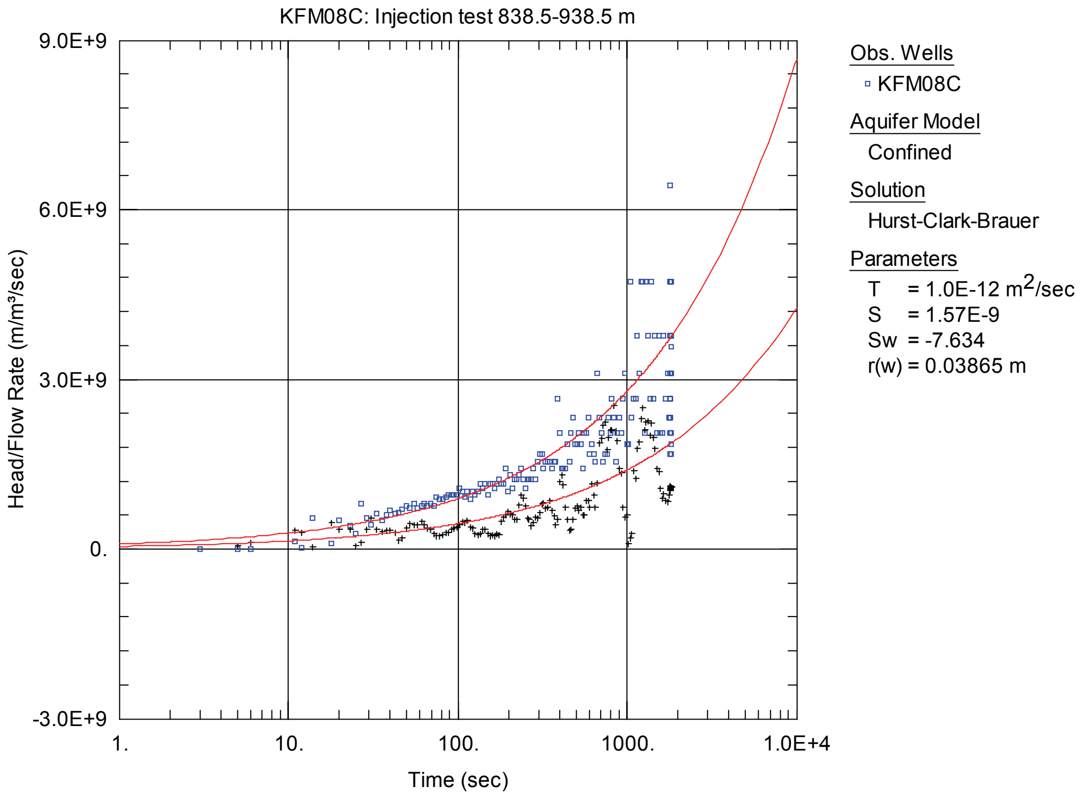


Figure A3-44. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 838.5-938.5 m in KFM08C. The type curve fit is only to show that an assumption of PRF is not valid.*

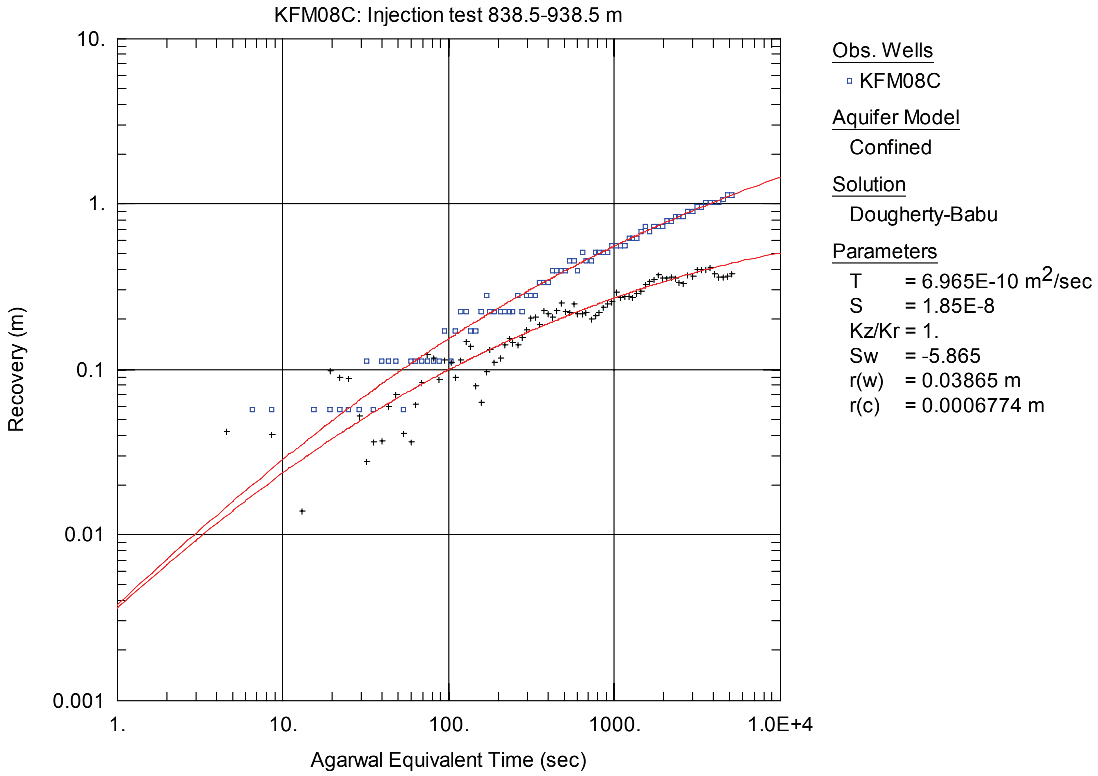


Figure A3-45. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 838.5-938.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

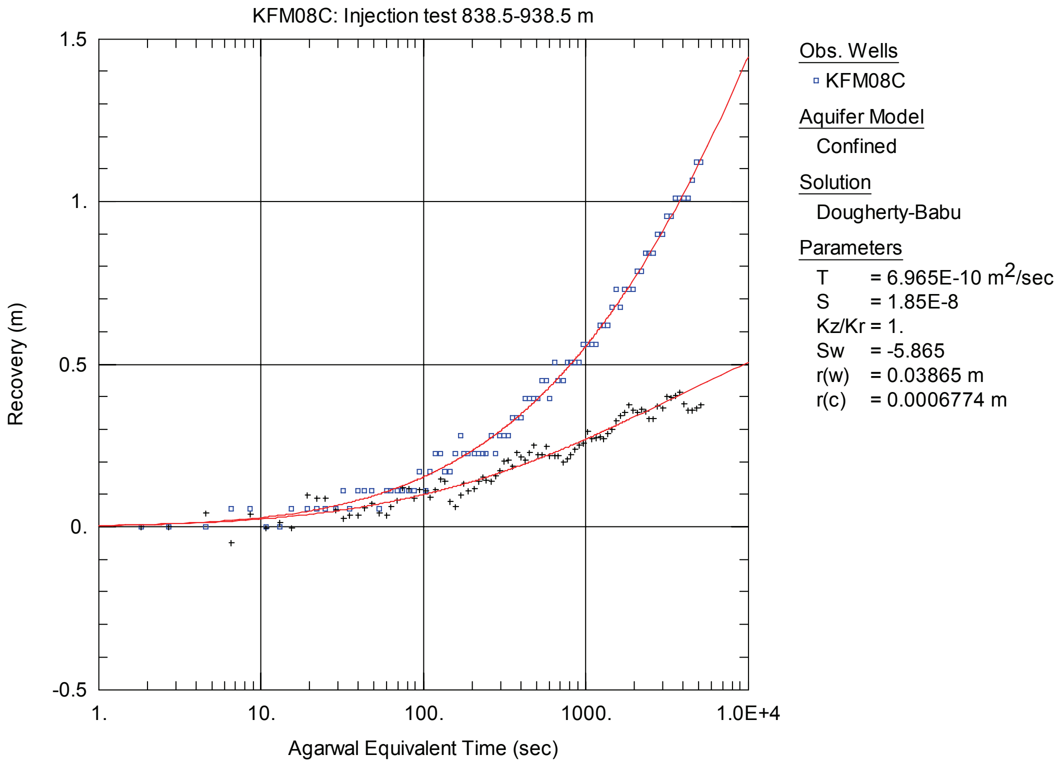


Figure A3-46. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 838.5-938.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

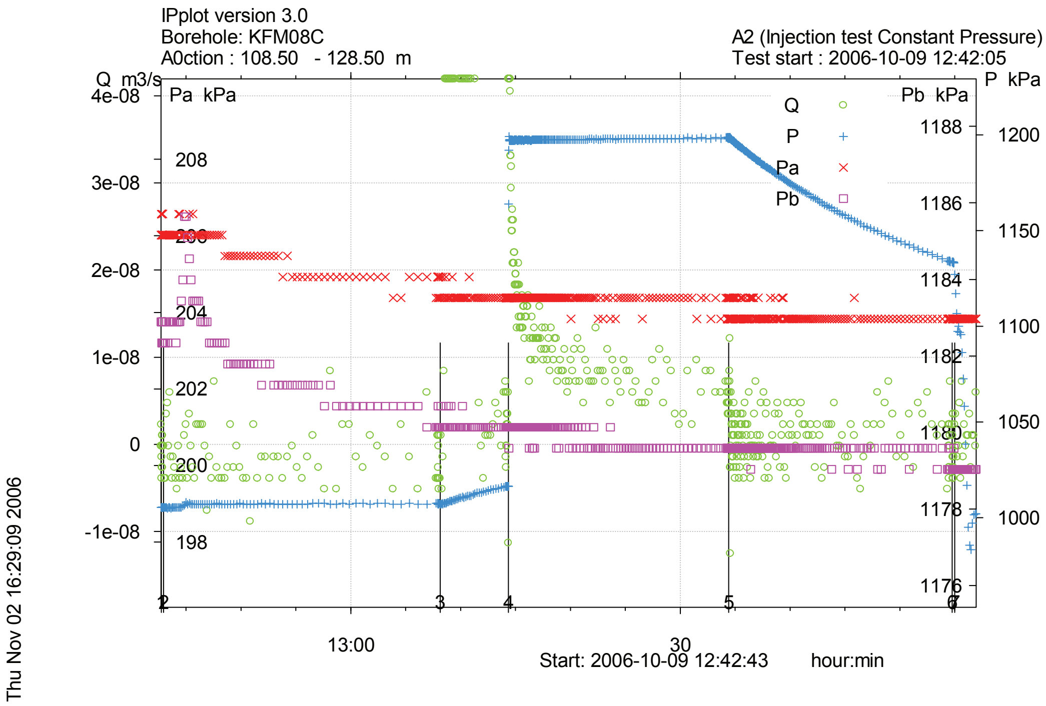


Figure A3-47. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 108.5-128.5 m in borehole KFM08C.*

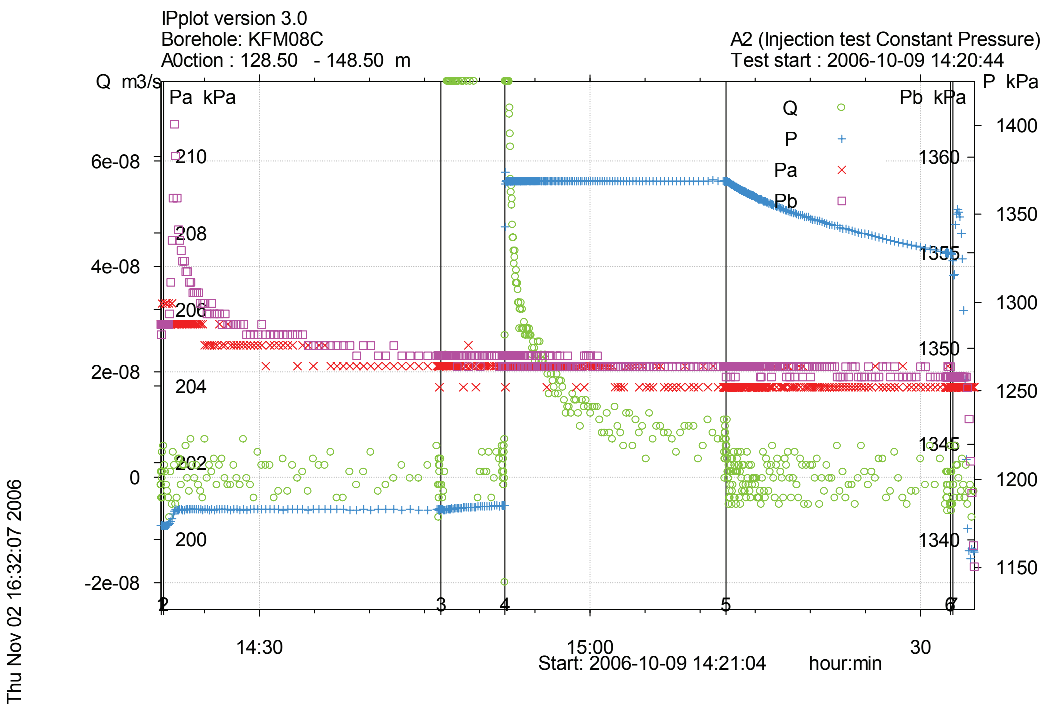


Figure A3-48. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 128.5-148.5 m in borehole KFM08C.*

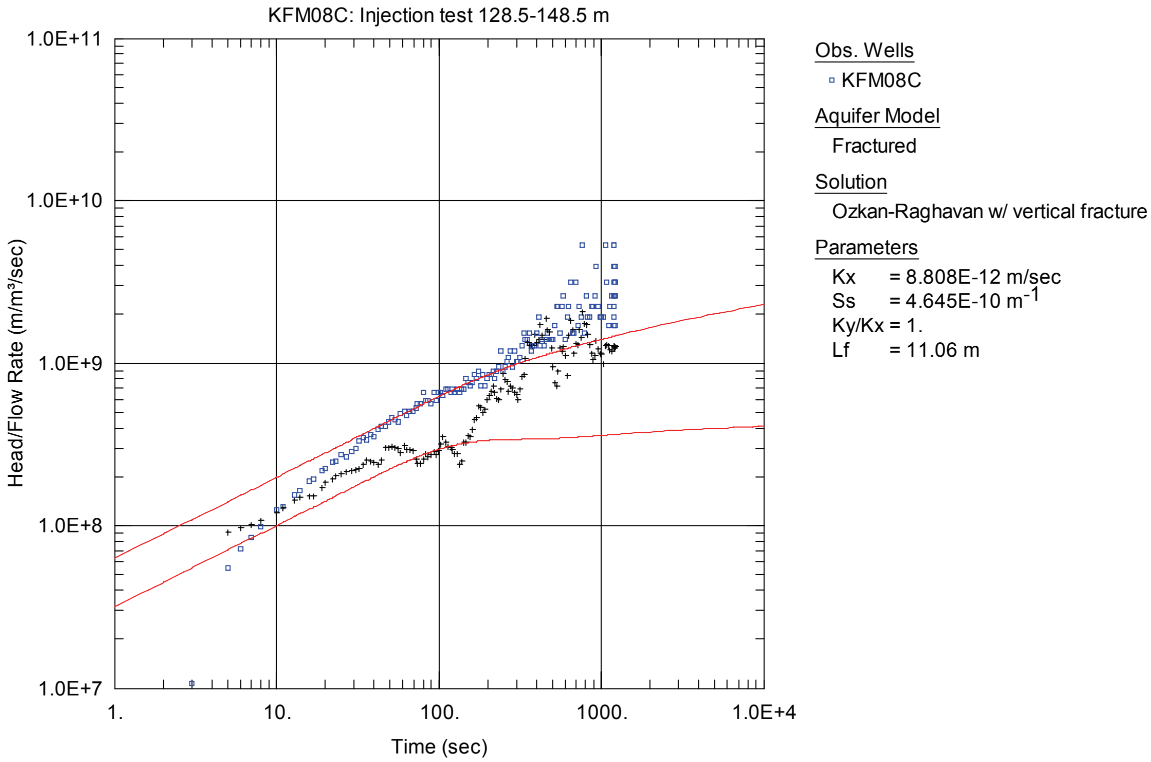


Figure A3-49. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 128.5-148.5 m in KFM08C*

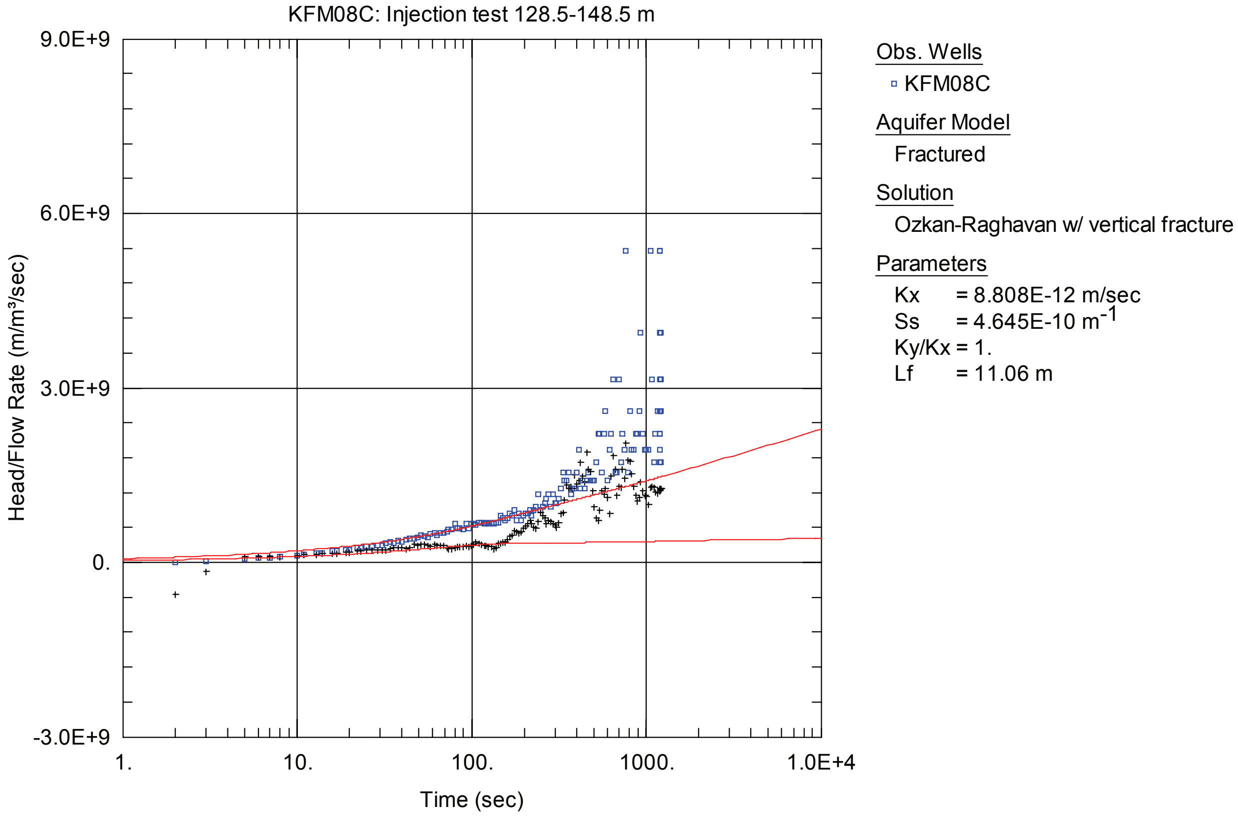


Figure A3-50. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 128.5-148.5 m in KFM08C*

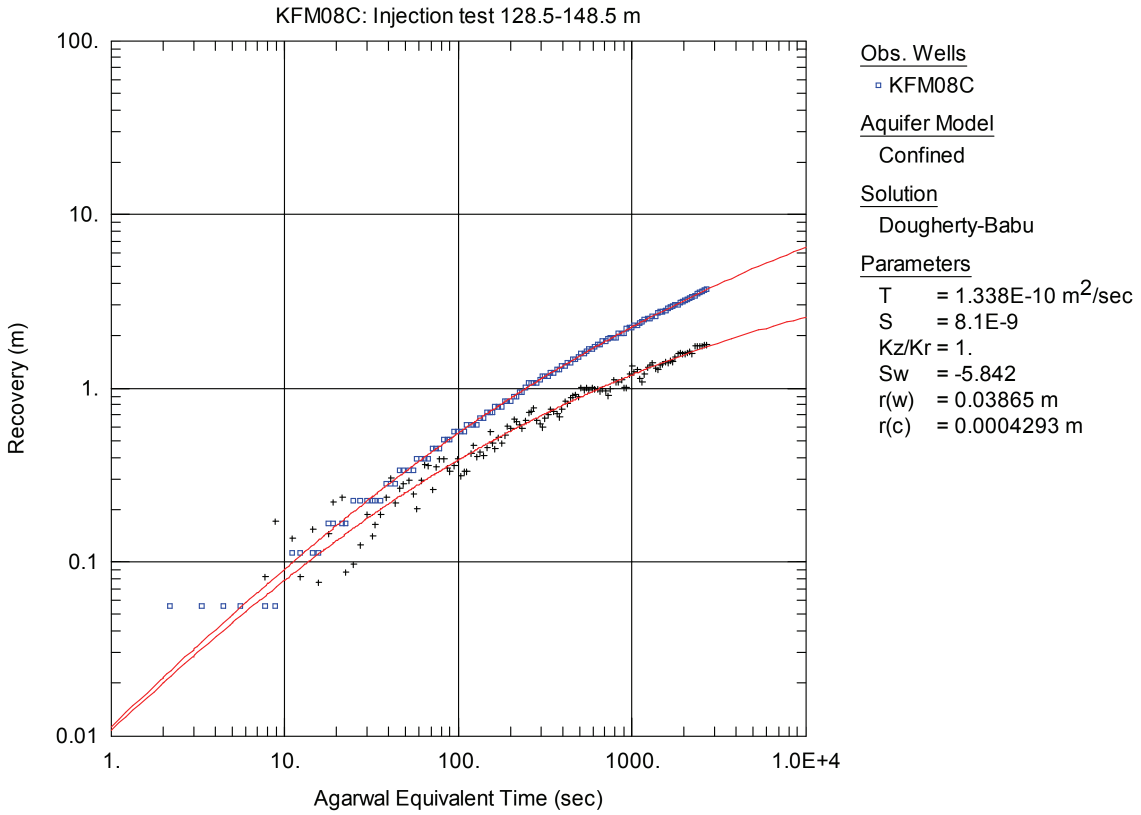


Figure A3-51. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 128.5-148.5 m in KFM08C.*

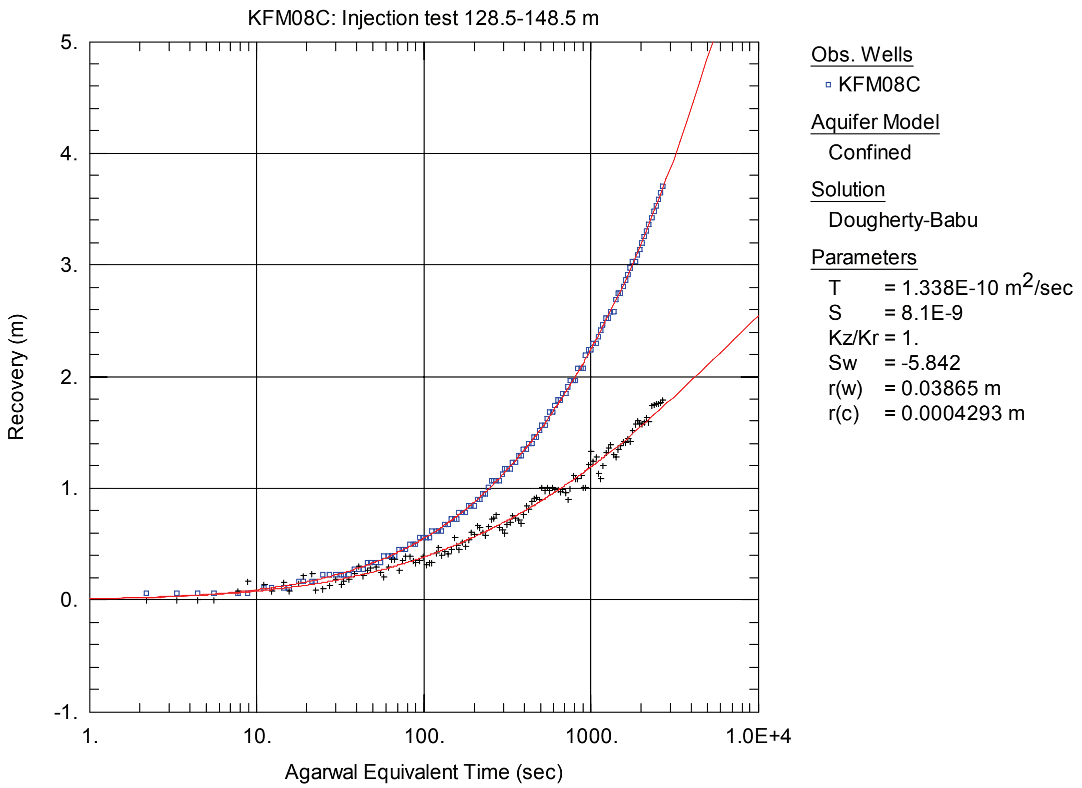


Figure A3-52. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 128.5-148.5 m in KFM08C.*

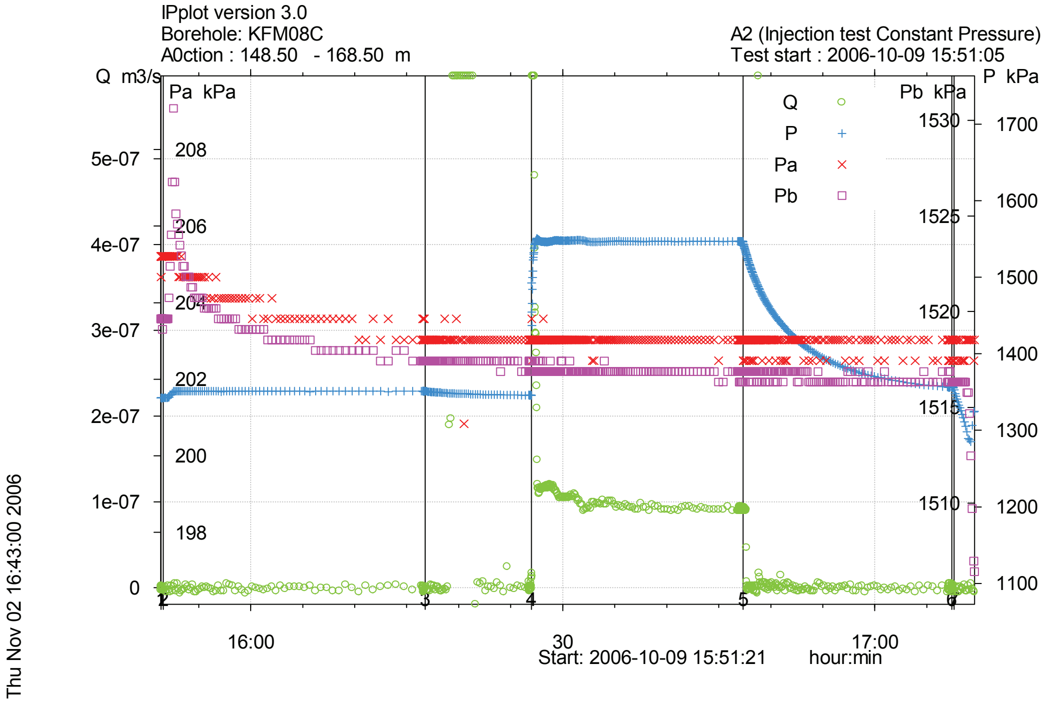


Figure A3-53. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 148.5-168.5 m in borehole KFM08C.*

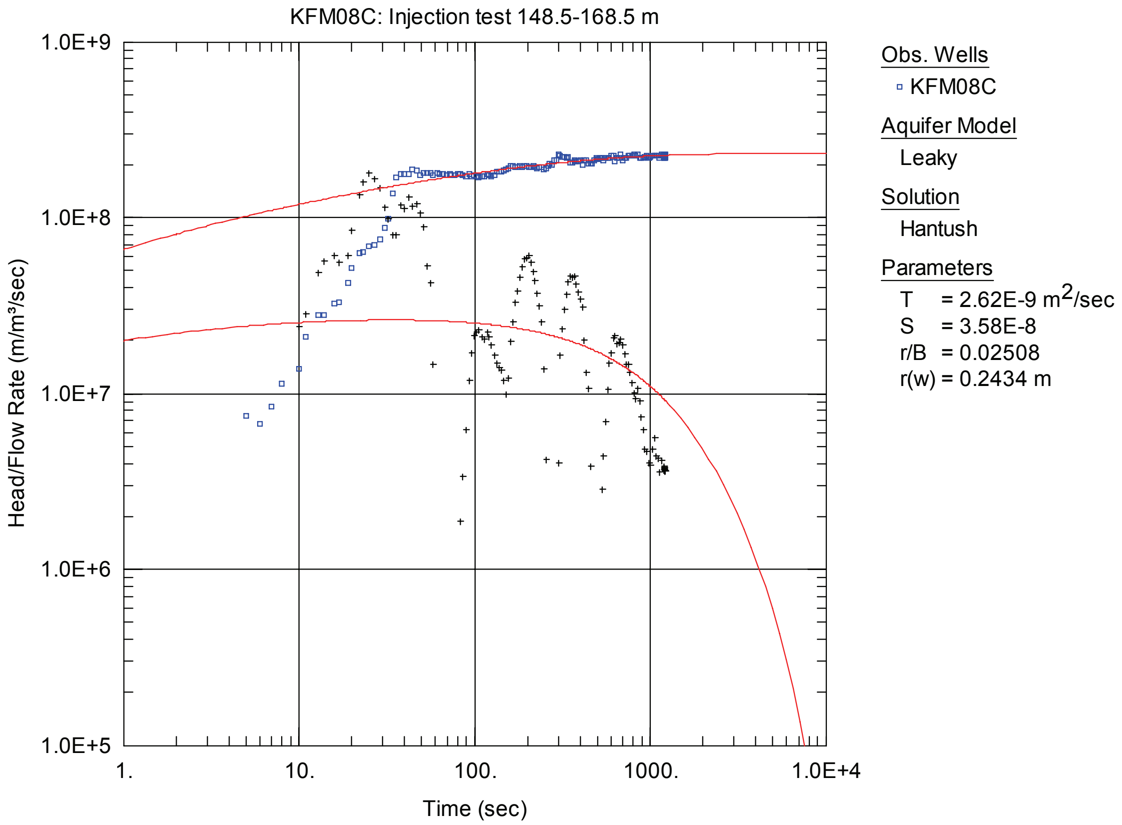


Figure A3-54. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 148.5-168.5 m in KFM08C.*

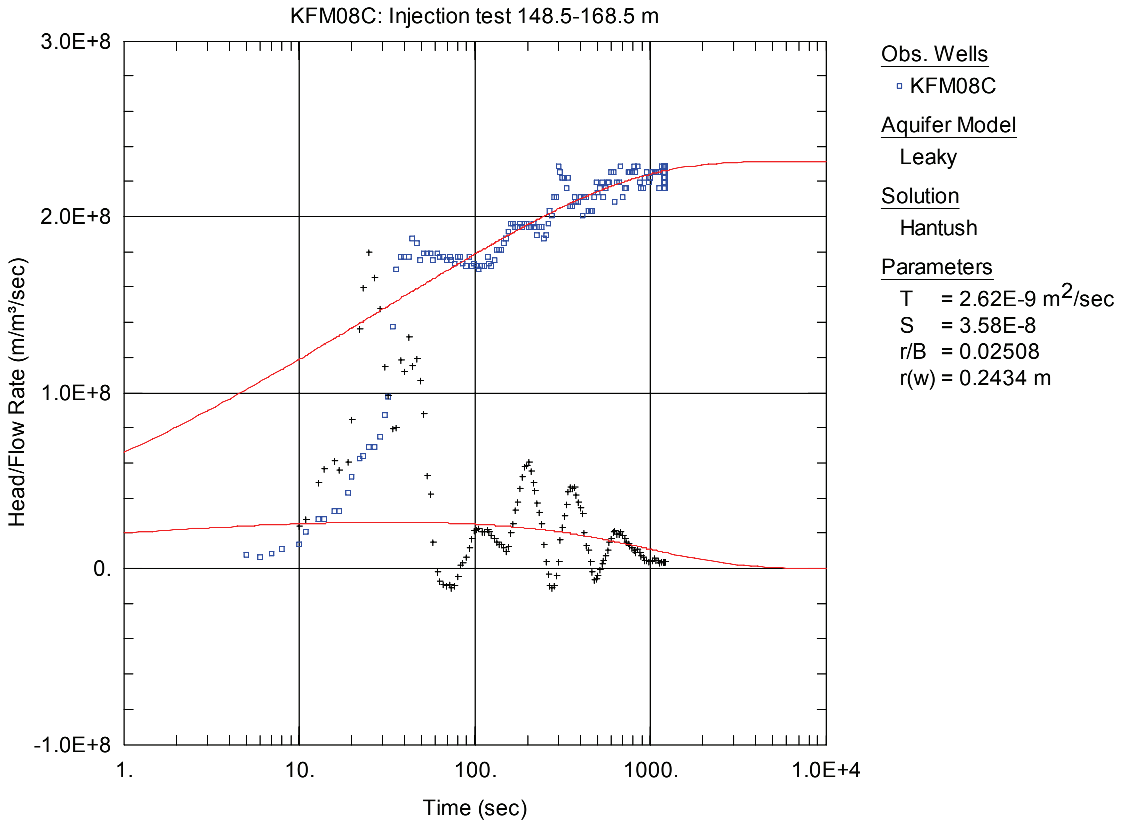


Figure A3-55. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 148.5-168.5 m in KFM08C.*

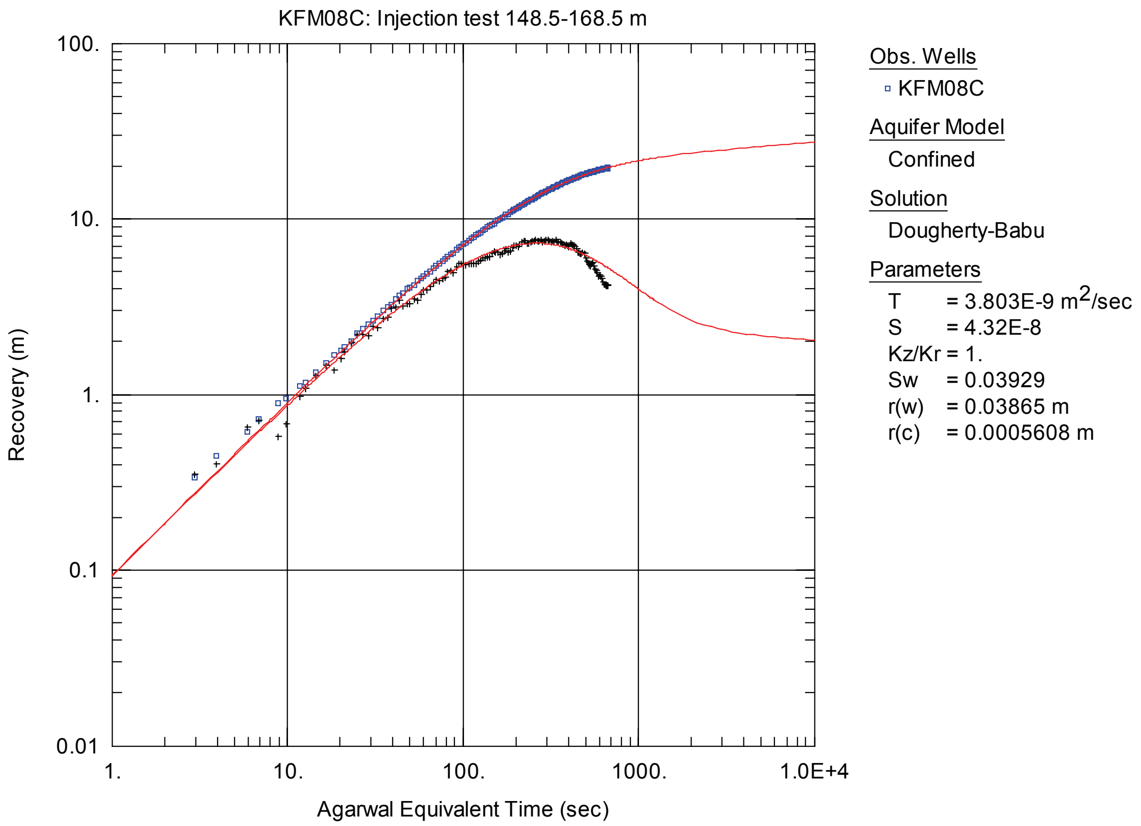


Figure A3-56. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Babu solution, from the injection test in section 148.5-168.5 m in KFM08C.*

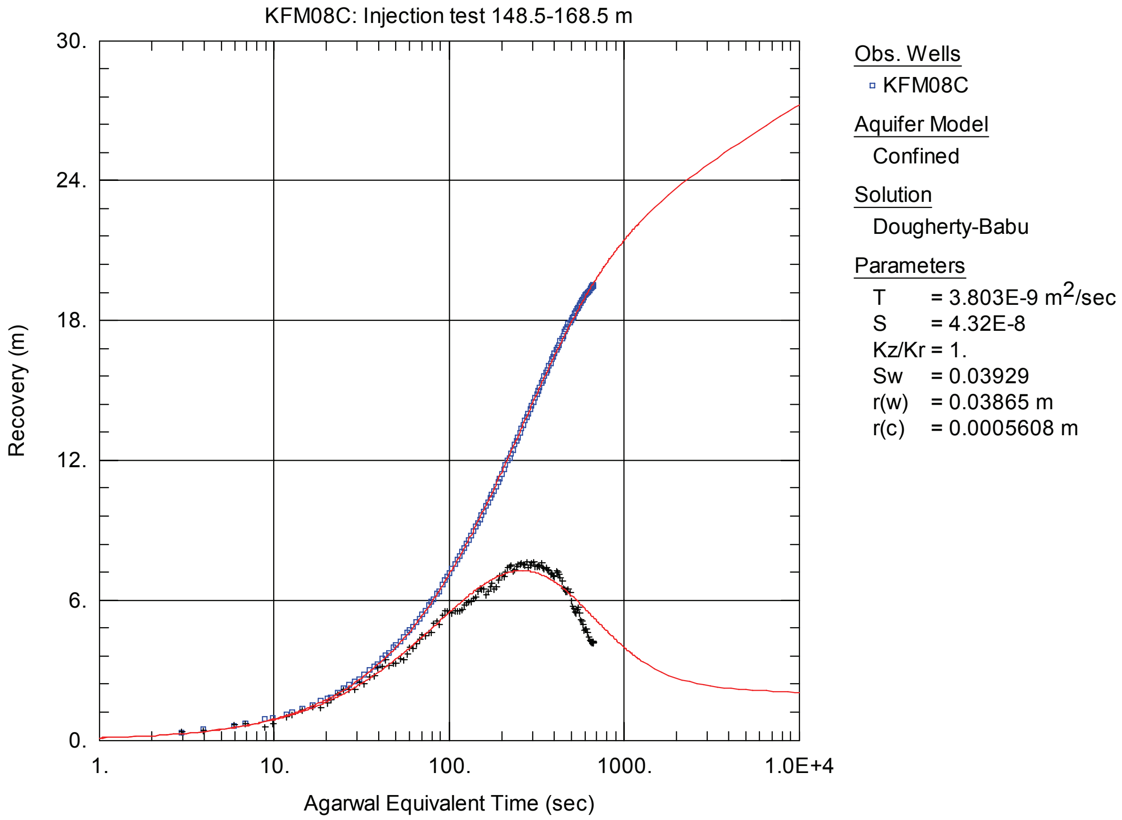


Figure A3-57. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Babu solution, from the injection test in section 148.5-168.5 m in KFM08C.*

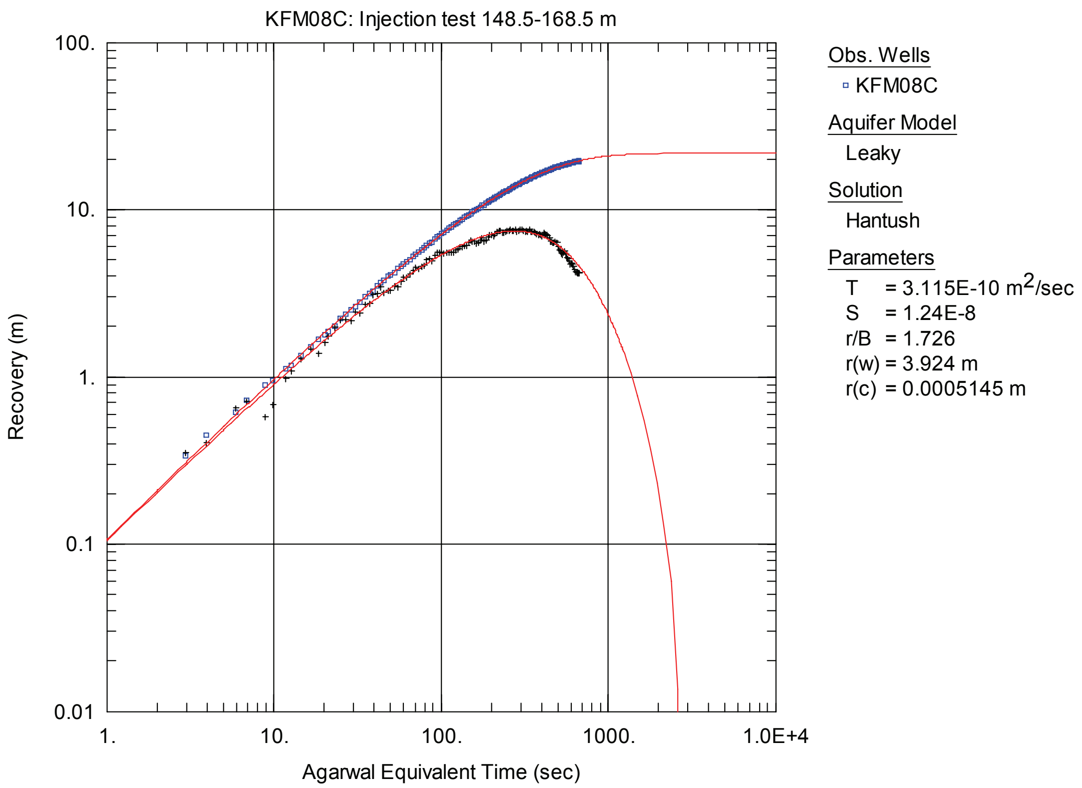


Figure A3-58. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Hantush solution, from the injection test in section 148.5-168.5 m in KFM08C.*

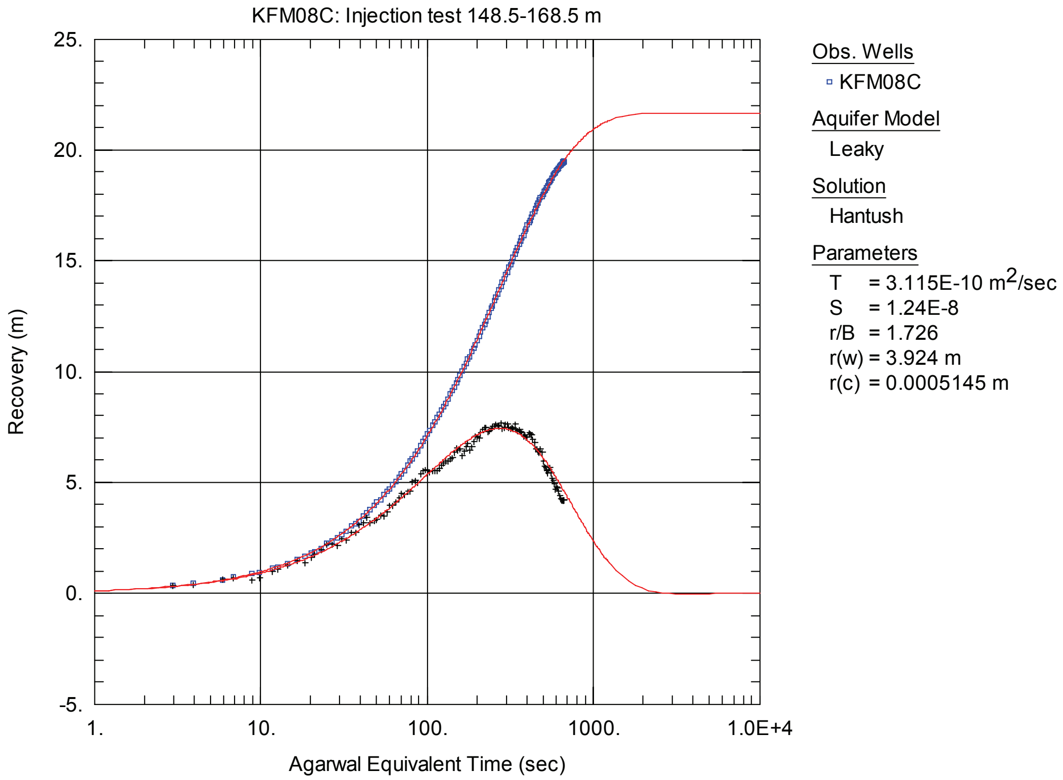


Figure A3-59. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Hantush solution, from the injection test in section 148.5-168.5 m in KFM08C.*

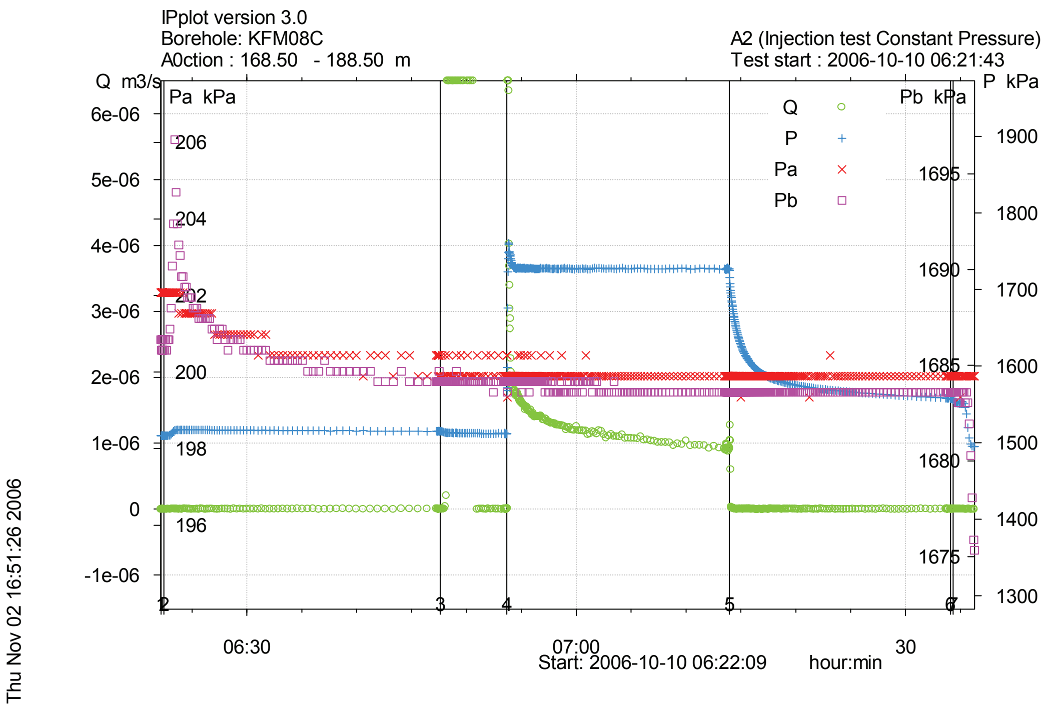


Figure A3-60. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 168.5-188.5 m in borehole KFM08C.*

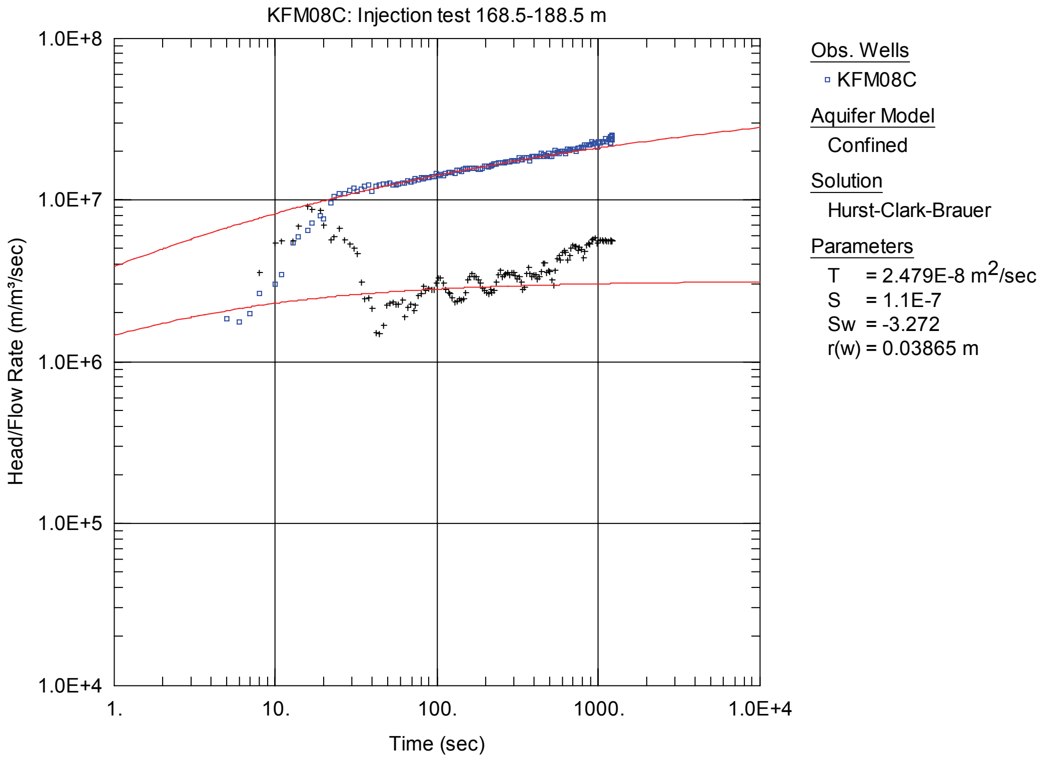


Figure A3-61. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 168.5-188.5 m in KFM08C.*

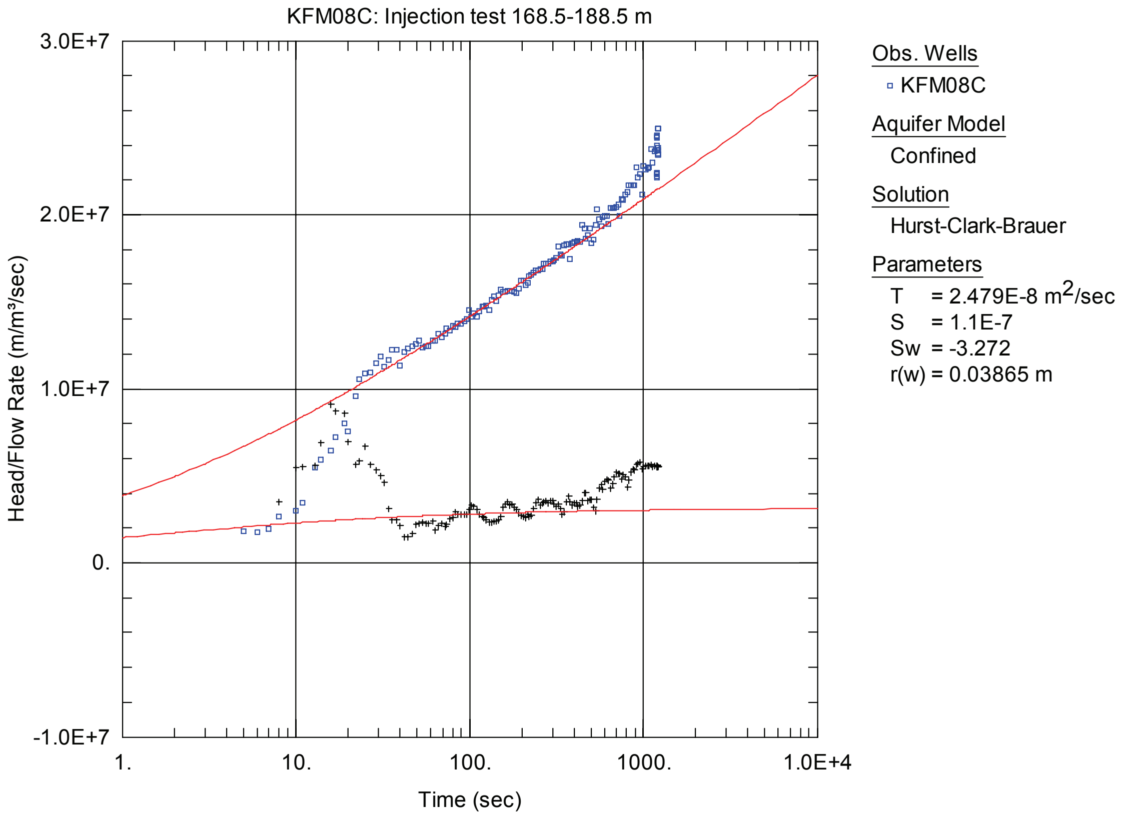


Figure A3-62. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 168.5-188.5 m in KFM08C.*

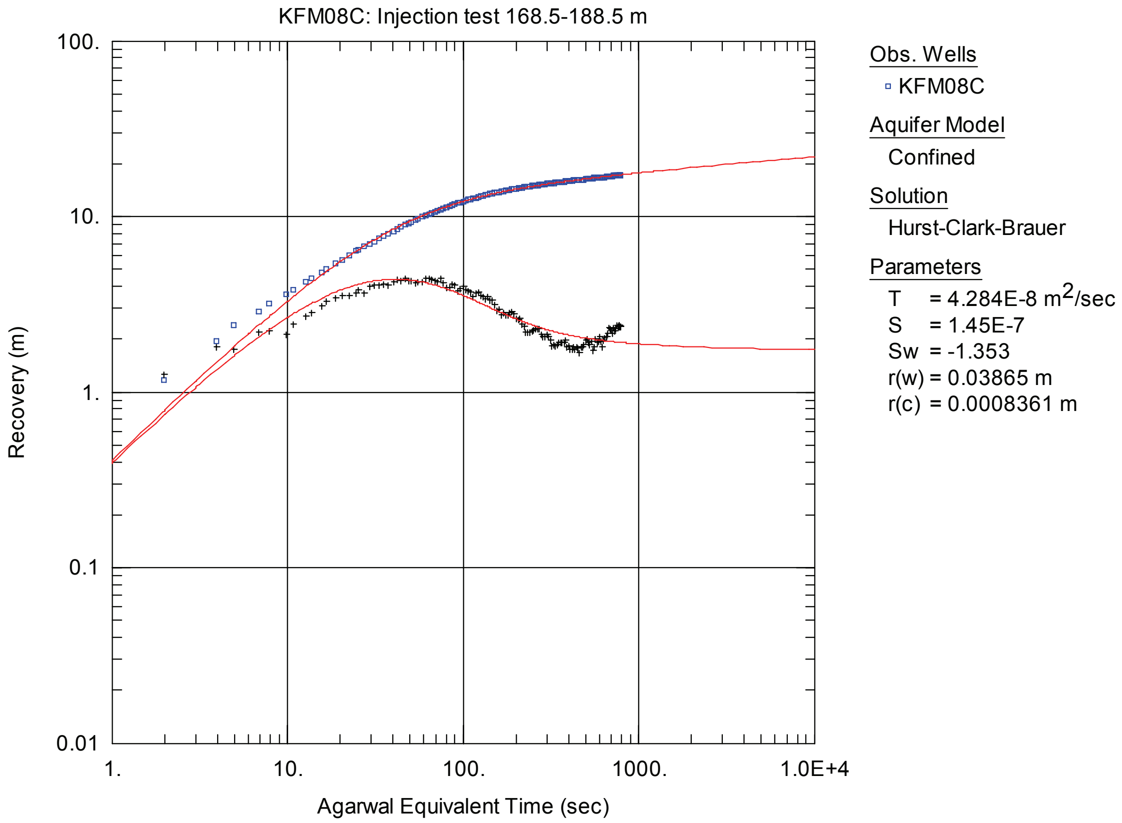


Figure A3-63. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 168.5-188.5 m in KFM08C.*

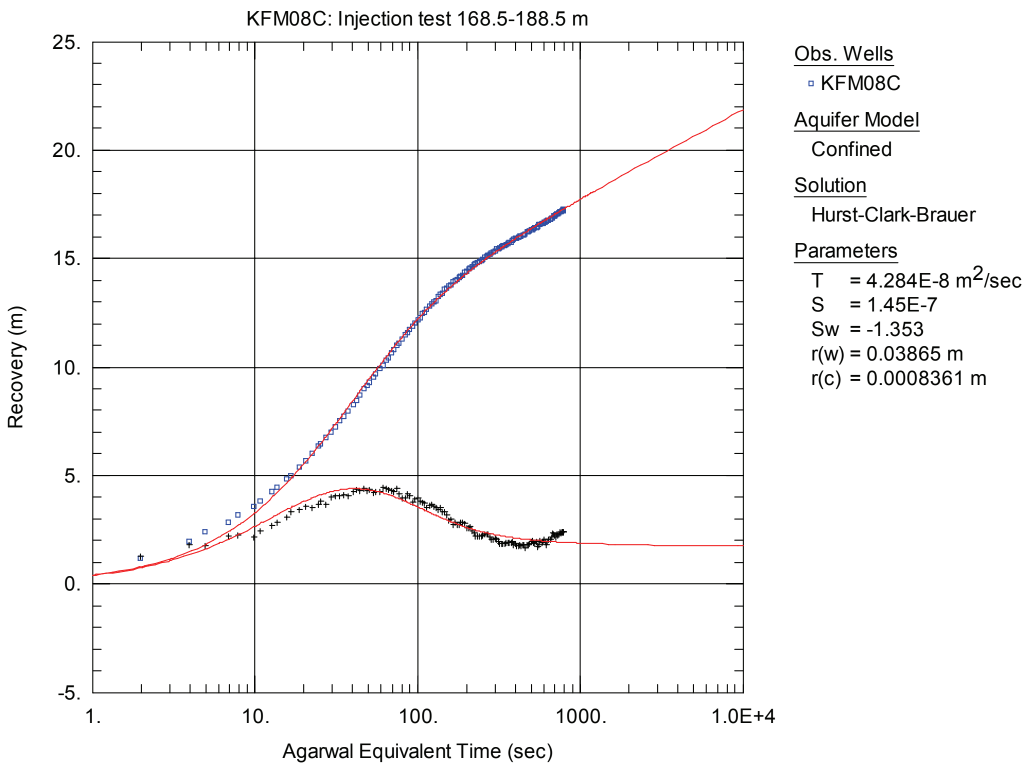


Figure A3-64. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 168.5-188.5 m in KFM08C.*

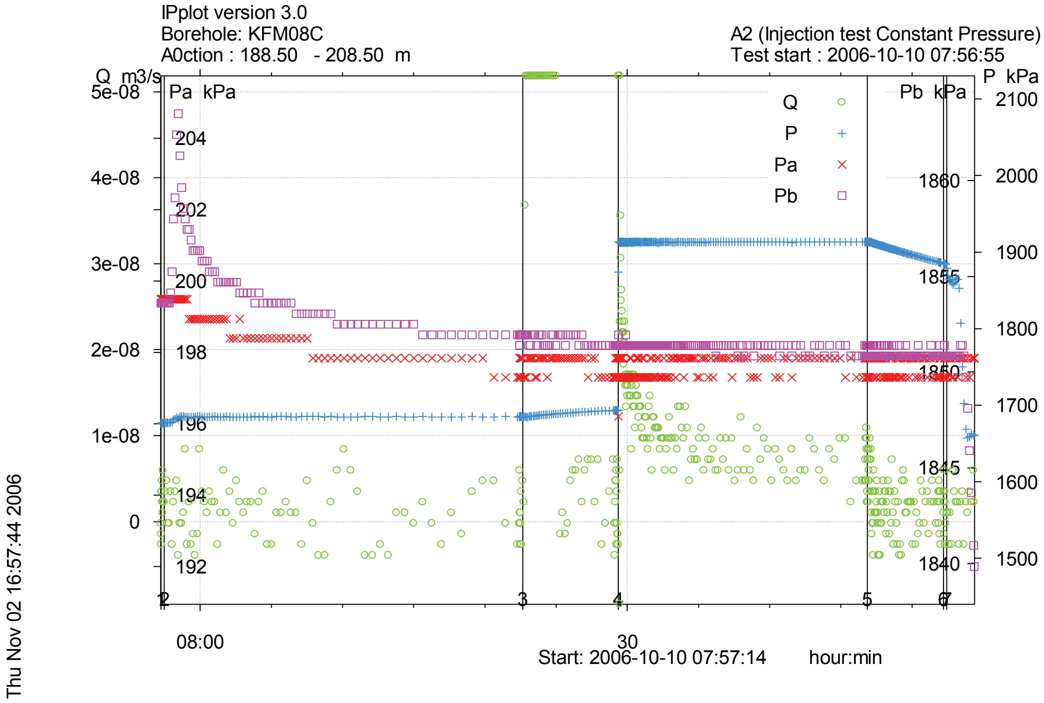


__Figure A3-65.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 188.5-208.5 m in borehole KFM08C.

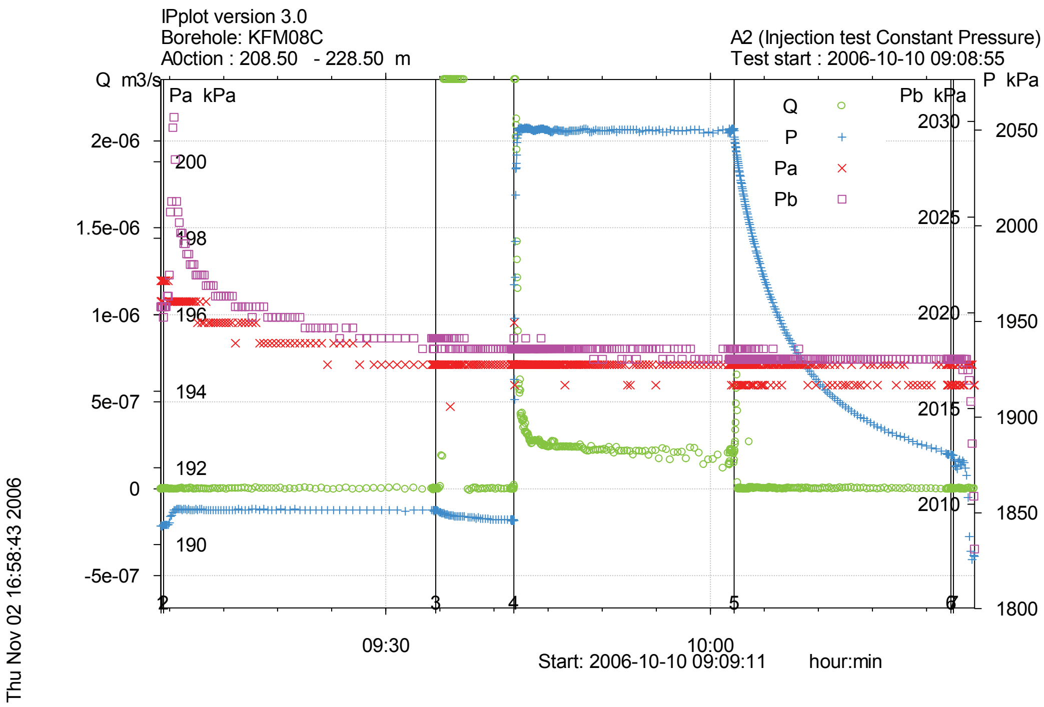


__Figure A3-66.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 208.5-228.5 m in borehole KFM08C.

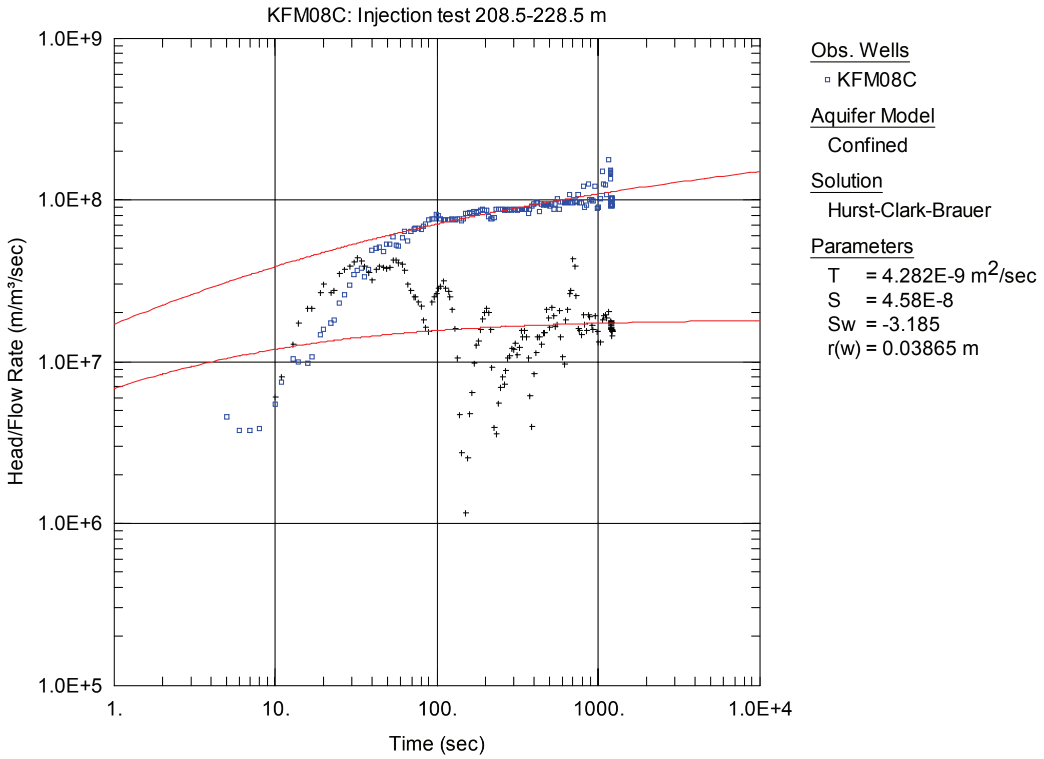


Figure A3-67. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 208.5-228.5 m in KFM08C.*

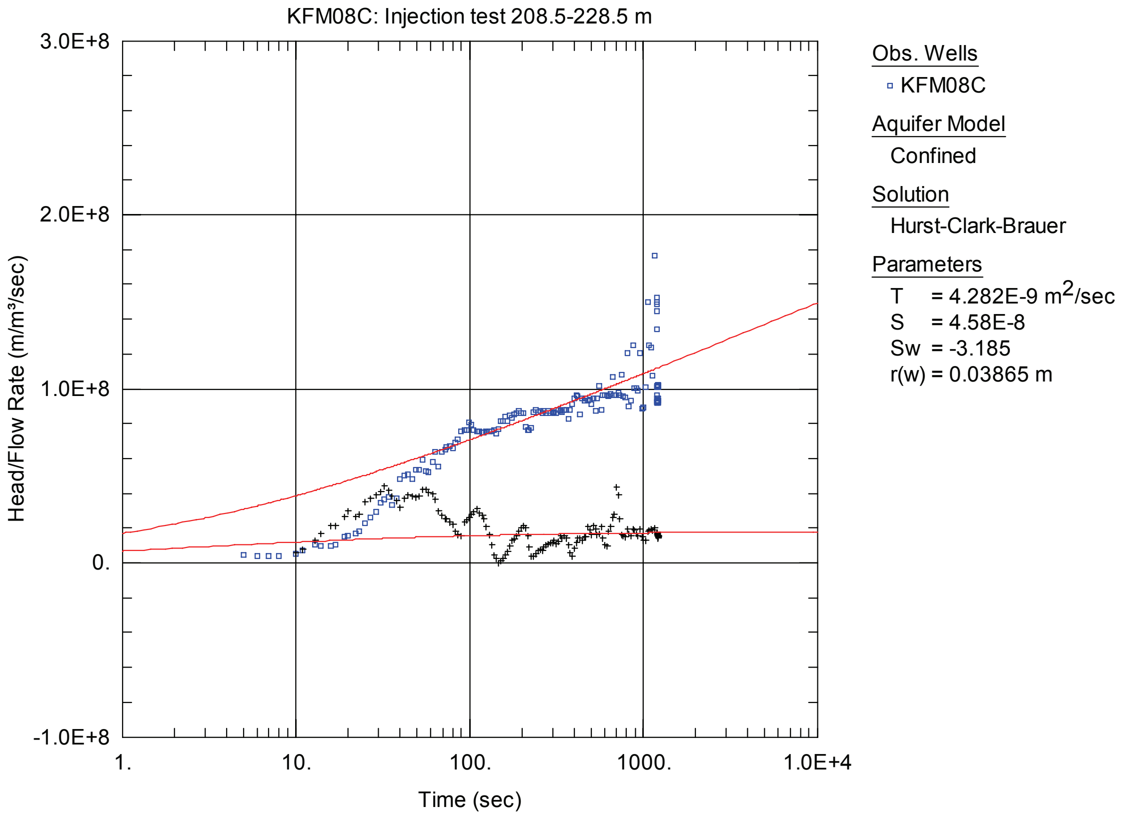


Figure A3-68. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 208.5-228.5 m in KFM08C.*

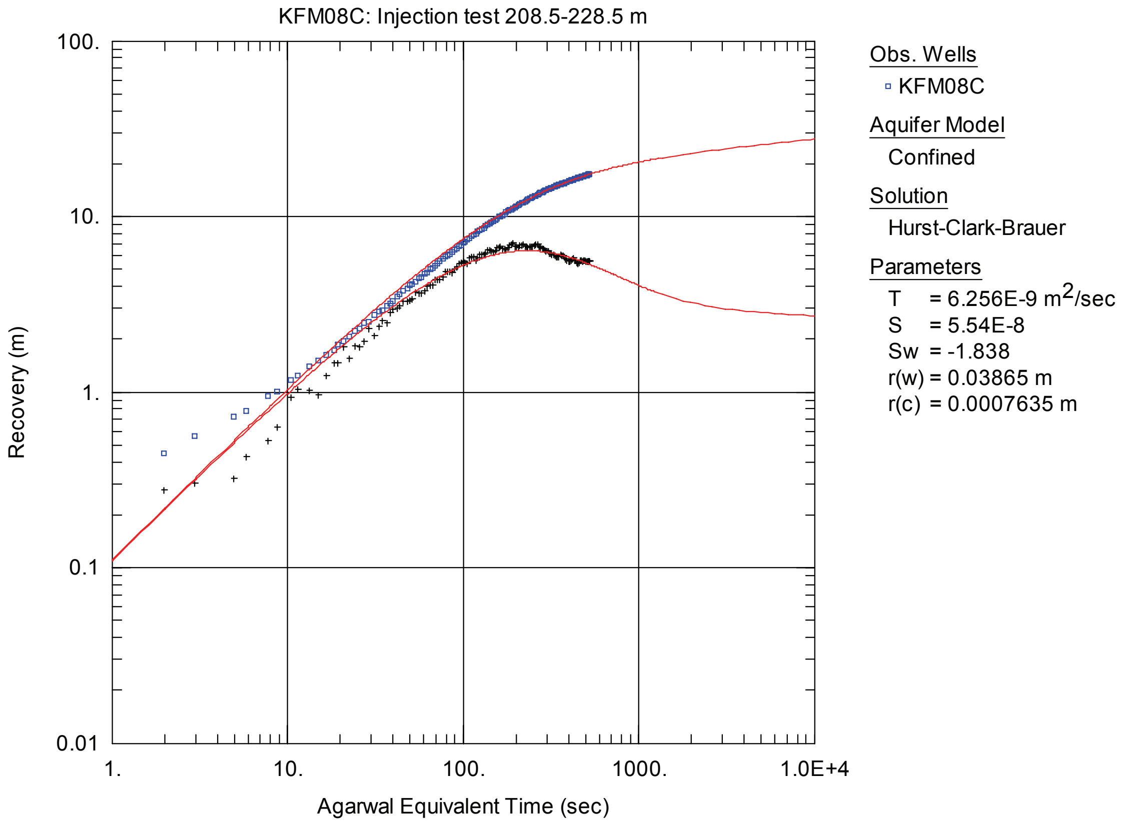


Figure A3-69. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 208.5-228.5 m in KFM08C.*

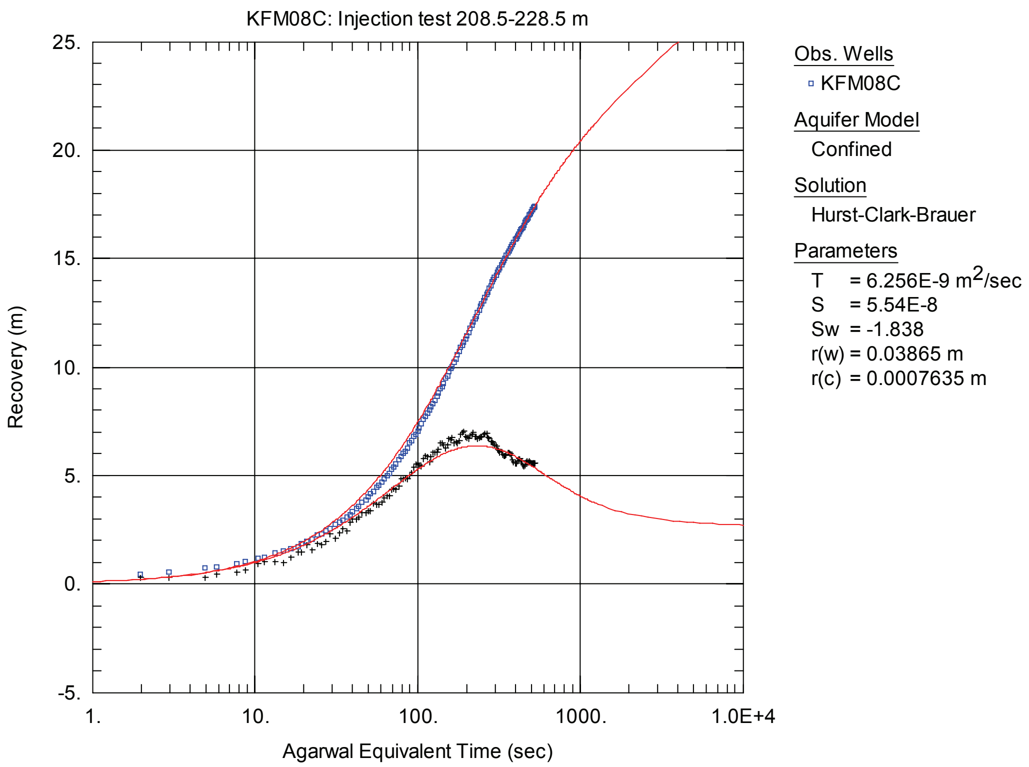


Figure A3-70. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 208.5-228.5 m in KFM08C.*

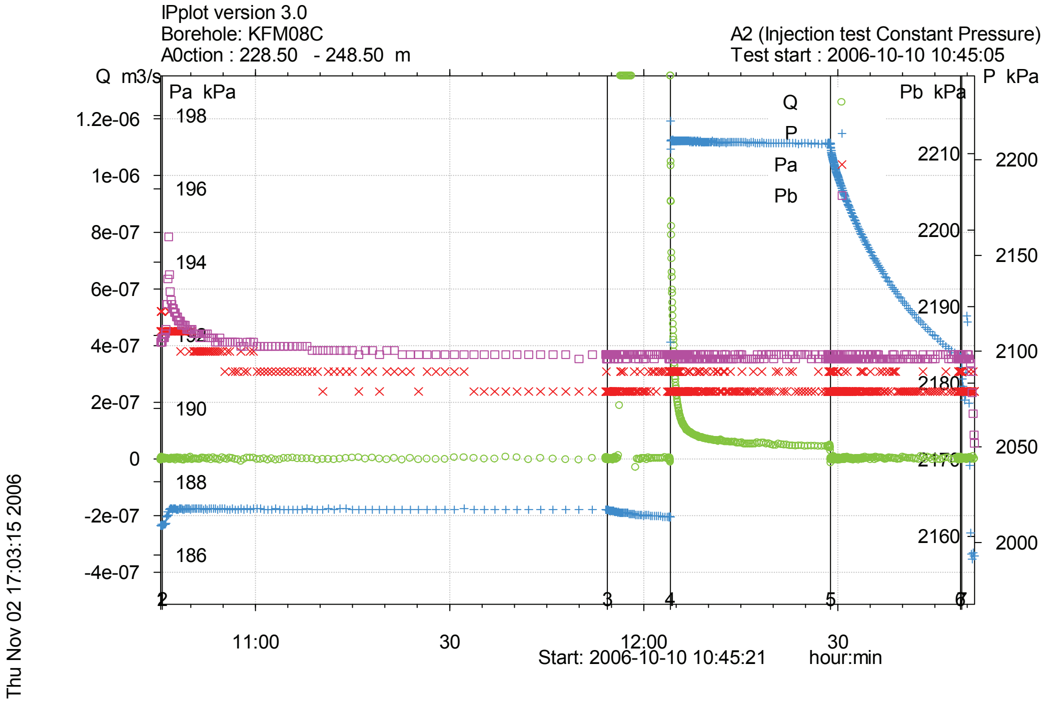


Figure A3-71. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 228.5-248.5 m in borehole KFM08C.*

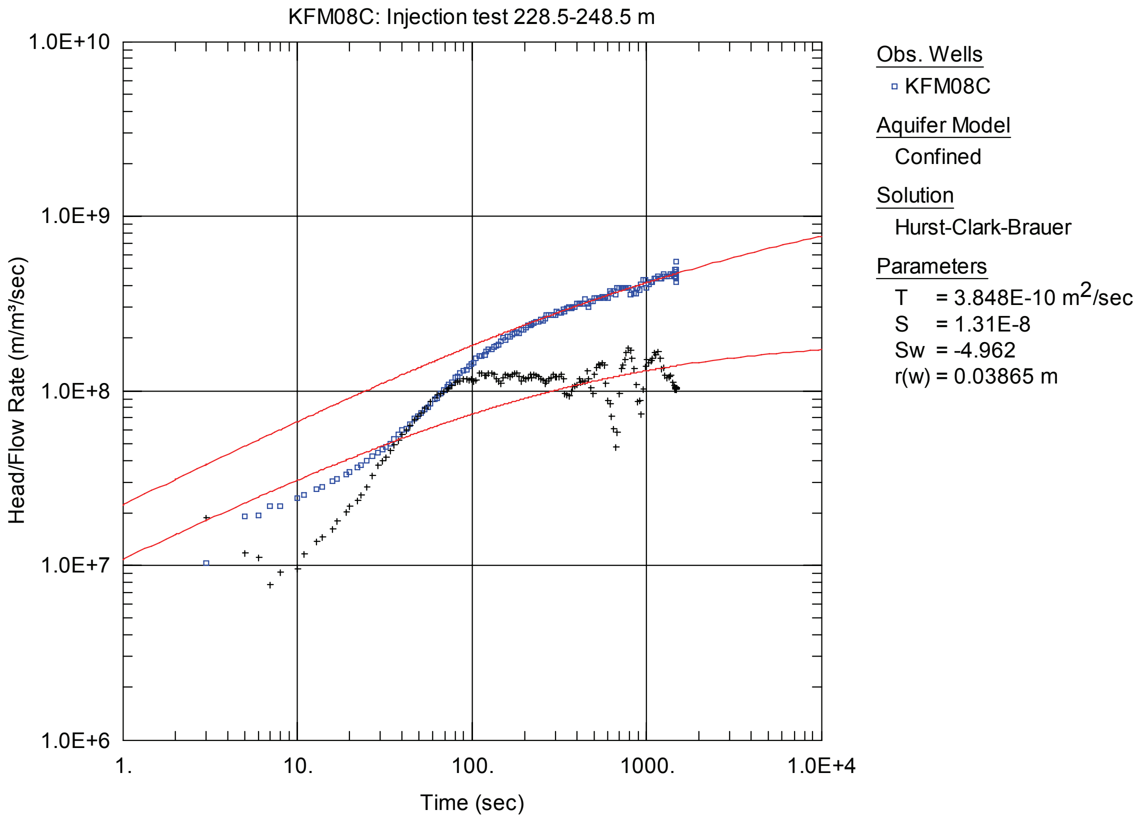


Figure A3-72. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 228.5-248.5 m in KFM08C.*

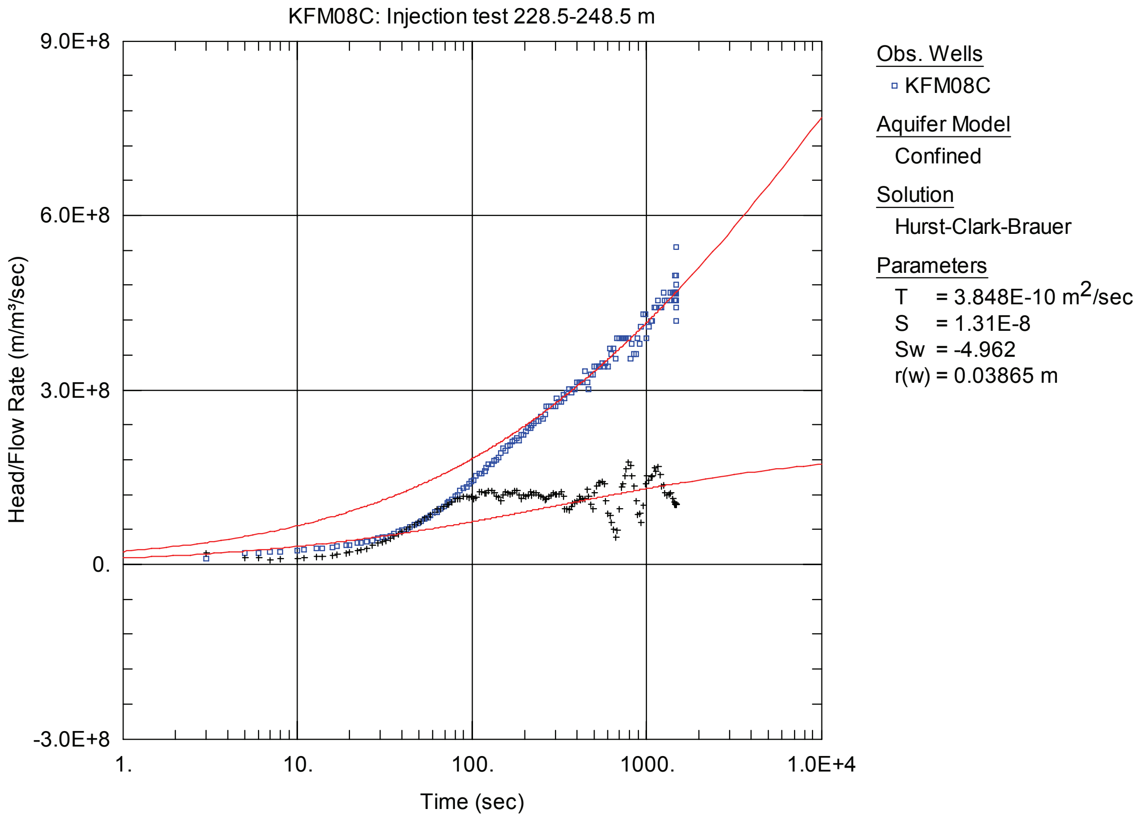


Figure A3-73. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 228.5-248.5 m in KFM08C.*

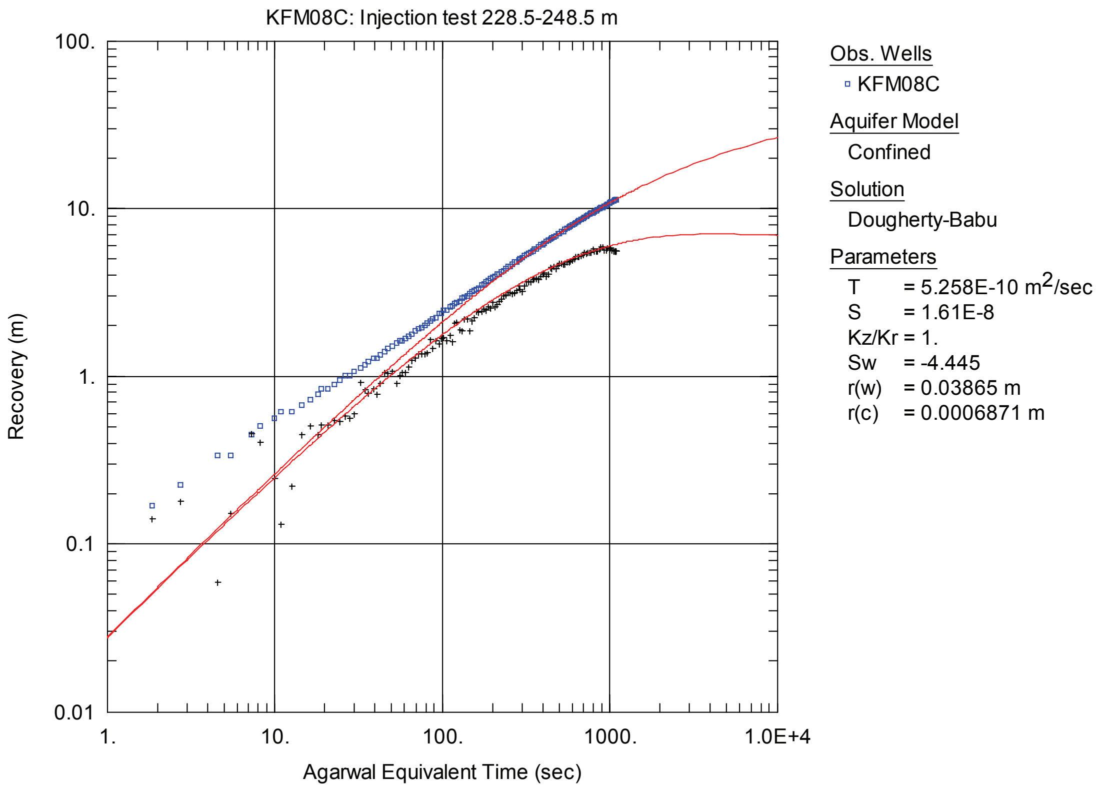


Figure A3-74. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 228.5-248.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

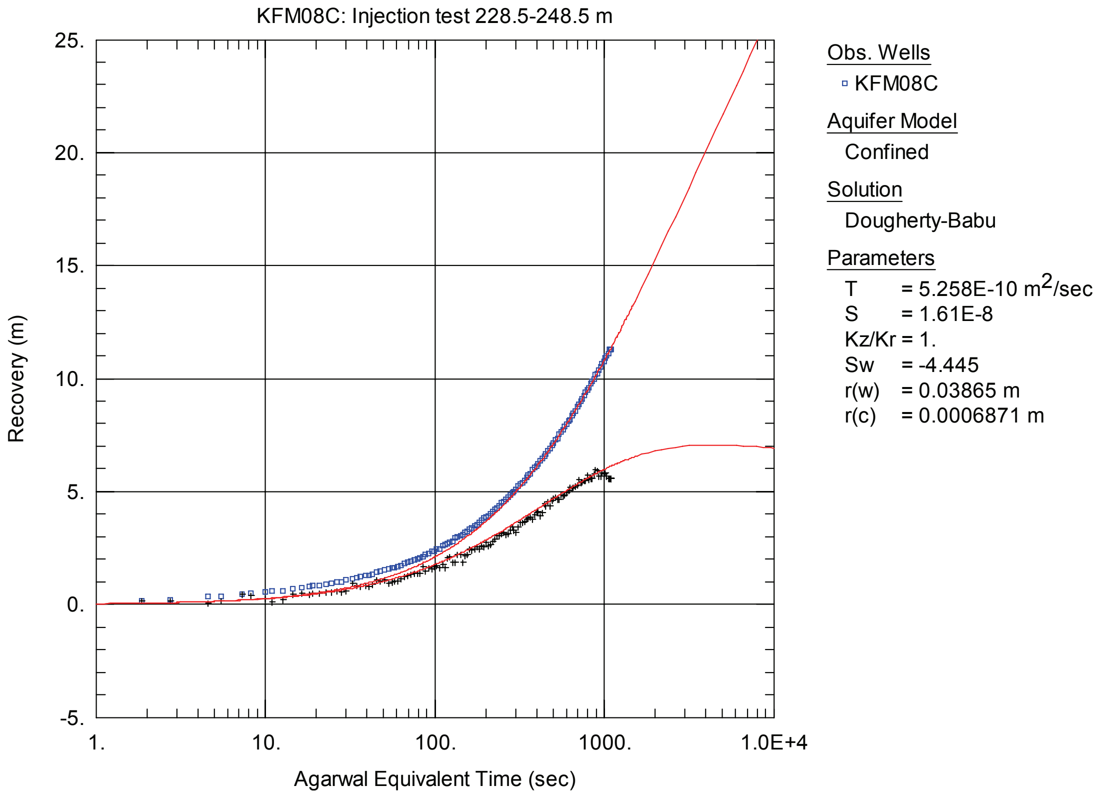


Figure A3-75. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 228.5-248.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

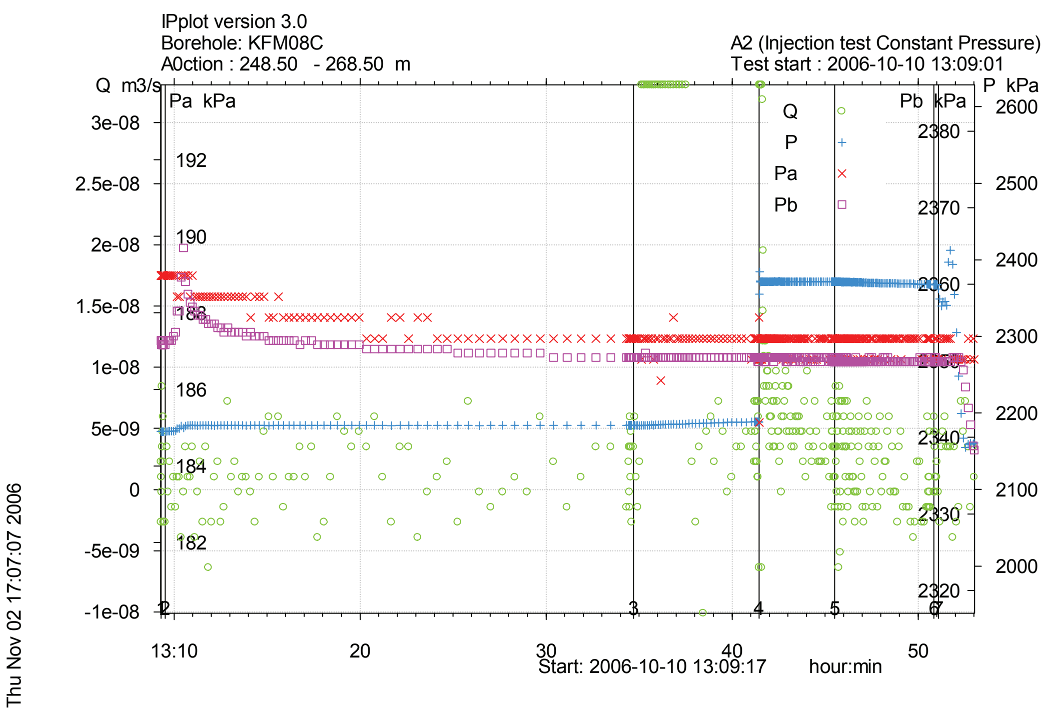


Figure A3-76. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 248.5-268.5 m in borehole KFM08C.*

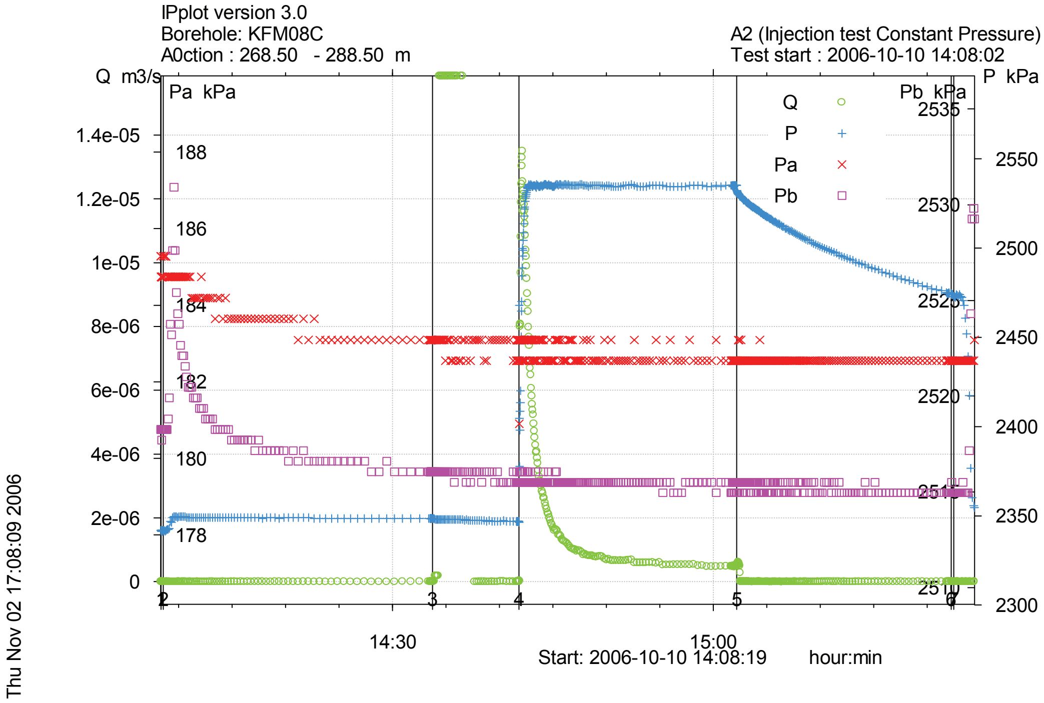


Figure A3-77. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 268.5-288.5 m in borehole KFM08C.*

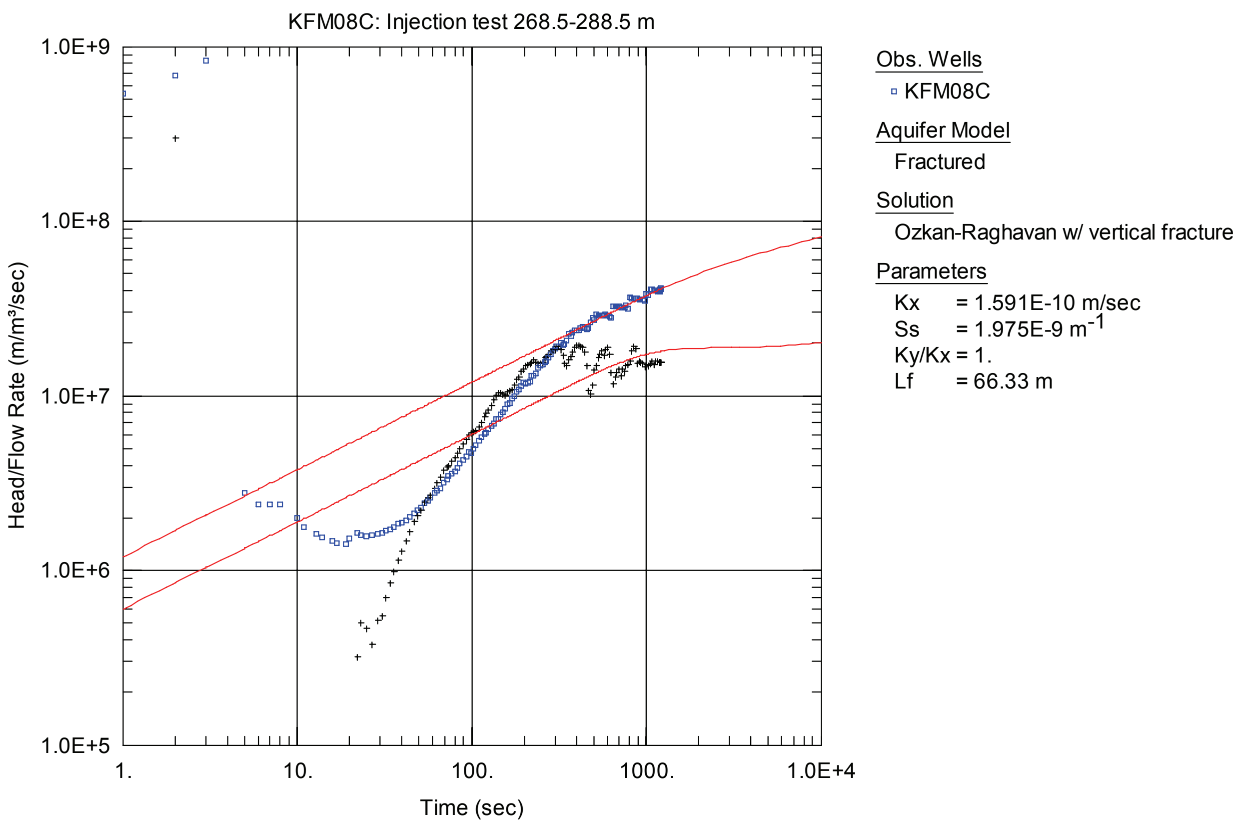


Figure A3-78. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 268.5-288.5 m in KFM08C.*

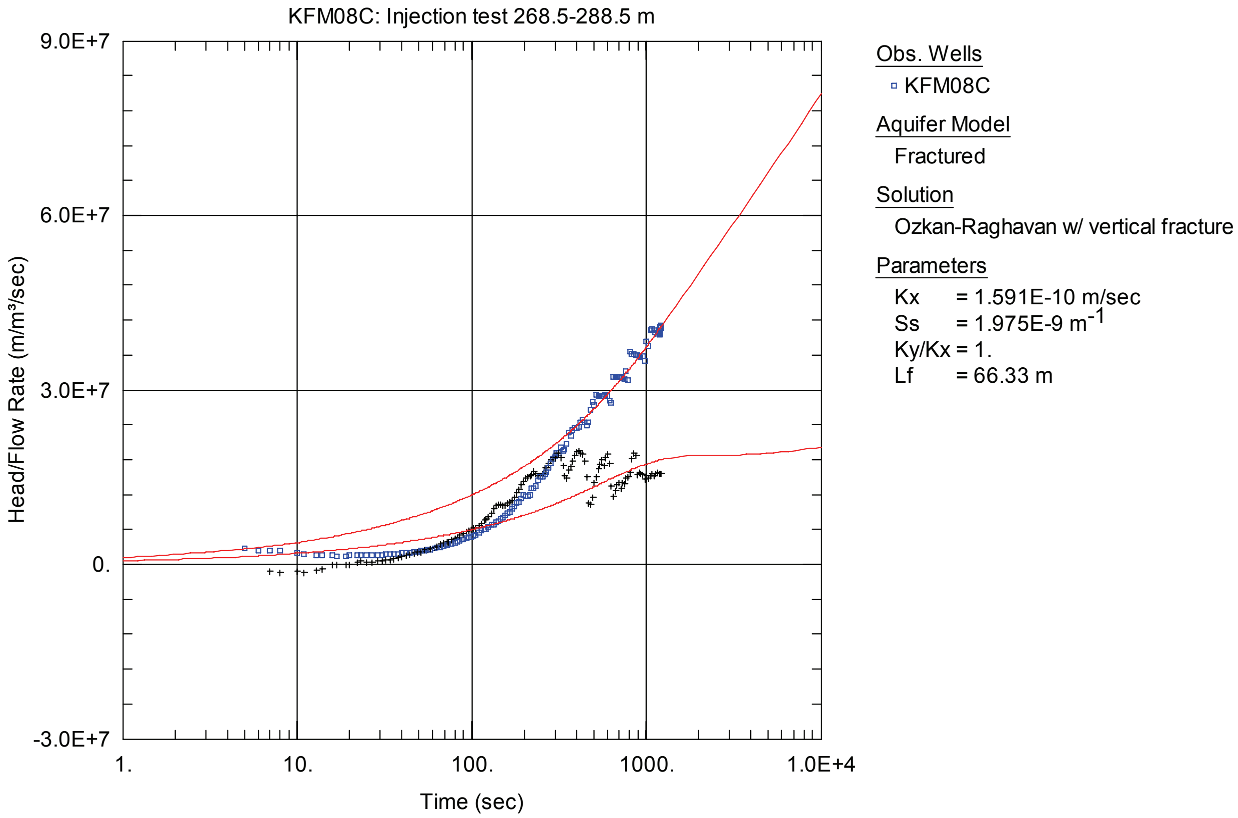


Figure A3-79. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 268.5-288.5 m in KFM08C.*

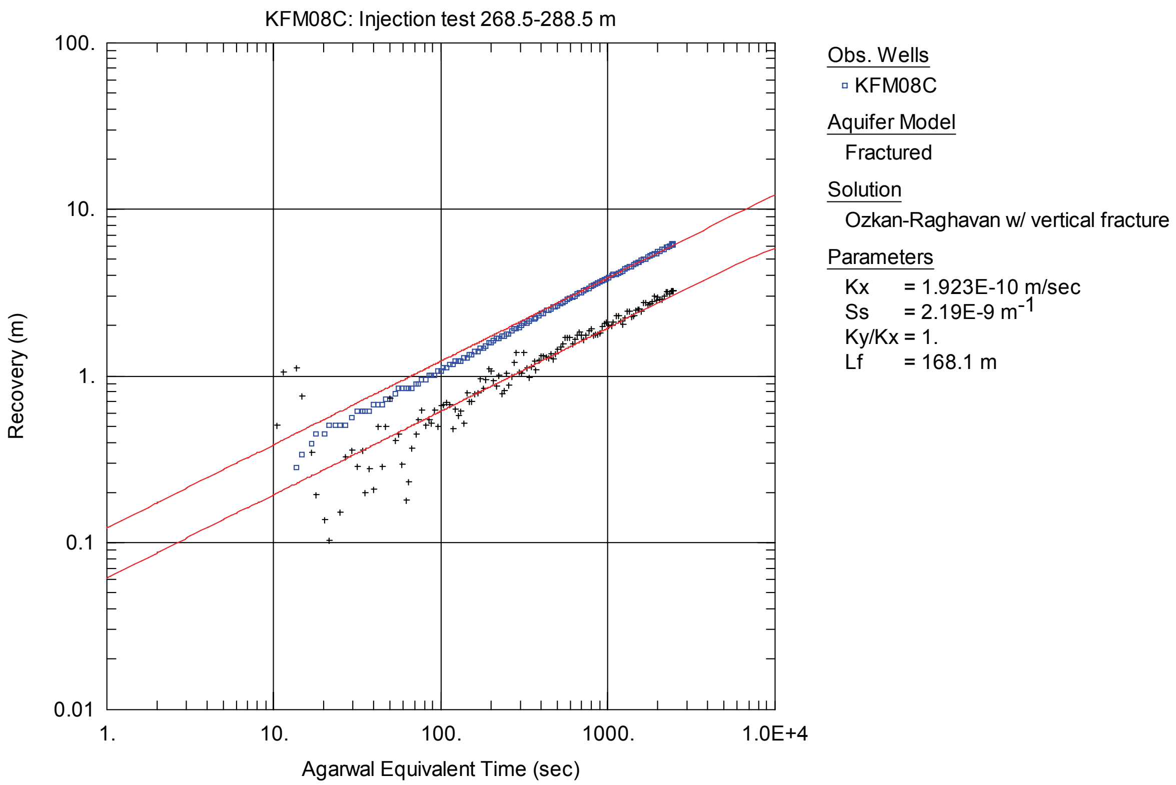


Figure A3-80. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 268.5-288.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

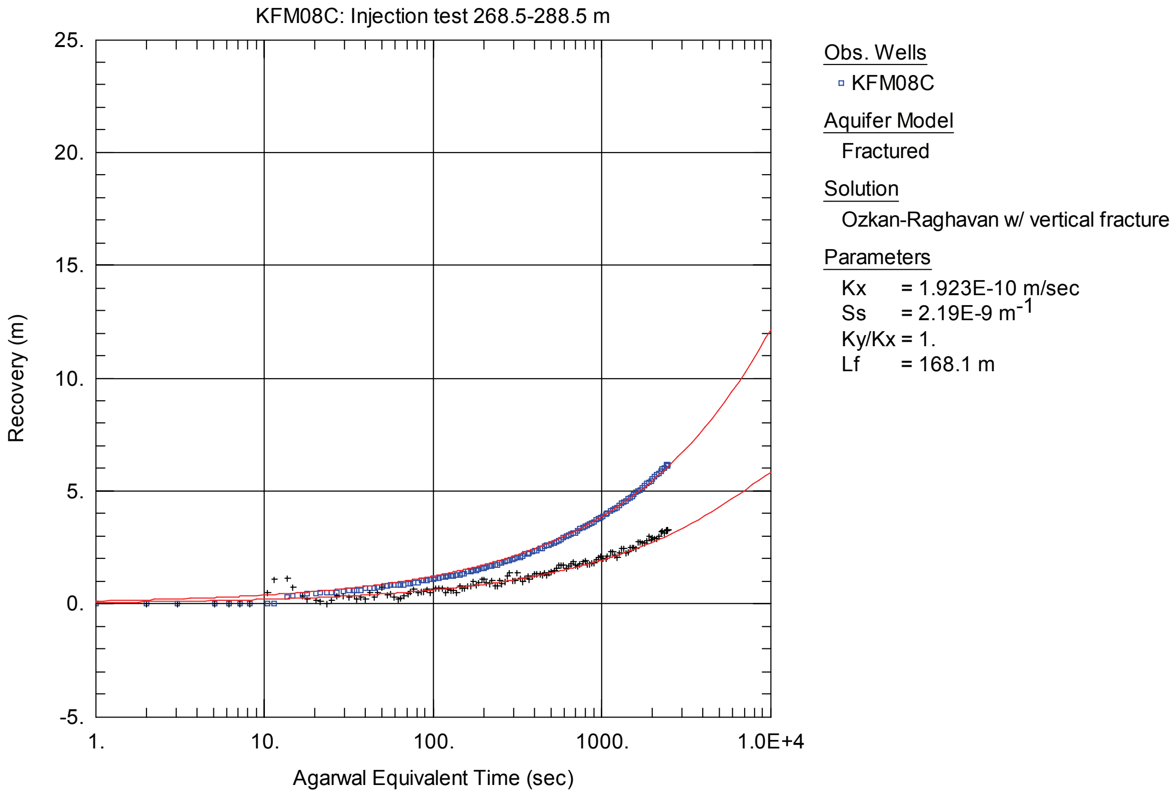


Figure A3-81. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 268.5-288.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

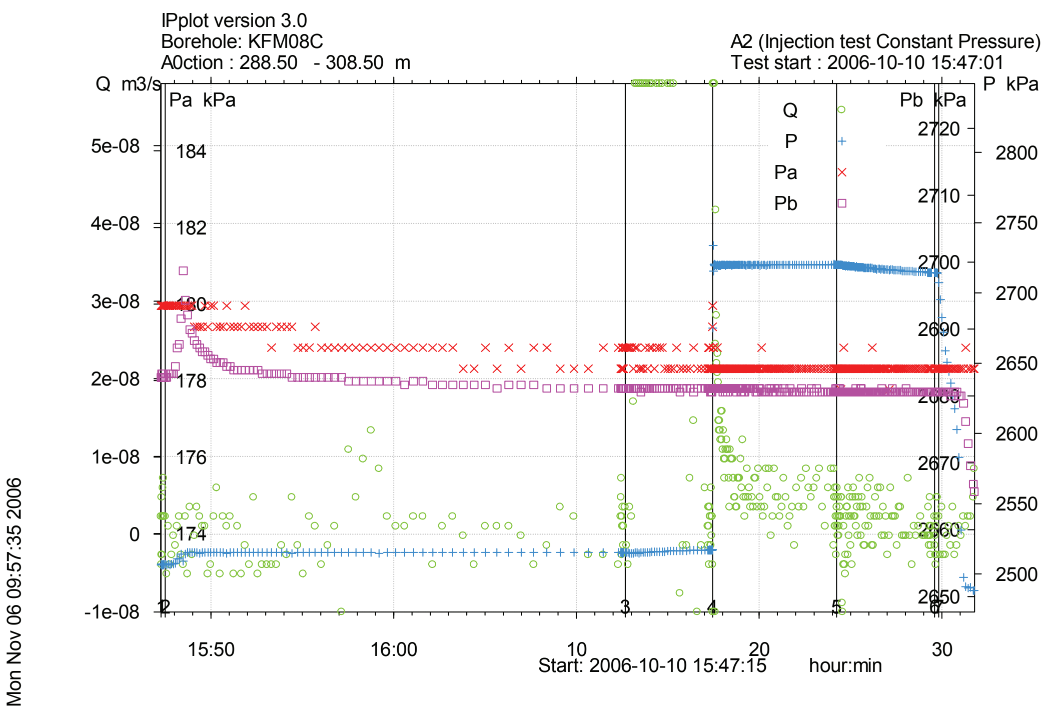


Figure A3-82. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 288.5-308.5 m in borehole KFM08C.*

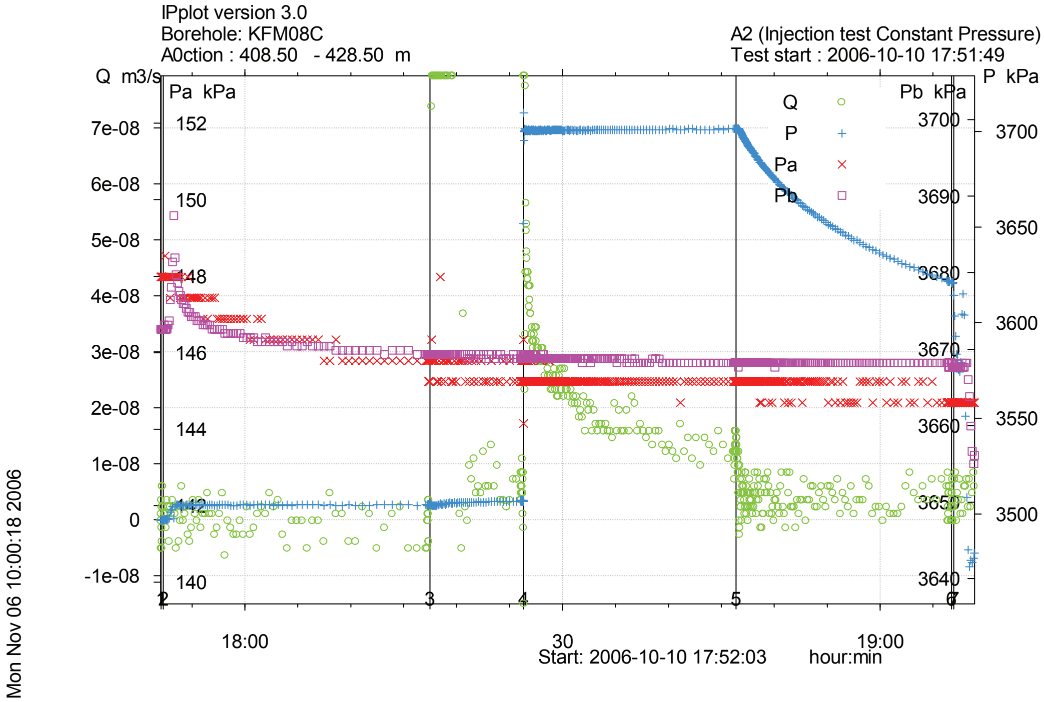


Figure A3-83. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 408.5-428.5 m in borehole KFM08C.*

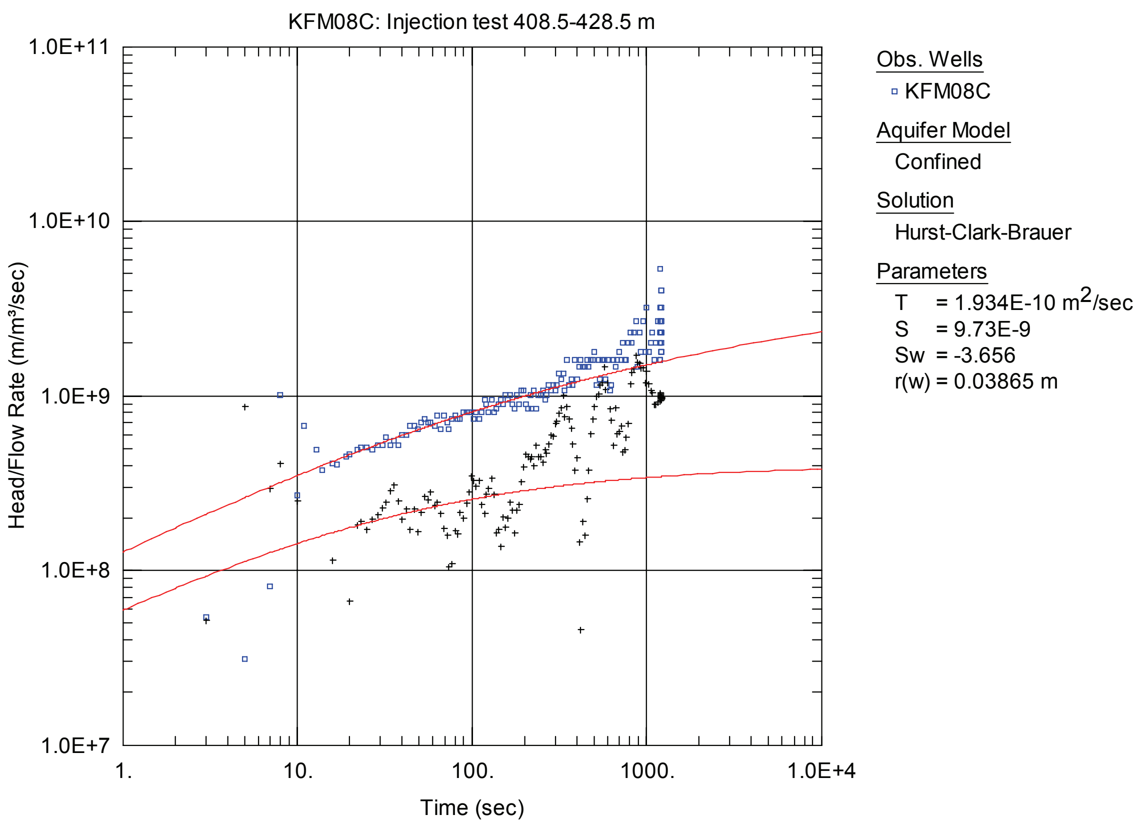


Figure A3-84. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 408.5-428.5 m in KFM08C.*

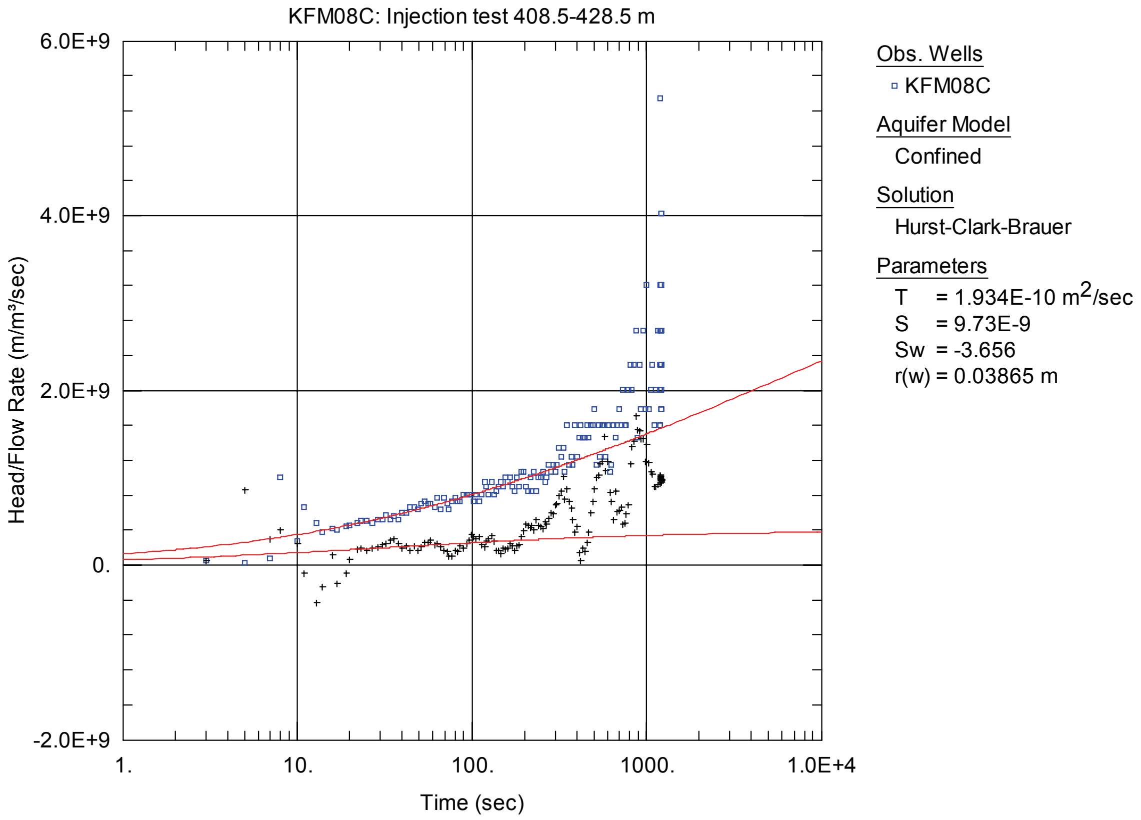


Figure A3-85. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 408.5-428.5 m in KFM08C.*

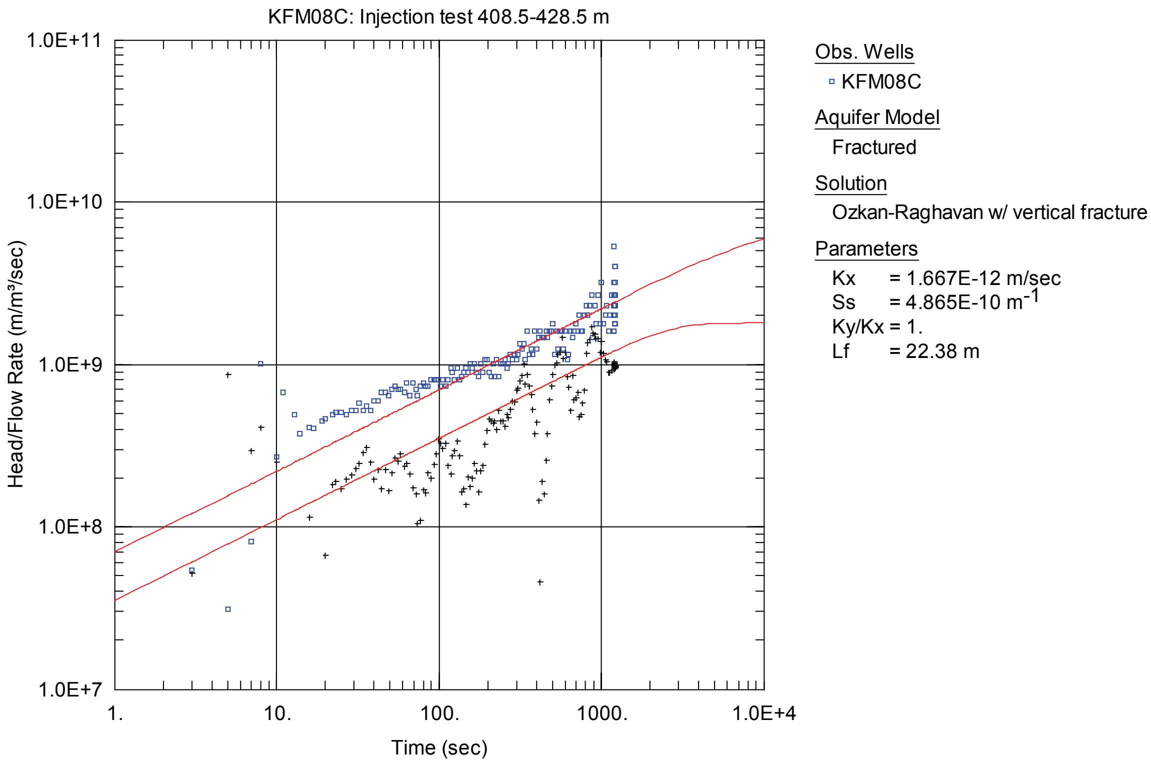


Figure A3-86. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 408.5-428.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

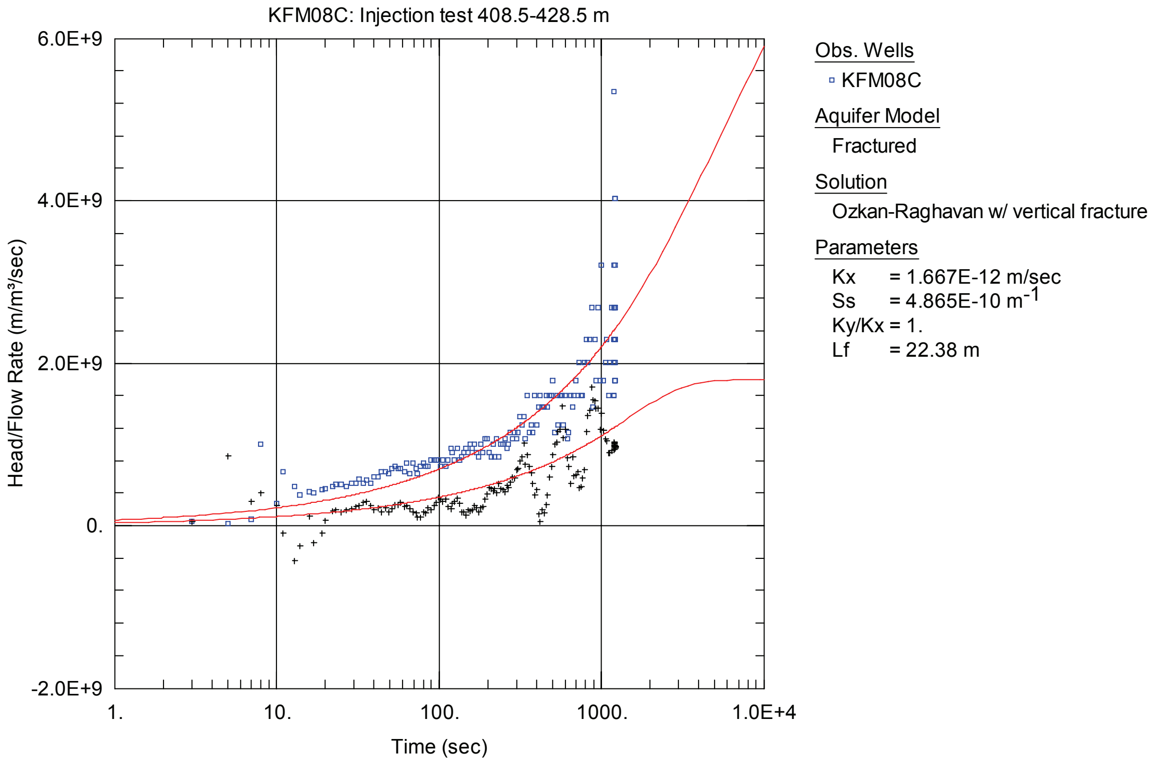


Figure A3-87. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 408.5-428.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

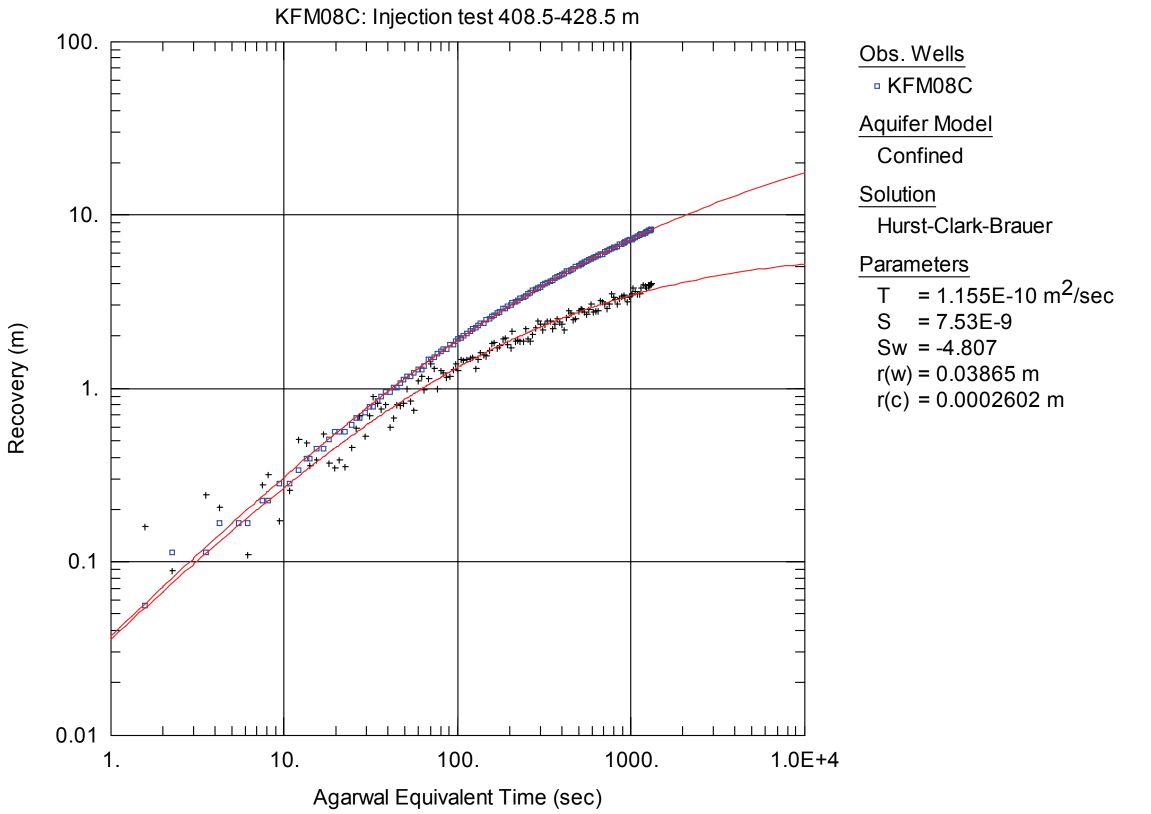


Figure A3-88. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 408.5-428.5 m in KFM08C.*

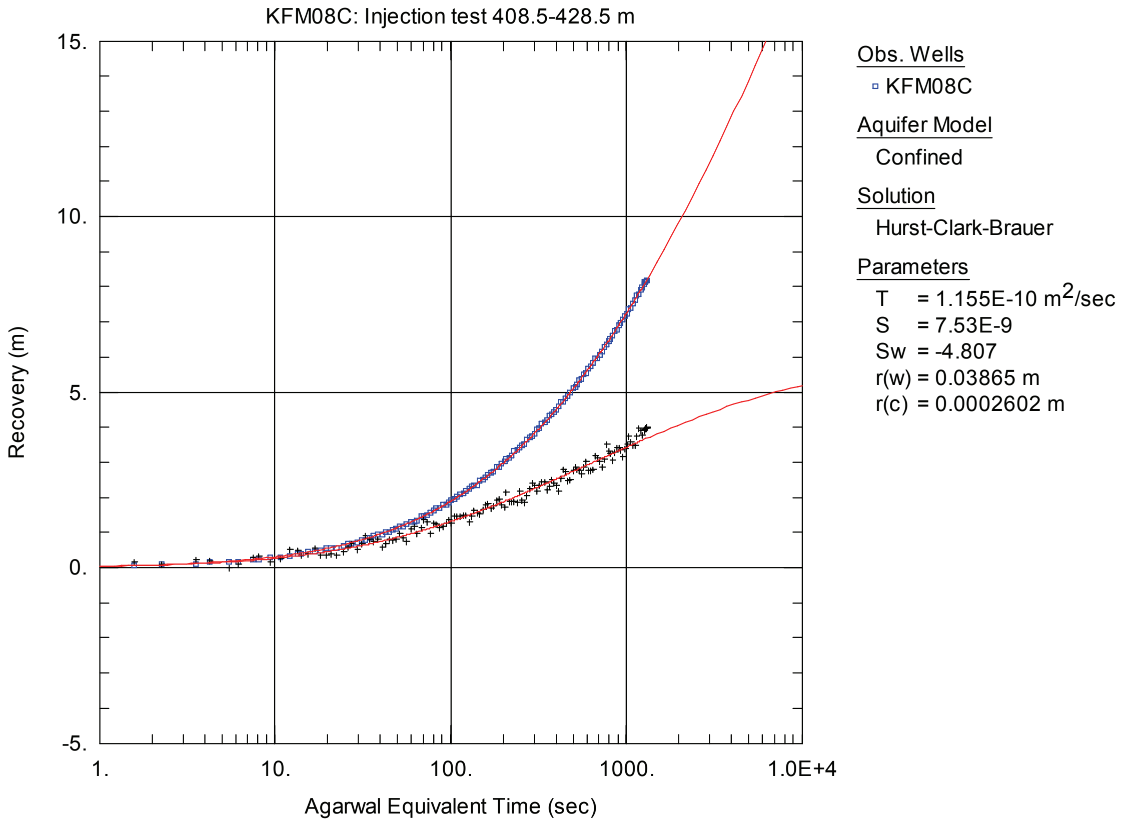


Figure A3-89. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 408.5-428.5 m in KFM08C.*

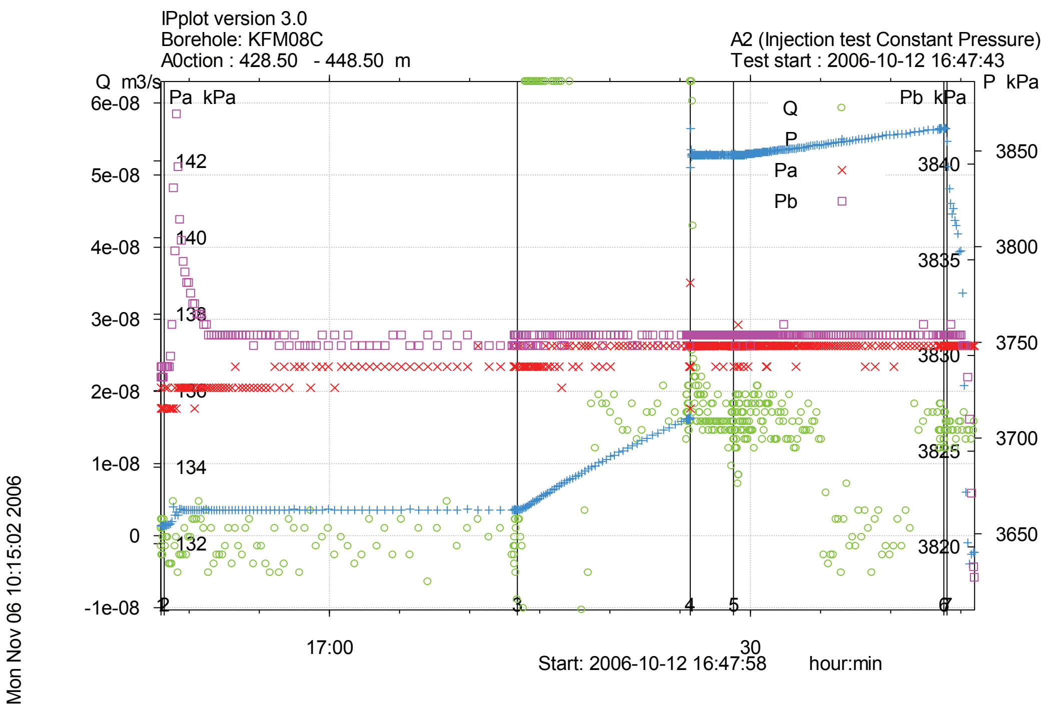


Figure A3-90. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 428.5-448.5 m in*

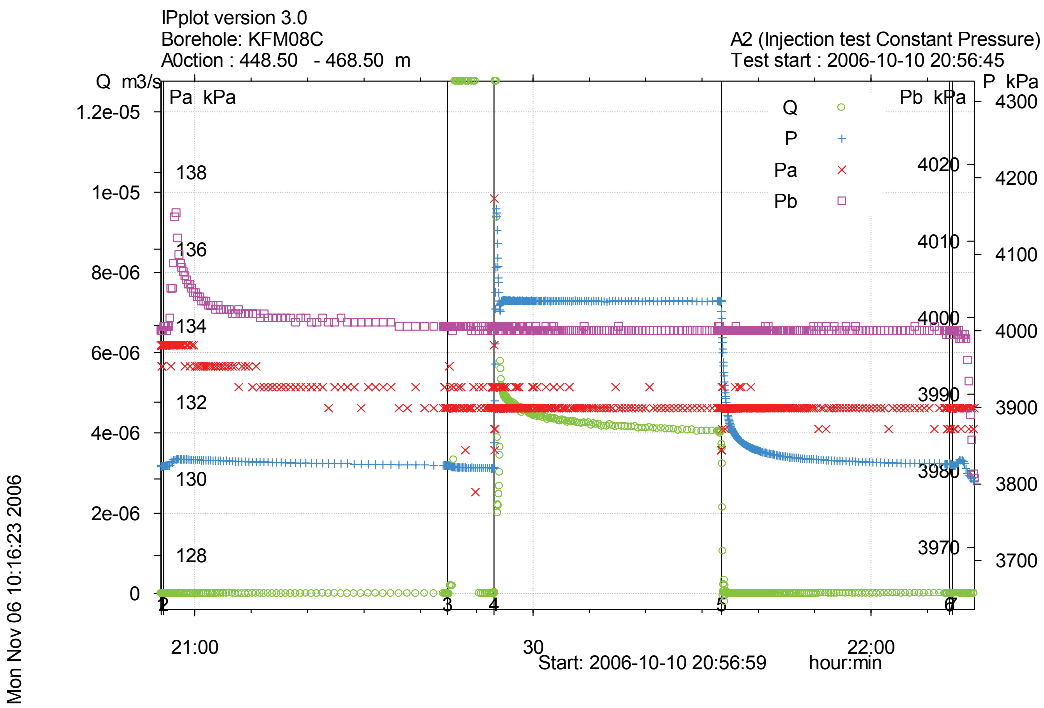


Figure A3-91. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 448.5-468.5 m in borehole KFM08C.*

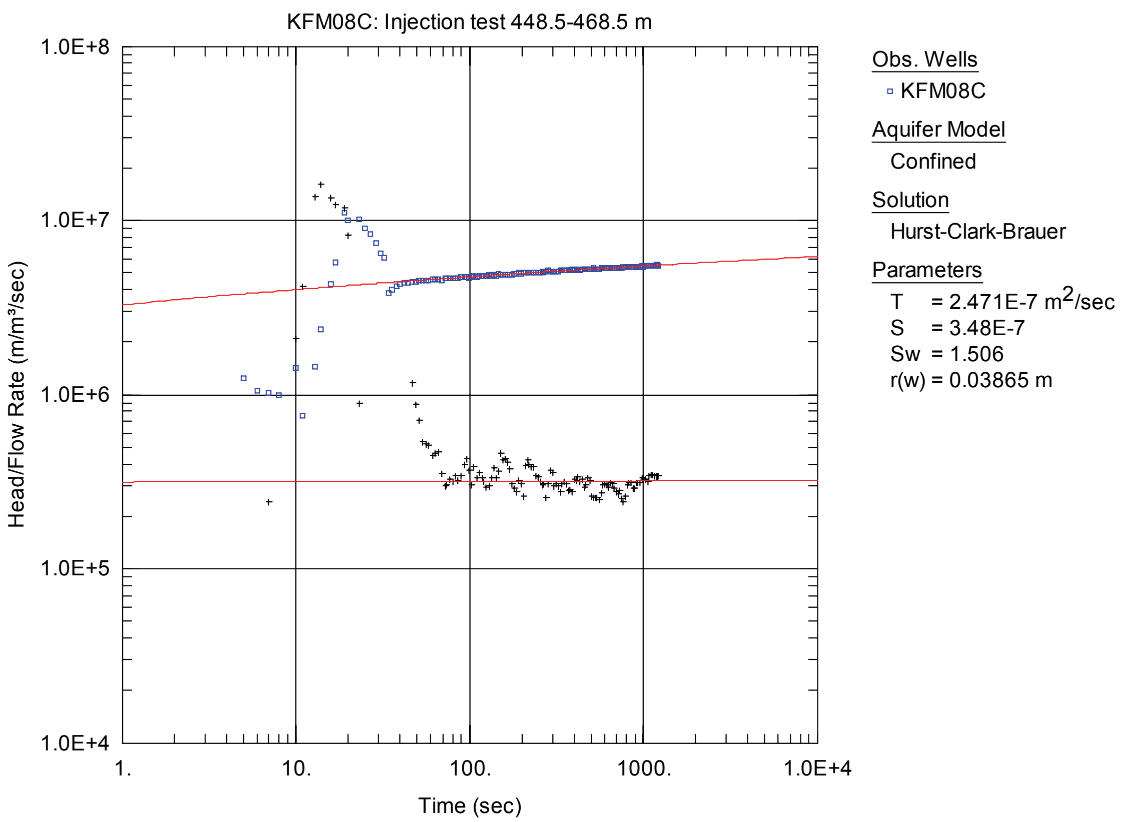


Figure A3-92. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 448.5-468.5 m in KFM08C.*

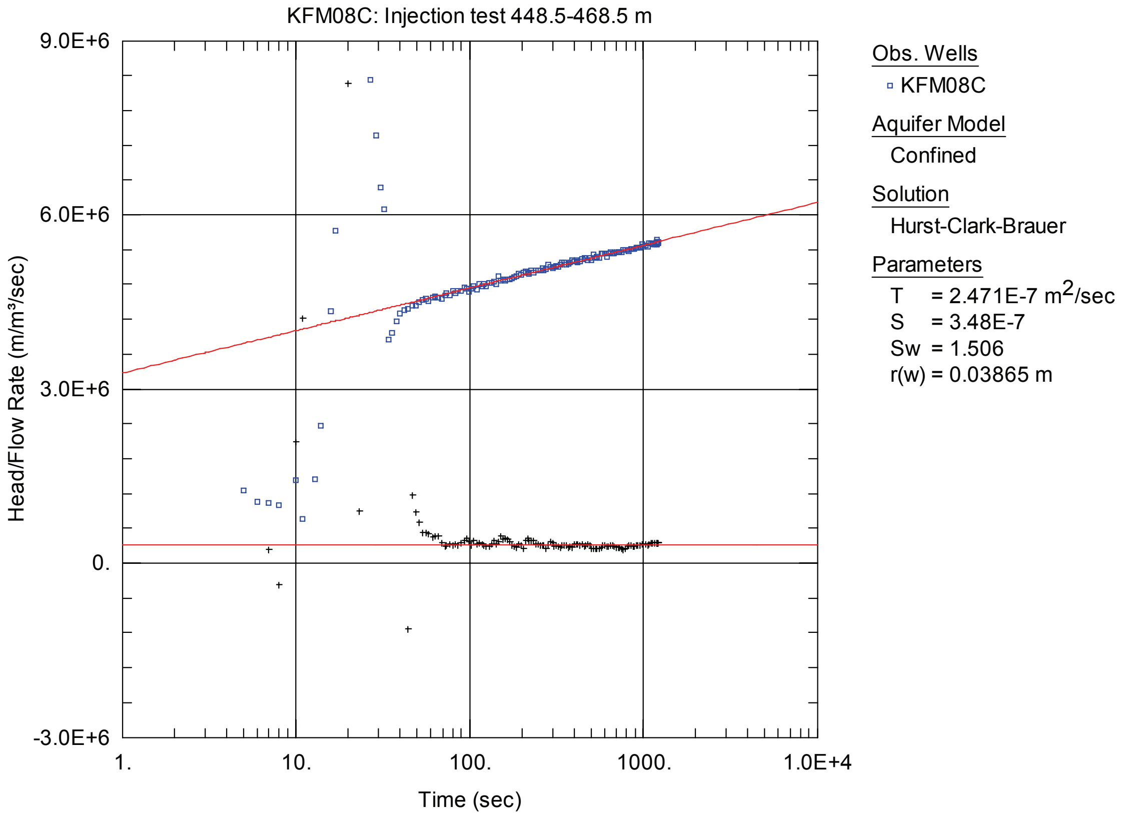


Figure A3-93. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 448.5-468.5 m in KFM08C.*

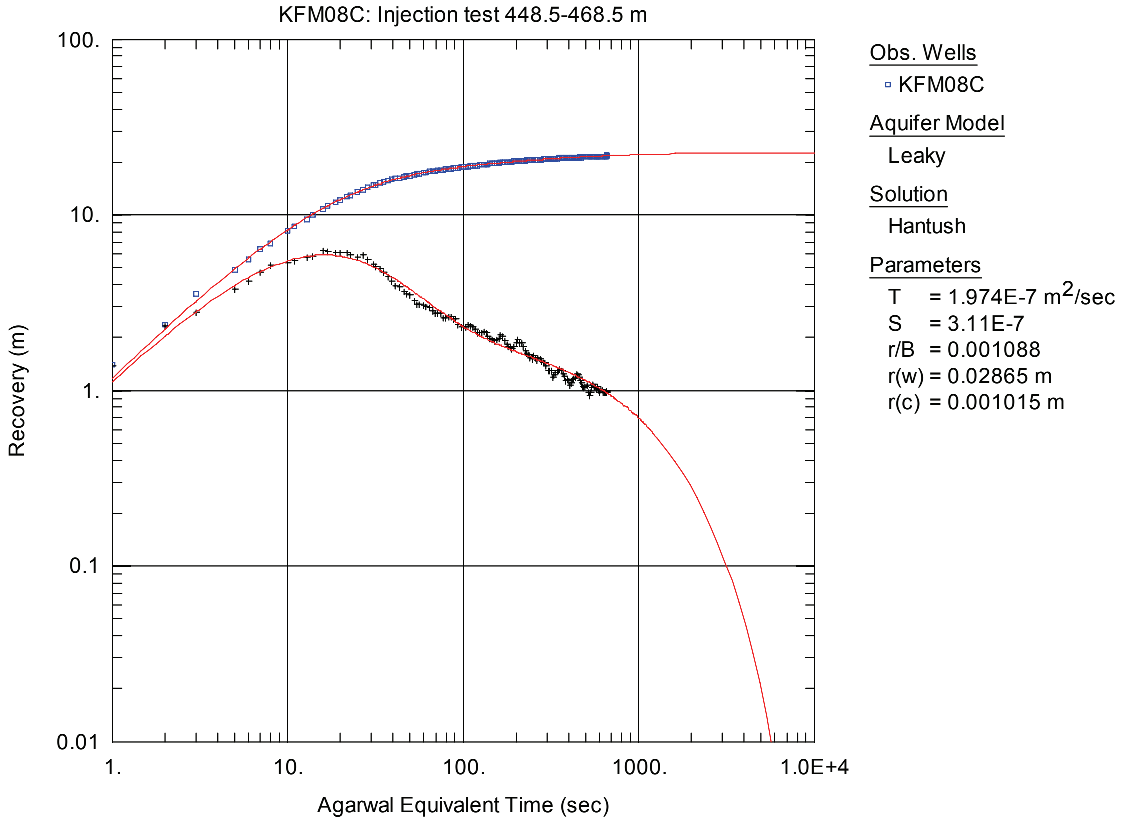


Figure A3-94. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 448.5-468.5 m in KFM08C.*

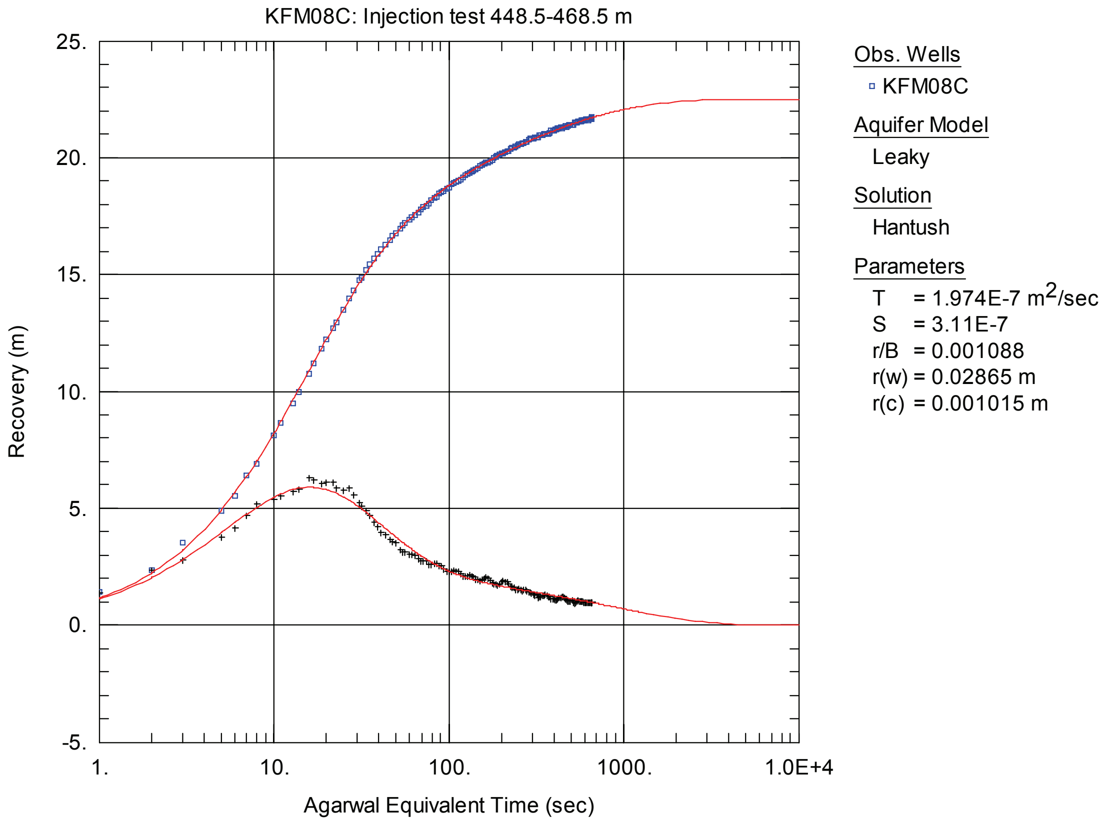


Figure A3-95. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 448.5-468.5 m in KFM08C.*

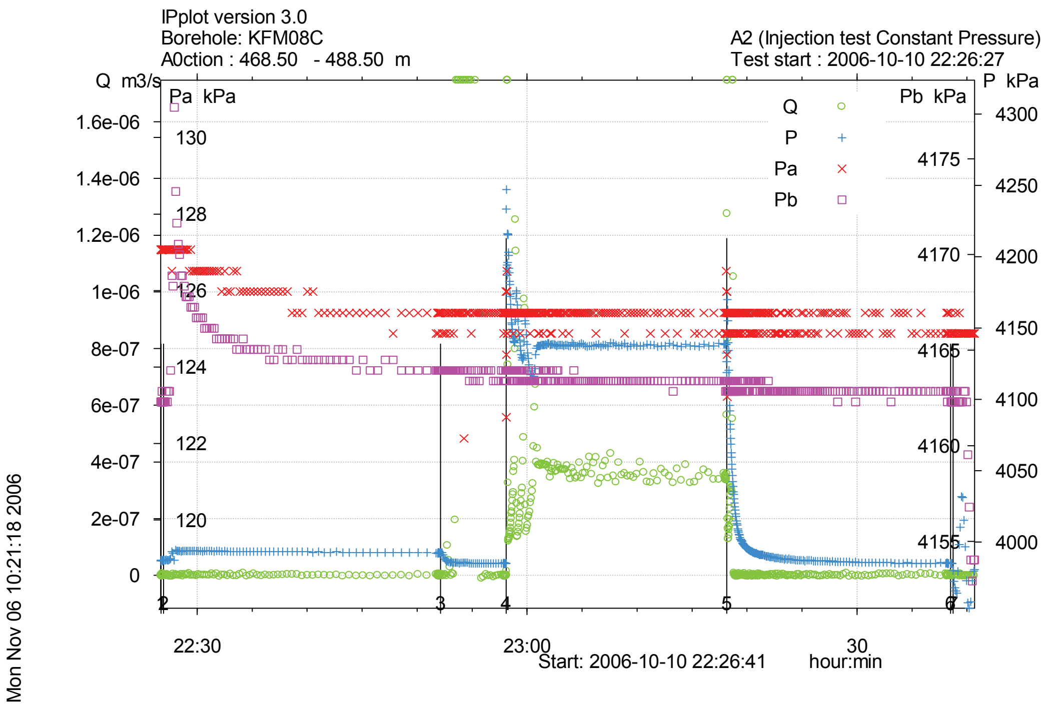


Figure A3-96. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 468.5-488.5 m in borehole KFM08C.*

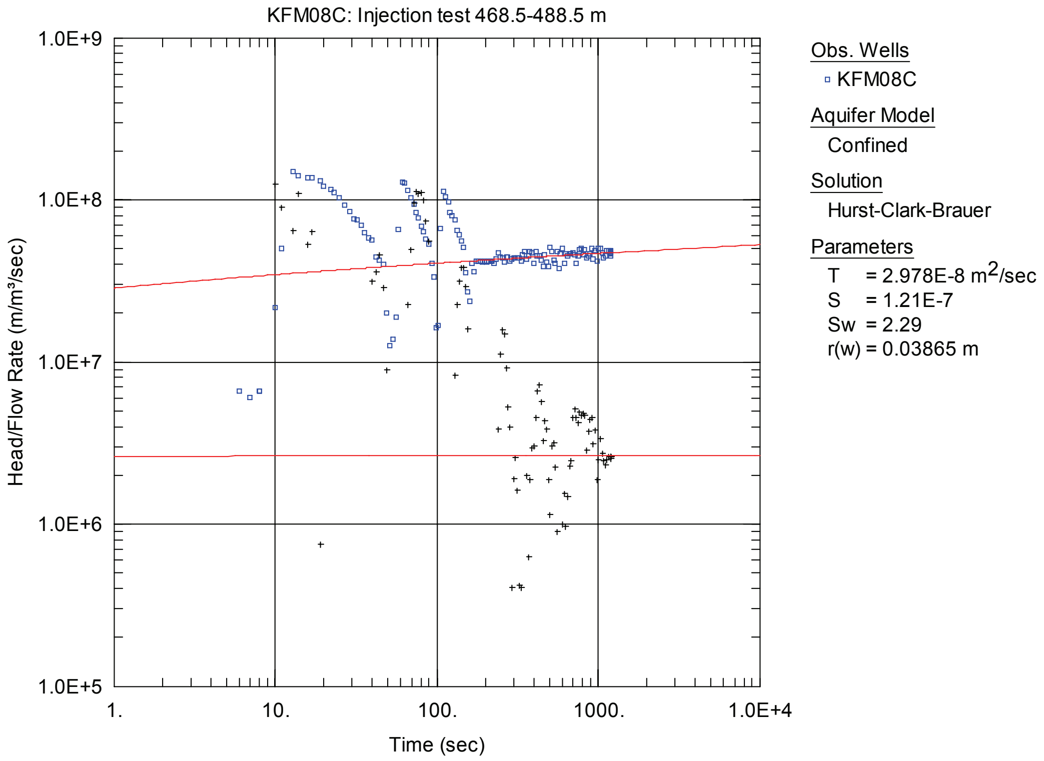


Figure A3-97. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 468.5-488.5 m in KFM08C.*

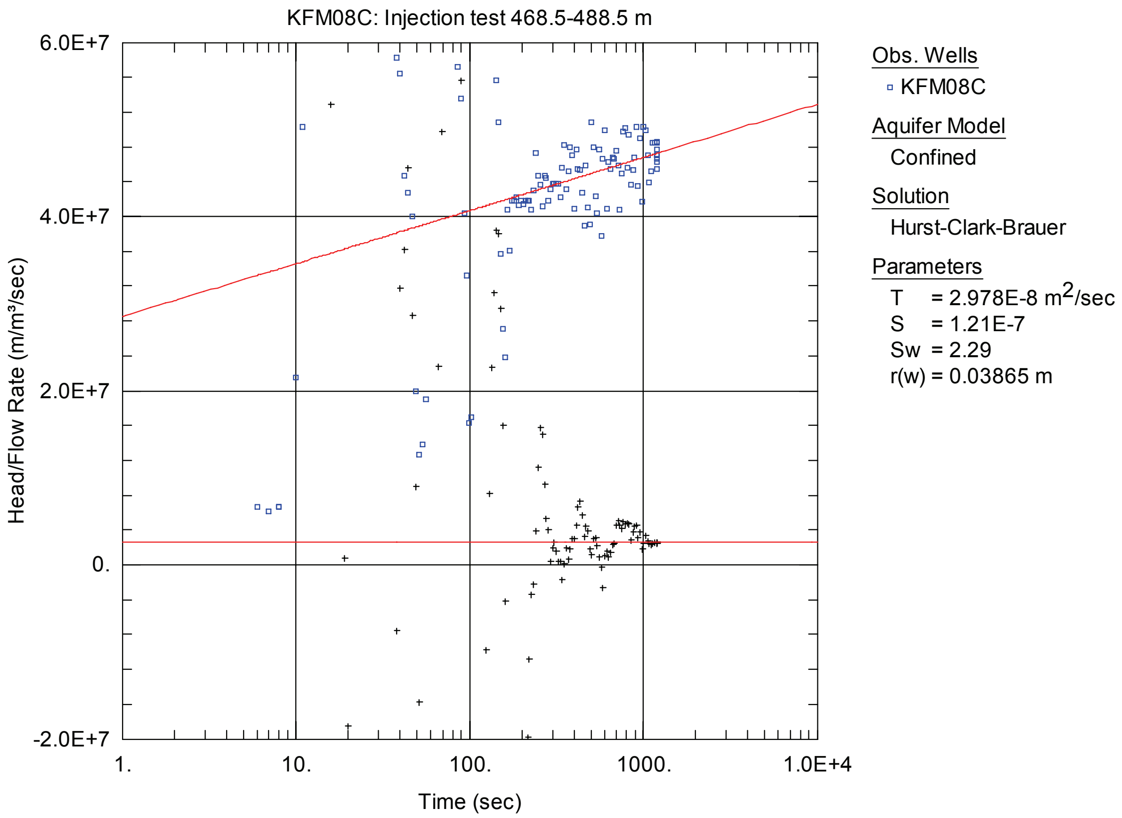


Figure A3-98. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 468.5-488.5 m in KFM08C.*

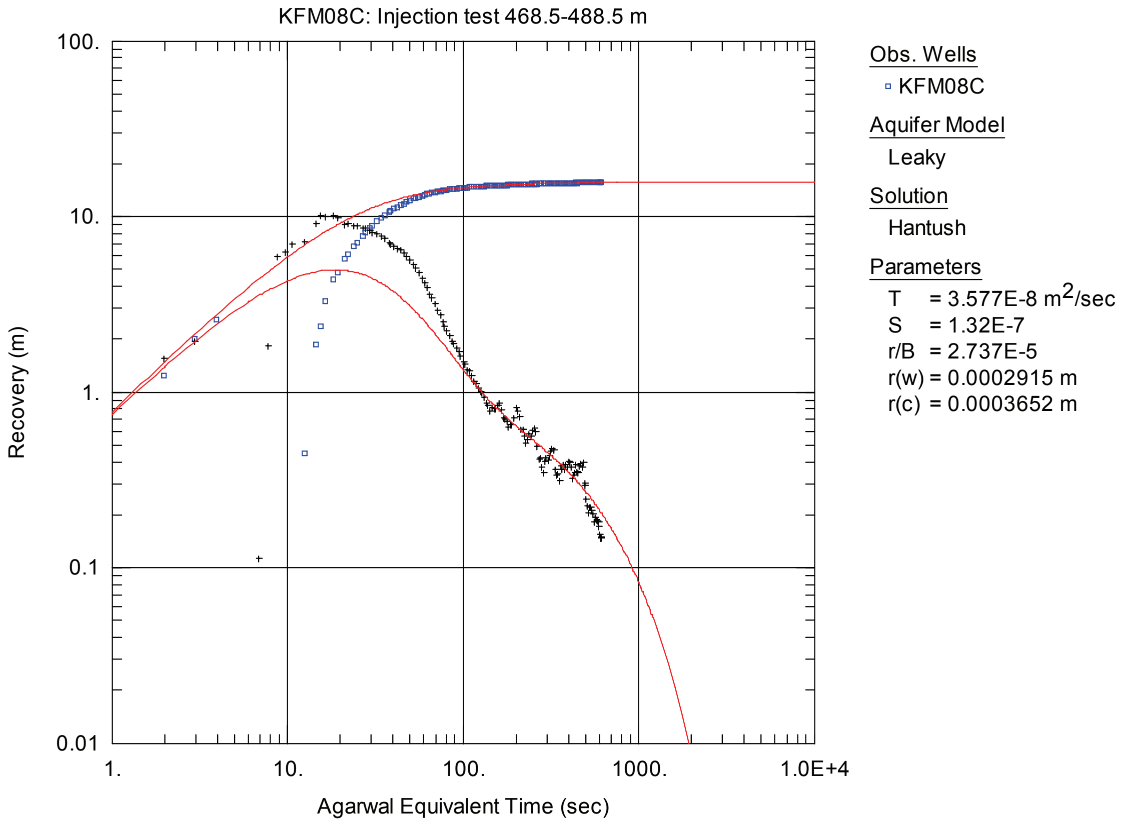


Figure A3-99. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 468.5-488.5 m in KFM08C.*

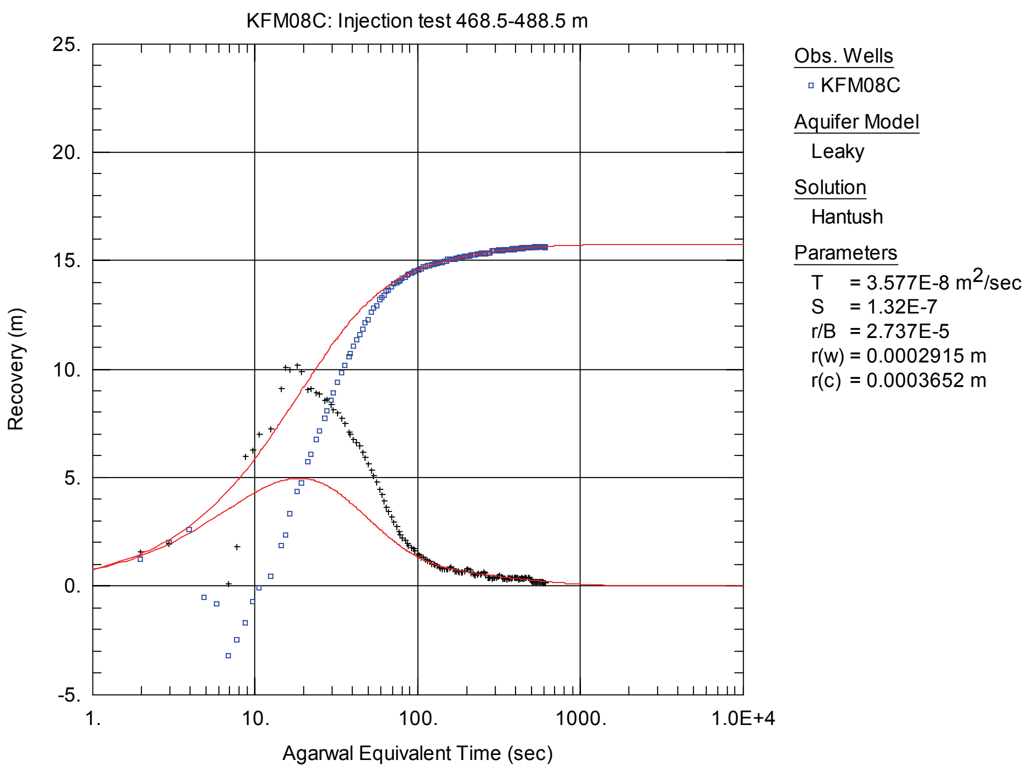


Figure A3-100. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 468.5-488.5 m in KFM08C.*

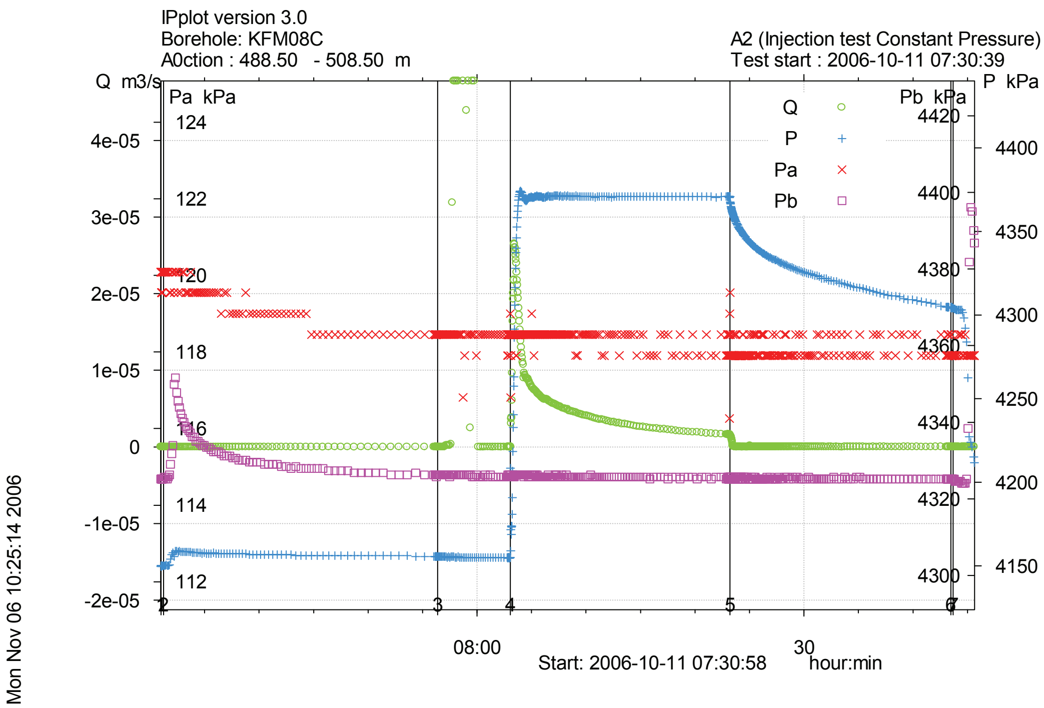


Figure A3-101. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 488.5-508.5 m in borehole KFM08C.

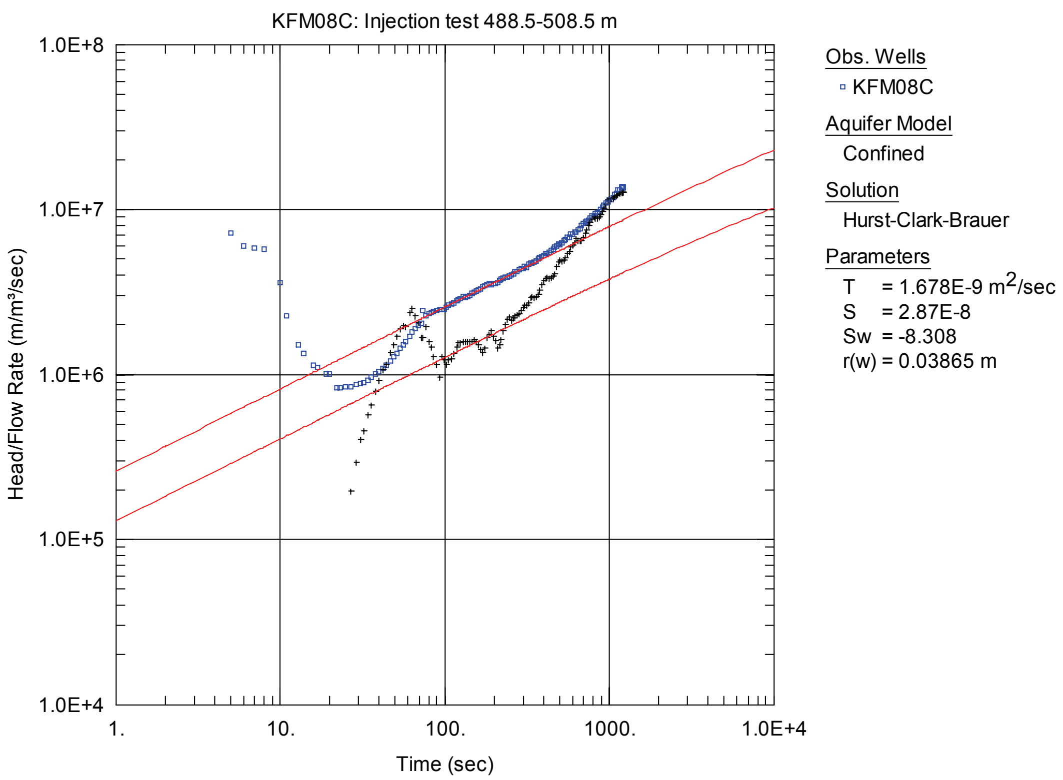


Figure A3-102. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 488.5-508.5 m in KFM08C. The type curve fit is only to show that an assumption of PRF is not valid.

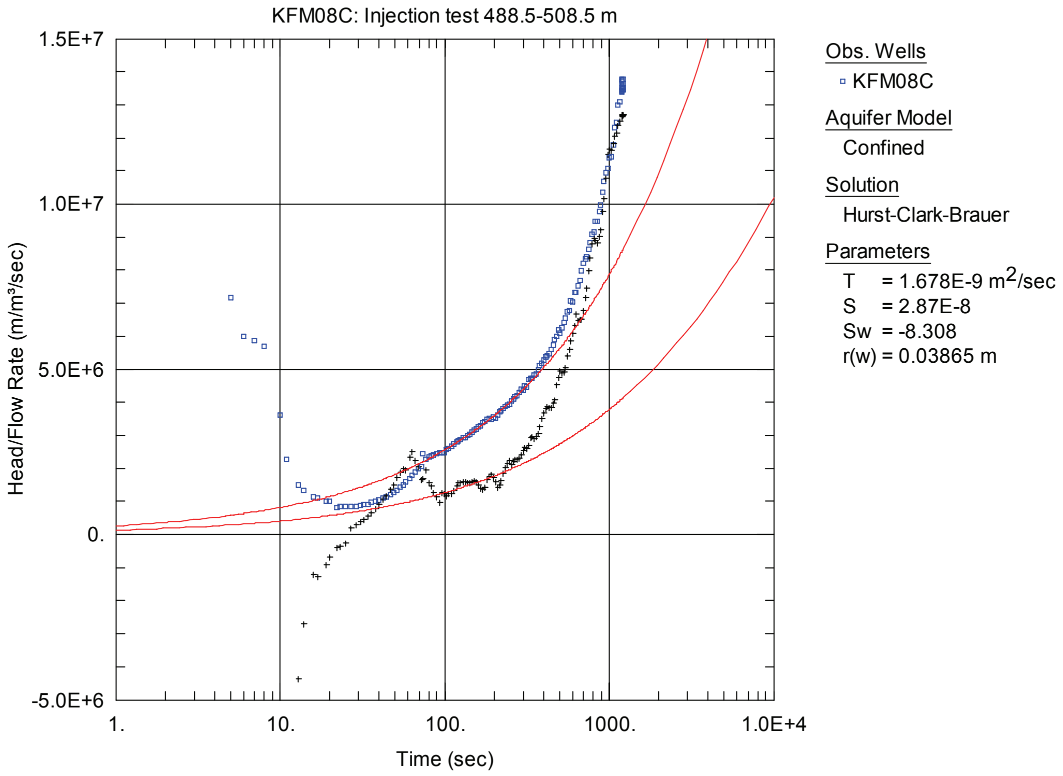


Figure A3-103. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 488.5-508.5 m in KFM08C. The type curve fit is only to show that an assumption of PRF is not valid.*

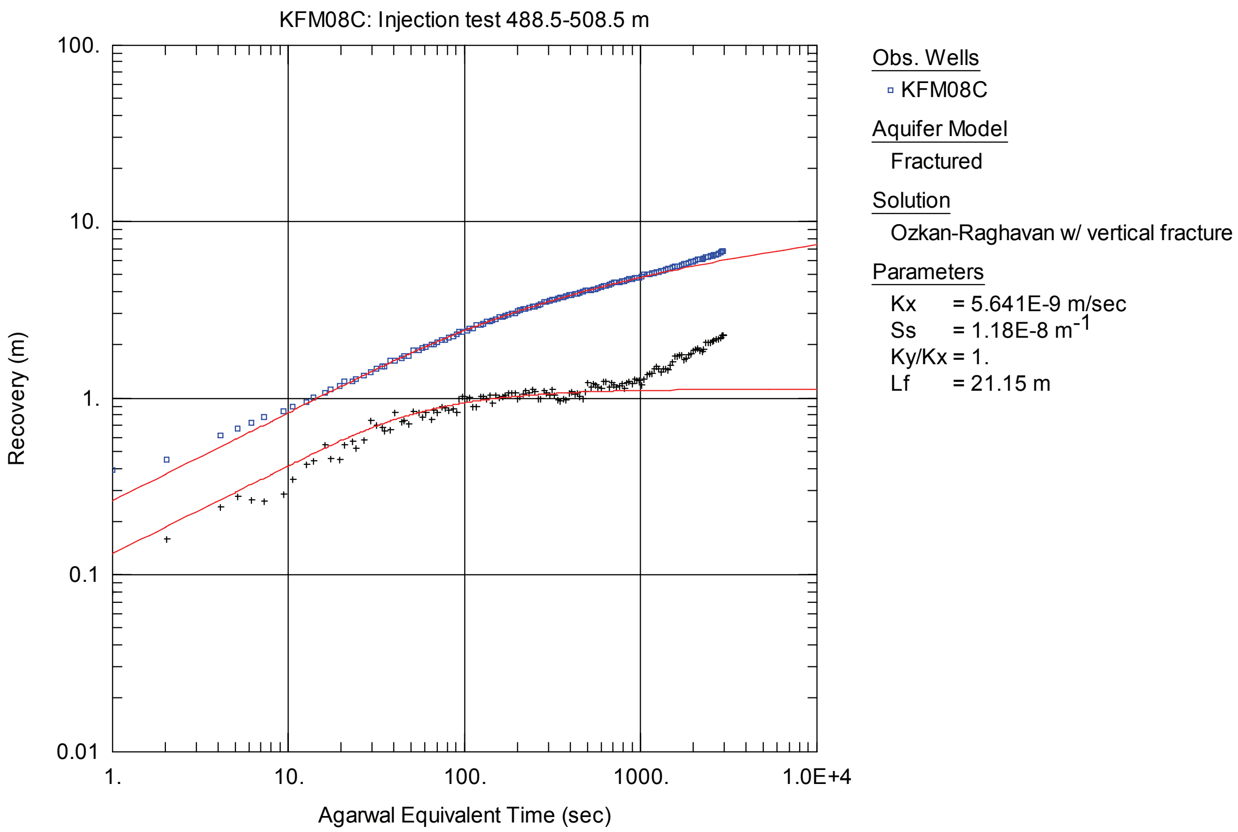


Figure A3-104. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 488.5-508.5 m in KFM08C.*

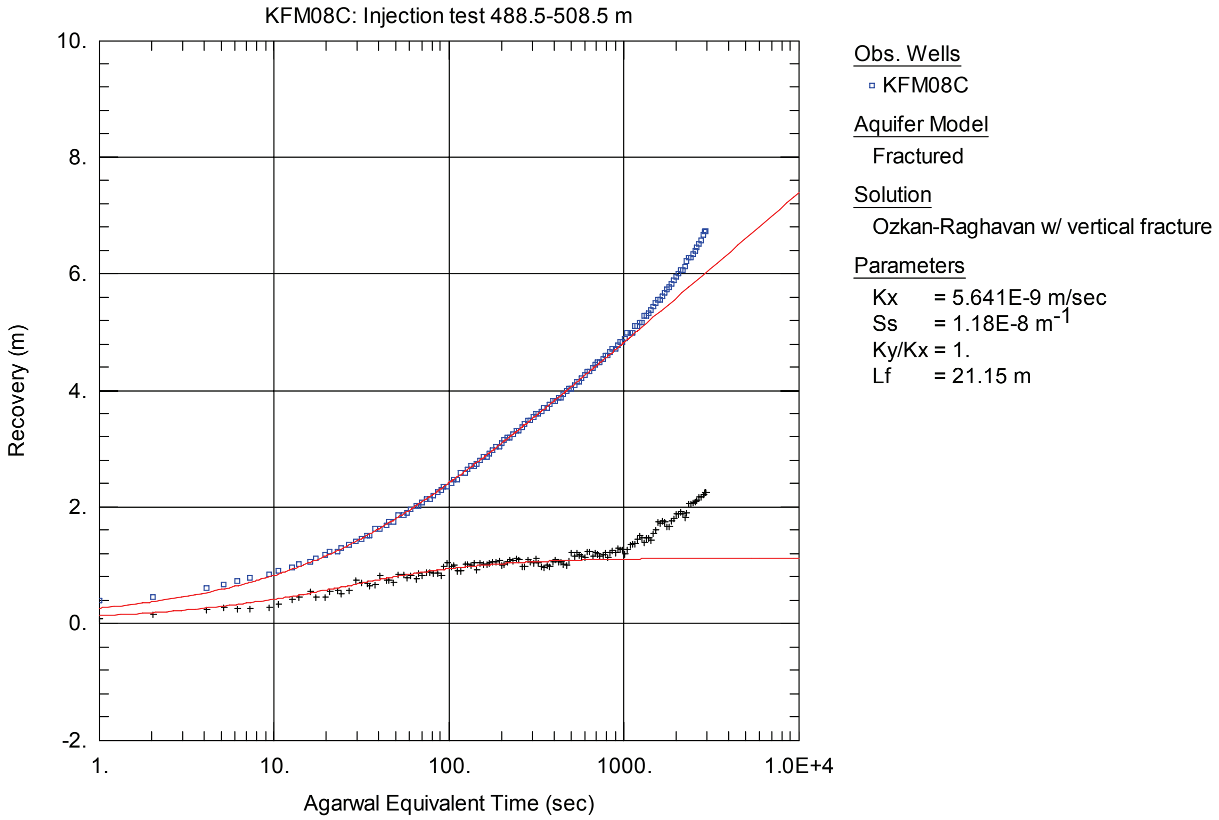


***Figure A3-105.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 488.5-508.5 m in KFM08C.*

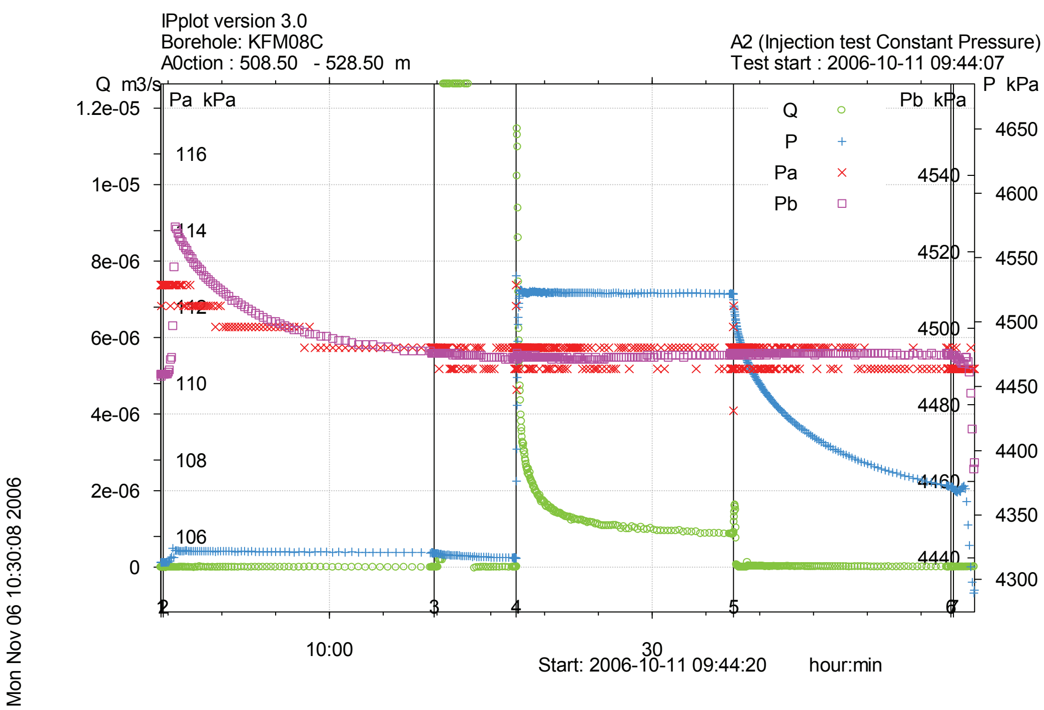


***Figure A3-106.** Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 508.5-528.5 m in borehole KFM08C.*

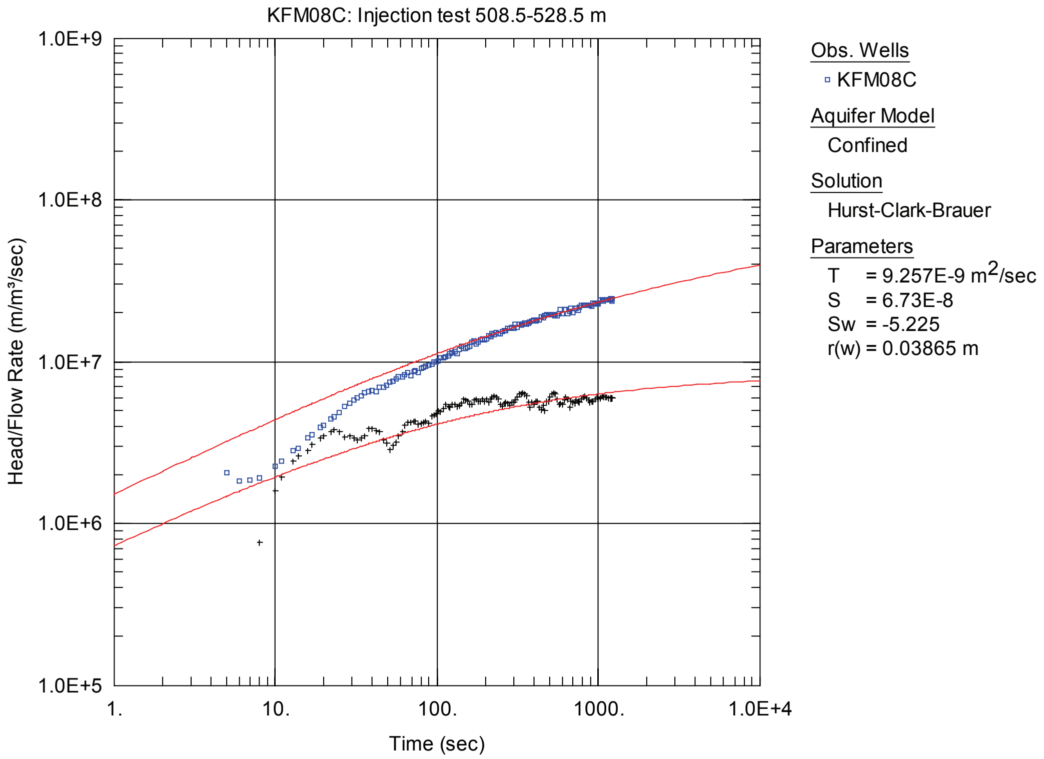


Figure A3-107. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 508.5-528.5 m in KFM08C.*

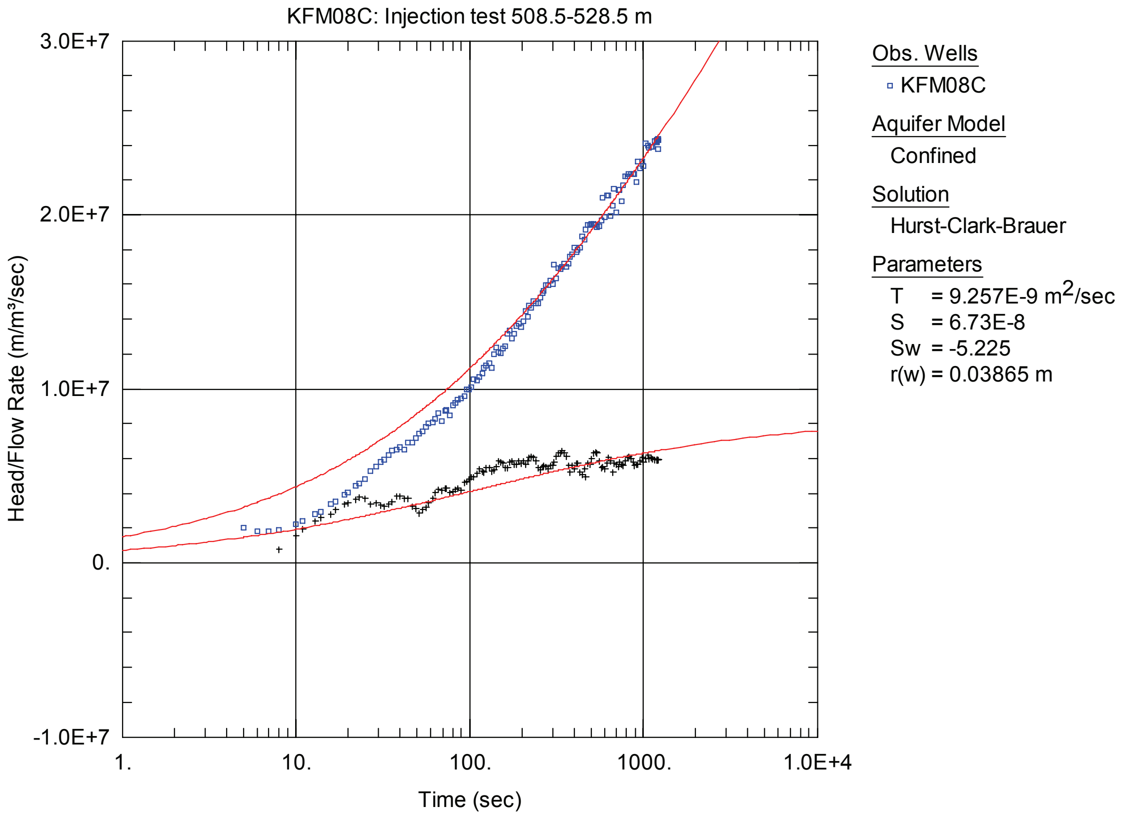


Figure A3-108. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 508.5-528.5 m in KFM08C.*

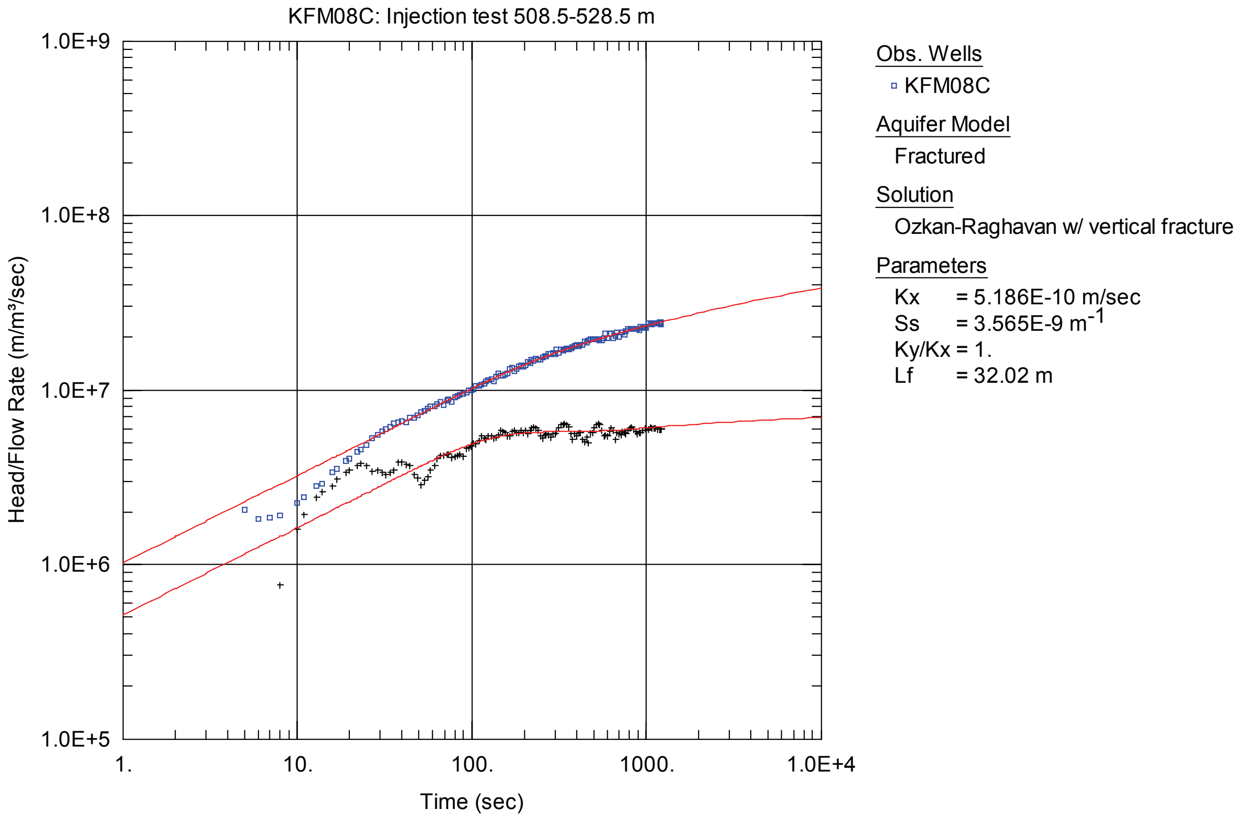


Figure A3-109. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Ozkan solution, from the injection test in section 508.5-528.5 m in KFM08C.*

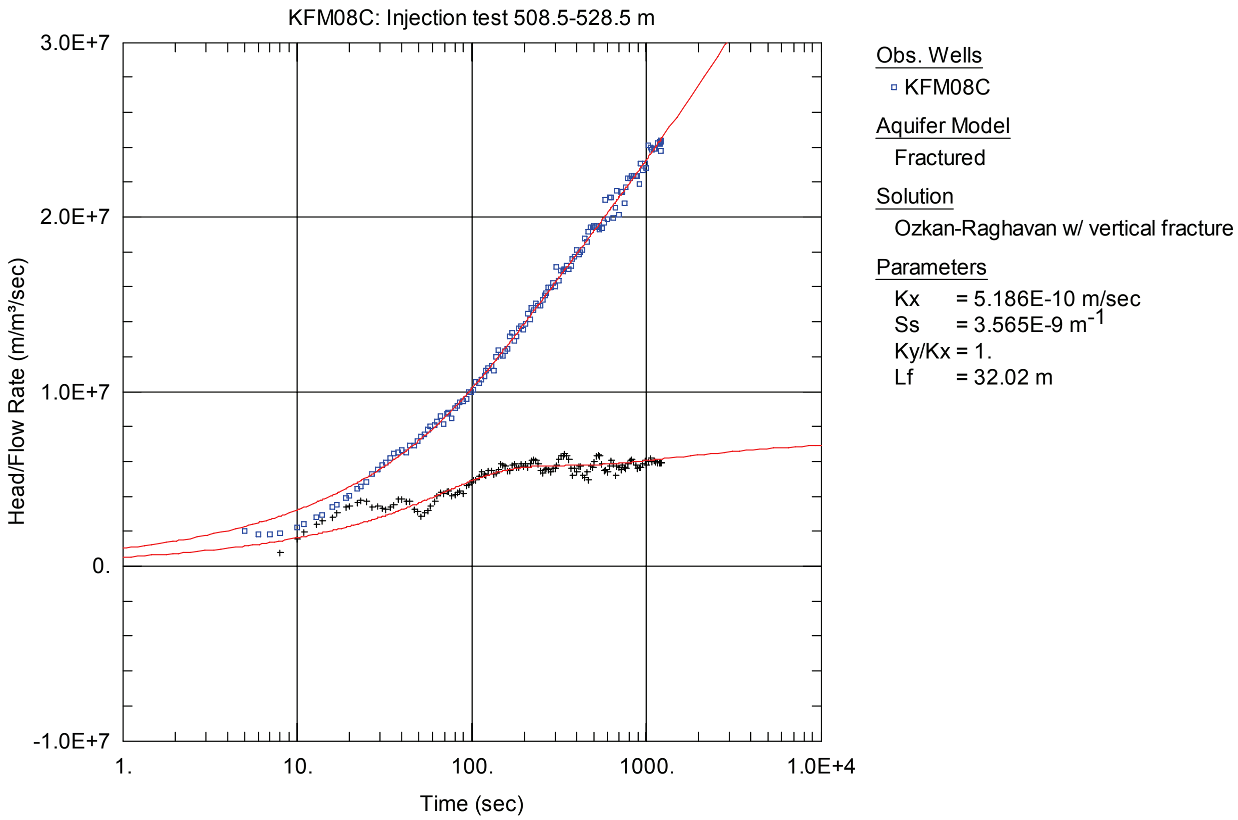


Figure A3-110. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Ozkan solution, from the injection test in section 508.5-528.5 m in KFM08C.*

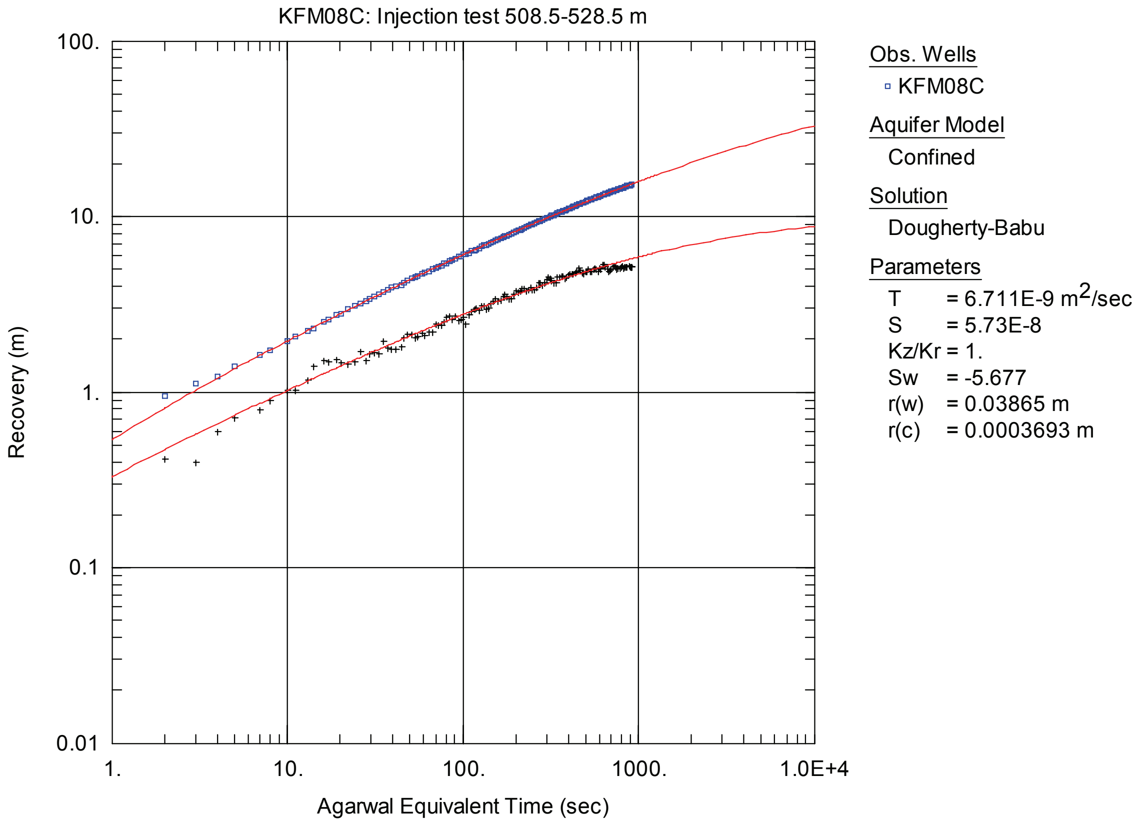


Figure A3-111. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Babu solution, from the injection test in section 508.5-528.5 m in KFM08C.*

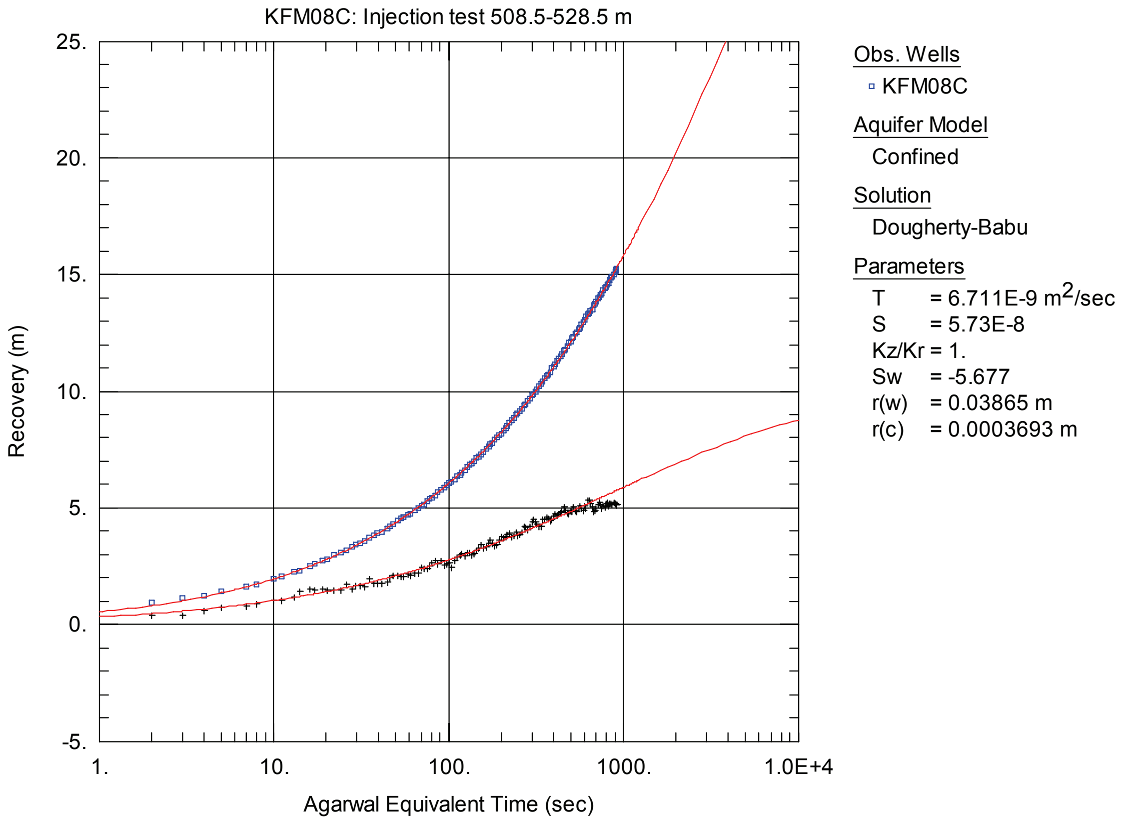


Figure A3-112. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Babu solution, from the injection test in section 508.5-528.5 m in KFM08C.*

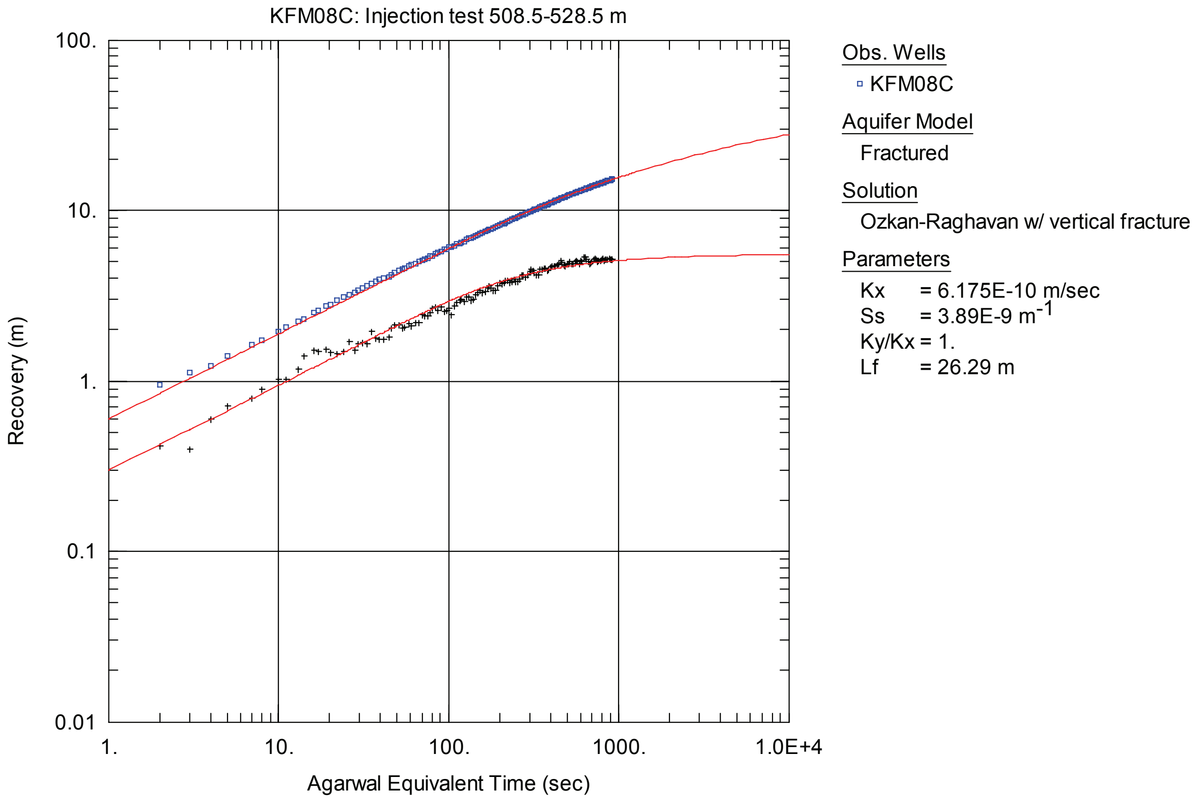


Figure A3-113. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Ozkan solution, from the injection test in section 508.5-528.5 m in KFM08C.*

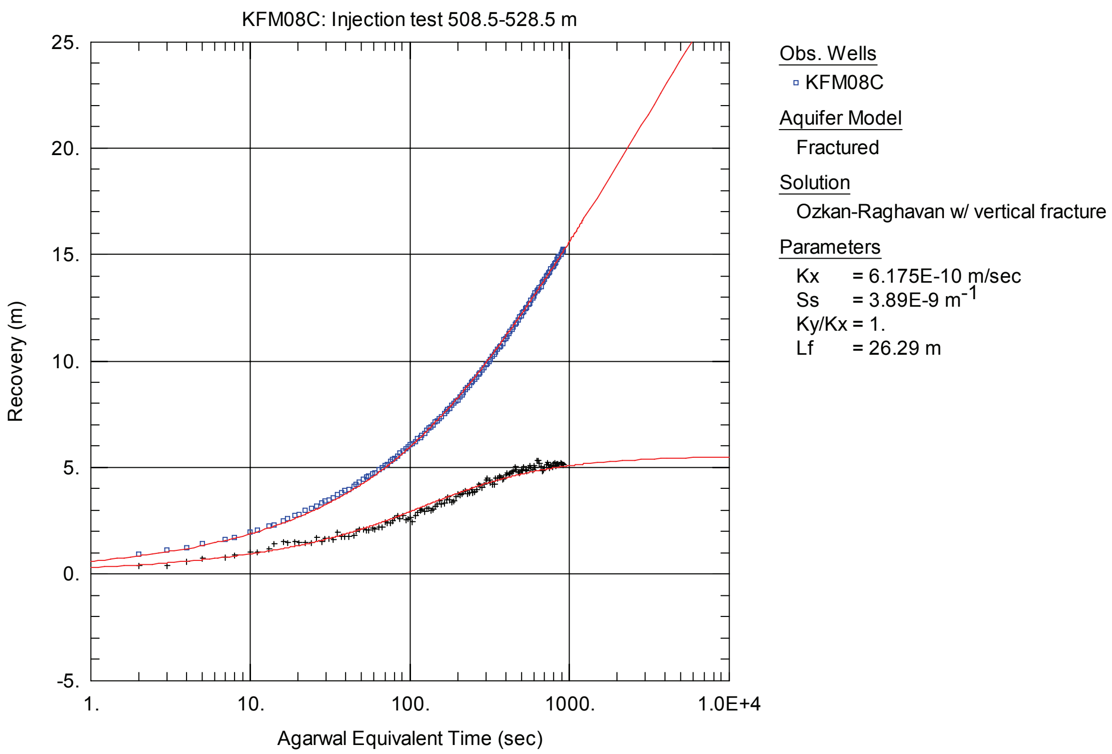


Figure A3-114. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Ozkan solution, from the injection test in section 508.5-528.5 m in KFM08C.*

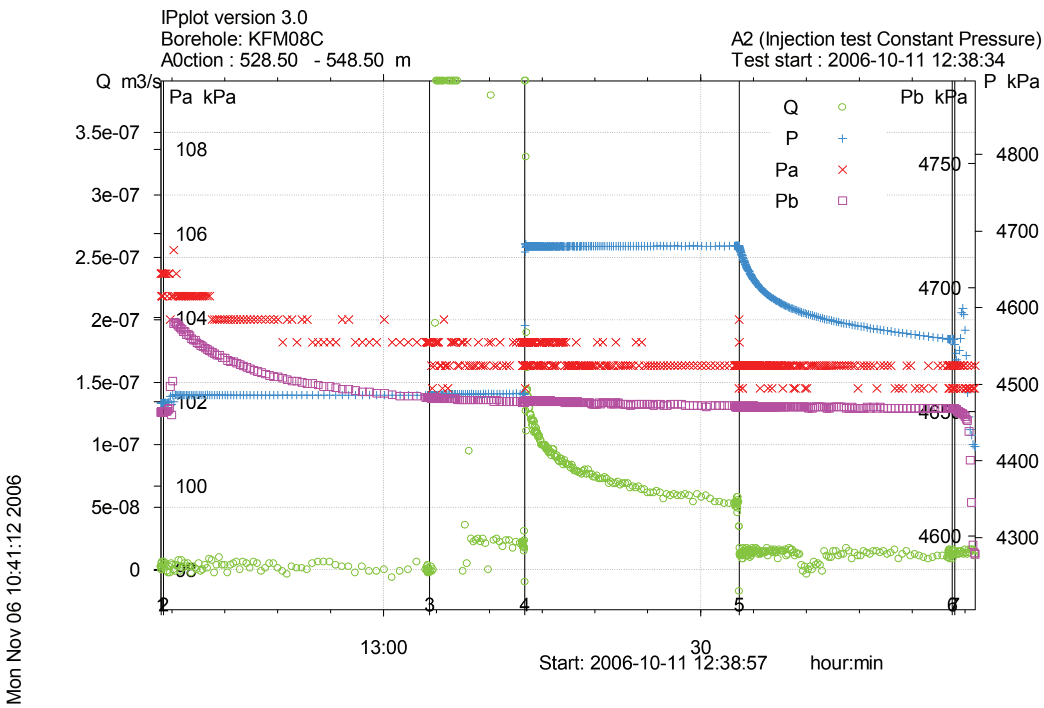


***Figure A3-115.** Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 528.5-548.5 m in borehole KFM08C.*

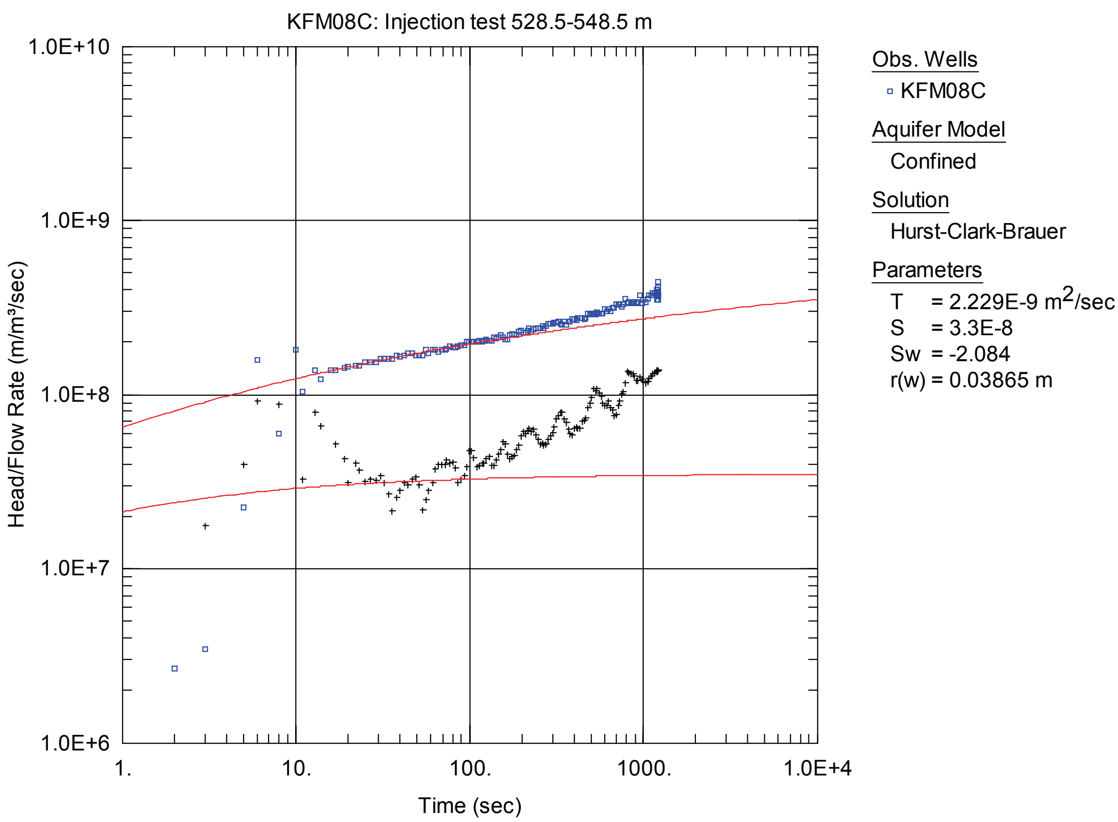


***Figure A3-116.** Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 528.5-548.5 m in KFM08C.*

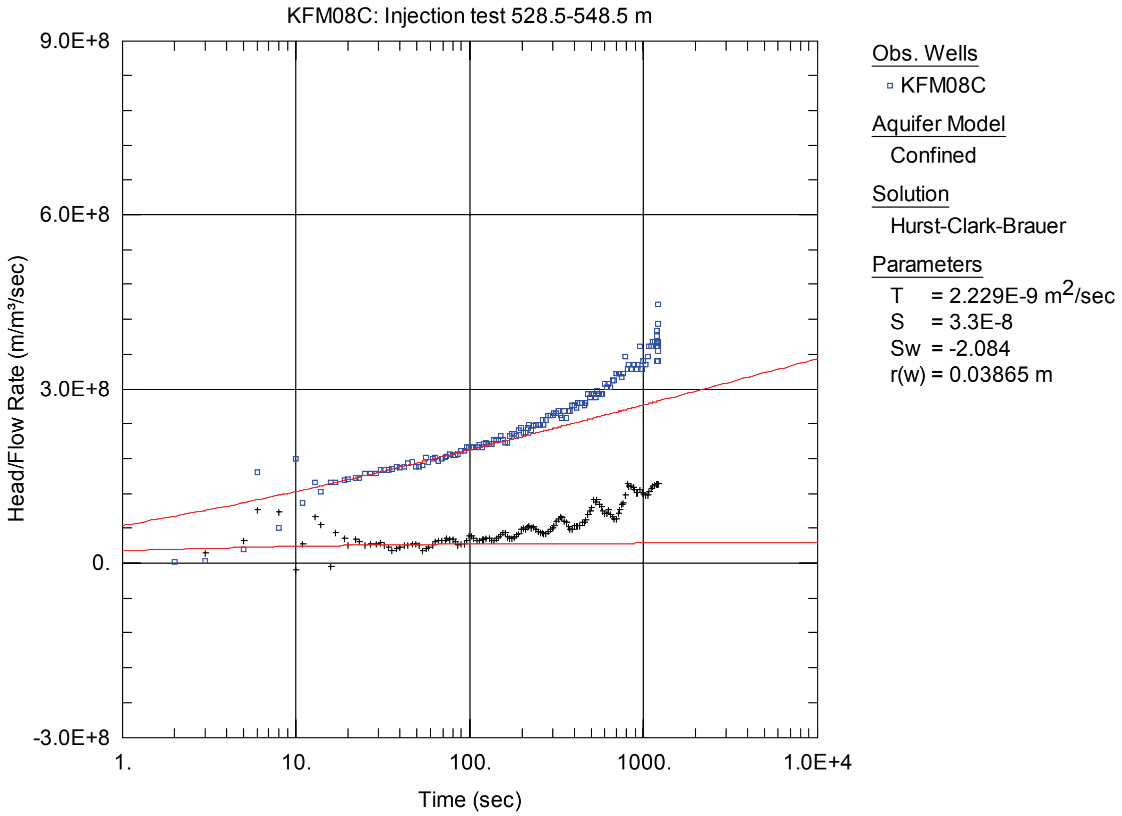


Figure A3-117. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 528.5-548.5 m in KFM08C.*

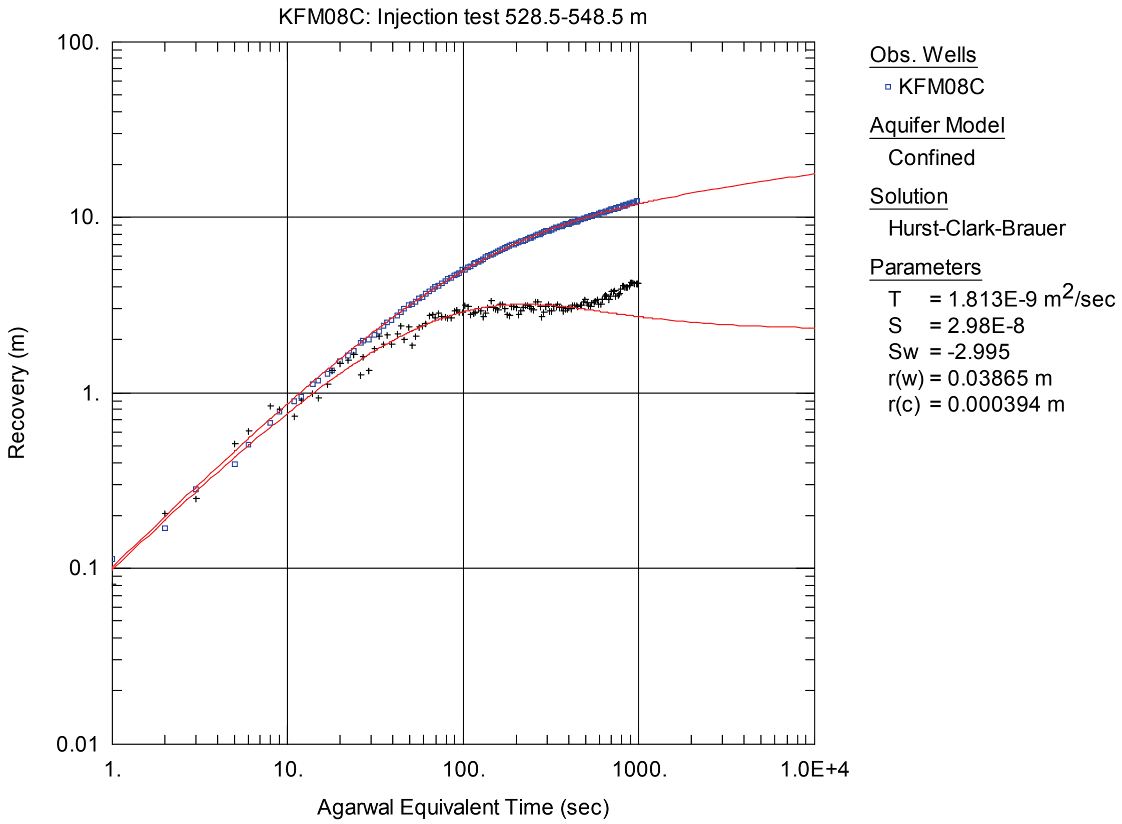


Figure A3-118. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 528.5-548.5 m in KFM08C.*

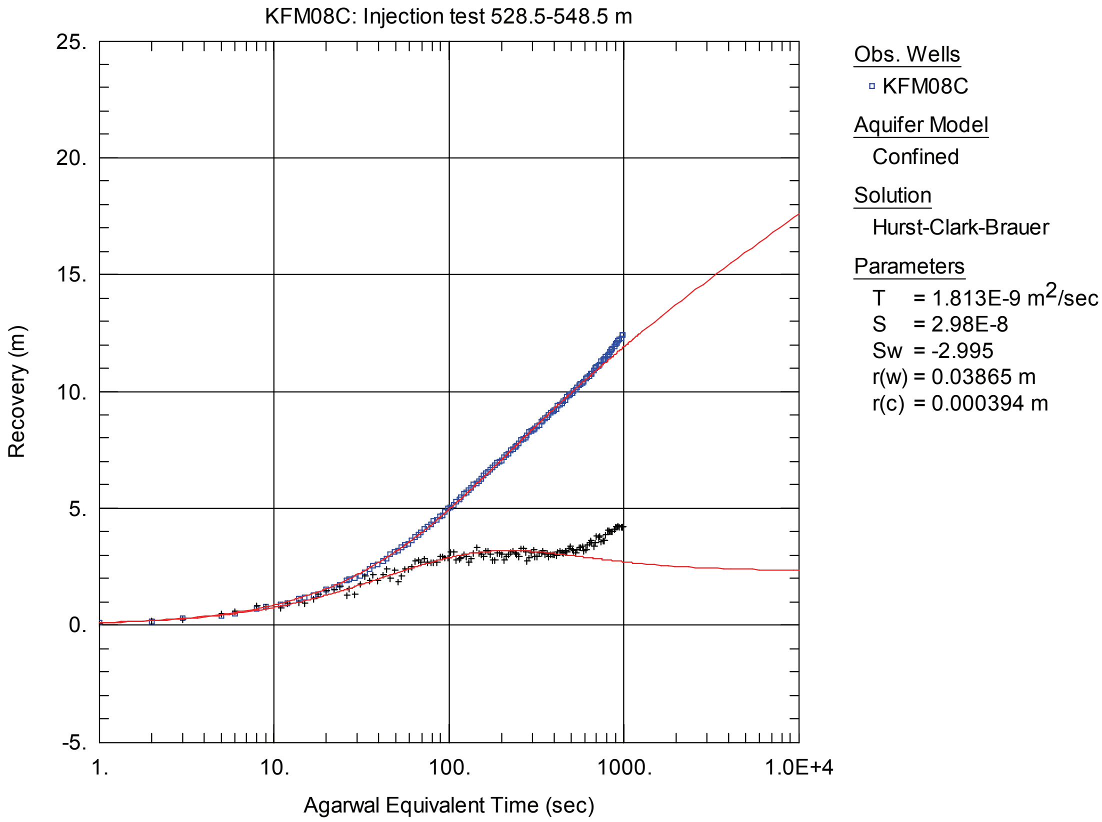


Figure A3-119. Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 528.5-548.5 m in KFM08C.

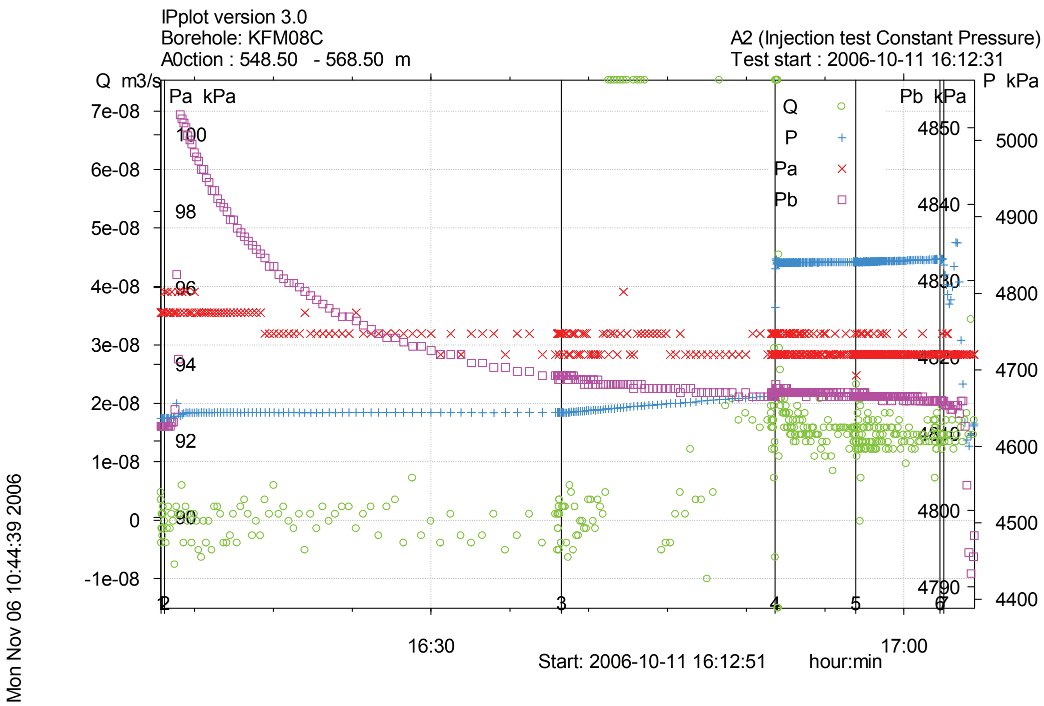


Figure A3-120. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 548.5-568.5 m in borehole KFM08C.

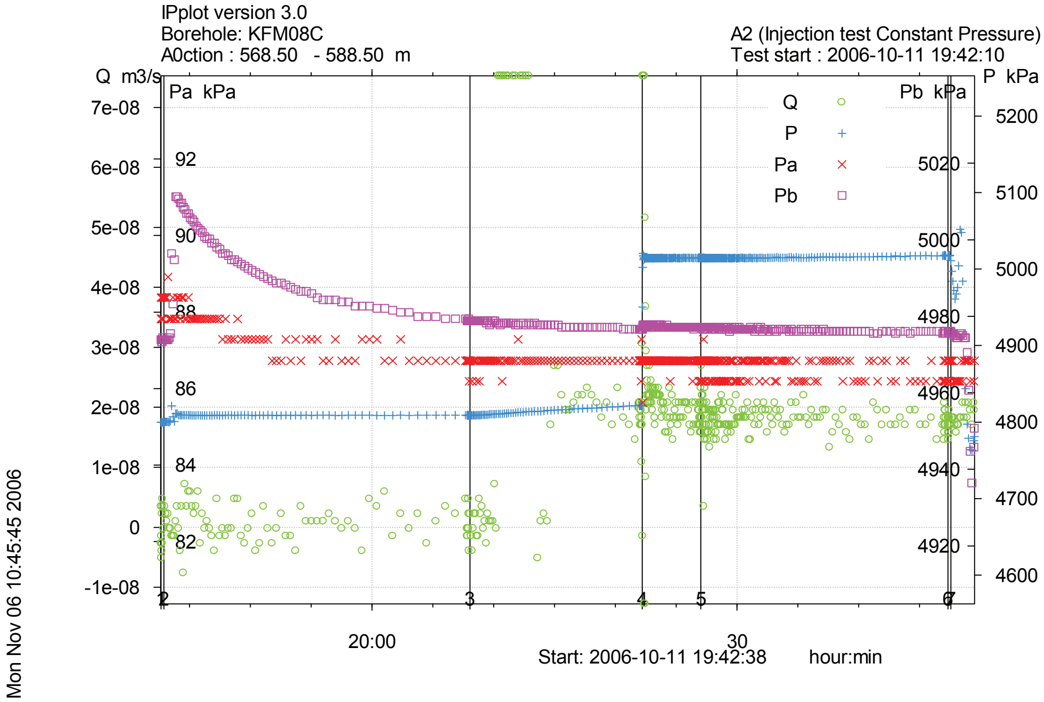


***Figure A3-121.** Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 568.5-588.5 m in borehole KFM08C.*

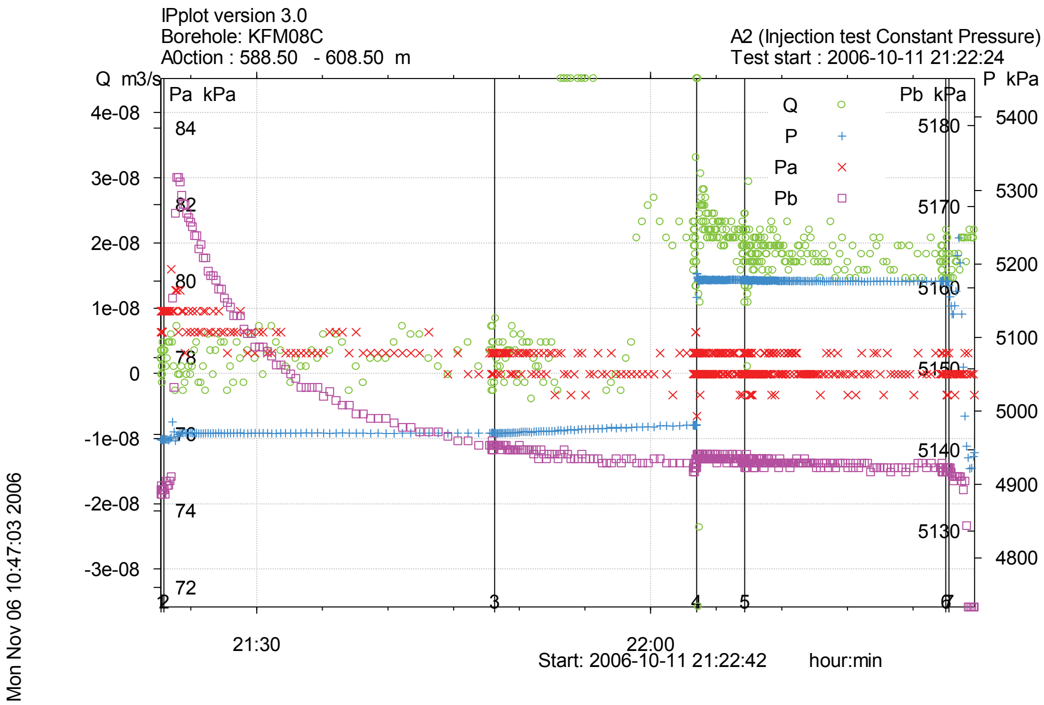


***Figure A3-122.** Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 588.5-608.5 m in borehole KFM08C.*

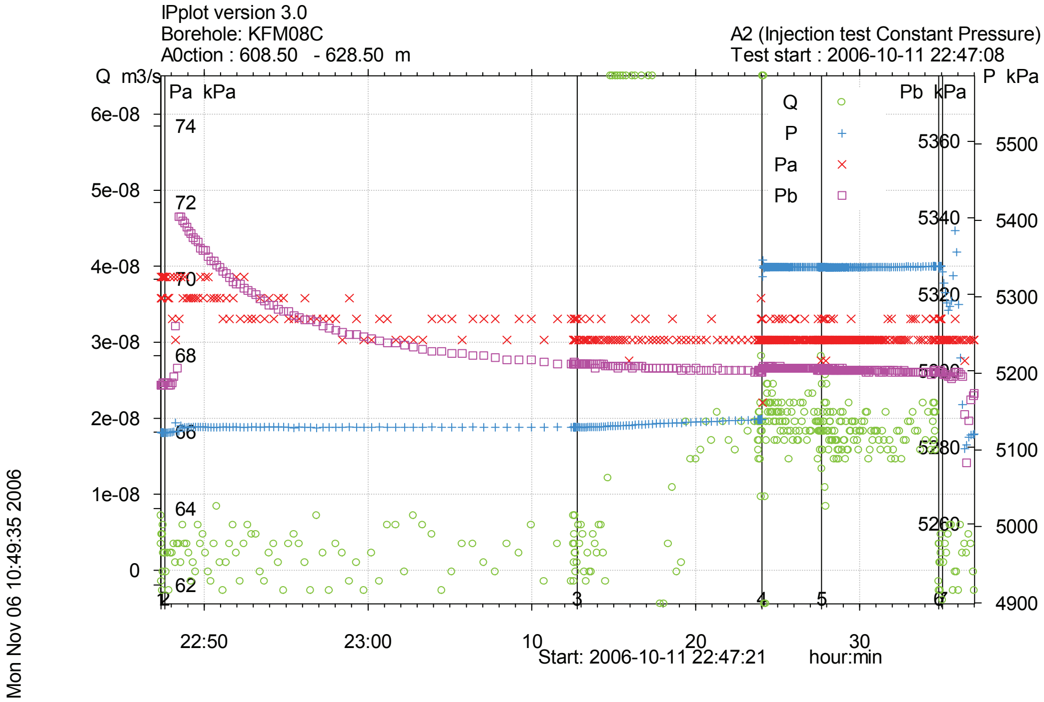


Figure A3-123. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 608.5-628.5 m in borehole KFM08C.*

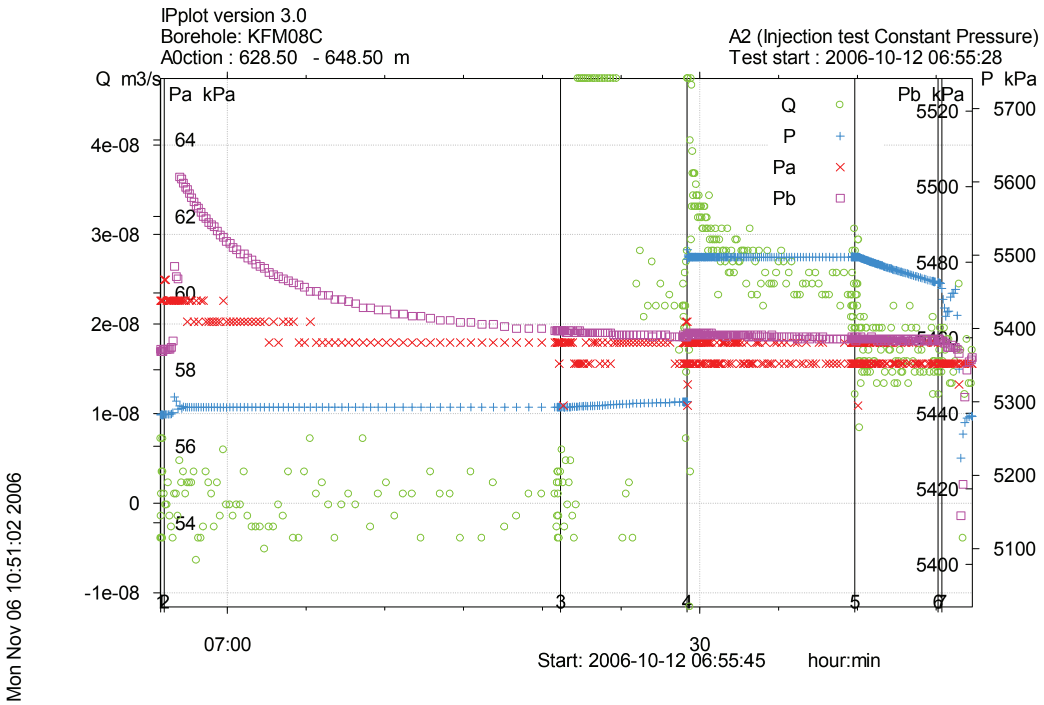


Figure A3-124. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 628.5-648.5 m in borehole KFM08C.*

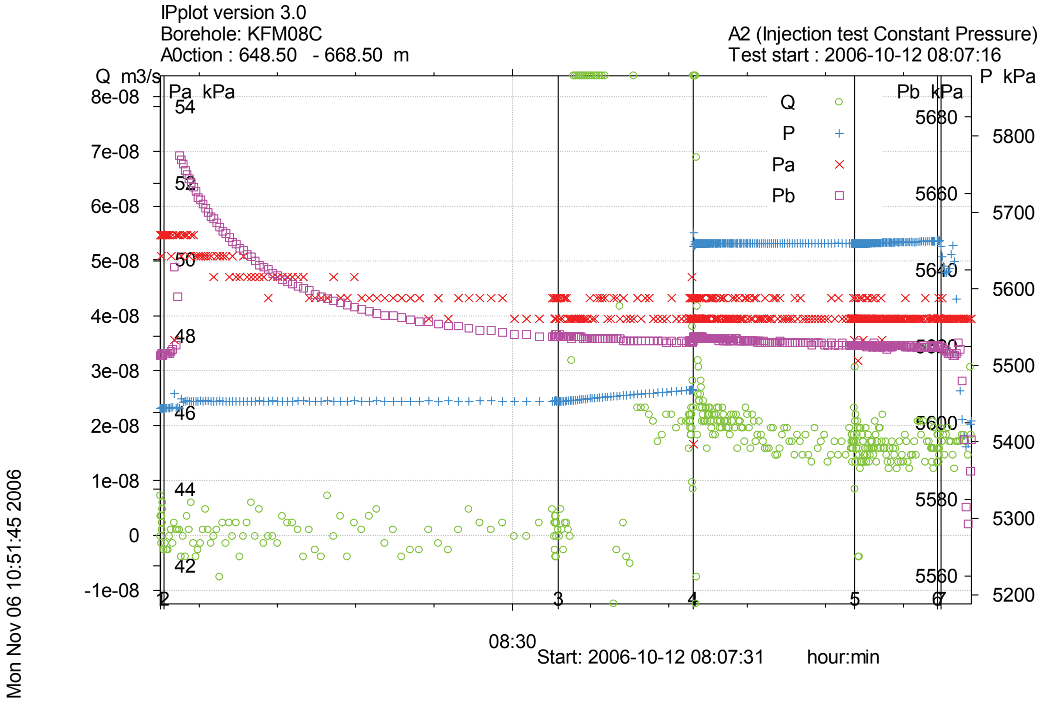


Figure A3-125. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 648.5-668.5 m in borehole KFM08C.*

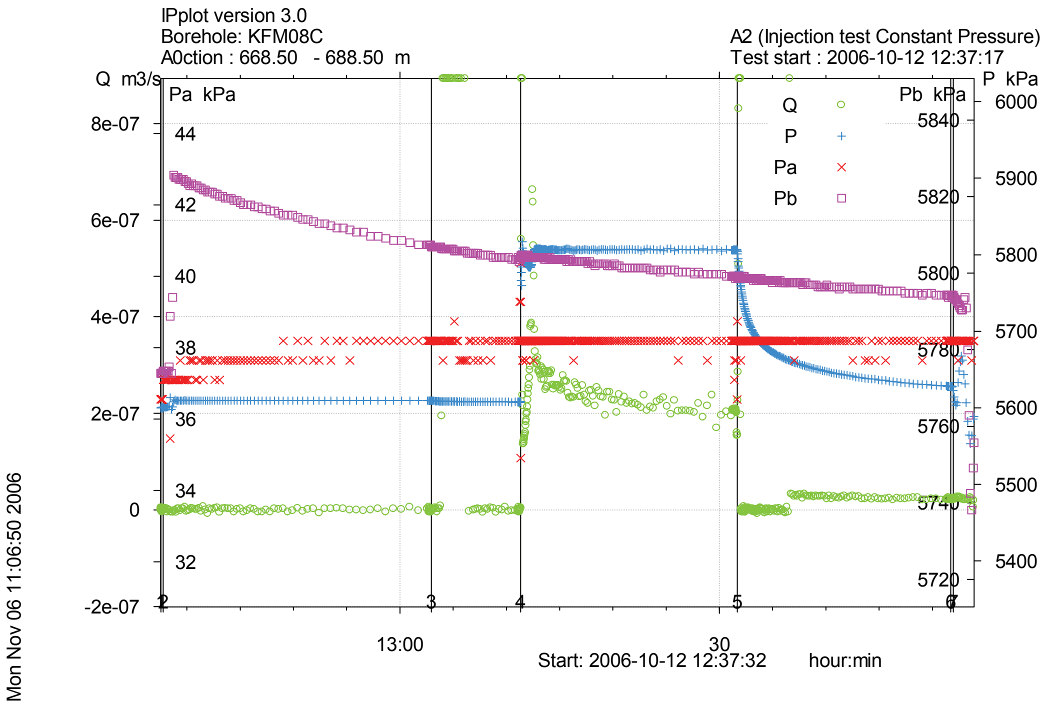


Figure A3-126. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 668.5-688.5 m in borehole KFM08C.*

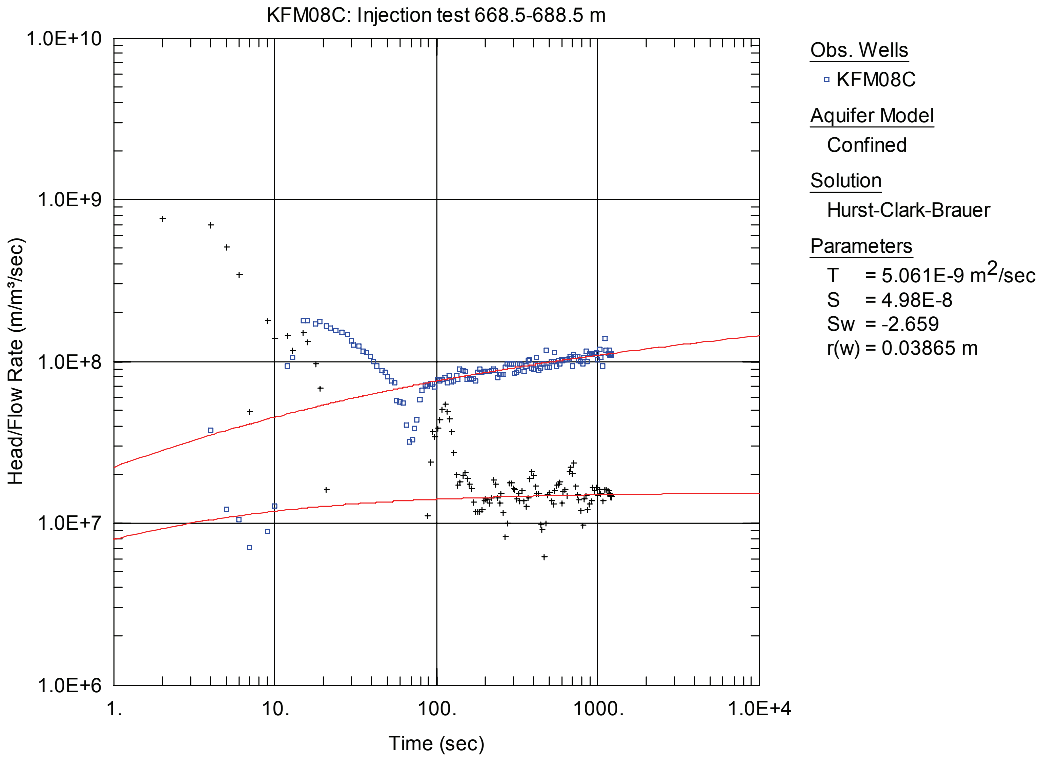


***Figure A3-127.** Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 668.5-688.5 m in KFM08C.*

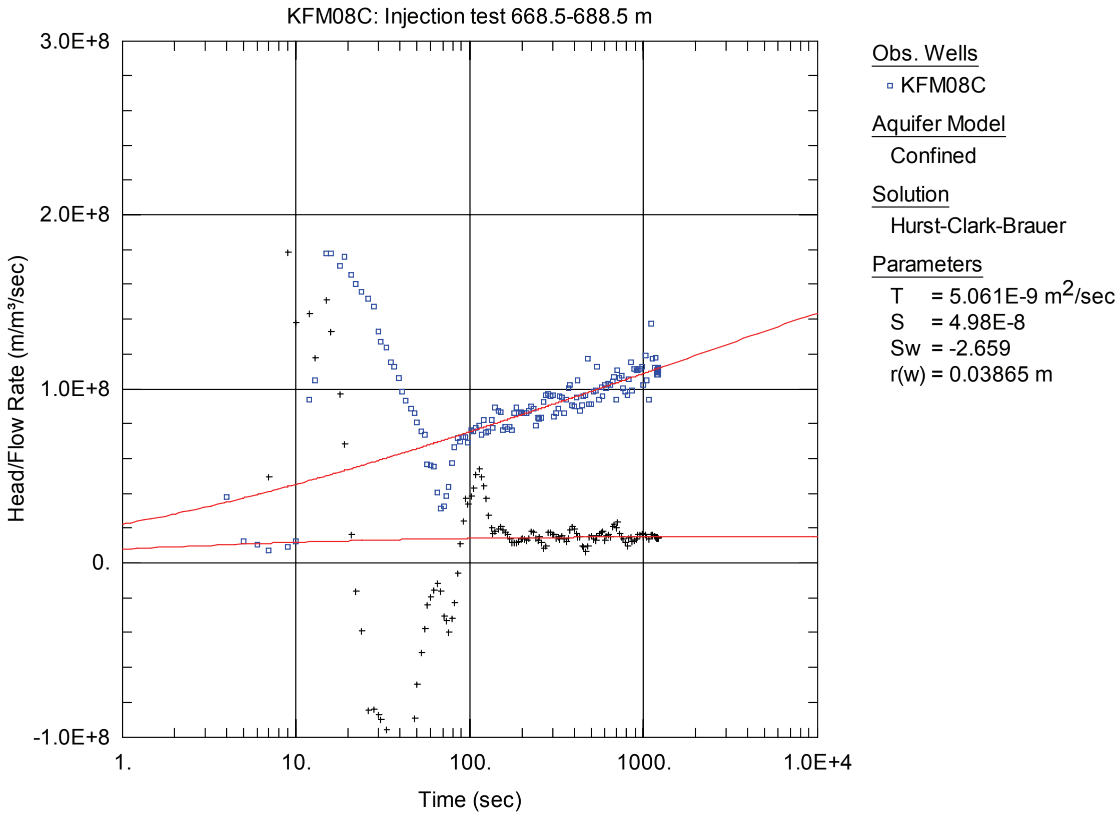


***Figure A3-128.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 668.5-688.5 m in KFM08C.*

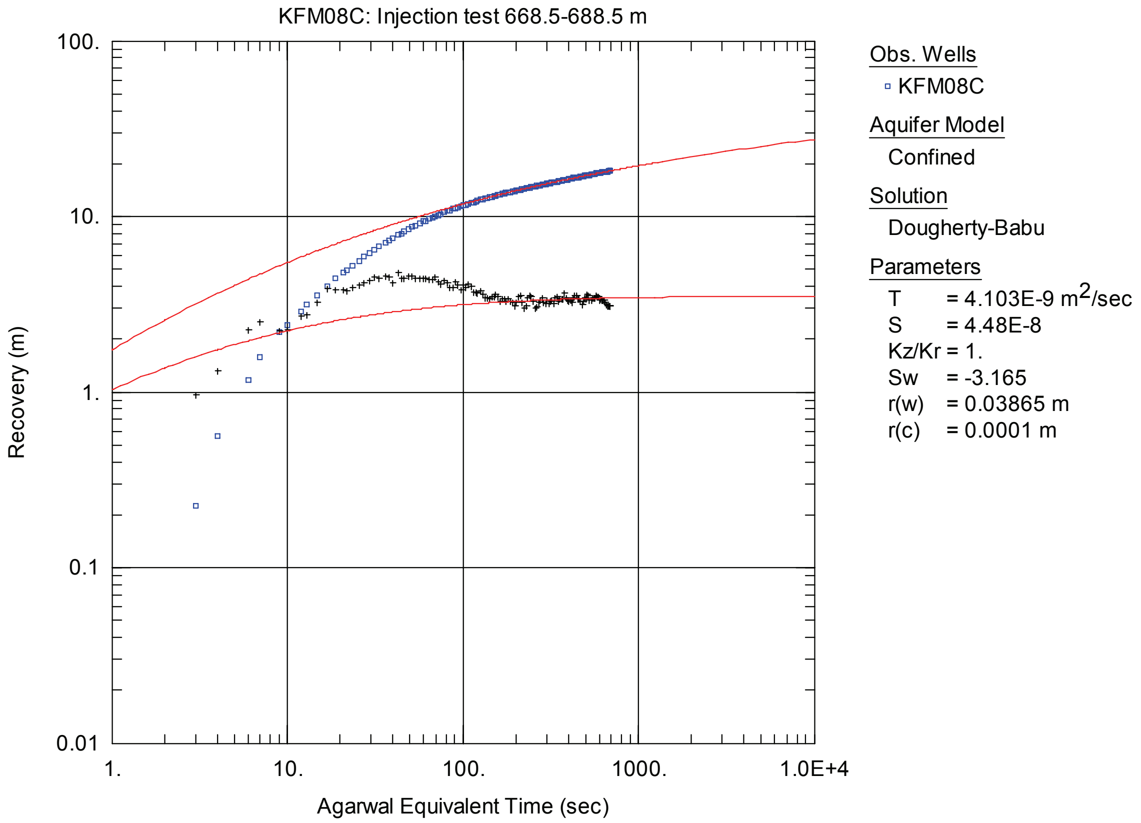


***Figure A3-129.** Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 668.5-688.5 m in KFM08C.*

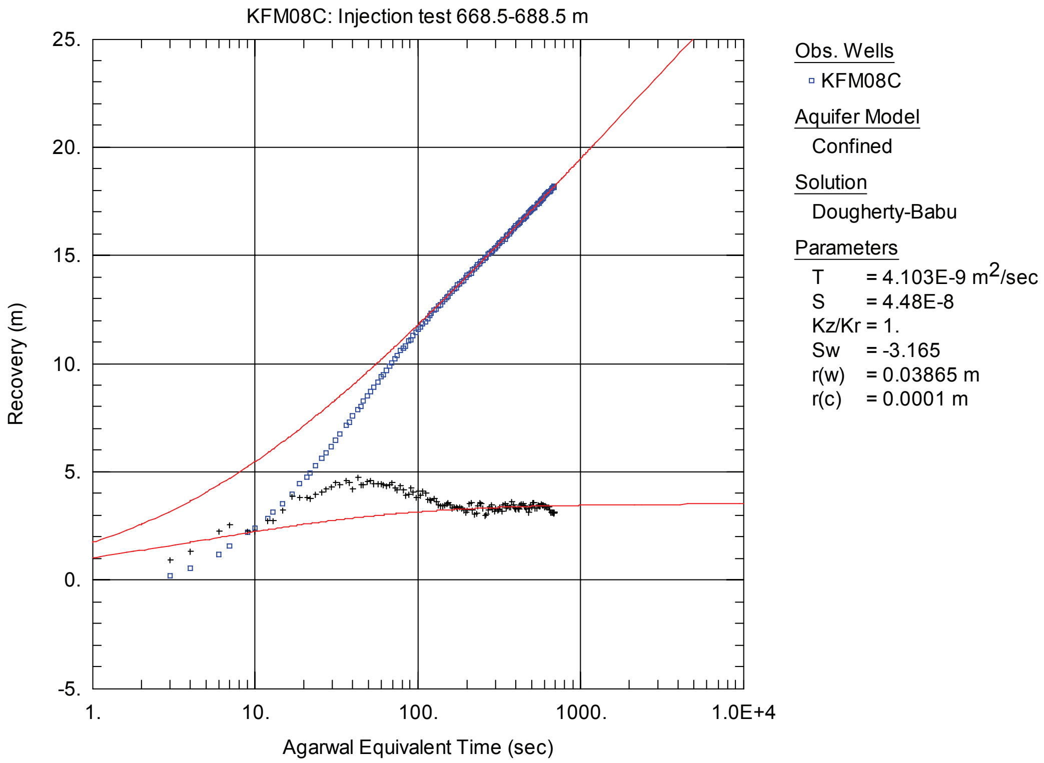


***Figure A3-130.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 668.5-688.5 m in KFM08C.*

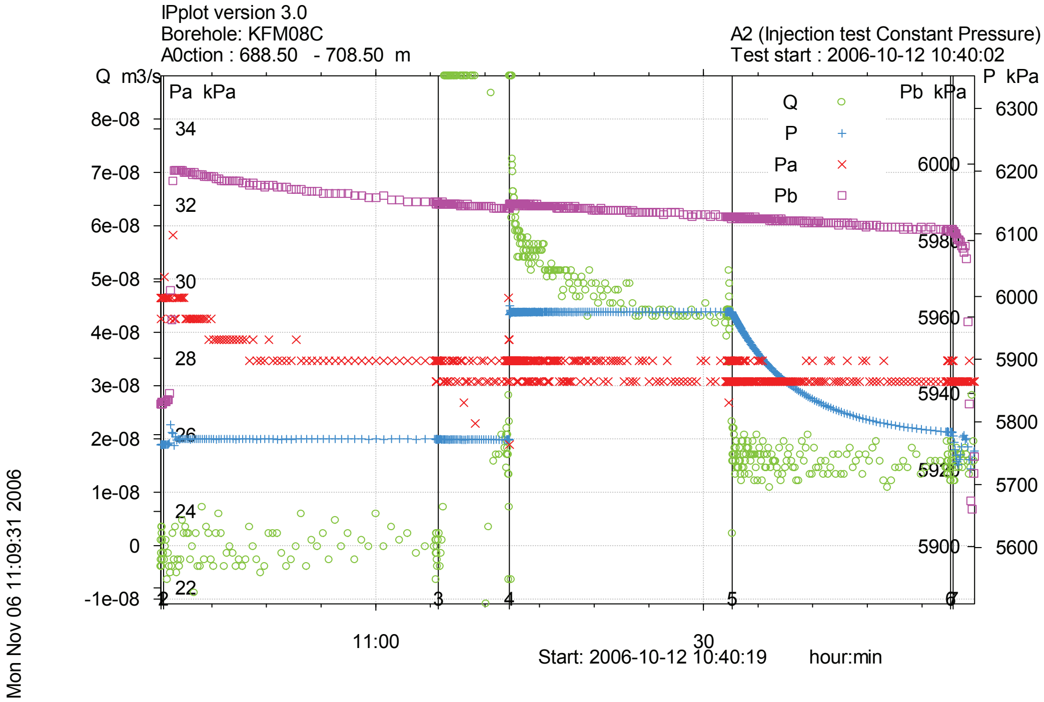


__Figure A3-131.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 688.5-708.5 m in borehole KFM08C.

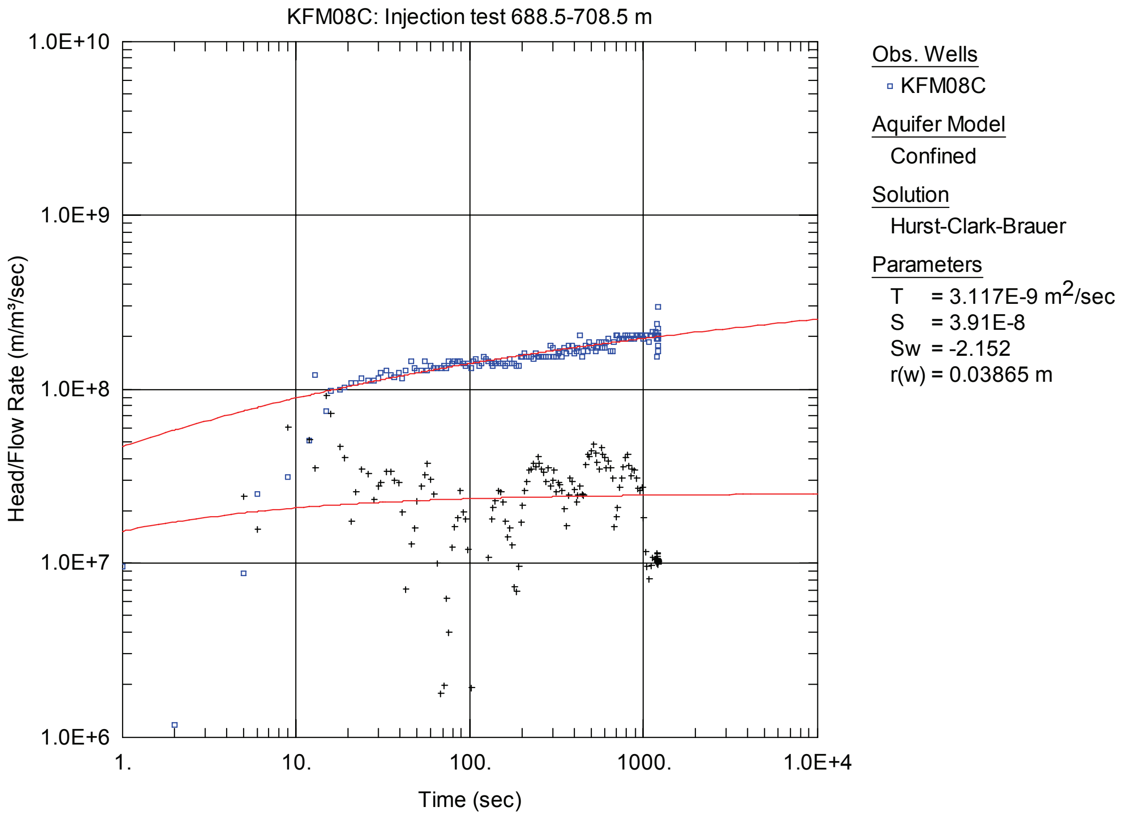


__Figure A3-132.__ Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 688.5-708.5 m in KFM08C.

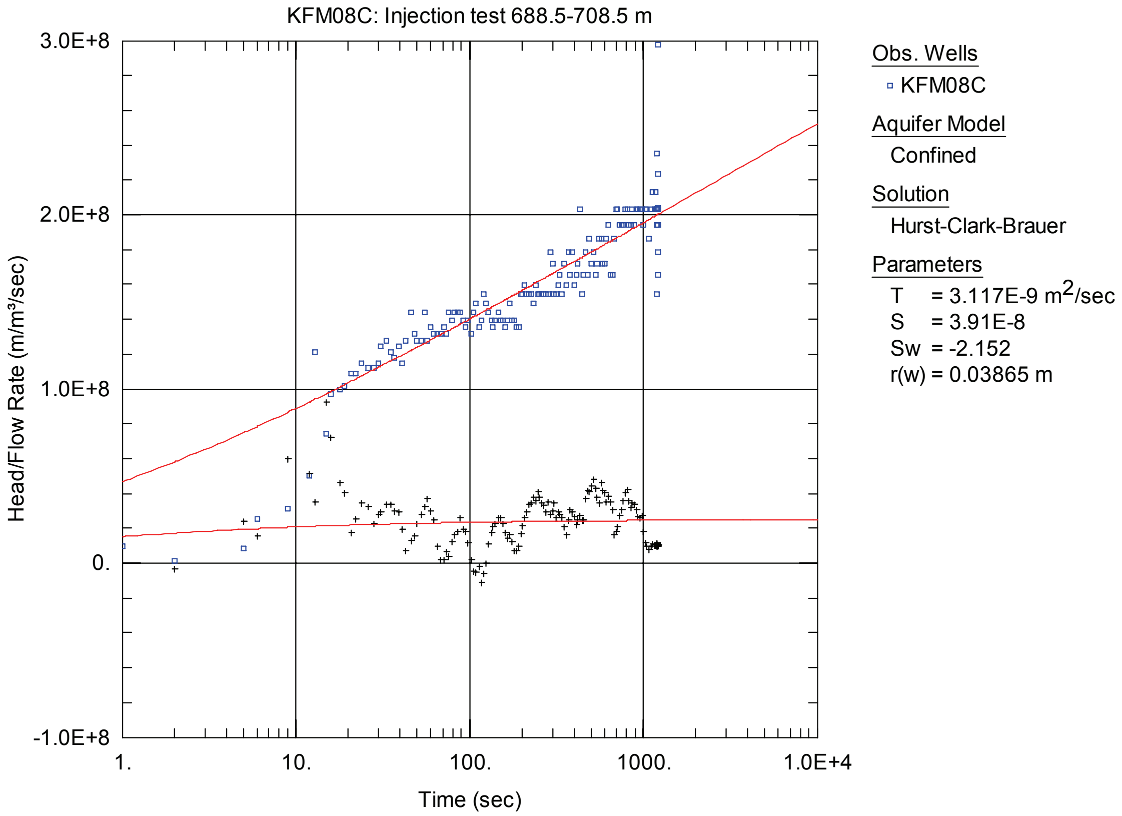


Figure A3-133. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 688.5-708.5 m in KFM08C.*

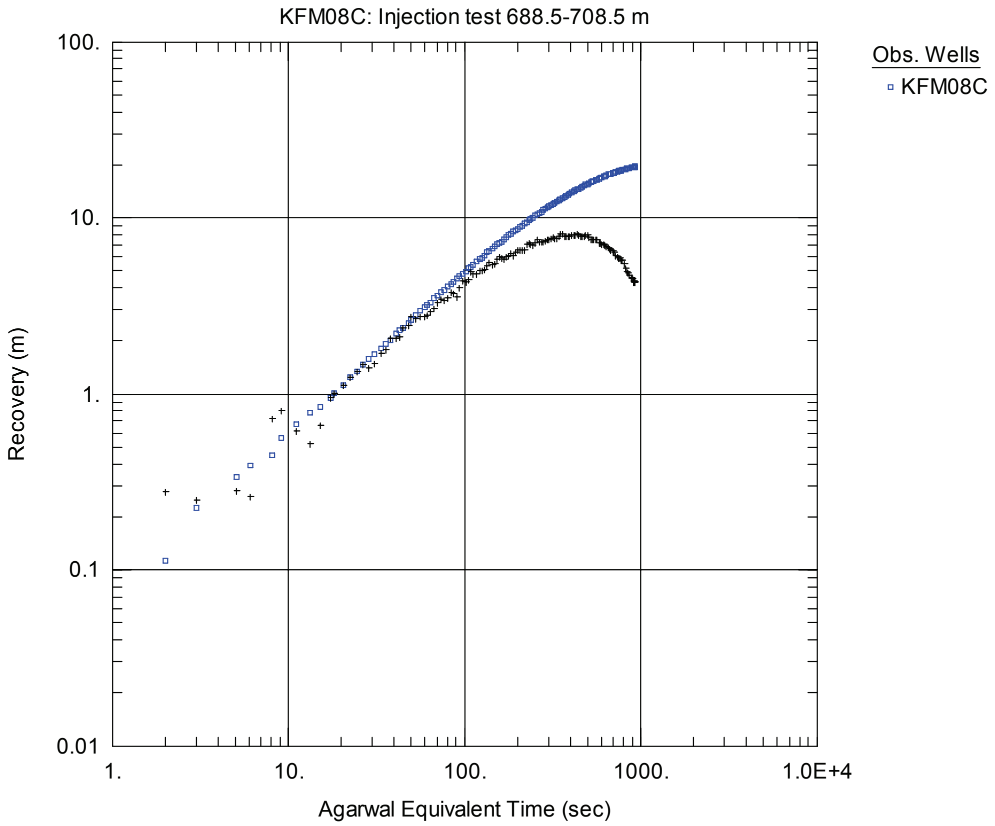


Figure A3-134. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 688.5-708.5 m in KFM08C.*

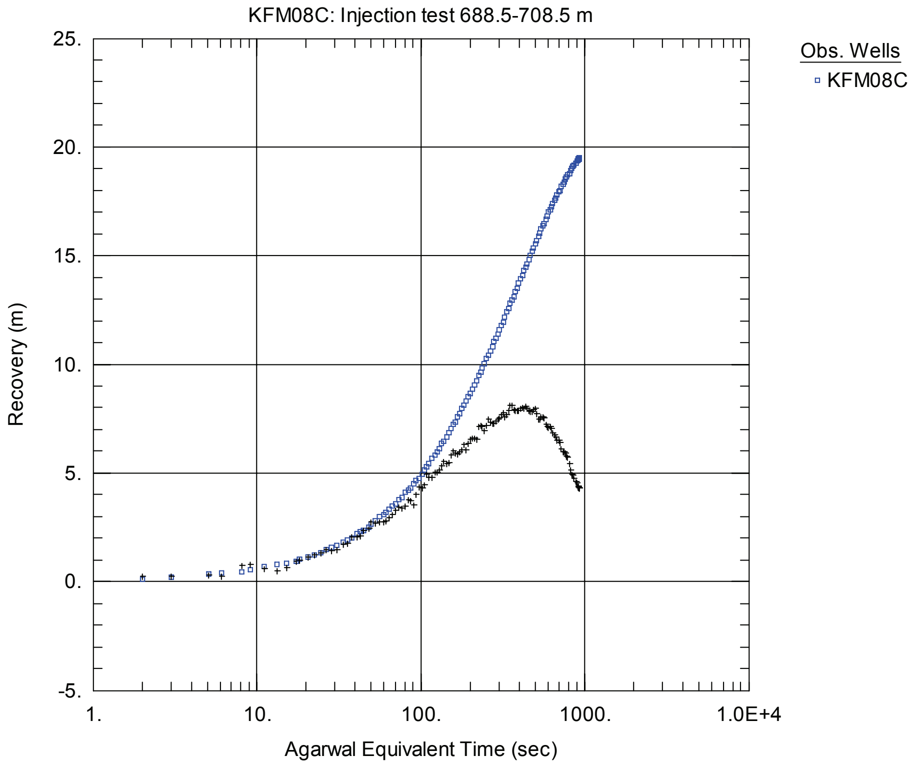


***Figure A3-135.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 688.5-708.5 m in KFM08C.*

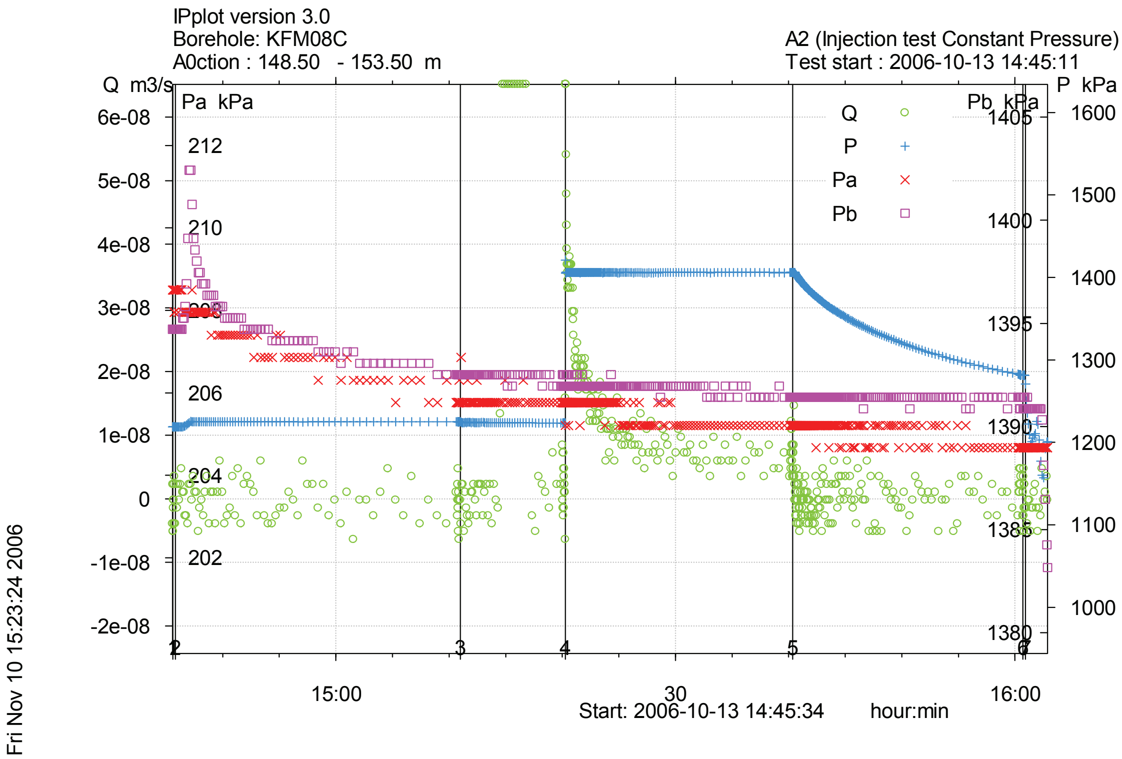


***Figure A3-136.** Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 148.5-153.5 m in borehole KFM08C.*

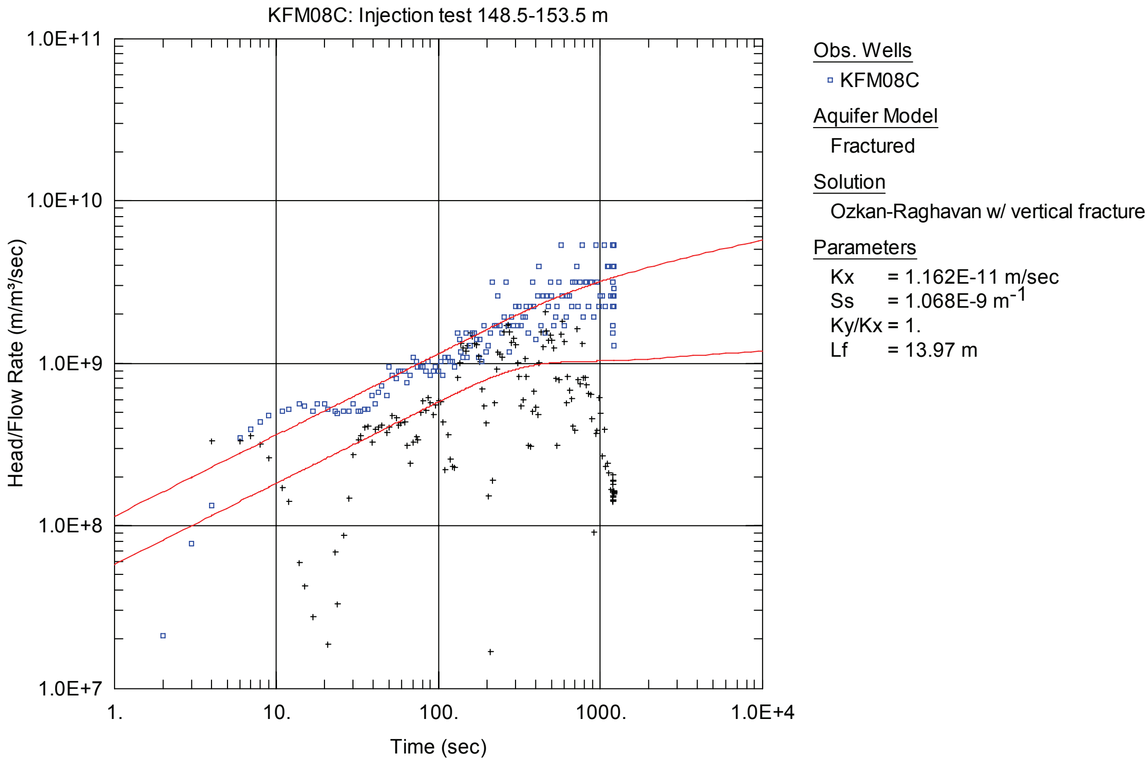


Figure A3-137. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 148.5-153.5 m in KFM08C.*

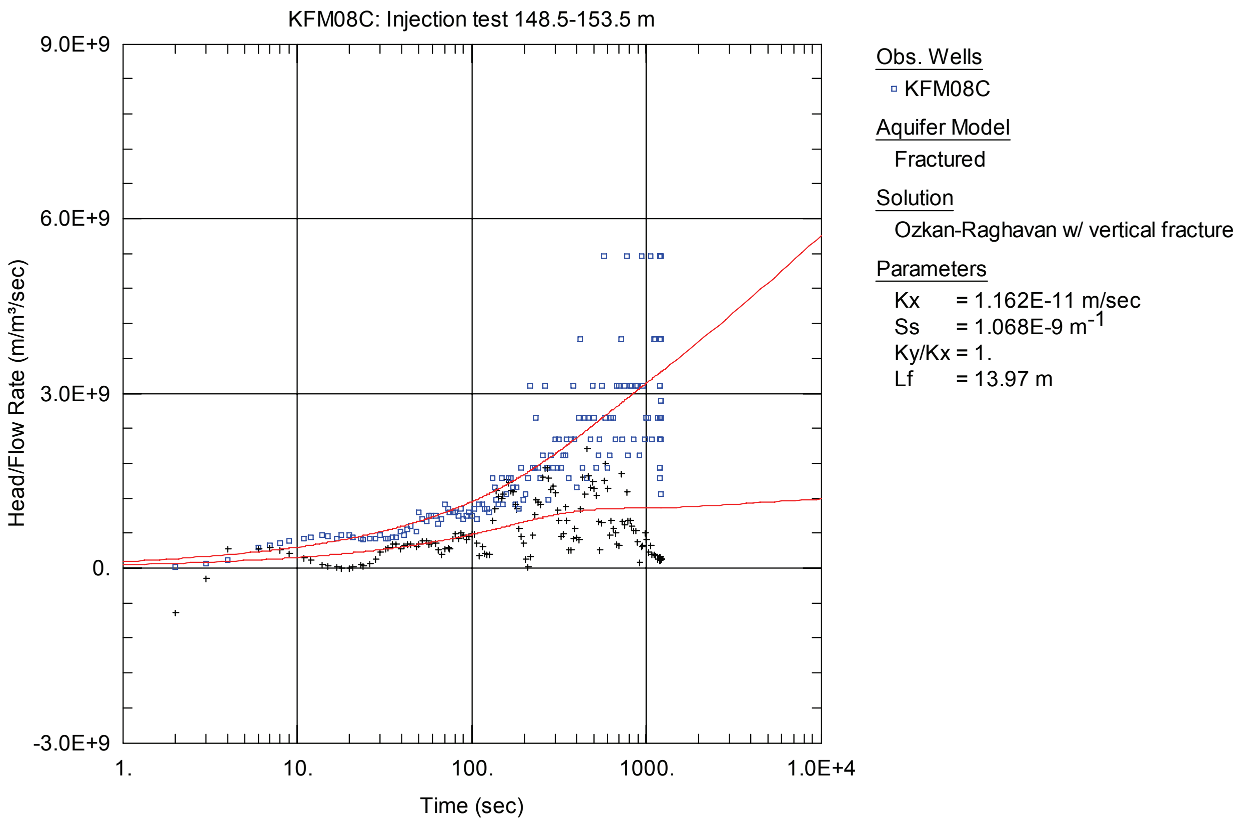


Figure A3-138. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 148.5-153.5 m in KFM08C.*

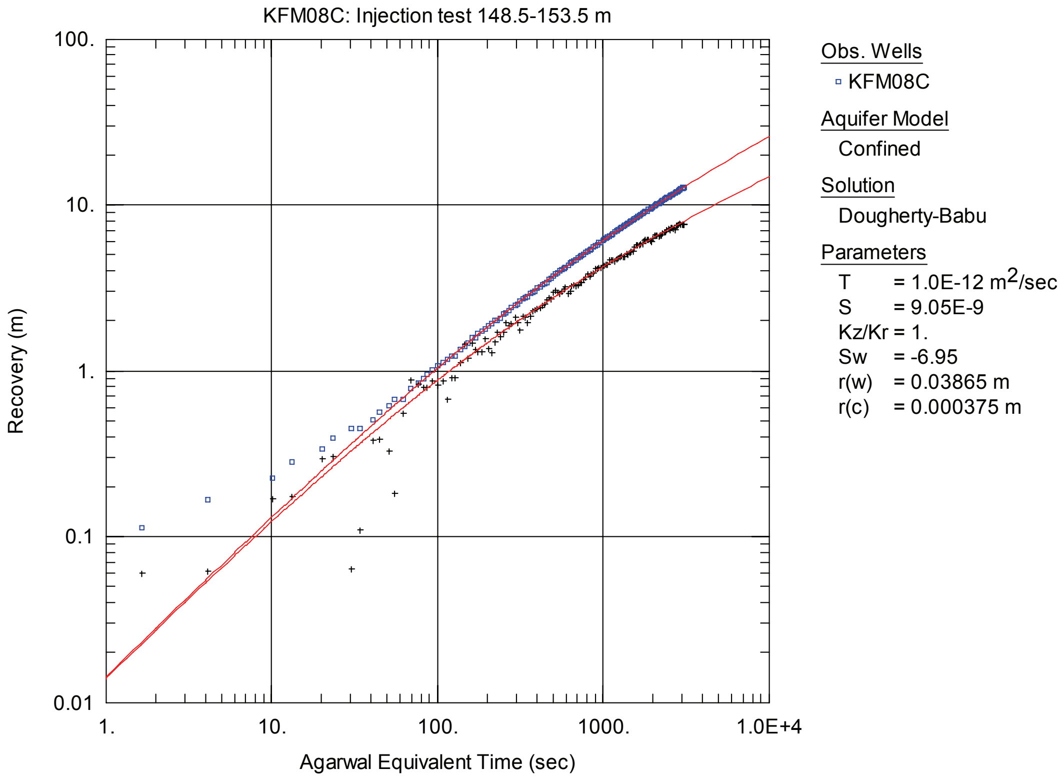


Figure A3-139. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 148.5-153.5 m in KFM08C. The type curve fit is only to show that an assumption of PRF is not valid.*

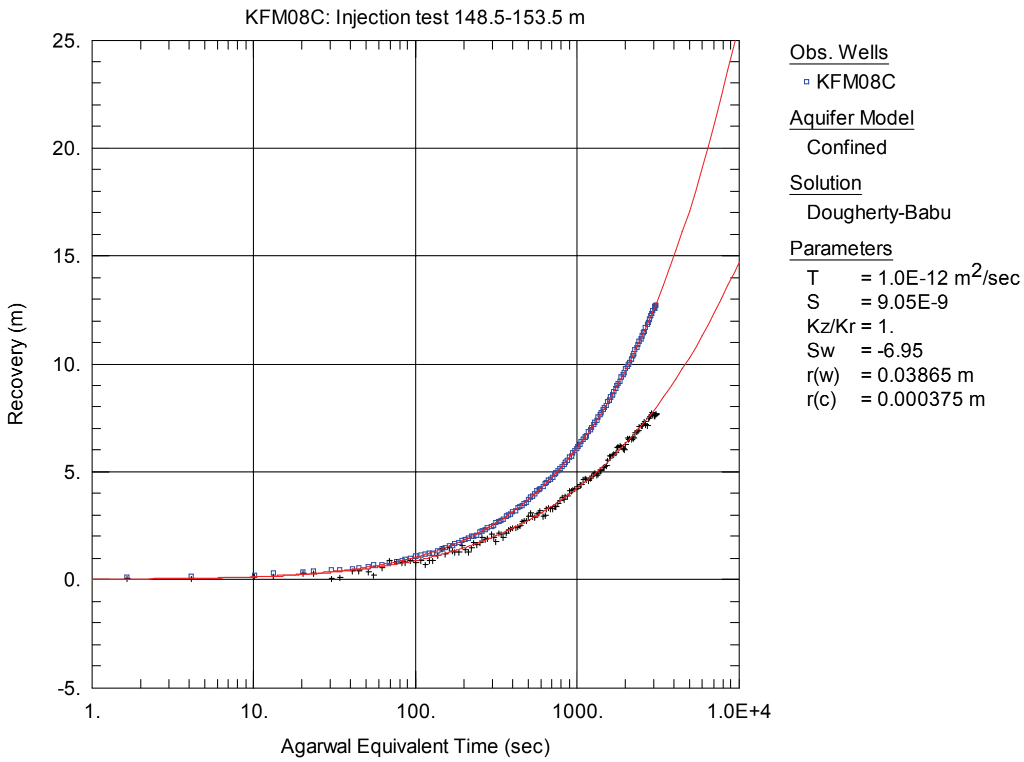


Figure A3-140. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 148.5-153.5 m in KFM08C. The type curve fit is only to show that an assumption of PRF is not valid.*

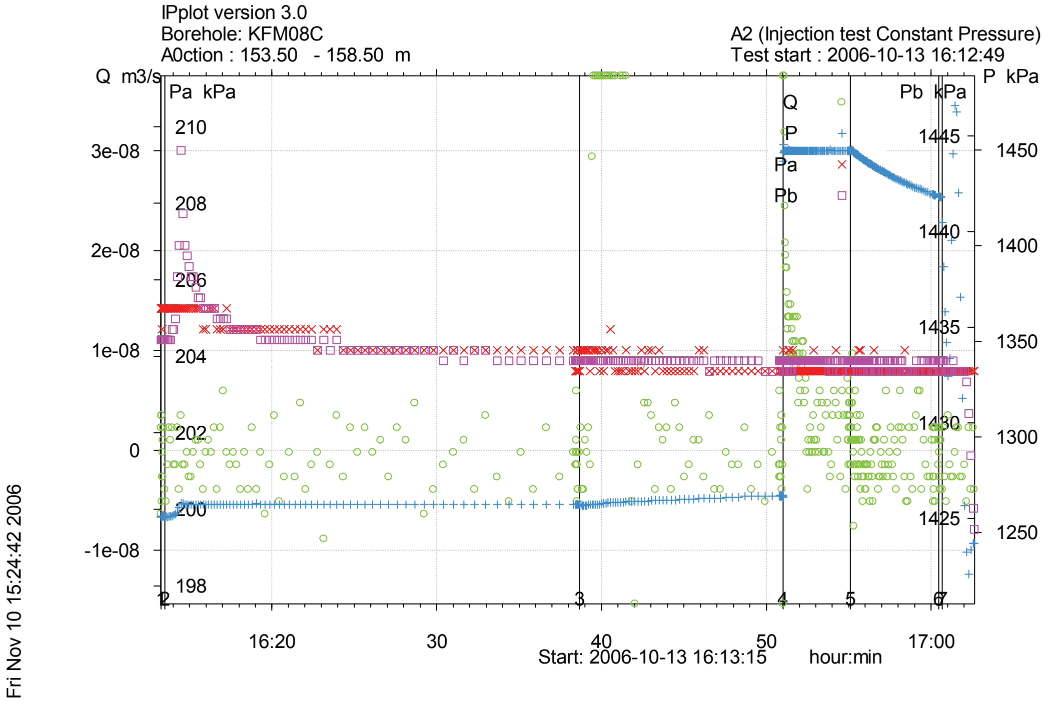


Figure A3-141. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 153.5-158.5 m in borehole KFM08C.

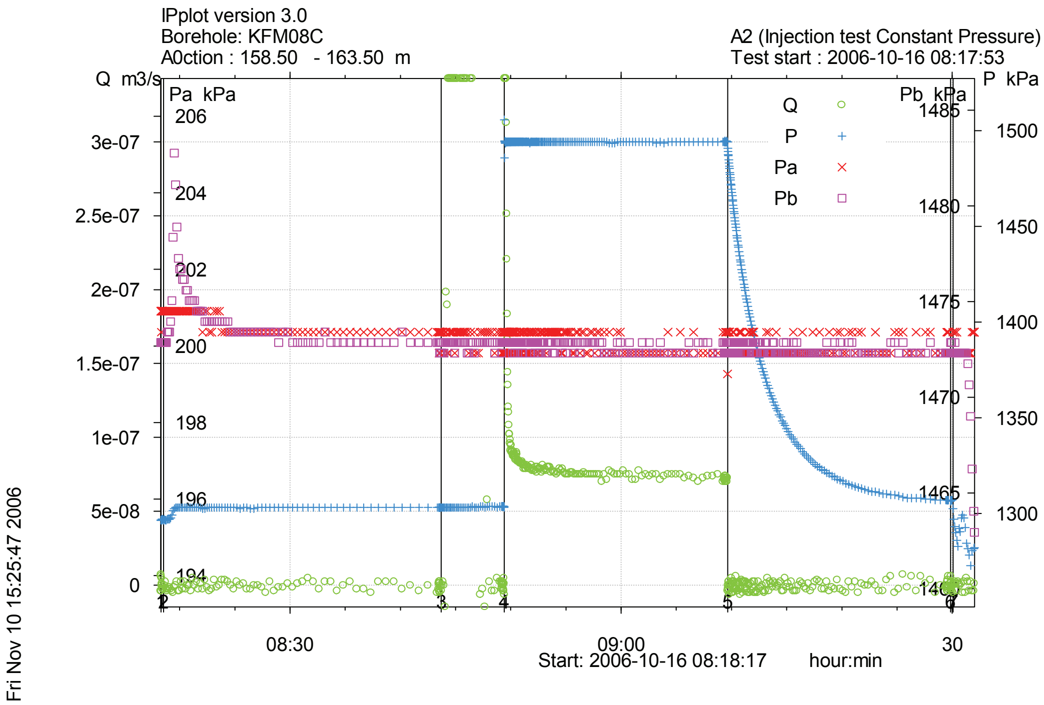


Figure A3-142. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 158.5-163.5 m in borehole KFM08C.

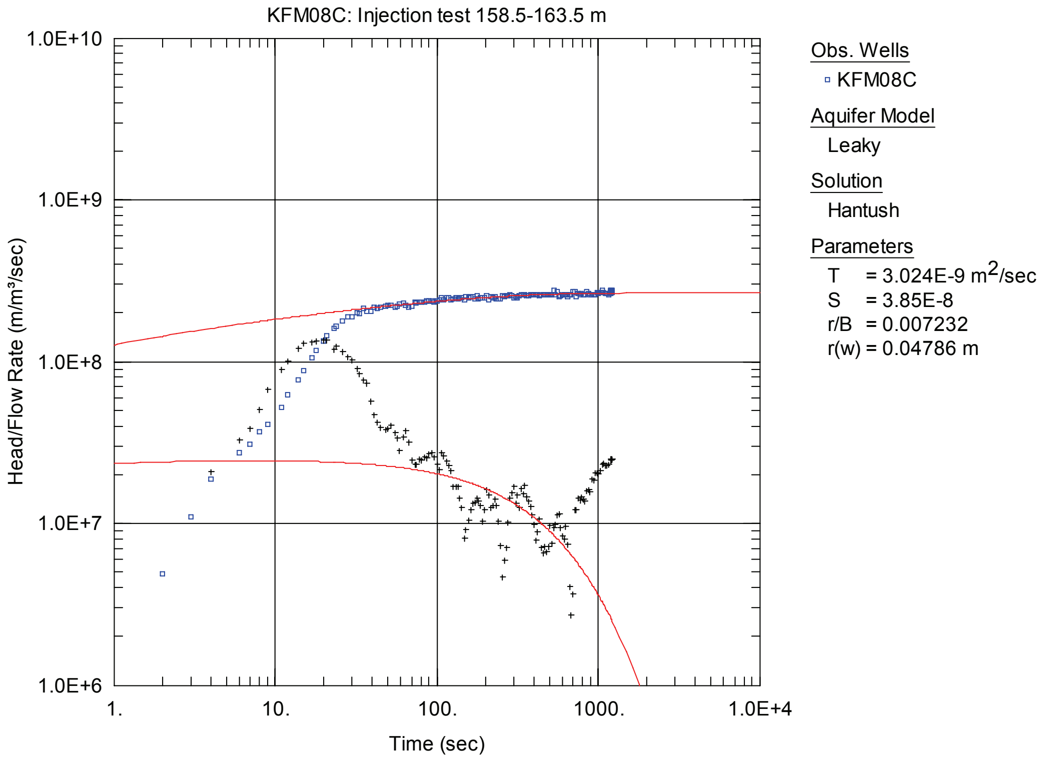


Figure A3-143. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 158.5-163.5 m in KFM08C.*

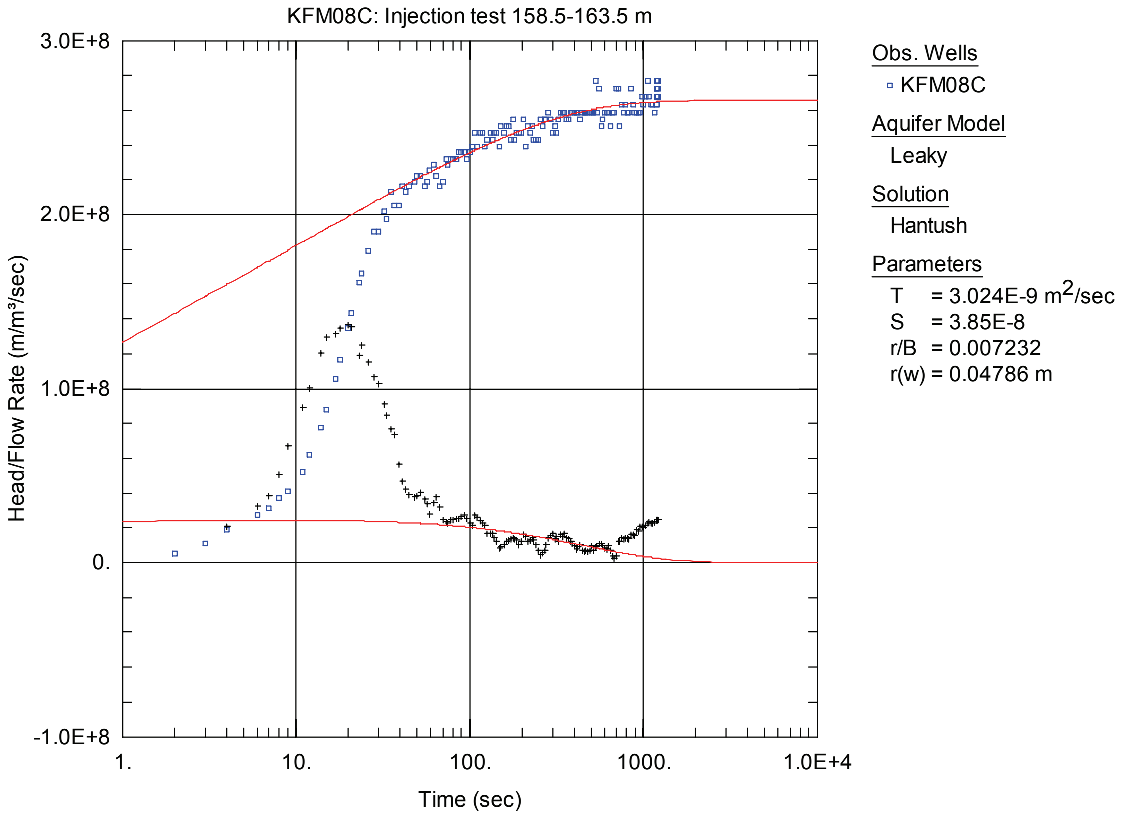


Figure A3-144. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 158.5-163.5 m in KFM08C.*

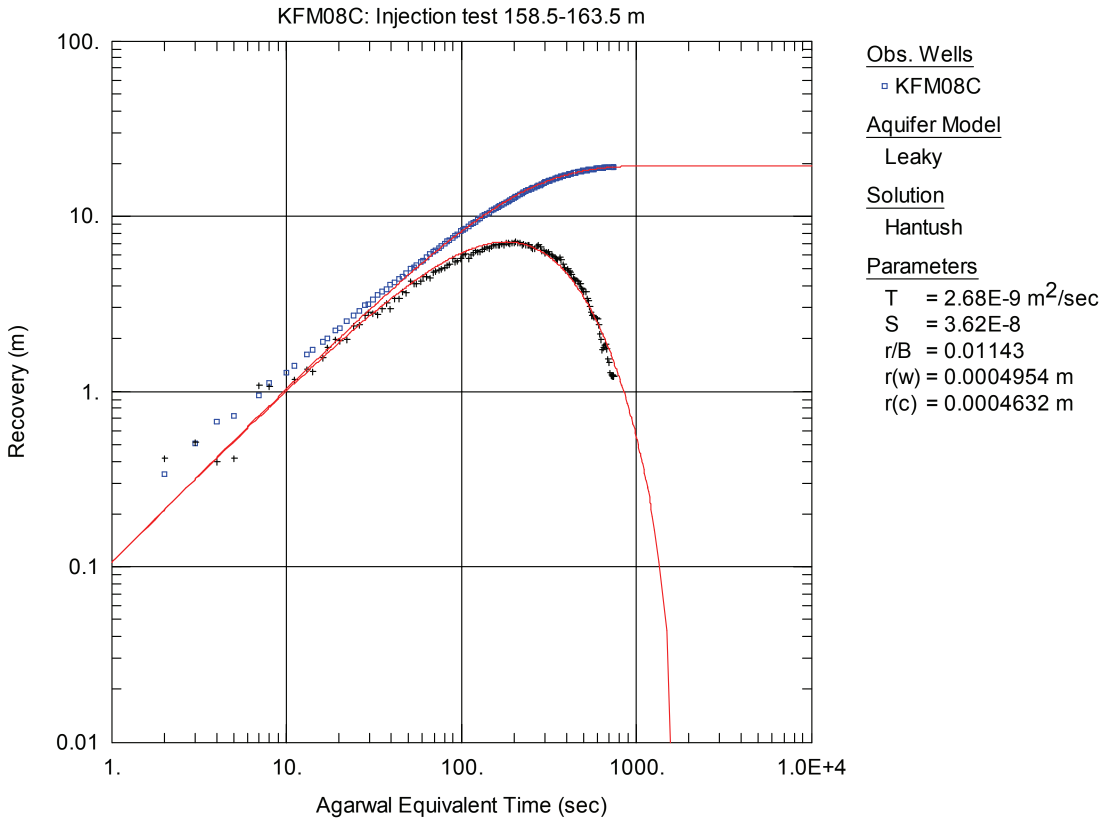


Figure A3-145. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 158.5-163.5 m in KFM08C.*

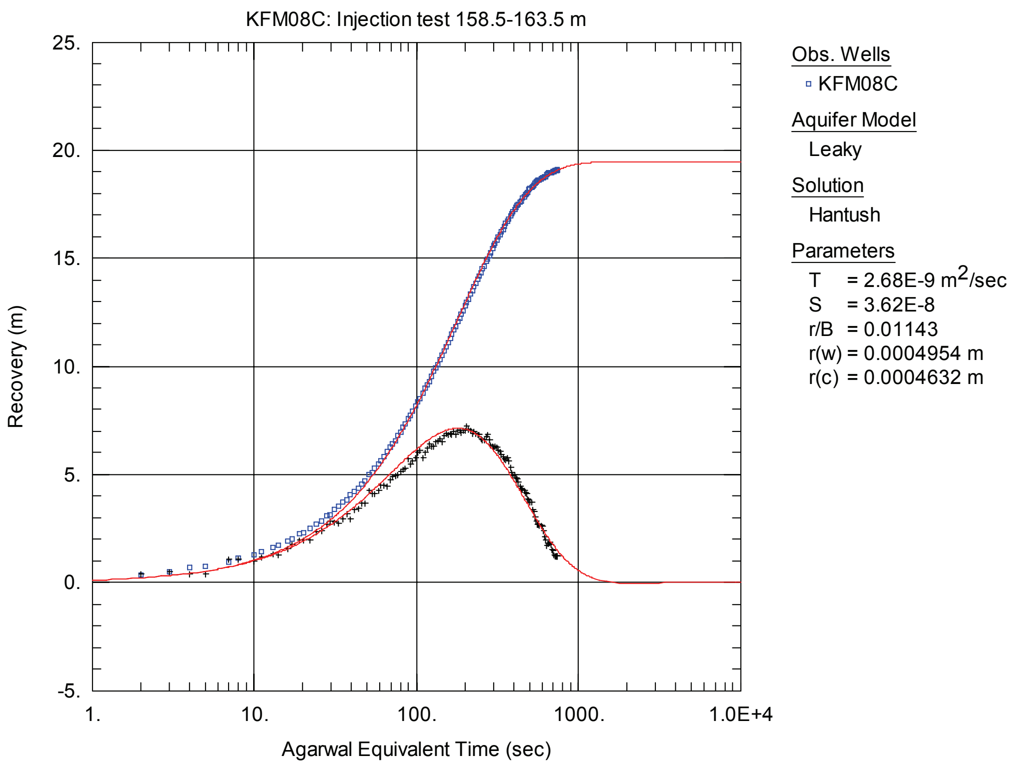


Figure A3-146. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 158.5-163.5 m in KFM08C.*

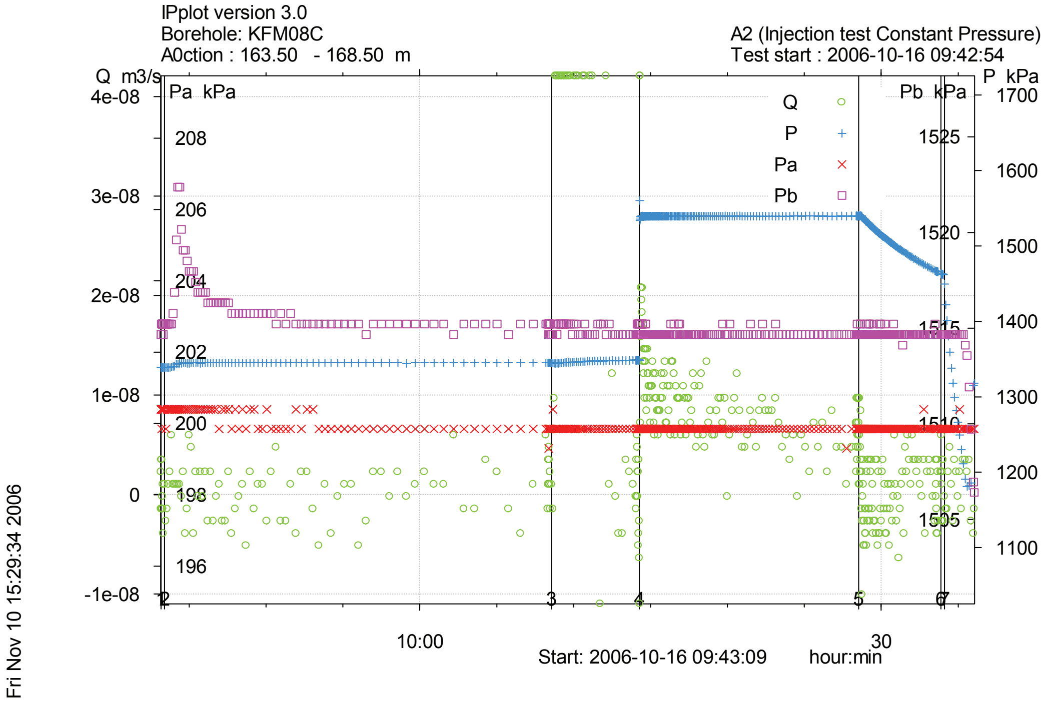


Figure A3-147. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 163.5-168.5 m in borehole KFM08C.*

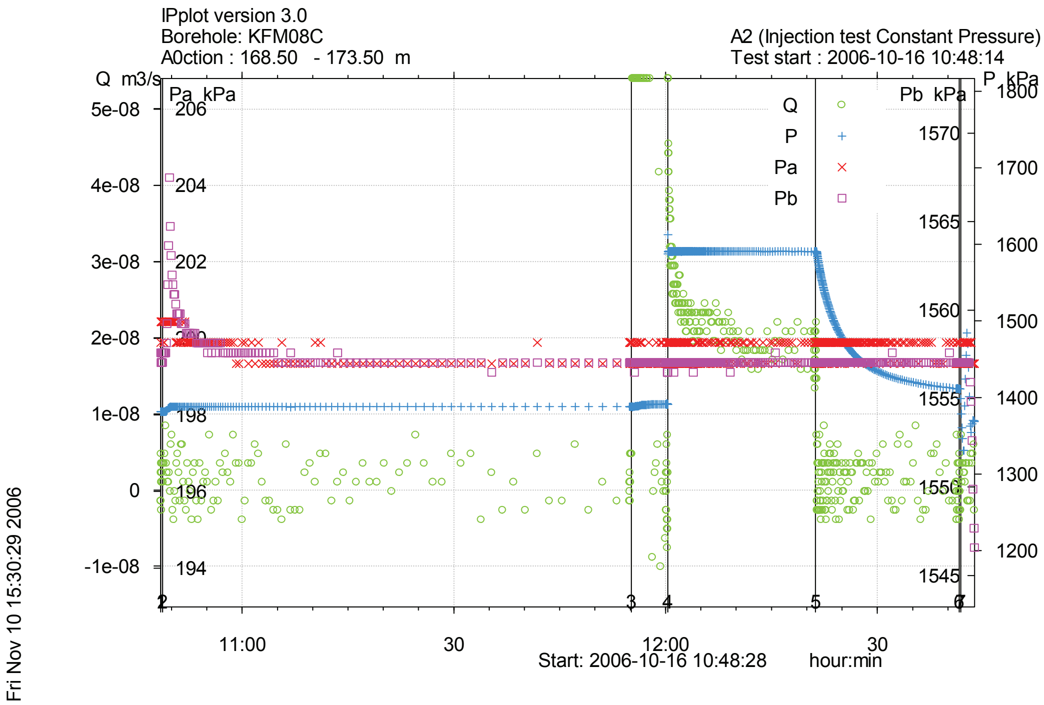


Figure A3-148. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 168.5-173.5 m in borehole KFM08C.*

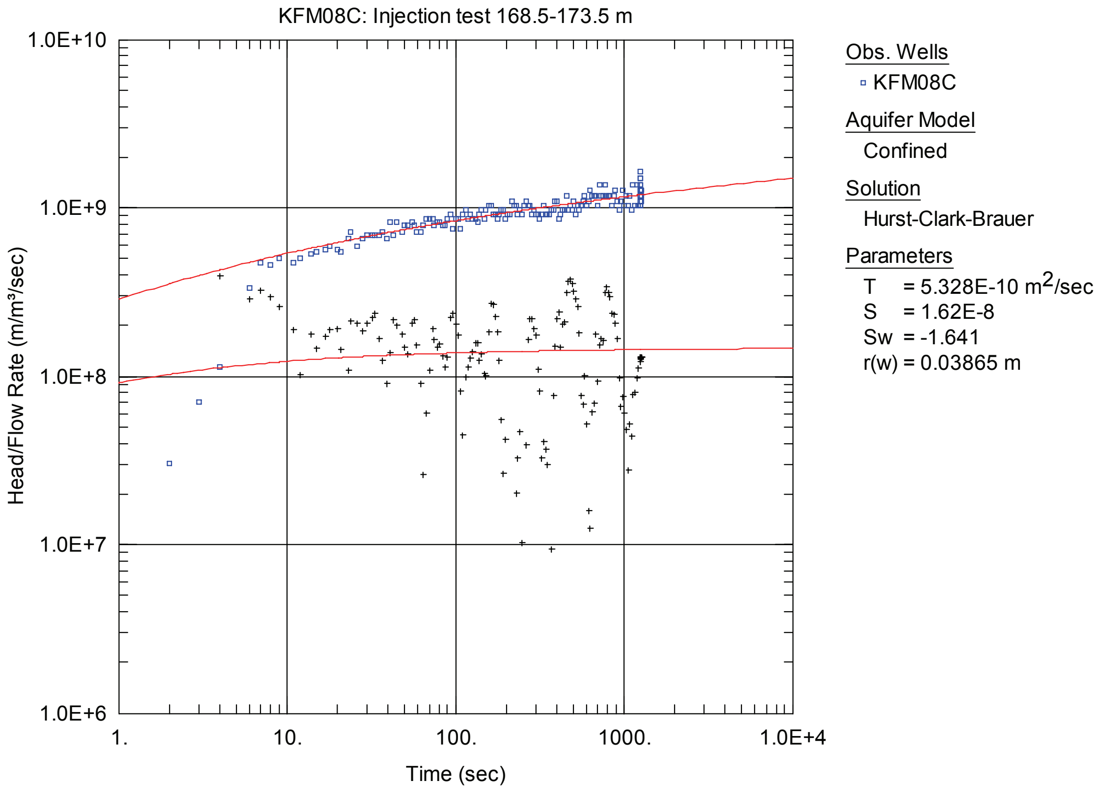


Figure A3-149. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 168.5-173.5 m in KFM08C.*

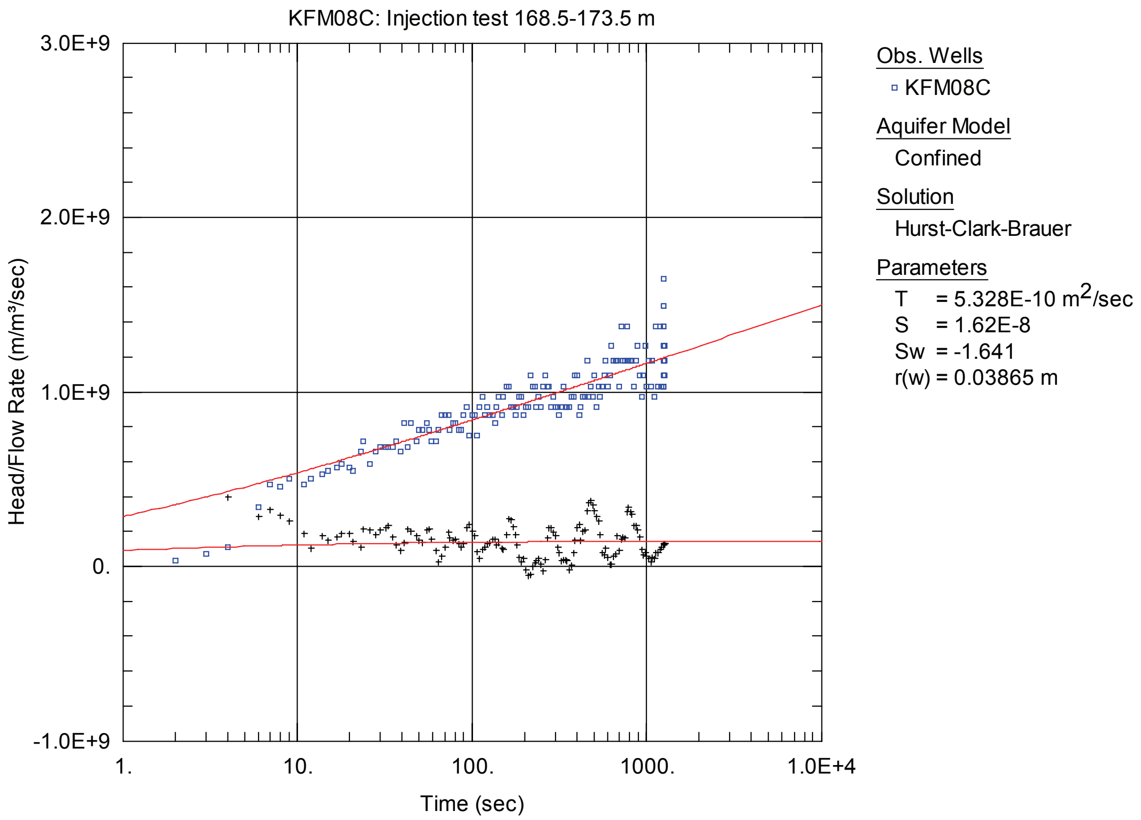


Figure A3-150. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 168.5-173.5 m in KFM08C.*

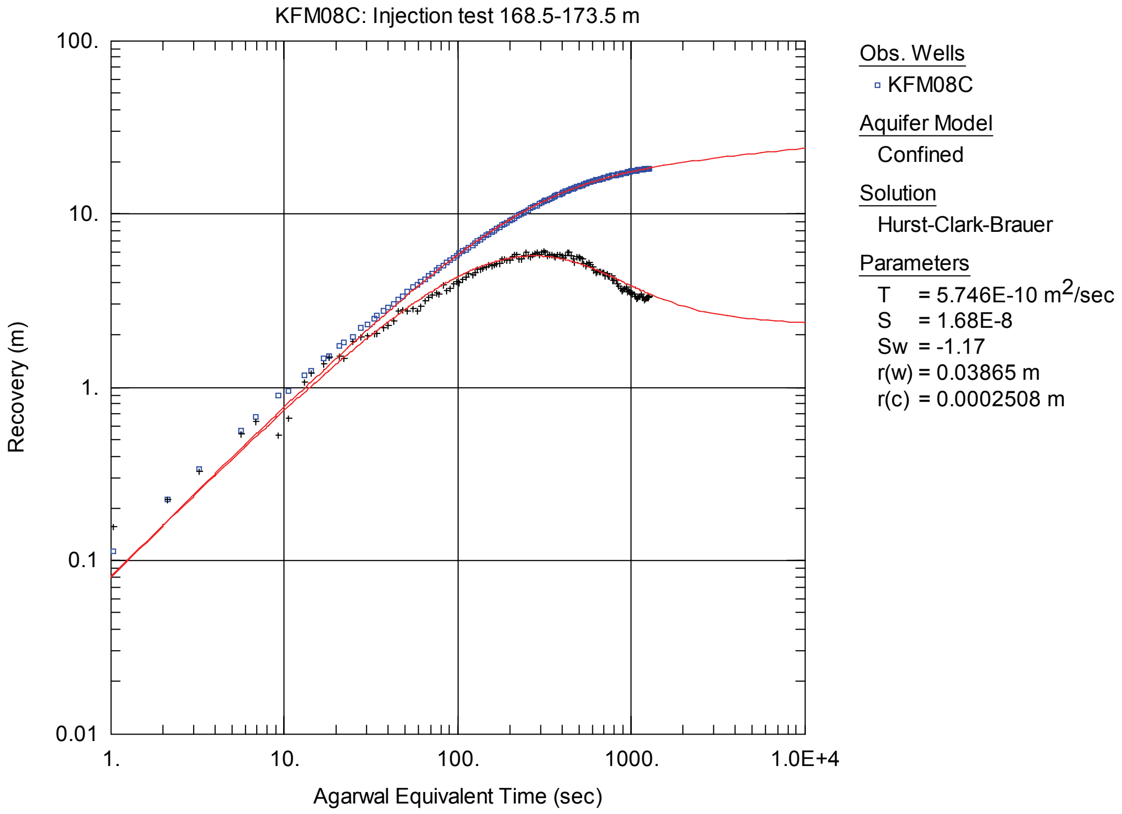


Figure A3-151. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 168.5-173.5 m in KFM08C.*

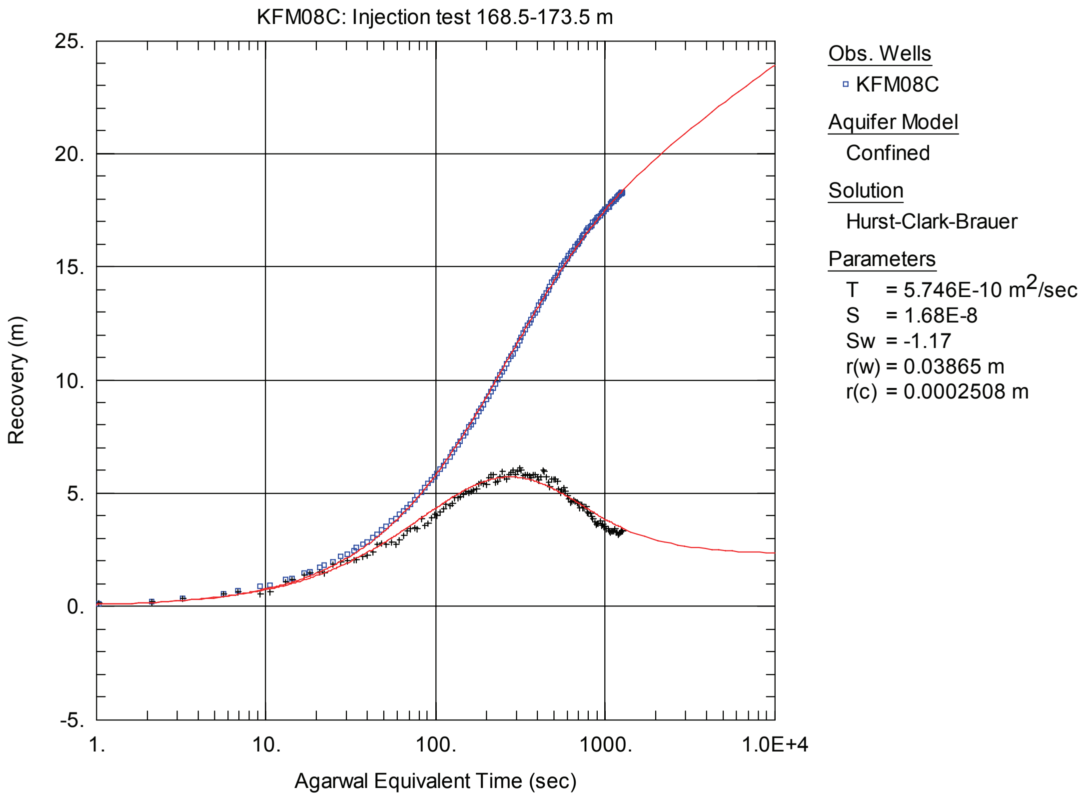


Figure A3-152. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 168.5-173.5 m in KFM08C.*

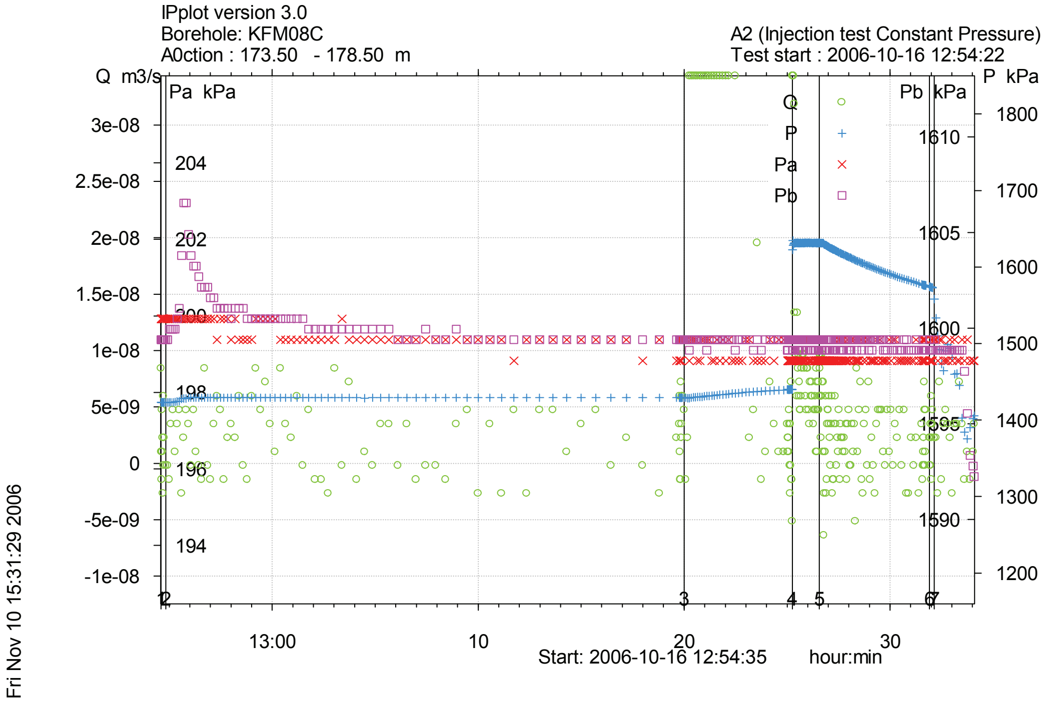


Figure A3-153. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 173.5-178.5 m in borehole KFM08C.*

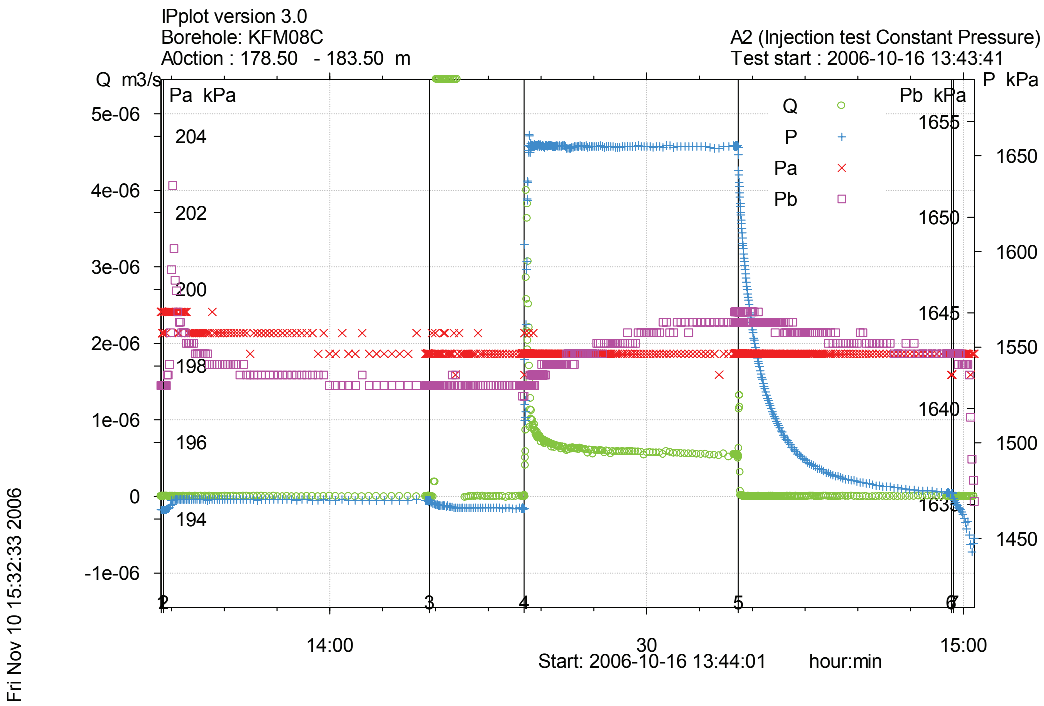


Figure A3-154. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 178.5-183.5 m in borehole KFM08C.*

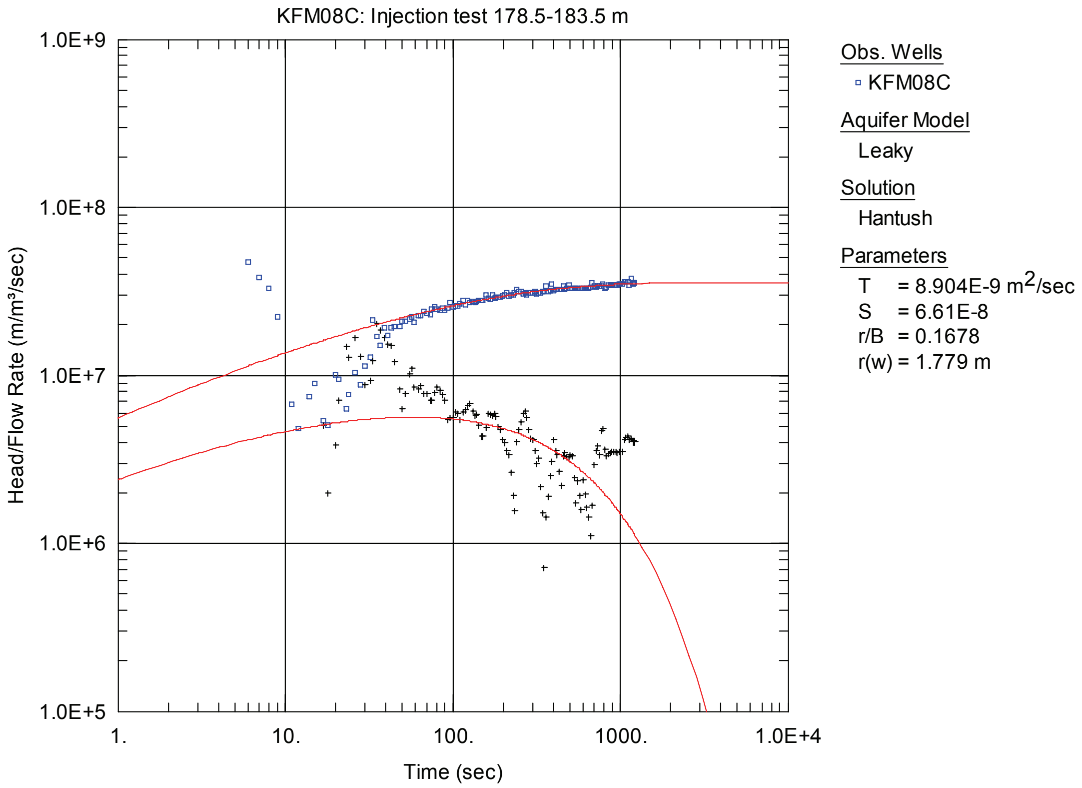


Figure A3-155. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 178.5-183.5 m in KFM08C.*

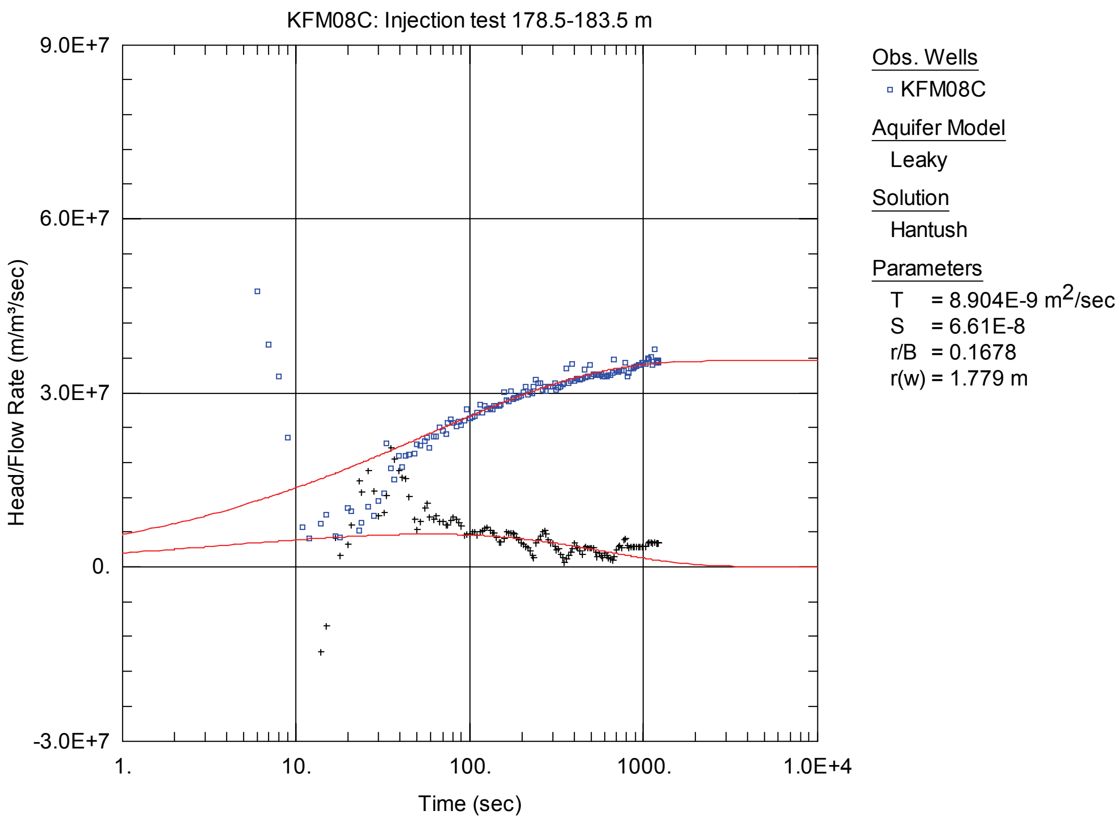


Figure A3-156. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 178.5-183.5 m in KFM08C.*

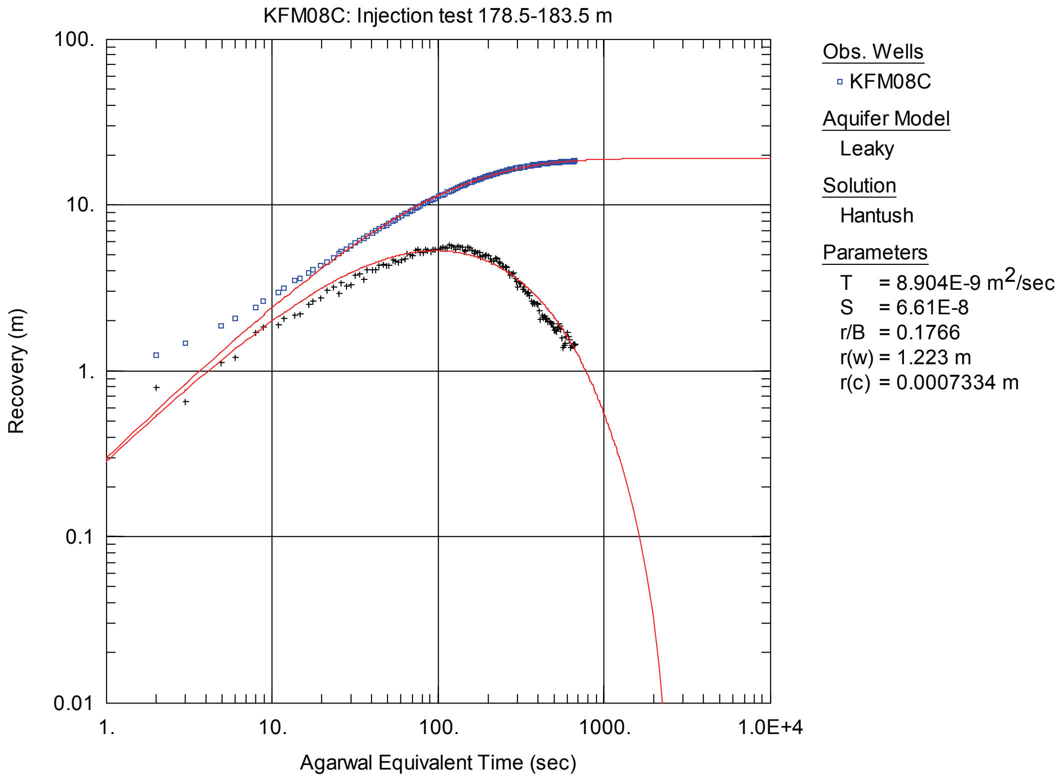


Figure A3-157. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 178.5-183.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

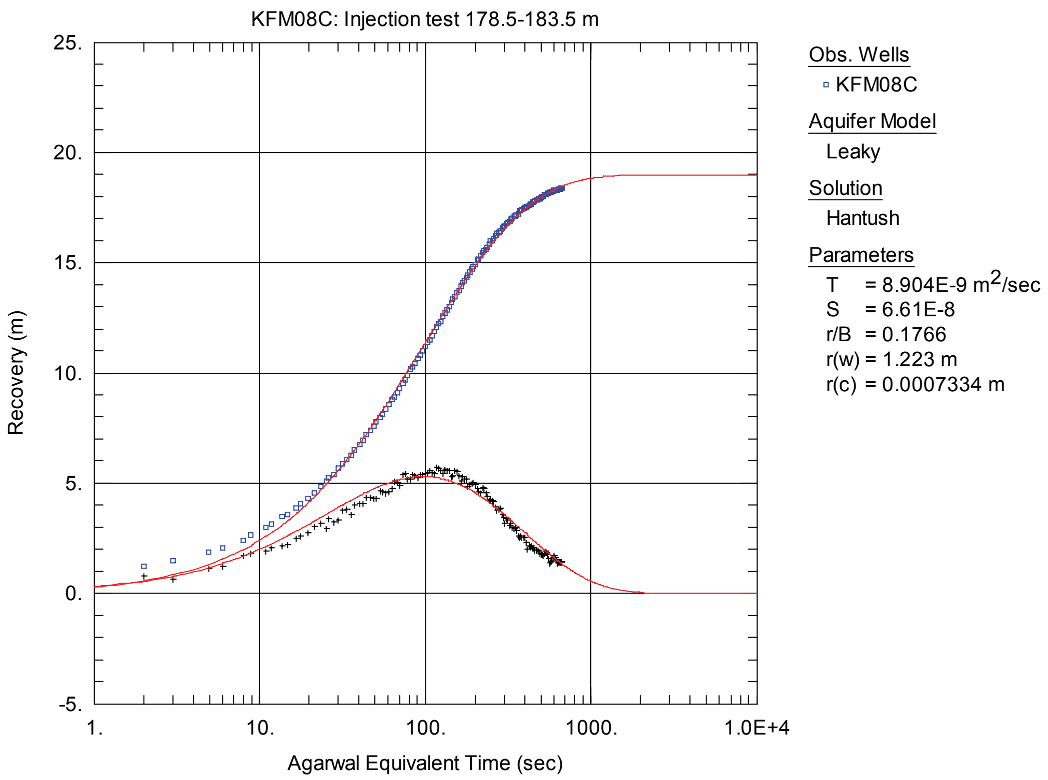


Figure A3-158. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 178.5-183.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

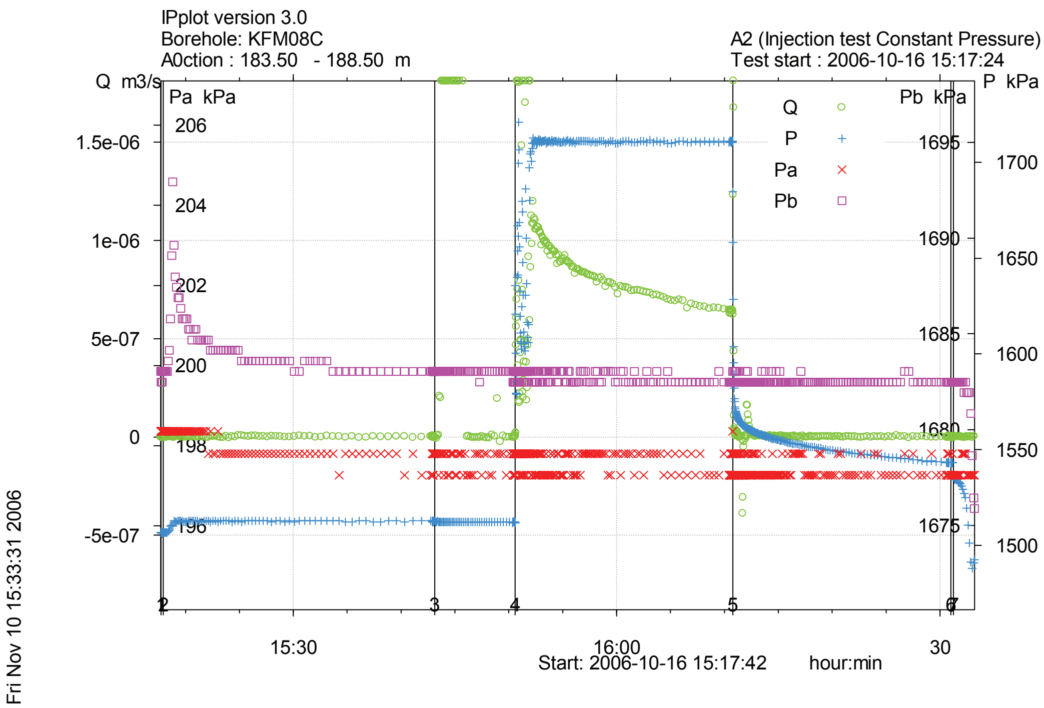


***Figure A3-159.** Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 183.5-188.5 m in borehole KFM08C.*

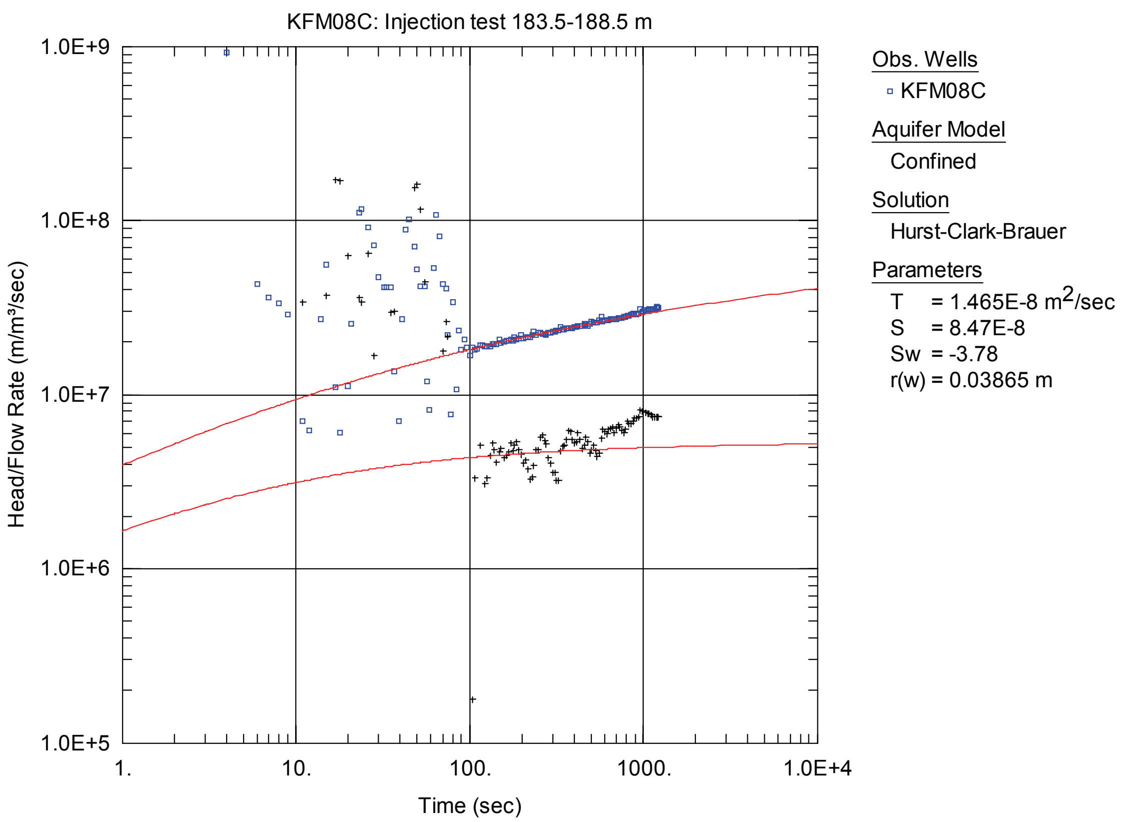


***Figure A3-160.** Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 183.5-188.5 m in KFM08C.*

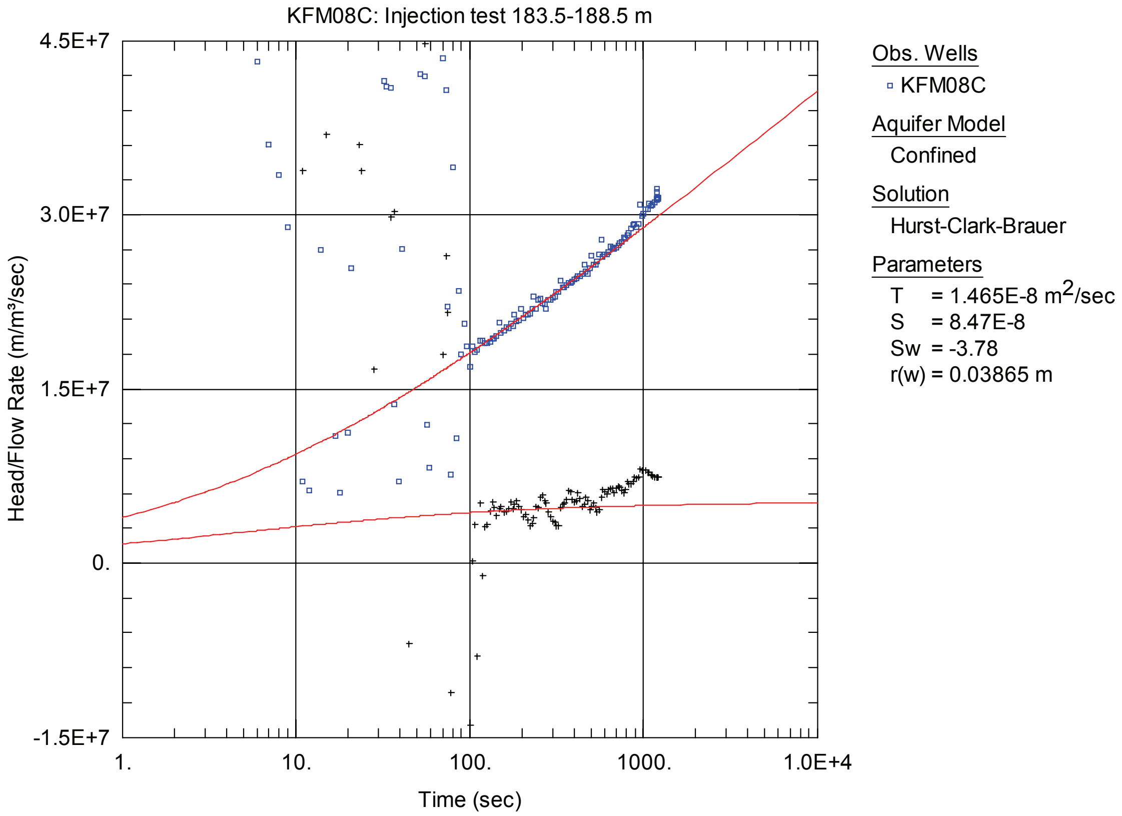


Figure A3-161. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 183.5-188.5 m in KFM08C.*

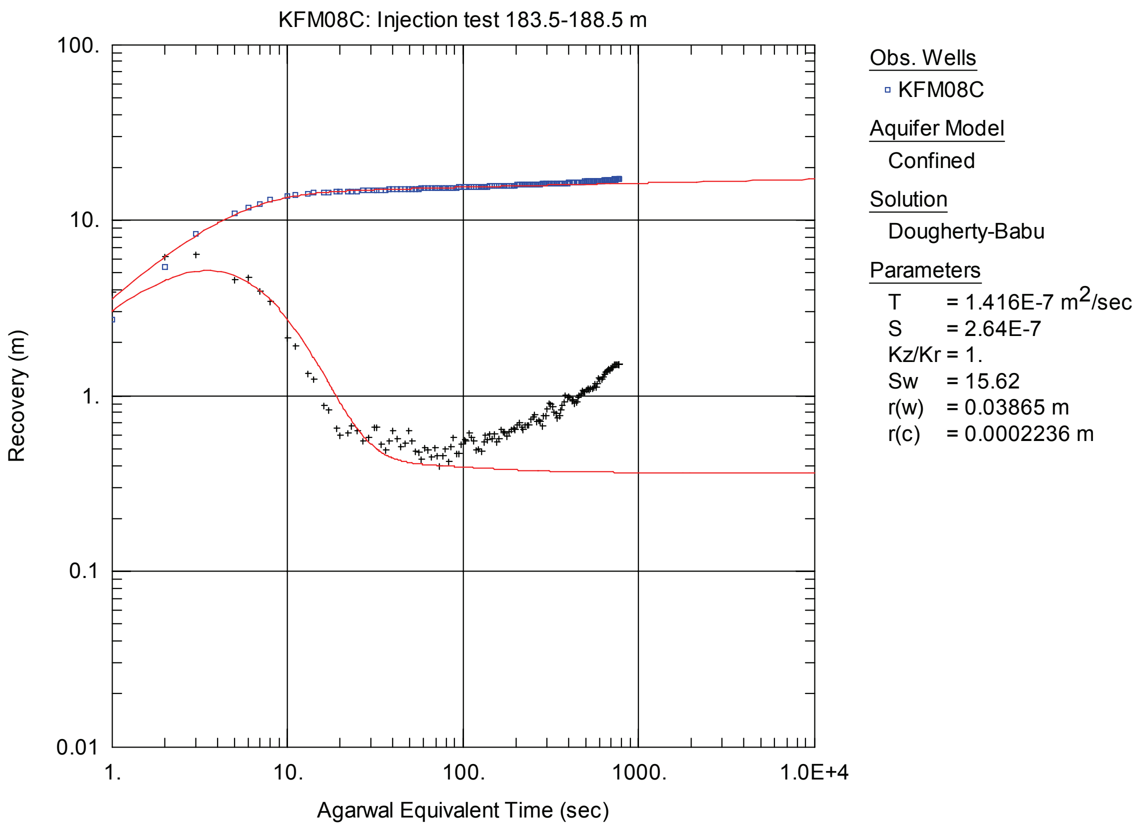


Figure A3-162. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 183.5-188.5 m in KFM08C.*

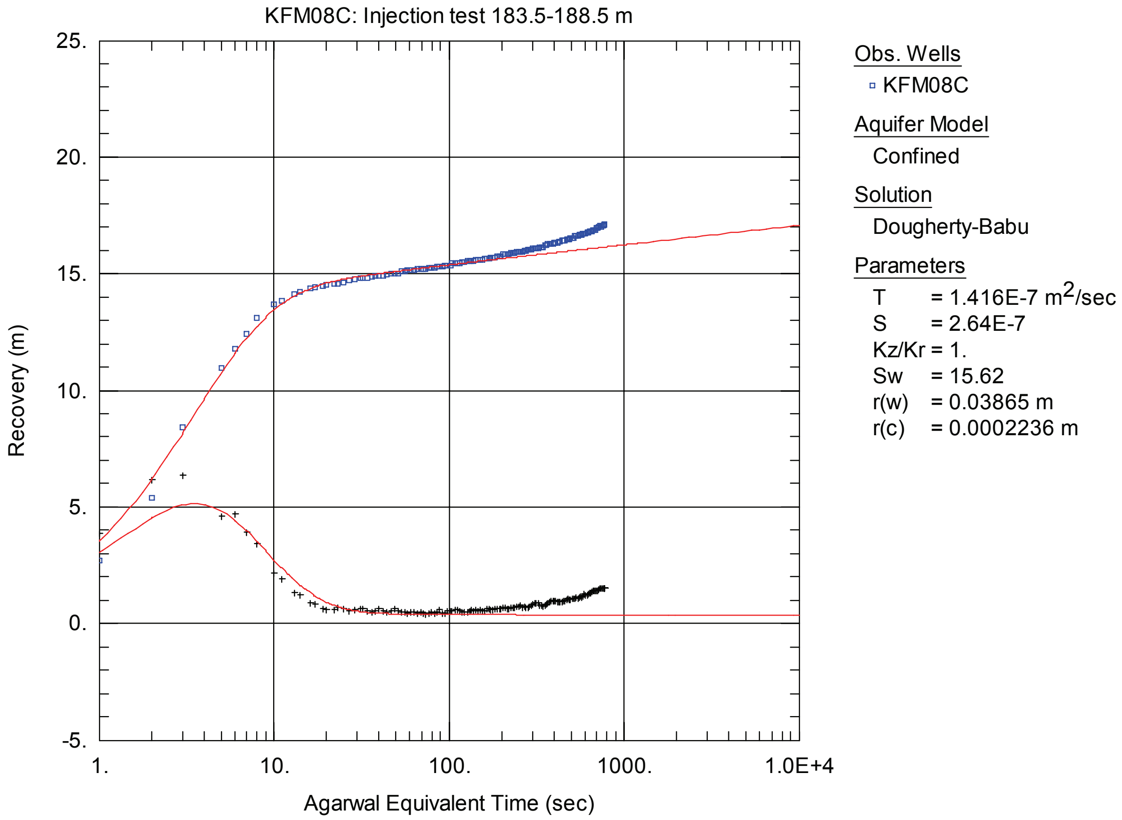


Figure A3-163. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 183.5-188.5 m in KFM08C.*

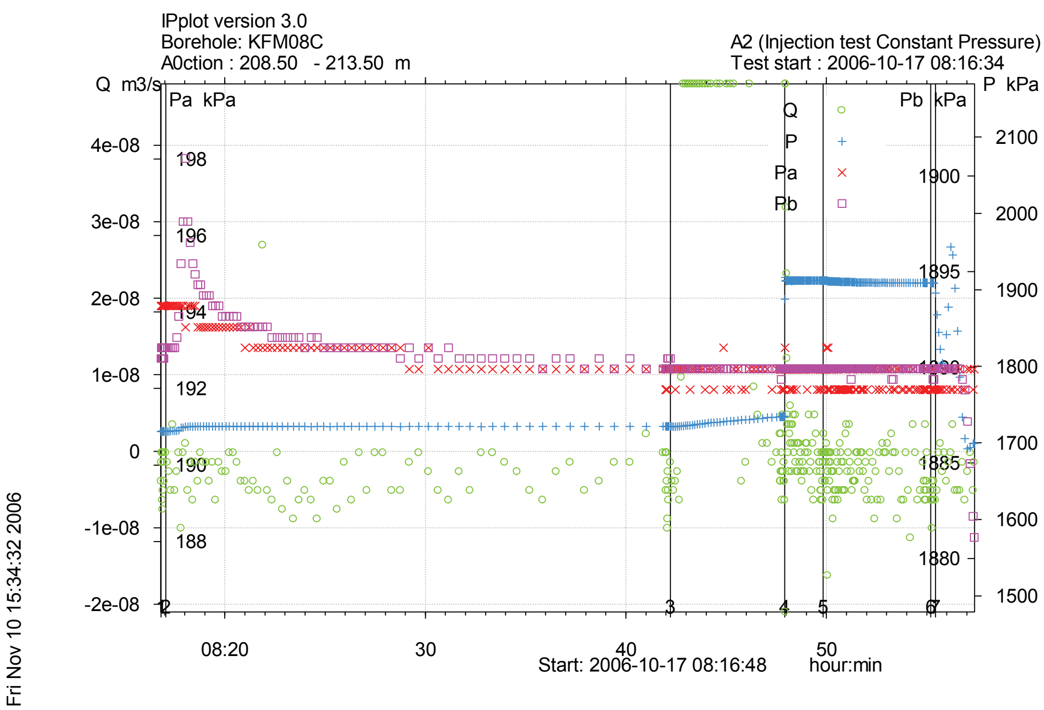


Figure A3-164. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 208.5-213.5 m in borehole KFM08C.*

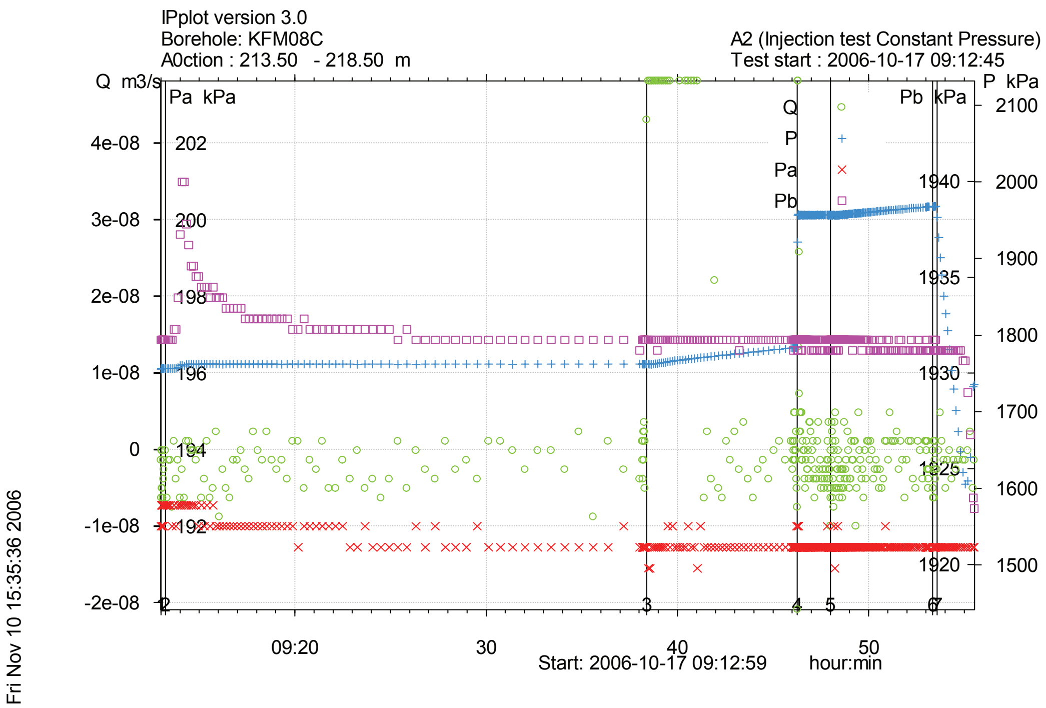


Figure A3-165. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 213.5-218.5 m in borehole KFM08C.*

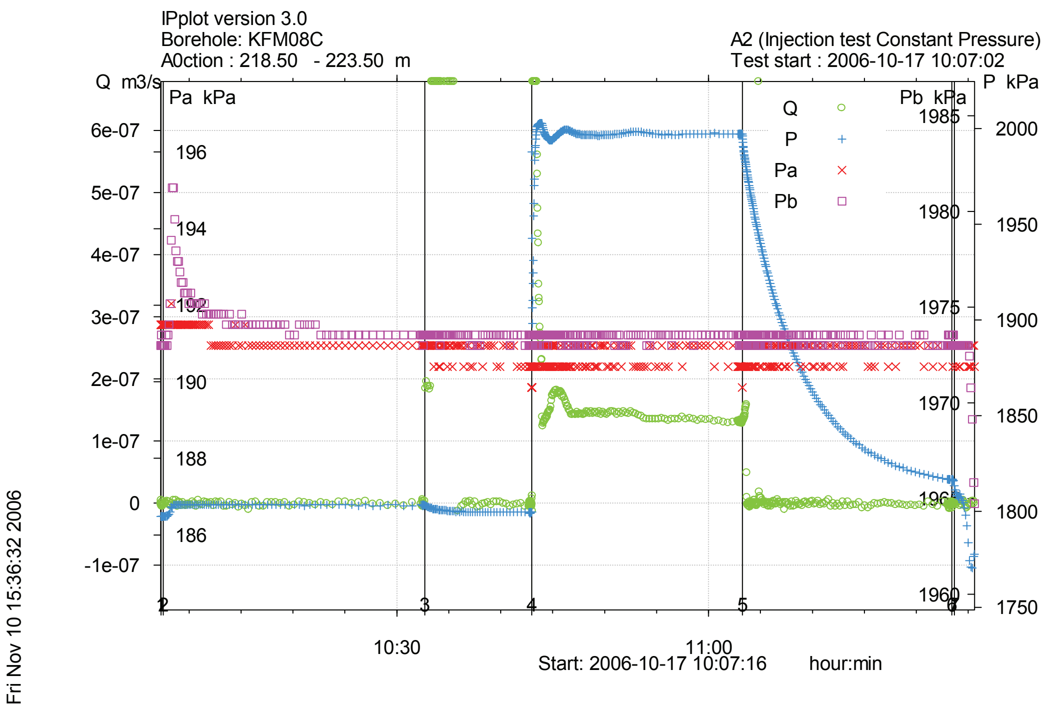


Figure A3-166. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 218.5-223.5 m in borehole KFM08C.*

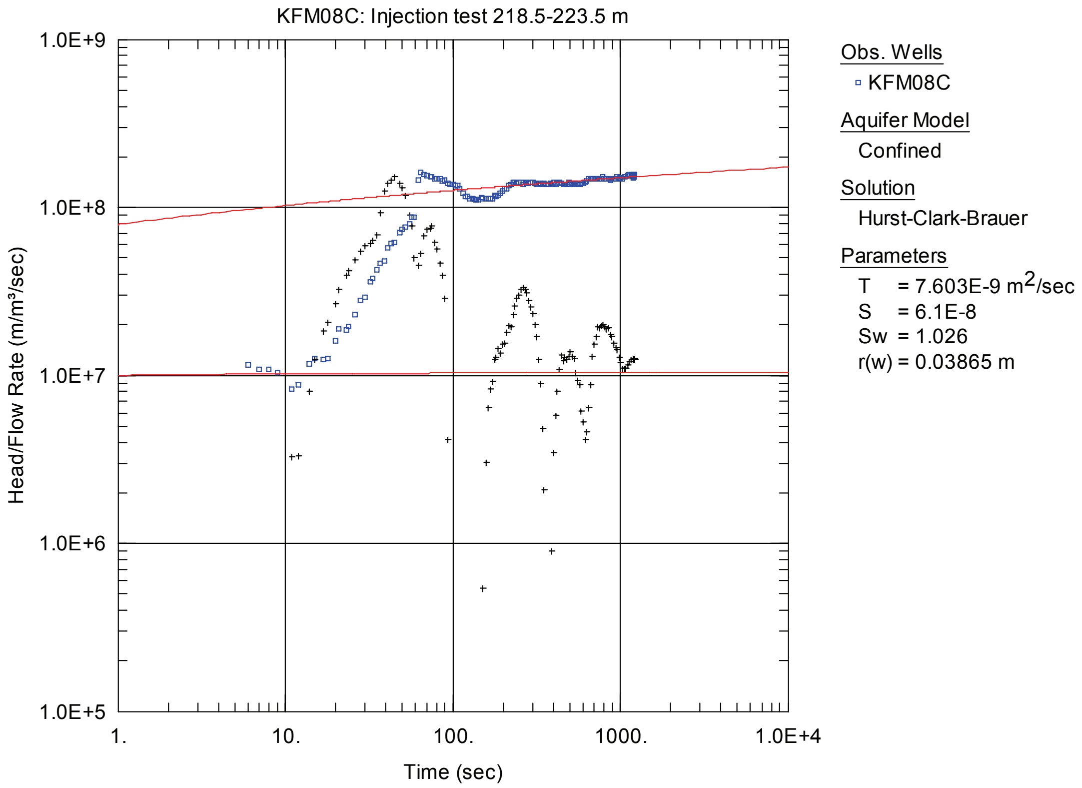


Figure A3-167. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 218.5-223.5 m in KFM08C.*

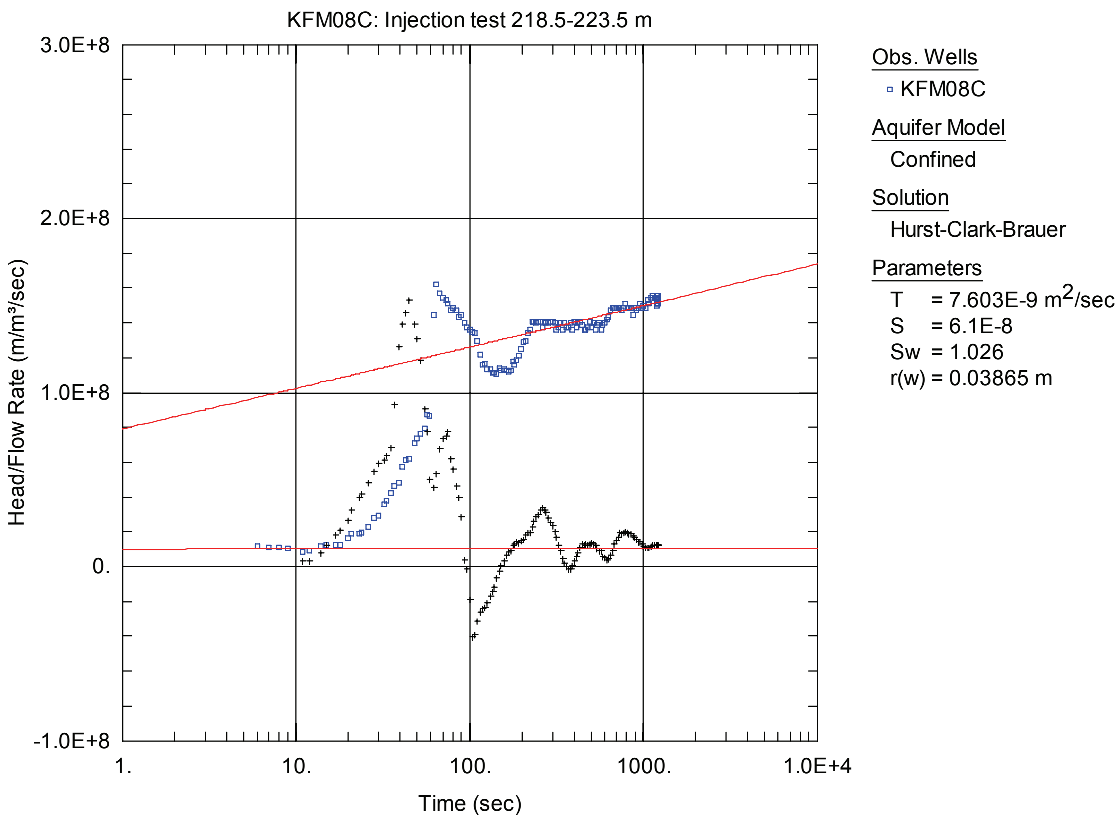


Figure A3-168. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 218.5-223.5 m in KFM08C.*

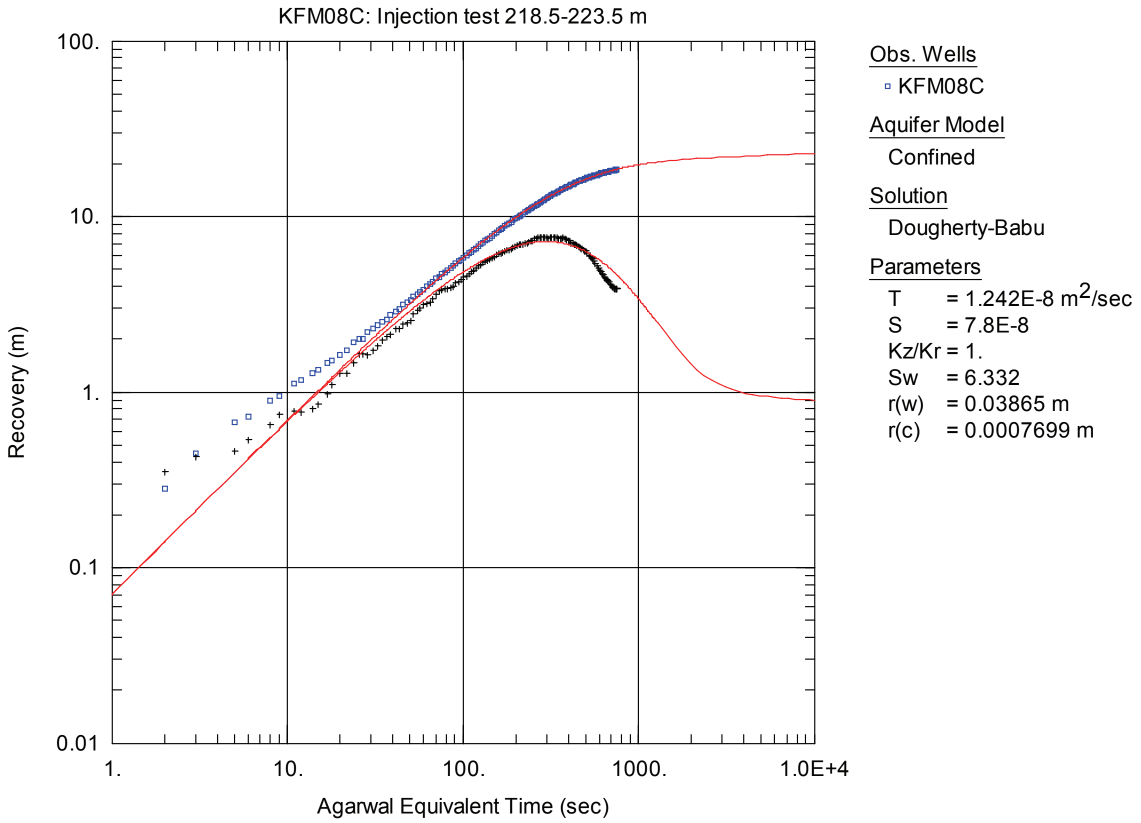


Figure A3-169. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 218.5-223.5 m in KFM08C.*

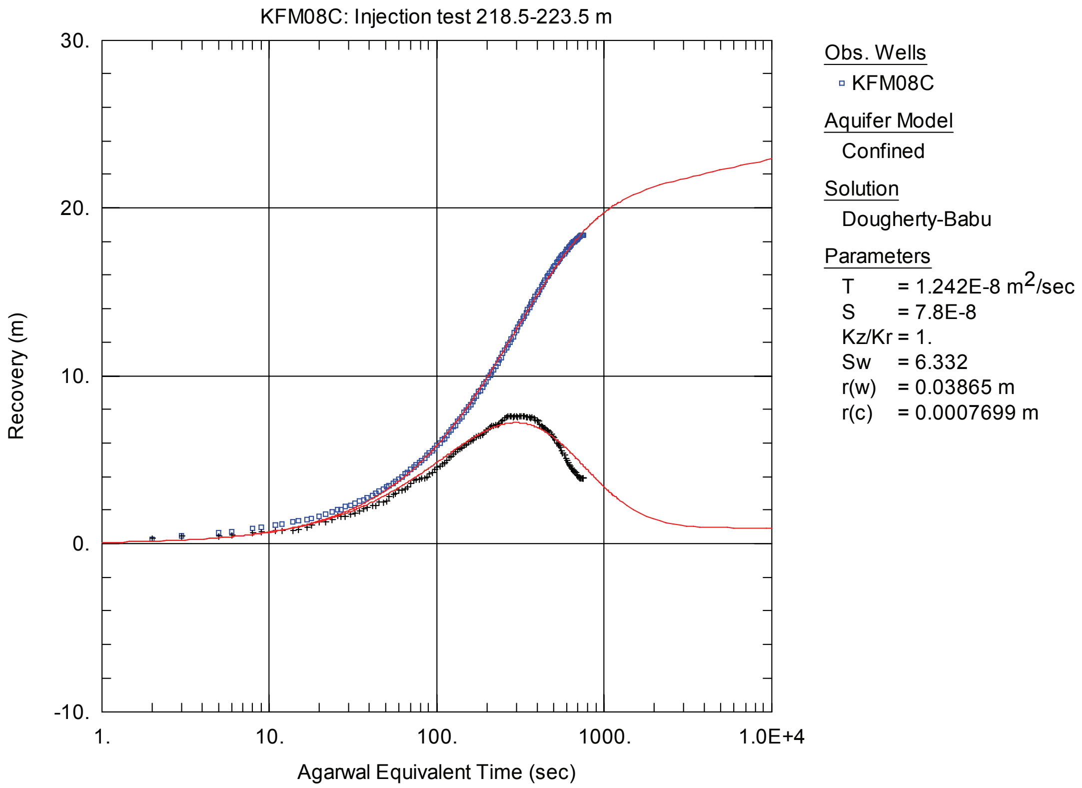


Figure A3-170. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 218.5-223.5 m in KFM08C.*

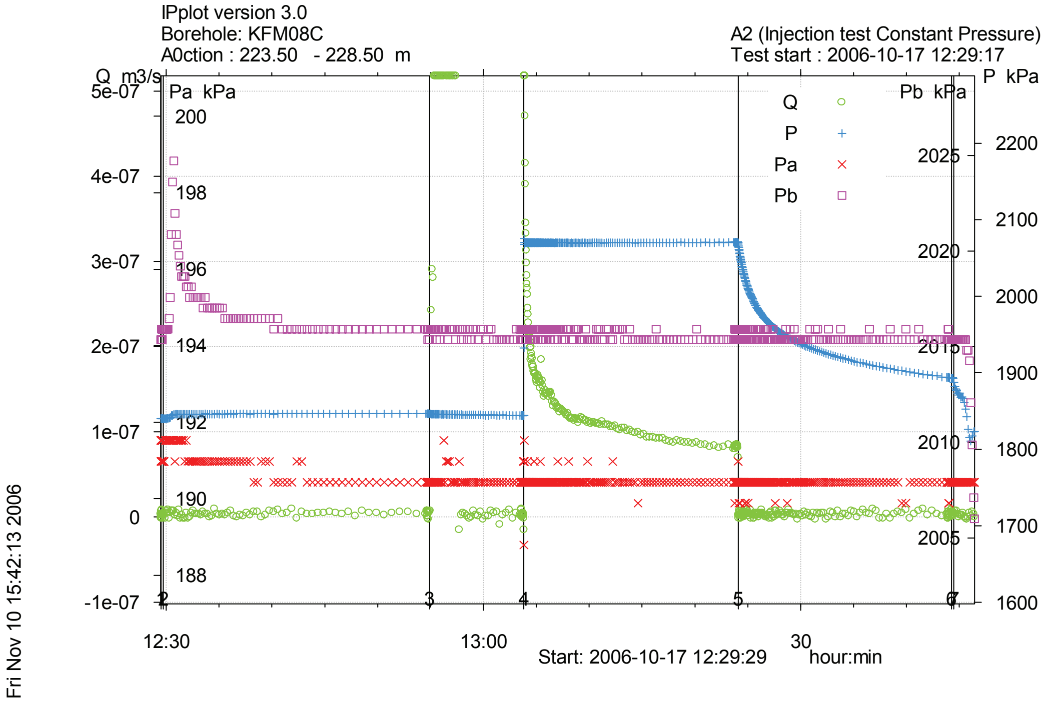


Figure A3-171. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 223.5-228.5 m in borehole KFM08C.*

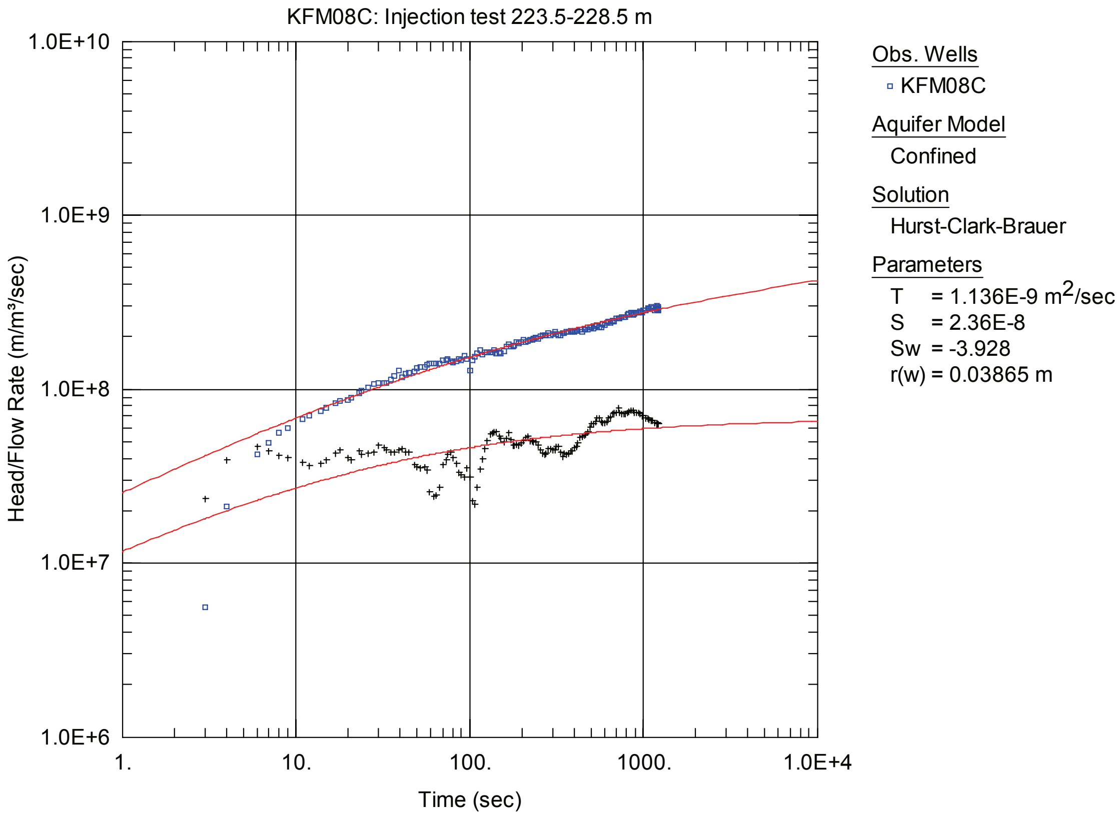


Figure A3-172. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 223.5-228.5 m in KFM08C.*

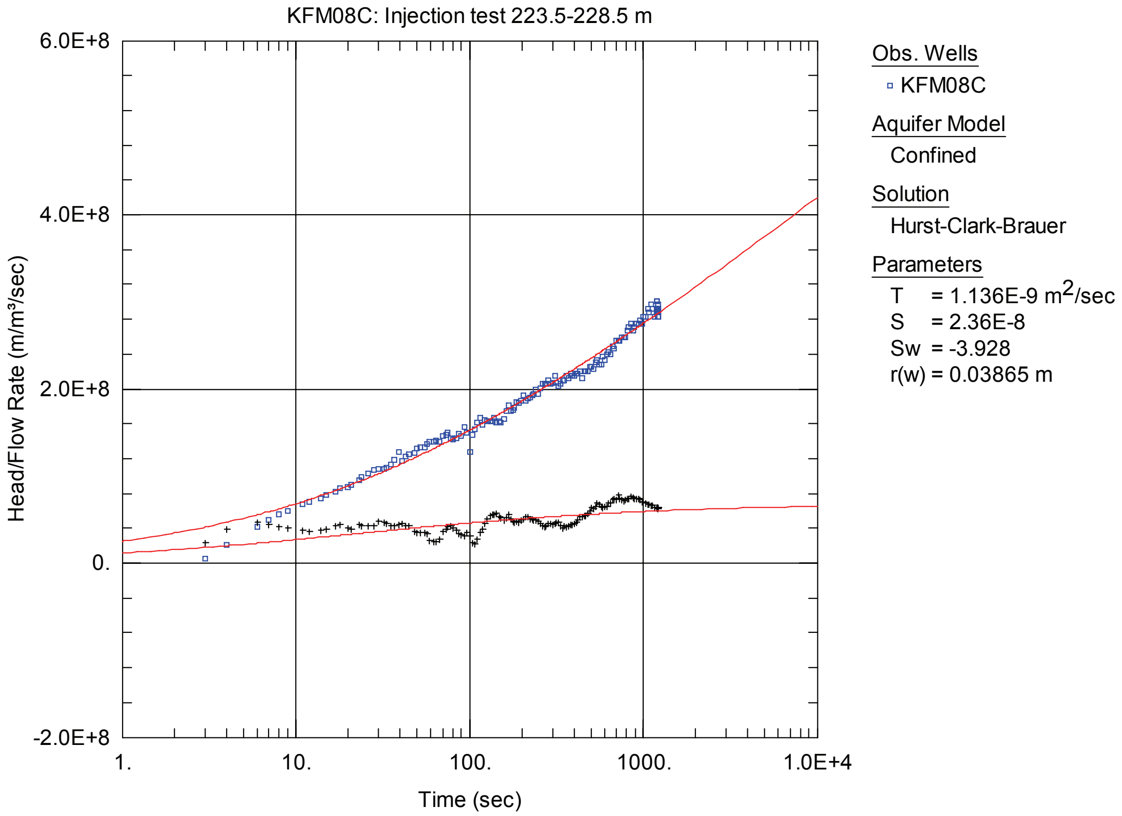


Figure A3-173. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 223.5-228.5 m in KFM08C.*

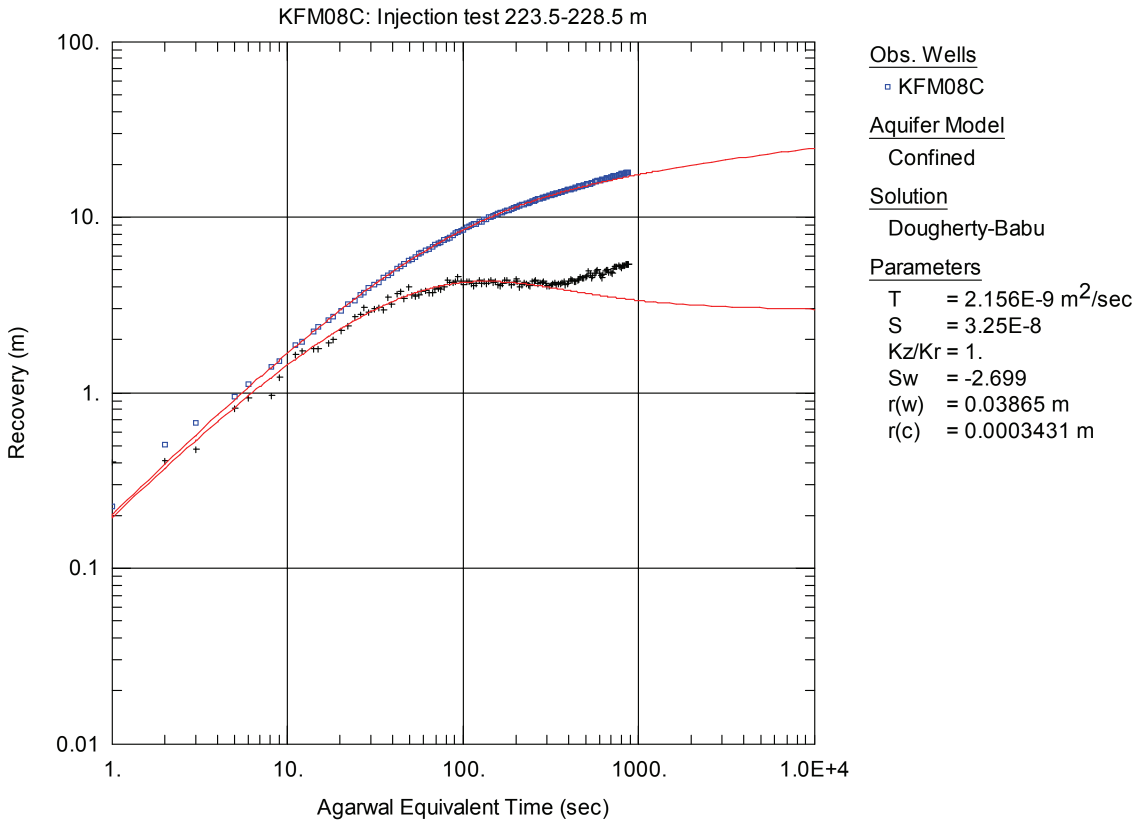


Figure A3-174. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 223.5-228.5 m in KFM08C.*

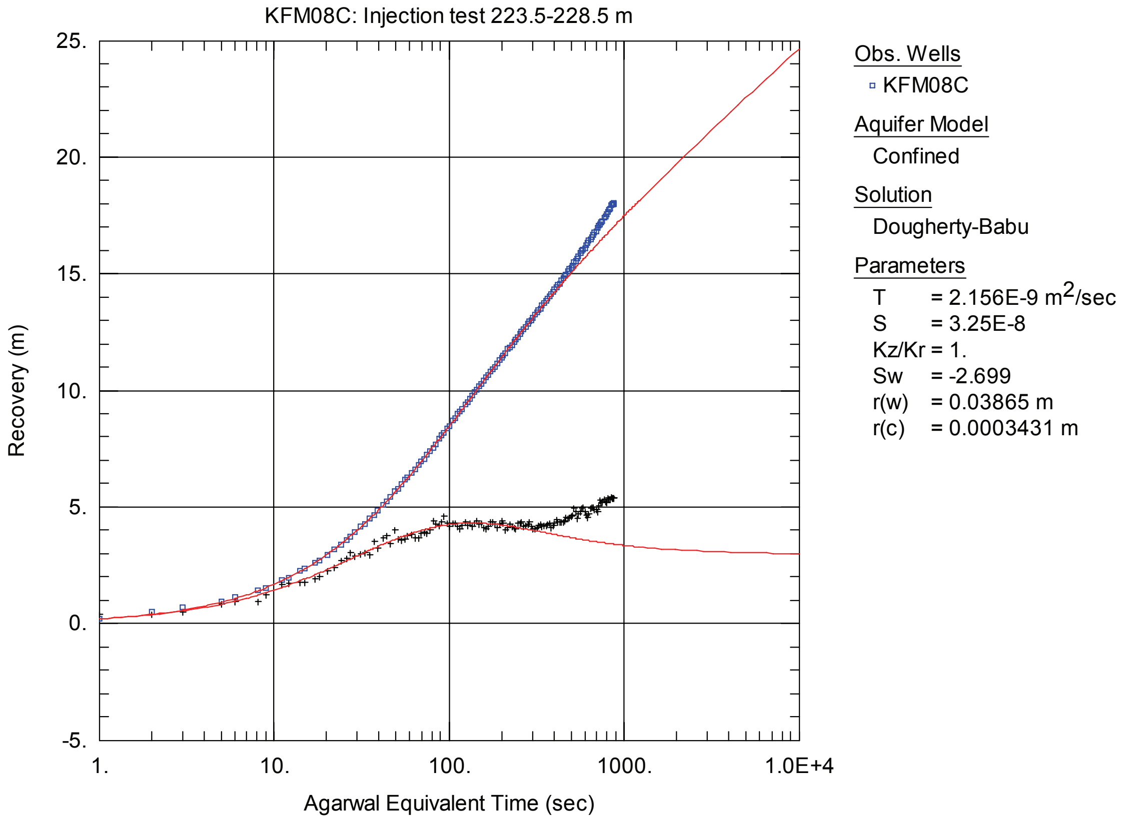


Figure A3-175. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 223.5-228.5 m in KFM08C.*

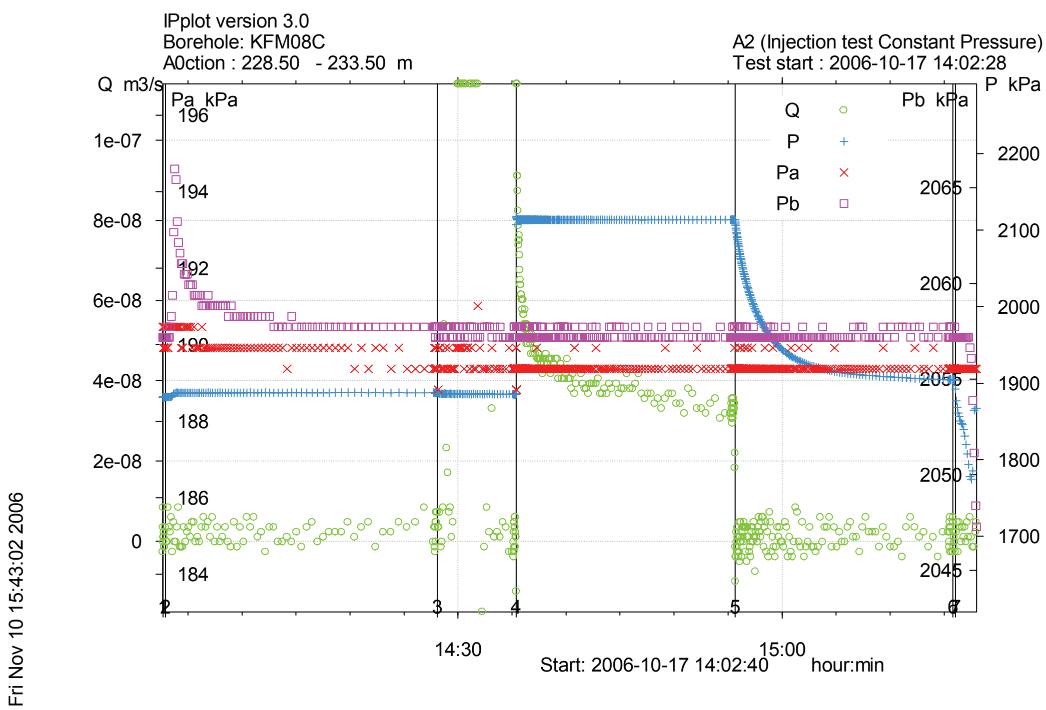


Figure A3-176. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 228.5-233.5 m in borehole KFM08C.*

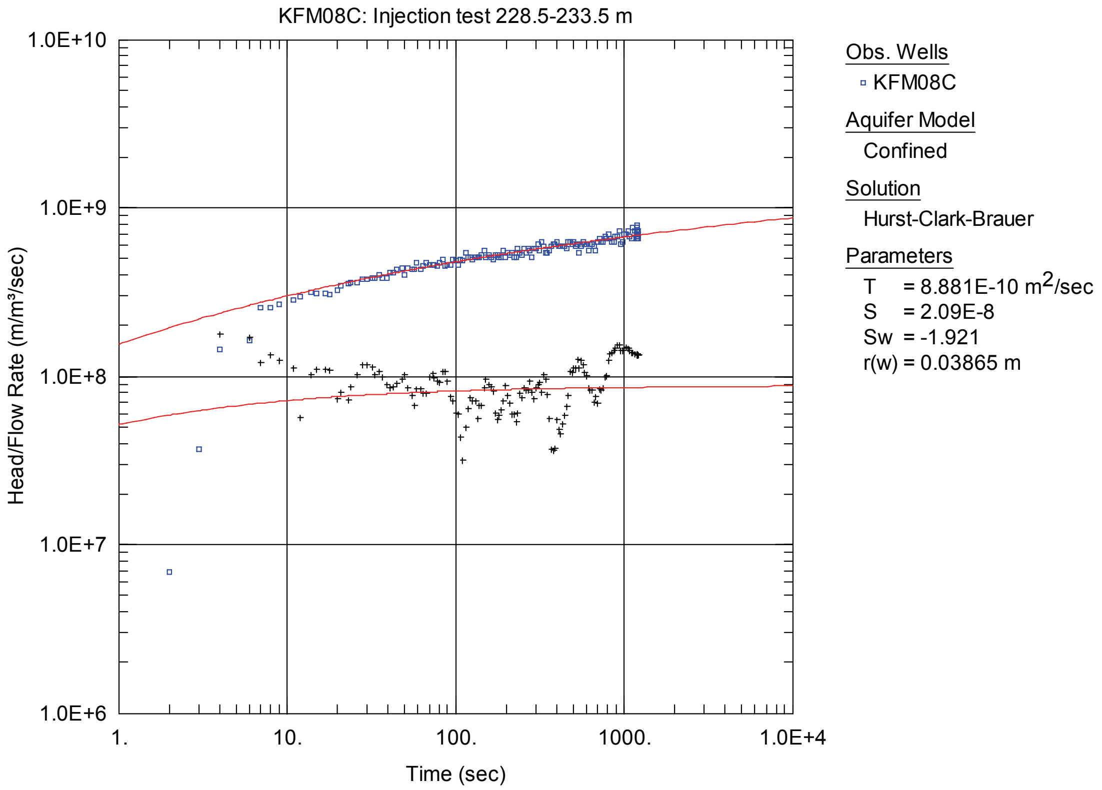


Figure A3-177. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 228.5-233.5 m in KFM08C.*

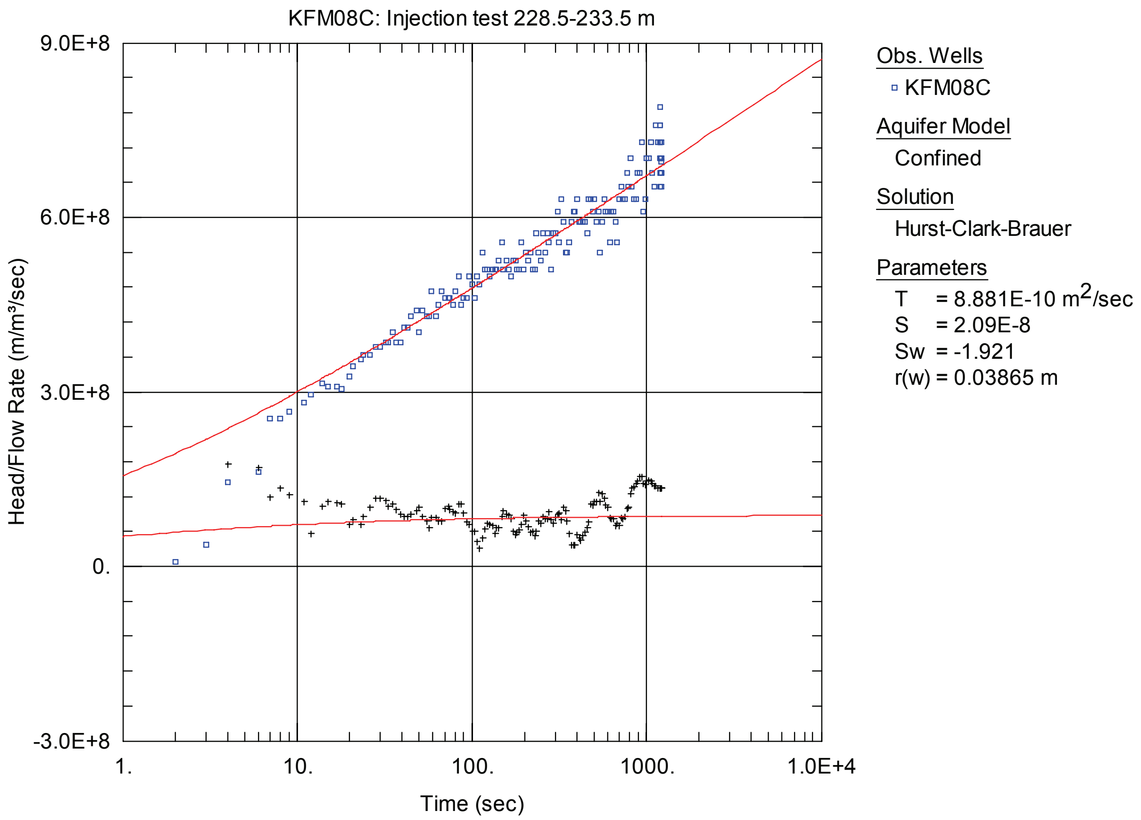


Figure A3-178. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 228.5-233.5 m in KFM08C.*

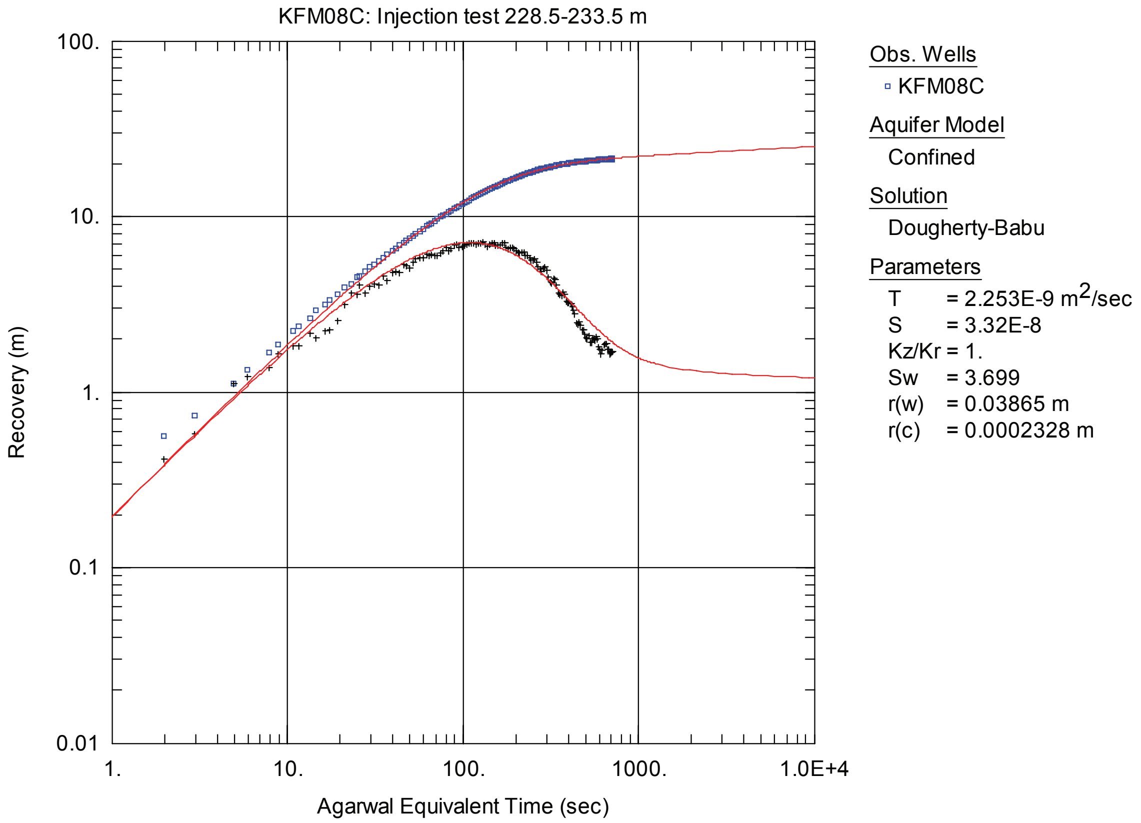


Figure A3-179. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 228.5-233.5 m in KFM08C.*

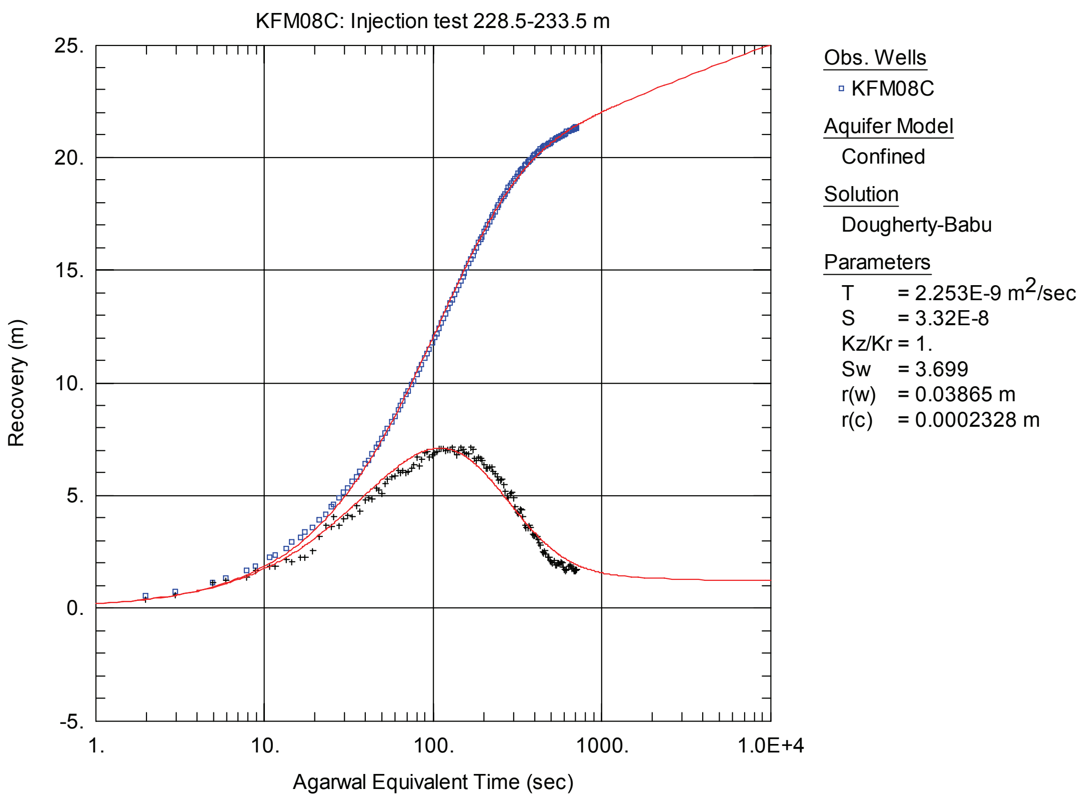


Figure A3-180. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 228.5-233.5 m in KFM08C.*

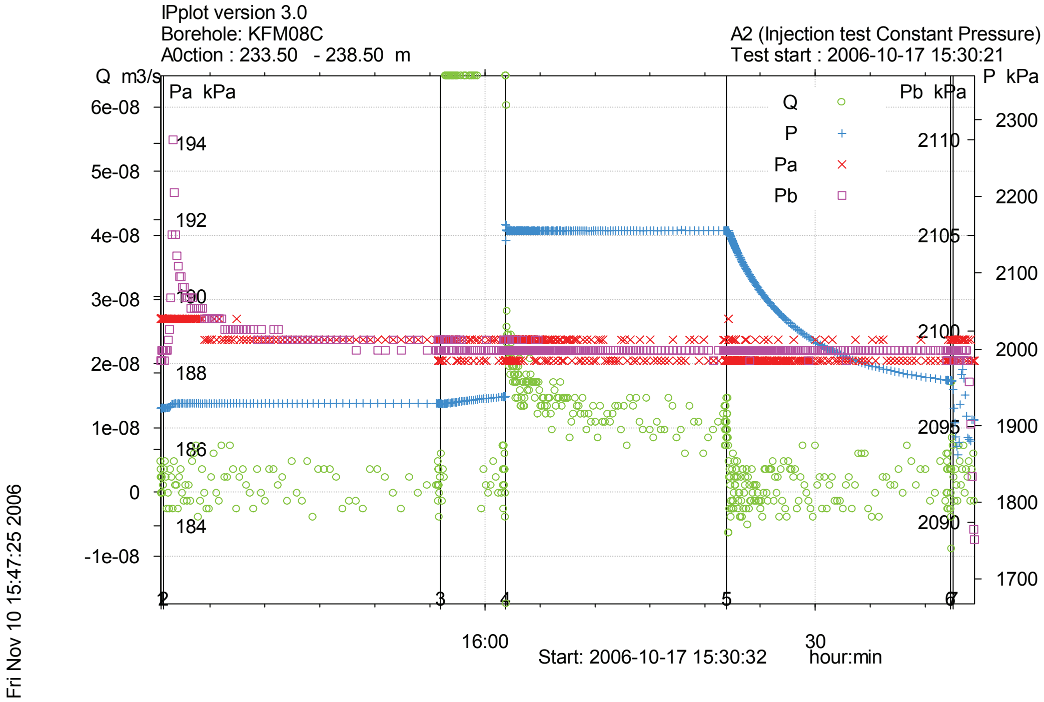


Figure A3-181. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 233.5-238.5 m in borehole KFM08C.

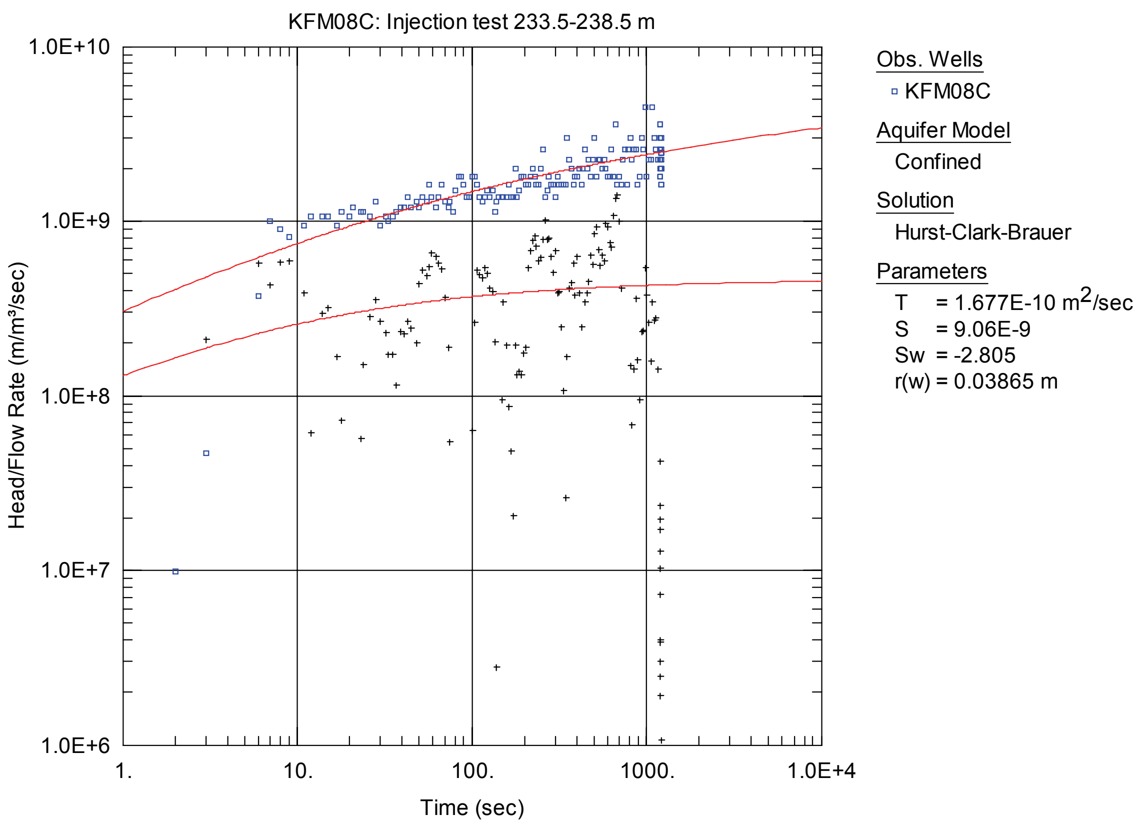


Figure A3-182. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 233.5-238.5 m in KFM08C.

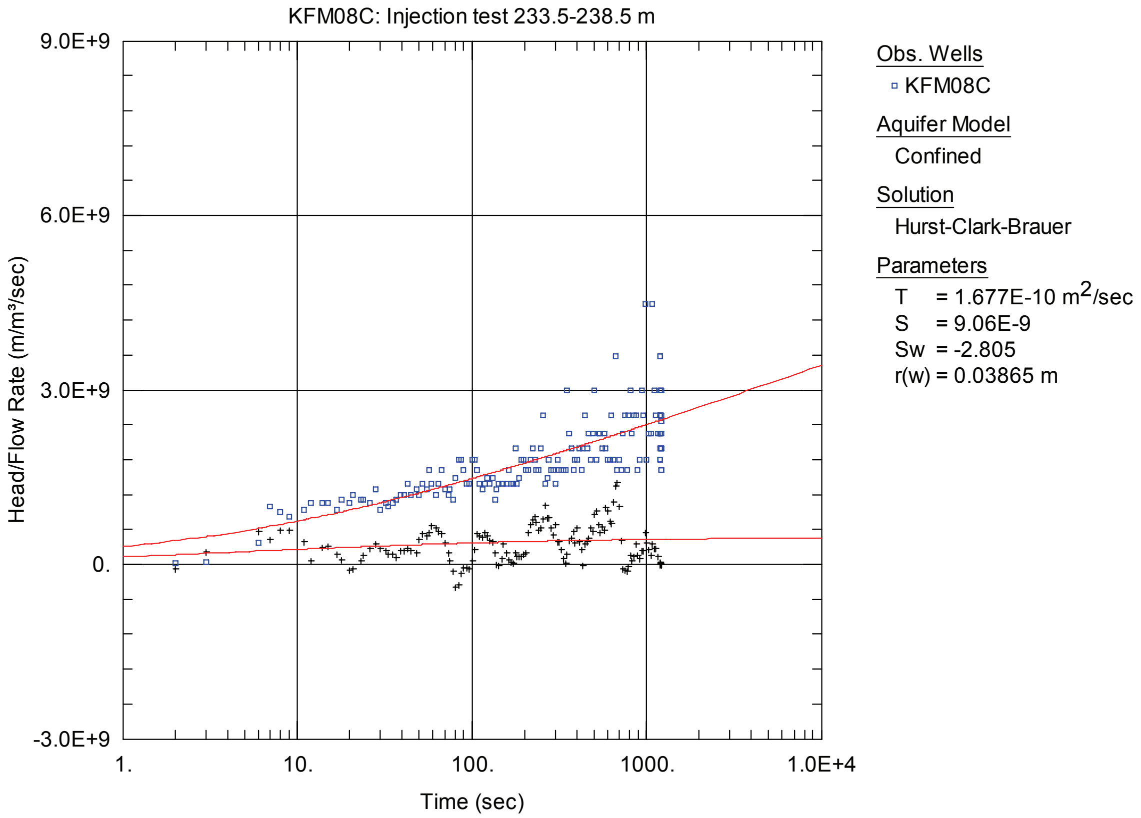


Figure A3-183. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 233.5-238.5 m in KFM08C.*

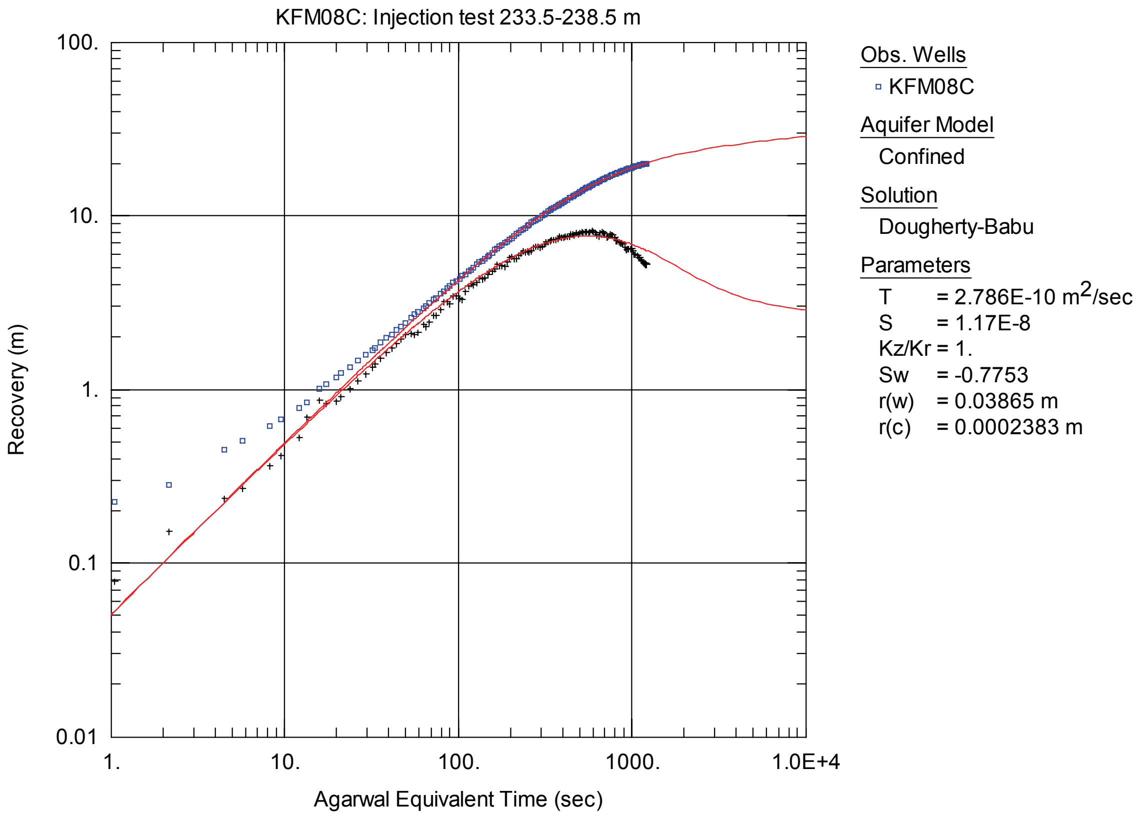


Figure A3-184. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 233.5-238.5 m in KFM08C.*

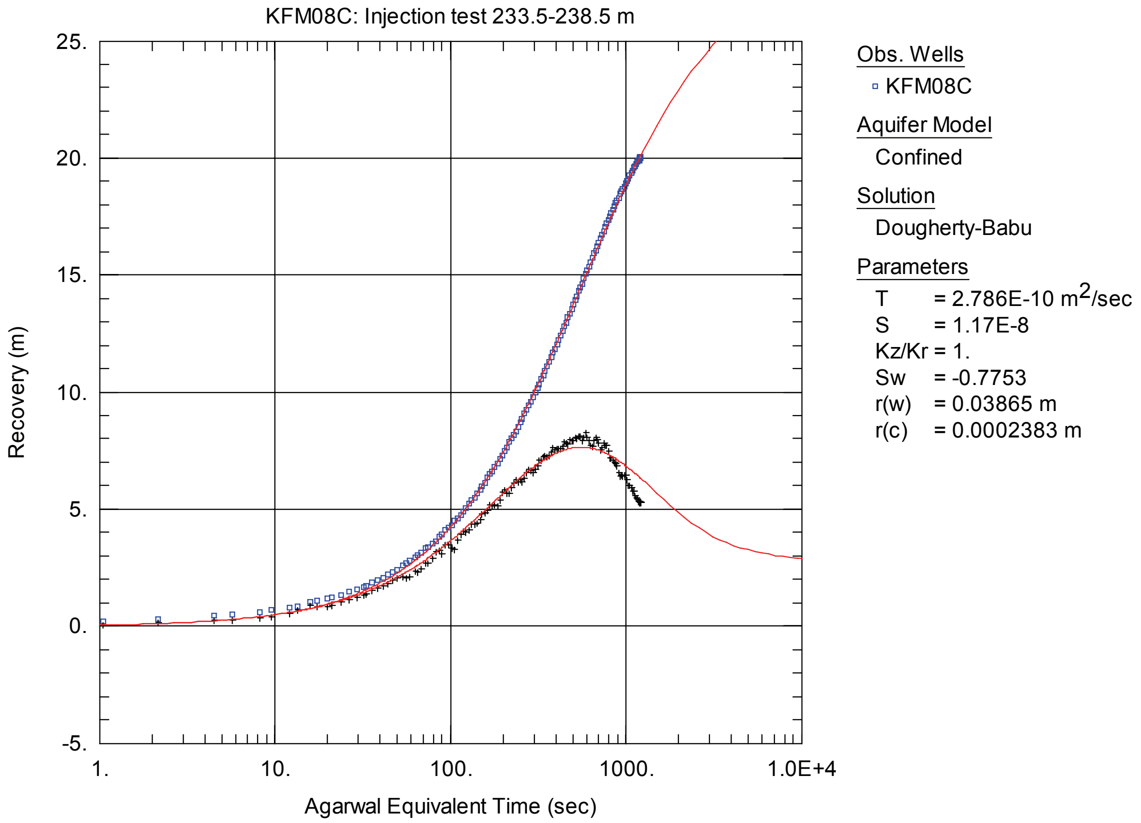


Figure A3-185. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 233.5-238.5 m in KFM08C.*

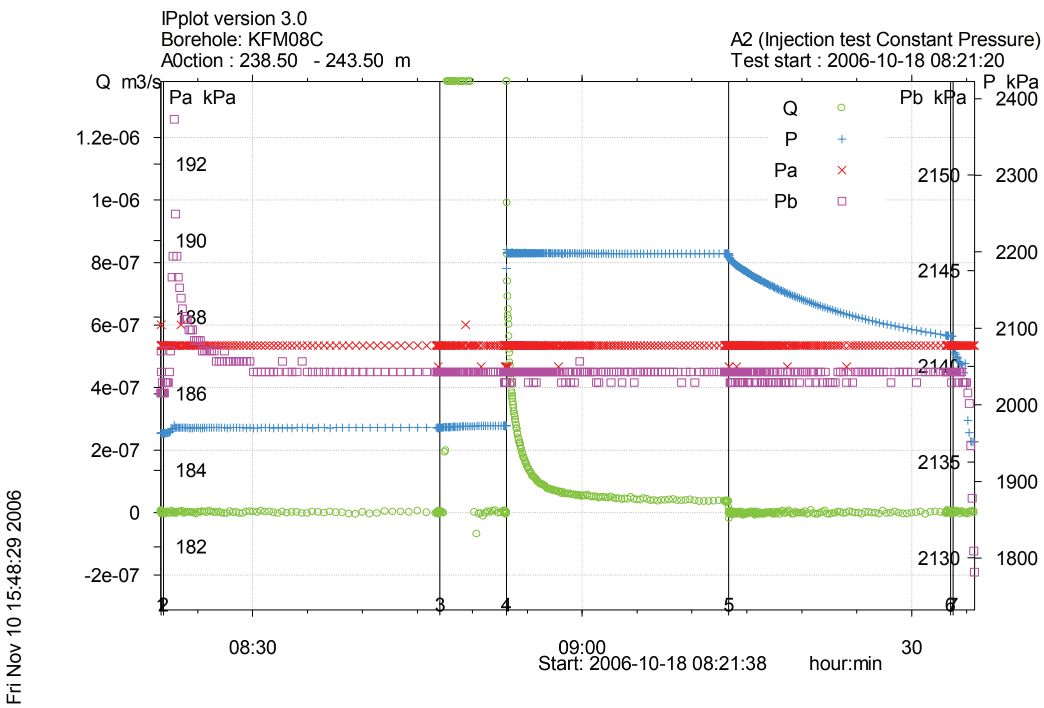


Figure A3-186. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 238.5-243.5 m in borehole KFM08C.*

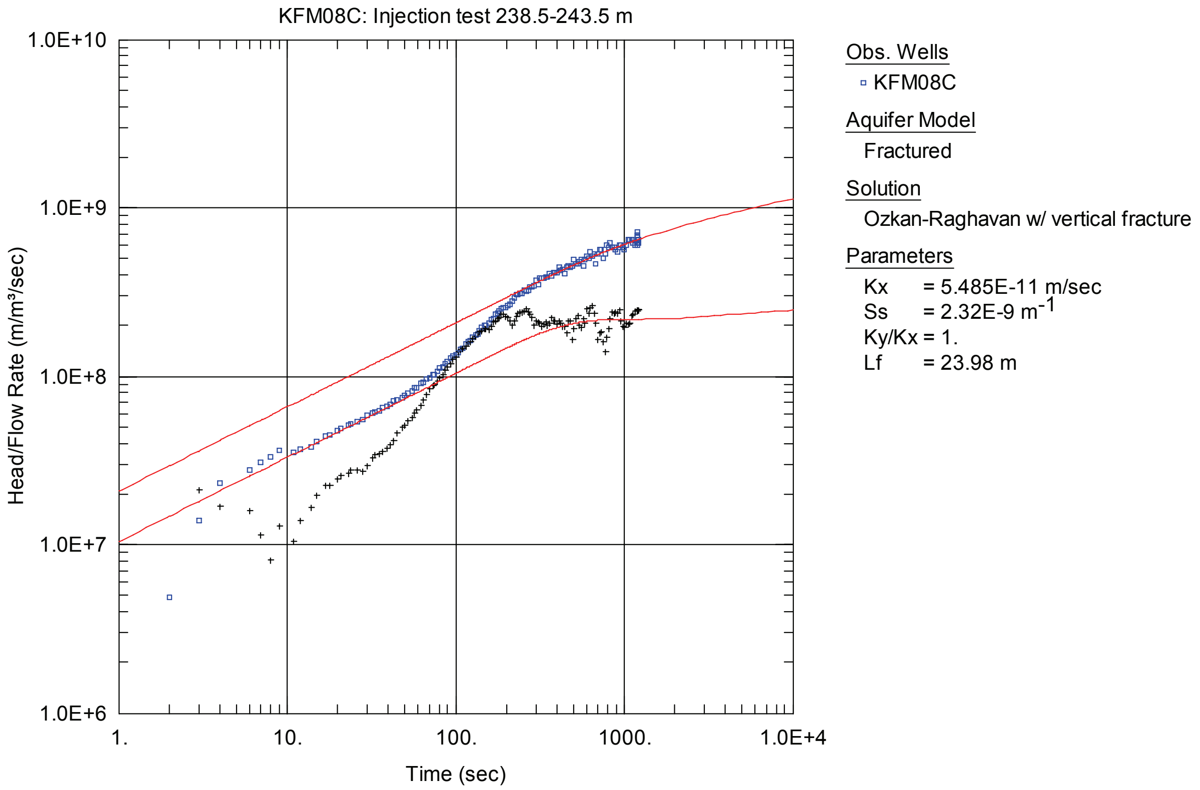


Figure A3-187. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 238.5-243.5 m in KFM08C.*

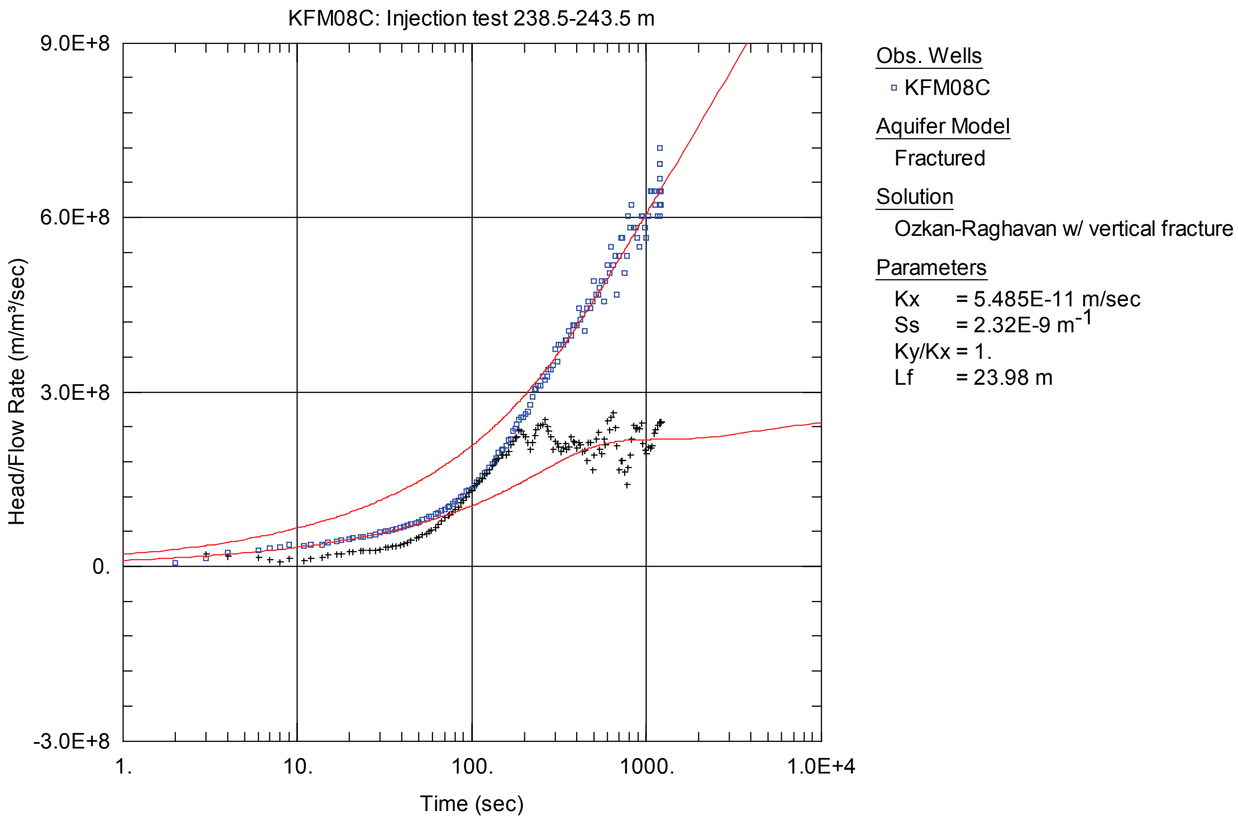


Figure A3-188. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 238.5-243.5 m in KFM08C.*

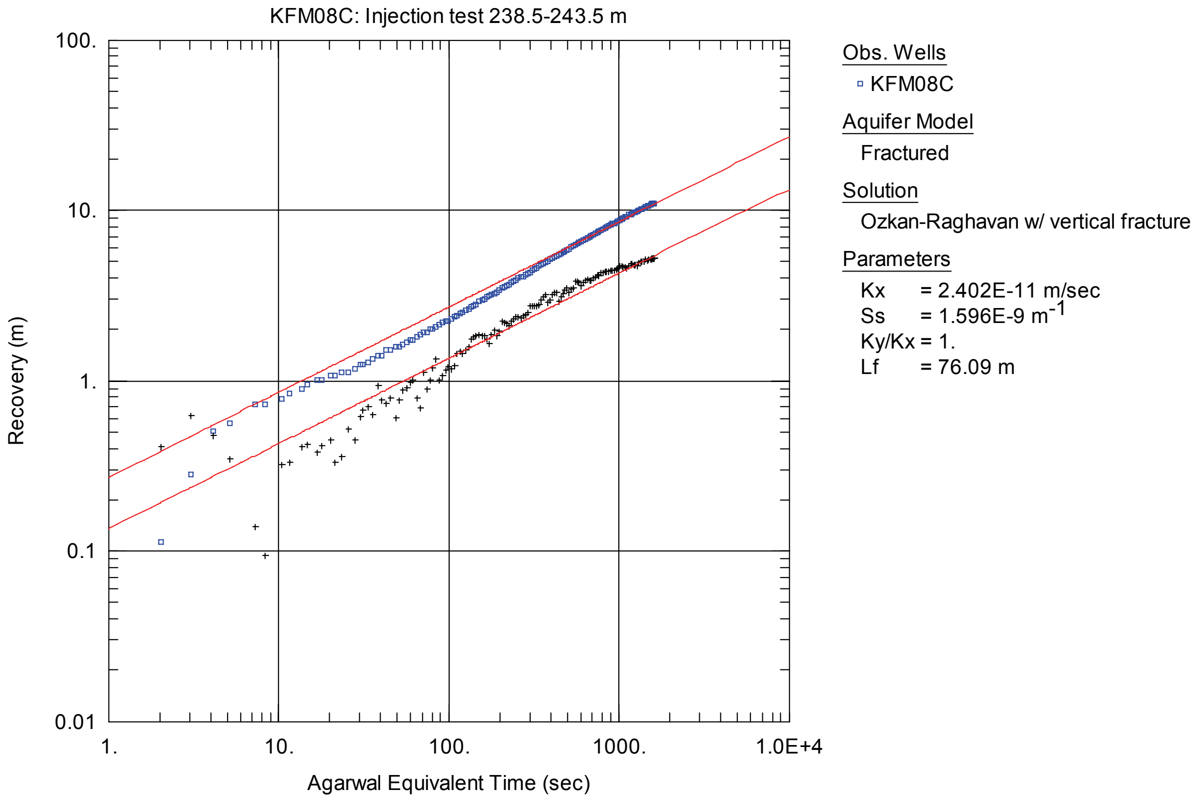


Figure A3-189. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 238.5-243.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

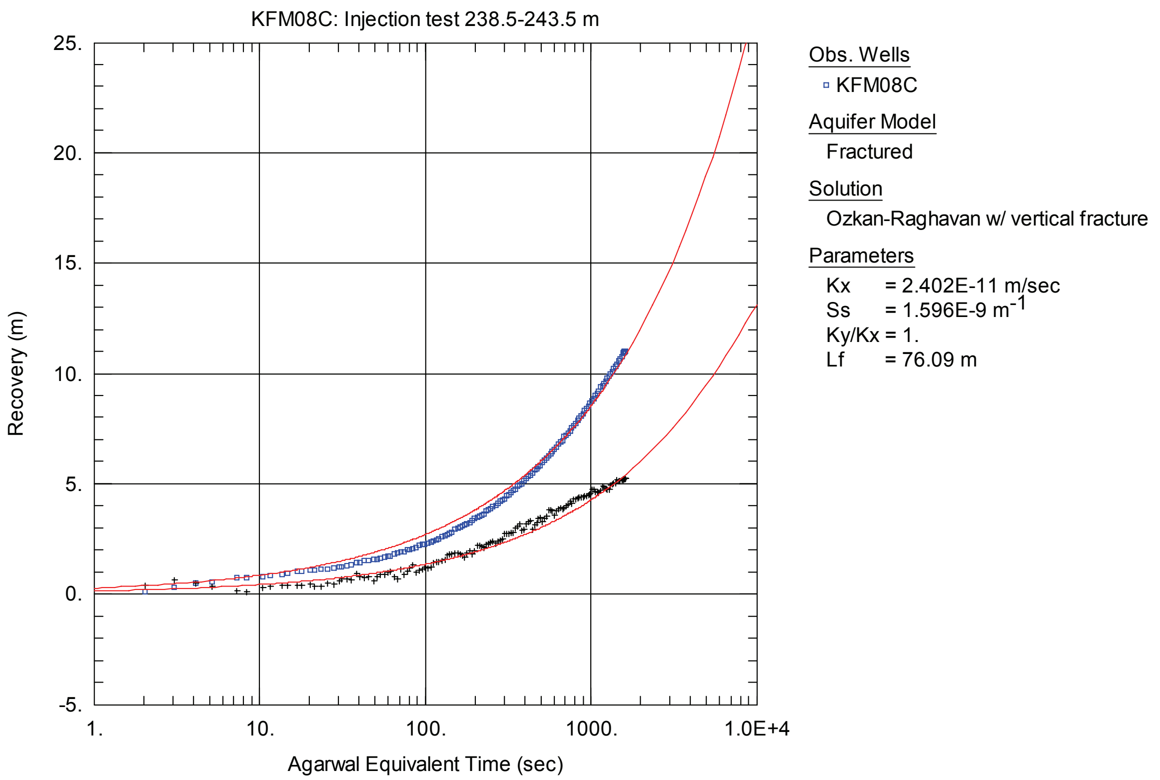


Figure A3-190. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 238.5-243.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

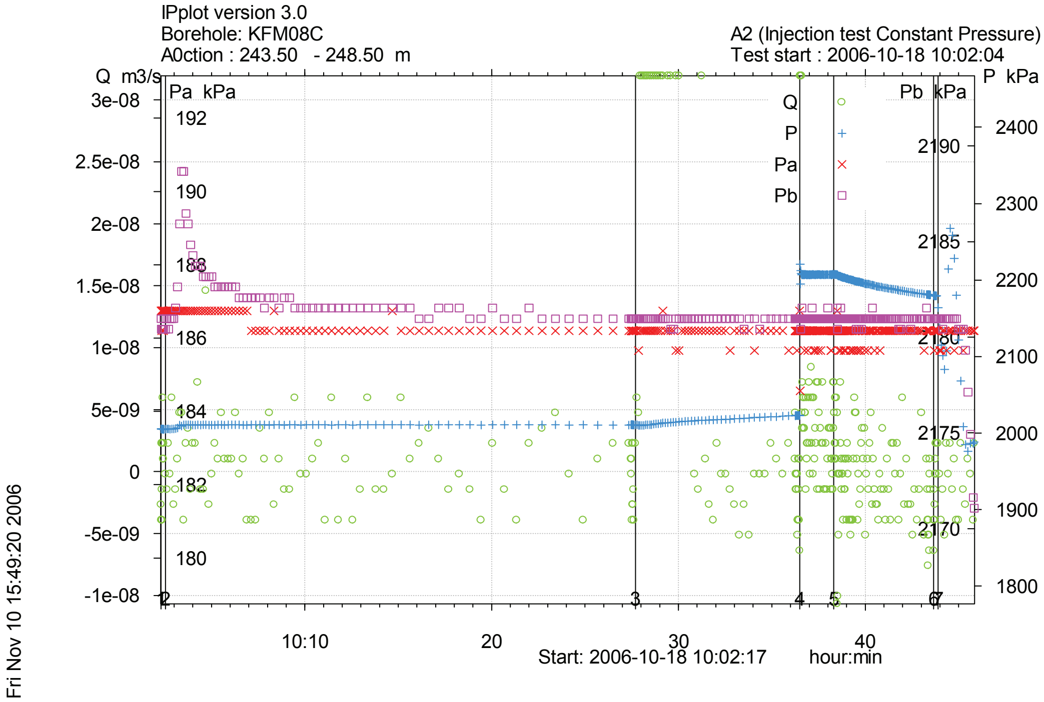


Figure A3-191. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 243.5-248.5 m in borehole KFM08C.*

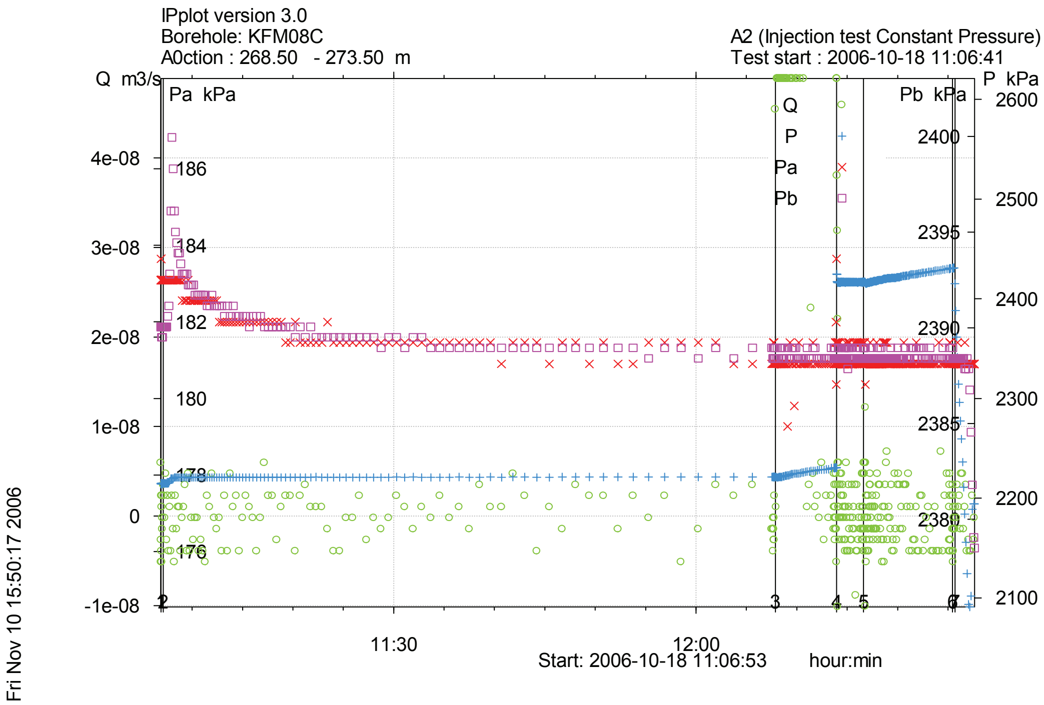


Figure A3-192. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 268.5-273.5 m in borehole KFM08C.*

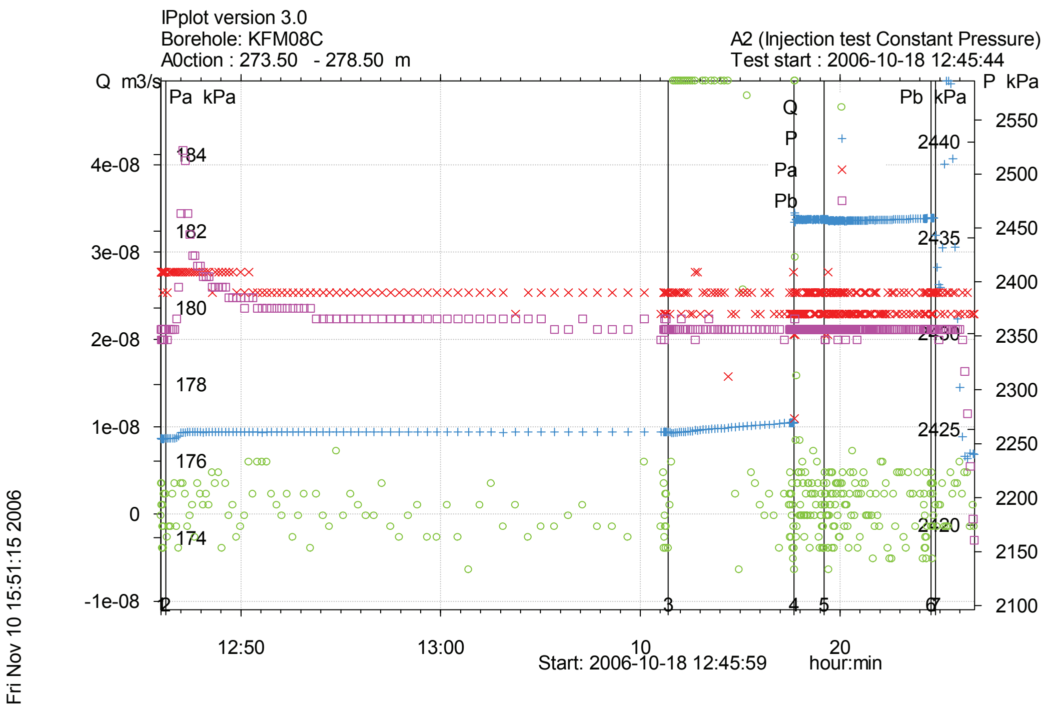


Figure A3-193. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 273.5-278.5 m in borehole KFM08C.

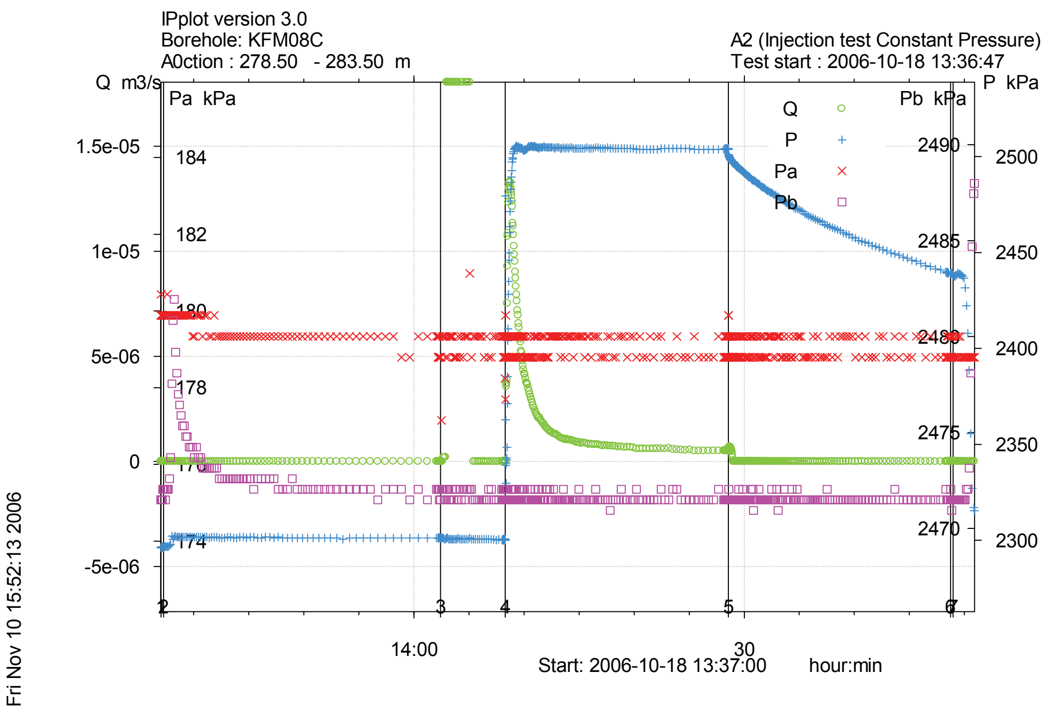


Figure A3-194. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 278.5-283.5 m in borehole KFM08C.

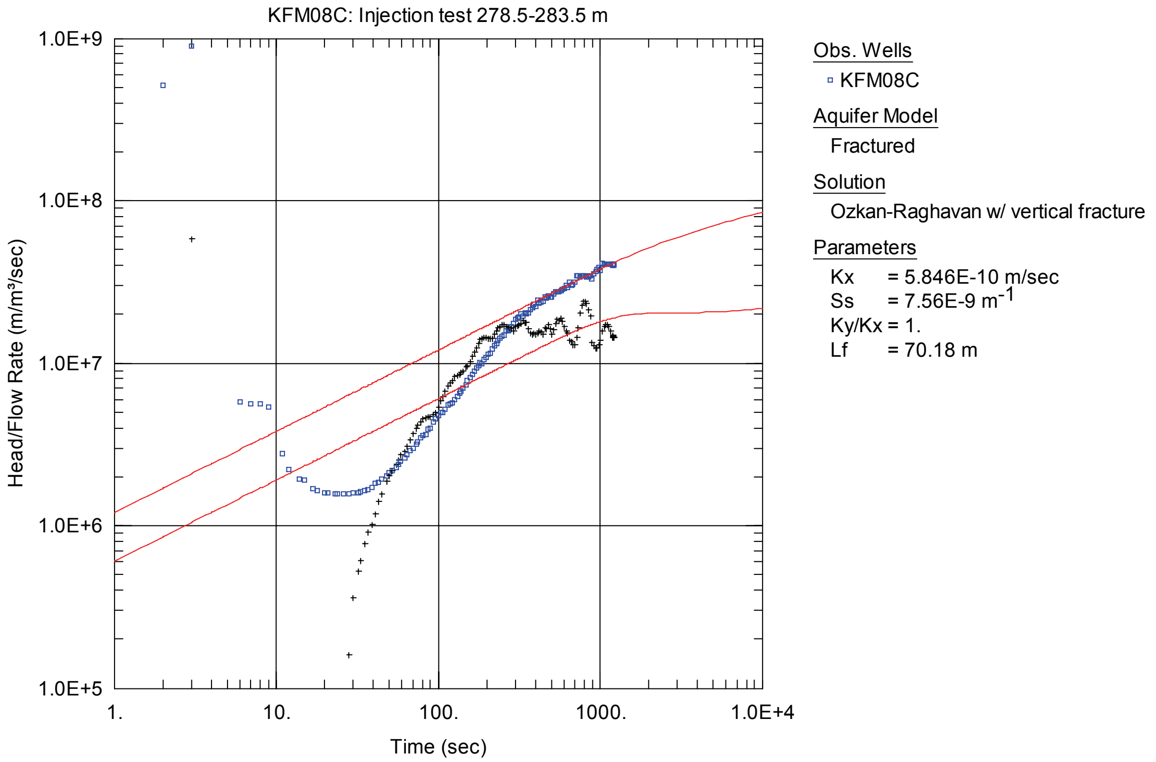


Figure A3-195. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 278.5-283.5 m in KFM08C.*

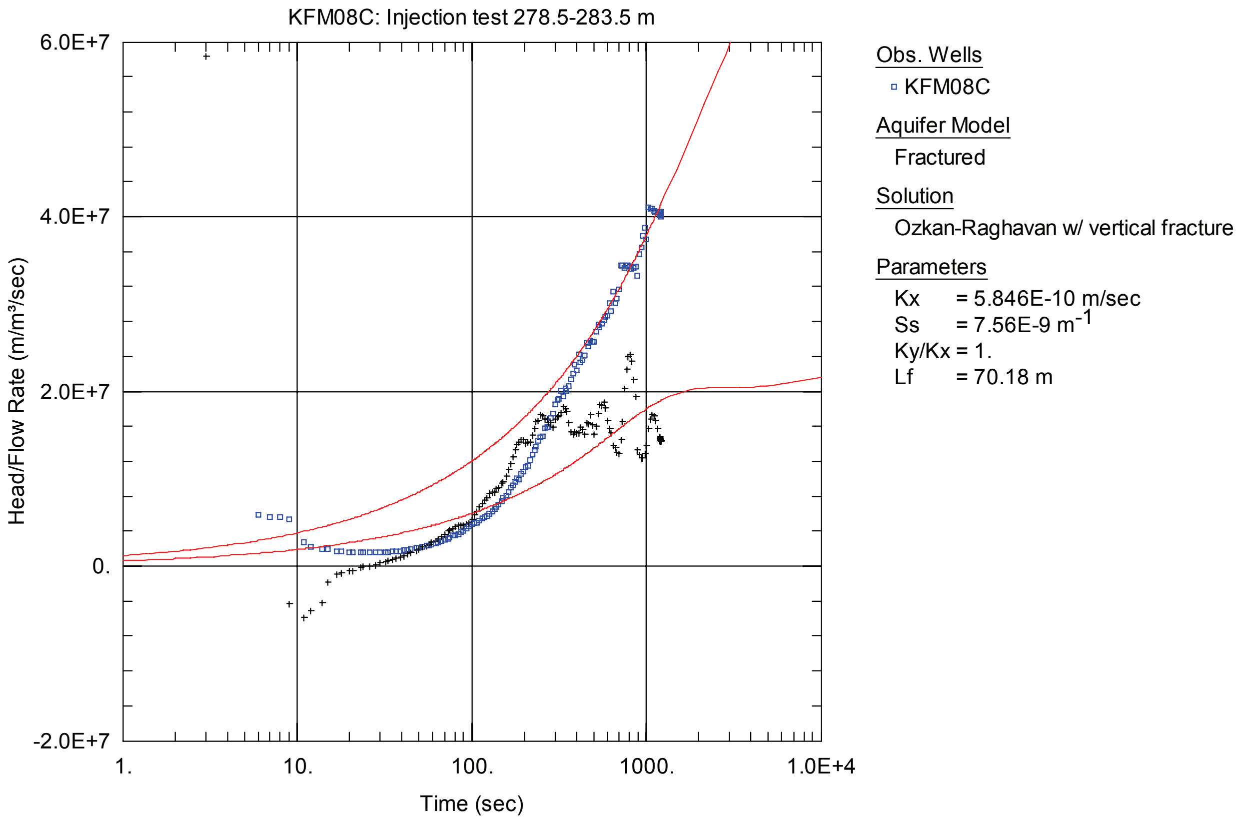


Figure A3-196. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 278.5-283.5 m in KFM08C.*

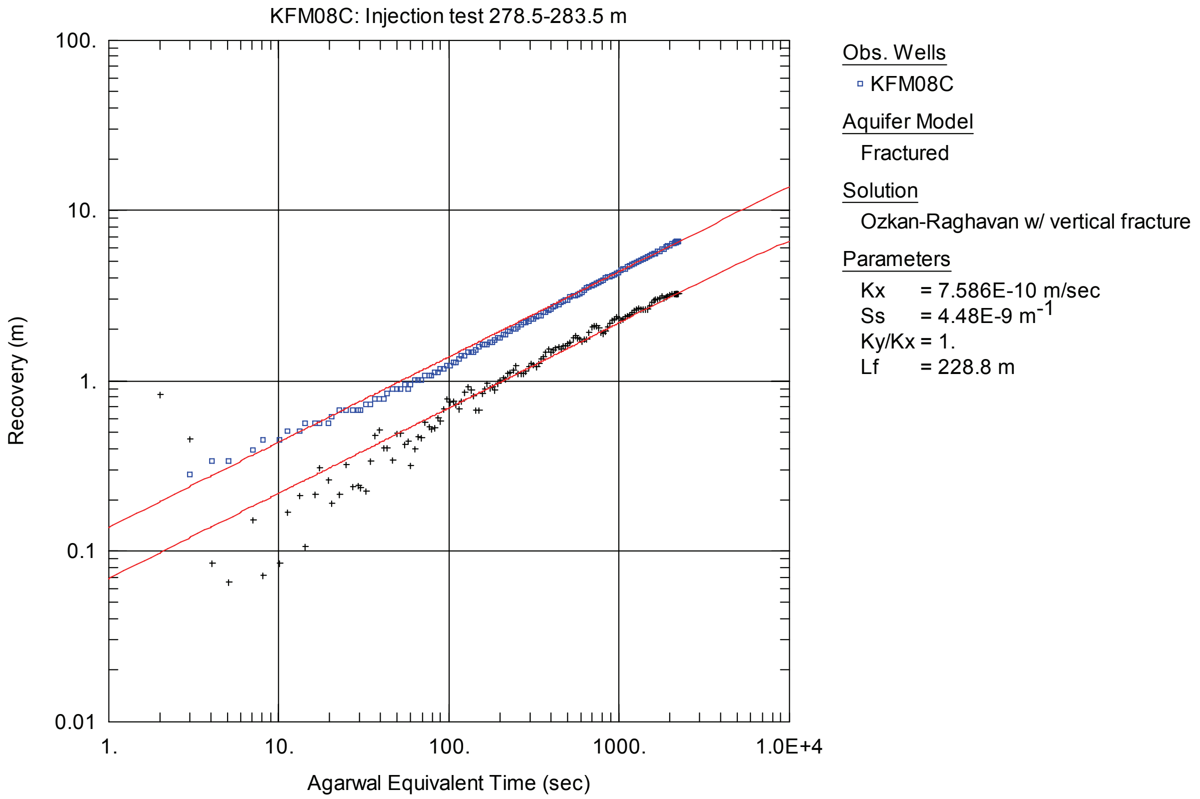


***Figure A3-197.** Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 278.5-283.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

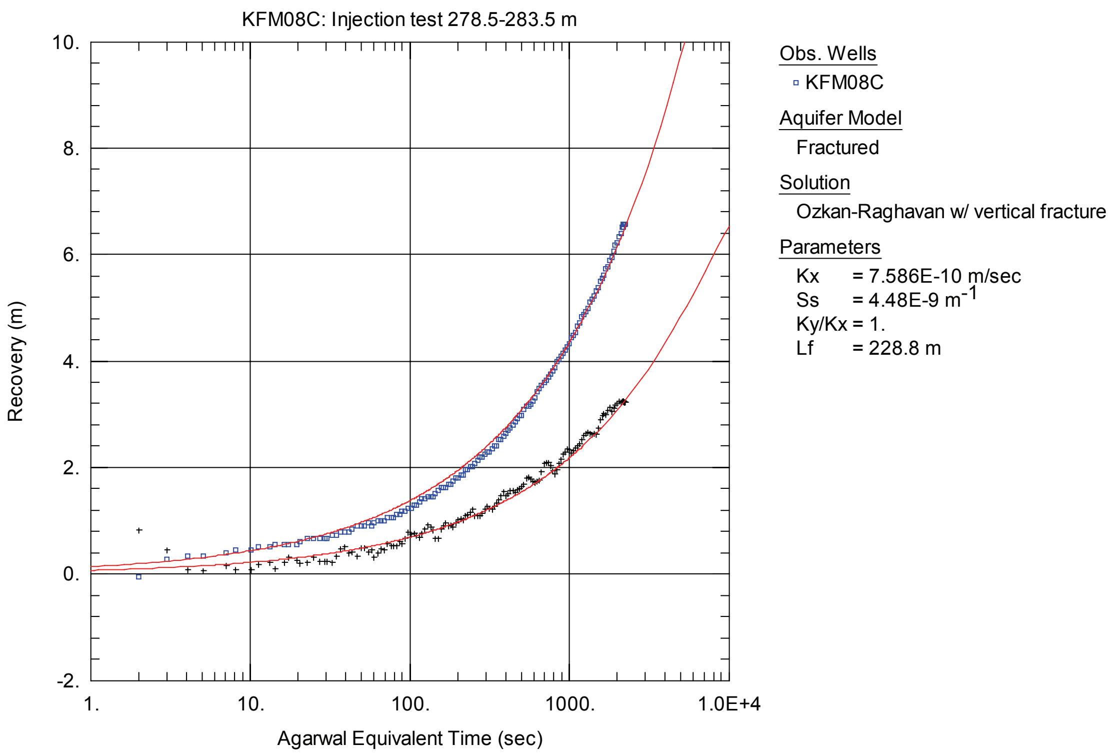


***Figure A3-198.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 278.5-283.5 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

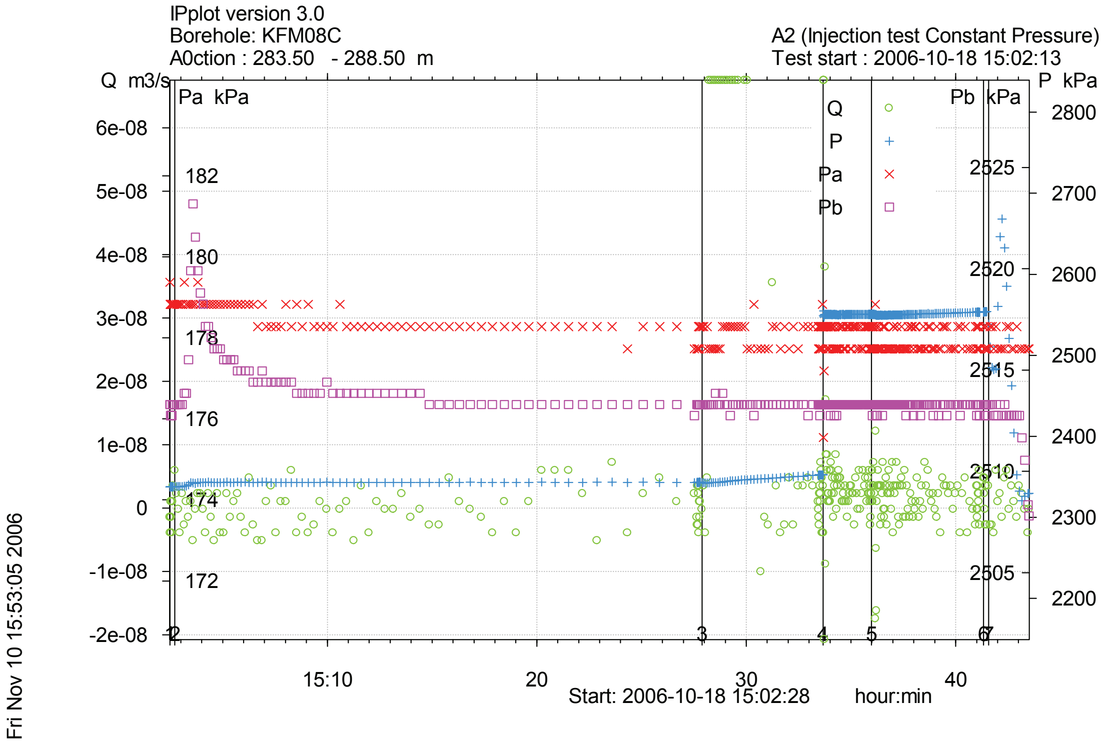


Figure A3-199. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 283.5-288.5 m in borehole KFM08C.*

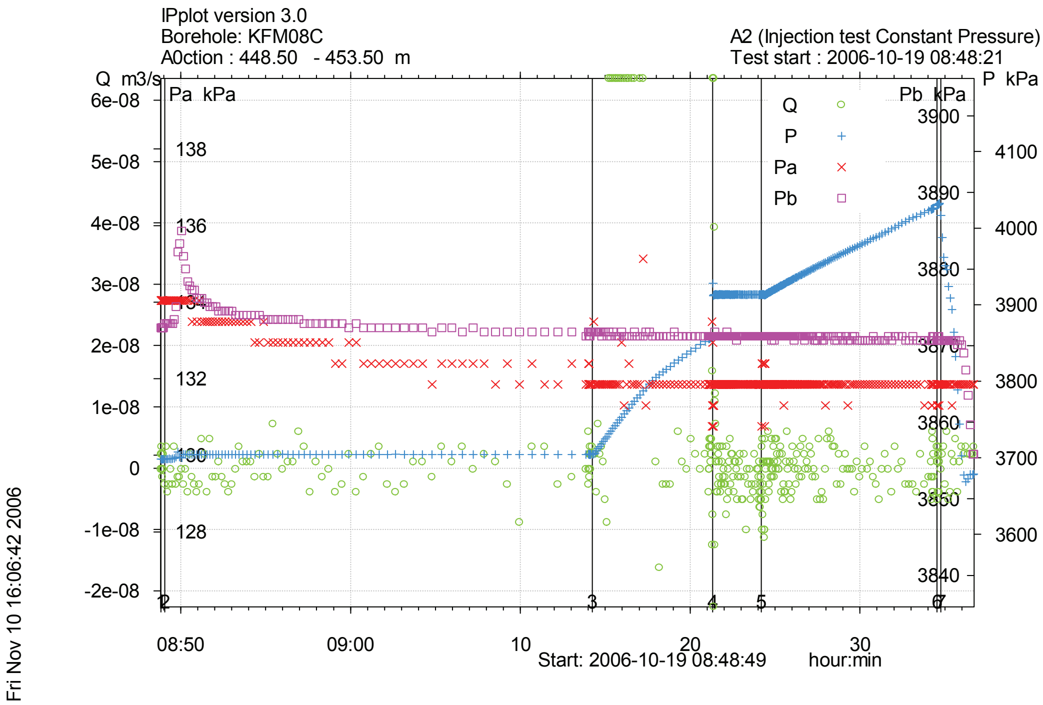


Figure A3-200. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 448.5-453.5 m in borehole KFM08C.*

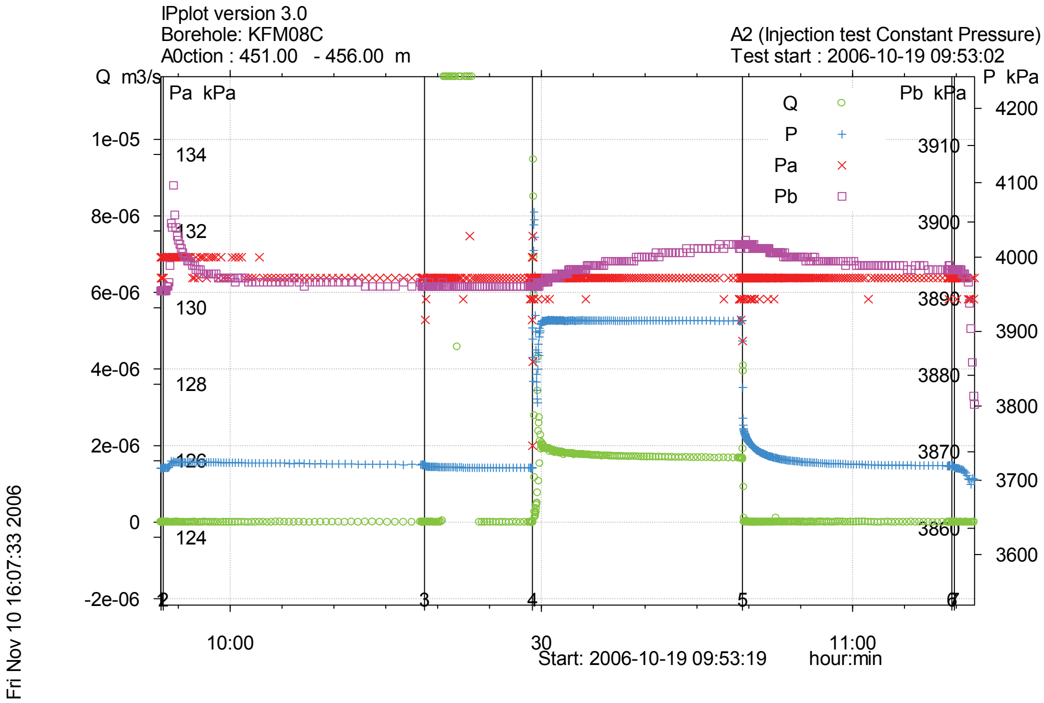


Figure A3-201. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 451.0-456.0 m in borehole KFM08C.*

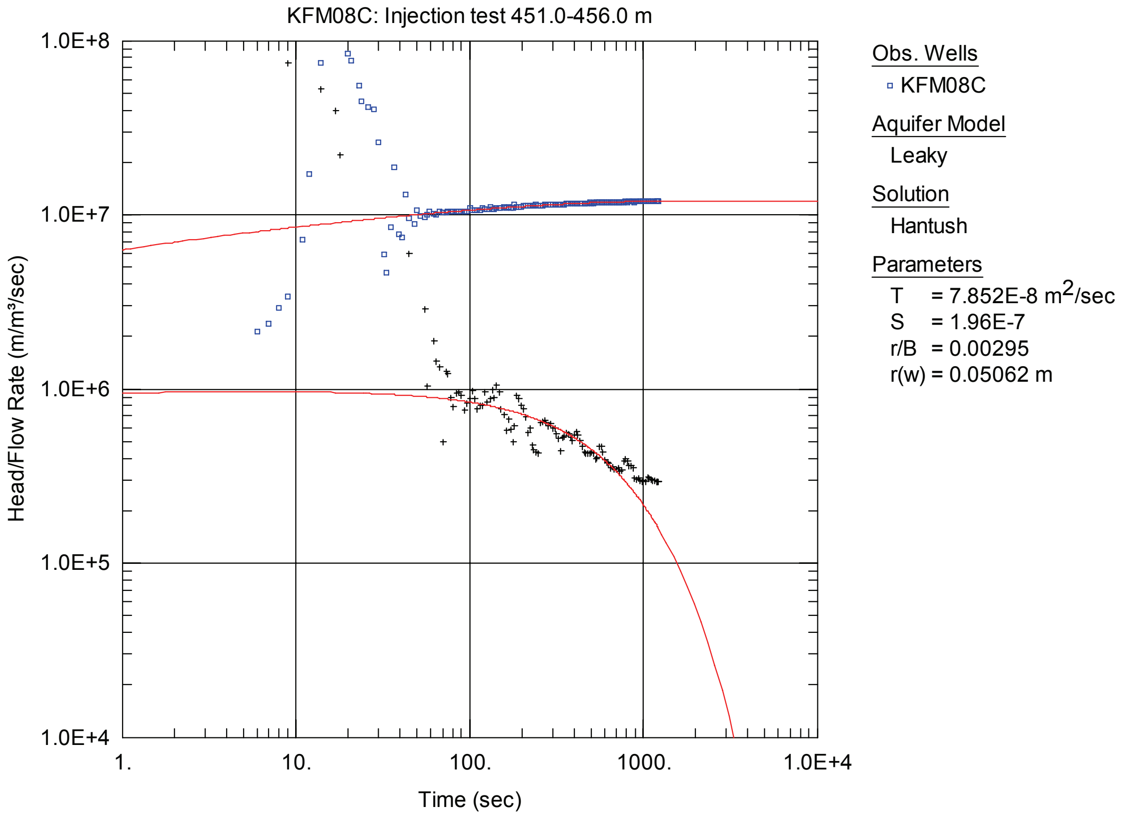


Figure A3-202. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 451.0-456.0 m in KFM08C.*

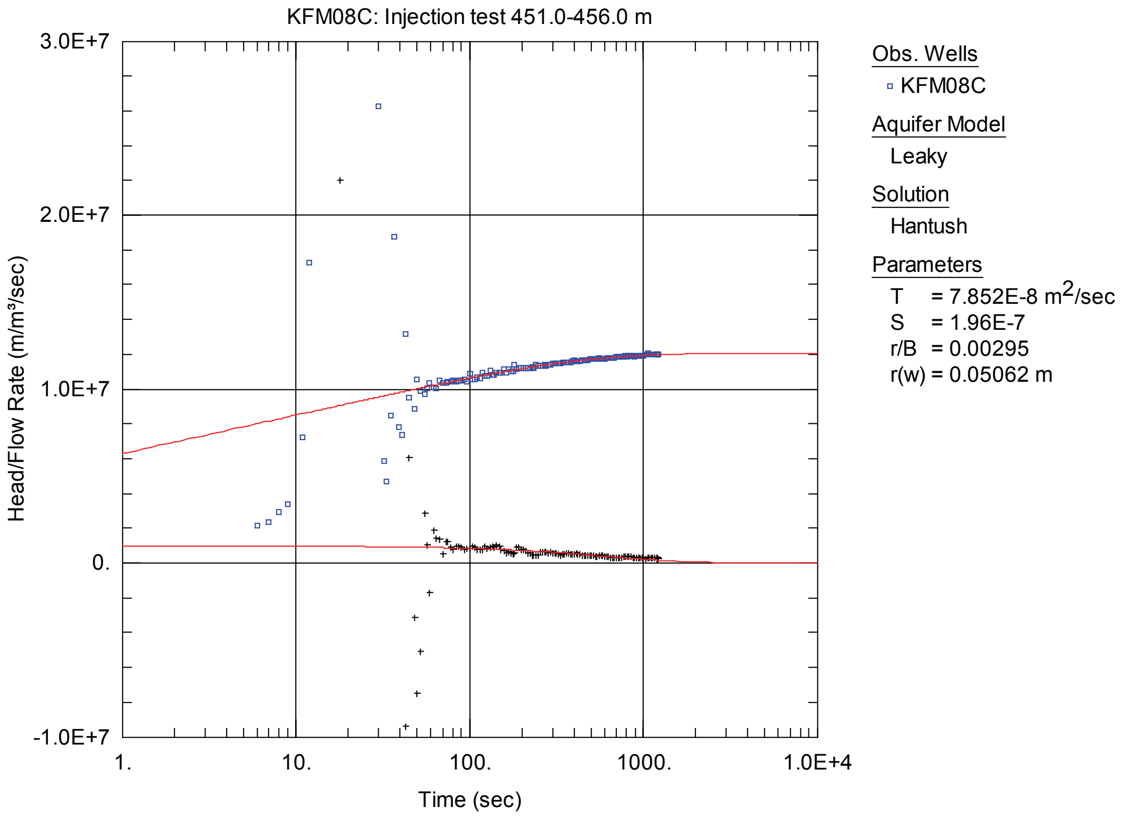


Figure A3-203. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 451.0-456.0 m in KFM08C.*

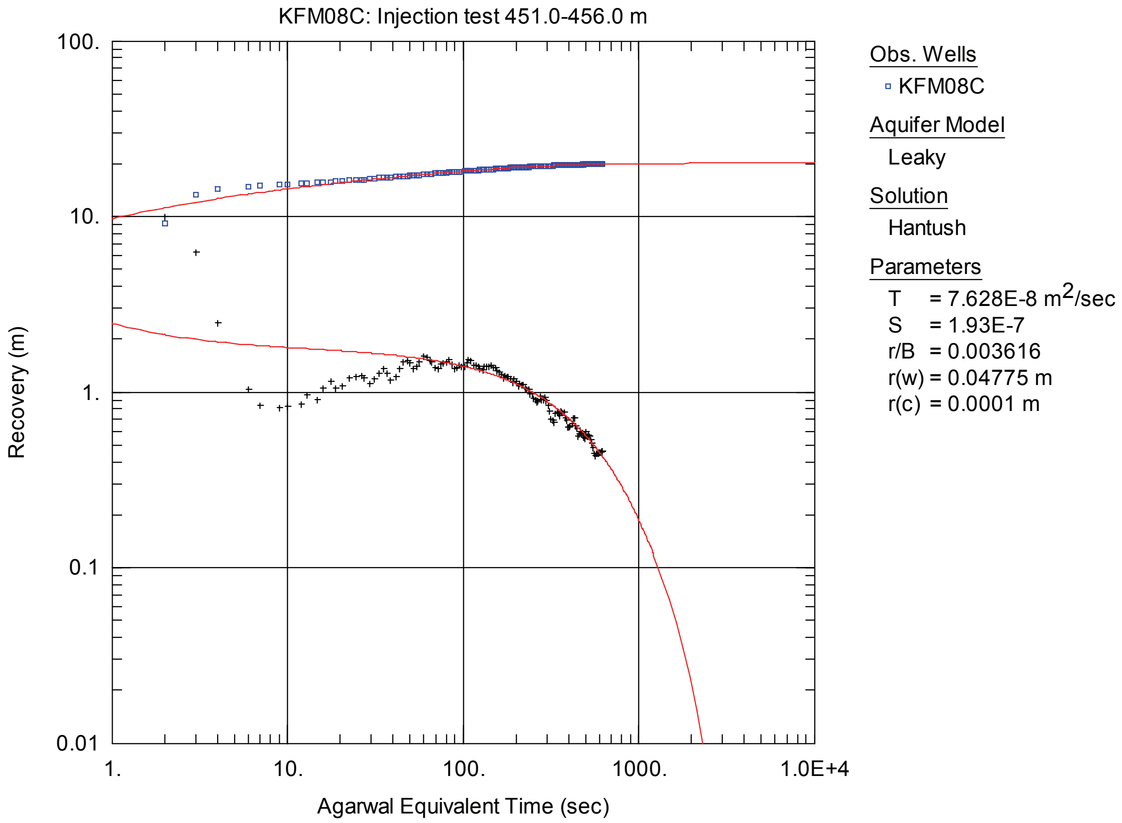


Figure A3-204. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 451.0-456.0 m in KFM08C.*

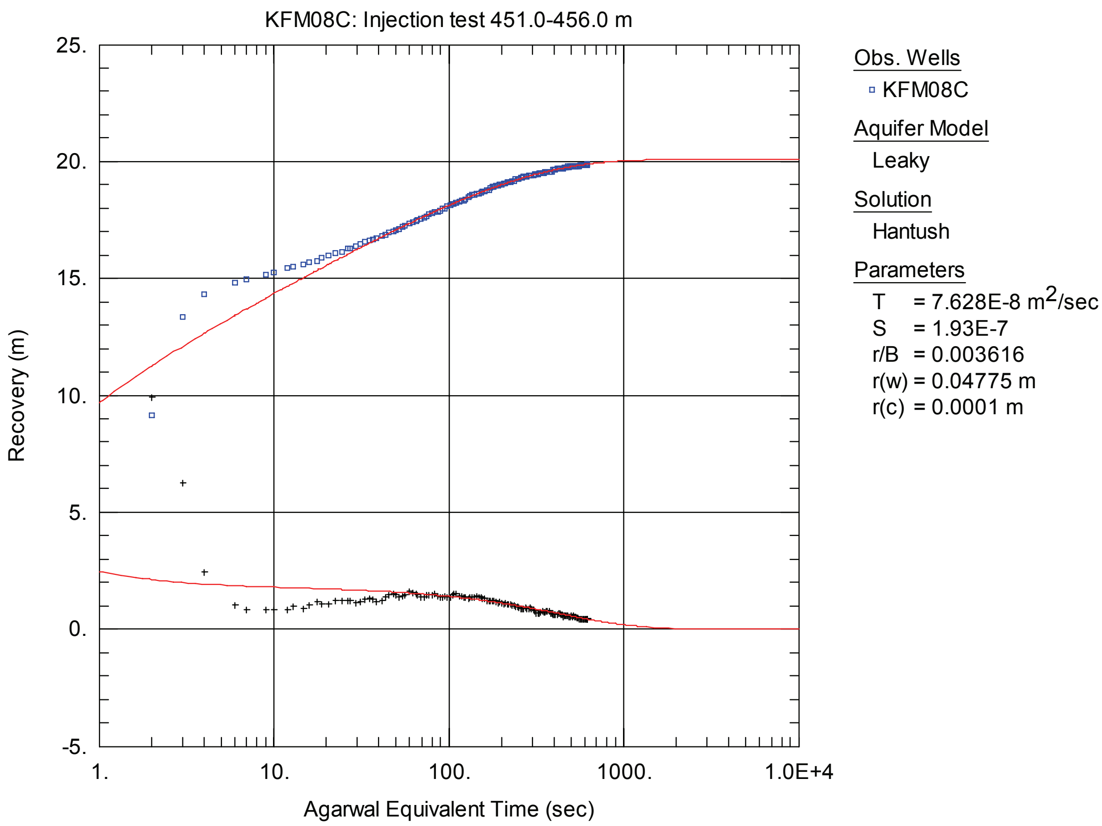


Figure A3-205. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 451.0-456.0 m in KFM08C.*

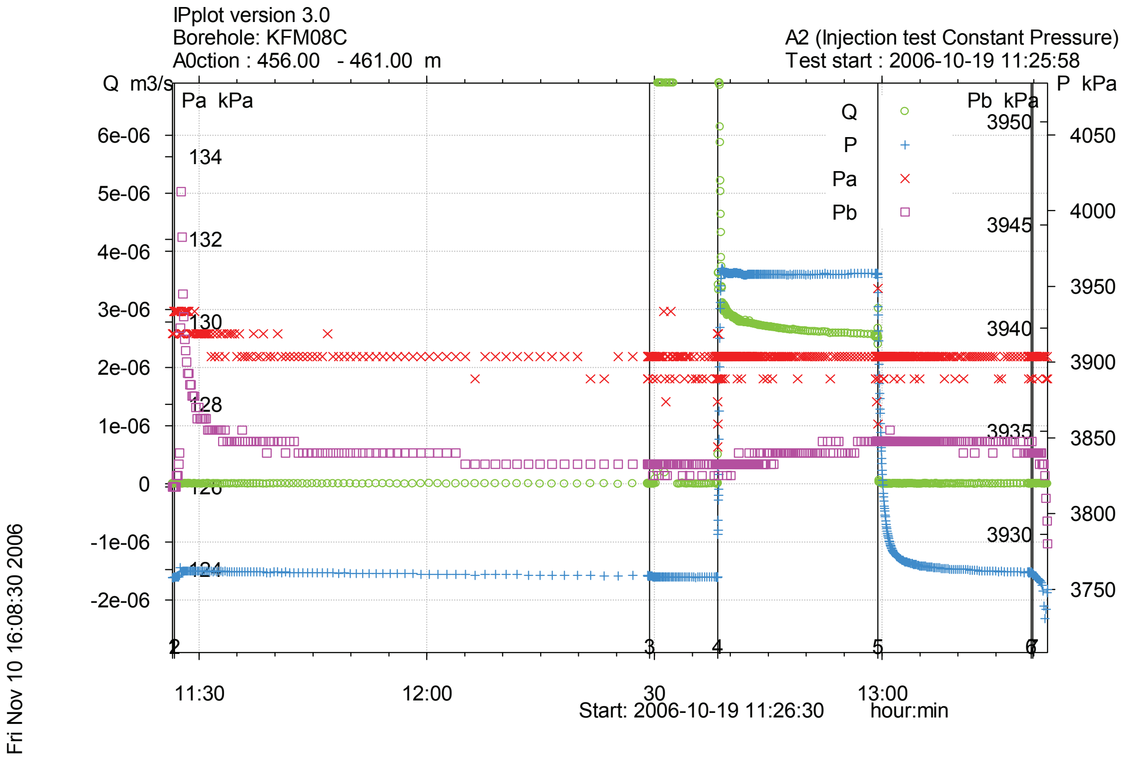


Figure A3-206. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 456.0-461.0 m in borehole KFM08C.

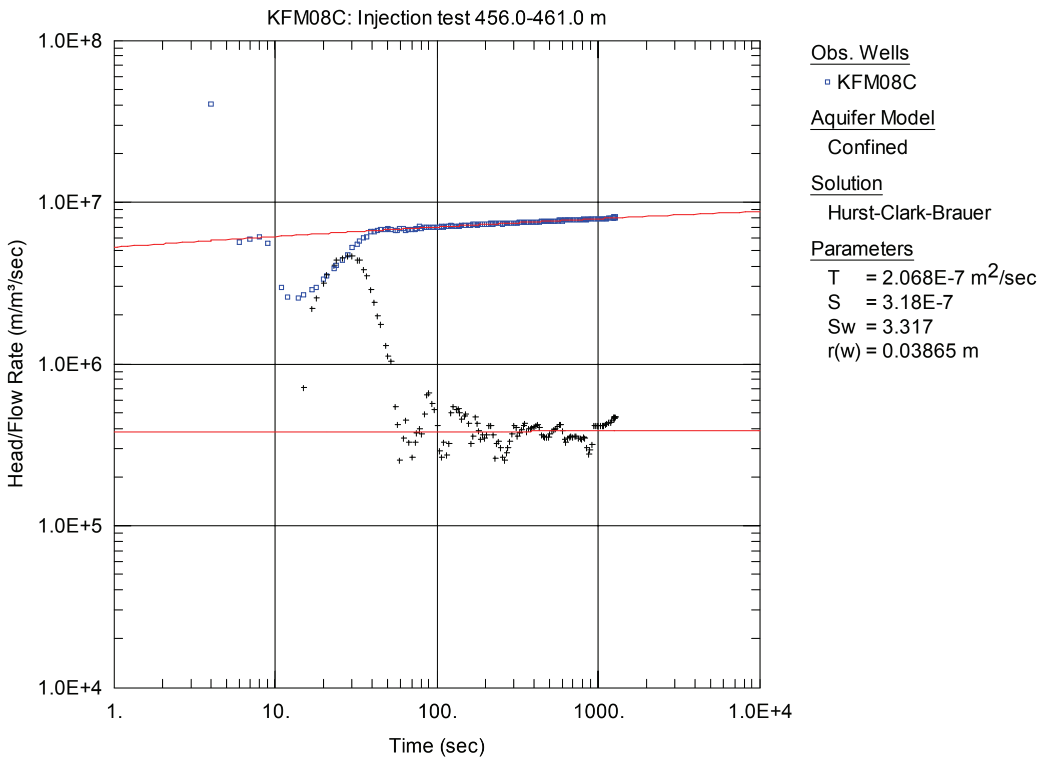


Figure A3-207. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 456.0-461.0 m in KFM08C.

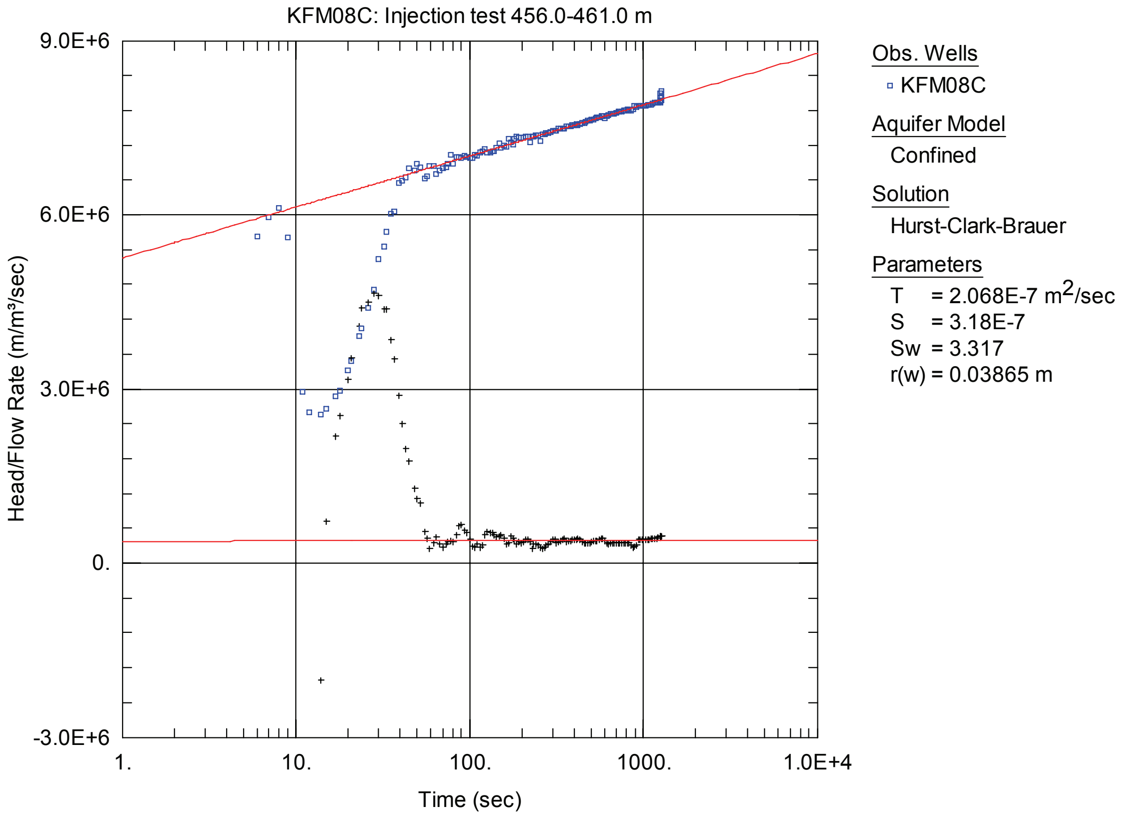


Figure A3-208. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 456.0-461.0 m in KFM08C.*

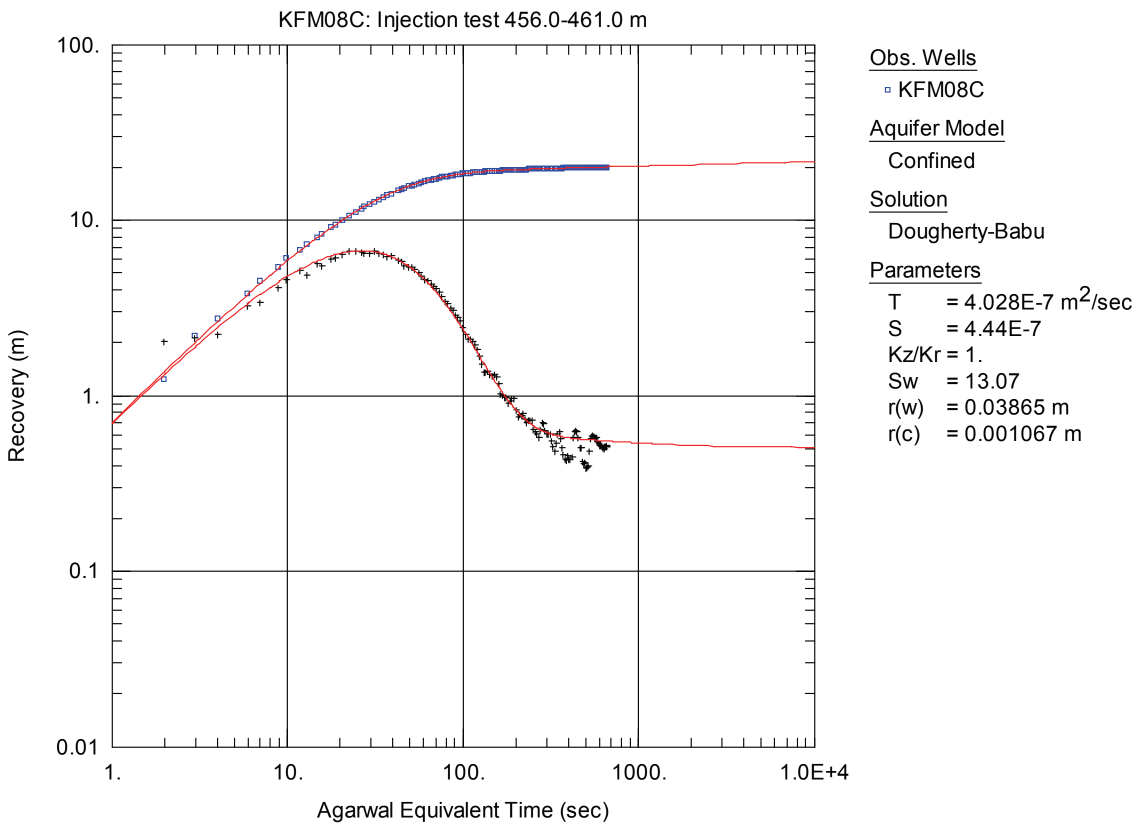


Figure A3-209. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 456.0-461.0 m in KFM08C.*

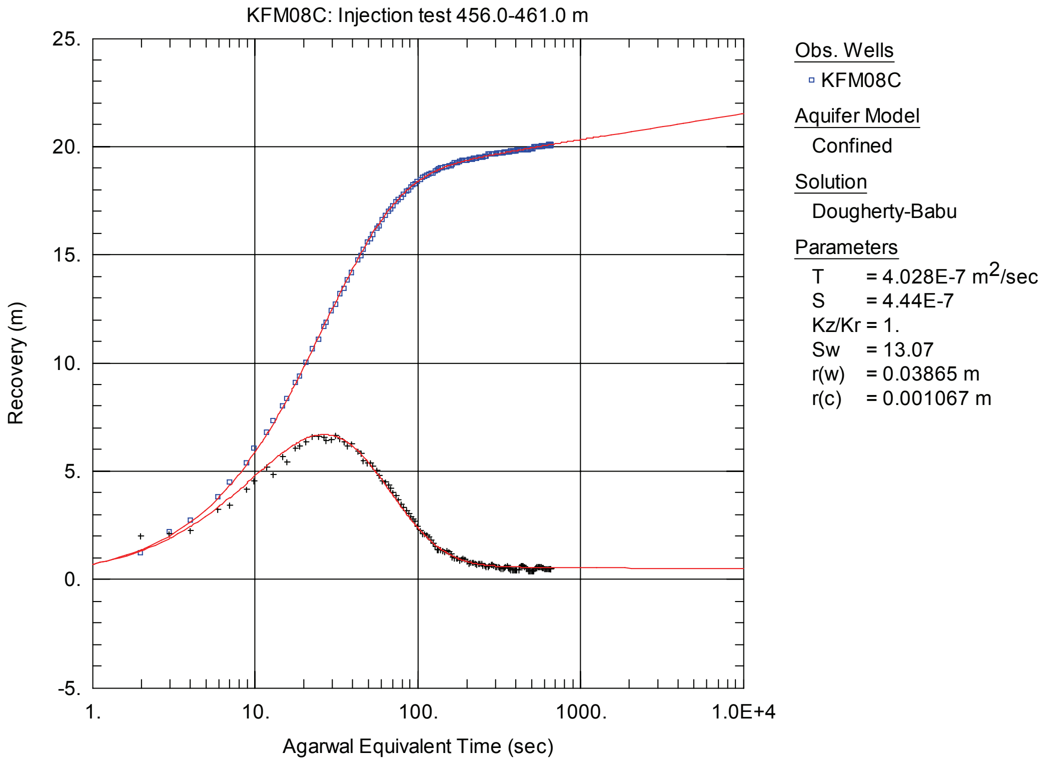


Figure A3-210. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 456.0-461.0 m in KFM08C.*

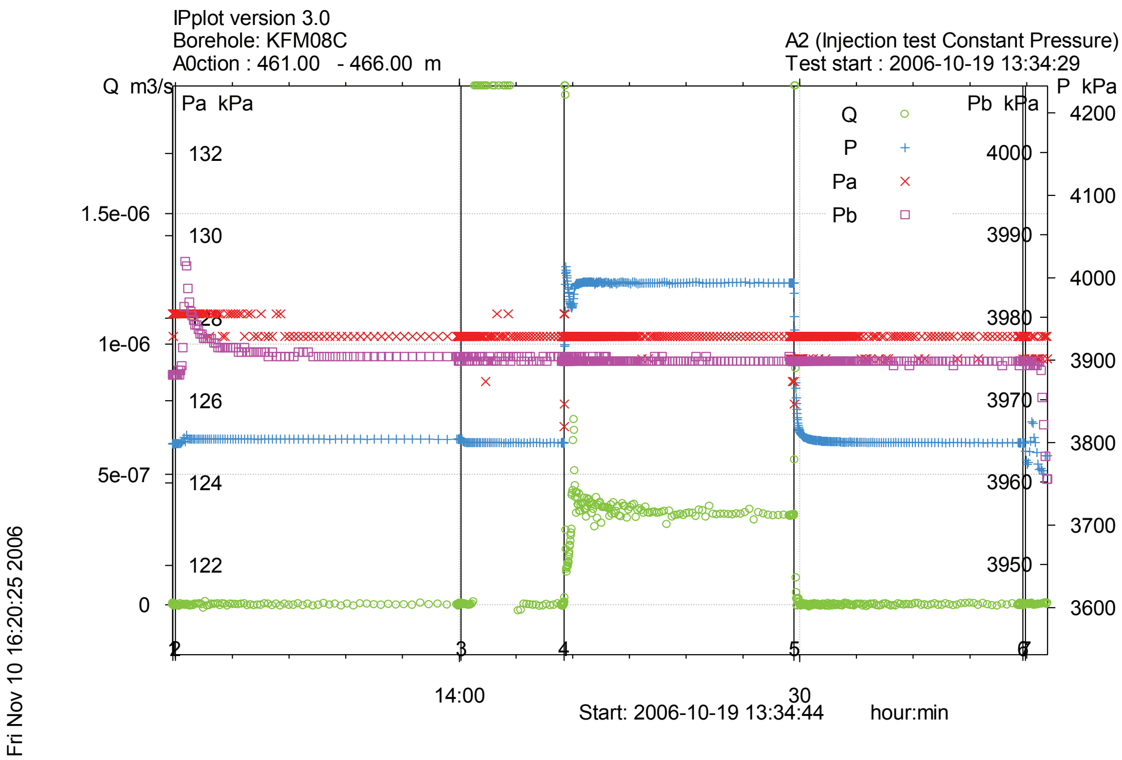


Figure A3-211. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 461.0-466.0 m in borehole KFM08C.*

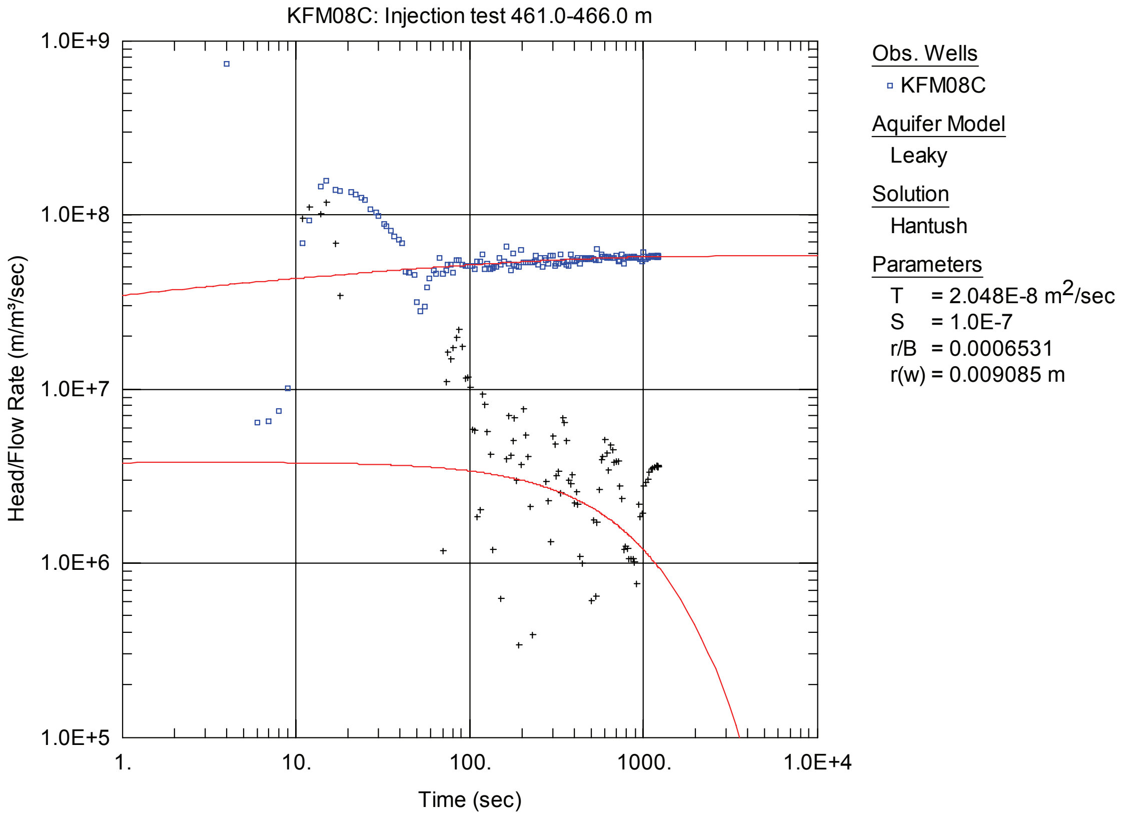


***Figure A3-212.** Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 461.0-466.0 m in KFM08C.*

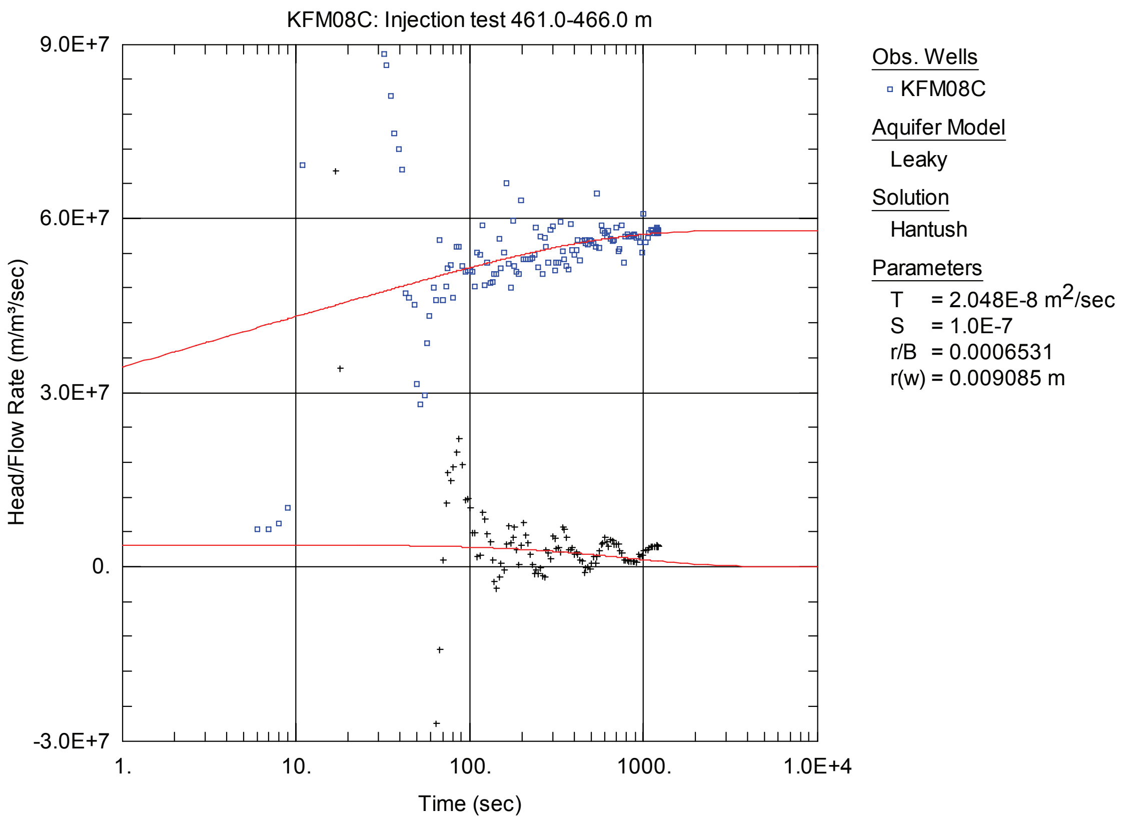


***Figure A3-213.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 461.0-466.0 m in KFM08C.*

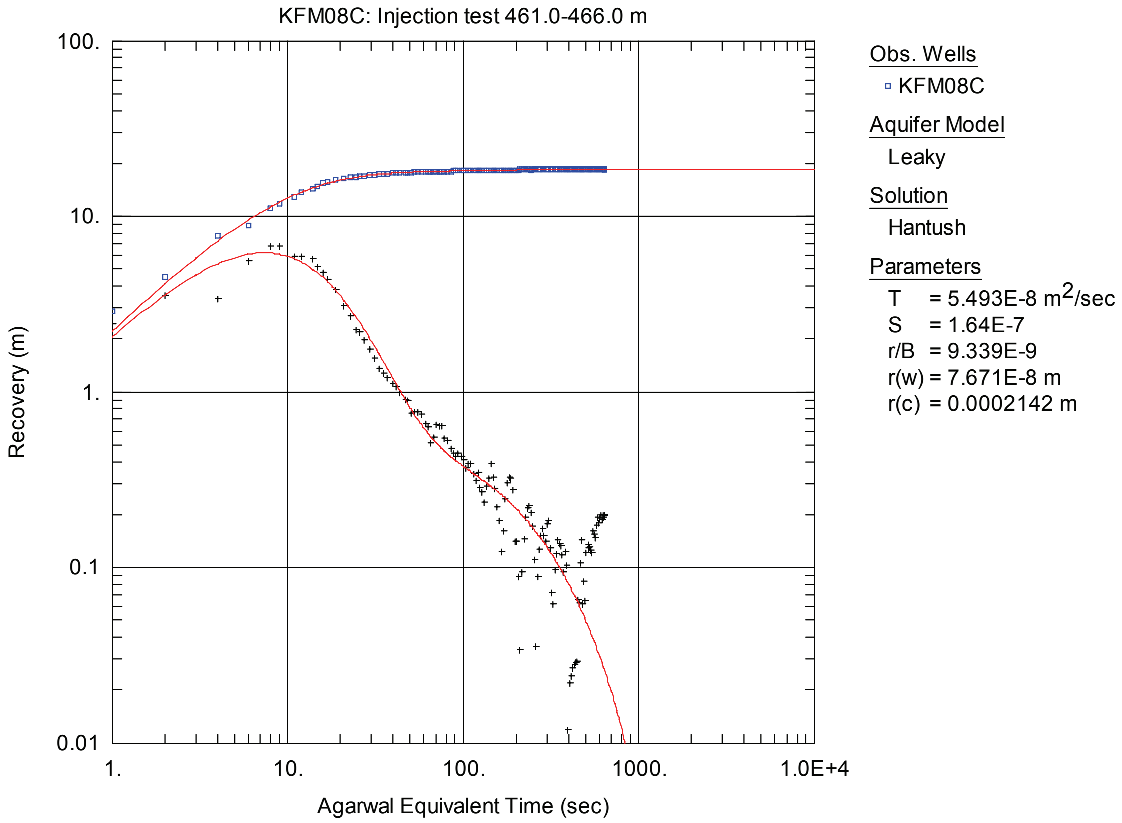


Figure A3-214. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 461.0-466.0 m in KFM08C.*

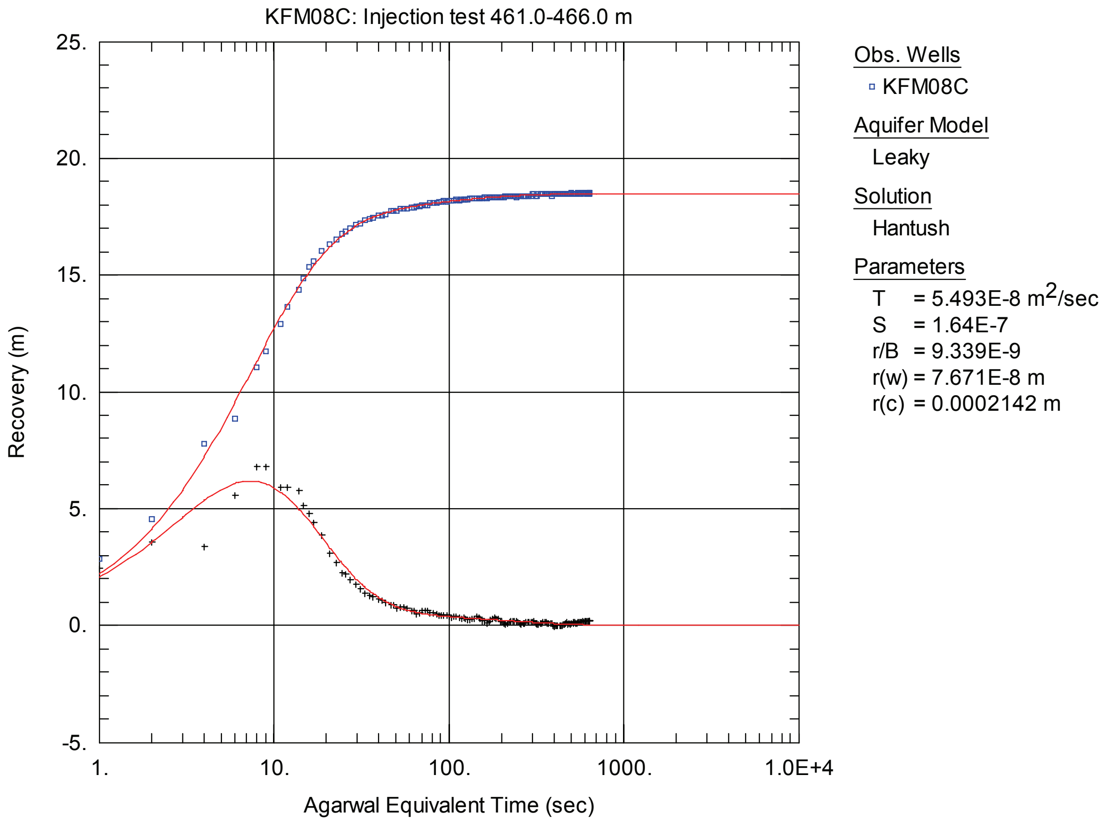


Figure A3-215. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 461.0-466.0 m in KFM08C.*

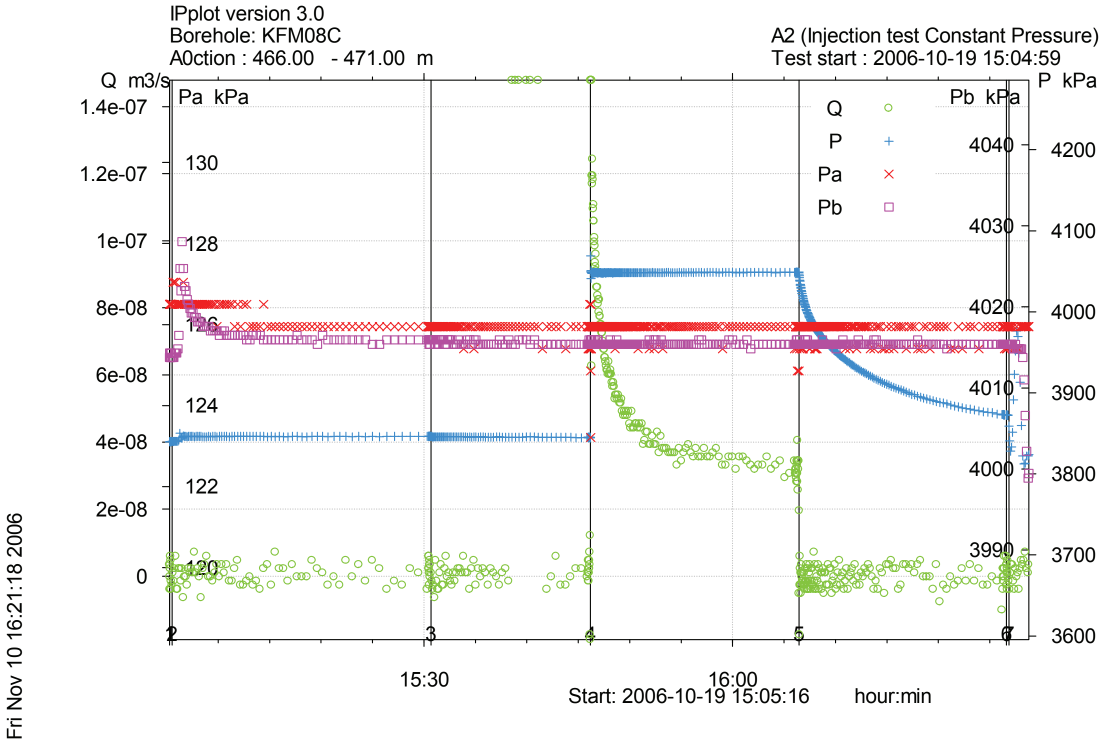


Figure A3-216. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 466.0-471.0 m in borehole KFM08C.*

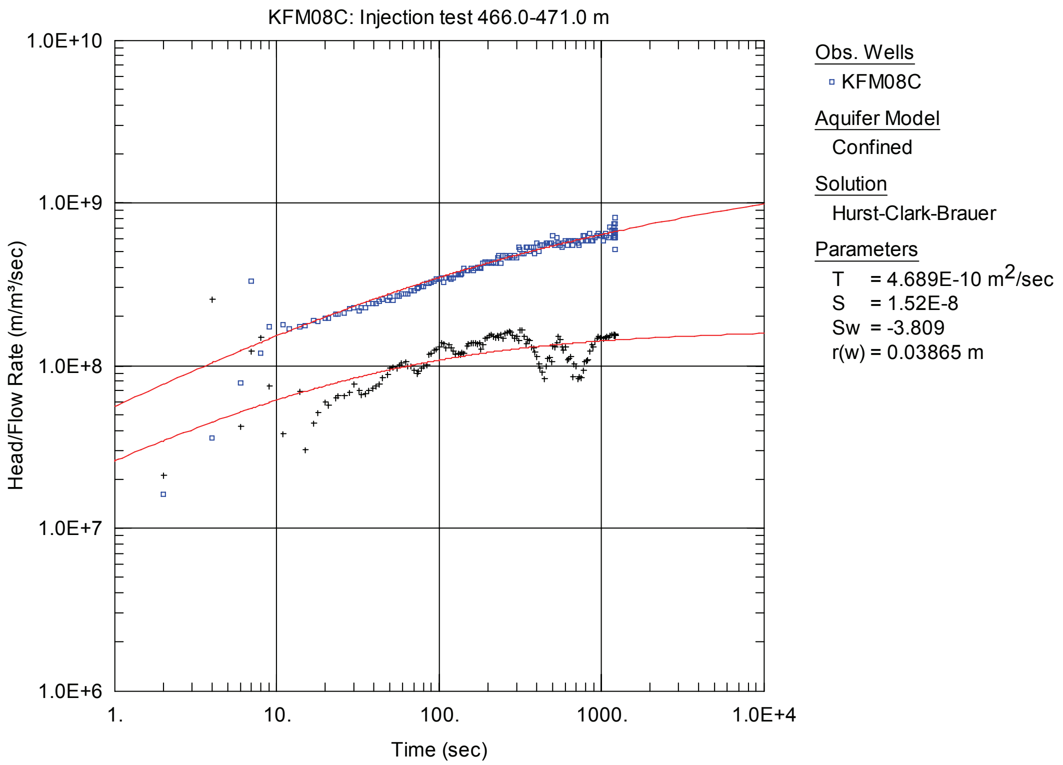


Figure A3-217. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 466.0-471.0 m in KFM08C.*

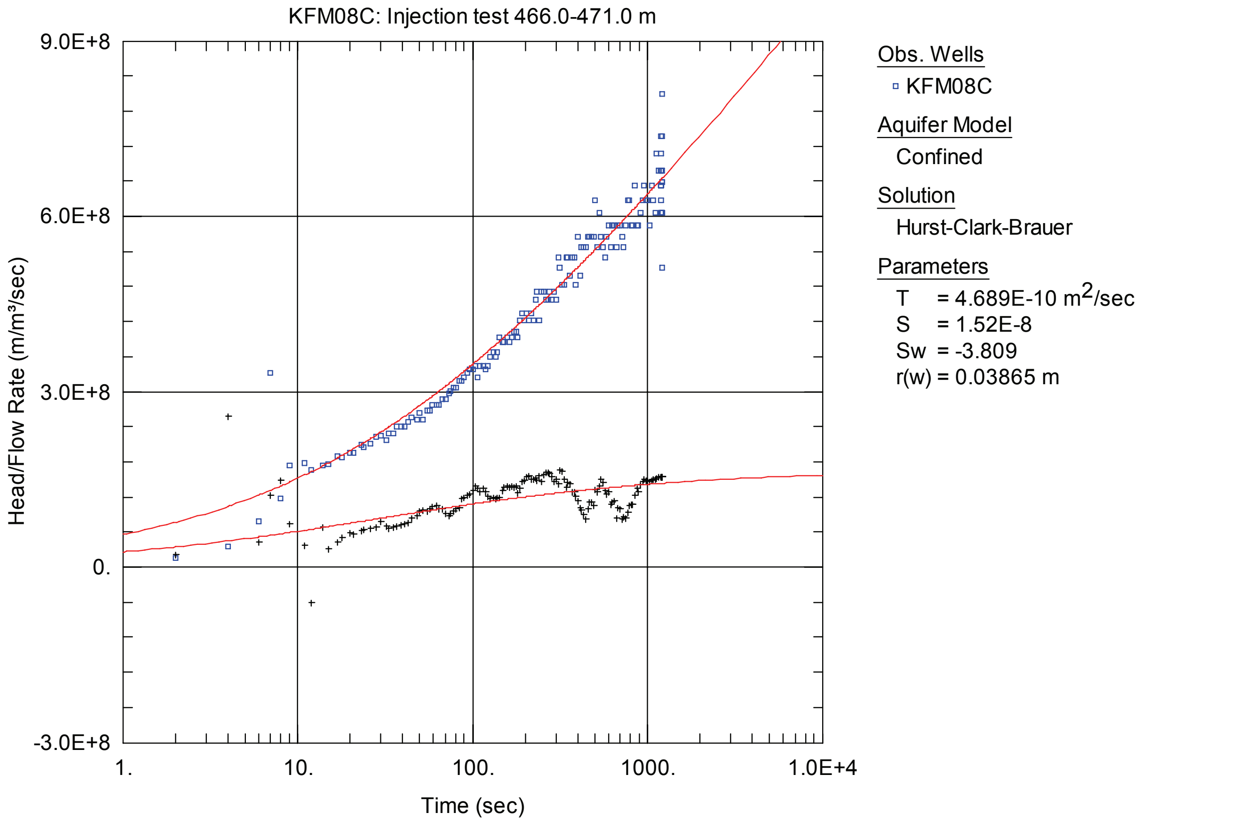


Figure A3-218. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 466.0-471.0 m in KFM08C.*

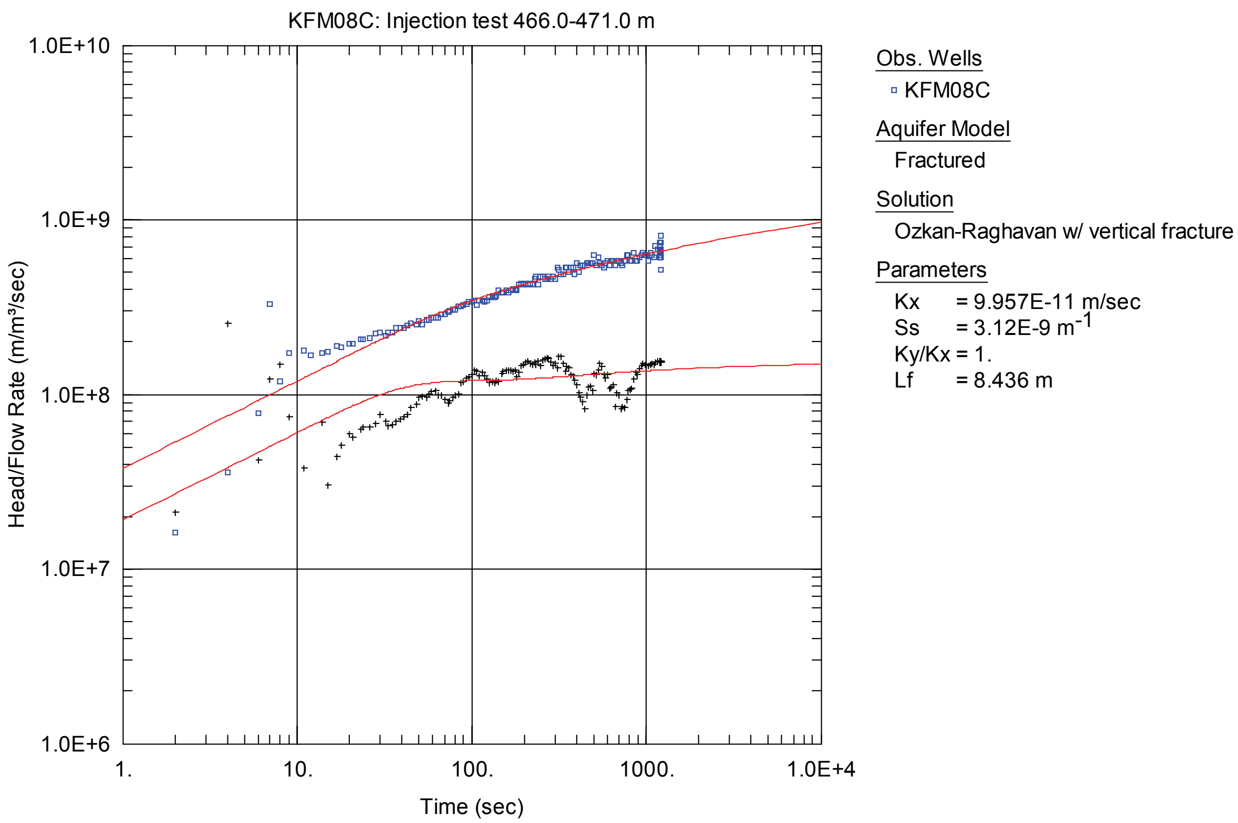


Figure A3-219. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Ozkan solution, from the injection test in section 466.0-471.0 m in KFM08C.*

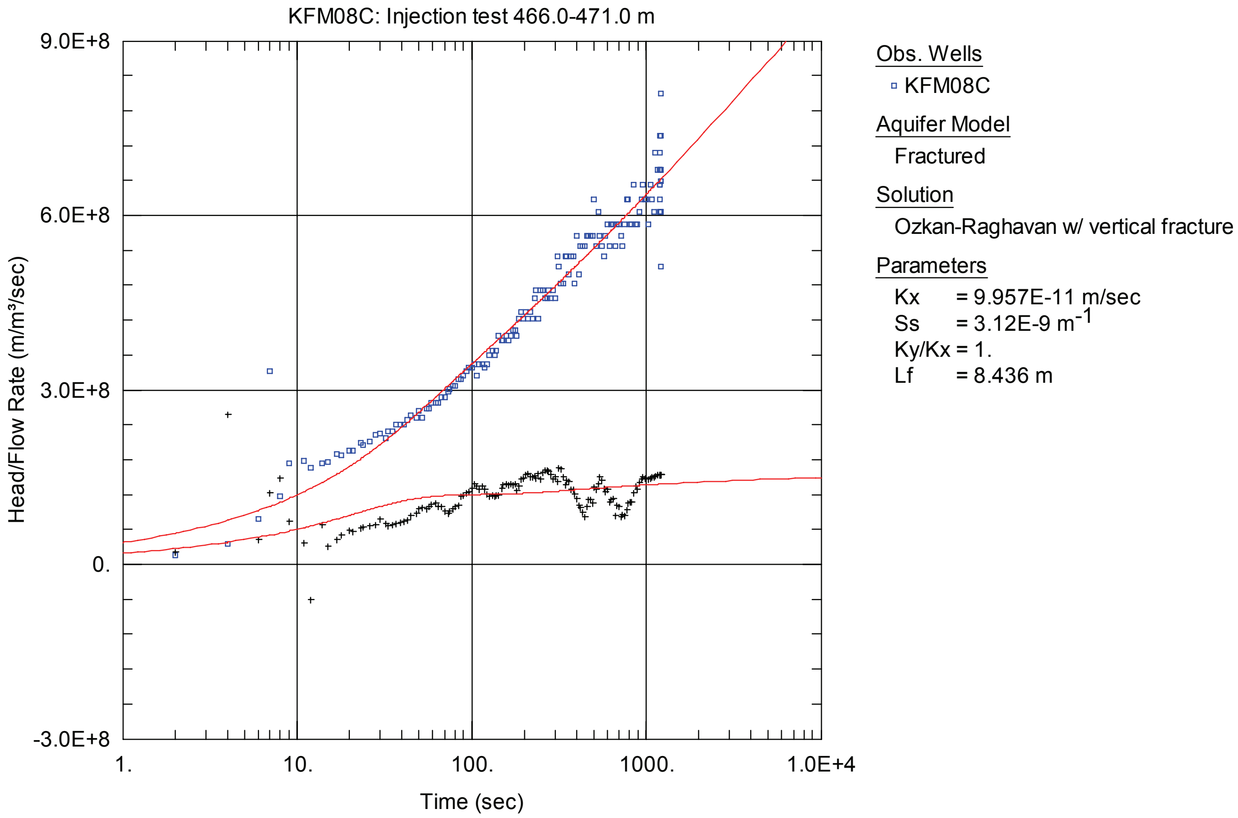


Figure A3-220. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Ozkan solution, from the injection test in section 466.0-471.0 m in KFM08C.*

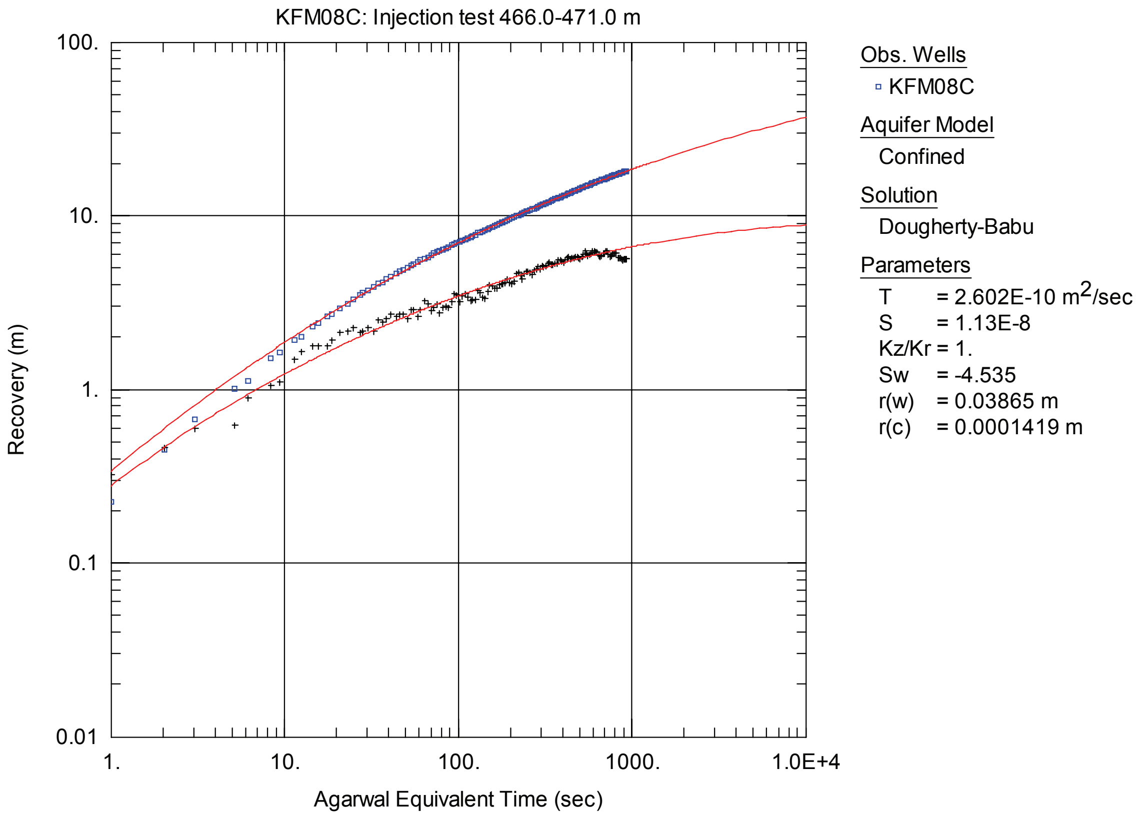


Figure A3-221. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Babu solution, from the injection test in section 466.0-471.0 m in KFM08C.*

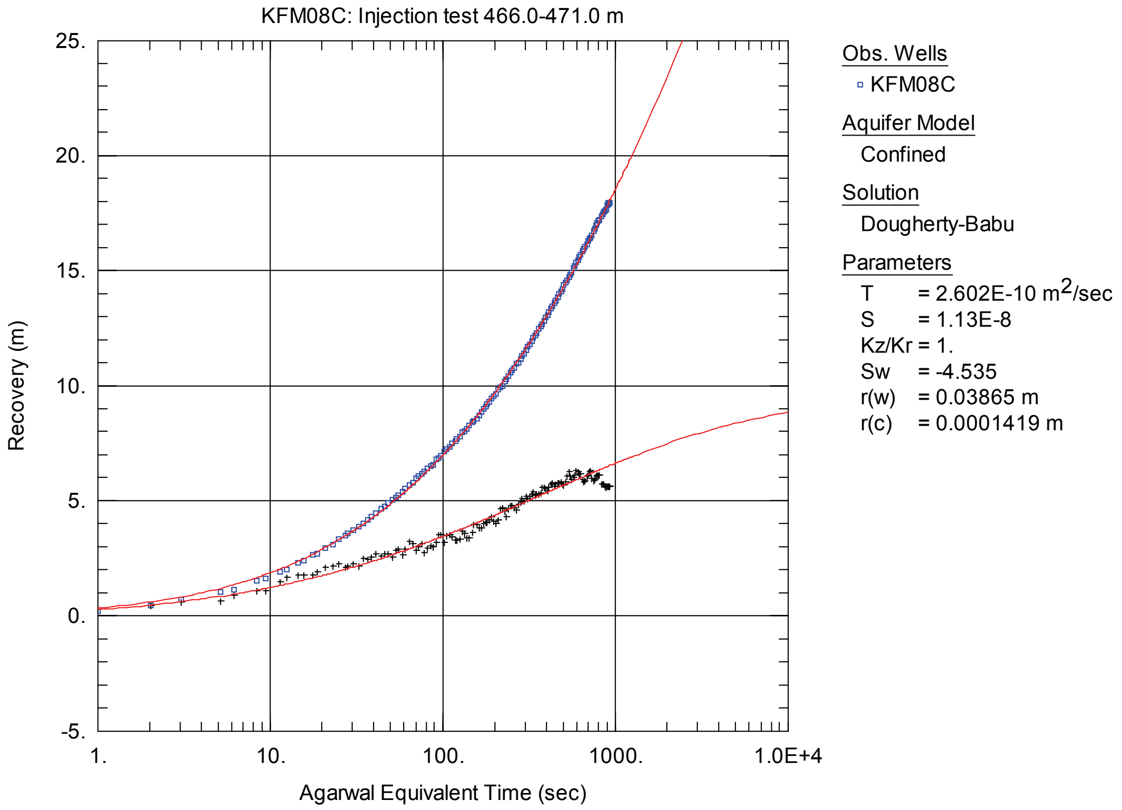


Figure A3-222. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Babu solution, from the injection test in section 466.0-471.0 m in KFM08C.*

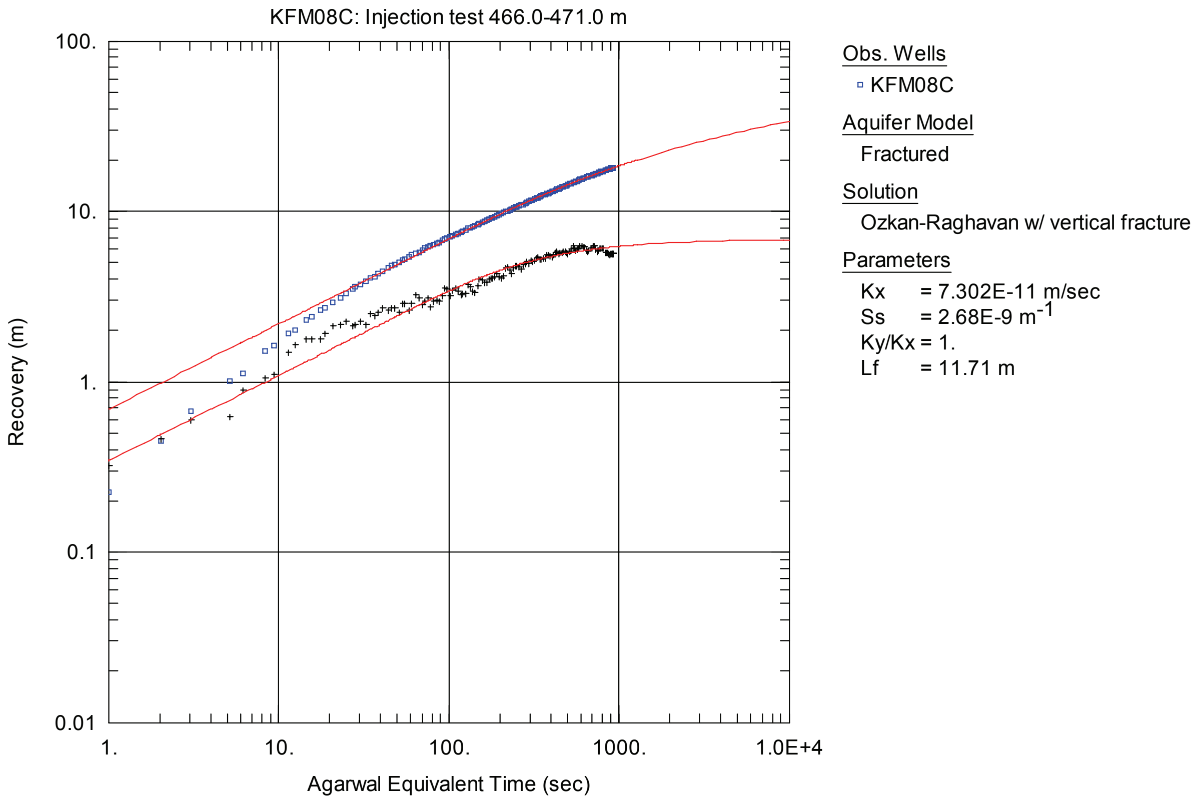


Figure A3-223. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Ozkan solution, from the injection test in section 466.0-471.0 m in KFM08C.*

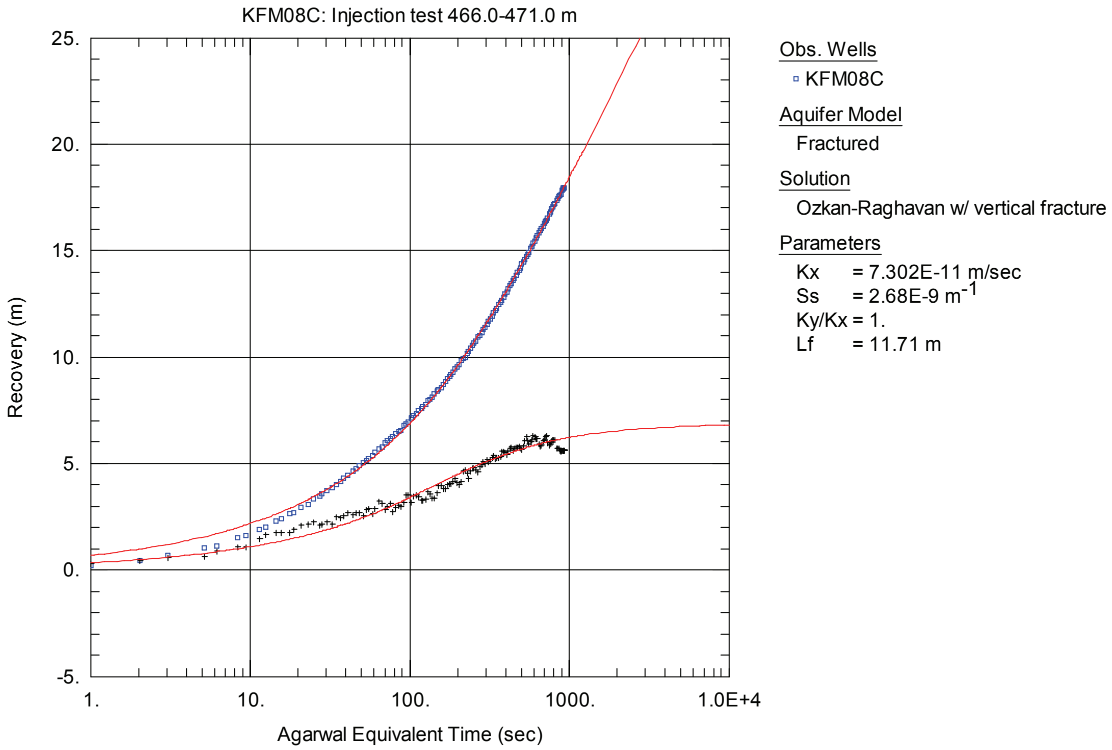


Figure A3-224. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Ozkan solution, from the injection test in section 466.0-471.0 m in KFM08C.*

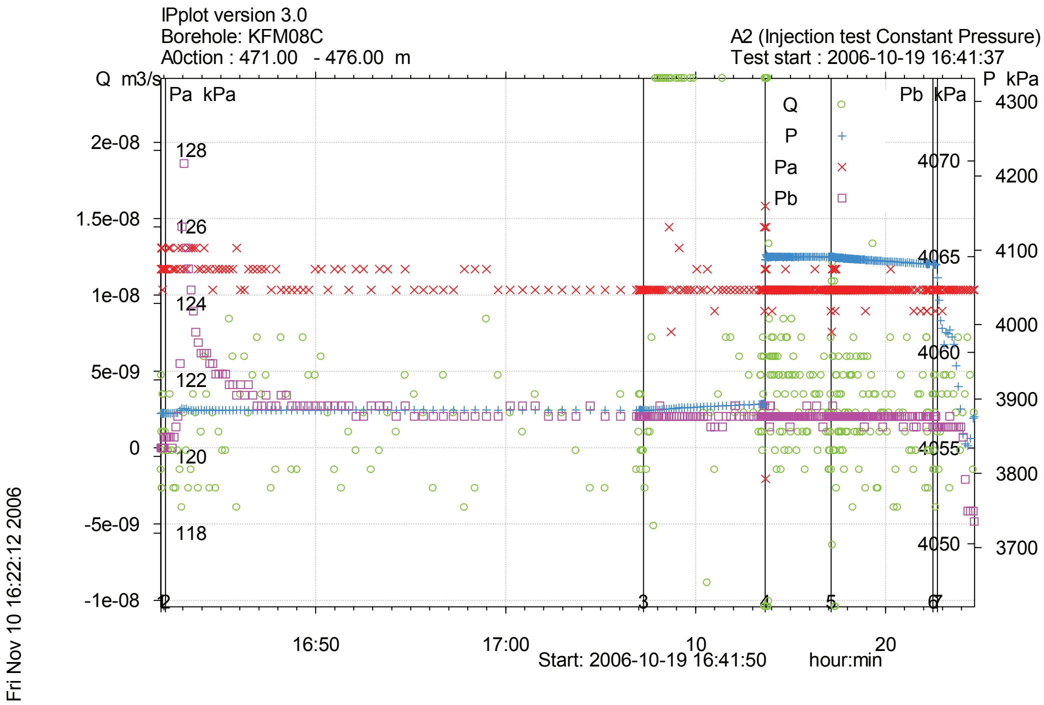


Figure A3-225. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 471.0-476.0 m in borehole KFM08C.*

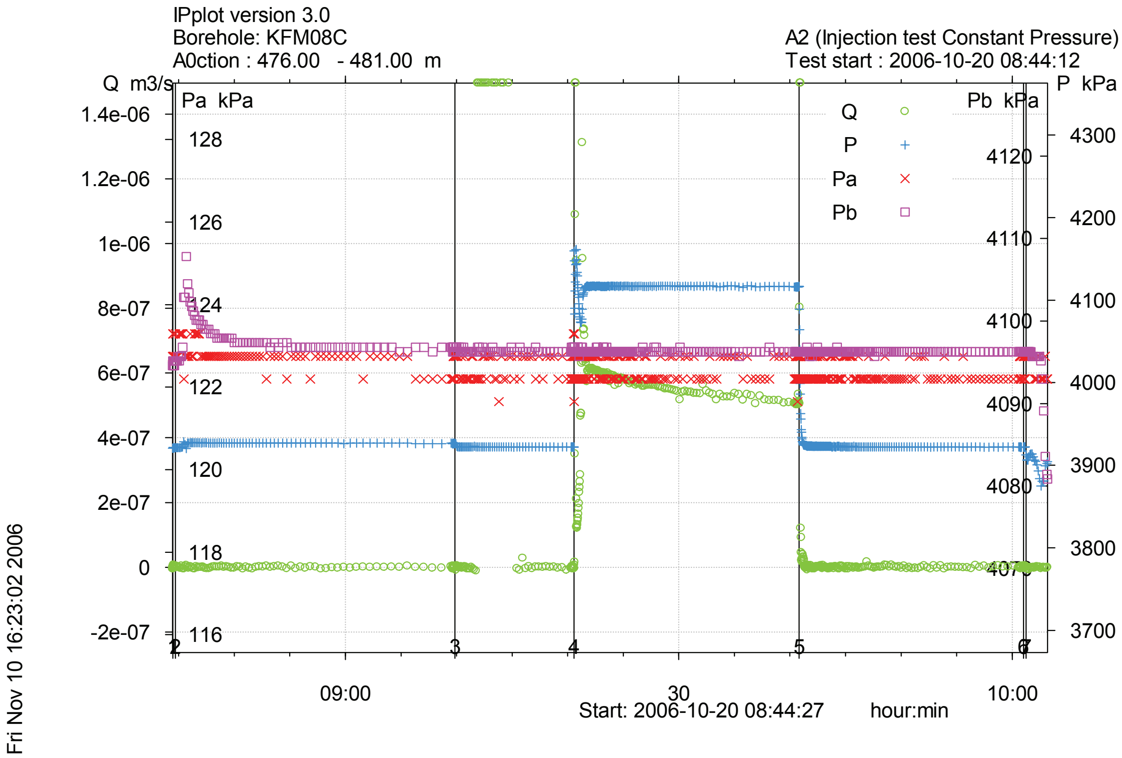


Figure A3-226. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 476.0-481.0 m in borehole KFM08C.

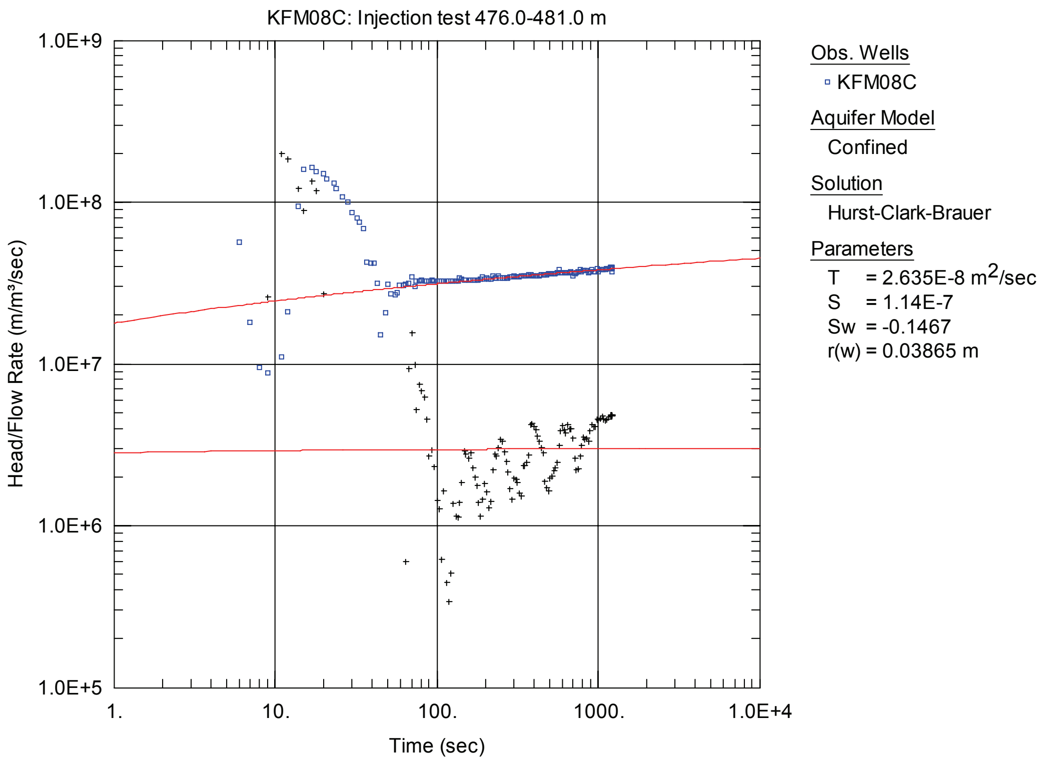


Figure A3-227. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 476.0-481.0 m in KFM08C.

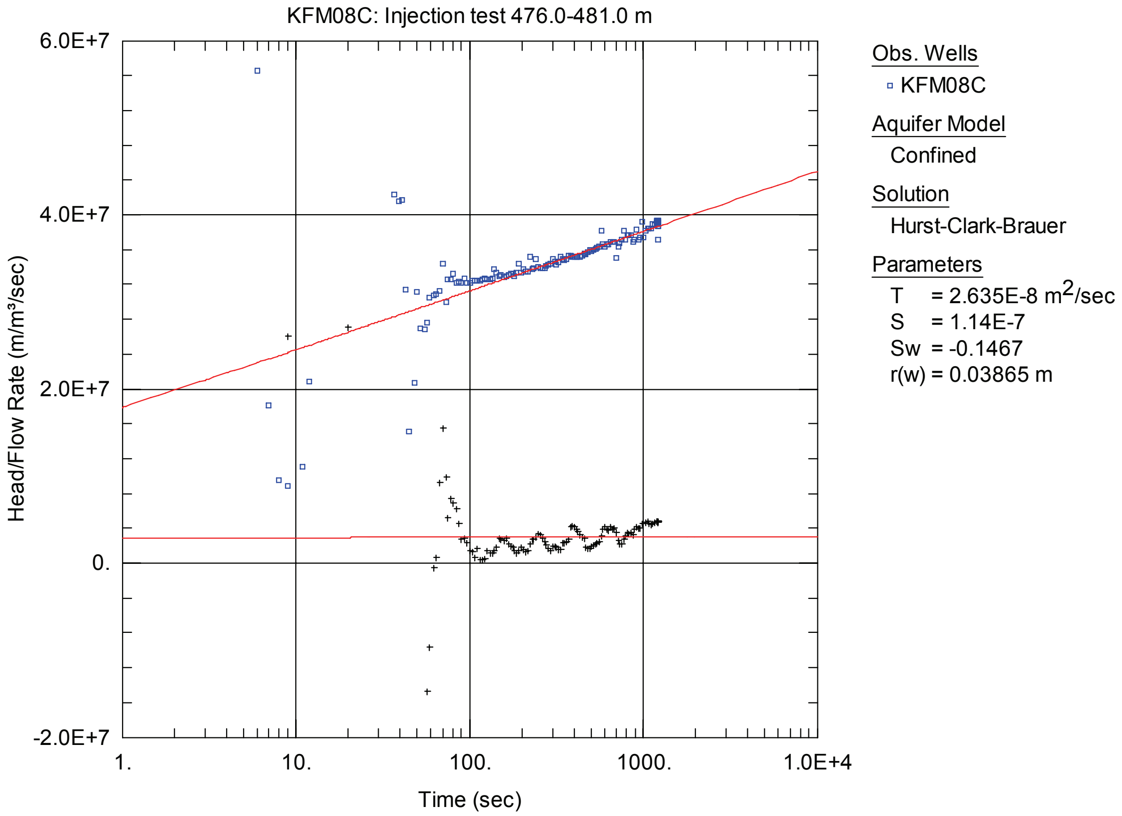


***Figure A3-228.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 476.0-481.0 m in KFM08C.*

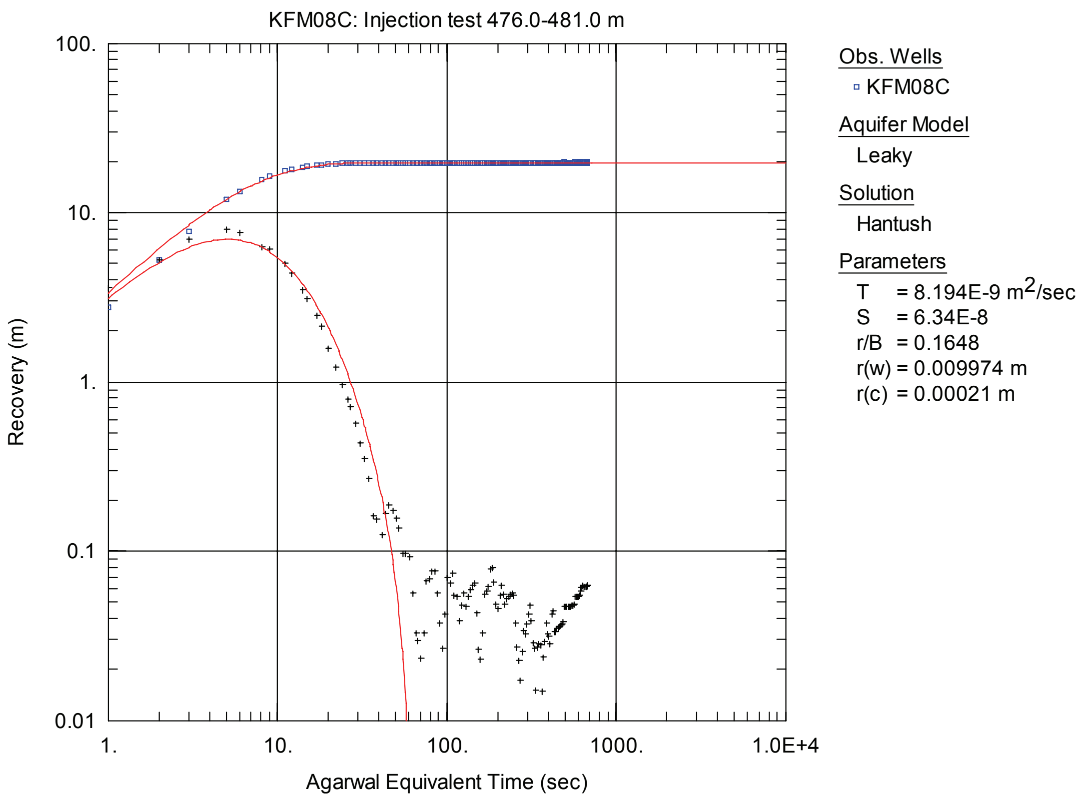


***Figure A3-229.** Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 476.0-481.0 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

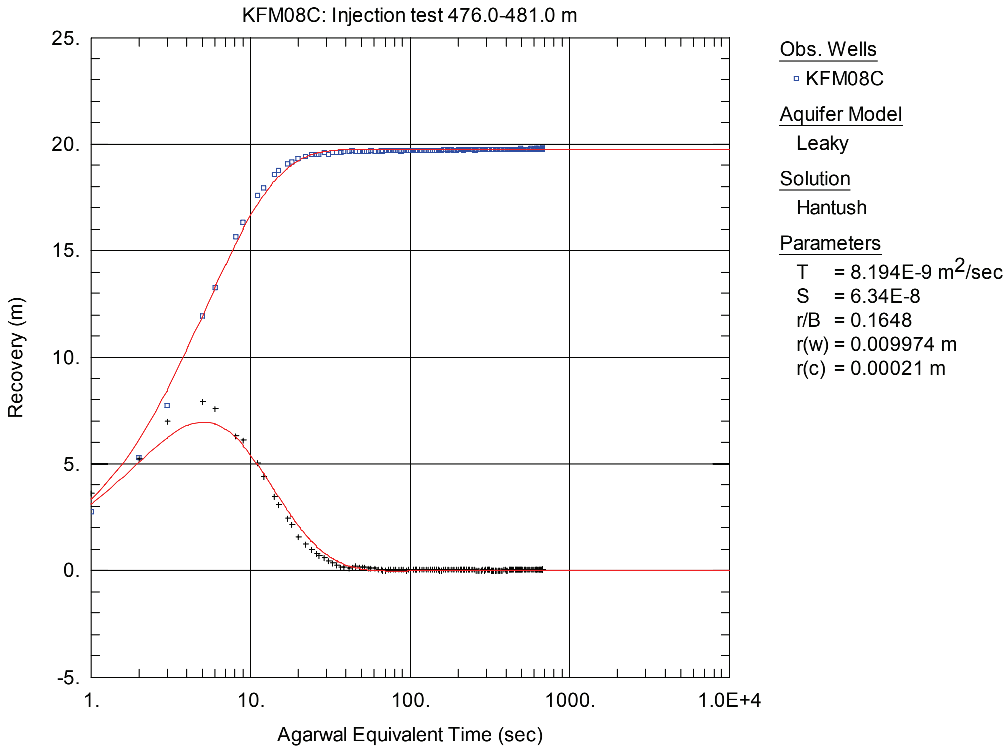


Figure A3-230. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 476.0-481.0 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

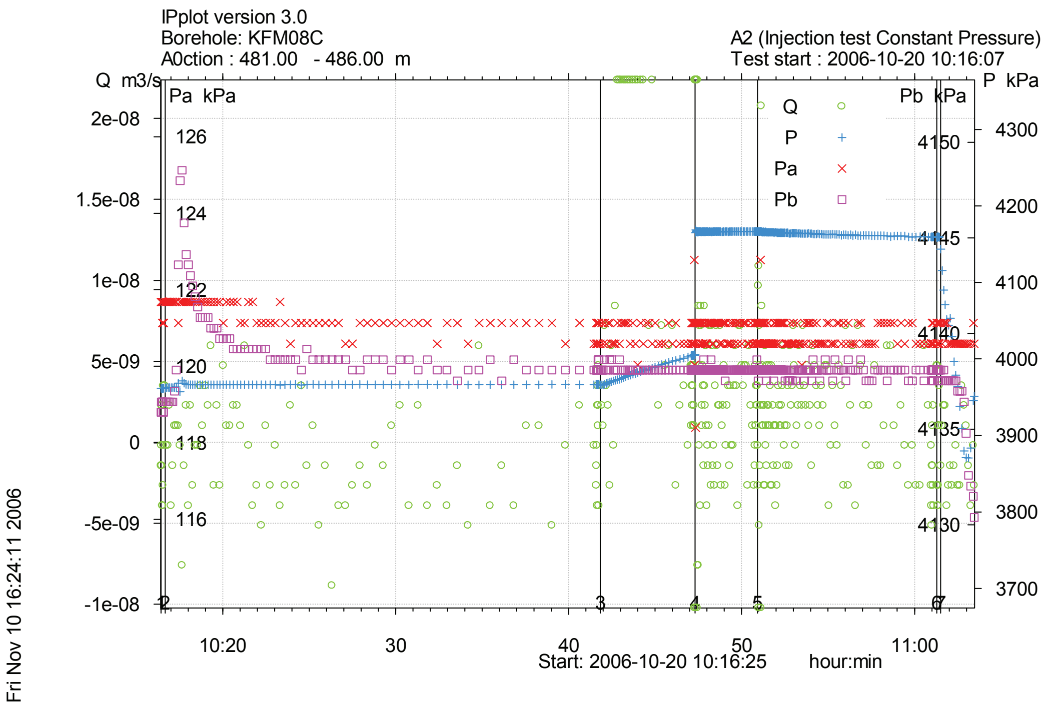


Figure A3-231. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 481.0-486.0 m in borehole KFM08C.*

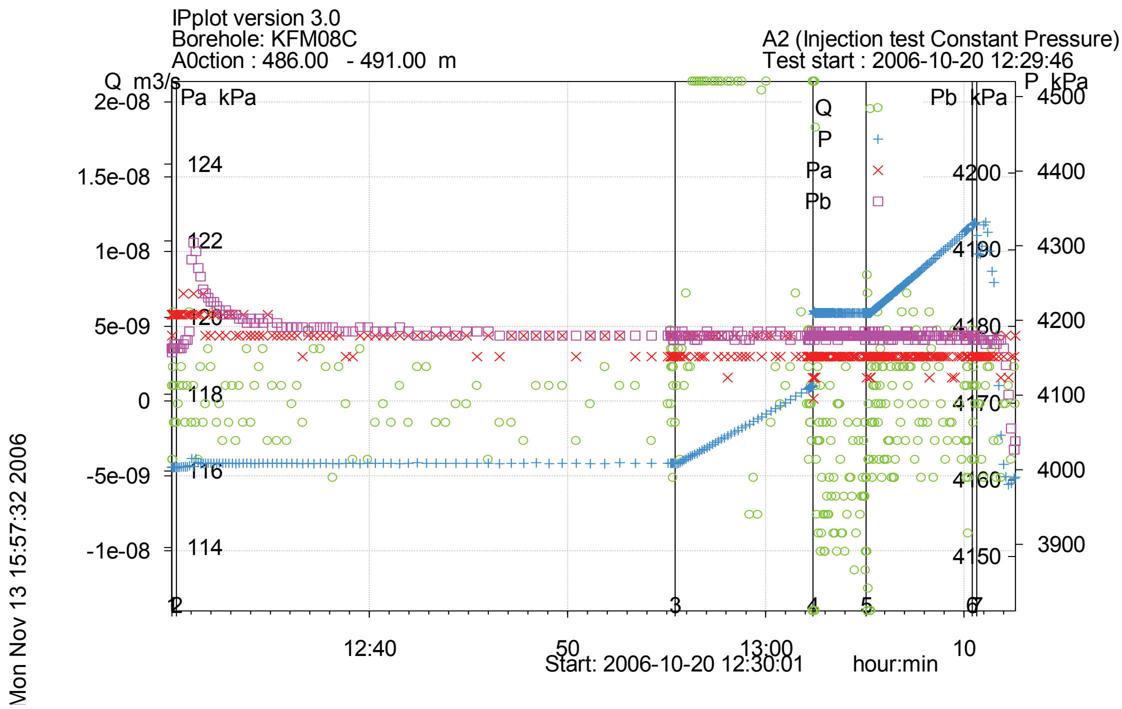


Figure A3-232. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 486.0-491.0 m in borehole KFM08C.*

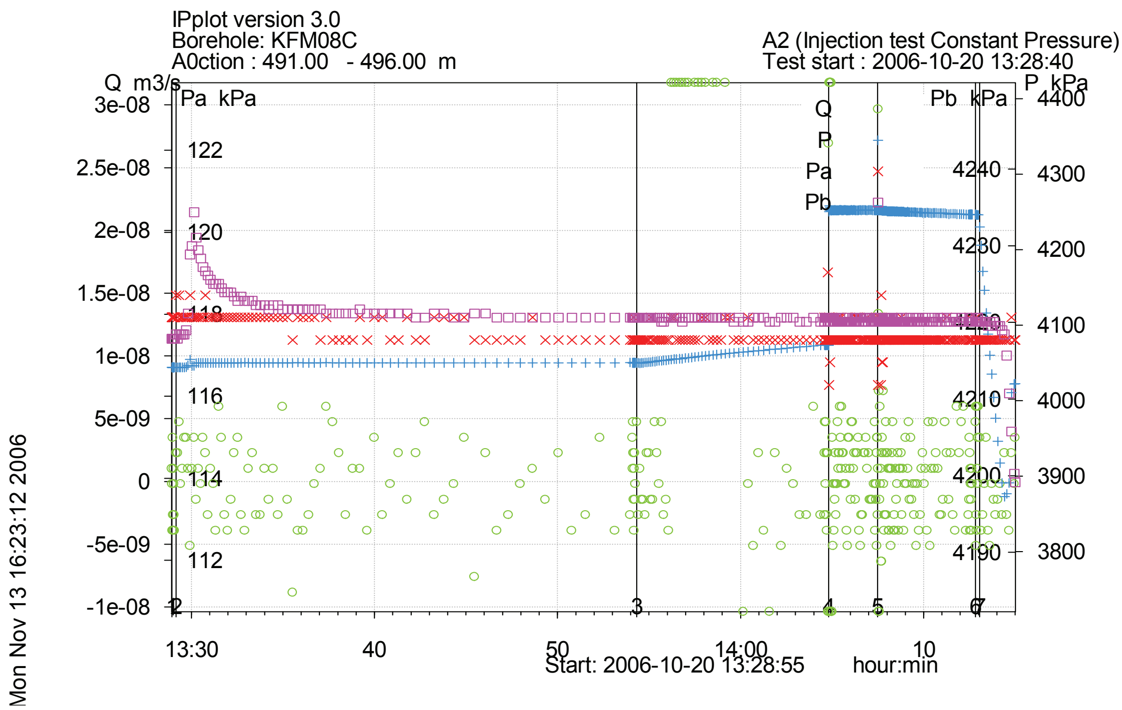


Figure A3-233. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 491.0-496.0 m in borehole KFM08C.*

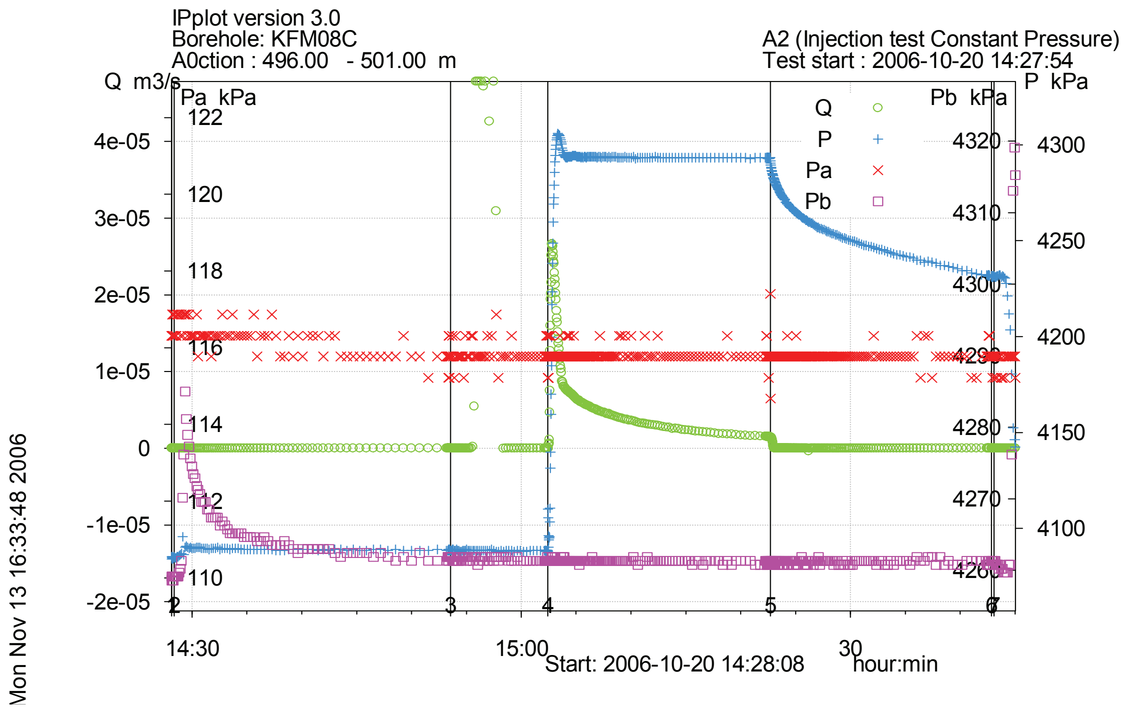


Figure A3-234. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 496.0-501.0 m in borehole KFM08C.

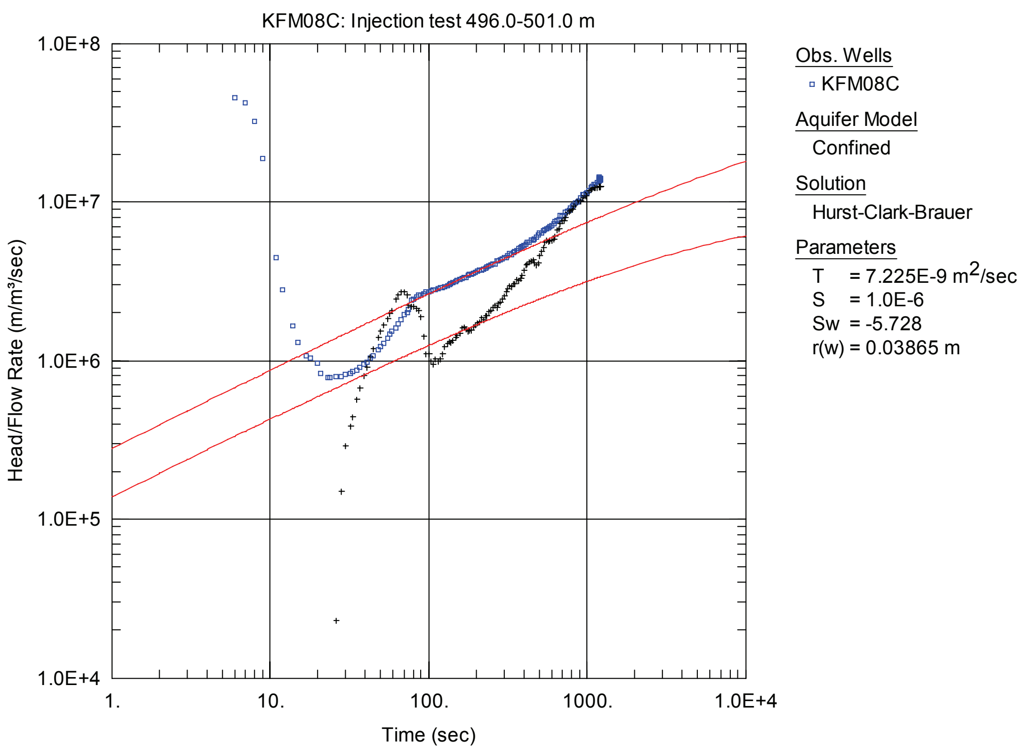


Figure A3-235. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 496.0-501.0 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.

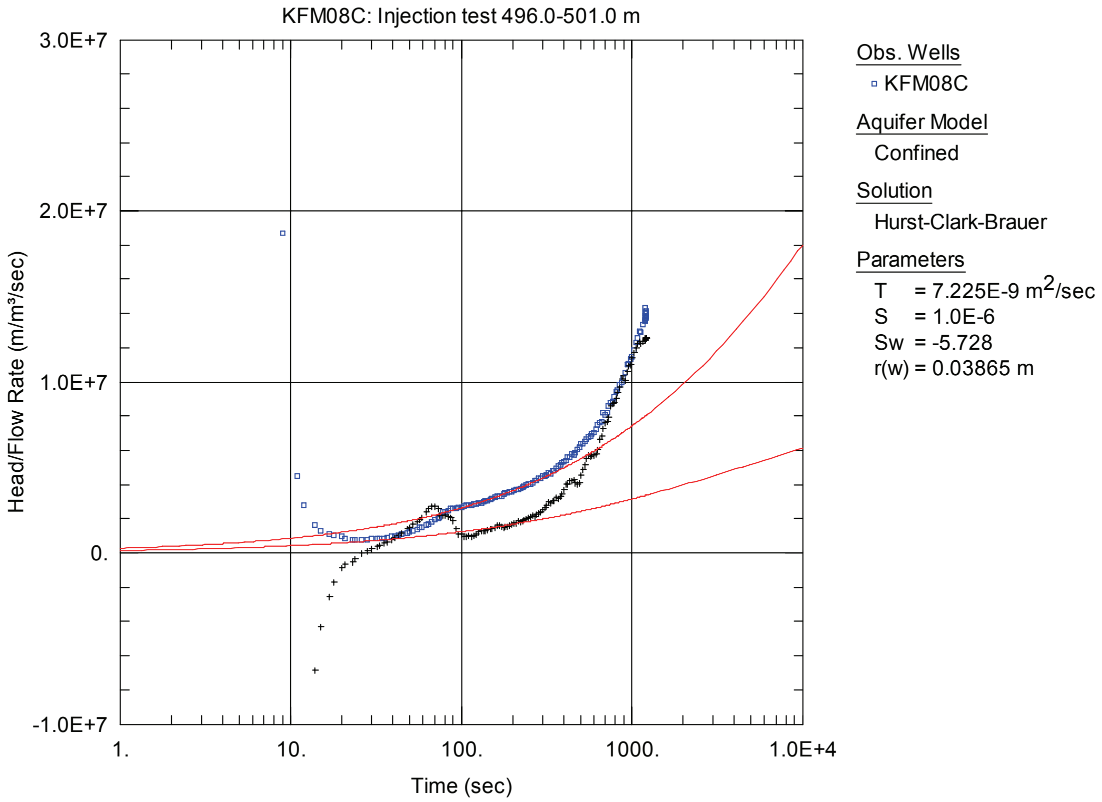


Figure A3-236. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 496.0-501.0 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

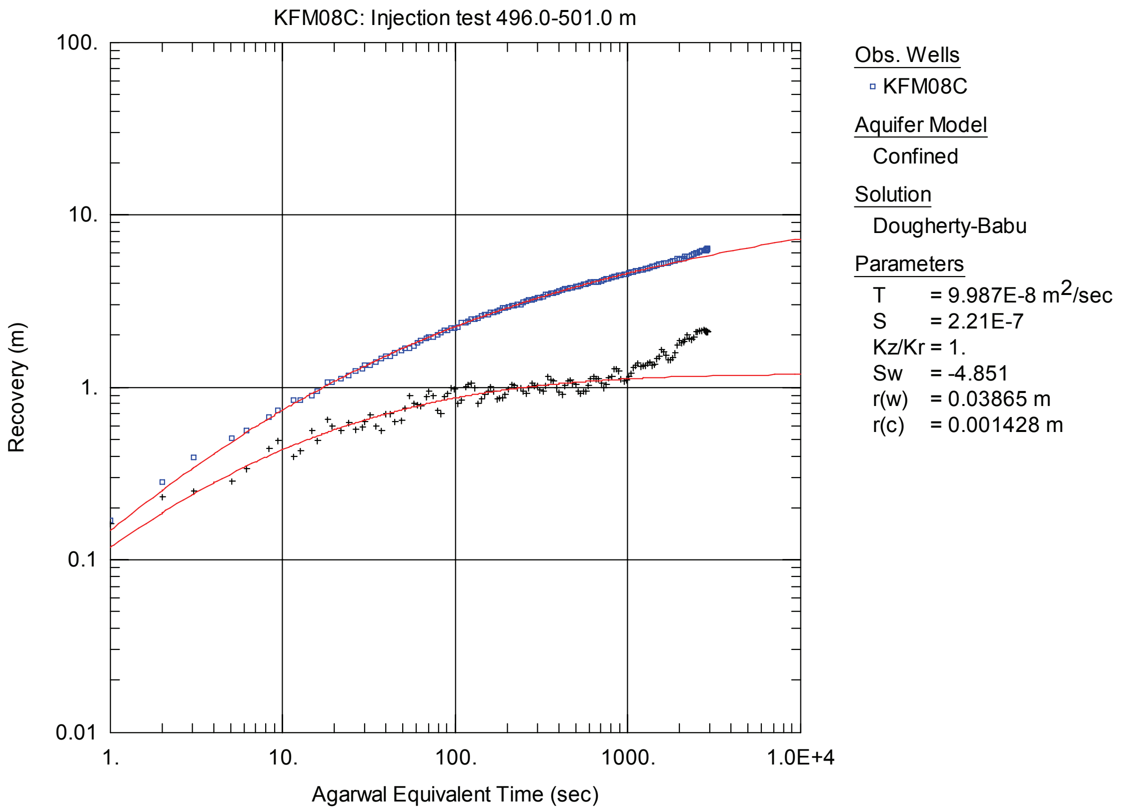


Figure A3-237. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 496.0-501.0 m in KFM08C.*

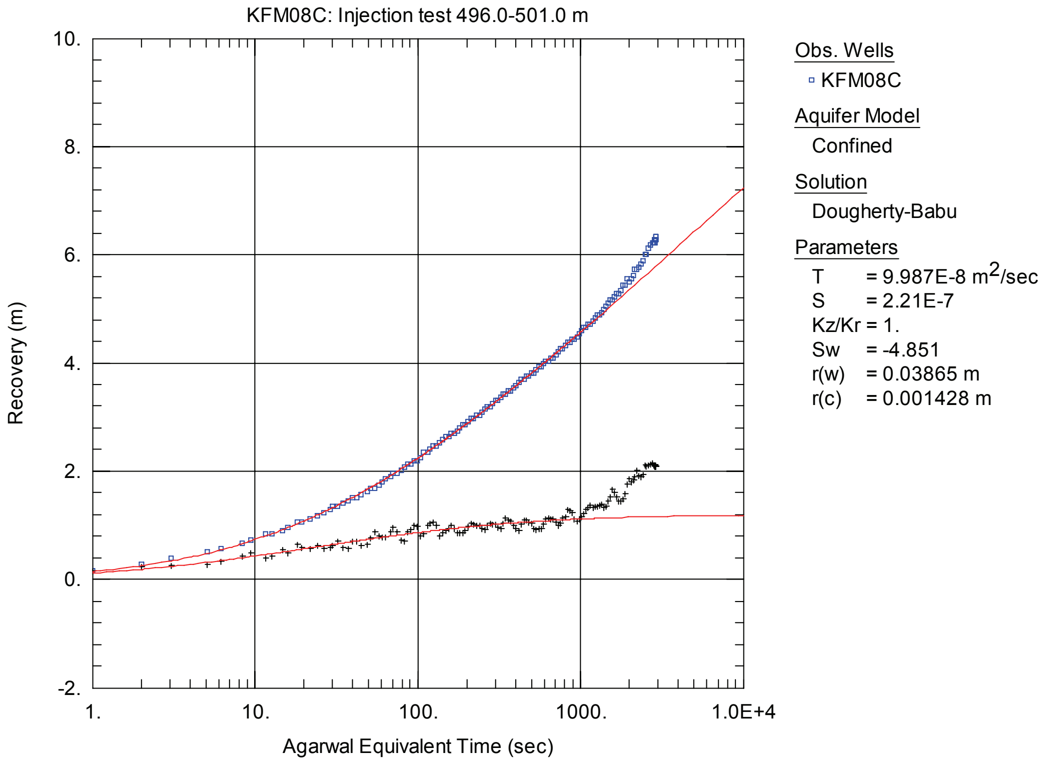


Figure A3-238. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 496.0-501.0 m in KFM08C.*

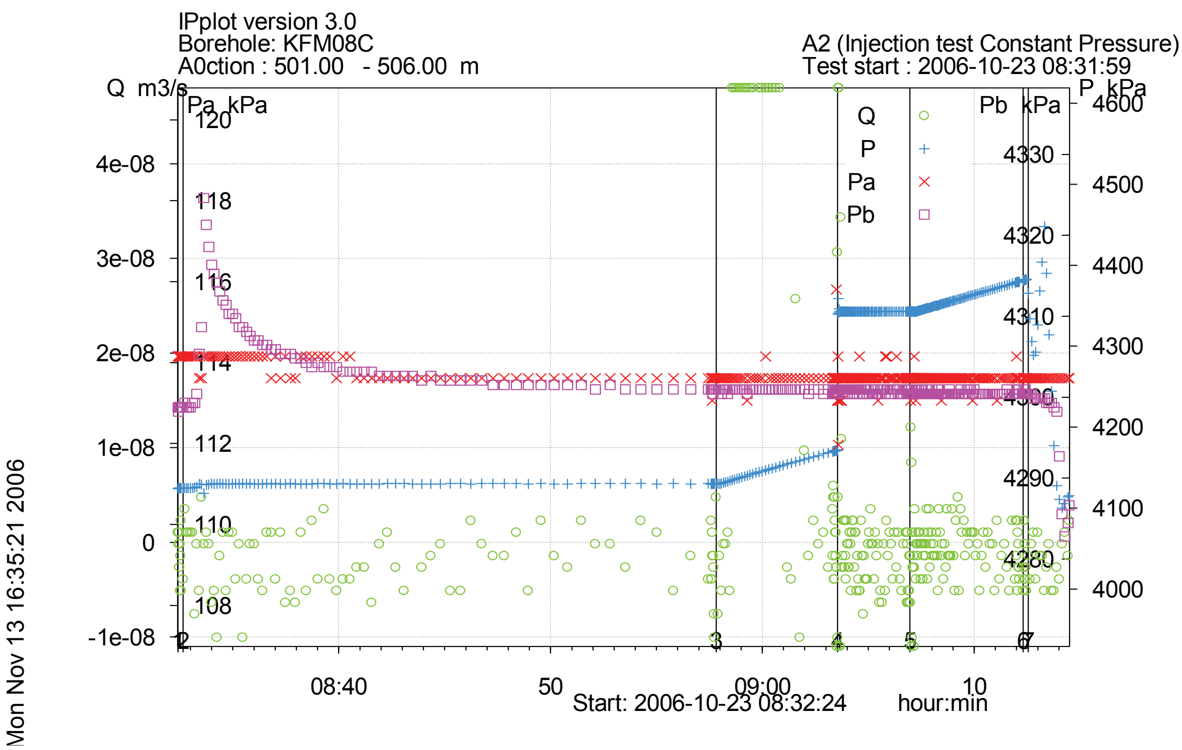


Figure A3-239. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 501.0-506.0 m in borehole KFM08C.*

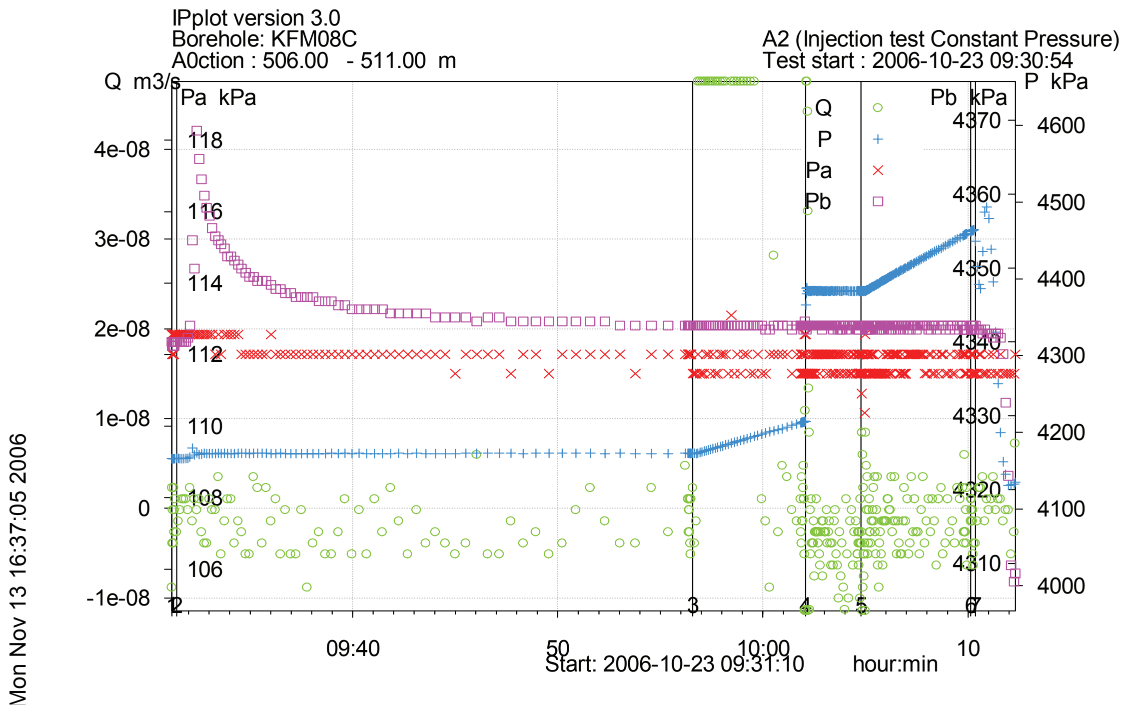


Figure A3-240. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 506.0-511.0 m in borehole KFM08C.*

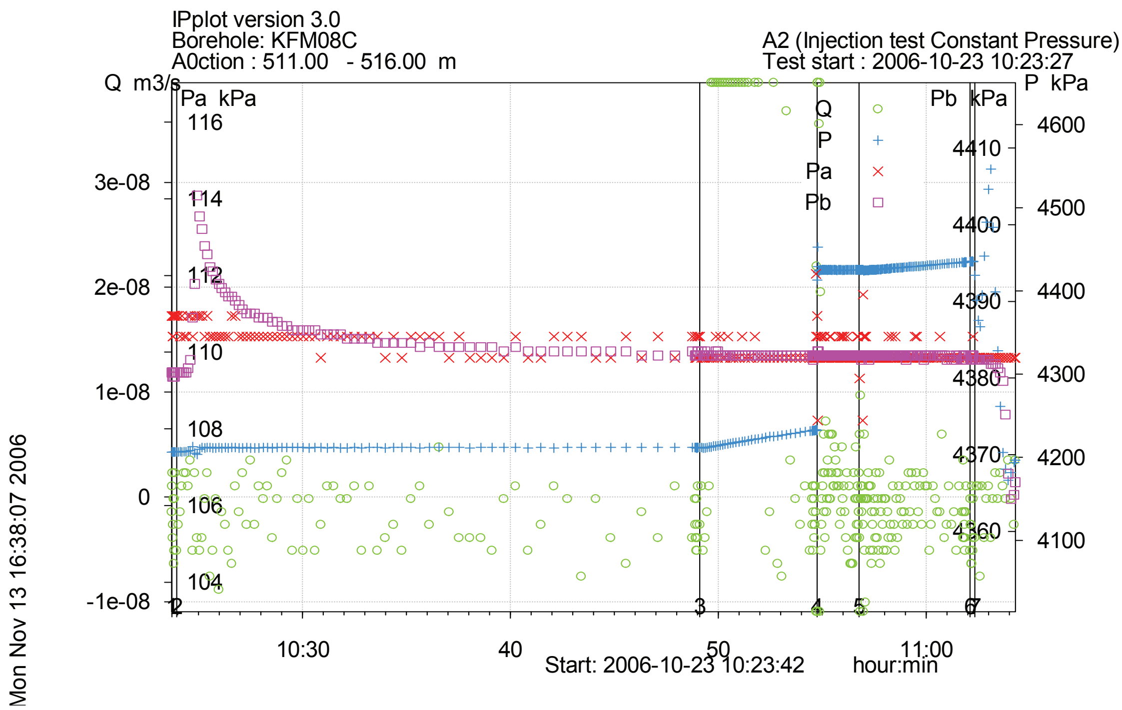


Figure A3-241. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 511.0-516.0 m in borehole KFM08C.*

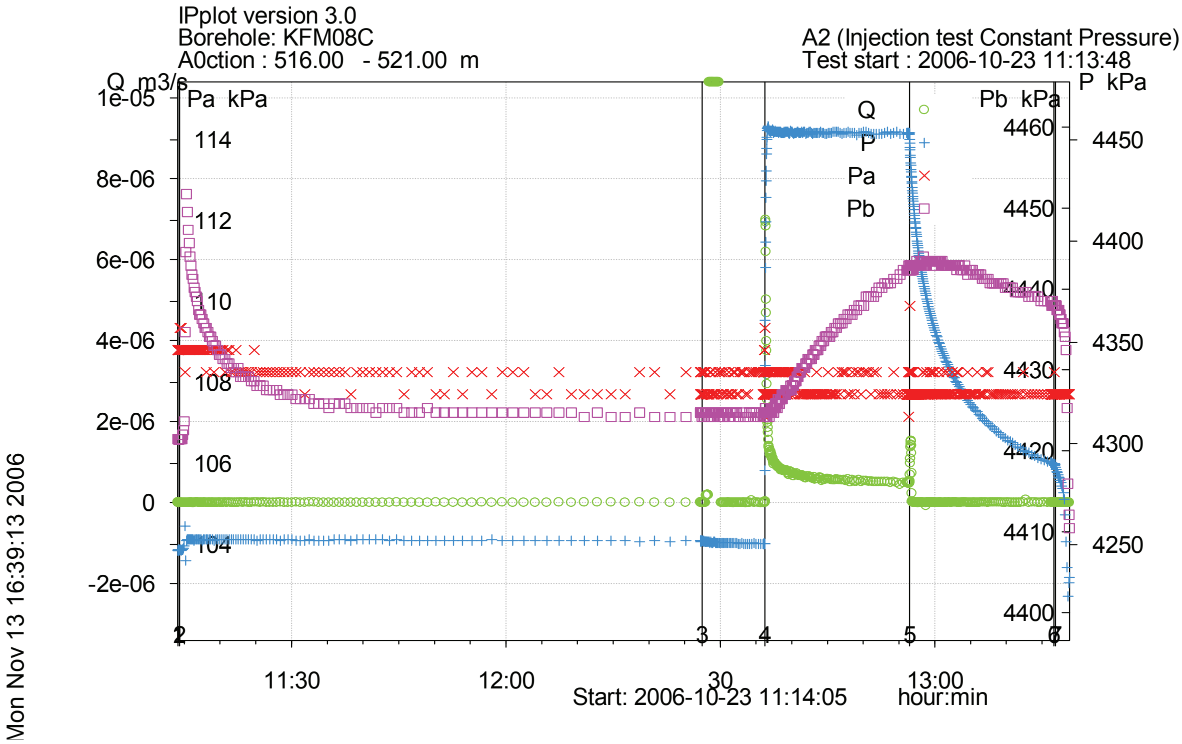


Figure A3-242. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 516.0-521.0 m in borehole KFM08C.

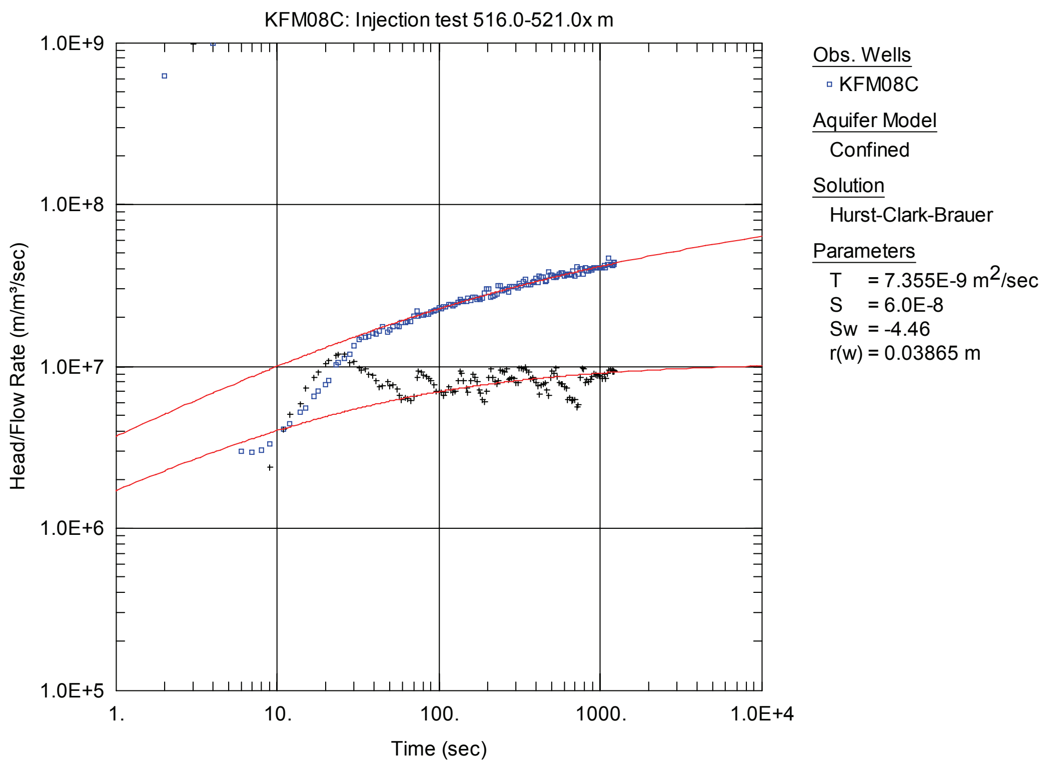


Figure A3-243. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 516.0-521.0 m in KFM08C.

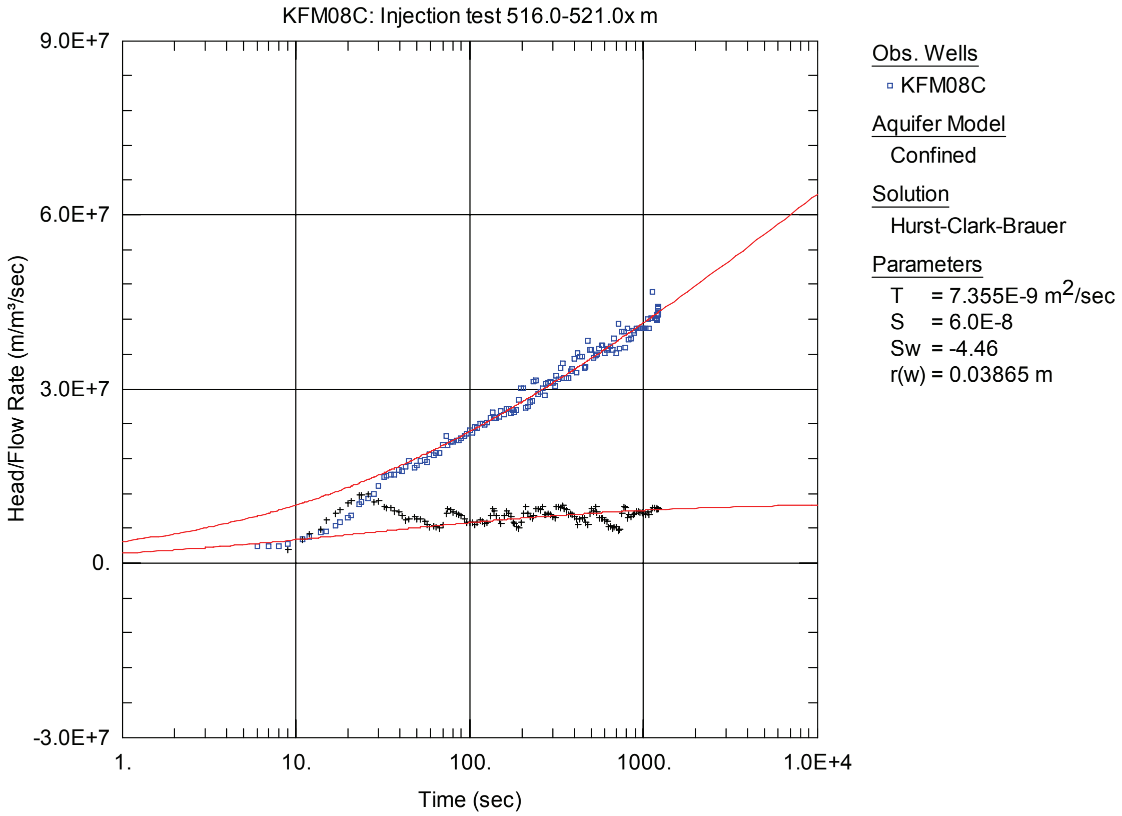


***Figure A3-244.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 516.0-521.0 m in KFM08C.*

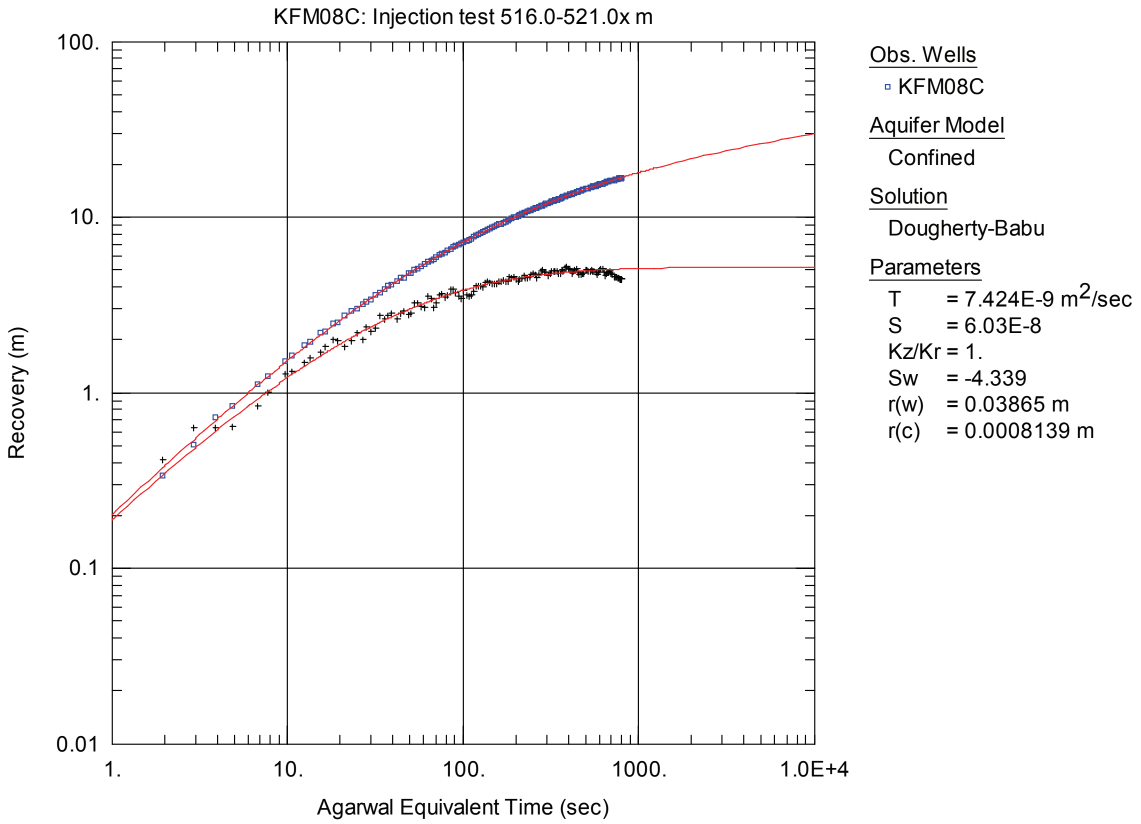


***Figure A3-245.** Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 516.0-521.0 m in KFM08C.*

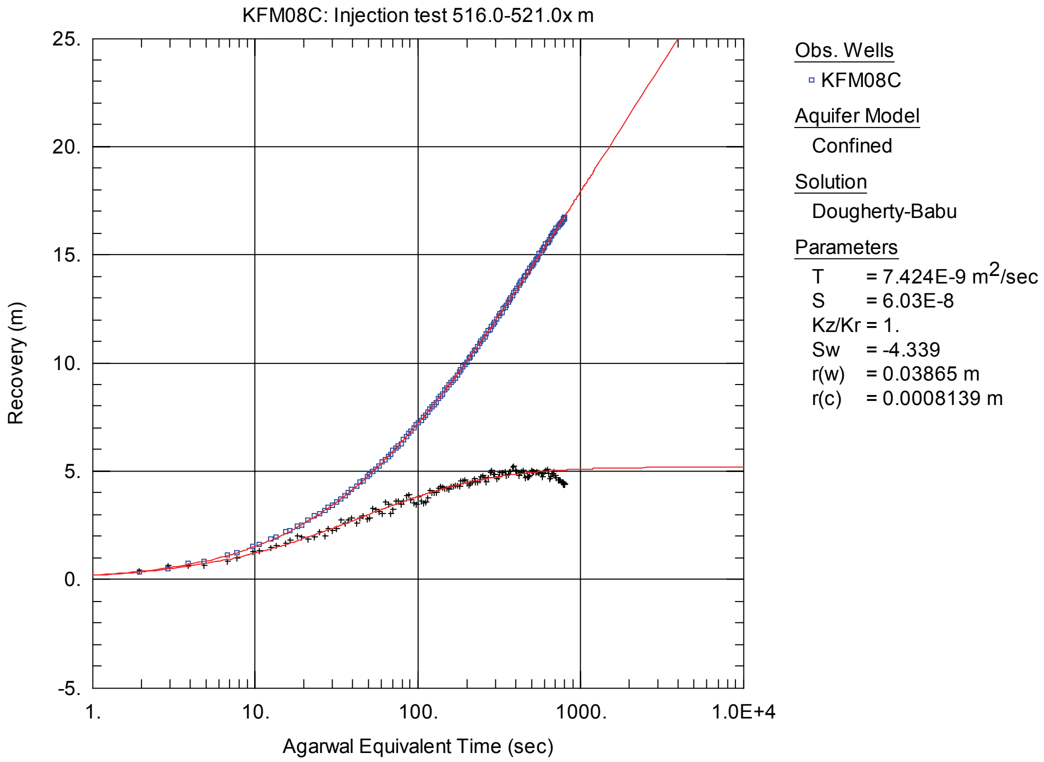


Figure A3-246. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 516.0-521.0 m in KFM08C.*

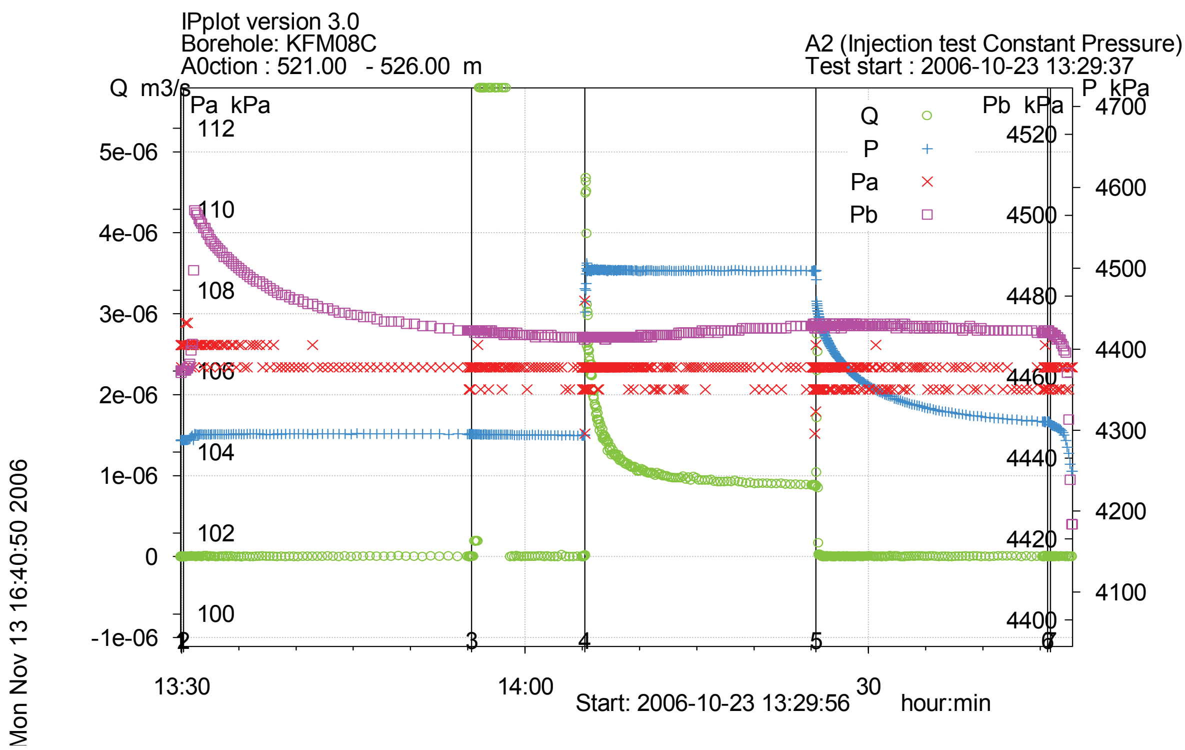


Figure A3-247. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 521.0-526.0 in borehole KFM08C.*

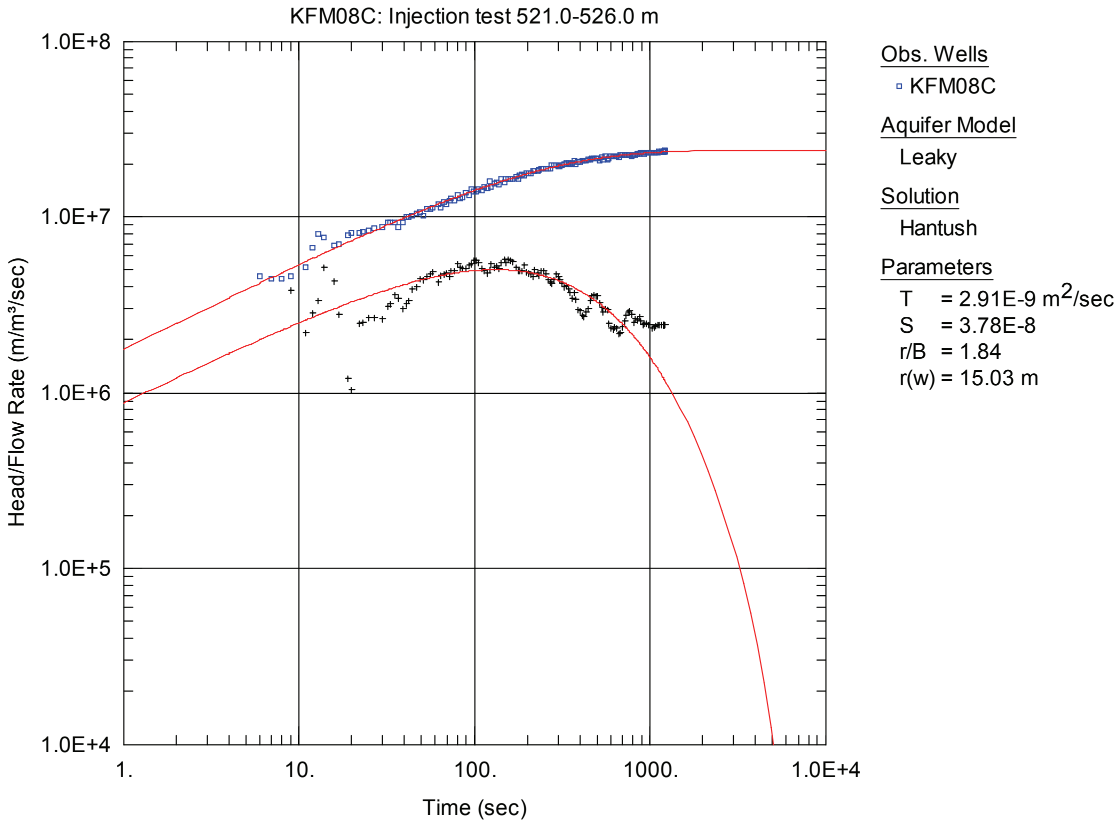


***Figure A3-248.** Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 521.0-526.0 m in KFM08C.*

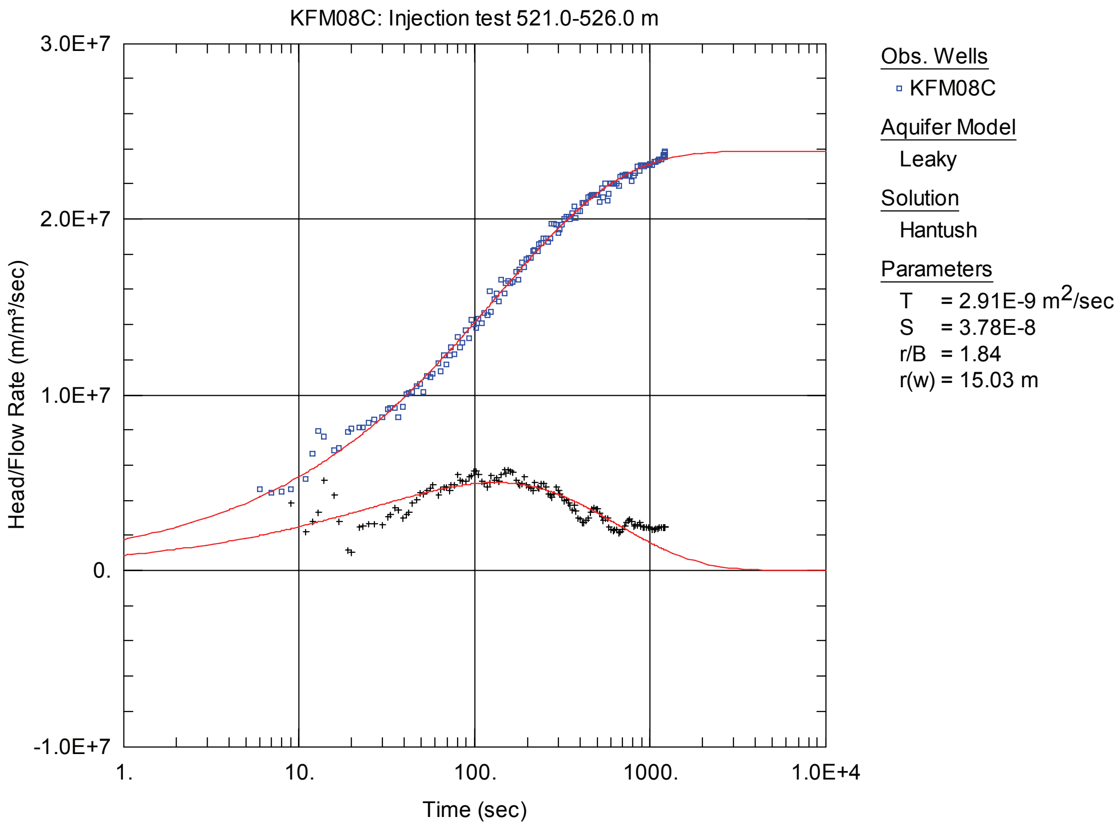


***Figure A3-249.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 521.0-526.0 m in KFM08C.*

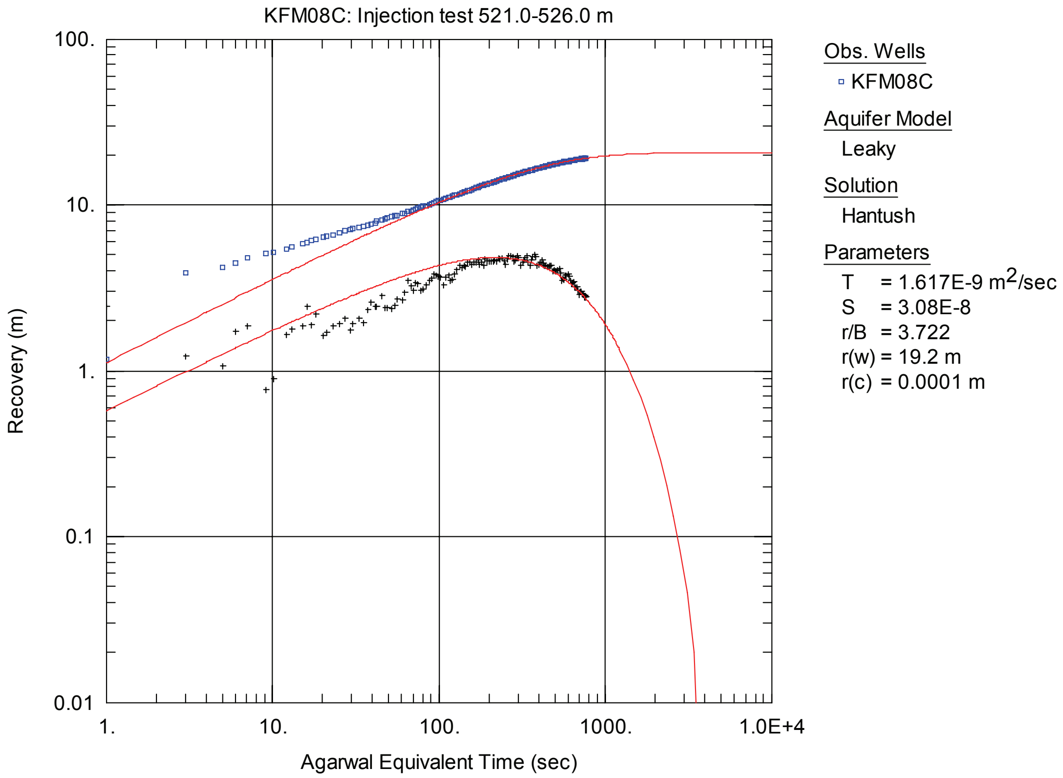


Figure A3-250. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 521.0-526.0 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

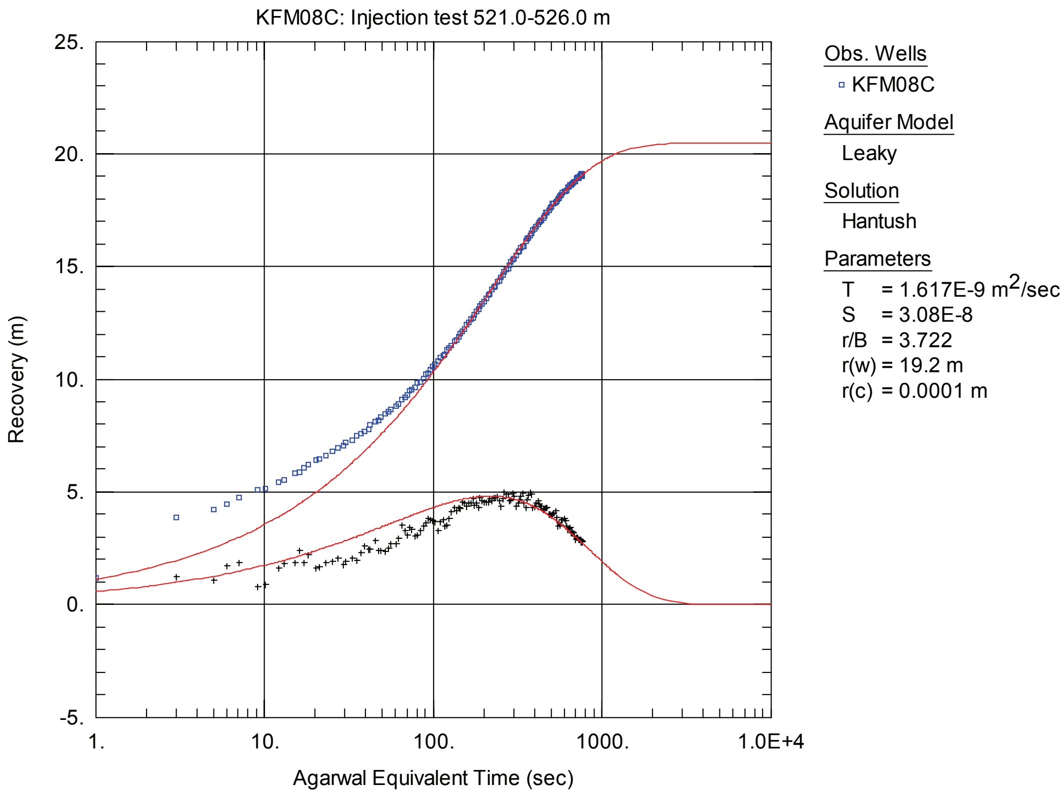


Figure A3-251. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 521.0-526.0 m in KFM08C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

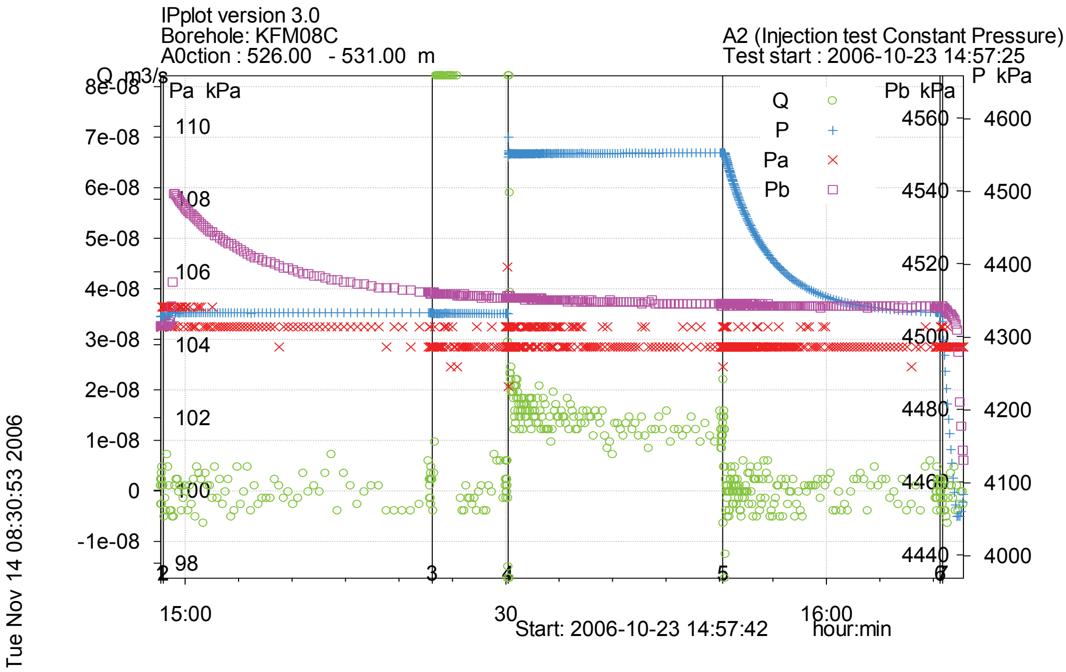


Figure A3-252. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 526.0-531.0 m in borehole KFM08C.*

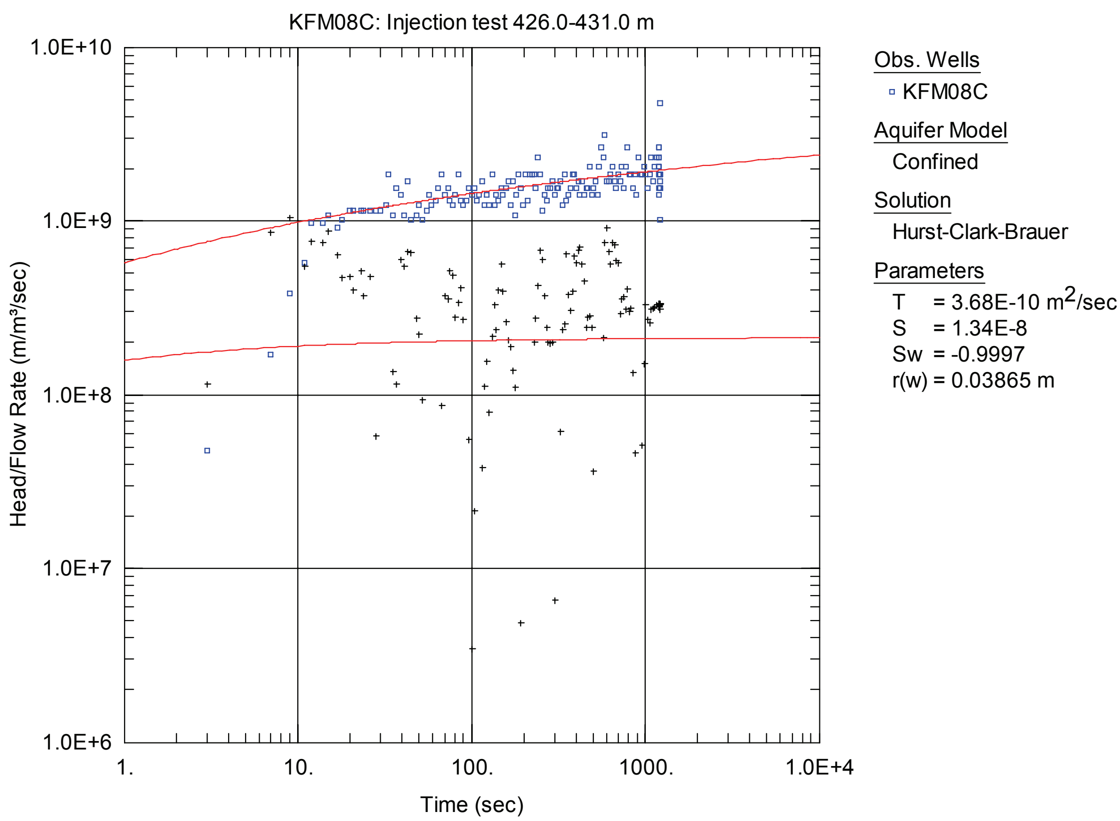


Figure A3-253. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 526.0-531.0 m in KFM08C.*

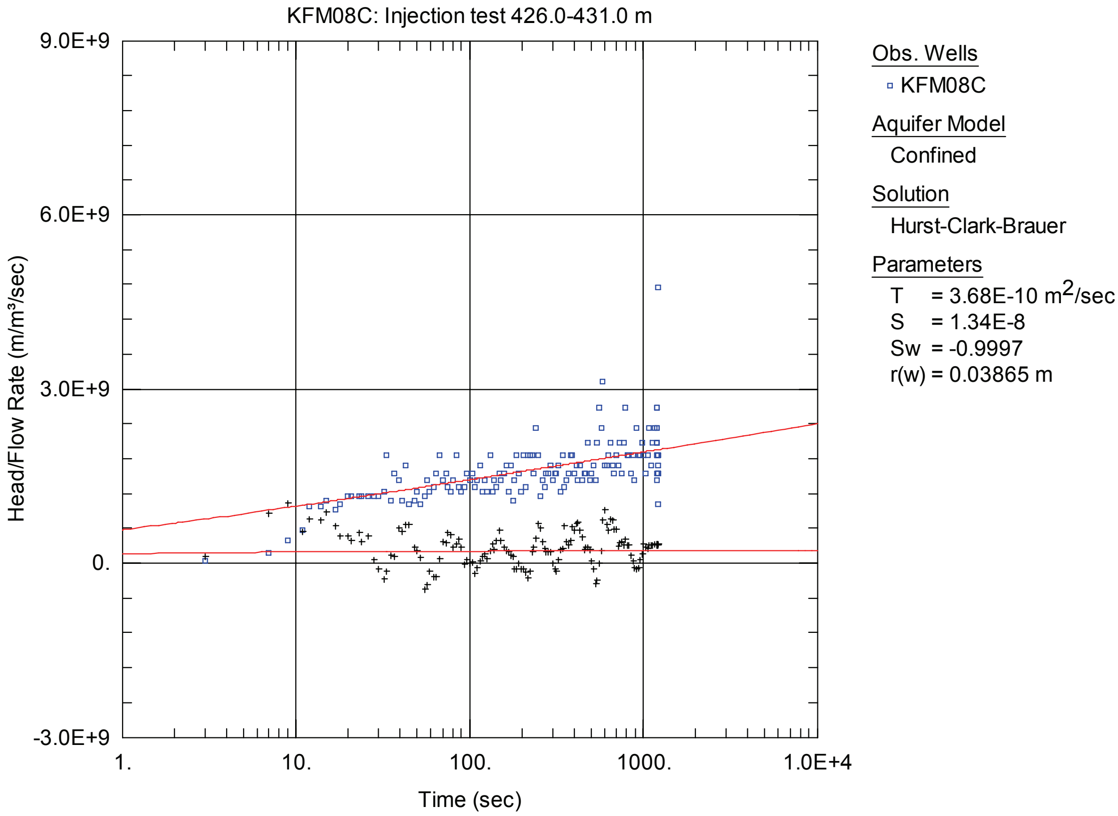


Figure A3-254. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 526.0-531.0 m in KFM08C.*

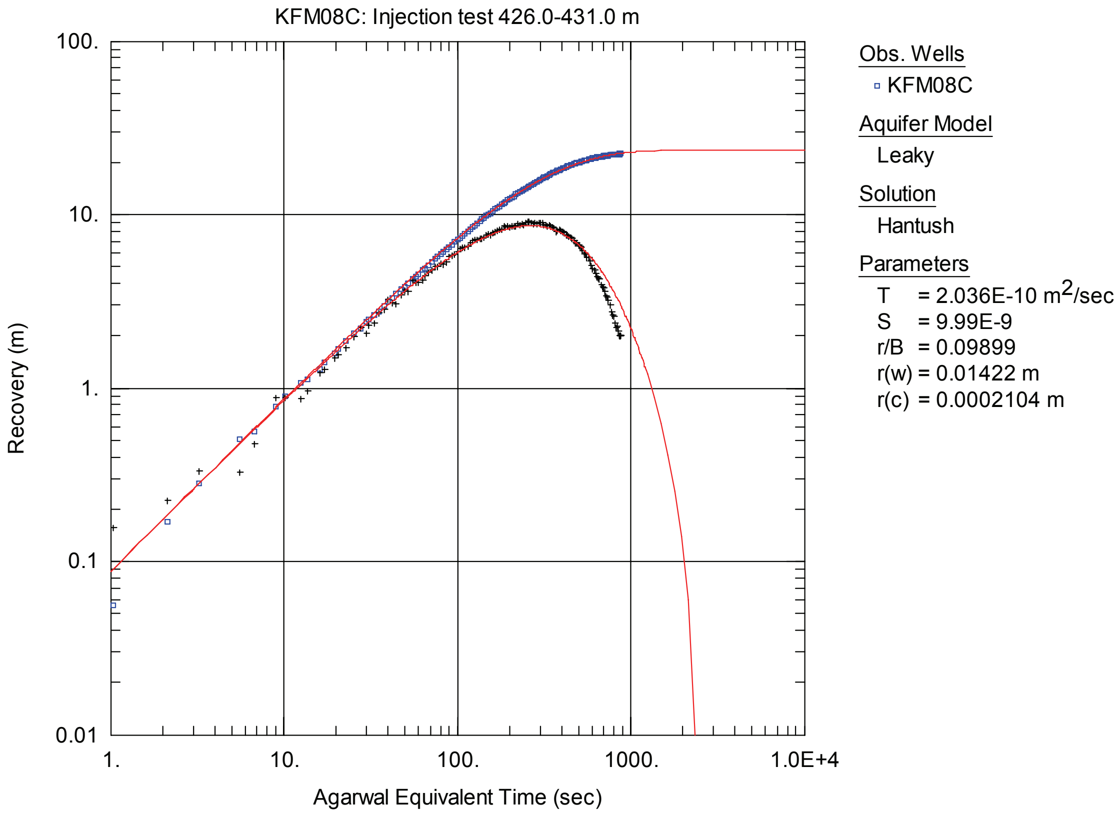


Figure A3-255. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 526.0-531.0 m in KFM08C.*

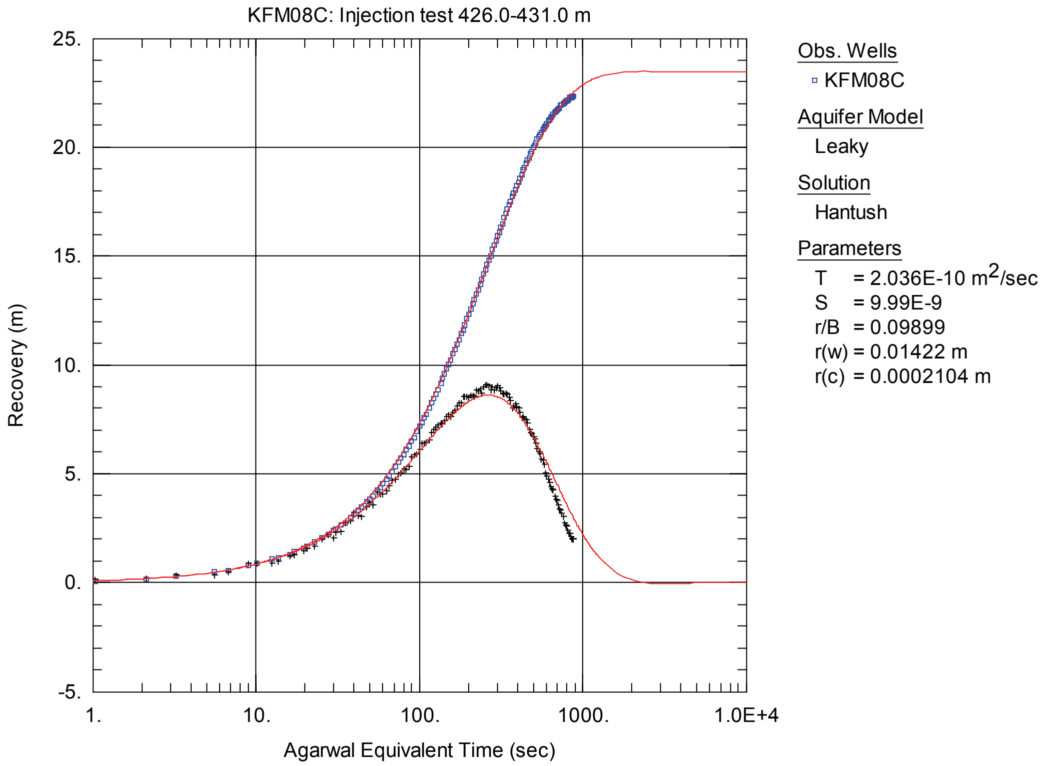


Figure A3-256. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 526.0-531.0 m in KFM08C.*

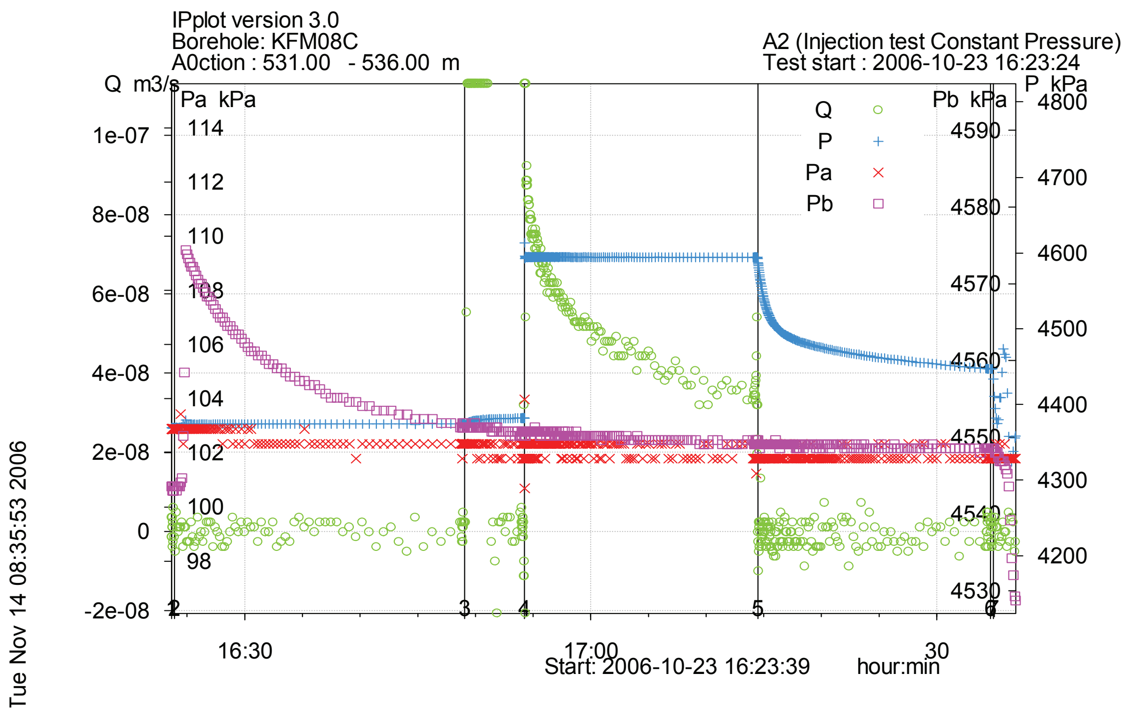


Figure A3-257. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 531.0-536.0 m in borehole KFM08C.*

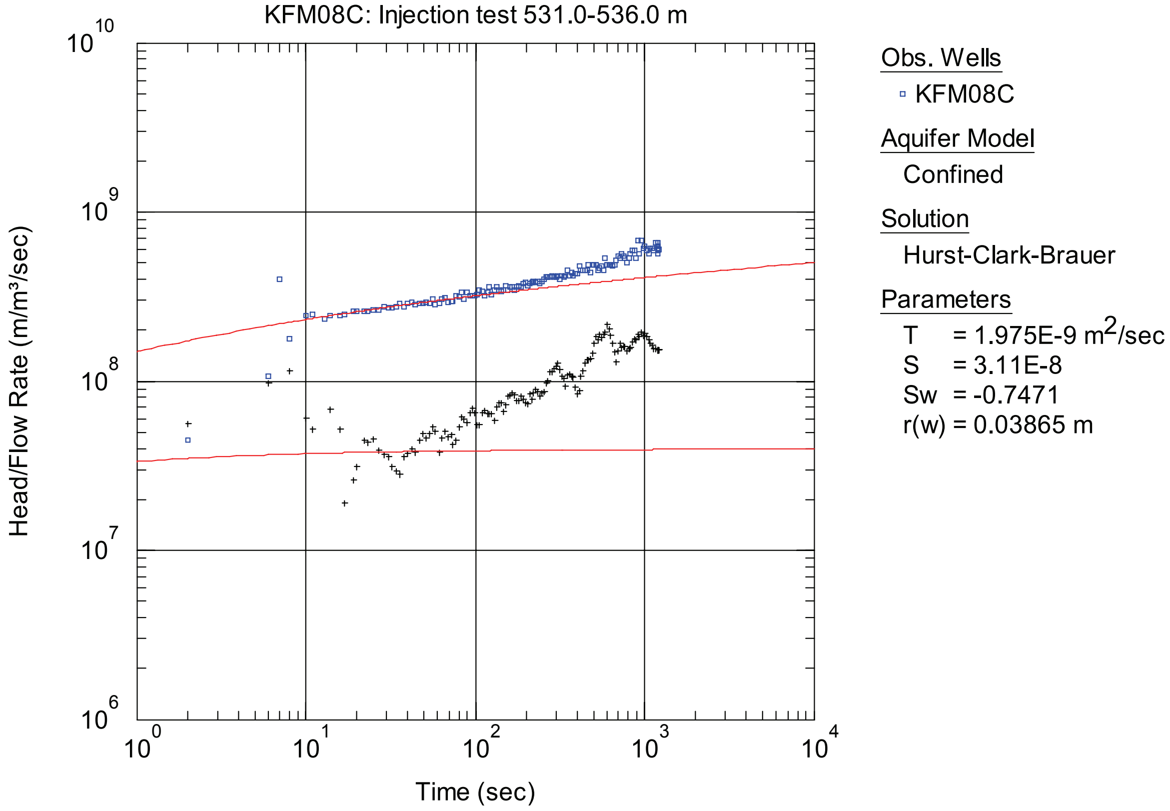


Figure A3-258. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 531.0-536.0 m in KFM08C.*

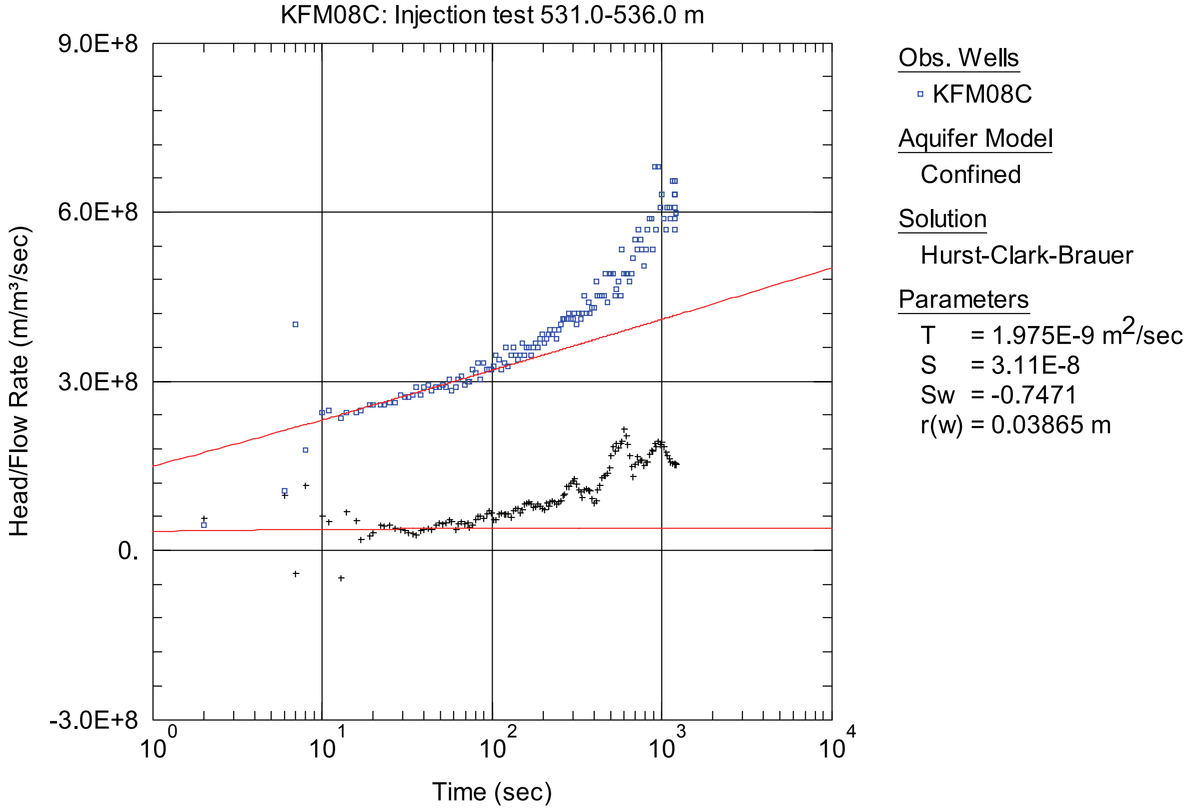


Figure A3-259. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 531.0-536.0 m in KFM08C.*

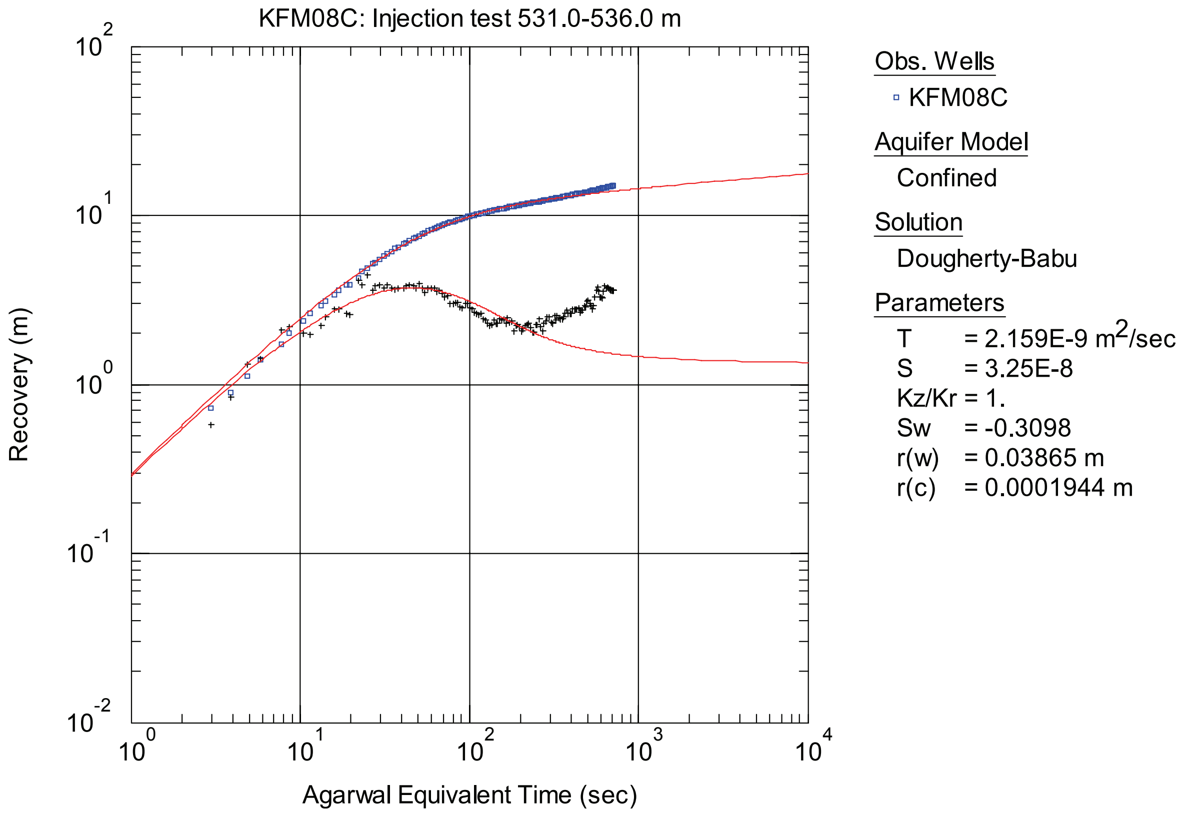


Figure A3-260. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 531.0-536.0 m in KFM08C.*

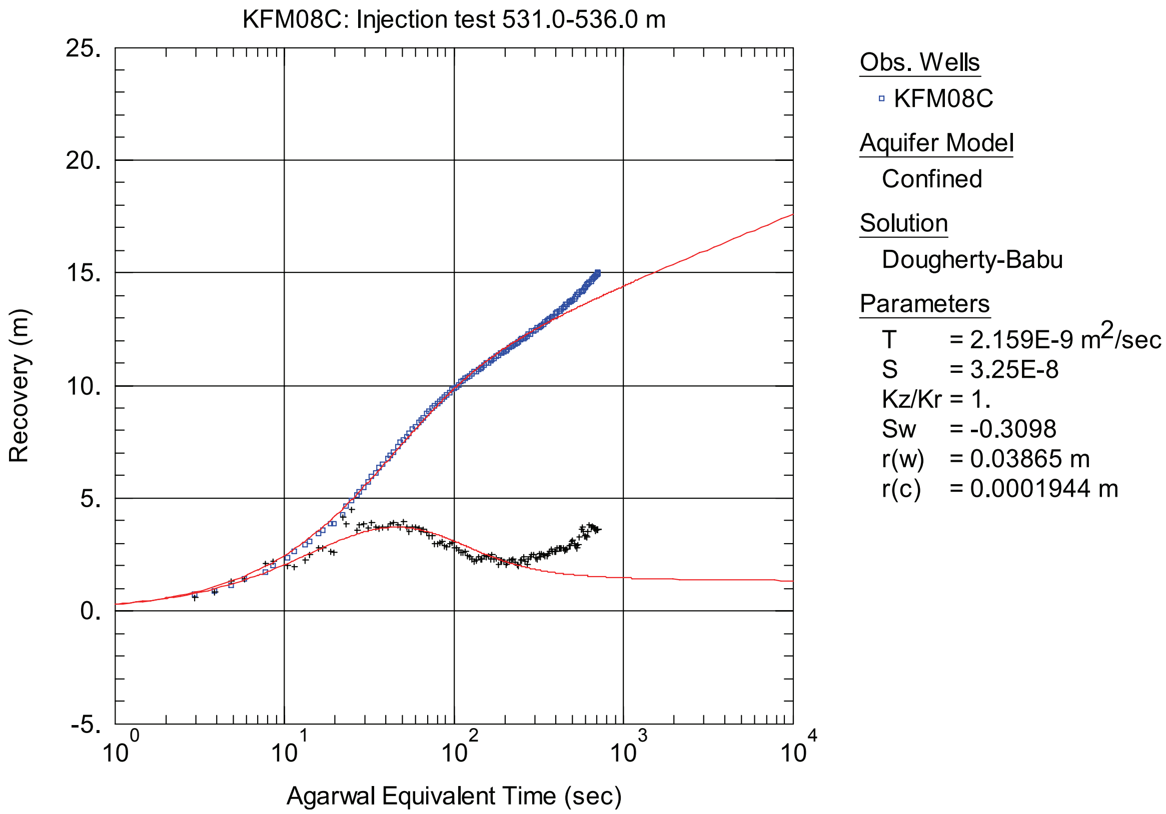


Figure A3-261. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 531.0-536.0 m in KFM08C.*

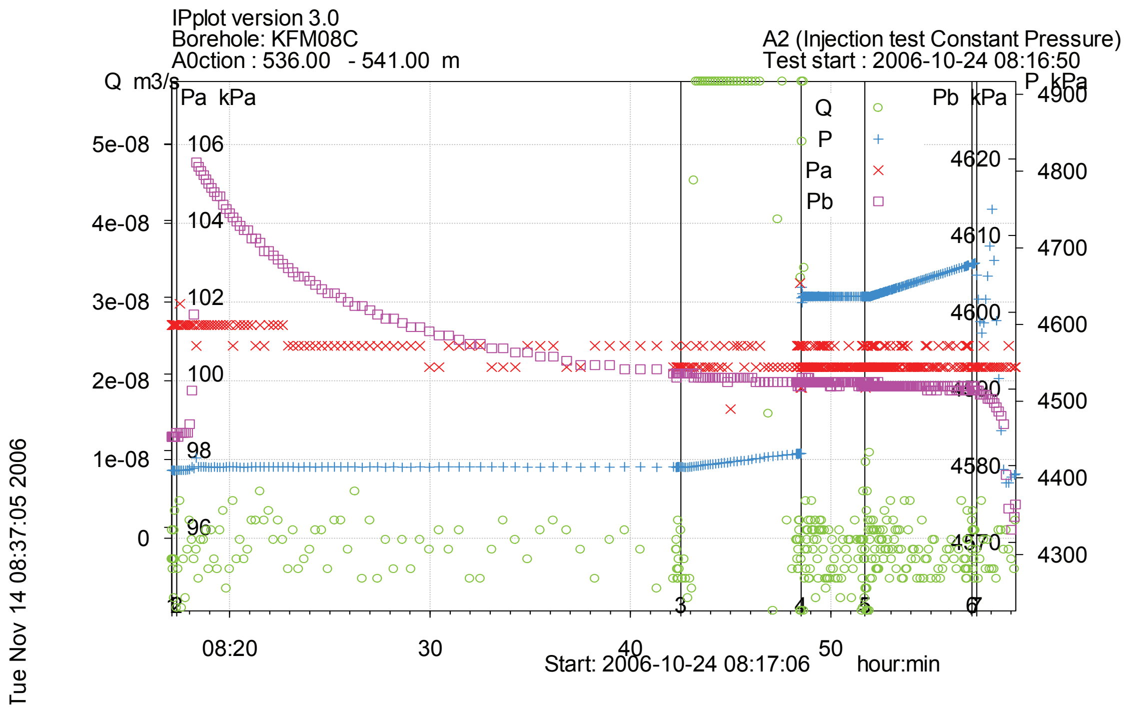


Figure A3-262. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 536.0-541.0 m in borehole KFM08C.*

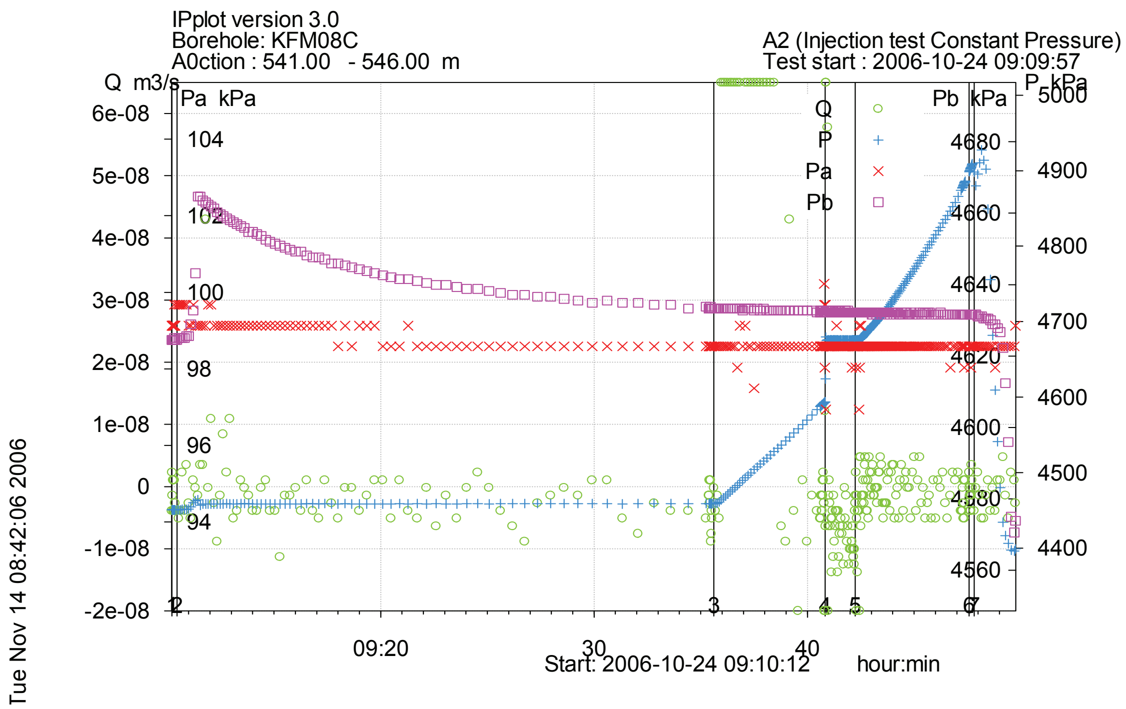


Figure A3-263. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 541.0-546.0 m in borehole KFM08C.*

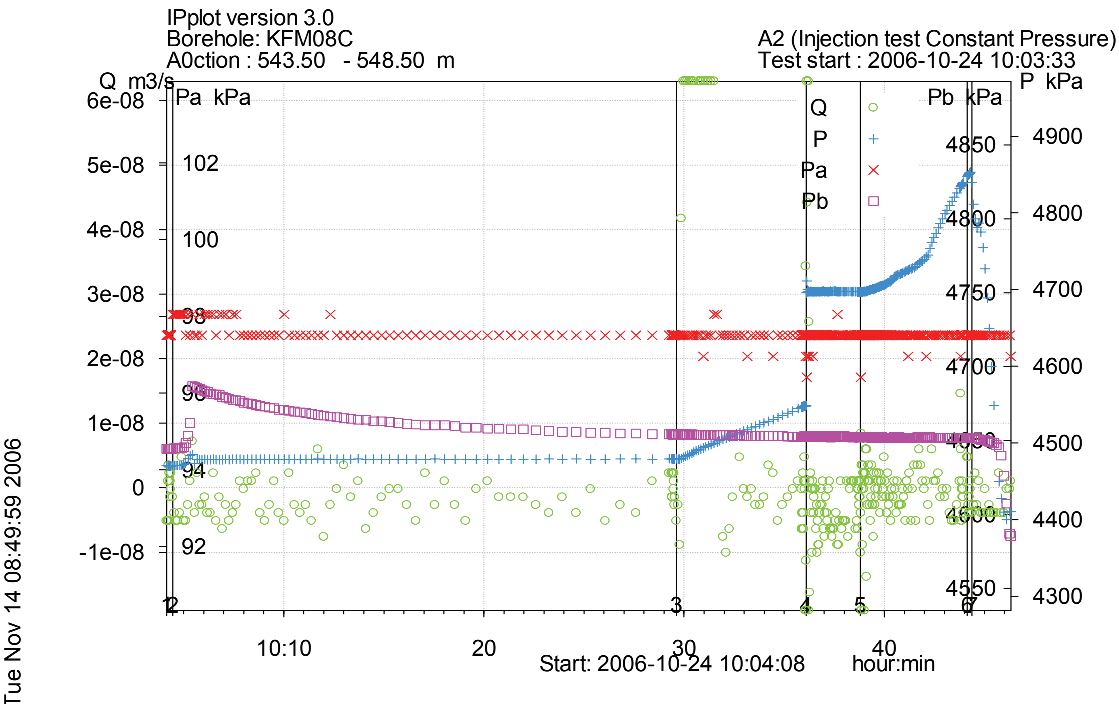


Figure A3-264. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 543.5-548.5 m in borehole KFM08C.*

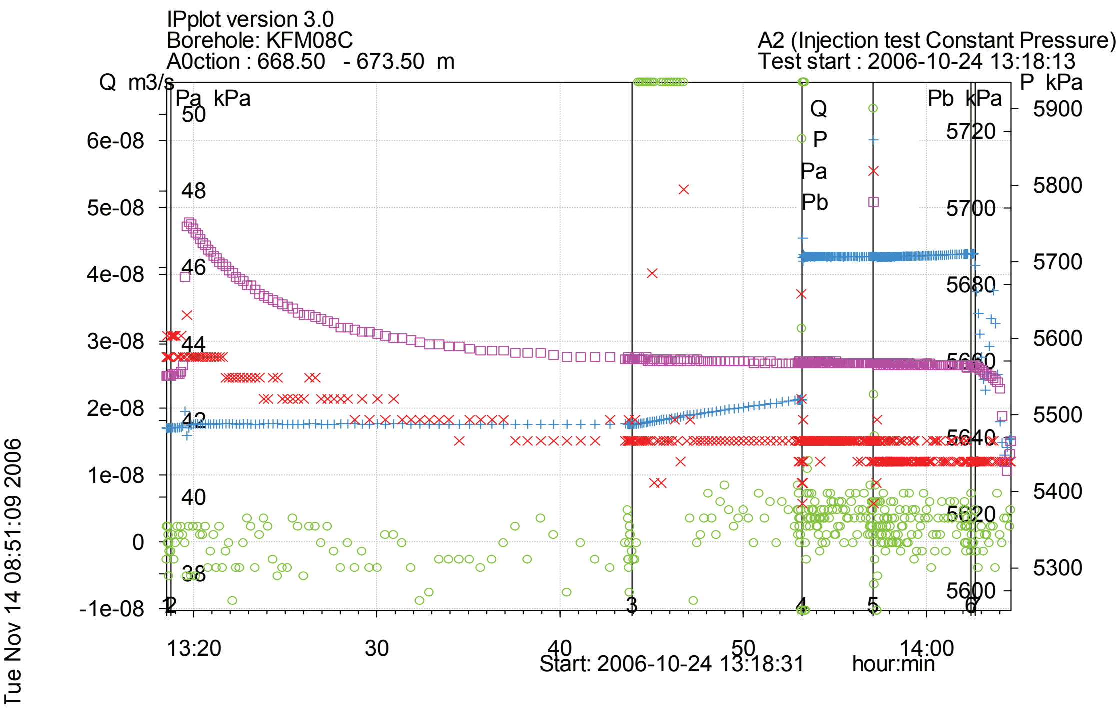


Figure A3-265. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 668.5-673.5 m in borehole KFM08C.*

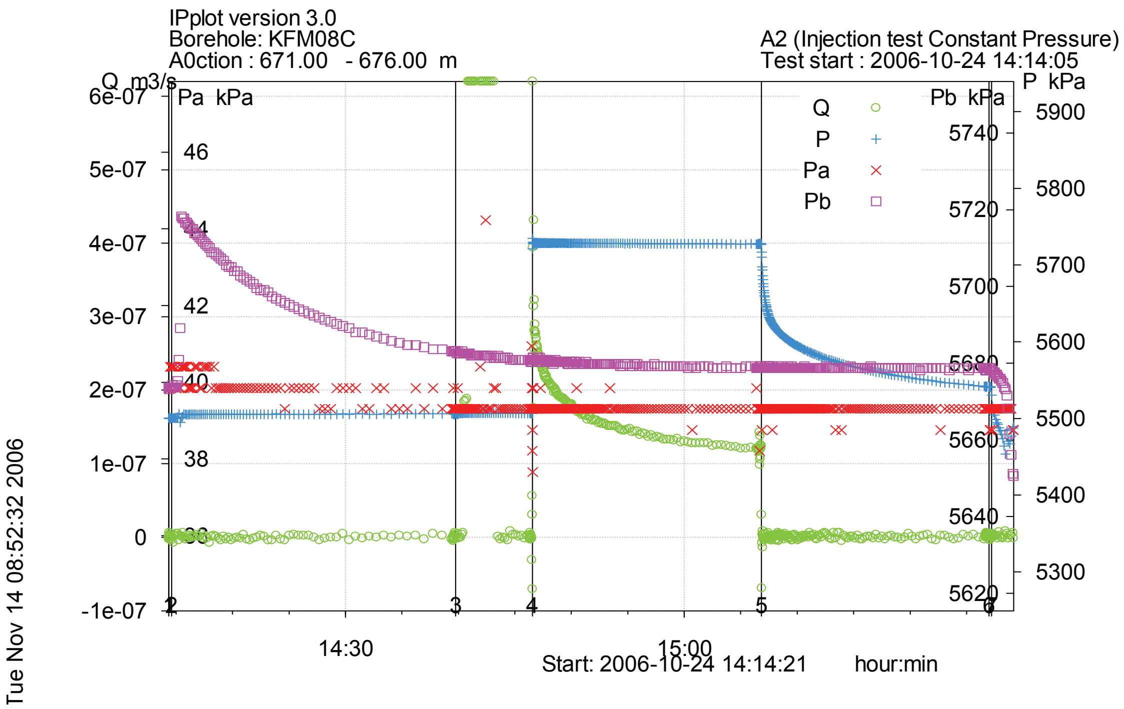


__Figure A3-266.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 671.0-676.0 m in borehole KFM08C.

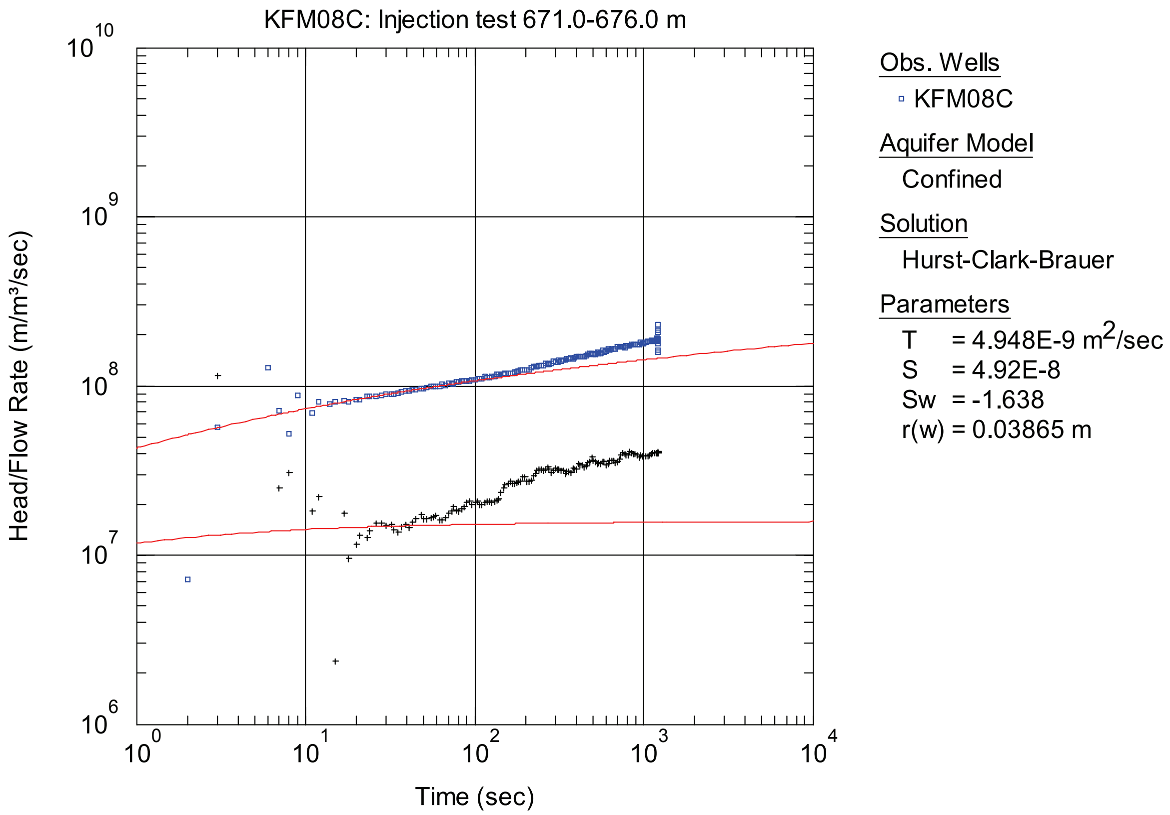


__Figure A3-267.__ Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the first PRF-period, from the injection test in section 671.0-676.0 m in borehole KFM08C.

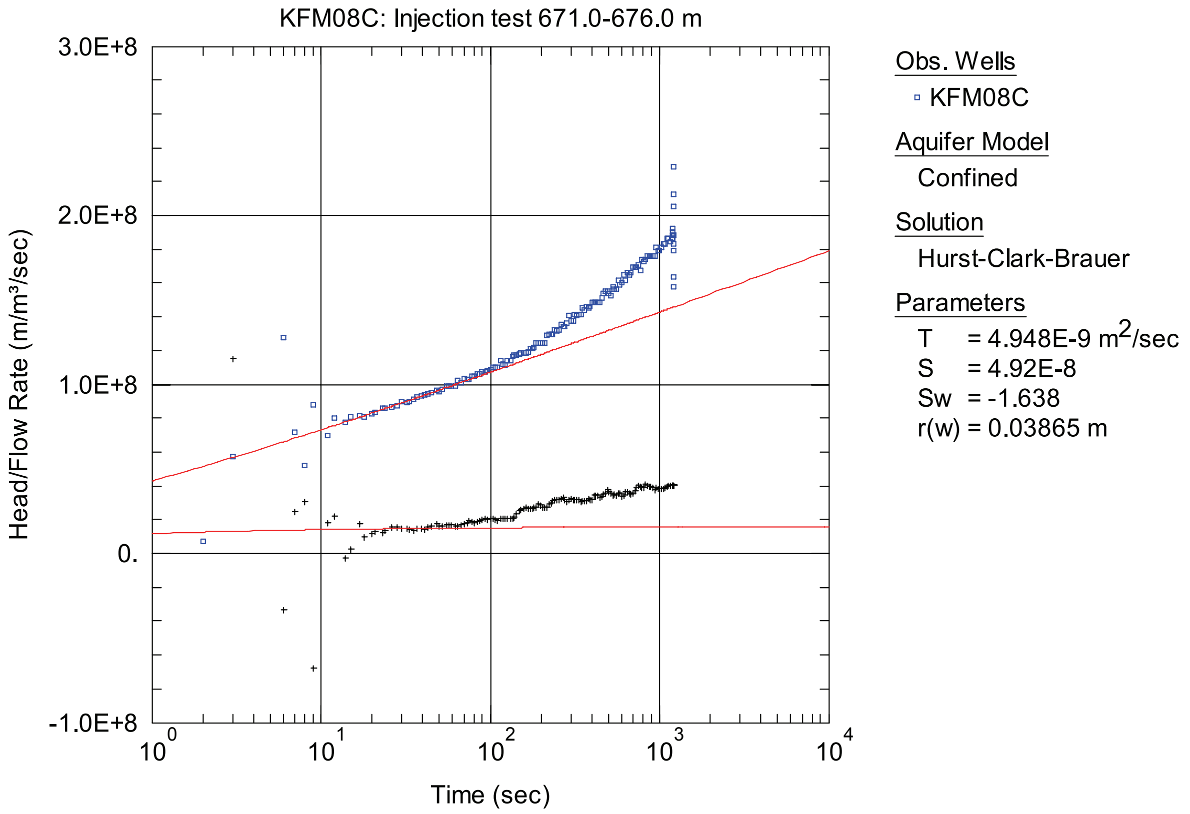


Figure A3-268. Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the first PRF-period, from the injection test in section 671.0-676.0 m in KFM08C.

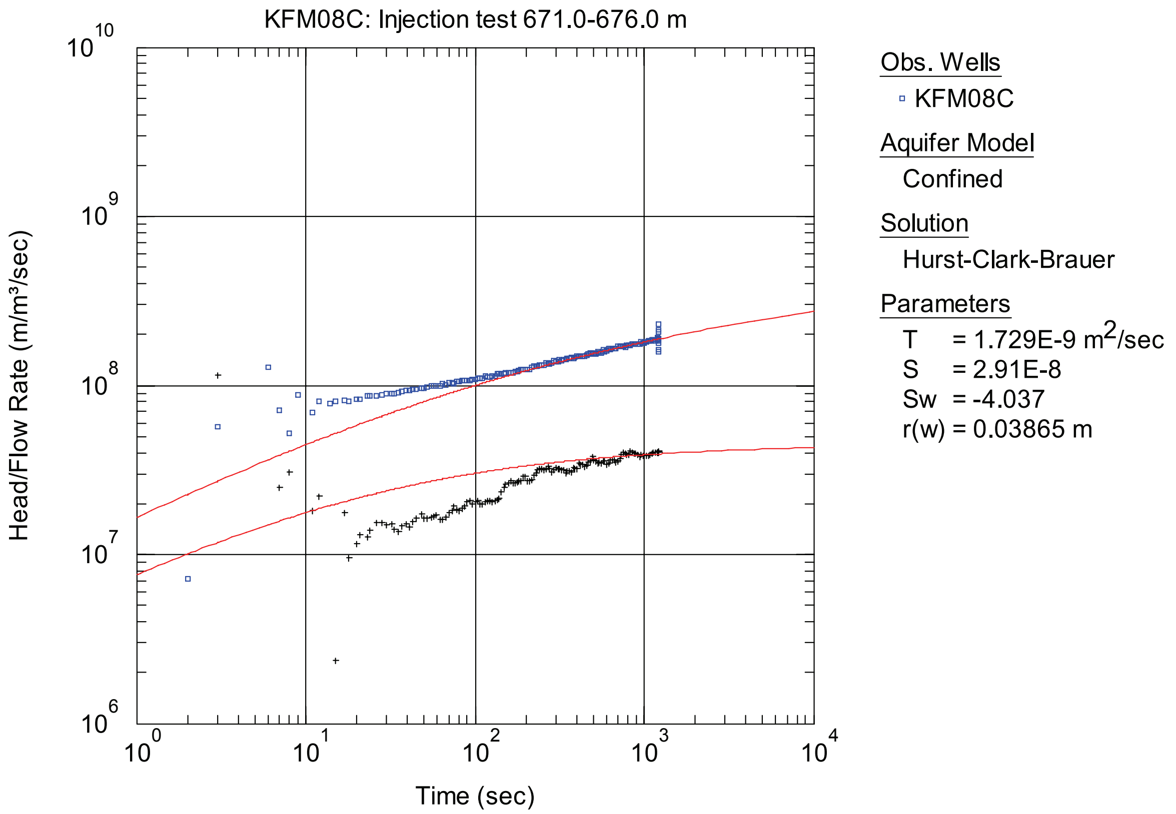


Figure A3-269. Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the second PRF-period, from the injection test in section 671.0-676.0 m in KFM08C.

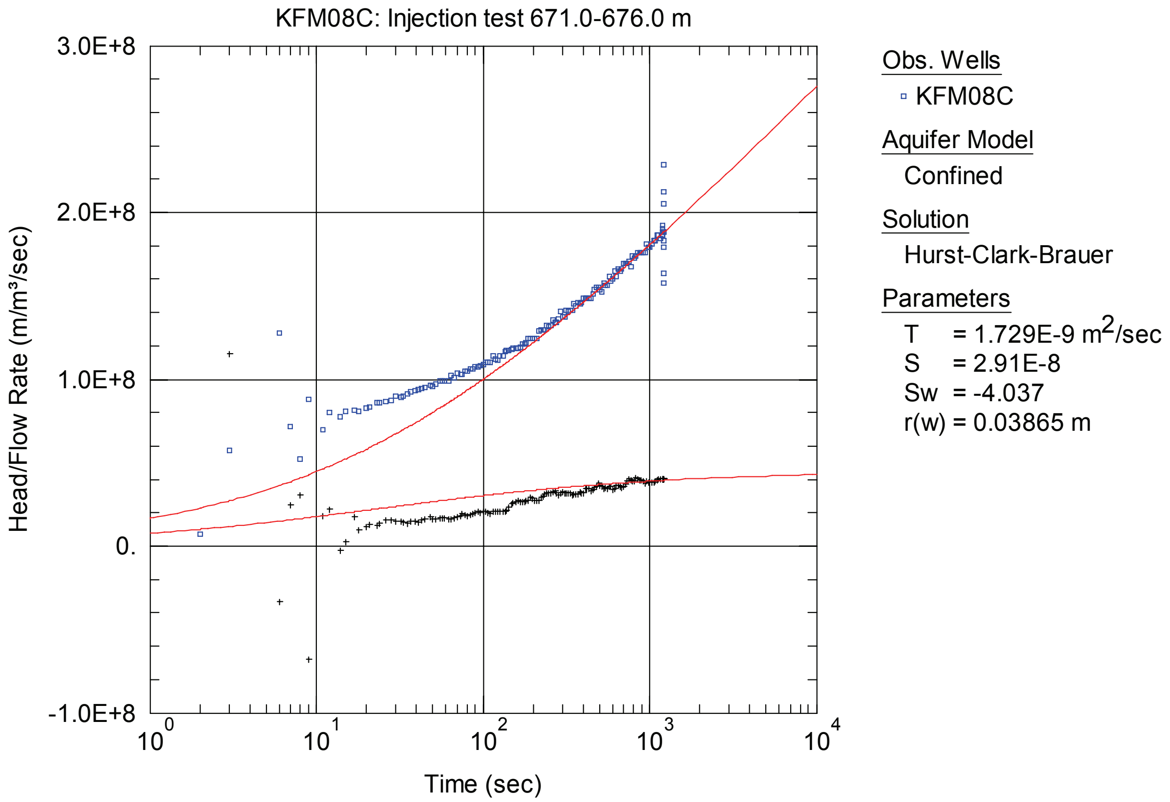


Figure A3-270. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the second PRF-period, from the injection test in section 671.0-676.0 m in KFM08C.*

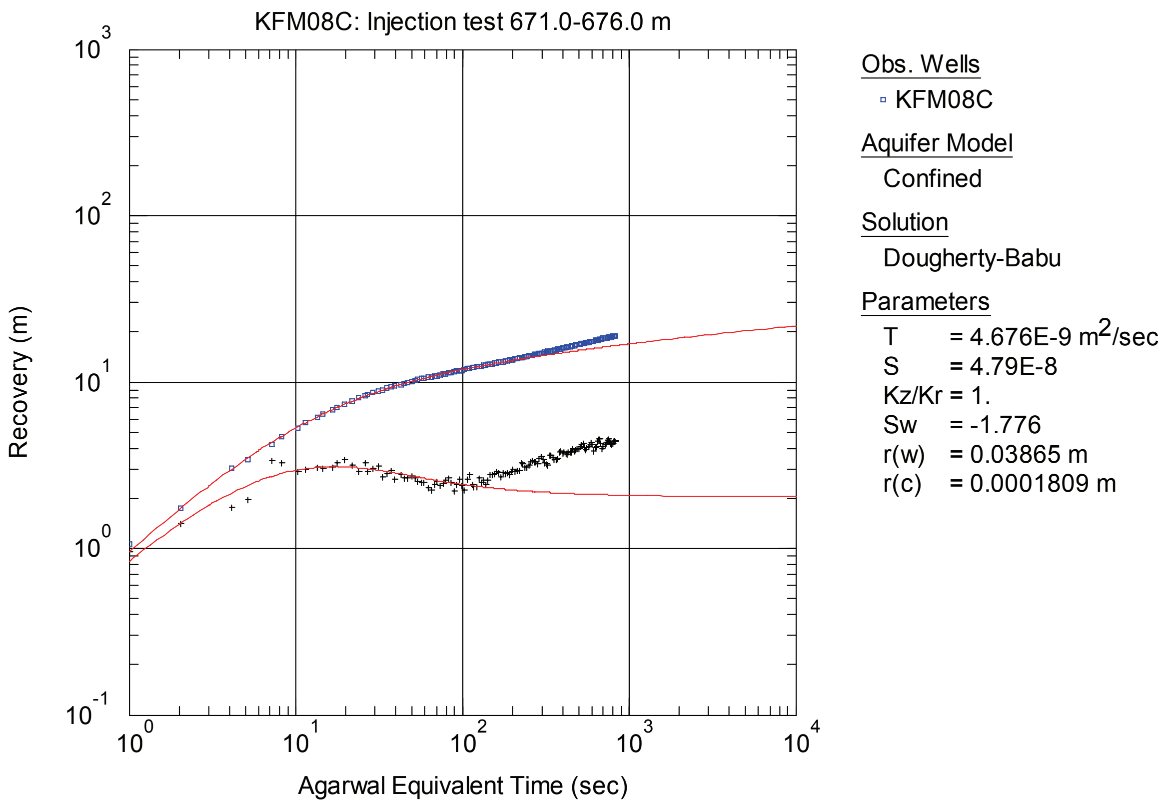


Figure A3-271. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the first PRF-period, from the injection test in section 671.0-676.0 m in KFM08C.*

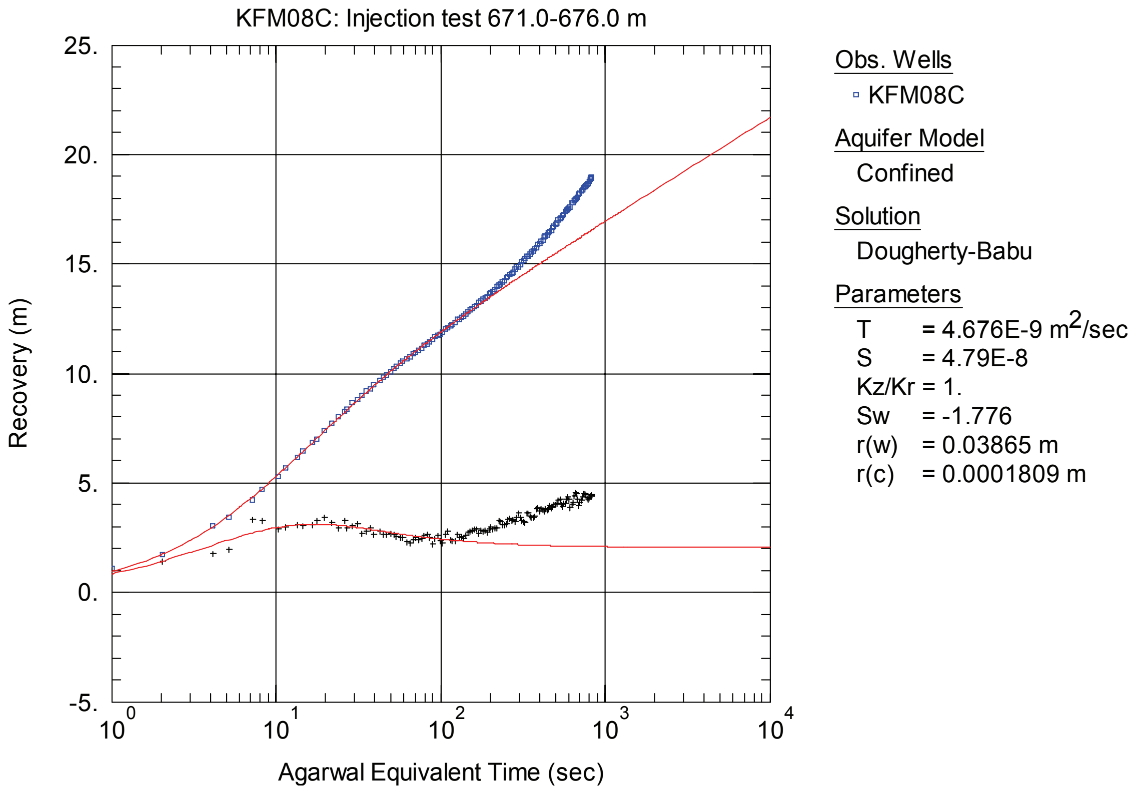


Figure A3-272. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the first PRF-period, from the injection test in section 671.0-676.0 m in KFM08C.*

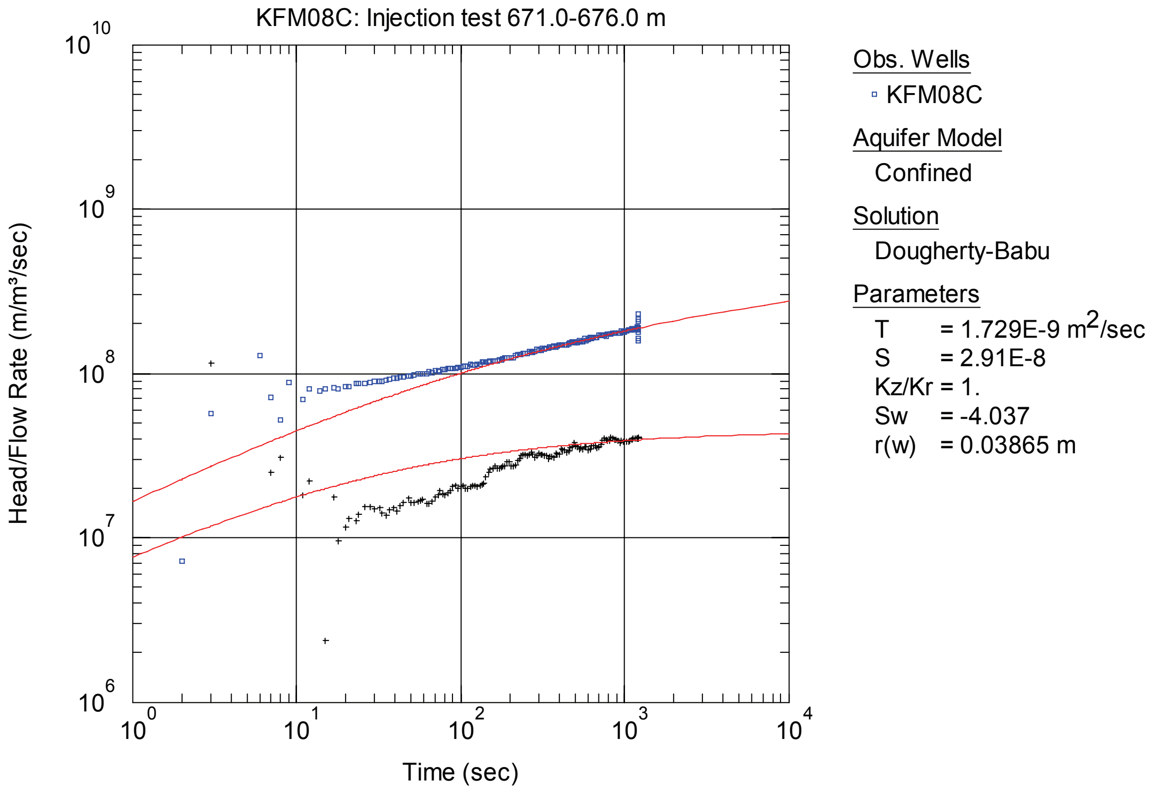


Figure A3-273. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the second PRF-period, from the injection test in section 671.0-676.0 m in KFM08C.*

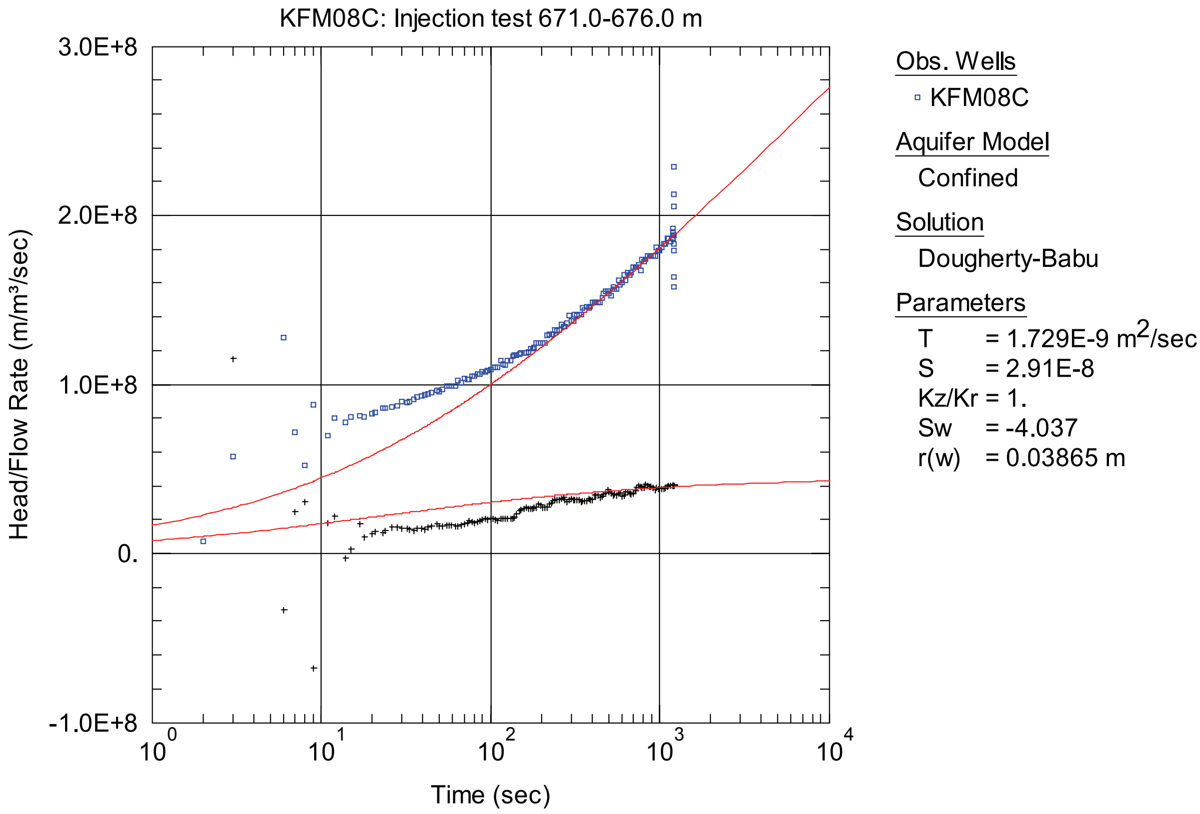


Figure A3-274. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the second PRF-period, from the injection test in section 671.0-676.0 m in KFM08C.*

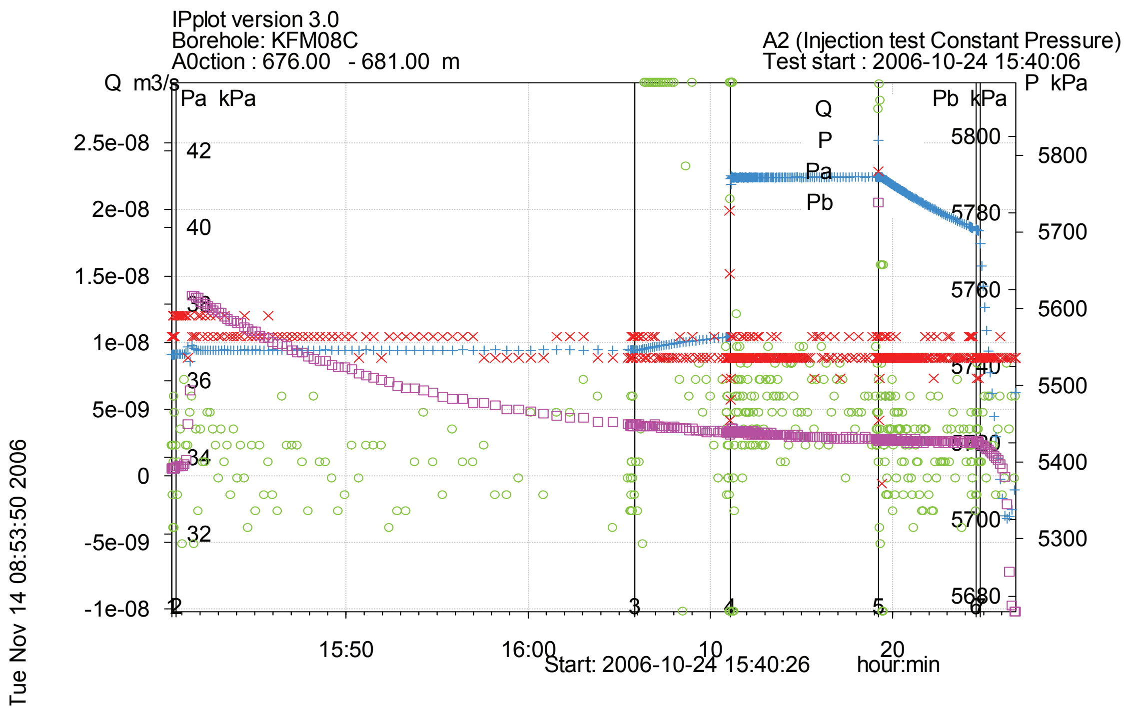


Figure A3-275. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 676.0-681.0 m in borehole KFM08C.*

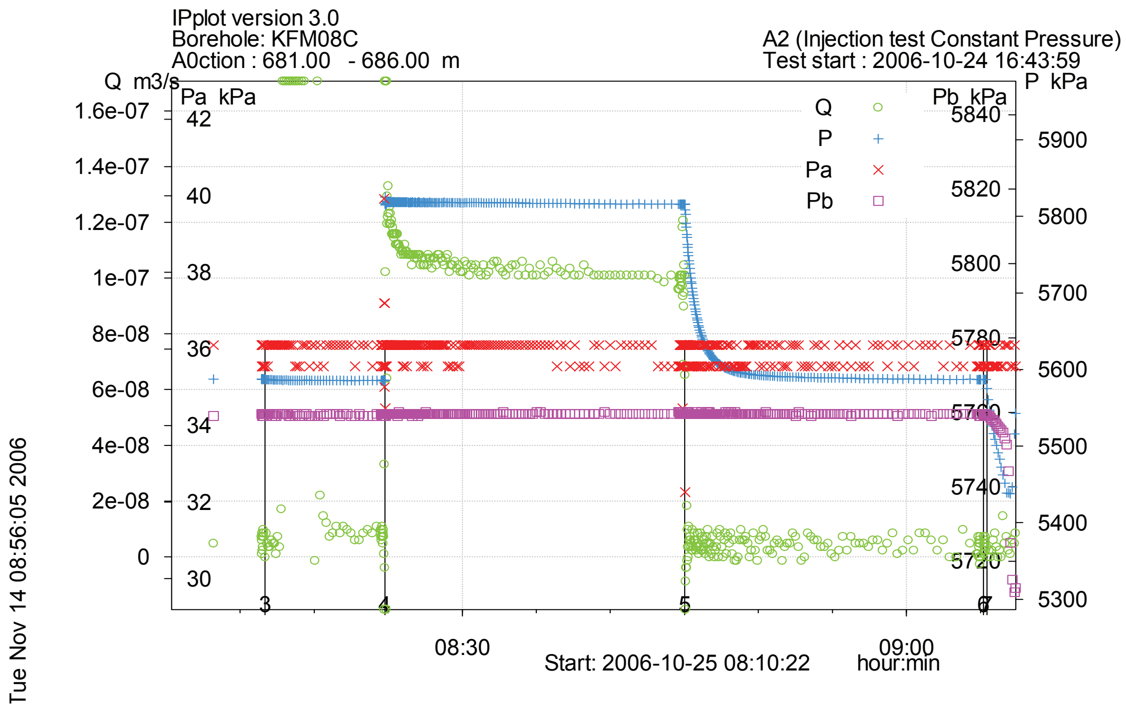


Figure A3-276. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 681.0-686.0 m in borehole KFM08C.

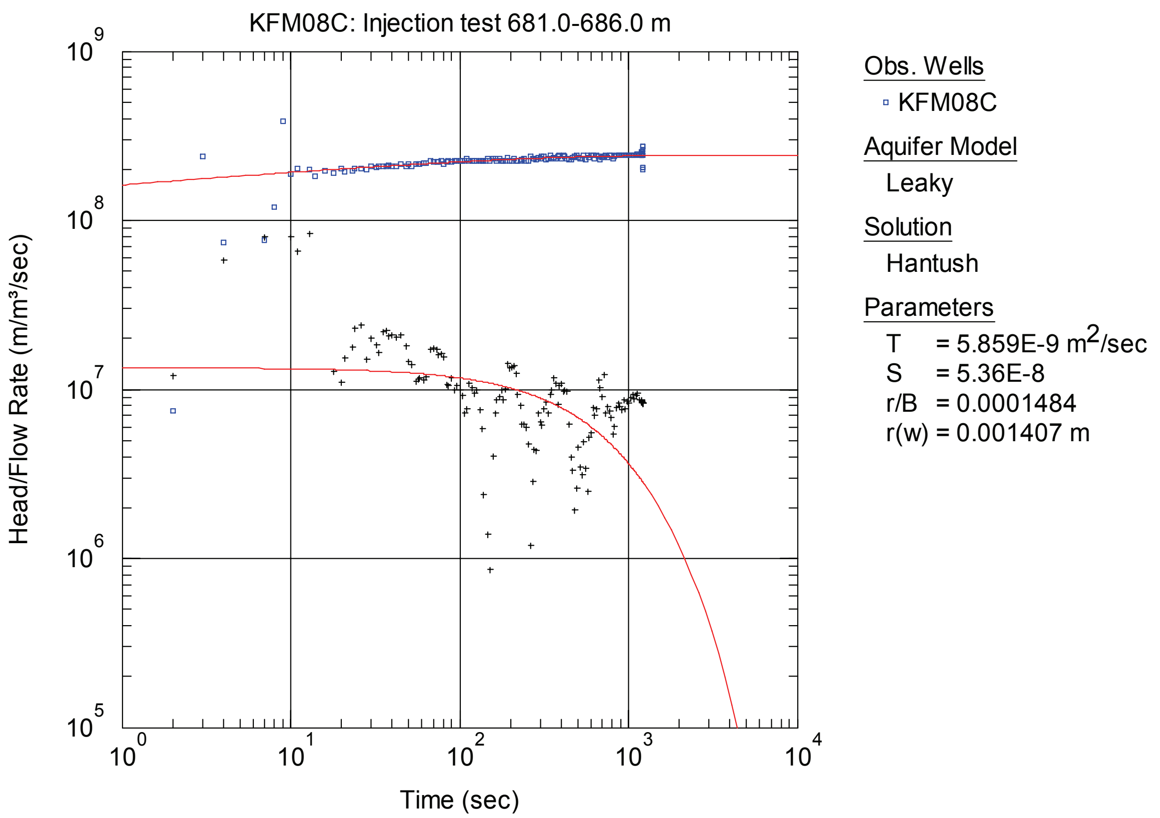


Figure A3-277. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 681.0-686.0 m in KFM08C.

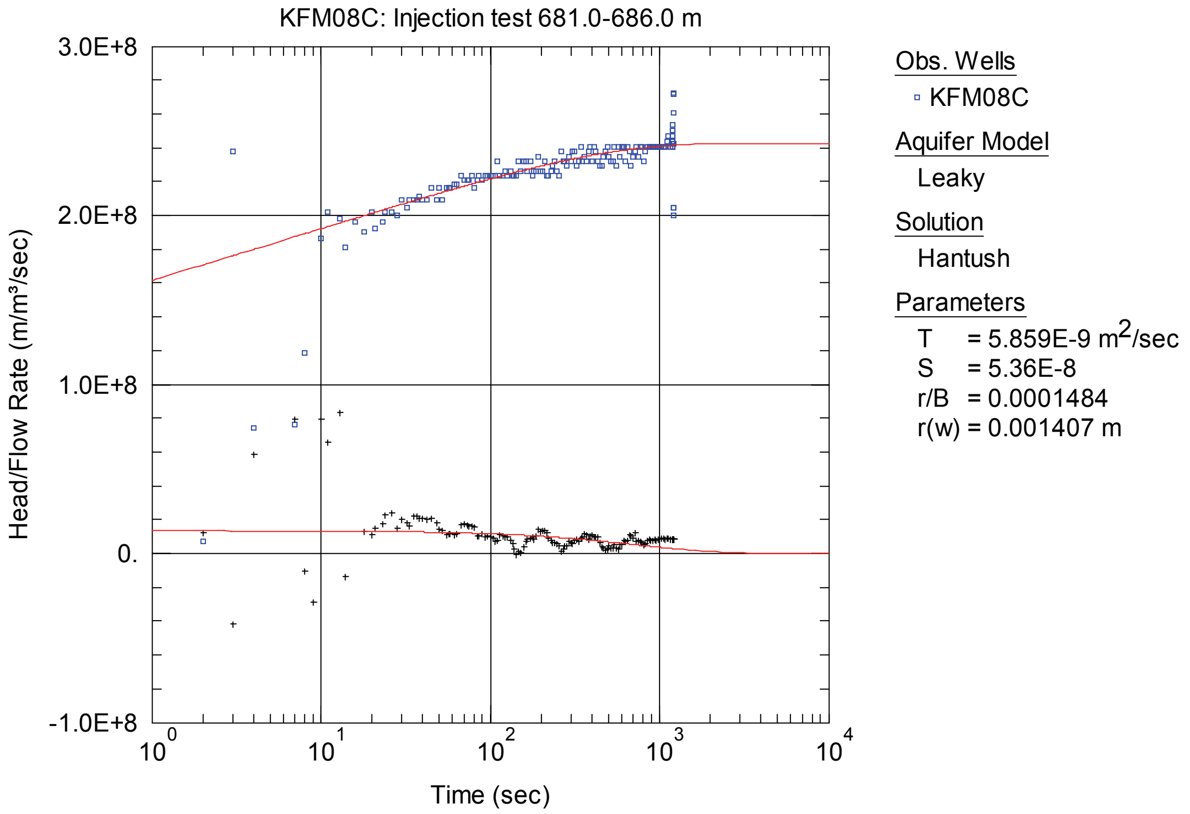


Figure A3-278. Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 681.0-686.0 m in KFM08C.

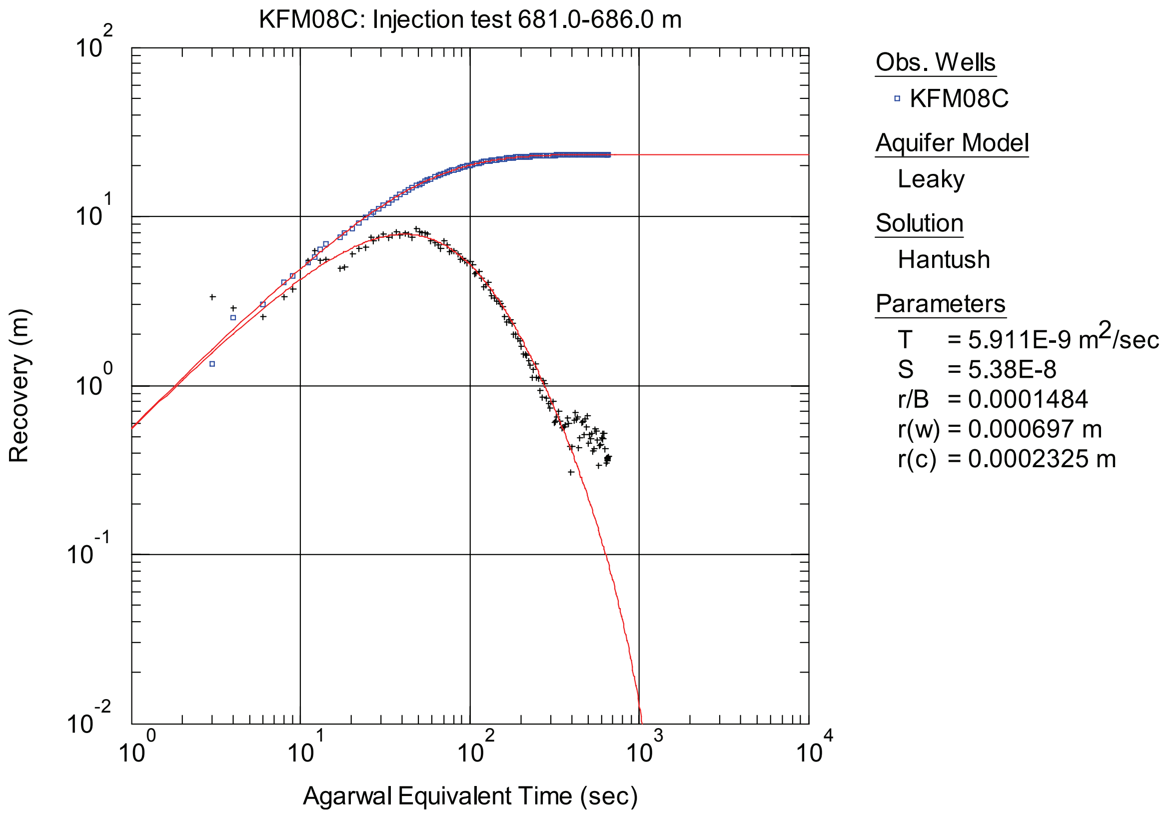


Figure A3-279. Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 681.0-686.0 m in KFM08C.

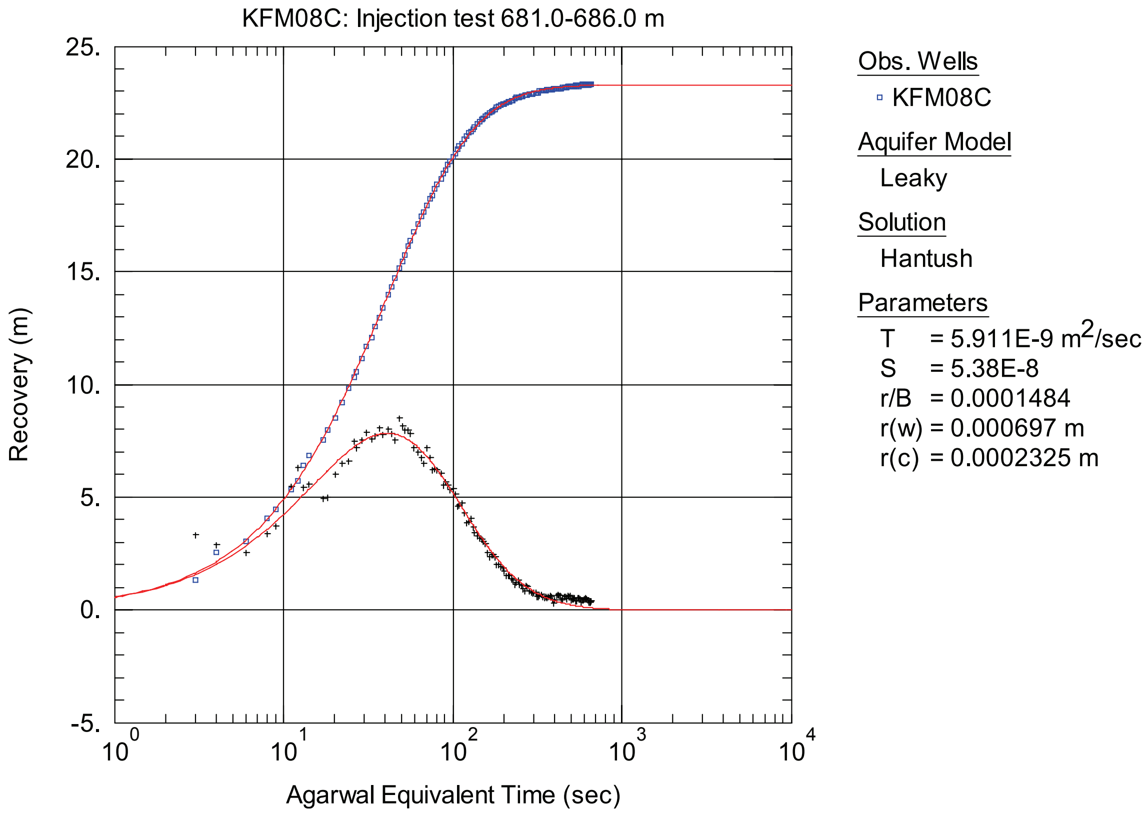


Figure A3-280. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 681.0-686.0 m in KFM08C.*

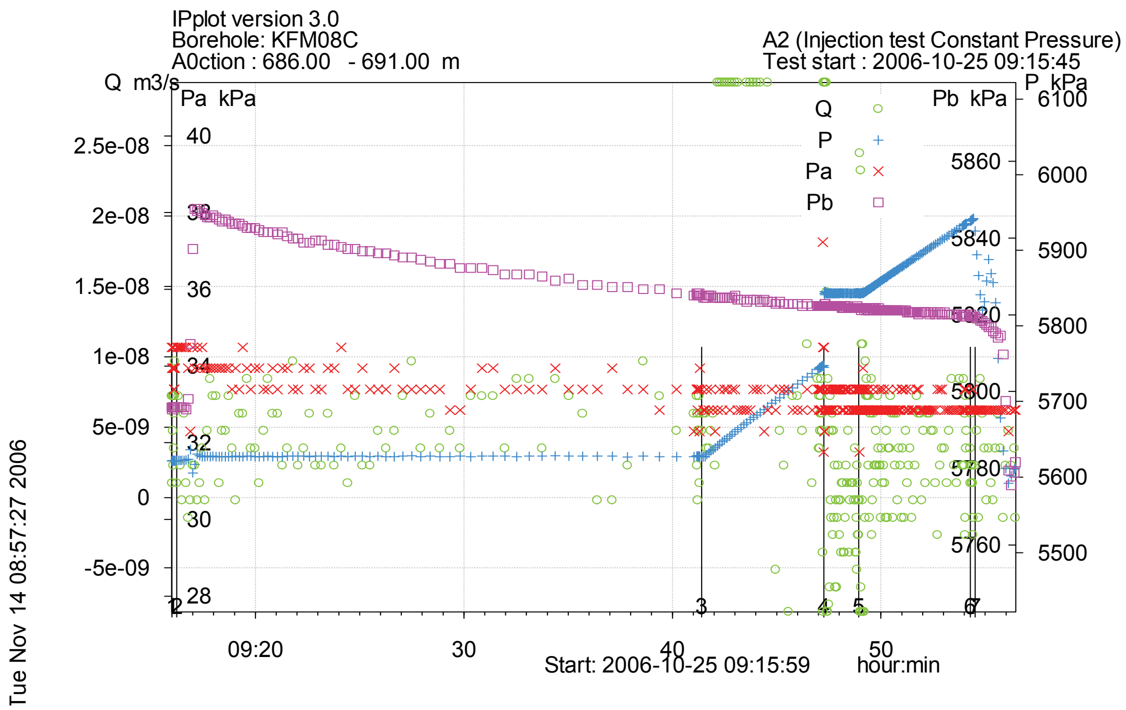


Figure A3-281. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 686.0-691.0 m in borehole KFM08C.*

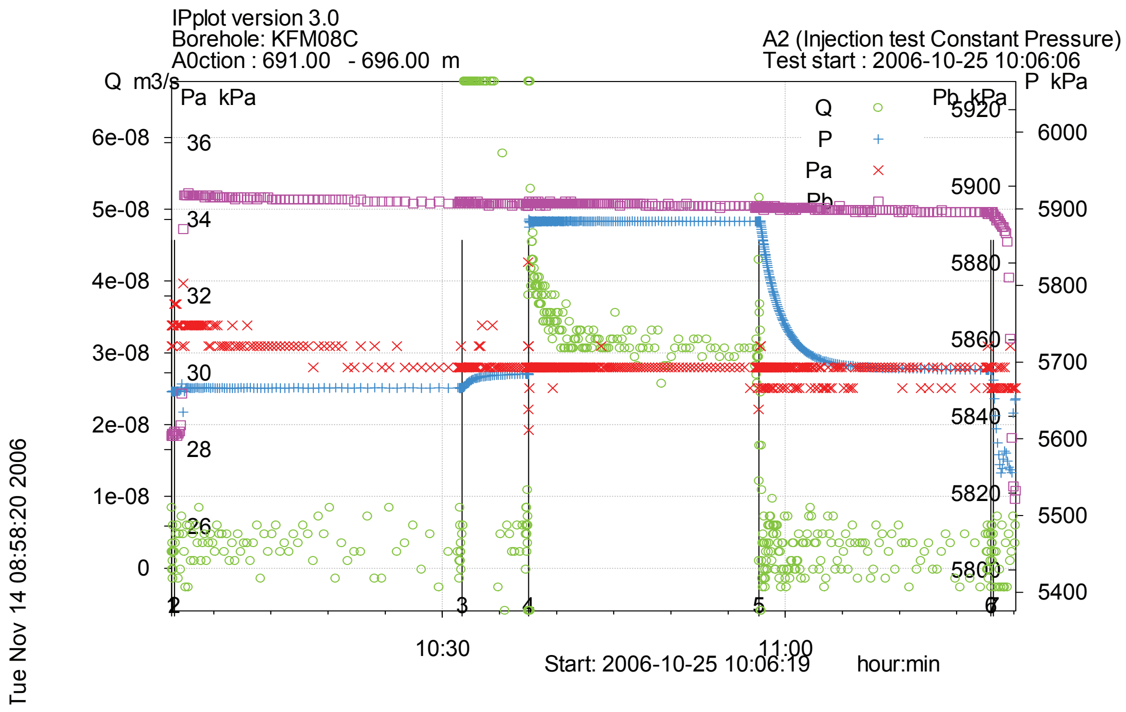


__Figure A3-282.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 691.0-696.0 m in borehole KFM08C.

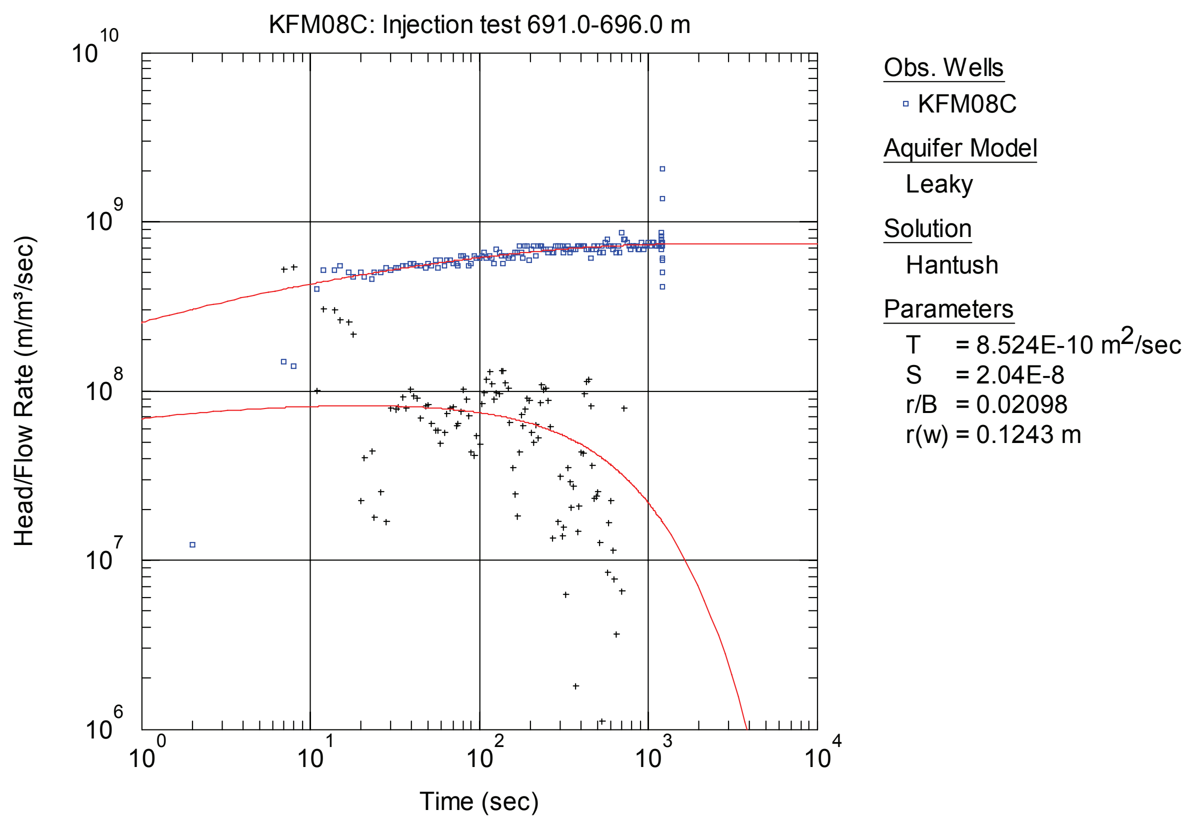


__Figure A3-283.__ Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 691.0-696.0 m in KFM08C.

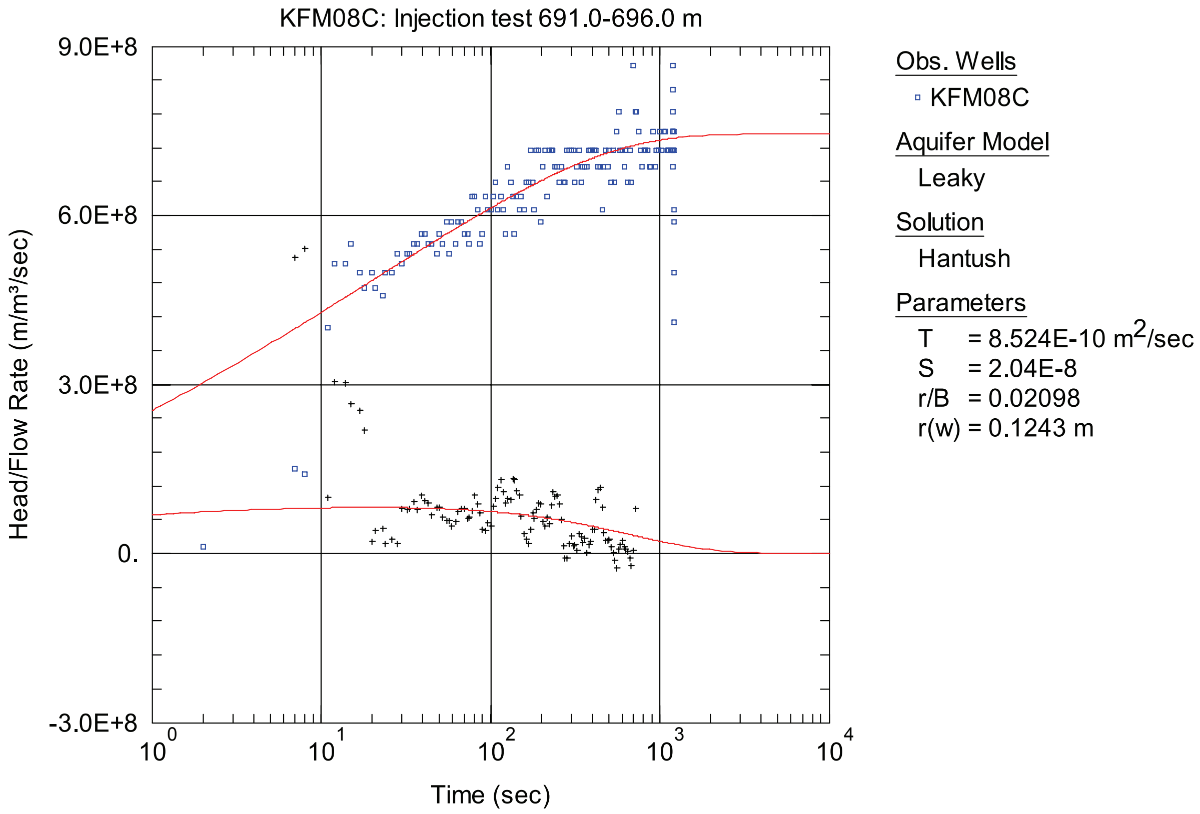


Figure A3-284. Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 691.0-696.0 m in KFM08C.

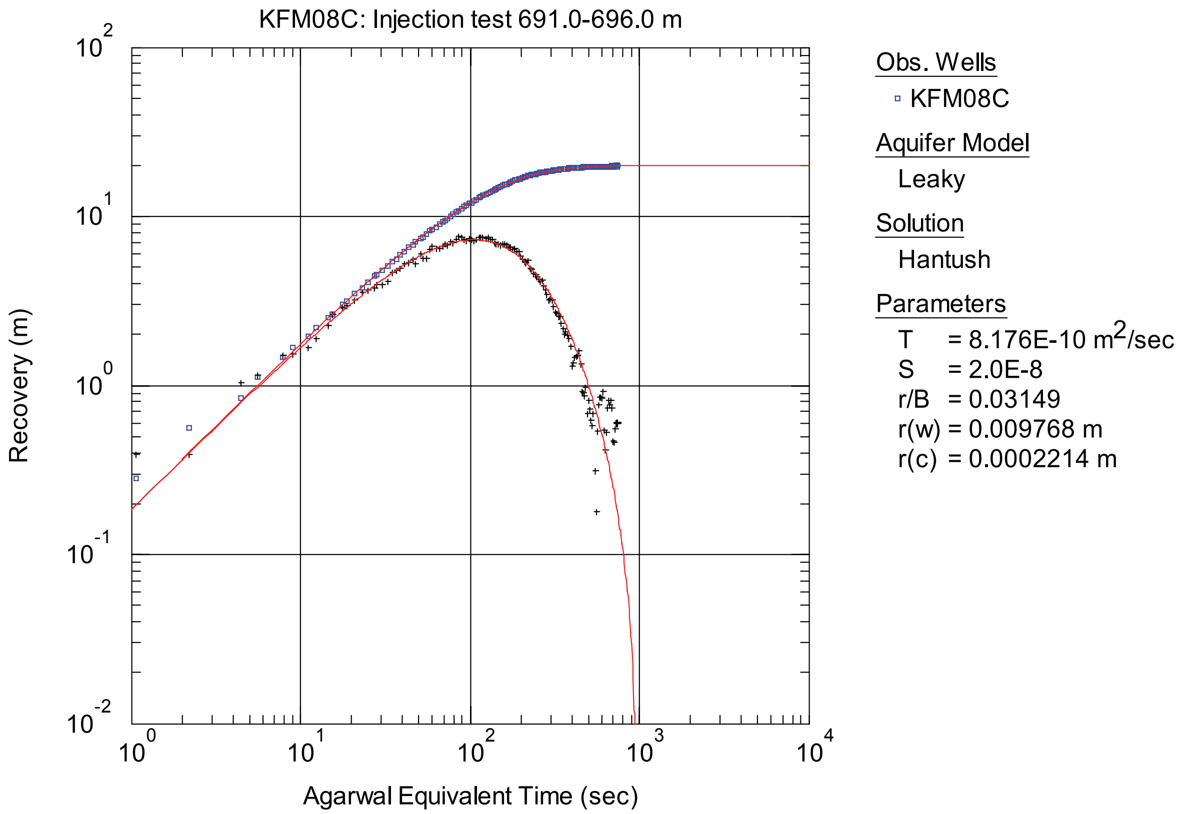


Figure A3-285. Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 691.0-696.0 m in KFM08C.

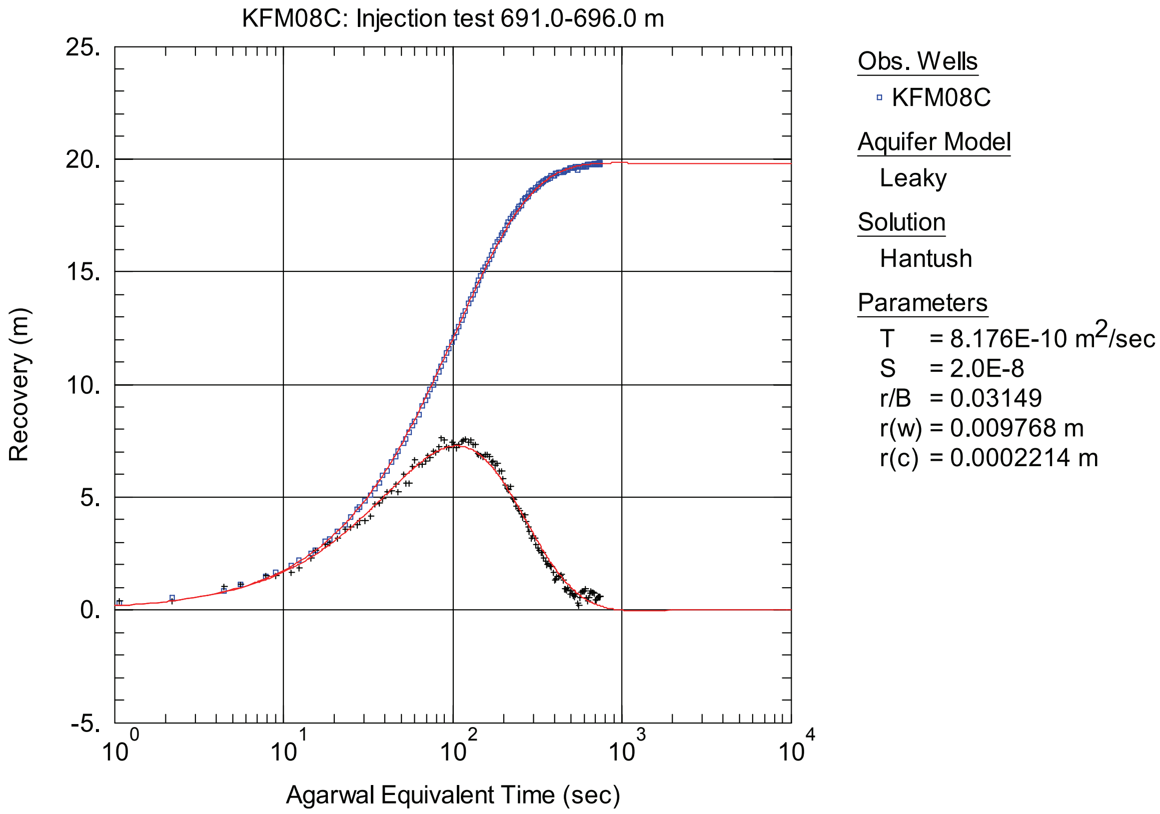


Figure A3-286. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 691.0-696.0 in KFM08C.*

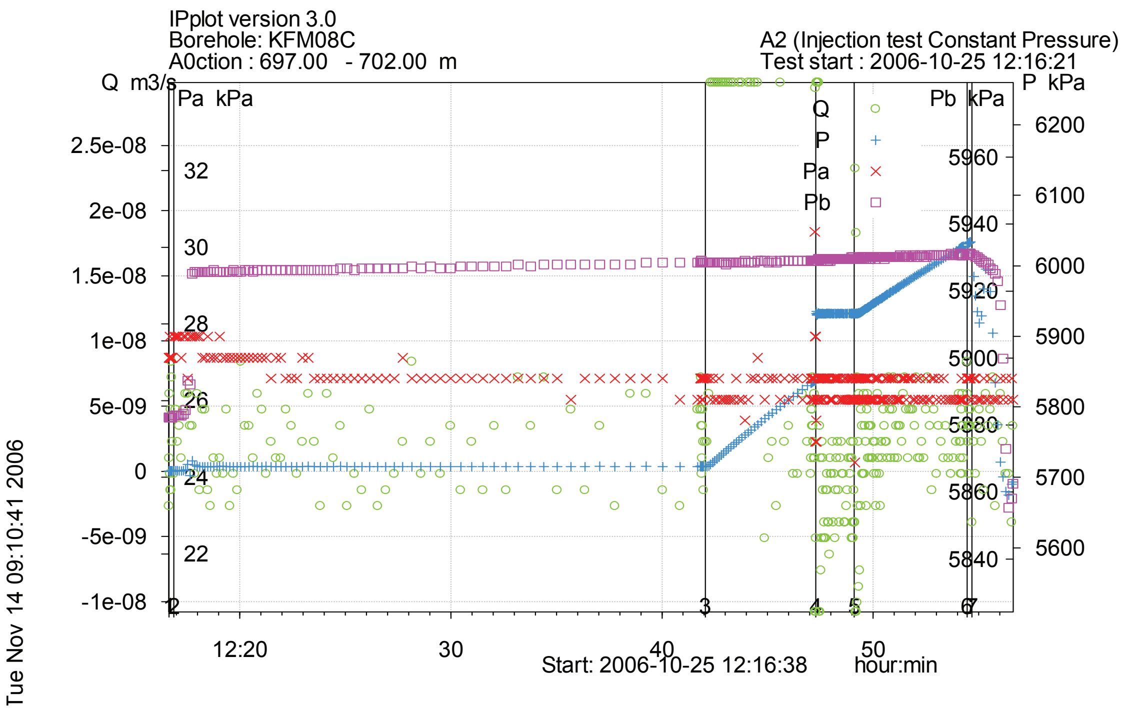


Figure A3-287. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 697.0-702.0 m in borehole KFM08C.*

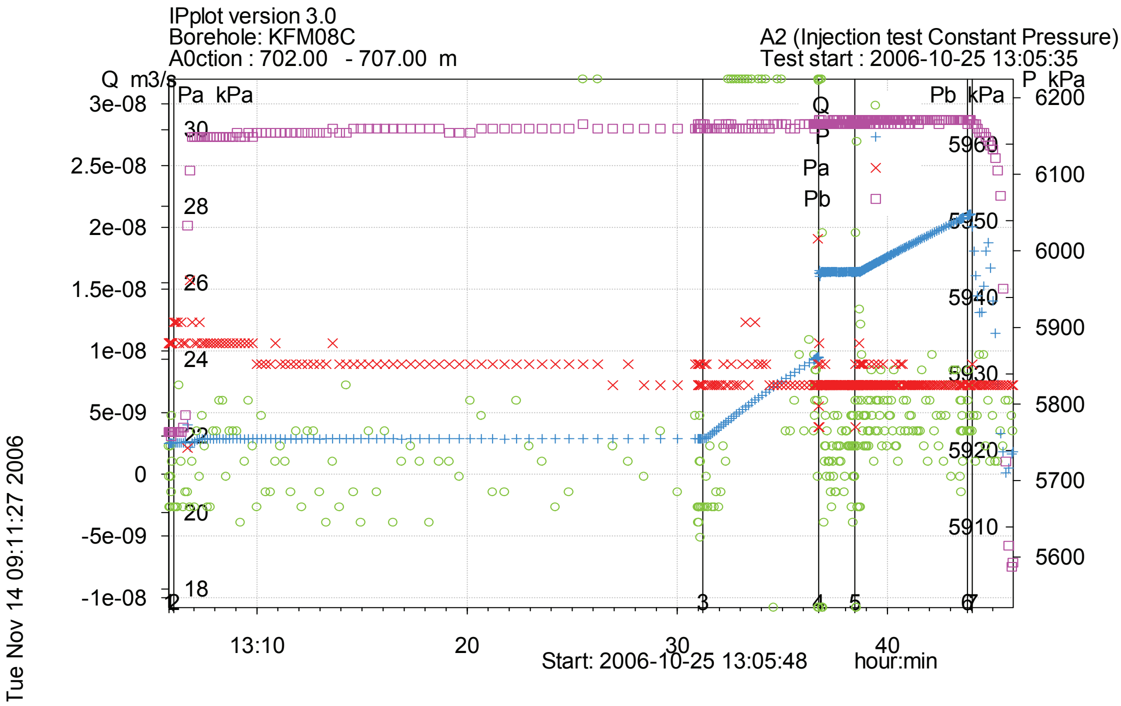


Figure A3-288. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 702.0-707.0 m in borehole KFM08C.*

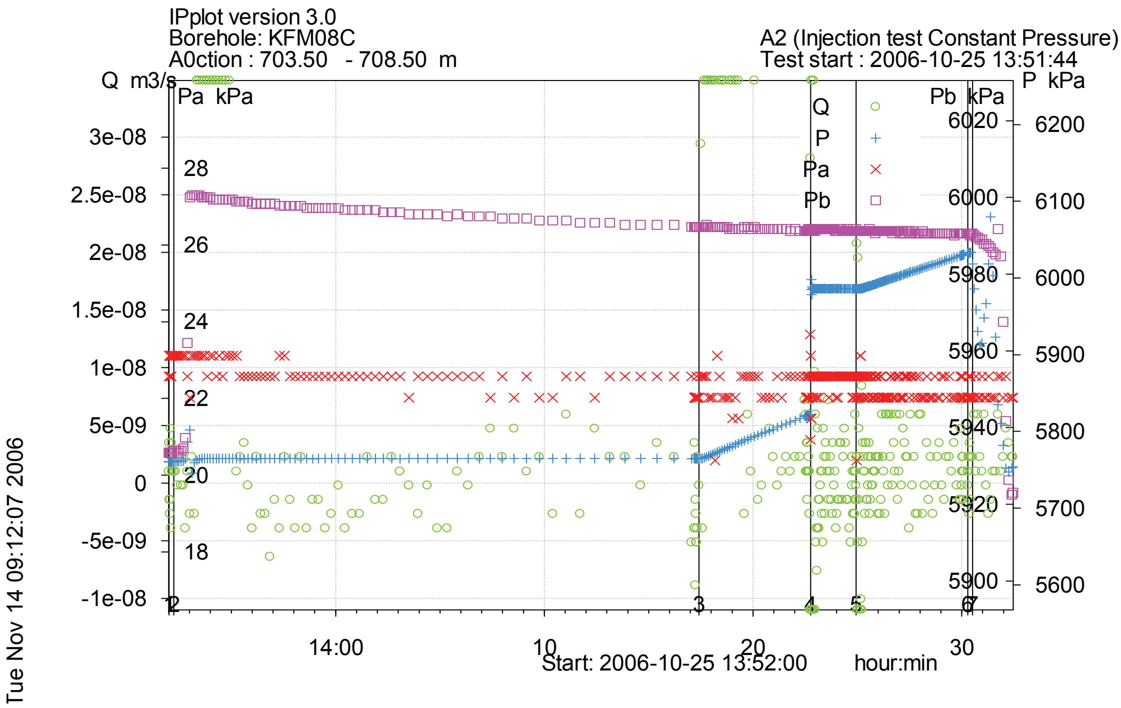
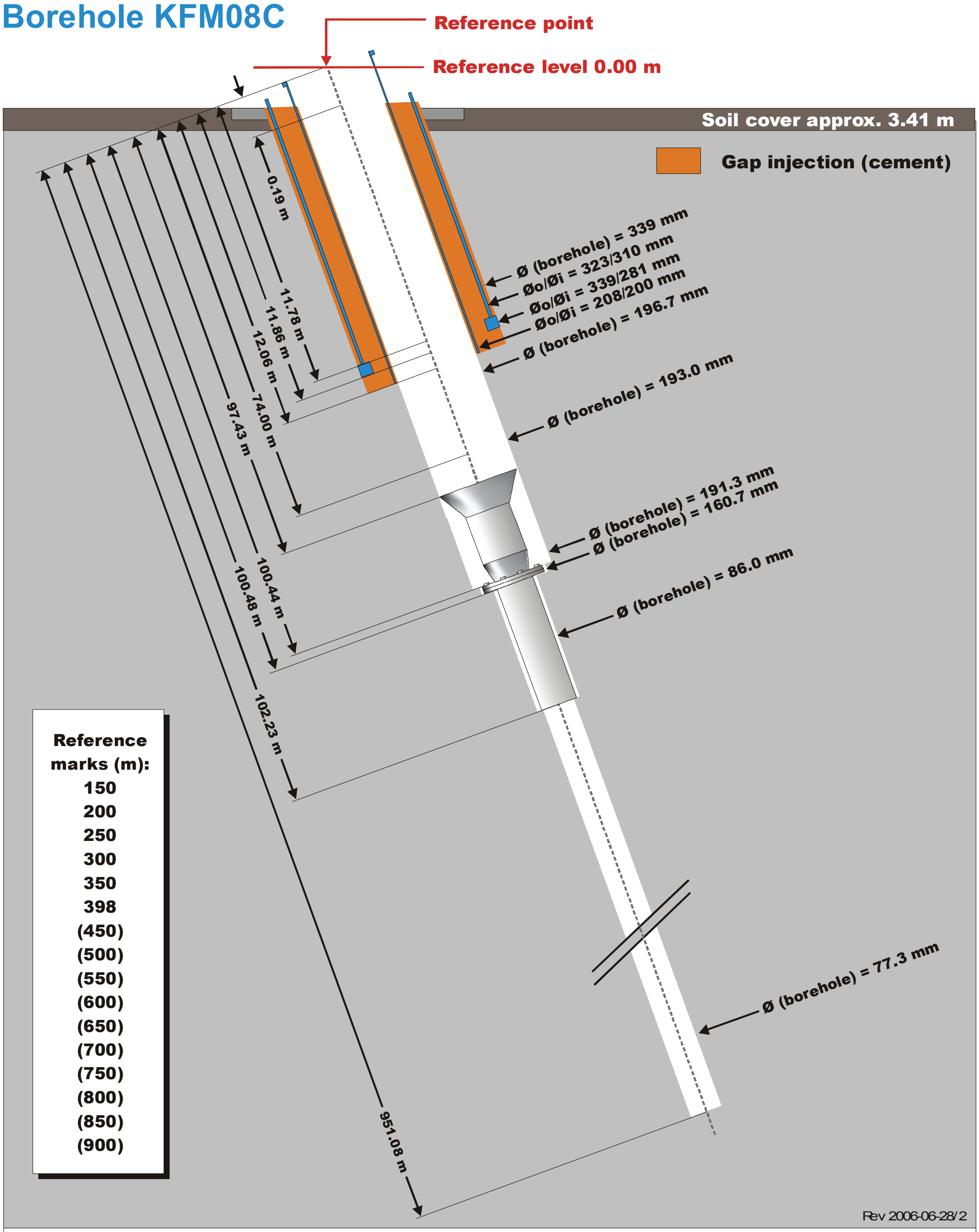


Figure A3-289. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 703.5-708.5 m in borehole KFM08C.*

Appendix 4. Borehole technical data

Technical data

Borehole KFM08C



Drilling reference point

Northing: 6700495.88 (m), RT90 2,5 gon V 0:-15

Easting: 1631187.57 (m), RT90 2,5 gon V 0:-15

Elevation: 2.47 (m), RHB 70

Orientation

Bearing (degrees): 35.88°

Inclination (degrees): -60.46°

Borehole

Length: 951.08 m

Percussion drilling period

Drilling start date: 2005-12-06

Drilling stop date: 2005-12-19

Core drilling period

Drilling start date: 2006-01-30

Drilling stop date: 2006-05-09

Appendix 5. Sicada tables

Nomenclature plu_s_hole_test_d

Column	Datatype	Unit	Column Description	Alt. Symbol
site	CHAR		Investigation site name	
activity_type	CHAR		Activity type code	
start_date	DATE		Date (yymmdd hh:mm:ss)	
stop_date	DATE		Date (yymmdd hh:mm:ss)	
project	CHAR		project code	
idcode	CHAR		Object or borehole identification code	
secup	FLOAT	m	Upper section limit (m)	
seclow	FLOAT	m	Lower section limit (m)	
section_no	INTEGER	number	Section number	
test_type	CHAR		Test type code (1-7), see table description	
formation_type	CHAR		1: Rock, 2: Soil (superficial deposits)	
start_flow_period	DATE	yyyymmdd	Date & time of pumping/injection start (YYYY-MM-DD hh:mm:ss)	
stop_flow_period	DATE	yyyymmdd	Date & time of pumping/injection stop (YYYY-MM-DD hh:mm:ss)	
flow_rate_end_qp	FLOAT	m**3/s	Flow rate at the end of the flowing period	
value_type_qp	CHAR		0:true value,-1<lower meas.limit1:>upper meas.limit	
mean_flow_rate_qm	FLOAT	m**3/s	Arithmetic mean flow rate during flow period	
Q_measl__l	FLOAT	m**3/s	Estimated lower measurement limit of flow rate	**Q-measl-L**
Q_measl__u	FLOAT	m**3/s	Estimated upper measurement limit of flow rate	Q-measl-U
tot_volume_vp	FLOAT	m**3	Total volume of pumped or injected water	
dur_flow_phase_tp	FLOAT	s	Duration of the flowing period of the test	
dur_rec_phase_tf	FLOAT	s	Duration of the recovery period of the test	
initial_head_hi	FLOAT	m	Hydraulic head in test section at start of the flow period	
head_at_flow_end_hp	FLOAT	m	Hydraulic head in test section at stop of the flow period.	
final_head_hf	FLOAT	m	Hydraulic head in test section at stop of recovery period.	
initial_press_pi	FLOAT	kPa	Groundwater pressure in test section at start of flow period	
press_at_flow_end_pp	FLOAT	kPa	Groundwater pressure in test section at stop of flow period.	
final_press_pf	FLOAT	kPa	Ground water pressure at the end of the recovery period.	
fluid_temp_tew	FLOAT	oC	Measured section fluid temperature, see table description	
fluid_elcond_ecw	FLOAT	mS/m	Measured section fluid el. conductivity,see table descr.	
fluid_salinity_tdsw	FLOAT	mg/l	Total salinity of section fluid based on EC,see table descr.	
fluid_salinity_tdswm	FLOAT	mg/l	Tot. section fluid salinity based on water sampling,see...	
reference	CHAR		SKB report No for reports describing data and evaluation	
comments	VARCHAR		Short comment to data	
error_flag	CHAR		If error_flag = "*" then an error occured and an error	
In_use	CHAR		If in_use = "*" then the activity has been selected as	
sign	CHAR		Signature for QA data accknowledge (QA - OK)	
Lp	FLOAT	m	Hydraulic point of application	

Nomenclature plu_s_hole_test_ed1

Column	Datatype	Unit	Column Description	Alt. Symbol
site	CHAR		Investigation site name	
activity_type	CHAR		Activity type code	
start_date	DATE		Date (yymmdd hh:mm:ss)	
stop_date	DATE		Date (yymmdd hh:mm:ss)	
project	CHAR		project code	
idcode	CHAR		Object or borehole identification code	
secup	FLOAT	m	Upper section limit (m)	

Column	Datatype	Unit	Column Description	Alt. Symbol
seclow	FLOAT	m	Lower section limit (m)	
section_no	INTEGER	number	Section number	
test_type	CHAR		Test type code (1-7), see table description!	
formation_type	CHAR		Formation type code. 1: Rock, 2: Soil (superficial deposits)	
Lp	FLOAT	m	Hydraulic point of application for test section, see descr.	
seclen_class	FLOAT	m	Planned ordinary test interval during test campaign.	
spec_capacity_q_s	FLOAT	m**2/s	Specific capacity (Q/s) of test section, see table descript.	Q/s
value_type_q_s	CHAR		0:true value,-1:Q/s<lower meas.limit,1:Q/s>upper meas.limit	
transmissivity_tq	FLOAT	m**2/s	Tranmissivity based on Q/s, see table description	
value_type_tq	CHAR		0:true value,-1:TQ<lower meas.limit,1:TQ>upper meas.limit.	
bc_tq	CHAR		Best choice code. 1 means TQ is best choice of T, else 0	
transmissivity_moye	FLOAT	m**2/s	Transmissivity,TM, based on Moye (1967)	T_M
bc_tm	CHAR		Best choice code. 1 means Tmoye is best choice of T, else 0	
value_type_tm	CHAR		0:true value,-1:TM<lower meas.limit,1:TM>upper meas.limit.	
hydr_cond_moye	FLOAT	m/s	K_M: Hydraulic conductivity based on Moye (1967)	K_M
formation_width_b	FLOAT	m	b:Aquifer thickness repr. for T(generally b=Lw) ,see descr.	b
width_of_channel_b	FLOAT	m	B:Inferred width of formation for evaluated TB	
Tb	FLOAT	m**3/s	TB:Flow capacity in 1D formation of T & width B, see descr.	
l_measl_tb	FLOAT	m**3/s	Estimated lower meas. limit for evaluated TB,see description	
U_measl_tb	FLOAT	m**3/s	Estimated upper meas. limit of evaluated TB,see description	
sb	FLOAT	m	SB:S=storativity,B=width of formation,1D model,see descript.	
assumed_sb	FLOAT	m	SB* : Assumed SB,S=storativity,B=width of formation,see...	
leakage_factor_lf	FLOAT	m	Lf:1D model for evaluation of Leakage factor	
transmissivity_tt	FLOAT	m**2/s	TT:Transmissivity of formation, 2D radial flow model,see...	T_T
value_type_tt	CHAR		0:true value,-1:TT<lower meas.limit,1:TT>upper meas.limit,	
bc_tt	CHAR		Best choice code. 1 means TT is best choice of T, else 0	
l_measl_q_s	FLOAT	m**2/s	Estimated lower meas. limit for evaluated TT,see table descr	Q/s-measl-L
U_measl_q_s	FLOAT	m**2/s	Estimated upper meas. limit for evaluated TT,see description	Q/s-measl-U
storativity_s	FLOAT		S:Storativity of formation based on 2D rad flow,see descr.	
assumed_s	FLOAT		Assumed Storativity,2D model evaluation,see table descr.	
bc_s	FLOAT		Best choice of S (Storativity) ,see descr.	
Ri	FLOAT	m	Radius of influence	
Ri_index	CHAR		ri index=index of radius of influence :-1,0 or 1, see descr.	
leakage_coeff	FLOAT	1/s	K'/b':2D rad flow model evaluation of leakage coeff,see desc	
hydr_cond_ksf	FLOAT	m/s	Ksf:3D model evaluation of hydraulic conductivity,see desc.	
value_type_ksf	CHAR		0:true value,-1:Ksf<lower meas.limit,1:Ksf>upper meas.limit,	
l_measl_ksf	FLOAT	m/s	Estimated lower meas.limit for evaluated Ksf,see table desc.	
U_measl_ksf	FLOAT	m/s	Estimated upper meas.limit for evaluated Ksf,see table descr	
spec_storage_ssf	FLOAT	1/m	Ssf:Specific storage,3D model evaluation,see table descr.	
assumed_ssf	FLOAT	1/m	Ssf*:Assumed Spec.storage,3D model evaluation,see table des.	
C	FLOAT	m**3/pa	C: Wellbore storage coefficient; flow or recovery period	C
cd	FLOAT		CD: Dimensionless wellbore storage coefficient	
skin	FLOAT		Skin factor;best estimate of flow/recovery period,see descr.	ξ
dt1	FLOAT	s	Estimated start time of evaluation, see table description	
dt2	FLOAT	s	Estimated stop time of evaluation. see table description	
t1	FLOAT	s	Start time for evaluated parameter from start flow period	t_1
t2	FLOAT	s	Stop time for evaluated parameter from start of flow period	t_2
dte1	FLOAT	s	Start time for evaluated parameter from start of recovery	dte_1
dte2	FLOAT	s	Stop time for evaluated parameter from start of recovery	dte_2
P_horner	FLOAT	kPa	p*:Horner extrapolated pressure, see table description	
transmissivity_t_nlr	FLOAT	m**2/s	T_NLR Transmissivity based on None Linear Regression...	
storativity_s_nlr	FLOAT		S_NLR=storativity based on None Linear Regression,see..	
value_type_t_nlr	CHAR		0:true value,-1:T_NLR<lower meas.limit,1:>upper meas.limit	

Column	Datatype	Unit	Column Description	Alt. Symbol
bc_t_nlr	CHAR		Best choice code. 1 means T_NLR is best choice of T, else 0	
C_nlr	FLOAT	m**3/pa	Wellbore storage coefficient, based on NLR, see descr.	
cd_nlr	FLOAT		Dimensionless wellbore storage constant, see table descrip.	
skin_nlr	FLOAT		Skin factor based on Non Linear Regression,see desc.	
transmissivity_t_grf	FLOAT	m**2/s	T_GRF:Transmissivity based on Genelized Radial Flow,see...	
value_type_t_grf	CHAR		0:true value,-1:T_GRF<lower meas.limit,1:>upper meas.limit	
bc_t_grf	CHAR		Best choice code. 1 means T_GRF is best choice of T, else 0	
storativity_s_grf	FLOAT		S_GRF:Storativity based on Generalized Radial Flow, see des.	
flow_dim_grf	FLOAT		Inferred flow dimesion based on Generalized Rad. Flow model	
comment	VARCHAR	no_unit	Short comment to the evaluated parameters	
error_flag	CHAR		If error_flag = "*" then an error occured and an error	
In_use	CHAR		If in_use = "*" then the activity has been selected as	
sign	CHAR		Signature for QA data accknowledge (QA - OK)	

Nomenclature plu_s_hole_test_obs

Column	Datatype	Unit	Column Description
site	CHAR		Investigation site name
activity_type	CHAR		Activity type code
idcode	CHAR		Object or borehole identification code
start_date	DATE		Date (yymmdd hh:mm:ss)
secup	FLOAT	m	Upper section limit (m)
seclow	FLOAT	m	Lower section limit (m)
obs_secup	FLOAT	m	Upper limit of observation section
obs_seclow	FLOAT	m	Lower limit of observation section
pi_above	FLOAT	kPa	Groundwater pressure above test section,start of flow period
pp_above	FLOAT	kPa	Groundwater pressure above test section,at stop flow period
pf_above	FLOAT	kPa	Groundwater pressure above test section at stop recovery per
pi_below	FLOAT	kPa	Groundwater pressure below test section at start flow period
pp_below	FLOAT	kPa	Groundwater pressure below test section at stop flow period
pf_below	FLOAT	kPa	Groundwater pressure below test section at stop recovery per
comments	VARCHAR		Comment text row (unformatted text)

KFM08C plu_s_hole_test_d. Left (This result table to SICADA includes more columns which are empty, these columns are not presented here.)

idcode	start_date	stop_date	secup	seclow	test_type	Formation_type	start_flow_period	stop_flow_period	flow_rate_end_qp	Value_type_qp	mean_flow_rate_qm
KFM08C	20061006 08:14	20061006 10:04	108.50	208.50	3	1	20061006 09:01:40	20061006 09:31:53	9.09E-07	0	1.23E-06
KFM08C	20061004 11:21	20061004 14:02	208.50	308.50	3	1	20061004 13:00:23	20061004 13:30:32	6.97E-07	0	1.66E-06
KFM08C	20061004 14:58	20061004 16:39	308.50	408.50	3	1	20061004 15:36:59	20061004 16:07:15	7.40E-09	0	4.42E-08
KFM08C	20061004 18:14	20061004 19:53	408.50	508.50	3	1	20061004 18:50:41	20061004 19:20:53	5.33E-06	0	7.86E-06
KFM08C	20061004 20:54	20061004 22:32	508.50	608.50	3	1	20061004 21:29:35	20061004 21:59:44	8.00E-07	0	1.19E-06
KFM08C	20061005 06:07	20061005 07:57	608.50	708.50	3	1	20061005 06:54:32	20061005 07:24:41	2.50E-07	0	3.33E-07
KFM08C	20061005 08:52	20061005 09:52	708.50	808.50	3	1	20061005 09:39:01	20061005 09:44:39		-1	
KFM08C	20061005 10:17	20061005 11:19	738.50	838.50	3	1	20061005 11:03:49	20061005 11:11:59		-1	
KFM08C	20061005 14:24	20061005 16:16	838.50	938.50	3	1	20061005 15:14:25	20061005 15:44:58	9.05E-09	0	4.79E-08
KFM08C	20061009 12:42	20061009 13:56	108.50	128.50	3	1	20061009 13:14:21	20061009 13:34:36		-1	
KFM08C	20061009 14:20	20061009 15:34	128.50	148.50	3	1	20061009 14:52:17	20061009 15:12:30	7.21E-09	0	2.55E-08
KFM08C	20061009 15:51	20061009 17:09	148.50	168.50	3	1	20061009 16:26:59	20061009 16:47:19	9.23E-08	0	1.15E-07
KFM08C	20061010 06:21	20061010 07:36	168.50	188.50	3	1	20061010 06:53:41	20061010 07:13:57	9.34E-07	0	1.22E-06
KFM08C	20061010 07:56	20061010 08:54	188.50	208.50	3	1	20061010 08:29:22	20061010 08:46:52		-1	
KFM08C	20061010 09:08	20061010 10:24	208.50	228.50	3	1	20061010 09:41:50	20061010 10:02:11	2.04E-07	0	2.69E-07
KFM08C	20061010 10:45	20061010 12:51	228.50	248.50	3	1	20061010 12:04:07	20061010 12:28:52	4.26E-08	0	8.65E-08
KFM08C	20061010 13:09	20061010 13:53	248.50	268.50	3	1	20061010 13:41:27	20061010 13:45:32		-1	
KFM08C	20061010 14:08	20061010 15:24	268.50	288.50	3	1	20061010 14:41:50	20061010 15:02:11	4.72E-07	0	1.42E-06
KFM08C	20061010 15:47	20061010 16:31	288.50	308.50	3	1	20061010 16:17:27	20061010 16:24:15		-1	
KFM08C	20061010 17:51	20061010 19:08	408.50	428.50	3	1	20061010 18:26:19	20061010 18:46:40	8.65E-09	0	2.74E-08
KFM08C	20061012 16:47	20061012 17:45	428.50	448.50	3	1	20061012 17:25:43	20061012 17:28:49		-1	
KFM08C	20061010 20:56	20061010 22:09	448.50	468.50	3	1	20061010 21:26:33	20061010 21:46:43	4.02E-06	0	4.36E-06
KFM08C	20061010 22:26	20061010 23:40	468.50	488.50	3	1	20061010 22:58:05	20061010 23:18:06	3.33E-07	0	3.67E-07
KFM08C	20061011 07:30	20061011 08:45	488.50	508.50	3	1	20061011 08:03:03	20061011 08:23:14	1.59E-06	0	4.30E-06
KFM08C	20061011 09:44	20061011 10:59	508.50	528.50	3	1	20061011 10:17:22	20061011 10:37:35	8.61E-07	0	1.31E-06
KFM08C	20061011 12:38	20061011 13:55	528.50	548.50	3	1	20061011 13:13:22	20061011 13:33:37	5.20E-08	0	8.59E-08
KFM08C	20061011 16:12	20061011 17:04	548.50	568.50	3	1	20061011 16:51:50	20061011 16:56:58		-1	
KFM08C	20061011 19:42	20061011 20:49	568.50	588.50	3	1	20061011 20:22:13	20061011 20:27:03		-1	

idcode	start_date	stop_date	secup	seclow	test_type	Formation_type	start_flow_period	stop_flow_period	flow_rate_end_qp	Value_type_qp	mean_flow_rate_qm
KFM08C	20061011 21:22	20061011 22:24	588.50	608.50	3	1	20061011 22:03:30	20061011 22:07:11		-1	
KFM08C	20061011 22:47	20061011 23:37	608.50	628.50	3	1	20061011 23:24:03	20061011 23:27:42		-1	
KFM08C	20061012 06:55	20061012 07:47	628.50	648.50	3	1	20061012 07:29:12	20061012 07:39:52		-1	
KFM08C	20061012 08:07	20061012 08:59	648.50	668.50	3	1	20061012 08:41:33	20061012 08:51:53		-1	
KFM08C	20061012 12:37	20061012 13:53	668.50	688.50	3	1	20061012 13:11:20	20061012 13:31:39	1.82E-07	0	2.42E-07
KFM08C	20061012 10:40	20061012 11:54	688.50	708.50	3	1	20061012 11:12:14	20061012 11:32:37	2.71E-08	0	5.68E-08
KFM08C	20061013 14:45	20061013 16:02	148.50	153.50	3	1	20061013 15:20:16	20061013 15:40:33	6.50E-09	0	1.08E-08
KFM08C	20061013 16:12	20061013 17:02	153.50	158.50	3	1	20061013 16:51:01	20061013 16:55:07		-1	
KFM08C	20061016 08:17	20061016 09:32	158.50	163.50	3	1	20061016 08:49:24	20061016 09:09:38	7.13E-08	0	8.51E-08
KFM08C	20061016 09:42	20061016 10:36	163.50	168.50	3	1	20061016 10:14:17	20061016 10:28:33		-1	
KFM08C	20061016 10:48	20061016 12:43	168.50	173.50	3	1	20061016 12:00:19	20061016 12:21:25	1.61E-08	0	2.18E-08
KFM08C	20061016 12:54	20061016 13:34	173.50	178.50	3	1	20061016 13:25:15	20061016 13:26:35		-1	
KFM08C	20061016 13:43	20061016 15:01	178.50	183.50	3	1	20061016 14:18:25	20061016 14:38:39	5.46E-07	0	6.35E-07
KFM08C	20061016 15:17	20061016 16:33	183.50	188.50	3	1	20061016 15:50:35	20061016 16:10:46	6.44E-07	0	7.87E-07
KFM08C	20061017 08:16	20061017 08:57	208.50	213.50	3	1	20061017 08:47:55	20061017 08:49:51		-1	
KFM08C	20061017 09:12	20061017 09:55	213.50	218.50	3	1	20061017 09:46:16	20061017 09:48:01		-1	
KFM08C	20061017 10:07	20061017 11:25	218.50	223.50	3	1	20061017 10:42:59	20061017 11:03:15	1.31E-07	0	1.74E-07
KFM08C	20061017 12:29	20061017 13:46	223.50	228.50	3	1	20061017 13:03:49	20061017 13:24:05	7.95E-08	0	1.21E-07
KFM08C	20061017 14:02	20061017 15:17	228.50	233.50	3	1	20061017 14:35:23	20061017 14:55:39	3.34E-08	0	4.27E-08
KFM08C	20061017 15:30	20061017 16:44	233.50	238.50	3	1	20061017 16:01:52	20061017 16:22:09	9.00E-09	0	1.47E-08
KFM08C	20061018 08:21	20061018 09:35	238.50	243.50	3	1	20061018 08:53:06	20061018 09:13:20	3.56E-08	0	8.14E-08
KFM08C	20061018 10:02	20061018 10:45	243.50	248.50	3	1	20061018 10:36:30	20061018 10:38:20		-1	
KFM08C	20061018 11:06	20061018 12:27	268.50	273.50	3	1	20061018 12:13:57	20061018 12:16:38		-1	
KFM08C	20061018 12:45	20061018 13:26	273.50	278.50	3	1	20061018 13:17:42	20061018 13:19:13		-1	
KFM08C	20061018 13:36	20061018 14:50	278.50	283.50	3	1	20061018 14:08:18	20061018 14:28:32	5.14E-07	0	1.54E-06
KFM08C	20061018 15:02	20061018 15:43	283.50	288.50	3	1	20061018 15:33:40	20061018 15:36:00		-1	
KFM08C	20061019 08:48	20061019 09:36	448.50	453.50	3	1	20061019 09:21:20	20061019 09:24:12		-1	
KFM08C	20061019 09:53	20061019 11:11	451.00	456.00	3	1	20061019 10:29:09	20061019 10:49:23	1.68E-06	0	1.74E-06
KFM08C	20061019 11:25	20061019 13:21	456.00	461.00	3	1	20061019 12:38:20	20061019 12:59:25	2.56E-06	0	2.72E-06
KFM08C	20061019 13:34	20061019 14:51	461.00	466.00	3	1	20061019 14:09:14	20061019 14:29:31	3.43E-07	0	3.62E-07
KFM08C	20061019 15:04	20061019 16:28	466.00	471.00	3	1	20061019 15:46:11	20061019 16:06:28	3.16E-08	0	4.56E-08

idcode	start_date	stop_date	secup	seclow	test_type	Formation_type	start_flow_period	stop_flow_period	flow_rate_end_qp	Value_type_qp	mean_flow_rate_qm
KFM08C	20061019 16:41	20061019 17:24	471.00	476.00	3	1	20061019 17:13:40	20061019 17:17:09		-1	
KFM08C	20061020 08:44	20061020 10:03	476.00	481.00	3	1	20061020 09:20:34	20061020 09:40:50	5.07E-07	0	5.47E-07
KFM08C	20061020 10:16	20061020 11:03	481.00	486.00	3	1	20061020 10:47:19	20061020 10:50:56		-1	
KFM08C	20061020 12:29	20061020 13:12	486.00	491.00	3	1	20061020 13:02:23	20061020 13:05:05		-1	
KFM08C	20061020 13:28	20061020 14:15	491.00	496.00	3	1	20061020 14:04:49	20061020 14:07:30		-1	
KFM08C	20061020 14:27	20061020 15:45	496.00	501.00	3	1	20061020 15:02:25	20061020 15:22:41	1.50E-06	0	4.05E-06
KFM08C	20061023 08:31	20061023 09:14	501.00	506.00	3	1	20061023 09:03:33	20061023 09:06:59		-1	
KFM08C	20061023 09:30	20061023 10:12	506.00	511.00	3	1	20061023 10:02:05	20061023 10:04:48		-1	
KFM08C	20061023 10:23	20061023 11:04	511.00	516.00	3	1	20061023 10:54:45	20061023 10:56:47		-1	
KFM08C	20061023 11:13	20061023 13:18	516.00	521.00	3	1	20061023 12:36:14	20061023 12:56:28	4.83E-07	0	6.71E-07
KFM08C	20061023 13:29	20061023 14:47	521.00	526.00	3	1	20061023 14:05:13	20061023 14:25:25	8.73E-07	0	1.07E-06
KFM08C	20061023 14:57	20061023 16:12	526.00	531.00	3	1	20061023 15:30:13	20061023 15:50:29	1.21E-08	0	1.75E-08
KFM08C	20061023 16:23	20061023 17:36	531.00	536.00	3	1	20061023 16:54:15	20061023 17:14:23	3.62E-08	0	4.86E-08
KFM08C	20061024 08:16	20061024 08:59	536.00	541.00	3	1	20061024 08:48:31	20061024 08:51:43		-1	
KFM08C	20061024 09:09	20061024 09:49	541.00	546.00	3	1	20061024 09:40:50	20061024 09:42:15		-1	
KFM08C	20061024 10:03	20061024 10:46	543.50	548.50	3	1	20061024 10:36:06	20061024 10:38:49		-1	
KFM08C	20061024 13:18	20061024 14:04	668.50	673.50	3	1	20061024 13:53:13	20061024 13:57:06		-1	
KFM08C	20061024 14:14	20061024 15:29	671.00	676.00	3	1	20061024 14:46:33	20061024 15:06:50	1.20E-07	0	1.53E-07
KFM08C	20061024 15:40	20061024 16:26	676.00	681.00	3	1	20061024 16:11:06	20061024 16:19:15		-1	
KFM08C	20061024 16:43	20061025 09:07	681.00	686.00	3	1	20061025 08:24:46	20061025 08:45:02	9.75E-08	0	1.06E-07
KFM08C	20061025 09:15	20061025 09:56	686.00	691.00	3	1	20061025 09:47:16	20061025 09:48:57		-1	
KFM08C	20061025 10:06	20061025 11:20	691.00	696.00	3	1	20061025 10:37:33	20061025 10:57:50	2.84E-08	0	3.37E-08
KFM08C	20061025 12:16	20061025 12:56	697.00	702.00	3	1	20061025 12:47:17	20061025 12:49:07		-1	
KFM08C	20061025 13:05	20061025 13:45	702.00	707.00	3	1	20061025 13:36:44	20061025 13:38:28		-1	
KFM08C	20061025 13:51	20061025 14:32	703.50	708.50	3	1	20061025 14:22:46	20061025 14:24:57		-1	
KFM08C[2)]	20061004 08:30	20061004 10:23	108.50	208.50	3	1	20061004 09:21:25	20061004 09:51:34	8.50E-07	0	1.01E-06
KFM08C[3)]	20061010 19:29	20061010 20:19	431.50	451.50	3	1	20061010 20:06:50	20061010 20:27:09	5.65E-09	-1	
KFM08C[1)]	20061012 09:18	20061012 10:14	668.50	688.50	3	1	20061012 09:52:07	20061012 10:11:48		-1	

1) Incomplete test, interrupted and re-performed later.
2) Complete test, re-performed later.
3) The test was performed at an incorrect position and therefore not evaluated.

KFM08C plu_s_hole_test_d. Right (This result table to SICADA includes more columns which are empty, these columns are not presented here.)

idcode	secup	seclow	q_measl__l	q_measl__u	tot_volume_vp	dur_flow_phase_tp	dur_rec_phase_tf	initial_press_pi	press_at_flow_end_pp	final_press_pf	fluid_temp_tew
KFM08C	108.50	208.50	1.7E-08	1.0E-03	2.24E-03	1813	1810	993.25	1198.57	1042.23	7.34
KFM08C	208.50	308.50	1.7E-08	1.0E-03	3.00E-03	1809	1814	1826.50	2038.02	1939.48	7.86
KFM08C	308.50	408.50	4.9E-09	1.0E-03	7.97E-05	1816	1821	2656.20	2858.35	2829.03	8.60
KFM08C	408.50	508.50	1.7E-08	1.0E-03	1.43E-02	1812	1811	3464.41	3677.60	3505.01	9.37
KFM08C	508.50	608.50	1.7E-08	1.0E-03	2.15E-03	1809	1815	4283.77	4490.06	4337.31	10.33
KFM08C	608.50	708.50	1.7E-08	1.0E-03	6.02E-04	1809	1814	5082.07	5346.44	5109.60	11.30
KFM08C	708.50	808.50	4.7E-09	1.0E-03		338	321	5898.28	6074.01	6074.01	12.34
KFM08C	738.50	838.50	6.1E-09	1.0E-03		490	321	6133.46	6339.20	6336.59	12.64
KFM08C	838.50	938.50	6.0E-09	1.0E-03	8.60E-05	1833	1821	6903.57	7123.79	7094.02	13.71
KFM08C	108.50	128.50	7.2E-09	1.0E-03		1215	1221	1016.37	1198.33	1133.62	7.34
KFM08C	128.50	148.50	6.0E-09	1.0E-03	3.07E-05	1213	1221	1185.36	1368.66	1327.92	7.40
KFM08C	148.50	168.50	6.0E-09	1.0E-03	1.40E-04	1220	1203	1345.54	1546.87	1356.00	7.51
KFM08C	168.50	188.50	1.7E-08	1.0E-03	1.49E-03	1216	1209	1511.77	1727.01	1558.01	7.62
KFM08C	188.50	208.50	6.0E-09	1.0E-03		1050	321	1693.43	1913.07	1886.10	7.73
KFM08C	208.50	228.50	1.7E-08	1.0E-03	3.28E-04	1221	1203	1846.05	2050.55	1880.59	7.87
KFM08C	228.50	248.50	6.5E-09	1.0E-03	1.29E-04	1485	1203	2013.26	2208.39	2096.92	8.00
KFM08C	248.50	268.50	6.0E-09	1.0E-03		245	320	2188.17	2371.60	2368.29	8.14
KFM08C	268.50	288.50	1.7E-08	1.0E-03	1.74E-03	1221	1203	2346.69	2535.09	2474.55	8.28
KFM08C	288.50	308.50	6.2E-09	1.0E-03		408	322	2517.20	2720.05	2714.54	8.42
KFM08C	408.50	428.50	4.9E-09	1.0E-03	3.30E-05	1221	1221	3506.79	3701.52	3621.70	9.46
KFM08C	428.50	448.50	4.7E-09	1.0E-03		186	900	3710.47	3847.95	3861.71	9.57
KFM08C	448.50	468.50	1.7E-08	1.0E-03	5.28E-03	1210	1215	3820.84	4038.95	3825.92	9.78
KFM08C	468.50	488.50	1.7E-08	1.0E-03	4.42E-04	1201	1221	3985.02	4138.65	3985.02	9.97
KFM08C	488.50	508.50	1.7E-08	1.0E-03	5.21E-03	1211	1215	4154.97	4370.74	4304.83	10.15
KFM08C	508.50	528.50	1.7E-08	1.0E-03	1.59E-03	1213	1213	4316.39	4521.85	4372.53	10.34
KFM08C	528.50	548.50	1.7E-08	1.0E-03	1.05E-04	1215	1209	4487.58	4680.80	4559.14	10.56
KFM08C	548.50	568.50	4.7E-09	1.0E-03		308	321	4665.93	4841.25	4844.28	10.75
KFM08C	568.50	588.50	4.7E-09	1.0E-03		290	1218	4821.71	5014.79	5017.12	10.94

idcode	secup	seclow	q_measl__l	q_measl__u	tot_volume_vp	dur_flow_phase_tp	dur_rec_phase_tf	initial_press_pi	press_at_flow_end_pp	final_press_pf	fluid_temp_tew
KFM08C	588.50	608.50	6.2E-09	1.0E-03		221	919	4981.08	5178.27	5176.76	11.13
KFM08C	608.50	628.50	6.0E-09	1.0E-03		219	429	5139.74	5339.15	5339.70	11.30
KFM08C	628.50	648.50	6.0E-09	1.0E-03		640	317	5300.20	5497.69	5464.10	11.50
KFM08C	648.50	668.50	6.0E-09	1.0E-03		620	317	5467.96	5659.52	5662.27	11.70
KFM08C	668.50	688.50	3.1E-09	1.0E-03	2.95E-04	1219	1203	5607.78	5806.63	5628.14	11.88
KFM08C	688.50	708.50	1.7E-08	1.0E-03	6.96E-05	1223	1200	5772.09	5975.20	5783.92	12.11
KFM08C	148.50	153.50	6.0E-09	1.0E-03	1.31E-05	1217	1221	1223.06	1406.09	1281.69	7.49
KFM08C	153.50	158.50	6.0E-09	1.0E-03		246	321	1269.02	1449.58	1426.46	7.53
KFM08C	158.50	163.50	1.7E-08	1.0E-03	1.03E-04	1214	1211	1303.57	1494.16	1307.01	7.54
KFM08C	163.50	168.50	6.0E-09	1.0E-03		856	321	1348.71	1539.71	1465.54	7.57
KFM08C	168.50	173.50	6.0E-09	1.0E-03	2.74E-05	1266	1221	1391.23	1590.50	1411.59	7.60
KFM08C	173.50	178.50	4.9E-09	1.0E-03		80	321	1439.95	1631.51	1575.64	7.63
KFM08C	178.50	183.50	1.7E-08	1.0E-03	7.73E-04	1214	1210	1465.54	1655.45	1473.80	7.66
KFM08C	183.50	188.50	1.7E-08	1.0E-03	9.54E-04	1211	1215	1512.19	1710.91	1543.15	7.70
KFM08C	208.50	213.50	4.9E-09	1.0E-03		116	322	1734.72	1911.97	1909.21	7.83
KFM08C	213.50	218.50	4.7E-09	1.0E-03		105	321	1783.70	1956.83	1967.56	7.87
KFM08C	218.50	223.50	1.7E-08	1.0E-03	2.11E-04	1216	1209	1799.67	1997.29	1816.74	7.90
KFM08C	223.50	228.50	6.2E-09	1.0E-03	1.47E-04	1216	1210	1844.26	2070.50	1893.25	7.94
KFM08C	228.50	233.50	1.7E-08	1.0E-03	5.20E-05	1216	1210	1885.55	2113.44	1904.26	7.97
KFM08C	233.50	238.50	6.2E-09	1.0E-03	1.78E-05	1217	1221	1938.25	2155.28	1959.31	8.00
KFM08C	238.50	243.50	1.7E-08	1.0E-03	9.90E-05	1214	1211	1972.79	2197.66	2090.32	8.05
KFM08C	243.50	248.50	6.0E-09	1.0E-03		110	321	2023.16	2207.57	2180.60	8.08
KFM08C	268.50	273.50	4.7E-09	1.0E-03		161	530	2230.68	2416.74	2430.50	8.25
KFM08C	273.50	278.50	6.0E-09	1.0E-03		91	321	2269.49	2458.03	2459.13	8.29
KFM08C	278.50	283.50	1.7E-08	1.0E-03	1.87E-03	1214	1210	2300.45	2503.71	2439.31	8.33
KFM08C	283.50	288.50	6.2E-09	1.0E-03		140	321	2352.33	2550.51	2553.25	8.36
KFM08C	448.50	453.50	6.0E-09	1.0E-03		172	621	3857.86	3913.18	4026.29	9.74
KFM08C	451.00	456.00	1.7E-08	1.0E-03	2.11E-03	1214	1211	3716.93	3914.55	3719.68	9.78
KFM08C	456.00	461.00	1.7E-08	1.0E-03	3.45E-03	1265	1212	3758.08	3958.31	3760.97	9.85
KFM08C	461.00	466.00	1.7E-08	1.0E-03	4.40E-04	1217	1210	3799.64	3993.82	3799.50	9.87
KFM08C	466.00	471.00	1.7E-08	1.0E-03	5.55E-05	1217	1210	3844.92	4048.86	3872.72	9.91

idcode	secup	seclow	q_measl__l	q_measl__u	tot_volume_vp	dur_flow_phase_tp	dur_rec_phase_tf	initial_press_pi	press_at_flow_end_pp	final_press_pf	fluid_temp_tew
KFM08C	471.00	476.00	6.2E-09	1.0E-03		209	322	3893.22	4091.25	4081.34	9.95
KFM08C	476.00	481.00	1.7E-08	1.0E-03	6.66E-04	1216	1210	3922.12	4116.30	3921.70	10.01
KFM08C	481.00	486.00	6.0E-09	1.0E-03		217	622	4005.52	4166.67	4159.51	10.05
KFM08C	486.00	491.00	6.0E-09	1.0E-03		162	321	4112.03	4210.01	4323.54	10.09
KFM08C	491.00	496.00	6.0E-09	1.0E-03		161	321	4073.63	4252.40	4246.48	10.13
KFM08C	496.00	501.00	1.7E-08	1.0E-03	4.93E-03	1216	1209	4088.36	4293.27	4231.62	10.24
KFM08C	501.00	506.00	4.7E-09	1.0E-03		206	321	4171.48	4342.95	4379.68	10.23
KFM08C	506.00	511.00	4.7E-09	1.0E-03		163	321	4214.01	4384.23	4458.96	10.28
KFM08C	511.00	516.00	4.7E-09	1.0E-03		122	321	4232.58	4425.39	4434.74	10.32
KFM08C	516.00	521.00	1.7E-08	1.0E-03	8.16E-04	1214	1211	4250.34	4453.00	4289.97	10.38
KFM08C	521.00	526.00	1.7E-08	1.0E-03	1.30E-03	1212	1213	4293.68	4497.10	4310.33	10.42
KFM08C	526.00	531.00	6.0E-09	1.0E-03	2.11E-05	1216	1221	4332.34	4553.09	4334.00	10.47
KFM08C	531.00	536.00	5.0E-09	1.0E-03	5.90E-05	1208	1211	4381.89	4594.37	4446.85	10.51
KFM08C	536.00	541.00	5.0E-09	1.0E-03		192	321	4431.85	4636.75	4677.50	10.57
KFM08C	541.00	546.00	5.0E-09	1.0E-03		85	321	4593.27	4675.84	4886.11	10.61
KFM08C	543.50	548.50	6.0E-09	1.0E-03		163	321	4548.55	4697.31	4839.87	10.63
KFM08C	668.50	673.50	6.0E-09	1.0E-03		233	321	5519.70	5706.86	5710.16	11.88
KFM08C	671.00	676.00	5.0E-09	1.0E-03	1.87E-04	1217	1209	5506.49	5727.36	5541.72	11.91
KFM08C	676.00	681.00	6.0E-09	1.0E-03		489	321	5562.77	5771.68	5705.20	11.96
KFM08C	681.00	686.00	1.7E-08	1.0E-03	1.29E-04	1216	1210	5585.76	5815.85	5586.86	12.02
KFM08C	686.00	691.00	6.0E-09	1.0E-03		101	321	5746.90	5843.24	5935.30	12.07
KFM08C	691.00	696.00	1.7E-08	1.0E-03	4.07E-05	1217	1218	5684.56	5883.65	5689.79	12.12
KFM08C	697.00	702.00	4.7E-09	1.0E-03		110	321	5837.60	5932.13	6027.77	12.18
KFM08C	702.00	707.00	4.7E-09	1.0E-03		104	321	5861.13	5972.32	6043.19	12.23
KFM08C	703.50	708.50	4.7E-09	1.0E-03		131	321	5821.63	5985.94	6030.53	12.24
KFM08C[2)]	108.50	208.50	1.7E-08	1.0E-03	1.83E-03	1809	1812	992.97	1200.77	1034.53	7.33
KFM08C[3)]	431.50	451.50	1.7E-08	1.0E-03		1219	321	3711.57	3891.98	3885.93	9.62
KFM08C[1)]	668.50	688.50	4.7E-09	1.0E-03		1181	59	5607.91	5837.87	5760.25	11.92

[1)] Incomplete test, interrupted and re-performed later.
[2)] Complete test, re-performed later.
[3)] The test was performed at an incorrect position and therefore not evaluated.

KFM08C plu_s_hole_test_ed1. Left (This result table to SICADA includes more columns which are empty, these columns are not presented here.)

idcode	start_date	stop_date	secup	seclow	test_type	formation_type	spec_capacity_q_s	value_type_q_s	transmissivity_moye	value_type_tm	bc_tm	hydr_cond_moye	formation_width_b
KFM08C	20061006 08:14	20061006 10:04	108.50	208.50	3	1	4.35E-08	0	5.65E-08	0	0	5.65E-10	100.00
KFM08C	20061004 11:21	20061004 14:02	208.50	308.50	3	1	3.23E-08	0	4.20E-08	0	0	4.20E-10	100.00
KFM08C	20061004 14:58	20061004 16:39	308.50	408.50	3	1	3.59E-10	0	4.67E-10	0	1	4.67E-12	100.00
KFM08C	20061004 18:14	20061004 19:53	408.50	508.50	3	1	2.45E-07	0	3.19E-07	0	0	3.19E-09	100.00
KFM08C	20061004 20:54	20061004 22:32	508.50	608.50	3	1	3.81E-08	0	4.95E-08	0	0	4.95E-10	100.00
KFM08C	20061005 06:07	20061005 07:57	608.50	708.50	3	1	9.28E-09	0	1.21E-08	0	0	1.21E-10	100.00
KFM08C	20061005 08:52	20061005 09:52	708.50	808.50	3	1	2.37E-10	-1	3.08E-10	-1	0	3.08E-12	100.00
KFM08C	20061005 10:17	20061005 11:19	738.50	838.50	3	1	3.07E-10	-1	3.99E-10	-1	0	3.99E-12	100.00
KFM08C	20061005 14:24	20061005 16:16	838.50	938.50	3	1	4.03E-10	0	5.24E-10	0	1	5.24E-12	100.00
KFM08C	20061009 12:42	20061009 13:56	108.50	128.50	3	1	3.60E-10	-1	3.76E-10	-1	0	1.88E-11	20.00
KFM08C	20061009 14:20	20061009 15:34	128.50	148.50	3	1	3.86E-10	0	4.03E-10	0	0	2.01E-11	20.00
KFM08C	20061009 15:51	20061009 17:09	148.50	168.50	3	1	4.50E-09	0	4.69E-09	0	0	2.35E-10	20.00
KFM08C	20061010 06:21	20061010 07:36	168.50	188.50	3	1	4.26E-08	0	4.44E-08	0	0	2.22E-09	20.00
KFM08C	20061010 07:56	20061010 08:54	188.50	208.50	3	1	2.98E-10	-1	3.11E-10	-1	0	1.55E-11	20.00
KFM08C	20061010 09:08	20061010 10:24	208.50	228.50	3	1	9.79E-09	0	1.02E-08	0	0	5.11E-10	20.00
KFM08C	20061010 10:45	20061010 12:51	228.50	248.50	3	1	2.14E-09	0	2.24E-09	0	0	1.12E-10	20.00
KFM08C	20061010 13:09	20061010 13:53	248.50	268.50	3	1	2.98E-10	-1	3.11E-10	-1	0	1.55E-11	20.00
KFM08C	20061010 14:08	20061010 15:24	268.50	288.50	3	1	2.46E-08	0	2.57E-08	0	0	1.28E-09	20.00
KFM08C	20061010 15:47	20061010 16:31	288.50	308.50	3	1	3.09E-10	-1	3.23E-10	-1	0	1.61E-11	20.00
KFM08C	20061010 17:51	20061010 19:08	408.50	428.50	3	1	4.36E-10	0	4.55E-10	0	0	2.27E-11	20.00
KFM08C	20061012 16:47	20061012 17:45	428.50	448.50	3	1	2.37E-10	-1	2.47E-10	-1	0	1.24E-11	20.00
KFM08C	20061010 20:56	20061010 22:09	448.50	468.50	3	1	1.81E-07	0	1.89E-07	0	0	9.44E-09	20.00
KFM08C	20061010 22:26	20061010 23:40	468.50	488.50	3	1	2.13E-08	0	2.22E-08	0	0	1.11E-09	20.00
KFM08C	20061011 07:30	20061011 08:45	488.50	508.50	3	1	7.25E-08	0	7.57E-08	0	0	3.78E-09	20.00
KFM08C	20061011 09:44	20061011 10:59	508.50	528.50	3	1	4.11E-08	0	4.29E-08	0	0	2.14E-09	20.00
KFM08C	20061011 12:38	20061011 13:55	528.50	548.50	3	1	2.64E-09	0	2.76E-09	0	0	1.38E-10	20.00
KFM08C	20061011 16:12	20061011 17:04	548.50	568.50	3	1	2.37E-10	-1	2.47E-10	-1	0	1.24E-11	20.00
KFM08C	20061011 19:42	20061011 20:49	568.50	588.50	3	1	2.37E-10	-1	2.47E-10	-1	0	1.24E-11	20.00
KFM08C	20061011 21:22	20061011 22:24	588.50	608.50	3	1	3.08E-10	-1	3.22E-10	-1	0	1.61E-11	20.00
KFM08C	20061011 22:47	20061011 23:37	608.50	628.50	3	1	2.98E-10	-1	3.11E-10	-1	0	1.55E-11	20.00

idcode	start_date	stop_date	secup	seclow	test_type	formation_type	spec_capacity_q_s	value_type_q_s	transmissivity_moye	value_type_tm	bc_tm	hydr_cond_moye	formation_width_b
KFM08C	20061012 06:55	20061012 07:47	628.50	648.50	3	1	2.98E-10	-1	3.11E-10	-1	0	1.55E-11	20.00
KFM08C	20061012 08:07	20061012 08:59	648.50	668.50	3	1	2.98E-10	-1	3.11E-10	-1	0	1.55E-11	20.00
KFM08C	20061012 12:37	20061012 13:53	668.50	688.50	3	1	8.96E-09	0	9.35E-09	0	0	4.68E-10	20.00
KFM08C	20061012 10:40	20061012 11:54	688.50	708.50	3	1	1.31E-09	0	1.37E-09	0	0	6.83E-11	20.00
KFM08C	20061013 14:45	20061013 16:02	148.50	153.50	3	1	3.49E-10	0	2.87E-10	0	0	5.73E-11	5.00
KFM08C	20061013 16:12	20061013 17:02	153.50	158.50	3	1	2.98E-10	-1	2.45E-10	-1	0	4.90E-11	5.00
KFM08C	20061016 08:17	20061016 09:32	158.50	163.50	3	1	3.67E-09	0	3.02E-09	0	0	6.04E-10	5.00
KFM08C	20061016 09:42	20061016 10:36	163.50	168.50	3	1	2.98E-10	-1	2.45E-10	-1	0	4.90E-11	5.00
KFM08C	20061016 10:48	20061016 12:43	168.50	173.50	3	1	7.91E-10	0	6.50E-10	0	0	1.30E-10	5.00
KFM08C	20061016 12:54	20061016 13:34	173.50	178.50	3	1	2.47E-10	-1	2.03E-10	-1	0	4.06E-11	5.00
KFM08C	20061016 13:43	20061016 15:01	178.50	183.50	3	1	2.82E-08	0	2.32E-08	0	0	4.64E-09	5.00
KFM08C	20061016 15:17	20061016 16:33	183.50	188.50	3	1	3.18E-08	0	2.62E-08	0	0	5.24E-09	5.00
KFM08C	20061017 08:16	20061017 08:57	208.50	213.50	3	1	2.47E-10	-1	2.03E-10	-1	0	4.06E-11	5.00
KFM08C	20061017 09:12	20061017 09:55	213.50	218.50	3	1	2.37E-10	-1	1.95E-10	-1	0	3.90E-11	5.00
KFM08C	20061017 10:07	20061017 11:25	218.50	223.50	3	1	6.51E-09	0	5.35E-09	0	0	1.07E-09	5.00
KFM08C	20061017 12:29	20061017 13:46	223.50	228.50	3	1	3.45E-09	0	2.84E-09	0	0	5.67E-10	5.00
KFM08C	20061017 14:02	20061017 15:17	228.50	233.50	3	1	1.44E-09	0	1.18E-09	0	0	2.37E-10	5.00
KFM08C	20061017 15:30	20061017 16:44	233.50	238.50	3	1	4.07E-10	0	3.35E-10	0	0	6.70E-11	5.00
KFM08C	20061018 08:21	20061018 09:35	238.50	243.50	3	1	1.55E-09	0	1.28E-09	0	0	2.55E-10	5.00
KFM08C	20061018 10:02	20061018 10:45	243.50	248.50	3	1	2.98E-10	-1	2.45E-10	-1	0	4.90E-11	5.00
KFM08C	20061018 11:06	20061018 12:27	268.50	273.50	3	1	2.37E-10	-1	1.95E-10	-1	0	3.90E-11	5.00
KFM08C	20061018 12:45	20061018 13:26	273.50	278.50	3	1	2.98E-10	-1	2.45E-10	-1	0	4.90E-11	5.00
KFM08C	20061018 13:36	20061018 14:50	278.50	283.50	3	1	2.48E-08	0	2.04E-08	0	0	4.08E-09	5.00
KFM08C	20061018 15:02	20061018 15:43	283.50	288.50	3	1	3.09E-10	-1	2.54E-10	-1	0	5.09E-11	5.00
KFM08C	20061019 08:48	20061019 09:36	448.50	453.50	3	1	2.98E-10	-1	2.45E-10	-1	0	4.90E-11	5.00
KFM08C	20061019 09:53	20061019 11:11	451.00	456.00	3	1	8.33E-08	0	6.86E-08	0	0	1.37E-08	5.00
KFM08C	20061019 11:25	20061019 13:21	456.00	461.00	3	1	1.25E-07	0	1.03E-07	0	0	2.06E-08	5.00
KFM08C	20061019 13:34	20061019 14:51	461.00	466.00	3	1	1.73E-08	0	1.43E-08	0	0	2.85E-09	5.00
KFM08C	20061019 15:04	20061019 16:28	466.00	471.00	3	1	1.52E-09	0	1.25E-09	0	0	2.50E-10	5.00
KFM08C	20061019 16:41	20061019 17:24	471.00	476.00	3	1	3.09E-10	-1	2.55E-10	-1	0	5.09E-11	5.00
KFM08C	20061020 08:44	20061020 10:03	476.00	481.00	3	1	2.56E-08	0	2.11E-08	0	0	4.21E-09	5.00
KFM08C	20061020 10:16	20061020 11:03	481.00	486.00	3	1	2.98E-10	-1	2.45E-10	-1	0	4.90E-11	5.00
KFM08C	20061020 12:29	20061020 13:12	486.00	491.00	3	1	2.98E-10	-1	2.45E-10	-1	0	4.90E-11	5.00

idcode	start_date	stop_date	secup	seclow	test_type	formation_type	spec_capacity_q_s	value_type_q_s	transmissivity_moye	value_type_tm	bc_tm	hydr_cond_moye	formation_width_b
KFM08C	20061020 13:28	20061020 14:15	491.00	496.00	3	1	2.98E-10	-1	2.45E-10	-1	0	4.90E-11	5.00
KFM08C	20061020 14:27	20061020 15:45	496.00	501.00	3	1	7.20E-08	0	5.92E-08	0	0	1.18E-08	5.00
KFM08C	20061023 08:31	20061023 09:14	501.00	506.00	3	1	2.37E-10	-1	1.95E-10	-1	0	3.90E-11	5.00
KFM08C	20061023 09:30	20061023 10:12	506.00	511.00	3	1	2.37E-10	-1	1.95E-10	-1	0	3.90E-11	5.00
KFM08C	20061023 10:23	20061023 11:04	511.00	516.00	3	1	2.37E-10	-1	1.95E-10	-1	0	3.90E-11	5.00
KFM08C	20061023 11:13	20061023 13:18	516.00	521.00	3	1	2.34E-08	0	1.93E-08	0	0	3.85E-09	5.00
KFM08C	20061023 13:29	20061023 14:47	521.00	526.00	3	1	4.21E-08	0	3.46E-08	0	0	6.93E-09	5.00
KFM08C	20061023 14:57	20061023 16:12	526.00	531.00	3	1	5.40E-10	0	4.44E-10	0	0	8.88E-11	5.00
KFM08C	20061023 16:23	20061023 17:36	531.00	536.00	3	1	1.67E-09	0	1.38E-09	0	0	2.75E-10	5.00
KFM08C	20061024 08:16	20061024 08:59	536.00	541.00	3	1	2.50E-10	-1	2.06E-10	-1	0	4.11E-11	5.00
KFM08C	20061024 09:09	20061024 09:49	541.00	546.00	3	1	2.50E-10	-1	2.06E-10	-1	0	4.11E-11	5.00
KFM08C	20061024 10:03	20061024 10:46	543.50	548.50	3	1	3.00E-10	-1	2.47E-10	-1	0	4.94E-11	5.00
KFM08C	20061024 13:18	20061024 14:04	668.50	673.50	3	1	3.00E-10	-1	2.47E-10	-1	0	4.94E-11	5.00
KFM08C	20061024 14:14	20061024 15:29	671.00	676.00	3	1	5.32E-09	0	4.38E-09	0	0	8.75E-10	5.00
KFM08C	20061024 15:40	20061024 16:26	676.00	681.00	3	1	3.00E-10	-1	2.47E-10	-1	0	4.94E-11	5.00
KFM08C	20061024 16:43	20061025 09:07	681.00	686.00	3	1	4.16E-09	0	3.42E-09	0	0	6.85E-10	5.00
KFM08C	20061025 09:15	20061025 09:56	686.00	691.00	3	1	2.98E-10	-1	2.45E-10	-1	0	4.90E-11	5.00
KFM08C	20061025 10:06	20061025 11:20	691.00	696.00	3	1	1.40E-09	0	1.15E-09	0	0	2.30E-10	5.00
KFM08C	20061025 12:16	20061025 12:56	697.00	702.00	3	1	2.37E-10	-1	1.95E-10	-1	0	3.90E-11	5.00
KFM08C	20061025 13:05	20061025 13:45	702.00	707.00	3	1	2.37E-10	-1	1.95E-10	-1	0	3.90E-11	5.00
KFM08C	20061025 13:51	20061025 14:32	703.50	708.50	3	1	2.37E-10	-1	1.95E-10	-1	0	3.90E-11	5.00
KFM08C[2)]	20061004 08:30	20061004 10:23	108.50	208.50	3	1	4.02E-08	0	5.22E-08	0	0	5.22E-10	100.00
KFM08C[3)]	20061010 19:29	20061010 20:19	431.50	451.50	3	1	8.33E-10	-1	8.69E-10	-1	0	4.35E-11	20.00
KFM08C[1)]	20061012 09:18	20061012 10:14	668.50	688.50	3	1	2.37E-10	-1	2.47E-10	-1	0	1.24E-11	20.00

[1)] Incomplete test, interrupted and re-performed later.
[2)] Complete test, re-performed later.
[3)] The test was performed at an incorrect position and therefore not evaluated.

KFM08C plu_s_hole_test_ed1. Right (This result table to SICADA includes more columns which are empty, these columns are not presented here.)

idcode	secup	seclow	transmissivity_tt	value_type_tt	bc_tt	l_measl_q_s	u_measl_q_s	assumed_s	bc_s	ri	ri_index	c	skin	t1	t2	dte1	dte2
KFM08C	108.50	208.50	2.99E-08	0	1	8.0E-10	5.0E-04	1.21E-07	1.21E-07	12.91	1	3.06E-11	-3.15	50	300		
KFM08C	208.50	308.50	5.96E-09	0	1	7.7E-10	5.0E-04	5.40E-08	5.40E-08	21.13	0			300	1800		
KFM08C	308.50	408.50		0	0	2.4E-10	5.0E-04	1.51E-08	1.51E-08	11.23		4.36E-10					
KFM08C	408.50	508.50	1.00E-07	0	1	7.7E-10	5.0E-04	2.21E-07	2.21E-07	12.35	-1		-5.18	60	150		
KFM08C	508.50	608.50	8.96E-09	0	1	7.9E-10	5.0E-04	6.63E-08	6.63E-08	23.40	0		-5.32	200	1800		
KFM08C	608.50	708.50	5.75E-09	0	1	6.2E-10	5.0E-04	5.31E-08	5.31E-08	20.95	0	2.83E-10	-2.52	200	1800		
KFM08C	708.50	808.50		-1	0	2.4E-10	5.0E-04										
KFM08C	738.50	838.50		-1	0	3.1E-10	5.0E-04										
KFM08C	838.50	938.50		0	0	2.7E-10	5.0E-04	1.60E-08	1.60E-08	11.61							
KFM08C	108.50	128.50		-1	0	3.6E-10	5.0E-04										
KFM08C	128.50	148.50	1.76E-10	0	1	3.2E-10	5.0E-04	9.29E-09	9.29E-09	2.53	1			30	150		
KFM08C	148.50	168.50	2.62E-09	0	1	2.9E-10	5.0E-04	3.58E-08	3.58E-08	14.17	-1	1.32E-10	-1.84				
KFM08C	168.50	188.50	2.48E-08	0	1	7.6E-10	5.0E-04	1.10E-07	1.10E-07	12.32	1		-3.27	50	300		
KFM08C	188.50	208.50		-1	0	3.0E-10	5.0E-04										
KFM08C	208.50	228.50	4.28E-09	0	1	8.0E-10	5.0E-04	4.58E-08	4.58E-08	15.89	0		-3.19	100	1200		
KFM08C	228.50	248.50	3.48E-10	0	1	3.3E-10	5.0E-04	1.31E-08	1.31E-08	9.49	0		-4.96	100	1500		
KFM08C	248.50	268.50		-1	0	3.0E-10	5.0E-04										
KFM08C	268.50	288.50	3.18E-09	0	1	8.7E-10	5.0E-04	3.95E-08	3.95E-08	14.88	0						
KFM08C	288.50	308.50		-1	0	3.1E-10	5.0E-04										
KFM08C	408.50	428.50	1.93E-10	0	1	2.5E-10	5.0E-04	9.73E-09	9.73E-09	2.99	1	3.30E-11	-3.66	20	200		
KFM08C	428.50	448.50		-1	0	2.4E-10	5.0E-04										
KFM08C	448.50	468.50	2.47E-07	0	1	7.5E-10	5.0E-04	3.48E-07	3.48E-07	43.79	0		1.51	60	1200		
KFM08C	468.50	488.50	2.98E-08	0	1	1.1E-09	5.0E-04	1.21E-07	1.21E-07	25.80	0		2.29	200	1200		
KFM08C	488.50	508.50	8.91E-08	0	1	7.6E-10	5.0E-04	2.09E-07	2.09E-07	25.91	1		-5.04			100	700
KFM08C	508.50	528.50	9.26E-09	0	1	8.0E-10	5.0E-04	6.73E-08	6.73E-08	19.26	0		-5.23	200	1200		
KFM08C	528.50	548.50	1.81E-09	0	1	8.5E-10	5.0E-04	2.98E-08	2.98E-08	8.27	1	6.62E-11	-3.00			100	500
KFM08C	548.50	568.50		-1	0	2.4E-10	5.0E-04										
KFM08C	568.50	588.50		-1	0	2.4E-10	5.0E-04										

idcode	secup	seclow	transmissivity_tt	value_type_tt	bc_tt	l_measl_q_s	u_measl_q_s	assumed_s	bc_s	ri	ri_index	c	skin	t1	t2	dte1	dte2
KFM08C	588.50	608.50		-1	0	3.1E-10	5.0E-04										
KFM08C	608.50	628.50		-1	0	3.0E-10	5.0E-04										
KFM08C	628.50	648.50		-1	0	3.0E-10	5.0E-04										
KFM08C	648.50	668.50		-1	0	3.0E-10	5.0E-04										
KFM08C	668.50	688.50	5.06E-09	0	1	1.5E-10	5.0E-04	4.98E-08	4.98E-08	16.57	0		-2.66	100	1200		
KFM08C	688.50	708.50	3.12E-09	0	1	8.1E-10	5.0E-04	3.91E-08	3.91E-08	14.67	0	5.31E-11	-2.15	20	1200		
KFM08C	148.50	153.50	5.81E-11	0	1	3.2E-10	5.0E-04	5.34E-09	5.34E-09	5.42	0			200	1200		
KFM08C	153.50	158.50		-1	0	3.0E-10	5.0E-04										
KFM08C	158.50	163.50	3.02E-09	0	1	8.6E-10	5.0E-04	3.85E-08	3.85E-08	14.65	-1	9.18E-11	-0.21				
KFM08C	163.50	168.50		-1	0	3.0E-10	5.0E-04										
KFM08C	168.50	173.50	5.33E-10	0	1	2.9E-10	5.0E-04	1.62E-08	1.62E-08	9.44	0	2.13E-11	-1.64	10	1200		
KFM08C	173.50	178.50		-1	0	2.5E-10	5.0E-04										
KFM08C	178.50	183.50	8.91E-09	0	1	8.6E-10	5.0E-04	6.61E-08	6.61E-08	19.19	-1		-3.83				
KFM08C	183.50	188.50	1.47E-08	0	1	8.2E-10	5.0E-04	8.47E-08	8.47E-08	13.95	1		-3.78	100	500		
KFM08C	208.50	213.50		-1	0	2.5E-10	5.0E-04										
KFM08C	213.50	218.50		-1	0	2.4E-10	5.0E-04										
KFM08C	218.50	223.50	7.60E-09	0	1	8.3E-10	5.0E-04	6.10E-08	6.10E-08	18.34	0		1.03	200	1200		
KFM08C	223.50	228.50	1.14E-09	0	1	2.7E-10	5.0E-04	2.36E-08	2.36E-08	11.41	0		-3.93	10	1200		
KFM08C	228.50	233.50	8.88E-10	0	1	7.2E-10	5.0E-04	2.09E-08	2.09E-08	10.72	0	2.76E-11	-1.92	20	1200		
KFM08C	233.50	238.50	1.68E-10	0	1	2.8E-10	5.0E-04	9.06E-09	9.06E-09	7.07	0		-2.81	10	1200		
KFM08C	238.50	243.50	2.74E-10	0	1	7.3E-10	5.0E-04	1.16E-08	1.16E-08	7.99	0			200	1200		
KFM08C	243.50	248.50		-1	0	3.0E-10	5.0E-04										
KFM08C	268.50	273.50		-1	0	2.4E-10	5.0E-04										
KFM08C	273.50	278.50		-1	0	3.0E-10	5.0E-04										
KFM08C	278.50	283.50	2.92E-09	0	1	8.0E-10	5.0E-04	3.78E-08	3.78E-08	14.52	0						
KFM08C	283.50	288.50		-1	0	3.1E-10	5.0E-04										
KFM08C	448.50	453.50		-1	0	3.0E-10	5.0E-04										
KFM08C	451.00	456.00	7.85E-08	0	1	8.3E-10	5.0E-04	1.96E-07	1.96E-07	33.07	-1		-0.27				
KFM08C	456.00	461.00	2.07E-07	0	1	8.2E-10	5.0E-04	3.18E-07	3.18E-07	41.88	0		3.32	60	1200		
KFM08C	461.00	466.00	2.05E-08	0	1	8.4E-10	5.0E-04	1.00E-07	1.00E-07	23.66	-1		1.45				
KFM08C	466.00	471.00	4.69E-10	0	1	8.0E-10	5.0E-04	1.52E-08	1.52E-08	9.14	0		-3.81	100	1200		

idcode	secup	seclow	transmissivity_tt	value_type_tt	bc_tt	l_measl_q_s	u_measl_q_s	assumed_s	bc_s	ri	ri_index	c	skin	t1	t2	dte1	dte2
KFM08C	471.00	476.00		-1	0	3.1E-10	5.0E-04										
KFM08C	476.00	481.00	2.64E-08	0	1	8.4E-10	5.0E-04	1.14E-07	1.14E-07	25.02	0		-0.15	200	1200		
KFM08C	481.00	486.00		-1	0	3.0E-10	5.0E-04										
KFM08C	486.00	491.00		-1	0	3.0E-10	5.0E-04										
KFM08C	491.00	496.00		-1	0	3.0E-10	5.0E-04										
KFM08C	496.00	501.00	9.99E-08	0	1	8.0E-10	5.0E-04	2.21E-07	2.21E-07	31.87	1		-4.85			100	1000
KFM08C	501.00	506.00		-1	0	2.4E-10	5.0E-04										
KFM08C	506.00	511.00		-1	0	2.4E-10	5.0E-04										
KFM08C	511.00	516.00		-1	0	2.4E-10	5.0E-04										
KFM08C	516.00	521.00	7.36E-09	0	1	8.1E-10	5.0E-04	6.00E-08	6.00E-08	18.19	0	3.08E-10	-4.46	40	1200		
KFM08C	521.00	526.00	2.91E-09	0	1	8.0E-10	5.0E-04	3.78E-08	3.78E-08	14.50	-1		-5.96				
KFM08C	526.00	531.00	3.68E-10	0	1	2.6E-10	5.0E-04	1.34E-08	1.34E-08	8.60	0	1.55E-11	-1.00	20	1200		
KFM08C	531.00	536.00	2.16E-09	0	1	2.3E-10	5.0E-04	3.25E-08	3.25E-08	6.69	1	1.99E-11	-0.31			150	300
KFM08C	536.00	541.00		-1	0	2.5E-10	5.0E-04										
KFM08C	541.00	546.00		-1	0	2.5E-10	5.0E-04										
KFM08C	543.50	548.50		-1	0	3.0E-10	5.0E-04										
KFM08C	668.50	673.50		-1	0	3.0E-10	5.0E-04										
KFM08C	671.00	676.00	4.95E-09	0	1	2.2E-10	5.0E-04	4.92E-08	4.92E-08	3.98	1		-1.64	20	70		
KFM08C	676.00	681.00		-1	0	3.0E-10	5.0E-04										
KFM08C	681.00	686.00	5.86E-09	0	1	7.1E-10	5.0E-04	5.36E-08	5.36E-08	17.29	-1	1.99E-11	3.31				
KFM08C	686.00	691.00		-1	0	3.0E-10	5.0E-04										
KFM08C	691.00	696.00	8.52E-10	0	1	8.2E-10	5.0E-04	2.04E-08	2.04E-08	10.69	-1	1.79E-11	-1.17				
KFM08C	697.00	702.00		-1	0	2.4E-10	5.0E-04										
KFM08C	702.00	707.00		-1	0	2.4E-10	5.0E-04										
KFM08C	703.50	708.50		-1	0	2.4E-10	5.0E-04										
KFM08C[3]	108.50	208.50	1.66E-08	0	1	7.9E-10	5.0E-04	9.03E-08	9.03E-08	11.15	1		-3.88	40	300		
KFM08C[2]	431.50	451.50		-1	0	8.3E-10	5.0E-04										
KFM08C[1]	668.50	688.50		-1	0	2.4E-10	5.0E-04										

[1] Incomplete test, interrupted and re-performed later.
[2] Complete test, re-performed later.
[3] The test was performed at an incorrect position and therefore not evaluated.

KFM08C plu_s_hole_test_obs. Injection tests (This result table to SICADA includes more columns which are empty, these columns are not presented here.)

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KFM08C	20061006 08:14	20061006 10:04	108.50	208.50	12.06	107.50	203.56	203.56	203.28				
KFM08C	20061006 08:14	20061006 10:04	108.50	208.50	209.50	951.08				1850.30	1850.30	1850.30	
KFM08C	20061004 11:21	20061004 14:02	208.50	308.50	12.06	207.50	195.11	194.97	195.25				
KFM08C	20061004 11:21	20061004 14:02	208.50	308.50	309.50	951.08				2680.02	2680.02	2680.02	
KFM08C	20061004 14:58	20061004 16:39	308.50	408.50	12.06	307.50	175.58	175.04	174.62				
KFM08C	20061004 14:58	20061004 16:39	308.50	408.50	409.50	951.08				3504.24	3503.69	3503.14	
KFM08C	20061004 18:14	20061004 19:53	408.50	508.50	12.06	407.50	147.30	146.47	146.34				
KFM08C	20061004 18:14	20061004 19:53	408.50	508.50	509.50	951.08				4325.98	4325.16	4325.16	
KFM08C	20061004 20:54	20061004 22:32	508.50	608.50	12.06	507.50	114.77	113.67	113.67				
KFM08C	20061004 20:54	20061004 22:32	508.50	608.50	609.50	951.08				5139.48	5137.41	5136.72	
KFM08C	20061009 12:42	20061009 13:56	108.50	128.50	12.06	107.50	204.38	204.10	203.83				
KFM08C	20061009 12:42	20061009 13:56	108.50	128.50	129.50	951.08				1180.14	1179.59	1179.04	
KFM08C	20061005 08:52	20061005 09:52	708.50	808.50	12.06	707.50	22.33	22.05	22.05				
KFM08C	20061005 08:52	20061005 09:52	708.50	808.50	809.50	951.08				6786.53	6787.91	6786.81	
KFM08C	20061005 10:17	20061005 11:19	738.50	838.50	12.06	737.50	4.35	4.22	4.22				
KFM08C	20061005 10:17	20061005 11:19	738.50	838.50	839.50	951.08				7023.81	7025.05	7023.41	
KFM08C	20061005 14:24	20061005 16:16	838.50	938.50	12.06	837.50	-60.75	-60.75	-61.30				
KFM08C	20061005 14:24	20061005 16:16	838.50	938.50	939.50	951.08				7833.45	7797.14	7778.30	
KFM08C	20061009 12:42	20061009 13:56	108.50	128.50	12.06	107.50	204.38	204.10	203.83				
KFM08C	20061009 12:42	20061009 13:56	108.50	128.50	129.50	951.08				1180.14	1179.59	1179.04	
KFM08C	20061009 14:20	20061009 15:34	128.50	148.50	12.06	127.50	204.52	204.11	203.97				
KFM08C	20061009 14:20	20061009 15:34	128.50	148.50	149.50	951.08				1349.32	1349.05	1349.05	
KFM08C	20061009 15:51	20061009 17:09	148.50	168.50	12.06	147.50	203.03	203.03	203.03				
KFM08C	20061009 15:51	20061009 17:09	148.50	168.50	169.50	951.08				1517.28	1516.87	1516.87	
KFM08C	20061010 06:21	20061010 07:36	168.50	188.50	12.06	167.50	200.03	199.89	199.89				
KFM08C	20061010 06:21	20061010 07:36	168.50	188.50	189.50	951.08				1684.13	1683.58	1683.58	
KFM08C	20061010 07:56	20061010 08:54	188.50	208.50	12.06	187.50	197.70	197.30	197.30				

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KFM08C	20061010 07:56	20061010 08:54	188.50	208.50	209.50	951.08				1851.40	1851.26	1850.84	
KFM08C	20061010 09:08	20061010 10:24	208.50	228.50	12.06	207.50	194.70	194.56	194.70				
KFM08C	20061010 09:08	20061010 10:24	208.50	228.50	229.50	951.08				2018.25	2017.84	2017.57	
KFM08C	20061010 10:45	20061010 12:51	228.50	248.50	12.06	227.50	190.74	190.74	190.46				
KFM08C	20061010 10:45	20061010 12:51	228.50	248.50	249.50	951.08				2183.31	2183.31	2183.73	
KFM08C	20061010 13:09	20061010 13:53	248.50	268.50	12.06	247.50	187.19	187.19	187.32				
KFM08C	20061010 13:09	20061010 13:53	248.50	268.50	269.50	951.08				2350.30	2350.03	2350.44	
KFM08C	20061010 14:08	20061010 15:24	268.50	288.50	12.06	267.50	183.09	182.55	182.55				
KFM08C	20061010 14:08	20061010 15:24	268.50	288.50	289.50	951.08				2515.50	2515.23	2514.95	
KFM08C	20061010 15:47	20061010 16:31	288.50	308.50	12.06	287.50	178.58	178.31	178.31				
KFM08C	20061010 15:47	20061010 16:31	288.50	308.50	309.50	951.08				2680.85	2680.71	2680.57	
KFM08C	20061010 17:51	20061010 19:08	408.50	428.50	12.06	407.50	145.65	145.24	144.69				
KFM08C	20061010 17:51	20061010 19:08	408.50	428.50	429.50	951.08				3668.89	3668.20	3668.20	
KFM08C	20061012 16:47	20061012 17:45	428.50	448.50	12.06	427.50	137.31	137.17	137.17				
KFM08C	20061012 16:47	20061012 17:45	428.50	448.50	449.50	951.08				3831.06	3831.06	3831.06	
KFM08C	20061010 20:56	20061010 22:09	448.50	468.50	12.06	447.50	132.40	131.85	131.30				
KFM08C	20061010 20:56	20061010 22:09	448.50	468.50	469.50	951.08				3998.61	3998.34	3998.34	
KFM08C	20061010 22:26	20061010 23:40	468.50	488.50	12.06	467.50	125.55	125.69	124.88				
KFM08C	20061010 22:26	20061010 23:40	468.50	488.50	489.50	951.08				4163.53	4163.39	4162.84	
KFM08C	20061011 07:30	20061011 08:45	488.50	508.50	12.06	487.50	118.59	117.77	117.91				
KFM08C	20061011 07:30	20061011 08:45	488.50	508.50	509.50	951.08				4325.71	4325.43	4325.16	
KFM08C	20061011 09:44	20061011 10:59	508.50	528.50	12.06	507.50	111.07	110.80	110.39				
KFM08C	20061011 09:44	20061011 10:59	508.50	528.50	529.50	951.08				4492.28	4493.11	4492.97	
KFM08C	20061011 12:38	20061011 13:55	528.50	548.50	12.06	527.50	103.42	102.72	102.86				
KFM08C	20061011 12:38	20061011 13:55	528.50	548.50	549.50	951.08				4653.91	4652.12	4651.43	
KFM08C	20061011 16:12	20061011 17:04	548.50	568.50	12.06	547.50	94.66	94.39	94.25				
KFM08C	20061011 16:12	20061011 17:04	548.50	568.50	569.50	951.08				4814.98	4814.85	4814.30	
KFM08C	20061011 19:42	20061011 20:49	568.50	588.50	12.06	567.50	86.73	86.59	86.19				
KFM08C	20061011 19:42	20061011 20:49	568.50	588.50	589.50	951.08				4976.61	4977.16	4976.06	
KFM08C	20061011 21:22	20061011 22:24	588.50	608.50	12.06	587.50	78.12	77.85	77.57				
KFM08C	20061011 21:22	20061011 22:24	588.50	608.50	609.50	951.08				5138.10	5138.65	5137.28	
KFM08C	20061011 22:47	20061011 23:37	608.50	628.50	12.06	607.50	68.68	68.27	68.40				

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KFM08C	20061011 22:47	20061011 23:37	608.50	628.50	629.50	951.08				5299.86	5300.13	5299.58	
KFM08C	20061012 06:55	20061012 07:47	628.50	648.50	12.06	627.50	58.70	58.57	58.16				
KFM08C	20061012 06:55	20061012 07:47	628.50	648.50	649.50	951.08				5460.38	5459.84	5459.14	
KFM08C	20061012 08:07	20061012 08:59	648.50	668.50	12.06	647.50	48.72	48.45	48.45				
KFM08C	20061012 08:07	20061012 08:59	648.50	668.50	669.50	951.08				5621.18	5620.36	5619.81	
KFM08C	20061012 12:37	20061012 13:53	668.50	688.50	12.06	667.50	38.74	38.05	38.19				
KFM08C	20061012 12:37	20061012 13:53	668.50	688.50	689.50	951.08				5803.72	5799.18	5794.22	
KFM08C	20061012 10:40	20061012 11:54	688.50	708.50	12.06	687.50	28.07	27.66	27.94				
KFM08C	20061012 10:40	20061012 11:54	688.50	708.50	709.50	951.08				5988.45	5986.12	5982.95	
KFM08C	20061013 14:45	20061013 16:02	148.50	153.50	12.06	147.50	205.76	205.21	204.67				
KFM08C	20061013 14:45	20061013 16:02	148.50	153.50	154.50	951.08				1391.96	1391.42	1391.42	
KFM08C	20061013 16:12	20061013 17:02	153.50	158.50	12.06	152.50	203.75	203.61	203.61				
KFM08C	20061013 16:12	20061013 17:02	153.50	158.50	159.50	951.08				1433.09	1432.96	1433.23	
KFM08C	20061016 08:17	20061016 09:32	158.50	163.50	12.06	157.50	200.09	199.95	200.36				
KFM08C	20061016 08:17	20061016 09:32	158.50	163.50	164.50	951.08				1472.85	1472.44	1472.30	
KFM08C	20061016 09:42	20061016 10:36	163.50	168.50	12.06	162.50	199.85	199.85	199.85				
KFM08C	20061016 09:42	20061016 10:36	163.50	168.50	169.50	951.08				1515.08	1514.67	1514.67	
KFM08C	20061016 10:48	20061016 12:43	168.50	173.50	12.06	167.50	199.34	199.89	199.34				
KFM08C	20061016 10:48	20061016 12:43	168.50	173.50	174.50	951.08				1556.76	1557.03	1557.03	
KFM08C	20061016 12:54	20061016 13:34	173.50	178.50	12.06	172.50	199.10	198.83	199.38				
KFM08C	20061016 12:54	20061016 13:34	173.50	178.50	179.50	951.08				1599.40	1599.40	1598.85	
KFM08C	20061016 13:43	20061016 15:01	178.50	183.50	12.06	177.50	198.31	198.31	198.31				
KFM08C	20061016 13:43	20061016 15:01	178.50	183.50	184.50	951.08				1641.07	1644.65	1642.86	
KFM08C	20061016 15:17	20061016 16:33	183.50	188.50	12.06	182.50	197.53	197.53	197.80				
KFM08C	20061016 15:17	20061016 16:33	183.50	188.50	189.50	951.08				1682.89	1682.61	1682.48	
KFM08C	20061017 08:16	20061017 08:57	208.50	213.50	12.06	207.50	192.24	192.51	191.97				
KFM08C	20061017 08:16	20061017 08:57	208.50	213.50	214.50	951.08				1889.91	1889.91	1889.91	
KFM08C	20061017 09:12	20061017 09:55	213.50	218.50	12.06	212.50	191.59	191.46	191.46				
KFM08C	20061017 09:12	20061017 09:55	213.50	218.50	219.50	951.08				1931.73	1931.45	1931.18	
KFM08C	20061017 10:07	20061017 11:25	218.50	223.50	12.06	217.50	190.40	190.53	190.94				

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KFM08C	20061017 10:07	20061017 11:25	218.50	223.50	224.50	951.08				1973.27	1973.27	1973.54	
KFM08C	20061017 12:29	20061017 13:46	223.50	228.50	12.06	222.50	190.70	190.43	190.43				
KFM08C	20061017 12:29	20061017 13:46	223.50	228.50	229.50	951.08				2015.64	2015.78	2015.36	
KFM08C	20061017 14:02	20061017 15:17	228.50	233.50	12.06	227.50	189.92	189.50	189.37				
KFM08C	20061017 14:02	20061017 15:17	228.50	233.50	234.50	951.08				2057.32	2057.45	2057.73	
KFM08C	20061017 15:30	20061017 16:44	233.50	238.50	12.06	232.50	188.73	188.32	188.32				
KFM08C	20061017 15:30	20061017 16:44	233.50	238.50	239.50	951.08				2098.99	2098.99	2098.99	
KFM08C	20061018 08:21	20061018 09:35	238.50	243.50	12.06	237.50	186.85	187.26	187.26				
KFM08C	20061018 08:21	20061018 09:35	238.50	243.50	244.50	951.08				2139.29	2139.71	2139.71	
KFM08C	20061018 10:02	20061018 10:45	243.50	248.50	12.06	242.50	186.33	186.20	186.20				
KFM08C	20061018 10:02	20061018 10:45	243.50	248.50	249.50	951.08				2180.97	2180.97	2180.97	
KFM08C	20061018 11:06	20061018 12:27	268.50	273.50	12.06	267.50	181.73	180.90	180.90				
KFM08C	20061018 11:06	20061018 12:27	268.50	273.50	274.50	951.08				2388.41	2388.54	2388.41	
KFM08C	20061018 12:45	20061018 13:26	273.50	278.50	12.06	272.50	179.98	180.12	180.40				
KFM08C	20061018 12:45	20061018 13:26	273.50	278.50	279.50	951.08				2430.22	2430.22	2430.22	
KFM08C	20061018 13:36	20061018 14:50	278.50	283.50	12.06	277.50	178.79	179.06	178.79				
KFM08C	20061018 13:36	20061018 14:50	278.50	283.50	284.50	951.08				2471.90	2471.49	2471.49	
KFM08C	20061018 15:02	20061018 15:43	283.50	288.50	12.06	282.50	178.28	177.73	177.73				
KFM08C	20061018 15:02	20061018 15:43	283.50	288.50	289.50	951.08				2513.30	2513.30	2512.75	
KFM08C	20061019 08:48	20061019 09:36	448.50	453.50	12.06	447.50	132.12	131.85	131.85				
KFM08C	20061019 08:48	20061019 09:36	448.50	453.50	454.50	951.08				3871.23	3871.23	3871.23	
KFM08C	20061019 09:53	20061019 11:11	451.00	456.00	12.06	450.00	130.77	130.77	130.77				
KFM08C	20061019 09:53	20061019 11:11	451.00	456.00	457.00	951.08				3891.59	3897.09	3894.34	
KFM08C	20061019 11:25	20061019 13:21	456.00	461.00	12.06	455.00	128.89	129.16	129.16				
KFM08C	20061019 11:25	20061019 13:21	456.00	461.00	462.00	951.08				3933.40	3934.50	3933.95	
KFM08C	20061019 13:34	20061019 14:51	461.00	466.00	12.06	460.00	127.42	127.56	127.56				
KFM08C	20061019 13:34	20061019 14:51	461.00	466.00	467.00	951.08				3974.67	3974.67	3974.67	
KFM08C	20061019 15:04	20061019 16:28	466.00	471.00	12.06	465.00	125.95	125.95	125.40				
KFM08C	20061019 15:04	20061019 16:28	466.00	471.00	472.00	951.08				4015.39	4015.39	4015.39	
KFM08C	20061019 16:41	20061019 17:24	471.00	476.00	12.06	470.00	125.31	124.21	124.35				
KFM08C	20061019 16:41	20061019 17:24	471.00	476.00	477.00	951.08				4056.79	4056.65	4056.65	
KFM08C	20061020 08:44	20061020 10:03	476.00	481.00	12.06	475.00	122.61	122.33	122.19				

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KFM08C	20061020 08:44	20061020 10:03	476.00	481.00	482.00	951.08				4096.27	4096.27	4096.27	
KFM08C	20061020 10:16	20061020 11:03	481.00	486.00	12.06	480.00	121.27	120.86	120.59				
KFM08C	20061020 10:16	20061020 11:03	481.00	486.00	487.00	951.08				4138.09	4138.22	4138.09	
KFM08C	20061020 12:29	20061020 13:12	486.00	491.00	12.06	485.00	119.12	119.12	118.98				
KFM08C	20061020 12:29	20061020 13:12	486.00	491.00	492.00	951.08				4178.94	4178.66	4178.80	
KFM08C	20061020 13:28	20061020 14:15	491.00	496.00	12.06	490.00	117.92	117.37	117.37				
KFM08C	20061020 13:28	20061020 14:15	491.00	496.00	497.00	951.08				4220.34	4220.61	4220.06	
KFM08C	20061020 14:27	20061020 15:45	496.00	501.00	12.06	495.00	116.04	115.77	115.77				
KFM08C	20061020 14:27	20061020 15:45	496.00	501.00	502.00	951.08				4261.47	4260.92	4260.78	
KFM08C	20061023 08:31	20061023 09:14	501.00	506.00	12.06	500.00	114.02	113.61	113.61				
KFM08C	20061023 08:31	20061023 09:14	501.00	506.00	507.00	951.08				4300.54	4300.68	4300.40	
KFM08C	20061023 09:30	20061023 10:12	506.00	511.00	12.06	505.00	111.74	111.74	111.47				
KFM08C	20061023 09:30	20061023 10:12	506.00	511.00	512.00	951.08				4342.35	4342.21	4341.66	
KFM08C	20061023 10:23	20061023 11:04	511.00	516.00	12.06	510.00	110.54	110.13	109.85				
KFM08C	20061023 10:23	20061023 11:04	511.00	516.00	517.00	951.08				4382.93	4382.93	4382.38	
KFM08C	20061023 11:13	20061023 13:18	516.00	521.00	12.06	515.00	108.25	107.70	107.70				
KFM08C	20061023 11:13	20061023 13:18	516.00	521.00	522.00	951.08				4424.47	4442.35	4437.95	
KFM08C	20061023 13:29	20061023 14:47	521.00	526.00	12.06	520.00	106.23	105.69	106.10				
KFM08C	20061023 13:29	20061023 14:47	521.00	526.00	527.00	951.08				4469.72	4472.88	4470.96	
KFM08C	20061023 14:57	20061023 16:12	526.00	531.00	12.06	525.00	104.63	103.94	103.94				
KFM08C	20061023 14:57	20061023 16:12	526.00	531.00	532.00	951.08				4510.57	4508.93	4508.37	
KFM08C	20061023 16:23	20061023 17:36	531.00	536.00	12.06	530.00	102.33	102.06	101.79				
KFM08C	20061023 16:23	20061023 17:36	531.00	536.00	537.00	951.08				4550.75	4549.23	4548.55	
KFM08C	20061024 08:16	20061024 08:59	536.00	541.00	12.06	535.00	100.73	100.32	100.73				
KFM08C	20061024 08:16	20061024 08:59	536.00	541.00	542.00	951.08				4590.64	4590.77	4589.81	
KFM08C	20061024 09:09	20061024 09:49	541.00	546.00	12.06	540.00	99.13	98.59	98.59				
KFM08C	20061024 09:09	20061024 09:49	541.00	546.00	547.00	951.08				4632.18	4632.18	4631.62	
KFM08C	20061024 10:03	20061024 10:46	543.50	548.50	12.06	542.50	97.37	97.50	97.50				
KFM08C	20061024 10:03	20061024 10:46	543.50	548.50	549.50	951.08				4652.53	4652.39	4651.98	
KFM08C	20061024 13:18	20061024 14:04	668.50	673.50	12.06	667.50	42.29	41.33	40.93				
KFM08C	20061024 13:18	20061024 14:04	668.50	673.50	674.50	951.08				5659.42	5659.42	5658.88	
KFM08C	20061024 14:14	20061024 15:29	671.00	676.00	12.06	670.00	39.44	39.31	39.31				

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KFM08C	20061024 14:14	20061024 15:29	671.00	676.00	677.00	951.08				5680.47	5678.82	5678.13	
KFM08C	20061024 15:40	20061024 16:26	676.00	681.00	12.06	675.00	37.70	36.74	37.15				
KFM08C	20061024 15:40	20061024 16:26	676.00	681.00	682.00	951.08				5722.57	5720.91	5720.50	
KFM08C	20061024 16:43	20061025 09:07	681.00	686.00	12.06	680.00	37.33	35.96	35.55				
KFM08C	20061024 16:43	20061025 09:07	681.00	686.00	687.00	951.08				5759.29	5759.56	5759.56	
KFM08C	20061025 09:15	20061025 09:56	686.00	691.00	12.06	685.00	34.49	33.12	32.85				
KFM08C	20061025 09:15	20061025 09:56	686.00	691.00	692.00	951.08				5822.28	5821.88	5819.54	
KFM08C	20061025 10:06	20061025 11:20	691.00	696.00	12.06	690.00	30.83	29.86	30.14				
KFM08C	20061025 10:06	20061025 11:20	691.00	696.00	697.00	951.08				5895.33	5894.36	5893.26	
KFM08C	20061025 12:16	20061025 12:56	697.00	702.00	12.06	696.00	27.67	26.16	26.02				
KFM08C	20061025 12:16	20061025 12:56	697.00	702.00	703.00	951.08				5929.02	5929.72	5930.68	
KFM08C	20061025 13:05	20061025 13:45	702.00	707.00	12.06	701.00	24.01	23.33	23.33				
KFM08C	20061025 13:05	20061025 13:45	702.00	707.00	708.00	951.08				5962.60	5962.87	5963.14	
KFM08C	20061025 13:51	20061025 14:32	703.50	708.50	12.06	702.50	23.52	22.57	22.02				
KFM08C	20061025 13:51	20061025 14:32	703.50	708.50	709.50	951.08				5991.34	5991.21	5990.66	
KFM08C	20061004 08:30	20061004 10:23	108.50	208.50	12.06	107.50	203.69	203.01	202.74				Complete test, reperformed later.
KFM08C	20061004 08:30	20061004 10:23	108.50	208.50	209.50	951.08				1850.84	1850.16	1849.74	Complete test, reperformed later.
KFM08C	20061010 19:29	20061010 20:19	431.50	451.50	12.06	430.50	137.85	137.71	137.85				Complete test reperformed in wrong position.
KFM08C	20061010 19:29	20061010 20:19	431.50	451.50	452.50	951.08				3857.20	3857.06	3856.92	Complete test performed in wrong position.
KFM08C	20061012 09:18	20061012 10:14	668.50	688.50	12.06	667.50	38.47	38.19	38.19				Incomplete test, interrupted and re-performed later.
KFM08C	20061012 09:18	20061012 10:14	668.50	688.50	689.50	951.08				5796.29	5790.10	5789.83	Incomplete test, interrupted and re-performed later.