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Oskarshamn site investigation

Hydraulic injection tests in borehole KLX12A

Subarea Laxemar

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September 2006

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Abstract

Borehole KLX12A is a deep core-drilled borehole within the site investigations in the Oskarshamn area. It is designed as telescopic borehole, with an enlarged diameter in the upper approximately 100 m, enabling installation of certain bulky borehole equipment. The borehole is inclined c. 75 degrees from the horizontal plane, has a drilling length about 602 m and is cased to a depth of about 102 m. The borehole diameter is 76 mm in the interval 102.13–602.29 m.

This report presents injection tests performed using the pipe string system PSS2 in borehole KLX12A and the test results.

The main aim of the injection tests in KLX12A was to characterize the hydraulic conditions of the rock adjacent to the borehole on different measurement scales (100 m, 20 m and 5 m). Hydraulic parameters such as transmissivity and hydraulic conductivity were determined using analysis methods for stationary as well as transient conditions together with the dominating flow regime and possible outer hydraulic boundaries.

The injection tests gave rather consistent results on the different measurement scales regarding transmissivity. During most of the tests, a certain time interval with pseudo-radial flow could be identified from the injection period, making a standard transient evaluation possible. The pressure recovery was in many tests strongly affected by wellbore storage effects, making an unambiguous transient evaluation of this period difficult.

The interval with the highest transmissivity in KLX12A is 144–164 m. Other intervals with a relatively high transmissivity are 104–144 m and 224–264 m.

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 KLX12A är ett djupt kärnborrhål inom platsundersökningarna i Oskarshamnsområdet. Det är utfört som ett så kallat teleskopborrhål där de översta ca 100 metrarna har större diameter än resten av borrhålet. Detta gör det möjligt att installera viss skrymmande utrustning i borrhålet. Kärnborrhålet är 602 m långt, lutar ca 75 grader från horisontalplanet och är försett med foderrör till ca 102 m. Borrhålsdiametern är 76 mm i intervallet 102,13–602,29 m.

Denna rapport beskriver genomförda injektionstester med rörgångssystemet PSS2 i borrhål KLX12A samt resultaten från desamma.

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

Injektionstesterna gav ganska samstämmiga resultat för de olika mätskalorna beträffande transmissivitet. Under de flesta tester kunde ett visst tidsintervall med pseudoradiellt flöde identifieras från flödesperioden, vilket möjliggjorde en standardmässig transient utvärdering. Tryckåterhämtningen var, i många tester, starkt påverkad av brunnsmagasinseffekter, vilket gör en unik transient utvärdering av denna period svår.

Den mest transmissiva zonen är intervallet 144–164 m. Andra intervall med relativt stor transmissivitet är 104–144 m och 224–264 m.

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 in borehole KLX12A, situated in the Laxemar subarea, at Oskarshamn, Sweden, were carried out in April and May 2006 by Geosigma AB. The borehole KLX12A is a deep cored borehole within the on-going site investigation in the Oskarshamn area. The borehole is a so called telescopic borehole and designed with an enlarged diameter in the upper approximately 100 m percussion drilled part, allowing installation of certain bulky borehole equipment. The borehole is inclined, c. 75 degrees from the horizontal plane, has a drilling length of about 602 m and is cased to about 102 m. The borehole diameter is about 76 mm in the interval 102.13–602.29 m. The location of the borehole is shown in Figure 1-1.

This document reports the results obtained from the injection tests in borehole KLX12A. The activity is performed within the Oskarshamn 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.

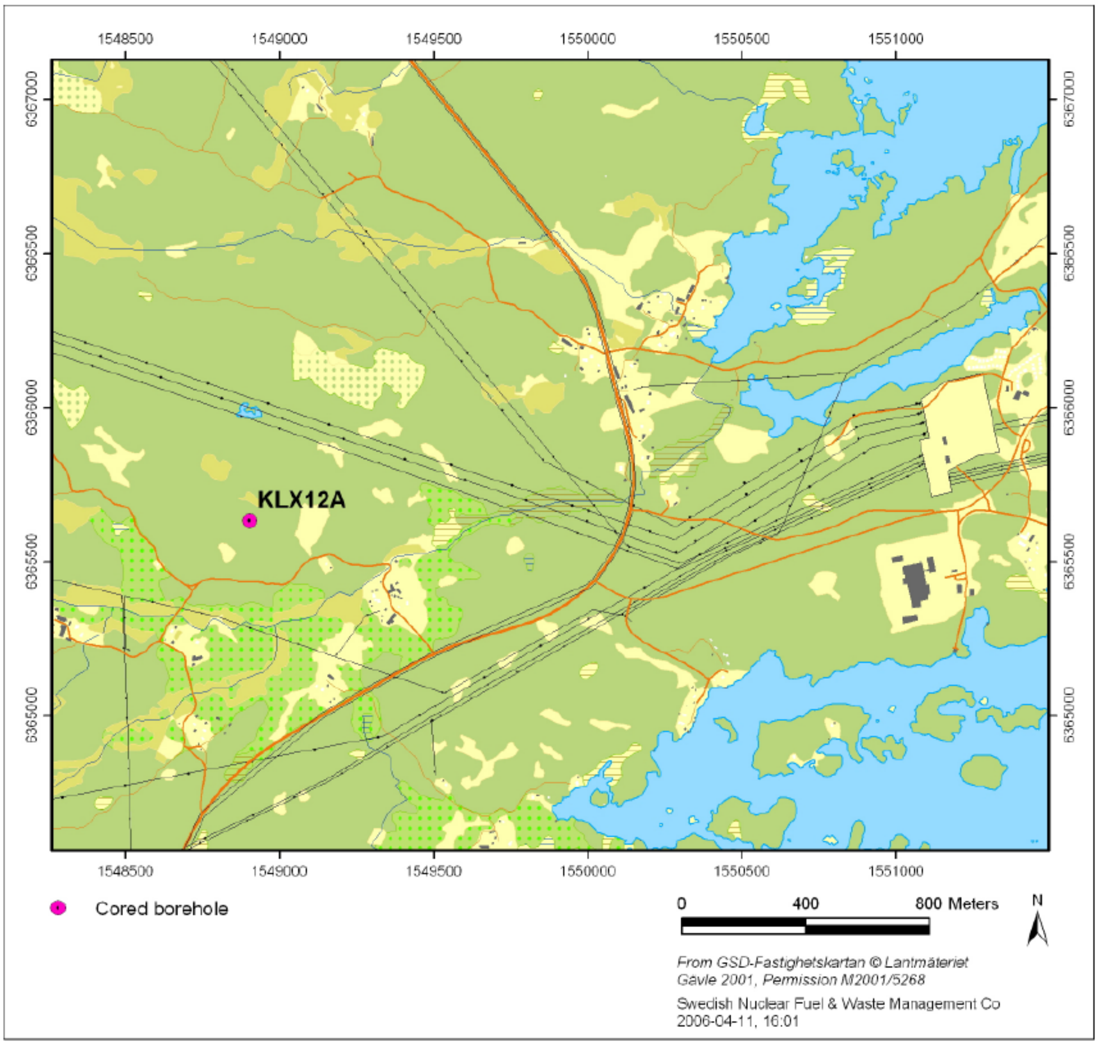


Figure 1-1. *The position of borehole KLX12A in the Laxemar subarea of the Oskarshamn site investigation.*

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

Activity Plan	Number	Version
Hydraulic injection tests in borehole KLX12A	AP PS 400-06-051	1.0
Method descriptions	**Number**	**Version**
Mätsystembeskrivning (MSB) – Allmän del. Pipe String System	SKB MD 345.100	1.0
Mätsystembeskrivning för: Kalibrering	SKB MD 345.122	1.0
Mätsystembeskrivning för: Skötsel, service, serviceprotokoll	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 600.04	1.0

2 Objectives

The main aim of the injection tests in borehole KLX12A was to characterize the hydraulic properties of the rock adjacent to the borehole on different measurement scales (100 m, 20 m and 5 m). The primary parameter to be determined was hydraulic transmissivity from which hydraulic conductivity can be derived. The results of the injection tests provide a database which can be used for statistical analyses of the hydraulic conductivity distribution along the borehole on different measurement scales. Basic statistical analyses are presented in this report.

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

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 borehole.

3.2 Tests performed

The injection tests in borehole KLX12A, performed according to Activity Plan AP PS 400-06-051 (see Table 1-1), are listed in Table 3-2. The injection tests were carried out with the Pipe String System (PSS). The test procedure and the equipment are described in the measurement system description for PSS (SKB MD 345.100) and in the corresponding method descriptions for hydraulic injection tests (SKB MD 323.001, Table 1-1).

Table 3-1. Technical data of borehole KLX12A (printout from SKB database, SICADA).

Borehole length (m):	**602.290**				
Drilling Period(s):	**From date**	**To date**	**Secup (m)**	**Seclow (m)**	**Drilling type**
	2005-11-10	2006-03-04	100.570	602.290	Core drilling
Starting point coordinate:	**Length (m)**	**Northing (m)**	**Easting (m)**	**Elevation**	**Coord system**
	0.000	6365630.783	1548904.440	17.739	RT90-RHB70
	3.000	6365631.338	1548903.902	14.840	RT90-RHB70
Angles:	**Length(m)**	**Bearing**	**Inclination (– = down)**		
	0.000	315.923	–75.074		
Borehole diameter:	**Secup (m)**	**Seclow (m)**	**Hole diam (m)**		
	0.150	15.100	0.343		
	15.100	17.920	0.248		
	17.920	100.400	0.197		
	100.400	100.570	0.160		
	100.570	102.130	0.086		
	102.130	602.290	0.076		
Core diameter:	**Secup (m)**	**Seclow (m)**	**Core diam (m)**		
	100.570	101.120	0.072		
	101.120	602.29	0.048–0.062[1]		
Casing diameter:	**Secup (m)**	**Seclow (m)**	**Case in (m)**	**Case out (m)**	
	0.000	17.920	0.200	0.208	
	0.150	15.100	0.310	0.323	

[1] For further information see Appendix 4.

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 3-2. Single-hole injection tests performed in borehole KLX12A.

Borehole Bh ID	Test section secup	seclow	Section length	Test type[1)] (1–6)	Test no	Test start date, time YYYYMMDD hh:mm	Test stop date, time YYYYMMDD hh:mm
KLX12A	104.00	204.00	100.0	3	1	2006-04-20 13:44	2006-04-20 15:40
KLX12A	204.00	304.00	100.0	3	1	2006-04-20 17:04	2006-04-20 18:53
KLX12A	284.00	384.00	100.0	3	1	2006-04-21 07:16	2006-04-21 09:05
KLX12A	384.00	484.00	100.0	3	1	2006-04-21 10:08	2006-04-21 11:57
KLX12A	484.00	584.00	100.0	3	1	2006-04-24 14:22	2006-04-24 16:25
KLX12A	104.00	124.00	20.0	3	1	2006-04-26 07:43	2006-04-26 09:09
KLX12A	124.00	144.00	20.0	3	1	2006-04-26 09:46	2006-04-26 11:16
KLX12A	144.00	164.00	20.0	3	1	2006-04-26 12:38	2006-04-26 13:54
KLX12A	164.00	184.00	20.0	3	1	2006-04-26 14:14	2006-04-26 15:35
KLX12A	184.00	204.00	20.0	3	1	2006-04-26 16:04	2006-04-26 17:24
KLX12A	204.00	224.00	20.0	3	1	2006-04-26 17:49	2006-04-26 19:07
KLX12A	224.00	244.00	20.0	3	1	2006-04-27 07:40	2006-04-27 08:59
KLX12A	244.00	264.00	20.0	3	1	2006-04-27 09:28	2006-04-27 10:46
KLX12A	264.00	284.00	20.0	3	1	2006-04-27 11:07	2006-04-27 12:22
KLX12A	284.00	304.00	20.0	3	1	2006-04-27 13:34	2006-04-27 14:37
KLX12A	304.00	324.00	20.0	3	1	2006-04-27 14:58	2006-04-27 16:23
KLX12A	324.00	344.00	20.0	3	1	2006-04-27 16:40	2006-04-27 17:57
KLX12A	344.00	364.00	20.0	3	1	2006-04-28 07:18	2006-04-28 08:15
KLX12A	364.00	384.00	20.0	3	1	2006-04-28 08:42	2006-04-28 09:59
KLX12A	369.00	389.00	20.0	3	1	2006-05-02 14:22	2006-05-02 15:39
KLX12A	389.00	409.00	20.0	3	1	2006-05-02 16:09	2006-05-02 17:25
KLX12A	409.00	429.00	20.0	3	1	2006-05-02 17:49	2006-05-02 19:08
KLX12A	429.00	449.00	20.0	3	1	2006-05-03 07:33	2006-05-03 08:55
KLX12A	449.00	469.00	20.0	3	1	2006-05-03 09:16	2006-05-03 10:38
KLX12A	469.00	489.00	20.0	3	1	2006-05-03 10:59	2006-05-03 12:17
KLX12A	489.00	509.00	20.0	3	1	2006-05-03 13:28	2006-05-03 14:28
KLX12A	509.00	529.00	20.0	3	2	2006-05-04 09:16	2006-05-04 10:38
KLX12A	527.00	547.00	20.0	3	1	2006-05-03 15:54	2006-05-03 17:11
KLX12A	547.00	567.00	20.0	3	1	2006-05-03 17:30	2006-05-03 18:46
KLX12A	564.00	584.00	20.0	3	1	2006-05-04 07:25	2006-05-04 08:28
KLX12A	304.00	309.00	5.0	3	1	2006-05-08 17:21	2006-05-08 18:12
KLX12A	309.00	314.00	5.0	3	1	2006-05-11 15:01	2006-05-11 16:22
KLX12A	314.00	319.00	5.0	3	1	2006-05-11 16:39	2006-05-11 17:59
KLX12A	319.00	324.00	5.0	3	1	2006-05-11 18:11	2006-05-11 19:30
KLX12A	322.00	327.00	5.0	3	1	2006-05-12 07:38	2006-05-12 08:54
KLX12A	327.00	332.00	5.0	3	1	2006-05-12 09:17	2006-05-12 09:59
KLX12A	332.00	337.00	5.0	3	1	2006-05-12 10:14	2006-05-12 10:56
KLX12A	337.00	342.00	5.0	3	1	2006-05-12 11:15	2006-05-12 11:59

Borehole Bh ID	Test section secup	 seclow	Section length	Test type[1)] (1–6)	Test no	Test start date, time YYYYMMDD hh:mm	Test stop date, time YYYYMMDD hh:mm
KLX12A	339.00	344.00	5.0	3	1	2006-05-15 12:50	2006-05-15 13:40
KLX12A	364.00	369.00	5.0	3	1	2006-05-15 14:15	2006-05-15 15:00
KLX12A	369.00	374.00	5.0	3	1	2006-05-15 15:13	2006-05-15 16:28
KLX12A	374.00	379.00	5.0	3	1	2006-05-15 16:39	2006-05-15 17:54
KLX12A	379.00	384.00	5.0	3	1	2006-05-15 18:05	2006-05-15 18:47
KLX12A	384.00	389.00	5.0	3	1	2006-05-15 18:59	2006-05-16 08:36
KLX12A	389.00	394.00	5.0	3	1	2006-05-16 08:58	2006-05-16 10:19
KLX12A	392.00	397.00	5.0	3	1	2006-05-16 10:31	2006-05-16 11:47
KLX12A	397.00	402.00	5.0	3	1	2006-05-16 13:57	2006-05-16 15:20
KLX12A	402.00	407.00	5.0	3	1	2006-05-16 15:30	2006-05-16 16:47
KLX12A	404.00	409.00	5.0	3	1	2006-05-16 16:55	2006-05-16 18:10
KLX12A	409.00	414.00	5.0	3	1	2006-05-16 18:20	2006-05-16 19:34
KLX12A	413.00	418.00	5.0	3	1	2006-05-17 08:21	2006-05-17 09:42
KLX12A	418.00	423.00	5.0	3	1	2006-05-17 09:51	2006-05-17 11:05
KLX12A	423.00	428.00	5.0	3	1	2006-05-17 11:14	2006-05-17 11:58
KLX12A	424.00	429.00	5.0	3	1	2006-05-17 12:06	2006-05-17 13:15
KLX12A	429.00	434.00	5.0	3	1	2006-05-17 13:25	2006-05-17 14:23
KLX12A	434.00	439.00	5.0	3	1	2006-05-17 15:05	2006-05-17 16:23
KLX12A	439.00	444.00	5.0	3	1	2006-05-17 16:36	2006-05-17 17:52
KLX12A	444.00	449.00	5.0	3	1	2006-05-17 18:04	2006-05-17 18:46
KLX12A	449.00	454.00	5.0	3	1	2006-05-17 18:57	2006-05-17 19:45
KLX12A	454.00	459.00	5.0	3	1	2006-05-18 08:14	2006-05-18 09:34
KLX12A	459.00	464.00	5.0	3	1	2006-05-18 09:44	2006-05-18 11:00
KLX12A	464.00	469.00	5.0	3	1	2006-05-18 11:11	2006-05-18 12:02
KLX12A	469.00	474.00	5.0	3	1	2006-05-18 13:30	2006-05-18 14:13
KLX12A	474.00	479.00	5.0	3	1	2006-05-18 14:23	2006-05-18 15:04
KLX12A	479.00	484.00	5.0	3	1	2006-05-18 15:14	2006-05-18 15:57
KLX12A	484.00	489.00	5.0	3	1	2006-05-18 16:09	2006-05-18 17:24
KLX12A	509.00	514.00	5.0	3	1	2006-05-18 17:50	2006-05-18 18:38
KLX12A	514.00	519.00	5.0	3	1	2006-05-19 07:17	2006-05-19 08:00
KLX12A	519.00	524.00	5.0	3	1	2006-05-19 08:11	2006-05-19 09:29
KLX12A	522.00	527.00	5.0	3	1	2006-05-29 13:25	2006-05-29 14:41
KLX12A	527.00	532.00	5.0	3	1	2006-05-29 14:56	2006-05-29 15:40
KLX12A	532.00	537.00	5.0	3	1	2006-05-29 15:54	2006-05-29 16:39
KLX12A	537.00	542.00	5.0	3	2	2006-05-30 07:21	2006-05-30 08:37
KLX12A	542.00	547.00	5.0	3	1	2006-05-30 08:54	2006-05-30 10:09
KLX12A	547.00	552.00	5.0	3	1	2006-05-30 10:19	2006-05-30 11:34
KLX12A	552.00	557.00	5.0	3	1	2006-05-30 12:22	2006-05-30 13:38
KLX12A	557.00	562.00	5.0	3	1	2006-05-30 13:49	2006-05-30 14:30
KLX12A	562.00	567.00	5.0	3	1	2006-05-30 14:38	2006-05-30 15:18

[1)] 3: Injection test.

3.3 Equipment checks

The PSS2 equipment was fully serviced, according to SKB internal controlling documents (SKB MD 345.124, service, and SKB MD 345.122, calibration), in December 2005.

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 both air and 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.

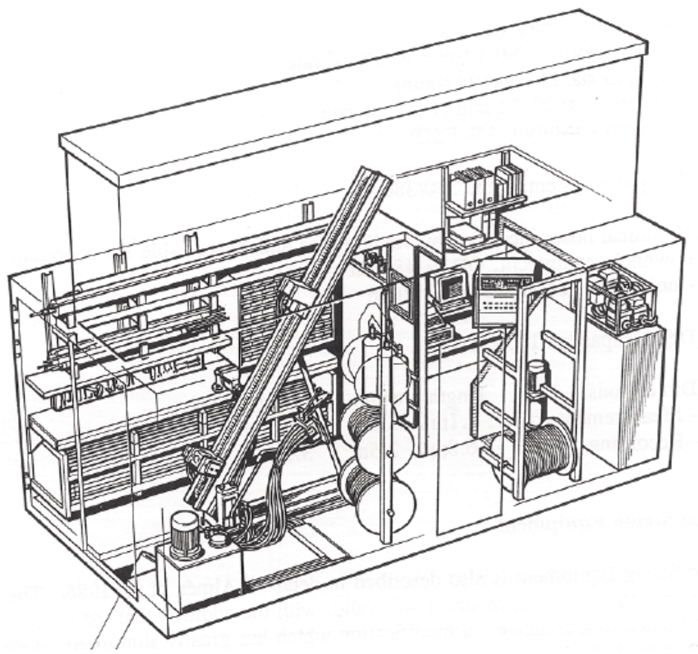


Figure 4-1. *Outline of the PSS container with equipment.*

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 together with corresponding data of the system are shown in Table 4-1. The sensors are components of the PSS. The accuracy of the PSS 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).

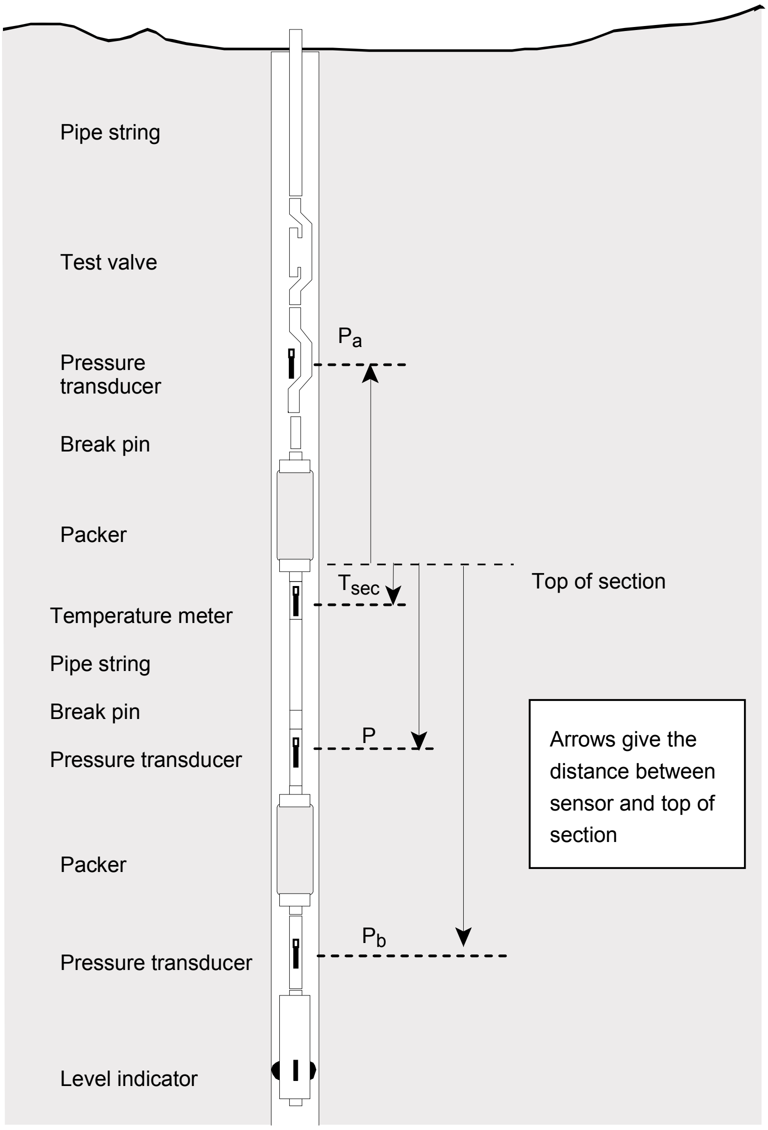


Figure 4-2. *Schematic drawing of the down-hole equipment in the PSS.*

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

Technical specification Parameter		Unit	Sensor	PSS	Comments
Absolute pressure	Output signal	mA	4–20		
	Meas. range	MPa	0–13.5		
	Resolution	kPa	< 1.0		
	Accuracy1)	% 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	$6.7 \cdot 10^{-8}$		
	Accuracy2)	% 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	$6.7 \cdot 10^{-10}$		
	Accuracy3)	% O.R	0.1–0.4	0.5–30	

[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	20	100
Equipment displacement volume in test section [1]	3.6	13	61
Total volume of test section [2]	0.011	0.045	0.23
Position for sensor P_a, pressure above test section, (m above secup) [3]	1.88	1.87	1.87
Position for sensor P, pressure in test section, (m above secup) [3]	–4.11	–19.10	–99.10
Position for sensor T_{sec}, temperature in test section, (m above secup) [3]	–0.96[4], –0,98	–0.98	–0.96
Position for sensor P_b, pressure below test section, (m above secup) [3]	–7.00[4], –7.01	–22.00	–102.00

[1] Displacement volume in test section due to pipe string, signal cable, sensors and packer ends (in litre).
[2] Total volume of test section [m^3] (V = section length*π*d^2/4).
[3] Position of sensor relative top of test section. A negative value indicates a position below top of test section, (secup).
[4] The section were taken up and rebuilt causing the sensor to be located in a different position, the first position is from the first setup of the test section.

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.

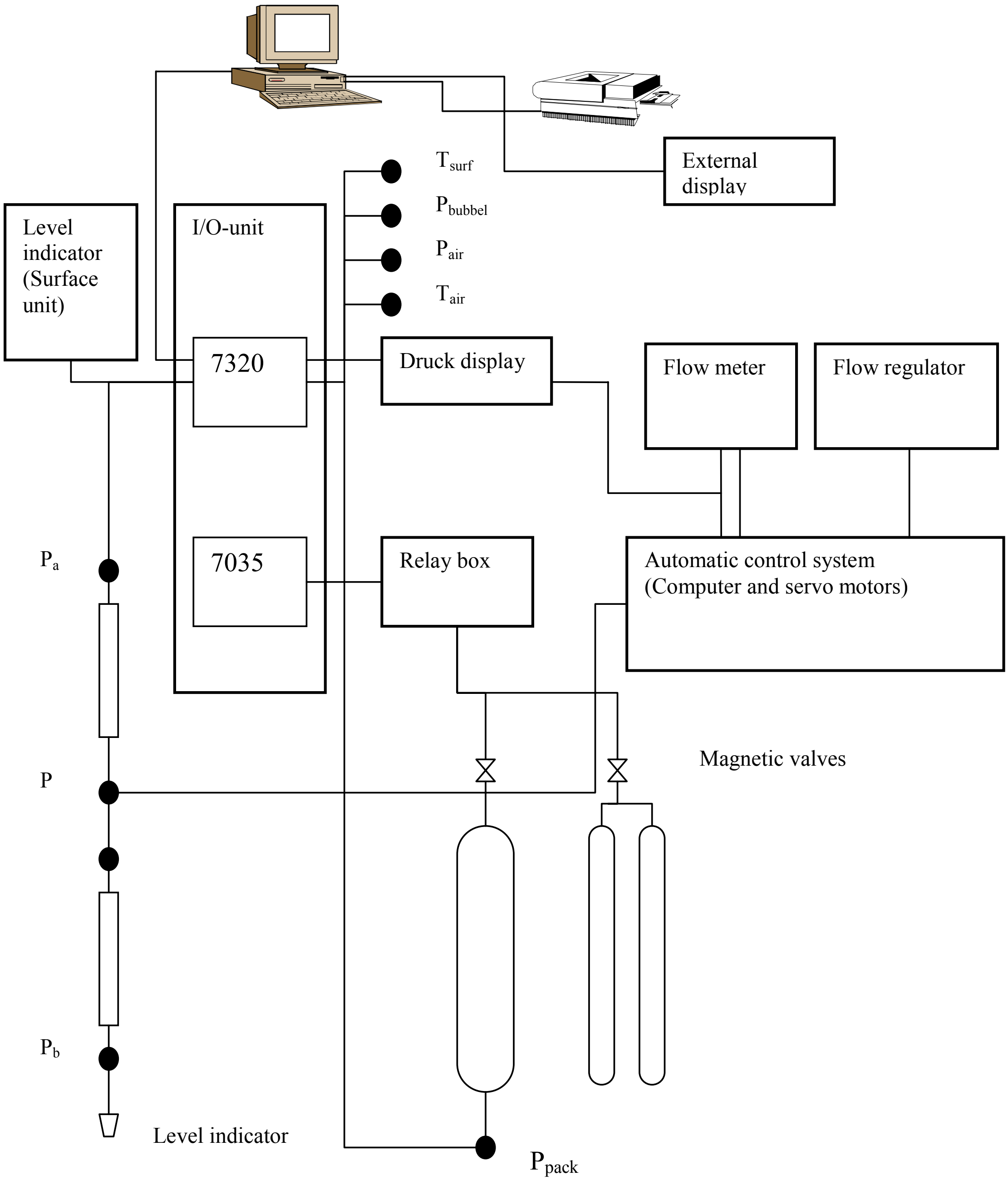


Figure 4-3. *Schematic drawing of the data acquisition system and the automatic control system in PSS.*

5 Execution

5.1 Preparation

5.1.1 Calibration

All sensors included in PSS are calibrated at the SKB:s service station in Oskarshamn. Calibration is generally performed at least once every year. Results from calibration, e.g. calibration constants, of sensors are kept in a document folder in PSS2. 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 600.04, see Table 1-1), level 1.

5.2 Test performance

5.2.1 Test principle

The injection tests in KLX12A were carried out while maintaining a constant head of generally 200 kPa (20 m) in the test section. Before start of the injection period, approximately steady-state pressure conditions prevailed in the test section. After the injection period, the pressure recovery was measured.

For injection tests with 20 m and 5 m section length, 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 PS 400-06-051. 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 period and 5) Pressure recovery.

The estimated times for the various phases are presented in Table 5-1. Regarding the packer inflation times and actual injection and recovery times, slightly different procedures were used for the tests in 100 m sections compared to the tests in 20 m and 5 m sections in accordance with AP PS 400-06-051. Furthermore, slightly longer test times were used for the tests in 100 m sections, cf. Table 5-1.

Table 5-1. Packer inflation times, pressure stabilisation times and test times used for the injection tests in KLX12A.

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

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

5.2.3 Test strategy

Due to fractures in the borehole, some parts were measured with overlapping test-sections which are described in Nonconformities, Section 5.5. This strategy was necessary because of the risk of damaging the packers if they were to be inflated across a fracture. Firstly, injection tests in 100 m sections were performed in KLX12A within the interval 104.0–584.0 m. The delimitations of the test sections were, as far as possible, selected in order to minimize the overlap of sections in subsequent testing on different scales.

Secondly, injection tests in 20 m sections were carried out in the same interval, 104.0–584.0 m. In all of the tested 100 m sections, five successive injection tests with 20 m section length were performed. The interval between 484–489 m overlapped during testing with 20 m sections was not used in the summation and comparison of results with 100 and 5 m sections. This overlapped section showed no visible cracks and hence were not expected to influence the transmissivity.

Finally, injection tests with 5 m section length were conducted in the interval 304–584 m was the previously measured 20 m sections gave a flow above the detection limit. Four successive tests with 5 m section length were performed within the 20 m intervals. Exceptions are the two 20 m sections 389–409 and 409–429, in which five 5 m tests were performed. The total number of injection tests was, thus, dependent on the results of the previous tests.

Since the results of the tests in 100 m sections will have a strong effect on the continued test program, it was considered important to ensure accurate results of these tests, particularly regarding test sections close to the lower measurement limit.

5.3 Data handling

With the PSS, 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 _KLX12A_0104.00_200604201344.ht2). The name differs slightly from the convention stated in Instructions 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 KLX12A 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).

The centre of the zero flow noise level of the flow meter, Qsmall, was controlled at the establishing of the PSS container. This centre of the zero flow noise level may sometimes shift a bit up or down for some unknown reason. Hence, sometimes it is necessary to manually adjust the flow rate measurement limit as well as the measured flow during the evaluation of tests with a low flow rate. The reason for this shift of the zero flow noise level is not fully explained, but one probable cause might be temperature changes in the PSS. For evaluation of the test data, no other 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 50% of the injection tests in KLX12A, a test-specific lower measurement limit of the flow rate was estimated, and the values were ranging from $2.45 \cdot 10^{-9}$ m^3/s to $1.22 \cdot 10^{-8}$ 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 KLX12A, the actual injection pressure was considerably different. The highest injection pressure during the tests in KLX12A was 311 kPa and for two 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 KLX12A ranged from $1.23 \cdot 10^{-10}$ m^2/s to $3.09 \cdot 10^{-10}$ 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).

Table 5-2. Estimated lower measurement limit for specific flow rate and steady-state transmissivity for different injection pressures, measurement scales and estimated lower measurement limits for flow rate for the injection tests in borehole KLX12A.

r_w (m)	L_w (m)	Q-measl-L (m^3/s)	Injection pressure (kPa)	Q/s-measl-L (m^2/s)	Factor C_M in Moye's formula	TM-measl-L (m^2/s)
0.038	100	1.7E–08	100	1.6E–09	1.30	2.1E–09
0.038	100	1.7E–08	200	8.2E–10	1.30	1.1E–09
0.038	100	1.7E–08	300	5.5E–10	1.30	7.1E–10
0.038	100	1.2E–08	100	1.1E–09	1.30	1.5E–09
0.038	100	1.2E–08	200	5.7E–10	1.30	7.4E–10
0.038	100	1.2E–08	300	3.8E–10	1.30	5.0E–10
0.038	100	5.0E–09	100	4.9E–10	1.30	6.4E–10
0.038	100	5.0E–09	200	2.5E–10	1.30	3.2E–10
0.038	100	5.0E–09	300	1.6E–10	1.30	2.1E–10
0.038	20	1.7E–08	100	1.6E–09	1.04	1.7E–09
0.038	20	1.7E–08	200	8.2E–10	1.04	8.5E–10
0.038	20	1.7E–08	300	5.5E–10	1.04	5.7E–10
0.038	20	1.2E–08	100	1.1E–09	1.04	1.2E–09
0.038	20	1.2E–08	200	5.7E–10	1.04	6.0E–10
0.038	20	1.2E–08	300	3.8E–10	1.04	4.0E–10
0.038	20	5.0E–09	100	4.9E–10	1.04	5.1E–10
0.038	20	5.0E–09	200	2.5E–10	1.04	2.6E–10
0.038	20	5.0E–09	300	1.6E–10	1.04	1.7E–10
0.038	5	1.7E–08	100	1.6E–09	0.83	1.4E–09
0.038	5	1.7E–08	200	8.2E–10	0.83	6.8E–10
0.038	5	1.7E–08	300	5.5E–10	0.83	4.5E–10
0.038	5	1.2E–08	100	1.1E–09	0.83	9.5E–10
0.038	5	1.2E–08	200	5.7E–10	0.83	4.8E–10
0.038	5	1.2E–08	300	3.8E–10	0.83	3.2E–10
0.038	5	5.0E–09	100	4.9E–10	0.83	4.1E–10
0.038	5	5.0E–09	200	2.5E–10	0.83	2.0E–10
0.038	5	5.0E–09	300	1.6E–10	0.83	1.4E–10

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 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).

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

Due to the limited resolution of the flow meter and pressure sensor, the derivative may sometimes 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 equation:

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

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

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

ρ_w = density of water (kg/m^3)

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

C_M = geometrical shape factor (–)

dp_p = injection pressure, p_p–p_i (Pa)

r_w = borehole radius (m)

L_w = section length (m)

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

The transient analysis was performed using a special version of the test analysis software AQTESOLV, which enables both visual and automatic type curve matching. The quantitative transient evaluation is generally carried out as an iterative process of manual type curve matching and automatic matching. For the injection period, a model based on the Jacob and Lohman (1952) 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 KLX12A, 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 was 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.

$$S = 0.007 \cdot T^{0.5} \qquad (5\text{-}3)$$

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, the wellbore storage are 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 5-4.

$$C = V_w \cdot c_w = L_w \cdot \pi \cdot r_w^2 \cdot c_w \qquad (5\text{-}4)$$

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})

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 5-5.

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

ζ = skin factor

r_w = borehole radius (m)

r_{wf} = effective borehole radius

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. This model also allows calculation of the wellbore storage coefficient according to Equation 5-6.

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

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 sometimes strongly affected by wellbore storage and in some of these cases 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 50 tests with a definable final flow rate in KLX12A the steady-state transmissivity, T_M, was chosen as the most representative value of transmissivity of the test section. The latter transmissivity was chosen whenever a 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. $T_R < T_M = Q/s\text{-measl-}L \cdot C_M$).

Estimated values of the borehole storage coefficient, C, based on actual borehole geometrical data and assumed fluid properties together with the estimated effective C_{eff} from laboratory experiments /10/ 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) /11/.

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 /10/.

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)
0.0380	100	0.454	0.061	0.393	1.81E–10	1.88E–10
0.0380	20	0.091	0.013	0.078	3.58E–11	4.28E–11
0.0380	5	0.023	0.004	0.019	8.59E–12	1.56E–11

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 (C_{net}) based on geometry and the value of C_{eff} based on laboratory experiments (Table 5-3).

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) /11/.

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/:

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 applied. The radius of influence can be used to deduce the length of the hydraulic feature(s) tested.

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

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

S = storativity estimated from Equation 5-3

r_i = radius of influence (m)

t = time after start of injection (s)

Furthermore, a 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 period. 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 actual flow time t_p in Equation 5-7.

5.5 Nonconformities

The test program in KLX12A was carried out according to the Activity Plan AP PS 400-06-051 with the following exceptions:

- Due to fractures in the borehole, some of the positions of the 100-, 20- and 5 m test sections were shifted. This fact resulted in that some of the intervals measured with different section lengths are not identical. It also resulted in some partly overlapping borehole intervals as follows:
  - The interval between 284.0 and 304.0 m were measured with overlapping 100 m sections.
  - The following intervals were measured with overlapping 20 m sections: 369.0–384.0 m, 527.0–529.0 m and 564.0–567.0 m.
  - The following intervals were measured with overlapping 5 m sections: 322.0–324.0 m, 339.0–342.0 m, 392.0–394.0 m, 404.0–407.0 m, 413.0–414.0 m and 424.0–428.0 m.
- Problems in lowering the pressure probe in the casing prevented measurement of the groundwater pressure during tests in the following sections:
  - 100 m-test: 484.0–584.0 m.
  - 20 m-test: 369.0–429.0 m.
  - 5 m-test: 304.0–327.0 m

6 Results

6.1 Nomenclature and symbols

The nomenclature and symbols used for the results of the injection tests in KLX12A are in accordance with the Instruction for analysis of injection and single-hole pumping tests (SKB MD 320.004). Additional symbols are explained in the text and in Appendix 5. Symbols used by the AQTESOLV software are explained in Appendix 3.

6.2 Routine evaluation of the single-hole injection tests

6.2.1 General test data

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

6.2.2 Length corrections

The down-hole equipment is supplied with a level indicator located c. 3 m below the lower packer in the test section, see Figure 4-2. The level indicator transmits a signal each time a reference mark in the borehole is passed. In KLX12A, reference marks were milled into the borehole wall at every 50 m (with a few exceptions).

During the injection tests in KLX12A with the PSS, length reference marks were detected as presented in Table 6-1. As seen from Table 6-1, all but two of the reference marks were detected during the lowering of the sections. At each mark, the length scale for the injection tests was adjusted according to the reported length to the reference mark. The tests with 20 m and 5 m section length above the first reference mark were adjusted according to the first detected reference mark by the tests in 100 m sections.

Table 6-1. Detected reference marks during the injection tests in KLX12A.

Borehole length (m)	Detected during the injection tests in 100 m sections	Detected during the injection tests in 20 m sections	Detected during the injection tests in 5 m sections [1)]
110	Yes	Yes	Yes
150	Yes	Yes	Yes
200	Yes	Yes	Yes
250	Yes	Yes	Yes
300	Yes	Yes	Yes
350	Yes	Yes	Yes
400	Yes	Yes	Yes
450	Yes	Yes	Yes
500	No	Yes	Yes
550	Yes	Yes	Yes
580	No	Yes	No

[1)] No tests of section length 5 m were performed below 562.0–567.0 m, hence the reference marks at 580 m was not passed using this section length.

The largest difference between the reported and measured lengths at the reference marks during the injection tests was 0.37 m, at the 580 m reference mark. The difference between two consecutive measurements over a 100 m borehole interval was 0.04 m or less in all cases. A comparison of the measurements performed with different section lengths results in a maximum difference of 0.02 m.

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 log-log and lin-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 KLX12A are also compiled in appropriate tables in Appendix 5 to be stored in the SICADA database, where they will be traceable by the Activity Plan number.

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. 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 section between 397.0 and 418 m show some interesting features. All evaluations of the tests with 5 m sections in this part show an obvious pseudo-radial flow throughout the entire injection period, making the evaluation pretty straight forward. However, the evaluated skin factor is rather high for these tests (more than 3) compared to other tests performed in KLX12A (often negative). Also, the transient evaluations results in a higher transmissivity than the stationary evaluation.

Many of the responses during the recovery period were strongly influenced by wellbore storage effects. Thus, for some of these tests, pseudo-radial flow was not reached during this period.

For a few tests, a type curve fit is yet displayed in the diagrams in Appendix 3, despite that the estimated parameters from the fit are judged as non-representative or ambiguous and not included in the result tables in SICADA. For these tests, the type curve fit is presented, for example, to illustrate that an assumption of pseudo-radial flow regime is not justified for the test and some other flow regime is likely to dominate or to show one possible fit in 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.

Table 6-2. Summary of the routine evaluation of the single-hole injection tests in borehole KLX12A.

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 (–)
104.00	204.00	2006-04-20 13:44	100.00	PRF->PSF	PRF->PSF	1.13E–05	3.61E–06	3.46E–06	3.61E–06	3.61E–06	–4.81	60	200	20	200		34.96	–1
204.00	304.00	2006-04-20 17:04	100.00	PRF/PSF	WBS->	5.48E–07	1.67E–07	3.33E–07	1.67E–07	1.67E–07	–4.39						48.80	–1
284.00	384.00	2006-04-21 07:16	100.00	PLF/PRF	PLF/PRF	2.24E–08	3.51E–09	3.32E–09	3.51E–09	3.51E–09							18.60	1
384.00	484.00	2006-04-21 10:08	100.00	PRF->(PSF)	PRF->(PSF)	3.35E–07	1.79E–07	2.00E–07	1.79E–07	1.79E–07	–2.88	50	1,000	50	600		36.87	–1
484.00	584.00	2006-04-24 14:22	100.00	PRF	WBS->PRF	2.83E–07	2.60E–07	2.80E–07	2.60E–07	2.60E–07	0.16	80	1,800	500	1,000		54.30	0
104.00	124.00	2006-04-26 07:43	20.00	(PRF)->PSF	PRF->PSF	8.57E–07	4.83E–07	5.79E–07	4.83E–07	4.83E–07	–3.31			30	300		52.15	–1
124.00	144.00	2006-04-26 09:46	20.00	PSF	PSF	7.94E–06	7.58E–07	8.65E–07	7.58E–07	7.58E–07	–6.65						58.34	–1
144.00	164.00	2006-04-26 12:38	20.00	PSF	PSF(->PSS)	2.49E–06	2.05E–06	2.25E–06	2.05E–06	2.05E–06	–1.85						74.49	–1
164.00	184.00	2006-04-26 14:14	20.00	PRF->NFB	WBS->PSF	4.15E–08	6.45E–08	1.73E–07	6.45E–08	6.45E–08	2.85	80	500				20.20	1
184.00	204.00	2006-04-26 16:04	20.00	PSF	WBS->PRF1->PRF2	1.62E–08	3.14E–09	1.21E–08	3.14E–09	3.14E–09	–4.49			70	200	6.28E–11	14.76	–1
204.00	224.00	2006-04-26 17:49	20.00	PLF/PRF	WBS->PLF	2.43E–09	3.53E–10	3.74E–11	3.53E–10	3.53E–10	–4.99	300	1,200				8.51	0
224.00	244.00	2006-04-27 07:40	20.00	PRF/PSF	WBS->PSF	3.38E–07	4.84E–07	5.14E–07	4.84E–07	4.84E–07	2.20	60	1,200				51.80	0
244.00	264.00	2006-04-27 09:28	20.00	PRF	WBS->	6.31E–07	1.02E–06	1.15E–06	1.02E–06	1.02E–06	3.13	200	1,200				62.37	0
264.00	284.00	2006-04-27 11:07	20.00	(PRF)	PSF	7.14E–08		9.93E–08	9.93E–08	9.93E–08	3.47						34.82	–1
284.00	304.00	2006-04-27 13:34	20.00	–	–	<2.25E–10				<2.25E–10							–	–
304.00	324.00	2006-04-27 14:58	20.00	PLF->(PRF)	WBS->PLF	2.13E–08	3.94E–09	4.92E–09	3.94E–09	3.94E–09		300	1,200				15.56	0
324.00	344.00	2006-04-27 16:40	20.00	PSS	WBS->PSS	4.27E–08		1.94E–09	1.94E–09	1.94E–09	–1.14						13.02	–1
344.00	364.00	2006-04-28 07:18	20.00	–	–	<2.18E–10				<2.18E–10							–	–
364.00	384.00	2006-04-28 08:42	20.00	(PRF)	WBS->	3.59E–10				3.59E–10						3.98E–11	8.63	–
369.00	389.00	2006-05-02 14:22	20.00	PLF/PRF	WBS->	3.39E–10	4.56E–11	1.30E–10	1.30E–10	1.30E–10	–4.65						6.69	1
389.00	409.00	2006-05-02 16:09	20.00	PRF	PRF	2.46E–07	2.46E–07	3.68E–07	2.46E–07	2.46E–07	–0.57	40	1,200	20	700		43.73	0
409.00	429.00	2006-05-02 17:49	20.00	PSF	PRF->PSF	4.18E–08	1.63E–08	1.76E–08	1.76E–08	1.76E–08	–3.03			10	200		9.23	–1
429.00	449.00	2006-05-03 07:33	20.00	PLF/NFB	WBS->	2.59E–10		1.62E–10	1.62E–10	1.62E–10	–5.68						7.07	1
449.00	469.00	2006-05-03 09:16	20.00	PLF->PRF	PLF	1.89E–08	3.28E–09	2.42E–09	3.28E–09	3.28E–09	–5.40	800	1,200				14.86	0
469.00	489.00	2006-05-03 10:59	20.00	PLF/PRF	PLF	3.58E–10	4.11E–11		4.11E–11	4.11E–11	–4.93						5.03	1
489.00	509.00	2006-05-03 13:28	20.00	–	–	<2.89E–10				<2.89E–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 (–)
509.00	529.00	2006-05-04 09:16	20.00	PRF	WBS->PSF	1.31E–08	1.25E–08	1.26E–08	1.25E–08	1.25E–08	–0.07	100	1,200				20.78	0
527.00	547.00	2006-05-03 15:54	20.00	PRF	PRF	2.69E–07	3.23E–07	3.54E–07	3.23E–07	3.23E–07	0.73	100	1,200	100	700		46.82	0
547.00	567.00	2006-05-03 17:30	20.00	(PRF)->PSF	PRF->PSF	1.50E–08	3.89E–09	4.31E–09	4.31E–09	4.31E–09	–3.74	80	250	30	300		7.96	–1
564.00	584.00	2006-05-04 07:25	20.00	–	–	<1.28E–10				<1.28E–10							–	–
304.00	309.00	2006-05-08 17:21	5.00	–	–	<1.52E–10				<1.52E–10							–	–
309.00	314.00	2006-05-11 15:01	5.00	PRF->(NFB)	WBS->	6.07E–10	7.25E–10		7.25E–10	7.25E–10	–0.60	20	200			1.37E–11	4.16	1
314.00	319.00	2006-05-11 16:39	5.00	PRF	WBS->?	3.06E–09	1.81E–09		1.81E–09	1.81E–09	–2.86	20	1,200			1.85E–11	12.80	0
319.00	324.00	2006-05-11 18:11	5.00	PRF	WBS->	1.71E–08	6.49E–09	4.00E–09	6.49E–09	6.49E–09	–4.47	200	1,200				17.63	0
322.00	327.00	2006-05-12 07:38	5.00	PRF	WBS->	1.72E–08	6.73E–09	3.81E–09	6.73E–09	6.73E–09	–4.39	200	1,200				17.79	0
327.00	332.00	2006-05-12 09:17	5.00	–	–	<2.03E–10				<2.03E–10							–	–
332.00	337.00	2006-05-12 10:14	5.00	–	–	<1.01E–10				<1.01E–10							–	–
337.00	342.00	2006-05-12 11:15	5.00	–	–	<1.52E–10				<1.52E–10							–	–
339.00	344.00	2006-05-15 12:50	5.00	–	–	<2.03E–10				<2.03E–10							–	–
364.00	369.00	2006-05-15 14:15	5.00	–	–	<2.03E–10				<2.03E–10							–	–
369.00	374.00	2006-05-15 15:13	5.00	PLF/PRF	WBS->	3.36E–10	7.32E–11	9.42E–11	7.32E–11	7.32E–11	–4.17					2.06E–11	5.81	–1
374.00	379.00	2006-05-15 16:39	5.00	PLF/PRF	WBS->	2.19E–10	6.04E–11		6.04E–11	6.04E–11	–3.06	100	1,200			1.31E–11	5.47	0
379.00	384.00	2006-05-15 18:05	5.00	–	–	<1.52E–10				<1.52E–10							–	–
384.00	389.00	2006-05-15 18:59	5.00	–	–	<1.52E–10				<1.52E–10							–	–
389.00	394.00	2006-05-16 08:58	5.00	PLF/PRF	WBS->PSS	2.80E–09	1.11E–09		1.11E–09	1.11E–09	–3.96	200	1,200			1.85E–11	11.33	0
392.00	397.00	2006-05-16 10:31	5.00	PRF	WBS->PSS	3.37E–08	3.57E–08		3.57E–08	3.57E–08	–1.21	100	1,200				27.00	0
397.00	402.00	2006-05-16 13:57	5.00	PRF	WBS->PSF	5.77E–08	1.40E–07		1.40E–07	1.40E–07	5.73	50	1,200				38.02	0
402.00	407.00	2006-05-16 15:30	5.00	PRF	WBS->PRF	1.49E–07	3.21E–07	5.14E–07	3.21E–07	3.21E–07	3.92	70	1,200	100	700		46.73	0
404.00	409.00	2006-05-16 16:55	5.00	PRF	WBS->PRF	1.48E–07	3.15E–07	5.11E–07	3.15E–07	3.15E–07	3.87	80	1,200	100	700		46.53	0
409.00	414.00	2006-05-16 18:20	5.00	PRF	WBS->PSS	1.16E–09	2.16E–09	1.98E–09	2.16E–09	2.16E–09	3.64	20	1,200			1.61E–11	13.39	0
413.00	418.00	2006-05-17 08:21	5.00	PRF	WBS->PSS	5.36E–09	1.69E–08		1.69E–08	1.69E–08	9.81	200	1,200				22.40	0
418.00	423.00	2006-05-17 09:51	5.00	PSF	PRF->PSF	3.21E–08	2.16E–08	2.12E–08	2.12E–08	2.12E–08	–2.51			10	200		9.68	–1
423.00	428.00	2006-05-17 11:14	5.00	–	–	<1.20E–10				<1.20E–10							–	–
424.00	429.00	2006-05-17 12:06	5.00	–	–	<1.71E–10				<1.71E–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 (–)
429.00	434.00	2006-05-17 13:25	5.00	–	–	<1.71E–10				<1.71E–10							–	–
434.00	439.00	2006-05-17 15:05	5.00	PRF?	WBS->	4.55E–10	9.13E–11		9.13E–11	9.13E–11	–3.82					2.77E–11	6.14	0
439.00	444.00	2006-05-17 16:36	5.00	PRF	WBS->	4.33E–10	2.18E–10	3.17E–10	3.17E–10	3.17E–10	–0.93					2.07E–11	8.36	–1
444.00	449.00	2006-05-17 18:04	5.00	–	–	<1.71E–10				<1.71E–10							–	–
449.00	454.00	2006-05-17 18:57	5.00	–	–	<1.71E–10				<1.71E–10							–	–
454.00	459.00	2006-05-18 08:14	5.00	PRF	WBS->PRF	7.92E–09	3.90E–09	3.72E–09	3.90E–09	3.90E–09	–3.72	50	1,200	0	1,200		15.52	0
459.00	464.00	2006-05-18 09:44	5.00	NFB?	PLF	7.98E–09				7.98E–09							18.62	–
464.00	469.00	2006-05-18 11:11	5.00	–	–	<1.01E–10				<1.01E–10							–	–
469.00	474.00	2006-05-18 13:30	5.00	–	–	<1.20E–10				<1.20E–10							–	–
474.00	479.00	2006-05-18 14:23	5.00	–	–	<1.71E–10				<1.71E–10							–	–
479.00	484.00	2006-05-18 15:14	5.00	–	–	<1.20E–10				<1.20E–10							–	–
484.00	489.00	2006-05-18 16:09	5.00	–	–	<1.71E–10				<1.71E–10							–	–
509.00	514.00	2006-05-18 17:50	5.00	–	–	<1.71E–10				<1.71E–10							–	–
514.00	519.00	2006-05-19 07:17	5.00	–	–	<1.71E–10				<1.71E–10							–	–
519.00	524.00	2006-05-19 08:11	5.00	PRF	WBS->PSF	1.05E–08	1.42E–08		1.42E–08	1.42E–08	0.57	80	1,200				21.43	0
522.00	527.00	2006-05-29 13:25	5.00	PRF	WBS->PSF	1.28E–08	1.69E–08	2.38E–08	1.69E–08	1.69E–08	2.74	100	1,200				22.40	0
527.00	532.00	2006-05-29 14:56	5.00	–	–	<1.61E–10				<1.61E–10							–	–
532.00	537.00	2006-05-29 15:54	5.00	–	–	<1.61E–10				<1.61E–10							–	–
537.00	542.00	2006-05-30 07:21	5.00	PRF	WBS->PRF	2.13E–07	3.50E–07	4.12E–07	3.50E–07	3.50E–07	1.30	40	1,200	50	400		47.76	0
542.00	547.00	2006-05-30 08:54	5.00	PRF->PSF	(PRF)->PSF	2.95E–08	1.49E–08	2.16E–08	1.49E–08	1.49E–08	–2.82	10	50				4.43	–1
547.00	552.00	2006-05-30 10:19	5.00	PRF->PSF->PSS	PRF->PSF	9.62E–09	4.22E–09	3.95E–09	4.22E–09	4.22E–09	–3.21	10	200	10	200		6.46	–1
552.00	557.00	2006-05-30 12:22	5.00	PLF->PSF	WBS->PRF	3.18E–09	1.07E–09	1.12E–09	1.07E–09	1.07E–09	–3.94			400	700		11.35	–1
557.00	562.00	2006-05-30 13:49	5.00	–	–	<2.08E–10				<2.08E–10							–	–
562.00	567.00	2006-05-30 14:38	5.00	–	–	<2.08E–10				<2.08E–10							–	–

[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 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 KLX12A. 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 fell below the actual test-specific measurement limit during the test, 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.

The results of the routine evaluation of the injection tests in borehole KLX12A are also compiled in appropriate tables in Appendix 5 to be stored in the SICADA database.

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. 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.

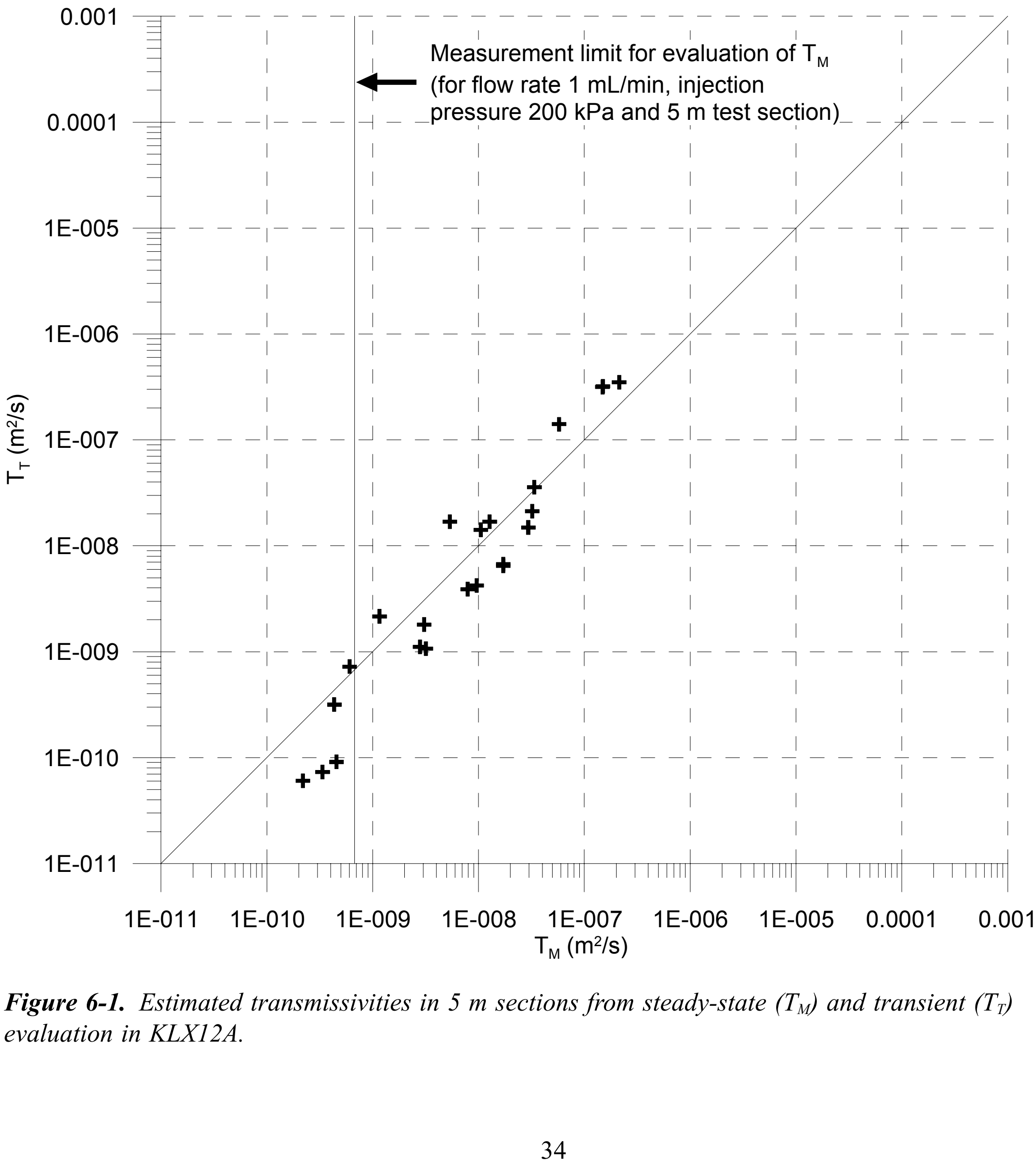


Figure 6-1. *Estimated transmissivities in 5 m sections from steady-state (T_M) and transient (T_T) evaluation in KLX12A.*

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 KLX12A, 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} /10/, both found in Table 5-3.

The number of tests with a well-defined line of unit slope for which it was possible to calculate C was as follows: 2 out of 25 with the 20 m test section and 8 out of 48 with the 5 m test section resulted in a well-defined 1:1 straight line. For 100 m test section no well-defined 1:1 straight line could be observed. Since only two tests conducted with 20 m-section displayed a unit slope during recovery period, these will not be taken into account in the statistic comparison of C-values. Table 6-2 shows that the calculated values from the tests tend to be slightly higher than C_{net} presented in Table 5-3. However, when the calculated values are compared with the value C_{eff} obtained from laboratory experiments, the agreement is better although the calculated values still tend to be slightly higher. When constructing 95% confidence intervals (using a t-distribution) from calculated values of C from the tests, the values of C_{net} listed in Table 5-3 is slightly lower than the confidence interval for the 5 m sections. When the same comparison is made with C_{eff}, the values fall within the confidence interval for section length 5 m.

6.2.4 Comments on the tests

Short comments on each test follow below. Tests were performed within the interval 104.0–584.0 m in KLX12A. 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

104.0–204.0 m

A PRF is dominating the injection period transitioning to a PSF at the end. The recovery period initially indicates a PRF transitioning to a PSF after c. 200 s. Transient evaluations using PRF and PSF models give similar results for both the injection and recovery period. The transient evaluation on the injection period was selected as the most representative for the test section.

204.0–304.0 m

The injection pressure is somewhat unstable during the first minutes due to changes of valves caused by a rapidly decreasing flow rate. After 9 minutes (540 s) of injection there were a change from the big to the small flow meter and this change caused a small disturbance in pressure for a while. However, this disturbance in pressure was not considered to affect the evaluation of the test significantly. The injection period appears to be dominated by a PSF towards the end, possibly preceded by an approximate PRF. Transient evaluation using PRF and the PSF models result in similar values on the hydraulic parameters. However, the latter model is judged to be the most representative for the test section. The recovery period shows a WBS followed by a transition for the rest of the period. As visible in the over-view plot, the pressure in all sections (above, below and in the test section), was decreasing before start of injection. This is an interesting effect and is still to be explained.

284.0–384.0 m

The injection period appears to be dominated by an intermediate between PLF and PRF. The transmissivity evaluated with models for a single-fracture and PRF models, respectively was similar. The recovery period is dominated by a PLF in the beginning which transitions towards a possible PRF at the end. Transient evaluation of the recovery period using PRF models and single-fracture models, respectively gives consistent results. The transient evaluation from the injection period is considered as the most representative for the section.

384.0–484.0 m

The injection period is dominated by a PRF from c. 70 s to 1,000 s when weak signs of a PSF can be seen. The recovery period is also dominated by a PRF from c. 50 s to c. 600 s. The interpretation of a PSF at the end of the injection period is supported by very similar behaviour of the recovery derivative after c. 600 s. Transient evaluation of both periods give similar results using a PRF model. As visible in the overview plot, the pressure in all sections (above, below and in the test section), was decreasing before start of injection, just as during the test in section 204.0–304.0 m. This is a rather interesting effect and is still to be explained.

484.0–584.0 m

After pressure stabilisation, a well-defined PRF is observed throughout the injection period. The recovery period is dominated by initial WBS transitioning to a PRF by the end. Transient evaluation of the injection and recovery period results in similar values on the hydraulic parameters. The pressure response in the section below the test section suggests a hydraulic connection between the two sections. The borehole is not tested below 584.0 m, hence the transmissivity of the lowest part of the borehole is unknown. However, the rather large pressure increase (c. 150 kPa) in the section below due to packer inflation indicates a rather low transmissivity of the borehole interval below 585.0 m.

104.0–124.0 m

After a transition period a short period of a possible PRF is indicated between c. 100 s to c. 300 s. After c. 300 s to the end of the injection period the derivative has a negative slope pointing at a flow regime of higher dimension, i.e. PSF. During the recovery period a PRF is dominating the first 300 s. in agreement with the injection period, after a initial WBS, the end of the recovery period show signs of a PSF. Transient evaluations using Hurst-Clark-Brauer model and the Hantush model for the injection period and the Dougherty-Babu model for the recovery period give consistent results.

124.0–144.0 m

Both the injection and the recovery period are dominated by a PSF, possibly preceded by short PRF periods. Hence, a leaky aquifer model is employed for the transient evaluation. Transient evaluation of the injection period and the recovery period shows good agreement. A highly negative skin factor is calculated from both periods. Transient evaluation indicates a lower transmissivity than the steady-state transmissivity, which is likely to be an effect of the low skin factor estimated from the transient evaluation. The pressure in the section below the test section increased by c. 14 kPa during the injection period. Since the transmissivity in the section below is higher than the transmissivity in the section 124.0–144.0, this relatively high pressure interference may have resulted in an overestimation of the transmissivity in this section. On the other hand, the transmissivity considered to be the most representative for this section was derived by using the Hantush model, which to some degree compensates for leakage. The transient evaluation of the injection period is considered to best represent the formation characteristics in the section.

144.0–164.0 m

The pressure in the section above the test section increased by c. 4.4 kPa during the injection period. Since transmissivity in the section above is in the same order of magnitude as the transmissivity in the section 144.0–164.0, this relatively small pressure interference should not have a major impact of the test performed in the section. Also, the transmissivity considered to be the most representative for this section was derived by using the Hantush model, which to some degree compensates for leakage. After pressure stabilisation the injection period is dominated by a PSF and throughout the injection period. The recovery period show signs of PSF during the entire period, with a possible PSS at the end. Transient evaluation using the Hantush model for both the injection and recovery period give consistent results.

164.0–184.0 m

During the first part of the injection period data is a more scattered than usual due to a number of switches between the control valves during the first minute. Nevertheless, a PRF is indicated from c. 80 s to c. 500 s. Signs of an apparent NFB appear after the period PRF, indicated by the increasing inverse flow derivative. The recovery period shows a short period dominated by WBS followed by a transition to a PSF that dominates from c. 100 s throughout the recovery period. No unambiguous transient evaluation of the recovery period is possible. A very high value on the skin factor is indicated (corresponding to a very low value on the simulated effective borehole radius). An example evaluation of the recovery period is presented. The transient evaluation of the injection period results in a slightly higher transmissivity than from the steady-state evaluation which fact may be explained by the apparent NFB by the end of the injection period. The transient evaluation of the injection period is considered as the most representative of the section.

184.0–204.0 m

A flow rate lower than expected and an unfavourable starting value on the control valves made the time to achieve stable pressure rather long. This fact decreases the number of data useful for transient evaluation. The injection period is assumed to be dominated by a PSF throughout the period. The recovery period shows a rather short WBS followed by an early, first PRF that later transitions into a second PRF with a slightly lower transmissivity. The transient evaluation of the injection period is considered as the most representative for the section.

204.0–224.0 m

A disturbance after c. 60 s during the injection period led to an increased time to achieve pressure stabilisation. The injection period data are scattered due to the low flow and a flow regime interpretation is rather difficult. Still, there are signs of flow with a dimension between PRF and PLF. This is supported by the low value on the skin factor from transient evaluation assuming radial flow. The recovery period is dominated by WBS possibly transitioning to PLF by the end. The transient evaluation of the injection period results in a transmissivity significantly lower than the steady-state evaluation. This fact may be explained by an overestimation of the steady-state transmissivity due to low flow dimension (negative skin factor).

224.0–244.0 m

The pressure in the section below the test section increased by c. 41 kPa during the injection period. Since the transmissivity in the section below is higher than the transmissivity in the section 224.0–244.0, this relatively high pressure interference probably resulted in an overestimation of the transmissivity in this section. The injection period is dominated by an intermediate between PRF and PSF. The recovery period show early signs of WBS followed by a PSF that last throughout the recovery period. The Hurst-Clark-Brauer model for the injection period and the Hantush model for the recovery period give consistent results and have a positive skin factor.

244.0–264.0 m

A series of switches between control valves led to a prolonged time to achieve a stable injection pressure. This means that the relevant, evaluable data of the injection period has a shorter span than usual. Also the inverse flow derivative is affected. However, this fact does not prevent the interpretation of a PRF from c. 200 s to the end of the injection period. During the recovery period WBS is dominant the first 100 s followed by a transition period to some other flow regime, possibly a PRF. Transient evaluation of the injection period gives a high transmissivity relative to the steady-state transmissivity and a positive skin. Applying a leaky aquifer model for the transient evaluation of the recovery period gives an apparently good type curve fit to the data. However this evaluation has a high degree of uncertainty and was thus rejected. There was pressure interference with the sections above and below the test section. The pressure in the section above the test section increased by c. 7.6 kPa during the injection period. Since transmissivity in the section below is lower than the transmissivity in the section 244.0–264.0, this pressure interference should not have a major impact of the test performed in the section. The transient evaluation from the injection period is considered as the most representative for the section.

264.0–284.0 m

The injection period displays a rather flat derivative that should suggest a dominating period of PRF. However, a fit using the Hurst-Clark-Brauer model results in an unreasonable high skin factor making this interpretation uncertain. The recovery period, on the other hand, clearly displays a PSF after an initial short period of WBS. Due to the uncertainty about the transient evaluation of the injection period the leaky aquifer model used for evaluation of the recovery period is considered to be the most representative.

284.0–304.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

304.0–324.0 m

The flow rate is somewhat unstable, hence the interpretation of flow regimes during the injection period is uncertain. However, the injection period seems to be dominated by a PLF up to c. 300 s which is followed by an approximate PRF. The recovery period indicates WBS and a transition to PLF after c. 200 s. Transient evaluations using PRF models and single-fracture models give consistent results for both the injection and recovery period. The transient evaluation on the injection period is considered as the most representative for the section.

324.0–344.0 m

The time to achieve a stable injection pressure was unusually long since the section had much lower transmissivity than expected. The injection period shows that the derivative is rapidly approaching zero and hence interpreted as a PSS. The recovery period shows initial WBS transitioning to PSS. No unambiguous transient evaluation could be made on neither the injection nor the recovery period. However, the transmissivity estimated from the transient evaluation on the recovery period is assumed to be more representative than the steady-state transmissivity TM in this case. Thus, the parameter values are selected from the recovery period although the evaluation is uncertain.

344.0–364.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Since the measurement noise with a zero flow was centred slightly below zero, the flow rate measurement limit was manually elevated 6e–9 m^3/s.

364.0–384.0 m

The flow rate is low, very close to the measurement limit and hence the data, especially the flow derivative, is quite scattered making an interpretation of the injection period difficult. During the recovery period WBS is indicated transitioning to some other flow regime. No unambiguous transient evaluation of neither the injection nor the recovery period is possible. As a result TM was considered to be the most representative transmissivity value for this section. Since the measurement noise with a zero flow was centred slightly below zero, the flow rate measurement limit as well as the flow data was manually elevated 4.28e–9 m^3/s.

369.0–389.0 m

The section has a low transmissivity and the flow is close to the measurement limit. Hence, the flow rate data are rather scattered making it necessary to use a large filter on the derivative. The injection period is interpreted as an intermediate between a PLF and a PRF. The apparent increase of the derivative at the end of the period may possibly be an effect of the increased scan interval and not a true characteristic of the rock formation. The recovery only displays WBS and a transition period to some other flow regime, possibly a PRF. Transient evaluations using PRF models and single fracture models on the injection period and a PRF model on the recovery period gives consistent results. The transient evaluation on the recovery period is chosen as representative for the section. Since the noise level on the flow data was centred below zero, all flow rate data was elevated 3.68e–09 m^3/s.

389.0–409.0 m

Both the injection and recovery period are dominated by a PRF and the transient evaluations using the Hurst-Clark-Brauer and the Dougherty-Babu model give consistent results. Transmissivity from the transient evaluation of the injection is chosen as representative for the section. The pressure in the section below the test section increased by c. 4.6 kPa during the injection period. Since the transmissivity in the section below is in the same order of magnitude as the transmissivity in the section 389.0–409.0, this relatively small pressure interference should not have a major impact of the test performed in the section.

409.0–429.0 m

A PSF is dominating throughout the injection period. During the recovery period a PRF is indicated between c. 10 s to c. 200 s transitioning to a PSF after c. 200 s. The transient evaluations of the PSF of both the injection and recovery periods give consistent results, also with the transient evaluation of the PRF on the recovery period. The latter evaluation is considered as the most representative for the section.

429.0–449.0 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, is quite scattered. An apparent PLF/NFB is indicated for the entire injection period and no unambiguous transient evaluation can be made. The recovery period only indicates WBS and a transition period. Still, a transient evaluation of the recovery period, using a PRF-model, results in a good fit. The transient evaluation of the recovery period is considered as the most representative for this section.

449.0–469.0 m

During the injection period a dominating PLF transitioning to a PRF by the end is indicated. The recovery period indicates a PLF throughout the period. Transient evaluations using single-fracture models and PRF models for both the injection and recovery period give consistent results. The transient evaluations results in a significantly lower transmissivity than the steady-state transmissivity probably due to fracture flow associated by a highly negative skin factor. The transient evaluation of the injection period is considered as the most representative for this section.

469.0–489.0 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, is quite scattered. Still, there are signs of a dominating flow regime in between a PLF and a PRF. Transient evaluations using PRF models and single fracture models give consistent results for the injection period. The recovery period indicates an apparent PLF/NFB. No unambiguous transient evaluation can be made on the recovery period. Only an example evaluation on this period is shown. The transient evaluation on the injection period is considered as the most representative for this section despite it is significantly lower than TM.

489.0–509.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

509.0–529.0 m

The pressure in the section below the test section increased by c. 3.3 kPa during the injection period. Since the transmissivity in the section below is higher than the transmissivity in the section 509.0–529.0, this relatively small pressure interference may have resulted in an overestimation of the transmissivity in this section. The injection period displays a PRF from c. 100 s throughout the period. During the recovery period an early WBS is shown followed by a possible PSF. The transient evaluation of the injection period is considered as the most representative for this section.

527.0–547.0 m

The pressure in the section above the test section increased by c. 61 kPa during the injection period. Since transmissivity in the section below is much lower than the transmissivity in the section 527.0–547.0, this relatively large pressure interference should not have a major impact of the test performed in the section. Both the injection- and recovery period clearly indicates a PRF. The transient evaluations from the two periods show consistent results, and the data from the injection is chosen as representative for the section.

547.0–567.0 m

Both the injection- and recovery period displays a short PRF transitioning to a PSF. Transient evaluations using PRF and PSF models give consistent results. The transient evaluation from the recovery period is considered as the most representative for this section.

564.0–584.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

304.0–309.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered 3.08e–9 m^3/s.

309.0–314.0 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, is quite scattered. Still, signs of an early PRF are visible between c. 20 and 200 s of the injection period. After 200 s the derivative increases which would point to an apparent NFB. The recovery period starts with WBS and a transition period. No unambiguous transient evaluation is possible of the recovery period. An example evaluation of the recovery assuming the same transmissivity and storativity as was obtained from the injection period is shown. The transmissivity from the injection period is considered as the most representative for the section. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit as well as the flow data was manually lowered 5.65e–9 m^3/s.

314.0–319.0 m

The flow rate is low and hence the data, especially the flow derivative, is quite scattered. However, a PRF is assumed to dominate the injection period. The recovery period indicates WBS and a transition to some other flow regime. At the end of the recovery period the derivative becomes very scattered and apparently stabilizes which possibly may indicate a PRF. However, transient evaluation with a PRF model results in an increasingly high skin factor and associated high transmissivity and no unambiguous evaluation is possible with this model.

An example evaluation of the recovery period with a maximal value of 20 on the skin factor is shown. Neither, an evaluation with the Hantush model gives reliable values. Transmissivity from the evaluation of the injection period is chosen as representative for this section. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit as well as the flow data was manually lowered 5.65e–9 m^3/s.

319.0–324.0 m

Throughout the injection period a PRF is indicated from c. 200 s. The recovery is affected by WBS and displays a transition to some flow regime at the end. It is possible to make a transient evaluation of the recovery by using the Dougherty-Babu model. This evaluation gives similar values with the transient evaluation from the injection period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate data was manually lowered 4.43e–9 m^3/s. The response and evaluation of this section is very similar the partly overlapping section 322.0–327.0 m, indicating that the dominating fractures is found in the interval 319.0–322.0 m.

322.0–327.0 m

The injection period displays a PRF from c. 200 s and throughout the period. The recovery is affected by WBS and displays a transition to some flow regime at the end. It is possible to make a transient evaluation of the recovery by using the Dougherty-Babu model. This evaluation gives similar values with the transient evaluation from the injection period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate data was manually lowered 4.43e–9 m^3/s. The response and evaluation of this section is very similar the partly overlapping section 319.0–324.0 m, indicating that the dominating fractures is found in the interval 322.0–324.0 m.

327.0–332.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered 8.11e–9 m^3/s.

332.0–337.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered 8.11e–9 m^3/s.

337.0–342.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered 6.88e–9 m^3/s.

339.0–344.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered 4.43e–9 m^3/s.

364.0–369.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered 6.88e–9 m^3/s.

369.0–374.0 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, is quite scattered. Still, a PLF/PRF is indicated from c. 50–1,200 s during the injection period. At the end a tendency to a PSF is indicated. Transient evaluations using PRF and PSF models give similar results. The recovery period starts with WBS followed by a transition period. A good type curve fit can be accomplished with a PRF model, although no flat derivate is observed during the recovery period. The transient evaluation from the injection- and recovery period gives similar results, and the injection is chosen for the section. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit as well as the flow data was manually lowered 6.88e–9 m^3/s.

374.0–379.0 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, is quite scattered. A PLF/PRF is assumed to dominate the injection period. However, this interpretation is uncertain. The recovery period initially indicates of a WBS followed by a short transition period. No unambiguous transient evaluation could be made on the recovery period. An example evaluation of the recovery is shown assuming the same transmissivity and storativity as obtained from the injection period. The transient evaluation from the injection period is chosen as representative for this section. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit as well as the flow data was manually lowered 8.11e–9 m^3/s.

379.0–384.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered 8.1e–09 m^3/s.

384.0–389.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered 4.43e–9 m^3/s.

389.0–394.0 m

Due to a poor regulation of the injection pressure the time to achieve a stable injection pressure was unusually long for this test. In addition, a change of valves after c. 13 min results in an unstable injection pressure. The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, is quite scattered. However, a PLF/PRF is indicated during the injection period. The recovery is rather fast with a short period of WBS followed by a transition to PSS. No unambiguous transient evaluation of the recovery period is possible. An example evaluation of the recovery period is shown. The transient evaluation from the injection period is chosen as representative for this section.

392.0–397.0 m

The pressure in the section below the test section increased by c. 6.8 kPa during the injection period. Since the transmissivity in the section below is much higher than the transmissivity in the section 392.0–397.0, this relatively small pressure interference has probably resulted in an overestimation of the transmissivity in this section. During the injection period, a PRF is present between c. 100 and 1,200 s. The recovery is fast and the pressure starts with a WBS transitioning towards a PSS by the end. No unambiguous transient evaluation is possible on this period. An apparent, high positive skin factor is indicated. An example evaluation of the recovery is shown assuming the same transmissivity and storativity as obtained from the injection period. The transient evaluation from the injection period is chosen as representative for this section.

397.0–402.0 m

The injection period is dominated by a PRF during the entire period. Transient evaluation of the injection period using a PRF model results in a rather large positive skin factor. The recovery period, on the other hand, displays a slightly sloping derivative suggesting a dominating PSF. No unambiguous transient evaluation of the recovery period is possible. An apparent, high positive skin factor is indicated. An example evaluation of the recovery period is shown.
The pressure in the section below the test section increased by c. 5.5 kPa during the injection period. Since the transmissivity in the section below is higher than the transmissivity in the section 397.0–402.0, this pressure interference may have resulted in an overestimation of the transmissivity in this section. The transient evaluation from the injection period is chosen as representative for this section.

402.0–407.0 m

During the injection period, a PRF is present between c. 100 and 1,200 s. The recovery period displays initial WBS transitioning to a PRF by the end. The transient evaluation of both periods displays a rather high positive skin factor, particularly during the recovery period. The pressure in the section below the test section increased by c. 3 kPa during the injection period. Since transmissivity in the section above is in the same order of magnitude as the transmissivity in the section 402.0–407.0, this relatively small pressure interference should not have a major impact of the test performed in the section. The response and evaluation of this section is similar to the partly overlapping next lower section 404.0–409.0 m indicating that the dominating fracture is found in the interval 404.0–407.0 m.

404.0–409.0 m

The responses during both the injection and recovery period are almost identical with the previous section indicating the same conductive fracture is tested. The fracture is assumed to be located between 404.0–407.0 m. The pressure in the section below the test section increased by c. 3 kPa during the injection period. Since transmissivity in the section above is in the same order of magnitude as the transmissivity in the section 404.0–409.0, this relatively small pressure interference should not have a major impact of the test performed in the section.

409.0–414.0 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, is quite scattered. Still, a PRF is assumed to dominate the entire injection period. The recovery period begins with a short WBS followed by a transition towards a PSS. The transient evaluation of both periods displays a rather high positive skin factor, particularly during the recovery period. The transient evaluation from the injection period is chosen as representative for this section.

413.0–418.0 m

Due to a poor regulation of the injection pressure the time to achieve a stable injection pressure was unusually long for this test. The pressure in the section below the test section increased by c. 3 kPa during the injection period. Since the transmissivity in the section below is higher than the transmissivity in the section 413.0–418.0, this relatively small pressure interference may have resulted in an overestimation of the transmissivity in this section. The injection period displays a flat derivative which indicates a dominating PRF. Transient evaluation of the injection period using a PRF model reveals a large positive skin factor. The recovery is rather fast and only displays a short WBS and a transition period towards PSS. No unambiguous transient evaluation of the recovery period is possible. An example evaluation of the recovery is shown assuming the same transmissivity and storativity as obtained from the injection period. The transient evaluation from the injection period is chosen as representative for this section.

418.0–423.0 m

The injection period shows a PSF throughout the period. The recovery period displays a PRF transitioning to a PSF after c. 200 s. Transient evaluations using a PSF model for both the injection and recovery period as well as a PRF model for the recovery period give consistent results. The transient evaluation of the recovery period was considered to give the most representative transmissivity value for this section.

423.0–428.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

424.0–429.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

429.0–434.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

434.0–439.0 m

The flow rate is low, close to the measurement limit and hence the data, especially the flow derivative, is quite scattered. The flow rate approaches the lower measurement limit at the end of the period. Hence, the qualitative interpretation is very uncertain. A possible PRF seems to occur in the beginning of the injection period. The recovery period only indicates WBS and a short transition period. The transient evaluation of the injection period is uncertain and based on the early part of the curve before the flow rate approaches the lower measurement limit. No unambiguous transient evaluation of the recovery period is possible. An example evaluation of the recovery is shown assuming the same transmissivity and storativity as obtained from the injection period. The transient evaluation from the injection period is chosen as representative for this section.

439.0–444.0 m

The injection period is assumed to be dominated by a PRF despite that the data, especially the flow derivative, is quite scattered due to the low flow rate. The recovery period starts with WBS followed by a short transition period. Transient evaluations from both periods using PRF-models are consistent. The transient evaluation from the recovery period is chosen as representative for this section.

444.0–449.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

449.0–454.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

454.0–459.0 m

The injection period clearly indicates a PRF from c. 50–1,200 s. After an initial WBS the recovery period also clearly has a flat derivate by the end indicating a PRF. Transient evaluation using a PRF-model gives consistent results for the injection and recovery period. The transient evaluation from the injection period is considered as the most representative for the section.

459.0–464.0 m

Since the measurement noise with a zero flow was centred slightly below zero, the flow rate data was manually elevated 2e–9 m^3/s. The injection period indicates an apparent NFB. During the recovery period a PLF is indicated but no unambiguous transient evaluation is possible from neither the injection nor recovery period. The steady-state value for transmissivity, T-moye, is considered as the most representative for the section.

464.0–469.0 m

Since the measurement noise with a zero flow was centred slightly below zero, the flow rate measurement limit was manually elevated 7.7e–10 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. Hence, in accordance with AP PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

469.0–474.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

474.0–479.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

479.0–484.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

484.0–489.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

509.0–514.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section.

514.0–519.0 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 PS 400-06-51, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase, indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period.

519.0–524.0 m

The injection period is clearly dominated by a PRF from c. 80 s and throughout the period. The recovery period starts with WBS followed by a transition to a possible PSF by the end. The apparent flat derivative at the end of the recovery period is considered as false and caused by limited resolution of the pressure registration. No unambiguous transient evaluation is possible on the recovery period. An example evaluation of the recovery is shown assuming the same transmissivity and storativity as obtained from the injection period. The transient evaluation from the injection period is chosen as representative for this section. The pressure in the section below the test section increased by c. 3.7 kPa during the injection period. Since the transmissivity in the section below is much higher than the transmissivity in the section 519.0–524.0, this relatively small pressure interference may have resulted in an overestimation of the transmissivity in this section. The partly overlapping section 522.0–527.0 m has a similar response and transmissivity which should indicate that the two sections are measuring the same conductive fracture, which ought to be situated somewhere between 522–524 m.

522.0–527.0 m

The injection period is clearly dominated by a PRF from c. 100 s and throughout the period. The recovery period indicates a WBS transitioning to a PSF. The apparent flat derivative at the end of the recovery period is considered as false and caused by limited resolution of the pressure registration. The transient evaluations of the injection and recovery period give consistent results. The transient evaluation from the injection period is chosen as representative for this section. The pressure in the section below the test section increased by c. 2.8 kPa during the injection period. Since the transmissivity in the section below is much higher than the transmissivity in the section 522.0–527.0, this relatively small pressure interference may have resulted in an overestimation of the transmissivity in this section. The partly overlapping section 519.0–524.0 m has a similar response and transmissivity which indicates that the two sections are measuring the same conductive fracture, which ought to be situated somewhere between 522–524 m.

527.0–532.0 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 400-06-051, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly below zero, the flow rate measurement limit was manually elevated 1e–9 m^3/s.

532.0–537.0 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 400-06-051, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly below zero, the flow rate measurement limit was manually elevated 1e–9 m^3/s.

537.0–542.0 m

Both the injection and recovery period is dominated by a PRF. After c. 400 s of the recovery period, the derivative decreases which may indicate a transition to a possible PSF. Transient evaluation of the injection and recovery period using PRF models give consistent results. The pressure in the section below the test section increased by c. 67 kPa during the injection period. Since transmissivity in the section below is lower than the section 537.0–542.0, this relatively large pressure interference should not have a major impact of the test performed in the section. The transient evaluation from the injection period is chosen as representative for this section.

542.0–547.0 m

The injection period displays a short period of PRF followed by a PSF. The recovery period is dominated by a PSF, possibly preceded by a short PRF. The Hantush model for both the injection and recovery period as well as the Hurst-Clark-Brauer model for the injection period give consistent results. The pressure in the section below the test section increased by c. 58 kPa during the injection period. Since transmissivity in the section below is lower than the section 542.0–547.0, this relatively large pressure interference should not have a major impact of the test performed in the section. The transient evaluation from the injection period is chosen as representative for this section.

547.0–552.0 m

Both the injection and recovery period displays a PRF transitioning to a PSF. At the end of the injection period, a PSS is visible. Transient evaluations using PRF and PSF models give consistent results for both the injection and recovery period, respectively. 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 lower than the section 547.0–552.0, this relatively small pressure interference should not have a major impact of the test performed in the section. The transient evaluation from the injection period is chosen as representative for this section.

552.0–557.0 m

The injection period displays an early PLF transitioning to a PSF by the end. The recovery period shows initial WBS transitioning to a PRF. Transient evaluation using the Hurst-Clark-Brauer and Dougherty-Babu models on the injection and recovery periods, respectively give consistent results. The transient evaluation from the injection period is chosen as representative for this section.

557.0–562.0 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 400-06-051, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered 4e–9 m^3/s.

562.0–567.0 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 400-06-051, the injection time was shortened. As a result TM, based on Q/s-measl-L, was considered to be the most representative transmissivity value for this section. The period of measured recovery only showed a pressure increase indicating that the section is of such low transmissivity that packer expansion affects the pressure throughout the period. Since the measurement noise with a zero flow was centred slightly above zero, the flow rate measurement limit was manually lowered 4e–9 m^3/s.

6.2.5 Flow regimes

A certain time interval with pseudo-radial flow could, in most tests, be identified from the injection period. As discussed in Section 5.4.4, the recovery periods were sometimes dominated by wellbore storage effects and no pseudo-radial flow period was reached. A summary of the frequency of identified flow regimes on the different test scales is presented in Table 6-3, which shows all identified flow regimes during the test periods. 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.

Table 6-3. Interpreted flow regimes during the injection tests in KLX12A.

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
KLX12A	5	48	24	4(0)	21(15)	4(1)	1(0)	2(1)	20(8)	1(1)	8(0)	6(0)	4(0)	0(0)
KLX12A	20	25	21	6(0)	15(6)	7(4)	1(1)	2(0)	11(4)	4(2)	6(2)	9(2)	2(0)	0(0)
KLX12A	100	5	5	1(0)	5(1)	3(0)	0(0)	0(0)	2(1)	1(0)	4(0)	2(0)	0(0)	0(0)

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

Table 6-3 shows that, during the injection period, the most common interpreted flow regime was pseudo-radial flow (PRF). A certain period of pseudo-radial flow could be identified from the injection period in 82% of all the tests with a definable final flow rate for KLX12A. The percentage is higher for the tests in 5 m sections compared to the tests with the 20 m section and all of the tests with 100 m section showed some period of pseudo-radial flow. During the recovery period an early period of wellbore-storage could be identified in 62% of the tests. A certain period of pseudo-radial flow could also be identified in 36% of all the tests with a definable final flow rate during the recovery period. The same figure, 36%, is valid for pseudo-spherical flow as well.

For both the injection and recovery period more than one flow regime could be identified in 58% and 40% of all tests respectively. The most common mixed flow regime during the injection period in KLX12A was a PLF/PRF and the most common transition during the injection period was from PRF to PSF. During the recovery period in KLX12A the most common transition was from WBS to PRF or PSF, as well as from PRF to PSF. Also transitions from WBS to PSF were fairly common.

6.3 Comparison of transmissivity values on different test scales

The transmissivity values considered as the most representative, T_R, from the injection tests in KLX12A in the tested sections of 100 m, 20 m and 5 m length, respectively, are shown in Figure 6-2. This figure demonstrates a fairly good agreement between results obtained from tests on different scales in KLX12A. However the transmissivity in shorter sections tend to be higher. A consistency check of the transmissivity values on the different scales was made by summation of calculated values from smaller scales (20 m and 5 m) and comparing with the estimated values in longer sections (100 m and 20 m).

In Table 6-4, estimated transmissivity values in 100 m and 20 m test sections in KLX12A according to steady-state (T_M) and most representative evaluation (T_R) are listed together with summed transmissivities in 20 m and 5 m sections over the corresponding 100 m and 20 m sections for KLX12A. In addition, summations of transmissivities from the tests with 100 m and 20 m in the interval 104.0–584.0 m and 20 m and 5 m sections in the interval 304.0–567.0 m are also displayed in Table 6-4. The summation of the tests with 20 m sections, as well as 5 m sections were it was used for measuring, shows a rather good agreement with the transmissivity from the corresponding 100 m test. The total sums of transmissivity displayed at the end of Table 6-4 also show a very good agreement between the 100 and 20 m sections in the interval 104.0–584.0. The agreement between the total sum of transmissivities from 20 m and 5 m sections in the interval 304.0–567.0 m is very good.

In Table 6-4, when the transmissivity values are below the measurement limit (Q_p could not be defined), the most representative transmissivity value, T_R, was considered to be less than T_M, based on Q/s-measl-L, for the test section. The measurement limit values are included in the summed values in Table 6-4, which gives overestimated values of the summed transmissivities for intervals with low transmissivity.

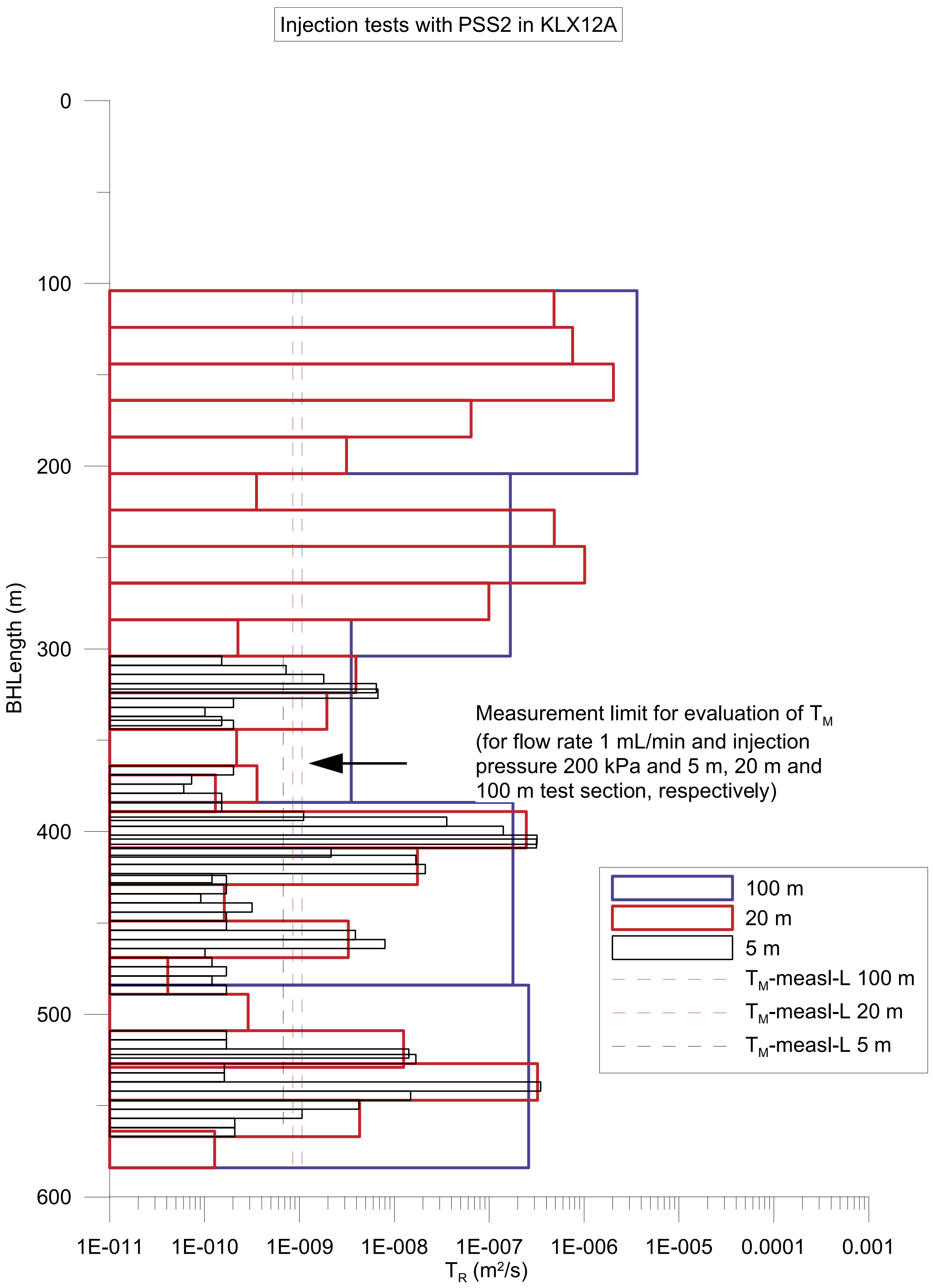


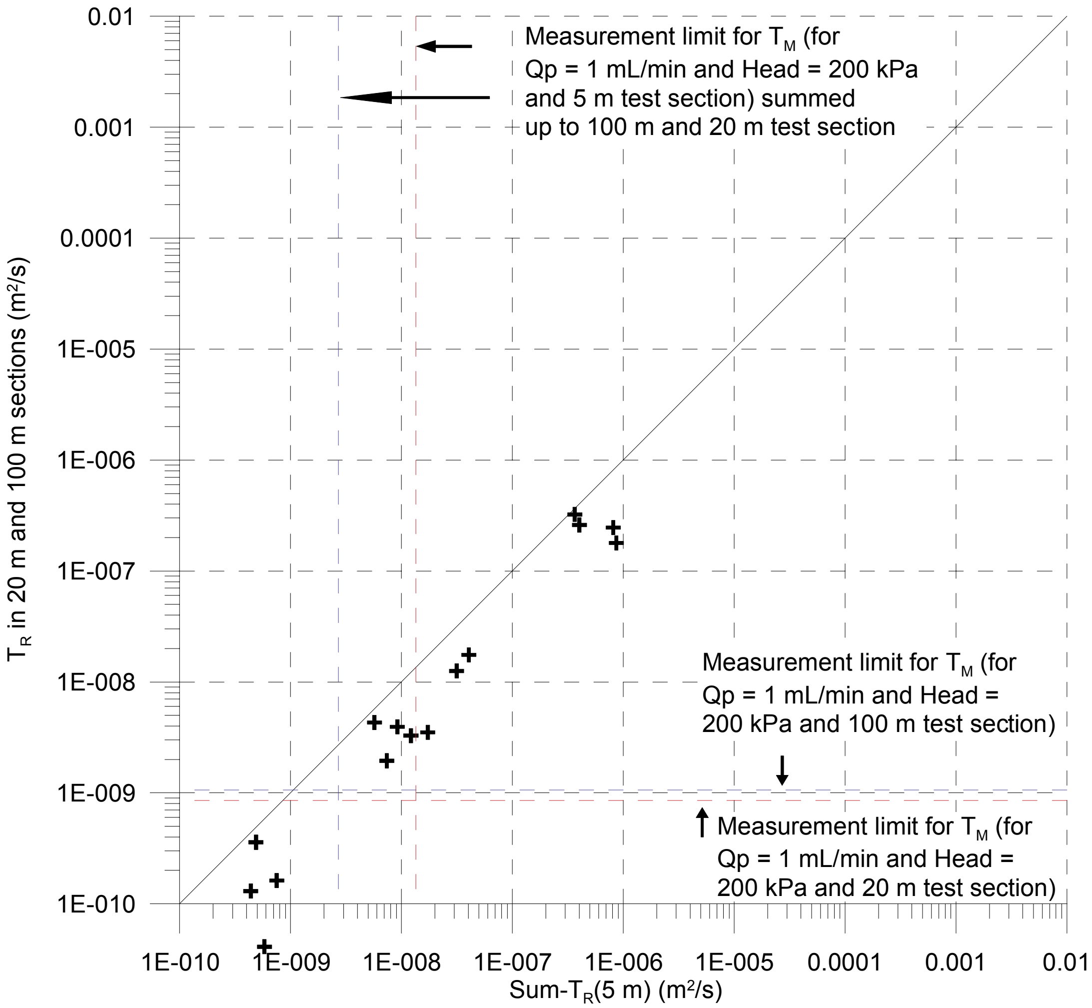
Figure 6-2. *Estimated best representative transmissivity values (T_R) for sections of 100 m, 20 m and 5 m length in borehole KLX12A. Estimated transmissivity values for the lower standard measurement limit from stationary evaluation (T_M-measl-L) for different test section lengths are also shown.*

Table 6-4. Estimated transmissivity values in 100 m and 20 m test sections together with summed up transmissivity values in 20 m and 5 m sections in the corresponding borehole intervals from the injection tests in KLX12A.

Borehole Idcode	Secup inj.test (m)	Seclow inj.test (m)	L_w (m)	T_M inj. tests (m^2/ s)	T_R inj. tests (m^2/s)	SUM T_M (20 m) inj. tests (m^2/s)	SUM T_R (20 m) inj. tests (m^2/s)	SUM T_M (5 m) inj. tests (m^2/s)	SUM T_R (5 m) inj. tests (m^2/s)
KLX12A	104.00	204.00	100.00	1.13E–05	3.61E–06	1.13E–05	3.35E–06	n.m. 5 m	n.m. 5 m
KLX12A	204.00	304.00	100.00	5.48E–07	1.67E–07	1.04E–06	1.60E–06	n.m. 5 m	n.m. 5 m
KLX12A	284.00	384.00	100.00	2.24E–08	3.51E–09	6.47E–08	6.69E–09	3.99E–08	1.73E–08
KLX12A	384.00	484.00	100.00	3.35E–07	1.79E–07	3.08E–07	2.67E–07	4.49E–07	8.67E–07
KLX12A	484.00	584.00	100.00	2.83E–07	2.60E–07	2.97E–07	3.40E–07	2.80E–07	4.02E–07
KLX12A	104.00	124.00	20.00	8.57E–07	4.83E–07			n.m. 5 m	n.m. 5 m
KLX12A	124.00	144.00	20.00	7.94E–06	7.58E–07			n.m. 5 m	n.m. 5 m
KLX12A	144.00	164.00	20.00	2.49E–06	2.05E–06			n.m. 5 m	n.m. 5 m
KLX12A	164.00	184.00	20.00	4.15E–08	6.45E–08			n.m. 5 m	n.m. 5 m
KLX12A	184.00	204.00	20.00	1.62E–08	3.14E–09			n.m. 5 m	n.m. 5 m
KLX12A	204.00	224.00	20.00	2.43E–09	3.53E–10			n.m. 5 m	n.m. 5 m
KLX12A	224.00	244.00	20.00	3.38E–07	4.84E–07			n.m. 5 m	n.m. 5 m
KLX12A	244.00	264.00	20.00	6.31E–07	1.02E–06			n.m. 5 m	n.m. 5 m
KLX12A	264.00	284.00	20.00	7.14E–08	9.93E–08			n.m. 5 m	n.m. 5 m
KLX12A	284.00	304.00	20.00	<2.25E–10	<2.25E–10			n.m. 5 m	n.m. 5 m
KLX12A	304.00	324.00	20.00	2.13E–08	3.94E–09			2.09E–08	9.18E–09
KLX12A	324.00	344.00	20.00	4.27E–08	1.94E–09			1.78E–08	7.39E–09
KLX12A	344.00	364.00	20.00	<2.18E–10	<2.18E–10			n.m. 5 m	n.m. 5 m
KLX12A	364.00	384.00	20.00	3.59E–10	3.59E–10			9.10E–10	4.88E–10
KLX12A	369.00	389.00	20.00	3.39E–10	1.30E–10			8.59E–10	4.37E–10
KLX12A	389.00	409.00	20.00	2.46E–07	2.46E–07			3.92E–07	8.13E–07
KLX12A	409.00	429.00	20.00	4.18E–08	1.76E–08			3.90E–08	4.06E–08
KLX12A	429.00	449.00	20.00	2.59E–10	1.62E–10			1.23E–09	7.49E–10
KLX12A	449.00	469.00	20.00	1.89E–08	3.28E–09			1.62E–08	1.22E–08
KLX12A	469.00	489.00	20.00	3.58E–10	4.11E–11			5.81E–10	5.81E–10
KLX12A	489.00	509.00	20.00	<2.89E–10	<2.89E–10			n.m. 5 m	n.m. 5 m
KLX12A	509.00	529.00	20.00	1.31E–08	1.25E–08			n.m. 5 m	n.m. 5 m
KLX12A	527.00	547.00	20.00	2.69E–07	3.23E–07			2.43E–07	3.65E–07
KLX12A	547.00	567.00	20.00	1.50E–08	4.31E–09			1.32E–08	5.70E–09
KLX12A	564.00	584.00	20.00	<1.28E–10	<1.28E–10			n.m. 5 m	n.m. 5 m
Sum of T in 104.00–584.00 m				1.25E–05[1)]	4.22E–06[1)]	1.31E–05	5.57E–06	n.m. 5 m	n.m. 5 m
Sum of T in 304.00–567.00 m				n.m	n.m	6.69E–07	6.14E–07	7.68E–07	1.29E–06

[1)] Sum of all 100 m tests.
n.m. = not measured.

In Figure 6-3, estimated transmissivity values considered as the most representative for 100 m and 20 m sections (T_R-100 m and T_R-20 m, respectively) in KLX12A are plotted versus the sum of the transmissivity values considered most representative in 5 m sections in the corresponding intervals (SUM T_R-5 m). The lower measurement limit of T_M for the different section lengths (Q_p = 1 mL/min and an assumed pressure difference of 200 kPa) together with the cumulative measurement limit for the sum of 5 m sections are also shown in the figure.



Figur 6-3. *Transmissivity values considered most representative (TR) for 100 m and 20 m sections versus the sum of most representative transmissivity values (TR) in 5 m sections in the corresponding borehole intervals from the injection tests in KLX12A together with the standard lower measurement limit at different scales.*

Figure 6-3 indicates a relatively good agreement between estimated transmissivity values in longer sections and summed transmissivity values in corresponding 5 m sections for the injection tests. However, all the data points are located below the straight line, indicating that the sum of transmissivity from the shorter sections is generally higher than the estimated transmissivity in longer sections. One reason might be the result of pressure interferences with adjacent sections that occurred during some 5 m tests. This can make a rather significant difference when summing the sections together. Some of the sections are also partly overlapping, resulting in an overestimation when summing the sections together. Since the measurement limit values are summed up, the sum of T in shorter sections can become higher than the estimated transmissivity value in the longer section, for very low-conductive sections. There might also be other reasons for discrepancies.

6.4 Basic statistics of hydraulic conductivity distributions in different scales

Some basic statistical parameters were calculated for the steady-state hydraulic conductivity (K_M) distributions in different scales (100 m, 20 m and 5 m) from the injection tests in borehole KLX12A. The hydraulic conductivity is obtained by dividing the transmissivity by the section length; in this case T_M/L_w. Results from tests where Q_p was below the estimated test-specific measurement limit were not included in the statistical analyses of K_M. The same basic statistical parameters were derived for the hydraulic conductivity considered most representative ($K_R=T_R/L_w$), including all tests. In the statistical analysis, the logarithm (base 10) of K_M and K_R was used. Selected results are shown in Table 6-5. It should be noted that the statistics for the different section lengths is based on different borehole intervals.

Table 6-5. Basic statistical parameters for steady-state hydraulic conductivity (K_M) and hydraulic conductivity considered most representative (K_R) in borehole KLX12A. L_w = section length, m = arithmetic mean, s = standard deviation.

Parameter	Unit	KLX12A L_w=100 m	KLX12A L_w=20 m	KLX12A L_w=20 m	KLX12A L_w=5 m
Measured borehole interval	m	104.0–584.0 [1)]	104.0–584.0 [1)]	304.0–567.0 [1)]	304.0–567.0 [1), 2)]
Number of tests	–	5	25	14	48
N:o of tests below E.L.M.L.[5)]	–	0	4	3	24
m ($Log_{10}(K_M)$)	Log_{10}(m/s)	–8.38	–8.79	–9.38	–8.85
s ($Log_{10}(K_M)$)	–	0.96	1.29	1.12	0.87
m ($Log_{10}(K_R)$)	Log_{10}(m/s)	–8.80	–9.44	–9.97	–9.73
s ($Log_{10}(K_R)$)	–	1.08	1.49	1.20	1.09

[1)] Some sections partly overlapping, see Section 5.5 point 4 in nonconformities.
[2)] Sections with very low or non-detectable flow (20 m section length) are not measured with 5 m section length.
[3)] Number of tests where Qp could not be defined (E.L.M.L. = estimated test-specific lower measurement limit).

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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		
KLX12A	104.00	204.00	3	6	2006-04-20 13:44	2006-04-20 15:40	__KLX12A_0104.00_200604201344.ht2	P, Q, Te	
KLX12A	204.00	304.00	3	1	2006-04-20 17:04	2006-04-20 18:53	__KLX12A_0204.00_200604201704.ht2	P, Q, Te	
KLX12A	284.00	384.00	3	1	2006-04-21 07:16	2006-04-21 09:05	__KLX12A_0284.00_200604210716.ht2	P, Q, Te	
KLX12A	404.50	504.50	3	1	2005-10-03 09:27	2005-10-03 10:32	__KLX12A_0384.00_200604211008.ht2	P, Q, Te	
KLX12A	484.00	584.00	3	1	2006-04-24 14:22	2006-04-24 16:25	__KLX12A_0484.00_200604241422.ht2	P, Q, Te	
KLX12A	104.00	124.00	3	1	2006-04-26 07:43	2006-04-26 09:09	__KLX12A_0104.00_200604260743.ht2	P, Q, Te	
KLX12A	124.00	144.00	3	1	2006-04-26 09:46	2006-04-26 11:16	__KLX12A_0124.00_200604260946.ht2	P, Q, Te	
KLX12A	144.00	164.00	3	1	2006-04-26 12:38	2006-04-26 13:54	__KLX12A_0144.00_200604261238.ht2	P, Q, Te	
KLX12A	164.00	184.00	3	1	2006-04-26 14:14	2006-04-26 15:35	__KLX12A_0164.00_200604261414.ht2	P, Q, Te	
KLX12A	184.00	204.00	3	1	2006-04-26 16:04	2006-04-26 17:24	__KLX12A_0184.00_200604261604.ht2	P, Q, Te	
KLX12A	204.00	224.00	3	1	2006-04-26 17:49	2006-04-26 19:07	__KLX12A_0204.00_200604261749.ht2	P, Q, Te	
KLX12A	224.00	244.00	3	1	2006-04-27 07:40	2006-04-27 08:59	__KLX12A_0224.00_200604270740.ht2	P, Q, Te	
KLX12A	244.00	264.00	3	1	2006-04-27 09:28	2006-04-27 10:46	__KLX12A_0244.00_200604270928.ht2	P, Q, Te	
KLX12A	264.00	284.00	3	1	2006-04-27 11:07	2006-04-27 12:22	__KLX12A_0264.00_200604271107.ht2	P, Q, Te	
KLX12A	284.00	304.00	3	1	2006-04-27 13:34	2006-04-27 14:37	__KLX12A_0284.00_200604271334.ht2	P, Q, Te	
KLX12A	304.00	324.00	3	1	2006-04-27 14:58	2006-04-27 16:23	__KLX12A_0304.00_200604271458.ht2	P, Q, Te	
KLX12A	324.00	344.00	3	1	2006-04-27 16:40	2006-04-27 17:57	__KLX12A_0324.00_200604271640.ht2	P, Q, Te	
KLX12A	344.00	364.00	3	1	2006-04-28 07:18	2006-04-28 08:15	__KLX12A_0344.00_200604280718.ht2	P, Q, Te	
KLX12A	364.00	384.00	3	1	2006-04-28 08:42	2006-04-28 09:59	__KLX12A_0364.00_200604280842.ht2	P, Q, Te	
KLX12A	369.00	389.00	3	1	2006-05-02 14:22	2006-05-02 15:39	__KLX12A_0369.00_200605021422.ht2	P, Q, Te	
KLX12A	389.00	409.00	3	1	2006-05-02 16:09	2006-05-02 17:25	__KLX12A_0389.00_200605021609.ht2	P, Q, Te	
KLX12A	409.00	429.00	3	1	2006-05-02 17:49	2006-05-02 19:08	__KLX12A_0409.00_200605021749.ht2	P, Q, Te	
KLX12A	429.00	449.00	3	1	2006-05-03 07:33	2006-05-03 08:55	__KLX12A_0429.00_200605030733.ht2	P, Q, Te	
KLX12A	449.00	469.00	3	1	2006-05-03 09:16	2006-05-03 10:38	__KLX12A_0449.00_200605030916.ht2	P, Q, Te	
KLX12A	469.00	489.00	3	1	2006-05-03 10:59	2006-05-03 12:17	__KLX12A_0469.00_200605031059.ht2	P, Q, Te	
KLX12A	489.00	509.00	3	1	2006-05-03 13:28	2006-05-03 14:28	__KLX12A_0489.00_200605031328.ht2	P, Q, Te	
KLX12A	509.00	529.00	3	1	2006-05-03 14:47	2006-05-03 15:29	__KLX12A_0509.00_200605031447.ht2	P, Q, Te	Interrupted [2)]
KLX12A	509.00	529.00	3	2	2006-05-04 09:16	2006-05-04 10:38	__KLX12A_0509.00_200605040916.ht2	P, Q, Te	Reperformed
KLX12A	527.00	547.00	3	1	2006-05-03 15:54	2006-05-03 17:11	__KLX12A_0527.00_200605031554.ht2	P, Q, Te	
KLX12A	547.00	567.00	3	1	2006-05-03 17:30	2006-05-03 18:46	__KLX12A_0547.00_200605031730.ht2	P, Q, Te	
KLX12A	564.00	584.00	3	1	2006-05-04 07:25	2006-05-04 08:28	__KLX12A_0564.00_200605040725.ht2	P, Q, Te	
KLX12A	304.00	309.00	3	1	2006-05-08 17:21	2006-05-08 18:12	__KLX12A_0304.00_200605081721.ht2	P, Q, Te	
KLX12A	309.00	314.00	3	1	2006-05-11 15:01	2006-05-11 16:22	__KLX12A_0309.00_200605111501.ht2	P, Q, Te	
KLX12A	314.00	319.00	3	1	2006-05-11 16:39	2006-05-11 17:59	__KLX12A_0314.00_200605111639.ht2	P, Q, Te	

Appendix 2.1. General test data

Borehole:	KLX12A
Testtype:	CHir (Constant Head injection and recovery)
Field crew:	J. Florberger, K. Gokall-Norman, E. Gustavsson, J. Harrström, C. Hjerne, J. Jönsson, T. Svensson, E. Wallger.
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)
104.00	204.00	2006-04-20 13:44:38	2006-04-20 14:38:27	2006-04-20 15:08:45	2006-04-20 15:40:57	30	30
204.00	304.00	2006-04-20 17:04:23	2006-04-20 17:50:54	2006-04-20 18:21:07	2006-04-20 18:53:24	30	30
284.00	384.00	2006-04-21 07:16:07	2006-04-21 08:03:15	2006-04-21 08:33:32	2006-04-21 09:05:45	30	30
384.00	484.00	2006-04-21 10:08:41	2006-04-21 10:55:19	2006-04-21 11:25:30	2006-04-21 11:57:48	30	30
484.00	584.00	2006-04-24 14:22:10	2006-04-24 15:22:49	2006-04-24 15:53:08	2006-04-24 16:25:19	30	30
104.00	124.00	2006-04-26 07:43:59	2006-04-26 08:26:53	2006-04-26 08:47:11	2006-04-26 09:09:17	20	20
124.00	144.00	2006-04-26 09:46:02	2006-04-26 10:33:55	2006-04-26 10:54:11	2006-04-26 11:16:19	20	20
144.00	164.00	2006-04-26 12:38:26	2006-04-26 13:11:40	2006-04-26 13:31:47	2006-04-26 13:54:05	20	20
164.00	184.00	2006-04-26 14:14:57	2006-04-26 14:52:43	2006-04-26 15:12:53	2006-04-26 15:35:10	20	20
184.00	204.00	2006-04-26 16:04:22	2006-04-26 16:41:35	2006-04-26 17:01:44	2006-04-26 17:24:02	20	20
204.00	224.00	2006-04-26 17:49:18	2006-04-26 18:24:32	2006-04-26 18:44:49	2006-04-26 19:07:00	20	20
224.00	244.00	2006-04-27 07:40:52	2006-04-27 08:16:38	2006-04-27 08:36:50	2006-04-27 08:59:07	20	20
244.00	264.00	2006-04-27 09:28:46	2006-04-27 10:03:55	2006-04-27 10:24:06	2006-04-27 10:46:24	20	20
264.00	284.00	2006-04-27 11:07:32	2006-04-27 11:39:56	2006-04-27 12:00:18	2006-04-27 12:22:26	20	20
284.00	304.00	2006-04-27 13:34:09	2006-04-27 14:19:58	2006-04-27 14:25:05	2006-04-27 14:37:37	5	10
304.00	324.00	2006-04-27 14:58:52	2006-04-27 15:40:31	2006-04-27 16:00:44	2006-04-27 16:23:01	20	20
324.00	344.00	2006-04-27 16:40:12	2006-04-27 17:14:43	2006-04-27 17:35:05	2006-04-27 17:57:13	20	20
344.00	364.00	2006-04-28 07:18:02	2006-04-28 08:03:46	2006-04-28 08:08:05	2006-04-28 08:15:35	4	5
364.00	384.00	2006-04-28 08:42:03	2006-04-28 09:17:16	2006-04-28 09:37:41	2006-04-28 09:59:46	20	20
369.00	389.00	2006-05-02 14:22:33	2006-05-02 14:57:07	2006-05-02 15:17:32	2006-05-02 15:39:37	20	20
389.00	409.00	2006-05-02 16:09:39	2006-05-02 16:42:38	2006-05-02 17:03:01	2006-05-02 17:25:07	20	20
409.00	429.00	2006-05-02 17:49:01	2006-05-02 18:26:03	2006-05-02 18:46:27	2006-05-02 19:08:33	20	20
429.00	449.00	2006-05-03 07:33:19	2006-05-03 08:12:58	2006-05-03 08:33:24	2006-05-03 08:55:27	20	20
449.00	469.00	2006-05-03 09:16:06	2006-05-03 09:56:07	2006-05-03 10:16:31	2006-05-03 10:38:36	20	20
469.00	489.00	2006-05-03 10:59:50	2006-05-03 11:34:46	2006-05-03 11:55:13	2006-05-03 12:17:16	20	20
489.00	509.00	2006-05-03 13:28:21	2006-05-03 14:01:18	2006-05-03 14:21:11	2006-05-03 14:28:42	20	5
509.00	529.00	2006-05-04 09:16:06	2006-05-04 09:55:42	2006-05-04 10:16:06	2006-05-04 10:38:11	20	20
527.00	547.00	2006-05-03 15:54:36	2006-03-05 16:29:06	2006-03-05 16:49:29	2006-05-03 17:11:35	20	20
547.00	567.00	2006-05-03 17:30:43	2006-05-03 18:04:18	2006-05-03 18:24:42	2006-05-03 18:46:47	20	20
564.00	584.00	2006-05-04 07:25:04	2006-05-04 08:06:54	2006-05-04 08:20:33	2006-05-04 08:28:04	14	5
304.00	309.00	2006-05-08 17:21:39	2006-05-08 18:02:44	2006-05-08 18:05:23	2006-05-08 18:12:53	3	5
309.00	314.00	2006-05-11 15:01:46	2006-05-11 15:40:07	2006-05-11 16:00:33	2006-05-11 16:22:36	20	20
314.00	319.00	2006-05-11 16:39:32	2006-05-11 17:16:44	2006-05-11 17:36:59	2006-05-11 17:59:13	20	20
319.00	324.00	2006-05-11 18:11:27	2006-05-11 18:48:10	2006-05-11 19:08:34	2006-05-11 19:30:39	20	20
322.00	327.00	2006-05-12 07:38:21	2006-05-12 08:12:12	2006-05-12 08:32:27	2006-05-12 08:54:41	20	20
327.00	332.00	2006-05-12 09:17:34	2006-05-12 09:50:07	2006-05-12 09:52:10	2006-05-12 09:59:41	2	5
332.00	337.00	2006-05-12 10:14:28	2006-05-12 10:47:40	2006-05-12 10:48:45	2006-05-12 10:56:16	1	5
337.00	342.00	2006-05-12 11:15:37	2006-05-12 11:49:57	2006-05-12 11:52:16	2006-05-12 11:59:47	2	5
339.00	344.00	2006-05-15 12:50:51	2006-05-15 13:27:25	2006-05-15 13:32:47	2006-05-15 13:40:17	5	5
364.00	369.00	2006-05-15 14:15:56	2006-05-15 14:50:54	2006-05-15 14:52:48	2006-05-15 15:00:18	2	5
369.00	374.00	2006-05-15 15:13:11	2006-05-15 15:45:52	2006-05-15 16:06:19	2006-05-15 16:28:21	20	20
374.00	379.00	2006-05-15 16:39:48	2006-05-15 17:12:28	2006-05-15 17:32:55	2006-05-15 17:54:57	20	20
379.00	384.00	2006-05-15 18:05:38	2006-05-15 18:37:42	2006-05-15 18:40:19	2006-05-15 18:47:49	3	5
384.00	389.00	2006-05-15 18:59:08	2006-05-16 08:24:24	2006-05-16 08:29:18	2006-05-16 08:36:48	5	5
389.00	394.00	2006-05-16 08:58:35	2006-05-16 09:37:02	2006-05-16 09:57:28	2006-05-16 10:19:31	20	20
392.00	397.00	2006-05-16 10:31:33	2006-05-16 11:05:12	2006-05-16 11:25:24	2006-05-16 11:47:41	20	20
397.00	402.00	2006-05-16 13:57:51	2006-05-16 14:37:35	2006-05-16 14:57:49	2006-05-16 15:20:04	20	20
402.00	407.00	2006-05-16 15:30:38	2006-05-16 16:04:33	2006-05-16 16:24:43	2006-05-16 16:47:02	20	20
404.00	409.00	2006-05-16 16:55:39	2006-05-16 17:28:22	2006-05-16 17:48:34	2006-05-16 18:10:51	20	20
409.00	414.00	2006-05-16 18:20:24	2006-05-16 18:52:27	2006-05-16 19:12:51	2006-05-16 19:34:57	20	20
413.00	418.00	2006-05-17 08:21:04	2006-05-17 09:00:25	2006-05-17 09:20:36	2006-05-17 09:42:54	20	20
418.00	423.00	2006-05-17 09:51:33	2006-05-17 10:22:57	2006-05-17 10:43:15	2006-05-17 11:05:26	20	20
423.00	428.00	2006-05-17 11:14:30	2006-05-17 11:47:50	2006-05-17 11:50:58	2006-05-17 11:58:28	3	5
424.00	429.00	2006-05-17 12:06:34	2006-05-17 13:04:15	2006-05-17 13:07:46	2006-05-17 13:15:16	4	5
429.00	434.00	2006-05-17 13:25:10	2006-05-17 14:00:38	2006-05-17 14:16:15	2006-05-17 14:23:45	16	5
434.00	439.00	2006-05-17 15:05:39	2006-05-17 15:41:27	2006-05-17 16:01:53	2006-05-17 16:23:56	20	20
439.00	444.00	2006-05-17 16:36:52	2006-05-17 17:09:58	2006-05-17 17:30:24	2006-05-17 17:52:27	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)
444.00	449.00	2006-05-17 18:04:12	2006-05-17 18:35:55	2006-05-17 18:38:31	2006-05-17 18:46:01	3	5
449.00	454.00	2006-05-17 18:57:24	2006-05-17 19:31:19	2006-05-17 19:37:39	2006-05-17 19:45:09	6	5
454.00	459.00	2006-05-18 08:14:36	2006-05-18 08:52:21	2006-05-18 09:12:45	2006-05-18 09:34:50	20	20
459.00	464.00	2006-05-18 09:44:30	2006-05-18 10:17:32	2006-05-18 10:37:39	2006-05-18 11:00:01	20	20
464.00	469.00	2006-05-18 11:11:50	2006-05-18 11:43:24	2006-05-18 11:55:29	2006-05-18 12:02:59	12	5
469.00	474.00	2006-05-18 13:30:35	2006-05-18 14:04:20	2006-05-18 14:06:21	2006-05-18 14:13:51	2	5
474.00	479.00	2006-05-18 14:23:00	2006-05-18 14:55:01	2006-05-18 14:57:13	2006-05-18 15:04:43	2	5
479.00	484.00	2006-05-18 15:14:07	2006-05-18 15:46:05	2006-05-18 15:50:13	2006-05-18 15:57:43	4	5
484.00	489.00	2006-05-18 16:09:50	2006-05-18 16:41:34	2006-05-18 17:01:57	2006-05-18 17:24:03	20	20
509.00	514.00	2006-05-18 17:50:07	2006-05-18 18:22:06	2006-05-18 18:30:53	2006-05-18 18:38:23	9	5
514.00	519.00	2006-05-19 07:17:15	2006-05-19 07:50:58	2006-05-19 07:53:02	2006-05-19 08:00:32	2	5
519.00	524.00	2006-05-19 08:11:27	2006-05-19 08:47:22	2006-05-19 09:07:39	2006-05-19 09:29:51	20	20
522.00	527.00	2006-05-29 13:25:56	2006-05-29 13:58:53	2006-05-29 14:19:19	2006-05-29 14:41:22	20	20
527.00	532.00	2006-05-29 14:56:32	2006-05-29 15:30:29	2006-05-29 15:33:23	2006-05-29 15:40:53	3	5
532.00	537.00	2006-05-29 15:54:47	2006-05-29 16:30:40	2006-05-29 16:31:42	2006-05-29 16:39:12	1	5
537.00	542.00	2006-05-30 07:21:05	2006-05-30 07:54:48	2006-05-30 08:15:04	2006-05-30 08:37:16	20	20
542.00	547.00	2006-05-30 08:54:41	2006-05-30 09:26:49	2006-05-30 09:47:15	2006-05-30 10:09:17	20	20
547.00	552.00	2006-05-30 10:19:22	2006-05-30 10:52:15	2006-05-30 11:12:41	2006-05-30 11:34:43	20	20
552.00	557.00	2006-05-30 12:22:59	2006-05-30 12:55:39	2006-05-30 13:16:05	2006-05-30 13:38:07	20	20
557.00	562.00	2006-05-30 13:49:02	2006-05-30 14:21:51	2006-05-30 14:23:07	2006-05-30 14:30:37	1	5
562.00	567.00	2006-05-30 14:38:33	2006-05-30 15:09:50	2006-05-30 15:11:27	2006-05-30 15:18:58	2	5
509.00[1)]	529.00	2006-05-03 14:47:43	2006-05-03 15:24:15	2006-05-03 15:27:26	2006-05-03 15:29:36	3	0
537.01[2]	542.00	2006-05-29 16:51:21	2006-05-29 18:56:01	2006-05-29 19:15:59	2006-05-29 19:18:38	20	1

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

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		
KLX12A	319.00	324.00	3	1	2006-05-11 18:11	2006-05-11 19:30	__KLX12A_0319.00_200605111811.ht2	P, Q, Te	
KLX12A	322.00	327.00	3	1	2006-05-12 07:38	2006-05-12 08:54	__KLX12A_0322.00_200605120738.ht2	P, Q, Te	
KLX12A	327.00	332.00	3	1	2006-05-12 09:17	2006-05-12 09:59	__KLX12A_0327.00_200605120917.ht2	P, Q, Te	
KLX12A	332.00	337.00	3	1	2006-05-12 10:14	2006-05-12 10:56	__KLX12A_0332.00_200605121014.ht2	P, Q, Te	
KLX12A	337.00	342.00	3	1	2006-05-12 11:15	2006-05-12 11:59	__KLX12A_0337.00_200605121115.ht2	P, Q, Te	
KLX12A	339.00	344.00	3	1	2006-05-15 12:50	2006-05-15 13:40	__KLX12A_0339.00_200605151250.ht2	P, Q, Te	
KLX12A	364.00	369.00	3	1	2006-05-15 14:15	2006-05-15 15:00	__KLX12A_0364.00_200605151415.ht2	P, Q, Te	
KLX12A	369.00	374.00	3	1	2006-05-15 15:13	2006-05-15 16:28	__KLX12A_0369.00_200605151513.ht2	P, Q, Te	
KLX12A	374.00	379.00	3	1	2006-05-15 16:39	2006-05-15 17:54	__KLX12A_0374.00_200605151639.ht2	P, Q, Te	
KLX12A	379.00	384.00	3	1	2006-05-15 18:05	2006-05-15 18:47	__KLX12A_0379.00_200605151805.ht2	P, Q, Te	
KLX12A	384.00	389.00	3	1	2006-05-15 18:59	2006-05-16 08:36	__KLX12A_0384.00_200605151859.ht2	P, Q, Te	
KLX12A	389.00	394.00	3	1	2006-05-16 08:58	2006-05-16 10:19	__KLX12A_0389.00_200605160858.ht2	P, Q, Te	
KLX12A	392.00	397.00	3	1	2006-05-16 10:31	2006-05-16 11:47	__KLX12A_0392.00_200605161031.ht2	P, Q, Te	
KLX12A	397.00	402.00	3	1	2006-05-16 13:57	2006-05-16 15:20	__KLX12A_0397.00_200605161357.ht2	P, Q, Te	
KLX12A	402.00	407.00	3	1	2006-05-16 15:30	2006-05-16 16:47	__KLX12A_0402.00_200605161530.ht2	P, Q, Te	
KLX12A	404.00	409.00	3	1	2006-05-16 16:55	2006-05-16 18:10	__KLX12A_0404.00_200605161655.ht2	P, Q, Te	
KLX12A	409.00	414.00	3	1	2006-05-16 18:20	2006-05-16 19:34	__KLX12A_0409.00_200605161820.ht2	P, Q, Te	
KLX12A	413.00	418.00	3	1	2006-05-17 08:21	2006-05-17 09:42	__KLX12A_0413.00_200605170821.ht2	P, Q, Te	
KLX12A	418.00	423.00	3	1	2006-05-17 09:51	2006-05-17 11:05	__KLX12A_0418.00_200605170951.ht2	P, Q, Te	
KLX12A	423.00	428.00	3	1	2006-05-17 11:14	2006-05-17 11:58	__KLX12A_0423.00_200605171114.ht2	P, Q, Te	
KLX12A	424.00	429.00	3	1	2006-05-17 12:06	2006-05-17 13:15	__KLX12A_0424.00_200605171206.ht2	P, Q, Te	
KLX12A	429.00	434.00	3	1	2006-05-17 13:25	2006-05-17 14:23	__KLX12A_0429.00_200605171325.ht2	P, Q, Te	
KLX12A	434.00	439.00	3	1	2006-05-17 15:05	2006-05-17 16:23	__KLX12A_0434.00_200605171505.ht2	P, Q, Te	
KLX12A	439.00	444.00	3	1	2006-05-17 16:36	2006-05-17 17:52	__KLX12A_0439.00_200605171636.ht2	P, Q, Te	
KLX12A	444.00	449.00	3	1	2006-05-17 18:04	2006-05-17 18:46	__KLX12A_0444.00_200605171804.ht2	P, Q, Te	
KLX12A	449.00	454.00	3	1	2006-05-17 18:57	2006-05-17 19:45	__KLX12A_0449.00_200605171857.ht2	P, Q, Te	
KLX12A	454.00	459.00	3	1	2006-05-18 08:14	2006-05-18 09:34	__KLX12A_0454.00_200605180814.ht2	P, Q, Te	
KLX12A	459.00	464.00	3	1	2006-05-18 09:44	2006-05-18 11:00	__KLX12A_0459.00_200605180944.ht2	P, Q, Te	
KLX12A	464.00	469.00	3	1	2006-05-18 11:11	2006-05-18 12:02	__KLX12A_0464.00_200605181111.ht2	P, Q, Te	
KLX12A	469.00	474.00	3	1	2006-05-18 13:30	2006-05-18 14:13	__KLX12A_0469.00_200605181330.ht2	P, Q, Te	
KLX12A	474.00	479.00	3	1	2006-05-18 14:23	2006-05-18 15:04	__KLX12A_0474.00_200605181423.ht2	P, Q, Te	
KLX12A	479.00	484.00	3	1	2006-05-18 15:14	2006-05-18 15:57	__KLX12A_0479.00_200605181514.ht2	P, Q, Te	
KLX12A	484.00	489.00	3	1	2006-05-18 16:09	2006-05-18 17:24	__KLX12A_0484.00_200605181609.ht2	P, Q, Te	
KLX12A	509.00	514.00	3	1	2006-05-18 17:50	2006-05-18 18:38	__KLX12A_0509.00_200605181750.ht2	P, Q, Te	
KLX12A	514.00	519.00	3	1	2006-05-19 07:17	2006-05-19 08:00	__KLX12A_0514.00_200605190717.ht2	P, Q, Te	
KLX12A	519.00	524.00	3	1	2006-05-19 08:11	2006-05-19 09:29	__KLX12A_0519.00_200605190811.ht2	P, Q, Te	
KLX12A	522.00	527.00	3	1	2006-05-29 13:25	2006-05-29 14:41	__KLX12A_0522.00_200605291325.ht2	P, Q, Te	
KLX12A	527.00	532.00	3	1	2006-05-29 14:56	2006-05-29 15:40	__KLX12A_0527.00_200605291456.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		
KLX12A	532.00	537.00	3	1	2006-05-29 15:54	2006-05-29 16:39	__KLX12A_0532.00_200605291554.ht2	P, Q, Te	
KLX12A	537.00	542.00	3	1	2006-05-29 16:51	2006-05-29 19:18	__KLX12A_0537.00_200605291651.ht2	P, Q, Te	Interrupted [2)]
KLX12A	537.00	542.00	3	2	2006-05-30 07:21	2006-05-30 08:37	__KLX12A_0537.00_200605300721.ht2	P, Q, Te	Reperformed
KLX12A	542.00	547.00	3	1	2006-05-30 08:54	2006-05-30 10:09	__KLX12A_0542.00_200605300854.ht2	P, Q, Te	
KLX12A	547.00	552.00	3	1	2006-05-30 10:19	2006-05-30 11:34	__KLX12A_0547.00_200605301019.ht2	P, Q, Te	
KLX12A	552.00	557.00	3	1	2006-05-30 12:22	2006-05-30 13:38	__KLX12A_0552.00_200605301222.ht2	P, Q, Te	
KLX12A	557.00	562.00	3	1	2006-05-30 13:49	2006-05-30 14:30	__KLX12A_0557.00_200605301349.ht2	P, Q, Te	
KLX12A	562.00	567.00	3	1	2006-05-30 14:38	2006-05-30 15:18	__KLX12A_0562.00_200605301438.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 2.2 Pressure and flow data

Summary of pressure and flow data for all tests in KLX12A

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)
104.00	204.00	1022	1227.29	1025.85	0.000181	0.000197	3.59E-01
204.00	304.00	1959.08	2195.37	1976.51	1.01E-05	1.26E-05	2.28E-02
284.00	384.00	2726.81	2931.41	2816.83	3.59E-07	7.21E-07	1.31E-03
384.00	484.00	3679.7	3891.53	3693.39	5.55E-06	6.29E-06	1.14E-02
484.00	584.00	4630.3	4816.4	4642.94	4.11E-06	4.52E-06	8.23E-03
104.00	124.00	1028.14	1241.09	1034.72	1.78E-05	1.97E-05	2.40E-02
124.00	144.00	1218.04	1406.58	1221.34	0.000146	0.000159	1.94E-01
144.00	164.00	1410.15	1612.48	1411.25	4.91E-05	5.23E-05	6.32E-02
164.00	184.00	1591.83	1784.76	1592.93	7.8E-07	8.96E-07	1.08E-03
184.00	204.00	1783.11	1945.31	1792.72	2.57E-07	2.89E-07	3.50E-04
204.00	224.00	1976.87	2185.5	2050.14	4.94E-08	9.02E-08	1.10E-04
224.00	244.00	2155.5	2374.12	2161.01	7.21E-06	7.65E-06	9.27E-03
244.00	264.00	2346.53	2558.95	2352.57	1.31E-05	1.52E-05	1.84E-02
264.00	284.00	2535.9	2697.27	2535.35	1.12E-06	1.18E-06	1.44E-03
284.00	304.00	2766.01	2970.62	2962.37			
304.00	324.00	2917.37	3128.13	3016.72	4.37E-07	8.95E-07	1.09E-03
324.00	344.00	3103.44	3305.97	3102.88	8.42E-07	8.69E-07	1.06E-03
344.00	364.00	3328.48	3546.38	3543.09			
364.00	384.00	3494.79	3740.67	3656.71	8.59E-09	1.98E-08	2.38E-05
369.00	389.00	3540.89	3819.92	3728.06	9.21E-09	2.29E-08	2.74E-05
389.00	409.00	3719.68	3933.88	3730.25	5.14E-06	5.6E-06	6.86E-03
409.00	429.00	3914.68	4115.6	3918.51	8.18E-07	8.65E-07	1.06E-03
429.00	449.00	4122.7	4360.47	4318.65	6E-09	2.49E-08	2.99E-05
449.00	469.00	4296.69	4496.5	4371.89	3.67E-07	6.32E-07	7.74E-04
469.00	489.00	4538.75	4732.5	4660.06	6.76E-09	1.92E-08	2.30E-05
489.00	509.00	4698.88	4942.72	4932.30			
509.00	529.00	4864.23	5097.5	4866.42	2.97E-07	3.34E-07	4.10E-04
527.00	547.00	5037.54	5243.5	5049.20	5.39E-06	5.78E-06	7.06E-03
547.00	567.00	5237.61	5439.32	5243.50	2.94E-07	3.42E-07	4.19E-04
564.00	584.00	5436.29	5622.78	5629.91			
304.00	309.00	2982.57	3168.51	3252.61			
309.00	314.00	2954.28	3187.6	2963.07	1.75E-08	2.97E-08	3.61E-05
314.00	319.00	2993.68	3234.27	2997.65	9.08E-08	1.18E-07	1.44E-04
319.00	324.00	3040.06	3247.44	3114.59	4.38E-07	7.83E-07	9.60E-04
322.00	327.00	3065.86	3274.89	3139.84	4.43E-07	7.88E-07	9.59E-04
327.00	332.00	3232.21	3372.75	3403.90			
332.00	337.00	3327.87	3455.65	3796.97			
337.00	342.00	3243.19	3478.02	3487.90			
339.00	344.00	3252.93	3480.08	3487.35			
364.00	369.00	3492.84	3724.51	3836.50			
369.00	374.00	3527.97	3771.72	3626.24	1.01E-08	2.2E-08	2.64E-05
374.00	379.00	3571.48	3809.62	3654.80	6.44E-09	1.77E-08	2.13E-05
379.00	384.00	3625.55	3856.4	3867.24			
384.00	389.00	3657.53	3908.97	3894.15			
389.00	394.00	3704.34	3995.3	3703.11	1.01E-07	1.98E-07	2.43E-04
392.00	397.00	3728.77	3973.7	3730.00	1.02E-06	1.14E-06	1.38E-03
397.00	402.00	3778.86	3979.38	3779.96	1.43E-06	1.48E-06	1.79E-03
402.00	407.00	3828.17	4046.77	3832.11	4.03E-06	4.25E-06	5.14E-03
404.00	409.00	3847.62	4051.3	3851.33	3.73E-06	3.9E-06	4.74E-03
409.00	414.00	3899.64	4131.38	3895.25	3.33E-08	3.89E-08	4.78E-05
413.00	418.00	3929.97	4240.97	3930.39	2.06E-07	2.22E-07	2.69E-04
418.00	423.00	3980.34	4187	3983.09	8.2E-07	8.9E-07	1.09E-03
423.00	428.00	4039.63	4255.93	4231.23			
424.00	429.00	4111.96	4267.05	4260.32			
429.00	434.00	4111.68	4336.09	4310.83			
434.00	439.00	4136.25	4402.65	4188.95	1.5E-08	2.01E-08	2.41E-05
439.00	444.00	4196.64	4405.25	4225.19	1.12E-08	1.55E-08	1.86E-05
444.00	449.00	4236.44	4452.33	4448.63			
449.00	454.00	4285.03	4484.04	4454.12			
454.00	459.00	4324.42	4524.8	4362.43	1.96E-07	2.6E-07	3.19E-04
459.00	464.00	4372.31	4611.54	4493.65	2.36E-07	4.77E-07	5.80E-04
464.00	469.00	4432.7	4632.67	4606.19			
469.00	474.00	4521.1	4680.57	4701.16			

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)
474.00	479.00	4638.43	4728.19	4768.69			
479.00	484.00	4611.68	4775.27	4799.43			
484.00	489.00	4642.97	4822.35	4758.79			
509.00	514.00	4872.44	5061.85	5051.42			
514.00	519.00	4922.4	5099.73	5108.51			
519.00	524.00	4938.87	5187.56	4940.52	3.22E-07	3.45E-07	4.20E-04
522.00	527.00	4968.79	5182.08	4969.06	3.36E-07	3.65E-07	4.48E-04
527.00	532.00	5038.1	5215.01	5229.83			
532.00	537.00	5169.04	5263.73	5277.60			
537.00	542.00	5102.2	5305.18	5118.39	5.34E-06	5.69E-06	6.92E-03
542.00	547.00	5161.62	5374.77	5163.95	7.78E-07	8.23E-07	1.01E-03
547.00	552.00	5215.56	5435.15	5217.21	2.61E-07	2.84E-07	3.49E-04
552.00	557.00	5263.59	5474.55	5283.63	8.29E-08	1E-07	1.23E-04
557.00	562.00	5395.35	5523.13	5565.81			
562.00	567.00	5448.74	5571.3	5634.99			
509.00 3)	529.00	4866.29	5232.67	0.00	4.38E-07	8.62E-07	1.65E-04
537.00 3)	542.00	5107.82	5158.06	5142.00			

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.

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 (-)

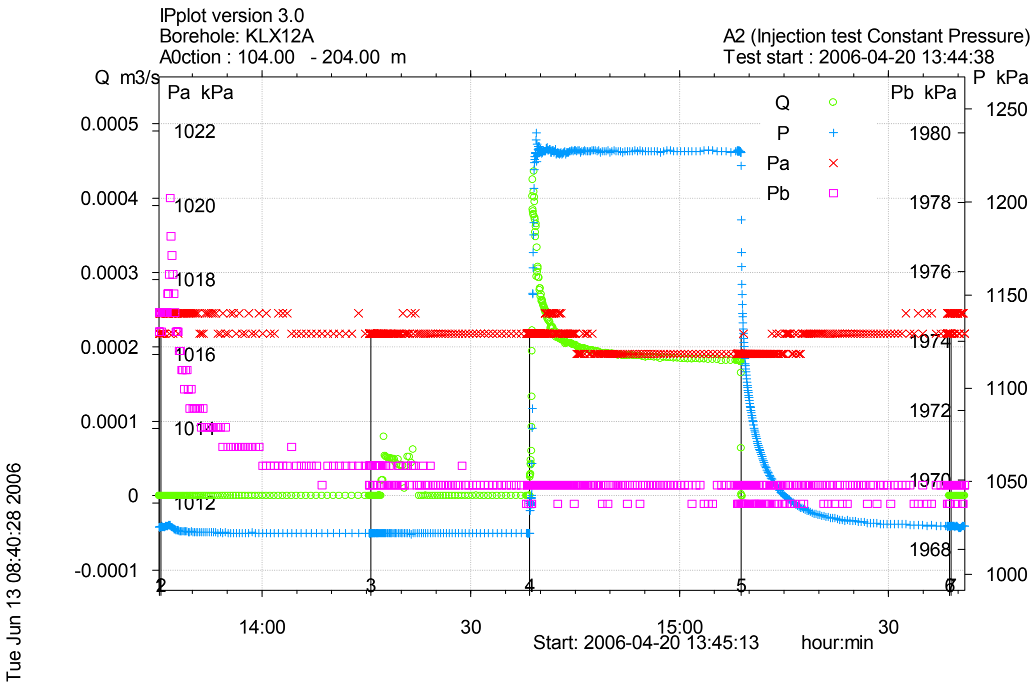

Figure A3-1. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 104.0-204.0 m in borehole KLX12A.*

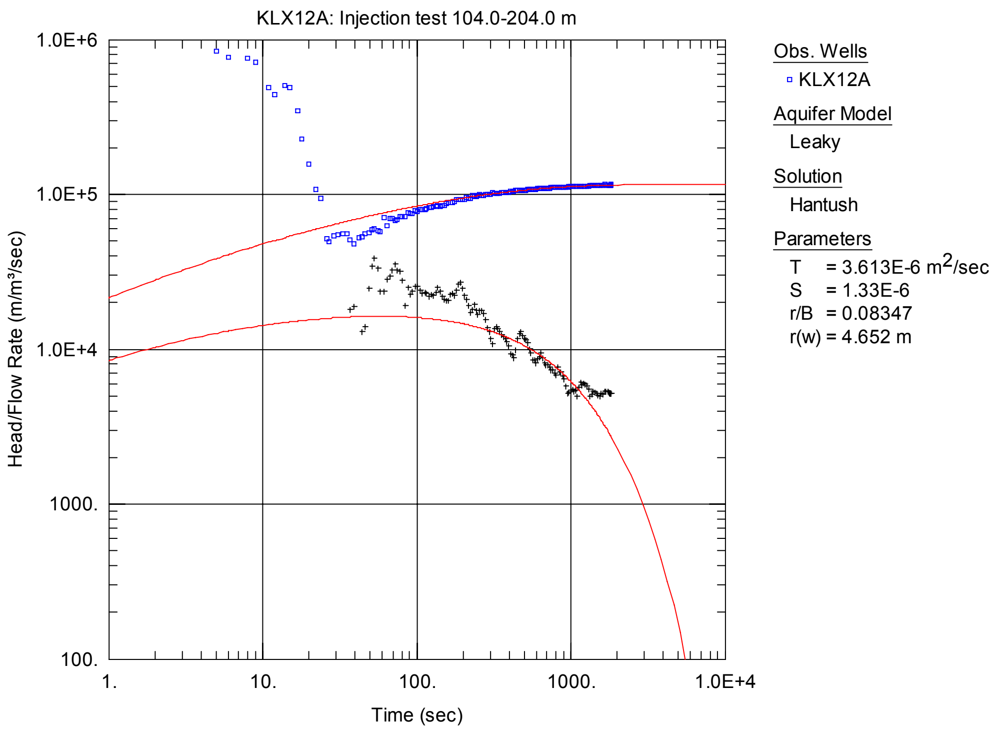

Figure A3-2. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 104.0-204.0 m in KLX12A.*

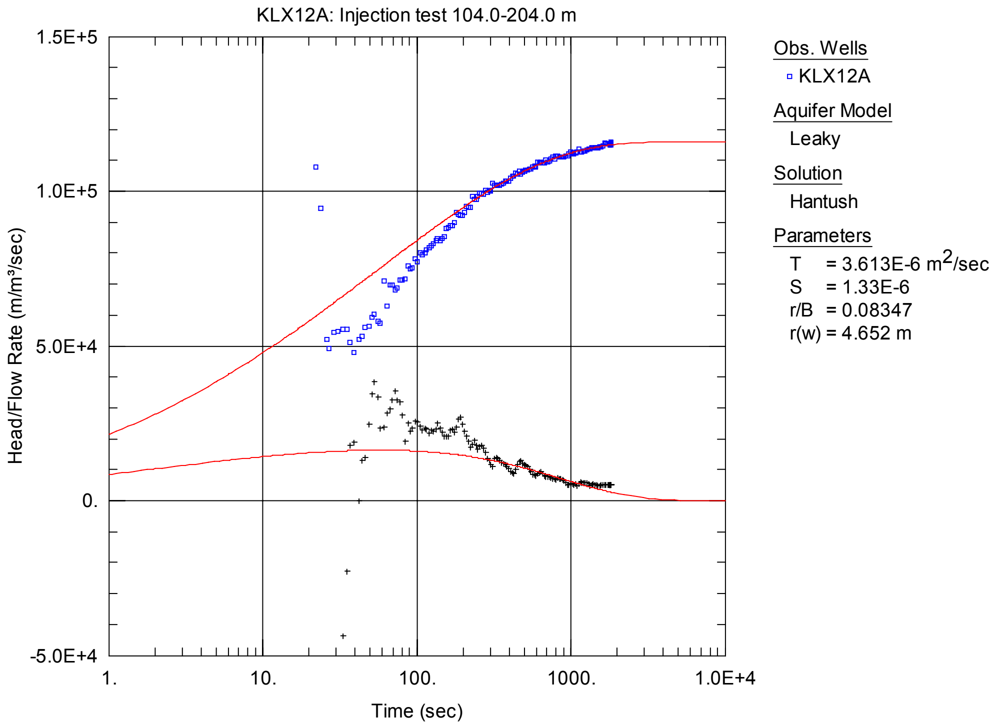

Figure A3-3. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 104.0-204.0 m in KLX12A.*

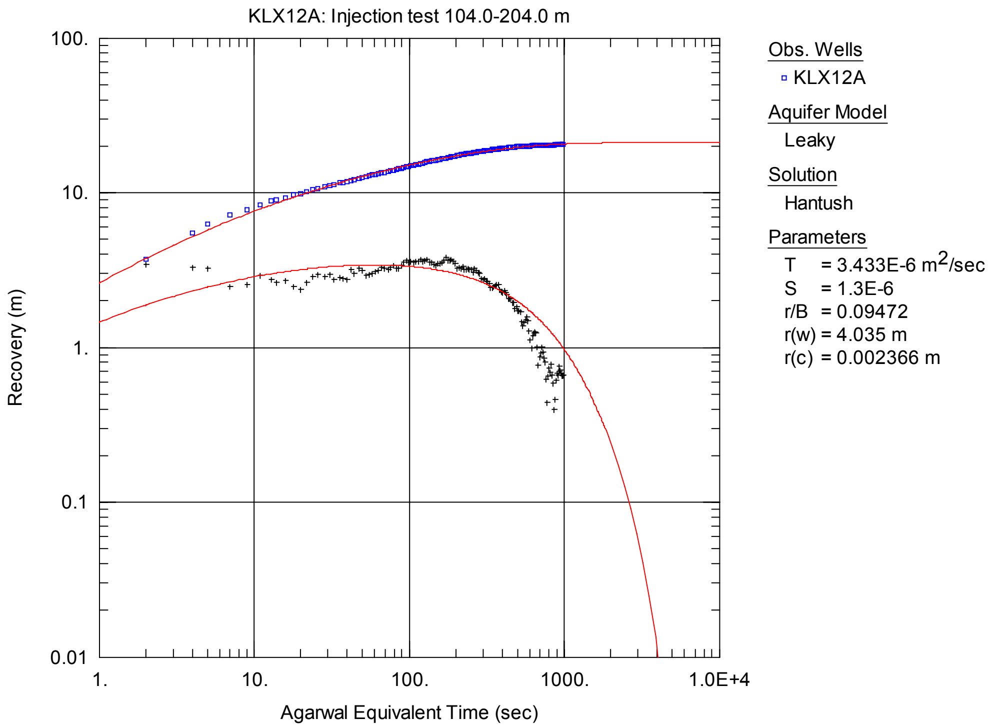

Figure A3-4. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 104.0-204.0 m in KLX12A.*

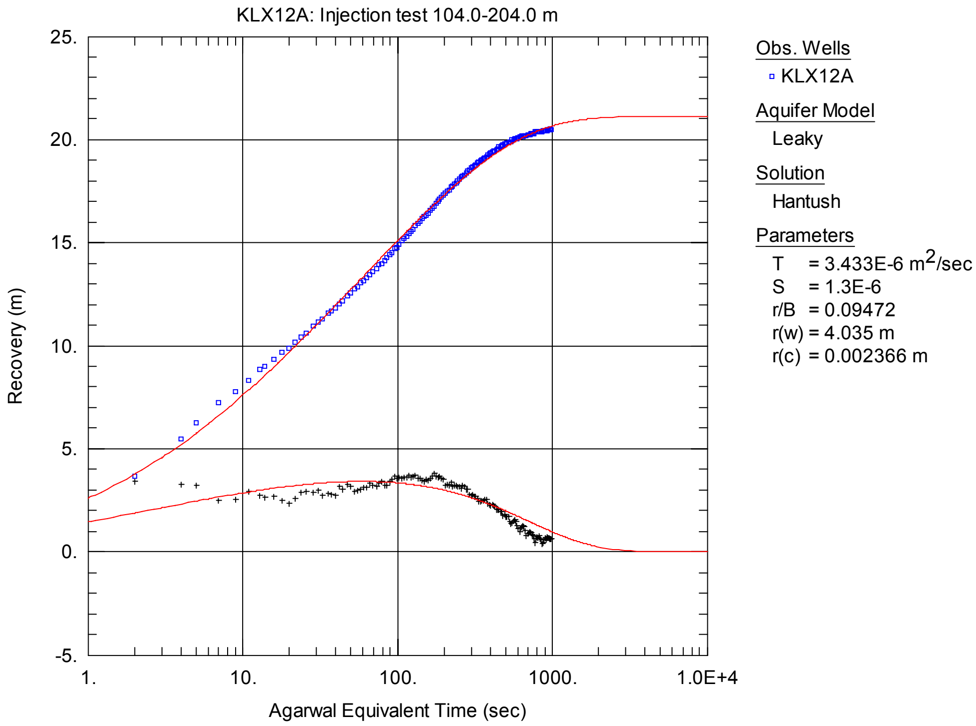

Figure A3-5. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 104.0-204.0 m in KLX12A.*

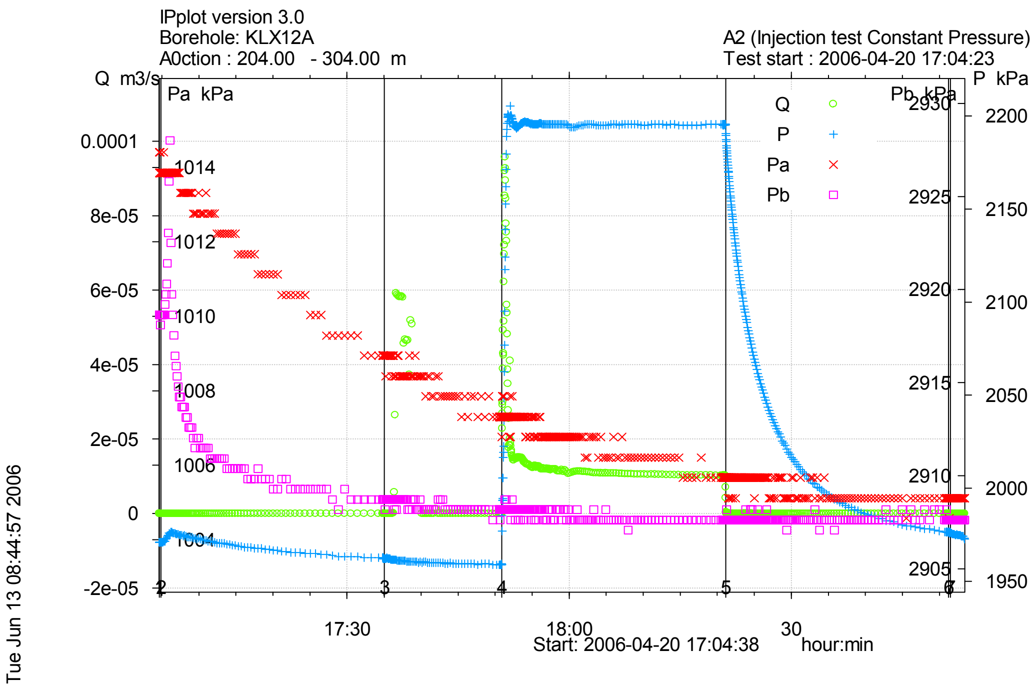

Figure A3-6. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 204.0-304.0 m in borehole KLX12A.*

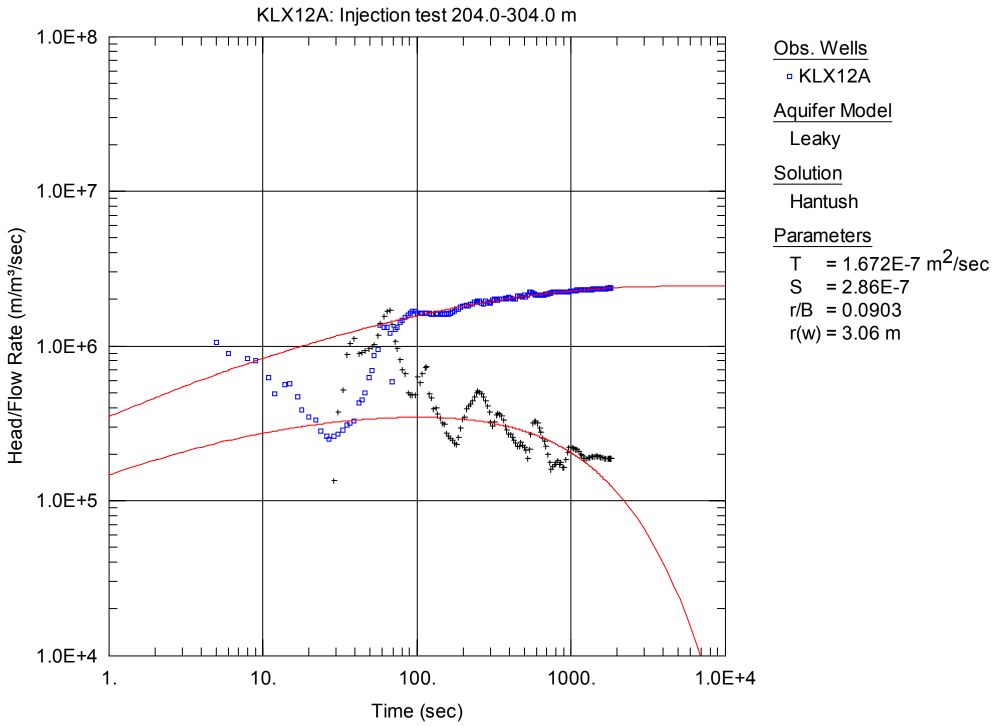

Figure A3-7. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 204.0-304.0 m in KLX12A.*

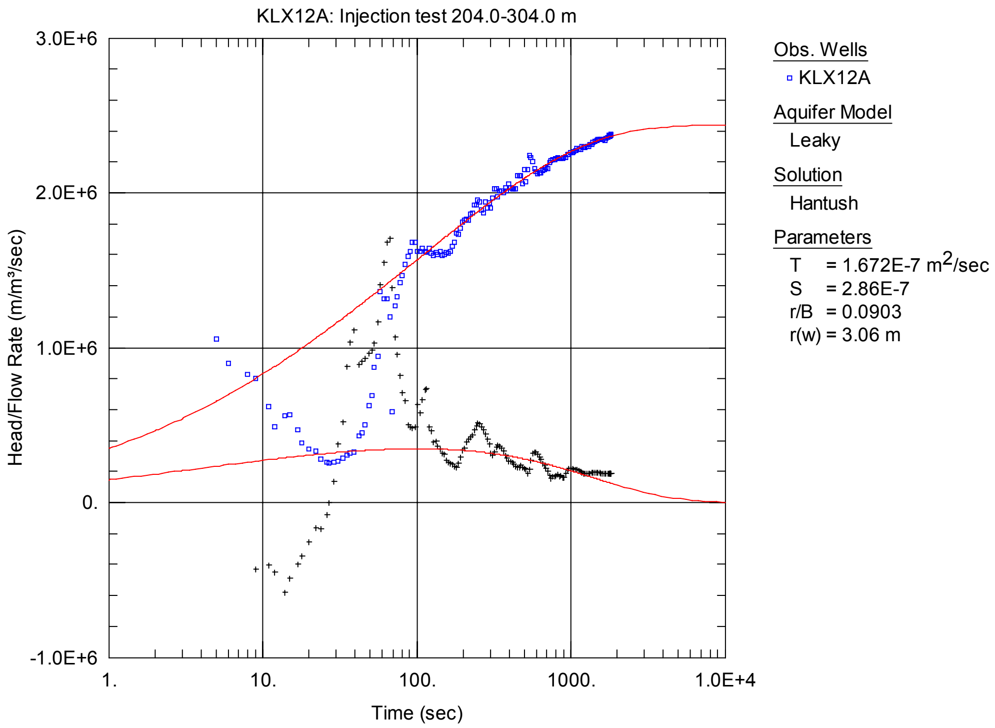

Figure A3-8. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 204.0-304.0 m in KLX12A.*

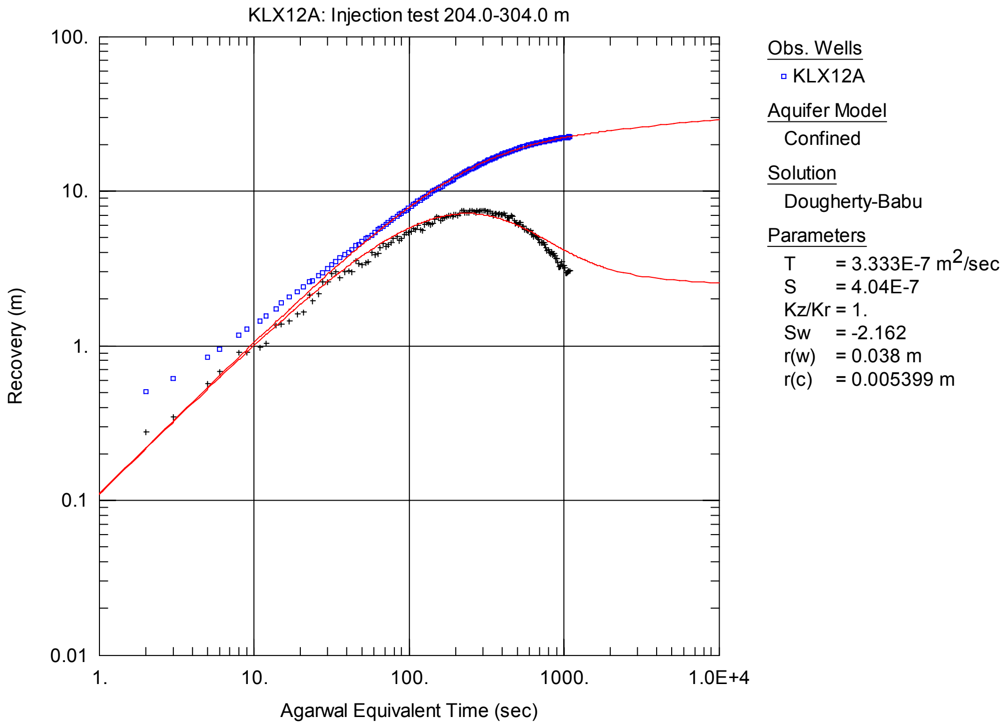

Figure A3-9. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 204.0-304.0 m in KLX12A.*

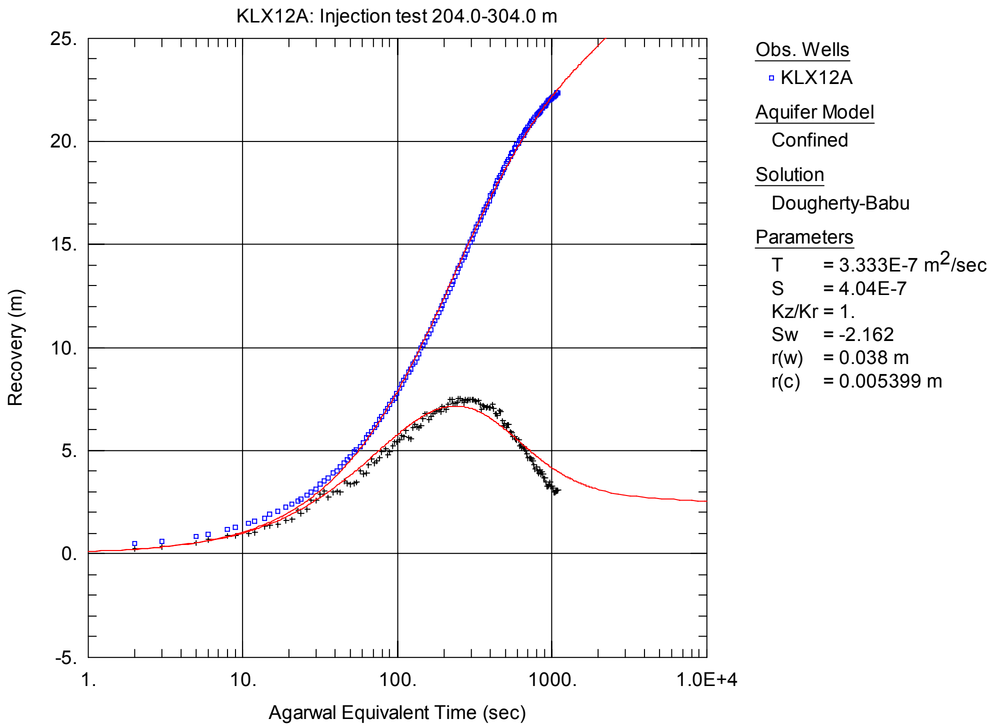

Figure A3-10. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 204.0-304.0 m in KLX12A.*

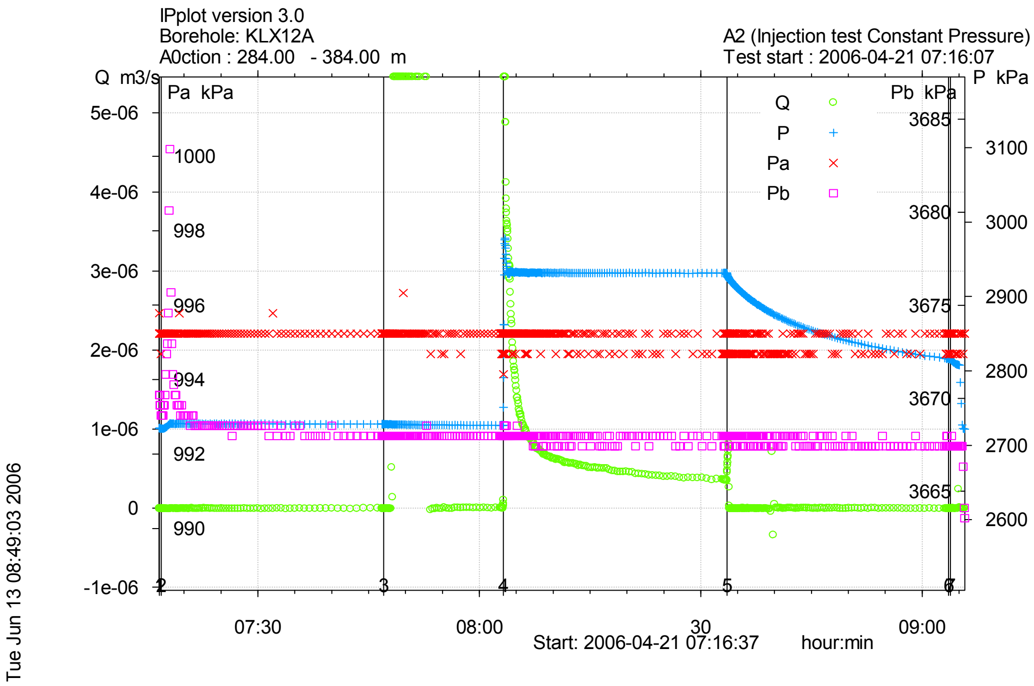

Figure A3-11. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 284.0-384.0 m in borehole KLX12A.*

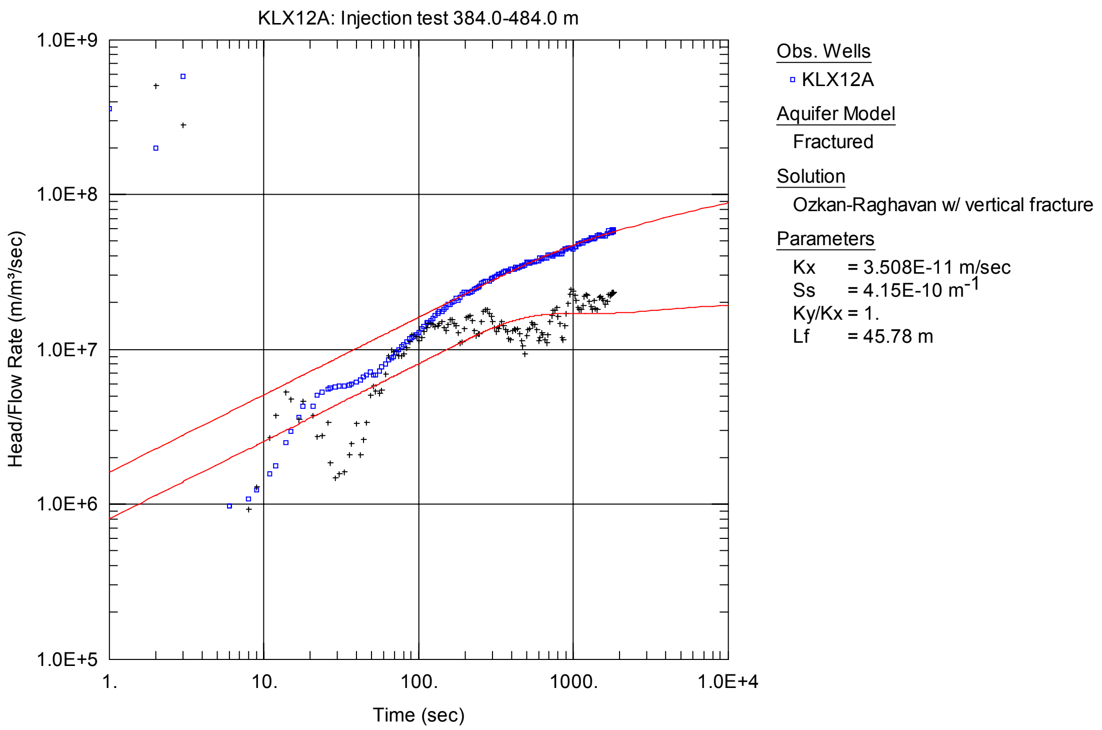

Figure A3-12. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 284.0-384.0 m in KLX12A.*

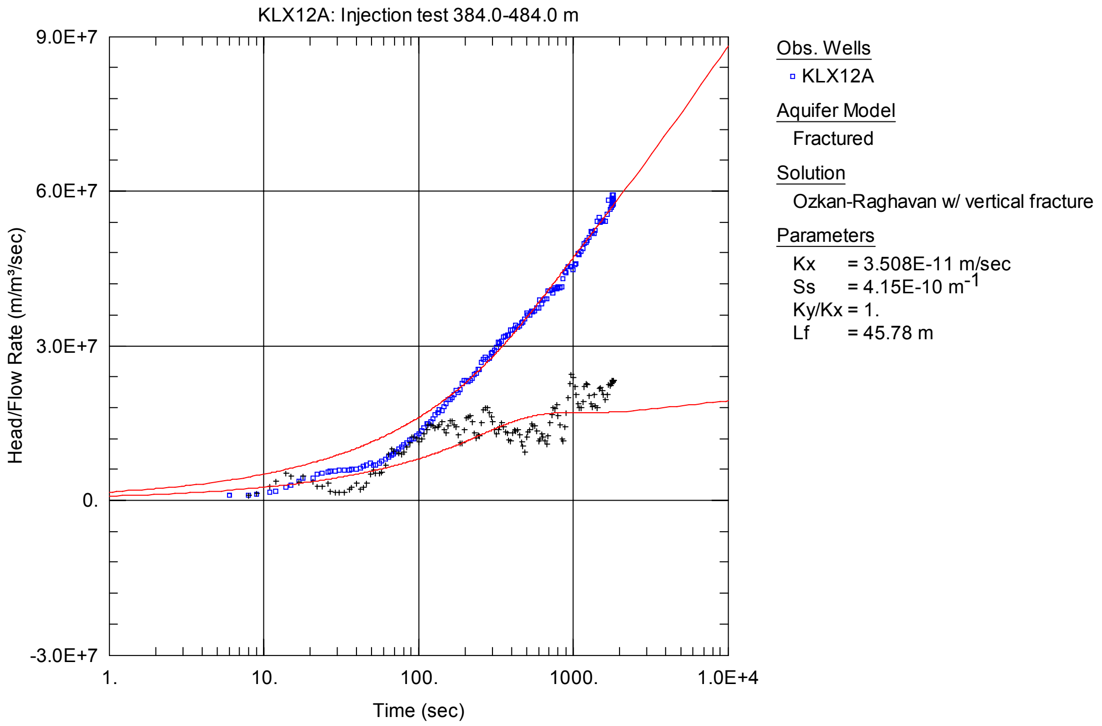

Figure A3-13. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 284.0-384.0 m in KLX12A.*

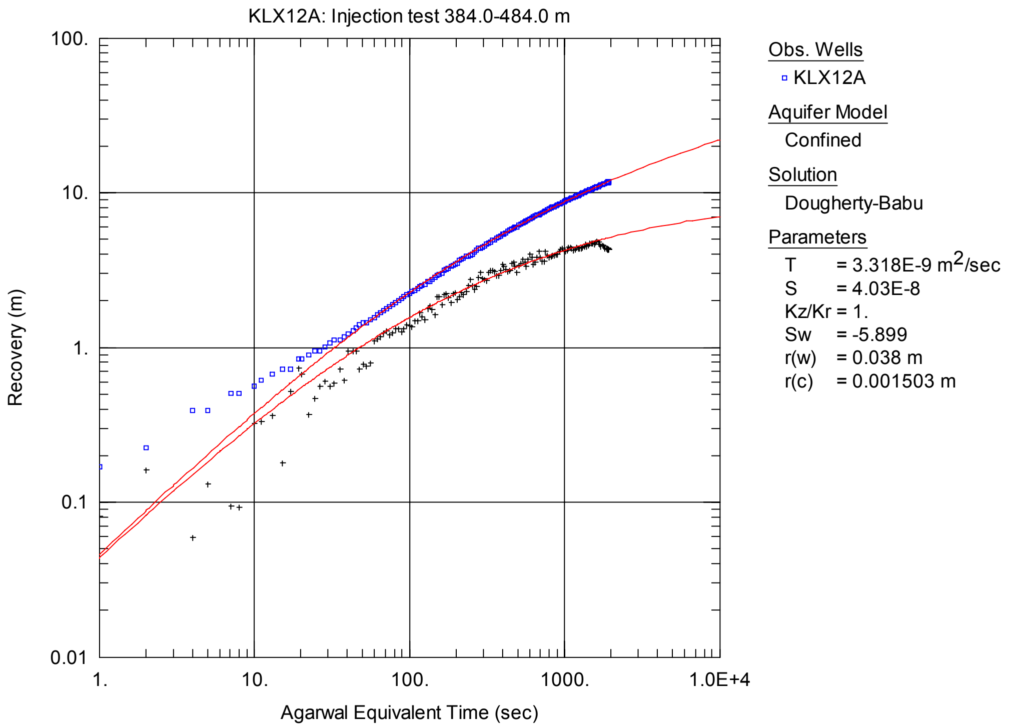

Figure A3-14. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 284.0-384.0 m in KLX12A.*

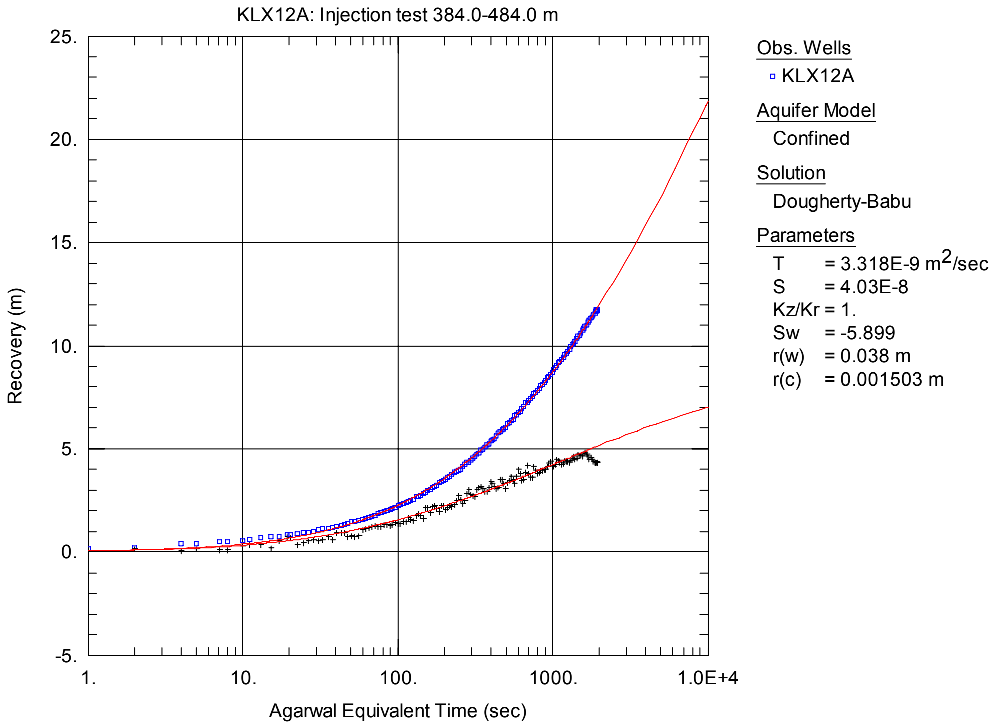

Figure A3-15. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 284.0-384.0 m in KLX12A.*

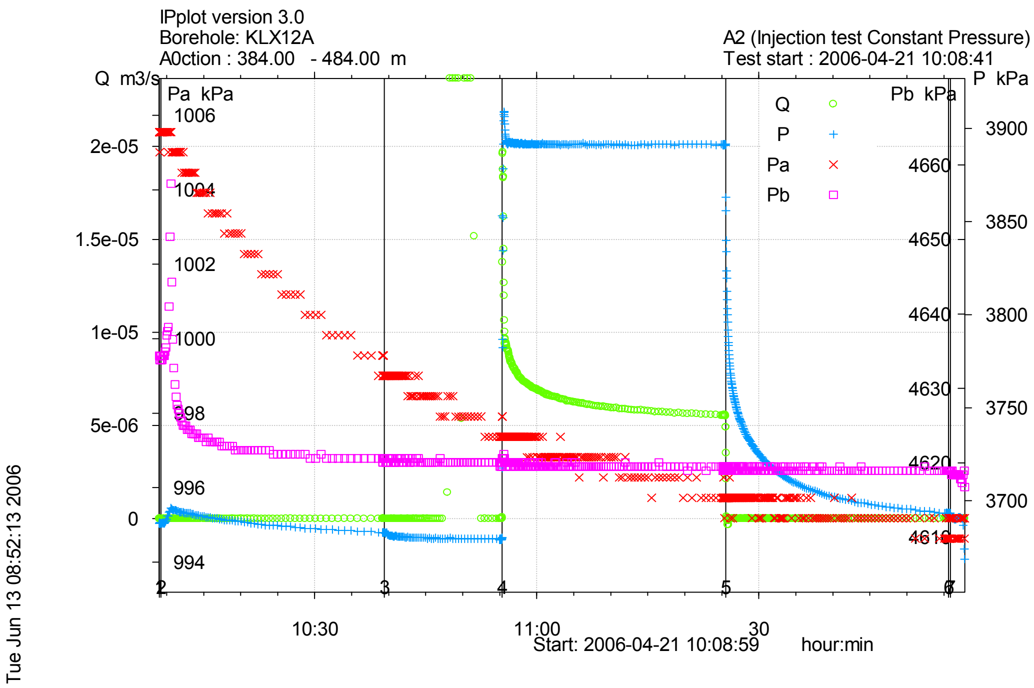

Figure A3-16. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 384.0-484.0 m in borehole KLX12A.*

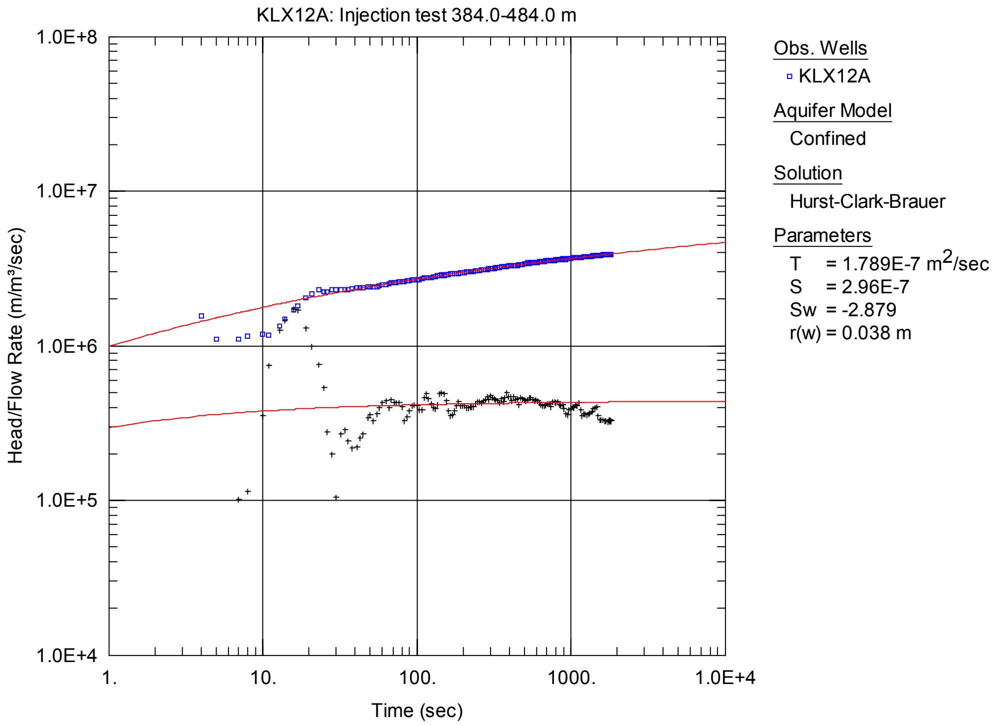

Figure A3-17. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 384.0-484.0 m in KLX12A.*

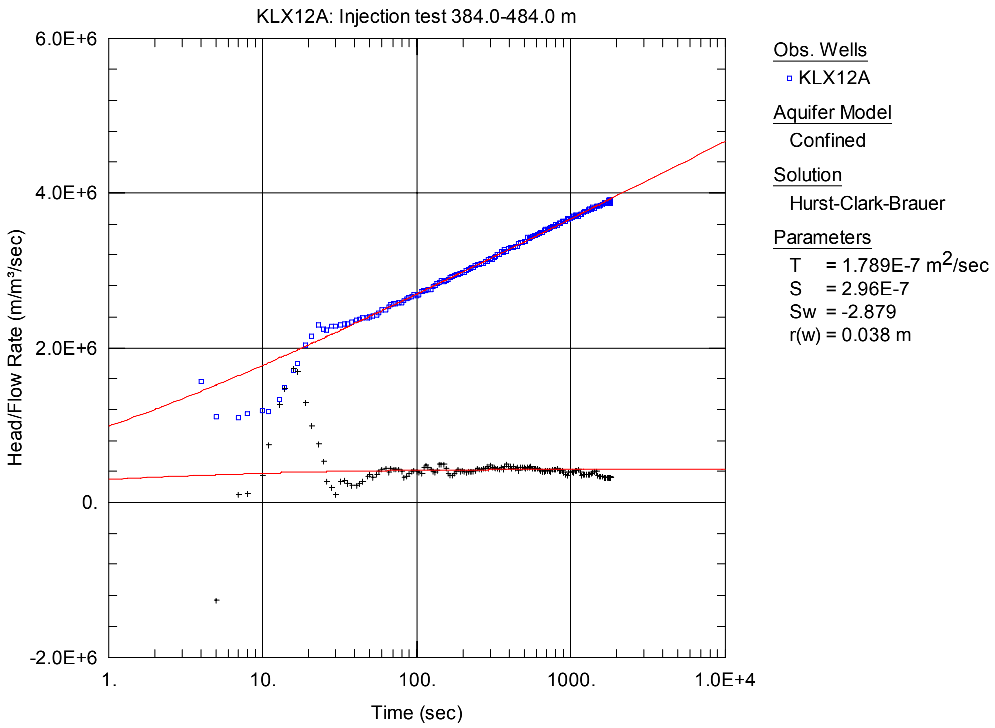

Figure A3-18. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 384.0-484.0 m in KLX12A.*

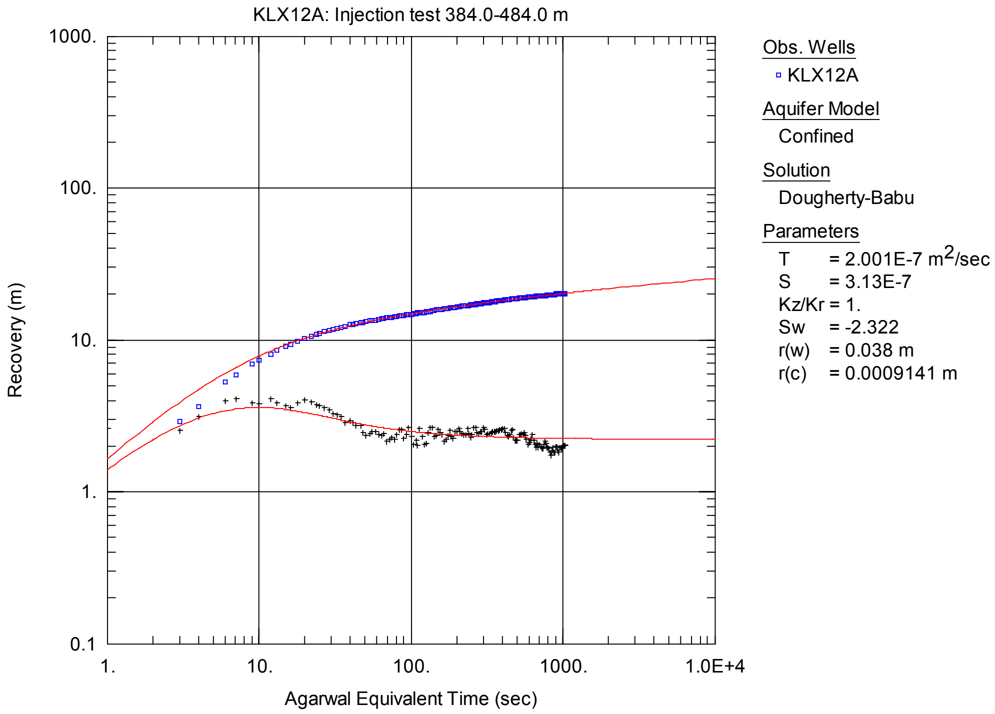

Figure A3-19. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 384.0-484.0 m in KLX12A.*

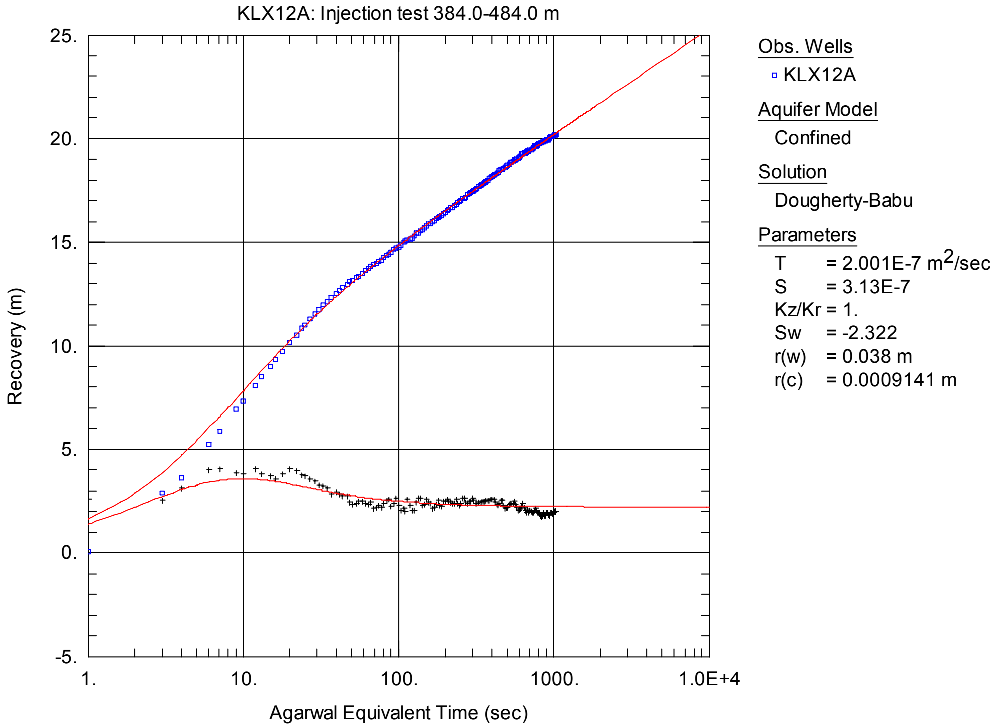

Figure A3-20. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 384.0-484.0 m in KLX12A.*

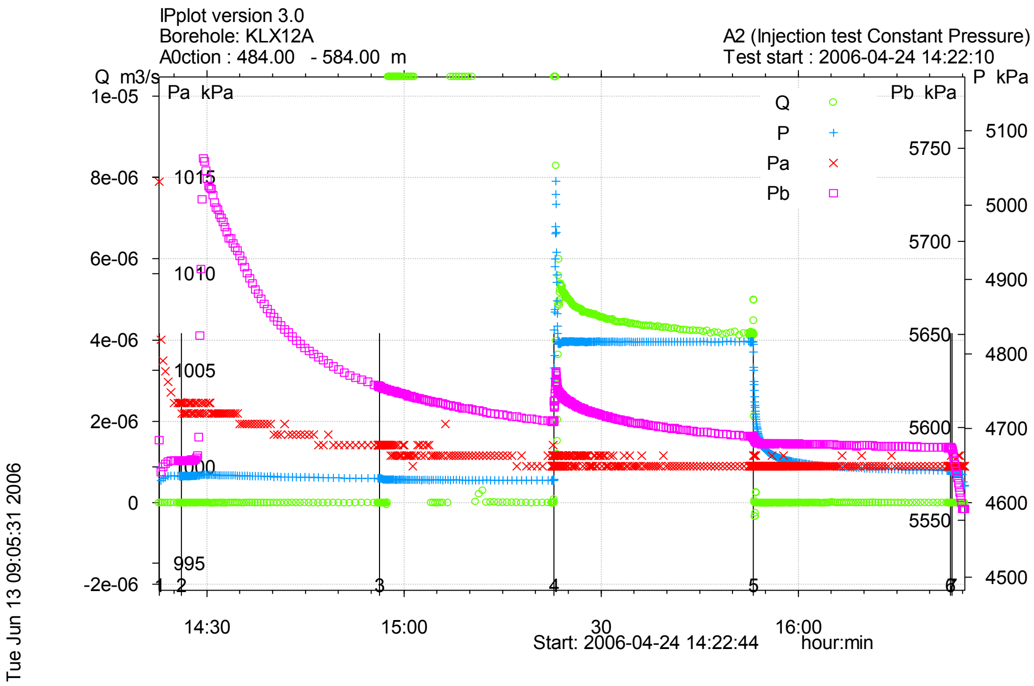

Figure A3-21. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 484.0-584.0 m in borehole KLX12A.*

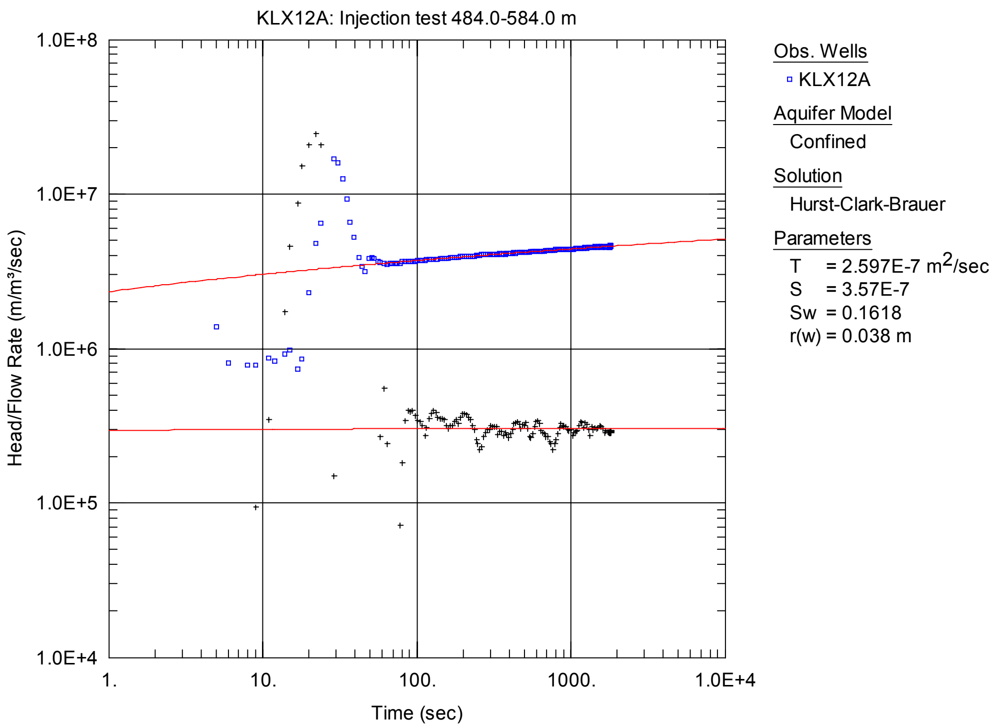

Figure A3-22. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 484.0-584.0 m in KLX12A.*

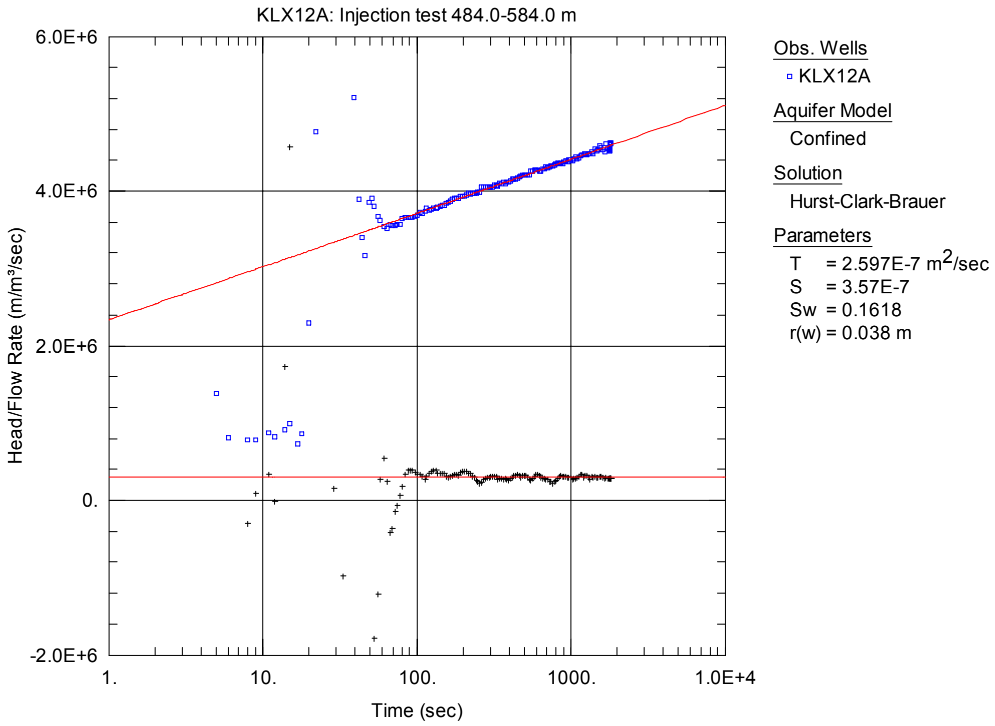

Figure A3-23. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 484.0-584.0 m in KLX12A.*

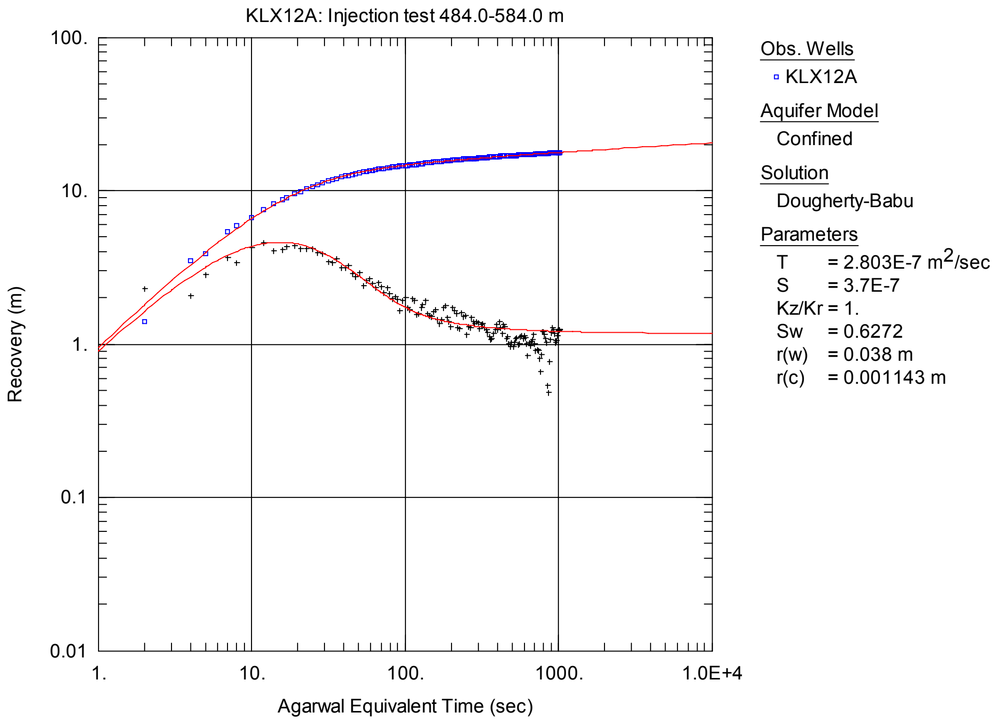

Figure A3-24. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 484.0-584.0 m in KLX12A.*

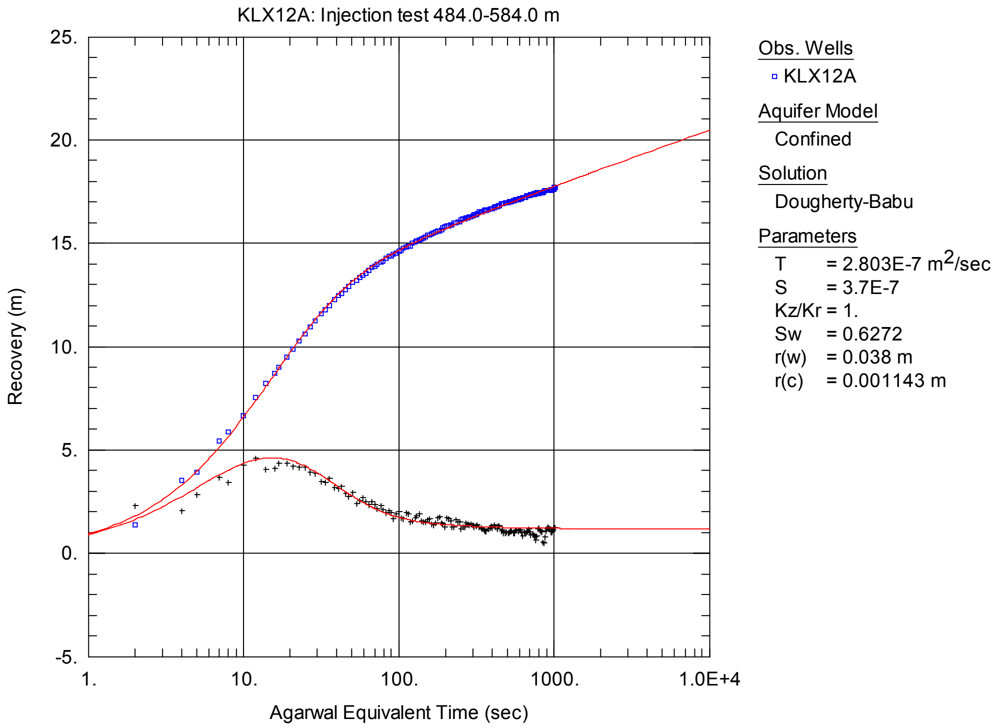

Figure A3-25. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 484.0-584.0 m in KLX12A.*

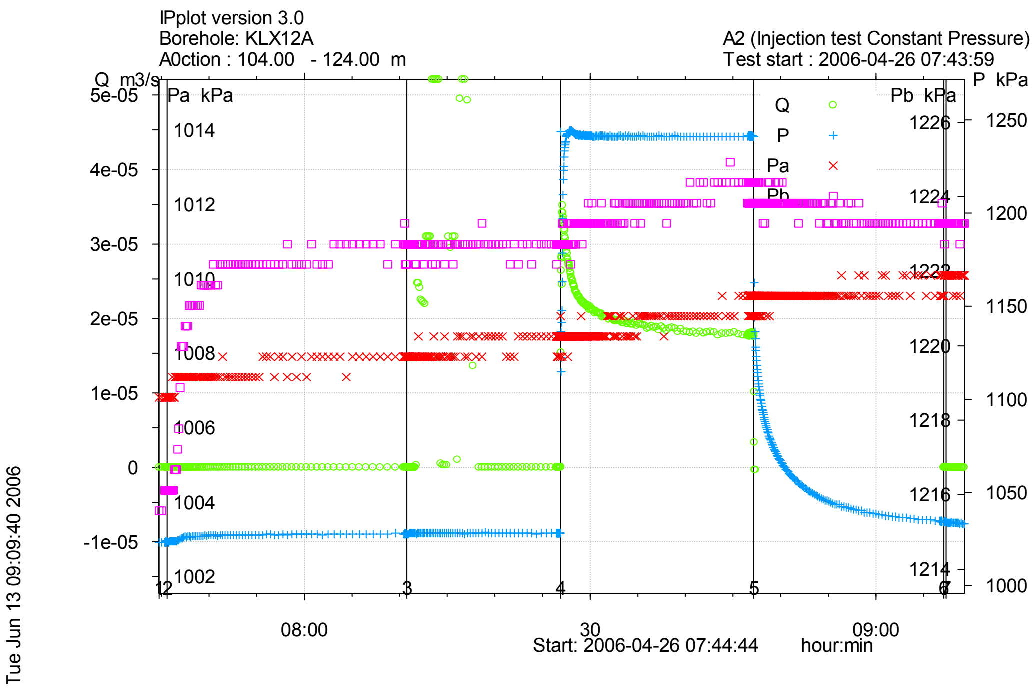

Figure A3-26. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 104.0-124.0 m in borehole KLX12A.*

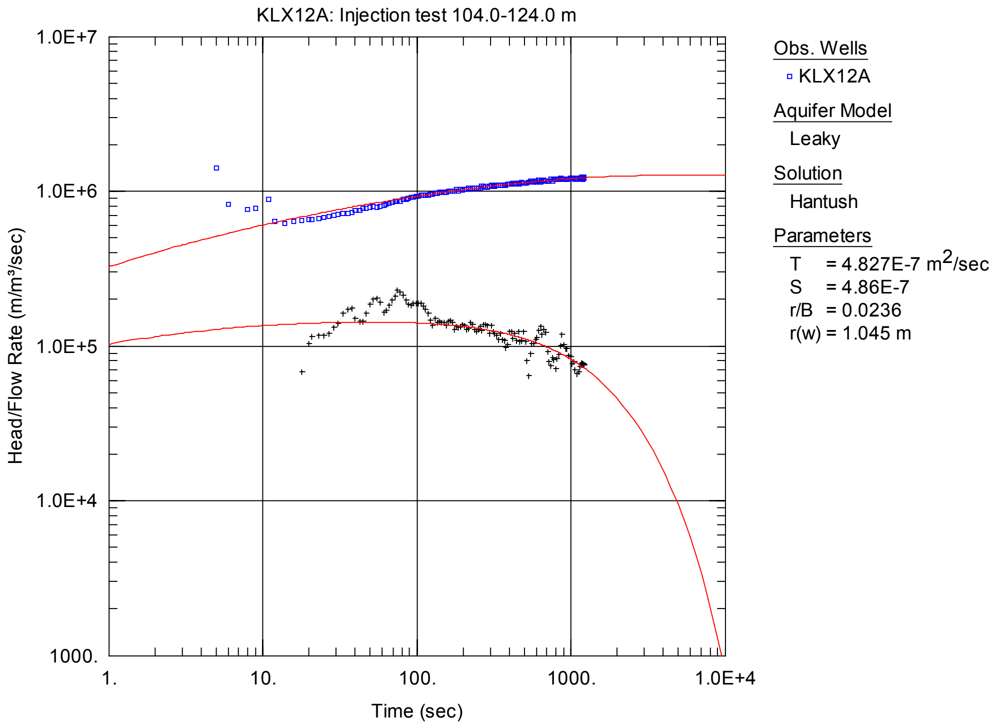

Figure A3-27. *Log-log plot of head/flow rate (□) and derivative (+) versus time,* showing fit to the Hantush solution, *from the injection test in section 104.0-124.0 m in KLX12A.*

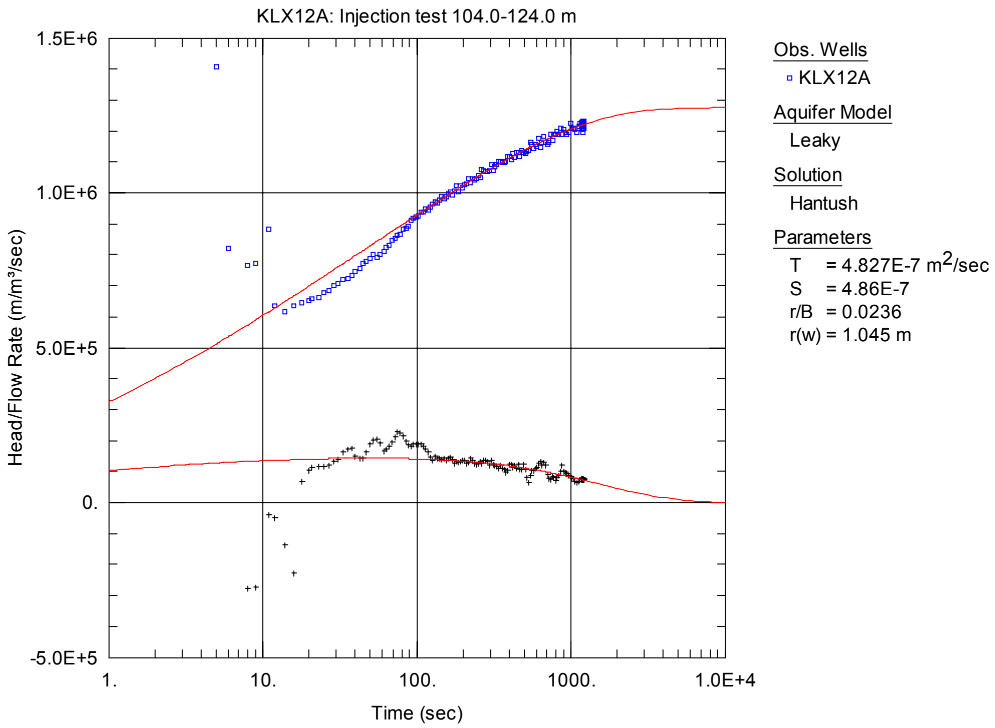

Figure A3-28. *Lin-log plot of head/flow rate (□) and derivative (+) versus time*, showing fit to the Hantush solution, *from the injection test in section 104.0-124.0 m in KLX12A.*

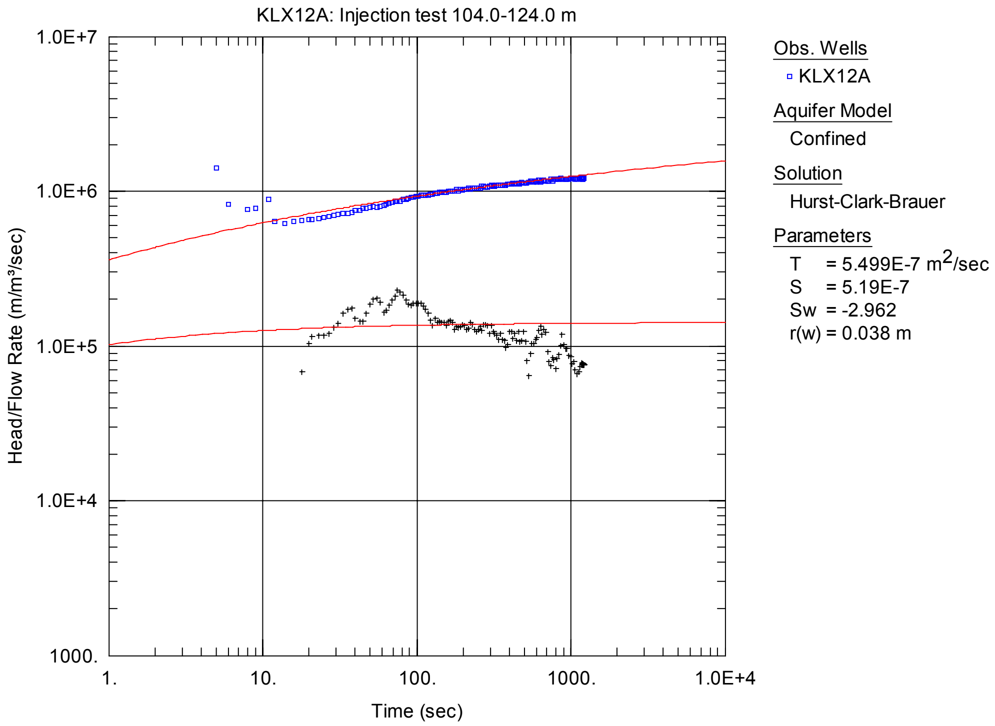

Figure A3-29. *Log-log plot of head/flow rate (□) and derivative (+) versus time,* showing fit to the Hurst solution, *from the injection test in section 104.0-124.0 m in KLX12A.*

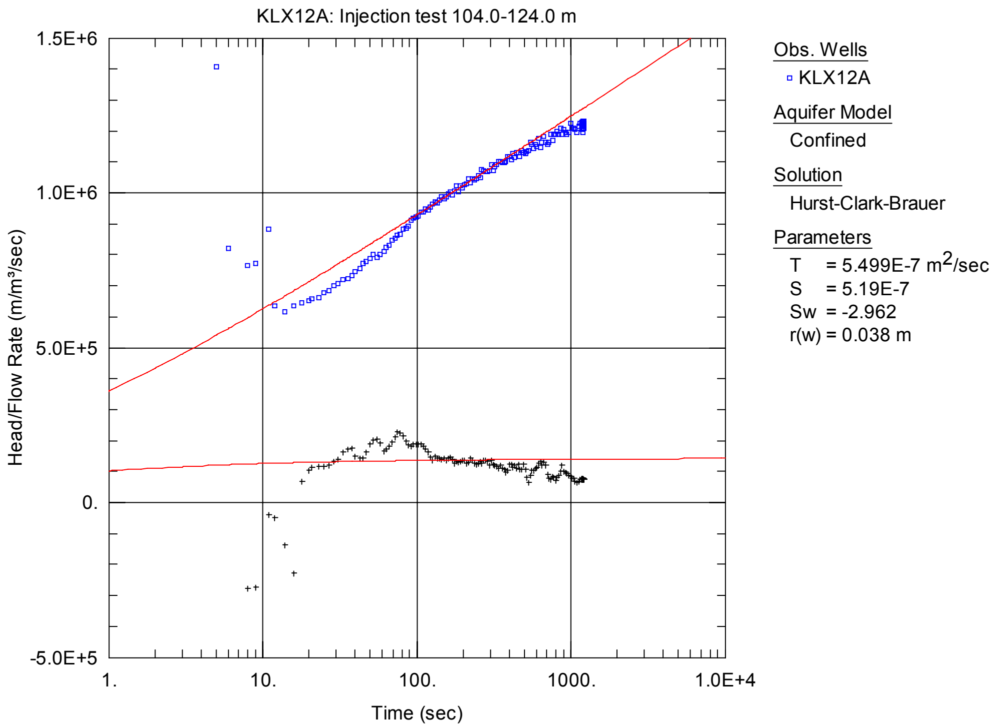

Figure A3-30. *Lin-log plot of head/flow rate (□) and derivative (+) versus time*, showing fit to the Hurst solution, *from the injection test in section 104.0-124.0 m in KLX12A.*

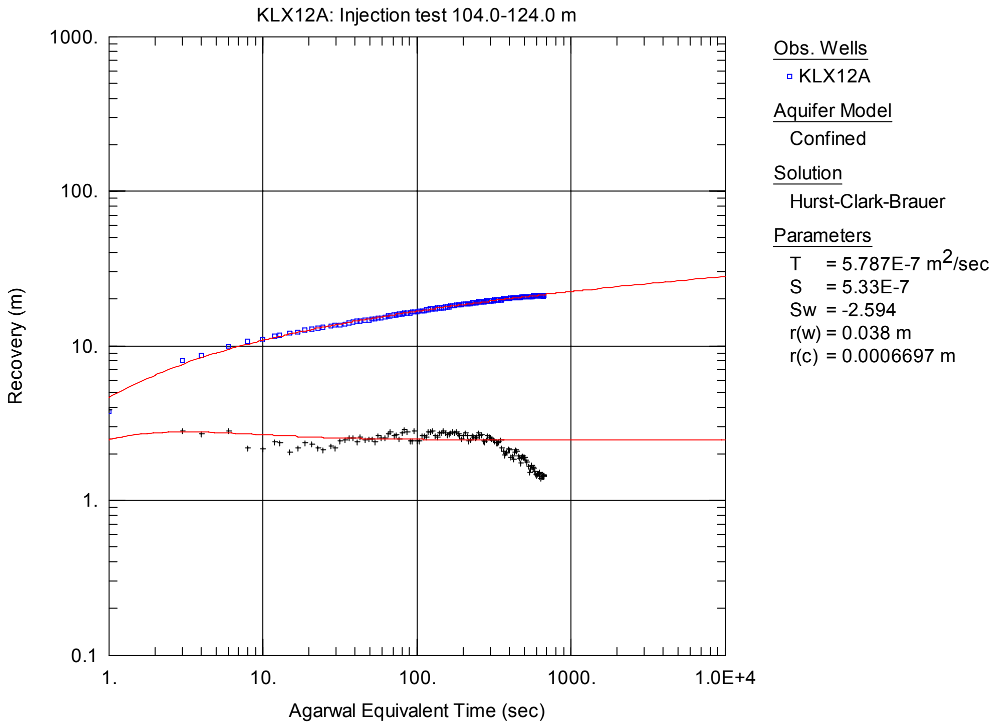

Figure A3-31. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 104.0-124.0 m in KLX12A.*

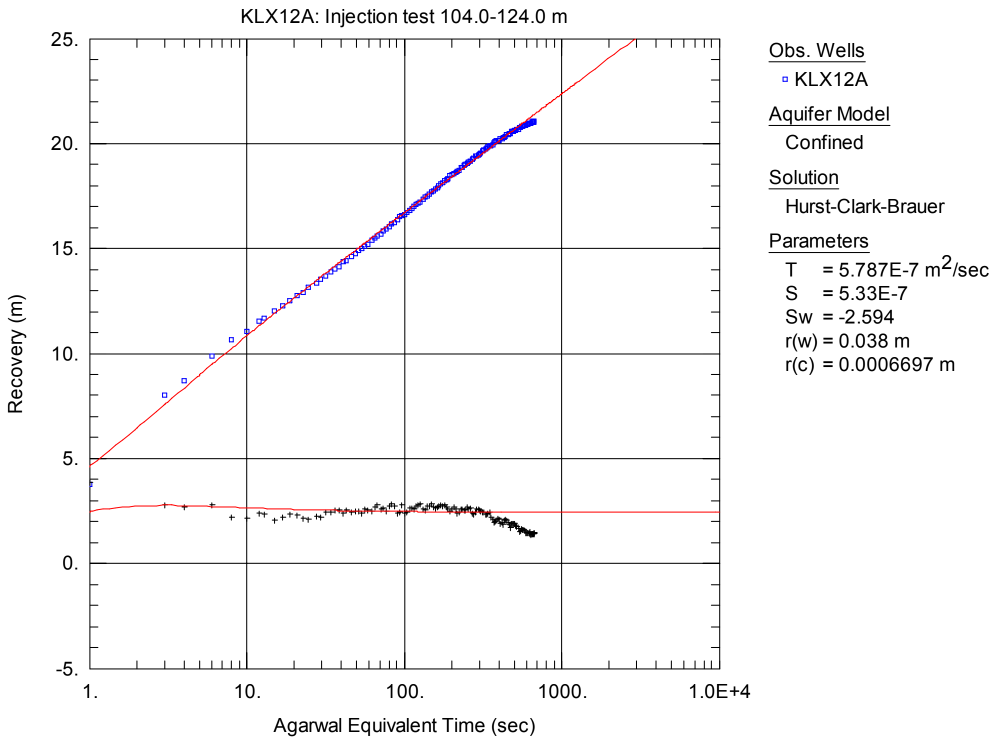

Figure A3-32. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 104.0-124.0 m in KLX12A.*

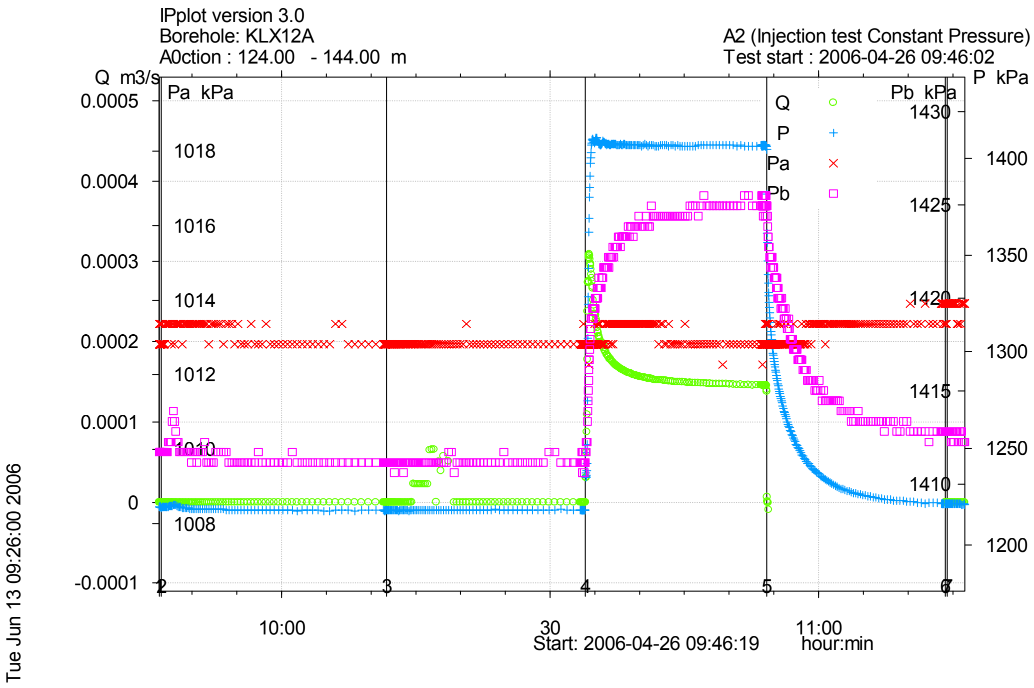

Figure A3-33. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 124.0-144.0 m in borehole KLX12A.*

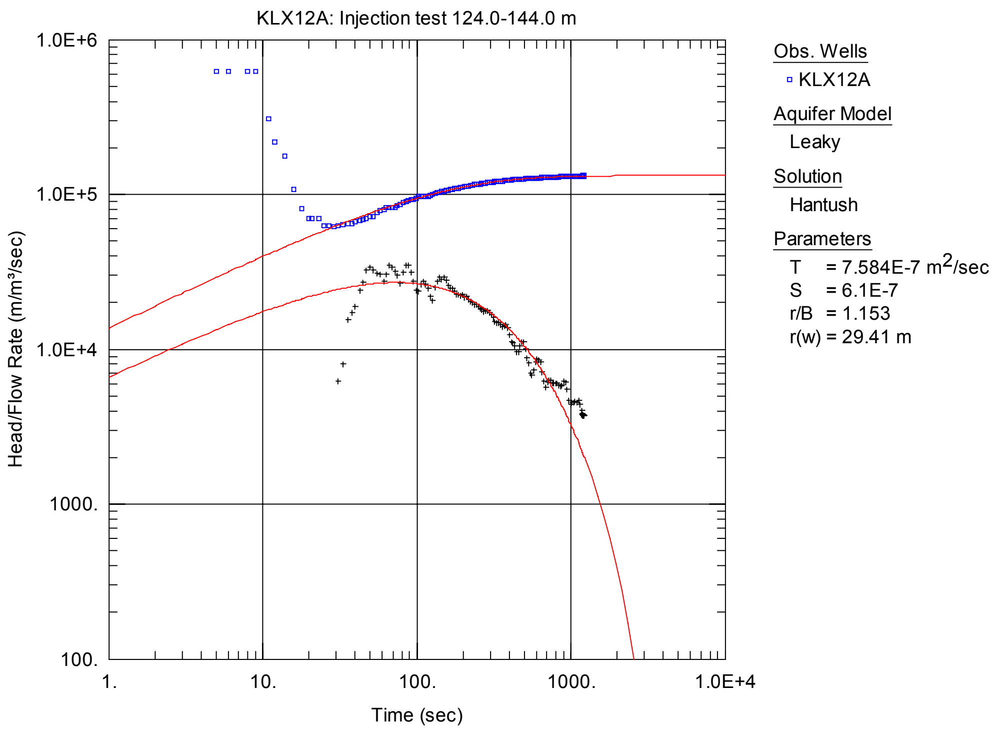

Figure A3-34. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 124.0-144.0 m in KLX12A.*

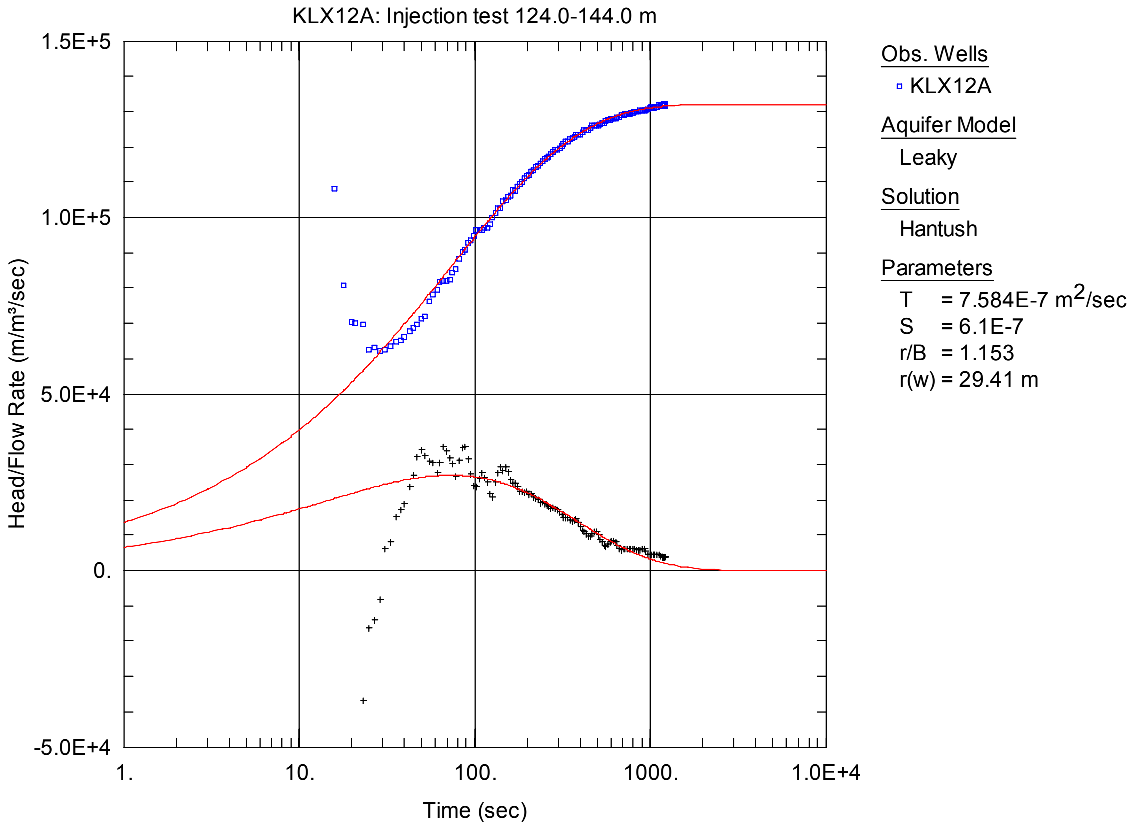

Figure A3-35. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 124.0-144.0 m in KLX12A.*

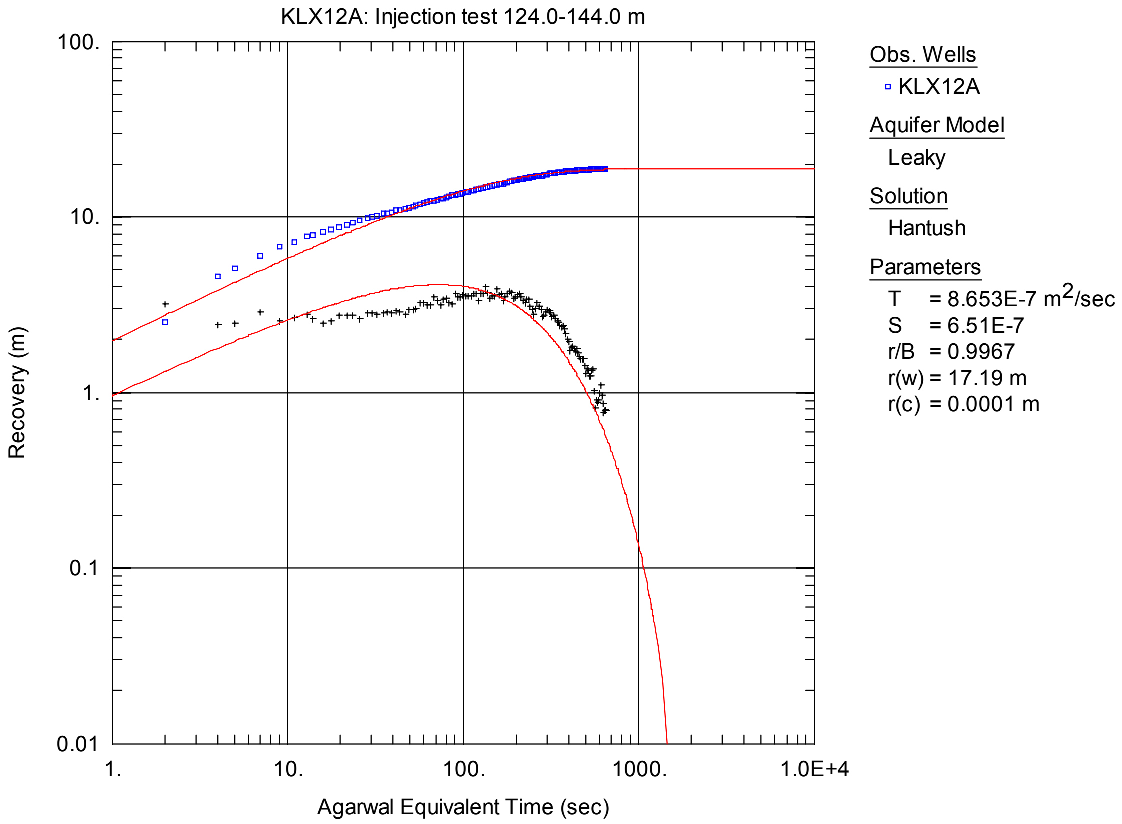

Figure A3-36. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 124.0-144.0 m in KLX12A.*

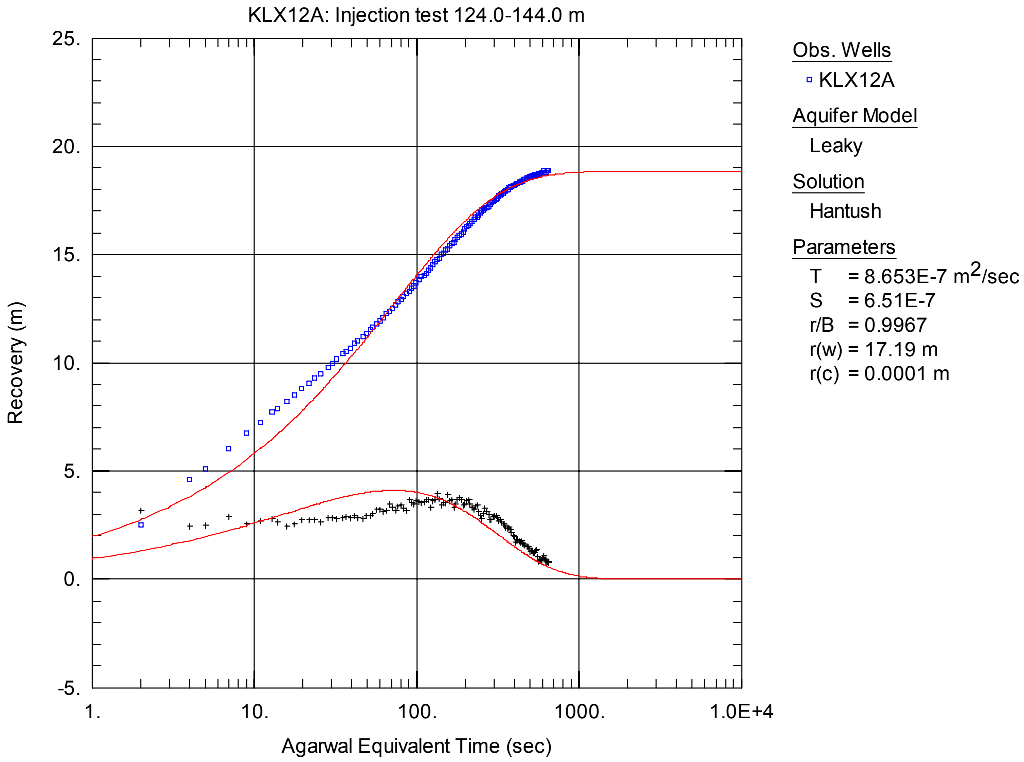

Figure A3-37. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 124.0-144.0 m in KLX12A.*

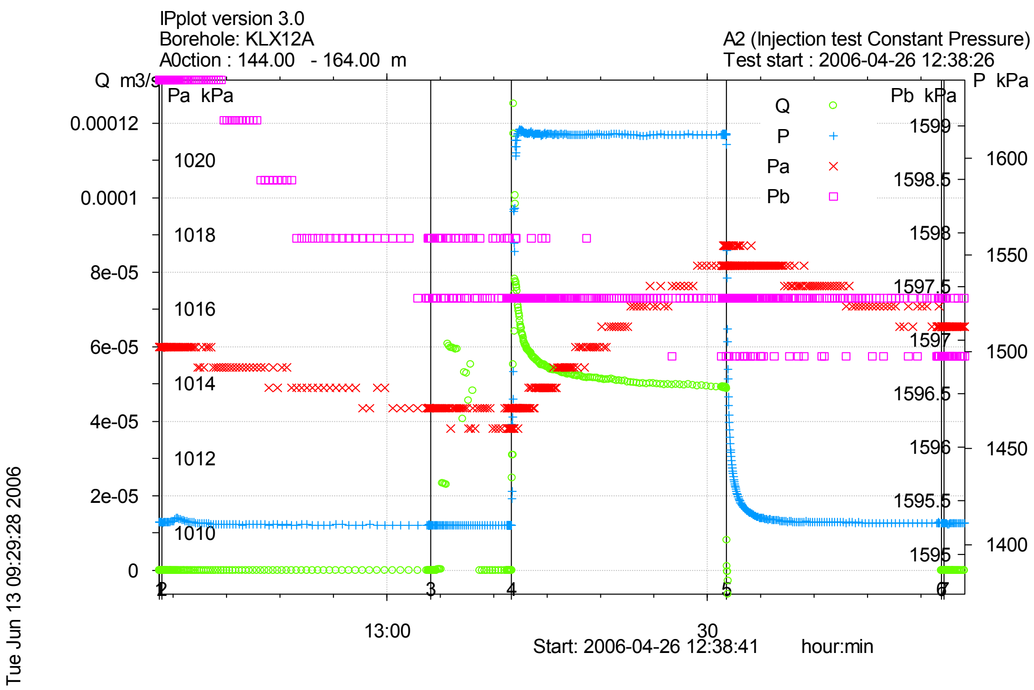

Figure A3-38. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 144.0-164.0 m in borehole KLX12A.*

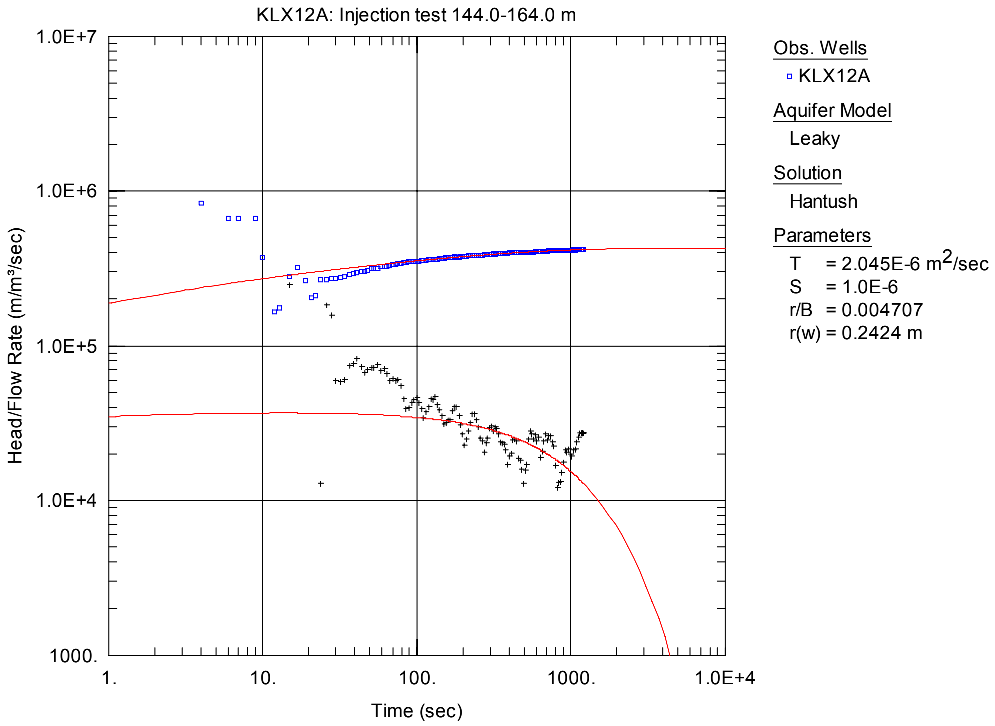

Figure A3-39. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 144.0-164.0 m in KLX12A.*

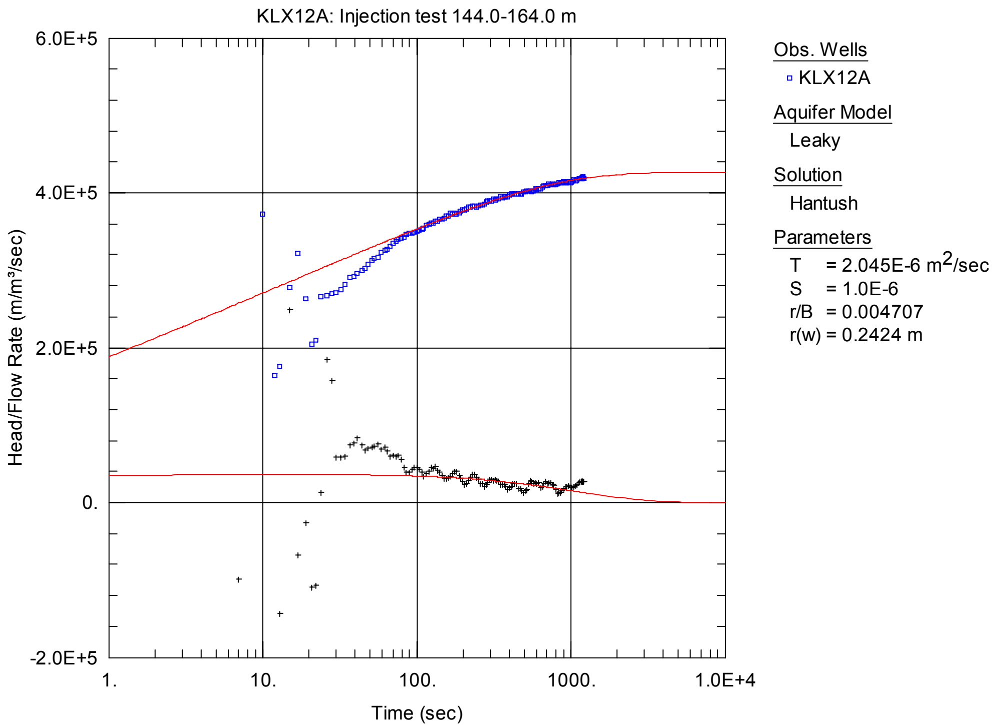

Figure A3-40. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 144.0-164.0 m in KLX12A.*

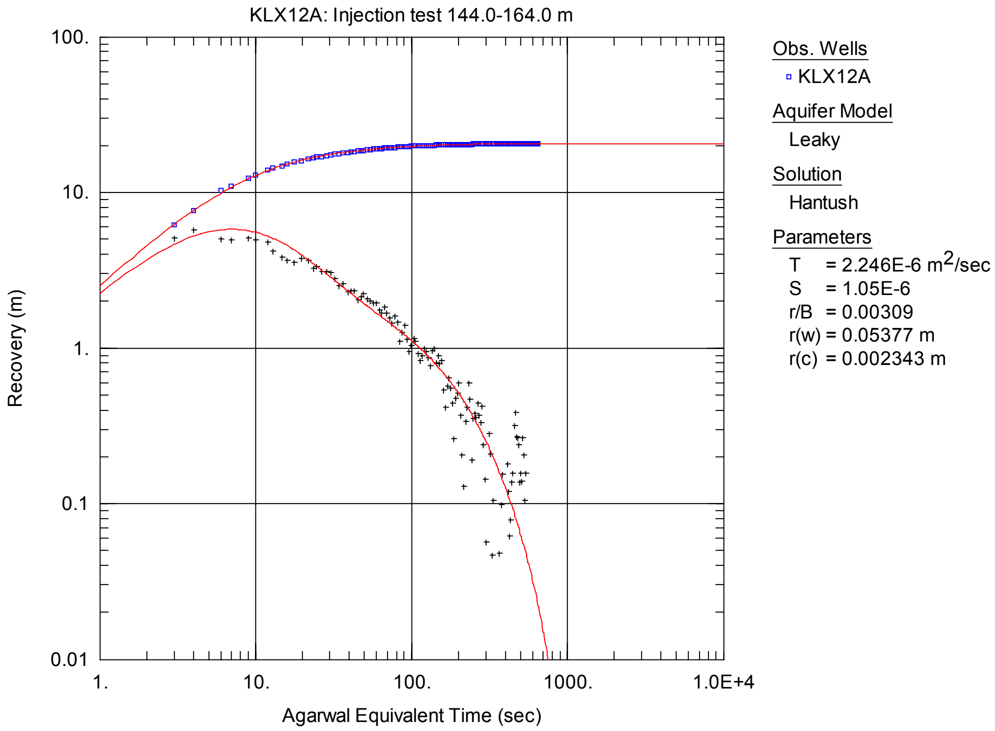

Figure A3-41. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 144.0-164.0 m in KLX12A.*

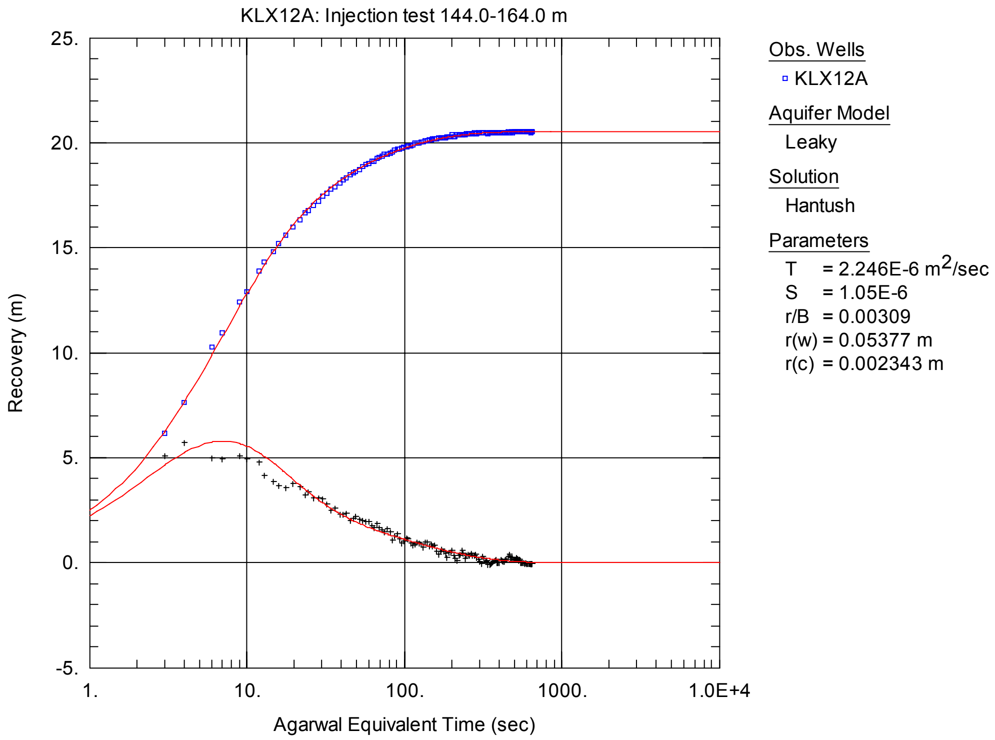

Figure A3-42. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 144.0-164.0 m in KLX12A.*

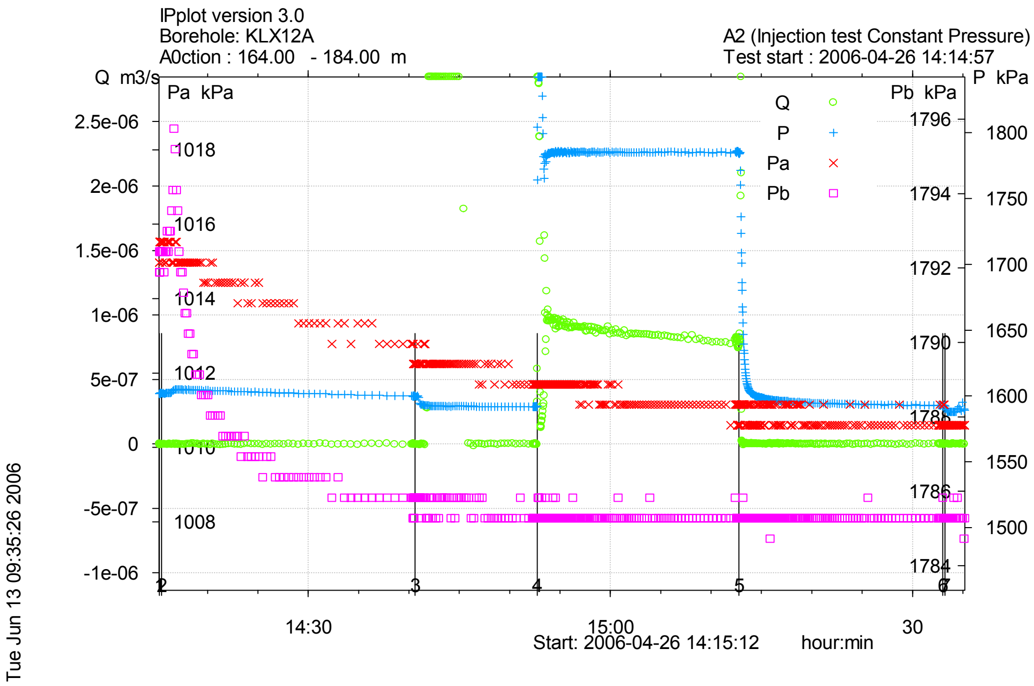

Figure A3-43. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 164.0-184.0 m in borehole KLX12A.*

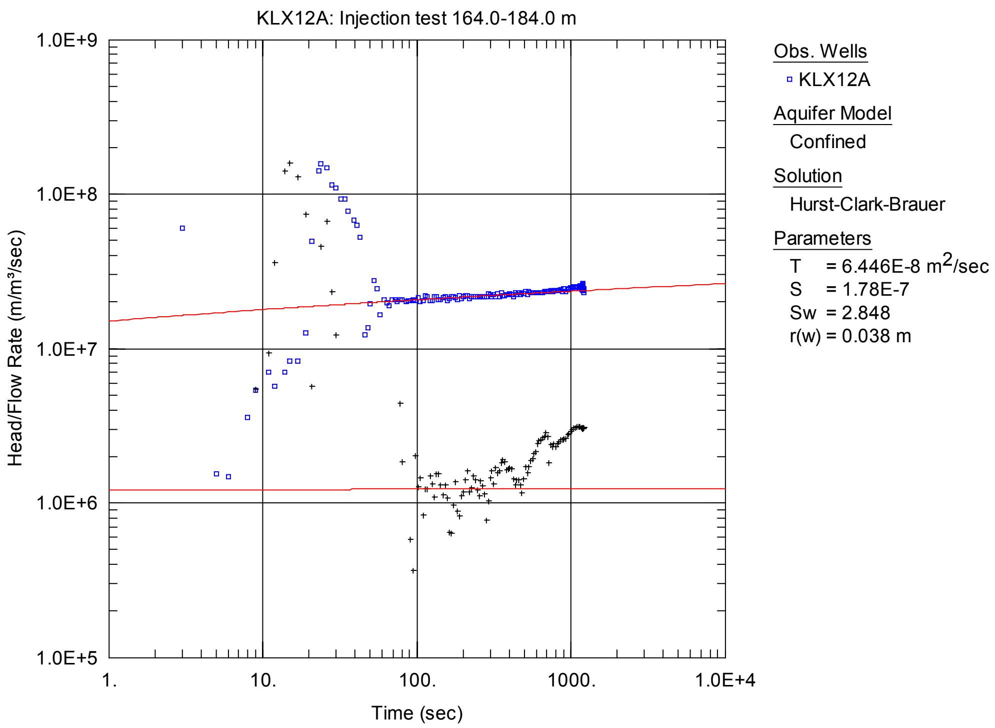

Figure A3-44. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 164.0-184.0 m in KLX12A.*

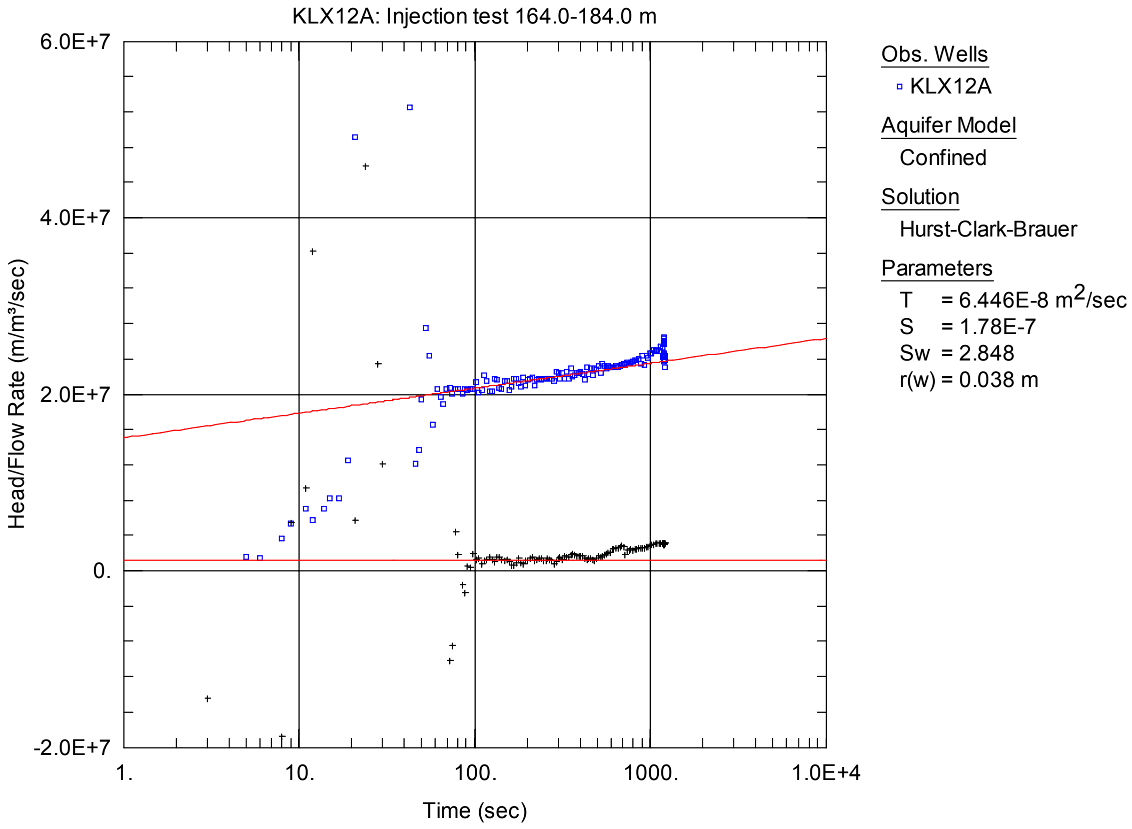

Figure A3-45. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 164.0-184.0 m in KLX12A.*

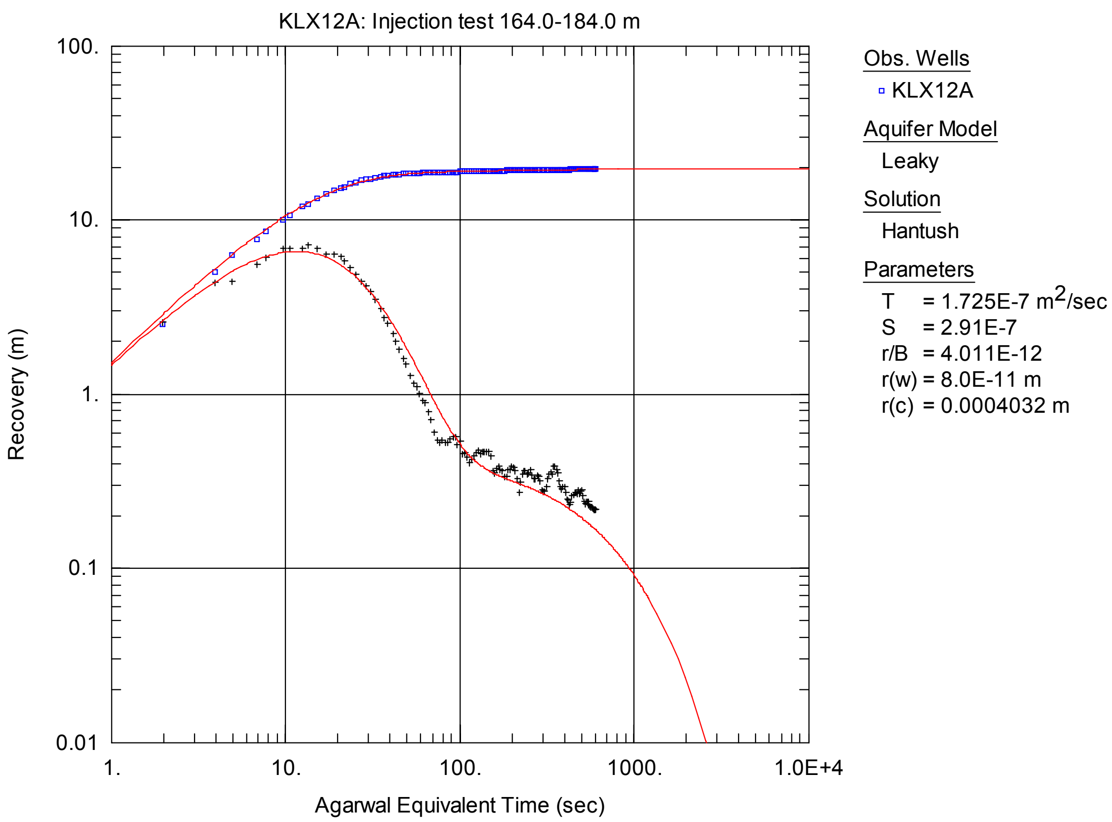

Figure A3-46. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 164.0-184.0 m in KLX12A.*

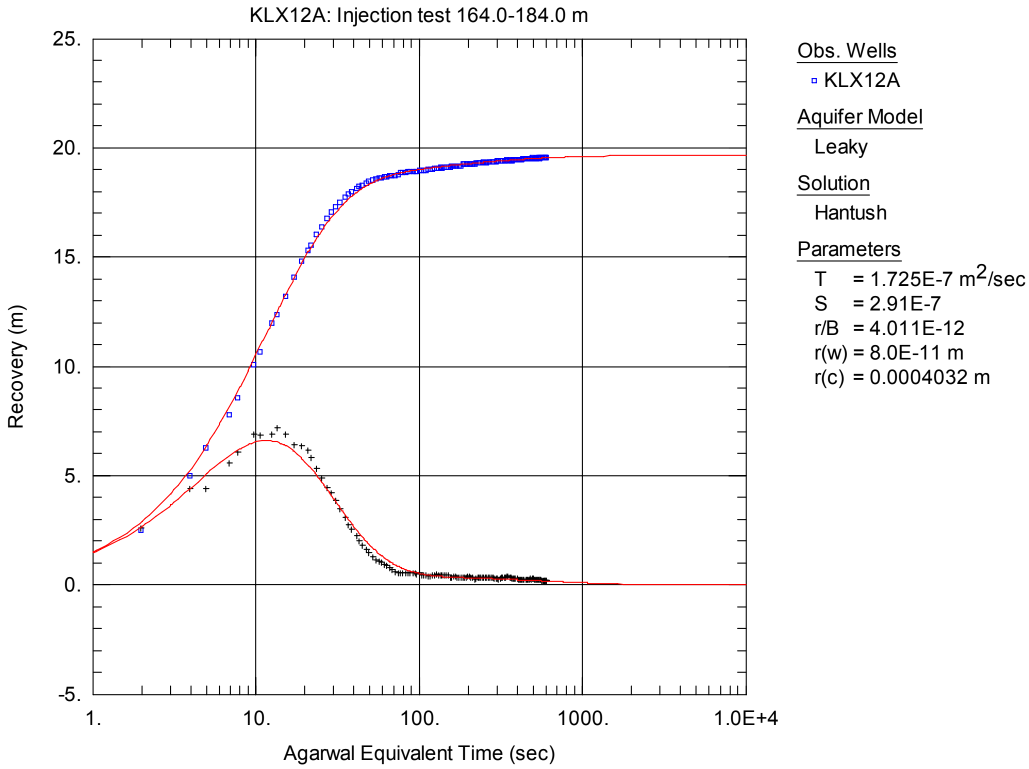

Figure A3-47. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 164.0-184.0 m in KLX12A.*

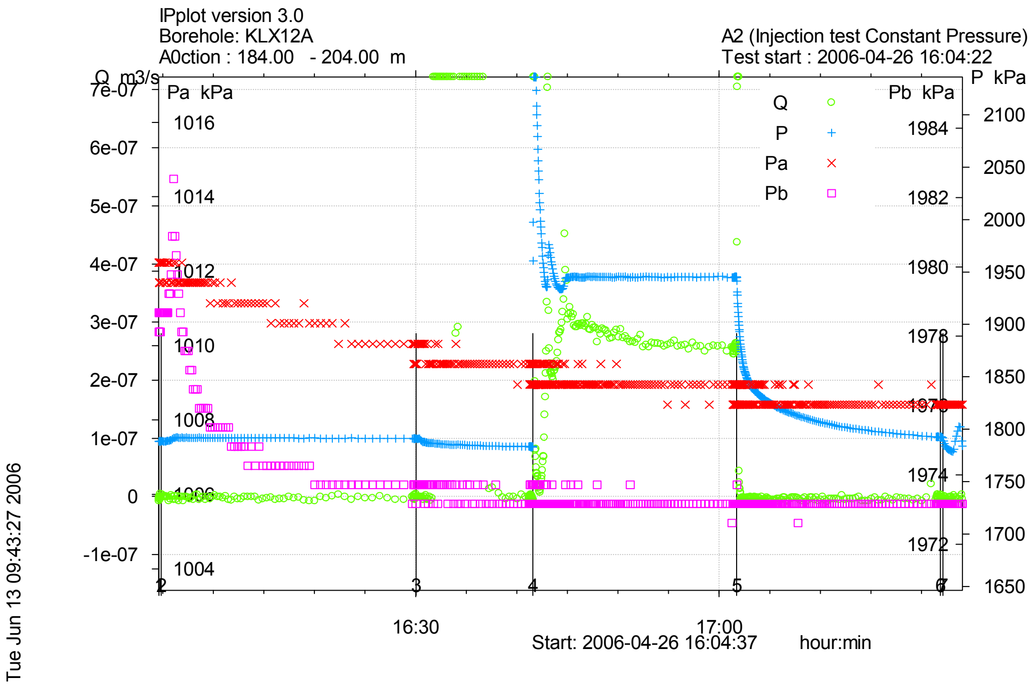

Figure A3-48. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 184.0-204.0 m in borehole KLX12A.*

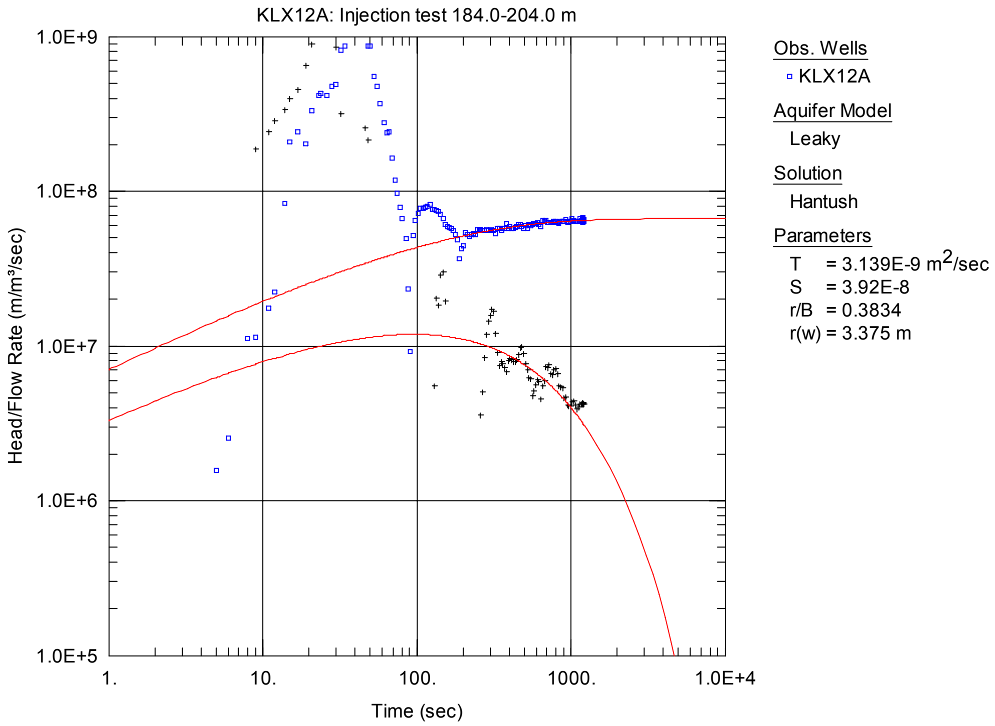

Figure A3-49. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 184.0-204.0 m in KLX12A.*

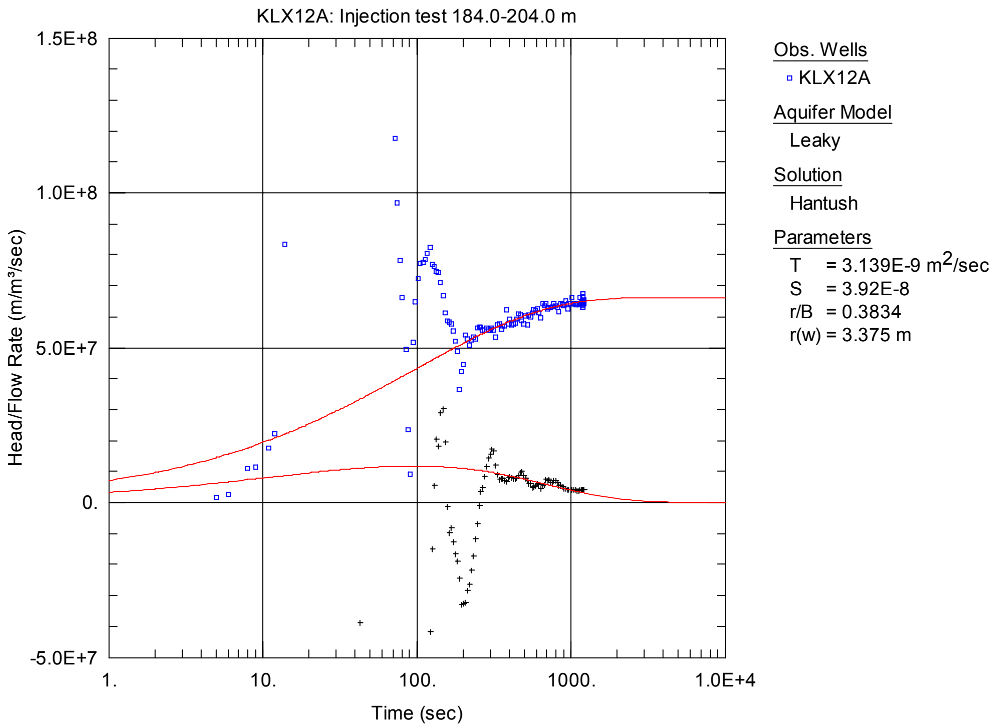

Figure A3-50. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 184.0-204.0 m in KLX12A.*

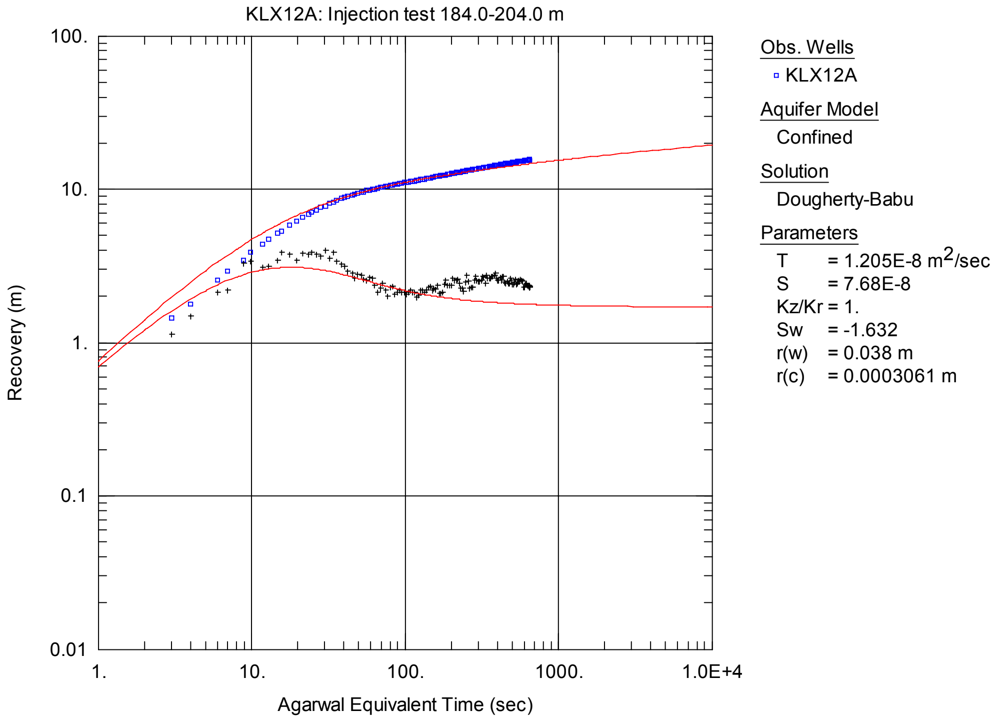

Figure A3-51. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Hurst solution on the first PRF-period, from the injection test in section 184.0-204.0 m in KLX12A.*

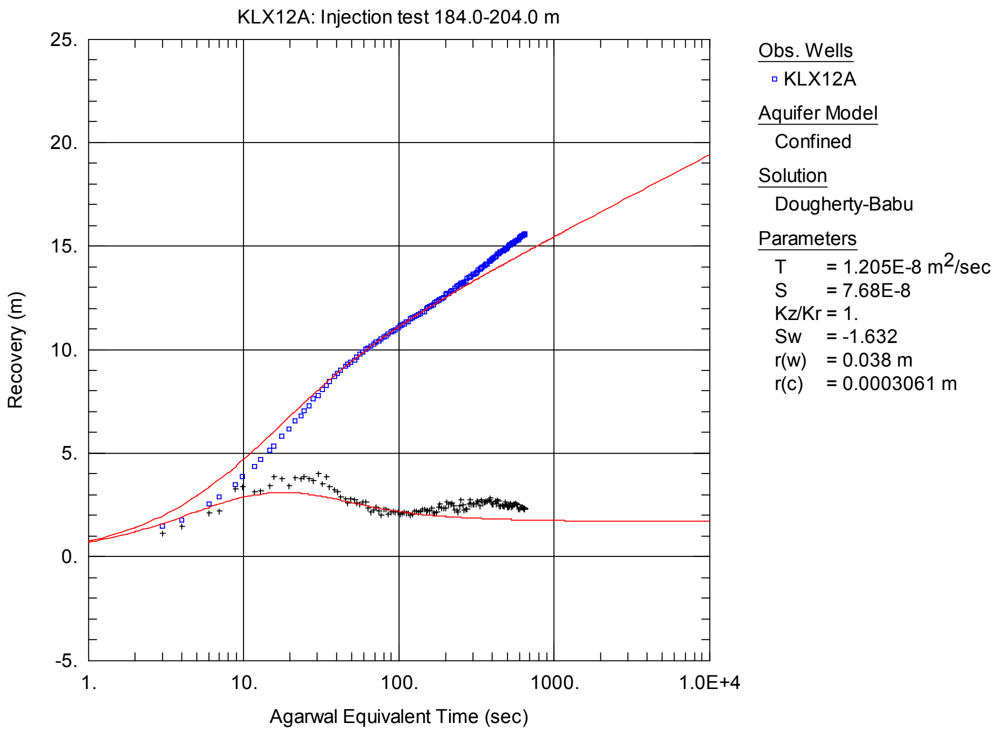

Figure A3-52. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Hurst solution on the first PRF-period, from the injection test in section 184.0-204.0 m in KLX12A.*

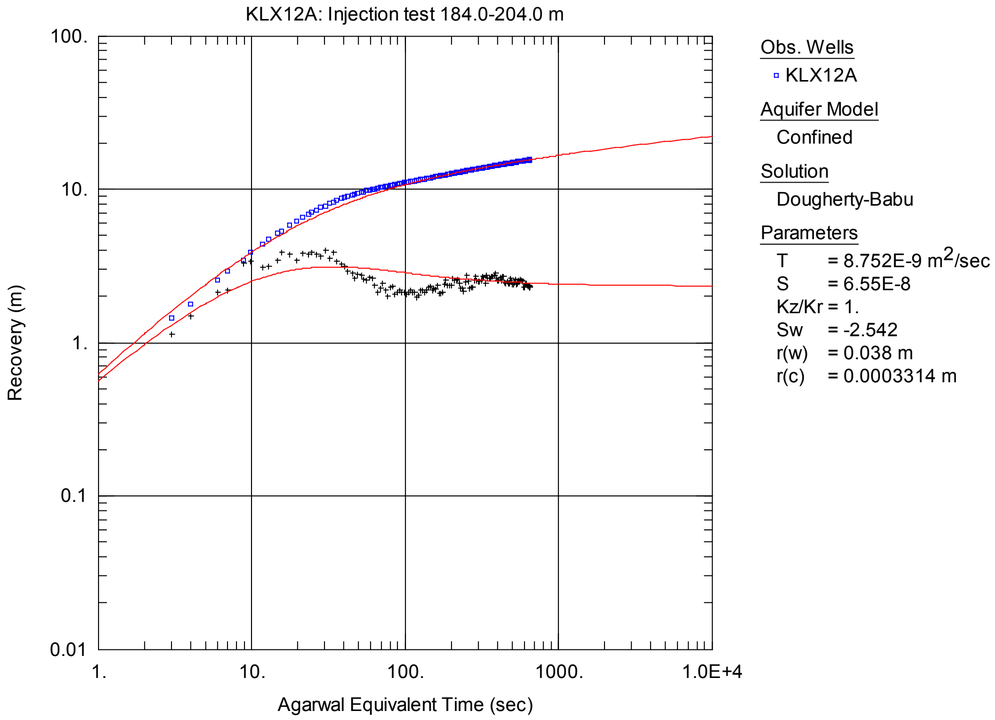

Figure A3-53. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Hurst solution on the second PRF-period, from the injection test in section 184.0-204.0 m in KLX12A.*

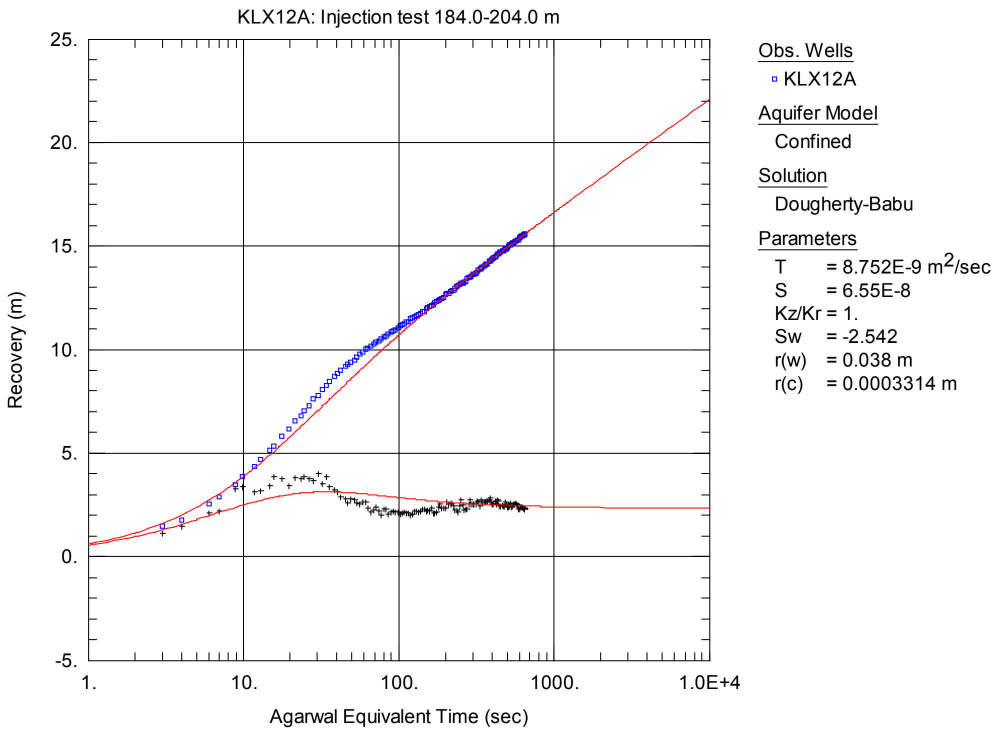

Figure A3-54. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Hurst solution on the second PRF-period, from the injection test in section 184.0-204.0 m in KLX12A.*

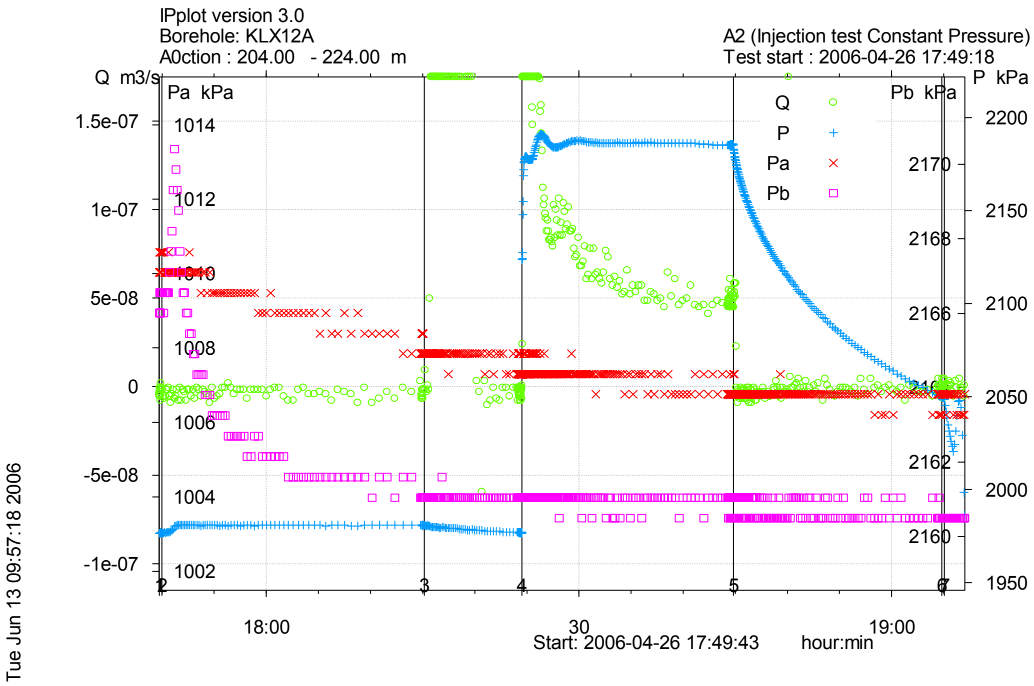

Figure A3-55. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 204.0-224.0 m in borehole KLX12A.*

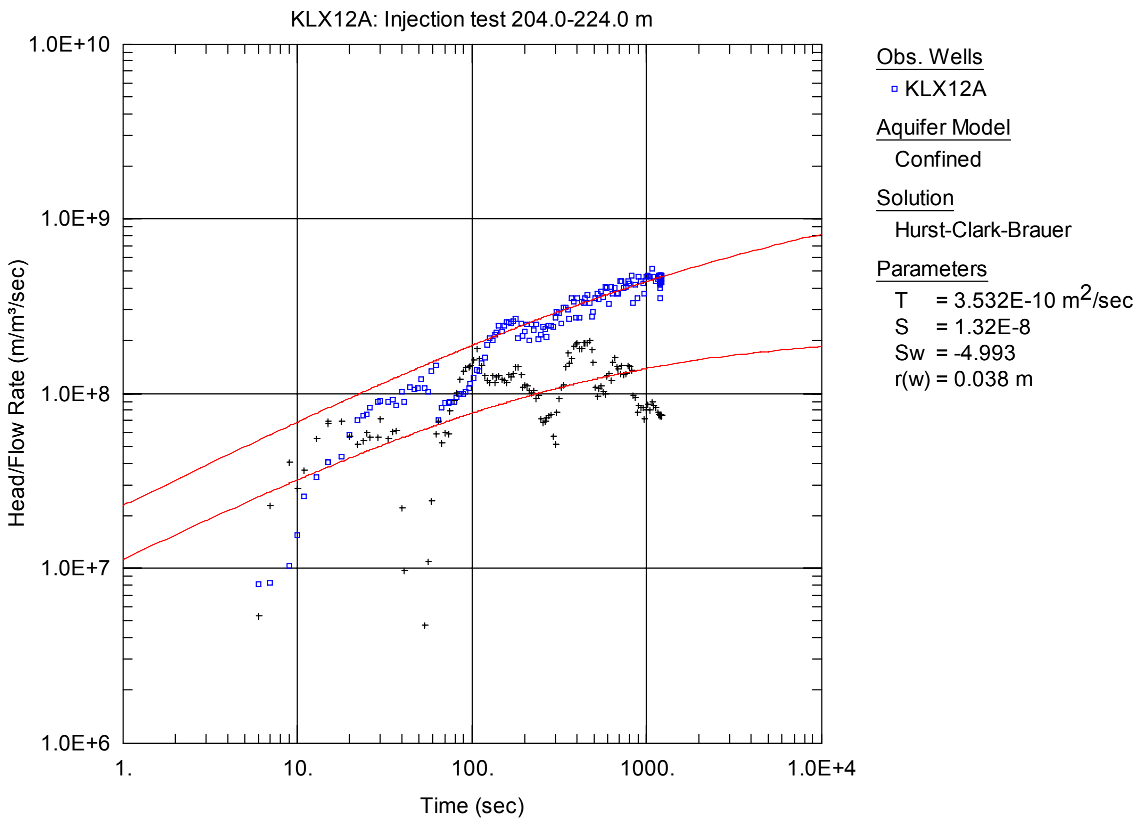

Figure A3-56. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 204.0-224.0 m in KLX12A.*

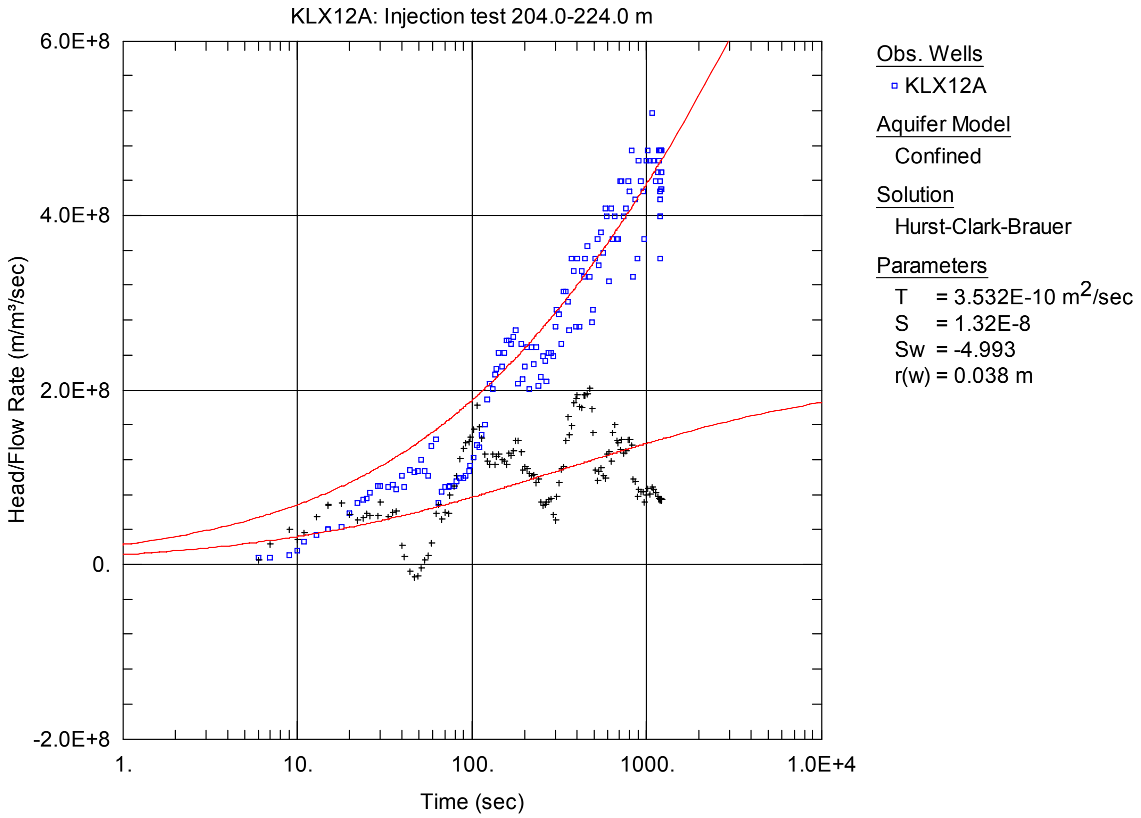

Figure A3-57. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 204.0-224.0 m in KLX12A.*

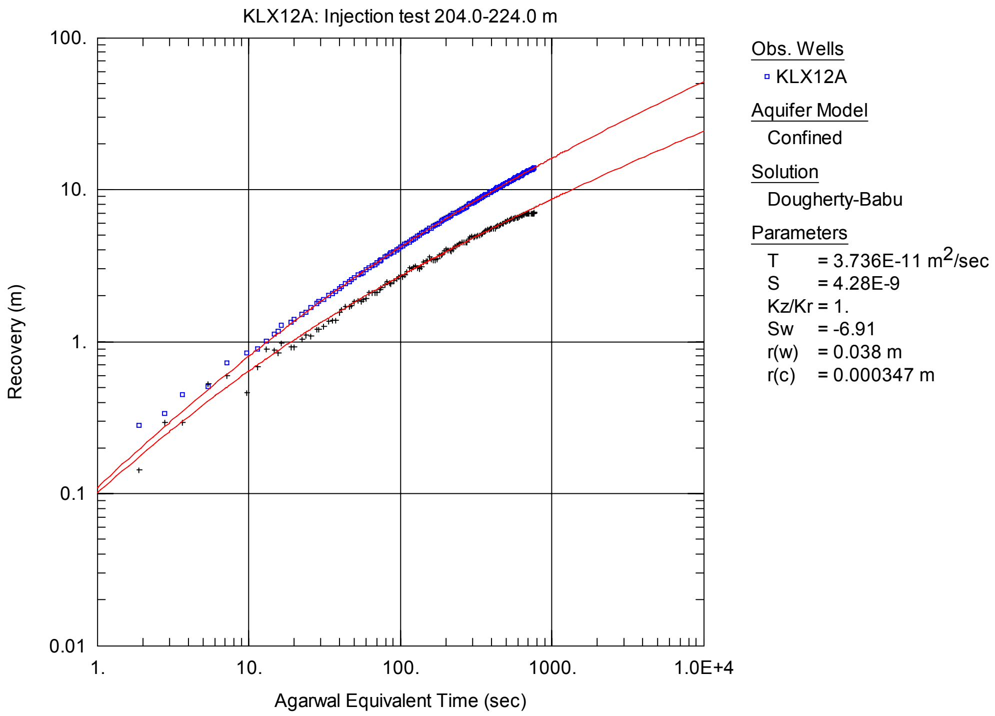

Figure A3-58. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 204.0-224.0 m in KLX12A.*

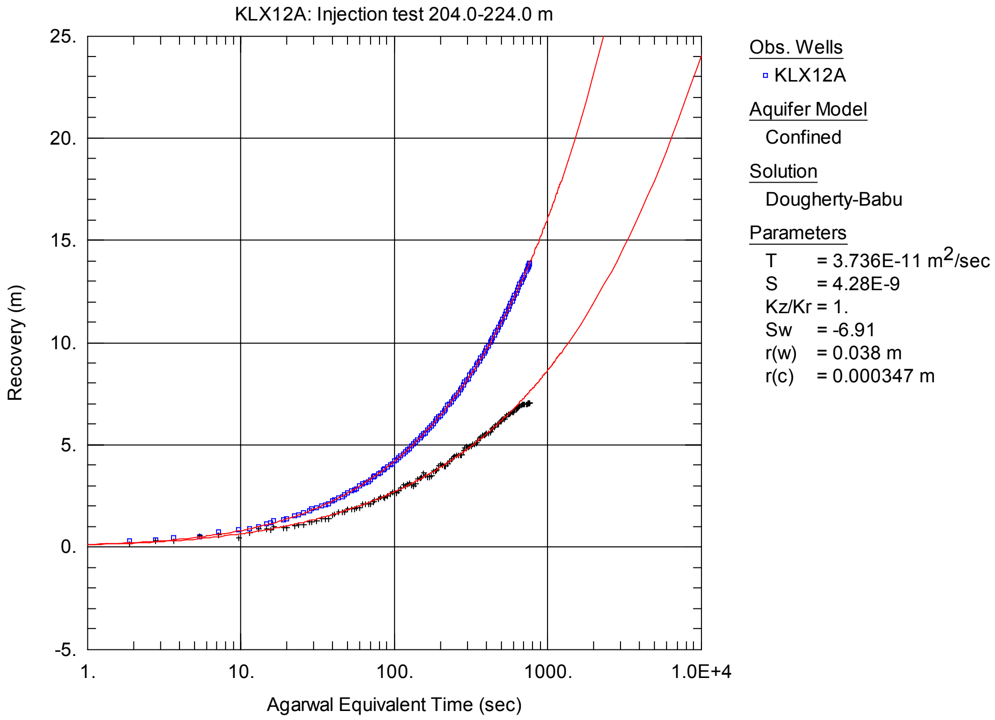

Figure A3-59. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 204.0-224.0 m in KLX12A.*

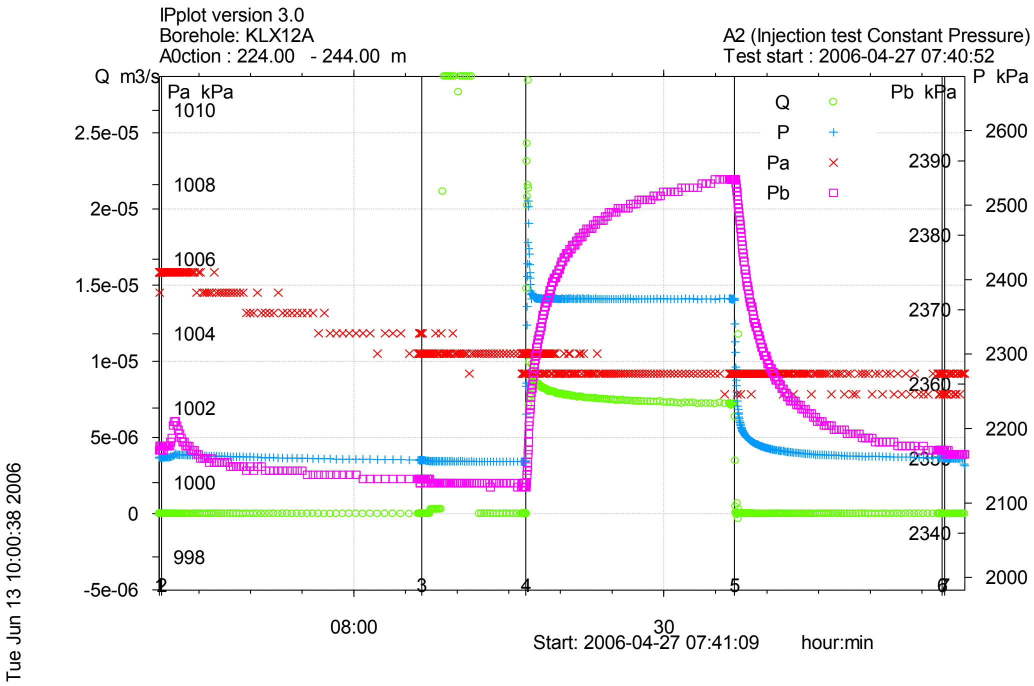

Figure A3-60. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 224.0-244.0 m in borehole KLX12A.*

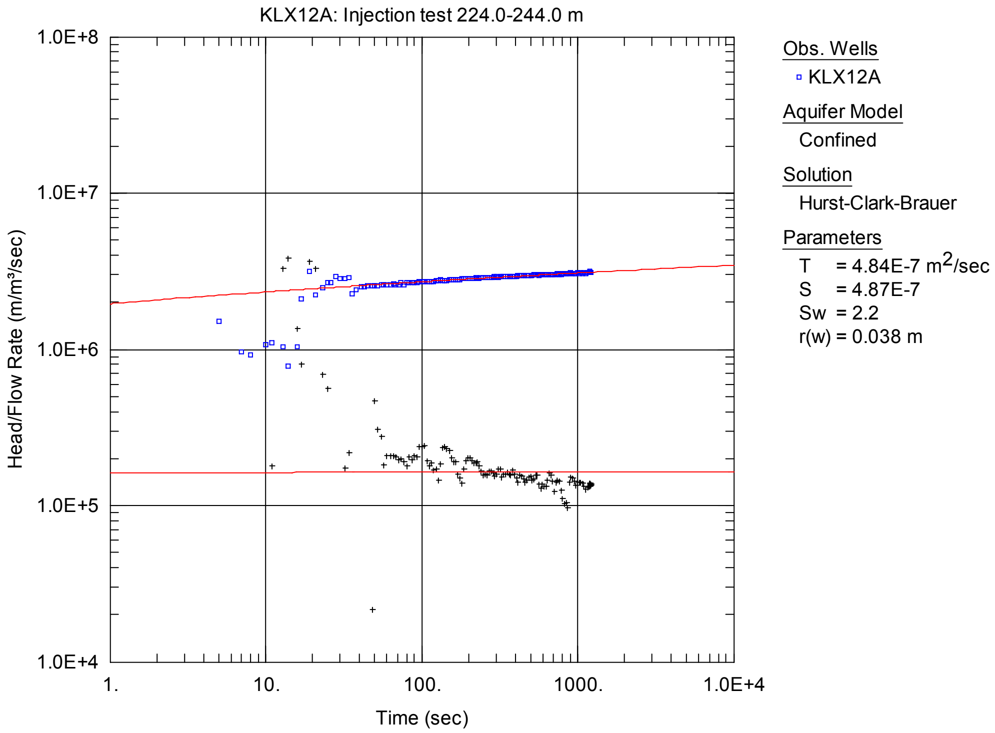

Figure A3-61. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 224.0-244.0 m in KLX12A.*

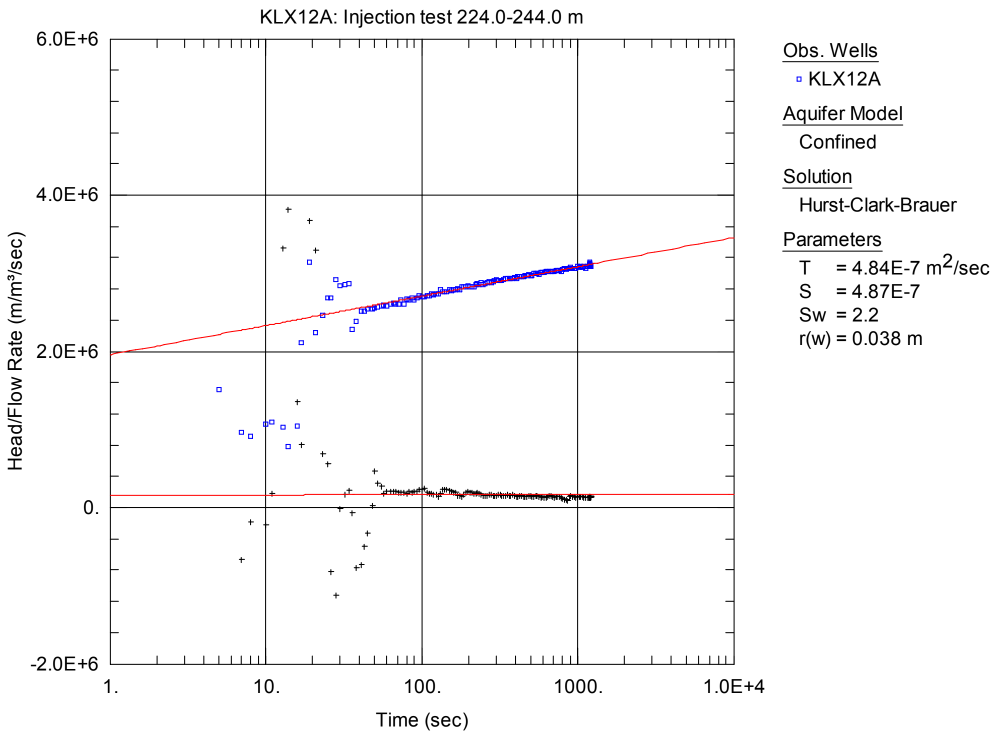

Figure A3-62. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 224.0-244.0 m in KLX12A.*

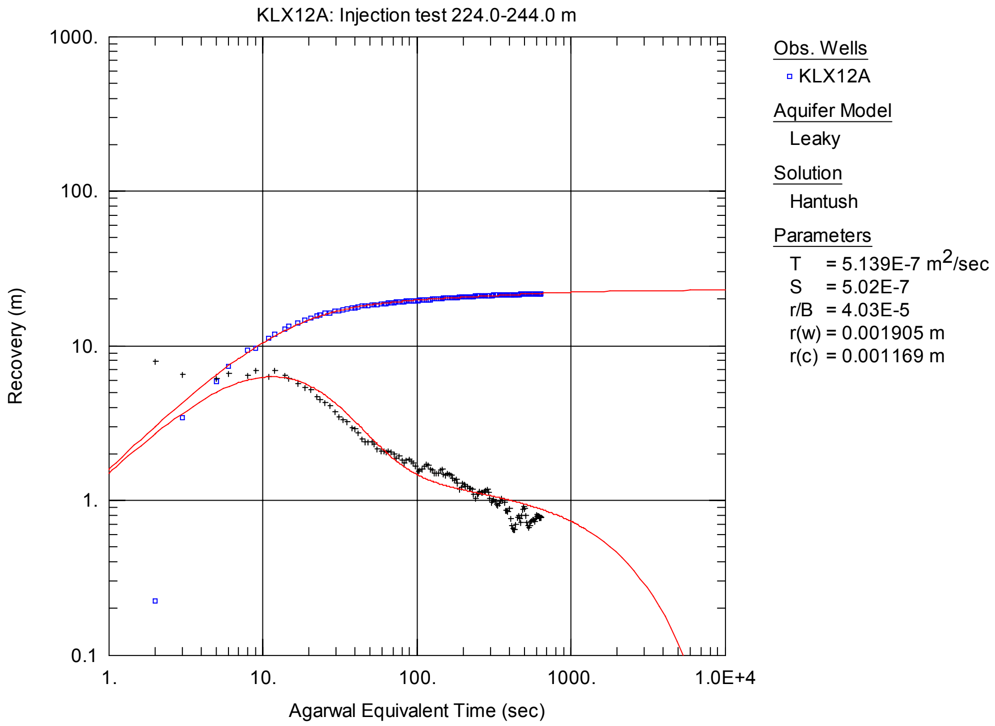

Figure A3-63. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 224.0-244.0 m in KLX12A.*

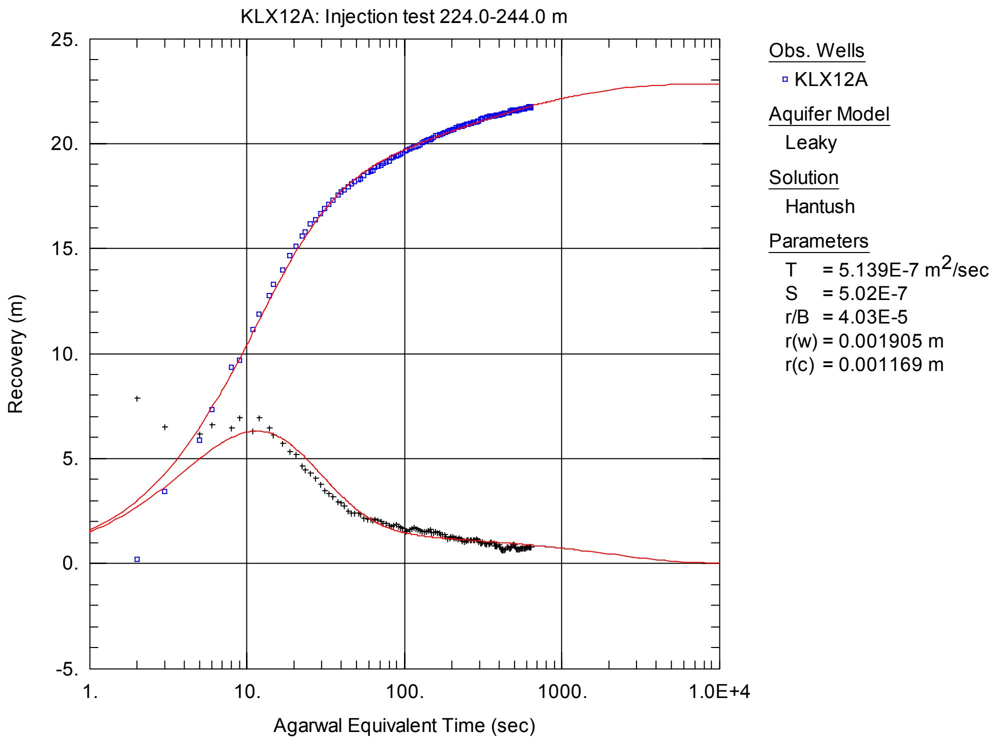

Figure A3-64. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 224.0-244.0 m in KLX12A.*

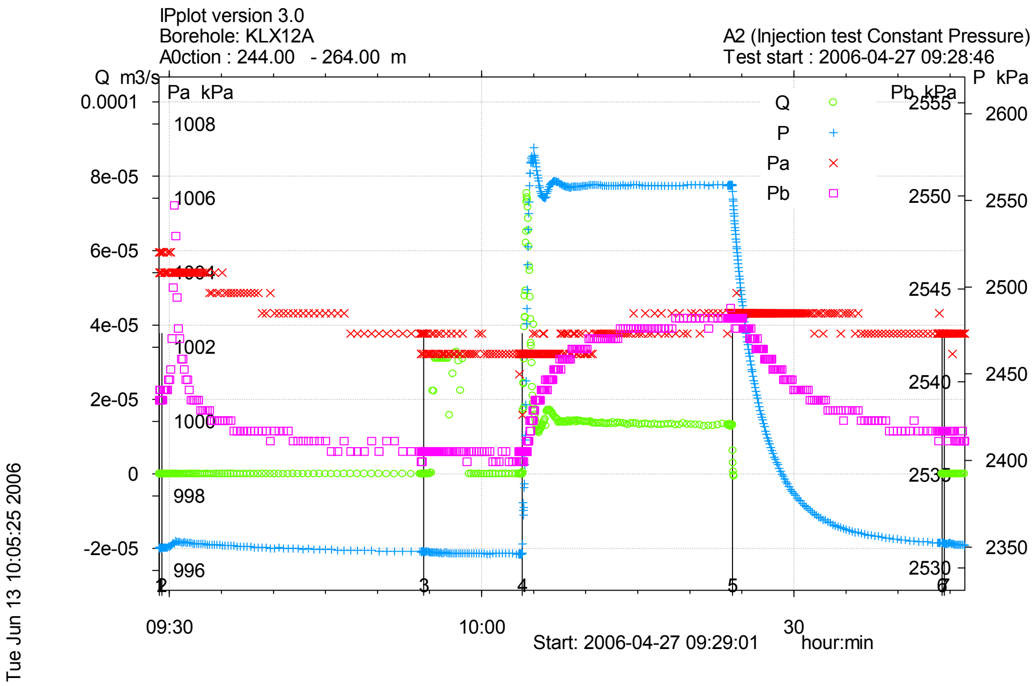

Figure A3-65. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 244.0-264.0 m in borehole KLX12A.*

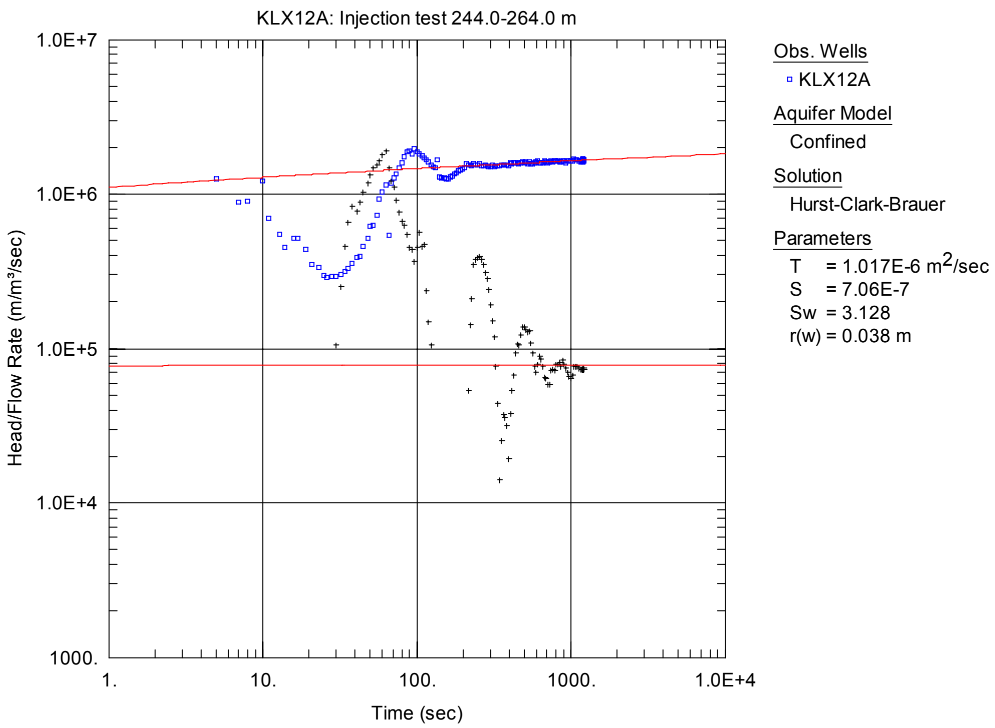

Figure A3-66. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 244.0-264.0 m in KLX12A.*

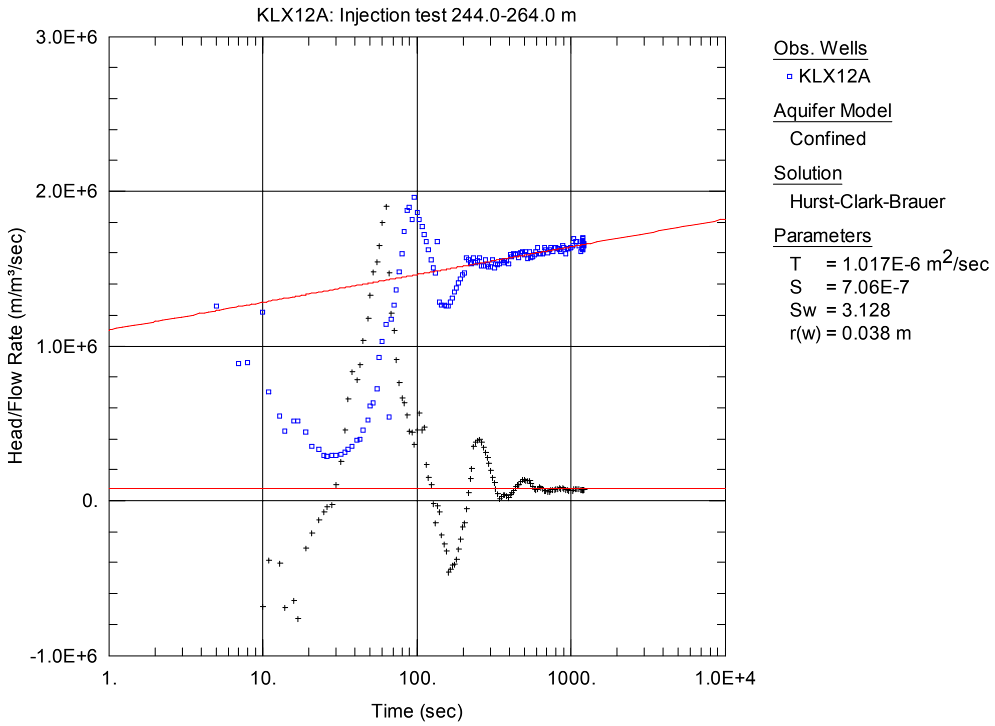

Figure A3-67. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 244.0-264.0 m in KLX12A.*

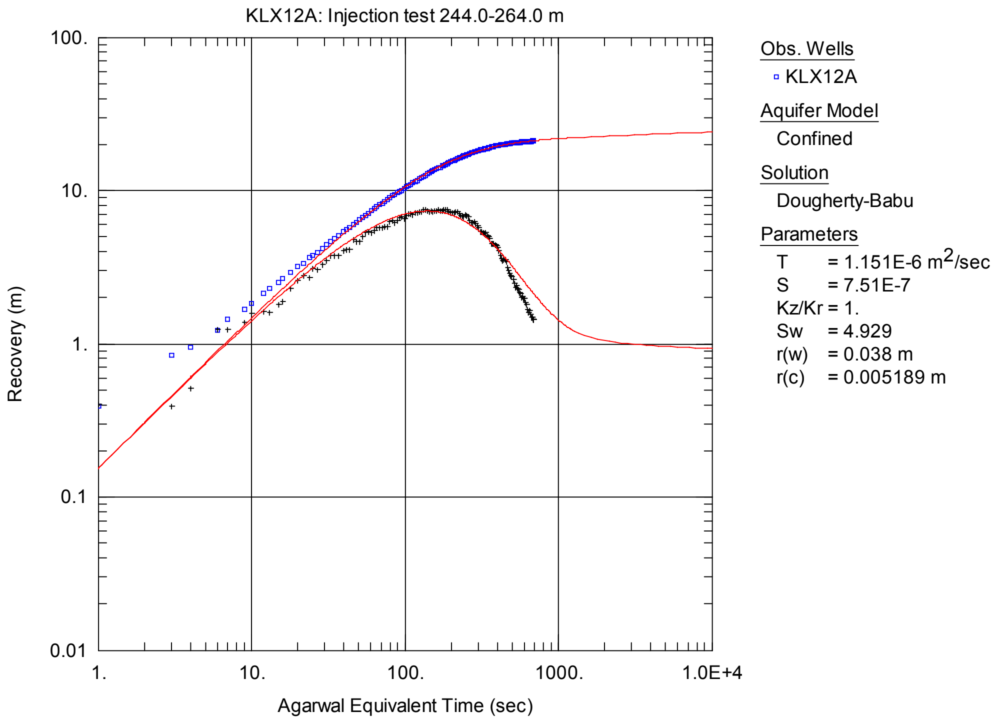

Figure A3-68. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 244.0-264.0 m in KLX12A.*

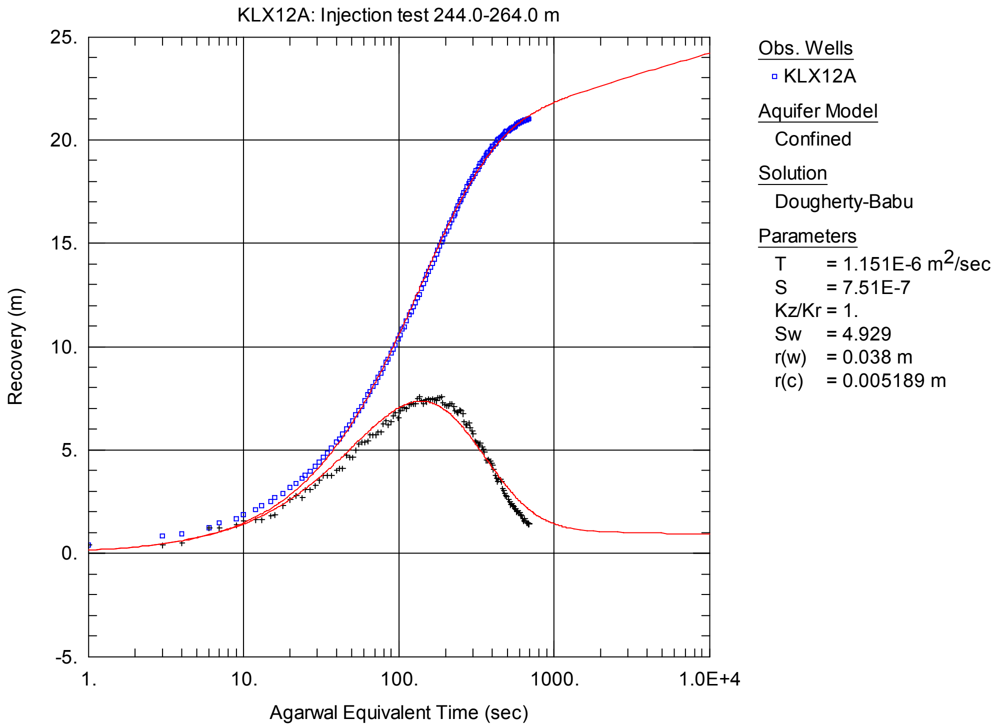

Figure A3-69. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 244.0-264.0 m in KLX12A.*

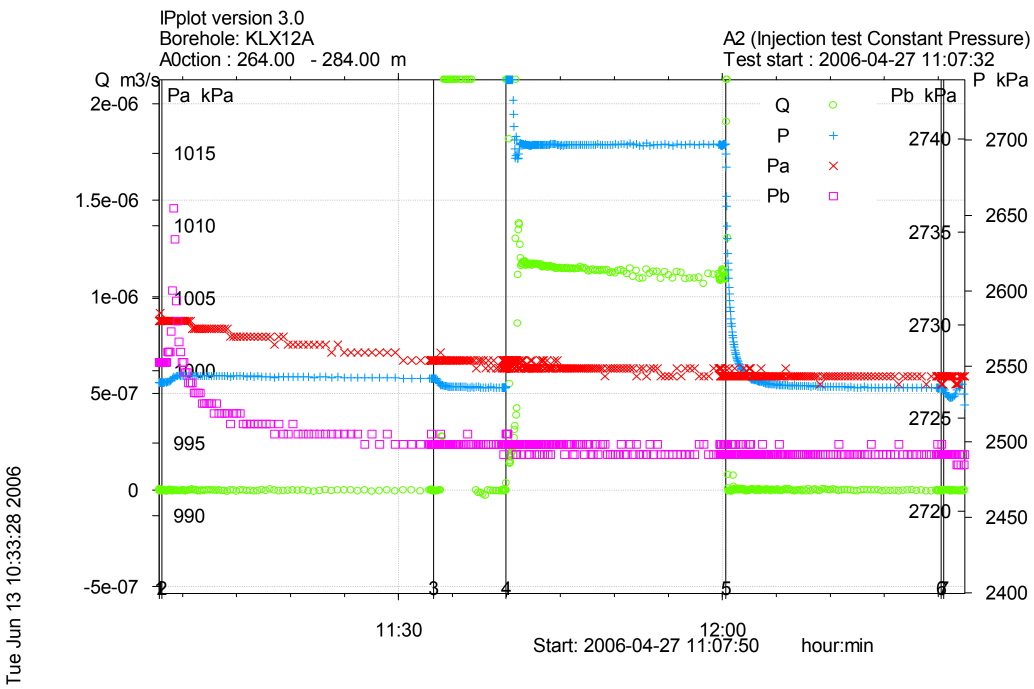

Figure A3-70. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 264.0-284.0 m in borehole KLX12A.*

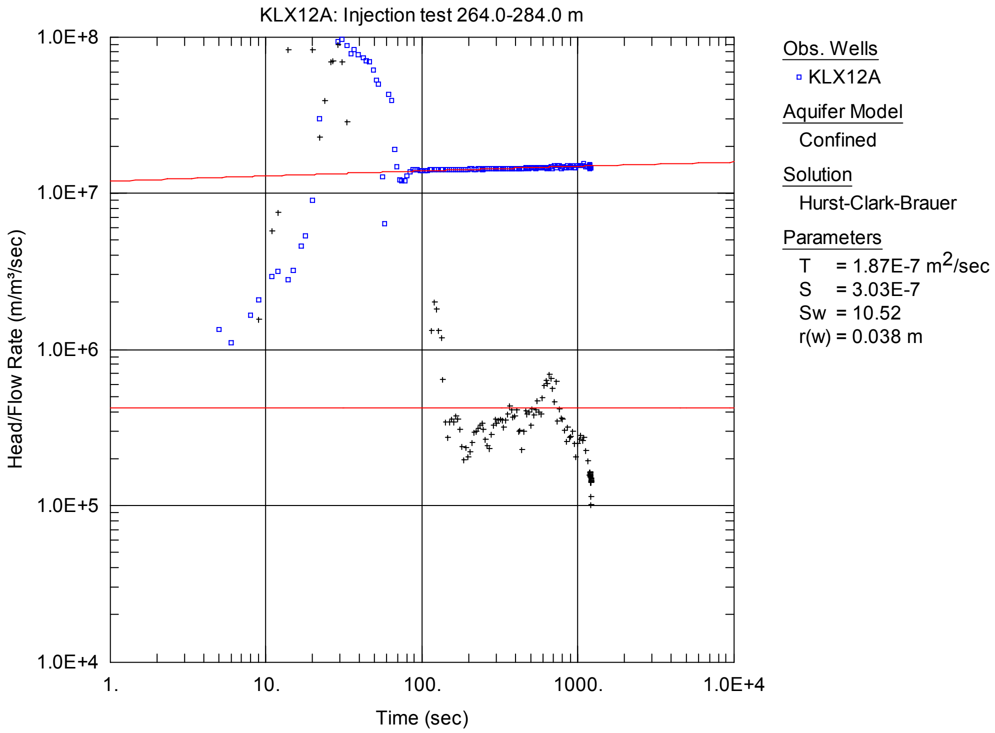

Figure A3-71. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 264.0-284.0 m in KLX12A. The type curve fit is only to show that an assumption of PRF is not valid.*

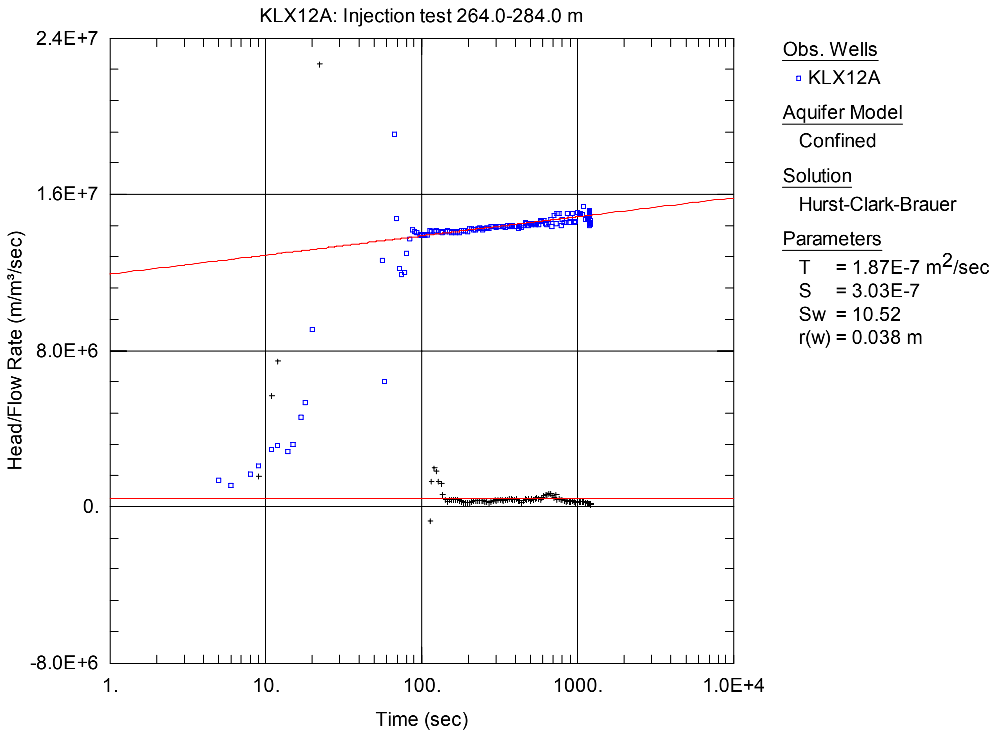

Figure A3-72. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 264.0-284.0 m in KLX12A. The type curve fit is only to show that an assumption of PRF is not valid.*

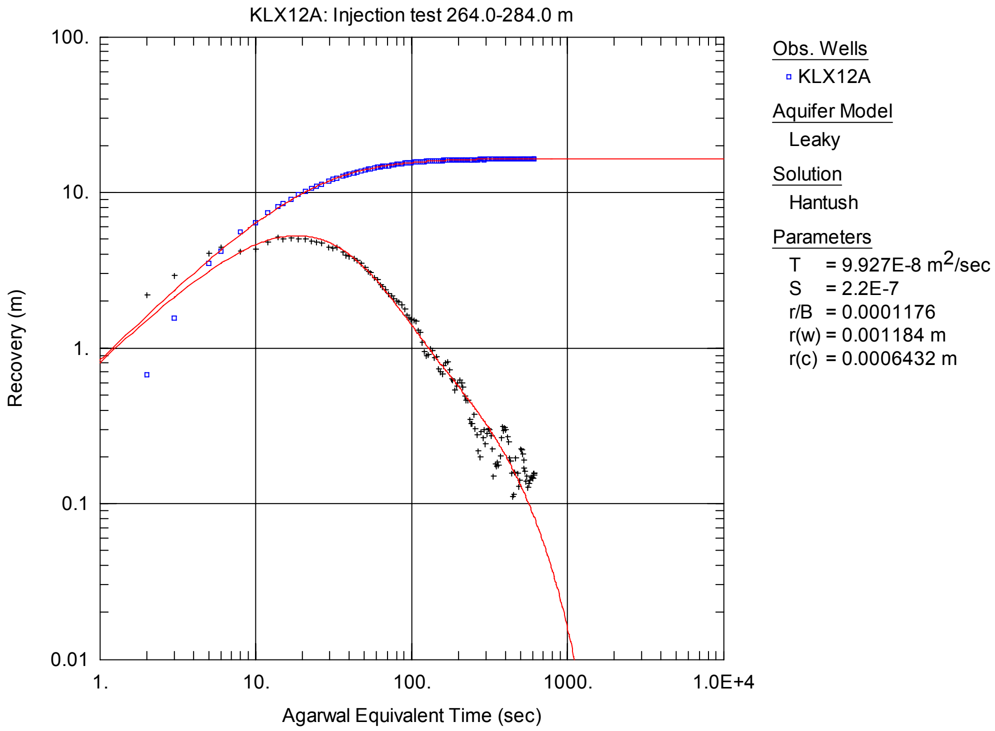

Figure A3-73. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 264.0-284.0 m in KLX12A.*

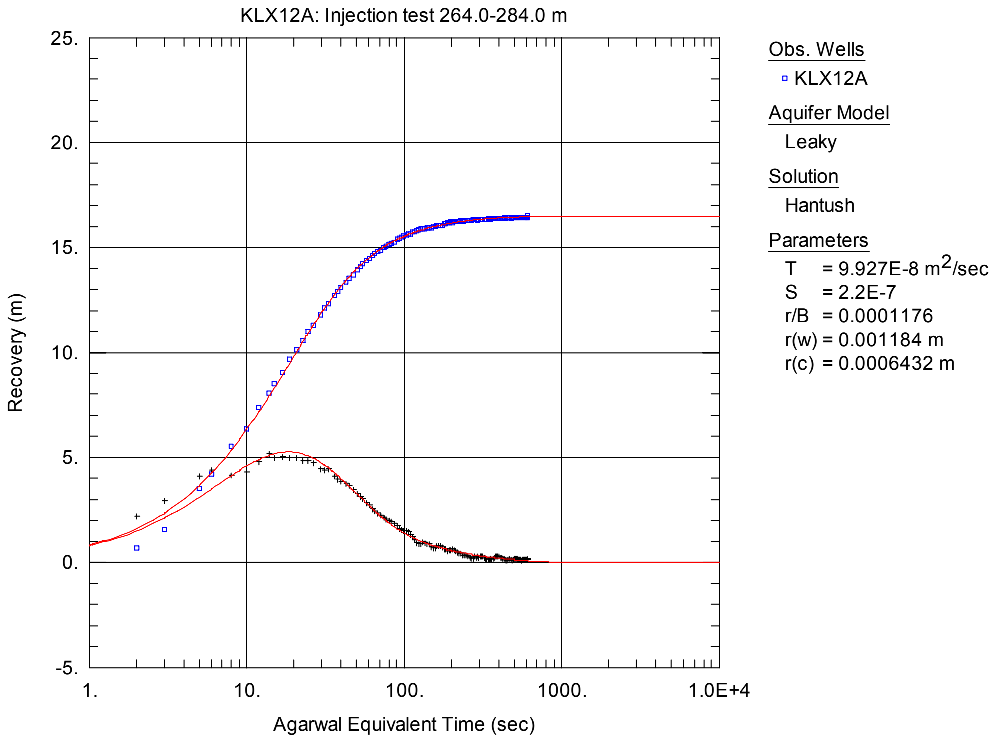

Figure A3-74. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 264.0-284.0 m in KLX12A.*

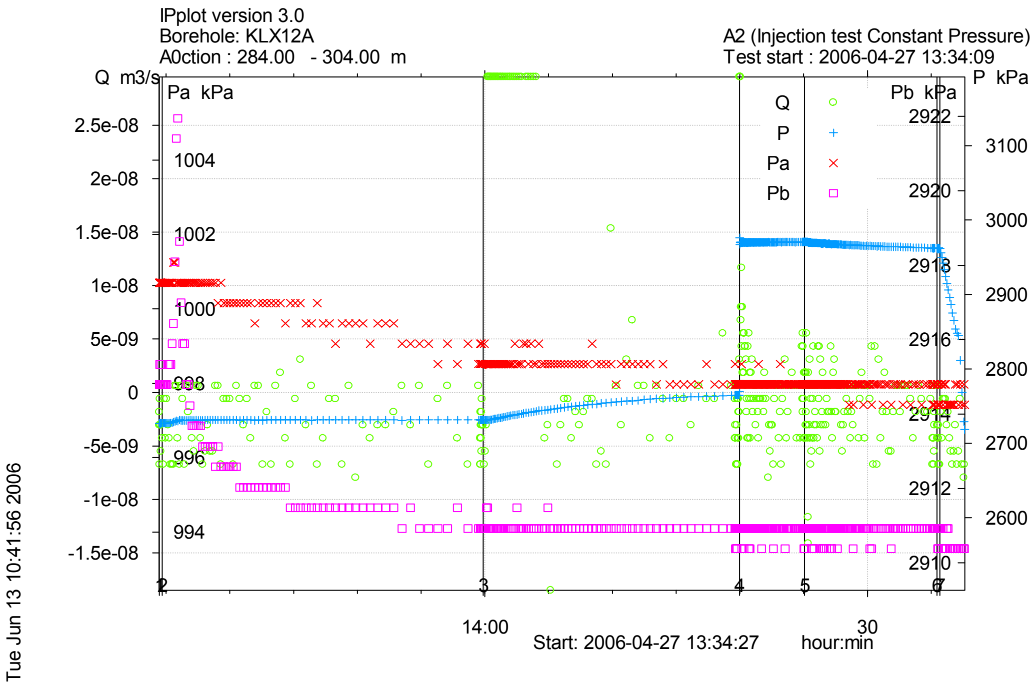

__Figure A3-75.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 284.0-304.0 m in borehole KLX12A.

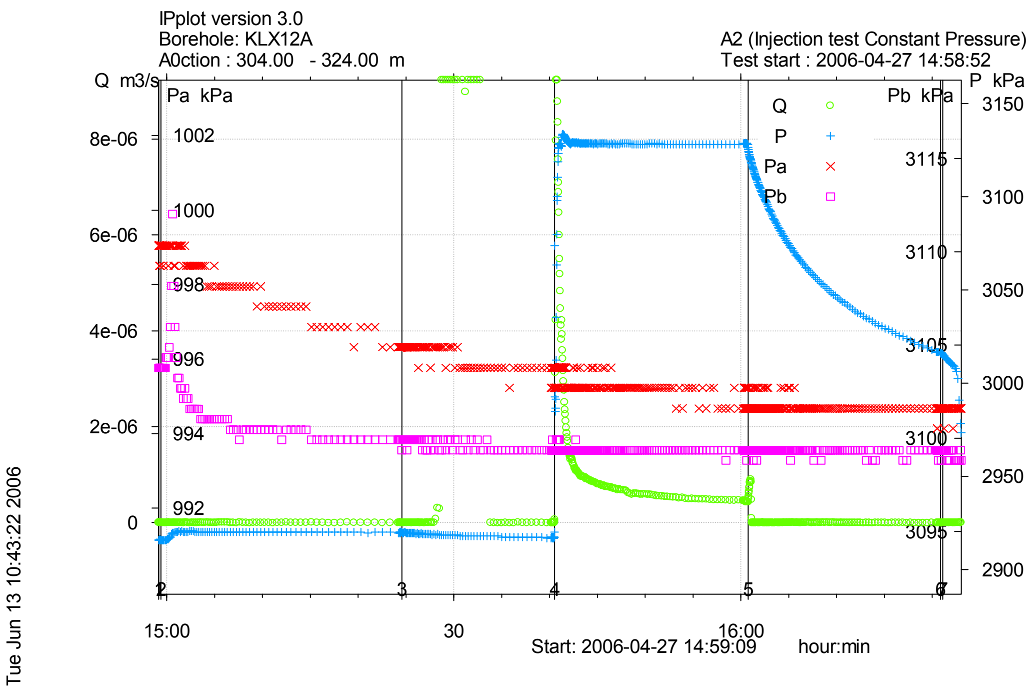

__Figure A3-76.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 304.0-324.0 m in borehole KLX12A.

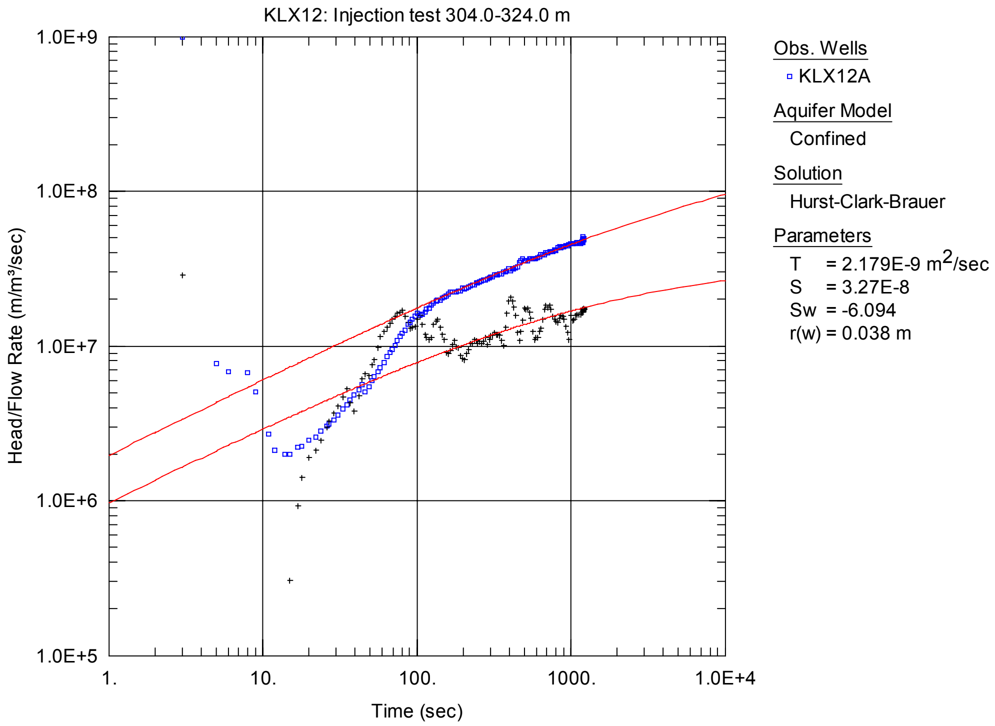

Figure A3-77. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 304.0-324.0 m in KLX12A.*

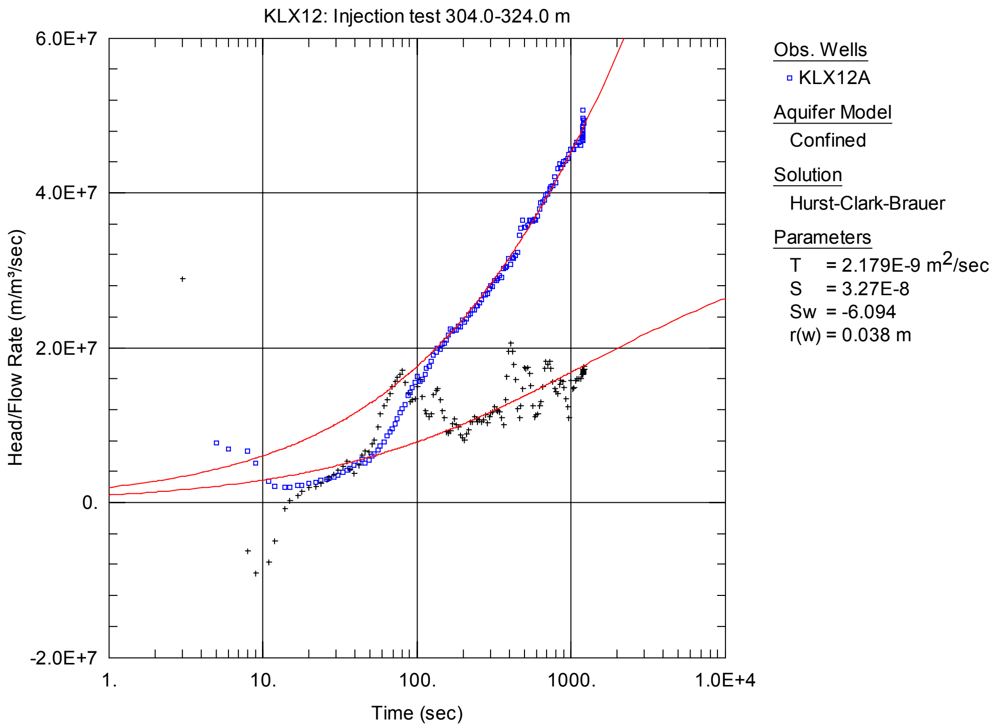

Figure A3-78. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 304.0-324.0 m in KLX12A.*

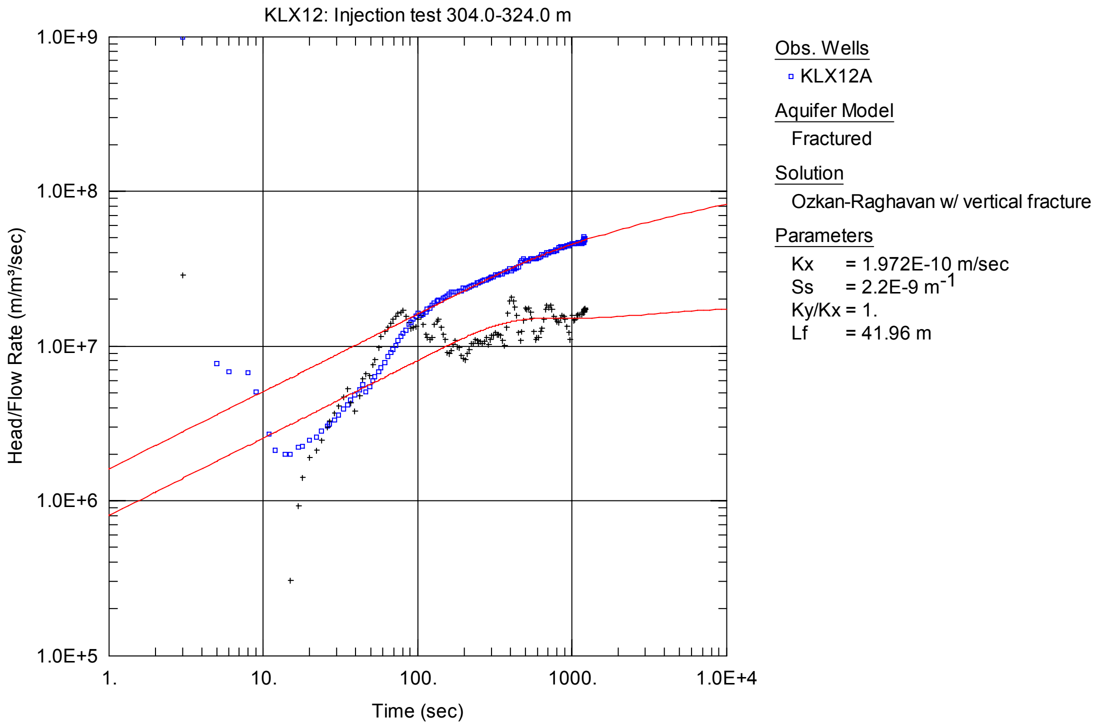

Figure A3-79. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Ozkan solution, from the injection test in section 304.0-324.0 m in KLX12A.*

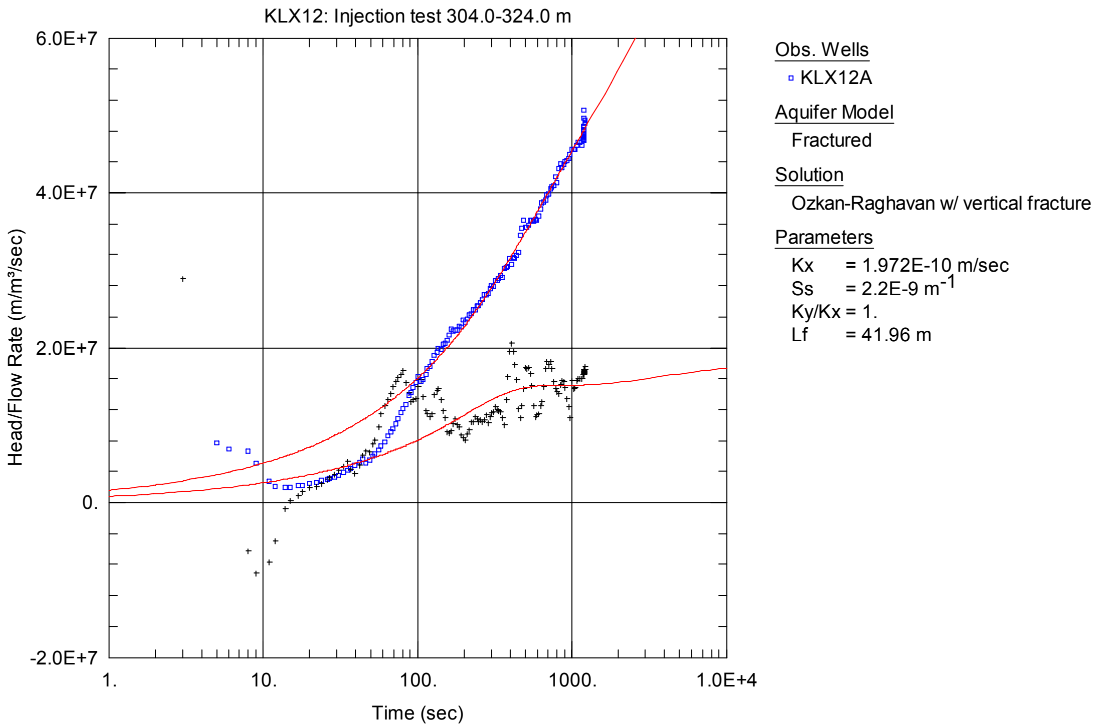

Figure A3-80. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Ozkan solution, from the injection test in section 304.0-324.0 m in KLX12A.*

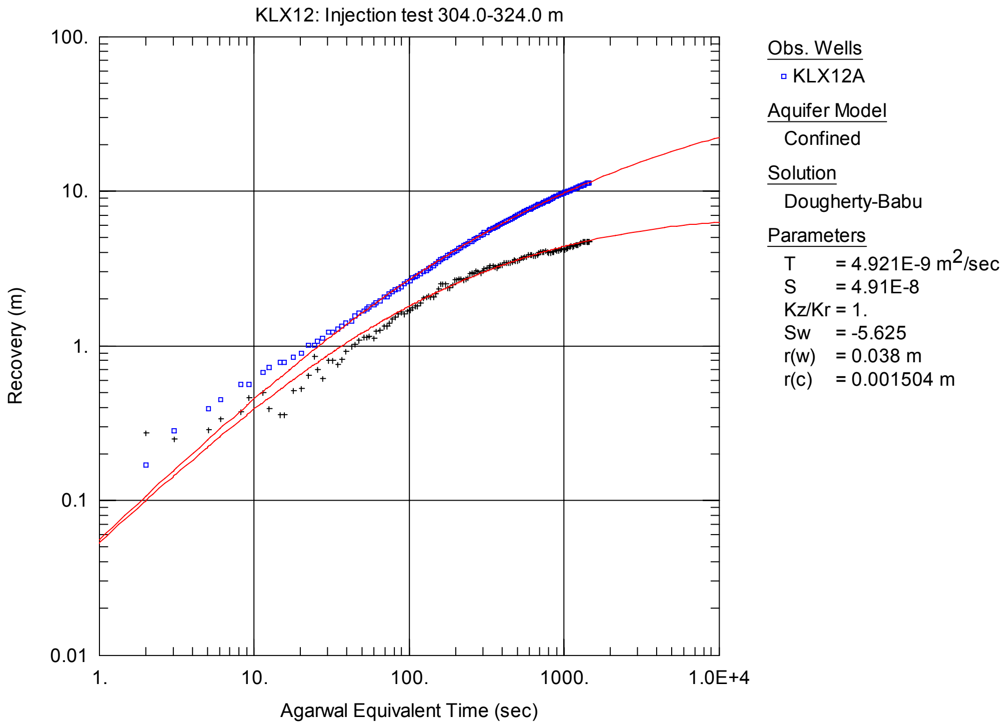

Figure A3-81. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Babu solution, from the injection test in section 304.0-324.0 m in KLX12A.*

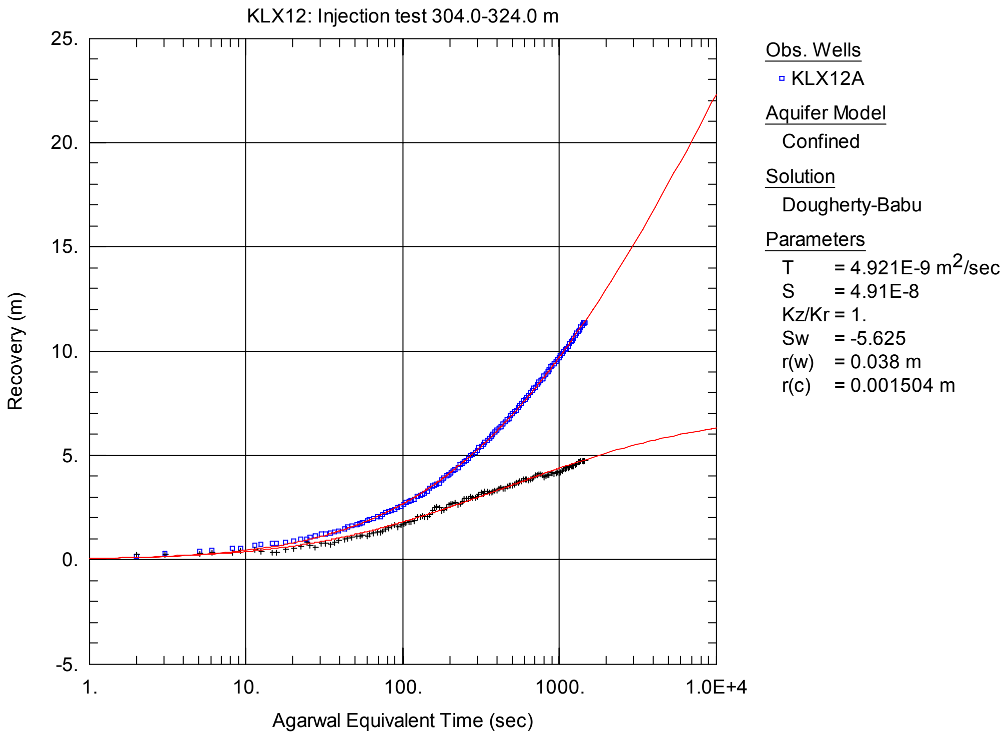

Figure A3-82. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Babu solution, from the injection test in section 304.0-324.0 m in KLX12A.*

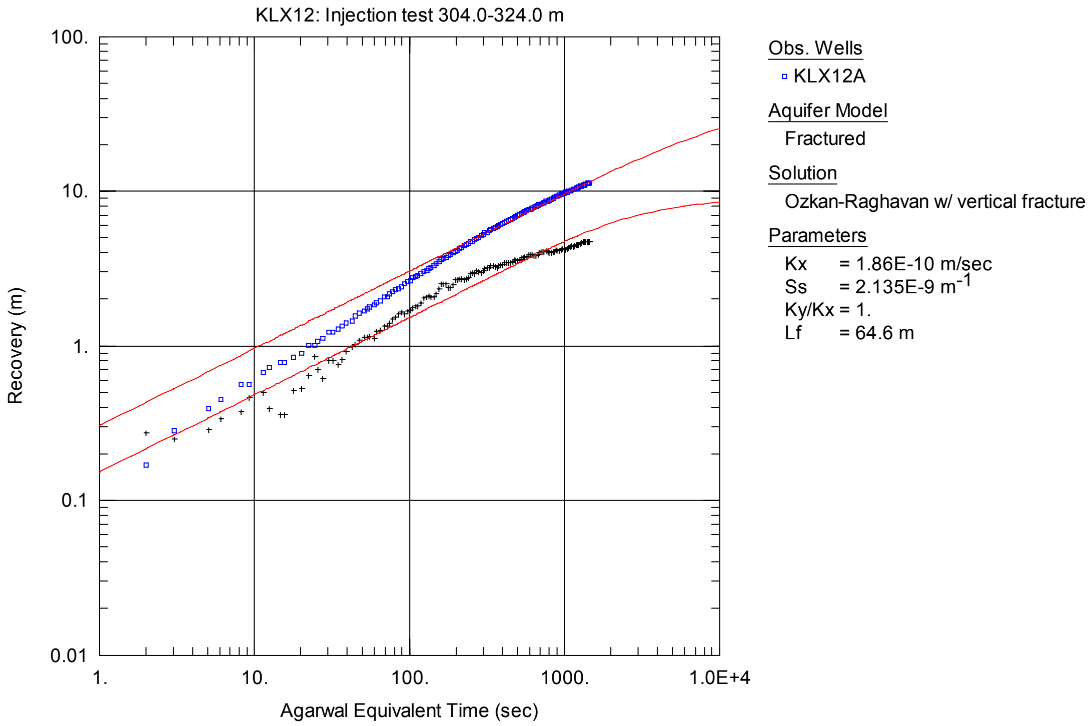

Figure A3-83. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Ozkan solution, from the injection test in section 304.0-324.0 m in KLX12A.*

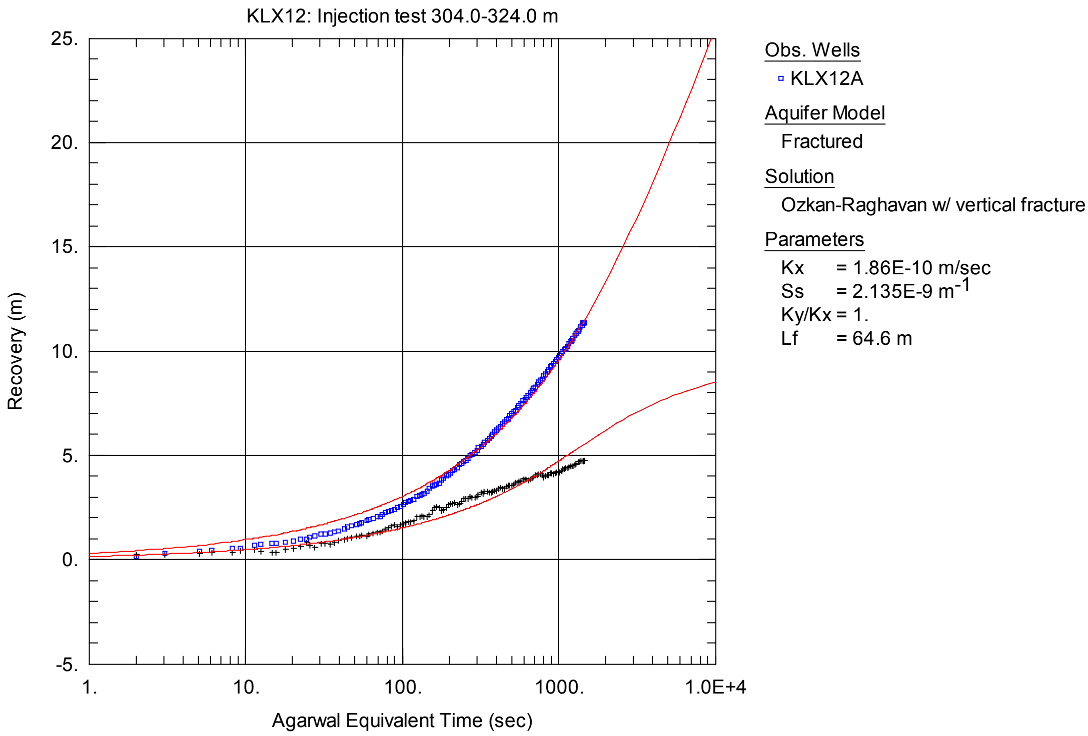

Figure A3-84. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Ozkan solution, from the injection test in section 304.0-324.0 m in KLX12A.*

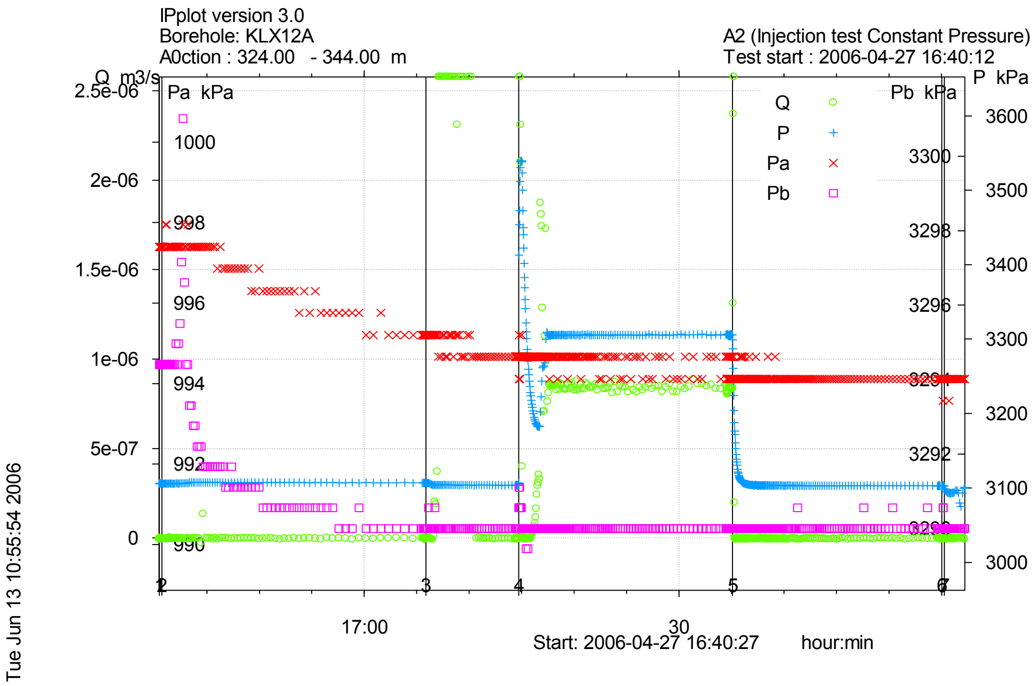

Figure A3-85. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 324.0-344.0 m in borehole KLX12A.*

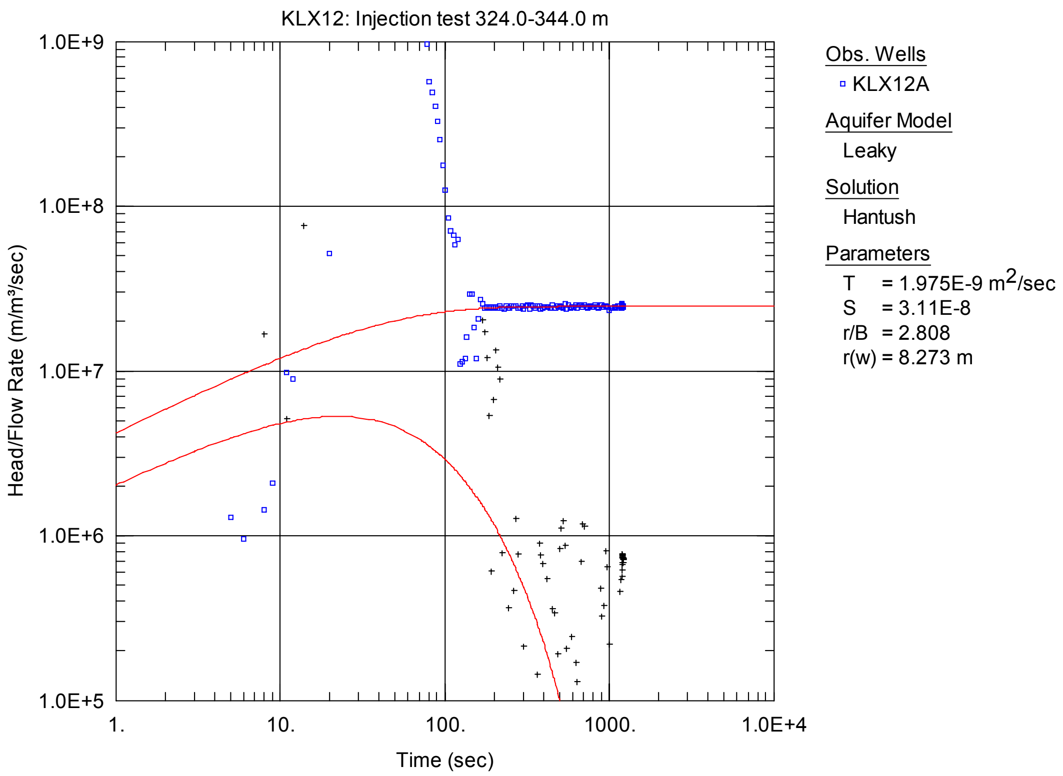

Figure A3-86. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 324.0-344.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

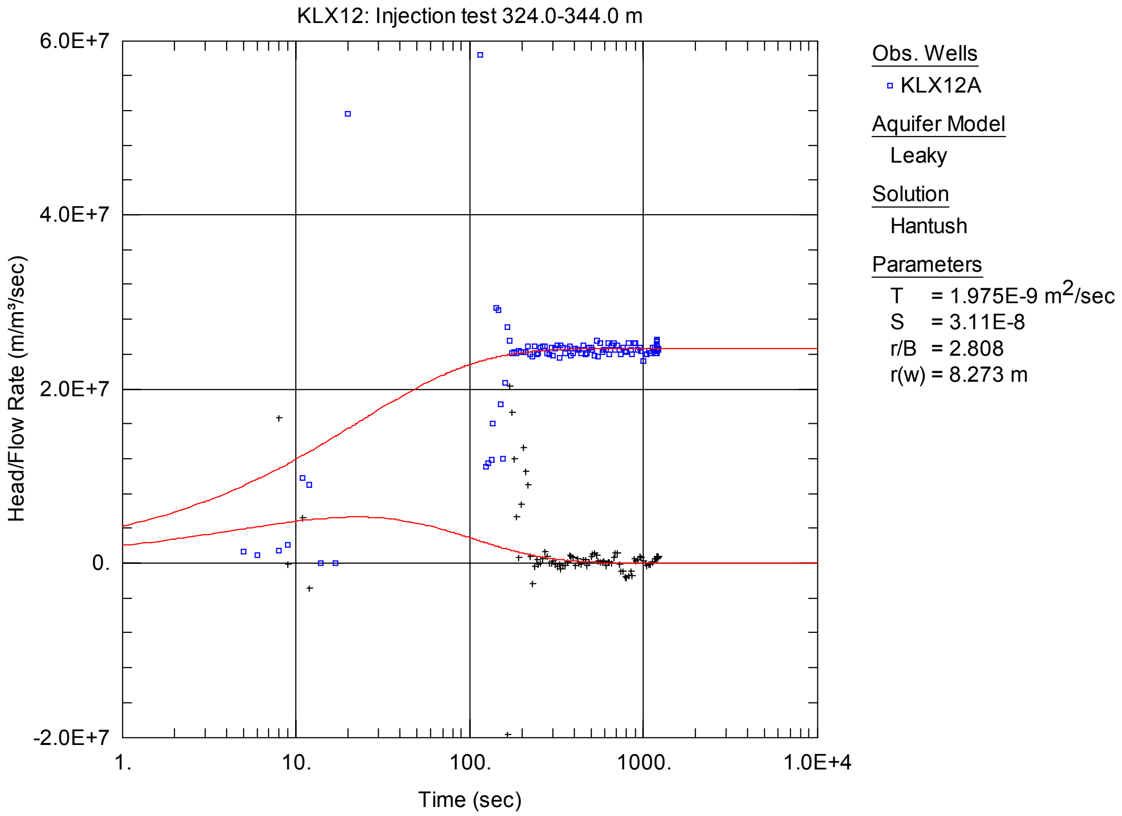

Figure A3-87. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 324.0-344.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

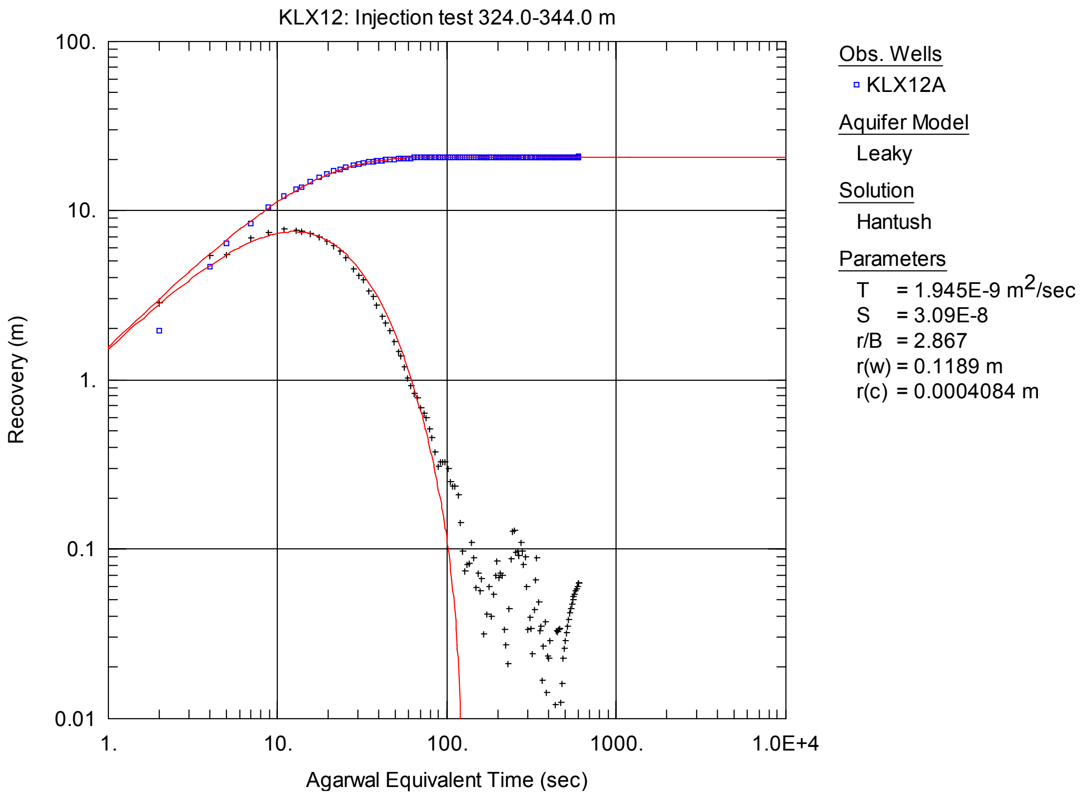

Figure A3-88. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 324.0-344.0 m in KLX12A.*

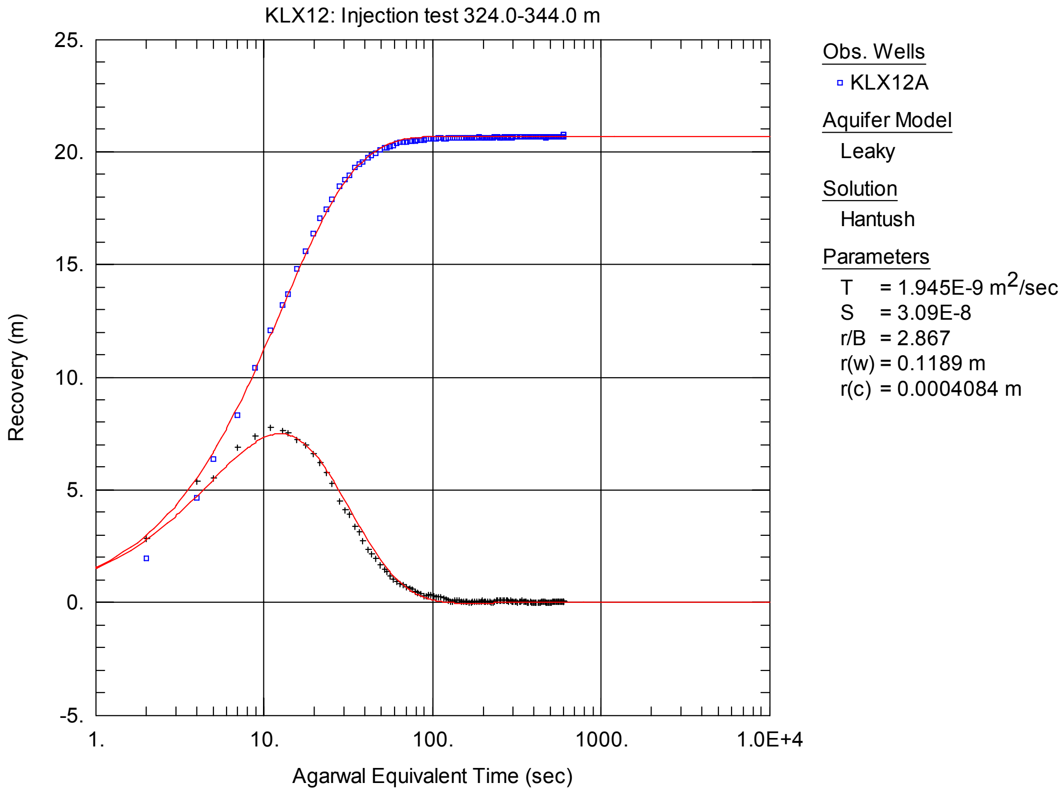

Figure A3-89. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 324.0-344.0 m in KLX12A.*

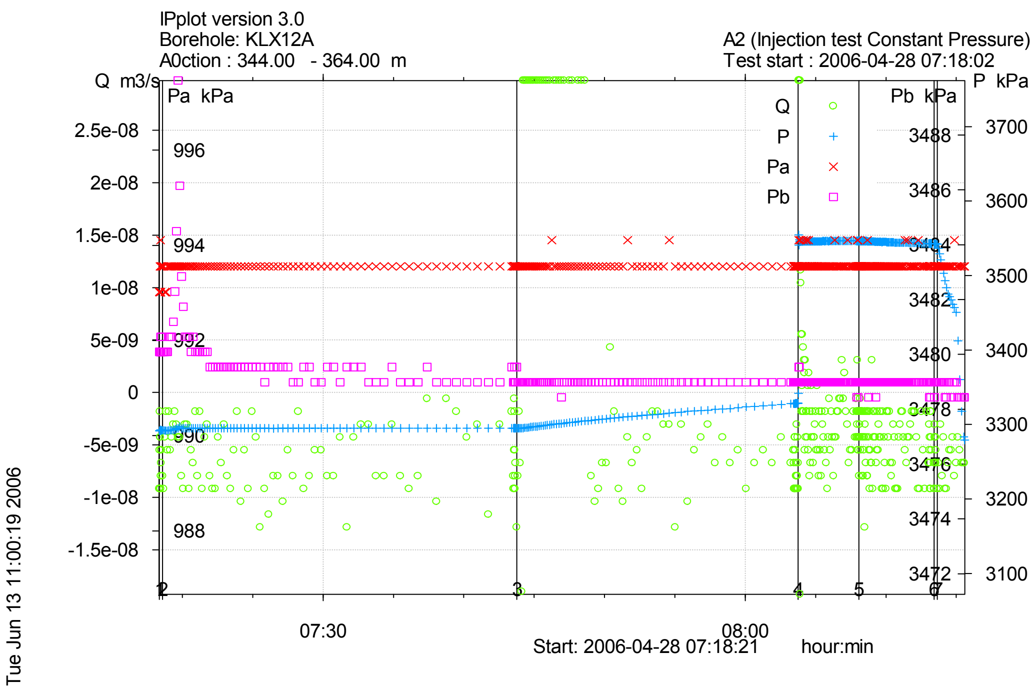

Figure A3-90. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 344.0-364.0 m in borehole KLX12A.*

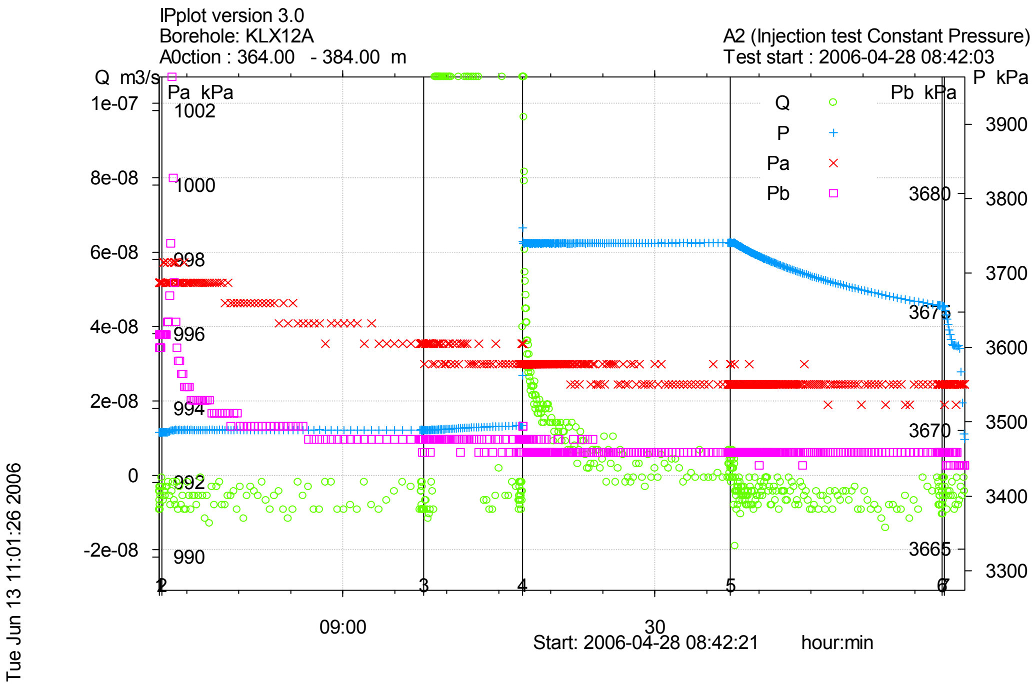

Figure A3-91. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 364.0-384.0 m in borehole KLX12A.*

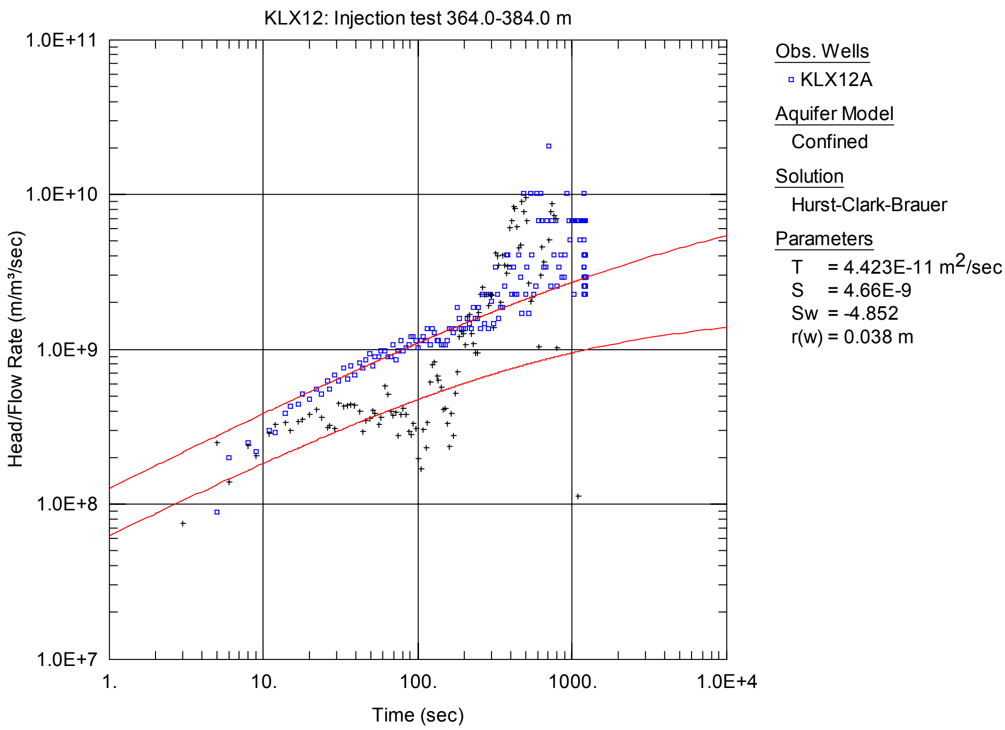

Figure A3-92. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 364.0-384.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

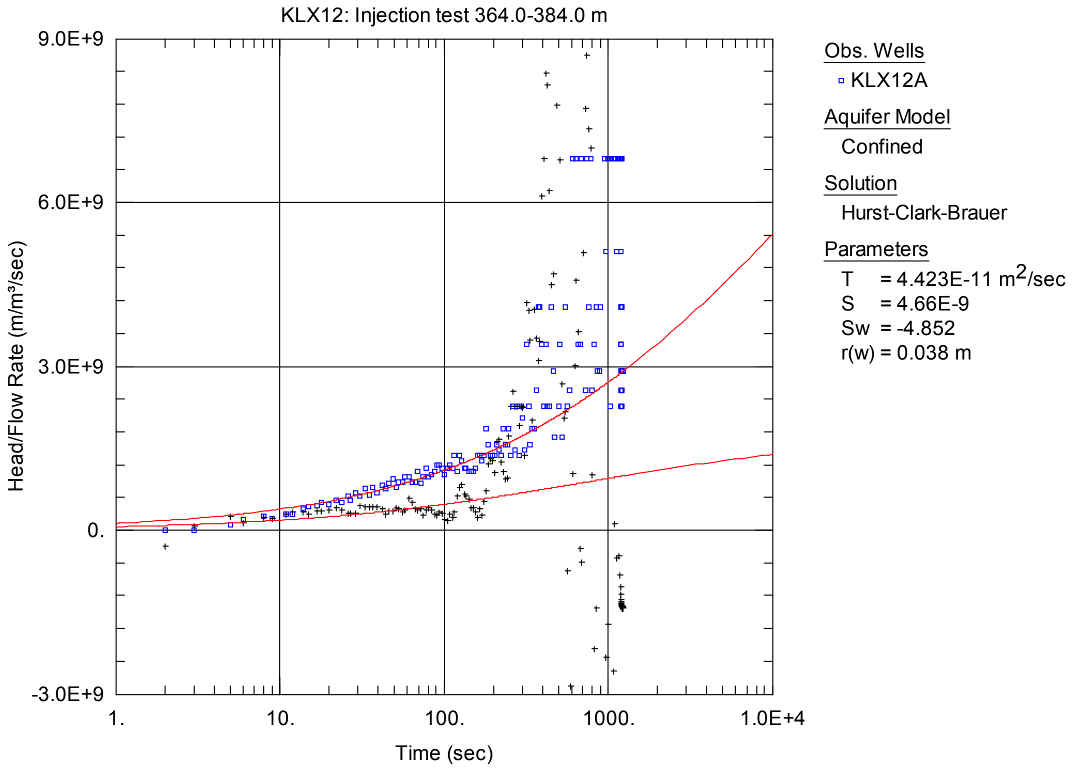

Figure A3-93. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 364.0-384.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

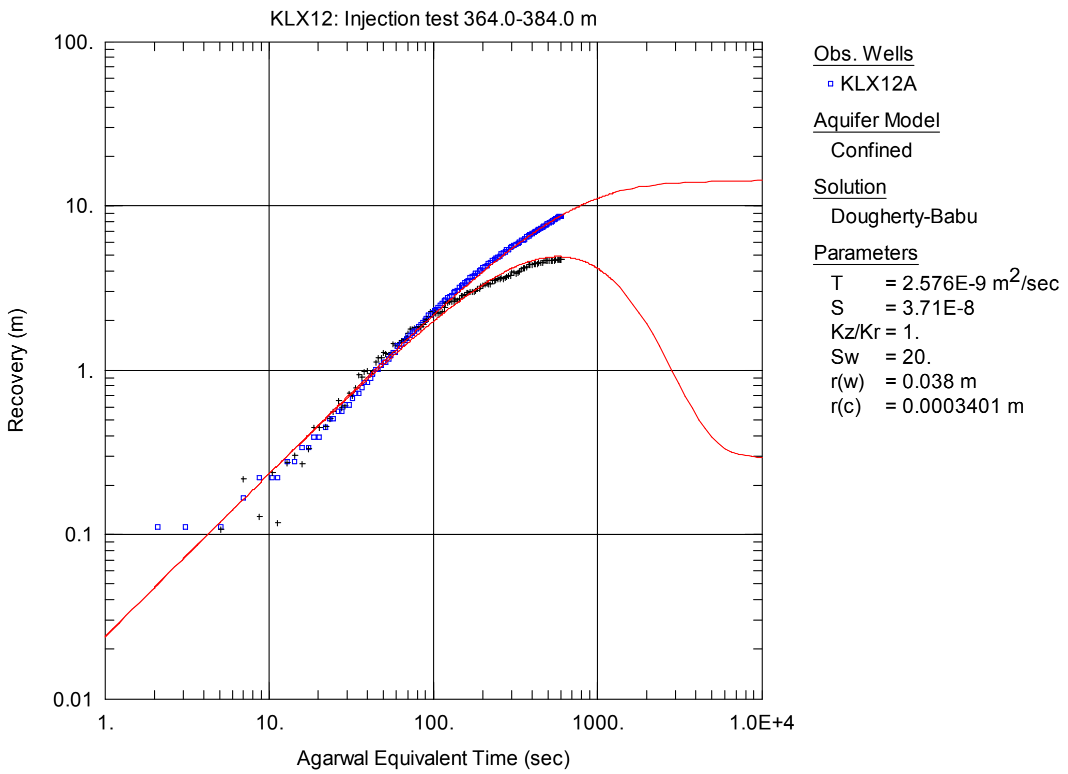

Figure A3-94. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 364.0-384.0 m in KLX12A. The type curve fit is only to show that an assumption of PRF is not valid.*

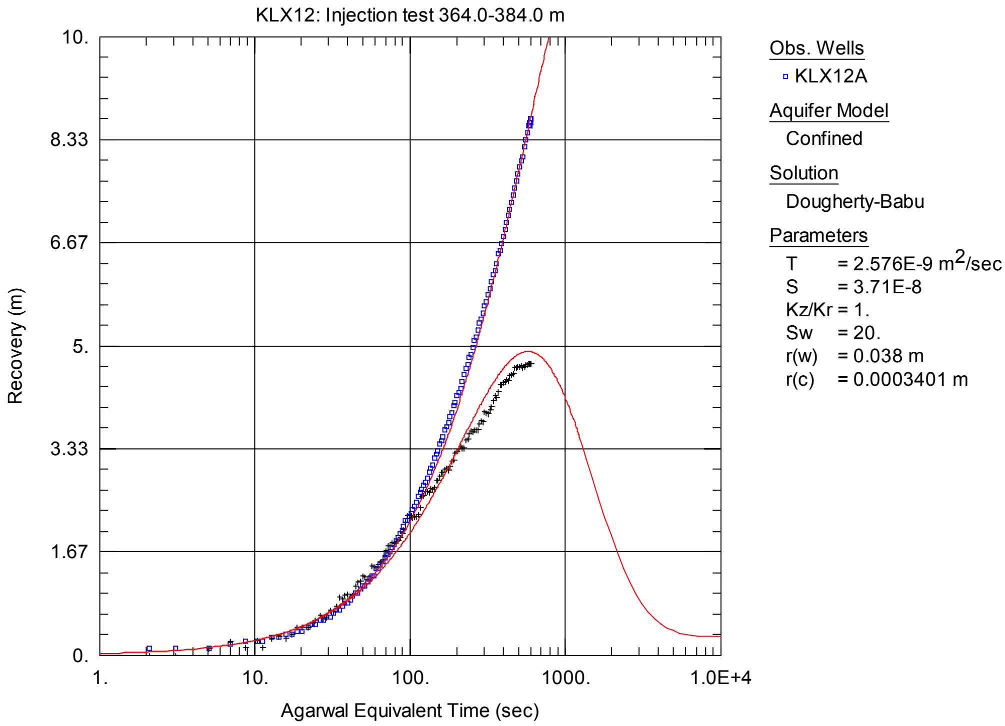

Figure A3-95. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 364.0-384.0 m in KLX12A. The type curve fit is only to show that an assumption of PRF is not valid.*

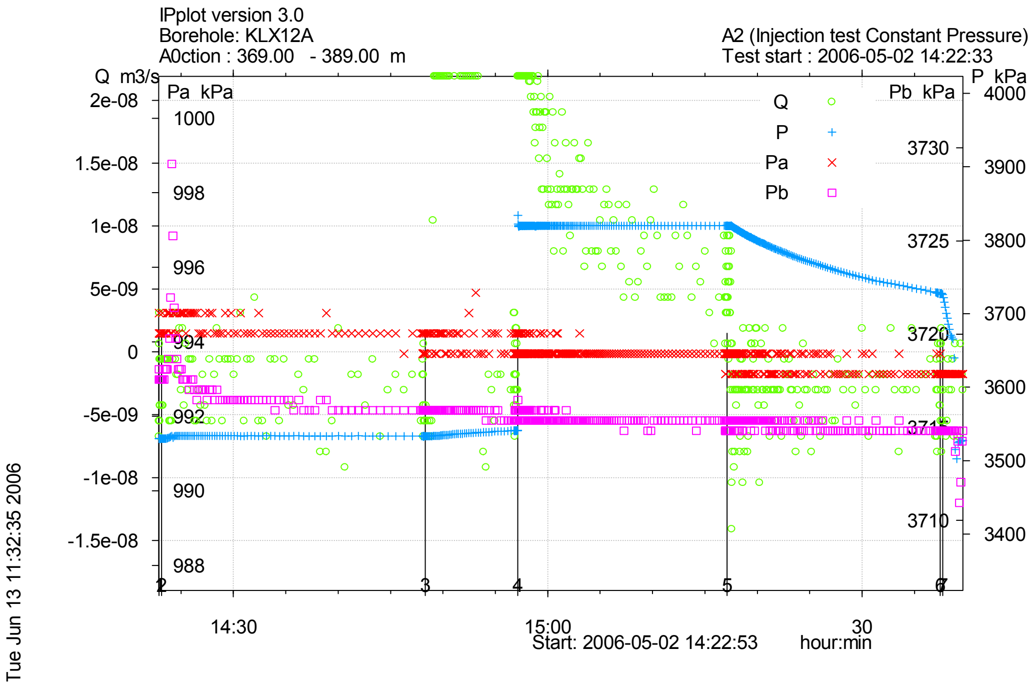

Figure A3-96. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 369.0-389.0 m in borehole KLX12A.*

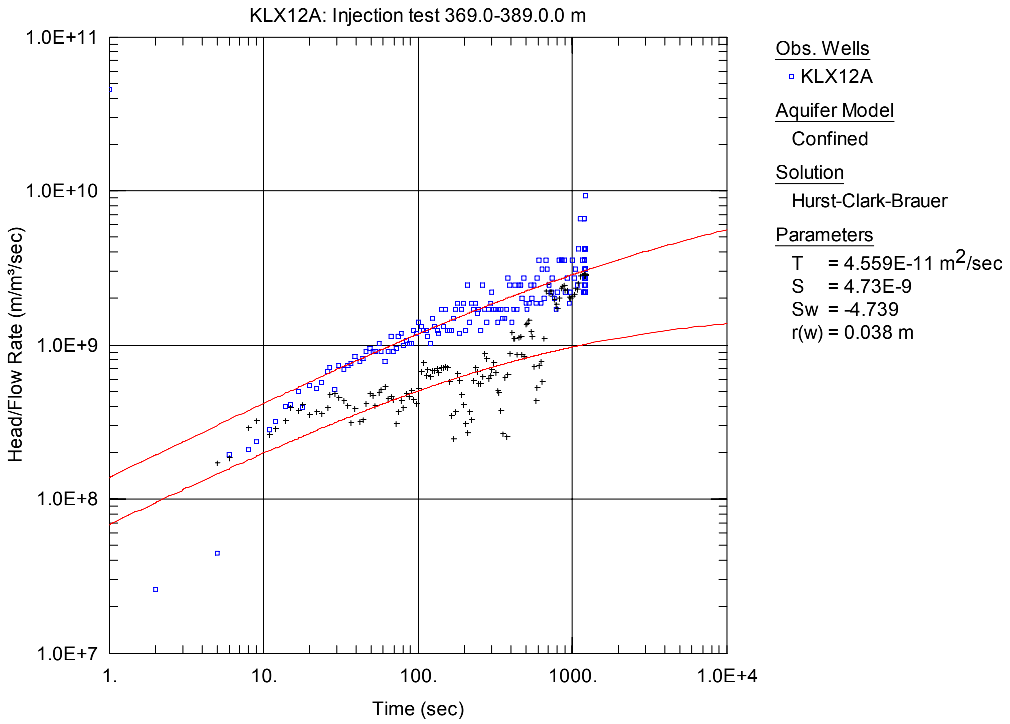

Figure A3-97. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 369.0-389.0 m in KLX12A.*

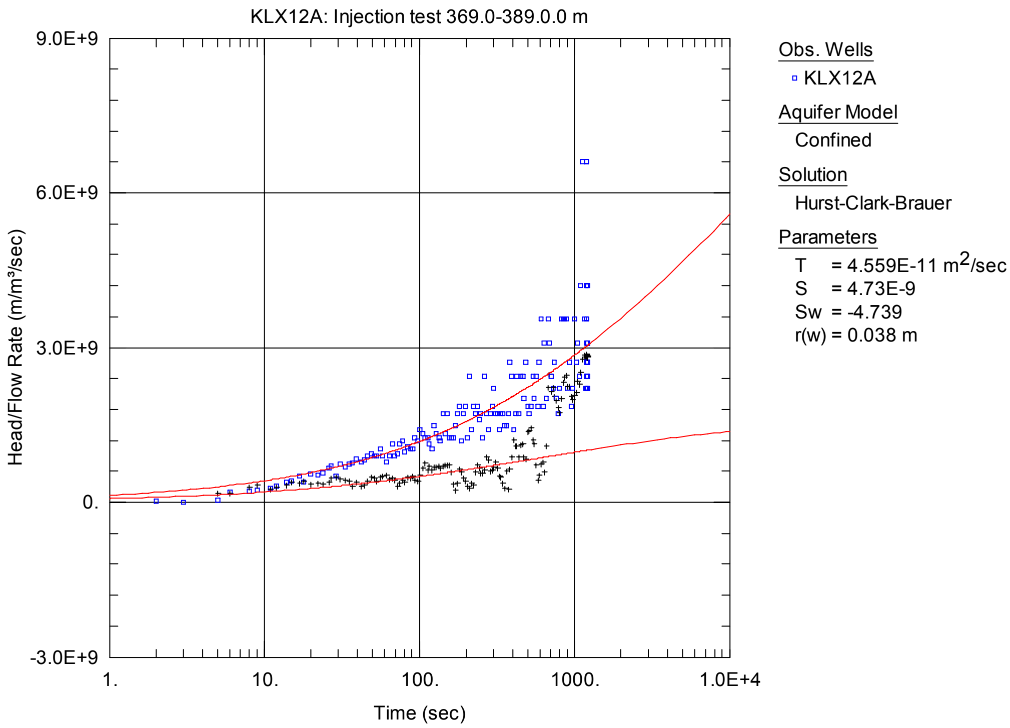

Figure A3-98. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 369.0-389.0 m in KLX12A.*

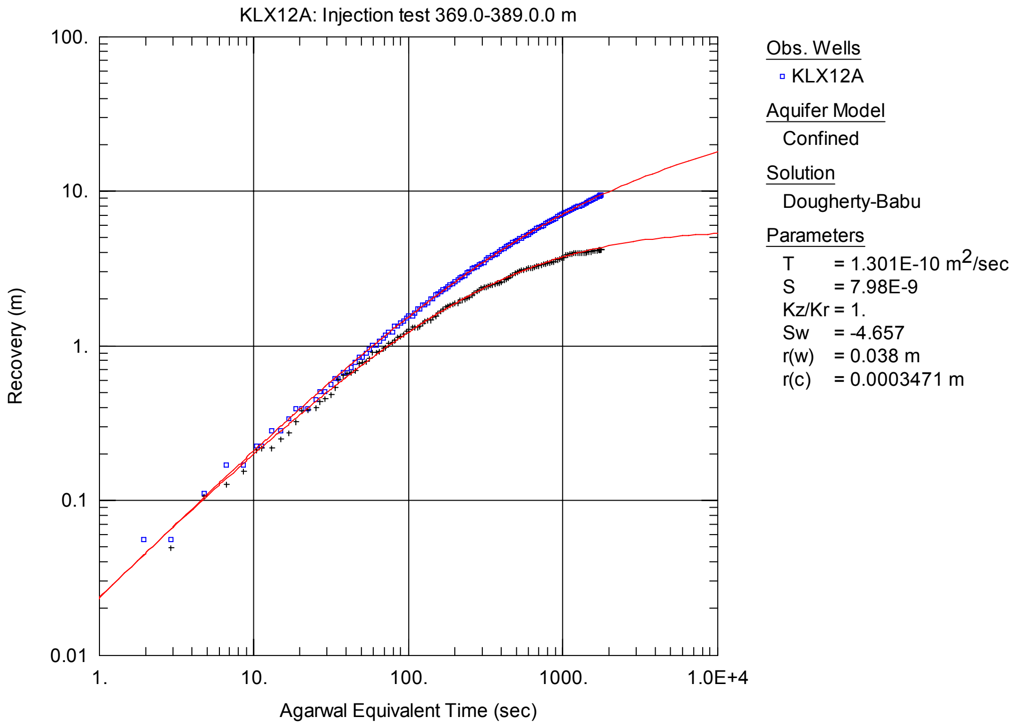

Figure A3-99. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 369.0-389.0 m in KLX12A.*

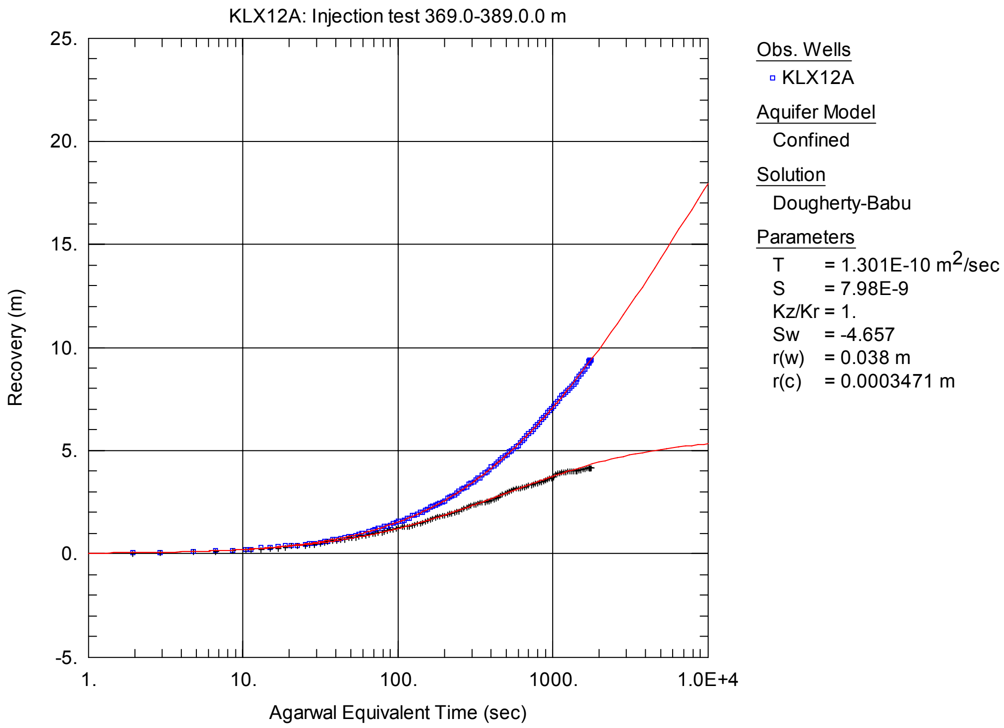

Figure A3-100. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 369.0-389.0 m in KLX12A.*

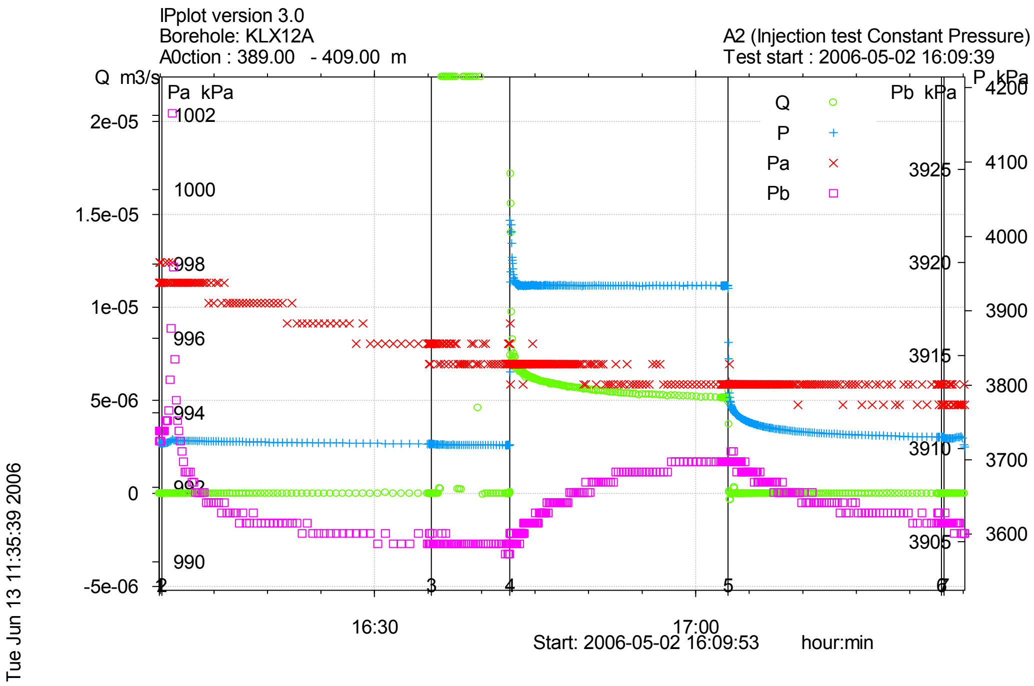

Figure A3-101. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 389.0-409.0 m in borehole KLX12A.*

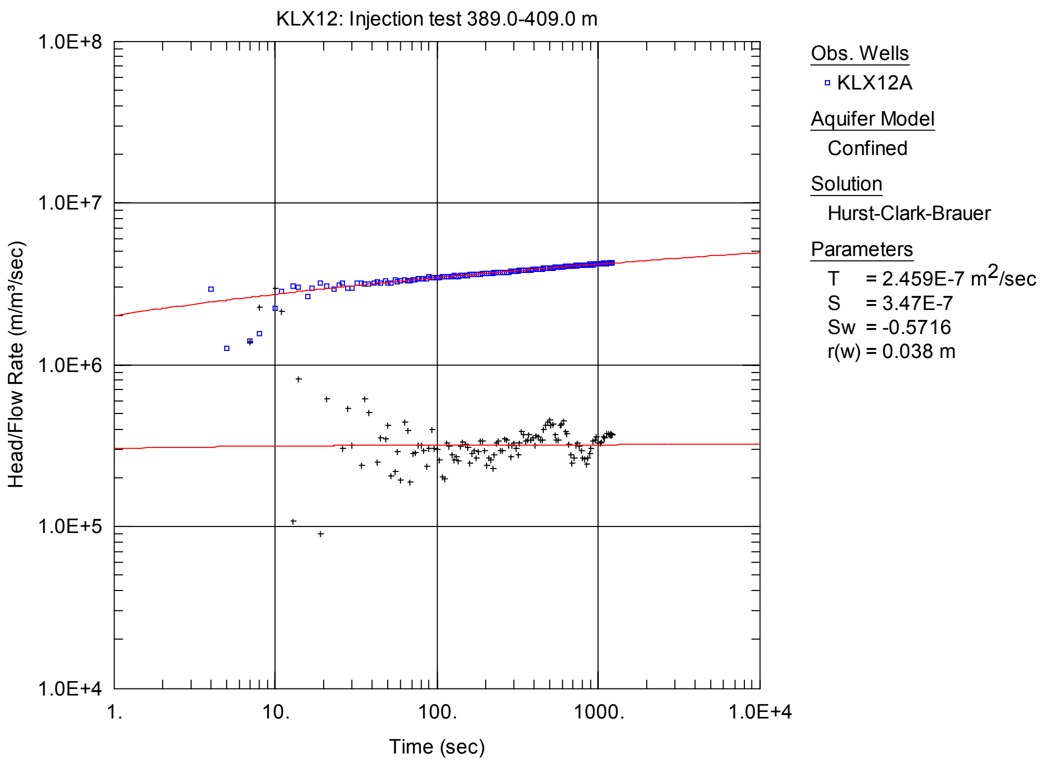

Figure A3-102. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 389.0-409.0 m in KLX12A.*

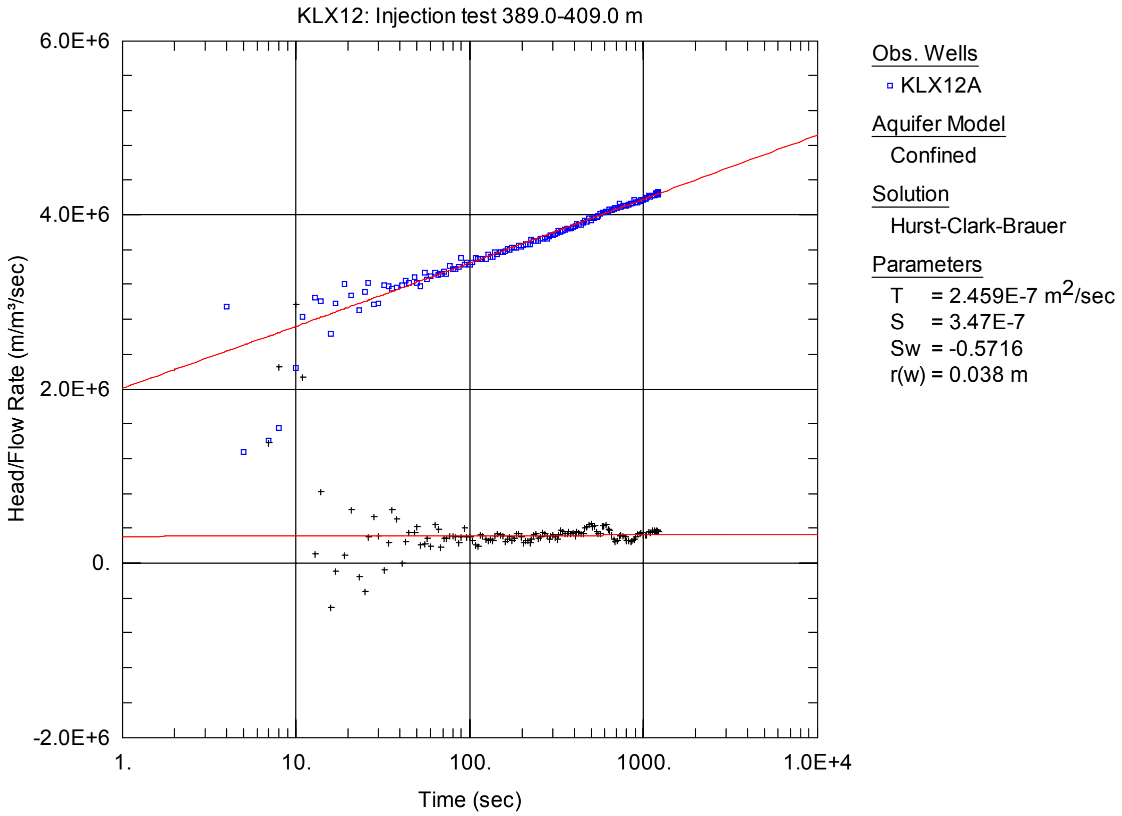

Figure A3-103. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 389.0-409.0 m in KLX12A.*

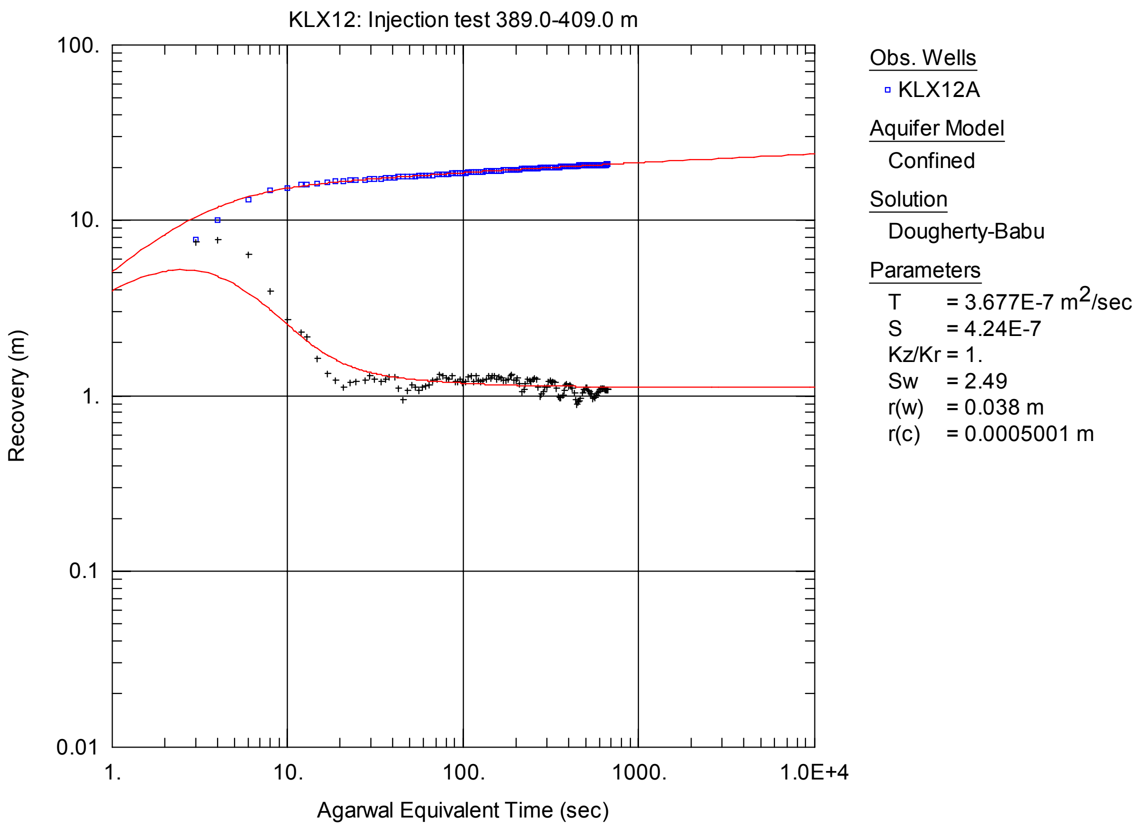

Figure A3-104. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 389.0-409.0 m in KLX12A.*

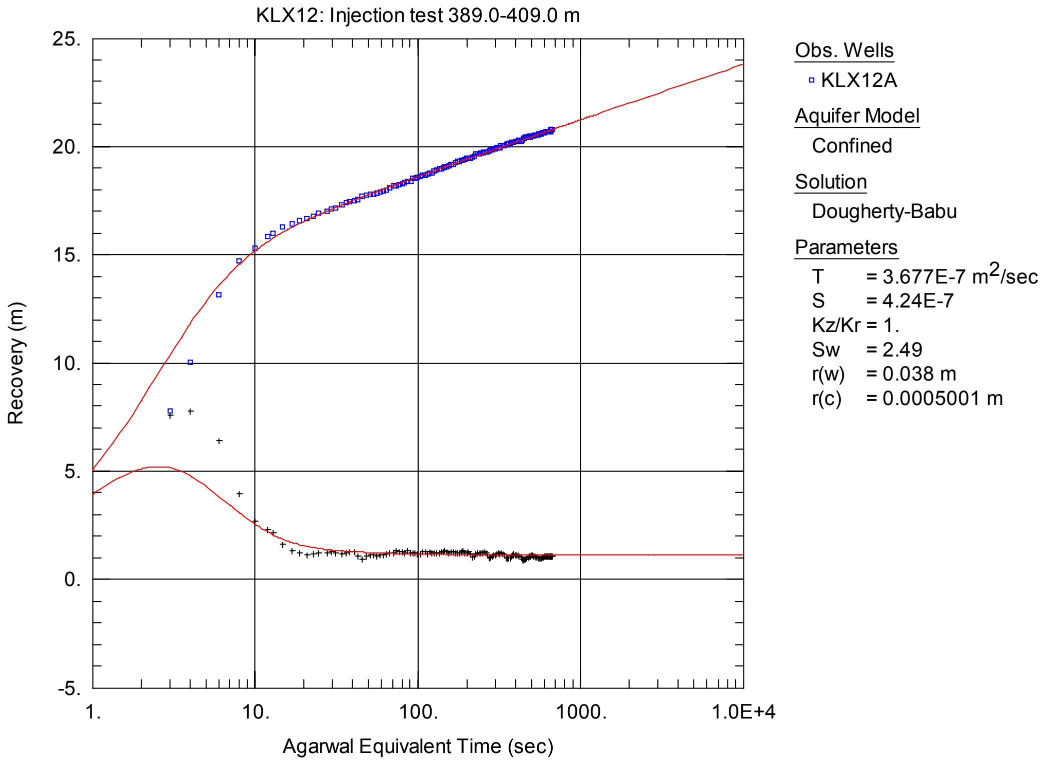

Figure A3-105. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 389.0-409.0 m in KLX12A.*

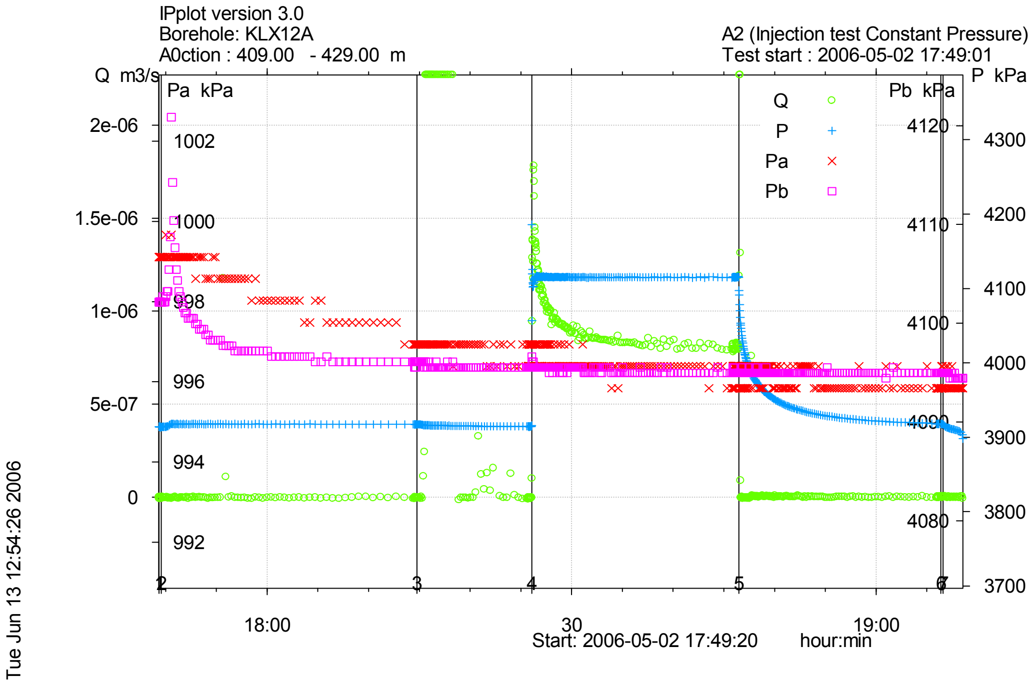

Figure A3-106. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 409.0-429.0 m in borehole KLX12A.*

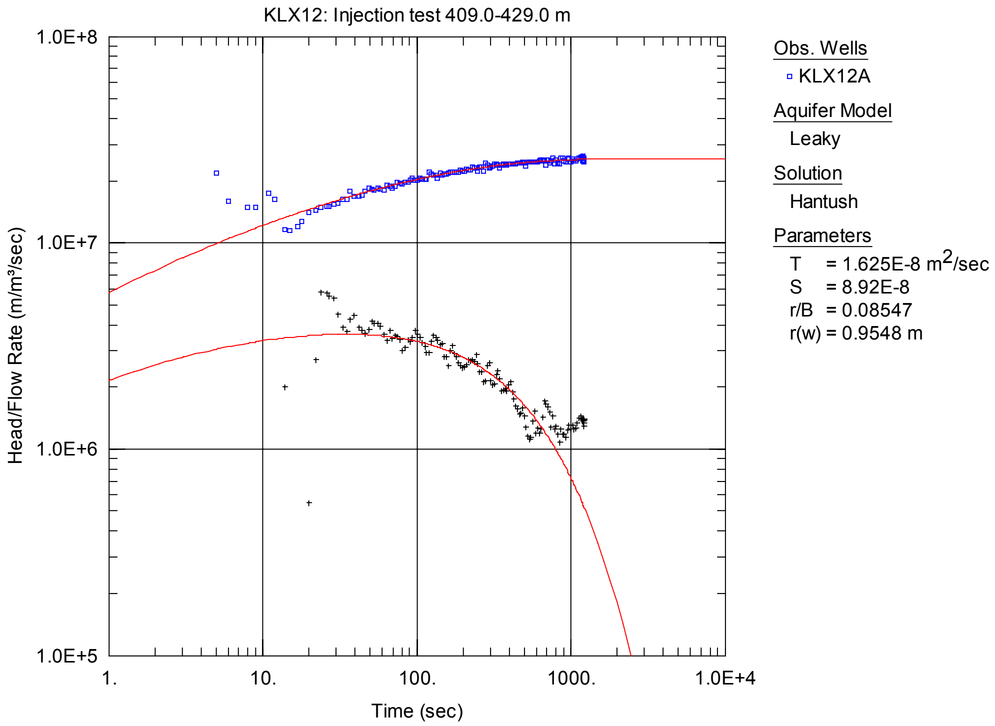

Figure A3-107. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 409.0-429.0 m in KLX12A.*

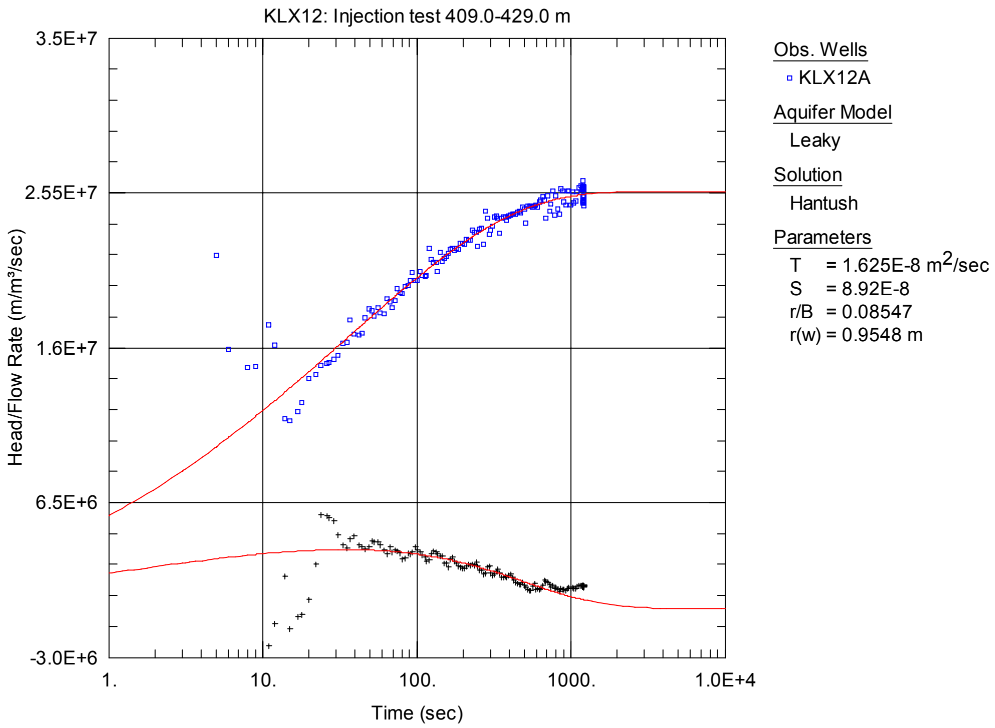

Figure A3-108. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 409.0-429.0 m in KLX12A.*

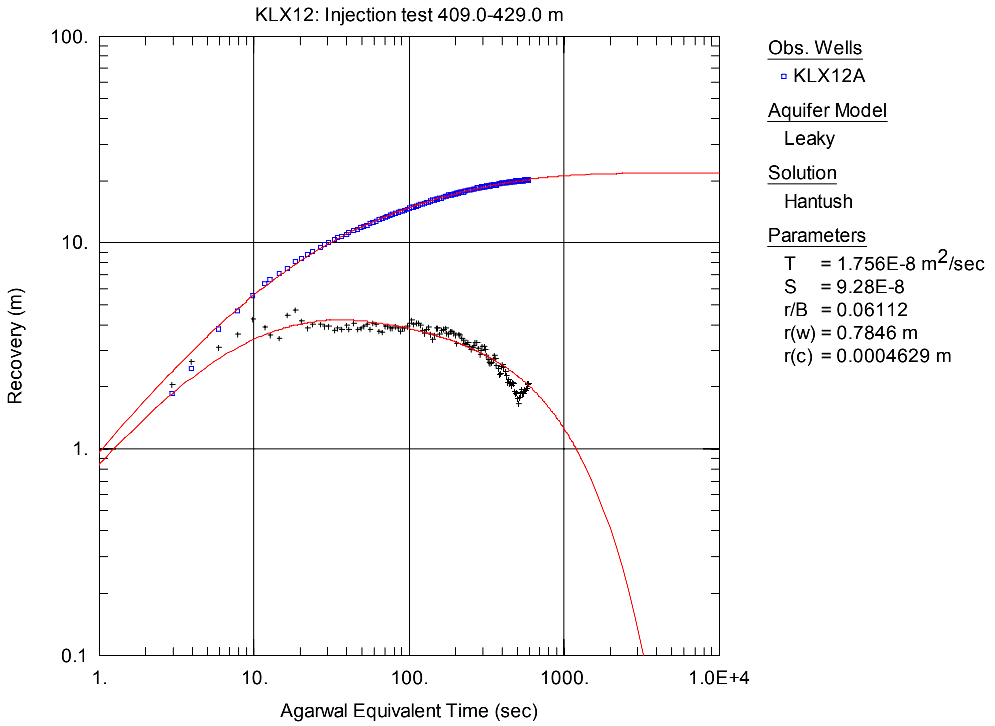

Figure A3-109. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 409.0-429.0 m in KLX12A.*

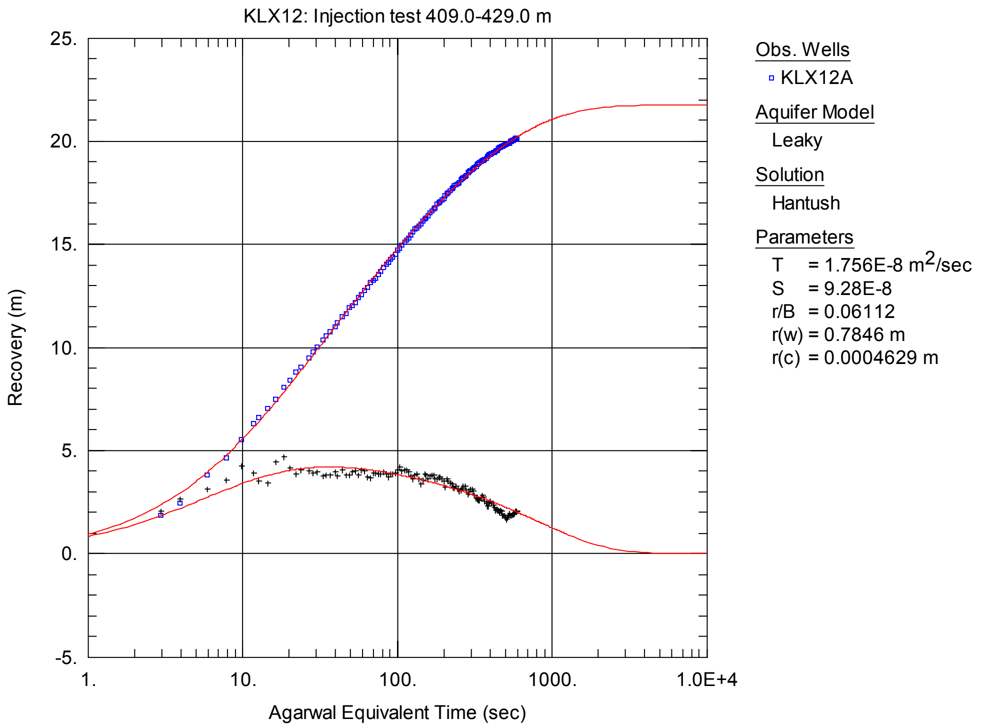

Figure A3-110. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 409.0-429.0 m in KLX12A.*

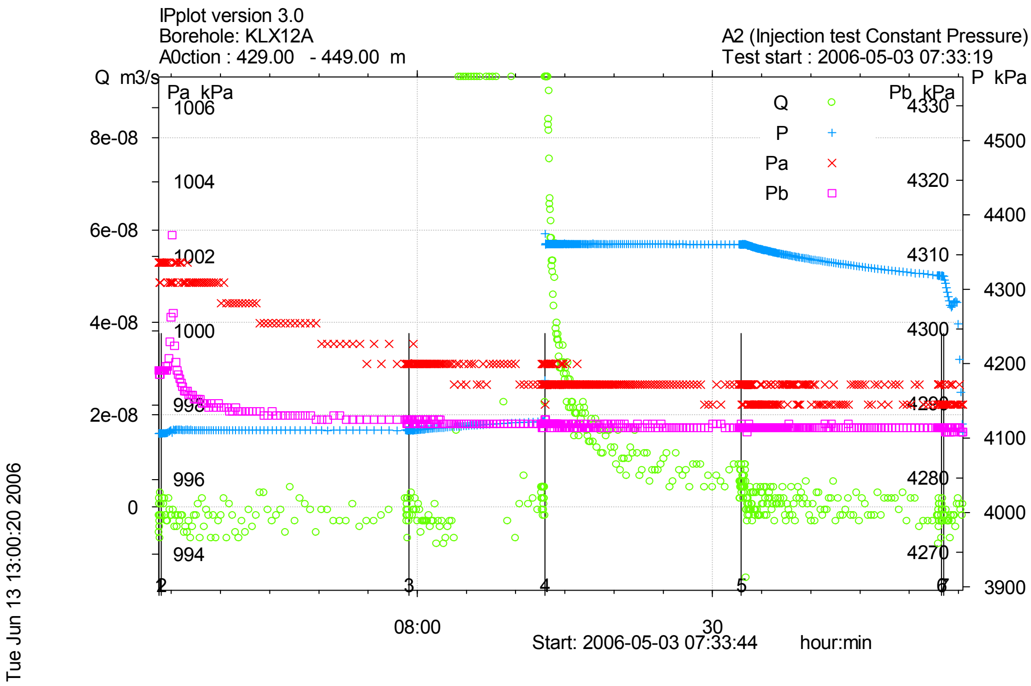

Figure A3-111. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 429.0-449.0 m in borehole KLX12A.*

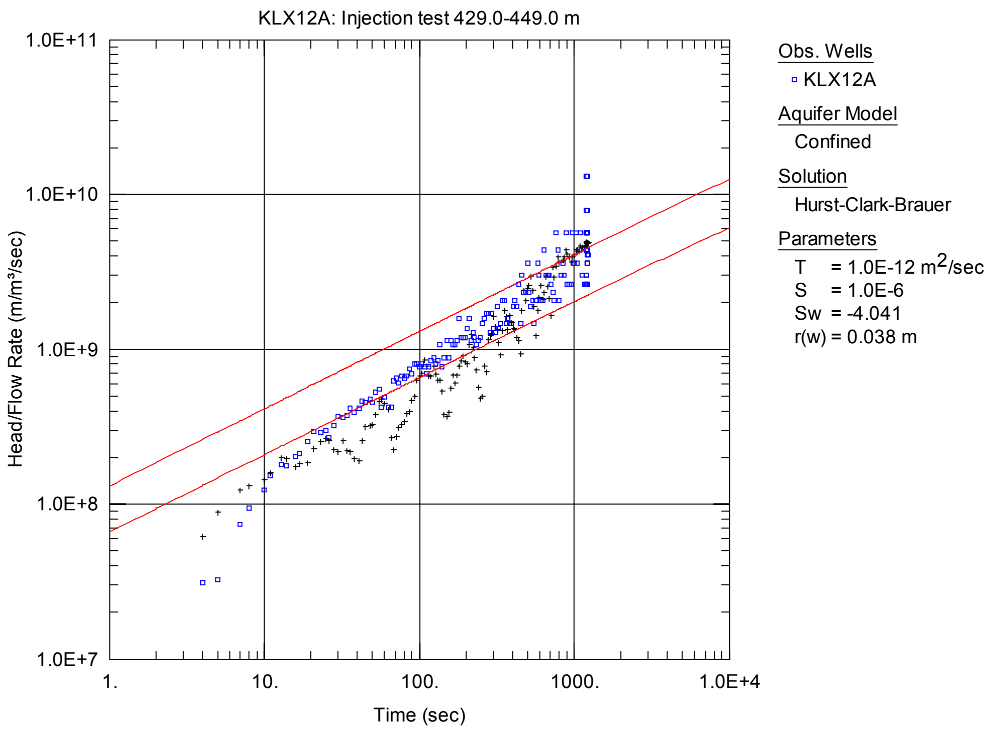

Figure A3-112. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 429.0-449.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

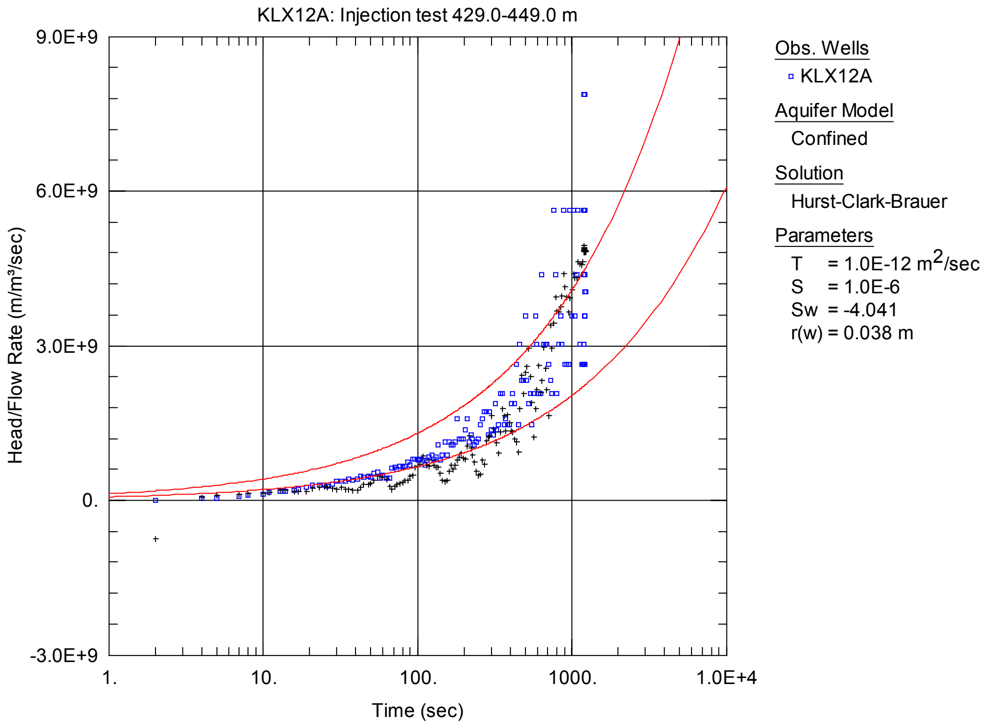

Figure A3-113. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 429.0-449.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

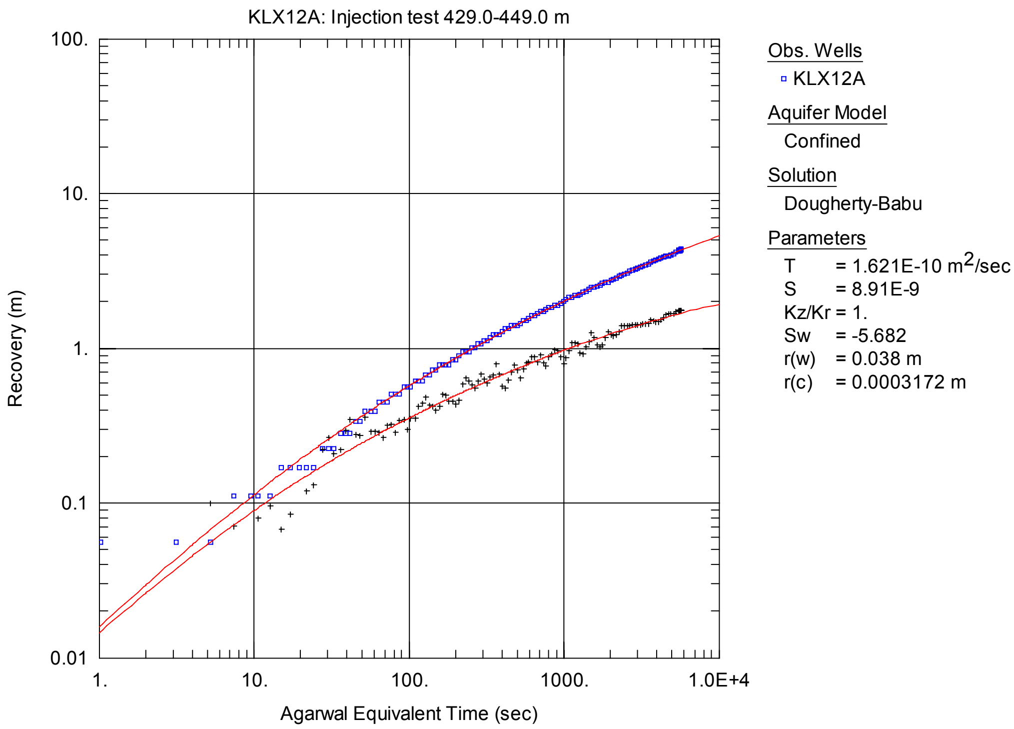

Figure A3-114. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 429.0-449.0 m in KLX12A.*

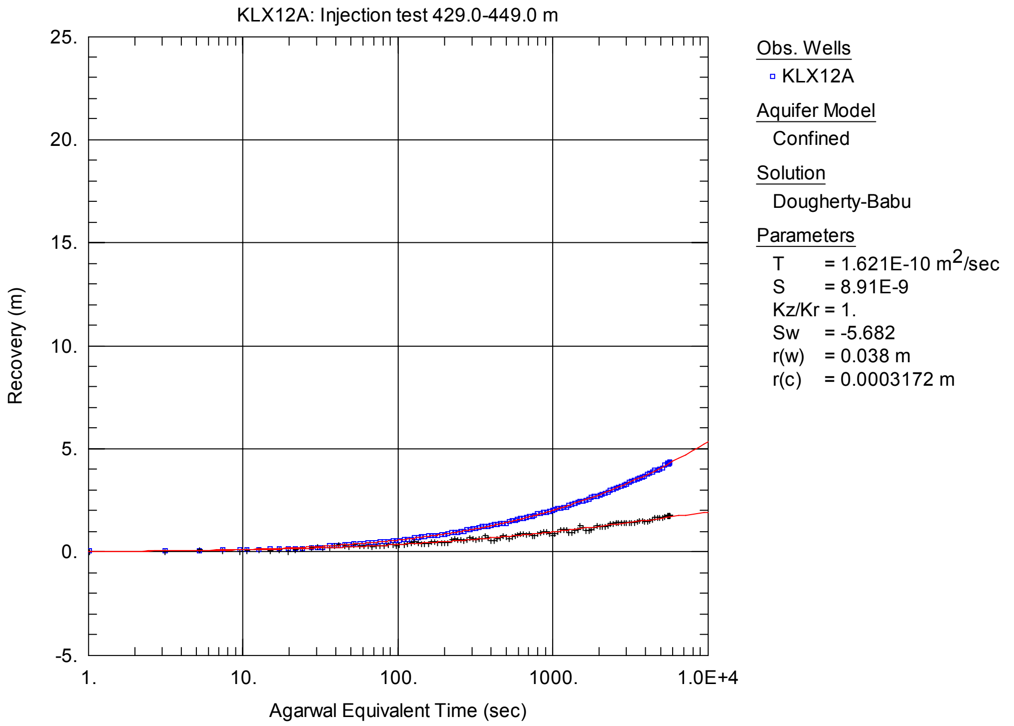

Figure A3-115. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 429.0-449.0 m in KLX12A.*

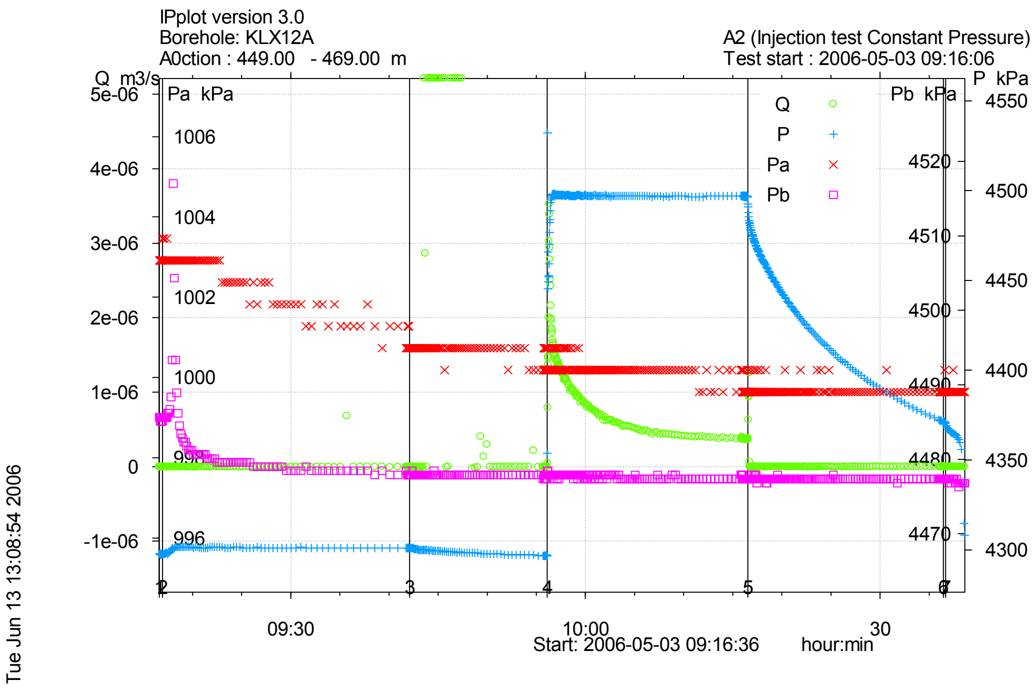

Figure A3-116. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 449.0-469.0 m in borehole KLX12A.*

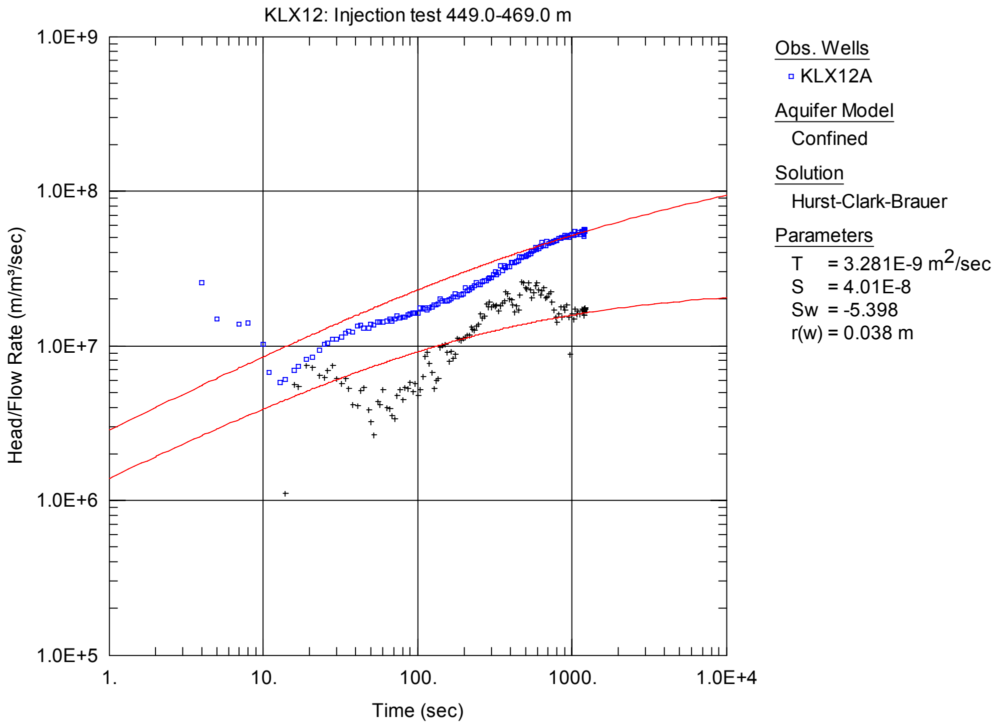

Figure A3-117. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 449.0-469.0 m in KLX12A.*

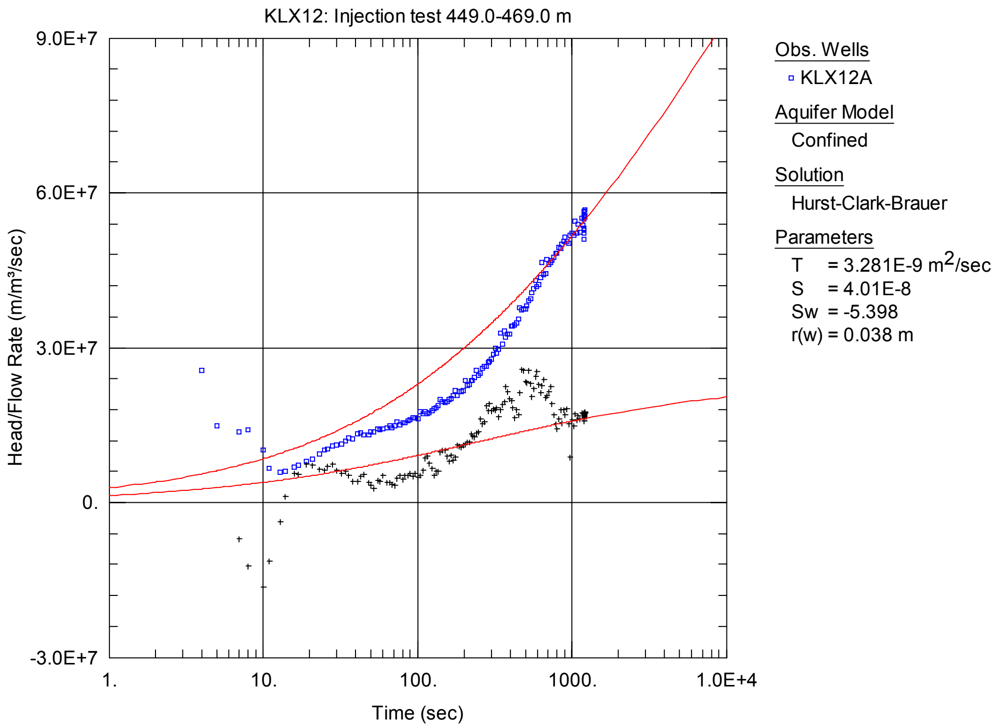

Figure A3-118. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 449.0-469.0 m in KLX12A.*

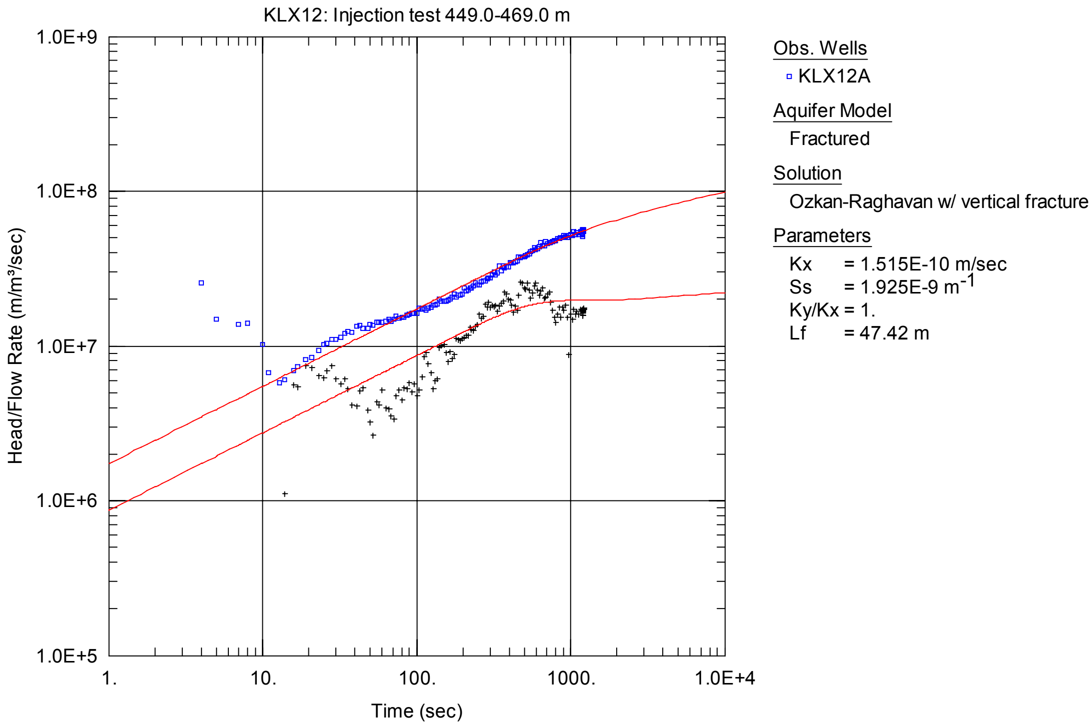

Figure A3-119. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Ozkan solution, from the injection test in section 449.0-469.0 m in KLX12A.*

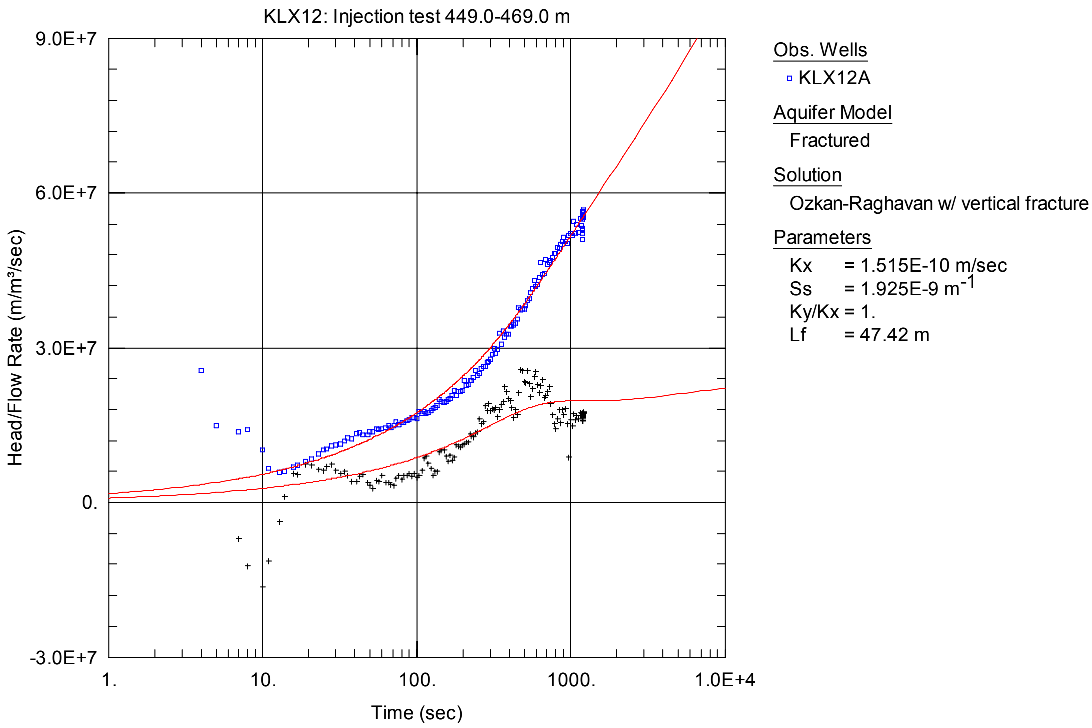

Figure A3-120. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Ozkan solution, from the injection test in section 449.0-469.0 m in KLX12A.*

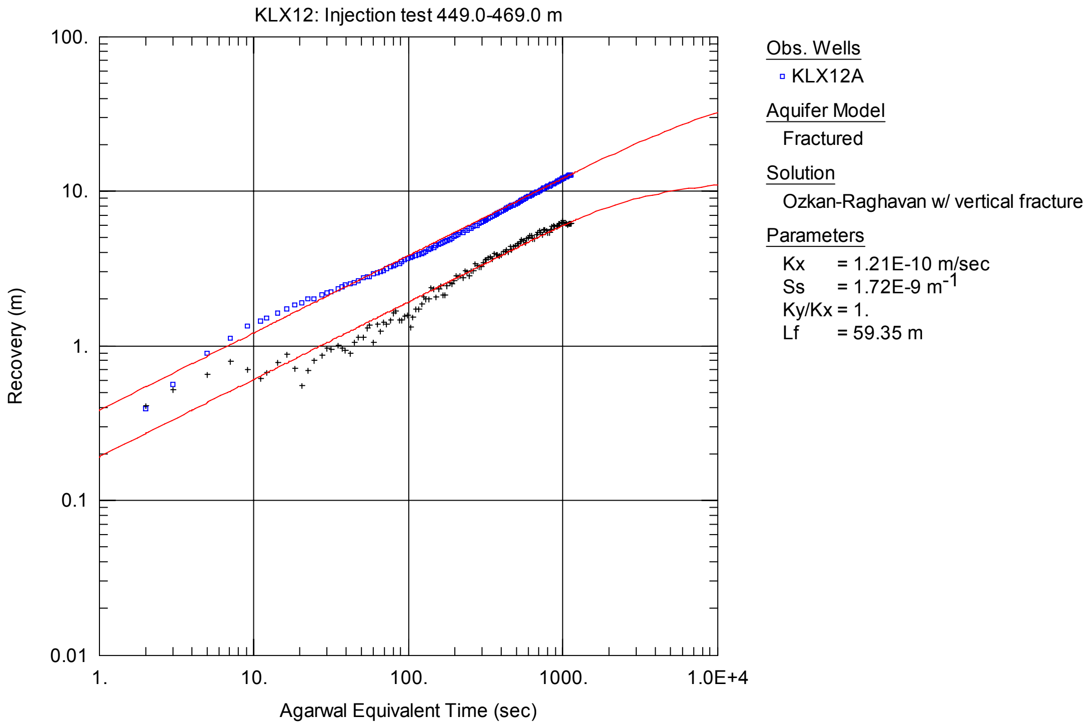

Figure A3-121. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 449.0-469.0 m in KLX12A.*

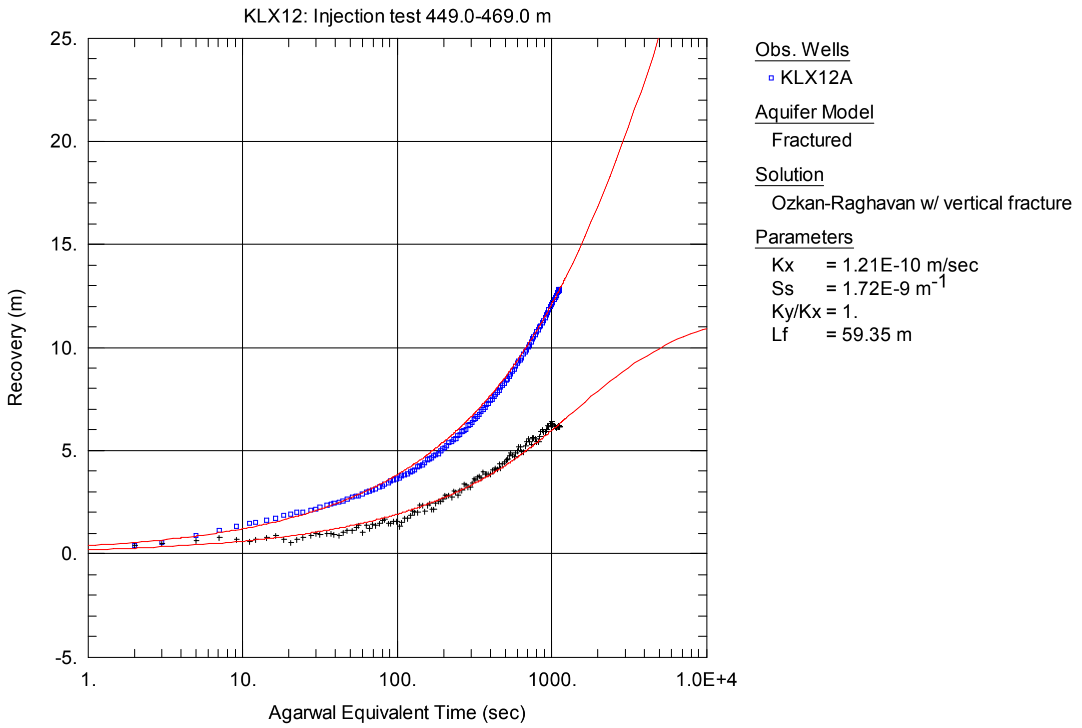

Figure A3-122. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 449.0-469.0 m in KLX12A.*

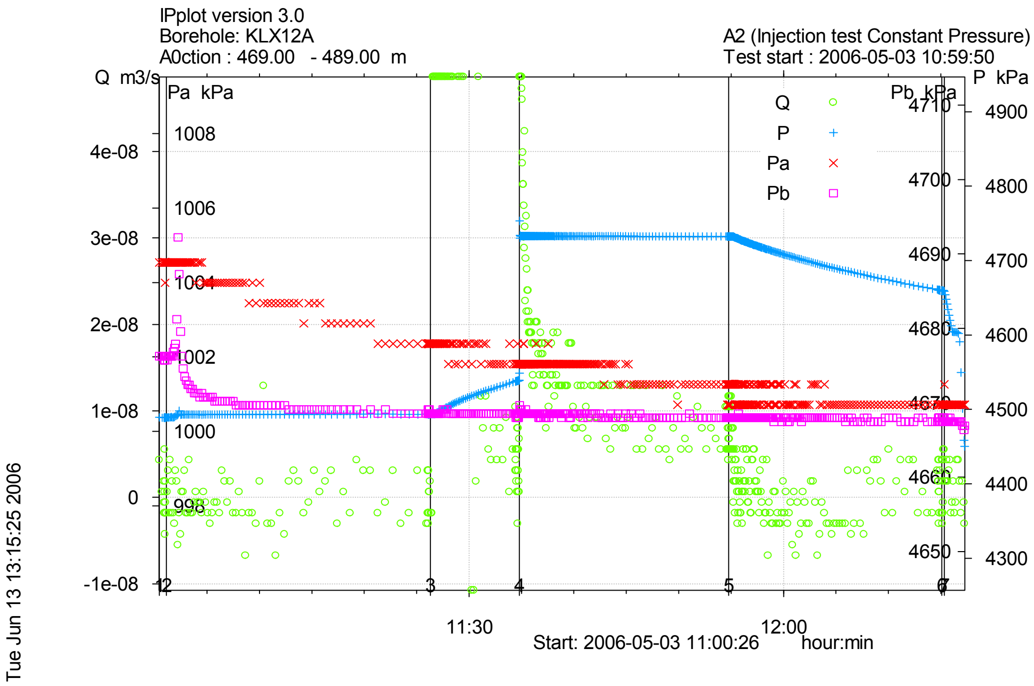

__Figure A3-123.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 469.0-489.0 m in borehole KLX12A.

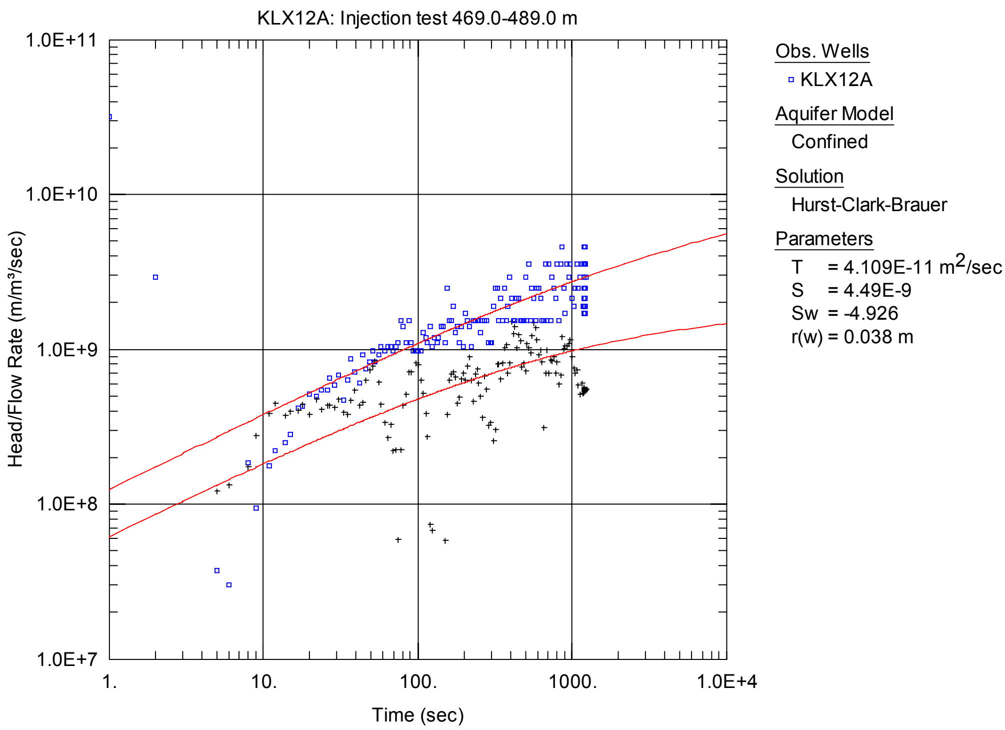

__Figure A3-124.__ Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 469.0-489.0 m in KLX12A.

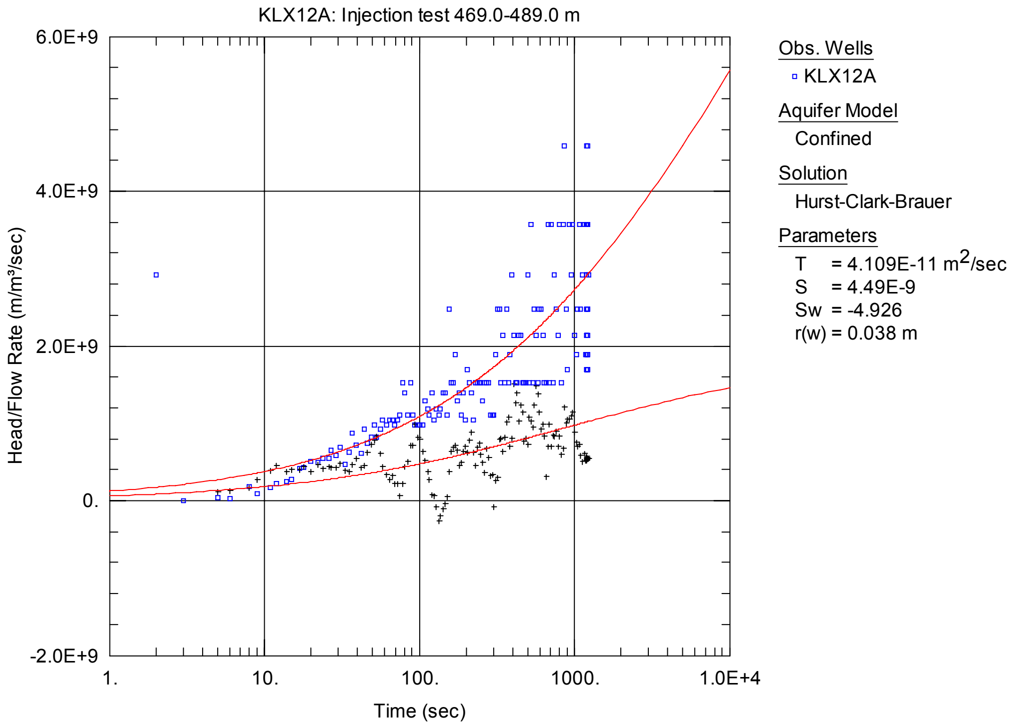

Figure A3-125. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 469.0-489.0 m in KLX12A.*

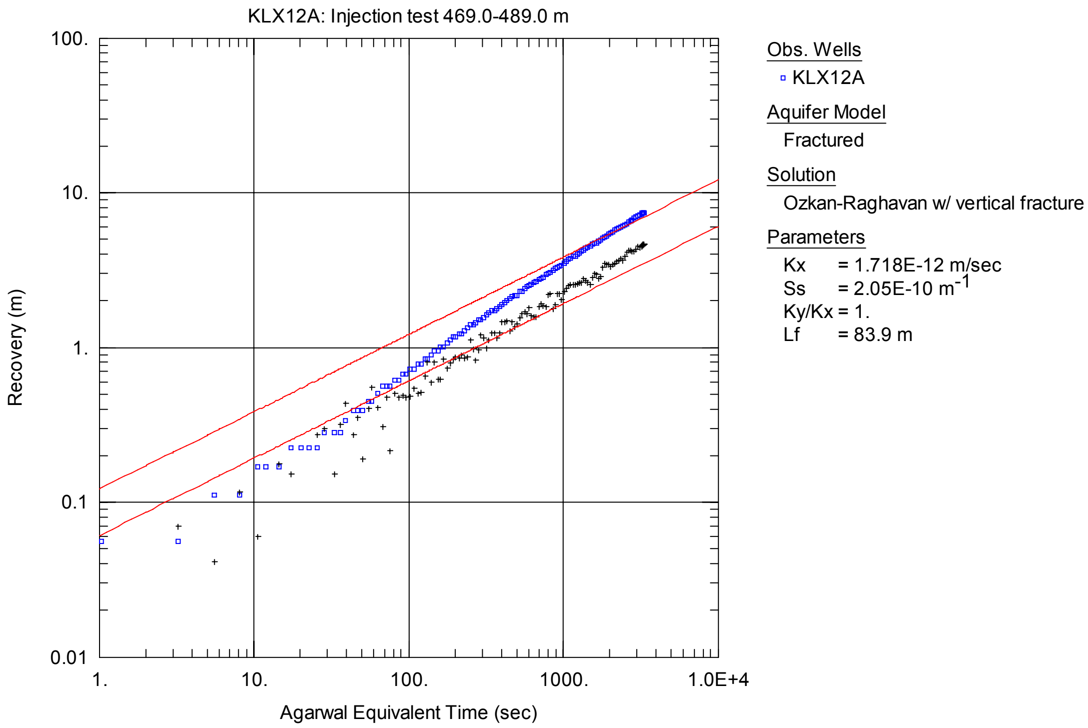

Figure A3-126. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 469.0-489.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

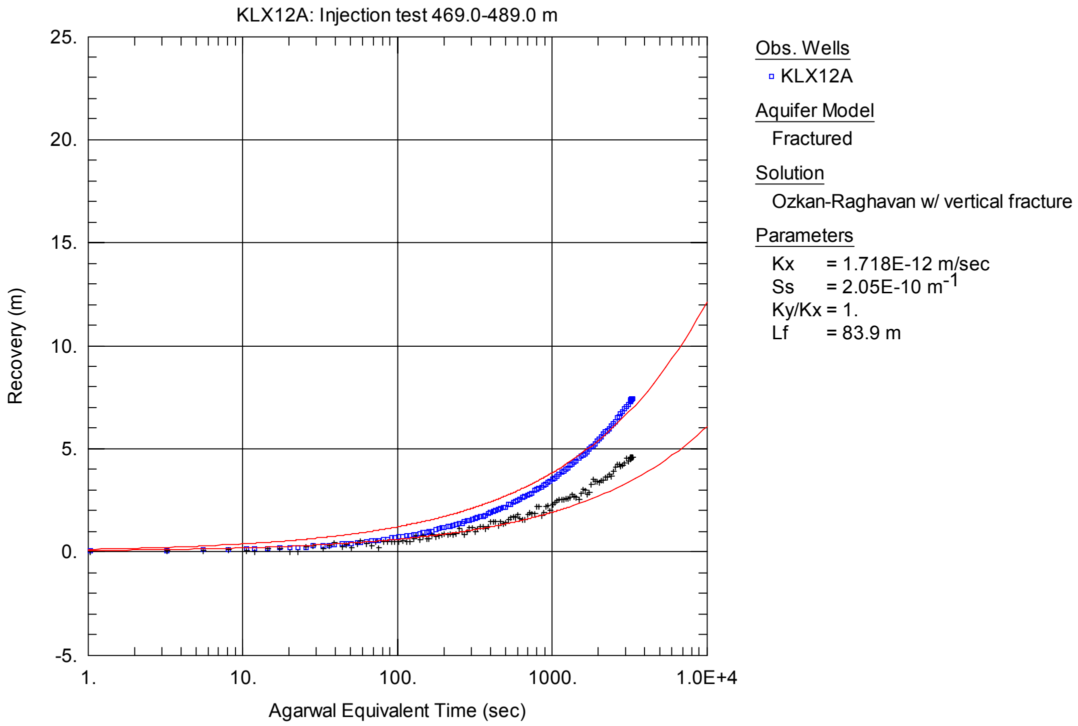

Figure A3-127. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 469.0-489.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

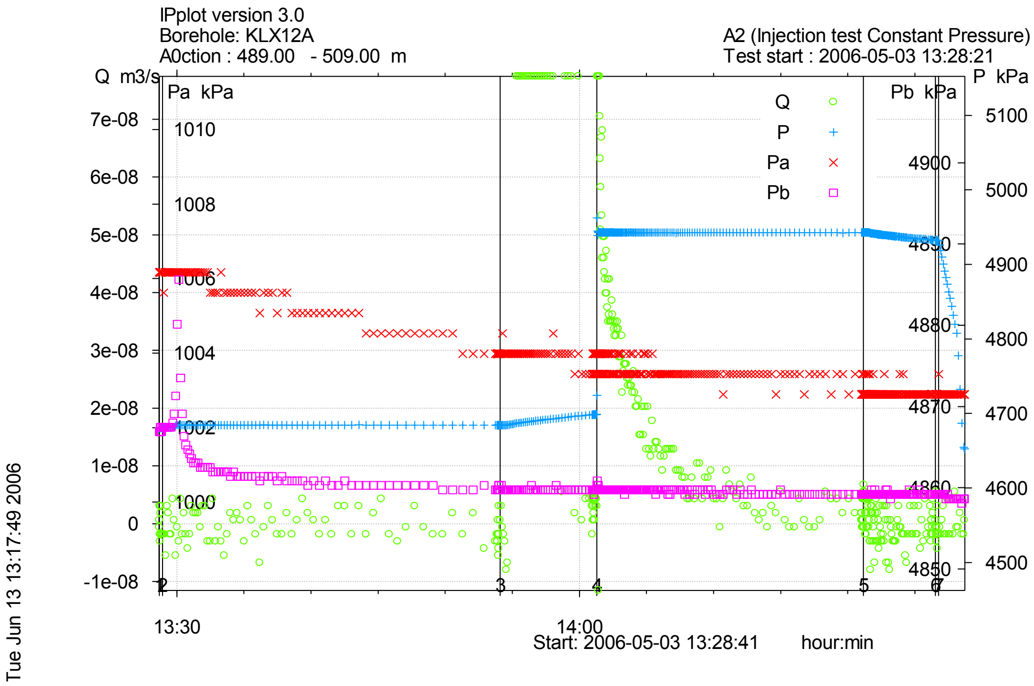

Figure A3-128. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 489.0-509.0 m in borehole KLX12A.*

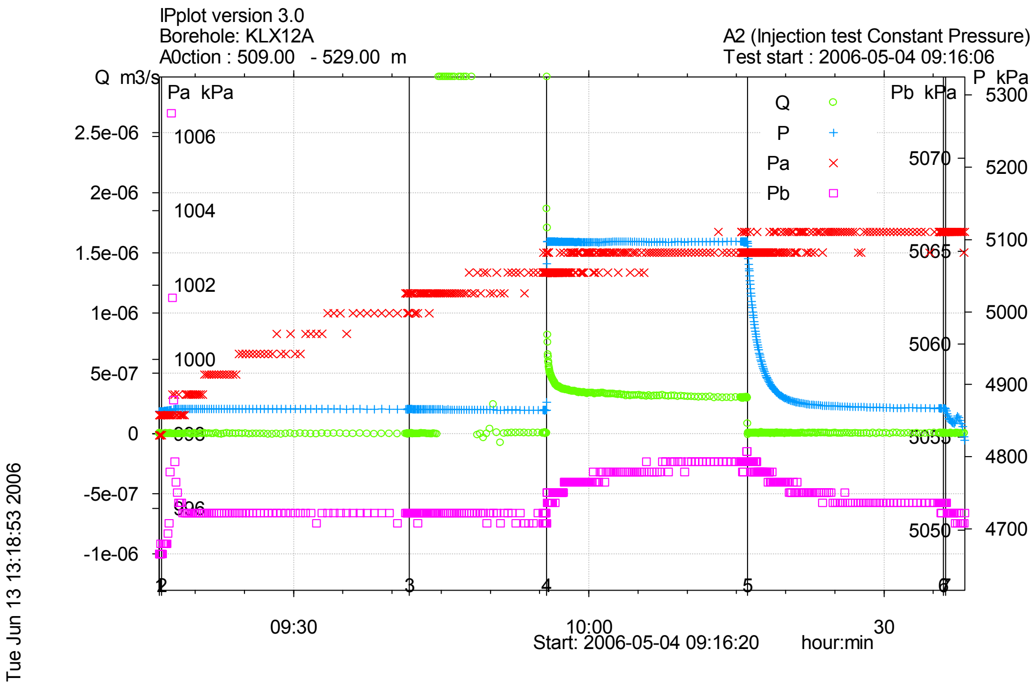

__Figure A3-129.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 509.0-529.0 m in borehole KLX12A.

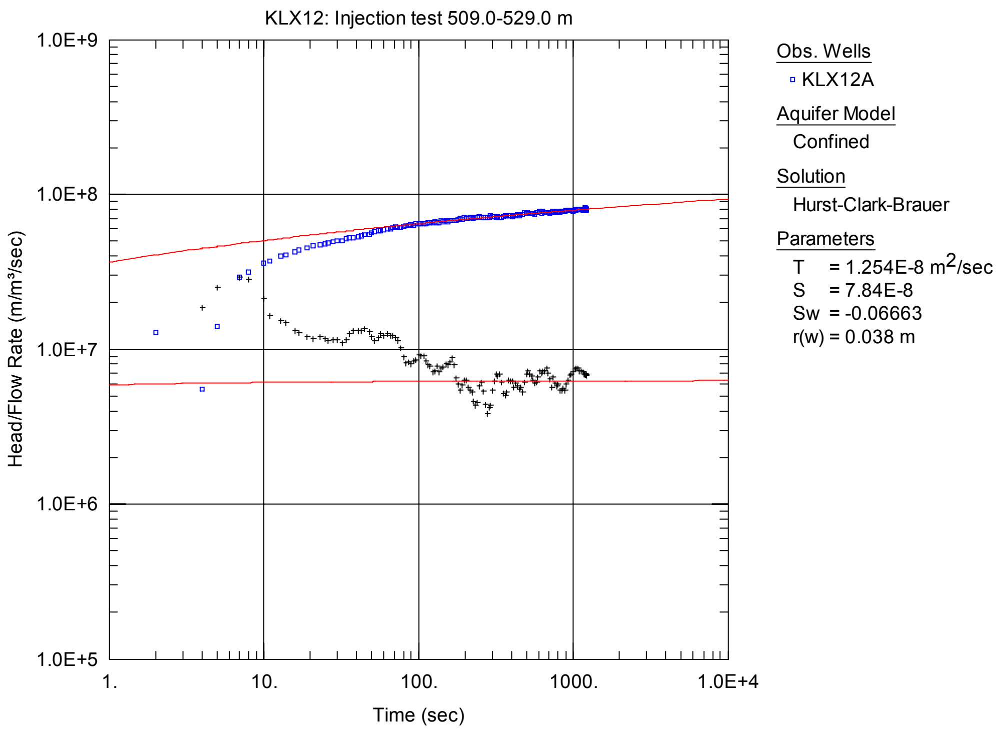

__Figure A3-130.__ Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 509.0-529.0 m in KLX12A.

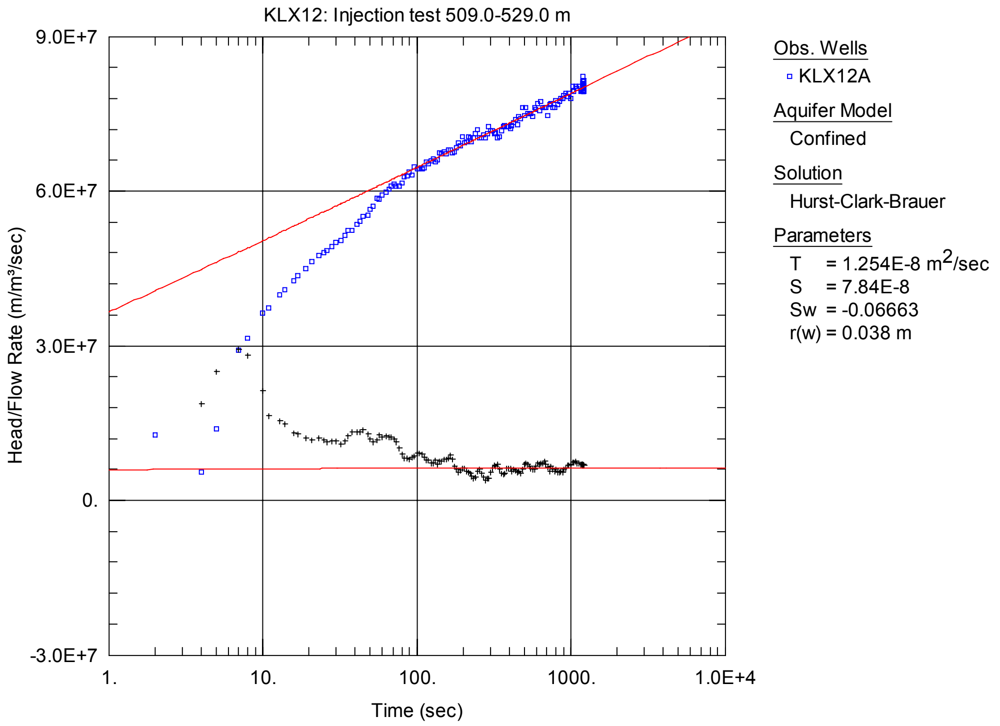

Figure A3-131. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 509.0-529.0 m in KLX12A.*

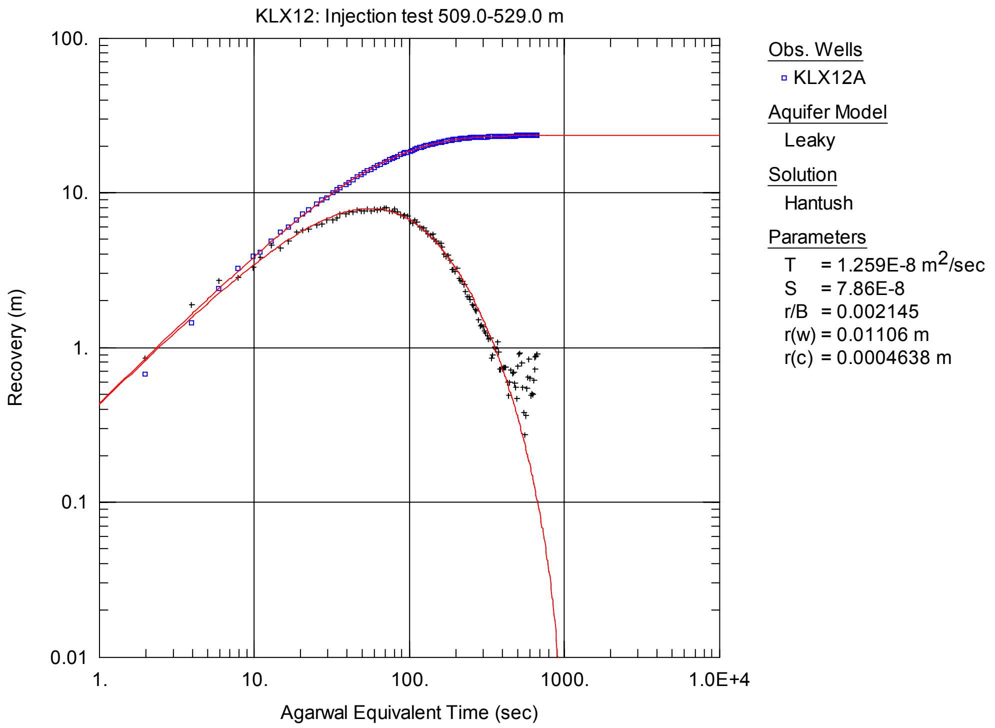

Figure A3-132. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 509.0-529.0 m in KLX12A.*

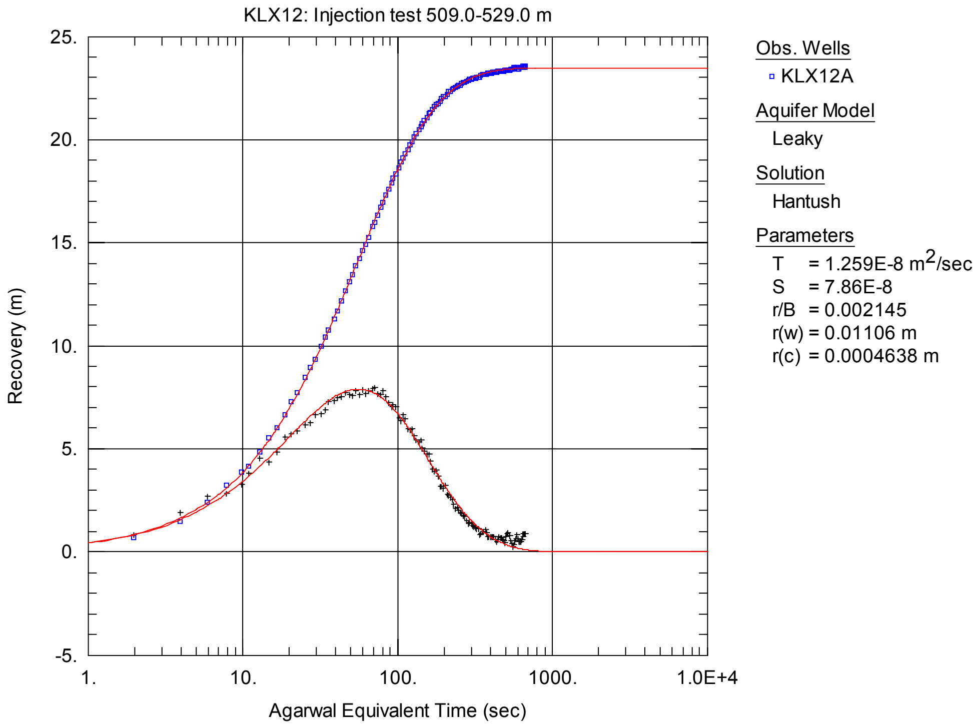

Figure A3-133. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 509.0-529.0 m in KLX12A.*

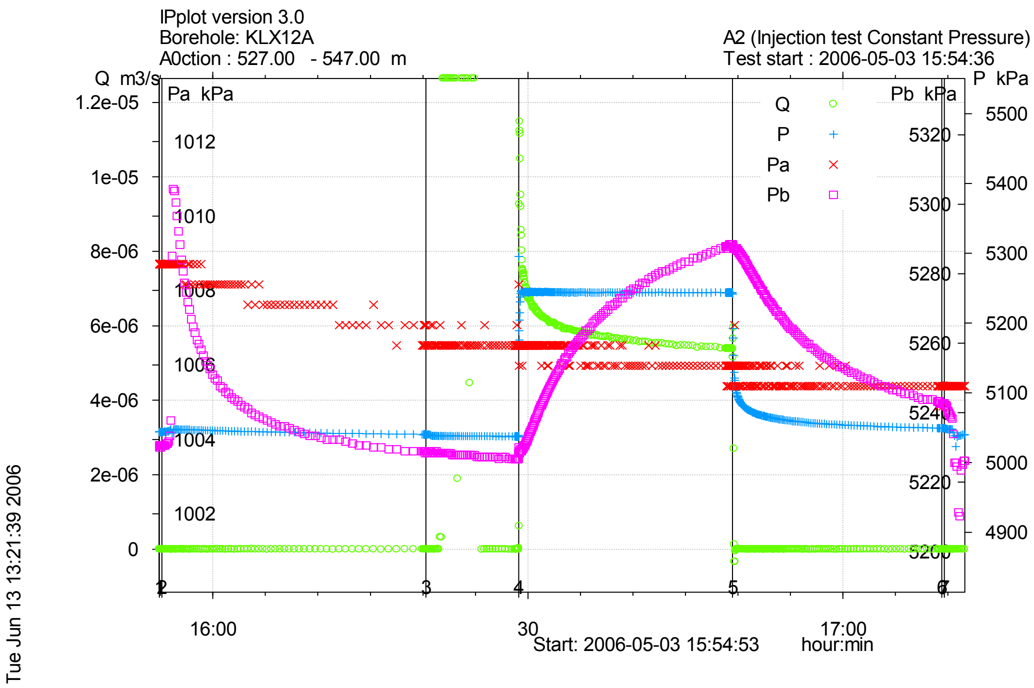

Figure A3-134. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 527.0-547.0 m in borehole KLX12A.*

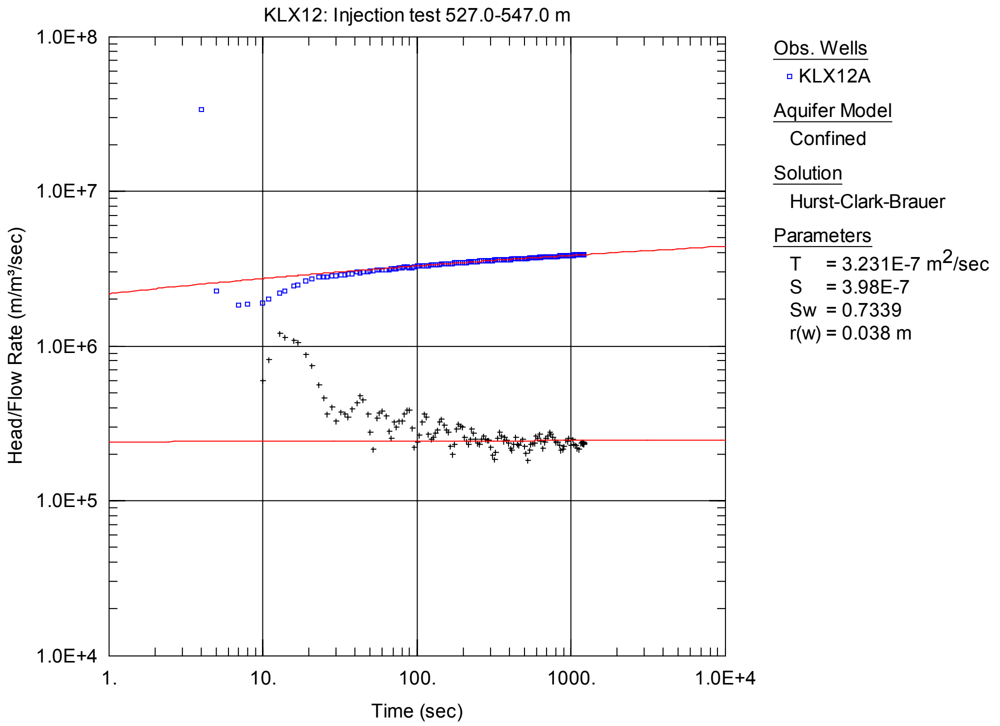

Figure A3-135. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 527.0-547.0 m in KLX12A.*

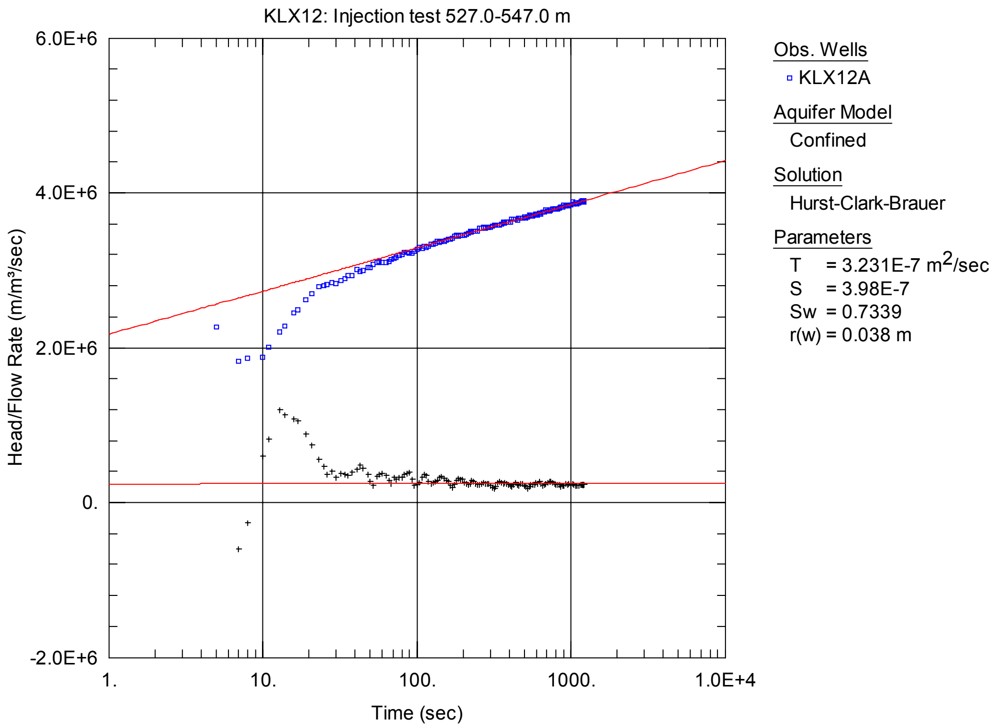

Figure A3-136. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 527.0-547.0 m in KLX12A.*

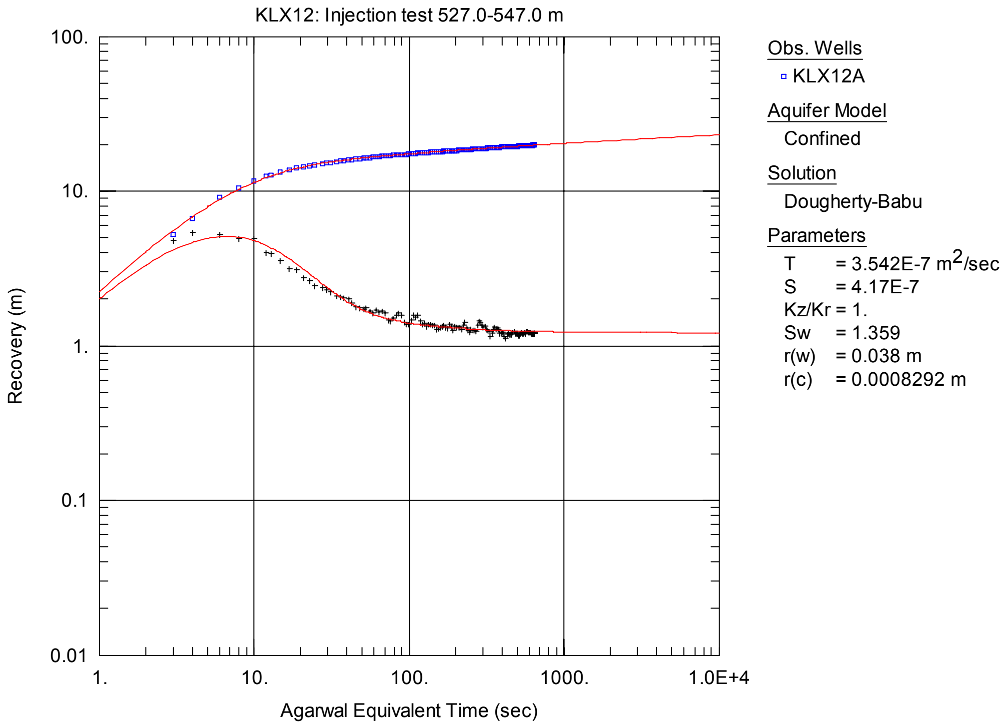

Figure A3-137. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 527.0-547.0 m in KLX12A.*

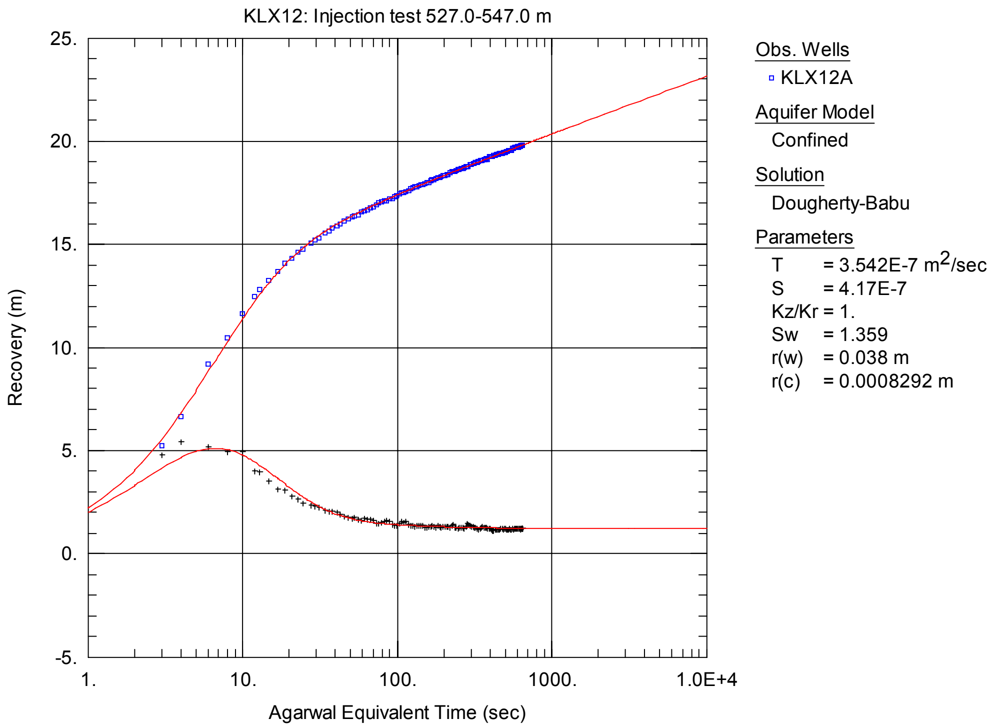

Figure A3-138. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 527.0-547.0 m in KLX12A.*

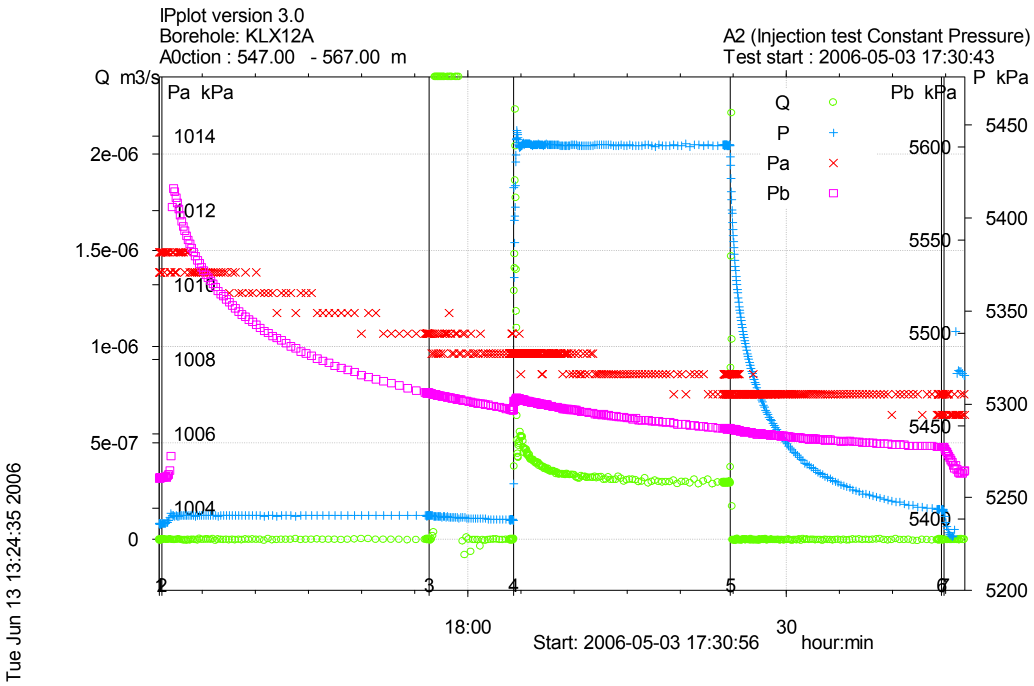

Figure A3-139. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 547.0-567.0 m in borehole KLX12A.*

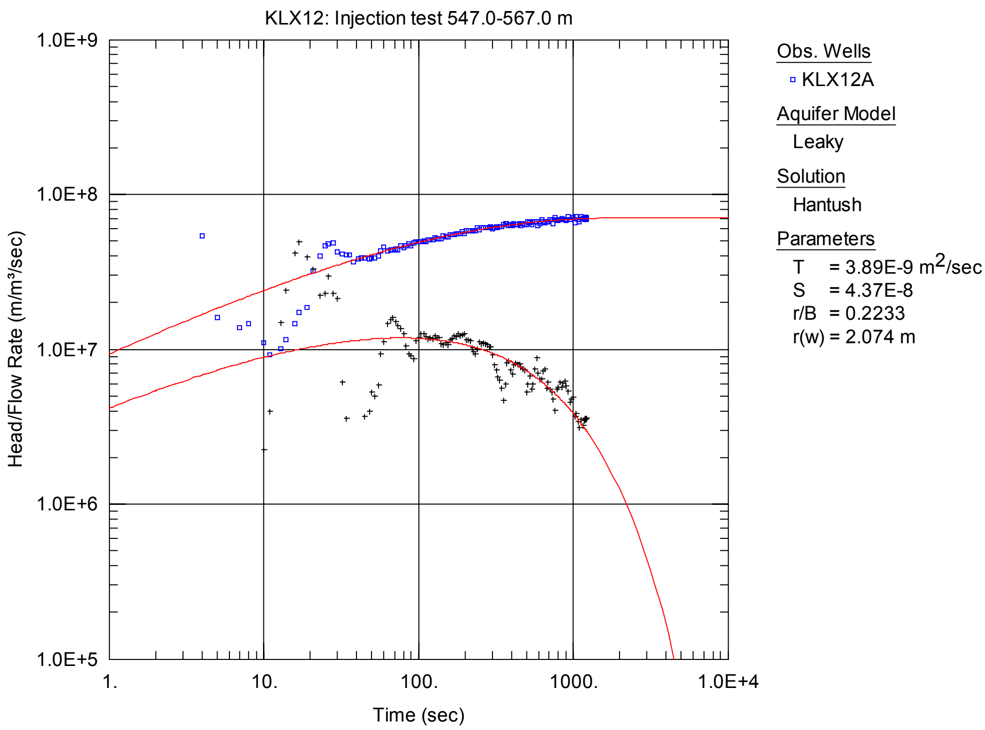

Figure A3-140. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 547.0-567.0 m in KLX12A.*

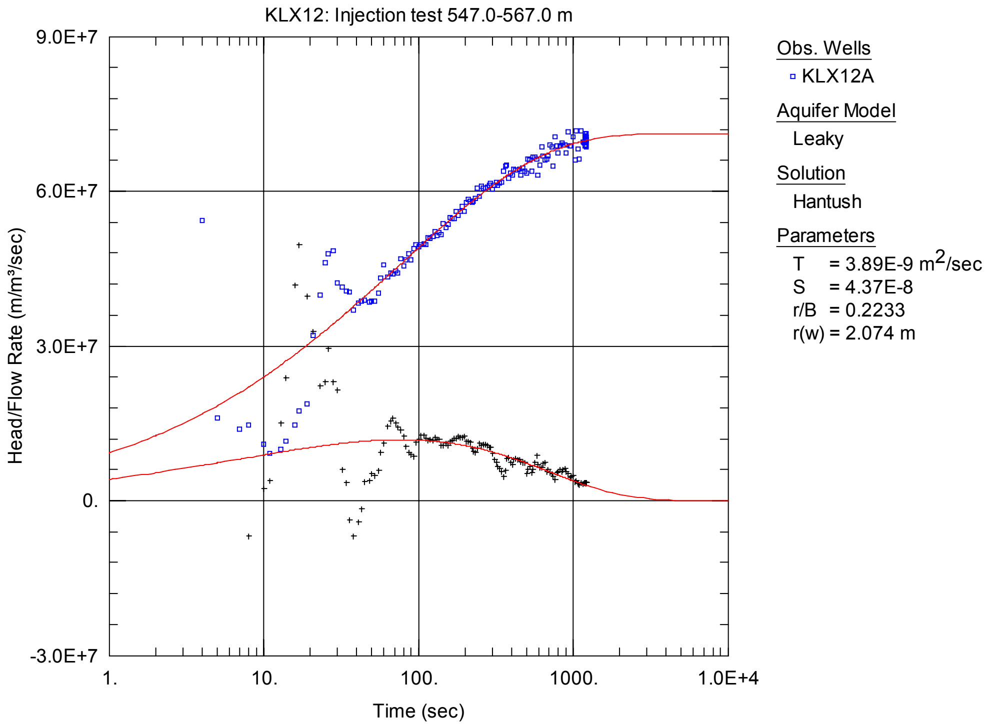

Figure A3-141. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 547.0-567.0 m in KLX12A.*

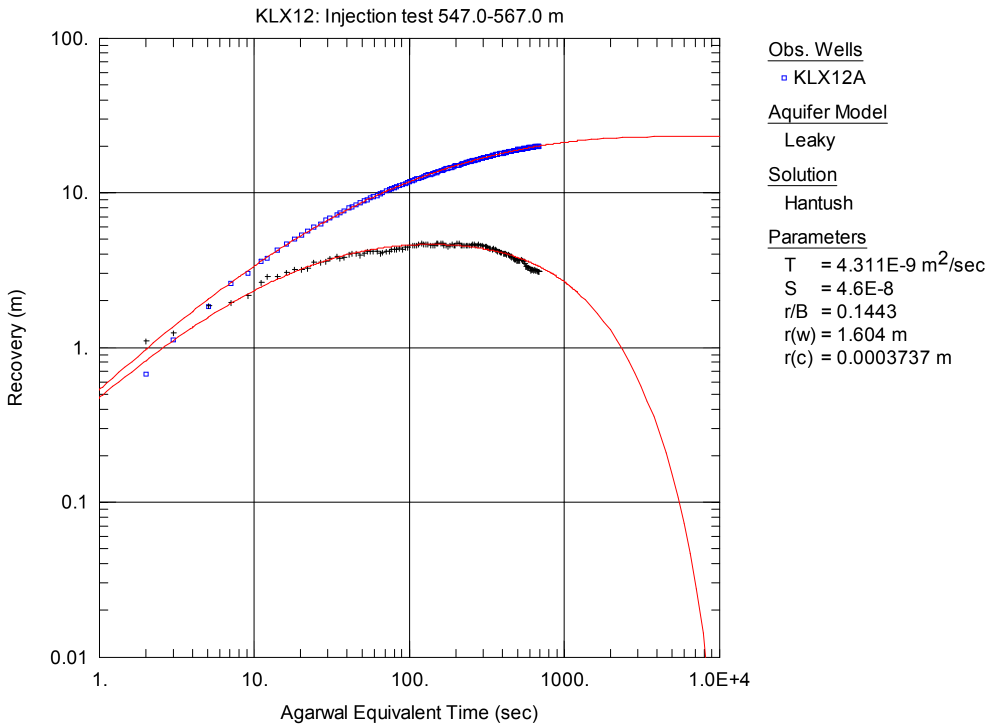

Figure A3-142. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 547.0-567.0 m in KLX12A.*

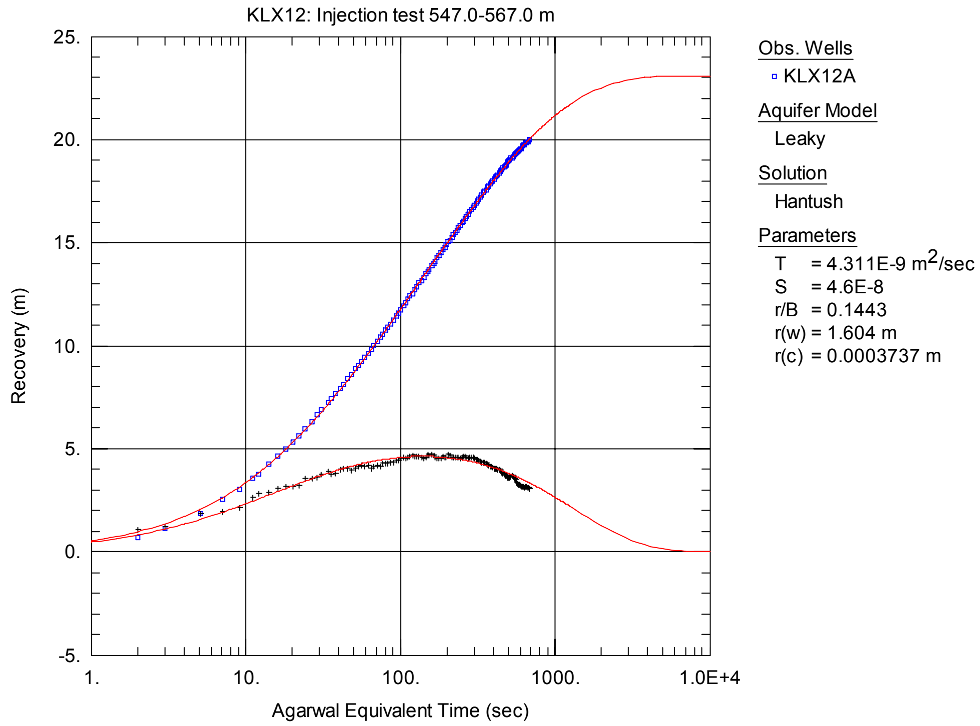

Figure A3-143. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 547.0-567.0 m in KLX12A.*

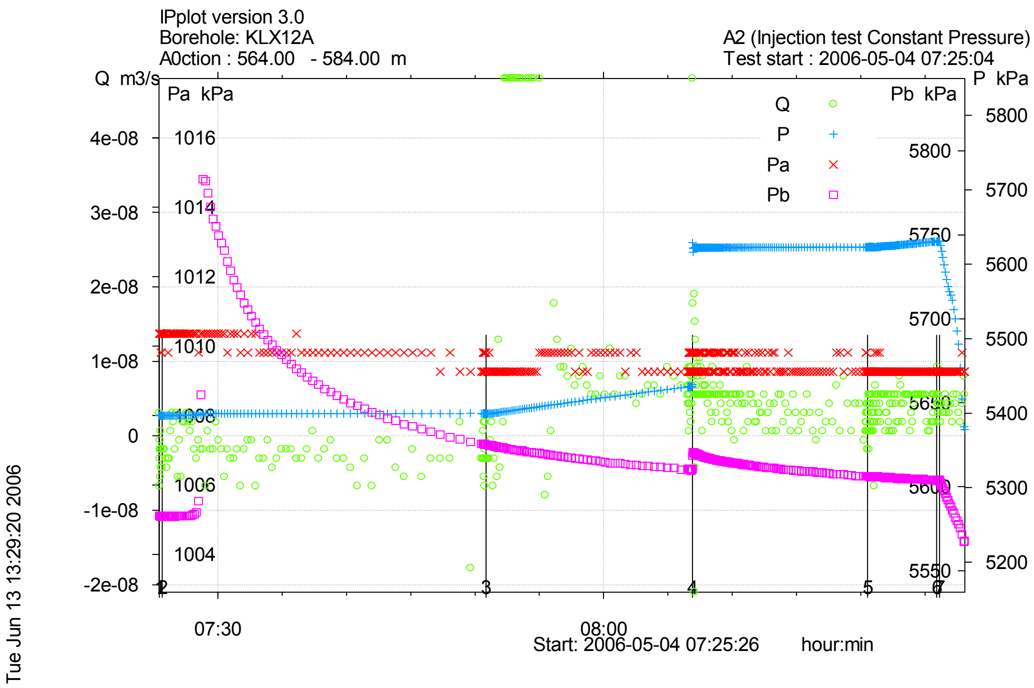

Figure A3-144. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 564.0-584.0 m in borehole KLX12A.*

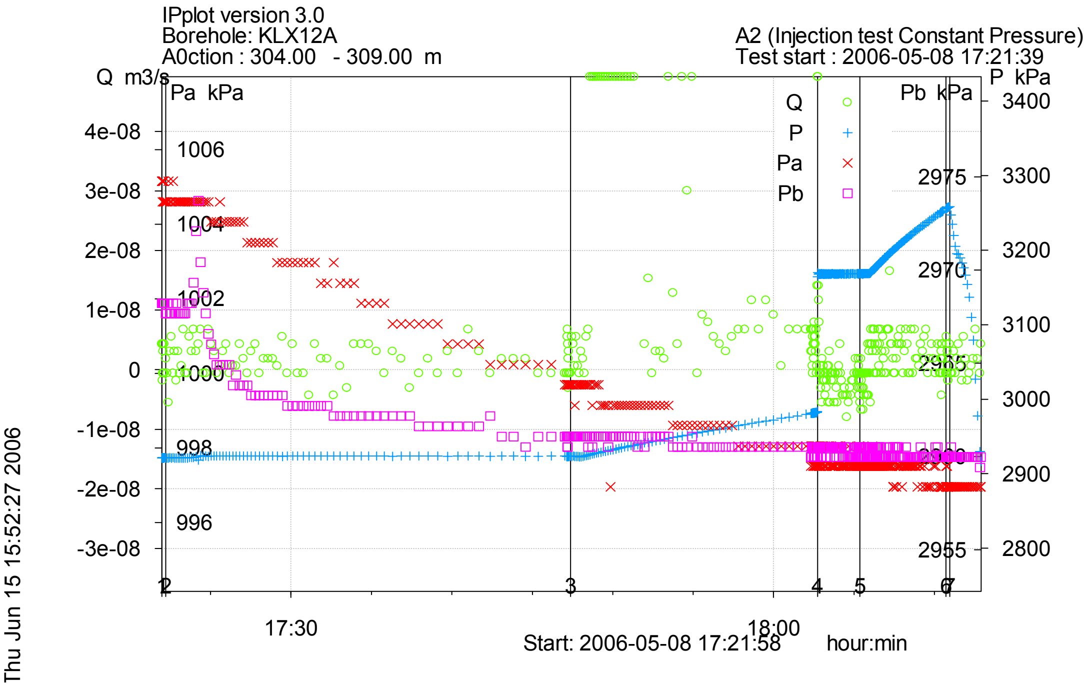

Figure A3-145. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 304.0-309.0 m in borehole KLX12A.

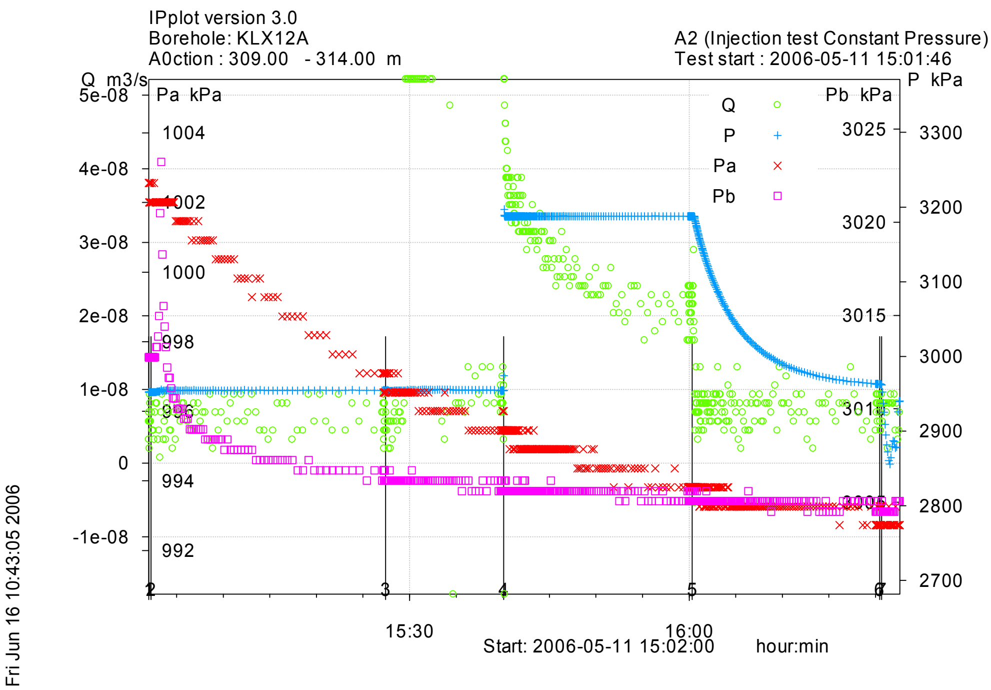

Figure A3-146. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 309.0-314.0 m in borehole KLX12A.

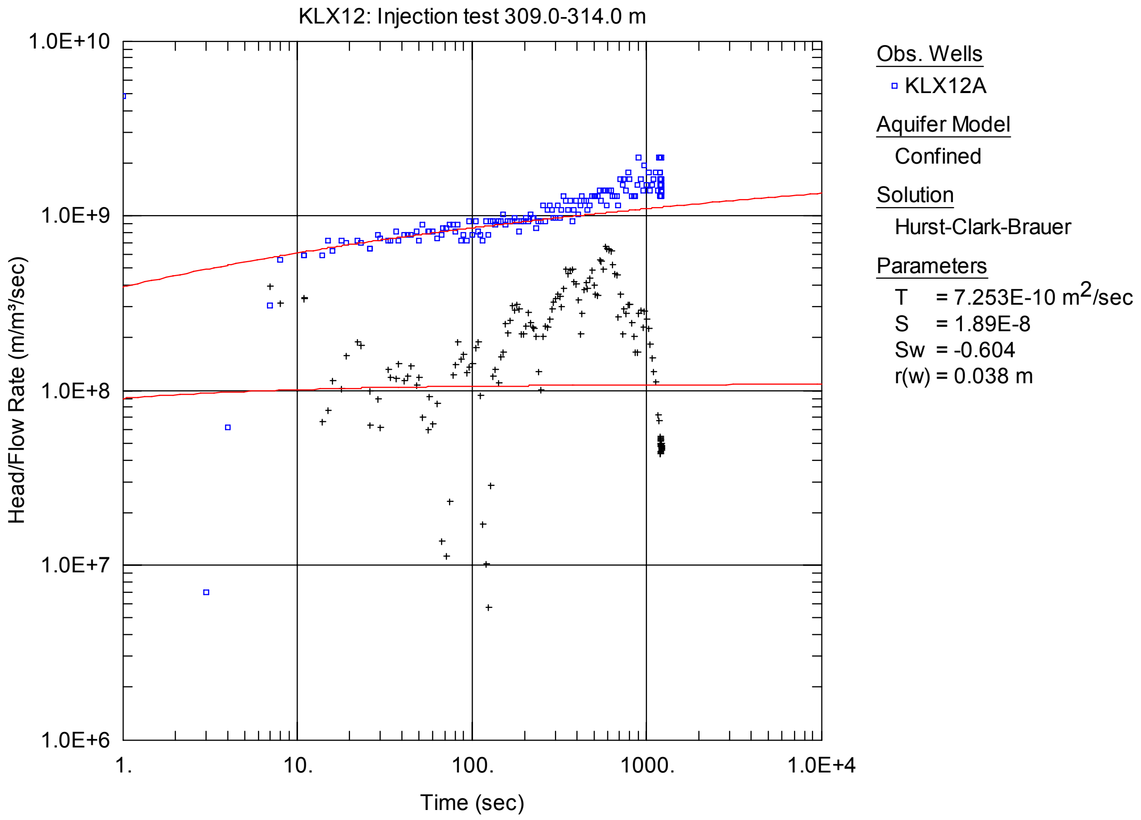

Figure A3-147. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 309.0-314.0 m in KLX12A.*

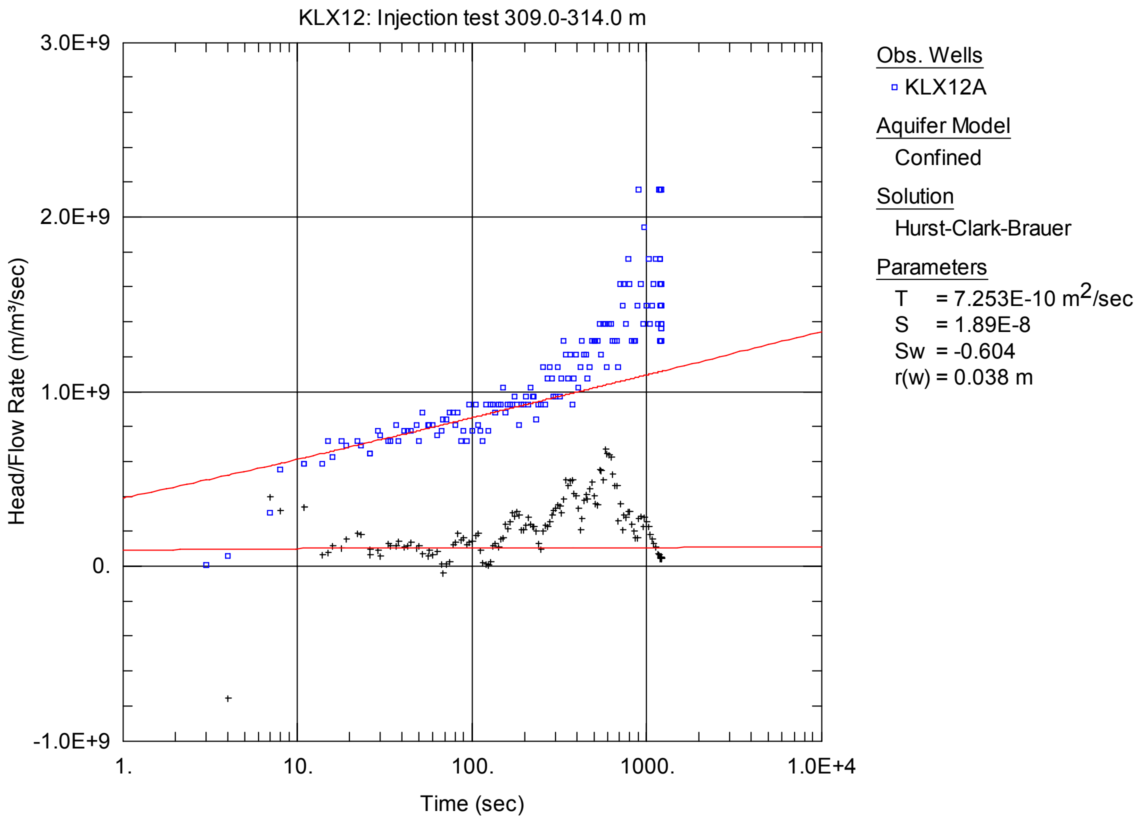

Figure A3-148. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 309.0-314.0 m in KLX12A.*

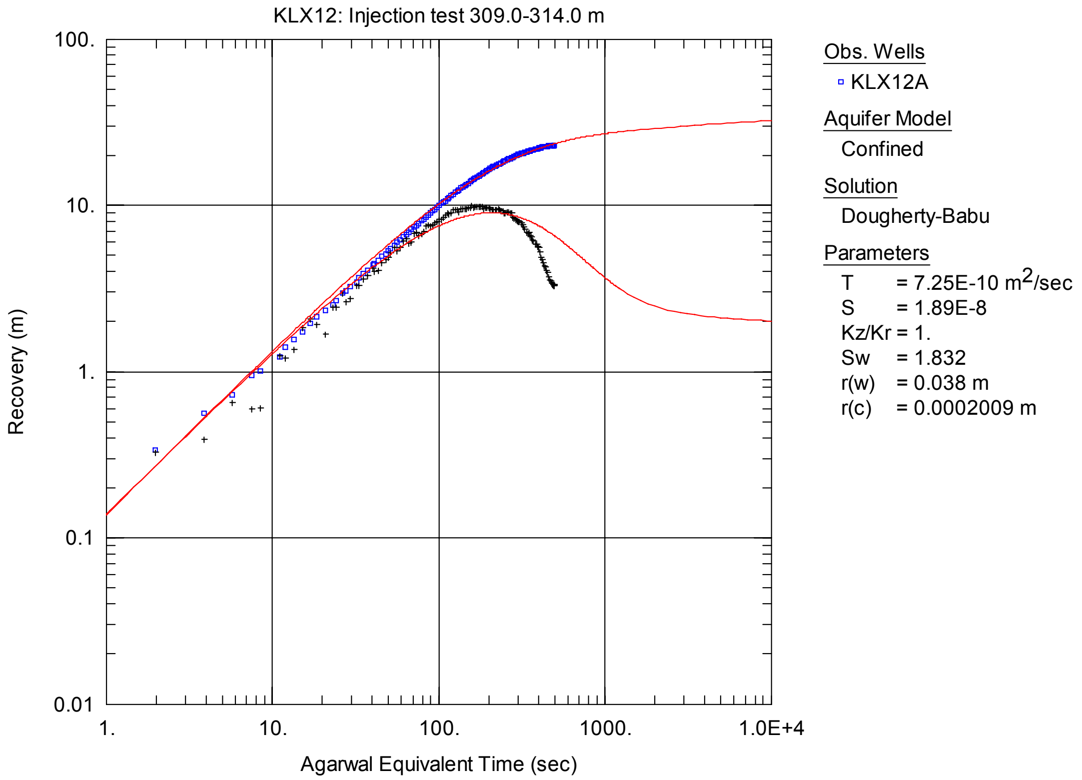

Figure A3-149. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 309.0-314.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

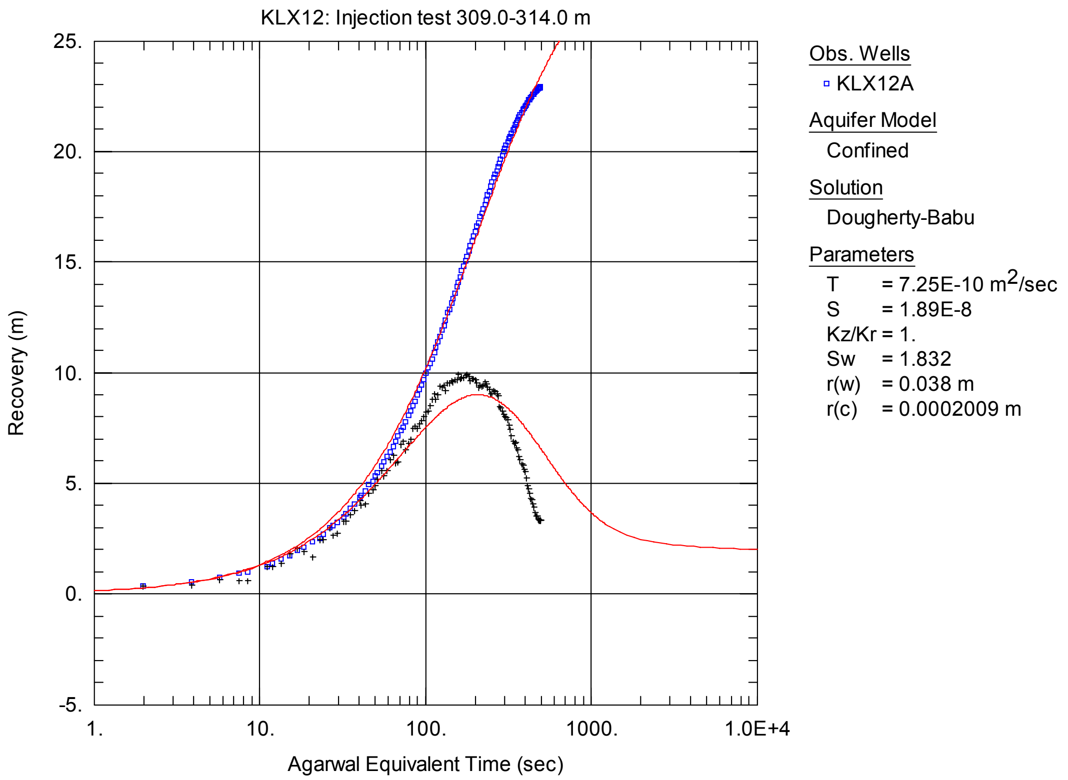

Figure A3-150. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 309.0-314.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

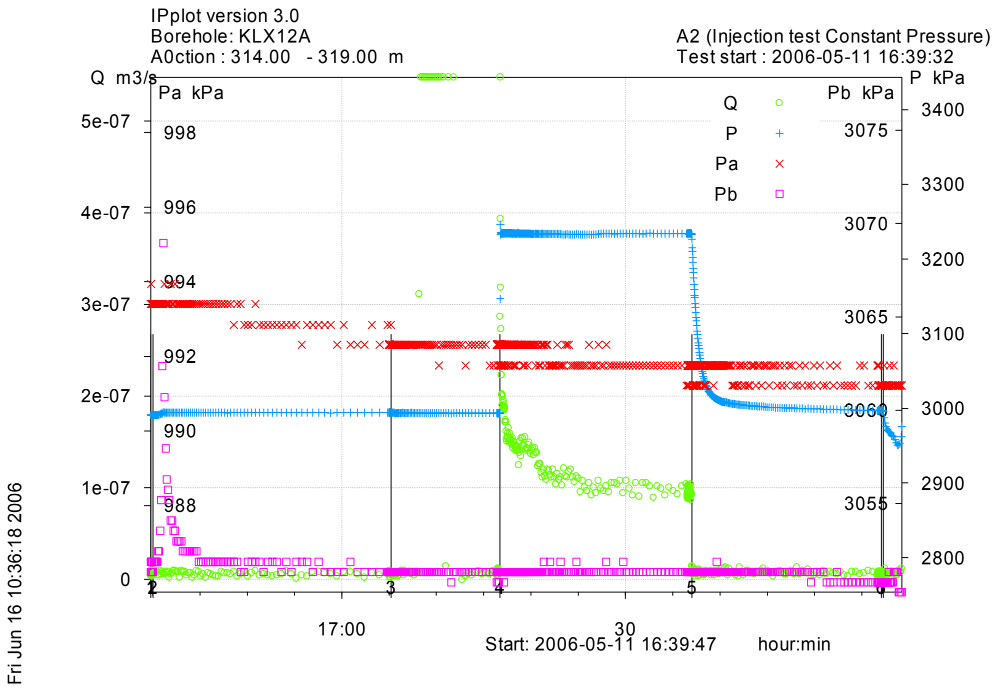

Figure A3-151. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 314.0-319.0 m in borehole KLX12A.

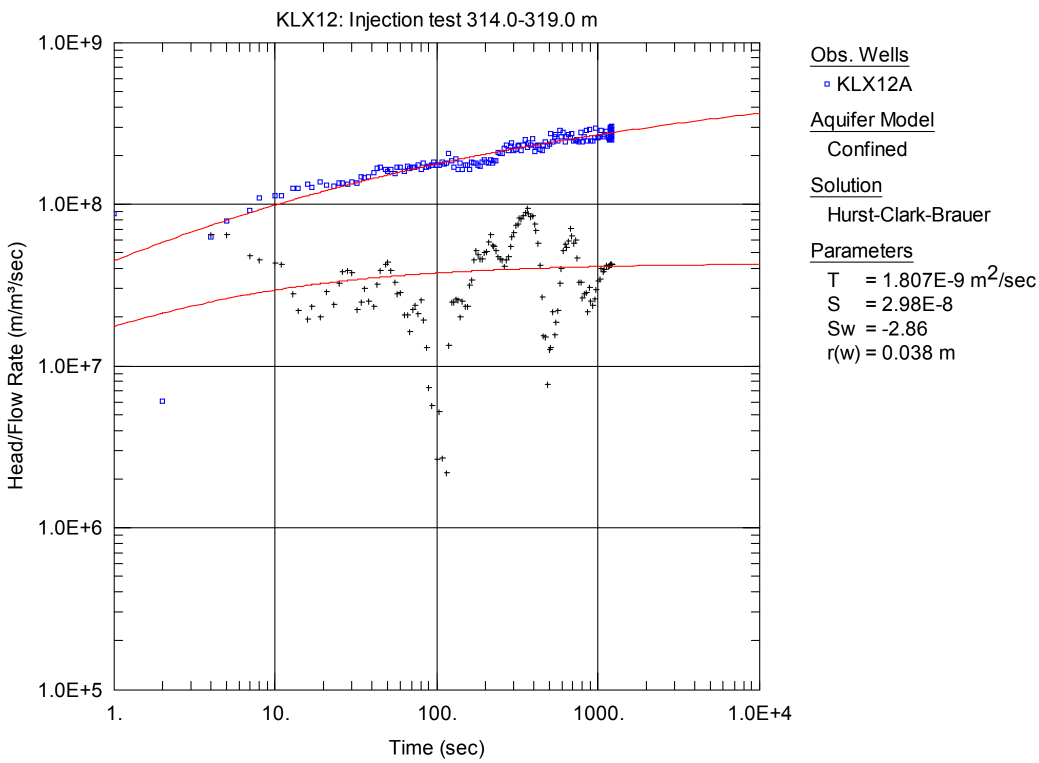

Figure A3-152. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 314.0-319.0 m in KLX12A.

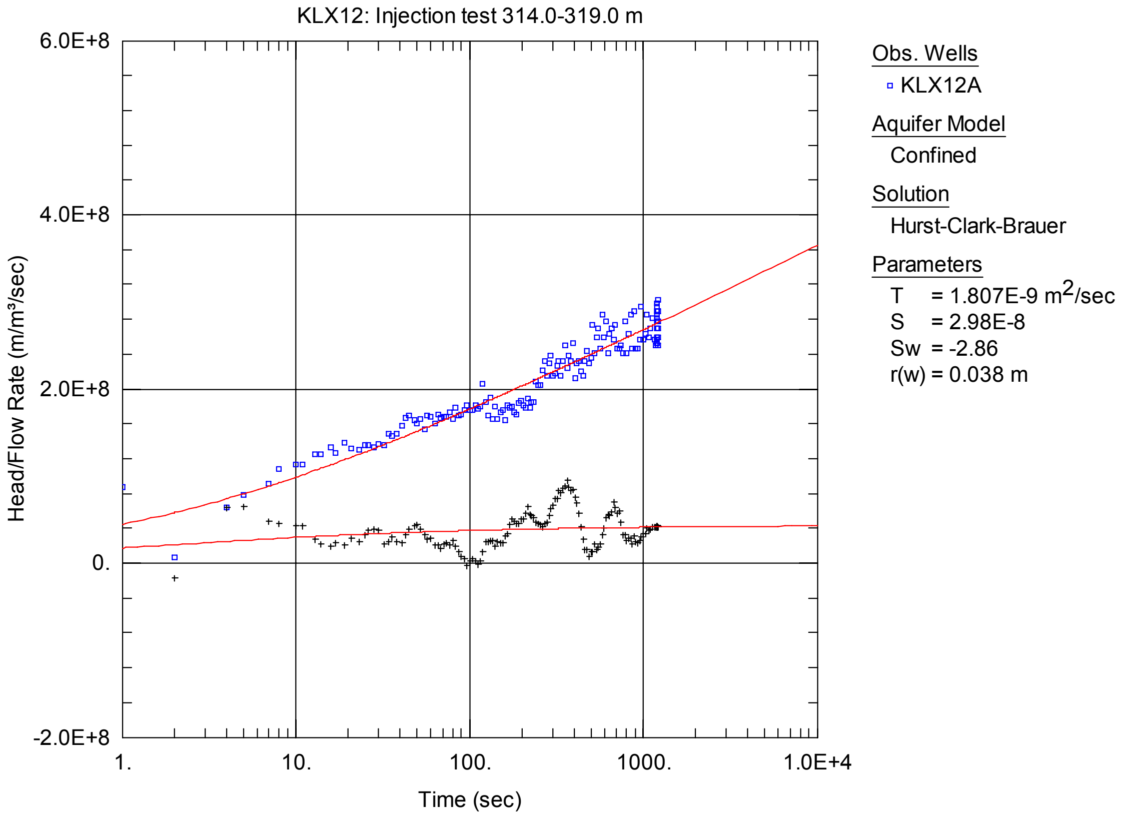

***Figure A3-153.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 314.0-319.0 m in KLX12A.*

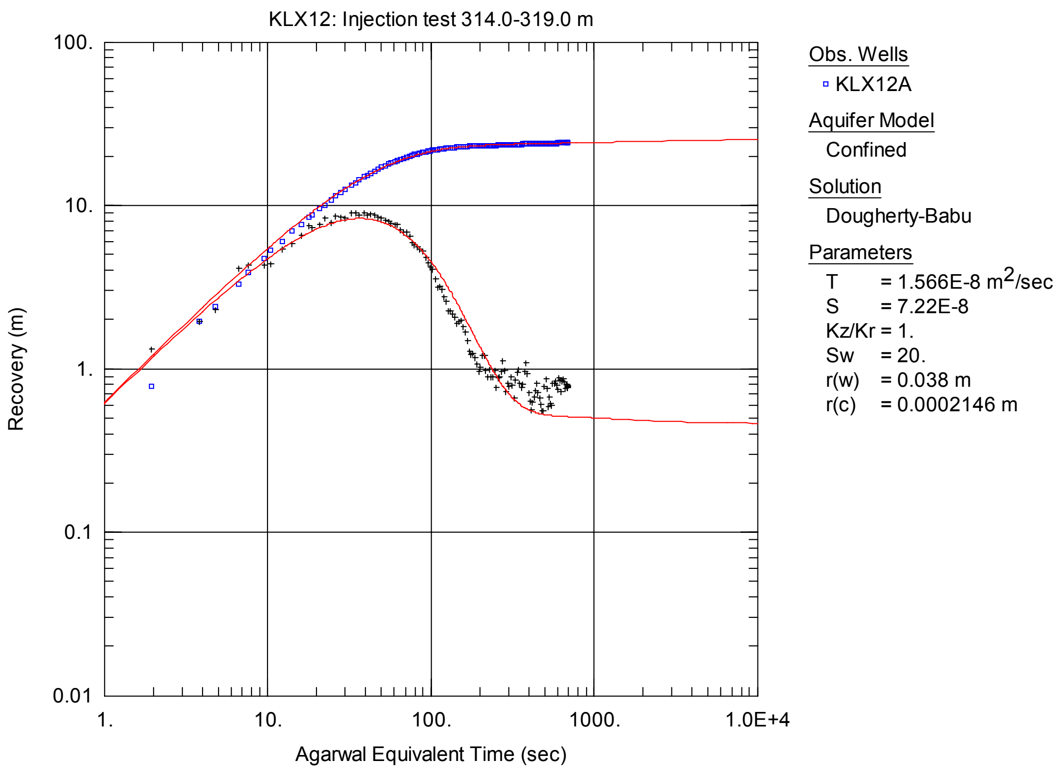

***Figure A3-154.** Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 314.0-319.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

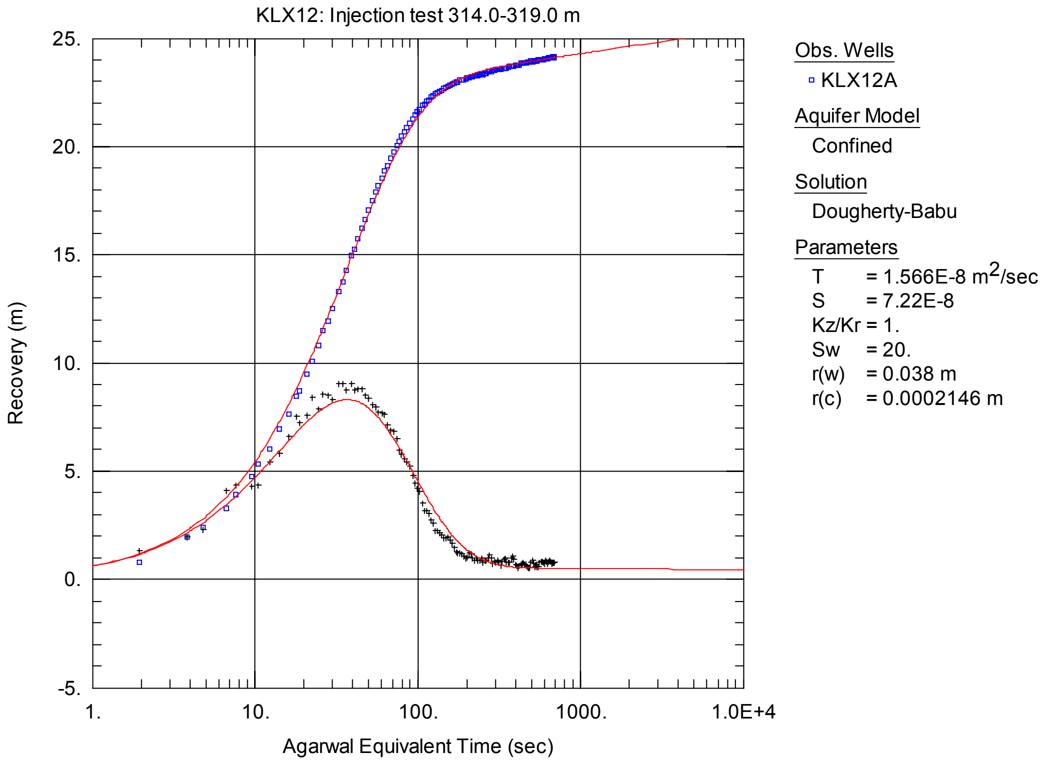

Figure A3-155. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 314.0-319.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

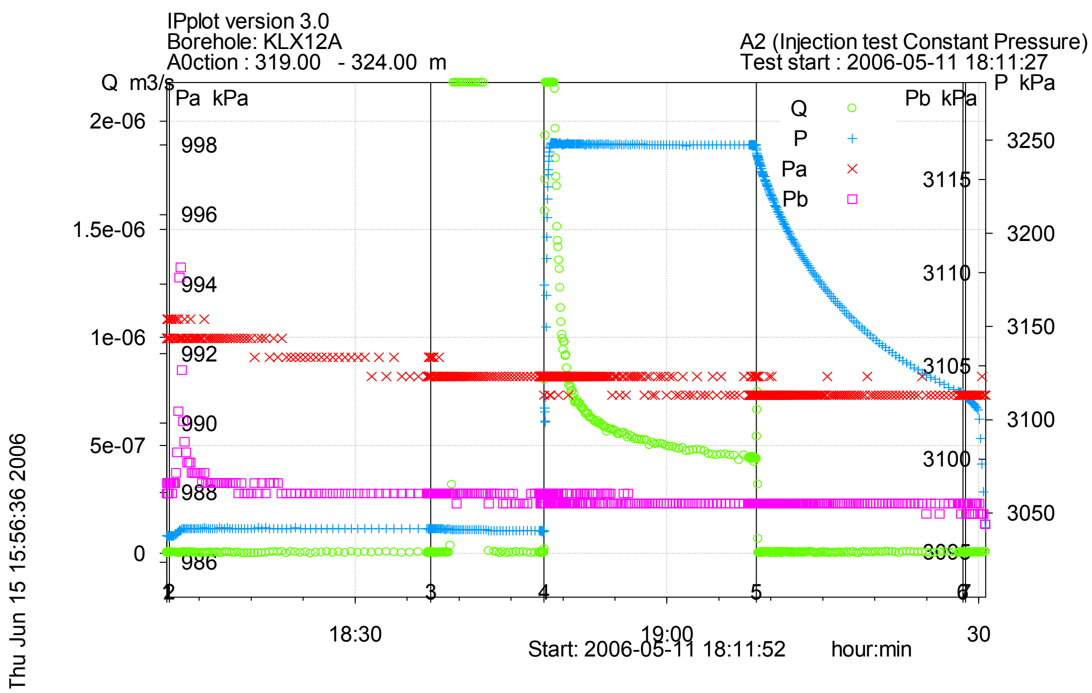

Figure A3-156. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 319.0-324.0 m in borehole KLX12A.*

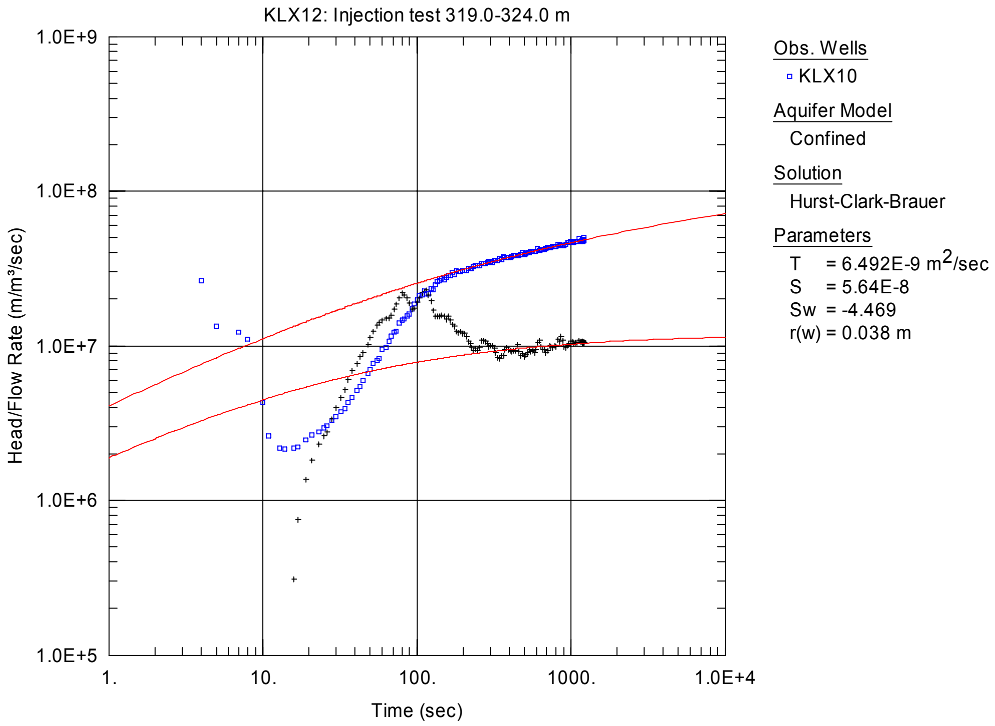

Figure A3-157. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 319.0-324.0 m in KLX12A.*

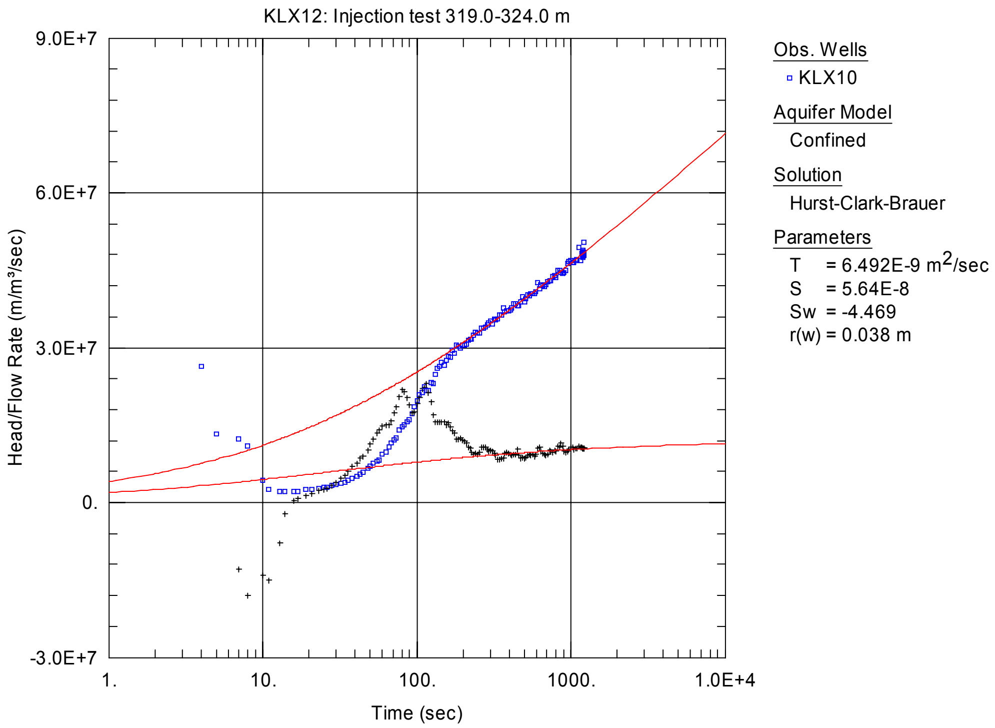

Figure A3-158. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 319.0-324.0 m in KLX12A.*

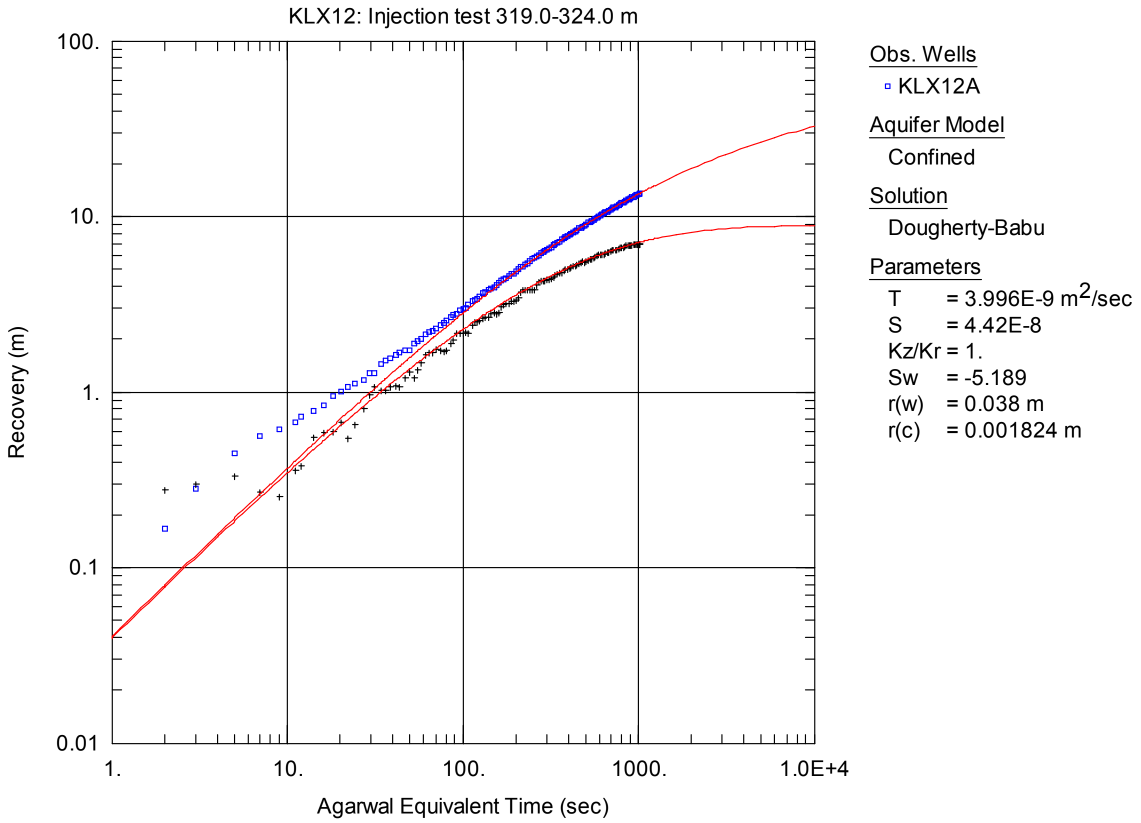

Figure A3-159. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 319.0-324.0 m in KLX12A.*

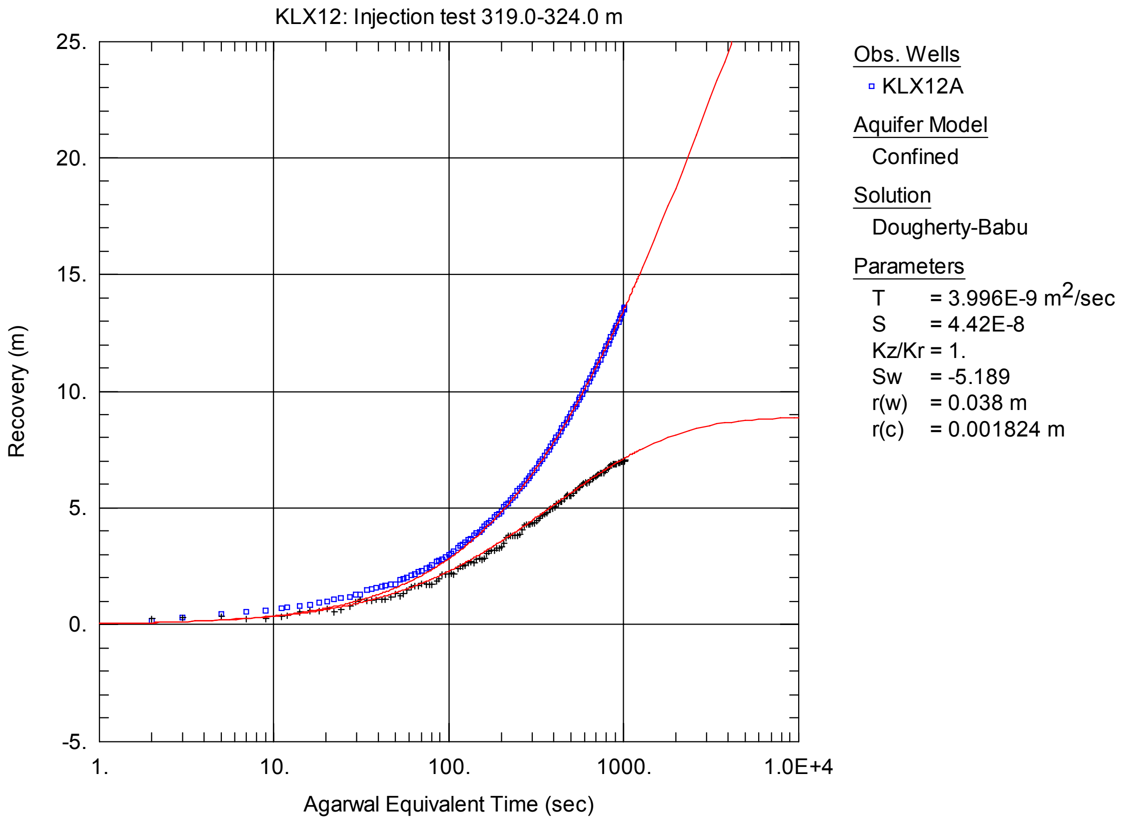

Figure A3-160. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 319.0-324.0 m in KLX12A.*

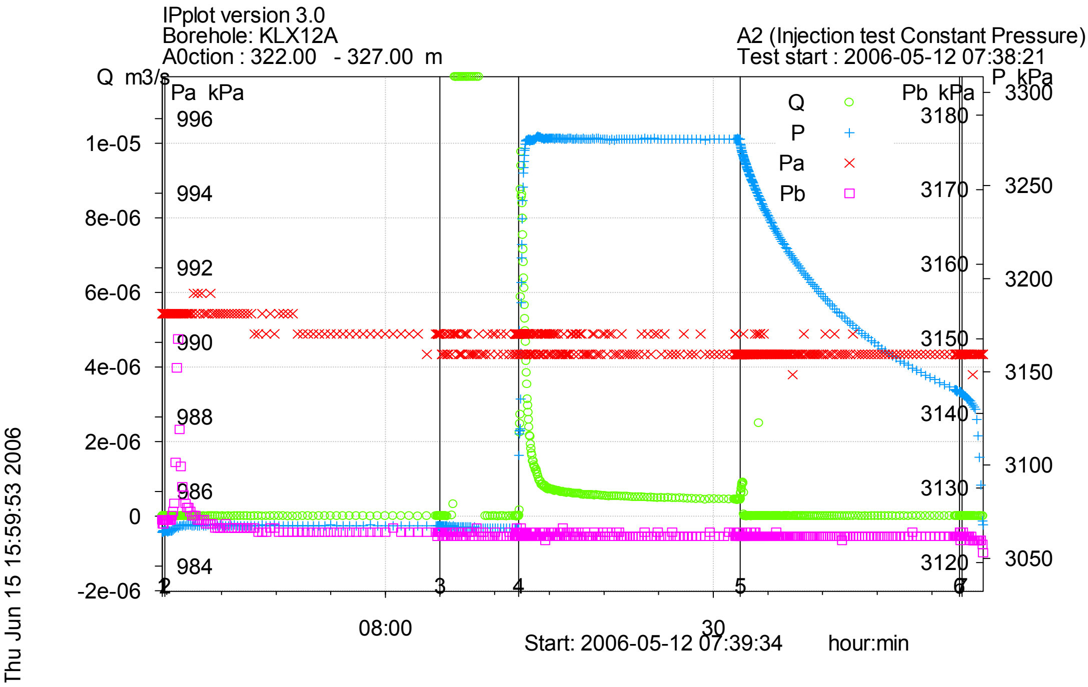

Figure A3-161. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 322.0-327.0 m in borehole KLX12A.*

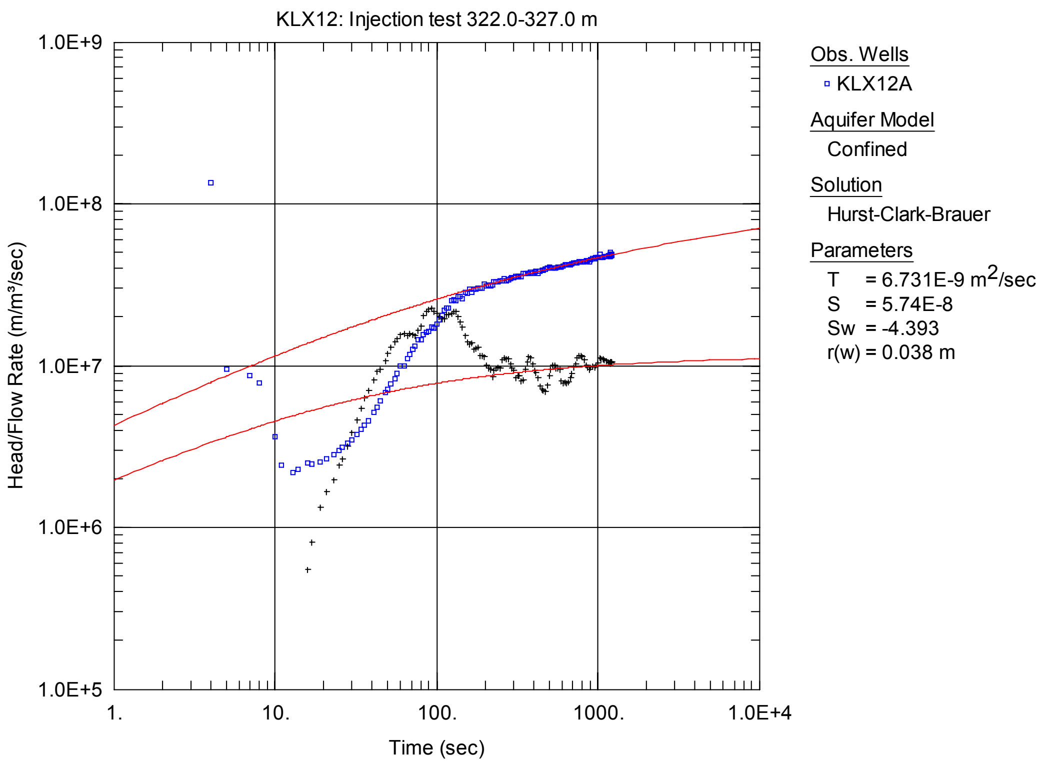

Figure A3-162. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 322.0-327.0 m in KLX12A.*

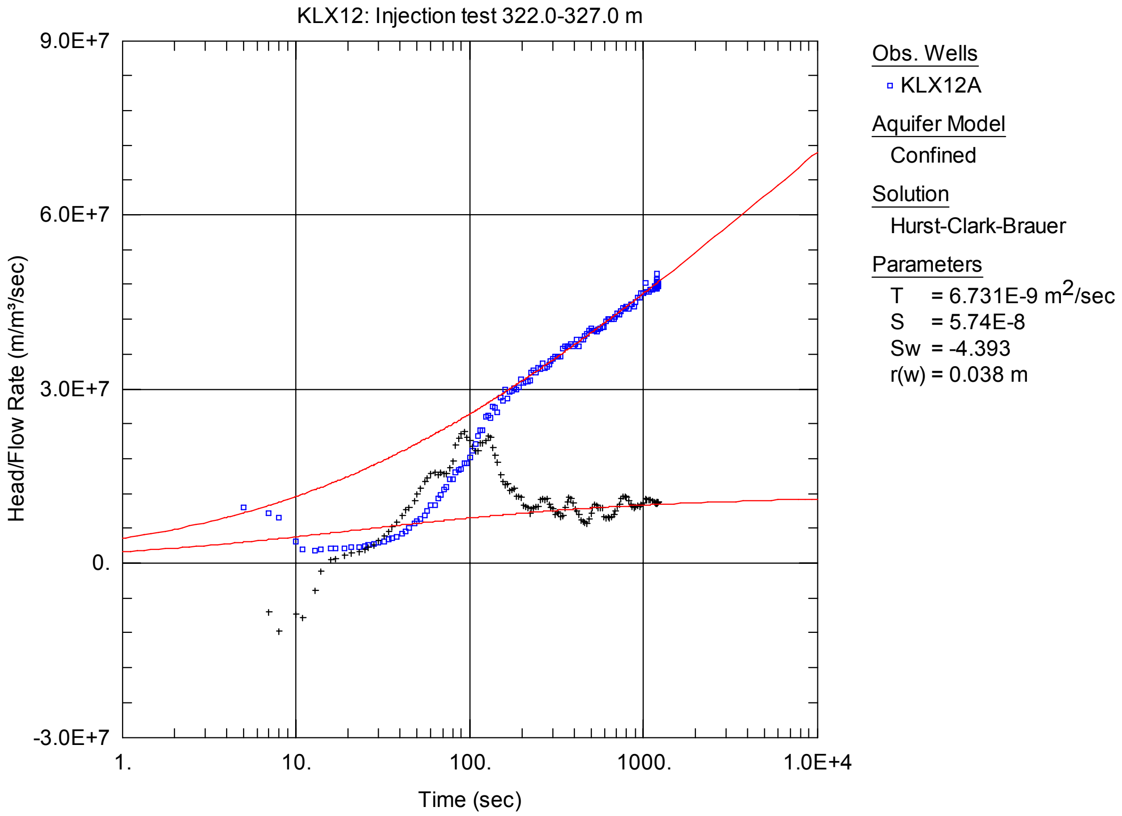

***Figure A3-163.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 322.0-327.0 m in KLX12A.*

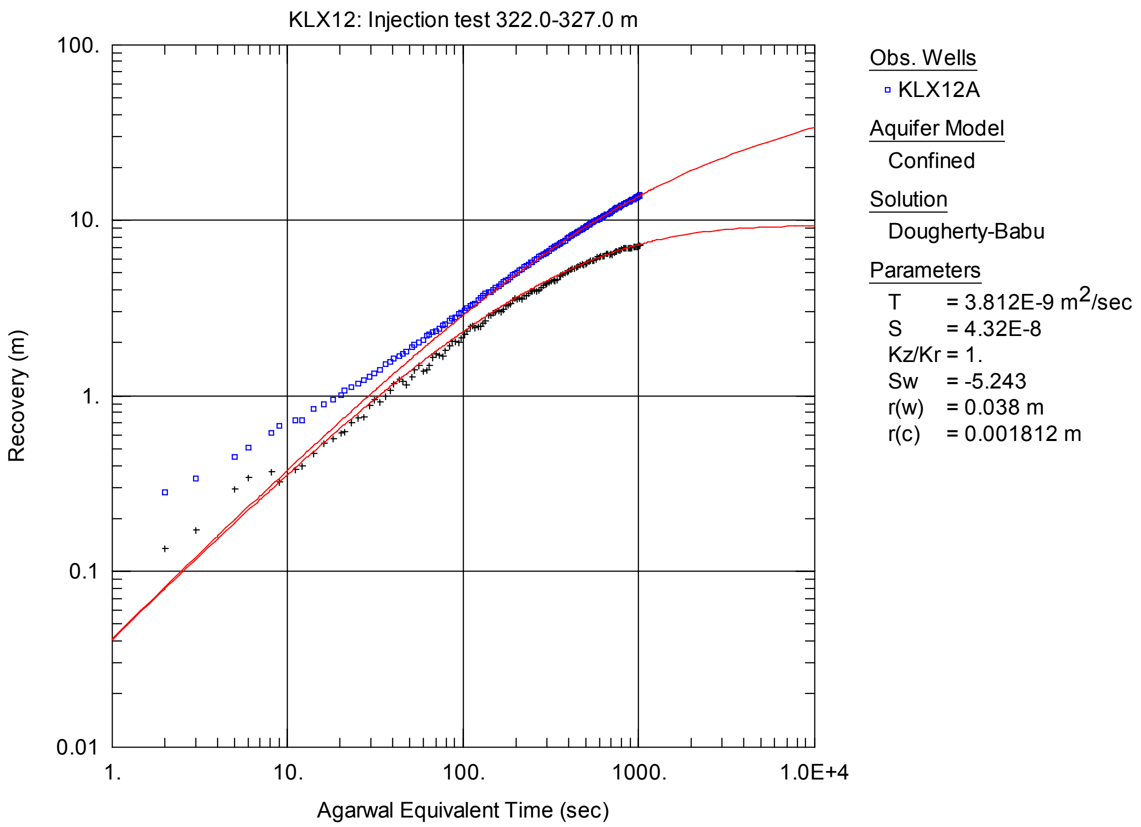

***Figure A3-164.** Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 322.0-327.0 m in KLX12A.*

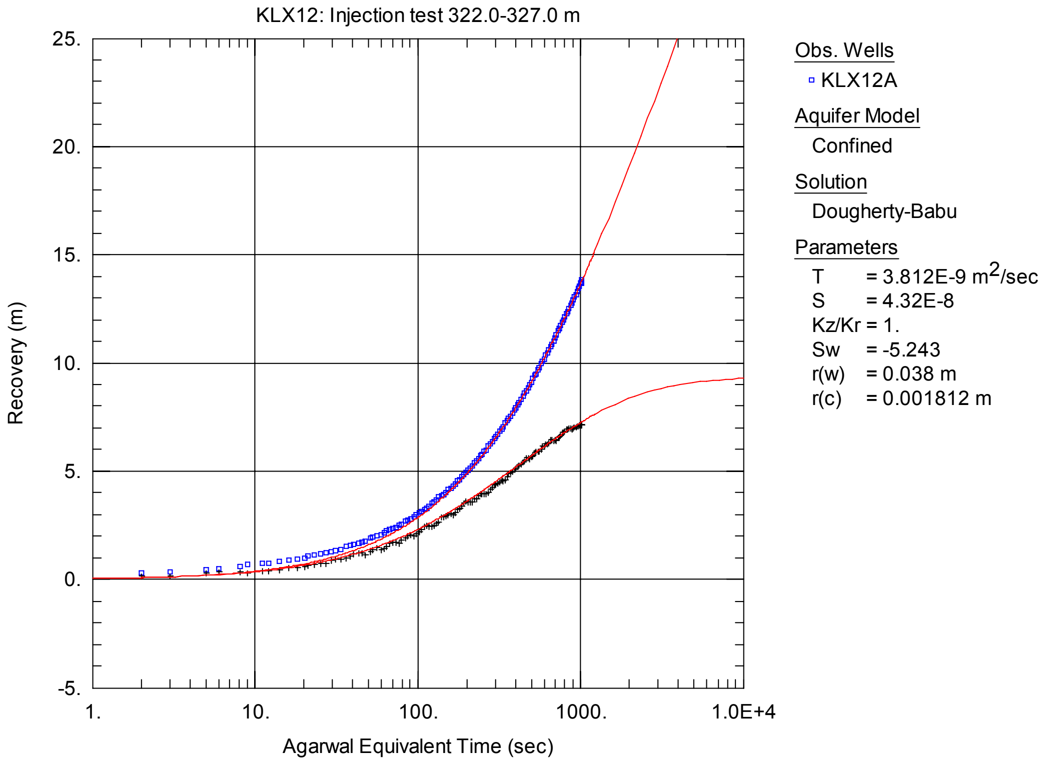

Figure A3-165. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 322.0-327.0 m in KLX12A.*

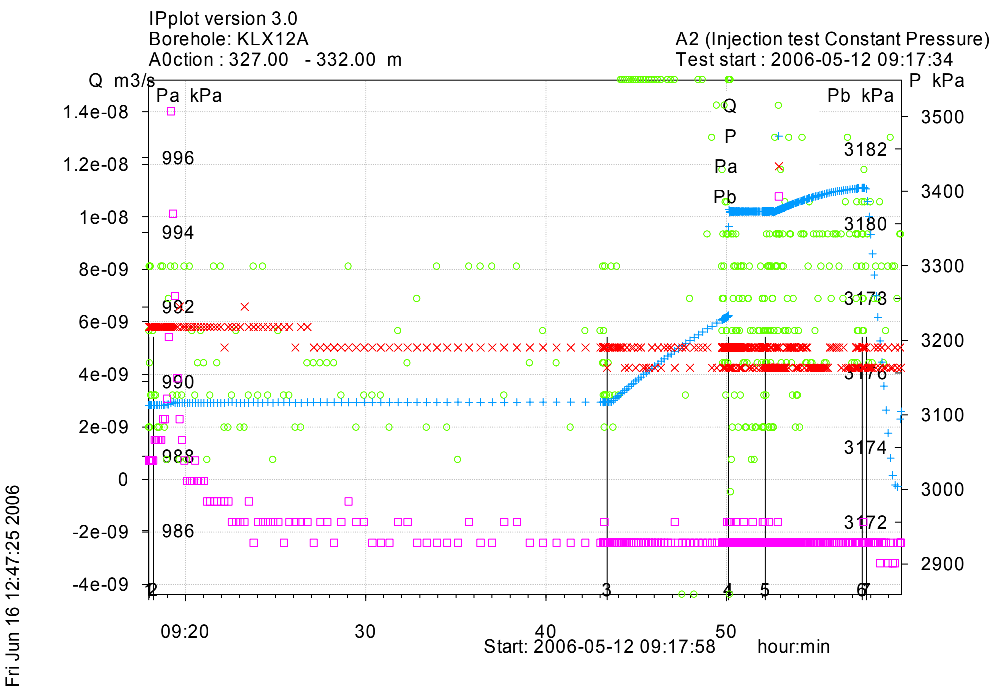

Figure A3-166. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 327.0-332.0 m in borehole KLX12A.*

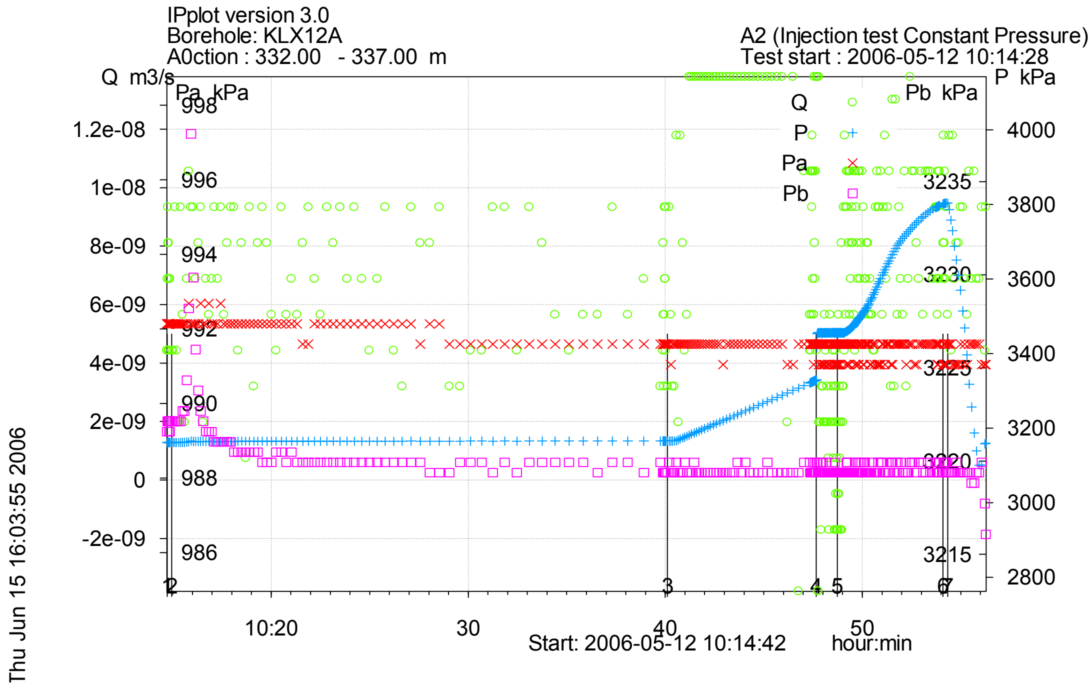

Figure A3-167. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 332.0-337.0 m in borehole KLX12A.*

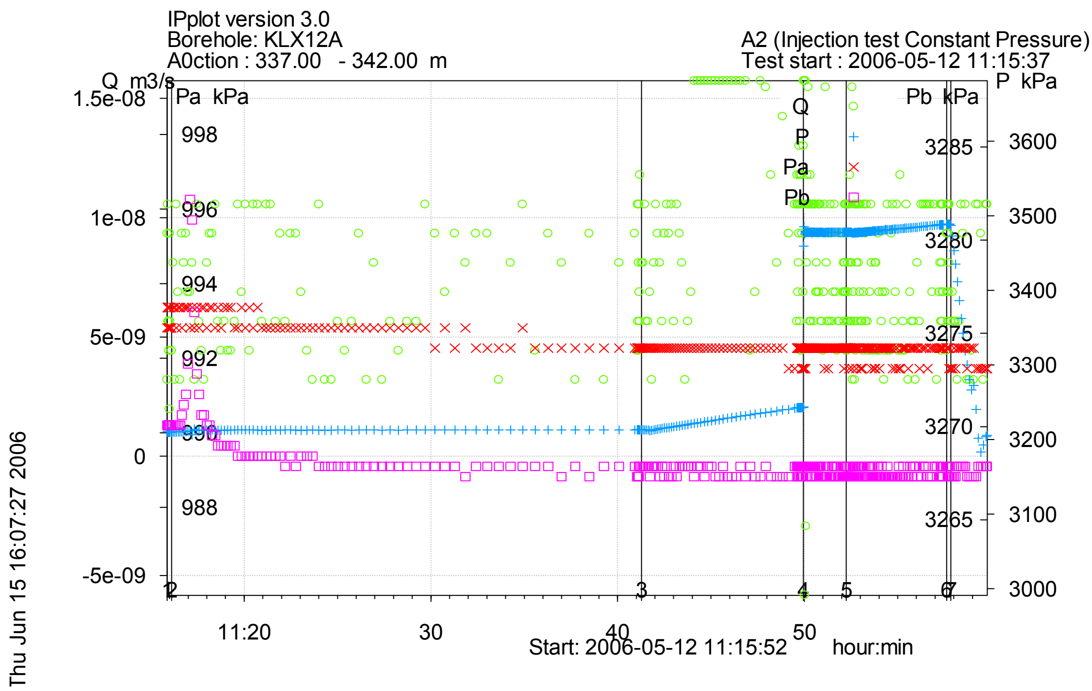

Figure A3-168. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 337.0-342.0 m in borehole KLX12A.*

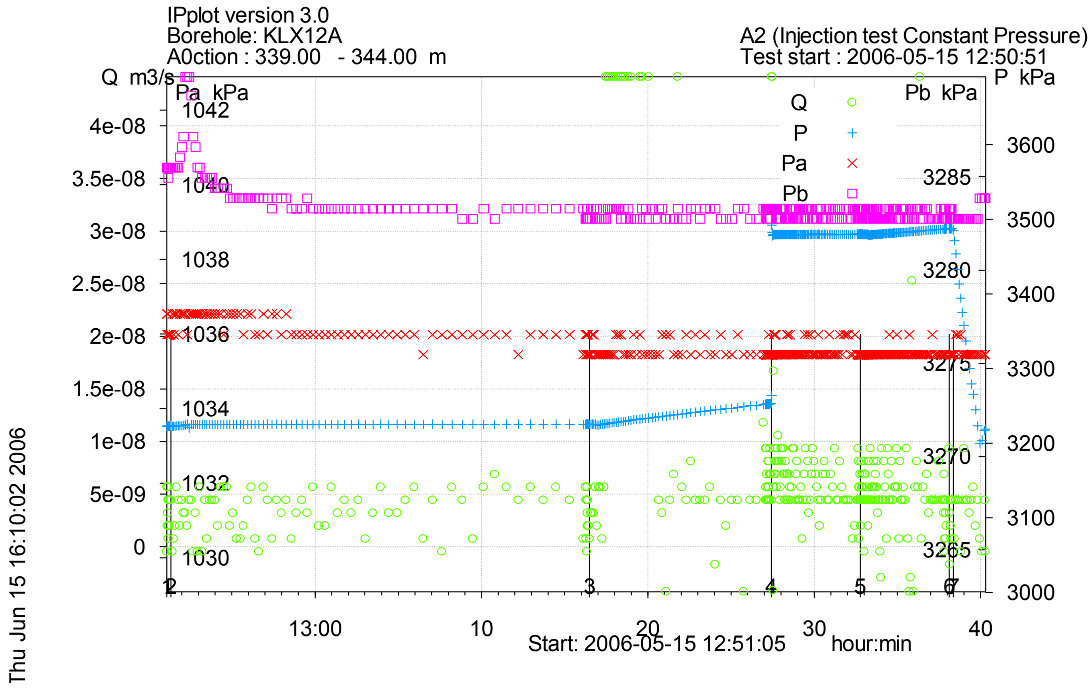

Figure A3-169. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 339.0-344.0 m in borehole KLX12A.*

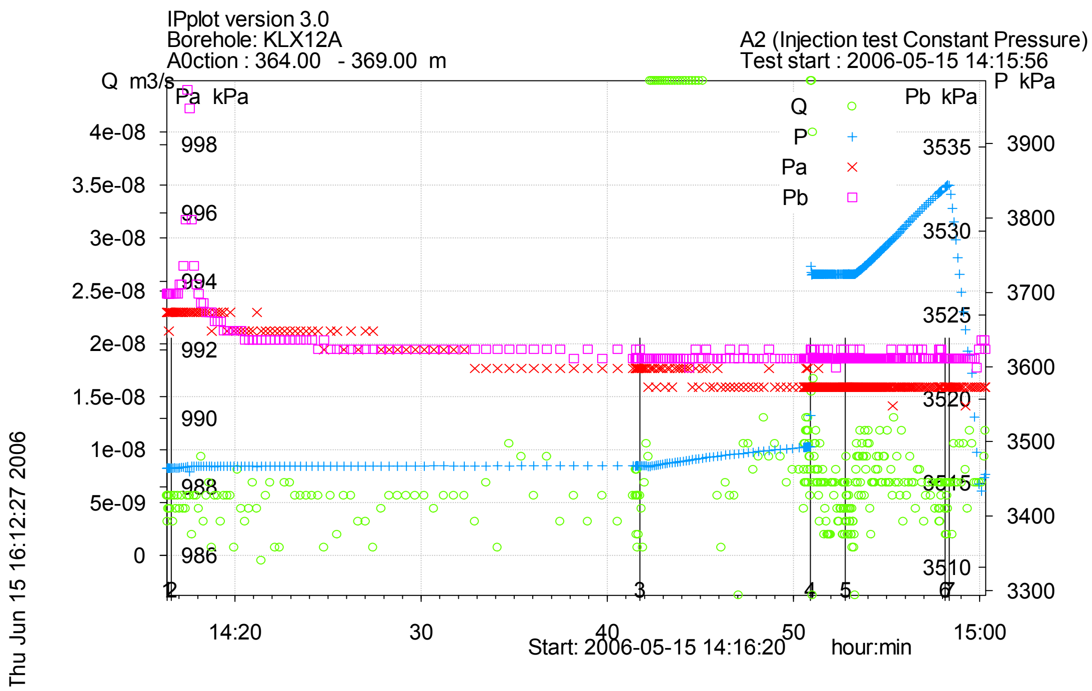

Figure A3-170. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 364.0-371.0 m in borehole KLX12A.*

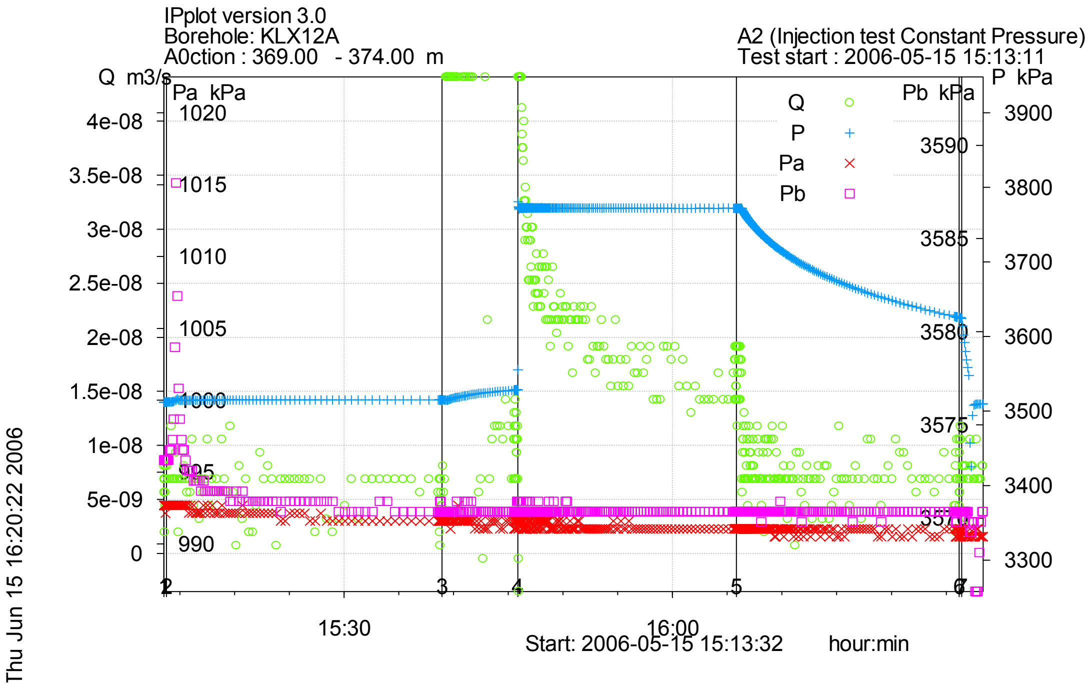

Figure A3-171. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 369.0-374.0 m in borehole KLX12A.*

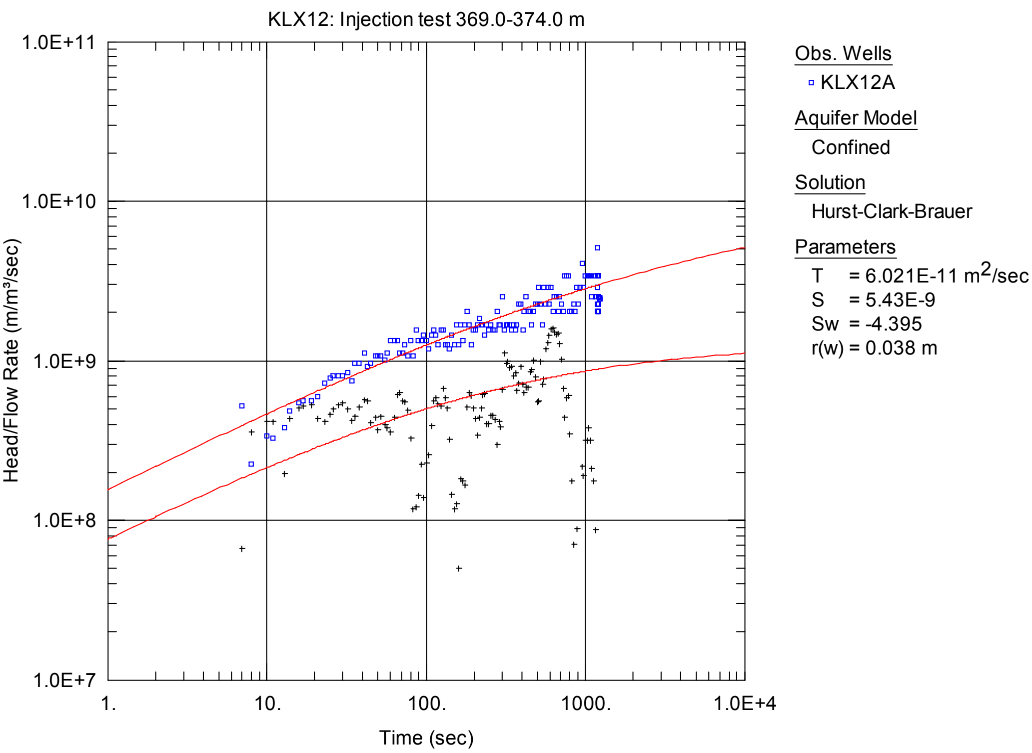

Figure A3-172. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 369.0-374.0 m in KLX12A.*

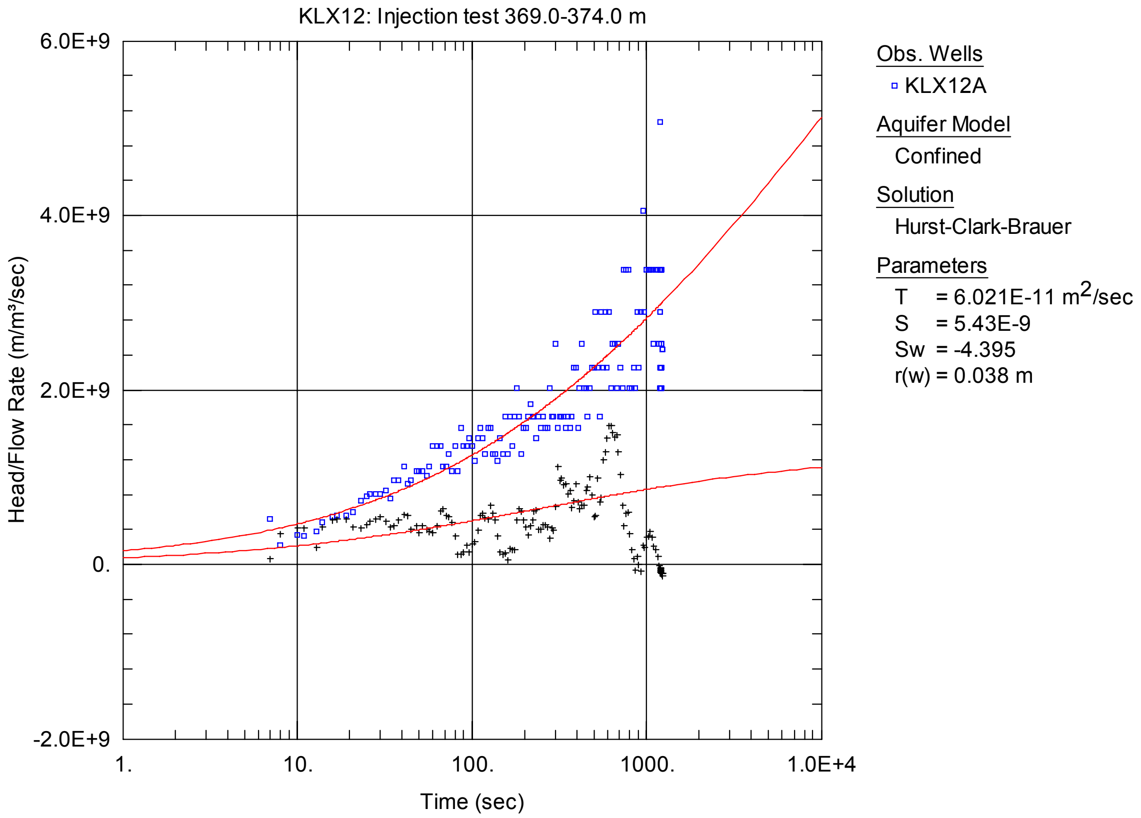

Figure A3-173. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hurst solution, from the injection test in section 369.0-374.0 m in KLX12A.*

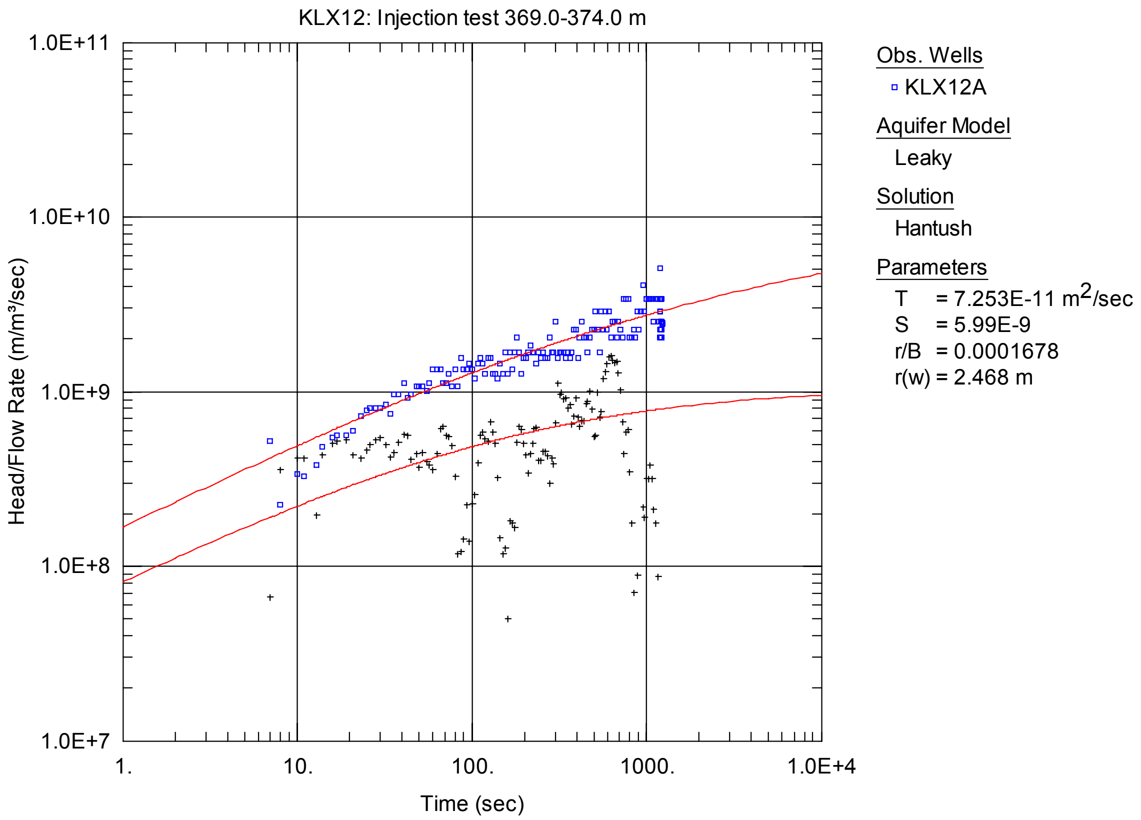

Figure A3-174. *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hantush solution, from the injection test in section 369.0-374.0 m in KLX12A.*

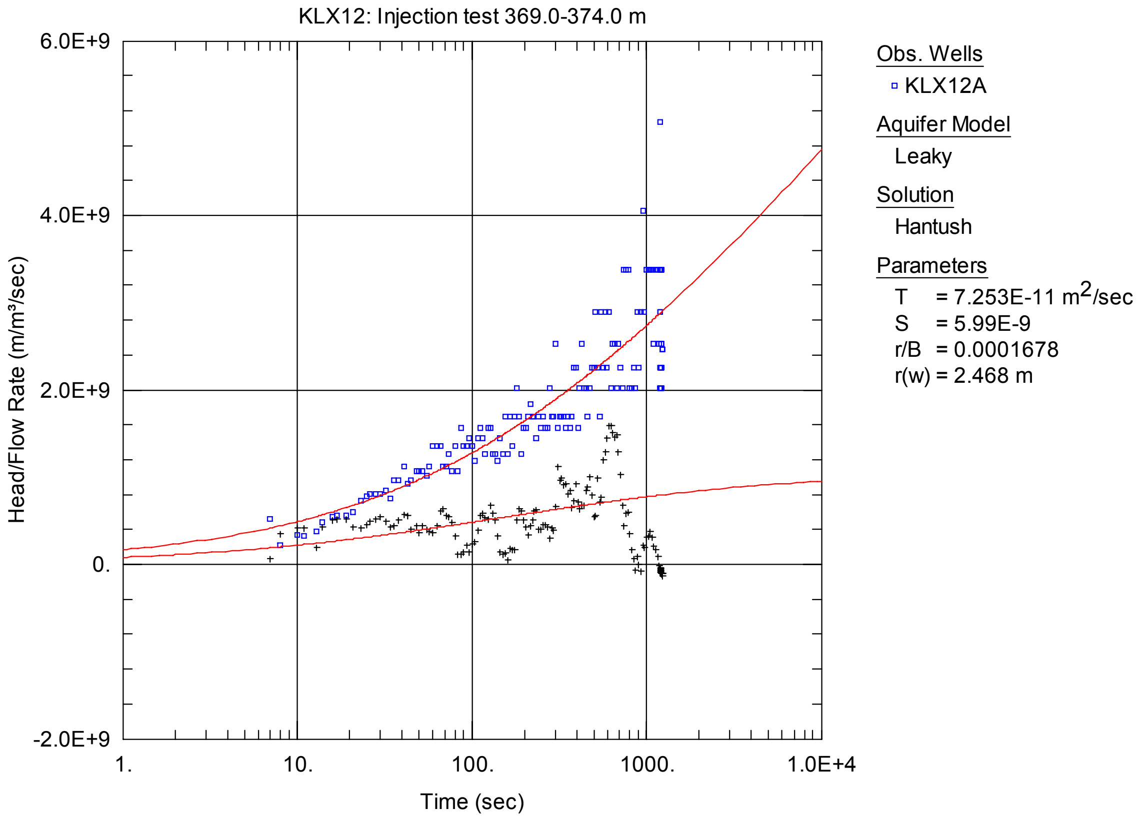

Figure A3-175. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to the Hantush solution, from the injection test in section 369.0-374.0 m in KLX12A.*

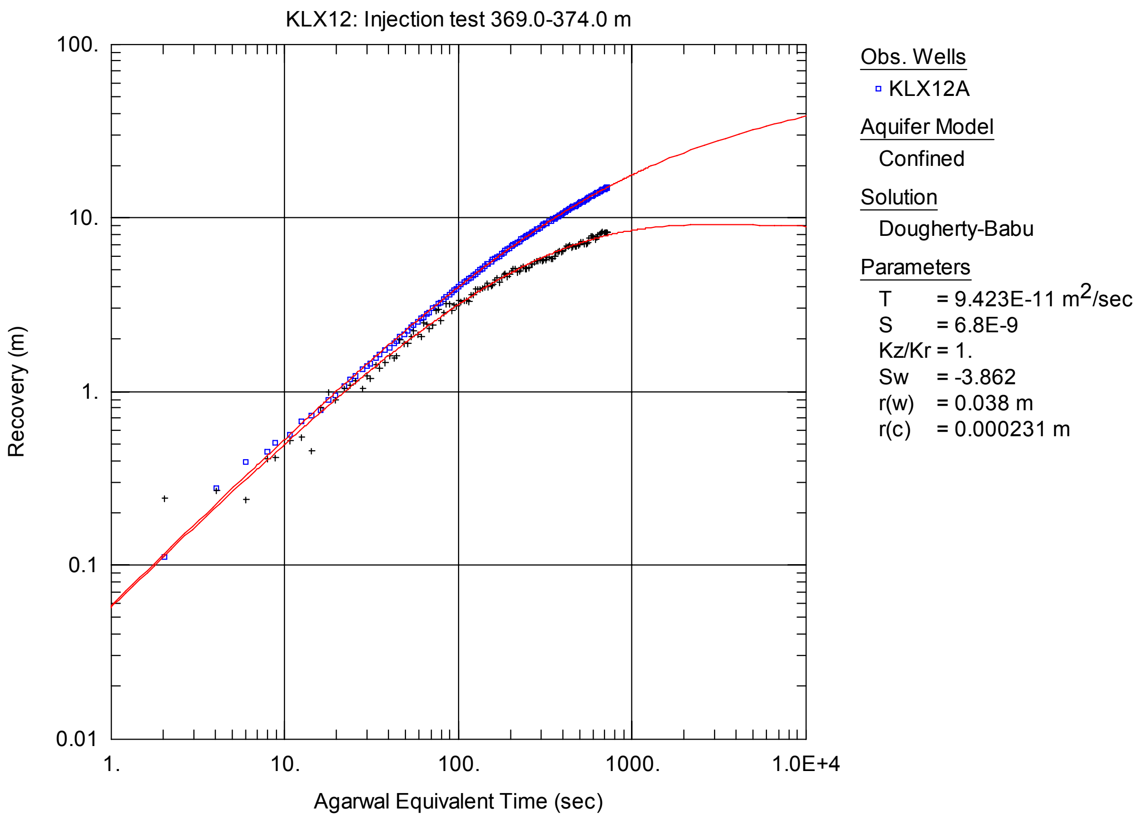

Figure A3-176. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 369.0-374.0 m in KLX12A.*

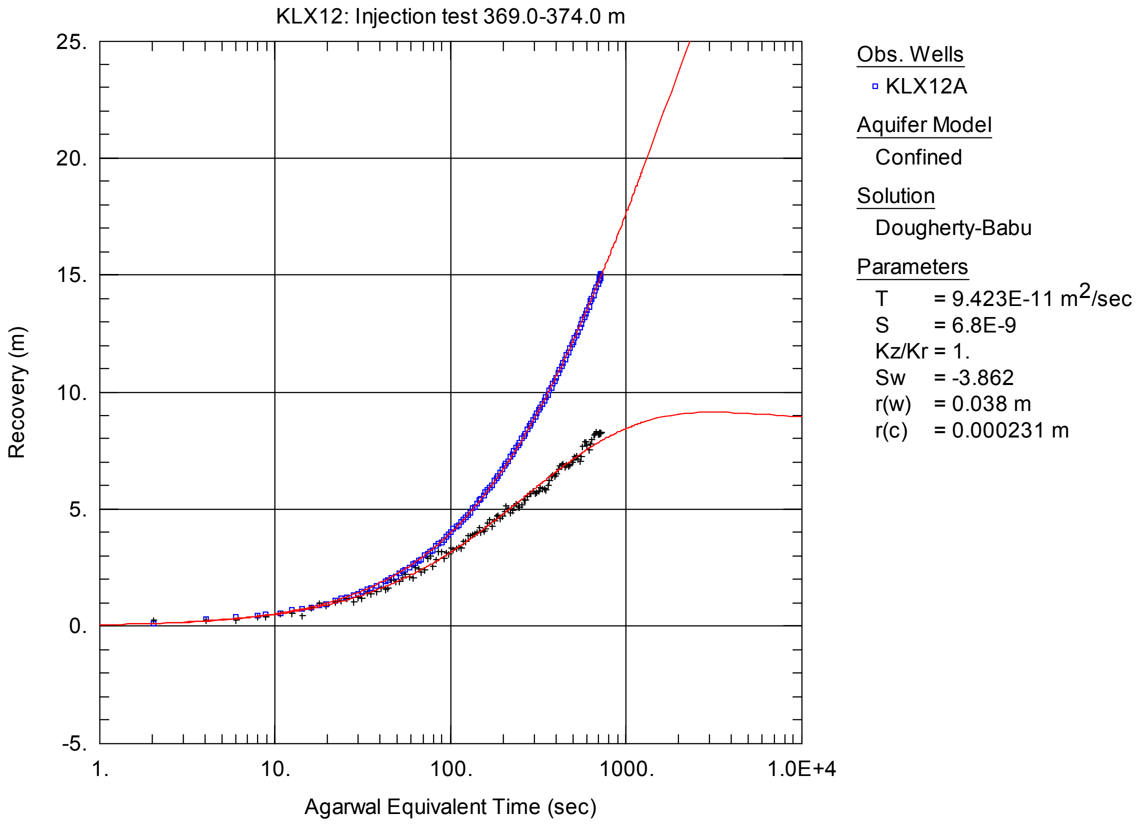

Figure A3-177. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 369.0-374.0 m in KLX12A.*

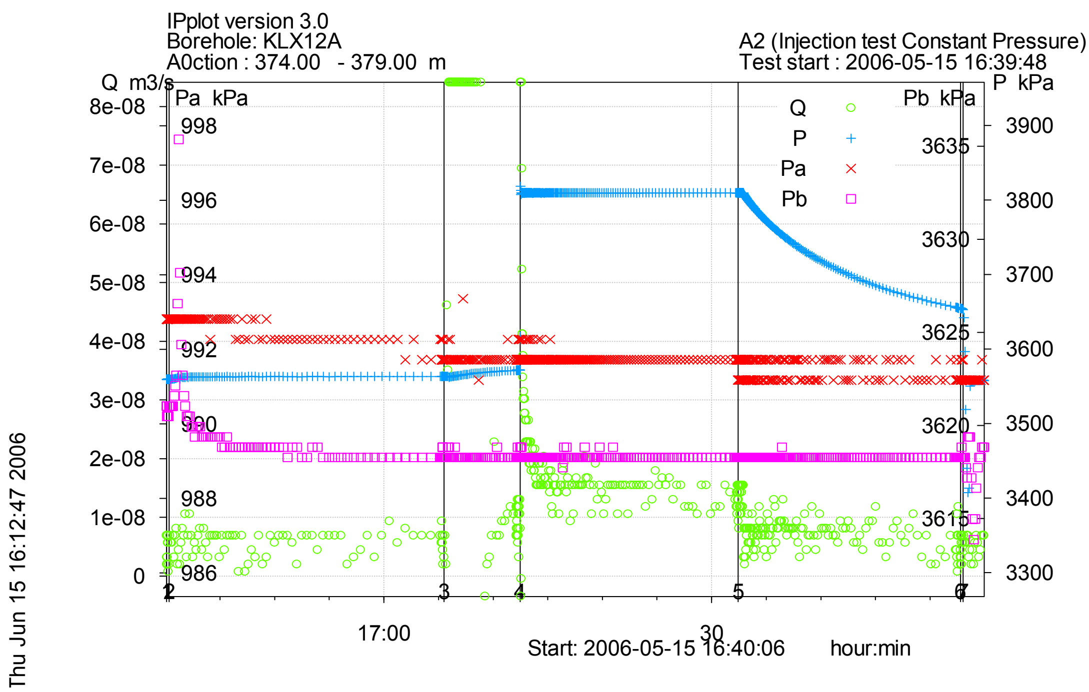

Figure A3-178. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 374.0-379.0 m in borehole KLX12A.*

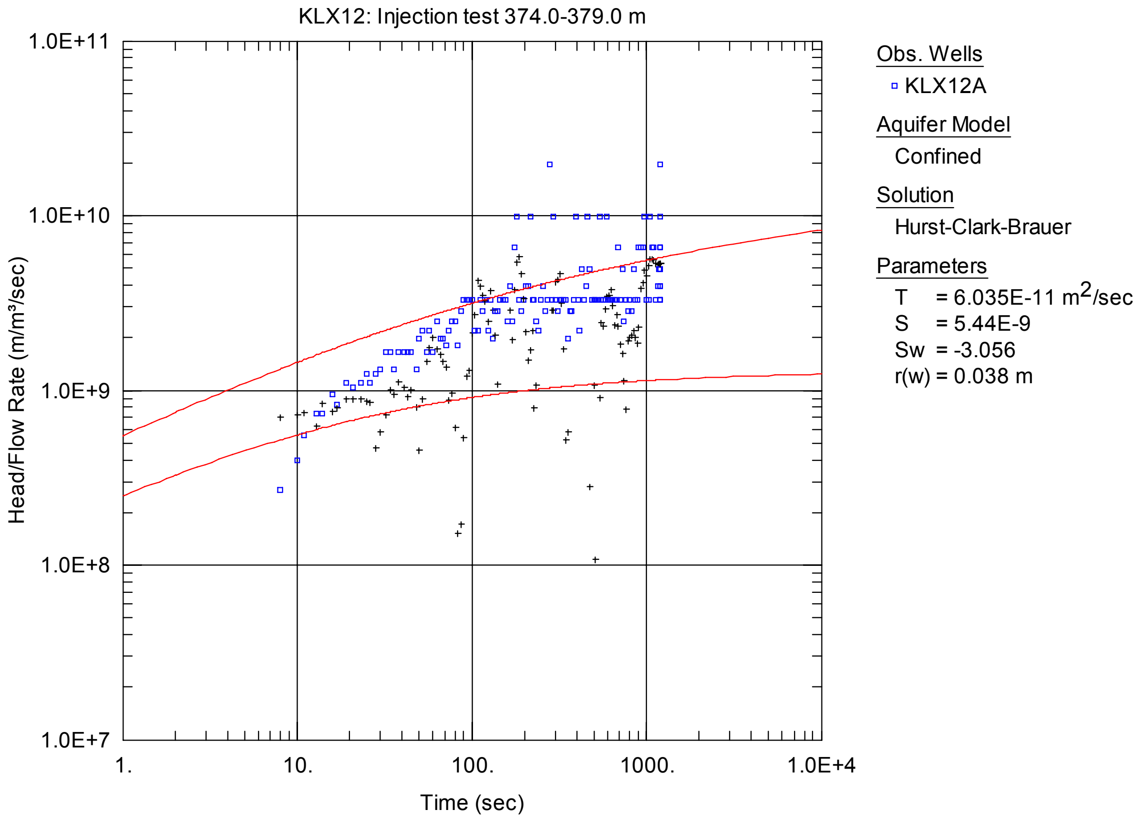

Figure A3-179. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 374.0-379.0 m in KLX12A.*

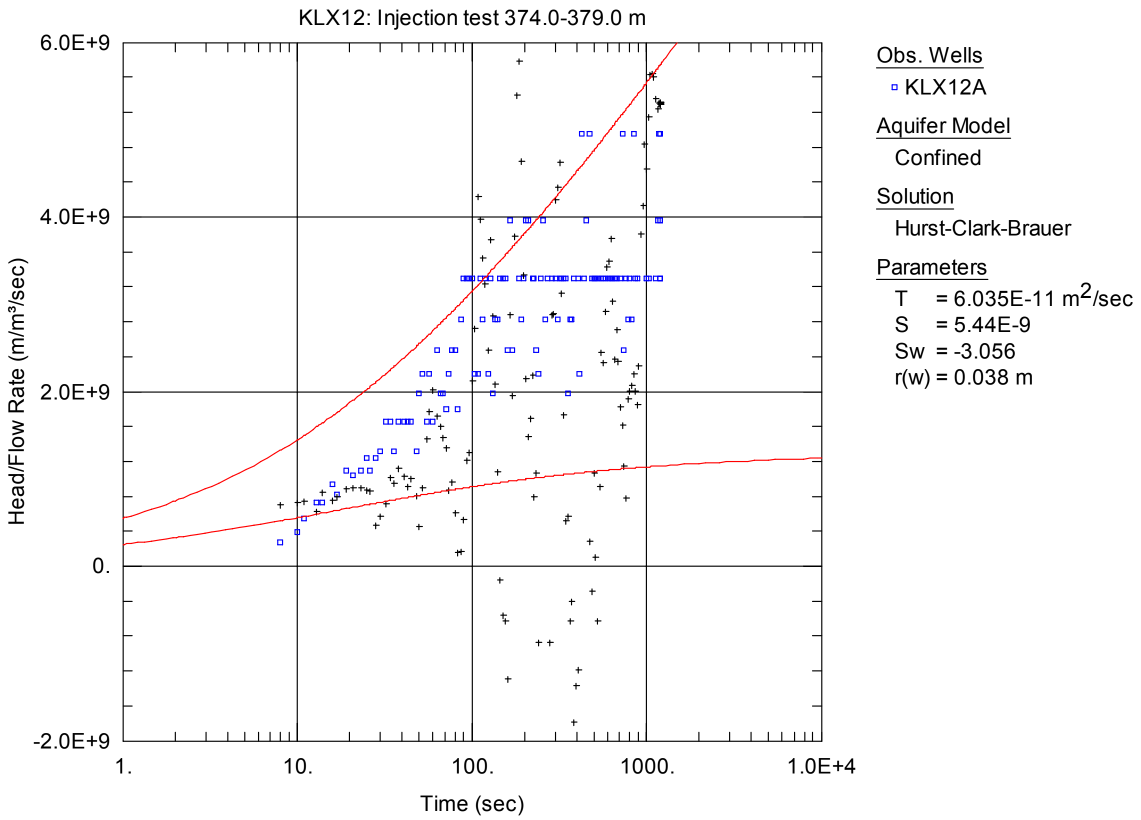

Figure A3-180. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 374.0-379.0 m in KLX12A.*

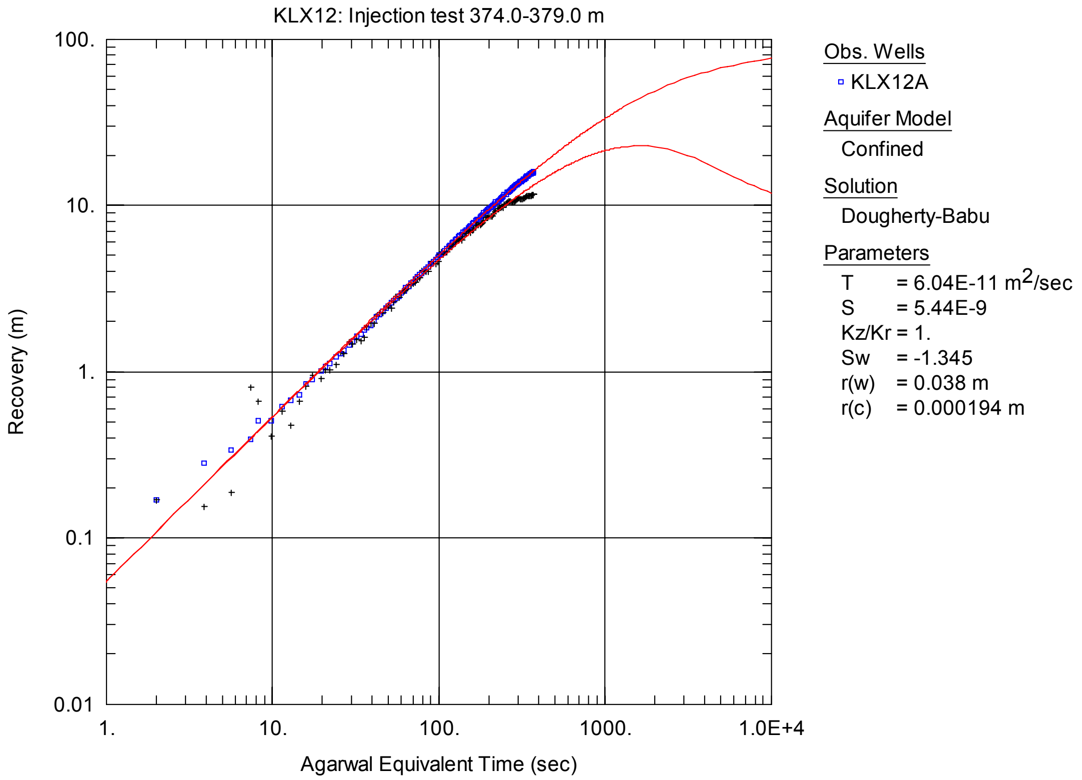

Figure A3-181. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 374.0-379.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

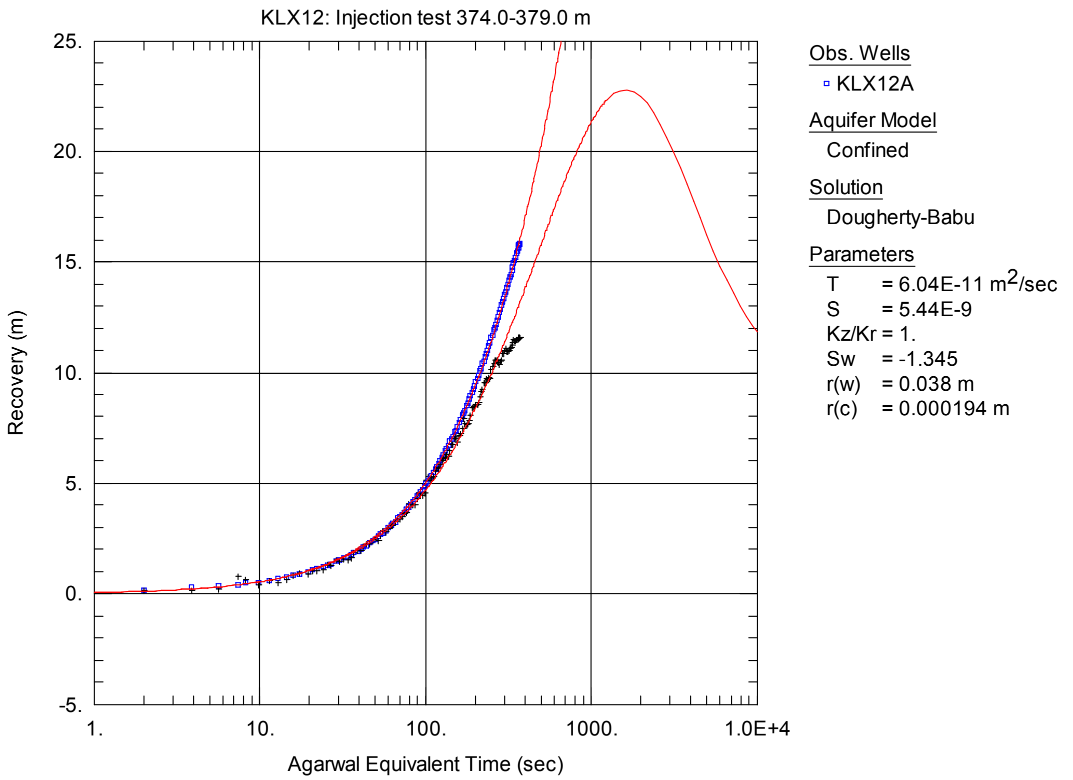

Figure A3-182. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 374.0-379.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

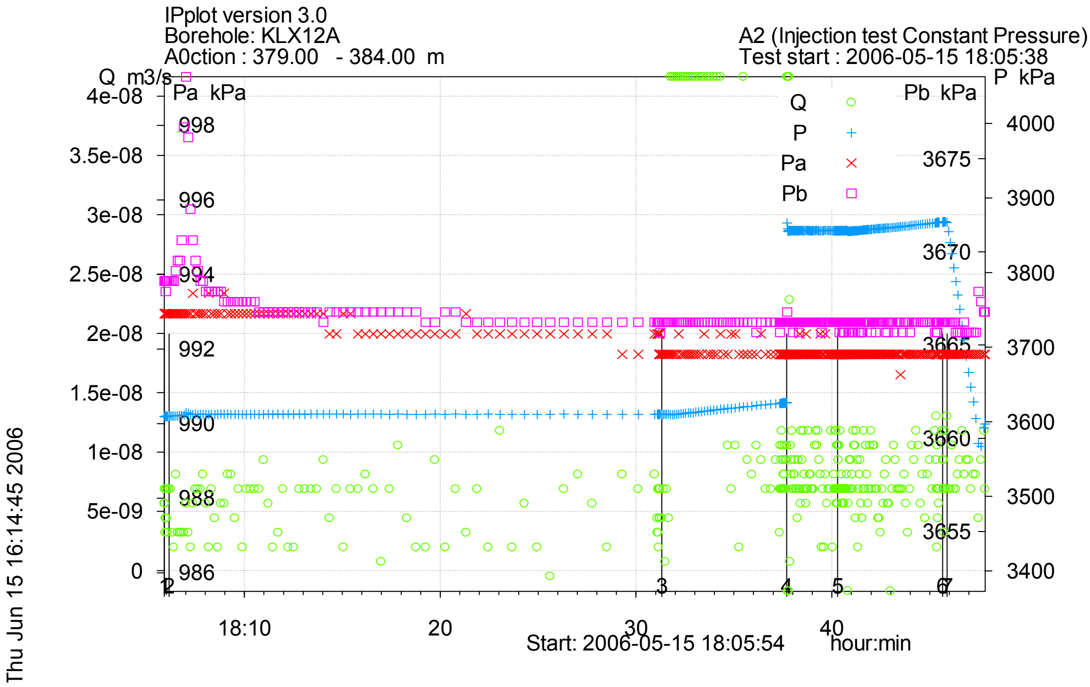

Figure A3-183. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 379.0-384.0 m in borehole KLX12A.*

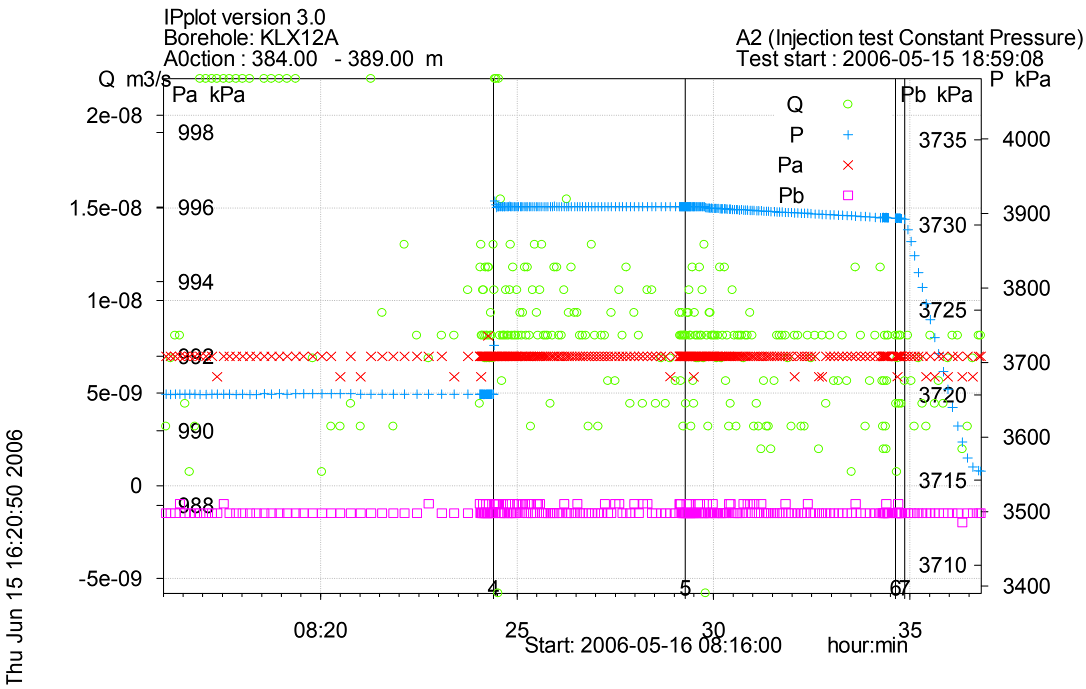

Figure A3-184. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 384.0-389.0 m in borehole KLX12A.*

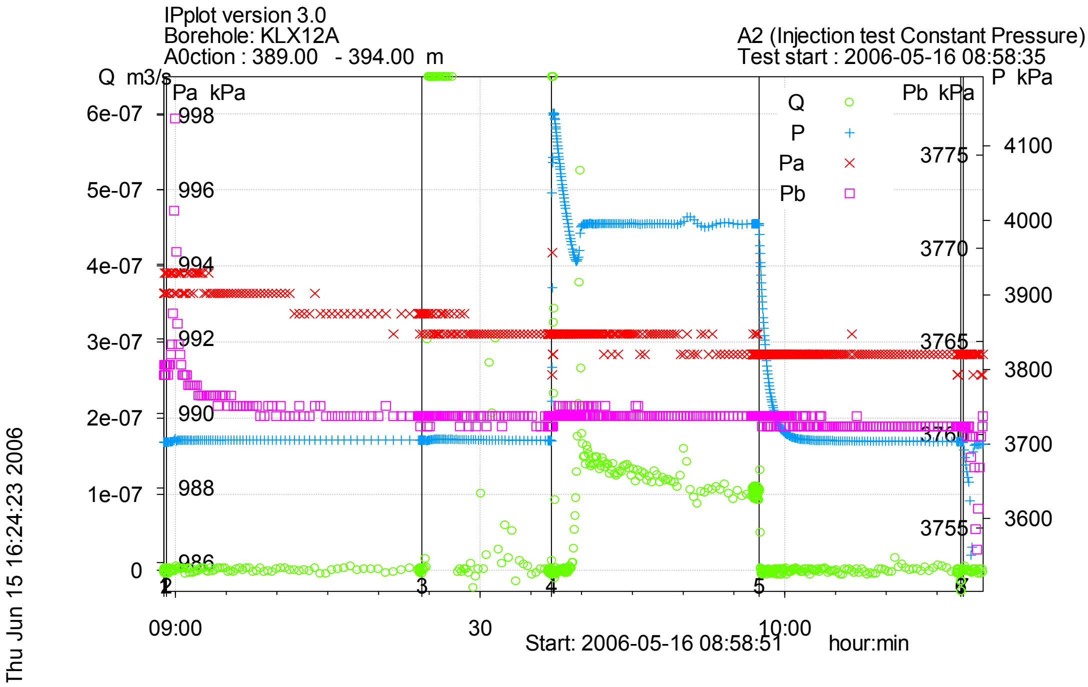

***Figure A3-185.** Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 389.0-394.0 m in borehole KLX12A.*

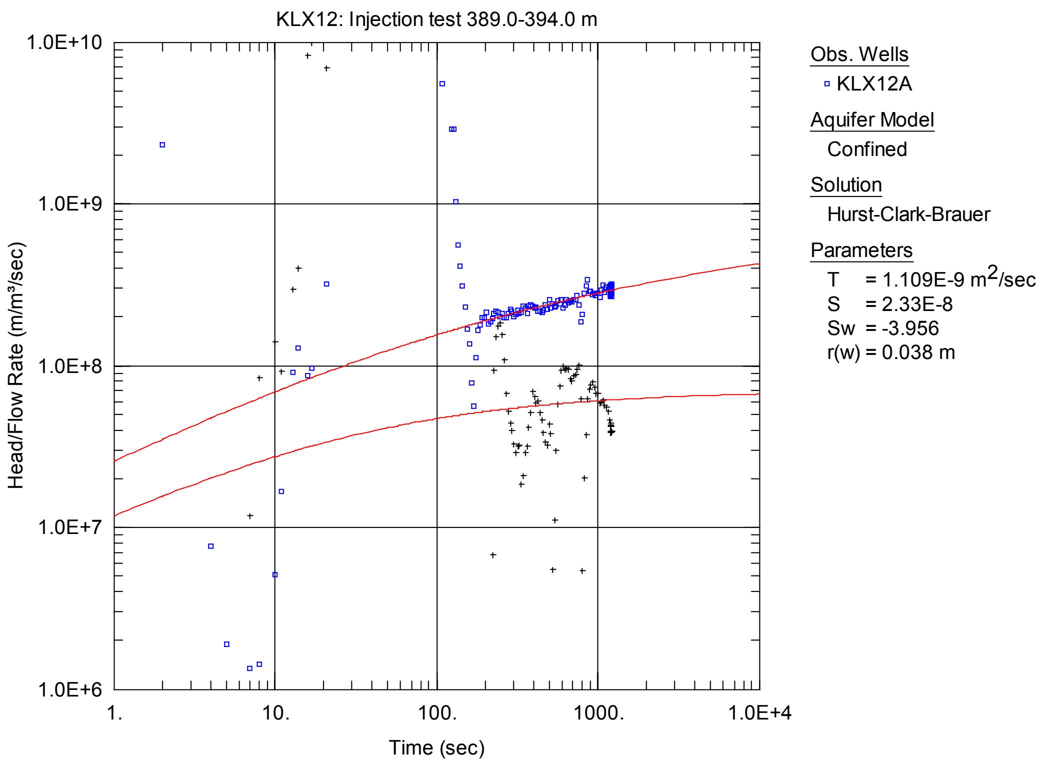

***Figure A3-186.** Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 389.0-394.0 m in KLX12A.*

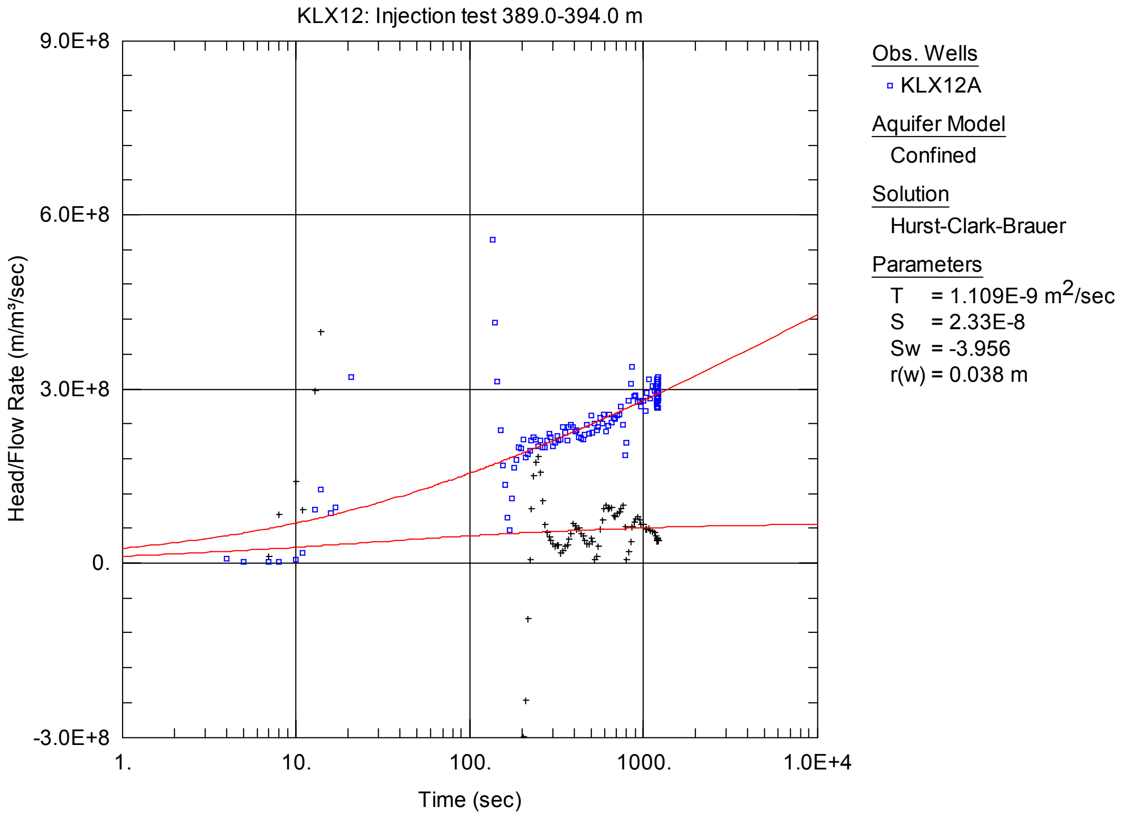

***Figure A3-187.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 389.0-394.0 m in KLX12A.*

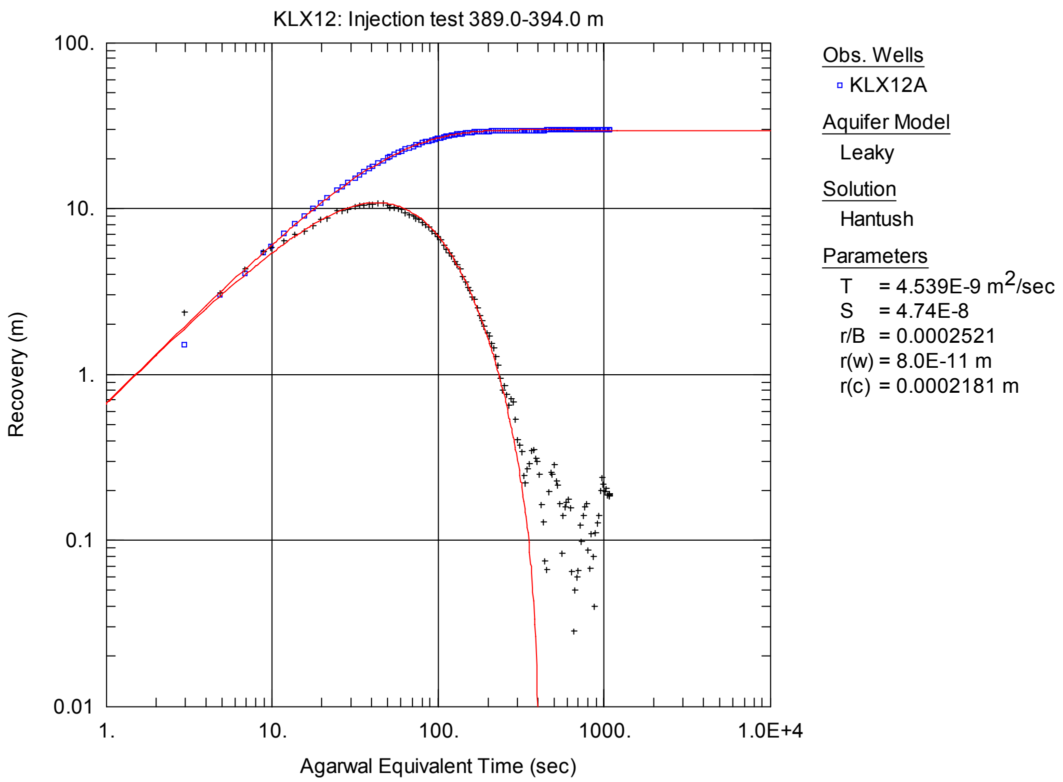

***Figure A3-188.** Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 389.0-394.0 m in KLX12. The type curve fit is showing a possible, however not unambiguous, evaluation.*

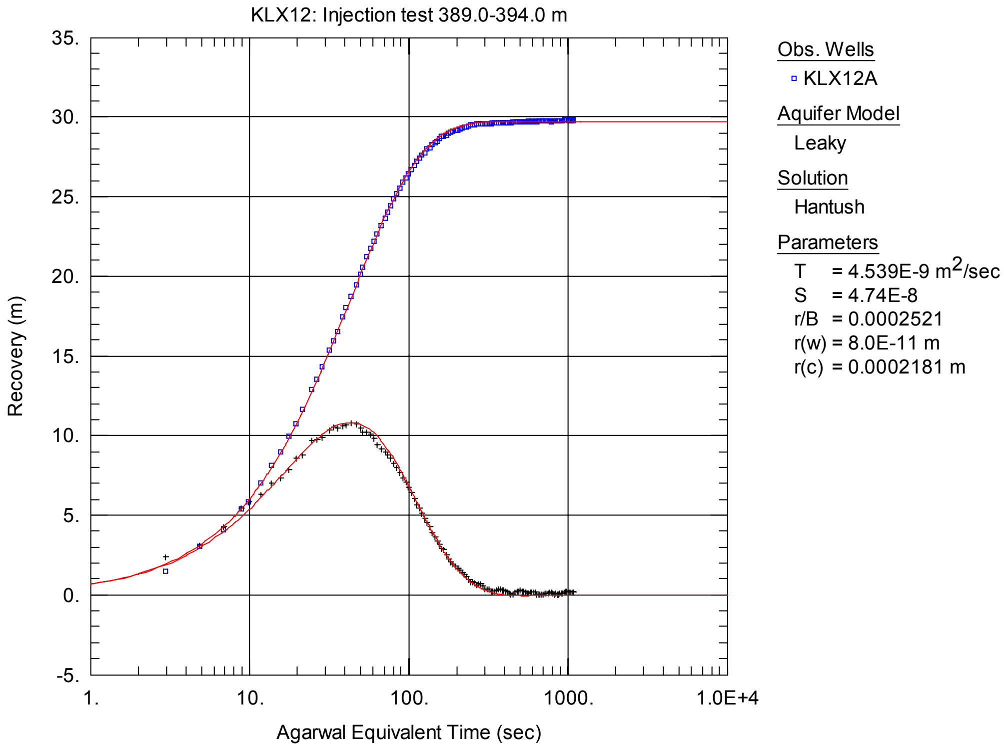

Figure A3-189. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 389.0-394.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

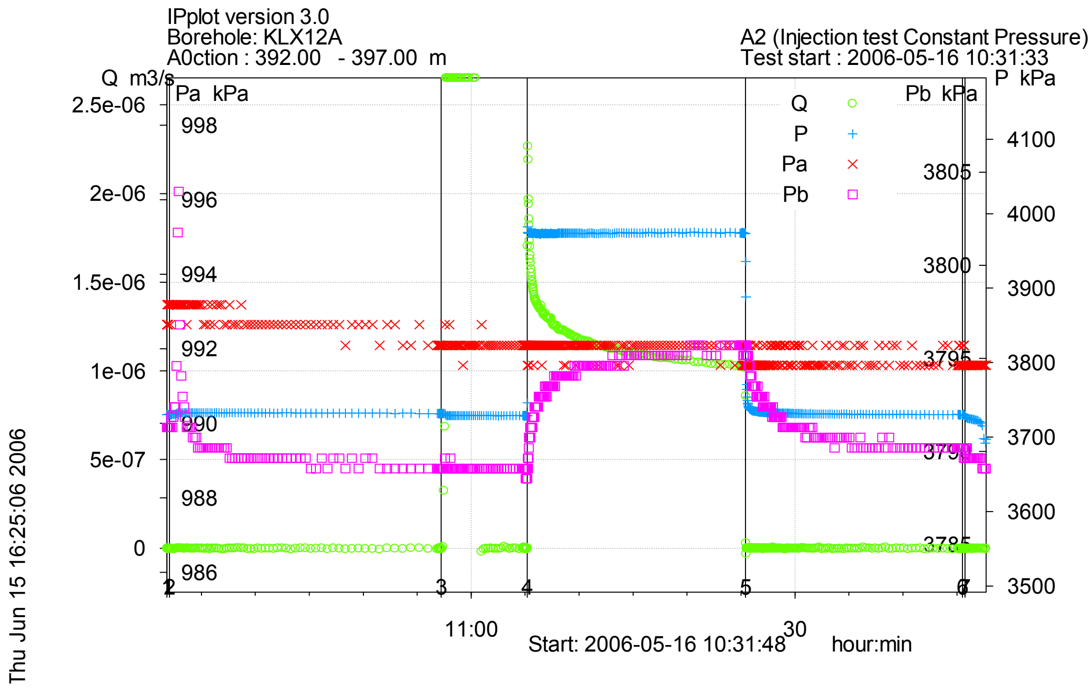

Figure A3-190. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 392.0-397.0 m in borehole KLX12A.*

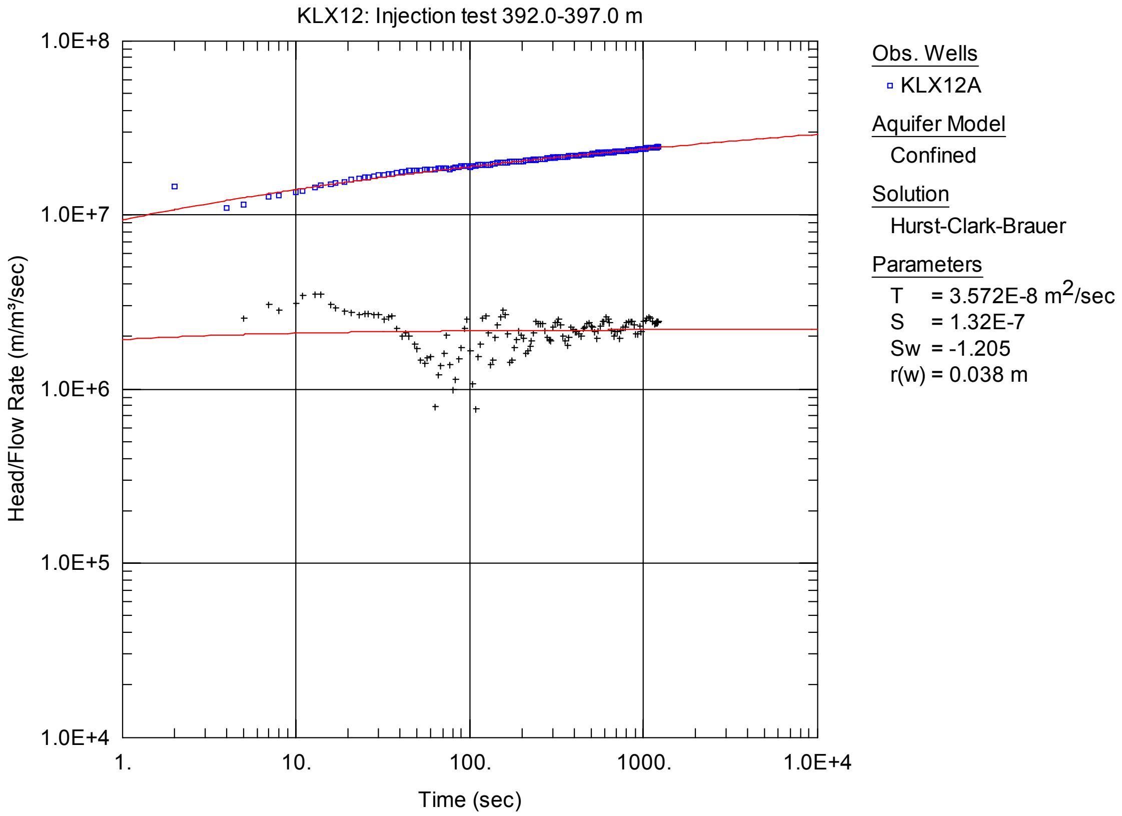

Figure A3-191. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 392.0-397.0 m in KLX12A.*

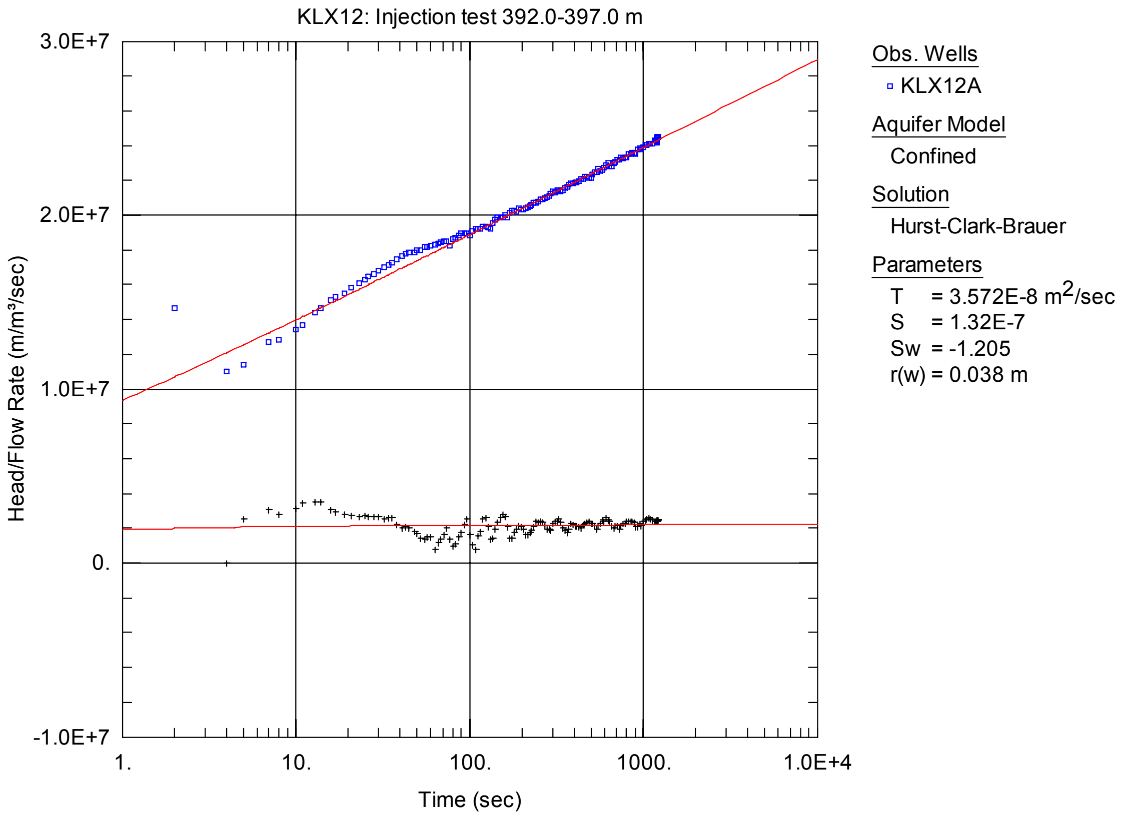

Figure A3-192. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 392.0-397.0 m in KLX12A.*

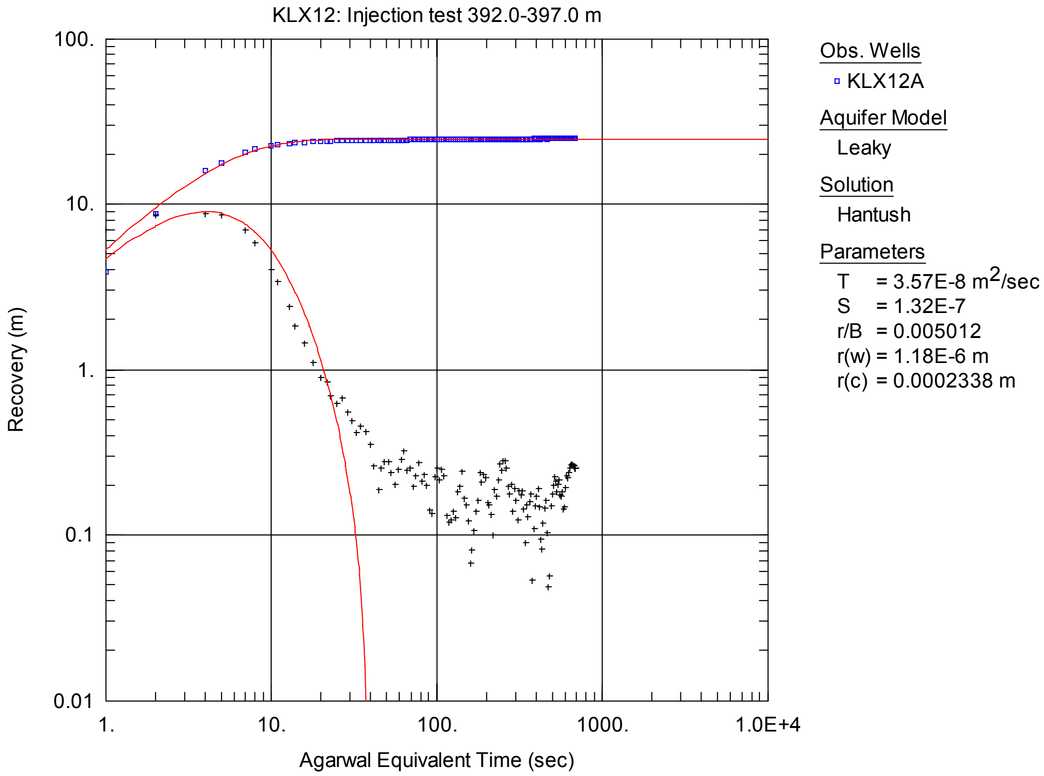

Figure A3-193. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 392.0-397.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

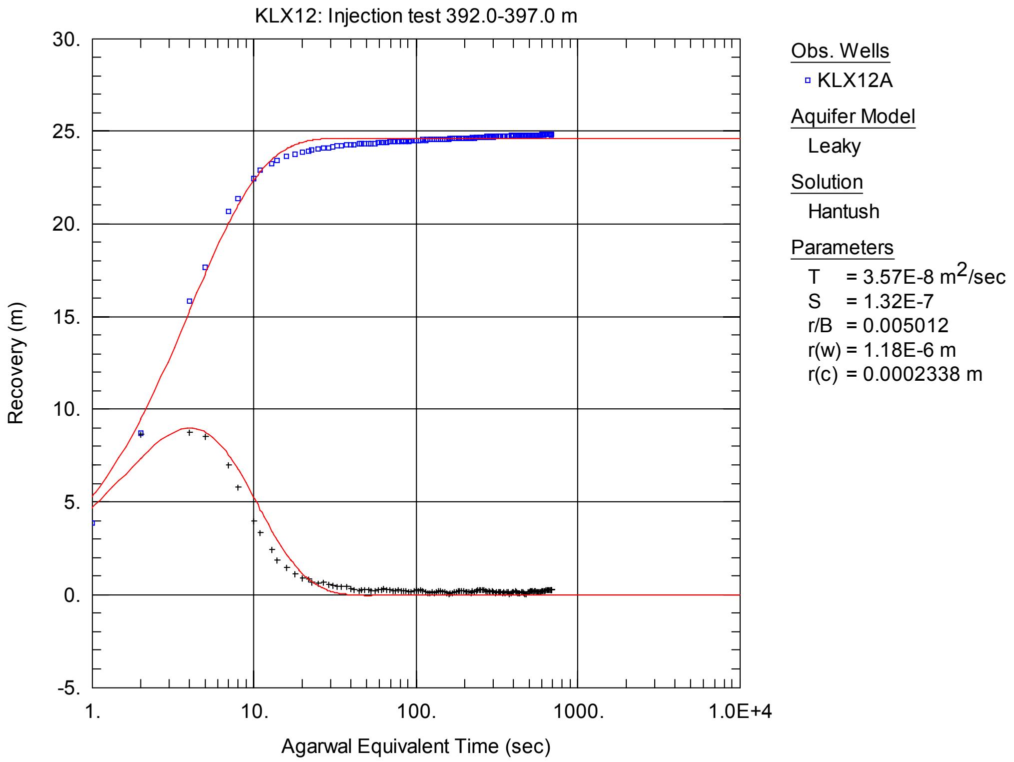

Figure A3-194. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 392.0-397.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

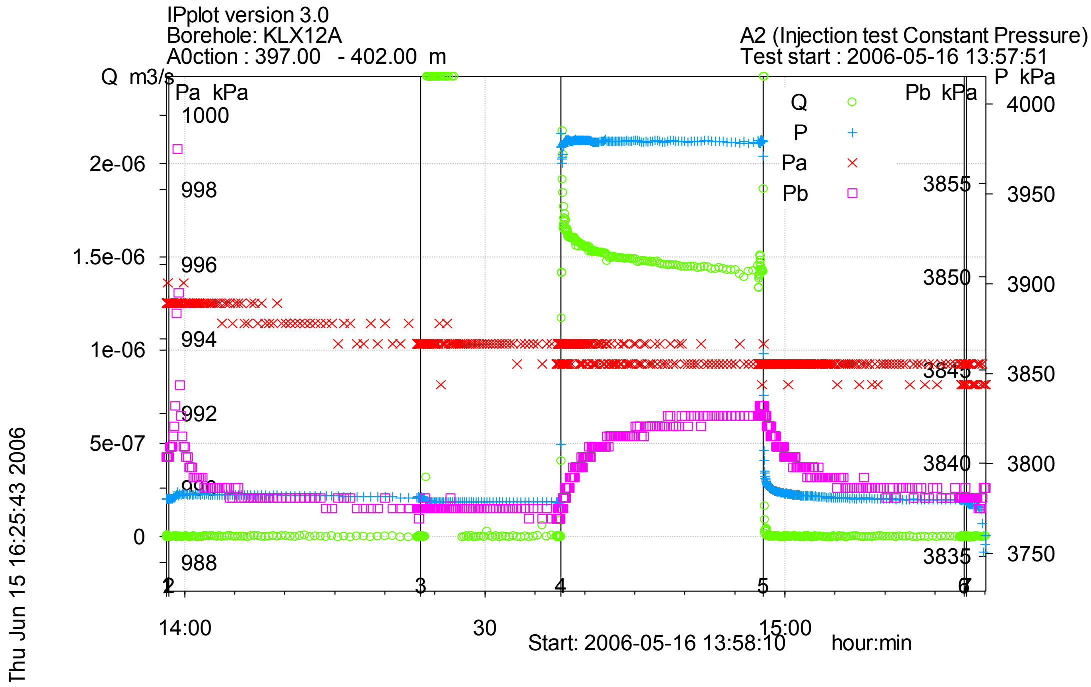

Figure A3-195. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 397.0-402.0 m in borehole KLX12A.*

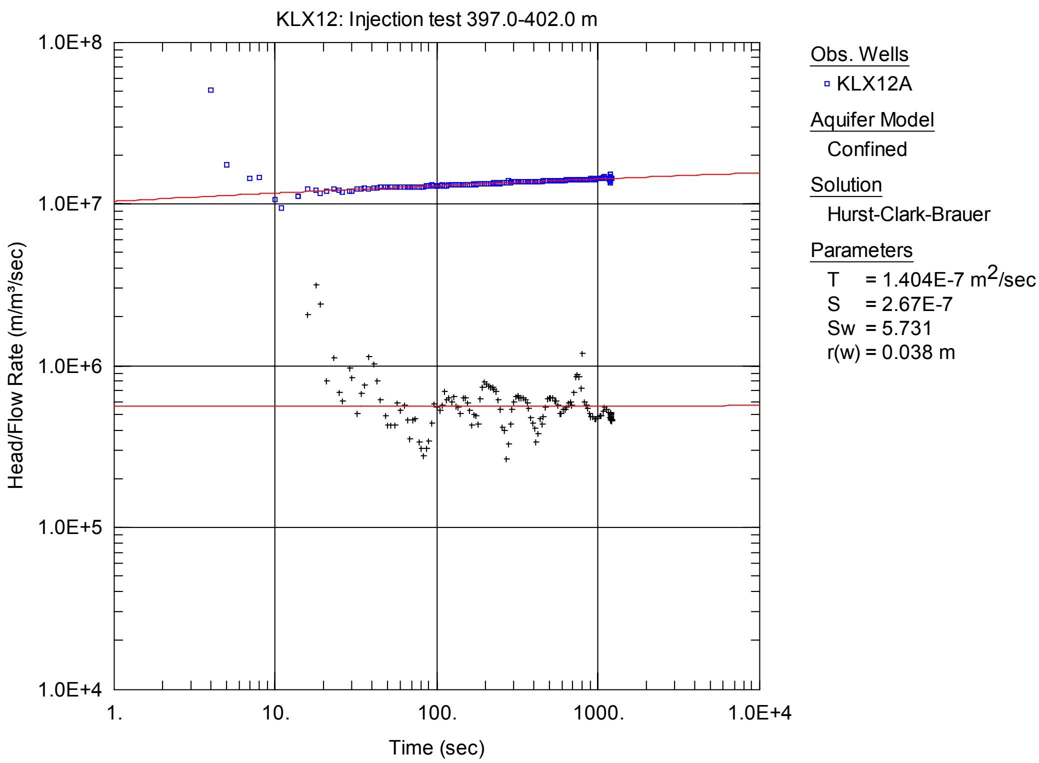

Figure A3-196. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 397.0-402.0 m in KLX12A.*

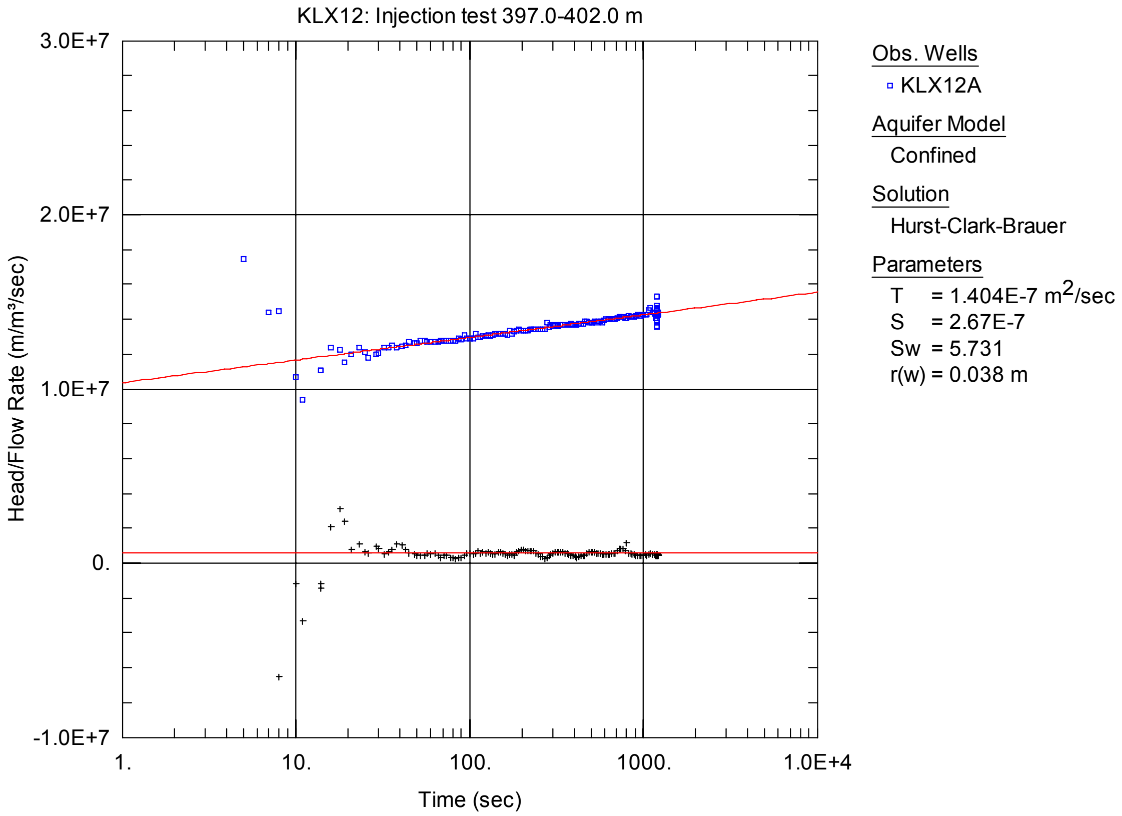

Figure A3-197. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 397.0-402.0 m in KLX12A.*

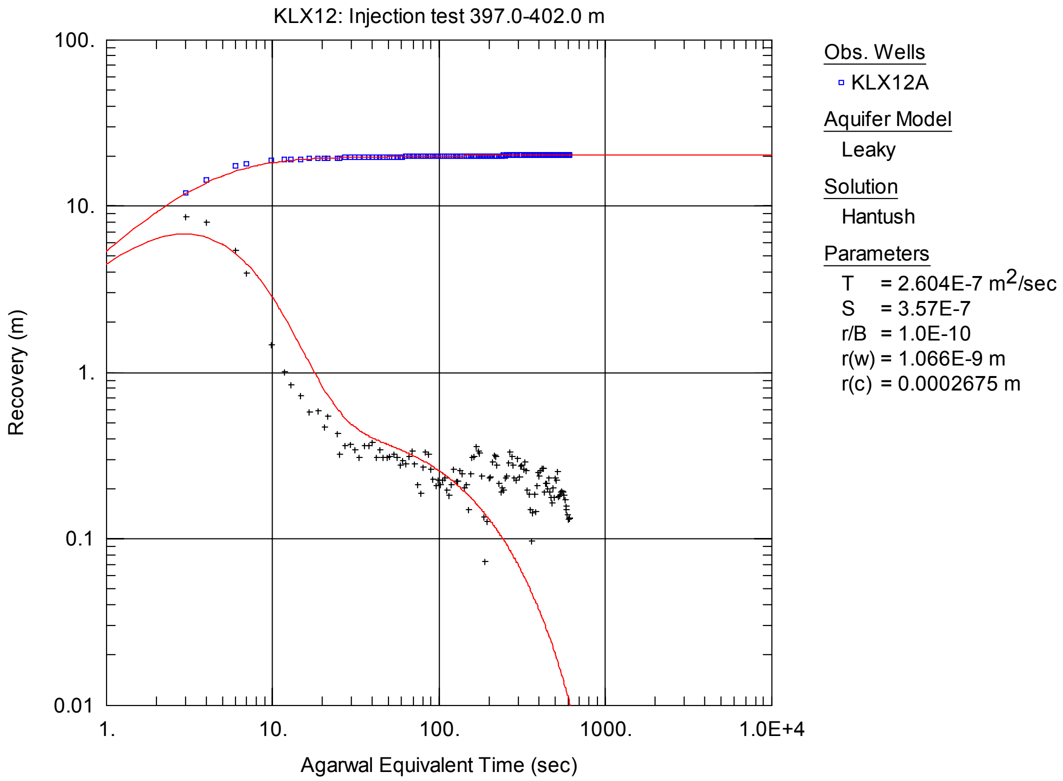

Figure A3-198. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 397.0-402.0 m in KLX12A. The type curve is showing a possible, however not unambiguous, evaluation.*

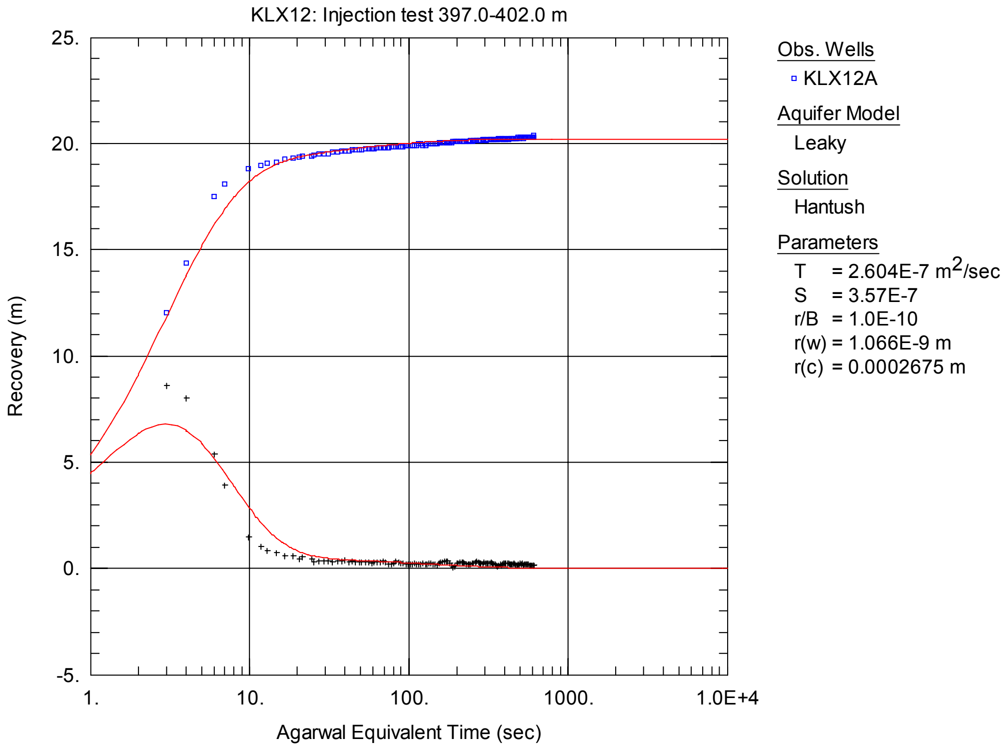

Figure A3-199. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 397.0-402.0 m in KLX12A. The type curve is showing a possible, however not unambiguous, evaluation.*

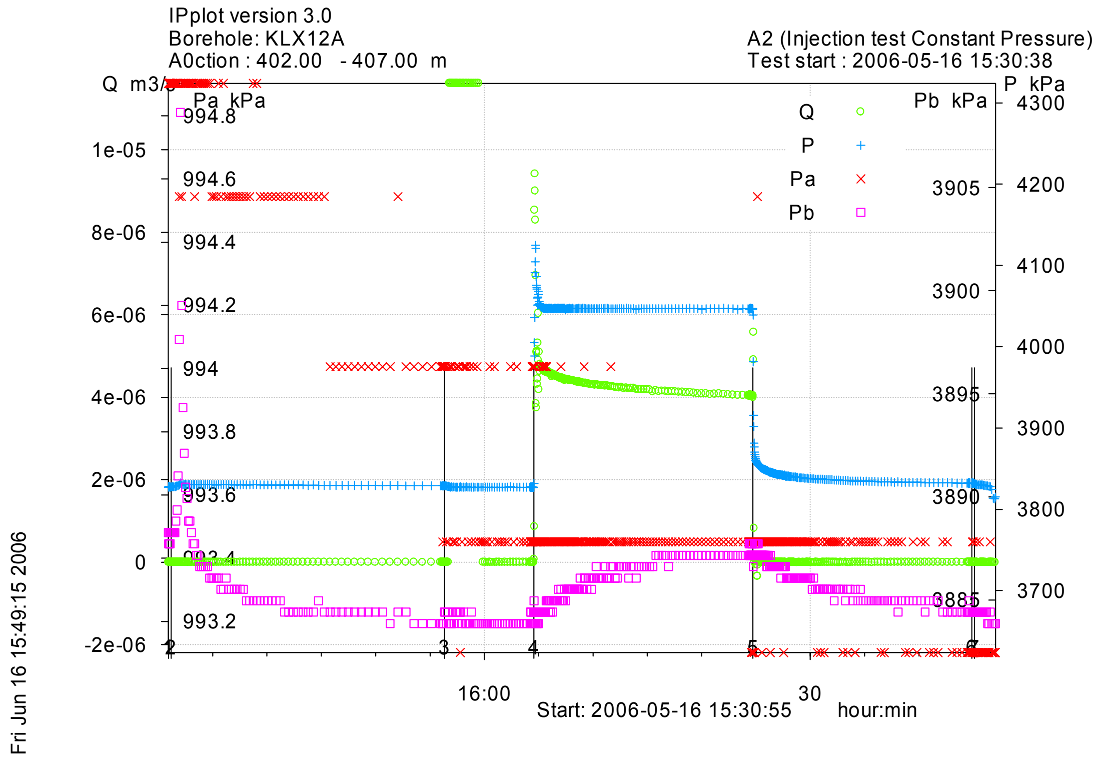

Figure A3-200. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 402.0-407.0 m in borehole KLX12A.*

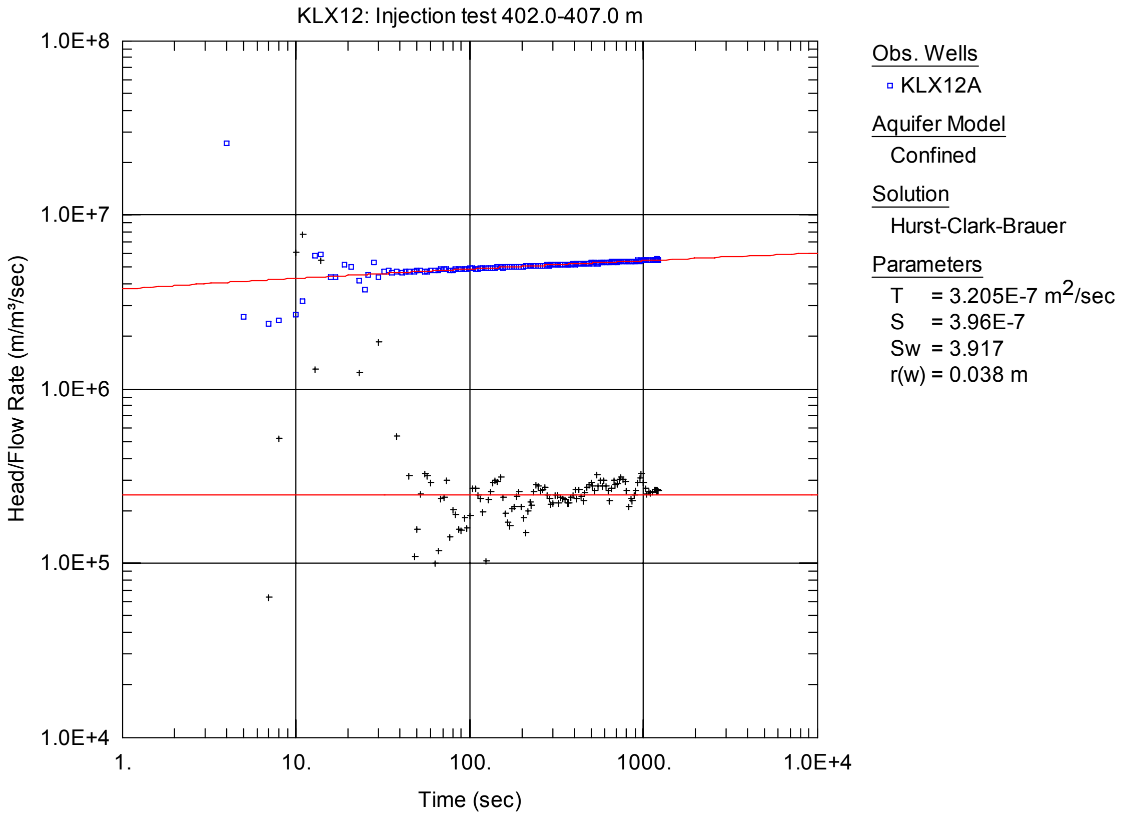

Figure A3-201. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 402.0-407.0 m in KLX12A.*

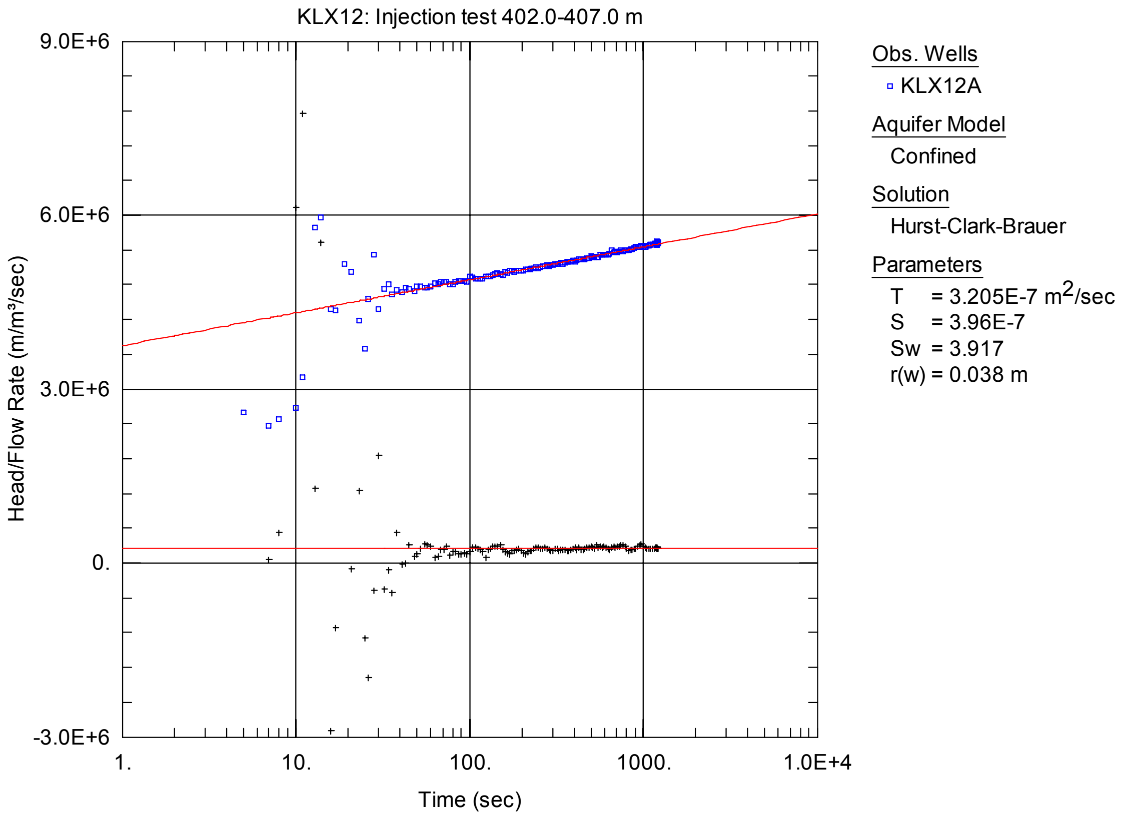

Figure A3-202. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 402.0-407.0 m in KLX12A.*

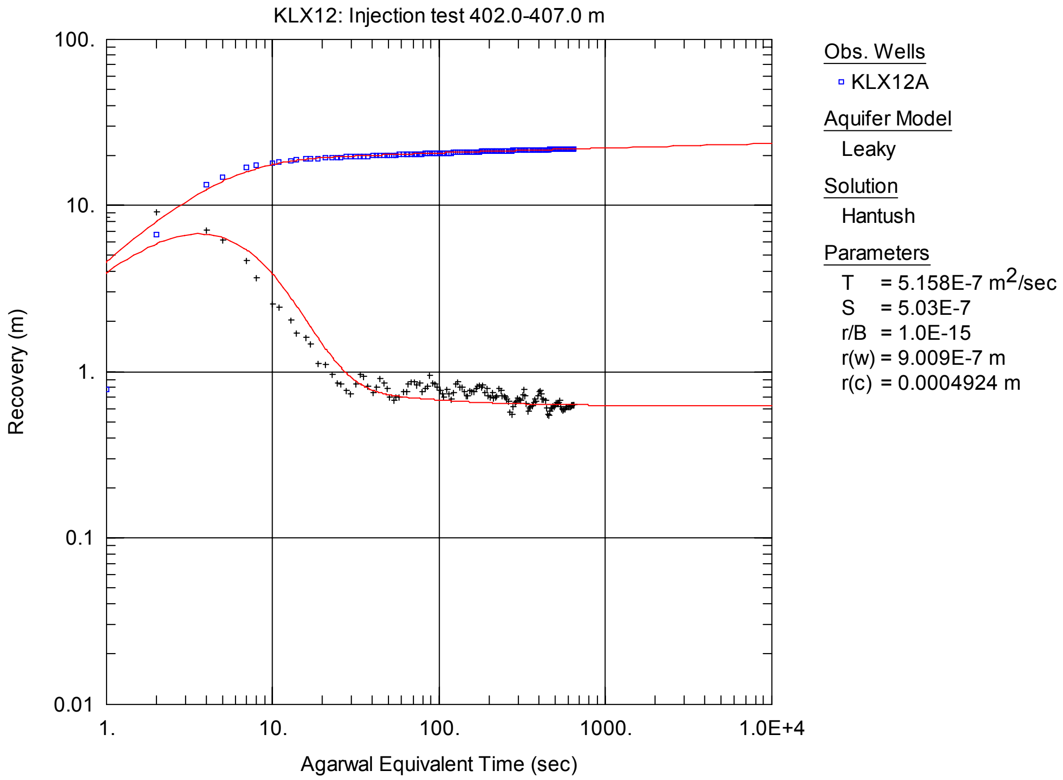

Figure A3-203. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Hantush solution, from the injection test in section 402.0-407.0 m in KLX12A.*

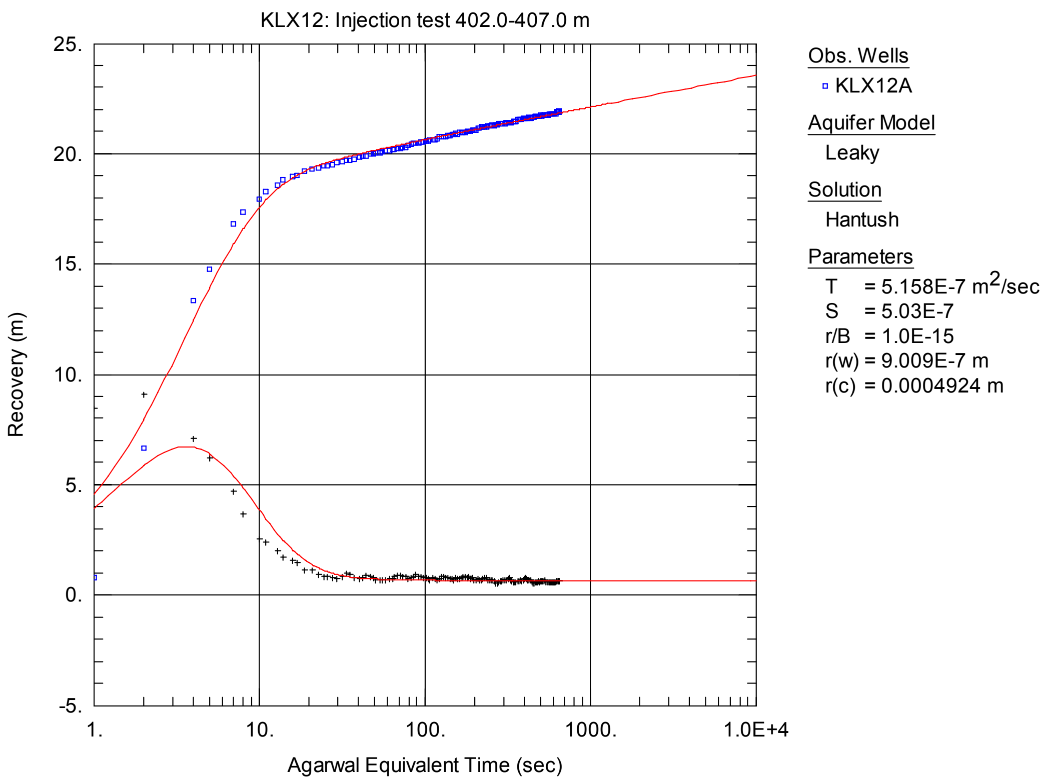

Figure A3-204. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Hantush solution, from the injection test in section 402.0-407.0 m in KLX12A.*

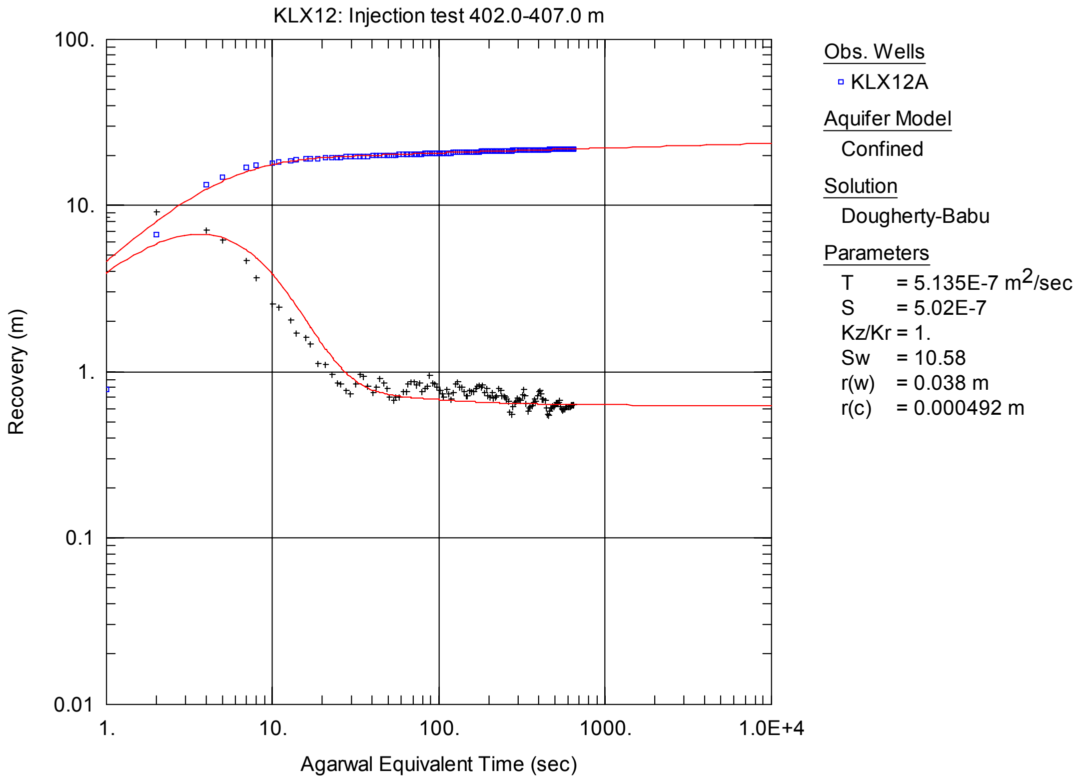

Figure A3-205. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Dougherty-Babu solution, from the injection test in section 402.0-407.0 m in KLX12A.*

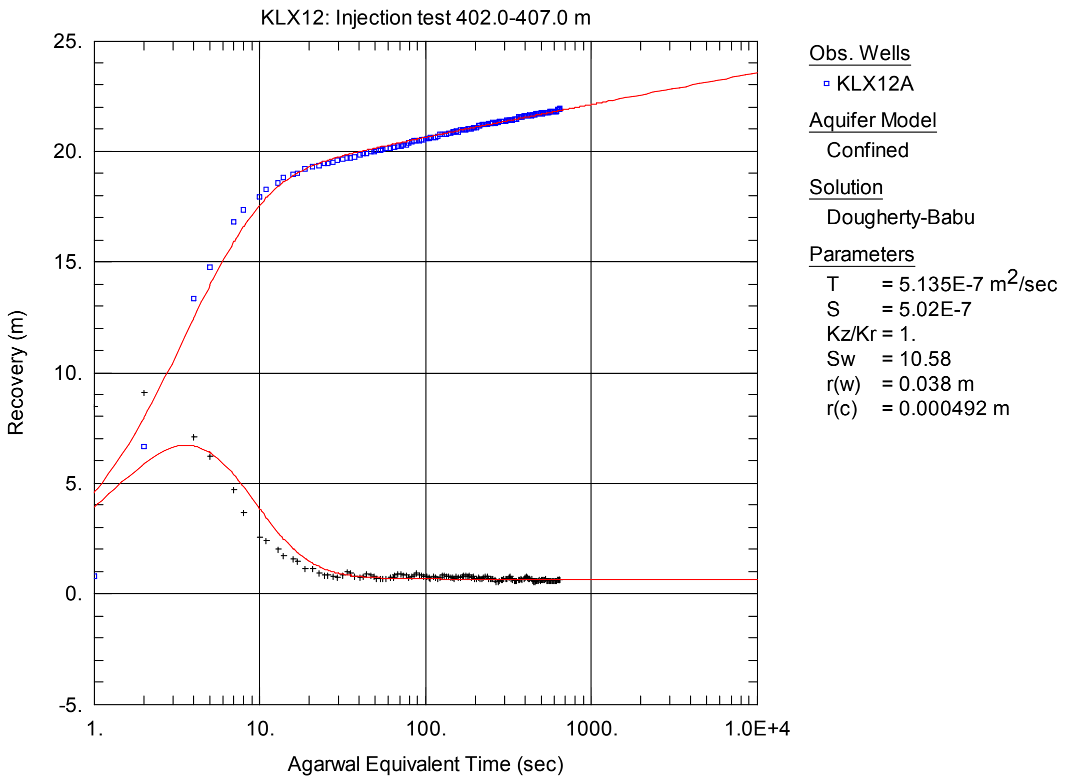

Figure A3-206. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, showing fit to the Dougherty-Babu solution, from the injection test in section 402.0-407.0 m in KLX12A.*

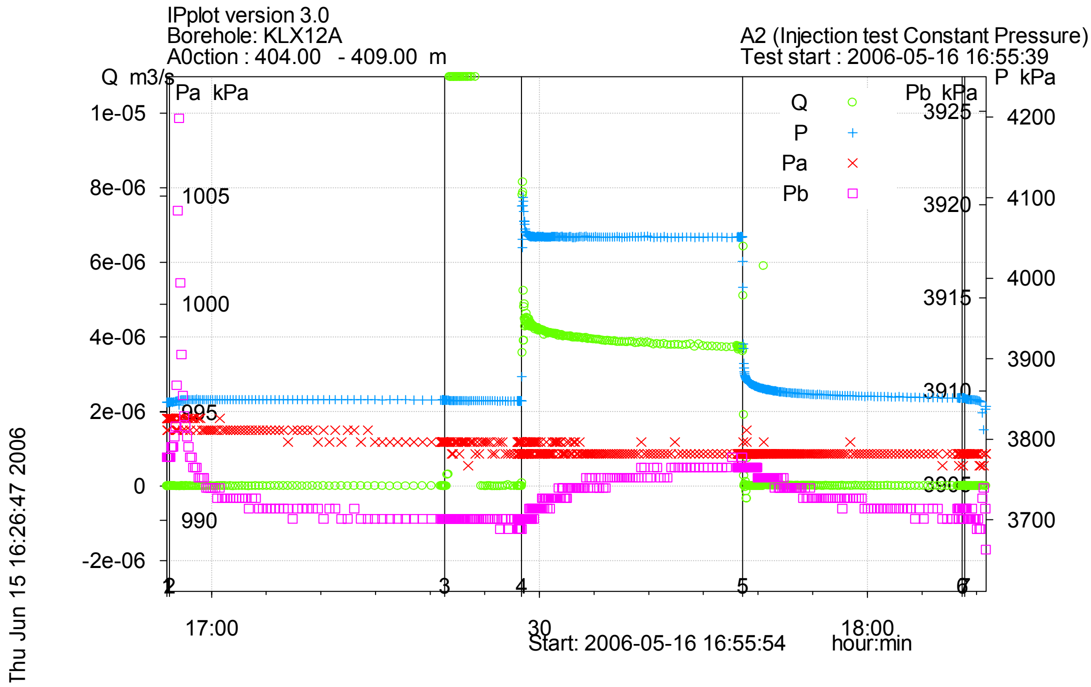

Figure A3-207. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 404.0-409.0 m in borehole KLX12A.

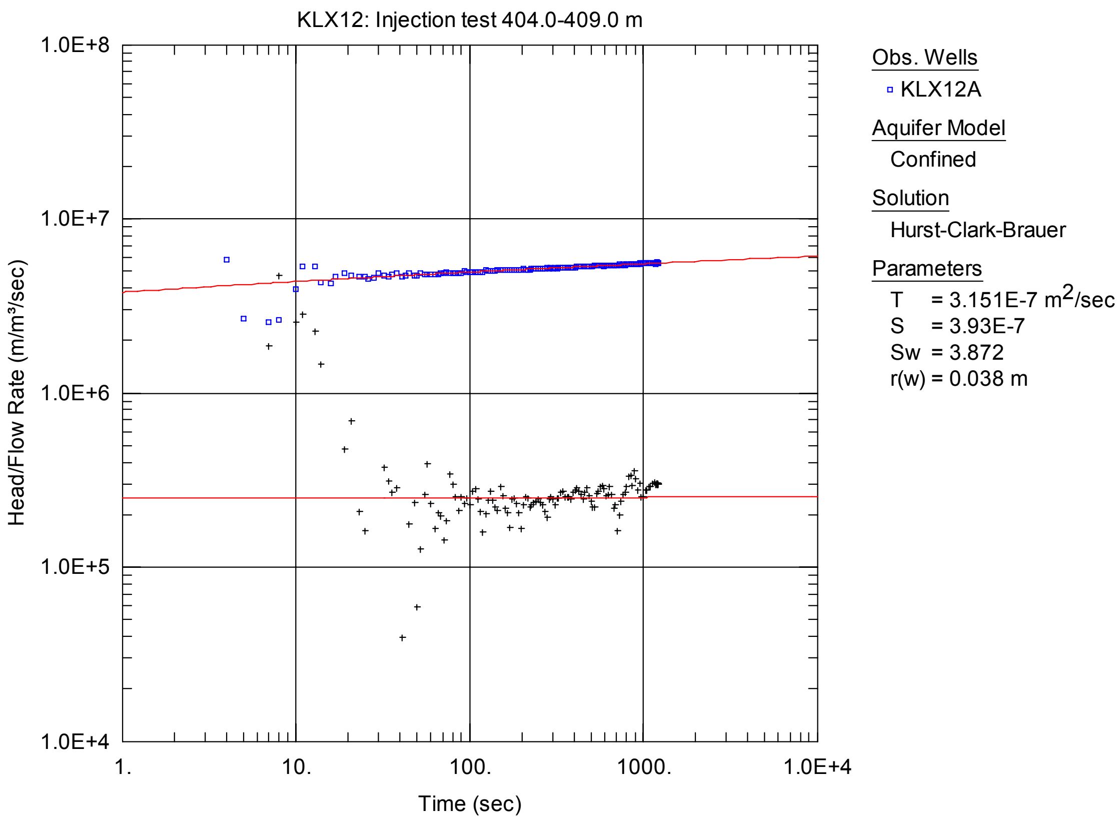

Figure A3-208. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 404.0-409.0 m in KLX12A.

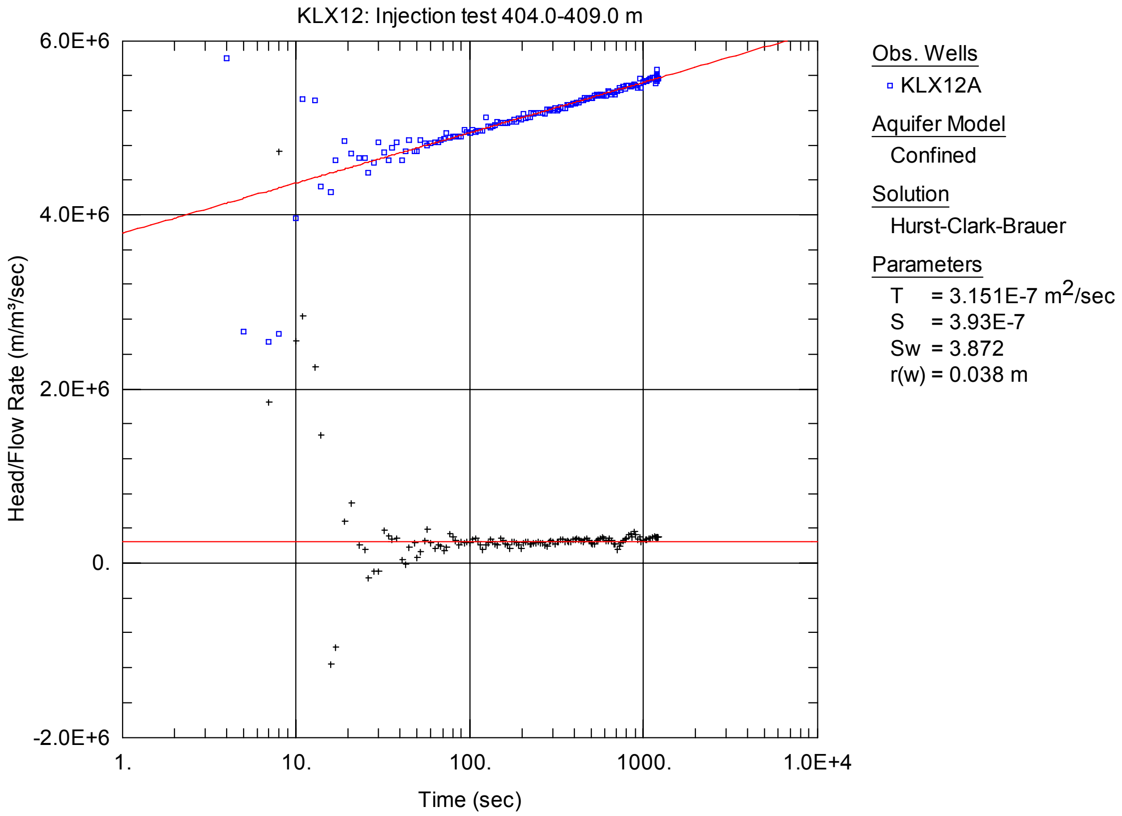

Figure A3-209. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 404.0-409.0 m in KLX12A.*

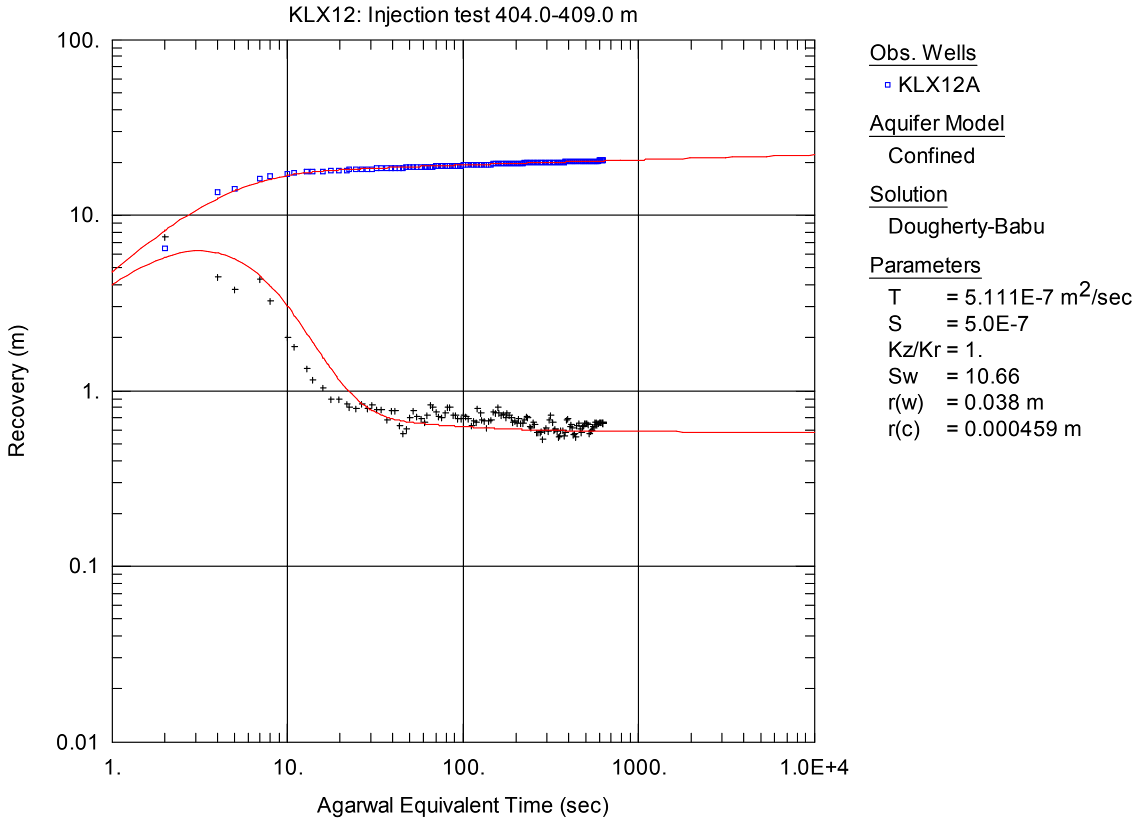

Figure A3-210. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 404.0-409.0 m in KLX12A.*

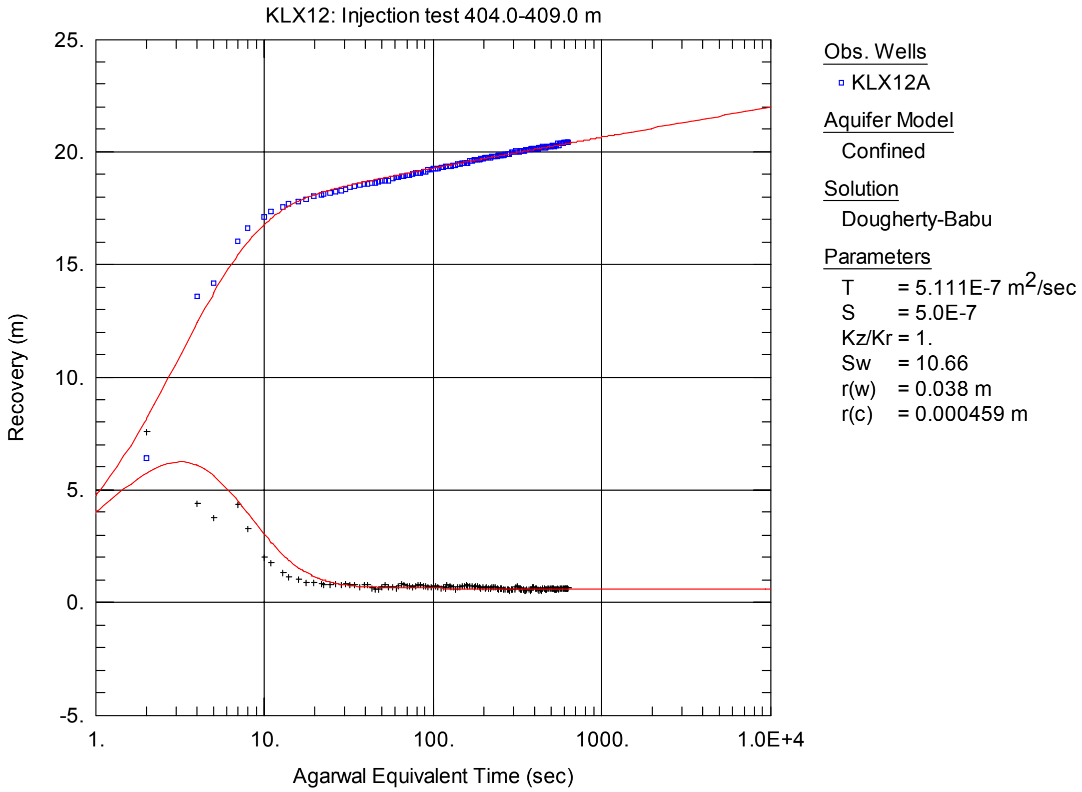

Figure A3-211. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 404.0-409.0 m in KLX12A.*

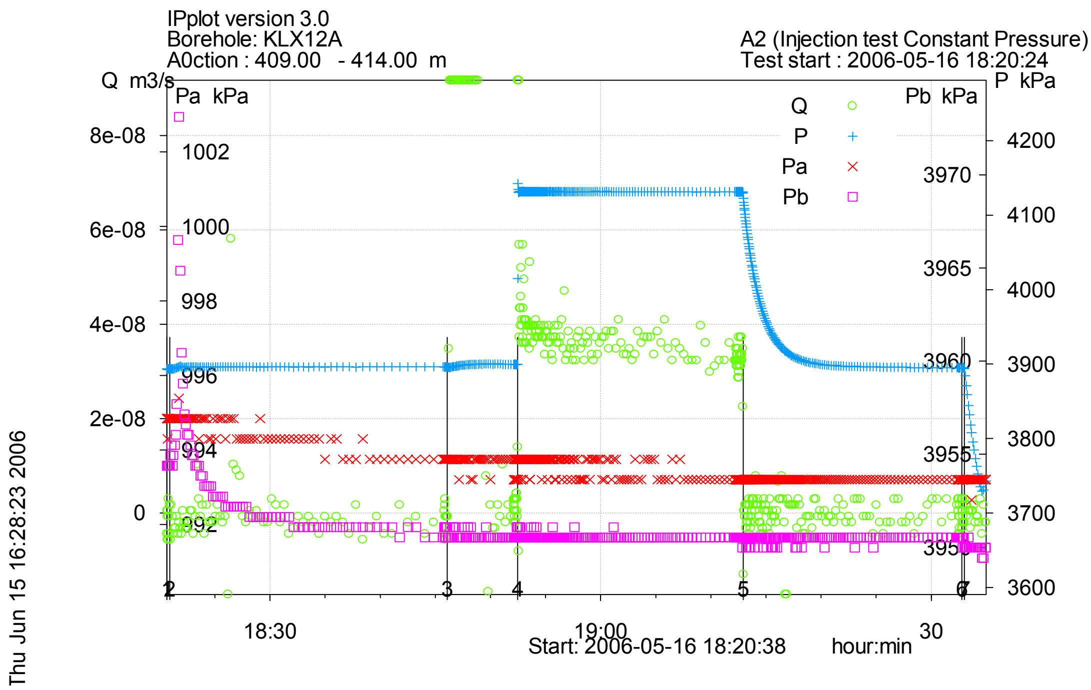

Figure A3-212. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 409.0-414.0 m in borehole KLX12A.*

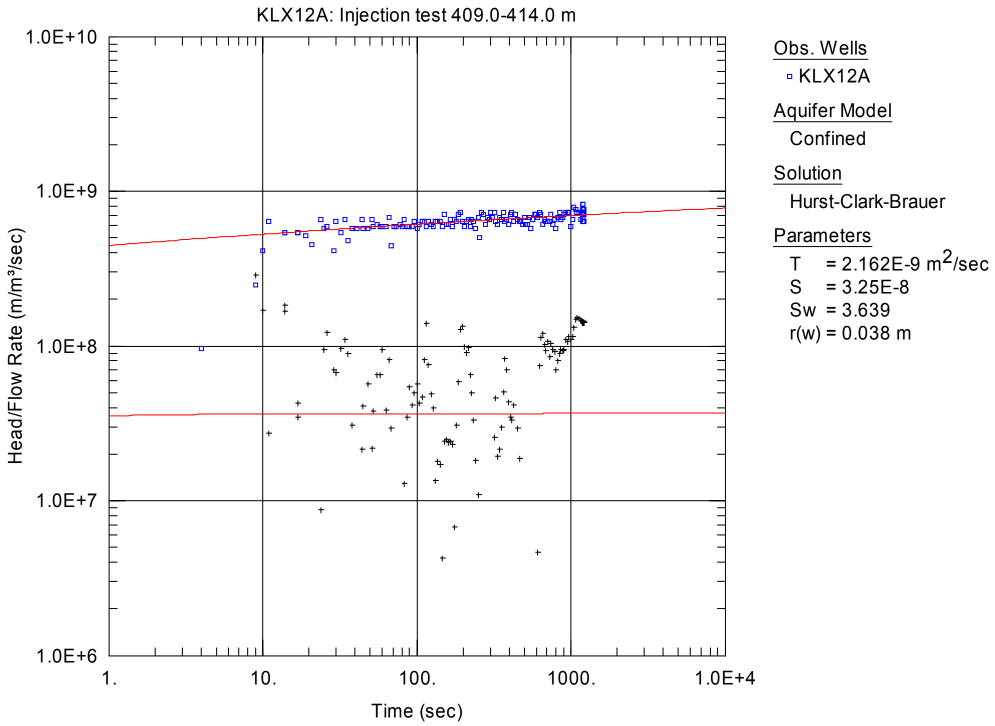

Figure A3-213. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 409.0-414.0 m in KLX12A.*

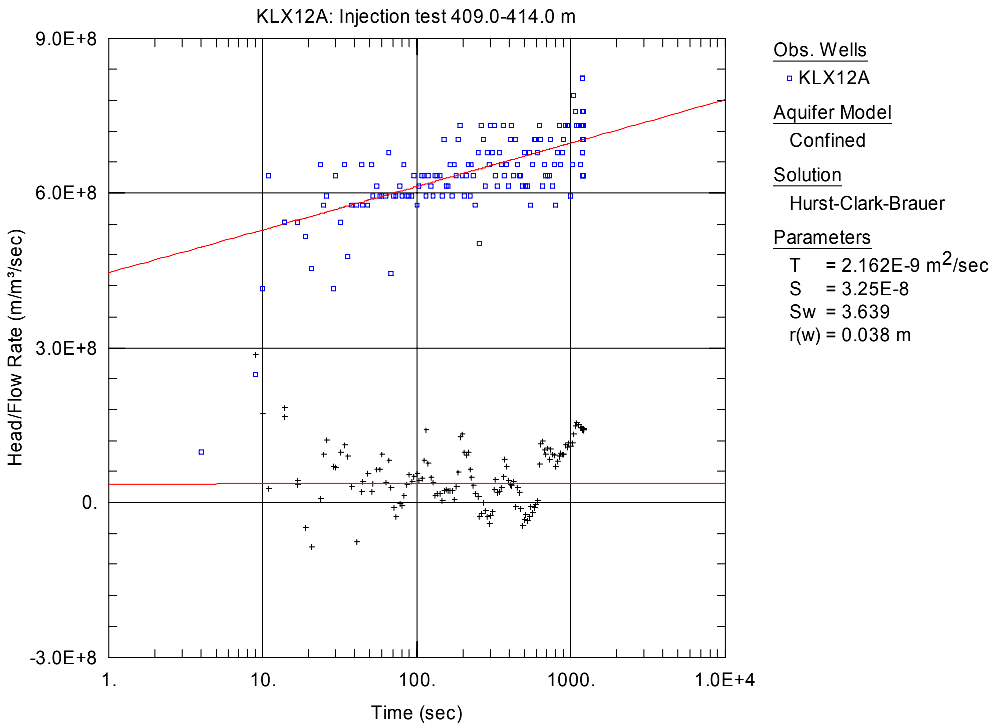

Figure A3-214. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 409.0-414.0 m in KLX12A.*

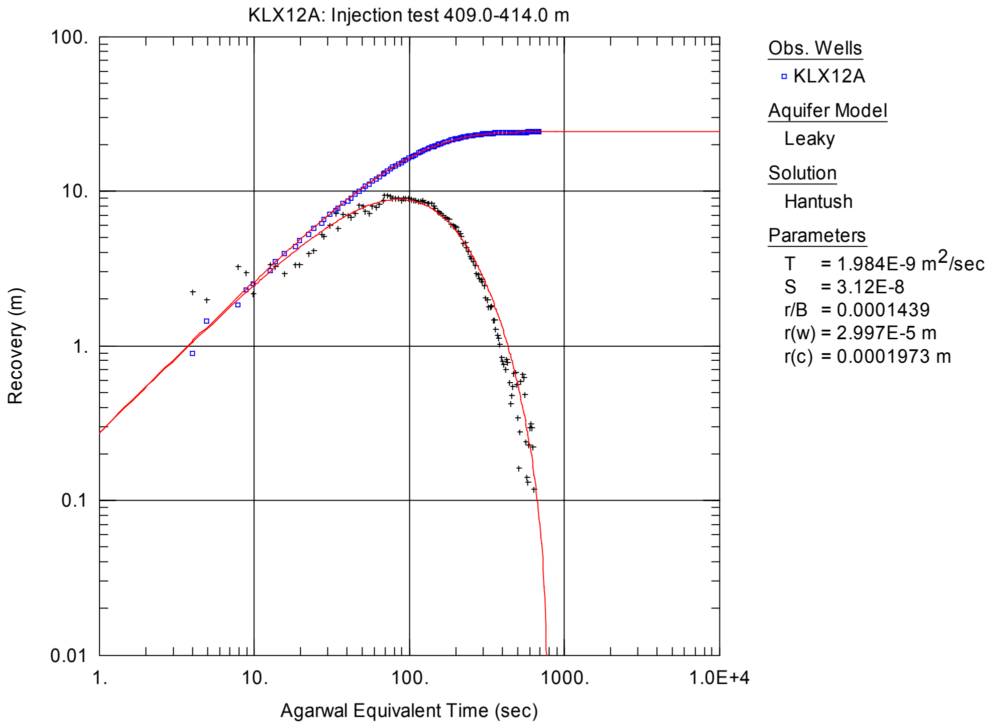

Figure A3-215. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 409.0-414.0 m in KLX12A.*

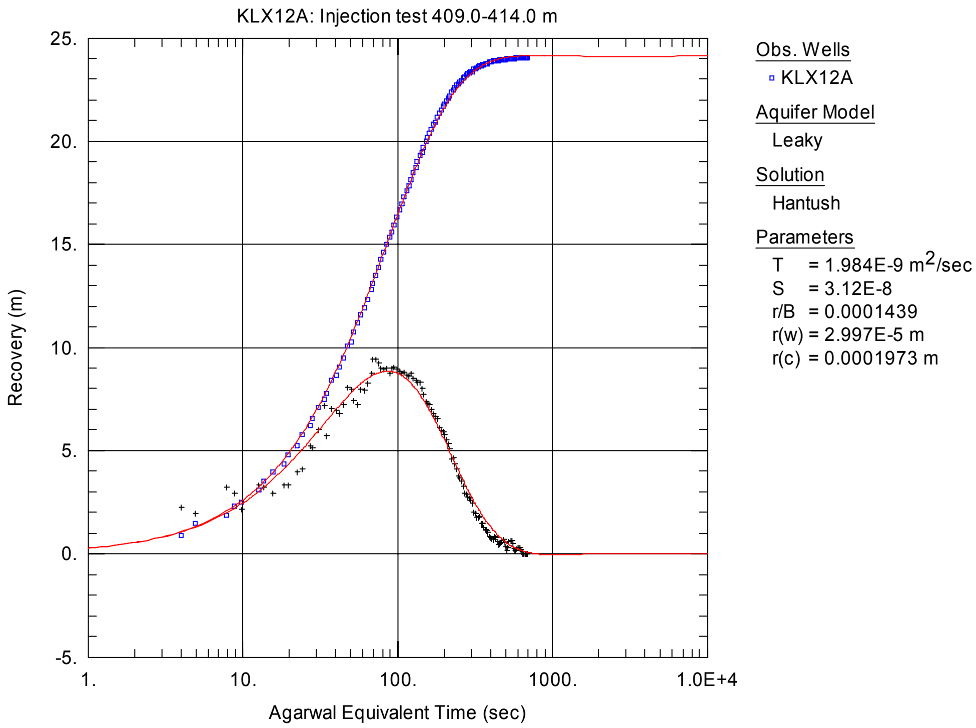

Figure A3-216. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 409.0-414.0 m in KLX12A.*

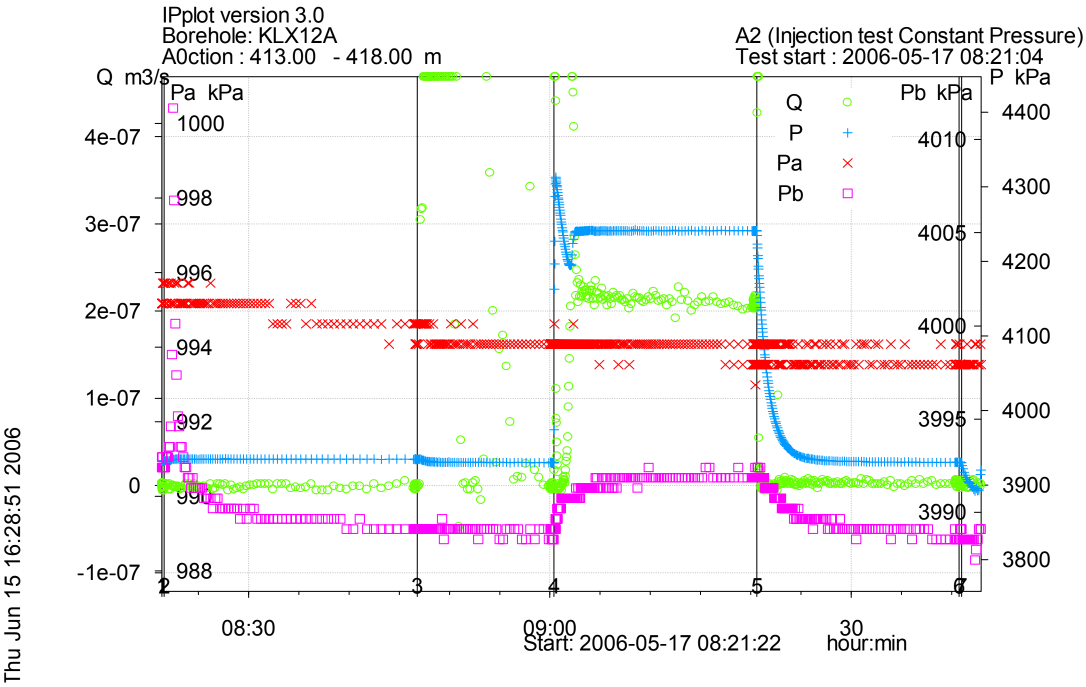

Figure A3-217. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 413.0-418.0 m in borehole KLX12A.*

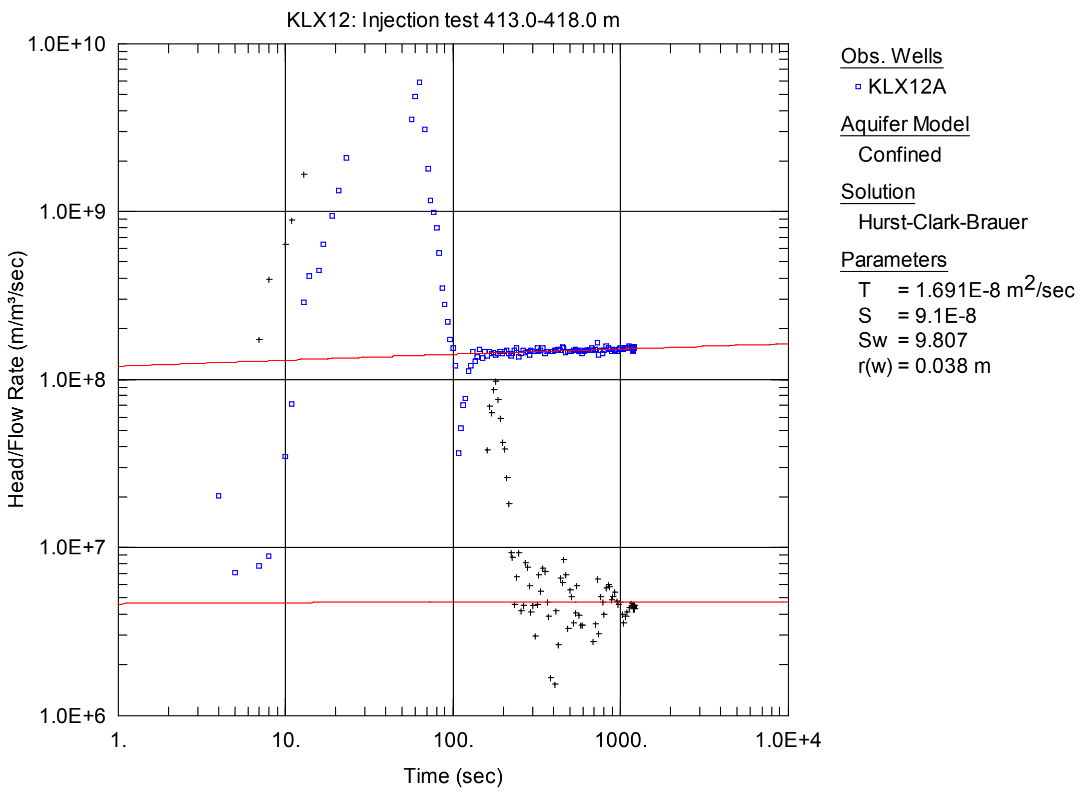

Figure A3-218. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 413.0-418.0 m in KLX12A.*

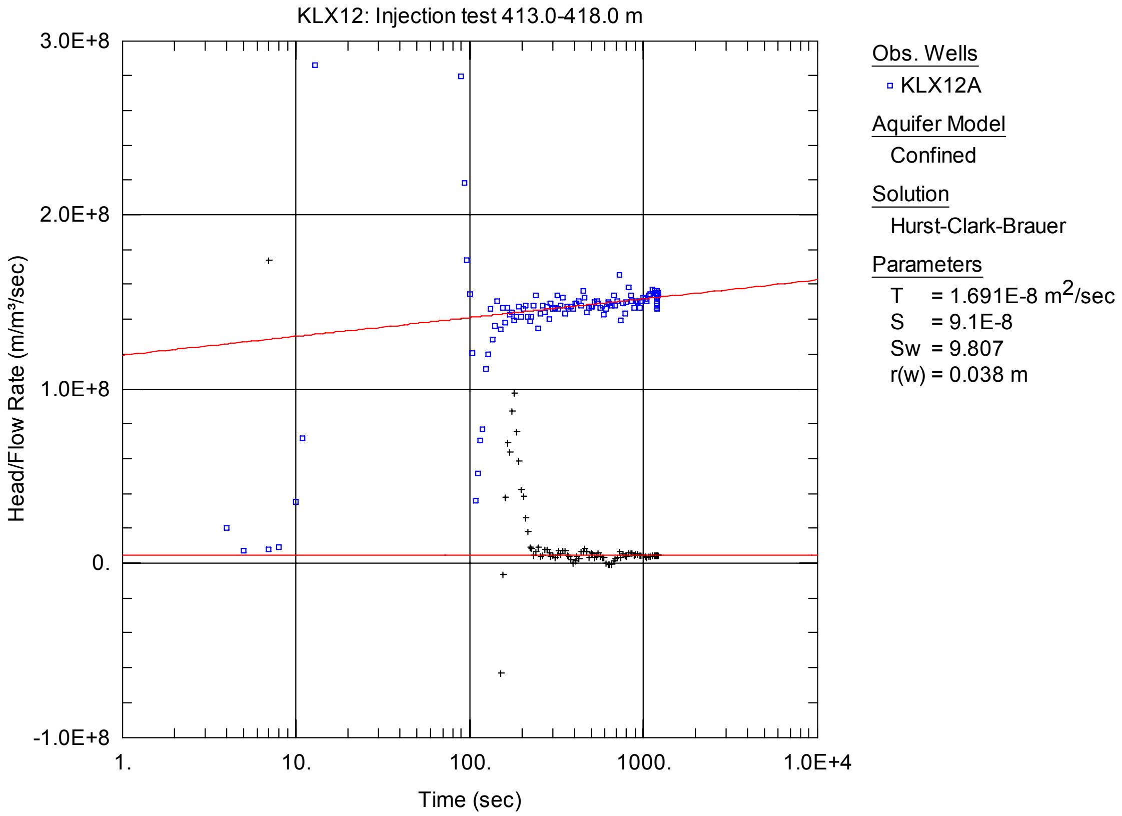

Figure A3-219. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 413.0-418.0 m in KLX12A.*

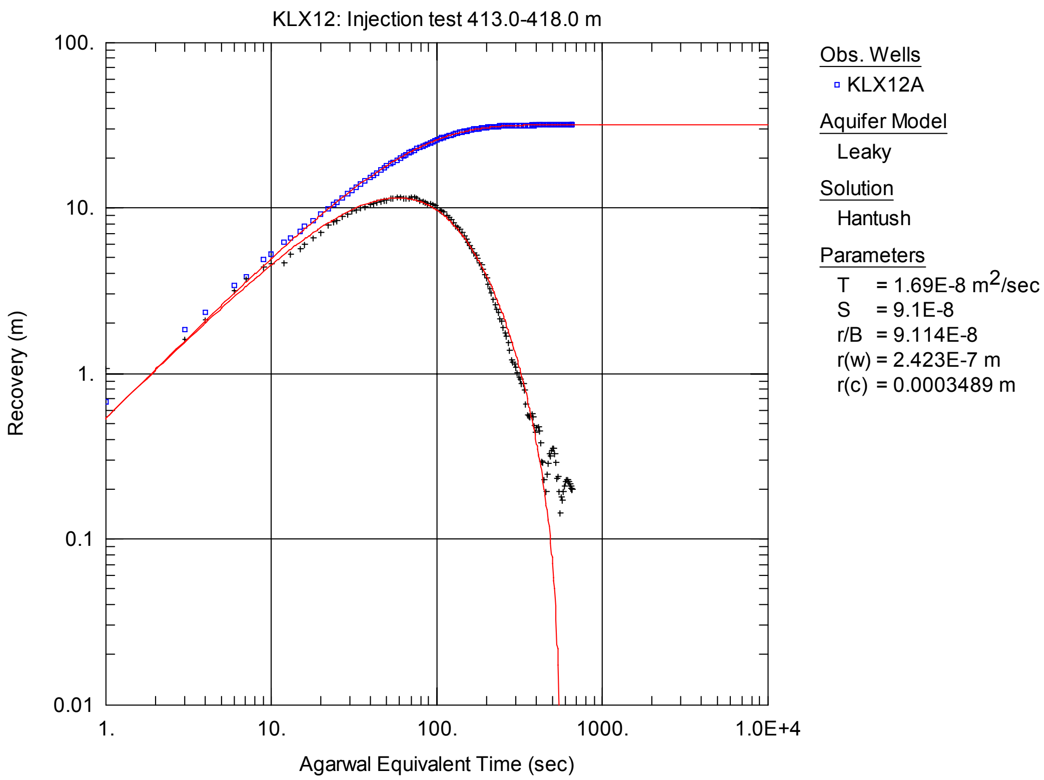

Figure A3-220. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 413.0-418.0 m in KLX12A. The type curve is showing a possible, however not unambiguous, evaluation.*

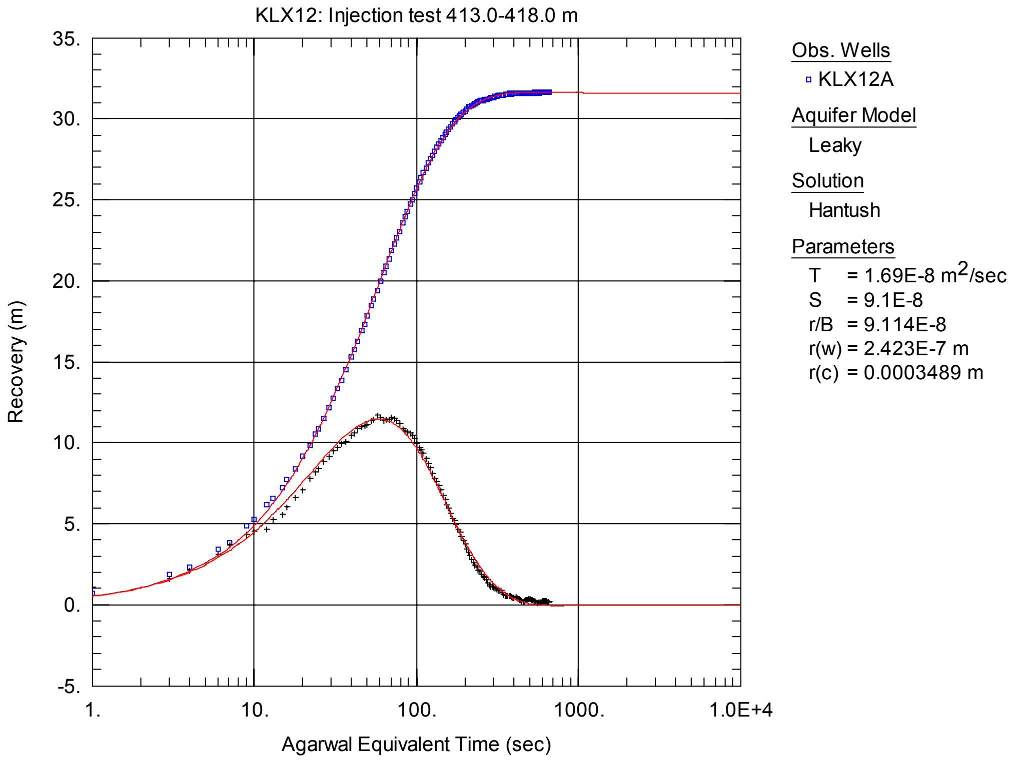

Figure A3-221. Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 413.0-418.0 m in KLX12A. The type curve is showing a possible, however not unambiguous, evaluation.

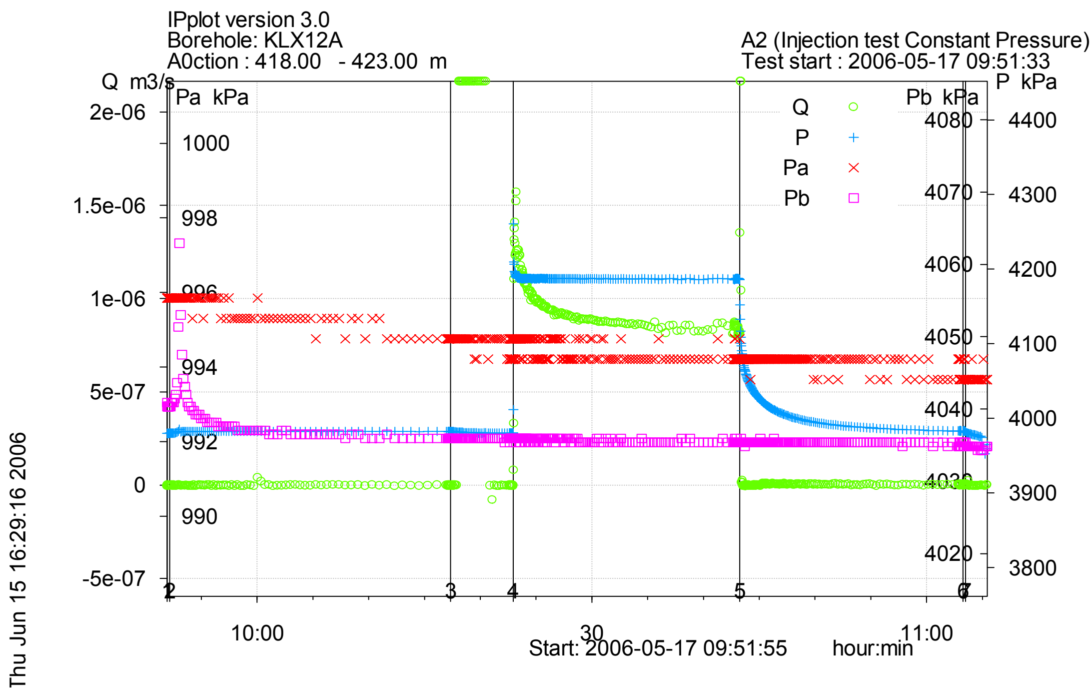

Figure A3-222. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 418.0-423.0 m in borehole KLX12A.

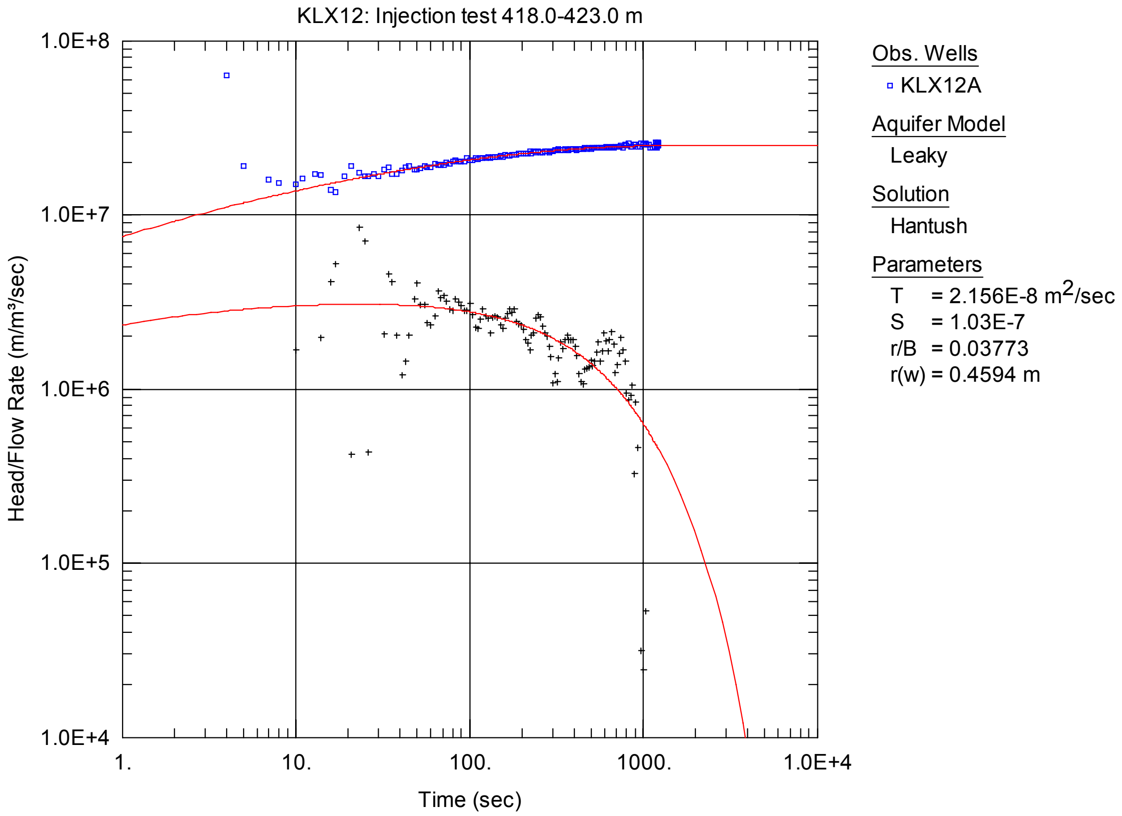

Figure A3-223. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 418.0-423.0 m in KLX12A.*

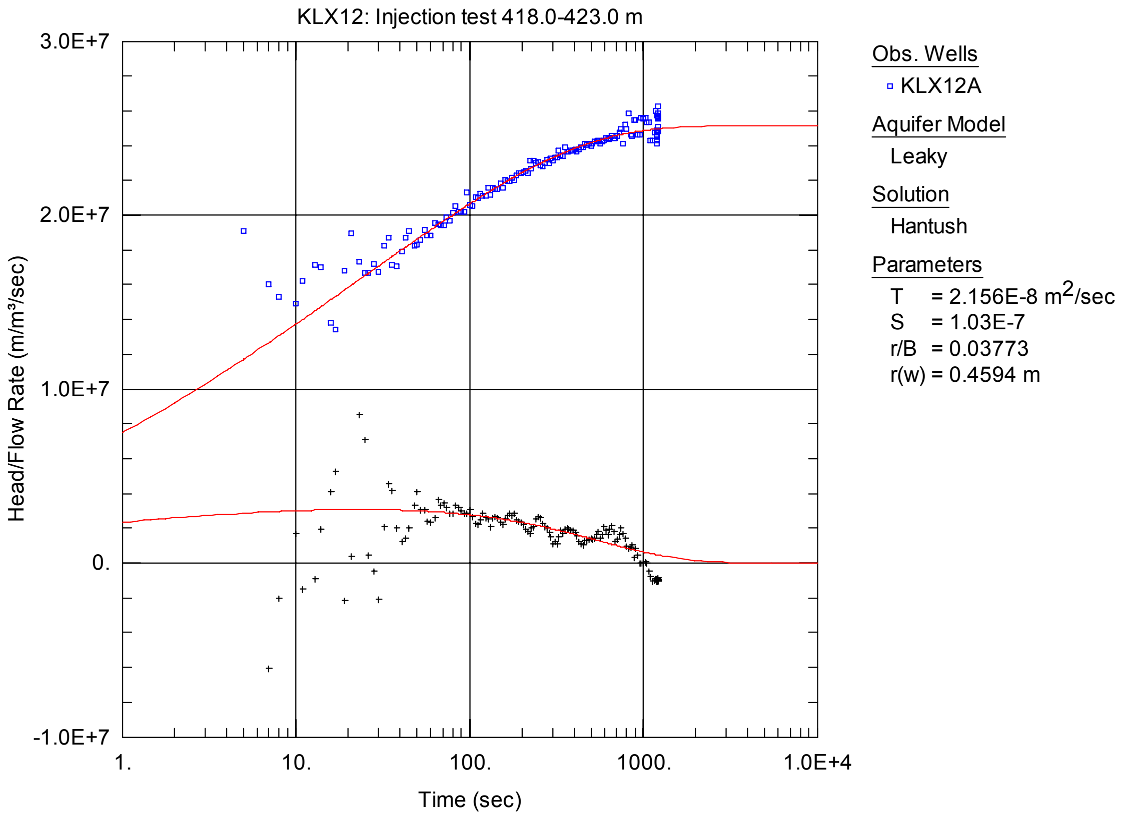

Figure A3-224. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 418.0-423.0 m in KLX12A.*

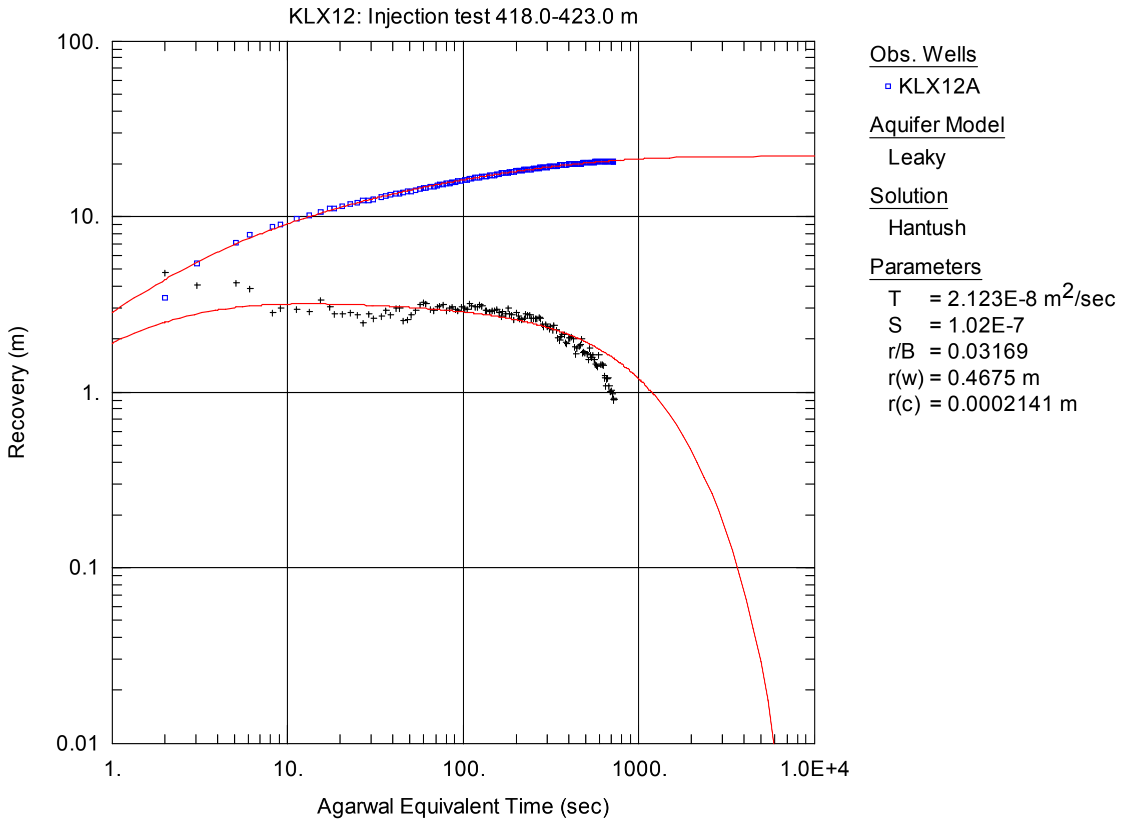

Figure A3-225. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 418.0-423.0 m in KLX12A.*

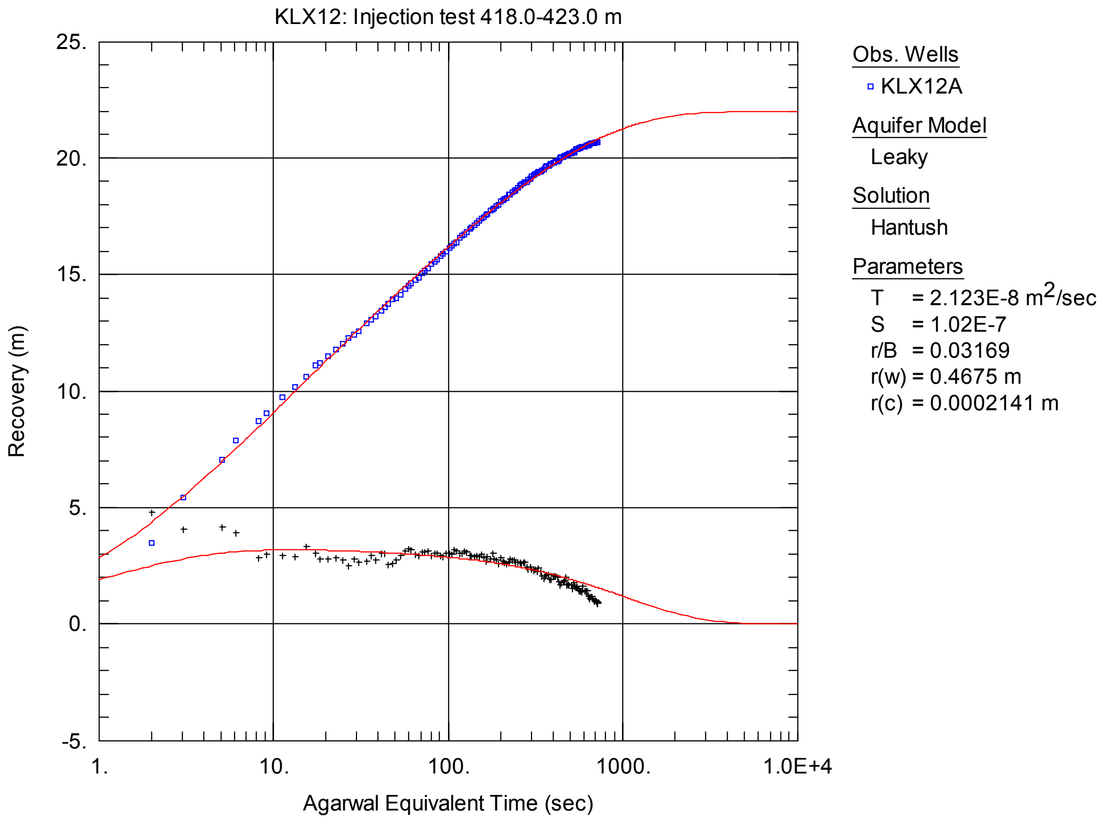

Figure A3-226. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 418.0-423.0 m in KLX12A.*

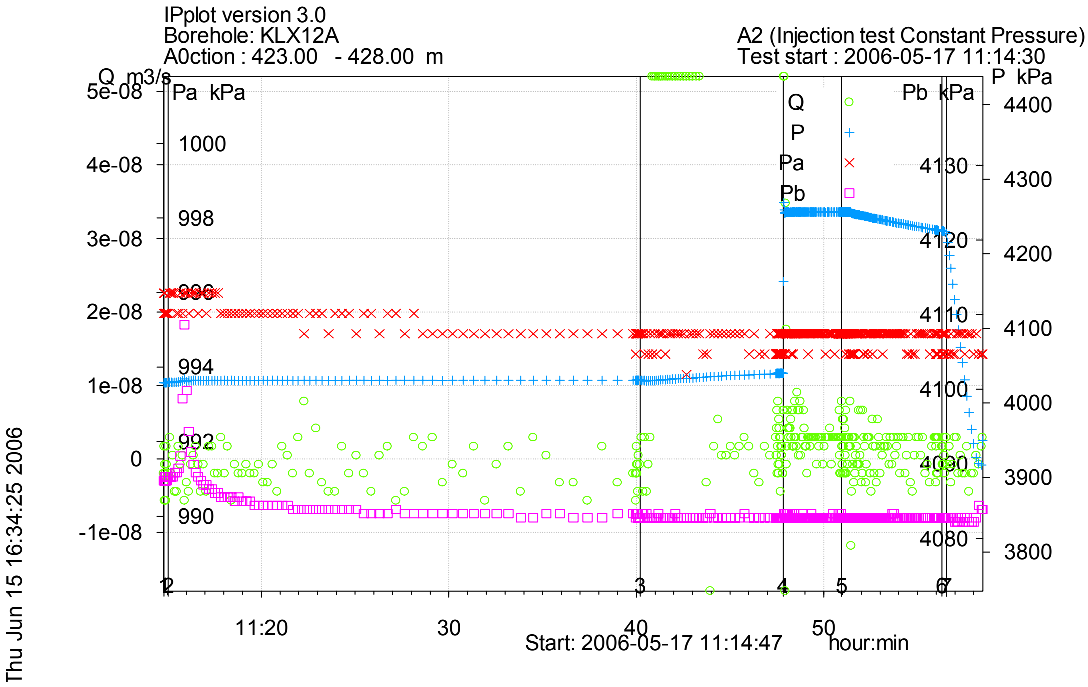

Figure A3-227. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 423.0-428.0 m in borehole KLX12A.

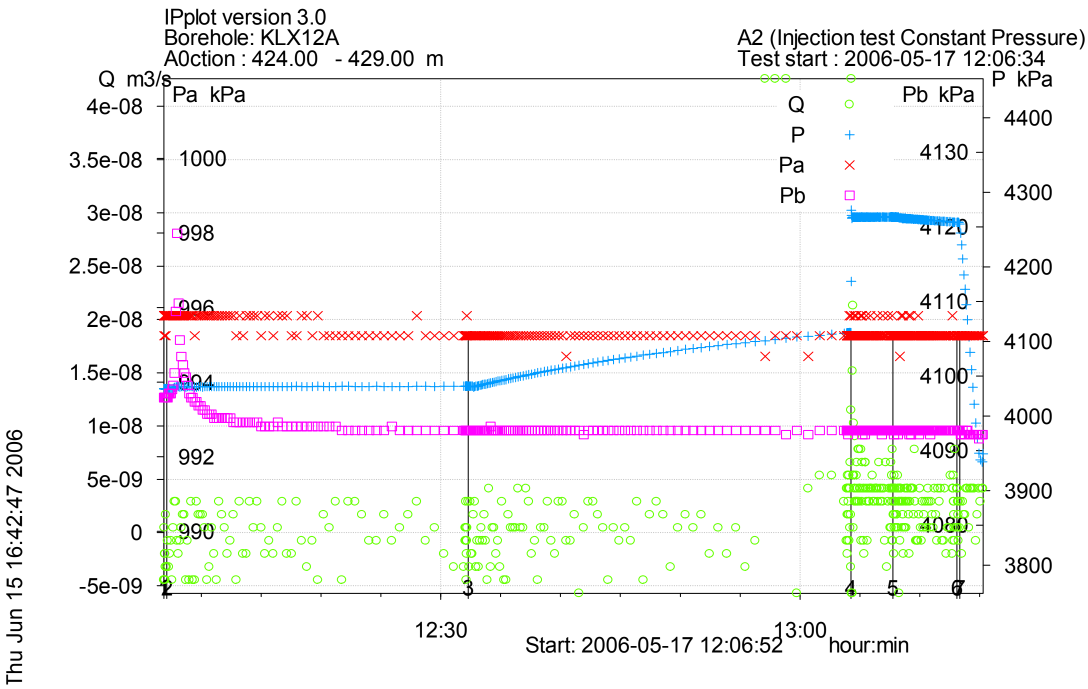

Figure A3-228. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 424.0-429.0 m in borehole KLX12A.

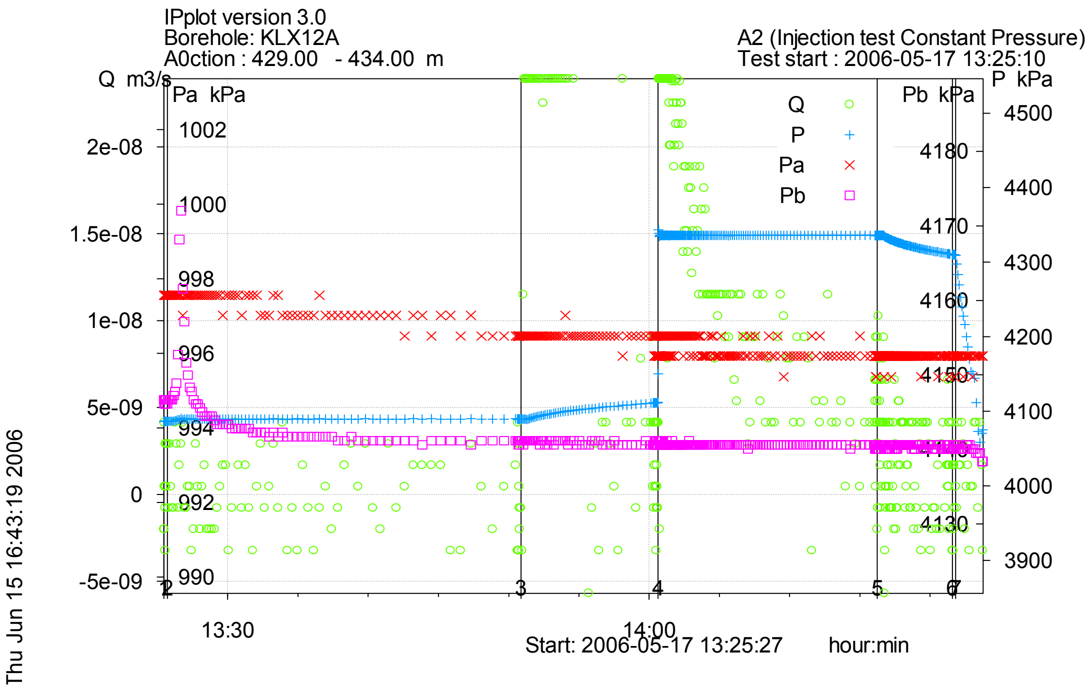

Figure A3-229. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 429.0-434.0 m in borehole KLX12A.*

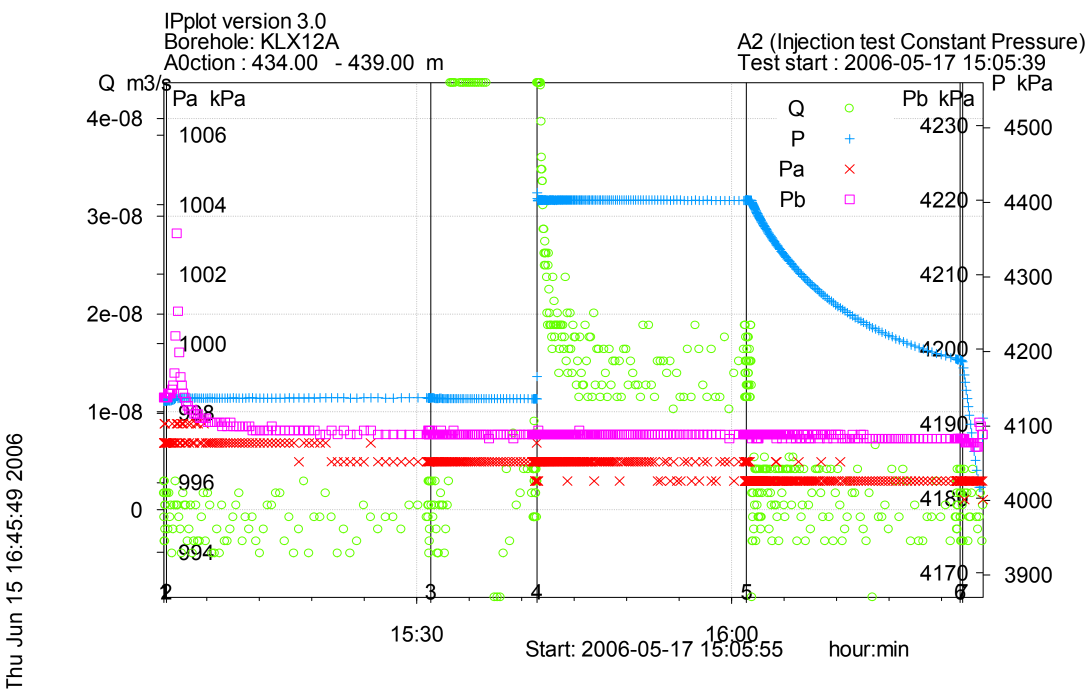

Figure A3-230. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 434.0-439.0 m in borehole KLX12A.*

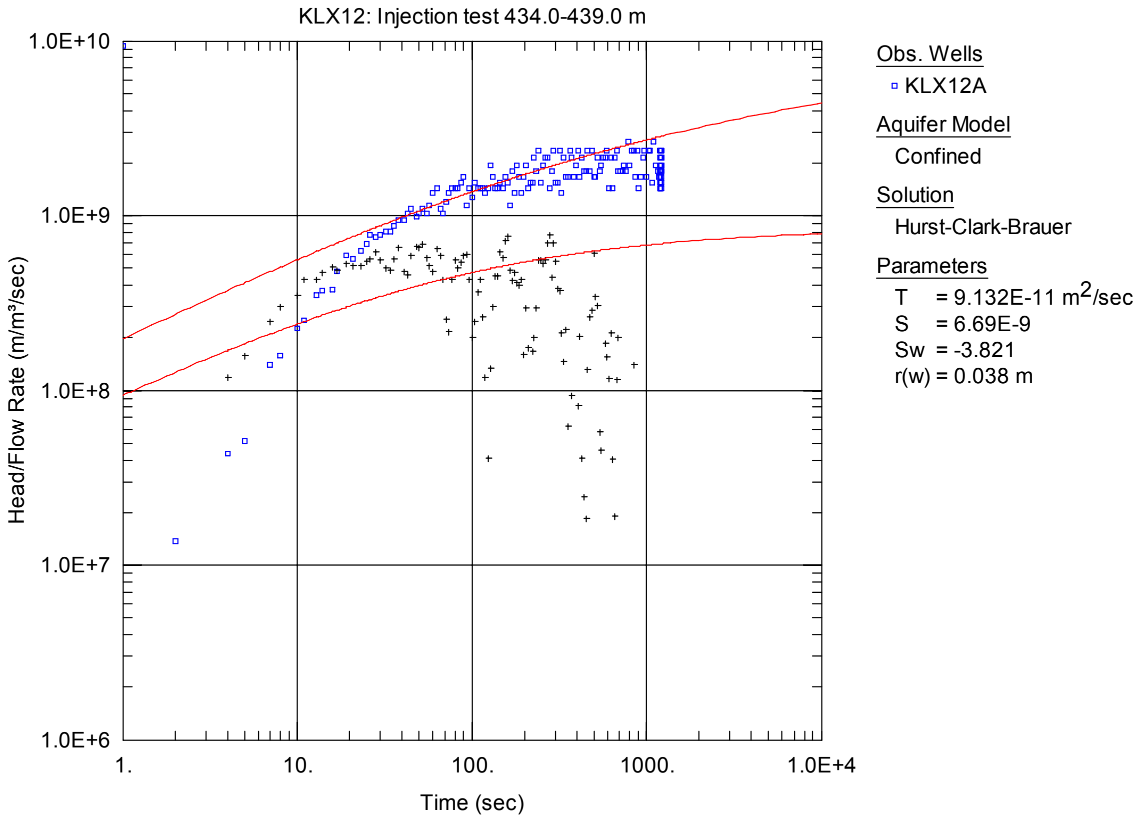

Figure A3-231. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 434.0-439.0 m in KLX12A.*

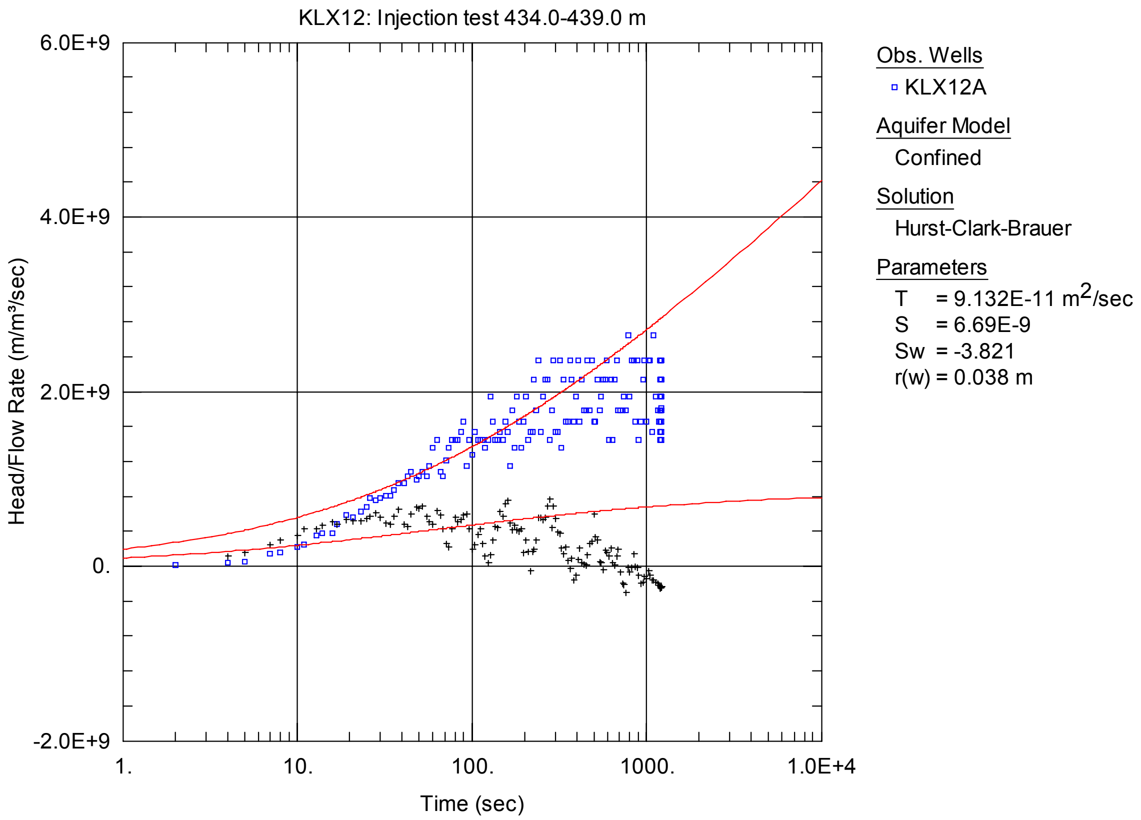

Figure A3-232. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 434.0-439.0 m in KLX12A.*

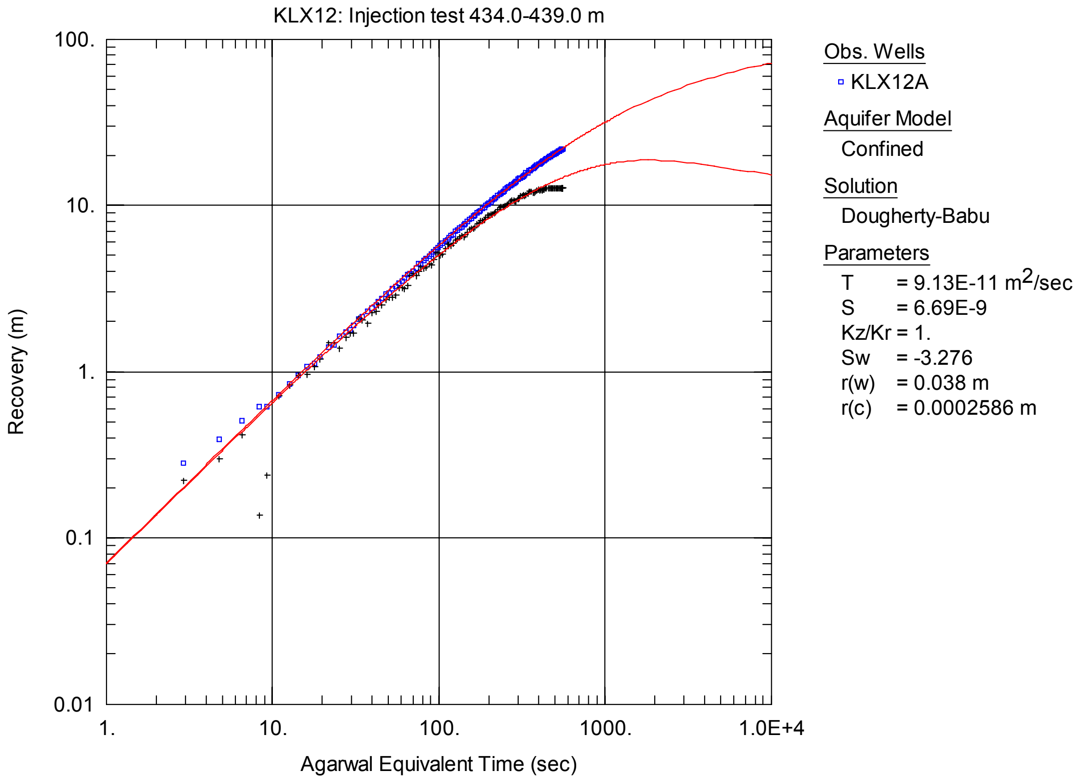

Figure A3-233. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 434.0-439.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

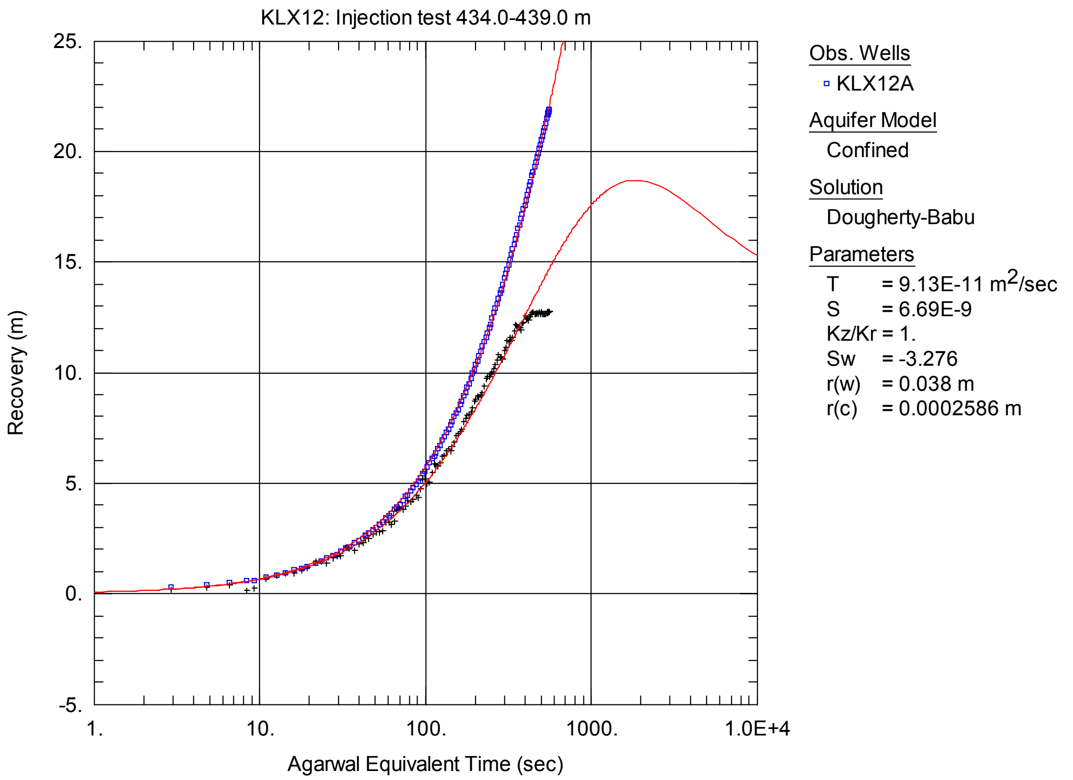

Figure A3-234. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 434.0-439.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

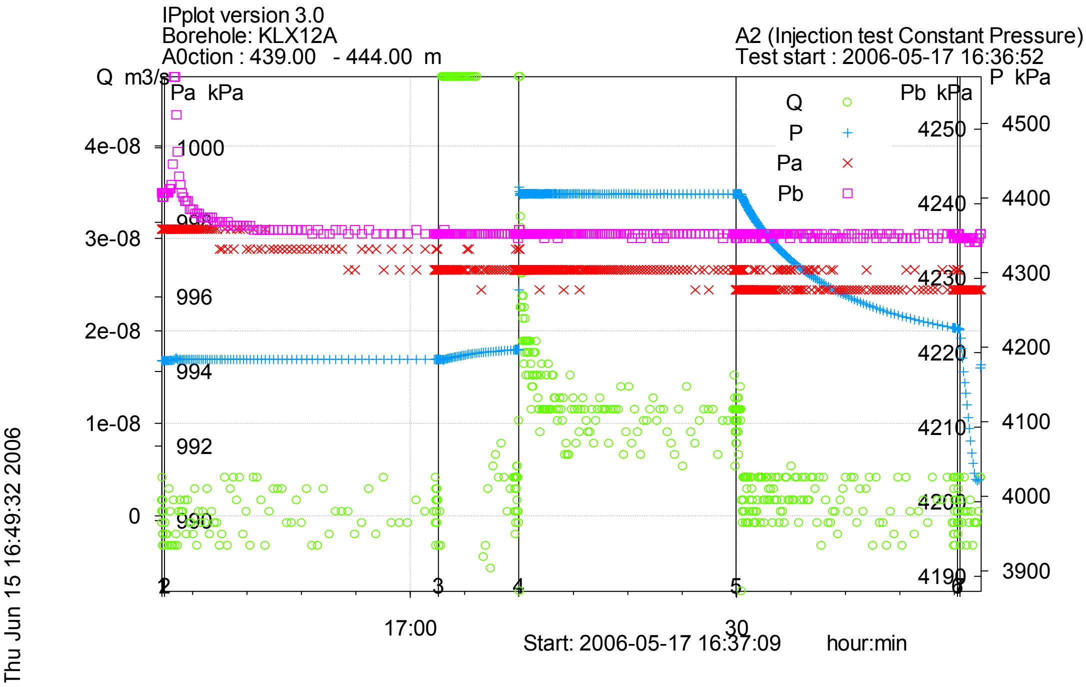

Figure A3-235. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 439.0-444.0 m in borehole KLX12A.*

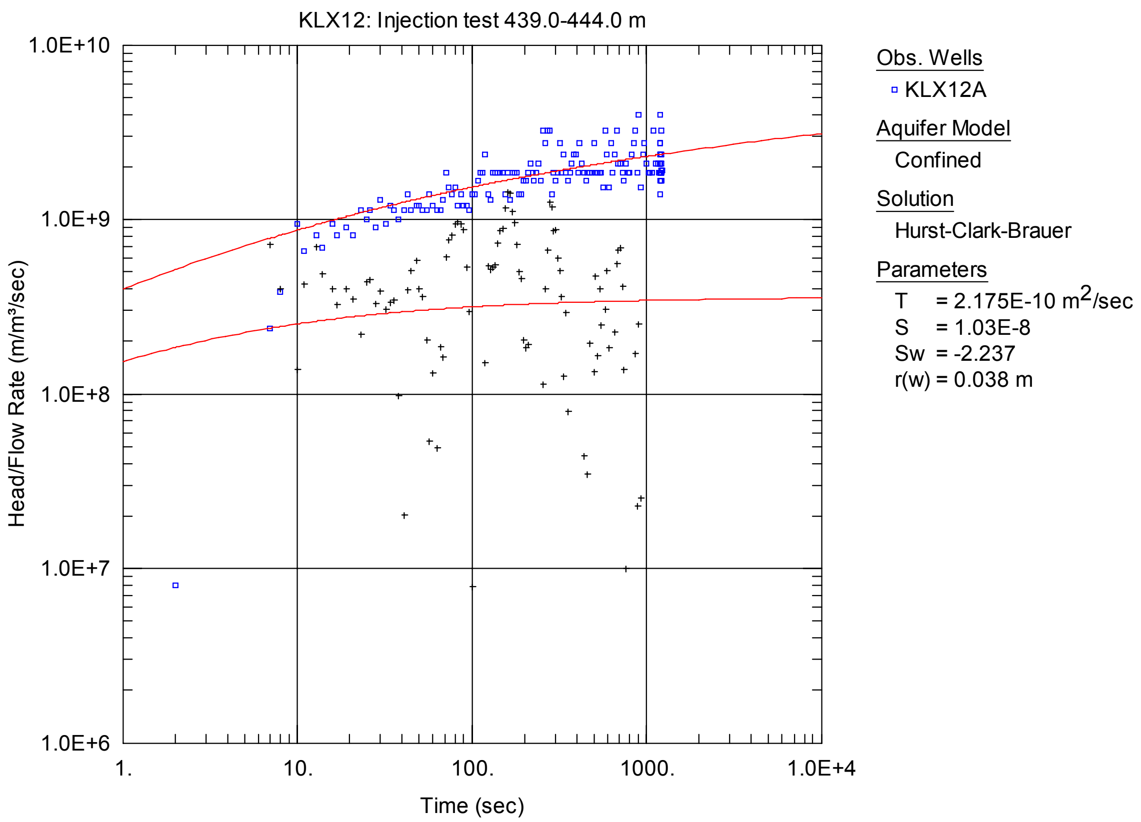

Figure A3-236. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 439.0-444.0 m in KLX12A.*

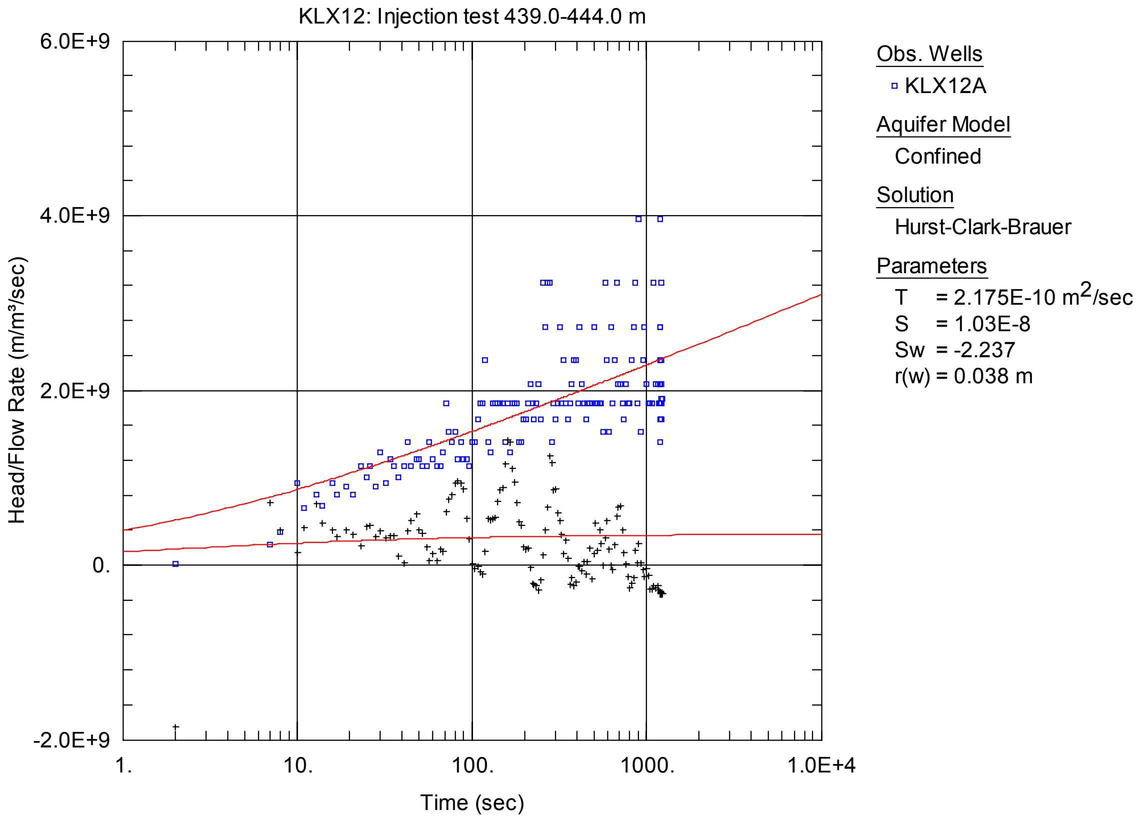

Figure A3-237. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 439.0-444.0 m in KLX12A.*

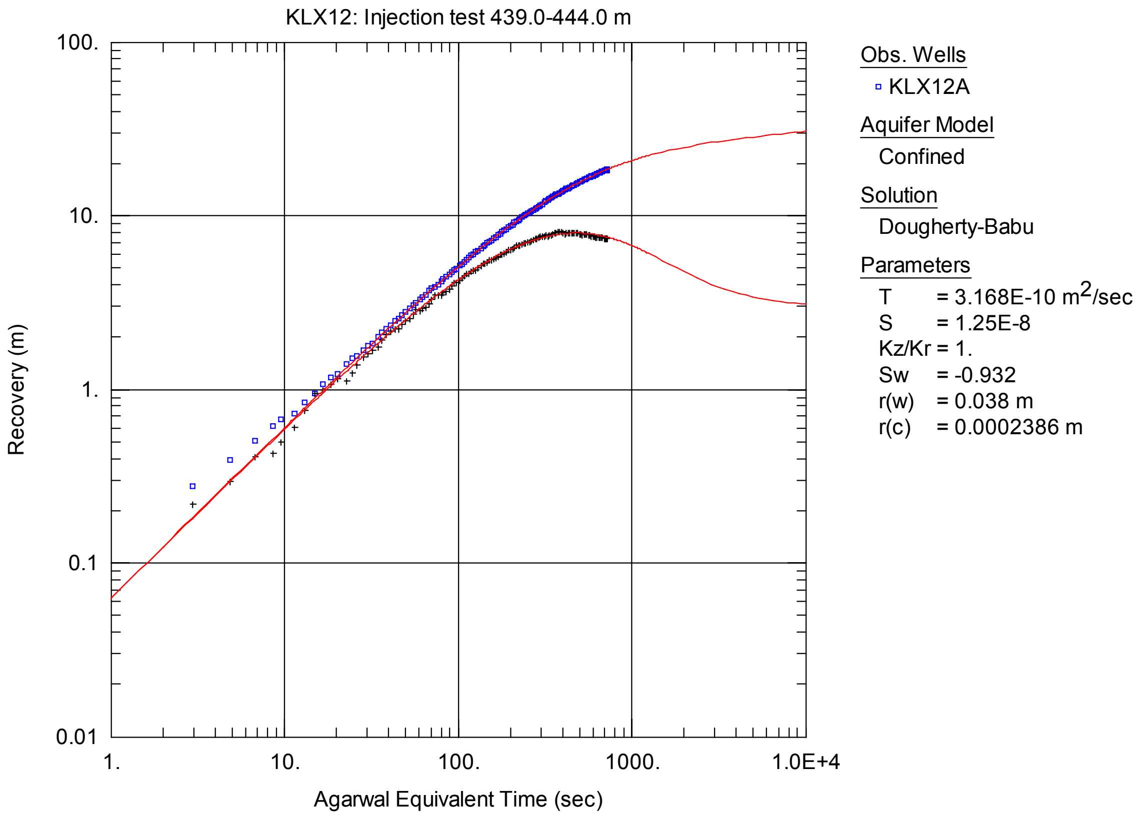

Figure A3-238. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 439.0-444.0 m in KLX12A.*

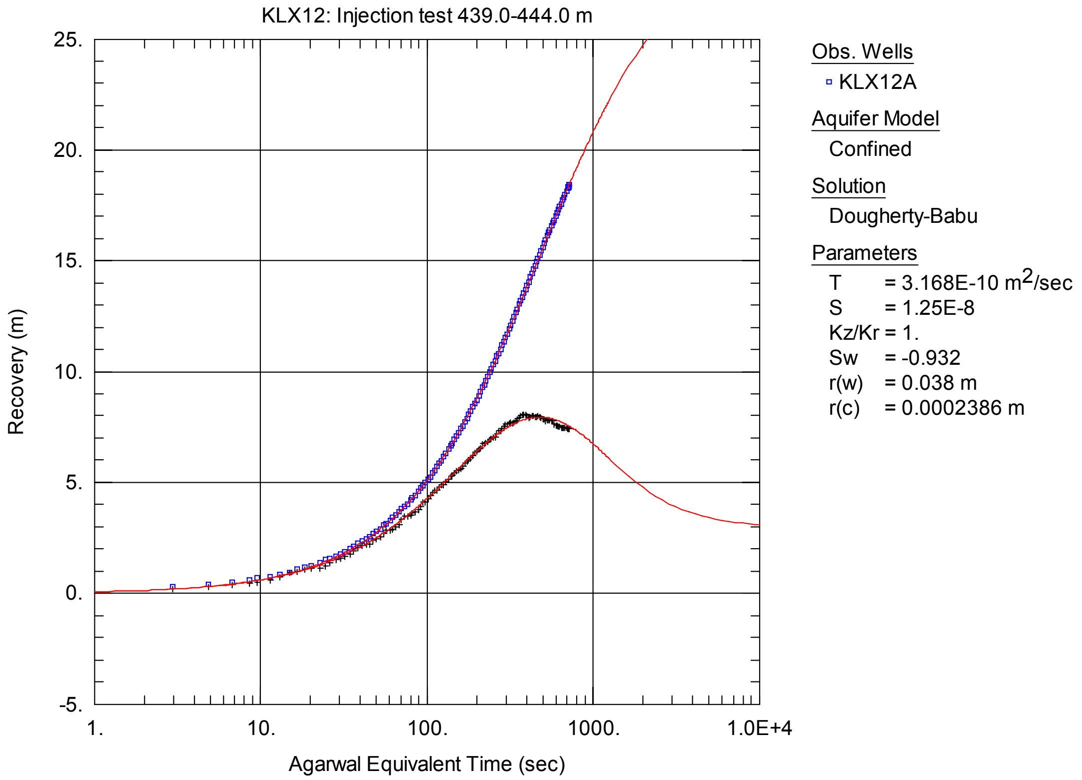

Figure A3-239. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 439.0-444.0 m in KLX12A.*

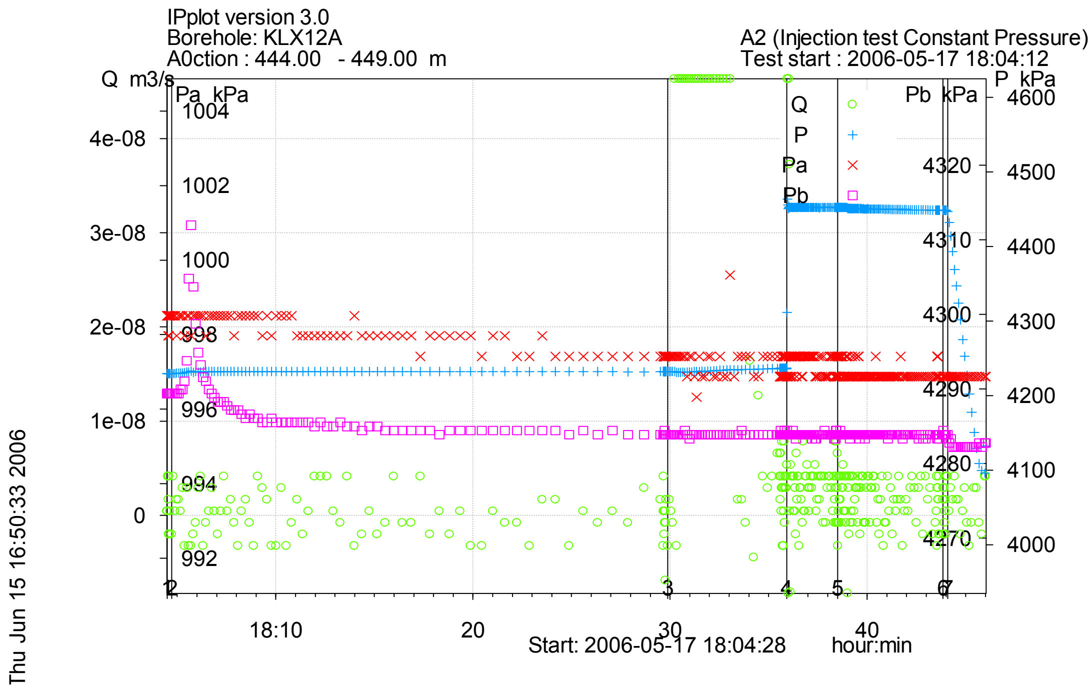

Figure A3-240. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 444.0-449.0 m in borehole KLX12A.*

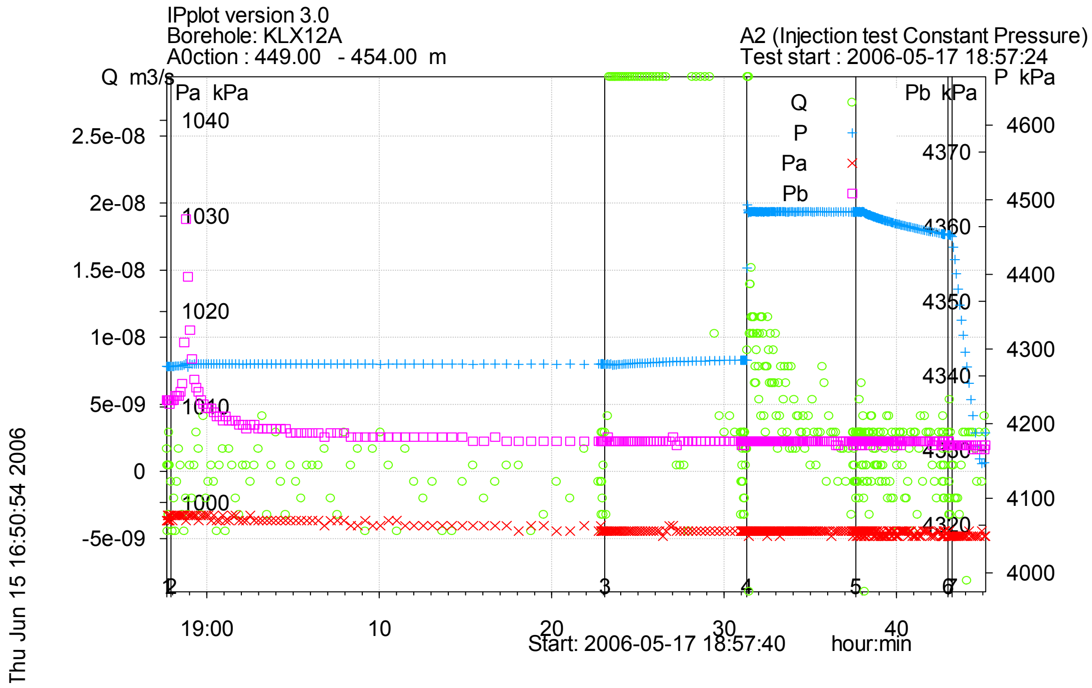

Figure A3-241. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 449.0-454.0 m in borehole KLX12A.*

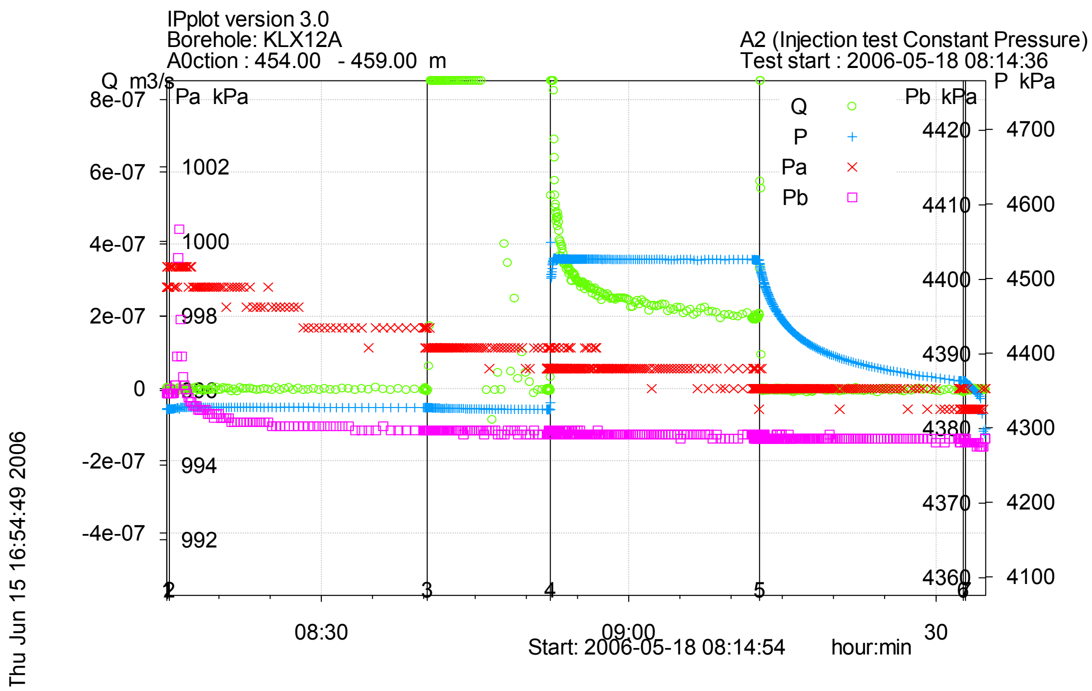

Figure A3-242. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 454.0-459.0 m in borehole KLX12A.*

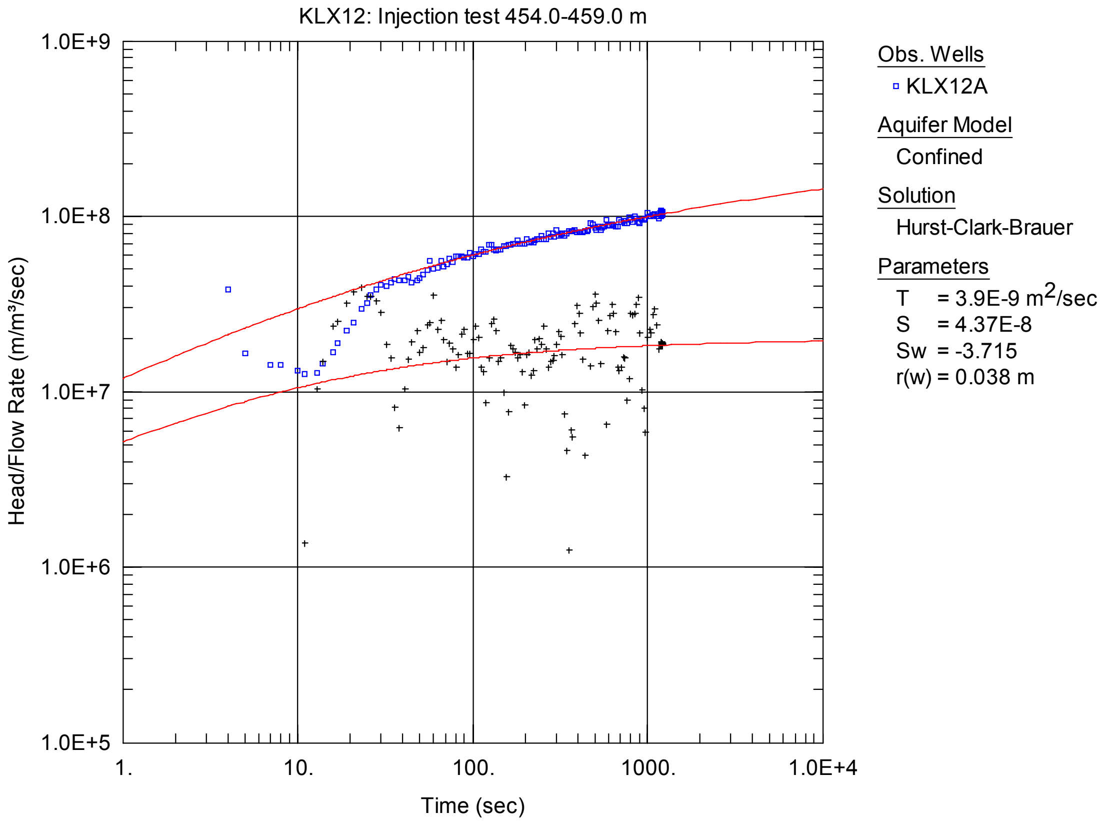

Figure A3-243. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 454.0-459.0 m in KLX12A.*

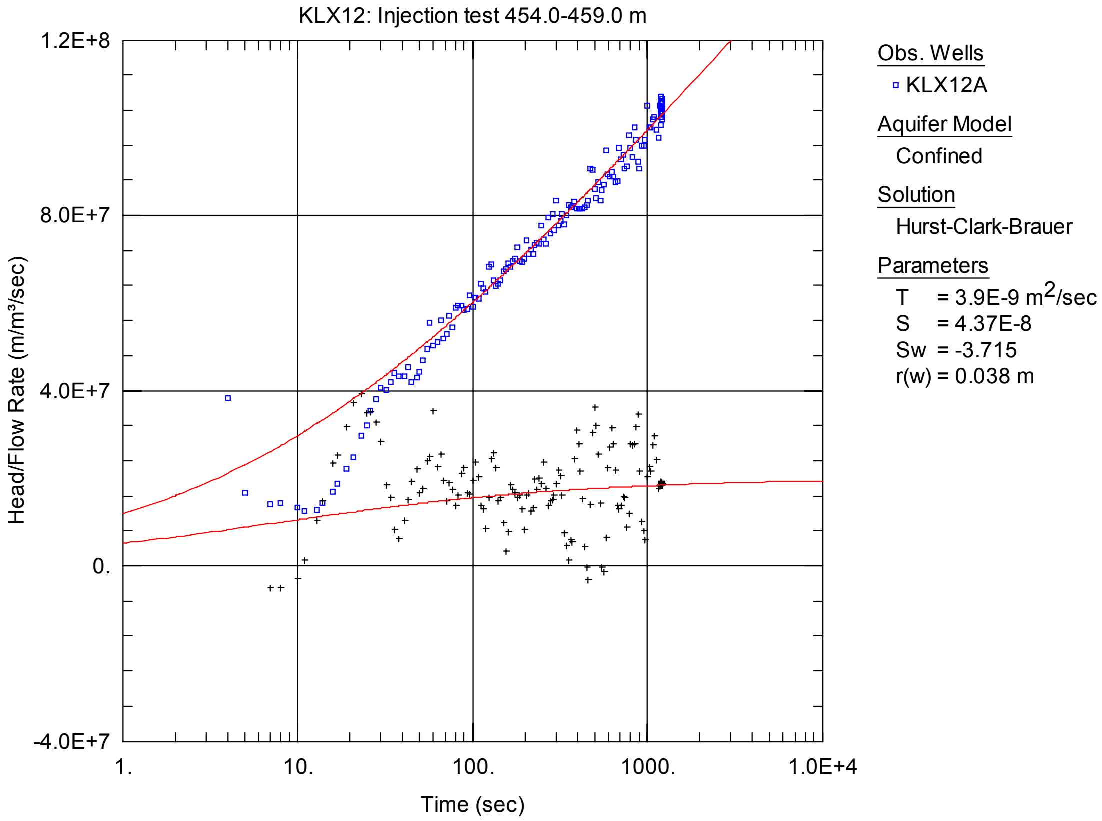

Figure A3-244. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 454.0-459.0 m in KLX12A.*

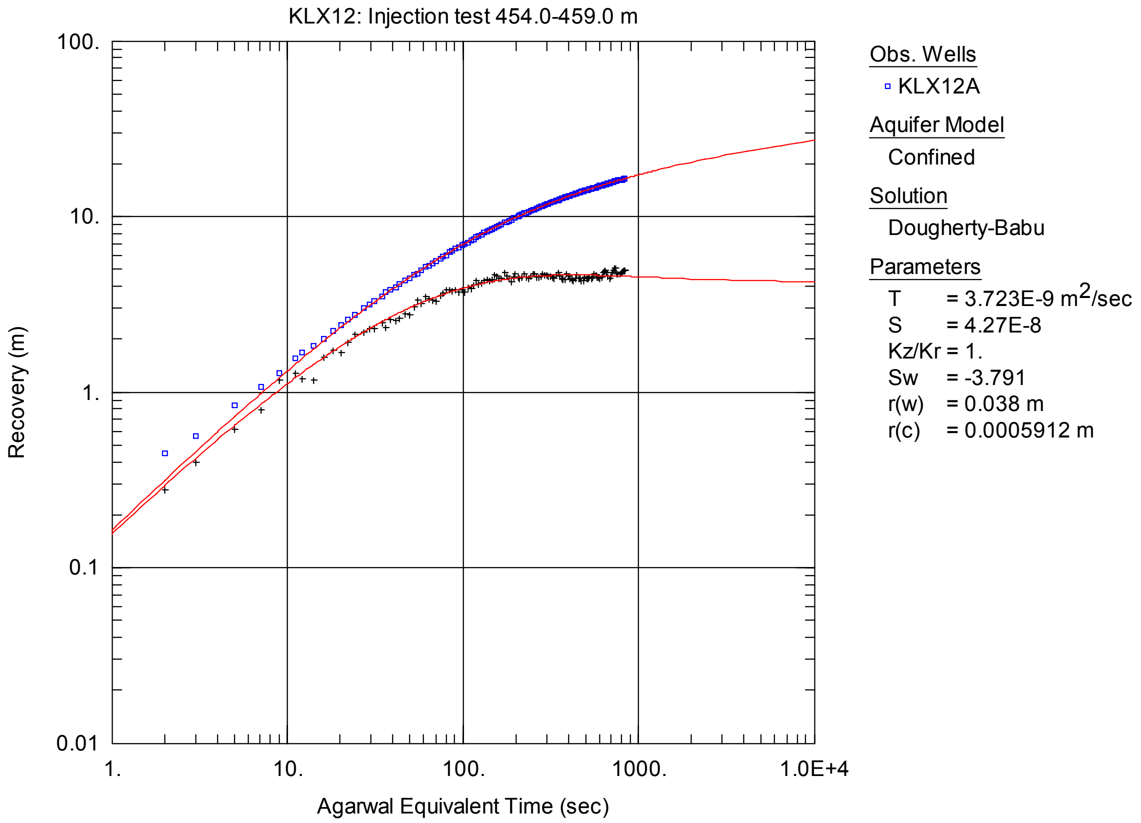

Figure A3-245. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 454.0-459.0 m in KLX12A.*

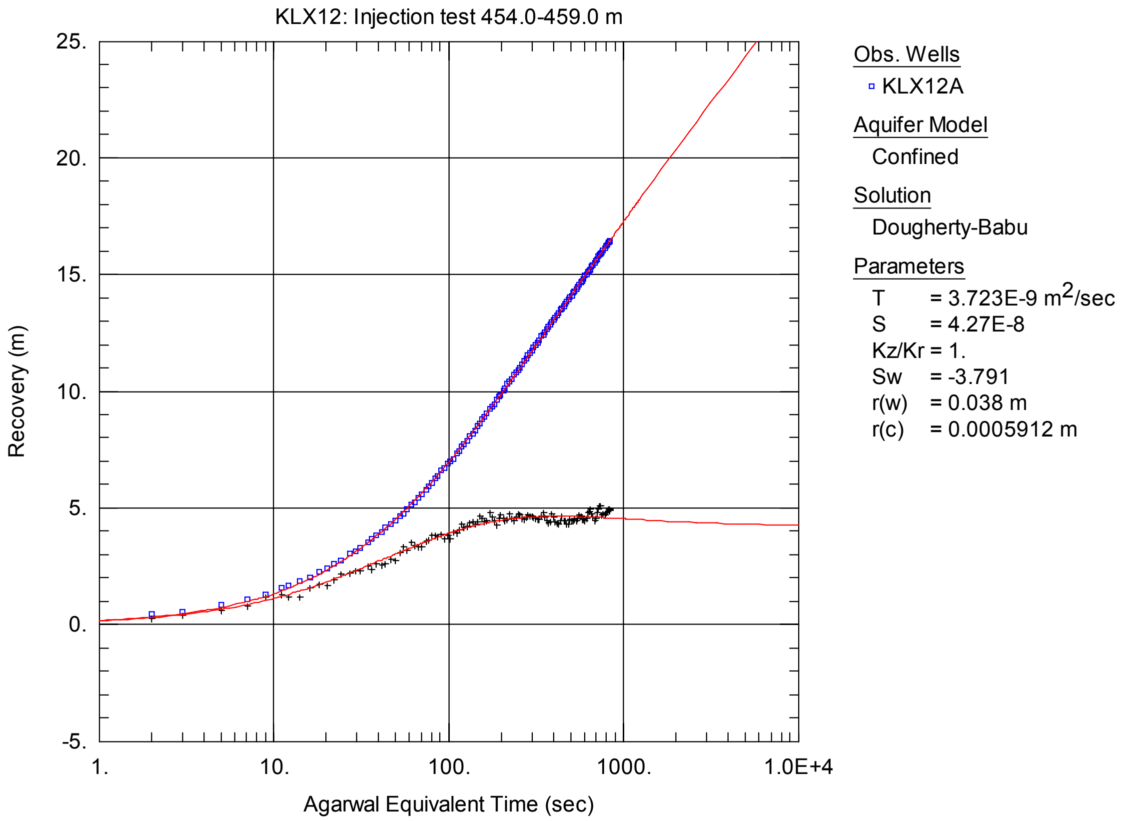

Figure A3-246. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 454.0-459.0 m in KLX12A.*

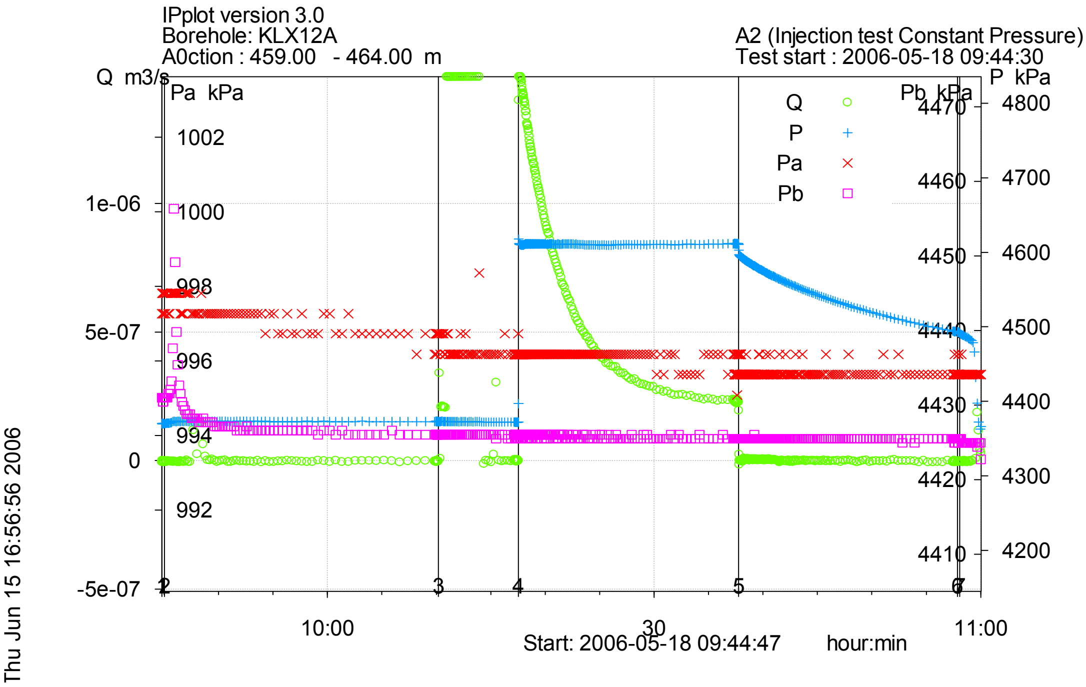

Figure A3-247. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 459.0-464.0 m in borehole KLX12A.

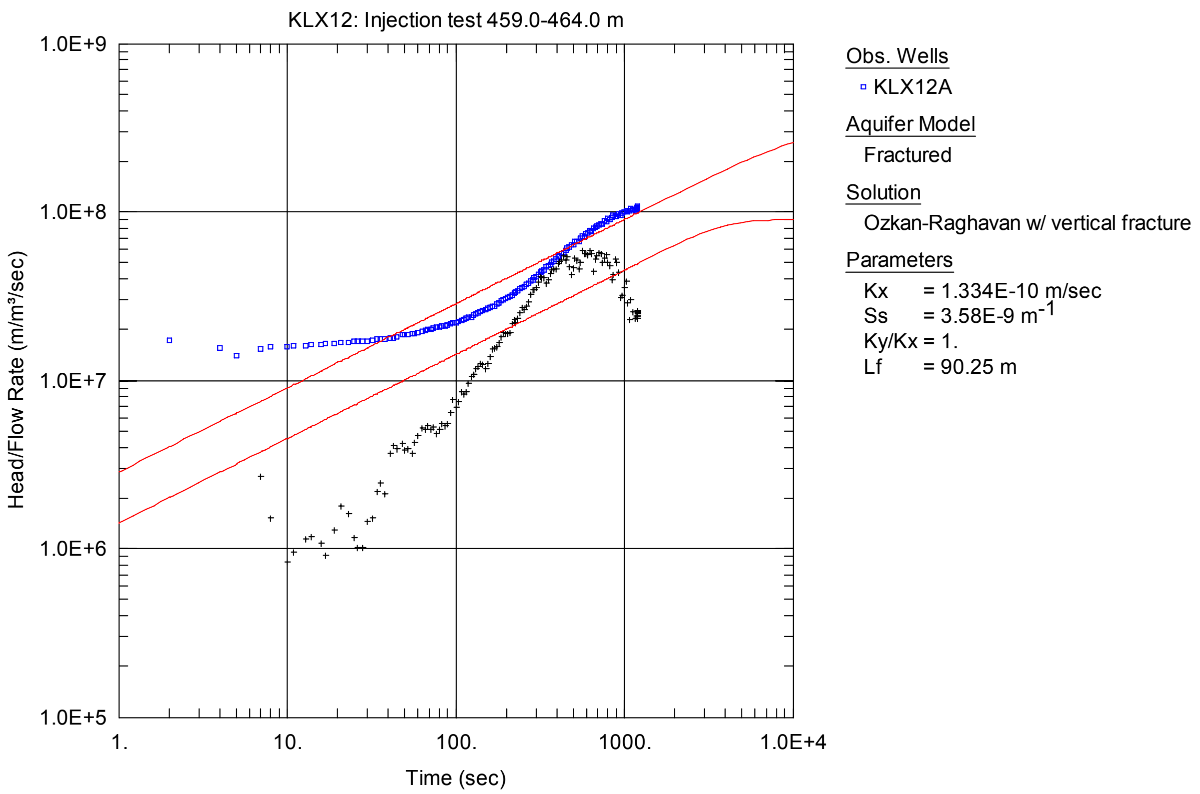

Figure A3-248. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 459.0-464.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.

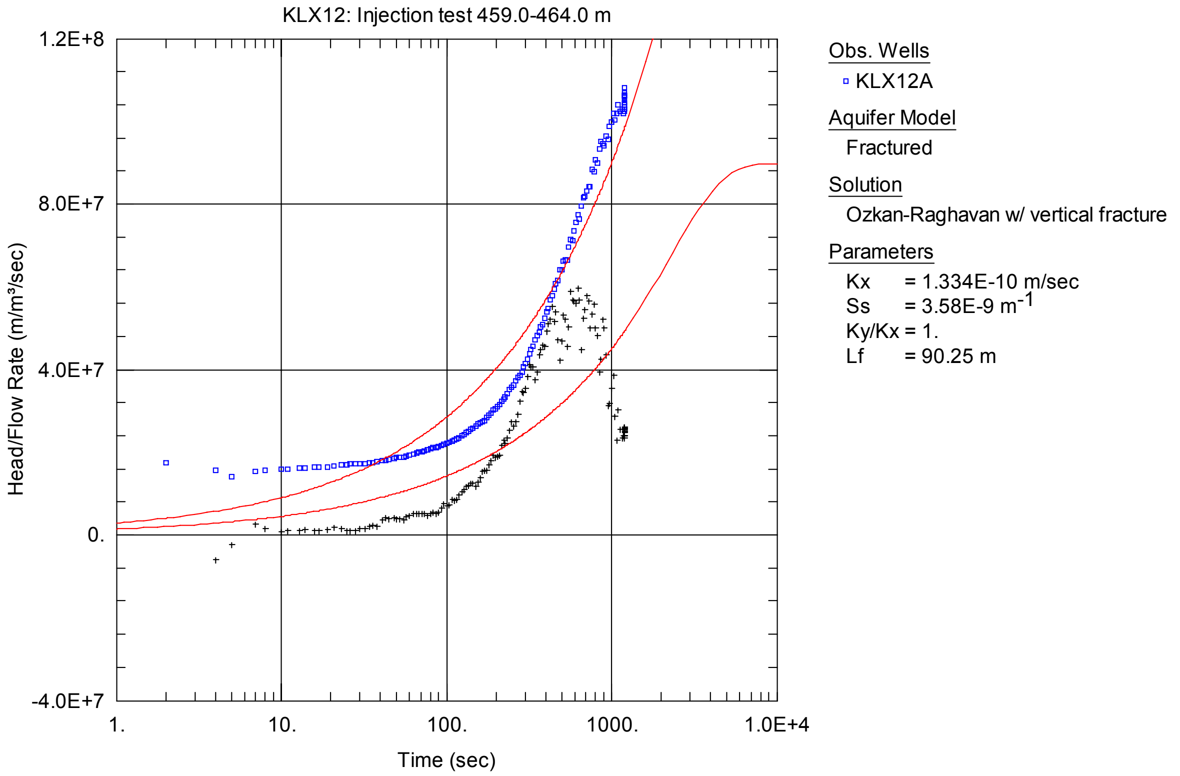

***Figure A3-249.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 459.0-464.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

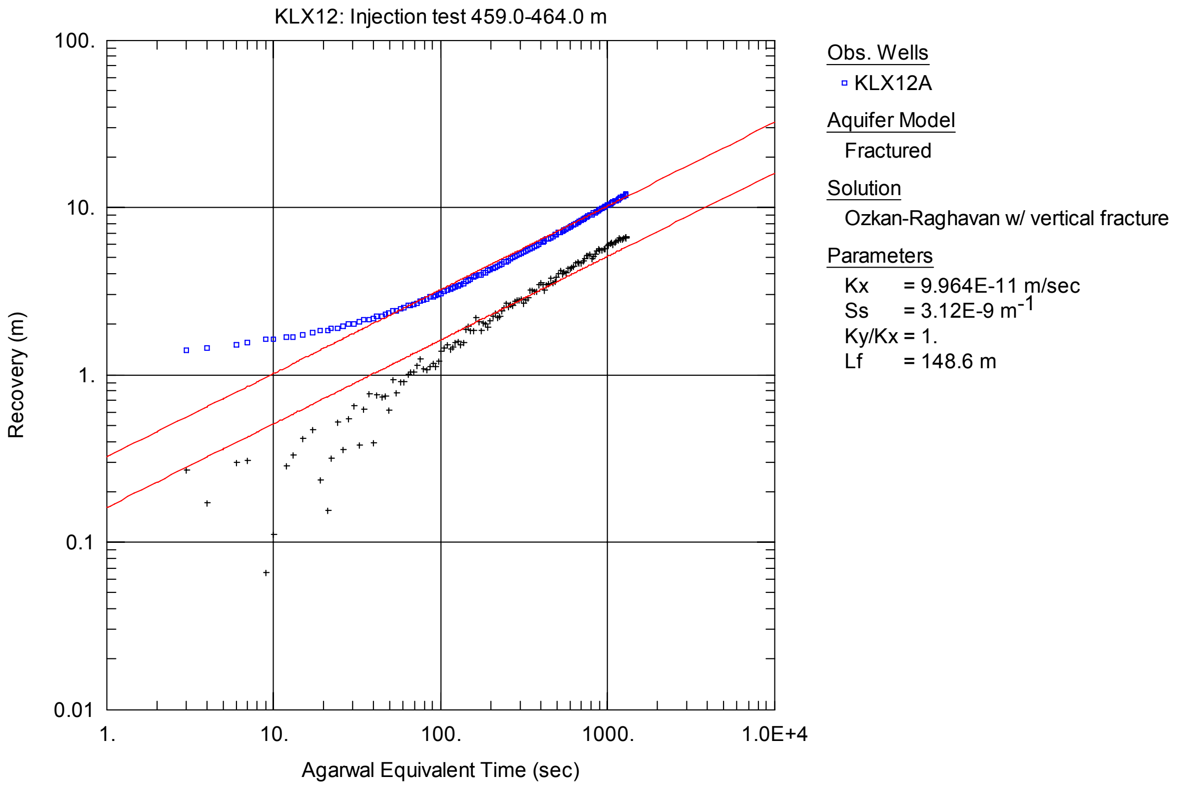

***Figure A3-250.** Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 459.0-464.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

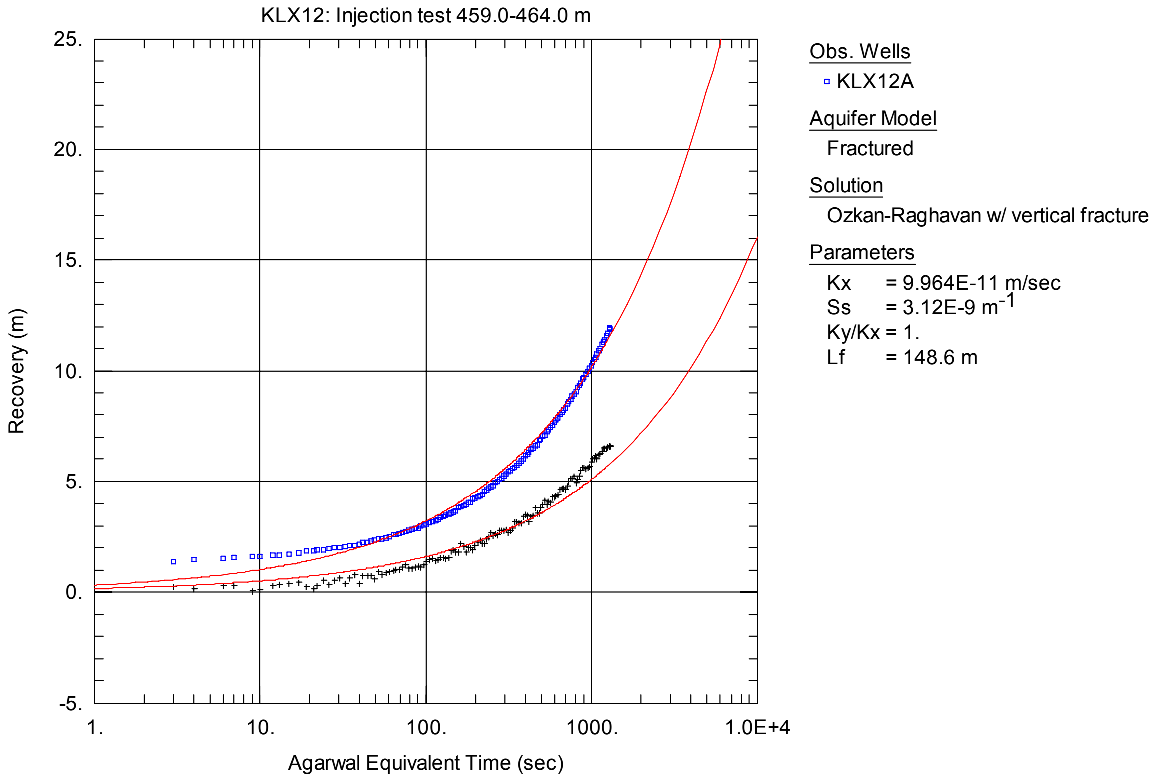

***Figure A3-251.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 459.0-464.0 m in KLX12A.* The type curve fit is showing a possible, however not unambiguous, evaluation.

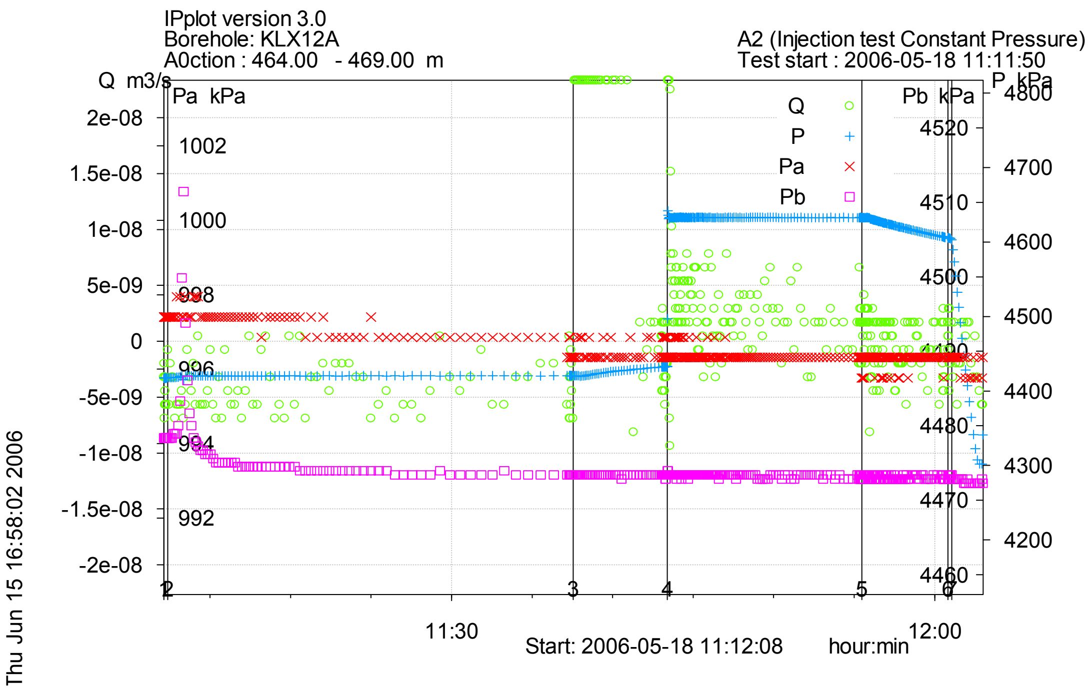

***Figure A3-252.** Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 464.0-469.0 m in borehole KLX12A.*

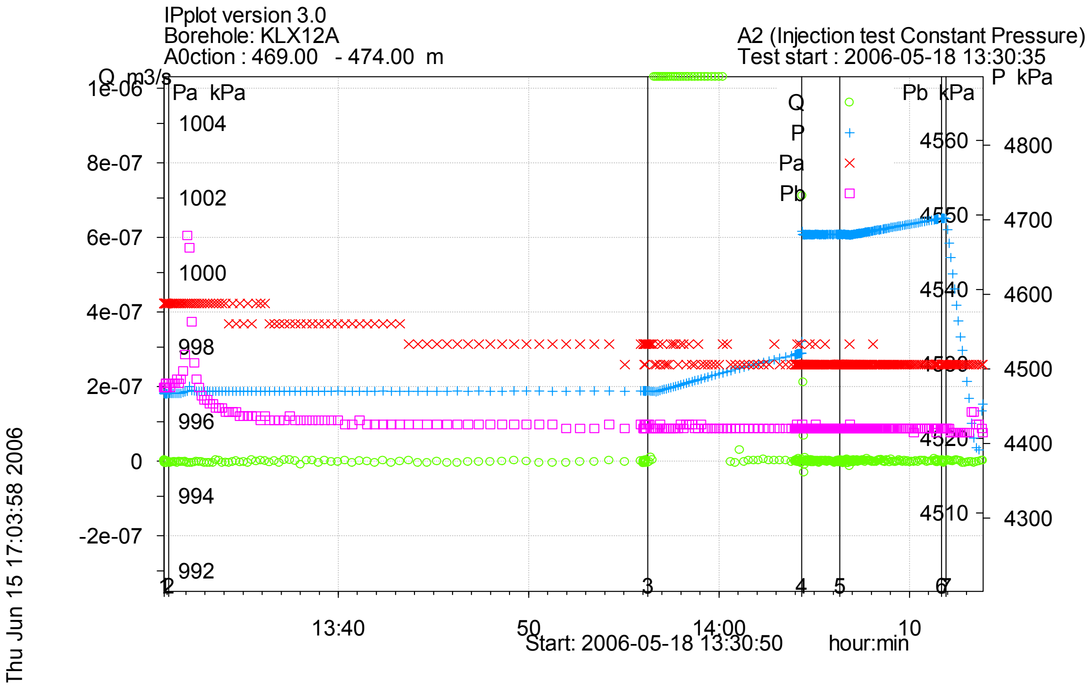

__Figure A3-253.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 469.0-474.0 m in borehole KLX12A.

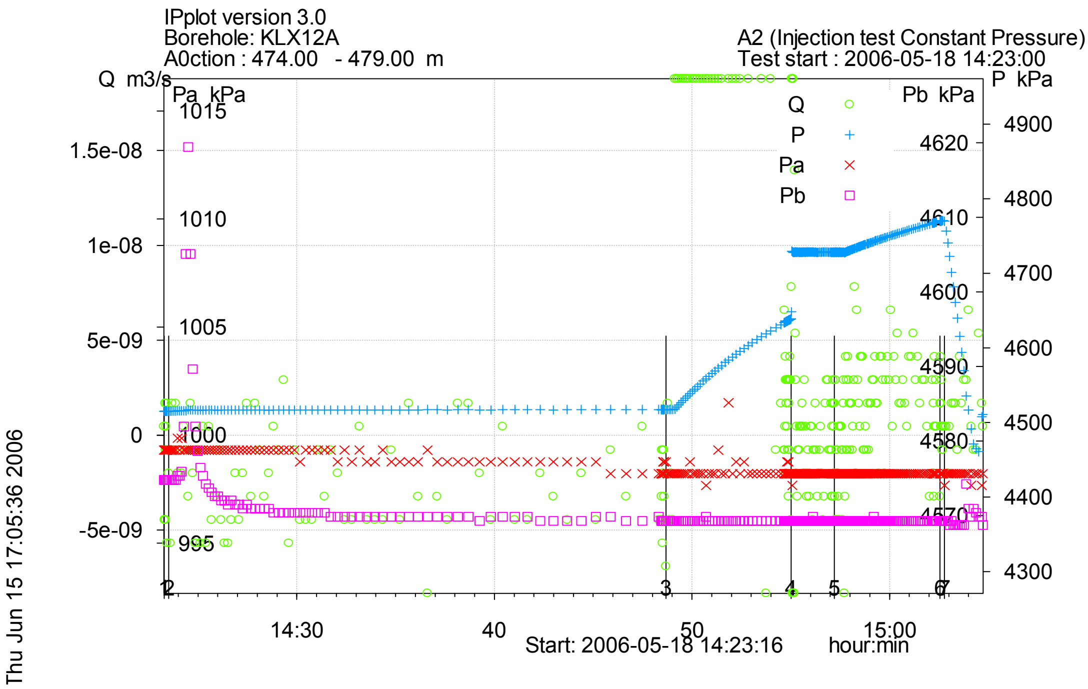

__Figure A3-254.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 474.0-479.0 m in borehole KLX12A.

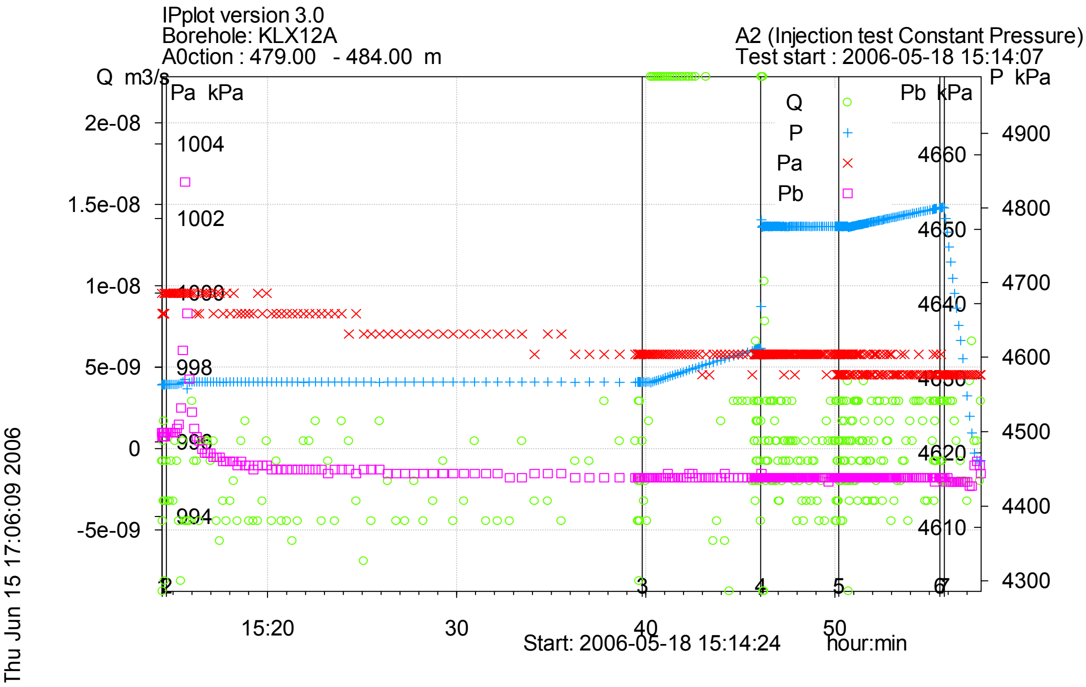

Figure A3-255. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 479.0-484.0 m in borehole KLX12A.*

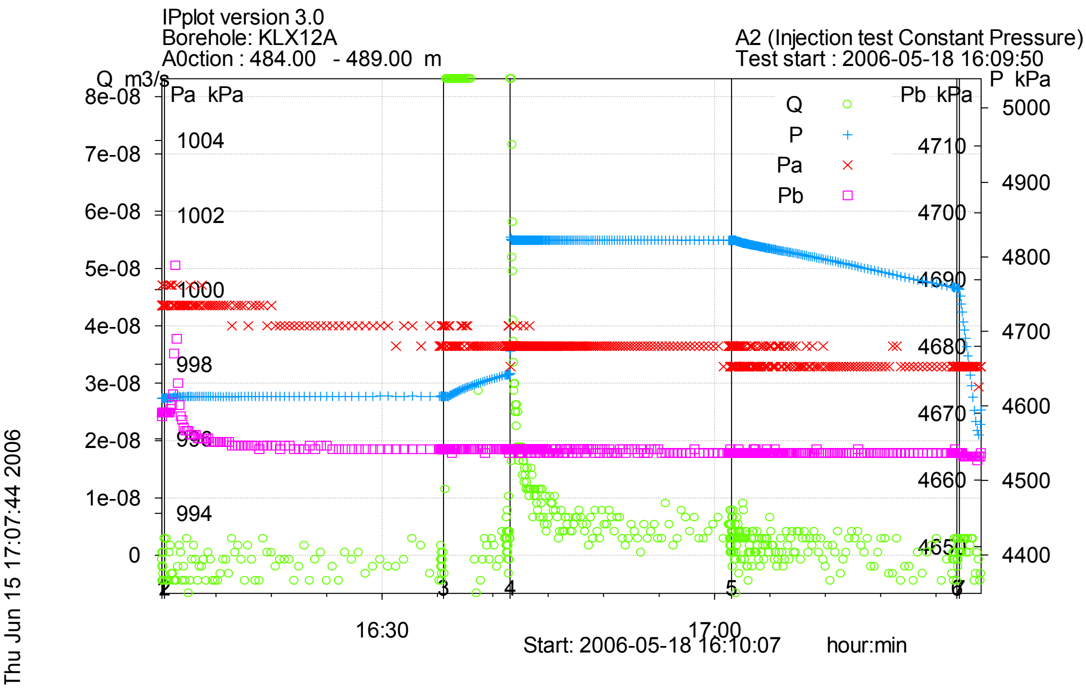

Figure A3-256. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 484.0-489.0 m in borehole KLX12A.*

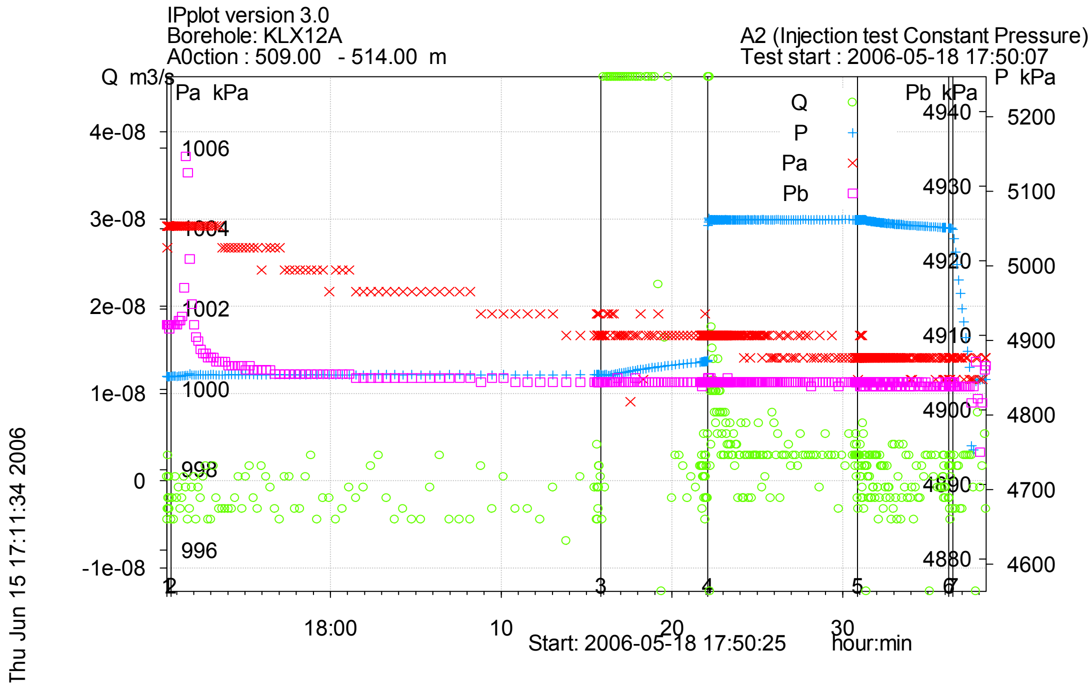

__Figure A3-257.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 509.0-514.0 m in borehole KLX12A.

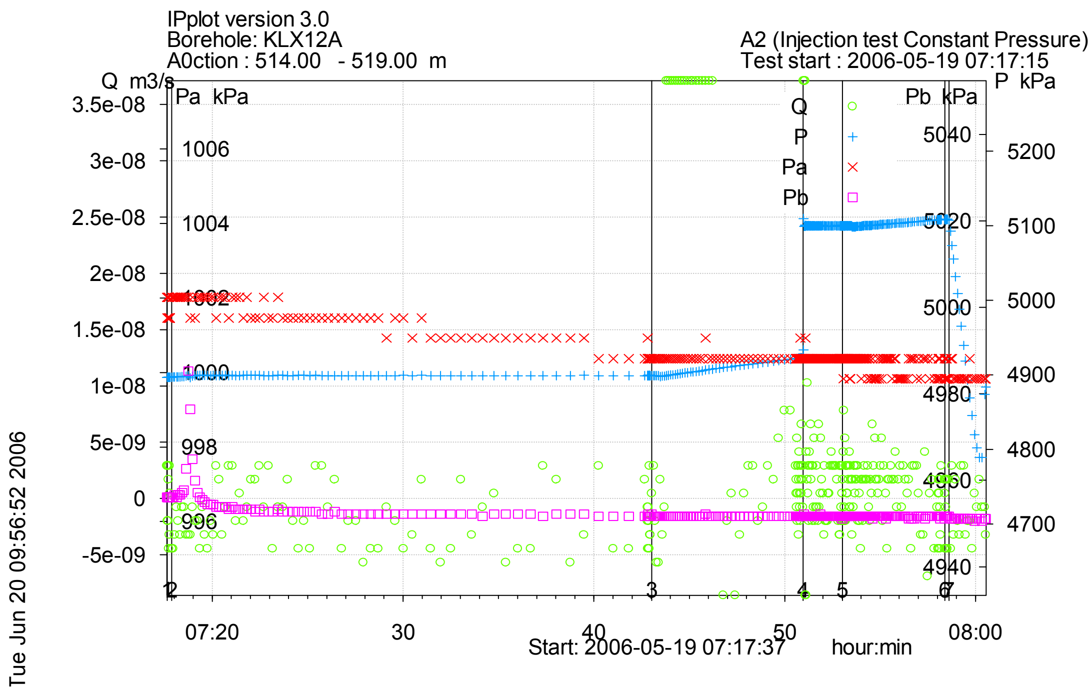

__Figure A3-258.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 514.0-519.0 m in borehole KLX12A.

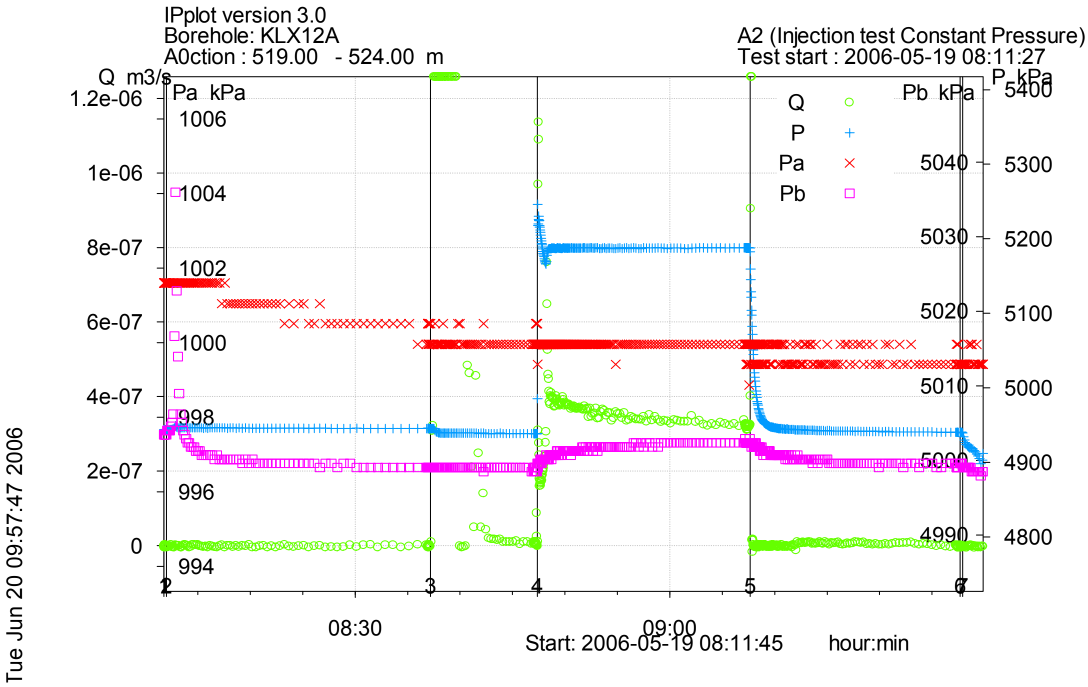

Figure A3-259. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 519.0-524.0 m in borehole KLX12A.

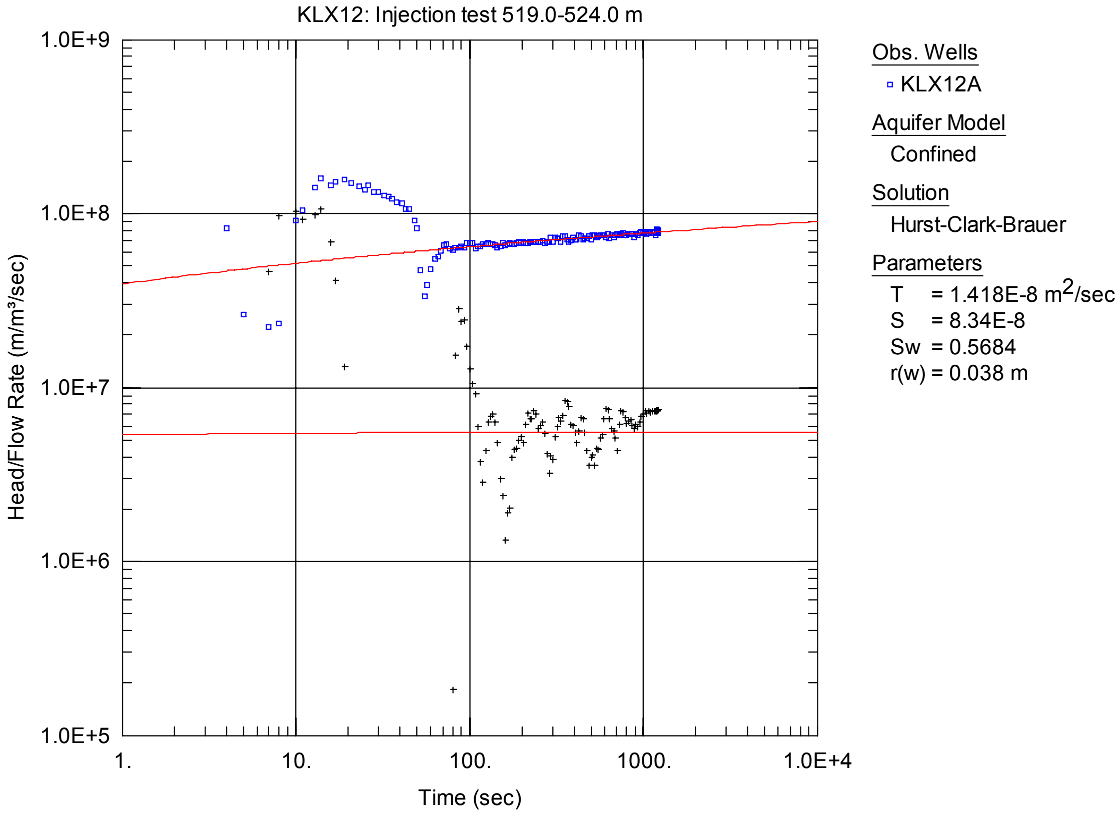

Figure A3-260. Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 519.0-524.0 m in KLX12A.

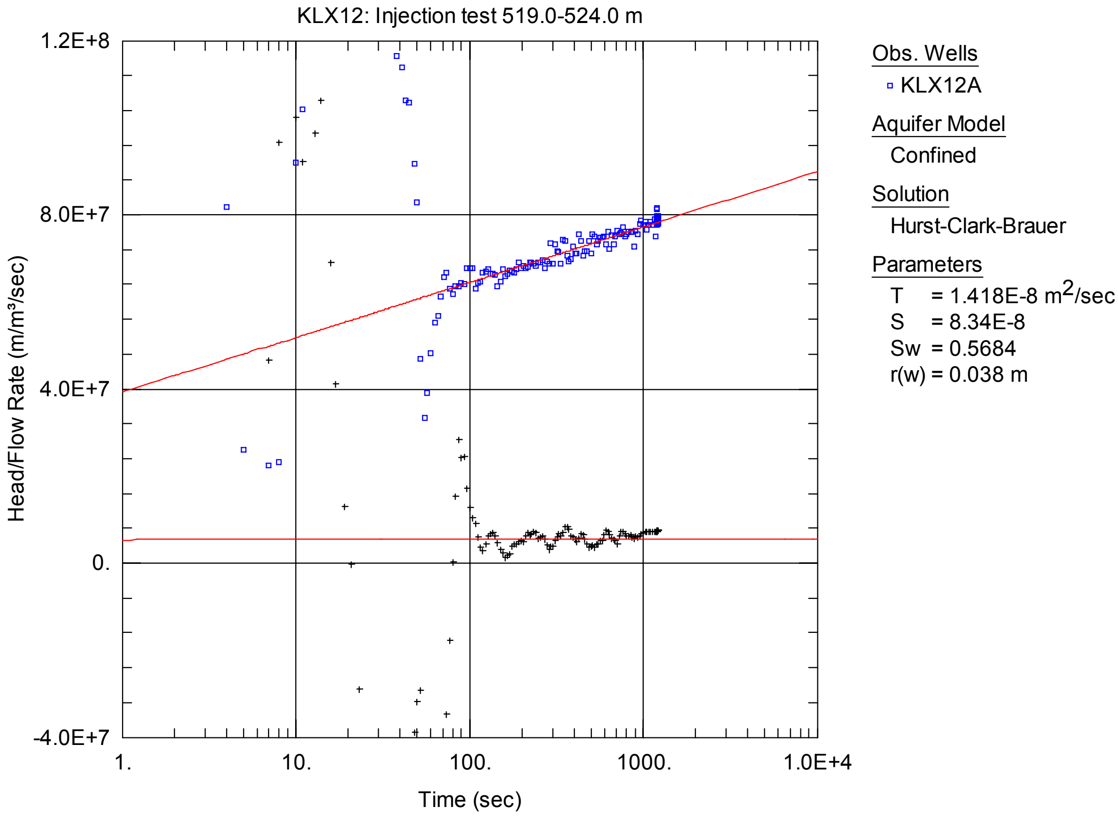

Figure A3-261. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 519.0-524.0 m in KLX12A.*

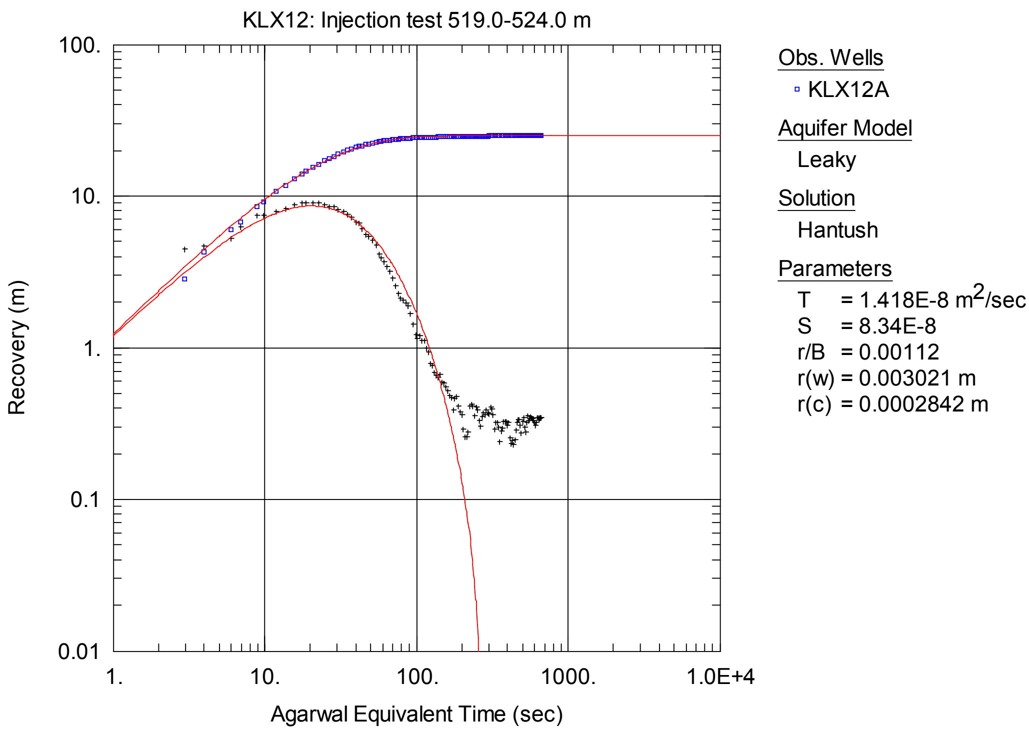

Figure A3-262. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 519.0-524.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

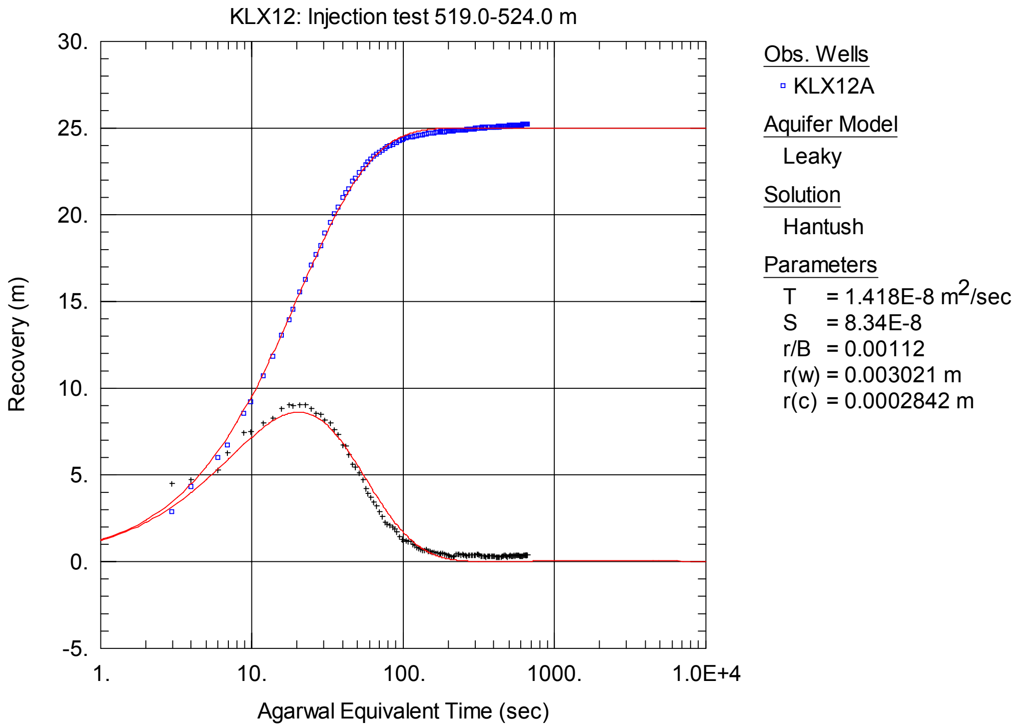

Figure A3-263. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 519.0-524.0 m in KLX12A. The type curve fit is showing a possible, however not unambiguous, evaluation.*

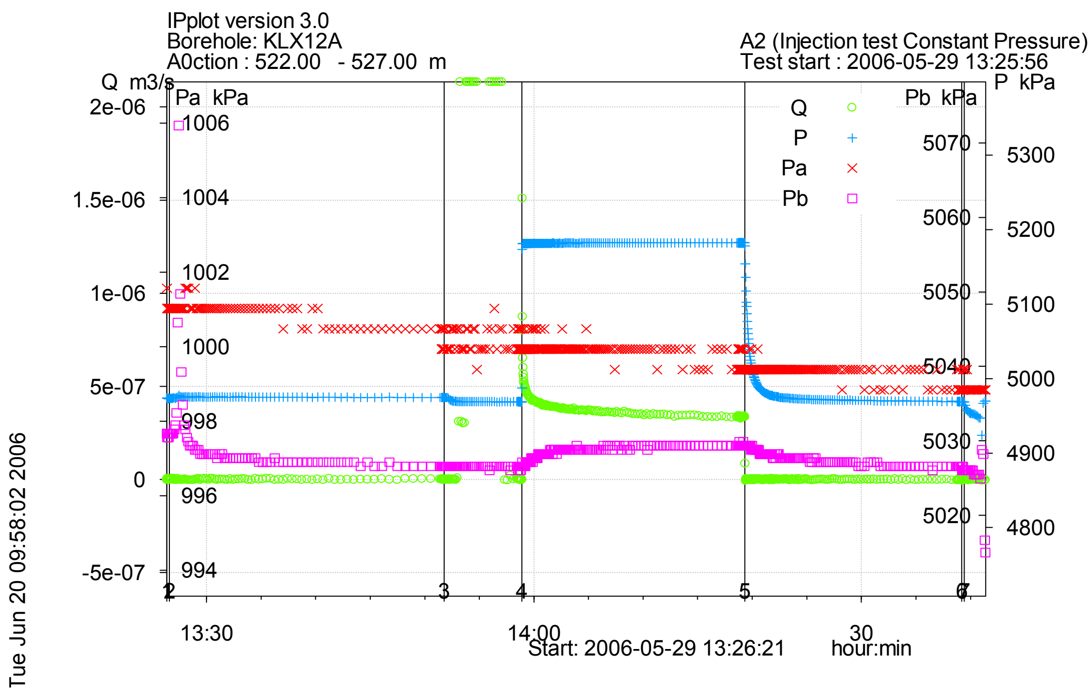

Figure A3-264. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 522.0-527.0 m in borehole KLX12A.*

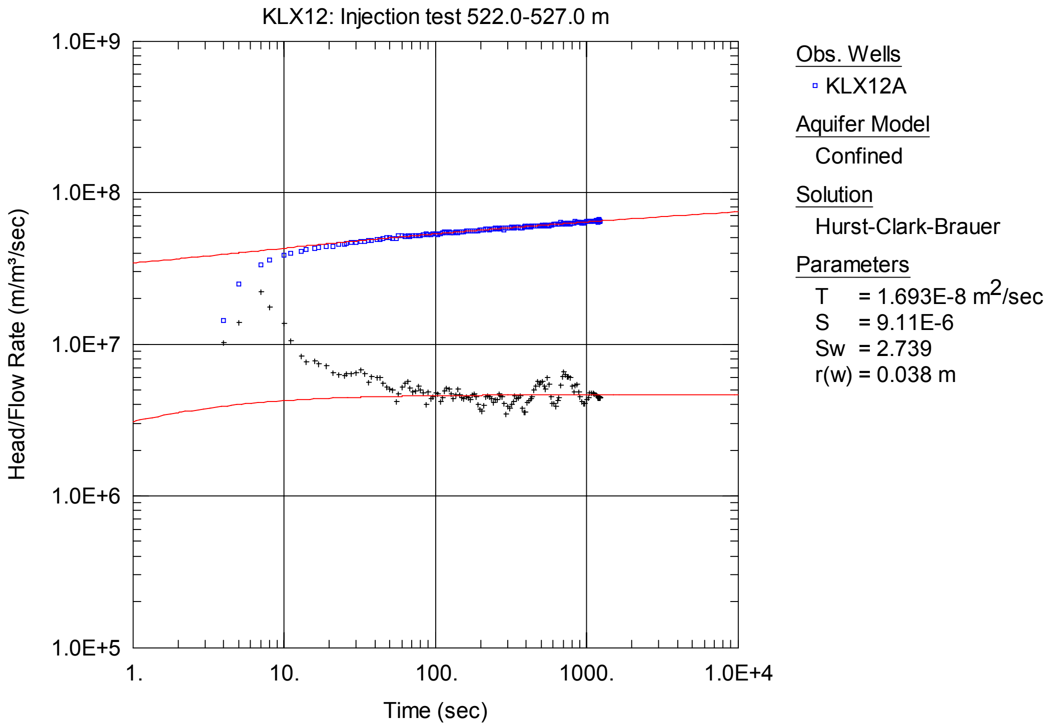

Figure A3-265. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 522.0-527.0 m in KLX12A.*

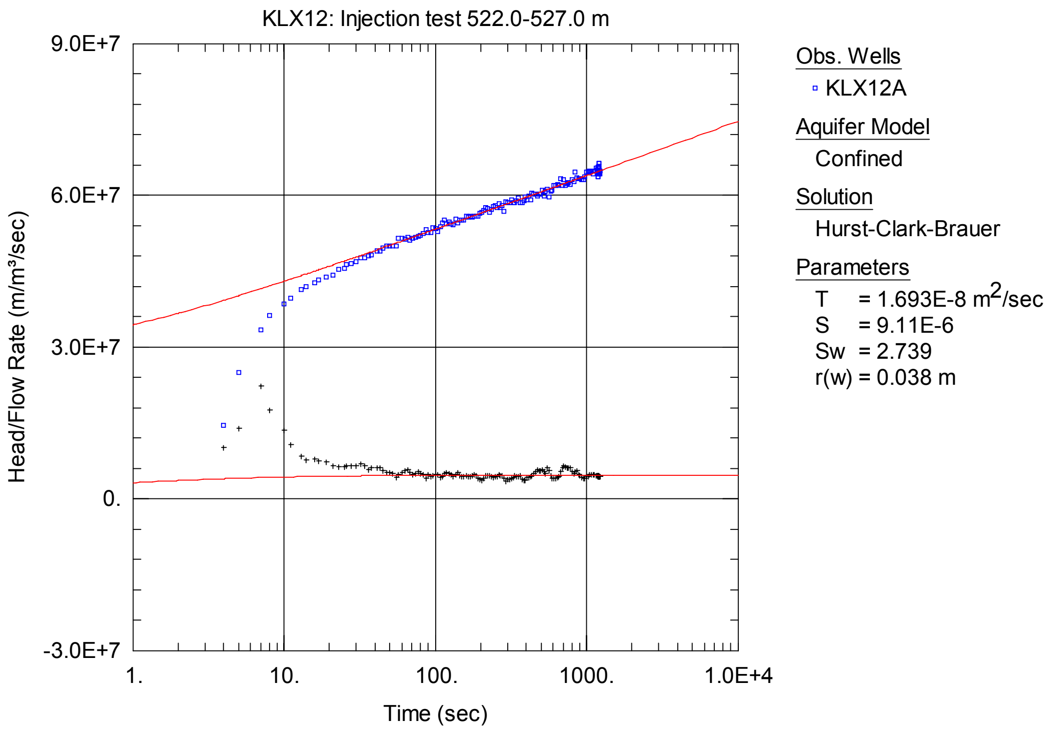

Figure A3-266. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 522.0-527.0 m in KLX12A.*

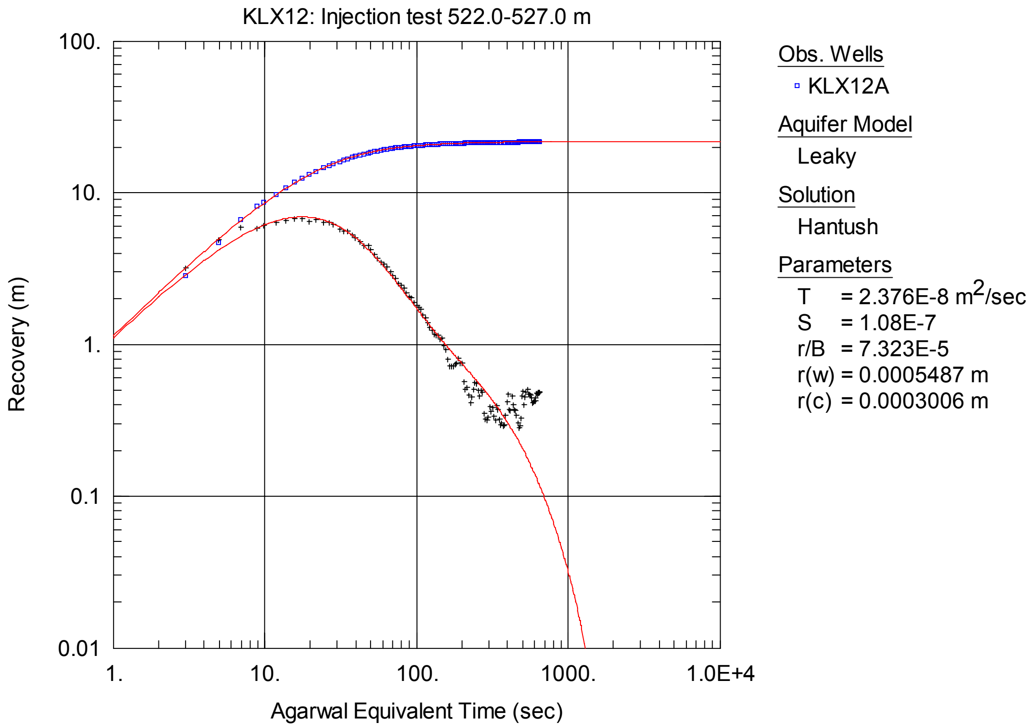

Figure A3-267. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 522.0-527.0 m in KLX12A.*

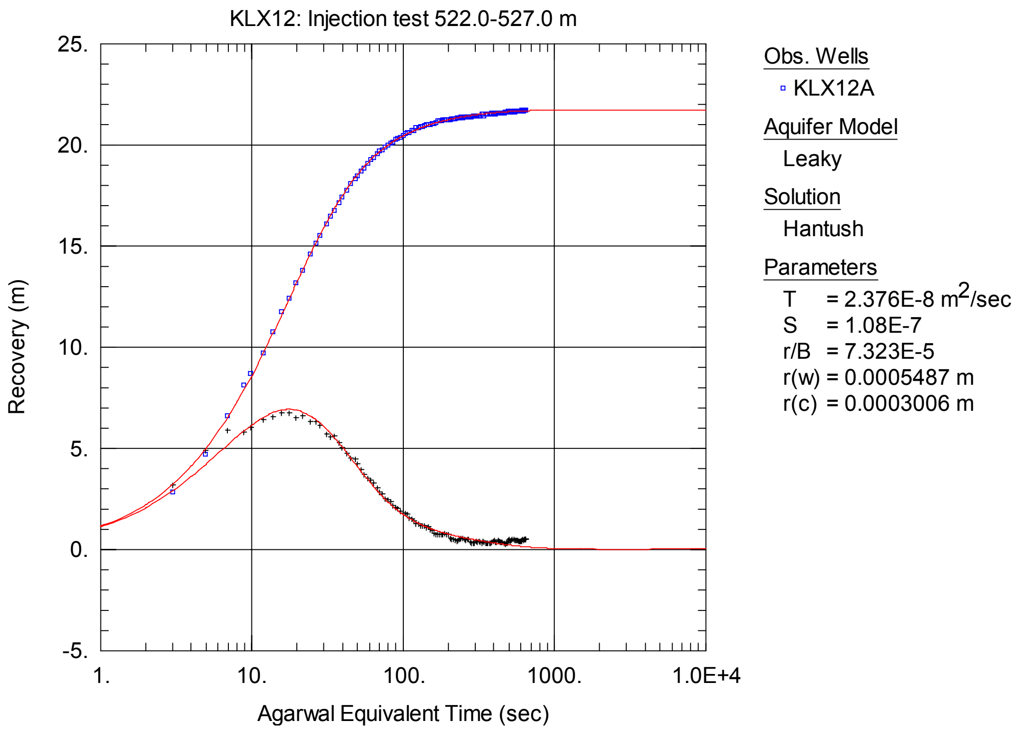

Figure A3-268. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 522.0-527.0 m in KLX12A.*

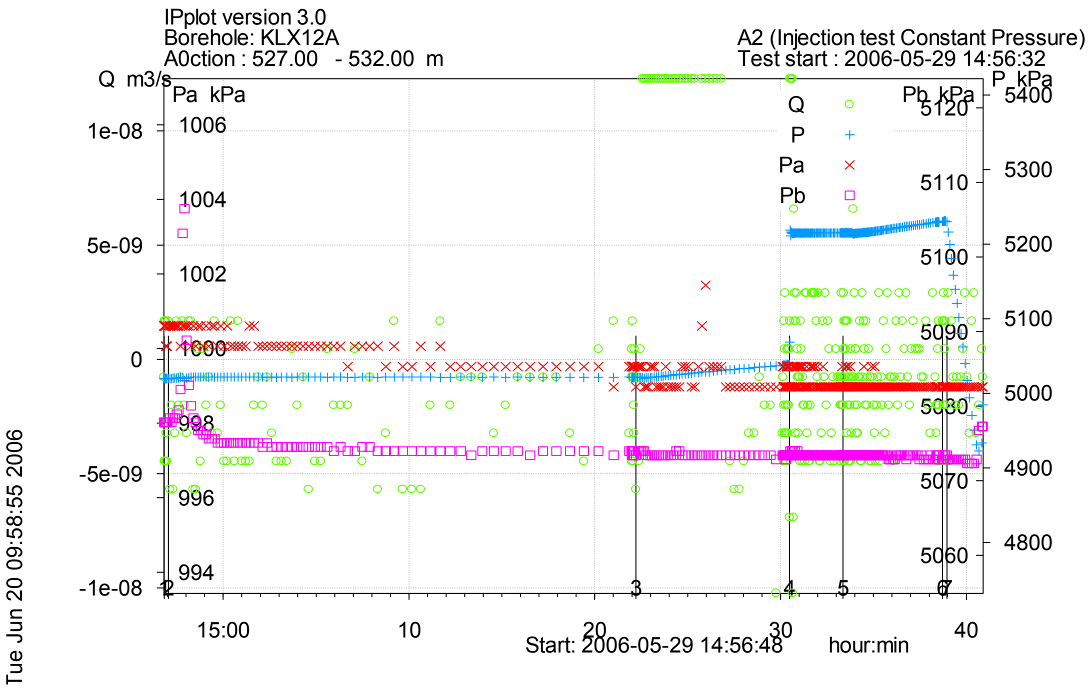

Figure A3-269. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 527.0-532.0 m in borehole KLX12A.

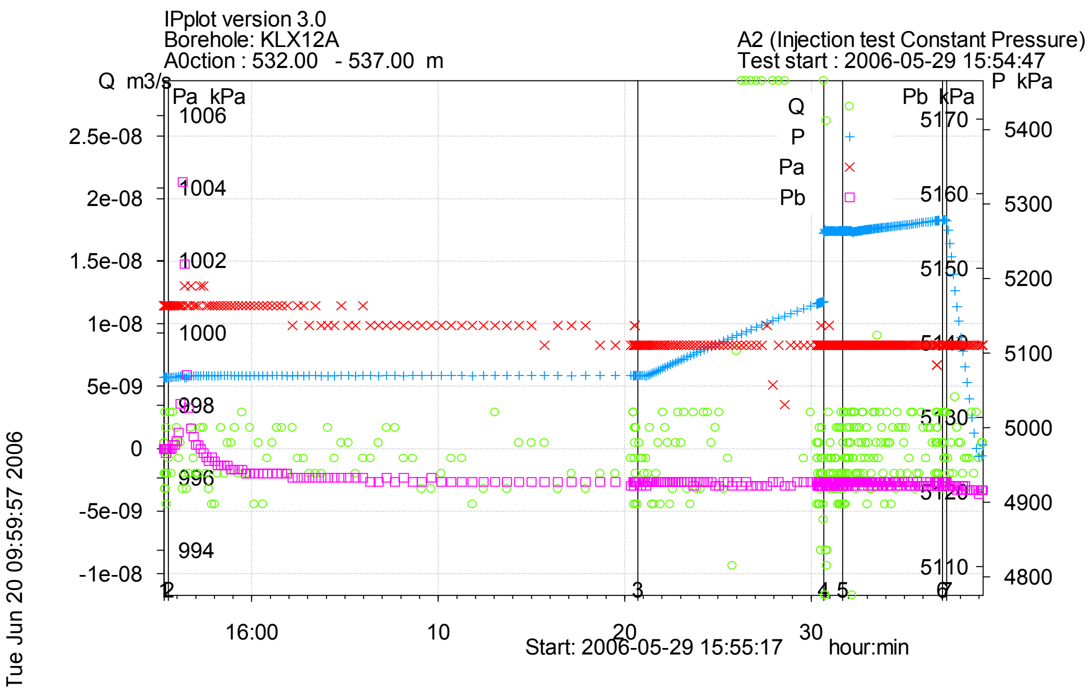

Figure A3-270. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 532.0-537.0 m in borehole KLX12A.

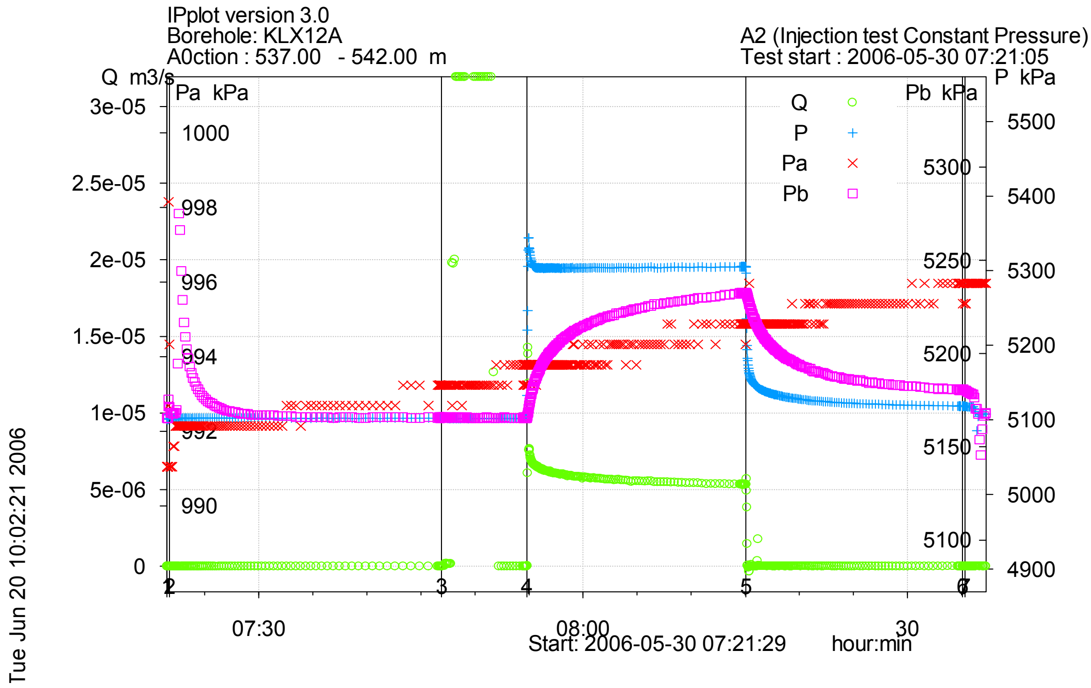

***Figure A3-271.** Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 537.0-542.0 m in borehole KLX12A.*

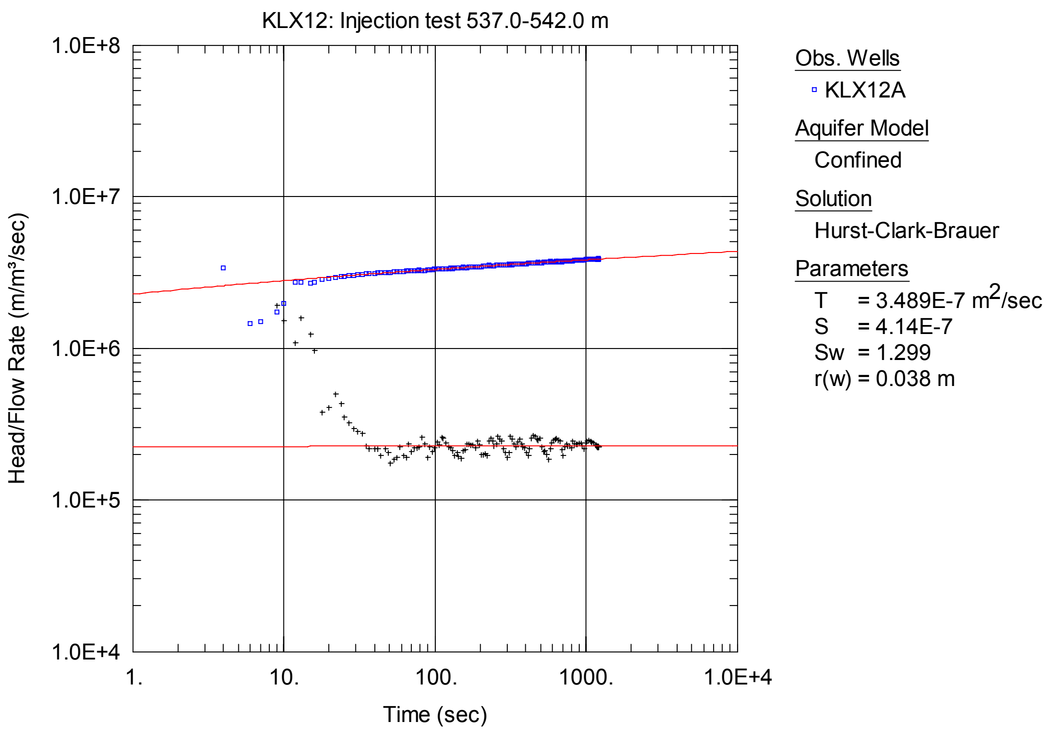

***Figure A3-272.** Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 537.0-542.0 m in KLX12A.*

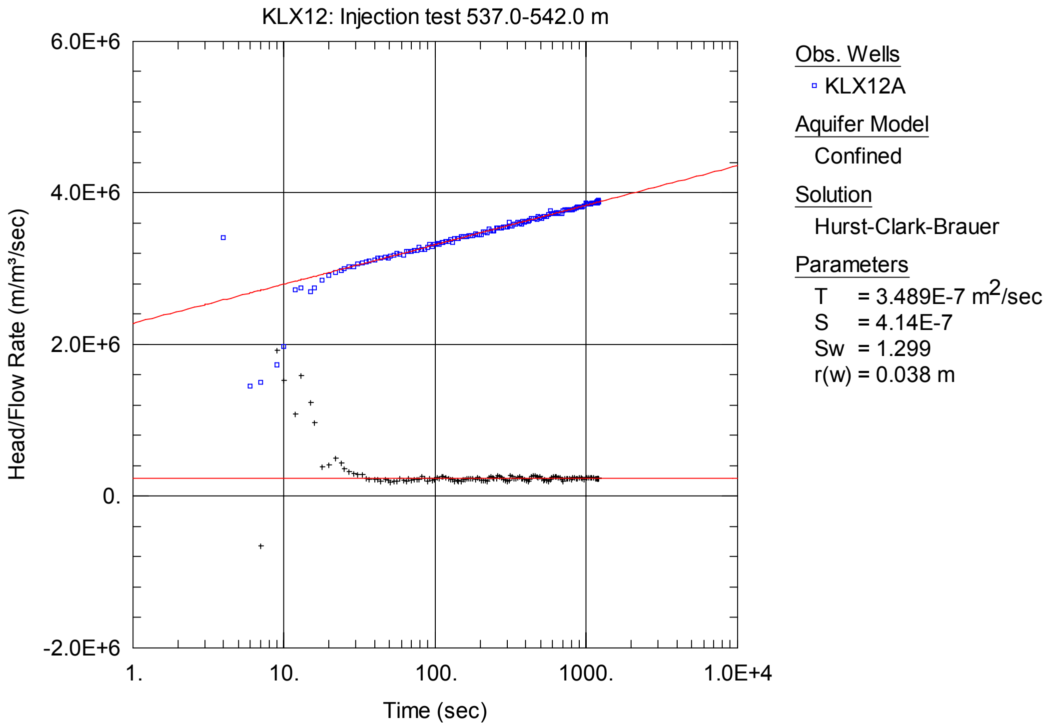

***Figure A3-273.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 537.0-542.0 m in KLX12A.*

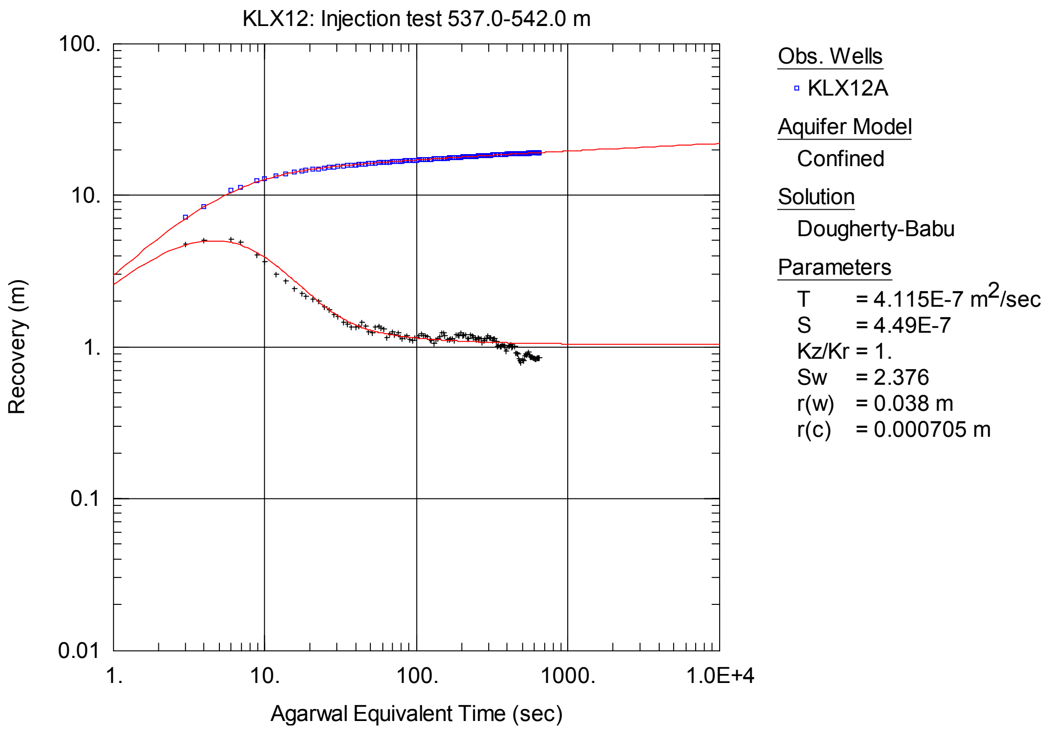

***Figure A3-274.** Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 537.0-542.0 m in KLX12A.*

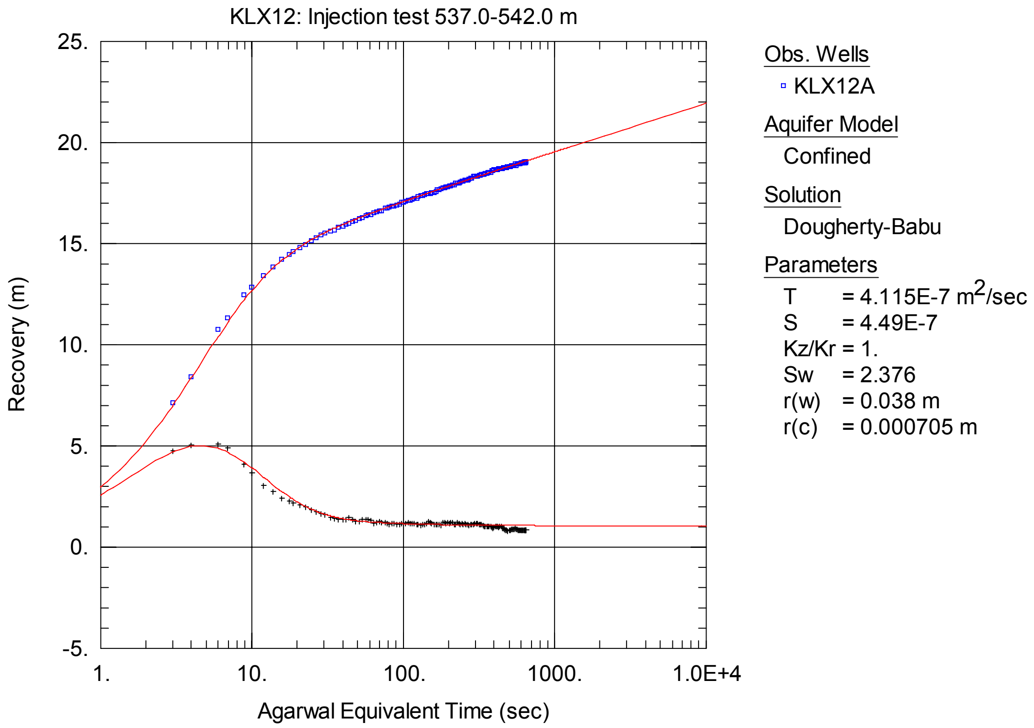

Figure A3-275. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 537.0-542.0 m in KLX12A.*

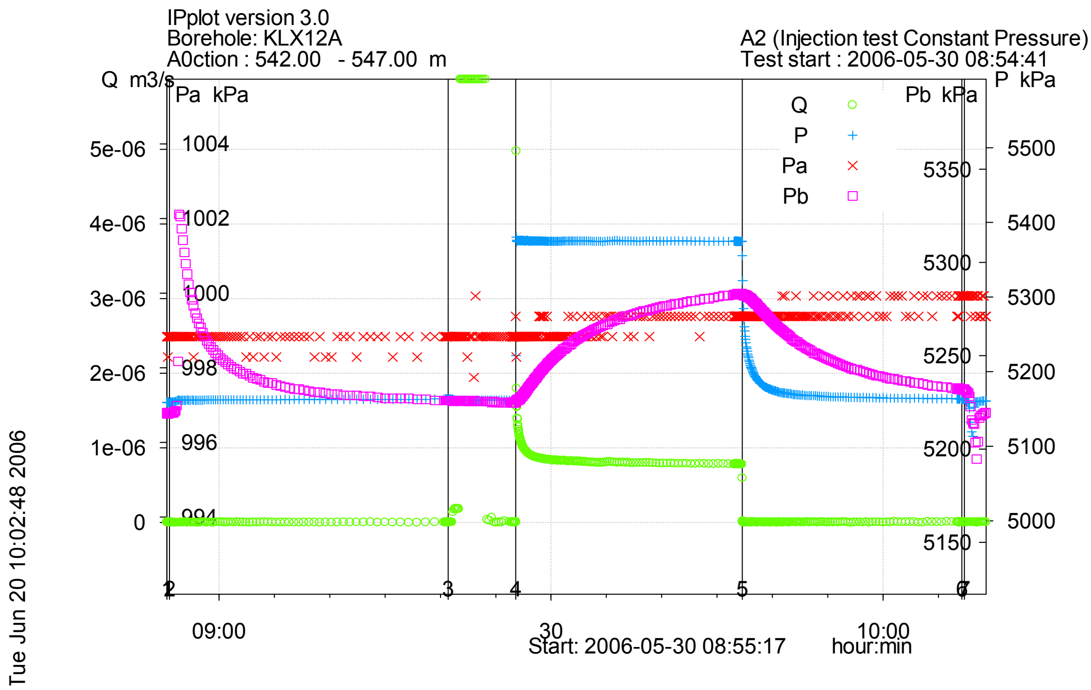

Figure A3-276. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 542.0-547.0 m in borehole KLX12A.*

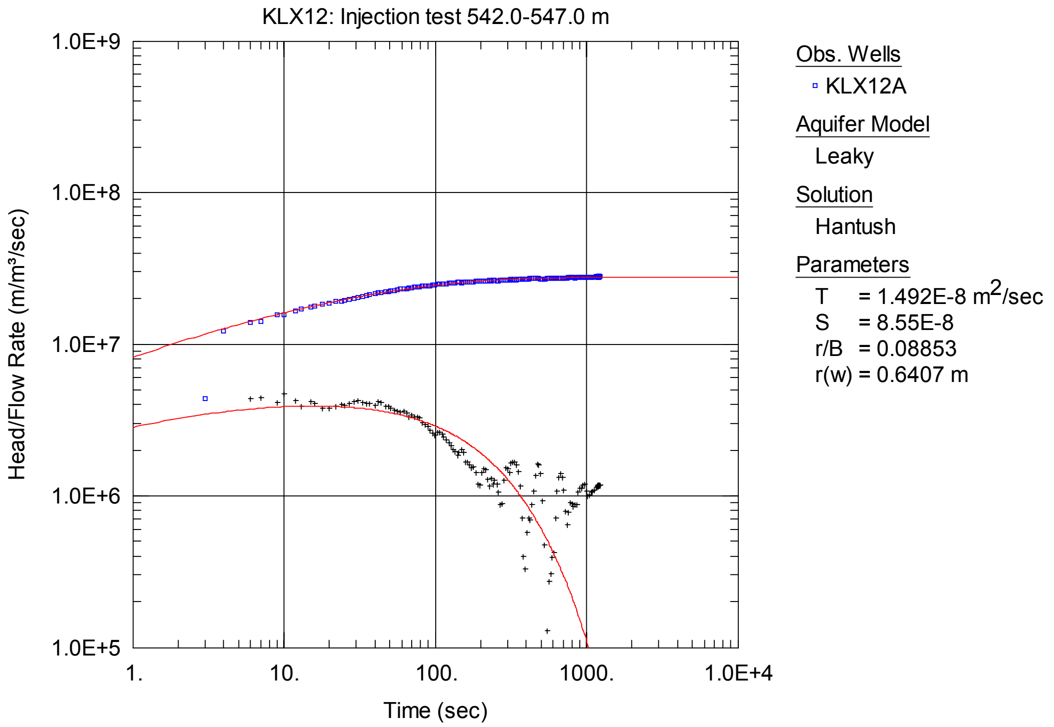

__Figure A3-277.__ Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 542.0-547.0 m in KLX12A.

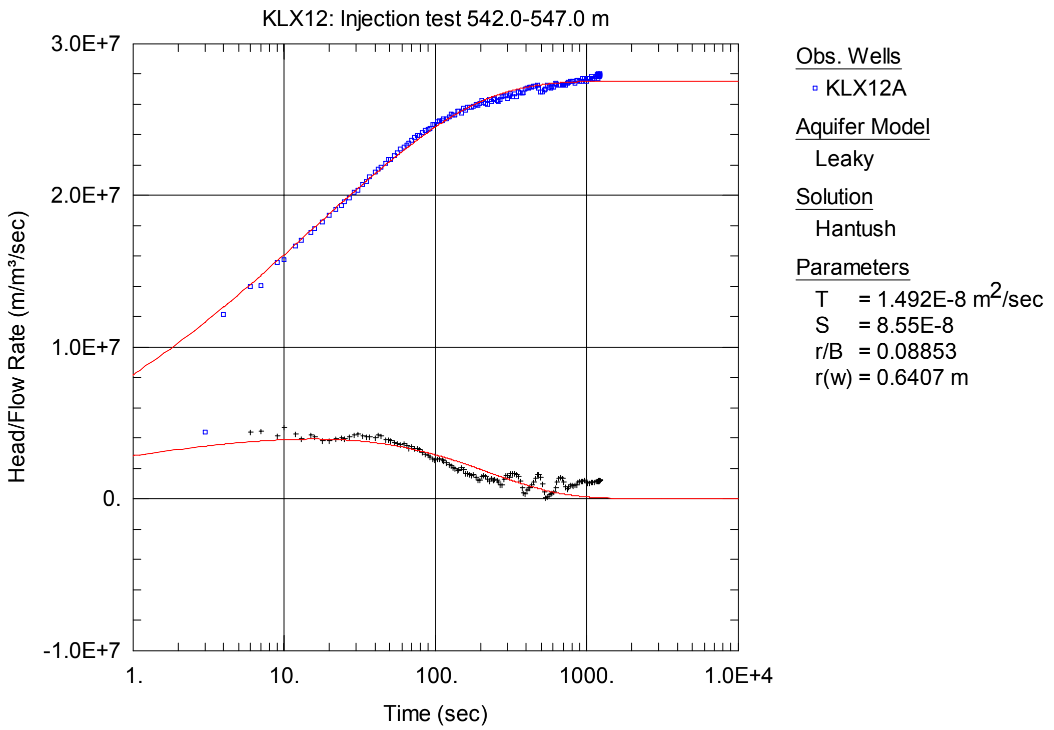

__Figure A3-278.__ Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 542.0-547.0 m in KLX12A.

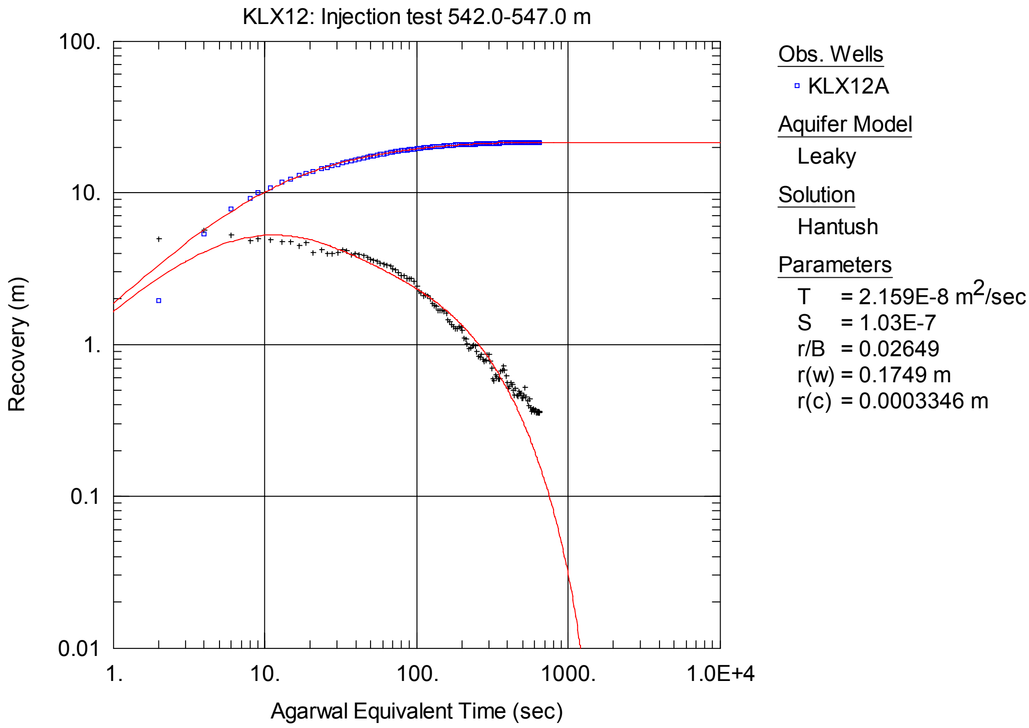

Figure A3-279. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 542.0-547.0 m in KLX12A.*

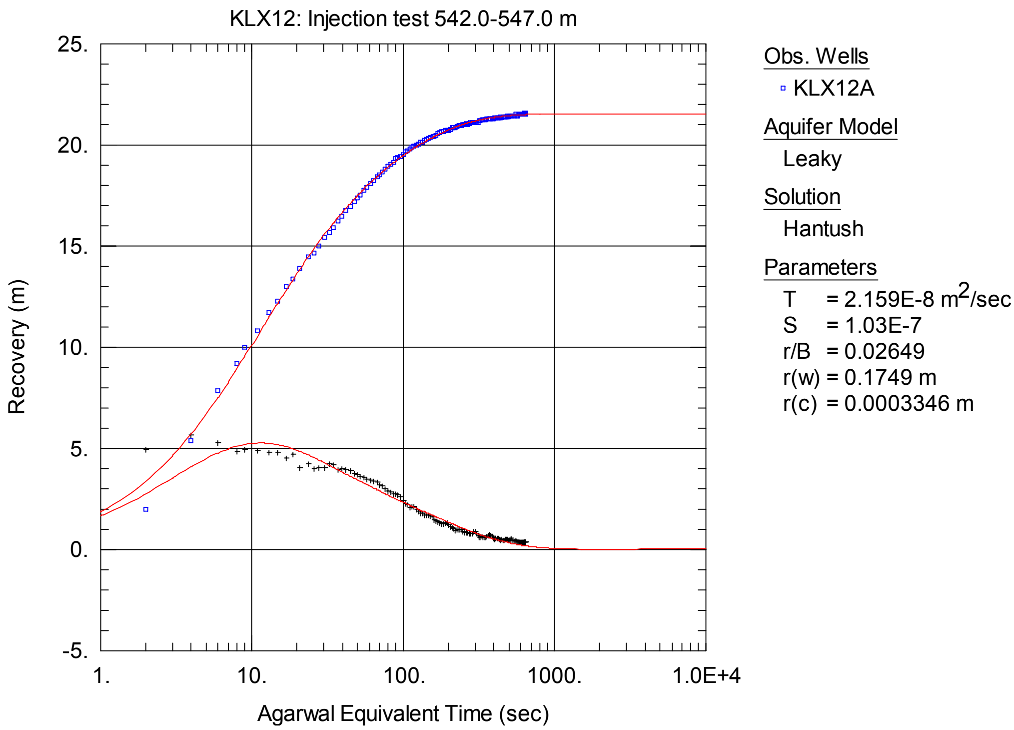

Figure A3-280. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 542.0-547.0 m in KLX12A.*

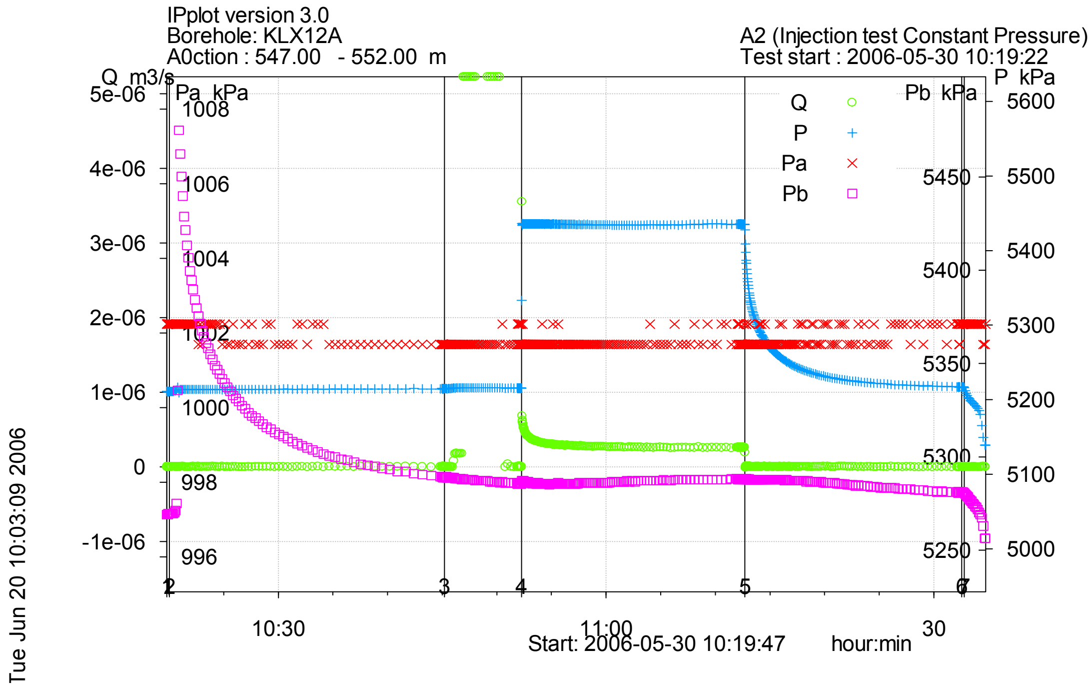

Figure A3-281. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 547.0-552.0 m in borehole KLX12A.*

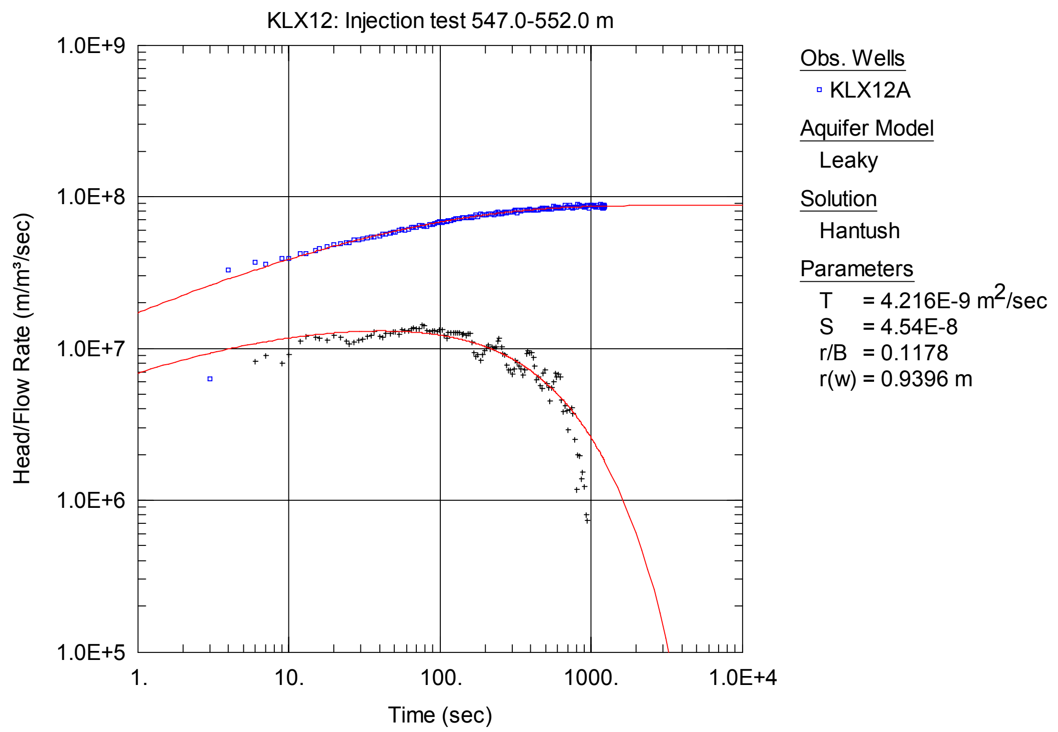

Figure A3-282. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 547.0-552.0 m in KLX12A.*

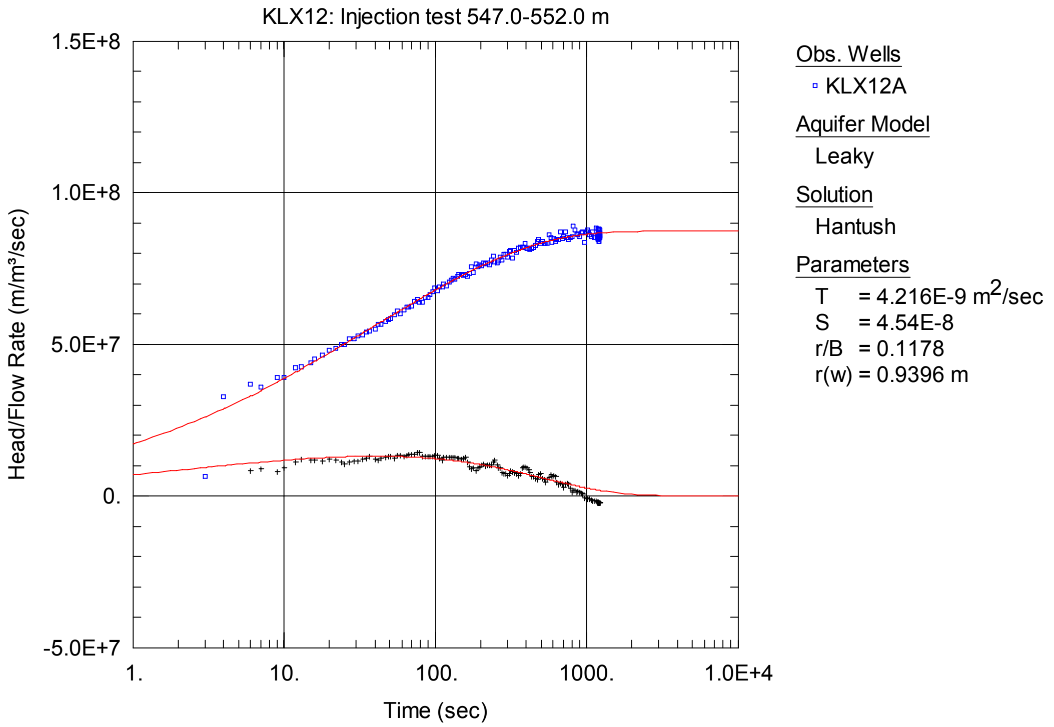

Figure A3-283. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 547.0-552.0 m in KLX12A.*

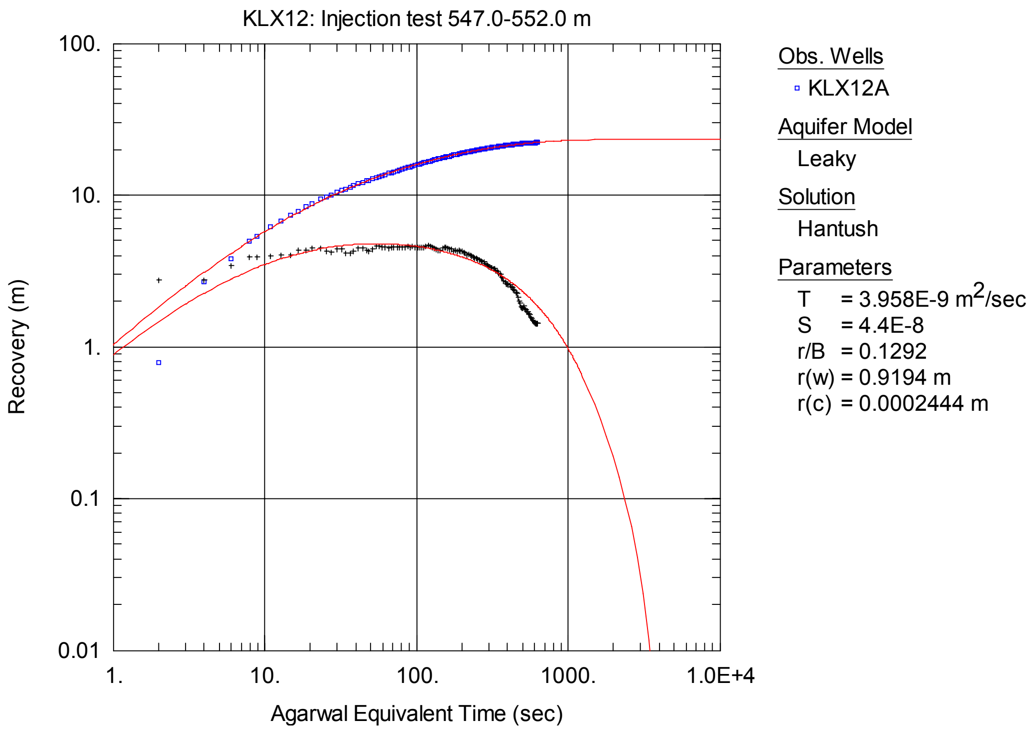

Figure A3-284. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 547.0-552.0 m in KLX12A.*

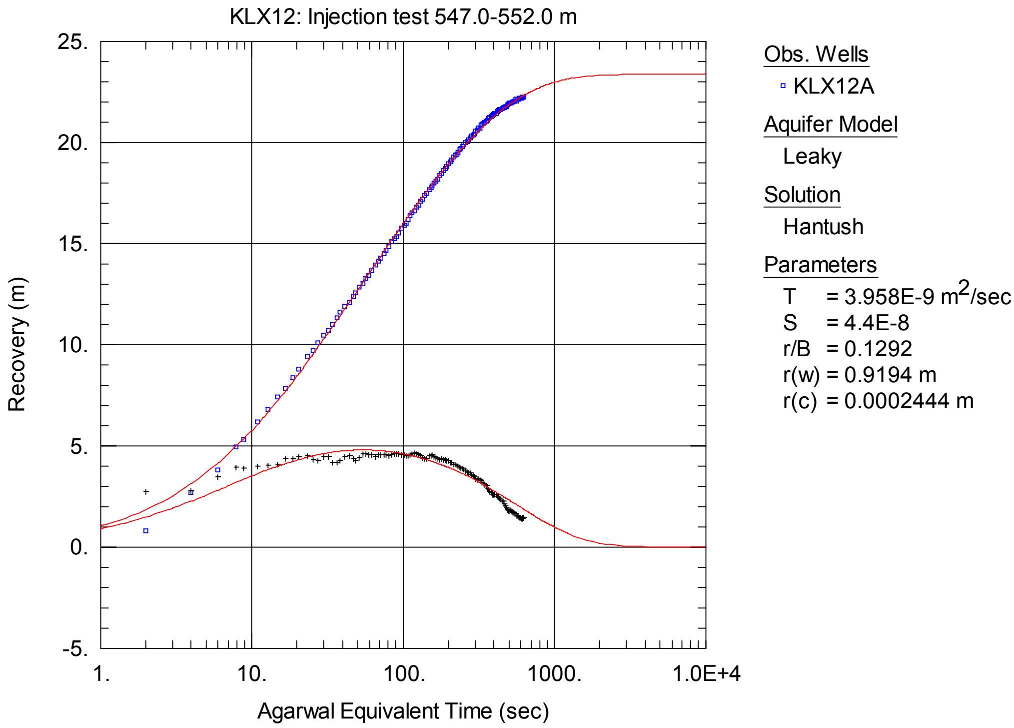

Figure A3-285. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 547.0-552.0 m in KLX12A.*

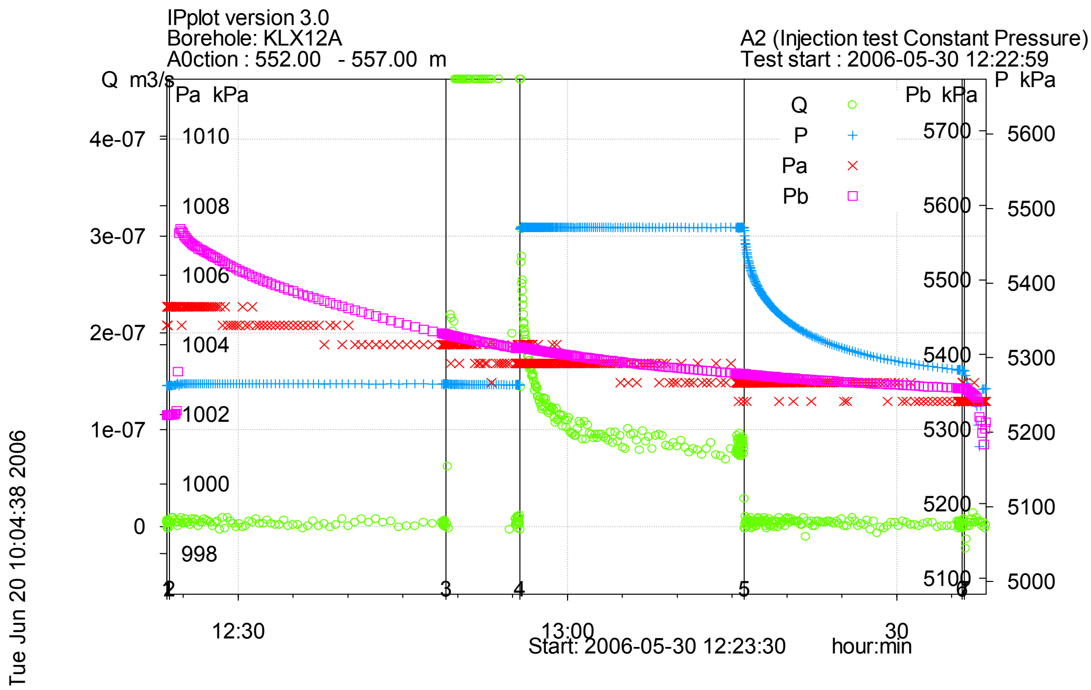

Figure A3-286. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 552.0-557.0 m in borehole KLX12A.*

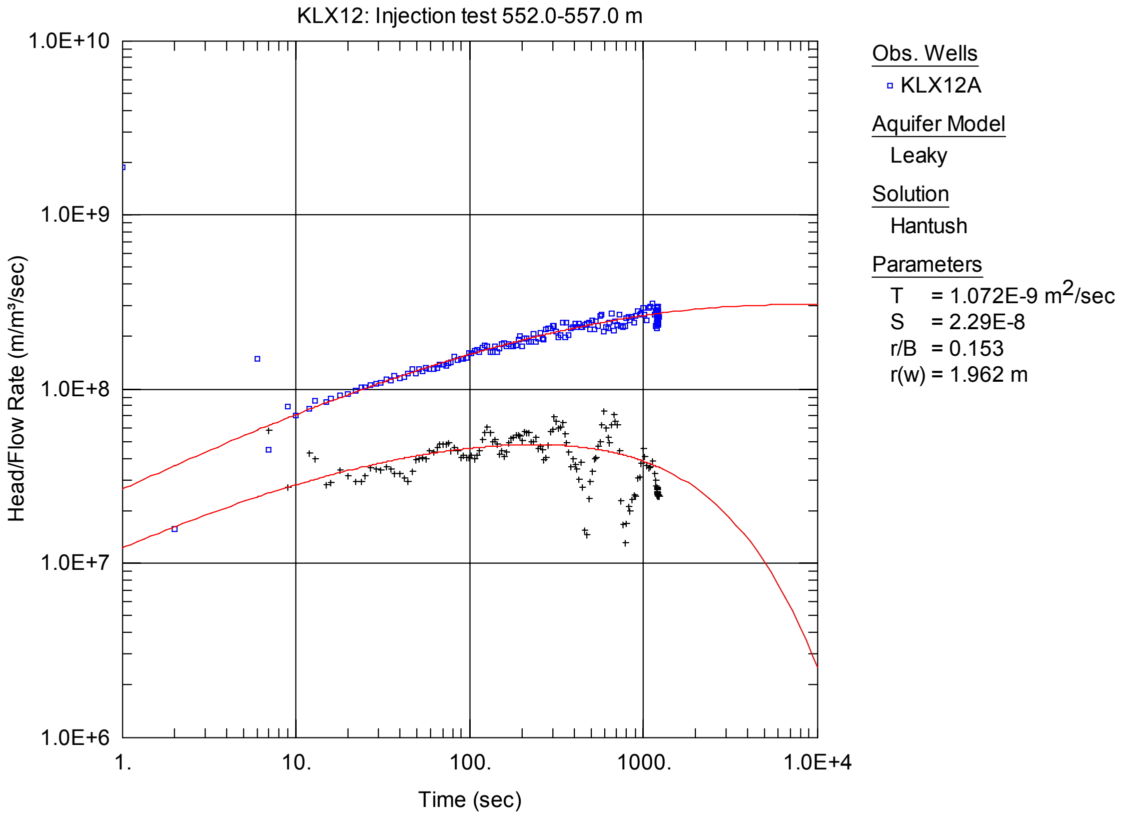

Figure A3-287. *Log-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 552.0-557.0 m in KLX12A.*

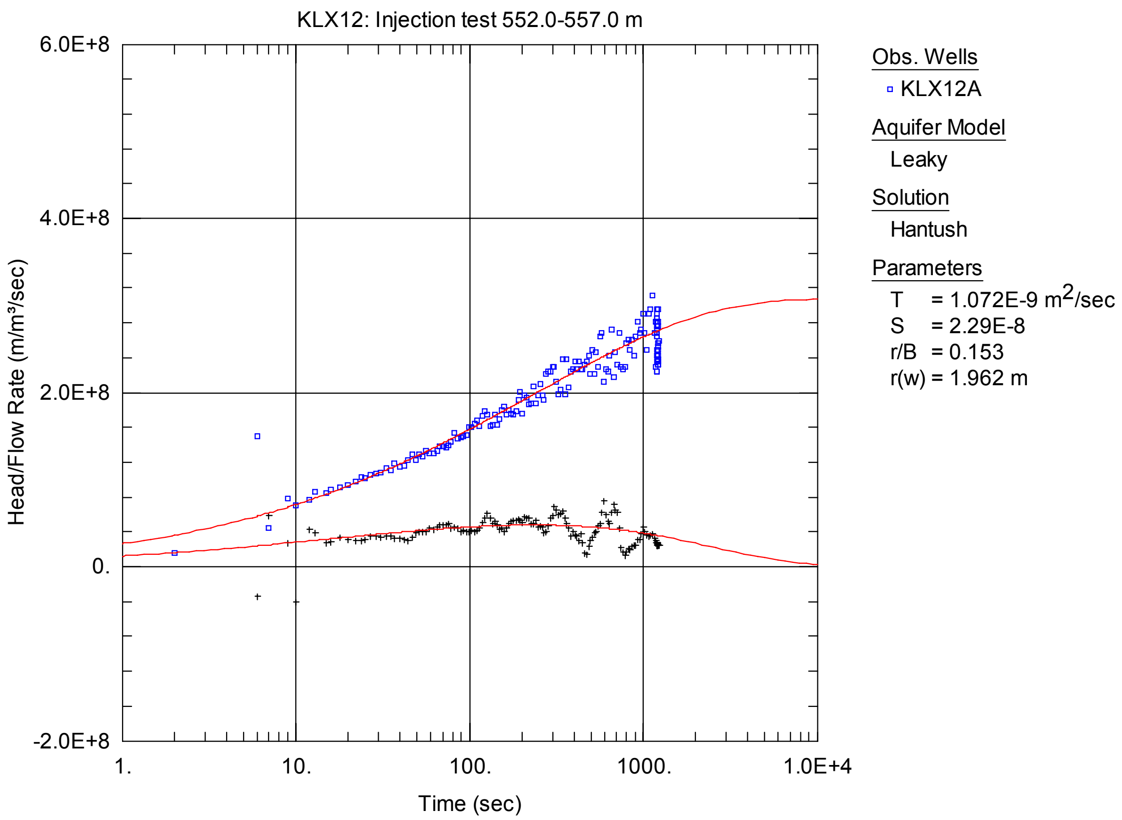

Figure A3-288. *Lin-log plot of head/flow rate (□) and derivative (+) versus time, from the injection test in section 552.0-557.0 m in KLX12A.*

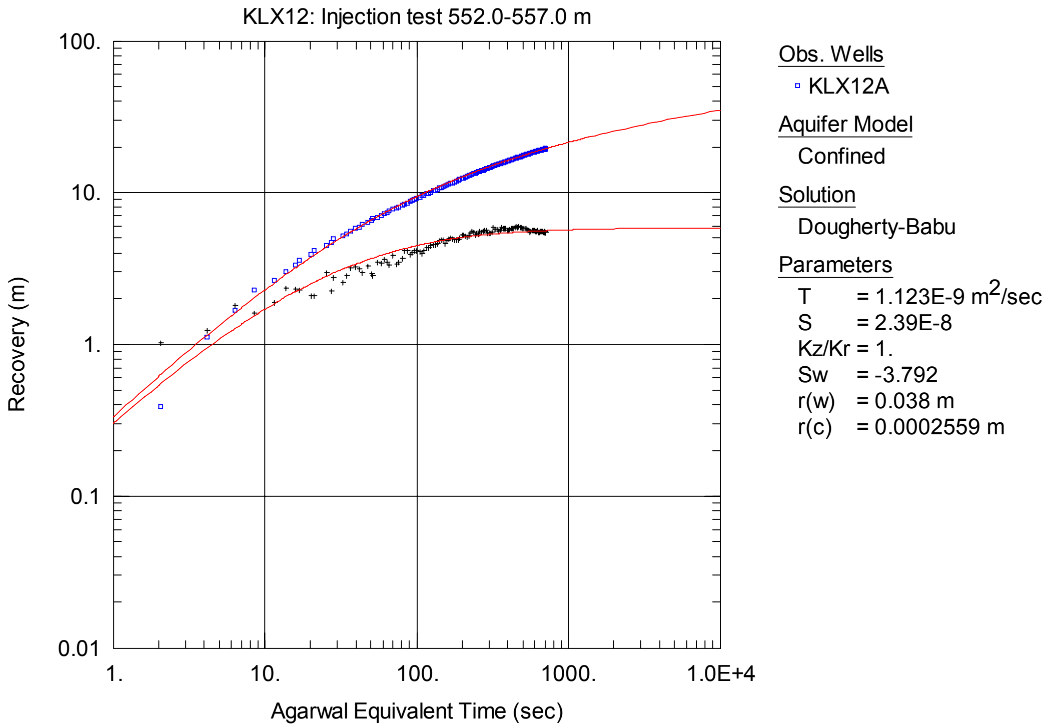

Figure A3-289. *Log-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 552.0-557.0 m in KLX12A.*

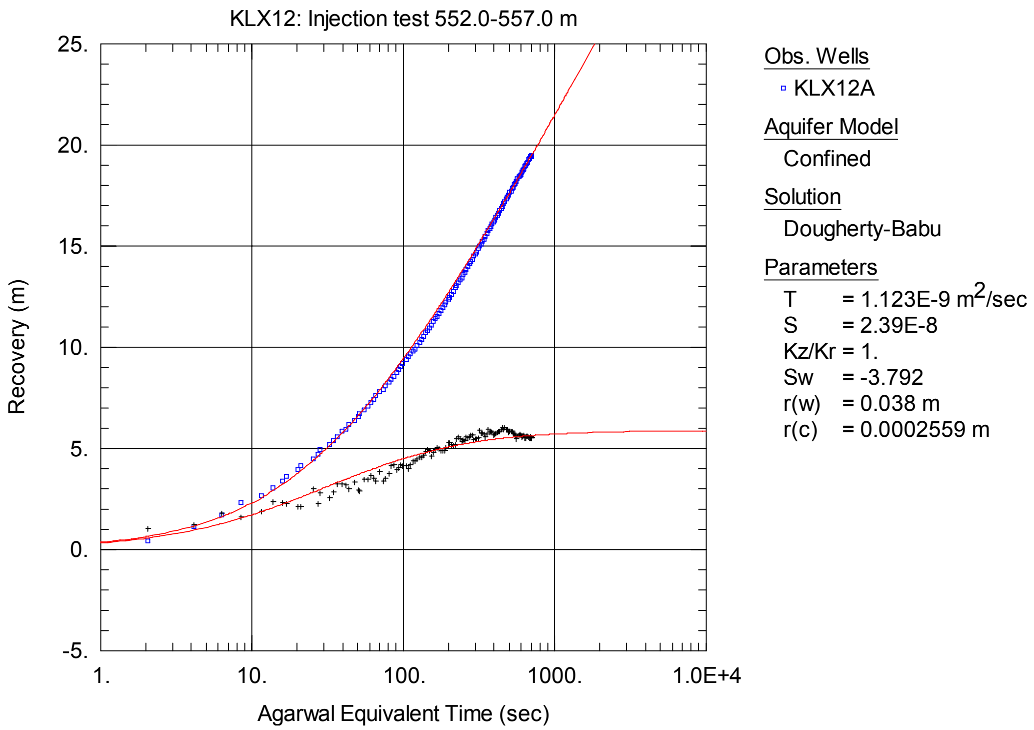

Figure A3-290. *Lin-log plot of recovery (□) and derivative (+) versus equivalent time, from the injection test in section 552.0-557.0 m in KLX12A.*

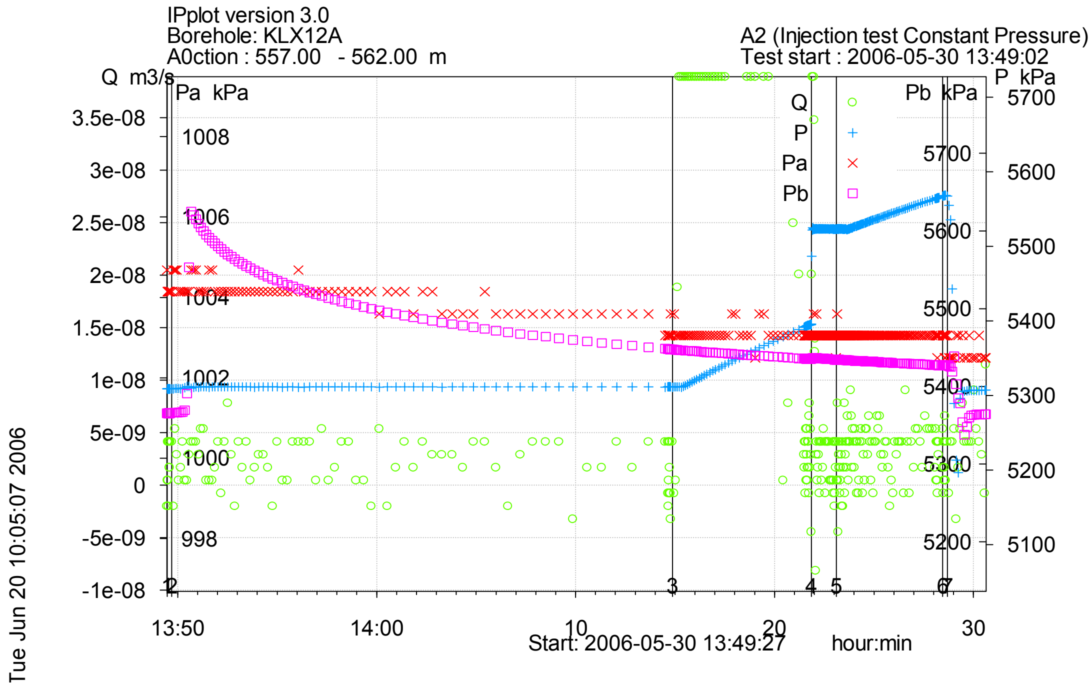

Figure A3-291. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 557.0-562.0 m in borehole KLX12A.*

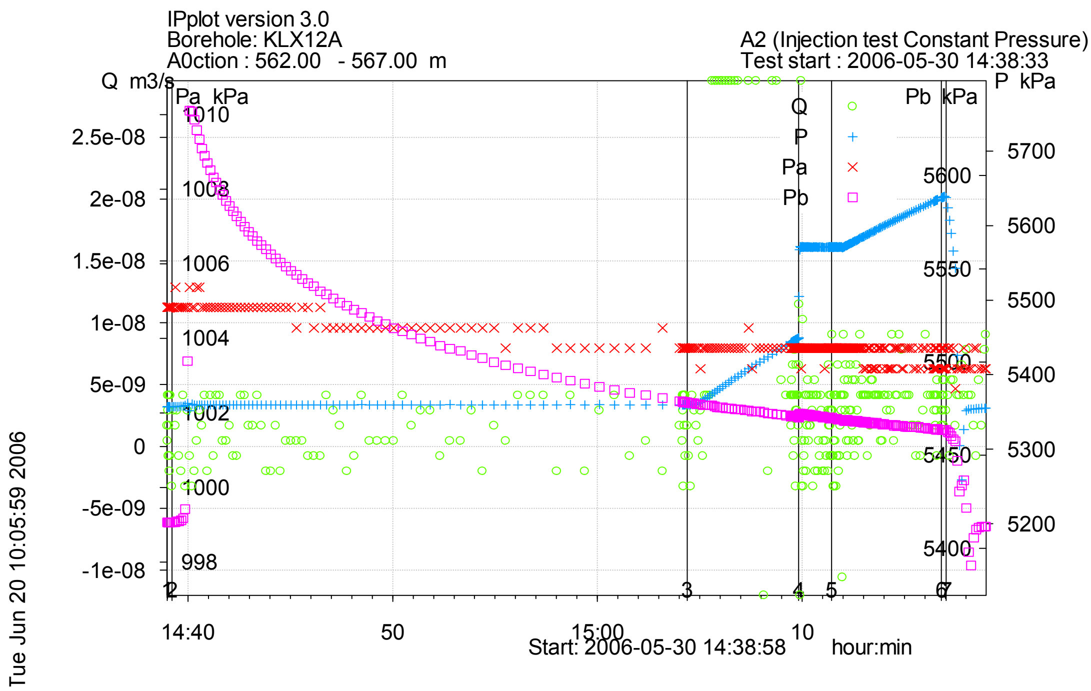

Figure A3-292. *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 562.0-567.0 m in borehole KLX12A.*

Appendix 4. Borehole technical data

Tabel 1-1 SICADA - Information about KLX12A

Title	Value				
	Information about cored borehole KLX12A (2006-05-29).				
Comment:	No comment exists.				
Borehole length (m):	602.290				
Reference level:					
Drilling Period(s):	From Date	To Date	Secup(m)	Seclow(m)	Drilling Type
	2005-11-10	2006-03-04	100.570	602.290	Core drilling
Starting point coordinate:	Length(m)	Northing(m)	Easting(m)	Elevation	Coord
	0.000	6365630.783	1548904.440	17.739	RT90-
	3.000	6365631.338	1548903.902	14.840	RT90-
Angles:	Length(m)	Bearing	Inclination (- = down)		Coord
	0.000	315.923	-75.074		RT90-
Borehole diameter:	Secup(m)	Seclow(m)	Hole Diam(m)		
	0.150	15.100	0.343		
	15.100	17.920	0.248		
	17.920	100.400	0.197		
	100.400	100.570	0.160		
	100.570	102.130	0.086		
	102.130	602.290	0.076		
Core diameter:	Secup(m)	Seclow(m)	Core Diam(m)		
	100.570	101.120	0.072		
	101.120	224.030	0.050		
	224.030	224.070			
	224.070	224.990	0.062		
	224.990	225.480	0.050		
	225.480	225.540			
	225.540	226.390	0.050		
	226.390	226.430			
	226.430	226.770	0.050		
	226.770	226.820			
	226.820	227.720	0.050		
	227.720	228.810			
	228.810	228.870	0.062		
	228.870	228.910			
	228.910	229.880	0.050		
	229.880	229.930			
	229.930	231.040	0.050		
	231.040	231.200			
	231.200	232.200	0.062		
	232.200	232.240			
	232.240	233.250	0.062		
	233.250	233.280			
	233.280	234.310	0.062		
	234.310	235.820	0.050		
	235.820	236.100			
	236.100	237.130	0.062		
	237.130	237.170			
	237.170	238.170	0.062		
	238.170	238.900	0.050		
	238.900	238.930			
	238.930	239.140	0.050		
	239.140	239.210			
	239.210	240.280	0.062		
	240.280	241.900	0.050		
	241.900	241.950			
	241.950	302.170	0.050		
	302.170	304.810	0.048		
	304.810	307.920	0.050		
	307.920	310.810	0.048		
	310.810	313.810	0.050		
	313.810	316.570	0.048		

316.570	319.650	0.050
319.650	322.550	0.048
322.550	325.670	0.050
325.720	328.720	0.048
328.720	331.850	0.050
331.850	334.810	0.048
334.810	349.940	0.050
349.940	352.160	0.062
352.160	355.070	0.050
355.070	356.150	0.062
356.150	357.230	0.050
357.230	358.260	0.062
358.260	359.360	0.050
359.360	360.430	0.062
360.430	365.220	0.050
365.220	368.260	0.062
368.260	467.140	0.050
467.140	469.410	0.062
469.410	470.560	0.050
470.180	474.180	0.062
474.180	475.100	0.050
475.100	476.280	0.062
476.280	479.170	0.050
479.170	480.190	0.062
480.190	481.650	0.050
481.650	483.730	0.062
483.730	602.290	0.050

Casing diameter:

Secup(m)	Seclow(m)	Case In(m)	Case Out(m)	Comment
0.000	17.920	0.200	0.208	
0.150	15.100	0.310	0.323	

Cone dimensions:

Secup(m)	Seclow(m)	Cone In(m)	Cone Out(m)
97.360	102.130		

Grove milling:

Length(m)	Trace detectable
110.000	Yes
150.000	Yes
200.000	Yes
250.000	Yes
300.000	Yes
350.000	Yes
400.000	Yes
450.000	Yes
500.000	Yes
550.000	Yes
580.000	Yes

Installed sections: Section no Start Date Secup(m) Seclow(m)

Section status: Packers are released.

Valve status: (No valve installation/removal)

End of additional information.

Number of rows: 122.

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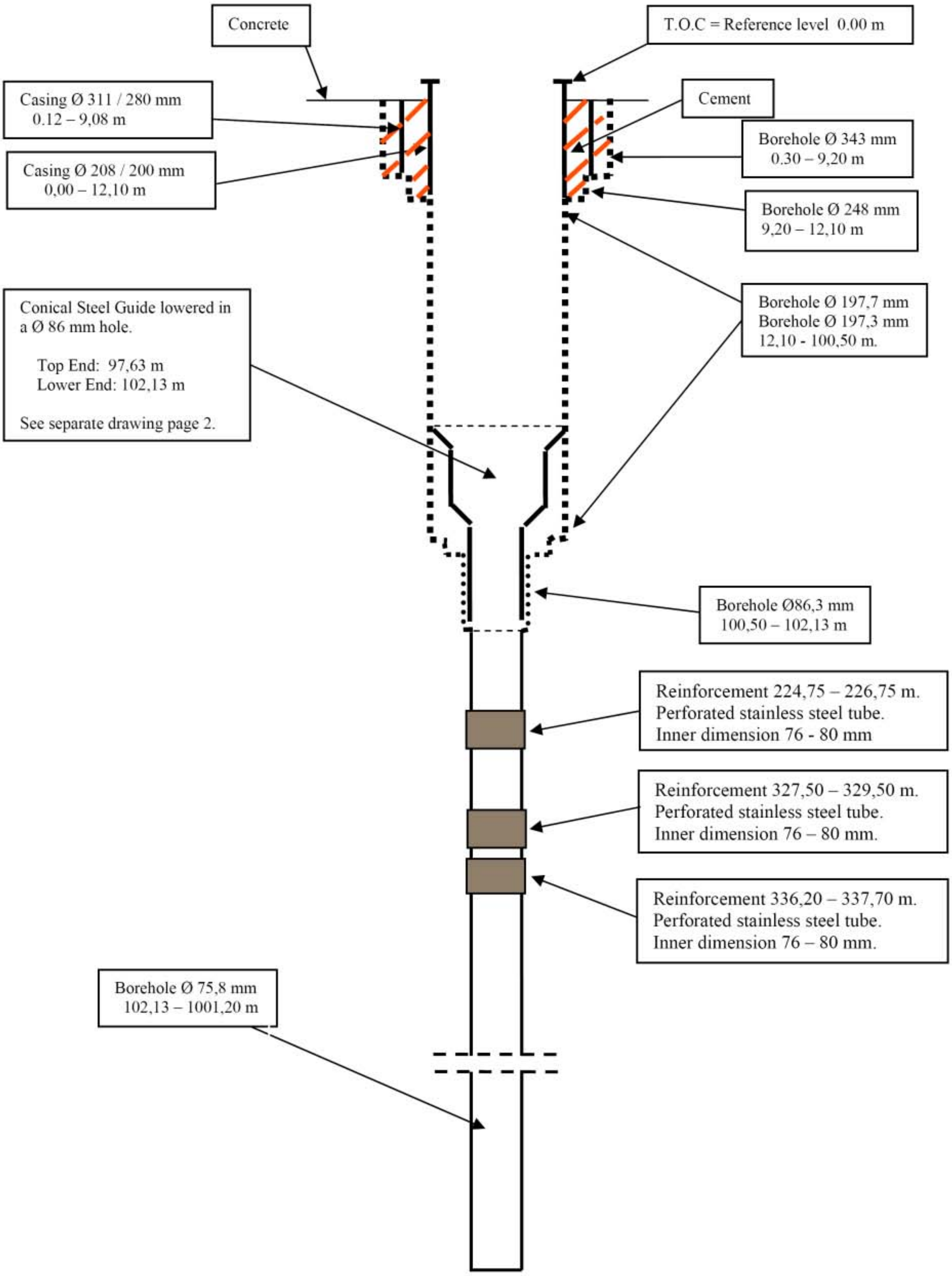
<u>**TECHNICAL DATA BOREHOLE KLX10.(Not on scale).NHa 051028.**</u>



Appendix 5. Sicada tables

Nomenclature plu_s_hole_test_d

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

Nomenclature plu_s_hole_test_ed1

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

Column	Datatype	Unit	Column Description	Alt. Symbol
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	Tranmissivity based on Q/s, see table description	
value_type_tq	CHAR		0:true value,-1:TQ<lower meas.limit,1:TQ>upper meas.limit.	
bc_tq	CHAR		Best choice code. 1 means TQ is best choice of T, else 0	
transmissivity_moye	FLOAT	m**2/s	Transmissivity,TM, based on Moye (1967)	T_M
bc_tm	CHAR		Best choice code. 1 means Tmoye is best choice of T, else 0	
value_type_tm	CHAR		0:true value,-1:TM<lower meas.limit,1:TM>upper meas.limit.	
hydr_cond_moye	FLOAT	m/s	K_M: Hydraulic conductivity based on Moye (1967)	K_M
formation_width_b	FLOAT	m	b:Aquifer thickness repr. for T(generally b=Lw) ,see descr.	b
width_of_channel_b	FLOAT	m	B:Inferred width of formation for evaluated TB	
tb	FLOAT	m**3/s	TB:Flow capacity in 1D formation of T & width B, see descr.	
l_measl_tb	FLOAT	m**3/s	Estimated lower meas. limit for evaluated TB,see description	
u_measl_tb	FLOAT	m**3/s	Estimated upper meas. limit of evaluated TB,see description	
sb	FLOAT	m	SB:S=storativity,B=width of formation,1D model,see descript.	
assumed_sb	FLOAT	m	SB* : Assumed SB,S=storativity,B=width of formation,see...	
leakage_factor_lf	FLOAT	m	Lf:1D model for evaluation of Leakage factor	
transmissivity_tt	FLOAT	m**2/s	TT:Transmissivity of formation, 2D radial flow model,see...	T_T
value_type_tt	CHAR		0:true value,-1:TT<lower meas.limit,1:TT>upper meas.limit,	
bc_tt	CHAR		Best choice code. 1 means TT is best choice of T, else 0	
l_measl_q_s	FLOAT	m**2/s	Estimated lower meas. limit for evaluated TT,see table descr	Q/s-measl-L
u_measl_q_s	FLOAT	m**2/s	Estimated upper meas. limit for evaluated TT,see description	Q/s-measl-U
storativity_s	FLOAT		S:Storativity of formation based on 2D rad flow,see descr.	
assumed_s	FLOAT		Assumed Storativity,2D model evaluation,see table descr.	
bc_s	FLOAT		Best choice of S (Storativity) ,see descr.	
ri	FLOAT	m	Radius of influence	
ri_index	CHAR		ri index=index of radius of influence :-1,0 or 1, see descr.	
leakage_coeff	FLOAT	1/s	K'/b':2D rad flow model evaluation of leakage coeff,see desc	
hydr_cond_ksf	FLOAT	m/s	Ksf:3D model evaluation of hydraulic conductivity,see desc.	
value_type_ksf	CHAR		0:true value,-1:Ksf<lower meas.limit,1:Ksf>upper meas.limit,	
l_measl_ksf	FLOAT	m/s	Estimated lower meas.limit for evaluated Ksf,see table desc.	
u_measl_ksf	FLOAT	m/s	Estimated upper meas.limit for evaluated Ksf,see table descr	
spec_storage_ssf	FLOAT	1/m	Ssf:Specific storage,3D model evaluation,see table descr.	
assumed_ssf	FLOAT	1/m	Ssf*:Assumed Spec.storage,3D model evaluation,see table des.	
c	FLOAT	m**3/pa	C: Wellbore storage coefficient; flow or recovery period	C
cd	FLOAT		CD: Dimensionless wellbore storage coefficient	
skin	FLOAT		Skin factor;best estimate of flow/recovery period,see descr.	ξ
dt1	FLOAT	s	Estimated start time of evaluation, see table description	
dt2	FLOAT	s	Estimated stop time of evaluation. see table description	
t1	FLOAT	s	Start time for evaluated parameter from start flow period	t_1
t2	FLOAT	s	Stop time for evaluated parameter from start of flow period	t_2
dte1	FLOAT	s	Start time for evaluated parameter from start of recovery	dte_1
dte2	FLOAT	s	Stop time for evaluated parameter from start of recovery	dte_2
p_horner	FLOAT	kPa	p*:Horner extrapolated pressure, see table description	
transmissivity_t_nlr	FLOAT	m**2/s	T_NLR Transmissivity based on None Linear Regression...	
storativity_s_nlr	FLOAT		S_NLR=storativity based on None Linear Regression,see..	

Column	Datatype	Unit	Column Description	Alt. Symbol
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		Signature for QA data accknowledge (QA - OK)	

Nomenclature plu_s_hole_test_obs

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

KLX12A 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
KLX12A	20060420 13:44	20060420 15:40	104.00	204.00		3	1	20060420 14:38:27	20060420 15:08:45	1.81E-04	0
KLX12A	20060420 17:04	20060420 18:53	204.00	304.00		3	1	20060420 17:50:54	20060420 18:21:07	1.01E-05	0
KLX12A	20060421 07:16	20060421 09:05	284.00	384.00		3	1	20060421 08:03:15	20060421 08:33:32	3.59E-07	0
KLX12A	20060421 10:08	20060421 11:57	384.00	484.00		3	1	20060421 10:55:19	20060421 11:25:30	5.55E-06	0
KLX12A	20060424 14:22	20060424 16:25	484.00	584.00		3	1	20060424 15:22:49	20060424 15:53:08	4.11E-06	0
0											
KLX12A	20060426 07:43	20060426 09:09	104.00	124.00		3	1	20060426 08:26:53	20060426 08:47:11	1.78E-05	0
KLX12A	20060426 09:46	20060426 11:16	124.00	144.00		3	1	20060426 10:33:55	20060426 10:54:11	1.46E-04	0
KLX12A	20060426 12:38	20060426 13:54	144.00	164.00		3	1	20060426 13:11:40	20060426 13:31:47	4.91E-05	0
KLX12A	20060426 14:14	20060426 15:35	164.00	184.00		3	1	20060426 14:52:43	20060426 15:12:53	7.80E-07	0
KLX12A	20060426 16:04	20060426 17:24	184.00	204.00		3	1	20060426 16:41:35	20060426 17:01:44	2.57E-07	0
KLX12A	20060426 17:49	20060426 19:07	204.00	224.00		3	1	20060426 18:24:32	20060426 18:44:49	4.94E-08	0
KLX12A	20060427 07:40	20060427 08:59	224.00	244.00		3	1	20060427 08:16:38	20060427 08:36:50	7.21E-06	0
KLX12A	20060427 09:28	20060427 10:46	244.00	264.00		3	1	20060427 10:03:55	20060427 10:24:06	1.31E-05	0
KLX12A	20060427 11:07	20060427 12:22	264.00	284.00		3	1	20060427 11:39:56	20060427 12:00:18	1.12E-06	0
KLX12A	20060427 13:34	20060427 14:37	284.00	304.00		3	1	20060427 14:19:58	20060427 14:25:05		-1
KLX12A	20060427 14:58	20060427 16:23	304.00	324.00		3	1	20060427 15:40:31	20060427 16:00:44	4.37E-07	0
KLX12A	20060427 16:40	20060427 17:57	324.00	344.00		3	1	20060427 17:14:43	20060427 17:35:05	8.42E-07	0
KLX12A	20060428 07:18	20060428 08:15	344.00	364.00		3	1	20060428 08:03:46	20060428 08:08:05		-1
KLX12A	20060428 08:42	20060428 09:59	364.00	384.00		3	1	20060428 09:17:16	20060428 09:37:41	8.59E-09	0
KLX12A	20060502 14:22	20060502 15:39	369.00	389.00		3	1	20060502 14:57:07	20060502 15:17:32	9.21E-09	0
KLX12A	20060502 16:09	20060502 17:25	389.00	409.00		3	1	20060502 16:42:38	20060502 17:03:01	5.14E-06	0
KLX12A	20060502 17:49	20060502 19:08	409.00	429.00		3	1	20060502 18:26:03	20060502 18:46:27	8.18E-07	0
KLX12A	20060503 07:33	20060503 08:55	429.00	449.00		3	1	20060503 08:12:58	20060503 08:33:24	6.00E-09	0
KLX12A	20060503 09:16	20060503 10:38	449.00	469.00		3	1	20060503 09:56:07	20060503 10:16:31	3.67E-07	0
KLX12A	20060503 10:59	20060503 12:17	469.00	489.00		3	1	20060503 11:34:46	20060503 11:55:13	6.76E-09	0
KLX12A	20060503 13:28	20060503 14:28	489.00	509.00		3	1	20060503 14:01:18	20060503 14:21:11		-1
KLX12A	20060504 09:16	20060504 10:38	509.00	529.00		3	1	20060504 09:55:42	20060504 10:16:06	2.97E-07	0

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
KLX12A	20060503 15:54	20060503 17:11	527.00	547.00		3	1	20060305 16:29:06	20060305 16:49:29	5.39E-06	0
KLX12A	20060503 17:30	20060503 18:46	547.00	567.00		3	1	20060503 18:04:18	20060503 18:24:42	2.94E-07	0
KLX12A	20060504 07:25	20060504 08:28	564.00	584.00		3	1	20060504 08:06:54	20060504 08:20:33		-1
KLX12A	20060508 17:21	20060508 18:12	304.00	309.00		3	1	20060508 18:02:44	20060508 18:05:23		-1
KLX12A	20060511 15:01	20060511 16:22	309.00	314.00		3	1	20060511 15:40:07	20060511 16:00:33	1.75E-08	0
KLX12A	20060511 16:39	20060511 17:59	314.00	319.00		3	1	20060511 17:16:44	20060511 17:36:59	9.08E-08	0
KLX12A	20060511 18:11	20060511 19:30	319.00	324.00		3	1	20060511 18:48:10	20060511 19:08:34	4.38E-07	0
KLX12A	20060512 07:38	20060512 08:54	322.00	327.00		3	1	20060512 08:12:12	20060512 08:32:27	4.43E-07	0
KLX12A	20060512 09:17	20060512 09:59	327.00	332.00		3	1	20060512 09:50:07	20060512 09:52:10		-1
KLX12A	20060512 10:14	20060512 10:56	332.00	337.00		3	1	20060512 10:47:40	20060512 10:48:45		-1
KLX12A	20060512 11:15	20060512 11:59	337.00	342.00		3	1	20060512 11:49:57	20060512 11:52:16		-1
KLX12A	20060515 12:50	20060515 13:40	339.00	344.00		3	1	20060515 13:27:25	20060515 13:32:47		-1
KLX12A	20060515 14:15	20060515 15:00	364.00	369.00		3	1	20060515 14:50:54	20060515 14:52:48		-1
KLX12A	20060515 15:13	20060515 16:28	369.00	374.00		3	1	20060515 15:45:52	20060515 16:06:19	1.01E-08	0
KLX12A	20060515 16:39	20060515 17:54	374.00	379.00		3	1	20060515 17:12:28	20060515 17:32:55	6.44E-09	0
KLX12A	20060515 18:05	20060515 18:47	379.00	384.00		3	1	20060515 18:37:42	20060515 18:40:19		-1
KLX12A	20060515 18:59	20060516 08:36	384.00	389.00		3	1	20060516 08:24:24	20060516 08:29:18		-1
KLX12A	20060516 08:58	20060516 10:19	389.00	394.00		3	1	20060516 09:37:02	20060516 09:57:28	1.01E-07	0
KLX12A	20060516 10:31	20060516 11:47	392.00	397.00		3	1	20060516 11:05:12	20060516 11:25:24	1.02E-06	0
KLX12A	20060516 13:57	20060516 15:20	397.00	402.00		3	1	20060516 14:37:35	20060516 14:57:49	1.43E-06	0
KLX12A	20060516 15:30	20060516 16:47	402.00	407.00		3	1	20060516 16:04:33	20060516 16:24:43	4.03E-06	0
KLX12A	20060516 16:55	20060516 18:10	404.00	409.00		3	1	20060516 17:28:22	20060516 17:48:34	3.73E-06	0
KLX12A	20060516 18:20	20060516 19:34	409.00	414.00		3	1	20060516 18:52:27	20060516 19:12:51	3.33E-08	0
KLX12A	20060517 08:21	20060517 09:42	413.00	418.00		3	1	20060517 09:00:25	20060517 09:20:36	2.06E-07	0
KLX12A	20060517 09:51	20060517 11:05	418.00	423.00		3	1	20060517 10:22:57	20060517 10:43:15	8.20E-07	0
KLX12A	20060517 11:14	20060517 11:58	423.00	428.00		3	1	20060517 11:47:50	20060517 11:50:58		-1
KLX12A	20060517 12:06	20060517 13:15	424.00	429.00		3	1	20060517 13:04:15	20060517 13:07:46		-1
KLX12A	20060517 13:25	20060517 14:23	429.00	434.00		3	1	20060517 14:00:38	20060517 14:16:15		-1
KLX12A	20060517 15:05	20060517 16:23	434.00	439.00		3	1	20060517 15:41:27	20060517 16:01:53	1.50E-08	0
KLX12A	20060517 16:36	20060517 17:52	439.00	444.00		3	1	20060517 17:09:58	20060517 17:30:24	1.12E-08	0
KLX12A	20060517 18:04	20060517 18:46	444.00	449.00		3	1	20060517 18:35:55	20060517 18:38:31		-1

idcode	start_date	stop_date	secup	seclow	test_type	Formation_type	start_flow_period	stop_flow_period	flow_rate_end_qp	Value_type_qp	mean_flow_rate_qm
KLX12A	20060517 18:57	20060517 19:45	449.00	454.00		3	1	20060517 19:31:19	20060517 19:37:39		-1
KLX12A	20060518 08:14	20060518 09:34	454.00	459.00		3	1	20060518 08:52:21	20060518 09:12:45	1.96E-07	0
KLX12A	20060518 09:44	20060518 11:00	459.00	464.00		3	1	20060518 10:17:32	20060518 10:37:39	2.36E-07	0
KLX12A	20060518 11:11	20060518 12:02	464.00	469.00		3	1	20060518 11:43:24	20060518 11:55:29		-1
KLX12A	20060518 13:30	20060518 14:13	469.00	474.00		3	1	20060518 14:04:20	20060518 14:06:21		-1
KLX12A	20060518 14:23	20060518 15:04	474.00	479.00		3	1	20060518 14:55:01	20060518 14:57:13		-1
KLX12A	20060518 15:14	20060518 15:57	479.00	484.00		3	1	20060518 15:46:05	20060518 15:50:13		-1
KLX12A	20060518 16:09	20060518 17:24	484.00	489.00		3	1	20060518 16:41:34	20060518 17:01:57		-1
KLX12A	20060518 17:50	20060518 18:38	509.00	514.00		3	1	20060518 18:22:06	20060518 18:30:53		-1
KLX12A	20060519 07:17	20060519 08:00	514.00	519.00		3	1	20060519 07:50:58	20060519 07:53:02		-1
KLX12A	20060519 08:11	20060519 09:29	519.00	524.00		3	1	20060519 08:47:22	20060519 09:07:39	3.22E-07	0
KLX12A	20060529 13:25	20060529 14:41	522.00	527.00		3	1	20060529 13:58:53	20060529 14:19:19	3.36E-07	0
KLX12A	20060529 14:56	20060529 15:40	527.00	532.00		3	1	20060529 15:30:29	20060529 15:33:23		-1
KLX12A	20060529 15:54	20060529 16:39	532.00	537.00		3	1	20060529 16:30:40	20060529 16:31:42		-1
KLX12A	20060530 07:21	20060530 08:37	537.00	542.00		3	1	20060530 07:54:48	20060530 08:15:04	5.34E-06	0
KLX12A	20060530 08:54	20060530 10:09	542.00	547.00		3	1	20060530 09:26:49	20060530 09:47:15	7.78E-07	0
KLX12A	20060530 10:19	20060530 11:34	547.00	552.00		3	1	20060530 10:52:15	20060530 11:12:41	2.61E-07	0
KLX12A	20060530 12:22	20060530 13:38	552.00	557.00		3	1	20060530 12:55:39	20060530 13:16:05	8.29E-08	0
KLX12A	20060530 13:49	20060530 14:30	557.00	562.00		3	1	20060530 14:21:51	20060530 14:23:07		-1
KLX12A	20060530 14:38	20060530 15:18	562.00	567.00		3	1	20060530 15:09:50	20060530 15:11:27		-1
KLX12A[1)]	20060503 14:47	20060503 15:29	509.00	529.00		3	1	20060503 15:24:15	20060503 15:27:26	4.38E-07	0
KLX12A[1)]	20060529 16:51	20060529 19:18	537.00	542.00		3	1	20060529 18:56:01	20060529 19:15:59		-1

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

KLX12A 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
KLX12A	104.00	204.00	1.7E-08	1.0E-03	3.59E-01	1818	1797	1022.00	1227.29	1025.85	9.36
KLX12A	204.00	304.00	1.7E-08	1.0E-03	2.28E-02	1813	1806	1959.08	2195.37	1976.51	9.75
KLX12A	284.00	384.00	1.7E-08	1.0E-03	1.31E-03	1817	1802	2726.81	2931.41	2816.83	11.01
KLX12A	384.00	484.00	1.7E-08	1.0E-03	1.14E-02	1811	1806	3679.70	3891.53	3693.39	12.42
KLX12A	484.00	584.00	1.7E-08	1.0E-03	8.23E-03	1819	1800	4630.30	4816.40	4642.94	13.94
KLX12A											
KLX12A	104.00	124.00	1.7E-08	1.0E-03	2.40E-02	1218	1196	1028.14	1241.09	1034.72	8.31
KLX12A	124.00	144.00	1.7E-08	1.0E-03	1.94E-01	1216	1197	1218.04	1406.58	1221.34	9.35
KLX12A	144.00	164.00	1.7E-08	1.0E-03	6.32E-02	1207	1208	1410.15	1612.48	1411.25	8.66
KLX12A[1)]	164.00	184.00	1.7E-08	1.0E-03	1.08E-03	1210	1214	1591.83	1784.76	1592.93	9.37
	184.00	204.00	1.7E-08	1.0E-03	3.50E-04	1209	1208	1783.11	1945.31	1792.72	9.62
KLX12A	204.00	224.00	1.7E-08	1.0E-03	1.10E-04	1217	1199	1976.87	2185.50	2050.14	9.89
KLX12A	224.00	244.00	1.7E-08	1.0E-03	9.27E-03	1212	1206	2155.50	2374.12	2161.01	10.16
KLX12A	244.00	264.00	1.7E-08	1.0E-03	1.84E-02	1211	1208	2346.53	2558.95	2352.57	10.32
KLX12A	264.00	284.00	1.7E-08	1.0E-03	1.44E-03	1222	1197	2535.90	2697.27	2535.35	10.72
KLX12A	284.00	304.00	4.3E-09	1.0E-03		307	623	2766.01	2970.62	2962.37	11.04
KLX12A	304.00	324.00	1.7E-08	1.0E-03	1.09E-03	1213	1206	2917.37	3128.13	3016.72	11.27
KLX12A	324.00	344.00	1.7E-08	1.0E-03	1.06E-03	1222	1197	3103.44	3305.97	3102.88	11.55
KLX12A	344.00	364.00	4.2E-09	1.0E-03		259	321	3328.48	3546.38	3543.09	11.84
KLX12A	364.00	384.00	3.7E-09	1.0E-03	2.38E-05	1225	1221	3494.79	3740.67	3656.71	12.18
KLX12A	369.00	389.00	5.5E-09	1.0E-03	2.74E-05	1225	1221	3540.89	3819.92	3728.06	12.20
KLX12A	389.00	409.00	1.7E-08	1.0E-03	6.86E-03	1223	1196	3719.68	3933.88	3730.25	12.53
KLX12A	409.00	429.00	1.7E-08	1.0E-03	1.06E-03	1224	1194	3914.68	4115.60	3918.51	12.82
KLX12A	429.00	449.00	4.3E-09	1.0E-03	2.99E-05	1226	1221	4122.70	4360.47	4318.65	13.12
KLX12A	449.00	469.00	1.7E-08	1.0E-03	7.74E-04	1224	1194	4296.69	4496.50	4371.89	13.41
KLX12A	469.00	489.00	5.5E-09	1.0E-03	2.30E-05	1227	1221	4538.75	4732.50	4660.06	13.73
KLX12A	489.00	509.00	5.5E-09	1.0E-03		1193	322	4698.88	4942.72	4932.30	14.03
KLX12A	509.00	529.00	1.7E-08	1.0E-03	4.10E-04	1224	1194	4864.23	5097.50	4866.42	14.32

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
KLX12A	527.00	547.00	1.7E-08	1.0E-03	7.06E-03	1223	1196	5037.54	5243.50	5049.20	14.61
KLX12A	547.00	567.00	1.7E-08	1.0E-03	4.19E-04	1224	1194	5237.61	5439.32	5243.50	14.89
KLX12A	564.00	584.00	2.5E-09	1.0E-03		819	322	5436.29	5622.78	5629.91	15.11
KLX12A											
KLX12A	304.00	309.00	3.7E-09	1.0E-03		159	321	2982.57	3168.51	3252.61	11.26
KLX12A	309.00	314.00	7.3E-09	1.0E-03	3.61E-05	1226	1206	2954.28	3187.60	2963.07	11.30
KLX12A	314.00	319.00	7.3E-09	1.0E-03	1.44E-04	1215	1202	2993.68	3234.27	2997.65	11.37
KLX12A	319.00	324.00	1.7E-08	1.0E-03	9.60E-04	1224	1193	3040.06	3247.44	3114.59	11.46
KLX12A	322.00	327.00	1.7E-08	1.0E-03	9.59E-04	1215	1203	3065.86	3274.89	3139.84	11.51
KLX12A	327.00	332.00	4.9E-09	1.0E-03		123	322	3232.21	3372.75	3403.90	11.58
KLX12A	332.00	337.00	2.5E-09	1.0E-03		65	322	3327.87	3455.65	3796.97	11.64
KLX12A	337.00	342.00	3.7E-09	1.0E-03		139	322	3243.19	3478.02	3487.90	11.72
KLX12A	339.00	344.00	4.9E-09	1.0E-03		322	321	3252.93	3480.08	3487.35	11.75
KLX12A	364.00	369.00	4.9E-09	1.0E-03		114	321	3492.84	3724.51	3836.50	12.10
KLX12A	369.00	374.00	4.9E-09	1.0E-03	2.64E-05	1227	1221	3527.97	3771.72	3626.24	12.17
KLX12A	374.00	379.00	3.7E-09	1.0E-03	2.13E-05	1227	1221	3571.48	3809.62	3654.80	12.25
KLX12A	379.00	384.00	3.7E-09	1.0E-03		157	321	3625.55	3856.40	3867.24	
KLX12A	384.00	389.00	3.7E-09	1.0E-03		294	321	3657.53	3908.97	3894.15	
KLX12A	389.00	394.00	1.7E-08	1.0E-03	2.43E-04	1226	1193	3704.34	3995.30	3703.11	
KLX12A	392.00	397.00	1.7E-08	1.0E-03	1.38E-03	1212	1206	3728.77	3973.70	3730.00	
KLX12A	397.00	402.00	1.7E-08	1.0E-03	1.79E-03	1214	1205	3778.86	3979.38	3779.96	
KLX12A	402.00	407.00	1.7E-08	1.0E-03	5.14E-03	1210	1209	3828.17	4046.77	3832.11	
KLX12A	404.00	409.00	1.7E-08	1.0E-03	4.74E-03	1212	1206	3847.62	4051.30	3851.33	
KLX12A	409.00	414.00	1.7E-08	1.0E-03	4.78E-05	1224	1190	3899.64	4131.38	3895.25	
KLX12A	413.00	418.00	1.7E-08	1.0E-03	2.69E-04	1211	1208	3929.97	4240.97	3930.39	
KLX12A	418.00	423.00	1.7E-08	1.0E-03	1.09E-03	1218	1200	3980.34	4187.00	3983.09	
KLX12A	423.00	428.00	2.9E-09	1.0E-03		188	321	4039.63	4255.93	4231.23	
KLX12A	424.00	429.00	4.1E-09	1.0E-03		211	321	4111.96	4267.05	4260.32	
	429.00	434.00	4.1E-09	1.0E-03		937	321	4111.68	4336.09	4310.83	
KLX12A	434.00	439.00	4.1E-09	1.0E-03	2.41E-05	1226	1221	4136.25	4402.65	4188.95	13.17
KLX12A	439.00	444.00	4.1E-09	1.0E-03	1.86E-05	1226	1221	4196.64	4405.25	4225.19	13.25
KLX12A	444.00	449.00	4.1E-09	1.0E-03		156	321	4236.44	4452.33	4448.63	13.32

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
KLX12A	449.00	454.00	4.1E-09	1.0E-03		380	321	4285.03	4484.04	4454.12	13.40
KLX12A	454.00	459.00	1.7E-08	1.0E-03	3.19E-04	1224	1194	4324.42	4524.80	4362.43	13.48
KLX12A	459.00	464.00	1.7E-08	1.0E-03	5.80E-04	1207	1205	4372.31	4611.54	4493.65	13.56
KLX12A	464.00	469.00	2.5E-09	1.0E-03		725	321	4432.70	4632.67	4606.19	13.64
KLX12A	469.00	474.00	2.9E-09	1.0E-03		121	321	4521.10	4680.57	4701.16	13.72
KLX12A	474.00	479.00	4.1E-09	1.0E-03		132	321	4638.43	4728.19	4768.69	13.80
KLX12A	479.00	484.00	2.9E-09	1.0E-03		248	321	4611.68	4775.27	4799.43	13.87
KLX12A	484.00	489.00	4.1E-09	1.0E-03		1223	1221	4642.97	4822.35	4758.79	13.94
KLX12A	509.00	514.00	4.1E-09	1.0E-03		527	321	4872.44	5061.85	5051.42	14.30
KLX12A	514.00	519.00	4.1E-09	1.0E-03		124	322	4922.40	5099.73	5108.51	14.40
KLX12A	519.00	524.00	1.7E-08	1.0E-03	4.20E-04	1217	1202	4938.87	5187.56	4940.52	14.47
KLX12A	522.00	527.00	1.7E-08	1.0E-03	4.48E-04	1226	1193	4968.79	5182.08	4969.06	14.52
KLX12A	527.00	532.00	3.9E-09	1.0E-03		174	321	5038.10	5215.01	5229.83	14.59
KLX12A	532.00	537.00	3.9E-09	1.0E-03		62	321	5169.04	5263.73	5277.60	14.64
KLX12A	537.00	542.00	1.7E-08	1.0E-03	6.92E-03	1216	1202	5102.20	5305.18	5118.39	14.71
KLX12A	542.00	547.00	1.7E-08	1.0E-03	1.01E-03	1226	1191	5161.62	5374.77	5163.95	14.84
KLX12A	547.00	552.00	1.7E-08	1.0E-03	3.49E-04	1226	1191	5215.56	5435.15	5217.21	14.87
KLX12A	552.00	557.00	1.7E-08	1.0E-03	1.23E-04	1226	1191	5263.59	5474.55	5283.63	14.93
KLX12A	557.00	562.00	5.0E-09	1.0E-03		76	321	5395.35	5523.13	5565.81	15.04
KLX12A	562.00	567.00	5.0E-09	1.0E-03		97	322	5448.74	5571.30	5634.99	15.10
KLX12A[1)]	509.00	529.00	1.7E-08	1.0E-03	1.65E-04	191	0	4866.29	5232.67		14.34
KLX12A[1)]	537.00	542.00	1.7E-08	1.0E-03		1198	79	5107.82	5158.06	5142.00	14.70

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

KLX12A 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	bc_tm	value_type_tm	hydr_cond_moye	formation_width_b
KLX12A	20060420 13:44	20060420 15:40	104.00	204.00	3	1	8.66E-06	0	1.13E-05	0	0	1.13E-07	100.00
KLX12A	20060420 17:04	20060420 18:53	204.00	304.00	3	1	4.21E-07	0	5.48E-07	0	0	5.48E-09	100.00
KLX12A	20060421 07:16	20060421 09:05	284.00	384.00	3	1	1.72E-08	0	2.24E-08	0	0	2.24E-10	100.00
KLX12A	20060421 10:08	20060421 11:57	384.00	484.00	3	1	2.57E-07	0	3.35E-07	0	0	3.35E-09	100.00
KLX12A	20060424 14:22	20060424 16:25	484.00	584.00	3	1	2.17E-07	0	2.83E-07	0	0	2.83E-09	100.00
KLX12A	20060426 07:43	20060426 09:09	104.00	124.00	3	1	8.19E-07	0	8.57E-07	0	0	4.29E-08	20.00
KLX12A	20060426 09:46	20060426 11:16	124.00	144.00	3	1	7.59E-06	0	7.94E-06	0	0	3.97E-07	20.00
KLX12A	20060426 12:38	20060426 13:54	144.00	164.00	3	1	2.38E-06	0	2.49E-06	0	0	1.25E-07	20.00
KLX12A	20060426 14:14	20060426 15:35	164.00	184.00	3	1	3.97E-08	0	4.15E-08	0	0	2.08E-09	20.00
KLX12A	20060426 16:04	20060426 17:24	184.00	204.00	3	1	1.55E-08	0	1.62E-08	0	0	8.12E-10	20.00
KLX12A	20060426 17:49	20060426 19:07	204.00	224.00	3	1	2.32E-09	0	2.43E-09	0	0	1.22E-10	20.00
KLX12A	20060427 07:40	20060427 08:59	224.00	244.00	3	1	3.24E-07	0	3.38E-07	0	0	1.69E-08	20.00
KLX12A	20060427 09:28	20060427 10:46	244.00	264.00	3	1	6.03E-07	0	6.31E-07	0	0	3.15E-08	20.00
KLX12A	20060427 11:07	20060427 12:22	264.00	284.00	3	1	6.82E-08	0	7.14E-08	0	0	3.57E-09	20.00
KLX12A	20060427 13:34	20060427 14:37	284.00	304.00	3	1	2.15E-10	-1	2.25E-10	0	-1	1.13E-11	20.00
KLX12A	20060427 14:58	20060427 16:23	304.00	324.00	3	1	2.03E-08	0	2.13E-08	0	0	1.06E-09	20.00
KLX12A	20060427 16:40	20060427 17:57	324.00	344.00	3	1	4.08E-08	0	4.27E-08	0	0	2.13E-09	20.00
KLX12A	20060428 07:18	20060428 08:15	344.00	364.00	3	1	2.09E-10	-1	2.18E-10	0	-1	1.09E-11	20.00
KLX12A	20060428 08:42	20060428 09:59	364.00	384.00	3	1	3.43E-10	0	3.59E-10	1	0	1.79E-11	20.00
KLX12A	20060502 14:22	20060502 15:39	369.00	389.00	3	1	3.24E-10	0	3.39E-10	0	0	1.69E-11	20.00
KLX12A	20060502 16:09	20060502 17:25	389.00	409.00	3	1	2.35E-07	0	2.46E-07	0	0	1.23E-08	20.00
KLX12A	20060502 17:49	20060502 19:08	409.00	429.00	3	1	3.99E-08	0	4.18E-08	0	0	2.09E-09	20.00
KLX12A	20060503 07:33	20060503 08:55	429.00	449.00	3	1	2.48E-10	0	2.59E-10	0	0	1.30E-11	20.00
KLX12A	20060503 09:16	20060503 10:38	449.00	469.00	3	1	1.80E-08	0	1.89E-08	0	0	9.43E-10	20.00
KLX12A	20060503 10:59	20060503 12:17	469.00	489.00	3	1	3.42E-10	0	3.58E-10	0	0	1.79E-11	20.00
KLX12A	20060503 13:28	20060503 14:28	489.00	509.00	3	1	2.77E-10	-1	2.89E-10	0	-1	1.45E-11	20.00
KLX12A	20060504 09:16	20060504 10:38	509.00	529.00	3	1	1.25E-08	0	1.31E-08	0	0	6.53E-10	20.00
KLX12A	20060503 15:54	20060503 17:11	527.00	547.00	3	1	2.57E-07	0	2.69E-07	0	0	1.34E-08	20.00
KLX12A	20060503 17:30	20060503 18:46	547.00	567.00	3	1	1.43E-08	0	1.50E-08	0	0	7.49E-10	20.00

idcode	start_date	stop_date	secup	seclow	test_type	formation_type	spec_capacity_q_s	value_type_q_s	transmissivity_moye	bc_tm	value_type_tm	hydr_cond_moye	formation_width_b
KLX12A	20060504 07:25	20060504 08:28	564.00	584.00	3	1	1.23E-10	-1	1.28E-10	0	-1	6.42E-12	20.00
KLX12A	20060508 17:21	20060508 18:12	304.00	309.00	3	1	1.84E-10	-1	1.52E-10	0	-1	3.04E-11	5.00
KLX12A	20060511 15:01	20060511 16:22	309.00	314.00	3	1	7.35E-10	0	6.07E-10	0	0	1.21E-10	5.00
KLX12A	20060511 16:39	20060511 17:59	314.00	319.00	3	1	3.70E-09	0	3.06E-09	0	0	6.11E-10	5.00
KLX12A	20060511 18:11	20060511 19:30	319.00	324.00	3	1	2.07E-08	0	1.71E-08	0	0	3.42E-09	5.00
KLX12A	20060512 07:38	20060512 08:54	322.00	327.00	3	1	2.08E-08	0	1.72E-08	0	0	3.44E-09	5.00
KLX12A	20060512 09:17	20060512 09:59	327.00	332.00	3	1	2.45E-10	-1	2.03E-10	0	-1	4.05E-11	5.00
KLX12A	20060512 10:14	20060512 10:56	332.00	337.00	3	1	1.23E-10	-1	1.01E-10	0	-1	2.03E-11	5.00
KLX12A	20060512 11:15	20060512 11:59	337.00	342.00	3	1	1.84E-10	-1	1.52E-10	0	-1	3.04E-11	5.00
KLX12A	20060515 12:50	20060515 13:40	339.00	344.00	3	1	2.45E-10	-1	2.03E-10	0	-1	4.05E-11	5.00
KLX12A	20060515 14:15	20060515 15:00	364.00	369.00	3	1	2.45E-10	-1	2.03E-10	0	-1	4.05E-11	5.00
KLX12A	20060515 15:13	20060515 16:28	369.00	374.00	3	1	4.07E-10	0	3.36E-10	0	0	6.73E-11	5.00
KLX12A	20060515 16:39	20060515 17:54	374.00	379.00	3	1	2.65E-10	0	2.19E-10	0	0	4.38E-11	5.00
KLX12A	20060515 18:05	20060515 18:47	379.00	384.00	3	1	1.84E-10	-1	1.52E-10	0	-1	3.04E-11	5.00
KLX12A	20060515 18:59	20060516 08:36	384.00	389.00	3	1	1.84E-10	-1	1.52E-10	0	-1	3.04E-11	5.00
KLX12A	20060516 08:58	20060516 10:19	389.00	394.00	3	1	3.40E-09	0	2.80E-09	0	0	5.61E-10	5.00
KLX12A	20060516 10:31	20060516 11:47	392.00	397.00	3	1	4.09E-08	0	3.37E-08	0	0	6.75E-09	5.00
KLX12A	20060516 13:57	20060516 15:20	397.00	402.00	3	1	6.99E-08	0	5.77E-08	0	0	1.15E-08	5.00
KLX12A	20060516 15:30	20060516 16:47	402.00	407.00	3	1	1.81E-07	0	1.49E-07	0	0	2.99E-08	5.00
KLX12A	20060516 16:55	20060516 18:10	404.00	409.00	3	1	1.80E-07	0	1.48E-07	0	0	2.96E-08	5.00
KLX12A	20060516 18:20	20060516 19:34	409.00	414.00	3	1	1.41E-09	0	1.16E-09	0	0	2.33E-10	5.00
KLX12A	20060517 08:21	20060517 09:42	413.00	418.00	3	1	6.49E-09	0	5.36E-09	0	0	1.07E-09	5.00
KLX12A	20060517 09:51	20060517 11:05	418.00	423.00	3	1	3.89E-08	0	3.21E-08	0	0	6.43E-09	5.00
KLX12A	20060517 11:14	20060517 11:58	423.00	428.00	3	1	1.45E-10	-1	1.20E-10	0	-1	2.40E-11	5.00
KLX12A	20060517 12:06	20060517 13:15	424.00	429.00	3	1	2.07E-10	-1	1.71E-10	0	-1	3.41E-11	5.00
KLX12A	20060517 13:25	20060517 14:23	429.00	434.00	3	1	2.07E-10	-1	1.71E-10	0	-1	3.41E-11	5.00
KLX12A	20060517 15:05	20060517 16:23	434.00	439.00	3	1	5.51E-10	0	4.55E-10	0	0	9.09E-11	5.00
KLX12A	20060517 16:36	20060517 17:52	439.00	444.00	3	1	5.25E-10	0	4.33E-10	0	0	8.67E-11	5.00
KLX12A	20060517 18:04	20060517 18:46	444.00	449.00	3	1	2.07E-10	-1	1.71E-10	0	-1	3.41E-11	5.00
KLX12A	20060517 18:57	20060517 19:45	449.00	454.00	3	1	2.07E-10	-1	1.71E-10	0	-1	3.41E-11	5.00
KLX12A	20060518 08:14	20060518 09:34	454.00	459.00	3	1	9.60E-09	0	7.92E-09	0	0	1.58E-09	5.00
KLX12A	20060518 09:44	20060518 11:00	459.00	464.00	3	1	9.67E-09	0	7.98E-09	1	0	1.60E-09	5.00
KLX12A	20060518 11:11	20060518 12:02	464.00	469.00	3	1	1.23E-10	-1	1.01E-10	0	-1	2.03E-11	5.00

idcode	start_date	stop_date	secup	seclow	test_type	formation_type	spec_capacity_q_s	value_type_q_s	transmissivity_moye	bc_tm	value_type_tm	hydr_cond_moye	formation_width_b
KLX12A	20060518 13:30	20060518 14:13	469.00	474.00	3	1	1.45E-10	-1	1.20E-10	0	-1	2.40E-11	5.00
KLX12A	20060518 14:23	20060518 15:04	474.00	479.00	3	1	2.07E-10	-1	1.71E-10	0	-1	3.41E-11	5.00
KLX12A	20060518 15:14	20060518 15:57	479.00	484.00	3	1	1.45E-10	-1	1.20E-10	0	-1	2.40E-11	5.00
KLX12A	20060518 16:09	20060518 17:24	484.00	489.00	3	1	2.07E-10	-1	1.71E-10	0	-1	3.41E-11	5.00
KLX12A	20060518 17:50	20060518 18:38	509.00	514.00	3	1	2.07E-10	-1	1.71E-10	0	-1	3.41E-11	5.00
KLX12A	20060519 07:17	20060519 08:00	514.00	519.00	3	1	2.07E-10	-1	1.71E-10	0	-1	3.41E-11	5.00
KLX12A	20060519 08:11	20060519 09:29	519.00	524.00	3	1	1.27E-08	0	1.05E-08	0	0	2.10E-09	5.00
KLX12A	20060529 13:25	20060529 14:41	522.00	527.00	3	1	1.55E-08	0	1.28E-08	0	0	2.55E-09	5.00
KLX12A	20060529 14:56	20060529 15:40	527.00	532.00	3	1	1.95E-10	-1	1.61E-10	0	-1	3.22E-11	5.00
KLX12A	20060529 15:54	20060529 16:39	532.00	537.00	3	1	1.95E-10	-1	1.61E-10	0	-1	3.22E-11	5.00
KLX12A	20060530 07:21	20060530 08:37	537.00	542.00	3	1	2.58E-07	0	2.13E-07	0	0	4.26E-08	5.00
KLX12A	20060530 08:54	20060530 10:09	542.00	547.00	3	1	3.58E-08	0	2.95E-08	0	0	5.91E-09	5.00
KLX12A	20060530 10:19	20060530 11:34	547.00	552.00	3	1	1.17E-08	0	9.62E-09	0	0	1.92E-09	5.00
KLX12A	20060530 12:22	20060530 13:38	552.00	557.00	3	1	3.86E-09	0	3.18E-09	0	0	6.37E-10	5.00
KLX12A	20060530 13:49	20060530 14:30	557.00	562.00	3	1	2.52E-10	-1	2.08E-10	0	-1	4.16E-11	5.00
KLX12A	20060530 14:38	20060530 15:18	562.00	567.00	3	1	2.52E-10	-1	2.08E-10	0	-1	4.16E-11	5.00
							0.00E+00	0	0.00E+00	0	0	0.00E+00	#########
KLX12A 1)	20060503 14:47	20060503 15:29	509.00	529.00	3	1	0.00E+00	0	0.00E+00	0	0	0.00E+00	20.00
KLX12A 1)	20060529 16:51	20060529 19:18	537.00	542.00	3	1	0.00E+00	0	0.00E+00	0	0	0.00E+00	5.00

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

KLX12A plu_s_hole_test_ed1. Right (This result table to SICADA includes more columns which are empty, these columns are not presented here.)

idcode	secup	seclow	transmissivity_tt	value_type_tt	bc_tt	l_measl_q_s	u_measl_q_s	assumed_s	bc_s	ri	ri_index	c	skin	t1	t2	dte1	dte2
KLX12A	104.00	204.00	3.61E-06	0	1	8.0E-10	5.0E-04	1.33E-06	1.33E-06	34.96	-1		-4.81	60	200		
KLX12A	204.00	304.00	1.67E-07	0	1	6.9E-10	5.0E-04	2.86E-07	2.86E-07	48.80	-1		-4.39				
KLX12A	284.00	384.00	3.51E-09	0	1	8.0E-10	5.0E-04	4.15E-08	4.15E-08	18.60	1						
KLX12A	384.00	484.00	1.79E-07	0	1	7.7E-10	5.0E-04	2.96E-07	2.96E-07	36.87	-1		-2.88	50	1000		
KLX12A	484.00	584.00	2.60E-07	0	1	8.8E-10	5.0E-04	3.57E-07	3.57E-07	54.30	0		0.16	80	1800		
KLX12A	104.00	124.00	4.83E-07	0	1	7.7E-10	5.0E-04	4.86E-07	4.86E-07	52.15	-1		-3.31				
KLX12A	124.00	144.00	7.58E-07	0	1	8.7E-10	5.0E-04	6.10E-07	6.10E-07	58.34	-1		-6.65				
KLX12A	144.00	164.00	2.05E-06	0	1	8.1E-10	5.0E-04	1.00E-06	1.00E-06	74.49	-1		-1.85				
KLX12A	164.00	184.00	6.45E-08	0	1	8.5E-10	5.0E-04	1.78E-07	1.78E-07	20.20	1		2.85	80	500		
KLX12A	184.00	204.00	3.14E-09	0	1	1.0E-09	5.0E-04	3.92E-08	3.92E-08	14.76	-1	6.28E-11	-4.49				
KLX12A	204.00	224.00	3.53E-10	0	1	7.8E-10	5.0E-04	1.32E-08	1.32E-08	8.51	0		-4.99	300	1200		
KLX12A	224.00	244.00	4.84E-07	0	1	7.5E-10	5.0E-04	4.87E-07	4.87E-07	51.80	0		2.20	60	1200		
KLX12A	244.00	264.00	1.02E-06	0	1	7.7E-10	5.0E-04	7.06E-07	7.06E-07	62.37	0		3.13	200	1200		
KLX12A	264.00	284.00	9.93E-08	0	1	1.0E-09	5.0E-04	2.21E-07	2.21E-07	34.82	-1		3.47				
KLX12A	284.00	304.00		-1	0	2.2E-10	5.0E-04										
KLX12A	304.00	324.00	3.94E-09	0	1	7.8E-10	5.0E-04	4.40E-08	4.40E-08	15.56	0			300	1200		
KLX12A	324.00	344.00	1.94E-09	0	1	8.1E-10	5.0E-04	3.09E-08	3.09E-08	13.02	-1		-1.14				
KLX12A	344.00	364.00		-1	0	2.1E-10	5.0E-04										
KLX12A	364.00	384.00		0	0	1.5E-10	5.0E-04	1.33E-08	1.33E-08	8.63		3.98E-11					
KLX12A	369.00	389.00	1.30E-10	0	1	1.9E-10	5.0E-04	7.99E-09	7.99E-09	6.69	1		-4.65				
KLX12A	389.00	409.00	2.46E-07	0	1	7.6E-10	5.0E-04	3.47E-07	3.47E-07	43.73	0		-0.57	40	1200		
KLX12A	409.00	429.00	1.76E-08	0	1	8.1E-10	5.0E-04	9.28E-08	9.28E-08	9.23	-1		-3.03			10	200
KLX12A	429.00	449.00	1.62E-10	0	1	1.8E-10	5.0E-04	8.91E-09	8.91E-09	7.07	1		-5.68				
KLX12A	449.00	469.00	3.28E-09	0	1	8.2E-10	5.0E-04	4.01E-08	4.01E-08	14.86	0		-5.40	800	1200		
KLX12A	469.00	489.00	4.11E-11	0	1	2.8E-10	5.0E-04	4.49E-09	4.49E-09	5.03	1		-4.93				
KLX12A	489.00	509.00		-1	0	2.8E-10	5.0E-04										
KLX12A	509.00	529.00	1.25E-08	0	1	7.0E-10	5.0E-04	7.84E-08	7.84E-08	20.78	0		-0.07	100	1200		

idcode	secup	seclow	transmissivity_tt	value_type_tt	bc_tt	l_measl_q_s	u_measl_q_s	assumed_s	bc_s	ri	ri_index	c	skin	t1	t2	dte1	dte2
KLX12A	527.00	547.00	3.23E-07	0	1	7.9E-10	5.0E-04	3.98E-07	3.98E-07	46.82	0		0.73	100	1200		
KLX12A	547.00	567.00	4.31E-09	0	1	8.1E-10	5.0E-04	4.60E-08	4.60E-08	7.96	-1		-3.74			30	300
KLX12A	564.00	584.00		-1	0	1.2E-10	5.0E-04										
KLX12A	304.00	309.00		-1	0	1.8E-10	5.0E-04										
KLX12A	309.00	314.00	7.25E-10	0	1	3.1E-10	5.0E-04	1.89E-08	1.89E-08	4.16	1	1.37E-11	-0.60	20	200		
KLX12A	314.00	319.00	1.81E-09	0	1	3.0E-10	5.0E-04	2.98E-08	2.98E-08	12.80	0	1.85E-11	-2.86	20	1200		
KLX12A	319.00	324.00	6.49E-09	0	1	7.9E-10	5.0E-04	5.64E-08	5.64E-08	17.63	0		-4.47	200	1200		
KLX12A	322.00	327.00	6.73E-09	0	1	7.8E-10	5.0E-04	5.74E-08	5.74E-08	17.79	0		-4.39	200	1200		
KLX12A	327.00	332.00		-1	0	2.5E-10	5.0E-04										
KLX12A	332.00	337.00		-1	0	1.2E-10	5.0E-04										
KLX12A	337.00	342.00		-1	0	1.8E-10	5.0E-04										
KLX12A	339.00	344.00		-1	0	2.5E-10	5.0E-04										
KLX12A	364.00	369.00		-1	0	2.5E-10	5.0E-04										
KLX12A	369.00	374.00	7.32E-11	0	1	2.0E-10	5.0E-04	5.99E-09	5.99E-09	5.81	-1	2.06E-11	-4.17				
KLX12A	374.00	379.00	6.04E-11	0	1	1.5E-10	5.0E-04	5.44E-09	5.44E-09	5.47	0	1.31E-11	-3.06	100	1200		
KLX12A	379.00	384.00		-1	0	1.8E-10	5.0E-04										
KLX12A	384.00	389.00		-1	0	1.8E-10	5.0E-04										
KLX12A	389.00	394.00	1.11E-09	0	1	5.6E-10	5.0E-04	2.33E-08	2.33E-08	11.33	0	1.85E-11	-3.96	200	1200		
KLX12A	392.00	397.00	3.57E-08	0	1	6.7E-10	5.0E-04	1.32E-07	1.32E-07	27.00	0		-1.21	100	1200		
KLX12A	397.00	402.00	1.40E-07	0	1	8.2E-10	5.0E-04	2.62E-07	2.62E-07	38.02	0		5.73	50	1200		
KLX12A	402.00	407.00	3.21E-07	0	1	7.5E-10	5.0E-04	3.96E-07	3.96E-07	46.73	0		3.92	70	1200		
KLX12A	404.00	409.00	3.15E-07	0	1	8.0E-10	5.0E-04	3.93E-07	3.93E-07	46.53	0		3.87	80	1200		
KLX12A	409.00	414.00	2.16E-09	0	1	7.1E-10	5.0E-04	3.25E-08	3.25E-08	13.39	0	1.61E-11	3.64	20	1200		
KLX12A	413.00	418.00	1.69E-08	0	1	5.3E-10	5.0E-04	9.10E-08	9.10E-08	22.40	0		9.81	200	1200		
KLX12A	418.00	423.00	2.12E-08	0	1	7.9E-10	5.0E-04	1.02E-07	1.02E-07	9.68	-1		-2.51			10	200
KLX12A	423.00	428.00		-1	0	1.5E-10	5.0E-04										
KLX12A	424.00	429.00		-1	0	2.1E-10	5.0E-04										
KLX12A	429.00	434.00		-1	0	2.1E-10	5.0E-04										
KLX12A	434.00	439.00	9.13E-11	0	1	1.5E-10	5.0E-04	6.69E-09	6.69E-09	6.14	0	2.77E-11	-3.82				
KLX12A	439.00	444.00	3.17E-10	0	1	1.9E-10	5.0E-04	1.25E-08	1.25E-08	8.36	-1	2.07E-11	-0.93				
KLX12A	444.00	449.00		-1	0	2.1E-10	5.0E-04										

idcode	secup	seclow	transmissivity_tt	value_type_tt	bc_tt	l_measl_q_s	u_measl_q_s	assumed_s	bc_s	ri	ri_index	c	skin	t1	t2	dte1	dte2
KLX12A	449.00	454.00		-1	0	2.1E-10	5.0E-04										
KLX12A	454.00	459.00	3.90E-09	0	1	8.2E-10	5.0E-04	4.37E-08	4.37E-08	15.52	0		-3.72	50	1200		
KLX12A	459.00	464.00		0	0	6.8E-10	5.0E-04	6.25E-08	6.25E-08	18.62							
KLX12A	464.00	469.00		-1	0	1.2E-10	5.0E-04										
KLX12A	469.00	474.00		-1	0	1.5E-10	5.0E-04										
KLX12A	474.00	479.00		-1	0	2.1E-10	5.0E-04										
KLX12A	479.00	484.00		-1	0	1.5E-10	5.0E-04										
KLX12A	484.00	489.00		-1	0	2.1E-10	5.0E-04										
KLX12A	509.00	514.00		-1	0	2.1E-10	5.0E-04										
KLX12A	514.00	519.00		-1	0	2.1E-10	5.0E-04										
KLX12A	519.00	524.00	1.42E-08	0	1	6.6E-10	5.0E-04	8.34E-08	8.34E-08	21.43	0		0.57	80	1200		
KLX12A	522.00	527.00	1.69E-08	0	1	7.7E-10	5.0E-04	9.11E-08	9.11E-08	22.40	0		2.74	100	1200		
KLX12A	527.00	532.00		-1	0	2.0E-10	5.0E-04										
KLX12A	532.00	537.00		-1	0	2.0E-10	5.0E-04										
KLX12A	537.00	542.00	3.50E-07	0	1	8.1E-10	5.0E-04	4.14E-07	4.14E-07	47.76	0		1.30	40	1200		
KLX12A	542.00	547.00	1.49E-08	0	1	7.7E-10	5.0E-04	8.55E-08	8.55E-08	4.43	-1		-2.82	10	50		
KLX12A	547.00	552.00	4.22E-09	0	1	7.4E-10	5.0E-04	4.54E-08	4.54E-08	6.46	-1		-3.21	10	200		
KLX12A	552.00	557.00	1.07E-09	0	1	7.8E-10	5.0E-04	2.29E-08	2.29E-08	11.35	-1		-3.94				
KLX12A	557.00	562.00		-1	0	2.5E-10	5.0E-04										
KLX12A	562.00	567.00		-1	0	2.5E-10	5.0E-04										
													0.00				
KLX12A[1)]	509.00	529.00	0.00E+00	0	0	0.0E+00	0.0E+00	0.00E+00	#######	0.00	0	0.00E+00	0.00				
KLX12A[1)]	537.00	542.00	0.00E+00	0	0	0.0E+00	0.0E+00	0.00E+00	#######	0.00	0	0.00E+00	0.00				

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

KLX12A 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
KLX12A	20060420 13:44	20060420 15:40	104.00	204.00	102.13	103.00	1016.55	1016.01	1016.55				
KLX12A	20060420 13:44	20060420 15:40	104.00	204.00	205.00	602.29				1969.85	1969.71	1969.85	
KLX12A	20060420 17:04	20060420 18:53	204.00	304.00	102.13	203.00	1007.30	1005.66	1005.11				
KLX12A	20060420 17:04	20060420 18:53	204.00	304.00	305.00	602.29				2908.18	2907.62	2907.62	
KLX12A	20060421 07:16	20060421 09:05	284.00	384.00	102.13	283.00	995.24	994.83	995.24				
KLX12A	20060421 07:16	20060421 09:05	284.00	384.00	385.00	602.29				3667.97	3667.97	3667.42	
KLX12A	20060421 10:08	20060421 11:57	384.00	484.00	102.13	383.00	997.36	995.73	994.63				
KLX12A	20060421 10:08	20060421 11:57	384.00	484.00	485.00	602.29				4620.06	4619.24	4618.96	
KLX12A	20060424 14:22	20060424 16:25	484.00	584.00	102.13	483.00	1000.16	1000.03	1000.03				
KLX12A	20060424 14:22	20060424 16:25	484.00	584.00	585.00	602.29				5603.28	5595.01	5588.68	
KLX12A	20060426 07:43	20060426 09:09	104.00	124.00	102.13	103.00	1008.32	1009.27	1009.55				
KLX12A	20060426 07:43	20060426 09:09	104.00	124.00	125.00	602.29				1222.73	1224.11	1223.83	
KLX12A	20060426 09:46	20060426 11:16	124.00	144.00	102.13	123.00	1012.82	1012.95	1013.91				
KLX12A	20060426 09:46	20060426 11:16	124.00	144.00	145.00	602.29				1411.16	1425.22	1412.83	
KLX12A	20060426 12:38	20060426 13:54	144.00	164.00	102.13	143.00	1012.94	1017.30	1015.53				
KLX12A	20060426 12:38	20060426 13:54	144.00	164.00	165.00	602.29				1597.39	1597.25	1597.39	
KLX12A	20060426 14:14	20060426 15:35	164.00	184.00	102.13	163.00	1011.69	1011.01	1010.60				
KLX12A	20060426 14:14	20060426 15:35	164.00	184.00	185.00	602.29				1785.28	1785.28	1785.28	
KLX12A	20060426 16:04	20060426 17:24	184.00	204.00	102.13	183.00	1009.23	1008.82	1008.41				
KLX12A	20060426 16:04	20060426 17:24	184.00	204.00	205.00	602.29				1973.30	1973.17	1973.17	
KLX12A	20060427 07:40	20060427 08:59	204.00	224.00	102.13	203.00	1007.30	1006.76	1006.20				
KLX12A	20060427 07:40	20060427 08:59	204.00	224.00	225.00	602.29				2161.04	2160.63	2160.49	
KLX12A	20060427 07:40	20060427 08:59	224.00	244.00	102.13	223.00	1003.19	1002.93	1002.93				
KLX12A	20060427 07:40	20060427 08:59	224.00	244.00	245.00	602.29				2346.31	2387.50	2351.14	
KLX12A	20060427 09:28	20060427 10:46	244.00	264.00	102.13	243.00	1001.82	1002.91	1002.36				
KLX12A	20060427 09:28	20060427 10:46	244.00	264.00	265.00	602.29				2535.85	2543.43	2537.36	

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KLX12A	20060427 11:07	20060427 12:22	264.00	284.00	102.13	263.00	1000.30	999.75	999.61				
KLX12A	20060427 11:07	20060427 12:22	264.00	284.00	285.00	602.29				2723.59	2723.32	2723.04	
KLX12A	20060427 13:34	20060427 14:37	284.00	304.00	102.13	283.00	997.97	997.97	997.97				
KLX12A	20060427 13:34	20060427 14:37	284.00	304.00	305.00	602.29				2910.92	2910.79	2910.92	
KLX12A	20060427 14:58	20060427 16:23	304.00	324.00	102.13	303.00	995.50	994.81	994.67				
KLX12A	20060427 14:58	20060427 16:23	304.00	324.00	325.00	602.29				3099.35	3099.35	3099.35	
KLX12A	20060427 16:40	20060427 17:57	324.00	344.00	102.13	323.00	994.66	994.25	994.11				
KLX12A	20060427 16:40	20060427 17:57	324.00	344.00	345.00	602.29				3290.14	3290.00	3290.00	
KLX12A	20060428 07:18	20060428 08:15	344.00	364.00	102.13	343.00	993.56	993.69	993.56				
KLX12A	20060428 07:18	20060428 08:15	344.00	364.00	365.00	602.29				3478.99	3478.85	3478.99	
KLX12A	20060428 08:42	20060428 09:59	364.00	384.00	102.13	363.00	995.46	994.64	994.64				
KLX12A	20060428 08:42	20060428 09:59	364.00	384.00	385.00	602.29				3669.63	3669.08	3669.08	
KLX12A	20060502 14:22	20060502 15:39	369.00	389.00	102.13	368.00	993.82	993.68	993.13				
KLX12A	20060502 14:22	20060502 15:39	369.00	389.00	390.00	602.29				3715.50	3715.08	3714.81	
KLX12A	20060502 16:09	20060502 17:25	389.00	409.00	102.13	388.00	995.45	994.76	994.76				
KLX12A	20060502 16:09	20060502 17:25	389.00	409.00	410.00	602.29				3904.75	3909.30	3905.99	
KLX12A	20060502 17:49	20060502 19:08	409.00	429.00	102.13	408.00	996.93	996.39	995.84				
KLX12A	20060502 17:49	20060502 19:08	409.00	429.00	430.00	602.29				4095.52	4094.98	4094.98	
KLX12A	20060503 07:33	20060503 08:55	429.00	449.00	102.13	428.00	998.69	998.55	998.55				
KLX12A	20060503 07:33	20060503 08:55	429.00	449.00	450.00	602.29				4287.27	4286.73	4286.73	
KLX12A	20060503 09:16	20060503 10:38	449.00	469.00	102.13	448.00	1000.46	999.77	999.64				
KLX12A	20060503 09:16	20060503 10:38	449.00	469.00	470.00	602.29				4477.63	4477.36	4477.36	
KLX12A	20060503 10:59	20060503 12:17	469.00	489.00	102.13	468.00	1001.81	1001.12	1000.71				
KLX12A	20060503 10:59	20060503 12:17	469.00	489.00	490.00	602.29				4668.54	4667.99	4667.44	
KLX12A	20060503 13:28	20060503 14:28	489.00	509.00	102.13	488.00	1003.57	1002.89	1002.89				
KLX12A	20060503 13:28	20060503 14:28	489.00	509.00	510.00	602.29				4859.74	4859.19	4859.19	
KLX12A	20060504 09:16	20060504 10:38	509.00	529.00	102.13	508.00	1002.47	1003.01	1003.43				
KLX12A	20060504 09:16	20060504 10:38	509.00	529.00	530.00	602.29				5050.65	5053.95	5050.92	
KLX12A	20060503 15:54	20060503 17:11	527.00	547.00	102.13	526.00	1006.52	1005.98	1005.43				
KLX12A	20060503 15:54	20060503 17:11	527.00	547.00	548.00	602.29				5227.10	5288.40	5242.66	
KLX12A	20060503 17:30	20060503 18:46	547.00	567.00	102.13	546.00	1008.15	1007.20	1007.06				
KLX12A	20060503 17:30	20060503 18:46	547.00	567.00	568.00	602.29				5458.65	5448.73	5438.81	

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KLX12A	20060504 07:25	20060504 08:28	564.00	584.00	102.13	563.00	1009.40	1009.26	1009.26				
KLX12A	20060504 07:25	20060504 08:28	564.00	584.00	585.00	602.29				5610.30	5606.31	5604.11	
KLX12A	20060508 17:21	20060508 18:12	304.00	309.00	102.13	303.00	997.78	997.78	996.95				
KLX12A	20060508 17:21	20060508 18:12	304.00	309.00	310.00	602.29				2960.24	2960.24	2959.97	
KLX12A	20060511 15:01	20060511 16:22	309.00	314.00	102.13	308.00	995.59	993.82	992.72				
KLX12A	20060511 15:01	20060511 16:22	309.00	314.00	315.00	602.29				3005.59	3005.19	3004.49	
KLX12A	20060511 16:39	20060511 17:59	314.00	319.00	102.13	313.00	992.31	991.75	991.22				
KLX12A	20060511 16:39	20060511 17:59	314.00	319.00	320.00	602.29				3051.33	3051.33	3050.77	
KLX12A	20060511 18:11	20060511 19:30	319.00	324.00	102.13	318.00	991.34	991.07	990.80				
KLX12A	20060511 18:11	20060511 19:30	319.00	324.00	325.00	602.29				3097.75	3097.61	3097.05	
KLX12A	20060512 07:38	20060512 08:54	322.00	327.00	102.13	321.00	990.23	989.68	989.68				
KLX12A	20060512 07:38	20060512 08:54	322.00	327.00	328.00	602.29				3123.65	3123.93	3123.51	
KLX12A	20060512 09:17	20060512 09:59	327.00	332.00	102.13	326.00	990.77	990.77	990.91				
KLX12A	20060512 09:17	20060512 09:59	327.00	332.00	333.00	602.29				3171.58	3171.58	3171.45	
KLX12A	20060512 10:14	20060512 10:56	332.00	337.00	102.13	331.00	991.59	991.45	991.59				
KLX12A	20060512 10:14	20060512 10:56	332.00	337.00	338.00	602.29				3219.38	3219.38	3219.93	
KLX12A	20060512 11:15	20060512 11:59	337.00	342.00	102.13	336.00	992.00	992.27	992.27				
KLX12A	20060512 11:15	20060512 11:59	337.00	342.00	343.00	602.29				3267.59	3267.45	3267.87	
KLX12A	20060515 12:50	20060515 13:40	339.00	344.00	102.13	338.00	1035.45	1035.45	1035.45				
KLX12A	20060515 12:50	20060515 13:40	339.00	344.00	345.00	602.29				3283.02	3283.15	3282.75	
KLX12A	20060515 14:15	20060515 15:00	364.00	369.00	102.13	363.00	990.91	990.91	990.91				
KLX12A	20060515 14:15	20060515 15:00	364.00	369.00	370.00	602.29				3522.42	3522.42	3522.42	
KLX12A	20060515 15:13	20060515 16:28	369.00	374.00	102.13	368.00	991.59	991.04	991.04				
KLX12A	20060515 15:13	20060515 16:28	369.00	374.00	375.00	602.29				3570.63	3570.35	3570.35	
KLX12A	20060515 16:39	20060515 17:54	374.00	379.00	102.13	373.00	991.86	991.59	991.18				
KLX12A	20060515 16:39	20060515 17:54	374.00	379.00	380.00	602.29				3618.28	3618.28	3618.28	
KLX12A	20060515 18:05	20060515 18:47	379.00	384.00	102.13	378.00	991.86	991.86	991.86				
KLX12A	20060515 18:05	20060515 18:47	379.00	384.00	385.00	602.29				3666.23	3666.23	3666.23	
KLX12A	20060515 18:59	20060516 08:36	384.00	389.00	102.13	383.00	992.00	992.00	992.00				
KLX12A	20060515 18:59	20060516 08:36	384.00	389.00	390.00	602.29				3713.06	3713.06	3713.06	

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KLX12A	20060516 08:58	20060516 10:19	389.00	394.00	102.13	388.00	992.13	991.58	991.58				
KLX12A	20060516 08:58	20060516 10:19	389.00	394.00	395.00	602.29				3760.44	3760.99	3760.44	
KLX12A	20060516 10:31	20060516 11:47	392.00	397.00	102.13	391.00	992.10	991.69	991.56				
KLX12A	20060516 10:31	20060516 11:47	392.00	397.00	398.00	602.29				3788.95	3795.70	3790.19	
KLX12A	20060516 13:57	20060516 15:20	397.00	402.00	102.13	396.00	993.87	993.33	993.33				
KLX12A	20060516 13:57	20060516 15:20	397.00	402.00	403.00	602.29				3837.44	3842.95	3838.13	
KLX12A	20060516 15:30	20060516 16:47	402.00	407.00	102.13	401.00	993.59	993.32	992.91				
KLX12A	20060516 15:30	20060516 16:47	402.00	407.00	408.00	602.29				3884.27	3887.44	3884.41	
KLX12A	20060516 16:55	20060516 18:10	404.00	409.00	102.13	403.00	993.62	993.07	993.07				
KLX12A	20060516 16:55	20060516 18:10	404.00	409.00	410.00	602.29				3903.00	3906.17	3903.69	
KLX12A	20060516 18:20	20060516 19:34	409.00	414.00	102.13	408.00	993.61	993.20	993.20				
KLX12A	20060516 18:20	20060516 19:34	409.00	414.00	415.00	602.29				3950.53	3950.40	3950.53	
KLX12A	20060517 08:21	20060517 09:42	413.00	418.00	102.13	412.00	994.08	993.81	993.53				
KLX12A	20060517 08:21	20060517 09:42	413.00	418.00	419.00	602.29				3988.82	3991.85	3988.55	
KLX12A	20060517 09:51	20060517 11:05	418.00	423.00	102.13	417.00	994.62	994.21	993.67				
KLX12A	20060517 09:51	20060517 11:05	418.00	423.00	424.00	602.29				4035.93	4035.38	4034.83	
KLX12A	20060517 11:14	20060517 11:58	423.00	428.00	102.13	422.00	994.62	994.89	994.89				
KLX12A	20060517 11:14	20060517 11:58	423.00	428.00	429.00	602.29				4082.76	4082.90	4082.76	
KLX12A	20060517 12:06	20060517 13:15	424.00	429.00	102.13	423.00	995.38	995.38	995.25				
KLX12A	20060517 12:06	20060517 13:15	424.00	429.00	430.00	602.29				4092.68	4092.68	4092.68	
KLX12A	20060517 13:25	20060517 14:23	429.00	434.00	102.13	428.00	996.33	995.79	995.93				
KLX12A	20060517 13:25	20060517 14:23	429.00	434.00	435.00	602.29				4140.62	4140.34	4140.06	
KLX12A	20060517 15:05	20060517 16:23	434.00	439.00	102.13	433.00	996.60	996.33	996.05				
KLX12A	20060517 15:05	20060517 16:23	434.00	439.00	440.00	602.29				4188.55	4188.55	4188.00	
KLX12A	20060517 16:36	20060517 17:52	439.00	444.00	102.13	438.00	996.87	996.60	996.19				
KLX12A	20060517 16:36	20060517 17:52	439.00	444.00	445.00	602.29				4235.80	4235.80	4235.94	
KLX12A	20060517 18:04	20060517 18:46	444.00	449.00	102.13	443.00	997.15	997.01	996.88				
KLX12A	20060517 18:04	20060517 18:46	444.00	449.00	450.00	602.29				4283.87	4284.01	4283.87	
KLX12A	20060517 18:57	20060517 19:45	449.00	454.00	102.13	448.00	997.00	997.00	997.00				
KLX12A	20060517 18:57	20060517 19:45	449.00	454.00	455.00	602.29				4331.25	4331.25	4330.71	
KLX12A	20060518 08:14	20060518 09:34	454.00	459.00	102.13	453.00	997.00	995.91	996.05				
KLX12A	20060518 08:14	20060518 09:34	454.00	459.00	460.00	602.29				4379.33	4378.77	4378.63	

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KLX12A	20060518 09:44	20060518 11:00	459.00	464.00	102.13	458.00	996.31	995.77	995.64				
KLX12A	20060518 09:44	20060518 11:00	459.00	464.00	465.00	602.29				4425.61	4425.47	4425.47	
KLX12A	20060518 11:11	20060518 12:02	464.00	469.00	102.13	463.00	996.58	996.32	996.32				
KLX12A	20060518 11:11	20060518 12:02	464.00	469.00	470.00	602.29				4473.40	4473.13	4472.86	
KLX12A	20060518 13:30	20060518 14:13	469.00	474.00	102.13	468.00	997.53	997.53	997.53				
KLX12A	20060518 13:30	20060518 14:13	469.00	474.00	475.00	602.29				4521.35	4521.35	4521.35	
KLX12A	20060518 14:23	20060518 15:04	474.00	479.00	102.13	473.00	998.22	998.22	998.22				
KLX12A	20060518 14:23	20060518 15:04	474.00	479.00	480.00	602.29				4569.28	4569.28	4569.28	
KLX12A	20060518 15:14	20060518 15:57	479.00	484.00	102.13	478.00	998.35	997.94	998.35				
KLX12A	20060518 15:14	20060518 15:57	479.00	484.00	485.00	602.29				4616.66	4616.66	4616.66	
KLX12A	20060518 16:09	20060518 17:24	484.00	489.00	102.13	483.00	998.48	998.07	997.94				
KLX12A	20060518 16:09	20060518 17:24	484.00	489.00	490.00	602.29				4664.60	4664.04	4664.60	
KLX12A	20060518 17:50	20060518 18:38	509.00	514.00	102.13	508.00	1001.34	1000.78	1000.25				
KLX12A	20060518 17:50	20060518 18:38	509.00	514.00	515.00	602.29				4903.72	4903.72	4903.72	
KLX12A	20060519 07:17	20060519 08:00	514.00	519.00	102.13	513.00	1000.37	1000.37	999.83				
KLX12A	20060519 07:17	20060519 08:00	514.00	519.00	520.00	602.29				4951.66	4951.52	4951.66	
KLX12A	20060519 08:11	20060519 09:29	519.00	524.00	102.13	518.00	1000.23	999.68	999.42				
KLX12A	20060519 08:11	20060519 09:29	519.00	524.00	525.00	602.29				4998.76	5002.48	4999.04	
KLX12A	20060529 13:25	20060529 14:41	522.00	527.00	102.13	521.00	999.93	999.38	998.84				
KLX12A	20060529 13:25	20060529 14:41	522.00	527.00	528.00	602.29				5026.58	5029.35	5026.58	
KLX12A	20060529 14:56	20060529 15:40	527.00	532.00	102.13	526.00	999.25	999.11	998.97				
KLX12A	20060529 14:56	20060529 15:40	527.00	532.00	533.00	602.29				5073.42	5073.42	5073.42	
KLX12A	20060529 15:54	20060529 16:39	532.00	537.00	102.13	531.00	999.66	999.66	999.66				
KLX12A	20060529 15:54	20060529 16:39	532.00	537.00	538.00	602.29				5121.09	5120.81	5121.36	
KLX12A	20060530 07:21	20060530 08:37	537.00	542.00	102.13	536.00	993.65	994.74	995.97				
KLX12A	20060530 07:21	20060530 08:37	537.00	542.00	543.00	602.29				5165.57	5232.65	5180.86	
KLX12A	20060530 08:54	20060530 10:09	542.00	547.00	102.13	541.00	998.97	999.38	999.92				
KLX12A	20060530 08:54	20060530 10:09	542.00	547.00	548.00	602.29				5224.94	5282.93	5232.65	
KLX12A	20060530 10:19	20060530 11:34	547.00	552.00	102.13	546.00	1001.83	1001.83	1002.24				
KLX12A	20060530 10:19	20060530 11:34	547.00	552.00	553.00	602.29				5285.55	5288.30	5281.14	
KLX12A	20060530 12:22	20060530 13:38	552.00	557.00	102.13	551.00	1003.73	1002.78	1002.37				
KLX12A	20060530 12:22	20060530 13:38	552.00	557.00	558.00	602.29				5408.00	5373.70	5354.97	

idcode	start_date	stop_date	secup	seclow	obs_secup	obs_seclow	pi_above	pp_above	pf_above	pi_below	pp_below	pf_below	comments
KLX12A	20060530 13:49	20060530 14:30	557.00	562.00	102.13	556.00	1003.05	1002.91	1003.05				
KLX12A	20060530 13:49	20060530 14:30	557.00	562.00	563.00	602.29				5435.41	5434.73	5427.15	
KLX12A	20060530 14:38	20060530 15:18	562.00	567.00	102.13	561.00	1003.74	1003.74	1003.18				
KLX12A	20060530 14:38	20060530 15:18	562.00	567.00	568.00	602.29				5470.40	5469.57	5463.52	
0													
0													
KLX12A	20060503 14:47	20060503 15:29	509.00	529.00	102.13	508.00	1005.61	1005.34	0.00				**Incomplete test, interrupted and reperformed later**
KLX12A	20060503 14:47	20060503 15:29	509.00	529.00	530.00	1001.20				5051.34	5053.13	0.00	**Incomplete test, interrupted and reperformed later**
KLX12A	20060529 16:51	20060529 19:18	537.00	542.00	102.13	536.00	998.01	998.29	998.15				**Incomplete test, interrupted and reperformed later**
KLX12A	20060529 16:51	20060529 19:18	537.00	542.00	543.00	1001.20				5167.64	5222.60	5210.07	**Incomplete test, interrupted and reperformed later**