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Forsmark site investigation

Single-hole injection tests in borehole KFM01C

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June 2006

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Abstract

Borehole KFM01C is a core-drilled borehole at drill site 1 within the site investigations in the Forsmark area. The borehole is inclined, c. 50 degrees from the horizontal plane, c. 450 m long and cased to a length of c. 12 m. The borehole diameter is c. 76 mm except in the interval 83.51–85.65 m where the borehole diameter has been enlarged to c. 84 mm in order to enable installation of a perforated sheet of steel to stabilize the higly fractured borehole wall in this section.

This report presents injection tests performed using the pipe string system PSS3 in borehole KFM01C and the test results.

The main aim of the injection tests in KFM01C was to characterize the hydraulic conditions of the rock adjacent to the borehole on a 5 m measurement scale. Hydraulic parameters such as transmissivity and skin factor were determined using analysis methods for stationary as well as transient conditions. Also the dominating flow regime and possible outer hydraulic boundaries were determined for each test.

During many of the tests, some period with pseudo-radial flow could be identified from the injection period, making a relatively straight-forward transient evaluation possible. Other tests often also displayed pseudo-linear or pseudo-spherical flow making transient evaluation possible. However, the recovery periods in KFM01C were often strongly affected by wellbore storage, making an unambiguous transient evaluation of this period more difficult.

The total transmissivity in KFM01C is dominated by the sections 30.5–43.8 m and 82.0–87.0 m. The two sections contribute to c. 90% of the transmissivity of the entire borehole. Below 150 m borehole length, most tests had a transmissivity below the standard measurement limit.

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

Sammanfattning

Borrhål KFM01C är ett djupt kärnborrhål inom platsundersökningarna i Forsmarksområdet. Borrhålet är ca 450 m långt, lutar ca 50 grader från horisontalplanet och är försett med ett foderrör till ca 12 m längd. Borrhålsdiametern är c. 76 mm förutom i intervallet 83,51–85,65 m där borrhålets diameter har utvidgats till ca 84 mm för att möjliggöra installation av en stabiliserande perforerad stålplåt.

Denna rapport beskriver genomförda injektionstester med rörgångssystemet PSS3 i borrhål KFM01C samt resultaten från desamma.

Huvudsyftet med injektionstesterna var att karaktärisera de hydrauliska förhållandena av berget i anslutning till borrhålet i 5 m mätskala. Hydrauliska parametrar såsom transmissivitet och hydraulisk konduktivitet bestämdes med hjälp av analysmetoder för såväl stationära som transienta förhållanden. Vidare fastställdes dominerande flödesregim och eventuella yttre hydrauliska randvillkor för varje test.

Under många tester kunde en viss period med pseudoradiellt flöde identifieras från flödesperioden, vilket möjliggjorde en standardmässig transient utvärdering. Andra tester visade ofta även pseudolinjärt eller pseudosfäriskt flöde, som möjliggör transient utvärdering. Återhämtningsperioden i KFM01C var däremot ofta starkt påverkad av brunnsmagasins-effekter, vilket gjorde en unik transient utvärdering av denna period svårare.

Den totala transmissiviteten i KFM01C domineras av sektionerna 30,5–43,8 m och 82,0–87,0 m. Tillsammans utgör de ca 90% av den totala transmissiviteten i hela borrhålet. Under ca 150 m är transmissiviteten ofta lägre än standardmätgränsen.

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 KFM01C at Forsmark, Sweden during, March and April, 2006 by Geosigma AB. Borehole KFM01C is a cored borehole at Drill Site 1 within the on-going site investigation in the Forsmark area. The location of the borehole is shown in Figure 1-1. The borehole is inclined, c. 50 degrees from the horizontal plane, c. 450 m long and cased to a length of c. 12 m. The borehole diameter is c. 76 mm in the cored interval 12–450 m with exception for the interval 83.51–85.65 m where the diameter of the borehole has been increased to c. 84 mm due to high degree of fracturing. Due to a high degree fracturing in this interval a PLEX-plate has been installed from 84.30–86.27 m. Because the plate reaches below the enlarged part of the borehole, the diameter is c. 0.5 mm smaller in section 85.65–86.27 m than in the rest of the borehole, see Appendix 4.

This document reports the results obtained from the injection tests in borehole KFM01C. 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, were they are traceable by the Activity Plan number.

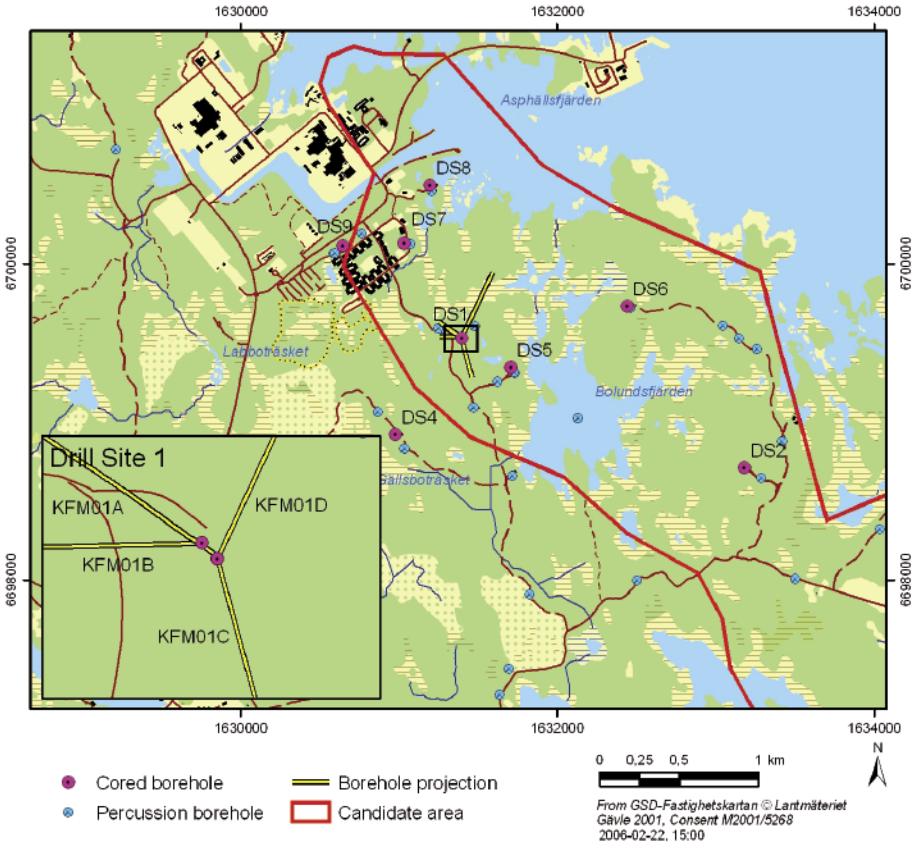

Figure 1-1. *The investigation area at Forsmark including the candidate area selected for more detailed investigations. Borehole KFM01C is situated at drill site DS1.*

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

Activity Plan	Number	Version
Hydraulic injection tests in borehole KFM01C with PSS3	AP PF 400-06-009	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 KFM01C was to characterize the hydraulic properties of the rock adjacent to the borehole on different measurement scales (100 m, 20 m and 5 m). Since the PLEX-plate at 84.30–86.27 m was difficult to pass with the borehole equipment, it was decided to measure the borehole only in the 5 m measurement scale (see Section 5.5 Nonconformities). The primary parameters to be determined were transmissivity, from which the hydraulic conductivity can be derived, together with the skin factor. The results of the injection tests provide a database which can be used for statistical analyses of the hydraulic conductivity distribution along the borehole. Basic statistical analyses are presented in this report.

Other hydraulic information of interest were flow regimes and outer hydraulic boundaries. This information was obtained from transient evaluation of the test responses during the flow- and recovery period of the injection tests.

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 KFM01C, performed according to Activity Plan AP PF 400-06-009 (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).

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, only data from the last test in each section were used.

Table 3-1. Pertinent technical data of borehole KFM01C (printout from SKB database, SICADA).

Borehole length (m):	450.02				
Drilling period(s):	**From date**	**To date**	**Secup (m)**	**Seclow(m)**	**Drilling type**
	2005-11-05	2005-11-29	0.00	6.15	Percussion drilling
	2005-11-05	2005-11-29	0.00	450.02	Core drilling
Starting point coordinate:	**Length (m)**	**Northing (m)**	**Easting (m)**	**Elevation**	**Coord system**
	0.00	6699526.14	1631403.75	2.91	RT90-RHB70
Angles:	**Length (m)**	**Bearing**	**Inclination (– = down)**		
	0.00	165.35	–49.61		
Borehole diameter:	**Secup (m)**	**Seclow (m)**	**Hole diam (m)**		
	0.00	6.15	0.151		
	6.15	11.96	0.092		
	11.96	450.02	0.076		
Core diameter:	**Secup (m)**	**Seclow(m)**	**Core diam (m)**		
	6.150	450.020	0.050		
Casing diameter:	**Secup (m)**	**Seclow (m)**	**Case in (m)**	**Case out (m)**	
	0.00	11.96	0.077	0.090	

Table 3-2. Single-hole injection tests performed in borehole KFM01C.

Borehole Bh ID	Test section Secup	 Seclow	Section length	Test type1) (1–6)	Test no	Test start date, time YYYYMMDD hh:mm	Test stop date, time YYYYMMDD hh:mm
KFM01C	15.50	20.50	5.00	3	1	2006-03-24 09:12	2006-03-24 10:52
KFM01C	20.50	25.50	5.00	3	1	2006-03-24 11:14	2006-03-24 13:11
KFM01C	25.50	30.50	5.00	3	2	2006-03-27 16:20	2006-03-27 17:36
KFM01C	30.50	35.50	5.00	3	1	2006-03-28 08:26	2006-03-28 09:43
KFM01C	32.80	37.80	5.00	3	1	2006-03-28 10:19	2006-03-28 11:33
KFM01C	38.80	43.80	5.00	3	1	2006-03-28 12:34	2006-03-28 13:50
KFM01C	44.80	49.80	5.00	3	1	2006-03-28 14:14	2006-03-28 15:35
KFM01C	49.80	54.80	5.00	3	1	2006-03-28 15:49	2006-03-28 17:06
KFM01C	54.80	59.80	5.00	3	1	2006-03-29 08:33	2006-03-29 09:50
KFM01C	59.80	64.80	5.00	3	1	2006-03-29 10:02	2006-03-29 11:21
KFM01C	64.80	69.80	5.00	3	1	2006-03-29 11:32	2006-03-29 13:21
KFM01C	69.80	74.80	5.00	3	1	2006-03-29 13:37	2006-03-29 14:54
KFM01C	74.80	79.80	5.00	3	1	2006-03-29 15:08	2006-03-29 16:26
KFM01C	77.00	82.00	5.00	3	1	2006-03-30 08:12	2006-03-30 09:41
KFM01C	82.00	87.00	5.00	3	1	2006-03-30 13:13	2006-03-30 14:29
KFM01C	88.20	93.20	5.00	3	1	2006-03-31 08:05	2006-03-31 09:26
KFM01C	92.00	97.00	5.00	3	1	2006-03-31 09:51	2006-03-31 11:10
KFM01C	97.00	102.00	5.00	3	1	2006-03-31 11:28	2006-03-31 13:28
KFM01C	102.00	107.00	5.00	3	1	2006-03-31 13:51	2006-03-31 15:09
KFM01C	107.00	112.00	5.00	3	1	2006-03-31 15:33	2006-03-31 16:52
KFM01C	112.00	117.00	5.00	3	1	2006-04-03 08:01	2006-04-03 09:21
KFM01C	117.00	122.00	5.00	3	1	2006-04-03 09:33	2006-04-03 10:54
KFM01C	122.00	127.00	5.00	3	1	2006-04-03 11:08	2006-04-03 13:20
KFM01C	127.00	132.00	5.00	3	1	2006-04-03 13:37	2006-04-03 15:09
KFM01C	132.00	137.00	5.00	3	1	2006-04-03 15:24	2006-04-03 16:43
KFM01C	137.00	142.00	5.00	3	1	2006-04-04 08:16	2006-04-04 09:37
KFM01C	142.00	147.00	5.00	3	1	2006-04-04 09:57	2006-04-04 11:19
KFM01C	147.00	152.00	5.00	3	1	2006-04-04 11:31	2006-04-04 13:32
KFM01C	152.00	157.00	5.00	3	1	2006-04-04 14:12	2006-04-04 15:02
KFM01C	157.00	162.00	5.00	3	1	2006-04-04 15:18	2006-04-04 16:36
KFM01C	162.00	167.00	5.00	3	1	2006-04-05 09:09	2006-04-05 09:58
KFM01C	165.00	170.00	5.00	3	1	2006-04-05 10:12	2006-04-05 11:01
KFM01C	170.00	175.00	5.00	3	1	2006-04-05 11:14	2006-04-05 12:01
KFM01C	175.00	180.00	5.00	3	1	2006-04-05 12:13	2006-04-05 13:49
KFM01C	180.00	185.00	5.00	3	1	2006-04-05 14:06	2006-04-05 15:19
KFM01C	185.00	190.00	5.00	3	1	2006-04-05 15:36	2006-04-05 16:22
KFM01C	190.00	195.00	5.00	3	1	2006-04-05 16:40	2006-04-05 18:04
KFM01C	195.00	200.00	5.00	3	1	2006-04-05 18:27	2006-04-05 19:44
KFM01C	200.00	205.00	5.00	3	1	2006-04-06 07:20	2006-04-06 08:55
KFM01C	202.70	207.70	5.00	3	1	2006-04-06 09:14	2006-04-06 10:11
KFM01C	207.70	212.70	5.00	3	1	2006-04-06 10:27	2006-04-06 11:44
KFM01C	213.20	218.20	5.00	3	1	2006-04-06 12:45	2006-04-06 13:36
KFM01C	218.20	223.20	5.00	3	1	2006-04-06 13:50	2006-04-06 15:14
KFM01C	223.20	228.20	5.00	3	1	2006-04-07 08:47	2006-04-07 10:12
KFM01C	228.20	233.20	5.00	3	1	2006-04-07 10:25	2006-04-07 11:44

Borehole	Test section		Section length	Test type1)	Test no	Test start date, time	Test stop date, time
Bh ID	Secup	Seclow		(1–6)		YYYYMMDD hh:mm	YYYYMMDD hh:mm
KFM01C	231.20	236.20	5.00	3	1	2006-04-07 12:35	2006-04-07 14:02
KFM01C	236.20	241.20	5.00	3	1	2006-04-07 14:15	2006-04-07 15:19
KFM01C	242.20	247.20	5.00	3	1	2006-04-21 15:42	2006-04-21 16:56
KFM01C	244.30	249.30	5.00	3	1	2006-04-07 16:44	2006-04-07 17:32
KFM01C	249.30	254.30	5.00	3	1	2006-04-10 08:26	2006-04-10 09:44
KFM01C	254.30	259.30	5.00	3	1	2006-04-10 09:57	2006-04-10 11:14
KFM01C	259.30	264.30	5.00	3	1	2006-04-10 12:00	2006-04-10 13:07
KFM01C	264.30	269.30	5.00	3	1	2006-04-10 13:24	2006-04-10 14:28
KFM01C	269.30	274.30	5.00	3	1	2006-04-10 15:10	2006-04-10 16:25
KFM01C	274.30	279.30	5.00	3	1	2006-04-10 16:46	2006-04-11 09:05
KFM01C	279.30	284.30	5.00	3	1	2006-04-11 09:30	2006-04-11 10:46
KFM01C	284.30	289.30	5.00	3	1	2006-04-11 11:22	2006-04-11 13:23
KFM01C	289.30	294.30	5.00	3	1	2006-04-11 13:47	2006-04-11 15:03
KFM01C	294.30	299.30	5.00	3	1	2006-04-11 15:17	2006-04-11 16:12
KFM01C	299.30	304.30	5.00	3	1	2006-04-11 16:25	2006-04-11 17:42
KFM01C	304.30	309.30	5.00	3	1	2006-04-12 08:15	2006-04-12 09:30
KFM01C	309.30	314.30	5.00	3	1	2006-04-12 09:44	2006-04-12 11:01
KFM01C	314.30	319.30	5.00	3	1	2006-04-12 11:14	2006-04-12 13:11
KFM01C	316.50	321.50	5.00	3	1	2006-04-12 13:25	2006-04-12 14:41
KFM01C	321.50	326.50	5.00	3	1	2006-04-12 15:13	2006-04-12 16:00
KFM01C	326.50	331.50	5.00	3	1	2006-04-12 16:19	2006-04-12 17:06
KFM01C	331.50	336.50	5.00	3	1	2006-04-18 08:21	2006-04-18 09:40
KFM01C	336.50	341.50	5.00	3	1	2006-04-18 09:53	2006-04-18 10:45
KFM01C	341.50	346.50	5.00	3	1	2006-04-18 11:04	2006-04-18 12:58
KFM01C	346.50	351.50	5.00	3	1	2006-04-18 13:24	2006-04-18 14:40
KFM01C	351.50	356.50	5.00	3	1	2006-04-18 14:57	2006-04-18 16:11
KFM01C	355.70	360.70	5.00	3	1	2006-04-18 16:25	2006-04-18 17:39
KFM01C	360.70	365.70	5.00	3	1	2006-04-19 07:21	2006-04-19 08:40
KFM01C	365.70	370.70	5.00	3	1	2006-04-19 08:55	2006-04-19 10:12
KFM01C	370.70	375.70	5.00	3	1	2006-04-19 10:24	2006-04-19 11:40
KFM01C	375.70	380.70	5.00	3	1	2006-04-19 12:42	2006-04-19 13:39
KFM01C	380.70	385.70	5.00	3	1	2006-04-19 14:00	2006-04-19 15:16
KFM01C	385.00	390.00	5.00	3	1	2006-04-20 08:16	2006-04-20 09:33
KFM01C	390.00	395.00	5.00	3	1	2006-04-20 09:48	2006-04-20 10:43
KFM01C	395.00	400.00	5.00	3	1	2006-04-20 11:04	2006-04-20 12:53
KFM01C	400.00	405.00	5.00	3	1	2006-04-20 13:15	2006-04-20 14:32
KFM01C	403.00	408.00	5.00	3	1	2006-04-20 14:43	2006-04-20 15:32
KFM01C	408.00	413.00	5.00	3	1	2006-04-20 15:47	2006-04-20 16:33
KFM01C	413.00	418.00	5.00	3	1	2006-04-20 16:58	2006-04-21 08:20
KFM01C	418.00	423.00	5.00	3	1	2006-04-21 08:36	2006-04-21 09:18
KFM01C	423.00	428.00	5.00	3	1	2006-04-21 09:35	2006-04-21 10:19
KFM01C	428.00	433.00	5.00	3	1	2006-04-21 10:32	2006-04-21 11:14
KFM01C	433.00	438.00	5.00	3	1	2006-04-21 11:28	2006-04-21 13:18

[1] 3: Injection test.

3.3 Equipment checks

The PSS3 equipment was fully 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 ($p/\rho g$). 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.

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.

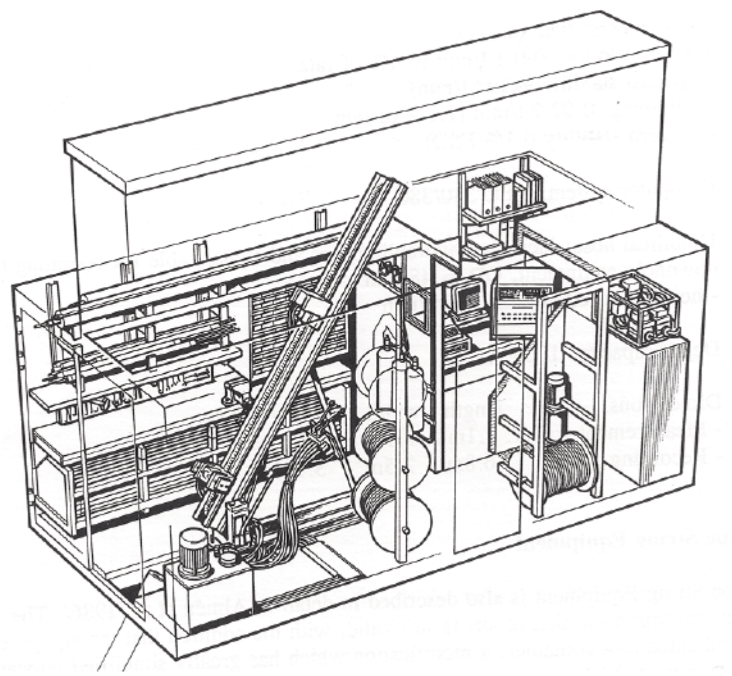

Figure 4-1. *Outline of the PSS3 container with equipment.*

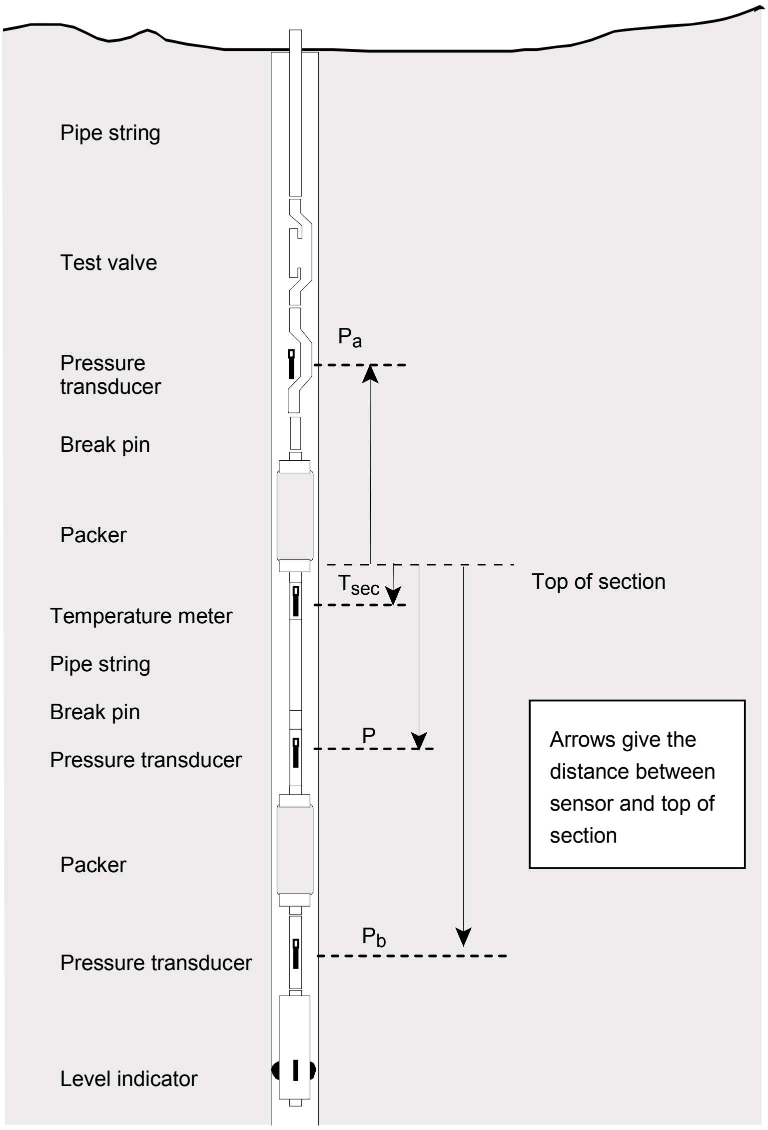

Figure 4-2. *Schematic drawing of the down-hole equipment in the PSS3 system.*

At the lower end of the borehole equipment, a level indicator (caliper 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 m).

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	PSS3	Comments
Absolute pressure	Output signal	mA	4–20		
	Meas. range	MPa	0–13.5		
	Resolution	kPa	< 1.0		
	Accuracy[1)]	% F.S	0.1		
Differential pressure, 200 kPa	Accuracy	kPa		< ±5	Estimated value
Temperature	Output signal	mA	4–20		
	Meas. range	°C	0–32		
	Resolution	°C	< 0.01		
	Accuracy	°C	± 0.1		
Flow Qbig	Output signal	mA	4–20		
	Meas. range	m^3/s	$1.67 \cdot 10^{-5}$–$1.67 \cdot 10^{-3}$		The specific accuracy is depending on actual flow
	Resolution	m^3/s	$6.7 \cdot 10^{-8}$		
	Accuracy[2)]	% O.R	0.15–0.3	< 1.5	
Flow Qsmall	Output signal	mA	4–20		
	Meas. range	m^3/s	$1.67 \cdot 10^{-8}$–$1.67 \cdot 10^{-5}$		The specific accuracy is depending on actual flow
	Resolution	m^3/s	$6.7 \cdot 10^{-10}$		
	Accuracy[3)]	% O.R	0.1–0.4	0.5–20	

[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.

Parameter	Length of test section (m) 5
Equipment displacement volume in test section [1)]	3.6
Total volume of test section [2)]	23
Position for sensor P_a, pressure above test section, (m above secup) [3)]	1.88
Position for sensor P, pressure in test section, (m above secup) [3)]	–4.13
Position for sensor T_{sec}, temperature in test section, (m above secup) [3)]	–0.95
Position for sensor P_b, pressure below test section, (m above secup) [3)]	–6.98

[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.

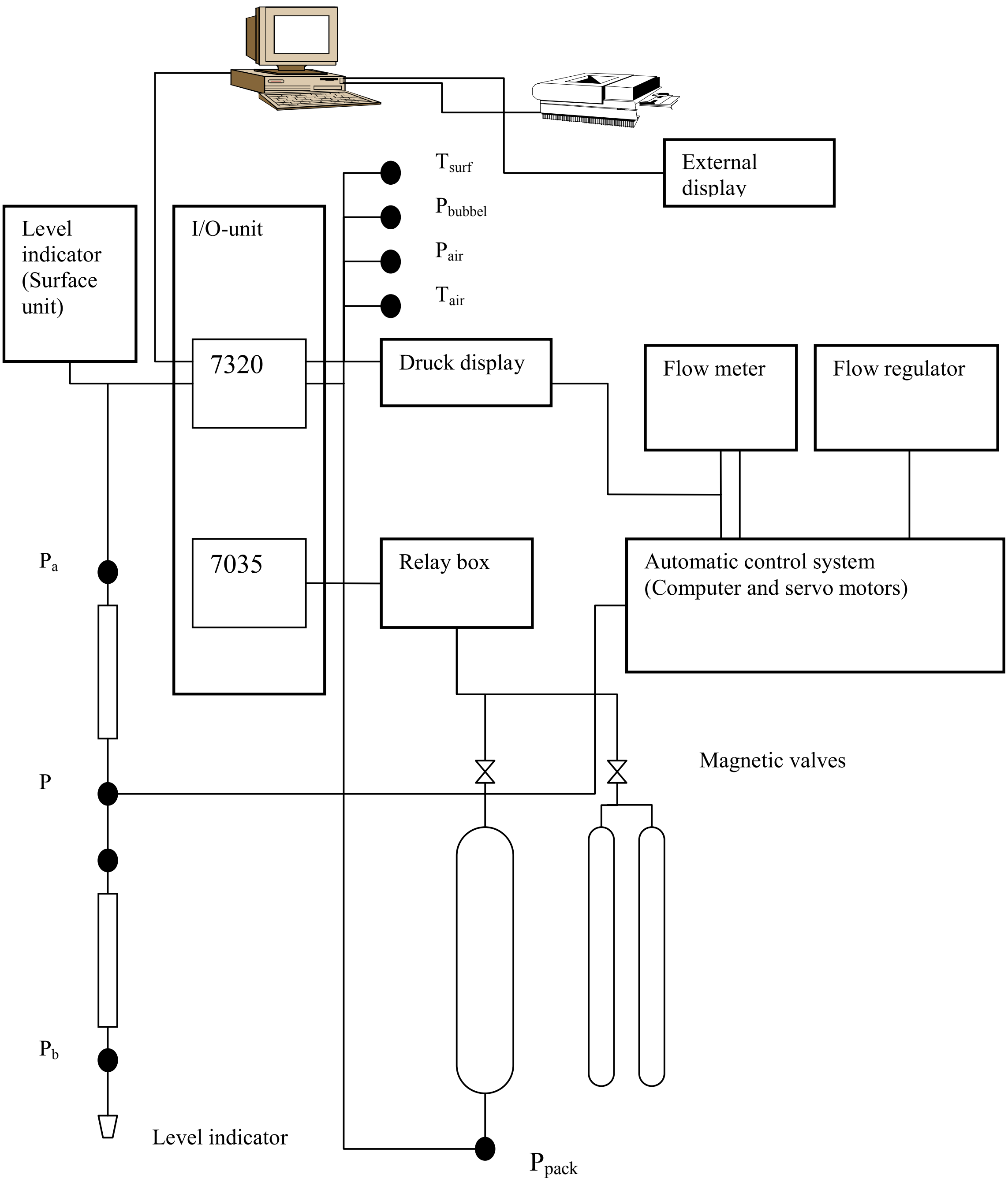

Figure 4-3. *Schematic drawing of the data acquisition system and the automatic control system in PSS.*

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 KFM01C 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 the injection tests, 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 400-06-009. Exceptions to this are presented in Section 5.5.

A test cycle 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 in accordance with AP PF 400-06-009.

Injection tests with 5 m section length were conducted within the interval 15.5–438.0 m. Due to large fractures or cavities in the borehole, the position of the packers had to be shifted, hence some of the test sections were partly overlapping and a few intervals were missing.

Table 5-1. Packer inflation times, pressure stabilisation times and test times used for the injection tests in KFM01C.

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

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

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 __KFM01C_0106.00_200511171609.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 KFM01C 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, see Table 1-1).

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. For approximately 58% of the injection tests in KFM01C, the actual lower measurement limit of the flow rate was lower than the standard measurement limit and was estimated ranging from $2.9 \cdot 10^{-9}$ m^3/s to $1.0 \cdot 10^{-8}$ m^3/s.

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). However, for some test sections in KFM01C, the actual injection pressure was considerably different. The highest injection pressure during the tests in KFM01C was 250 kPa and for six of the tests the injection pressure was below 100 kPa. A 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. The estimated test specific lower measurement limit for the specific flow rate in all injection tests in KFM01C ranged from $1.2 \cdot 10^{-10}$ m^2/s to $4.7 \cdot 10^{-10}$ m^2/s.

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 (since the actual pressure difference often was significantly less than 200 kPa, see above).

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 and estimated lower measurement limits for flow rate for the injection tests in borehole KFM01C.

r_w (m)	L_w (m)	Q-measl-L (m^3/s)	Injection pressure (kPa)	Q/s-measl-L (m^2/s)	Factor CM in Moye's formula	TM-measl-L (m^2/s)
0.0379	5	1.70E–08	100	1.60E–09	0.83	1.40E–09
0.0379	5	1.70E–08	200	8.20E–10	0.83	6.90E–10
0.0379	5	1.70E–08	300	5.50E–10	0.83	4.60E–10
0.0379	5	1.20E–08	100	1.10E–09	0.83	9.70E–10
0.0379	5	1.20E–08	200	5.70E–10	0.83	4.80E–10
0.0379	5	1.20E–08	300	3.80E–10	0.83	3.20E–10
0.0379	5	5.00E–09	100	4.90E–10	0.83	4.00E–10
0.0379	5	5.00E–09	200	2.50E–10	0.83	2.00E–10
0.0379	5	5.00E–09	300	1.60E–10	0.83	1.40E–10

5.4.3 Qualitative analysis

Initially, a qualitative evaluation of actual flow regimes, e.g. wellbore storage (WBS), 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 represent 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 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

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 = $p_p - p_i$ (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) solution /1/ 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) /2/.

In borehole KFM01C, the storativity was calculated using an empirical regression relationship between storativity and transmissivity, see Equation 5-3 (Rhén et al. 1997) /3/. 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.

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

S = storativity (–)

T = transmissivity (m^2/s)

For transient analysis of the recovery period, a model presented by Dougherty-Babu (1984) /4/ 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 is 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) /5/ 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 model by Dougherty-Babu (1984) was used to estimate the transmissivity and skin factor from the recovery period. 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) /6/ 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) /7/, 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 (a slope of 0.5 or less in a log-log plot). A model for single fractures was then used for the transient analysis as a complement to the standard models. The model by Ozkan-Raghavan (1991a) /8/ and (1991b) /9/ for a vertical fracture was employed. In this case, the test section length was used to convert K and S_s to T and S, respectively, after analysis by fracture models. The quotient K_x/K_y of the hydraulic conductivity in the x and the y-direction, respectively, was assumed to be 1.0 (one). Type curve matching provided values of K_x and L_f, where L_f is the theoretical fracture length.

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 assumed as the most representative for the hydraulic conditions in the rock close to the tested section. In most cases, the transient estimates of transmissivity from the injection period were considered more representative than those from the recovery period. The recovery responses were often strongly affected by wellbore storage and, sometimes, no pseudo-radial flow regime was reached.

Finally, a representative value of transmissivity of the test section, T_R, was chosen from T_T and T_M. In general, the transmissivity from the transient evaluation, T_T, was considered as the best estimate. In 2 out of 55 tests with a definable final flow rate in KFM01C the steady-state transmissivity, T_M, was chosen as the most representative value of transmissivity of the test section. T_M was chosen when a reliable transient evaluation of the test data was not possible. Whenever the flow rate by the end of the injection period (Q_p) was too low to be defined, and thus neither T_T nor T_M could be estimated, the representative transmissivity for the test section was 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). In 33 out of 88 tests the flow rate was too low to be defined.

Estimated values of the borehole storage coefficient, C, based on actual borehole geometrical data and assumed fluid properties are shown in Table 5-3. 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) /10/:

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

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 (Ludvigson, Hansson and Hjerne, 2006) /11/, (Table 5-3).

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)
0.0379	5	0.023	0.004	0.019	8.54·10–12	1.6·10–11

Furthermore, when using the model by Dougherty-Babu (1984) /4/, 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) /10/:

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

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.

The radius of influence at a certain time may be estimated from Jacob's approximation of the Theis' well function, Cooper and Jacob (1946) /12/:

$$r_i = \sqrt{\frac{2.25Tt}{S}} \tag{5-7}$$

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.

5.5 Nonconformities

The test program in KFM01C was carried out according to the Activity Plan AP PF 400-06-009 with the following exceptions:

- The Tecalan hose connected to P_{bubbel}, the transducer measuring the ground water level, could not be put into position in the borehole before testing. This was due to the small diameter of the borehole which made it impossible desend it to the ground water surface.
- Since a PLEX-plate at 84.30–86.27 m was difficult to pass with the borehole equipment, it was decided together with the activity manager that only 5 m sections should be measured.
- Due to major fractures in the borehole, some of the positions of the 5 m tests were shifted. This resulted in some partly overlapping and missing sections as follows:
  – The following intervals were not measured by 5 m sections: 37.8–38.8 m, 43.8–44.8 m, 87.0–88.2 m and 212.7–213.2 m.
  – The following 5 m sections were partly overlapping: 30.5–35.5 m and 32.8–37.8 m, 74.8–79.8 m and 77.0–82.0 m, 88.2–93.2 m and 92.0–97.0 m, 162.0–167.0 m and 165.0–170.0 m, 200.0–205.0 m and 202.7–207.2 m, 228.2–233.2 m and 231.2–236.2 m, 242.2–247.2 m and 244.3–249.3 m, 314.3–319.3 m and 316.5–321.5 m, 351.5–356.5 m and 355.7–360.7 m, 380.7–385.7 m and 385.0–390.0 m, 400.0–405.0 m and 403.0–408.0.

Technical problems:

- During the tests in sections 15.5–20.5 m, 20.5–25.5 m, 30.5–35.5 m and 32.8–37.8 m, the test valve could not shut properly after the injection. However, the evaluations of the injection periods in these tests gave sufficient information of the transmissivity, and the tests did not need to be re-performed.
- A small leakage was discovered in the pipe string during tests performed on the 5 m sections 418–423 m, 423–428 m, 428–433 m and 433–438 m. These leakages had a magnitude of maximum 1 ml/min at 300 kPa pressure. Since the leakage was quantifiable it was possible to compensate for this during the evaluation of the tests.

6 Results

6.1 Nomenclature and symbols

The nomenclature and symbols used for the results of the injection tests in KFM01C 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.

During the injection tests in KFM01C, drilling of KFM10A and pumping in HFM14 as well as pumping in KFM05A are activities that may have affected the pressure in KFM01C. However no evident signs of that have been discovered. Borehole KFM10A is located at DS10 and borehole KFM05A and HFM14 are located at DS5, the locations are shown in Figure 1-1.

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 KFM01C, reference marks were milled into the borehole wall at every 50 m (with a few exceptions).

During the injection tests in KFM01C with the PSS, length reference marks were detected as presented in Table 6-1. As seen from Table 6-1, all of the length marks of the borehole were detected. At each mark, the length scale for the injection tests was adjusted according to the reported length to the reference mark.

The largest difference between the reported and measured lengths at the reference marks during the injection tests was 0.25 m, at the 400 m reference mark. The difference between two consecutive measurements over a 100 m borehole interval was 0.08 m or less in all cases.

Table 6-1. Detected reference marks during the injection tests in KFM01C.

Borehole length (m)	Detected during the injection tests in 5 m sections
51	Yes
100	Yes
150	Yes
200	Yes
252	Yes
299	Yes
350	Yes
400	Yes

Since the length scale was adjusted in the field every time a reference mark was passed, and because the difference between consecutive marks was 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 (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. Transient evaluation was performed for all tests for which a significant flow rate, Q_p, could be identified, see Section 5.4.2. The quantitative analysis was conducted using the AQTESOLV software.

A summary of the results of the routine evaluation of the injection tests is presented, test by test, in Table 6-2. 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. The quantitative analysis was performed from such diagrams using the AQTESOLV software. From 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 KFM01C 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, 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 ambiguous evaluation. For example, for test responses showing only wellbore storage and tests approaching a pseudo-stationary state, no unambiguous transient evaluation may be possible.

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 are further commented on in Section 6.2.4. Several of the responses during the recovery period were strongly influenced by wellbore storage effects. Thus, for some tests, pseudo-radial flow was not reached during this period. On the other hand, during the injection period, a certain time interval with pseudo-radial flow could, in most tests, be identified. Consequently, standard methods for single-hole tests with wellbore storage and skin effects were generally 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.

The transmissivity judged as the most reliable from the transient evaluation of the flow- and recovery periods of the tests was selected as T_T. The associated value of the skin factor is listed in Table 6-2. Since a fairly well-defined time interval with pseudo-radial flow in most cases could be identified from the injection period, the transmissivity calculated from this period is generally considered as the most reliable transmissivity, T_T, from the transient analysis of the injection tests in KFM01C. Furthermore, the transient evaluation of transmissivity from the injection period was for most of the tests also judged as the most representative estimate of transmissivity, T_R.

For those tests where transient evaluation was not possible or not considered representative, T_M was chosen as the representative transmissivity value, T_R. If 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, see Section 5.4.2 and 5.4.4.

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) slightly overestimates the transmissivity if steady-state conditions do not prevail in the borehole. This is the explanation to the predominance of points below the 1:1 curve, especially for low values of transmissivity, since steady-state conditions is normally not attained during the injection period. In cases were an apparent no-flow boundary appears at the end of the injection period and transient evaluation is performed on the early data, the opposite can be true (i.e. T_M is low in comparison with the transient estimate of transmissivity). In this case two different zones of the bedrock are obviously measured during the early and the late parts of the injection respectively, but when looking at the values only, the effect seen is that T_M is underestimated. The lower standard measurement limit of transmissivity in 5 m sections based on a flow rate of 1 mL/min and an injection pressure of 200 kPa is indicated in the figure.

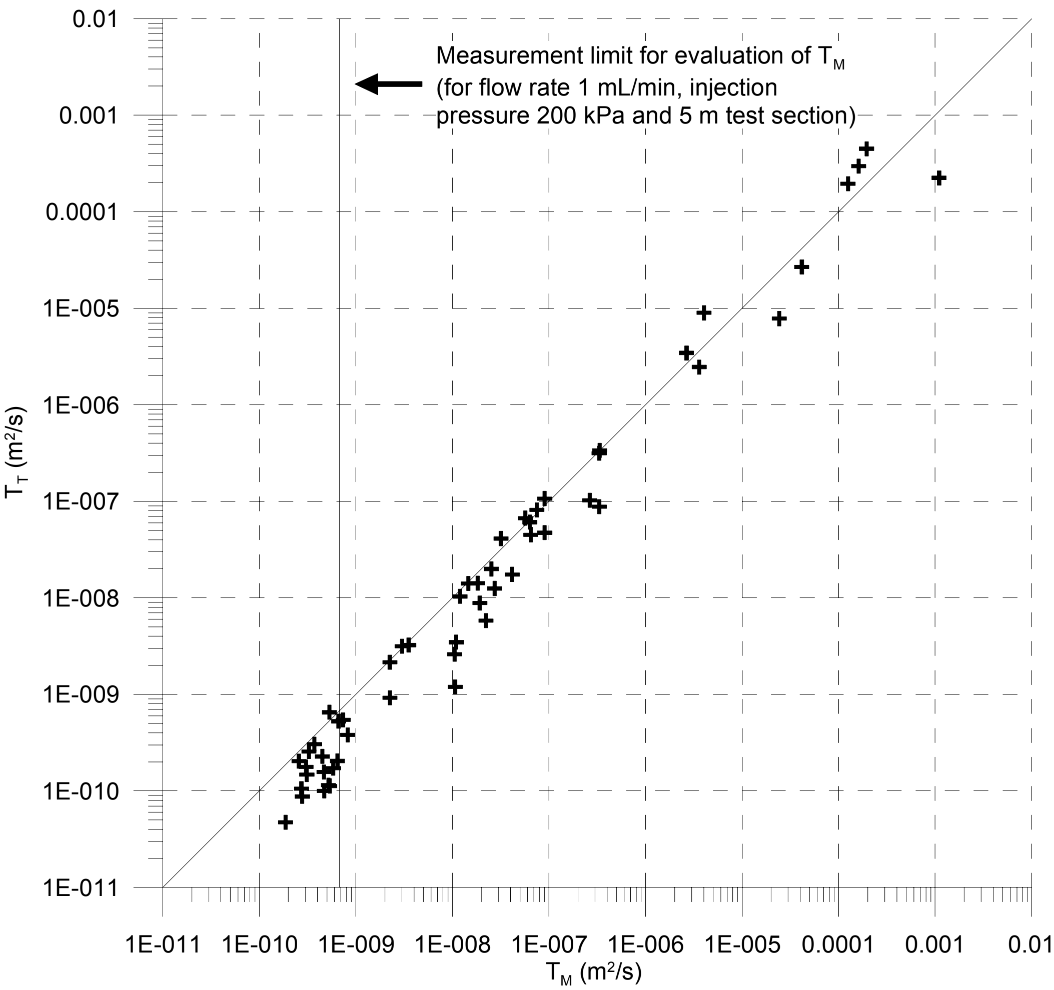

Figure 6-1. *Estimated transmissivities in 5 m sections from steady-state (T_M) and transient (T_T) evaluation in KFM01C.*

The wellbore storage coefficient, C, was calculated from the straight line with a unit slope in the log-log diagrams from the recovery period in KFM01C, 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_{net} (based on geometry) and the value of C obtained from laboratory experiments, C_{eff} /11/, both found in Table 5-3.

In 10 of 88 injection tests a well-defined 1:1 straight line was observed for which it was possible to calculate C. Table 6-2 shows that there is, in general, a 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 can be explained by the compressibility contribution of the rock formation and water in good hydraulic connection (i.e. open fractures) with the section.

The test in section 195.0–200.0 m resulted in a significantly higher estimate of C than tests in the other 5 m intervals. It is also higher than the value of C_{net} and C_{eff} in Table 5-3. No reasonable explanation has been found for the significantly higher wellbore storage coefficient estimated from the test in this interval. When constructing a 95% confidence interval (using a t-distribution) from calculated values of C from the tests, the values of C_{net} and C_{eff} listed in Table 5-3 are within this confidence interval. When constructing the same confidence interval, but excluding the test with higher C-value, C_{net} falls below the confidence interval and C_{eff} are within this interval.

In test sections 15.5–20.5 m, 25.5–30.5 m, 30.5–35.5 m, 32.8–37.8 m, 38.8–43.8 m, 82.0–87.0 m and 97.0–102.0 m a pressure decrease was observed at the start of, and during, the injection period. The pressure partly recovered during the recovery period. No technical explanation was possible to find for this effect. This fact could possibly be explained by an ejector effect (stream of injected water in fractures causing pressure drop in adjoining fractures) in some cases. However, since the transmissivity above most of these sections are higher than in the test sections it seems unlikely that this behaviour would appear. It also seems unlikely that an ejector effect would appear so frequently.

Table 6-2. Summary of the routine evaluation of the single-hole injection tests in borehole KFM01C.

Secup (m)	Seclow (m)	Test start YYYYMMDD 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 (–)
15.50	20.50	20060324 09:12	5.0	PRF	WBS->PRF	4.15E–05	2.67E–05	2.07E–05	2.67E–05	2.67E–05	–4.99	200	1,200	50	400		141.20	0
20.50	25.50	20060324 11:14	5.0	PSF	PSF	3.35E–07	3.37E–07	3.04E–07	3.37E–07	3.37E–07	–0.91						47.59	–1
25.50	30.50	20060327 16:20	5.0	PSF->PSS	PLF->PSF	2.65E–06	3.44E–06		3.44E–06	3.44E–06	–0.17						85.18	–1
30.50	35.50	20060328 08:26	5.0	PRF->(NFB)	PSS	1.61E–04	2.96E–04	2.53E–04	2.96E–04	2.96E–04	0.65	300	900				223.09	1
32.80	37.80	20060328 10:19	5.0	PSS	PSF->PSS	1.94E–04	1.84E–04	4.48E–04	4.48E–04	1.94E–04	4.33						229.92	–1
38.80	43.80	20060328 12:34	5.0	PRF	PSS	1.25E–04	1.94E–04	2.05E–04	1.94E–04	1.94E–04	–0.69						232.56	1
44.80	49.80	20060328 14:14	5.0	PRF	PSF->PSS	3.18E–08	4.12E–08	7.16E–08	4.12E–08	4.12E–08	0.16	40	1,200				27.97	0
49.80	54.80	20060328 15:49	5.0	PSF	PSF	2.64E–07	1.02E–07	8.30E–08	1.02E–07	1.02E–07	–4.29						35.35	–1
54.80	59.80	20060329 08:33	5.0	PRF/PSF	PSF	7.48E–08	8.17E–08		8.17E–08	8.17E–08	–1.01	30	1,200				33.20	0
59.80	64.80	20060329 10:02	5.0	PSF	PSF	6.35E–08	6.09E–08	2.73E–08	6.09E–08	6.09E–08	–1.30						31.08	–1
64.80	69.80	20060329 11:32	5.0	PSF	PSF	1.82E–08	1.42E–08	1.04E–08	1.42E–08	1.42E–08	–1.88						21.60	–1
69.80	74.80	20060329 13:37	5.0	PSF	PSS	5.70E–08	6.70E–08	7.17E–08	6.70E–08	6.70E–08	–0.30						31.82	–1
74.80	79.80	20060329 15:08	5.0	PSF	PSF->PSS	9.03E–08	1.07E–07		1.07E–07	1.07E–07	–0.01						35.74	–1
77.0	82.0	20060330 08:12	5.0	PSF(->NFB?)	PSF->PSS	3.30E–07	9.82E–07	3.15E–07	3.15E–07	3.15E–07	–0.16						46.74	–1
82.0	87.0	20060330 13:13	5.0	PSS	PSS	1.10E–03	2.24E–04	2.75E–04	2.24E–04	2.24E–04	–5.80						238.43	–1
88.20	93.20	20060331 08:05	5.0	PSF	PSF	4.03E–06	8.96E–06	1.23E–05	8.96E–06	8.96E–06	3.54						107.90	–1
92.0	97.0	20060331 09:51	5.0	(PSF)	PSF->PSS	3.58E–06	2.46E–06	2.48E–06	2.46E–06	2.46E–06	–1.82						78.30	–1
97.0	102.0	20060331 11:28	5.0	(PLF)->(PRF)>PSF	PLF->(PRF)->(PSF)	2.42E–05	7.80E–06	7.90E–06	7.80E–06	7.80E–06							103.62	–1
102.0	107.0	20060331 13:51	5.0	PRF	PLF/NFB	9.03E–08	4.74E–08		4.74E–08	4.74E–08	–4.16	500	1,200				28.97	0
107.0	112.0	20060331 15:33	5.0	PLF->(PRF)	PLF->(PRF)	3.32E–07	7.02E–08	8.80E–08	8.80E–08	8.80E–08		300	1,200				33.94	0
112.0	117.0	20060403 08:01	5.0	PRF->PSF	(PRF)->PSF	2.23E–08	5.81E–09	4.73E–09	5.81E–09	5.81E–09	–4.66						17.27	–1
117.0	122.0	20060403 09:33	5.0	PRF	WBS->PRF->NFB	2.54E–08	1.99E–08	5.53E–08	1.99E–08	1.99E–08	–2.54	20	1,200	100	200		23.33	0
122.0	127.0	20060403 11:08	5.0	PRF	PRF	6.49E–08	4.51E–08	4.91E–08	4.51E–08	4.51E–08	–3.22	30	1,200	30	1,200		28.62	0
127.0	132.0	20060403 13:37	5.0	PRF->NFB	WBS->(PRF)->NFB	1.20E–08	1.03E–08	1.71E–08	1.03E–08	1.03E–08	–2.36	50	200				8.09	1
132.0	137.0	20060403 15:24	5.0	PRF1->PRF2	WBS->PSF>NFB	1.46E–08	1.41E–08	3.54E–09	1.41E–08	1.41E–08	–2.42	30	300				10.69	0
137.0	142.0	20060404 08:16	5.0	PRF	WBS->PRF->NFB	4.17E–08	1.75E–08	9.69E–08	1.75E–08	1.75E–08	–4.44	250	1,200	20	80		22.58	0
142.0	147.0	20060404 09:57	5.0	PLF->(PRF)	WBS->PRF	1.05E–08	2.61E–09	2.88E–08	2.61E–09	2.61E–09				200	1,200		14.14	0
147.0	152.0	20060404 11:31	5.0	PLF->(PRF)	WBS->PLF	1.07E–08	1.20E–09	1.46E–09	1.20E–09	1.20E–09	–5.96						11.65	–1

Secup (m)	Seclow (m)	Test start YYYYMMDD 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 (–)
152.0	157.0	20060404 14:12	5.0	–	–	<2.70E–10				<2.70E–10							–	–
157.0	162.0	20060404 15:18	5.0	–	–	<2.19E–10				<2.19E–10							–	–
162.0	167.0	20060405 09:09	5.0	–	–	<1.69E–10				<1.69E–10							–	–
165.0	170.0	20060405 10:12	5.0	–	–	<1.69E–10				<1.69E–10							–	–
170.0	175.0	20060405 11:14	5.0	–	–	<2.19E–10				<2.19E–10							–	–
175.0	180.0	20060405 12:13	5.0	–	–	<1.69E–10				<1.69E–10							–	–
180.0	185.0	20060405 14:06	5.0	–	–	<2.18E–10				<2.18E–10							–	–
185.0	190.0	20060405 15:36	5.0	–	–	<2.18E–10				<2.18E–10							–	–
190.0	195.0	20060405 16:40	5.0	PLF	PLF	1.10E–08	2.07E–09	3.48E–09	3.48E–09	3.48E–09							15.12	1
195.0	200.0	20060405 18:27	5.0	PLF->(PRF)	WBS->	1.92E–08	8.85E–09	1.64E–08	8.85E–09	8.85E–09	–4.09					6.74E–10	19.20	1
200.0	205.0	20060406 07:20	5.0	–	–	<1.68E–10				<1.68E–10							–	–
202.70	207.70	20060406 09:14	5.0	–	–	<2.18E–10				<2.18E–10							–	–
207.70	212.70	20060406 10:27	5.0	–	–	<2.18E–10				<2.18E–10							–	–
213.20	218.20	20060406 12:45	5.0	–	–	<2.18E–10				<2.18E–10							–	–
218.20	223.20	20060406 13:50	5.0	PLF->PSF?	WBS->PLF/NFB	5.37E–10	1.13E–10	3.57E–10	1.13E–10	1.13E–10	–4.47					1.61E–11	6.45	0
223.20	228.20	20060407 08:47	5.0	PLF->NFB	PLF	3.53E–09	4.49E–09	3.24E–09	3.24E–09	3.24E–09	–4.72	30	100				14.84	1
228.20	233.20	20060407 10:25	5.0	PRF1->PRF2	WBS->PRF->NFB?	3.02E–09	3.16E–09	4.83E–09	3.16E–09	3.16E–09	–0.97	20	400				8.50	1
231.20	236.20	20060407 12:35	5.0	PRF	WBS->(PRF)	2.25E–09	2.16E–09	3.24E–09	2.16E–09	2.16E–09	–0.88	20	1,225				13.52	0
236.20	241.20	20060407 14:15	5.0	–	–	<3.20E–10				<3.20E–10							–	–
242.20	247.20	20060421 15:42	5.0	–	–	<1.53E–10				<1.53E–10							–	–
244.30	249.30	20060407 16:44	5.0	–	–	<1.68E–10				<1.68E–10							–	–
249.30	254.30	20060410 08:26	5.0	PLF	WBS->PLF	5.85E–10	1.21E–10	1.72E–10	1.72E–10	1.72E–10							7.17	1
254.30	259.30	20060410 09:57	5.0	PRF	WBS->	8.24E–10	3.81E–10	7.88E–10	3.81E–10	3.81E–10	–3.24	30	1,800	0	1,200	2.73E–11	10.63	0
259.30	264.30	20060410 12:00	5.0	–	–	<2.18E–10				<2.18E–10							–	–
264.30	269.30	20060410 13:24	5.0	–	–	<3.20E–10				<3.20E–10							–	–
269.30	274.30	20060410 15:10	5.0	PLF	WBS->PLF->(PRF)	4.49E–10	1.29E–10	2.28E–10	2.28E–10	2.28E–10							7.70	1
274.30	279.30	20060410 16:46	5.0	PLF->(PRF)	WBS->PRF	3.06E–10	1.78E–10	1.55E–10	1.78E–10	1.78E–10	–2.84			0	1,200	3.21E–11	7.24	0
279.30	284.30	20060411 09:30	5.0	PRF->NFB	WBS->(PRF)->NFB	5.33E–10	6.53E–10	1.10E–09	6.53E–10	6.53E–10	–2.98	10	100				2.87	1
284.30	289.30	20060411 11:22	5.0	(PRF)->NFB	WBS->PRF	7.36E–10	6.09E–10	5.45E–10	5.45E–10	5.45E–10	–3.25	10	250	70	1,000	1.49E–11	8.66	1
289.30	294.30	20060411 13:47	5.0	PRF->NFB	WBS->PRF	2.73E–10	2.75E–10	1.06E–10	1.06E–10	1.06E–10	–3.26	30	200			9.52E–12	6.35	1
294.30	299.30	20060411 15:17	5.0	–	–	<2.48E–10				<2.48E–10							–	–

Secup (m)	Seclow (m)	Test start YYYYMMDD hh:mm	b (m)	Flow regime [1] injection	Recovery	T_M (m²/s)	T_f (m²/s)	T_s (m²/s)	T_T (m²/s)	T_R [2] (m²/s)	ξ (–)	t_1 (s)	t_2 (s)	dte_1 (s)	dte_2 (s)	C (m³/Pa)	r_i (m)	r_i-index (–)
299.30	304.30	20060411 16:25	5.0	PLF	WBS->(PRF)	3.28E–10	1.0E–10	2.57E–10	2.57E–10	2.57E–10	–3.01					1.59E–11	7.93	0
304.30	309.30	20060412 08:15	5.0	PLF->NFB?	WBS->	2.48E–10	3.86E–11			2.48E–10							7.87	–
309.30	314.30	20060412 09:44	5.0	PLF->(PRF)	WBS->NFB	2.26E–09	9.24E–10	2.85E–09	9.24E–10	9.24E–10	–3.90						10.94	1
314.30	319.30	20060412 11:14	5.0	PRF?	WBS->	2.80E–10	8.78E–11		8.78E–11	8.78E–11	–2.78						6.07	0
316.50	321.50	20060412 13:25	5.0	–	–	<2.06E–10				<2.06E–10							–	–
321.50	326.50	20060412 15:13	5.0	–	–	<1.69E–10				<1.69E–10							–	–
326.50	331.50	20060412 16:19	5.0	–	–	<2.06E–10				<2.06E–10							–	–
331.50	336.50	20060418 08:21	5.0	PLF->	WBS->	6.45E–10	2.05E–10	1.76E–10	2.05E–10	2.05E–10							7.50	1
336.50	341.50	20060418 09:53	5.0	–	–	<2.06E–10				<2.06E–10							–	–
341.50	346.50	20060418 11:04	5.0	–	–	<2.06E–10				<2.06E–10							–	–
346.50	351.50	20060418 13:24	5.0	PLF->	WBS->	1.87E–10	3.44E–11	4.75E–11	4.75E–11	4.75E–11	–5.08						5.20	1
351.50	356.50	20060418 14:57	5.0	PLF->NFB	WBS->PLF	4.71E–10	4.65E–11	1.0E–10	1.00E–10	1.00E–10	–5.38						6.27	1
355.70	360.70	20060418 16:25	5.0	PLF	WBS->	4.67E–10	1.57E–10	3.60E–10	1.57E–10	1.57E–10	–3.11					2.41E–11	7.02	1
360.70	365.70	20060419 07:21	5.0	PLF	WBS->	6.61E–10	5.27E–10	1.25E–09	5.27E–10	5.27E–10	–1.51					1.70E–11	9.51	1
365.70	370.70	20060419 08:55	5.0	PLF	WBS->	3.74E–10	1.20E–10	3.06E–10	3.06E–10	3.06E–10	–1.40						8.29	0
370.70	375.70	20060419 10:24	5.0	–	–	<2.48E–10				<2.48E–10							–	–
375.70	380.70	20060419 12:42	5.0	–	–	<2.06E–10				<2.06E–10							–	–
380.70	385.70	20060419 14:00	5.0	PLF/NFB?	WBS->	2.57E–10		2.04E–10	2.04E–10	2.04E–10	–1.54						7.49	0
385.0	390.0	20060420 08:16	5.0	PLF->(PSF)	WBS->	3.11E–10	1.12E–10	1.48E–10	1.48E–10	1.48E–10	–2.69					1.15E–11	6.91	–1
390.0	395.0	20060420 09:48	5.0	–	–	<2.66E–10				<2.66E–10							–	–
395.0	400.0	20060420 11:04	5.0	–	–	<1.73E–10				<1.73E–10							–	–
400.0	405.0	20060420 13:15	5.0	PRF/PSF	WBS->PSF?	5.20E–10	1.15E–10	1.09E–10	1.15E–10	1.15E–10	–3.63					4.69E–11	6.50	–1
403.0	408.0	20060420 14:43	5.0	–	–	<2.18E–10				<2.18E–10							–	–
408.0	413.0	20060420 15:47	5.0	–	–	<2.18E–10				<2.18E–10							–	–
413.0	418.0	20060420 16:58	5.0	–	–	<1.73E–10				<1.73E–10							–	–
418.0	423.0	20060421 08:36	5.0	–	–	<1.73E–10				<1.73E–10							–	–
423.0	428.0	20060421 09:35	5.0	–	–	<1.73E–10				<1.73E–10							–	–
428.0	433.0	20060421 10:32	5.0	–	–	<1.68E–10				<1.68E–10							–	–
433.0	438.0	20060421 11:28	5.0	PLF->PRF->NFB	(PLF)->PRF->PSF	2.73E–08	1.25E–08	1.24E–08	1.25E–08	1.25E–08	–4.37	100	600				14.68	1

[1] The acronyms in the column "Flow regime" are as follow: 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.

The transmissivity values considered the most representative, T_R, from the injection tests in KFM01C in the tested section of 5 m length, are shown in Figure 6-2. This figure demonstrates a significant difference between the upper c. 150 m of the borehole and the interval below with high transmissivities in the upper sections and much lower values in the lower sections.

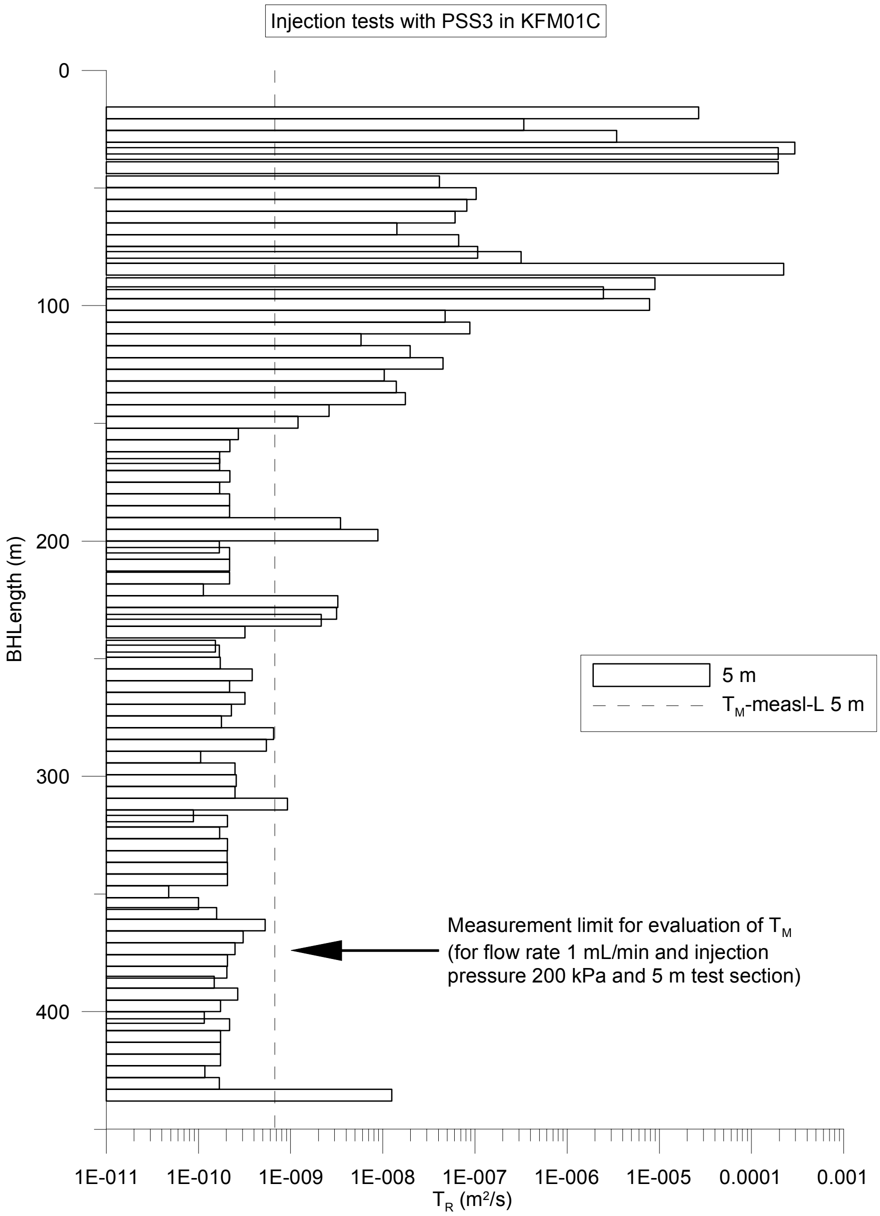

Figure 6-2. *Estimated best representative transmissivity values (T_R) for 5 m sections in borehole KFM01C and estimated transmissivity value for the lower standard measurement limit from stationary evaluation (T_M-measl-L).*

6.2.4 Comments on the tests

Short comments on each test follow below. Tests were performed within the interval 15.5–438.0 m in KFM01C. 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

15.5–20.5 m

The section has a high transmissivity; hence due to the limited capacity of the PSS equipment, the injection pressure was only c. 6 m water column. The time to achieve constant pressure in the section during the injection period is rather long since the flow is rapidly decreasing in the beginning. After c. 200 s, a PRF is indicated lasting throughout the period. The test valve did not close properly after the injection period, hence the evaluation of the recovery period is uncertain. The pressure in the section above is affected by the injection, but not as a normal pressure interference. In this case, a pressure decrease was observed at the start of, and during the injection period and a corresponding pressure increase during the recovery period. No technical explanation was possible to find for this effect.

20.5–25.5 m

Both the injection- and the recovery period show a PSF. The test valve did not close properly after the injection, hence the evaluation of the recovery period is very uncertain. The values of transmissivity obtained from the injection and recovery period, respectively are similar. The transient evaluation from the injection period was selected as the most representative for the tested section.

25.5–30.5 m

The injection period demonstrates a PSF transitioning to a PSS. An approximate transient evaluation was made on this period. The recovery period displays an initial PLF transitioning to a PSF by the end. No PRF is developed. No unambiguous transient evaluation is possible on the entire recovery period but only a transient evaluation using the Ozkan-Raghavan model during the initial PLF. As an example, a simulation of the recovery was made by assuming the steady-state transmissivity T_M from the injection period. The pressure in the section above is affected by the injection, but not as a normal pressure interference. In this case, a pressure decrease was observed at the start of, and during, the injection period and a corresponding pressure increase during the recovery period. No technical explanation was possible to find for this effect.

30.5–35.5 m

The section has a high transmissivity, hence due to the limited capacity of the PSS equipment, the injection pressure obtained was only c. 3 m water column. The injection period indicates a PRF from 300 s until 900 s. After 900 s the derivative increases which suggests an apparent NFB. The pressure recovery is very fast, and since the test valve did not close properly after the injection, the evaluation of the recovery period is very uncertain. The pressure in the section above is affected by the injection, but not as a normal pressure interference. In this case, a pressure decrease was observed at the start of, and during, the injection period and a corresponding pressure increase during the recovery period. No technical explanation was possible to find for this effect. The pressure in the section below indicates a small interference, since the pressure increases during the injection and recovers after stop of injection.

32.8–37.8 m

The section has a high transmissivity, hence due to the limited capacity of the PSS equipment, the injection pressure reached was only c. 2 m water column. The test valve did not close properly after the injection, hence the evaluation of the recovery period is uncertain. It does however result in a value of transmissivity close to the stationary T-value, T_M. The injection period displays a dominating PSS, and thus, the transient evaluation is uncertain. The recovery period displays a PSF transitioning to a PSS by the end. The stationary estimate, T_M, is regarded to provide the most representative value of transmissivity in this section. The section is overlapping the previous section tested and probably the fracture contributing to most of the flow is measured during both tests. The pressure in the section above is affected by the injection, but not as a normal pressure interference. In this case, a pressure decrease was observed at the start of and during the injection period and a corresponding pressure increase during the recovery period. No technical explanation was possible to find for this effect.

38.8–43.8 m

The section has a high transmissivity. Hence due to the limited capacity of the PSS equipment, the injection pressure was only c. 3.5 m water column. The derivative is rather scattered, making the flow regime interpretation difficult. However, a PRF is assumed during the entire injection period. The recovery is rapid and only displays PSS. Despite this fact transient evaluation provides an estimate of transmissivity supporting the transient evaluation for the injection period and the steady-state evaluation. Still, the transient evaluation of the recovery period is uncertain. The transient evaluation of the injection period is considered to give the most representative transmissivity value for this section. The pressure in the section above is affected by the injection, but not as normal pressure interference. In this case, a pressure decrease was observed at the start of and during the injection period and a corresponding pressure increase during the recovery period. No technical explanation was possible to find for this effect.

44.8–49.8 m

The injection period displays a clear PRF starting after 40 s, lasting throughout the period. The recovery period indicates a PSF transitioning to a PSS by the end. Transient evaluation from both periods gives consistent results, also with the stationary evaluation T_M. However, the transient evaluation of the recovery period results in a rather high skin factor.

49.8–54.8 m

Both the injection- and the recovery period show a PSF, and transient evaluation of both periods using the Hantush model for pseudo-spherical flow provides good curve fitting and estimates of transmissivity consistent to the stationary transmissivity, T_M.

54.8–59.8 m

During the injection period an intermediate flow regime between PRF and PSF is observed from c. 30 s throughout the period. The recovery period displays a PSF. No unambiguous transient evaluation is possible from the recovery period. An example is shown assuming the same transmissivity and storativity as was determined from the injection period. The transient evaluation from the injection period is selected as the representative one for the test section.

59.8–64.8 m

A PSF is dominating the injection period from c. 50 s and throughout the period. The pressure in the section recovers rather quickly and the recovery period also displays a PSF. The transmissivities obtained from the transient evaluations using the Hantush model for both the injection and recovery period are consistent and similar to the stationary transmissivity T_M.

64.8–69.8 m

The flow rate data are scattered due to that the pressure regulation valve was working near one of its end positions. Despite this fact, a PSF is identified during the injection period, starting at c. 40 s and continues throughout the period. The recovery period also displays a PSF. Transient evaluations on both periods are in good agreement with each other and with the stationary transmissivity T_M. The transient evaluation from the injection period was selected as the most representative for this section.

69.8–74.8 m

The injection period demonstrates a PSF. The recovery is fast and is transitioning to a PSS. The transient evaluation on the recovery period is uncertain and ambiguous. The transient evaluation on the injection period and the steady-state evaluation give consistent results. The transient evaluation from the injection period was selected as the most representative for this section.

74.8–79.8 m

The injection is dominated by a clear PSF throughout the period. The recovery period is also dominated by a PSF transitioning to a PSS at the end of the period. No unambiguous transient evaluation is possible on the recovery period. An example is shown assuming the same transmissivity and storativity as were estimated from the injection period. The transient evaluation from the injection period was selected as the most representative for this section.

77.0–82.0 m

The injection period starts with a PSF. After about 600 s the flow possibly makes a transition to an apparent NFB. The recovery period dominates by a PSF transitioning to a PSS by the end of the period. The transient evaluation from the recovery period is chosen as the most representative for this section.

82.0–87.0 m

This test section contains the area with the partly mismounted PLEX-plate. This PLEX-plate is installed to reinforce the borehole wall and prevent fallouts. The area it is covering has at least one very large fracture entailing a very high transmissivity which causes problems to achieve a sufficient injection pressure with the PSS equipment. It turned out possible to reach 5.5 kPa at the maximal flow of 49.2 L/min at the end of the period.

The test shows a clear PSS during both the injection and recovery period. The test valve was not able to shut off the flow at stop of injection, but this fact is considered not to significantly affect the pressure recovery in this highly transmissive section. Due to the dominating PSS no unambiguous transient evaluations are possible on neither the injection nor the recovery period. Examples of possible transient evaluations showing consistent results for the injection and recovery period are presented. In addition, the estimated steady-state transmissivity T_M is considered as uncertain in this case due to a presumptive high negative skin factor due to the large fracture in the test section which may cause an overestimation of T_M. Therefore, the transient evaluation on the injection period was yet chosen as the most representative for the section. The pressure in the section below the test section increased by c. 1.6 kPa during the injection period. Even though the transmissivity in the section below is lower than the transmissivity in the section 82.0–87.0 m, this relatively large pressure interference should not have a major impact on the test performed in the section. The pressure in the section above is affected by the injection, but not as a normal pressure interference. In this case, a pressure decrease was observed at the start of and during the injection period and a corresponding pressure increase during the recovery period. No technical explanation was possible to find for this effect.

88.2–93.2 m

During the injection period a transition to a PSF occurs which continues for the rest of the period. The recovery period also begins with a transition to a PSF that dominates during the rest of the period. The transient evaluations from the injection and recovery period give similar T-values. The transient evaluation from the injection period is chosen as representative for the section.

92.0–97.0 m

When this test was conducted, the valve at the bottom of the injection pressure vessel was accidentally left closed during packer inflation. When the injection started, the valve was still closed and a change to the pressure vessel caused a drop in the flow after about 400 s as seen in the plots. This drop probably affected the test and hence the PSF appearing after about 500 s is somewhat uncertain. Thus, the transient evaluation on the injection period is uncertain. The recovery period shows a PSF transitioning to a PSS, but no unambiguous transient evaluation is possible on this period. An example evaluation of the recovery period is shown assuming the same value of the leakage factor r/B as was obtained from the injection period. The transient evaluation from the injection period was selected as the most representative for the test section.

97.0–102.0 m

This section has a relatively high transmissivity. The injection period begins with a transition into an approximate PRF, which is probably preceded by a PLF is masked by the pressure regulation phase to a constant injection pressure. A transition to a PSF occurs after about 500 s during the rest of the period. The recovery period also starts with a PLF transitioning to a short PRF and weak indications of a PSF by the end. The transient evaluation of the injection period was chosen as most representative for this section. The pressure in the section below the test section increased by c. 2.6 kPa during the injection period. Even though the transmissivity in the section below is lower than the transmissivity in the section 97.0–102.0 m, this relatively small pressure interference should not have a major impact of the test. The pressure in the section above is affected by the injection, but not as normal pressure interference. In this case, a pressure decrease was observed at the start of and during the injection period and a corresponding pressure increase during the recovery period. No technical explanation was possible to find for this effect.

102.0–107.0 m

The time to reach a constant pressure in the test section is increased due to changes between the pump and pressure vessel as well as a change of pressure regulation valve. During the injection period a transition to PRF is assumed towards the end of the period. The recovery period indicates a PLF or an apparent NFB and no unambiguous transient evaluation is possible on this period. An example evaluation is shown assuming the same transmissivity and storativity as was estimated from the injection period. The transient evaluation of the injection period was chosen as most representative for this section. The pressure in the section below the test section increased by c. 1.9 kPa during the injection period. Since transmissivity in the section below is higher than the transmissivity in the section 102.0–107.0, this relatively small pressure interference should not have a major impact on the test performed in the section. Also the dominating flow regime, (PRF) supports this conclusion. The pressure in the section only partly recovers (c. 13 m) during the recovery period.

107.0–112.0 m

During the beginning of the injection period, changes between the pump and the pressure vessel extend the time to reach a constant pressure. At the end of the injection period a change of valve temporarily affects the pressure and flow data. Even though the pressure is not quite constant during the injection period, a possible PLF transitioning into an approximate PRF at c. 300 s can still be detected. A low, negative skin factor indicates that the flow regime is of a lower dimension than two, i.e. closer to a linear flow. Using a model for linear flow produces similar results, which strengthens the assumption of a one-dimensional flow regime in the beginning. The recovery period also indicates a PLF transitioning into an approximate PRF at c. 700 s, lasting throughout the recovery period. Very slight pressure interference is detected in the section below the test section.

112.0–117.0 m

Although the derivative is rather scattered, a PRF transitioning to a PSF is assumed to dominate the entire injection period. Due to a few valve changes and one valve being inadvertently closed, the initial pressure regulation works poorly which produces scattered data during the first seconds of the injection period. The recovery period exhibits a transition to a late, short PRF transitioning into a PSF by the end. The transient evaluation from the injection period is selected as the representative for the section.

117.0–122.0 m

Although the derivative is rather scattered, a PRF is believed to dominate the entire injection period. The recovery period exhibits a short period of WBS followed by a transition period into a PRF, which further transitions into an apparent NFB after c. 150 s. The transient evaluation from the injection period is selected as the most representative for the section.

122.0–127.0 m

The entire injection period is dominated by a PRF. Also during the recovery period an approximate PRF is present throughout the recovery period. Transient evaluations using models for radial flow for both the injection period and the recovery period give consistent results. The transient evaluation from the injection period is selected as the representative for the section. The pressure in the section below the test section increased by c. 2.5 kPa during the injection period. Since transmissivity in the section below is in the same order of magnitude as the transmissivity in the section 122.0–127.0 m, this relatively small pressure interference should not have a major impact on the test performed in the section. Also the dominating flow regime, (PRF) supports this conclusion.

127.0–132.0 m

The first part of the injection period until c. 300 s is dominated by a PRF transitioning to an apparent NFB that lasts until the end of the injection period. The initial part of the recovery period displays WBS and a transition phase to a short period of PRF between c. 150 s and 300 s. After this time an apparent NFB is present. The transient evaluation from the injection period is selected as the representative for the section.

132.0–137.0 m

Two consecutive periods of PRF are observed during the injection period. The first one lasts from c. 30 s to 300 s and the second PRF lasts from 300 s and until the end of the injection period. The first PRF is assumed to represent the hydraulic properties close to the borehole whereas the second PRF is likely to represent the hydraulic properties of the rock further away. During the recovery period initial WBS transitioning to a short PSF, followed by a transition to an apparent NFB, is present. No complete recovery (c. 16 m) was achieved during the recovery period. No unambiguous transient evaluation is possible from the recovery period. The pressure from the pressure vessel was lower than normally during the injection period, but this fact appears to have no effect on the test. The transient evaluation from the first PRF during the injection period is selected as the representative for the section.

137.0–142.0 m

During the injection period a PRF is displayed until the end of the injection period after a long initial transition period. After initial WBS a short period of PRF is present during the recovery period as well between c. 20 s and 80 s transitioning to an apparent NFB by the end. The evaluation of the recovery period results in a value of transmissivity that is almost 10 times larger than that from the evaluation of the injection period. The transmissivity value from the injection period, which is supported by the stationary transmissivity, is assumed to be most representative for this section. A very slight tendency of pressure interference below the test section is detected.

142.0–147.0 m

The derivative during the injection period is quite scattered. Still, a PLF transitioning to an approximate PRF is assumed to dominate the injection period. Transient evaluation of the injection period results in a T-value that is c. 1/10 of the transmissivity calculated from the recovery period. The recovery period displays WBS transitioning to a PRF. The transient evaluation from the first PRF during the injection period is selected as the representative for the section.

147.0–152.0 m

An initial PLF, partly masked by the pressure regulation phase, transitioning into an approximate PRF, is assumed during the injection period. The derivative, however, is very scattered and the qualitative evaluation is rather uncertain. During the recovery period, WBS transitioning to a PLF is indicated. Only a limited pressure recovery (c. 9 m) was achieved during the recovery period. The transient evaluation of the injection period using a single fracture model was considered to provide the most representative value of transmissivity for this section.

152.0–157.0 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 400-06-009, 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.

157.0–162.0 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 400-06-009, 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.

162.0–167.0 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 400-06-009, 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.

165.0–170.0 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 400-06-009, 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.

170.0–175.0 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 400-06-009, 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.

175.0–180.0 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 400-06-009, 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.

180.0–185.0 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 400-06-009, 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.

185.0–190.0 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 400-06-009, 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 slight pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

190.0–195.0 m

Both the injection period and the recovery period are dominated by a PLF indicating flow in a single fracture. The transient evaluation from the recovery period supports the transient evaluation from the injection period. No clear PRF develops during either the injection period or the recovery period. The transient evaluation from the recovery period using a single fracture model is considered to provide the most representative value of transmissivity for this section. The pressure in the section below the test section increased by c. 2.8 kPa during the injection period. Since transmissivity in the section below is higher than the transmissivity in the section 190.0–195.0 m, this relatively small pressure interference should not have a major impact on the test performed in the section. Also the dominating flow regime (PLF) supports this conclusion.

195.0–200.0 m

During the injection period a PLF is dominating which is transitioning to an approximate PRF by the end. Transient evaluations of the injection period with a model assuming PRF and a single fracture model, respectively, give consistent results. During the recovery period only WBS and a transition period are observed. The transient evaluation of the recovery period supports the results from the injection period. The transient evaluation from the injection period is considered to provide the most representative value of transmissivity for this section.

200.0–205.0 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 400-06-009, 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.

202.7–207.7 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 400-06-009, 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.

207.7–212.7 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.

213.2–218.2 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 400-06-009, 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$1.25 \cdot 10^{-9}$ m^3/s.

218.2–223.2 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. Still an approximate PLF is believed to be present between c. 100 s and throughout the injection period. A possible PSF is developed by the end but it is considered as uncertain due to the scatter in the flow rate at this time. After initial WBS and a transition period, the recovery period indicates a PLF or alternatively, an apparent NFB lasting from about 200 s until the end of the recovery period. The transient evaluations from the injection period and the recovery period give similar results. The transient evaluation from the injection period is considered to provide the most representative value of transmissivity for this section.

223.2–228.2 m

The flow rate is low and the data, especially the flow derivative, are rather scattered. Still a short PLF is believed to be present between c. 30 s and 100 s after which only an apparent NFB is detected. During the recovery period an approximate PLF is believed to dominate during the entire period. The estimated transmissivities from the injection and recovery period give similar results.

228.2–233.2 m

The injection period starts with a first PRF that appears after about 20 s and continues to c. 400 s. After c. 700 s, a transition to a second PRF begins which dominates the rest of the injection period. The recovery period starts with WBS that makes a transition into a PRF between 200 s and 600 s. After this time the flow makes a transition into a possible apparent NFB. The transient evaluation based on the first PRF during the injection period is chosen as representative for this section.

231.2–236.2 m

The injection period is dominated by a clear PRF throughout the period. The recovery period begins with WBS, followed by a transition into a possible PRF that begins after about 400 s and continues for the rest of the period. The test valve did not close properly neither before nor after the test. This fact might have slightly affected the recovery though the results from this period are very similar to those from the injection period and also the stationary transmissivity T_M. The transient evaluation of the injection period is chosen as representative for the test section.

236.2–241.2 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 400-06-009, 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.

242.2–247.2 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. 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. There was a slight leakage in the pipe string during this test and hence the flow appears to be larger than it was. After c. two minutes of recovery the pressure to the pipe string above the test valve was shut off, causing the decreasing flow seen in the SKB-plot.

244.3–249.3 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. 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. The test valve was not shut properly before the injection, but this wasn't considered a problem due to the absent flow in this section.

249.3–254.3 m

The injection period is dominated by a PLF between c. 30–1,800 s. No unambiguous transient evaluation can be made on the injection period. An example of a possible transient evaluation is presented. During the recovery period WBS is transitioning to PLF. The transient evaluation from the recovery period using a single fracture model is considered to provide the most representative value of transmissivity for this section.

254.3–259.3 m

The injection period is dominated by a PRF between c. 30–1,800 s. The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are rather scattered during the injection period. During the recovery period an initial WBS and a transition period to a possible PRF is indicated. The transient evaluation from the injection period is chosen as representative for the section.

259.3–264.3 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 400-06-009, 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.

264.3–269.3 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 400-06-009, 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.

269.3–274.3 m

The injection period is dominated by a PLF from c. 100 s throughout the period. The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are rather scattered during the injection period. During the recovery period a PLF is indicated after initial WBS transitioning to an approximate PRF by the end. The evaluation from the injection period is regarded as uncertain. Hence the transient evaluation from the recovery period is chosen as representative for the section.

274.3–279.3 m

The injection period is dominated by a PLF transitioning to an approximate PRF by the end of the period. 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. During the recovery period an initial WBS is indicated transitioning to a PRF. The transmissivity from the injection period is chosen as the representative for the section.

279.3–284.3 m

The injection period is dominated by an early PRF between c. 10–100 s transitioning to an apparent NFB. 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. The recovery period begins with WBS followed by a transition towards an approximate PRF which is interrupted by an apparent NFB at the end of the recovery period. The transient evaluation from the injection period is chosen as representative for the section.

284.3–289.3 m

The injection period displays an approximate PRF from c. 10 s until 250 s when a possible apparent NFB is indicated. The recovery period clearly shows a WBS transitioning to a PRF after c. 70 s until 1,000 s. The transient evaluation from the recovery period is chosen as representative for the section.

289.3–294.3 m

The flow rate is low, close to the measurement limit. Hence the data from the injection period are quite scattered. A short PRF can still be identified between 30 s and 100 s. After the PRF the derivative increases which can possibly be a sign of an apparent NFB. The recovery period shows a WBS transitioning into a PRF. Unambiguous transient evaluation can be made from both periods. The transient evaluation from the recovery period is chosen as the representative for the section.

294.3–299.3 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 400-06-009, 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.

299.3–304.3 m

The flow rate is rather low, but a PLF can be identified during the injection period. The recovery period clearly shows WBS transitioning to an approximate PRF. The transient evaluation from the recovery period is regarded to give the most representative estimate of T in the section.

304.3–309.3 m

The flow rate is very low, close to the measurement limit. Hence the data from the injection period are quite scattered. The injection period indicates PLF possibly transitioning to an apparent NFB. Only an approximate transient evaluation was made from this period. The recovery period only displays WBS, and no unambiguous transient evaluation can be made from this period. Since no reliable transient evaluation is possible, the steady-state transmissivity T_M is regarded the best estimate of transmissivity in the section. However, the transmissivity of the section may be lower.

309.3–314.3 m

During the injection period a PLF transitioning to an approximate PRF is indicated. During the recovery period WBS transitioning to an apparent NFB is visible. The transient evaluation from the injection period is regarded to give the most representative estimate of transmissivity of the section.

314.3–319.3 m

Since the measurement noise with a zero flow was centred slightly above zero due to a suspected small leakage in the pipe string, the flow rate measurement limit as well as the flow data were manually decreased by $2.0 \cdot 10^{-9}$ m^3/s. The injection period might, despite the scattered data, indicate a possible PRF. During the recovery period however, only WBS and a short transition period are observed. No unambiguous transient evaluation can be made from the recovery period. An example is presented assuming the same transmissivity and storativity as was obtained from the injection period. Although the transient evaluation from the injection period is uncertain it is yet regarded to be the best estimate of transmissivity for the section.

316.5–321.5 m

Since the measurement noise with a zero flow was centred slightly above zero due to a suspected small leakage in the pipe string, the flow rate measurement limit as well as the flow data were manually decreased by $2.0 \cdot 10^{-9}$ m^3/s. 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. It was however not obvious until the very end of the test that the flow rate was below the measurement limit. Hence the injection time and the recovery time were not shortened.

321.5–326.5 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 400-06-009, the injection time was shortened. 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. 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 $2.0 \cdot 10^{-9}$ m^3/s.

326.5–331.5 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 400-06-009, 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 $2.0 \cdot 10^{-9}$ m^3/s.

331.5–336.5 m

The injection period starts with a PLF transitioning towards a possible PRF. The recovery period displays WBS transitioning to a possible PRF at the end. The transient evaluations on the injection and recovery periods result in similar estimates of T. The transient evaluation from the injection period is regarded to give the most representative estimate of T in the section.

336.5–341.5 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 400-06-009, 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.

341.5–346.5 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. Since it was not obvious that the flow rate was below the measurement limit the injection time was not shortened, which, however, the recovery time was. 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 measurement limit was manually lowered by $2.0 \cdot 10^{-9}$ m^3/s.

346.5–351.5 m

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 measurement limit was manually lowered $2.5\cdot10^{-9}$ m^3/s. The flow rate is low, close to the measurement limit. Hence the data from the injection period are quite scattered. A PLF can still be identified during the entire period, possibly transitioning towards a PRF. The recovery period shows WBS and a transition period towards a possible PRF. Unambiguous transient evaluation can be made from both periods. The transient evaluation from the recovery period is considered to provide the best estimate of T for the section.

351.5–356.5 m

The flow data and the measurement limit were manually adjusted downwards by $3.0\cdot10^{-9}$ m^3/s, since there was a very small leakage in the pipe string. The injection period indicates a PLF transitioning to an apparent NFB after c. 200 s. During the recovery period a PLF is identified after the initial period of WBS. The transient evaluation from the recovery period is considered to provide the best estimate of T for the section.

355.7–360.7 m

The flow data and the measurement limit were manually adjusted downwards by $2.5\cdot10^{-9}$ m^3/s, since there was a very small leakage in the pipe string. The injection period is assumed to display a PLF despite the rather scattered data. Unambiguous transient evaluation on the recovery period is only possible when the Agarwal equivalent time is based on the actual flow time rather than the multi-rate option. The recovery period shows WBS and a transition period. The transient evaluation from the injection period is considered to provide the best estimate of T for the section.

360.7–365.7 m

Since the measurement noise with a zero flow was centred slightly below zero, the flow rate measurement limit was manually elevated by $4.0\cdot10^{-9}$ m^3/s. Also due to a suspected small leakage in the pipe string, the flow data were decreased by $7.0\cdot10^{-9}$ m^3/s to compensate for the leakage. The injection period displays a PLF throughout the period. The recovery period shows WBS and a transition period. The transient evaluation from the injection period is considered to provide the best estimate of T for the section.

365.7–370.7 m

The flow rate is low, close to the measurement limit, and hence the data, especially the flow derivative, are quite scattered. Anyway, a PLF can be identified during the injection period. The recovery period shows WBS and a transition period. Transient evaluation from the injection period is considered the most representative estimate of T for the section. Due to a small leakage in the pipe string the flow data as well as the measurement limit were manually lowered by $3.0\cdot10^{-9}$ m^3/s.

370.7–375.7 m

Since the measurement noise with a zero flow was centred slightly above zero due to a suspected small leakage in the pipe string, the flow rate measurement limit was manually lowered by $3.5\cdot10^{-9}$ m^3/s. 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. It was however not obvious until the very end of the test that the flow rate was below the measurement limit, hence the injection time and the recovery time were not shortened.

375.7–380.7 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 400-06-009, the injection time was shortened. 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. 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 $3.5 \cdot 10^{-9}$ m^3/s.

380.7–385.7 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. Therefore the identification of flow regimes becomes very difficult. No unambiguous transient evaluation can be made on the injection period. The recovery period shows WBS and a transition period but unambiguous transient evaluation is possible on this period. The value of transmissivity obtained from the recovery period is considered the best estimate of T for the section. Due to a small leakage in the pipe string, the flow data as well as the measurement limit was manually lowered by $2.5 \cdot 10^{-9}$ m^3/s.

385.0–390.0 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. A PLF transitioning to a possible PSF by the end is assumed during the injection period. The recovery period only indicates WBS and a transition period. 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 measurement limit as well as the flow data were manually lowered by $4.0 \cdot 10^{-9}$ m^3/s. The value of transmissivity obtained from the recovery period is considered the best estimate of T for the section.

390.0–395.0 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. 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 due to a small leakage in the pipe string, the flow rate measurement limit was manually lowered by $5.0 \cdot 10^{-9}$ m^3/s.

395.0–400.0 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. 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 measurement limit was manually lowered by $6.0 \cdot 10^{-9}$ m^3/s.

400.0–405.0 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, are quite scattered. However the injection is dominated by a PRF/PSF throughout the period. Recovery begins with a WBS and a transition period to a possible PSF. No unambiguous transient evaluation is possible on the recovery period. The transient evaluation of the injection period is chosen as most representative for this section.

403.0–408.0 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 400-06-009, 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.

408.0–413.0 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 400-06-009, 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 due to a small leakage in the pipe string, the flow rate measurement limit was manually lowered by $7.0 \cdot 10^{-9}$ m^3/s.

413.0–418.0 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 400-06-009, 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.

418.0–423.0 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 400-06-009, 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.

423.0–428.0 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 400-06-009, 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.

428.0–433.0 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 400-06-009, 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.

433.0–438.0 m

The injection period starts with a PLF that turns into a PRF between c. 100 s and 600 s followed by an apparent NFB by the end. Recovery starts with a PLF transitioning to a short PRF between c. 80–200 s and to a PSF by the end. The transient evaluation from the injection period is chosen as the most representative for this section.

6.2.5 Flow regimes

As discussed in Section 5.4.4, several of the recovery periods were dominated by wellbore storage effects and no pseudo-radial flow period was reached. On the other hand, some time interval of pseudo-radial flow could in many cases be identified from the injection period. In addition, pseudo-linear flow and pseudo-spherical (leaky) flow could be identified from the injection period making transient evaluation possible. A summary of the frequency of identified flow regimes 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 solely 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 may mask the initial flow regime.

Table 6-3 shows that a certain period of pseudo-radial flow (PRF) could be identified from the injection period in c. 51% of the tests with a definable final flow rate in KFM01C. For the recovery period, the corresponding result is c. 33%.

More than one flow regime could be identified in c. 44% of the tests from the injection period and c. 56% of the tests from the recovery period. The most common transitions in KFM01C during the injection period were from pseudo-linear flow to pseudo-radial flow. Also the transition from pseudo-radial flow to an apparent no-flow boundary was quite common. During the recovery period in KFM01C transition from wellbore storage to pseudo-radial flow was the most frequent transition followed by the transitions from pseudo-radial flow to apparent no-flow boundary and from pseudo-spherical flow to pseudo-stationary flow.

6.3 Basic statistics of hydraulic conductivity distributions

Some basic statistical parameters were calculated for the steady-state hydraulic conductivity (K_M) from the injection tests in borehole KFM01C. 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.

Table 6-3. Interpreted flow regimes during the injection tests in KFM01C.

Borehole	Section length (m)	Number of tests	Number of tests with definable Q_p	Injection period					Recovery period					
				PLF	PRF	PSF	PSS	NFB	WBS	PLF	PRF	PSF	PSS	NFB
KFM01C	5	88	55	23(9)	28(12)	16(8)	3(2)	11(0)	31(11)	12(2)	18(1)	17(6)	9(4)	9(0)

Table 6-5. Basic statistical parameters for steady-state hydraulic conductivity (K_M) and hydraulic conductivity considered most representative (K_R) in borehole KFM01C. L_w = section length, m = arithmetic mean, s = standard deviation.

Parameter	Unit	KFM01C L_w = 5 m
Measured borehole interval	m	15.5–438.0 [2)3)]
Number of tests	–	88
N:o of tests below E.L.M.L.[1)]	–	32
m ($Log_{10}(K_M)$)	Log_{10}(m/s)	–8.40
s ($Log_{10}(K_M)$)	–	1.78
m ($Log_{10}(K_R)$)	Log_{10}(m/s)	–9.30
s ($Log_{10}(K_R)$)	–	1.72

[1)] Number of tests where Qp could not be defined (E.L.M.L. = estimated test-specific lower measurement limit)
[2)] Some sections are partly overlapping, see Section 5.5.
[3)] Within the measured intervals, some small sections are not measured, see Section 5.5.

7 References

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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		
KFM01C	15.50	20.50	3	1	2006-03-24 09:12	2006-03-24 10:52	__KFM01C_0015.50_200603240912.ht2	P, Q, Te	
KFM01C	20.50	25.50	3	1	2006-03-24 11:14	2006-03-24 13:11	__KFM01C_0020.50_200603241114.ht2	P, Q, Te	
KFM01C	25.50	30.50	3	1	2006-03-27 15:18	2006-03-27 16:13	__KFM01C_0025.50_200603271518.ht2	P, Q, Te	Interrupted [2)]
KFM01C	25.50	30.50	3	2	2006-03-27 16:20	2006-03-27 17:36	__KFM01C_0025.50_200603271620.ht2	P, Q, Te	
KFM01C	30.50	35.50	3	1	2006-03-28 08:26	2006-03-28 09:43	__KFM01C_0030.50_200603280826.ht2	P, Q, Te	
KFM01C	32.80	37.80	3	1	2006-03-28 10:19	2006-03-28 11:33	__KFM01C_0032.80_200603281019.ht2	P, Q, Te	
KFM01C	38.80	43.80	3	1	2006-03-28 12:34	2006-03-28 13:50	__KFM01C_0038.80_200603281234.ht2	P, Q, Te	
KFM01C	44.80	49.80	3	1	2006-03-28 14:14	2006-03-28 15:35	__KFM01C_0044.80_200603281414.ht2	P, Q, Te	
KFM01C	49.80	54.80	3	1	2006-03-28 15:49	2006-03-28 17:06	__KFM01C_0049.80_200603281549.ht2	P, Q, Te	
KFM01C	54.80	59.80	3	1	2006-03-29 08:33	2006-03-29 09:50	__KFM01C_0054.80_200603290833.ht2	P, Q, Te	
KFM01C	59.80	64.80	3	1	2006-03-29 10:02	2006-03-29 11:21	__KFM01C_0059.80_200603291002.ht2	P, Q, Te	
KFM01C	64.80	69.80	3	1	2006-03-29 11:32	2006-03-29 13:21	__KFM01C_0064.80_200603291132.ht2	P, Q, Te	
KFM01C	69.80	74.80	3	1	2006-03-29 13:37	2006-03-29 14:54	__KFM01C_0069.80_200603291337.ht2	P, Q, Te	
KFM01C	74.80	79.80	3	1	2006-03-29 15:08	2006-03-29 16:26	__KFM01C_0074.80_200603291508.ht2	P, Q, Te	
KFM01C	77.00	82.00	3	1	2006-03-30 08:12	2006-03-30 09:41	__KFM01C_0077.00_200603300812.ht2	P, Q, Te	
KFM01C	82.00	87.00	3	1	2006-03-30 13:13	2006-03-30 14:29	__KFM01C_0082.00_200603301313.ht2	P, Q, Te	
KFM01C	88.20	93.20	3	1	2006-03-31 08:05	2006-03-31 09:26	__KFM01C_0088.20_200603310805.ht2	P, Q, Te	
KFM01C	92.00	97.00	3	1	2006-03-31 09:51	2006-03-31 11:10	__KFM01C_0092.00_200603310951.ht2	P, Q, Te	
KFM01C	97.00	102.00	3	1	2006-03-31 11:28	2006-03-31 13:28	__KFM01C_0097.00_200603311128.ht2	P, Q, Te	
KFM01C	102.00	107.00	3	1	2006-03-31 13:51	2006-03-31 15:09	__KFM01C_0102.00_200603311351.ht2	P, Q, Te	
KFM01C	107.00	112.00	3	1	2006-03-31 15:33	2006-03-31 16:52	__KFM01C_0107.00_200603311533.ht2	P, Q, Te	
KFM01C	112.00	117.00	3	1	2006-04-03 08:01	2006-04-03 09:21	__KFM01C_0112.00_200604030801.ht2	P, Q, Te	
KFM01C	117.00	122.00	3	1	2006-04-03 09:33	2006-04-03 10:54	__KFM01C_0117.00_200604030933.ht2	P, Q, Te	
KFM01C	122.00	127.00	3	1	2006-04-03 11:08	2006-04-03 13:20	__KFM01C_0122.00_200604031108.ht2	P, Q, Te	
KFM01C	127.00	132.00	3	1	2006-04-03 13:37	2006-04-03 15:09	__KFM01C_0127.00_200604031337.ht2	P, Q, Te	
KFM01C	132.00	137.00	3	1	2006-04-03 15:24	2006-04-03 16:43	__KFM01C_0132.00_200604031524.ht2	P, Q, Te	
KFM01C	137.00	142.00	3	1	2006-04-04 08:16	2006-04-04 09:37	__KFM01C_0137.00_200604040816.ht2	P, Q, Te	
KFM01C	142.00	147.00	3	1	2006-04-04 09:57	2006-04-04 11:19	__KFM01C_0142.00_200604040957.ht2	P, Q, Te	
KFM01C	147.00	152.00	3	1	2006-04-04 11:31	2006-04-04 13:32	__KFM01C_0147.00_200604041131.ht2	P, Q, Te	
KFM01C	152.00	157.00	3	1	2006-04-04 14:12	2006-04-04 15:02	__KFM01C_0152.00_200604041412.ht2	P, Q, Te	
KFM01C	157.00	162.00	3	1	2006-04-04 15:18	2006-04-04 16:36	__KFM01C_0157.00_200604041518.ht2	P, Q, Te	
KFM01C	162.00	167.00	3	1	2006-04-05 09:09	2006-04-05 09:58	__KFM01C_0162.00_200604050909.ht2	P, Q, Te	
KFM01C	165.00	170.00	3	1	2006-04-05 10:12	2006-04-05 11:01	__KFM01C_0165.00_200604051012.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
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KFM01C	170.00	175.00	3	1	2006-04-05 11:14	2006-04-05 12:01	__KFM01C_0170.00_200604051114.ht2	P, Q, Te	
KFM01C	175.00	180.00	3	1	2006-04-05 12:13	2006-04-05 13:49	__KFM01C_0175.00_200604051213.ht2	P, Q, Te	
KFM01C	180.00	185.00	3	1	2006-04-05 14:06	2006-04-05 15:19	__KFM01C_0180.00_200604051406.ht2	P, Q, Te	
KFM01C	185.00	190.00	3	1	2006-04-05 15:36	2006-04-05 16:22	__KFM01C_0185.00_200604051536.ht2	P, Q, Te	
KFM01C	190.00	195.00	3	1	2006-04-05 16:40	2006-04-05 18:04	__KFM01C_0190.00_200604051640.ht2	P, Q, Te	
KFM01C	195.00	200.00	3	1	2006-04-05 18:27	2006-04-05 19:44	__KFM01C_0195.00_200604051827.ht2	P, Q, Te	
KFM01C	200.00	205.00	3	1	2006-04-06 07:20	2006-04-06 08:55	__KFM01C_0200.00_200604060720.ht2	P, Q, Te	
KFM01C	202.70	207.70	3	1	2006-04-06 09:14	2006-04-06 10:11	__KFM01C_0202.70_200604060914.ht2	P, Q, Te	
KFM01C	207.70	212.70	3	1	2006-04-06 10:27	2006-04-06 11:44	__KFM01C_0207.70_200604061027.ht2	P, Q, Te	
KFM01C	213.20	218.20	3	1	2006-04-06 12:45	2006-04-06 13:36	__KFM01C_0213.20_200604061245.ht2	P, Q, Te	
KFM01C	218.20	223.20	3	1	2006-04-06 13:50	2006-04-06 15:14	__KFM01C_0218.20_200604061350.ht2	P, Q, Te	
KFM01C	223.20	228.20	3	1	2006-04-07 08:47	2006-04-07 10:12	__KFM01C_0223.20_200604070847.ht2	P, Q, Te	
KFM01C	228.20	233.20	3	1	2006-04-07 10:25	2006-04-07 11:44	__KFM01C_0228.20_200604071025.ht2	P, Q, Te	
KFM01C	231.20	236.20	3	1	2006-04-07 12:35	2006-04-07 14:02	__KFM01C_0231.20_200604071235.ht2	P, Q, Te	
KFM01C	236.20	241.20	3	1	2006-04-07 14:15	2006-04-07 15:19	__KFM01C_0236.20_200604071415.ht2	P, Q, Te	
KFM01C	242.20	247.20	3	1	2006-04-21 15:42	2006-04-21 16:56	__KFM01C_0242.20_200604211542.ht2	P, Q, Te	
KFM01C	244.30	249.30	3	1	2006-04-07 16:44	2006-04-07 17:32	__KFM01C_0244.30_200604071644.ht2	P, Q, Te	
KFM01C	249.30	254.30	3	1	2006-04-10 08:26	2006-04-10 09:44	__KFM01C_0249.30_200604100826.ht2	P, Q, Te	
KFM01C	254.30	259.30	3	1	2006-04-10 09:57	2006-04-10 11:14	__KFM01C_0254.30_200604100957.ht2	P, Q, Te	
KFM01C	259.30	264.30	3	1	2006-04-10 12:00	2006-04-10 13:07	__KFM01C_0259.30_200604101200.ht2	P, Q, Te	
KFM01C	264.30	269.30	3	1	2006-04-10 13:24	2006-04-10 14:28	__KFM01C_0264.30_200604101324.ht2	P, Q, Te	
KFM01C	269.30	274.30	3	1	2006-04-10 15:10	2006-04-10 16:25	__KFM01C_0269.30_200604101510.ht2	P, Q, Te	
KFM01C	274.30	279.30	3	1	2006-04-10 16:46	2006-04-11 09:05	__KFM01C_0274.30_200604101646.ht2	P, Q, Te	
KFM01C	279.30	284.30	3	1	2006-04-11 09:30	2006-04-11 10:46	__KFM01C_0279.30_200604110930.ht2	P, Q, Te	
KFM01C	284.30	289.30	3	1	2006-04-11 11:22	2006-04-11 13:23	__KFM01C_0284.30_200604111122.ht2	P, Q, Te	
KFM01C	289.30	294.30	3	1	2006-04-11 13:47	2006-04-11 15:03	__KFM01C_0289.30_200604111347.ht2	P, Q, Te	
KFM01C	294.30	299.30	3	1	2006-04-11 15:17	2006-04-11 16:12	__KFM01C_0294.30_200604111517.ht2	P, Q, Te	
KFM01C	299.30	304.30	3	1	2006-04-11 16:25	2006-04-11 17:42	__KFM01C_0299.30_200604111625.ht2	P, Q, Te	
KFM01C	304.30	309.30	3	1	2006-04-12 08:15	2006-04-12 09:30	__KFM01C_0304.30_200604120815.ht2	P, Q, Te	
KFM01C	309.30	314.30	3	1	2006-04-12 09:44	2006-04-12 11:01	__KFM01C_0309.30_200604120944.ht2	P, Q, Te	
KFM01C	314.30	319.30	3	1	2006-04-12 11:14	2006-04-12 13:11	__KFM01C_0314.30_200604121114.ht2	P, Q, Te	
KFM01C	316.50	321.50	3	1	2006-04-12 13:25	2006-04-12 14:41	__KFM01C_0316.50_200604121325.ht2	P, Q, Te	
KFM01C	321.50	326.50	3	1	2006-04-12 15:13	2006-04-12 16:00	__KFM01C_0321.50_200604121513.ht2	P, Q, Te	
KFM01C	326.50	331.50	3	1	2006-04-12 16:19	2006-04-12 17:06	__KFM01C_0326.50_200604121619.ht2	P, Q, Te	
KFM01C	331.50	336.50	3	1	2006-04-18 08:21	2006-04-18 09:40	__KFM01C_0331.50_200604180821.ht2	P, Q, Te	
KFM01C	336.50	341.50	3	1	2006-04-18 09:53	2006-04-18 10:45	__KFM01C_0336.50_200604180953.ht2	P, Q, Te	
KFM01C	341.50	346.50	3	1	2006-04-18 11:04	2006-04-18 12:58	__KFM01C_0341.50_200604181104.ht2	P, Q, Te	
KFM01C	346.50	351.50	3	1	2006-04-18 13:24	2006-04-18 14:40	__KFM01C_0346.50_200604181324.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		
KFM01C	351.50	356.50	3	1	2006-04-18 14:57	2006-04-18 16:11	__KFM01C_0351.50_200604181457.ht2	P, Q, Te	
KFM01C	355.70	360.70	3	1	2006-04-18 16:25	2006-04-18 17:39	__KFM01C_0355.70_200604181625.ht2	P, Q, Te	
KFM01C	360.70	365.70	3	1	2006-04-19 07:21	2006-04-19 08:40	__KFM01C_0360.70_200604190721.ht2	P, Q, Te	
KFM01C	365.70	370.70	3	1	2006-04-19 08:55	2006-04-19 10:12	__KFM01C_0365.70_200604190855.ht2	P, Q, Te	
KFM01C	370.70	375.70	3	1	2006-04-19 10:24	2006-04-19 11:40	__KFM01C_0370.70_200604191024.ht2	P, Q, Te	
KFM01C	375.70	380.70	3	1	2006-04-19 12:42	2006-04-19 13:39	__KFM01C_0375.70_200604191242.ht2	P, Q, Te	
KFM01C	380.70	385.70	3	1	2006-04-19 14:00	2006-04-19 15:16	__KFM01C_0380.70_200604191400.ht2	P, Q, Te	
KFM01C	385.00	390.00	3	1	2006-04-20 08:16	2006-04-20 09:33	__KFM01C_0385.00_200604200816.ht2	P, Q, Te	
KFM01C	390.00	395.00	3	1	2006-04-20 09:48	2006-04-20 10:43	__KFM01C_0390.00_200604200948.ht2	P, Q, Te	
KFM01C	395.00	400.00	3	1	2006-04-20 11:04	2006-04-20 12:53	__KFM01C_0395.00_200604201104.ht2	P, Q, Te	
KFM01C	400.00	405.00	3	1	2006-04-20 13:15	2006-04-20 14:32	__KFM01C_0400.00_200604201315.ht2	P, Q, Te	
KFM01C	403.00	408.00	3	1	2006-04-20 14:43	2006-04-20 15:32	__KFM01C_0403.00_200604201443.ht2	P, Q, Te	
KFM01C	408.00	413.00	3	1	2006-04-20 15:47	2006-04-20 16:33	__KFM01C_0408.00_200604201547.ht2	P, Q, Te	
KFM01C	413.00	418.00	3	1	2006-04-20 16:58	2006-04-21 08:20	__KFM01C_0413.00_200604201658.ht2	P, Q, Te	
KFM01C	418.00	423.00	3	1	2006-04-21 08:36	2006-04-21 09:18	__KFM01C_0418.00_200604210836.ht2	P, Q, Te	
KFM01C	423.00	428.00	3	1	2006-04-21 09:35	2006-04-21 10:19	__KFM01C_0423.00_200604210935.ht2	P, Q, Te	
KFM01C	428.00	433.00	3	1	2006-04-21 10:32	2006-04-21 11:14	__KFM01C_0428.00_200604211032.ht2	P, Q, Te	
KFM01C	433.00	438.00	3	1	2006-04-21 11:28	2006-04-21 13:18	__KFM01C_0433.00_200604211128.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.

Appendix 2.1. General test data

Borehole:	KFM01C
Testtype:	CHir (Constant Head injection and recovery)
Field crew:	C. Hjerne, K. Gokall-Norman, T. Svensson, A. Lindquist, J. Harrström, E. Gustavsson, E. Walger
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)
15.50	20.50	20060324 09:12	20060324 10:10:08	20060324 10:30:07	20060324 10:52	20	20
20.50	25.50	20060324 11:14	20060324 12:29:02	20060324 12:49:16	20060324 13:11	20	20
25.50	30.50	20060327 16:20	20060327 16:53:49	20060327 17:14:06	20060327 17:36	20	20
30.50	35.50	20060328 08:26	20060328 09:01:00	20060328 09:20:46	20060328 09:43	20	20
32.80	37.80	20060328 10:19	20060328 10:51:35	20060328 11:11:15	20060328 11:33	20	20
38.80	43.80	20060328 12:34	20060328 13:07:51	20060328 13:27:59	20060328 13:50	20	20
44.80	49.80	20060328 14:14	20060328 14:52:38	20060328 15:12:55	20060328 15:35	20	20
49.80	54.80	20060328 15:49	20060328 16:23:54	20060328 16:44:09	20060328 17:06	20	20
54.80	59.80	20060329 08:33	20060329 09:08:15	20060329 09:28:30	20060329 09:50	20	20
59.80	64.80	20060329 10:02	20060329 10:38:45	20060329 10:59:03	20060329 11:21	20	20
64.80	69.80	20060329 11:32	20060329 12:39:15	20060329 12:59:33	20060329 13:21	20	20
69.80	74.80	20060329 13:37	20060329 14:11:40	20060329 14:31:57	20060329 14:54	20	20
74.80	79.80	20060329 15:08	20060329 15:43:36	20060329 16:03:52	20060329 16:26	20	20
77.00	82.00	20060330 08:12	20060330 08:58:56	20060330 09:19:11	20060330 09:41	20	20
82.00	87.00	20060330 13:13	20060330 13:47:44	20060330 14:07:27	20060330 14:29	20	20
88.20	93.20	20060331 08:05	20060331 08:43:59	20060331 09:04:09	20060331 09:26	20	20
92.00	97.00	20060331 09:51	20060331 10:28:16	20060331 10:48:31	20060331 11:10	20	20
97.00	102.00	20060331 11:28	20060331 12:46:34	20060331 13:06:30	20060331 13:28	20	20
102.00	107.00	20060331 13:51	20060331 14:27:01	20060331 14:47:21	20060331 15:09	20	20
107.00	112.00	20060331 15:33	20060331 16:10:01	20060331 16:30:17	20060331 16:52	20	20
112.00	117.00	20060403 08:01	20060403 08:38:35	20060403 08:58:53	20060403 09:21	20	20
117.00	122.00	20060403 09:33	20060403 10:11:45	20060403 10:32:04	20060403 10:54	20	20
122.00	127.00	20060403 11:08	20060403 12:38:14	20060403 12:58:31	20060403 13:20	20	20
127.00	132.00	20060403 13:37	20060403 14:26:27	20060403 14:46:45	20060403 15:09	20	20
132.00	137.00	20060403 15:24	20060403 16:00:59	20060403 16:21:16	20060403 16:43	20	20
137.00	142.00	20060404 08:16	20060404 08:54:54	20060404 09:15:13	20060404 09:37	20	20
142.00	147.00	20060404 09:57	20060404 10:36:42	20060404 10:57:01	20060404 11:19	20	20
147.00	152.00	20060404 11:31	20060404 12:49:35	20060404 13:09:54	20060404 13:32	20	20
152.00	157.00	20060404 14:12	20060404 14:49:15	20060404 14:55:17	20060404 15:02	6	5
157.00	162.00	20060404 15:18	20060404 15:54:13	20060404 16:14:19	20060404 16:36	20	20
162.00	167.00	20060405 09:09	20060405 09:47:17	20060405 09:50:56	20060405 09:58	4	5
165.00	170.00	20060405 10:12	20060405 10:50:13	20060405 10:53:31	20060405 11:01	3	5
170.00	175.00	20060405 11:14	20060405 11:52:09	20060405 11:54:20	20060405 12:01	2	5
175.00	180.00	20060405 12:13	20060405 13:26:42	20060405 13:41:36	20060405 13:49	15	5
180.00	185.00	20060405 14:06	20060405 14:51:19	20060405 15:11:41	20060405 15:19	20	6
185.00	190.00	20060405 15:36	20060405 16:12:12	20060405 16:15:06	20060405 16:22	3	5
190.00	195.00	20060405 16:40	20060405 17:22:21	20060405 17:42:40	20060405 18:04	20	20
195.00	200.00	20060405 18:27	20060405 19:01:38	20060405 19:21:57	20060405 19:44	20	20
200.00	205.00	20060406 07:20	20060406 08:12:44	20060406 08:32:50	20060406 08:55	20	20
202.70	207.70	20060406 09:14	20060406 09:49:33	20060406 10:04:12	20060406 10:11	15	5
207.70	212.70	20060406 10:27	20060406 11:02:22	20060406 11:22:28	20060406 11:44	20	20
213.20	218.20	20060406 12:45	20060406 13:18:50	20060406 13:28:34	20060406 13:36	10	5
218.20	223.20	20060406 13:50	20060406 14:32:15	20060406 14:52:36	20060406 15:14	20	20
223.20	228.20	20060407 08:47	20060407 09:30:16	20060407 09:50:35	20060407 10:12	20	20
228.20	233.20	20060407 10:25	20060407 11:01:31	20060407 11:21:52	20060407 11:44	20	20
231.20	236.20	20060407 12:35	20060407 13:19:39	20060407 13:40:00	20060407 14:02	20	20
236.20	241.20	20060407 14:15	20060407 14:55:16	20060407 15:12:12	20060407 15:19	17	5
242.20	247.20	20060421 15:42	20060421 16:13:58	20060421 16:34:03	20060421 16:56	20	20
244.30	249.30	20060407 16:44	20060407 17:22:45	20060407 17:24:37	20060407 17:32	2	5
249.30	254.30	20060410 08:26	20060410 09:02:13	20060410 09:22:34	20060410 09:44	20	20
254.30	259.30	20060410 09:57	20060410 10:32:08	20060410 10:52:30	20060410 11:14	20	20
259.30	264.30	20060410 12:00	20060410 12:35:21	20060410 12:55:26	20060410 13:07	20	10
264.30	269.30	20060410 13:24	20060410 14:00:22	20060410 14:20:29	20060410 14:28	20	5
269.30	274.30	20060410 15:10	20060410 15:42:39	20060410 16:03:01	20060410 16:25	20	20
274.30	279.30	20060410 16:46	20060411 08:22:43	20060411 08:43:07	20060411 09:05	20	20
279.30	284.30	20060411 09:30	20060411 10:04:15	20060411 10:24:40	20060411 10:46	20	20
284.30	289.30	20060411 11:22	20060411 12:41:21	20060411 13:01:45	20060411 13:23	20	20
289.30	294.30	20060411 13:47	20060411 14:20:57	20060411 14:41:21	20060411 15:03	20	20
294.30	299.30	20060411 15:17	20060411 15:49:25	20060411 16:05:16	20060411 16:12	16	5
299.30	304.30	20060411 16:25	20060411 16:59:30	20060411 17:19:54	20060411 17:42	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)
304.30	309.30	20060412 08:15	20060412 08:48:05	20060412 09:08:30	20060412 09:30	20	20
309.30	314.30	20060412 09:44	20060412 10:18:58	20060412 10:39:22	20060412 11:01	20	20
314.30	319.30	20060412 11:14	20060412 12:29:11	20060412 12:49:36	20060412 13:11	20	20
316.50	321.50	20060412 13:25	20060412 13:59:20	20060412 14:19:44	20060412 14:41	20	20
321.50	326.50	20060412 15:13	20060412 15:45:57	20060412 15:52:40	20060412 16:00	7	5
326.50	331.50	20060412 16:19	20060412 16:51:25	20060412 16:59:23	20060412 17:06	8	5
331.50	336.50	20060418 08:21	20060418 08:57:44	20060418 09:18:08	20060418 09:40	20	20
336.50	341.50	20060418 09:53	20060418 10:26:06	20060418 10:37:56	20060418 10:45	12	5
341.50	346.50	20060418 11:04	20060418 12:23:26	20060418 12:43:32	20060418 12:58	20	13
346.50	351.50	20060418 13:24	20060418 13:57:32	20060418 14:17:57	20060418 14:40	20	20
351.50	356.50	20060418 14:57	20060418 15:29:08	20060418 15:49:32	20060418 16:11	20	20
355.70	360.70	20060418 16:25	20060418 16:56:38	20060418 17:17:01	20060418 17:39	20	20
360.70	365.70	20060419 07:21	20060419 07:58:18	20060419 08:18:44	20060419 08:40	20	20
365.70	370.70	20060419 08:55	20060419 09:29:32	20060419 09:49:56	20060419 10:12	20	20
370.70	375.70	20060419 10:24	20060419 10:58:15	20060419 11:18:20	20060419 11:40	20	20
375.70	380.70	20060419 12:42	20060419 13:16:13	20060419 13:30:59	20060419 13:39	15	6
380.70	385.70	20060419 14:00	20060419 14:33:33	20060419 14:53:57	20060419 15:16	20	20
385.00	390.00	20060420 08:16	20060420 08:50:25	20060420 09:10:49	20060420 09:33	20	20
390.00	395.00	20060420 09:48	20060420 10:22:30	20060420 10:35:44	20060420 10:43	13	5
395.00	400.00	20060420 11:04	20060420 12:25:52	20060420 12:45:58	20060420 12:53	20	5
400.00	405.00	20060420 13:15	20060420 13:49:55	20060420 14:10:20	20060420 14:32	20	20
403.00	408.00	20060420 14:43	20060420 15:14:52	20060420 15:25:29	20060420 15:32	11	5
408.00	413.00	20060420 15:47	20060420 16:19:23	20060420 16:25:52	20060420 16:33	6	5
413.00	418.00	20060420 16:58	20060421 08:10:45	20060421 08:12:55	20060421 08:20	2	5
418.00	423.00	20060421 08:36	20060421 09:09:03	20060421 09:10:49	20060421 09:18	2	5
423.00	428.00	20060421 09:35	20060421 10:10:06	20060421 10:12:16	20060421 10:19	2	5
428.00	433.00	20060421 10:32	20060421 11:05:15	20060421 11:08:34	20060421 11:14	3	4
433.00	438.00	20060421 11:28	20060421 12:35:58	20060421 12:56:19	20060421 13:18	20	20
25.50[1)]	30.50	20060327 15:18	20060327 16:01:15	20060327 16:13:42	20060327 16:13	12	0

[1)] The tests were interrupted for various reasons or did not provide satisfying data for the evaluation and were hence re-performed later.

Appendix 2.2 Pressure and flow data

Summary of pressure and flow data for all tests in KFM01C

Test section		Pressure			Flow		
secup	seclow	p_i	p_p	p_F	Q_p [1)]	Q_m [2)]	V_p [2)]
(m)	(m)	(kPa)	(kPa)	(kPa)	(m^3/s)	(m^3/s)	(m^3)
15.50	20.50	186.71	244.79	190.30	2.98E-04	3.51E-04	4.21E-01
20.50	25.50	224.01	432.22	224.97	8.60E-06	8.83E-06	1.07E-02
25.50	30.50	262.4	454.38	263.50	6.28E-05	6.64E-05	8.08E-02
30.50	35.50	297.64	328.46	299.29	6.11E-04	6.29E-04	7.46E-01
32.80	37.80	316.08	338.4	315.81	5.35E-04	5.34E-04	6.30E-01
38.80	43.80	359.98	394.19	360.38	5.27E-04	5.56E-04	6.72E-01
44.80	49.80	404.56	603.33	404.98	7.79E-07	8.33E-07	1.01E-03
49.80	54.80	441.31	652.06	443.51	6.87E-06	7.57E-06	9.22E-03
54.80	59.80	477.36	682.41	477.63	1.89E-06	2.12E-06	2.58E-03
59.80	64.80	514.51	685.03	515.06	1.34E-06	1.42E-06	1.73E-03
64.80	69.80	551.94	753.36	552.50	4.53E-07	5.01E-07	6.10E-04
69.80	74.80	589.38	788.65	589.38	1.40E-06	1.46E-06	1.78E-03
74.80	79.80	626.81	860.17	627.37	2.60E-06	2.74E-06	3.35E-03
77.00	82.00	643.33	844.38	643.33	8.19E-06	8.47E-06	1.03E-02
82.00	87.00	680.21	686.26	681.31	8.19E-04	8.07E-04	9.57E-01
88.20	93.20	728.65	930.91	729.19	1.01E-04	1.04E-04	1.25E-01
92.00	97.00	757.41	978.73	757.27	9.78E-05	9.66E-05	1.18E-01
97.00	102.00	795.25	874.52	801.31	2.37E-04	3.05E-04	3.64E-01
102.00	107.00	833.78	1062.22	936.73	2.55E-06	5.72E-06	7.00E-03
107.00	112.00	870.12	1068.3	944.98	8.12E-06	1.47E-05	1.80E-02
112.00	117.00	908.65	1109.01	923.51	5.50E-07	6.14E-07	7.50E-04
117.00	122.00	947.18	1145.49	964.25	6.21E-07	7.26E-07	8.86E-04
122.00	127.00	986.27	1192.42	1013.78	1.65E-06	2.00E-06	2.44E-03
127.00	132.00	1030.85	1263.84	1072.13	3.45E-07	4.35E-07	5.31E-04
132.00	137.00	1064.29	1263.47	1102.96	3.60E-07	4.66E-07	5.68E-04
137.00	142.00	1095.26	1302.64	1134.90	1.07E-06	1.29E-06	1.58E-03
142.00	147.00	1132.69	1333.06	1148.10	2.60E-07	4.16E-07	5.08E-04
147.00	152.00	1175.07	1411.35	1325.89	3.12E-07	8.07E-07	9.90E-04
152.00	157.00	1232.88	1431.04	1413.43			
157.00	162.00	1267.68	1470.12	1372.13			
162.00	167.00	1309.94	1510.31	1502.60			
165.00	170.00	1310.76	1531.78	1515.26			
170.00	175.00	1348.47	1556.55	1553.79			
175.00	180.00	1379.57	1604.99	1595.62			
180.00	185.00	1424.4	1638.15	1609.94			
185.00	190.00	1458.01	1672.28	1671.59			
190.00	195.00	1488.01	1686.86	1559.29	2.69E-07	4.64E-07	5.67E-04
195.00	200.00	1524.89	1720.55	1578.01	4.63E-07	6.93E-07	8.49E-04
200.00	205.00	1583.24	1778.38	1699.12			
202.70	207.70	1614.48	1800.95	1775.63			
207.70	212.70	1649.3	1836.73	1750.86			
213.20	218.20	1687.55	1875.95	1856.00			
218.20	223.20	1701.32	1939.66	1784.44	1.58E-08	2.39E-08	2.89E-05
223.20	228.20	1736.14	1940.75	1870.85	8.9E-08	2E-07	2.45E-04
228.20	233.20	1774.53	2002.73	1808.11	8.5E-08	1.02E-07	1.25E-04
231.20	236.20	1803.98	2024.03	1822.97	6.11E-08	6.94E-08	8.48E-05
236.20	241.20	1845.81	2058.57	2029.94			
242.20	247.20	1889.85	2070.68	2081.14			
244.30	249.30	1925.36	2125.31	2129.58			
249.30	254.30	1962.79	2163.7	2065.72	1.45E-08	3.04E-08	3.66E-05
254.30	259.30	1977.1	2201.13	2025.54	2.28E-08	3.31E-08	4.05E-05
259.30	264.30	2024.44	2240.76	2181.31			
264.30	269.30	2078.38	2274.9	2270.49			
269.30	274.30	2085.53	2313.99	2211.59	1.27E-08	2.49E-08	3.00E-05
274.30	279.30	2119.12	2340.95	2169.76	8.36E-09	1.58E-08	1.90E-05
279.30	284.30	2172.1	2383.34	2290.31	1.39E-08	2.75E-08	3.31E-05
284.30	289.30	2195.49	2409.2	2273.79	1.94E-08	3.5E-08	4.24E-05
289.30	294.30	2276	2442.38	2323.89	5.61E-09	1.03E-08	1.24E-05
294.30	299.30	2326.37	2491.23	2474.72			
299.30	304.30	2305.45	2527.57	2392.70	8.98E-09	2.02E-08	2.43E-05
304.30	309.30	2345.36	2568.66	2405.36	6.83E-09	9.06E-09	1.09E-05
309.30	314.30	2388.29	2598.93	2438.38	5.87E-08	8.21E-08	1.01E-04
314.30	319.30	2420.91	2640.96	2469.21	7.59E-09	1.16E-08	1.40E-05
316.50	321.50	2474.16	2656.92	2582.61			
321.50	326.50	2570.22	2700.82	2708.11			

Test section		Pressure			Flow		
secup	seclow	p_i	p_p	p_F	Q_p [1)]	Q_m [2)]	V_p [2)]
(m)	(m)	(kPa)	(kPa)	(kPa)	(m^3/s)	(m^3/s)	(m^3)
326.50	331.50	2521.78	2738.8	2714.72			
331.50	336.50	2572.7	2774.17	2631.05	1.6E-08	2.66E-08	3.21E-05
336.50	341.50	2606.42	2810.77	2789.58			
341.50	346.50	2626.09	2849.58	2785.18			
346.50	351.50	2655.82	2875.46	2750.49	5.06E-09	1.51E-08	1.82E-05
351.50	356.50	2689.4	2913.43	2828.12	1.3E-08	3.06E-08	3.69E-05
355.70	360.70	2732.88	2951.78	2786.82	1.26E-08	1.67E-08	2.01E-05
360.70	365.70	2769.63	2997.06	2791.79	1.86E-08	2.57E-08	3.15E-05
365.70	370.70	2829.76	3039.43	2890.32	9.67E-09	1.91E-08	2.30E-05
370.70	375.70	2846.42	3071.41	2957.47			
375.70	380.70	2873.66	3104.18	3107.76			
380.70	385.70	2912.33	3136.03	2980.59	7.09E-09	1.68E-08	2.02E-05
385.00	390.00	2950.04	3171.6	3015.27	8.5E-09	1.67E-08	2.02E-05
390.00	395.00	2991.74	3210.68	3227.75			
395.00	400.00	3009.21	3248.67	3242.61			
400.00	405.00	3071.83	3283.3	3209.03	1.36E-08	1.8E-08	2.17E-05
403.00	408.00	3099.62	3303.02	3333.44			
408.00	413.00	3117.25	3337.15	3353.80			
413.00	418.00	3125.5	3374.99	3367.57			
418.00	423.00	3209.58	3376.37	3363.16			
423.00	428.00	3277.84	3413.67	3450.14			
428.00	433.00	3288.98	3447.94	3451.79			
433.00	438.00	3270.82	3476.66	3342.79	6.93E-07	9.75E-07	1.20E-03
25.50 [3)]	30.50	261.85	483.28	0.00	8.27E-05	6.71E-05	5.01E-02

[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)] No value indicates that the parameter could not be calculated due to low and uncertain flow rates during a major part of flow period
[3)] The tests were interrupted for various reasons or did not provide satisfying data for the evaluation and were hence re-performed later.

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 diagrams are presented for all test sections. A linear diagram of pressure and flow rate is presented for each test. For most tests are log-log and lin-log diagrams presented, from injection and recovery period respectively. From 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 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 (-)

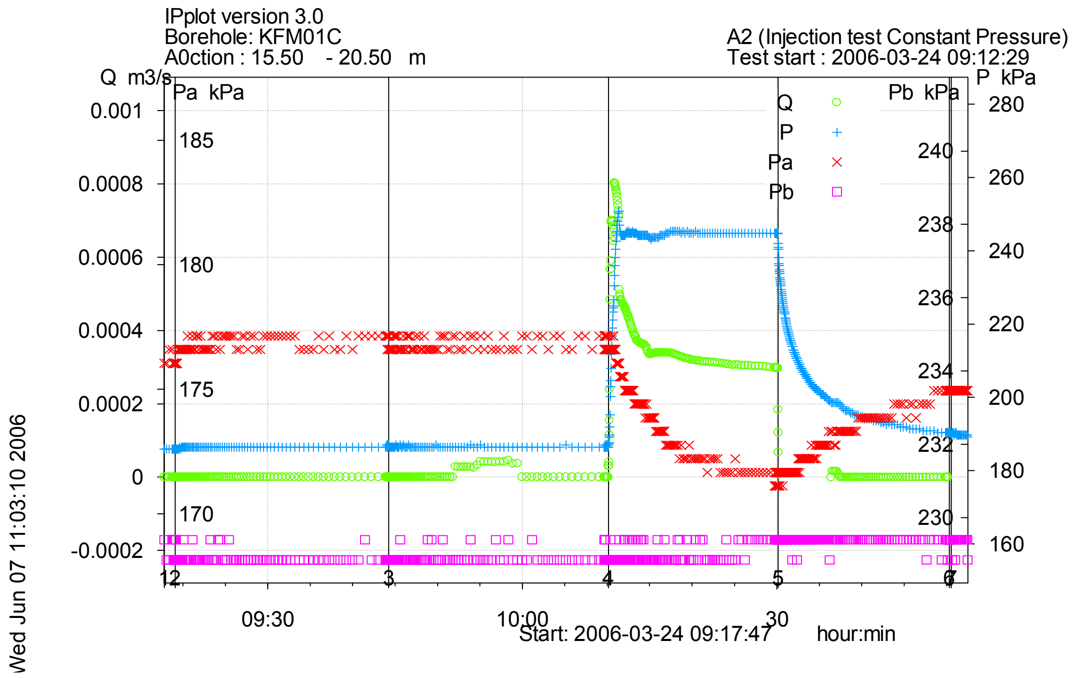

Figure A3-1. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 15.5-20.5 m in borehole KFM01C.*

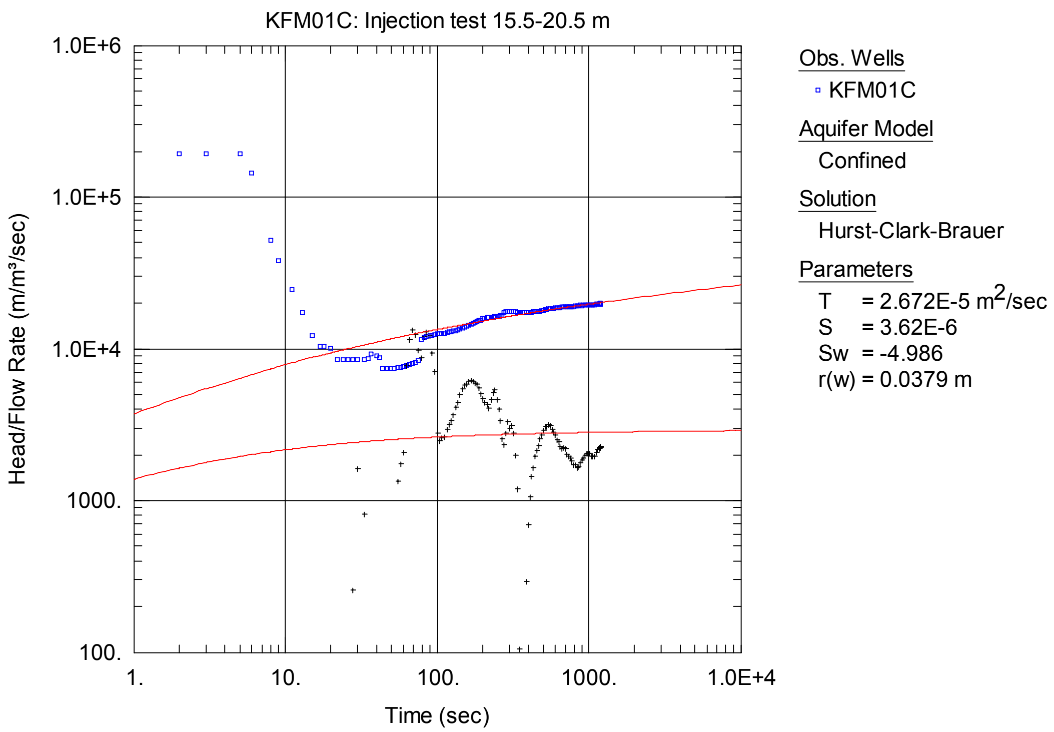

Figure A3-2. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 15.5-20.5 m in KFM01C.*

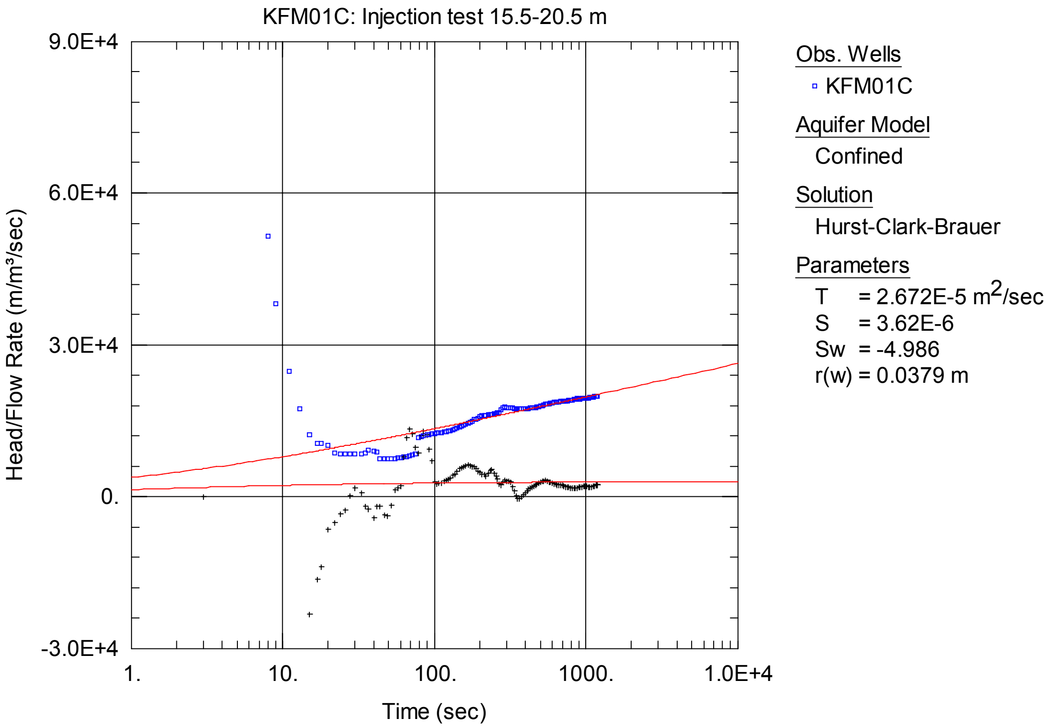

Figure A3-3. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 15.5-20.5 m in KFM01C.*

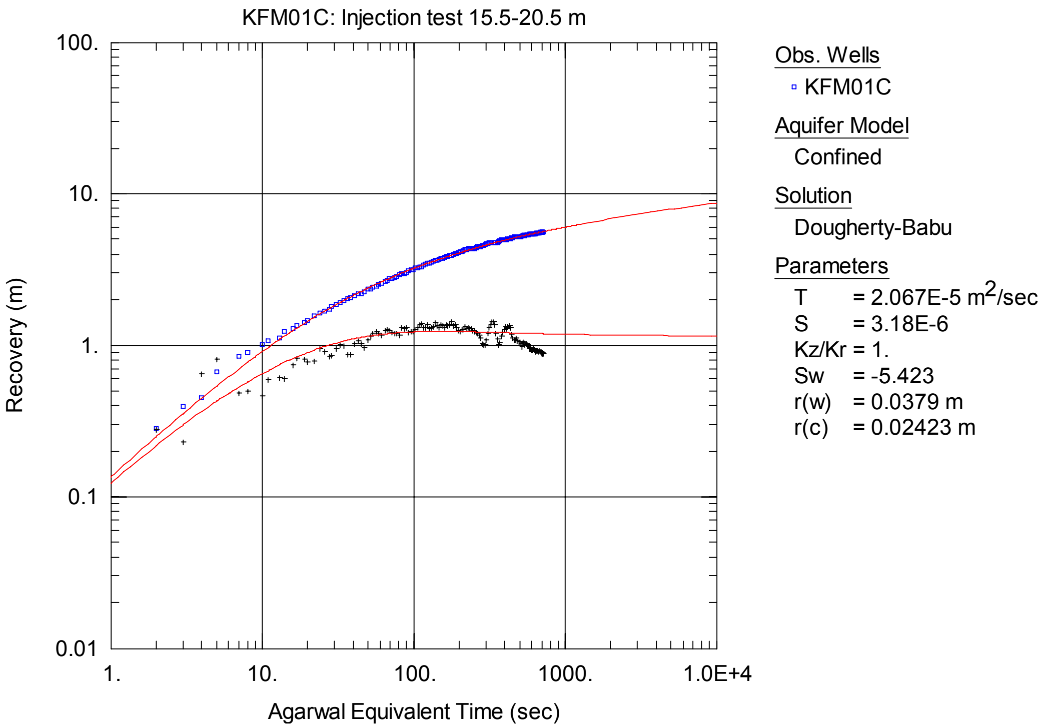

Figure A3-4. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 15.5-20.5 m in KFM01C.*

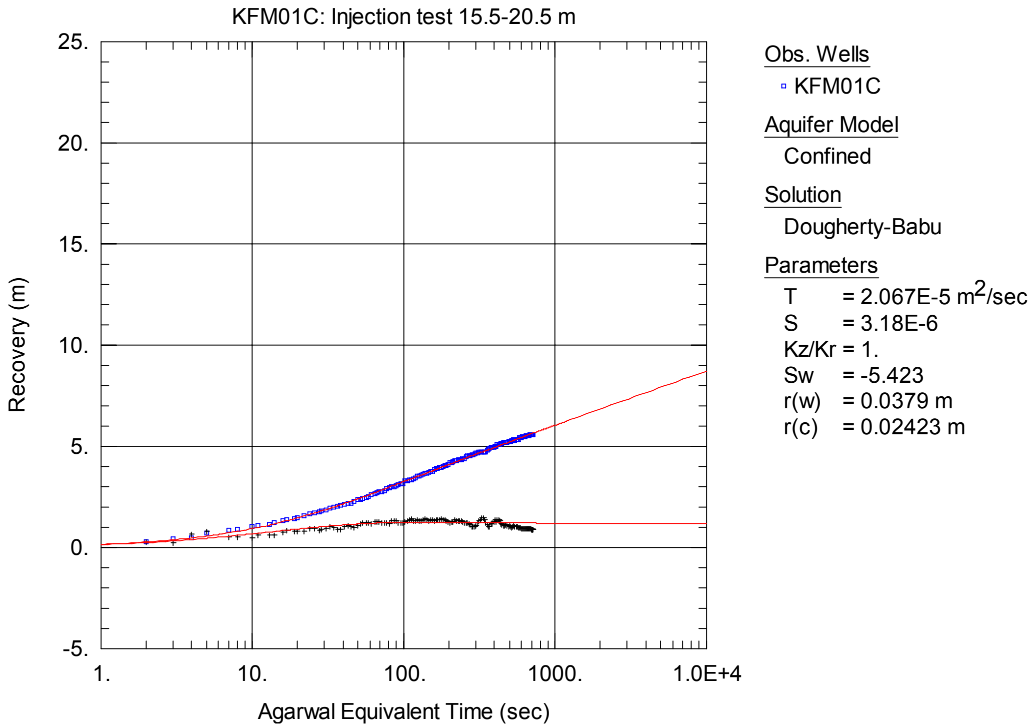

Figure A3-5. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 15.5-20.5 m in KFM01C.*

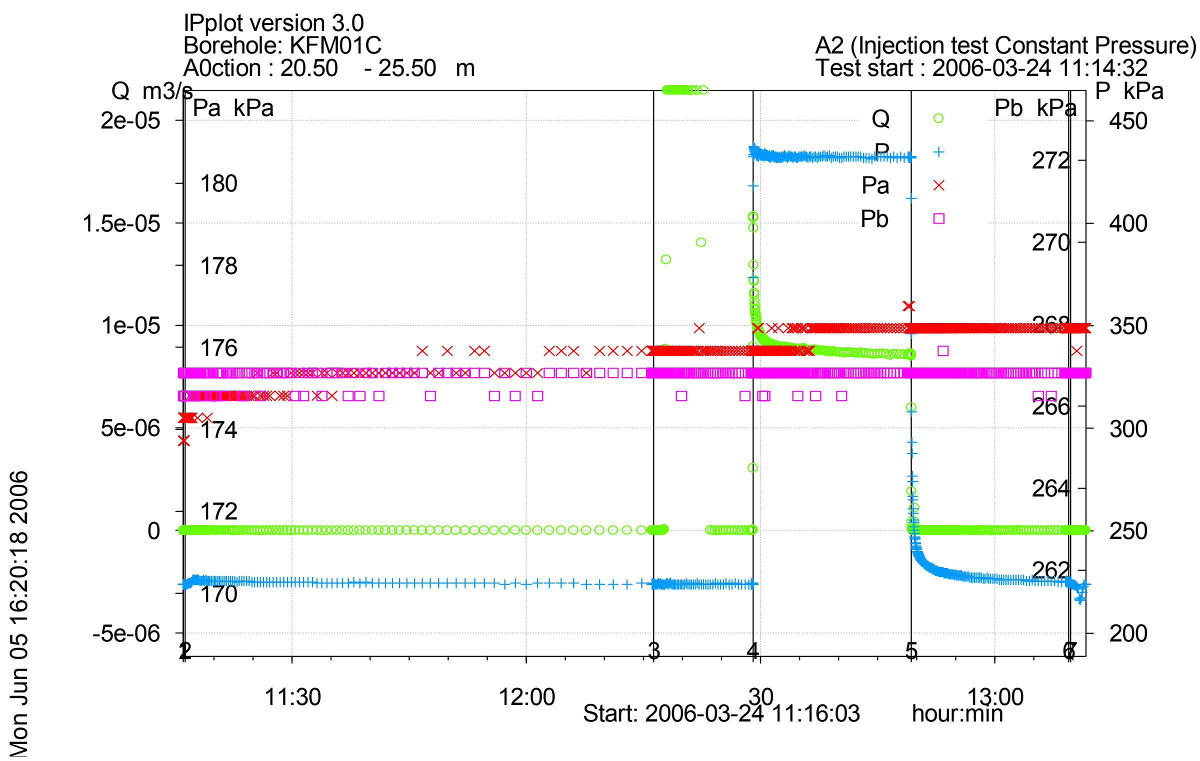

Figure A3-6. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 20.5-25.5 m in borehole KFM01C.*

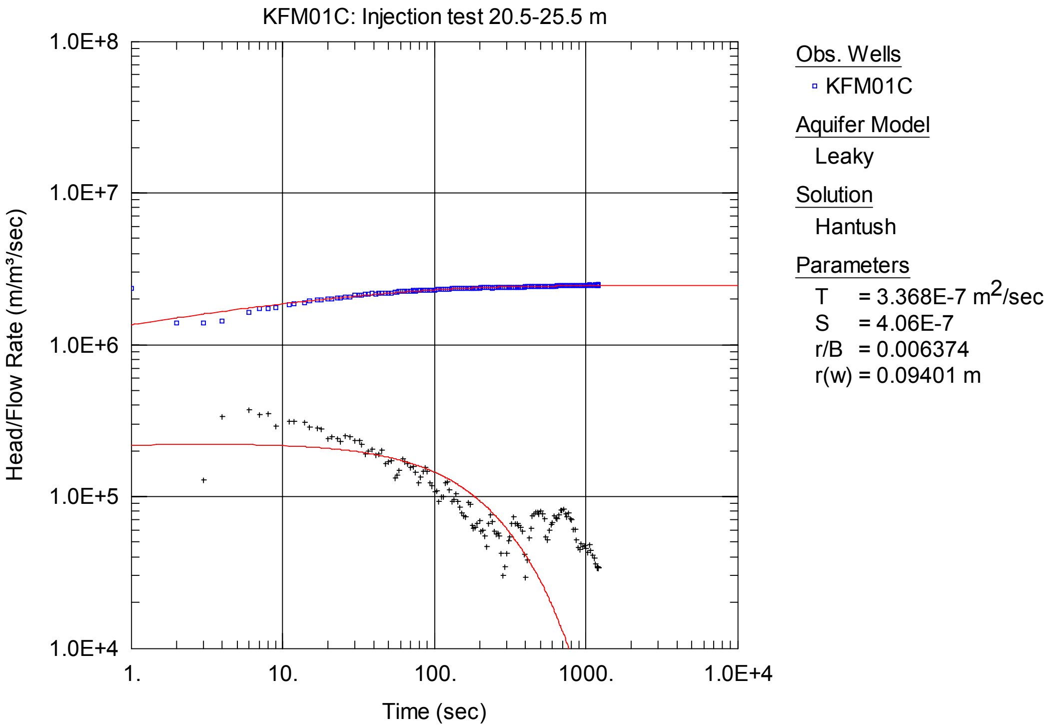

Figure A3-7. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 20.5-25.5 m in KFM01C.*

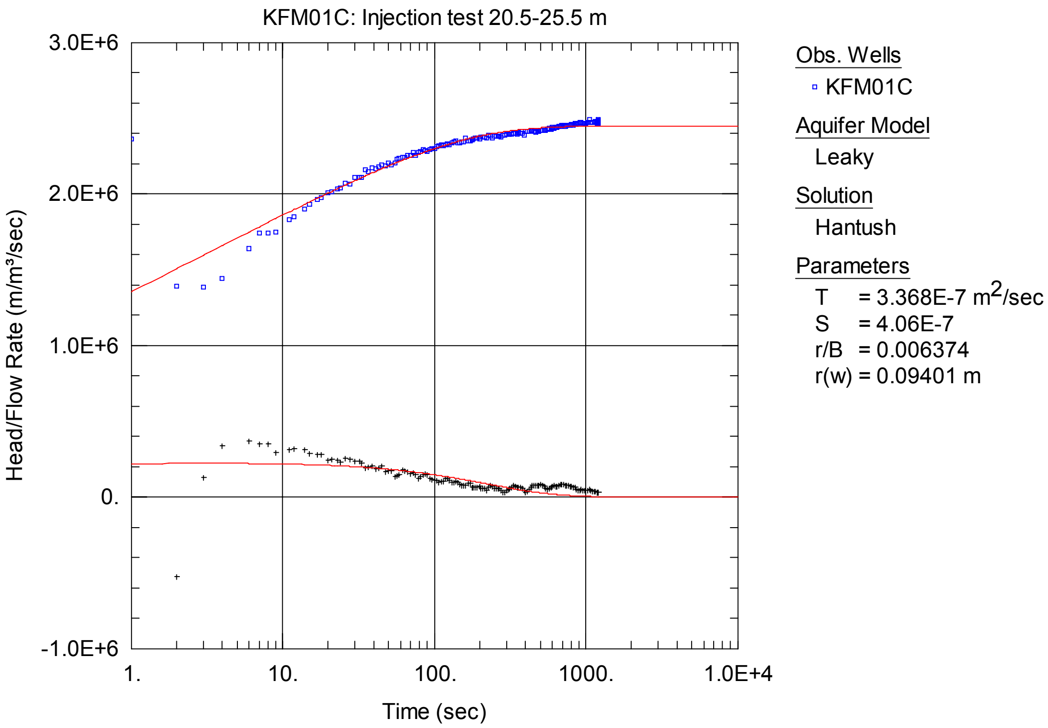

Figure A3-8. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 20.5-25.5 m in KFM01C.*

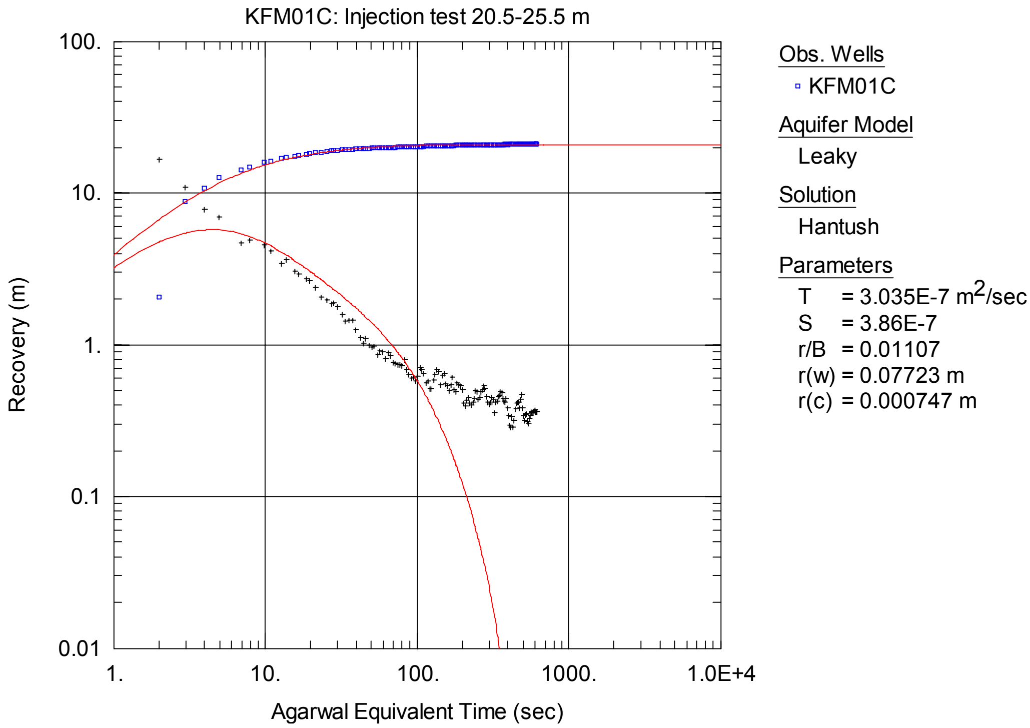

Figure A3-9. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 20.5-25.5 m in KFM01C.*

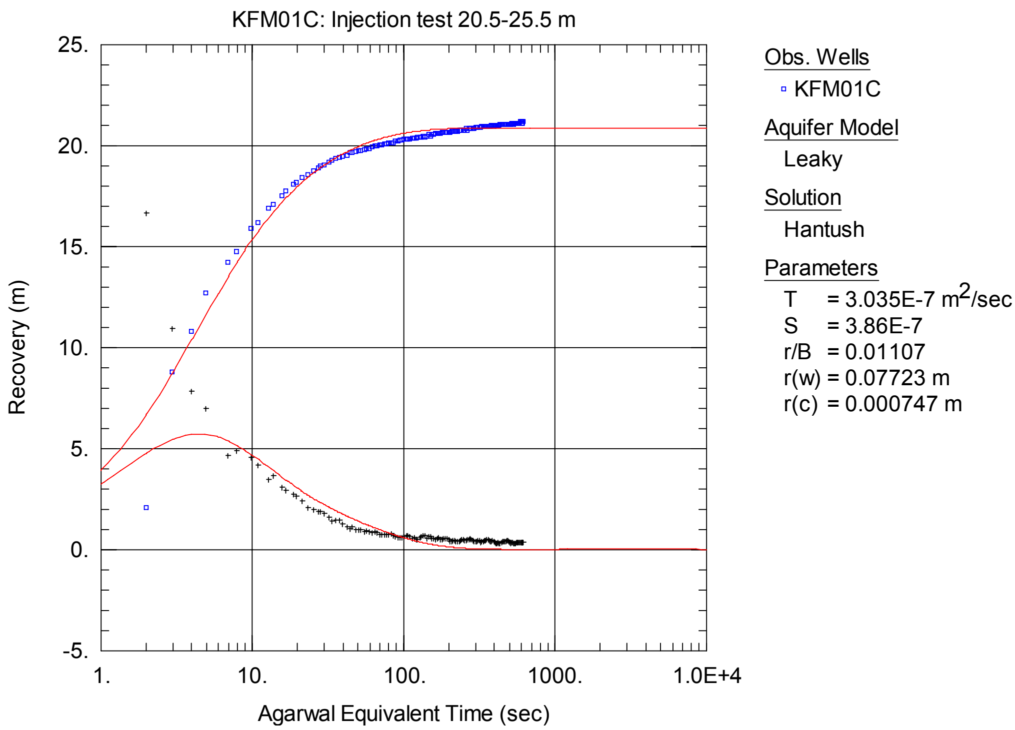

Figure A3-10. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 20.5-25.5 m in KFM01C.*

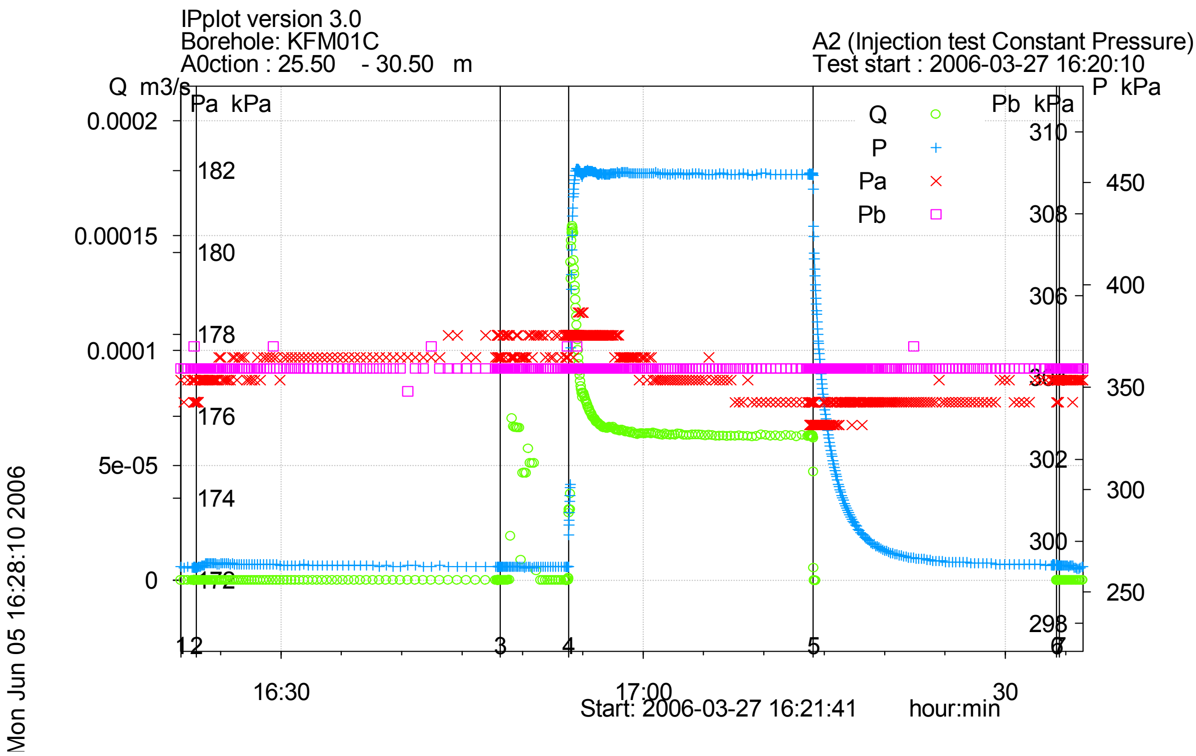

Figure A3-11. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 25.5-30.5 m in borehole KFM01C.*

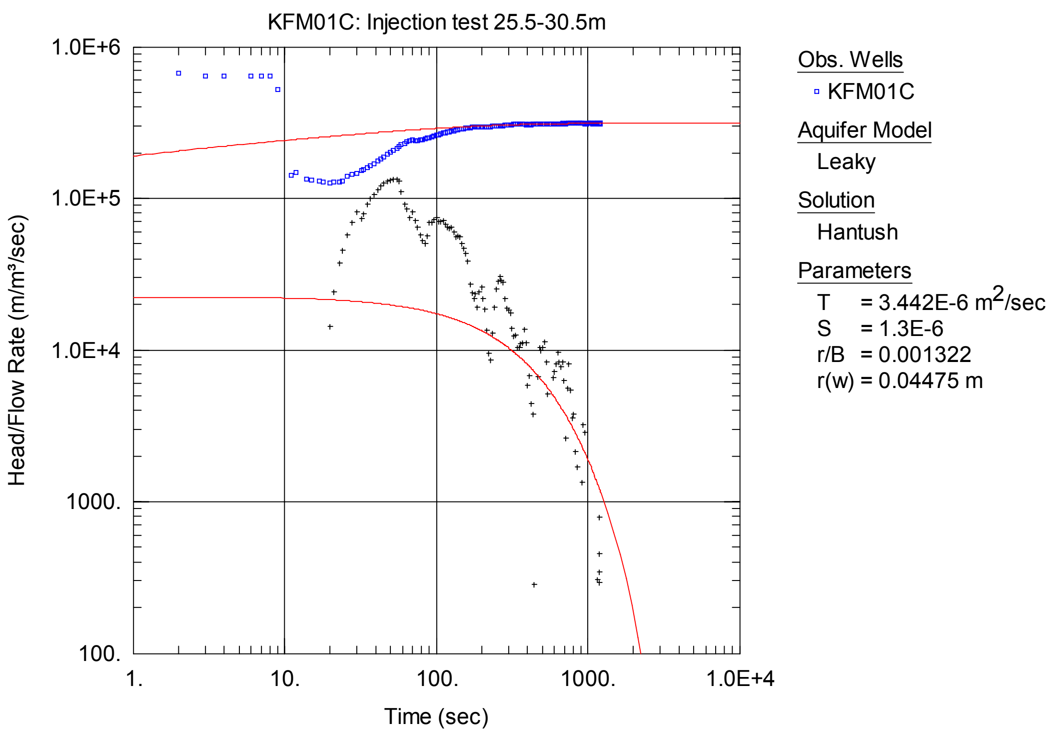

Figure A3-12. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 25.5-30.5 m in KFM01C.*

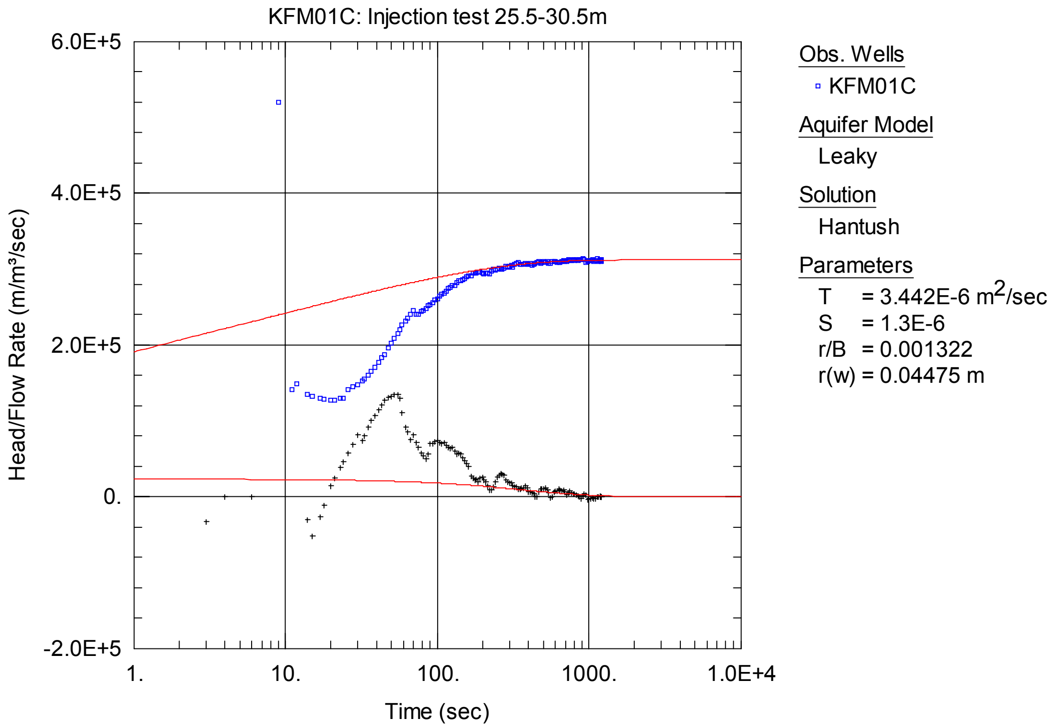

Figure A3-13. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 25.5-30.5 m in KFM01C.*

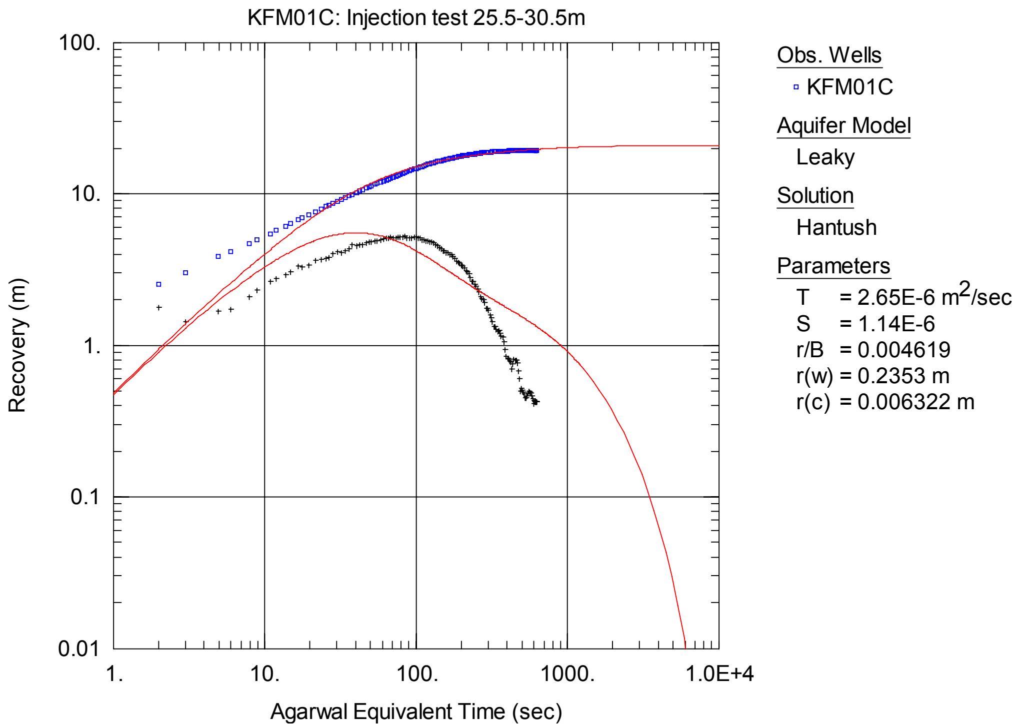

Figure A3-14. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 25.5-30.5 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

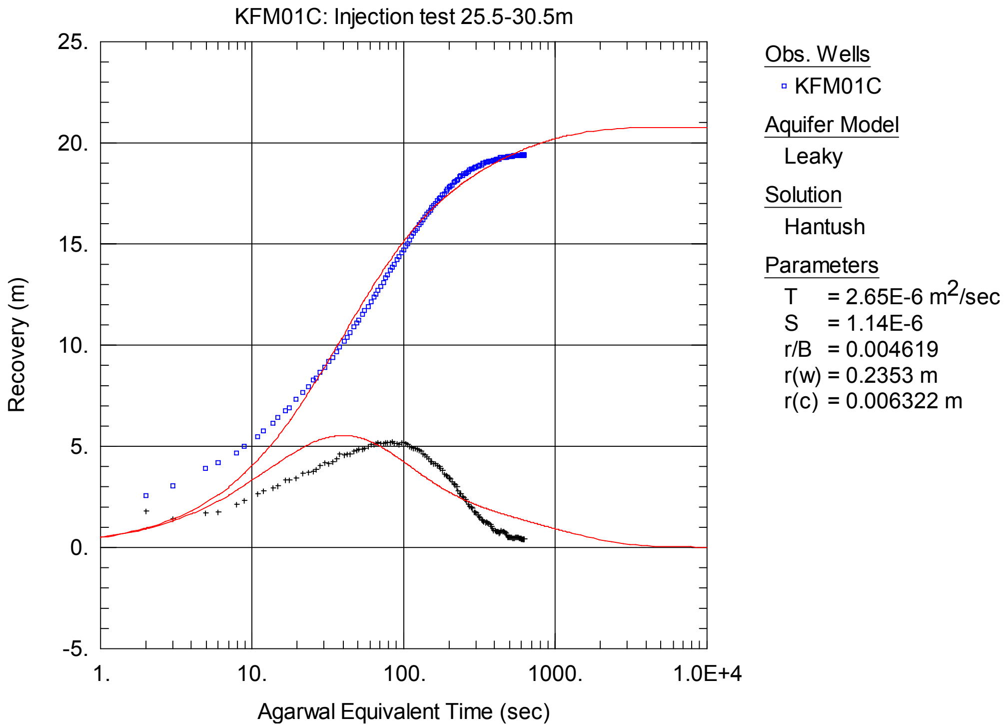

Figure A3-15. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 25.5-30.5 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

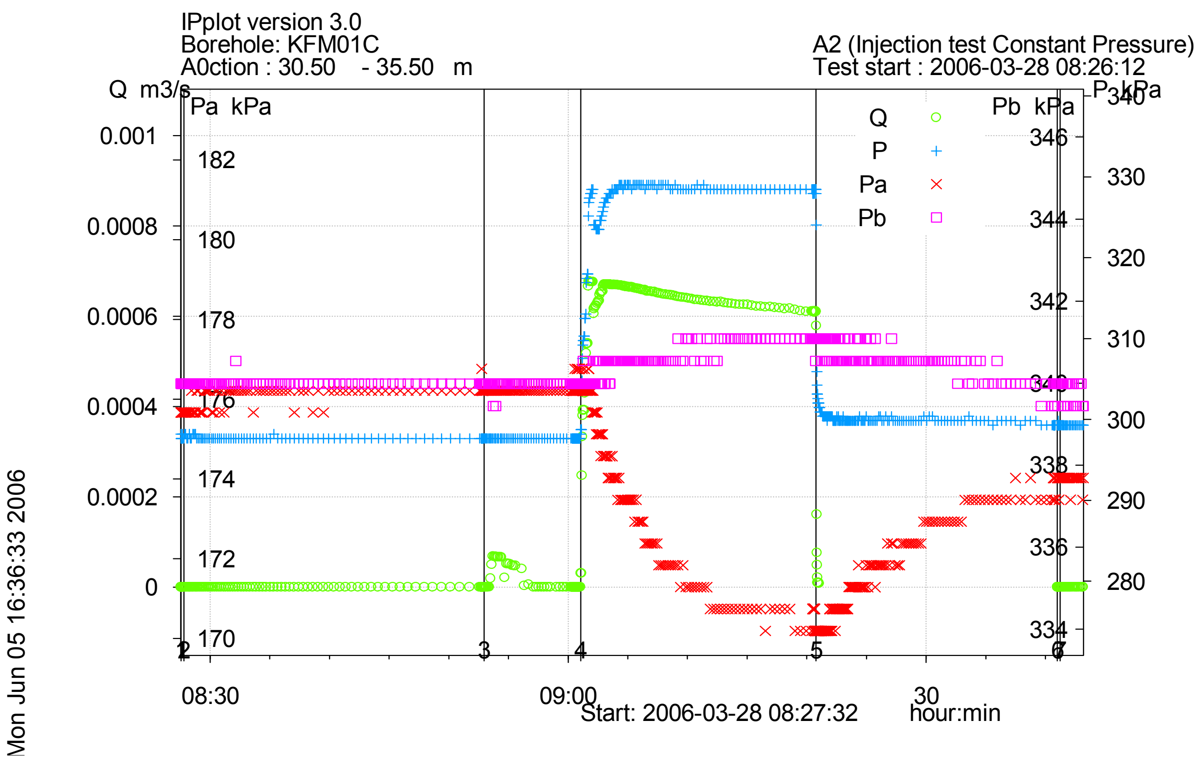

Figure A3-16. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 30.5-35.5 m in borehole KFM01C.*

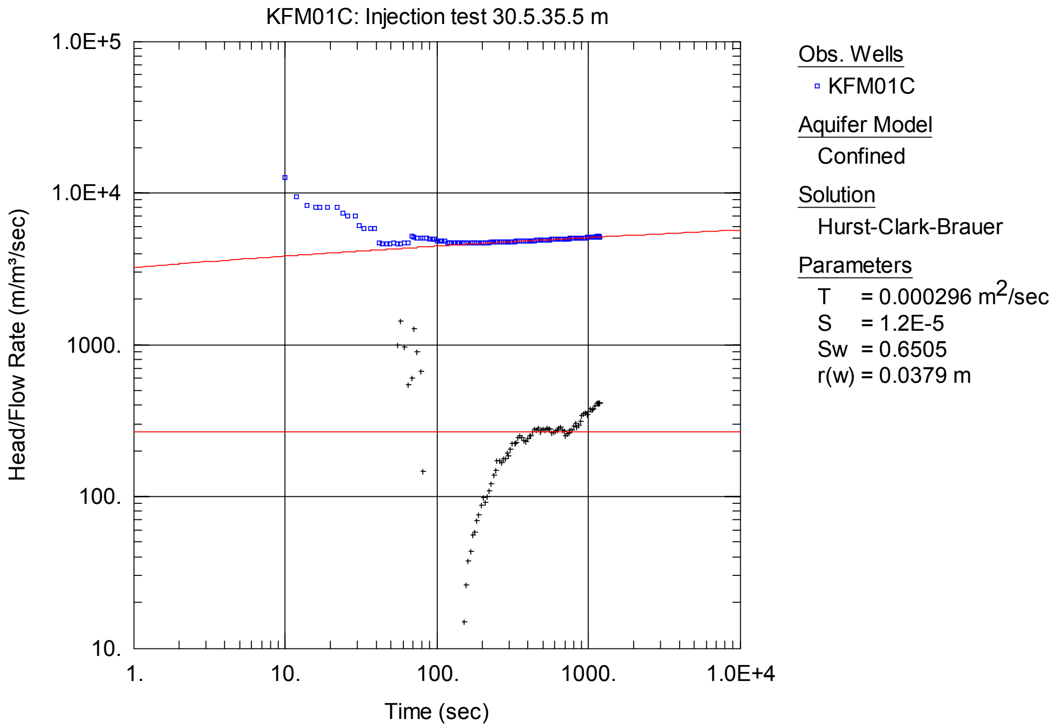

Figure A3-17. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 30.5-35.5 m in KFM01C.*

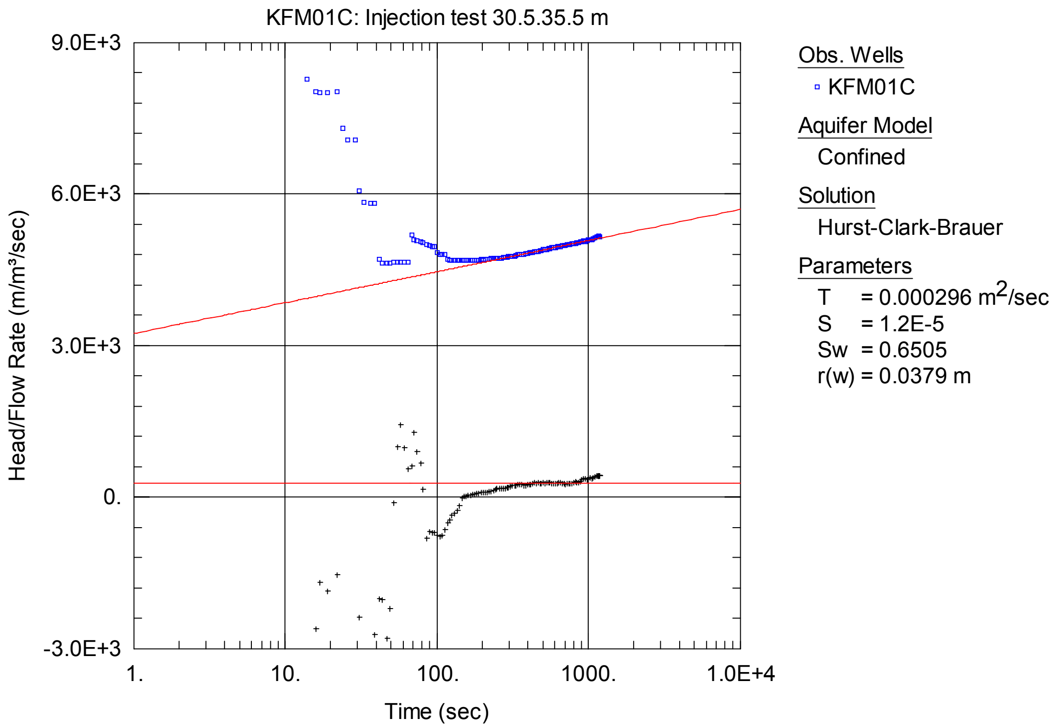

Figure A3-18. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 30.5-35.5 m in KFM01C.*

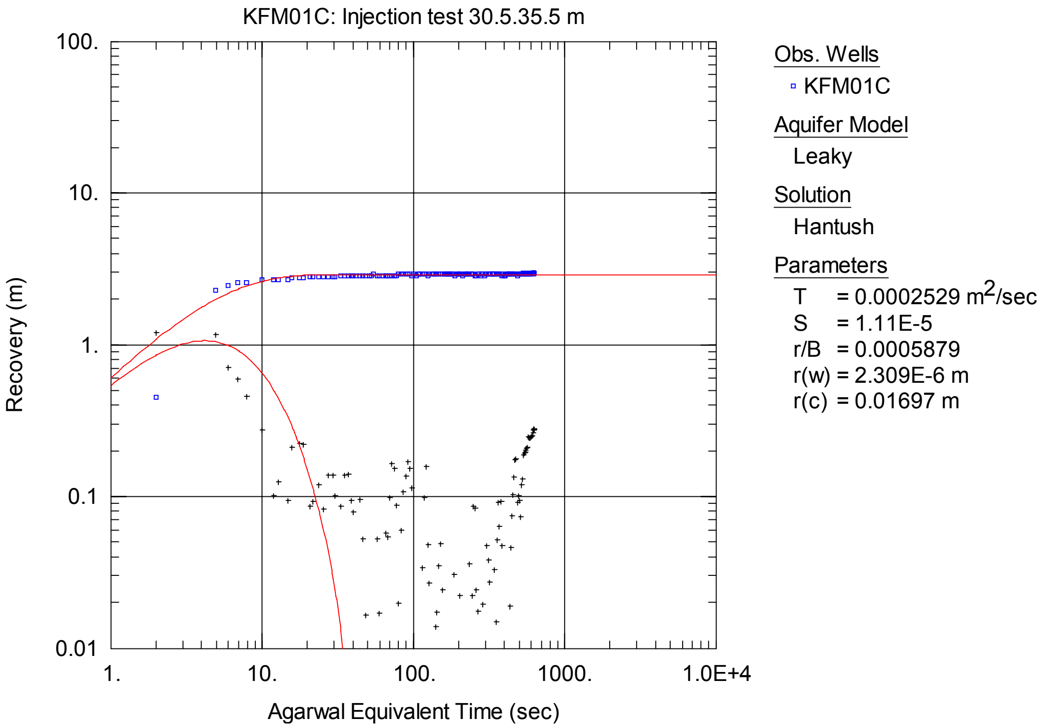

Figure A3-19. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 30.5-35.5 m in KFM01C.*

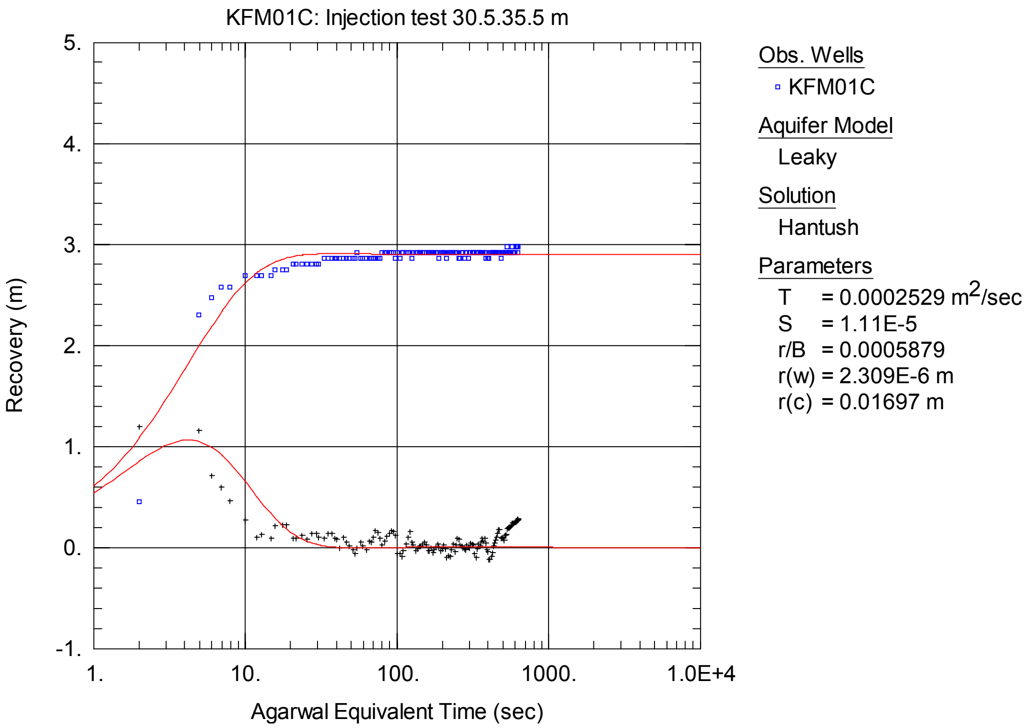

Figure A3-20. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 30.5-35.5 m in KFM01C.*

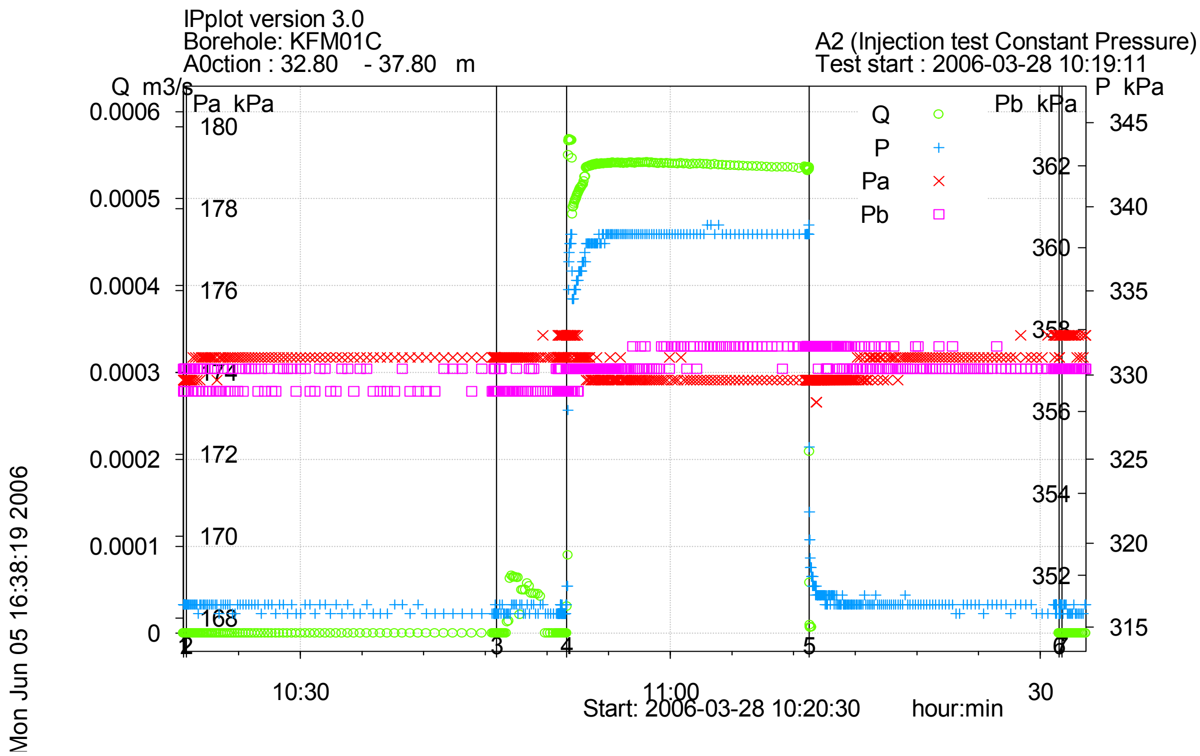

Figure A3-21. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 32.8-37.8 m in borehole KFM01C.*

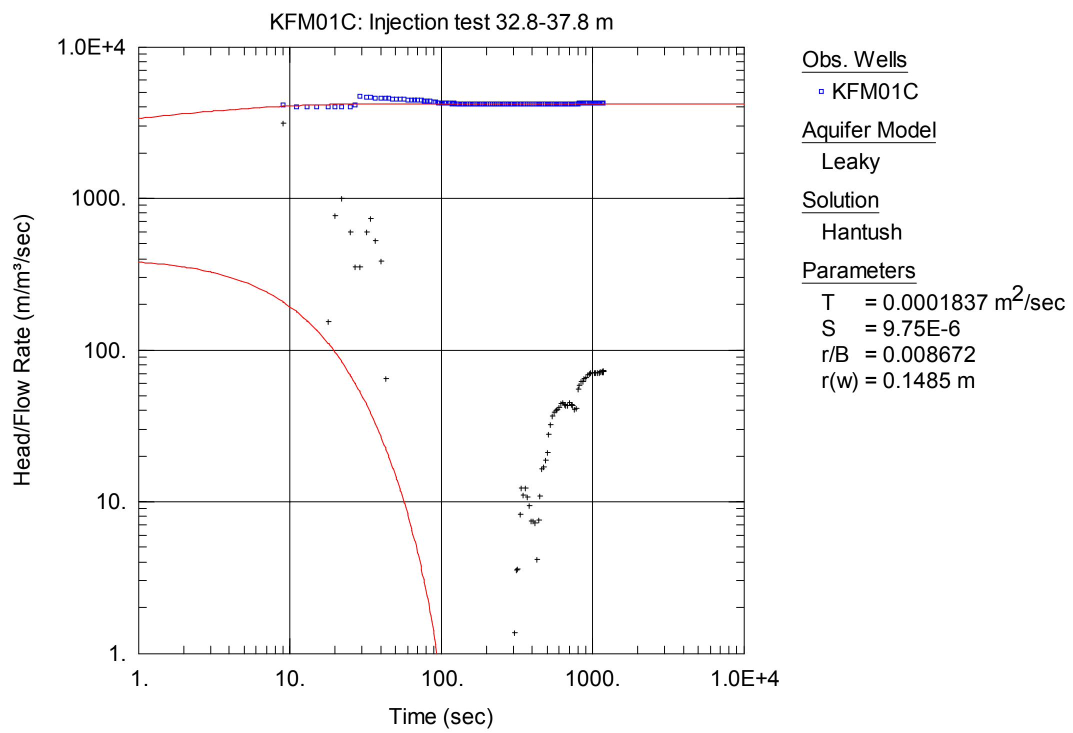

Figure A3-22. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 32.8-37.8 m in KFM01C.*

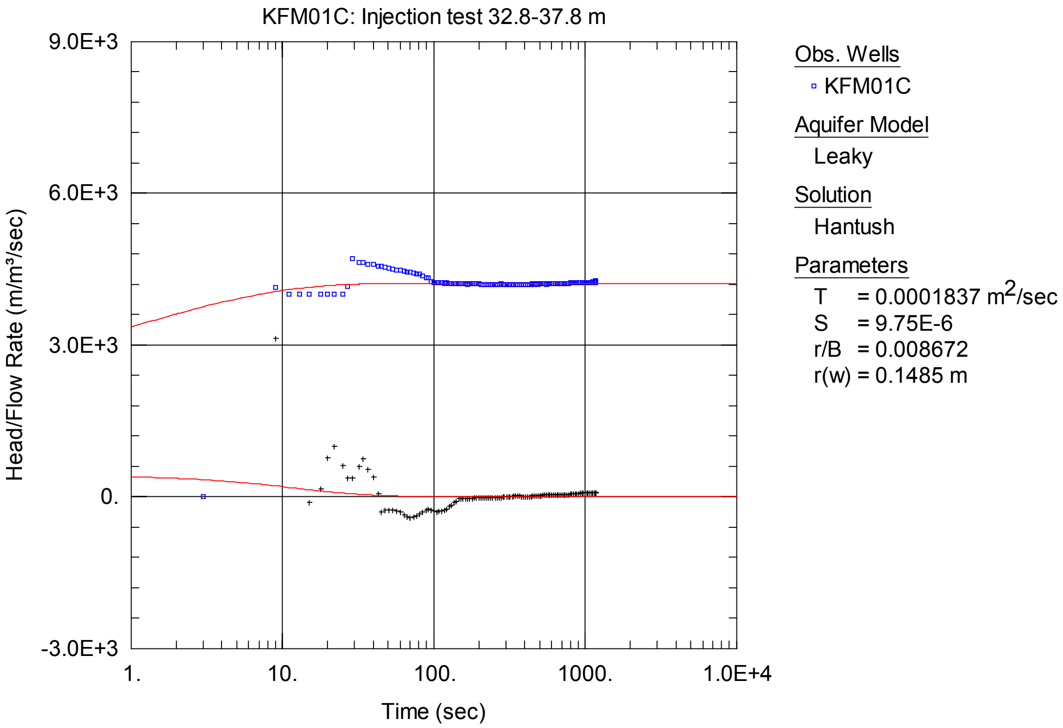

Figure A3-23. Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 32.8-37.8 m in KFM01C.

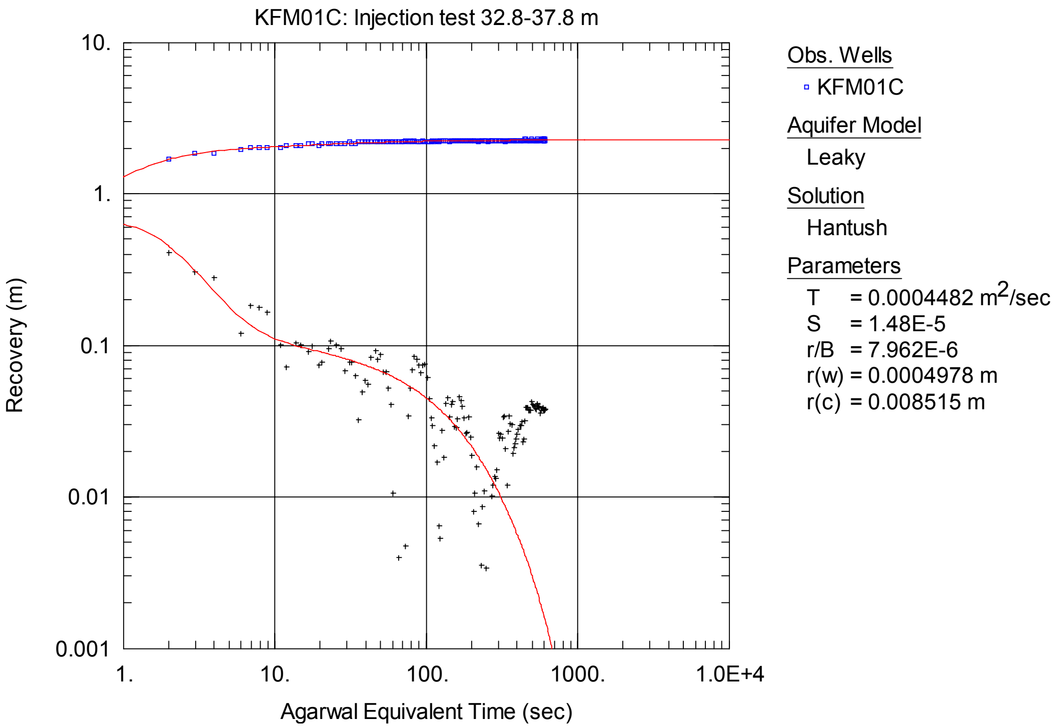

Figure A3-24. Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 32.8-37.8 m in KFM01C.

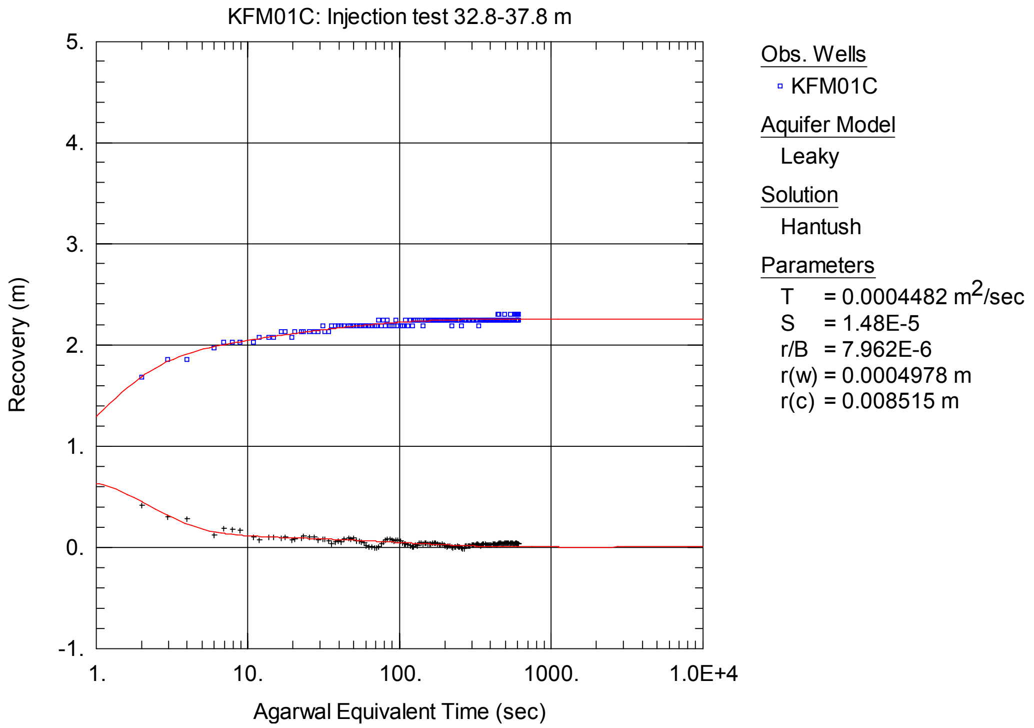

Figure A3-25. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 32.8-37.8 m in KFM01C.*

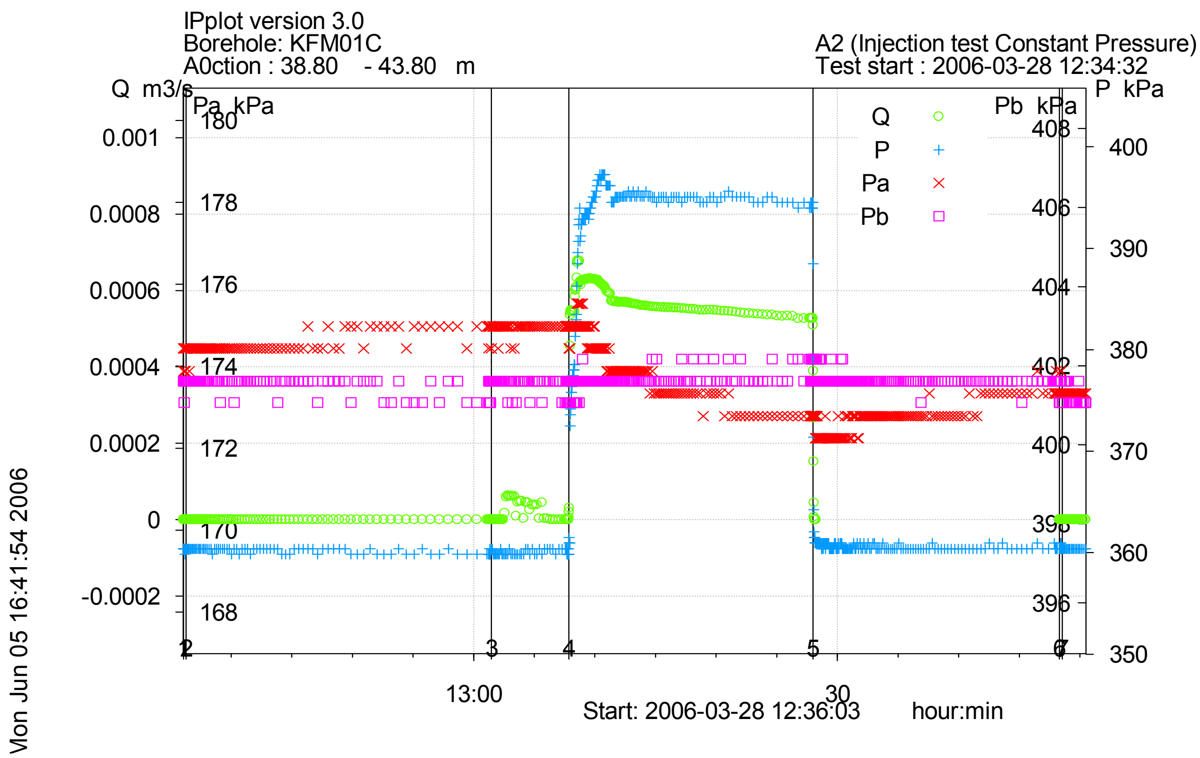

Figure A3-26. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 38.8-43.8 m in borehole KFM01C.*

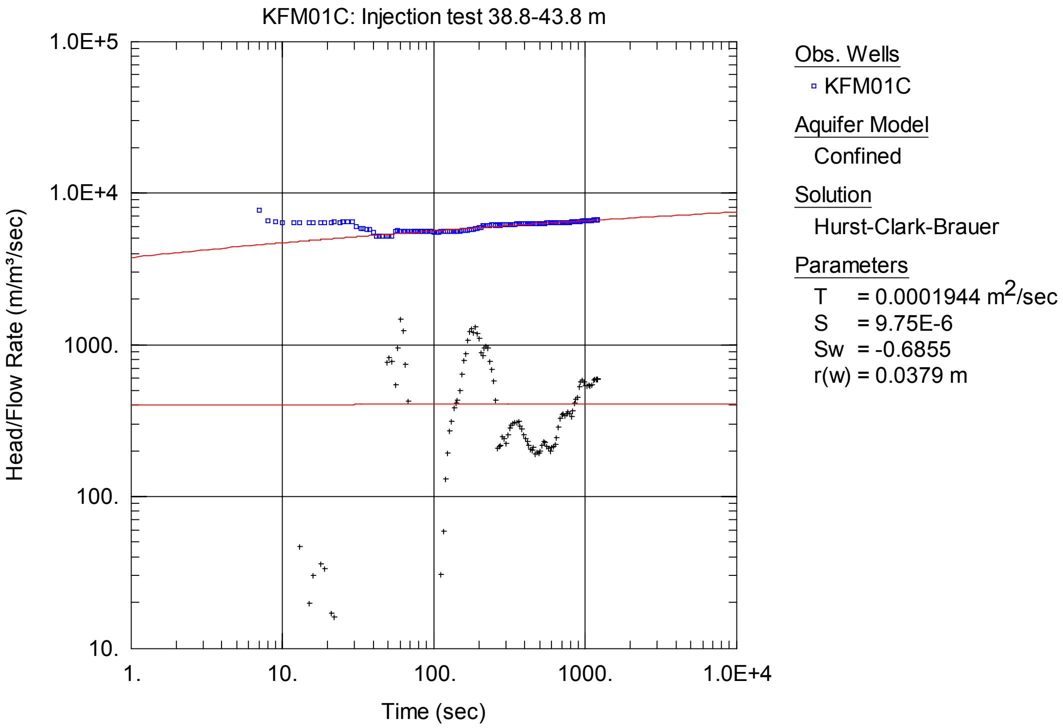

Figure A3-27. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 38.8-43.8 m in KFM01C.*

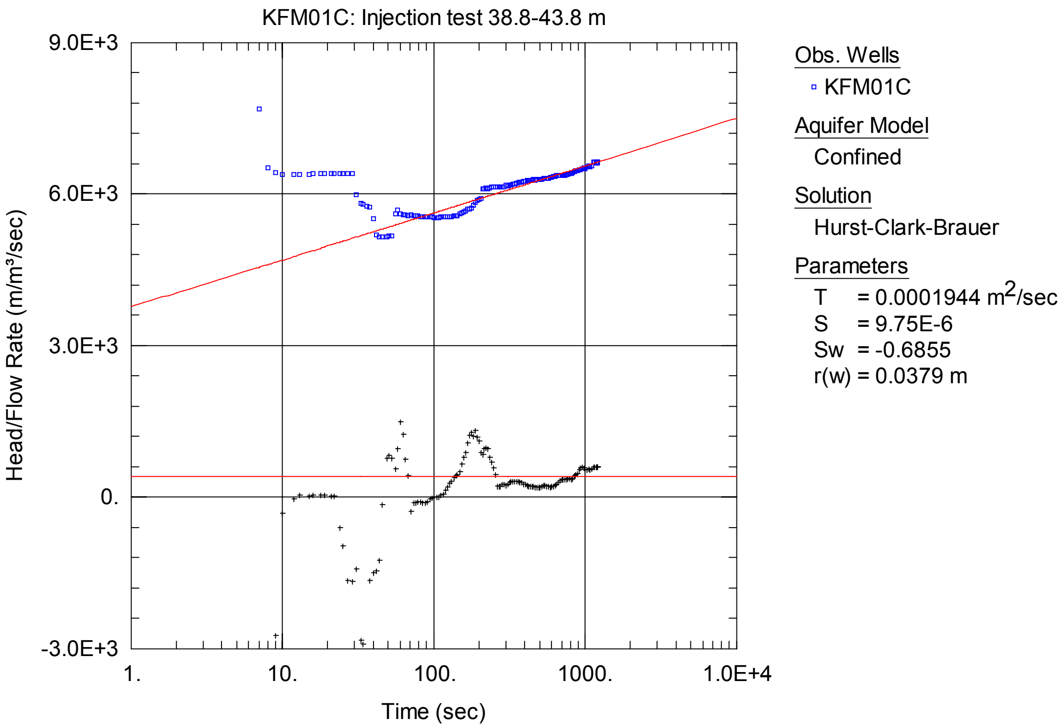

Figure A3-28. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 38.8-43.8 m in KFM01C.*

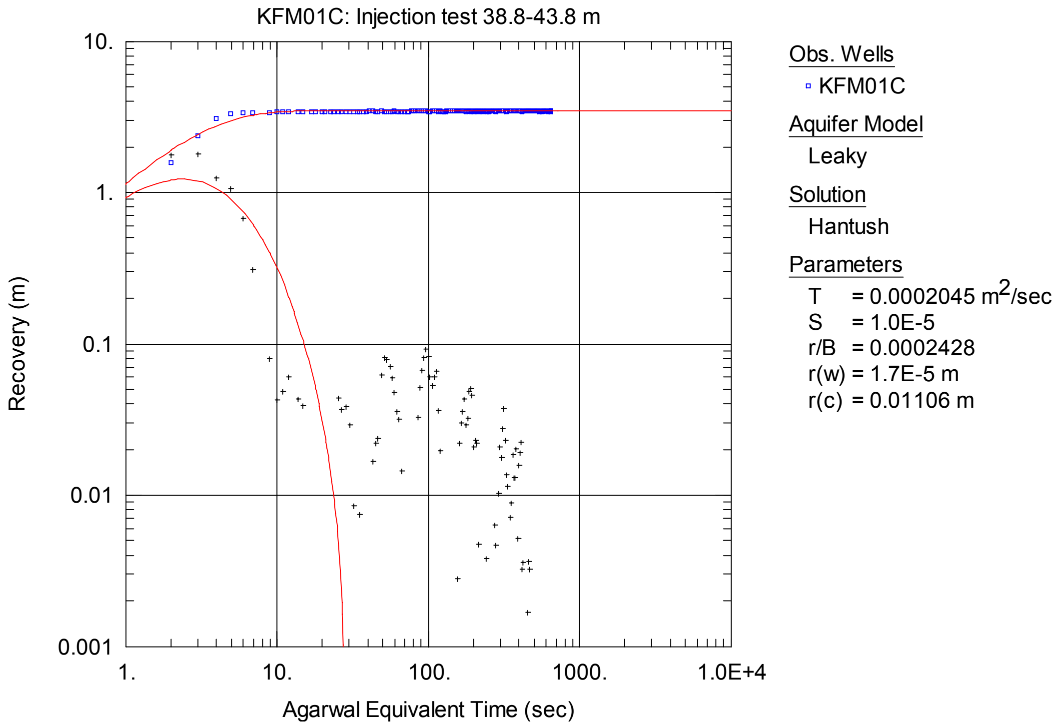

Figure A3-29. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 38.8-43.8 m in KFM01C.*

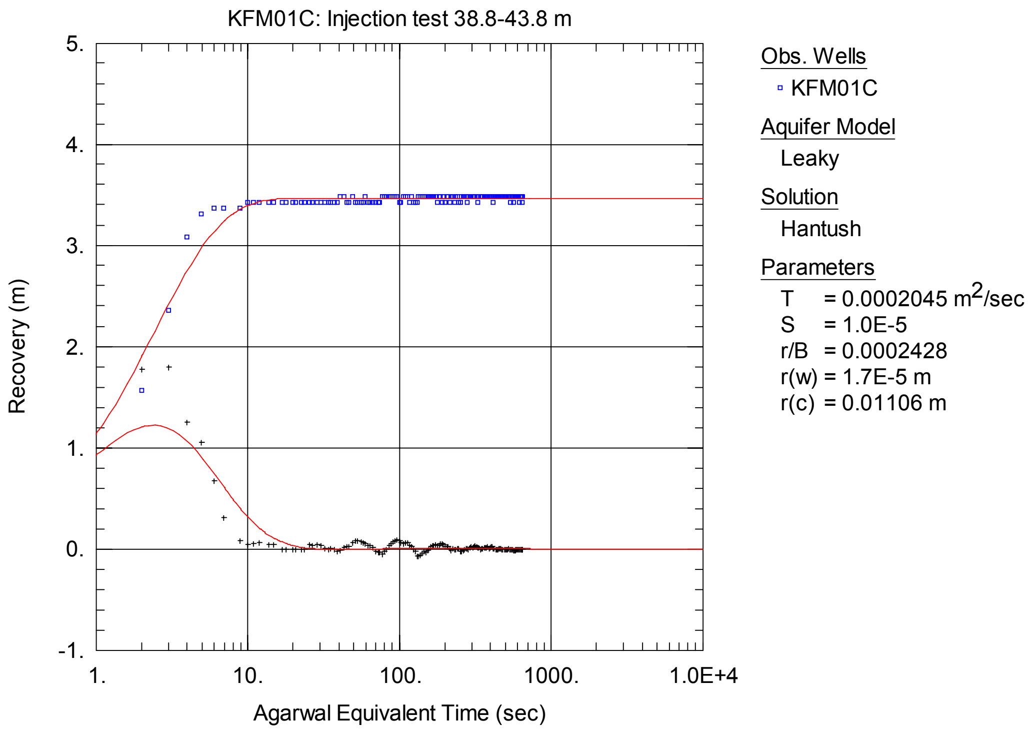

Figure A3-30. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 38.8-43.8 m in KFM01C.*

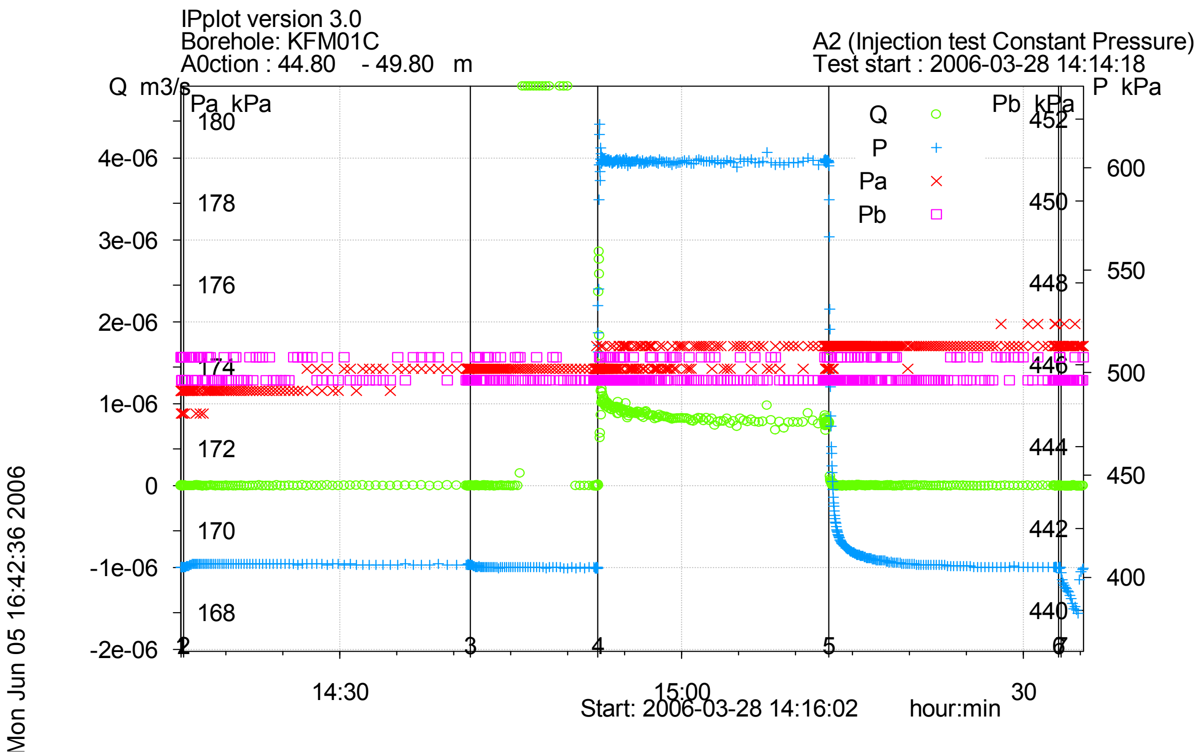

Figure A3-31. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 44.8-49.8 m in borehole KFM01C.

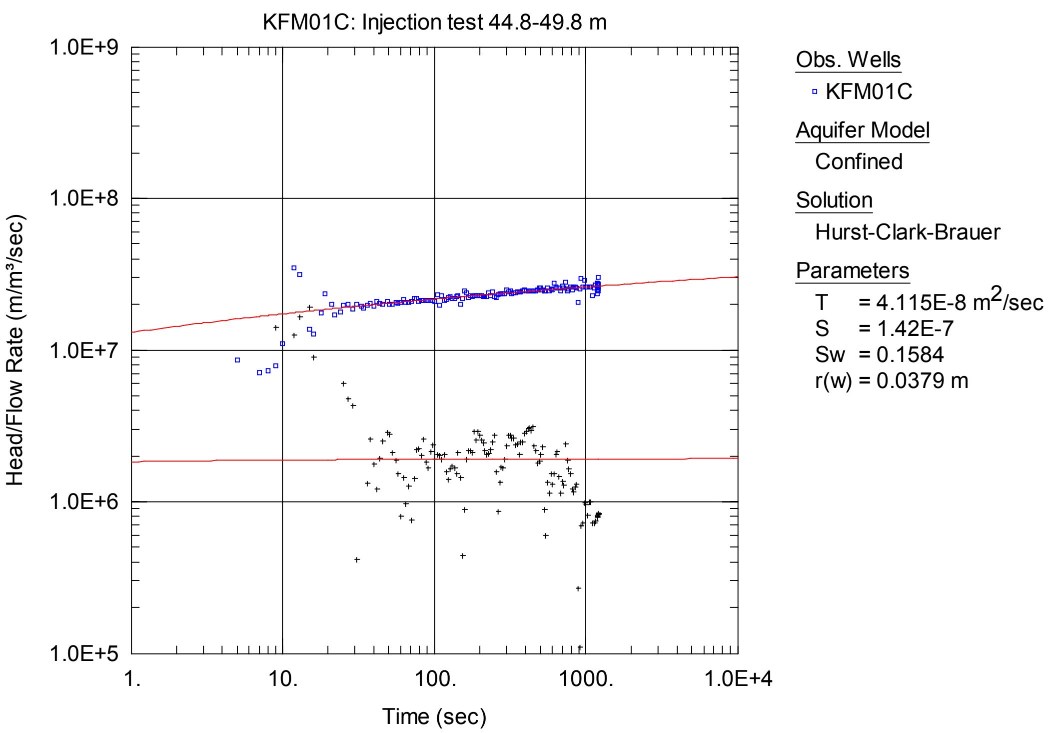

Figure A3-32. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 44.8-49.8 m in KFM01C.

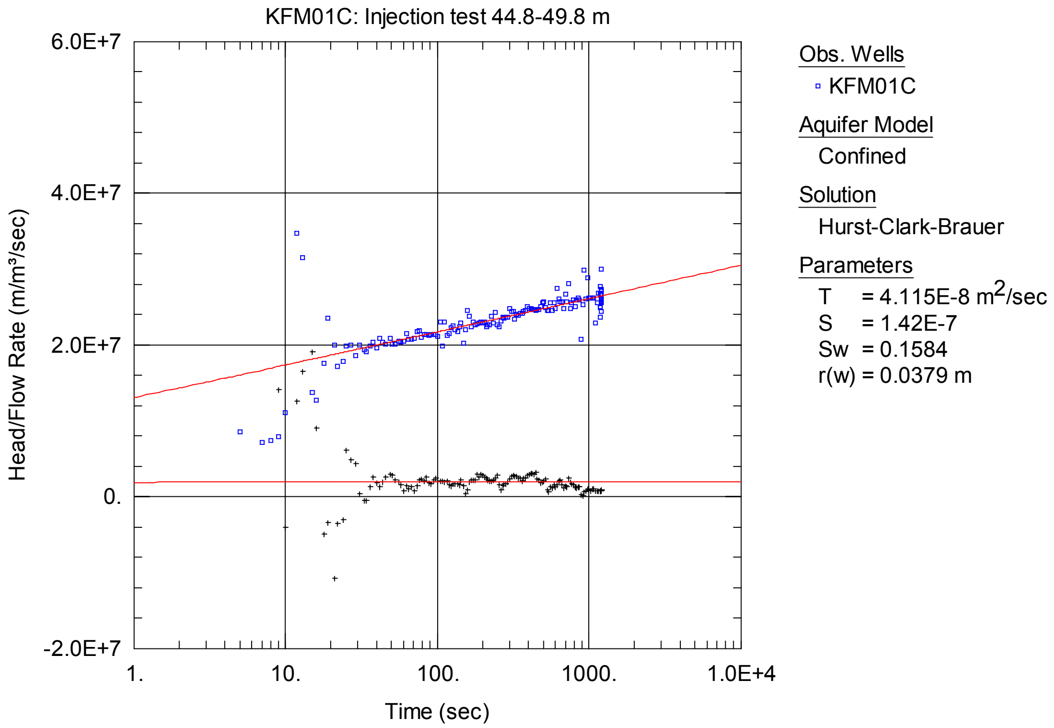

Figure A3-33. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 44.8-49.8 m in KFM01C.*

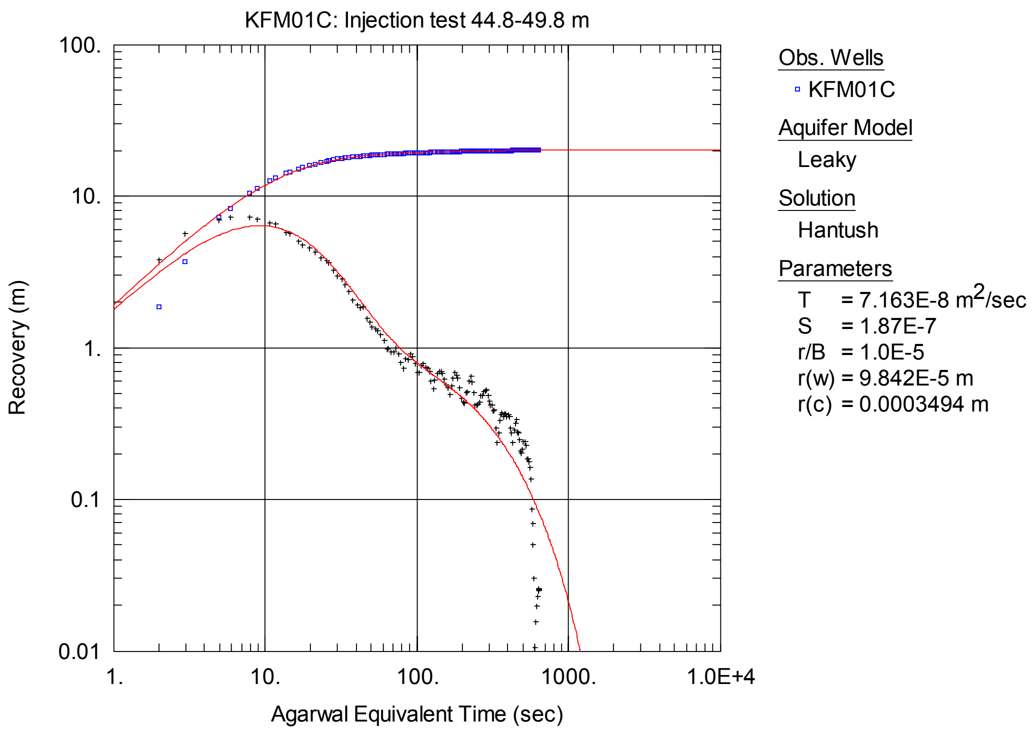

Figure A3-34. ***Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 44.8-49.8 m in KFM01C.***

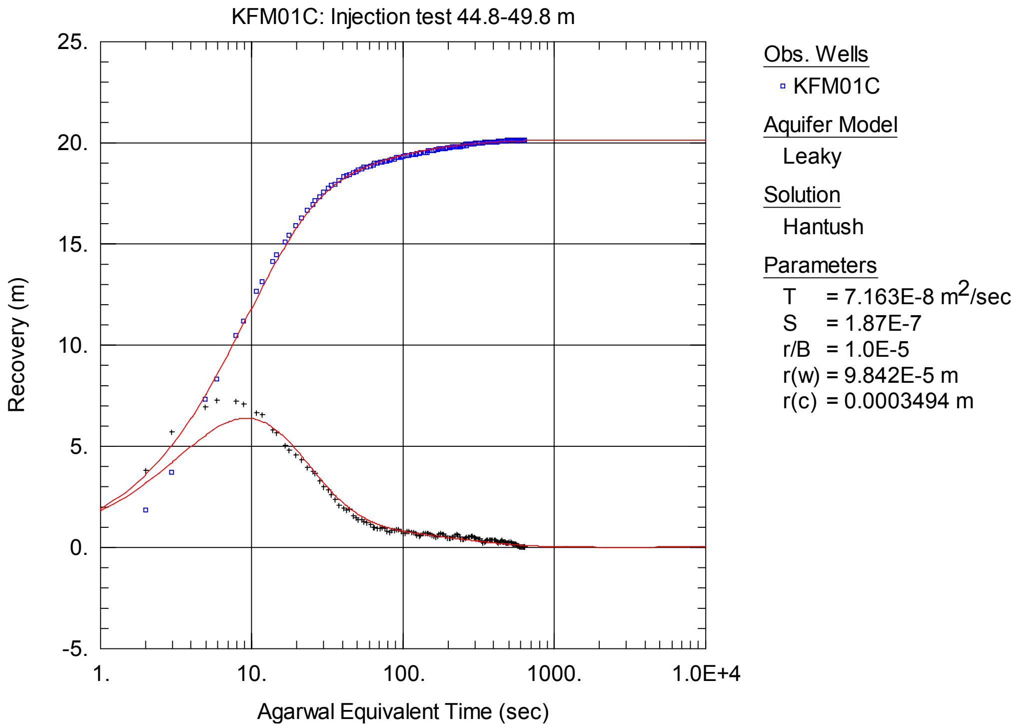

Figure A3-35. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 44.8-49.8 m in KFM01C.*

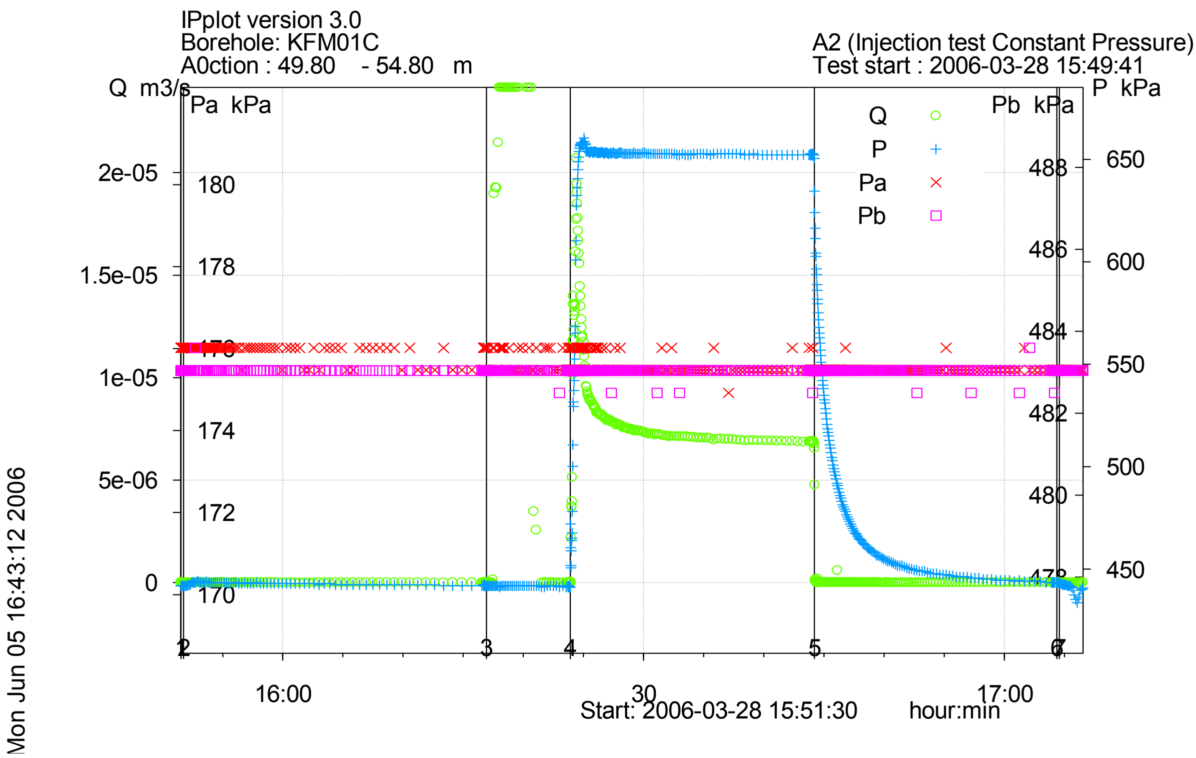

Figure A3-36. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 49.8-54.8 m in borehole KFM01C.*

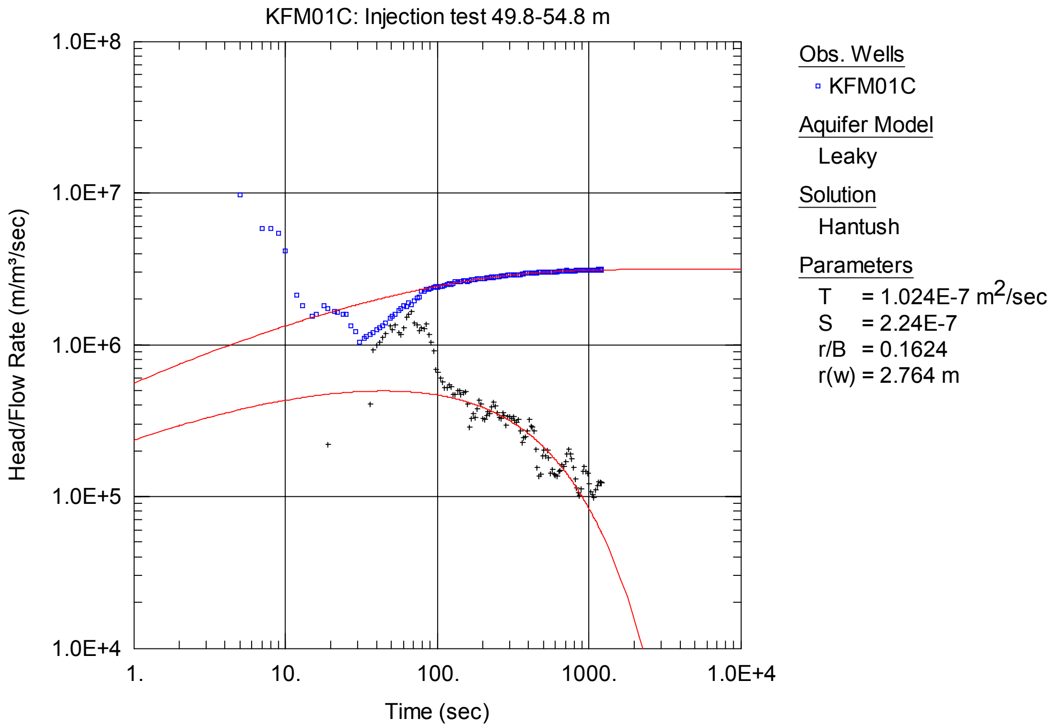

Figure A3-37. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 49.8-54.8 m in KFM01C.*

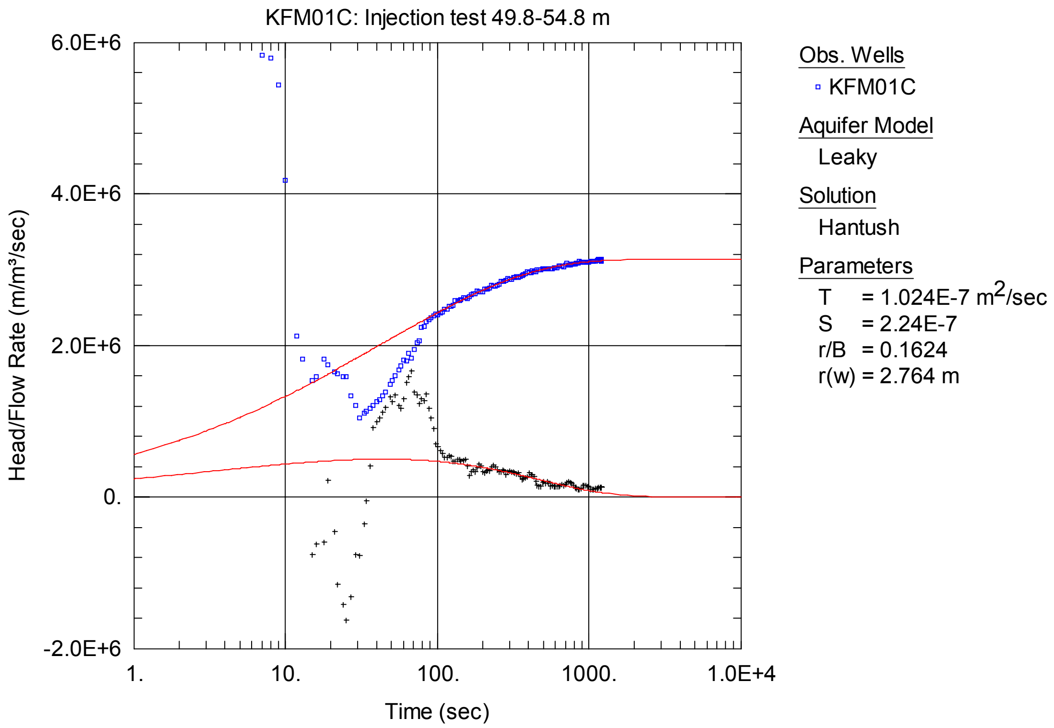

Figure A3-38. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 49.8-54.8 m in KFM01C.*

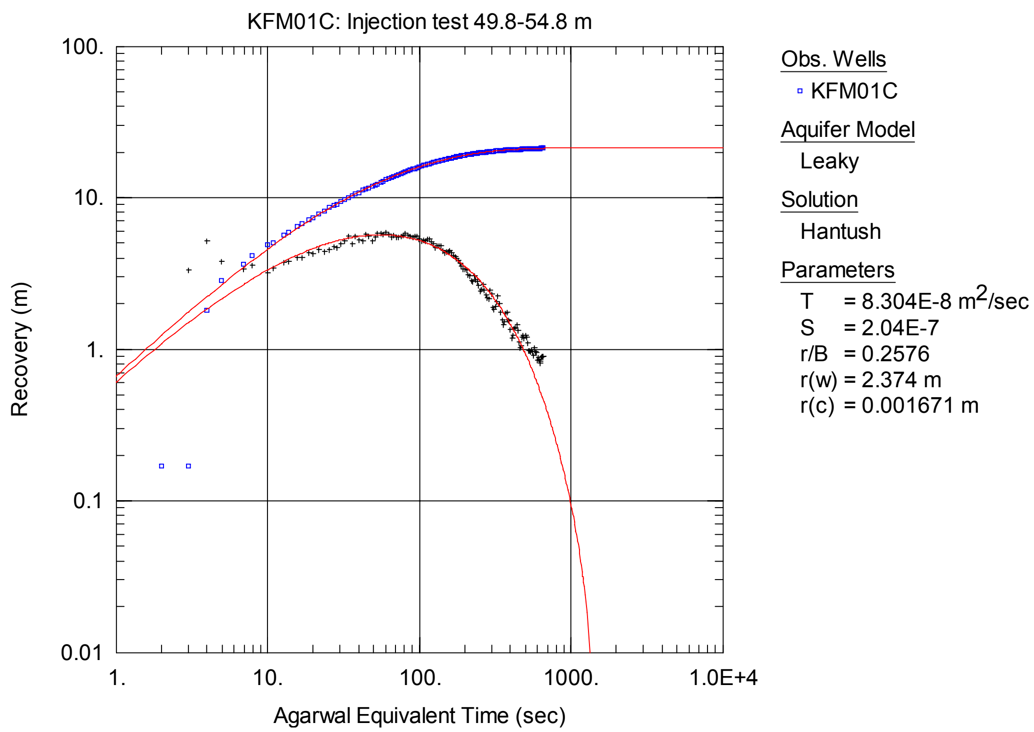

Figure A3-39. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 49.8-54.8 m in KFM01C.*

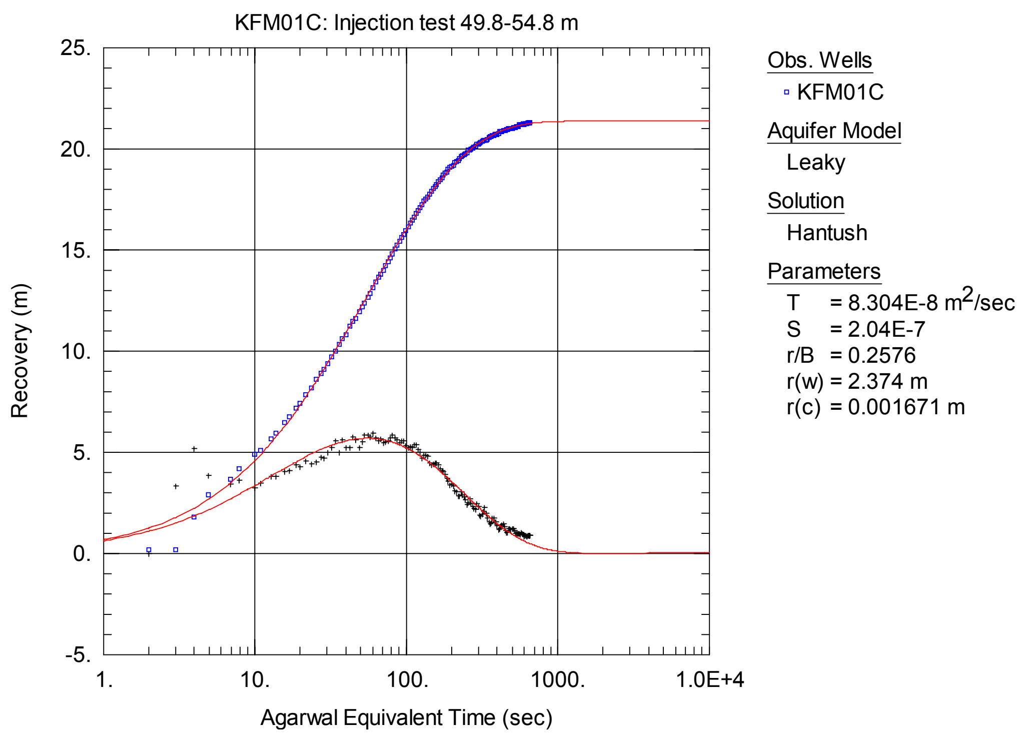

Figure A3-40. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 49.8-54.8 m in KFM01C.*

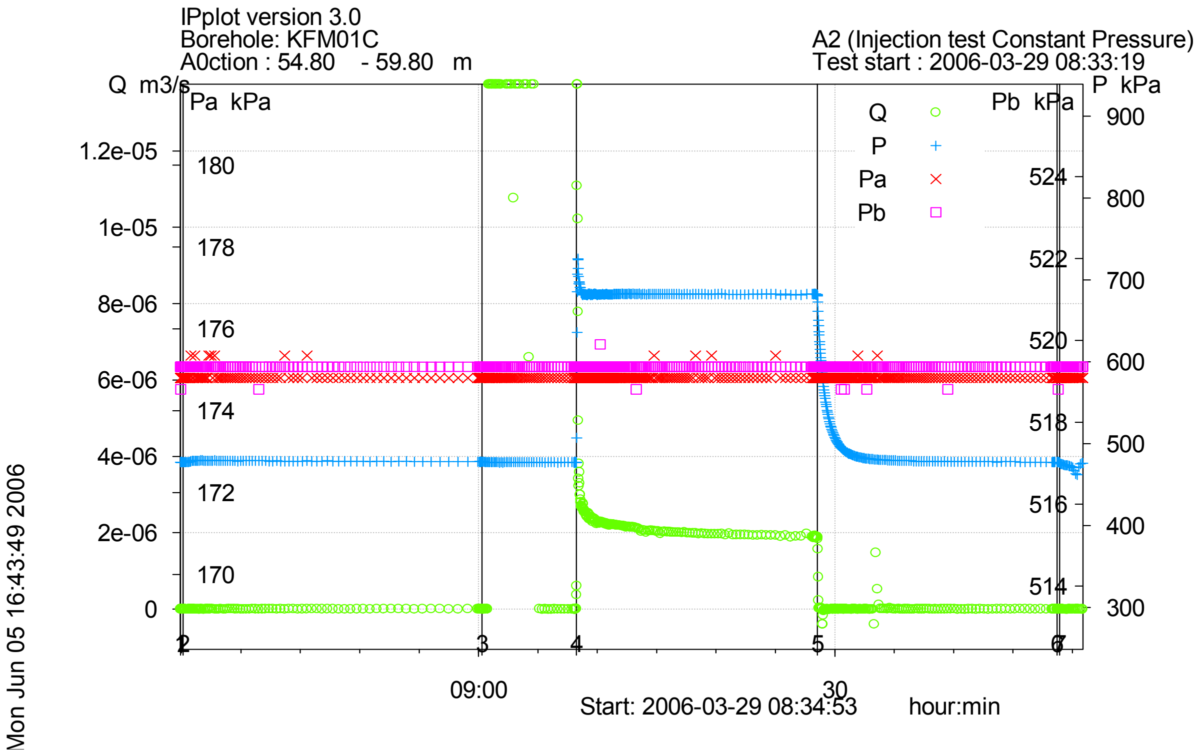

Figure A3-41. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 54.8-59.8 m in borehole KFM01C.*

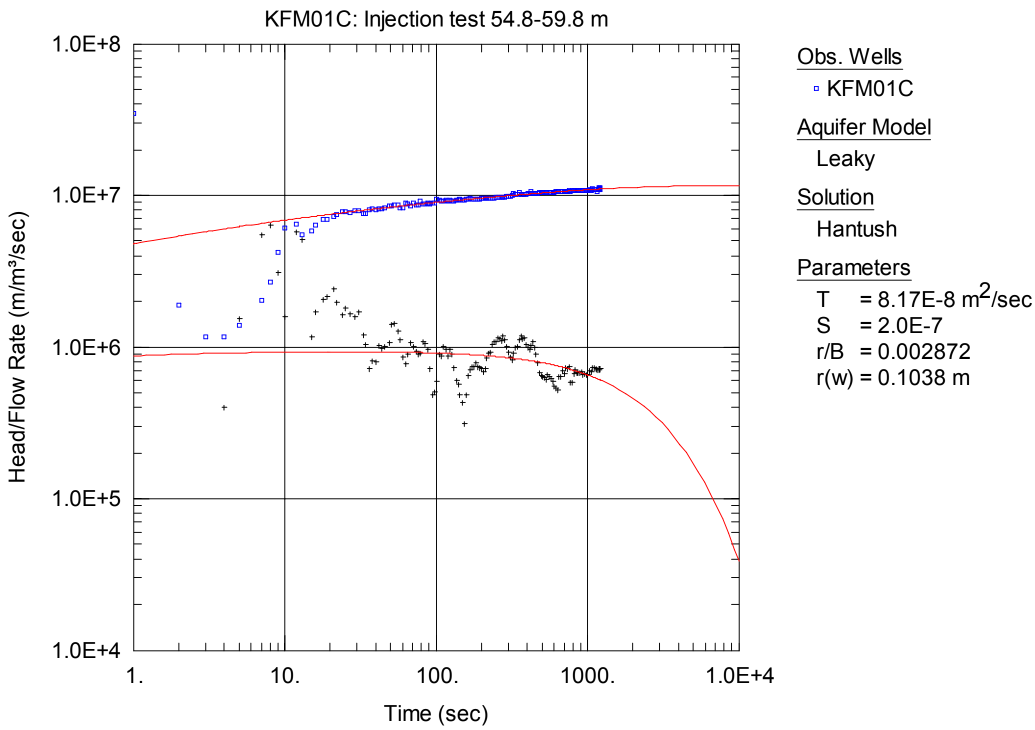

Figure A3-42. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 54.8-59.8 m in KFM01C.*

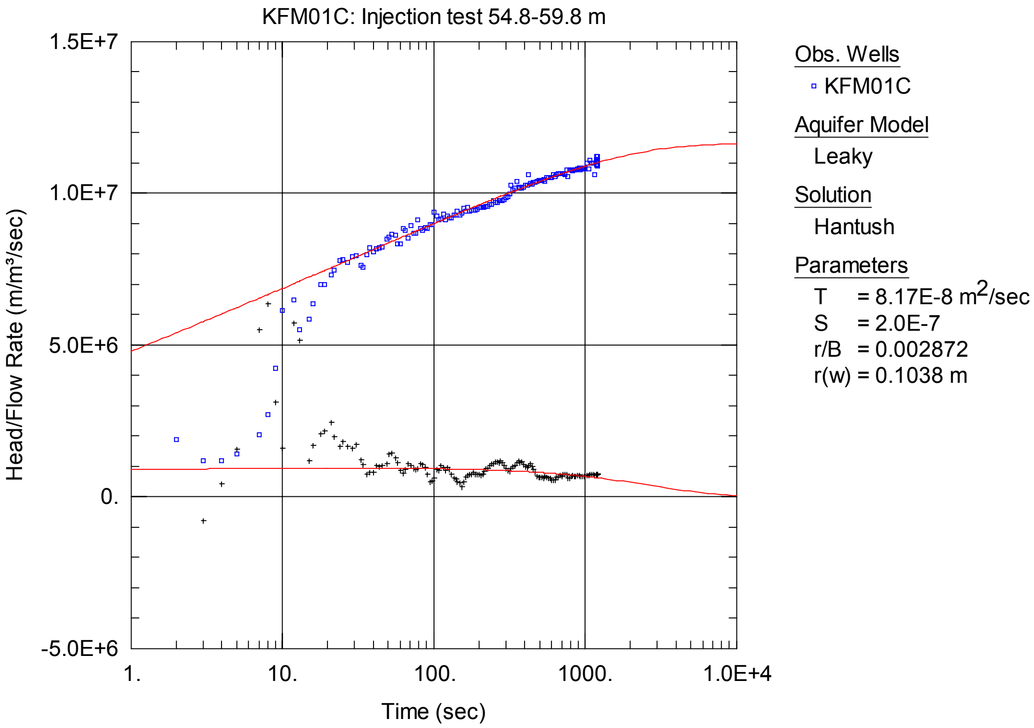

Figure A3-43. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 54.8-59.8 m in KFM01C.*

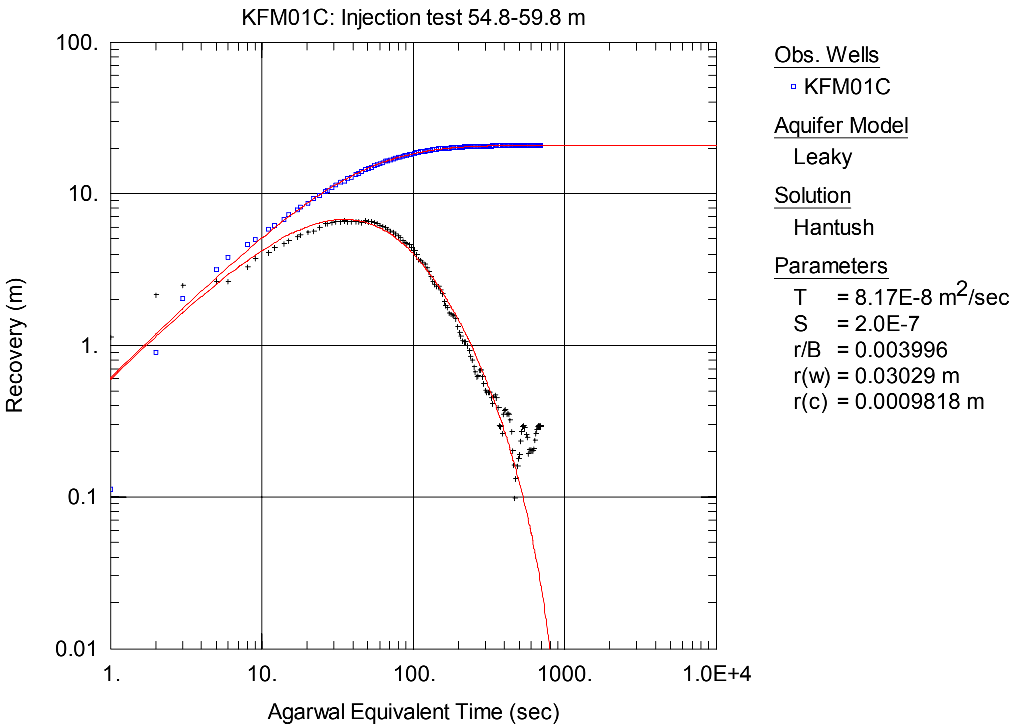

Figure A3-44. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 54.8-59.8 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

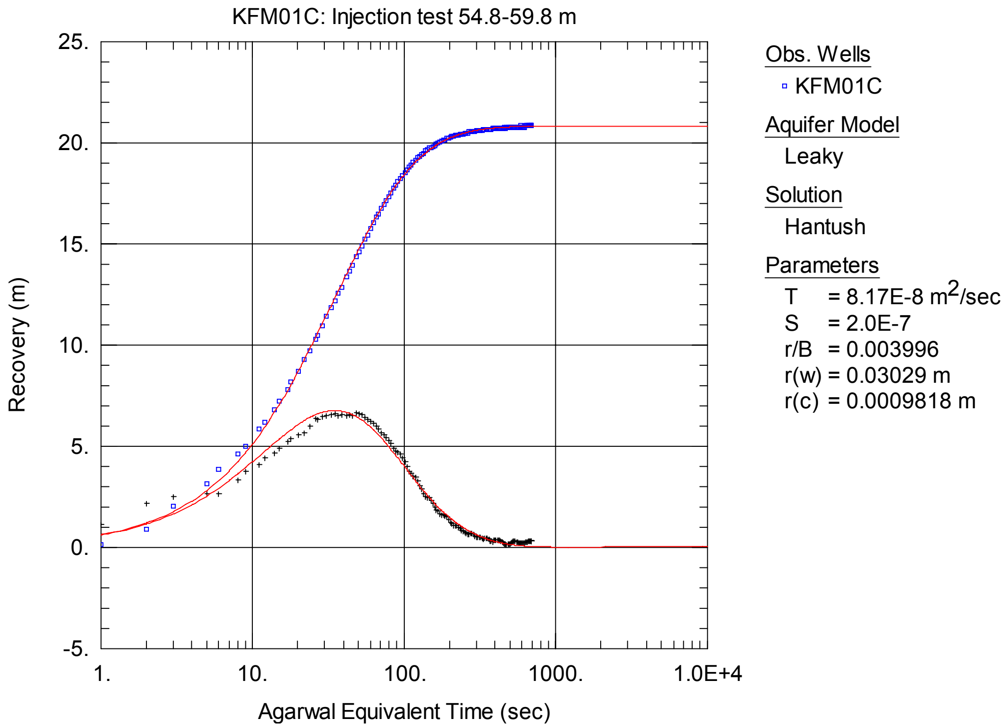

Figure A3-45. Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 54.8-59.8 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.

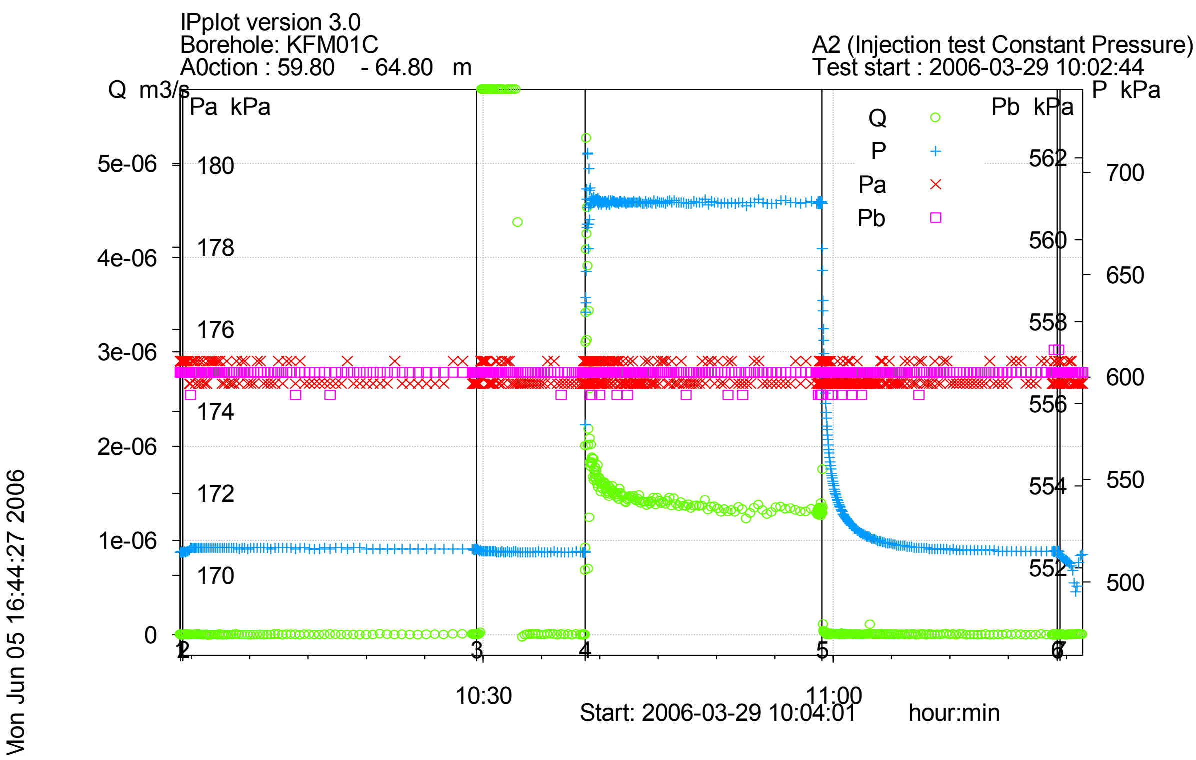

Figure A3-46. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 59.8-64.8 m in borehole KFM01C.

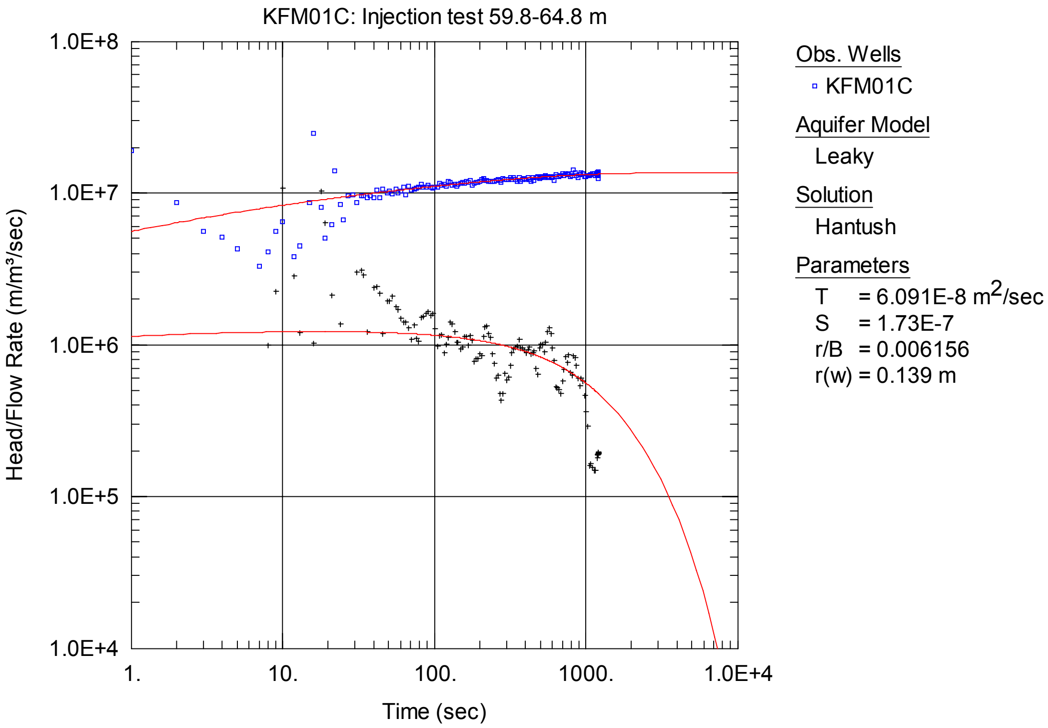

Figure A3-47. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 59.8-64.8 m in KFM01C.*

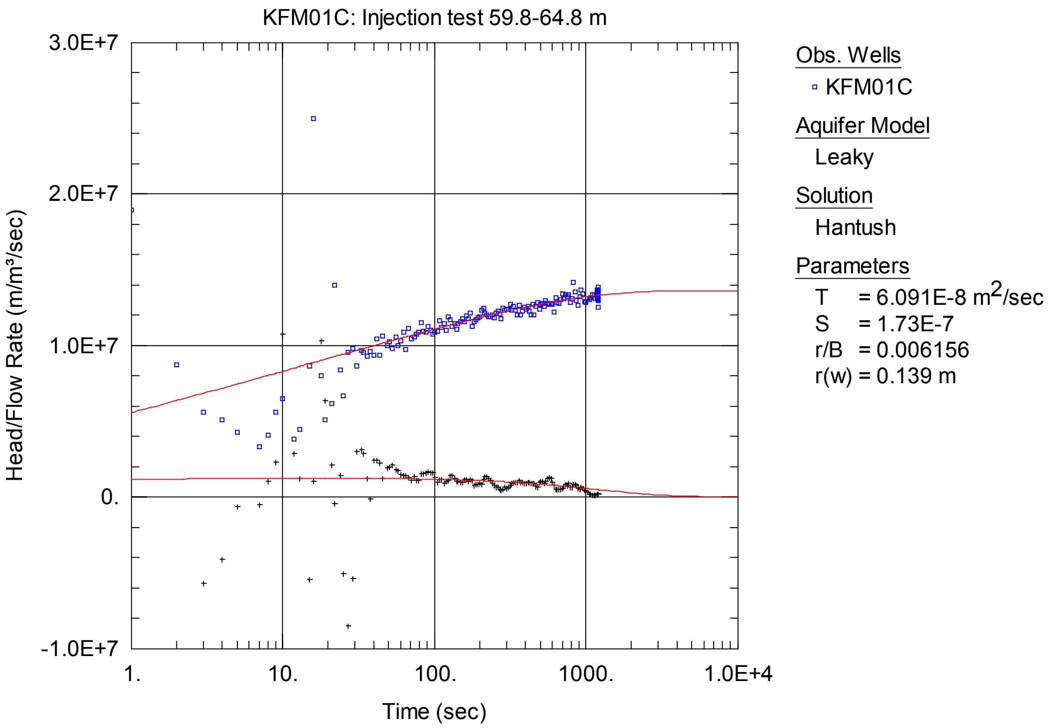

Figure A3-48. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 59.8-64.8 m in KFM01C.*

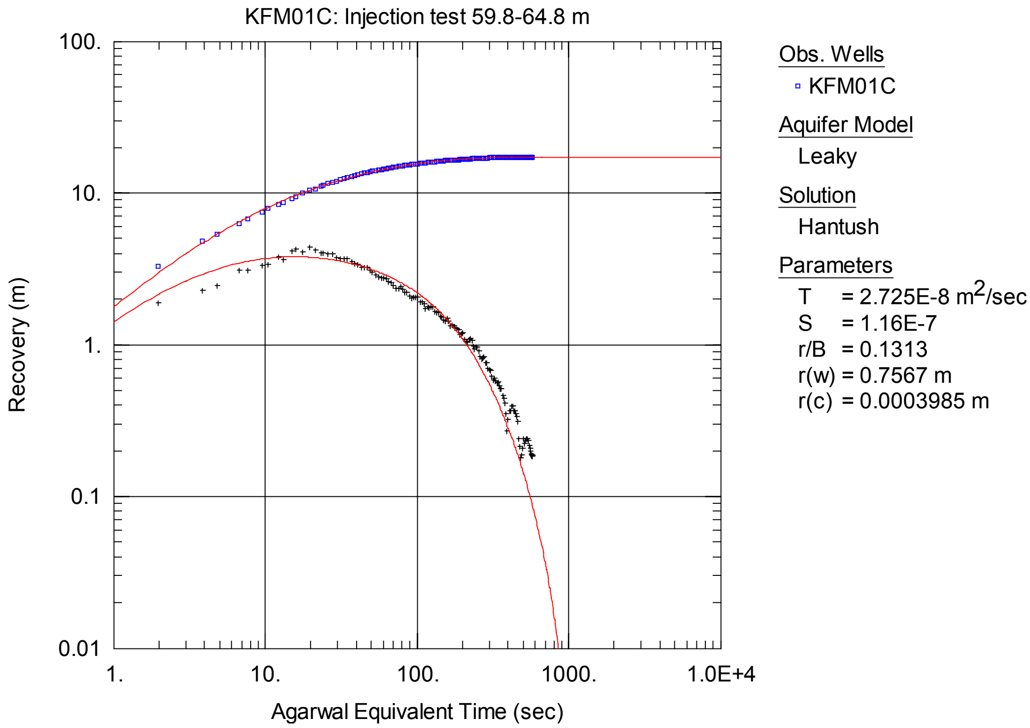

***Figure A3-49**. Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 59.8-64.8 m in KFM01C.*

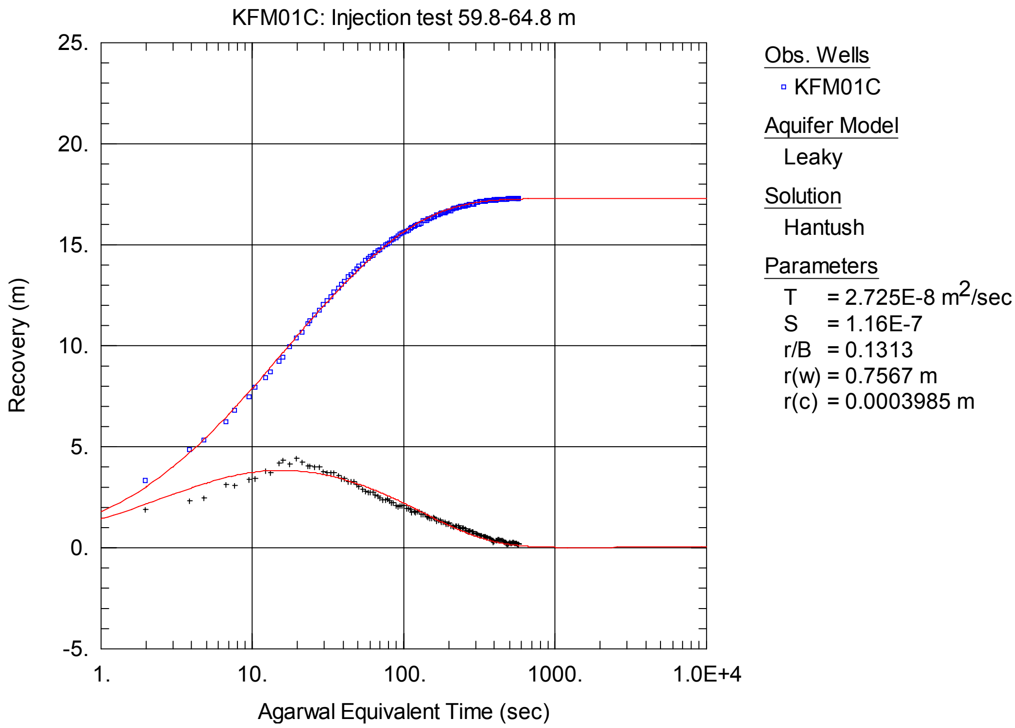

***Figure A3-50.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 59.8-64.8 m in KFM01C.*

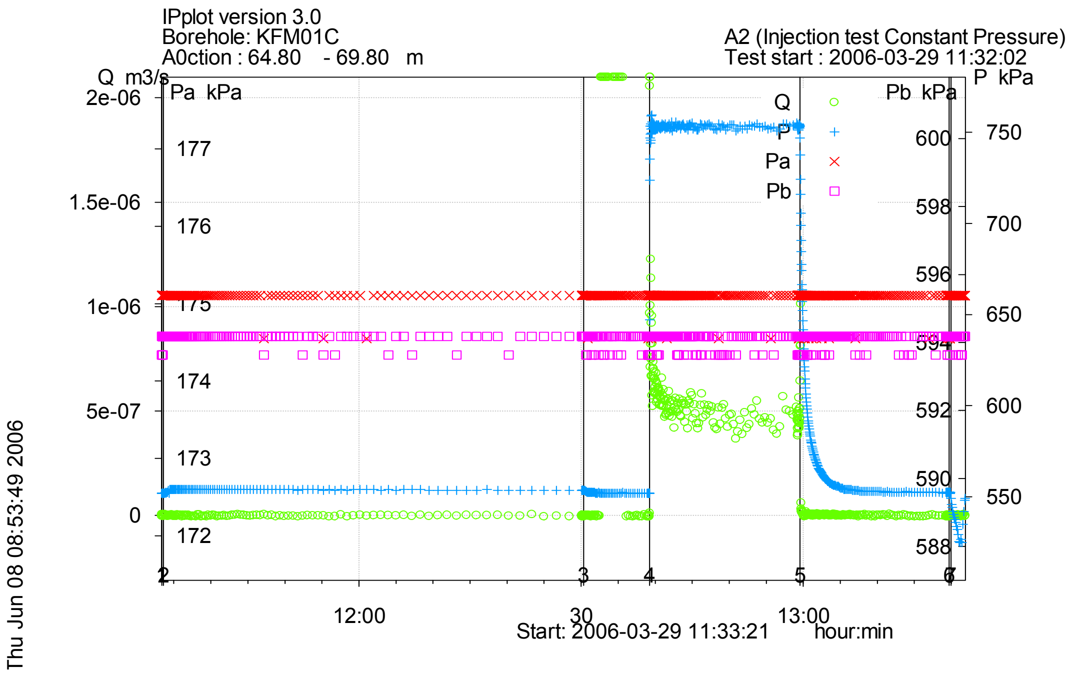

Figure A3-51. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 64.8-69.8 m in borehole KFM01C.*

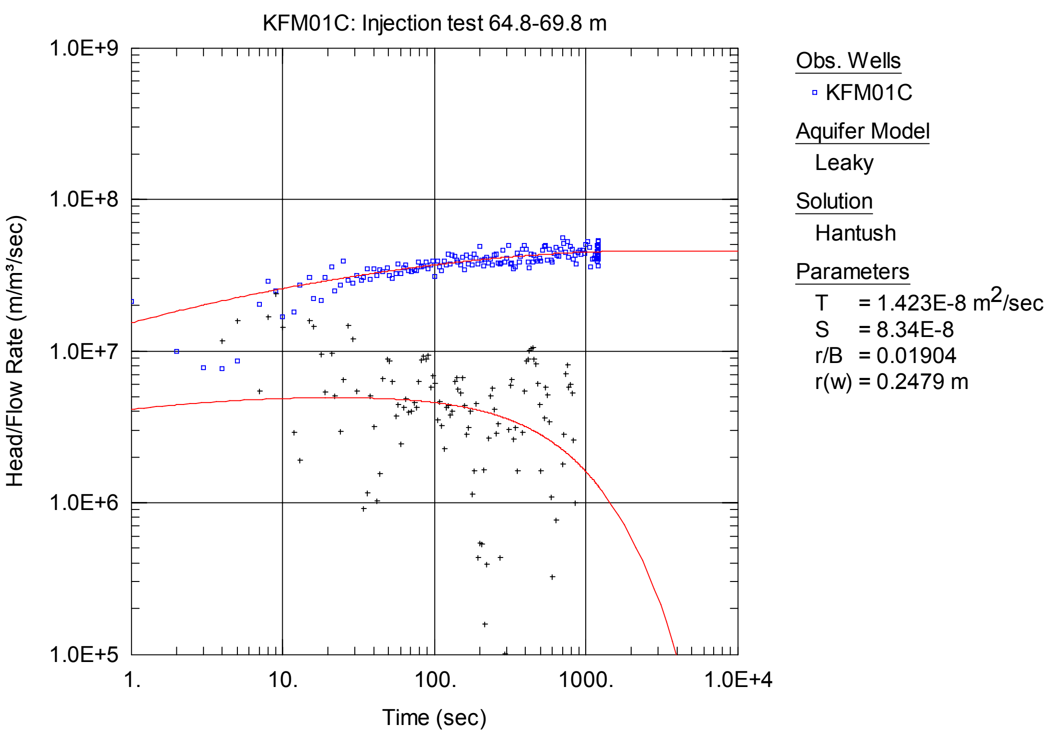

Figure A3-52. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 64.8-69.8 m in KFM01C.*

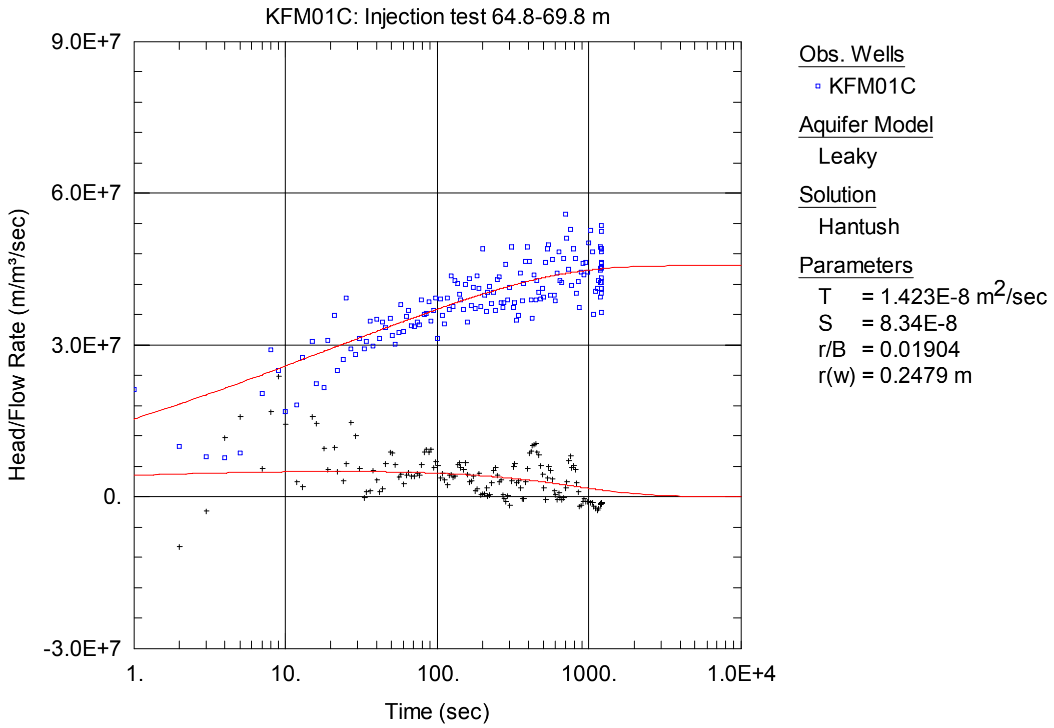

Figure A3-53. Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 64.8-69.8 m in KFM01C.

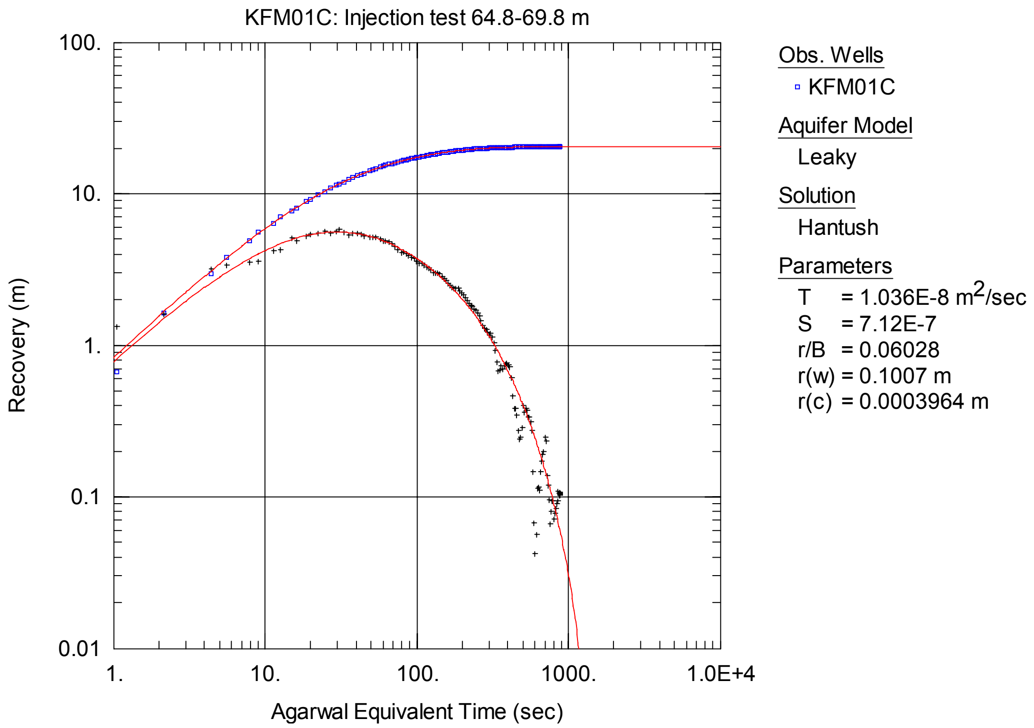

Figure A3-54. Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 64.8-69.8 m in KFM01C.

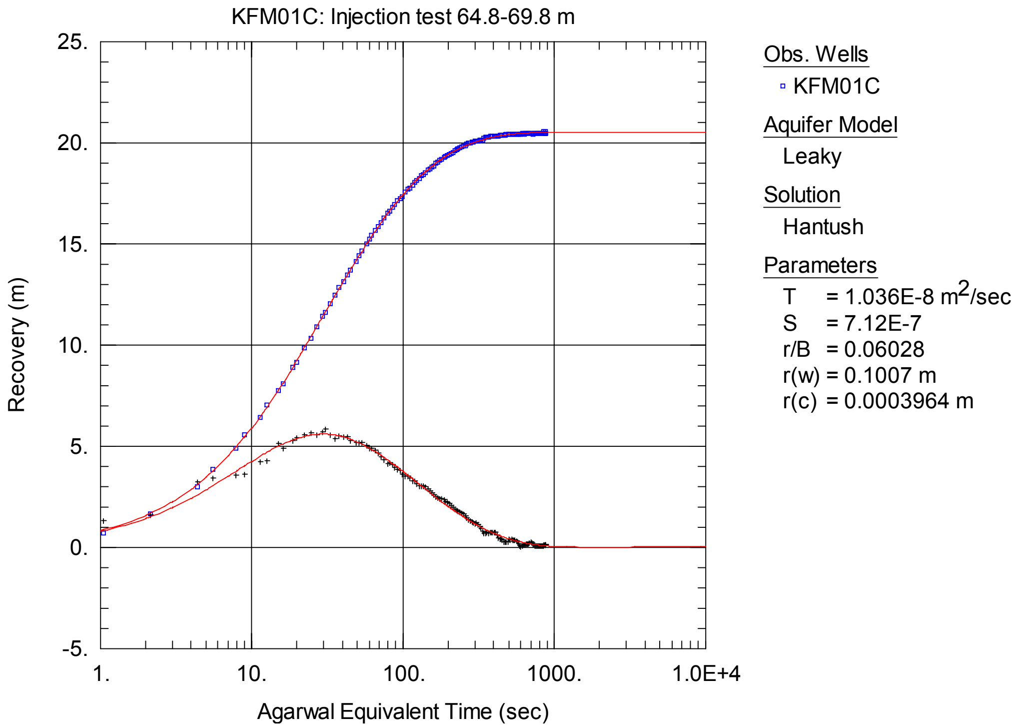

Figure A3-55. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 64.8-69.8 m in KFM01C.*

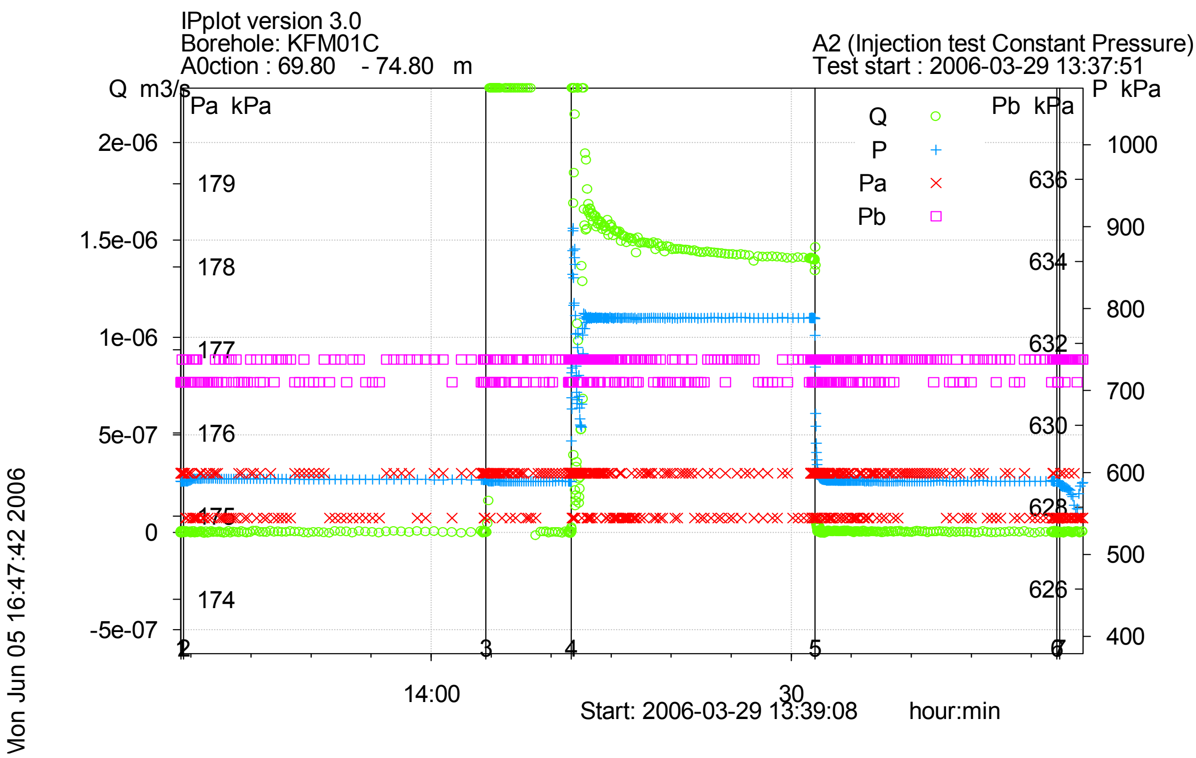

Figure A3-56. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 69.8-74.8 m in borehole KFM01C.*

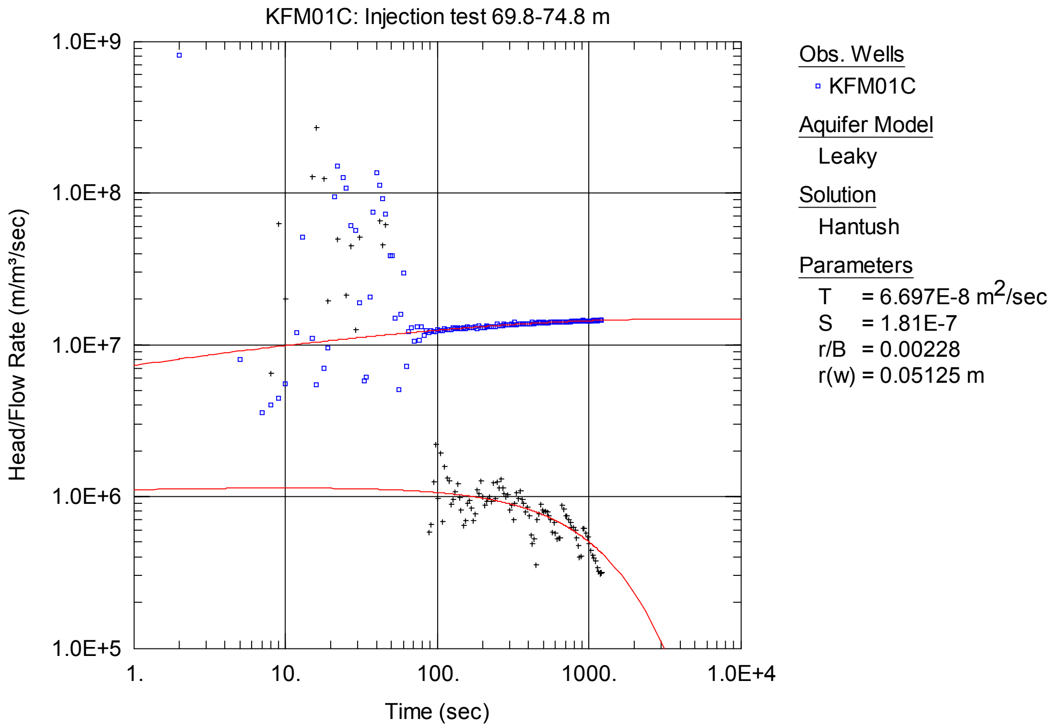

Figure A3-57. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 69.8-74.8 m in KFM01C.*

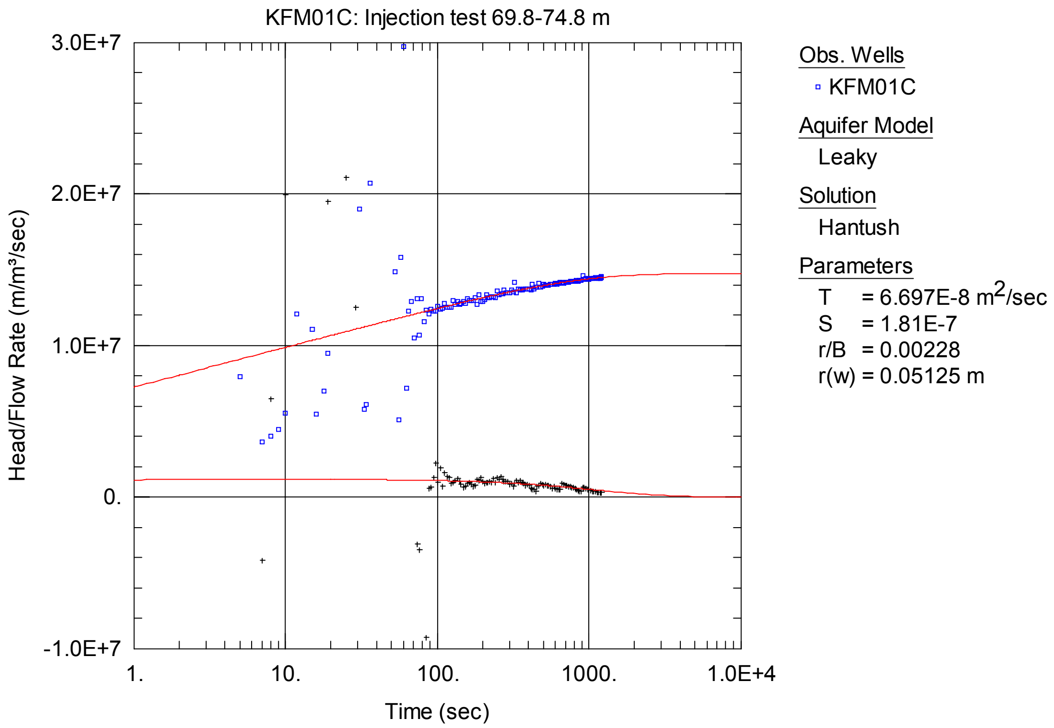

Figure A3-58. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 69.8-74.8 m in KFM01C.*

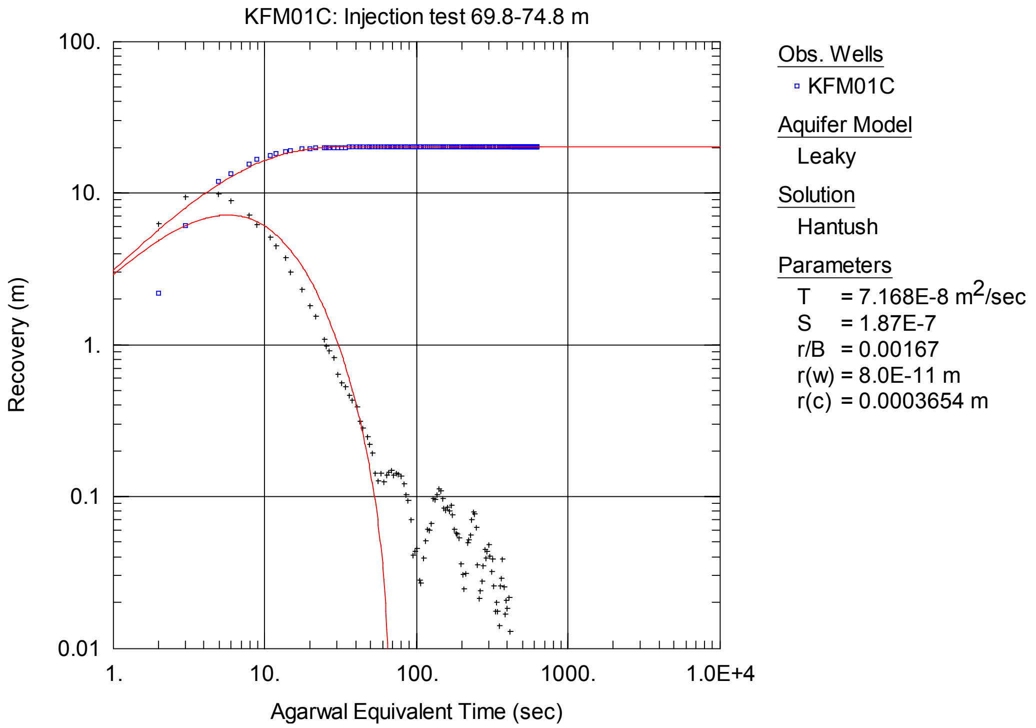

Figure A3-59. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 69.8-74.8 m in KFM01C.*

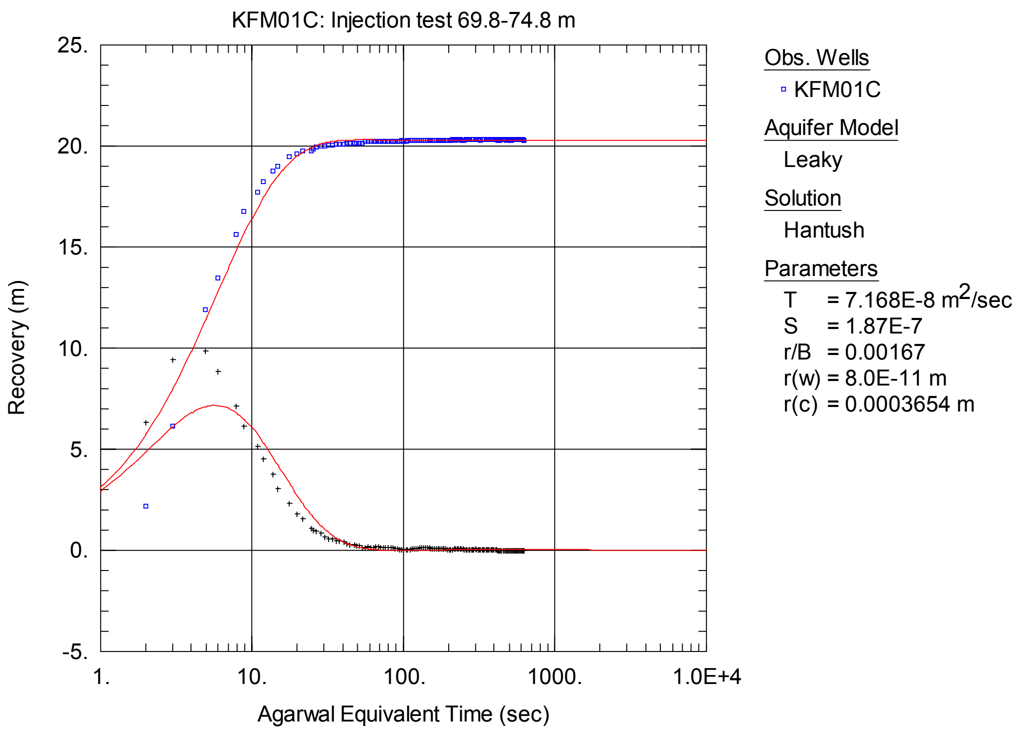

Figure A3-60. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 69.8-74.8 m in KFM01C.*

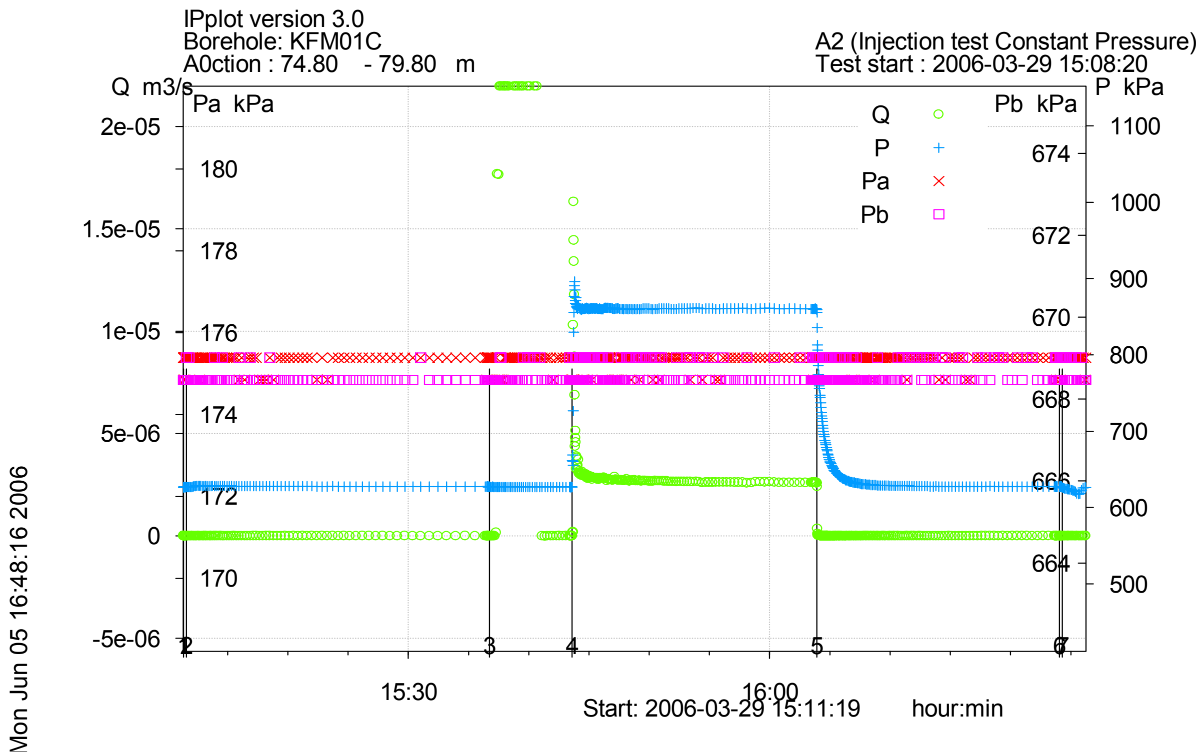

Figure A3-61. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 74.8-79.8 m in borehole KFM01C.*

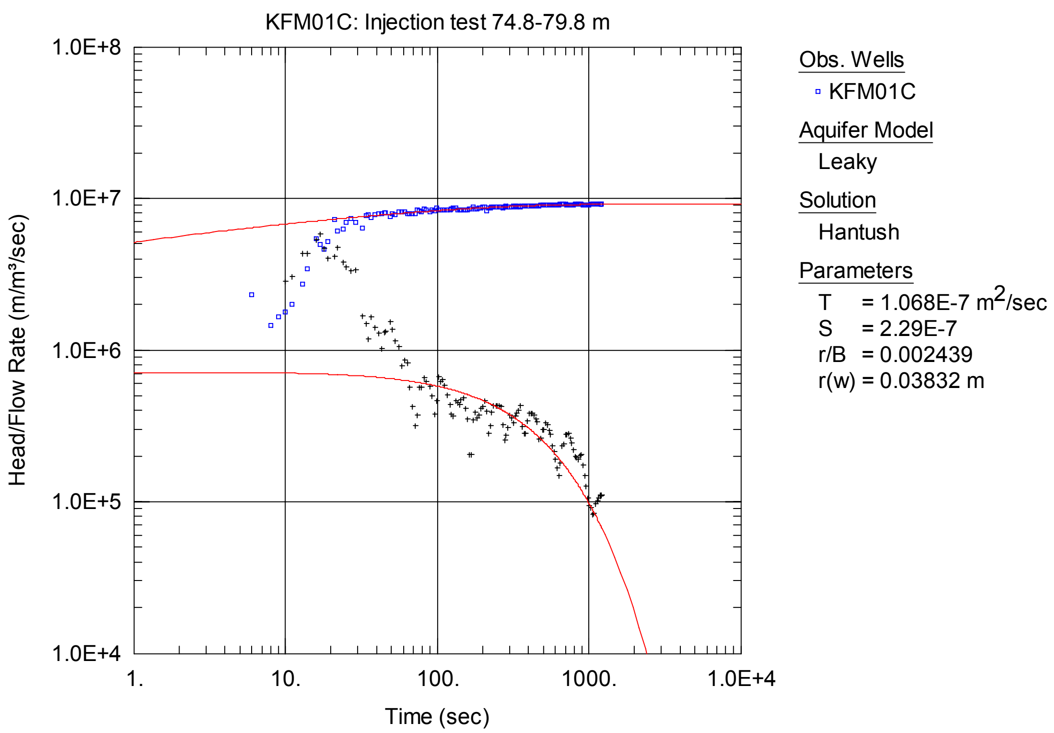

Figure A3-62. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 74.8-79.8 m in KFM01C.*

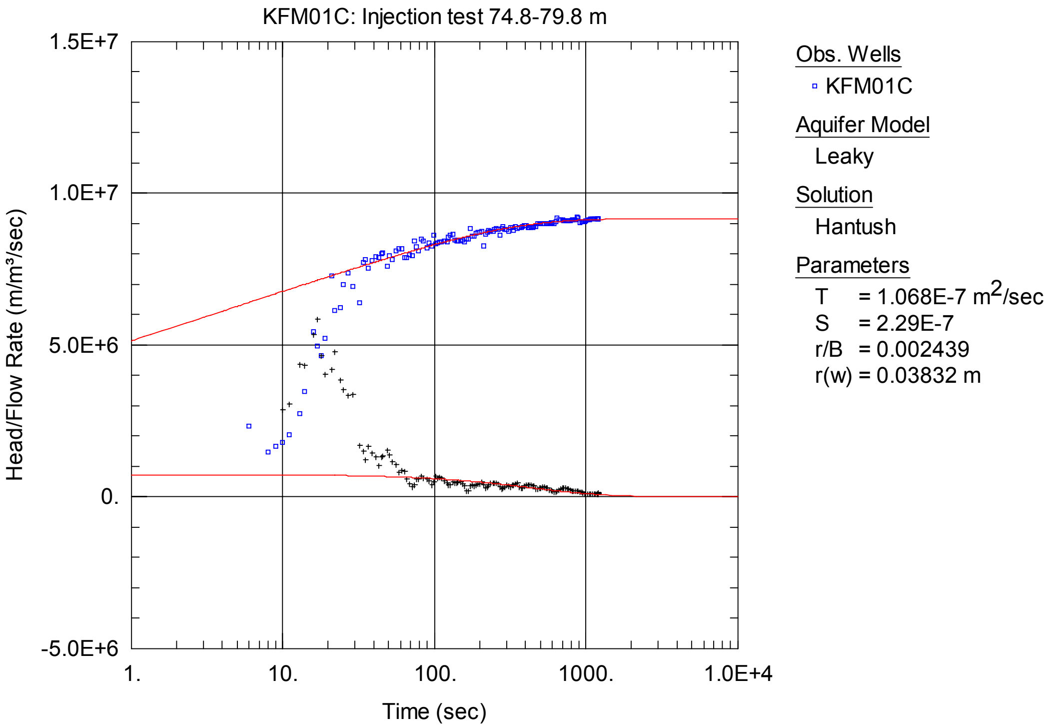

Figure A3-63. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 74.8-79.8 m in KFM01C.*

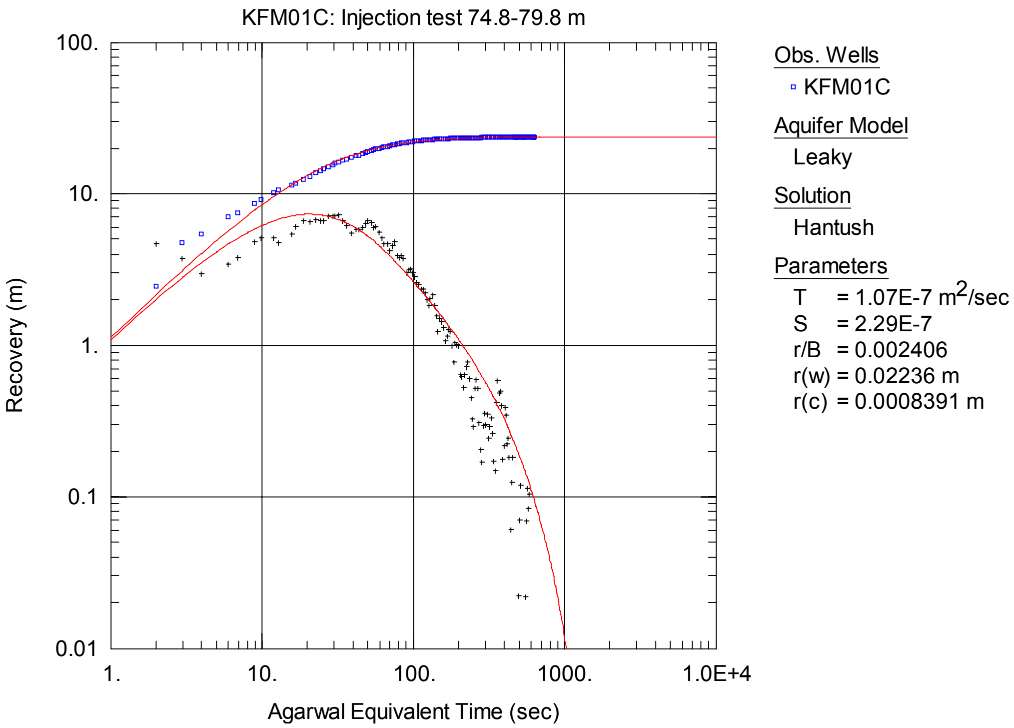

Figure A3-64*. Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 74.8-79.8 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

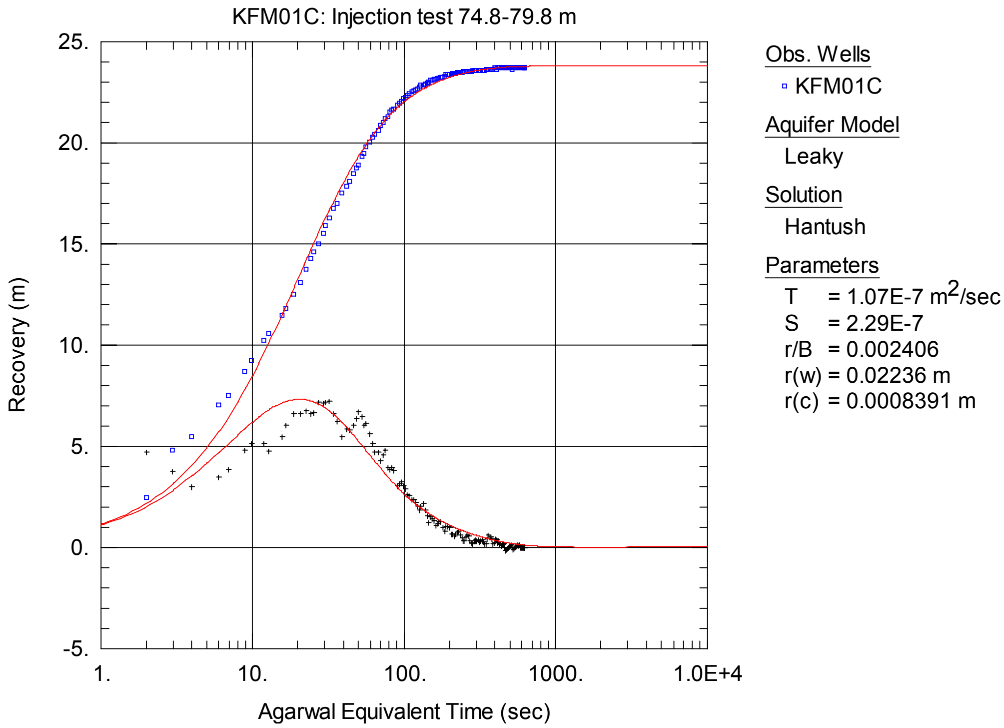

Figure A3-65. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 74.8-79.8 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

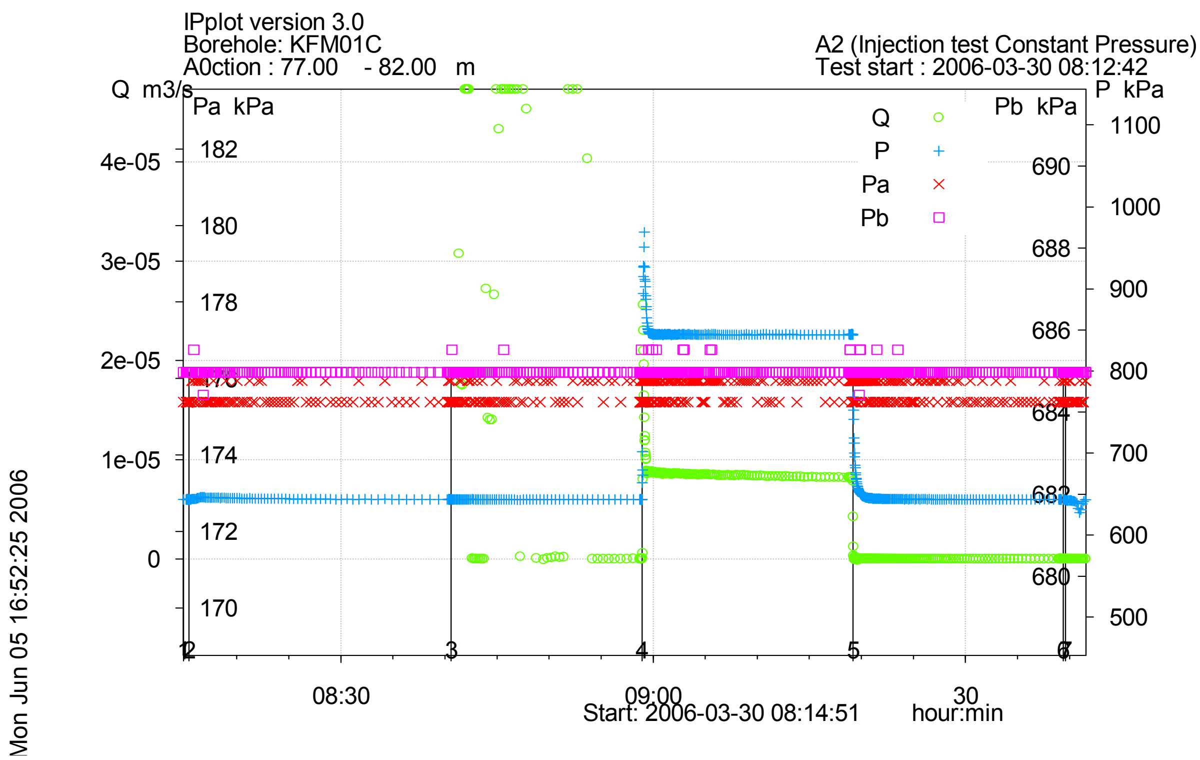

Figure A3-66. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 77.0-82.0 m in borehole KFM01C.*

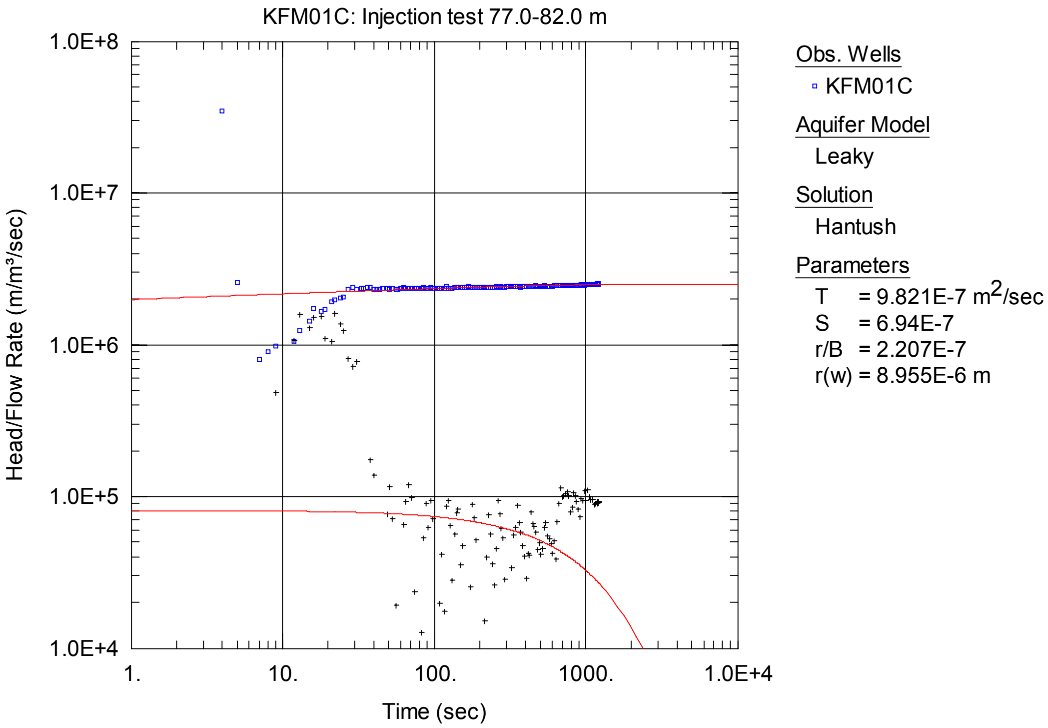

Figure A3-67. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 77.0-82.0 m in KFM01C.*

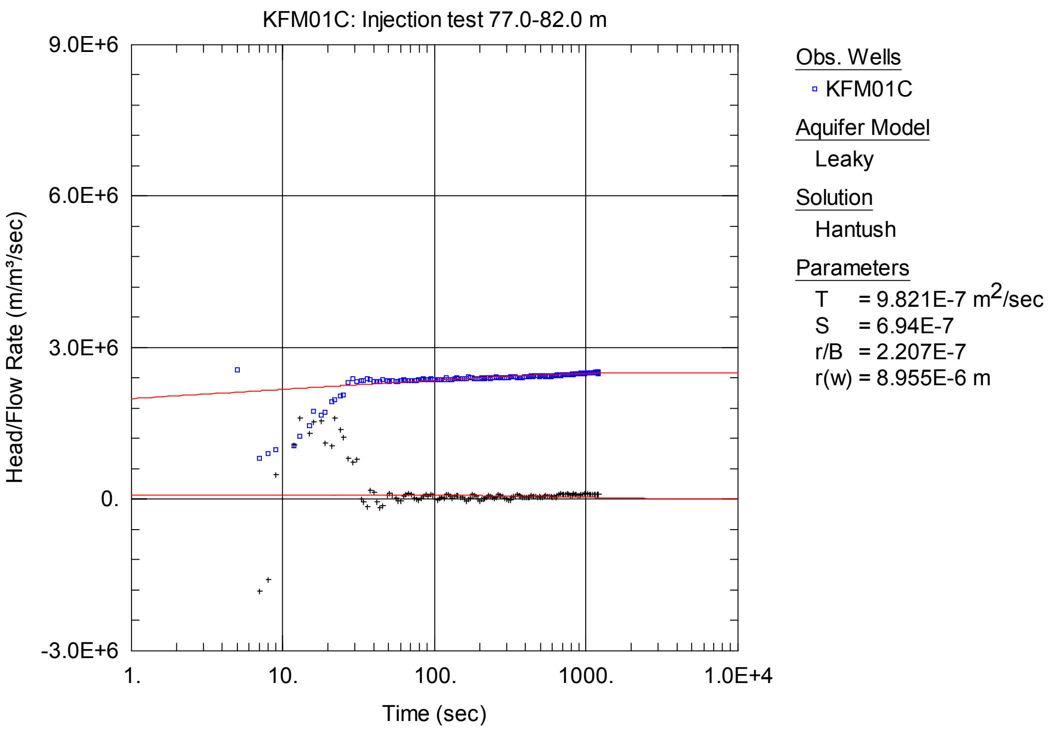

Figure A3-68. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 77.0-82.0 m in KFM01C.*

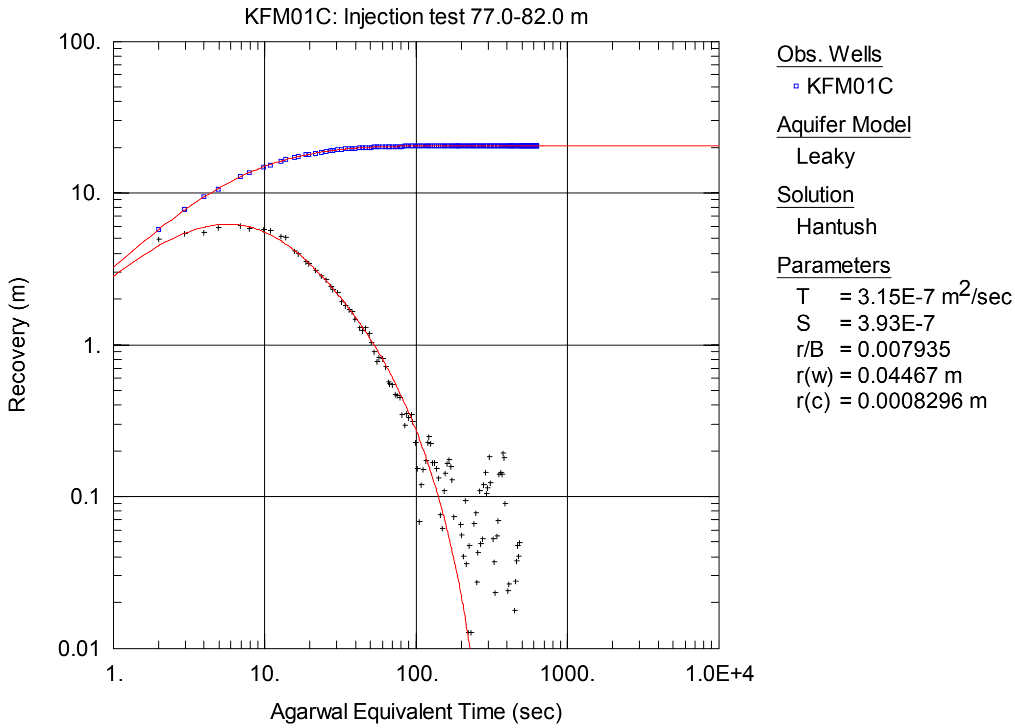

Figure A3-69. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 77.0-82.0 m in KFM01C.*

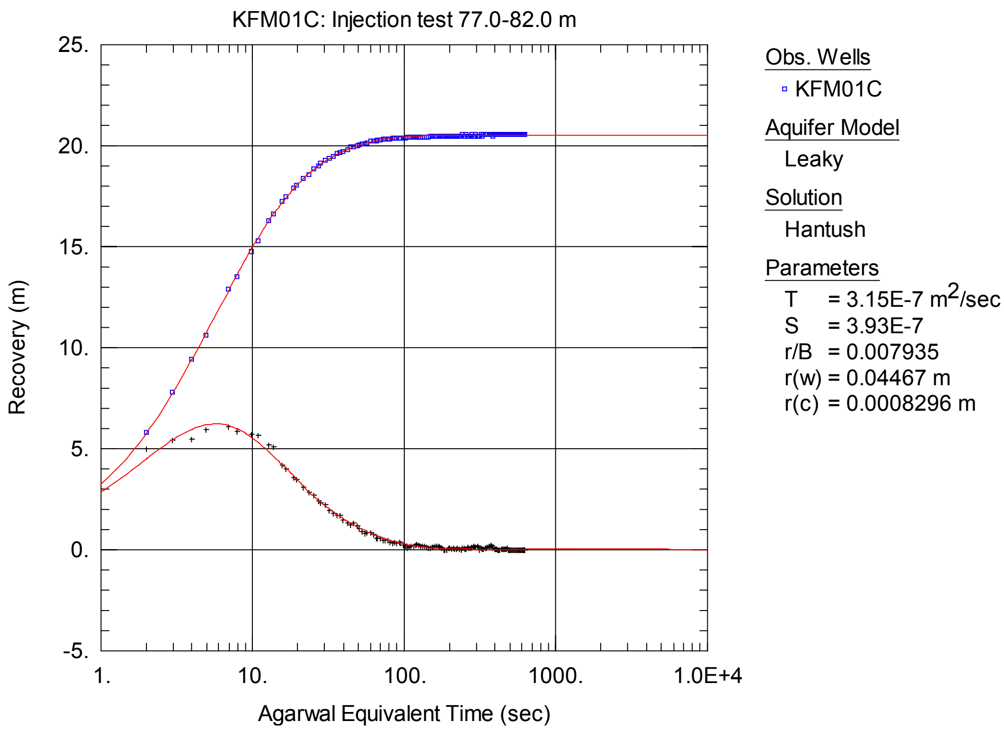

Figure A3-70. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 77.0-82.0 m in KFM01C.*

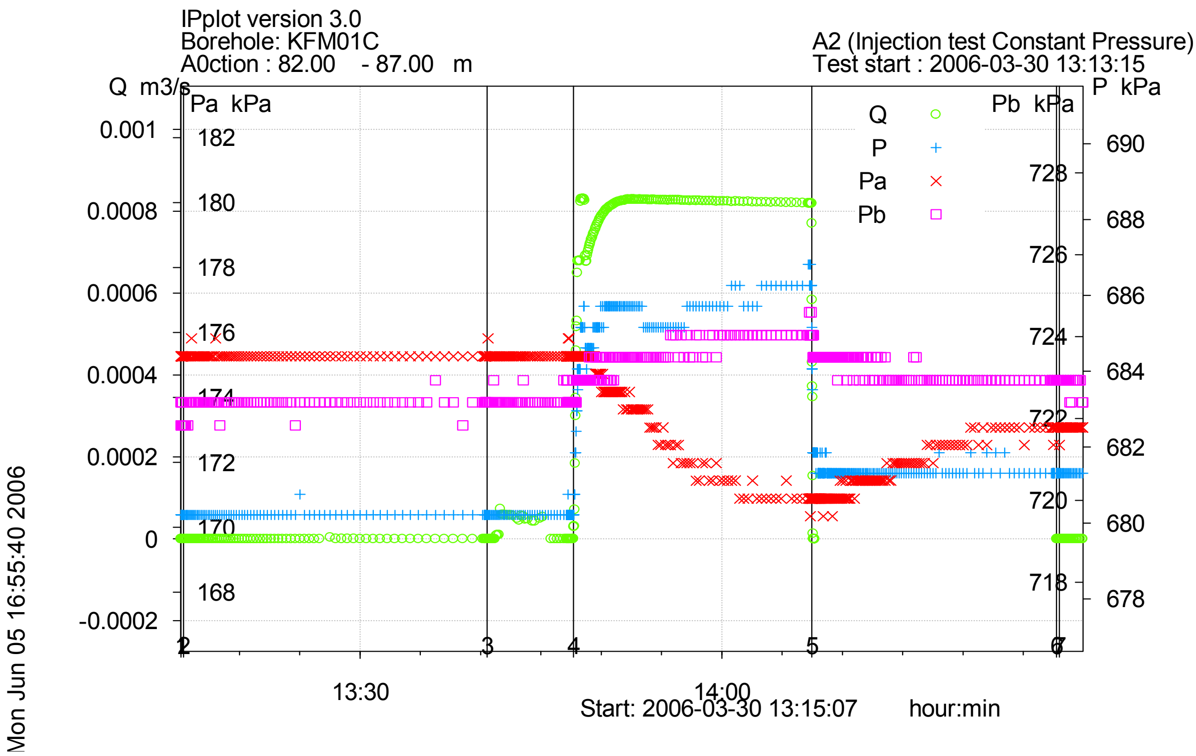

Figure A3-71. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 82.0-87.0 m in borehole KFM01C.*

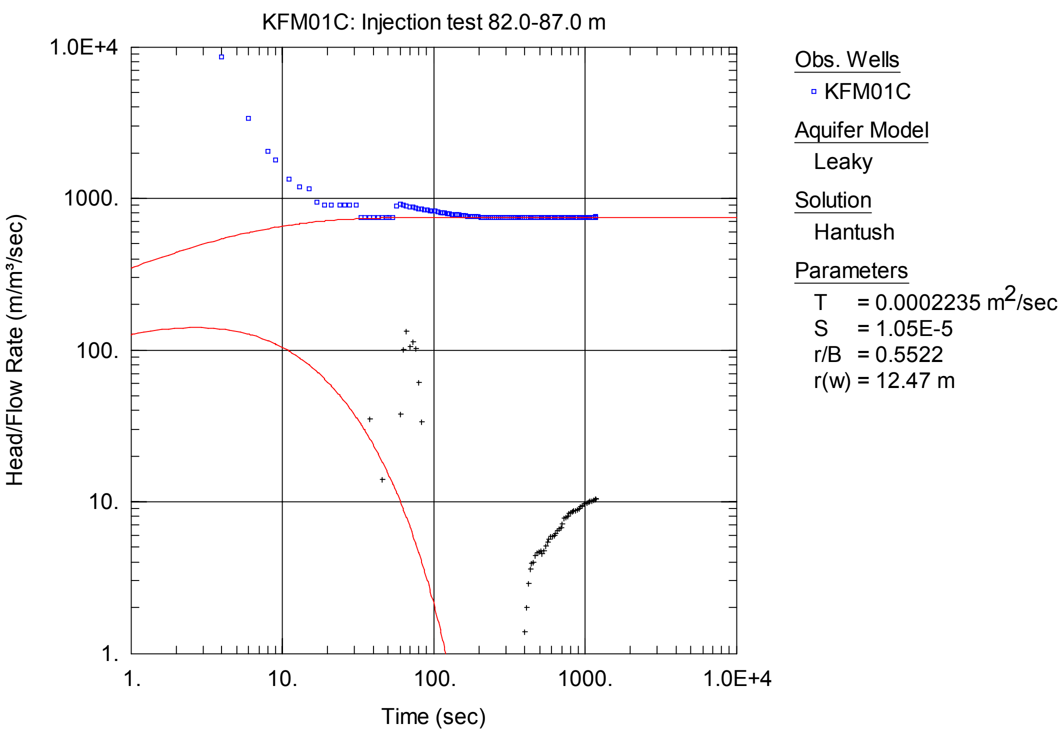

Figure A3-72. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 82.0-87.0 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

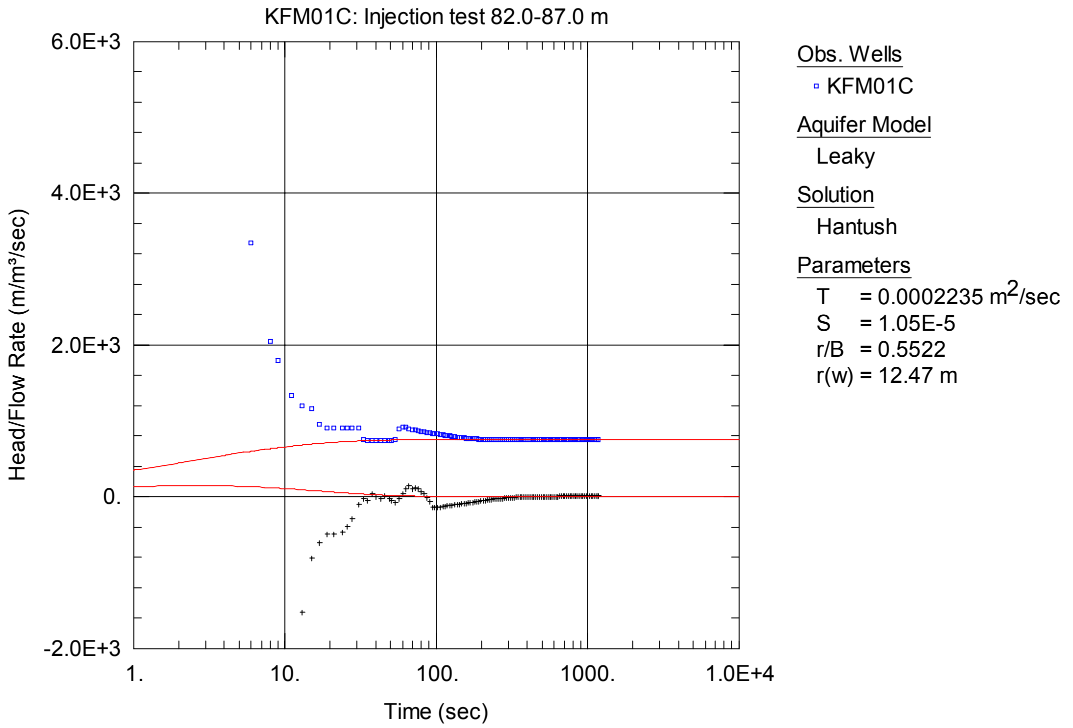

Figure A3-73. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 82.0-87.0 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

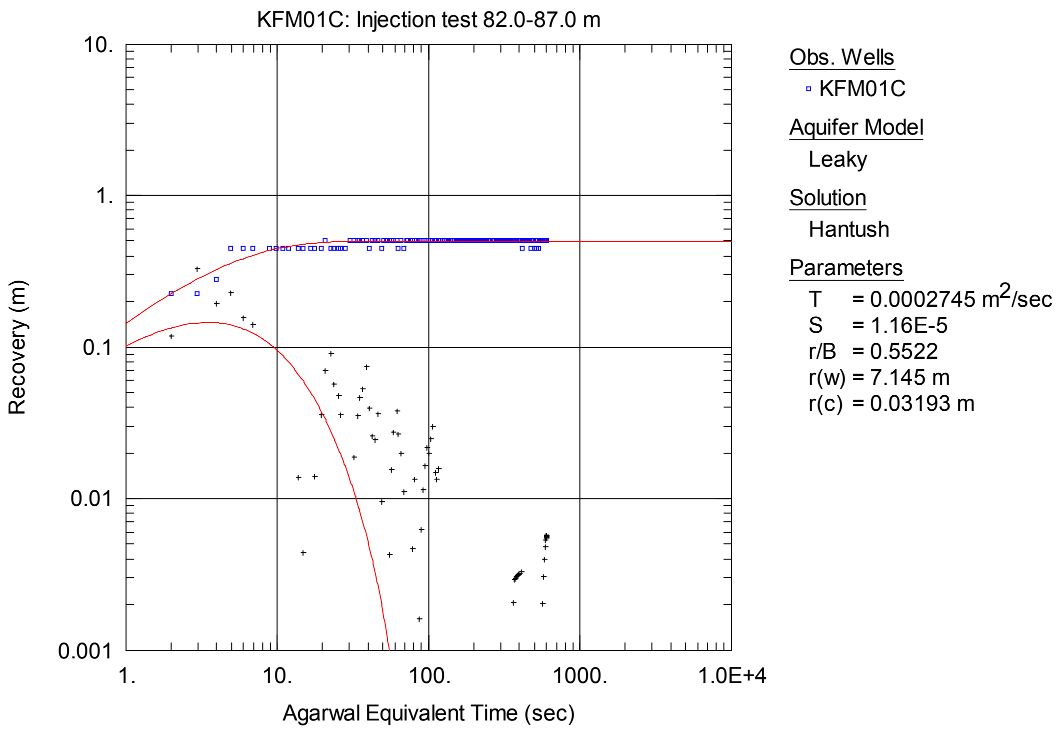

Figure A3-74. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 82.0-87.0 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

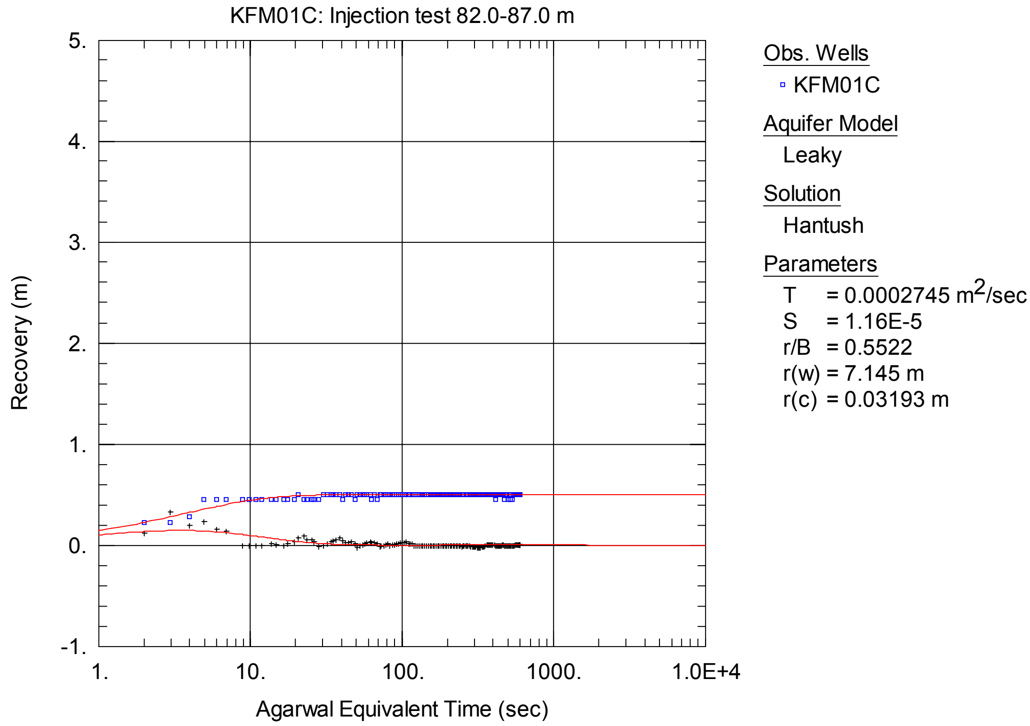

Figure A3-75. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 82.0-87.0 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

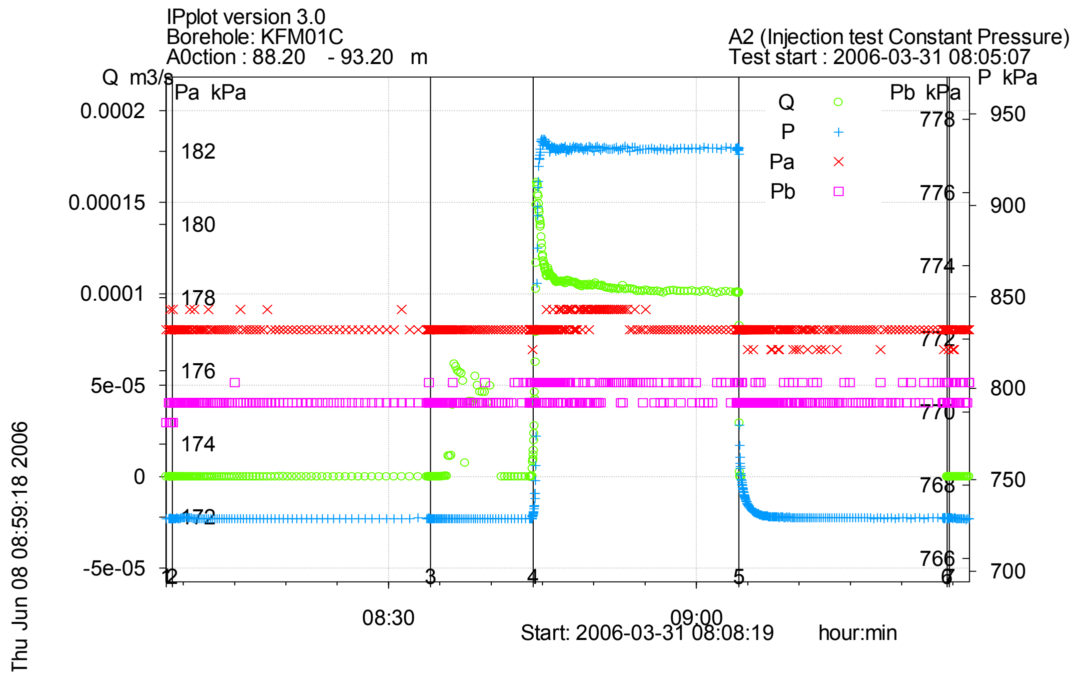

Figure A3-76. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 88.2-93.2 m in borehole KFM01C.*

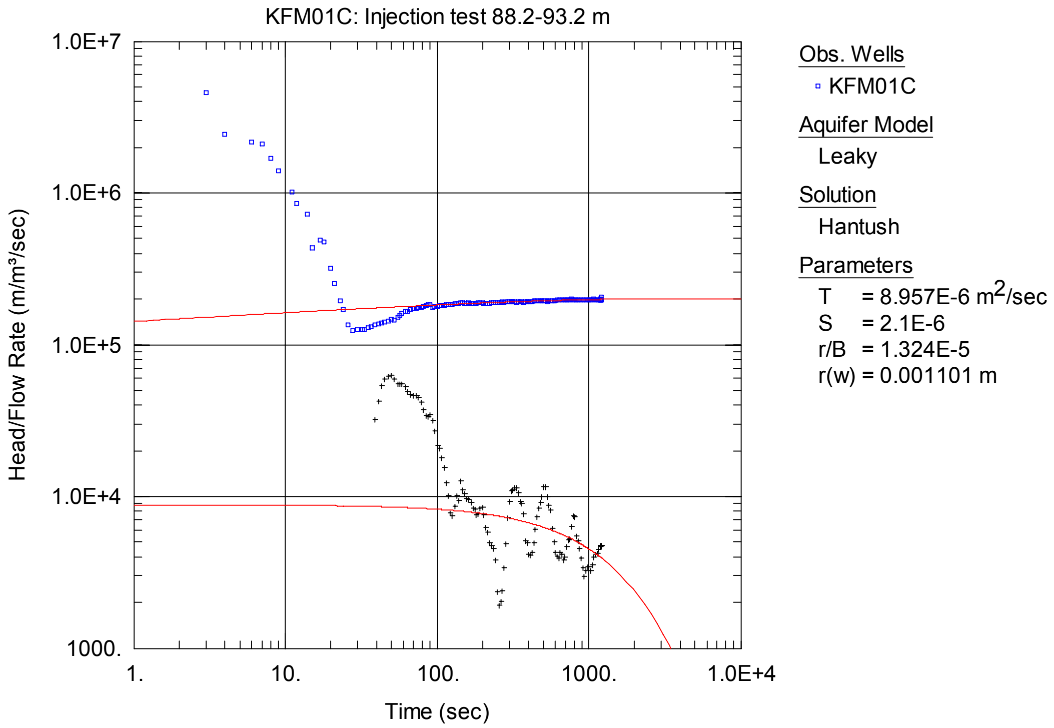

Figure A3-77. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 88.2-93.2 m in KFM01C.*

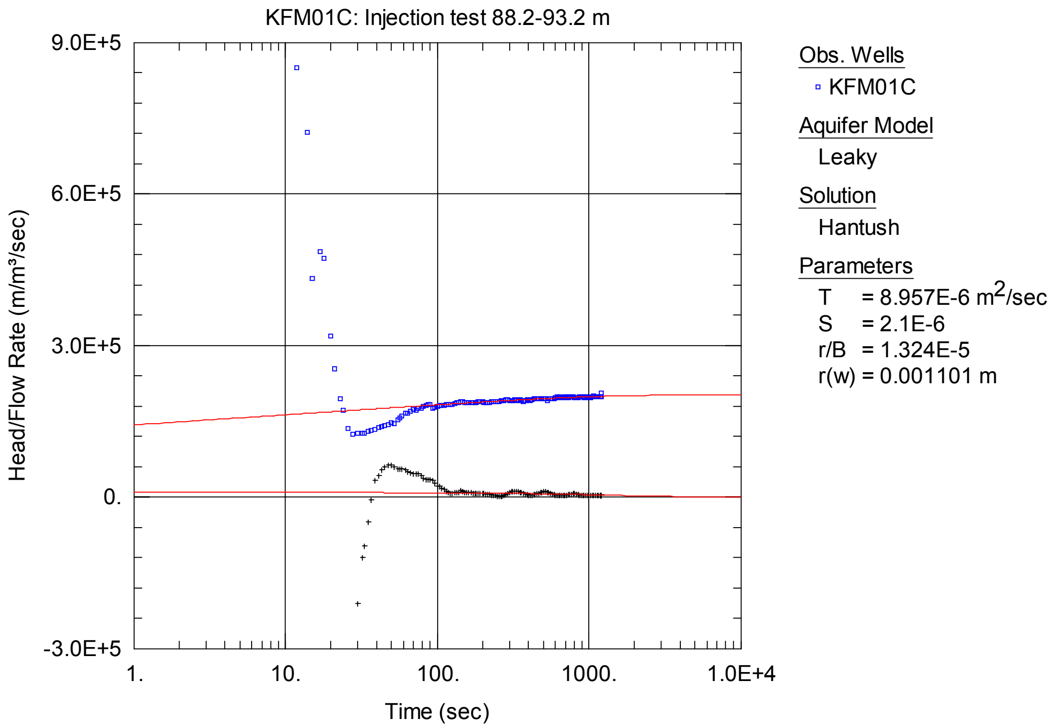

Figure A3-78. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 88.2-93.2 m in KFM01C.*

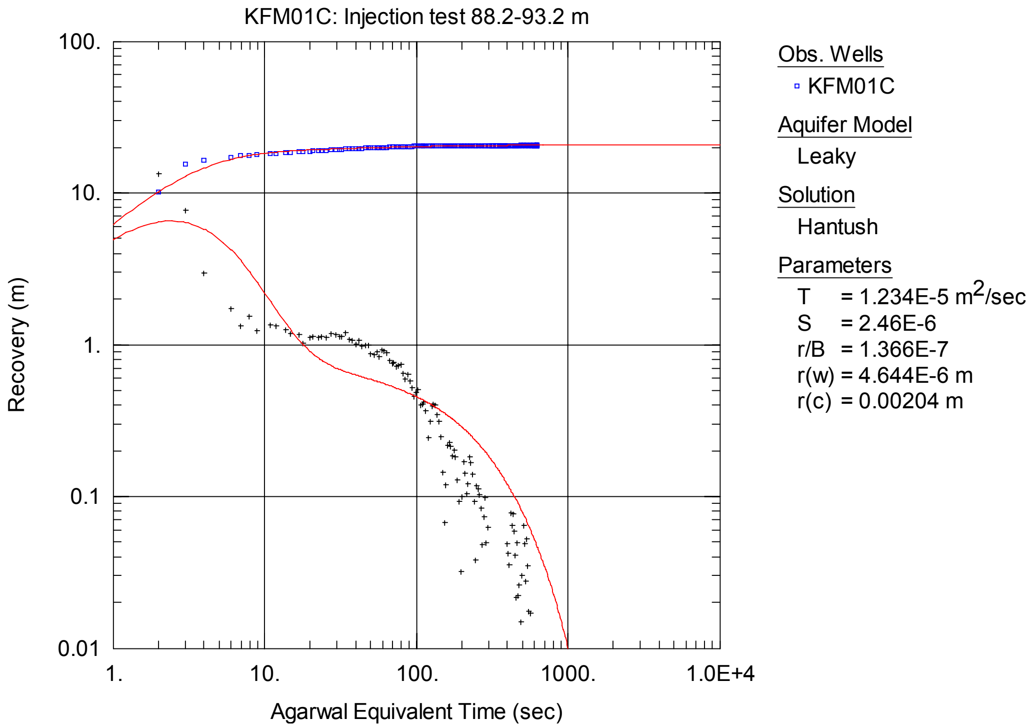

Figure A3-79. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 88.2-93.2 m in KFM01C.*

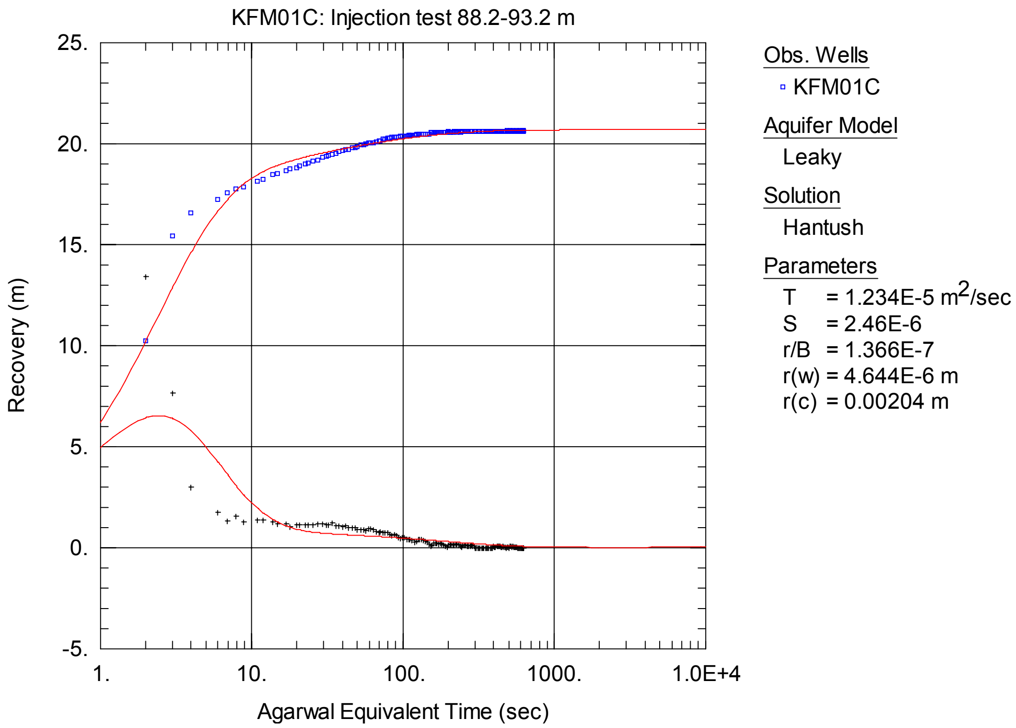

Figure A3-80. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 88.2-93.2 m in KFM01C.*

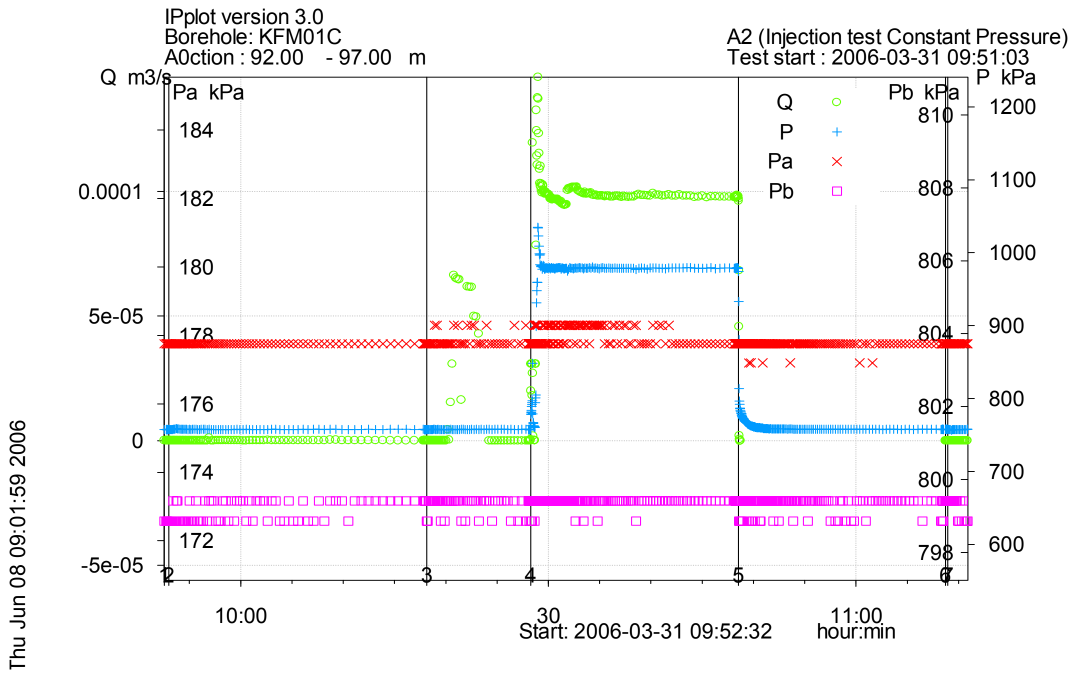

Figure A3-81. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 92.0-97.0 m in borehole KFM01C.*

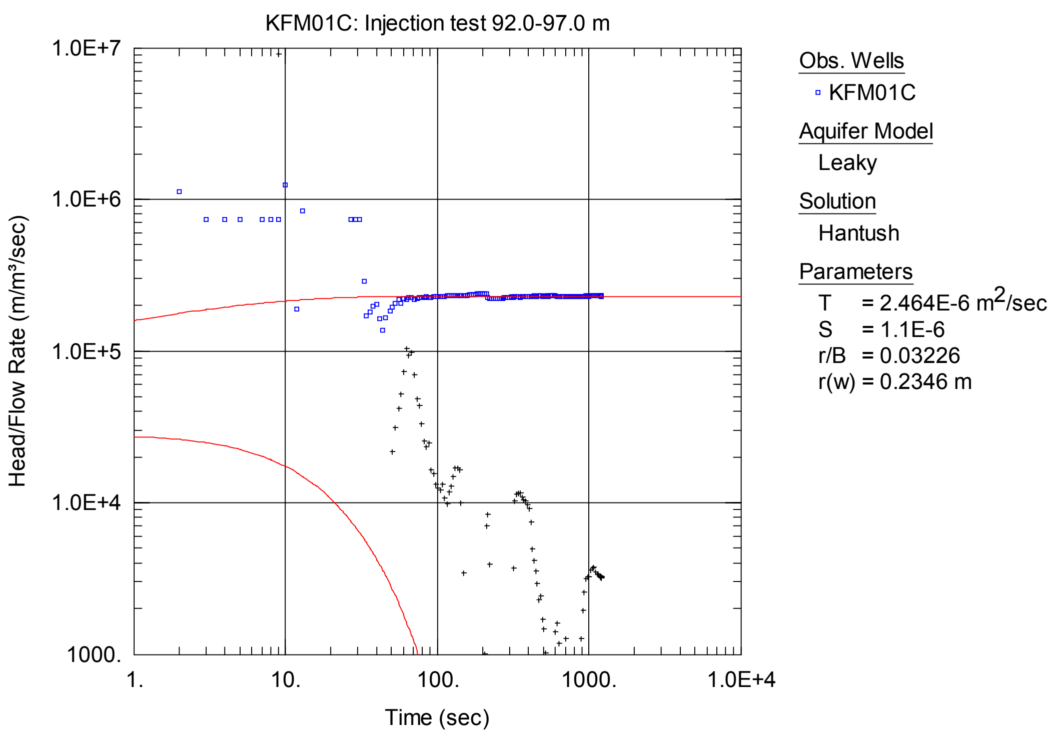

Figure A3-82. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 92.0-97.0 m in KFM01C.*

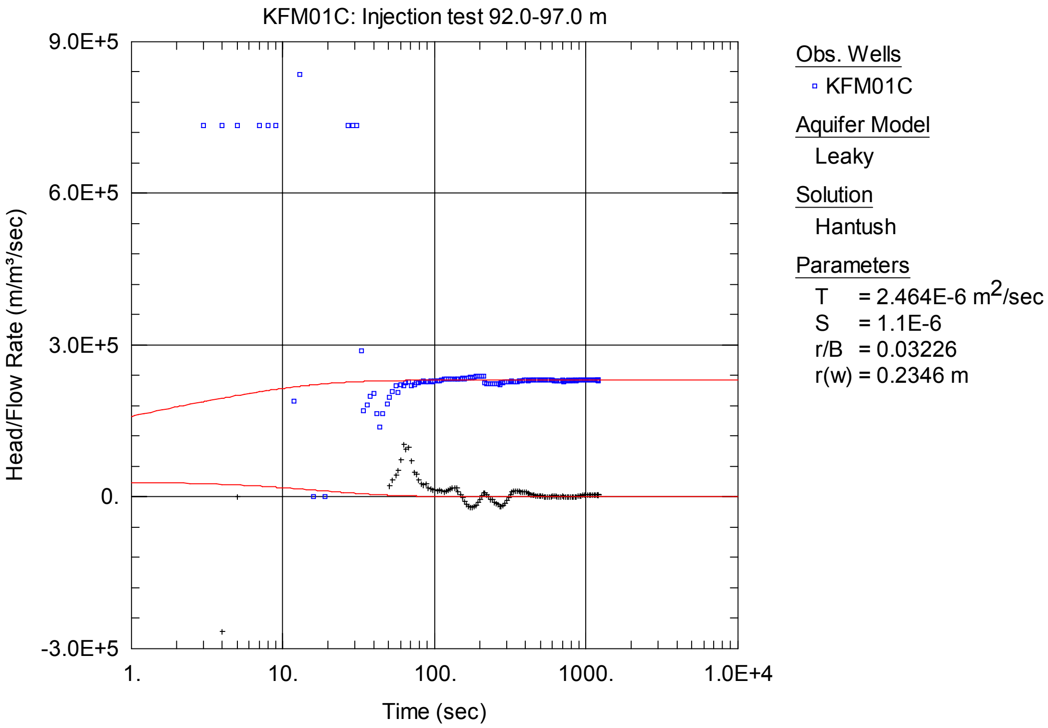

Figure A3-83. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 92.0-97.0 m in KFM01C.*

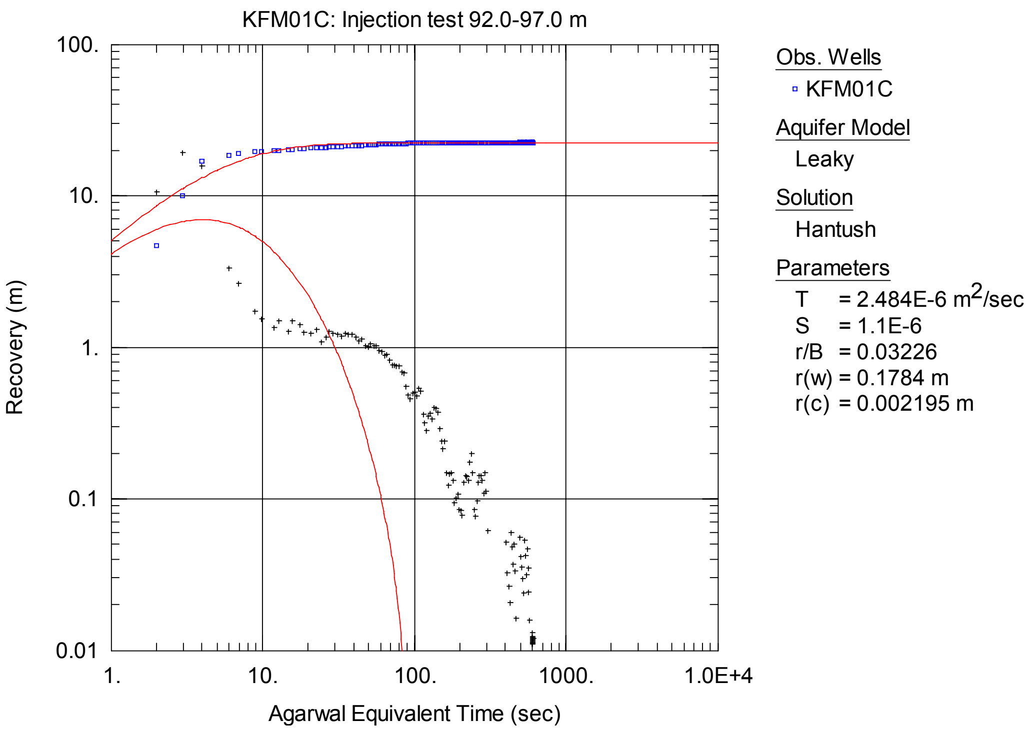

Figure A3-84. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 92.0-97.0 m in KFM01C.*

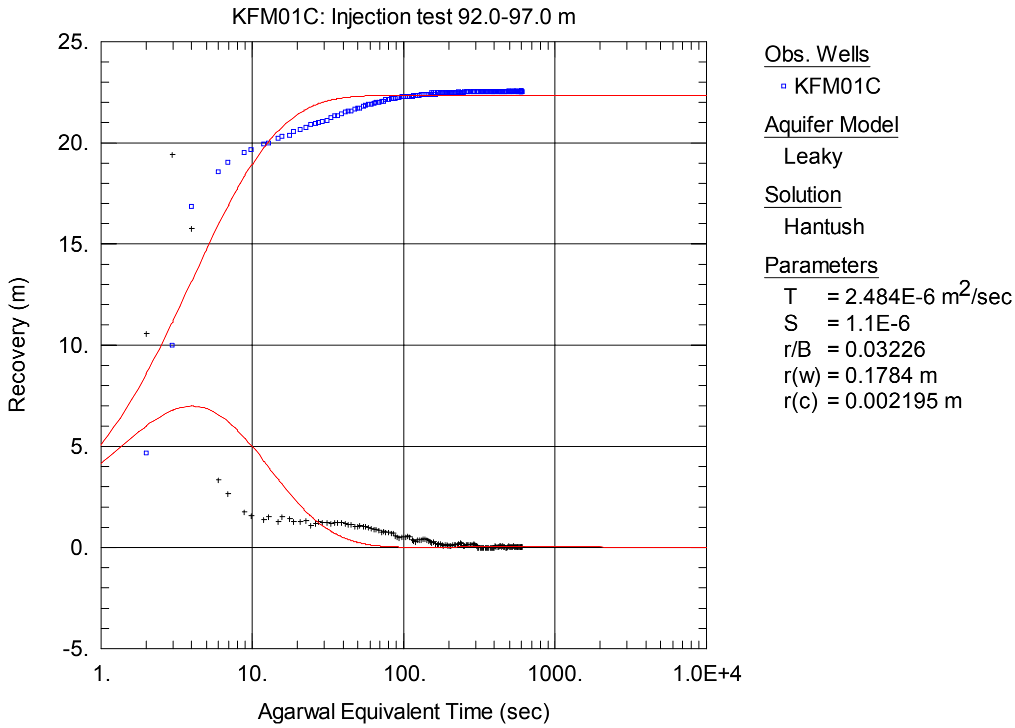

Figure A3-85. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 92.0-97.0 m in KFM01C.*

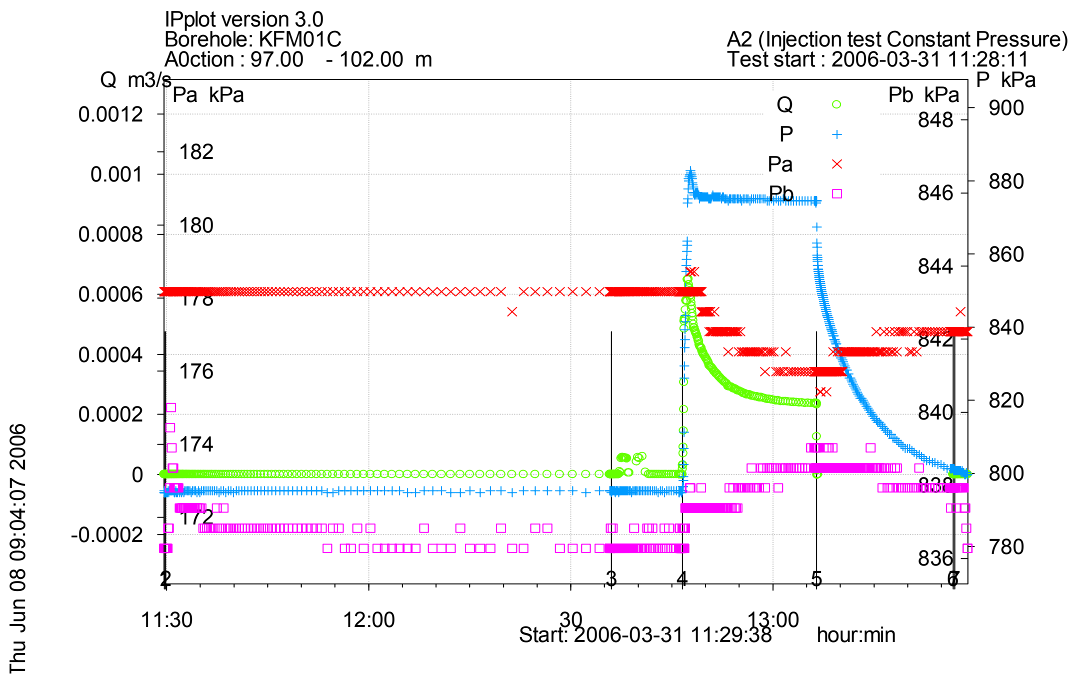

Figure A3-86. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 97.0-102.0 m in borehole KFM01C.*

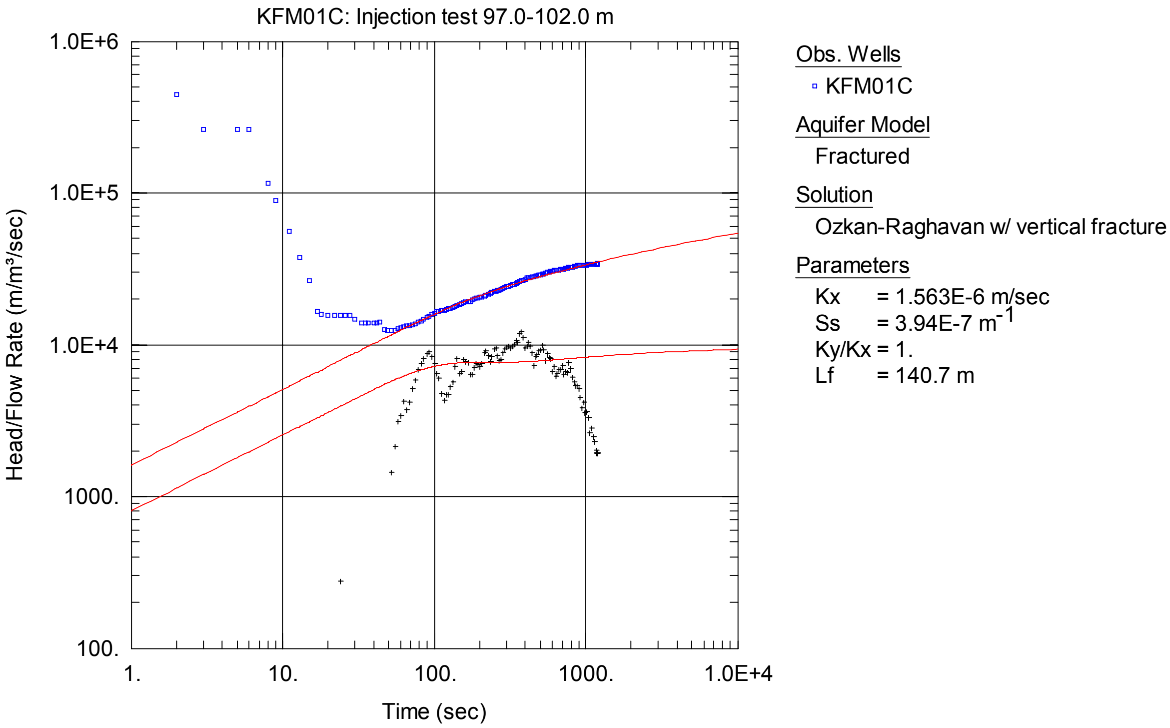

Figure A3-87. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 97.0-102.0 m in KFM01C.*

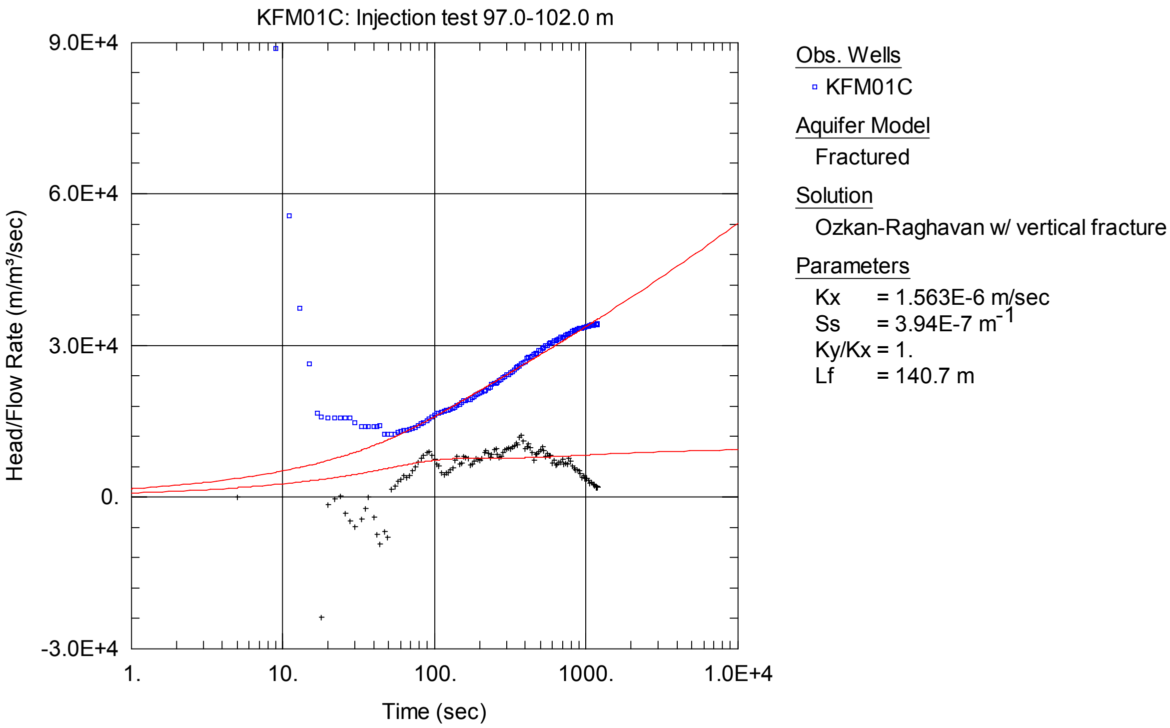

Figure A3-88. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 97.0-102.0 m in KFM01C.*

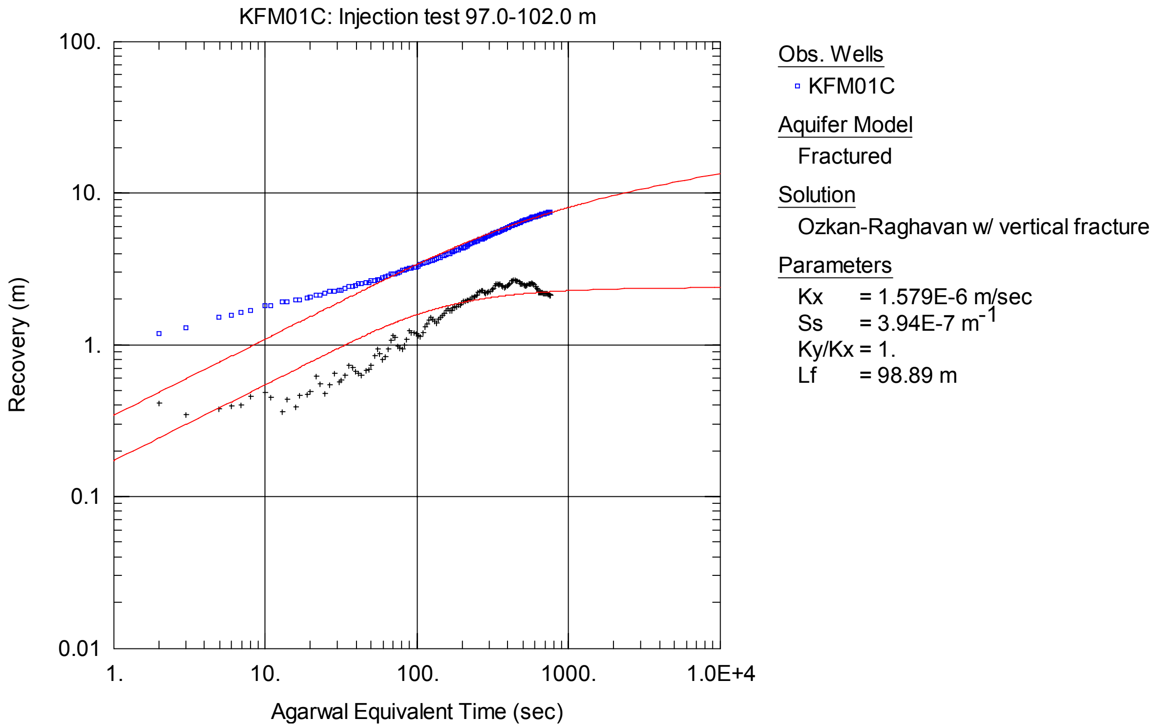

Figure A3-89. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 97.0-102.0 m in KFM01C.*

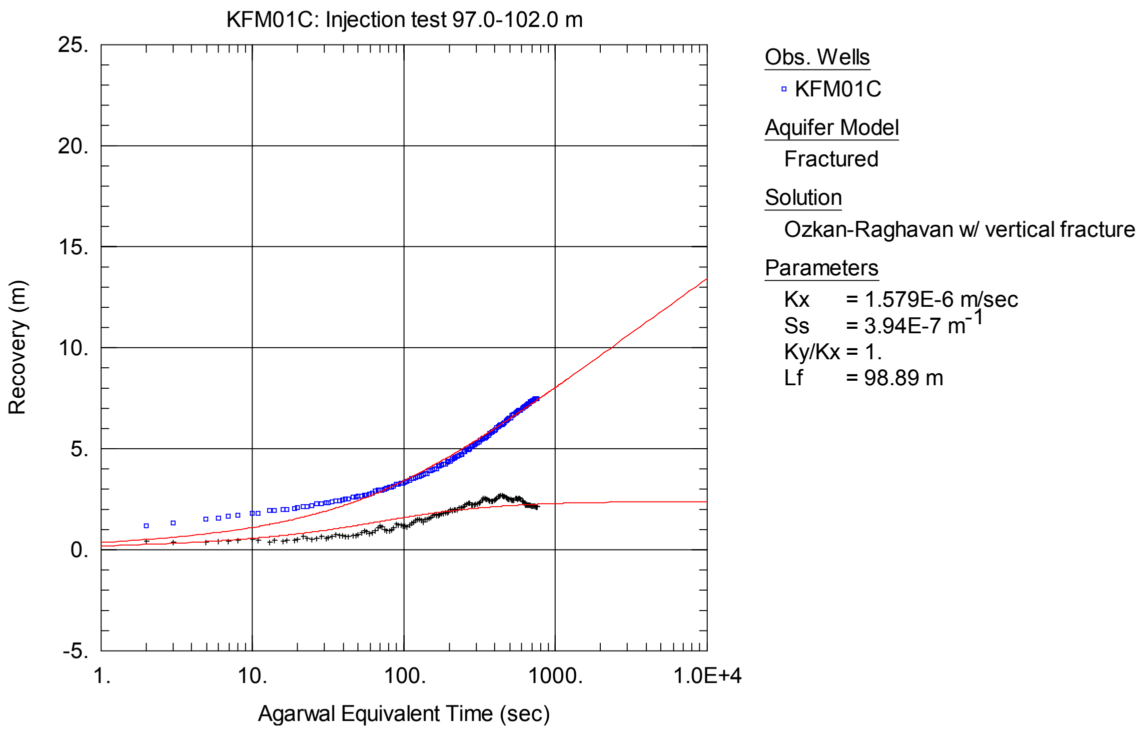

Figure A3-90. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 97.0-102.0 m in KFM01C.*

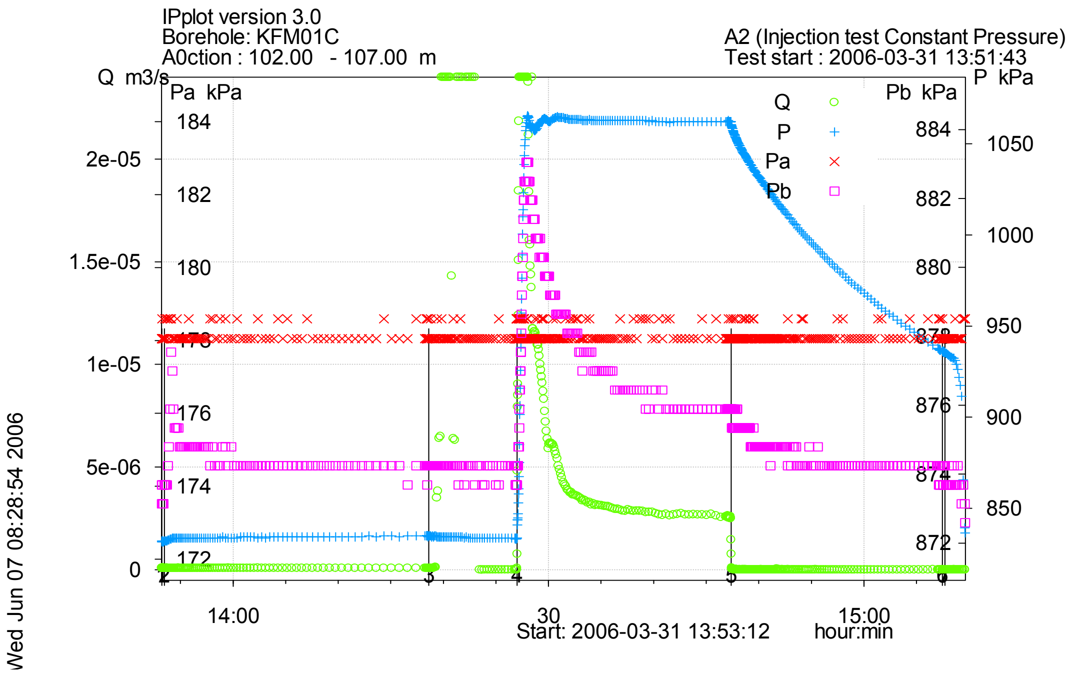

Figure A3-91. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 102.0-107.0 m in borehole KFM01C.*

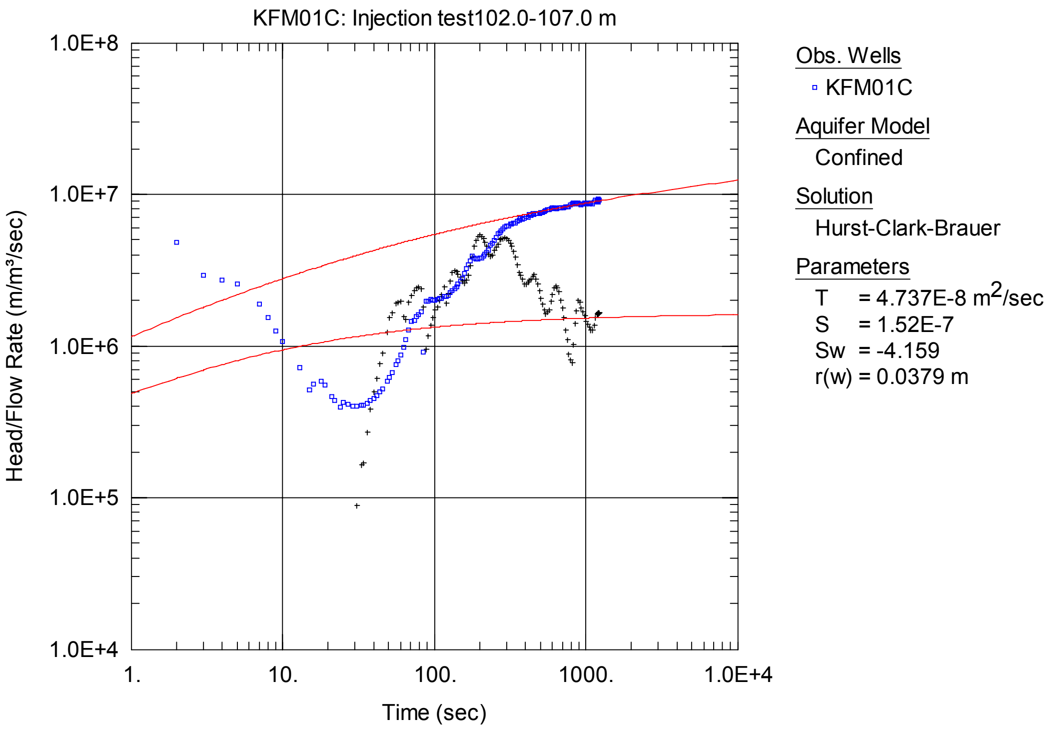

Figure A3-92. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 102.0-107.0 m in KFM01C.*

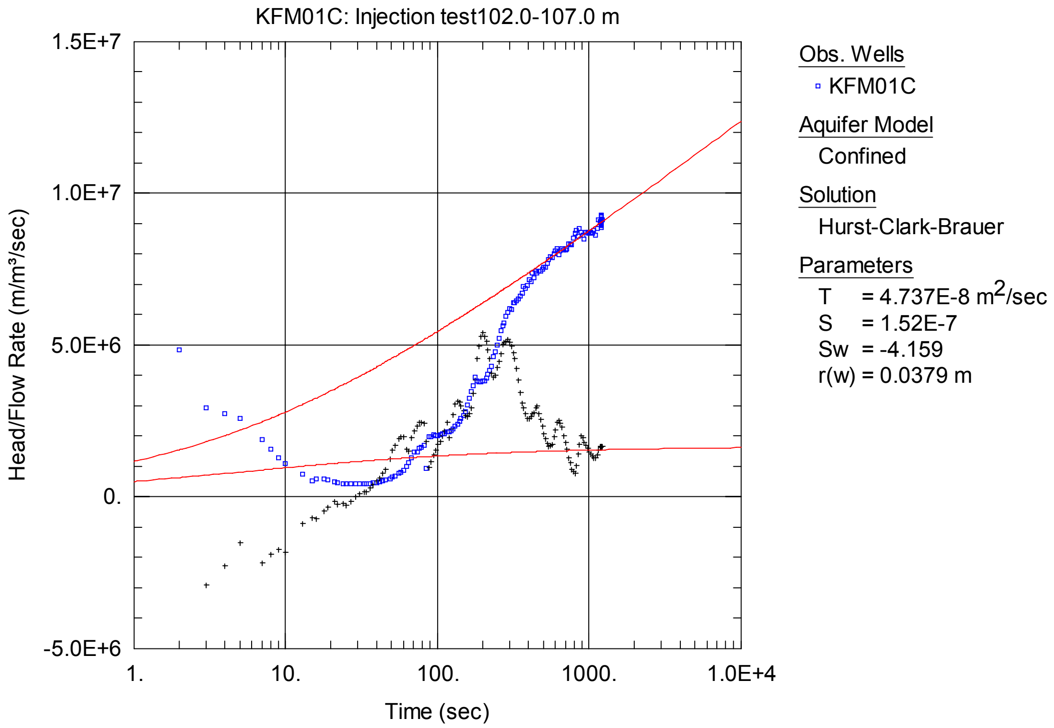

Figure A3-93. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 102.0-107.0 m in KFM01C.*

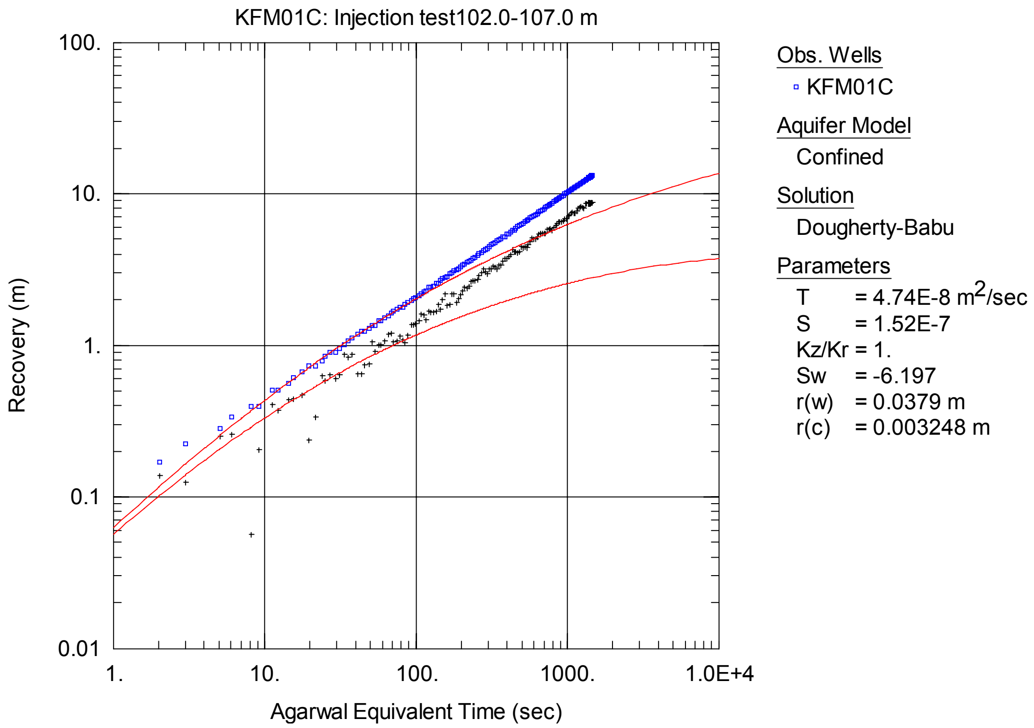

Figure A3-94. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 102.0-107.0 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

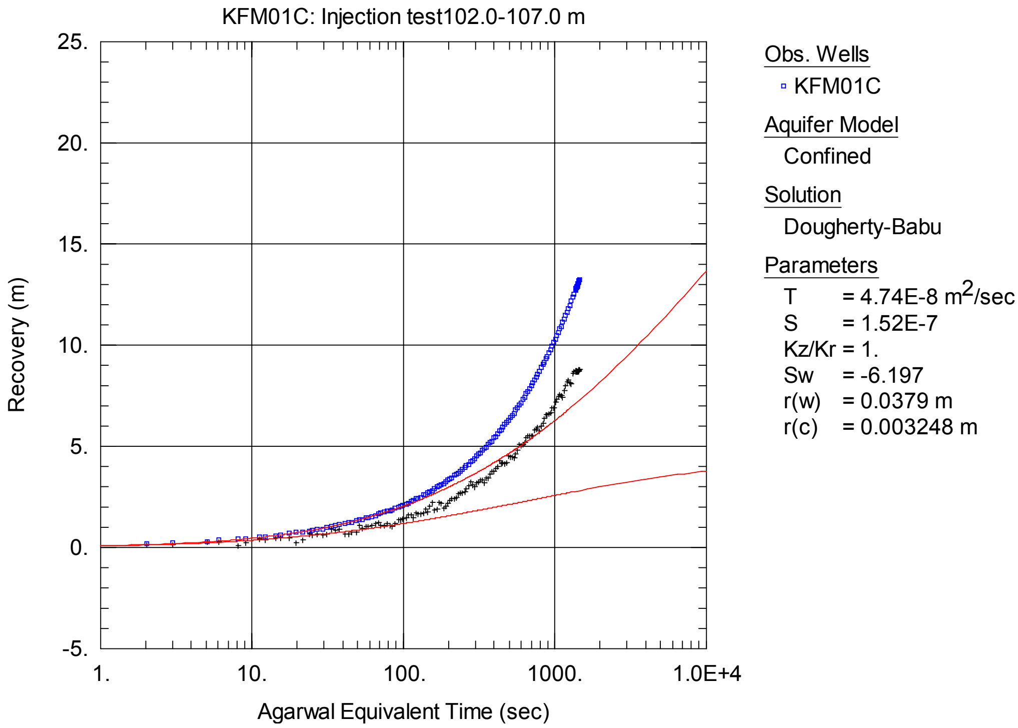

Figure A3-95. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 102.0-107.0 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

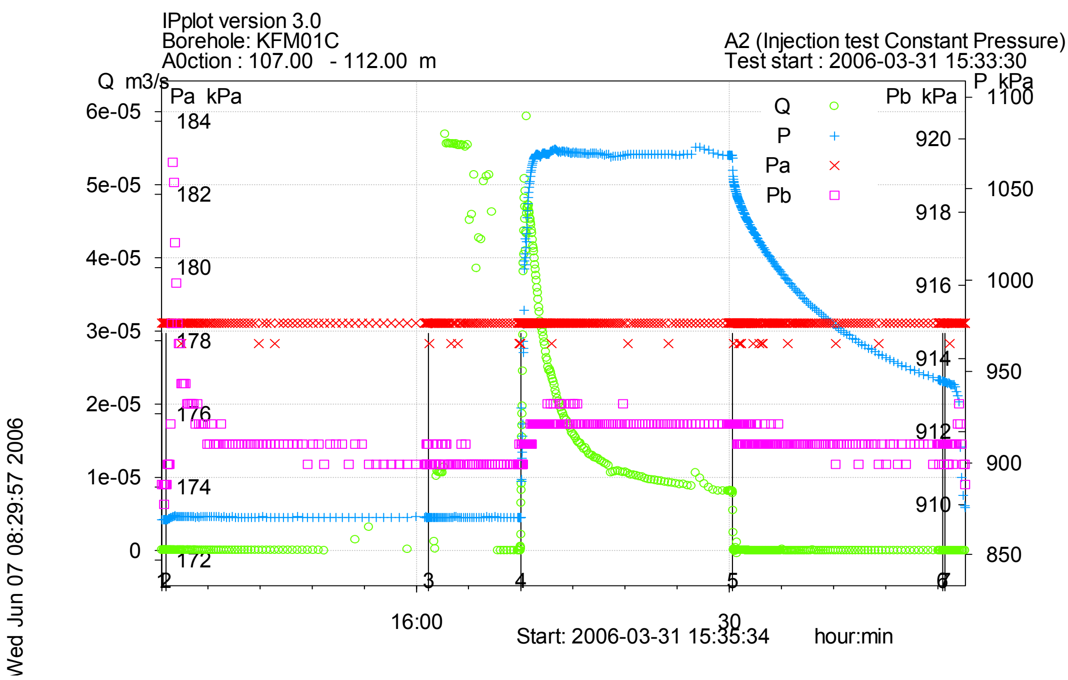

Figure A3-96. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 107.0-112.0 m in borehole KFM01C.*

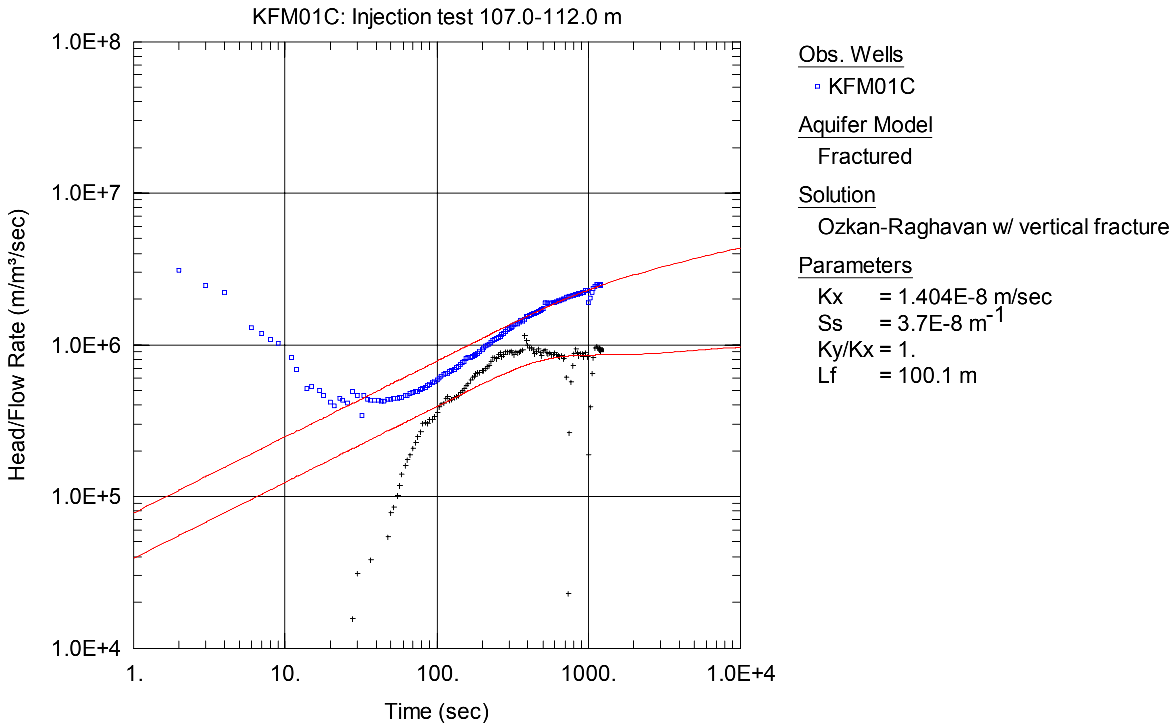

Figure A3-97. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 107.0-112.0 m in KFM01C.*

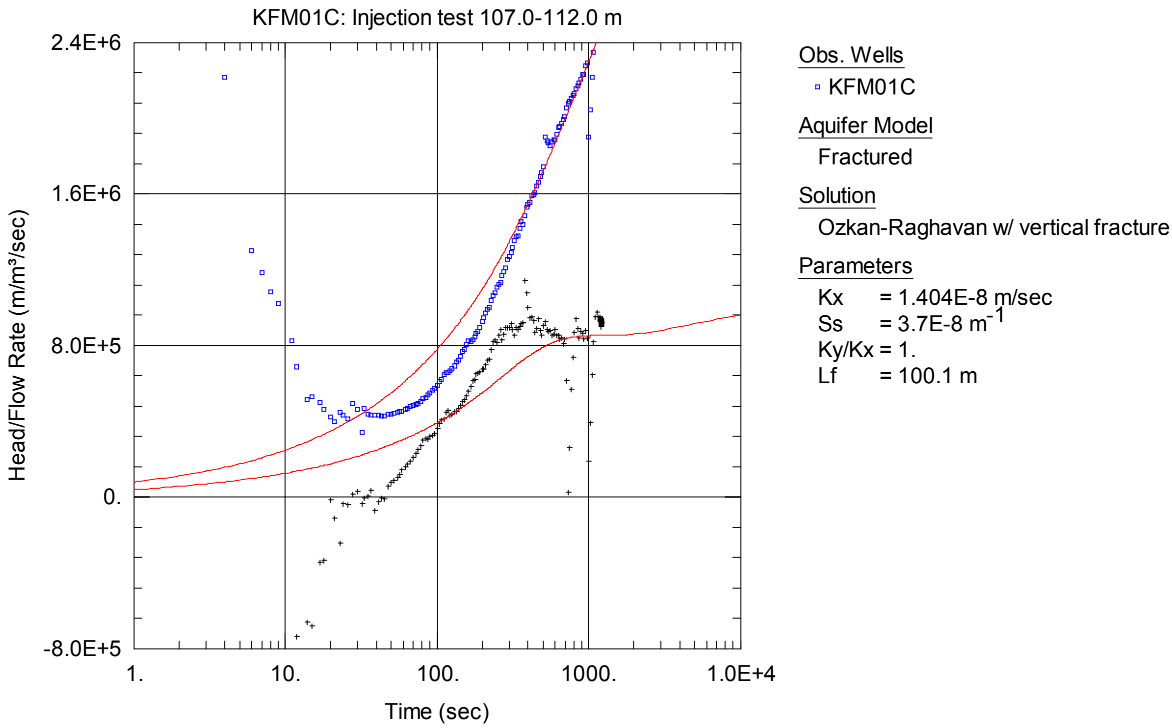

Figure A3-98. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 107.0-112.0 m in KFM01C.*

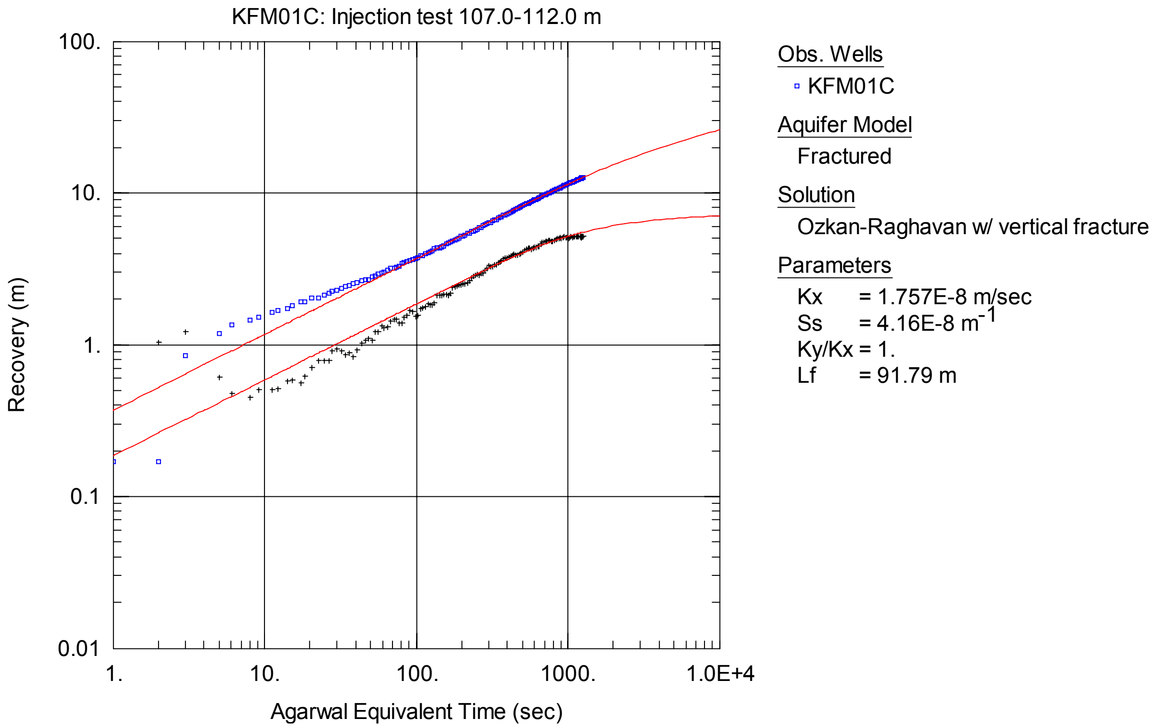

Figure A3-99. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 107.0-112.0 m in KFM01C.*

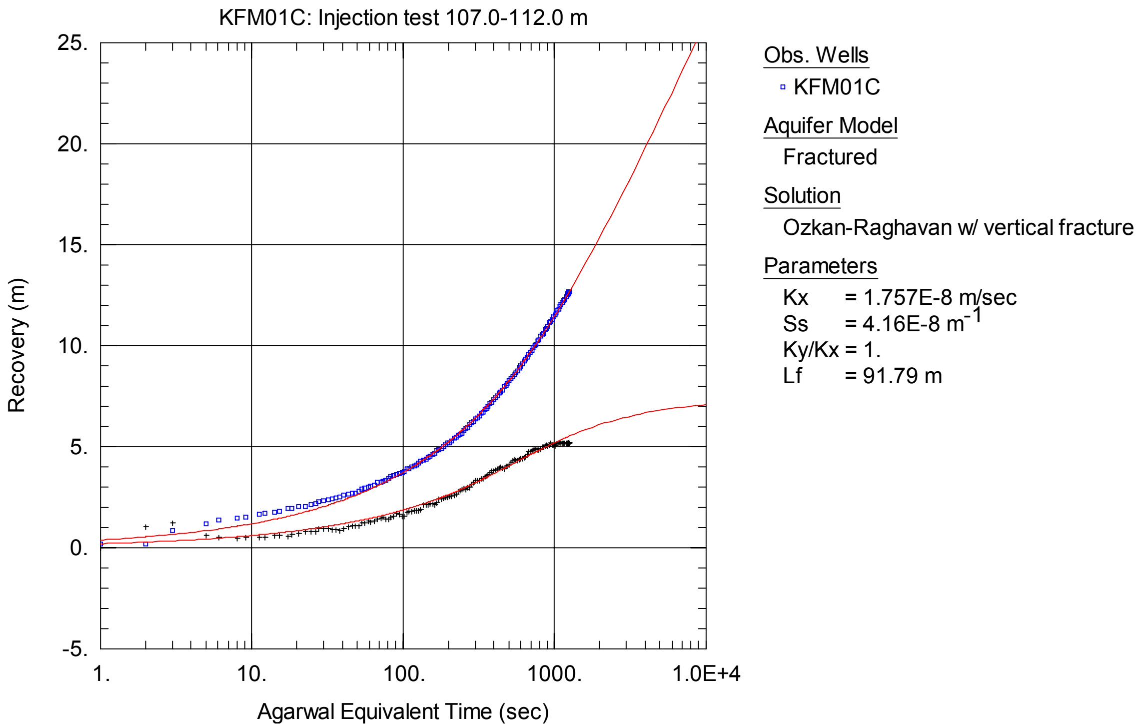

Figure A3-100. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 107.0-112.0 m in KFM01C.*

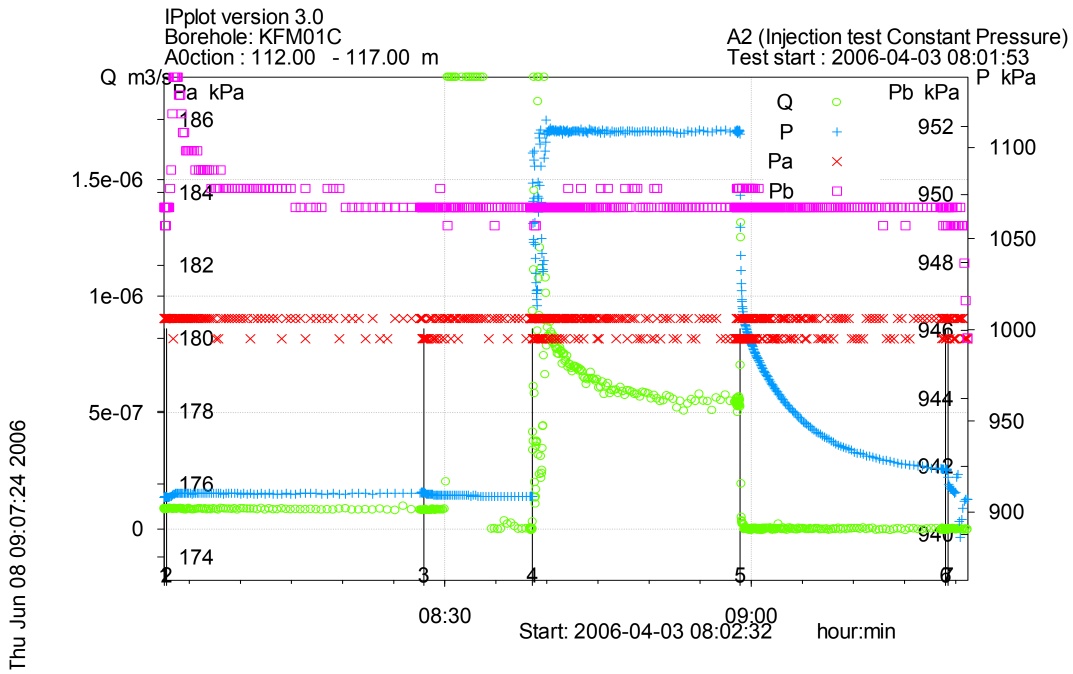

Figure A3-101. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 112.0-117.0 m in borehole KFM01C.*

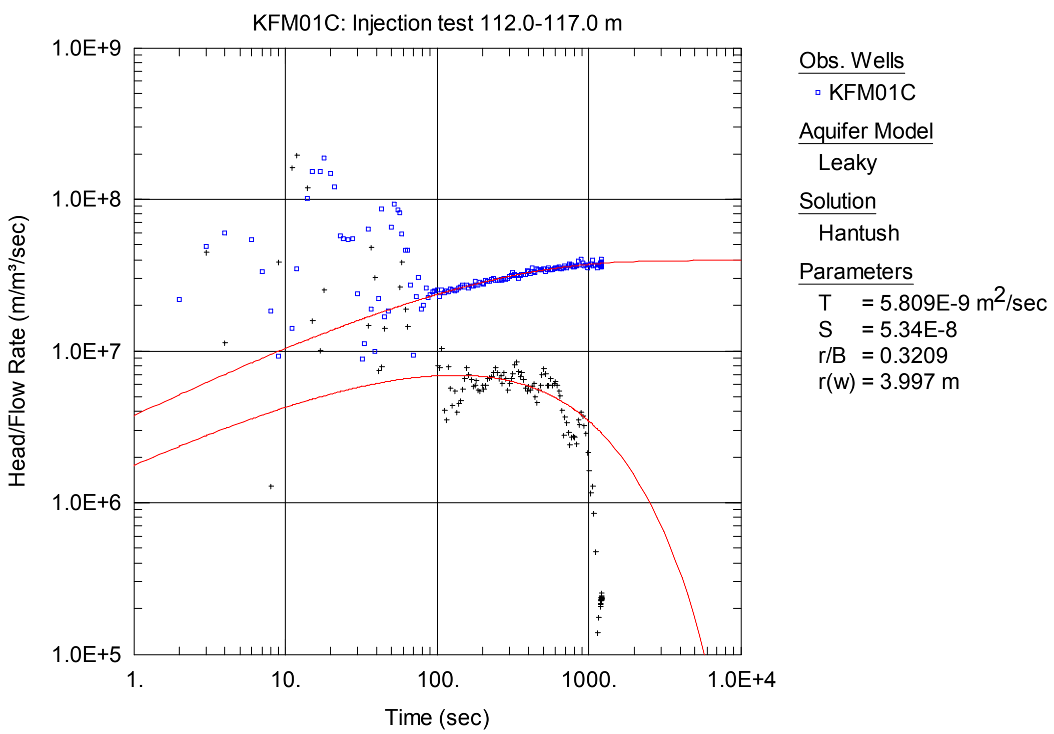

Figure A3-102. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 112.0-117.0 m in KFM01C.*

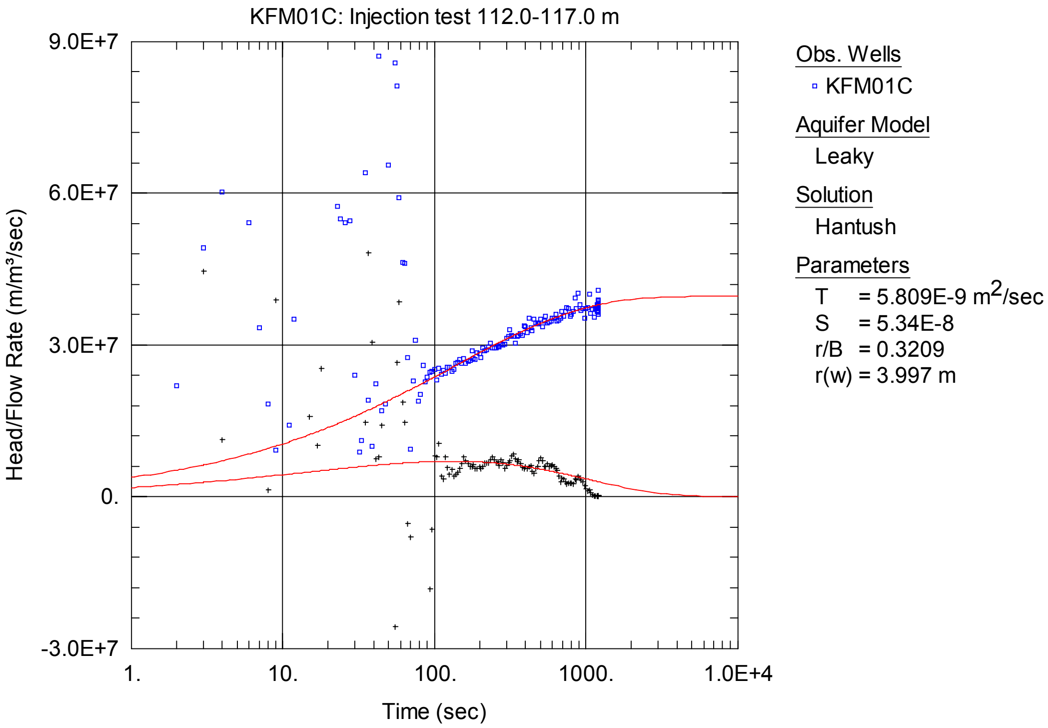

Figure A3-103. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 112.0-117.0 m in KFM01C.*

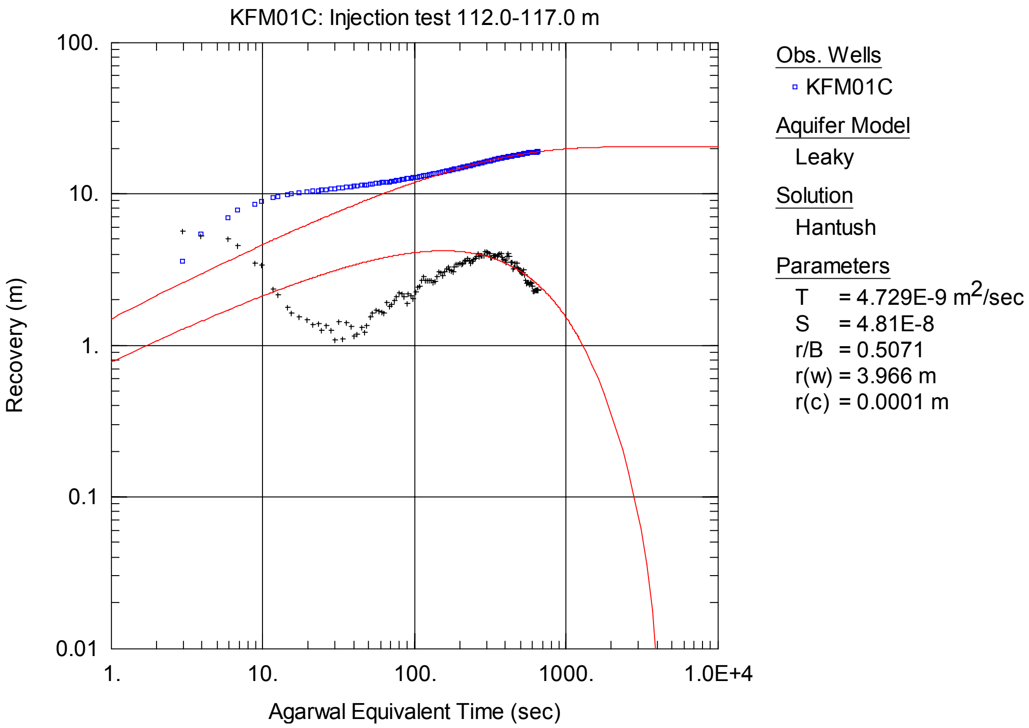

Figure A3-104. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 112.0-117.0 m in KFM01C.*

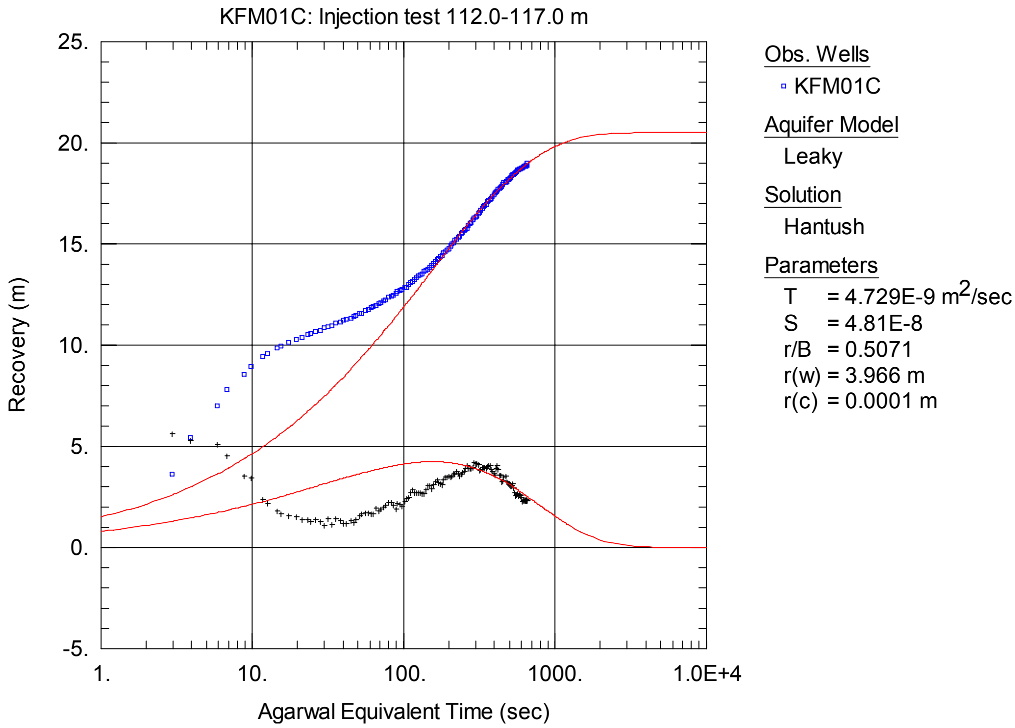

Figure A3-105. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 112.0-117.0 m in KFM01C.*

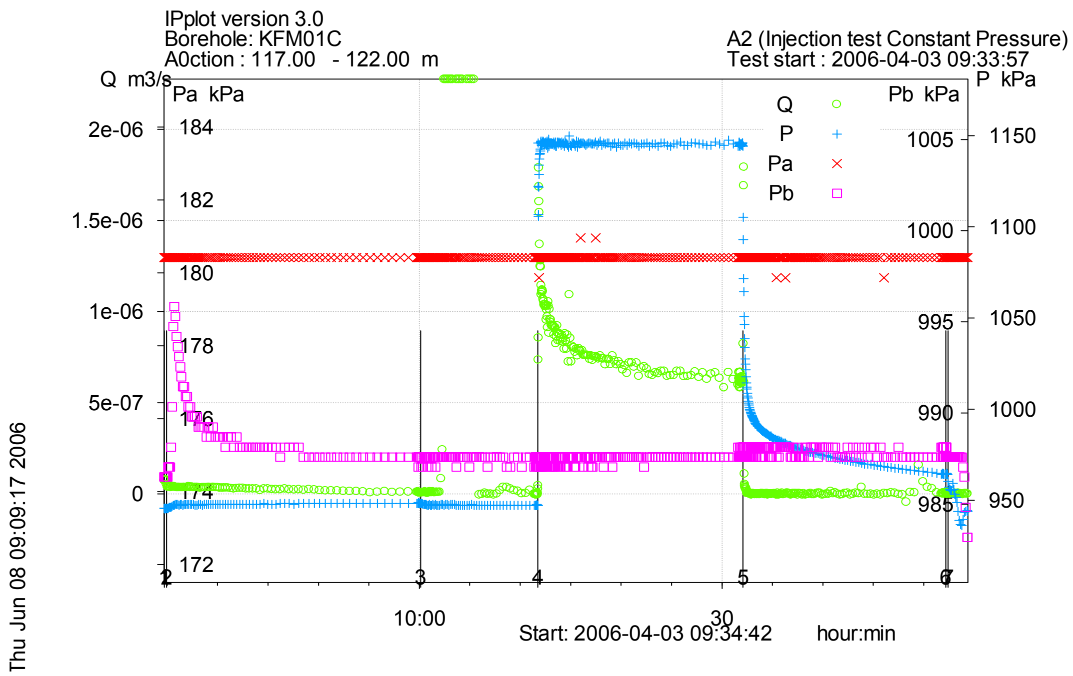

Figure A3-106. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 117.0-122.0 m in borehole KFM01C.*

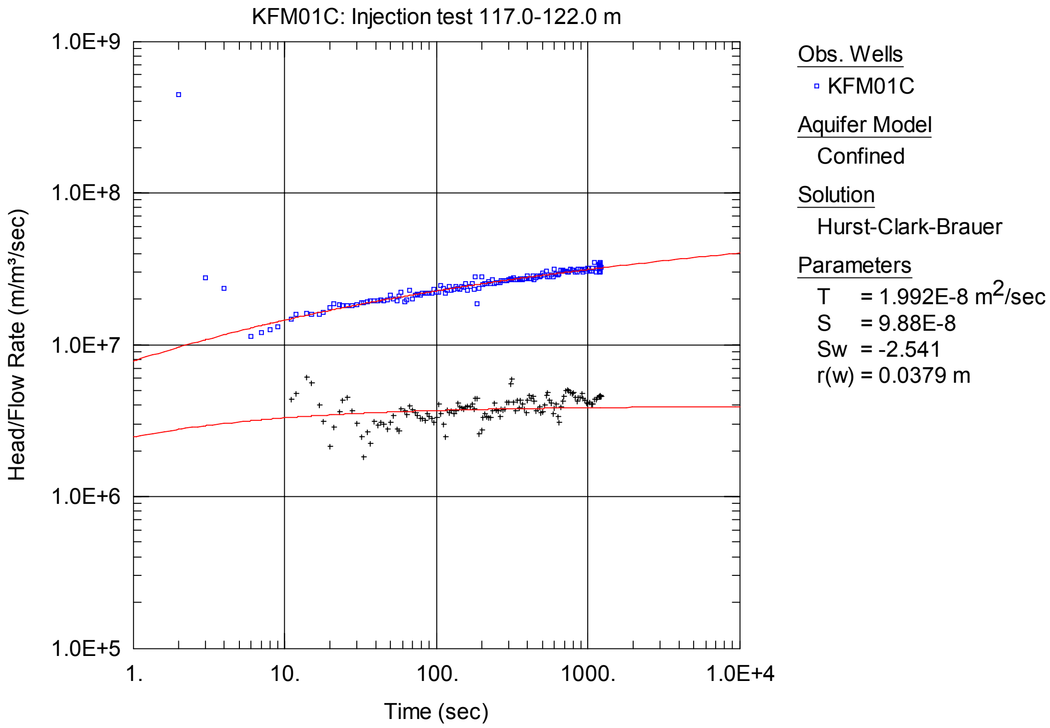

Figure A3-107. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 117.0-122.0 m in KFM01C.*

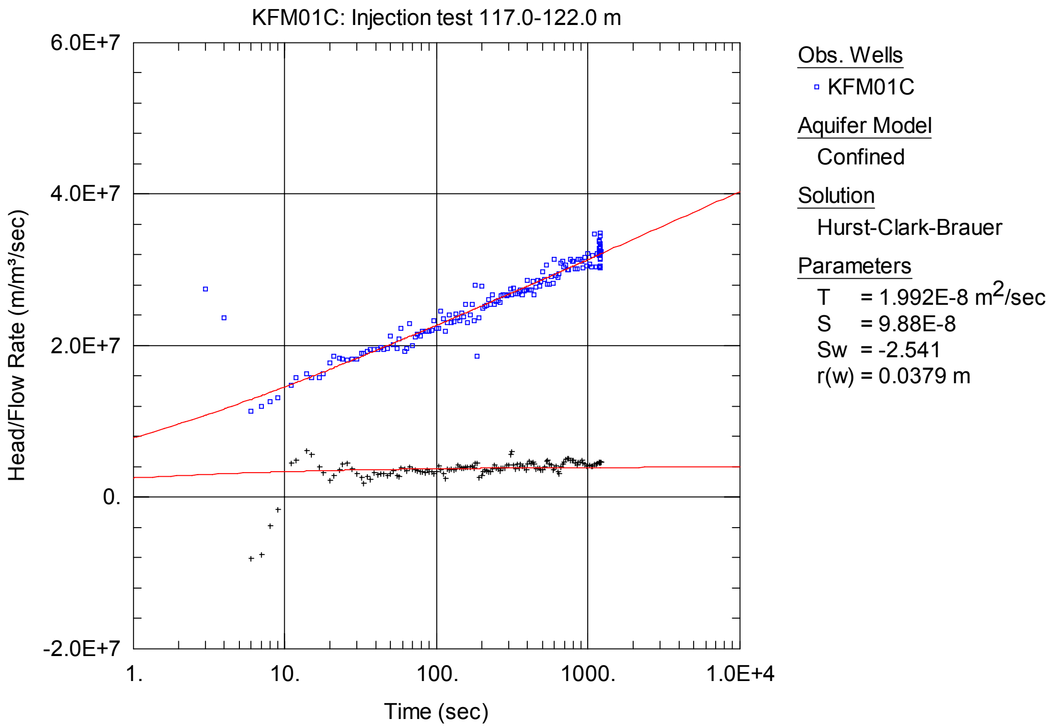

Figure A3-108. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 117.0-122.0 m in KFM01C.*

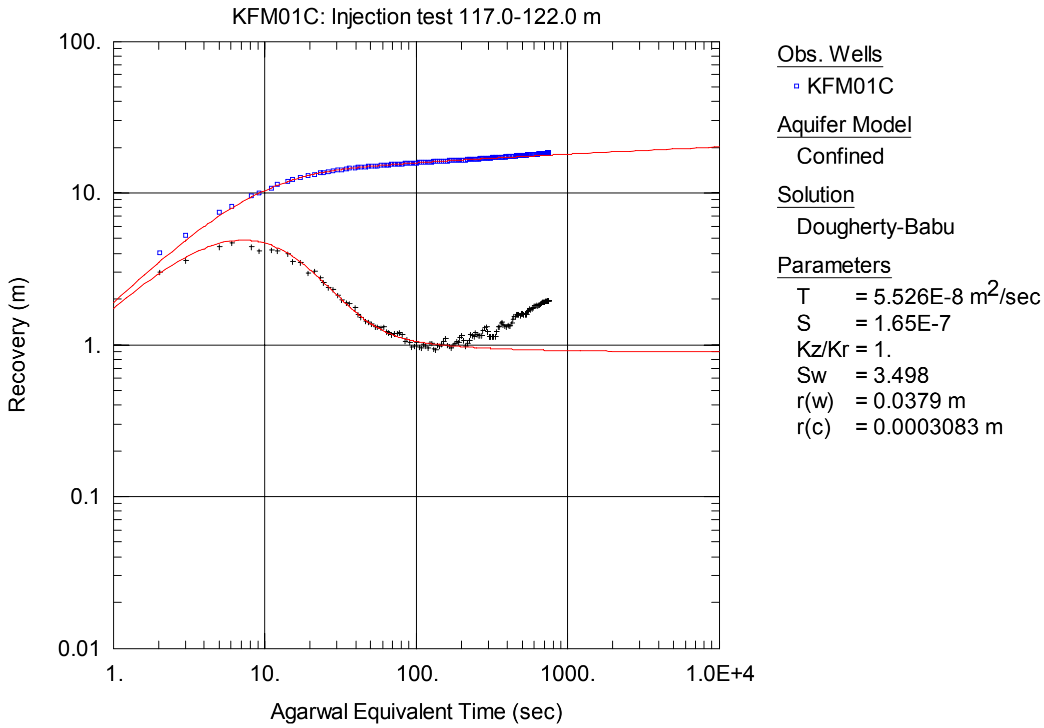

Figure A3-109. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 117.0-122.0 m in KFM01C.*

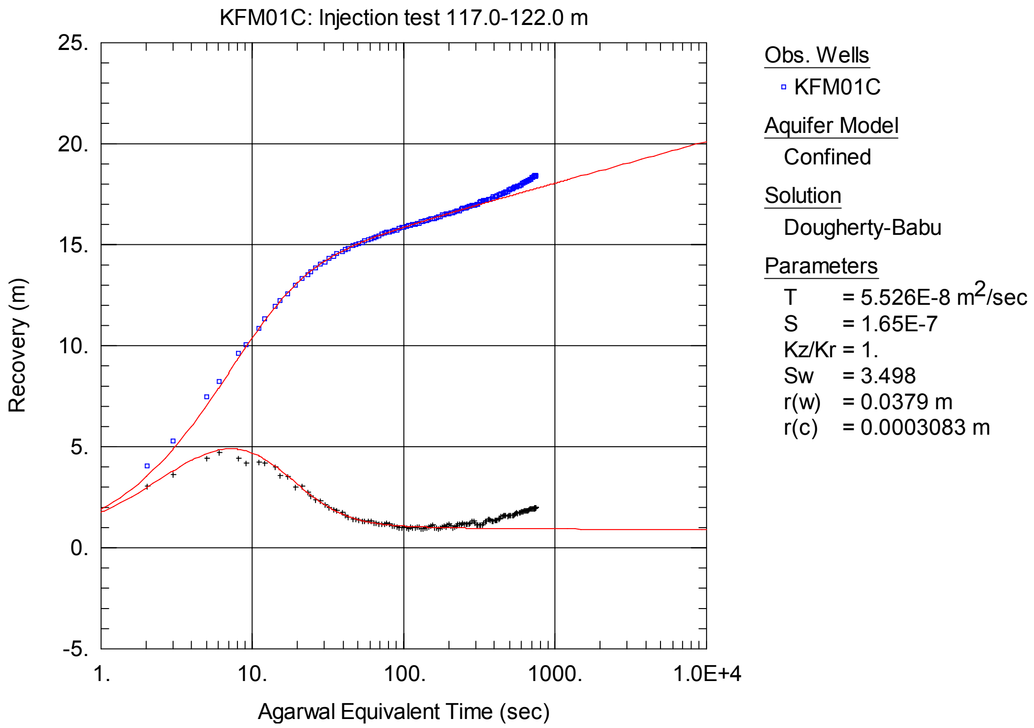

Figure A3-110. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 117.0-122.0 m in KFM01C.*

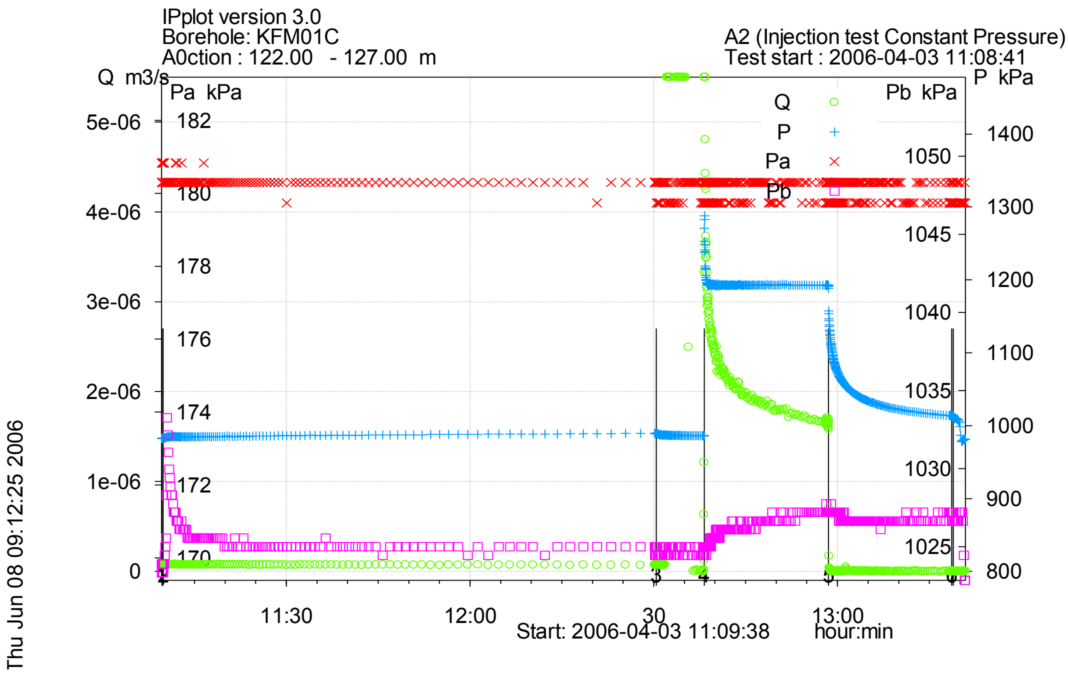

Figure A3-111. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 122.0-127.0 m in borehole KFM01C.*

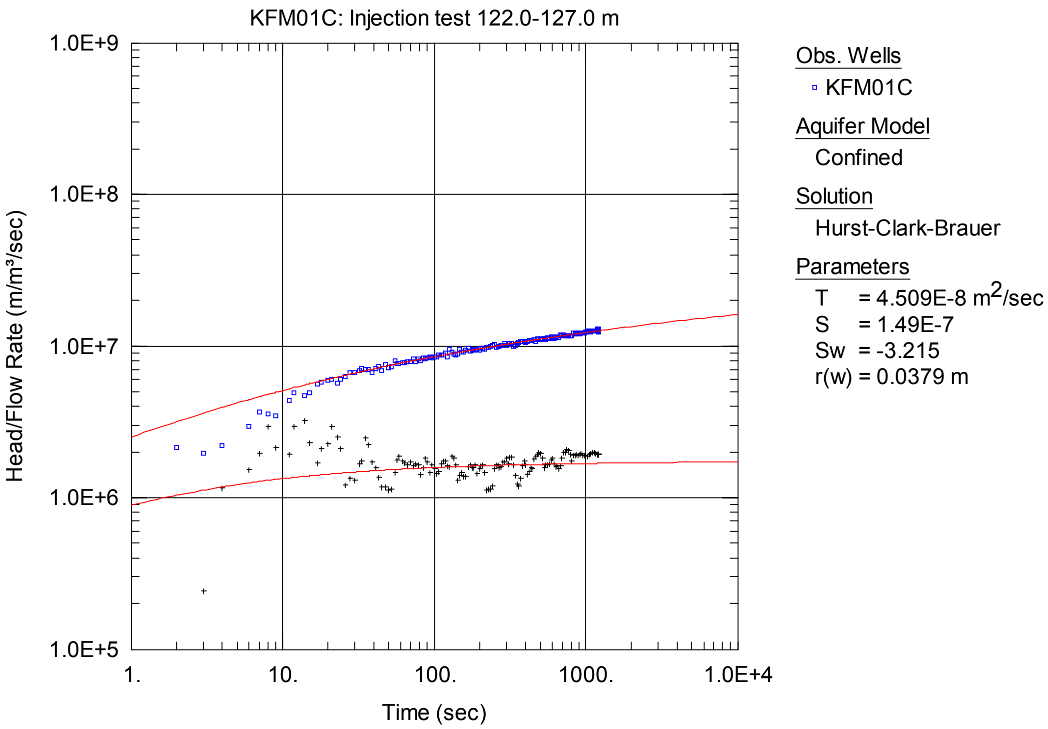

Figure A3-112. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 122.0-127.0 m in KFM01C.*

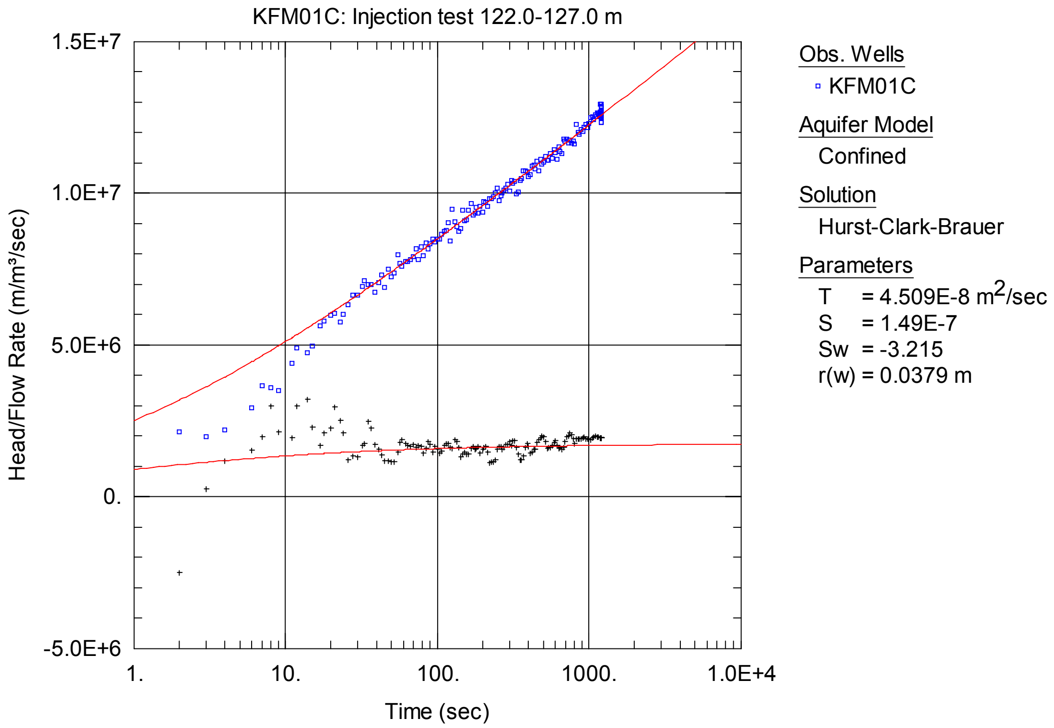

Figure A3-113. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 122.0-127.0 m in KFM01C.*

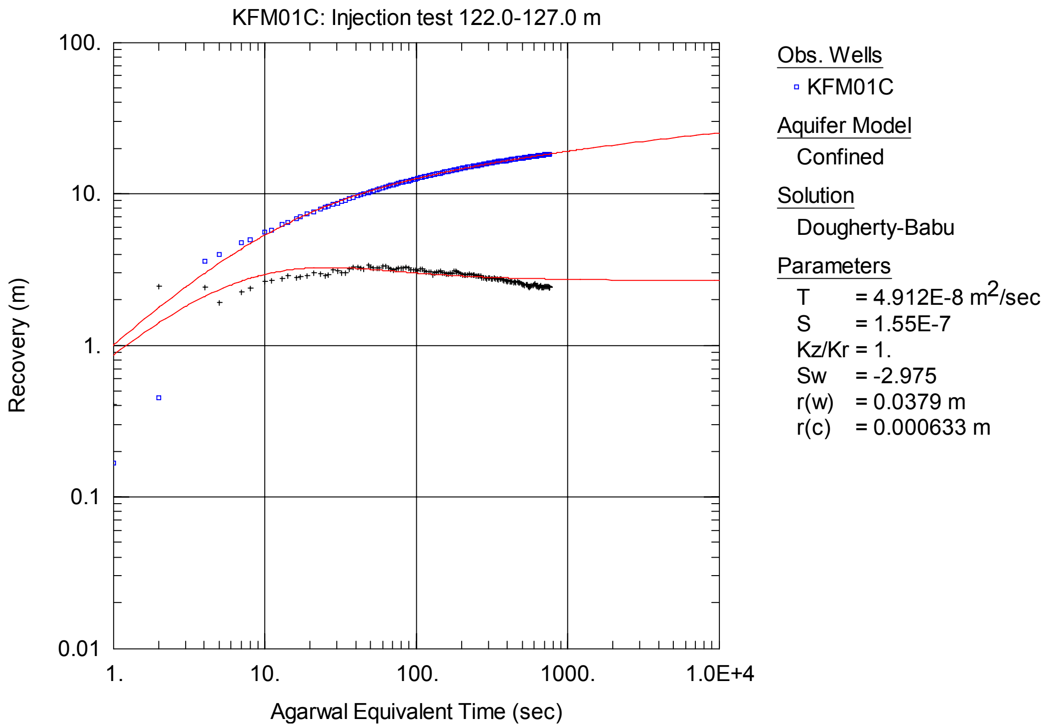

Figure A3-114. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 122.0-127.0 m in KFM01C.*

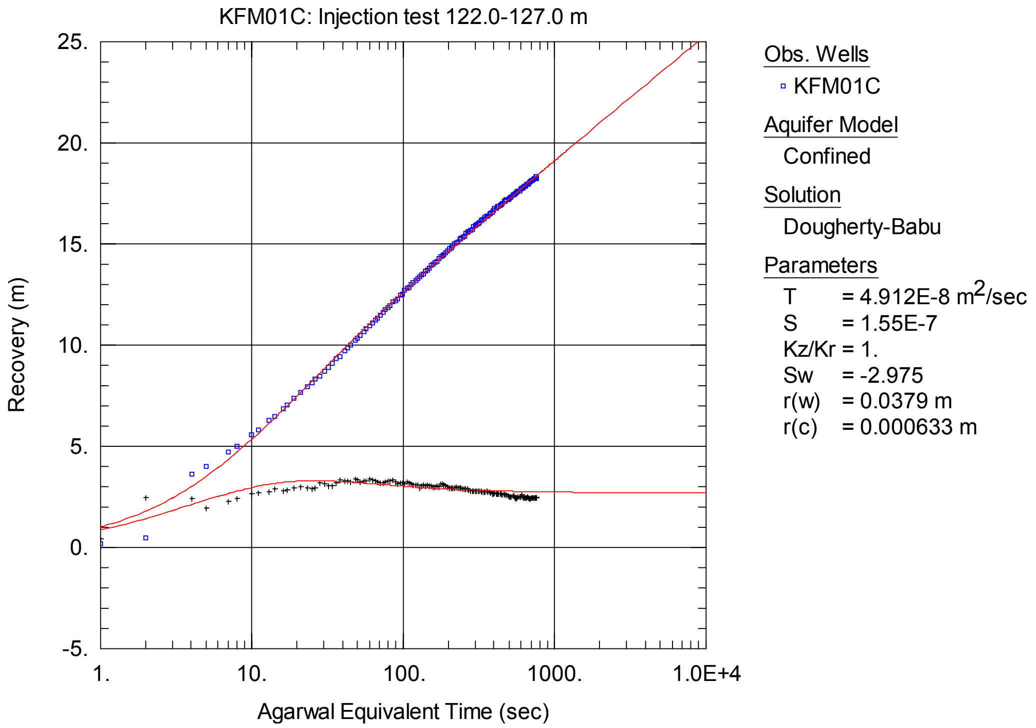

Figure A3-115. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 122.0-127.0 m in KFM01C.*

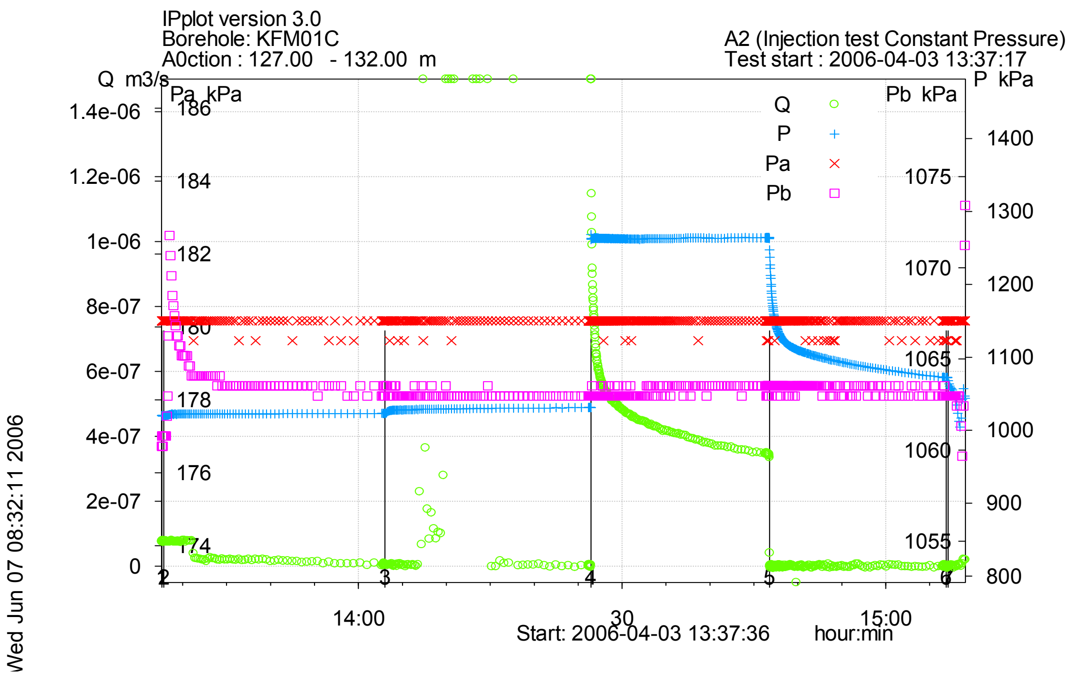

Figure A3-116. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 127.0-132.0 m in borehole KFM01C.*

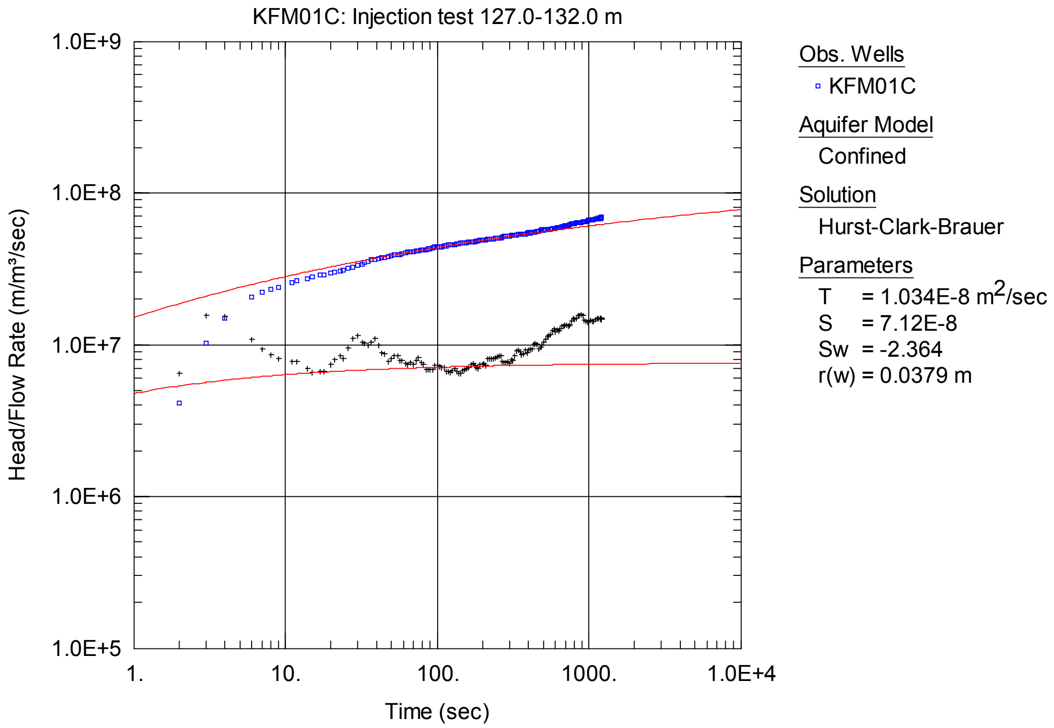

Figure A3-117. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 127.0-132.0 m in KFM01C.*

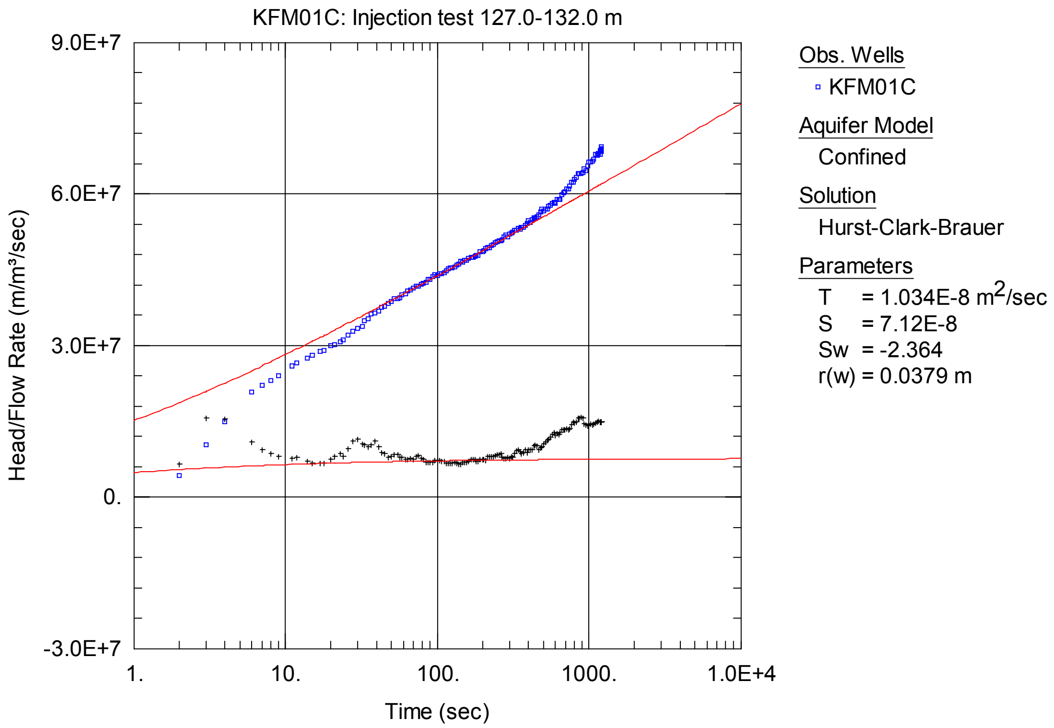

Figure A3-118. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 127.0-132.0 m in KFM01C.*

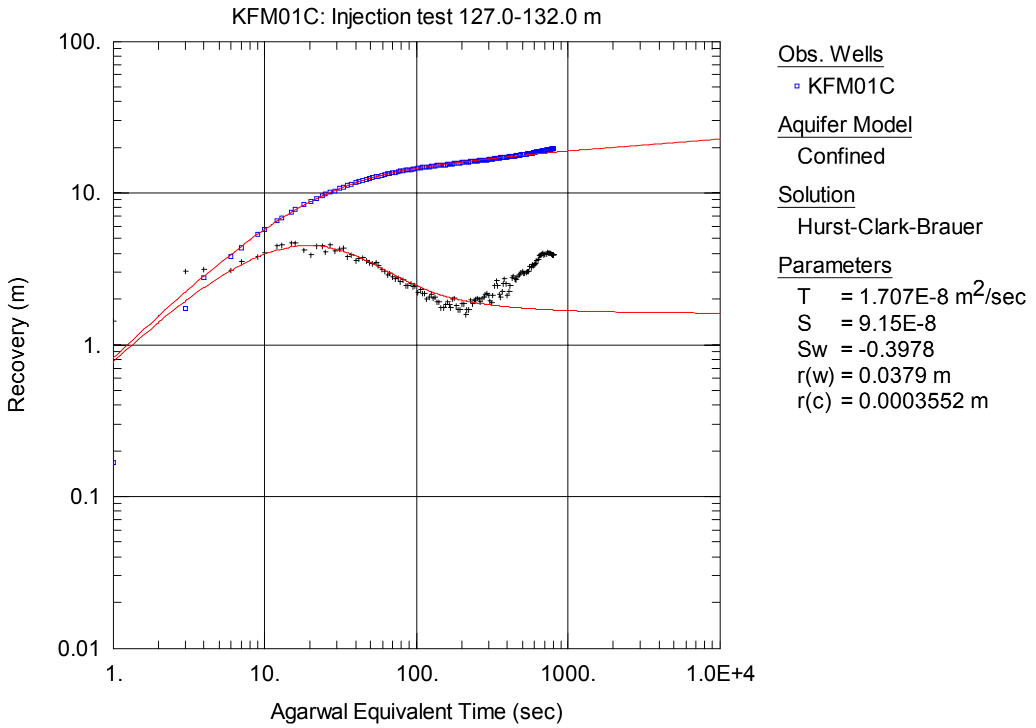

Figure A3-119. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 127.0-132.0 m in KFM01C.*

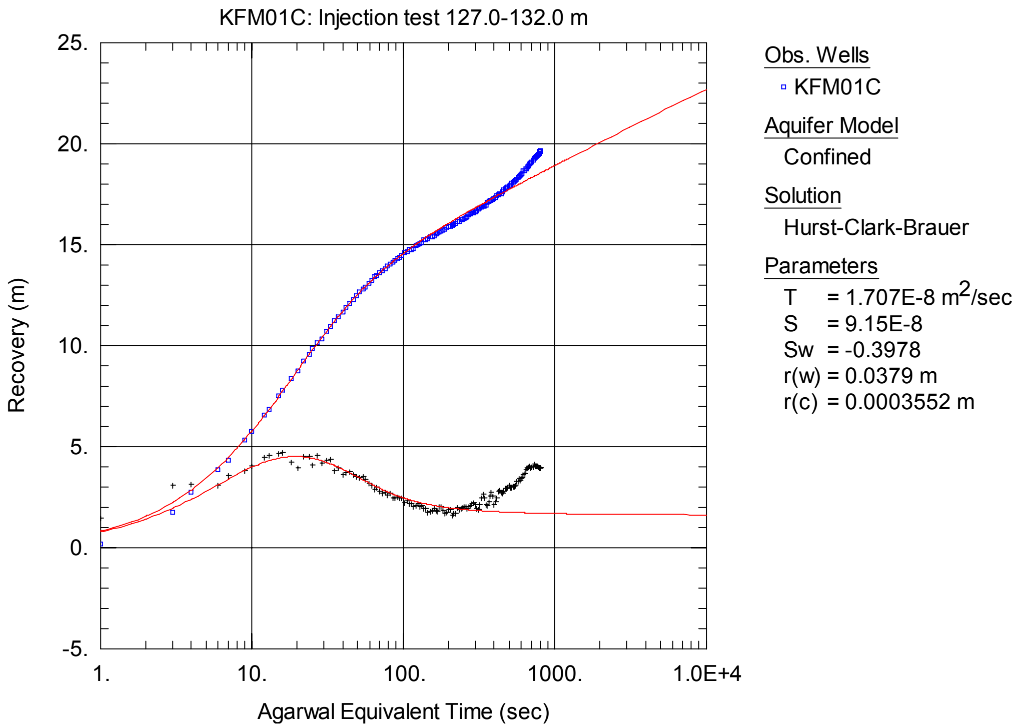

Figure A3-120. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 127.0-132.0 m in KFM01C.*

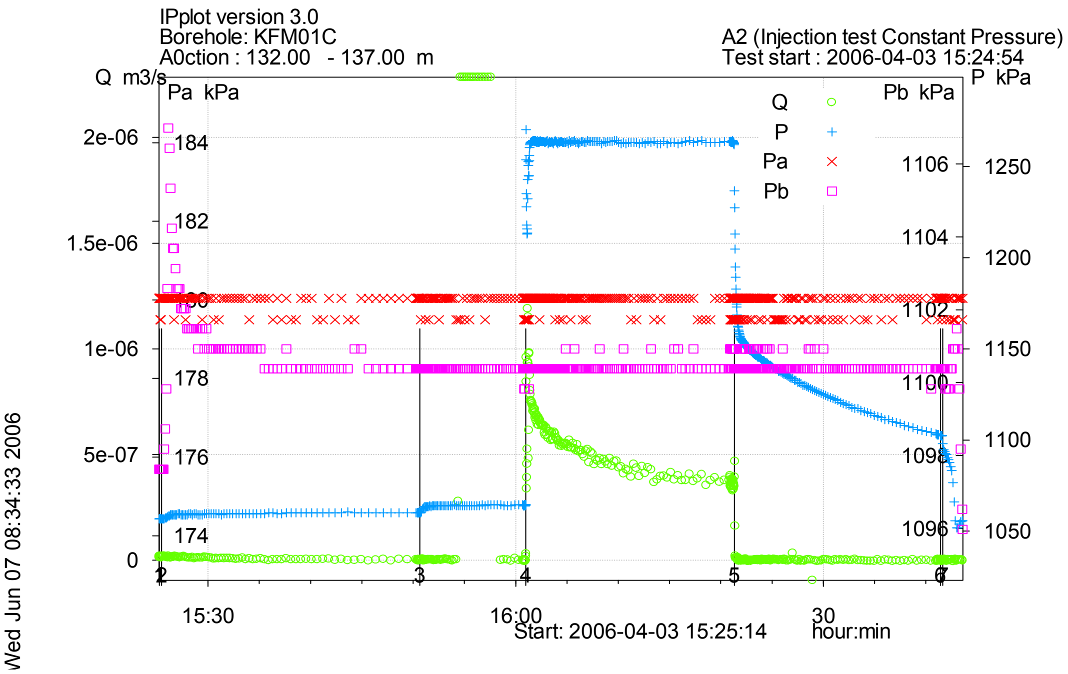

Figure A3-121. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 132.0-137.0 m in borehole KFM01C.*

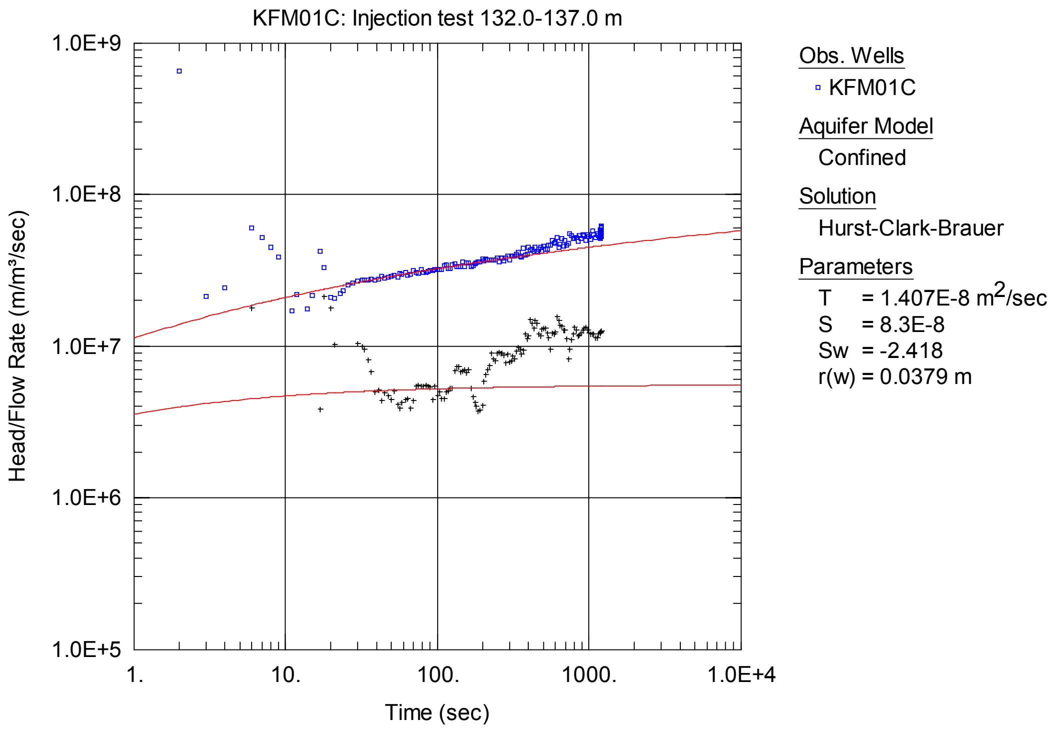

Figure A3-122. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 132.0-137.0 m in KFM01C.*

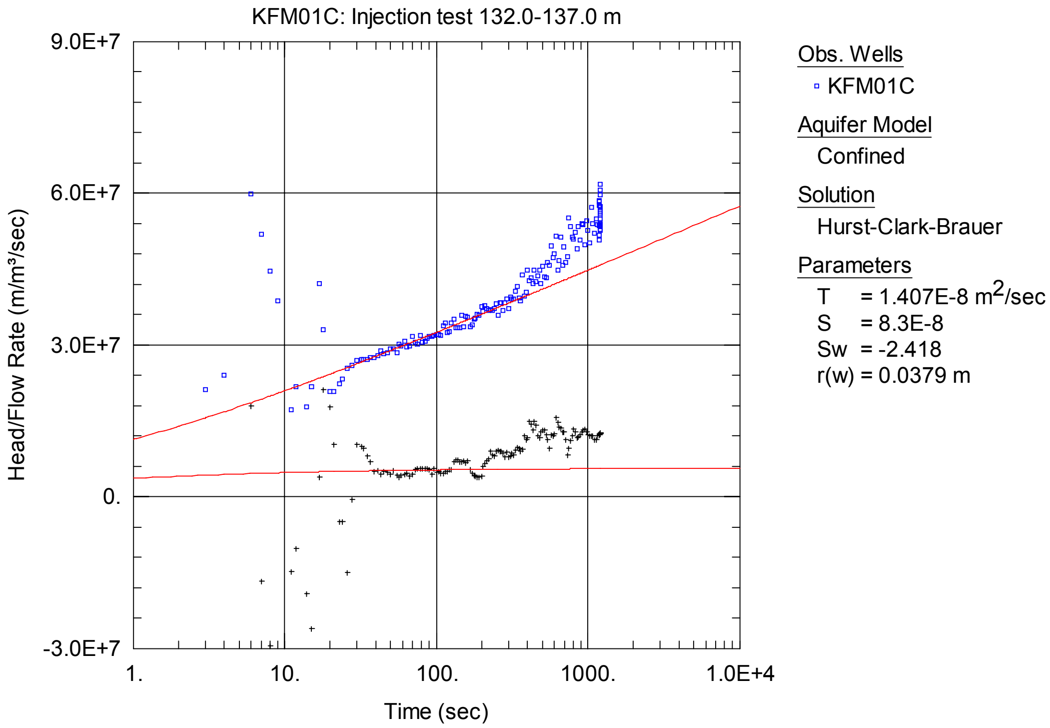

Figure A3-123. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 132.0-137.0 m in KFM01C.*

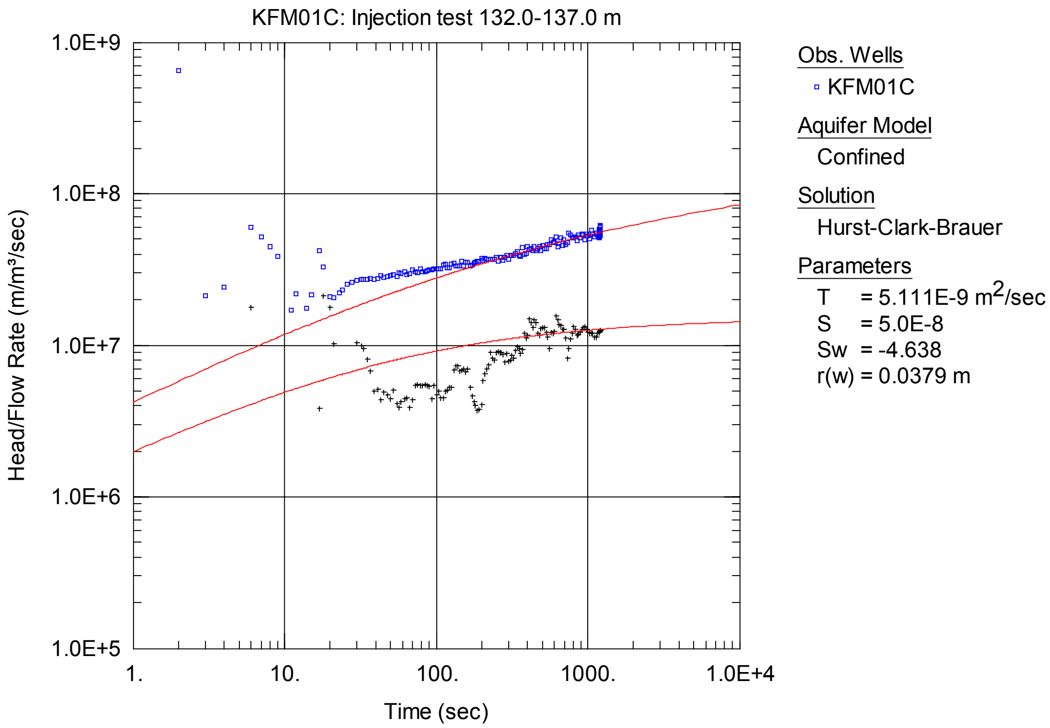

Figure A3-124. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 132.0-137.0 m in KFM01C.*

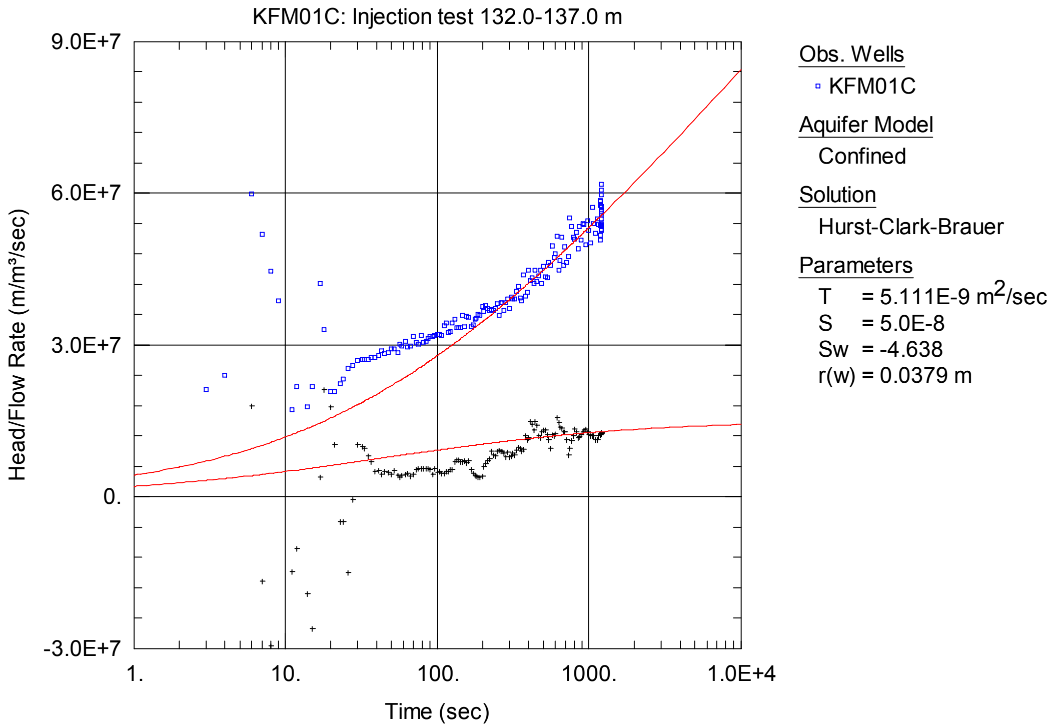

Figure A3-125. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 132.0-137.0 m in KFM01C.*

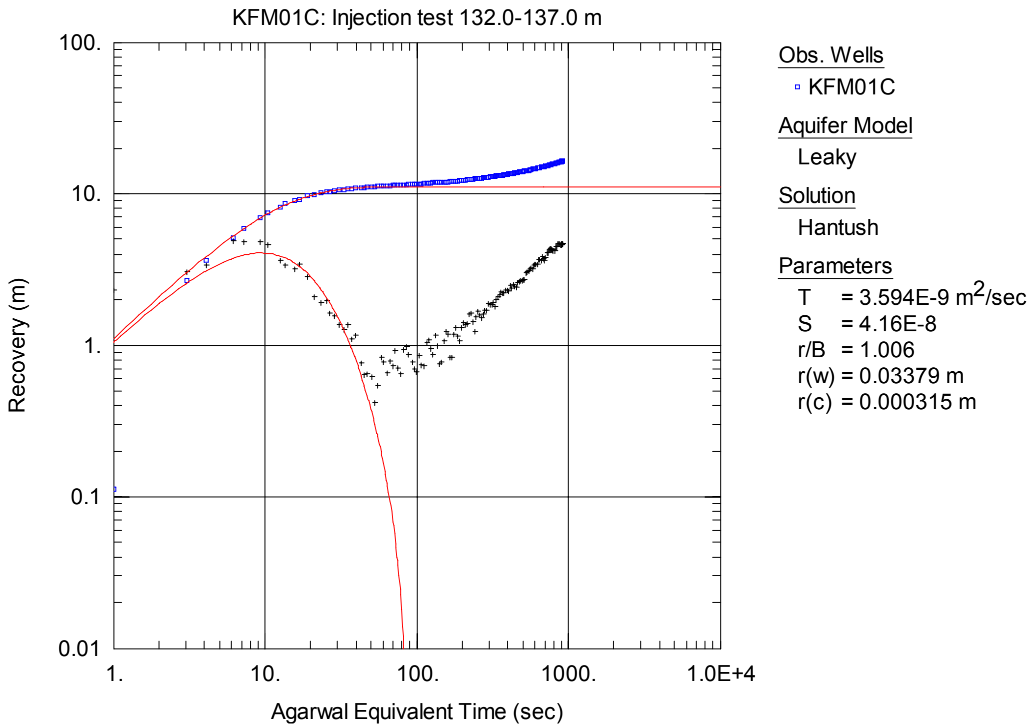

Figure A3-126. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 132.0-137.0 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

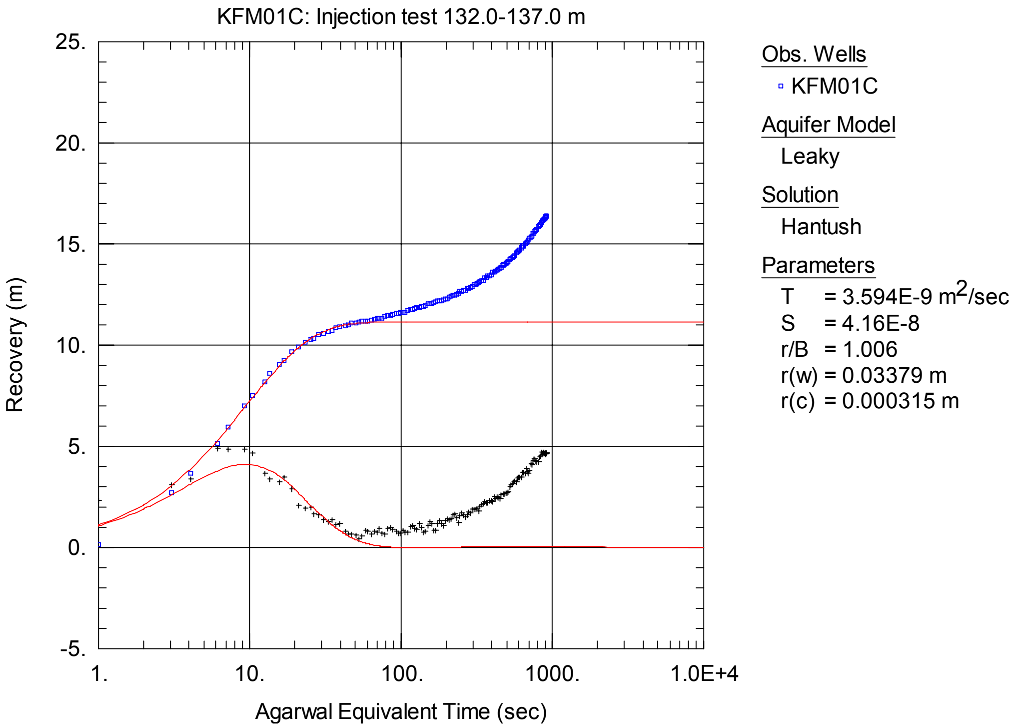

Figure A3-127. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 132.0-137.0 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

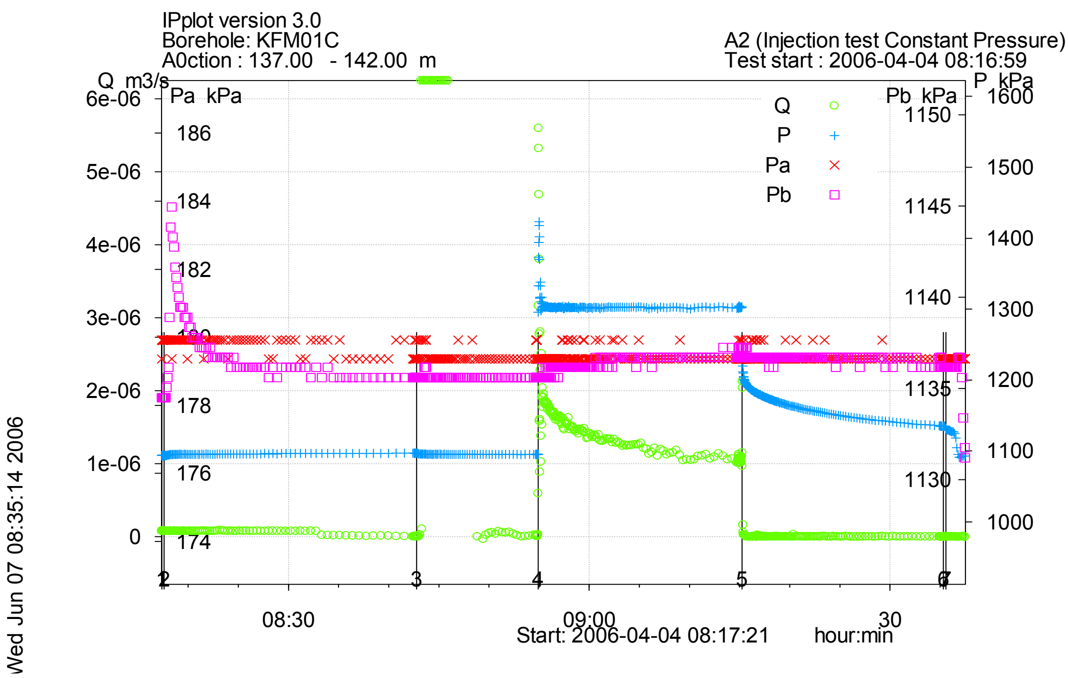

Figure A3-128. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 137.0-142.0 m in borehole KFM01C.*

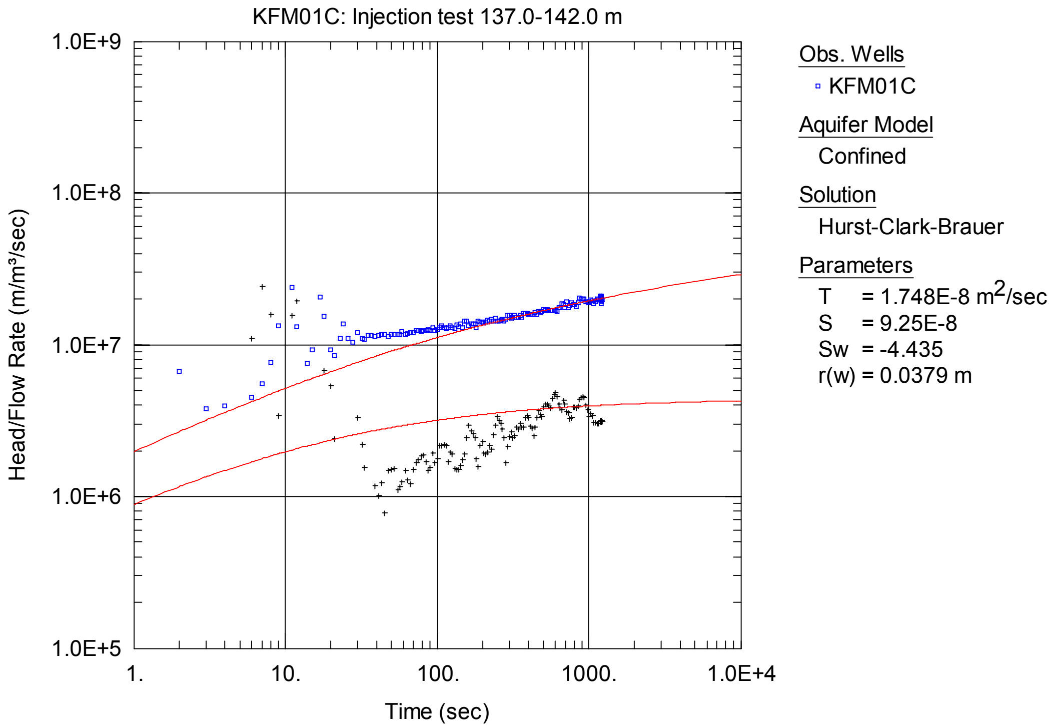

Figure A3-129. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 137.0-142.0 m in KFM01C.*

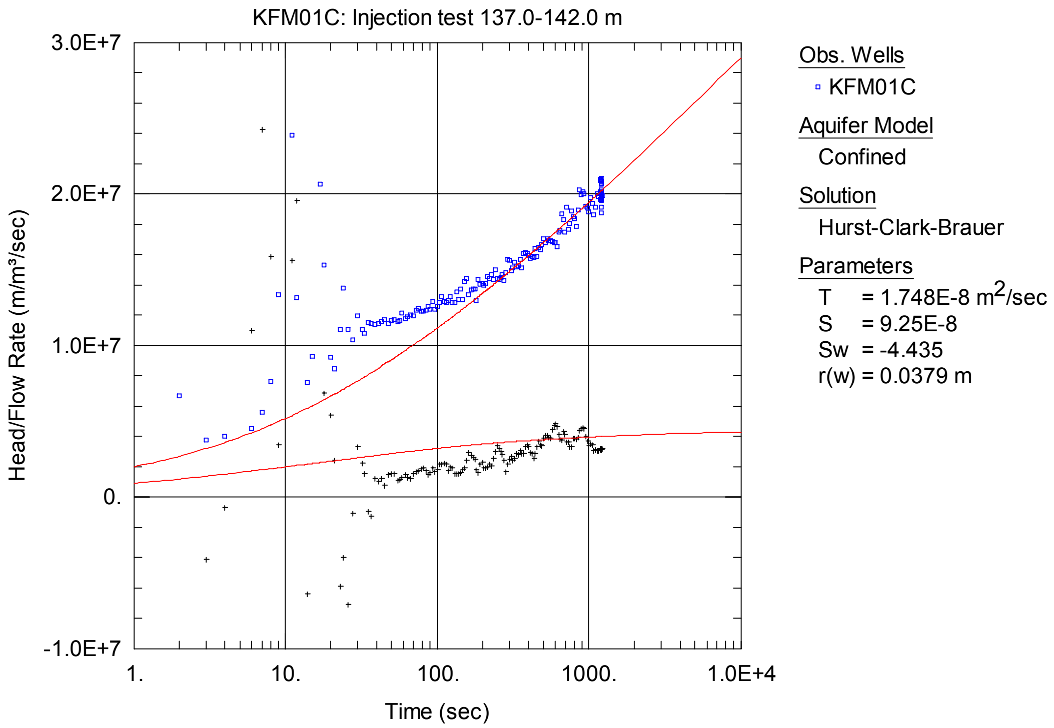

Figure A3-130. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 137.0-142.0 m in KFM01C.*

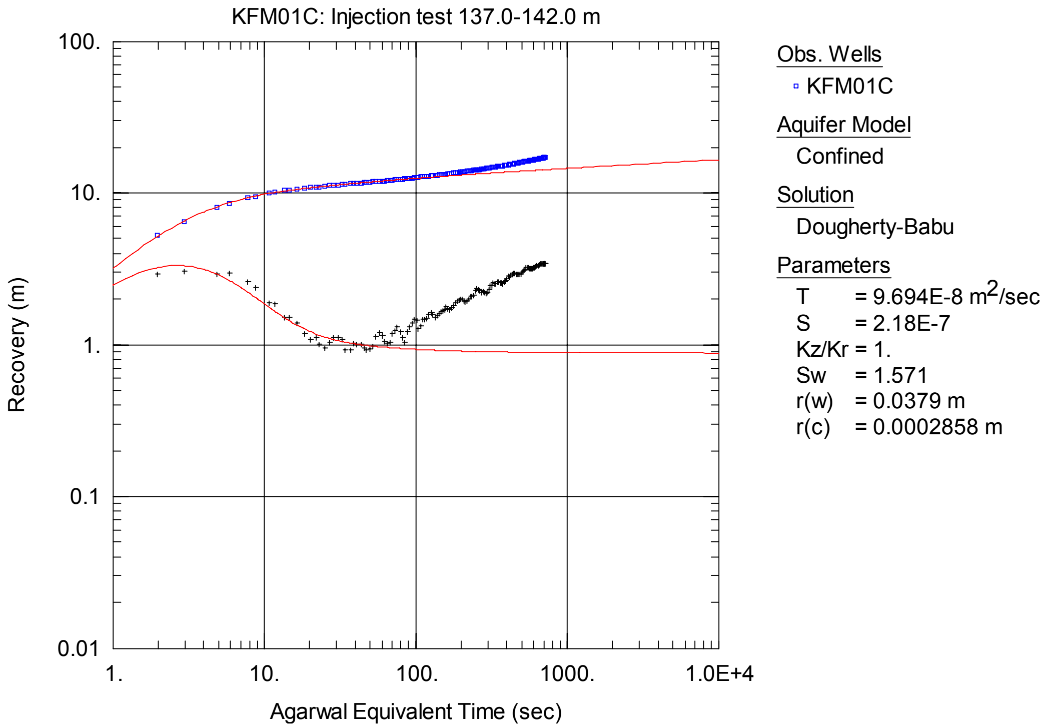

Figure A3-131. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 137.0-142.0 m in KFM01C.*

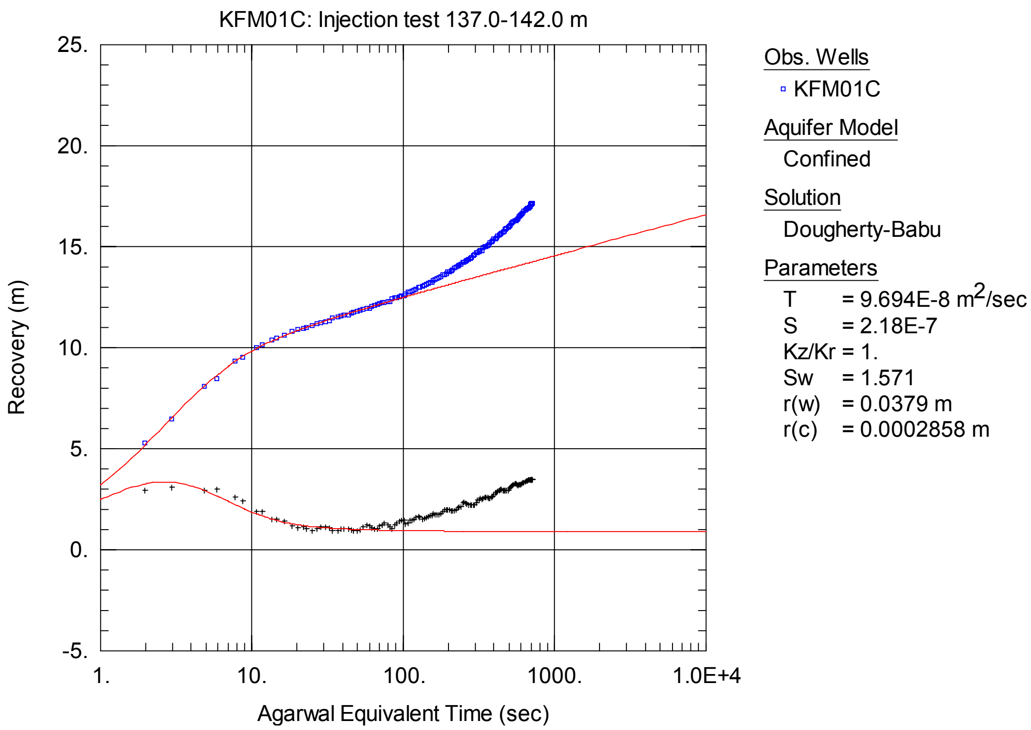

Figure A3-132. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 137.0-142.0 m in KFM01C.*

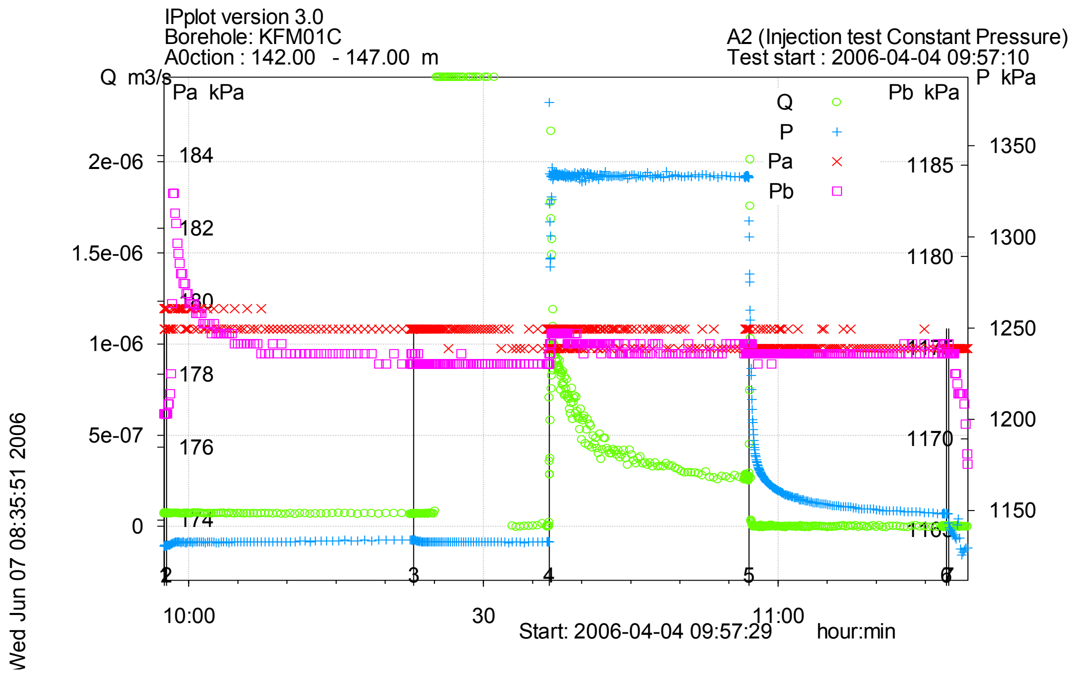

***Figure A3-133.** Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 142.0-147.0 m in borehole KFM01C.*

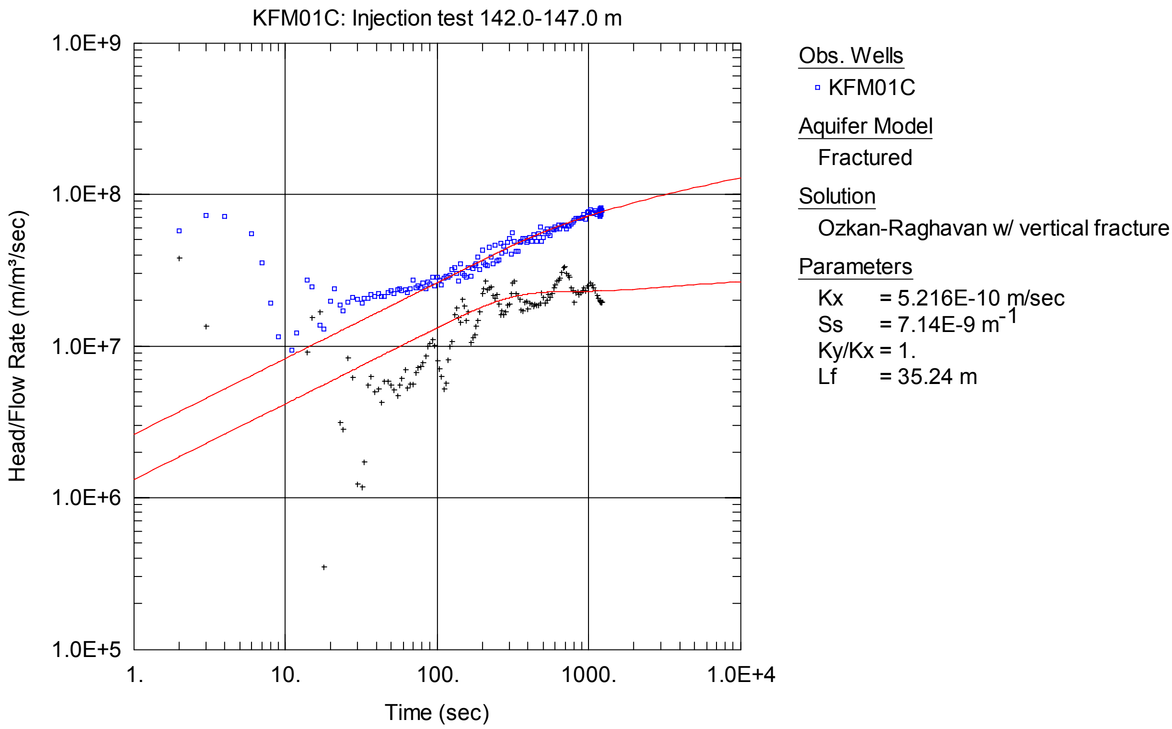

***Figure A3-134.** Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 142.0-147.0 m in KFM01C.*

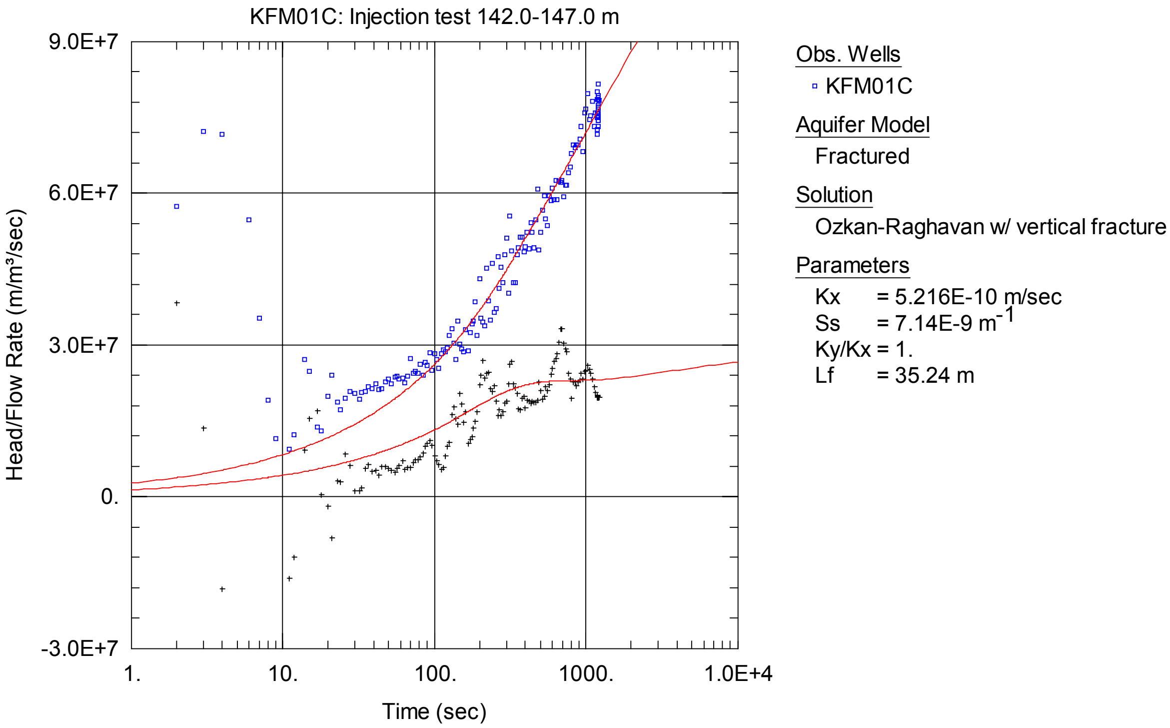

Figure A3-135. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 142.0-147.0 m in KFM01C.*

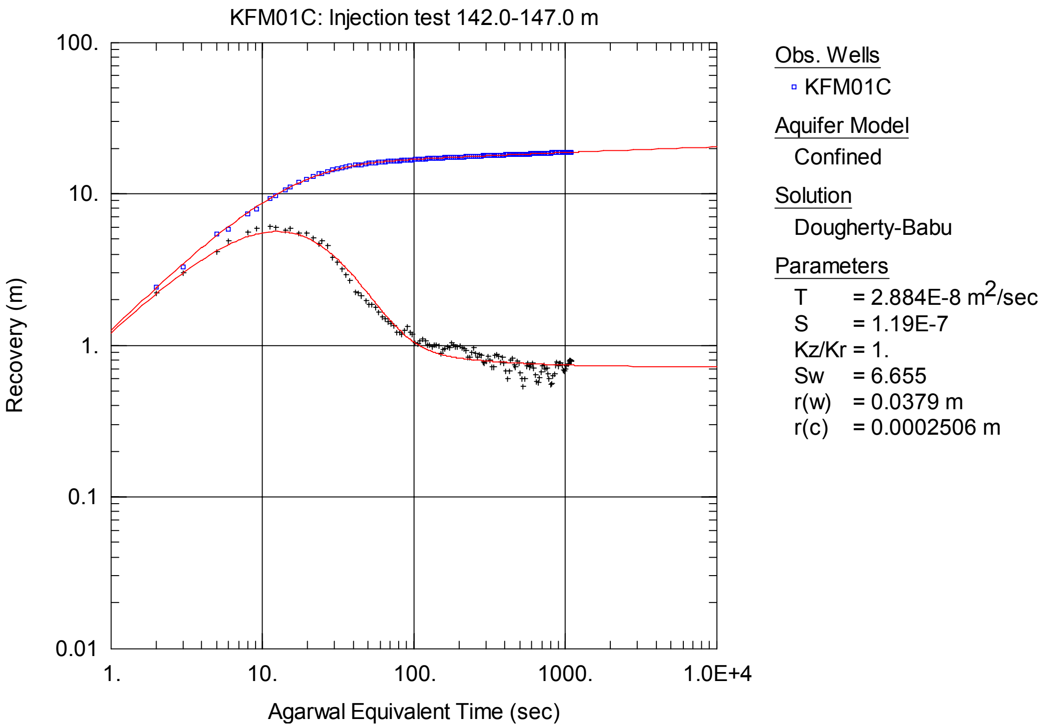

Figure A3-136. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 142.0-147.0 m in KFM01C.*

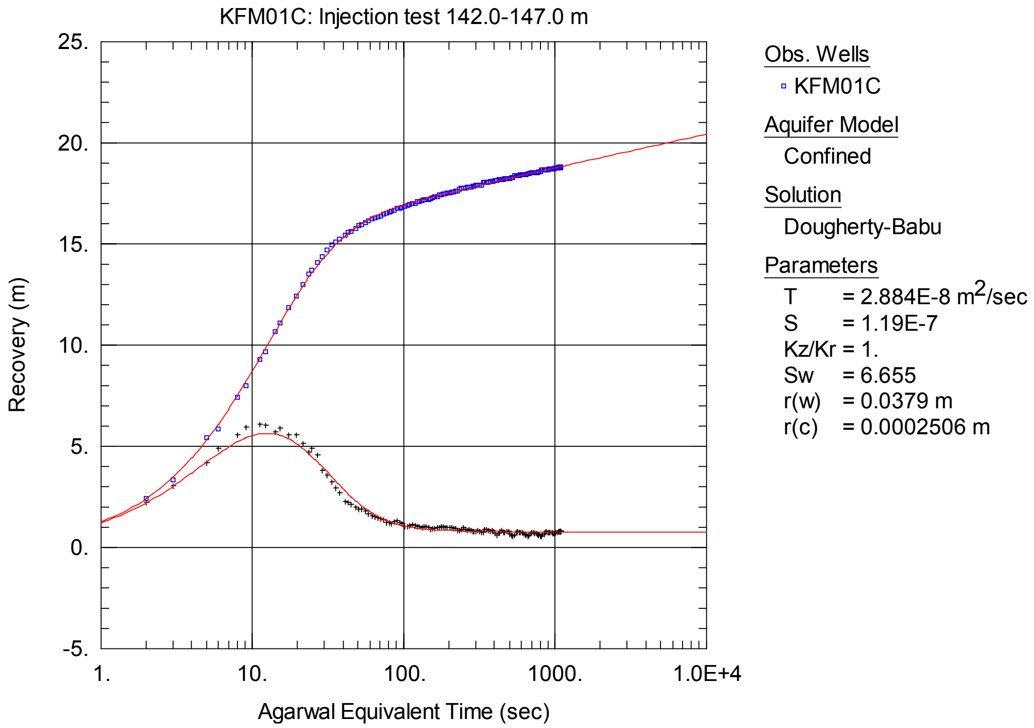

Figure A3-137. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 142.0-147.0 m in KFM01C.*

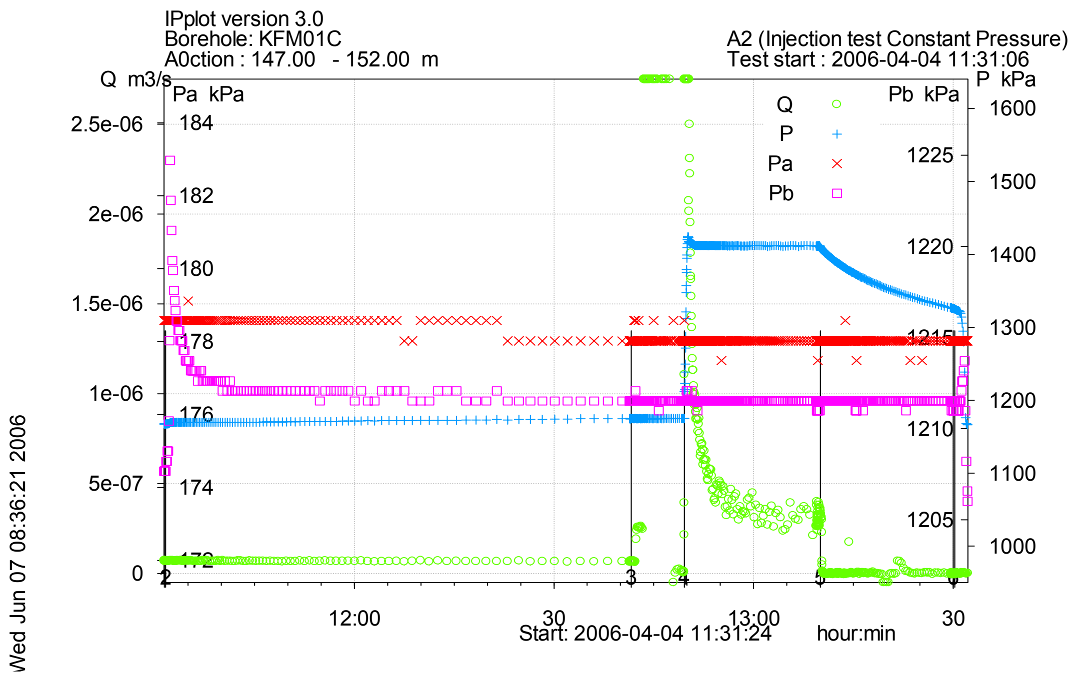

Figure A3-138. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 147.0-152.0 m in borehole KFM01C.*

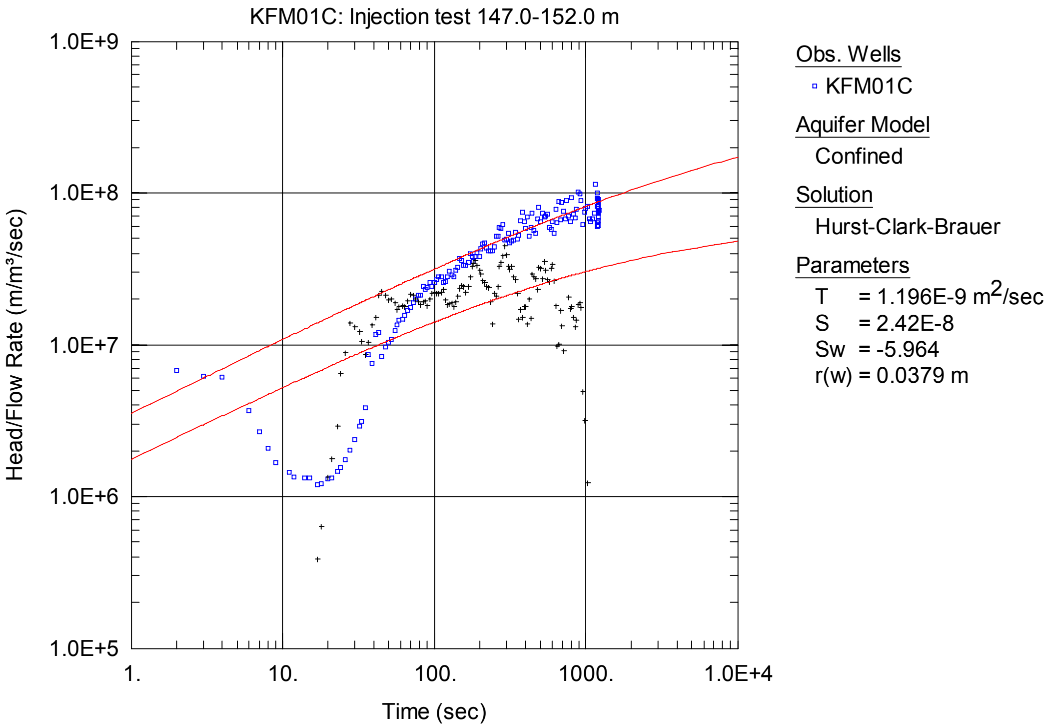

Figure A3-139. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 147.0-152.0 m in KFM01C.*

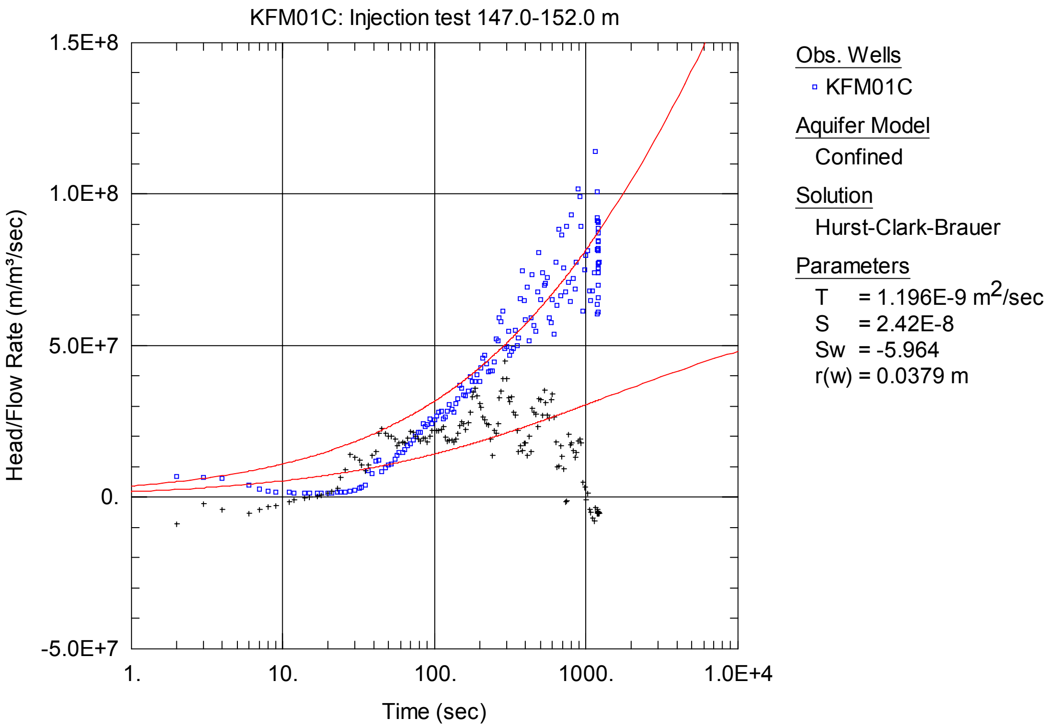

Figure A3-140. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 147.0-152.0 m in KFM01C.*

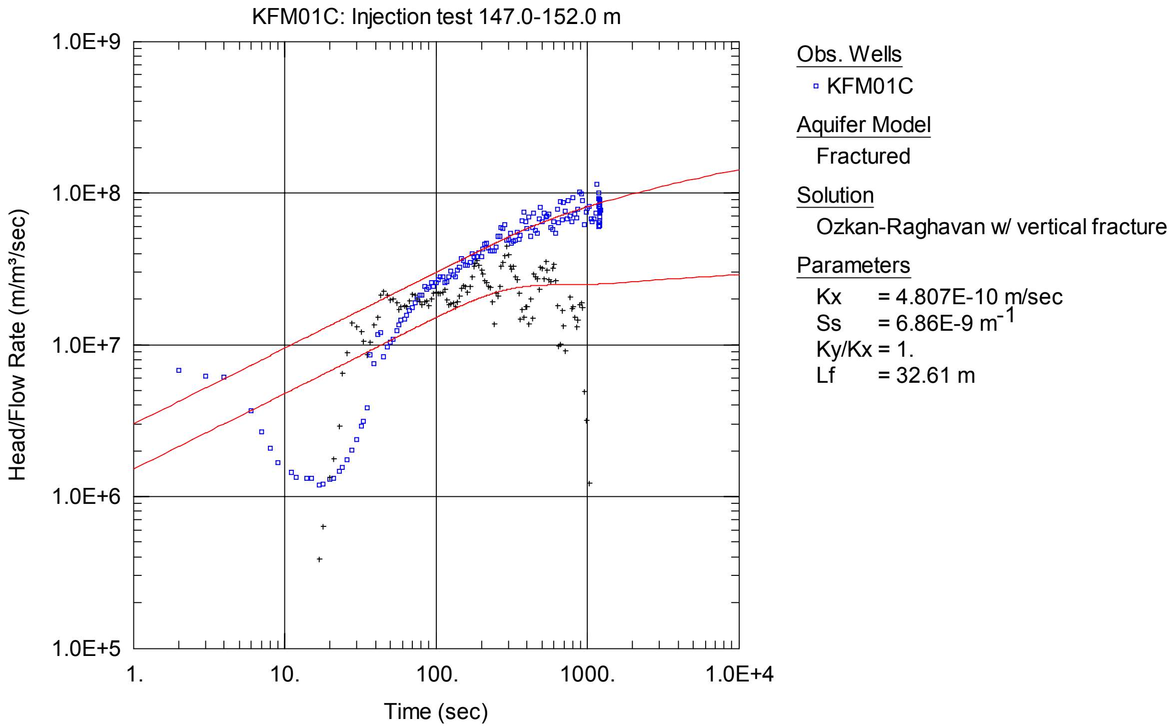

Figure A3-141. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 147.0-152.0 m in KFM01C.*

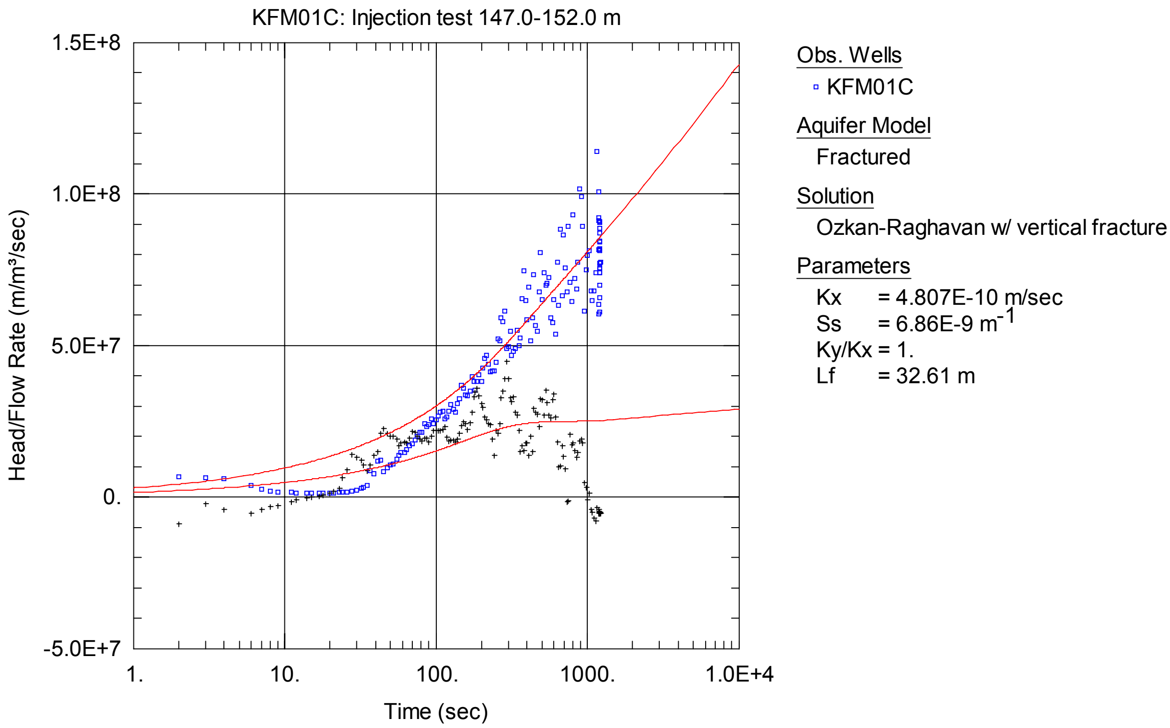

Figure A3-142. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 147.0-152.0 m in KFM01C.*

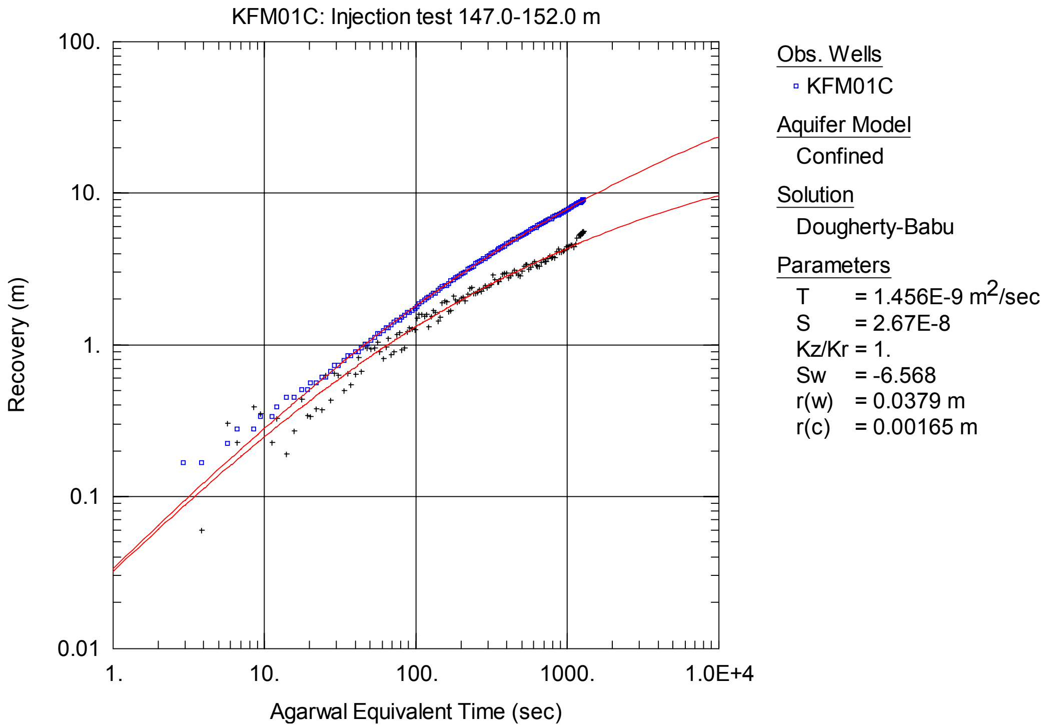

Figure A3-143. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 147.0-152.0 m in KFM01C.*

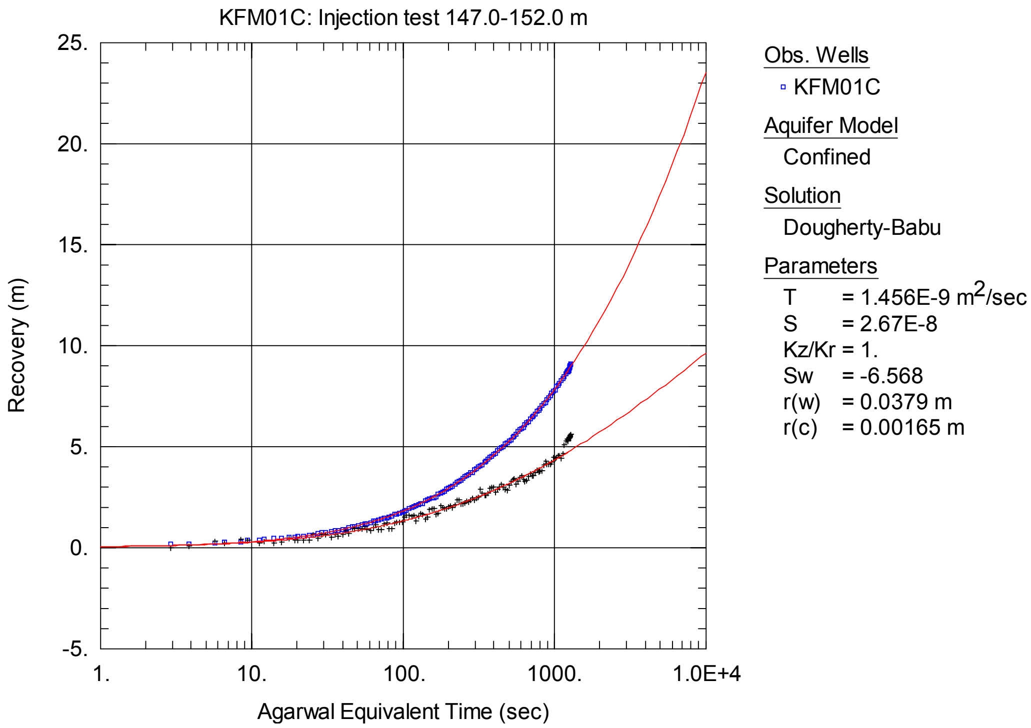

Figure A3-144. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 147.0-152.0 m in KFM01C.*

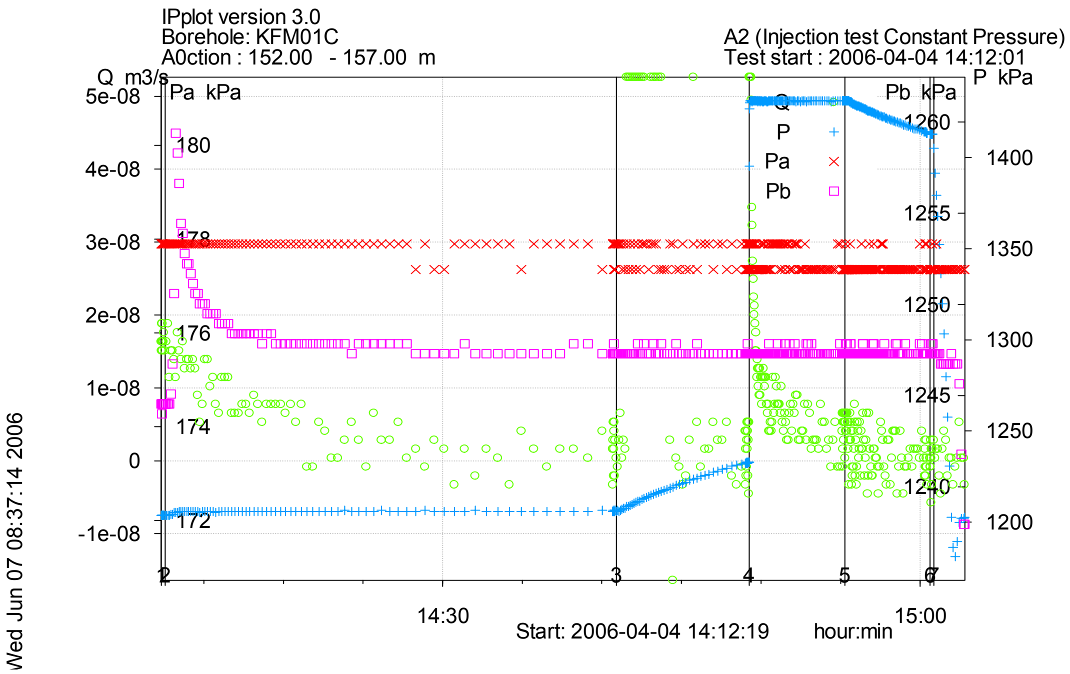

Figure A3-145. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 152.0-157.0 m in borehole KFM01C.*

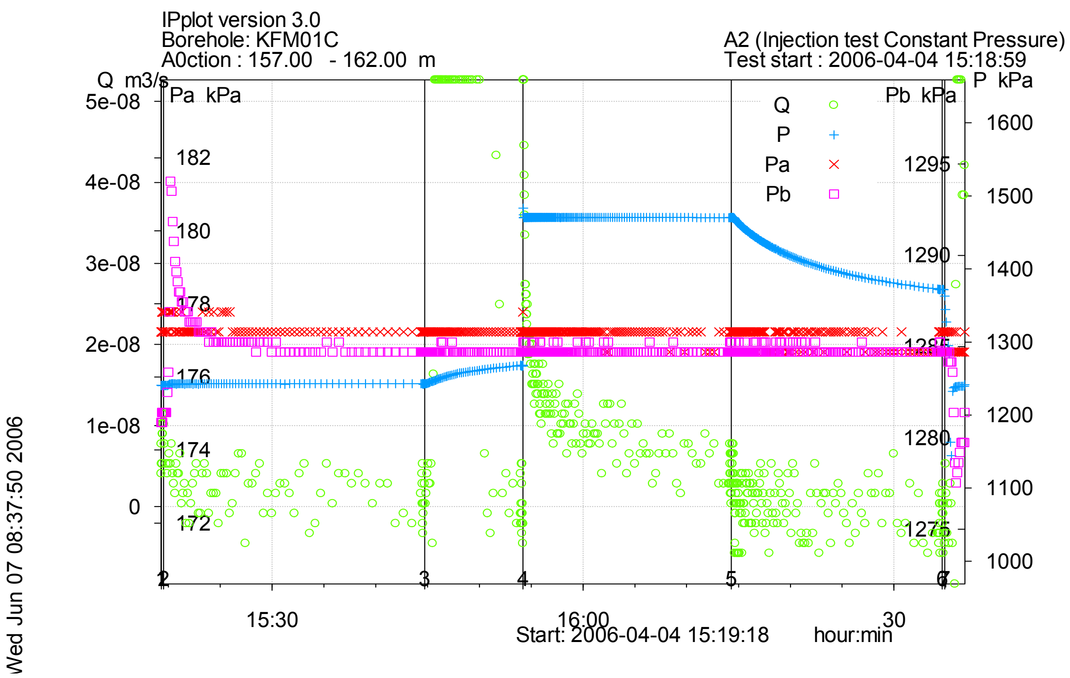

Figure A3-146. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 157.0-162.0 m in borehole KFM01C.*

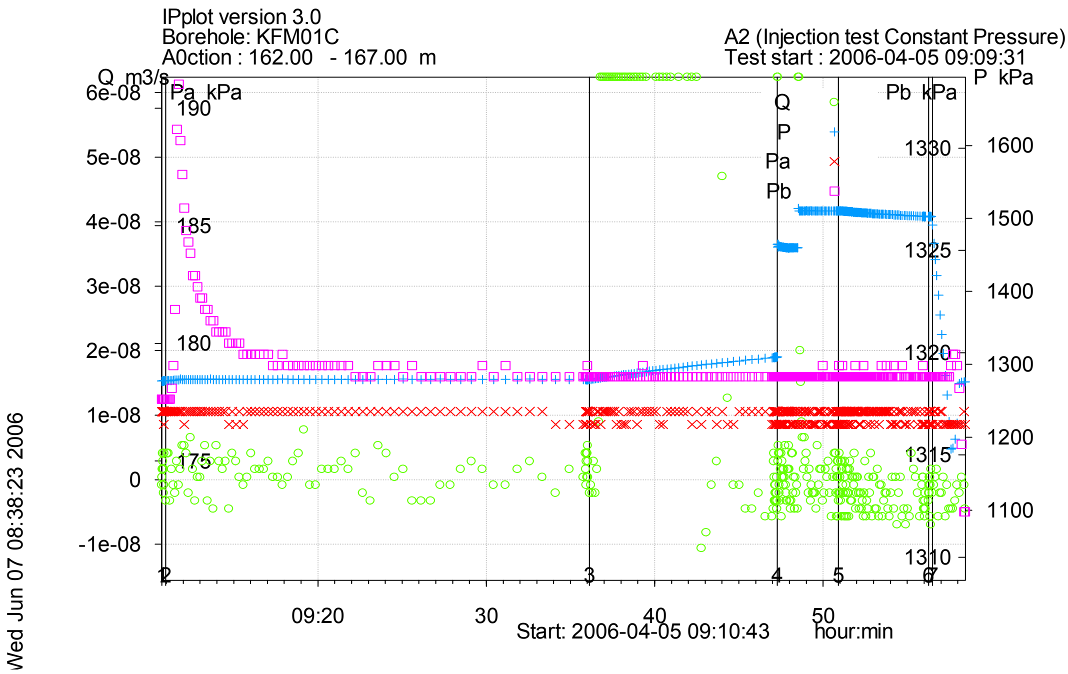

Figure A3-147. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 162.0-167.0 m in borehole KFM01C.*

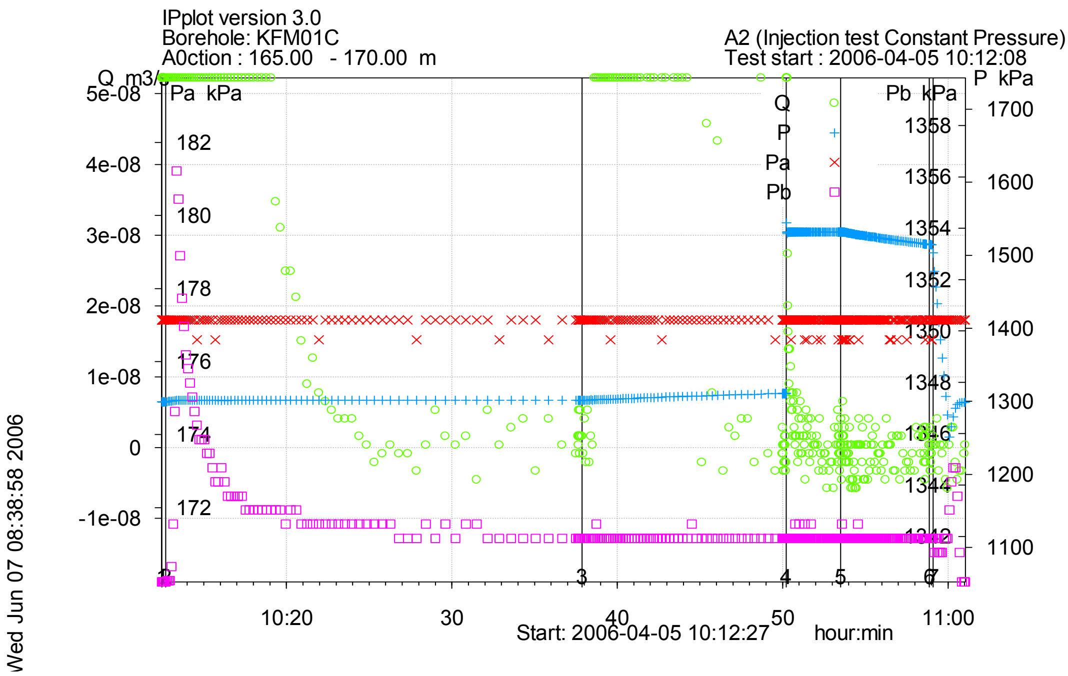

Figure A3-148. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 165.0-170.0 m in borehole KFM01C.*

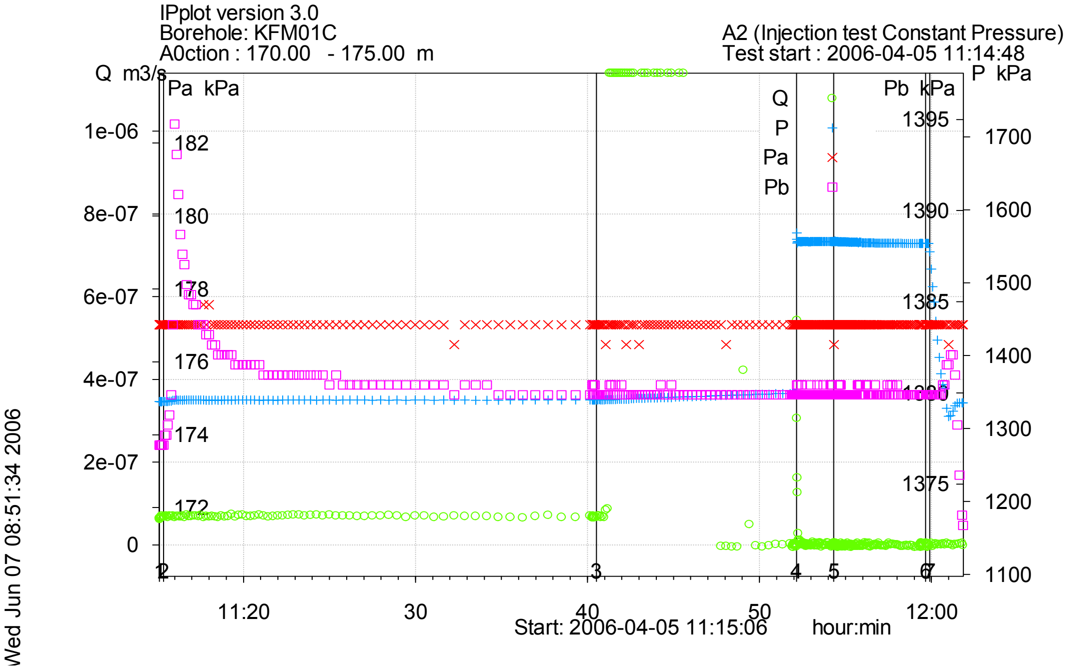

Figure A3-149. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 170.0-175.0 m in borehole KFM01C.*

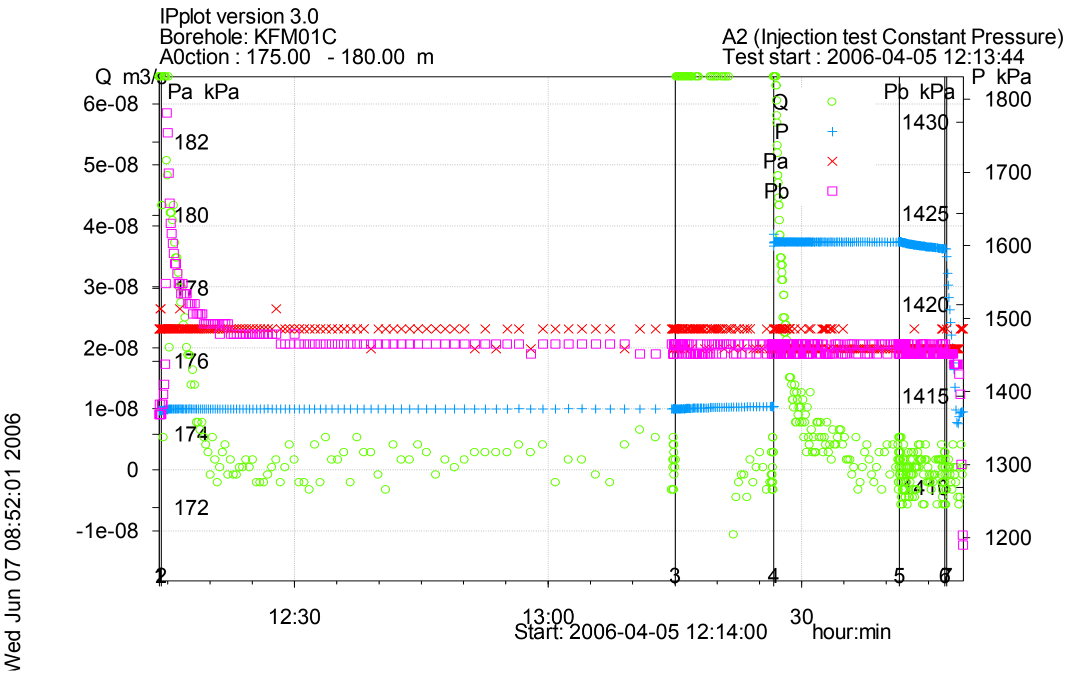

Figure A3-150. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 175.0-180.0 m in borehole KFM01C.*

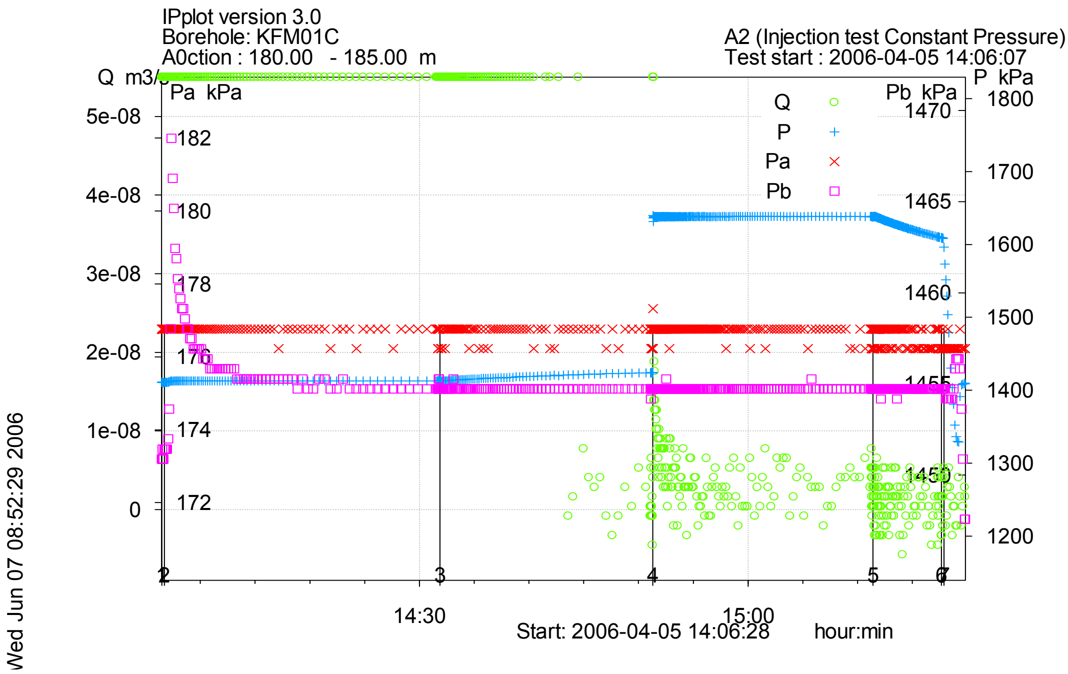

Figure A3-151. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 180.0-185.0 m in borehole KFM01C.*

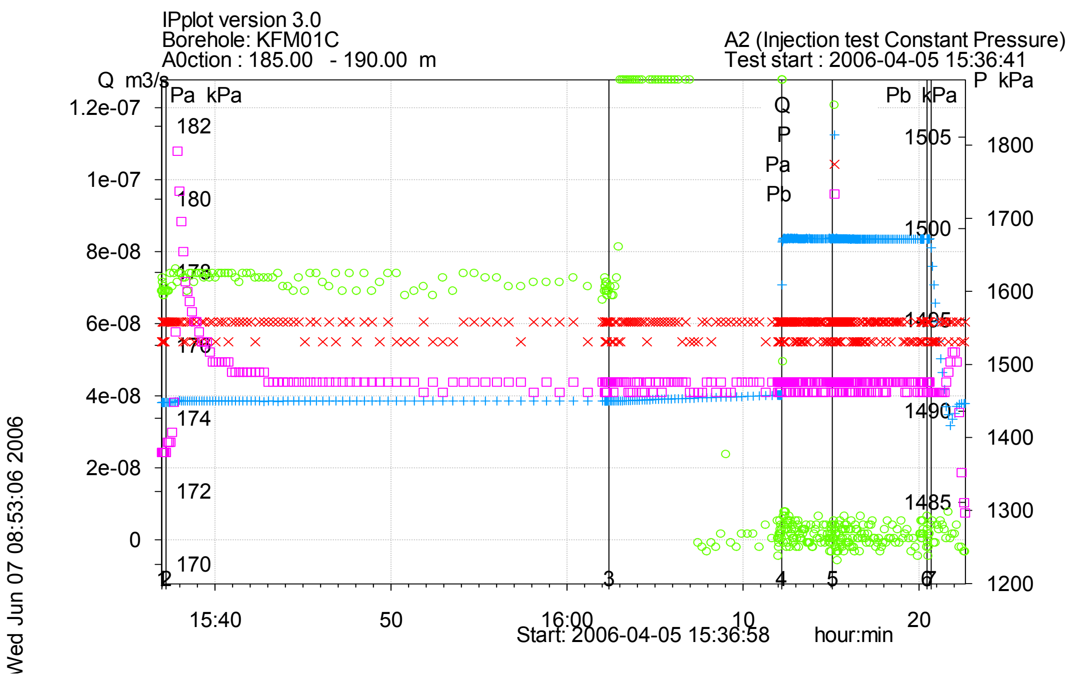

Figure A3-152. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 185.0-190.0 m in borehole KFM01C.*

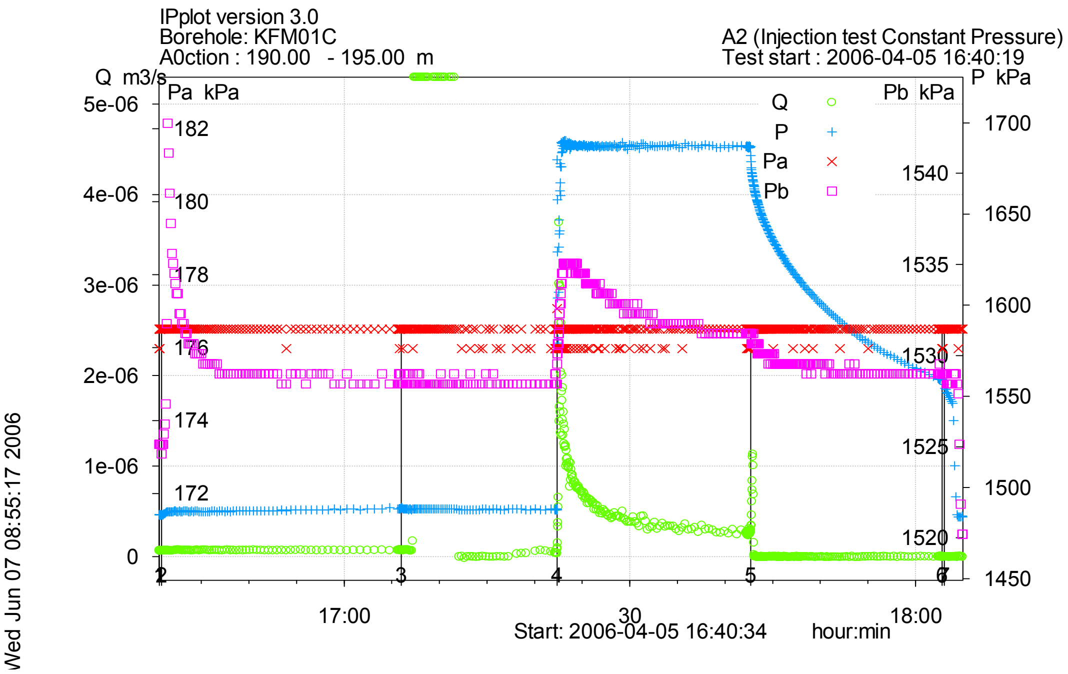

Figure A3-153. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 190.0-195.0 m in borehole KFM01C*

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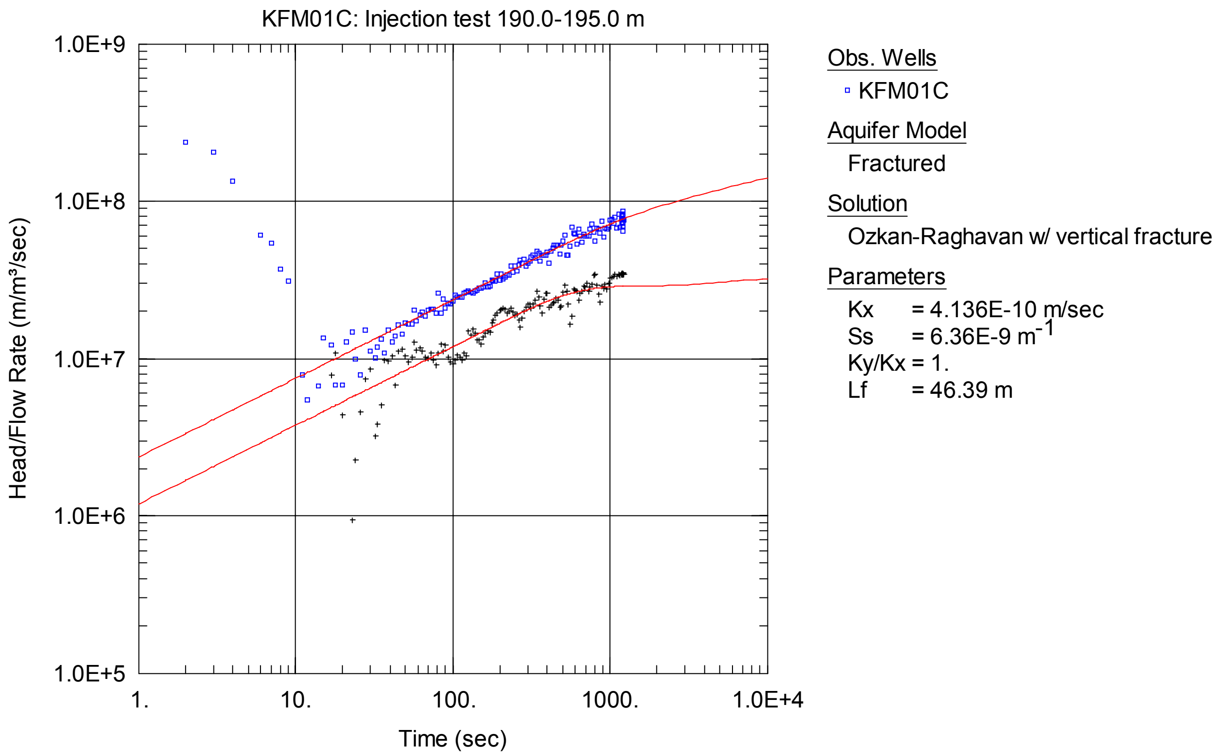


Figure A3-154. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 190.0-195.0 m in KFM01C.*

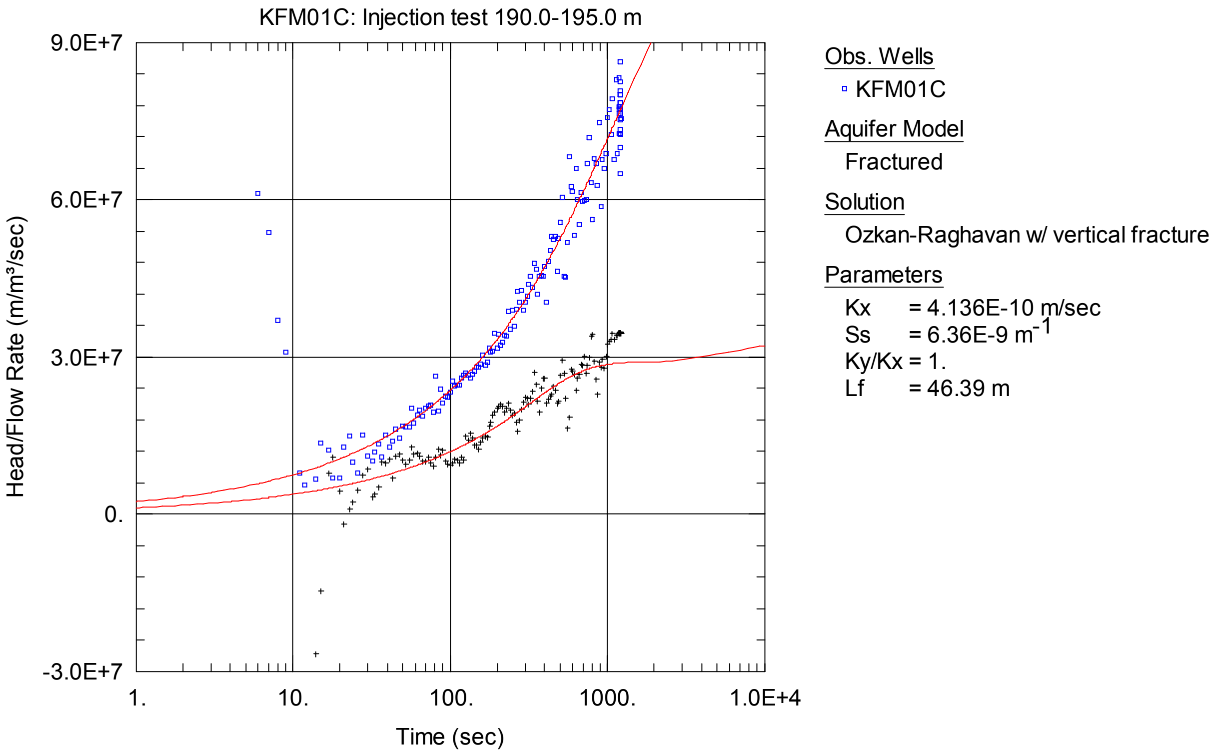


Figure A3-155. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 190.0-195.0 m in KFM01C.*

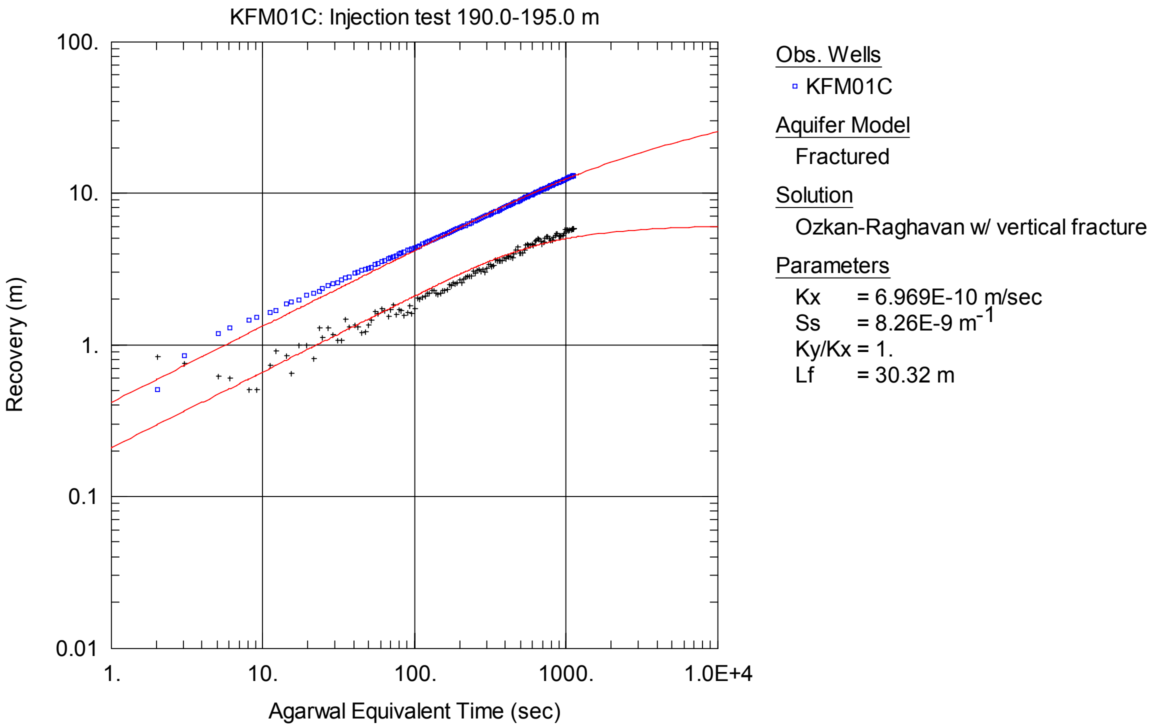


Figure A3-156. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 190.0-195.0 m in KFM01C.*

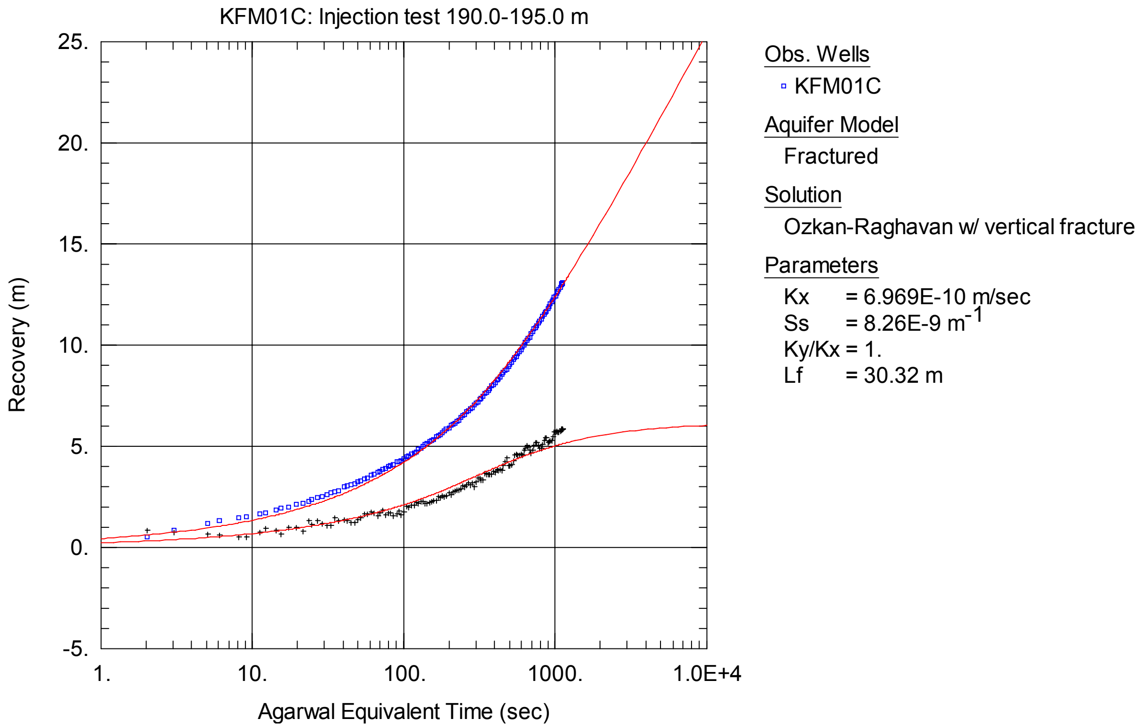


Figure A3-157. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 190.0-195.0 m in KFM01C.*

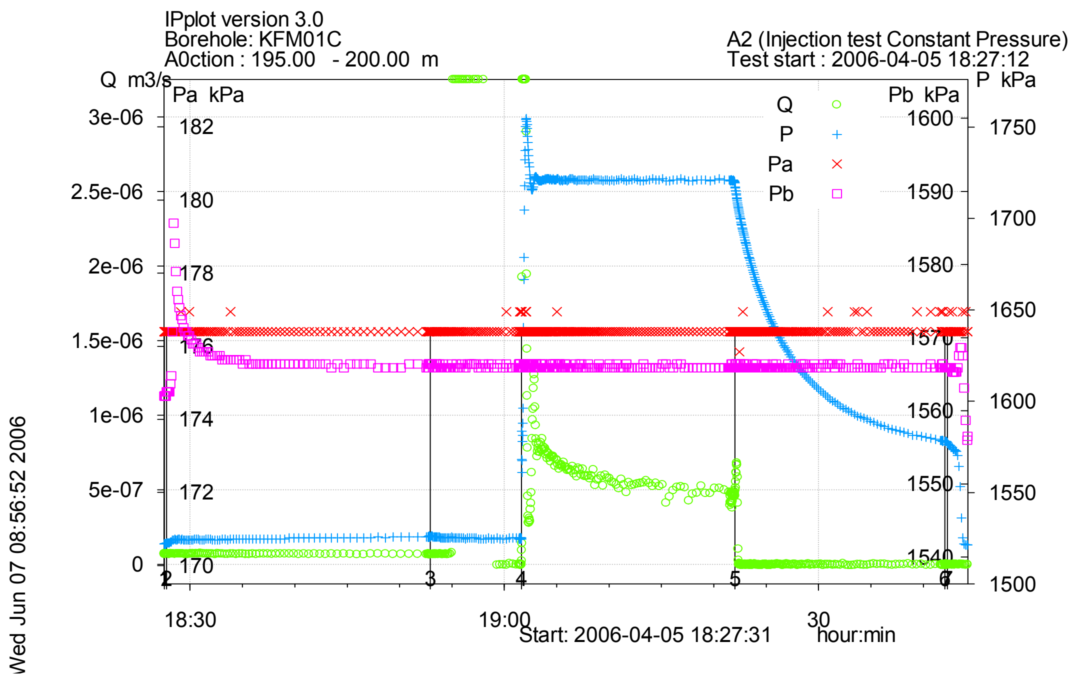


Figure A3-158. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 195.0-200.0 m in borehole KFM01C.*

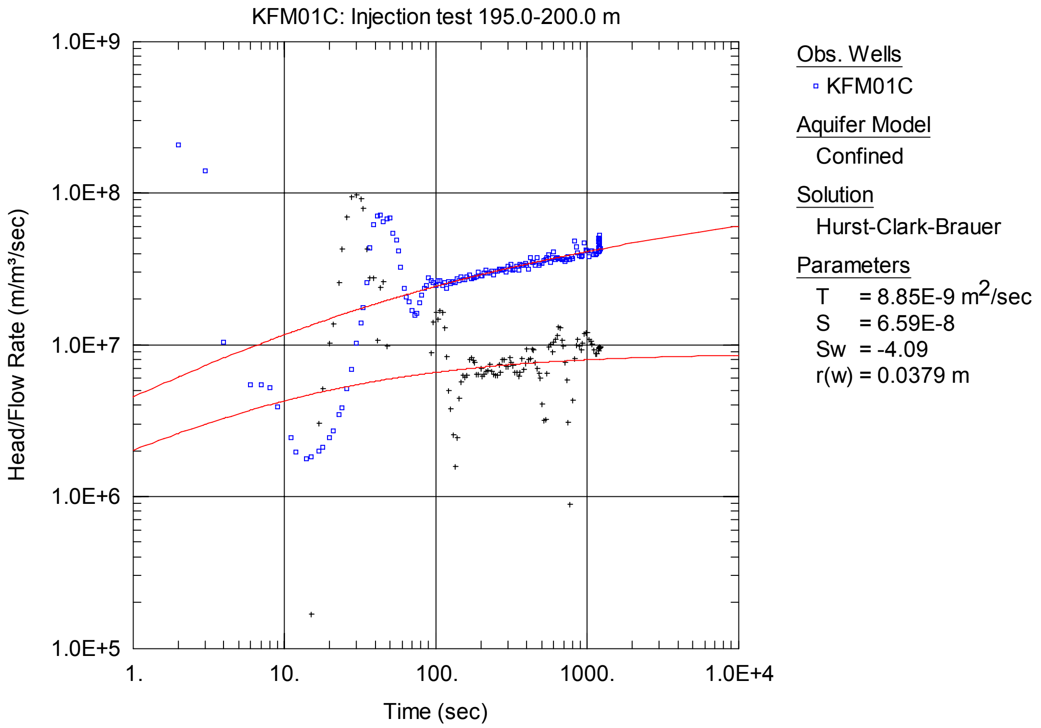


Figure A3-159. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 195.0-200.0 m in KFM01C.*

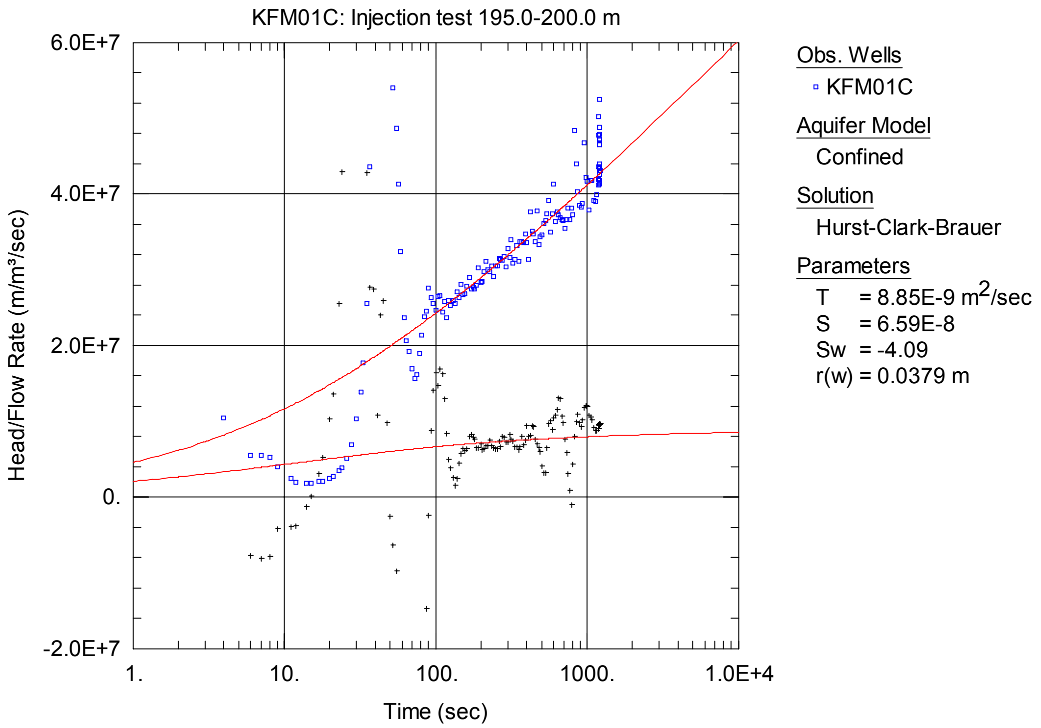


Figure A3-160. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 195.0-200.0 m in KFM01C.*

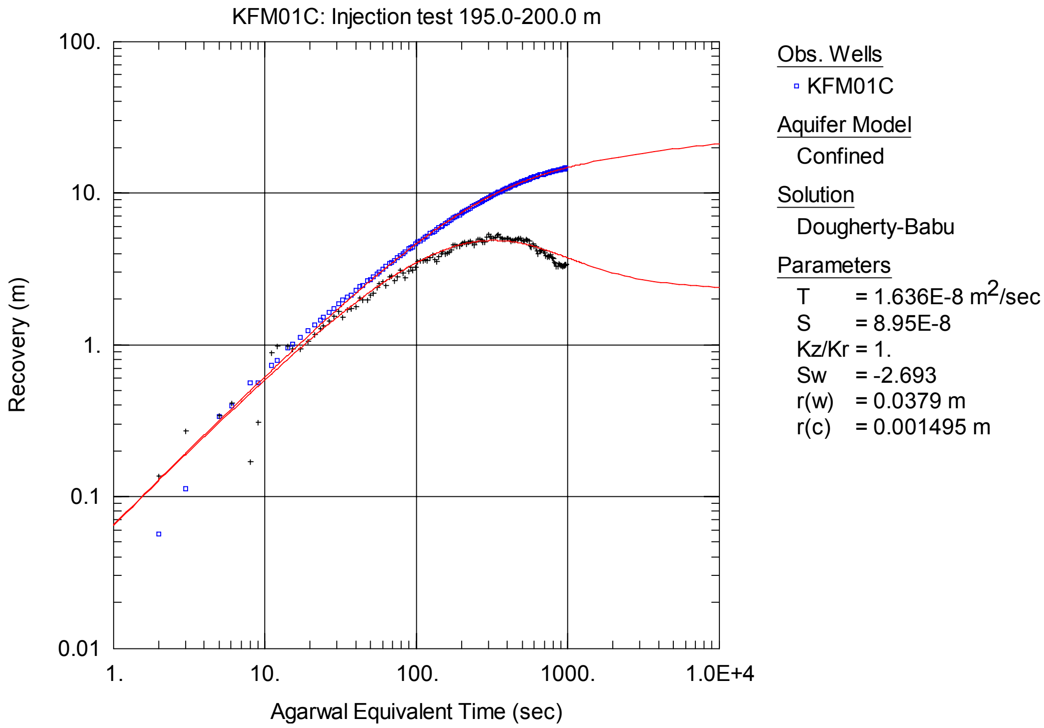


Figure A3-161. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 195.0-200.0 m in KFM01C.*

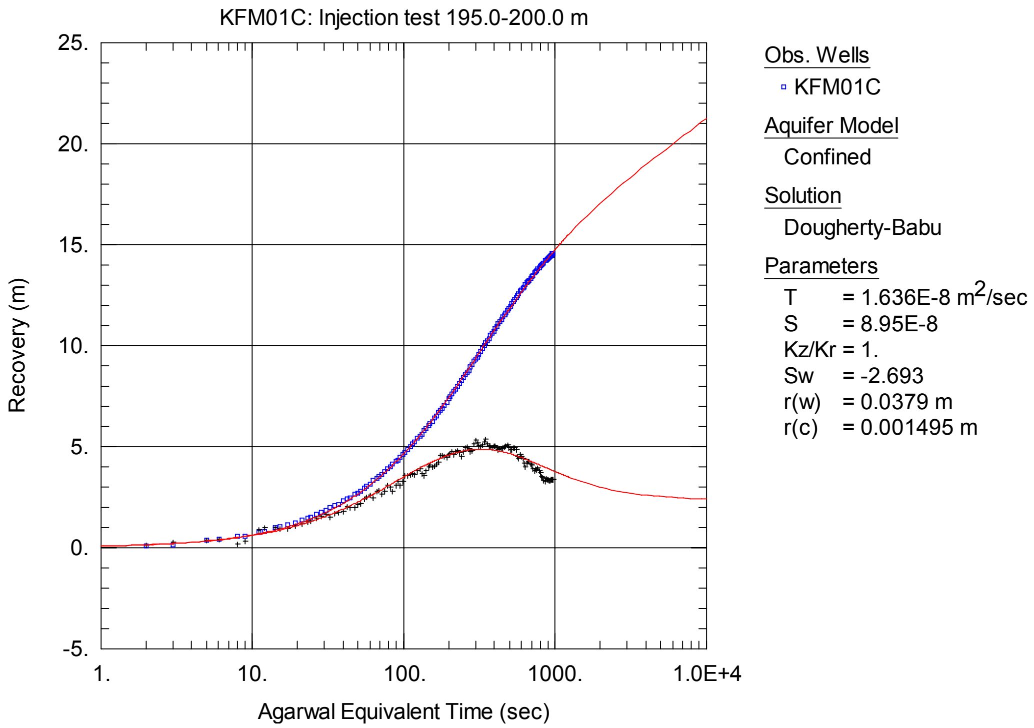


Figure A3-162. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 195.0-200.0 m in KFM01C.*

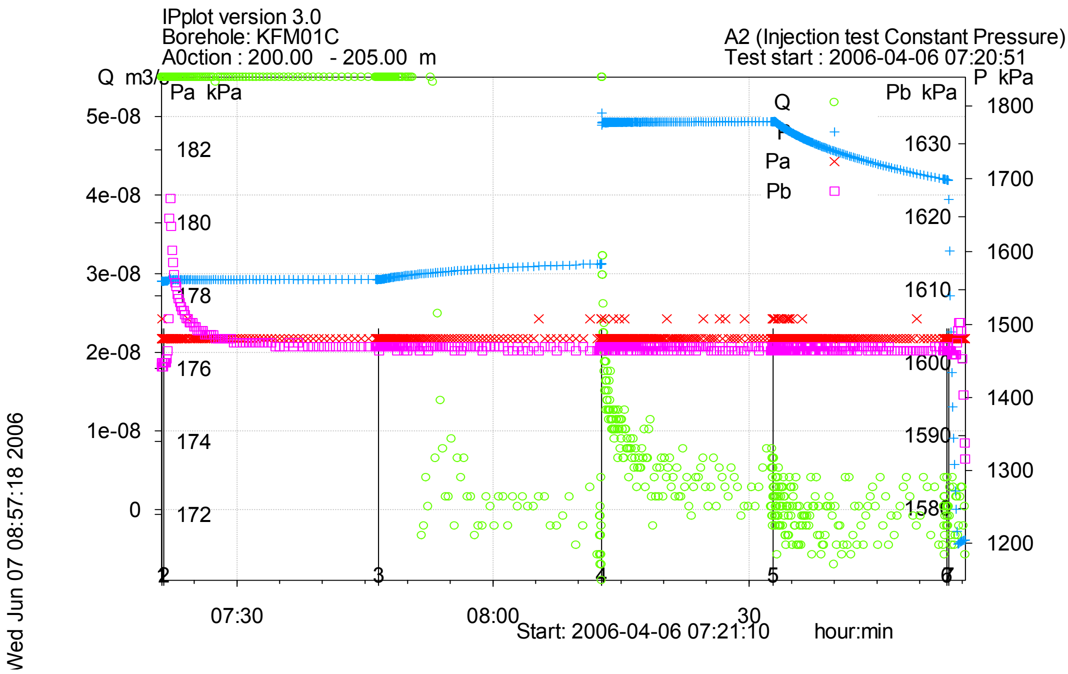


Figure A3-163. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 200.0-205.0 m in borehole KFM01C.*

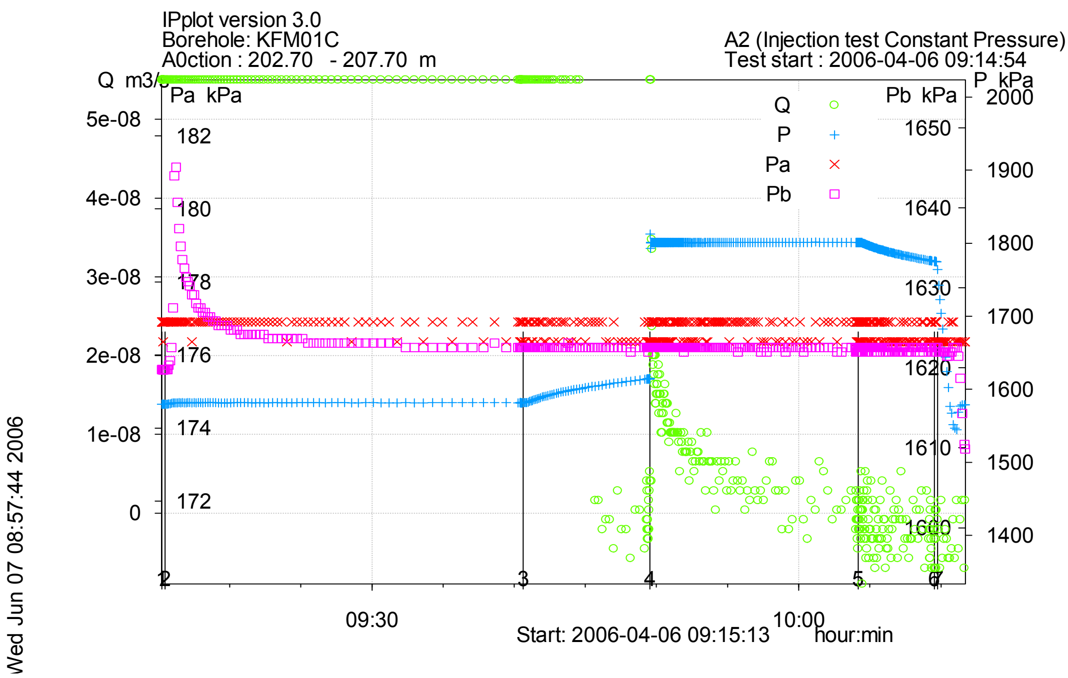


Figure A3-164. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 202.7-207.7 m in borehole KFM01C.*

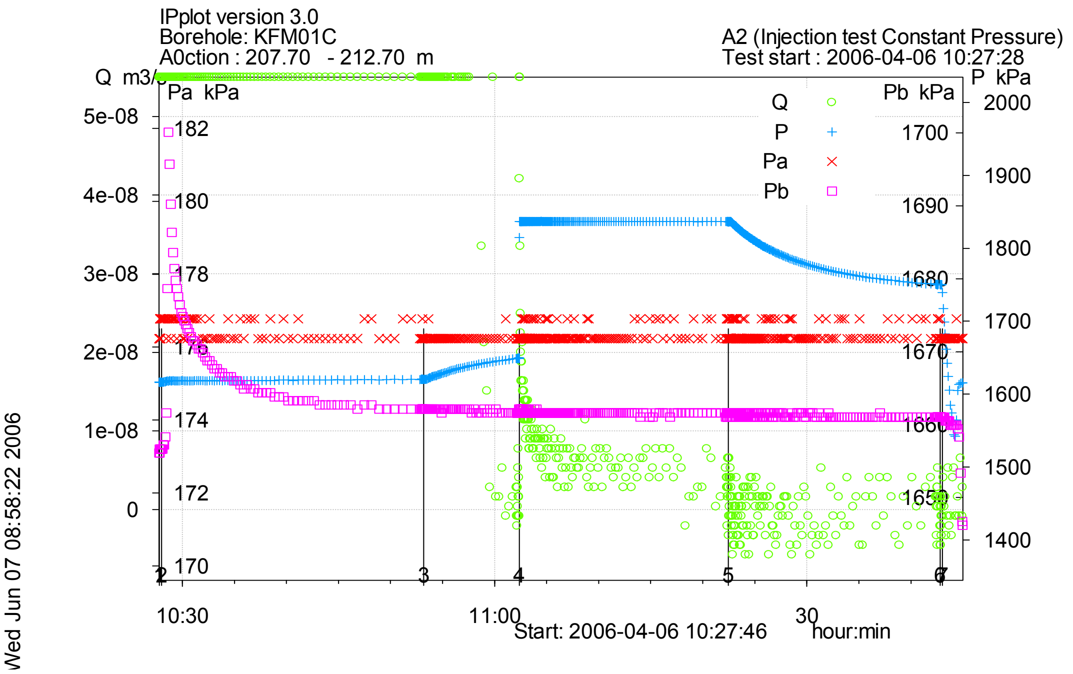


Figure A3-165. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 207.7-212.7 m in borehole KFM01C.*

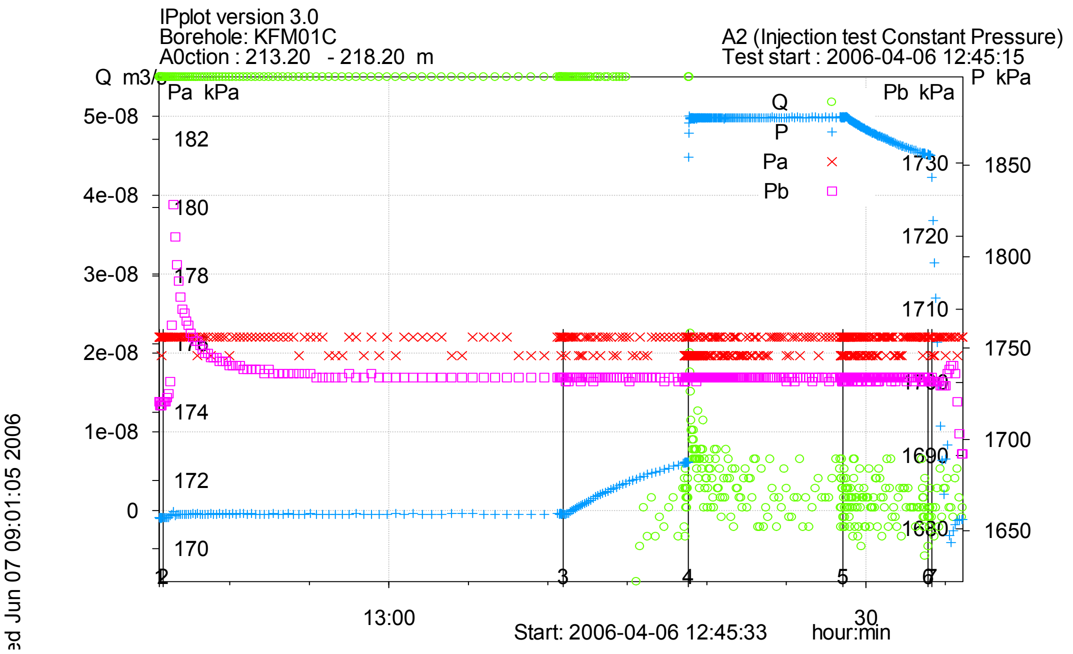


Figure A3-166. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 213.2-218.2 m in borehole KFM01C.*

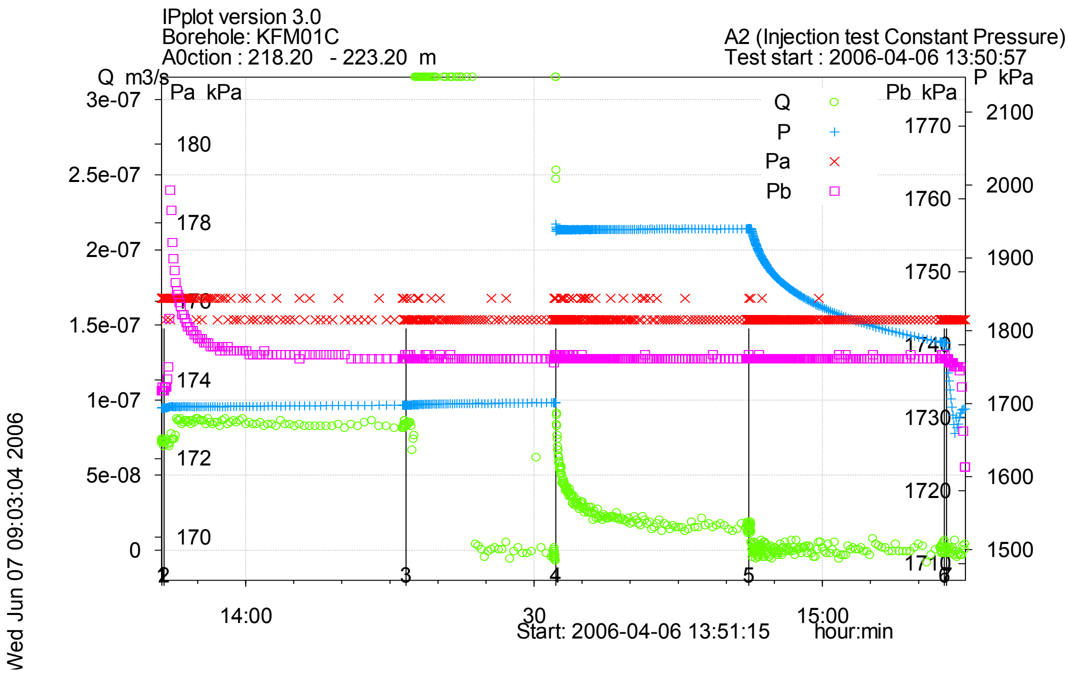


***Figure A3-167.** Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 218.2-223.2 m in borehole KFM01C.*

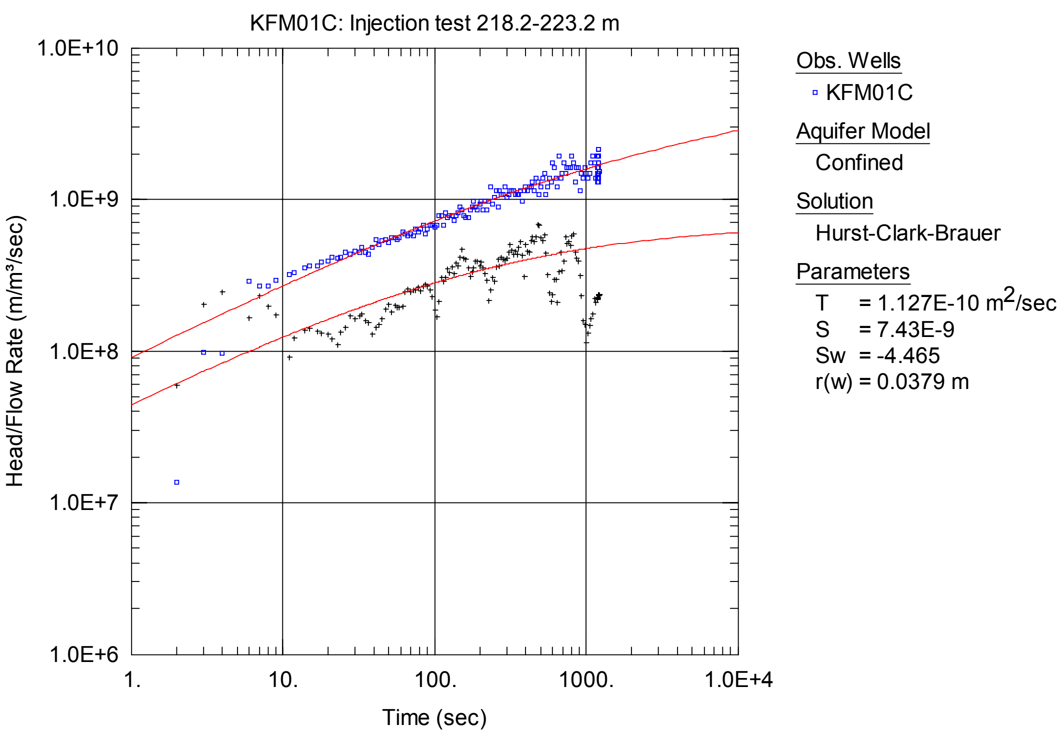


***Figure A3-168.** Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 218.2-223.2 m in KFM01C.*

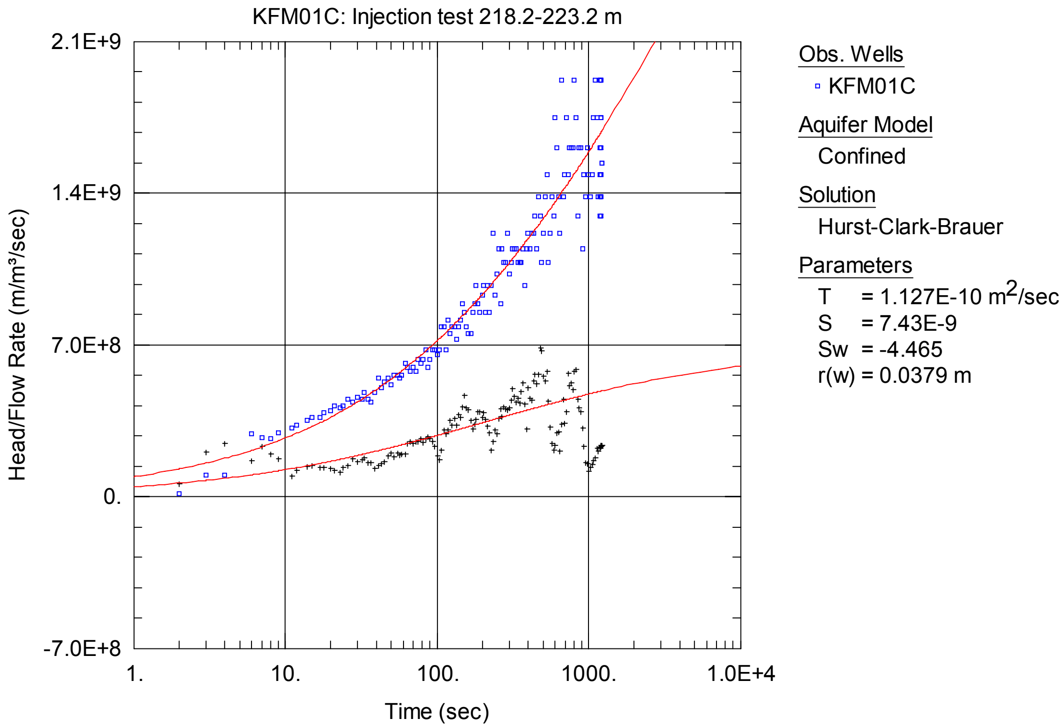


Figure A3-169. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 218.2-223.2 m in KFM01C.*

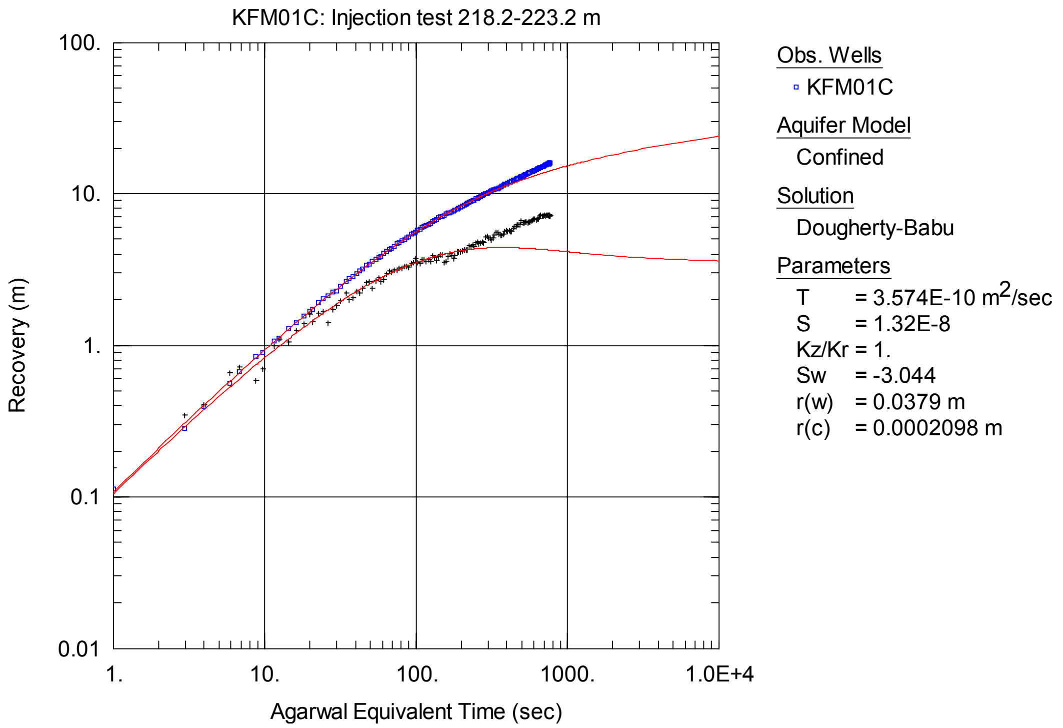


Figure A3-170. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 218.2-223.2 m in KFM01C.*

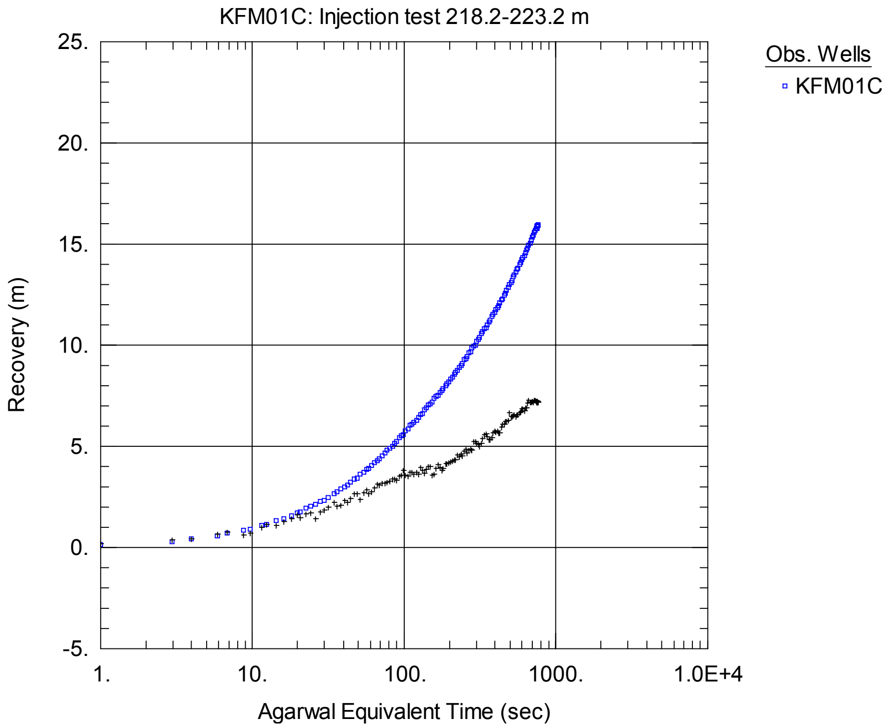


Figure A3-171. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 218.2-223.2 m in KFM01C.*

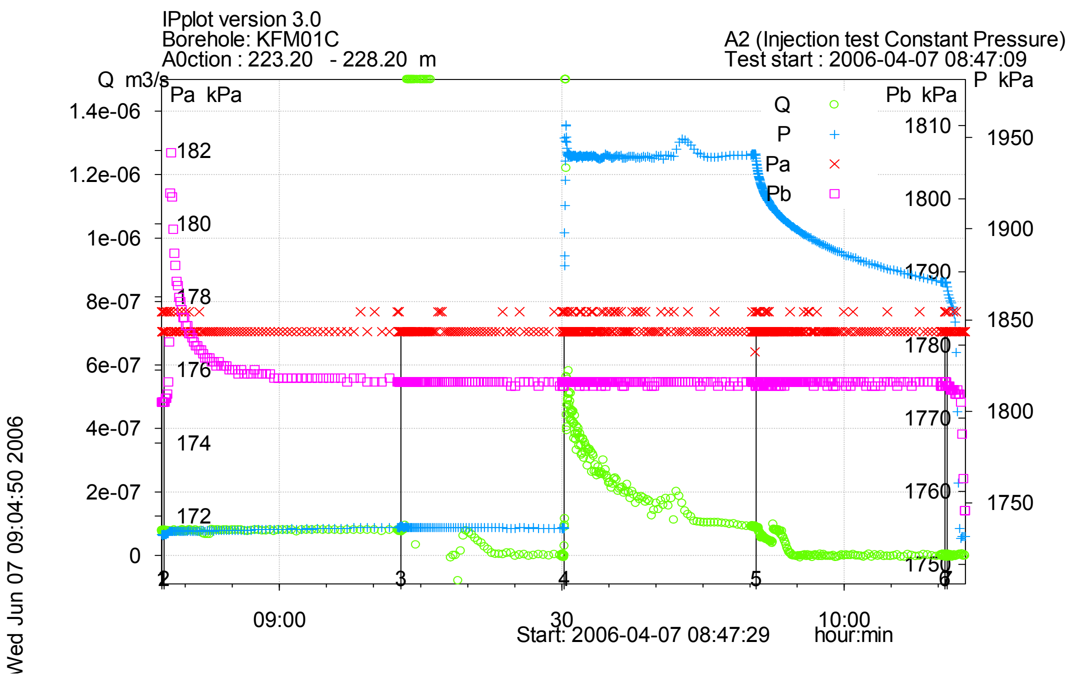


Figure A3-172. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 223.2-228.2 m in borehole KFM01C.*

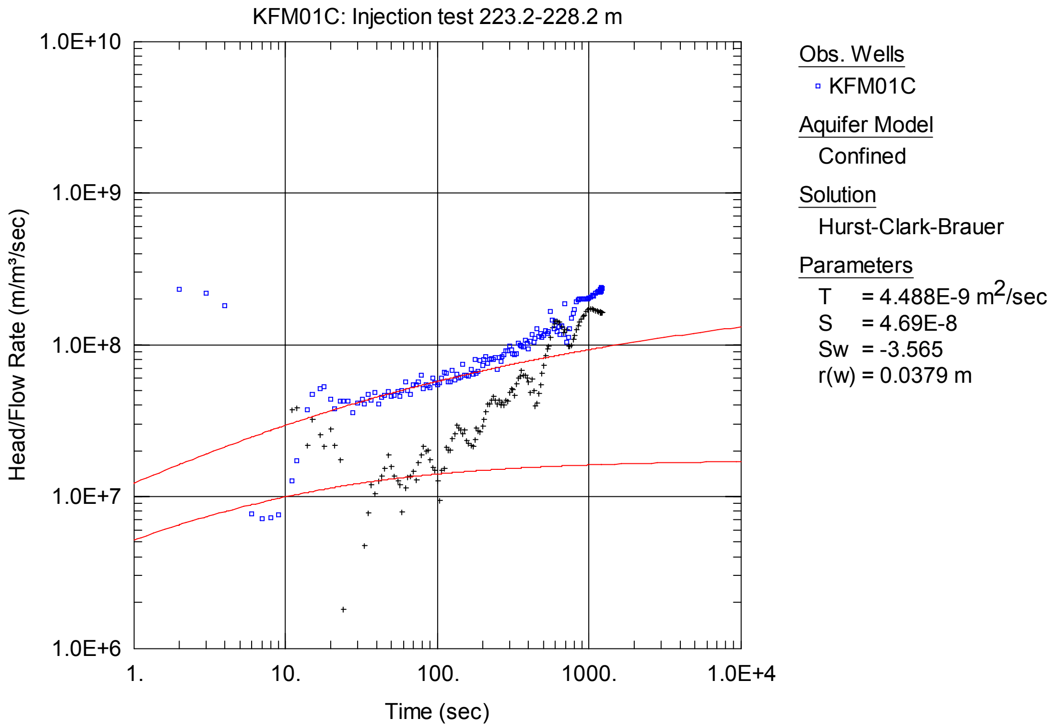


__Figure A3-173.__ Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 223.2-228.2 m in KFM01C.

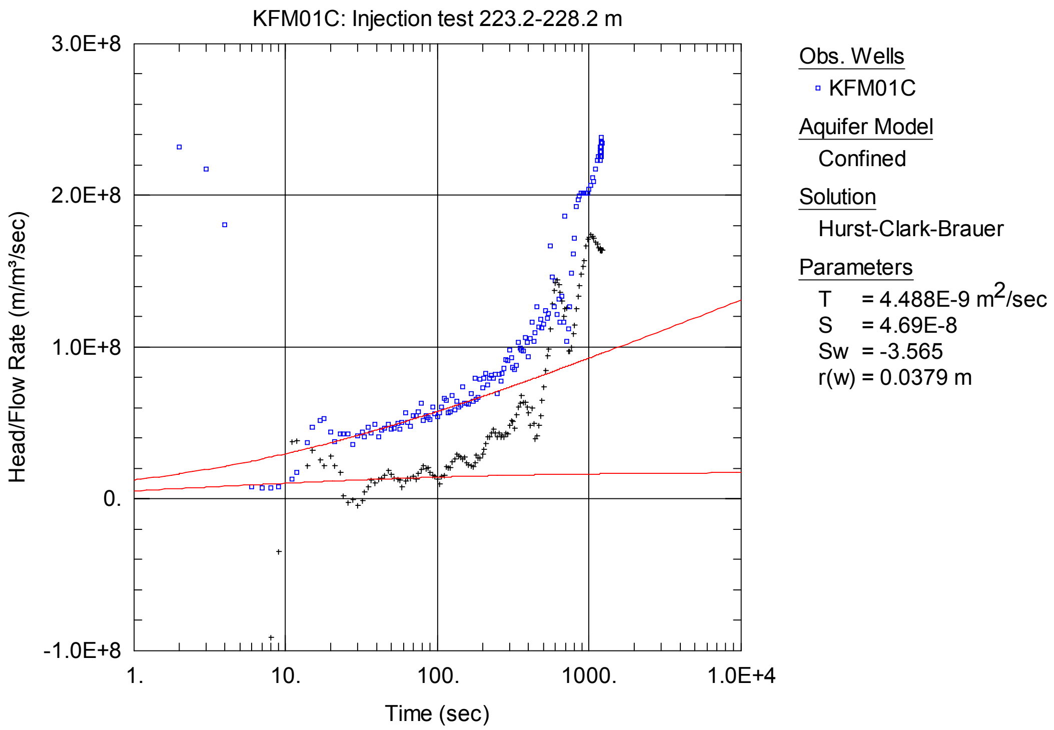


__Figure A3-174.__ Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 223.2-228.2 m in KFM01C.

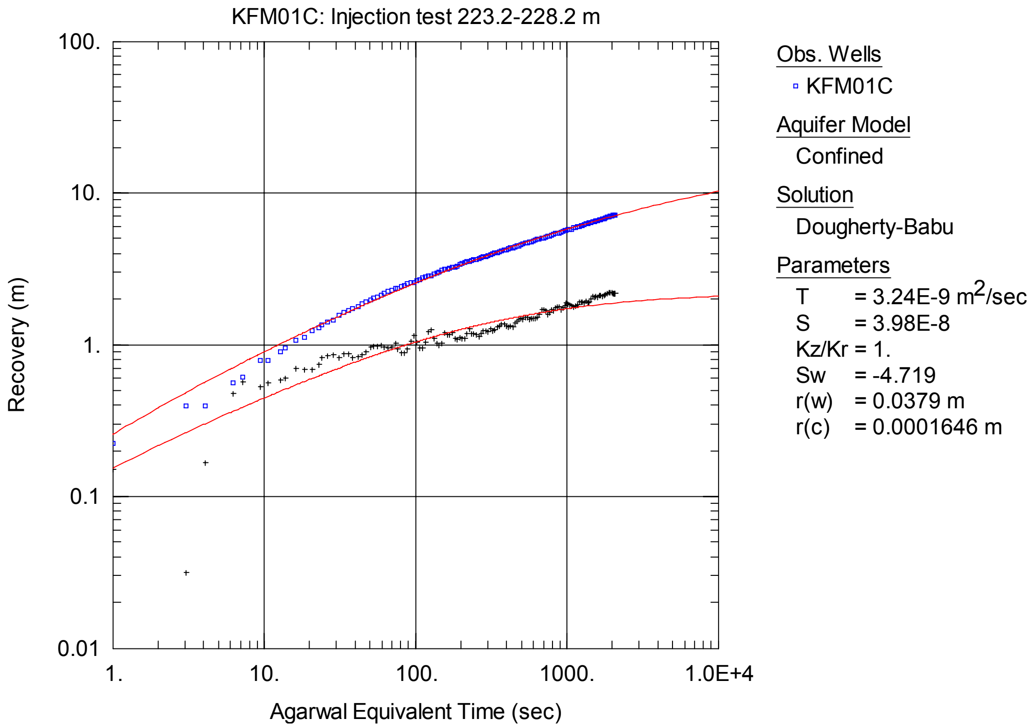


Figure A3-175. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 223.2-228.2 m in KFM01C.*

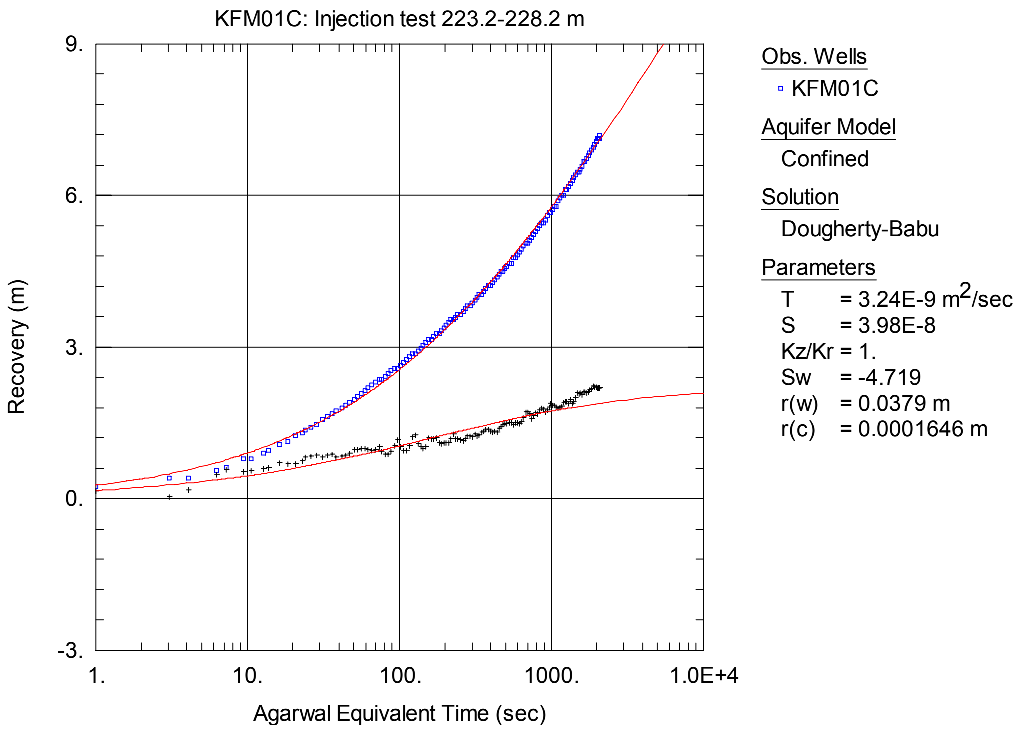


Figure A3-176. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 223.2-228.2 m in KFM01C.*

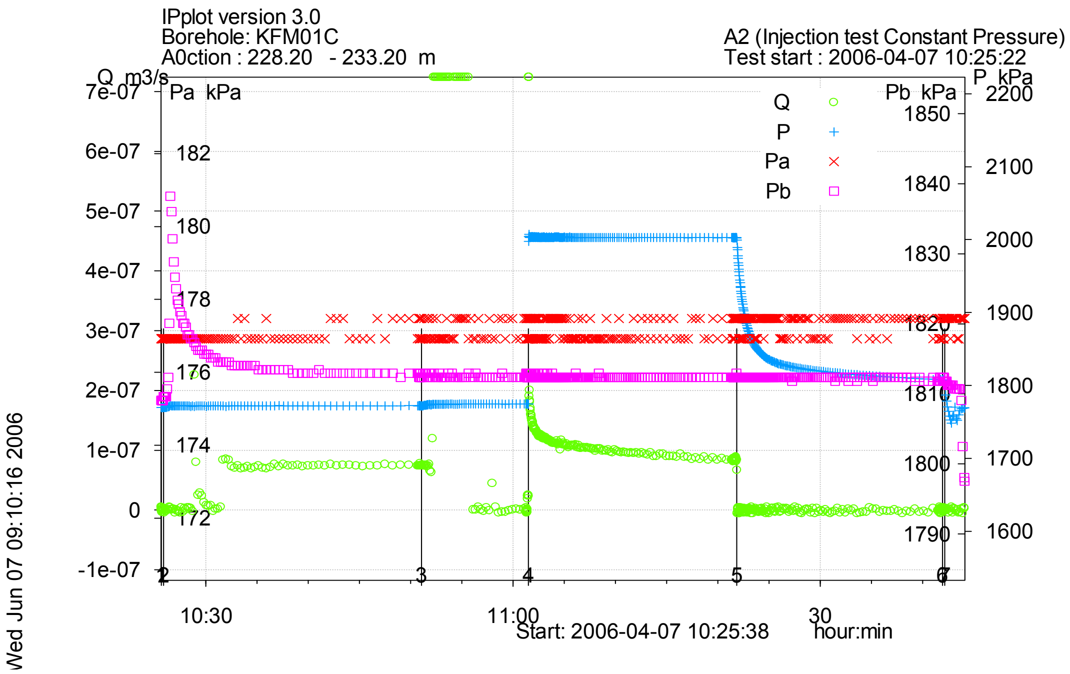


Figure A3-177. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 228.2-233.2 m in borehole KFM01C.

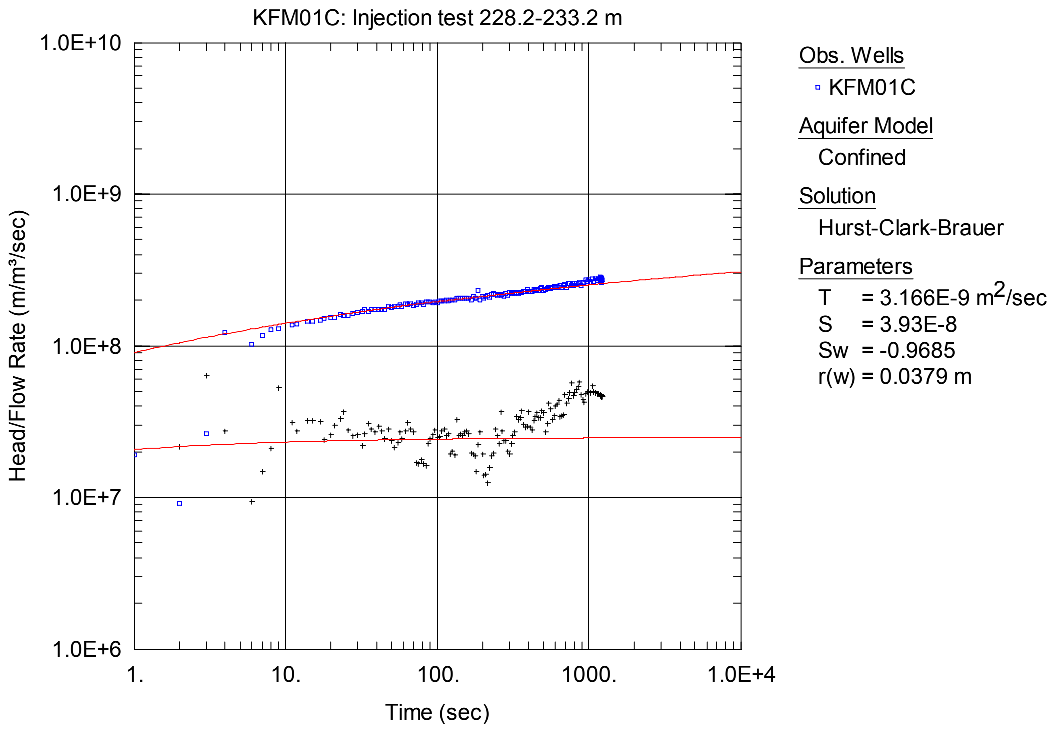


Figure A3-178. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 228.2-233.2 m in KFM01C.

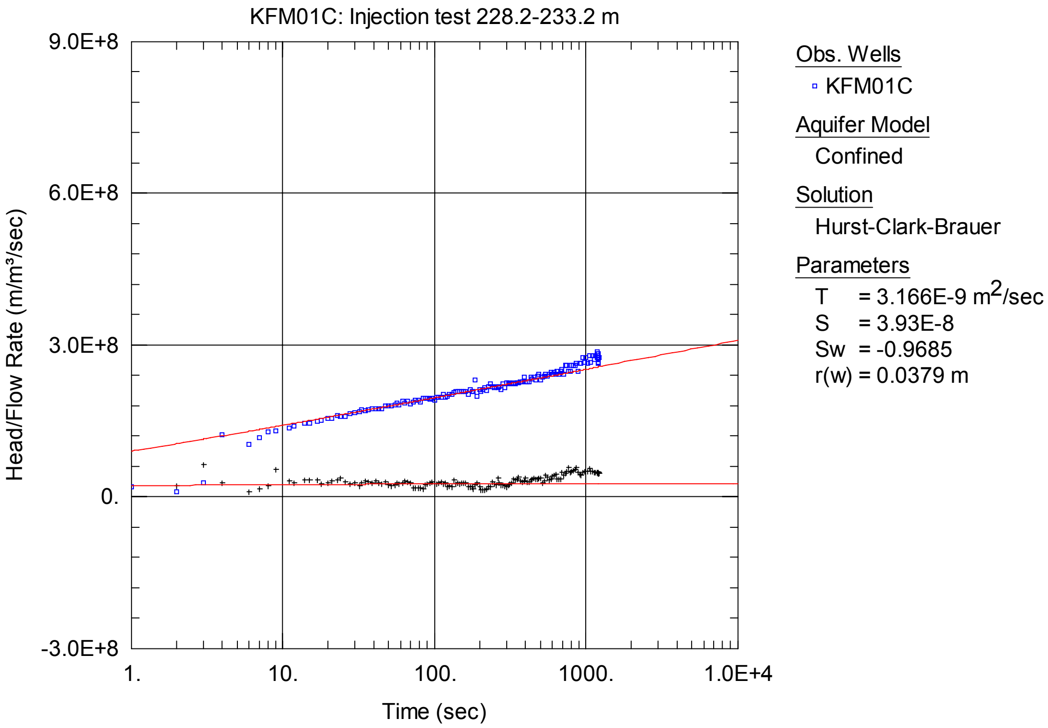


Figure A3-179. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 228.2-233.2 m in KFM01C.*

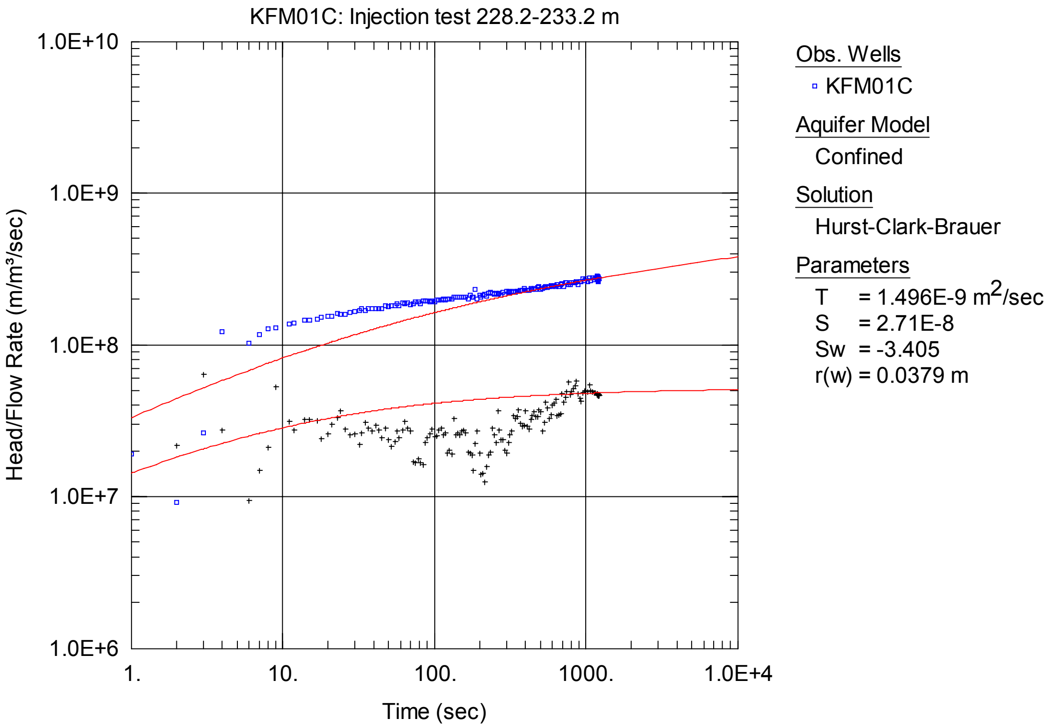


Figure A3-180. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 228.2-233.2 m in KFM01C.*

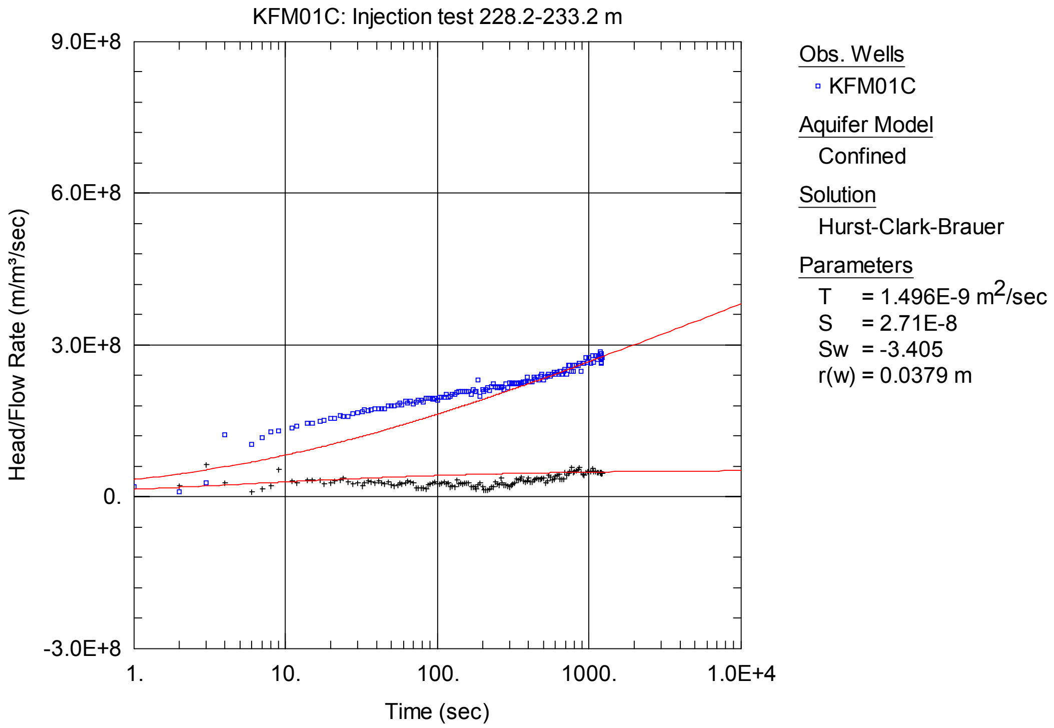


Figure A3-181. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 228.2-233.2 m in KFM01C.*

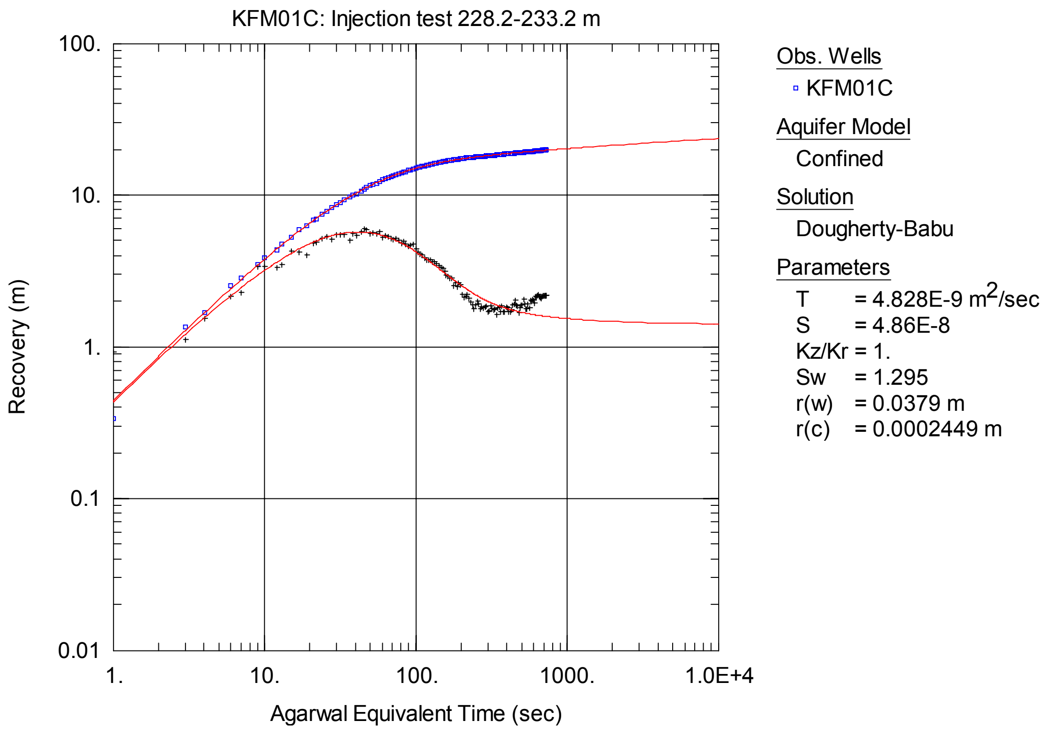


Figure A3-182. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 228.2-233.2 m in KFM01C.*

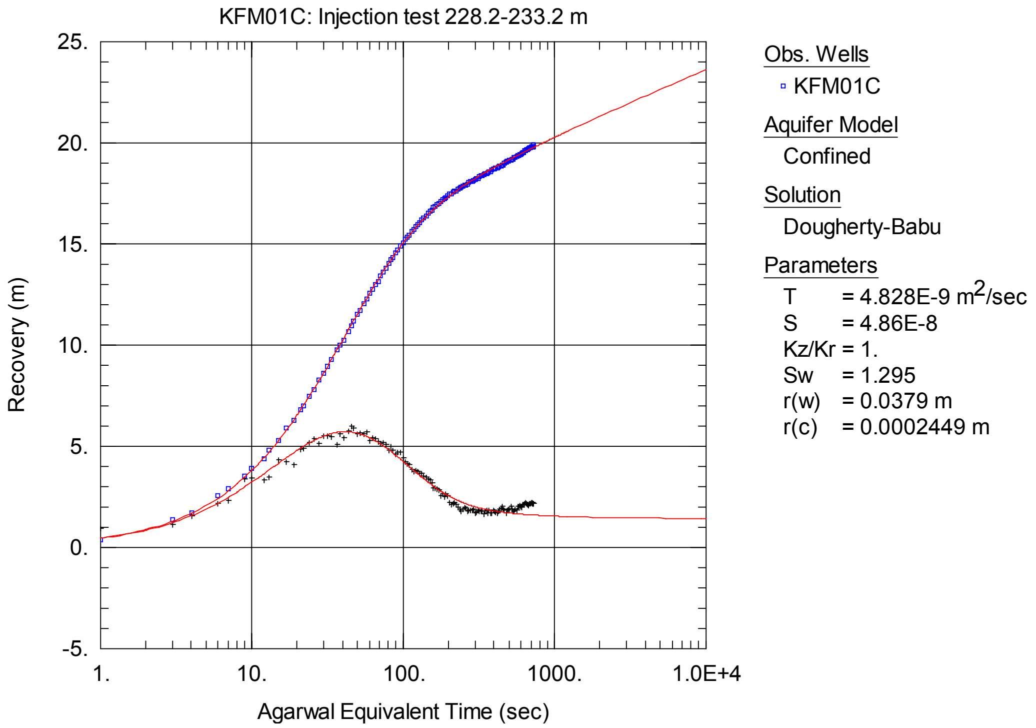


Figure A3-183. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 228.2-233.2 m in KFM01C.*

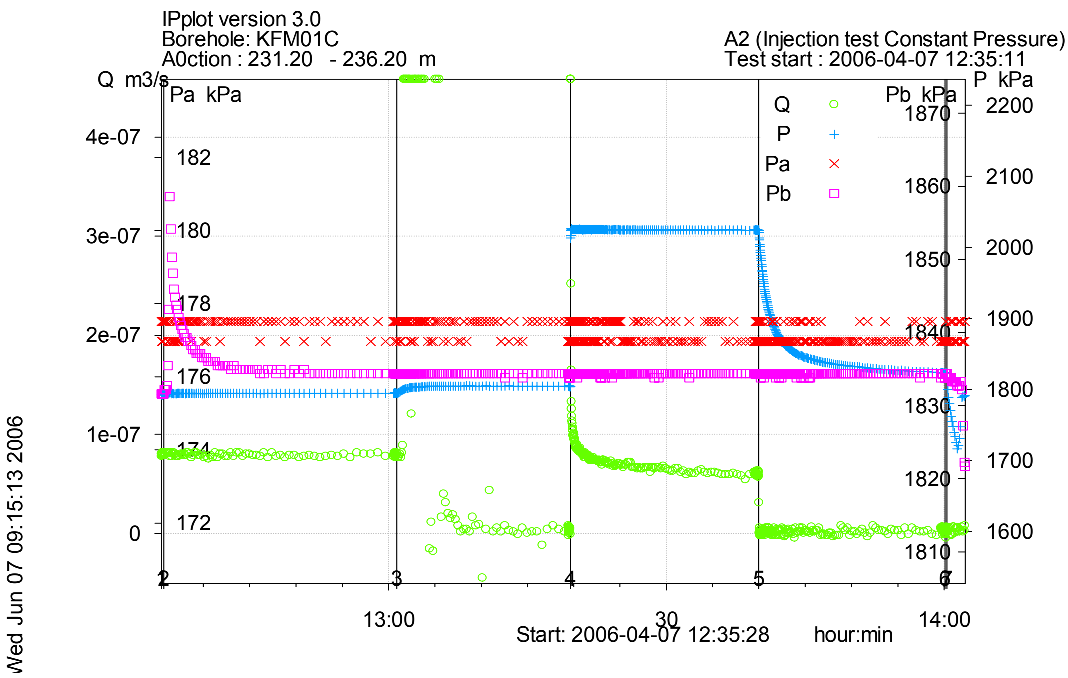


Figure A3-184. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 231.2-236.2 m in borehole KFM01C.*

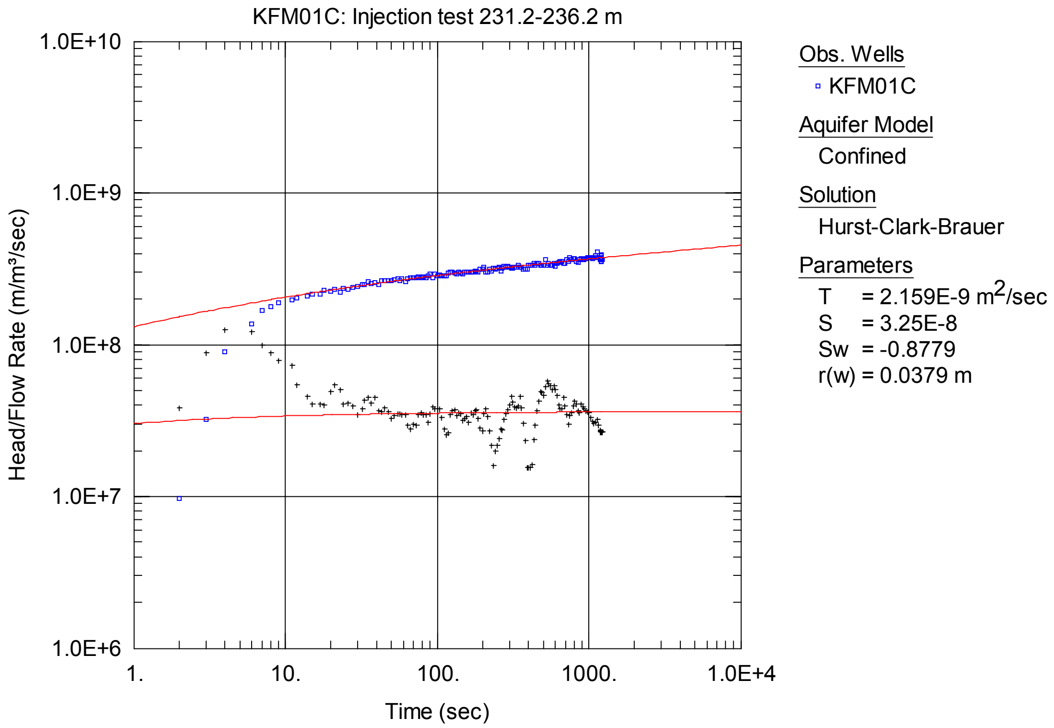


Figure A3-185. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 231.2-236.2 m in KFM01C.*

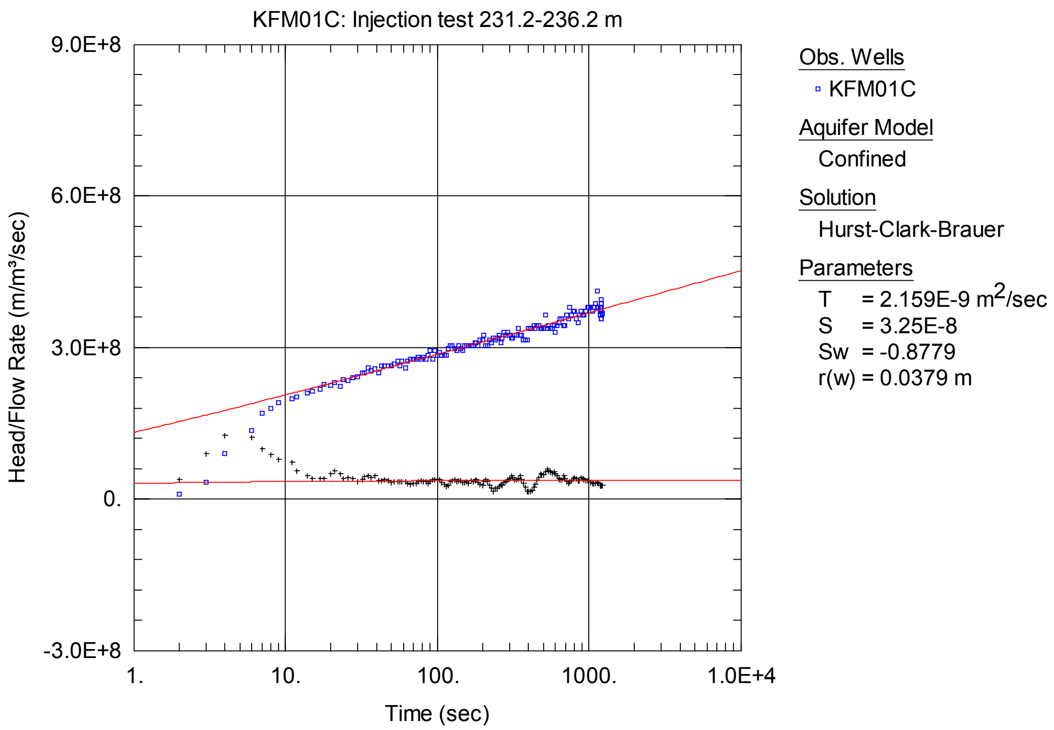


Figure A3-186. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 231.2-236.2 m in KFM01C.*

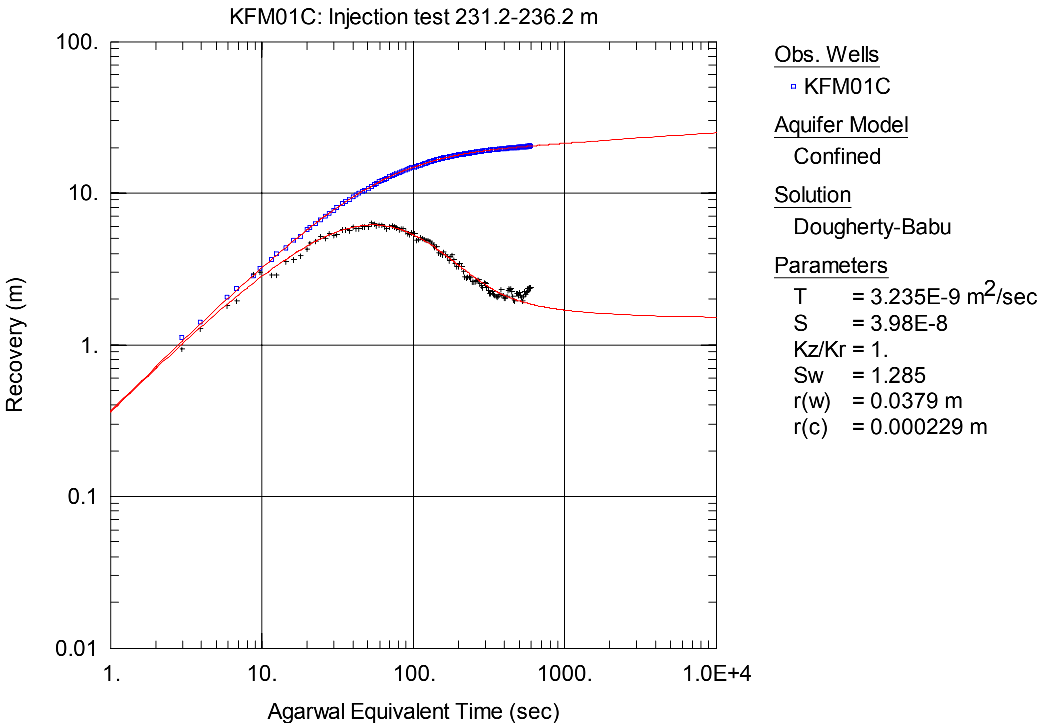


Figure A3-187. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 231.2-236.2 m in KFM01C.*

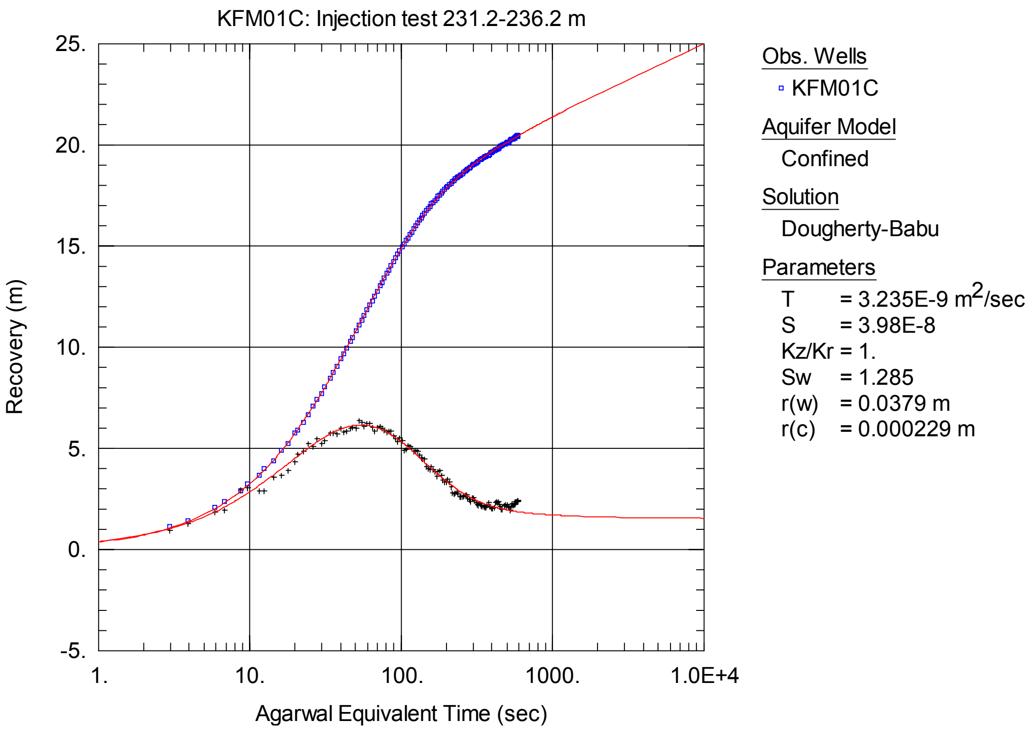


Figure A3-188. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 231.2-236.2 m in KFM01C.*

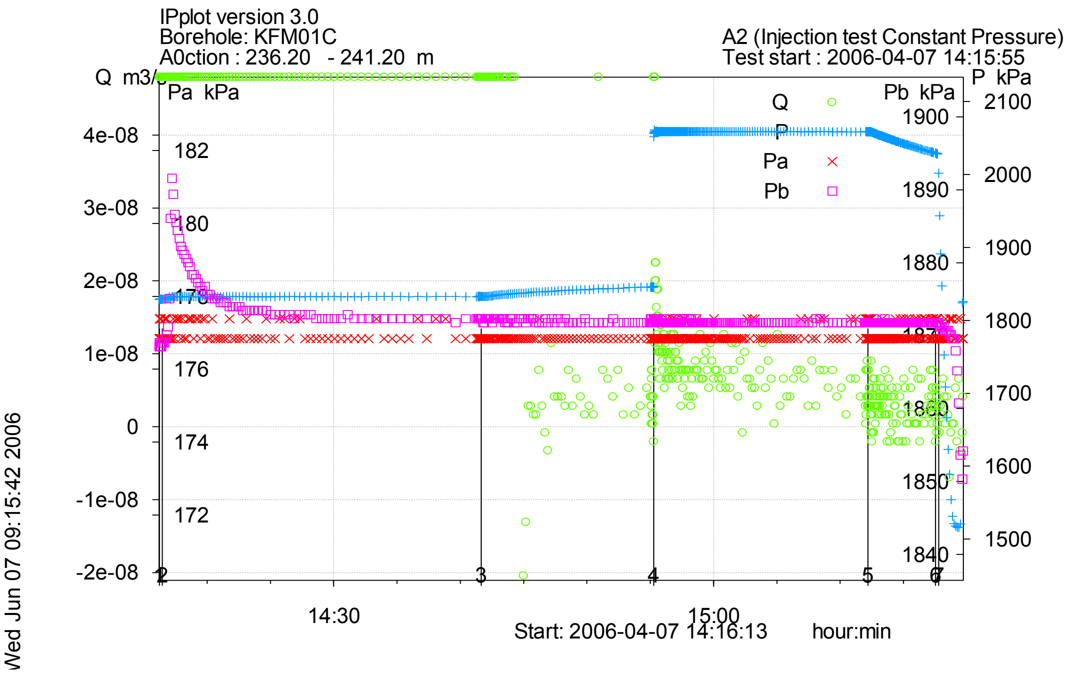


Figure A3-189. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 236.2-241.2 m in borehole KFM01C.*

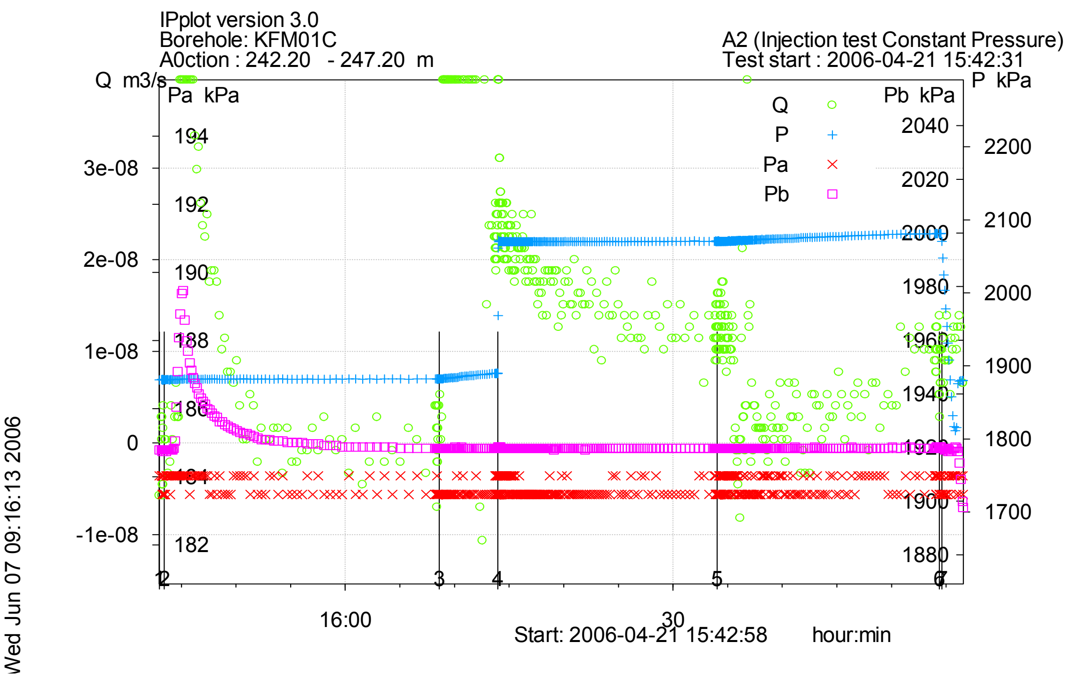


Figure A3-190. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 242.2-247.2 m in borehole KFM01C.*

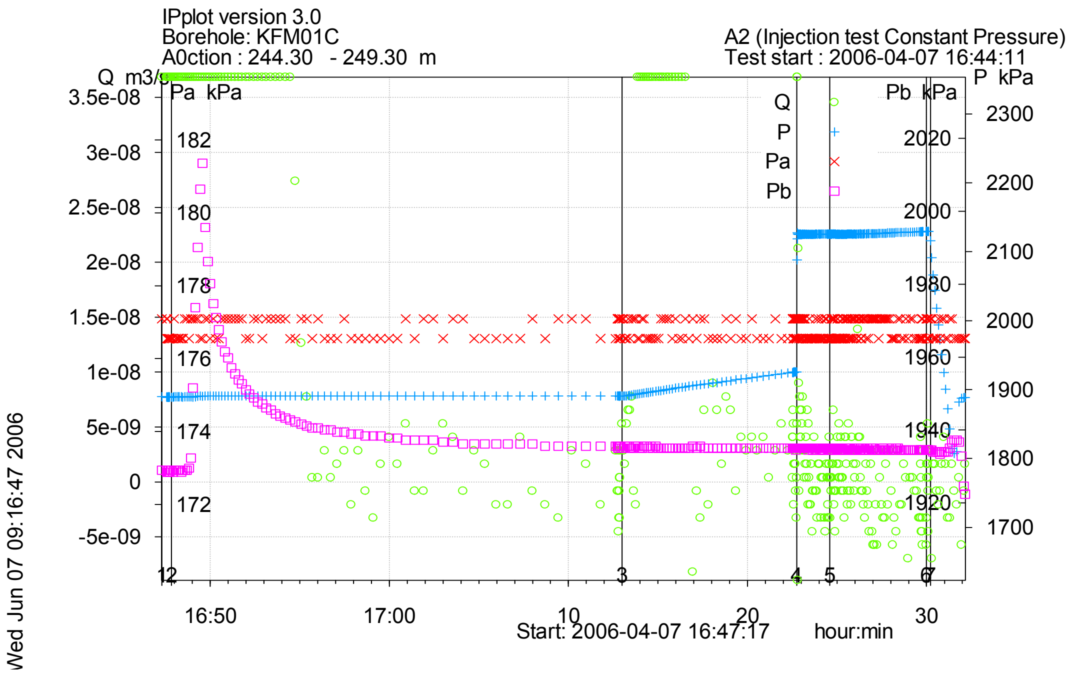


Figure A3-191. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 244.3-249.3 m in borehole KFM01C.*

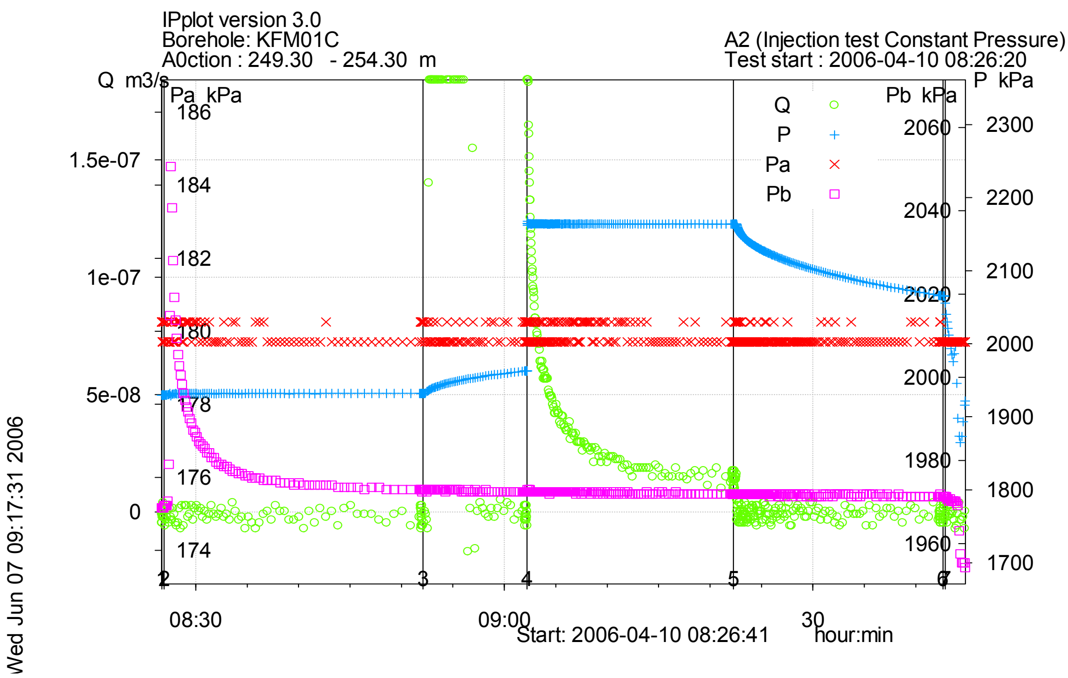


Figure A3-192. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 249.3-254.3 m in borehole KFM01C.*

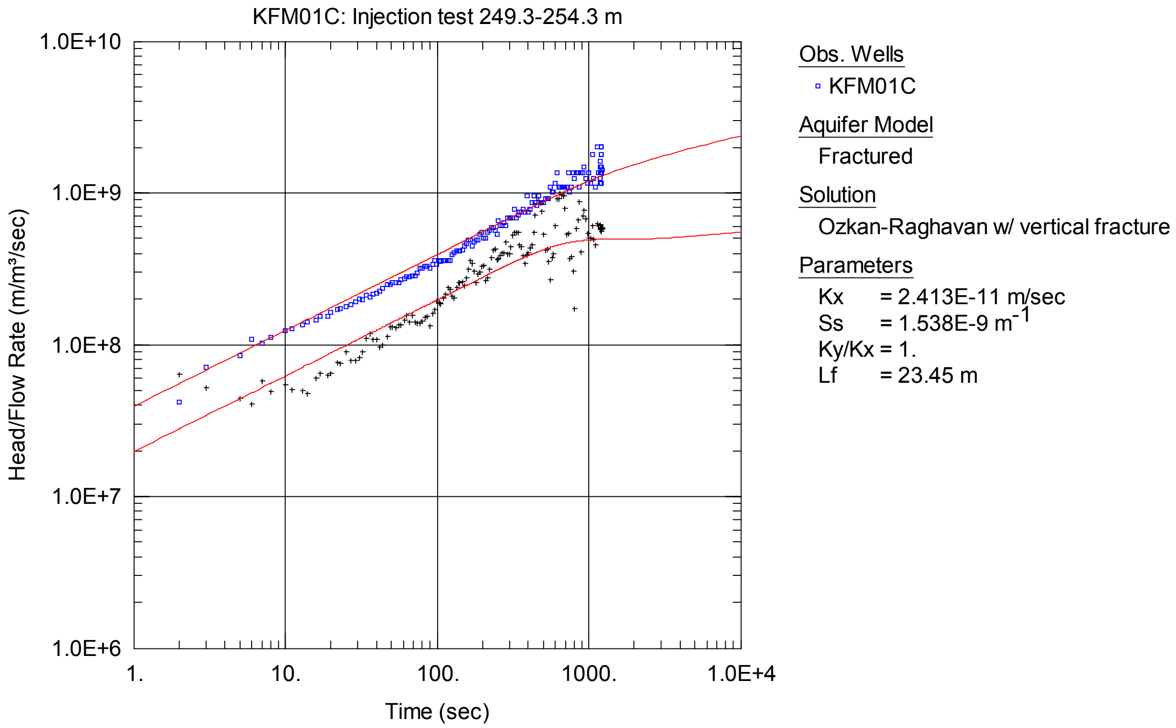


Figure A3-193. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 249.3-254.3 m in KFM01C.*

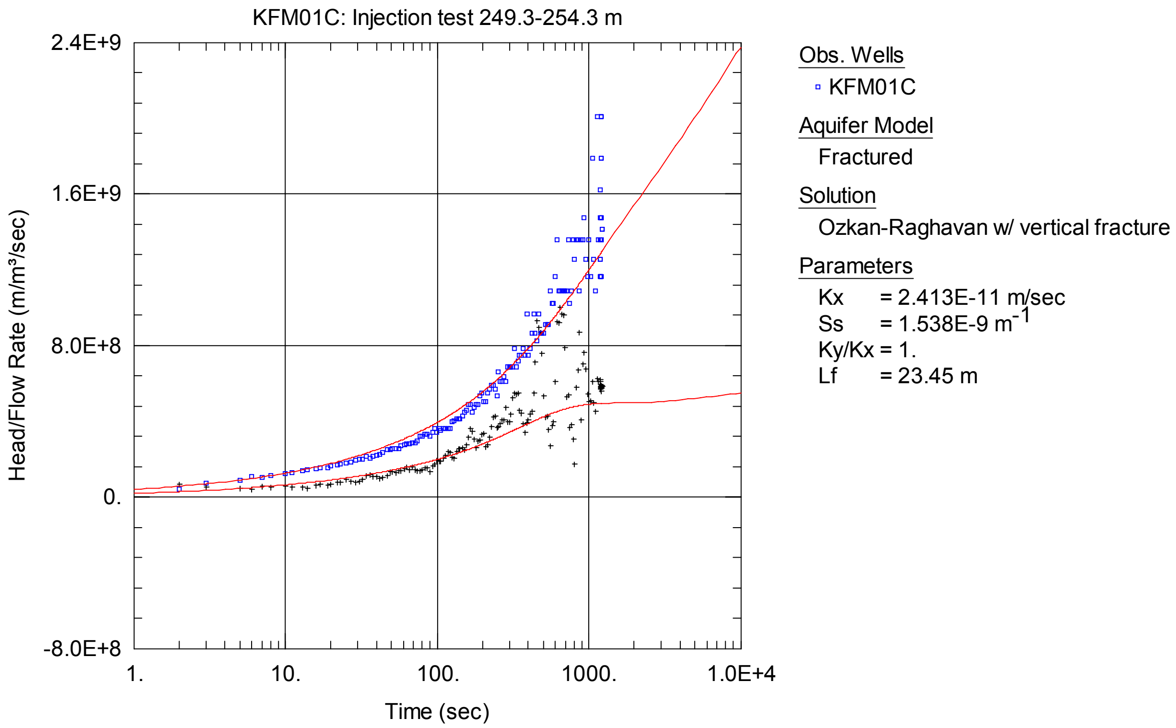


Figure A3-194. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 249.3-254.3 m in KFM01C.*

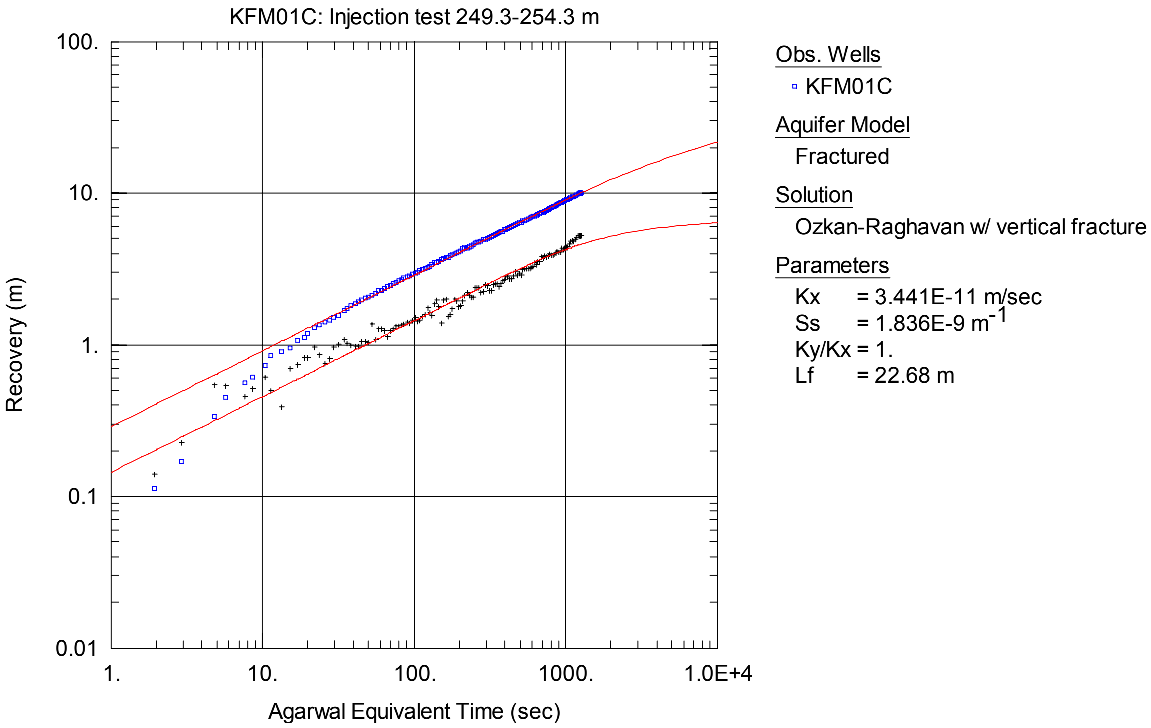


Figure A3-195. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 249.3-254.3 m in KFM01C.*

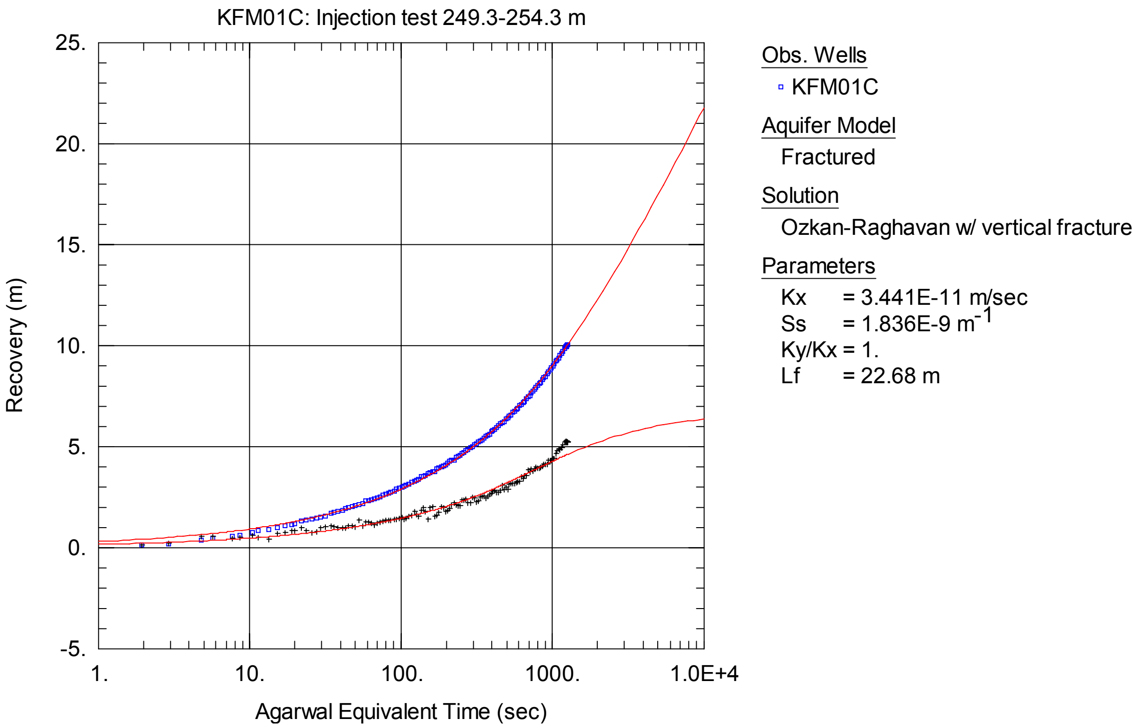


Figure A3-196. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 249.3-254.3 m in KFM01C.*

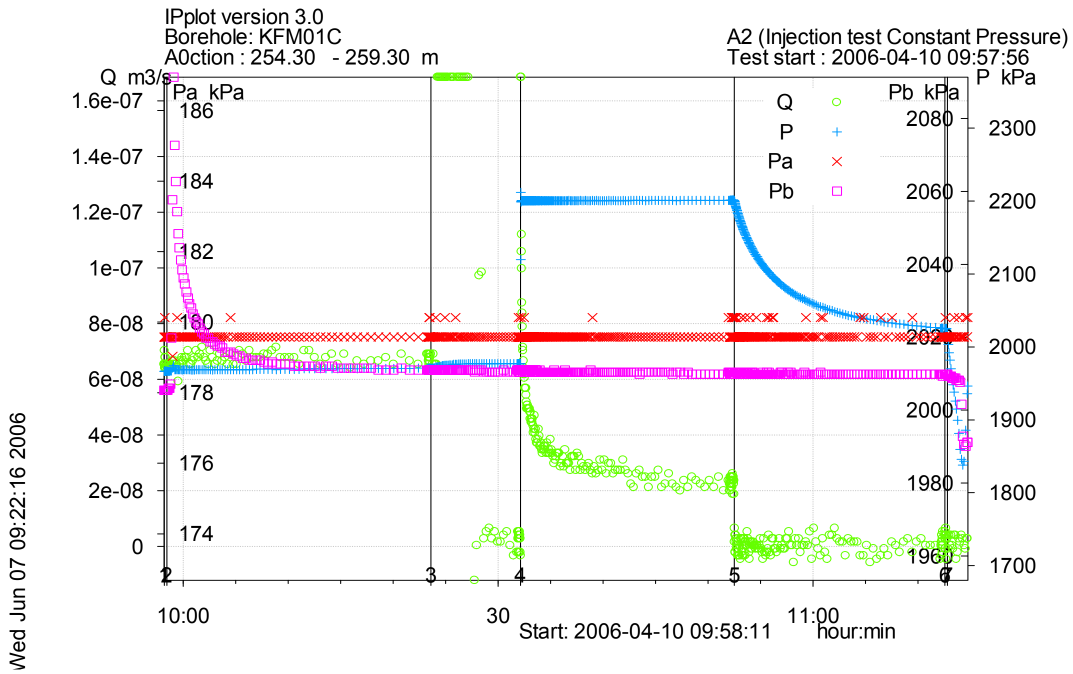


Figure A3-197. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 254.3-259.3 m in borehole KFM01C.*

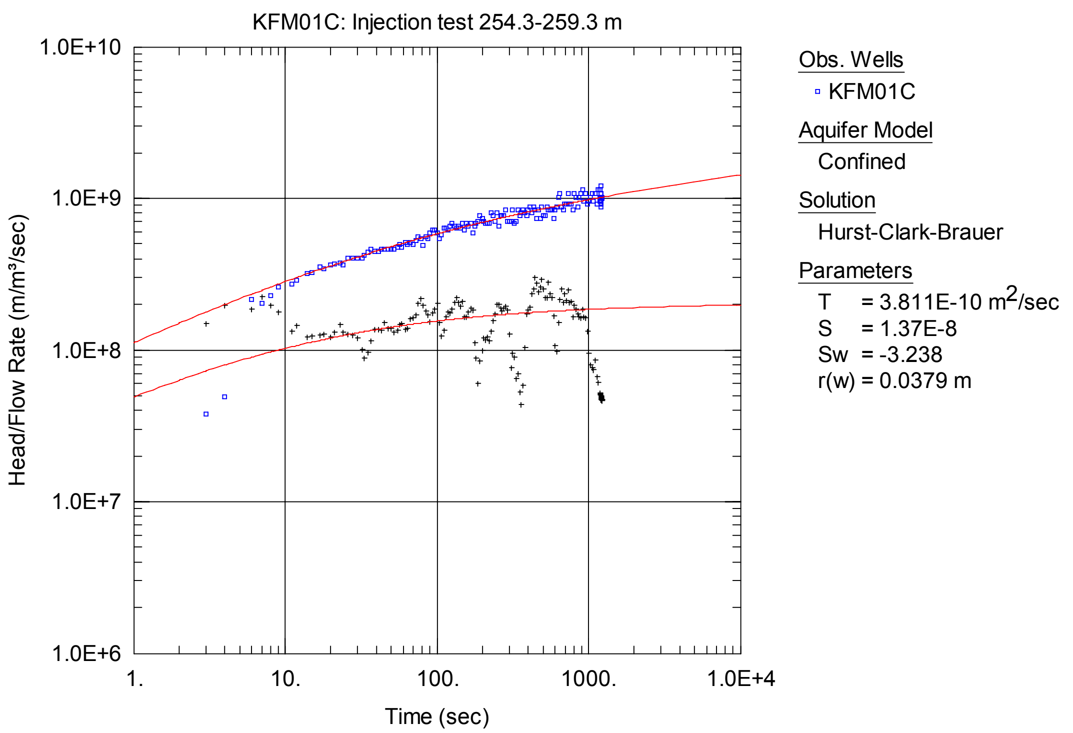


Figure A3-198. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 254.3-259.3 m in KFM01C.*

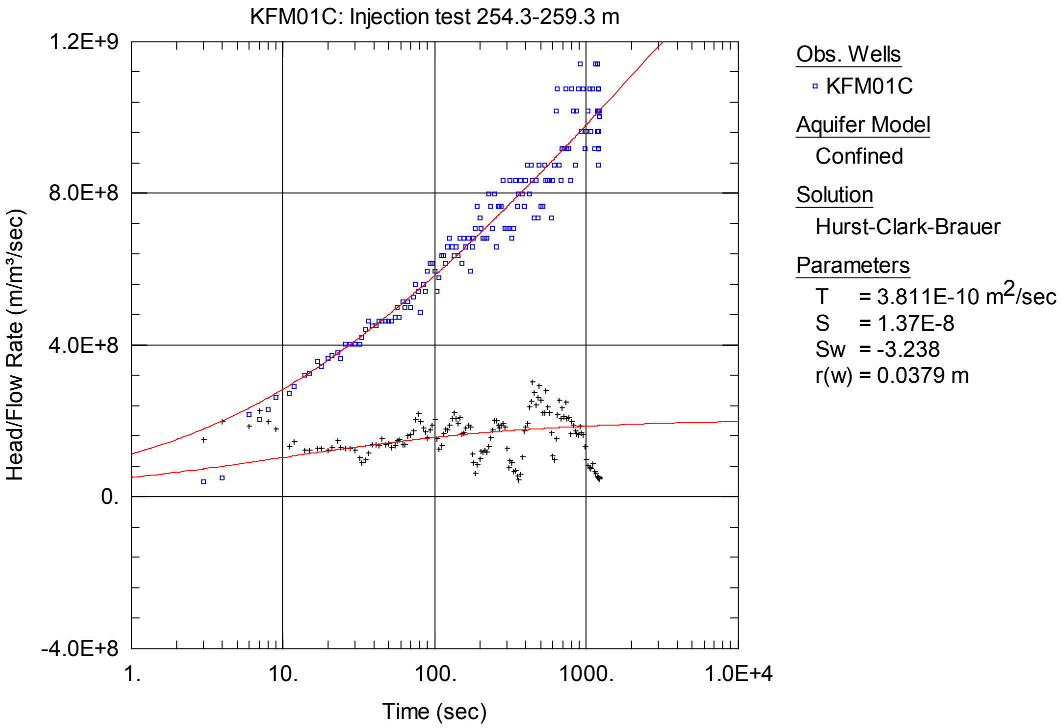


Figure A3-199. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 254.3-259.3 m in KFM01C.*

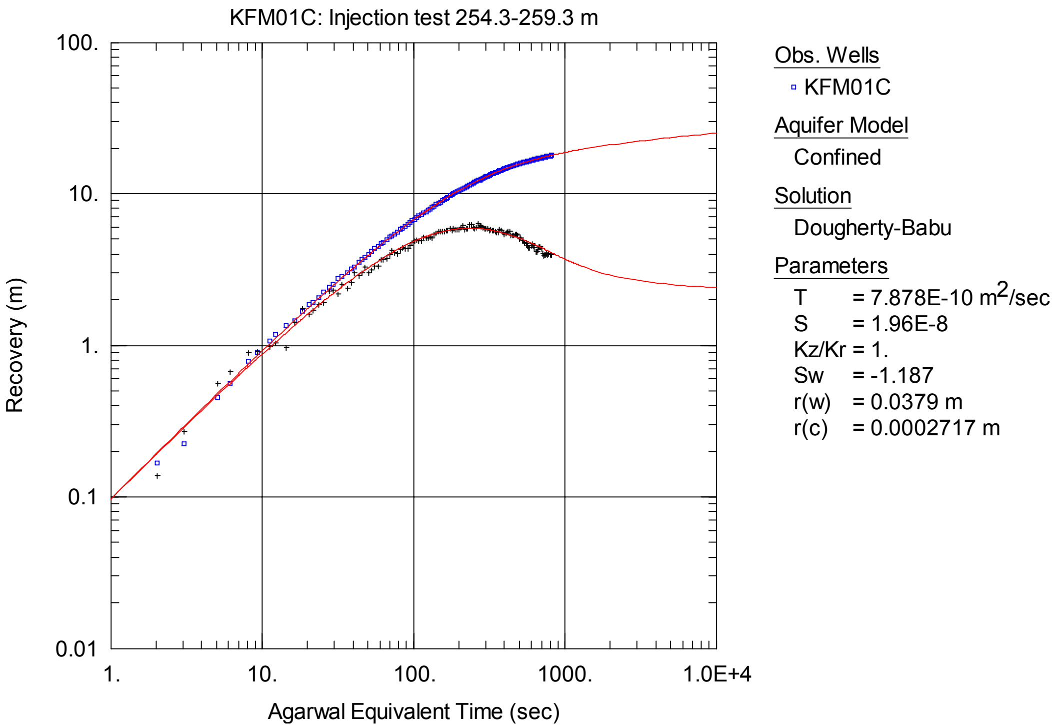


Figure A3-200. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 254.3-259.3 m in KFM01C.*

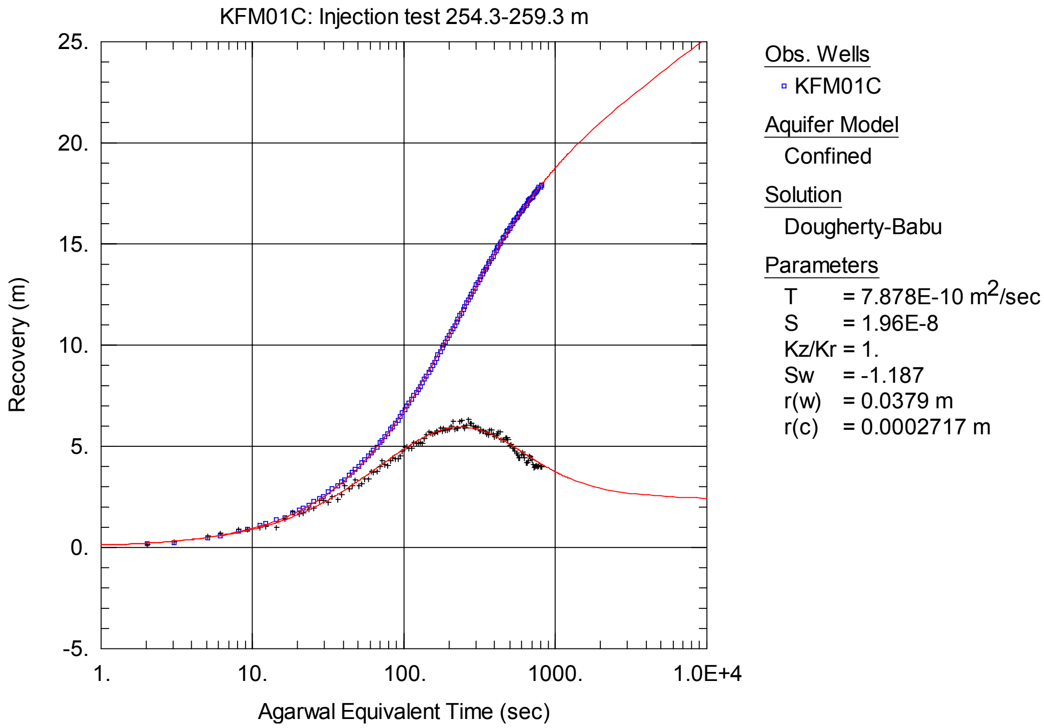


Figure A3-201. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 254.3-259.3 m in KFM01C.*

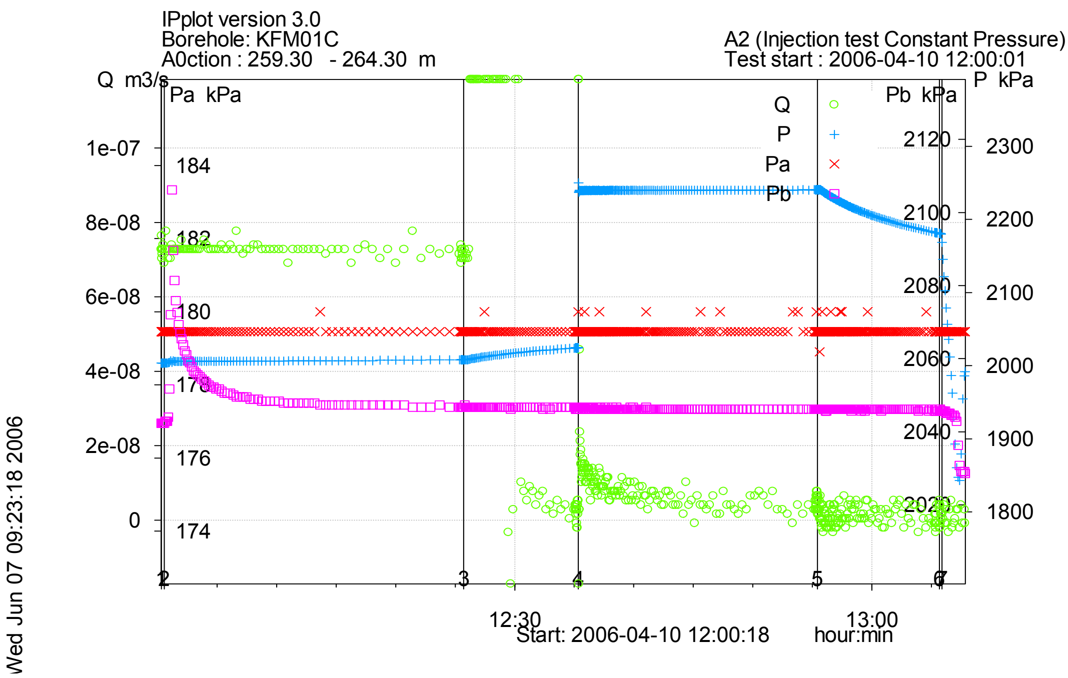


Figure A3-202. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 259.3-264.3 m in borehole KFM01C.*

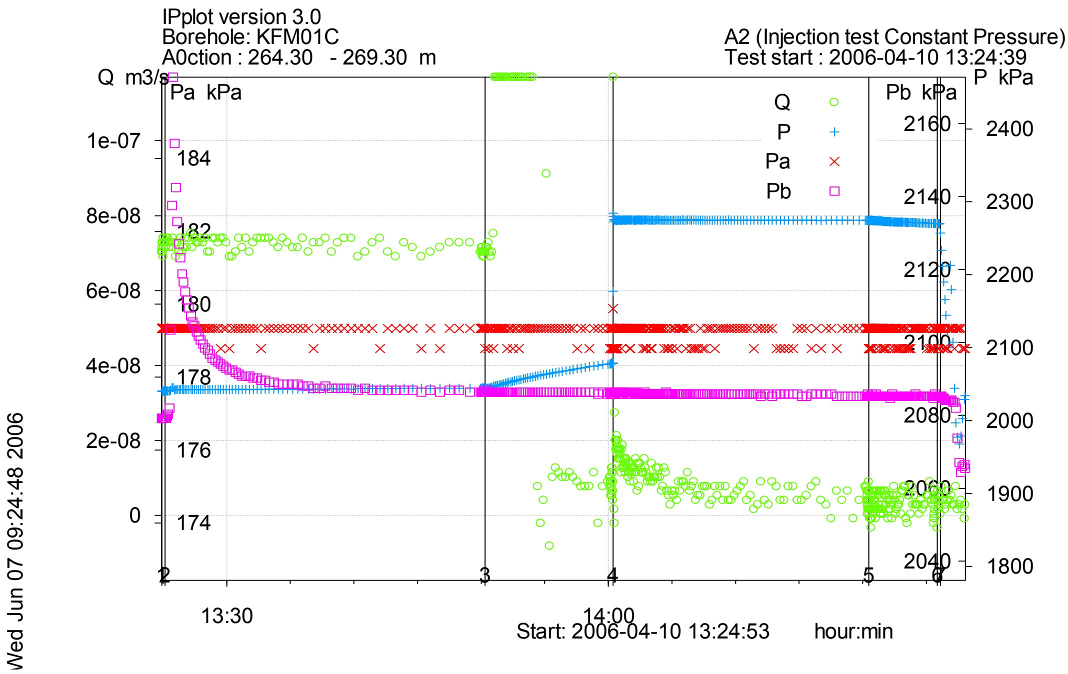


Figure A3-203. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 264.3-269.3 m in borehole KFM01C.*

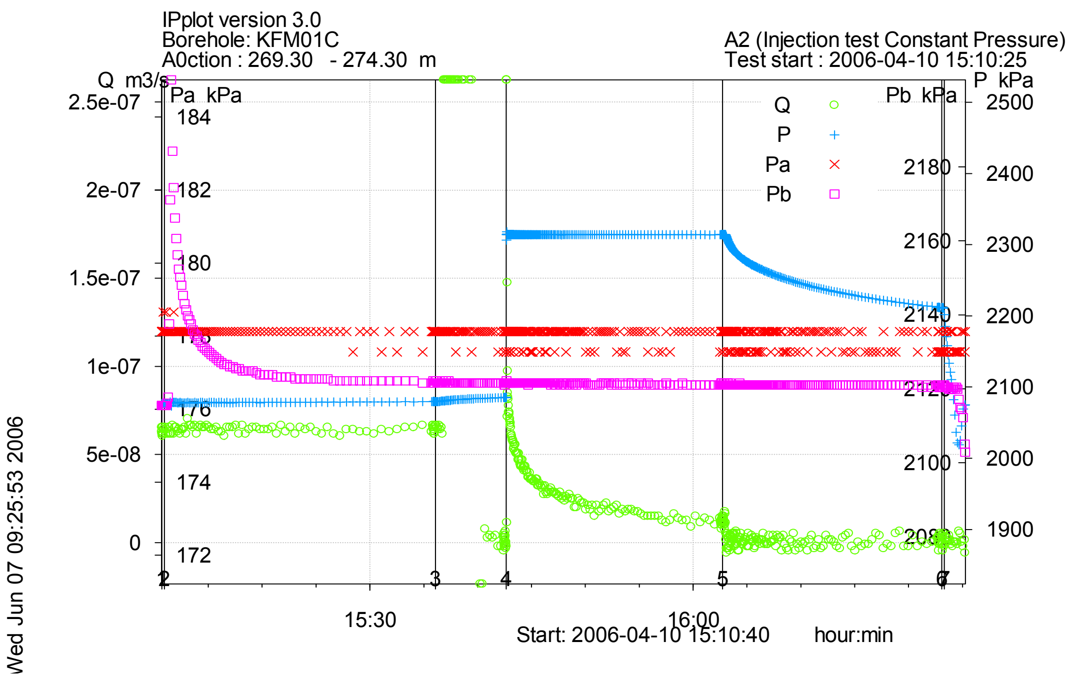


Figure A3-204. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 269.3-274.3 m in borehole KFM01C.*

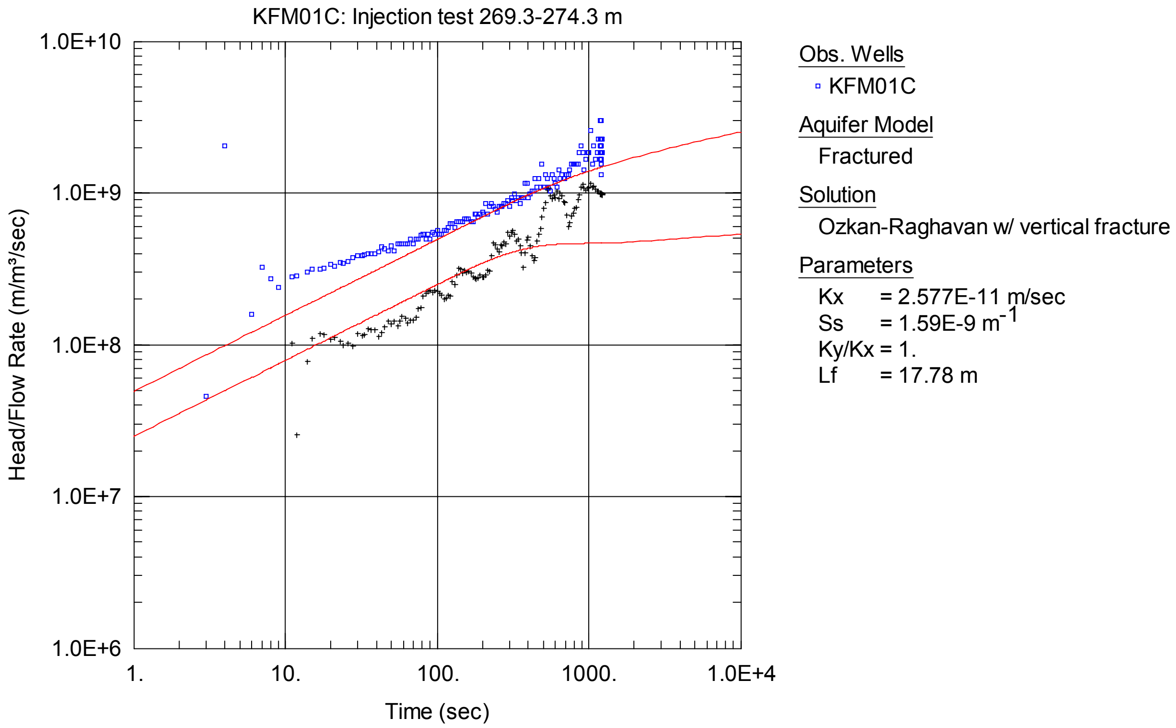


Figure A3-205. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 269.3-274.3 m in KFM01C.*

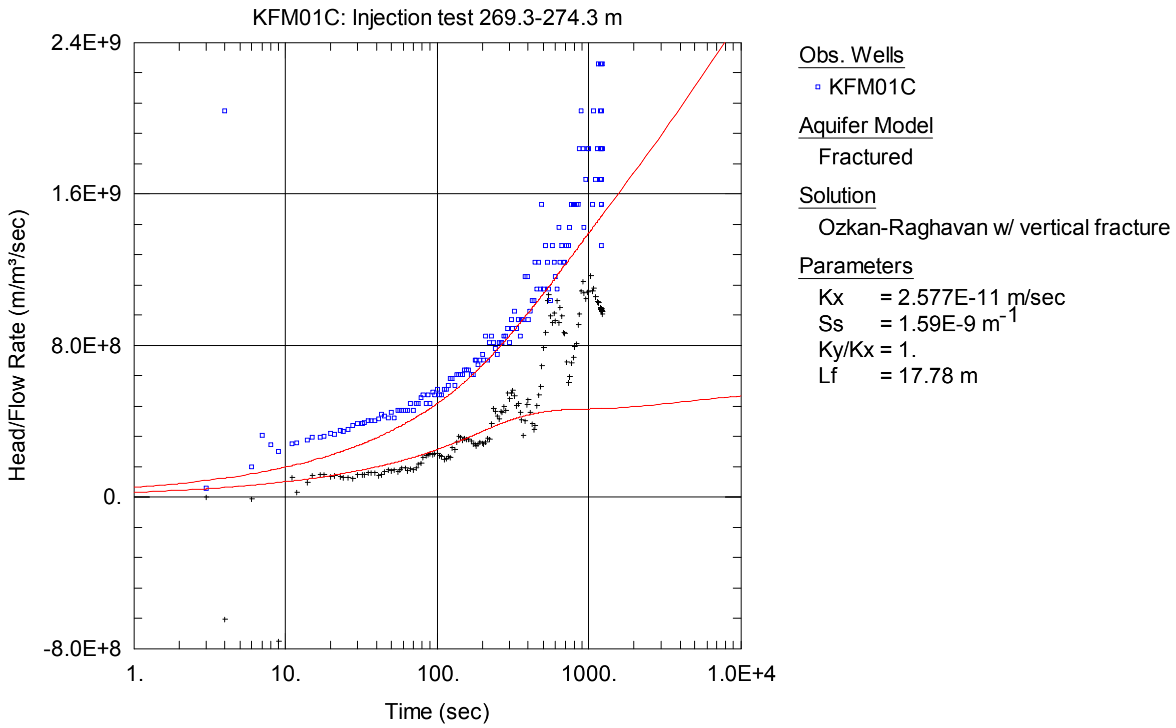


Figure A3-206. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 269.3-274.3 m in KFM01C.*

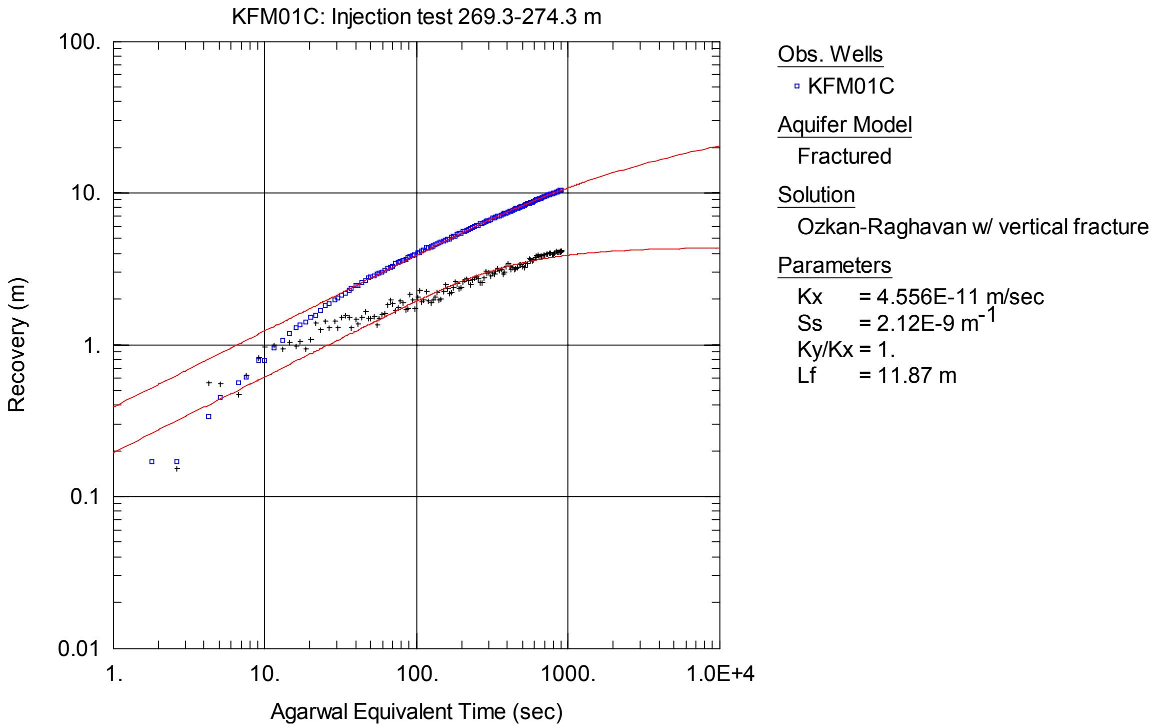


Figure A3-207. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 269.3-274.3 m in KFM01C.*

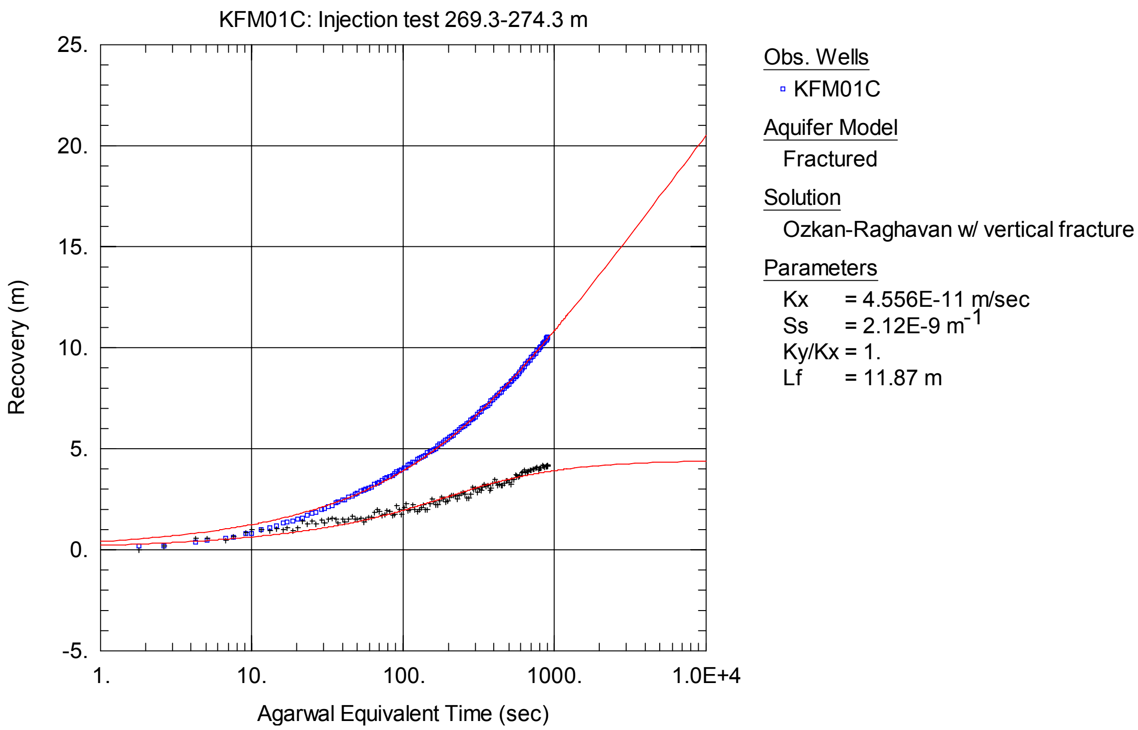


Figure A3-208. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 269.3-274.3 m in KFM01C.*

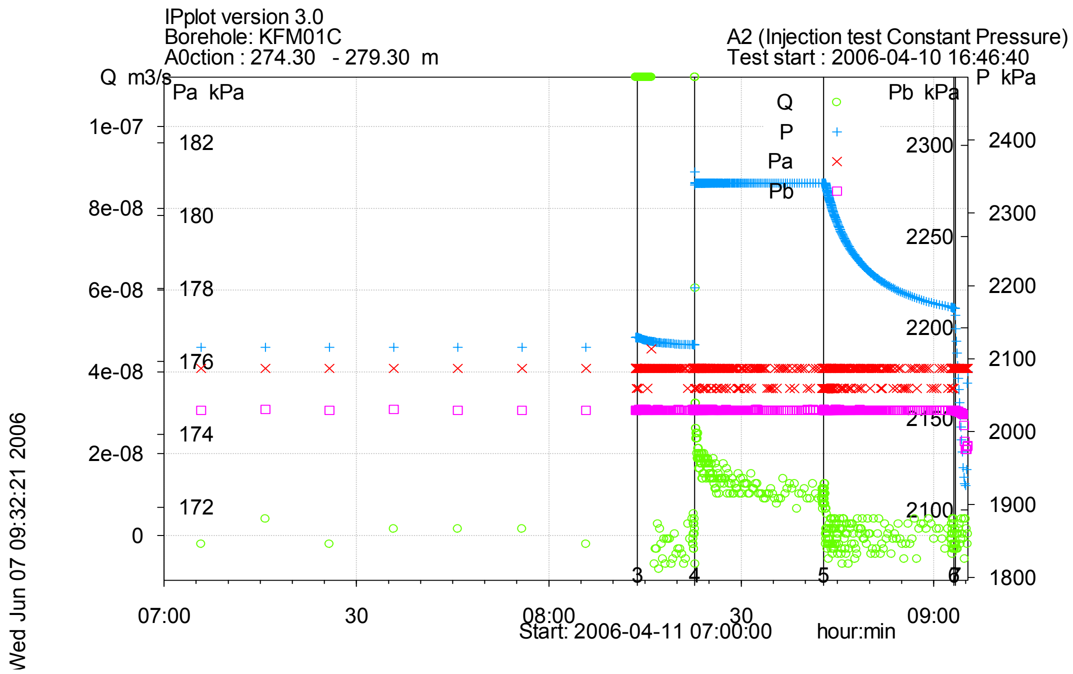


Figure A3-209. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 274.3-279.3 m in borehole KFM01C.*

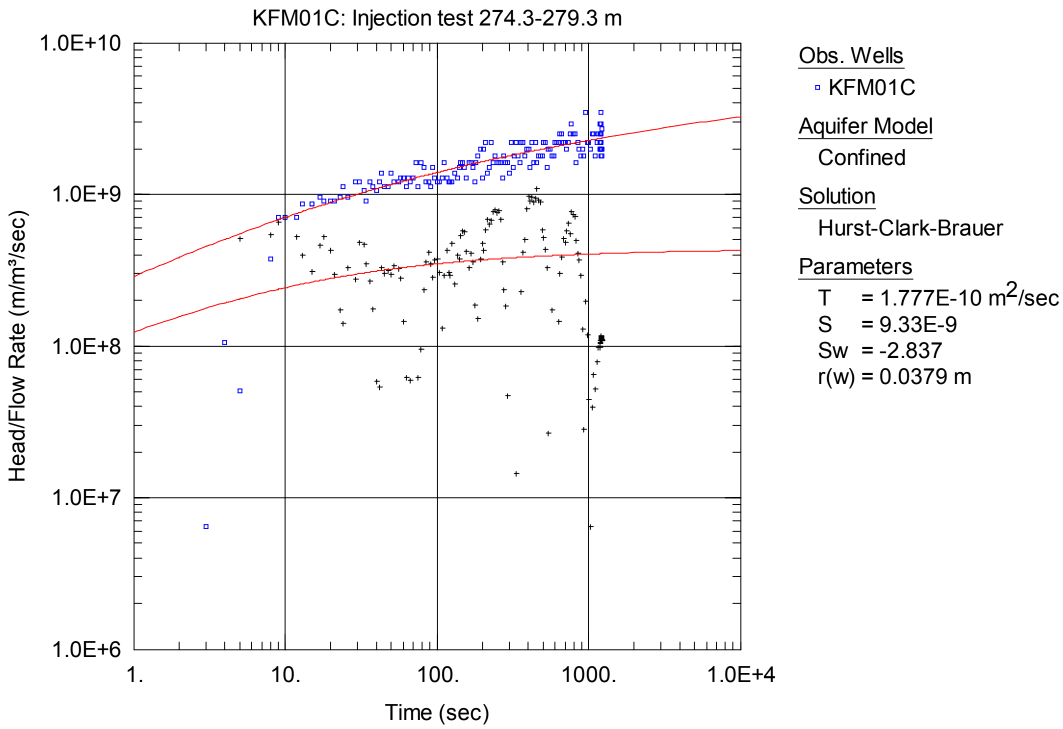


Figure A3-210. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 274.3-279.3 m in KFM01C.*

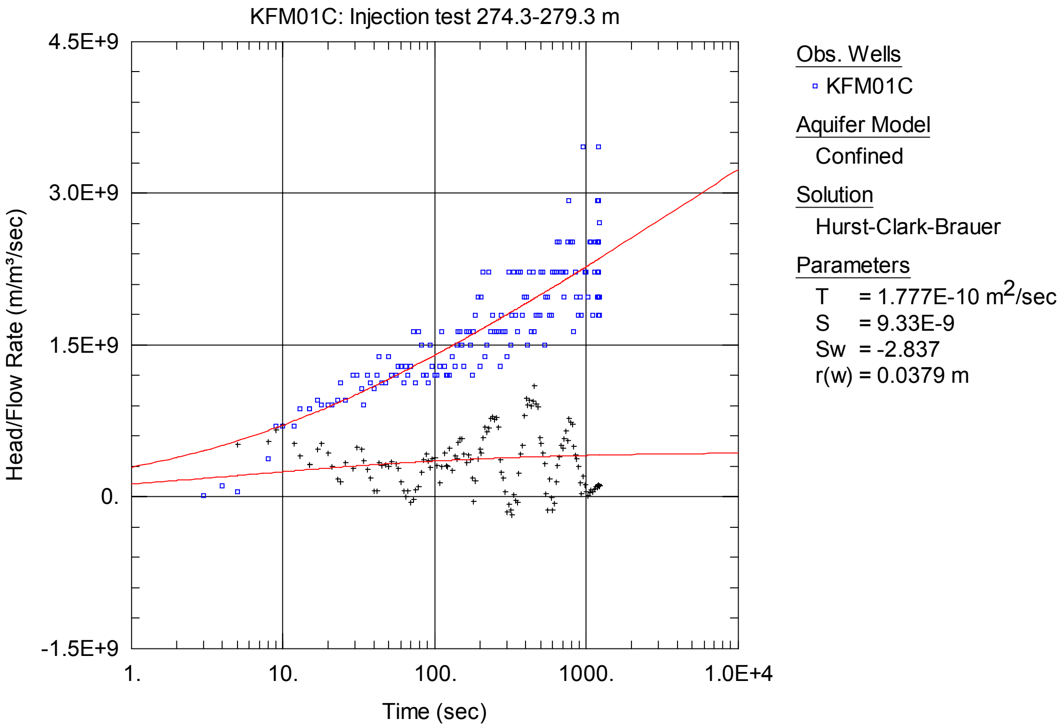


Figure A3-211. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 274.3-279.3 m in KFM01C.*

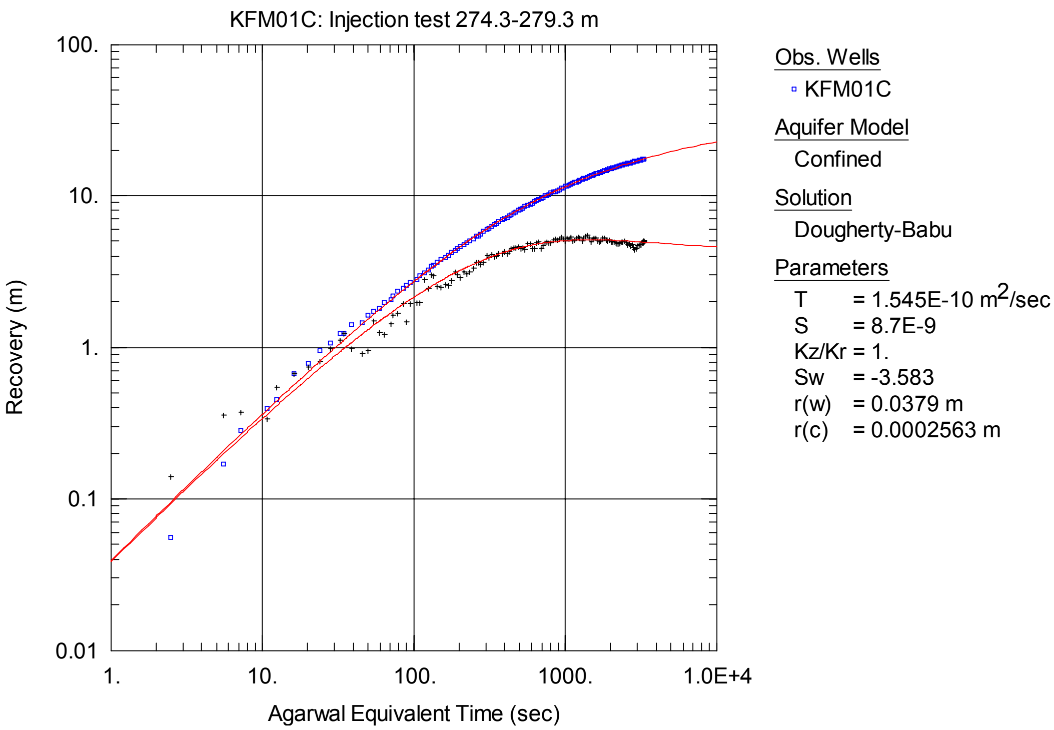


Figure A3-212. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 274.3-279.3 m in KFM01C.*

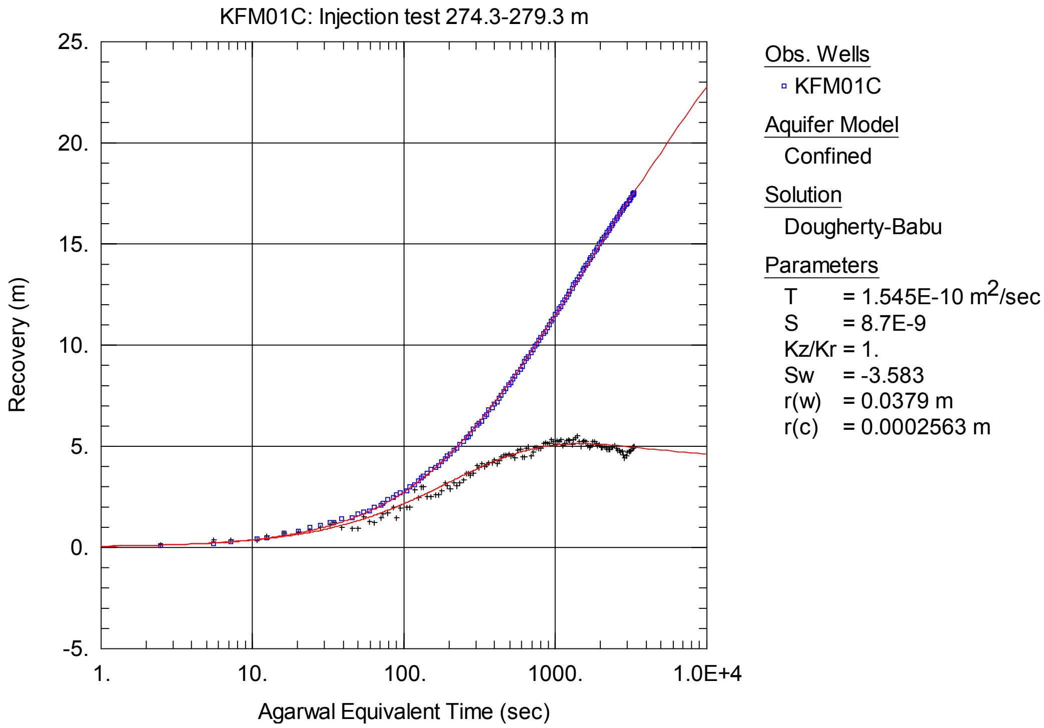


Figure A3-213. Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 274.3-279.3 m in KFM01C.

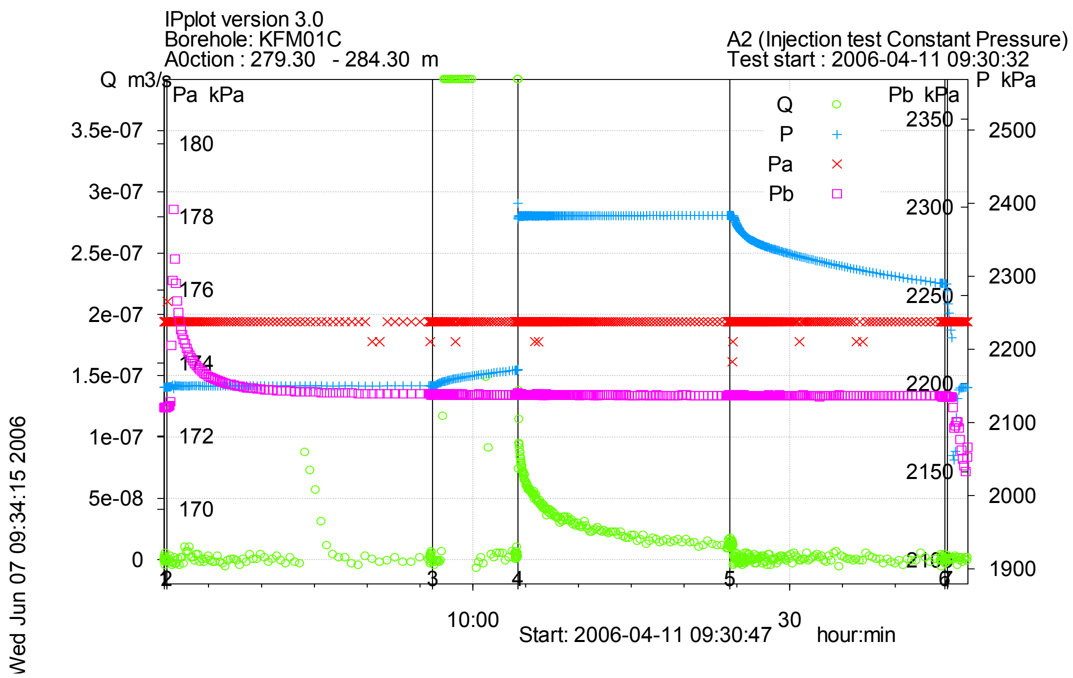


Figure A3-214. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 279.3-284.3 m in borehole KFM01C.

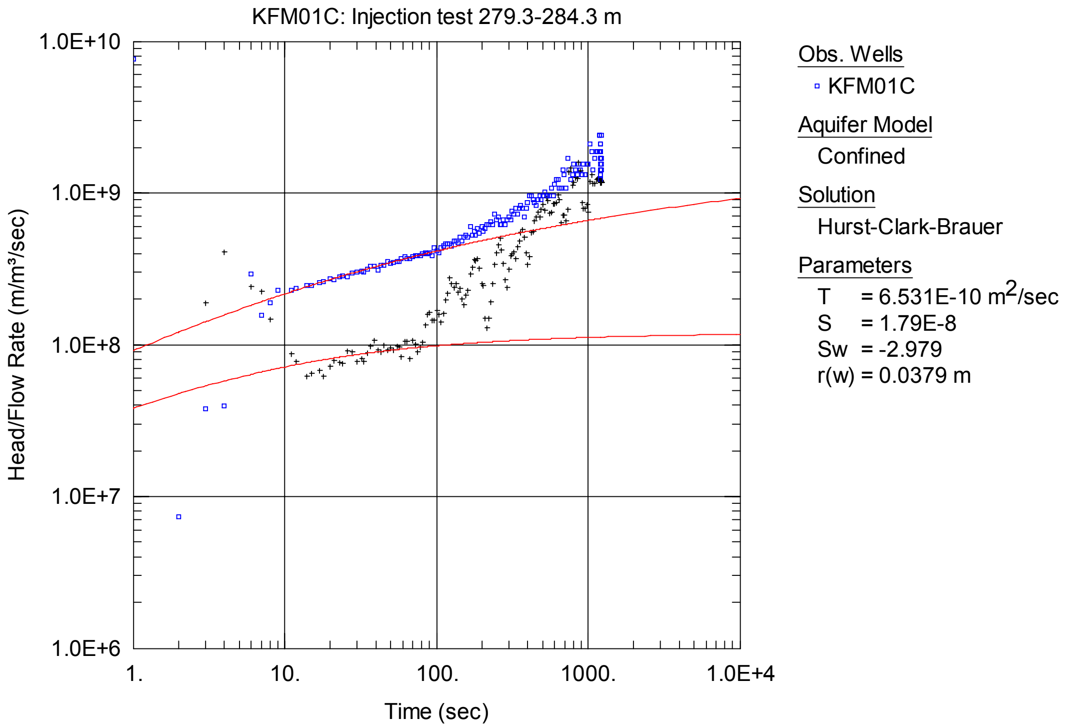


Figure A3-215. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 279.3-284.3 m in KFM01C.*

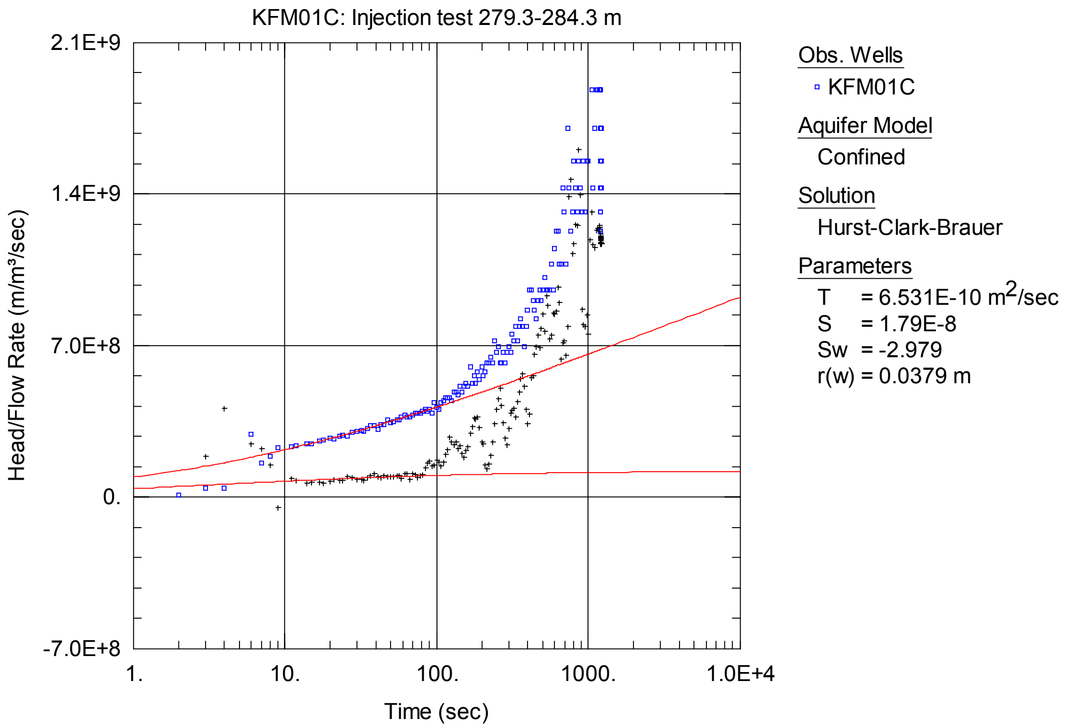


Figure A3-216. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 279.3-284.3 m in KFM01C.*

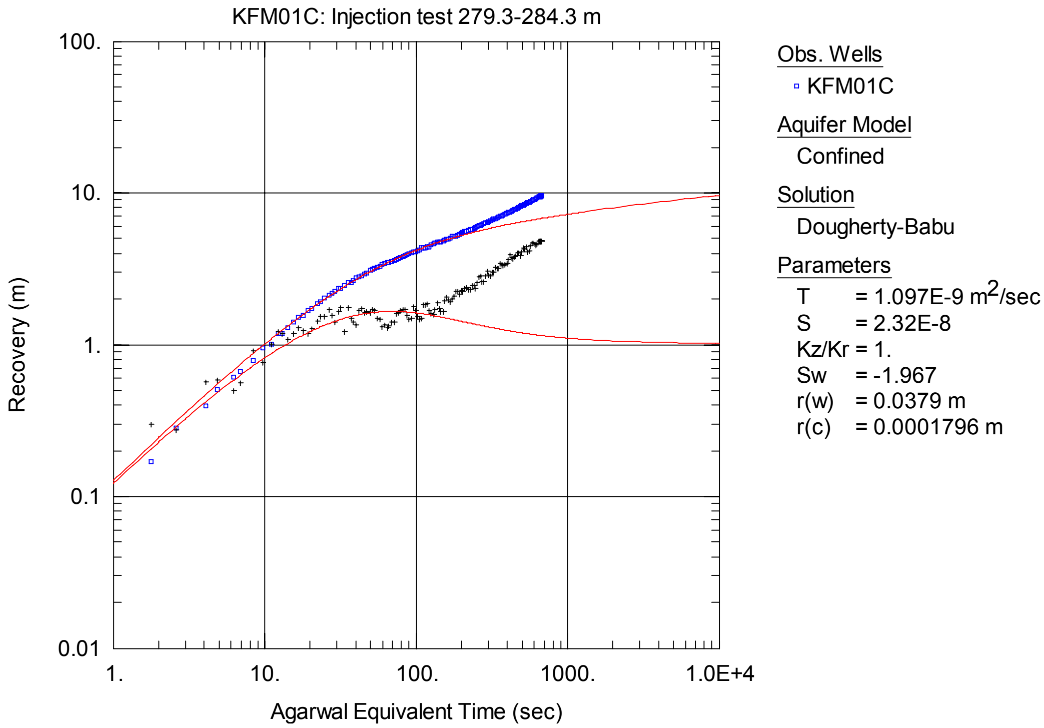


Figure A3-217. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 279.3-284.3 m in KFM01C.*

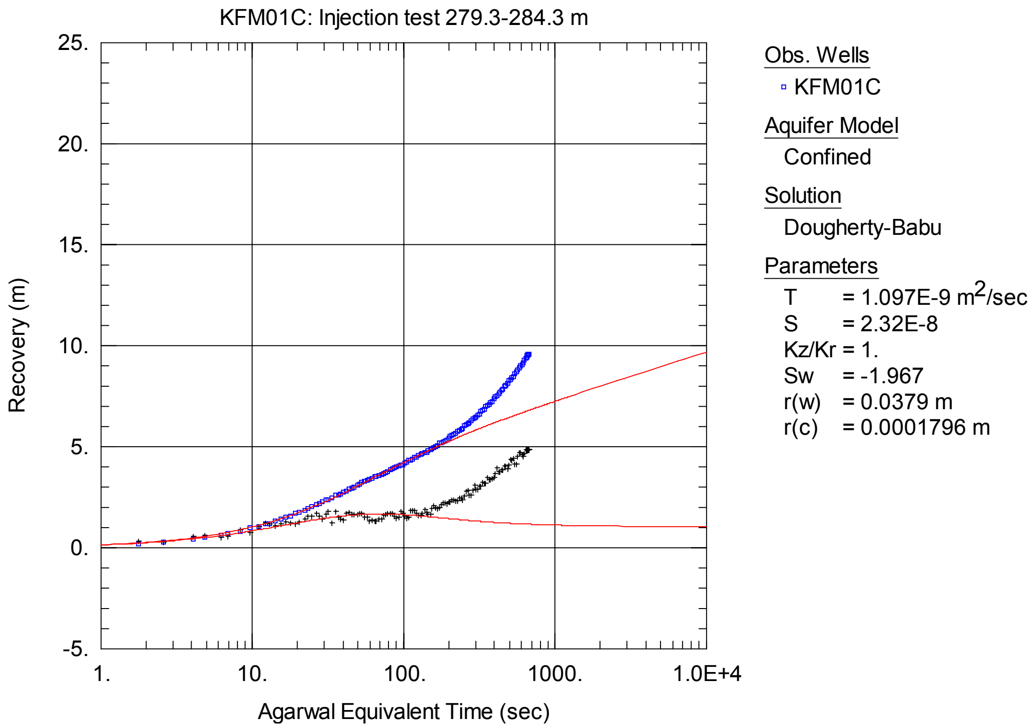


Figure A3-218. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 279.3-284.3 m in KFM01C.*

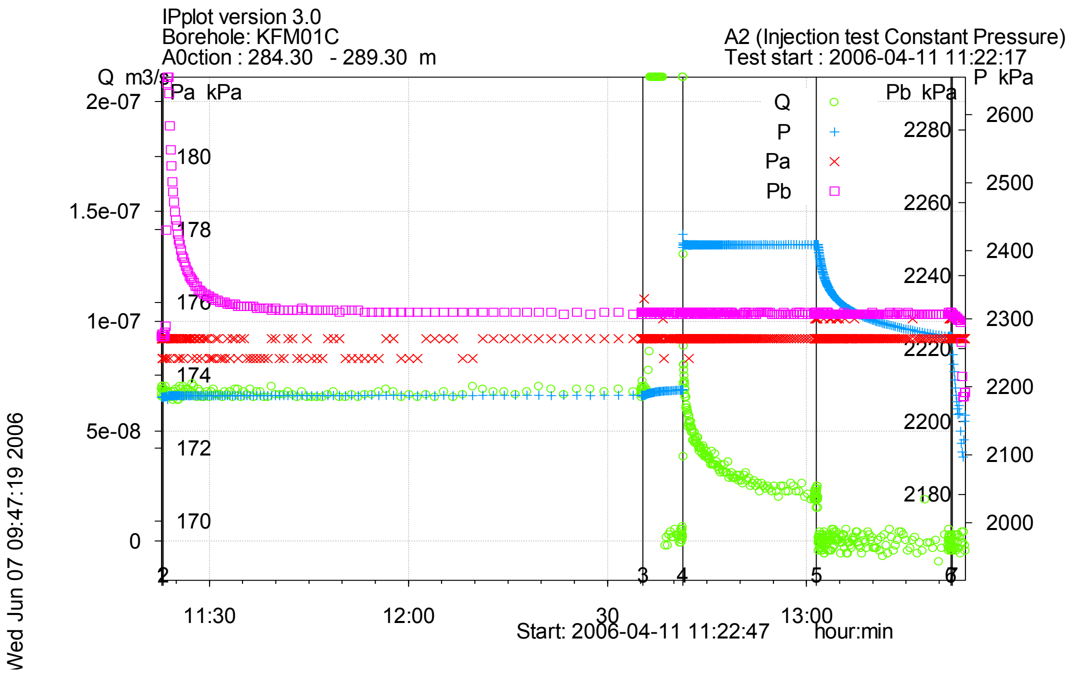


Figure A3-219. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 284.3-289.3 m in borehole KFM01C.*

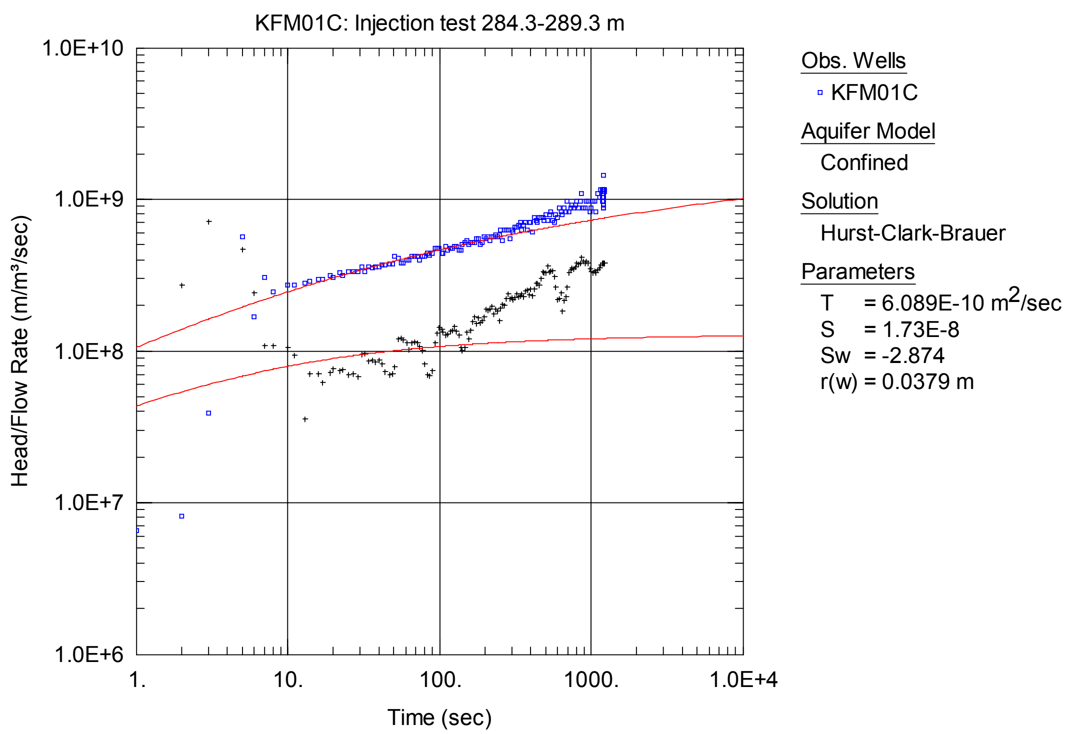


Figure A3-220. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 284.3-289.3 m in KFM01C.*

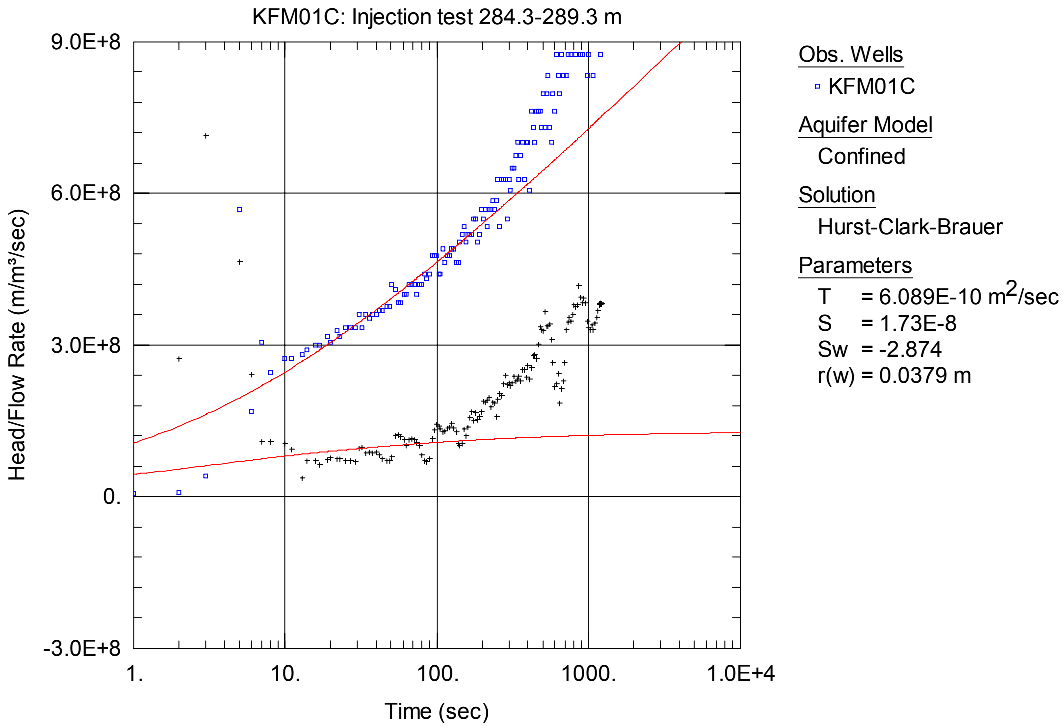


Figure A3-221. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 284.3-289.3 m in KFM01C.*

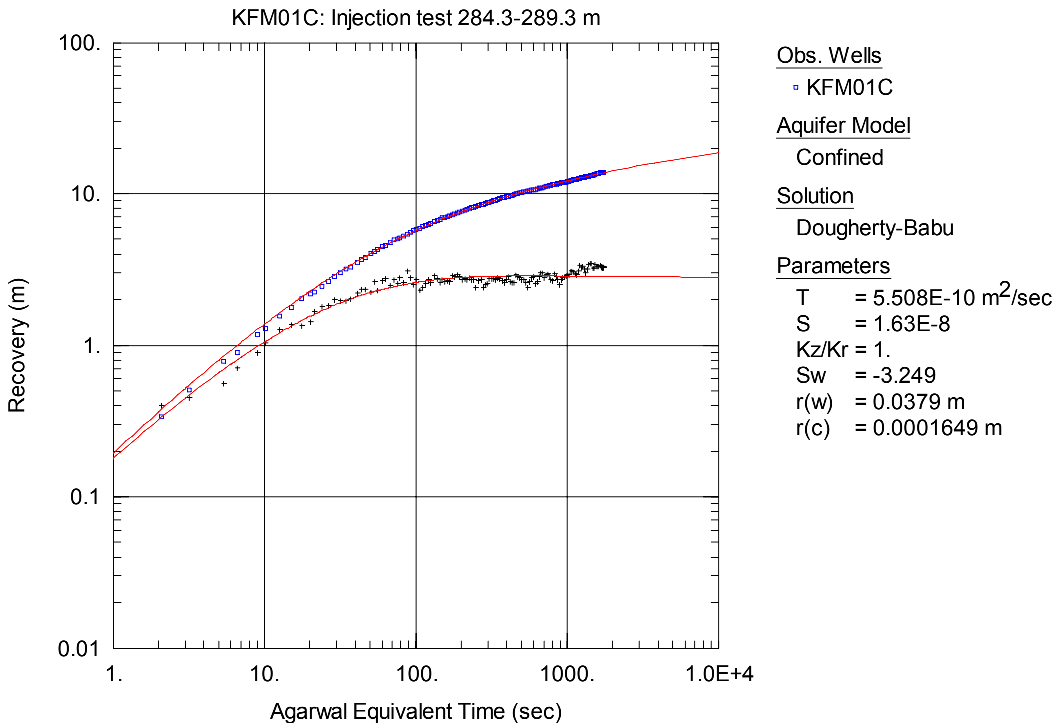


Figure A3-222. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 284.3-289.3 m in KFM01C.*

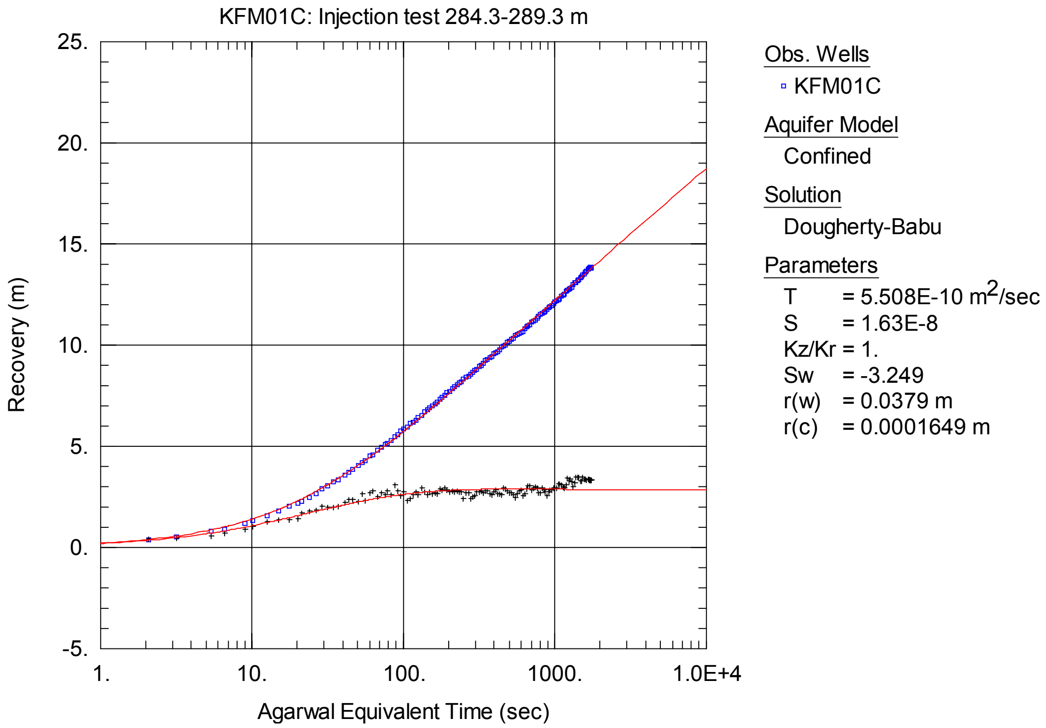


Figure A3-223. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 284.3-289.3 m in KFM01C.*

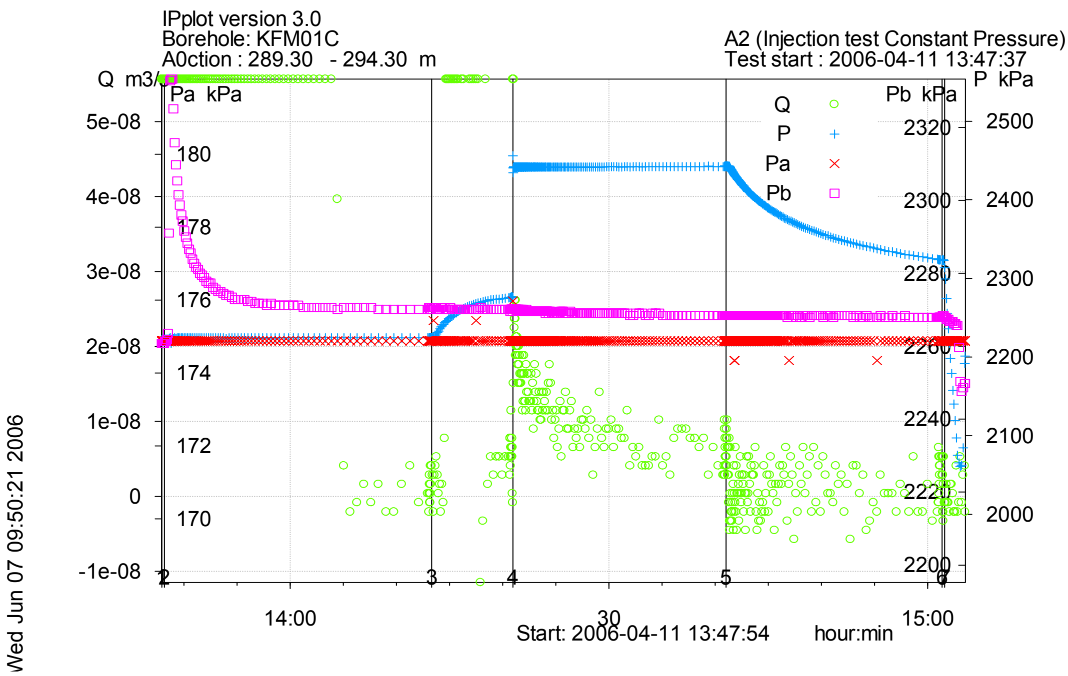


Figure A3-224. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 289.3-294.3 m in borehole KFM01C.*

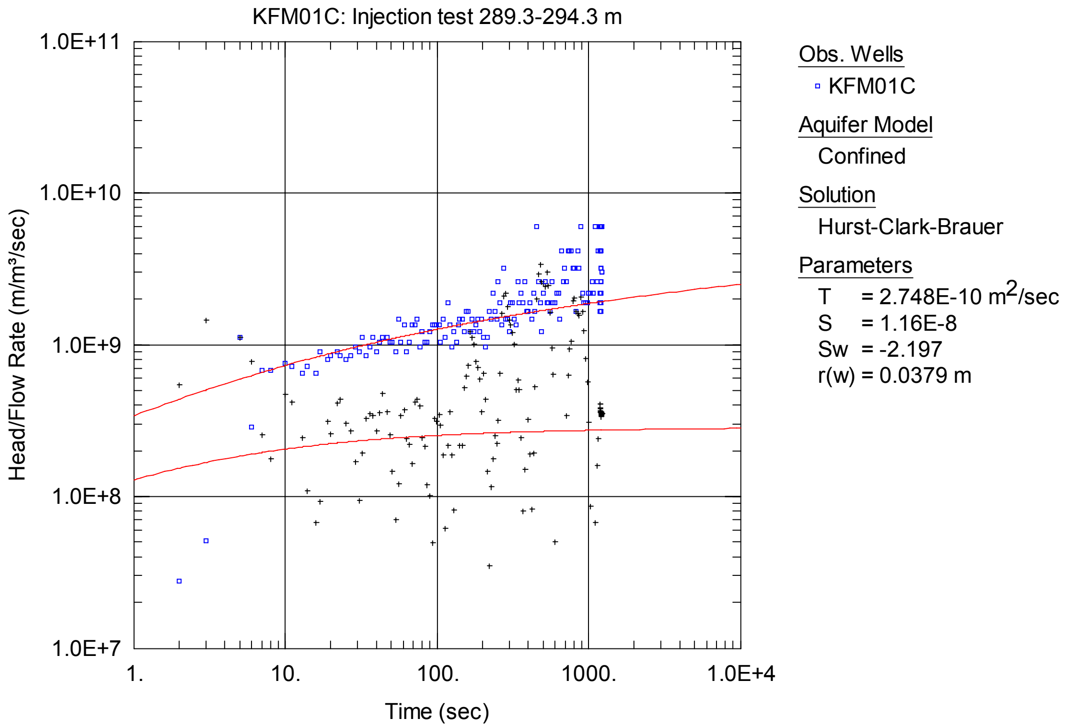


Figure A3-225. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 289.3-294.3 m in KFM01C.*

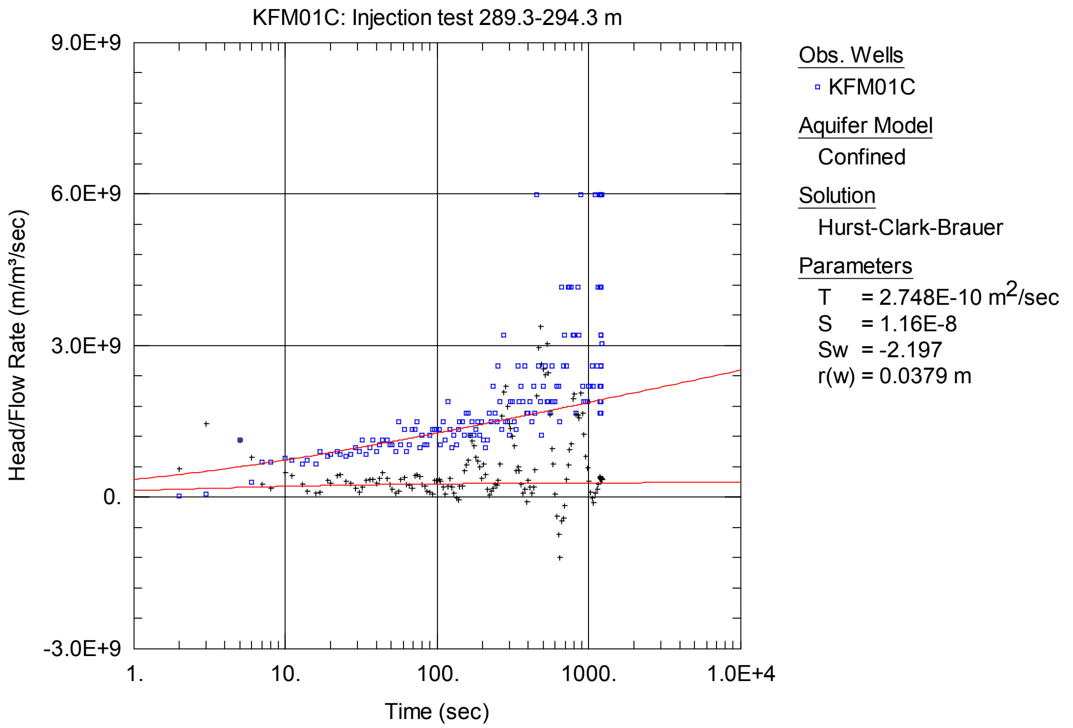


Figure A3-226. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 289.3-294.3 m in KFM01C.*

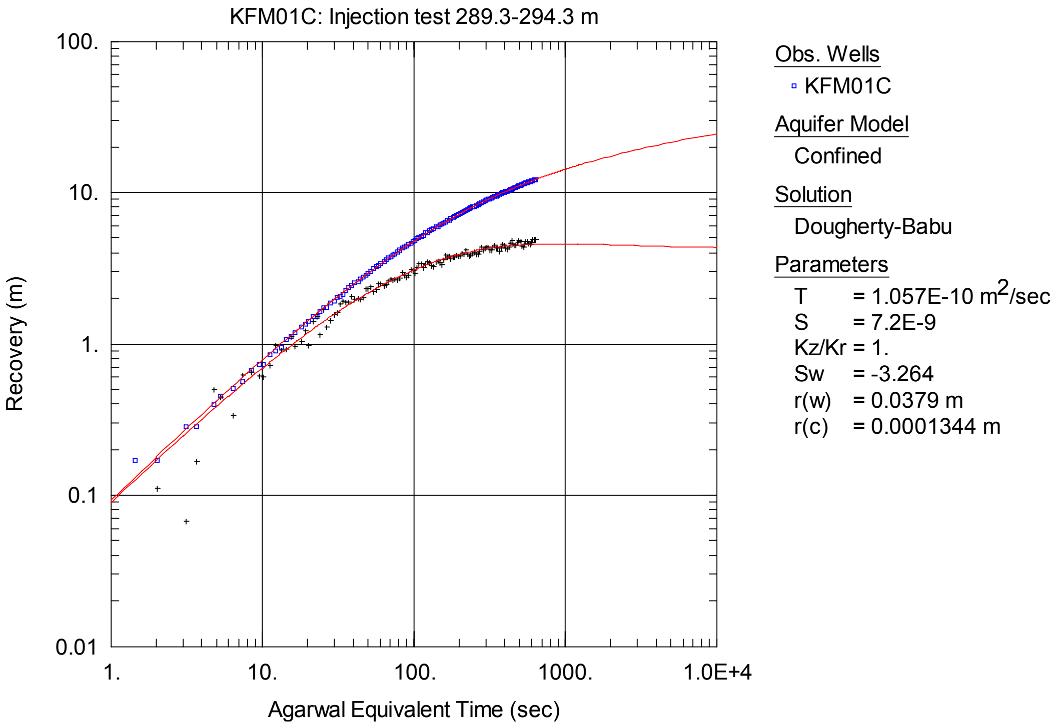


Figure A3-227. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 289.3-294.3 m in KFM01C.*

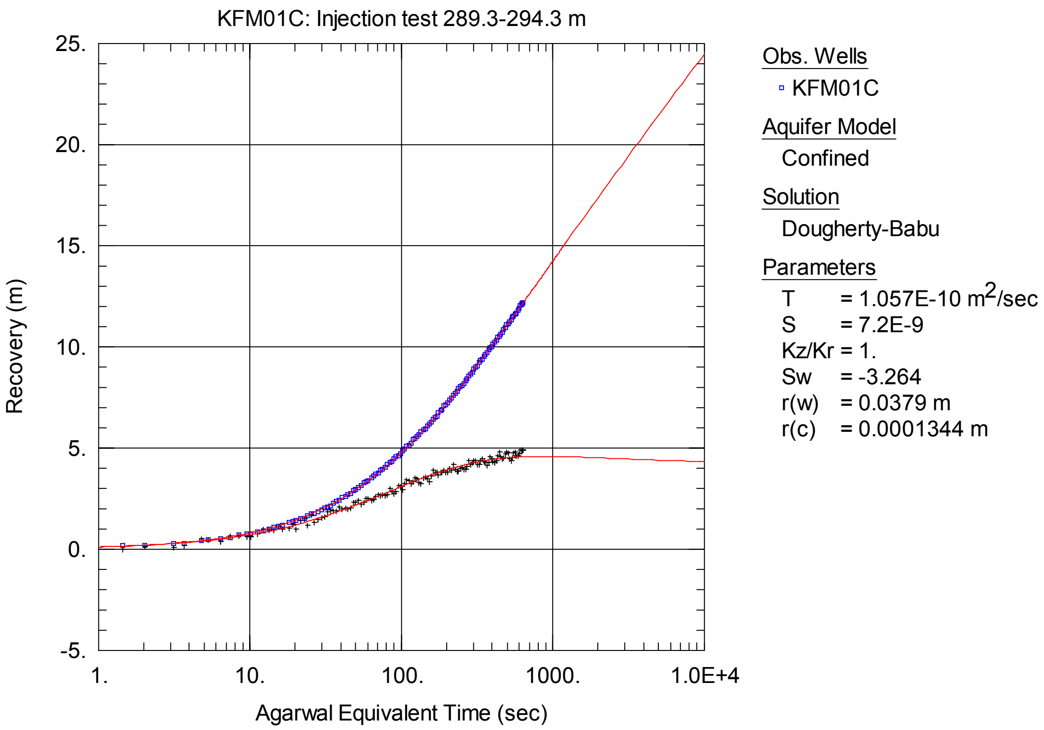


Figure A3-228. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 289.3-294.3 m in KFM01C.*

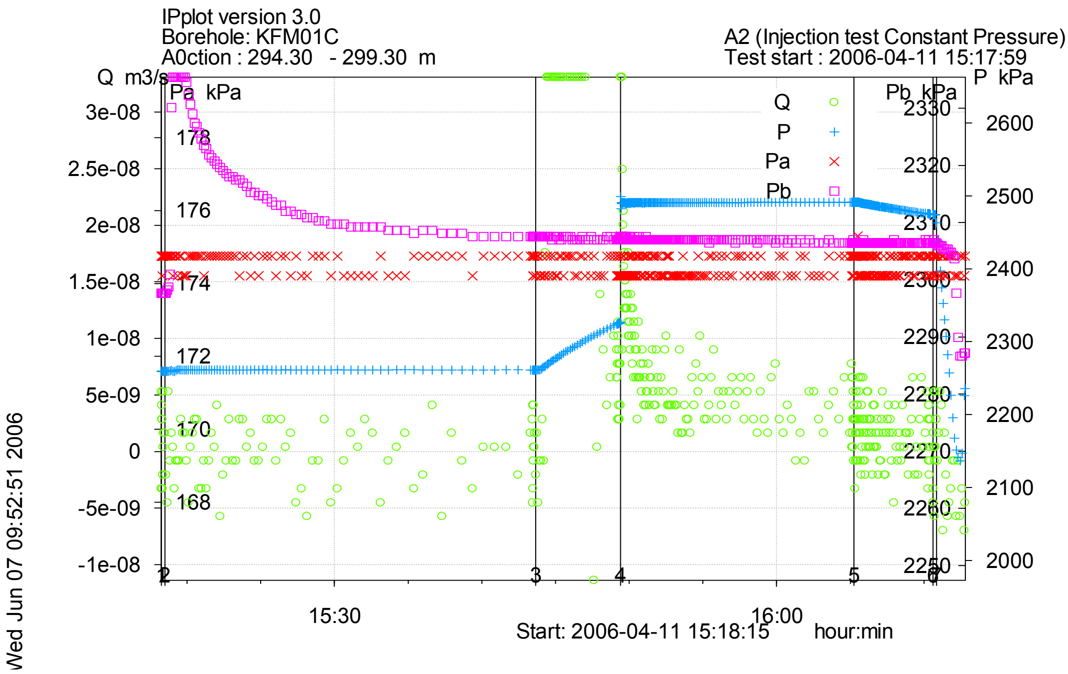


Figure A3-229. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 294.3-299.3 m in borehole KFM01C.*

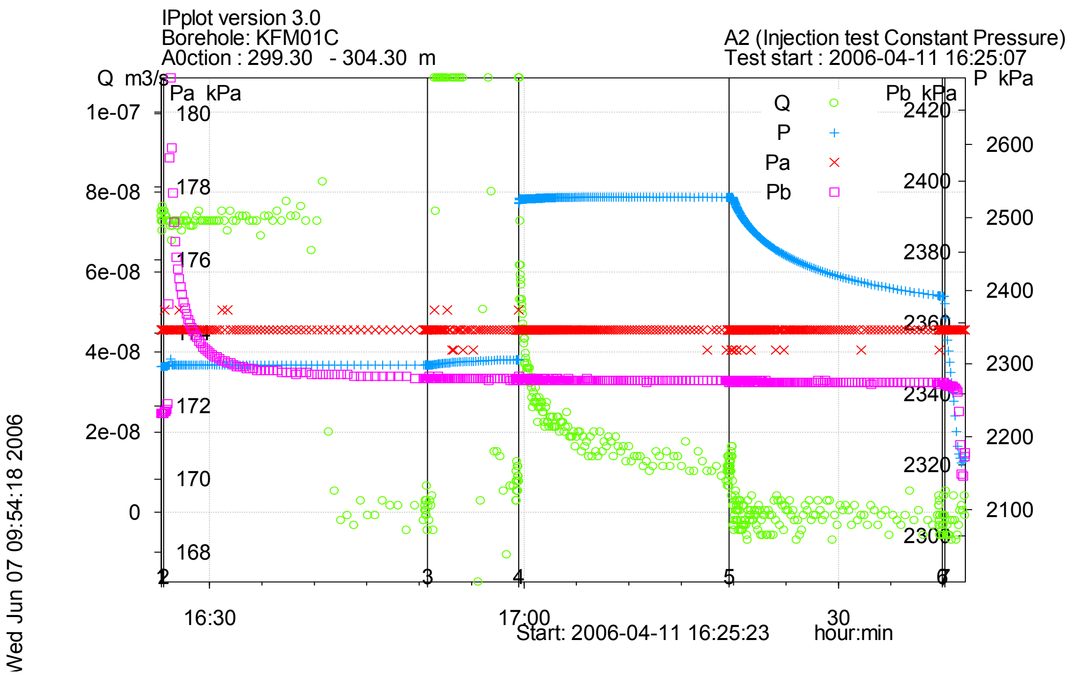


Figure A3-230. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 299.3-304.3 m in borehole KFM01C.*

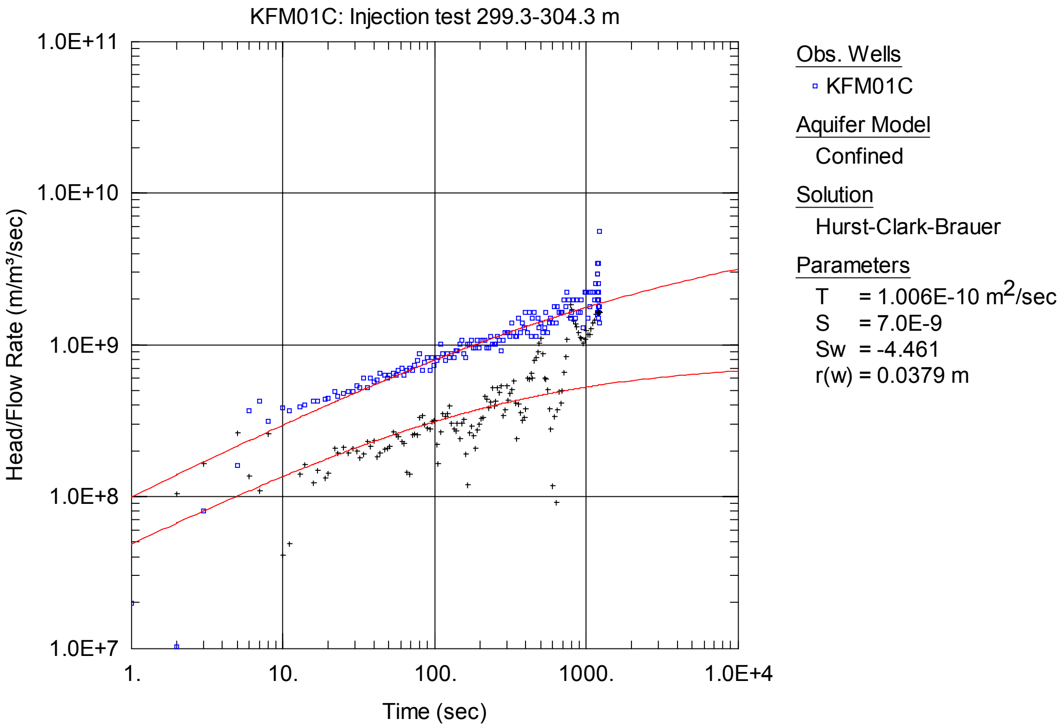


Figure A3-231. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 299.3-304.3 m in KFM01C.*

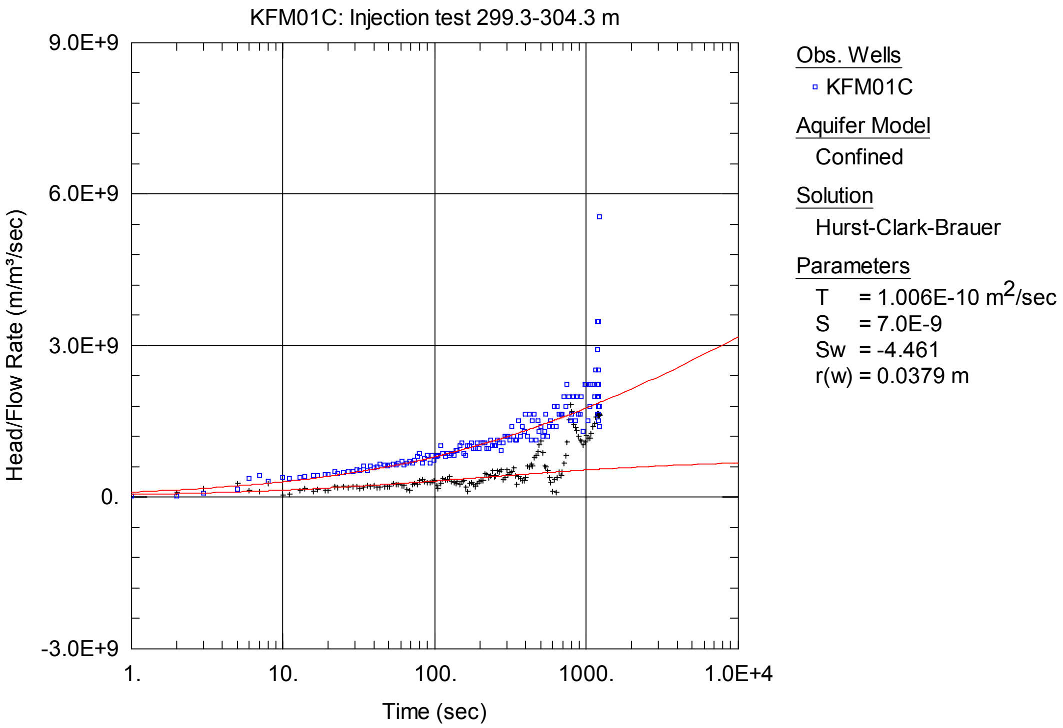


Figure A3-232. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 299.3-304.3 m in KFM01C.*

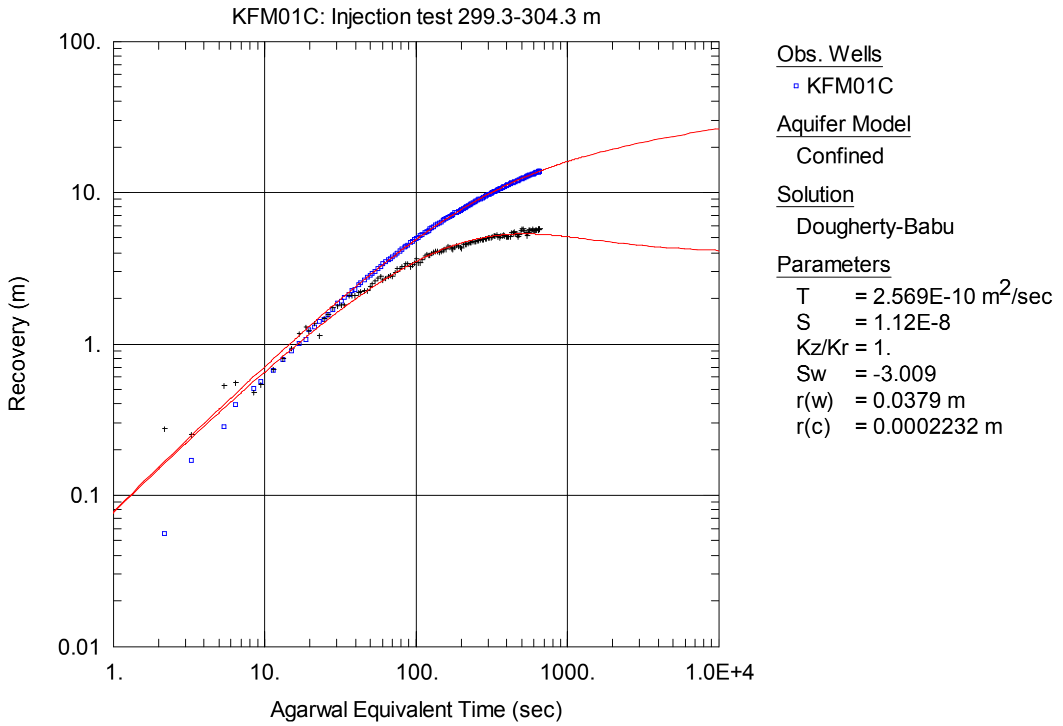


Figure A3-233. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 299.3-304.3 m in KFM01C.*

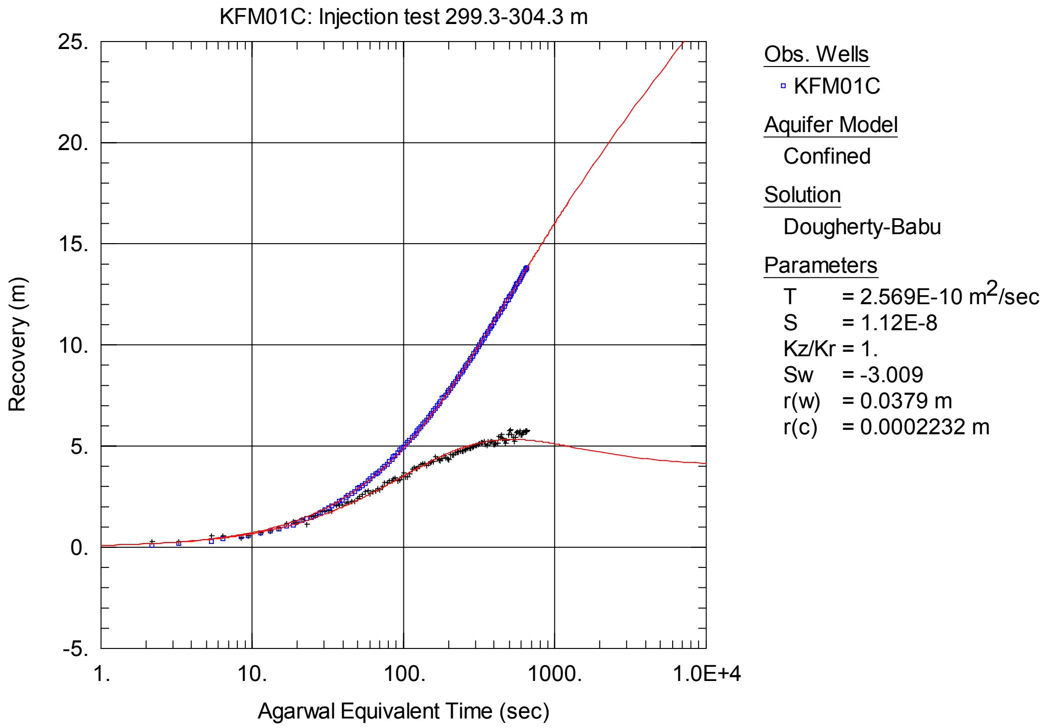


Figure A3-234. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 299.3-304.3 m in KFM01C.*

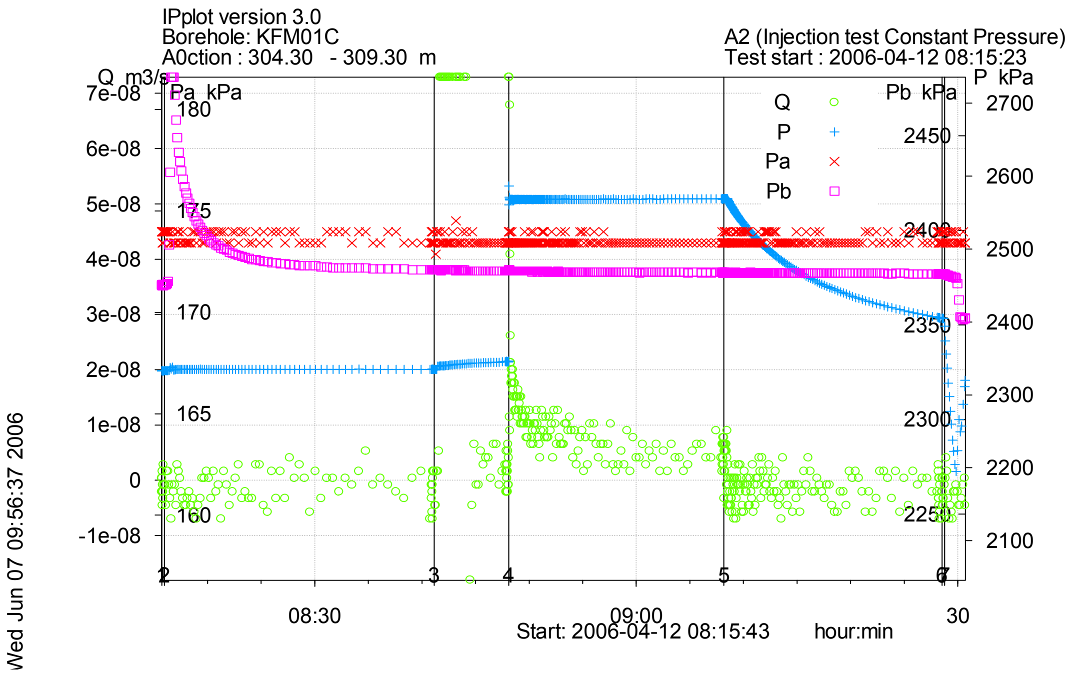


Figure A3-235. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 304.3-309.3 m in borehole KFM01C.*

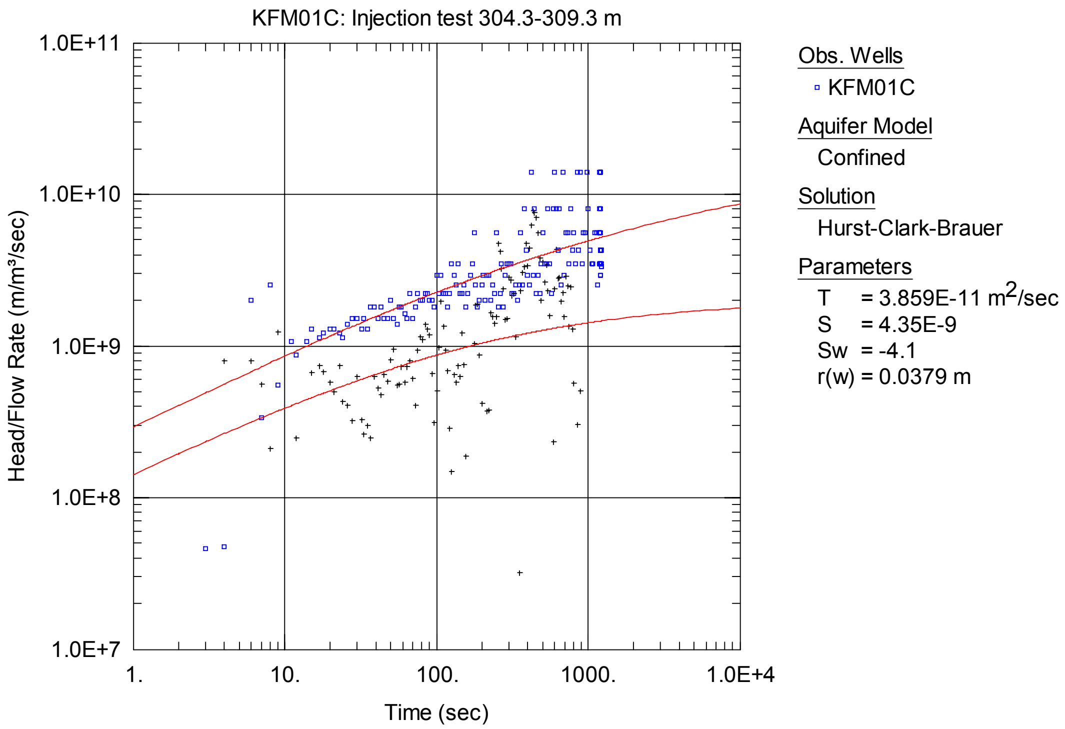


Figure A3-236. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 304.3-309.3 m in KFM01C.*

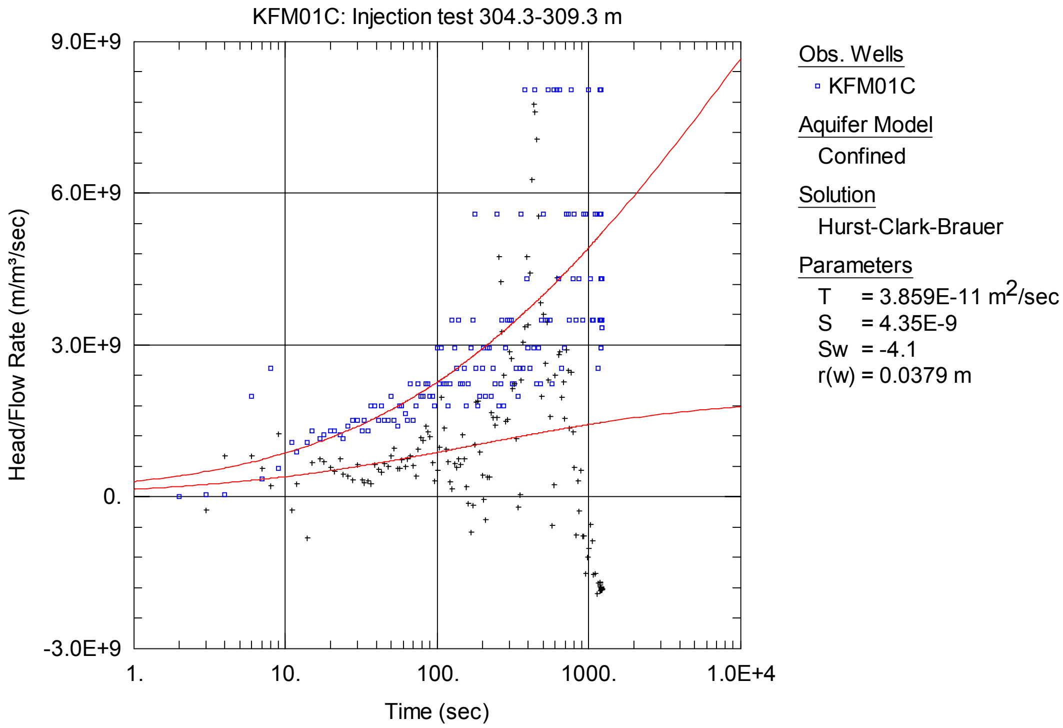


Figure A3-237. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 304.3-309.3 m in KFM01C.*

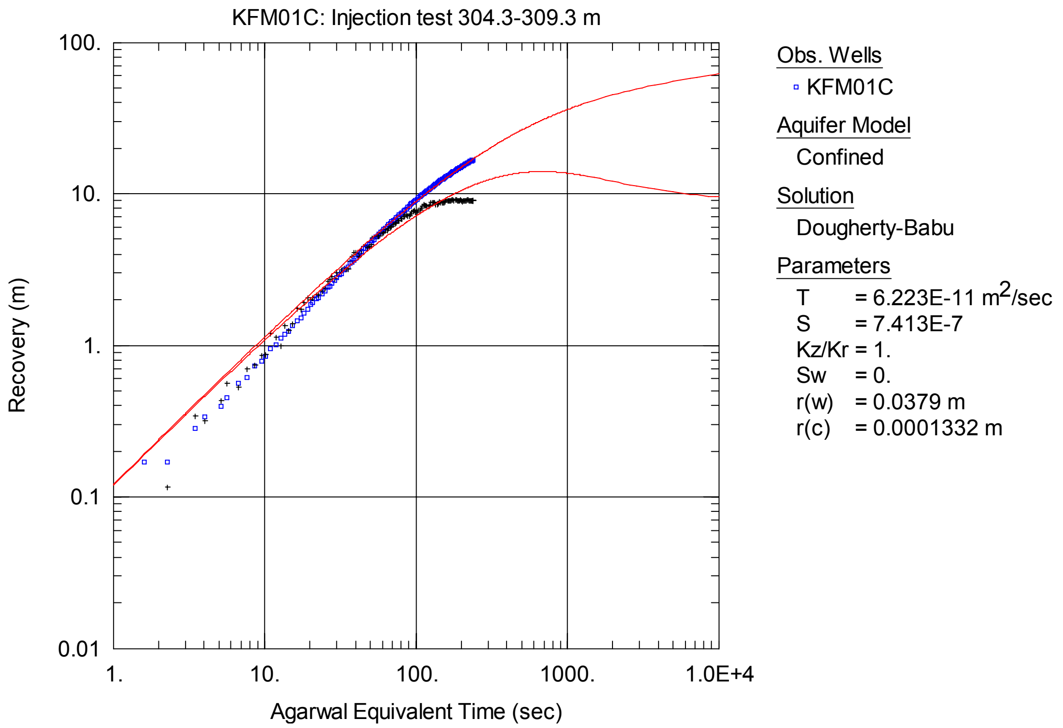


Figure A3-238. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 304.3-309.3 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

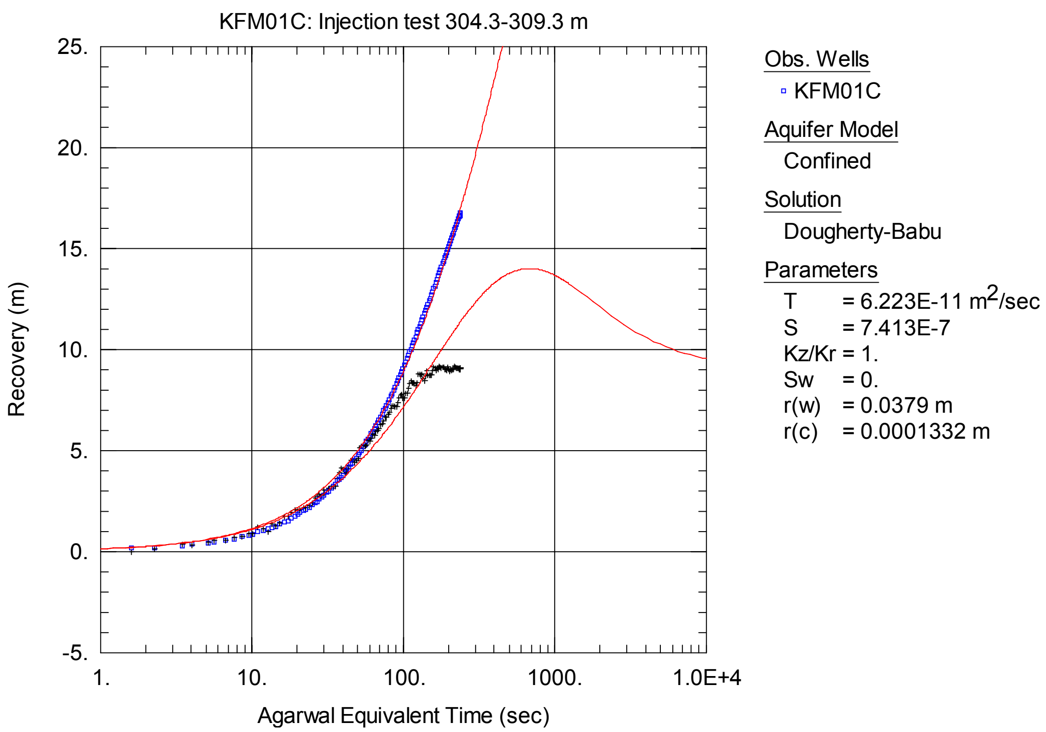


Figure A3-239. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 304.3-309.3 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

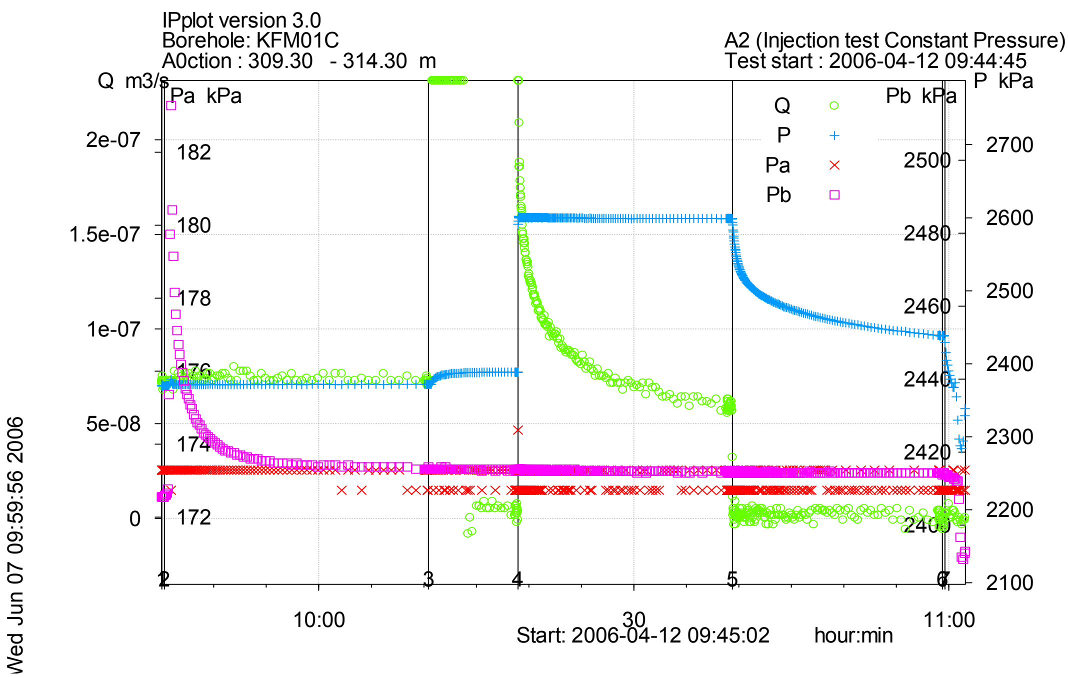


Figure A3-240. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 309.3-314.3 m in borehole KFM01C.*

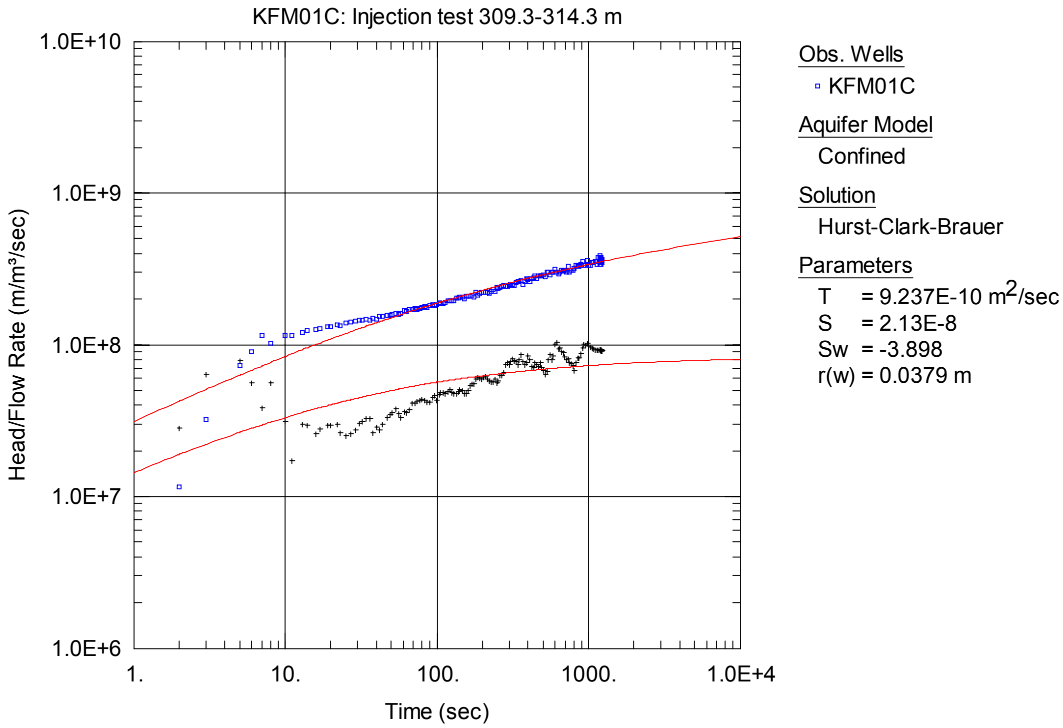


Figure A3-241. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 309.3-314.3 m in KFM01C.*

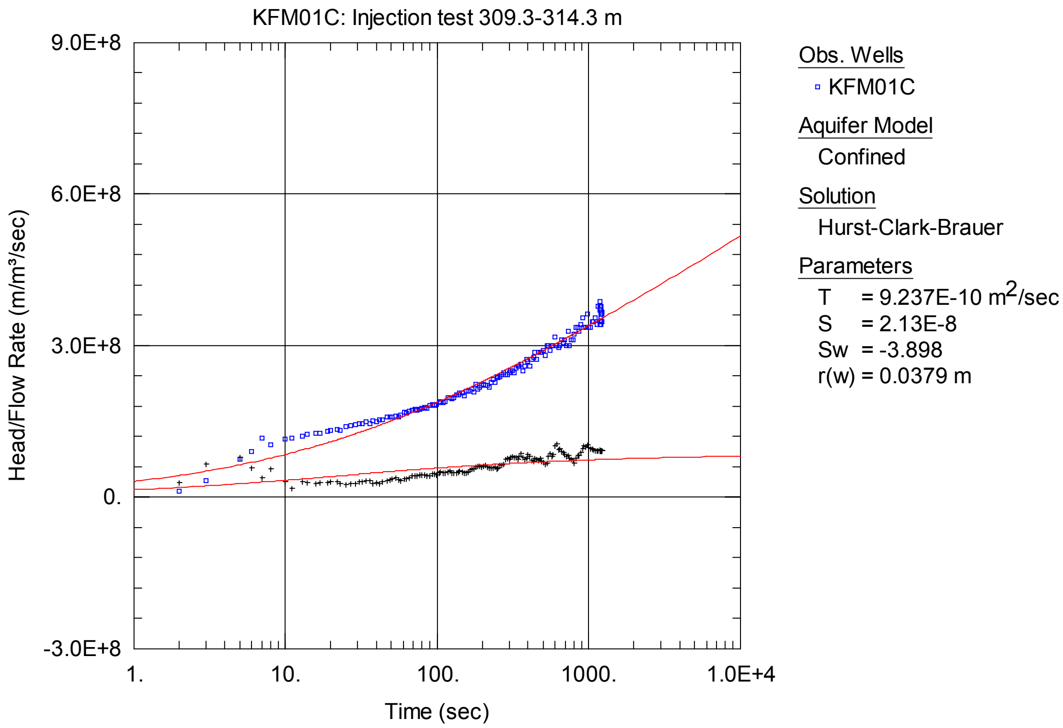


Figure A3-242. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 309.3-314.3 m in KFM01C.*

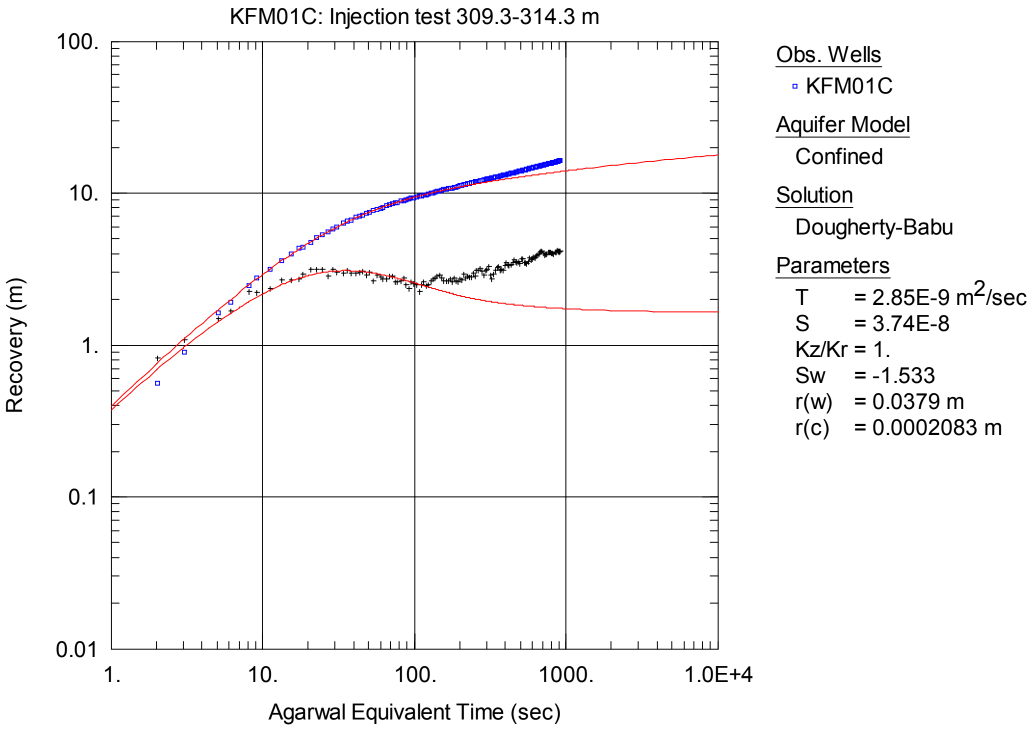


Figure A3-243. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 309.3-314.3 m in KFM01C.*

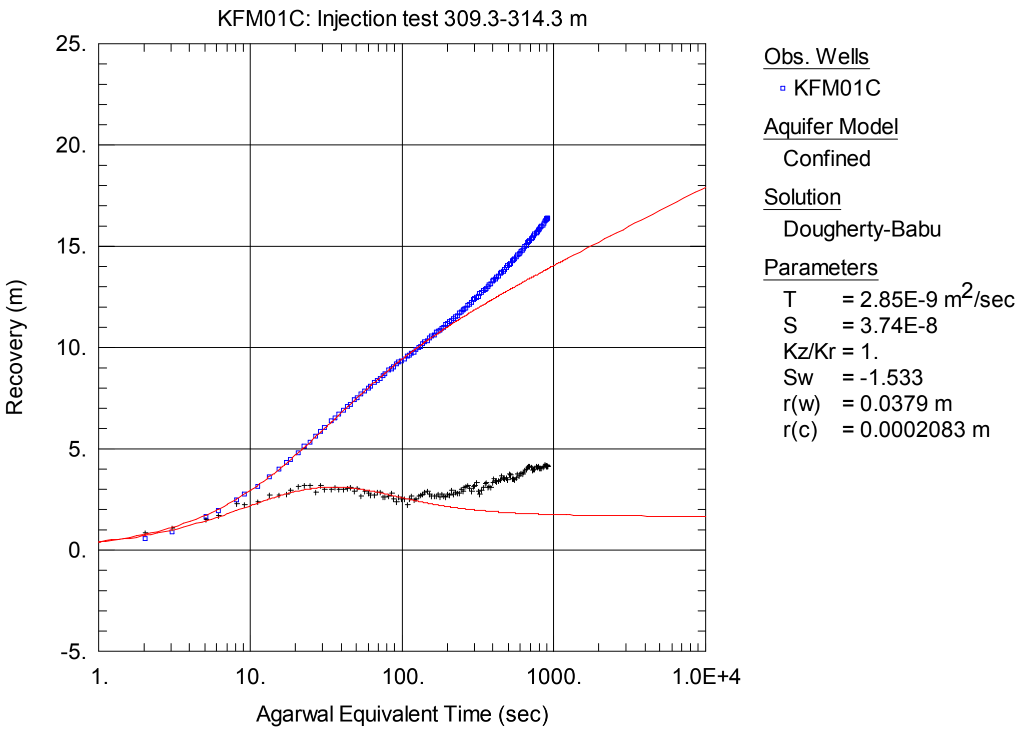


Figure A3-244. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 309.3-314.3 m in KFM01C.*

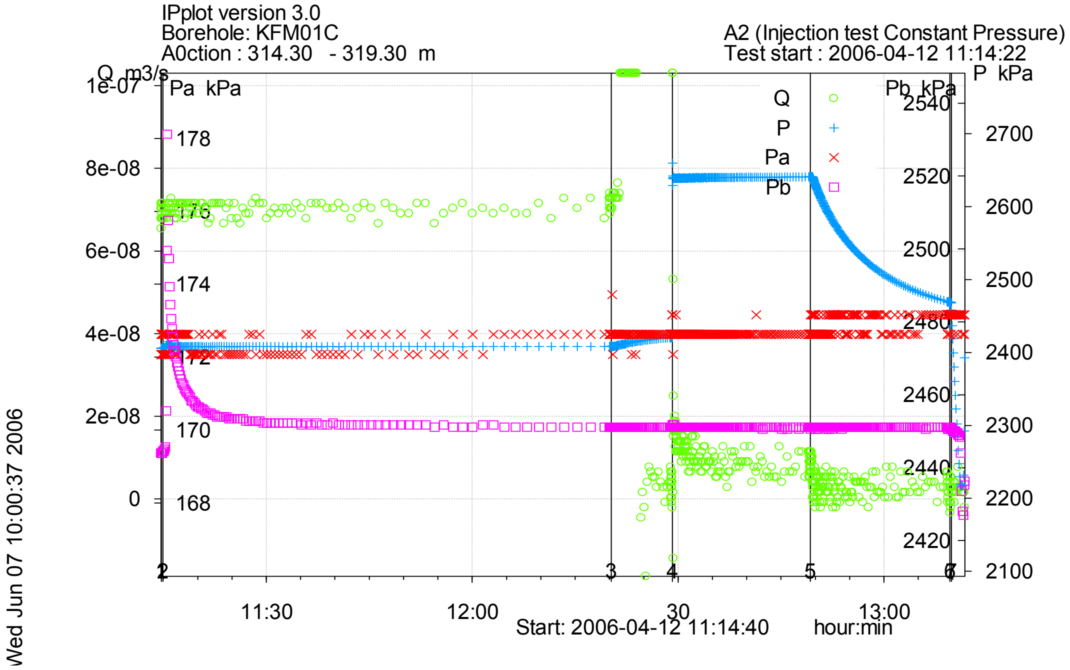


Figure A3-245. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 314.3-319.3 m in borehole KFM01C.*

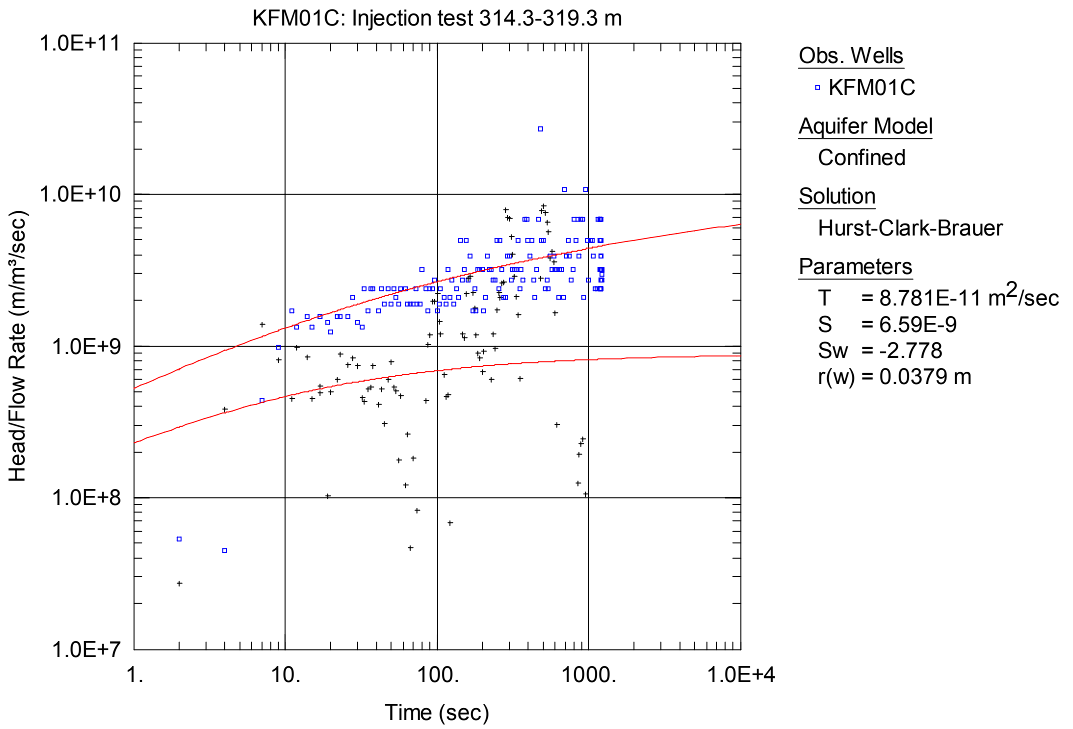


Figure A3-246. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 314.3-319.3 m in KFM01C.*

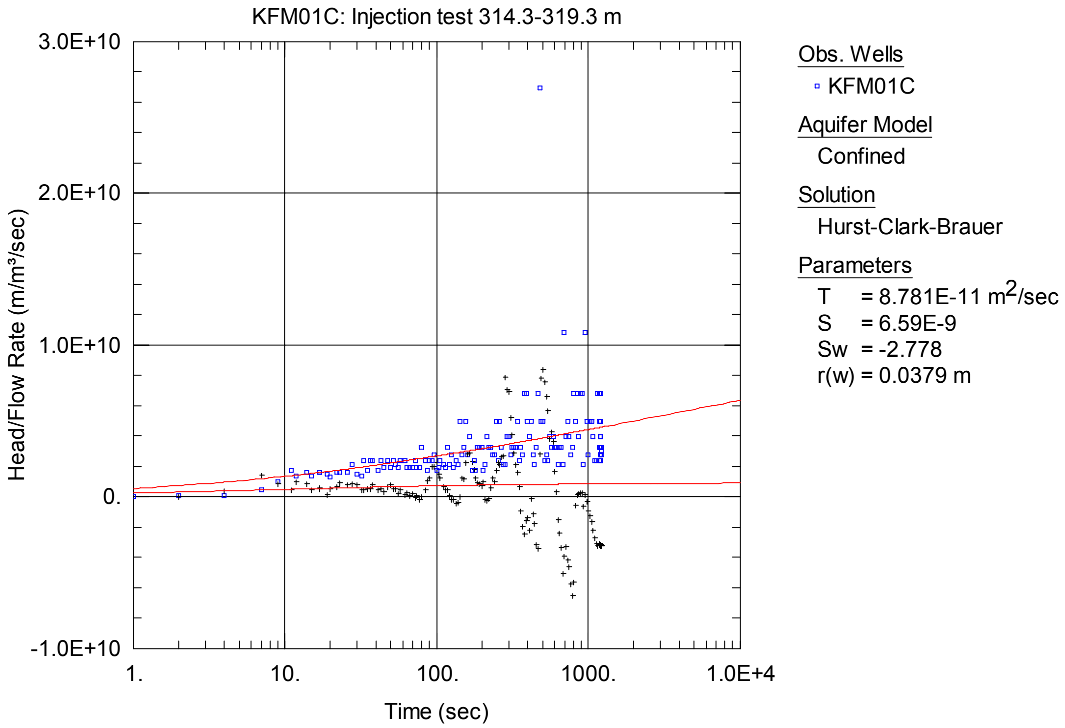


Figure A3-247. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 314.3-319.3 m in KFM01C.*

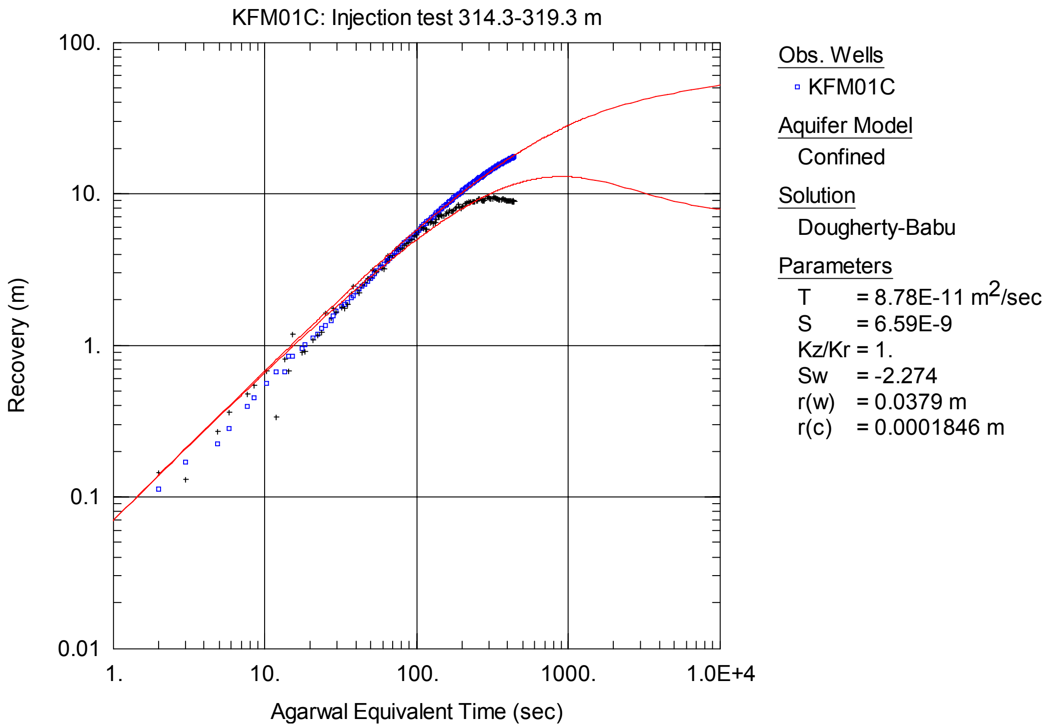


Figure A3-248. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 314.3-319.3 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

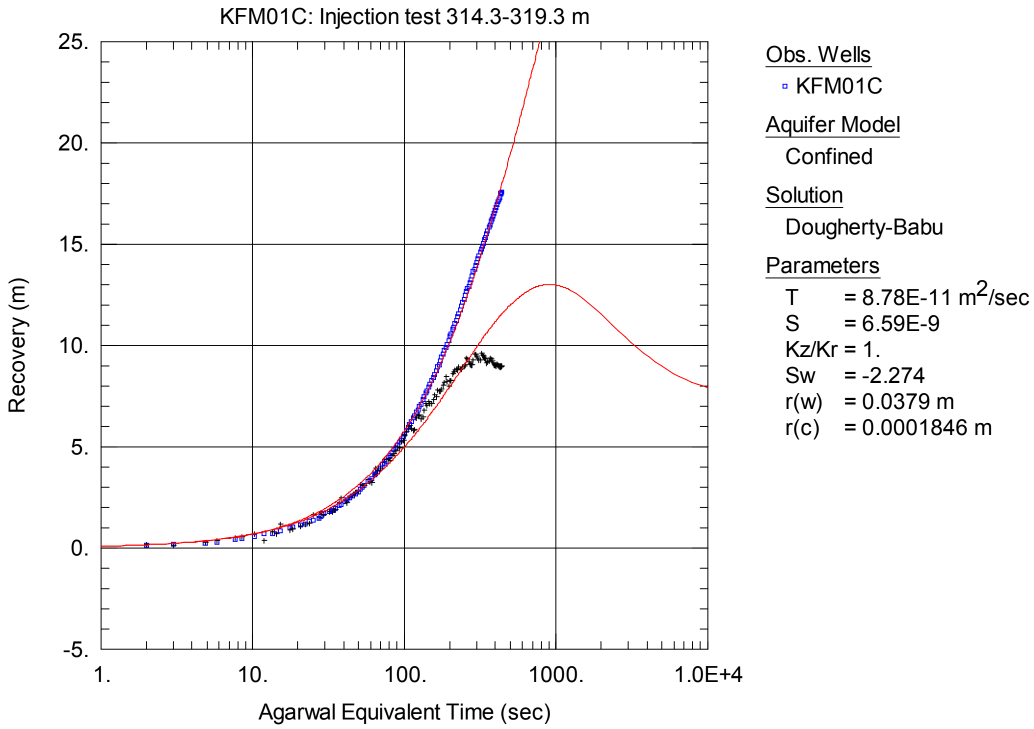


Figure A3-249. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 314.3-319.3 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

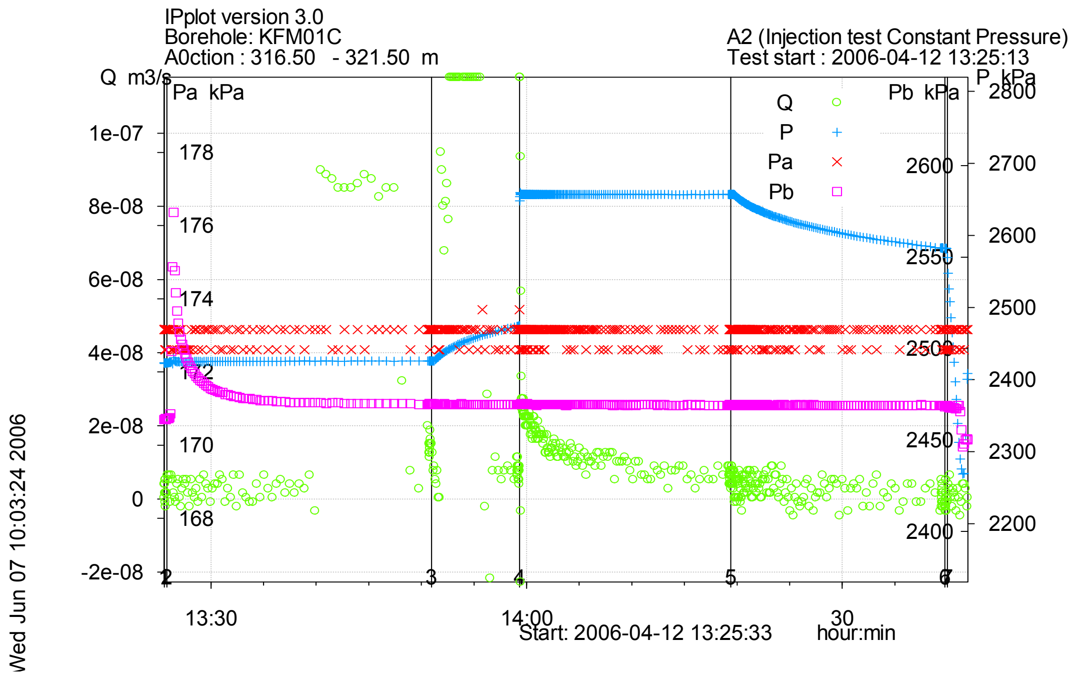


Figure A3-250. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 316.5-321.5 m in borehole KFM01C.*

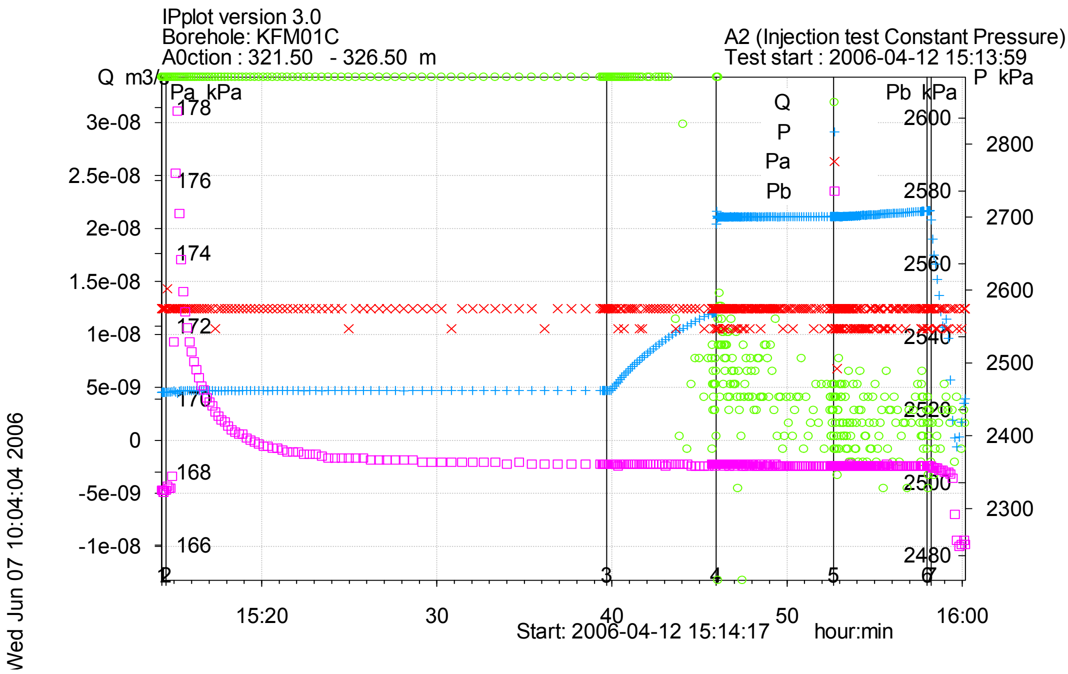


Figure A3-251. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 321.5-326.5 m in borehole KFM01C.*

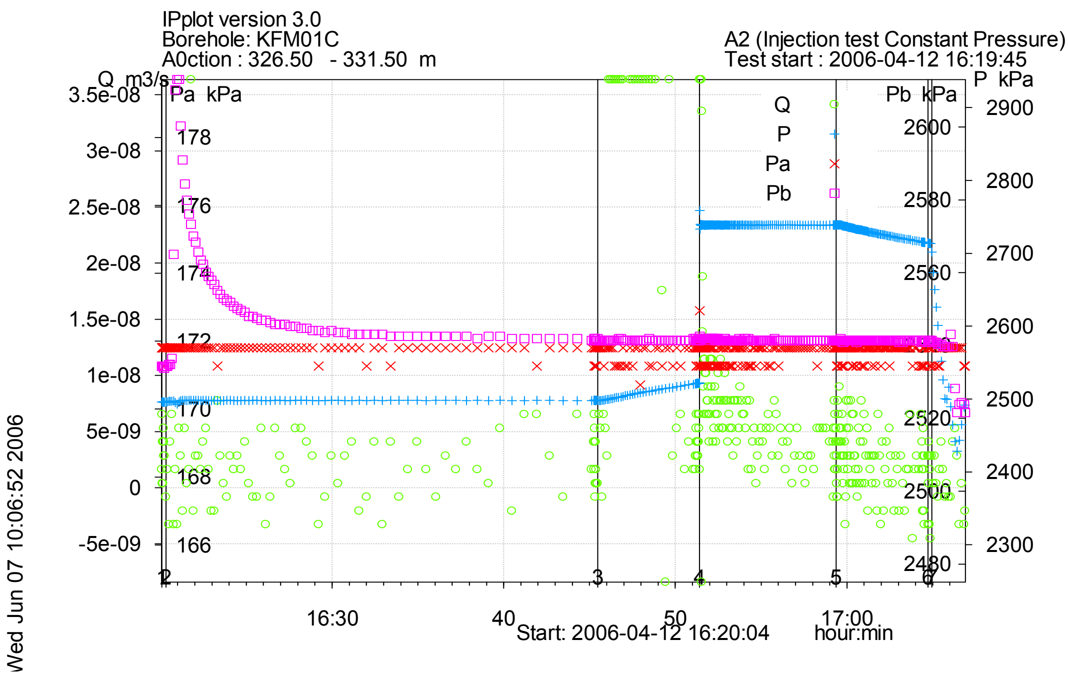


Figure A3-252. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 326.5-331.5 m in borehole KFM01C.*

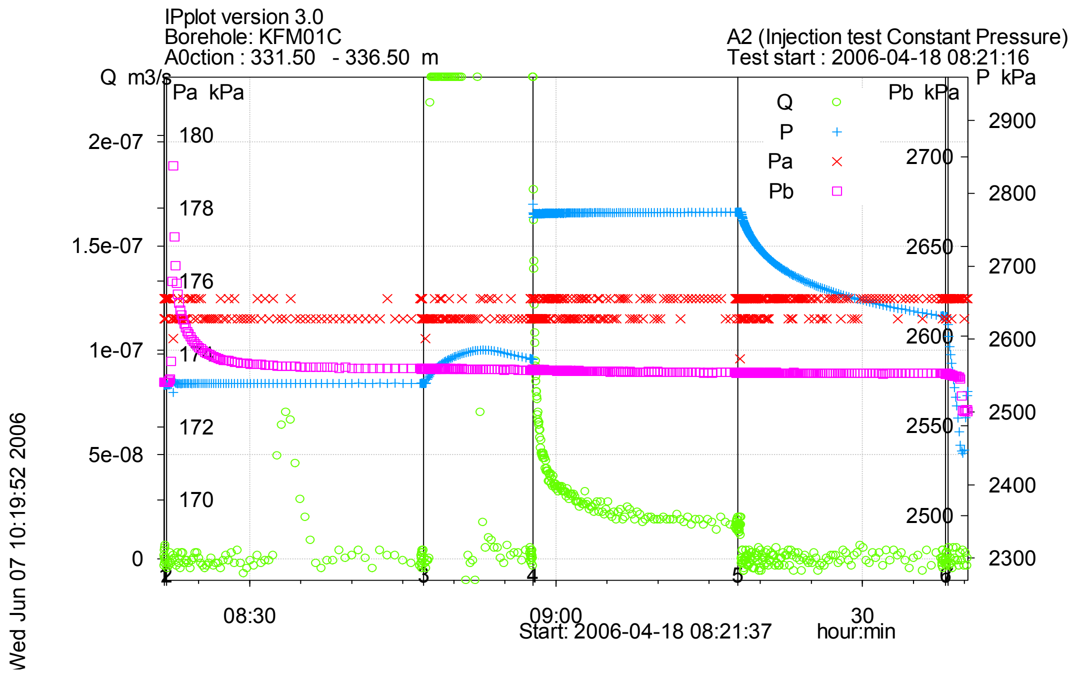


Figure A3-253. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 331.5-336.5 m in borehole KFM01C.*

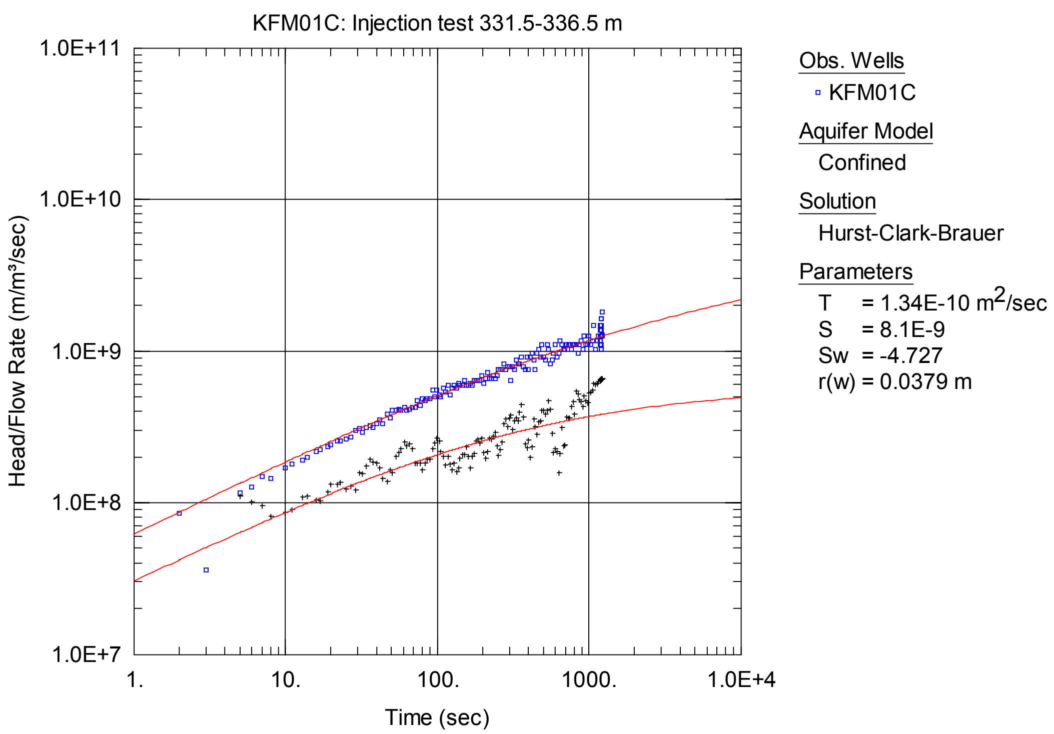


Figure A3-254. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 331.5-336.5 m in KFM01C.*

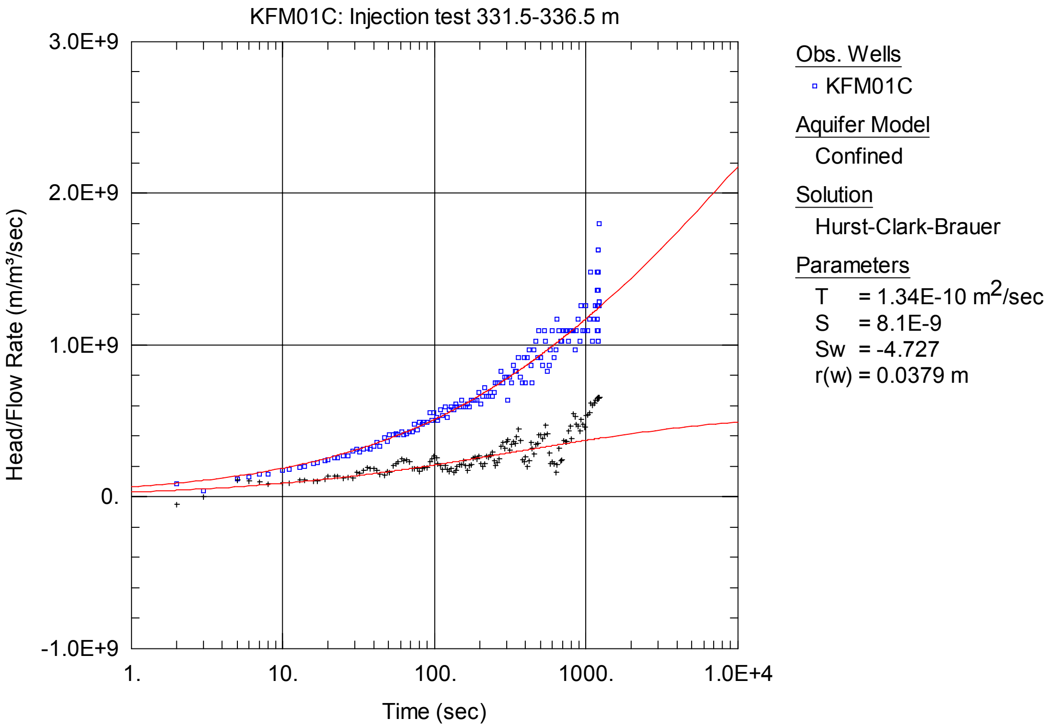


Figure A3-255. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 331.5-336.5 m in KFM01C.*

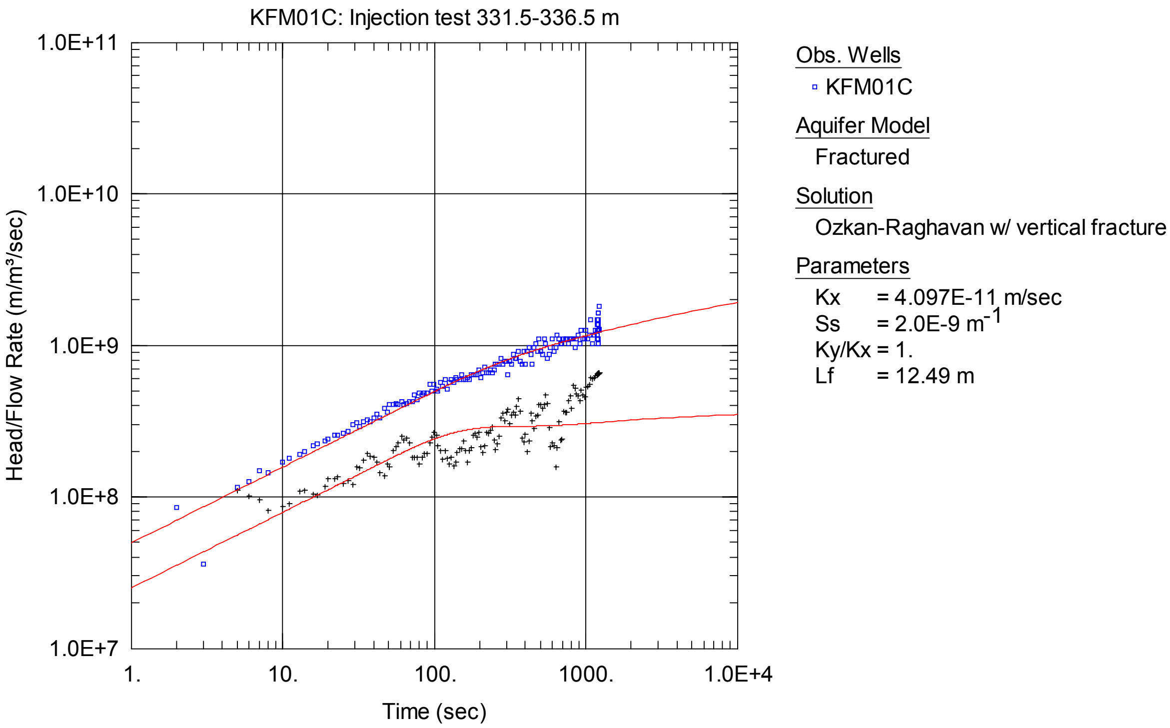


Figure A3-256. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 331.5-336.5 m in KFM01C.*

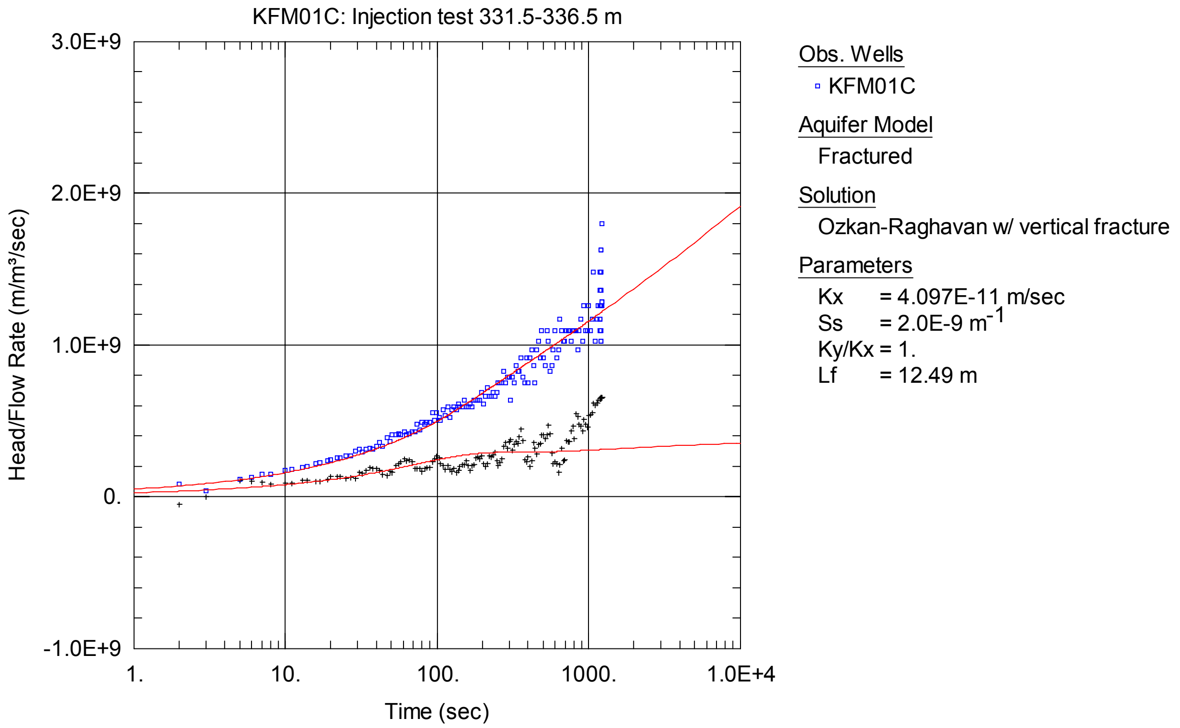


Figure A3-257. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 331.5-336.5 m in KFM01C.*

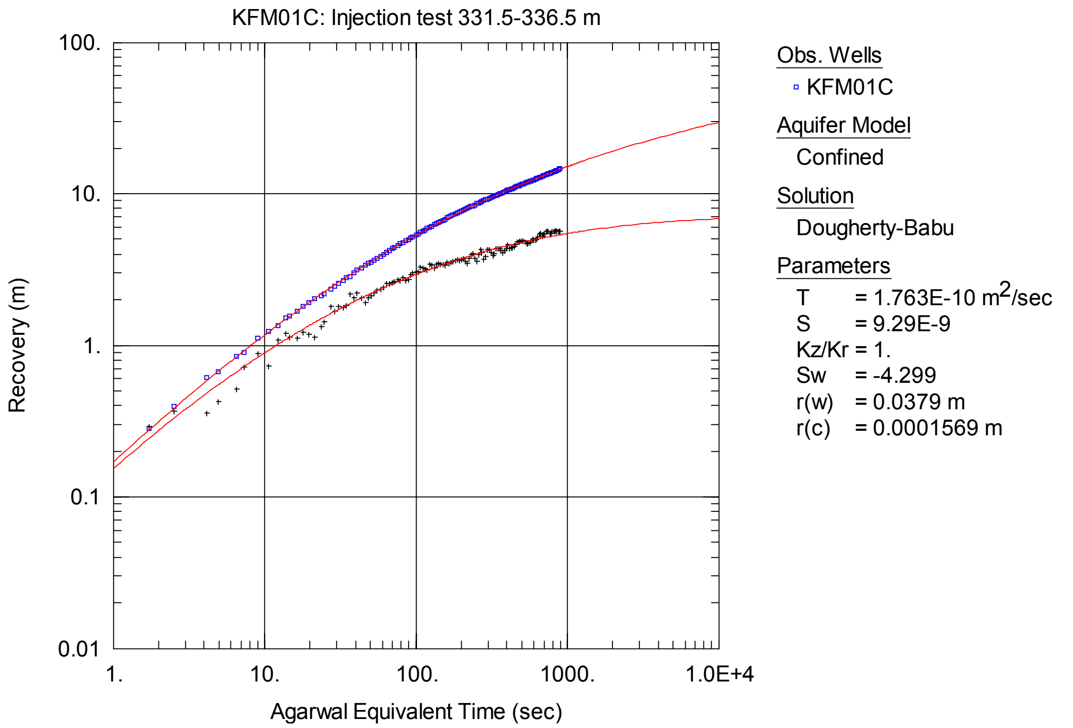


Figure A3-258. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 331.5-336.5 m in KFM01C.*

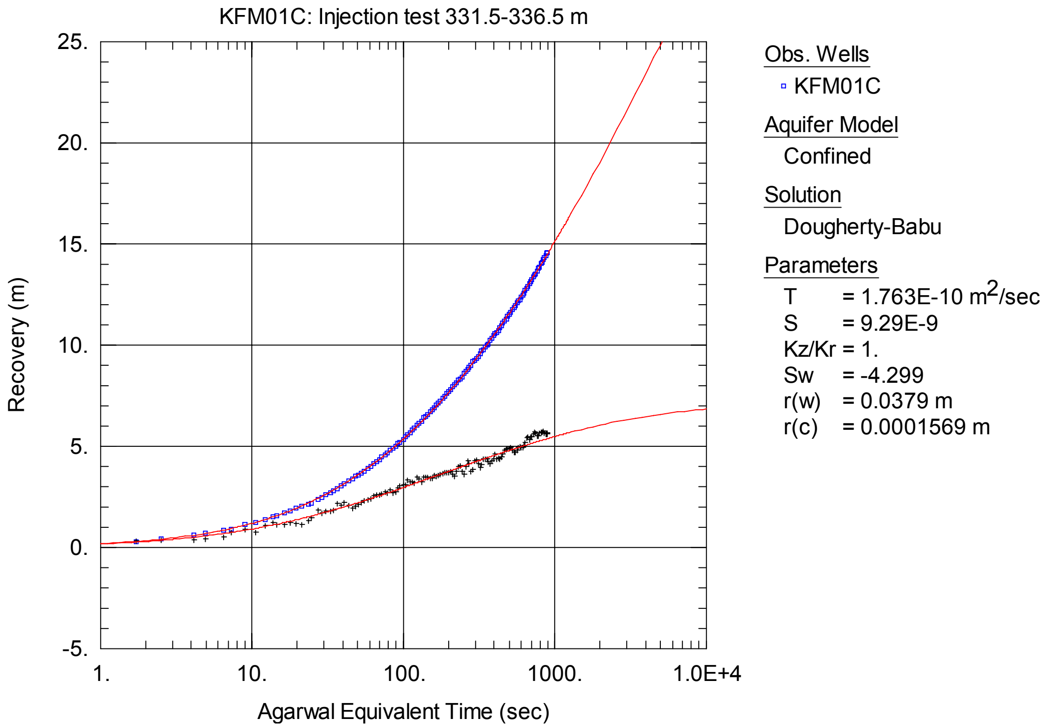


Figure A3-259. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 331.5-336.5 m in KFM01C.*

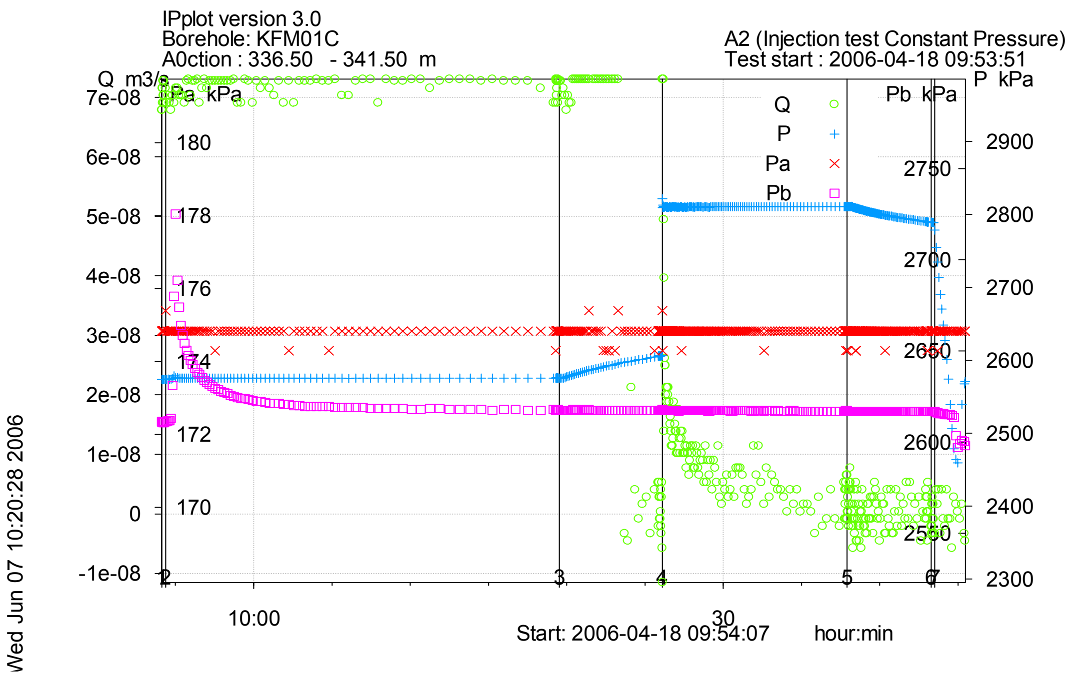


Figure A3-260. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 336.5-341.5 m in borehole KFM01C.*

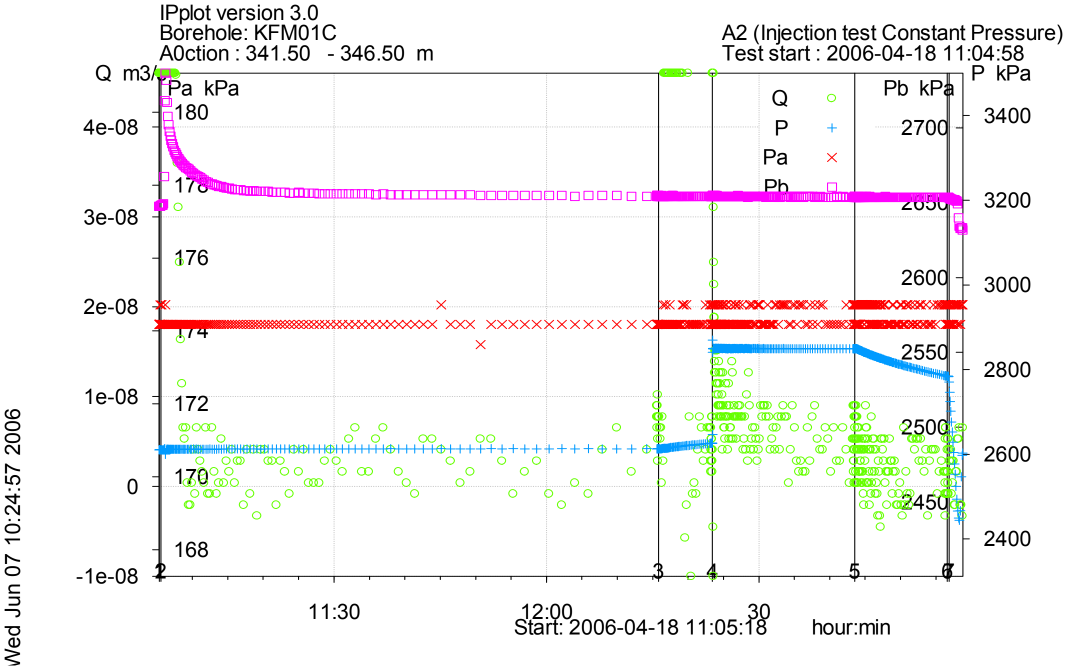


Figure A3-261. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 341.5-346.5 m in borehole KFM01C.*

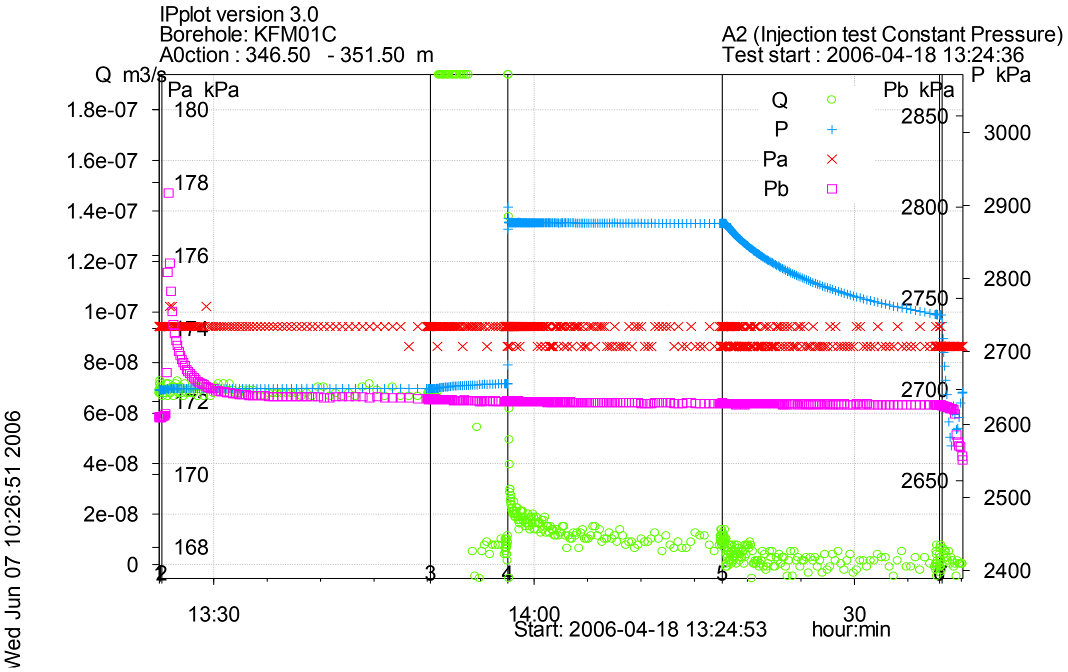


Figure A3-262. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 346.5-351.5 m in borehole KFM01C.*

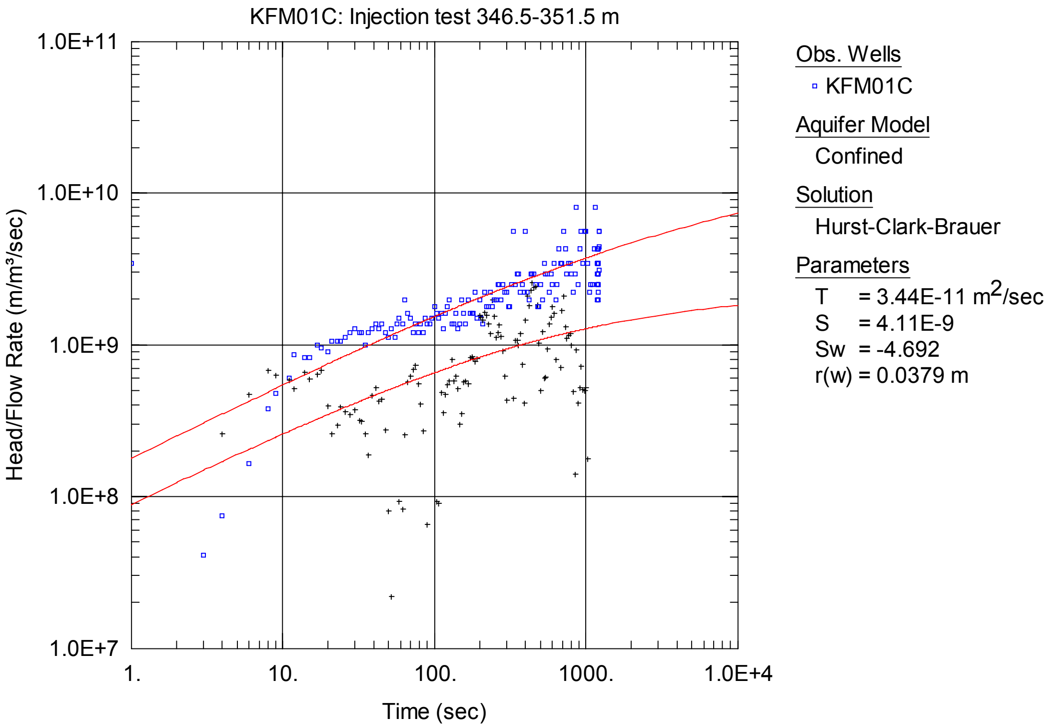


Figure A3-263. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 346.5-351.5 m in KFM01C.*

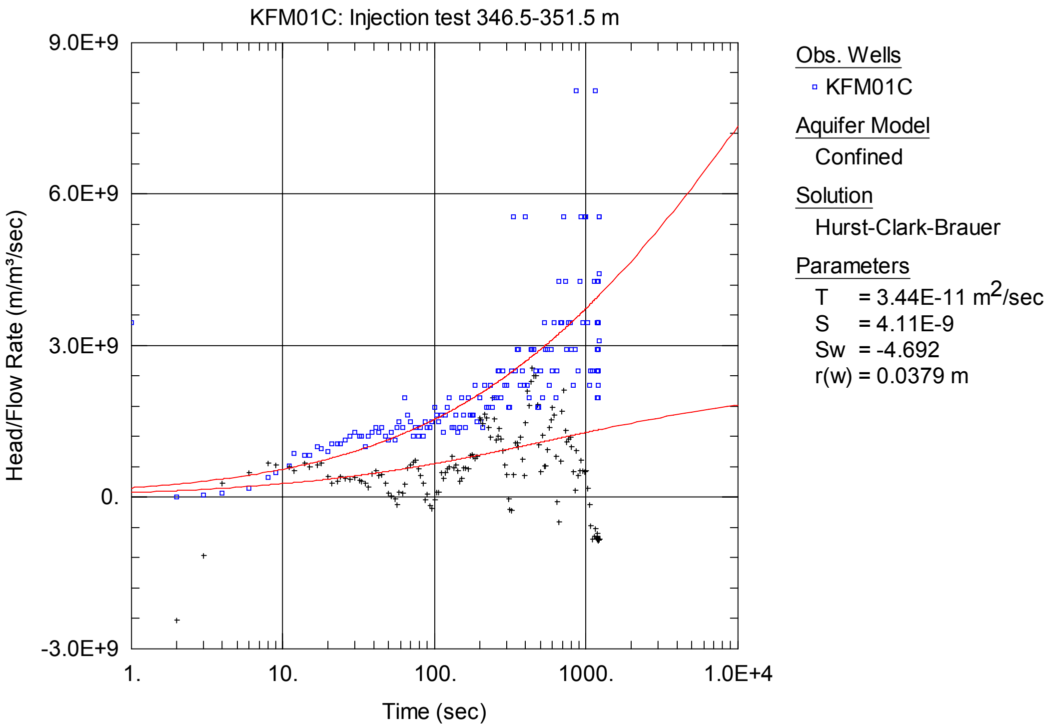


Figure A3-264. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 346.5-351.5 m in KFM01C.*

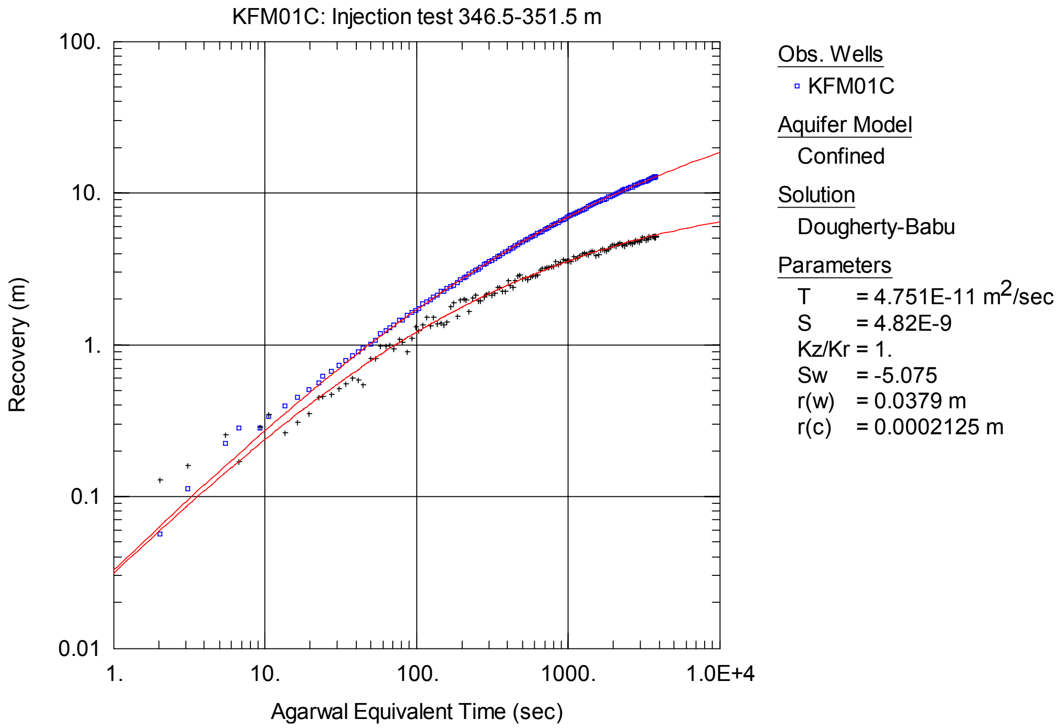


Figure A3-265. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 346.5-351.5 m in KFM01C.*

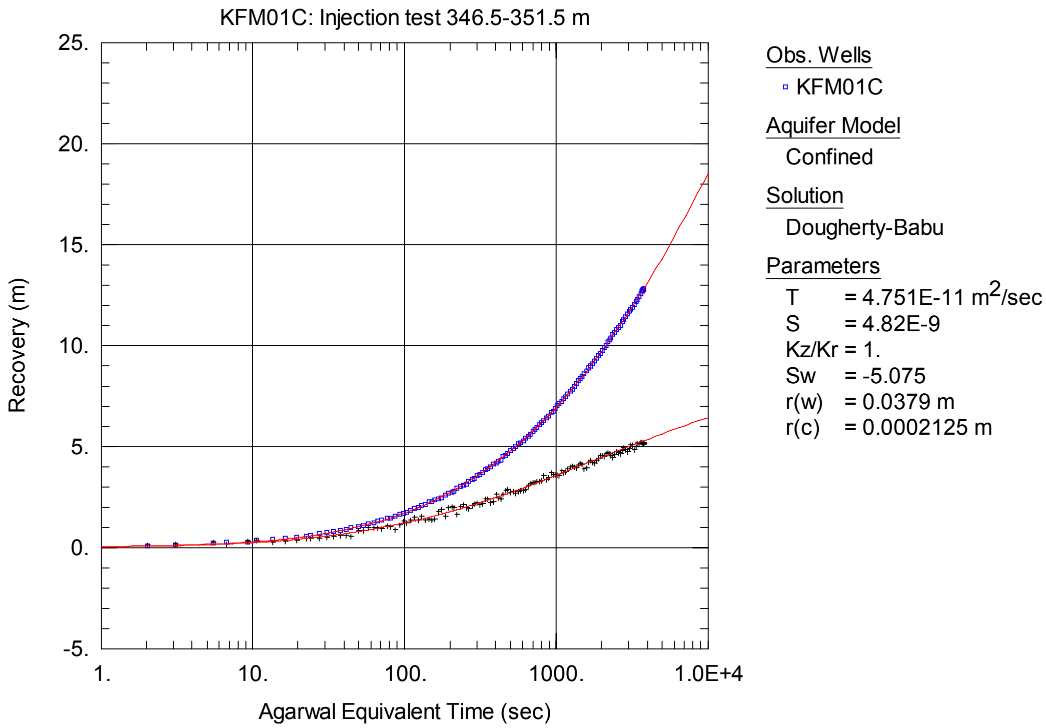


Figure A3-266. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 346.5-351.5 m in KFM01C.*

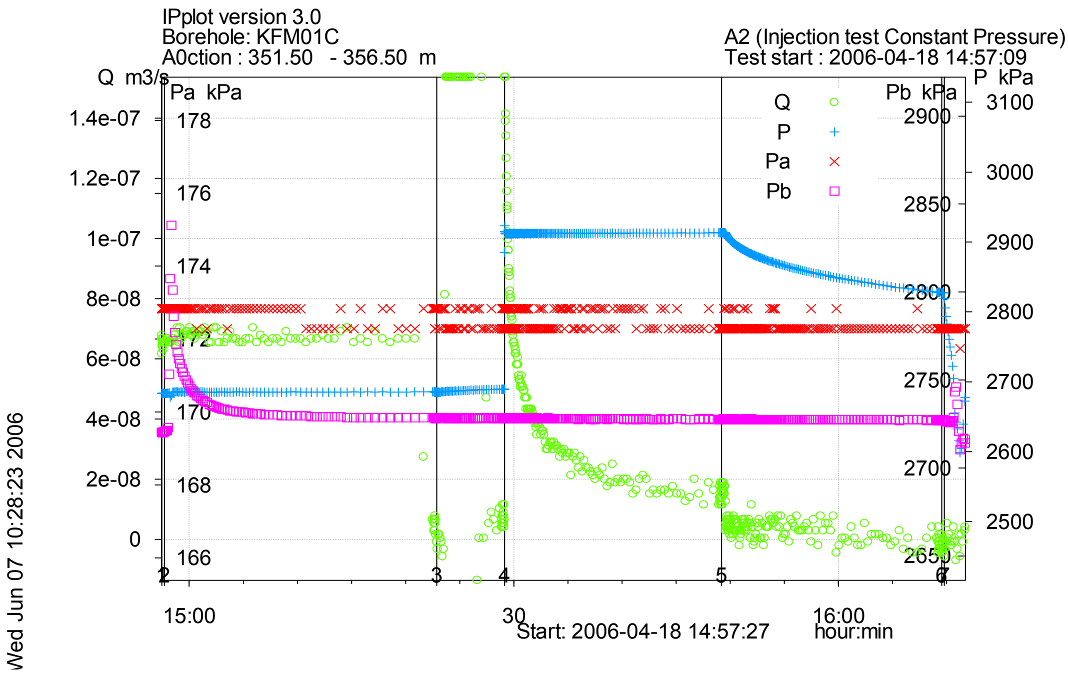


***Figure A3-267.** Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 351.5-356.5 m in borehole KFM01C.*

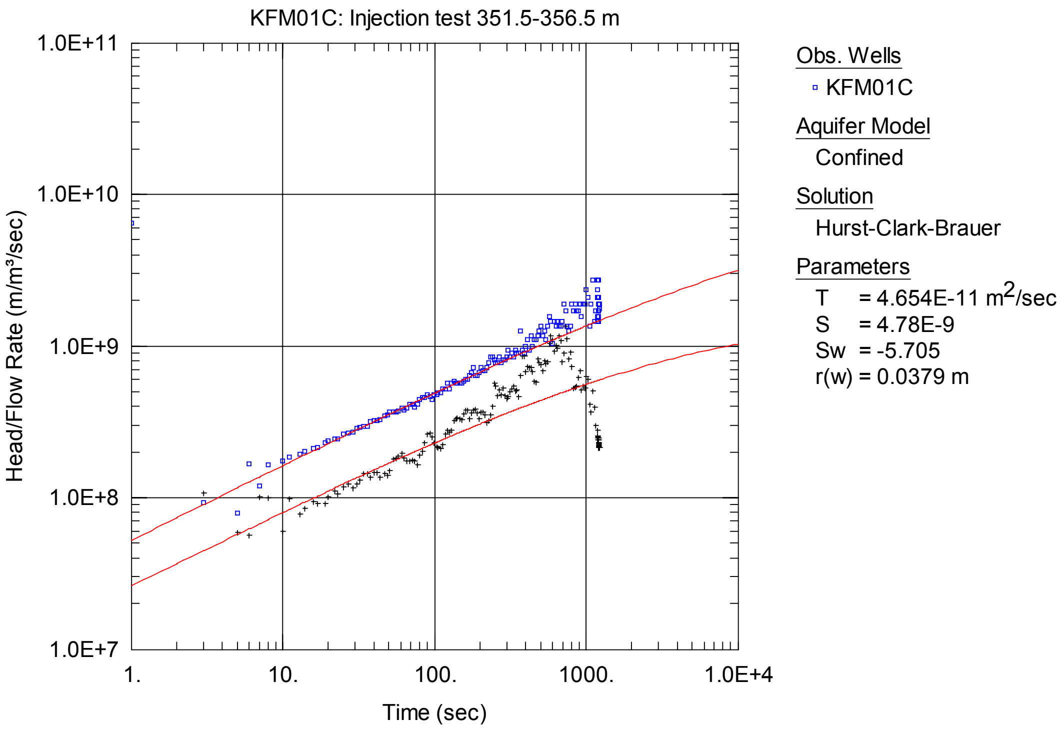


***Figure A3-268.** Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 351.5-356.5 m in KFM01C.*

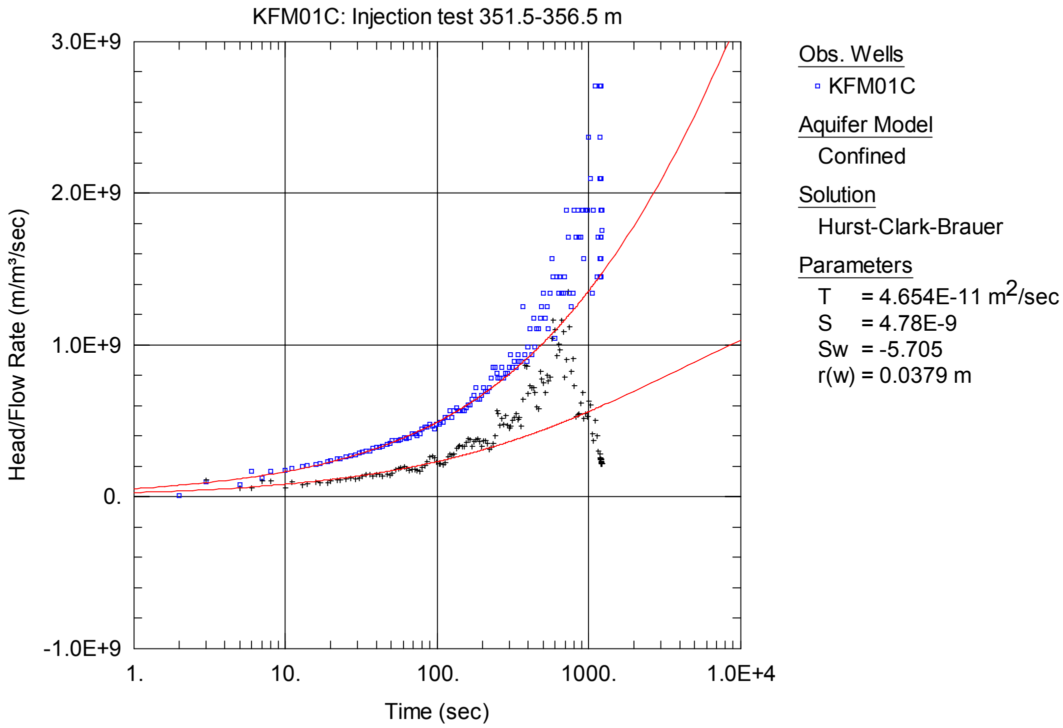


Figure A3-269. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 351.5-356.5 m in KFM01C.*

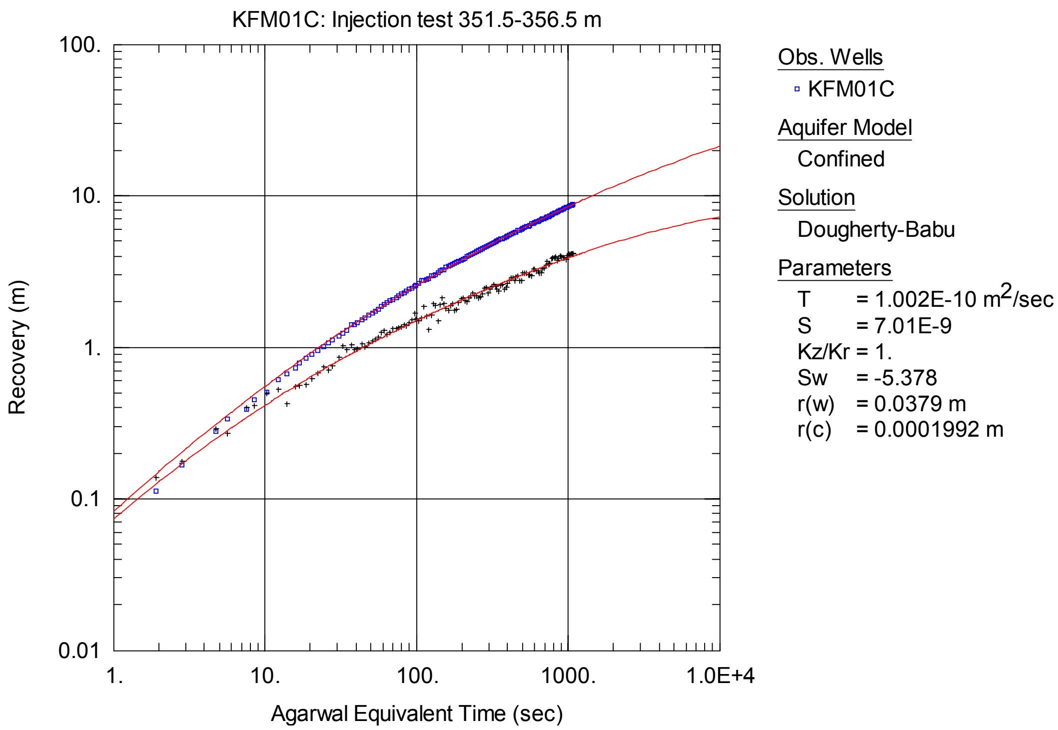


Figure A3-270. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 351.5-356.5 m in KFM01C.*

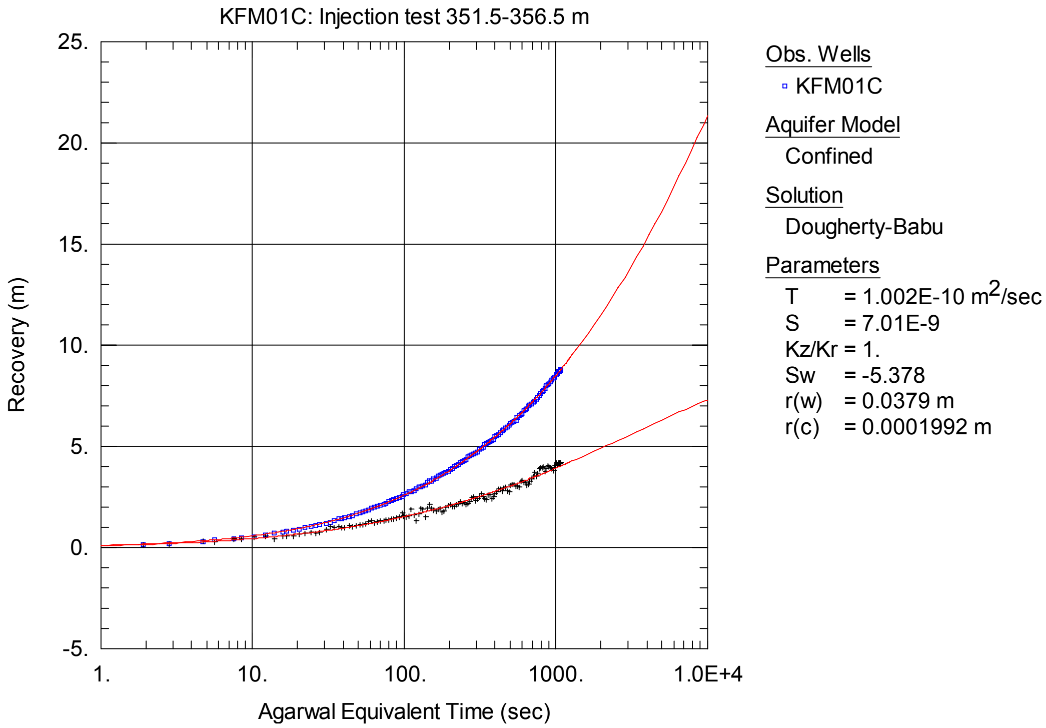


__Figure A3-271.__ Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 351.5-356.5 m in KFM01C.

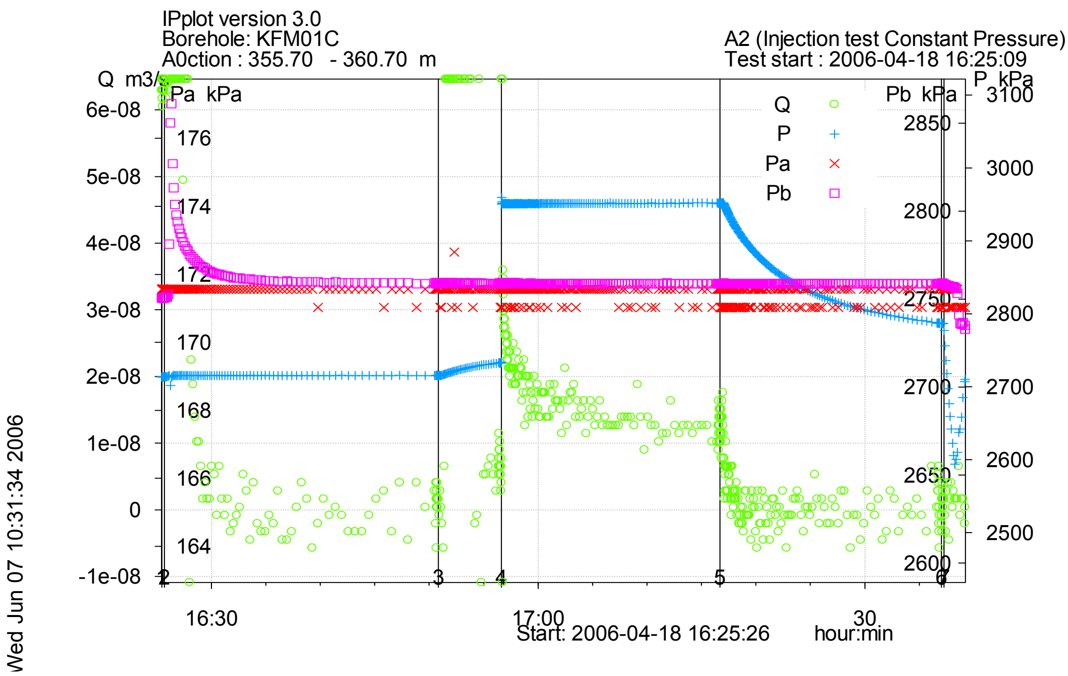


__Figure A3-272.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 355.7-360.7 m in borehole KFM01C.

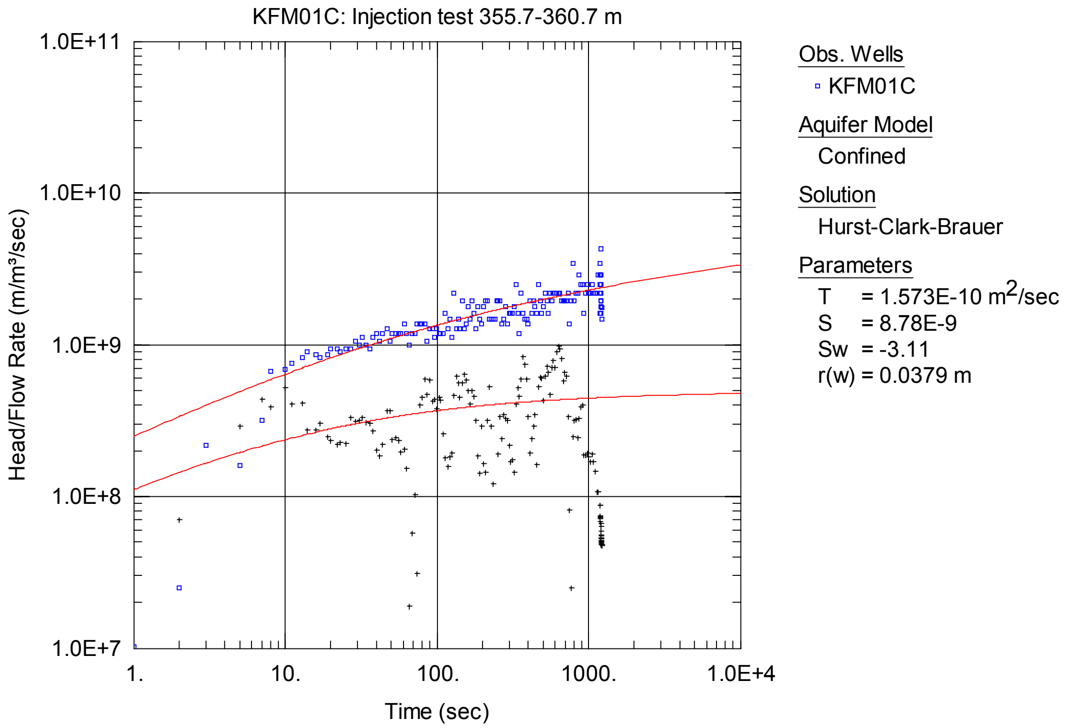


Figure A3-273. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 355.7-360.7 m in KFM01C.*

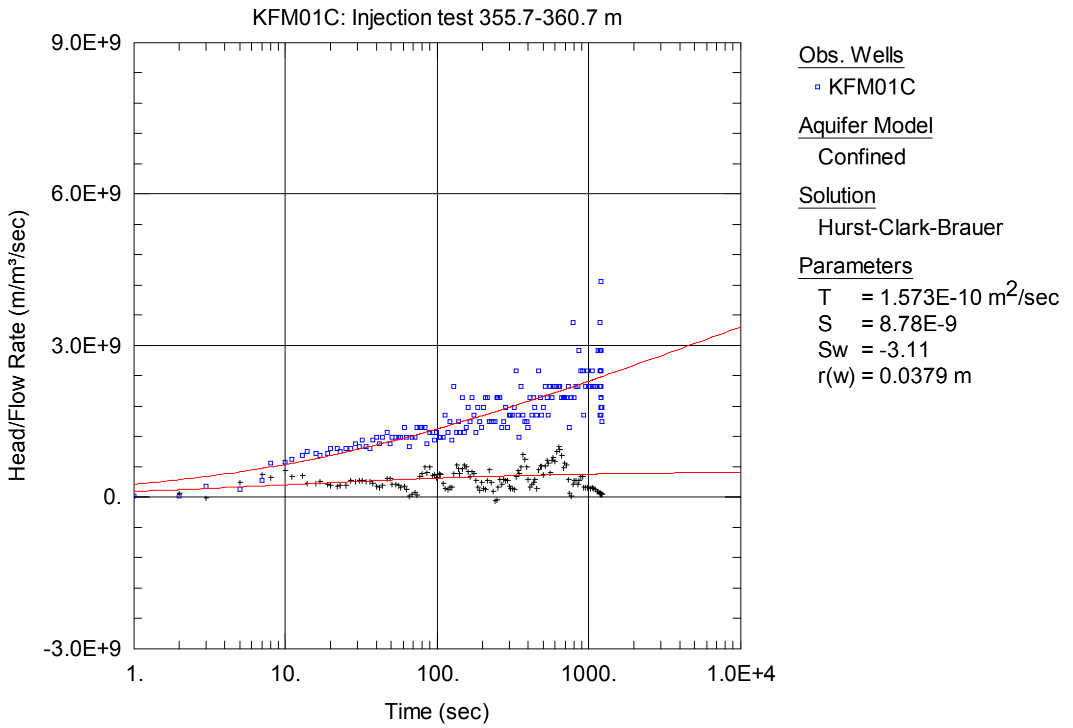


Figure A3-274. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 355.7-360.7 m in KFM01C.*

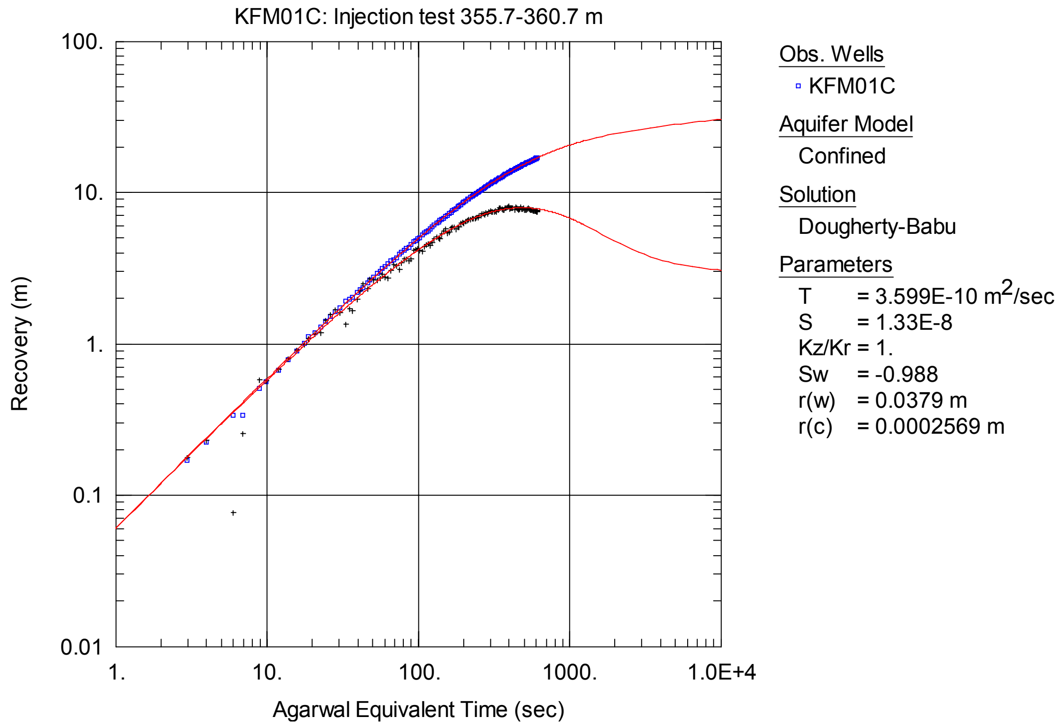


Figure A3-275. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 355.7-360.7 m in KFM01C.*

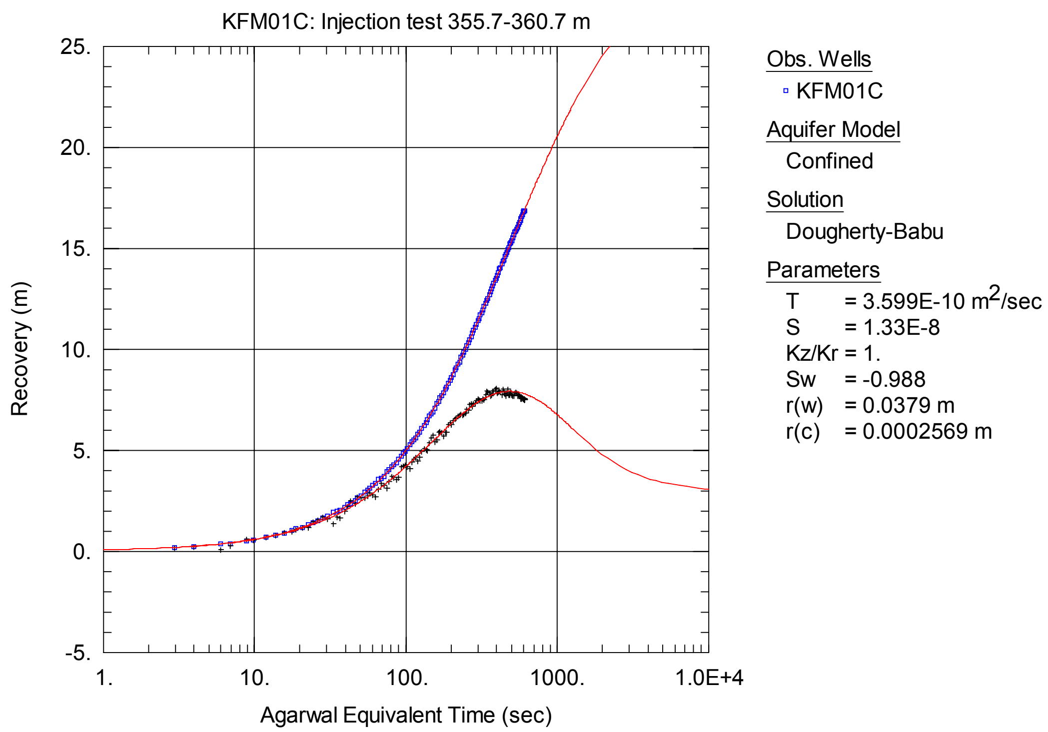


Figure A3-276. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 355.7-360.7 m in KFM01C.*

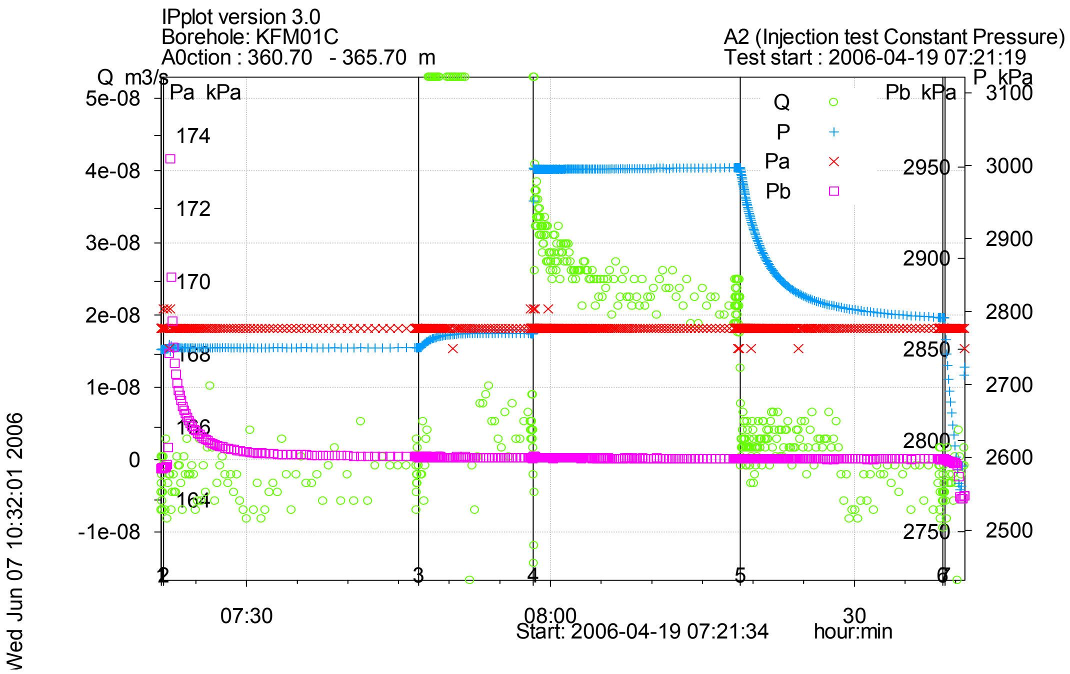


Figure A3-277. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 360.7-365.7 m in borehole KFM01C.*

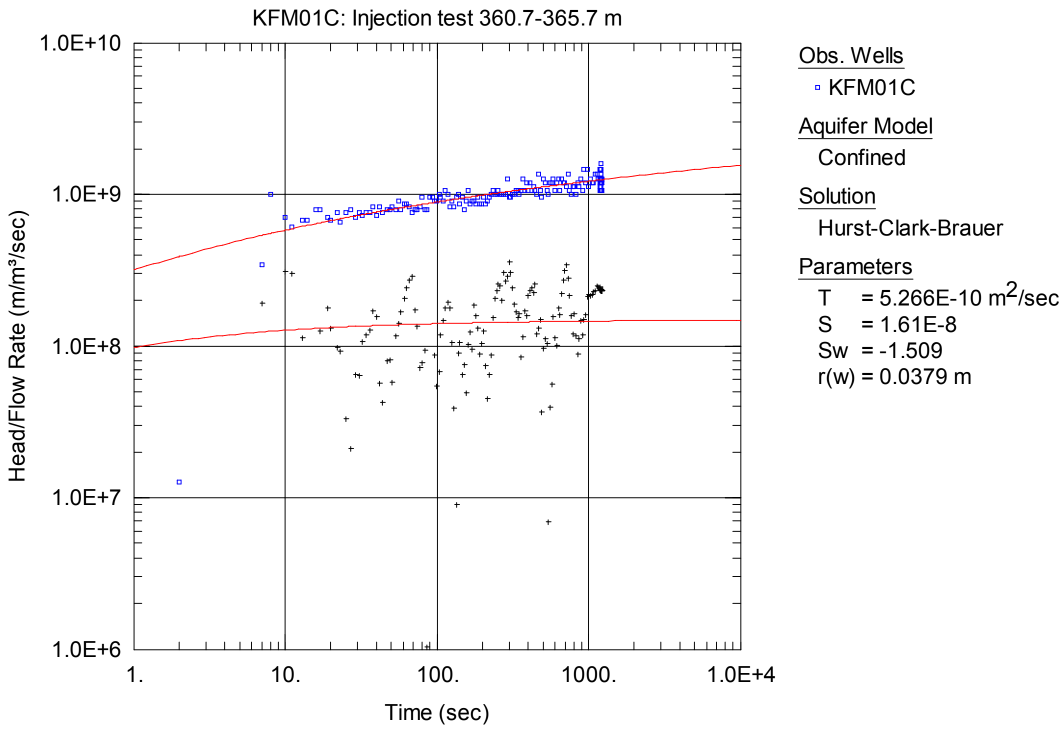


Figure A3-278. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 360.7-365.7 m in KFM01C.*

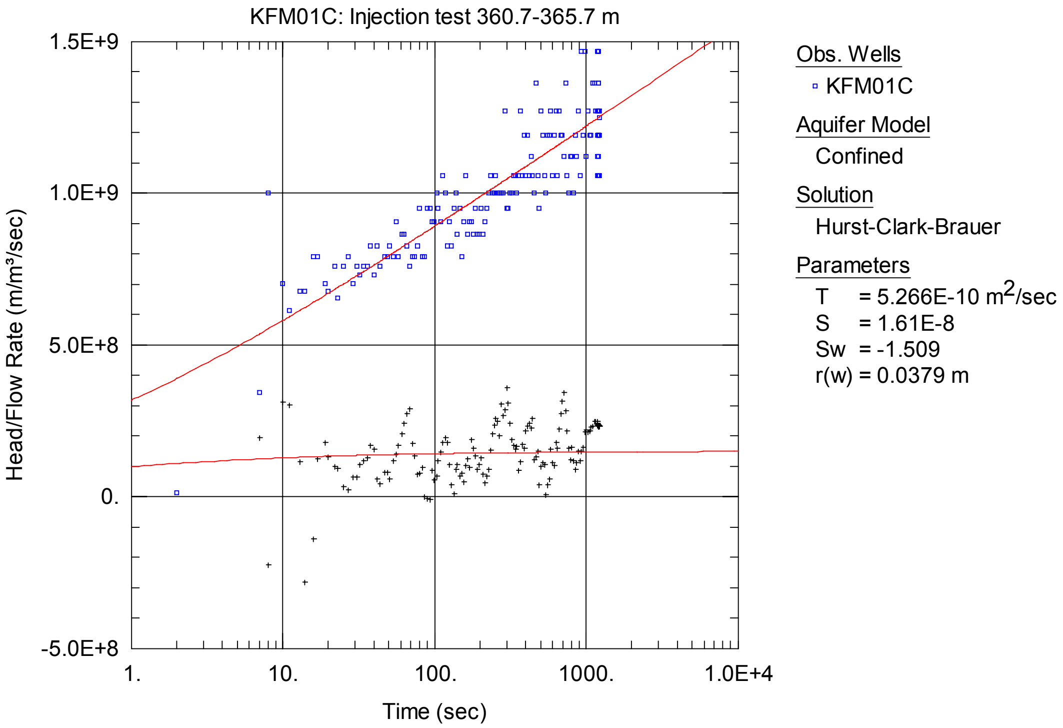


Figure A3-279. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 360.7-365.7 m in KFM01C.*

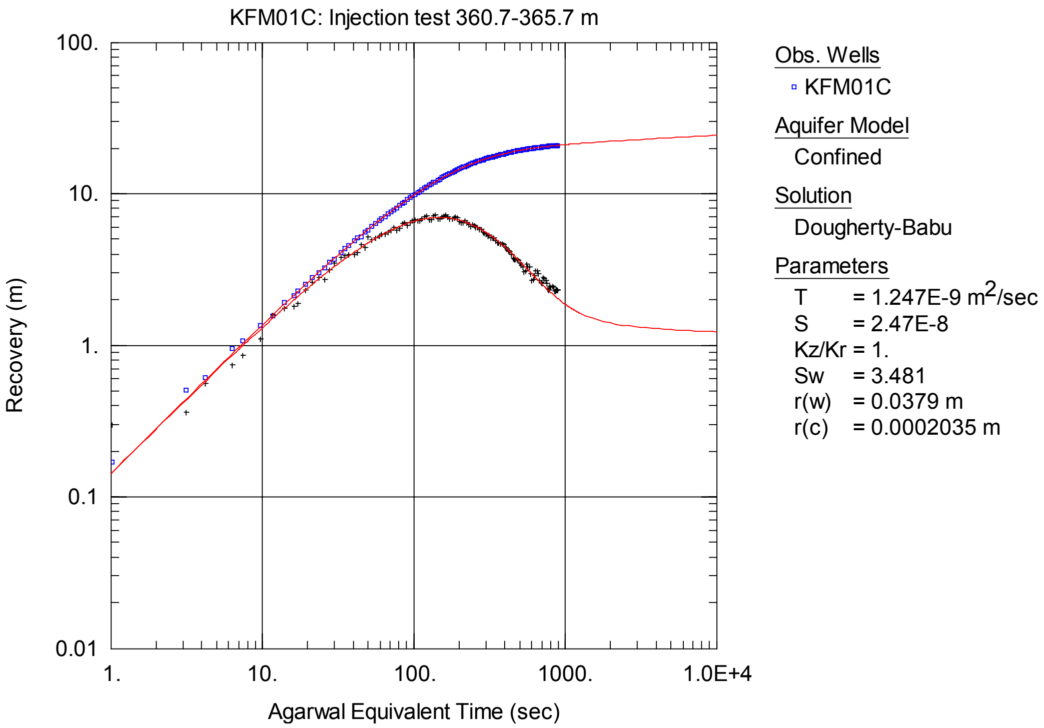


Figure A3-280. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 360.7-365.7 m in KFM01C.*

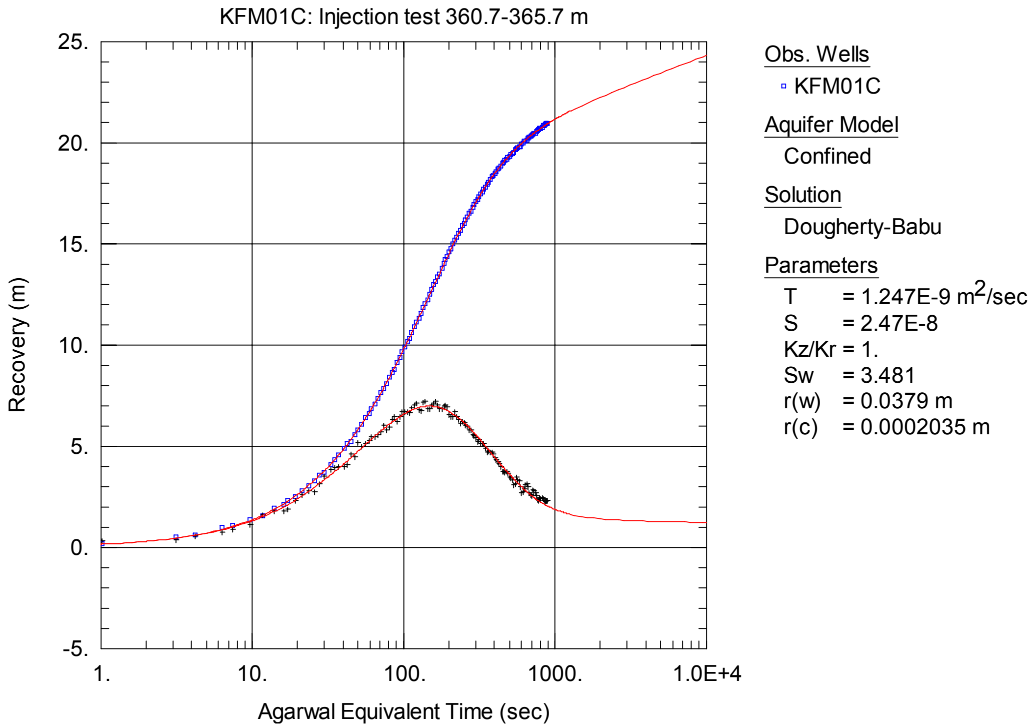


Figure A3-281. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 360.7-365.7 m in KFM01C.*

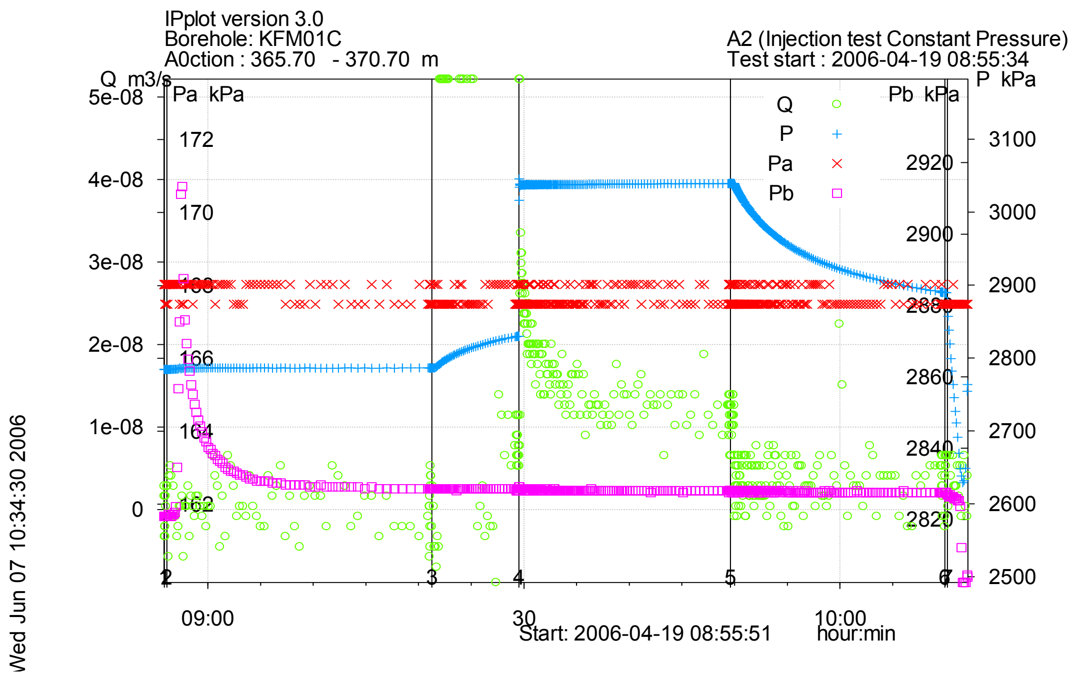


Figure A3-282. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 365.7-370.7 m in borehole KFM01C.*

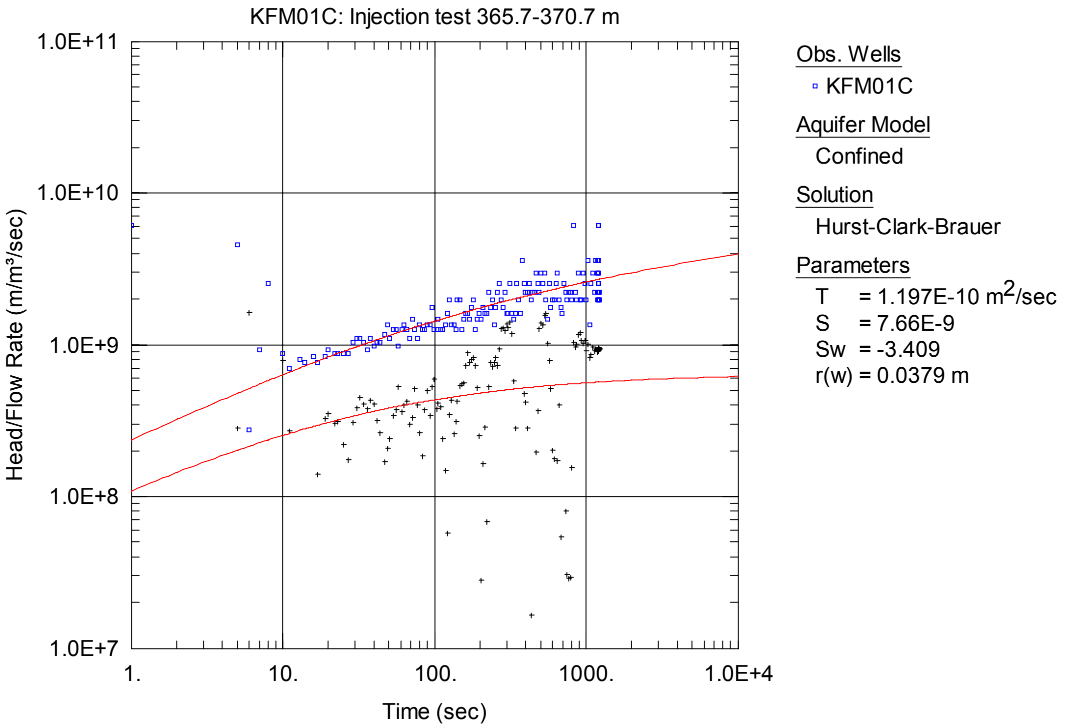


Figure A3-283. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 365.7-370.7 m in KFM01C.*

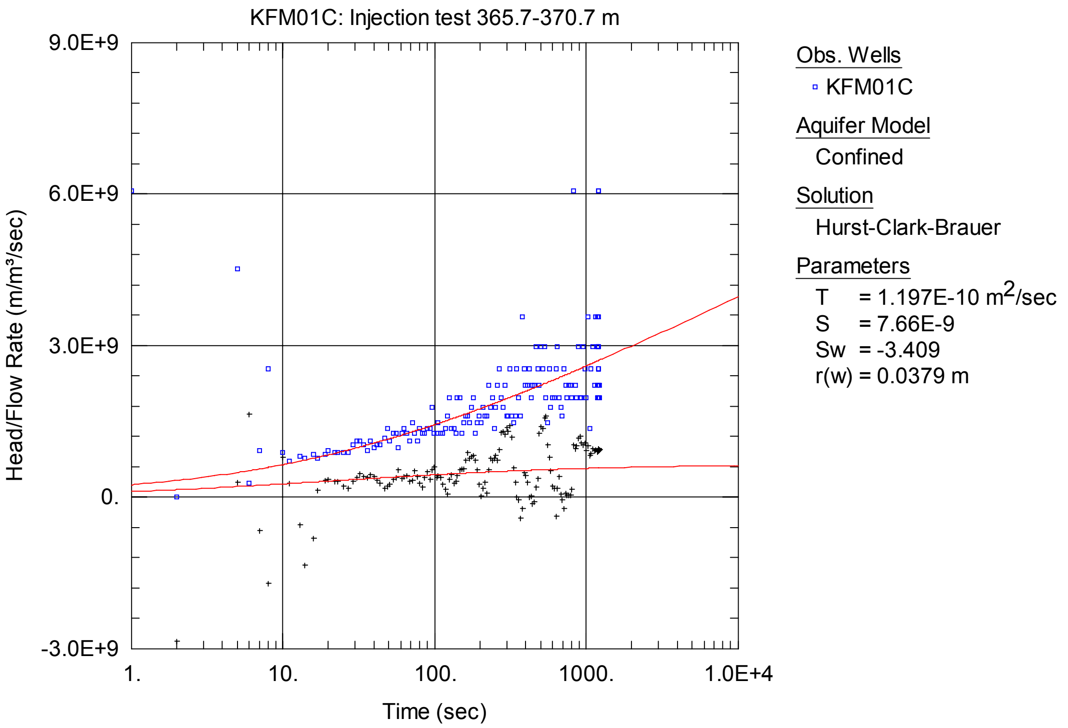


Figure A3-284. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 365.7-370.7 m in KFM01C.*

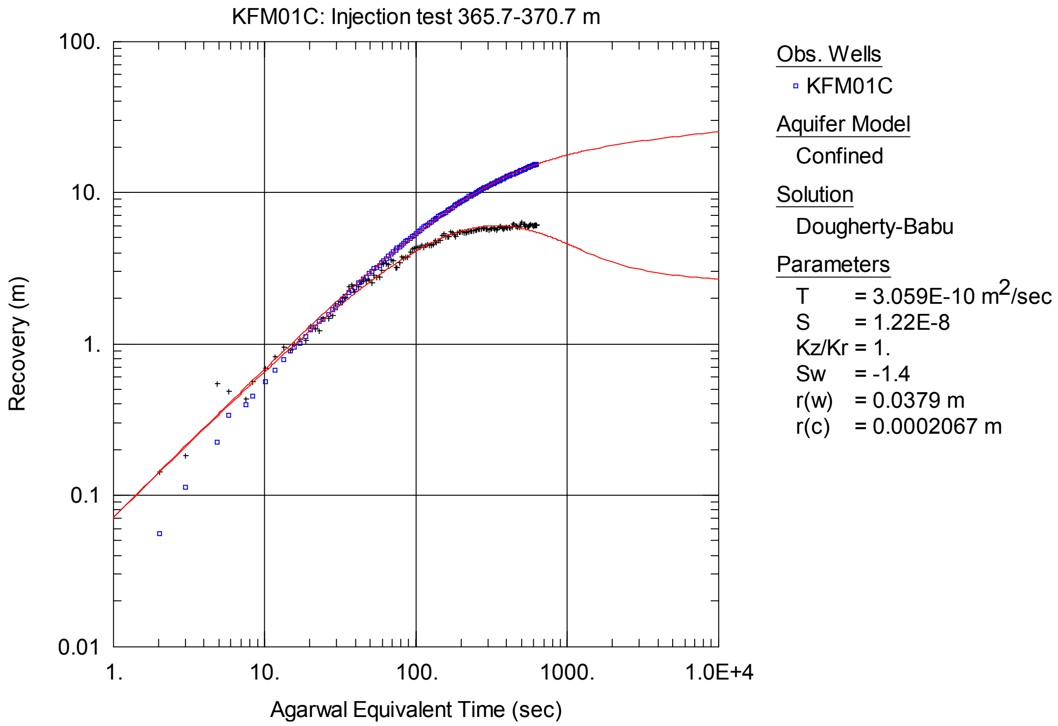


Figure A3-285. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 365.7-370.7 m in KFM01C.*

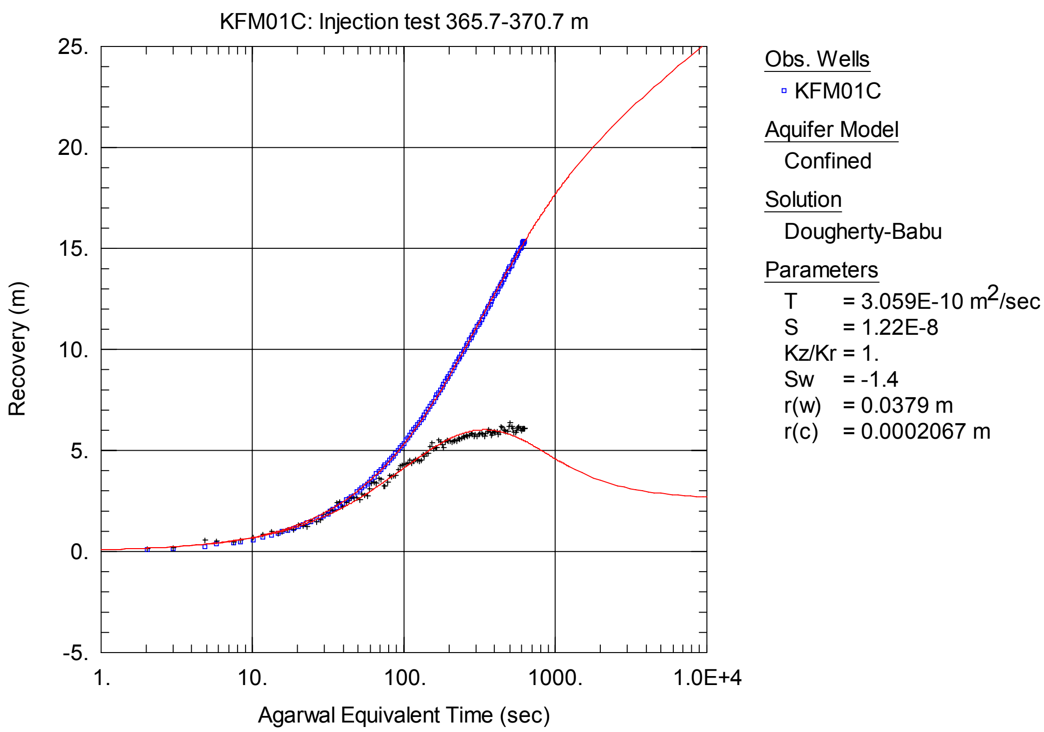


Figure A3-286. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 365.7-370.7 m in KFM01C.*

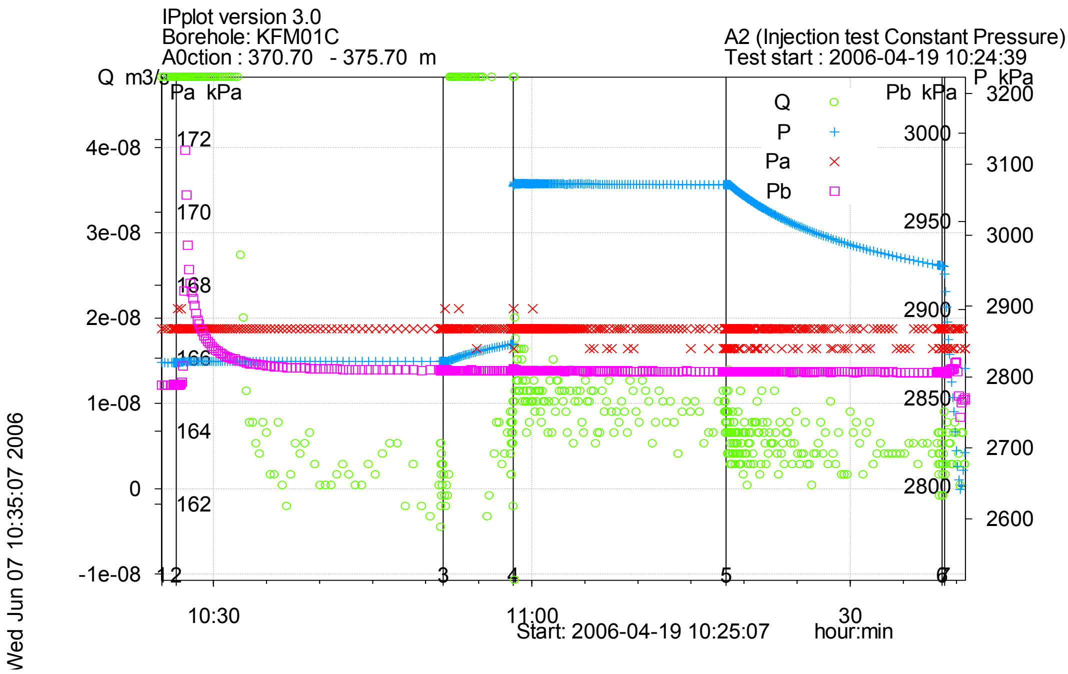


Figure A3-287. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 370.7-375.7 m in borehole KFM01C.*

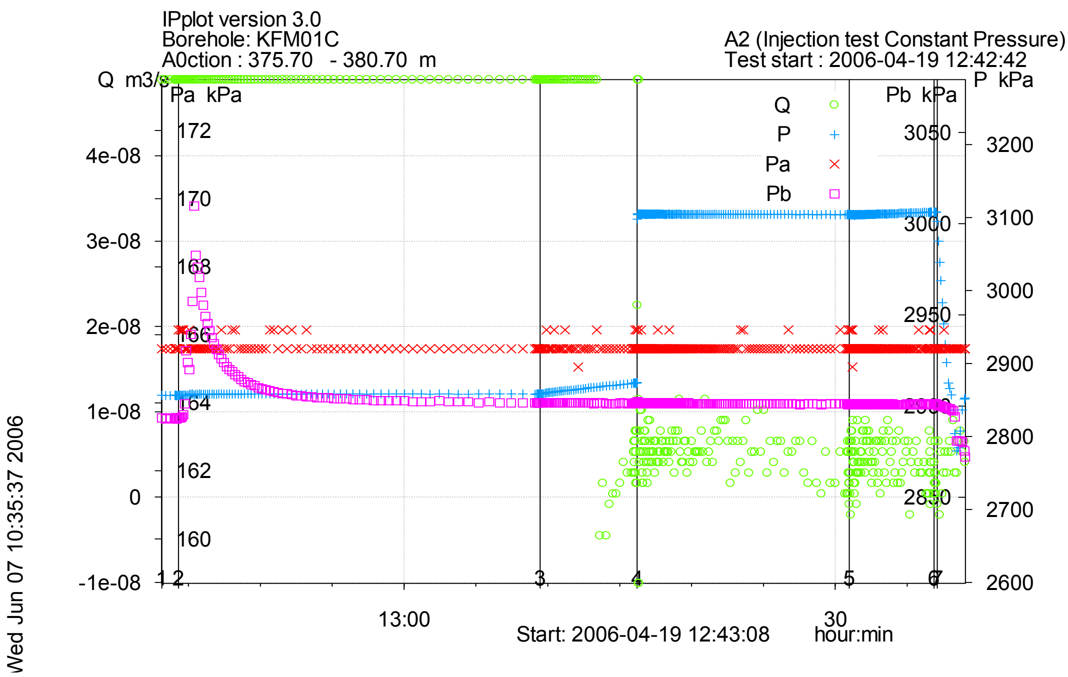


Figure A3-288. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 375.7-380.7 m in borehole KFM01C.*

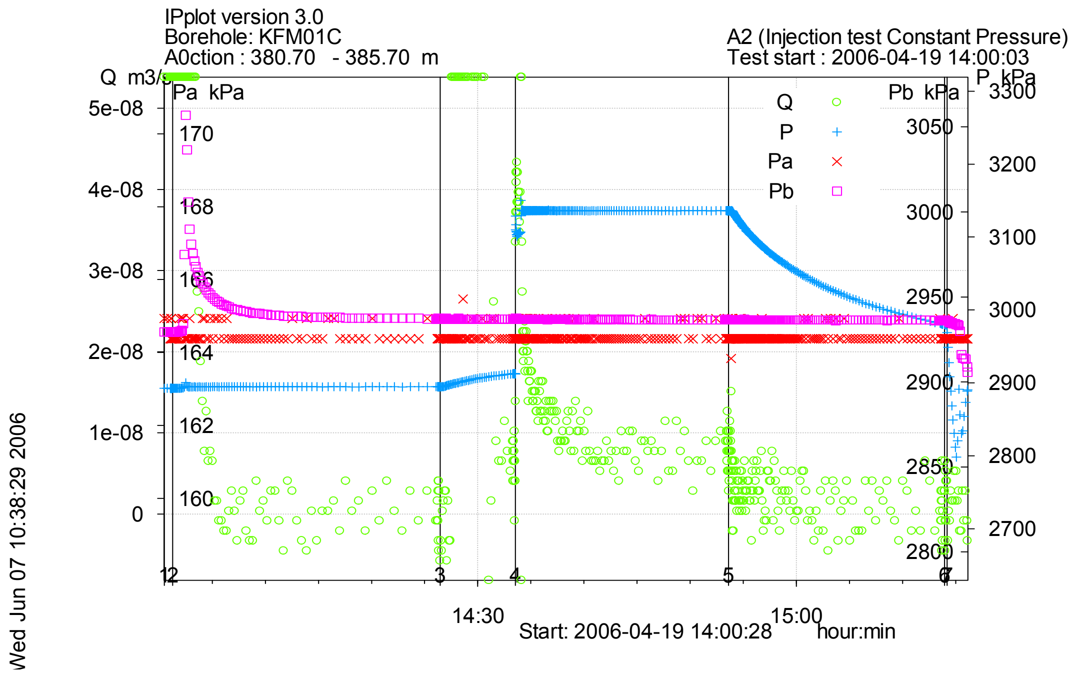


Figure A3-289. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 380.7-385.7 m in borehole KFM01C.

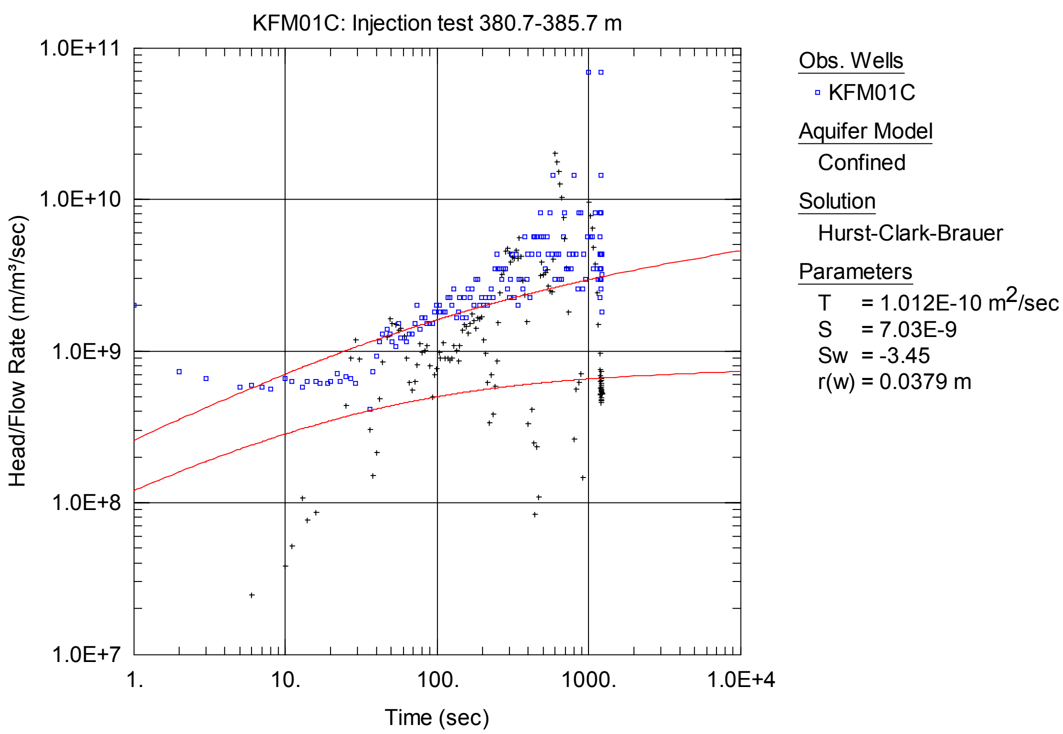


Figure A3-290. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 380.7-385.7 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.

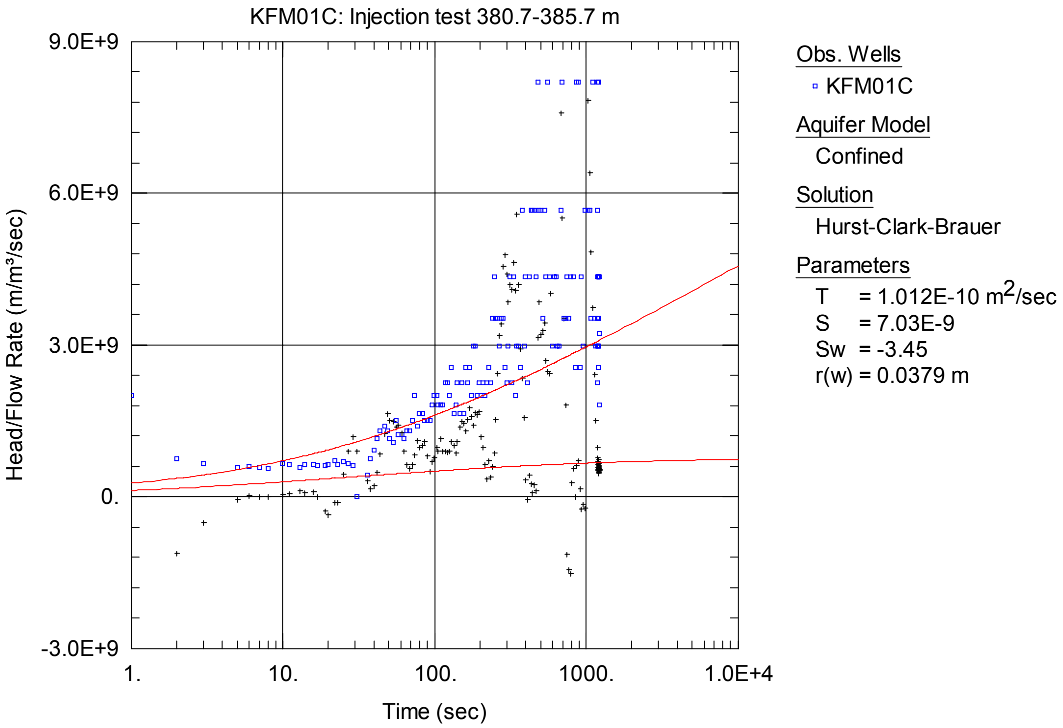


Figure A3-291. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 380.7-385.7 m in KFM01C. The type curve fit is showing a possible, however not unambiguous, evaluation.*

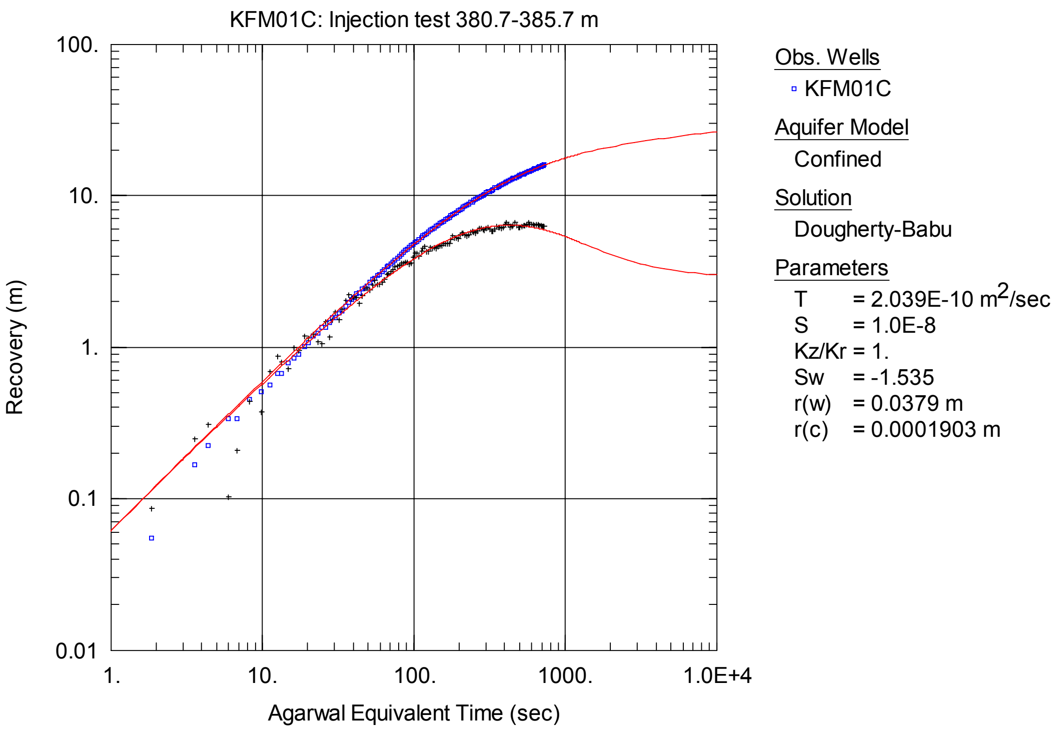


Figure A3-292. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 380.7-385.7 m in KFM01C.*

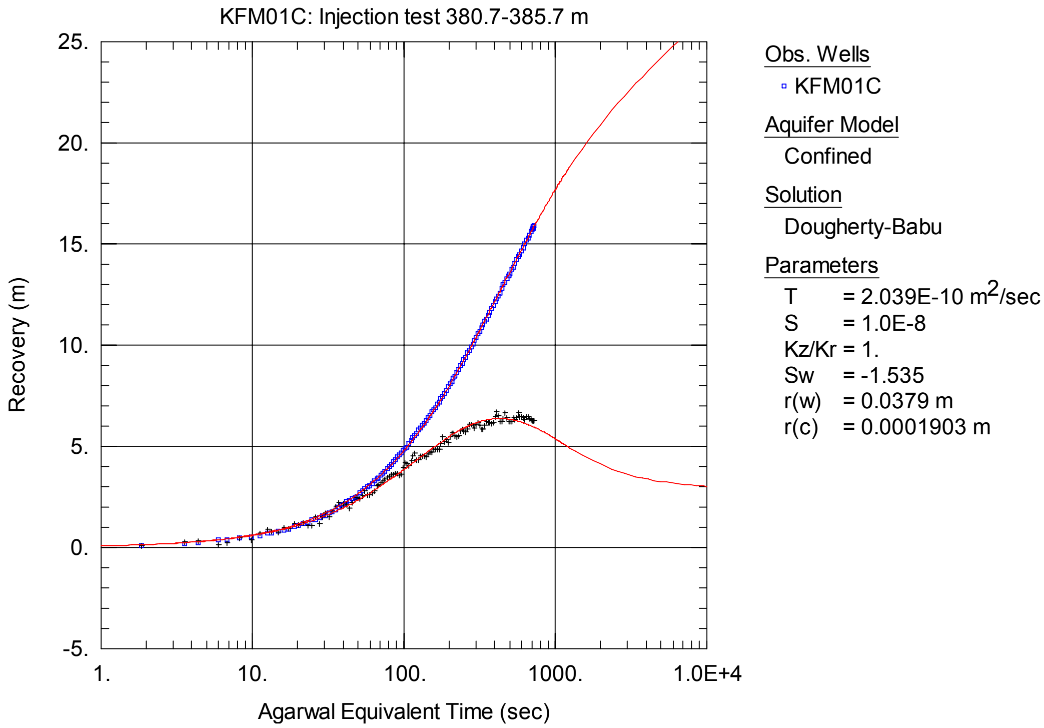


Figure A3-293. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 380.7-385.7 m in KFM01C.*

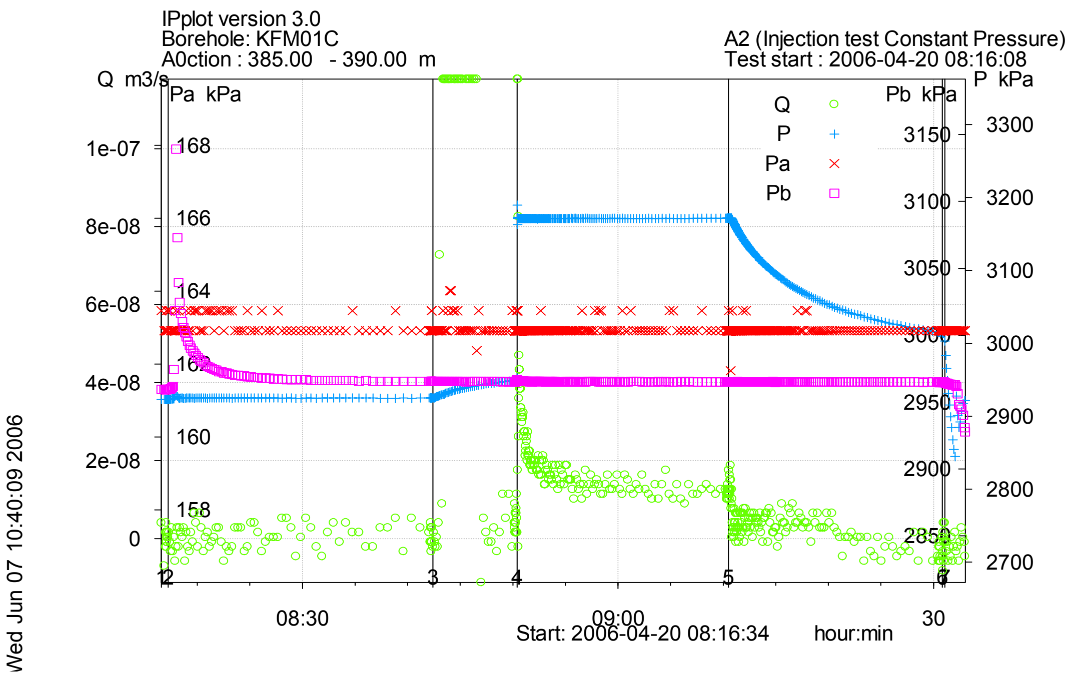


Figure A3-294. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 385.0-390.0 m in borehole KFM01C.*

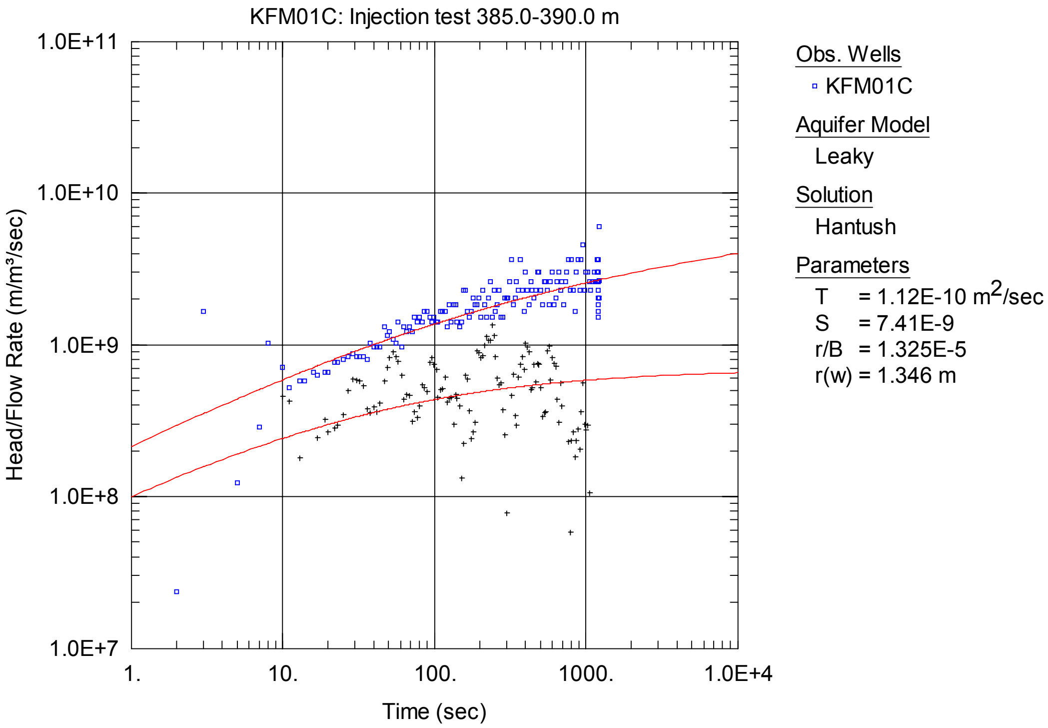


Figure A3-295. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 385.0-390.0 m in KFM01C.*

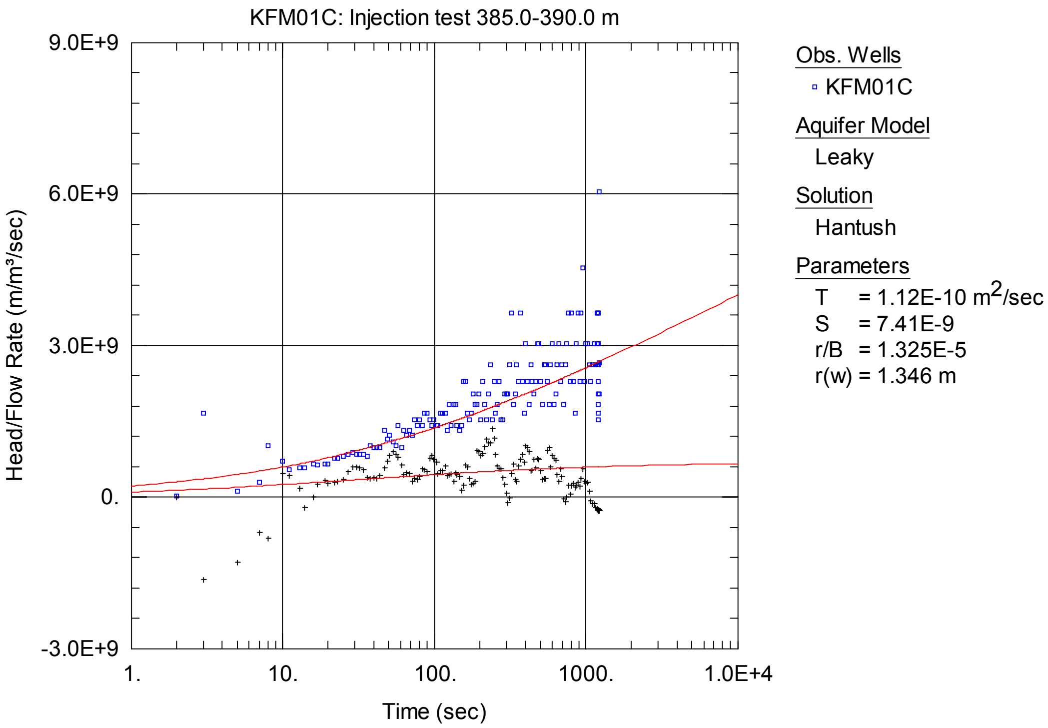


Figure A3-296. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 385.0-390.0 m in KFM01C.*

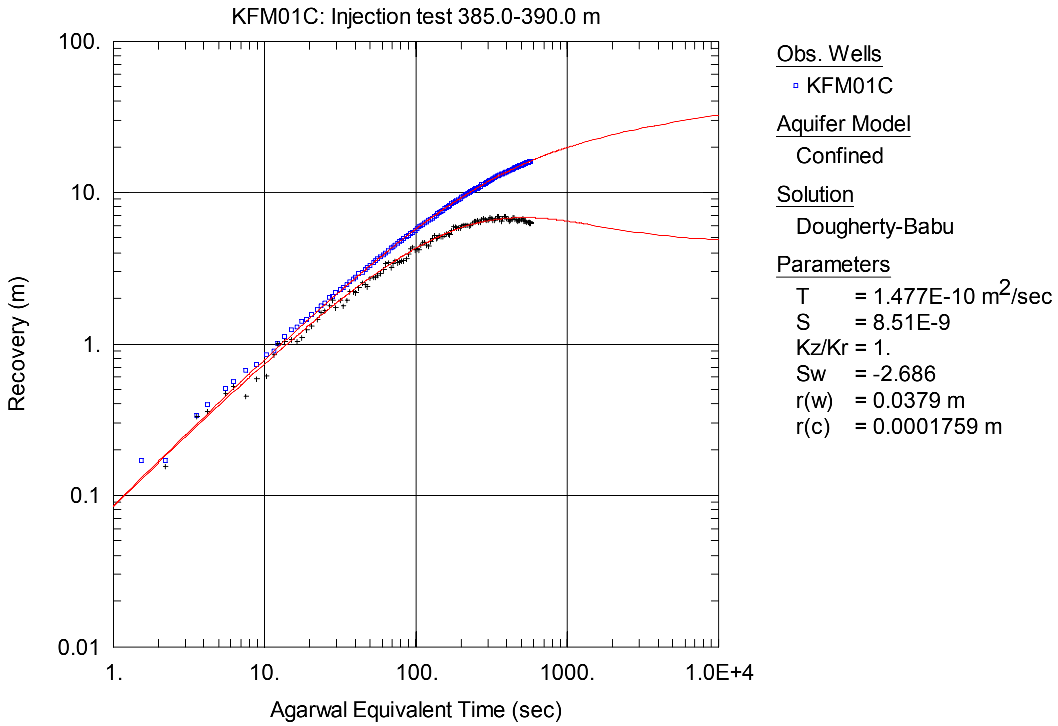


Figure A3-297. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 385.0-390.0 m in KFM01C.*

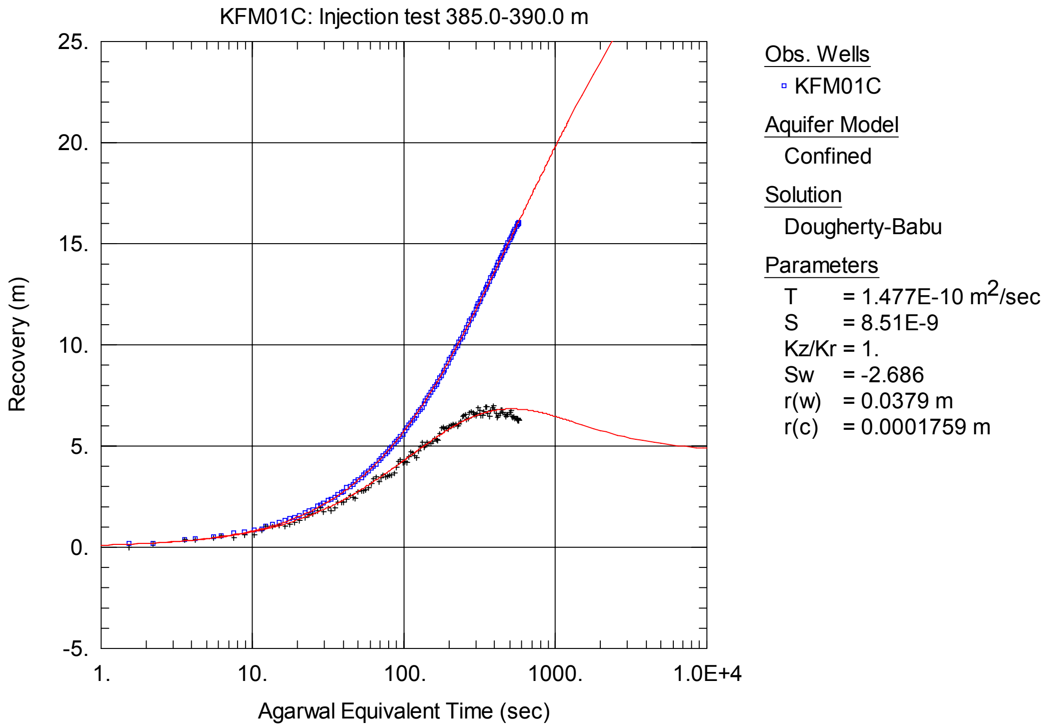


Figure A3-298. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 385.0-390.0 m in KFM01C.*

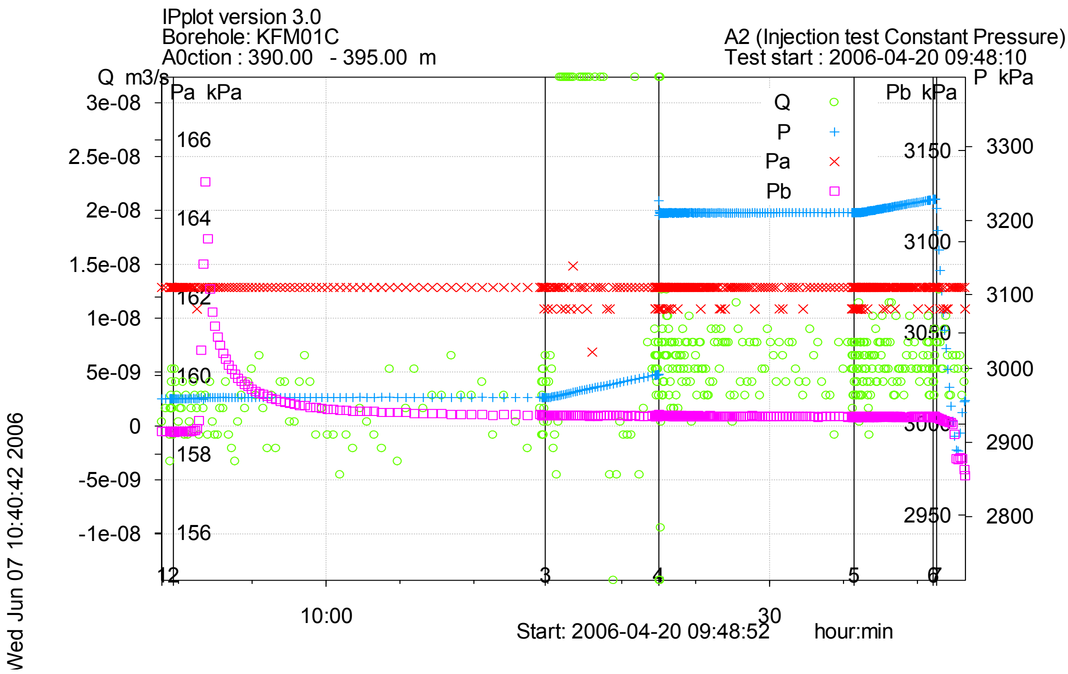


Figure A3-299. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 390.0-395.0 m in borehole KFM01C.*

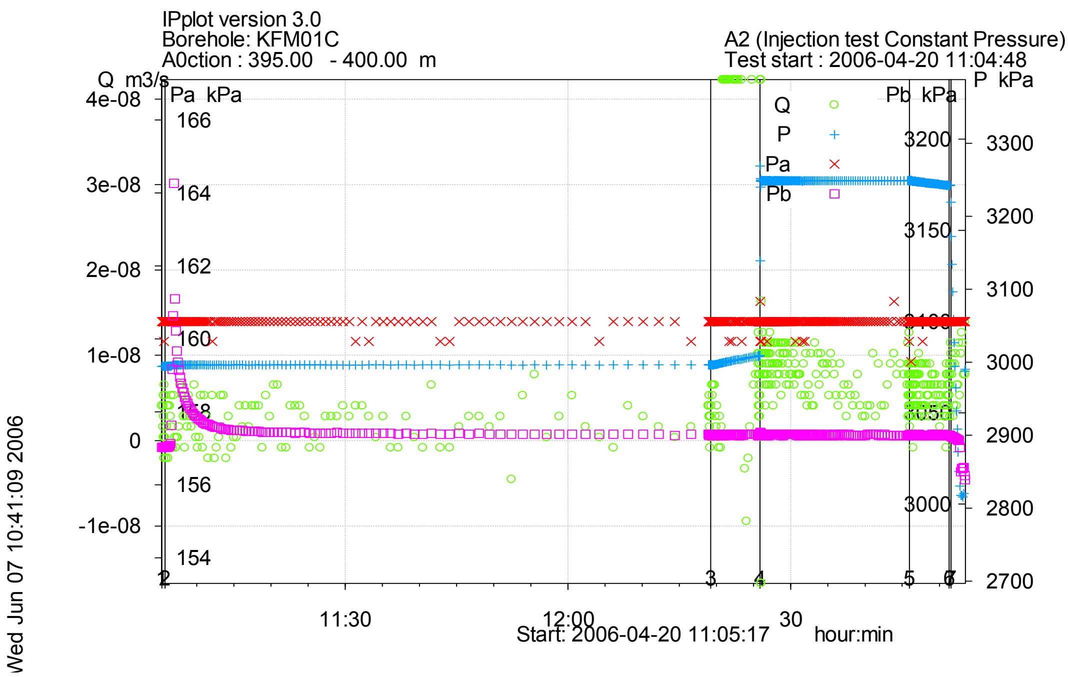


Figure A3-300. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 395.0-400.0 m in borehole KFM01C.*

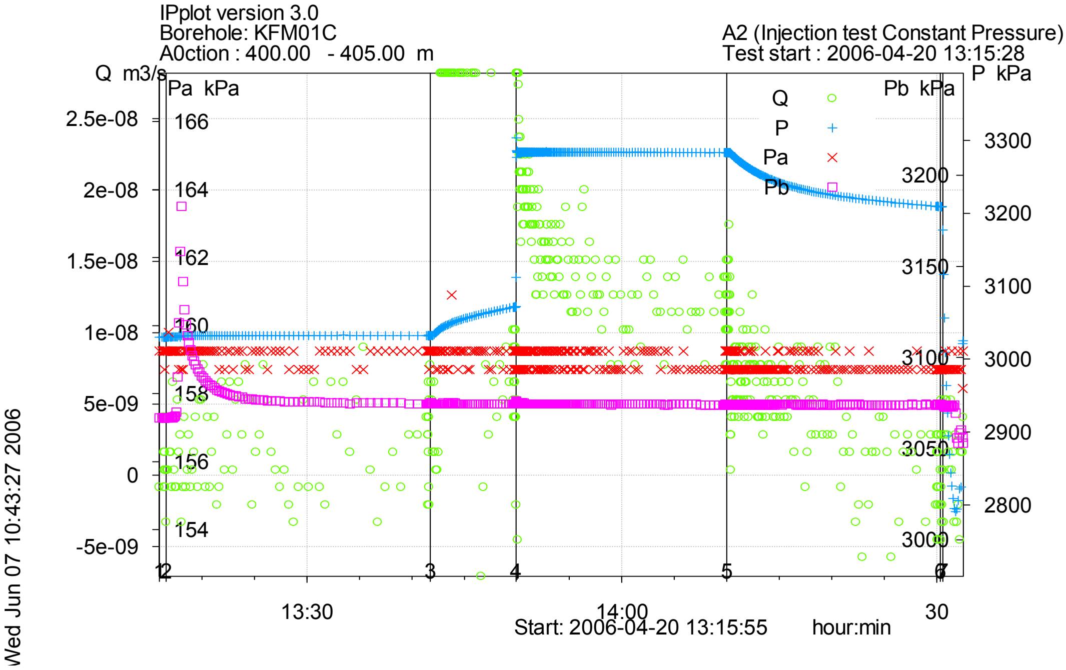


Figure A3-301. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 400.0-405.0 m in borehole KFM01C.*

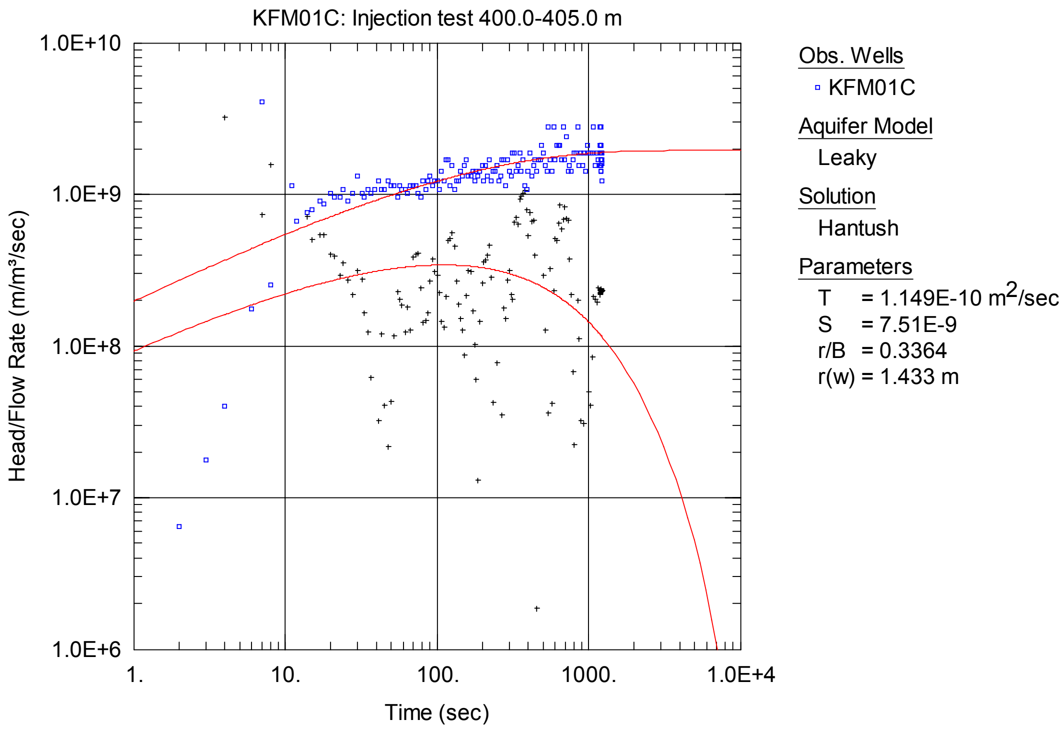


Figure A3-302. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 400.0-405.0 m in KFM01C.*

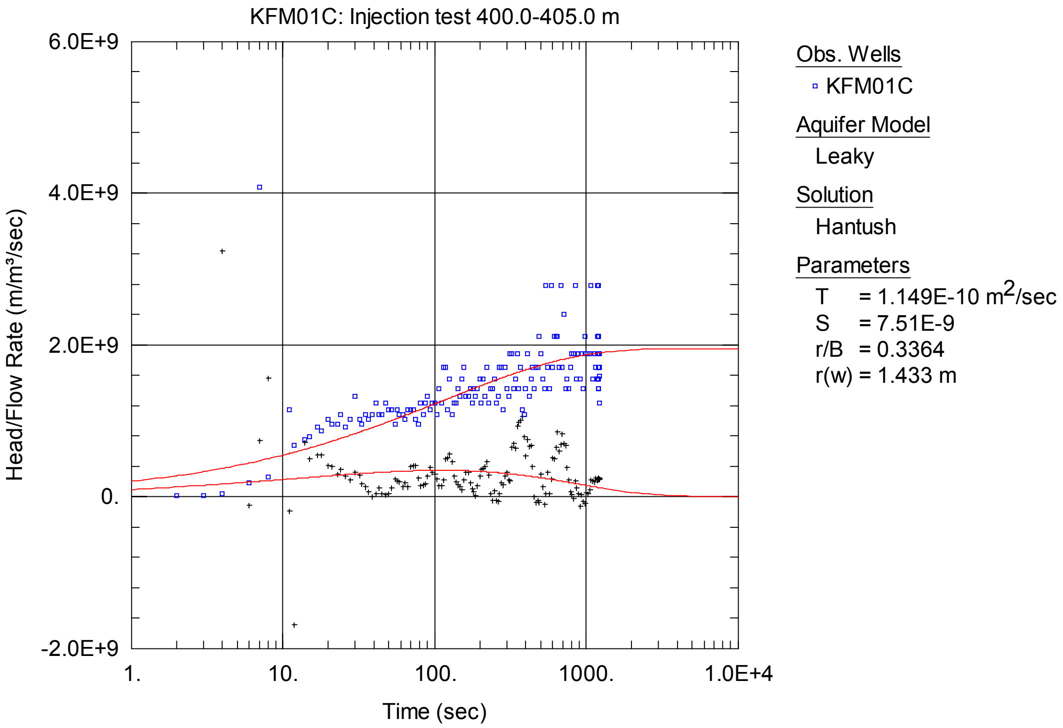


Figure A3-303. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 400.0-405.0 m in KFM01C.*

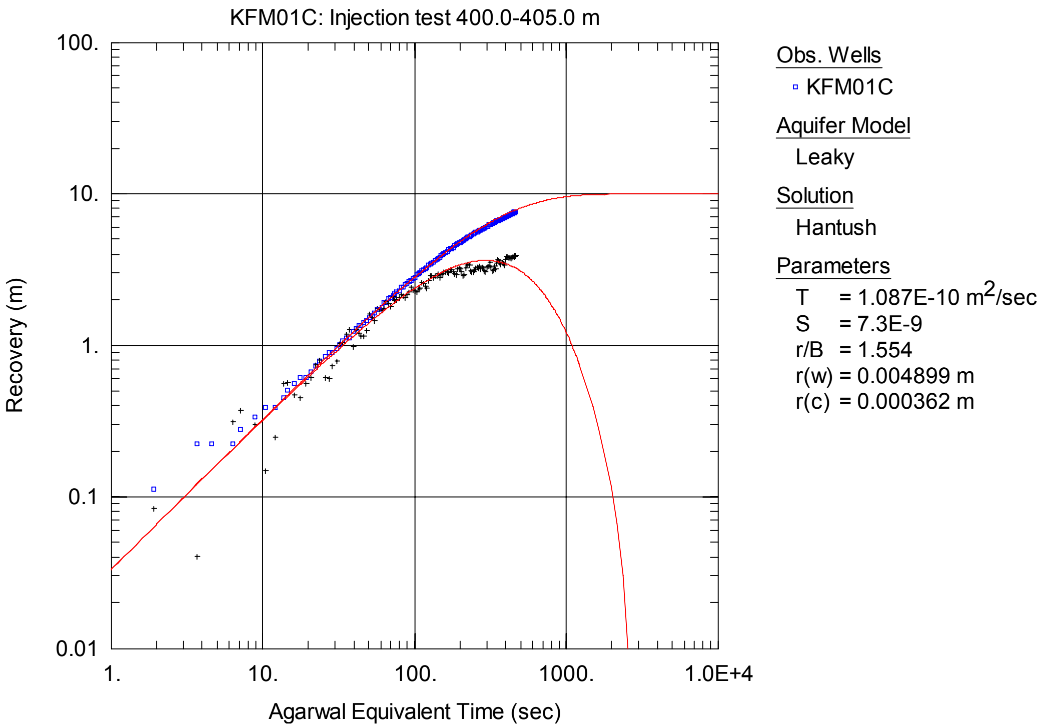


Figure A3-304. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 400.0-405.0 m in KFM01C.*

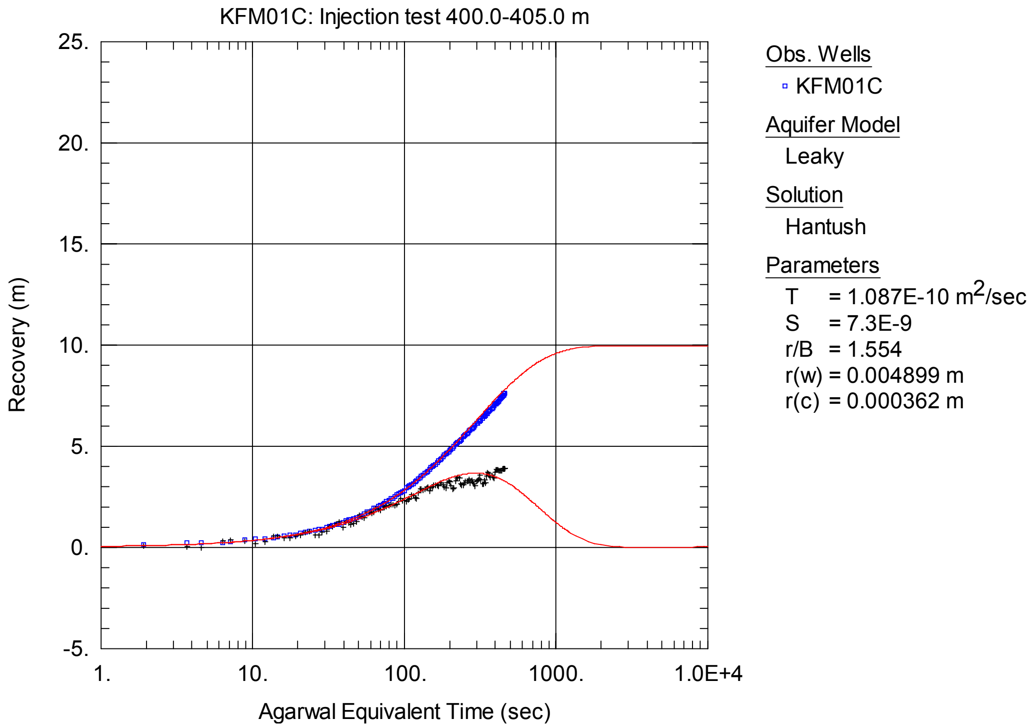


Figure A3-305. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 400.0-405.0 m in KFM01C.*

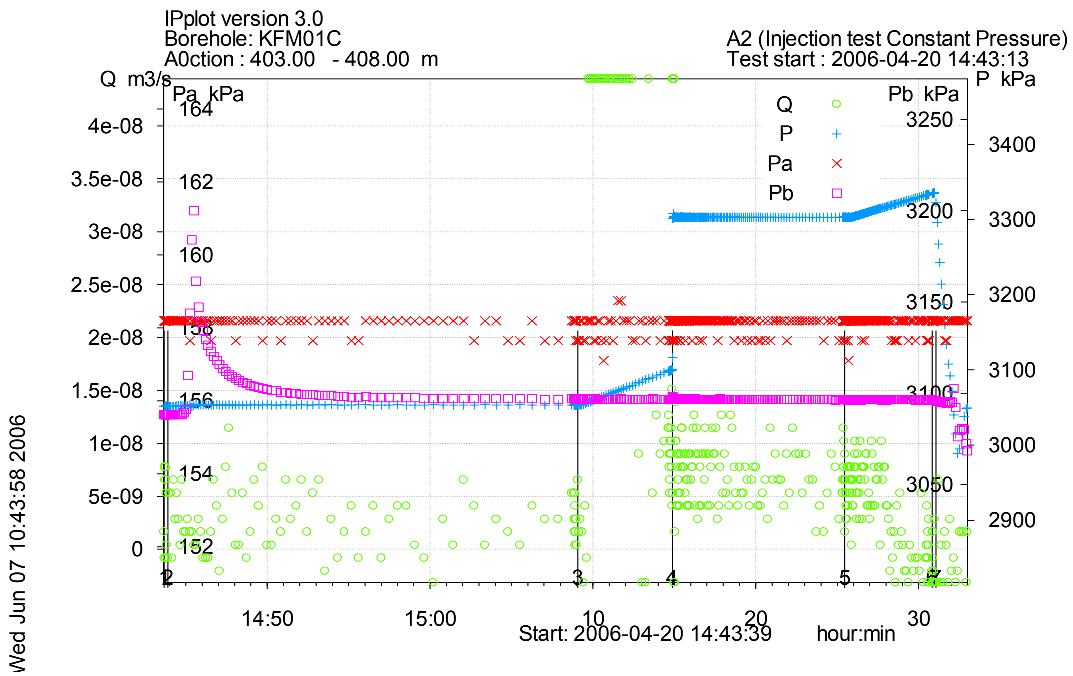


Figure A3-306. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 403.0-408.0 m in borehole KFM01C.*

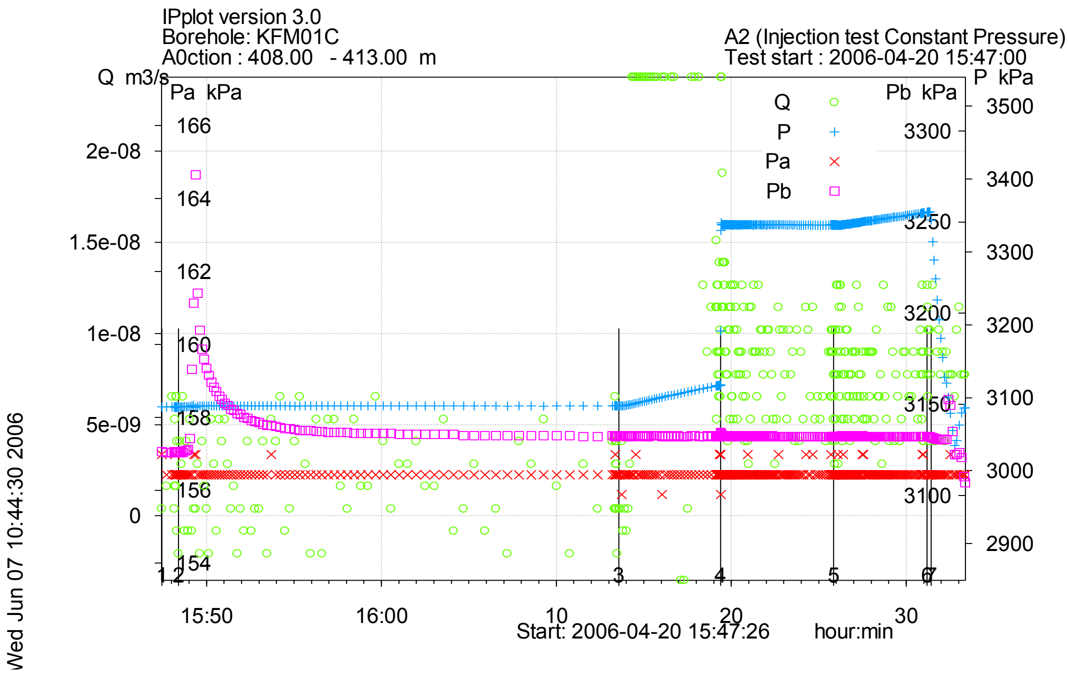


Figure A3-307. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 408.0-413.0 m in borehole KFM01C.*

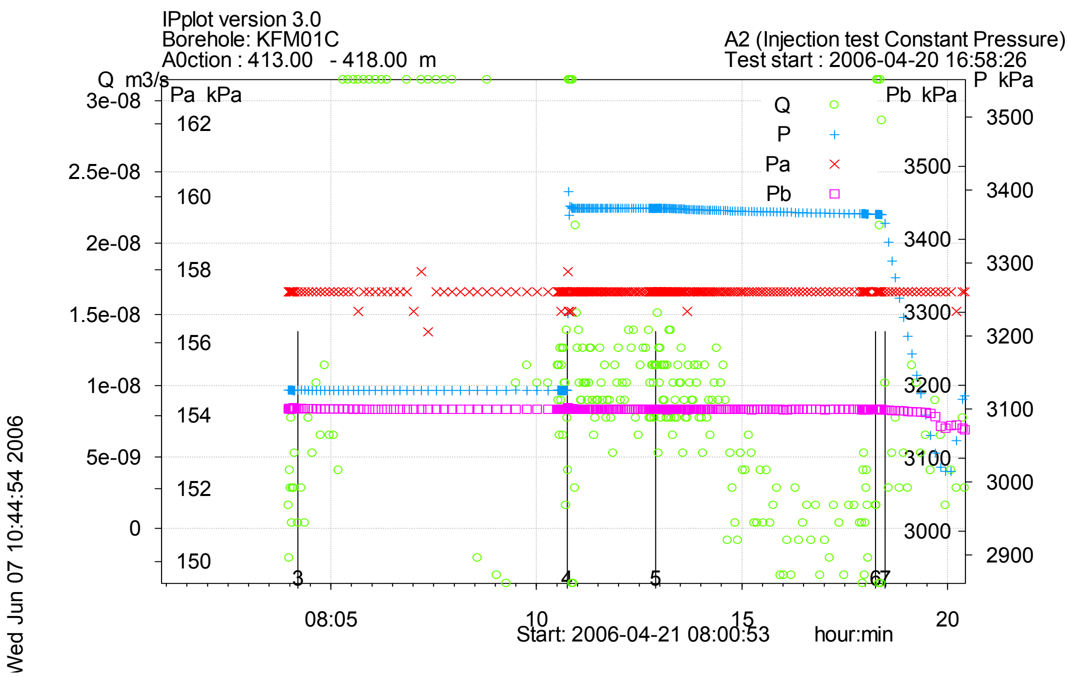


Figure A3-308. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 413.0-418.0 m in borehole KFM01C.*

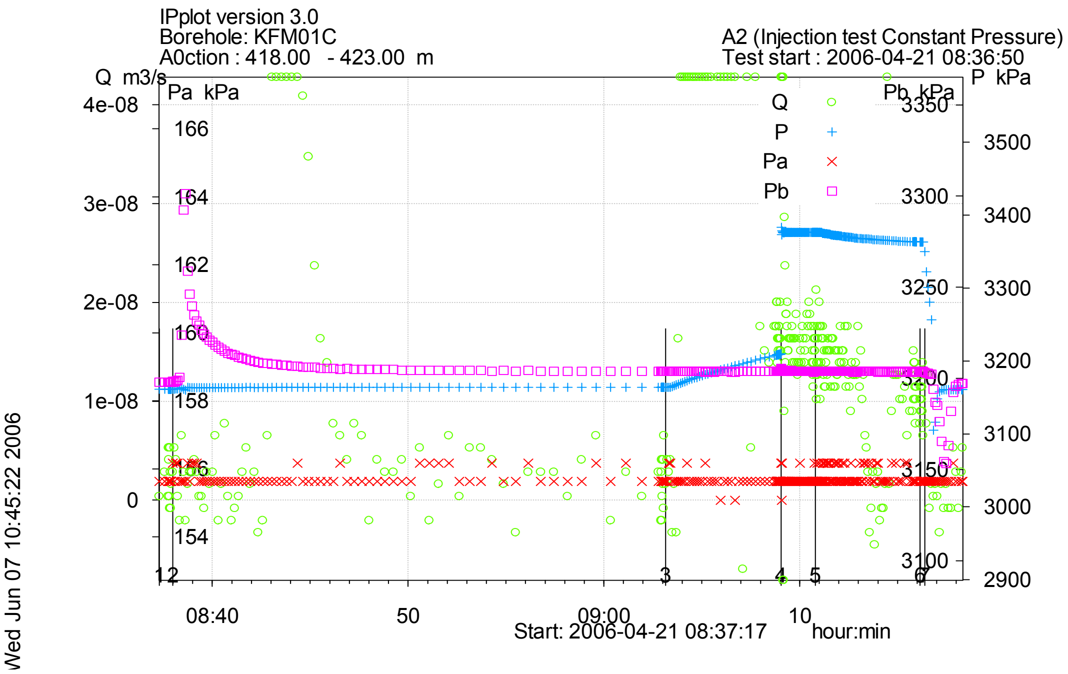


Figure A3-309. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 418.0-423.0 m in borehole KFM01C.*

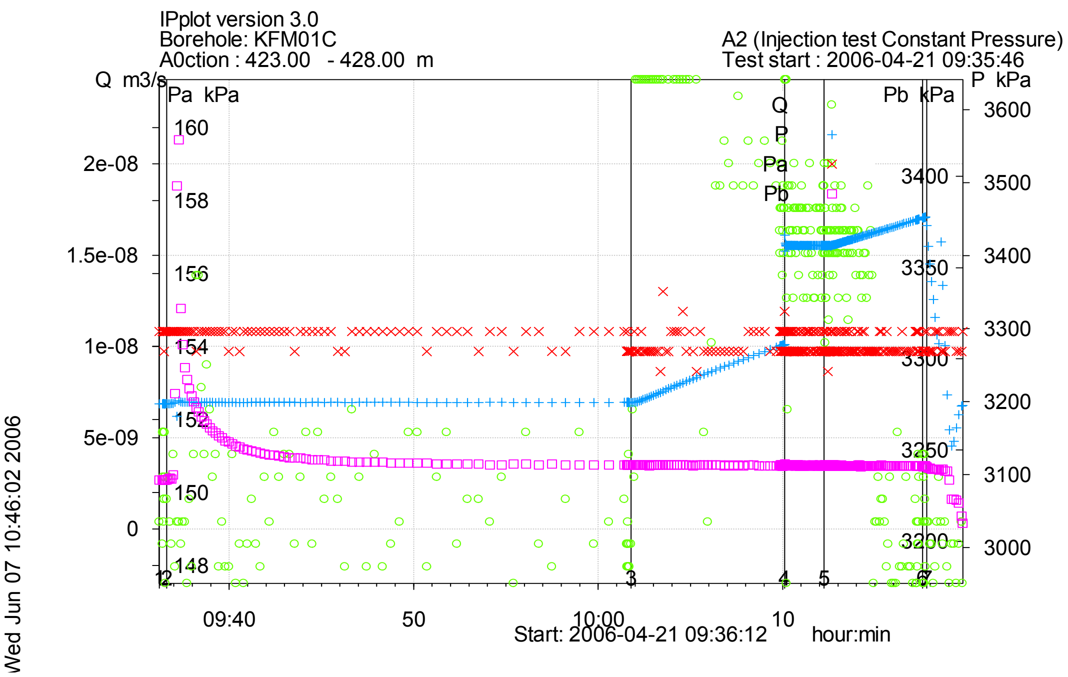


Figure A3-310. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 423.0-428.0 m in borehole KFM01C.*

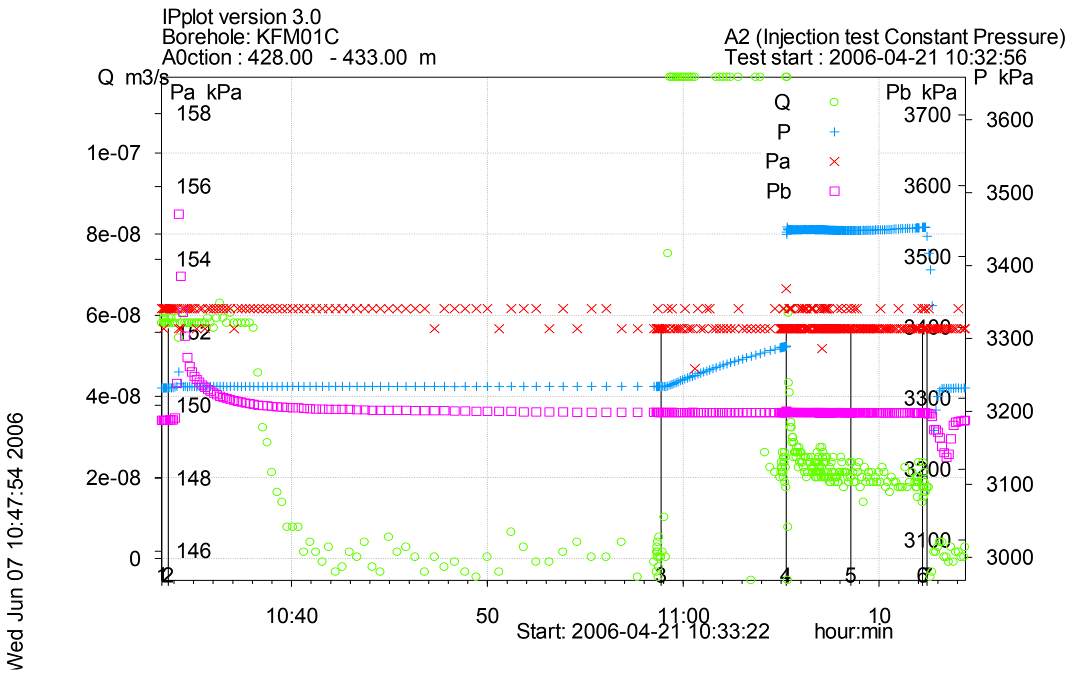


Figure A3-311. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 428.0-433.0 m in borehole KFM01C.*

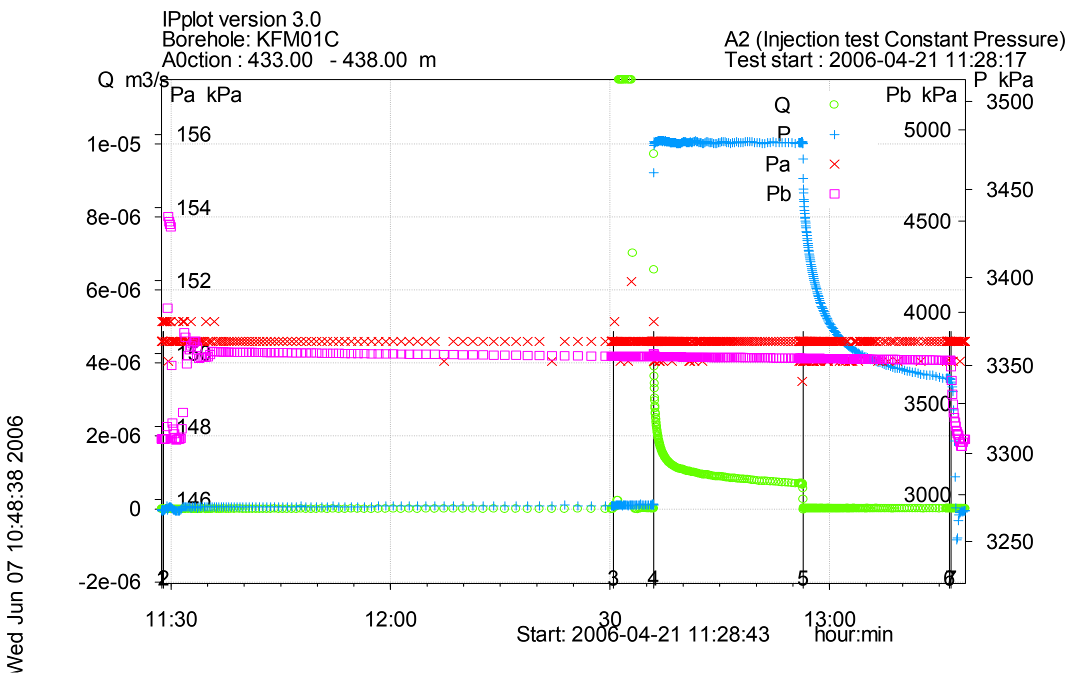


Figure A3-312. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 433.0-438.0 m in borehole KFM01C.*

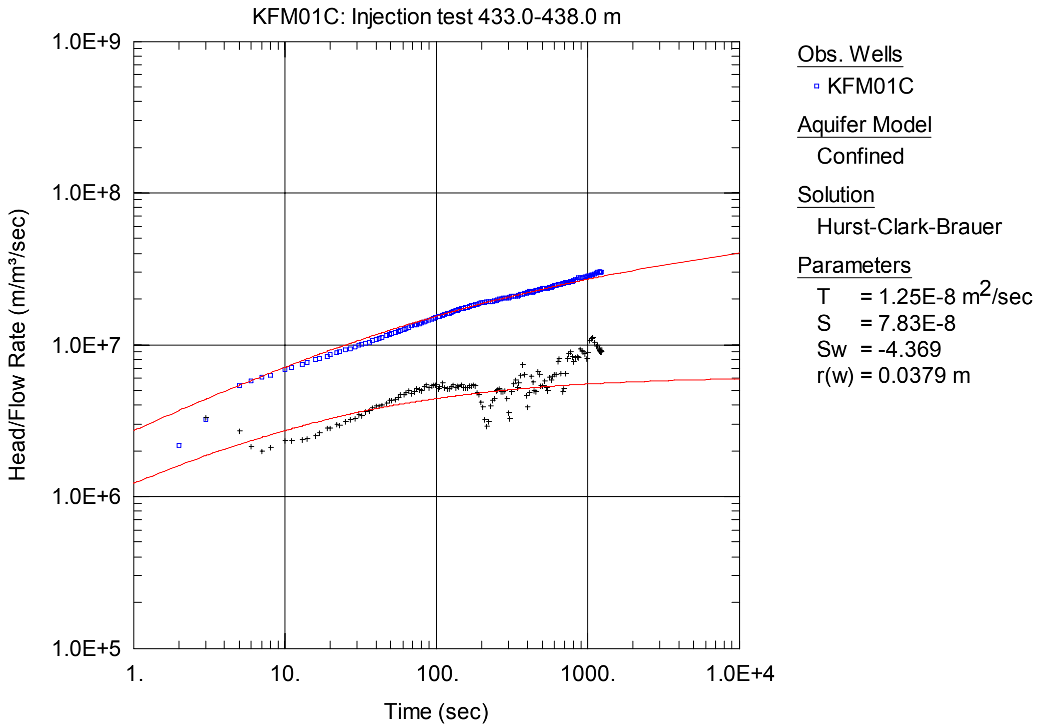


Figure A3-313. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 433.0-438.0 m in KFM01C.*

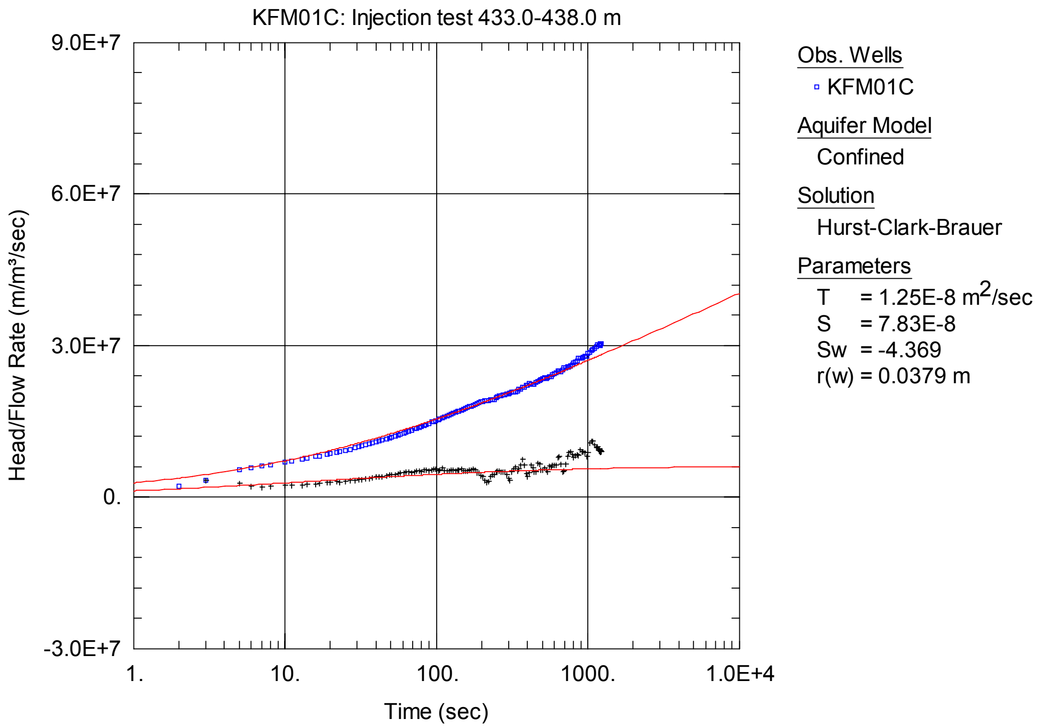


Figure A3-314. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 433.0-438.0 m in KFM01C.*

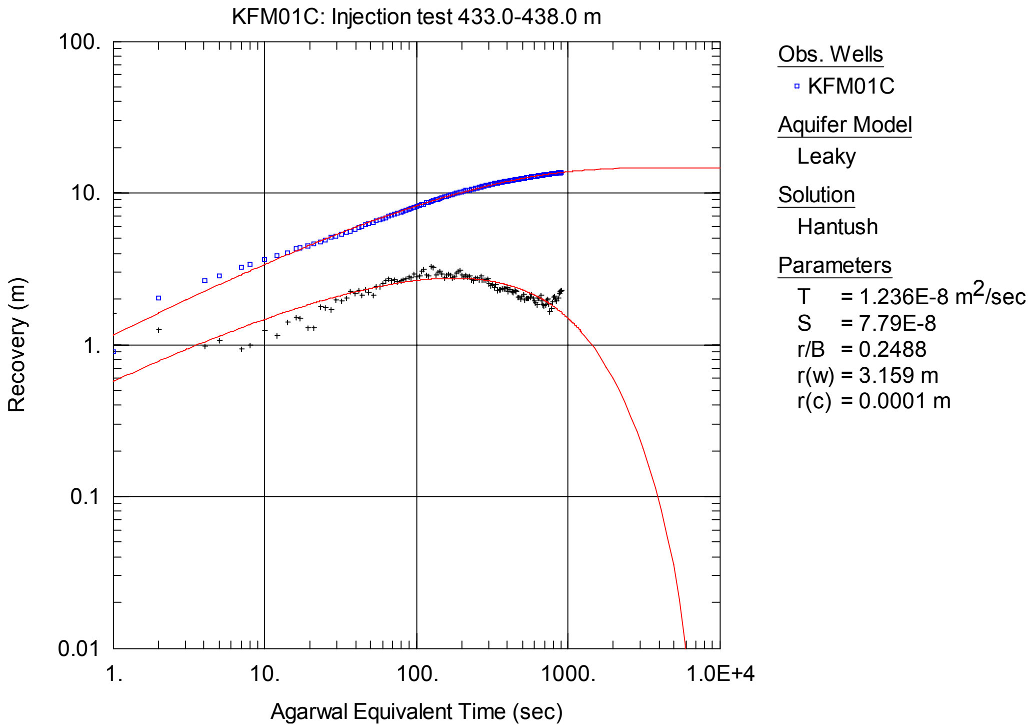


Figure A3-315. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 433.0-438.0 m in KFM01C.*

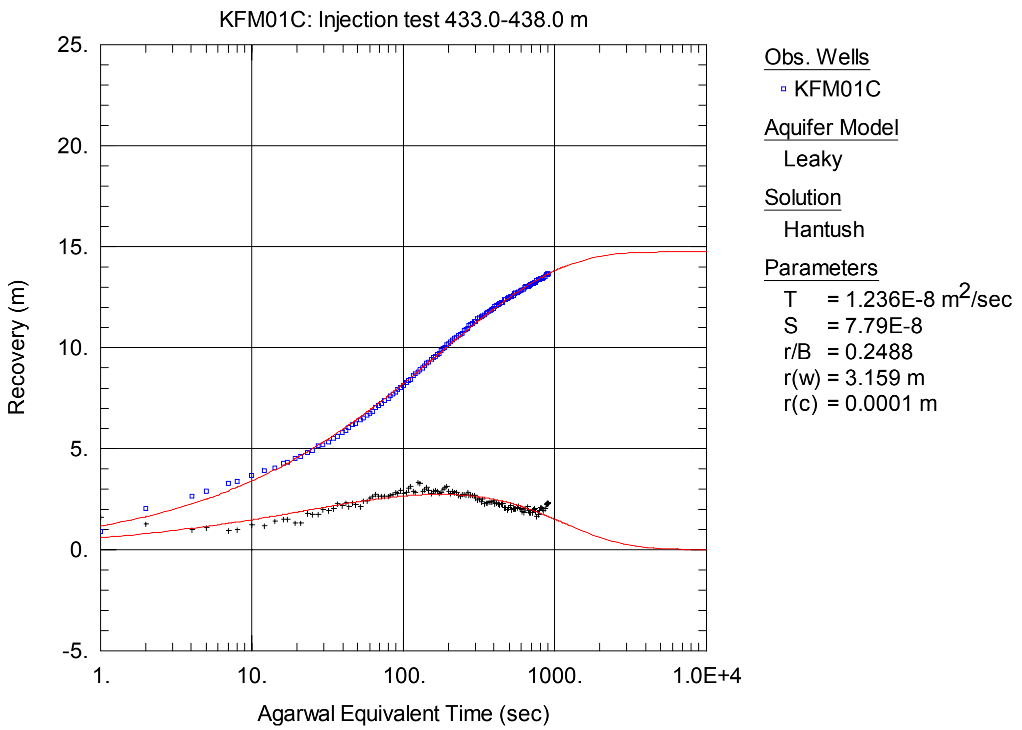
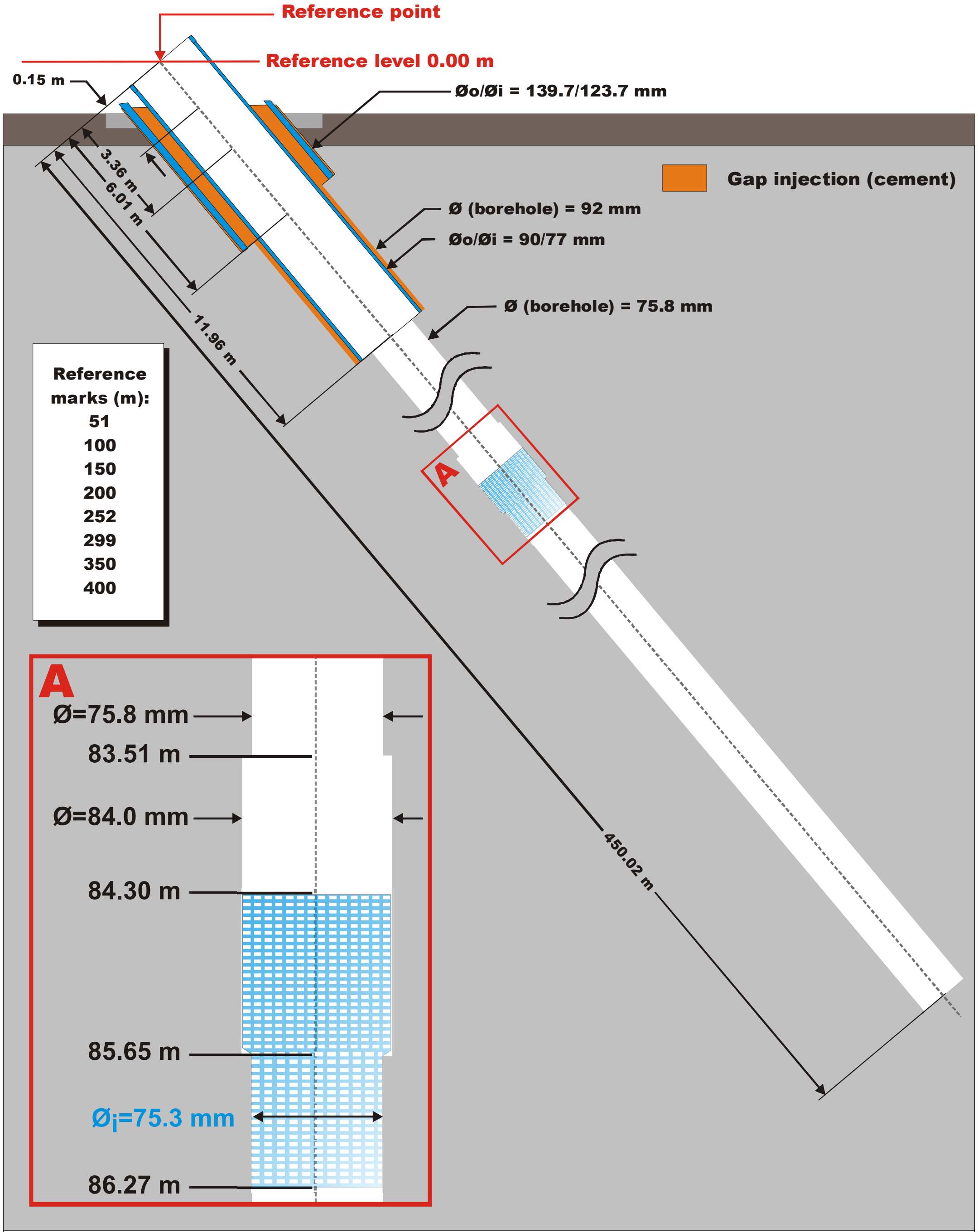


Figure A3-316. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 433.0-438.0 m in KFM01C.*

Appendix 4. Borehole technical data

Technical data

Borehole KFM01C



Drilling reference point

Northing:	**6699526.14 (m), RT90 2,5 gon V 0:-15**
Easting:	**1631403.75 (m), RT90 2,5 gon V 0:-15**
Elevation:	**2.91 (m), RHB 70**

Orientation

Bearing (degrees):	**165.35°**
Inclination (degrees):	**-49.61°**

Borehole

Length:	**450.02 m**

Percussion drilling period

Drilling start date:	**2005-10-26**
Drilling stop date:	**2005-10-26**

Core drilling period

Drilling start date:	**2005-11-05**
Drilling stop date:	**2005-12-01**

Rev. 2006-02-21

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		Activity QA signature	
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)	
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	Transmissivity 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
value_type_tm	CHAR		0:true value,-1:TM<lower meas.limit,1:TM>upper meas.limit.	
bc_tm	CHAR		Best choice code. 1 means Tmoye is best choice of T, else 0	
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.	
s_bc	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	

Column	Datatype	Unit	Column Description	Alt. Symbol
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	
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		Activity QA signature	

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)
sign	CHAR		Activity QA signature
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)

KFM01C 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
KFM01C	20060324 09:12	20060324 10:52	15.50	20.50	3	1	20060324 10:10:08	20060324 10:30:07	2.98E-04	0	3.51E-04
KFM01C	20060324 11:14	20060324 13:11	20.50	25.50	3	1	20060324 12:29:02	20060324 12:49:16	8.60E-06	0	8.83E-06
KFM01C	20060327 16:20	20060327 17:36	25.50	30.50	3	1	20060327 16:53:49	20060327 17:14:06	6.28E-05	0	6.64E-05
KFM01C	20060328 08:26	20060328 09:43	30.50	35.50	3	1	20060328 09:01:00	20060328 09:20:46	6.11E-04	0	6.29E-04
KFM01C	20060328 10:19	20060328 11:33	32.80	37.80	3	1	20060328 10:51:35	20060328 11:11:15	5.35E-04	0	5.34E-04
KFM01C	20060328 12:34	20060328 13:50	38.80	43.80	3	1	20060328 13:07:51	20060328 13:27:59	5.27E-04	0	5.56E-04
KFM01C	20060328 14:14	20060328 15:35	44.80	49.80	3	1	20060328 14:52:38	20060328 15:12:55	7.79E-07	0	8.33E-07
KFM01C	20060328 15:49	20060328 17:06	49.80	54.80	3	1	20060328 16:23:54	20060328 16:44:09	6.87E-06	0	7.57E-06
KFM01C	20060329 08:33	20060329 09:50	54.80	59.80	3	1	20060329 09:08:15	20060329 09:28:30	1.89E-06	0	2.12E-06
KFM01C	20060329 10:02	20060329 11:21	59.80	64.80	3	1	20060329 10:38:45	20060329 10:59:03	1.34E-06	0	1.42E-06
KFM01C	20060329 11:32	20060329 13:21	64.80	69.80	3	1	20060329 12:39:15	20060329 12:59:33	4.53E-07	0	5.01E-07
KFM01C	20060329 13:37	20060329 14:54	69.80	74.80	3	1	20060329 14:11:40	20060329 14:31:57	1.40E-06	0	1.46E-06
KFM01C	20060329 15:08	20060329 16:26	74.80	79.80	3	1	20060329 15:43:36	20060329 16:03:52	2.60E-06	0	2.74E-06
KFM01C	20060330 08:12	20060330 09:41	77.00	82.00	3	1	20060330 08:58:56	20060330 09:19:11	8.19E-06	0	8.47E-06
KFM01C	20060330 13:13	20060330 14:29	82.00	87.00	3	1	20060330 13:47:44	20060330 14:07:27	8.19E-04	0	8.07E-04
KFM01C	20060331 08:05	20060331 09:26	88.20	93.20	3	1	20060331 08:43:59	20060331 09:04:09	1.01E-04	0	1.04E-04
KFM01C	20060331 09:51	20060331 11:10	92.00	97.00	3	1	20060331 10:28:16	20060331 10:48:31	9.78E-05	0	9.66E-05
KFM01C	20060331 11:28	20060331 13:28	97.00	102.00	3	1	20060331 12:46:34	20060331 13:06:30	2.37E-04	0	3.05E-04
KFM01C	20060331 13:51	20060331 15:09	102.00	107.00	3	1	20060331 14:27:01	20060331 14:47:21	2.55E-06	0	5.72E-06
KFM01C	20060331 15:33	20060331 16:52	107.00	112.00	3	1	20060331 16:10:01	20060331 16:30:17	8.12E-06	0	1.47E-05
KFM01C	20060403 08:01	20060403 09:21	112.00	117.00	3	1	20060403 08:38:35	20060403 08:58:53	5.50E-07	0	6.14E-07
KFM01C	20060403 09:33	20060403 10:54	117.00	122.00	3	1	20060403 10:11:45	20060403 10:32:04	6.21E-07	0	7.26E-07
KFM01C	20060403 11:08	20060403 13:20	122.00	127.00	3	1	20060403 12:38:14	20060403 12:58:31	1.65E-06	0	2.00E-06
KFM01C	20060403 13:37	20060403 15:09	127.00	132.00	3	1	20060403 14:26:27	20060403 14:46:45	3.45E-07	0	4.35E-07
KFM01C	20060403 15:24	20060403 16:43	132.00	137.00	3	1	20060403 16:00:59	20060403 16:21:16	3.60E-07	0	4.66E-07
KFM01C	20060404 08:16	20060404 09:37	137.00	142.00	3	1	20060404 08:54:54	20060404 09:15:13	1.07E-06	0	1.29E-06
KFM01C	20060404 09:57	20060404 11:19	142.00	147.00	3	1	20060404 10:36:42	20060404 10:57:01	2.60E-07	0	4.16E-07
KFM01C	20060404 11:31	20060404 13:32	147.00	152.00	3	1	20060404 12:49:35	20060404 13:09:54	3.12E-07	0	8.07E-07

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
KFM01C	20060404 14:12	20060404 15:02	152.00	157.00	3	1	20060404 14:49:15	20060404 14:55:17		-1	
KFM01C	20060404 15:18	20060404 16:36	157.00	162.00	3	1	20060404 15:54:13	20060404 16:14:19		-1	
KFM01C	20060405 09:09	20060405 09:58	162.00	167.00	3	1	20060405 09:47:17	20060405 09:50:56		-1	
KFM01C	20060405 10:12	20060405 11:01	165.00	170.00	3	1	20060405 10:50:13	20060405 10:53:31		-1	
KFM01C	20060405 11:14	20060405 12:01	170.00	175.00	3	1	20060405 11:52:09	20060405 11:54:20		-1	
KFM01C	20060405 12:13	20060405 13:49	175.00	180.00	3	1	20060405 13:26:42	20060405 13:41:36		-1	
KFM01C	20060405 14:06	20060405 15:19	180.00	185.00	3	1	20060405 14:51:19	20060405 15:11:41		-1	
KFM01C	20060405 15:36	20060405 16:22	185.00	190.00	3	1	20060405 16:12:12	20060405 16:15:06		-1	
KFM01C	20060405 16:40	20060405 18:04	190.00	195.00	3	1	20060405 17:22:21	20060405 17:42:40	2.69E-07	0	4.64E-07
KFM01C	20060405 18:27	20060405 19:44	195.00	200.00	3	1	20060405 19:01:38	20060405 19:21:57	4.63E-07	0	6.93E-07
KFM01C	20060406 07:20	20060406 08:55	200.00	205.00	3	1	20060406 08:12:44	20060406 08:32:50		-1	
KFM01C	20060406 09:14	20060406 10:11	202.70	207.70	3	1	20060406 09:49:33	20060406 10:04:12		-1	
KFM01C	20060406 10:27	20060406 11:44	207.70	212.70	3	1	20060406 11:02:22	20060406 11:22:28		-1	
KFM01C	20060406 12:45	20060406 13:36	213.20	218.20	3	1	20060406 13:18:50	20060406 13:28:34		-1	
KFM01C	20060406 13:50	20060406 15:14	218.20	223.20	3	1	20060406 14:32:15	20060406 14:52:36	1.58E-08	0	2.39E-08
KFM01C	20060407 08:47	20060407 10:12	223.20	228.20	3	1	20060407 09:30:16	20060407 09:50:35	8.90E-08	0	2.00E-07
KFM01C	20060407 10:25	20060407 11:44	228.20	233.20	3	1	20060407 11:01:31	20060407 11:21:52	8.50E-08	0	1.02E-07
KFM01C	20060407 12:35	20060407 14:02	231.20	236.20	3	1	20060407 13:19:39	20060407 13:40:00	6.11E-08	0	6.94E-08
KFM01C	20060407 14:15	20060407 15:19	236.20	241.20	3	1	20060407 14:55:16	20060407 15:12:12		-1	
KFM01C	20060421 15:42	20060421 16:56	242.20	247.20	3	1	20060421 16:13:58	20060421 16:34:03		-1	
KFM01C	20060407 16:44	20060407 17:32	244.30	249.30	3	1	20060407 17:22:45	20060407 17:24:37		-1	
KFM01C	20060410 08:26	20060410 09:44	249.30	254.30	3	1	20060410 09:02:13	20060410 09:22:34	1.45E-08	0	3.04E-08
KFM01C	20060410 09:57	20060410 11:14	254.30	259.30	3	1	20060410 10:32:08	20060410 10:52:30	2.28E-08	0	3.31E-08
KFM01C	20060410 12:00	20060410 13:07	259.30	264.30	3	1	20060410 12:35:21	20060410 12:55:26		-1	
KFM01C	20060410 13:24	20060410 14:28	264.30	269.30	3	1	20060410 14:00:22	20060410 14:20:29		-1	
KFM01C	20060410 15:10	20060410 16:25	269.30	274.30	3	1	20060410 15:42:39	20060410 16:03:01	1.27E-08	0	2.49E-08
KFM01C	20060410 16:46	20060411 09:05	274.30	279.30	3	1	20060411 08:22:43	20060411 08:43:07	8.36E-09	0	1.58E-08
KFM01C	20060411 09:30	20060411 10:46	279.30	284.30	3	1	20060411 10:04:15	20060411 10:24:40	1.39E-08	0	2.75E-08
KFM01C	20060411 11:22	20060411 13:23	284.30	289.30	3	1	20060411 12:41:21	20060411 13:01:45	1.94E-08	0	3.50E-08
KFM01C	20060411 13:47	20060411 15:03	289.30	294.30	3	1	20060411 14:20:57	20060411 14:41:21	5.61E-09	0	1.03E-08
KFM01C	20060411 15:17	20060411 16:12	294.30	299.30	3	1	20060411 15:49:25	20060411 16:05:16		-1	
KFM01C	20060411 16:25	20060411 17:42	299.30	304.30	3	1	20060411 16:59:30	20060411 17:19:54	8.98E-09	0	2.02E-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
KFM01C	20060412 08:15	20060412 09:30	304.30	309.30	3	1	20060412 08:48:05	20060412 09:08:30	6.83E-09	0	9.06E-09
KFM01C	20060412 09:44	20060412 11:01	309.30	314.30	3	1	20060412 10:18:58	20060412 10:39:22	5.87E-08	0	8.21E-08
KFM01C	20060412 11:14	20060412 13:11	314.30	319.30	3	1	20060412 12:29:11	20060412 12:49:36	7.59E-09	0	1.16E-08
KFM01C	20060412 13:25	20060412 14:41	316.50	321.50	3	1	20060412 13:59:20	20060412 14:19:44		-1	
KFM01C	20060412 15:13	20060412 16:00	321.50	326.50	3	1	20060412 15:45:57	20060412 15:52:40		-1	
KFM01C	20060412 16:19	20060412 17:06	326.50	331.50	3	1	20060412 16:51:25	20060412 16:59:23		-1	
KFM01C	20060418 08:21	20060418 09:40	331.50	336.50	3	1	20060418 08:57:44	20060418 09:18:08	1.60E-08	0	2.66E-08
KFM01C	20060418 09:53	20060418 10:45	336.50	341.50	3	1	20060418 10:26:06	20060418 10:37:56		-1	
KFM01C	20060418 11:04	20060418 12:58	341.50	346.50	3	1	20060418 12:23:26	20060418 12:43:32		-1	
KFM01C	20060418 13:24	20060418 14:40	346.50	351.50	3	1	20060418 13:57:32	20060418 14:17:57	5.06E-09	0	1.51E-08
KFM01C	20060418 14:57	20060418 16:11	351.50	356.50	3	1	20060418 15:29:08	20060418 15:49:32	1.30E-08	0	3.06E-08
KFM01C	20060418 16:25	20060418 17:39	355.70	360.70	3	1	20060418 16:56:38	20060418 17:17:01	1.26E-08	0	1.67E-08
KFM01C	20060419 07:21	20060419 08:40	360.70	365.70	3	1	20060419 07:58:18	20060419 08:18:44	1.86E-08	0	2.57E-08
KFM01C	20060419 08:55	20060419 10:12	365.70	370.70	3	1	20060419 09:29:32	20060419 09:49:56	9.67E-09	0	1.91E-08
KFM01C	20060419 10:24	20060419 11:40	370.70	375.70	3	1	20060419 10:58:15	20060419 11:18:20		-1	
KFM01C	20060419 12:42	20060419 13:39	375.70	380.70	3	1	20060419 13:16:13	20060419 13:30:59		-1	
KFM01C	20060419 14:00	20060419 15:16	380.70	385.70	3	1	20060419 14:33:33	20060419 14:53:57	7.09E-09	0	1.68E-08
KFM01C	20060420 08:16	20060420 09:33	385.00	390.00	3	1	20060420 08:50:25	20060420 09:10:49	8.50E-09	0	1.67E-08
KFM01C	20060420 09:48	20060420 10:43	390.00	395.00	3	1	20060420 10:22:30	20060420 10:35:44		-1	
KFM01C	20060420 11:04	20060420 12:53	395.00	400.00	3	1	20060420 12:25:52	20060420 12:45:58		-1	
KFM01C	20060420 13:15	20060420 14:32	400.00	405.00	3	1	20060420 13:49:55	20060420 14:10:20	1.36E-08	0	1.80E-08
KFM01C	20060420 14:43	20060420 15:32	403.00	408.00	3	1	20060420 15:14:52	20060420 15:25:29		-1	
KFM01C	20060420 15:47	20060420 16:33	408.00	413.00	3	1	20060420 16:19:23	20060420 16:25:52		-1	
KFM01C	20060420 16:58	20060421 08:20	413.00	418.00	3	1	20060421 08:10:45	20060421 08:12:55		-1	
KFM01C	20060421 08:36	20060421 09:18	418.00	423.00	3	1	20060421 09:09:03	20060421 09:10:49		-1	
KFM01C	20060421 09:35	20060421 10:19	423.00	428.00	3	1	20060421 10:10:06	20060421 10:12:16		-1	
KFM01C	20060421 10:32	20060421 11:14	428.00	433.00	3	1	20060421 11:05:15	20060421 11:08:34		-1	
KFM01C	20060421 11:28	20060421 13:18	433.00	438.00	3	1	20060421 12:35:58	20060421 12:56:19	6.93E-07	0	9.75E-07
KFM01C[1)]	20060327 15:18	20060327 16:13	25.50	30.50	3	1	20060327 16:01:15	20060327 16:13:42	8.27E-05	0	6.71E-05

[1)] The test were interrupted for various reasons or did not provide satisfying data for the evaluation and were hence re-performed later.

KFM01C 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
KFM01C	15.50	20.50	1.7E-08	1.0E-03	4.21E-01	1199	1211	186.71	244.79	190.30	13.77
KFM01C	20.50	25.50	1.7E-08	1.0E-03	1.07E-02	1214	1211	224.01	432.22	224.97	7.19
KFM01C	25.50	30.50	1.7E-08	1.0E-03	8.08E-02	1217	1210	262.40	454.38	263.50	10.65
KFM01C	30.50	35.50	1.7E-08	1.0E-03	7.46E-01	1186	1213	297.64	328.46	299.29	15.65
KFM01C	32.80	37.80	1.7E-08	1.0E-03	6.30E-01	1180	1216	316.08	338.40	315.81	10.73
KFM01C	38.80	43.80	1.7E-08	1.0E-03	6.72E-01	1208	1219	359.98	394.19	360.38	12.43
KFM01C	44.80	49.80	1.7E-08	1.0E-03	1.01E-03	1217	1210	404.56	603.33	404.98	7.01
KFM01C	49.80	54.80	1.7E-08	1.0E-03	9.22E-03	1215	1209	441.31	652.06	443.51	6.65
KFM01C	54.80	59.80	1.7E-08	1.0E-03	2.58E-03	1215	1210	477.36	682.41	477.63	6.54
KFM01C	59.80	64.80	1.7E-08	1.0E-03	1.73E-03	1218	1209	514.51	685.03	515.06	6.57
KFM01C	64.80	69.80	1.7E-08	1.0E-03	6.10E-04	1218	1209	551.94	753.36	552.50	6.62
KFM01C	69.80	74.80	1.7E-08	1.0E-03	1.78E-03	1217	1209	589.38	788.65	589.38	6.62
KFM01C	74.80	79.80	1.7E-08	1.0E-03	3.35E-03	1216	1208	626.81	860.17	627.37	6.61
KFM01C	77.00	82.00	1.7E-08	1.0E-03	1.03E-02	1215	1211	643.33	844.38	643.33	6.56
KFM01C	82.00	87.00	1.7E-08	1.0E-03	9.57E-01	1183	1218	680.21	686.26	681.31	13.71
KFM01C	88.20	93.20	1.7E-08	1.0E-03	1.25E-01	1210	1216	728.65	930.91	729.19	7.57
KFM01C	92.00	97.00	1.7E-08	1.0E-03	1.18E-01	1215	1211	757.41	978.73	757.27	7.49
KFM01C	97.00	102.00	1.7E-08	1.0E-03	3.64E-01	1196	1215	795.25	874.52	801.31	9.76
KFM01C	102.00	107.00	1.7E-08	1.0E-03	7.00E-03	1220	1205	833.78	1062.22	936.73	6.97
KFM01C	107.00	112.00	1.7E-08	1.0E-03	1.80E-02	1216	1208	870.12	1068.30	944.98	6.89
KFM01C	112.00	117.00	1.7E-08	1.0E-03	7.50E-04	1218	1206	908.65	1109.01	923.51	6.82
KFM01C	117.00	122.00	1.7E-08	1.0E-03	8.86E-04	1219	1206	947.18	1145.49	964.25	6.84
KFM01C	122.00	127.00	1.7E-08	1.0E-03	2.44E-03	1217	1208	986.27	1192.42	1013.78	6.92
KFM01C	127.00	132.00	1.7E-08	1.0E-03	5.31E-04	1218	1206	1030.85	1263.84	1072.13	6.92
KFM01C	132.00	137.00	1.7E-08	1.0E-03	5.68E-04	1217	1206	1064.29	1263.47	1102.96	6.95
KFM01C	137.00	142.00	1.7E-08	1.0E-03	1.58E-03	1219	1206	1095.26	1302.64	1134.90	7.02
KFM01C	142.00	147.00	1.7E-08	1.0E-03	5.08E-04	1219	1206	1132.69	1333.06	1148.10	7.03
KFM01C	147.00	152.00	1.7E-08	1.0E-03	9.90E-04	1219	1199	1175.07	1411.35	1325.89	7.10

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
KFM01C	152.00	157.00	6.5E-09	1.0E-03		362	321	1232.88	1431.04	1413.43	7.12
KFM01C	157.00	162.00	5.3E-09	1.0E-03		1206	1221	1267.68	1470.12	1372.13	7.16
KFM01C	162.00	167.00	4.1E-09	1.0E-03		219	321	1309.94	1510.31	1502.60	7.19
KFM01C	165.00	170.00	4.1E-09	1.0E-03		198	322	1310.76	1531.78	1515.26	7.22
KFM01C	170.00	175.00	5.3E-09	1.0E-03		131	321	1348.47	1556.55	1553.79	7.27
KFM01C	175.00	180.00	4.1E-09	1.0E-03		894	322	1379.57	1604.99	1595.62	7.31
KFM01C	180.00	185.00	5.3E-09	1.0E-03		1222	375	1424.40	1638.15	1609.94	7.35
KFM01C	185.00	190.00	5.3E-09	1.0E-03		174	322	1458.01	1672.28	1671.59	7.39
KFM01C	190.00	195.00	1.7E-08	1.0E-03	5.67E-04	1219	1206	1488.01	1686.86	1559.29	7.44
KFM01C	195.00	200.00	1.7E-08	1.0E-03	8.49E-04	1219	1203	1524.89	1720.55	1578.01	7.48
KFM01C	200.00	205.00	4.1E-09	1.0E-03		1206	1221	1583.24	1778.38	1699.12	7.52
KFM01C	202.70	207.70	5.3E-09	1.0E-03		879	321	1614.48	1800.95	1775.63	7.54
KFM01C	207.70	212.70	5.3E-09	1.0E-03		1206	1221	1649.30	1836.73	1750.86	7.59
KFM01C	213.20	218.20	5.3E-09	1.0E-03		584	322	1687.55	1875.95	1856.00	7.63
KFM01C	218.20	223.20	6.5E-09	1.0E-03	2.89E-05	1221	1221	1701.32	1939.66	1784.44	7.67
KFM01C	223.20	228.20	1.7E-08	1.0E-03	2.45E-04	1219	1203	1736.14	1940.75	1870.85	7.71
KFM01C	228.20	233.20	1.7E-08	1.0E-03	1.25E-04	1221	1205	1774.53	2002.73	1808.11	7.75
KFM01C	231.20	236.20	1.7E-08	1.0E-03	8.48E-05	1221	1205	1803.98	2024.03	1822.97	7.78
KFM01C	236.20	241.20	7.7E-09	1.0E-03		1016	321	1845.81	2058.57	2029.94	7.84
KFM01C	242.20	247.20	3.7E-09	1.0E-03		1205	1221	1889.85	2070.68	2081.14	7.88
KFM01C	244.30	249.30	4.1E-09	1.0E-03		112	323	1925.36	2125.31	2129.58	7.89
KFM01C	249.30	254.30	2.8E-09	1.0E-03	3.66E-05	1221	1221	1962.79	2163.70	2065.72	7.94
KFM01C	254.30	259.30	2.8E-09	1.0E-03	4.05E-05	1222	1203	1977.10	2201.13	2025.54	7.97
KFM01C	259.30	264.30	5.3E-09	1.0E-03		1205	615	2024.44	2240.76	2181.31	8.02
KFM01C	264.30	269.30	7.7E-09	1.0E-03		1207	324	2078.38	2274.90	2270.49	8.05
KFM01C	269.30	274.30	5.3E-09	1.0E-03	3.00E-05	1222	1221	2085.53	2313.99	2211.59	8.09
KFM01C	274.30	279.30	4.1E-09	1.0E-03	1.90E-05	1224	1220	2119.12	2340.95	2169.76	8.12
KFM01C	279.30	284.30	5.3E-09	1.0E-03	3.31E-05	1225	1221	2172.10	2383.34	2290.31	8.17
KFM01C	284.30	289.30	1.7E-08	1.0E-03	4.24E-05	1224	1217	2195.49	2409.20	2273.79	8.21
KFM01C	289.30	294.30	5.5E-09	1.0E-03	1.24E-05	1224	1221	2276.00	2442.38	2323.89	8.25
KFM01C	294.30	299.30	6.0E-09	1.0E-03		951	322	2326.37	2491.23	2474.72	8.31
KFM01C	299.30	304.30	5.0E-09	1.0E-03	2.43E-05	1224	1221	2305.45	2527.57	2392.70	8.34

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
KFM01C	304.30	309.30	5.0E-09	1.0E-03	1.09E-05	1225	1221	2345.36	2568.66	2405.36	8.39
KFM01C	309.30	314.30	1.7E-08	1.0E-03	1.01E-04	1224	1200	2388.29	2598.93	2438.38	8.42
KFM01C	314.30	319.30	5.0E-09	1.0E-03	1.40E-05	1225	1221	2420.91	2640.96	2469.21	8.46
KFM01C	316.50	321.50	5.0E-09	1.0E-03		1224	1221	2474.16	2656.92	2582.61	8.49
KFM01C	321.50	326.50	4.1E-09	1.0E-03		403	321	2570.22	2700.82	2708.11	8.52
KFM01C	326.50	331.50	5.0E-09	1.0E-03		478	321	2521.78	2738.80	2714.72	8.56
KFM01C	331.50	336.50	5.0E-09	1.0E-03	3.21E-05	1224	1221	2572.70	2774.17	2631.05	8.61
KFM01C	336.50	341.50	5.0E-09	1.0E-03		710	322	2606.42	2810.77	2789.58	8.64
KFM01C	341.50	346.50	5.0E-09	1.0E-03		1206	786	2626.09	2849.58	2785.18	8.68
KFM01C	346.50	351.50	5.0E-09	1.0E-03	1.82E-05	1225	1221	2655.82	2875.46	2750.49	8.74
KFM01C	351.50	356.50	5.0E-09	1.0E-03	3.69E-05	1224	1221	2689.40	2913.43	2828.12	8.77
KFM01C	355.70	360.70	4.0E-09	1.0E-03	2.01E-05	1223	1221	2732.88	2951.78	2786.82	8.80
KFM01C	360.70	365.70	1.7E-08	1.0E-03	3.15E-05	1226	1199	2769.63	2997.06	2791.79	8.85
KFM01C	365.70	370.70	6.0E-09	1.0E-03	2.30E-05	1224	1221	2829.76	3039.43	2890.32	8.88
KFM01C	370.70	375.70	6.0E-09	1.0E-03		1205	1221	2846.42	3071.41	2957.47	8.92
KFM01C	375.70	380.70	5.0E-09	1.0E-03		886	354	2873.66	3104.18	3107.76	8.97
KFM01C	380.70	385.70	4.1E-09	1.0E-03	2.02E-05	1224	1221	2912.33	3136.03	2980.59	9.01
KFM01C	385.00	390.00	5.0E-09	1.0E-03	2.02E-05	1224	1221	2950.04	3171.60	3015.27	9.02
KFM01C	390.00	395.00	6.4E-09	1.0E-03		794	321	2991.74	3210.68	3227.75	9.10
KFM01C	395.00	400.00	4.2E-09	1.0E-03		1206	322	3009.21	3248.67	3242.61	9.12
KFM01C	400.00	405.00	1.0E-08	1.0E-03	2.17E-05	1225	1221	3071.83	3283.30	3209.03	9.16
KFM01C	403.00	408.00	5.3E-09	1.0E-03		637	321	3099.62	3303.02	3333.44	9.18
KFM01C	408.00	413.00	5.3E-09	1.0E-03		389	321	3117.25	3337.15	3353.80	9.22
KFM01C	413.00	418.00	4.2E-09	1.0E-03		130	321	3125.50	3374.99	3367.57	9.25
KFM01C	418.00	423.00	4.2E-09	1.0E-03		106	321	3209.58	3376.37	3363.16	9.31
KFM01C	423.00	428.00	4.2E-09	1.0E-03		130	320	3277.84	3413.67	3450.14	9.36
KFM01C	428.00	433.00	4.1E-09	1.0E-03		199	220	3288.98	3447.94	3451.79	9.39
KFM01C	433.00	438.00	1.7E-08	1.0E-03	1.20E-03	1221	1200	3270.82	3476.66	3342.79	9.45
KFM01C[1)]	25.50	30.50				747	0	261.85	483.28		9.44

[1)] The test were interrupted for various reasons or did not provide satisfying data for the evaluation and were hence re-performed later

KFM01C 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
KFM01C	20060324 09:12	20060324 10:52	15.50	20.50	3	1	5.03E-05	0	4.15E-05	0	0	8.31E-06	5.00
KFM01C	20060324 11:14	20060324 13:11	20.50	25.50	3	1	4.05E-07	0	3.35E-07	0	0	6.69E-08	5.00
KFM01C	20060327 16:20	20060327 17:36	25.50	30.50	3	1	3.21E-06	0	2.65E-06	0	0	5.30E-07	5.00
KFM01C	20060328 08:26	20060328 09:43	30.50	35.50	3	1	1.95E-04	0	1.61E-04	0	0	3.21E-05	5.00
KFM01C	20060328 10:19	20060328 11:33	32.80	37.80	3	1	2.35E-04	0	1.94E-04	0	1	3.89E-05	5.00
KFM01C	20060328 12:34	20060328 13:50	38.80	43.80	3	1	1.51E-04	0	1.25E-04	0	0	2.50E-05	5.00
KFM01C	20060328 14:14	20060328 15:35	44.80	49.80	3	1	3.84E-08	0	3.18E-08	0	0	6.35E-09	5.00
KFM01C	20060328 15:49	20060328 17:06	49.80	54.80	3	1	3.20E-07	0	2.64E-07	0	0	5.28E-08	5.00
KFM01C	20060329 08:33	20060329 09:50	54.80	59.80	3	1	9.05E-08	0	7.48E-08	0	0	1.50E-08	5.00
KFM01C	20060329 10:02	20060329 11:21	59.80	64.80	3	1	7.69E-08	0	6.35E-08	0	0	1.27E-08	5.00
KFM01C	20060329 11:32	20060329 13:21	64.80	69.80	3	1	2.21E-08	0	1.82E-08	0	0	3.65E-09	5.00
KFM01C	20060329 13:37	20060329 14:54	69.80	74.80	3	1	6.90E-08	0	5.70E-08	0	0	1.14E-08	5.00
KFM01C	20060329 15:08	20060329 16:26	74.80	79.80	3	1	1.09E-07	0	9.03E-08	0	0	1.81E-08	5.00
KFM01C	20060330 08:12	20060330 09:41	77.00	82.00	3	1	4.00E-07	0	3.30E-07	0	0	6.60E-08	5.00
KFM01C	20060330 13:13	20060330 14:29	82.00	87.00	3	1	1.33E-03	1	1.10E-03	1	0	2.20E-04	5.00
KFM01C	20060331 08:05	20060331 09:26	88.20	93.20	3	1	4.88E-06	0	4.03E-06	0	0	8.06E-07	5.00
KFM01C	20060331 09:51	20060331 11:10	92.00	97.00	3	1	4.34E-06	0	3.58E-06	0	0	7.17E-07	5.00
KFM01C	20060331 11:28	20060331 13:28	97.00	102.00	3	1	2.93E-05	0	2.42E-05	0	0	4.84E-06	5.00
KFM01C	20060331 13:51	20060331 15:09	102.00	107.00	3	1	1.09E-07	0	9.03E-08	0	0	1.81E-08	5.00
KFM01C	20060331 15:33	20060331 16:52	107.00	112.00	3	1	4.02E-07	0	3.32E-07	0	0	6.64E-08	5.00
KFM01C	20060403 08:01	20060403 09:21	112.00	117.00	3	1	2.69E-08	0	2.23E-08	0	0	4.45E-09	5.00
KFM01C	20060403 09:33	20060403 10:54	117.00	122.00	3	1	3.07E-08	0	2.54E-08	0	0	5.08E-09	5.00
KFM01C	20060403 11:08	20060403 13:20	122.00	127.00	3	1	7.85E-08	0	6.49E-08	0	0	1.30E-08	5.00
KFM01C	20060403 13:37	20060403 15:09	127.00	132.00	3	1	1.45E-08	0	1.20E-08	0	0	2.40E-09	5.00
KFM01C	20060403 15:24	20060403 16:43	132.00	137.00	3	1	1.77E-08	0	1.46E-08	0	0	2.93E-09	5.00
KFM01C	20060404 08:16	20060404 09:37	137.00	142.00	3	1	5.05E-08	0	4.17E-08	0	0	8.34E-09	5.00
KFM01C	20060404 09:57	20060404 11:19	142.00	147.00	3	1	1.27E-08	0	1.05E-08	0	0	2.10E-09	5.00
KFM01C	20060404 11:31	20060404 13:32	147.00	152.00	3	1	1.30E-08	0	1.07E-08	0	0	2.14E-09	5.00
KFM01C	20060404 14:12	20060404 15:02	152.00	157.00	3	1	3.27E-10	-1	2.70E-10	-1	0	5.40E-11	5.00
KFM01C	20060404 15:18	20060404 16:36	157.00	162.00	3	1	2.65E-10	-1	2.19E-10	-1	0	4.38E-11	5.00
KFM01C	20060405 09:09	20060405 09:58	162.00	167.00	3	1	2.05E-10	-1	1.69E-10	-1	0	3.39E-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
KFM01C	20060405 10:12	20060405 11:01	165.00	170.00	3	1	2.05E-10	-1	1.69E-10	-1	0	3.39E-11	5.00
KFM01C	20060405 11:14	20060405 12:01	170.00	175.00	3	1	2.65E-10	-1	2.19E-10	-1	0	4.38E-11	5.00
KFM01C	20060405 12:13	20060405 13:49	175.00	180.00	3	1	2.05E-10	-1	1.69E-10	-1	0	3.39E-11	5.00
KFM01C	20060405 14:06	20060405 15:19	180.00	185.00	3	1	2.64E-10	-1	2.18E-10	-1	0	4.37E-11	5.00
KFM01C	20060405 15:36	20060405 16:22	185.00	190.00	3	1	2.64E-10	-1	2.18E-10	-1	0	4.37E-11	5.00
KFM01C	20060405 16:40	20060405 18:04	190.00	195.00	3	1	1.33E-08	0	1.10E-08	0	0	2.19E-09	5.00
KFM01C	20060405 18:27	20060405 19:44	195.00	200.00	3	1	2.32E-08	0	1.92E-08	0	0	3.84E-09	5.00
KFM01C	20060406 07:20	20060406 08:55	200.00	205.00	3	1	2.04E-10	-1	1.68E-10	-1	0	3.37E-11	5.00
KFM01C	20060406 09:14	20060406 10:11	202.70	207.70	3	1	2.64E-10	-1	2.18E-10	-1	0	4.37E-11	5.00
KFM01C	20060406 10:27	20060406 11:44	207.70	212.70	3	1	2.64E-10	-1	2.18E-10	-1	0	4.37E-11	5.00
KFM01C	20060406 12:45	20060406 13:36	213.20	218.20	3	1	2.64E-10	-1	2.18E-10	-1	0	4.37E-11	5.00
KFM01C	20060406 13:50	20060406 15:14	218.20	223.20	3	1	6.51E-10	0	5.37E-10	0	0	1.07E-10	5.00
KFM01C	20060407 08:47	20060407 10:12	223.20	228.20	3	1	4.27E-09	0	3.53E-09	0	0	7.05E-10	5.00
KFM01C	20060407 10:25	20060407 11:44	228.20	233.20	3	1	3.66E-09	0	3.02E-09	0	0	6.04E-10	5.00
KFM01C	20060407 12:35	20060407 14:02	231.20	236.20	3	1	2.73E-09	0	2.25E-09	0	0	4.50E-10	5.00
KFM01C	20060407 14:15	20060407 15:19	236.20	241.20	3	1	3.87E-10	-1	3.20E-10	-1	0	6.39E-11	5.00
KFM01C	20060421 15:42	20060421 16:56	242.20	247.20	3	1	1.85E-10	-1	1.53E-10	-1	0	3.06E-11	5.00
KFM01C	20060407 16:44	20060407 17:32	244.30	249.30	3	1	2.04E-10	-1	1.68E-10	-1	0	3.37E-11	5.00
KFM01C	20060410 08:26	20060410 09:44	249.30	254.30	3	1	7.08E-10	0	5.85E-10	0	0	1.17E-10	5.00
KFM01C	20060410 09:57	20060410 11:14	254.30	259.30	3	1	9.98E-10	0	8.24E-10	0	0	1.65E-10	5.00
KFM01C	20060410 12:00	20060410 13:07	259.30	264.30	3	1	2.64E-10	-1	2.18E-10	-1	0	4.37E-11	5.00
KFM01C	20060410 13:24	20060410 14:28	264.30	269.30	3	1	3.87E-10	-1	3.20E-10	-1	0	6.39E-11	5.00
KFM01C	20060410 15:10	20060410 16:25	269.30	274.30	3	1	5.44E-10	0	4.49E-10	0	0	8.98E-11	5.00
KFM01C	20060410 16:46	20060411 09:05	274.30	279.30	3	1	3.70E-10	0	3.06E-10	0	0	6.11E-11	5.00
KFM01C	20060411 09:30	20060411 10:46	279.30	284.30	3	1	6.45E-10	0	5.33E-10	0	0	1.07E-10	5.00
KFM01C	20060411 11:22	20060411 13:23	284.30	289.30	3	1	8.91E-10	0	7.36E-10	0	0	1.47E-10	5.00
KFM01C	20060411 13:47	20060411 15:03	289.30	294.30	3	1	3.31E-10	0	2.73E-10	0	0	5.46E-11	5.00
KFM01C	20060411 15:17	20060411 16:12	294.30	299.30	3	1	3.00E-10	-1	2.48E-10	-1	0	4.96E-11	5.00
KFM01C	20060411 16:25	20060411 17:42	299.30	304.30	3	1	3.97E-10	0	3.28E-10	0	0	6.55E-11	5.00
KFM01C	20060412 08:15	20060412 09:30	304.30	309.30	3	1	3.00E-10	0	2.48E-10	0	1	4.96E-11	5.00
KFM01C	20060412 09:44	20060412 11:01	309.30	314.30	3	1	2.73E-09	0	2.26E-09	0	0	4.51E-10	5.00
KFM01C	20060412 11:14	20060412 13:11	314.30	319.30	3	1	3.38E-10	0	2.80E-10	0	0	5.59E-11	5.00
KFM01C	20060412 13:25	20060412 14:41	316.50	321.50	3	1	2.50E-10	-1	2.06E-10	-1	0	4.13E-11	5.00
KFM01C	20060412 15:13	20060412 16:00	321.50	326.50	3	1	2.05E-10	-1	1.69E-10	-1	0	3.39E-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
KFM01C	20060412 16:19	20060412 17:06	326.50	331.50	3	1	2.50E-10	-1	2.06E-10	-1	0	4.13E-11	5.00
KFM01C	20060418 08:21	20060418 09:40	331.50	336.50	3	1	7.81E-10	0	6.45E-10	0	0	1.29E-10	5.00
KFM01C	20060418 09:53	20060418 10:45	336.50	341.50	3	1	2.50E-10	-1	2.06E-10	-1	0	4.13E-11	5.00
KFM01C	20060418 11:04	20060418 12:58	341.50	346.50	3	1	2.50E-10	-1	2.06E-10	-1	0	4.13E-11	5.00
KFM01C	20060418 13:24	20060418 14:40	346.50	351.50	3	1	2.26E-10	0	1.87E-10	0	0	3.74E-11	5.00
KFM01C	20060418 14:57	20060418 16:11	351.50	356.50	3	1	5.71E-10	0	4.71E-10	0	0	9.43E-11	5.00
KFM01C	20060418 16:25	20060418 17:39	355.70	360.70	3	1	5.66E-10	0	4.67E-10	0	0	9.35E-11	5.00
KFM01C	20060419 07:21	20060419 08:40	360.70	365.70	3	1	8.01E-10	0	6.61E-10	0	0	1.32E-10	5.00
KFM01C	20060419 08:55	20060419 10:12	365.70	370.70	3	1	4.52E-10	0	3.74E-10	0	0	7.47E-11	5.00
KFM01C	20060419 10:24	20060419 11:40	370.70	375.70	3	1	3.00E-10	-1	2.48E-10	-1	0	4.96E-11	5.00
KFM01C	20060419 12:42	20060419 13:39	375.70	380.70	3	1	2.50E-10	-1	2.06E-10	-1	0	4.13E-11	5.00
KFM01C	20060419 14:00	20060419 15:16	380.70	385.70	3	1	3.11E-10	0	2.57E-10	0	0	5.14E-11	5.00
KFM01C	20060420 08:16	20060420 09:33	385.00	390.00	3	1	3.76E-10	0	3.11E-10	0	0	6.22E-11	5.00
KFM01C	20060420 09:48	20060420 10:43	390.00	395.00	3	1	3.22E-10	-1	2.66E-10	-1	0	5.32E-11	5.00
KFM01C	20060420 11:04	20060420 12:53	395.00	400.00	3	1	2.10E-10	-1	1.73E-10	-1	0	3.46E-11	5.00
KFM01C	20060420 13:15	20060420 14:32	400.00	405.00	3	1	6.30E-10	0	5.20E-10	0	0	1.04E-10	5.00
KFM01C	20060420 14:43	20060420 15:32	403.00	408.00	3	1	2.64E-10	-1	2.18E-10	-1	0	4.37E-11	5.00
KFM01C	20060420 15:47	20060420 16:33	408.00	413.00	3	1	2.64E-10	-1	2.18E-10	-1	0	4.37E-11	5.00
KFM01C	20060420 16:58	20060421 08:20	413.00	418.00	3	1	2.10E-10	-1	1.73E-10	-1	0	3.46E-11	5.00
KFM01C	20060421 08:36	20060421 09:18	418.00	423.00	3	1	2.10E-10	-1	1.73E-10	-1	0	3.46E-11	5.00
KFM01C	20060421 09:35	20060421 10:19	423.00	428.00	3	1	2.10E-10	-1	1.73E-10	-1	0	3.46E-11	5.00
KFM01C	20060421 10:32	20060421 11:14	428.00	433.00	3	1	2.04E-10	-1	1.68E-10	-1	0	3.37E-11	5.00
KFM01C	20060421 11:28	20060421 13:18	433.00	438.00	3	1	3.30E-08	0	2.73E-08	0	0	5.46E-09	5.00
KFM01C	20060327 15:18	20060327 16:13	25.50	30.50	3	1							5.00

[1] The test were interrupted for various reasons or did not provide satisfying data for the evaluation and were hence re-performed later

KFM01C 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	s_bc	ri	ri_index	c	skin	t1	t2	dte1	dte2
KFM01C	15.50	20.50	2.67E-05	0	1	2.8E-09	5.0E-04	3.62E-06	3.62E-06	141.20	0		-4.99	200	1200		
KFM01C	20.50	25.50	3.37E-07	0	1	7.9E-10	5.0E-04	4.06E-07	4.06E-07	47.59	-1		-0.91				
KFM01C	25.50	30.50	3.44E-06	0	1	8.5E-10	5.0E-04	1.30E-06	1.30E-06	85.18	-1		-0.17				
KFM01C	30.50	35.50	2.96E-04	0	1	5.3E-09	5.0E-04	1.20E-05	1.20E-05	223.09	1		0.65	300	900		
KFM01C	32.80	37.80	4.48E-04	0	0	7.3E-09	5.0E-04	9.76E-06	9.76E-06	229.92	-1		4.33				
KFM01C	38.80	43.80	1.94E-04	0	1	4.8E-09	5.0E-04	9.75E-06	9.75E-06	232.56	1		-0.69				
KFM01C	44.80	49.80	4.12E-08	0	1	8.2E-10	5.0E-04	1.42E-07	1.42E-07	27.97	0		0.16	40	1200		
KFM01C	49.80	54.80	1.02E-07	0	1	7.8E-10	5.0E-04	2.24E-07	2.24E-07	35.35	-1		-4.29				
KFM01C	54.80	59.80	8.17E-08	0	1	8.0E-10	5.0E-04	2.00E-07	2.00E-07	33.20	0		-1.01	30	1200		
KFM01C	59.80	64.80	6.09E-08	0	1	9.6E-10	5.0E-04	1.73E-07	1.73E-07	31.08	-1		-1.30				
KFM01C	64.80	69.80	1.42E-08	0	1	8.1E-10	5.0E-04	8.34E-08	8.34E-08	21.60	-1		-1.88				
KFM01C	69.80	74.80	6.70E-08	0	1	8.2E-10	5.0E-04	1.81E-07	1.81E-07	31.82	-1		-0.30				
KFM01C	74.80	79.80	1.07E-07	0	1	7.0E-10	5.0E-04	2.29E-07	2.29E-07	35.74	-1		-0.01				
KFM01C	77.00	82.00	3.15E-07	0	1	8.1E-10	5.0E-04	3.93E-07	3.93E-07	46.74	-1		-0.16				
KFM01C	82.00	87.00	2.24E-04	1	1	2.7E-08	5.0E-04	1.05E-05	1.05E-05	238.43	-1		-5.80				
KFM01C	88.20	93.20	8.96E-06	0	1	8.1E-10	5.0E-04	2.10E-06	2.10E-06	107.90	-1		3.54				
KFM01C	92.00	97.00	2.46E-06	0	1	7.4E-10	5.0E-04	1.10E-06	1.10E-06	78.30	-1		-1.82				
KFM01C	97.00	102.00	7.80E-06	0	1	2.1E-09	5.0E-04	1.95E-06	1.95E-06	103.62	-1						
KFM01C	102.00	107.00	4.74E-08	0	1	7.2E-10	5.0E-04	1.52E-07	1.52E-07	28.97	0		-4.16	500	1200		
KFM01C	107.00	112.00	8.80E-08	0	1	8.3E-10	5.0E-04	2.08E-07	2.08E-07	33.94	0						
KFM01C	112.00	117.00	5.81E-09	0	1	8.2E-10	5.0E-04	5.34E-08	5.34E-08	17.27	-1		-4.66				
KFM01C	117.00	122.00	1.99E-08	0	1	8.2E-10	5.0E-04	9.88E-08	9.88E-08	23.33	0		-2.54	20	1200		
KFM01C	122.00	127.00	4.51E-08	0	1	7.9E-10	5.0E-04	1.49E-07	1.49E-07	28.62	0		-3.22	30	1200		
KFM01C	127.00	132.00	1.03E-08	0	1	7.0E-10	5.0E-04	7.12E-08	7.12E-08	8.09	1		-2.36	50	200		
KFM01C	132.00	137.00	1.41E-08	0	1	8.2E-10	5.0E-04	8.30E-08	8.30E-08	10.69	0		-2.42	30	300		
KFM01C	137.00	142.00	1.75E-08	0	1	7.9E-10	5.0E-04	9.25E-08	9.25E-08	22.58	0		-4.44	250	1200		
KFM01C	142.00	147.00	2.61E-09	0	1	8.2E-10	5.0E-04	3.57E-08	3.57E-08	14.14	0						
KFM01C	147.00	152.00	1.20E-09	0	1	6.9E-10	5.0E-04	2.42E-08	2.42E-08	11.65	-1		-5.96				

idcode	secup	seclow	transmissivity_tt	value_type_tt	bc_tt	l_measl_q_s	u_measl_q_s	assumed_s	s_bc	ri	ri_index	c	skin	t1	t2	dte1	dte2
KFM01C	152.00	157.00		-1	0	3.3E-10	5.0E-04										
KFM01C	157.00	162.00		-1	0	2.7E-10	5.0E-04										
KFM01C	162.00	167.00		-1	0	2.1E-10	5.0E-04										
KFM01C	165.00	170.00		-1	0	2.1E-10	5.0E-04										
KFM01C	170.00	175.00		-1	0	2.7E-10	5.0E-04										
KFM01C	175.00	180.00		-1	0	2.1E-10	5.0E-04										
KFM01C	180.00	185.00		-1	0	2.6E-10	5.0E-04										
KFM01C	185.00	190.00		-1	0	2.6E-10	5.0E-04										
KFM01C	190.00	195.00	3.48E-09	0	1	8.2E-10	5.0E-04	4.13E-08	4.13E-08	15.12	1						
KFM01C	195.00	200.00	8.85E-09	0	1	8.4E-10	5.0E-04	6.59E-08	6.59E-08	19.20	1	6.74E-10	-4.09				
KFM01C	200.00	205.00		-1	0	2.0E-10	5.0E-04										
KFM01C	202.70	207.70		-1	0	2.6E-10	5.0E-04										
KFM01C	207.70	212.70		-1	0	2.6E-10	5.0E-04										
KFM01C	213.20	218.20		-1	0	2.6E-10	5.0E-04										
KFM01C	218.20	223.20	1.13E-10	0	1	2.7E-10	5.0E-04	7.43E-09	7.43E-09	6.45	0	1.61E-11	-4.47				
KFM01C	223.20	228.20	3.24E-09	0	1	8.0E-10	5.0E-04	3.98E-08	3.98E-08	14.84	1		-4.72				
KFM01C	228.20	233.20	3.16E-09	0	1	7.2E-10	5.0E-04	3.93E-08	3.93E-08	8.50	1		-0.97	20	400		
KFM01C	231.20	236.20	2.16E-09	0	1	7.4E-10	5.0E-04	3.25E-08	3.25E-08	13.52	0		-0.88	20	1225		
KFM01C	236.20	241.20		-1	0	3.9E-10	5.0E-04										
KFM01C	242.20	247.20		-1	0	1.9E-10	5.0E-04										
KFM01C	244.30	249.30		-1	0	2.0E-10	5.0E-04										
KFM01C	249.30	254.30	1.72E-10	0	1	1.4E-10	5.0E-04	9.18E-09	9.18E-09	7.17	1						
KFM01C	254.30	259.30	3.81E-10	0	1	1.2E-10	5.0E-04	1.37E-08	1.37E-08	10.63	0	2.73E-11	-3.24	30	1800		
KFM01C	259.30	264.30		-1	0	2.6E-10	5.0E-04										
KFM01C	264.30	269.30		-1	0	3.9E-10	5.0E-04										
KFM01C	269.30	274.30	2.28E-10	0	1	2.3E-10	5.0E-04	1.06E-08	1.06E-08	7.70	1						
KFM01C	274.30	279.30	1.78E-10	0	1	1.8E-10	5.0E-04	9.33E-09	9.33E-09	7.24	0	3.21E-11	-2.84				
KFM01C	279.30	284.30	6.53E-10	0	1	2.5E-10	5.0E-04	1.79E-08	1.79E-08	2.87	1		-2.98	10	100		
KFM01C	284.30	289.30	5.45E-10	0	1	7.7E-10	5.0E-04	1.63E-08	1.63E-08	8.66	1	1.49E-11	-3.25			70	1000
KFM01C	289.30	294.30	1.06E-10	0	1	3.2E-10	5.0E-04	7.20E-09	7.20E-09	6.35	1	9.52E-12	-3.26				
KFM01C	294.30	299.30		-1	0	3.0E-10	5.0E-04										
KFM01C	299.30	304.30	2.57E-10	0	1	2.2E-10	5.0E-04	1.12E-08	1.12E-08	7.93	0	1.59E-11	-3.01				

idcode	secup	seclow	transmissivity_tt	value_type_tt	bc_tt	l_measl_q_s	u_measl_q_s	assumed_s	s_bc	ri	ri_index	c	skin	t1	t2	dte1	dte2
KFM01C	304.30	309.30		0	0	2.2E-10	5.0E-04	1.10E-08	1.10E-08	7.87							
KFM01C	309.30	314.30	9.24E-10	0	1	7.8E-10	5.0E-04	2.13E-08	2.13E-08	10.94	1		-3.90				
KFM01C	314.30	319.30	8.78E-11	0	1	2.2E-10	5.0E-04	6.56E-09	6.56E-09	6.07	0		-2.78				
KFM01C	316.50	321.50		-1	0	2.5E-10	5.0E-04										
KFM01C	321.50	326.50		-1	0	2.1E-10	5.0E-04										
KFM01C	326.50	331.50		-1	0	2.5E-10	5.0E-04										
KFM01C	331.50	336.50	2.05E-10	0	1	2.4E-10	5.0E-04	1.00E-08	1.00E-08	7.50	1						
KFM01C	336.50	341.50		-1	0	2.5E-10	5.0E-04										
KFM01C	341.50	346.50		-1	0	2.5E-10	5.0E-04										
KFM01C	346.50	351.50	4.75E-11	0	1	2.2E-10	5.0E-04	4.82E-09	4.82E-09	5.20	1		-5.08				
KFM01C	351.50	356.50	1.00E-10	0	1	2.2E-10	5.0E-04	7.01E-09	7.01E-09	6.27	1		-5.38				
KFM01C	355.70	360.70	1.57E-10	0	1	1.8E-10	5.0E-04	8.78E-09	8.78E-09	7.02	1	2.41E-11	-3.11				
KFM01C	360.70	365.70	5.27E-10	0	1	7.2E-10	5.0E-04	1.61E-08	1.61E-08	9.51	1	1.70E-11	-1.51				
KFM01C	365.70	370.70	3.06E-10	0	1	2.8E-10	5.0E-04	1.22E-08	1.22E-08	8.29	0		-1.40				
KFM01C	370.70	375.70		-1	0	3.0E-10	5.0E-04										
KFM01C	375.70	380.70		-1	0	2.5E-10	5.0E-04										
KFM01C	380.70	385.70	2.04E-10	0	1	1.8E-10	5.0E-04	1.00E-08	1.00E-08	7.49	0		-1.54				
KFM01C	385.00	390.00	1.48E-10	0	1	2.2E-10	5.0E-04	8.51E-09	8.51E-09	6.91	-1	1.15E-11	-2.69				
KFM01C	390.00	395.00		-1	0	3.2E-10	5.0E-04										
KFM01C	395.00	400.00		-1	0	2.1E-10	5.0E-04										
KFM01C	400.00	405.00	1.15E-10	0	1	4.7E-10	5.0E-04	7.51E-09	7.51E-09	6.50	-1	4.69E-11	-3.63				
KFM01C	403.00	408.00		-1	0	2.6E-10	5.0E-04										
KFM01C	408.00	413.00		-1	0	2.6E-10	5.0E-04										
KFM01C	413.00	418.00		-1	0	2.1E-10	5.0E-04										
KFM01C	418.00	423.00		-1	0	2.1E-10	5.0E-04										
KFM01C	423.00	428.00		-1	0	2.1E-10	5.0E-04										
KFM01C	428.00	433.00		-1	0	2.0E-10	5.0E-04										
KFM01C	433.00	438.00	1.25E-08	0	1	7.9E-10	5.0E-04	7.83E-08	7.83E-08	14.68	1		-4.37	100	600		
KFM01C[1)]	25.50	30.50															

[1)] The test were interrupted for various reasons or did not provide satisfying data for the evaluation and were hence re-performed later

KFM01C plu_s_hole_test_obs (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
KFM01C	20060324 09:12	20060324 10:52	15.50	20.50	11.96	14.50	176.59	171.66	174.94				
KFM01C	20060324 09:12	20060324 10:52	15.50	20.50	21.50	450.02				228.84	229.39	228.84	
KFM01C	20060324 11:14	20060324 13:11	20.50	25.50	11.96	19.50	175.91	176.47	176.47				
KFM01C	20060324 11:14	20060324 13:11	20.50	25.50	26.50	450.02				266.81	266.81	266.81	
KFM01C	20060327 16:20	20060327 17:36	25.50	30.50	11.96	24.50	177.98	176.06	176.88				
KFM01C	20060327 16:20	20060327 17:36	25.50	30.50	31.50	450.02				304.22	304.22	304.22	
KFM01C	20060328 08:26	20060328 09:43	30.50	35.50	11.96	29.50	176.21	170.19	173.48				
KFM01C	20060328 08:26	20060328 09:43	30.50	35.50	36.50	450.02				339.98	340.95	339.98	
KFM01C	20060328 10:19	20060328 11:33	32.80	37.80	11.96	31.80	174.63	173.81	174.90				
KFM01C	20060328 10:19	20060328 11:33	32.80	37.80	38.80	450.02				356.49	357.59	357.04	
KFM01C	20060328 12:34	20060328 13:50	38.80	43.80	11.96	37.80	174.97	172.78	173.34				
KFM01C	20060328 12:34	20060328 13:50	38.80	43.80	44.80	450.02				401.34	401.89	401.61	
KFM01C	20060328 14:14	20060328 15:35	44.80	49.80	11.96	43.80	173.95	174.23	174.51				
KFM01C	20060328 14:14	20060328 15:35	44.80	49.80	50.80	450.02				445.62	445.62	445.62	
KFM01C	20060328 15:49	20060328 17:06	49.80	54.80	11.96	48.80	175.61	175.48	175.48				
KFM01C	20060328 15:49	20060328 17:06	49.80	54.80	55.80	450.02				483.04	483.04	483.04	
KFM01C	20060329 08:33	20060329 09:50	54.80	59.80	11.96	53.80	174.80	174.80	174.80				
KFM01C	20060329 08:33	20060329 09:50	54.80	59.80	60.80	450.02				519.36	519.36	519.36	
KFM01C	20060329 10:02	20060329 11:21	59.80	64.80	11.96	58.80	174.95	175.22	175.22				
KFM01C	20060329 10:02	20060329 11:21	59.80	64.80	65.80	450.02				556.77	556.63	556.77	
KFM01C	20060329 11:32	20060329 13:21	64.80	69.80	11.96	63.80	175.10	175.10	175.10				
KFM01C	20060329 11:32	20060329 13:21	64.80	69.80	70.80	450.02				593.90	594.04	594.18	
KFM01C	20060329 13:37	20060329 14:54	69.80	74.80	11.96	68.80	175.52	175.38	174.98				
KFM01C	20060329 13:37	20060329 14:54	69.80	74.80	75.80	450.02				631.33	631.46	631.60	
KFM01C	20060329 15:08	20060329 16:26	74.80	79.80	11.96	73.80	175.25	175.39	175.39				
KFM01C	20060329 15:08	20060329 16:26	74.80	79.80	80.80	450.02				668.47	668.61	669.01	
KFM01C	20060330 08:12	20060330 09:41	77.00	82.00	11.96	76.00	175.66	175.66	175.38				
KFM01C	20060330 08:12	20060330 09:41	77.00	82.00	83.00	450.02				684.97	684.97	684.97	

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KFM01C	20060330 13:13	20060330 14:29	82.00	87.00	11.96	81.00	175.26	170.88	173.07				
KFM01C	20060330 13:13	20060330 14:29	82.00	87.00	88.00	450.02				722.53	724.17	722.93	
KFM01C	20060331 08:05	20060331 09:26	88.20	93.20	11.96	87.20	176.99	177.12	177.12				
KFM01C	20060331 08:05	20060331 09:26	88.20	93.20	94.20	450.02				770.39	770.39	770.81	
KFM01C	20060331 09:51	20060331 11:10	92.00	97.00	11.96	91.00	177.75	177.75	177.75				
KFM01C	20060331 09:51	20060331 11:10	92.00	97.00	98.00	450.02				799.42	799.42	799.42	
KFM01C	20060331 11:28	20060331 13:28	97.00	102.00	11.96	96.00	178.18	175.99	177.08				
KFM01C	20060331 11:28	20060331 13:28	97.00	102.00	103.00	450.02				836.41	839.03	837.93	
KFM01C	20060331 13:51	20060331 15:09	102.00	107.00	11.96	101.00	178.46	178.19	178.05				
KFM01C	20060331 13:51	20060331 15:09	102.00	107.00	108.00	450.02				873.96	875.89	874.24	
KFM01C	20060331 15:33	20060331 16:52	107.00	112.00	11.96	106.00	178.34	178.48	178.48				
KFM01C	20060331 15:33	20060331 16:52	107.00	112.00	113.00	450.02				911.11	912.21	911.66	
KFM01C	20060403 08:01	20060403 09:21	112.00	117.00	11.96	111.00	180.54	180.12	179.98				
KFM01C	20060403 08:01	20060403 09:21	112.00	117.00	118.00	450.02				949.62	949.76	949.62	
KFM01C	20060403 09:33	20060403 10:54	117.00	122.00	11.96	116.00	180.42	180.42	180.42				
KFM01C	20060403 09:33	20060403 10:54	117.00	122.00	123.00	450.02				987.31	987.73	987.59	
KFM01C	20060403 11:08	20060403 13:20	122.00	127.00	11.96	121.00	180.16	180.02	179.74				
KFM01C	20060403 11:08	20060403 13:20	122.00	127.00	128.00	450.02				1024.73	1027.21	1027.21	
KFM01C	20060403 13:37	20060403 15:09	127.00	132.00	11.96	126.00	180.17	180.17	180.17				
KFM01C	20060403 13:37	20060403 15:09	127.00	132.00	133.00	450.02				1062.97	1063.38	1062.97	
KFM01C	20060403 15:24	20060403 16:43	132.00	137.00	11.96	131.00	180.04	179.77	180.04				
KFM01C	20060403 15:24	20060403 16:43	132.00	137.00	138.00	450.02				1100.38	1100.93	1100.38	
KFM01C	20060404 08:16	20060404 09:37	137.00	142.00	11.96	136.00	179.37	179.37	179.37				
KFM01C	20060404 08:16	20060404 09:37	137.00	142.00	143.00	450.02				1135.59	1136.97	1136.15	
KFM01C	20060404 09:57	20060404 11:19	142.00	147.00	11.96	141.00	179.10	178.97	178.70				
KFM01C	20060404 09:57	20060404 11:19	142.00	147.00	148.00	450.02				1174.11	1175.08	1175.21	
KFM01C	20060404 11:31	20060404 13:32	147.00	152.00	11.96	146.00	178.16	178.02	178.02				
KFM01C	20060404 11:31	20060404 13:32	147.00	152.00	153.00	450.02				1211.52	1211.39	1211.52	
KFM01C	20060404 14:12	20060404 15:02	152.00	157.00	11.96	151.00	177.76	177.35	177.35				
KFM01C	20060404 14:12	20060404 15:02	152.00	157.00	158.00	450.02				1247.29	1247.29	1247.29	
KFM01C	20060404 15:18	20060404 16:36	157.00	162.00	11.96	156.00	177.37	177.09	177.23				
KFM01C	20060404 15:18	20060404 16:36	157.00	162.00	163.00	450.02				1284.70	1284.84	1284.70	

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KFM01C	20060405 09:09	20060405 09:58	162.00	167.00	11.96	161.00	176.97	176.83	176.56				
KFM01C	20060405 09:09	20060405 09:58	162.00	167.00	168.00	450.02				1318.82	1318.82	1318.82	
KFM01C	20060405 10:12	20060405 11:01	165.00	170.00	11.96	164.00	177.13	177.13	177.13				
KFM01C	20060405 10:12	20060405 11:01	165.00	170.00	171.00	450.02				1341.93	1341.93	1341.93	
KFM01C	20060405 11:14	20060405 12:01	170.00	175.00	11.96	169.00	177.02	177.02	177.02				
KFM01C	20060405 11:14	20060405 12:01	170.00	175.00	176.00	450.02				1379.89	1379.89	1379.89	
KFM01C	20060405 12:13	20060405 13:49	175.00	180.00	11.96	174.00	176.48	176.34	176.34				
KFM01C	20060405 12:13	20060405 13:49	175.00	180.00	181.00	450.02				1417.58	1417.30	1417.30	
KFM01C	20060405 14:06	20060405 15:19	180.00	185.00	11.96	179.00	176.90	176.49	176.22				
KFM01C	20060405 14:06	20060405 15:19	180.00	185.00	186.00	450.02				1454.72	1454.72	1454.72	
KFM01C	20060405 15:36	20060405 16:22	185.00	190.00	11.96	184.00	176.64	176.64	176.64				
KFM01C	20060405 15:36	20060405 16:22	185.00	190.00	191.00	450.02				1491.31	1491.59	1491.03	
KFM01C	20060405 16:40	20060405 18:04	190.00	195.00	11.96	189.00	176.38	176.51	176.51				
KFM01C	20060405 16:40	20060405 18:04	190.00	195.00	196.00	450.02				1528.44	1531.20	1529.00	
KFM01C	20060405 18:27	20060405 19:44	195.00	200.00	11.96	194.00	176.53	176.40	176.40				
KFM01C	20060405 18:27	20060405 19:44	195.00	200.00	201.00	450.02				1565.86	1565.86	1565.86	
KFM01C	20060406 07:20	20060406 08:55	200.00	205.00	11.96	199.00	176.96	176.96	176.82				
KFM01C	20060406 07:20	20060406 08:55	200.00	205.00	206.00	450.02				1601.90	1602.04	1602.17	
KFM01C	20060406 09:14	20060406 10:11	202.70	207.70	11.96	201.70	176.36	176.63	176.90				
KFM01C	20060406 09:14	20060406 10:11	202.70	207.70	208.70	450.02				1622.54	1622.12	1621.98	
KFM01C	20060406 10:27	20060406 11:44	207.70	212.70	11.96	206.70	176.23	176.37	176.77				
KFM01C	20060406 10:27	20060406 11:44	207.70	212.70	213.70	450.02				1661.74	1661.46	1661.05	
KFM01C	20060406 12:45	20060406 13:36	213.20	218.20	11.96	212.20	175.79	175.93	176.21				
KFM01C	20060406 12:45	20060406 13:36	213.20	218.20	219.20	450.02				1700.66	1700.39	1700.66	
KFM01C	20060406 13:50	20060406 15:14	218.20	223.20	11.96	217.20	175.80	175.53	175.53				
KFM01C	20060406 13:50	20060406 15:14	218.20	223.20	224.20	450.02				1738.22	1738.22	1738.08	
KFM01C	20060407 08:47	20060407 10:12	223.20	228.20	11.96	222.20	177.05	177.18	177.05				
KFM01C	20060407 08:47	20060407 10:12	223.20	228.20	229.20	450.02				1774.81	1774.81	1774.39	
KFM01C	20060407 10:25	20060407 11:44	228.20	233.20	11.96	227.20	177.06	177.47	176.92				
KFM01C	20060407 10:25	20060407 11:44	228.20	233.20	234.20	450.02				1812.36	1812.49	1811.81	
KFM01C	20060407 12:35	20060407 14:02	231.20	236.20	11.96	230.20	177.24	177.10	176.97				
KFM01C	20060407 12:35	20060407 14:02	231.20	236.20	237.20	450.02				1834.23	1834.37	1834.37	

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KFM01C	20060407 14:15	20060407 15:19	236.20	241.20	11.96	235.20	176.97	177.11	176.84				
KFM01C	20060407 14:15	20060407 15:19	236.20	241.20	242.20	450.02				1871.78	1871.78	1871.78	
KFM01C	20060421 15:42	20060421 16:56	242.20	247.20	11.96	241.20	183.75	183.48	184.02				
KFM01C	20060421 15:42	20060421 16:56	242.20	247.20	248.20	450.02				1919.65	1919.65	1919.65	
KFM01C	20060407 16:44	20060407 17:32	244.30	249.30	11.96	243.30	176.82	176.55	176.55				
KFM01C	20060407 16:44	20060407 17:32	244.30	249.30	250.30	450.02				1934.92	1934.92	1934.51	
KFM01C	20060410 08:26	20060410 09:44	249.30	254.30	11.96	248.30	180.12	179.71	179.71				
KFM01C	20060410 08:26	20060410 09:44	249.30	254.30	255.30	450.02				1972.47	1971.92	1971.37	
KFM01C	20060410 09:57	20060410 11:14	254.30	259.30	11.96	253.30	179.58	179.72	179.58				
KFM01C	20060410 09:57	20060410 11:14	254.30	259.30	260.30	450.02				2010.58	2009.89	2009.89	
KFM01C	20060410 12:00	20060410 13:07	259.30	264.30	11.96	258.30	179.59	179.59	179.45				
KFM01C	20060410 12:00	20060410 13:07	259.30	264.30	265.30	450.02				2046.34	2046.21	2046.21	
KFM01C	20060410 13:24	20060410 14:28	264.30	269.30	11.96	263.30	179.20	179.34	179.34				
KFM01C	20060410 13:24	20060410 14:28	264.30	269.30	270.30	450.02				2086.09	2085.40	2085.26	
KFM01C	20060410 15:10	20060410 16:25	269.30	274.30	11.96	268.30	178.12	178.12	177.57				
KFM01C	20060410 15:10	20060410 16:25	269.30	274.30	275.30	450.02				2121.57	2121.03	2120.47	
KFM01C	20060410 16:46	20060411 09:05	274.30	279.30	11.96	273.30	175.81	175.26	175.81				
KFM01C	20060410 16:46	20060411 09:05	274.30	279.30	280.30	450.02				2154.59	2154.59	2154.59	
KFM01C	20060411 09:30	20060411 10:46	279.30	284.30	11.96	278.30	175.13	175.13	175.13				
KFM01C	20060411 09:30	20060411 10:46	279.30	284.30	285.30	450.02				2194.07	2193.10	2193.10	
KFM01C	20060411 11:22	20060411 13:23	284.30	289.30	11.96	283.30	175.00	175.28	175.55				
KFM01C	20060411 11:22	20060411 13:23	284.30	289.30	290.30	450.02				2229.83	2229.41	2229.41	
KFM01C	20060411 13:47	20060411 15:03	289.30	294.30	11.96	288.30	175.15	174.88	174.88				
KFM01C	20060411 13:47	20060411 15:03	289.30	294.30	295.30	450.02				2269.99	2268.49	2267.93	
KFM01C	20060411 15:17	20060411 16:12	294.30	299.30	11.96	293.30	174.75	174.48	174.21				
KFM01C	20060411 15:17	20060411 16:12	294.30	299.30	300.30	450.02				2307.01	2306.59	2306.45	
KFM01C	20060411 16:25	20060411 17:42	299.30	304.30	11.96	298.30	174.22	174.08	174.08				
KFM01C	20060411 16:25	20060411 17:42	299.30	304.30	305.30	450.02				2344.28	2343.73	2343.32	
KFM01C	20060412 08:15	20060412 09:30	304.30	309.30	11.96	303.30	173.56	173.42	173.42				
KFM01C	20060412 08:15	20060412 09:30	304.30	309.30	310.30	450.02				2378.53	2377.43	2376.88	
KFM01C	20060412 09:44	20060412 11:01	309.30	314.30	11.96	308.30	173.29	172.74	172.74				
KFM01C	20060412 09:44	20060412 11:01	309.30	314.30	315.30	450.02				2414.98	2414.56	2414.29	

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KFM01C	20060412 11:14	20060412 13:11	314.30	319.30	11.96	313.30	172.89	172.62	173.16				
KFM01C	20060412 11:14	20060412 13:11	314.30	319.30	320.30	450.02				2451.16	2451.16	2451.16	
KFM01C	20060412 13:25	20060412 14:41	316.50	321.50	11.96	315.50	173.02	173.16	173.16				
KFM01C	20060412 13:25	20060412 14:41	316.50	321.50	322.50	450.02				2469.31	2468.90	2468.76	
KFM01C	20060412 15:13	20060412 16:00	321.50	326.50	11.96	320.50	172.48	172.21	172.48				
KFM01C	20060412 15:13	20060412 16:00	321.50	326.50	327.50	450.02				2505.08	2504.52	2504.52	
KFM01C	20060412 16:19	20060412 17:06	326.50	331.50	11.96	325.50	171.94	171.81	171.81				
KFM01C	20060412 16:19	20060412 17:06	326.50	331.50	332.50	450.02				2541.53	2541.39	2541.39	
KFM01C	20060418 08:21	20060418 09:40	331.50	336.50	11.96	330.50	175.10	175.38	175.52				
KFM01C	20060418 08:21	20060418 09:40	331.50	336.50	337.50	450.02				2581.01	2579.63	2579.35	
KFM01C	20060418 09:53	20060418 10:45	336.50	341.50	11.96	335.50	174.98	174.84	174.84				
KFM01C	20060418 09:53	20060418 10:45	336.50	341.50	342.50	450.02				2617.46	2617.05	2616.77	
KFM01C	20060418 11:04	20060418 12:58	341.50	346.50	11.96	340.50	174.31	174.58	174.18				
KFM01C	20060418 11:04	20060418 12:58	341.50	346.50	347.50	450.02				2654.19	2653.77	2653.64	
KFM01C	20060418 13:24	20060418 14:40	346.50	351.50	11.96	345.50	173.92	173.92	173.50				
KFM01C	20060418 13:24	20060418 14:40	346.50	351.50	352.50	450.02				2693.39	2692.15	2691.60	
KFM01C	20060418 14:57	20060418 16:11	351.50	356.50	11.96	350.50	172.42	172.28	172.28				
KFM01C	20060418 14:57	20060418 16:11	351.50	356.50	357.50	450.02				2728.05	2727.37	2727.37	
KFM01C	20060418 16:25	20060418 17:39	355.70	360.70	11.96	354.70	171.56	171.56	171.56				
KFM01C	20060418 16:25	20060418 17:39	355.70	360.70	361.70	450.02				2758.86	2758.72	2758.72	
KFM01C	20060419 07:21	20060419 08:40	360.70	365.70	11.96	359.70	168.71	168.57	168.71				
KFM01C	20060419 07:21	20060419 08:40	360.70	365.70	366.70	450.02				2790.63	2790.08	2790.08	
KFM01C	20060419 08:55	20060419 10:12	365.70	370.70	11.96	364.70	167.76	167.76	167.49				
KFM01C	20060419 08:55	20060419 10:12	365.70	370.70	371.70	450.02				2828.19	2828.05	2827.50	
KFM01C	20060419 10:24	20060419 11:40	370.70	375.70	11.96	369.70	166.81	166.67	166.81				
KFM01C	20060419 10:24	20060419 11:40	370.70	375.70	376.70	450.02				2865.47	2864.92	2864.92	
KFM01C	20060419 12:42	20060419 13:39	375.70	380.70	11.96	374.70	165.73	165.73	165.59				
KFM01C	20060419 12:42	20060419 13:39	375.70	380.70	381.70	450.02				2901.51	2901.24	2900.68	
KFM01C	20060419 14:00	20060419 15:16	380.70	385.70	11.96	379.70	164.51	164.51	164.38				
KFM01C	20060419 14:00	20060419 15:16	380.70	385.70	386.70	450.02				2937.00	2936.45	2935.90	
KFM01C	20060420 08:16	20060420 09:33	385.00	390.00	11.96	384.00	163.05	162.91	162.91				
KFM01C	20060420 08:16	20060420 09:33	385.00	390.00	391.00	450.02				2965.88	2965.05	2965.05	

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KFM01C	20060420 09:48	20060420 10:43	390.00	395.00	11.96	389.00	162.10	162.10	162.24				
KFM01C	20060420 09:48	20060420 10:43	390.00	395.00	396.00	450.02				3004.40	3003.98	3004.12	
KFM01C	20060420 11:04	20060420 12:53	395.00	400.00	11.96	394.00	160.47	160.34	160.47				
KFM01C	20060420 11:04	20060420 12:53	395.00	400.00	401.00	450.02				3038.23	3037.68	3037.68	
KFM01C	20060420 13:15	20060420 14:32	400.00	405.00	11.96	399.00	159.11	158.98	158.71				
KFM01C	20060420 13:15	20060420 14:32	400.00	405.00	406.00	450.02				3074.55	3074.13	3074.00	
KFM01C	20060420 14:43	20060420 15:32	403.00	408.00	11.96	402.00	157.92	158.19	158.19				
KFM01C	20060420 14:43	20060420 15:32	403.00	408.00	409.00	450.02				3096.55	3096.55	3096.01	
KFM01C	20060420 15:47	20060420 16:33	408.00	413.00	11.96	407.00	156.70	156.42	156.42				
KFM01C	20060420 15:47	20060420 16:33	408.00	413.00	414.00	450.02				3132.32	3132.32	3132.32	
KFM01C	20060420 16:58	20060421 08:20	413.00	418.00	11.96	412.00	157.39	157.39	157.39				
KFM01C	20060420 16:58	20060421 08:20	413.00	418.00	419.00	450.02				3166.98	3166.98	3166.44	
KFM01C	20060421 08:36	20060421 09:18	418.00	423.00	11.96	417.00	155.76	155.76	155.63				
KFM01C	20060421 08:36	20060421 09:18	418.00	423.00	424.00	450.02				3204.26	3203.85	3203.85	
KFM01C	20060421 09:35	20060421 10:19	423.00	428.00	11.96	422.00	154.42	154.00	153.87				
KFM01C	20060421 09:35	20060421 10:19	423.00	428.00	429.00	450.02				3241.67	3241.26	3241.26	
KFM01C	20060421 10:32	20060421 11:14	428.00	433.00	11.96	427.00	152.37	152.24	152.10				
KFM01C	20060421 10:32	20060421 11:14	428.00	433.00	434.00	450.02				3279.91	3279.36	3279.22	
KFM01C	20060421 11:28	20060421 13:18	433.00	438.00	11.96	432.00	150.47	150.06	150.33				
KFM01C	20060421 11:28	20060421 13:18	433.00	438.00	439.00	450.02				3756.82	3747.46	3737.00	
KFM01C	20060327 15:18	20060327 16:13	25.50	30.50	11.96	24.50	177.98	177.57	0.00				Incomplete test, interrupted and reperformed later.
KFM01C	20060327 15:18	20060327 16:13	25.50	30.50	31.50	450.02				304.22	304.22	0.00	Incomplete test, interrupted and reperformed later.