P-04-100

# Forsmark site investigation

# Single-hole injection tests in borehole KFM02A

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May 2004

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# Abstract

Borehole KFM02A, which is the second cored borehole drilled within the site investigations in the Forsmark area, is of SKB hydrochemistry type. It designed as is a so called telescopic borehole which makes it possible to install certain borehole equipment in the upper about 100 m with larger diameter than the rest of the borehole. The borehole is sub-vertical, about 1000 m deep and cased to about 100 m depth. The borehole diameter is about 77 mm in the interval 100–1000 m.

This report presents the injection tests performed with the pipe string system PSS3 in borehole KFM02A and the test results obtained.

The main aim of the injection tests in KFM02A was to characterize the rock aquifer adjacent to the borehole on different measurement scales (100 m, 20 m and 5 m) regarding hydrogeological properties. Hydraulic parameters like transmissivity, conductivity, dominating flow regime and possible outer hydraulic boundaries were determined using analysis methods for stationary as well as transient conditions.

In addition, a comparison with the results of previously performed difference flow logging was made.

The injection tests gave consistent results on the different measurement scales regarding transmissivity. During most of the tests, some period with pseudo-radial flow could be identified from the flow period, making a standard transient evaluation possible. However, the recovery period for many tests was strongly affected by wellbore storage effects, making a unique transient evaluation of this period more difficult. In addition, the recovery periods from several borehole sections indicated pseudo-spherical or even pseudo-stationary flow regimes.

The injection test results were consistent with results from the previous difference flow logging in KFM02A although some discrepancies between the methods were found for estimated transmissivities in the 5 m sections.

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 KFM02A, som var det andra kärnborrhålet som borrades inom platsundersökningarna i Forsmarksområdet, är av SKB kemityp. Det är utfört som ett så kallat teleskopborrhål för att göra det möjligt att installera viss borrhålsutrustning i de övre, ca 100 m med större diameter än resten av borrhålet. Borrhålet är sub-vertikalt, ca 1000 m djupt och försett med foderrör till ca 100 m djup. Borrhålsdiametern är ca 77 mm i intervallet 100–1000 m.

Föreliggande rapport beskriver genomförda injektionstester med rörgångssystemet PSS3 i borrhål KFM02A samt resultaten från desamma.

Huvudsyftet med injektionstesterna var att karaktärisera berggrundsakviféren runt borrhålet i olika mätskalor (100 m, 20 m och 5 m) med avseende på hydrogeologiska egenskaper. Hydrauliska parametrar såsom transmissivitet, konduktivitet, dominerande flödesregim och eventuella yttre hydrauliska randvillkor bestämdes med hjälp av analysmetoder för såväl stationära som transienta förhållanden.

En jämförelse med resultaten av den tidigare utförda differensflödesloggningen i KFM02A gjordes också.

Injektionstesterna gav samstämmiga resultat beträffande transmissivitet för de olika mät-skalorna. Under de flesta tester kunde en viss period med pseudo-radiellt flöde identifieras från flödesperioden, vilket möjliggjorde en standardmässig transient utvärdering. Återhämtningsperioden för många tester var däremot starkt påverkad av brunnsmagasinseffekter, vilket gjorde en unik transient utvärdering av denna period svårare. Dessutom uppvisade flera av testernas återhämtningsperioder tecken på pseudo-sfäriskt och ibland pseudo-stationärt flöde.

Injektionstesterna gav även samstämmiga resultat med den tidigare differensflödesloggningen i KFM02A, även om vissa avvikelser inträffade för beräknade transmissiviteter i samma 5 m sektioner.

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

All appendices are included on the attached CD.

# 1 Introduction

The injection tests in borehole KFM02A at Forsmark, Sweden, were carried out during March 2004. The commission was conducted by GEOSIGMA AB. Borehole KFM02A was the second deep cored borehole within the on-going site investigation in the Forsmark area. The borehole is a so called telescopic borehole in order to make it possible to install certain borehole equipment in the upper c 100 m where the diameter is larger than in the rest of the borehole. The borehole is sub-vertical, c1000 m deep and cased to c 100 m depth. The borehole diameter is c 77 mm in the interval 102–1002.4 m. The location of the borehole is shown in Figure 1-1.

In KFM02A, difference flow logging was previously performed, in April and May, 2003. According to the results of the latter investigation, 125 conductive fractures were detected and the most conductive ones were found at 110.7 m, 114.2 m, 118.3 m and 120.9 m (with transmissivities ranging from c $1\cdot10^{-5}$ m$^2$/s to c $5\cdot10^{-5}$ m$^2$/s) (Rouhainen and Pöllänen, 2003 /1/).

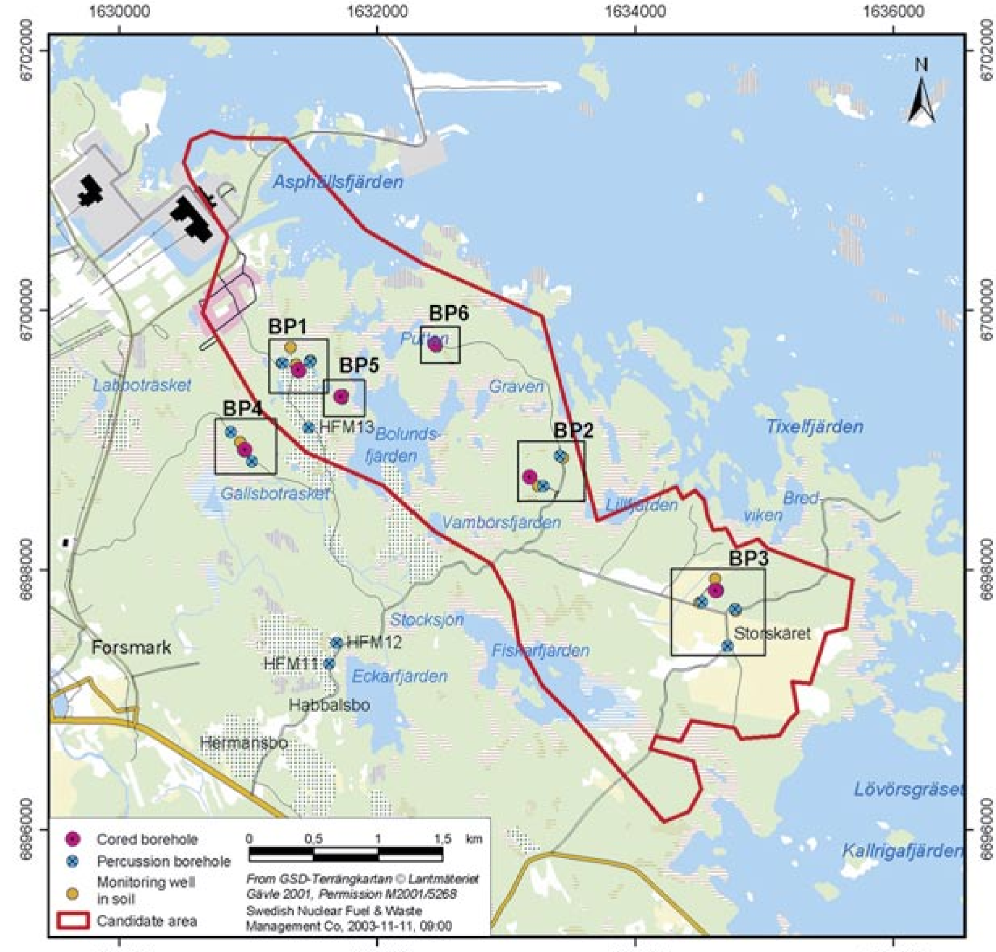


***Figure 1-1.*** *The investigation area at Forsmark including the candidate area selected for more detailed investigations. Borehole KFM02A is situated at drilling site BP2.*

This document reports the results obtained by the injection tests in borehole KFM02A. The activity is performed within the Forsmark site investigation. The work was carried out in compliance with the SKB internal controlling documents, presented in Table 1-1. Data and results were delivered to the SKB site characterization database SICADA under field note no Forsmark 297.

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

| Activity Plan | Number | Version |
|---|---|---|
| Hydraulic injection tests in borehole KFM02A with PSS3 | AP PF 400-04-08 | 1.0 |
| **Method descriptions** | **Number** | **Version** |
| Mätsystembeskrivning (MSB) – Allmän del. Pipe String System (PSS3). | SKB MD 345.100 | 1.0 |
| Mätsystembeskrivning för: Kalibrering, PSS3. | SKB MD 345.122 | 1.0 |
| Mätsystembeskrivning för: Skötsel, service, serviceprotokoll, PSS3. | SKB MD 345.124 | 1.0 |
| Metodbeskrivning för hydrauliska injektionstester | SKB MD 323.001 | 1.0 |
| Instruktion för analys av injektions- och enhålspumptester | SKB MD 320.004 | 1.0 |

# 2 Objectives

The main aim of the injection tests in borehole KFM02A was to characterize the rock aquifer adjacent to the borehole on different measurement scales (100 m, 20 m and 5 m) regarding hydrogeological properties. 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 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, which were determined by applying transient evaluation on the test responses during the flow- and recovery periods.

A comparison with the results of the previously performed difference flow logging in KFM02A was also included in the activity, to be used as a check of the plausibility of the test results obtained. The comparison also aimed at a deepened overall analysis of the hydraulic conditions of borehole KFM02A.

# 3 Scope

## 3.1 Boreholes

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

**Table 3-1. Technical data of the borehole KFM02A (printout from SKB database, SICADA).**

| | | | | | |
|---|---|---|---|---|---|
| Borehole length (m): | 1002.440 | | | | |
| Drilling Period(s): | From Date | To Date | Secup(m) | Seclow(m) | Drilling Type |
| | 2002-11-20 | 2002-11-26 | 0.000 | 100.400 | Percussion drilling |
| | 2003-01-08 | 2003-03-12 | 100.420 | 1002.440 | Core drilling |
| Starting point coordinate: | Length(m) | Northing(m) | Easting(m) | Elevation | Coord System |
| | 0.000 | 6698712.501 | 1633182.863 | 7.353 | RT90–RHB70 |
| Angles: | Length(m) | Bearing | Inclination (– = down) | | |
| | 0.000 | 275.764 | –85.385 | | |
| Borehole diameter: | Secup(m) | Seclow(m) | Hole Diam(m) | | |
| | 0.000 | 2.390 | 0.440 | | |
| | 2.390 | 11.800 | 0.358 | | |
| | 11.800 | 100.400 | 0.251 | | |
| | 100.420 | 102.000 | 0.086 | | |
| | 102.000 | 1002.440 | 0.077 | | |
| Core diameter: | Secup(m) | Seclow(m) | Core Diam(m) | | |
| | 100.420 | 102.000 | 0.072 | | |
| | 102.000 | 1002.440 | 0.051 | | |
| Casing diameter: | Secup(m) | Seclow(m) | Case In(m) | Case Out(m) | |
| | 0.000 | 100.140 | 0.200 | 0.280 | |
| | 0.100 | 11.800 | 0.265 | 0.273 | |

## 3.2 Tests performed

The injection tests in borehole KFM02A performed according to Activity Plan AP PF 400-04-08 (SKB internal controlling document) are listed in Table 3-2. The injection tests were carried out with the Pipe String System, PSS3. The performance of the tests, together with the equipment, are described in the description of the measurement system for PSS (SKB MD 345.100–01, SKB internal document) and in the corresponding methodology descriptions for hydraulic injection tests (SKB MD 323.001 Metodbeskrivning för Hydrauliska injektionstester, SKB internal document). In some test sections, the test was not performed as intended due to that the time for pressure stabilisation was too long or that malfunctions of equipment caused pressure and/or flow rate disturbances. Whenever such disturbances were expected to affect the possibility of evaluating the data, the test was repeated. Test number (Test no in Table 3-2) refers to the number of tests that have been performed in the actual section. For evaluation, data from the last test in each test section were used.

The upper and lower limits for the test sections were in most cases the same as the upper and lower section limits used during the previous sequential difference flow logging in KFM02A /2/. A few exceptions were made to avoid the risk of packer failure when expanding packers at borehole intervals with cavities. As a result, some sections overlap.

**Table 3-2. Single-hole injection tests performed in borehole KFM02A.**

| Borehole | Test section | | Section length (m) | Test type[1)] | Test no | Test start date, time | Test stop date, time |
|---|---|---|---|---|---|---|---|
| Bh ID | secup | seclow | | (1–6) | | YYYYMMDD hh:mm | YYYYMMDD hh:mm |
| KFM02A | 103.5 | 203.5 | 100 | 3 | 1 | 20040305 18:31 | 20040305 21:05 |
| KFM02A | 103.5 | 203.5 | 100 | 3 | 2 | 20040305 22:01 | 20040305 23:52 |
| KFM02A | 201 | 301 | 100 | 3 | 1 | 20040308 07:04 | 20040308 08:44 |
| KFM02A | 201 | 301 | 100 | 3 | 2 | 20040308 08:53 | 20040308 10:44 |
| KFM02A | 301 | 401 | 100 | 3 | 1 | 20040308 11:50 | 20040308 14:46 |
| KFM02A | 401 | 501 | 100 | 3 | 1 | 20040308 17:01 | 20040308 18:57 |
| KFM02A | 501 | 601 | 100 | 3 | 1 | 20040308 20:48 | 20040308 23:26 |
| KFM02A | 501 | 601 | 100 | 3 | 2 | 20040308 22:06 | 20040308 23:26 |
| KFM02A | 601 | 701 | 100 | 3 | 1 | 20040309 07:29 | 20040309 09:38 |
| KFM02A | 701 | 801 | 100 | 3 | 1 | 20040309 11:39 | 20040309 14:55 |
| KFM02A | 801 | 901 | 100 | 3 | 1 | 20040309 18:54 | 20040309 20:17 |
| KFM02A | 801 | 901 | 100 | 3 | 2 | 20040309 20:22 | 20040309 23:07 |
| KFM02A | | | | | | | |
| KFM02A | 103.5 | 123.5 | 20 | 3 | 1 | 20040315 10:27 | 20040315 12:46 |
| KFM02A | 103.5 | 123.5 | 20 | 3 | 2 | 20040315 12:49 | 20040315 13:57 |
| KFM02A | 103.5 | 123.5 | 20 | 3 | 3 | 20040318 14:48 | 20040318 16:09 |
| KFM02A | 121 | 141 | 20 | 3 | 1 | 20040315 14:41 | 20040315 18:10 |
| KFM02A | 141 | 161 | 20 | 3 | 1 | 20040315 19:23 | 20040315 21:45 |
| KFM02A | 161 | 181 | 20 | 3 | 1 | 20040315 22:08 | 20040315 23:06 |
| KFM02A | 161 | 181 | 20 | 3 | 2 | 20040315 23:23 | 20040316 00:30 |
| KFM02A | 181 | 201 | 20 | 3 | 1 | 20040316 06:51 | 20040316 08:13 |
| KFM02A | 201 | 221 | 20 | 3 | 1 | 20040316 08:45 | 20040316 10:04 |
| KFM02A | 221 | 241 | 20 | 3 | 1 | 20040316 10:27 | 20040316 11:43 |
| KFM02A | 241 | 261 | 20 | 3 | 1 | 20040316 12:30 | 20040316 13:47 |
| KFM02A | 261 | 281 | 20 | 3 | 1 | 20040316 14:04 | 20040316 15:19 |
| KFM02A | 281 | 301 | 20 | 3 | 1 | 20040316 15:55 | 20040316 17:24 |
| KFM02A | 281 | 301 | 20 | 3 | 2 | 20040318 08:13 | 20040318 09:19 |
| KFM02A | 281 | 301 | 20 | 3 | 3 | 20040318 11:34 | 20040318 12:24 |
| KFM02A | 300 | 320 | 20 | 3 | 1 | 20040316 19:37 | 20040316 21:15 |
| KFM02A | 301 | 321 | 20 | 3 | 1 | 20040316 17:50 | 20040316 19:16 |
| KFM02A | 401 | 421 | 20 | 3 | 1 | 20040316 22:41 | 20040317 00:09 |
| KFM02A | 421 | 441 | 20 | 3 | 1 | 20040317 06:18 | 20040317 07:35 |

| Borehole | Test section | | Section length (m) | Test type[1] | Test no | Test start date, time | Test stop date, time |
|---|---|---|---|---|---|---|---|
| Bh ID | secup | seclow | | (1–6) | | YYYYMMDD hh:mm | YYYYMMDD hh:mm |
| KFM02A | 441 | 461 | 20 | 3 | 1 | 20040317 08:11 | 20040317 09:26 |
| KFM02A | 461 | 481 | 20 | 3 | 1 | 20040317 09:47 | 20040317 11:02 |
| KFM02A | 481 | 501 | 20 | 3 | 1 | 20040317 11:15 | 20040317 13:13 |
| KFM02A | 501 | 521 | 20 | 3 | 1 | 20040317 14:00 | 20040317 15:44 |
| KFM02A | 521 | 541 | 20 | 3 | 1 | 20040317 16:22 | 20040317 17:52 |
| KFM02A | 541 | 561 | 20 | 3 | 1 | 20040317 18:21 | 20040317 19:44 |
| KFM02A | 561 | 581 | 20 | 3 | 1 | 20040317 20:11 | 20040317 21:47 |
| KFM02A | 581 | 601 | 20 | 3 | 1 | 20040317 22:18 | 20040317 23:34 |
| KFM02A | | | | | | | |
| KFM02A | 103.5 | 108.5 | 5 | 3 | 1 | 20040319 07:54 | 20040319 09:26 |
| KFM02A | 106 | 111 | 5 | 3 | 1 | 20040319 09:38 | 20040319 10:57 |
| KFM02A | 111 | 116 | 5 | 3 | 1 | 20040319 11:09 | 20040319 14:15 |
| KFM02A | 116 | 121 | 5 | 3 | 1 | 20040319 14:35 | 20040319 16:26 |
| KFM02A | 121 | 126 | 5 | 3 | 1 | 20040319 16:37 | 20040319 18:03 |
| KFM02A | 126 | 131 | 5 | 3 | 1 | 20040319 18:21 | 20040319 19:49 |
| KFM02A | 131 | 136 | 5 | 3 | 1 | 20040319 20:03 | 20040319 21:34 |
| KFM02A | 136 | 141 | 5 | 3 | 1 | 20040319 21:44 | 20040319 23:08 |
| KFM02A | 141 | 146 | 5 | 3 | 1 | 20040319 23:21 | 20040320 08:32 |
| KFM02A | 141 | 146 | 5 | 3 | 2 | 20040320 08:41 | 20040320 09:51 |
| KFM02A | 141 | 146 | 5 | 3 | 3 | 20040320 10:36 | 20040320 11:33 |
| KFM02A | 146 | 151 | 5 | 3 | 1 | 20040320 13:03 | 20040320 14:04 |
| KFM02A | 151 | 156 | 5 | 3 | 1 | 20040320 14:16 | 20040320 15:14 |
| KFM02A | 156 | 161 | 5 | 3 | 1 | 20040320 17:19 | 20040320 18:08 |
| KFM02A | 161 | 166 | 5 | 3 | 1 | 20040321 08:36 | 20040321 09:59 |
| KFM02A | 166 | 171 | 5 | 3 | 1 | 20040321 10:21 | 20040321 11:40 |
| KFM02A | 171 | 176 | 5 | 3 | 1 | 20040321 11:55 | 20040321 12:56 |
| KFM02A | 171 | 176 | 5 | 3 | 2 | 20040321 12:59 | 20040321 13:59 |
| KFM02A | 176 | 181 | 5 | 3 | 1 | 20040321 14:13 | 20040321 15:31 |
| KFM02A | 181 | 186 | 5 | 3 | 1 | 20040321 15:39 | 20040321 16:53 |
| KFM02A | 186 | 191 | 5 | 3 | 1 | 20040322 06:30 | 20040322 07:58 |
| KFM02A | 191 | 196 | 5 | 3 | 1 | 20040322 08:15 | 20040322 09:38 |
| KFM02A | 196 | 201 | 5 | 3 | 1 | 20040322 09:57 | 20040322 11:22 |
| KFM02A | 201 | 206 | 5 | 3 | 1 | 20040322 12:41 | 20040322 13:49 |
| KFM02A | 206 | 211 | 5 | 3 | 1 | 20040322 14:03 | 20040322 15:03 |
| KFM02A | 211 | 216 | 5 | 3 | 1 | 20040322 15:34 | 20040322 16:33 |
| KFM02A | 216 | 221 | 5 | 3 | 1 | 20040322 16:55 | 20040322 18:11 |
| KFM02A | 221 | 226 | 5 | 3 | 1 | 20040322 18:23 | 20040322 19:14 |
| KFM02A | 225 | 230 | 5 | 3 | 1 | 20040322 19:23 | 20040322 20:52 |
| KFM02A | 226 | 231 | 5 | 3 | 1 | 20040322 21:01 | 20040322 22:17 |
| KFM02A | 231 | 236 | 5 | 3 | 1 | 20040322 22:26 | 20040322 23:17 |
| KFM02A | 236 | 241 | 5 | 3 | 1 | 20040322 23:28 | 20040323 00:45 |
| KFM02A | 241 | 246 | 5 | 3 | 1 | 20040323 06:26 | 20040323 07:55 |
| KFM02A | 246 | 251 | 5 | 3 | 1 | 20040323 08:13 | 20040323 09:43 |
| KFM02A | 251 | 256 | 5 | 3 | 1 | 20040323 09:59 | 20040323 11:38 |
| KFM02A | 256 | 261 | 5 | 3 | 1 | 20040323 12:31 | 20040323 14:04 |
| KFM02A | 259.5 | 264.5 | 5 | 3 | 1 | 20040328 13:43 | 20040328 15:00 |
| KFM02A | 264.5 | 269.5 | 5 | 3 | 1 | 20040328 11:02 | 20040328 12:18 |
| KFM02A | 269.5 | 274.5 | 5 | 3 | 1 | 20040328 09:39 | 20040328 10:53 |
| KFM02A | 271 | 276 | 5 | 3 | 1 | 20040328 08:15 | 20040328 09:30 |
| KFM02A | 276 | 281 | 5 | 3 | 1 | 20040324 06:55 | 20040324 08:31 |
| KFM02A | 281 | 286 | 5 | 3 | 1 | 20040324 08:44 | 20040324 10:12 |
| KFM02A | 286 | 291 | 5 | 3 | 1 | 20040324 10:28 | 20040324 11:56 |
| KFM02A | 291 | 296 | 5 | 3 | 1 | 20040324 12:56 | 20040324 14:16 |
| KFM02A | 296 | 301 | 5 | 3 | 1 | 20040324 14:28 | 20040322 15:46 |
| KFM02A | 301 | 306 | 5 | 3 | 1 | 20040324 15:59 | 20040324 17:16 |
| KFM02A | 306 | 311 | 5 | 3 | 1 | 20040324 17:31 | 20040324 18:48 |
| KFM02A | 311 | 316 | 5 | 3 | 1 | 20040324 18:58 | 20040324 20:34 |
| KFM02A | 316 | 321 | 5 | 3 | 1 | 20040324 20:41 | 20040324 21:20 |
| KFM02A | 401 | 406 | 5 | 3 | 1 | 20040324 22:12 | 20040324 23:01 |

| Borehole | Test section | | Section length (m) | Test type[1)] | Test no | Test start date, time | Test stop date, time |
|---|---|---|---|---|---|---|---|
| Bh ID | secup | seclow | | (1–6) | | YYYYMMDD hh:mm | YYYYMMDD hh:mm |
| KFM02A | 406 | 411 | 5 | 3 | 1 | 20040324 23:09 | 20040324 23:52 |
| KFM02A | 411 | 416 | 5 | 3 | 1 | 20040325 07:35 | 20040325 08:25 |
| KFM02A | 416 | 421 | 5 | 3 | 1 | 20040325 08:43 | 20040325 10:04 |
| KFM02A | 421 | 426 | 5 | 3 | 1 | 20040325 10:23 | 20040325 11:43 |
| KFM02A | 426 | 431 | 5 | 3 | 1 | 20040325 13:03 | 20040325 14:21 |
| KFM02A | 431 | 436 | 5 | 3 | 1 | 20040325 14:33 | 20040325 15:50 |
| KFM02A | 436 | 441 | 5 | 3 | 1 | 20040325 15:59 | 20040325 17:13 |
| KFM02A | 441 | 446 | 5 | 3 | 1 | 20040325 17:25 | 20040325 18:42 |
| KFM02A | 446 | 451 | 5 | 3 | 1 | 20040325 18:54 | 20040325 20:11 |
| KFM02A | 451 | 456 | 5 | 3 | 1 | 20040325 20:22 | 20040325 21:37 |
| KFM02A | 456 | 461 | 5 | 3 | 1 | 20040325 21:56 | 20040325 22:34 |
| KFM02A | 456 | 461 | 5 | 3 | 2 | 20040325 22:43 | 20040326 00:02 |
| KFM02A | 461 | 466 | 5 | 3 | 1 | 20040326 06:46 | 20040326 08:07 |
| KFM02A | 466 | 471 | 5 | 3 | 1 | 20040326 08:23 | 20040326 09:42 |
| KFM02A | 471 | 476 | 5 | 3 | 1 | 20040326 10:01 | 20040326 10:46 |
| KFM02A | 476 | 481 | 5 | 3 | 1 | 20040326 11:04 | 20040326 12:26 |
| KFM02A | 481 | 486 | 5 | 3 | 1 | 20040326 13:41 | 20040326 14:59 |
| KFM02A | 486 | 491 | 5 | 3 | 1 | 20040326 15:37 | 20040326 16:54 |
| KFM02A | 491 | 496 | 5 | 3 | 1 | 20040326 17:04 | 20040326 18:19 |
| KFM02A | 496 | 501 | 5 | 3 | 1 | 20040326 18:30 | 20040326 19:48 |
| KFM02A | 501 | 506 | 5 | 3 | 1 | 20040326 20:01 | 20040326 21:19 |
| KFM02A | 506 | 511 | 5 | 3 | 1 | 20040326 21:33 | 20040326 22:50 |
| KFM02A | 511 | 516 | 5 | 3 | 1 | 20040326 23:47 | 20040327 08:48 |
| KFM02A | 511 | 516 | 5 | 3 | 2 | 20040327 09:44 | 20040327 10:37 |
| KFM02A | 516 | 521 | 5 | 3 | 1 | 20040327 10:49 | 20040327 11:43 |
| KFM02A | 541 | 546 | 5 | 3 | 1 | 20040327 12:44 | 20040327 13:35 |
| KFM02A | 546 | 551 | 5 | 3 | 1 | 20040327 13:48 | 20040327 14:33 |
| KFM02A | 551 | 556 | 5 | 3 | 1 | 20040327 14:40 | 20040327 15:25 |
| KFM02A | 556 | 561 | 5 | 3 | 1 | 20040327 15:32 | 20040327 16:51 |

[1)] 3: Injection test

## 3.3 Control of equipment

The PSS3 equipment was fully maintained according to SKB internal controlling documents (SKB MD 345.124, service and SKB MD 345.122, calibration) in February 2004.

Functioning checks of the equipment were performed during the establishment of PSS 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. Submerged in water while lowering, the sensors showed good agreement with the total head of water ($p/\rho g$). The temperature sensor showed 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 done 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 a data-room and workshop compartment. The container is placed on pallets to get a suitable working level in relation to the borehole casing.

The hoisting rig is of a hydraulically 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 a limit value for the load 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 executed by magnetic valves controlled by the software in the data acquisition system.

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

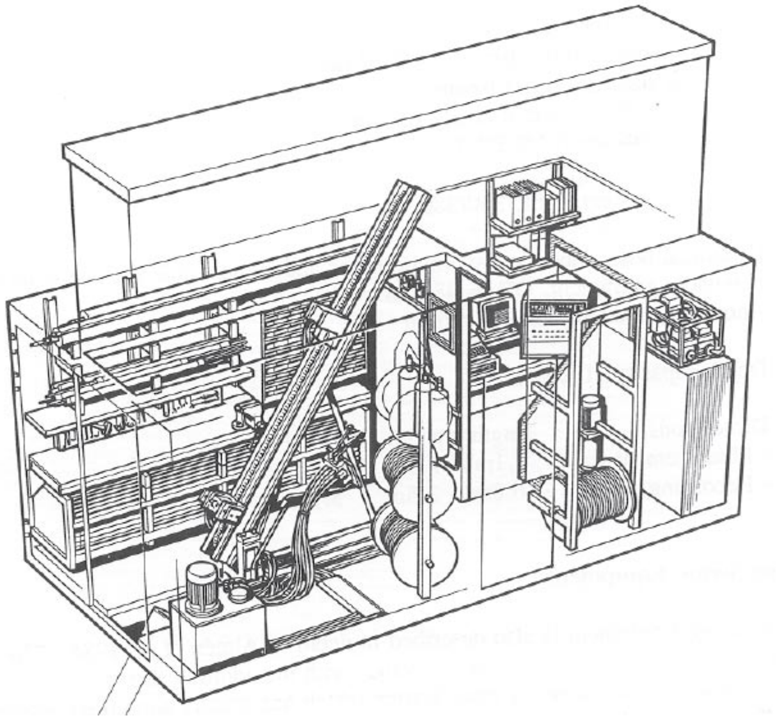

***Figure 4-1.*** *Outline of the PSS3 container with equipment.*

### 4.1.2 Down-hole equipment

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

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

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

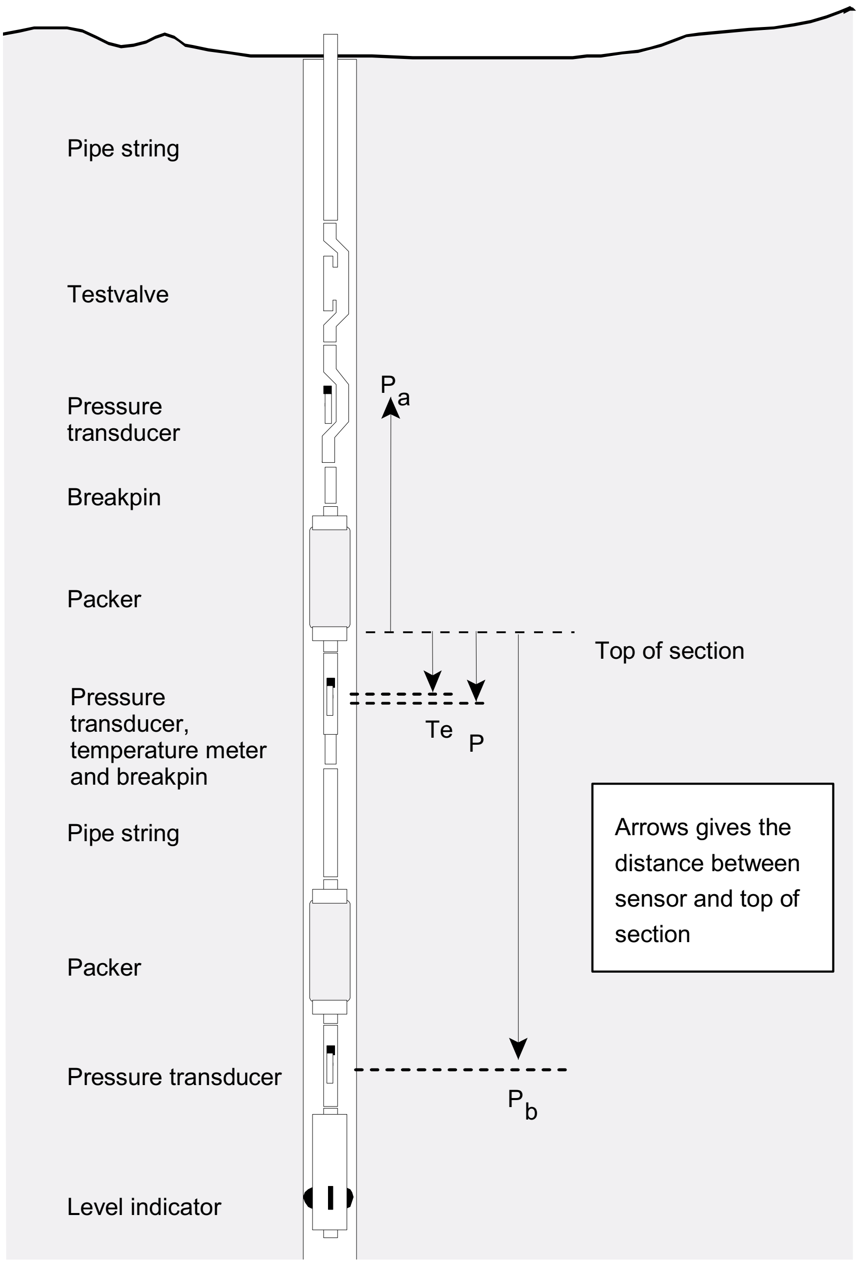


*Figure 4-2. Schematic drawing of the down-hole equipment in the PSS3 system.*

## 4.2 Measurement sensors

Technical data for the measurement sensors in the PSS system together with corresponding data of the system are shown in Table 4-1.

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

**Table 4-1. Technical data for sensors together with estimated data of the PSS system (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 | | |
| | Accuracy[1)] | % F.S | 0.1 | | |
| Differential pressure, 200 kPa | Accuracy | kPa | | <±5 | Estimated value |
| Temperature | Output signal | mA | 4–20 | | |
| | Meas. range | °C | 0–32 | | |
| | Resolution | °C | < 0.01 | | |
| | Accuracy | °C | ±0.1 | | |
| Flow Qbig | Output signal | mA | 4–20 | | |
| | Meas. range | $m^3/s$ | $1.67\cdot10^{-5}$–$1.67\cdot10^{-3}$ | | |
| | Resolution | $m^3/s$ | $6.7\cdot10^{-8}$ | | |
| | Accuracy[2)] | % O.R | 0.15–3 | 0.2–1 | The specific accuracy is depending on actual flow |
| Flow Qsmall | Output signal | mA | 4–20 | | |
| | Meas. range | $m^3/s$ | $1.67\cdot10^{-8}$–$1.67\cdot10^{-5}$ | | |
| | Resolution | $m^3/s$ | $6.7\cdot10^{-10}$ | | |
| | Accuracy[2)] | % O.R | 0.4–10 | 0.4–20 | The specific accuracy is depending on actual flow |

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

[2)] Maximum error in % of actual reading (% o.r.). 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)] | 4 | 18 | 92 |
| Total volume of test section [2)] | 23 | 93 | 466 |
| Position for sensor Pa, pressure above test section, (m above secup) [3)] | 1.89 | 1.89 | 1.82 |
| Position for sensor P, pressure in testsection, (m above secup) [3)] | –1.01 | –0.99 | –1.00 |
| Position for sensor Tsec, Temperature in test section, (m above secup) [3)] | –1.59 | –1.58 | –1.59 |
| Position for sensor Pb, pressure below test section, (m above secup) [3)] | –7.00 | –22.00 | –102.00 |

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

[2)] Total volume of test section ($V = \text{section length}*\pi*d^2/4$).

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

## 4.3 Data acquisition system

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

The data acquisition system can 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 over the regulating valve, together with pressure in test section as input signals.

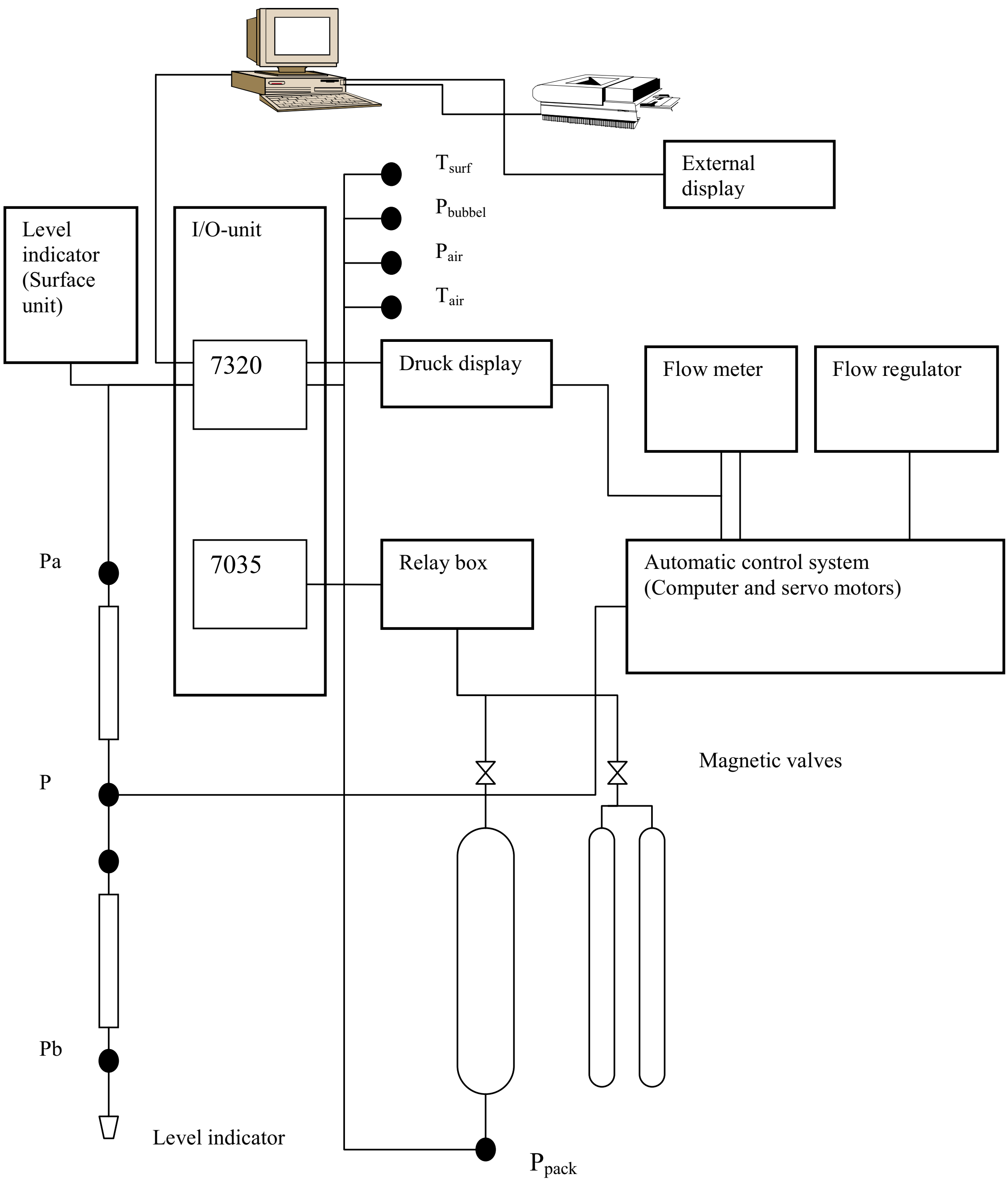


*Figure 4-3. Schematic drawing of the data acquisition system and the automatic control system in PSS.*

# 5 Excecution

## 5.1 Preparations

### 5.1.1 Calibration

All sensors included in PSS are calibrated at GEOSIGMA engineering service station in Uppsala. Calibration is generally performed prior to each measurement campaign. Results from calibration, e.g. calibration constants, of all sensors are kept in a document folder in PSS. If a sensor is replaced at the test site, calibration constants are changed. If a new, an un-calibrated sensor has to be used, calibration can be performed afterwards and data re-calculated.

### 5.1.2 Functional inspections

Functioning checks of equipment 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.

## 5.2 Test performance

### 5.2.1 Test principle

The injection tests in KFM02A were generally carried out with a constant head of 200 kPa (20 m) in the test section. Before start of the flow period, approximately steady-state pressure conditions prevailed in the test section. After the flow 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 apparently 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 (SKB internal controlling document). Exceptions are presented in Section 5.2.4.

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

The estimated time for each phase is 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 according to the Activity Plan (SKB internal controlling document) Furthermore, slightly longer test times were used for these tests, cf Table 5-1.

**Table 5-1. Packer inflation times, pressure stabilisation times and test times used for the injection tests in KFM02A.**

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

[1)] Exclusive of trip times in the borehole

### 5.2.3 Test strategy

Firstly, injection tests in 100 m sections were performed in the entire interval 100–1000 m. The limits of the test sections were, as far as possible, the same as was used by the difference flow logging to facilitate comparison of the results.

Secondly, injection tests in 20 m sections were carried out in tested 100 m sections with a measurable flow (above the measurement limit) and in sections with inconsistent results. Selected 100 m sections were measured in five successive injection tests with 20 m section length.

Finally, injection tests with 5 m section length were conducted in all tested 20 m sections with a measurable flow (above the measurement limit). I.e. four tests with 5 m section length were performed within the actual 20 m intervals. The total number of injection tests were, accordingly, dependent on the results of the previous tests.

Since the results of the tests in 100 m sections would have a strong effect on the continued test program, it was particularly important to ensure reliable results of these tests, including sections close to the lower measurement limit. Regarding the tests in 20 m and 5 m sections, shorter packer inflation times and test times were applied.

## 5.3 Data handling

With the PSS system, primary data are handled with the software Orchestrator (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 data and time of test start (as for example __KFM02A_0103.5_200403051831.ht2). The name differs slightly from the convention stated in Instructions for analysis of injection and single-borehole pump test, SKB MD 320.004 (SKB internal document).

With the software IPPLOT (Version 2.0), the *.ht2-files are converted to parameter files, suitable for plotting with the code SKB-plot and analysis with the software AQTESOLV.

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 Analyses and interpretation

As discussed in Section 5.2.1, the injection tests in KFM02A were performed as transient constant head tests followed by a pressure recovery period. 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, SKB internal document). From the flow 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 and pressure change were plotted versus Agarwal equivalent time in lin-log and log-log diagrams, respectively, together with the corresponding derivatives.

Initially, a qualitative evaluation of actual flow regimes, e.g. wellbore storage (WBS), pseudo-radial flow (PRF), pseudo-spherical flow (PSF) and pseudo-stationary flow (PSS), respectively, was performed. In addition, indications of outer boundary conditions during the tests were identified. The qualitative evaluation was mainly made from the log-log diagrams of the responses during the flow and recovery periods. In particular, time intervals with pseudo-radial flow, reflected by a constant (horizontal) derivative in the test diagrams, were identified. Apparent no-flow (NFB) and constant head boundaries (CHB) or equivalent boundary conditions of fractures are reflected by an increase/decrease of the derivative. In addition, a preliminary steady-state analysis of transmissivity according to Moye's formula (denoted $T_M$) was made for the flow period for all tests.

From the results of the qualitative evaluation, appropriate interpretation methods for the quantitative evaluation of the tests were selected. If possible, transient analysis was made on both the flow and recovery periods of the tests. Several of the responses during the recovery period were strongly influenced by wellbore storage effects. Thus, pseudo-radial flow was seldom reached during this period. On the other hand, during the flow 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 used for routine evaluation 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 presented by Hurst, Clark and Brauer (1969) /2/ is used for estimating transmissivity and skin factor for an assumed value on the storativity. The storativity was assumed to be $10^{-6}$ according to the instruction SKB MD 320.004 (SKB internal document). The model uses the effective wellbore radius concept to account for non-zero skin factors.

For evaluating transient recovery data, the Dougherty-Babu (1984) /3/ model was applied. Also, this model uses the effective wellbore radius concept to account for non-zero skin factors. The wellbore storage is treated as the water level change in a fictive stand pipe connected to the section. The wellbore storage can be calculated from the fictive radius of this pipe, denoted casing radius in the software AQTESOLV, see below. The nomenclature used in AQTESOLV is listed in Appendix 3. The model was used to estimate values of transmissivity, skin factor and the wellbore storage coefficient (represented by the fictive casing radius r(c)), cf Equation 5-2.

Some tests showed fracture responses (slope 0.5 in a log-log plot) and fracture models were then also used for the transient analysis. Both the models by Gringarten-Witherspoon (1972) /4/ and Ozkan-Raghavan (1991a) /5/ and (1991b) /6/ for a vertical fracture and Gringarten-Ramey (1974) /7/ for a horizontal fracture were employed. In these cases, the test section length was used to convert K and $S_s$ to T and S, respectively, after analysis by fracture models. The quote $K_x/K_y$ 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 length of the fracture.

The different transient estimates of transmissivity for the tests were checked, in general from the pseudo-radial flow regimes during flow and recovery period, respectively. One of these was chosen as the best representative value of 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 flow- or recovery period, the first one was judged 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 flow period were considered as more representative than those from the recovery period. The recovery responses were often strongly affected by wellbore storage and no pseudo-radial flow regime was reached. In addition, pseudo-spherical and pseudo-stationary flow often occurred during the recovery period.

Finally, a representative value of transmissivity of the section, $T_R$, was chosen from $T_T$ and $T_M$. For tests approaching a pseudo-spherical or pseudo-stationary flow by the end of the test, the steady-state evaluation ($T_M$) was in most cases considered the best estimate of transmissivity, (i.e. $T_R = T_M$). Whenever the flow rate by the end of the flow period ($Q_p$) was not defined, and thus neither $T_T$ nor $T_M$ could be estimated, the judged best representative value of transmissivity for the test section is considered to be the lower measurement limit for Q/s (i.e. $T_R$ = Q/s-measl-L).

Estimated values of the borehole storage coefficient C, based on actual borehole geometrical data and assumed fluid properties (net values) are shown in Table 5-2. The net water volume in the test section, $V_w$, has in Table 5-2 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 /8/:

$$C = V_w \cdot c_w = L_w \cdot \pi \cdot r_w^2 \cdot c_w \qquad (5\text{-}1)$$

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

$r_w$ = nominal borehole radius (m)

$L_w$ = section length (m)

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

**Table 5-2. Calculated net values of the wellbore storage coefficient C for injection tests with different section length, based on the actual geometrical properties of the borehole and equipment configuration in the test section.**

| Borehole | $r_w$(m) | $L_w$ (m) | Volume of test section ($m^3$) | Volume of equipment in section ($m^3$) | $V_w$ ($m^3$) | C ($m^3$/Pa) |
|---|---|---|---|---|---|---|
| KFM02A | 0.038 | 100 | 0.453 | 0.092 | 0.361 | $1.7 \cdot 10^{-10}$ |
| KFM02A | 0.038 | 20 | 0.091 | 0.018 | 0.073 | $3.4 \cdot 10^{-11}$ |
| KFM02A | 0.038 | 5 | 0.023 | 0.004 | 0.019 | $8.7 \cdot 10^{-12}$ |

When appropriate, estimation of the actual borehole storage coefficient C in the test sections was also made from the recovery period, based on the early borehole response with 1:1 slope in the log-log diagrams. The coefficient C was calculated only for tests with a well-defined line of slope 1:1 in the beginning of the recovery period. In the most conductive sections, this period occurred during very short periods at early test times. The latter values may be compared with the net values of C based on geometry (Table 5-2).

Furthermore, when using the model by Dougherty-Babu (1984), a fictive casing radius, r(c), is obtained from the parameter estimation. This value can then be used for calculating C as /8/:

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

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 recovery period.

The estimated values of C from the tests may differ from the net values in Table 5-2 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.

## 5.5 Nonconformities

The test program in KFM02A was carried out according to the Activity Plan (AP PF 400-04-08, SKB internal controlling document) with the following exceptions (decided by the activity- and investigation leader):

- When lowering the 100 m section to the lower part of the borehole, the packers tended to self-expand due to a combination of worn packer rubber and low transmissivity of the lower part of the borehole. To avoid the risk of packer jamming, the planned test in section 895–995 m was not performed. Instead, a rough estimate of the transmissivity for the section 902–1002.44 m was obtained by analysis of the pressure recovery in this section from packer expansion in test section 801–901 m.
- To avoid the risk of packer jamming (due to self-expansion), no injection tests with 20 m section length were performed in the interval 801–901 m. This was considered reasonable since the transmissivity in the section 801–901 m was low (although above measurement limit) and the results from the previous difference flow logging gave information on the location of inflow sections (c 894 m).

# 6 Results

## 6.1 Nomenclature and symbols

The nomenclature and symbols used for the results of the injection tests in KFM02A are in accordance with the Instruction for analysis of injection- and single-hole-pumping tests (SKB MD 320.004, SKB internal document). Additional symbols used are explained in the text. Symbols used by the software AQTESOLV are explained in Appendix 3.

## 6.2 Routine evaluation of the single-hole injection tests

### 6.2.1 General test data together with pressure and flow data

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

### 6.2.2 Measurement limit

The estimated standard lower measurement limit of the flow rate for the injection tests in KFM02A is c 1 mL/min ($1.7 \cdot 10^{-8}$ $m^3/s$). However, for some tests, a lower flow rate could be deduced by careful evaluation. In such cases also the transmissivity was estimated. The lower measurement limit is defined in terms of the specific flow rate (Q/s, flow rate divided by drawdown).

The minimal flow rate corresponds to different values of specific flow depending on the actual injection pressure during the test, see Table 6-1. 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, the injection pressure was considerably different. A higher injection pressure is often a result of the test section being of low hydraulic conductivity, and a low injection pressure is often a result of the test section being high conductive. For three of the tests, the injection pressure exceeded 300 kPa and for nine of the tests, the injection pressure was below 100 kPa.

The lower measurement limit for flow rate also corresponds to different values of steady-state transmissivity, $T_M$, depending on the section lengths used in the factor C in Moye's formula in compliance with the Instruction for analysis of injection- and single-hole pumping tests (SKB MD 320.004, SKB internal document), see Table 6-1.

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

**Table 6-1. Estimated lower measurement limit for flow rate, specific capacity Q/s, and for steady-state transmissivity for different injection pressures and different measurement scales.**

| Borehole | $r_w$ (m) | $L_w$ (m) | Q–measl–L ($m^3$/s) | Injection pressure (kPa) | Q/s-measl-L ($m^2$/s) | Factor C in Moye's formula | $T_M$–measl–L ($m^2$/s) |
|---|---|---|---|---|---|---|---|
| KFM02A | 0.038 | 100 | $1.7 \cdot 10^{-8}$ | 100 | $1.6 \cdot 10^{-9}$ | 1.30 | $2.1 \cdot 10^{-9}$ |
| KFM02A | 0.038 | 100 | $1.7 \cdot 10^{-8}$ | 200 | $8.2 \cdot 10^{-10}$ | 1.30 | $1.1 \cdot 10^{-9}$ |
| KFM02A | 0.038 | 100 | $1.7 \cdot 10^{-8}$ | 300 | $5.5 \cdot 10^{-10}$ | 1.30 | $7.1 \cdot 10^{-10}$ |
| KFM02A | 0.038 | 20 | $1.7 \cdot 10^{-8}$ | 100 | $1.6 \cdot 10^{-9}$ | 1.05 | $1.7 \cdot 10^{-9}$ |
| KFM02A | 0.038 | 20 | $1.7 \cdot 10^{-8}$ | 200 | $8.2 \cdot 10^{-10}$ | 1.05 | $8.6 \cdot 10^{-10}$ |
| KFM02A | 0.038 | 20 | $1.7 \cdot 10^{-8}$ | 300 | $5.5 \cdot 10^{-10}$ | 1.05 | $5.7 \cdot 10^{-10}$ |
| KFM02A | 0.038 | 5 | $1.7 \cdot 10^{-8}$ | 100 | $1.6 \cdot 10^{-9}$ | 0.83 | $1.4 \cdot 10^{-9}$ |
| KFM02A | 0.038 | 5 | $1.7 \cdot 10^{-8}$ | 200 | $8.2 \cdot 10^{-10}$ | 0.83 | $6.8 \cdot 10^{-10}$ |
| KFM02A | 0.038 | 5 | $1.7 \cdot 10^{-8}$ | 300 | $5.5 \cdot 10^{-10}$ | 0.83 | $4.5 \cdot 10^{-10}$ |

### 6.2.3 Length corrections

The down-hole equipment contains a level indicator located c 3 m below the lower packer in the test section, see Figure 4-3. The level indicator transmits a signal every time a reference mark in the borehole is passed. In KFM02A, reference marks were milled in the borehole wall at every 50 m. However, the reference mark at 900 m could not be detected by the subsequent caliper logging by SKB.

During the injection tests in KFM02A with PSS, length reference marks were detected as presented in Table 6-2.

**Table 6-2. Detected reference marks during the injection tests in KFM02A.**

| 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 |
|---|---|---|---|
| 110 | yes | yes | yes |
| 150 | yes | yes | yes |
| 200 | yes | yes | yes |
| 250 | yes | yes | yes |
| 300 | yes | yes | no |
| 350 | yes | yes | no |
| 400 | yes | yes | no |
| 450 | yes | yes | no |
| 500 | yes | yes | no |
| 550 | yes | yes | no |
| 600 | yes | yes | – |
| 650 | yes | – | – |
| 700 | yes | – | – |
| 750 | yes | – | – |
| 800 | yes | – | – |
| 850 | yes | – | – |
| 900 | no | – | – |

As seen from Table 6-2, during the injection tests in 5 m sections, length marks were only detected down to 250 m. After detecting the length mark at 250 m with the 5 m section test setup, the level indicator stopped working properly due to deposition from the borehole water clogging the moving parts in the level indicator. At each mark, the length scale for the injection tests was adjusted according to the reported length to the reference mark.

The largest total difference between the reported and measured lengths at the reference marks during the injection tests was 0.18 m, at the 850 m reference mark. The difference between two consecutive measurements over a 100 m borehole interval was less than 0.07 m in all cases. Comparing the measurements performed with different section lengths results in a maximum difference of 0.05 m.

Since the length scale was directly adjusted in the field every time a reference mark was passed, and since 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.

### 6.2.4 General results

A summary of the results of the routine evaluation of the injection tests in different scales in KFM02A is presented, test by test, in Table 6-3. Selected test diagrams are presented in Appendix 3. In general, one linear diagram showing the entire test sequence together with lin-log and log-log diagrams from the flow- and recovery phases, respectively, are presented. The quantitative analysis was performed from such diagrams by the software AQTESOLV. From tests with flow rate below the measurement limit, only the linear diagram is presented. The planned test in section 895–995 m could not be performed due to problems with self-expanding packers (cf Section 5.2.2). Instead, the pressure recovery in section 902–1002.44 m (after expanding packers for the injection test in section 801–901 m) was evaluated as a pressure-pulse test, using a model derived for a pulse test with a stand-pipe (Bredehoeff and Papadopulos, 1980 /11/). The evaluated transmissivity for section 902–1002.44 m is considered as uncertain and is not presented in the result tables for SICADA but in the tables and figures presented below.

The dominating transient flow regimes during the flow- and recovery periods, respectively, as deduced from the qualitative test evaluation, are listed in Table 6-3 and further commented in Section 6.2.5.

For some tests, particularly from the recovery period, a type curve fit is displayed in the diagrams in Appendix 3, although the parameters from the fit are judged as not representative and are thus neither shown in Table 6-3 nor in the result tables for SICADA. For these tests, the type curve fit is presented only to illustrate that an assumption of pseudo-radial flow regime is not justified, indicated by the high, apparent value on the skin factor. Rather, a pseudo-spherical flow regime is likely to dominate for these tests as commented in the diagrams. For tests showing only a wellbore storage and tests approaching a pseudo-stationary flow, no unique transient evaluation is possible. In such cases no type curve matching was done.

In the quantitative evaluation, the steady-state transmissivity ($T_M$) was calculated by Moye's formula. Transient evaluation was conducted, whenever possible, both on the flow- and recovery periods ($T_f$ and $T_s$, respectively). However, for the most low-conductive sections, no unique transient evaluation could be made from the recovery period (only wellbore storage response). Transient evaluation was performed for all tests for which a significant flow rate, $Q_p$, could be identified, even if $Q_p$ was slightly below the measurement limit shown in Table 6-1. This means that a few transmissivity values in Table 6-3 fall below the measurement limit in Table 6-1.

The value judged as the most reliable from the transient evaluation of the tests was selected as $T_T$. The associated value for the skin factor is listed in Table 6-3. Since a rather well-defined time interval with pseudo-radial flow in most cases could be identified, the transmissivity calculated from the flow period is in most cases considered as the most reliable transient analysis for the injection tests in KFM02A. In addition, the transient evaluation of transmissivity from the flow period was for most of the tests also judged to be the most representative estimate of transmissivity, $T_R$. The approximate start and stop times used for the transient evaluation are also listed in Table 6-3. For those tests where transient evaluation was not possible, $T_M$ was chosen as the representative transmissivity value, $T_R$. If $Q_p$ was not detectable (significantly lower than the measurement limit), the representative transmissivity value, $T_R$, was assumed less than Q/s-measl-L (see Table 6-1).

In some cases, two transmissivity values could be calculated from the diagrams, at early and at later times, respectively. It is then assumed that the first transmissivity value represents the near-region of the borehole, whereas the later value may represent a larger volume of the rock. In such cases, the first transmissivity value was selected as the representative one. This value is considered as the most suitable for statistical analyses of borehole data.

The results of the routine evaluation of the injection tests in borehole KFM02A are also compiled in appropriate tables in Appendix 5, to be stored in the SICADA database.

For the evaluation of the test data, no corrections of the measured flow rate and pressure data, e.g. for changes of the barometric pressure 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 subtractions of the barometric pressure from the measured absolute pressure have been made since the length of the test periods are short relative to the time scale for barometric pressure changes. In addition, pressure changes rather than the absolute pressure are used by the evaluation.

Drilling records were checked in order to identify possible interference with test data from drilling in nearby boreholes. These records showed that drilling of KFM05A (at drilling site BP1, see Figure 1-1) was in progress during the entire period for the injection tests in KFM02A. While drilling in KFM05A, flushing-water was pumped from the percussion-drilled borehole HFM13. However, the injection tests in KFM02A are assumed to be unaffected by these activities due to the long distance between these boreholes.

In Figure 6-1, a comparison of calculated transmissivities in 5 m sections from steady-state evaluation ($T_M$) and the representative transmissivity value from the transient evaluation ($T_T$) is shown. The agreement between the two populations is considered good. The estimated lower measurement limit of transmissivity in 5 m sections for an injection pressure of 200 kPa is also demonstrated in the figure. Values below this limit are considered uncertain.

The wellbore storage coefficient C for each test was calculated from the straight line with a unit slope in the log-log diagrams from the recovery period, see Table 6-3. 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. In sections with very low transmissivity, the estimates of C are uncertain due to difficulties in defining an accurate time for the end of flow period. Furthermore, the limited resolution of pressure sensors causes the recovery to be quite scattered. The values of C presented in Table 6-3 may be compared with the net values of C in Table 5-2 (based on geometry).

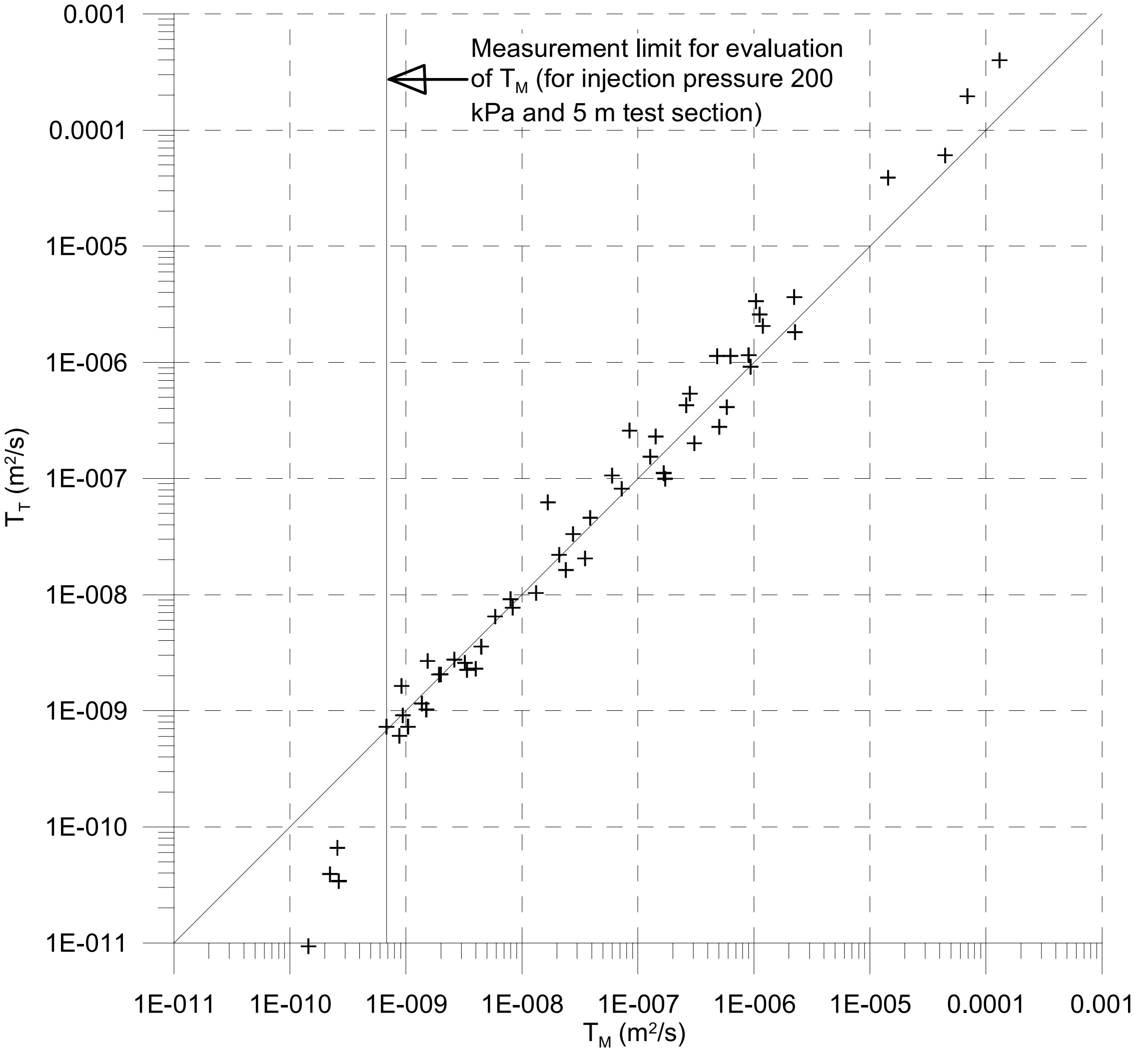


***Figure 6-1.*** *Estimated transmissivities in 5 m sections from steady-state ($T_M$) and transient ($T_T$) evaluation.*

The number of tests with a well defined line of unit slope for which it was possible to calculate C was as follows, 100 m tests; 4 out of 8, 20 m tests; 5 out of 22 and 5 m tests; 20 out of 74. Table 6-3 shows that there is, in general, good agreement between the calculated C-values from the tests and those listed in Table 5-2, although the calculated values from the tests tend to be higher. When constructing 95% confidence-intervals (by t-distribution) from calculated values of C from the tests, the values of C listed in Table 5-2 are within these confidence intervals.

**Table 6-3. Summary of the routine evaluation of the single-hole injection tests in borehole KFM02A.**

| Secup | Seclow | Test start | b | Flow regime [2] | Q/s | $T_M$ | $T_f$ | $T_s$ | $T_T$ | $T_R$ | $\xi$ | $dt_1$ | $dt_2$ | C | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (m) | (m) | YYYYMMDD hh:mm | (m) | injection | recovery | (m²/s) | (m²/ s) | (m²/ s) | (m²/ s) | (m²/s) | (m²/ s) | (–) | (s) | (s) | (m³/Pa) |
| 103.50 | 203.50 | 2004-03-05 22:01 | 100 | PRF | PRF | 4.64E–04 | 6.04E–04 | 4.42E–04 | 4.37E–04 | 4.42E–04 | 4.42E–04 | –4.6 | 500 | 1800 | |
| 201.00 | 301.00 | 2004-03-08 08:53 | 100 | PRF | PSF–>NFB | 9.49E–06 | 1.24E–05 | 7.87E–06 | | 7.87E–06 | 7.87E–06 | –3.4 | 400 | 1800 | |
| 301.00 | 401.00 | 2004-03-08 11:50 | 100 | PRF? | WBS | 2.86E–09 | 3.72E–09 | 5.42E–10 | | 5.42E–10 | 3.72E–09 | –2.8 | 400 | 1800 | 2.04E–10 |
| 401.00 | 501.00 | 2004-03-08 17:01 | 100 | PRF | PSF | 2.15E–06 | 2.80E–06 | 1.31E–06 | | 1.31E–06 | 1.31E–06 | –3.4 | 80 | 1800 | |
| 501.00 | 601.00 | 2004-03-08 22:06 | 100 | PSF | WBS–>PSF | 2.09E–06 | 2.73E–06 | | | | 2.73E–06 | | | | |
| 601.00 | 701.00 | 2004-03-09 07:29 | 100 | | WBS | 1.42E–10 | 1.85E–10 | 2.90E–11 | | 2.90E–11 | <4.73E–10 | | 900 | 1800 | 5.09E–10 |
| 701.00 | 801.00 | 2004-03-09 11:39 | 100 | | WBS | 2.36E–10 | 3.08E–10 | 2.14E–11 | | 2.14E–11 | <6.76E–10 | | 900 | 1800 | 5.94E–10 |
| 801.00 | 901.00 | 2004-03-09 20:22 | 100 | PRF | WBS | 3.87E–09 | 5.04E–09 | 3.65E–09 | | 3.65E–09 | 3.65E–09 | 1.0 | 30 | 1800 | 1.96E–10 |
| 902.00[1] | 1002.44 | 2004-03-09 20:22 | 100.44 | | | | | | | 1.15E–10 | 1.15E–10 | | 0 | 7000 | |
| 103.50 | 123.50 | 2004-03-18 14:48 | 20 | PRF | PSF | 4.74E–04 | 4.96E–04 | 3.43E–04 | 3.53E–04 | 3.43E–04 | 3.43E–04 | –5.7 | 300 | 900 | |
| 121.00 | 141.00 | 2004-03-15 14:41 | 20 | PSF | PSF | 8.81E–05 | 9.22E–05 | 2.42E–04 | | 2.42E–04 | 2.42E–04 | 6.9 | 300 | 1300 | |
| 141.00 | 161.00 | 2004-03-15 19:23 | 20 | PRF | WBS–>PSS | 6.58E–09 | 6.88E–09 | 5.37E–09 | | 5.37E–09 | 5.37E–09 | –1.4 | 100 | 1000 | 4.49E–11 |
| 161.00 | 181.00 | 2004-03-15 23:23 | 20 | PRF1–>PRF2 | PSF–>NFB | 1.88E–06 | 1.97E–06 | 3.63E–06 | | 3.63E–06 | 3.63E–06 | 3.3 | 50 | 500 | |
| 181.00 | 201.00 | 2004-03-16 06:51 | 20 | PRF | PSF | 3.25E–07 | 3.40E–07 | 3.49E–07 | | 3.49E–07 | 3.40E–07 | 0.1 | 30 | 1200 | |
| 201.00 | 221.00 | 2004-03-16 08:45 | 20 | PRF | PSF | 3.31E–07 | 3.46E–07 | 5.85E–07 | | 5.85E–07 | 5.85E–07 | 4.0 | 40 | 1200 | |
| 221.00 | 241.00 | 2004-03-16 10:27 | 20 | PRF–>PSF | PRF1–>PRF2–>PSF | 1.98E–07 | 2.08E–07 | 1.04E–07 | 2.10E–07 | 1.04E–07 | 1.04E–07 | –2.9 | 80 | 400 | |
| 241.00 | 261.00 | 2004-03-16 12:30 | 20 | PRF | WBS–>PRF? | 9.62E–09 | 1.01E–08 | 9.36E–09 | 9.64E–09 | 9.36E–09 | 9.36E–09 | 1.3 | 100 | 1200 | 7.53E–11 |
| 261.00 | 281.00 | 2004-03-16 14:04 | 20 | PRF1–>PRF2 | PSF–>NFB | 2.11E–06 | 2.21E–06 | 1.45E–06 | | 1.45E–06 | 1.45E–06 | –3.6 | 60 | 300 | |
| 281.00 | 301.00 | 2004-03-18 11:34 | 20 | PRF | PSF–>NFB | 8.09E–06 | 8.47E–06 | 5.36E–06 | | 5.36E–06 | 5.36E–06 | –4.0 | 50 | 1200 | |
| 300.00 | 320.00 | 2004-03-16 19:37 | 20 | PSF–>NFB? | WBS–>PSF | 2.61E–09 | 2.73E–09 | 9.61E–08 | | 9.61E–08 | 9.61E–08 | 6.8 | 40 | 300 | 6.63E–11 |
| 301.00 | 321.00 | 2004-03-16 17:50 | 20 | PRF–>PSS | PSS? | 3.82E–08 | 4.00E–08 | 6.07E–08 | | 6.07E–08 | 6.07E–08 | –0.2 | 70 | 130 | 6.66E–11 |
| 401.00 | 421.00 | 2004-03-16 22:41 | 20 | PSF/PRF? | PLF–>PSF | 7.78E–07 | 8.14E–07 | 8.51E–07 | | 8.51E–07 | 8.51E–07 | –0.3 | 300 | 1000 | |
| 421.00 | 441.00 | 2004-03-17 06:18 | 20 | PRF | PSS | 9.70E–07 | 1.02E–06 | 1.39E–06 | | 1.39E–06 | 1.39E–06 | 1.6 | 30 | 1200 | |
| 441.00 | 461.00 | 2004-03-17 08:11 | 20 | PRF | PSF–>NFB | 9.69E–08 | 1.01E–07 | 7.35E–08 | | 7.35E–08 | 7.35E–08 | –2.2 | 60 | 300 | |
| 461.00 | 481.00 | 2004-03-17 09:47 | 20 | PRF/PSF? | PSF | 1.53E–07 | 1.60E–07 | 2.85E–07 | | 2.85E–07 | 2.85E–07 | 5.0 | 100 | 1200 | |

| Secup | Seclow | Test start | b | Flow regime [2)] | Q/s | $T_M$ | $T_f$ | $T_s$ | $T_T$ | $T_R$ | $\xi$ | $dt_1$ | $dt_2$ | C | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 481.00 | 501.00 | 2004-03-17 11:15 | 20 | PRF1–>PRF2 | PSS | 1.89E–07 | 1.98E–07 | 2.61E–07 | | 2.61E–07 | 2.61E–07 | 1.2 | 20 | 200 | |
| 501.00 | 521.00 | 2004-03-17 14:00 | 20 | PSF | WBS–>PSF | 2.55E–06 | 2.66E–06 | | 1.88E–06 | 2.66E–06 | 1.88E–06 | –1.4 | 2 | 100 | |
| 521.00 | 541.00 | 2004-03-17 16:22 | 20 | | WBS | | | | | | <8.33E–10 | | | | |
| 541.00 | 561.00 | 2004-03-17 18:21 | 20 | PRF–>PLF | PRF–>PLF | 1.69E–09 | 1.77E–09 | 1.83E–09 | 1.38E–09 | 1.38E–09 | 1.38E–09 | –1.5 | 2 | 100 | |
| 561.00 | 581.00 | 2004-03-17 20:11 | 20 | | WBS | 2.32E–10 | 2.43E–10 | 2.64E–11 | | 2.64E–11 | 2.43E–10 | | | | 1.72E–11 |
| 581.00 | 601.00 | 2004-03-17 22:18 | 20 | | WBS | | | | | | <8.33E–10 | | | | |
| 103.50 | 108.50 | 2004-03-19 07:54 | 5 | PRF1–>PRF2 | WBS–>PSS | 4.09E–09 | 3.38E–09 | 2.25E–09 | | 2.25E–09 | 2.25E–09 | –1.7 | 100 | 500 | 1.82E–11 |
| 106.00 | 111.00 | 2004-03-19 09:38 | 5 | PRF/PSF | PSS | 1.74E–05 | 1.43E–05 | 3.88E–05 | | 3.88E–05 | 3.88E–05 | 5.0 | 200 | 1200 | |
| 111.00 | 116.00 | 2004-03-19 11:09 | 5 | PRF–>PSF | PSS | 5.38E–05 | 4.44E–05 | 6.04E–05 | | 6.04E–05 | 6.04E–05 | –2.0 | 60 | 200 | |
| 116.00 | 121.00 | 2004-03-19 14:35 | 5 | PRF/PSF? | PSF | 1.59E–04 | 1.31E–04 | 3.98E–04 | | 3.98E–04 | 1.31E–04 | 5.5 | 20 | 1300 | |
| 121.00 | 126.00 | 2004-03-19 16:37 | 5 | PRF/PSF? | PSF | 8.35E–05 | 6.90E–05 | 1.95E–04 | | 1.95E–04 | 6.90E–05 | 4.7 | 20 | 600 | |
| 126.00 | 131.00 | 2004-03-19 18:21 | 5 | PRF–>NFB | PSF–>NFB | 2.53E–08 | 2.09E–08 | 2.20E–08 | 1.42E–07 | 2.20E–08 | 2.20E–08 | –2.2 | 10 | 100 | |
| 131.00 | 136.00 | 2004-03-19 20:03 | 5 | | WBS | | | | | | <8.33E–10 | | | | |
| 136.00 | 141.00 | 2004-03-19 21:44 | 5 | PRF | PSF | 1.01E–08 | 8.32E–09 | 7.71E–09 | | 7.71E–09 | 7.71E–09 | 0.1 | 30 | 1500 | |
| 141.00 | 146.00 | 2004-03-20 10:36 | 5 | | WBS | | | | | | <8.33E–10 | | | | |
| 146.00 | 151.00 | 2004-03-20 13:03 | 5 | | | | | | | | <8.33E–10 | | | | |
| 151.00 | 156.00 | 2004-03-20 14:16 | 5 | | | | | | | | <8.33E–10 | | | | |
| 156.00 | 161.00 | 2004-03-20 17:19 | 5 | PRF | WBS–>PSF | 1.11E–09 | 9.17E–10 | 1.63E–09 | | 1.63E–09 | 1.63E–09 | 4.4 | 200 | 1200 | 1.58E–11 |
| 161.00 | 166.00 | 2004-03-21 08:36 | 5 | PRF | PSF | 7.08E–07 | 5.84E–07 | 4.11E–07 | | 4.11E–07 | 4.11E–07 | –2.6 | 20 | 600 | |
| 166.00 | 171.00 | 2004-03-21 10:21 | 5 | PRF | PSF | 3.17E–07 | 2.62E–07 | 4.27E–07 | | 4.27E–07 | 4.27E–07 | 1.7 | 10 | 1000 | |
| 171.00 | 176.00 | 2004-03-21 12:59 | 5 | PRF/PSF? | PSF | 1.26E–06 | 1.04E–06 | 3.35E–06 | | 3.35E–06 | 3.35E–06 | 6.5 | 100 | 1000 | |
| 176.00 | 181.00 | 2004-03-21 14:13 | 5 | PRF | PSS | 3.34E–08 | 2.76E–08 | 3.31E–08 | | 3.31E–08 | 3.31E–08 | 0.2 | 30 | 200 | |
| 181.00 | 186.00 | 2004-03-21 15:39 | 5 | PRF | PSF | 3.40E–07 | 2.81E–07 | 5.37E–07 | | 5.37E–07 | 5.37E–07 | 2.9 | 20 | 1000 | |
| 186.00 | 191.00 | 2004-03-22 06:30 | 5 | | WBS | | | | | | <8.33E–10 | | | | |
| 191.00 | 196.00 | 2004-03-22 08:15 | 5 | | WBS | | | | | | <8.33E–10 | | | | |
| 196.00 | 201.00 | 2004-03-22 09:57 | 5 | | WBS | 1.75E–10 | 1.44E–10 | 9.38E–12 | | 9.38E–12 | <8.10E–10 | | – | – | 9.17E–11 |
| 201.00 | 206.00 | 2004-03-22 12:41 | 5 | | WBS | | | | | | <8.33E–10 | | | | |
| 206.00 | 211.00 | 2004-03-22 14:03 | 5 | | WBS | | | | | | <8.33E–10 | | | | |

| Secup | Seclow | Test start | b | Flow regime [2)] | Q/s | $T_M$ | $T_f$ | $T_s$ | $T_T$ | $T_R$ | $\xi$ | $dt_1$ | $dt_2$ | C | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 211.00 | 216.00 | 2004-03-22 15:34 | 5 | | | | | | | | <8.33E–10 | | | | |
| 216.00 | 221.00 | 2004-03-22 16:55 | 5 | PRF | PSF–>NFB | 3.72E–07 | 3.07E–07 | 2.01E–07 | | 2.01E–07 | 2.01E–07 | –3.2 | 150 | 1200 | |
| 221.00 | 226.00 | 2004-03-22 18:23 | 5 | | WBS | | | | | | <8.33E–10 | | | | |
| 225.00 | 230.00 | 2004-03-22 19:23 | 5 | PLF–>PRF–>PSF | PLF–>PRF–>PSF | 2.08E–07 | 1.72E–07 | 9.38E–08 | 8.33E–08 | 9.38E–08 | 9.38E–08 | –3.2 | 100 | 700 | |
| 226.00 | 231.00 | 2004-03-22 21:01 | 5 | PRF–>PSF | PLF–>PRF–>PSF | 2.02E–07 | 1.67E–07 | 1.11E–07 | 1.05E–07 | 1.11E–07 | 1.11E–07 | –2.8 | 80 | 400 | |
| 231.00 | 236.00 | 2004-03-22 22:26 | 5 | | WBS | 3.21E–10 | 2.65E–10 | 3.41E–11 | | 3.41E–11 | <6.69E–10 | | – | – | 3.67E–11 |
| 236.00 | 241.00 | 2004-03-22 23:28 | 5 | PRF?–>PSF | WBS | 3.11E–10 | 2.57E–10 | 6.58E–11 | | 6.58E–11 | <6.48E–10 | | 100 | 500 | 1.38E–11 |
| 241.00 | 246.00 | 2004-03-23 06:26 | 5 | PRF | WBS–>PRF–>PSF | 4.82E–09 | 3.98E–09 | 2.30E–09 | 3.13E–09 | 2.30E–09 | 2.30E–09 | –1.3 | 50 | 1200 | 2.56E–11 |
| 246.00 | 251.00 | 2004-03-23 08:13 | 5 | PRF | WBS–>PSF | 1.66E–09 | 1.37E–09 | 1.15E–09 | 5.00E–09 | 1.15E–09 | 1.15E–09 | 0.3 | 700 | 1200 | 1.85E–11 |
| 251.00 | 256.00 | 2004-03-23 09:59 | 5 | PRF | WBS–>PSF | 1.14E–09 | 9.42E–10 | 9.13E–10 | | 9.13E–10 | 9.13E–10 | 1.1 | 80 | 700 | 1.92E–11 |
| 256.00 | 261.00 | 2004-03-23 12:31 | 5 | PRF | WBS–>PSF | 8.23E–10 | 6.79E–10 | 7.27E–10 | | 7.27E–10 | 7.27E–10 | 1.4 | 50 | 1000 | 1.52E–11 |
| 259.50 | 264.50 | 2004-03-28 13:43 | 5 | | WBS–>PSF/PSS? | 3.17E–09 | 2.62E–09 | 2.76E–09 | | 2.76E–09 | 2.76E–09 | 1.1 | 300 | 1200 | 1.65E–11 |
| 264.50 | 269.50 | 2004-03-28 11:02 | 5 | PRF/PSF? | PSS | 5.81E–07 | 4.80E–07 | 1.13E–06 | | 1.13E–06 | 1.13E–06 | 5.0 | 100 | 1200 | |
| 269.50 | 274.50 | 2004-03-28 09:39 | 5 | PRF | PSS | 1.55E–07 | 1.28E–07 | 1.54E–07 | | 1.54E–07 | 1.54E–07 | –0.1 | 30 | 1200 | |
| 271.00 | 276.00 | 2004-03-28 08:15 | 5 | PRF–>NFB?–>PSF? | PSS | 7.59E–07 | 6.26E–07 | 1.13E–06 | | 1.13E–06 | 1.13E–06 | –2.0 | 30 | 100 | |
| 276.00 | 281.00 | 2004-03-24 06:55 | 5 | PLF–>PRF? | PSS | 6.08E–07 | 5.02E–07 | 2.78E–07 | | 2.78E–07 | 2.78E–07 | –4.7 | 100 | 300 | |
| 281.00 | 286.00 | 2004-03-24 08:44 | 5 | PRF–>PLF | PSS | 1.36E–06 | 1.12E–06 | 2.58E–06 | | 2.58E–06 | 2.58E–06 | –2.9 | 20 | 70 | |
| 286.00 | 291.00 | 2004-03-24 10:28 | 5 | PRF1–>PLF–>PRF2 | PSS | 2.73E–06 | 2.25E–06 | 1.82E–06 | | 1.82E–06 | 1.82E–06 | –4.3 | 20 | 80 | |
| 291.00 | 296.00 | 2004-03-24 12:56 | 5 | PRF | PSS | 2.70E–06 | 2.23E–06 | 3.64E–06 | | 3.64E–06 | 3.64E–06 | 0.4 | 50 | 1200 | |
| 296.00 | 301.00 | 2004-03-24 14:28 | 5 | PRF | PSS | 1.44E–06 | 1.19E–06 | 2.05E–06 | | 2.05E–06 | 2.05E–06 | 1.4 | 40 | 1200 | |
| 301.00 | 306.00 | 2004-03-24 15:59 | 5 | PSF–>NFB | WBS–>PSF | 2.03E–08 | 1.67E–08 | 6.24E–08 | 3.72E–08 | 6.24E–08 | 6.24E–08 | 5.0 | 40 | 400 | 2.57E–10 |
| 306.00 | 311.00 | 2004-03-24 17:31 | 5 | PRF–>PSF | WBS–>PSF | 1.07E–09 | 8.79E–10 | 6.08E–10 | | 6.08E–10 | 6.08E–10 | 0.8 | 10 | 300 | 1.18E–11 |
| 311.00 | 316.00 | 2004-03-24 18:58 | 5 | PRF? | WBS | 2.69E–10 | 2.22E–10 | 3.92E–11 | | 3.92E–11 | <4.23E–10 | | 200 | 1200 | 1.54E–11 |
| 316.00 | 321.00 | 2004-03-24 20:41 | 5 | | | | | | | | <8.33E–10 | | | | |
| 401.00 | 406.00 | 2004-03-24 22:12 | 5 | | | | | | | | <8.33E–10 | | | | |
| 406.00 | 411.00 | 2004-03-24 23:09 | 5 | | | | | | | | <8.33E–10 | | | | |
| 411.00 | 416.00 | 2004-03-25 07:35 | 5 | PRF | PRF–>PSF | 4.70E–08 | 3.88E–08 | 4.58E–08 | 3.84E–08 | 4.58E–08 | 4.58E–08 | 0.3 | 60 | 1200 | |
| 416.00 | 421.00 | 2004-03-25 08:43 | 5 | PRF–>PSF | PSF | 1.13E–06 | 9.34E–07 | 9.15E–07 | 1.41E–06 | 9.15E–07 | 9.15E–07 | –1.9 | 100 | 300 | |

| Secup | Seclow | Test start | b | Flow regime [2)] | Q/s | $T_M$ | $T_f$ | $T_s$ | $T_T$ | $T_R$ | ξ | $dt_1$ | $dt_2$ | C | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 421.00 | 426.00 | 2004-03-25 10:23 | 5 | PRF–>NFB? | PSS | 1.72E–07 | 1.42E–07 | 2.30E–07 | | 2.30E–07 | 2.30E–07 | 1.8 | 50 | 400 | |
| 426.00 | 431.00 | 2004-03-25 13:03 | 5 | PRF | PSS | 1.09E–06 | 9.00E–07 | 1.15E–06 | | 1.15E–06 | 1.15E–06 | 2.6 | 100 | 1200 | |
| 431.00 | 436.00 | 2004-03-25 14:33 | 5 | PRF? | WBS–>PSS | 5.40E–09 | 4.46E–09 | 3.56E–09 | | 3.56E–09 | 3.56E–09 | –0.2 | 100 | 1000 | |
| 436.00 | 441.00 | 2004-03-25 15:59 | 5 | PRF | PSS | 7.23E–08 | 5.96E–08 | 1.06E–07 | | 1.06E–07 | 1.06E–07 | 2.9 | 30 | 1000 | |
| 441.00 | 446.00 | 2004-03-25 17:25 | 5 | PRF | WBS–>PSF | 1.26E–09 | 1.04E–09 | 7.27E–10 | | 7.27E–10 | 7.27E–10 | –0.3 | 200 | 1200 | 1.28E–11 |
| 446.00 | 451.00 | 2004-03-25 18:54 | 5 | PRF–>NFB | WBS–>PSS | 9.67E–09 | 7.99E–09 | 9.15E–09 | | 9.15E–09 | 9.15E–09 | –0.4 | 60 | 400 | 2.50E–11 |
| 451.00 | 456.00 | 2004-03-25 20:22 | 5 | PRF | PSS–>NFB | 4.24E–08 | 3.50E–08 | 2.05E–08 | | 2.05E–08 | 2.05E–08 | –2.6 | 110 | 1200 | |
| 456.00 | 461.00 | 2004-03-25 22:43 | 5 | PSF | WBS–>PSF | 2.34E–09 | 1.93E–09 | 5.14E–09 | 5.16E–09 | 5.14E–09 | 1.93E–09 | | 100 | 1200 | 1.62E–11 |
| 461.00 | 466.00 | 2004-03-26 06:46 | 5 | PRF? | WBS–>PSF | 3.91E–09 | 3.23E–09 | 2.58E–09 | | 2.58E–09 | 2.58E–09 | 0.1 | 100 | 1200 | 1.70E–11 |
| 466.00 | 471.00 | 2004-03-26 08:23 | 5 | PRF–>PSS | WBS–>PSF | 2.42E–09 | 1.99E–09 | 2.05E–09 | 3.46E–09 | 2.05E–09 | 2.05E–09 | 1.1 | 30 | 600 | 1.62E–11 |
| 471.00 | 476.00 | 2004-03-26 10:01 | 5 | | | | | | | | <8.33E–10 | | | | |
| 476.00 | 481.00 | 2004-03-26 11:04 | 5 | PRF | PSF | 1.03E–07 | 8.49E–08 | 2.58E–07 | | 2.58E–07 | 2.58E–07 | 9.0 | 10 | 1200 | |
| 481.00 | 486.00 | 2004-03-26 13:41 | 5 | PRF | PSF | 1.60E–08 | 1.32E–08 | 1.03E–08 | | 1.03E–08 | 1.03E–08 | –1.0 | 200 | 1200 | |
| 486.00 | 491.00 | 2004-03-26 15:37 | 5 | PSF–>PRF | PSS | 8.78E–08 | 7.25E–08 | 8.14E–08 | | 8.14E–08 | 8.14E–08 | 0.1 | 30 | 1200 | |
| 491.00 | 496.00 | 2004-03-26 17:04 | 5 | PRF | WBS–>PSF–>NFB | 7.13E–09 | 5.88E–09 | 6.47E–09 | | 6.47E–09 | 6.47E–09 | 1.6 | 170 | 1200 | 2.46E–11 |
| 496.00 | 501.00 | 2004-03-26 18:30 | 5 | PSF–>PRF | PSS | 2.90E–08 | 2.39E–08 | 1.63E–08 | | 1.63E–08 | 1.63E–08 | –2.0 | 30 | 200 | |
| 501.00 | 506.00 | 2004-03-26 20:01 | 5 | PRF | WBS–>PSF | 1.82E–09 | 1.50E–09 | 1.03E–09 | | 1.03E–09 | 1.03E–09 | –0.5 | 200 | 1200 | 2.94E–11 |
| 506.00 | 511.00 | 2004-03-26 21:33 | 5 | PSF | WBS | 3.51E–08 | 2.90E–08 | | | | 2.90E–08 | | | | |
| 511.00 | 516.00 | 2004-03-27 09:44 | 5 | PSF | WBS–>PSS | 2.47E–06 | 2.03E–06 | | | | 2.03E–06 | | | | |
| 516.00 | 521.00 | 2004-03-27 10:49 | 5 | | | | | | | | <8.33E–10 | | | | |
| 541.00 | 546.00 | 2004-03-27 12:44 | 5 | | | | | | | | <8.33E–10 | | | | |
| 546.00 | 551.00 | 2004-03-27 13:48 | 5 | | | | | | | | <8.33E–10 | | | | |
| 551.00 | 556.00 | 2004-03-27 14:40 | 5 | | | | | | | | <8.33E–10 | | | | |
| 556.00 | 561.00 | 2004-03-27 15:32 | 5 | PRF–>PLF | PRF–>PLF | 1.86E–09 | 1.54E–09 | 2.04E–09 | 2.68E–09 | 2.68E–09 | 2.68E–09 | –1.0 | 10 | 100 | |

1) Pressure recovery from packer expansion in section 801–901 m, evaluated as a pressure-pulse test

2) 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 no-flow boundary (NFB). The flow regime definitions are further discussed in Section 6.2.5 below

### 6.2.5 Comments on the tests

Short comments on each test follow below. Flow regimes and hydraulic boundaries 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

As discussed in Section 5.4, the flow regimes were mainly interpreted from the log-log plots of flow rate and pressure together with the corresponding derivatives. WBS is identified as a straight line of unit slope. PRF corresponds to a certain period of a horizontal derivative. PLF may at the beginning of the tests be reflected by a straight line of slope 0.5 or less in the log-log diagrams, both for the measured parameter (flow rate or pressure) and the derivative. A true PSF is reflected by a straight line with a slope of –0.5 for the derivative. However, other slopes may indicate transitions to PSF or PSS. The latter flow regime corresponds to almost stationary conditions with a derivative approaching zero. Due to the limited resolution of the flow meter and pressure sensor, the derivative may at some times indicate a false horizontal line by the end of periods with PSS.

#### *103.5–203.5 m*

Two tests were performed in this section. The first test was interrupted since it failed due to malfunction of a solenoid valve in the control system. The section is of very high conductivity and, as a result, time for building up sufficient injection pressure in the test section was long. Furthermore, the system capacity was insufficient for a constant head of 200 kPa (instead c 15 kPa). The limited capacity also caused a low flow rate during the initial phase of the flow period. Still, a PRF is indicated for both periods even if the small pressure change in combination with the limitations in pressure sensor resolution causes the recovery derivative to approach zero.

#### *201–301 m*

Two tests were performed. The first test was interrupted since the automatic control system failed to create a stable injection pressure. A PRF is indicated by the end of the flow period. The recovery period indicates a PSF followed by NFB effects by the end of the period.

#### *301–401 m*

Due to the low conductivity, the automatic control system failed to keep the injection pressure perfectly stable during the flow period. As a result, the pressure in the test section was oscillating (the oscillations decreased from c +/– 10 kPa to c +/– 2.5 kPa). The oscillations cause the plots from the flow period to be very scattered. Still, a possible PRF is assumed during the flow period. The recovery period only indicates WBS.

#### *401–501 m*

During the flow period, a PRF is indicated and during the recovery period, a PSF is observed. The type curve fit shown for the recovery period is not for the purpose of estimating hydraulic parameters but rather to illustrate that an assumption of PRF is not reasonable for the recovery period.

#### *501–601 m*

Two tests were performed. The first test was interrupted because the automatic control system failed to create a stable injection pressure. A PSF is indicated during the flow period. The type curve fit in the plots is shown only for the purpose of showing that an assumption of PRF is not suitable (strong positive skin). The recovery period indicates WBS followed by a PSF (type curve fit indicates large positive skin) and thus no reliable transient evaluation of T is possible.

#### *601–701 m*

Due to the very low conductivity, the automatic control system did not succeed in maintaining a stable pressure in the test section. The pressure was oscillating c +/– 4 kPa during the test. The oscillations make the plots from the flow period to be very scattered. The low, oscillating flow rate causes both the steady-state evaluation and transient analysis of transmissivity to be quite uncertain. The recovery period only shows WBS effects.

#### *701–801 m*

Due to a drifting gas pressure regulator, the pressure in the test section increased c 8 kPa during the flow period. The section is below the measurement limit and an attempt to perform a transient evaluation of the flow period did not result in a reliable estimate of the transmissivity. The recovery period only shows WBS effects.

#### *801–901 m*

Two tests were performed in this section. The first test was interrupted since an attempt to compensate for a drifting pressure regulator failed and, as a result, the pressure in the test section was not stable. The second test succeeded and a PRF is indicated during the flow period. For the recovery period, only WBS and a transition to some other regime or boundary is indicated.

#### *902–1002.44 m*

In this section, a pressure-pulse test was performed. During expansion of packers for section 801–901 m, the pressure in the section below (i.e. this section, 902–1002.44 m) increased by 9.75 m (see Figure A3–41). The pressure recovery after packer expansion was evaluated as an equivalent slug test with a stand-pipe. The plot used for this evaluation is shown in Figure A3–42. After c 5000 s, a small pressure increase is seen as a result of the injection start in section 801–901 m. Similarly, a small pressure decrease is observed at c 6800 s which coincides with the end of the flow period in section 801–901 m. For evaluation, the theoretical wellbore storage coefficient ($1.7 \cdot 10^{-10}$ $m^3/Pa$) was used in combination with Equation 5-2 to assign a value of the fictive stand-pipe radius (0.732 mm).

***103.5–123.5 m***

Three tests were performed. The first two tests were interrupted because of malfunction of one solenoid valve in the control system. Due to the very high transmissivity and limited flow capacity of the injection system, it was not possible to create a constant head higher than c 16 kPa. Thus, both the flow and recovery periods are of low test quality. The flow period indicates a PRF towards the end, whereas the recovery period indicates a PSF. No WBS effects are seen in the plots.

***121–141 m***

A PSF is indicated during both the flow and the recovery period.

***141–161 m***

A PRF is indicated throughout the flow period. For the recovery period, WBS is indicated with a transition to a PSS at later times.

***161–181 m***

Two tests were performed in this section. The first test failed due to malfunction of a solenoid valve. During the flow period, two separate PRF are indicated. The recovery period only shows a PSF (apparent large positive skin) with a transition to a NFB. Type curve fits were performed for both the first and the last PRF during the flow period, although the first one is judged to be the most representative.

***181–201 m***

For the flow period, a PRF is indicated from c 30 s and persists throughout the period. The recovery period does not indicate any WBS effects, only a PSF throughout the period.

***201–221 m***

For the flow period, a PRF is indicated from c 30 s and persists throughout the period. The recovery period does not indicate any WBS effects, only a PSF throughout the period.

***221–241 m***

For the flow period, a PRF regime is indicated from c 80 s until c 400 s followed by a transition to a PSF regime. The recovery period shows no WBS effects, but one early and one late PRF followed by a transition to a PSF by the end of the recovery period. The early and late PRF are indicated between c 8–25 s and c 200–400 s, respectively.

***241–261 m***

Since the test section is of low transmissivity, resulting in a low flow rate, flow rate data and flow rate derivative are quite scattered. Still, a PRF regime is indicated throughout the flow period. The recovery period is dominated by WBS effects followed by a transition to a possible PRF regime by the end of the recovery period.

### *261–281 m*

The pressure in the section below the test section increased by c 7 kPa during the flow period and recovered by c 3 kPa during the recovery period. For the flow period, one early and one late PRF regime are indicated from c 80 to c 300 s and after c 400 s, respectively. Throughout the recovery period, a PSF approaching a NFB by the end is indicated.

### *281–301 m*

Three tests were performed. The first two attempts failed due to malfunction of a solenoid valve. Although some scattered data, a clear PRF is indicated during the flow period. Throughout the recovery period, a PSF approaching a NFB by the end is indicated.

### *300–320 m*

By the end of the flow period, the pressure in the test section is not perfectly stable. The pressure oscillations are caused by two effects that usually cause problems for the automatic control system. Firstly, the low conductivity makes it difficult to maintain a stable pressure. Secondly, the test section demands a considerable flow rate decrease to keep the pressure constant, which is difficult to achieve without causing pressure oscillations. From c 1195 to c 1205 s during the flow period, the flow rate is close to, and sometimes below, the measurement limit. The flow rate values during this period are not considered representative and affected by problems maintaining a constant pressure. During the initial phase of the flow period, a PSF is indicated transitioning to an apparent NFB towards the end of the period. During the recovery period, WBS with transition to a possible PSF is indicated.

### *301–321 m*

For the flow period, a PRF is indicated from c 70–130 s followed by a transition to PSS. For the recovery period, short possible initial WBS effects are followed by indications of a PSS.

### *401–421 m*

A PRF transitioning to a PSF during the flow period. For the recovery period, a PLF with a transition to a PSF is indicated.

### *421–441 m*

A clear PRF is indicated during the flow period from c 30 s to c 300 s. During the recovery period, PSS is indicated from c 10 s and remains throughout the period.

### *441–461 m*

During the flow period, a PRF regime is indicated from c 60 s. For unknown reasons, a pressure disturbance occurs at c 300 to c 900 s. During the recovery period, a PSF is indicated from c 30 s and later with a transition to a NFB. No indications of leakage around packers are seen from the pressure above and below the test section.

### *461–481 m*

During the flow period, a PRF (or possibly a PSF) is indicated from c 10 s and remains throughout the period. A type curve fit results in large positive skin which indicates a PSF but the reciprocal flow rate derivative clearly indicates a PRF. For the recovery period, a PSF is indicated.

### *481–501 m*

During the flow period, one early and one late PRF is indicated from c 20–200 s and c 300–1200 s, respectively. The first PRF is judged to be the most representative. Type curve fits to both PRF are shown in Appendix 3. The recovery period is dominated by a PSS. No WBS effects are seen.

### *501–521 m*

During the flow period, a PSF is indicated and the type curve fit illustrated in the test plots shows that a model assuming PRF is not appropriate for this section. For the recovery period, WBS with a transitioning to a PSF is indicated.

### *521–541 m*

No transient evaluation is possible since the flow rate was below the measurement limit during the flow period. The recovery period indicates only WBS. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the transmissivity value judged most representative for this section is Q/s-measl-L.

### *541–561 m*

PRF followed by an apparent PLF is indicated during both the flow- and recovery period.

### *561–581 m*

No unique transient evaluation is possible due to high scatter in the data during the flow period and only WBS indications during the recovery period.

### *581–601 m*

No transient evaluation is possible since the flow rate was below the measurement limit during the flow period. The recovery period indicates only WBS. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the transmissivity value judged most representative for this section is Q/s-measl-L.

### *103.5–108.5 m*

The low transmissivity and flow rate cause the reciprocal flow rate and derivative to be quite scattered. Still, two separate PRF are weakly indicated during the flow period. Type curve fits are shown for both PRF in Appendix 3. The first PRF is judged to be the most representative. The initial phase of the recovery period is dominated by WBS effects. After the WBS effects, a PSS is indicated.

### *106–111 m*

Due to the relatively high transmissivity of this section, the time for pressure stabilisation was quite long. For the flow period, a PRF (or possibly PSF) is indicated from c 200 s and throughout the period. The recovery period indicates PSS, and no WBS effects are indicated.

### *111–116 m*

During the beginning of the flow period, a PRF is indicated transitioning to a PSF regime indicated from c 200 s and throughout the period. The recovery plots indicate only a PSS.

### *116–121 m*

During the flow period, a PRF (or possibly a PSF as indicated by large positive skin) is indicated. During the recovery period, a PSF is indicated.

### *121–126 m*

During the flow period, a PRF (or possibly a PSF) is indicated and during the recovery period, a PSF is indicated.

### *126–131 m*

Initial PRF is indicated during the flow period transitioning to a NFB towards the end of the period. Initial PSF is indicated during the recovery period with a transition to a NFB by the end of the period.

### *131–136 m*

No transient evaluation is possible since the flow rate was below the measurement limit during the flow period. The recovery period indicates only WBS. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the transmissivity value judged most representative for this section is Q/s-measl-L.

### *136–141 m*

During the flow period, a PRF is indicated and during the recovery period, a PSF is indicated.

### *141–146 m*

Three tests were performed in this test section. The test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document) since the flow rate was below Q-measl-L. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. The short period of measured recovery only shows WBS effects.

### *146–151 m*

Three tests were performed in this test section. The test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document) since the flow rate was below Q-measl-L. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. The short period of measured recovery only showed a pressure increase indicating that the section is of such low conductivity that packer expansion effects still were affecting the section.

### *151–156 m*

Three tests were performed in this test section. The test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document) since the flow rate was below Q-measl-L. Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. The short period of measured recovery only showed a pressure increase indicating that the section is of such low conductivity that packer expansion effects still were affecting the section.

### *156–161 m*

A sudden increase in flow rate appears, for unknown reasons, at about 100 s after injection start. During the flow period, a PRF is indicated and during the recovery period, WBS with a transition to a PSF is indicated.

### *161–166 m*

An unfortunate switch between controller valves performed by the automatic control system caused a discontinuity (increase) in flow rate towards the end of the flow period. Still, the flow period indicates a PRF and the recovery period indicates a PSF.

### *166–171 m*

The flow period indicates a PRF. No unique transient evaluation can be made from the recovery period due to PSF.

### *171–176 m*

The automatic control system failed to maintain a stable pressure during the first attempt to perform a test in this section. Therefore, another test was performed, this time successful. During the flow period, a PRF (or possibly a PSF) is indicated and during the recovery period, a PSF is indicated. The type curve fit to recovery data in Appendix 3 is shown only to demonstrate that PRF is not a justified assumption for the recovery period.

### *176–181 m*

During the flow period, a PRF is indicated and during the recovery period, a PSS is indicated. By the end of the recovery period, an apparent NFB is indicated from unknown disturbances.

### 181–186 m

During the flow period, a PRF is indicated and during the recovery period, a PSF is indicated.

### 186–191 m

The flow rate towards the end of the test was not detectable and clearly below Q-measl-L. As a result, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. The recovery period shows only WBS effects.

### 191–196 m

The flow rate towards the end of the test was not detectable and clearly below Q-measl-L. As a result, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. The recovery period shows only WBS effects.

### 196–201 m

The flow rate is very low and the flow rate data is very scattered. Still, a transient evaluation of flow period data was performed, although the results should be considered very uncertain. The recovery period is dominated by WBS. The judged most representative transmissivity value for this test section is Q/s-measl-L.

### 201–206 m

The test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document) since the flow rate was below Q-measl-L. Since no flow rate was detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. The recovery period shows only WBS effects.

### 206–211 m

The test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document) since the flow rate was below Q-measl-L. Because no flow rate was detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. The recovery period shows only WBS effects.

### 211–216 m

The pressure in the test section was increasing during the pressure stabilisation period before start of injection. The pressure stabilisation time was prolonged to c 20 min but the pressure was still not stable. When injection was started, the flow rate instantly fell below Q-measl-L and therefore the test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document). Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. During the recovery period, pressure increased slightly indicating a very tight section still affected by packer expansion.

### *216–221 m*

For the flow period, a PRF regime is indicated from c 150 s and throughout the period. For the recovery period, a PSF regime is indicated from c 10 s transitioning to an apparent NFB towards the end.

### *221–226 m*

The test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document) since the flow rate was below Q-measl-L. Because the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. The recovery period shows only WBS effects.

### *225–230 m*

For the flow period, a short initial PLF is indicated transitioning to a PRF from c 100 s to c 500 s. After c 500 s, a transition to PSF is indicated. Also during the recovery period, an initial PLF was indicated. After c 150 s, a transition to a PRF is indicated with a transition to a PSF by the end. A type curve fit with Ozkan-Raghavan /4/ for the flow period resulted in a (fictive) vertical fracture length of c 4.4 m. A type curve fit with Gringarten-Witherspoon /5/ for the recovery period resulted in a (fictive) vertical fracture length of c 4.6 m. Transmissivity values from type curve fitting with models assuming PLF were in good agreement with transmissivity values obtained from the models assuming PRF.

### *226–231 m*

For the flow period, a PRF is indicated from c 80 s to c 400 s. After c 400 s, a possible transition to a PSF is indicated. During the recovery period, an initial possible PLF regime is indicated transitioning to a PRF from c 200 s to c 500 s. After c 500 s, a transition to a PSF indicated. A type curve fit with Gringarten-Witherspoon for the recovery period resulted in a (fictive) vertical fracture length of c 4.3 m. However, plausible type curve fits were also obtained with models assuming PRF for both the flow and the recovery period.

### *231–236 m*

The test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document) since the flow rate was below Q-measl-L. However, the flow rate was detectable and thereby estimations of (both steady-state and transient) transmissivity were possible, although very uncertain. Since the detected flow rate was below Q-measl-L and the estimations of transmissivity very uncertain, the judged most representative transmissivity value for this section is Q/s-measl-L. The recovery period shows only WBS effects.

### *236–241 m*

A possible PRF is indicated during the flow period, transitioning to a PSF. The recovery period shows only WBS effects.

### *241–246 m*

Due to a drifting pressure regulator, a compensation of the drift was needed during the flow period. As a result, the pressure in the test section was not perfectly stable during the flow period. Still, a PRF is indicated during the flow period, although the derivative is clearly affected by the regulator compensation. The recovery period indicates WBS with a transitioning to a PRF and finally to a PSF towards the end of the recovery period.

### *246–251 m*

Due to the low conductivity of this section, an oscillation in pressure and flow rate develops, which dampens out but not completely, throughout the flow period. For transient evaluation of the flow period, a PRF is assumed. The recovery period indicates WBS with a transitioning to a PSF.

### *251–256 m*

During the flow period, a PRF is indicated from c80 to c 700 s and during the recovery period, WBS transitioning to a PSF is indicated.

### *256–261 m*

The low transmissivity, and thus low flow rate, causes reciprocal flow rate data and derivative to be quite scattered. Still, a PRF is indicated from c 50 to c 1000 s during the flow period. WBS transitioning to a PSF is indicated during the recovery period.

### *259.5–264.5 m*

The low transmissivity, and thus low flow rate, causes the reciprocal flow rate data and derivative to be quite scattered. Furthermore, stable pressure was not achieved; a decreasing oscillation continued throughout the flow period. Still, an approximate type curve fit of the flow period data was possible. The initial phase of the recovery period is dominated by WBS effects followed by a PSF (or possibly a PSS).

### *264.5–269.5 m*

For the flow period, a PRF is indicated from c 100 s and throughout the period. The type curve fit results in a relatively large positive skin factor indicating that the flow regime might be close to a PSF. The recovery period indicates a PSS flow regime from c 10 s and throughout the period.

### *269.5–274.5 m*

For the flow period, a well-defined PRF is indicated from c 30 s and throughout the period. For the recovery period, a PSS is indicated from c 10 s.

### *271–276 m*

A small disturbance is seen at c 1000 s during the flow period due to an unfortunate switch between controller valves performed by the automatic control system. For the flow period, a PRF regime is indicated from c 30 to c 100 s. After c 100 s, effects of an apparent NFB are indicated transitioning to a possible PSF. For the recovery period, only a PSS is indicated; no WBS effects are seen from the plots.

### *276–281 m*

For the flow period, a PLF is indicated from c 100 s to c 300 s, possibly transitioning to a PRF. The flow period is followed by an instantaneous pressure recovery; PSS is indicated. The sudden increase in the flow rate towards the end of the flow period is a result of the automatic control system switching from the bigger to the smaller flow meter.

### *281–286 m*

From c 240 s to c 300 s, the automatic control system was temporarily turned off due to a mistake during operation. A short PRF is indicated from c 20 to c 70 s transitioning to a PLF towards the end of the flow period. A type curve fit of the late data from flow period using a model assuming PRF results in a large negative skin which is an indication of PLF (fracture response). The pressure recovery was almost instantaneous; PSS is indicated.

### *286–291 m*

For the flow period, a short PRF is indicated from c 20 to c 80 s transitioning to a PLF and then to a second PRF towards the end of the period. Type curve fits for both PRF are shown in Appendix 3, although the first is judged to be the most representative one. The pressure recovery is almost instantaneous; PSS is indicated.

### *291–296 m*

A well-defined PRF is indicated during the flow period. The pressure recovery is almost instantaneous; PSS is indicated.

### *296–301 m*

For the flow period, a PRF regime is indicated from c 40 s and throughout the period. For the recovery period, a PSS flow regime is indicated from c 10 s and throughout the period. No WBS effects are seen in the plots.

### *301–306 m*

For the flow period, a PSF is indicated from c 40 s to c 400 s. After c 400 s, a transition to an apparent NFB (closed boundary) is indicated. Towards the end of the flow period (the last c 150 s), a disturbance is seen which is caused by an unfortunate switch of controller valves performed by the automatic control system. The initial phase of the recovery period is dominated of WBS effects. Towards the end of the recovery period, a PSF (or close to PSF) is indicated.

***306–311 m***

Since the flow rate is very low, the reciprocal flow rate and derivative plots are very scattered. However, a PRF is indicated during the flow period from c 10 s to c 300 s transitioning to a PSF. The packer expansion caused a pressure increase in the test section which was not fully recovered before the start of flow period. As a result, the flow rate increased towards the end of the flow period when the effect from the packer expansion decreased. For the recovery period, WBS effects dominate the initial c 40 s. After c 40 s, a transition stage is indicated followed by a PSF.

***311–316 m***

Since the flow rate is very low, the reciprocal flow rate and derivative plots are very scattered. However, a PRF is weakly indicated from c 500 s and throughout the flow period. The packer expansion caused a pressure increase in the test section which was not fully recovered before start of the flow period. For the recovery period, only WBS effects are indicated.

***316–321 m***

The pressure in the test section was increasing during the pressure stabilisation period before start of injection. When injection was started, the flow rate instantly fell below Q-measl-L and therefore the test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document). Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. During recovery, the pressure increased slightly indicating a very tight section still affected by packer expansion.

***401–406 m***

The pressure in the test section was increasing during the pressure stabilisation period before start of injection. When injection was started, the flow rate instantly fell below Q-measl-L and therefore the test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document). Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. During recovery, the pressure increased slightly indicating a very tight section still affected by packer expansion.

***406–411 m***

The pressure in the test section was increasing during the pressure stabilisation period before start of injection. When injection began, the flow rate instantly fell below Q-measl-L and therefore the test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document). Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. During recovery, the pressure increased slightly indicating a very tight section still affected by packer expansion.

***411–416 m***

A well-defined PRF is indicated throughout the entire flow period. A PRF with transition to a PSF is indicated during the recovery period.

***416–421 m***

A PRF transitioning to a PSF is indicated during the flow period. PSF is indicated during the recovery period.

***421–426 m***

A PRF is indicated during the flow period. Weak indications of a possible NFB are seen towards the end of the flow period. A PSS is indicated during the recovery period.

***426–431 m***

A PRF is indicated during the flow period. The recovery period indicates PSS.

***431–436 m***

Although the data is very scattered, a PRF is weakly indicated during the flow period. The recovery period indicates WBS effects followed by a PSS.

***436–441 m***

During the flow period, a PRF is indicated and during the recovery period, PSS is indicated.

***441–446 m***

During the flow period, a PRF is indicated and during the recovery period, WBS transitioning to a PSF is indicated.

***446–451 m***

A PRF is indicated during the first phase of the flow period transitioning to a NFB towards the end of the period. During the recovery period, WBS transitioning to a PSS is indicated.

***451–456 m***

During the flow period, a PRF is indicated and during the recovery period, a PSS with a transition to a NFB is indicated.

***456–461 m***

Two tests were performed in this test section due to a closed valve during the first attempt. During the flow period, a PSF is indicated. During the recovery period, WBS transitioning to a PSF is indicated.

***461–466 m***

The flow period is affected by variations in pressure. A possible PRF is weakly indicated during the flow period. WBS transitioning to a PSF is indicated during the recovery period.

***466–471 m***

During the flow period, a PRF transitioning to a PSS is indicated and during the recovery period, WBS transitioning to a PSF is indicated.

***471–476 m***

The pressure in the test section was increasing during the pressure stabilisation period before start of injection. When the injection was started, the flow rate instantly fell below Q-measl-L and therefore the test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document). Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. During the recovery period, pressure increased slightly indicating a very tight section still affected by packer expansion.

***476–481 m***

During the flow period, a PRF is indicated and during the recovery period, a PSF is indicated. A type curve fit of the data from the flow period resulted in a large positive skin factor. Still, the derivative of the reciprocal flow rate clearly indicates a PRF. A possible explanation is that the skin zone in fact is strongly positive (e.g. clogging of debris from drilling). Another explanation may be that the apparently large skin factor does not reflect the skin zone, but rather is an effect of the assumed storativity ($1 \cdot 10^{-6}$) being too large for this section.

***481–486 m***

A PRF is indicated from c 150 s and throughout the flow period. During the recovery period, a PSF is indicated.

***486–491 m***

During the flow period, a PSF transitioning to a PRF is indicated and during the recovery period, a PSS is indicated.

***491–496 m***

For the flow period, a PRF is indicated from c 170 s and throughout the entire period. During the recovery period, a short initial WBS with a transition to a PSF is indicated. Towards the end of recovery period, a NFB is indicated.

***496–501 m***

During the flow period, a PSF transitioning to a PRF is indicated and during the recovery period, a PSS is indicated.

#### *501–506 m*

A PRF is indicated towards the end of the flow period. During the recovery period, WBS transitioning to a PSF is indicated.

#### *506–511 m*

During the flow period, a PSF regime is indicated from c 100 s and throughout the period. During the recovery period, only WBS effects are indicated.

#### *511–516 m*

A first attempt to perform this test was interrupted due to leakage through a solenoid valve. The leakage was repaired and the second attempt to perform the test was successful. For the flow period, a PSF is indicated from c 50 s and throughout the flow period. For the recovery period, WBS effects are indicated during the initial phase and PSS from c 100 s throughout the period.

#### *516–521 m*

The pressure in the test section was increasing during the pressure stabilisation period before start of injection. When the injection was started, the flow rate instantly fell below Q-measl-L and therefore the test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document). Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. During the recovery, the pressure increased slightly indicating a very tight section still affected by packer expansion.

#### *541–546 m*

The pressure in the test section was increasing during the pressure stabilisation period before start of injection. When the injection was started, the flow rate instantly fell below Q-measl-L and therefore the test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document). Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. During the recovery, the pressure increased slightly indicating a very tight section still affected by packer expansion.

#### *546–551 m*

The pressure in the test section was increasing during the pressure stabilisation period before start of injection. When the injection was started, the flow rate instantly fell below Q-measl-L and therefore the test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document). Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. During the recovery, the pressure increased slightly indicating a very tight section still affected by packer expansion.

***551–556 m***

The pressure in the test section was increasing during the pressure stabilisation period before start of injection. When the injection was started, the flow rate instantly fell below Q-measl-L and therefore the test time was shortened (in accordance with the Activity Plan AP PF 400-04-08, SKB internal controlling document). Since the flow rate was not detectable, neither steady-state nor transient evaluation of transmissivity was possible. As a result, the judged most representative transmissivity value for this section is Q/s-measl-L. During the recovery, the pressure increased slightly indicating a very tight section still affected by packer expansion.

***556–561 m***

Due to a drifting gas regulator, the pressure in the test section decreased c 5 kPa during the flow period. Still, for the first c 100 s of the flow period, the pressure was relatively stable. For the flow period, a short PRF regime is indicated from c 20 s to c 60 s followed by a PLF regime from c 150 s and throughout the flow period. For the recovery period, a PRF regime is indicated from c 10 s to c 100 s. After c 300 s a PLF regime is indicated. The results from the flow and recovery periods are consistent. Type curve fits on early data with models assuming PRF results in similar estimates of transmissivity (c $2 \cdot 10^{-9}$ $m^2/s$) and skin factor for both periods. In addition, type curve fitting on later data with models assuming PLF results in similar estimates of transmissivity (c $2 \cdot 10^{-10}$ $m^2/s$) and fictive fracture lengths (c 3–4 m) for both periods.

### 6.2.6 Flow regimes

As discussed in the Section 6.2.5, several recovery tests were dominated by wellbore storage effects and no pseudo-radial flow period was reached. On the other hand, a certain time interval of pseudo-radial flow could in most cases be identified from the flow period. A summary of the frequency of identified flow regimes on different scales is presented in Table 6-4. Table 6-4 shows all identified flow regimes, i.e. if one flow period indicates a pseudo-radial flow regime transitioning to a pseudo-spherical flow regime, this flow period contributes to one observation of pseudo-radial and one observation of pseudo-spherical in Table 6-4 below. Numbers within brackets denote the number of tests where the actual flow regime is the only one present.

It should be observed that the interpretation of flow regime is tentative only and based on visual inspection of the data curves. The number of tests with a pseudo-linear flow regime may be underestimated for the flow period due to a certain pressure stabilisation time in beginning of test.

**Table 6-4. Interpreted flow regimes during the injection tests in KFM02A.**

| Section length (m) | Number of tests | Number of tests with defineable Qp | Flow period | | | | | Recovery period | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PLF | PRF | PSF | PSS | NFB | WBS | PLF | PRF | PSF | PSS | NFB |
| 5 | 74 | 56 | 5 (1) | 51 (40) | 13 (7) | 1 (1) | 5 | 30 | 3 (0) | 5 (0) | 29 (25) | 22 (21) | 4 |
| 20 | 22 | 20 | 1 (0) | 18 (9) | 5 (3) | 1 (0) | 1 | 7 | 2 (0) | 4 (1) | 13 (11) | 4 (4) | 4 |
| 100 | 8 | 8 | – | 5 (5) | 1 (1) | – | 0 | 5 | – | 1 (1) | 3 (3) | – | 1 |

For a minor part of the tests more than one flow regime could be identified, usually with a transition from pseudo-radial to pseudo-spherical flow.

During the recovery periods, pseudo-radial flow was interpreted only in a few tests, mainly depending on a dominating influence of wellbore storage. When the effect of wellbore storage has ceased, the flow regime often transits to pseudo-spherical or pseudo-stationary. This result is more typical for the 5 m sections than for the longer sections.

Another observation is that the number of tests with a pseudo-stationary flow regime was significantly higher for the recovery period of the tests. The reason for this is not clear.

## 6.3 Comparison of transmissivities on different scales

The judged most representative transmissivity values, $T_R$, from the injection tests in the tested sections of 100 m, 20 m and 5 m length, respectively, are shown in Figure 6.2. The figure demonstrates a good agreement between results on different scales. A consistency check of the transmissivity values on the different scales was also 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 6-5, estimated transmissivity values in 100 m and 20 m test sections according to steady-state ($T_M$) and judged 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, respectively. Besides, the corresponding sum of transmissivities from the difference flow logging in 5 m sections (SUM $T_D$) is displayed for each section.

In Table 6-5, all judged best representative values of transmissivity ($T_R$) below the measurement limit ($Q_p$ could not be detected) have been assigned the estimated lower measurement value of Q/s according to Q/s-measl-L in Section 5.4. Furthermore, in Table 6-5, all values of transmissivity from the steady-state evaluation ($T_M$), below the measurement limit ($Q_p$ not detected) have been assigned the estimated lower measurement value based on a pressure difference of 200 kPa and a flow rate of 1 mL/min ($1.7 \cdot 10^{-8}$ $m^3/s$). The measurement limit values are included in the summed values in Table 6-5. This leads to an overestimation of the summed transmissivities. No 20 m tests were carried out in the interval 321–401 m and below 601 m in KFM02A. No 5 m tests were performed in the intervals 321–401 m, 521–541 m and below 561 m.

In Figure 6-3, judged best representative transmissivity values for 100 m and 20 m sections ($T_R$–100 m and $T_R$–20 m, respectively) are plotted versus the sum of judged best representative transmissivity values in 5 m sections in the corresponding intervals (SUM $T_{MR}$–5 m). The lower measurement limit of $T_M$ for the different section lengths (and an assumed pressure difference of 200 kPa) together with the cumulative measurement limit for the sum of 5 m sections are also shown in the figure.

Figure 6-3 indicates a very good agreement between measured transmissivity values in longer sections and summed transmissivity values in corresponding 5 m sections for the injection tests. The deviation towards the lower limit is caused by the fact that values at the measurement limit (Q/s-measl-L) are accumulated in the summation process which most likely leads to an overestimation of SUM $T_R$–5 m in this range.

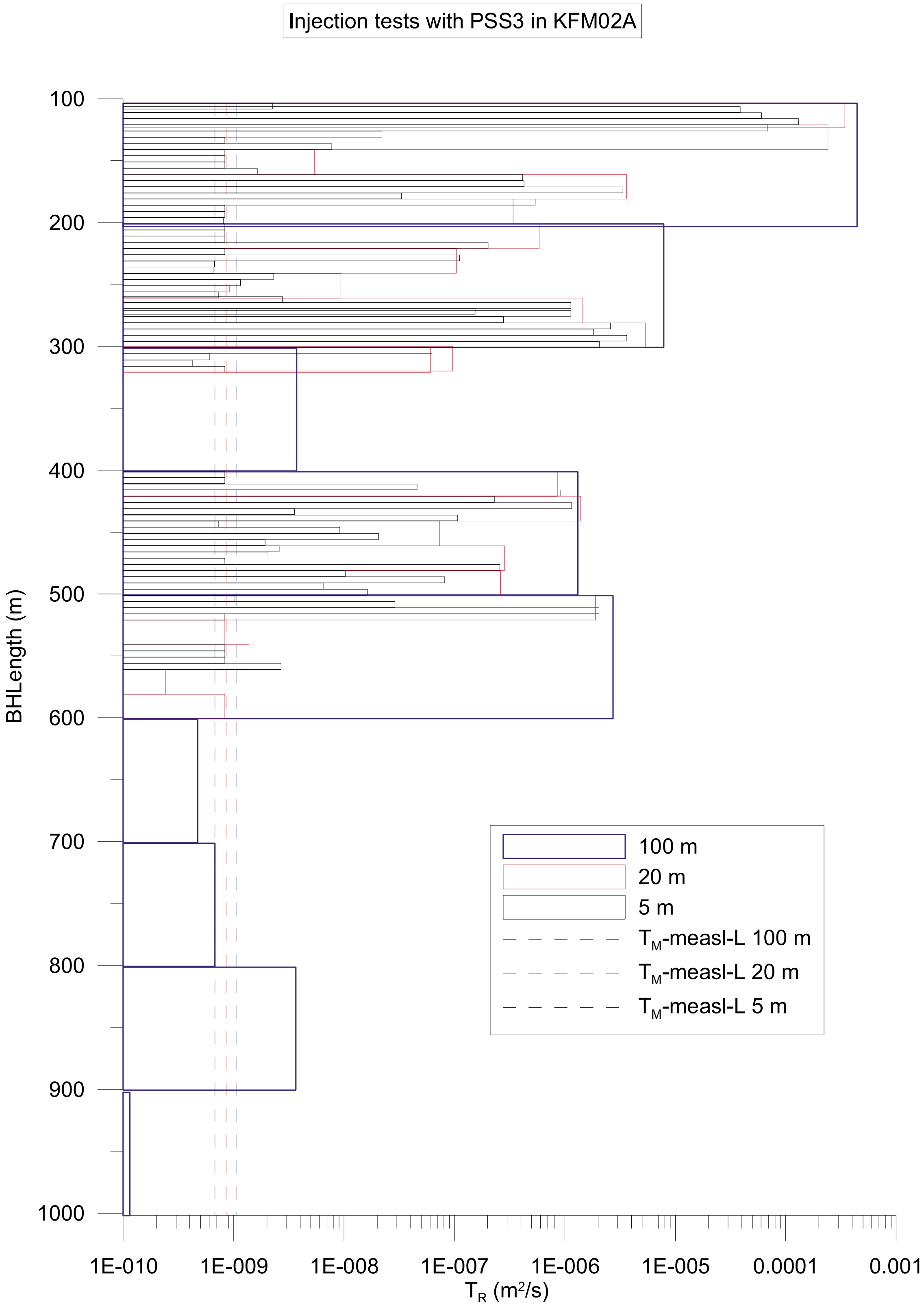


***Figure 6-2.*** *Estimated best representative transmissivity values ($T_R$) for sections of 100 m, 20 m and 5 m length in borehole KFM02A. Estimated transmissivity values for the lower measurement limit from stationary evaluation ($T_M$–measl–L) (flow rate $1.7 \cdot 10^{-8}$ m³/s and injection pressure 200 kPa) are also shown. The section 902.0–1002.44 m is evaluated as a pressure pulse test after packer expansion in the test section 801–901 m.*

**Table 6-5. 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 KFM02A. In addition, the corresponding sum of transmissivity values from the difference flow logging in 5 m sections is shown.**

| Bore-hole idcode | Secup (m) | Seclow (m) | $L_w$ (m) | $T_M$ inj. tests ($m^2/s$) | $T_R$ inj. tests ($m^2/s$) | SUM $T_M$(20m) inj. tests ($m^2/s$) | SUM $T_R$(20m) inj. tests ($m^2/s$) | SUM $T_M$(5m) inj. tests ($m^2/s$) | SUM $T_R$(5m) inj. tests ($m^2/s$) | SUM-$T_D$(5m) diff-flow log ($m^2/s$) |
|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 103.50[1)] | 203.50 | 100 | 6.04E–04 | 4.42E–04 | 5.91E–04 | 5.88E–04 | 2.61E–04 | 3.04E–04 | 1.21E–04 |
| KFM02A | 201.00[1)] | 301.00 | 100 | 1.24E–05 | 7.87E–06 | 1.12E–05 | 7.51E–06 | 9.02E–06 | 1.31E–05 | 1.21E–05 |
| KFM02A | 301.00 | 401.00 | 100 | 3.72E–09 | 3.72E–09 | n.m. 20 m | n.m. 20 m | n.m. 5 m | n.m. 5 m | 7.28E–08 |
| KFM02A | 401.00 | 501.00 | 100 | 2.80E–06 | 1.31E–06 | 2.29E–06 | 2.86E–06 | 2.33E–06 | 2.86E–06 | 4.13E–06 |
| KFM02A | 501.00 | 601.00 | 100 | 2.73E–06 | 2.73E–06 | 2.67E–06 | 1.89E–06 | n.m. 5 m | n.m. 5 m | 4.80E–06 |
| KFM02A | 601.00 | 701.00 | 100 | 1.85E–10 | 4.73E–10 | n.m. 20 m | n.m. 20 m | n.m. 5 m | n.m. 5 m | 5.64E–09 |
| KFM02A | 701.00 | 801.00 | 100 | 3.08E–10 | 6.76E–10 | n.m. 20 m | n.m. 20 m | n.m. 5 m | n.m. 5 m | 5.68E–09 |
| KFM02A | 801.00 | 901.00 | 100 | 5.04E–09 | 3.65E–09 | n.m. 20 m | n.m. 20 m | n.m. 5 m | n.m. 5 m | 6.57E–09 |
| KFM02A | 902.00[2)] | 1002.44 | 100 | | 1.15E–10 | n.m. 20 m | n.m. 20 m | n.m. 5 m | n.m. 5 m | 5.43E–09 |
| KFM02A | 103.50[1)] | 123.50 | 20 | 4.96E–04 | 3.43E–04 | | | 1.90E–04 | 2.30E–04 | 1.14E–04 |
| KFM02A | 121.00[1)] | 141.00 | 20 | 9.22E–05 | 2.42E–04 | | | 6.90E–05 | 6.90E–05 | 3.19E–06 |
| KFM02A | 141.00 | 161.00 | 20 | 6.88E–09 | 5.37E–09 | | | 2.94E–09 | 4.13E–09 | 2.36E–08 |
| KFM02A | 161.00 | 181.00 | 20 | 1.97E–06 | 3.63E–06 | | | 1.91E–06 | 4.22E–06 | 3.43E–06 |
| KFM02A | 181.00 | 201.00 | 20 | 3.40E–07 | 3.40E–07 | | | 2.82E–07 | 5.39E–07 | 3.44E–07 |
| KFM02A | 201.00 | 221.00 | 20 | 3.46E–07 | 5.85E–07 | | | 3.09E–07 | 2.04E–07 | 8.31E–07 |
| KFM02A | 221.00 | 241.00 | 20 | 2.08E–07 | 1.04E–07 | | | 1.68E–07 | 1.13E–07 | 9.33E–08 |
| KFM02A | 241.00 | 261.00 | 20 | 1.01E–08 | 9.36E–09 | | | 6.97E–09 | 5.09E–09 | 1.13E–09 |
| KFM02A | 261.00 | 281.00 | 20 | 2.21E–06 | 1.45E–06 | | | 1.74E–06 | 2.69E–06 | 1.31E–06 |
| KFM02A | 281.00 | 301.00 | 20 | 8.47E–06 | 5.36E–06 | | | 6.80E–06 | 1.01E–05 | 9.89E–06 |
| KFM02A | 300.00[1)] | 320.00 | 20 | 2.73E–09 | 9.61E–08 | | | 1.85E–08 | 6.42E–08 | 6.83E–08 |
| KFM02A | 301.00[1)] | 321.00 | 20 | 4.00E–08 | 6.07E–08 | | | 1.85E–08 | 6.42E–08 | 6.83E–08 |
| KFM02A | 401.00 | 421.00 | 20 | 8.14E–07 | 8.51E–07 | | | 9.74E–07 | 9.62E–07 | 1.24E–06 |
| KFM02A | 421.00 | 441.00 | 20 | 1.02E–06 | 1.39E–06 | | | 1.11E–06 | 1.49E–06 | 1.89E–06 |
| KFM02A | 441.00 | 461.00 | 20 | 1.01E–07 | 7.35E–08 | | | 4.60E–08 | 3.23E–08 | 1.66E–07 |
| KFM02A | 461.00 | 481.00 | 20 | 1.60E–07 | 2.85E–07 | | | 9.08E–08 | 2.63E–07 | 5.24E–07 |
| KFM02A | 481.00 | 501.00 | 20 | 1.98E–07 | 2.61E–07 | | | 1.15E–07 | 1.14E–07 | 3.11E–07 |
| KFM02A | 501.00 | 521.00 | 20 | 2.66E–06 | 1.88E–06 | | | 2.07E–06 | 2.07E–06 | 4.79E–06 |
| KFM02A | 521.00 | 541.00 | 20 | **8.55E–10** | 8.33E–10 | | | n.m. 5 m | n.m. 5 m | 1.13E–09 |
| KFM02A | 541.00 | 561.00 | 20 | 1.77E–09 | 1.38E–09 | | | 3.56E–09 | 5.18E–09 | 1.50E–09 |
| KFM02A | 561.00 | 581.00 | 20 | 2.43E–10 | 2.43E–10 | | | n.m. 5 m | n.m. 5 m | 1.13E–09 |
| KFM02A | 581.00 | 601.00 | 20 | **8.55E–10** | 8.33E–10 | | | n.m. 5 m | n.m. 5 m | 1.14E–09 |
| Sum of T in 103.5–301.0 m | | | | 6.16E–04 | 4.50E–04 | 6.02E–04 | 4.50E–04 | 6.02E–04 | 5.96E–04 | 1.33E–04 |
| Sum of T in 401.0–601.0 m | | | | 5.53E–06 | 4.04E–06 | 4.95E–06 | 4.04E–06 | 4.96E–06 | 4.75E–06 | 8.93E–06 |

[1)] partly overlapping sections

[2)] pressure recovery after packer expansion in test section 801–901 m, evaluated as a pressure pulse test

n.m.=not measured

bold values are below measurement limit and $T_M$ is calculated under assumption of a minimal flow rate of 1 mL/min and an injection pressure of 200 kPa.

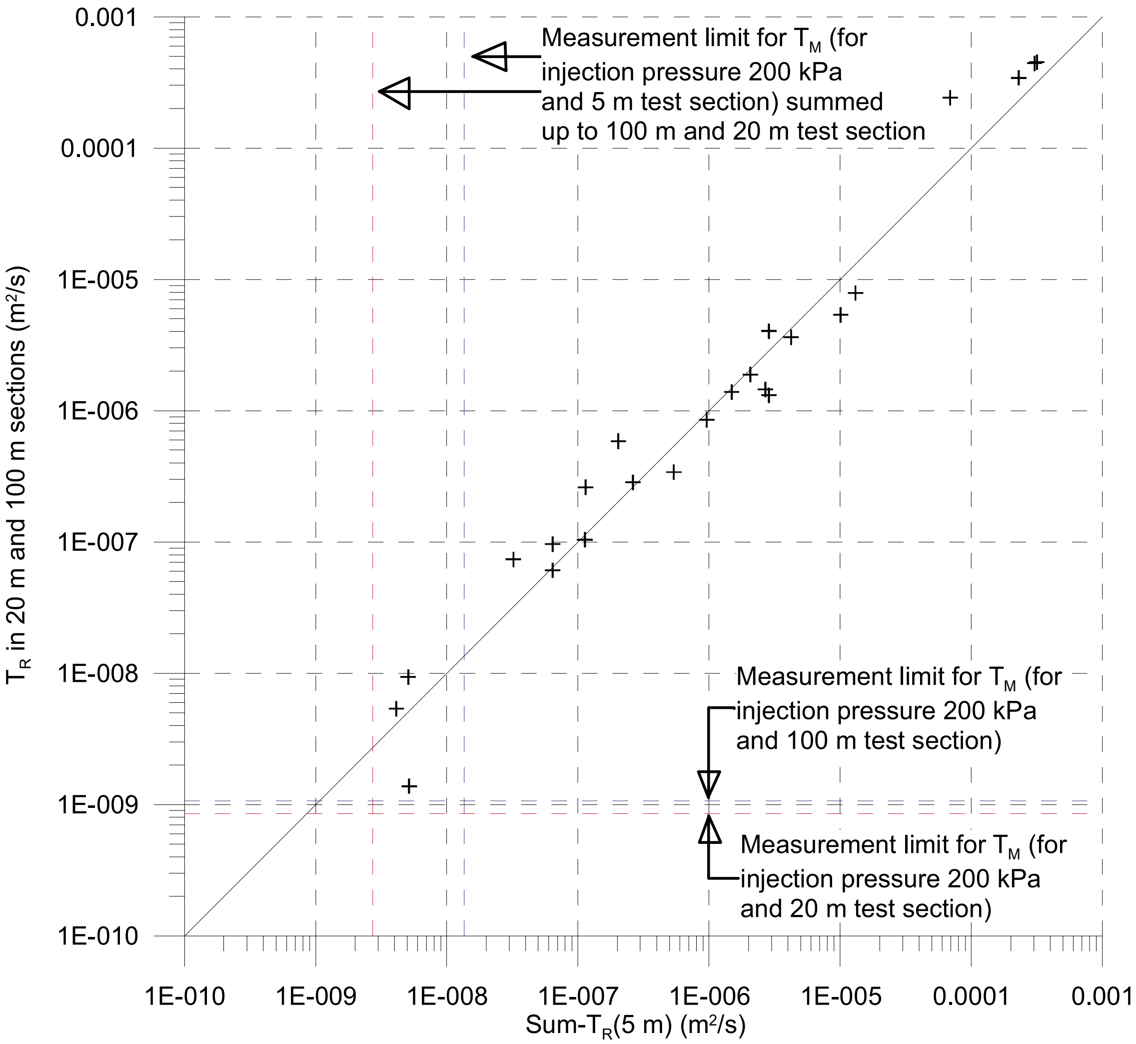


***Figure 6-3.*** *Judged most representative transmissivity values ($T_R$) for 100 m and 20 m sections versus the sum of most representative transmissivity values ($T_R$) in 5 m sections in the corresponding borehole intervals from the injection tests in KFM02A.*

## 6.4 Comparison with results from difference flow logging

In Figure 6-4, a direct comparison is made of calculated steady-state and judged best transmissivity values from the injection tests in 5 m sections with the calculated transmissivity values in the corresponding 5 m sections from the previously performed sequential difference flow logging in KFM02A /1/. The difference flow logging was performed at a drawdown of c 6 m in the borehole (and at a pumping rate of c 75–80 L/min). The presented measurement limit for the difference flow logging is a theoretical value; the practical lower measurement limit has earlier been interpreted as at least 10 times higher (varying along the borehole) /1/.

Figure 6-4 indicates a good consistency between the estimated transmissivity values from the injection tests and difference flow logging, respectively. It should, however, be remembered that the two methods differ regarding assumptions and uncertainties. Potential uncertainties for difference flow logging results are discussed in /9/ and for injection tests in /10/.

In Figure 6-5, a comparison is made of estimated steady-state transmissivity values from the injection tests in 100 m and 20 m test sections with summed transmissivity values for 5 m sections from the difference flow logging (SUM $T_D$(5 m)) in the corresponding intervals in borehole KFM02A. The latter sums are shown in Table 6-5. Figure 6-5 may be compared with Figure 6-3 for the injection tests solely.

Figure 6-5 shows that the estimated transmissivity values from the injection tests in 100 m and 20 m sections are distributed over a wider range than the sum of transmissivity values from the difference flow logging. This is partly a result of the lower measurement limit being included in the sum for the difference flow logging. These results are consistent with the results in Figure 6-4.

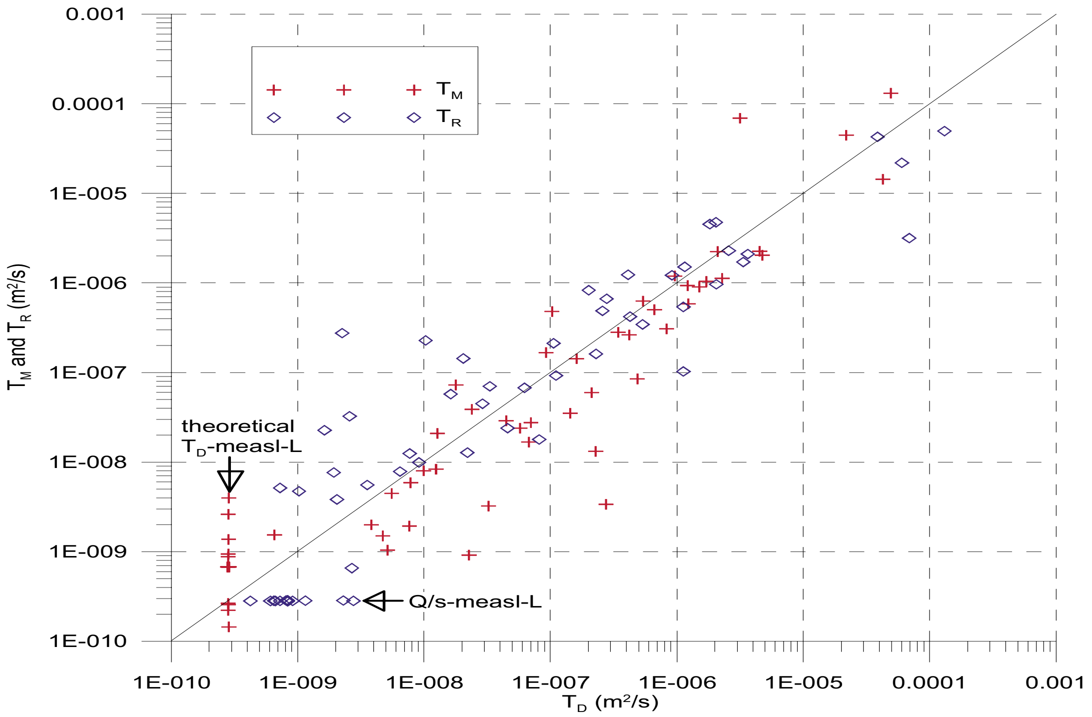


***Figure 6-4.*** *Comparison of estimated steady-state ($T_M$) and judged most representative ($T_R$) transmissivity values from the injection tests in 5 m sections with estimated transmissivity values in the corresponding 5 m sections from the previous difference flow logging ($T_D$) in KFM02A.*

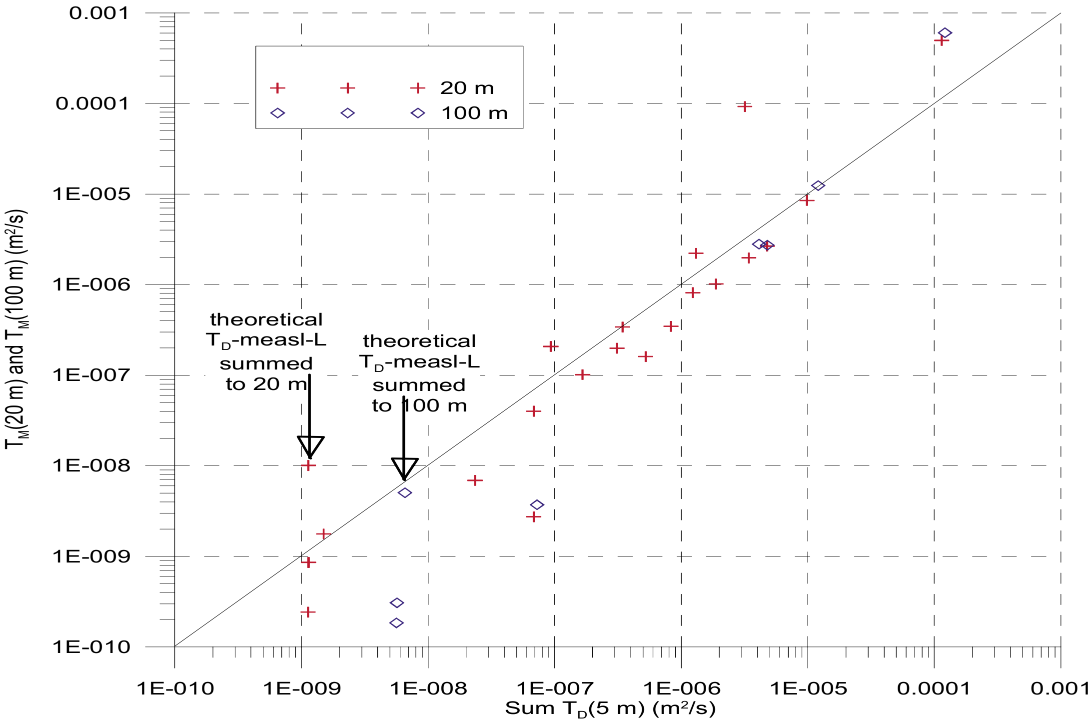


***Figure 6-5.*** *Comparison of estimated steady-state transmissivity values from injection tests in 20 m and 100 m sections with summed transmissivity values in 5 m sections in the corresponding borehole intervals from difference flow logging in KFM02A.*

**Table 6-6. Basic statistical parameters for steady-state hydraulic conductivity ($K_M$) and lower measurement limit for specific capacity (Q/s-measl-L) in different measurement scales in borehole KFM02A. $L_w$=section length, m=arithmetic mean, s=standard deviation.**

| Borehole | Parameter | Unit | $L_w$=100 m | $L_w$=20 m | $L_w$=20 m | $L_w$=5 m | $L_w$=5 m |
|---|---|---|---|---|---|---|---|
| KFM02A | Measured borehole interval | m | 103.5–901 [2)] | 103.5–321 [3)] | 401–601 | 103.5–321 [4)] | 401–601 |
| | Number of tests | – | 8 | 12 | 10 | 46 | 28 |
| | N:o of tests below L.M.L.[1)] | – | 0 | 0 | 2 | 11 | 7 |
| | m ($Log_{10}(K_M)$) | $Log_{10}$(m/s) | –8.90 | –7.59 | –8.37 | –7.91 | –8.37 |
| | s ($Log_{10}(K_M)$) | – | 2.40 | 1.63 | 1.41 | 1.71 | 0.98 |
| | m ($Log_{10}$(Q/s-measl-L/$L_w$)) | $Log_{10}$(m/s) | –11.01 | –10.26 | –10.40 | –9.78 | –9.77 |
| | s ($Log_{10}$(Q/s-measl-L/$L_w$)) | $Log_{10}$(m/s) | 0.43 | 0.34 | 0.02 | 0.13 | 0.10 |

1) Number of tests where Qp could not be defined

2) Sections 103.50–203.50 and 201.00–301.00 partly overlapping

3) Sections 103.50–123.50, 121.00–141.00 and 300.00–320.00, 301.00–321.00 partly overlapping

4) Sections 103.50–108.50, 106.00–111.00 and 256.00–261.00, 259.50–264.50 and 269.50–274.50, 271.00–276.00 partly overlapping

## 6.5 Basic statistics of hydraulic conductivity distributions

Some basic statistical parameters were derived for the calculated steady-state hydraulic conductivity distributions in different scales (100 m, 20 m and 5 m) from the injection tests in borehole KFM02A. In addition, the same basic statistical parameters were derived for the corresponding sets of the lower measurement limit for specific capacity (Q/s-measl-L). In the statistical analysis, the logarithm (base 10) of the hydraulic conductivity values ($K_M$) and lower measurement limit for specific capacity (Q/s-measl-L) were used. The hydraulic conductivity is derived from dividing the hydraulic transmissivity by section length. Selected results are shown in Table 6-6. Results from tests where $Q_p$ was below the measurement limit were not included in the statistical analyses of $K_M$. It should be observed that the statistics for the different section lengths is based on different borehole intervals.

## 6.6 Comparison of results from different hydraulic tests in KFM02A

At the bottom of Table 6-5, the sums of calculated transmissivity values are presented from different methods of analysis; from the injection tests and difference flow logging, respectively, in the intervals 103.5–301.0 and 401.0–601.0 m. In Table 6-7, a comparison of estimated transmissivity values from different hydraulic tests in KFM02A is presented.

Table 6-7 shows that the results of the different hydraulic test methods performed in borehole KFM02A are consistent. The total transmissivity of the borehole is dominated by the interval 103.50–141.00 m.

**Table 6-7. Comparison of calculated transmissivity values from different hydraulic tests in borehole KFM02A (n.m. = not measured).**

| Hydraulic test method | Sum of T ($m^2/s$) | Borehole interval and length of interval (m) | | | |
|---|---|---|---|---|---|
| | | 103.50–301.00 | 401.00–601.00 | 103.50–901.00 | 101.00–996.63 |
| Injection tests | $\sum T_M$(100 m) | $6.16 \cdot 10^{-4}$ | $5.53 \cdot 10^{-6}$ | $6.22 \cdot 10^{-4}$ | |
| | $\sum T_R$(100 m) | $4.50 \cdot 10^{-4}$ | $4.04 \cdot 10^{-6}$ | $4.54 \cdot 10^{-4}$ | |
| | $\sum T_M$(20 m) | $6.02 \cdot 10^{-4}$ | $4.95 \cdot 10^{-6}$ | n.m. | |
| | $\sum T_R$(20 m) | $5.96 \cdot 10^{-4}$ | $4.75 \cdot 10^{-6}$ | n.m. | |
| | $\sum T_M$(5 m) | $2.70 \cdot 10^{-4}$ | $4.40 \cdot 10^{-6}$ | n.m. | |
| | $\sum T_R$(5 m) | $3.17 \cdot 10^{-4}$ | $4.93 \cdot 10^{-6}$ | n.m. | |
| Difference flow logging | $\sum T_D$(5 m) | | | | $1.42 \cdot 10^{-4}$ |
| | $\sum T_{Df}$ (flow anomalies) | | | | $1.32 \cdot 10^{-4}$ 1) |
| Pumping test during difference flow logging | $T_M$ | | | | $3.44 \cdot 10^{-4}$ 2) |

1) From overlapping difference flow logging in the intervals 100.00–566.21 m and 886.49–900.62 m

2) From approximate drawdown 6 m and flow rate 75 L/min

# 7 References


/1/ **Rouhainen P, Pöllänen J, 2003.** Forsmark site investigation. Difference flow logging of borehole KFM02A.SKB P-03-XX. Svensk Kärnbränslehantering AB. (In Prep.)

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# File description table

| Bh id | Testsection | | Test type | Test no | Test start | Test stop | Data files of raw and primary data | Parameters in file | Comments |
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| KFM02A | 141 | 161 | 3 | 1 | 20040315 19:23 | 20040315 21:45 | __KFM02A_0141.00_200403151923.ht2 | P,Q,Te | |
| KFM02A | 161 | 181 | 3 | 1 | 20040315 22:08 | 20040315 23:06 | __KFM02A_0161.00_200403152208.ht2 | P,Q,Te | |
| KFM02A | 161 | 181 | 3 | 2 | 20040315 23:23 | 20040316 00:30 | __KFM02A_0161.00_200403152323.ht2 | P,Q,Te | |
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| KFM02A | 221 | 241 | 3 | 1 | 20040316 10:27 | 20040316 11:43 | __KFM02A_0221.00_200403161027.ht2 | P,Q,Te | |
| KFM02A | 241 | 261 | 3 | 1 | 20040316 12:30 | 20040316 13:47 | __KFM02A_0241.00_200403161230.ht2 | P,Q,Te | |
| KFM02A | 261 | 281 | 3 | 1 | 20040316 14:04 | 20040316 15:19 | __KFM02A_0261.00_200403161404.ht2 | P,Q,Te | |
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| KFM02A | 281 | 301 | 3 | 3 | 20040318 11:34 | 20040318 12:24 | __KFM02A_0281.00_200403181134.ht2 | P,Q,Te | |
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| Bh id | Testsection | | Test type | Test no | Test start | Test stop | Data files of raw and primary data | Parameters in file | Comments |
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| KFM02A | 461 | 481 | 3 | 1 | 20040317 09:47 | 20040317 11:02 | __KFM02A_0461.00_200403170947.ht2 | P,Q,Te | |
| KFM02A | 481 | 501 | 3 | 1 | 20040317 11:15 | 20040317 13:13 | __KFM02A_0481.00_200403171115.ht2 | P,Q,Te | |
| KFM02A | 501 | 521 | 3 | 1 | 20040317 14:00 | 20040317 15:44 | __KFM02A_0501.00_200403171400.ht2 | P,Q,Te | |
| KFM02A | 521 | 541 | 3 | 1 | 20040317 16:22 | 20040317 17:52 | __KFM02A_0521.00_200403171622.ht2 | P,Q,Te | |
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| KFM02A | 116 | 121 | 3 | 1 | 20040319 14:35 | 20040319 16:26 | __KFM02A_0116.00_200403191435.ht2 | P,Q,Te | |
| KFM02A | 121 | 126 | 3 | 1 | 20040319 16:37 | 20040319 18:03 | __KFM02A_0121.00_200403191637.ht2 | P,Q,Te | |
| KFM02A | 126 | 131 | 3 | 1 | 20040319 18:21 | 20040319 19:49 | __KFM02A_0126.00_200403191821.ht2 | P,Q,Te | |
| KFM02A | 131 | 136 | 3 | 1 | 20040319 20:03 | 20040319 21:34 | __KFM02A_0131.00_200403192003.ht2 | P,Q,Te | |
| KFM02A | 136 | 141 | 3 | 1 | 20040319 21:44 | 20040319 23:08 | __KFM02A_0136.00_200403192144.ht2 | P,Q,Te | |
| KFM02A | 141 | 146 | 3 | 1 | 20040319 23:21 | 20040320 08:32 | __KFM02A_0141.00_200403192321.ht2 | P,Q,Te | |
| KFM02A | 141 | 146 | 3 | 2 | 20040320 08:41 | 20040320 09:51 | __KFM02A_0141.00_200403200841.ht2 | P,Q,Te | |
| KFM02A | 141 | 146 | 3 | 3 | 20040320 10:36 | 20040320 11:33 | __KFM02A_0141.00_200403201036.ht2 | P,Q,Te | |
| KFM02A | 146 | 151 | 3 | 1 | 20040320 13:03 | 20040320 14:04 | __KFM02A_0146.00_200403201303.ht2 | P,Q,Te | |
| KFM02A | 151 | 156 | 3 | 1 | 20040320 14:16 | 20040320 15:14 | __KFM02A_0151.00_200403201416.ht2 | P,Q,Te | |
| KFM02A | 156 | 161 | 3 | 1 | 20040320 17:19 | 20040320 18:08 | __KFM02A_0156.00_200403201719.ht2 | P,Q,Te | |
| KFM02A | 161 | 166 | 3 | 1 | 20040321 08:36 | 20040321 09:59 | __KFM02A_0161.00_200403210836.ht2 | P,Q,Te | |
| KFM02A | 166 | 171 | 3 | 1 | 20040321 10:21 | 20040321 11:40 | __KFM02A_0166.00_200403211021.ht2 | P,Q,Te | |
| KFM02A | 171 | 176 | 3 | 1 | 20040321 11:55 | 20040321 12:56 | __KFM02A_0171.00_200403211155.ht2 | P,Q,Te | |
| KFM02A | 171 | 176 | 3 | 2 | 20040321 12:59 | 20040321 13:59 | __KFM02A_0171.00_200403211259.ht2 | P,Q,Te | |
| KFM02A | 176 | 181 | 3 | 1 | 20040321 14:13 | 20040321 15:31 | __KFM02A_0176.00_200403211413.ht2 | P,Q,Te | |
| KFM02A | 181 | 186 | 3 | 1 | 20040321 15:39 | 20040321 16:53 | __KFM02A_0181.00_200403211539.ht2 | P,Q,Te | |
| KFM02A | 186 | 191 | 3 | 1 | 20040322 06:30 | 20040322 07:58 | __KFM02A_0186.00_200403220630.ht2 | P,Q,Te | |
| KFM02A | 191 | 196 | 3 | 1 | 20040322 08:15 | 20040322 09:38 | __KFM02A_0191.00_200403220815.ht2 | P,Q,Te | |
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| Bh id | Testsection | | Test type | Test no | Test start | Test stop | Data files of raw and primary data | Parameters in file | Comments |
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| KFM02A | 225 | 230 | 3 | 1 | 20040322 19:23 | 20040322 20:52 | __KFM02A_0225.00_200403221923.ht2 | P,Q,Te | |
| KFM02A | 226 | 231 | 3 | 1 | 20040322 21:01 | 20040322 22:17 | __KFM02A_0226.00_200403222101.ht2 | P,Q,Te | |
| KFM02A | 231 | 236 | 3 | 1 | 20040322 22:26 | 20040322 23:17 | __KFM02A_0231.00_200403222226.ht2 | P,Q,Te | |
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| KFM02A | 241 | 246 | 3 | 1 | 20040323 06:26 | 20040323 07:55 | __KFM02A_0241.00_200403230626.ht2 | P,Q,Te | |
| KFM02A | 246 | 251 | 3 | 1 | 20040323 08:13 | 20040323 09:43 | __KFM02A_0246.00_200403230813.ht2 | P,Q,Te | |
| KFM02A | 251 | 256 | 3 | 1 | 20040323 09:59 | 20040323 11:38 | __KFM02A_0251.00_200403230959.ht2 | P,Q,Te | |
| KFM02A | 256 | 261 | 3 | 1 | 20040323 12:31 | 20040323 14:04 | __KFM02A_0256.00_200403231231.ht2 | P,Q,Te | |
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| KFM02A | 264.5 | 269.5 | 3 | 1 | 20040328 11:02 | 20040328 12:18 | __KFM02A_0264.50_200403281102.ht2 | P,Q,Te | |
| KFM02A | 269.5 | 274.5 | 3 | 1 | 20040328 09:39 | 20040328 10:53 | __KFM02A_0269.50_200403280939.ht2 | P,Q,Te | |
| KFM02A | 271 | 276 | 3 | 1 | 20040328 08:15 | 20040328 09:30 | __KFM02A_0271.00_200403280815.ht2 | P,Q,Te | |
| KFM02A | 276 | 281 | 3 | 1 | 20040324 06:55 | 20040324 08:31 | __KFM02A_0276.00_200403240655.ht2 | P,Q,Te | |
| KFM02A | 281 | 286 | 3 | 1 | 20040324 08:44 | 20040324 10:12 | __KFM02A_0281.00_200403240844.ht2 | P,Q,Te | |
| KFM02A | 286 | 291 | 3 | 1 | 20040324 10:28 | 20040324 11:56 | __KFM02A_0286.00_200403241028.ht2 | P,Q,Te | |
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| KFM02A | 301 | 306 | 3 | 1 | 20040324 15:59 | 20040324 17:16 | __KFM02A_0301.00_200403241559.ht2 | P,Q,Te | |
| KFM02A | 306 | 311 | 3 | 1 | 20040324 17:31 | 20040324 18:48 | __KFM02A_0306.00_200403241731.ht2 | P,Q,Te | |
| KFM02A | 311 | 316 | 3 | 1 | 20040324 18:58 | 20040324 20:34 | __KFM02A_0311.00_200403241858.ht2 | P,Q,Te | |
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| KFM02A | 411 | 416 | 3 | 1 | 20040325 07:35 | 20040325 08:25 | __KFM02A_0411.00_200403250735.ht2 | P,Q,Te | |
| KFM02A | 416 | 421 | 3 | 1 | 20040325 08:43 | 20040325 10:04 | __KFM02A_0416.00_200403250843.ht2 | P,Q,Te | |
| KFM02A | 421 | 426 | 3 | 1 | 20040325 10:23 | 20040325 11:43 | __KFM02A_0421.00_200403251023.ht2 | P,Q,Te | |
| KFM02A | 426 | 431 | 3 | 1 | 20040325 13:03 | 20040325 14:21 | __KFM02A_0426.00_200403251303.ht2 | P,Q,Te | |
| KFM02A | 431 | 436 | 3 | 1 | 20040325 14:33 | 20040325 15:50 | __KFM02A_0431.00_200403251433.ht2 | P,Q,Te | |
| KFM02A | 436 | 441 | 3 | 1 | 20040325 15:59 | 20040325 17:13 | __KFM02A_0436.00_200403251559.ht2 | P,Q,Te | |
| KFM02A | 441 | 446 | 3 | 1 | 20040325 17:25 | 20040325 18:42 | __KFM02A_0441.00_200403251725.ht2 | P,Q,Te | |
| KFM02A | 446 | 451 | 3 | 1 | 20040325 18:54 | 20040325 20:11 | __KFM02A_0446.00_200403251854.ht2 | P,Q,Te | |
| KFM02A | 451 | 456 | 3 | 1 | 20040325 20:22 | 20040325 21:37 | __KFM02A_0451.00_200403252022.ht2 | P,Q,Te | |

| Bh id | Testsection | | Test type | Test no | Test start | Test stop | Data files of raw and primary data | Parameters in file | Comments |
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| KFM02A | 461 | 466 | 3 | 1 | 20040326 06:46 | 20040326 08:07 | __KFM02A_0461.00_200403260646.ht2 | P,Q,Te | |
| KFM02A | 466 | 471 | 3 | 1 | 20040326 08:23 | 20040326 09:42 | __KFM02A_0466.00_200403260823.ht2 | P,Q,Te | |
| KFM02A | 471 | 476 | 3 | 1 | 20040326 10:01 | 20040326 10:46 | __KFM02A_0471.00_200403261001.ht2 | P,Q,Te | |
| KFM02A | 476 | 481 | 3 | 1 | 20040326 11:04 | 20040326 12:26 | __KFM02A_0476.00_200403261104.ht2 | P,Q,Te | |
| KFM02A | 481 | 486 | 3 | 1 | 20040326 13:41 | 20040326 14:59 | __KFM02A_0481.00_200403261341.ht2 | P,Q,Te | |
| KFM02A | 486 | 491 | 3 | 1 | 20040326 15:37 | 20040326 16:54 | __KFM02A_0486.00_200403261537.ht2 | P,Q,Te | |
| KFM02A | 491 | 496 | 3 | 1 | 20040326 17:04 | 20040326 18:19 | __KFM02A_0491.00_200403261704.ht2 | P,Q,Te | |
| KFM02A | 496 | 501 | 3 | 1 | 20040326 18:30 | 20040326 19:48 | __KFM02A_0496.00_200403261830.ht2 | P,Q,Te | |
| KFM02A | 501 | 506 | 3 | 1 | 20040326 20:01 | 20040326 21:19 | __KFM02A_0501.00_200403262001.ht2 | P,Q,Te | |
| KFM02A | 506 | 511 | 3 | 1 | 20040326 21:33 | 20040326 22:50 | __KFM02A_0506.00_200403262133.ht2 | P,Q,Te | |
| KFM02A | 511 | 516 | 3 | 1 | 20040326 23:47 | 20040327 08:48 | __KFM02A_0511.00_200403262347.ht2 | P,Q,Te | |
| KFM02A | 511 | 516 | 3 | 2 | 20040327 09:44 | 20040327 10:37 | __KFM02A_0511.00_200403270944.ht2 | P,Q,Te | |
| KFM02A | 516 | 521 | 3 | 1 | 20040327 10:49 | 20040327 11:43 | __KFM02A_0516.00_200403271049.ht2 | P,Q,Te | |
| KFM02A | 541 | 546 | 3 | 1 | 20040327 12:44 | 20040327 13:35 | __KFM02A_0541.00_200403271244.ht2 | P,Q,Te | |
| KFM02A | 546 | 551 | 3 | 1 | 20040327 13:48 | 20040327 14:33 | __KFM02A_0546.00_200403271348.ht2 | P,Q,Te | |
| KFM02A | 551 | 556 | 3 | 1 | 20040327 14:40 | 20040327 15:25 | __KFM02A_0551.00_200403271440.ht2 | P,Q,Te | |
| KFM02A | 556 | 561 | 3 | 1 | 20040327 15:32 | 20040327 16:51 | __KFM02A_0556.00_200403271532.ht2 | P,Q,Te | |

[1)] Test type 3 equals to injection test

# Appendix 2.1

## General test data

| | |
|---|---|
| **Borehole:** | KFM02A |
| **Testtype:** | CHir (Constant Head injection and recovery) |
| **Field crew:** | K. Gokall-Norman, M. Holmqvist, C. Hjerne, J. Jönsson, S. Jönsson, J. Källgården and T. Svensson |
| **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) |
| 103.50 | 203.50 | 20040305 22:01 | 20040305 22:49:53 | 20040305 23:20:10 | 20040305 23:52 | 30 | 30 |
| 201.00 | 301.00 | 20040308 08:53 | 20040308 09:41:48 | 20040308 10:12:06 | 20040308 10:44 | 30 | 30 |
| 301.00 | 401.00 | 20040308 11:50 | 20040308 13:44:05 | 20040308 14:14:32 | 20040308 14:46 | 30 | 30 |
| 401.00 | 501.00 | 20040308 17:01 | 20040308 17:55:28 | 20040308 18:25:43 | 20040308 18:57 | 30 | 30 |
| 501.00 | 601.00 | 20040308 22:06 | 20040308 22:24:06 | 20040308 22:54:30 | 20040308 23:26 | 30 | 30 |
| 601.00 | 701.00 | 20040309 07:29 | 20040309 08:36:04 | 20040309 09:06:39 | 20040309 09:38 | 31 | 30 |
| 701.00 | 801.00 | 20040309 11:39 | 20040309 13:52:30 | 20040309 14:22:49 | 20040309 14:55 | 30 | 30 |
| 801.00 | 901.00 | 20040309 20:22 | 20040309 22:04:57 | 20040309 22:35:35 | 20040309 23:07 | 31 | 30 |
| 103.50 | 123.50 | 20040318 14:48 | 20040318 15:26:27 | 20040318 15:46:42 | 20040318 16:09 | 20 | 20 |
| 121.00 | 141.00 | 20040315 14:41 | 20040315 17:07:26 | 20040315 17:37:43 | 20040315 18:10 | 30 | 30 |
| 141.00 | 161.00 | 20040315 19:23 | 20040315 20:43:03 | 20040315 21:13:25 | 20040315 21:45 | 30 | 30 |
| 161.00 | 181.00 | 20040315 23:23 | 20040315 23:27:42 | 20040315 23:58:00 | 20040316 00:30 | 30 | 30 |
| 181.00 | 201.00 | 20040316 06:51 | 20040316 07:31:06 | 20040316 07:51:25 | 20040316 08:13 | 20 | 20 |
| 201.00 | 221.00 | 20040316 08:45 | 20040316 09:21:27 | 20040316 09:41:46 | 20040316 10:04 | 20 | 20 |
| 221.00 | 241.00 | 20040316 10:27 | 20040316 11:00:46 | 20040316 11:21:06 | 20040316 11:43 | 20 | 20 |
| 241.00 | 261.00 | 20040316 12:30 | 20040316 13:05:17 | 20040316 13:25:38 | 20040316 13:47 | 20 | 20 |
| 261.00 | 281.00 | 20040316 14:04 | 20040316 14:37:08 | 20040316 14:57:27 | 20040316 15:19 | 20 | 20 |
| 281.00 | 301.00 | 20040318 11:34 | 20040318 11:42:10 | 20040318 12:02:26 | 20040318 12:24 | 20 | 20 |
| 300.00 | 320.00 | 20040316 19:37 | 20040316 20:32:33 | 20040316 20:53:01 | 20040316 21:15 | 20 | 20 |
| 301.00 | 321.00 | 20040316 17:50 | 20040316 18:33:52 | 20040316 18:54:14 | 20040316 19:16 | 20 | 20 |
| 401.00 | 421.00 | 20040316 22:41 | 20040316 23:26:55 | 20040316 23:47:14 | 20040317 00:09 | 20 | 20 |
| 421.00 | 441.00 | 20040317 06:18 | 20040317 06:53:20 | 20040317 07:13:39 | 20040317 07:35 | 20 | 20 |
| 441.00 | 461.00 | 20040317 08:11 | 20040317 08:43:59 | 20040317 09:04:18 | 20040317 09:26 | 20 | 20 |
| 461.00 | 481.00 | 20040317 09:47 | 20040317 10:19:51 | 20040317 10:40:10 | 20040317 11:02 | 20 | 20 |
| 481.00 | 501.00 | 20040317 11:15 | 20040317 12:31:10 | 20040317 12:51:28 | 20040317 13:13 | 20 | 20 |
| 501.00 | 521.00 | 20040317 14:00 | 20040317 15:01:40 | 20040317 15:21:57 | 20040317 15:44 | 20 | 20 |
| 521.00 | 541.00 | 20040317 16:22 | 20040317 17:10:02 | 20040317 17:30:50 | 20040317 17:52 | 21 | 20 |
| 541.00 | 561.00 | 20040317 18:21 | 20040317 19:01:37 | 20040317 19:22:02 | 20040317 19:44 | 20 | 20 |
| 561.00 | 581.00 | 20040317 20:11 | 20040417 21:05:06 | 20040417 21:25:28 | 20040317 21:47 | 20 | 20 |
| 581.00 | 601.00 | 20040317 22:18 | 20040317 22:52:07 | 20040317 23:12:21 | 20040317 23:34 | 20 | 20 |
| 103.50 | 108.50 | 20040319 07:54 | 20040319 08:43:40 | 20040319 09:04:01 | 20040319 09:26 | 20 | 20 |
| 106.00 | 111.00 | 20040319 09:38 | 20040319 10:15:07 | 20040319 10:35:22 | 20040319 10:57 | 20 | 20 |
| 111.00 | 116.00 | 20040319 11:09 | 20040319 13:32:50 | 20040319 13:53:04 | 20040319 14:15 | 20 | 20 |
| 116.00 | 121.00 | 20040319 14:35 | 20040319 15:44:03 | 20040319 16:04:17 | 20040319 16:26 | 20 | 20 |
| 121.00 | 126.00 | 20040319 16:37 | 20040319 17:20:35 | 20040319 17:40:49 | 20040319 18:03 | 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) |
| 126.00 | 131.00 | 20040319 18:21 | 20040319 19:06:52 | 20040319 19:27:11 | 20040319 19:49 | 20 | 20 |
| 131.00 | 136.00 | 20040319 20:03 | 20040319 20:51:28 | 20040319 21:11:59 | 20040319 21:34 | 21 | 20 |
| 136.00 | 141.00 | 20040319 21:44 | 20040319 22:25:49 | 20040319 22:46:08 | 20040319 23:08 | 20 | 20 |
| 141.00 | 146.00 | 20040320 10:36 | 20040320 11:22:26 | 20040320 11:25:55 | 20040320 11:33 | 3 | 5 |
| 146.00 | 151.00 | 20040320 13:03 | 20040320 13:51:51 | 20040320 13:56:00 | 20040320 14:04 | 4 | 6 |
| 151.00 | 156.00 | 20040320 14:16 | 20040320 15:02:05 | 20040320 15:05:08 | 20040320 15:14 | 3 | 7 |
| 156.00 | 161.00 | 20040320 17:19 | 20040321 17:26:04 | 20040321 17:46:23 | 20040320 18:08 | 20 | 20 |
| 161.00 | 166.00 | 20040321 08:36 | 20040321 09:17:16 | 20040321 09:37:32 | 20040321 09:59 | 20 | 20 |
| 166.00 | 171.00 | 20040321 10:21 | 20040321 10:57:39 | 20040321 11:17:55 | 20040321 11:40 | 20 | 20 |
| 171.00 | 176.00 | 20040321 12:59 | 20040321 13:16:37 | 20040321 13:36:55 | 20040321 13:59 | 20 | 20 |
| 176.00 | 181.00 | 20040321 14:13 | 20040321 14:48:42 | 20040321 15:08:58 | 20040321 15:31 | 20 | 20 |
| 181.00 | 186.00 | 20040321 15:39 | 20040321 16:11:16 | 20040321 16:31:33 | 20040321 16:53 | 20 | 20 |
| 186.00 | 191.00 | 20040322 06:30 | 20040322 07:15:53 | 20040322 07:36:38 | 20040322 07:58 | 21 | 20 |
| 191.00 | 196.00 | 20040322 08:15 | 20040322 08:55:47 | 20040322 09:17:18 | 20040322 09:38 | 22 | 19 |
| 196.00 | 201.00 | 20040322 09:57 | 20040322 10:40:15 | 20040322 11:01:01 | 20040322 11:22 | 21 | 20 |
| 201.00 | 206.00 | 20040322 12:41 | 20040322 13:28:55 | 20040322 13:35:42 | 20040322 13:49 | 7 | 11 |
| 206.00 | 211.00 | 20040322 14:03 | 20040322 14:46:28 | 20040322 14:53:54 | 20040322 15:03 | 7 | 7 |
| 211.00 | 216.00 | 20040322 15:34 | 20040322 16:23:36 | 20040322 16:25:34 | 20040322 16:33 | 2 | 6 |
| 216.00 | 221.00 | 20040322 16:55 | 20040322 17:28:46 | 20040322 17:49:03 | 20040322 18:11 | 20 | 20 |
| 221.00 | 226.00 | 20040322 18:23 | 20040322 19:03:36 | 20040322 19:06:14 | 20040322 19:14 | 3 | 6 |
| 225.00 | 230.00 | 20040322 19:23 | 20040322 20:09:25 | 20040322 20:29:43 | 20040322 20:52 | 20 | 20 |
| 226.00 | 231.00 | 20040322 21:01 | 20040322 21:34:29 | 20040322 21:54:46 | 20040322 22:17 | 20 | 20 |
| 231.00 | 236.00 | 20040322 22:26 | 20040322 23:04:46 | 20040322 23:09:52 | 20040322 23:17 | 5 | 5 |
| 236.00 | 241.00 | 20040322 23:28 | 20040323 00:45:55 | 20040323 01:06:01 | 20040323 00:45 | 20 | 20 |
| 241.00 | 246.00 | 20040323 06:26 | 20040323 07:13:10 | 20040323 07:33:22 | 20040323 07:55 | 20 | 20 |
| 246.00 | 251.00 | 20040323 08:13 | 20040323 09:00:31 | 20040323 09:20:53 | 20040323 09:43 | 20 | 20 |
| 251.00 | 256.00 | 20040323 09:59 | 20040323 10:55:35 | 20040323 11:15:56 | 20040323 11:38 | 20 | 20 |
| 256.00 | 261.00 | 20040323 12:31 | 20040323 13:21:33 | 20040323 13:41:55 | 20040323 14:04 | 20 | 20 |
| 259.50 | 264.50 | 20040328 13:43 | 20040328 14:17:48 | 20040328 14:38:18 | 20040328 15:00 | 21 | 20 |
| 264.50 | 269.50 | 20040328 11:02 | 20040328 11:35:39 | 20040328 11:55:58 | 20040328 12:18 | 20 | 20 |
| 269.50 | 274.50 | 20040328 09:39 | 20040328 10:11:16 | 20040328 10:31:37 | 20040328 10:53 | 20 | 20 |
| 271.00 | 276.00 | 20040328 08:15 | 20040328 08:48:13 | 20040328 09:08:31 | 20040328 09:30 | 20 | 20 |
| 276.00 | 281.00 | 20040324 06:55 | 20040324 07:48:37 | 20040324 08:08:56 | 20040324 08:31 | 20 | 20 |
| 281.00 | 286.00 | 20040324 08:44 | 20040324 09:29:55 | 20040324 09:50:06 | 20040324 10:12 | 20 | 20 |
| 286.00 | 291.00 | 20040324 10:28 | 20040324 11:13:53 | 20040324 11:34:08 | 20040324 11:56 | 20 | 20 |
| 291.00 | 296.00 | 20040324 12:56 | 20040324 13:33:35 | 20040324 13:53:52 | 20040324 14:16 | 20 | 20 |
| 296.00 | 301.00 | 20040324 14:28 | 20040322 15:03:29 | 20040322 15:23:49 | 20040322 15:46 | 20 | 20 |
| 301.00 | 306.00 | 20040324 15:59 | 20040324 16:33:43 | 20040324 16:54:05 | 20040324 17:16 | 20 | 20 |
| 306.00 | 311.00 | 20040324 17:31 | 20040324 18:05:32 | 20040324 18:25:56 | 20040324 18:48 | 20 | 20 |
| 311.00 | 316.00 | 20040324 18:58 | 20040324 19:52:05 | 20040324 20:12:27 | 20040324 20:34 | 20 | 20 |
| 316.00 | 321.00 | 20040324 20:41 | 20040324 21:14:55 | 20040324 21:16:21 | 20040324 21:20 | 1 | 2 |
| 401.00 | 406.00 | 20040324 22:12 | 20040324 22:51:07 | 20040324 22:53:13 | 20040324 23:01 | 2 | 6 |
| 406.00 | 411.00 | 20040324 23:09 | 20040324 23:41:45 | 20040324 23:44:39 | 20040324 23:52 | 3 | 6 |

| Test section<br><br>secup<br>(m) | Test section<br><br>seclow<br>(m) | Test start<br>YYYYMMDD<br>hh:mm | Start of flow period<br>YYYYMMDD<br>hh:mm:ss | Stop of flow period<br>YYYYMMDD<br>hh:mm:ss | Test stop<br>YYYYMMDD<br>hh:mm | Total flow time<br>$t_p$<br>(min) | Total recovery time<br>$t_F$<br>(min) |
|---|---|---|---|---|---|---|---|
| 411.00 | 416.00 | 20040325 07:35 | 20040325 07:43:22 | 20040325 08:03:45 | 20040325 08:25 | 20 | 20 |
| 416.00 | 421.00 | 20040325 08:43 | 20040325 09:22:13 | 20040325 09:42:34 | 20040325 10:04 | 20 | 20 |
| 421.00 | 426.00 | 20040325 10:23 | 20040325 11:01:20 | 20040325 11:21:41 | 20040325 11:43 | 20 | 20 |
| 426.00 | 431.00 | 20040325 13:03 | 20040325 13:38:53 | 20040325 13:59:14 | 20040325 14:21 | 20 | 20 |
| 431.00 | 436.00 | 20040325 14:33 | 20040325 15:07:41 | 20040325 15:28:03 | 20040325 15:50 | 20 | 20 |
| 436.00 | 441.00 | 20040325 15:59 | 20040325 16:30:36 | 20040325 16:50:53 | 20040325 17:13 | 20 | 20 |
| 441.00 | 446.00 | 20040325 17:25 | 20040325 18:00:16 | 20040325 18:20:39 | 20040325 18:42 | 20 | 20 |
| 446.00 | 451.00 | 20040325 18:54 | 20040325 19:28:25 | 20040325 19:48:44 | 20040325 20:11 | 20 | 20 |
| 451.00 | 456.00 | 20040325 20:22 | 20040325 20:55:07 | 20040325 21:15:27 | 20040325 21:37 | 20 | 20 |
| 456.00 | 461.00 | 20040325 22:43 | 20040325 23:19:51 | 20040325 23:40:16 | 20040326 00:02 | 20 | 20 |
| 461.00 | 466.00 | 20040326 06:46 | 20040326 07:25:20 | 20040326 07:45:45 | 20040326 08:07 | 20 | 20 |
| 466.00 | 471.00 | 20040326 08:23 | 20040326 09:00:05 | 20040326 09:20:33 | 20040326 09:42 | 20 | 20 |
| 471.00 | 476.00 | 20040326 10:01 | 20040326 10:33:27 | 20040326 10:38:46 | 20040326 10:46 | 5 | 6 |
| 476.00 | 481.00 | 20040326 11:04 | 20040326 11:43:40 | 20040326 12:04:01 | 20040326 12:26 | 20 | 20 |
| 481.00 | 486.00 | 20040326 13:41 | 20040326 14:17:19 | 20040326 14:37:44 | 20040326 14:59 | 20 | 20 |
| 486.00 | 491.00 | 20040326 15:37 | 20040326 16:11:39 | 20040326 16:32:01 | 20040326 16:54 | 20 | 20 |
| 491.00 | 496.00 | 20040326 17:04 | 20040326 17:37:19 | 20040326 17:57:41 | 20040326 18:19 | 20 | 20 |
| 496.00 | 501.00 | 20040326 18:30 | 20040326 19:06:19 | 20040326 19:26:41 | 20040326 19:48 | 20 | 20 |
| 501.00 | 506.00 | 20040326 20:01 | 20040326 20:36:35 | 20040326 20:57:04 | 20040326 21:19 | 20 | 20 |
| 506.00 | 511.00 | 20040326 21:33 | 20040326 22:07:46 | 20040326 22:28:12 | 20040326 22:50 | 20 | 20 |
| 511.00 | 516.00 | 20040327 09:44 | 20040327 09:54:45 | 20040327 10:15:07 | 20040327 10:37 | 20 | 20 |
| 516.00 | 521.00 | 20040327 10:49 | 20040327 11:28:50 | 20040327 11:49:18 | 20040327 11:43 | 20 | 6 |
| 541.00 | 546.00 | 20040327 12:44 | 20040327 13:21:29 | 20040327 13:41:47 | 20040327 13:35 | 20 | 6 |
| 546.00 | 551.00 | 20040327 13:48 | 20040327 14:19:55 | 20040327 14:25:11 | 20040327 14:33 | 5 | 6 |
| 551.00 | 556.00 | 20040327 14:40 | 20040327 15:12:34 | 20040327 15:18:08 | 20040327 15:25 | 6 | 6 |
| 556.00 | 561.00 | 20040327 15:32 | 20040327 16:08:42 | 20040327 16:29:10 | 20040327 16:51 | 20 | 20 |

# Appendix 2.2

## Pressure and flow data

### Summary of pressure and flow data for all tests in KFM02A

| 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) | ($m^3$) |
| 103.50 | 203.50 | 1050.09 | 1065.13 | 1049 | 7.11E-04 | 7.44E-04 | 1.35E+00 |
| 201.00 | 301.00 | 2022.73 | 2222.92 | 2039 | 1.94E-04 | 2.14E-04 | 3.89E-01 |
| 301.00 | 401.00 | 2996.63 | 3202.62 | 3024 | 6.00E-08 | 1.27E-07 | 2.33E-04 |
| 401.00 | 501.00 | 4014.98 | 4239.18 | 3986 | 4.91E-05 | 5.54E-05 | 1.01E-01 |
| 501.00 | 601.00 | 4973.27 | 5257.26 | 4973 | 6.06E-05 | 6.47E-05 | 1.18E-01 |
| 601.00 | 701.00 | 5975.60 | 6321.72 | 6304 | 5.00E-09 | | |
| 701.00 | 801.00 | 6950.74 | 7192.75 | 7172 | 5.83E-09 | | |
| 801.00 | 901.00 | 7940.51 | 8136.00 | 7965 | 7.71E-08 | 1.14E-07 | 2.10E-04 |
| 103.50 | 123.50 | 1050.23 | 1065.69 | 1050 | 7.47E-04 | 8.12E-04 | 9.86E-01 |
| 121.00 | 141.00 | 1221.29 | 1296.39 | 1220 | 6.74E-04 | 7.02E-04 | 1.28E+00 |
| 141.00 | 161.00 | 1419.14 | 1616.56 | 1420 | 1.32E-07 | 2.20E-07 | 4.00E-04 |
| 161.00 | 181.00 | 1616.70 | 1825.59 | 1620 | 4.01E-05 | 4.33E-05 | 7.88E-02 |
| 181.00 | 201.00 | 1812.89 | 2036.55 | 1817 | 7.40E-06 | 7.90E-06 | 9.63E-03 |
| 201.00 | 221.00 | 2009.91 | 2210.64 | 2014 | 6.77E-06 | 7.17E-06 | 8.74E-03 |
| 221.00 | 241.00 | 2206.78 | 2407.25 | 2215 | 4.05E-06 | 4.69E-06 | 5.73E-03 |
| 241.00 | 261.00 | 2405.31 | 2556.08 | 2410 | 1.48E-07 | 1.67E-07 | 2.04E-04 |
| 261.00 | 281.00 | 2600.39 | 2856.92 | 2604 | 5.52E-05 | 6.61E-05 | 8.06E-02 |
| 281.00 | 301.00 | 2802.38 | 3003.54 | 2811 | 1.66E-04 | 1.87E-04 | 2.28E-01 |
| 300.00 | 320.00 | 2985.32 | 3180.95 | 2989 | 5.21E-08 | 4.10E-07 | 5.04E-04 |
| 301.00 | 321.00 | 3010.72 | 3195.31 | 2995 | 7.19E-07 | 9.74E-07 | 1.19E-03 |
| 401.00 | 421.00 | 3981.02 | 4209.10 | 3983 | 1.81E-05 | 2.01E-05 | 2.46E-02 |
| 421.00 | 441.00 | 4178.72 | 4379.06 | 4179 | 1.98E-05 | 2.13E-05 | 2.60E-02 |
| 441.00 | 461.00 | 4376.71 | 4575.80 | 4379 | 1.97E-06 | 2.55E-06 | 3.11E-03 |
| 461.00 | 481.00 | 4573.45 | 4774.88 | 4574 | 3.15E-06 | 3.30E-06 | 4.02E-03 |
| 481.00 | 501.00 | 4771.29 | 4971.89 | 4772 | 3.87E-06 | 4.38E-06 | 5.33E-03 |
| 501.00 | 521.00 | 4969.55 | 5183.27 | 4969 | 5.54E-05 | 5.87E-05 | 7.14E-02 |
| 521.00 | 541.00 | 5195.97 | 5378.21 | 5347 | | | |
| 541.00 | 561.00 | 5379.32 | 5595.66 | 5485 | 3.72E-08 | 9.09E-08 | 1.11E-04 |
| 561.00 | 581.00 | 5572.60 | 5784.12 | 5711 | 5.00E-09 | | |
| 581.00 | 601.00 | 5783.15 | 6010.12 | 6007 | | | |
| 103.50 | 108.50 | 1055.24 | 1269.09 | 1054 | 8.92E-08 | 1.33E-07 | 1.62E-04 |
| 106.00 | 111.00 | 1074.84 | 1275.99 | 1075 | 3.56E-04 | 3.72E-04 | 4.52E-01 |
| 111.00 | 116.00 | 1123.71 | 1238.17 | 1123 | 6.28E-04 | 6.45E-04 | 7.83E-01 |
| 116.00 | 121.00 | 1172.59 | 1221.33 | 1174 | 7.88E-04 | 8.05E-04 | 9.77E-01 |
| 121.00 | 126.00 | 1221.74 | 1301.81 | 1223 | 6.82E-04 | 6.85E-04 | 8.32E-01 |
| 126.00 | 131.00 | 1274.20 | 1517.89 | 1371 | 6.29E-07 | 9.99E-07 | 1.22E-03 |
| 131.00 | 136.00 | 1407.84 | 1579.04 | 1559 | | | |
| 136.00 | 141.00 | 1371.40 | 1576.14 | 1384 | 2.10E-07 | 2.36E-07 | 2.87E-04 |
| 141.00 | 146.00 | 1497.45 | 1634.54 | 1587 | | | |

| 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) | ($m^3$) |
| 146.00 | 151.00 | 1540.94 | 1665.19 | 1672 | | | |
| 151.00 | 156.00 | 1678.17 | 1716.56 | 1738 | | | |
| 156.00 | 161.00 | 1568.00 | 1801.60 | 1569 | 2.64E-08 | 3.36E-08 | 4.09E-05 |
| 161.00 | 166.00 | 1615.49 | 1814.86 | 1617 | 1.44E-05 | 1.48E-05 | 1.80E-02 |
| 166.00 | 171.00 | 1664.91 | 1865.39 | 1666 | 6.48E-06 | 6.83E-06 | 8.31E-03 |
| 171.00 | 176.00 | 1714.90 | 1931.38 | 1717 | 2.78E-05 | 2.91E-05 | 3.54E-02 |
| 176.00 | 181.00 | 1765.15 | 1965.34 | 1765 | 6.82E-07 | 7.73E-07 | 9.40E-04 |
| 181.00 | 186.00 | 1813.20 | 2014.08 | 1817 | 6.96E-06 | 7.41E-06 | 9.02E-03 |
| 186.00 | 191.00 | 2019.75 | 2100.64 | 1985 | | | |
| 191.00 | 196.00 | 1938.28 | 2164.98 | 2155 | | | |
| 196.00 | 201.00 | 1983.15 | 2185.00 | 2163 | 3.60E-09 | | |
| 201.00 | 206.00 | 2022.91 | 2239.39 | 2209 | | | |
| 206.00 | 211.00 | 2080.76 | 2294.21 | 2285 | | | |
| 211.00 | 216.00 | 2308.70 | 2428.95 | 2432 | | | |
| 216.00 | 221.00 | 2158.49 | 2359.10 | 2164 | 7.61E-06 | 8.86E-06 | 1.08E-02 |
| 221.00 | 226.00 | 2221.72 | 2447.45 | 2433 | | | |
| 225.00 | 230.00 | 2247.81 | 2448.14 | 2257 | 4.25E-06 | 4.84E-06 | 5.89E-03 |
| 226.00 | 231.00 | 2259.41 | 2459.19 | 2267 | 4.12E-06 | 4.71E-06 | 5.74E-03 |
| 231.00 | 236.00 | 2321.41 | 2565.91 | 2522 | 8.00E-09 | | |
| 236.00 | 241.00 | 2364.21 | 2616.45 | 2457 | 8.00E-09 | | |
| 241.00 | 246.00 | 2413.08 | 2632.74 | 2420 | 1.08E-07 | 1.30E-07 | 1.58E-04 |
| 246.00 | 251.00 | 2463.61 | 2677.88 | 2466 | 3.63E-08 | 5.39E-08 | 6.58E-05 |
| 251.00 | 256.00 | 2504.89 | 2748.57 | 2508 | 2.83E-08 | 3.66E-08 | 4.47E-05 |
| 256.00 | 261.00 | 2554.59 | 2786.67 | 2557 | 1.95E-08 | 2.75E-08 | 3.37E-05 |
| 259.50 | 264.50 | 2587.87 | 2788.47 | 2588 | 6.48E-08 | 9.07E-08 | 1.12E-04 |
| 264.50 | 269.50 | 2637.02 | 2838.59 | 2638 | 1.19E-05 | 1.23E-05 | 1.50E-02 |
| 269.50 | 274.50 | 2686.30 | 2886.64 | 2686 | 3.17E-06 | 3.44E-06 | 4.20E-03 |
| 271.00 | 276.00 | 2701.07 | 2901.82 | 2702 | 1.55E-05 | 2.16E-05 | 2.63E-02 |
| 276.00 | 281.00 | 2751.46 | 2959.94 | 2752 | 1.29E-05 | 1.60E-05 | 1.95E-02 |
| 281.00 | 286.00 | 2801.17 | 3003.02 | 2803 | 2.80E-05 | 4.54E-05 | 5.50E-02 |
| 286.00 | 291.00 | 2851.15 | 3028.42 | 2853 | 4.93E-05 | 6.65E-05 | 8.08E-02 |
| 291.00 | 296.00 | 2898.92 | 3111.81 | 2900 | 5.86E-05 | 6.31E-05 | 7.67E-02 |
| 296.00 | 301.00 | 2948.62 | 3150.19 | 2949 | 2.97E-05 | 3.12E-05 | 3.81E-02 |
| 301.00 | 306.00 | 2998.32 | 3201.46 | 3001 | 4.20E-07 | 6.52E-07 | 7.97E-04 |
| 306.00 | 311.00 | 3094.27 | 3261.74 | 3061 | 2.33E-08 | 2.81E-08 | 3.44E-05 |
| 311.00 | 316.00 | 3143.85 | 3482.64 | 3172 | 1.06E-08 | | |
| 316.00 | 321.00 | 3272.10 | 3356.19 | 3375 | | | |
| 401.00 | 406.00 | 4097.99 | 4228.04 | 4278 | | | |
| 406.00 | 411.00 | 4055.06 | 4281.89 | 4322 | | | |
| 411.00 | 416.00 | 4083.77 | 4283.96 | 4084 | 9.58E-07 | 1.07E-06 | 1.31E-03 |
| 416.00 | 421.00 | 4188.56 | 4334.08 | 4133 | 1.68E-05 | 1.82E-05 | 2.23E-02 |
| 421.00 | 426.00 | 4297.63 | 4381.16 | 4181 | 1.47E-06 | 1.58E-06 | 1.93E-03 |
| 426.00 | 431.00 | 4298.04 | 4430.86 | 4230 | 1.48E-05 | 1.57E-05 | 1.91E-02 |
| 431.00 | 436.00 | 4280.10 | 4479.46 | 4281 | 1.10E-07 | 1.27E-07 | 1.55E-04 |
| 436.00 | 441.00 | 4329.25 | 4529.71 | 4329 | 1.48E-06 | 1.57E-06 | 1.91E-03 |

| 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) | ($m^3/s$) | ($m^3/s$) | ($m^3$) |
| 441.00 | 446.00 | 4399.94 | 4741.50 | 4387 | 4.39E-08 | 1.72E-07 | 2.10E-04 |
| 446.00 | 451.00 | 4428.65 | 4627.46 | 4430 | 1.96E-07 | 2.79E-07 | 3.40E-04 |
| 451.00 | 456.00 | 4478.08 | 4677.02 | 4478 | 8.60E-07 | 1.02E-06 | 1.25E-03 |
| 456.00 | 461.00 | 4543.66 | 4743.84 | 4533 | 4.77E-08 | 5.73E-08 | 7.01E-05 |
| 461.00 | 466.00 | 4576.52 | 4743.71 | 4578 | 6.67E-08 | 7.76E-08 | 9.50E-05 |
| 466.00 | 471.00 | 4630.78 | 4824.48 | 4630 | 4.77E-08 | 5.56E-08 | 6.82E-05 |
| 471.00 | 476.00 | 4764.42 | 4885.78 | 4890 | | | |
| 476.00 | 481.00 | 4724.66 | 4925.81 | 4725 | 2.11E-06 | 2.18E-06 | 2.66E-03 |
| 481.00 | 486.00 | 4773.81 | 4973.31 | 4774 | 3.24E-07 | 3.67E-07 | 4.49E-04 |
| 486.00 | 491.00 | 4823.10 | 5019.83 | 4823 | 1.76E-06 | 1.86E-06 | 2.28E-03 |
| 491.00 | 496.00 | 4874.59 | 5074.09 | 4874 | 1.45E-07 | 1.55E-07 | 1.90E-04 |
| 496.00 | 501.00 | 4921.95 | 5121.17 | 4922 | 5.88E-07 | 7.77E-07 | 9.49E-04 |
| 501.00 | 506.00 | 4972.06 | 5174.74 | 4973 | 3.75E-08 | 5.25E-08 | 6.46E-05 |
| 506.00 | 511.00 | 5021.77 | 5261.16 | 5074 | 8.56E-07 | 1.35E-06 | 1.66E-03 |
| 511.00 | 516.00 | 5071.05 | 5271.25 | 5071 | 5.03E-05 | 5.27E-05 | 6.44E-02 |
| 516.00 | 521.00 | 5143.40 | 5323.30 | 5327 | | 1.27E-09 | 1.56E-06 |
| 541.00 | 546.00 | 5454.04 | 5572.50 | 5608 | | 2.78E-09 | 3.39E-06 |
| 546.00 | 551.00 | 5490.76 | 5621.51 | 5681 | | 7.45E-09 | 2.35E-06 |
| 551.00 | 556.00 | 5494.08 | 5672.32 | 5690 | | 1.64E-08 | 5.48E-06 |
| 556.00 | 561.00 | 5525.28 | 5718.02 | 5618 | 3.66E-08 | 7.56E-08 | 9.28E-05 |

1) No value indicates a flow below measurement limit (less then 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

| | |
|---|---|
| $p_i$ | 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

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

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) |

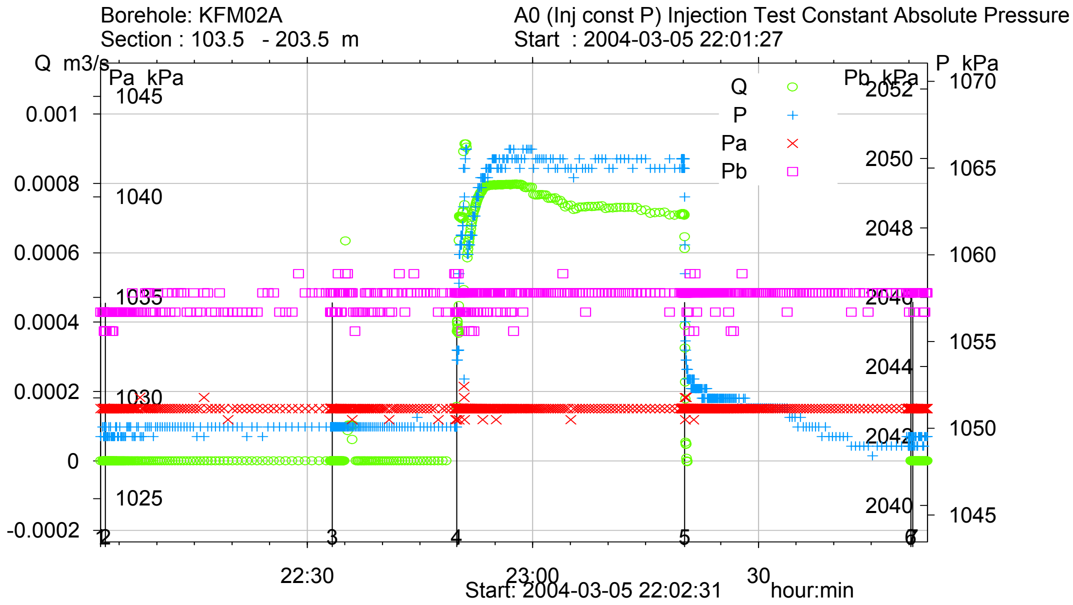



***Figure A3-1.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 103.5-203.5 m in borehole KFM02A.*

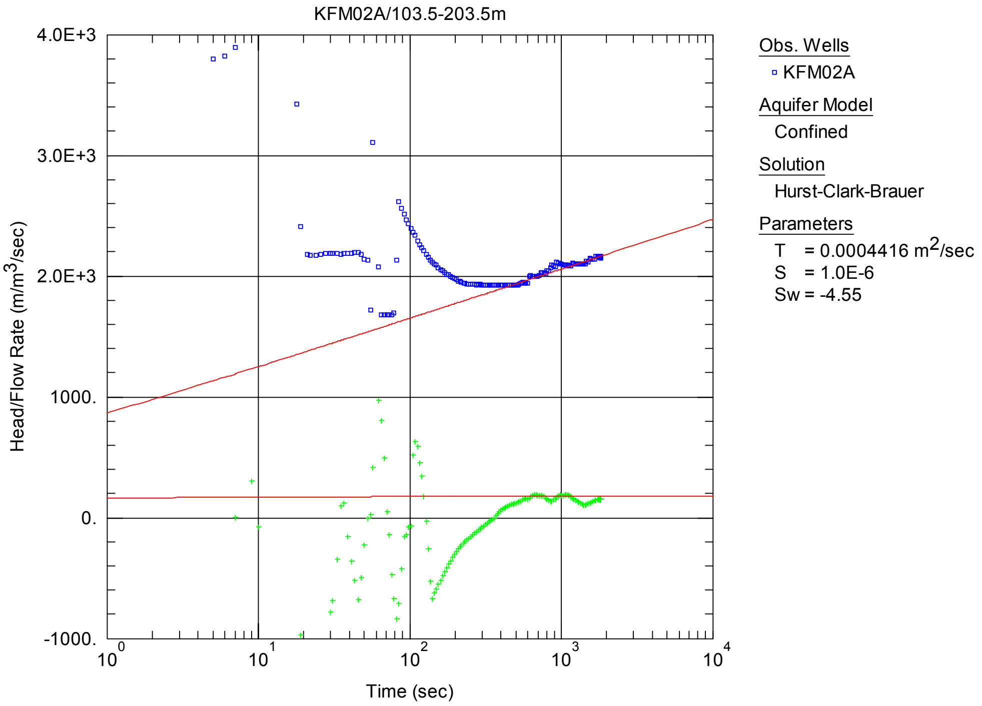



***Figure A3-2.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 103.5-203.5 m in KFM02A.*

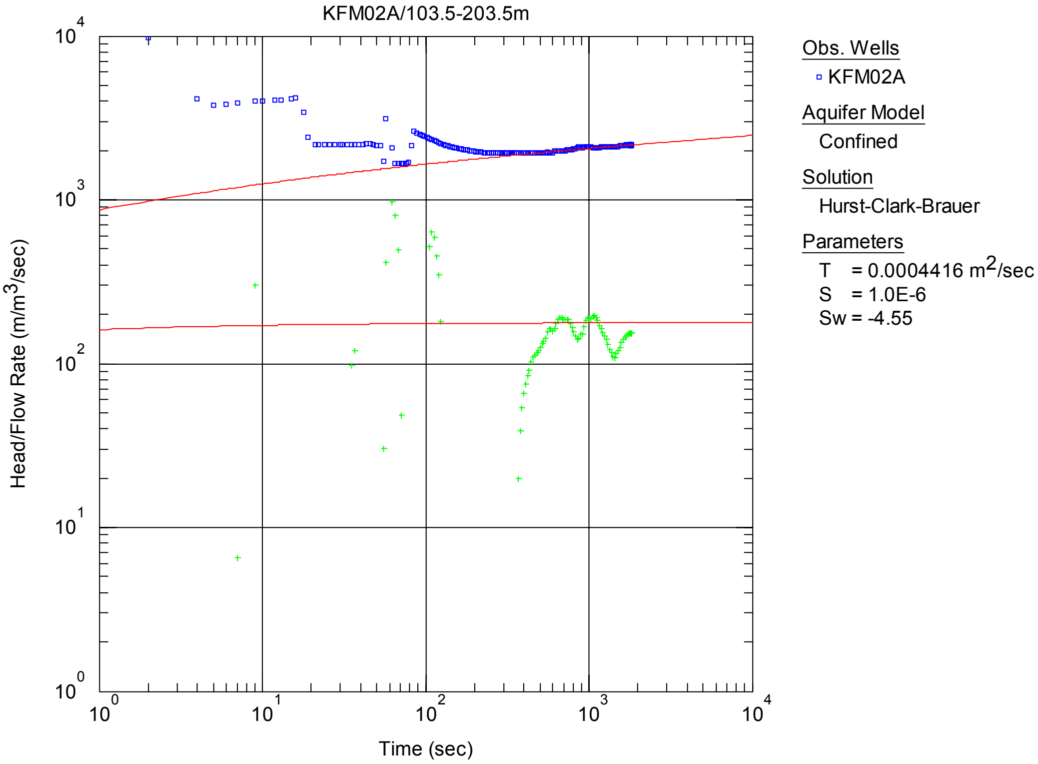



***Figure A3-3.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 103.5-203.5 m in KFM02A.*

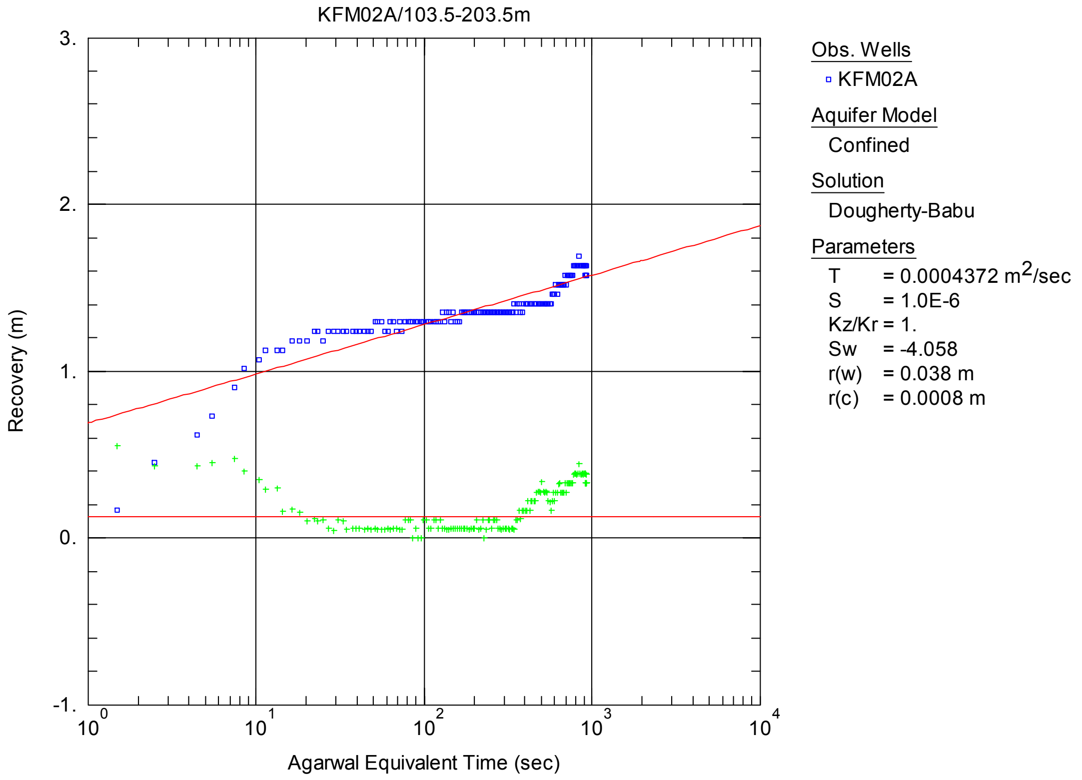



***Figure A3-4.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 103.5-203.5 m in KFM02A.*

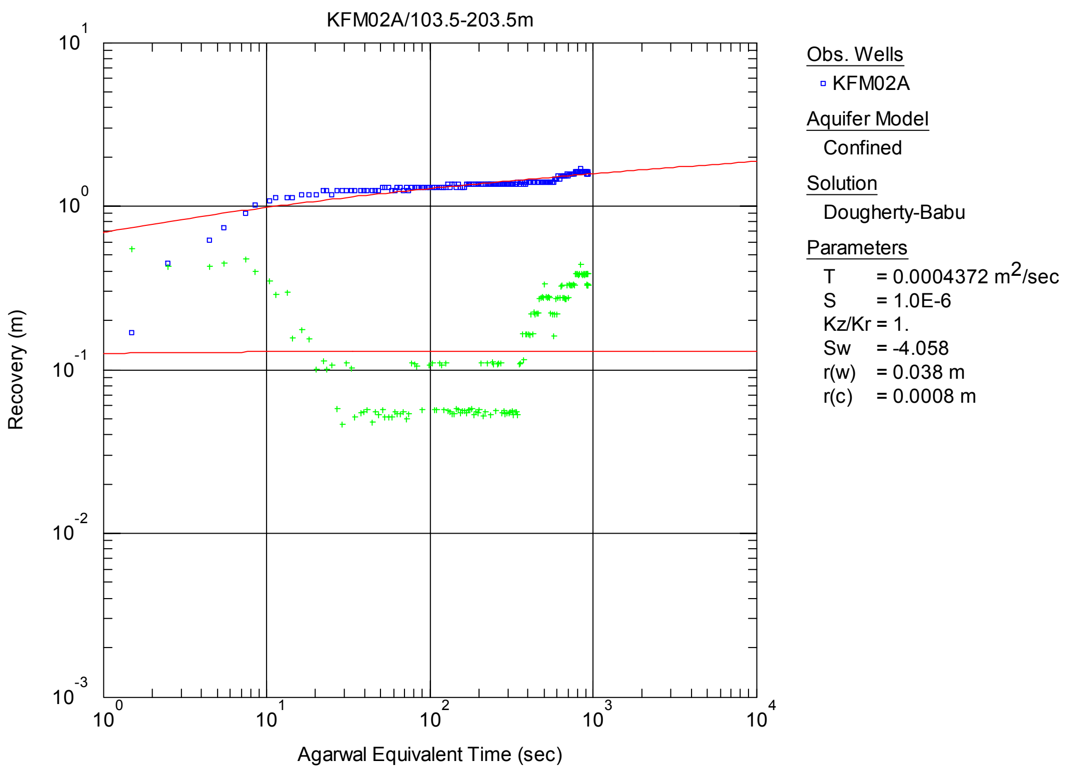



***Figure A3-5.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 103.5-203.5 m in KFM02A.*

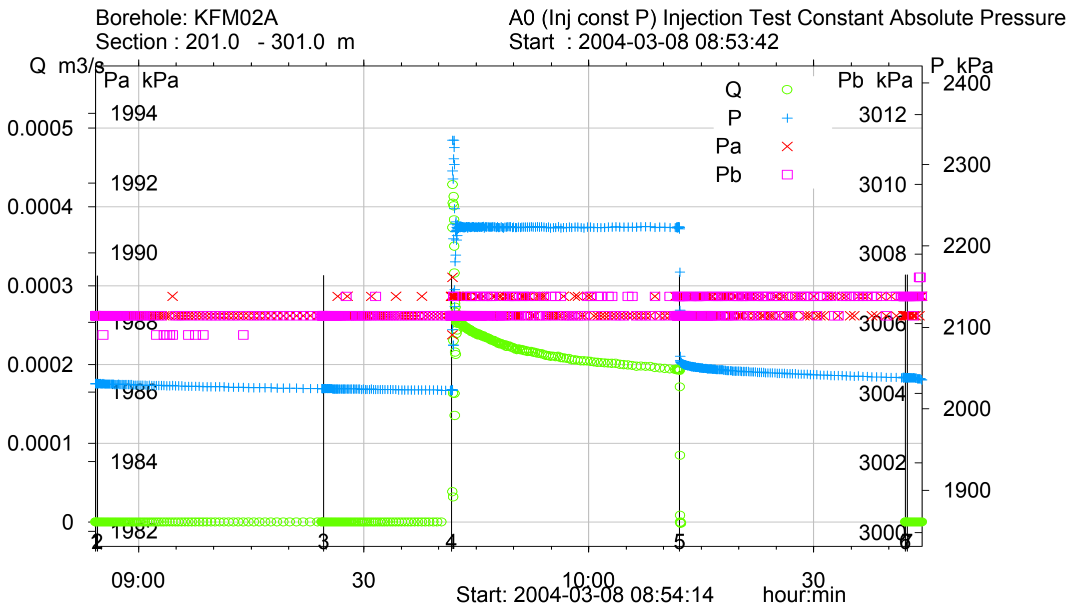



***Figure A3-6.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 201-301 m in borehole KFM02A.*

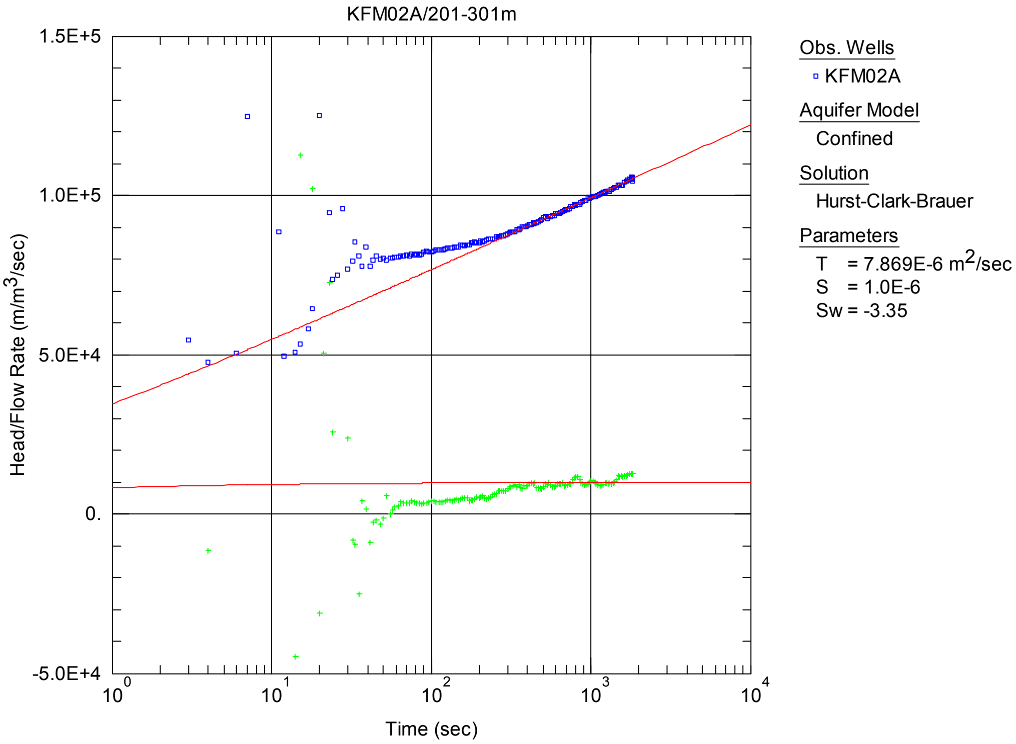



***Figure A3-7.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 201-301 m in KFM02A.*

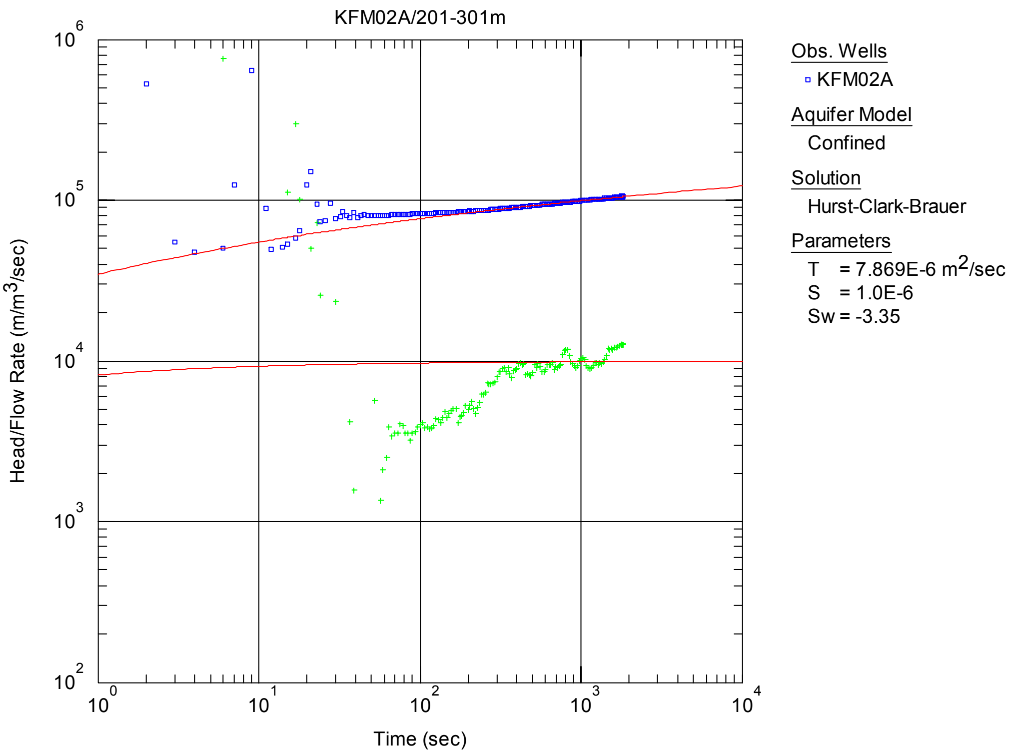



***Figure A3-8.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 201-301 m in KFM02A.*

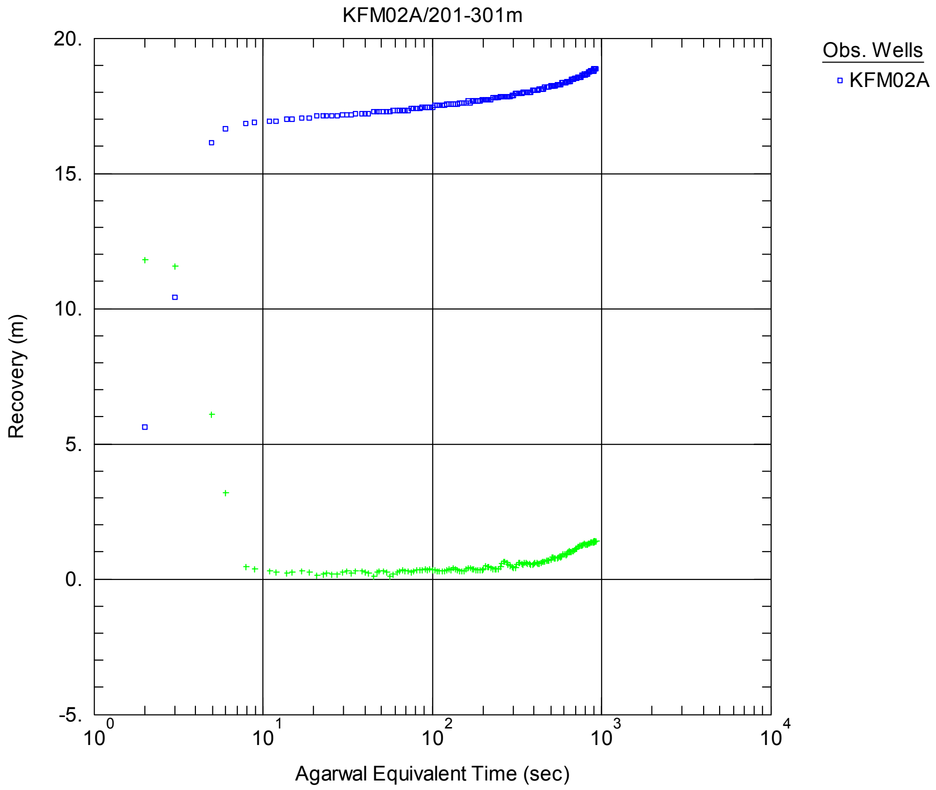



***Figure A3-9.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 201-301 m in KFM02A.*

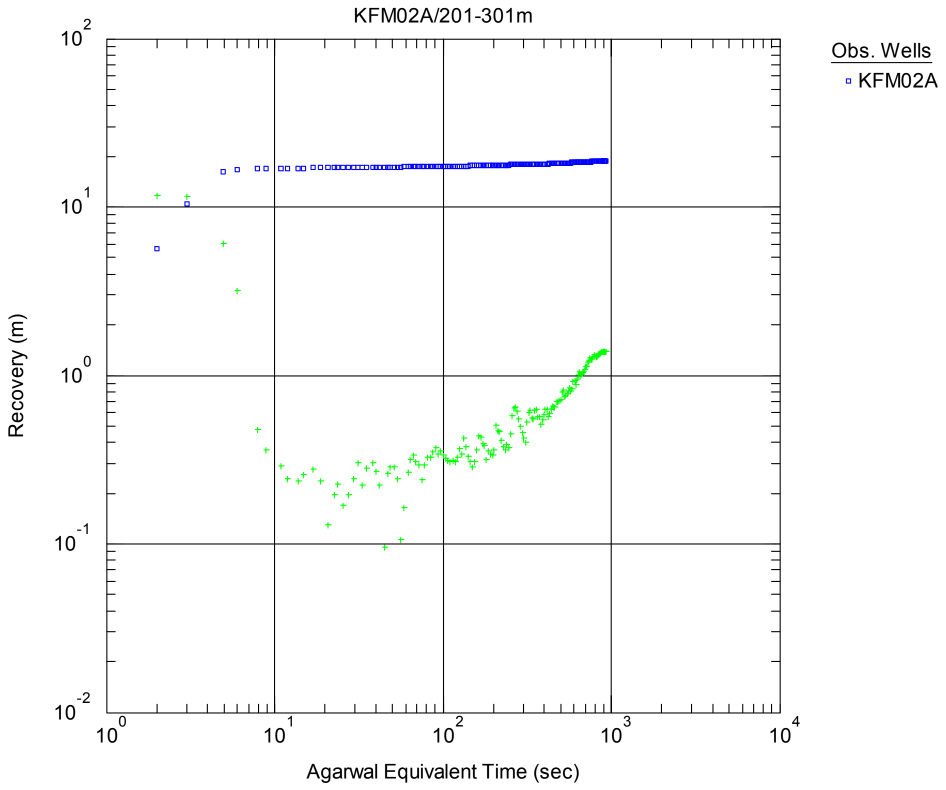



***Figure A3-10.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 201-301 m in KFM02A.*

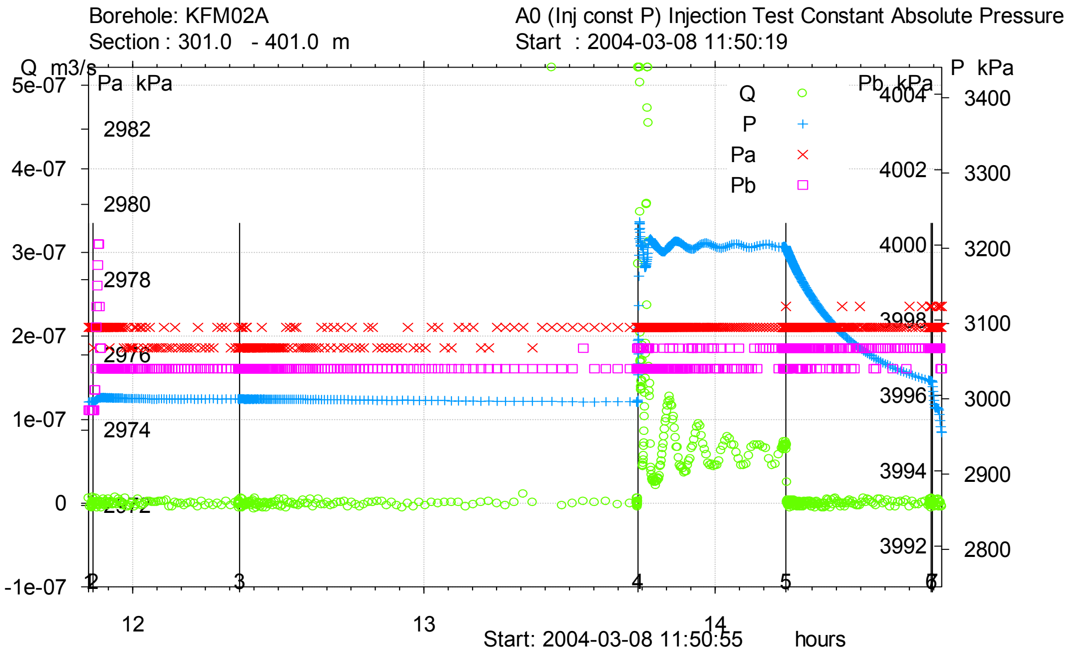



***Figure A3-11.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 301-401 m in borehole KFM02A.*

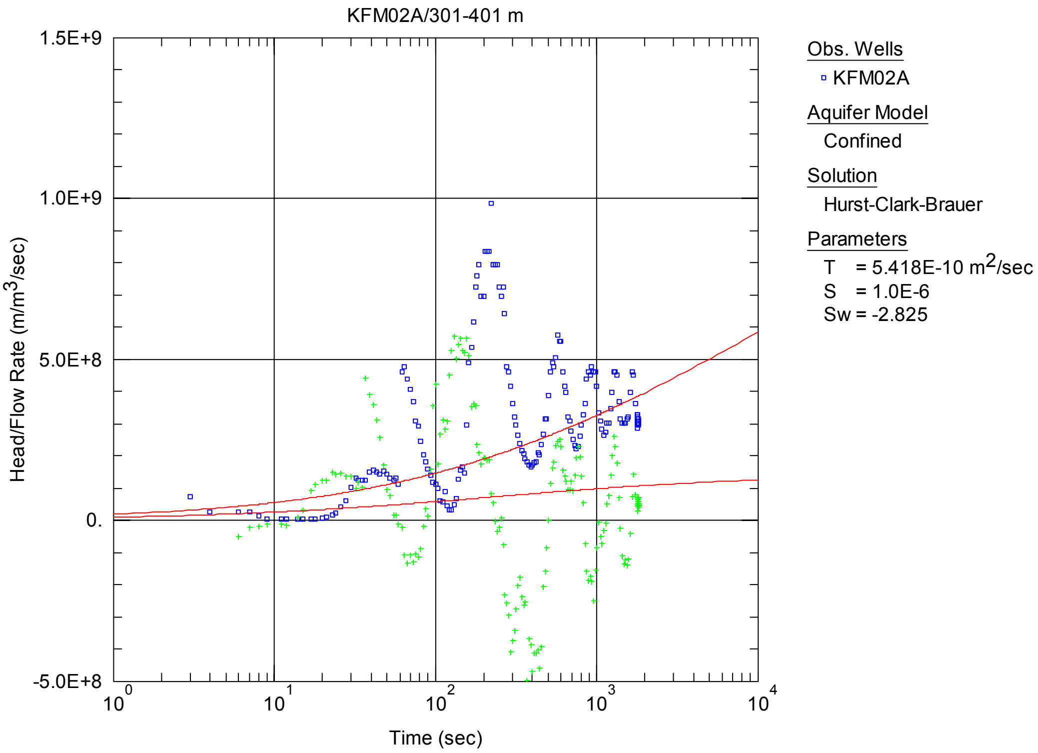



***Figure A3-12.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 301-401 m in KFM02A.*

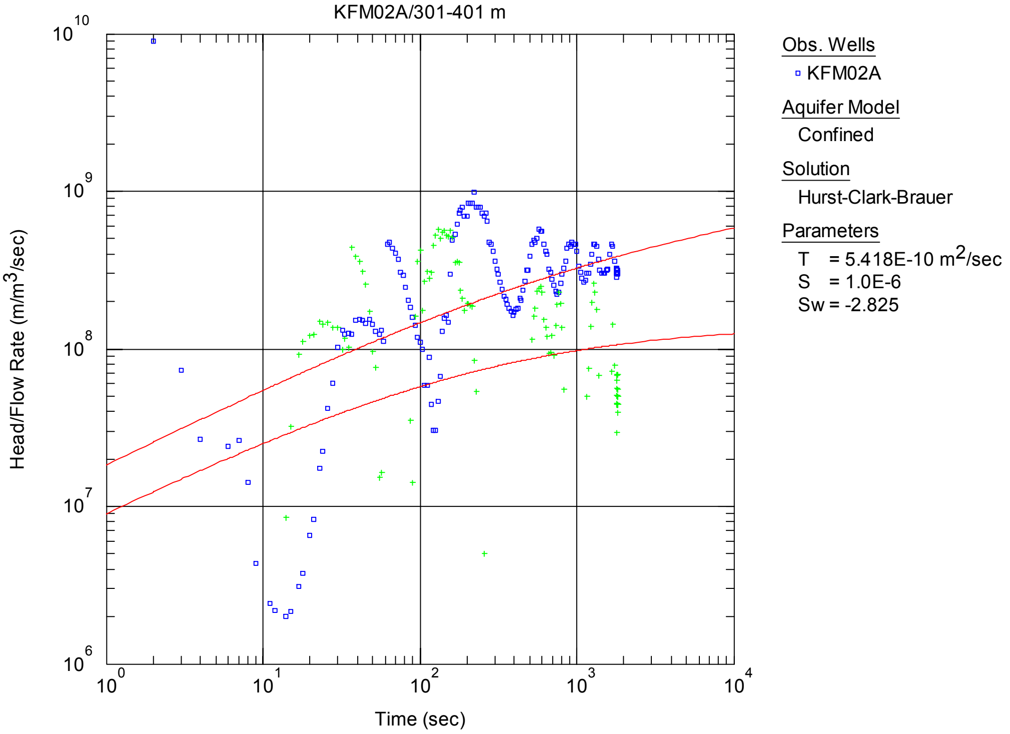



***Figure A3-13.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 301-401 m in KFM02A.*

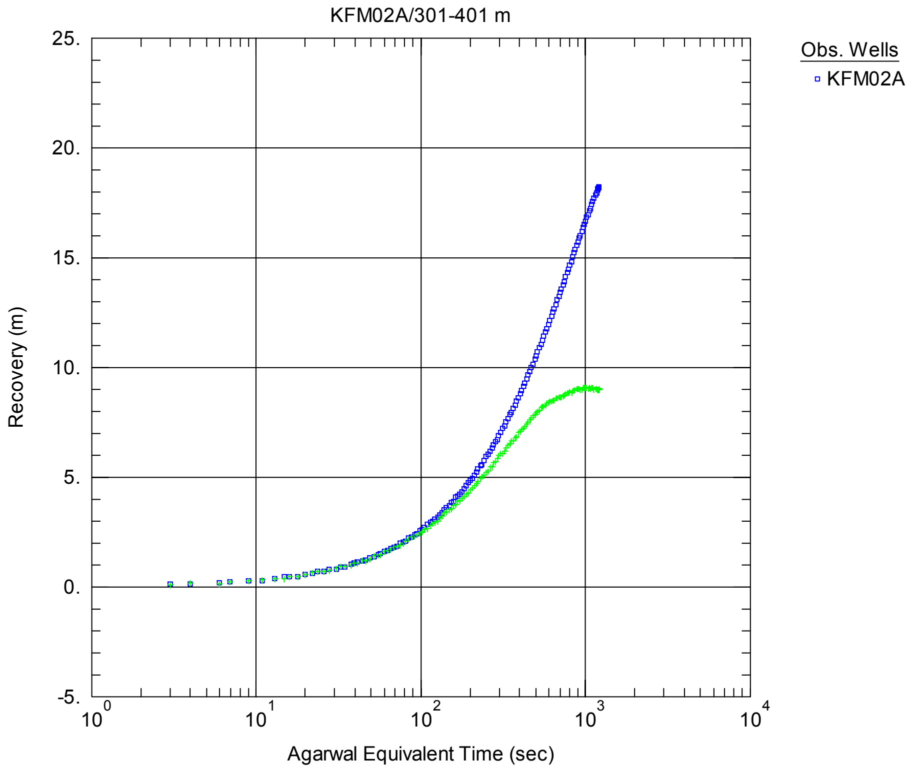



***Figure A3-14.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 301-401 m in KFM02A.*

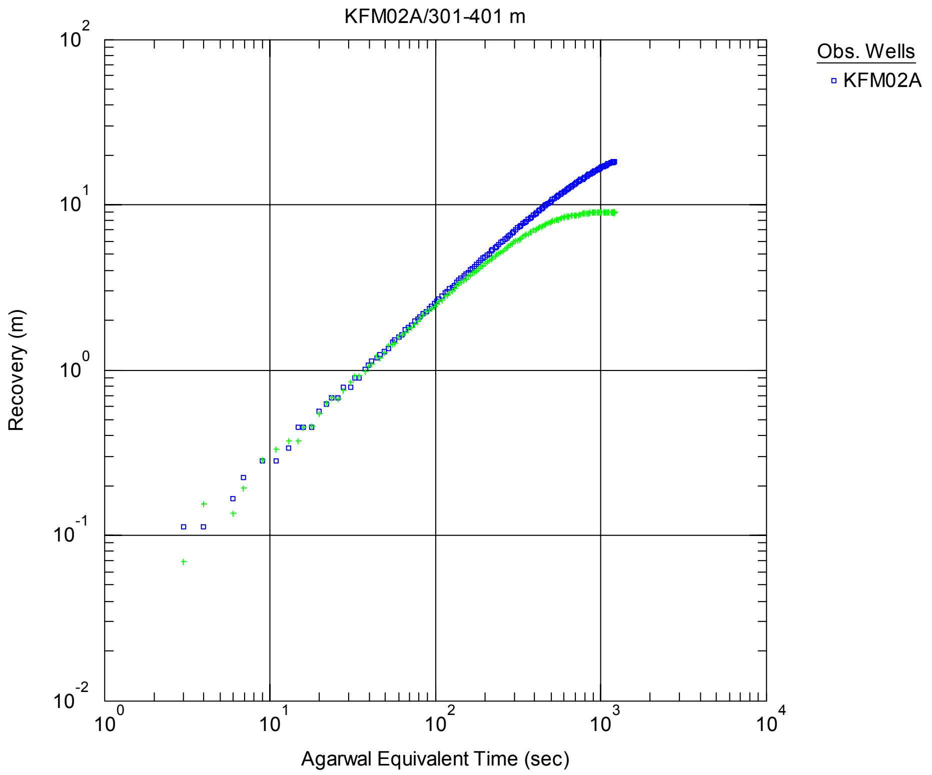



***Figure A3-15.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 301-401 m in KFM02A.*

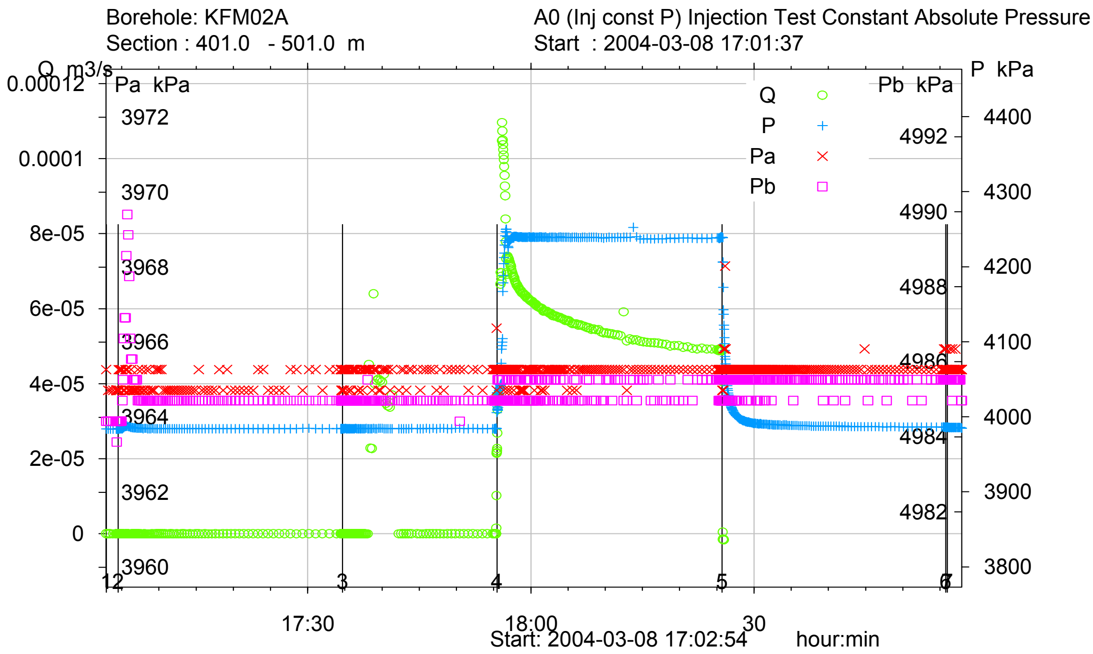



***Figure A3-16.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 401-501 m in borehole KFM02A.*

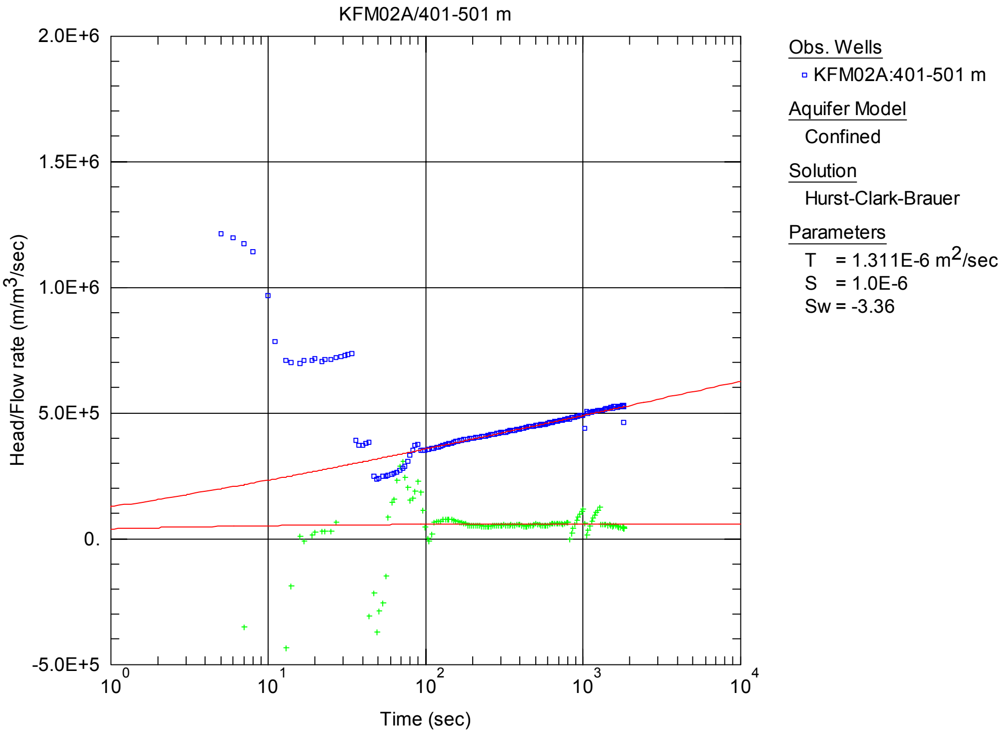



***Figure A3-17.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 401-501 m in KFM02A.*

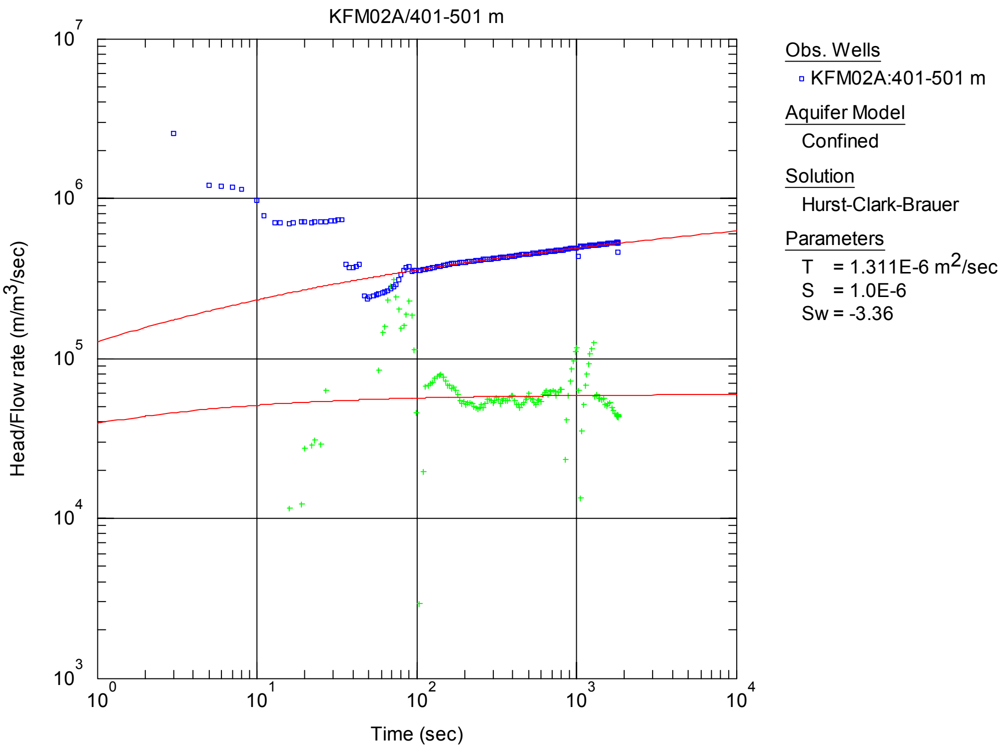



***Figure A3-18.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 401-501 m in KFM02A.*

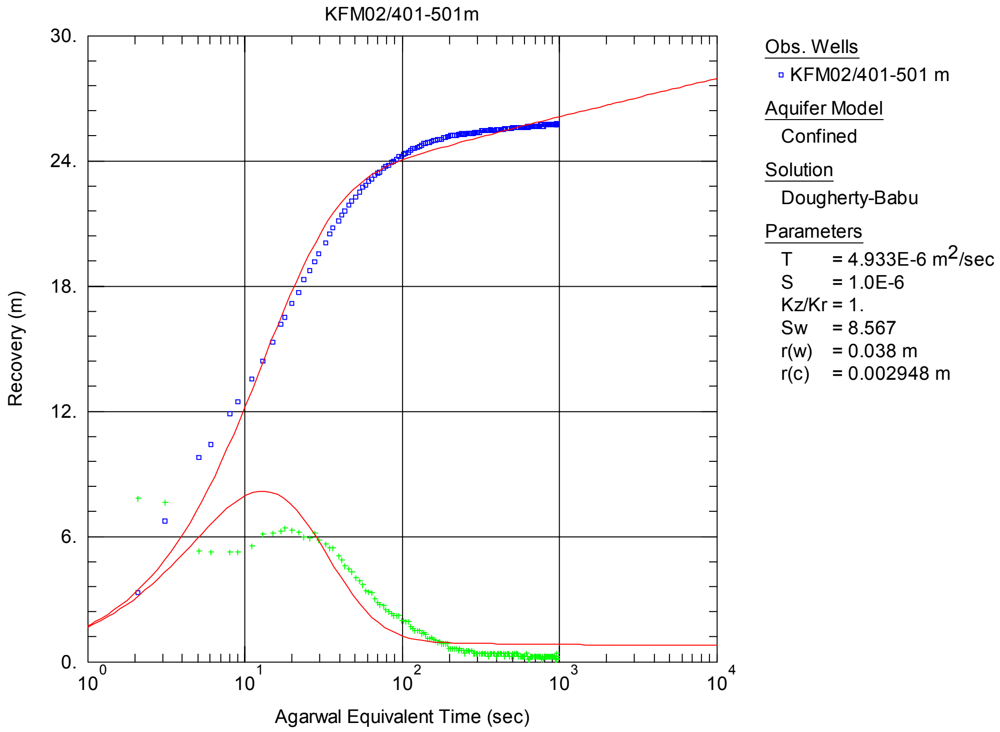



***Figure A3-19.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 401-501 m in KFM02A. Showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable.*

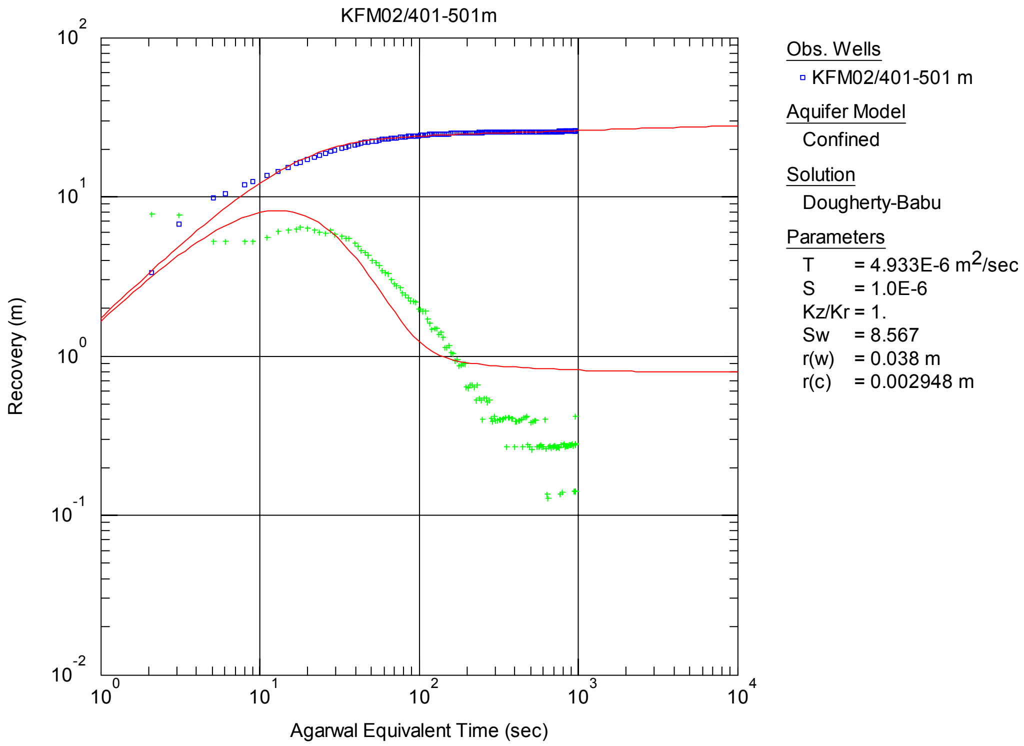



***Figure A3-20.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 401-501 m in KFM02A. Showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable.*

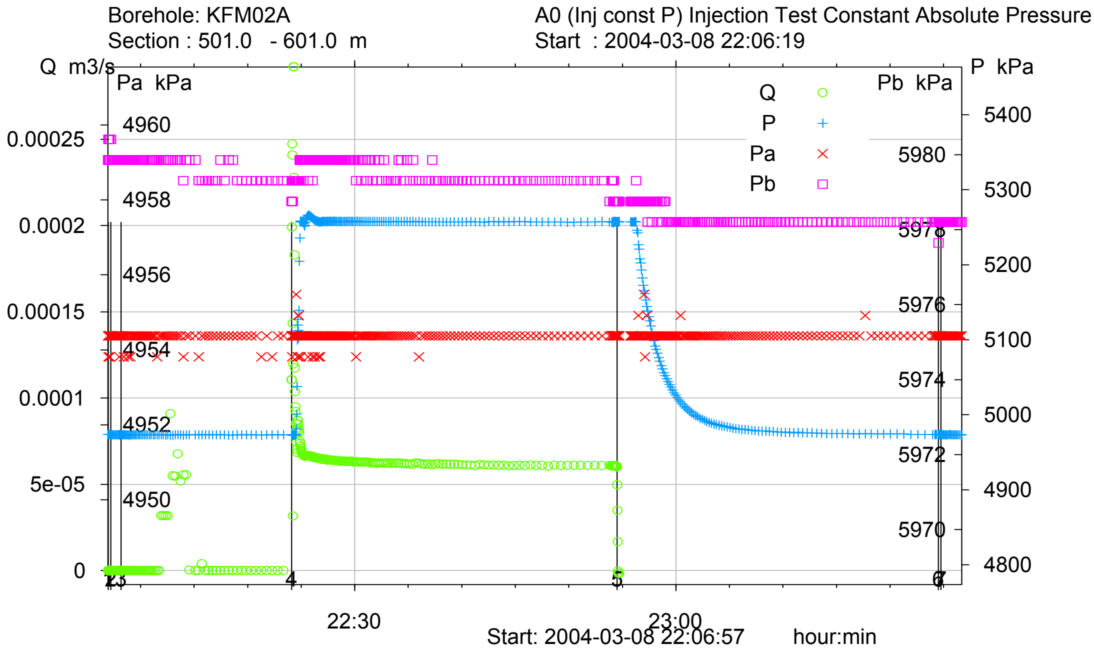



***Figure A3-21.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section501-601 m in borehole KFM02A.*

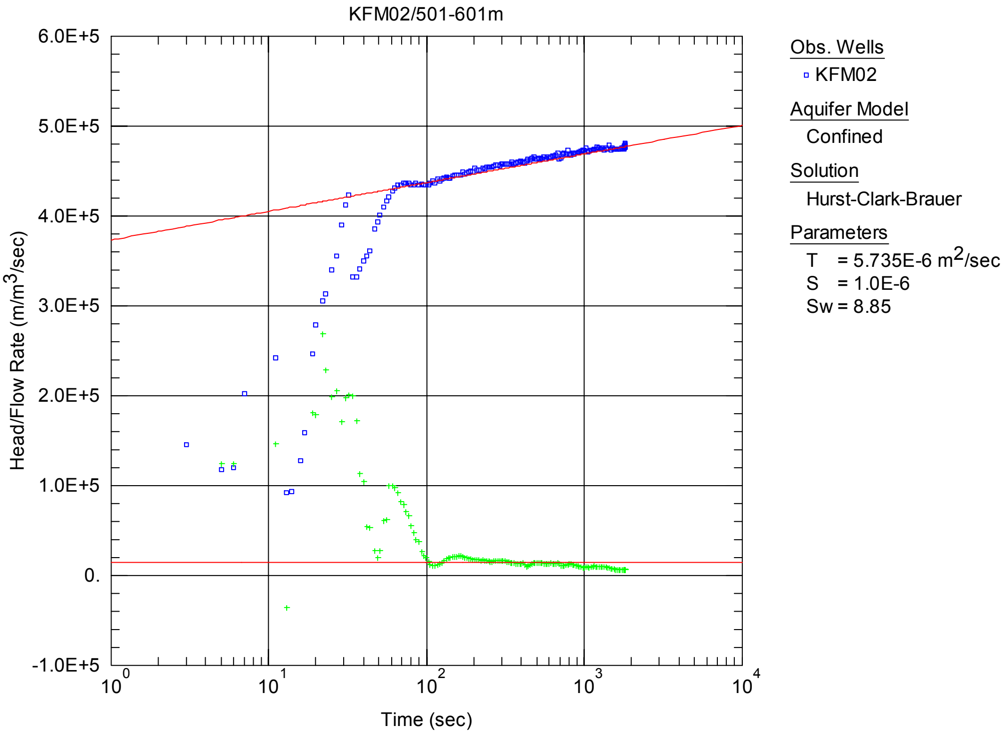



***Figure A3-22.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable, from the injection test in section 501-601 m in KFM02A.*

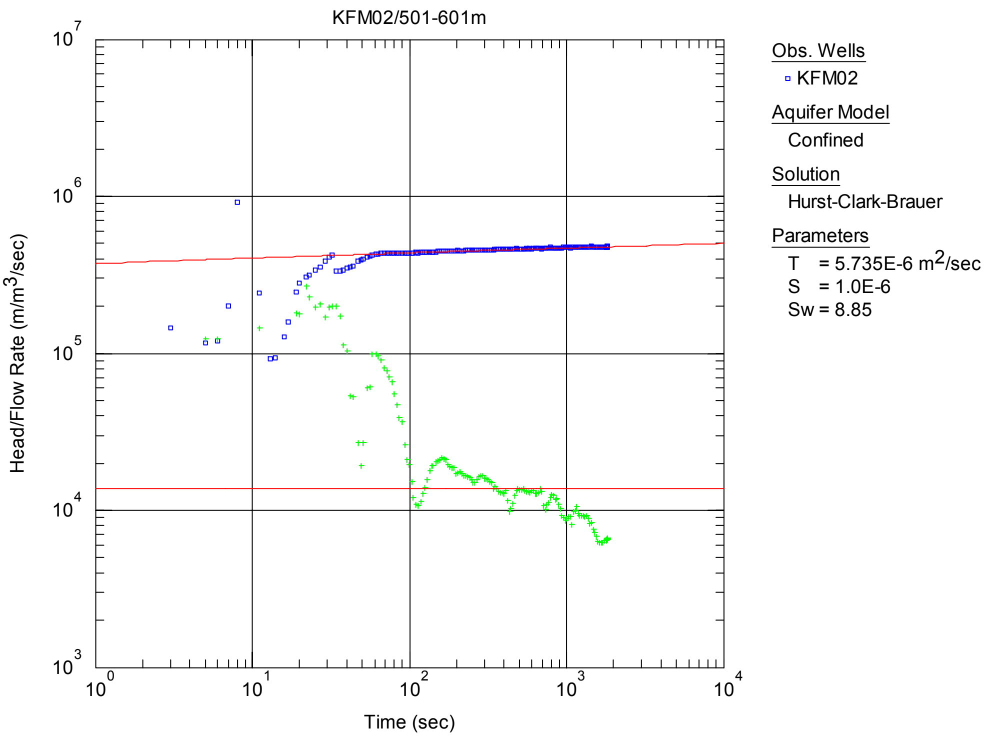



***Figure A3-23.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable, from the injection test in section 501-601 m in KFM02A.*

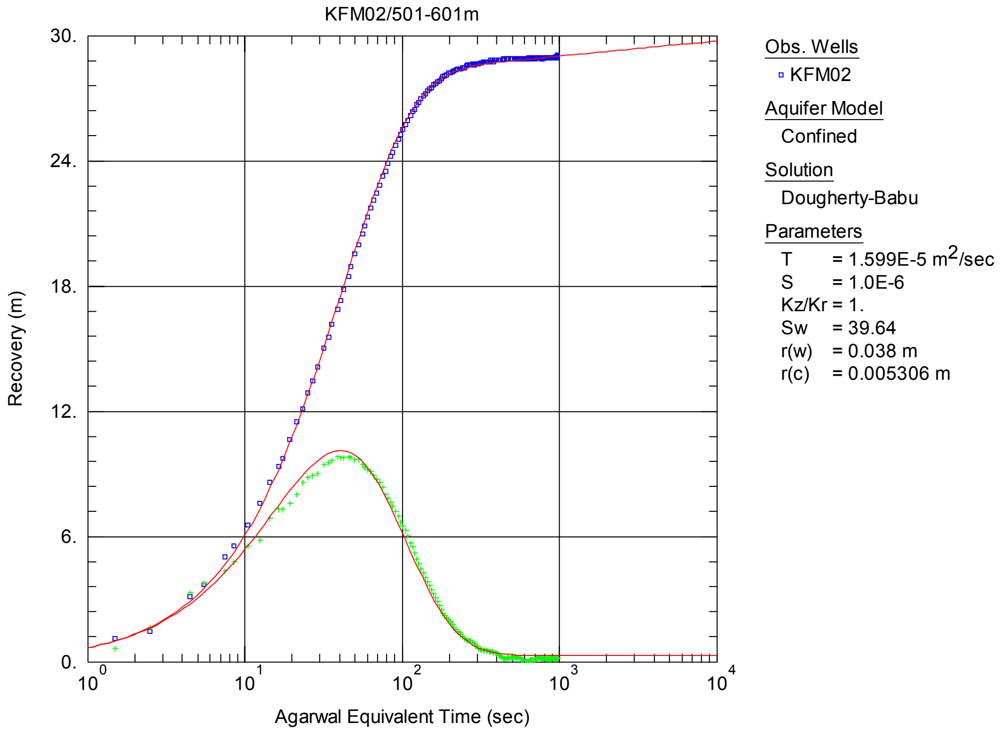



***Figure A3-24.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 501-601 m in KFM02A. Showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable.*

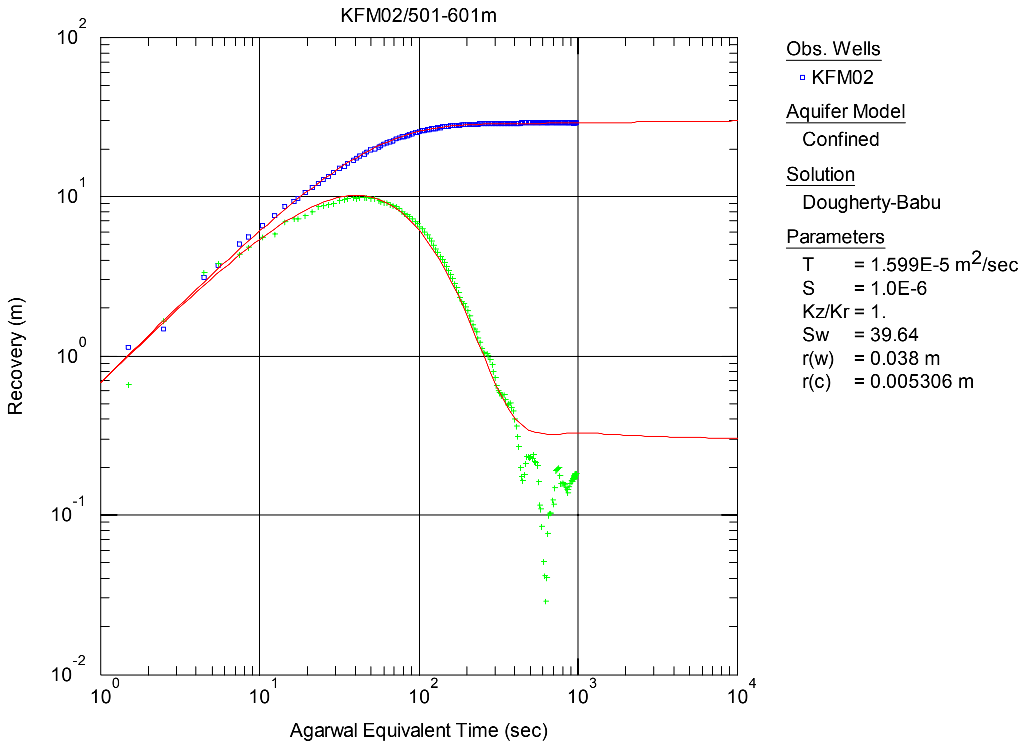



***Figure A3-25.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 501-601 m in KFM02A. Showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable.*

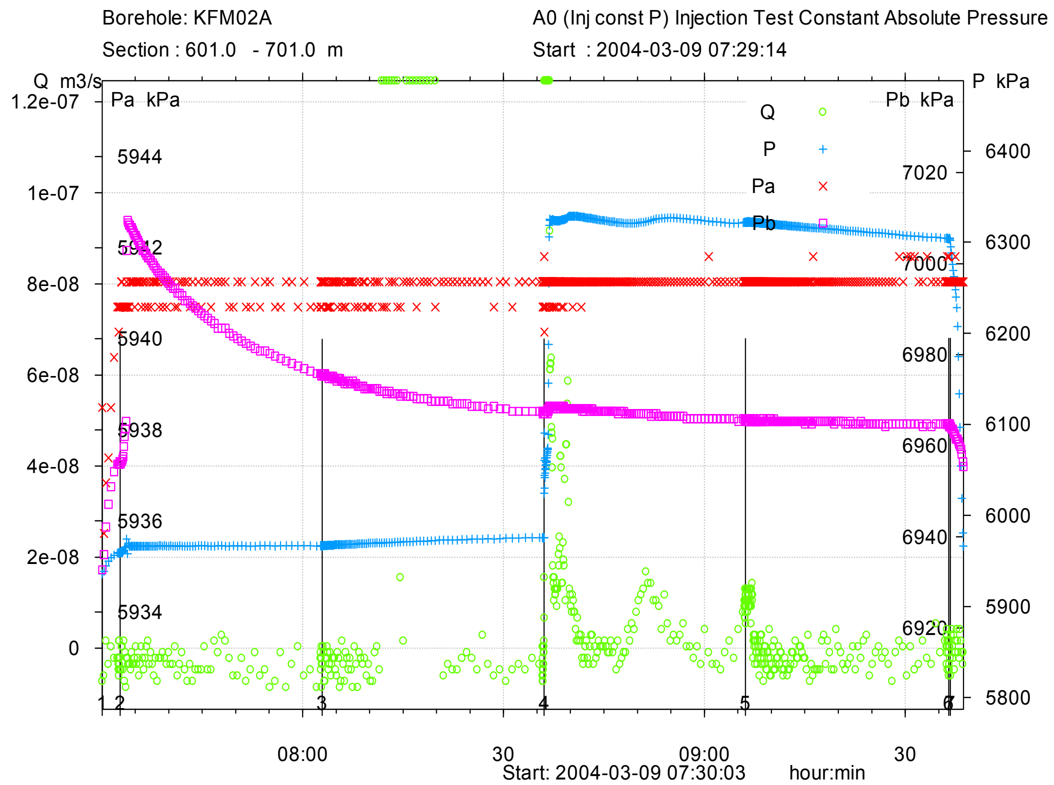



***Figure A3-26.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 601-701 m in borehole KFM02A.*

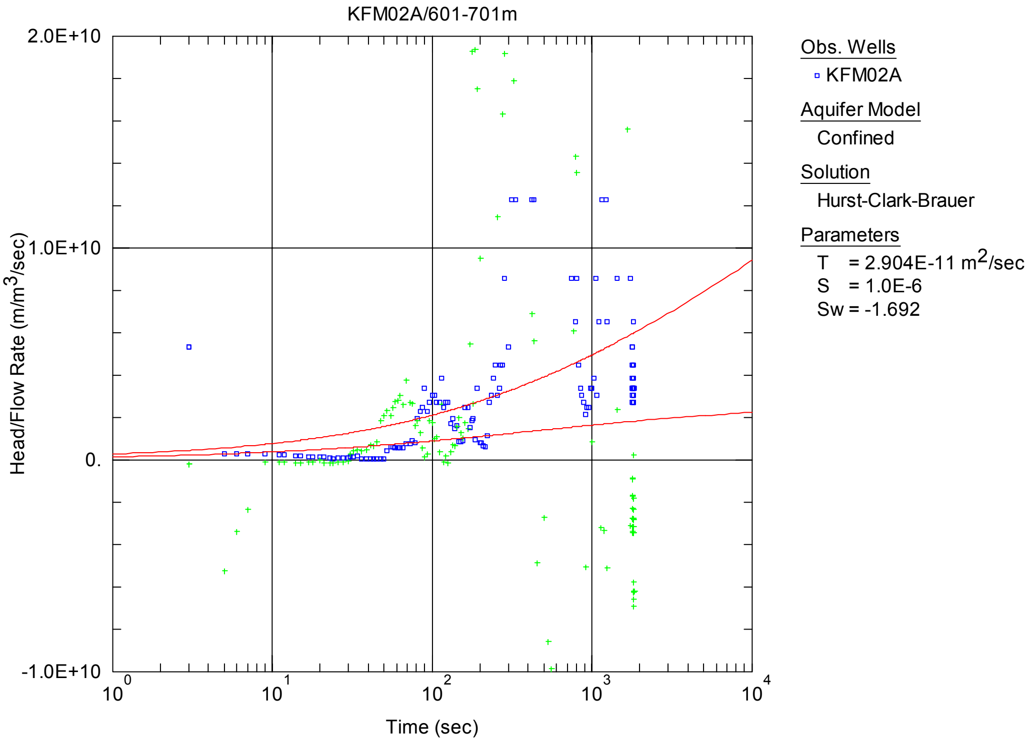



***Figure A3-27.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 601-701 m in KFM02A.*

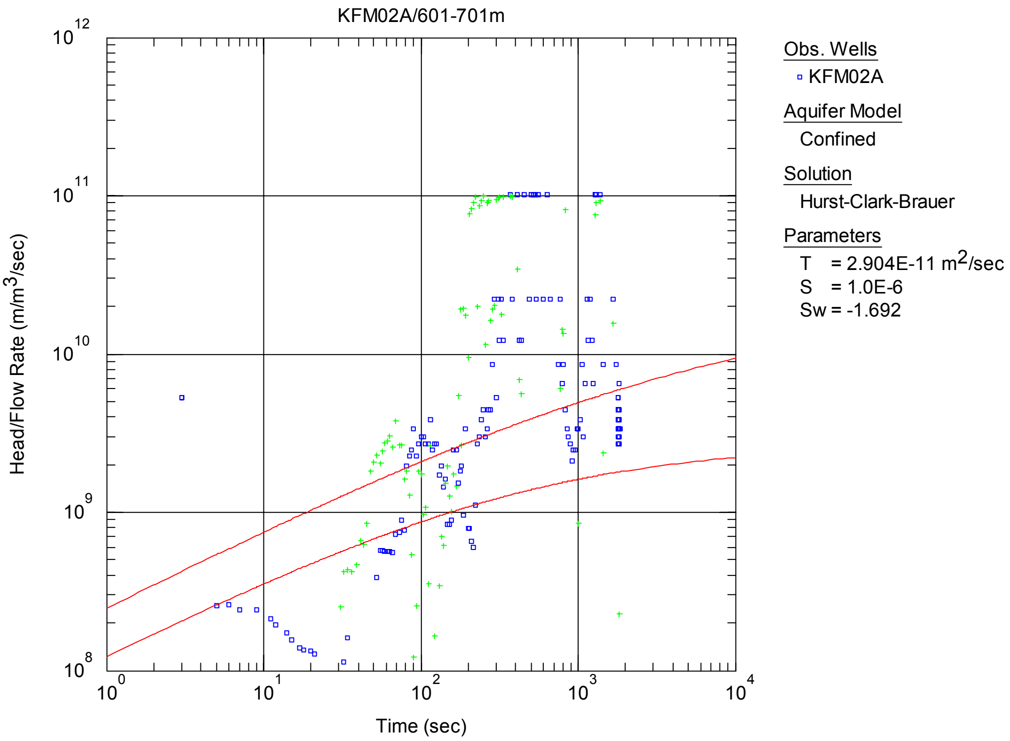



***Figure A3-28.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 601-701 m in KFM02A*

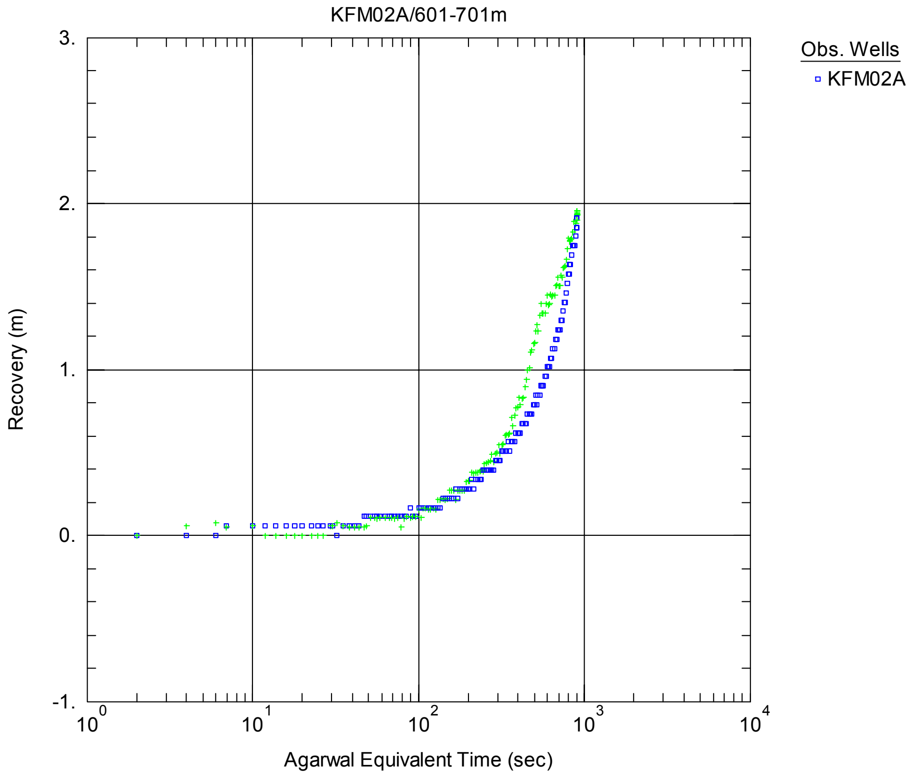



***Figure A3-29.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 601-701 m in KFM02A.*

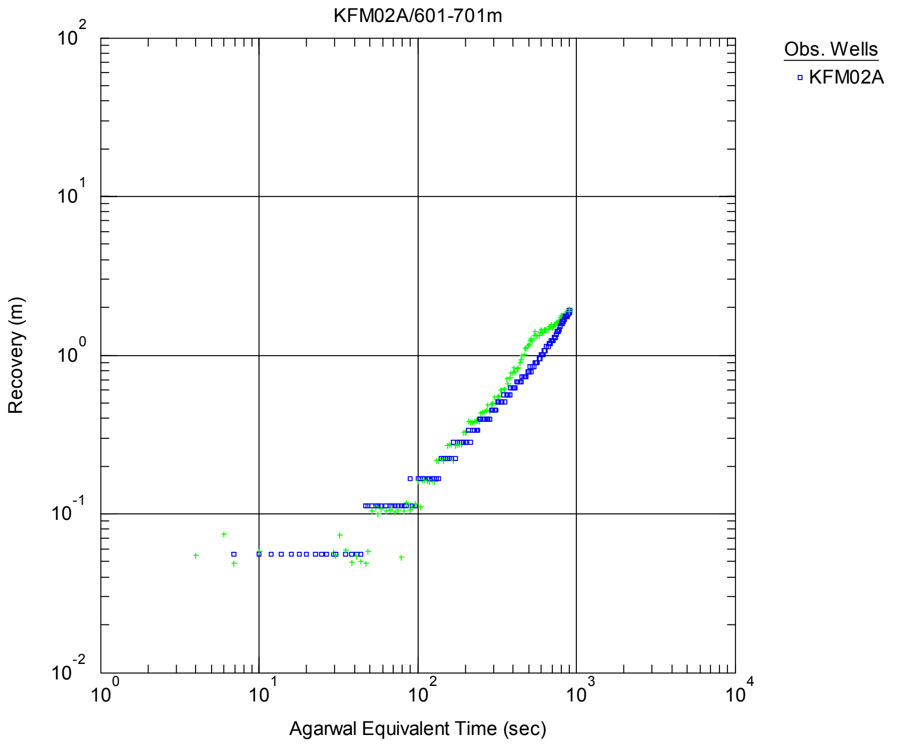



***Figure A3-30.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 601-701 m in KFM02A.*

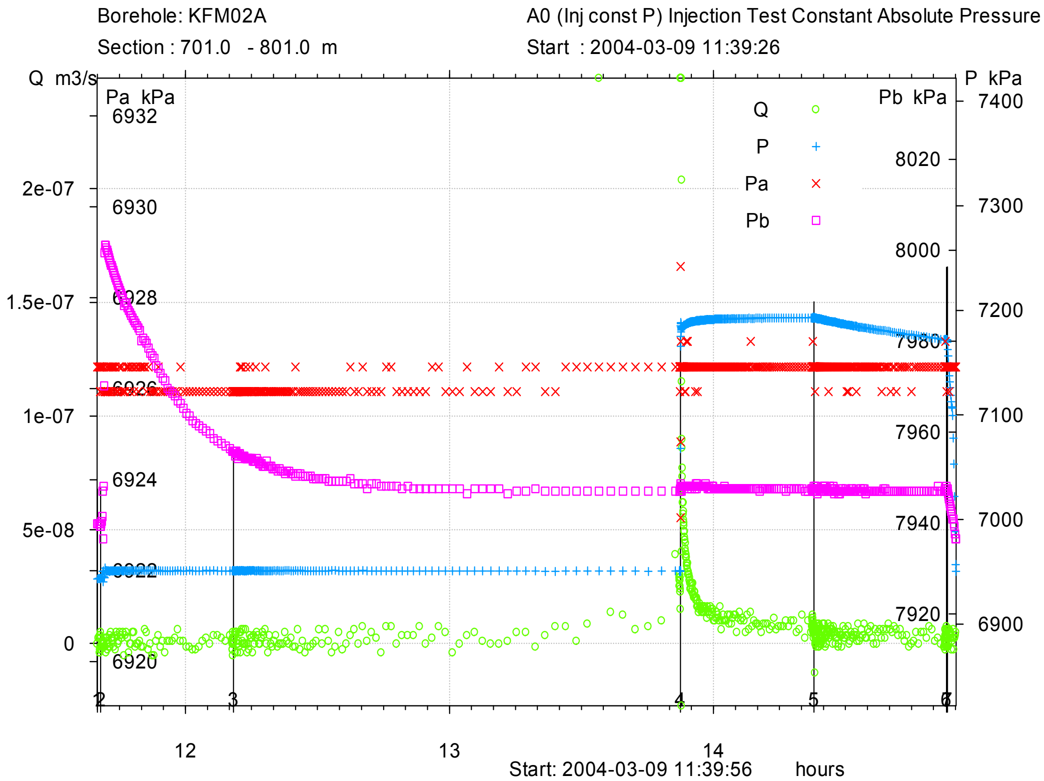



*__Figure A3-31.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 701-801 m in borehole KFM02A.*

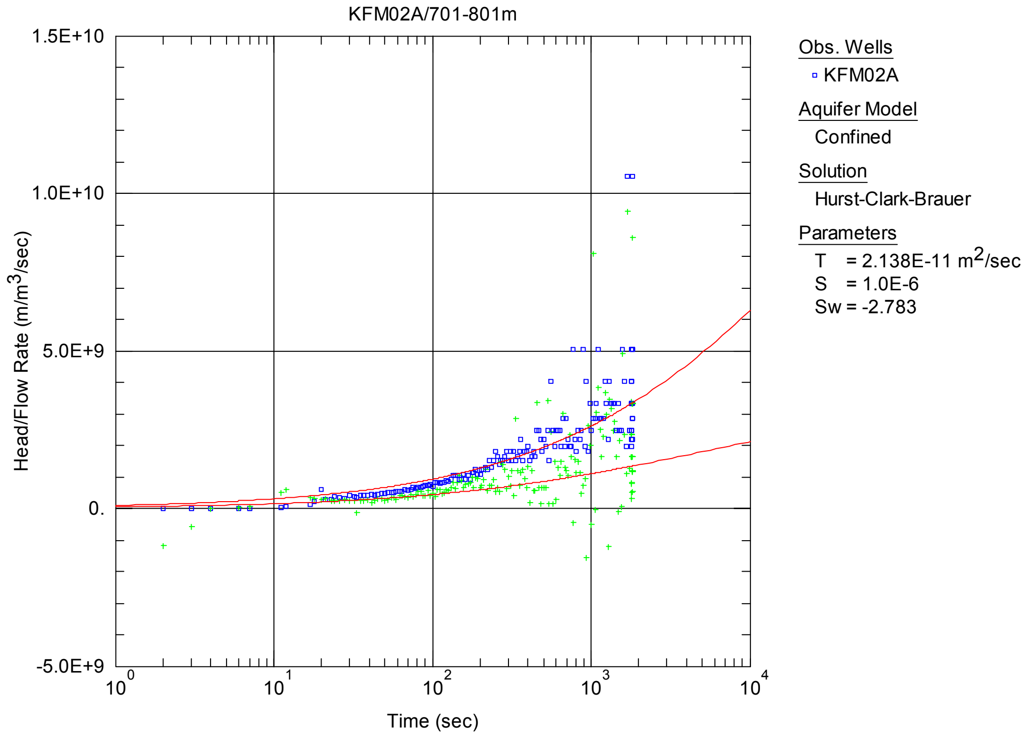



***Figure A3-32.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 701-801 m in KFM02A.*

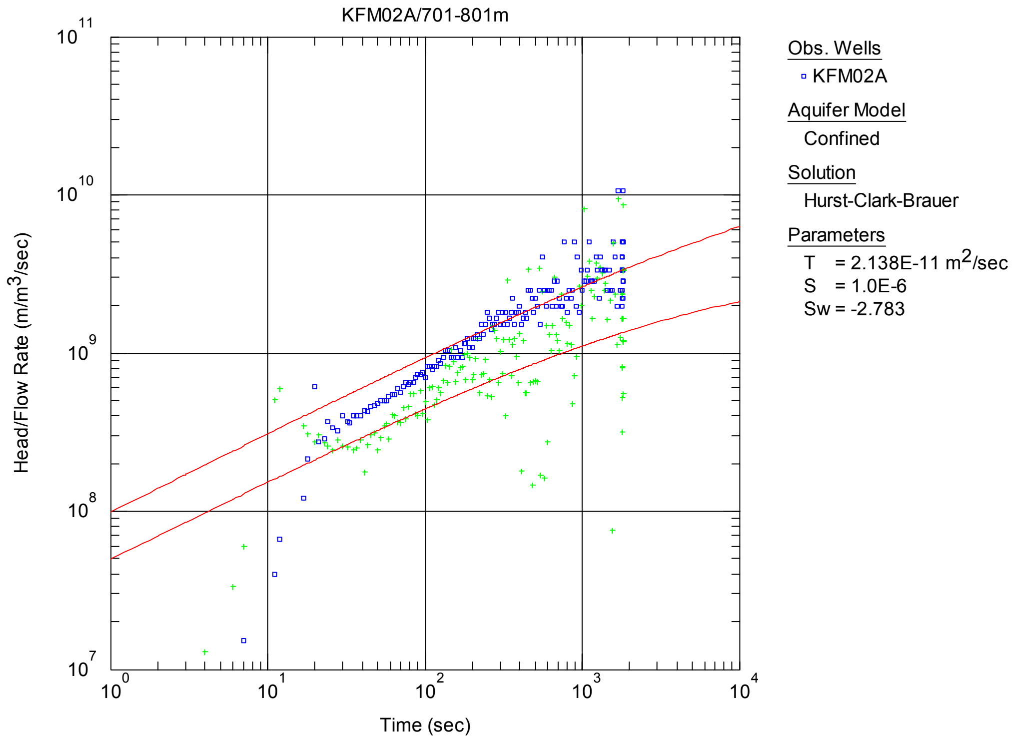



***Figure A3-33.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 701-801 m in KFM02A.*

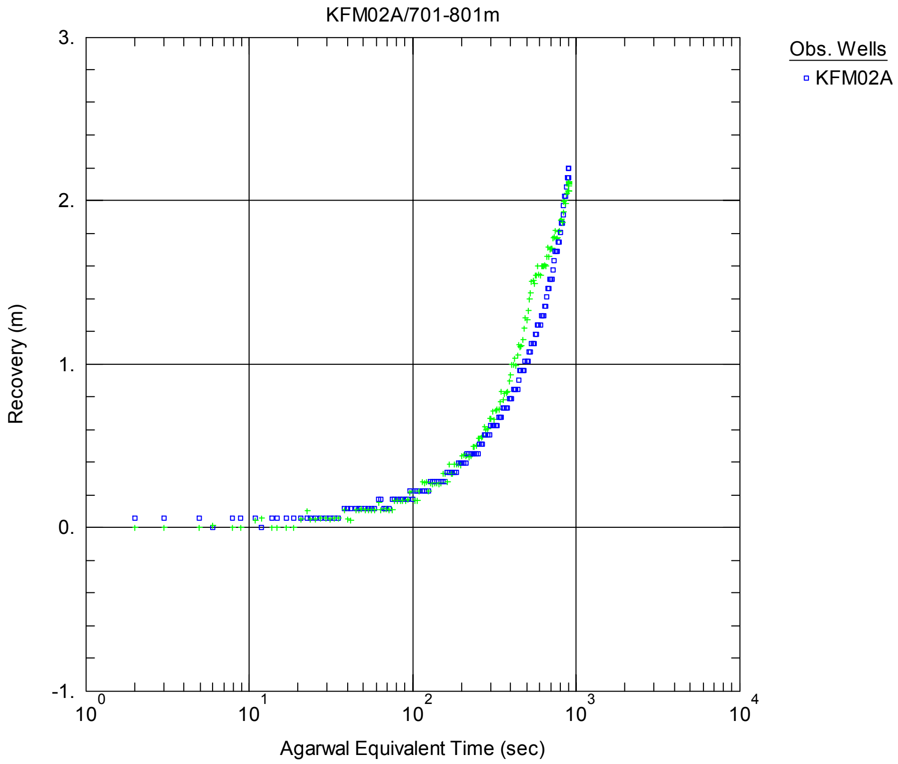



***Figure A3-34.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 701-801 m in KFM02A.*

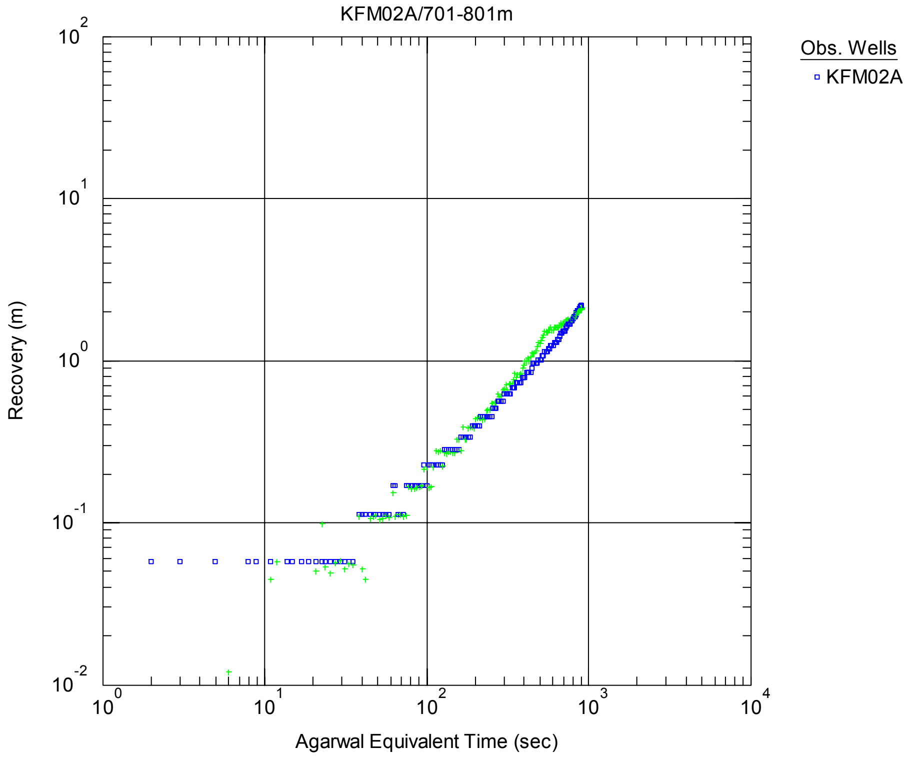



***Figure A3-35.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 701-801 m in KFM02A.*

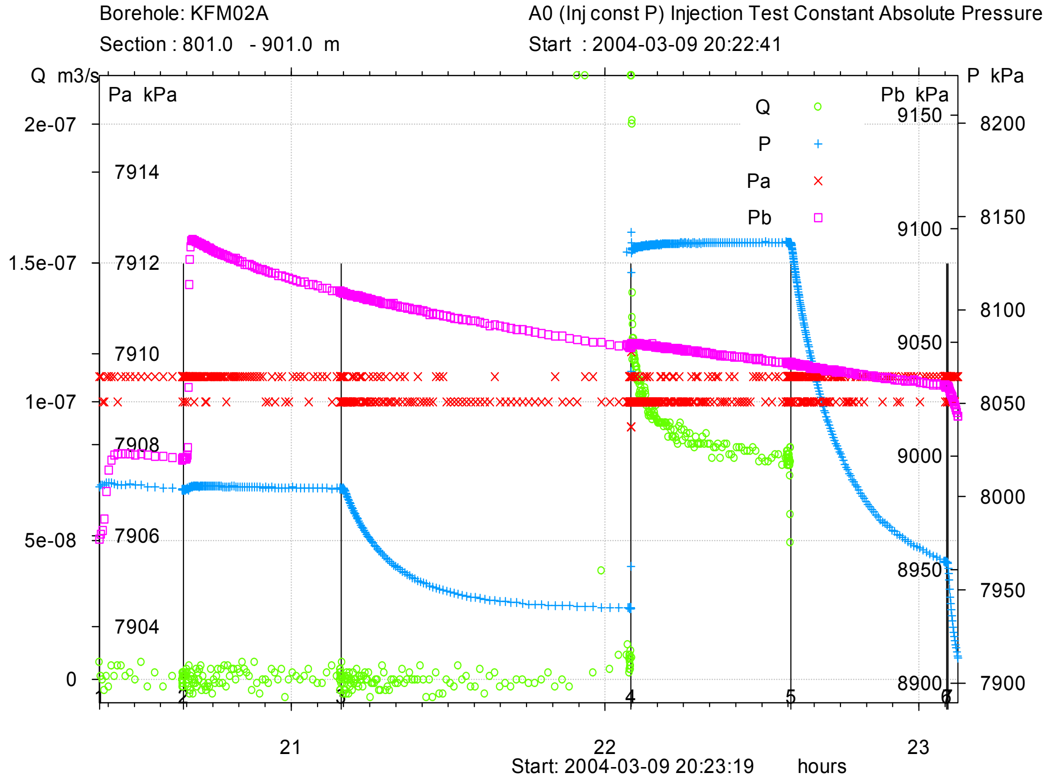



*Figure A3-36.* *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 801-901 m in borehole KFM02A.*

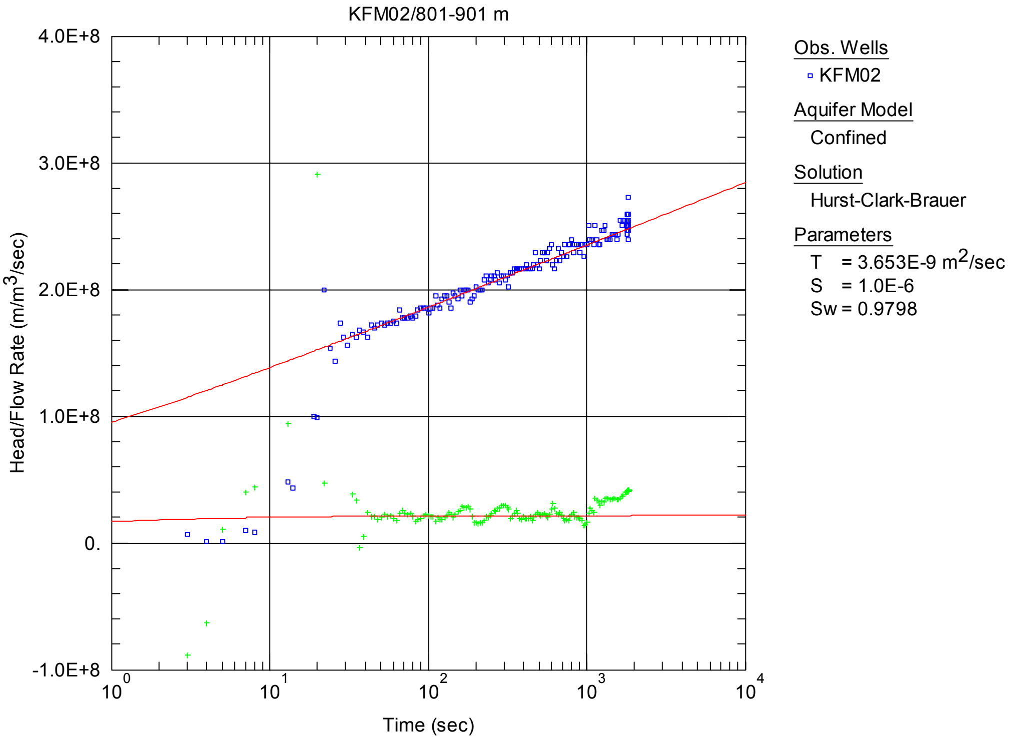



***Figure A3-37.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 801-901 m in KFM02A.*

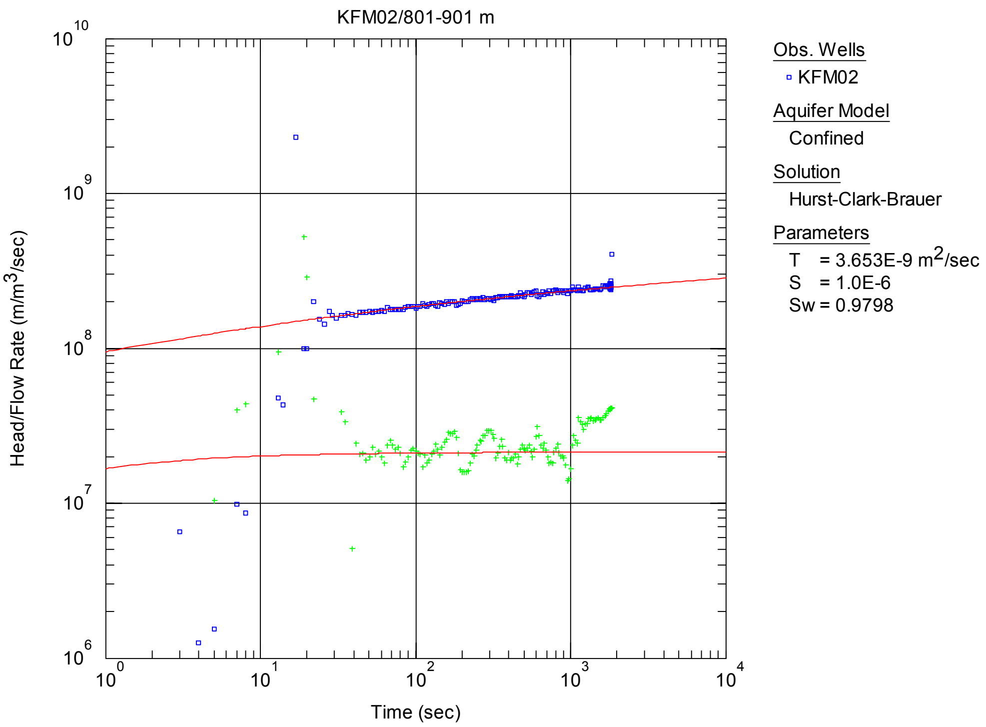



***Figure A3-38.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 801-901 m in KFM02A.*

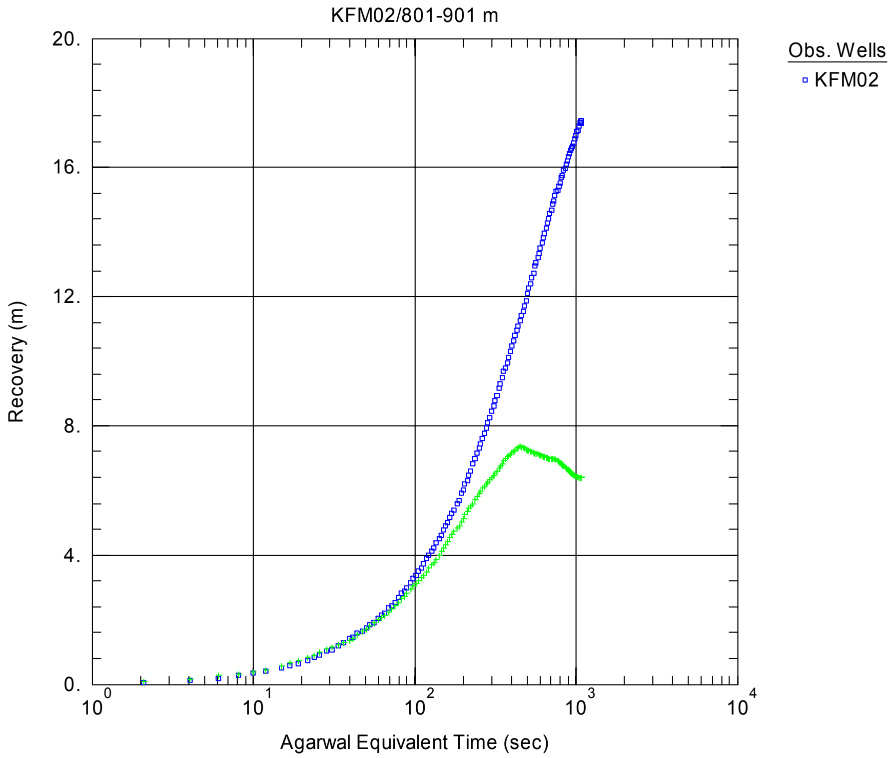



***Figure A3-39.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 801-901 m in KFM02A.*

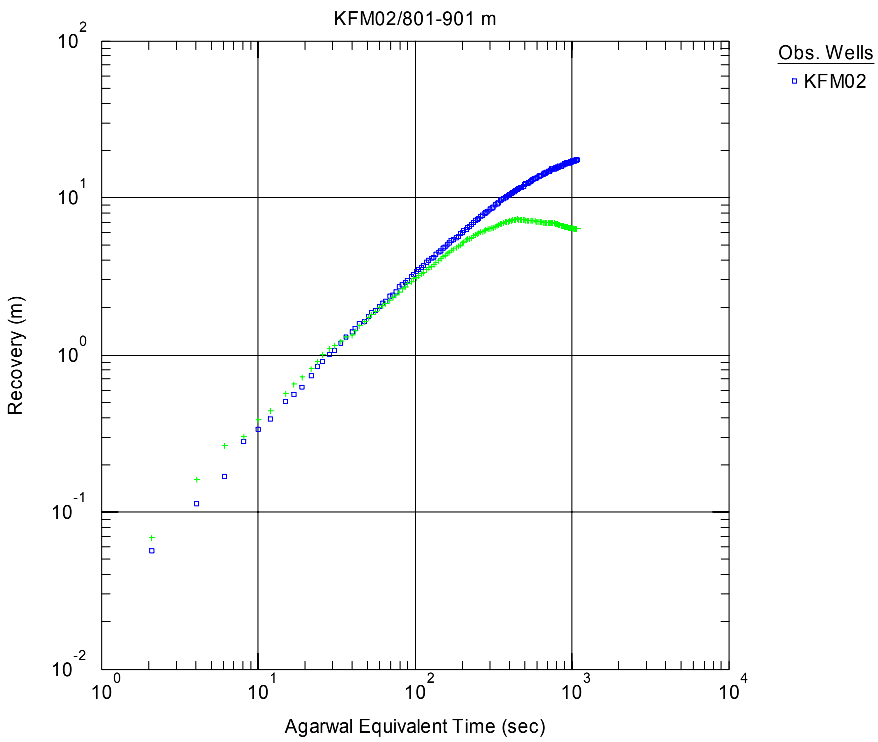



***Figure A3-40.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 801-901 m in KFM02A.*

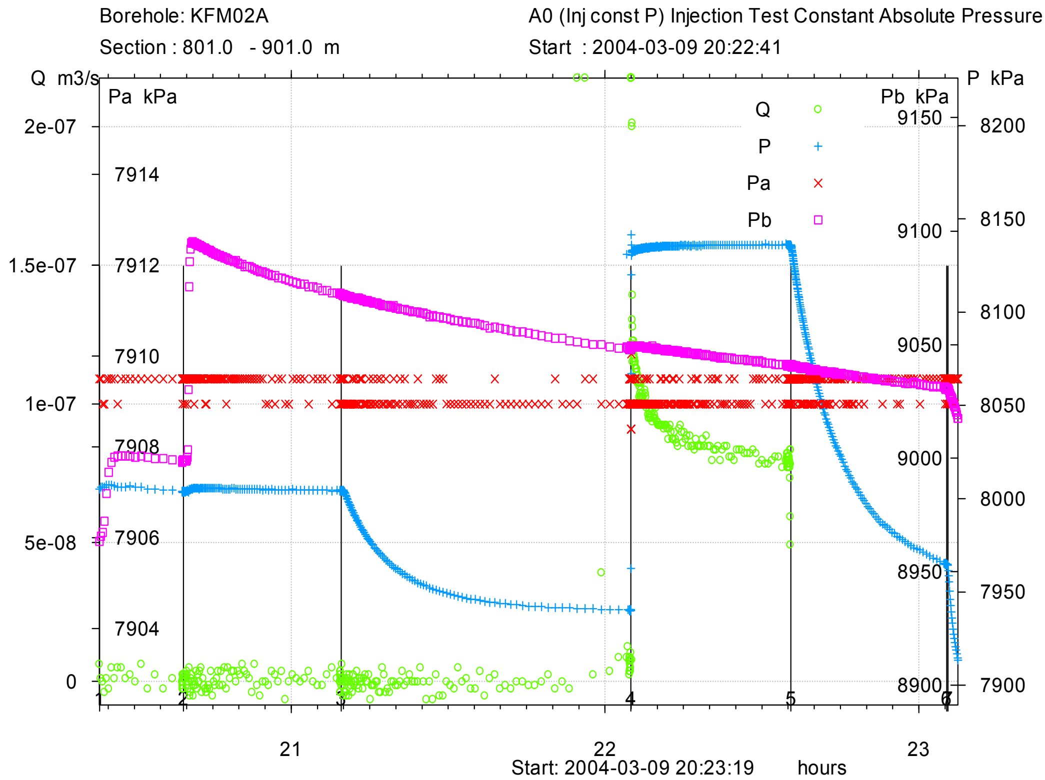



***Figure A3-41.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 801.0-901.0 m in borehole KFM02A. Pb in this diagram is pressure in the section 902.00-1002.44 m, evaluated as a pressure-pulse test.*

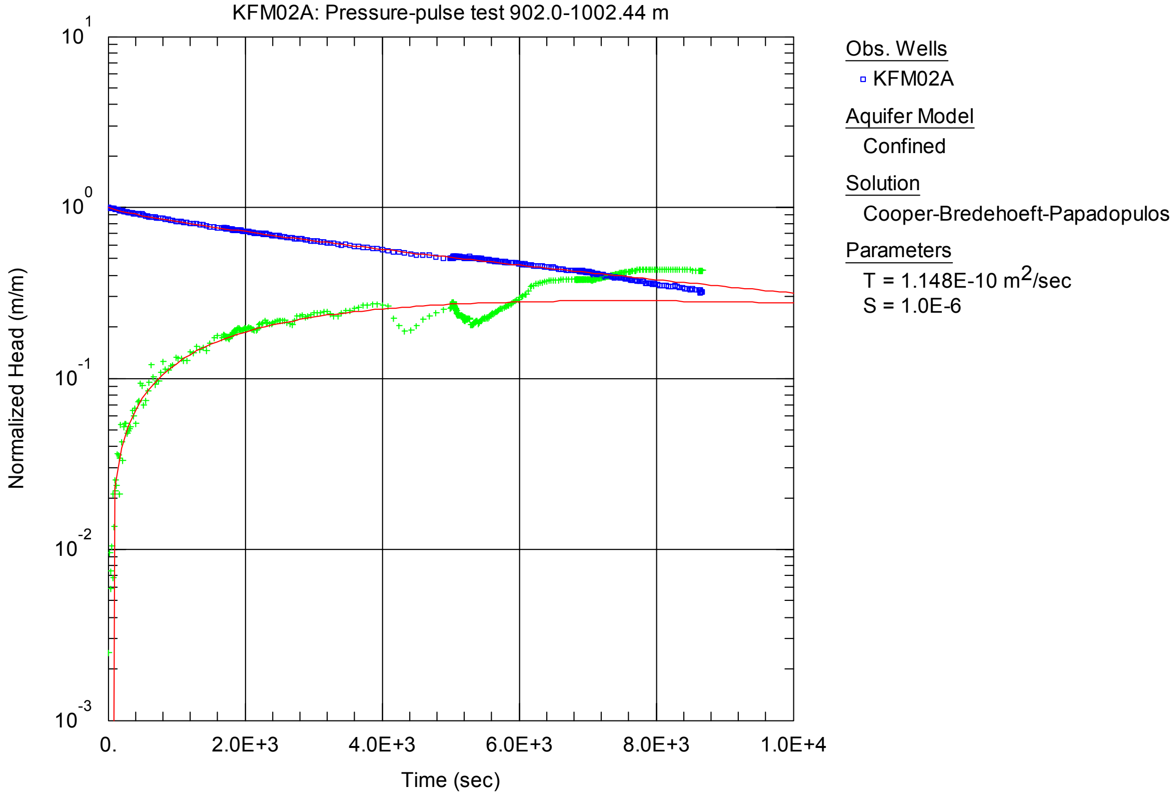



***Figure A3-42.*** *Lin-log plot of normalized head (□) and derivative (+) versus time, showing fit to Cooper-Bredehoeft-Papadopulos solution (solid line), from the injection test in section 902-1002.44 m in KFM02A*

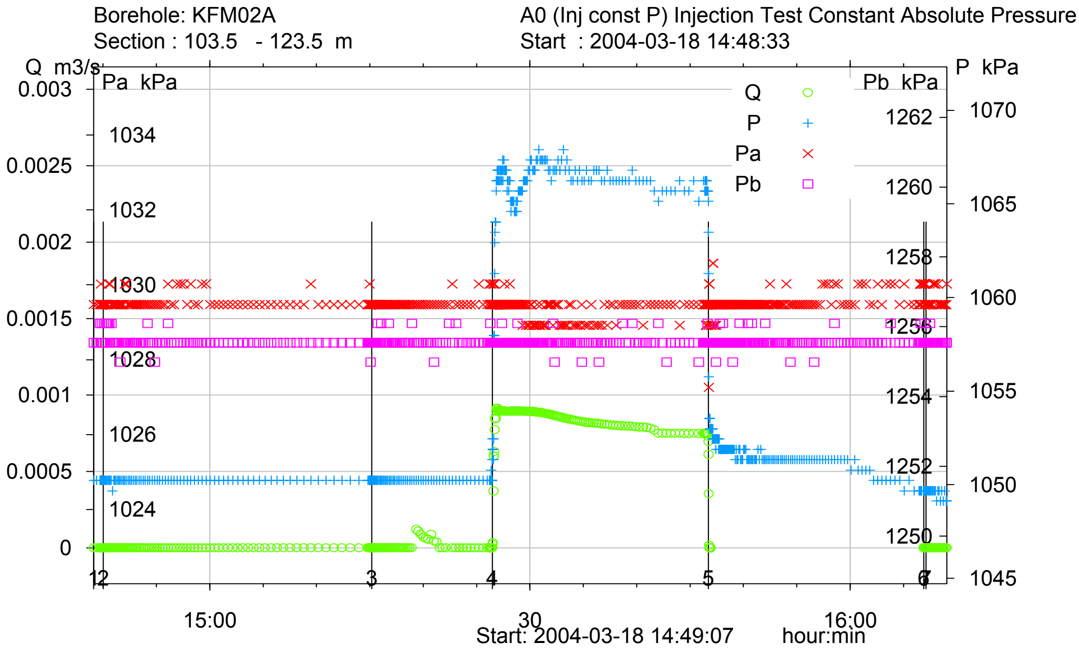



***Figure A3-43.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 103.5-123.5 m in borehole KFM02A*

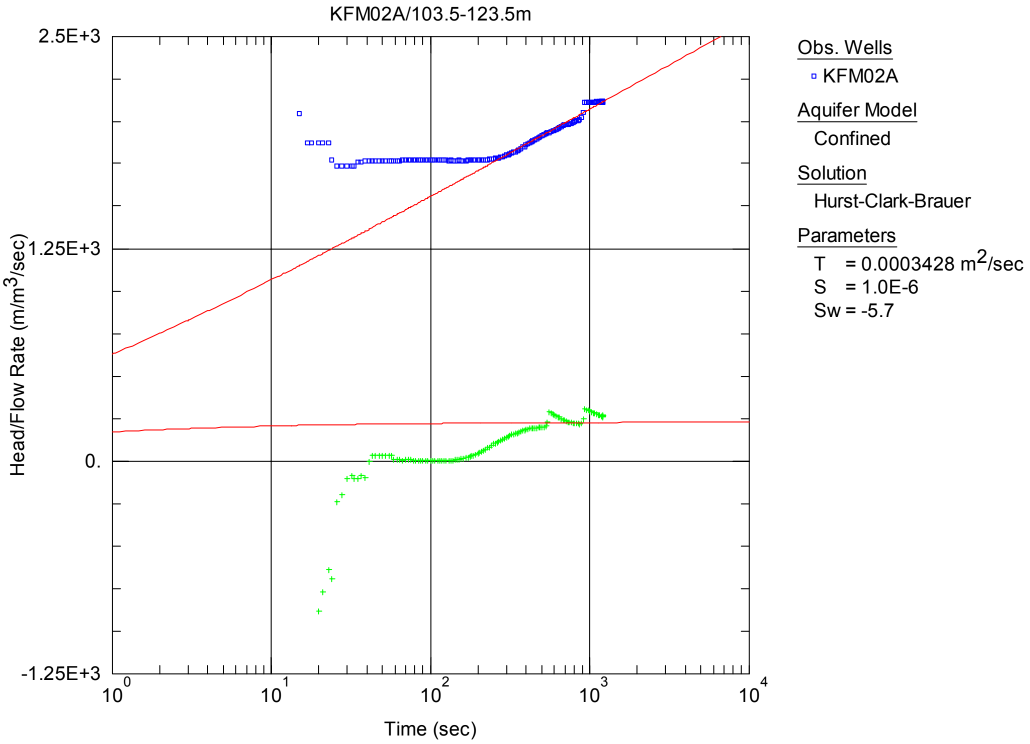



***Figure A3-44.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 103.5-123.5 m in KFM02A*

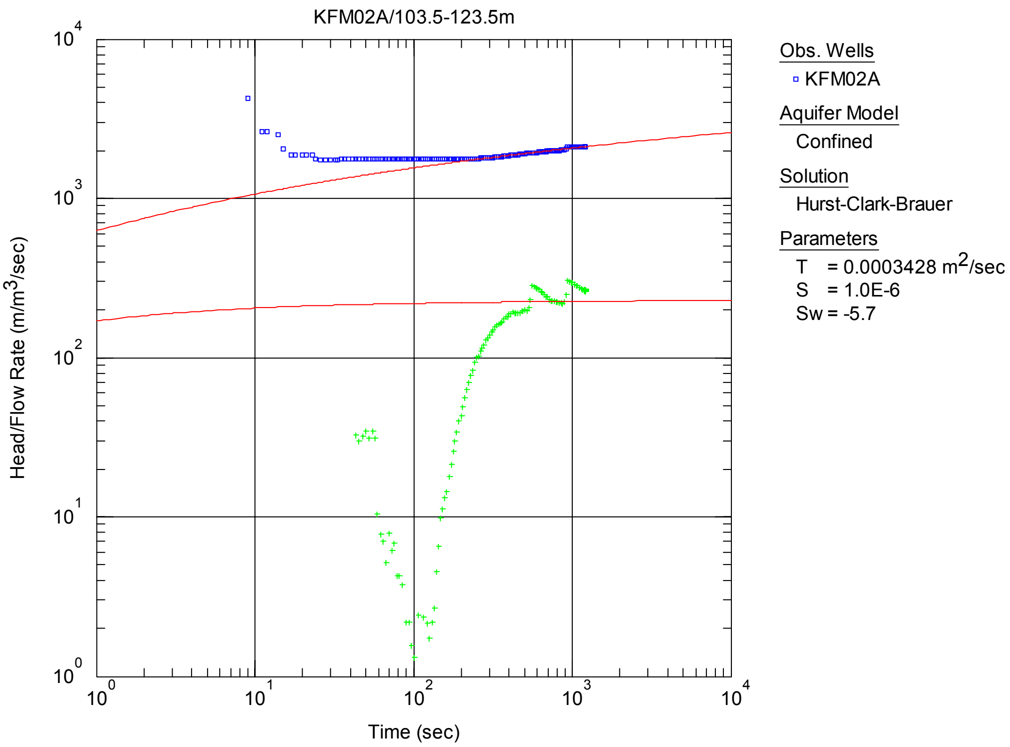



***Figure A3-45.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 103.5-123.5 m in KFM02A*

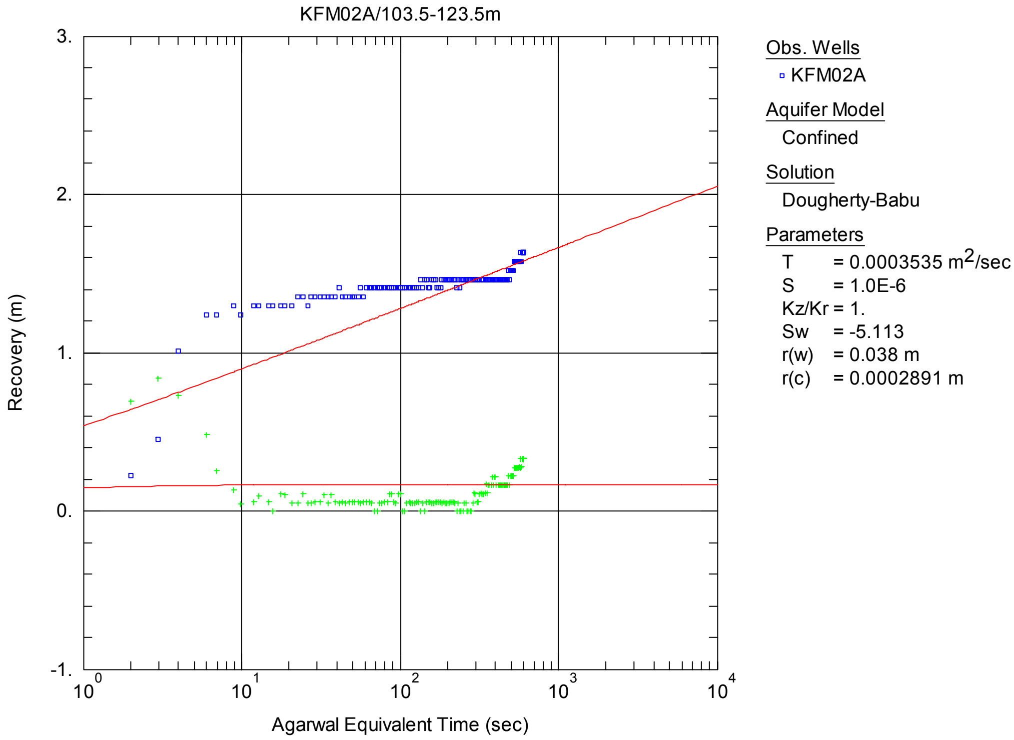



***Figure A3-46.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 103.5-123.5 m in KFM02A.*

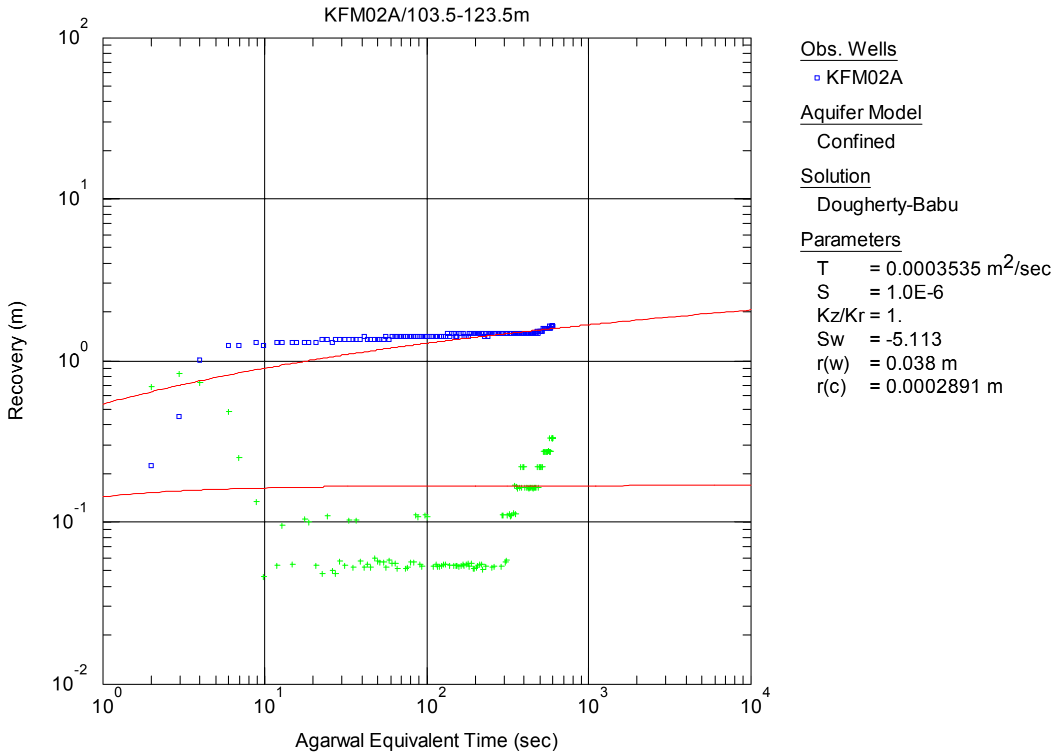



***Figure A3-47.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 103.5-123.5 m in KFM02A.*

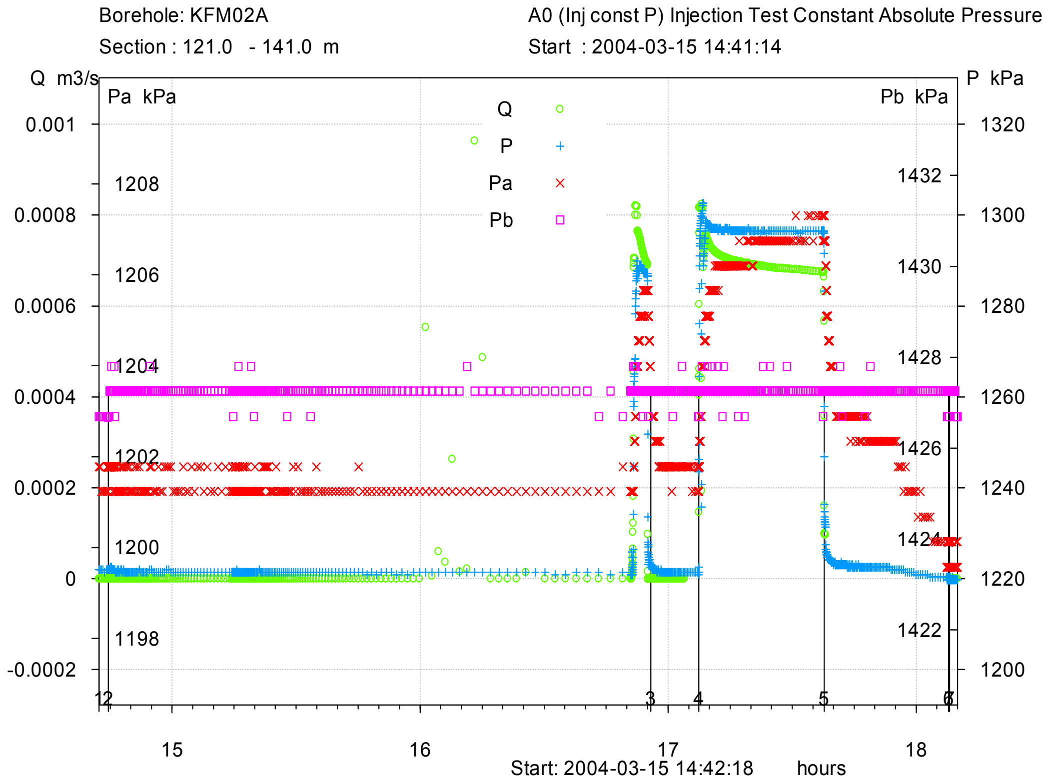



***Figure A3-48.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 121-141 m in borehole KFM02A.*

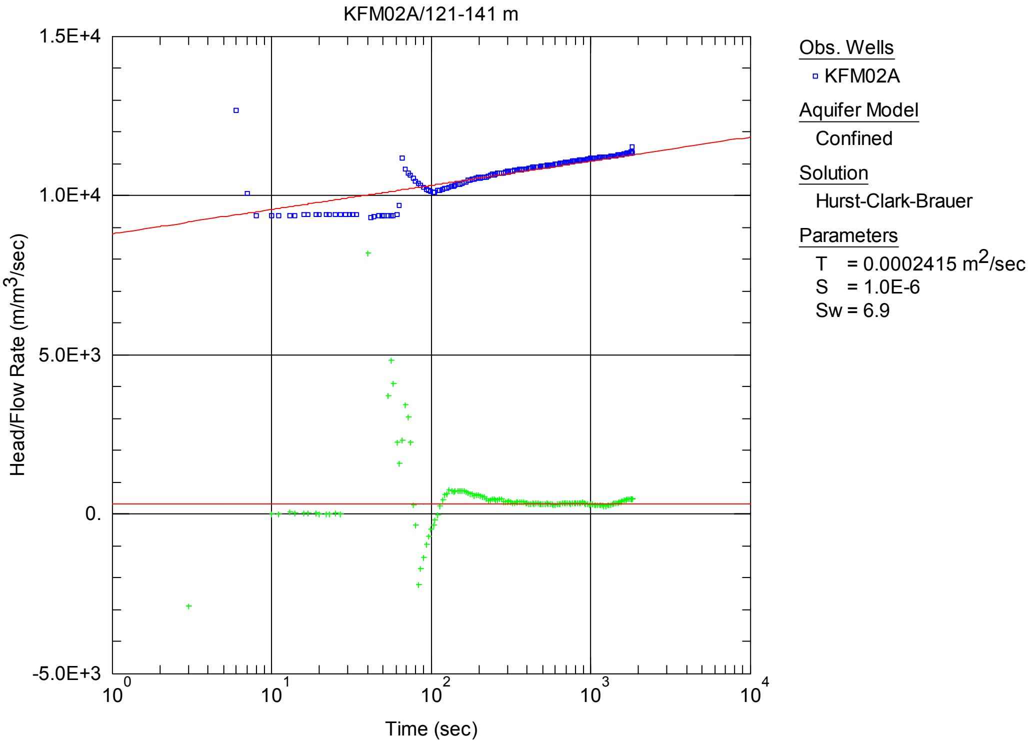



***Figure A3-49.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 121-141 m in KFM02A.*

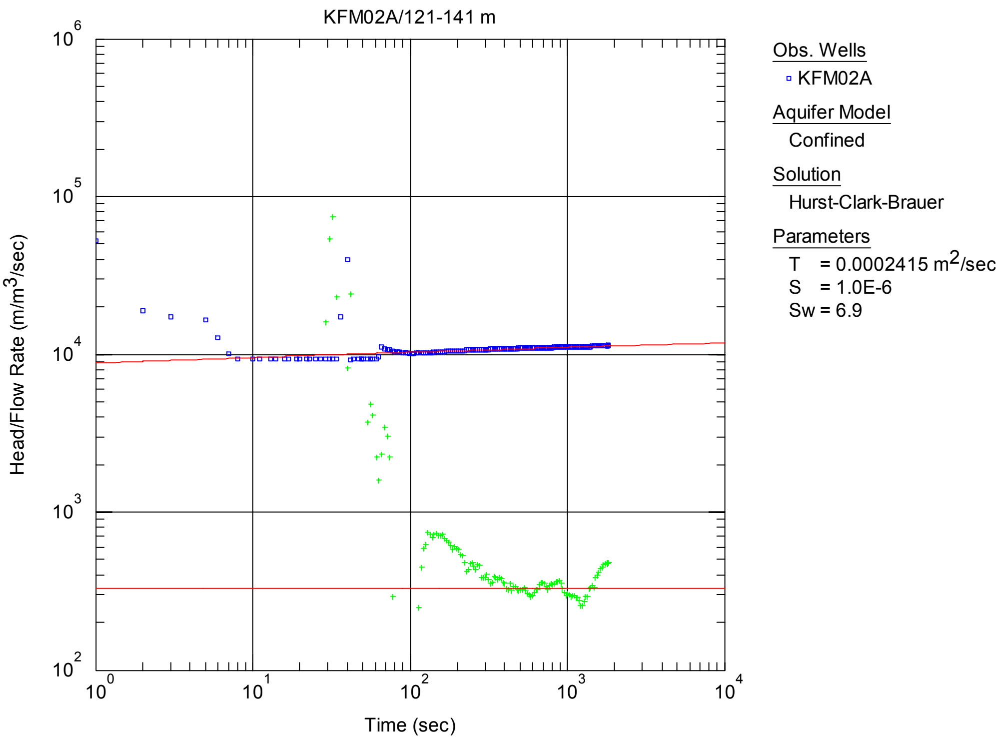



***Figure A3-50.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 121-141 m in KFM02A.*

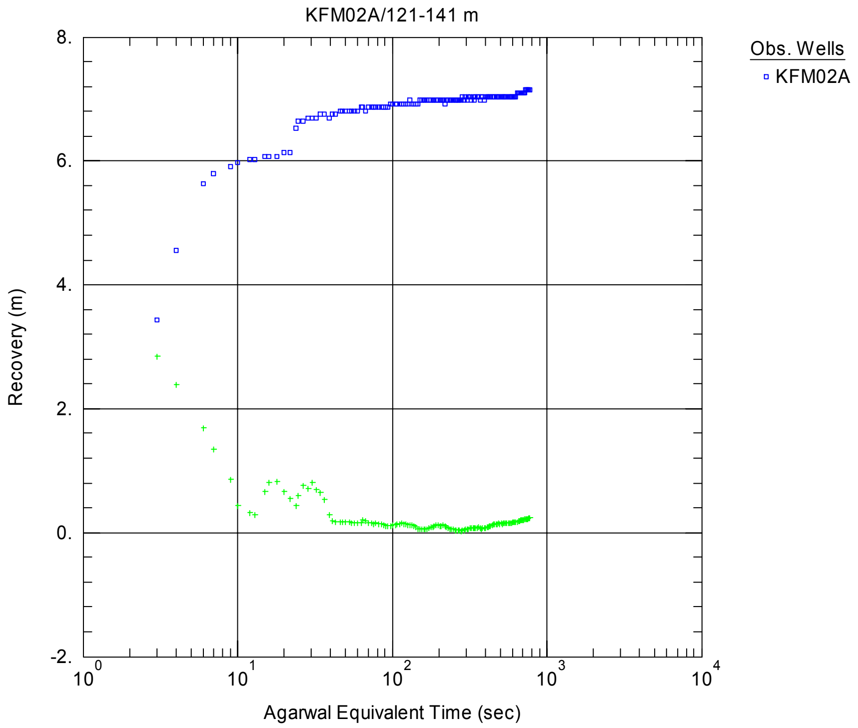



***Figure A3-51.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 121-141 m in KFM02A.*

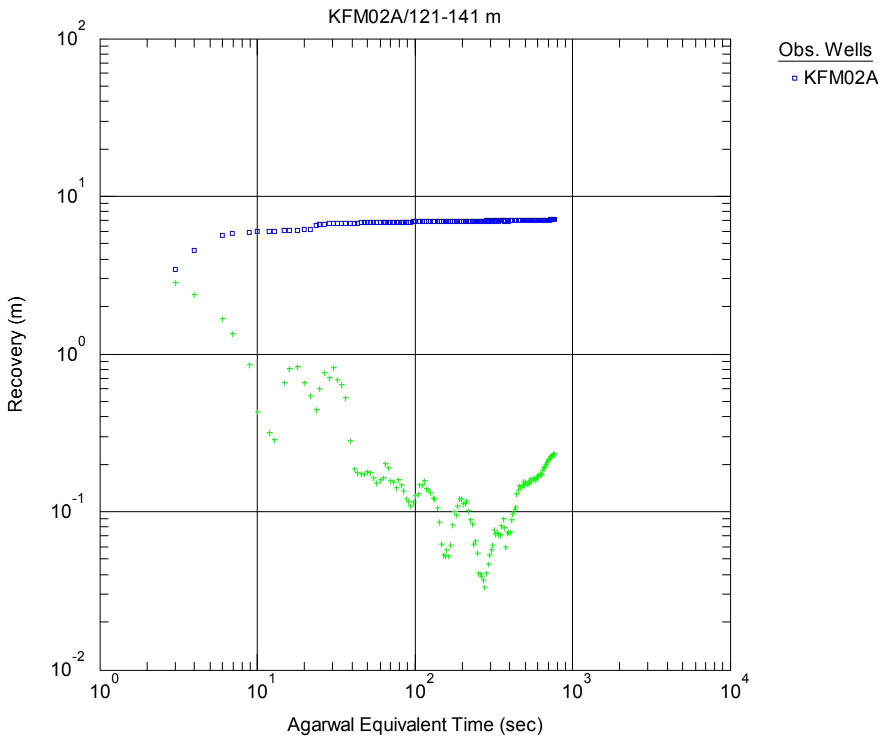



***Figure A3-52.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 121-141 m in KFM02A.*

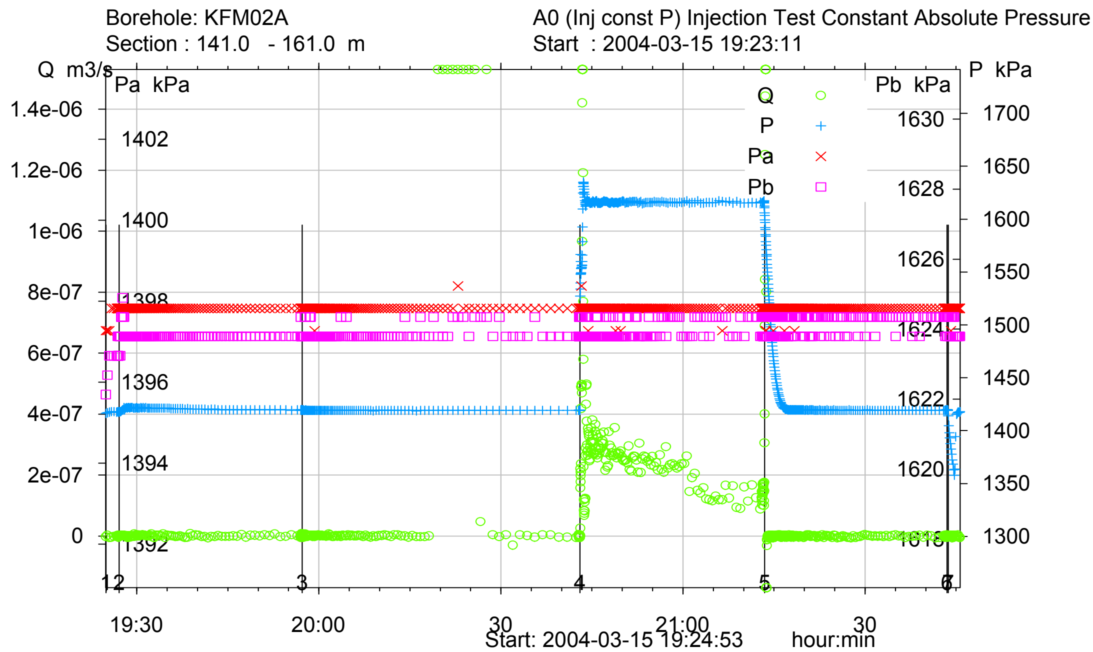



***Figure A3-53.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 141-161 m in borehole KFM02A.*

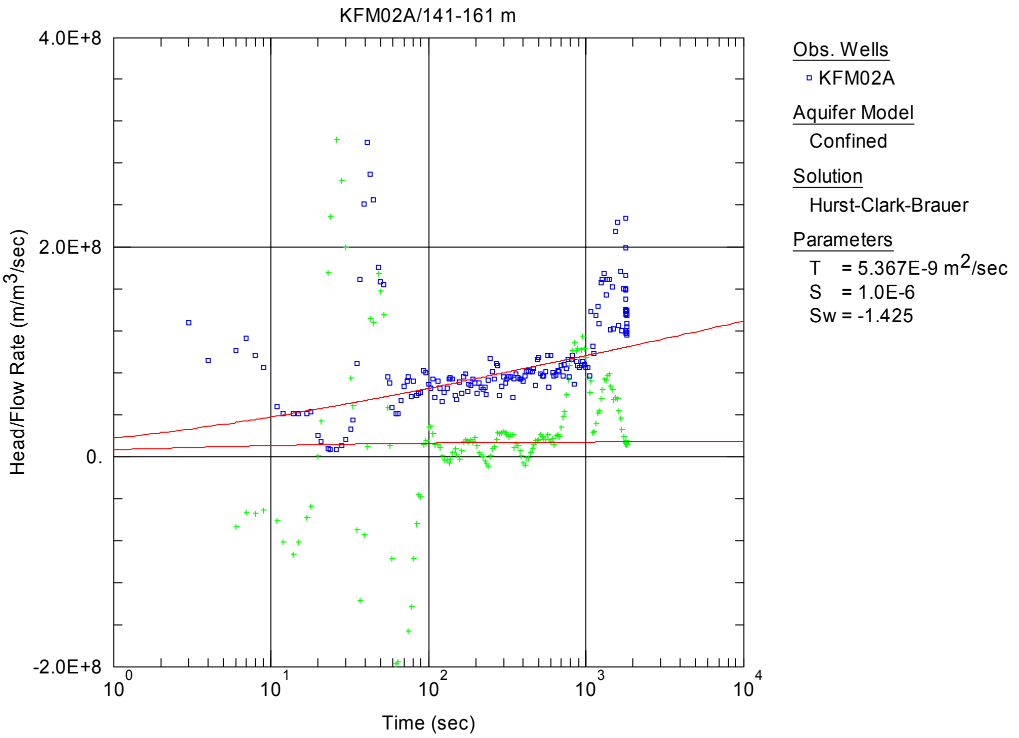



***Figure A3-54.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 141-161 m in KFM02A.*

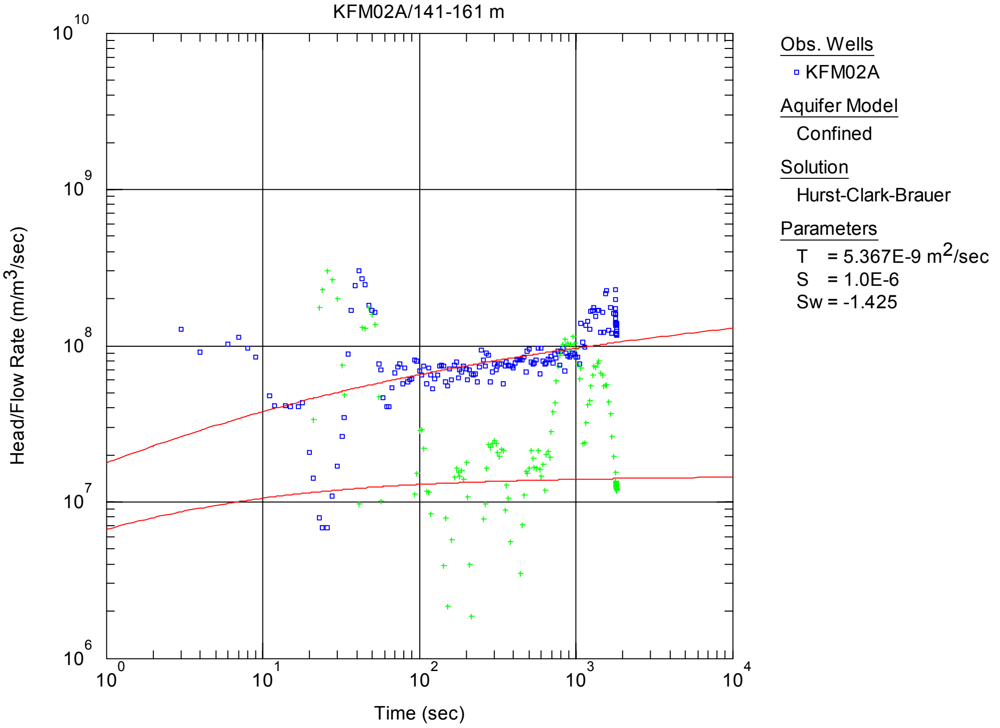



***Figure A3-55.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 141-161 m in KFM02A.*

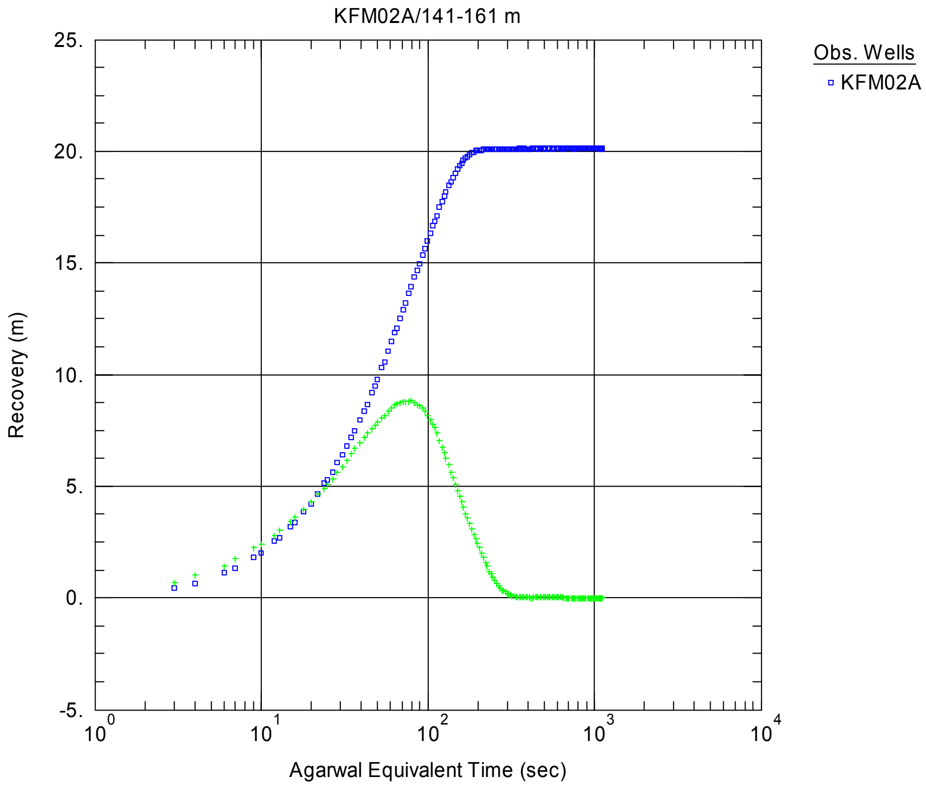



***Figure A3-56.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 141-161 m in KFM02A.*

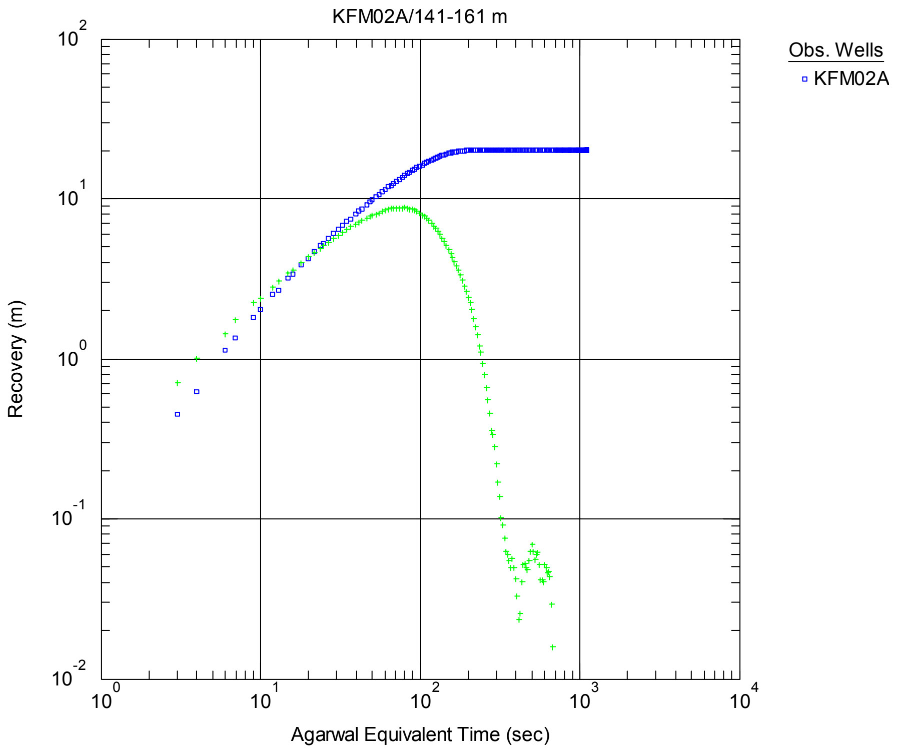



***Figure A3-57.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 141-161 m in KFM02A.*

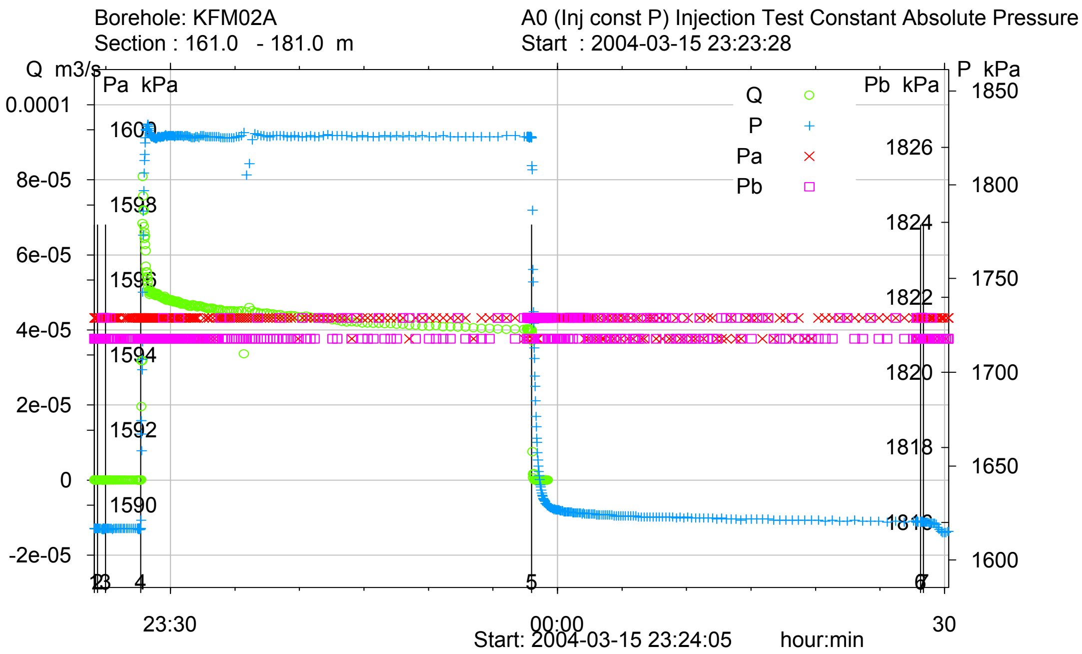



***Figure A3-58.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 161-181 m in borehole KFM02A.*

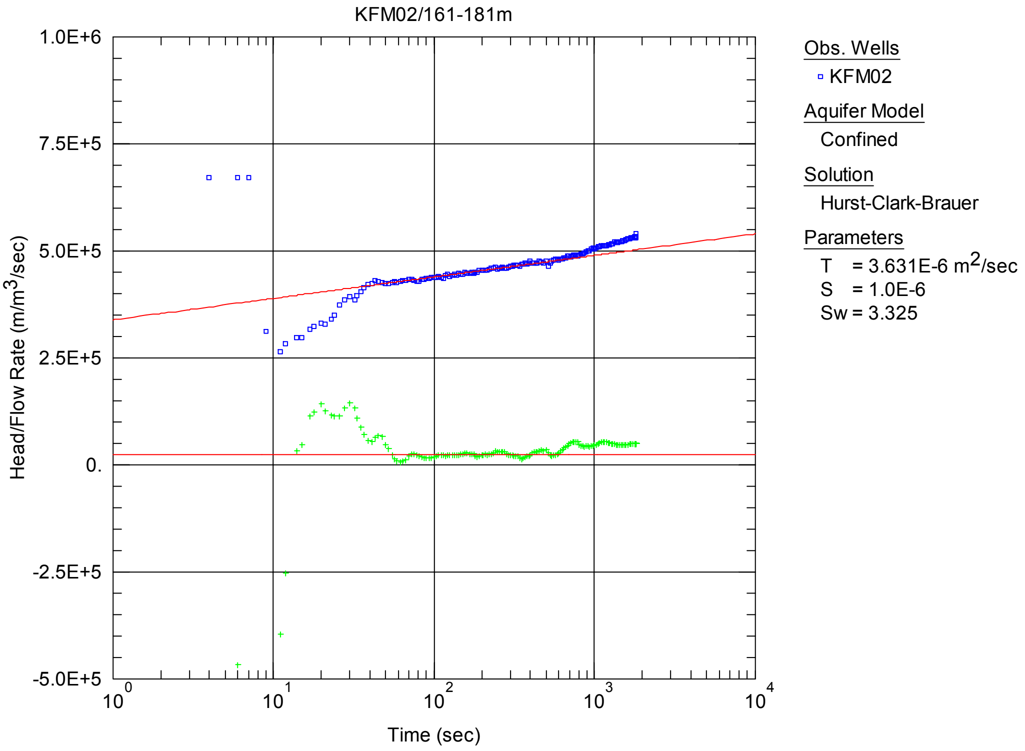



***Figure A3-59.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 161-181 m in KFM02A. First pseudo-radial flow regime.*

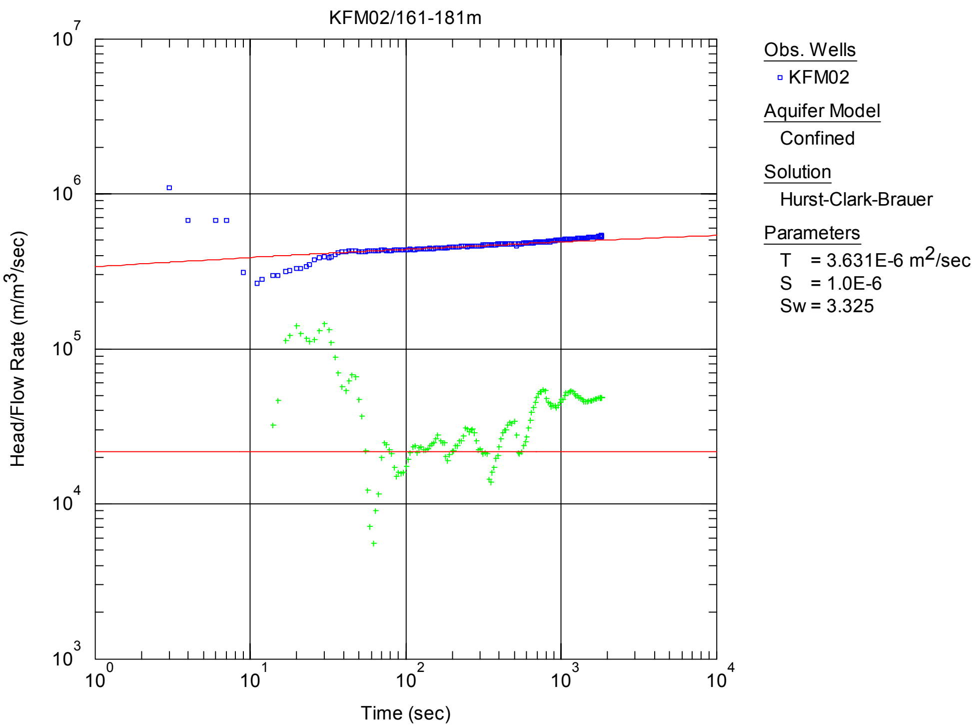



***Figure A3-60.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 161-181 m in KFM02A. First pseudo-radial flow regime.*

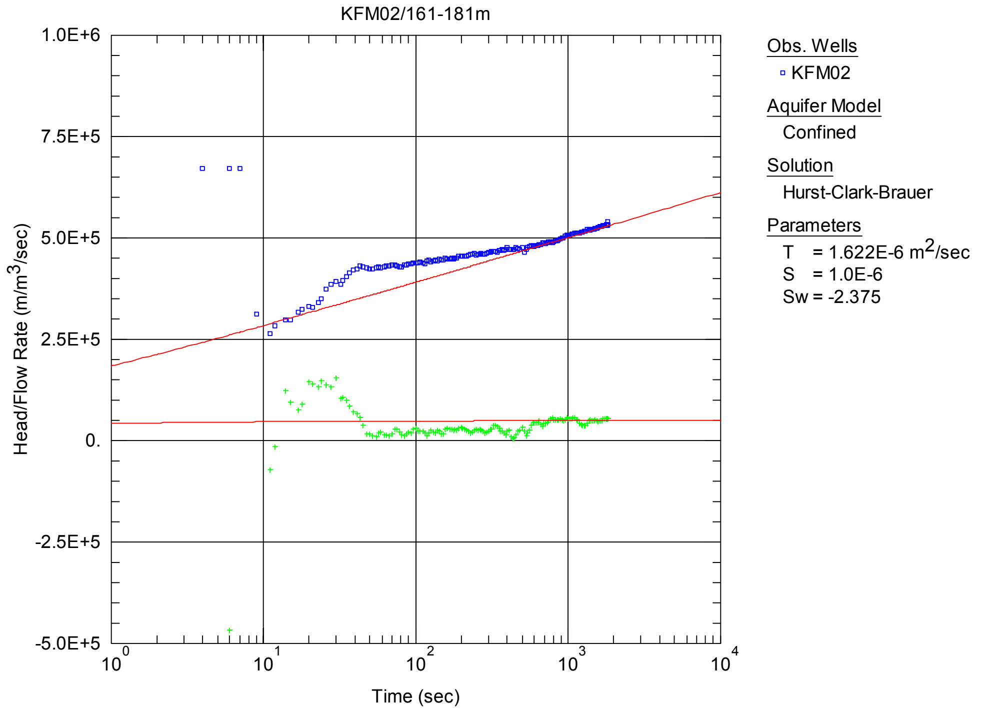



***Figure A3-61.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 161-181 m in KFM02A. Showing alternative type curve fit to the second pseudo-radial flow regime.*

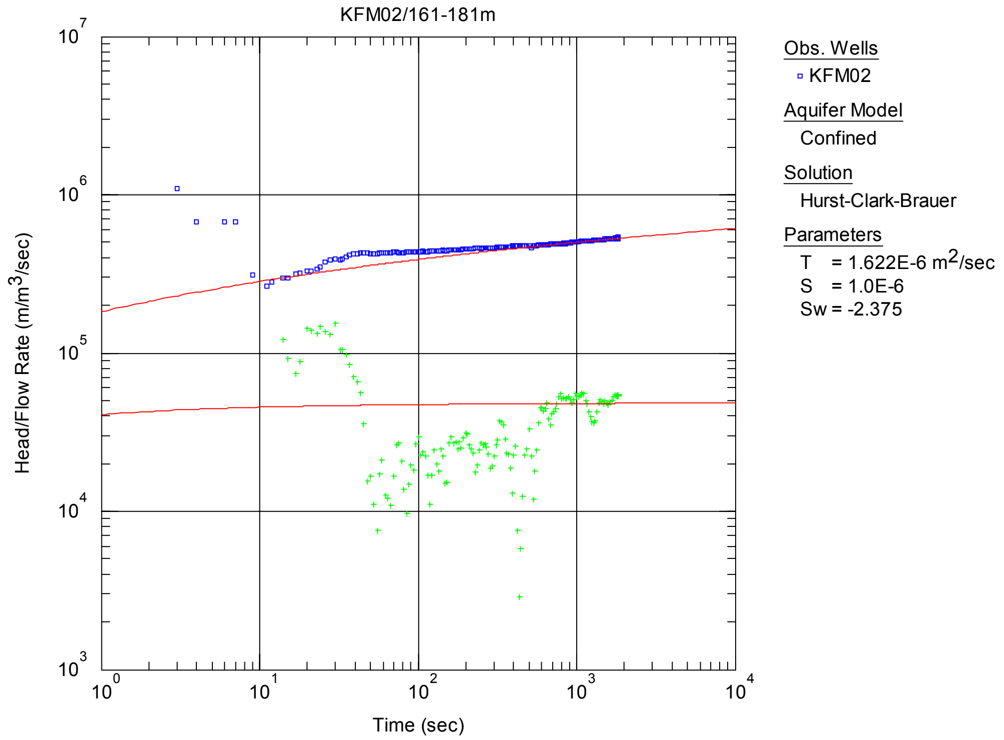



***Figure A3-62.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 161-181 m in KFM02A. Showing alternative type curve fit to the second pseudo-radial flow regime.*

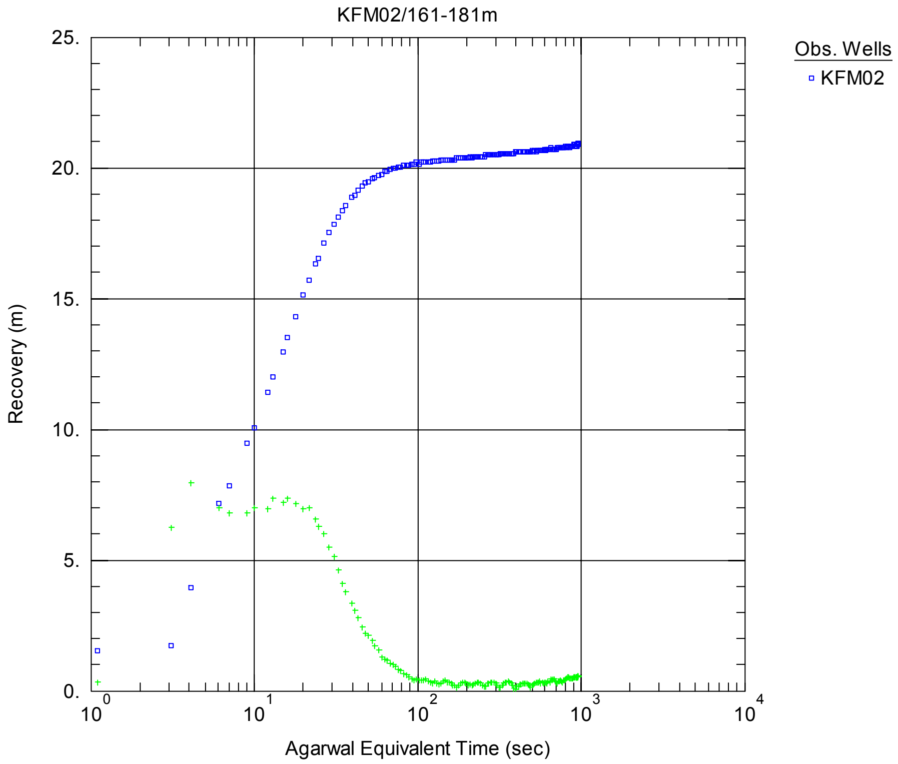



***Figure A3-63.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 161-181 m in KFM02A.*

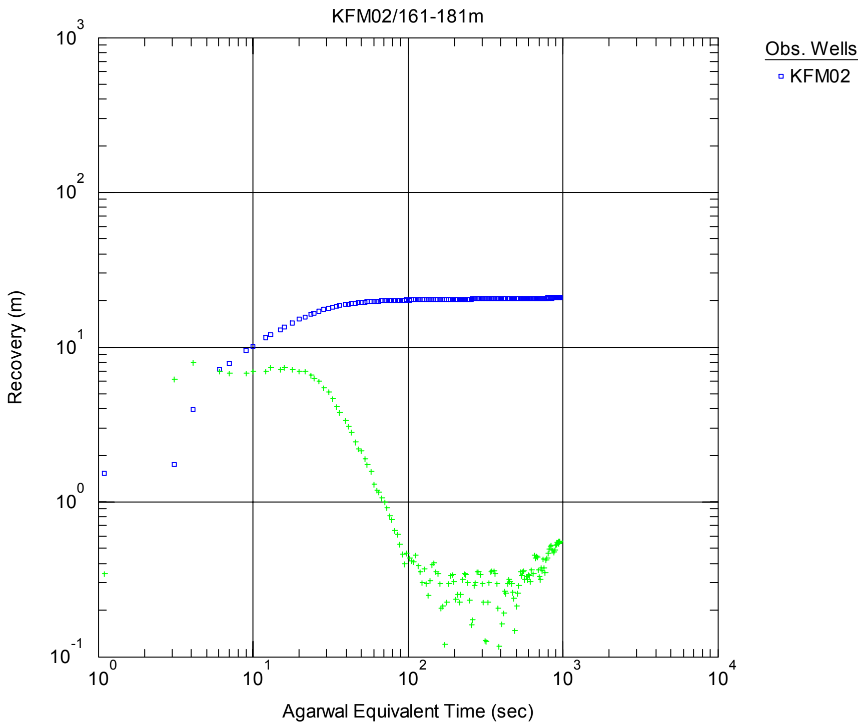



***Figure A3-64.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 161-181 m in KFM02A.*

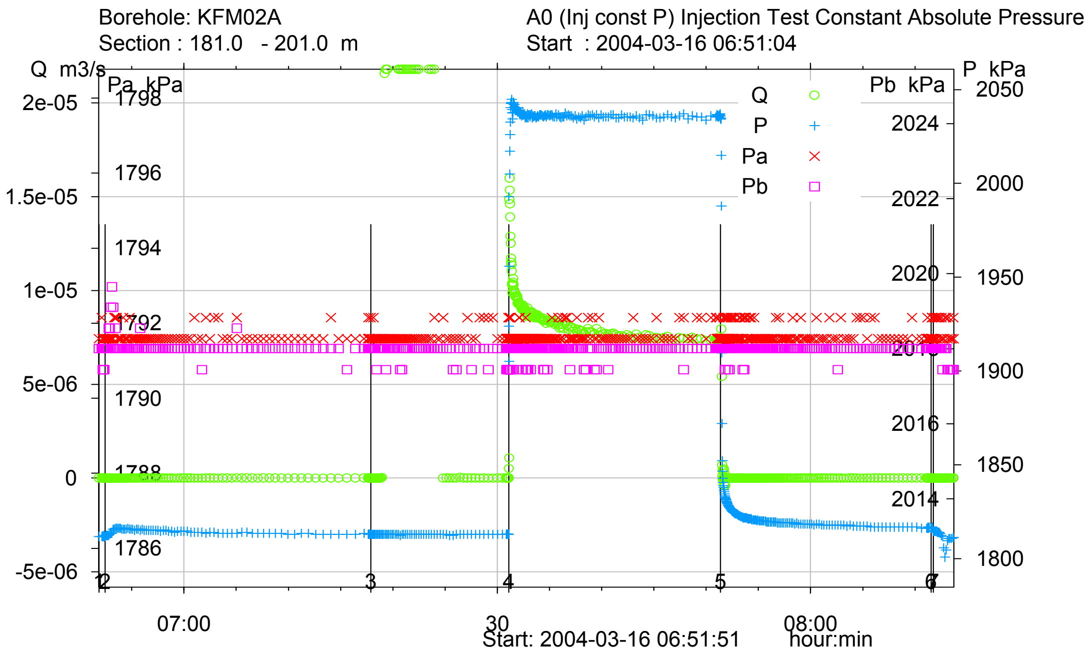



*Figure A3-65.* *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 181-201 m in borehole KFM02A.*

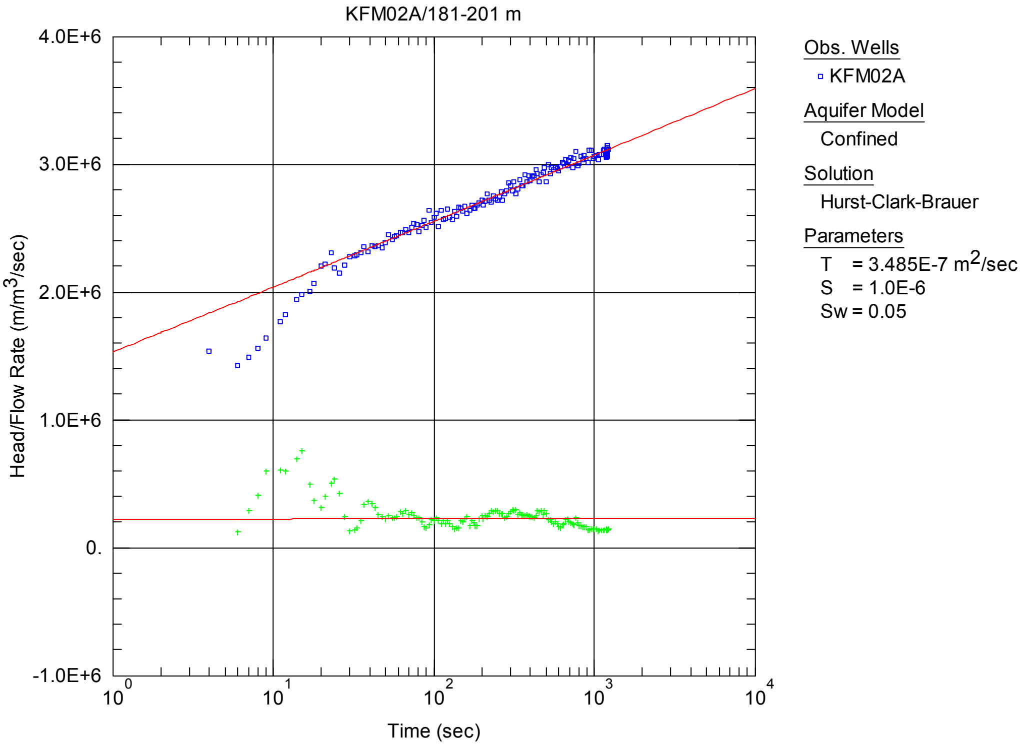



***Figure A3-66.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 181-201 m in KFM02A.*

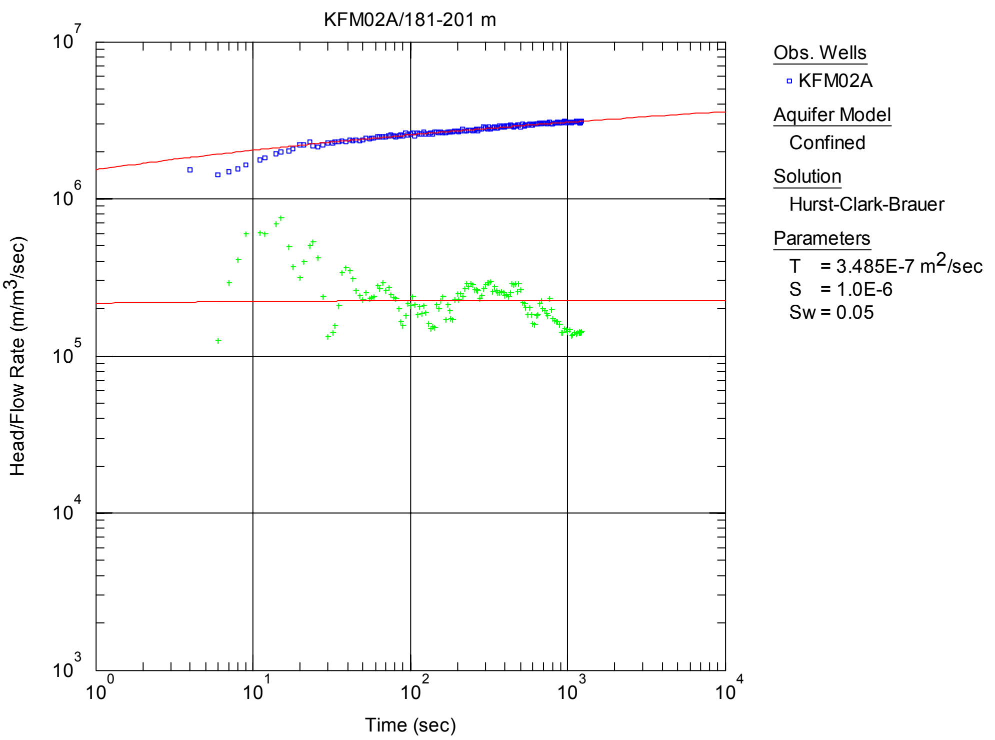



***Figure A3-67.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 181-201 m in KFM02A.*

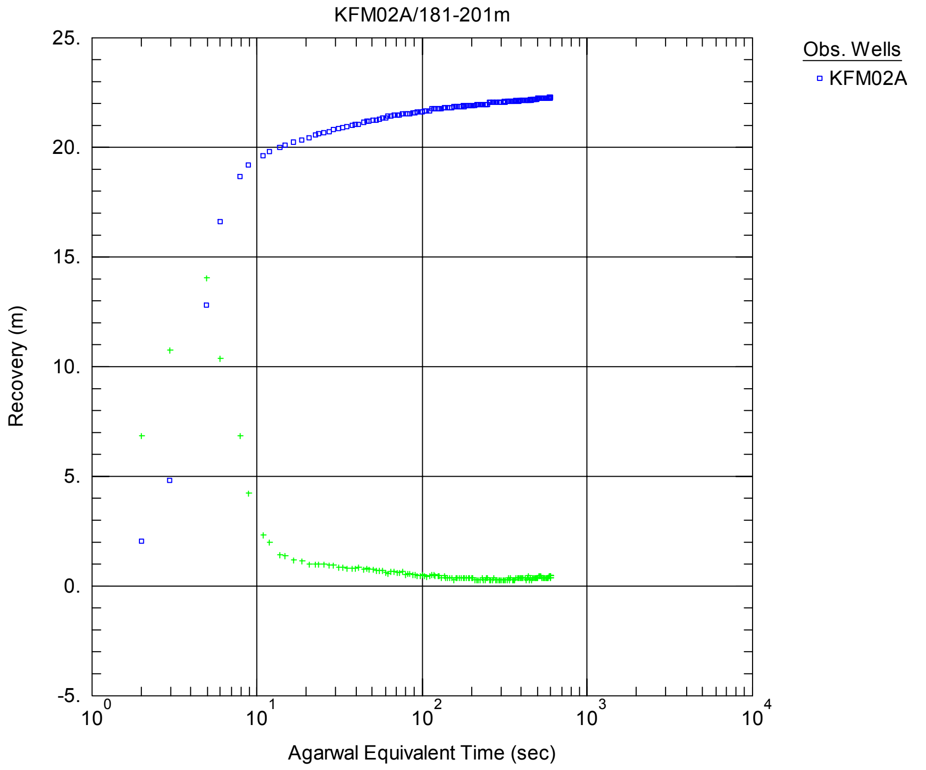



***Figure A3-68.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 181-201 m in KFM02A.*

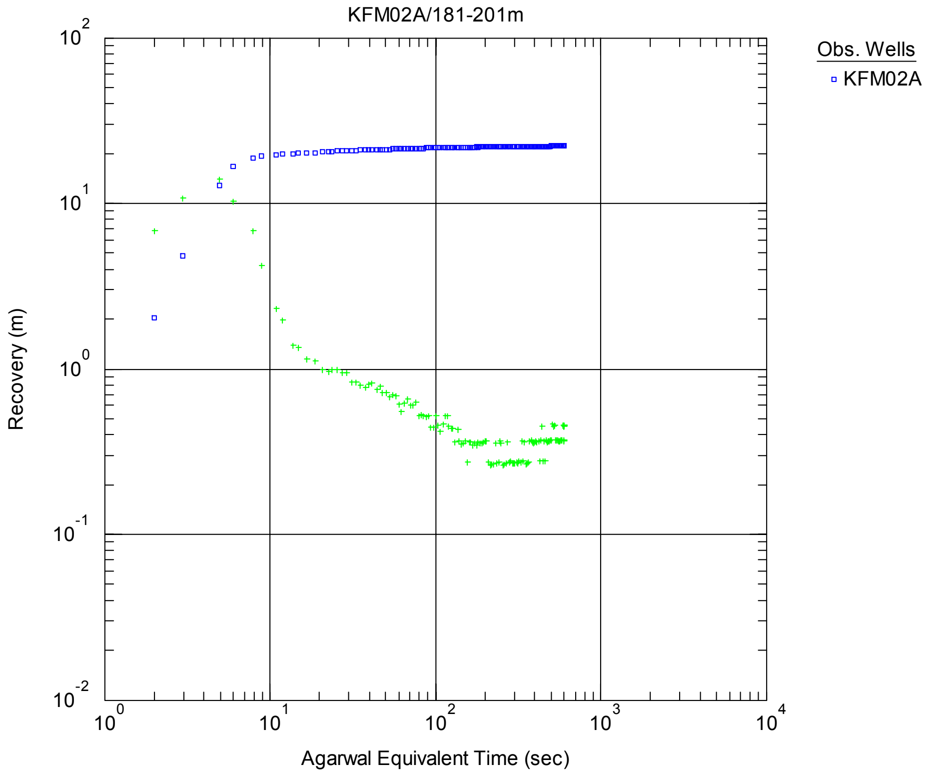



***Figure A3-69.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 181-201 m in KFM02A.*

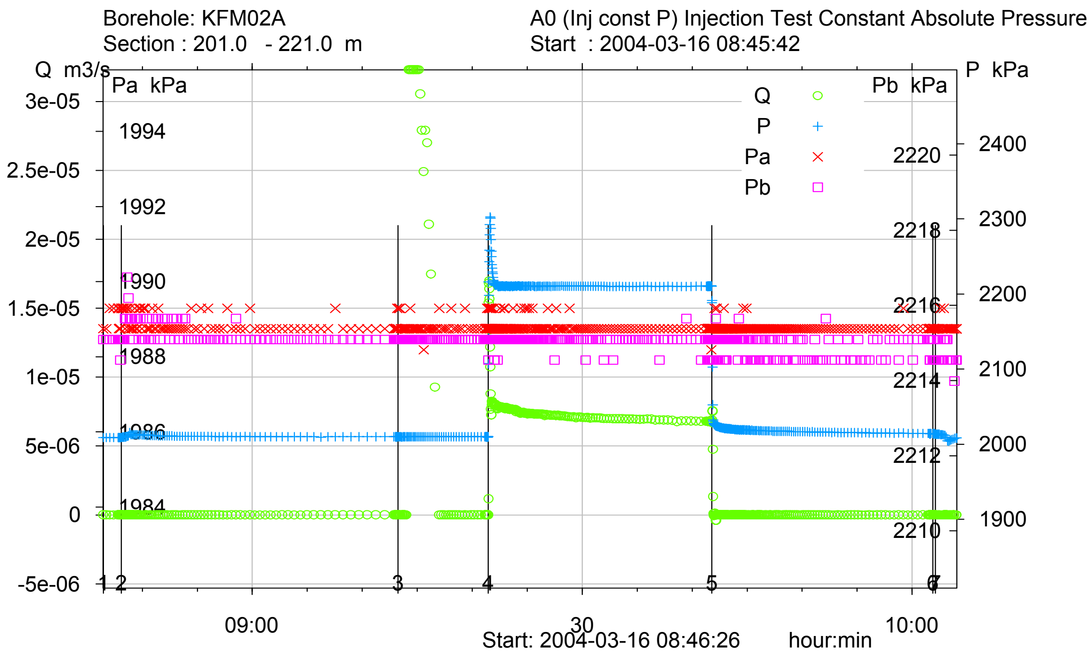



***Figure A3-70.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 201-221 m in borehole KFM02A.*

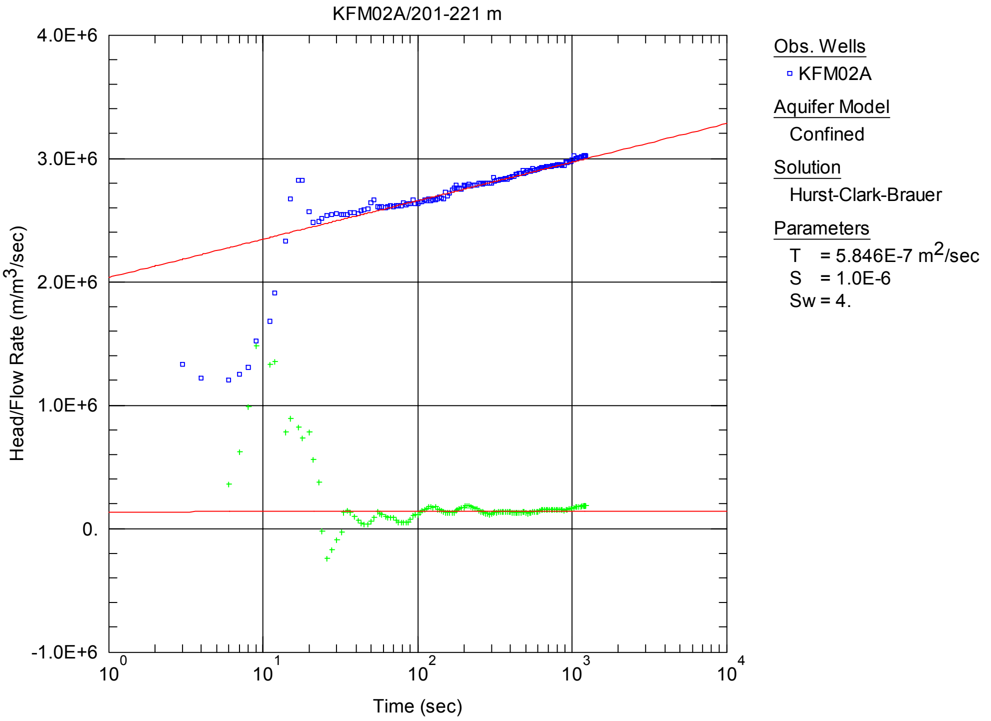



***Figure A3-71.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 201-221 m in KFM02A.*

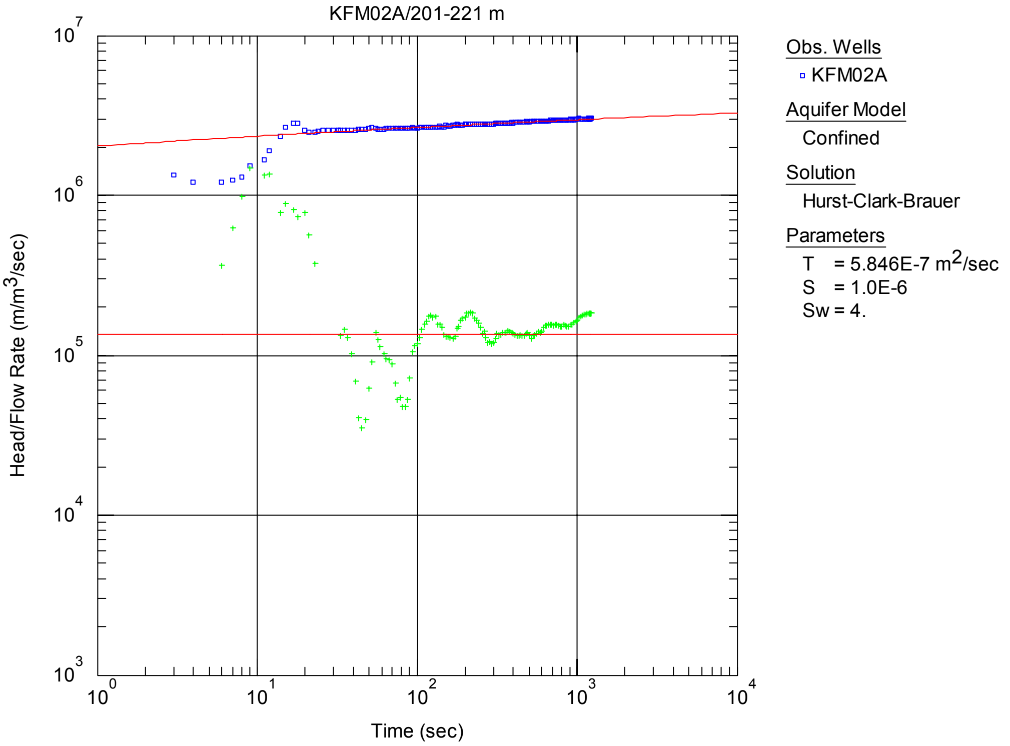



***Figure A3-72.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 201-221 m in KFM02A.*

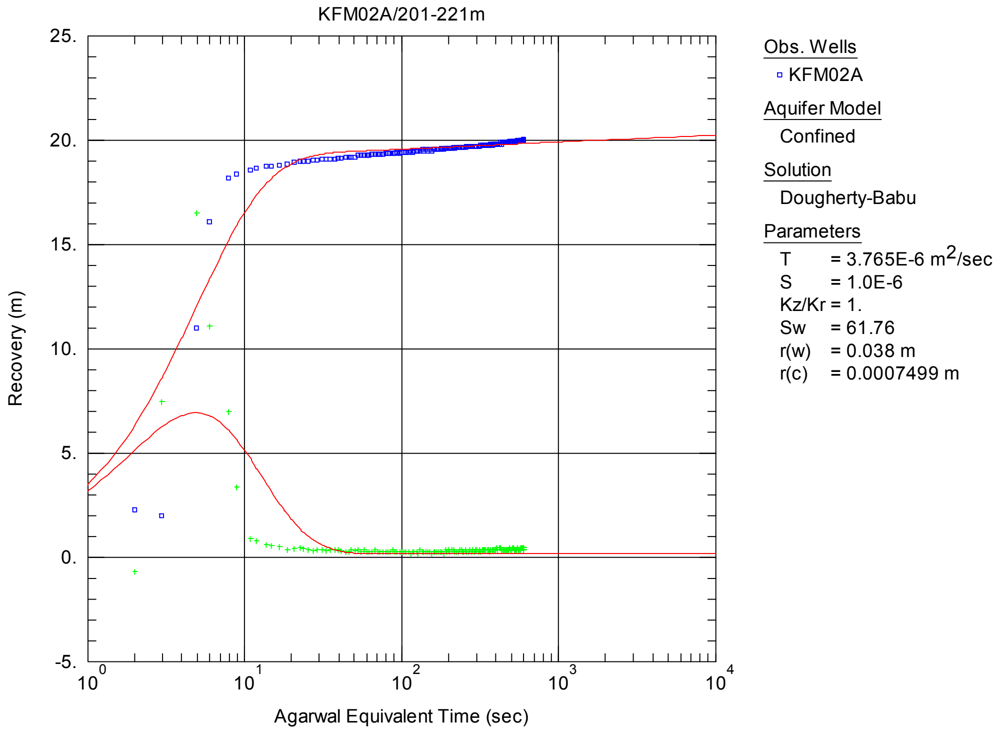



***Figure A3-73.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 201-221 m in KFM02A. Showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable.*

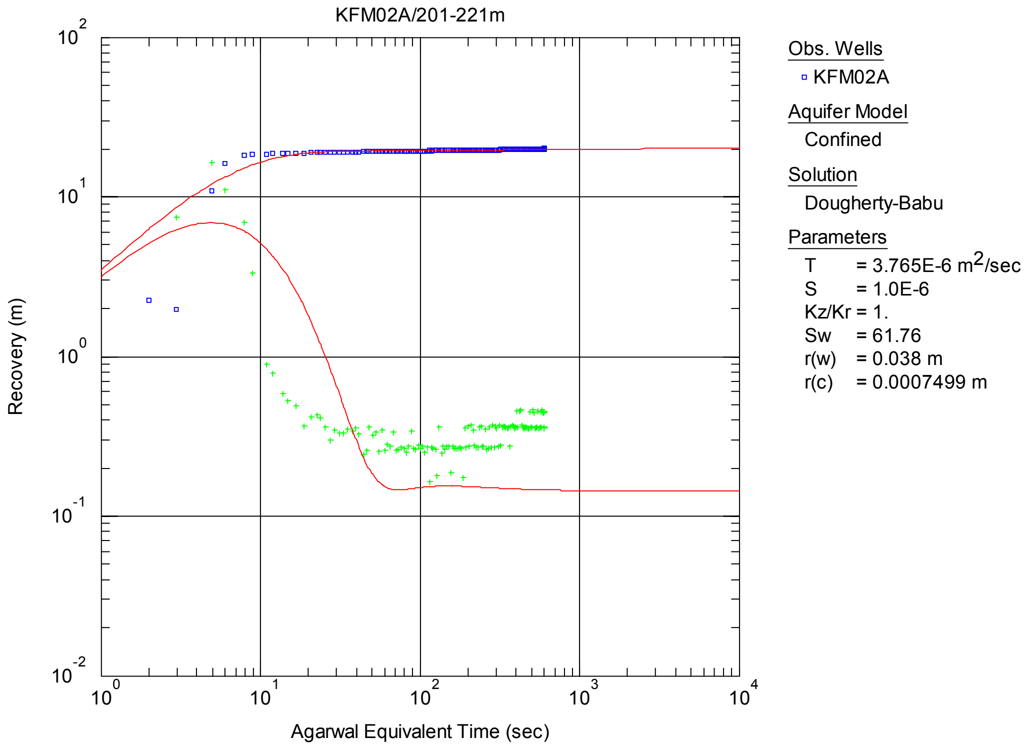



***Figure A3-74.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 201-221 m in KFM02A. Showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable.*

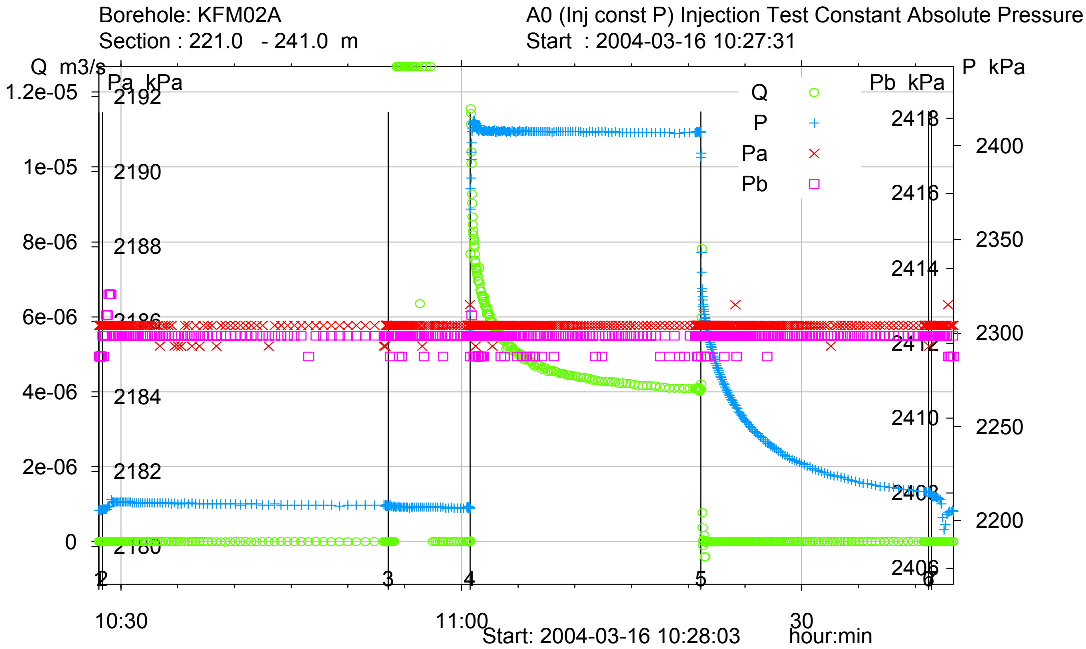



*Figure A3-75.* *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 221-241 m in borehole KFM02A.*

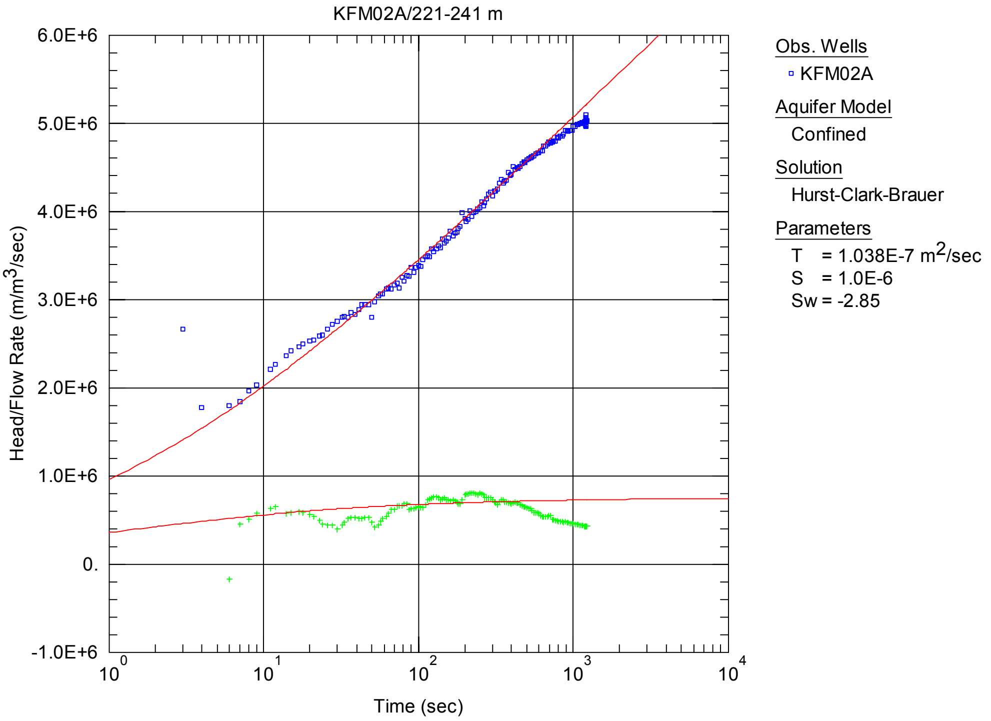



***Figure A3-76.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 221-241 m in KFM02A.*

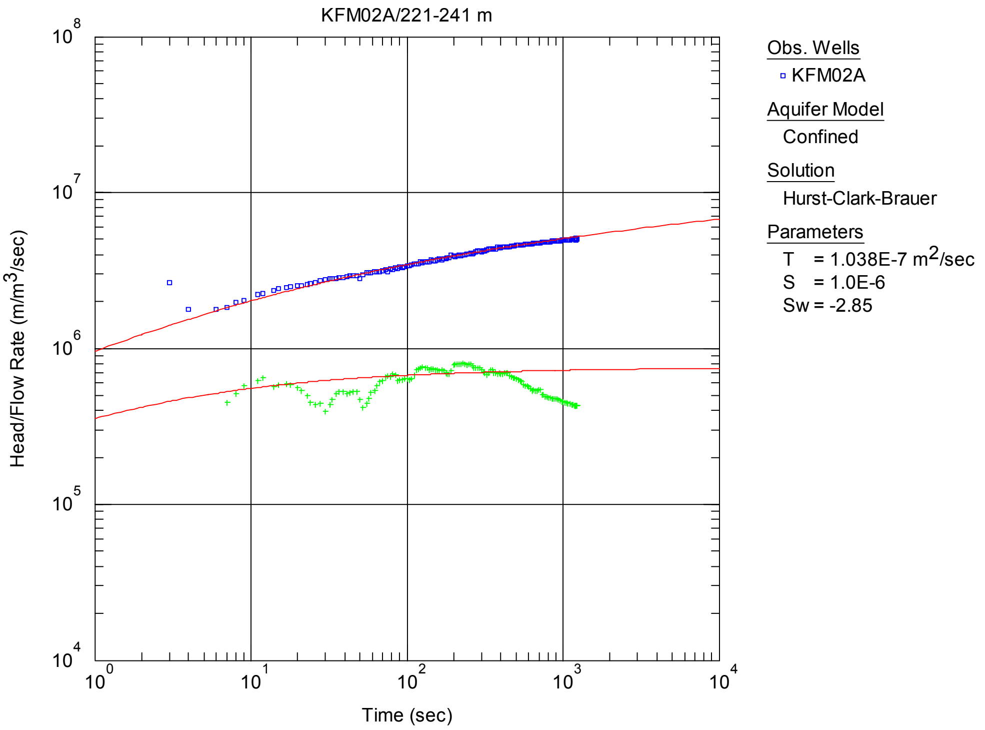



***Figure A3-77.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 221-241 m in KFM02A.*

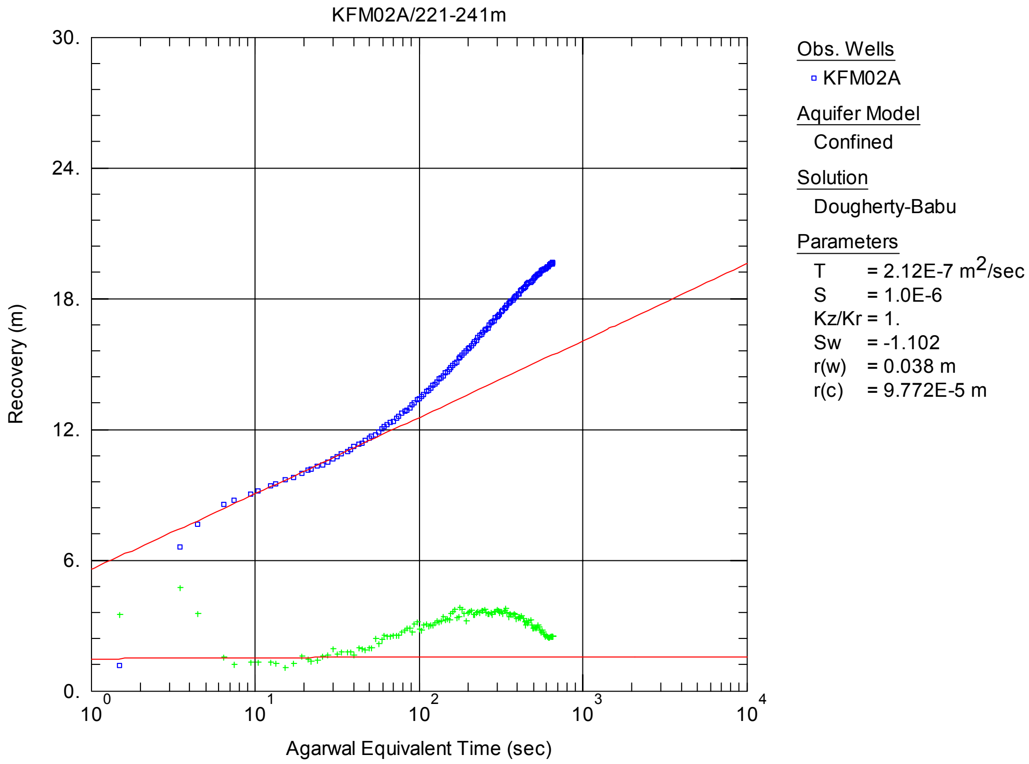



***Figure A3-78.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 221-241 m in KFM02A.*

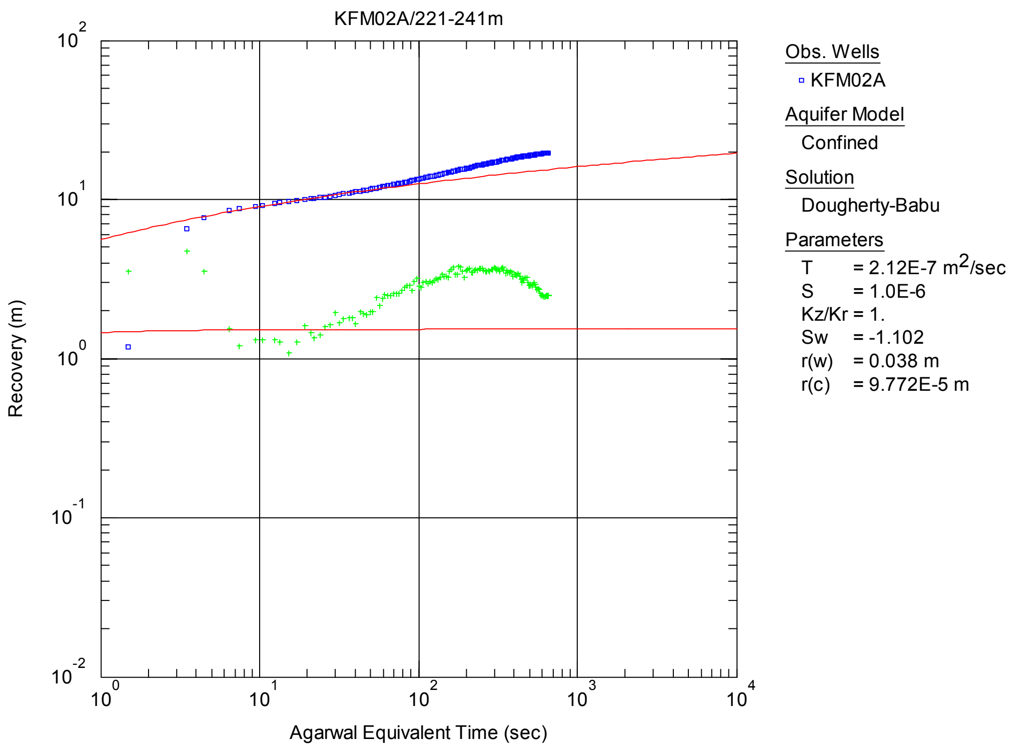



***Figure A3-79.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 221-241 m in KFM02A.*

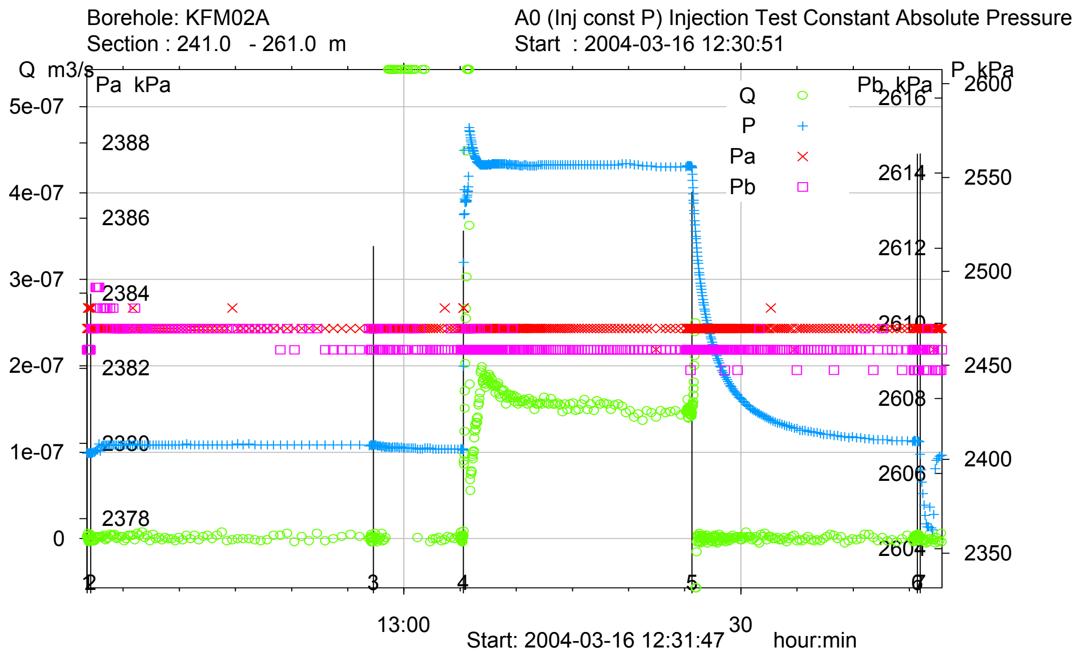



***Figure A3-80.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 241-261 m in borehole KFM02A.*

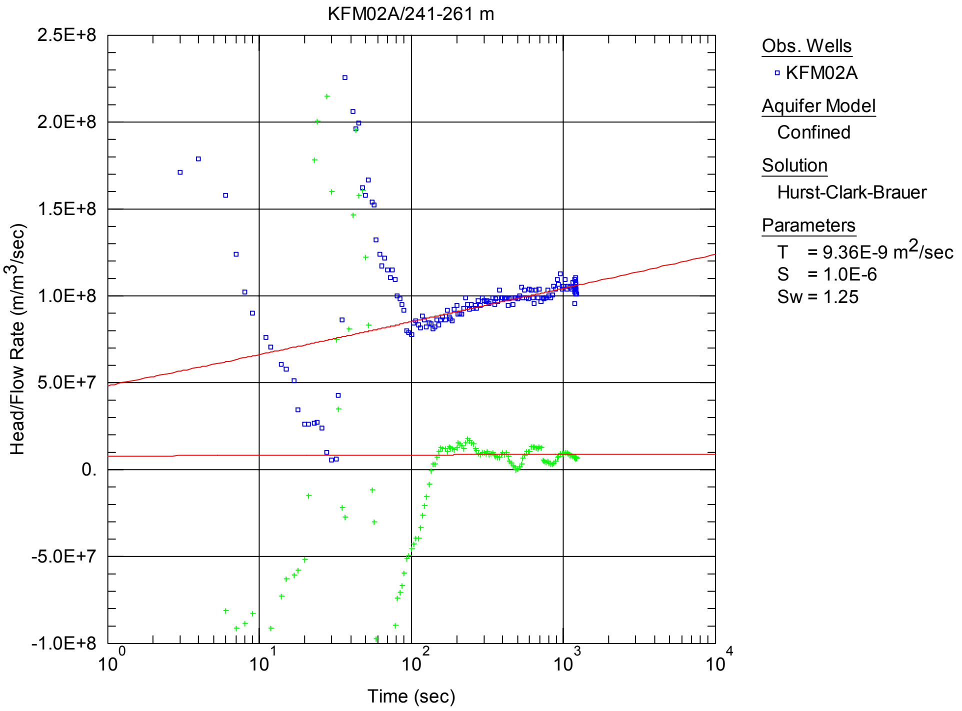



***Figure A3-81.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 241-261 m in KFM02A.*

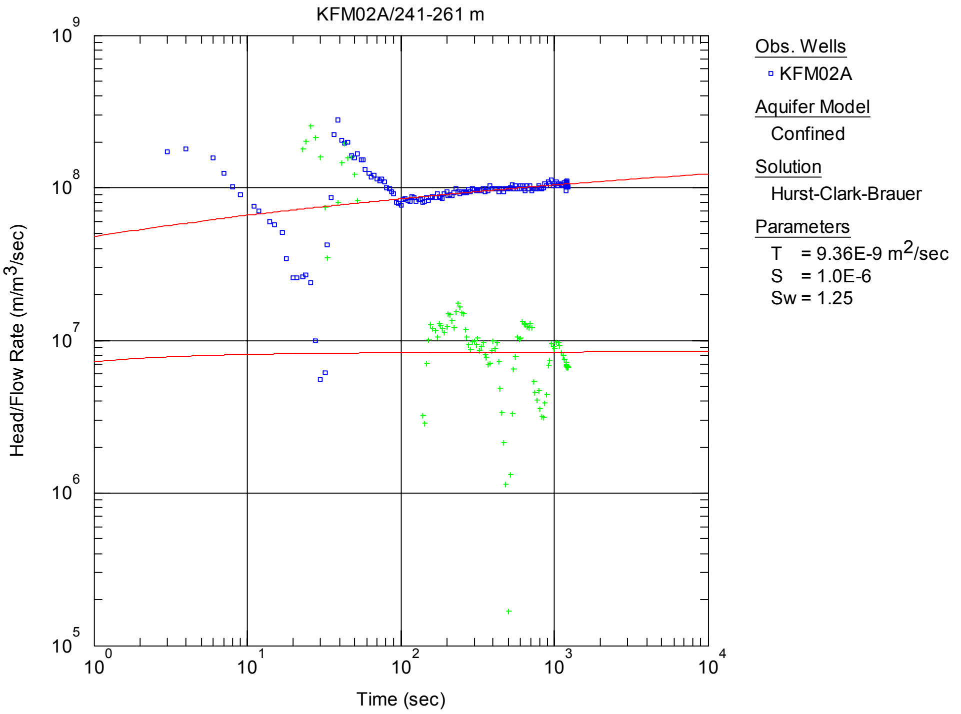



***Figure A3-82.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 241-261 m in KFM02A.*

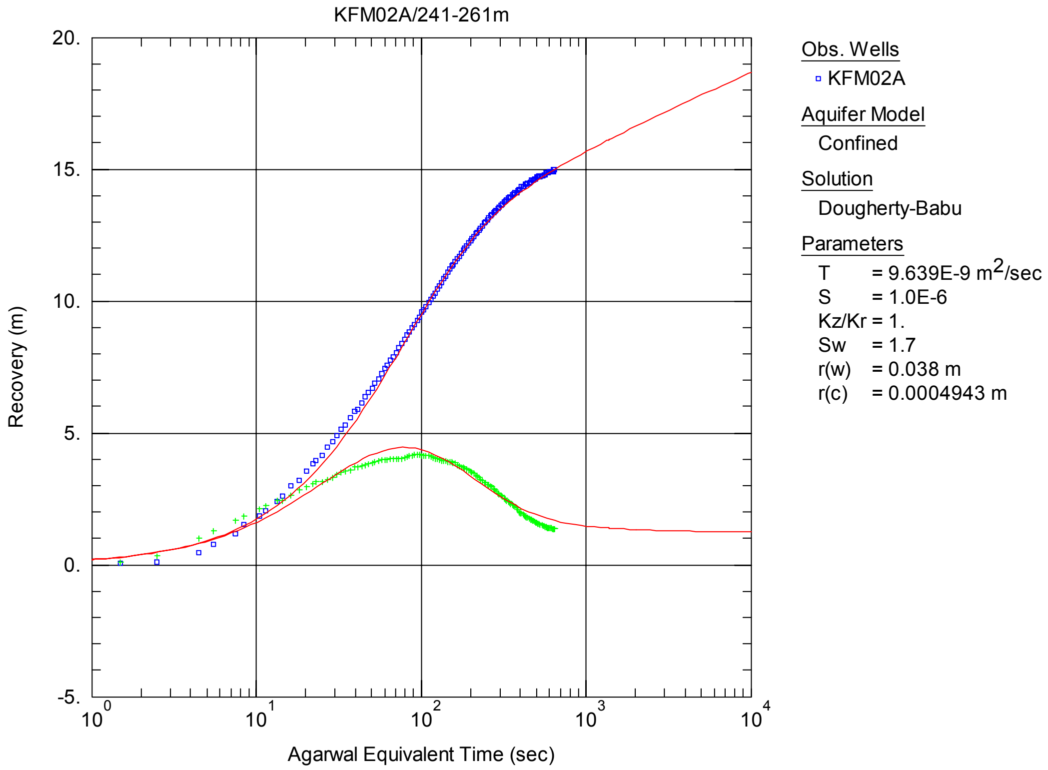



***Figure A3-83.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 241-261 m in KFM02A.*

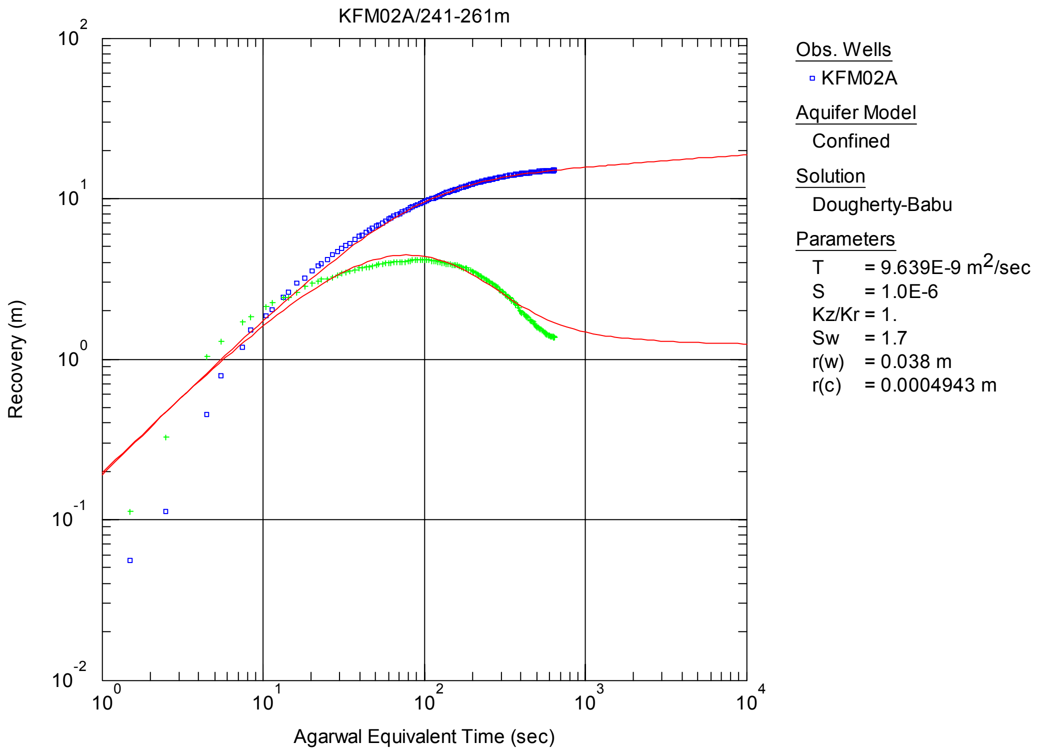



***Figure A3-84.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 241-261 m in KFM02A.*

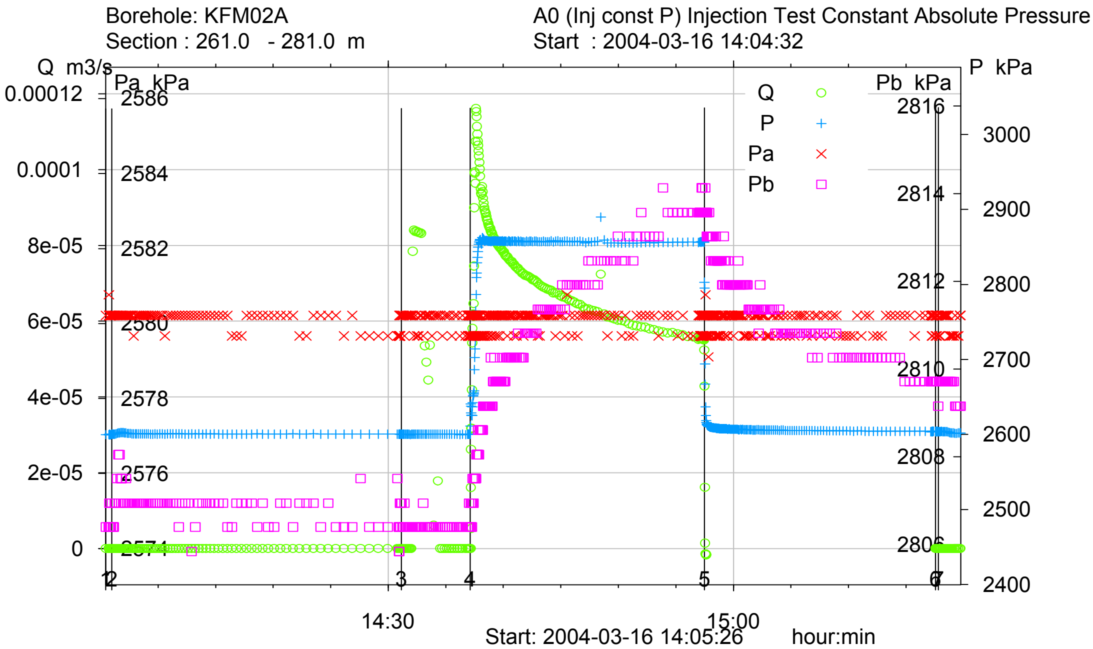



***Figure A3-85.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 261-281 m in borehole KFM02A.*

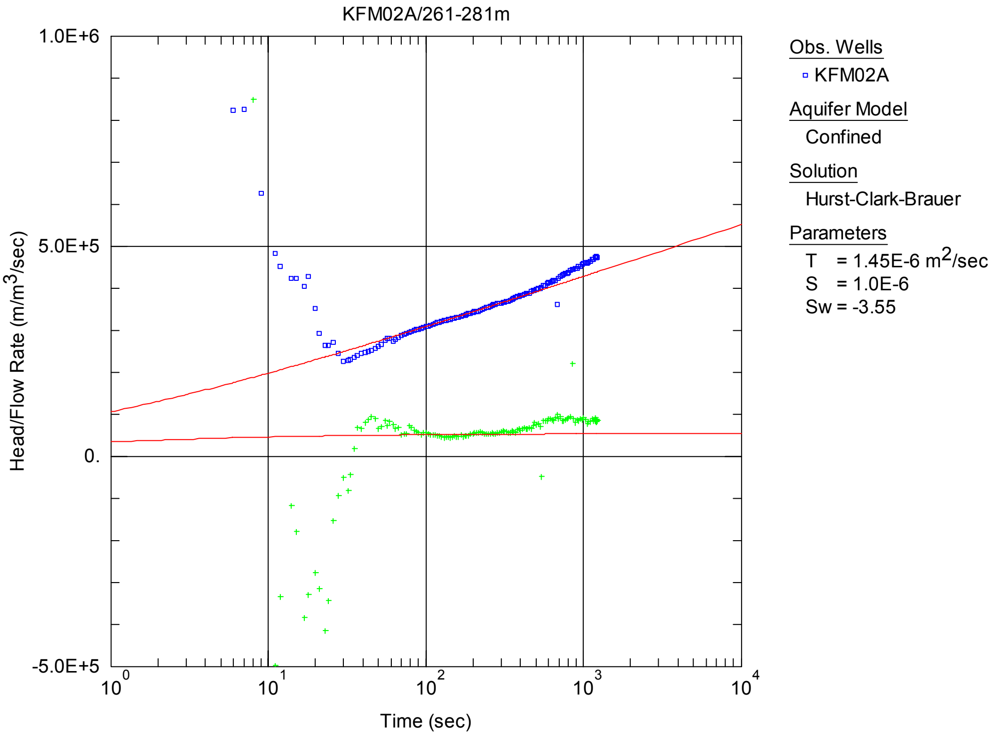



***Figure A3-86.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 261-281 m in KFM02A.*

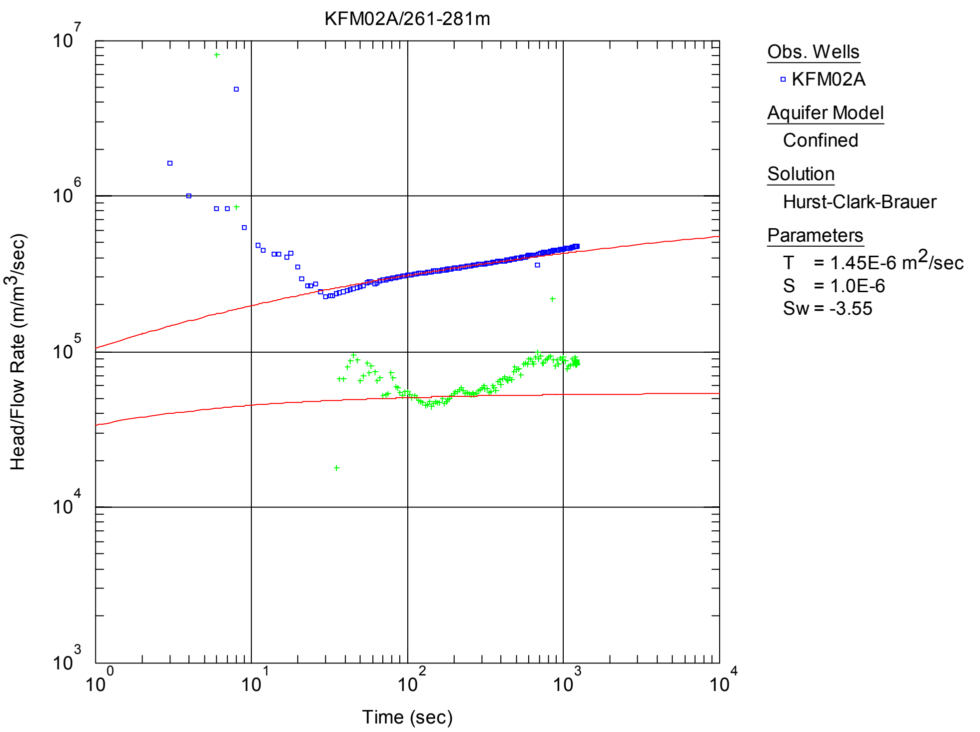



***Figure A3-87.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 261-281 m in KFM02A.*

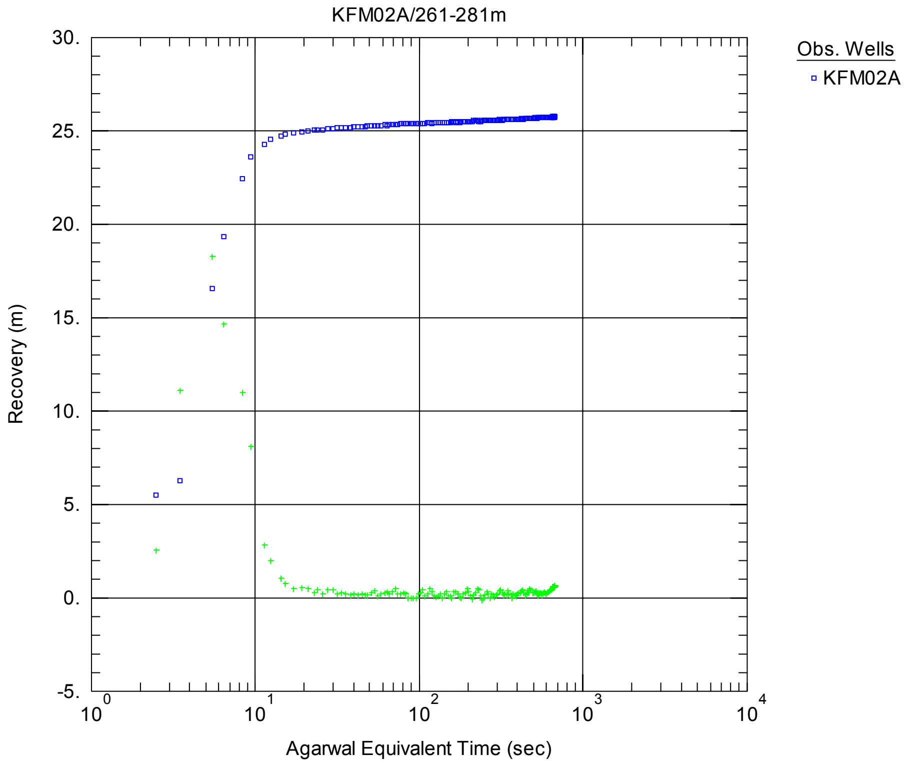



***Figure A3-88.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 261-281 m in KFM02A.*

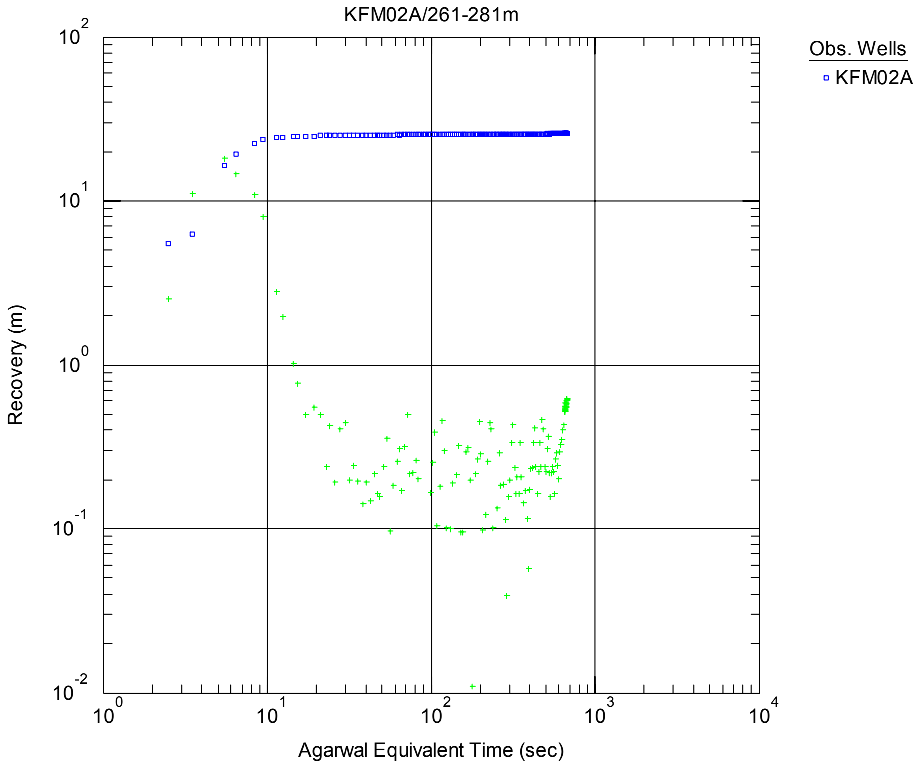



***Figure A3-89.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 261-281 m in KFM02A.*

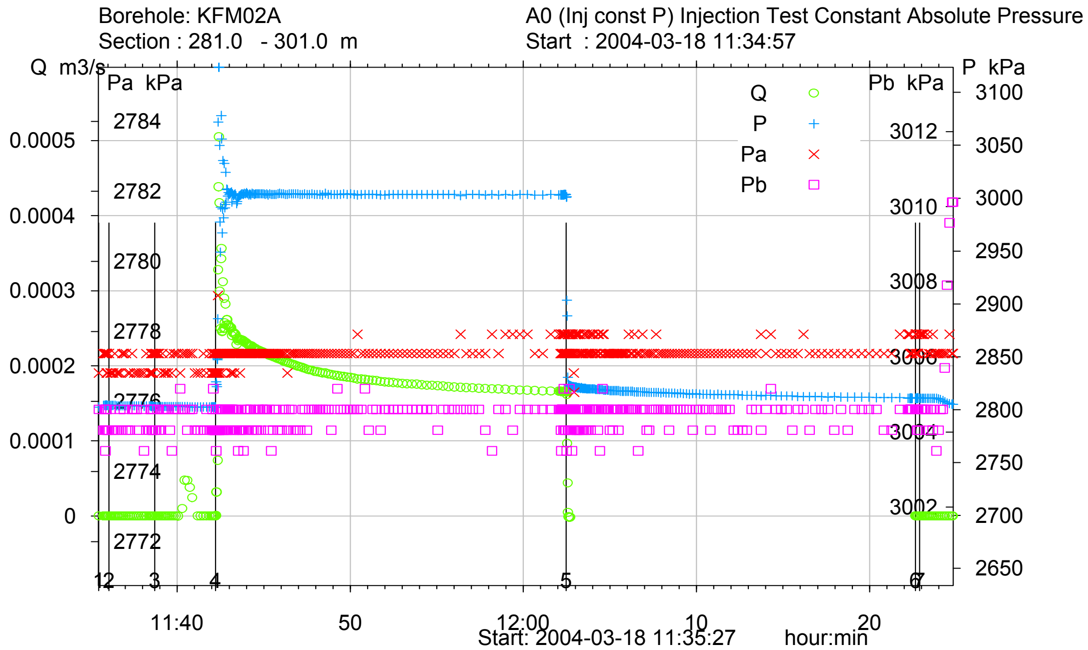



***Figure A3-90.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 281-301 m in borehole KFM02A.*

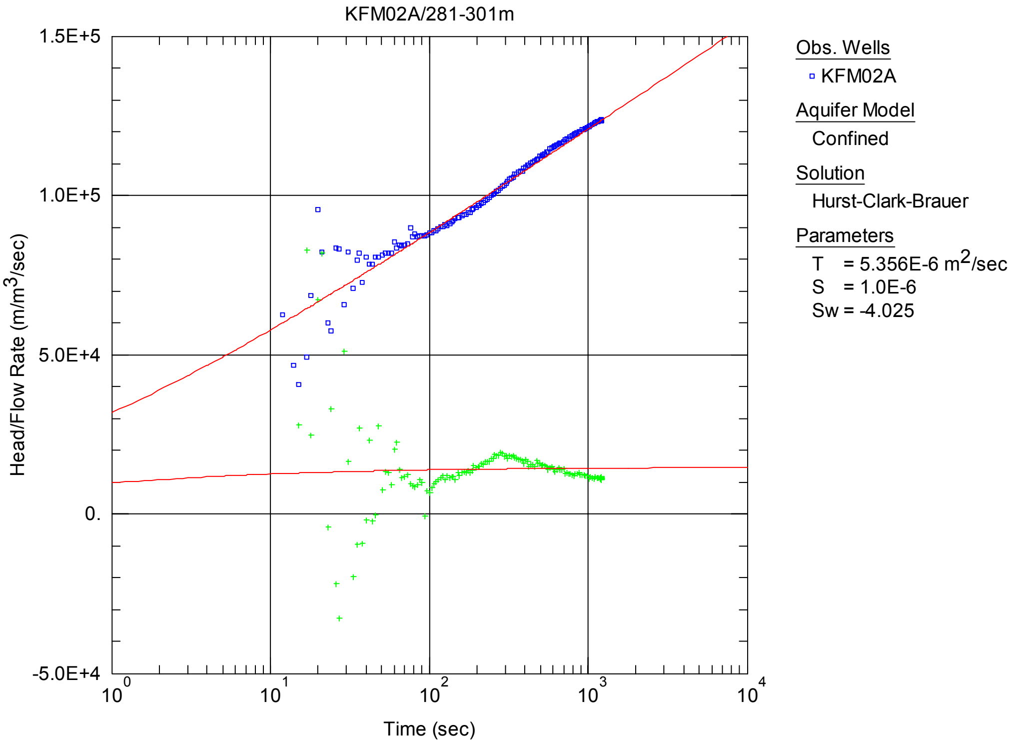



*Figure A3-91. Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 281-301 m in KFM02A.*

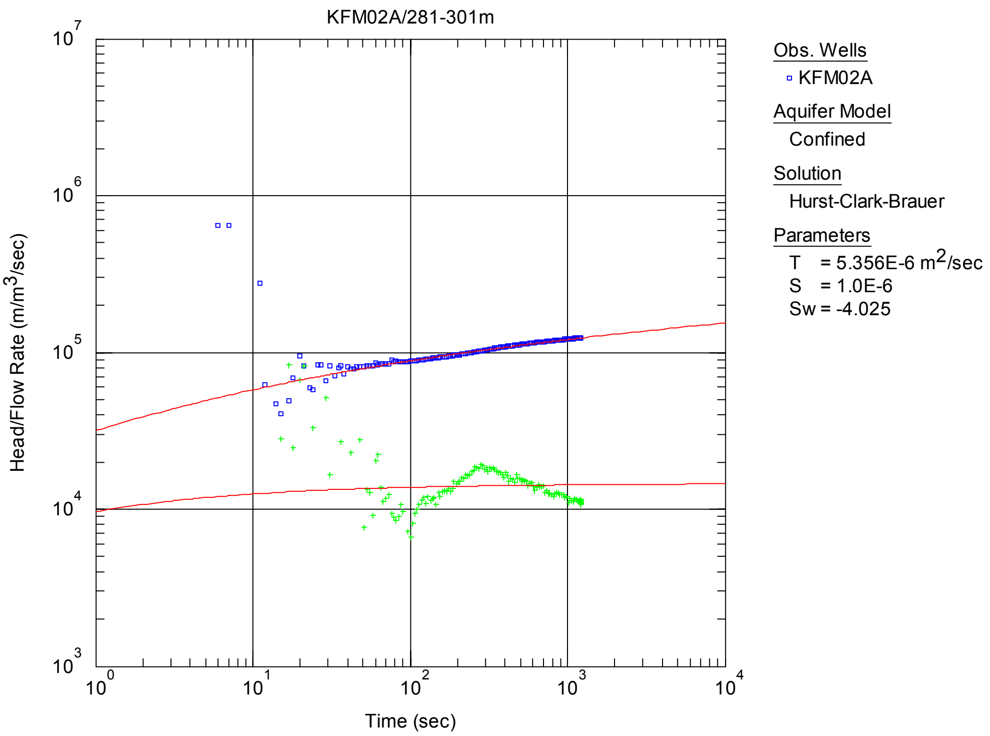



*Figure A3-92. Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 281-301 m in KFM02A.*

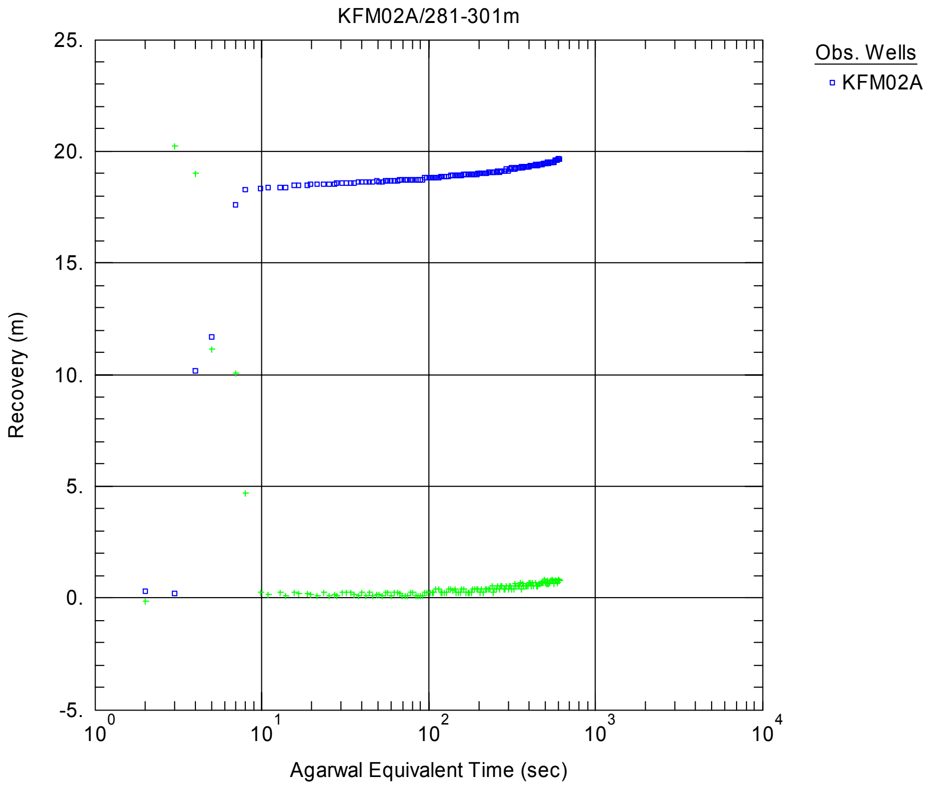



***Figure A3-93.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 281-301 m in KFM02A.*

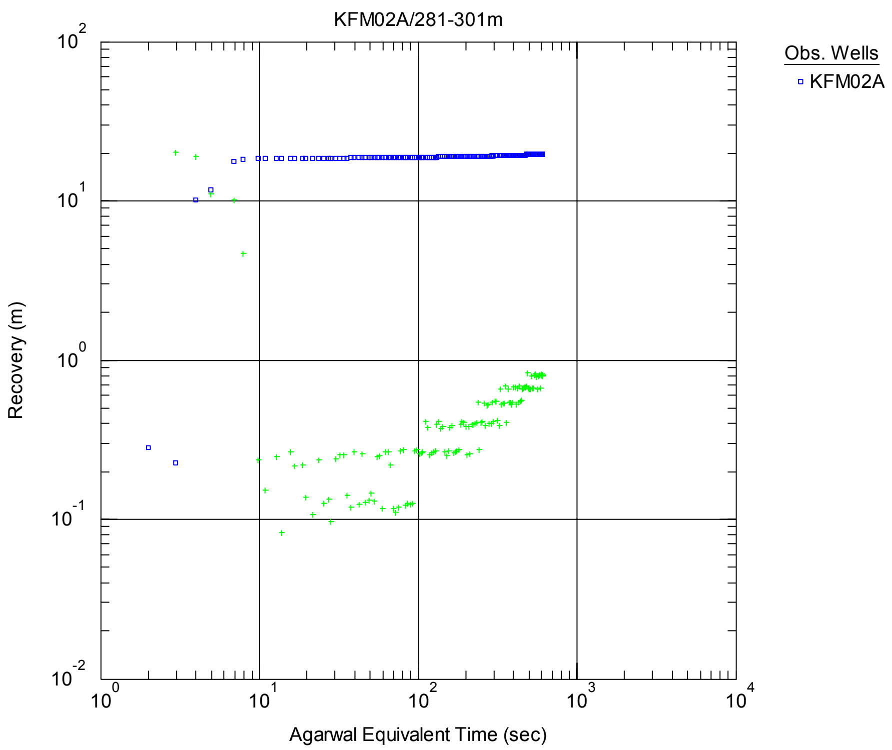



***Figure A3-94.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 281-301 m in KFM02A.*

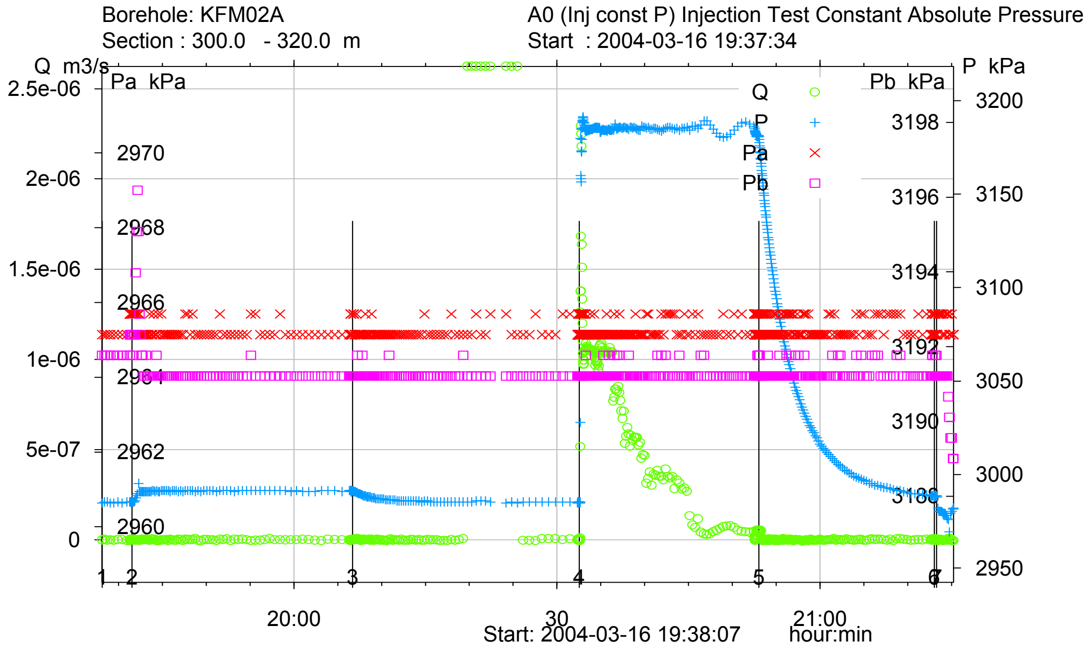



***Figure A3-95.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 300-320 m in borehole KFM02A.*

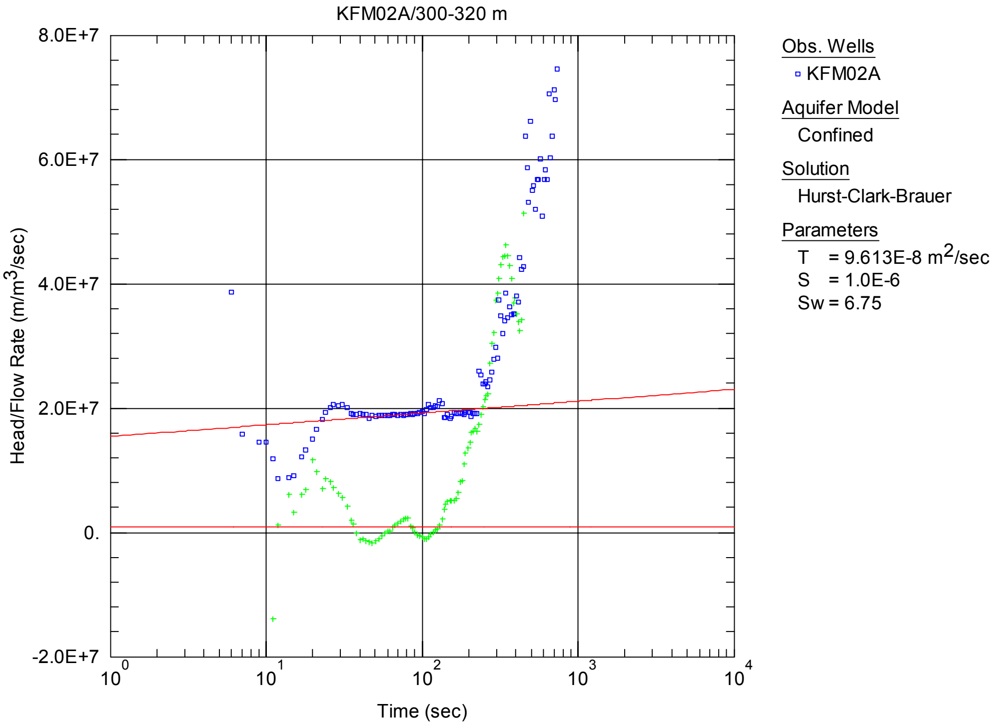



***Figure A3-96.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 300-320 m in KFM02A.*

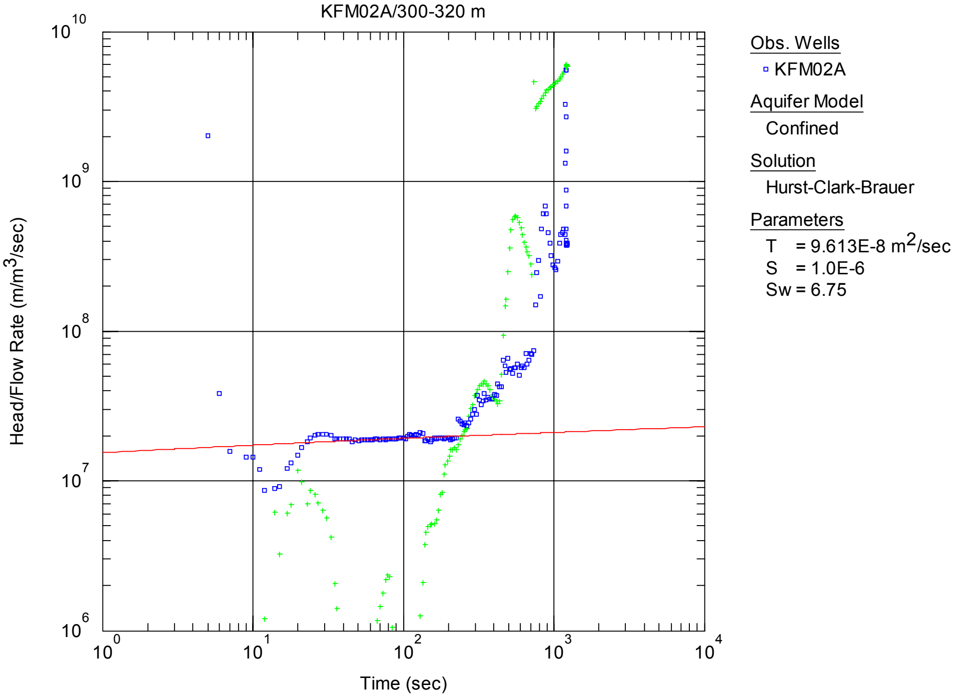



***Figure A3-97****.* *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 300-320 m in KFM02A.*

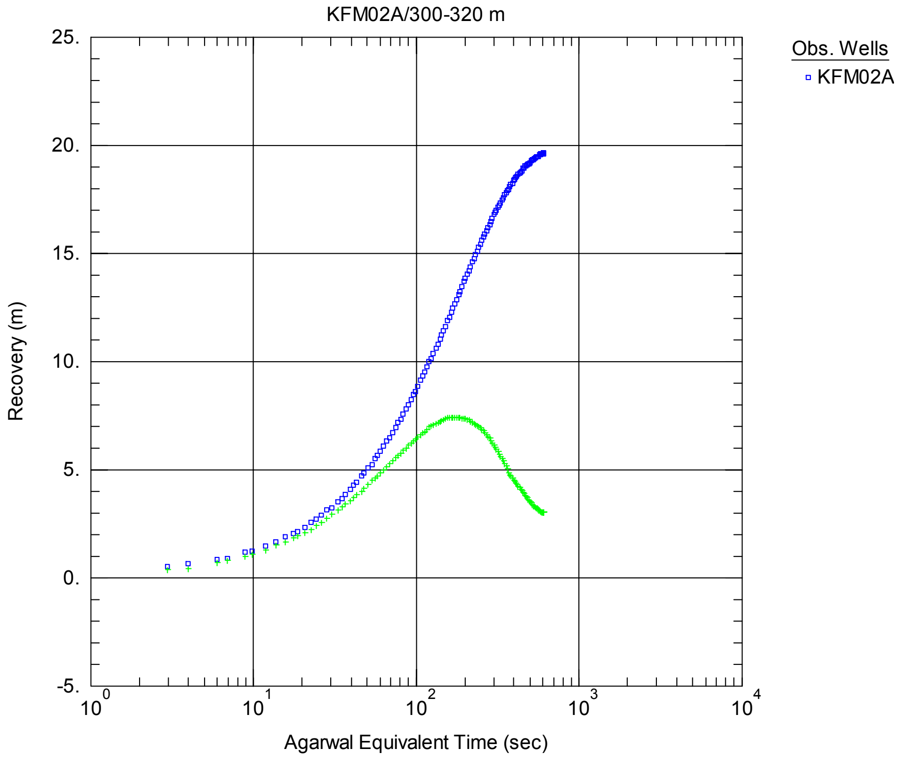



***Figure A3-98.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 300-320 m in KFM02A.*

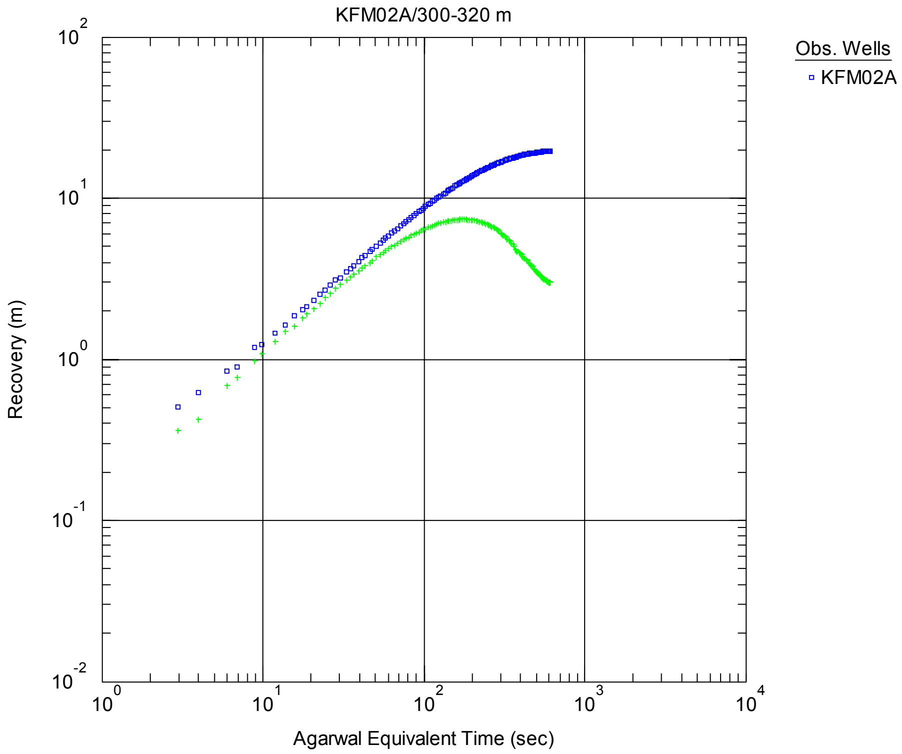



***Figure A3-99.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 300-320 m in KFM02A.*

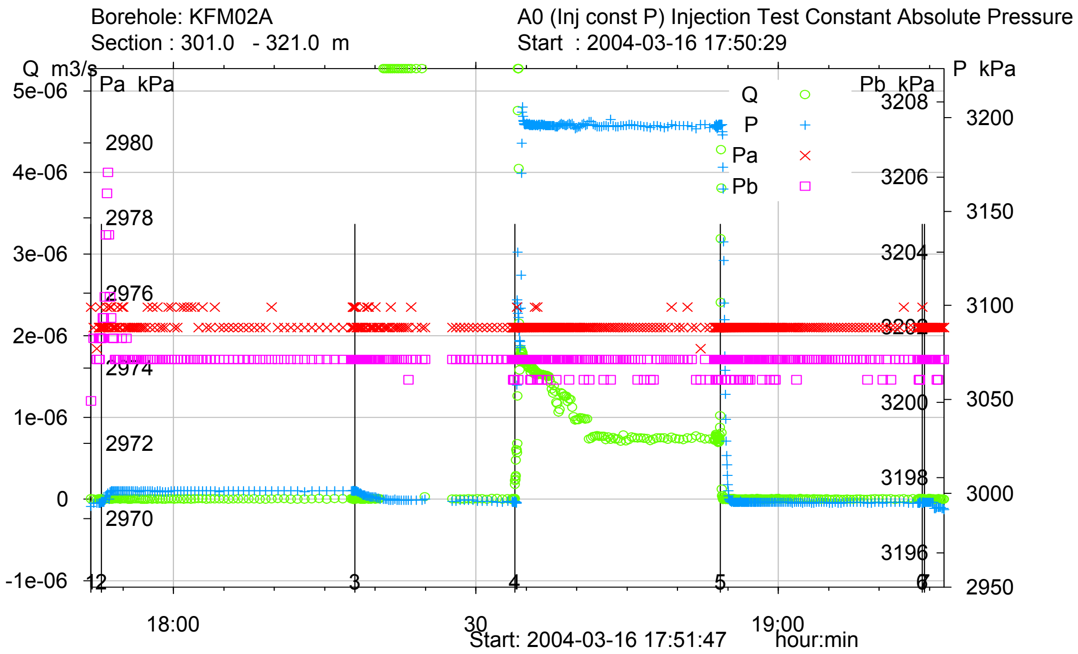



***Figure A3-100.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 301-321 m in borehole KFM02A.*

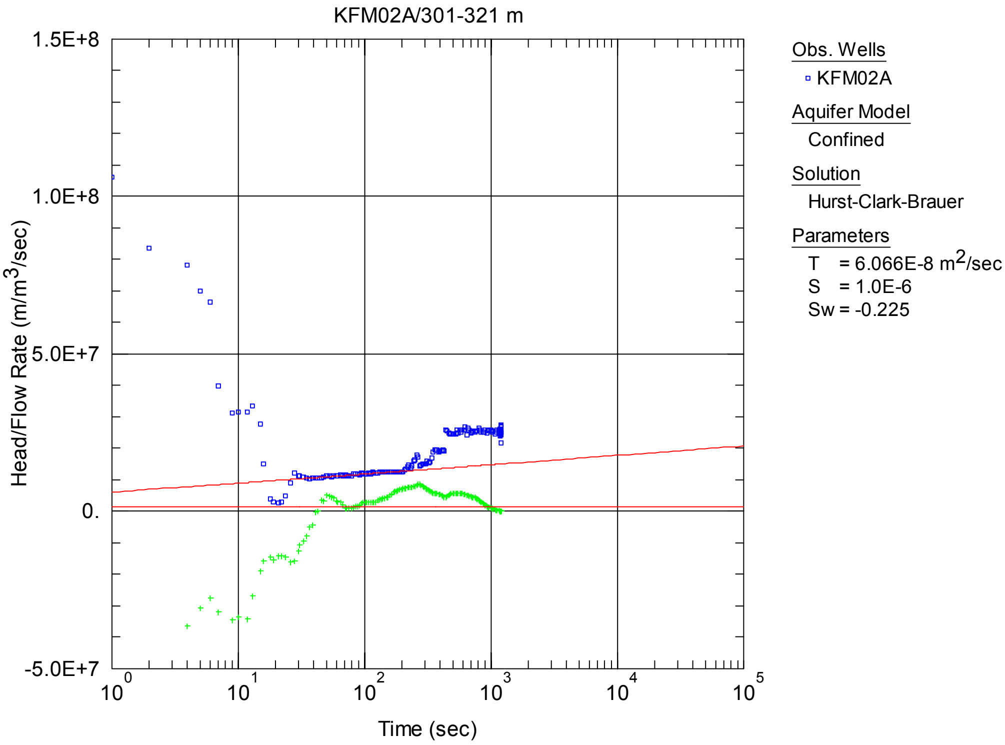



***Figure A3-101.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 301-321 m in KFM02A.*

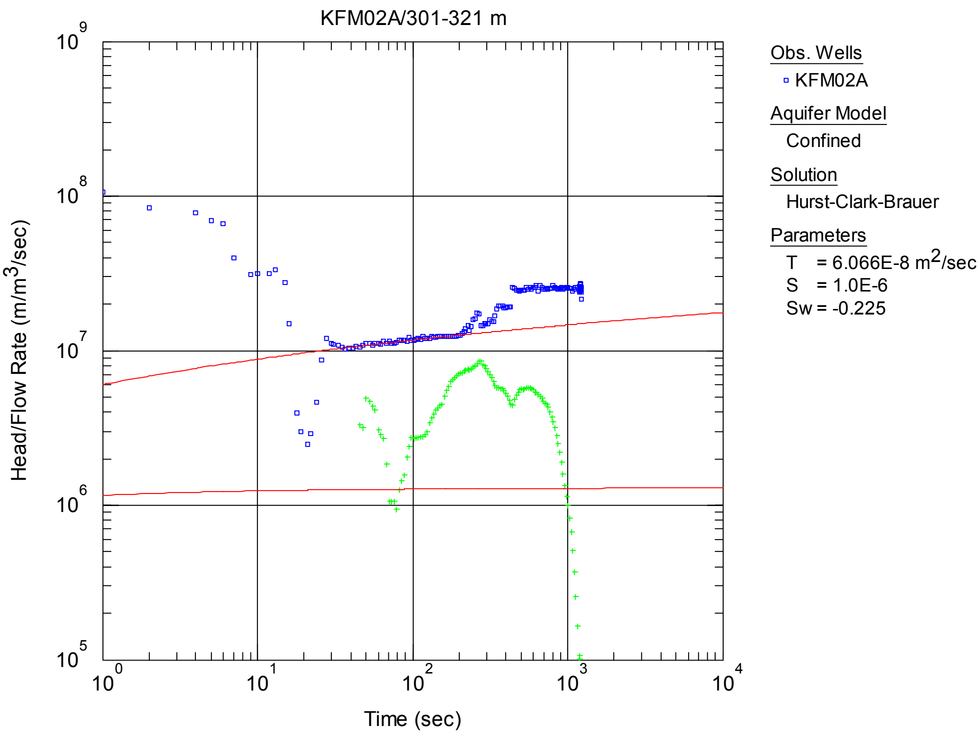



***Figure A3-102.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 301-321 m in KFM02A.*

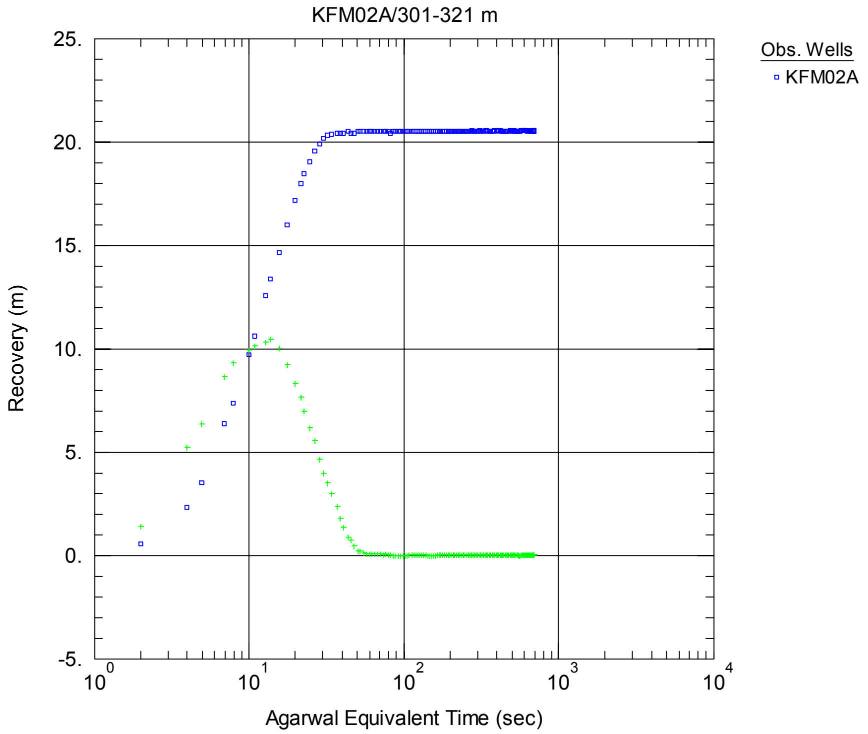



***Figure A3-103.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 301-321 m in KFM02A.*

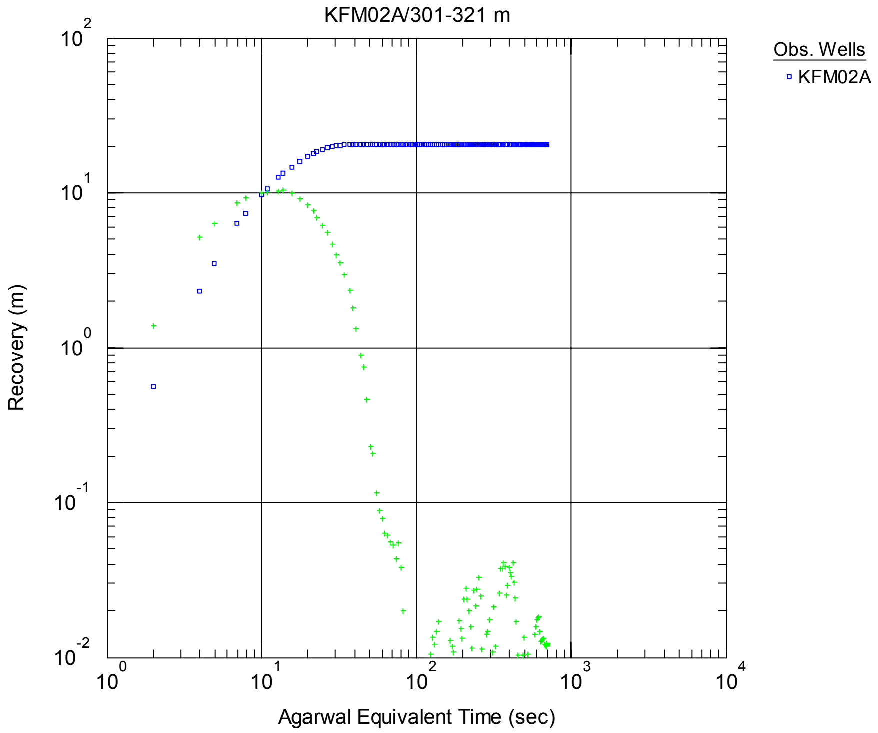



***Figure A3-104.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 301-321 m in KFM02A.*

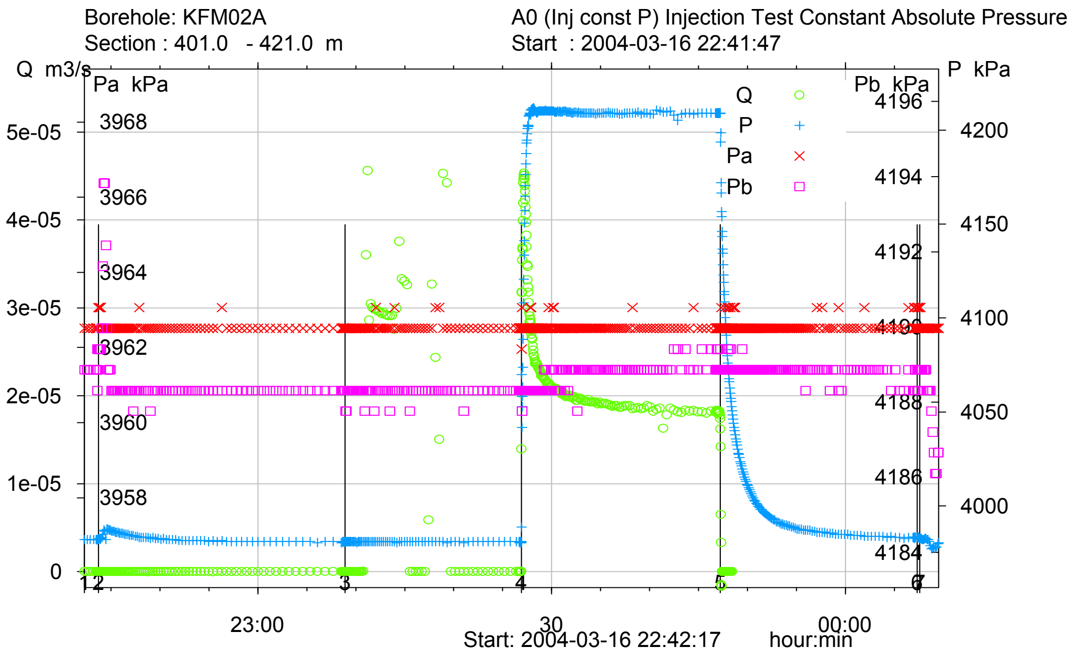



***Figure A3-105.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 401-421 m in borehole KFM02A.*

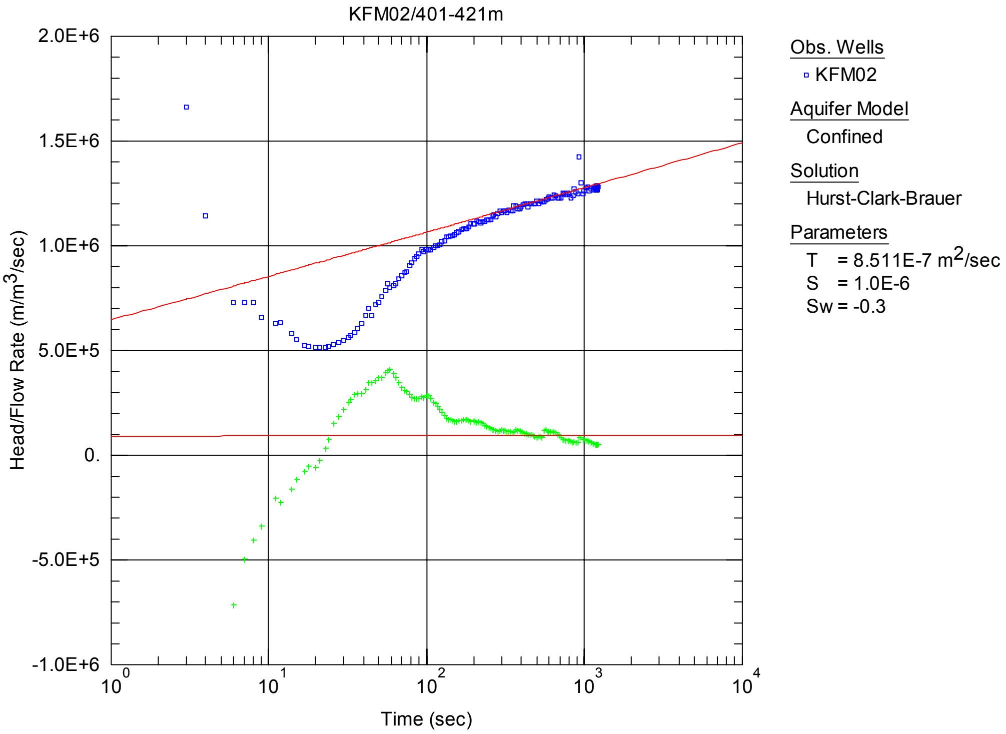



*Figure A3-106. Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 401-421 m in KFM02A.*

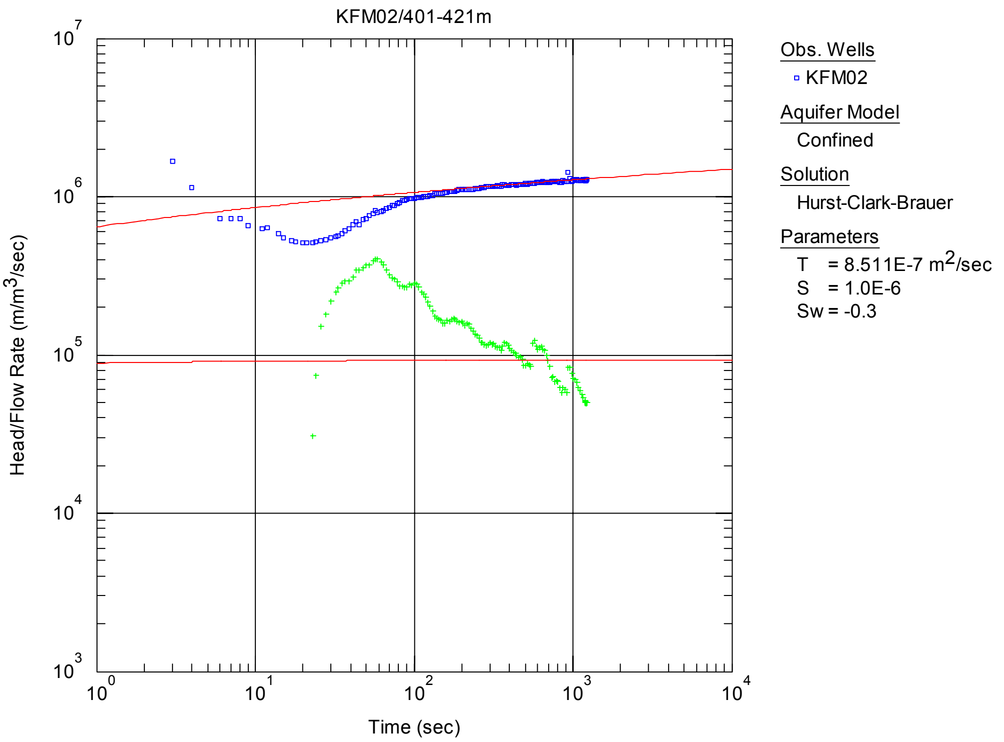



*Figure A3-107. Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 401-421 m in KFM02A.*

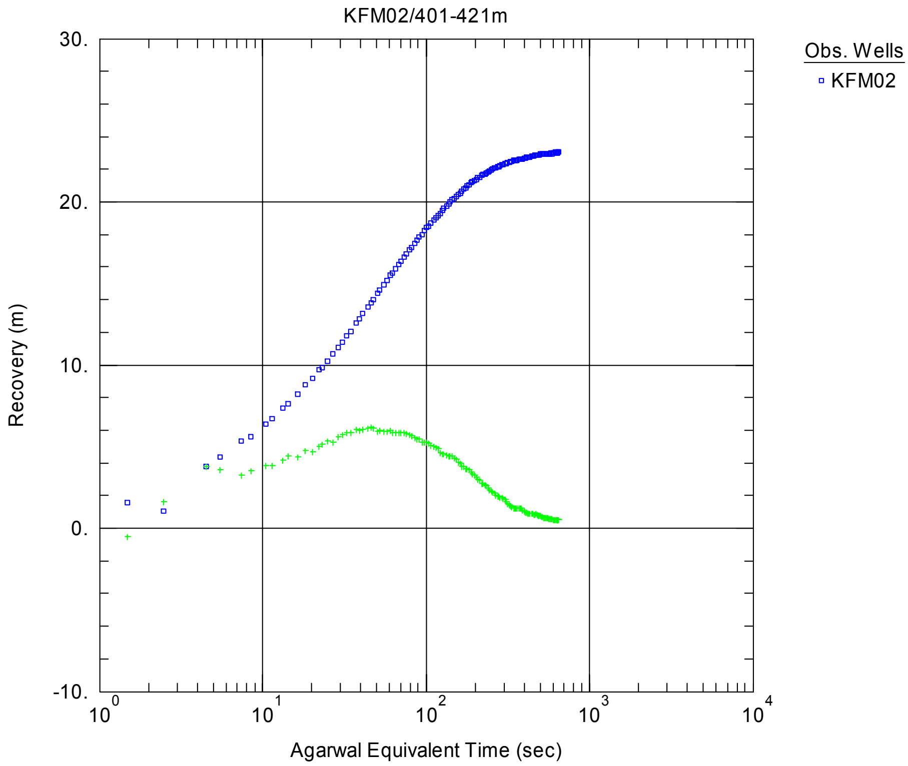



***Figure A3-108.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 401-421 m in KFM02A.*

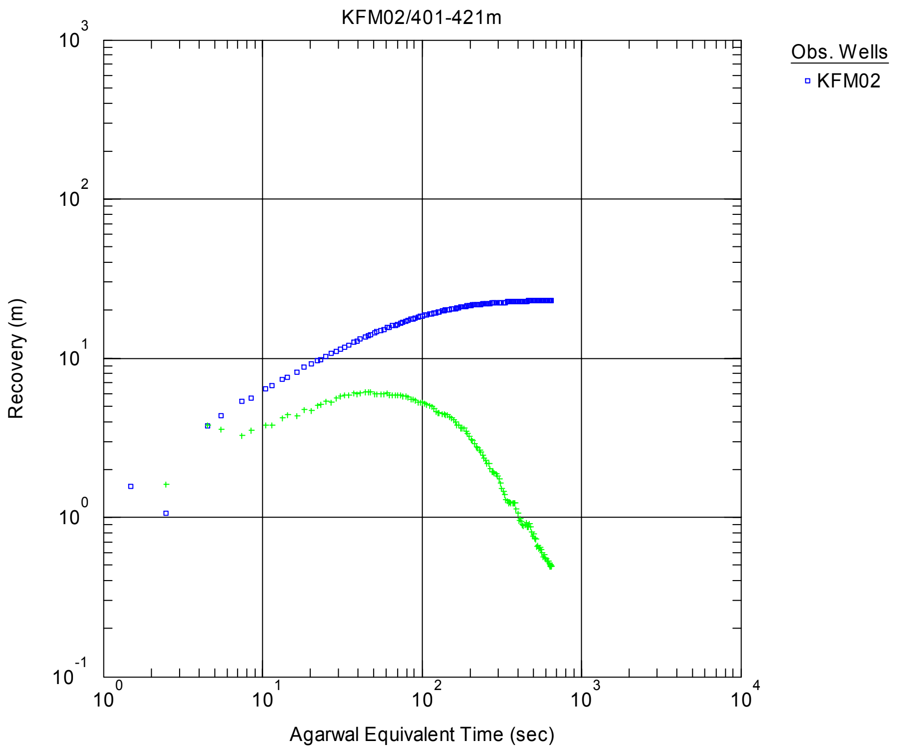



***Figure A3-109.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 401-421 m in KFM02A.*

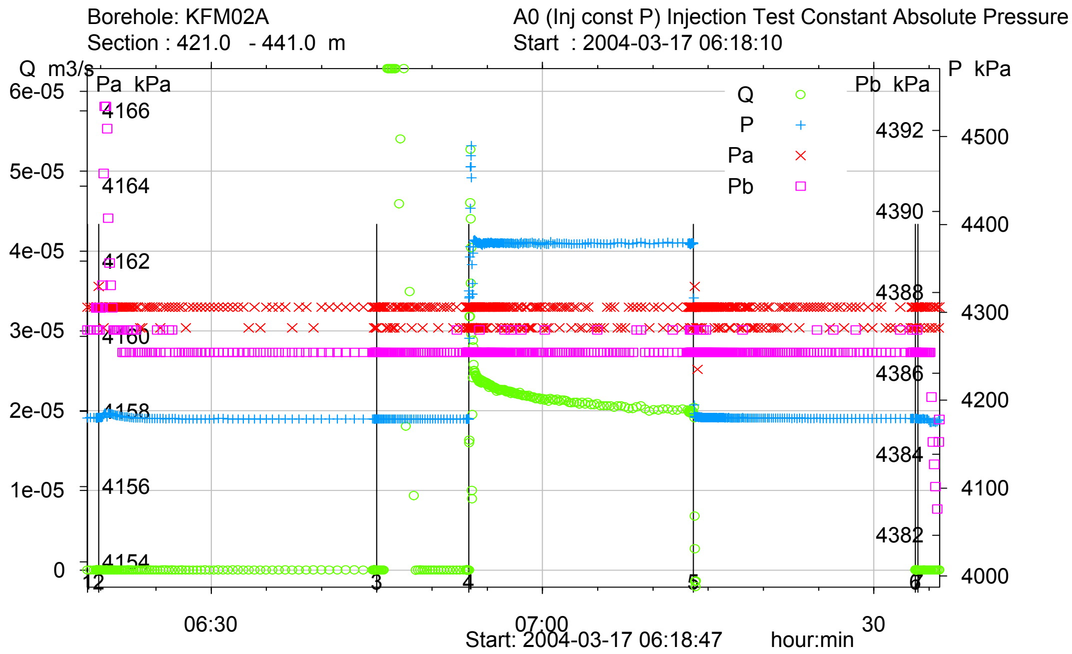



***Figure A3-110.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 421-441 m in borehole KFM02A.*

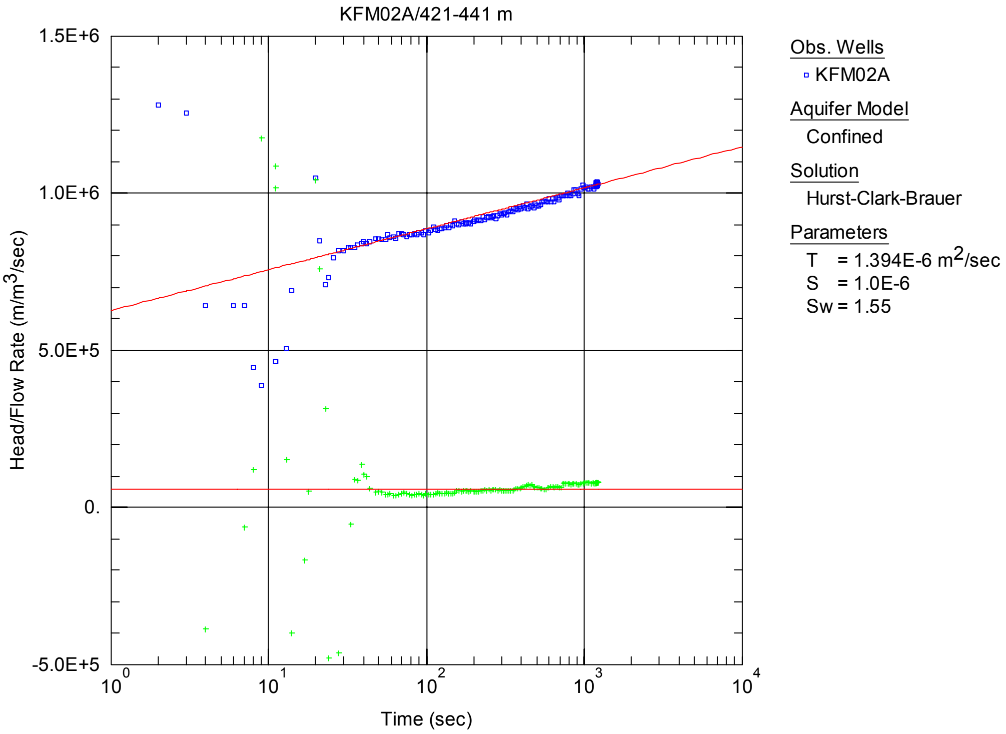



***Figure A3-111.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 421-441 m in KFM02A.*

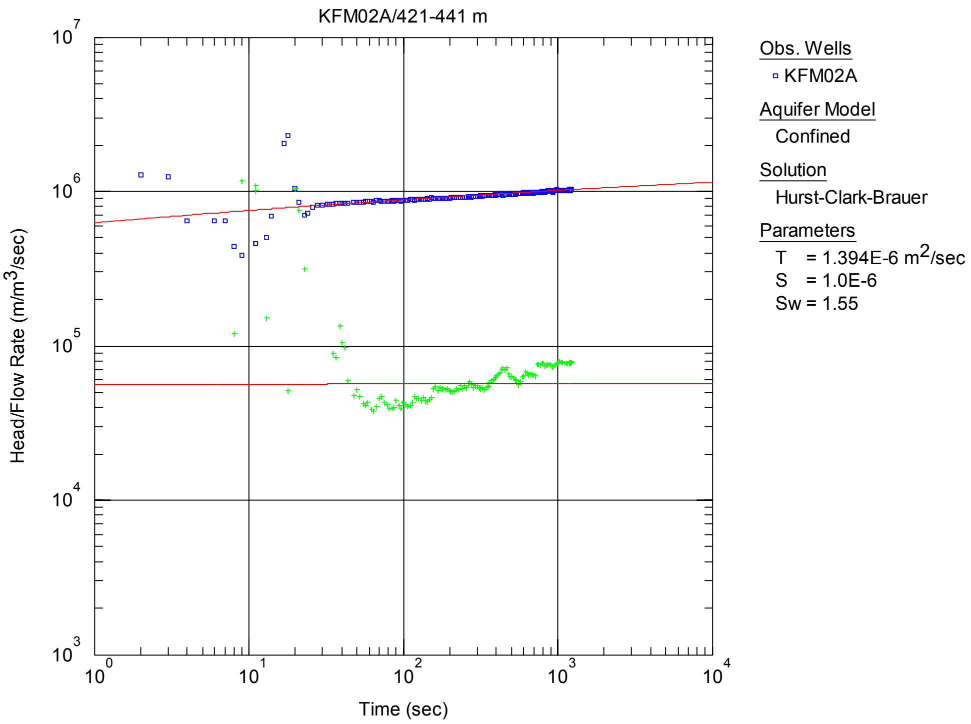



***Figure A3-112.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 421-441 m in KFM02A.*

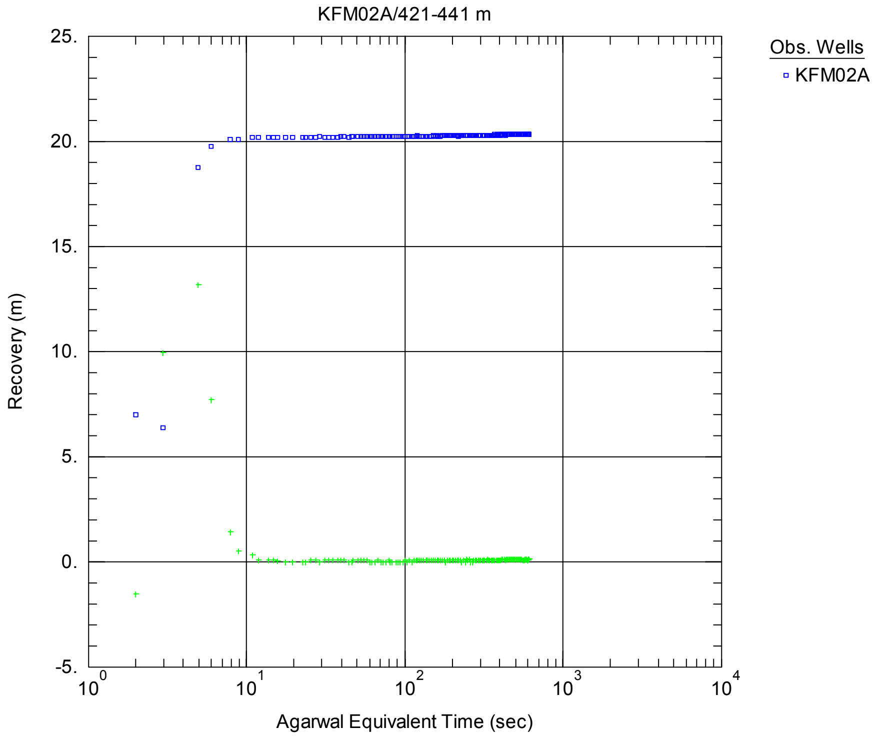



***Figure A3-113.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 421-441 m in KFM02A.*

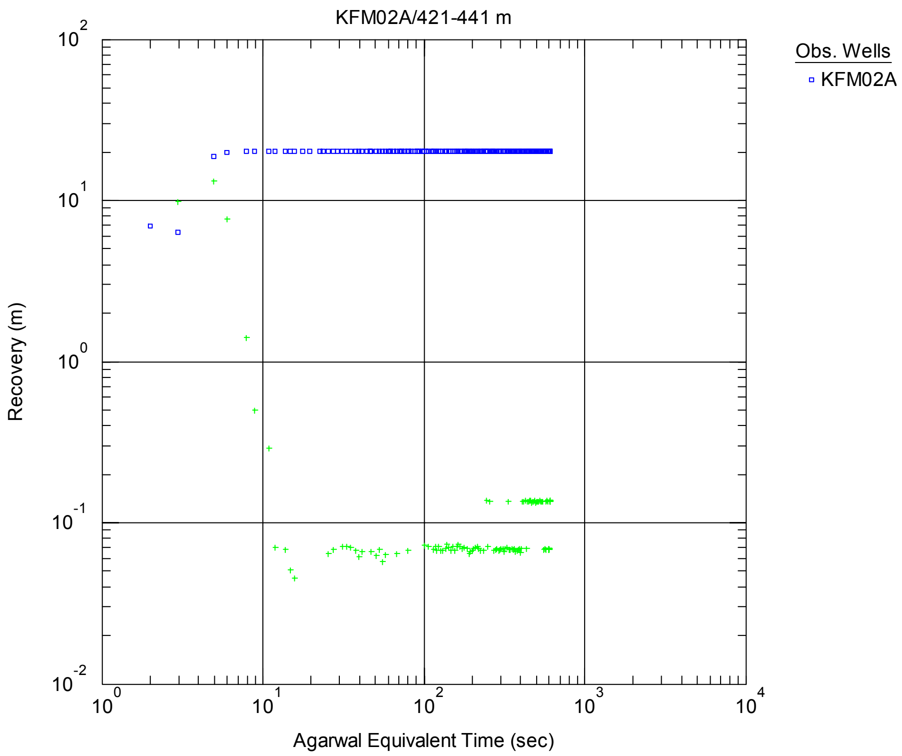



***Figure A3-114.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 421-441 m in KFM02A.*

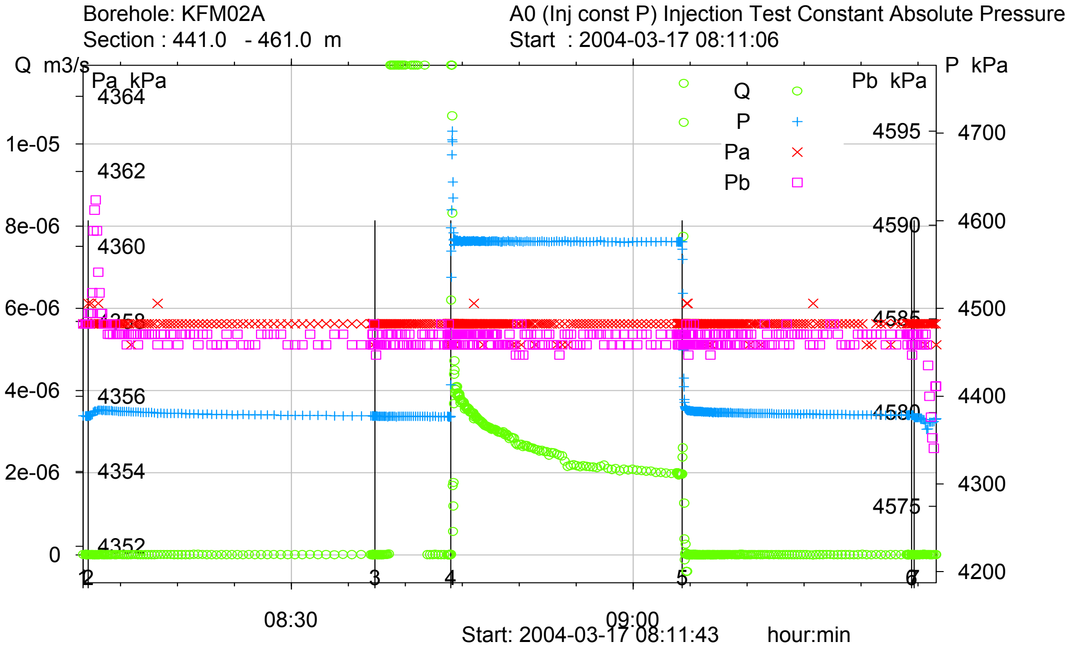



*__Figure A3-115.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 441-461 m in borehole KFM02A.*

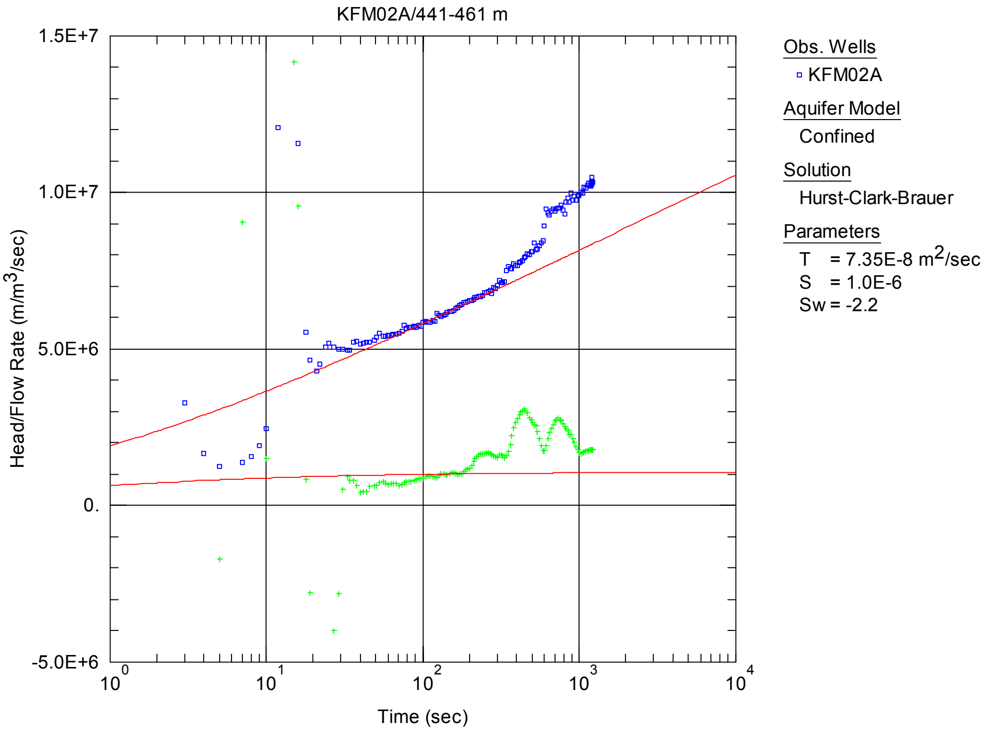



***Figure A3-116.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 441-461 m in KFM02A.*

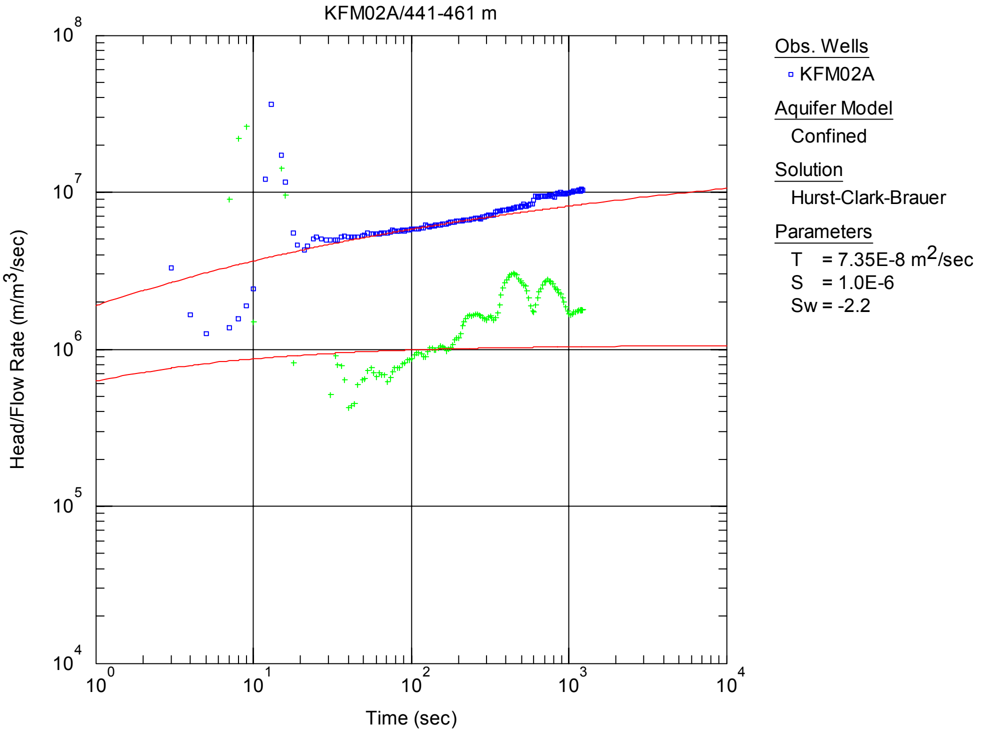



***Figure A3-117.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 441-461 m in KFM02A.*

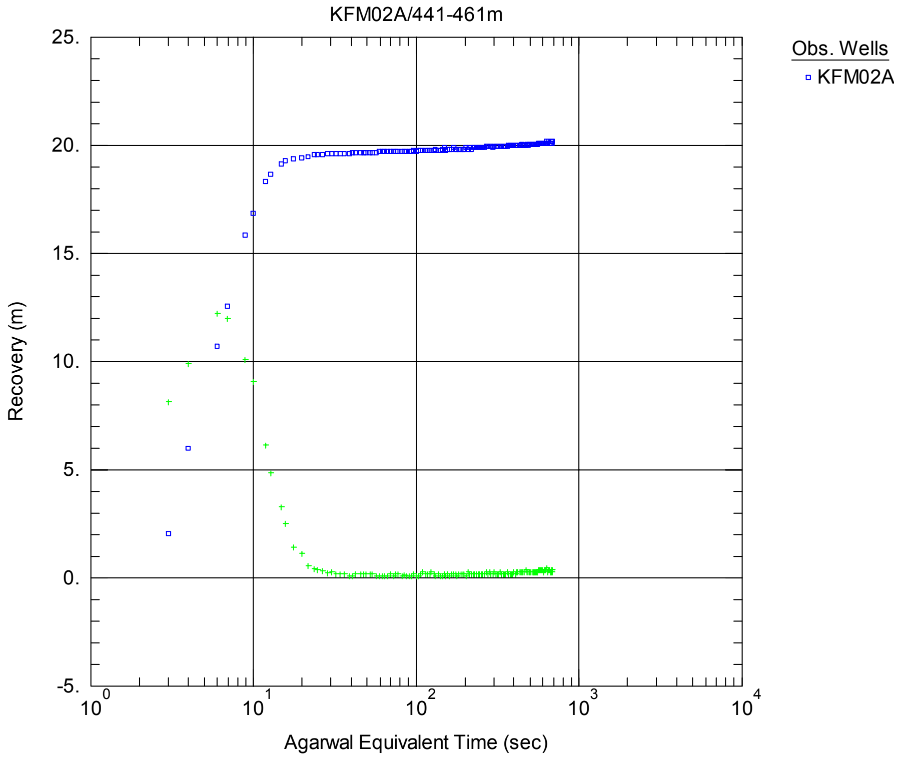



***Figure A3-118.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 441-461 m in KFM02A.*

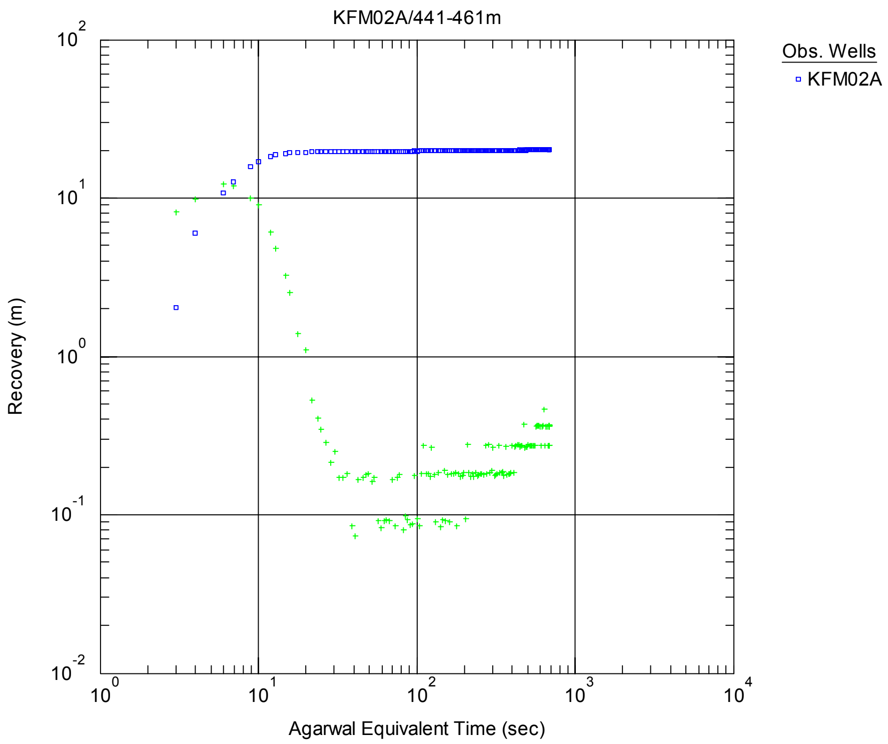



***Figure A3-119.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 441-461 m in KFM02A.*

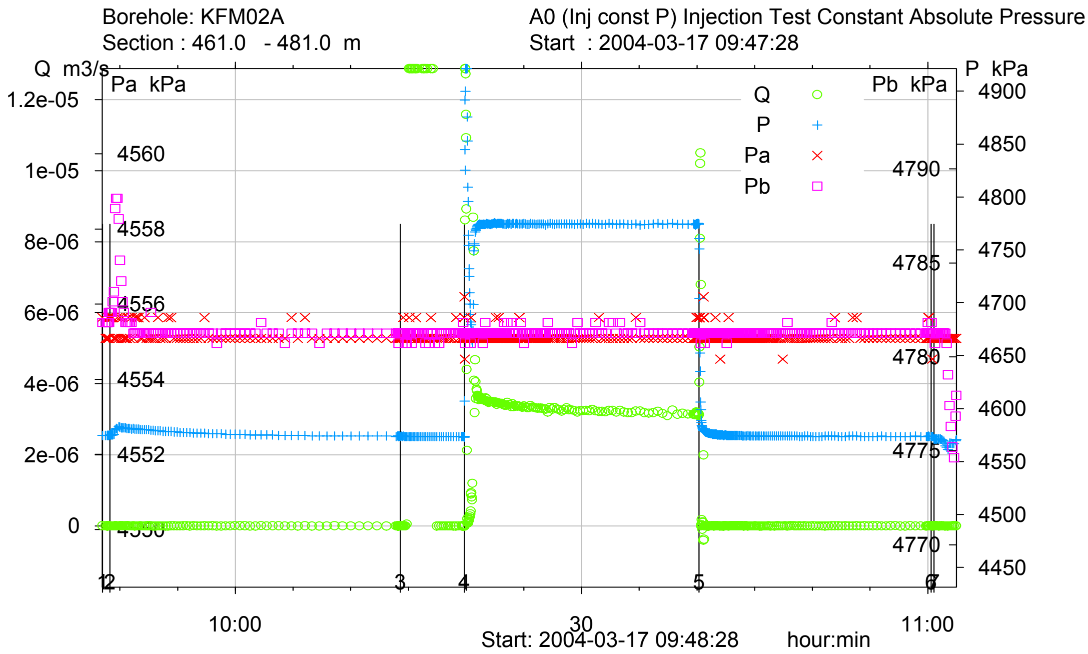



***Figure A3-120.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 461-481 m in borehole KFM02A.*

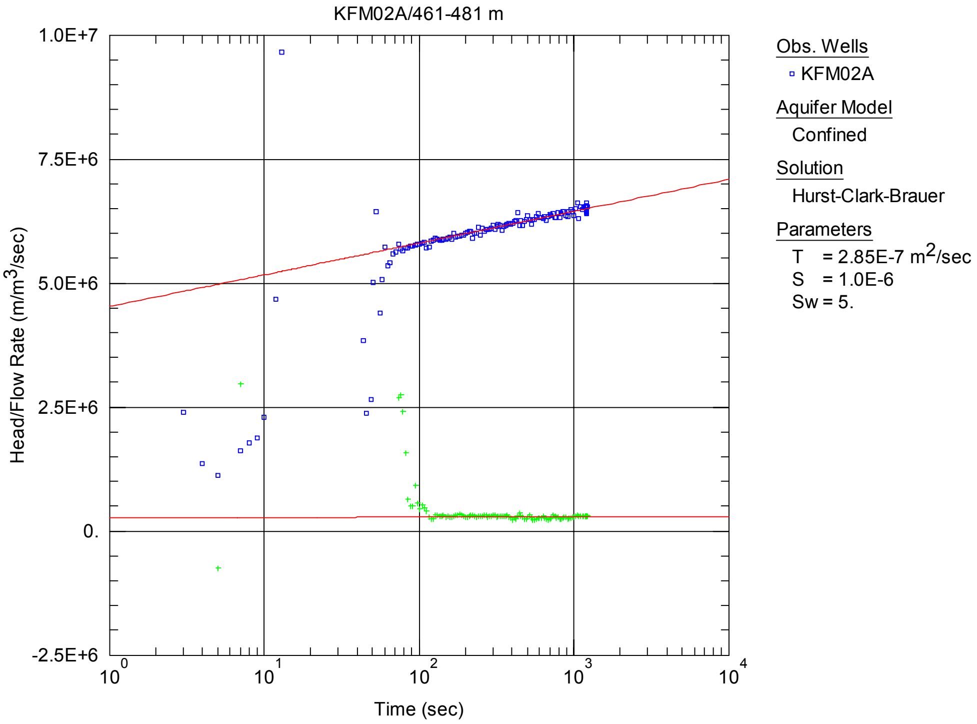



***Figure A3-121.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 461-481 m in KFM02A.*

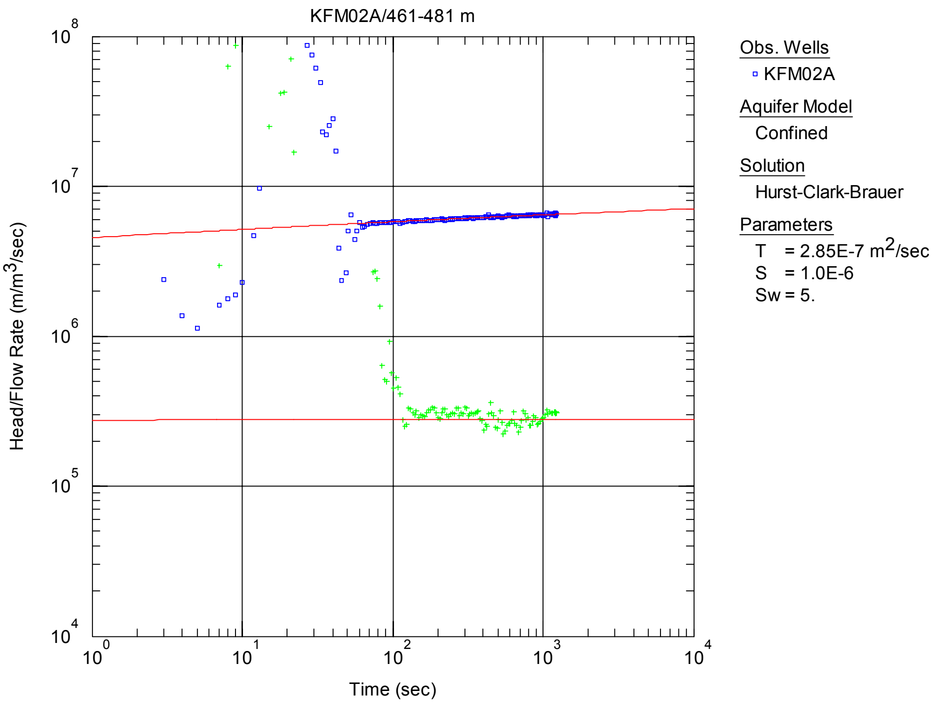



***Figure A3-122.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 461-481 m in KFM02A.*

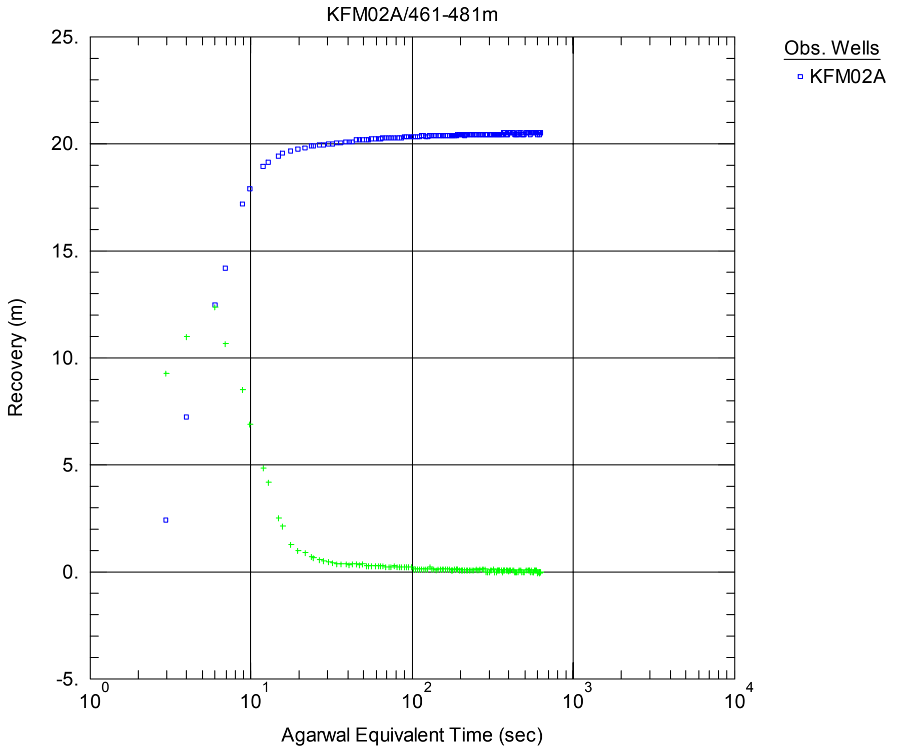



***Figure A3-123.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 461-481 m in KFM02A.*

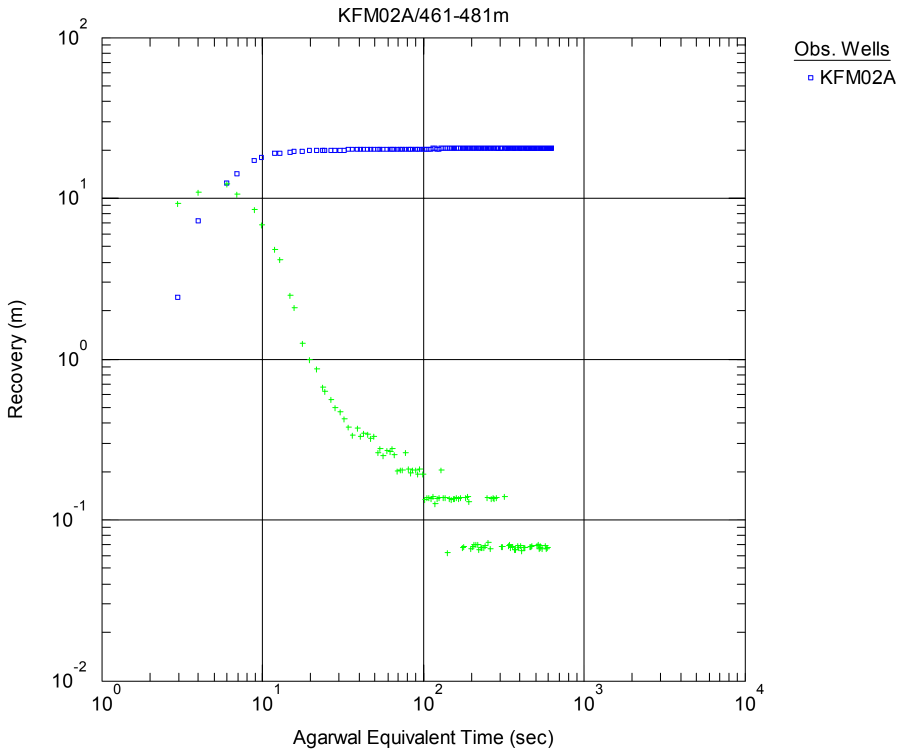



***Figure A3-124.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 461-481 m in KFM02A.*

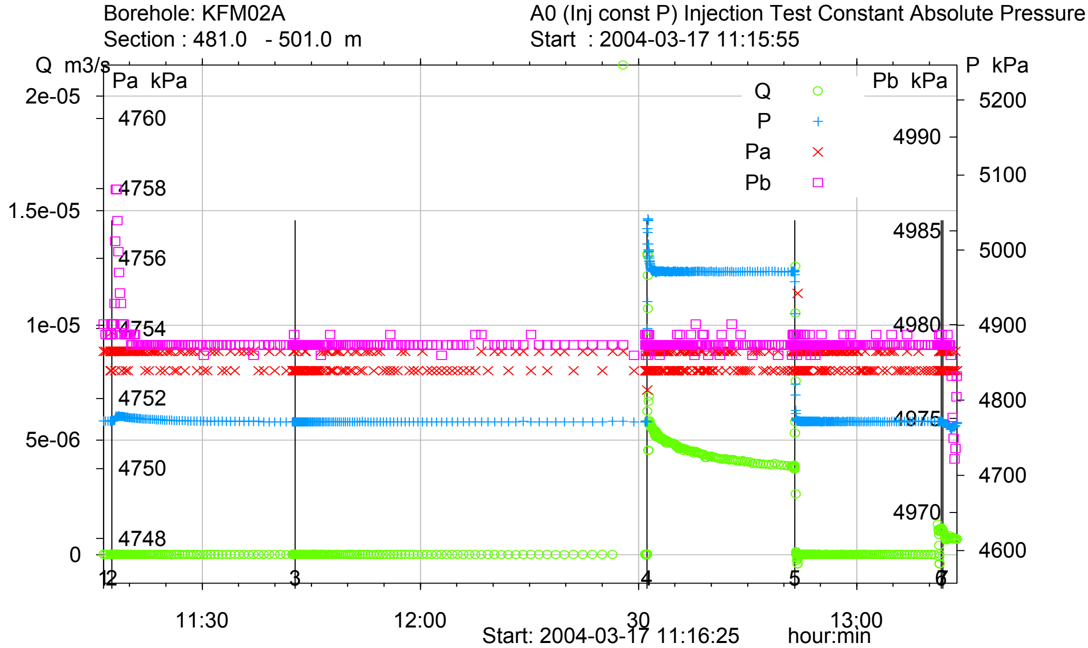



***Figure A3-125.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 481-501 m in borehole KFM02A.*

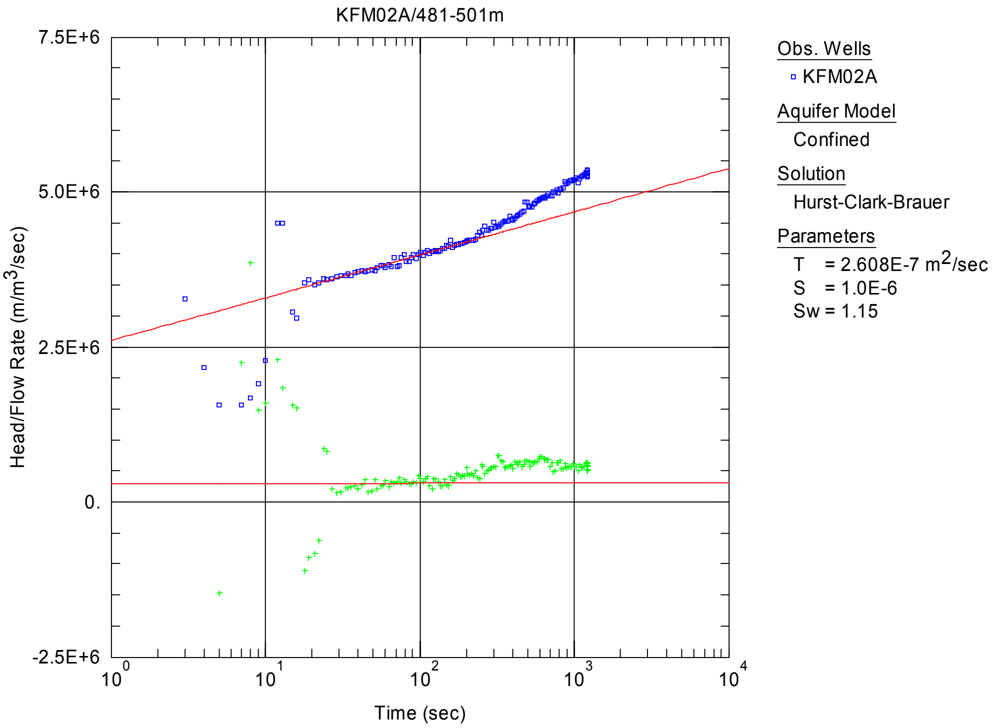



***Figure A3-126.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 481-501 m in KFM02A. Showing fit to first pseudo-radial flow regime.*

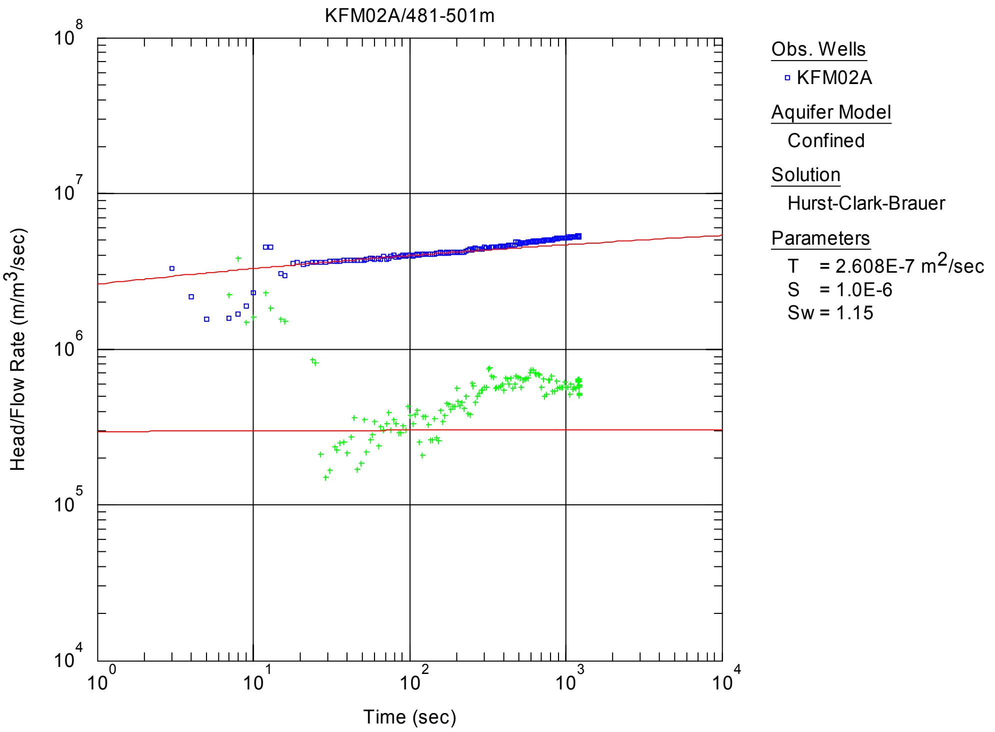



***Figure A3-127.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 481-501 m in KFM02A. Showing fit to first pseudo-radial flow regime.*

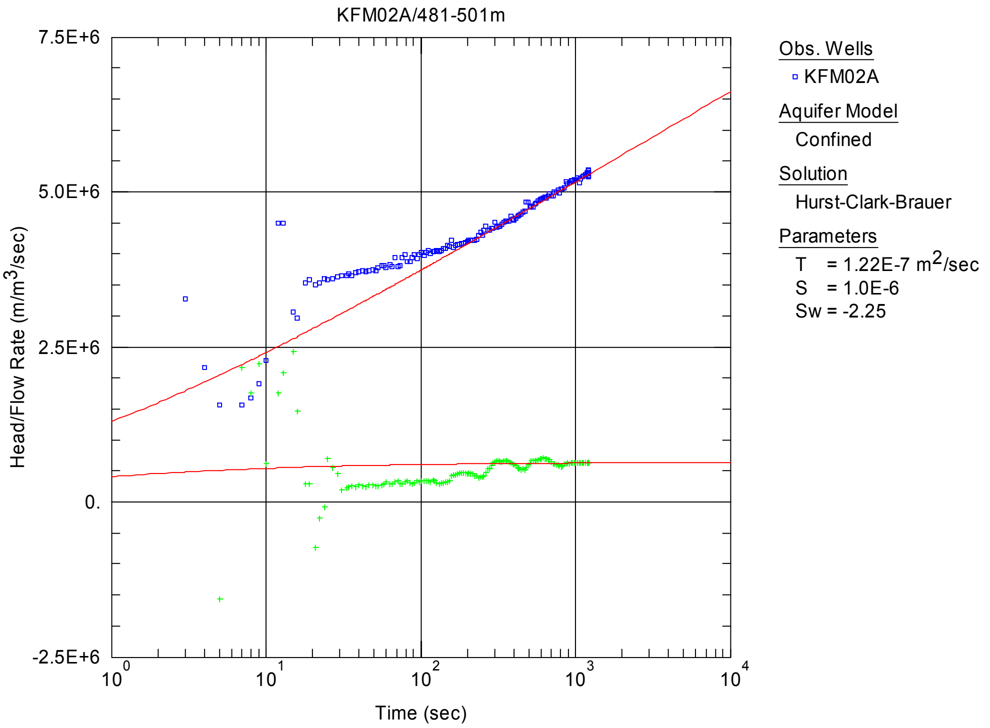



***Figure A3-128.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 481-501 m in KFM02A. Showing alternative fit to second pseudo-radial flow regime.*

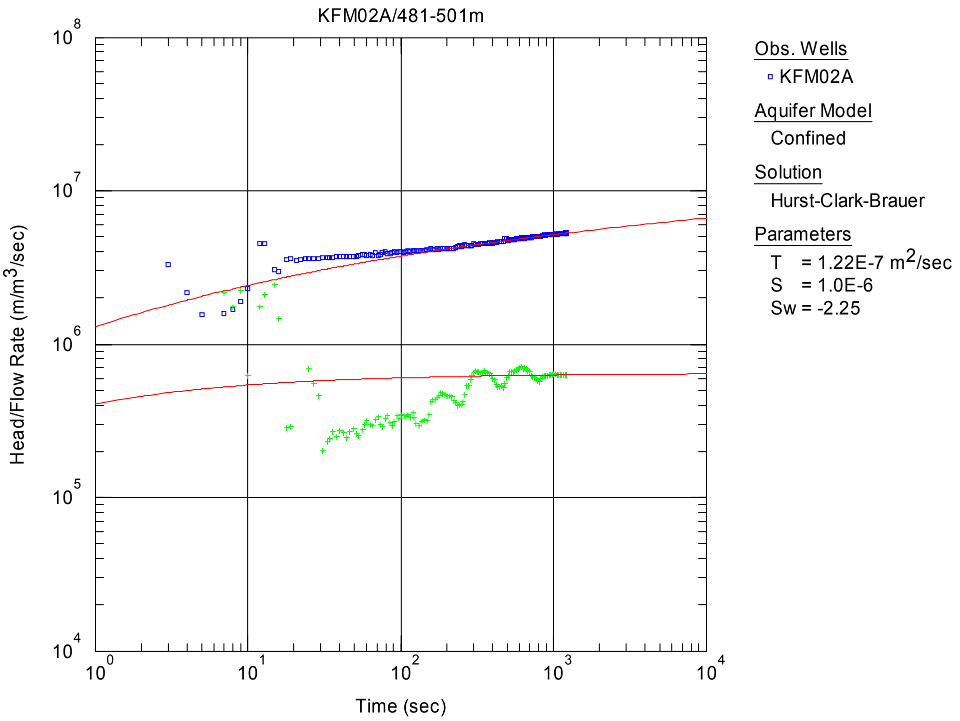



***Figure A3-129.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 481-501 m in KFM02A. Showing alternative fit to second pseudo-radial flow regime.*

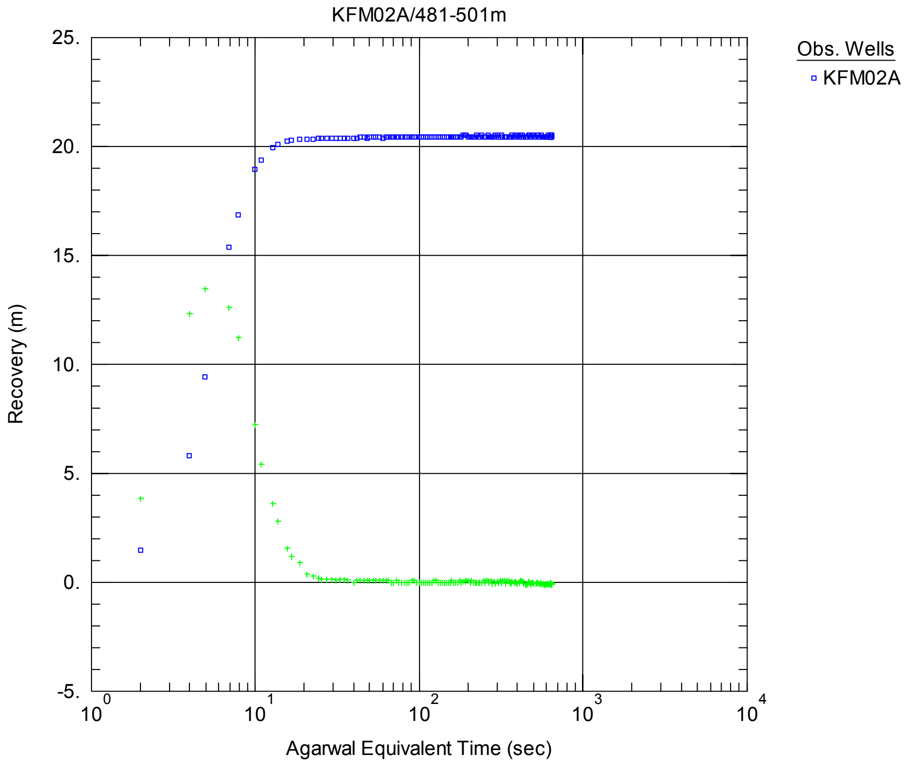



***Figure A3-130.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 481-501 m in KFM02A.*

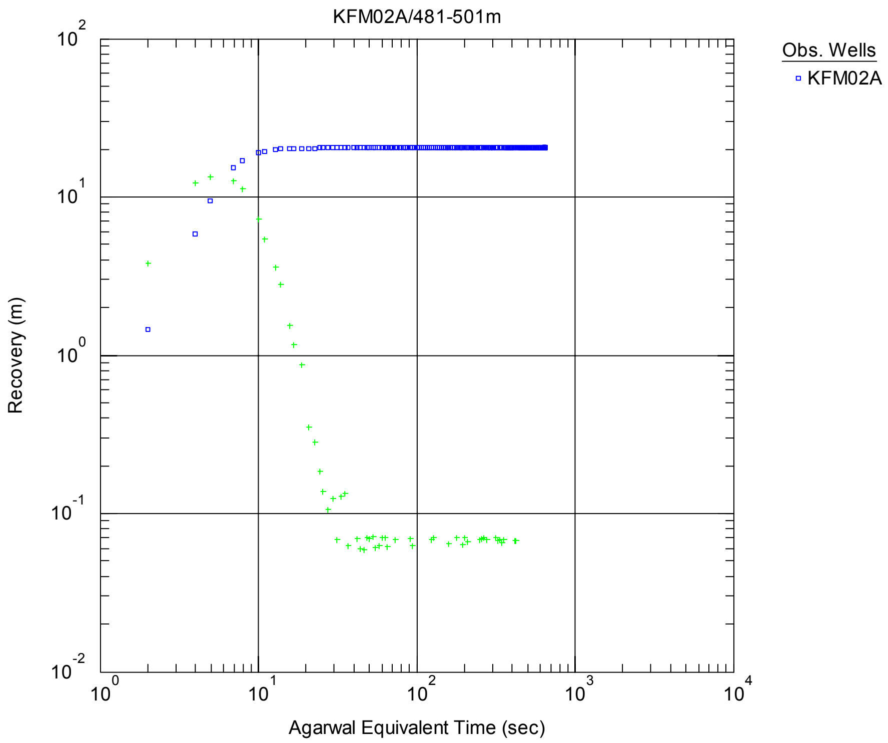



***Figure A3-131.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 481-501 m in KFM02A.*

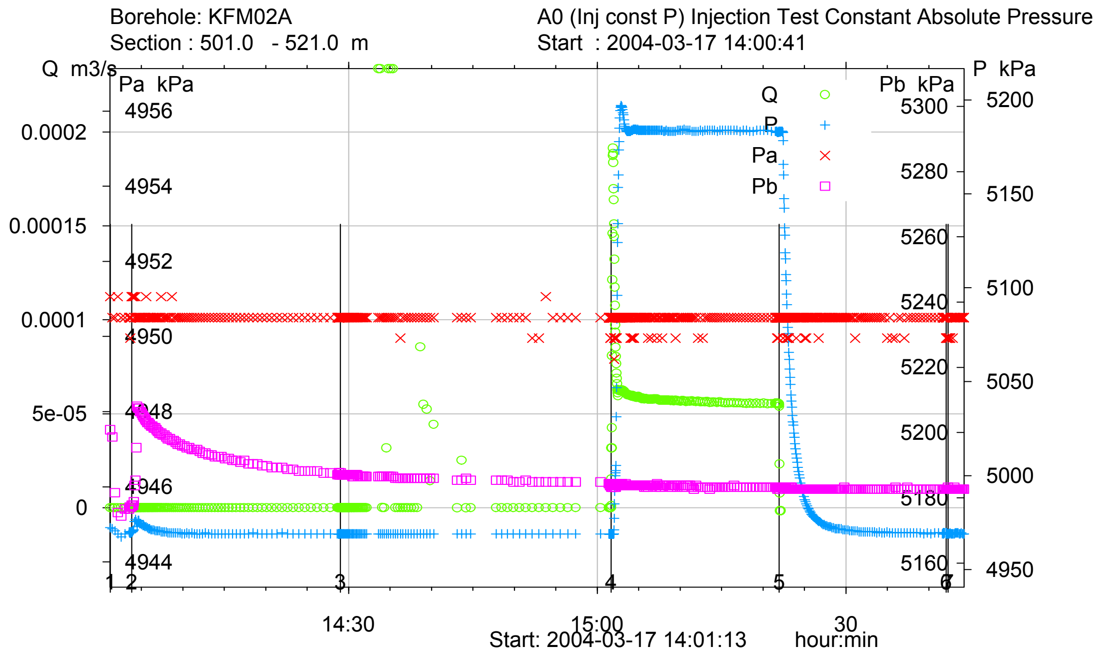



***Figure A3-132.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 501-521 m in borehole KFM02A.*

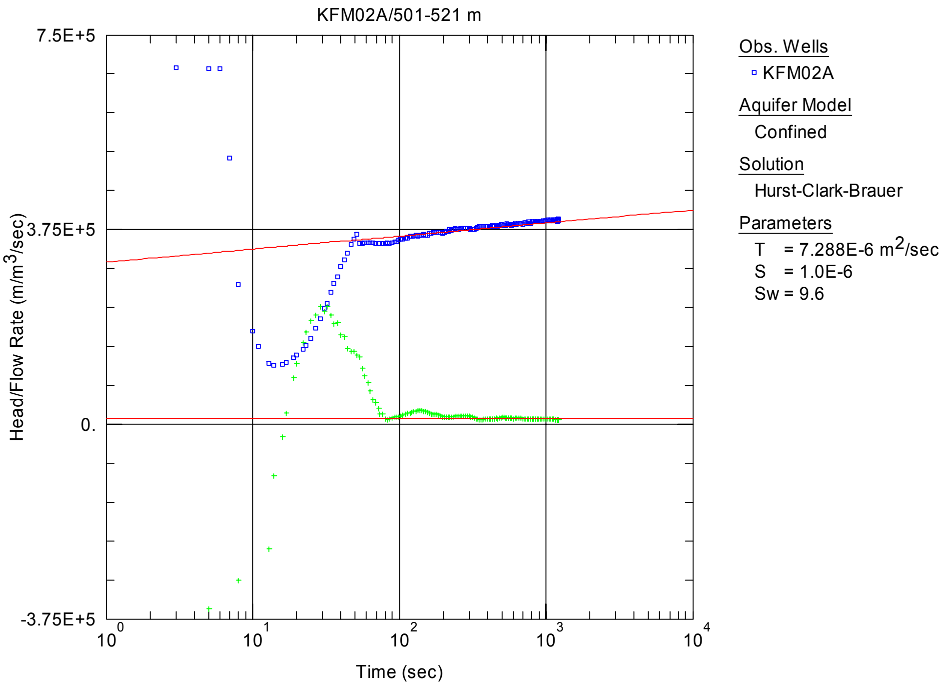



***Figure A3-133.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 501-521 m in KFM02A. Showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable.*

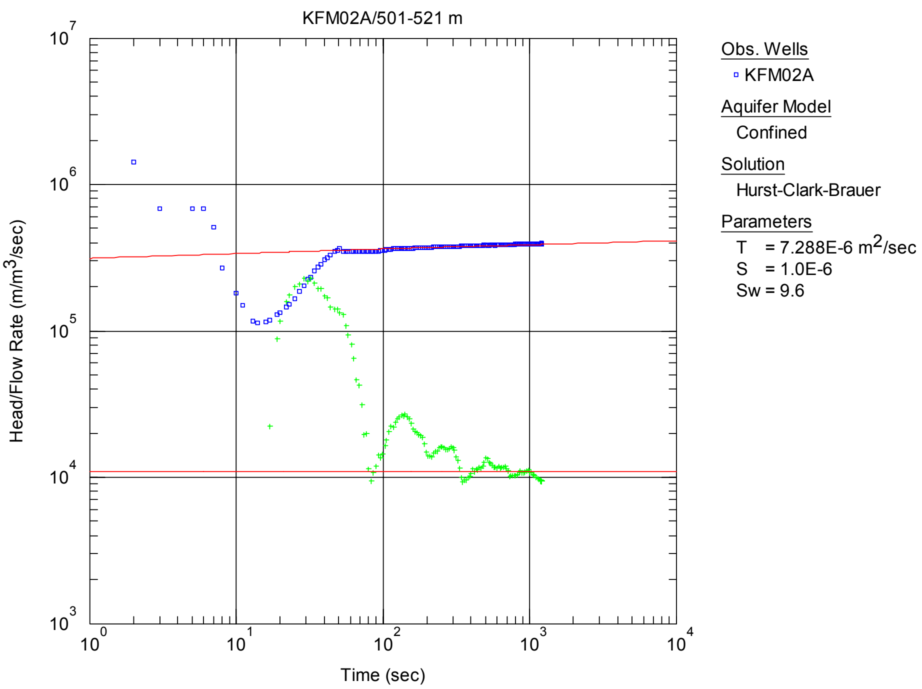



***Figure A3-134.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 501-521 m in KFM02A. Showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable.*

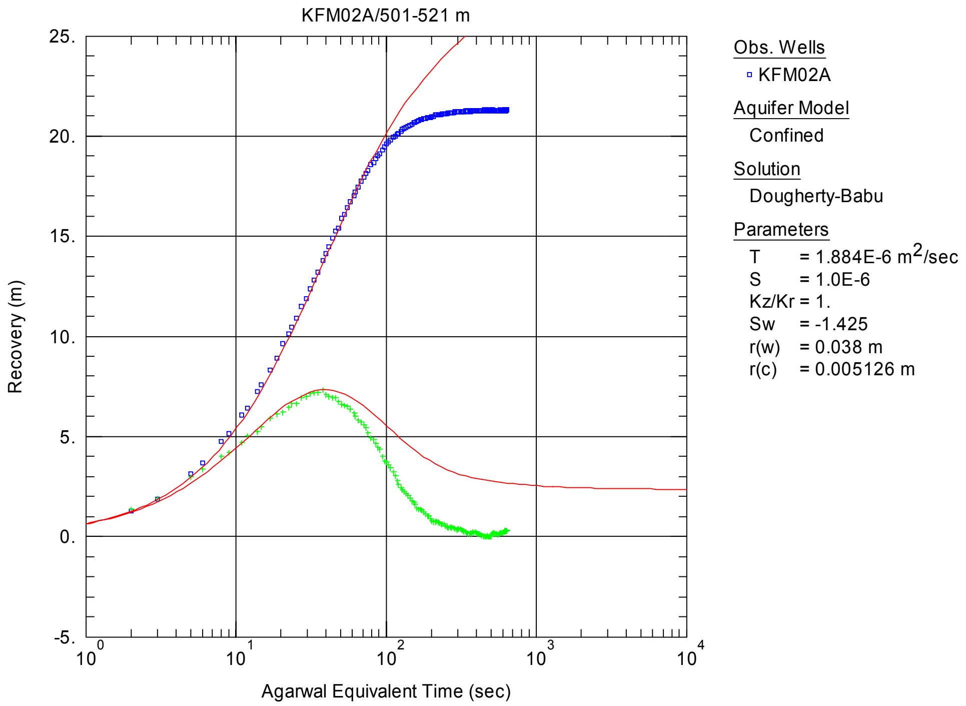



***Figure A3-135.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 501-521 m in KFM02A.*

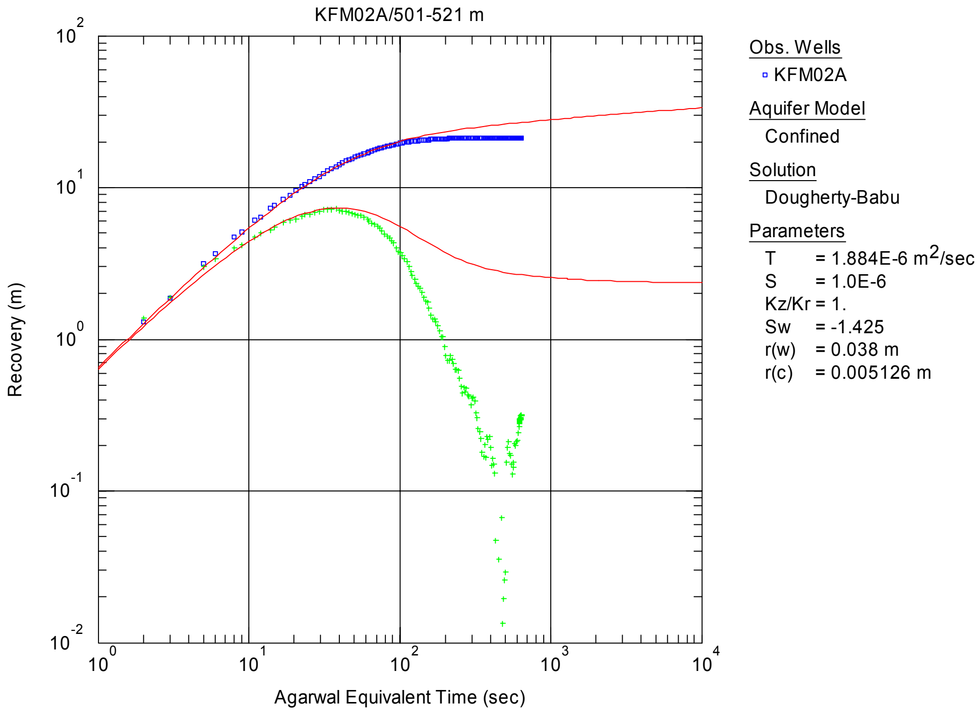



***Figure A3-136.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 501-521 m in KFM02A.*

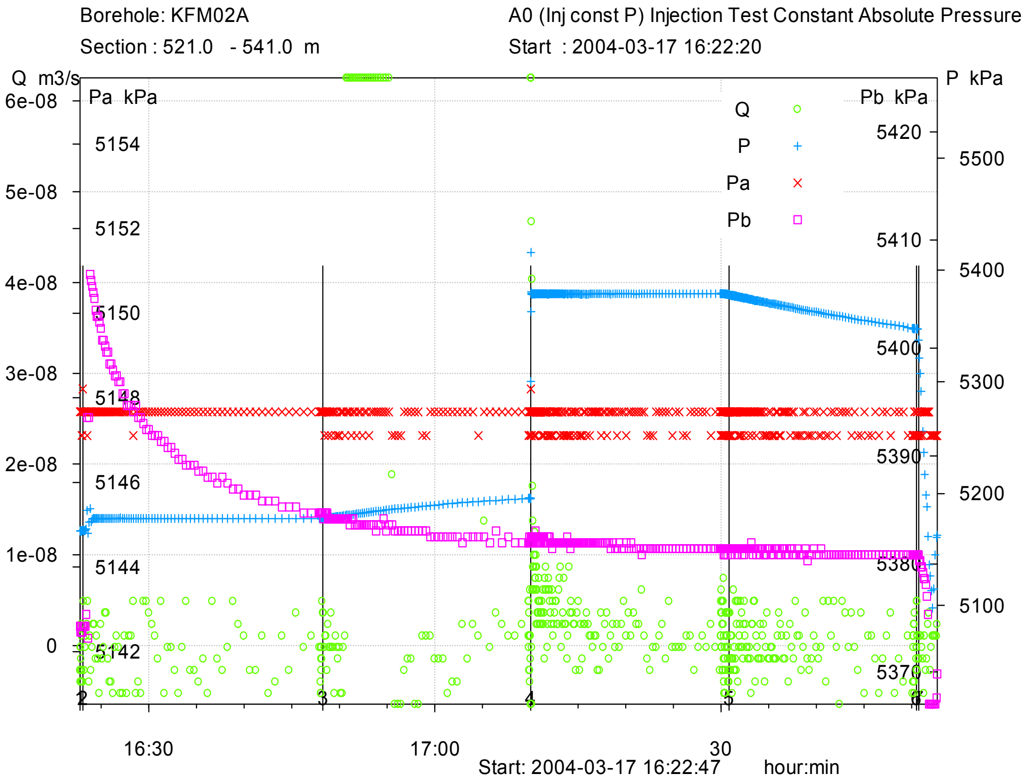



***Figure A3-137.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 521-541 m in borehole KFM02A.*

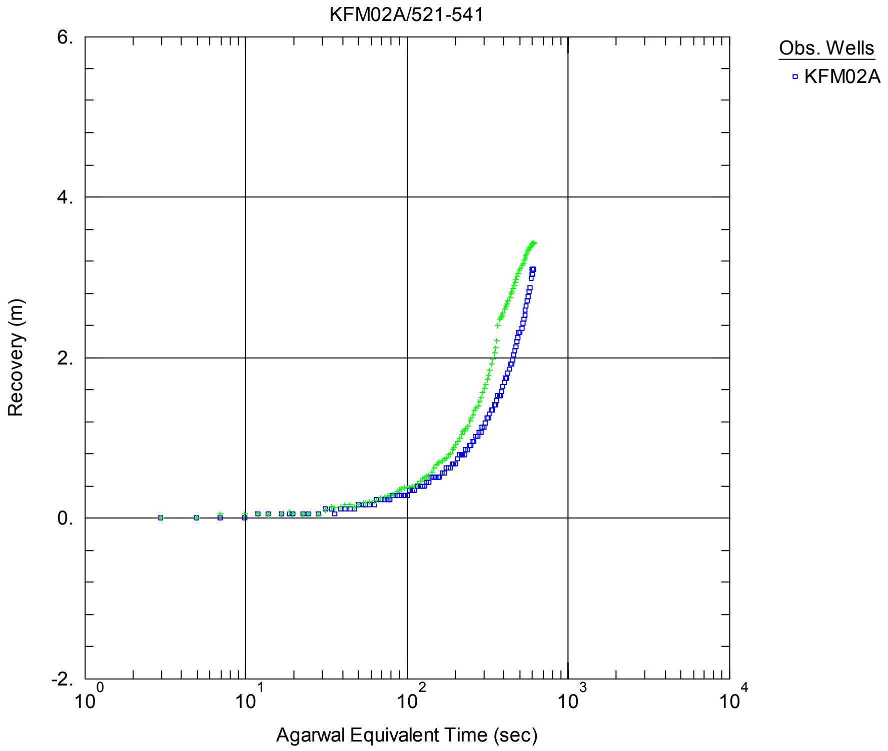



***Figure A3-138.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 521-541 m in KFM02A.*

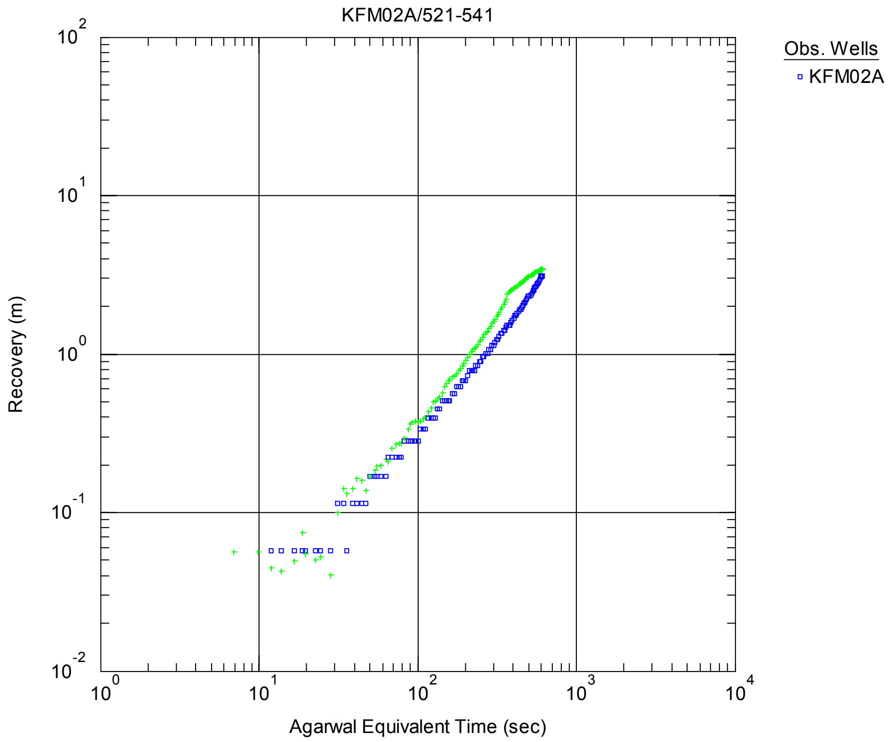



***Figure A3-139.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 521-541 m in KFM02A.*

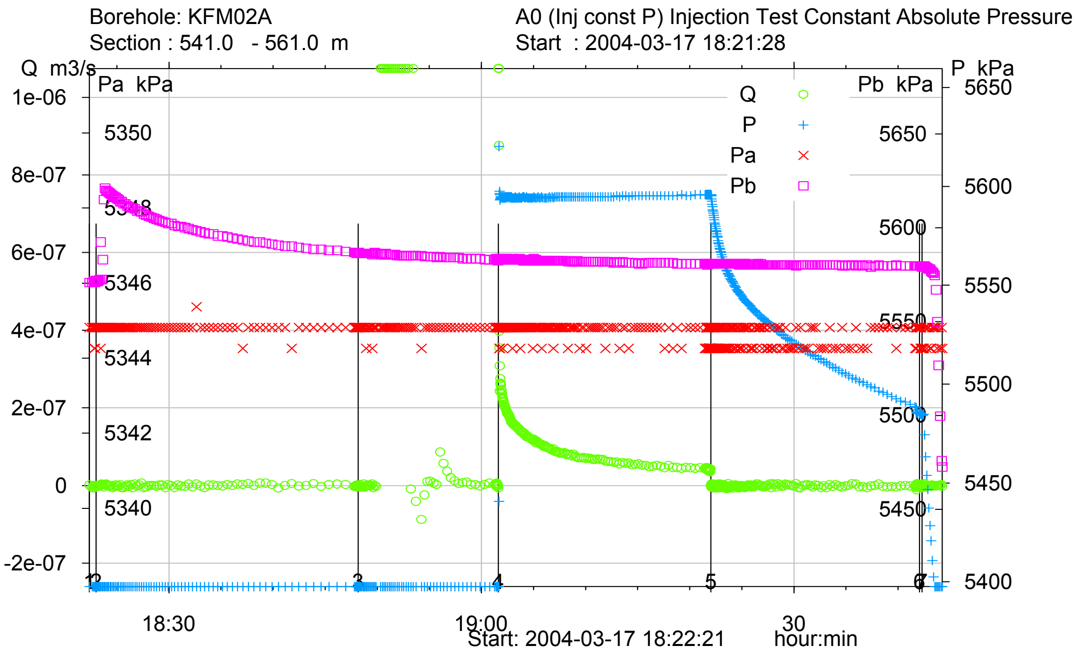



*__Figure A3-140.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 541-561 m in borehole KFM02A.*

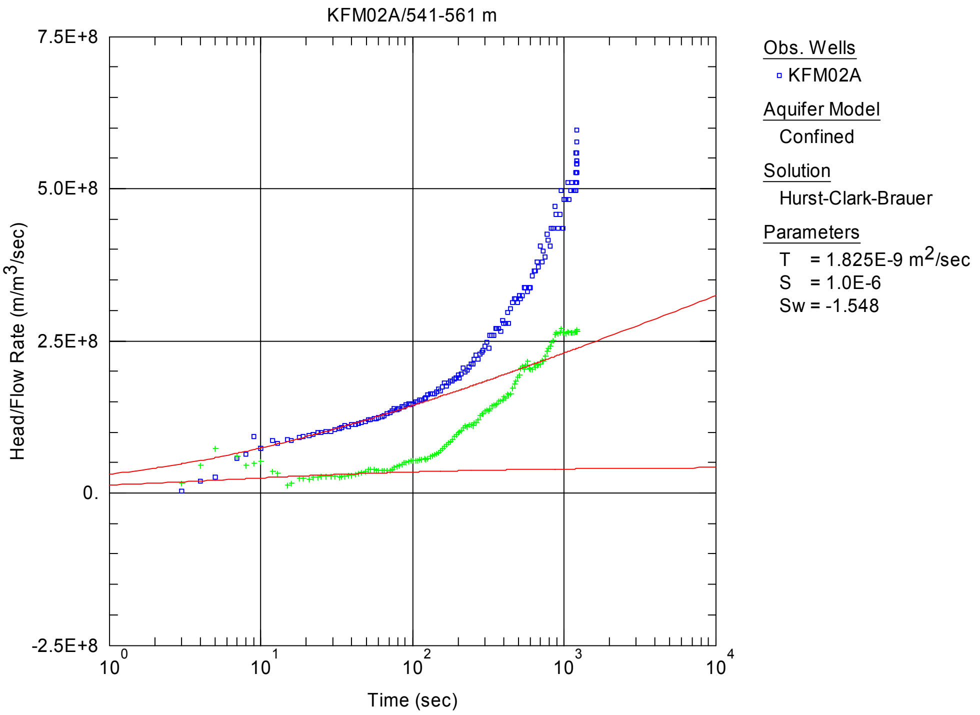



***Figure A3-141.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 541-561 m in KFM02A.*

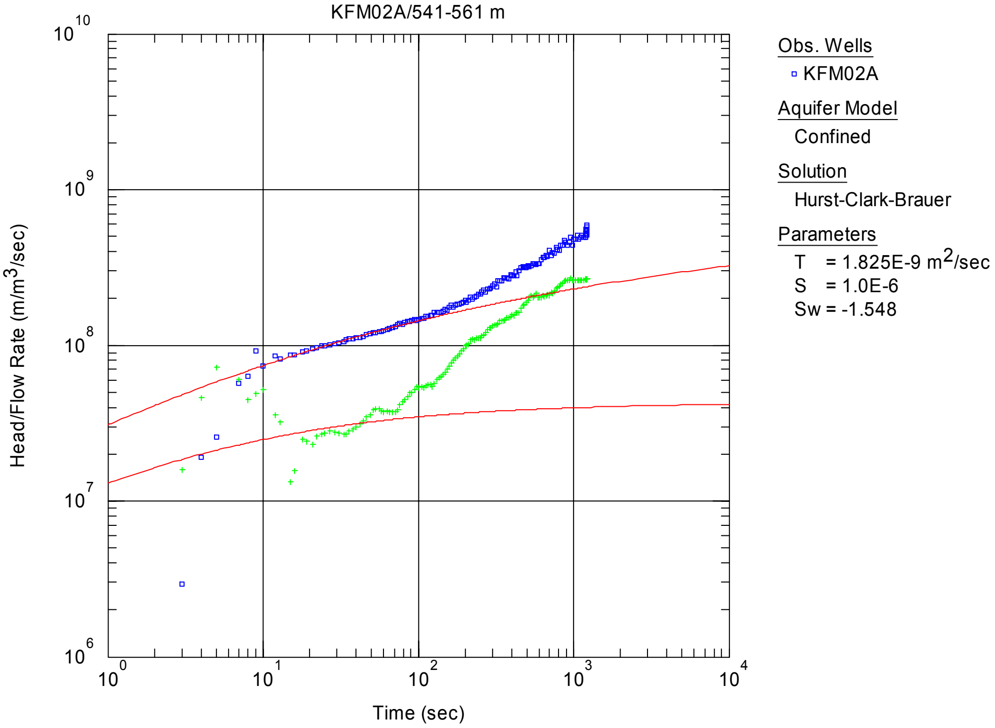



***Figure A3-142.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 541-561 m in KFM02A.*

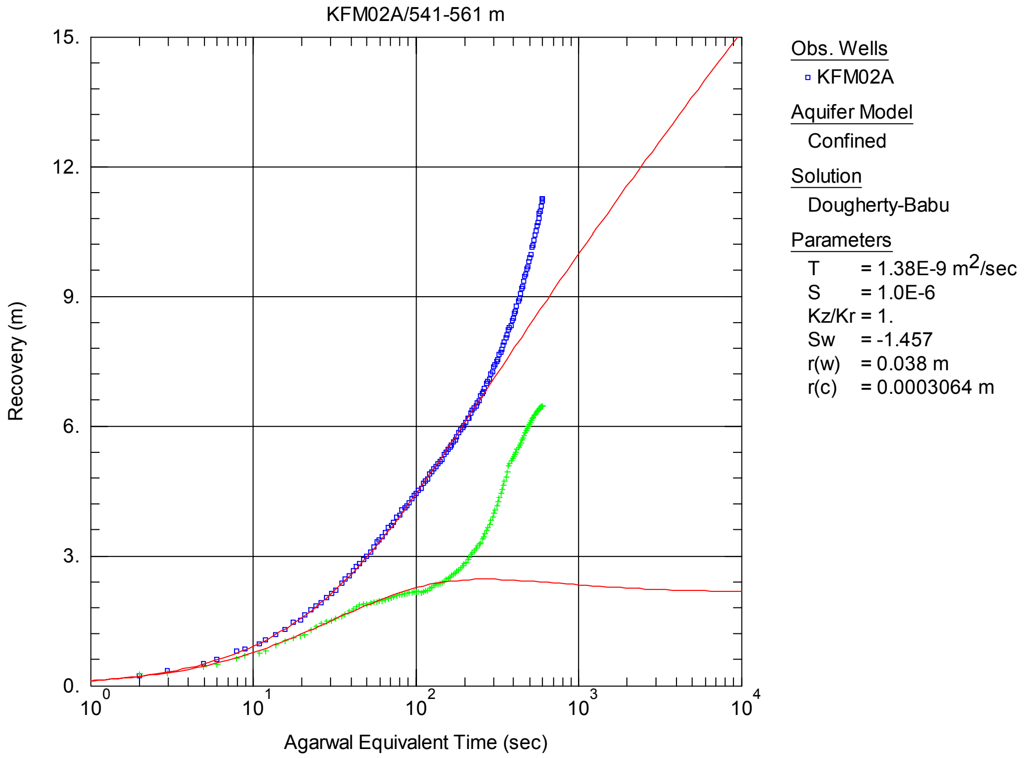



***Figure A3-143.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 541-561 m in KFM02A.*

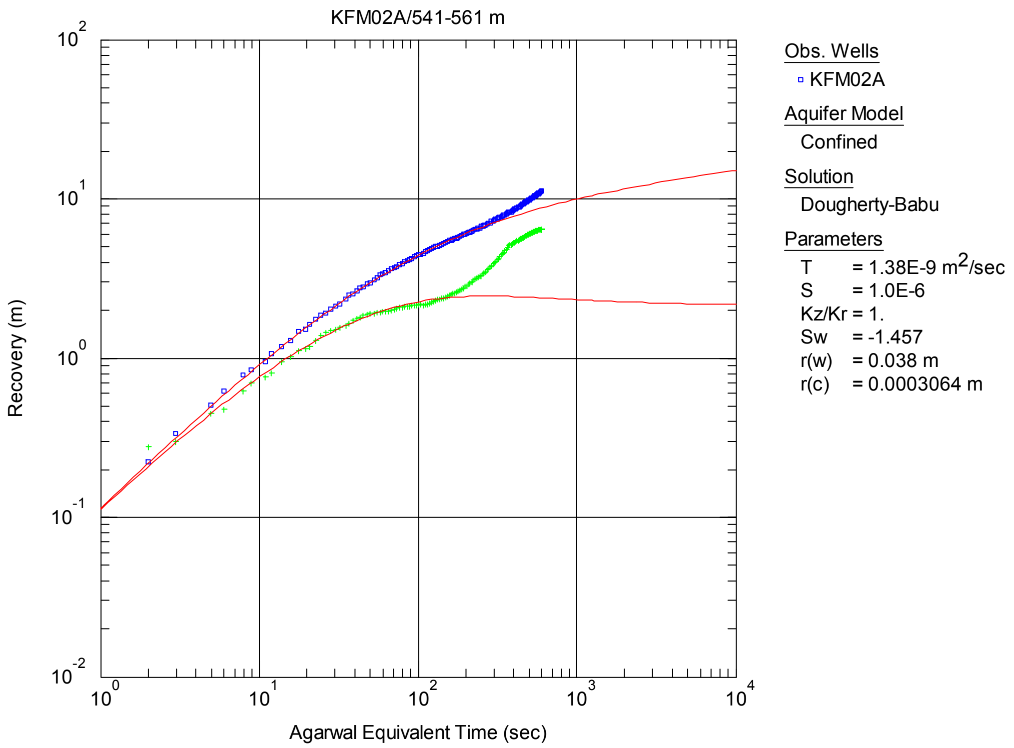



***Figure A3-144.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 541-561 m in KFM02A.*

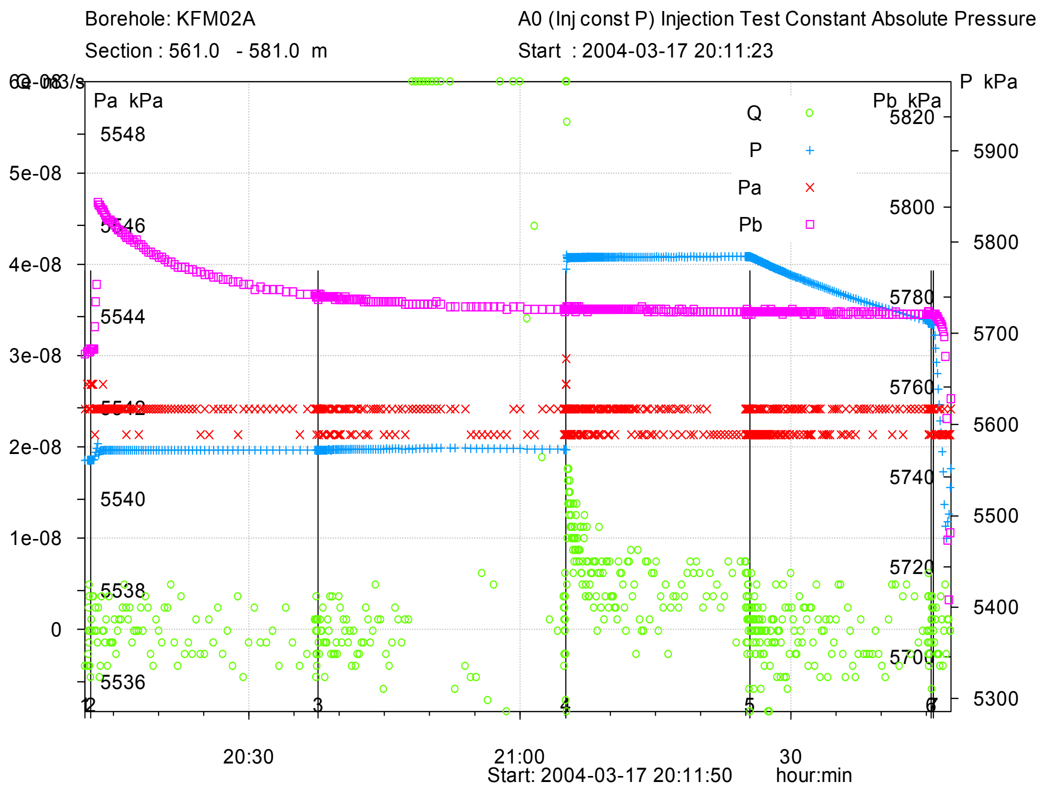



***Figure A3-145.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 561-581 m in borehole KFM02A.*

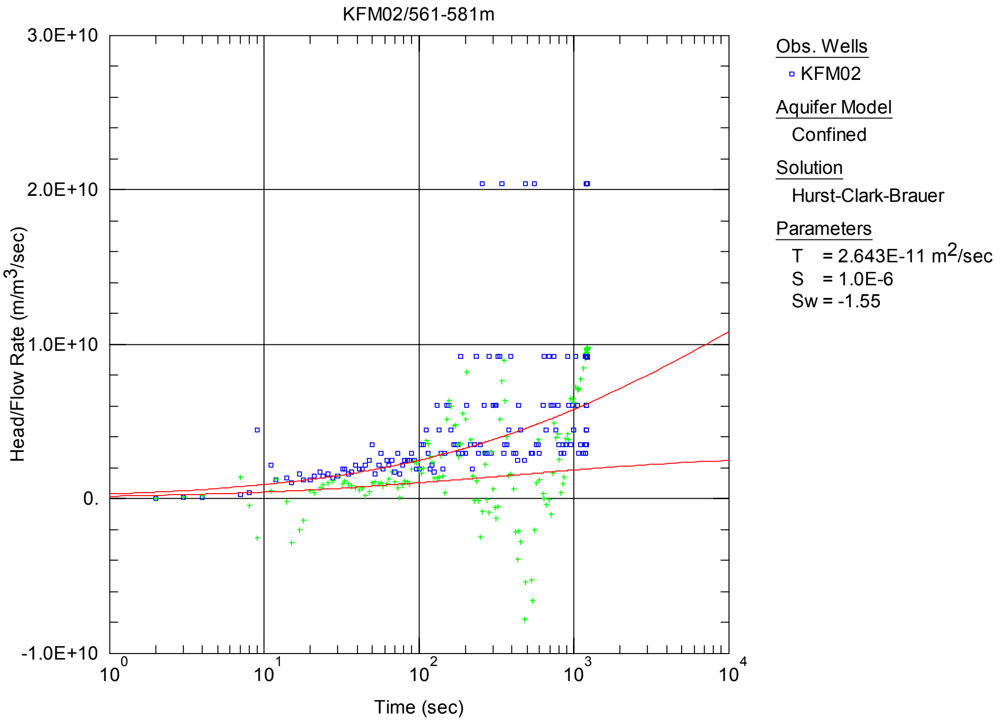



***Figure A3-146.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 561-581 m in KFM02A.*

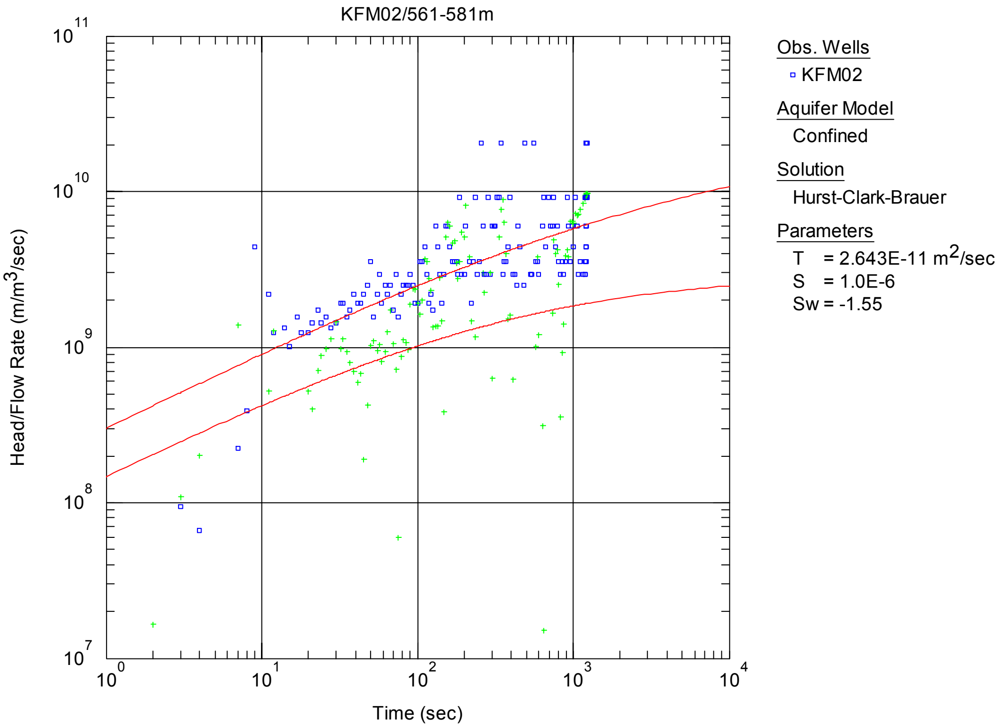



***Figure A3-147.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 561-581 m in KFM02A.*

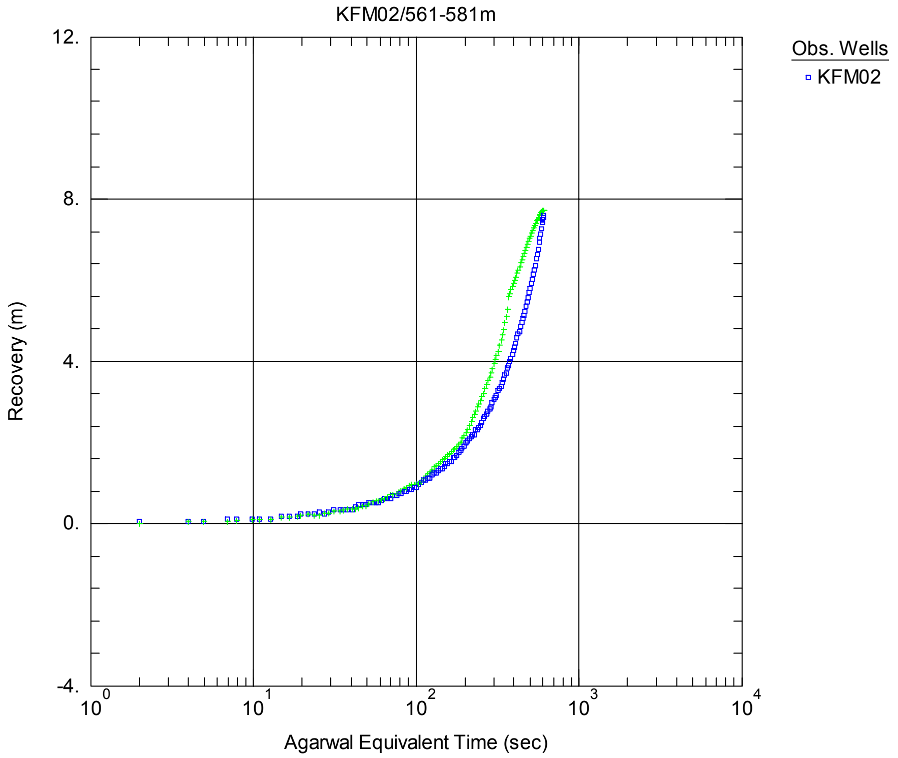



***Figure A3-148.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 561-581 m in KFM02A.*

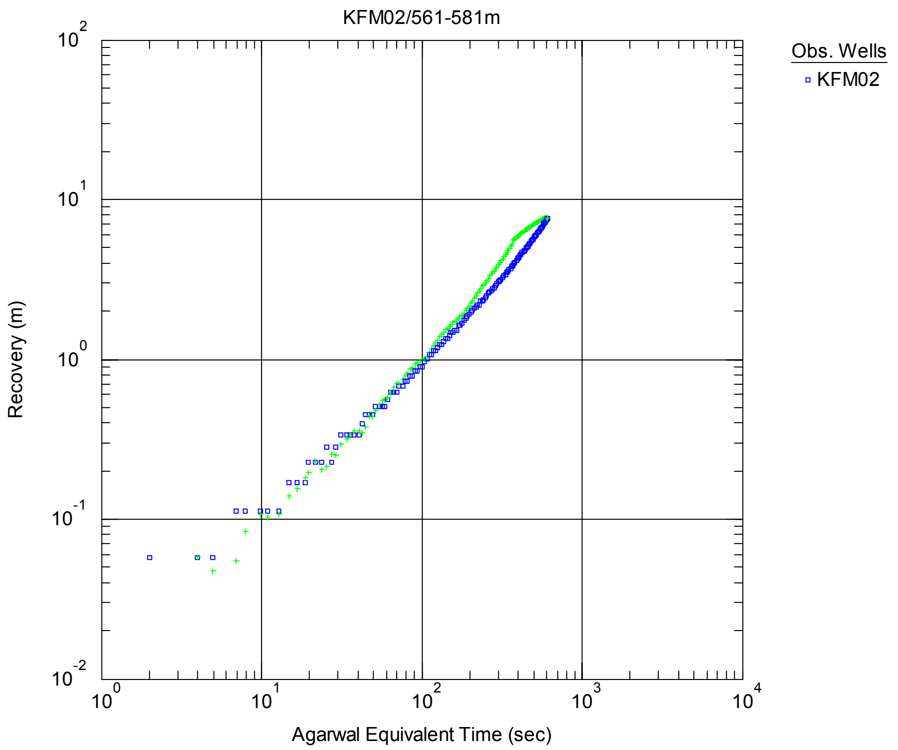



***Figure A3-149.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 561-581 m in KFM02A.*

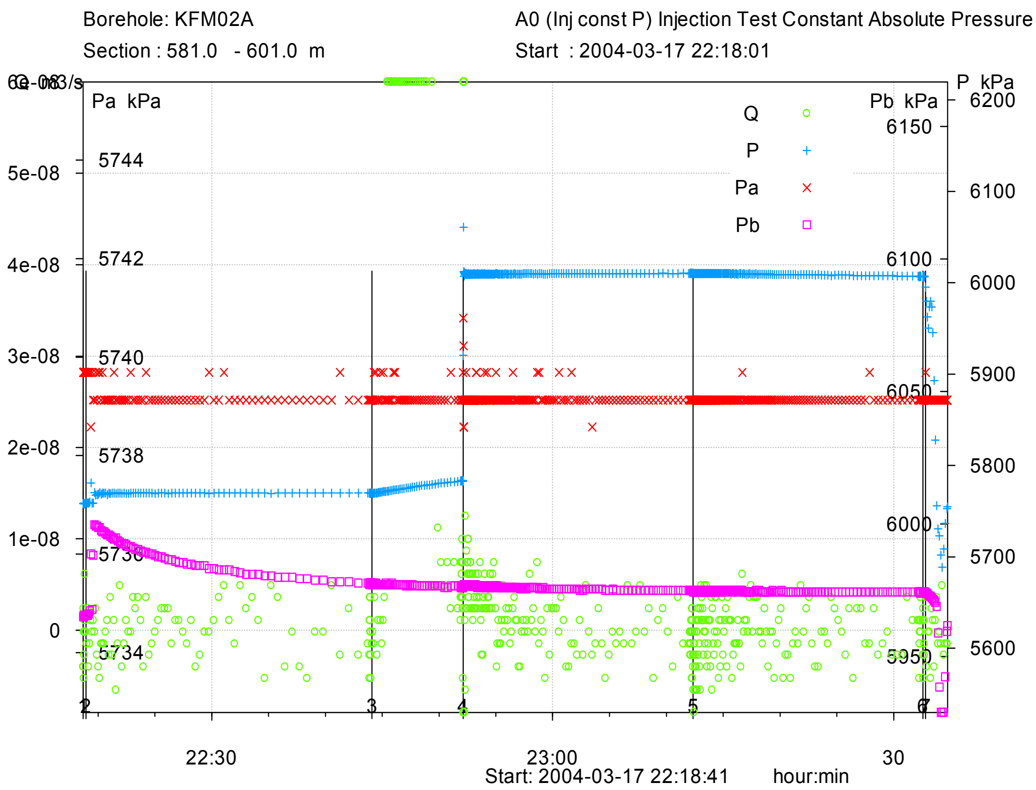



***Figure A3-150.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 581-601 m in borehole KFM02A.*

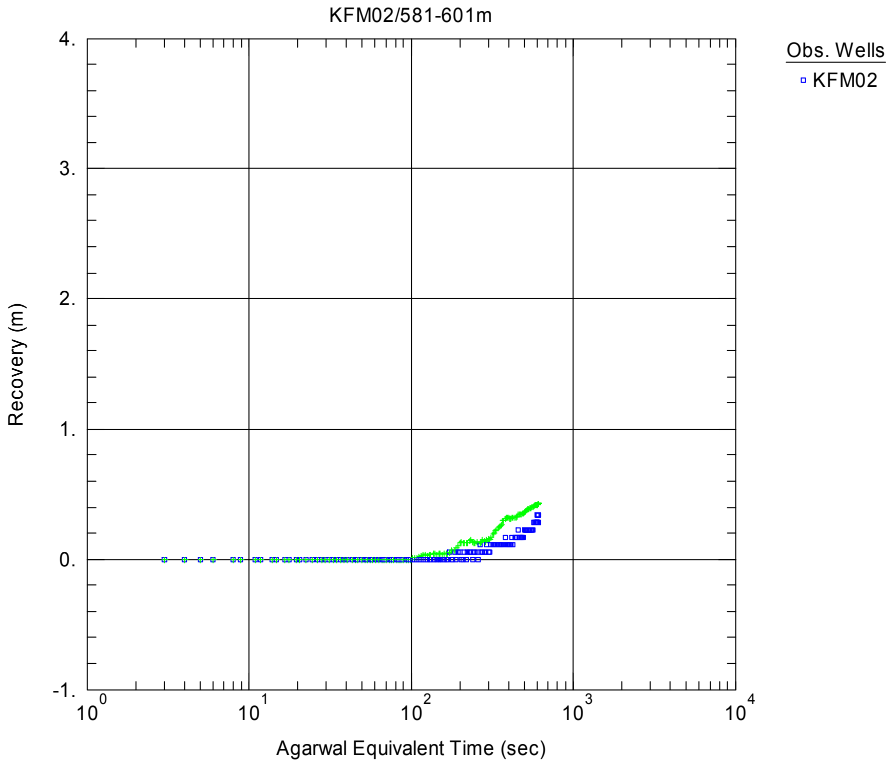



***Figure A3-151.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 581-601 m in KFM02A.*

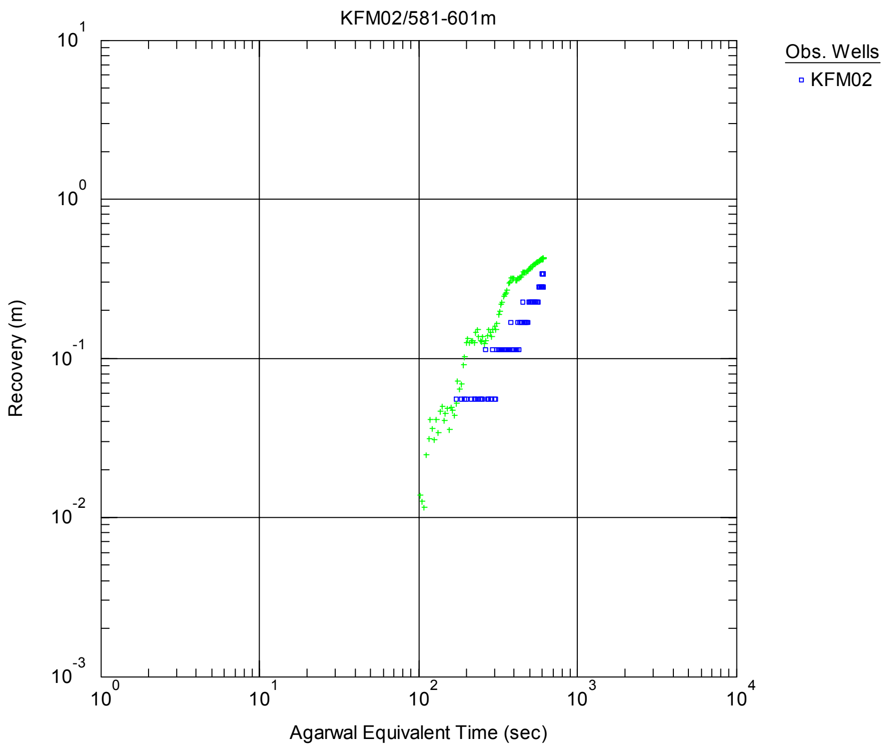



***Figure A3-152.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 581-601 m in KFM02A.*

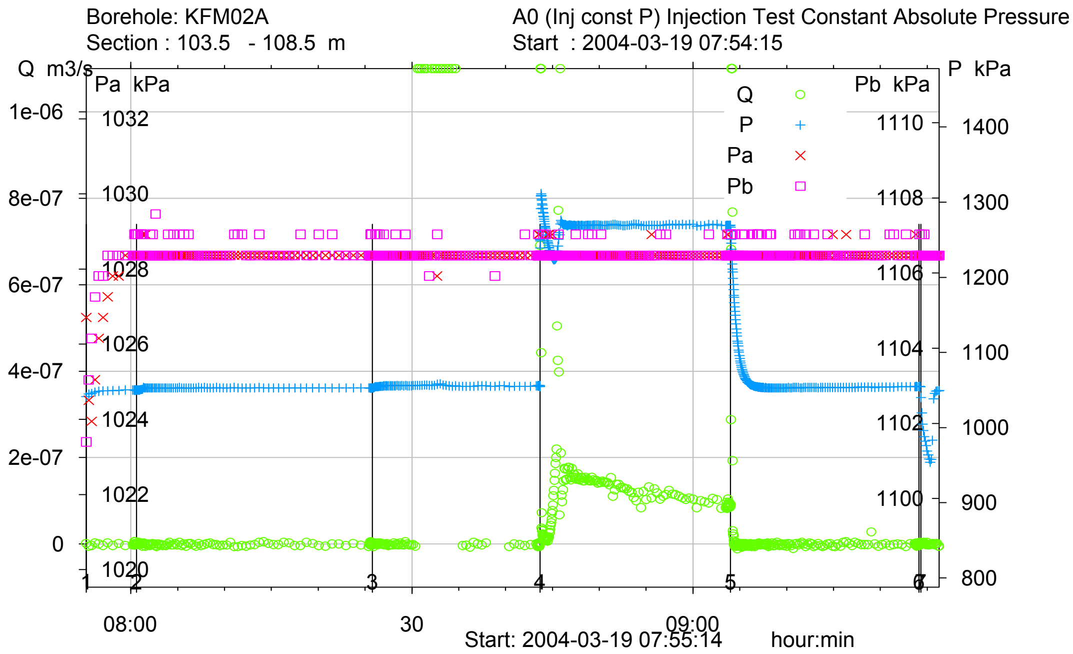



***Figure A3-153.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 103.5-108.5 m in borehole KFM02A.*

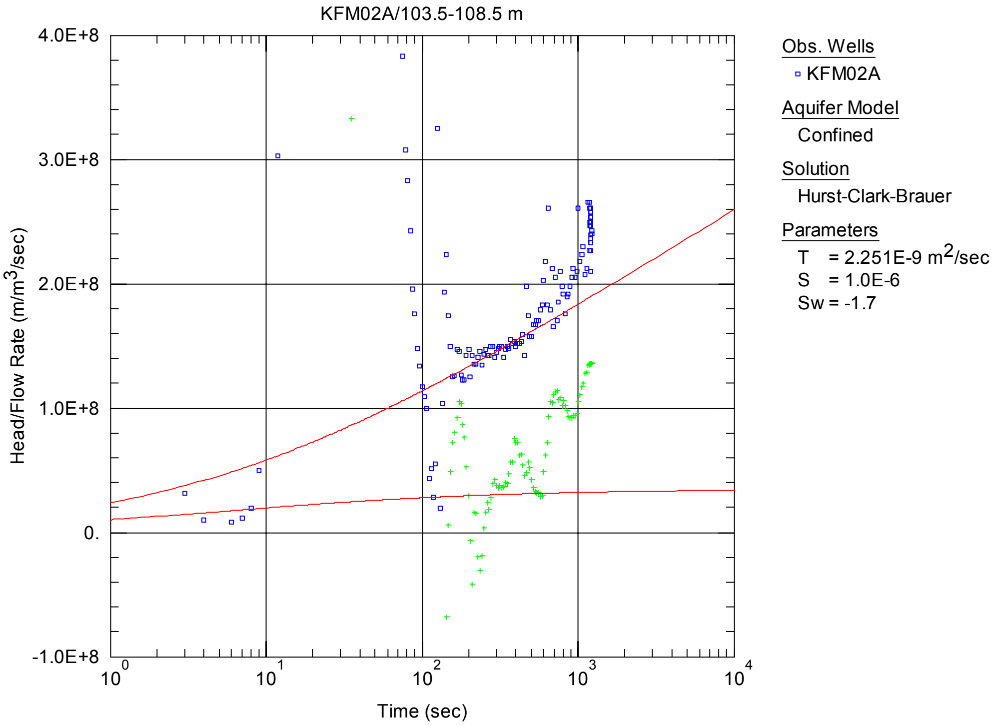



***Figure A3-154.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 103.5-108.5 m in KFM02A. Showing type curve fit to the first pseudo-radial flow regime.*

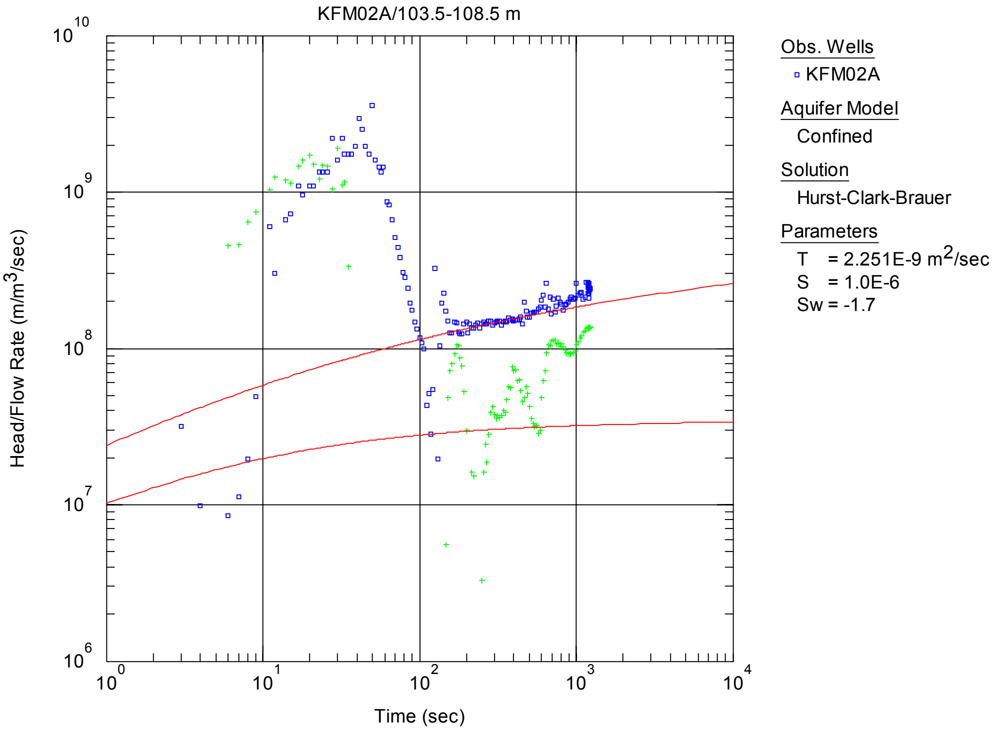



***Figure A3-155.** Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 103.5-108.5 m in KFM02A. Showing type curve fit to the first pseudo-radial flow regime.*

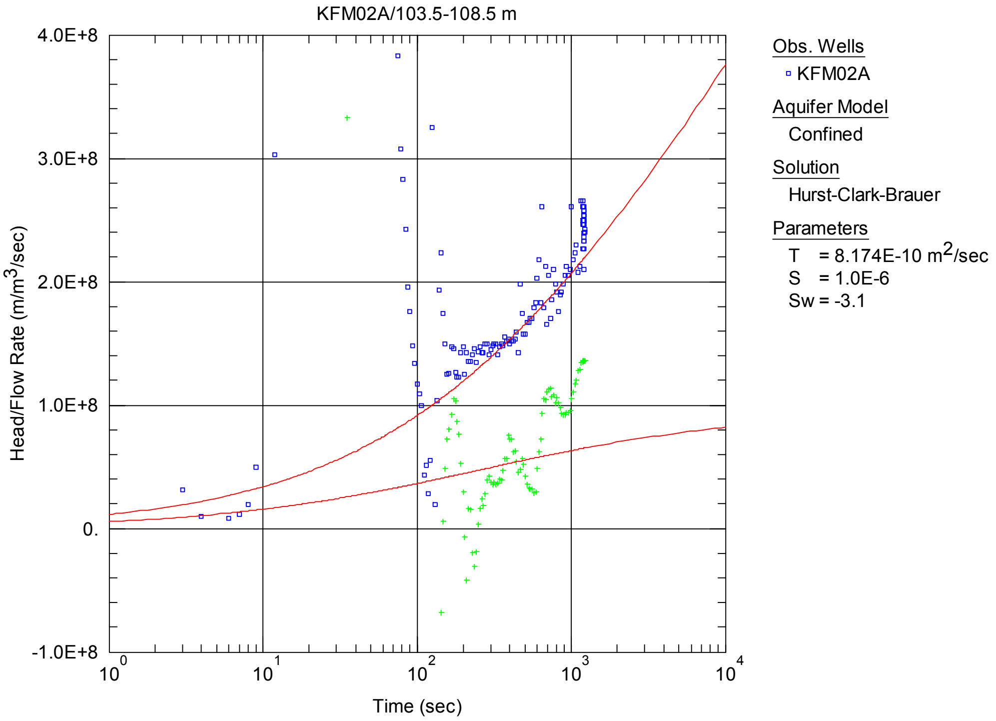



***Figure A3-156.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 103.5-108.5 m in KFM02A. Showing type curve fit to the second pseudo-radial flow regime.*

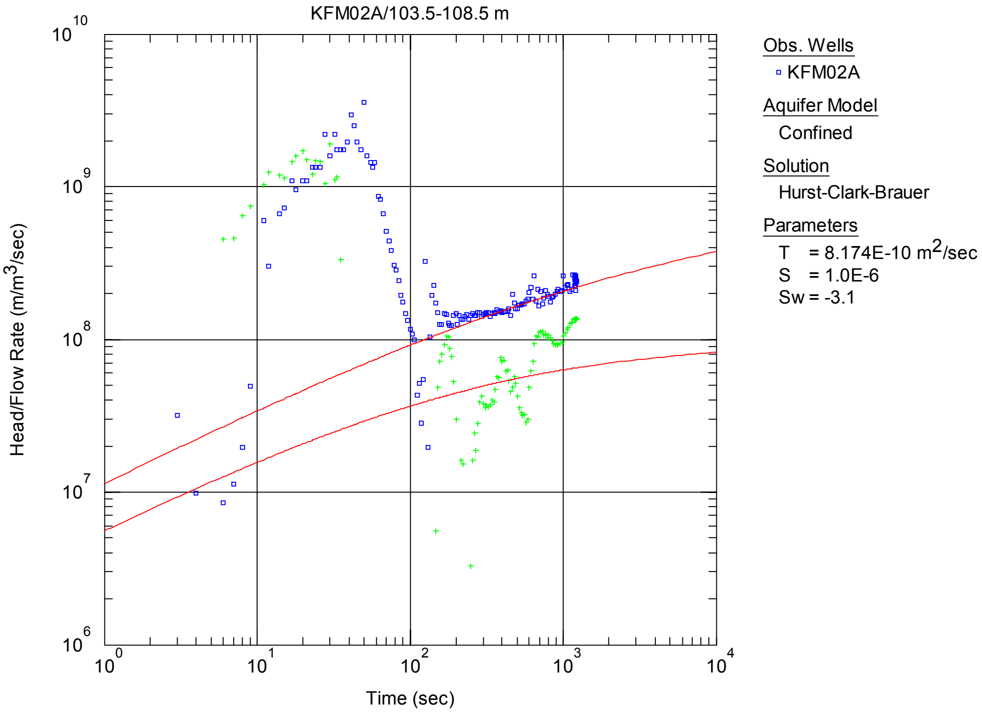



***Figure A3-157.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 103.5-108.5 m in KFM02A. Showing type curve fit to the second pseudo-radial flow regime.*

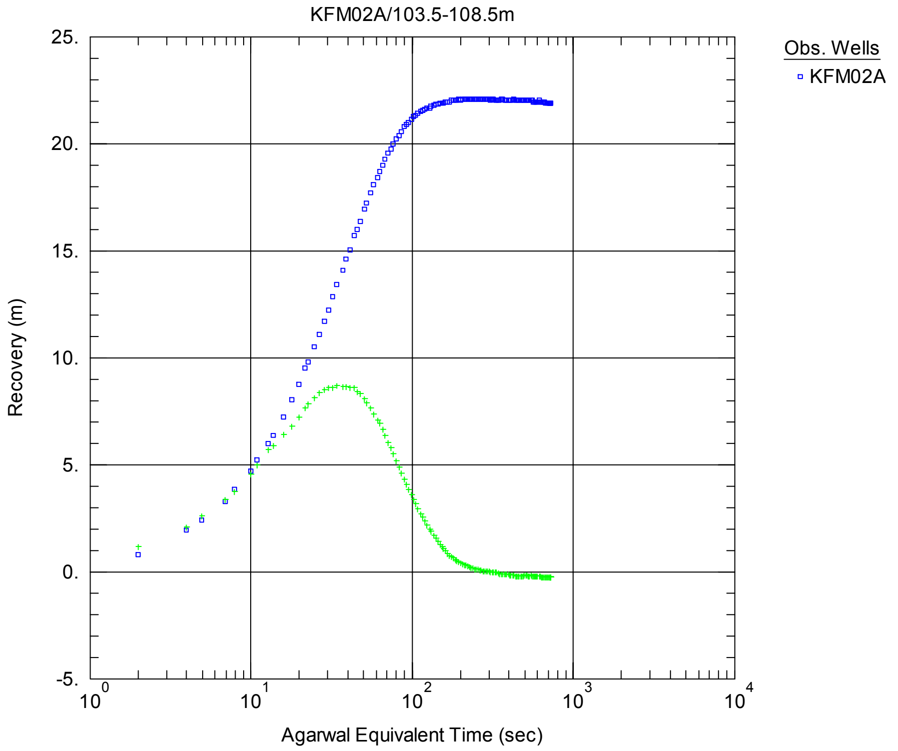



***Figure A3-158.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 103.5-108.5 m in KFM02A.*

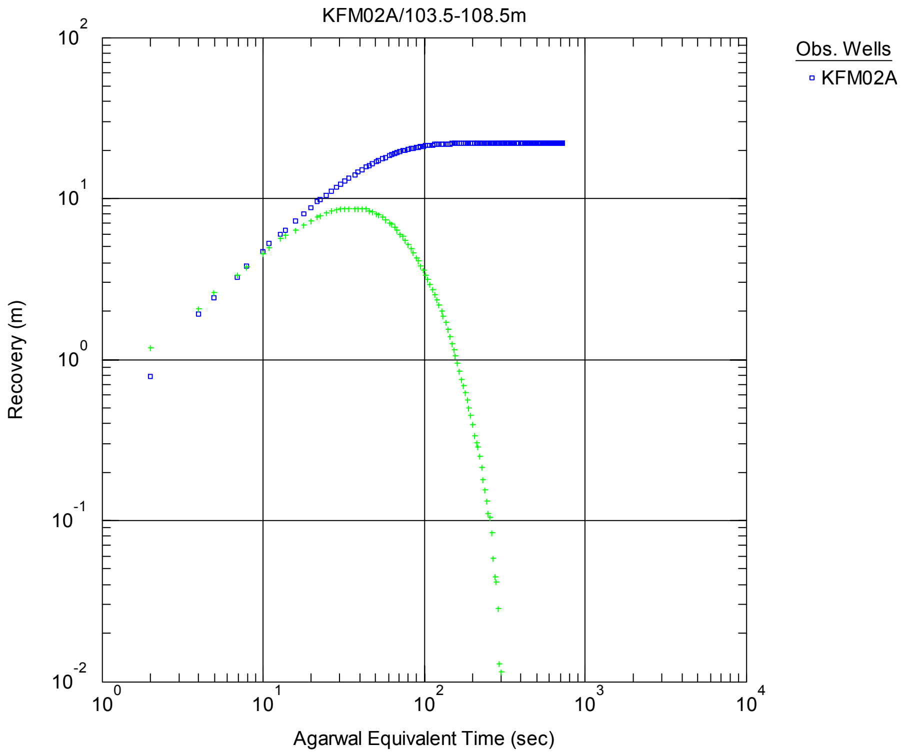



***Figure A3-159.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 103.5-108.5 m in KFM02A.*

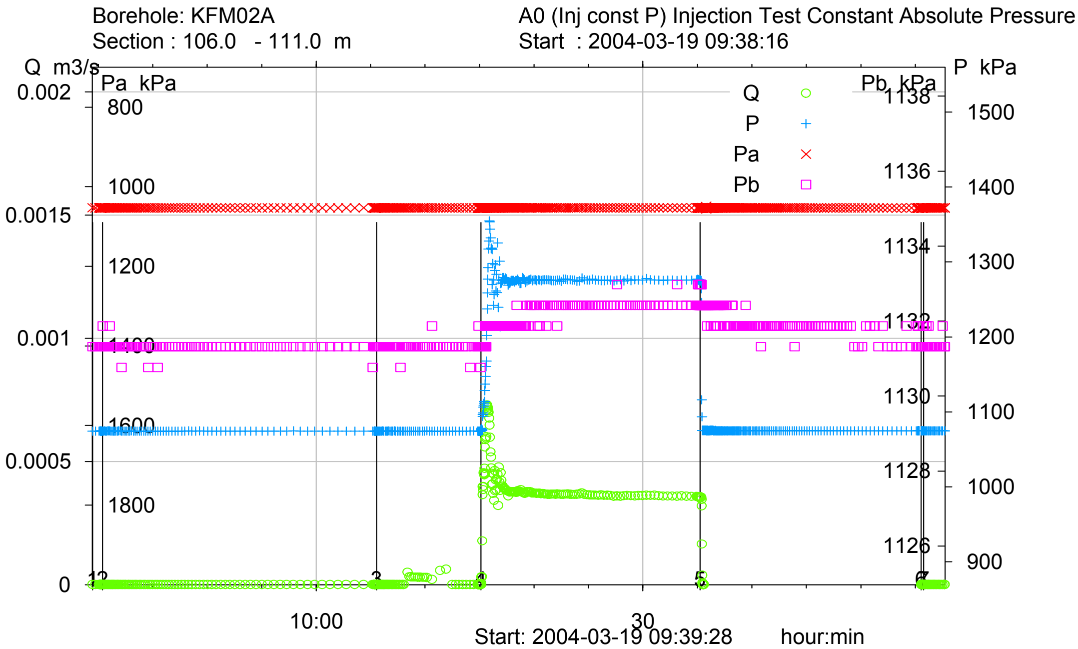



***Figure A3-160.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 106-111 m in borehole KFM02A.*

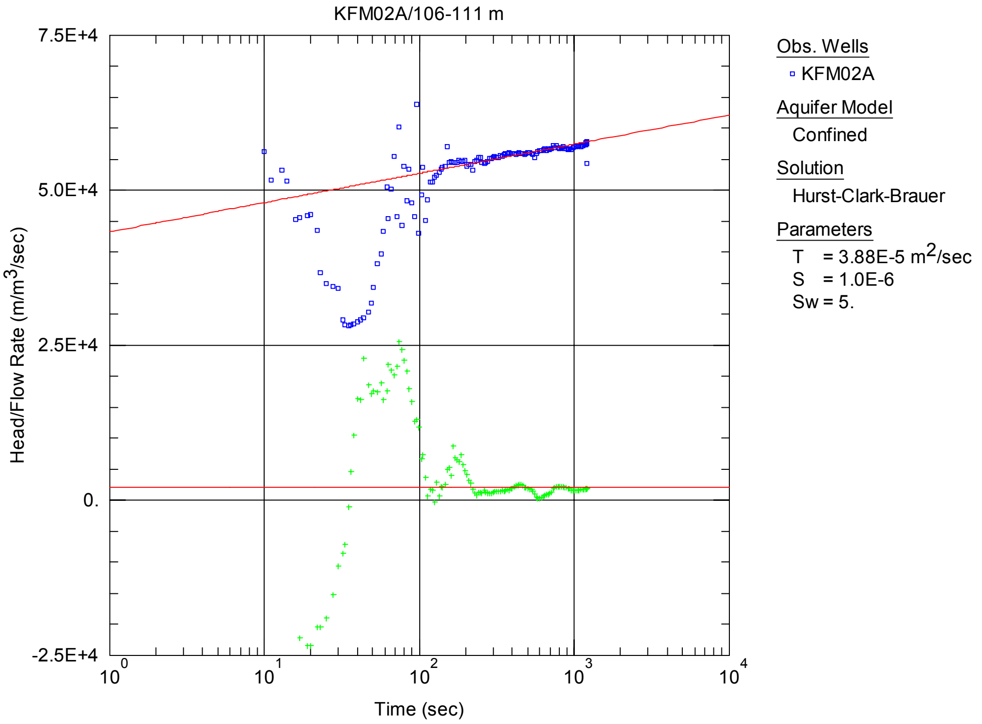



***Figure A3-161.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 106-111 m in KFM02A.*

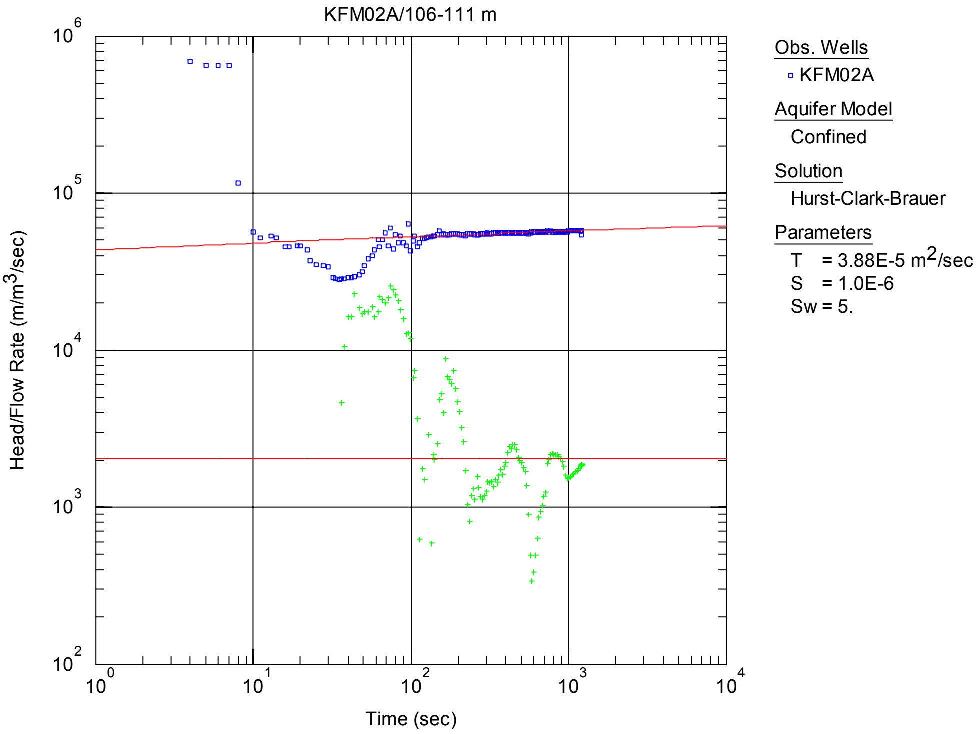



***Figure A3-162.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 106-111 m in KFM02A.*

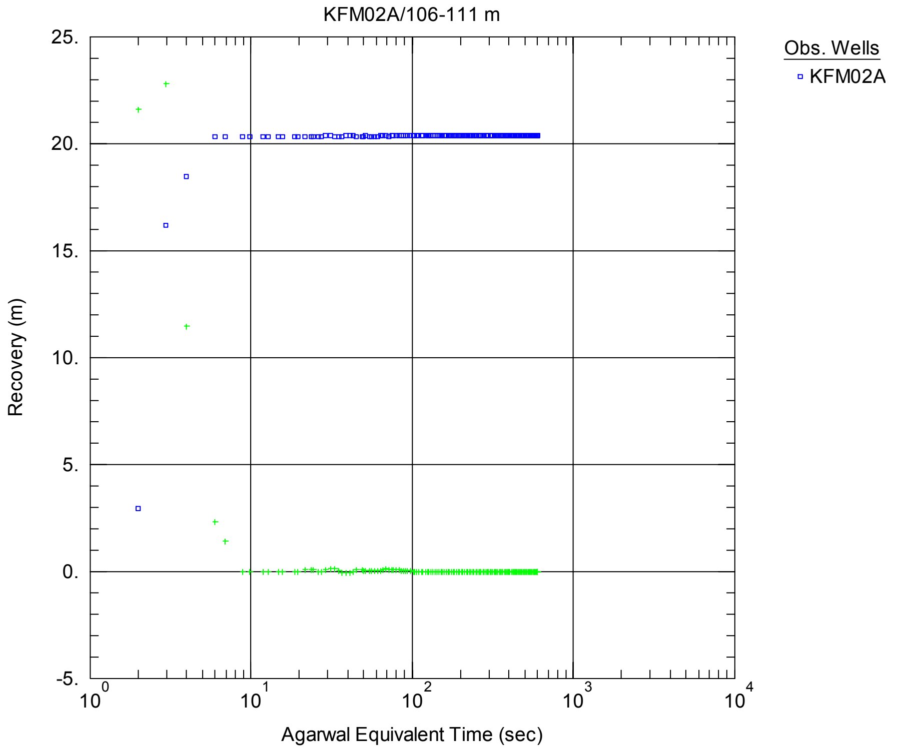



***Figure A3-163.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 106-111 m in KFM02A.*

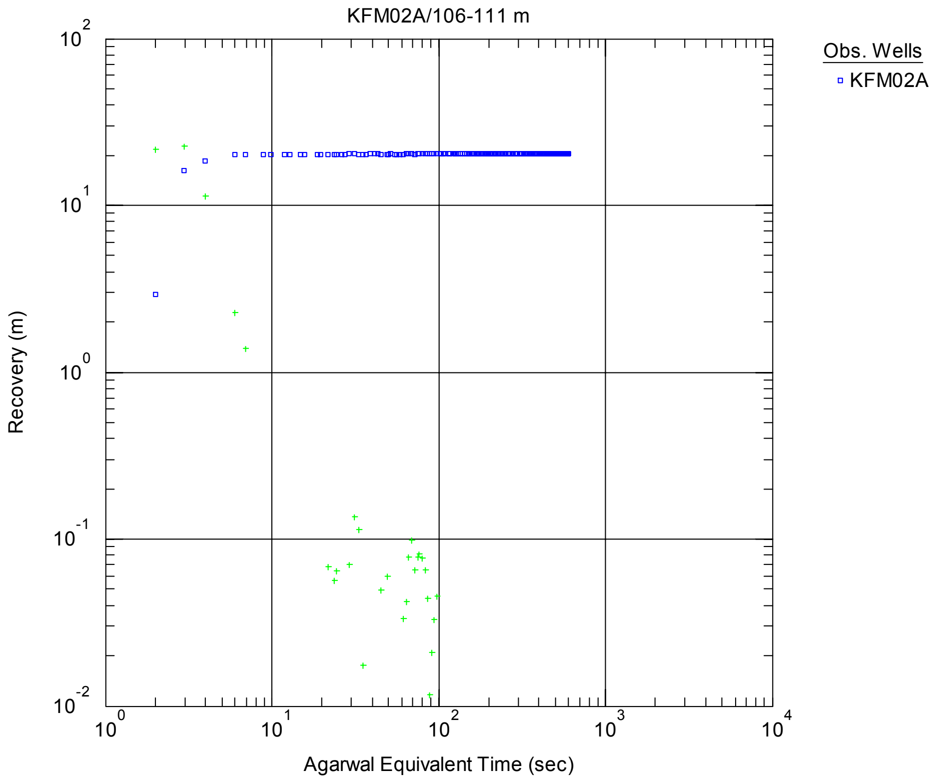



***Figure A3-164.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 106-111 m in KFM02A.*

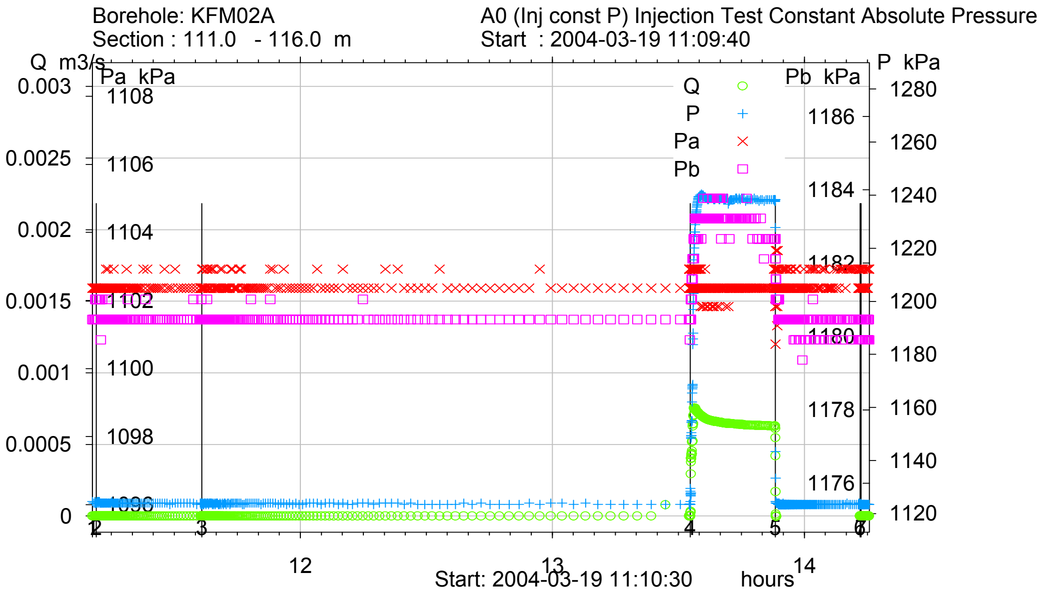



***Figure A3-165.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 111-116 m in borehole KFM02A.*

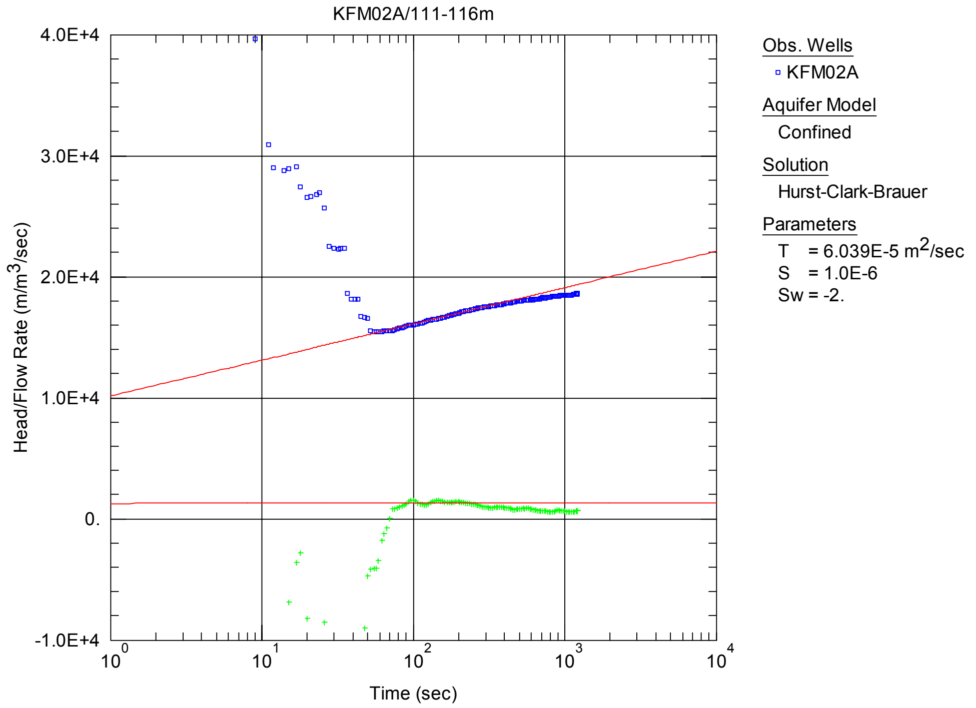



***Figure A3-166.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 111-116 m in KFM02A.*

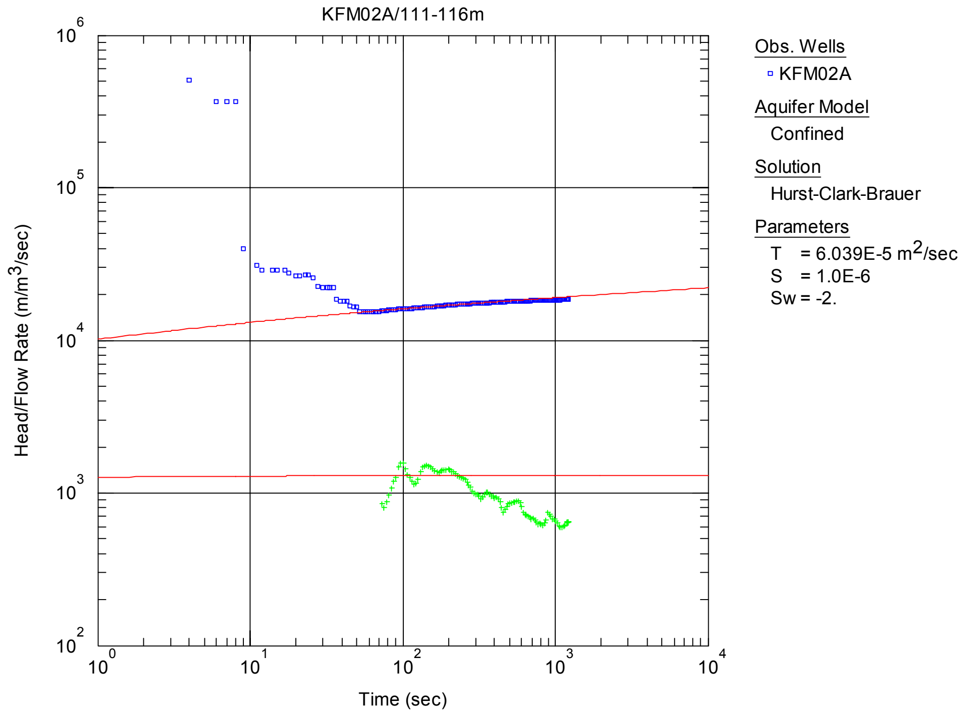



***Figure A3-167.** Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 111-116 m in KFM02A.*

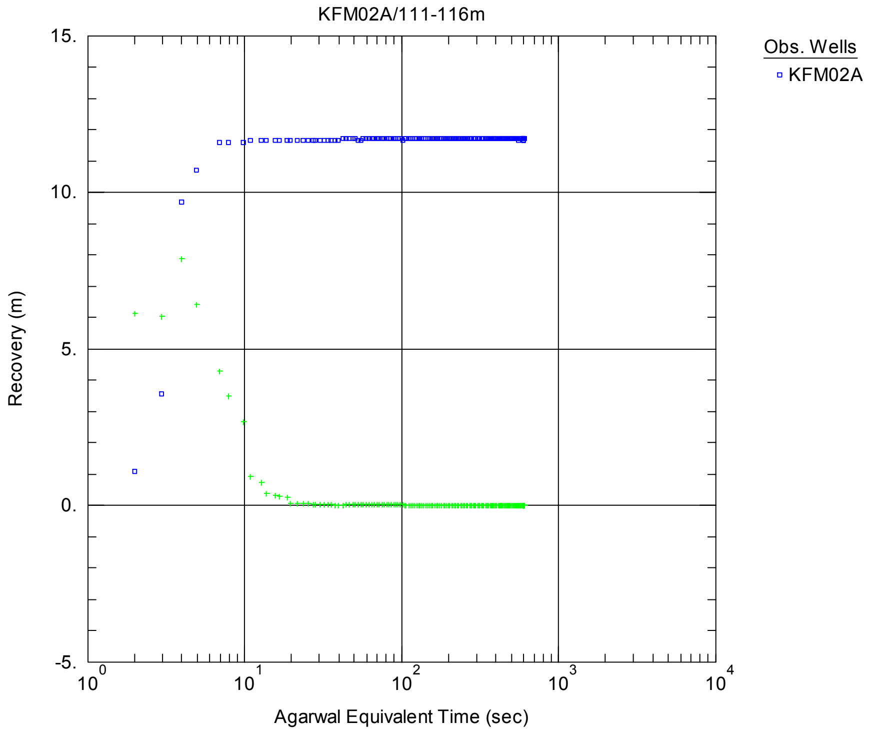



***Figure A3-168.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 111-116 m in KFM02A.*

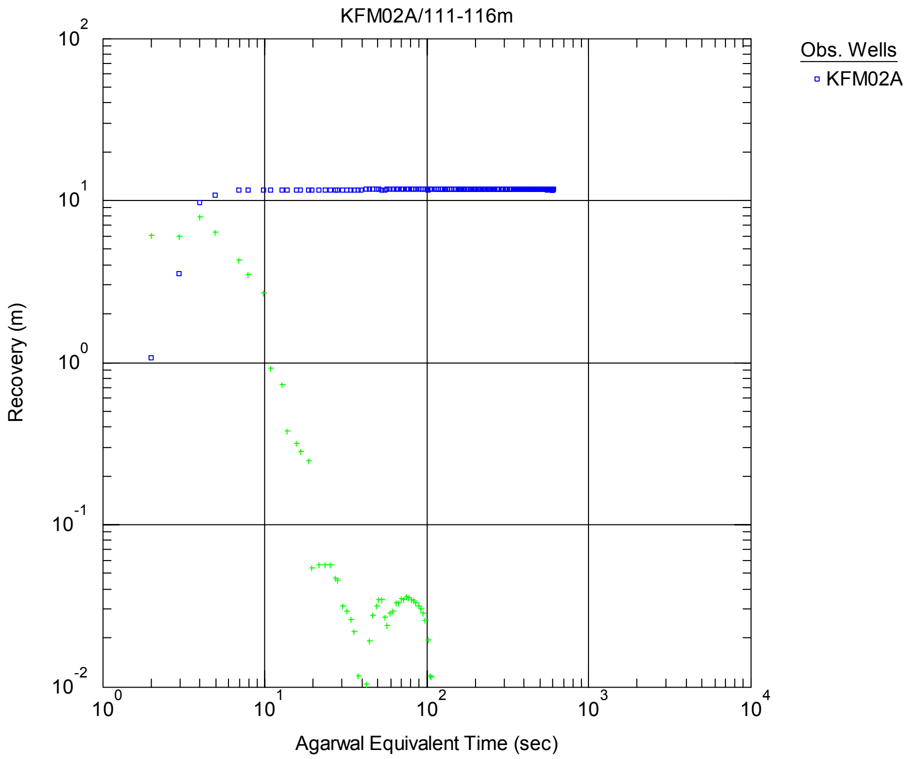



***Figure A3-169.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 111-116 m in KFM02A.*

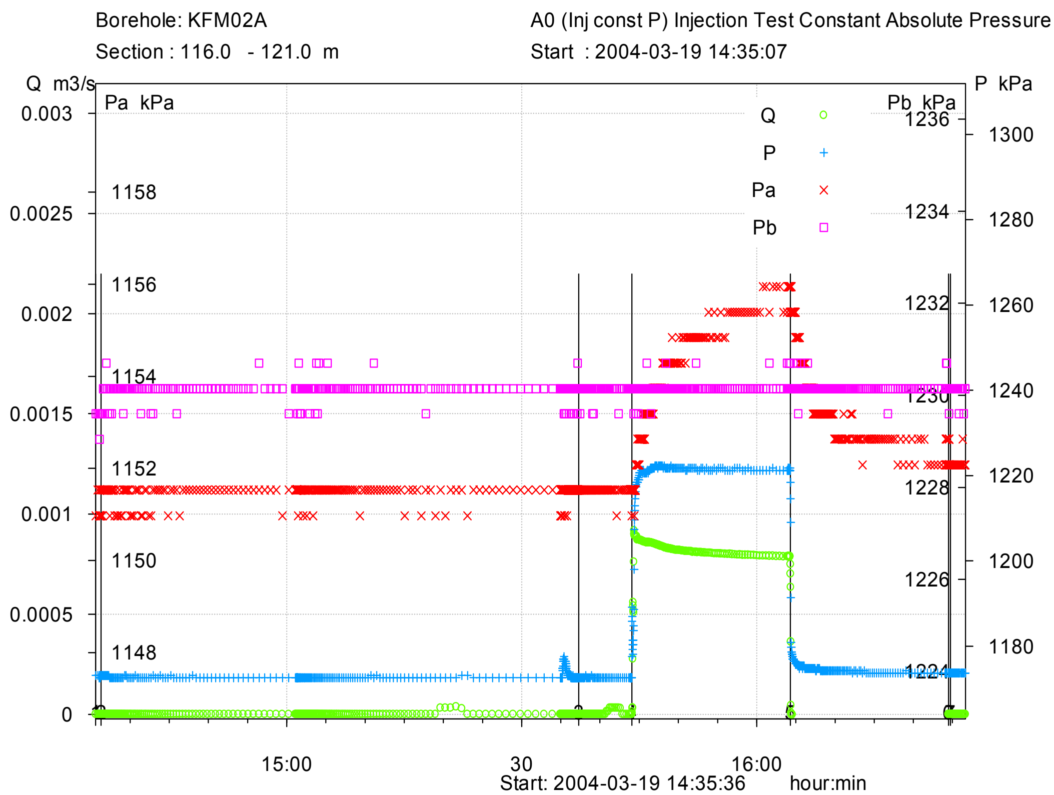



***Figure A3-170.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 116-121 m in borehole KFM02A.*

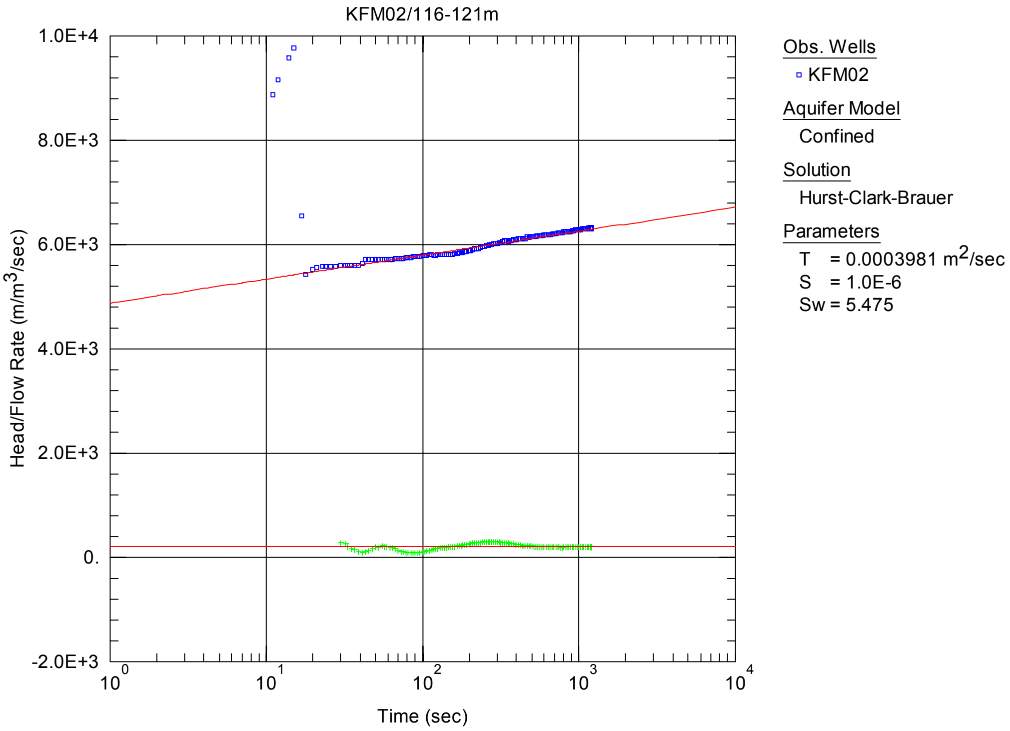



***Figure A3-171.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 116-121 m in KFM02A.*

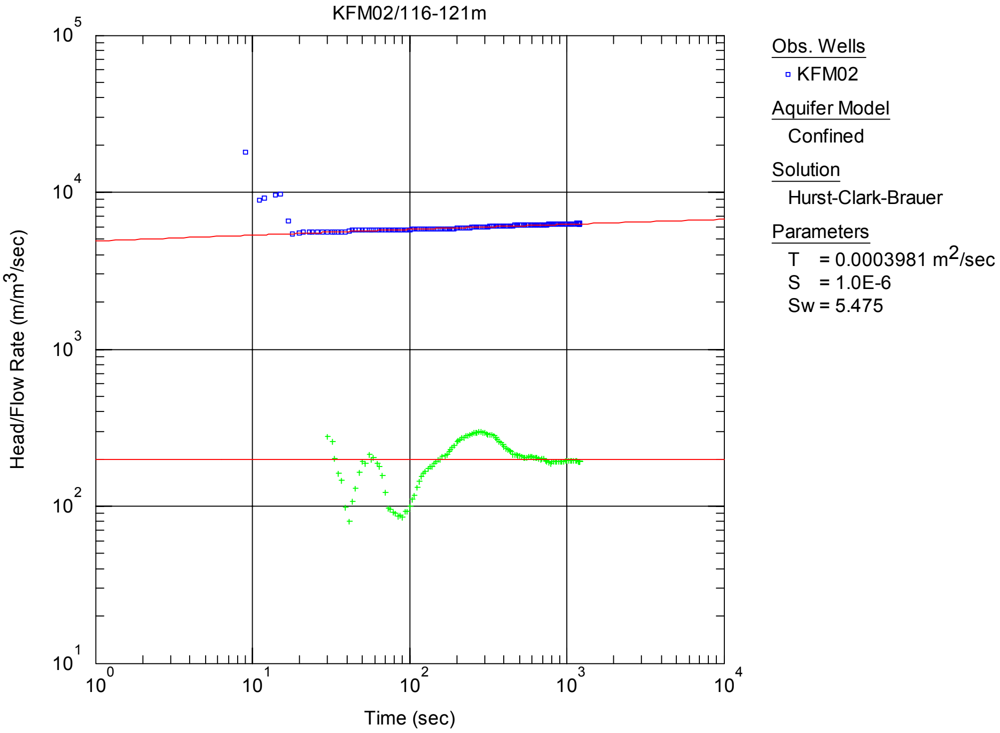



***Figure A3-172.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 116-121 m in KFM02A.*

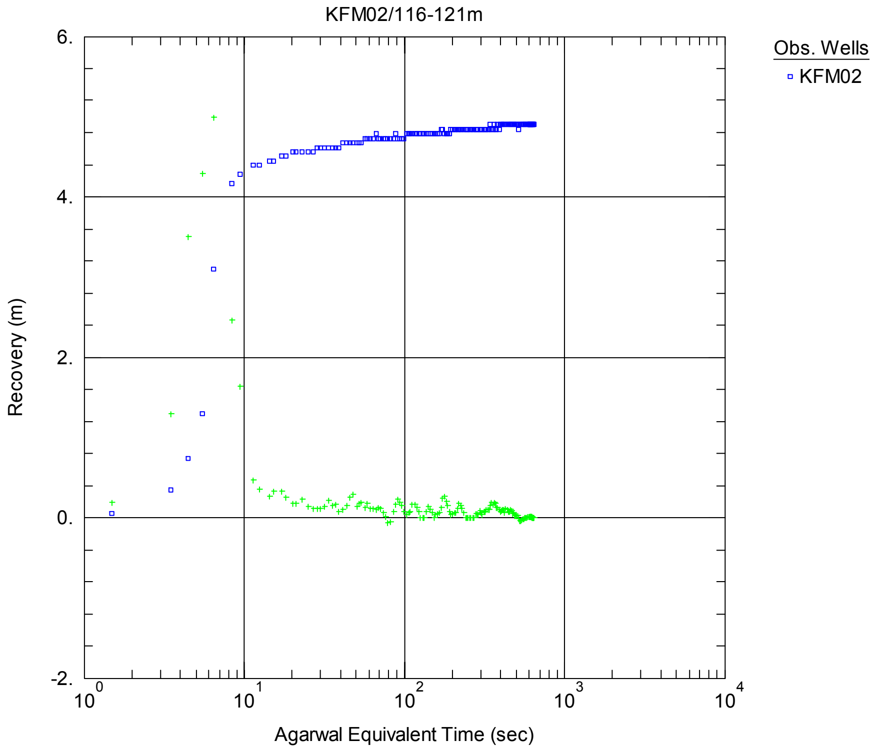



***Figure A3-173.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 116-121 m in KFM02A.*

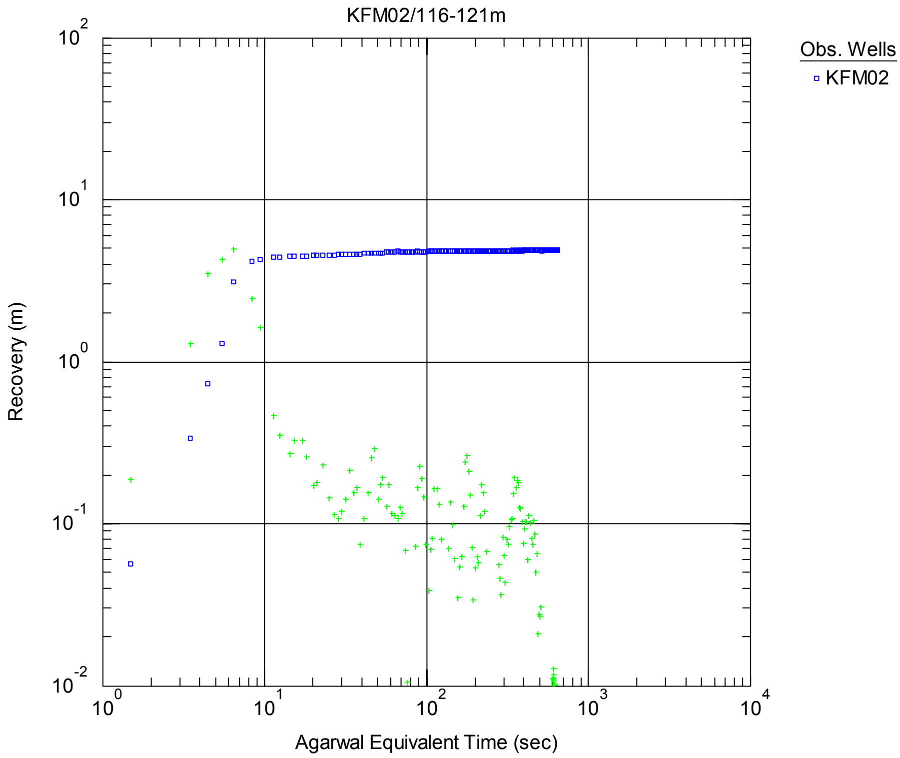



***Figure A3-174.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 116-121 m in KFM02A.*

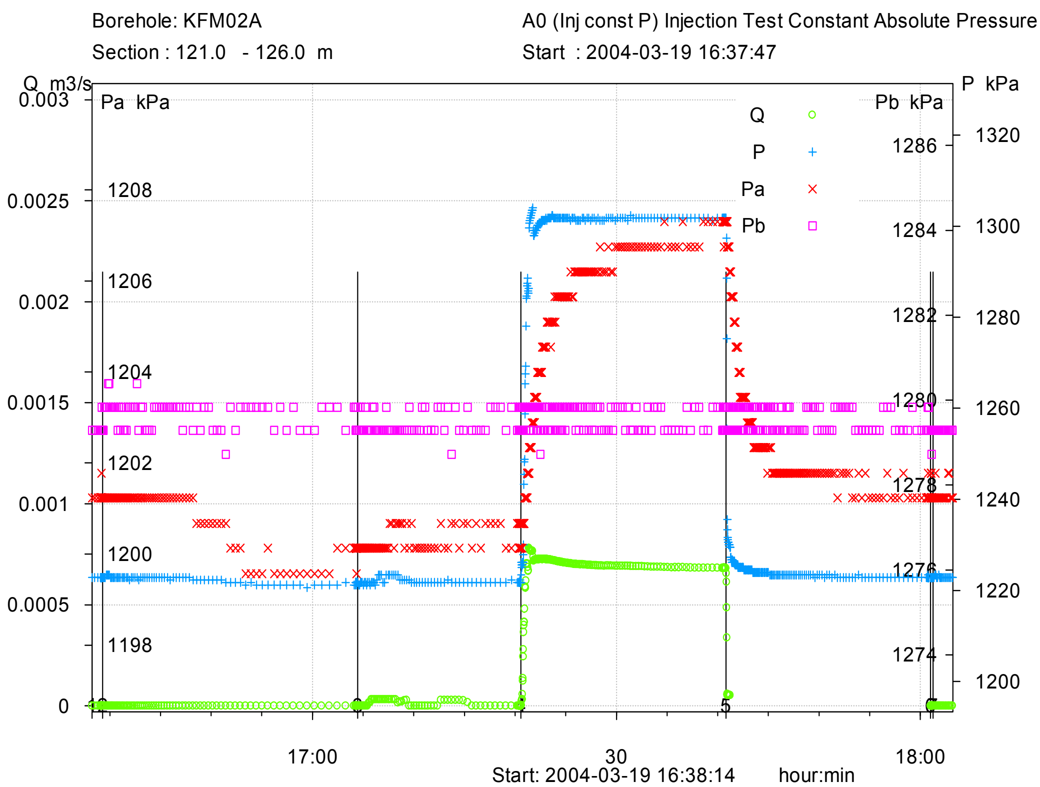



***Figure A3-175.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 121-126 m in borehole KFM02A.*

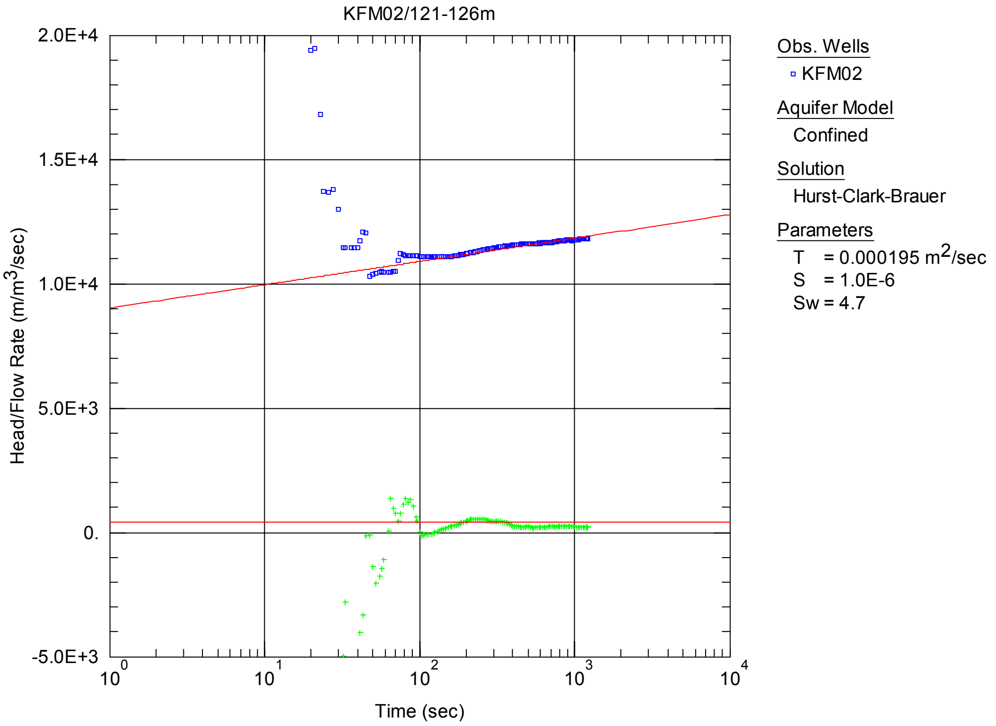



*Figure A3-176.* *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 121-126 m in KFM02A.*

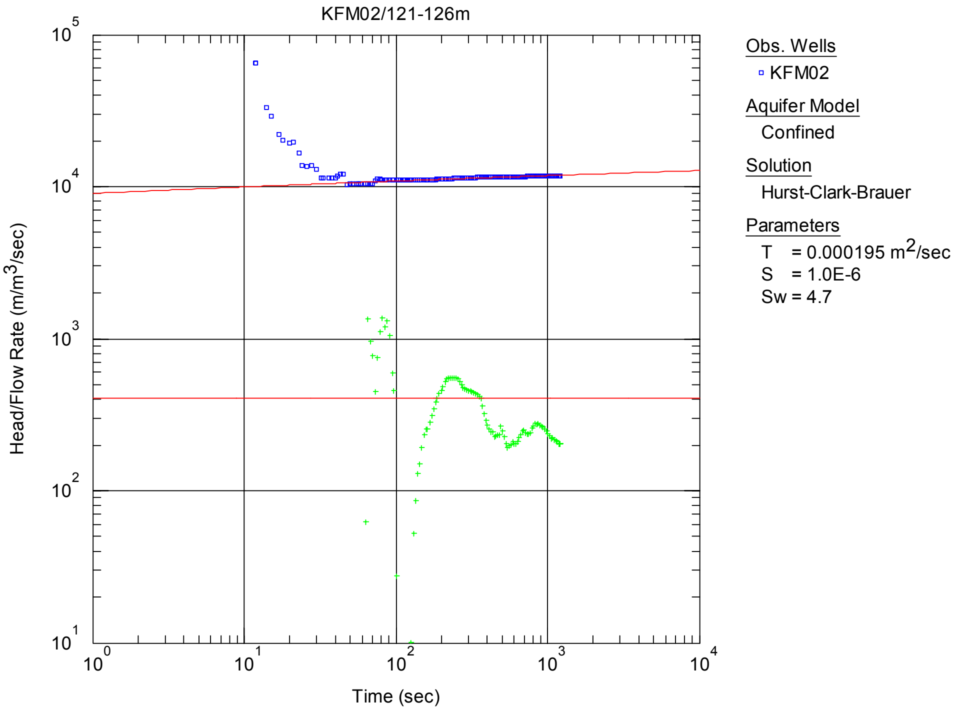



*Figure A3-177.* *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 121-126 m in KFM02A.*

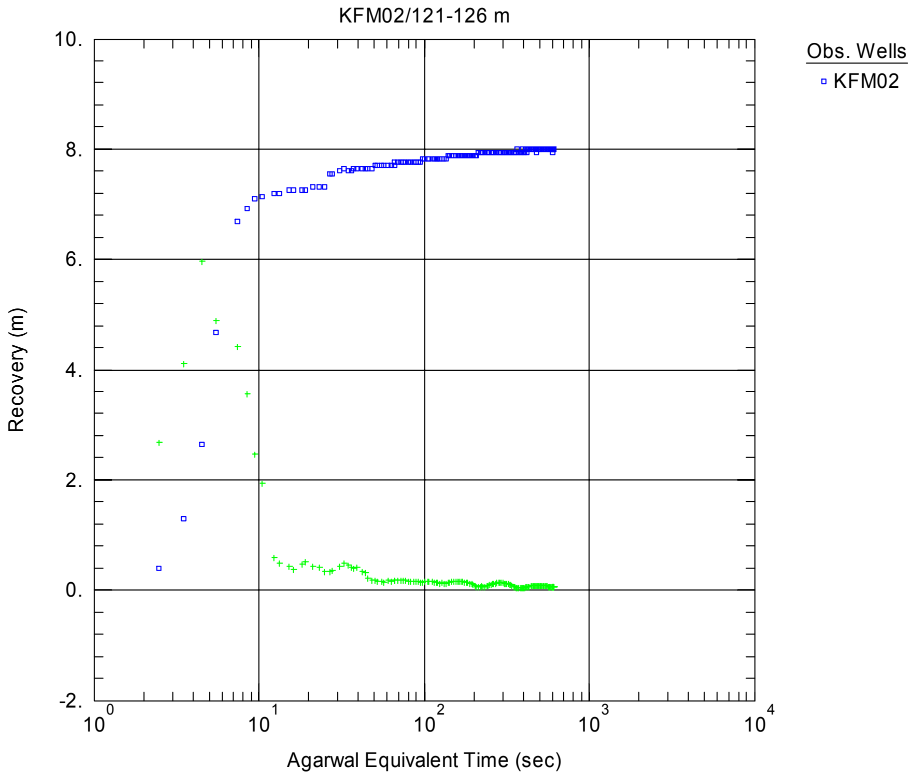



***Figure A3-178.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 121-126 m in KFM02A.*

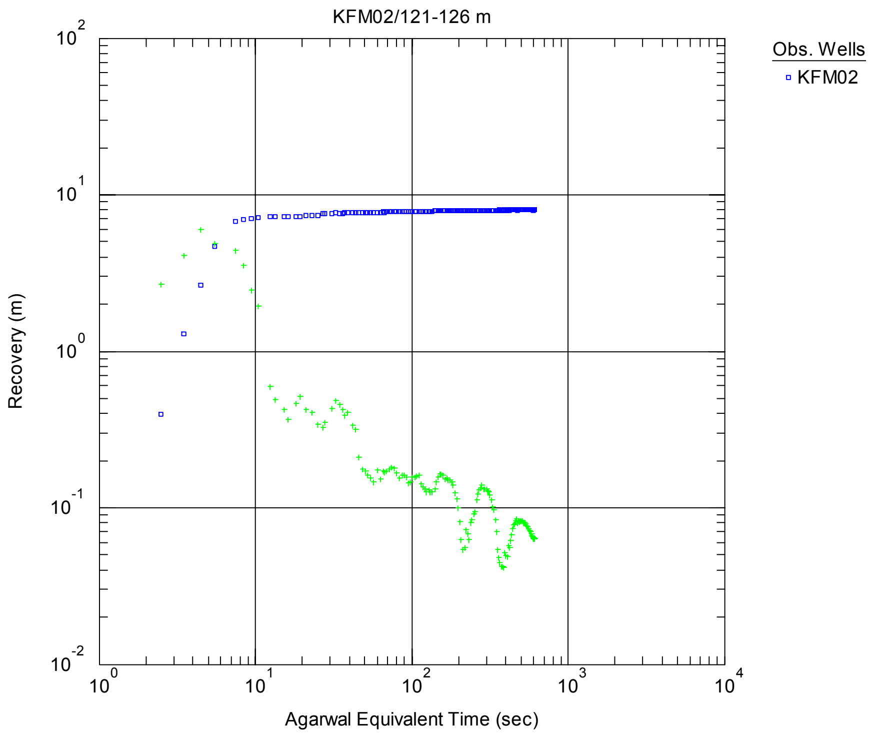



***Figure A3-179.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 121-126 m in KFM02A.*

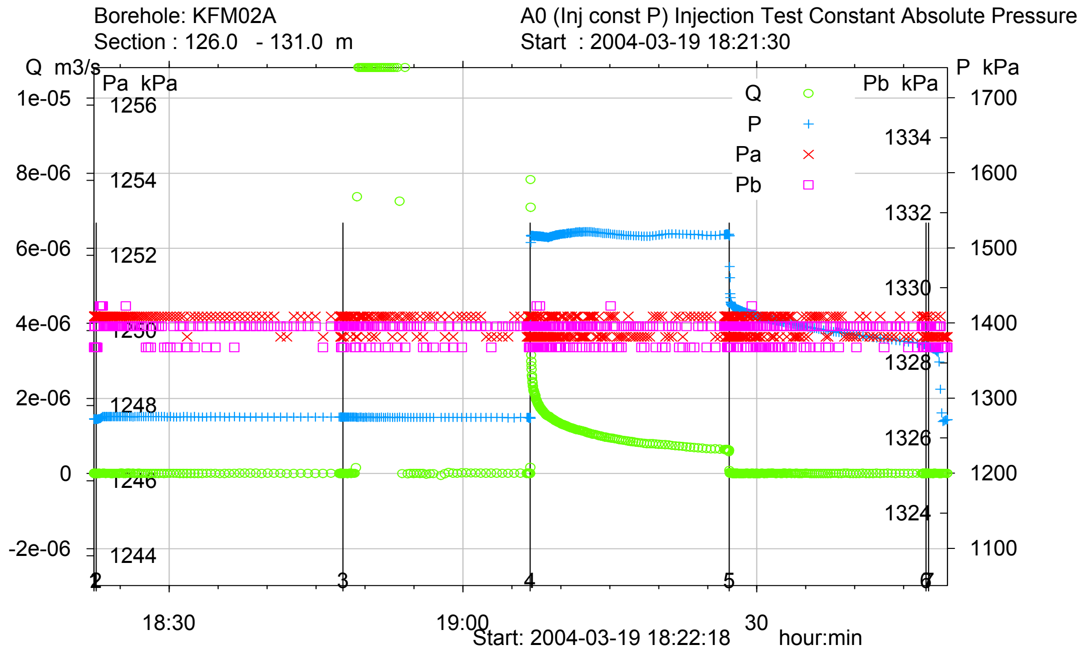



***Figure A3-180.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 126-131 m in borehole KFM02A.*

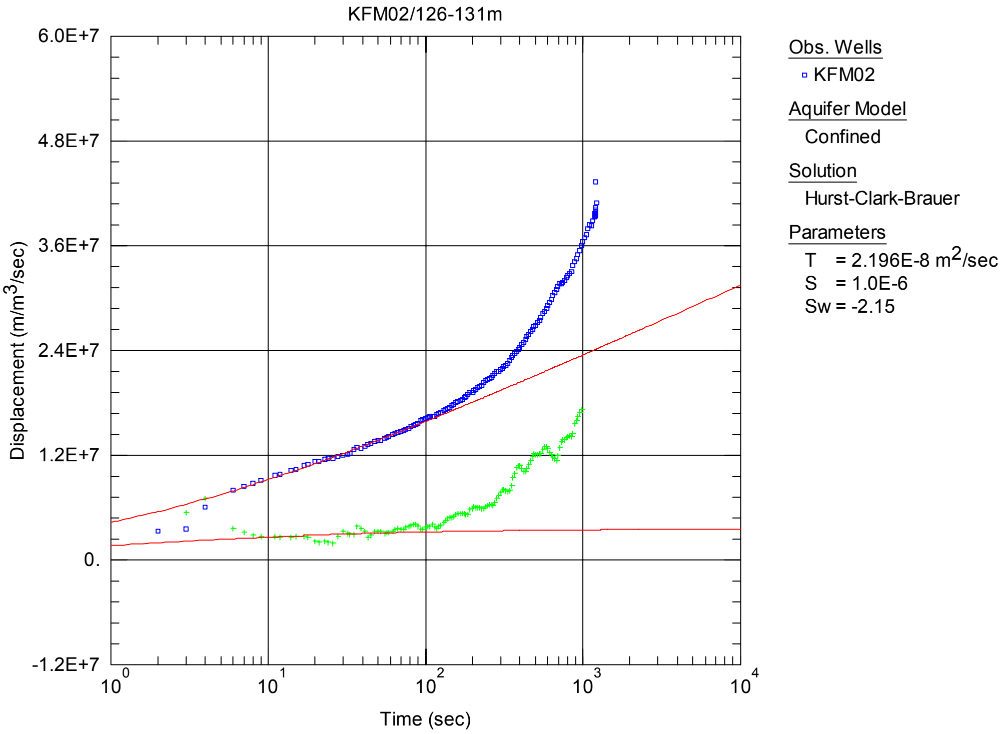



***Figure A3-181.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 126-131 m in KFM02A.*

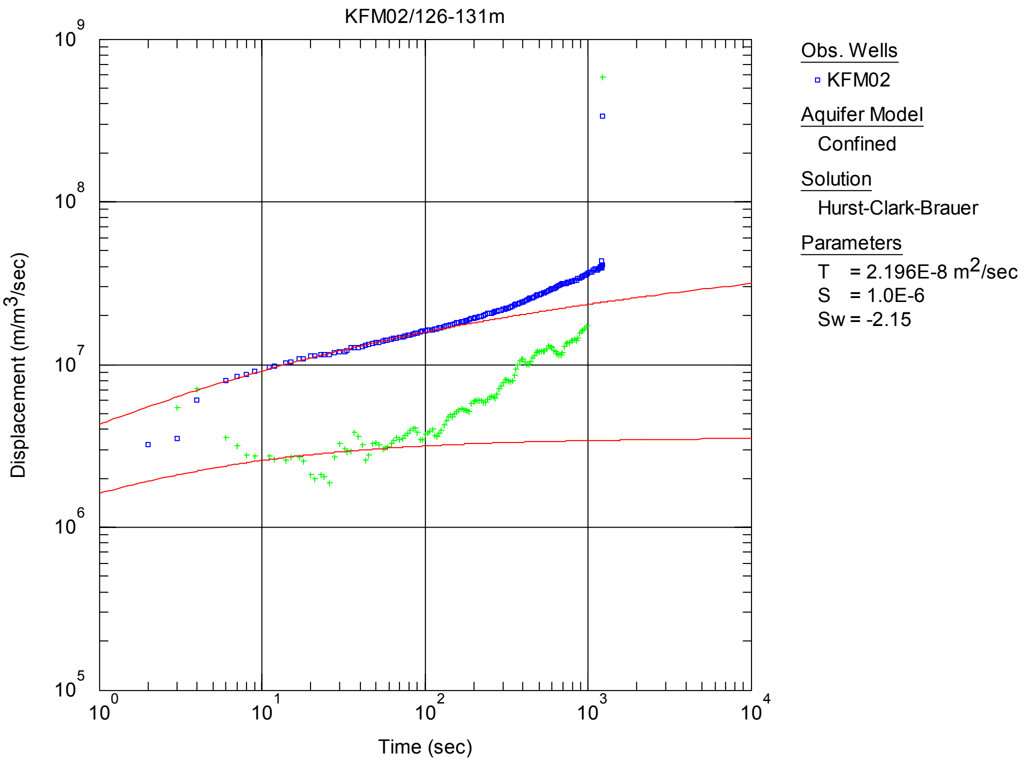



***Figure A3-182.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 126-131 m in KFM02A.*

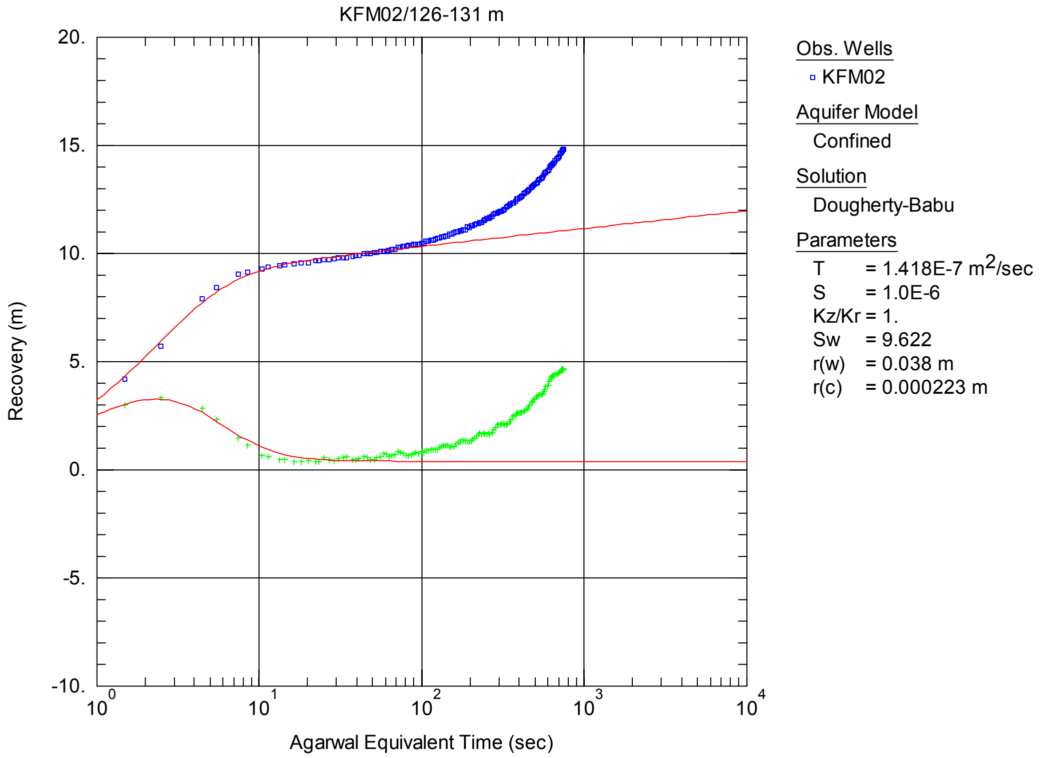



***Figure A3-183.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 126-131 m in KFM02A.*

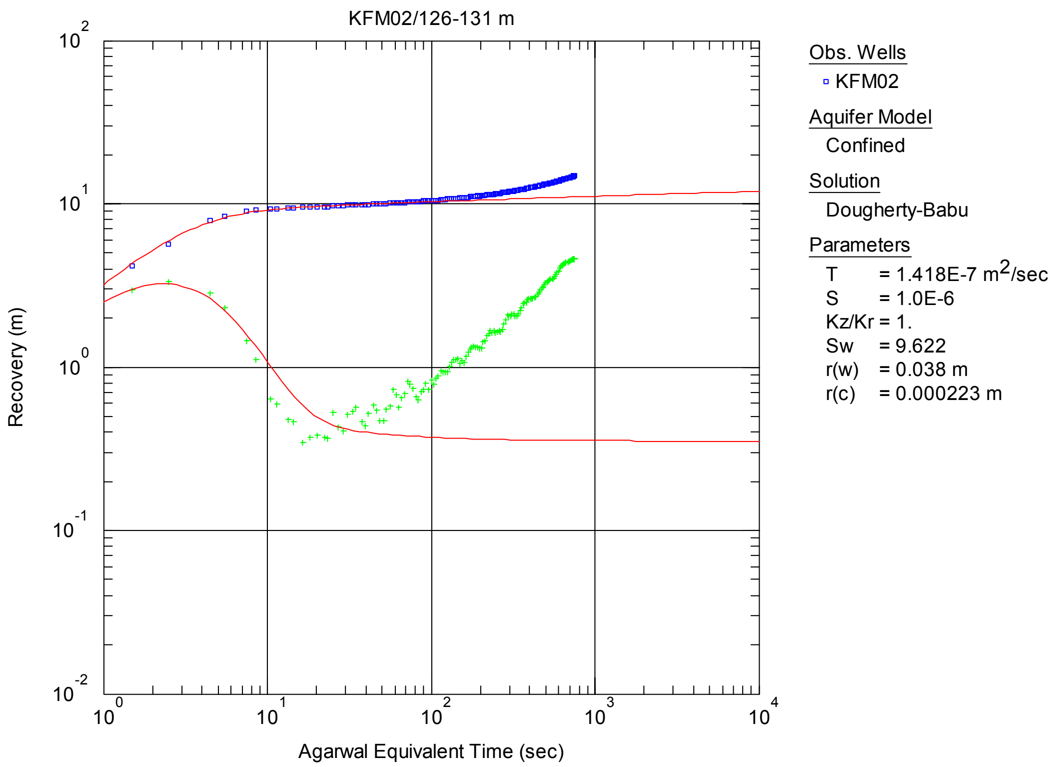



***Figure A3-184.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 126-131 m in KFM02A.*

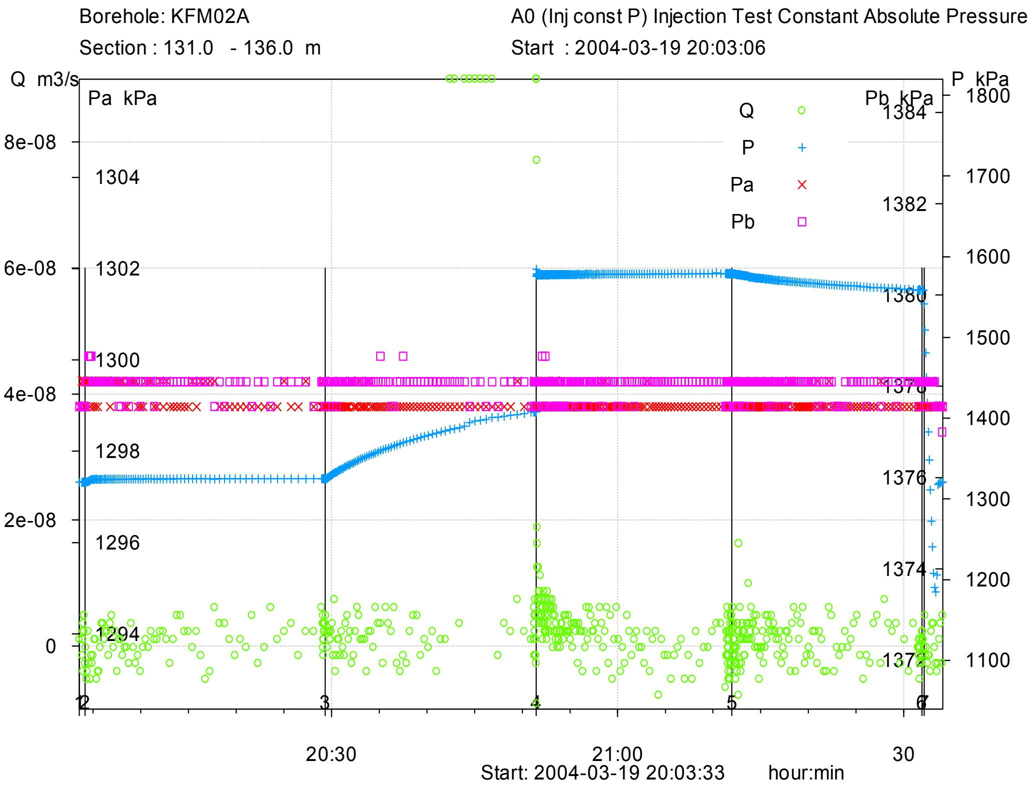



*__Figure A3-185.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 131-136 m in borehole KFM02A.*

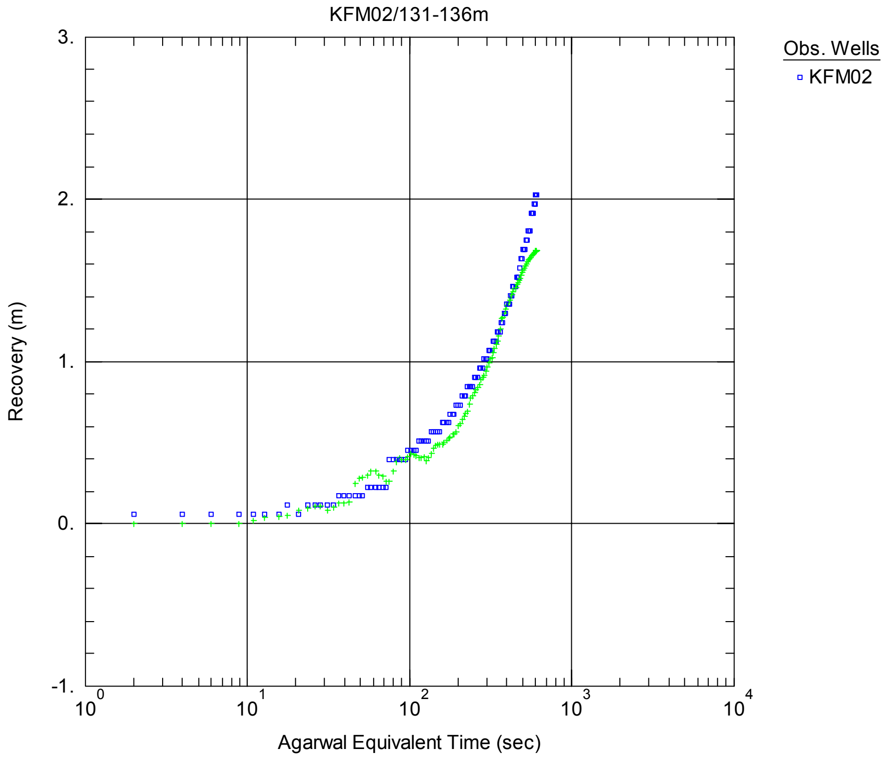



***Figure A3-186.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 131-136 m in KFM02A.*

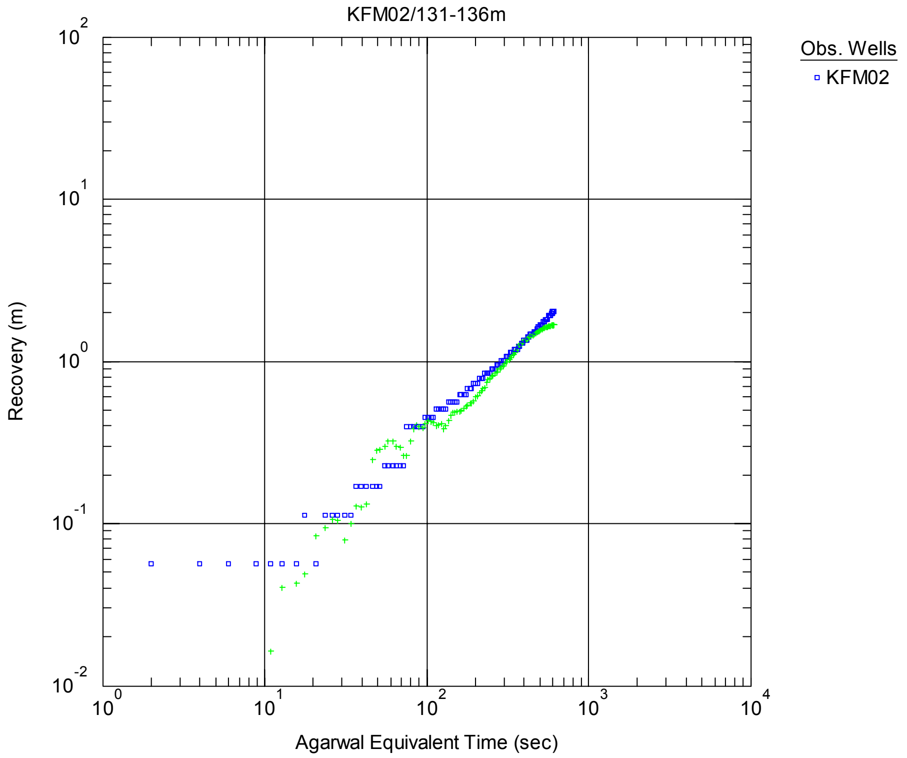



***Figure A3-187.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 131-136 m in KFM02A.*

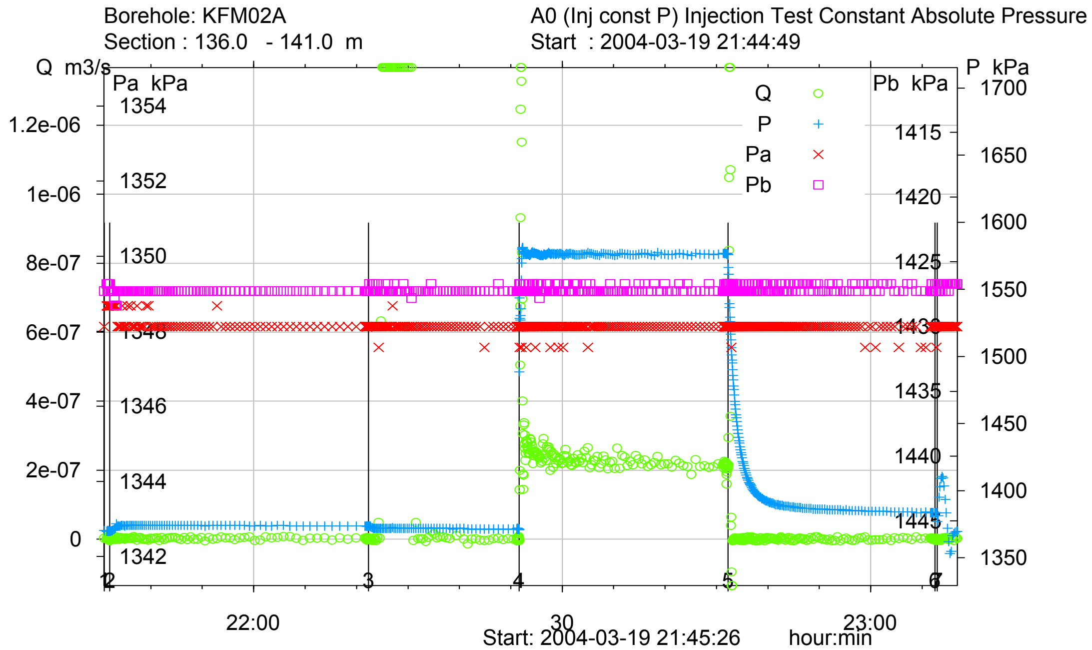



***Figure A3-188.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 136-141 m in borehole KFM02A.*

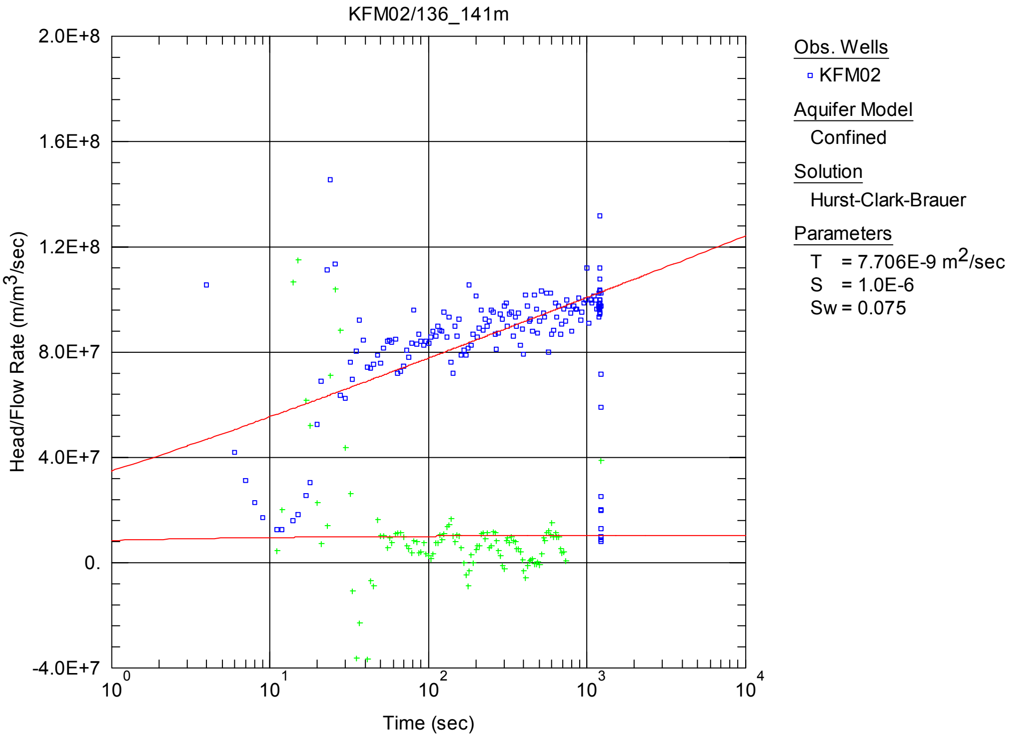



*Figure A3-189.* *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 136-141 m in KFM02A.*

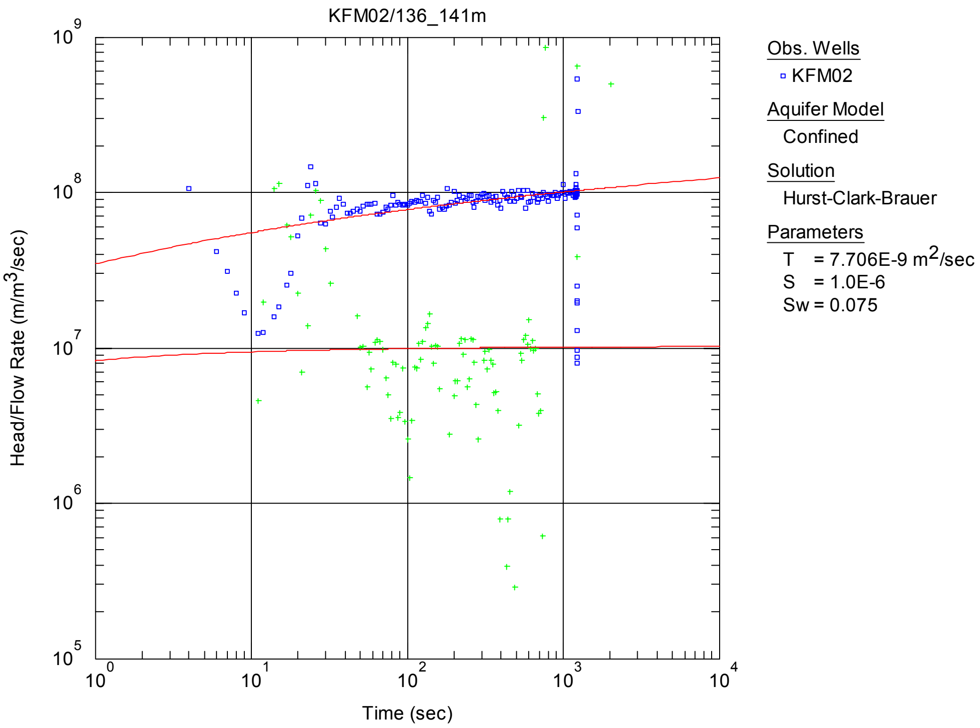



*Figure A3-190.* *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 136-141 m in KFM02A.*

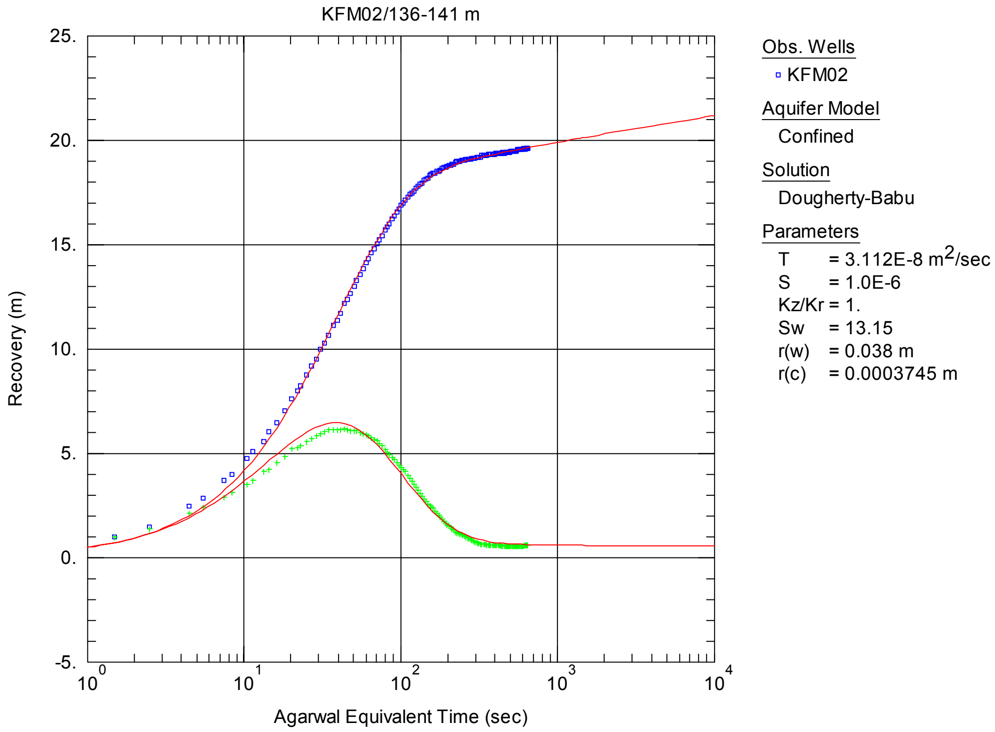



***Figure A3-191.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 136-141 m in KFM02A. Showing type curve fit only to illsutrate that an assumption of PRF is not reasonable.*

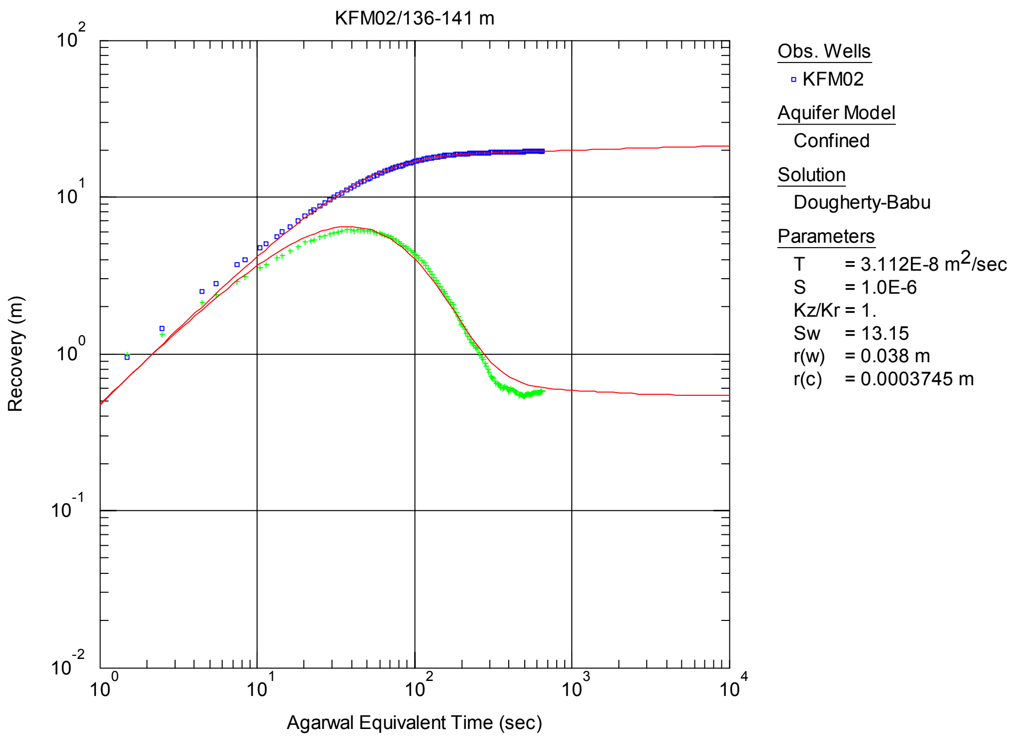



***Figure A3-192.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 136-141 m in KFM02A. Showing type curve fit only to illsutrate that an assumption of PRF is not reasonable.*

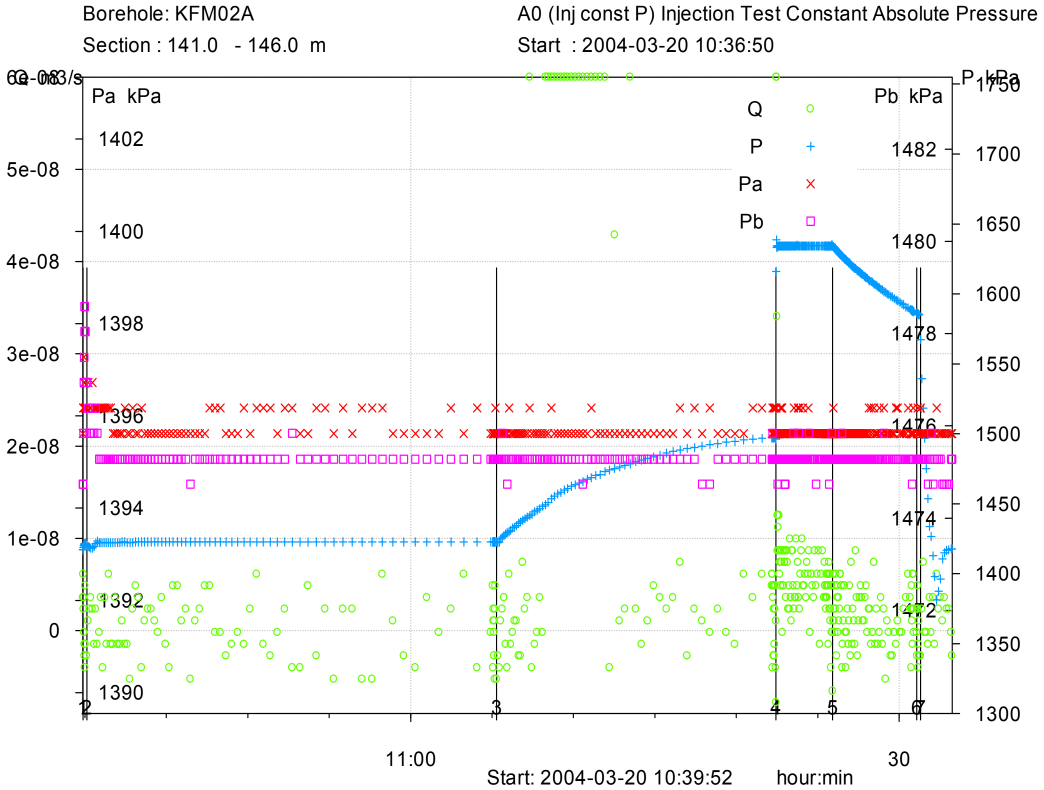



***Figure A3-193.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 301-401 m in borehole KFM02A.*

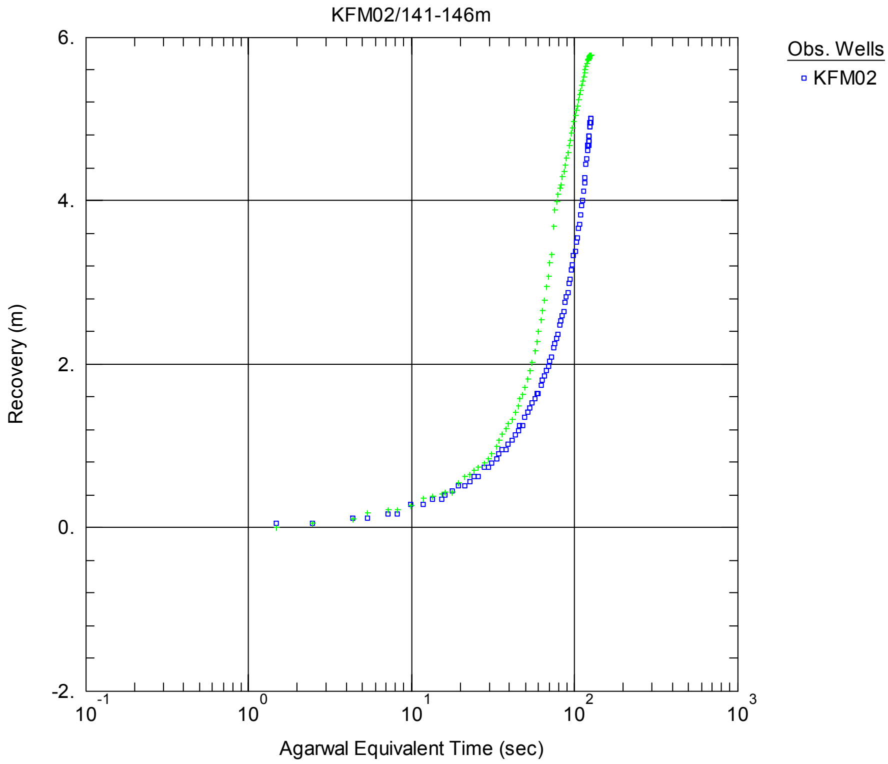



***Figure A3-194.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 301-401 m in KFM02A.*

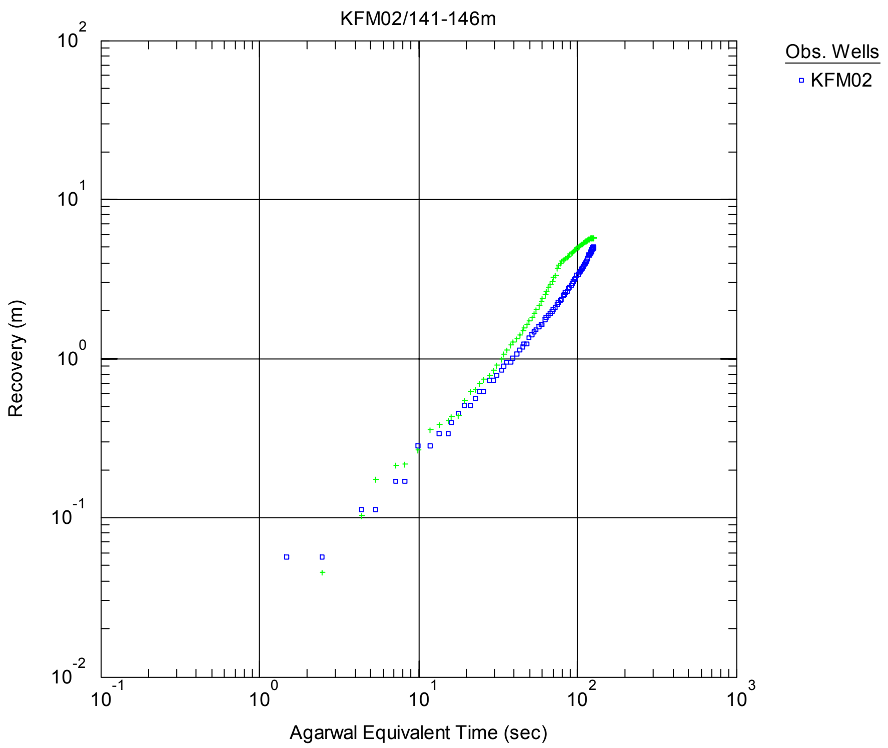



***Figure A3-195.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 301-401 m in KFM02A.*

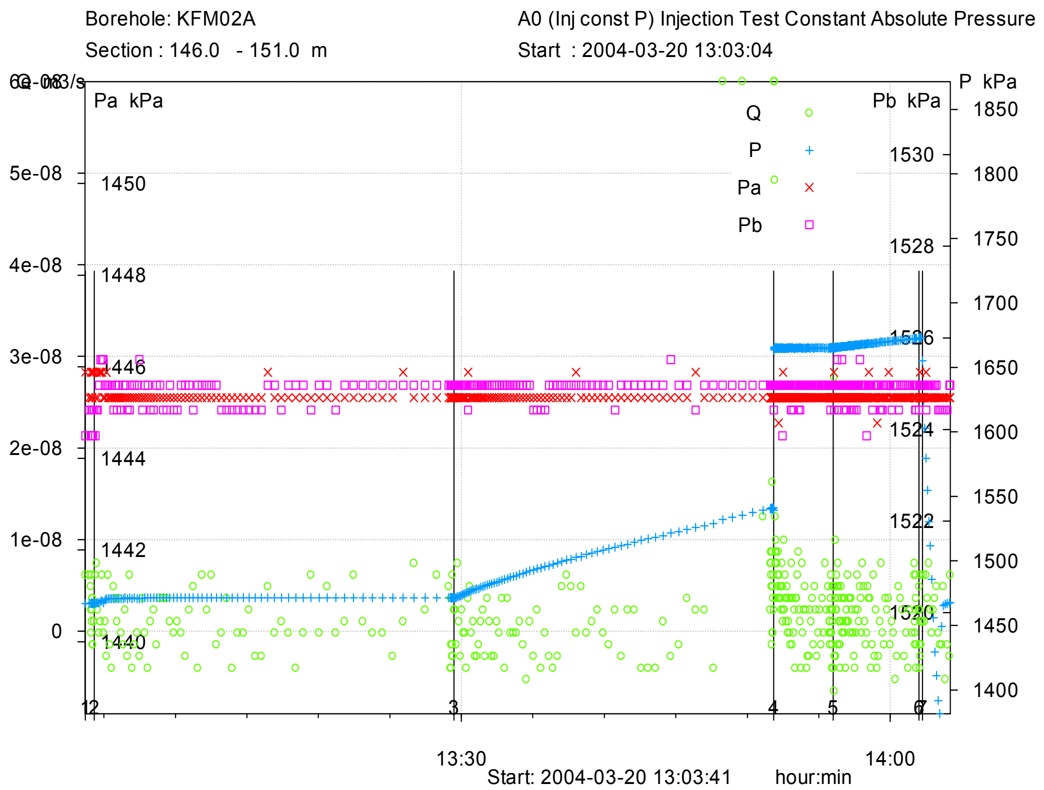



***Figure A3-196.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 146-151 m in borehole KFM02A.*

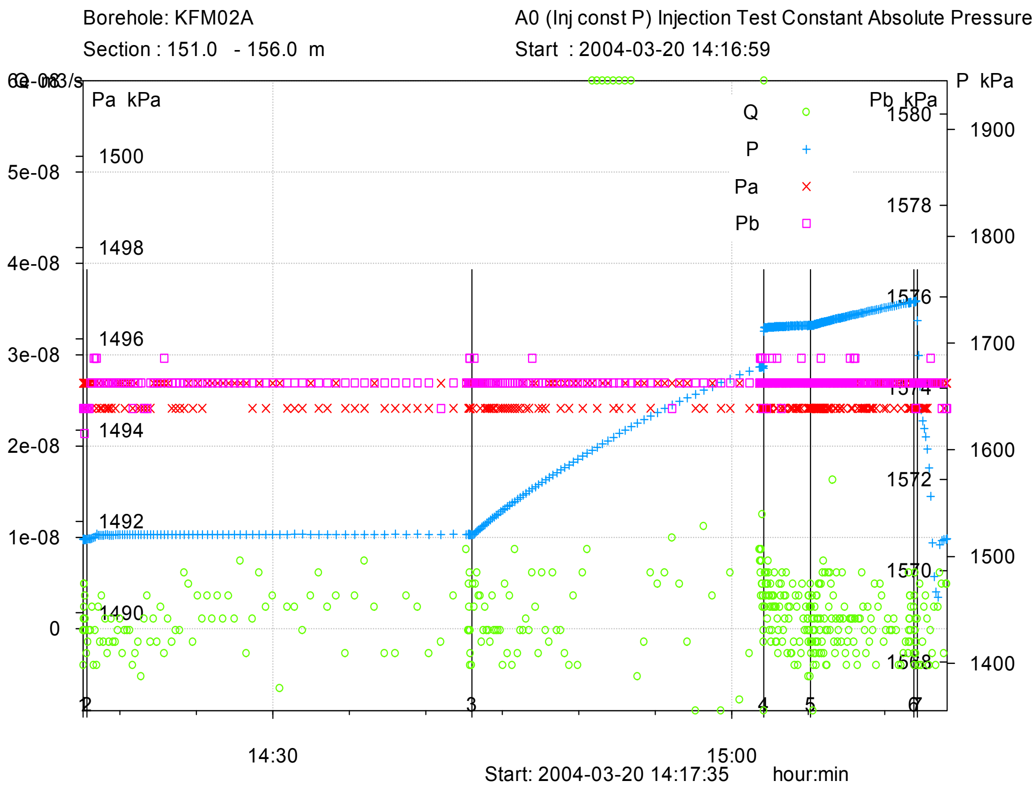



*__Figure A3-197.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 151-156 m in borehole KFM02A.*

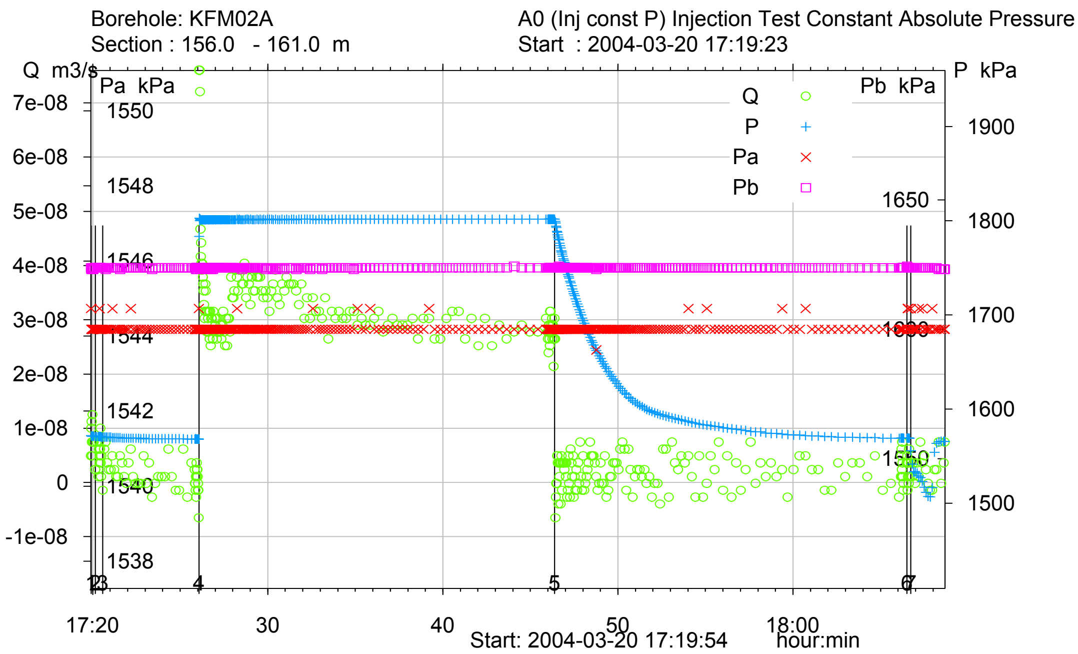



***Figure A3-198.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 156-161 m in borehole KFM02A.*

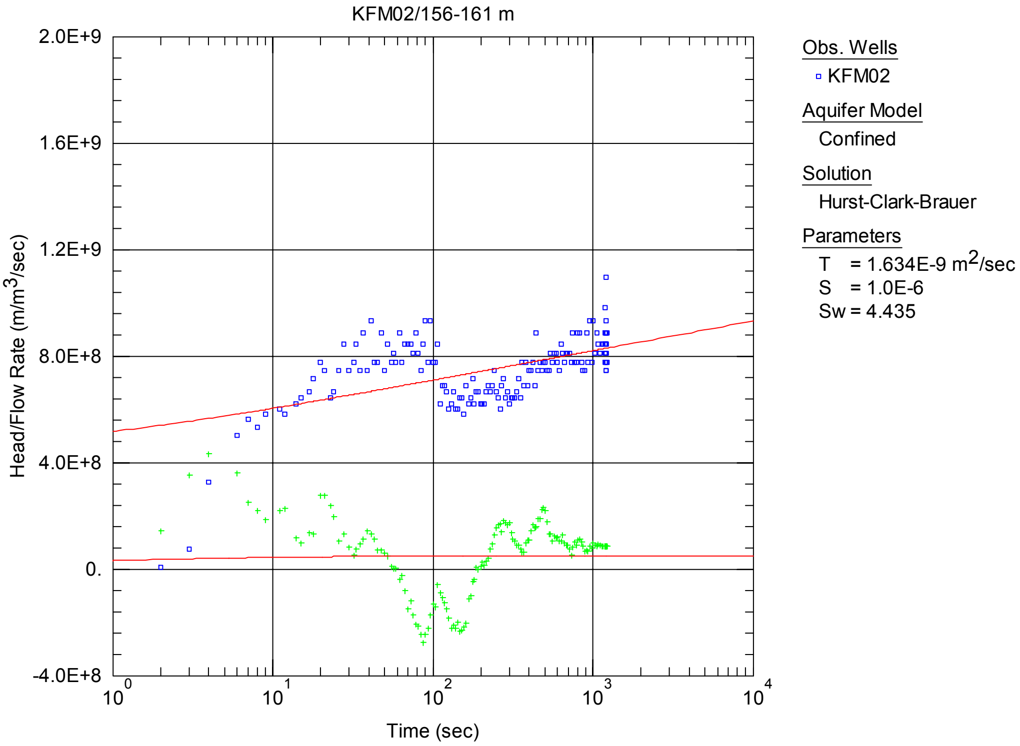



***Figure A3-199.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 156-161 m in KFM02A.*

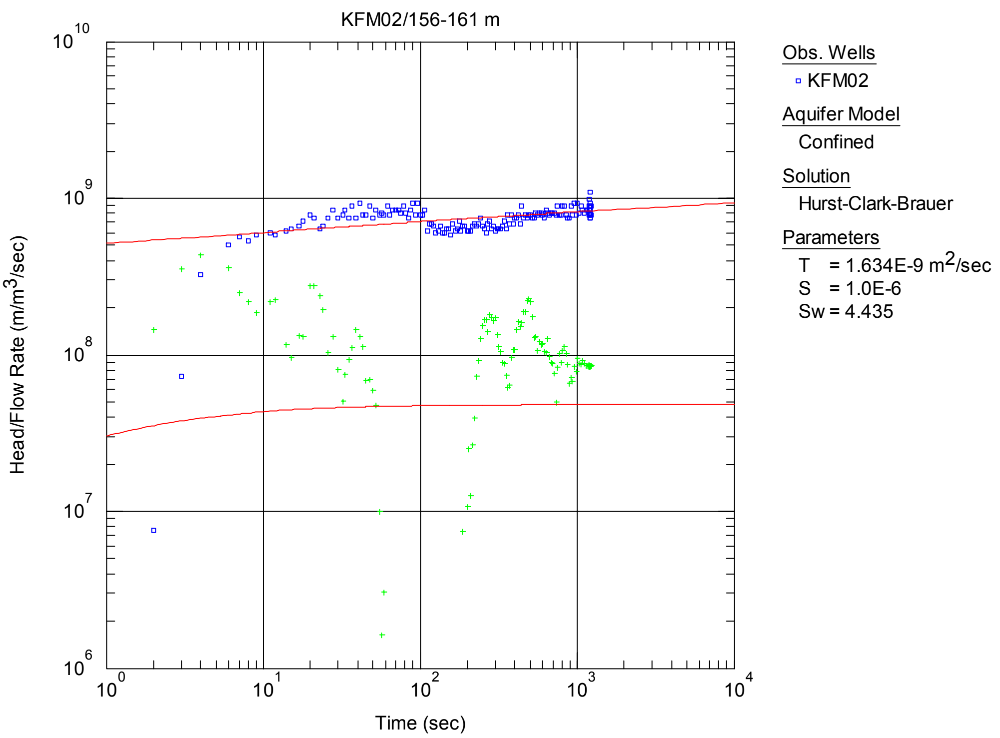



***Figure A3-200.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 156-161 m in KFM02A.*

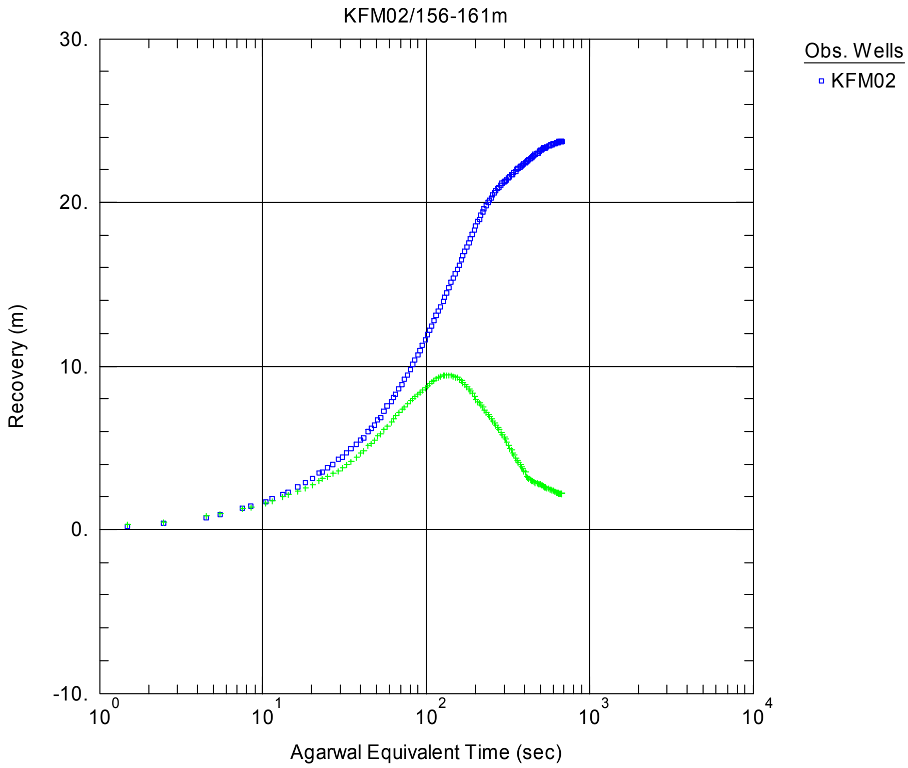



***Figure A3-201.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 156-161 m in KFM02A.*

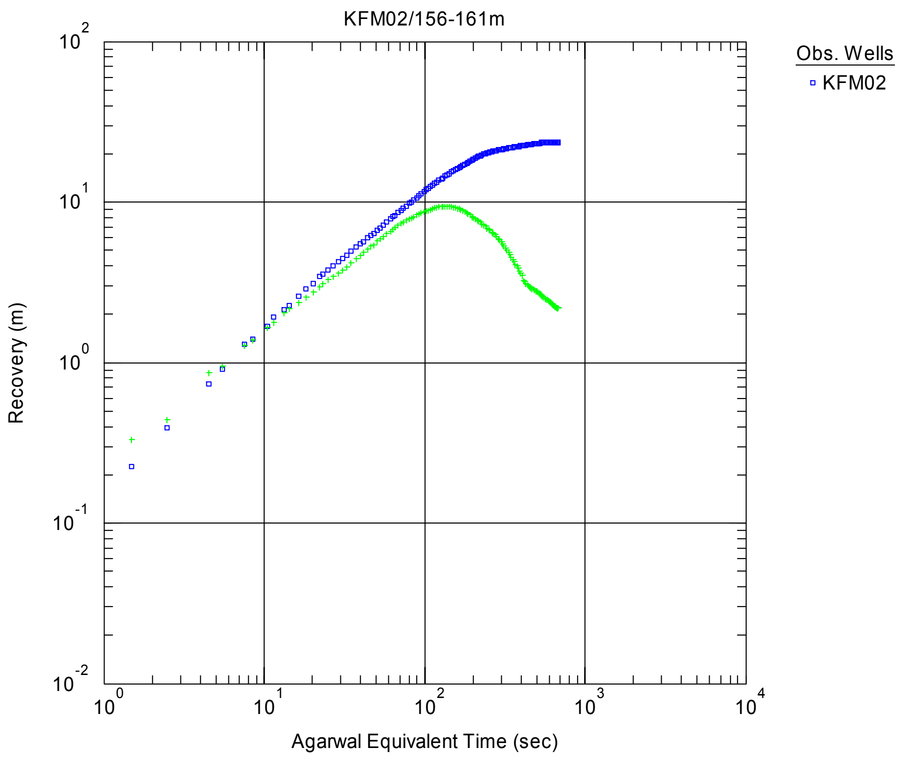



***Figure A3-202.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 156-161 m in KFM02A.*

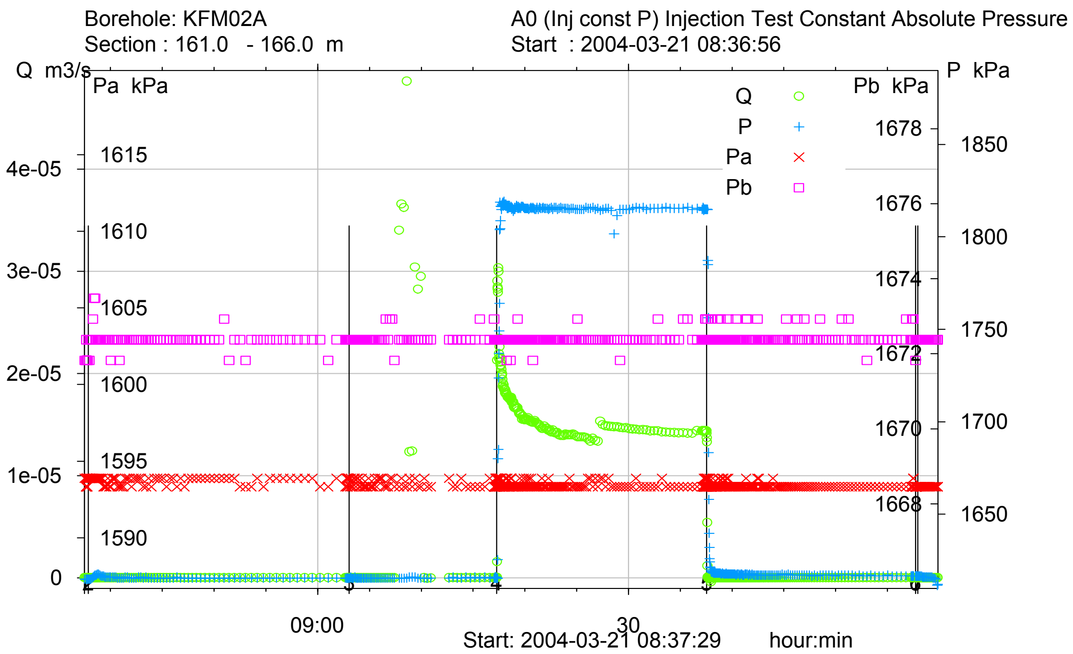



***Figure A3-203.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 161-166 m in borehole KFM02A.*

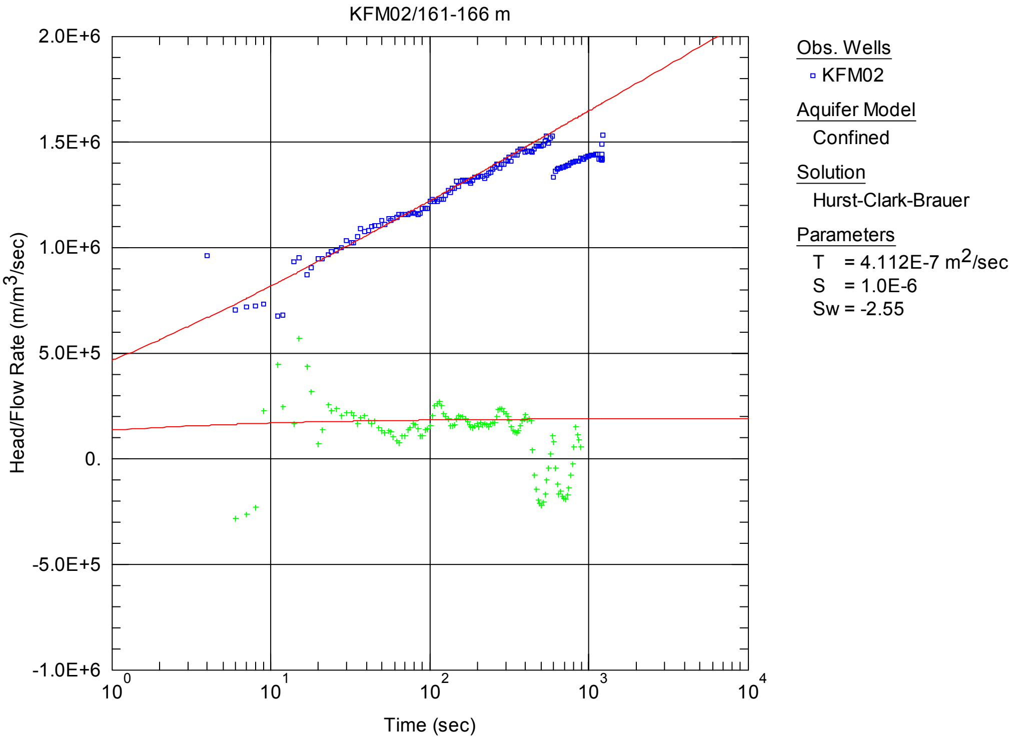



***Figure A3-204.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 161-166 m in KFM02A.*

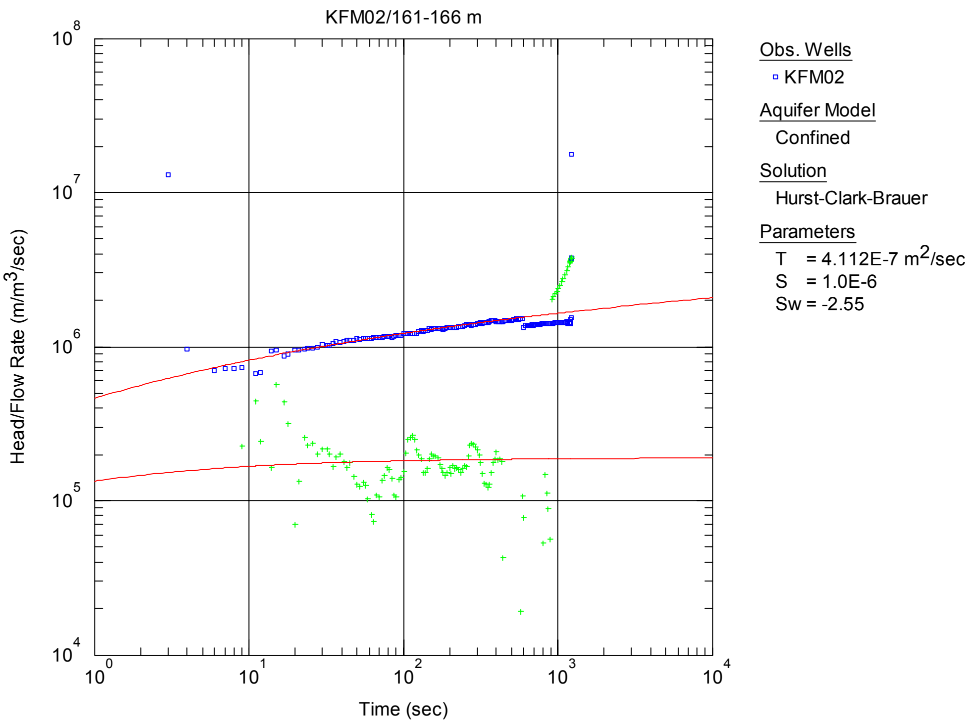



***Figure A3-205.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 161-166 m in KFM02A.*

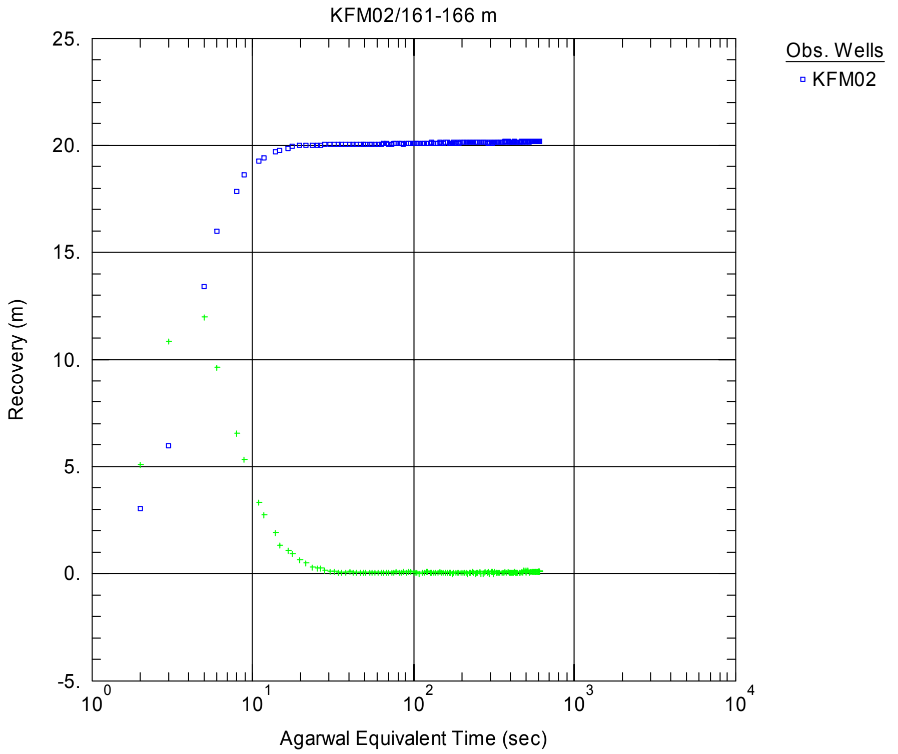



***Figure A3-206.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 161-166 m in KFM02A.*

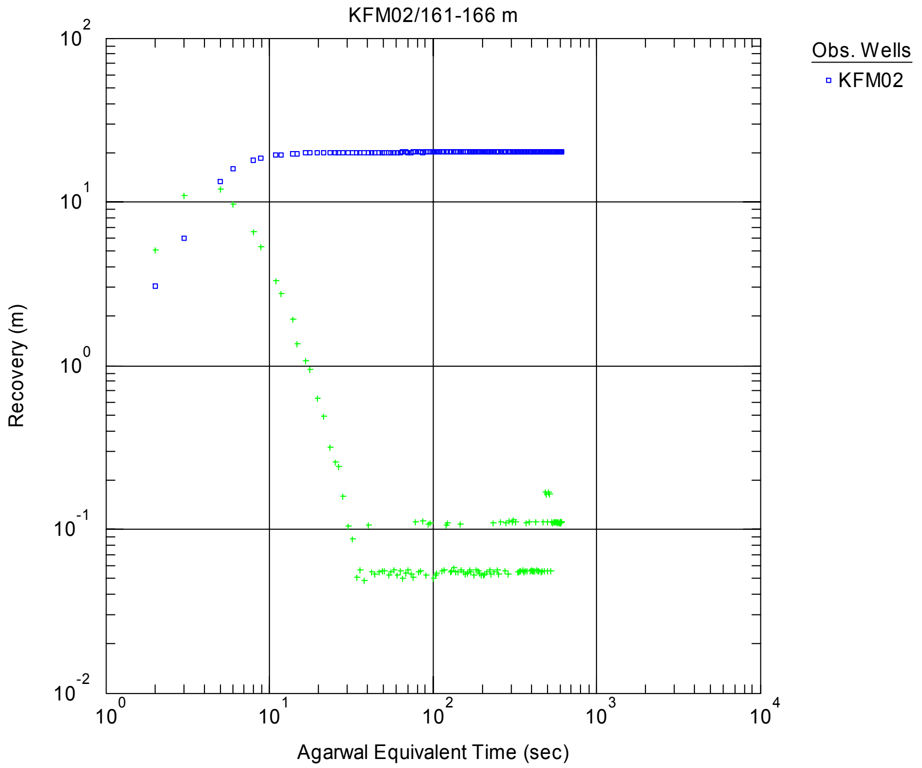



***Figure A3-207.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 161-166 m in KFM02A.*

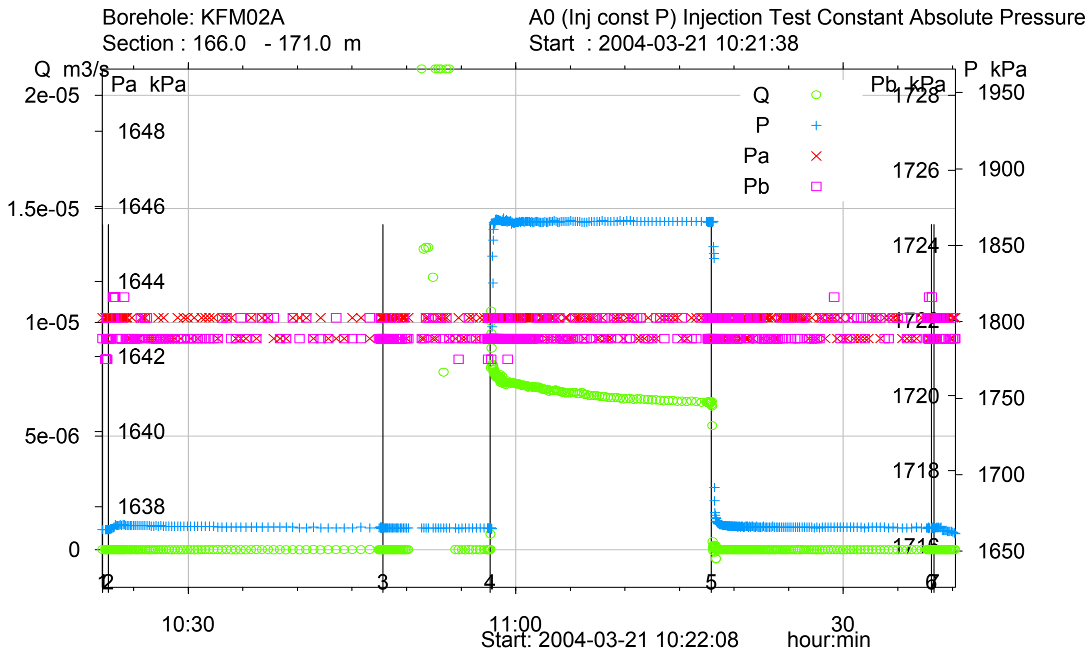



***Figure A3-208.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 166-171 m in borehole KFM02A.*

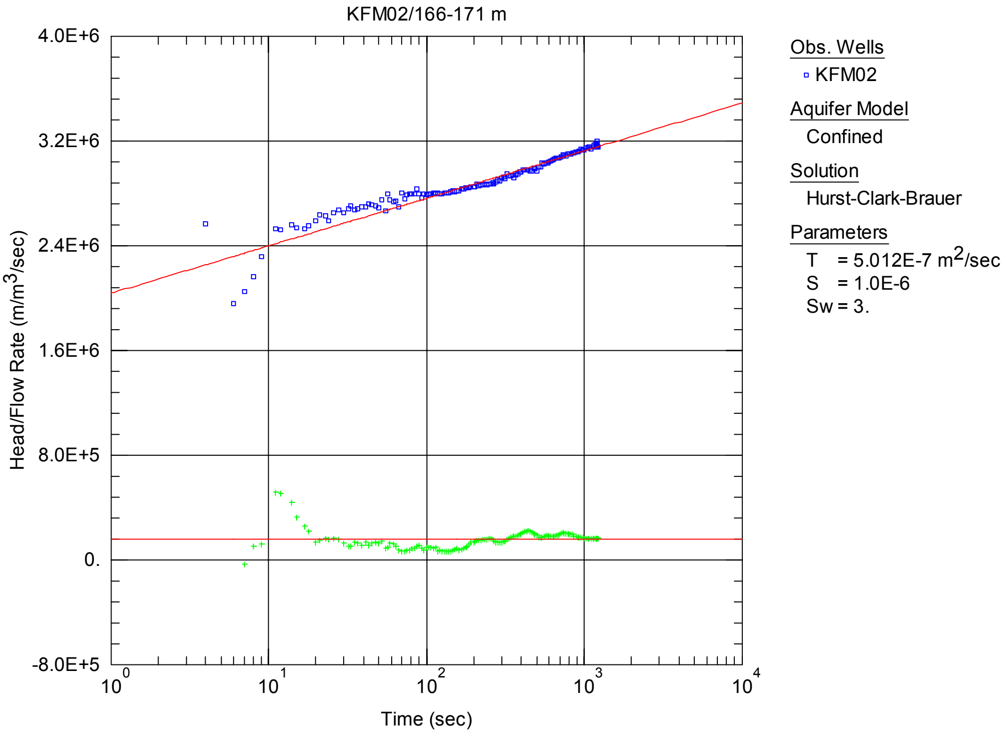



*Figure A3-209.* Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 166-171 m in KFM02A.

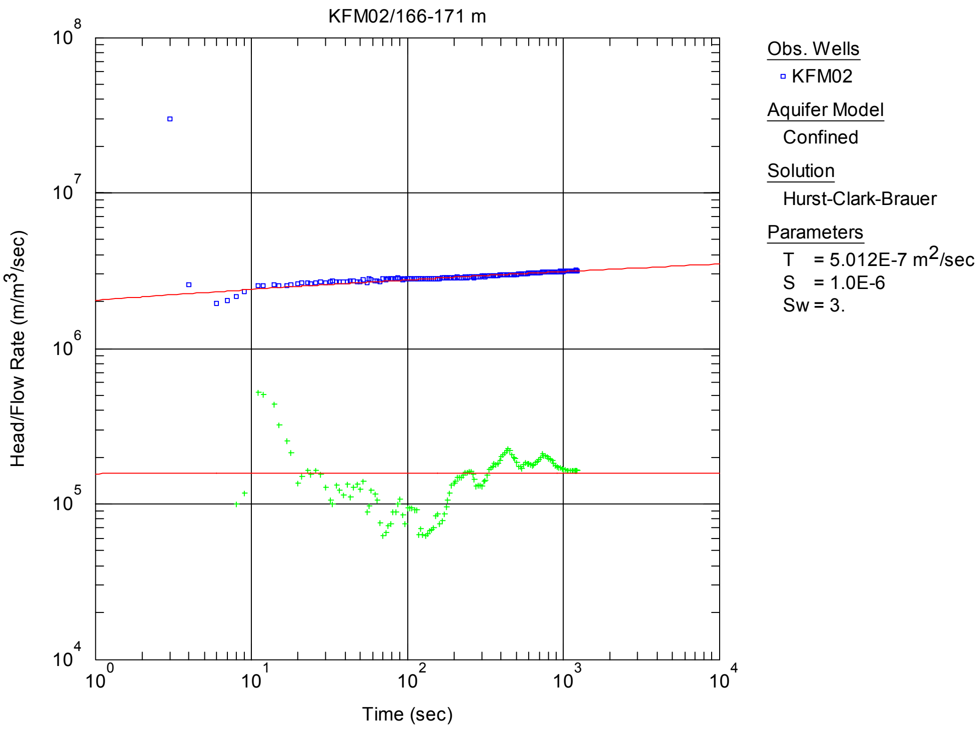



*Figure A3-210.* Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 166-171 m in KFM02A.

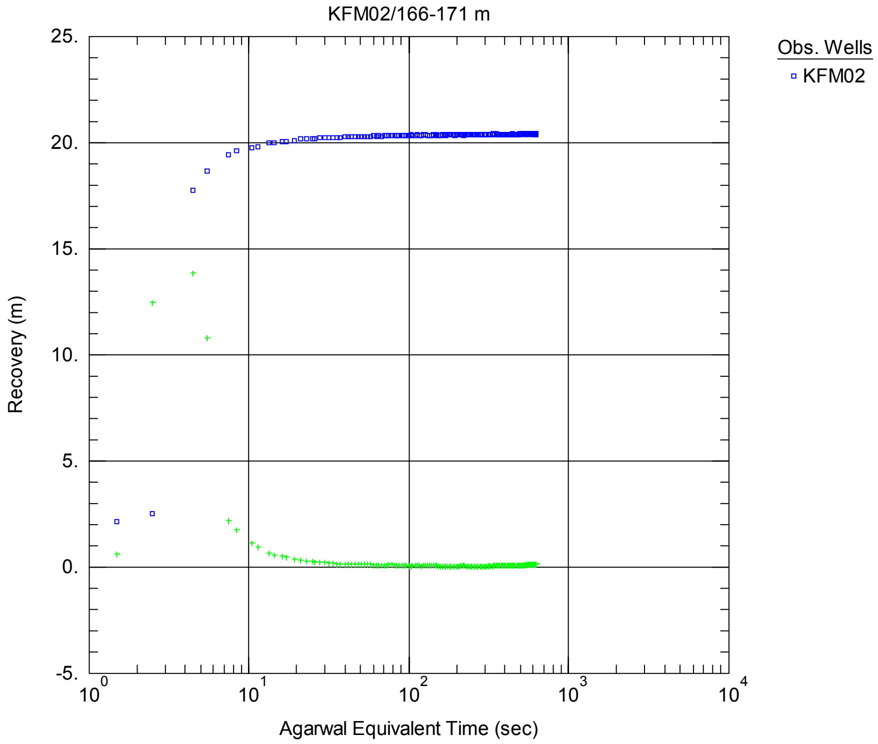



***Figure A3-211.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 166-171 m in KFM02A.*

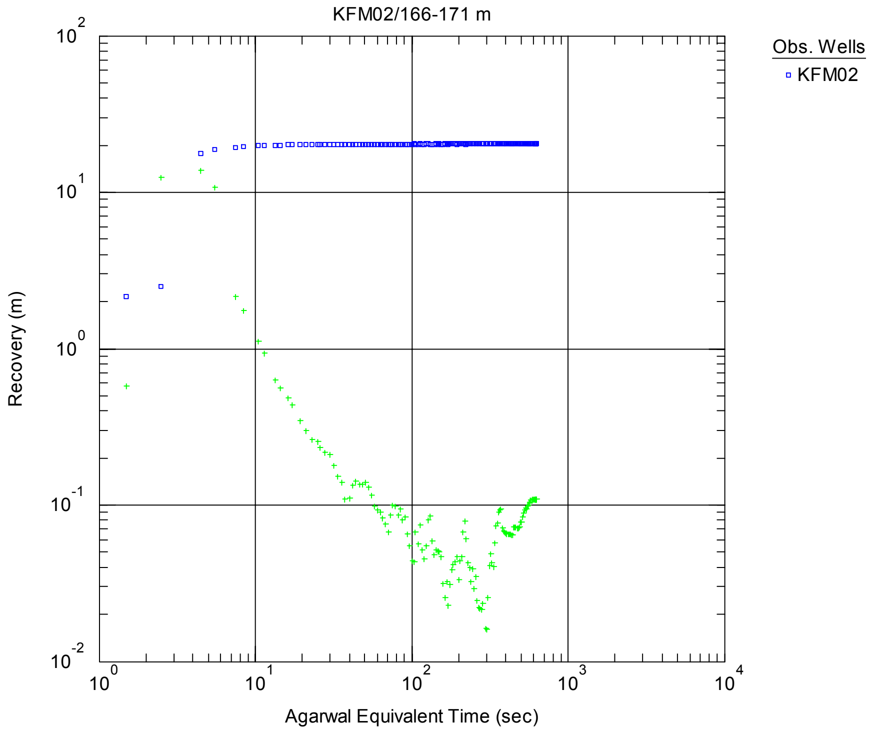



***Figure A3-212.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 166-171 m in KFM02A.*

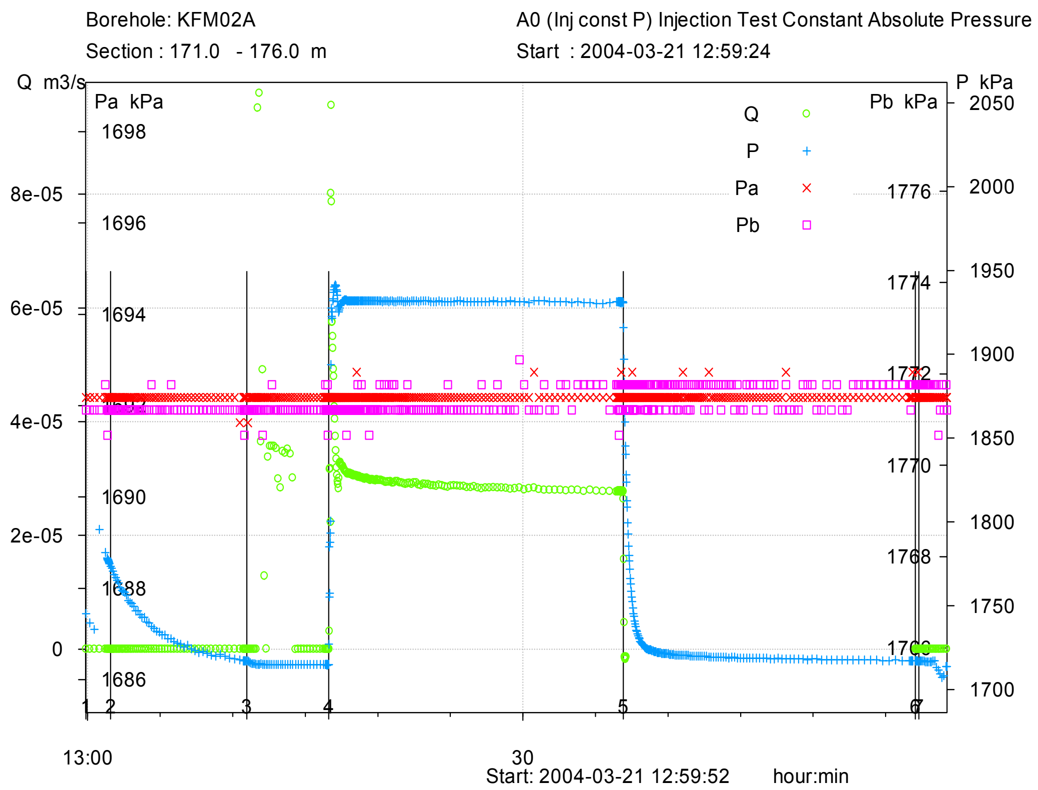



***Figure A3-213.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 171-176 m in borehole KFM02A.*

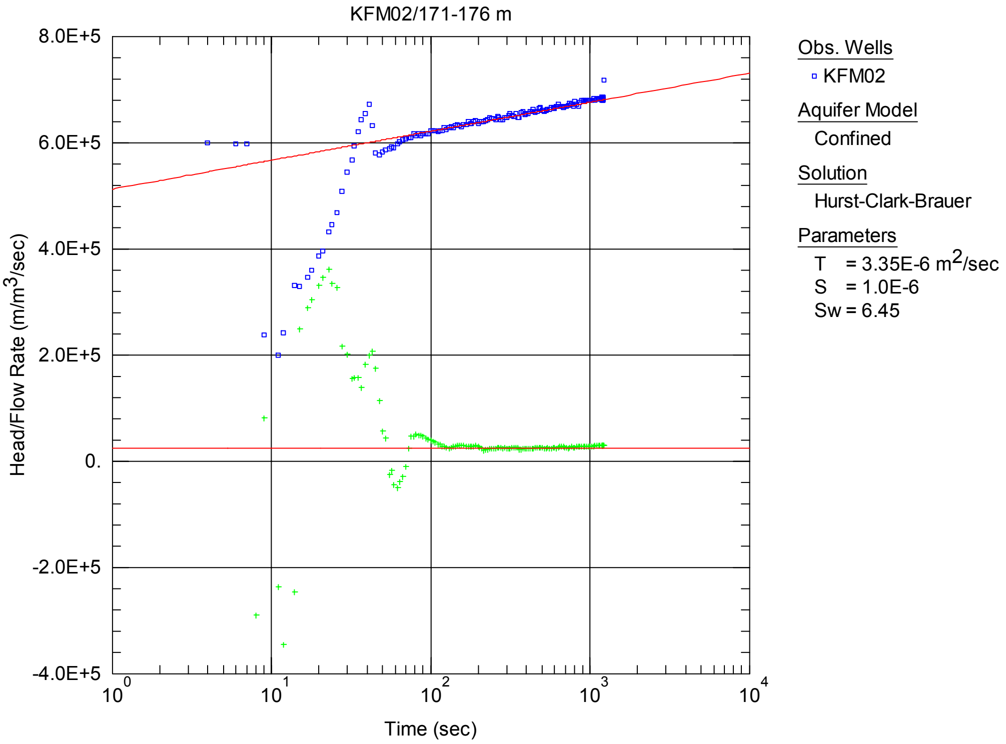



***Figure A3-214.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 171-176 m in KFM02A.*

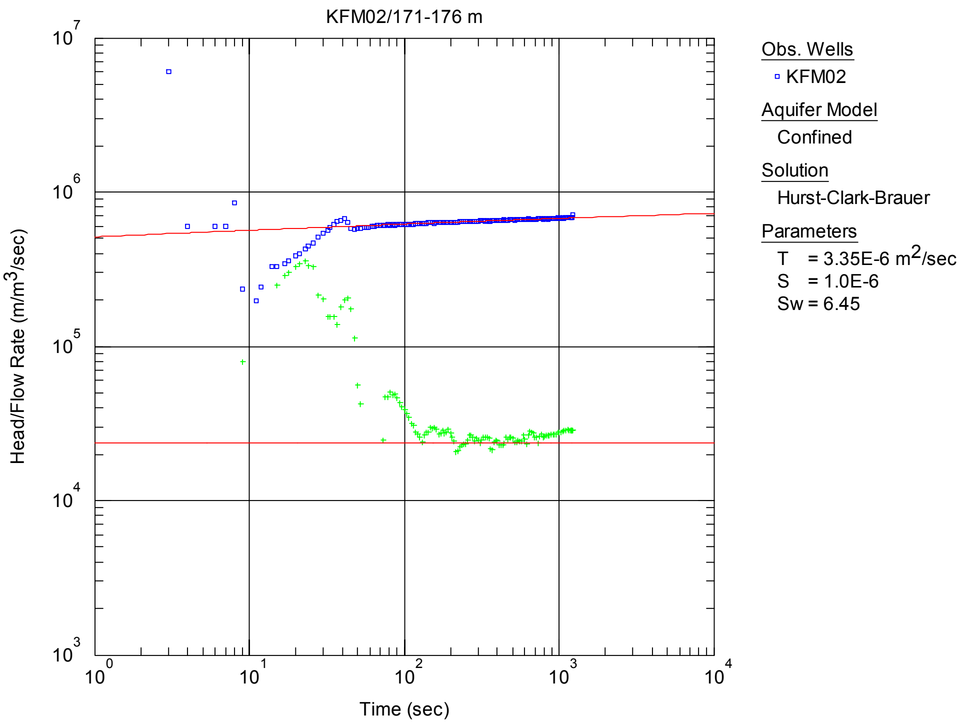



***Figure A3-215.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 171-176 m in KFM02A.*

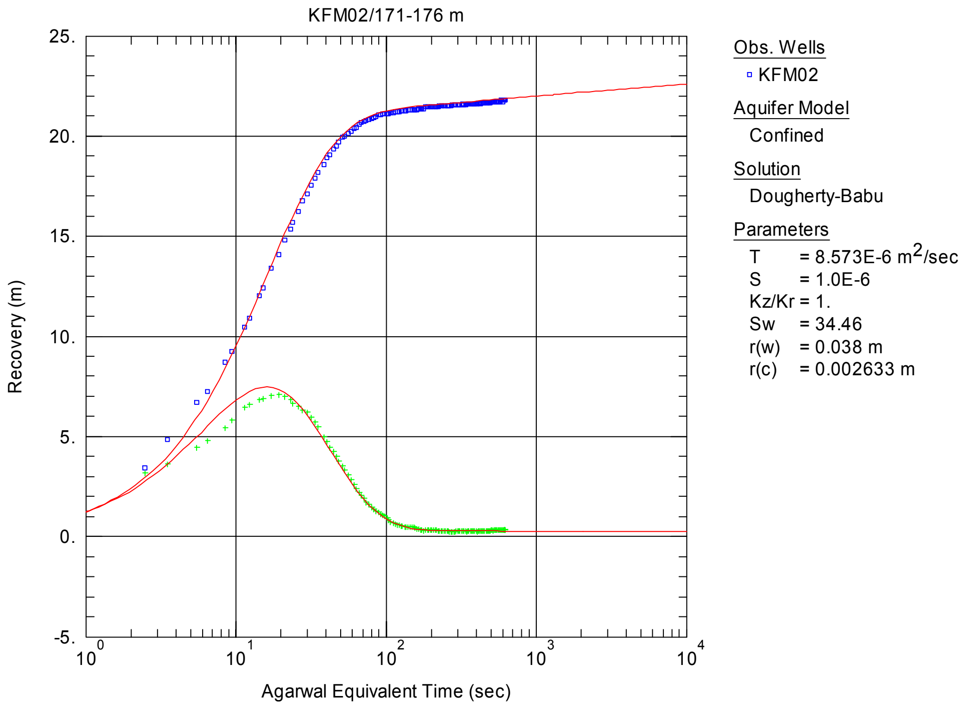



***Figure A3-216.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 171-176 m in KFM02A. Showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable.*

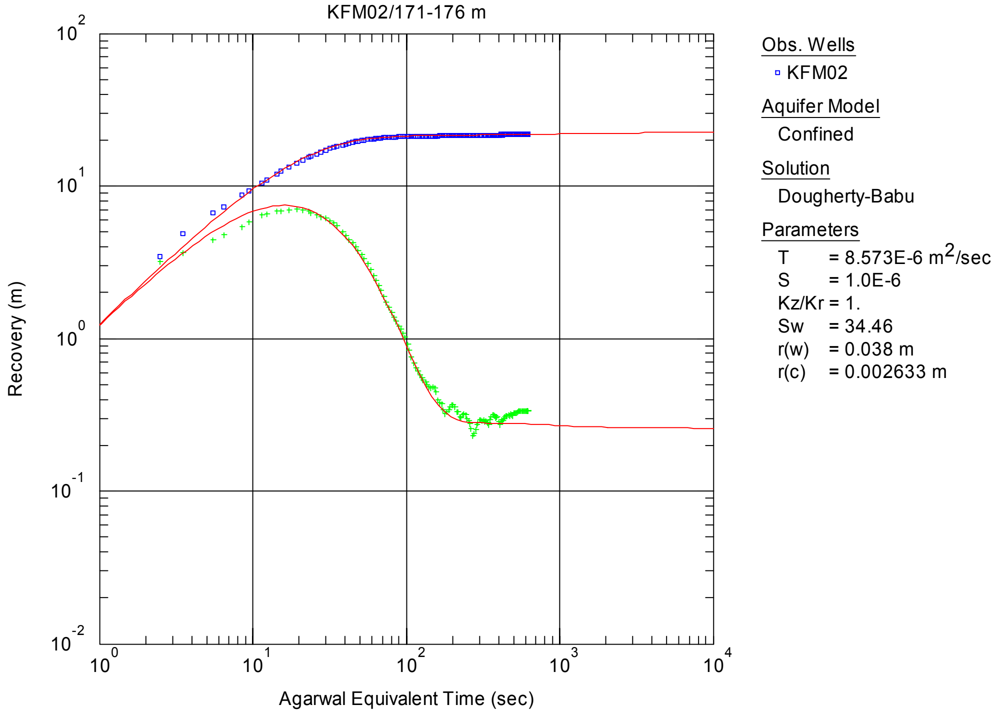



***Figure A3-217.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 171-176 m in KFM02A. Showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable.*

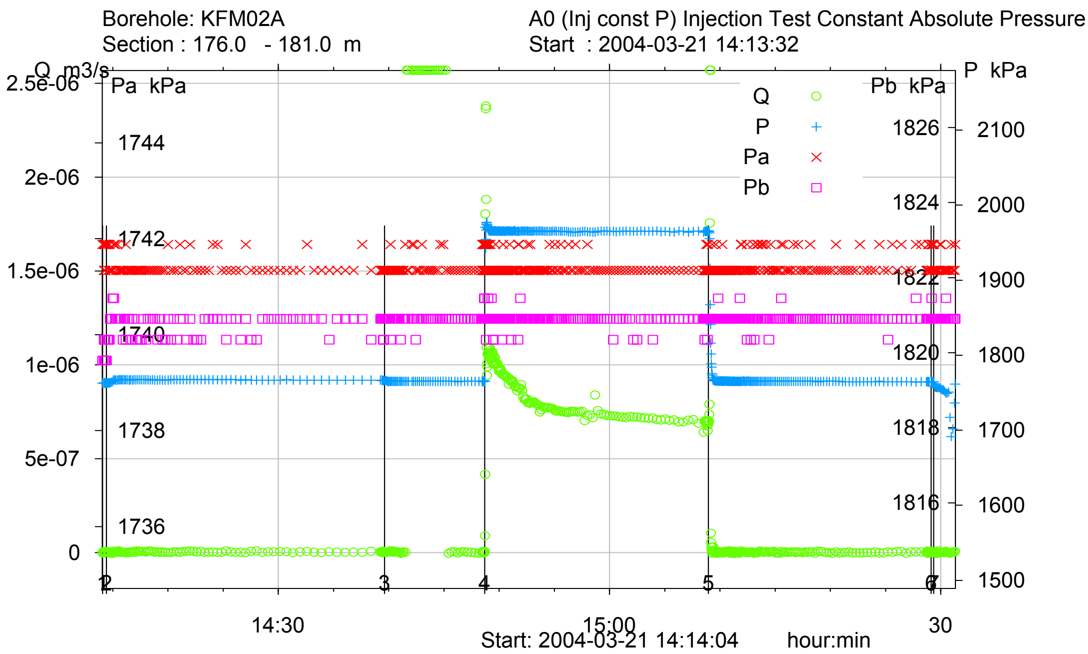



***Figure A3-218.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 176-181 m in borehole KFM02A.*

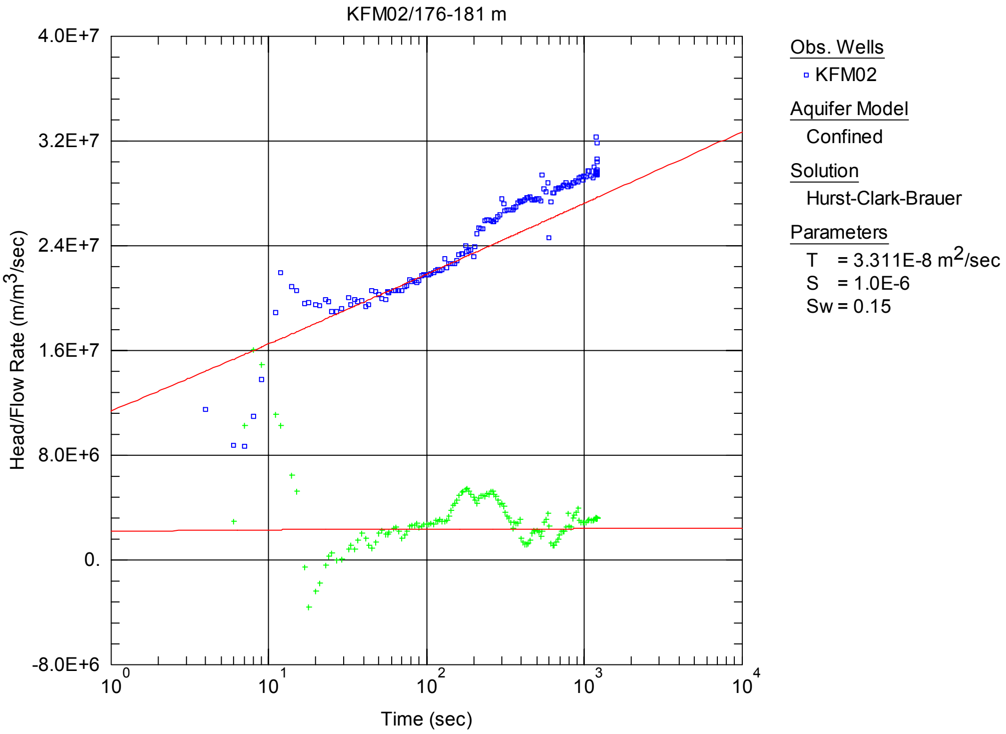



***Figure A3-219.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 176-181 m in KFM02A.*

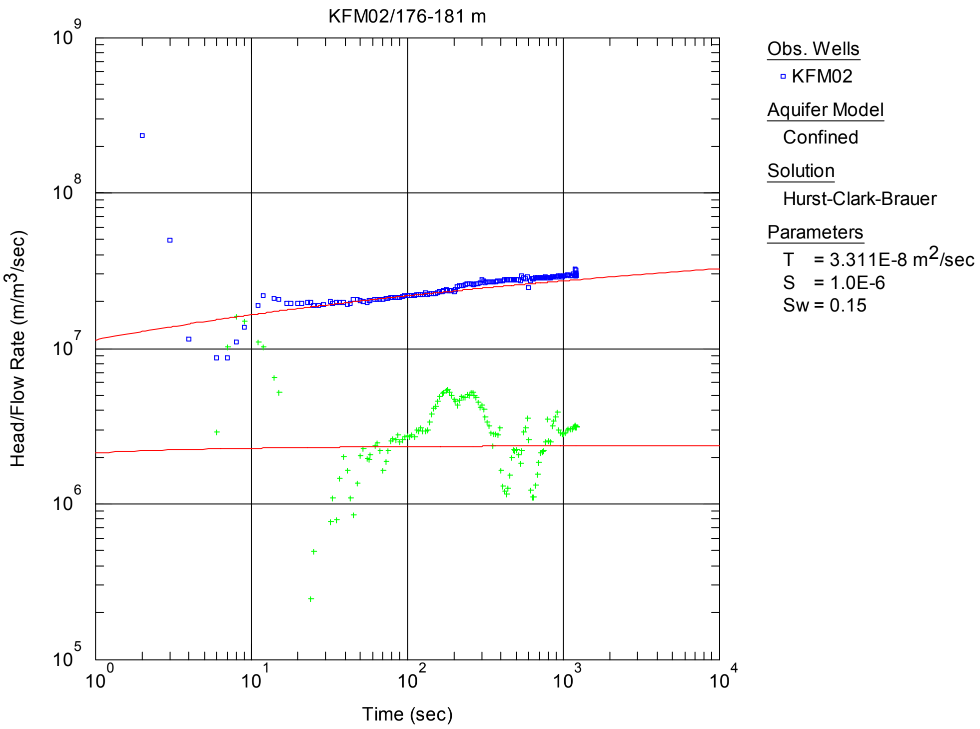



***Figure A3-220.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 176-181 m in KFM02A.*

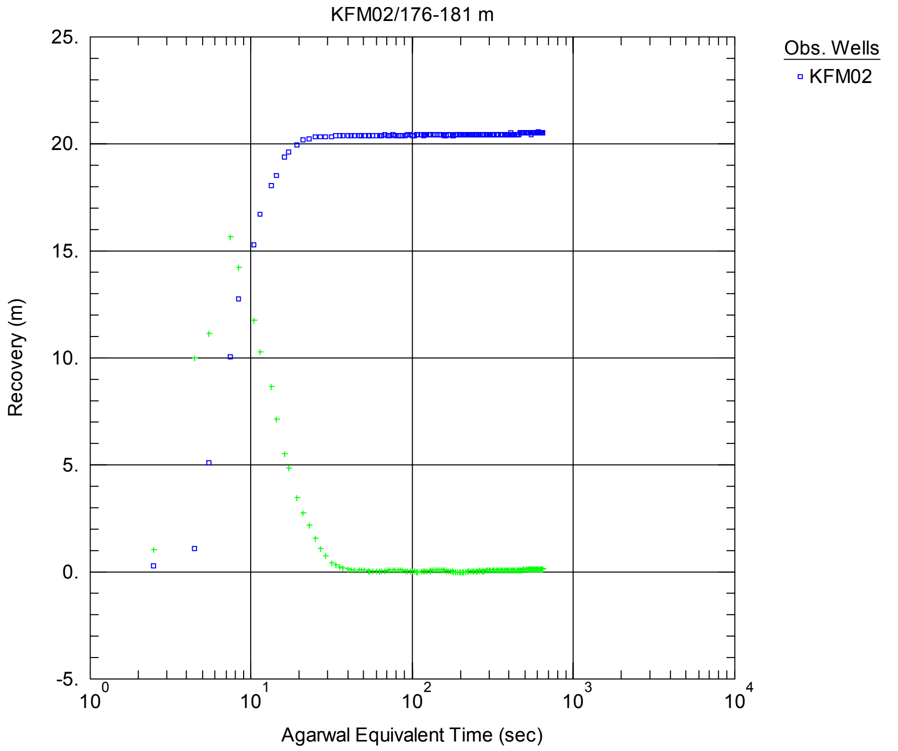



***Figure A3-221.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 176-181 m in KFM02A.*

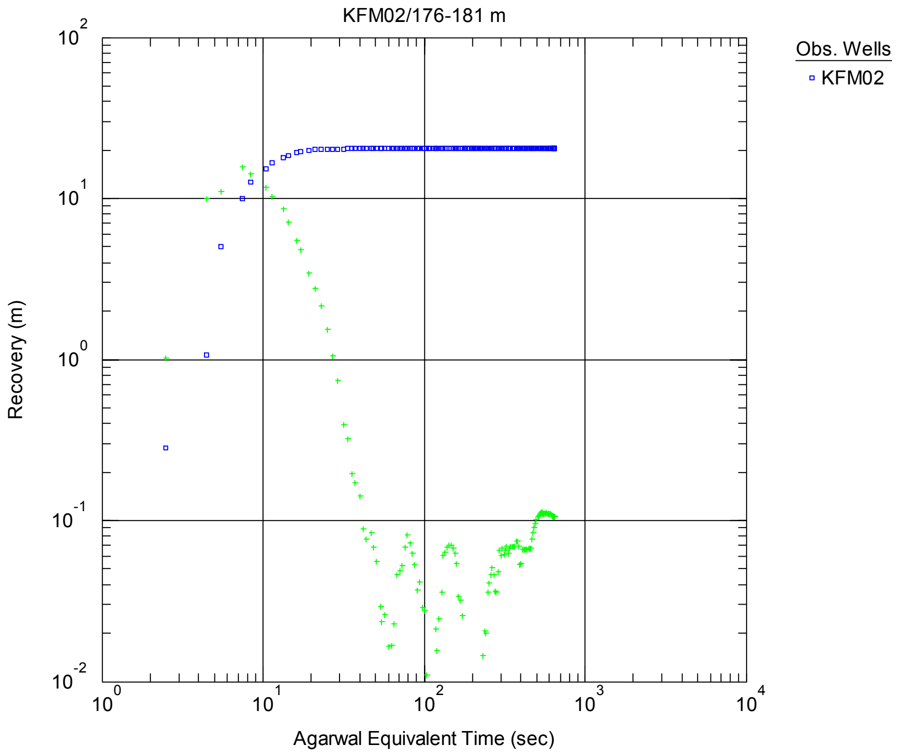



***Figure A3-222.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 176-181 m in KFM02A.*

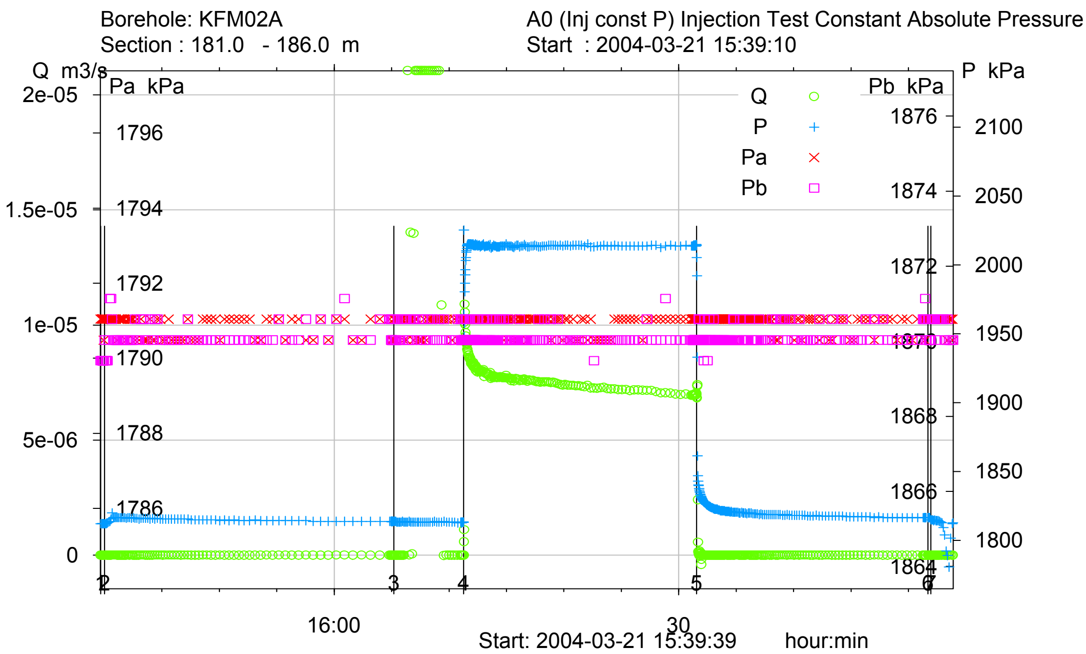



***Figure A3-223.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 181-186 m in borehole KFM02A.*

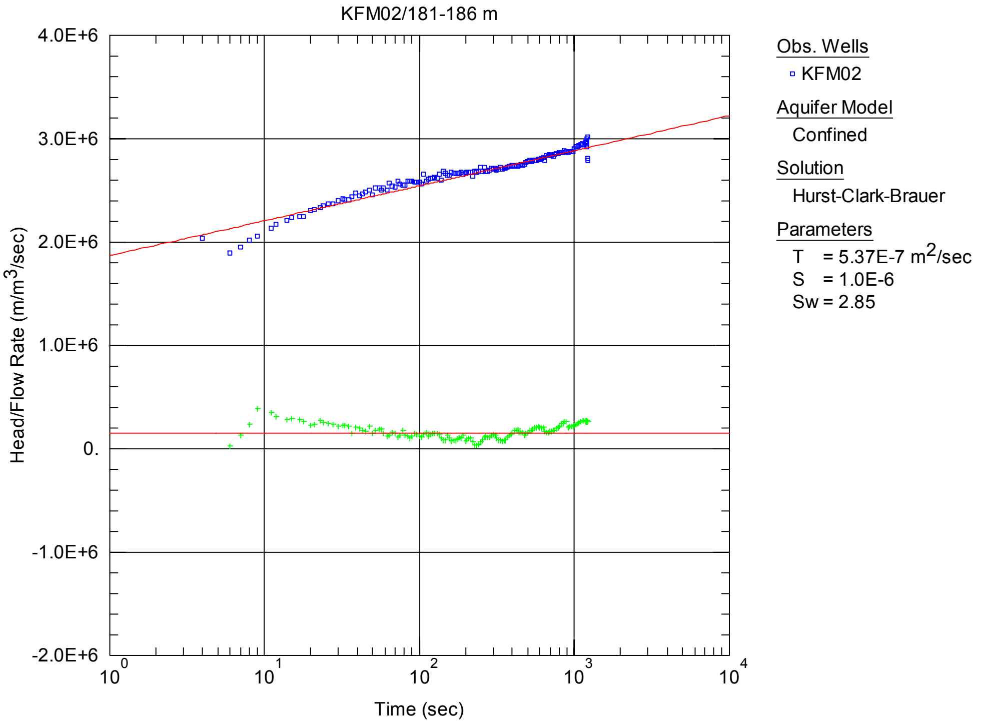



***Figure A3-224.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 181-186 m in KFM02A.*

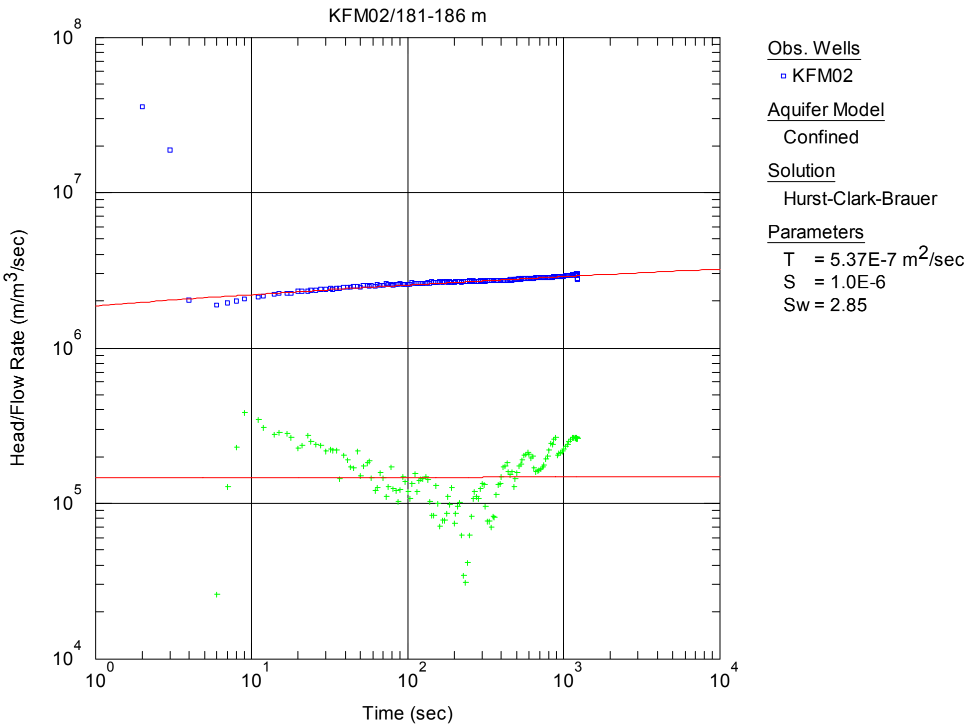



***Figure A3-225.** Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 181-186 m in KFM02A.*

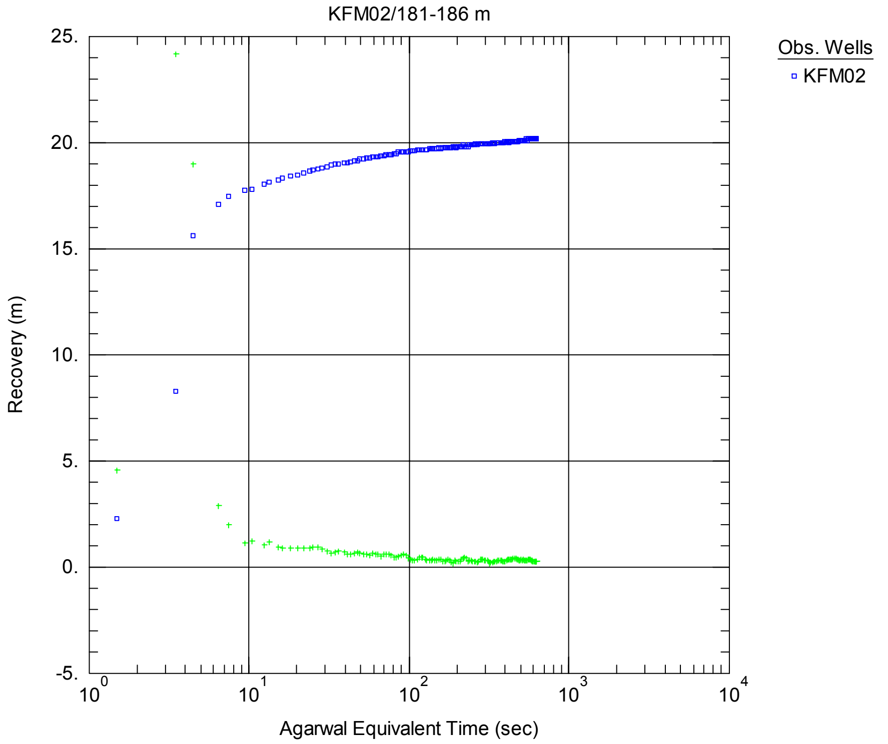



***Figure A3-226.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 181-186 m in KFM02A.*

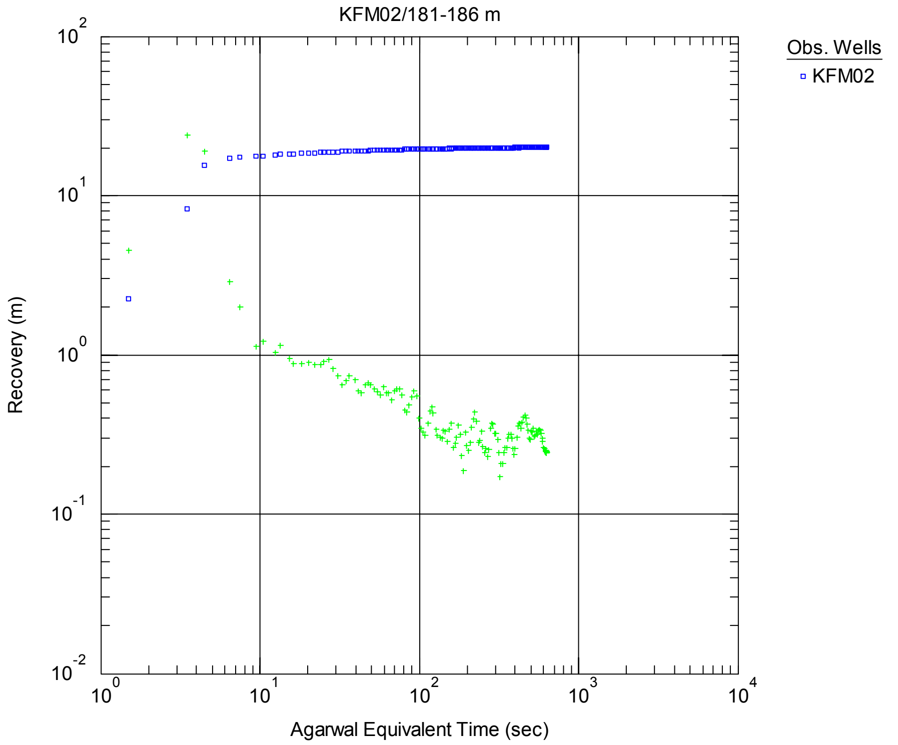



***Figure A3-227.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 181-186 m in KFM02A.*

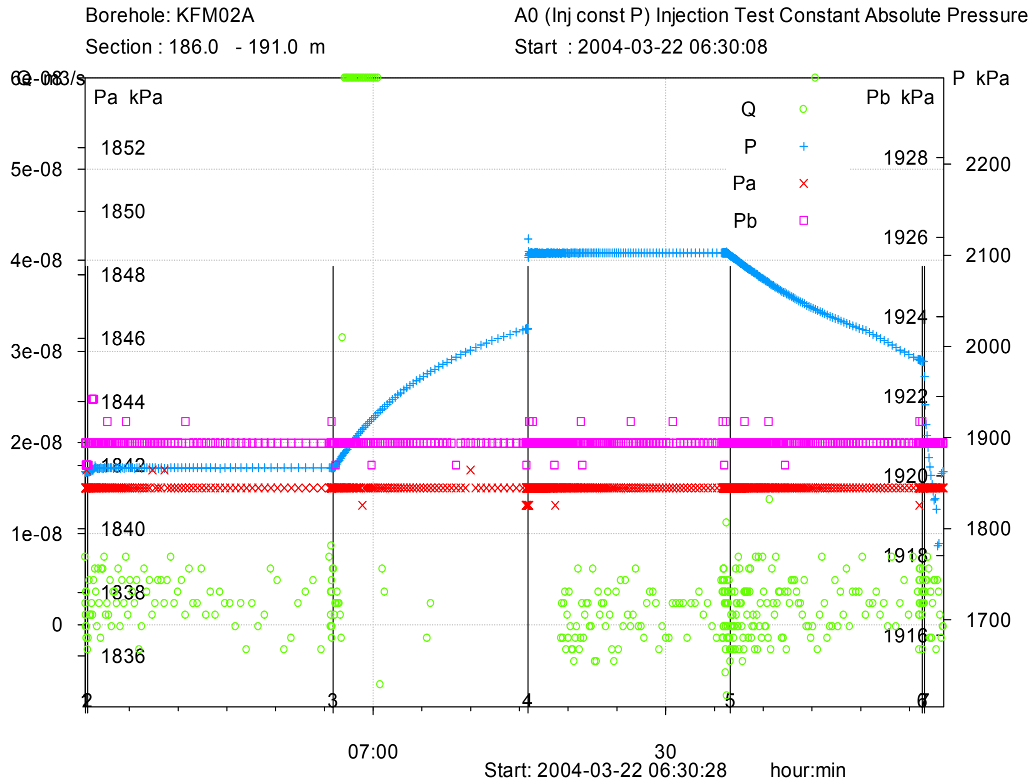



***Figure A3-228.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 186-191 m in borehole KFM02A.*

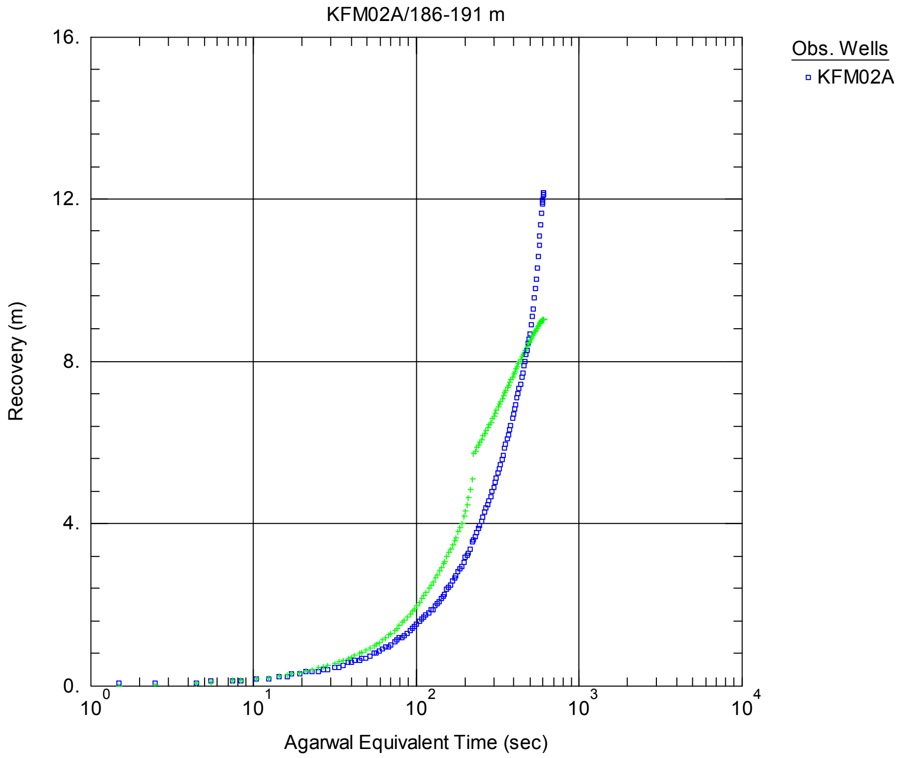



***Figure A3-229.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 186-191 m in KFM02A.*

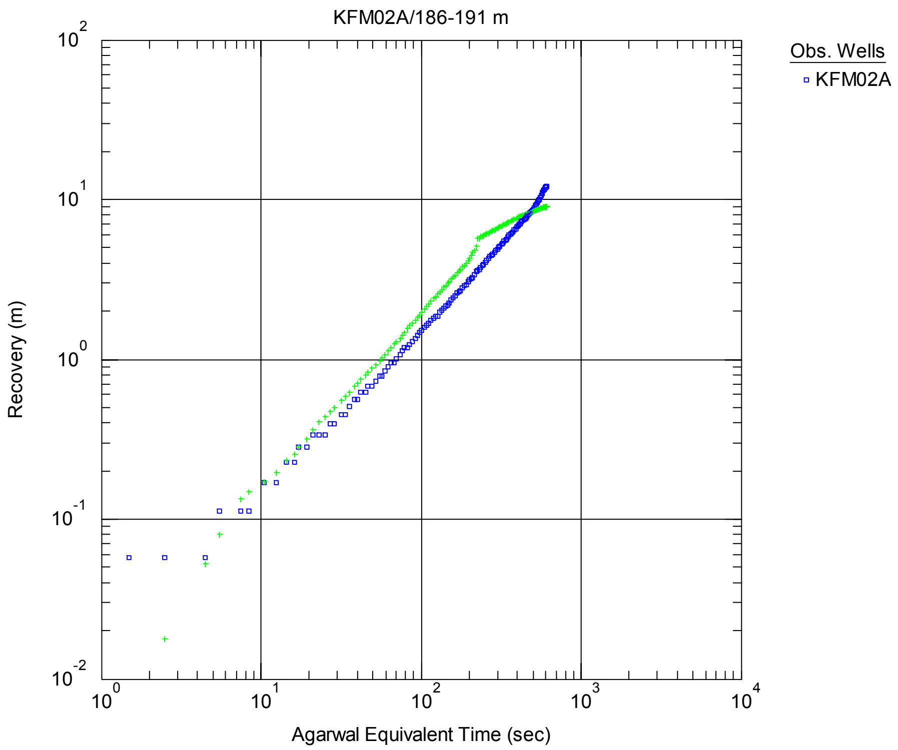



***Figure A3-230.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 186-191 m in KFM02A.*

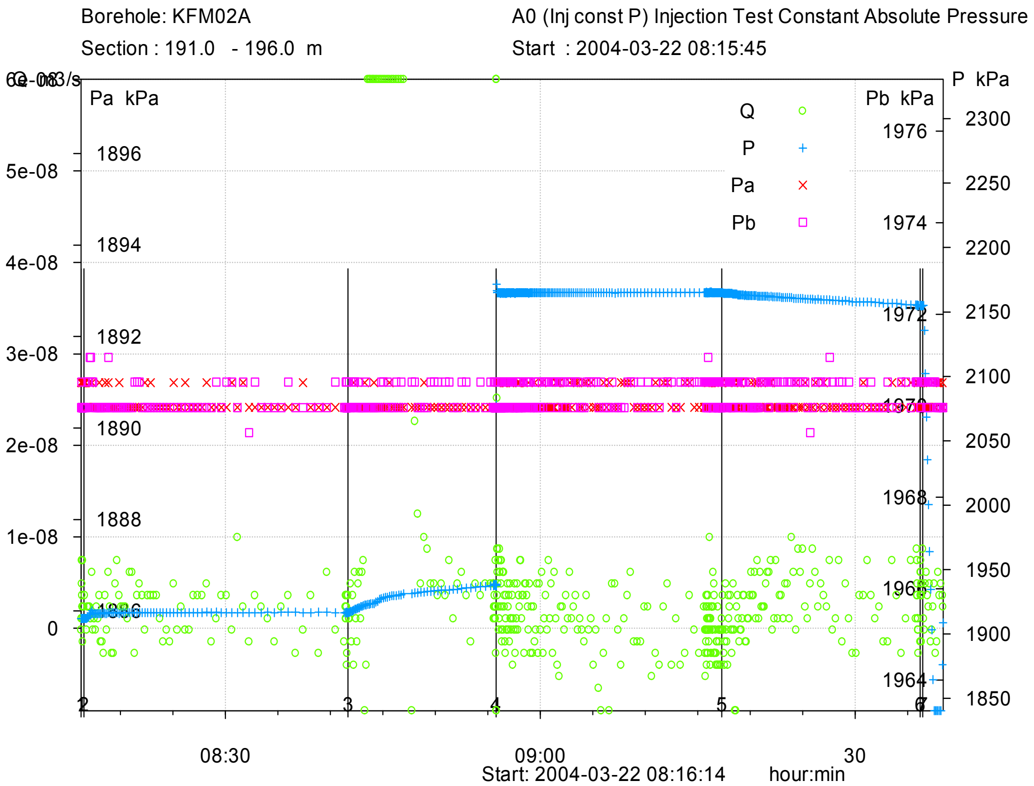



***Figure A3-231.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 191-196 m in borehole KFM02A.*

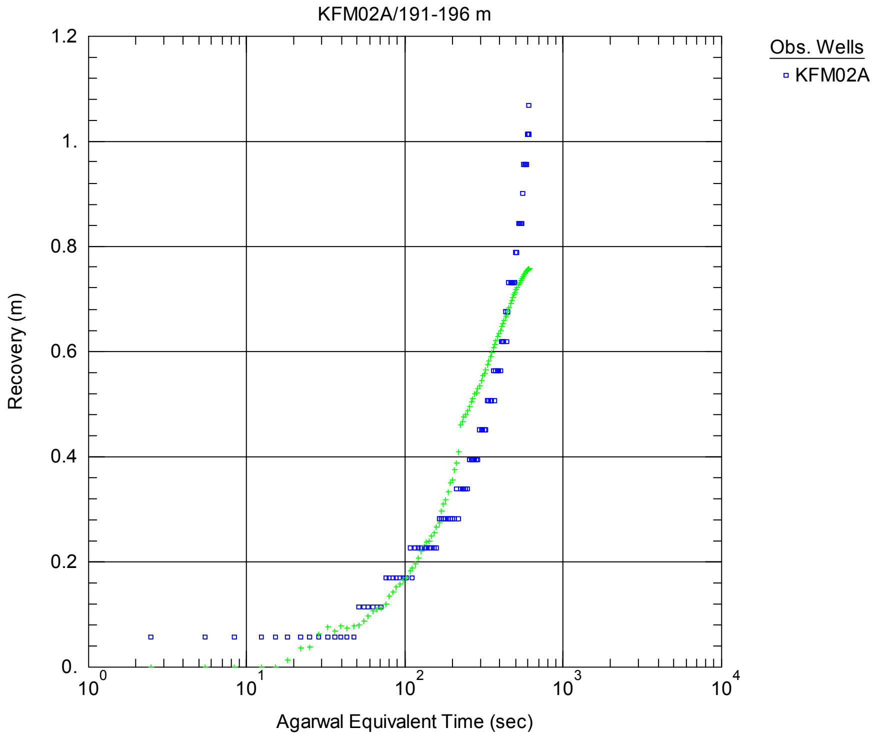



***Figure A3-232.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 191-196 m in KFM02A.*

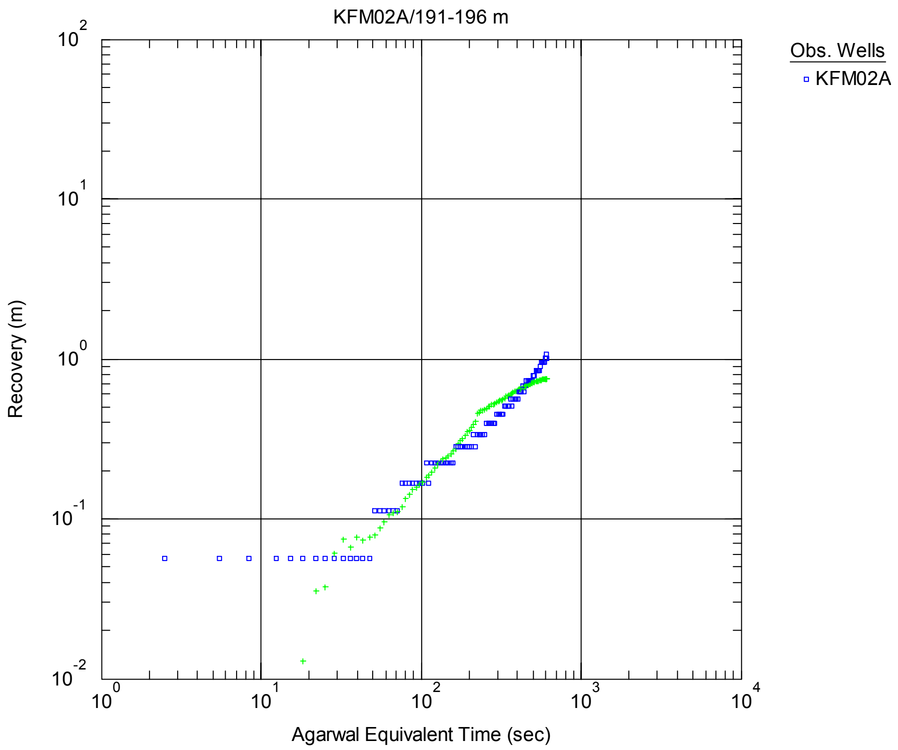



***Figure A3-233.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 191-196 m in KFM02A.*

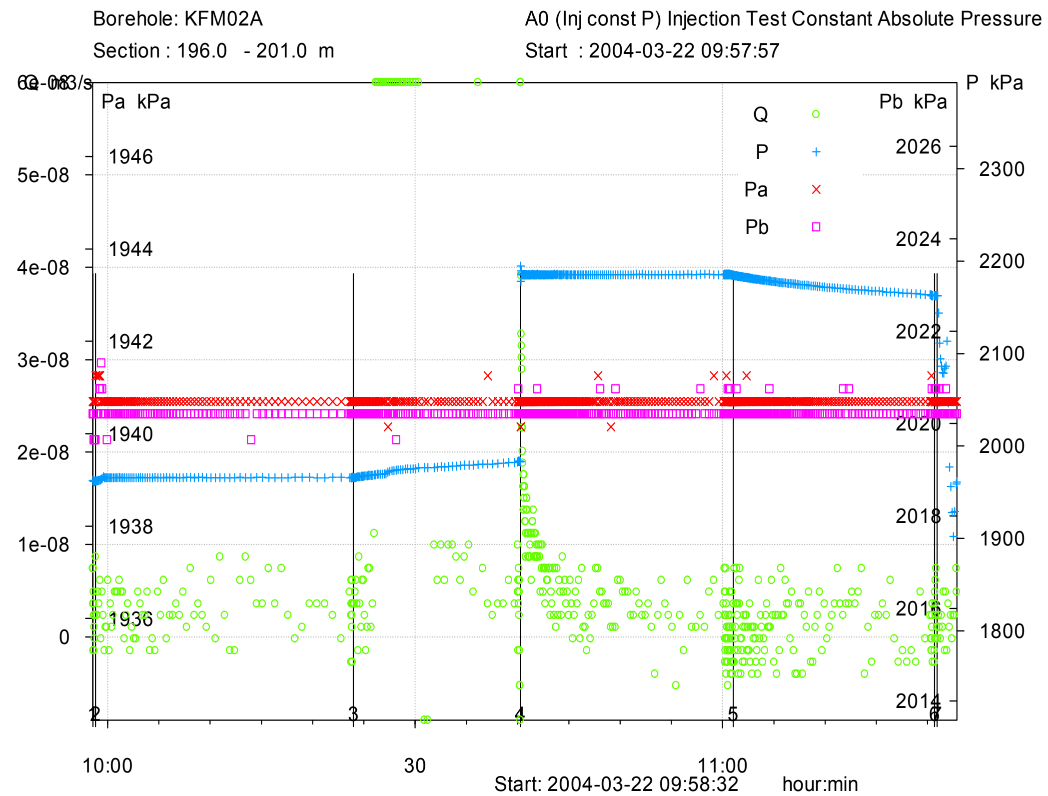



*Figure A3-234.* *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 196-201 m in borehole KFM02A.*

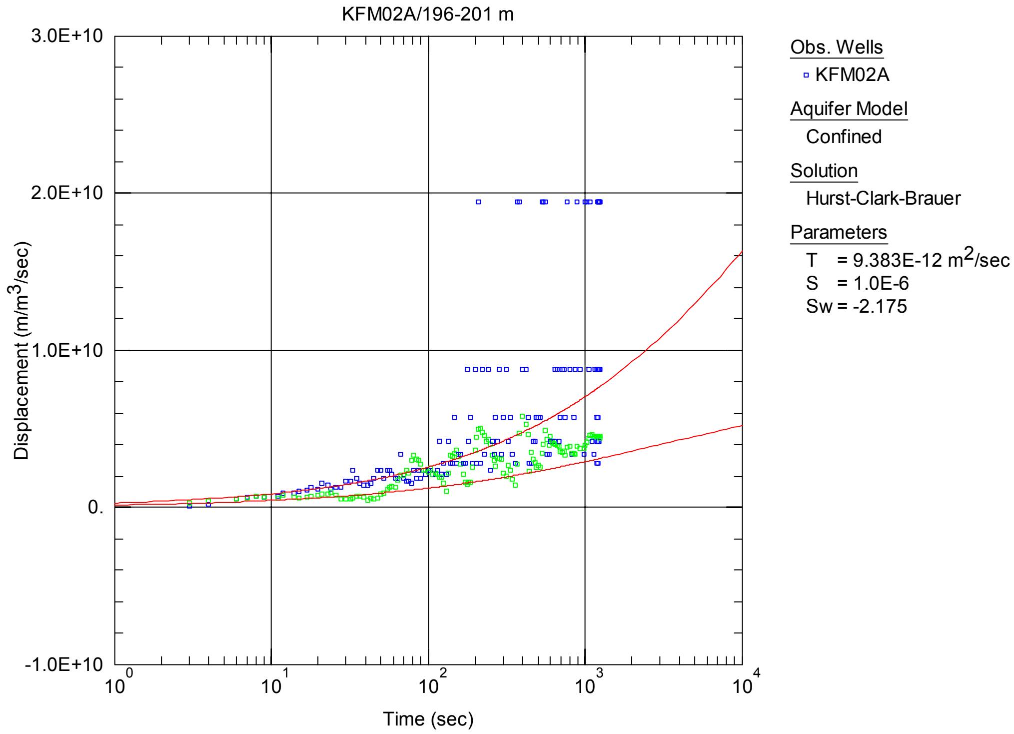



***Figure A3-235.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 196-201 m in KFM02A.*

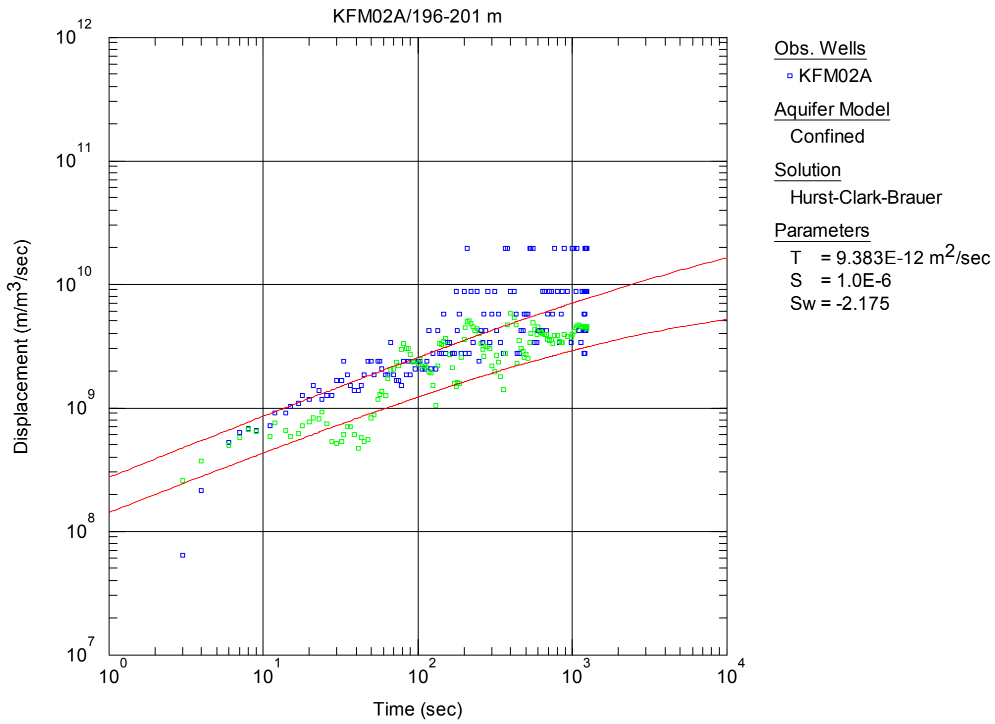



***Figure A3-236.** Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 196-201 m in KFM02A.*

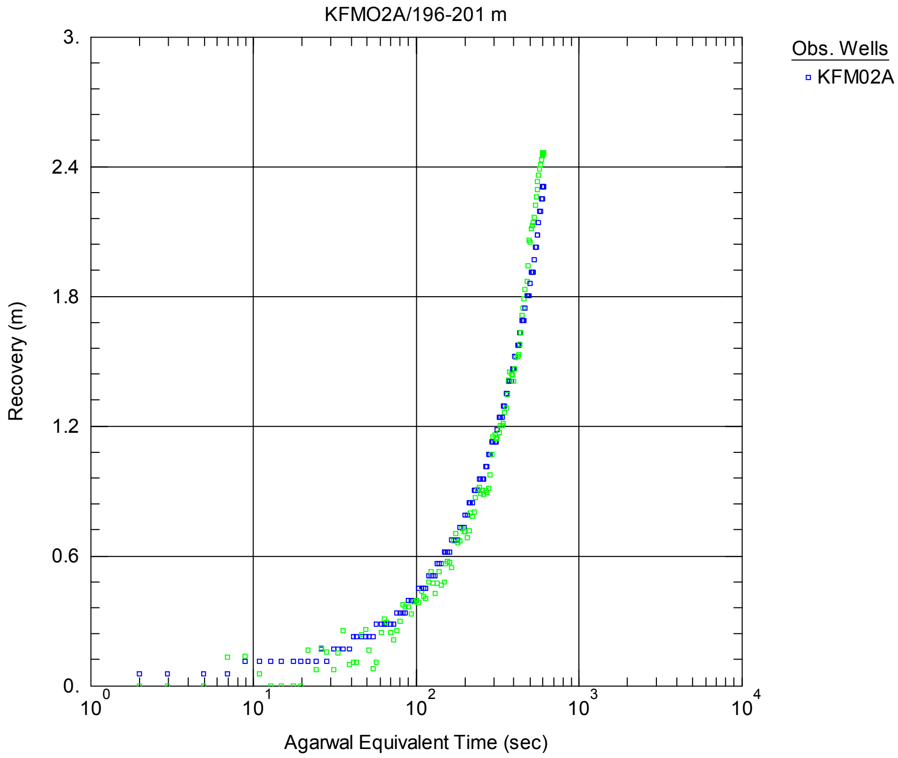



***Figure A3-237.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 196-201 m in KFM02A.*

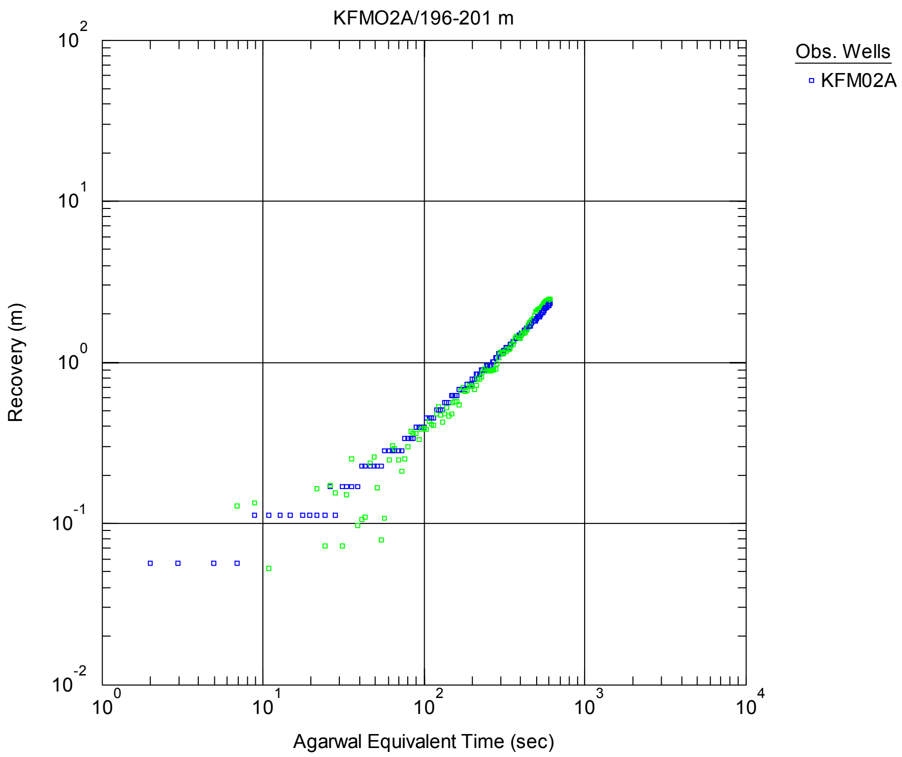



***Figure A3-238.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 196-201 m in KFM02A.*

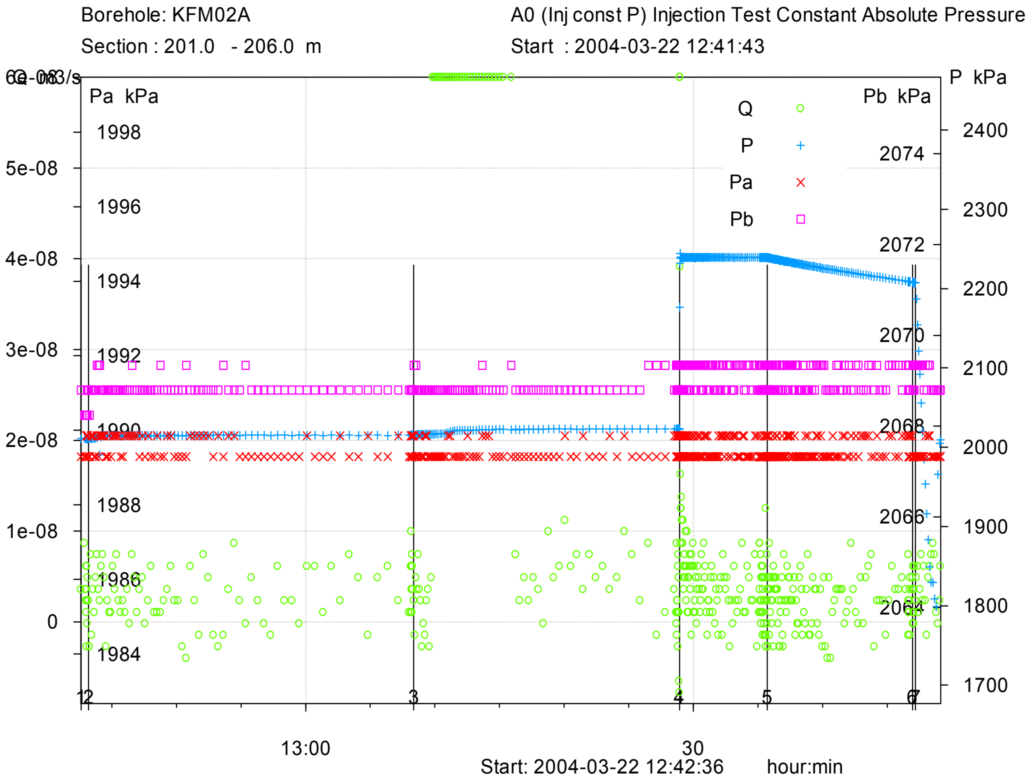



***Figure A3-239.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 201-206 m in borehole KFM02A.*

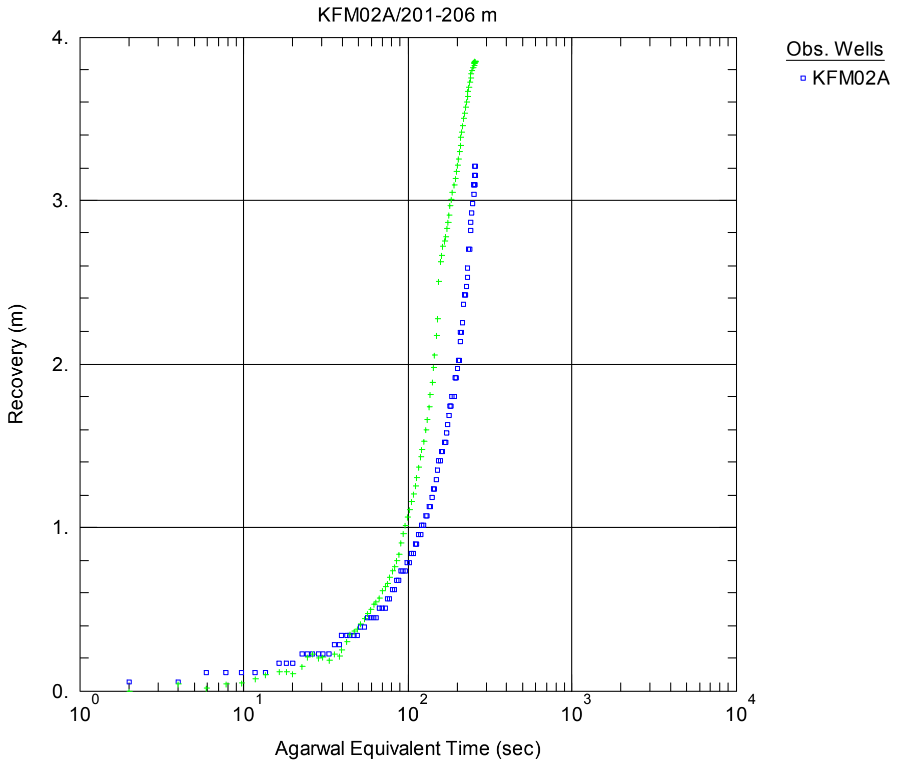



***Figure A3-240.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 201-206 m in KFM02A.*

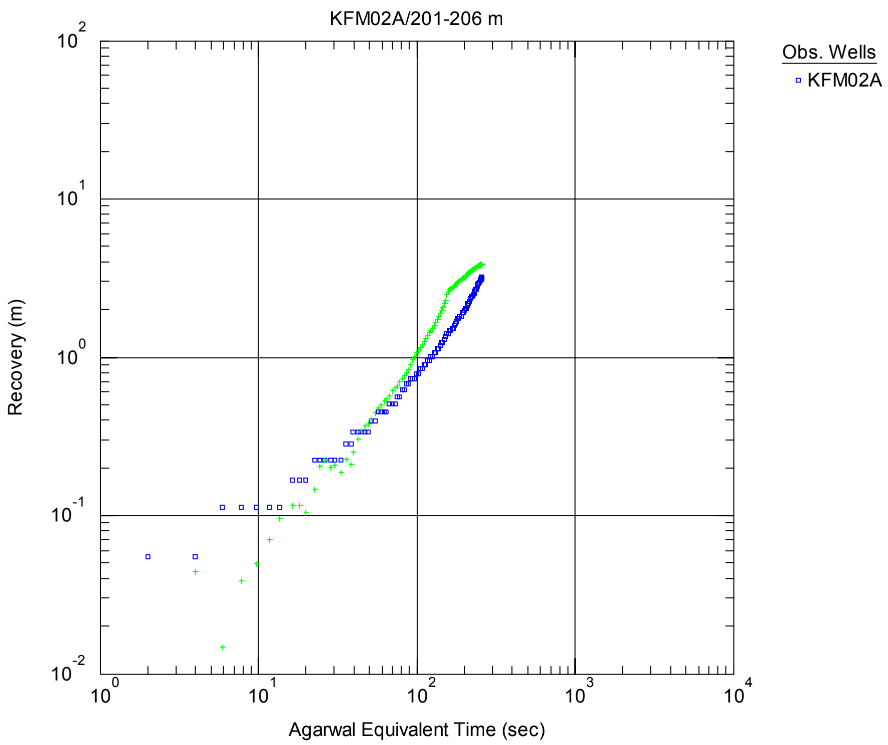



***Figure A3-241.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 201-206 m in KFM02A.*

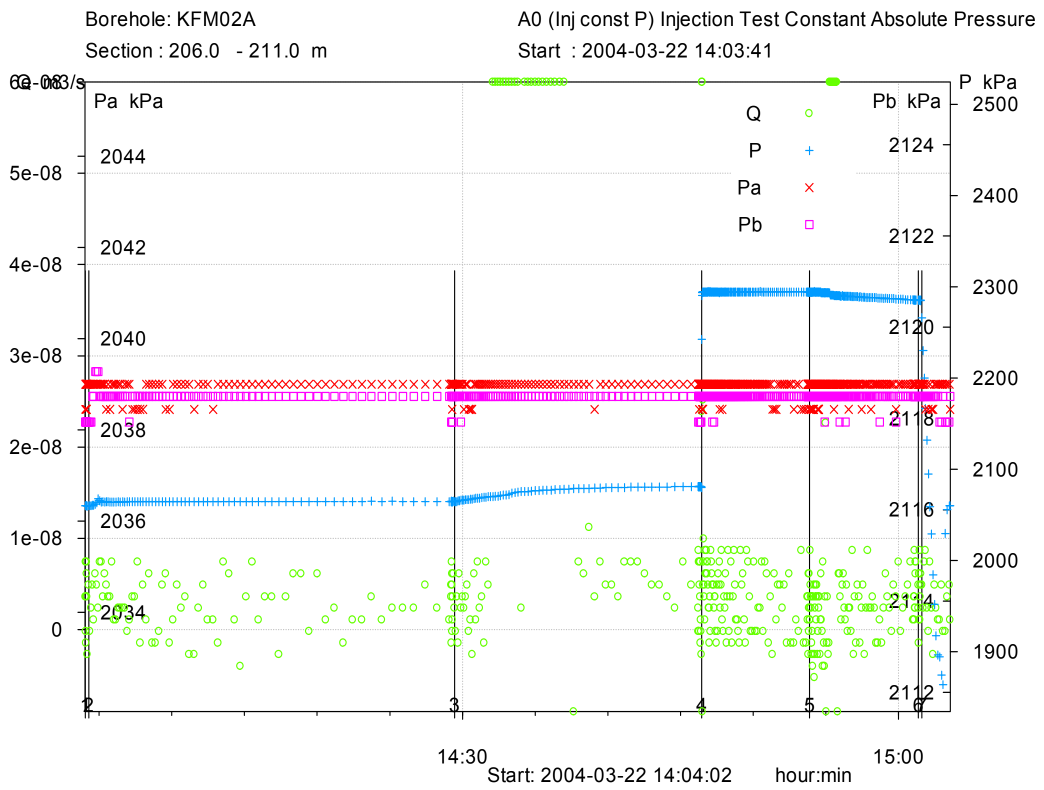



***Figure A3-242.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 206-211 m in borehole KFM02A.*

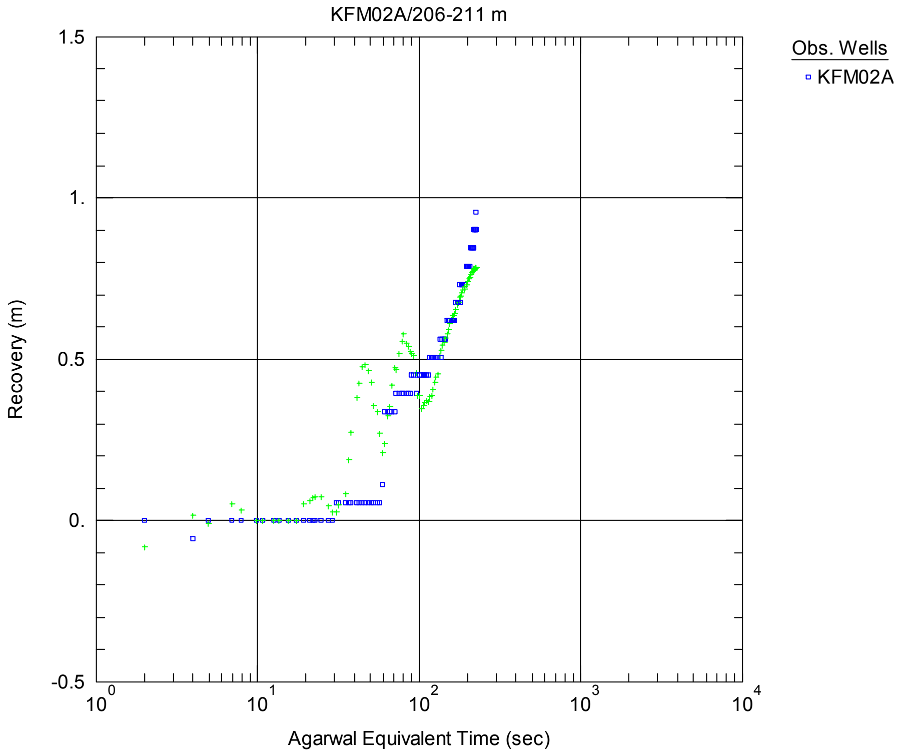



***Figure A3-243.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 206-211 m in KFM02A.*

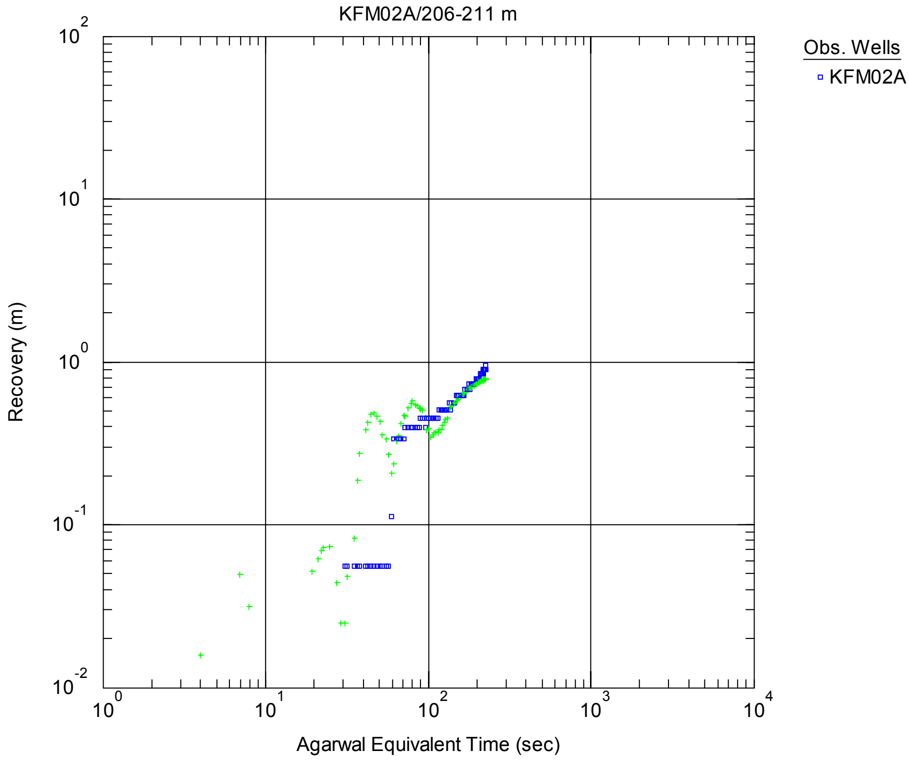



***Figure A3-244.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 206-211 m in KFM02A.*

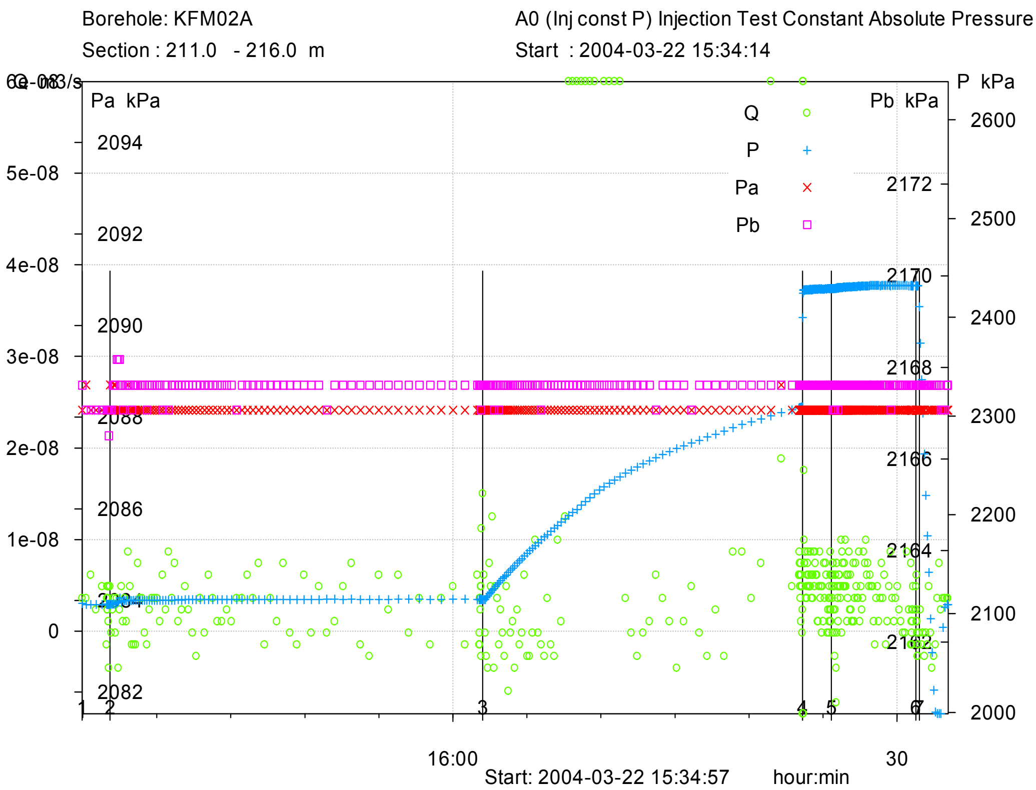



***Figure A3-245.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 211-216 m in borehole KFM02A.*

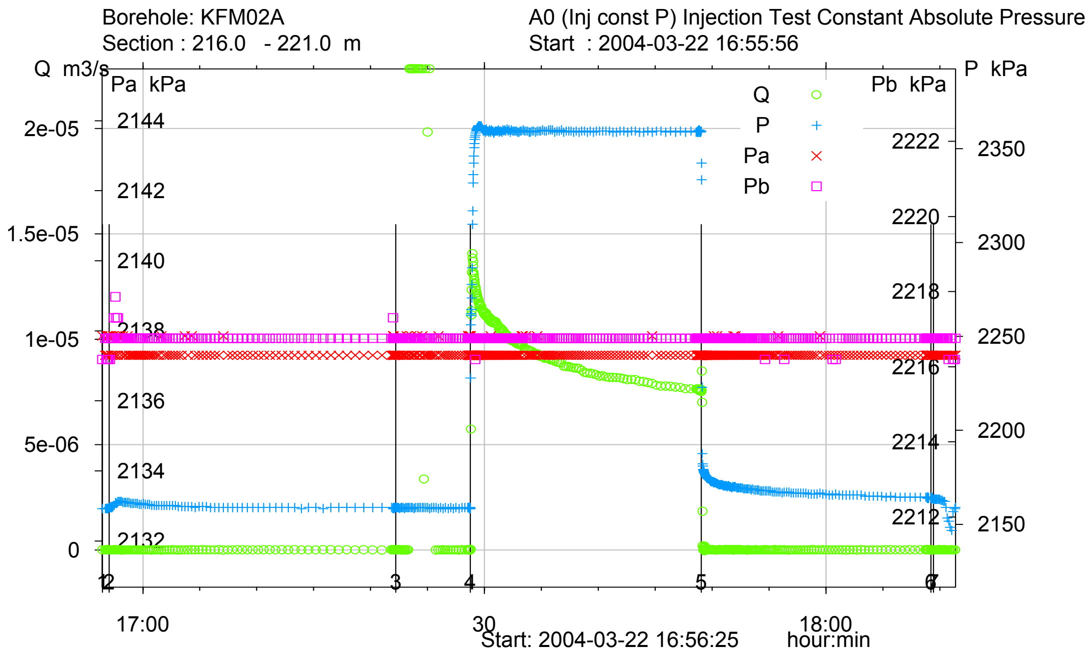



***Figure A3-246.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 216-221 m in borehole KFM02A.*

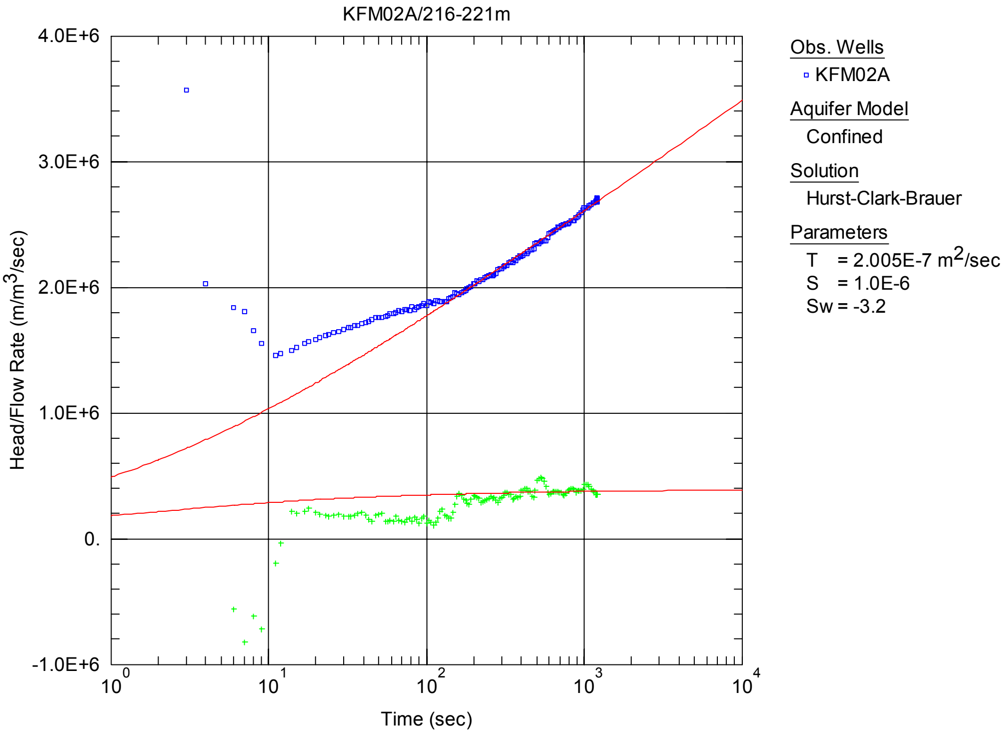



*Figure A3-247. Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 216-221 m in KFM02A.*

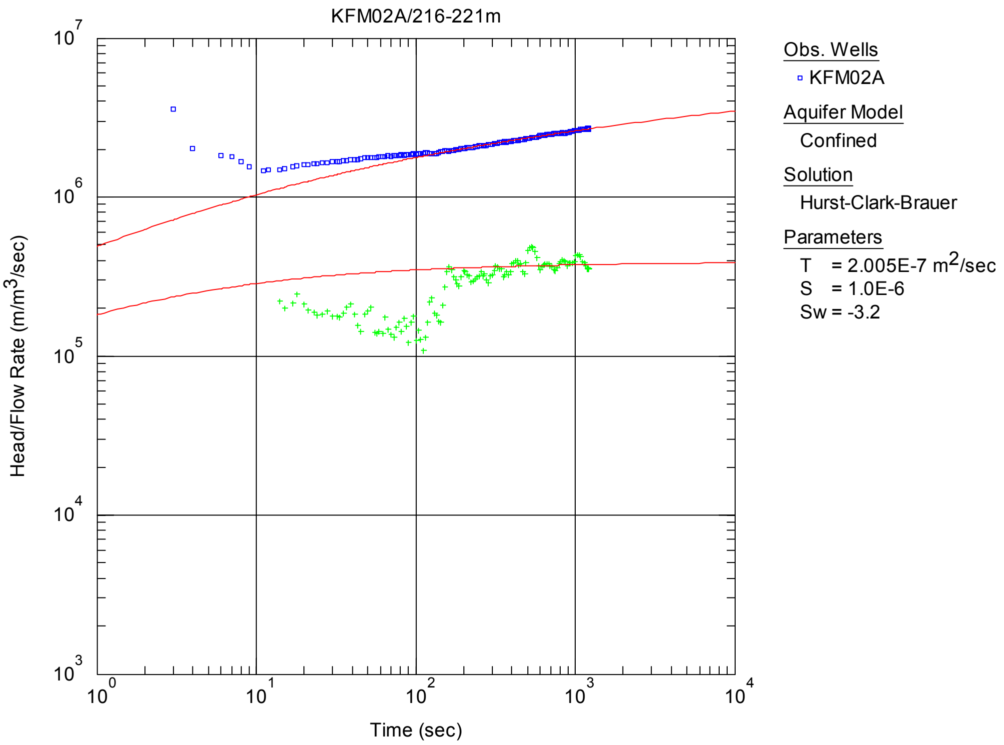



*Figure A3-248. Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 216-221 m in KFM02A.*

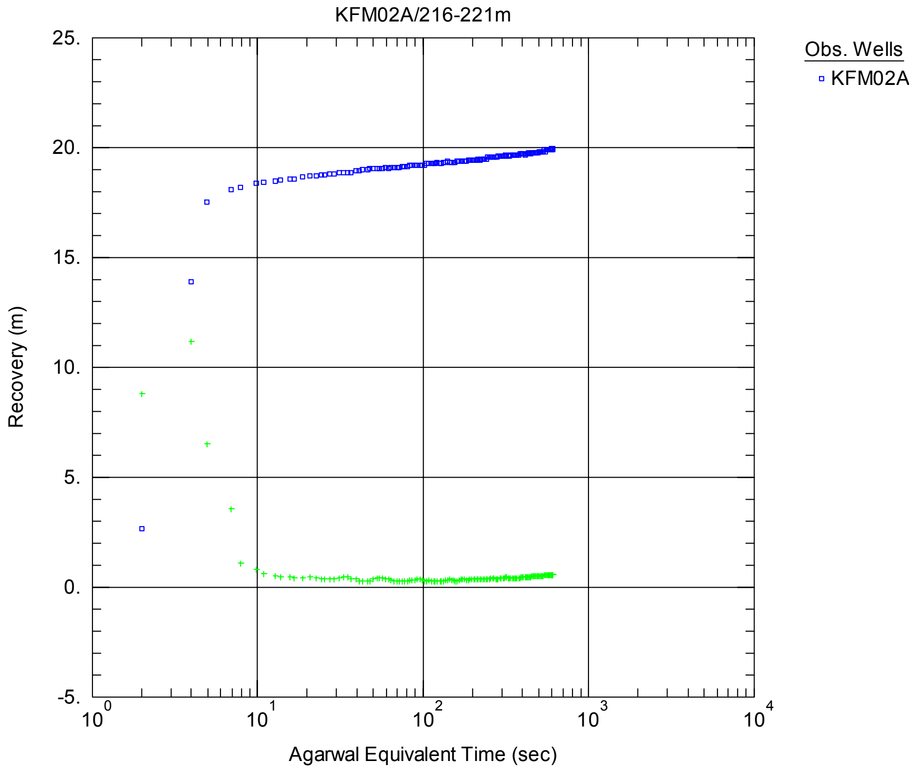



***Figure A3-249.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 216-221 m in KFM02A.*

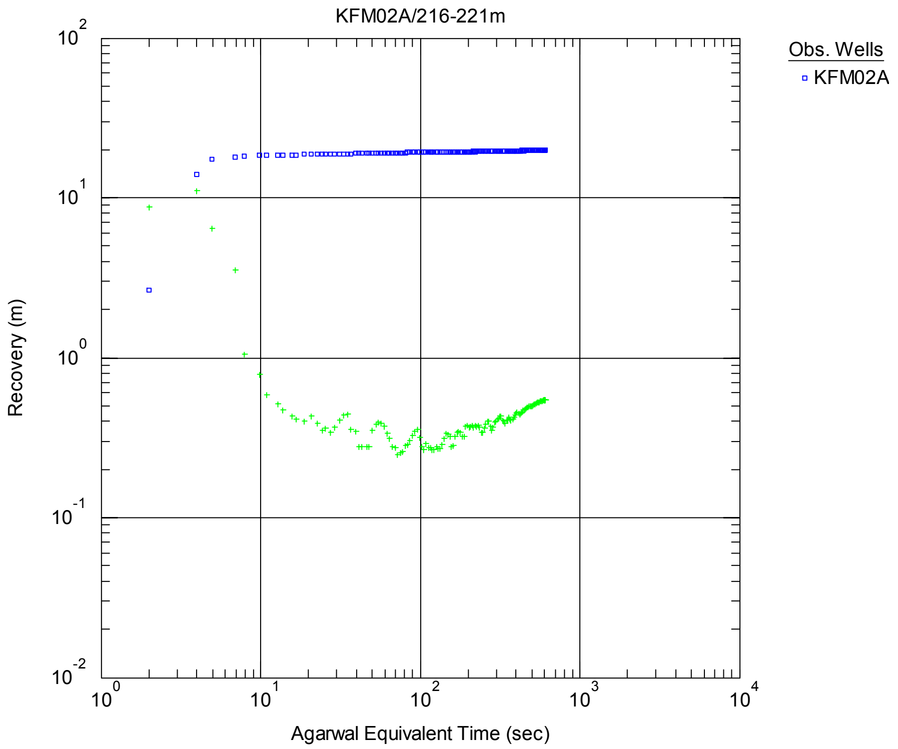



***Figure A3-250.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 216-221 m in KFM02A.*

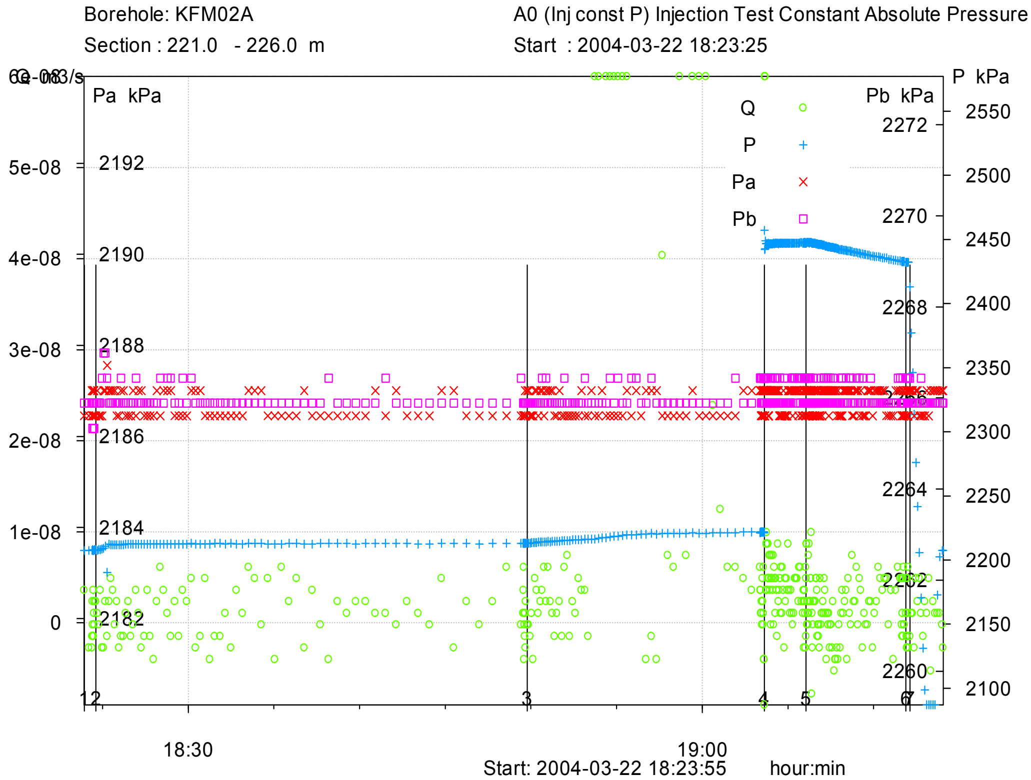



*Figure A3-251. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 221-226 m in borehole KFM02A.*

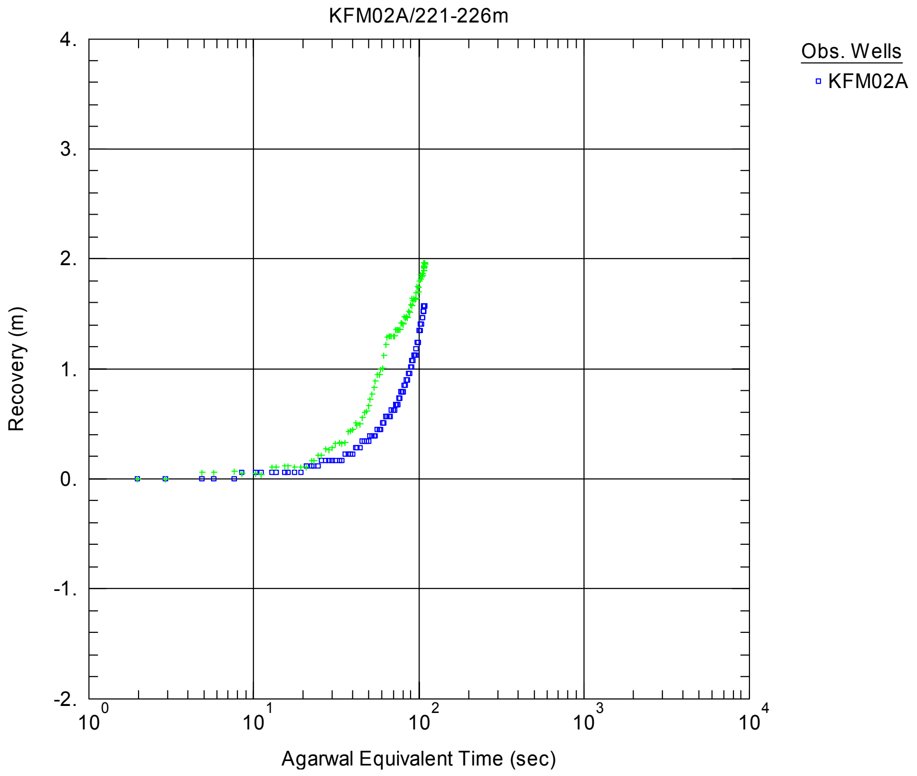



***Figure A3-252.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 221-226 m in KFM02A.*

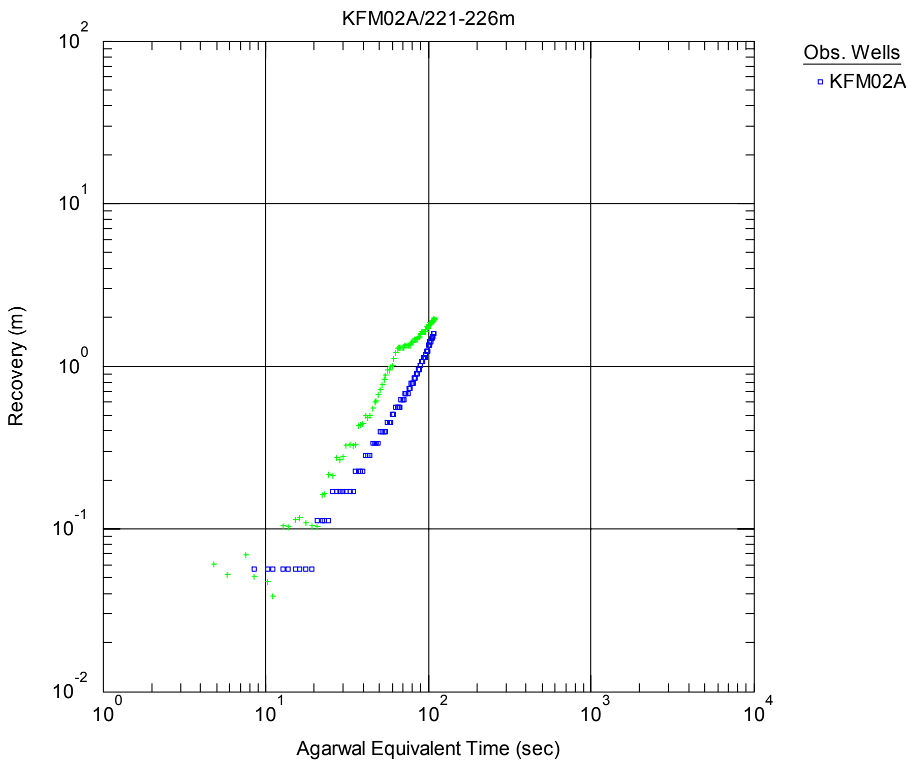



***Figure A3-253.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 221-226 m in KFM02A.*

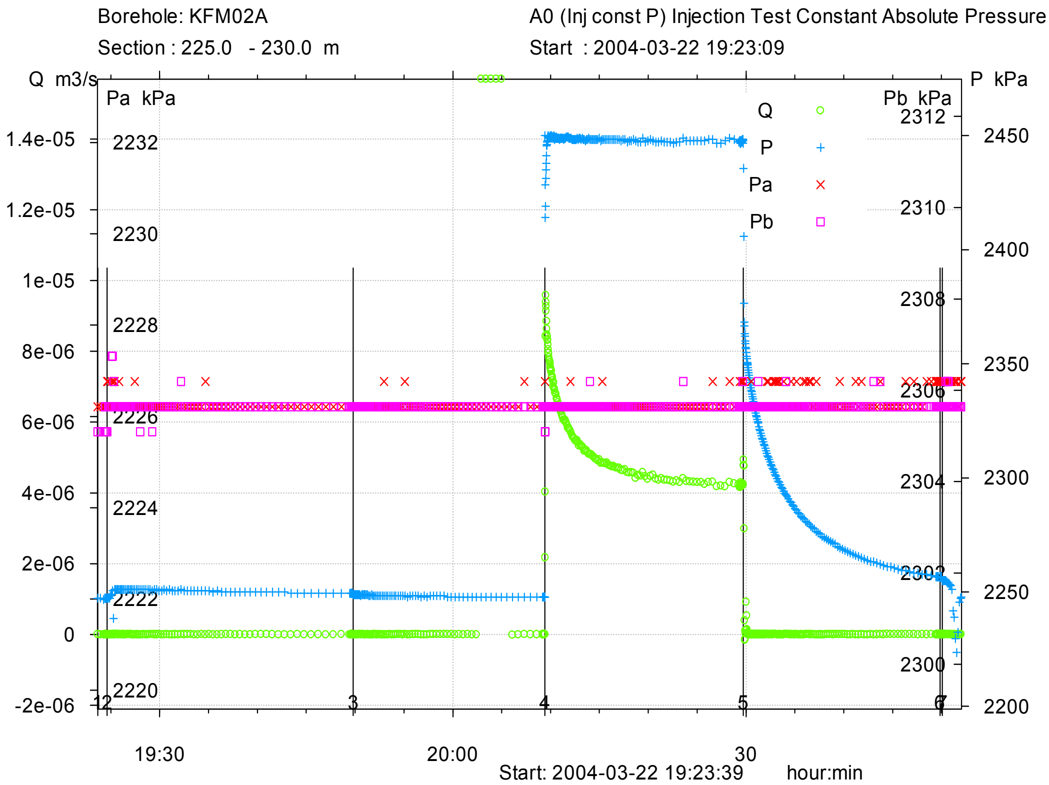



***Figure A3-254.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 225-230 m in borehole KFM02A.*

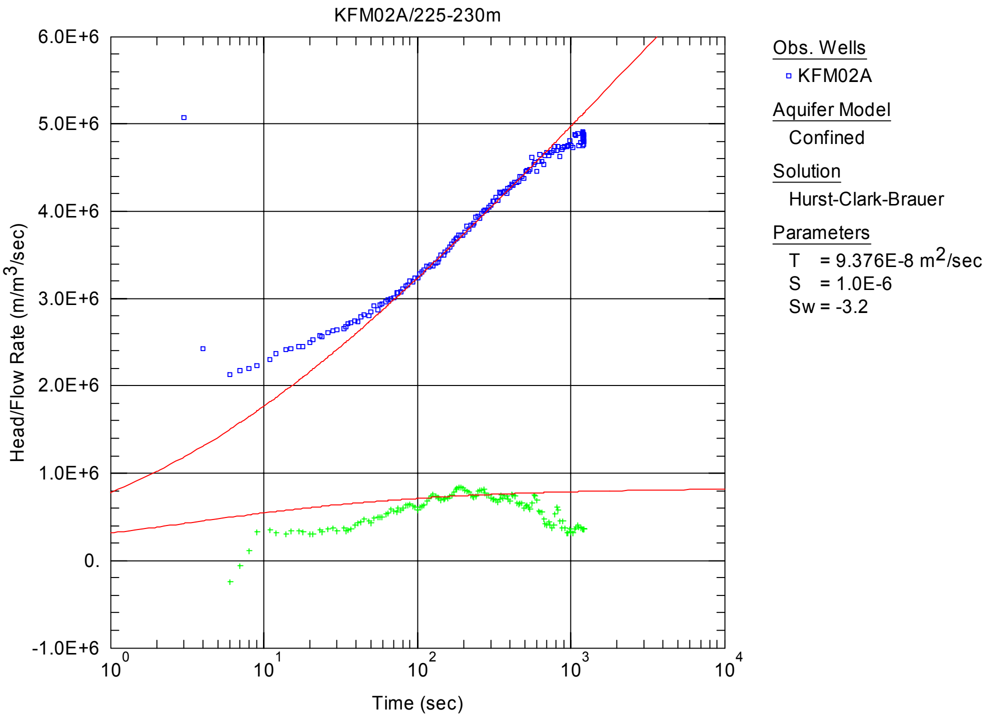



***Figure A3-255.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 225-230 m in KFM02A.*

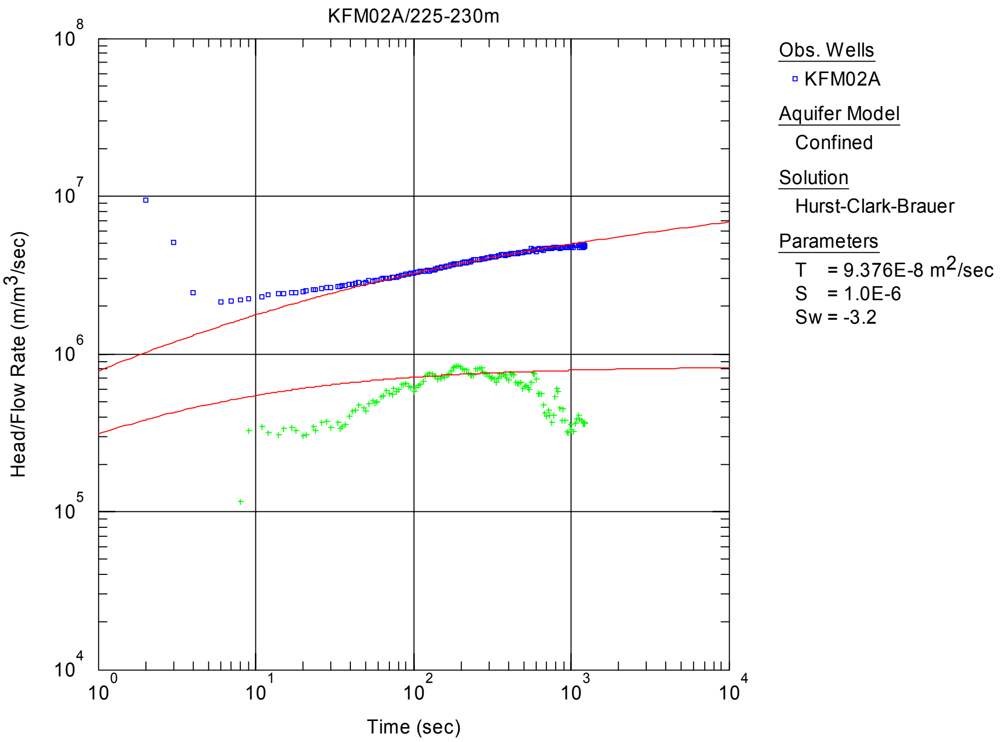



***Figure A3-256.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 225-230 m in KFM02A.*

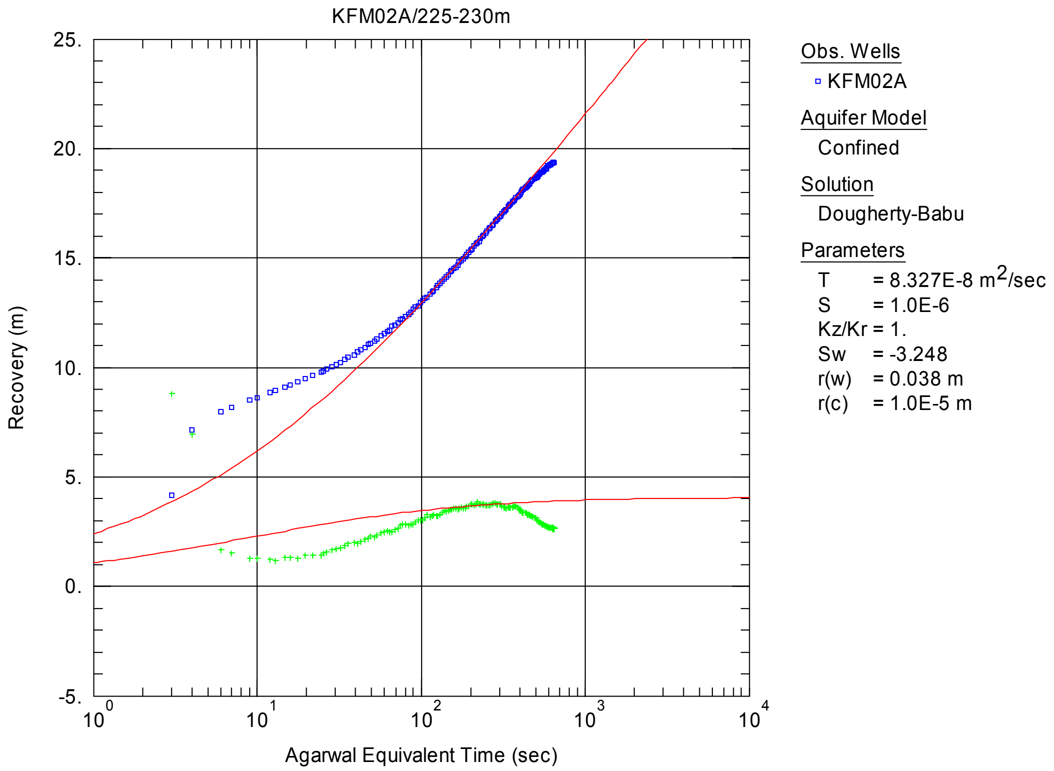



***Figure A3-257.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 225-230 m in KFM02A.*

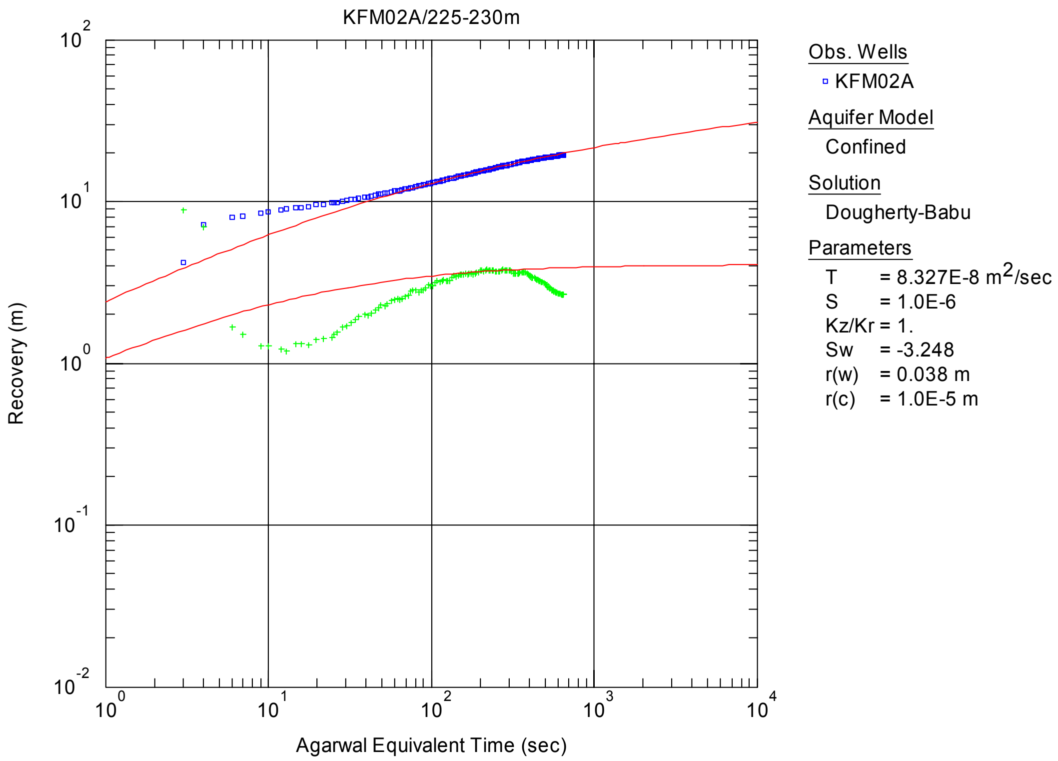



***Figure A3-258.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 225-230 m in KFM02A.*

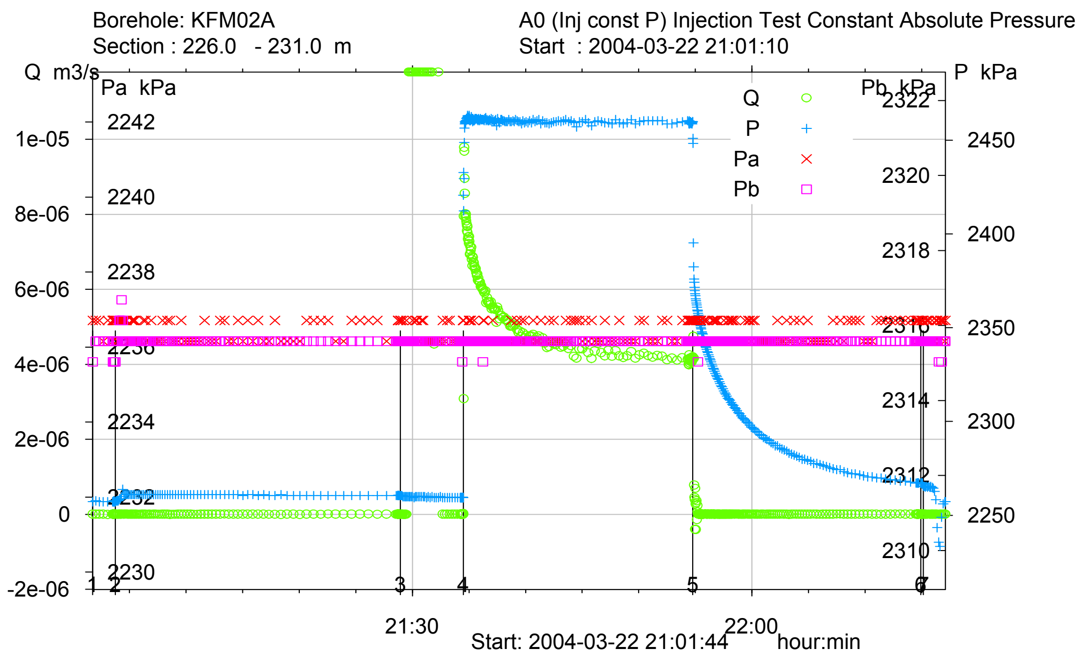



***Figure A3-259.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 226-231 m in borehole KFM02A.*

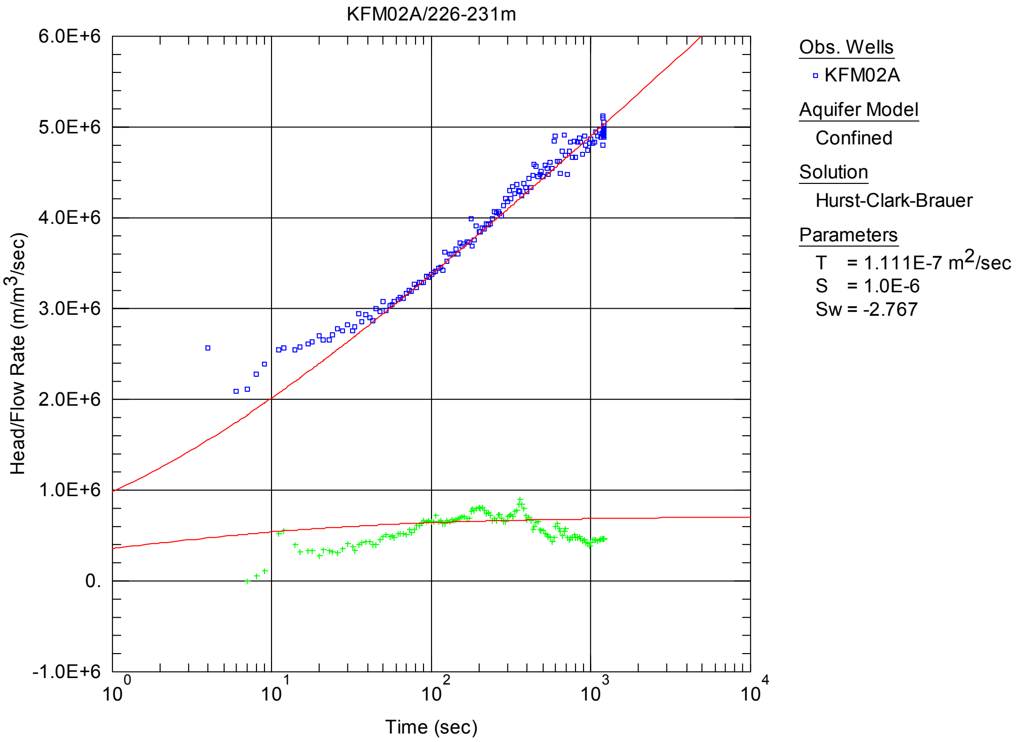



***Figure A3-260.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 226-231 m in KFM02A.*

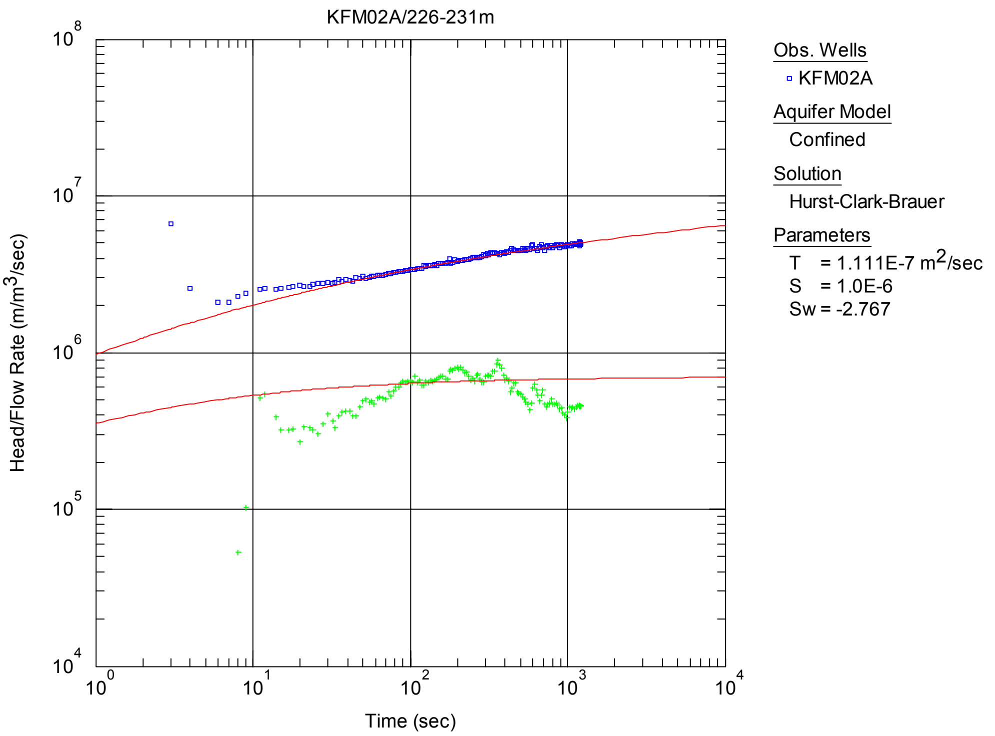



***Figure A3-261.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 226-231 m in KFM02A.*

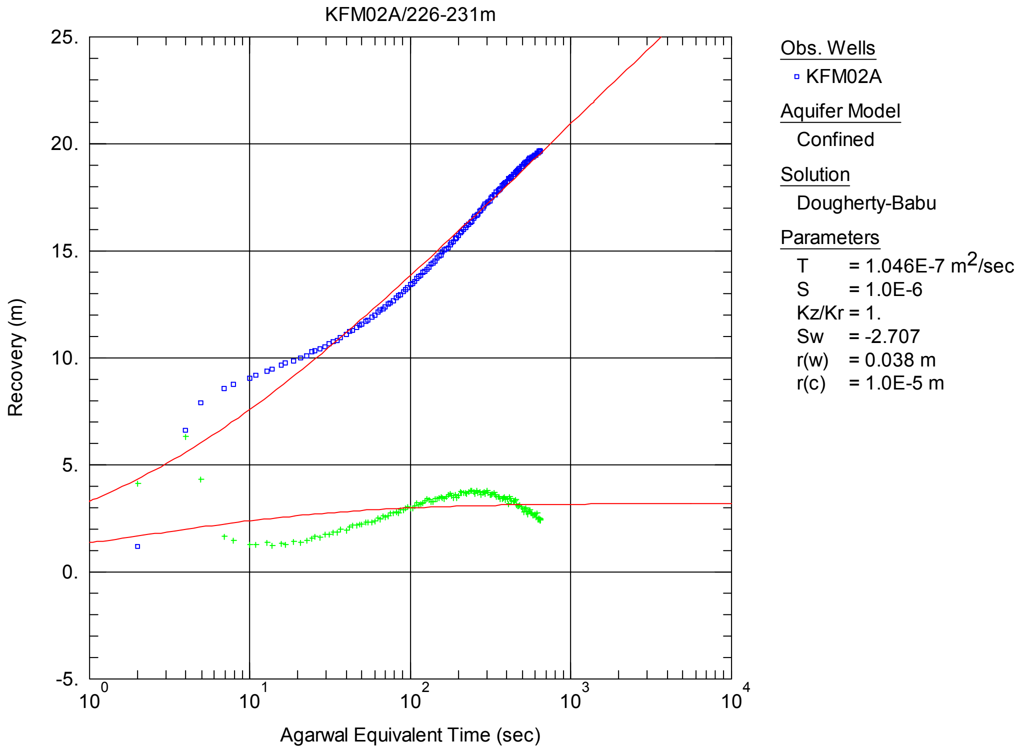



***Figure A3-262.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 226-231 m in KFM02A.*

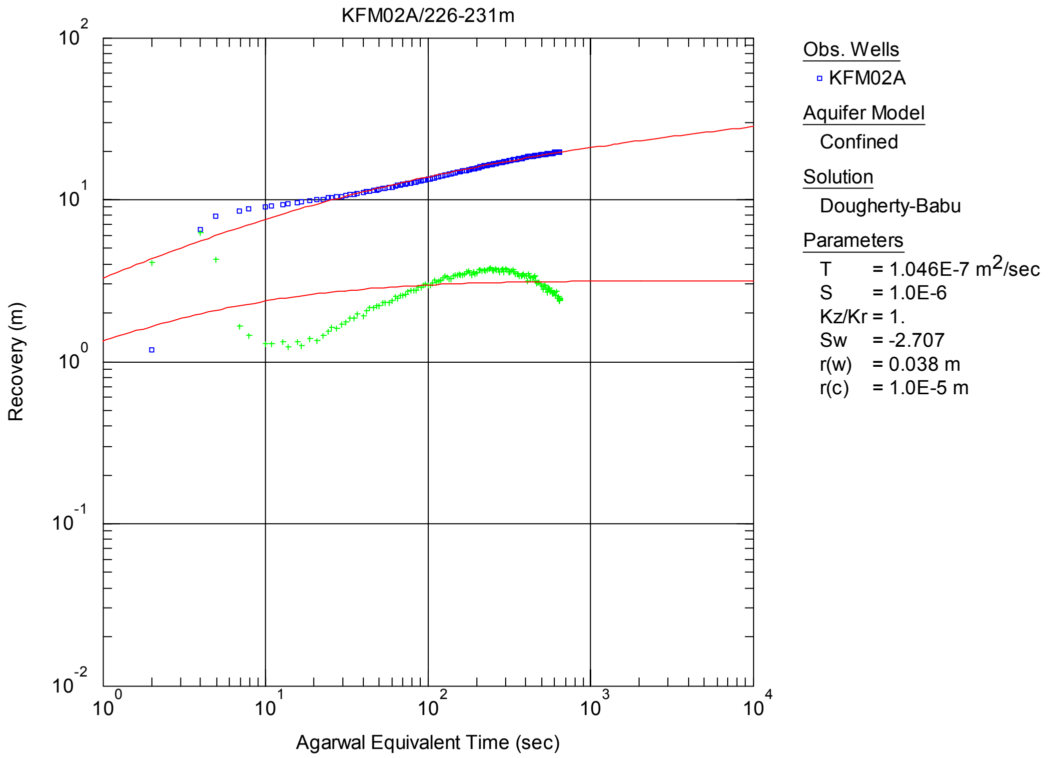



***Figure A3-263.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 226-231 m in KFM02A.*

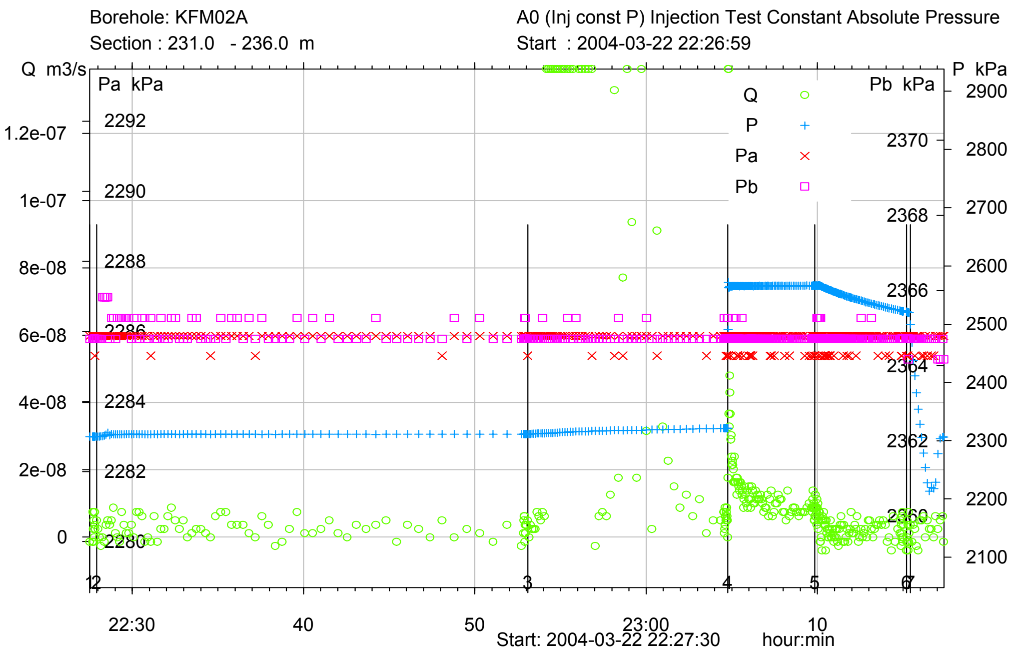



***Figure A3-264.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 231-236 m in borehole KFM02A.*

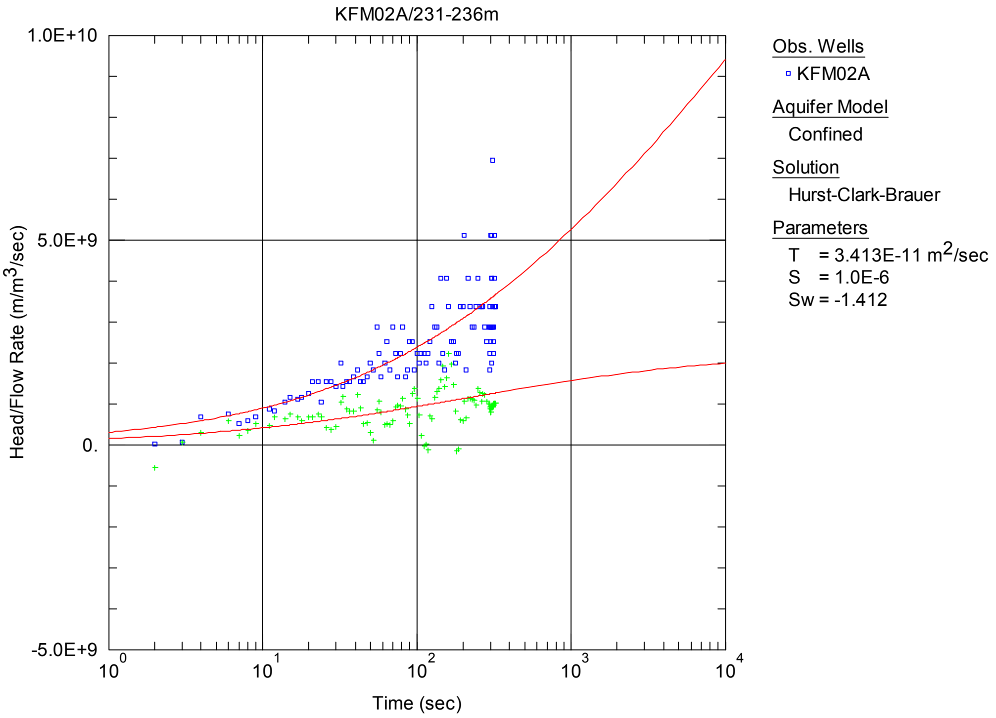



***Figure A3-265.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 231-236 m in KFM02A.*

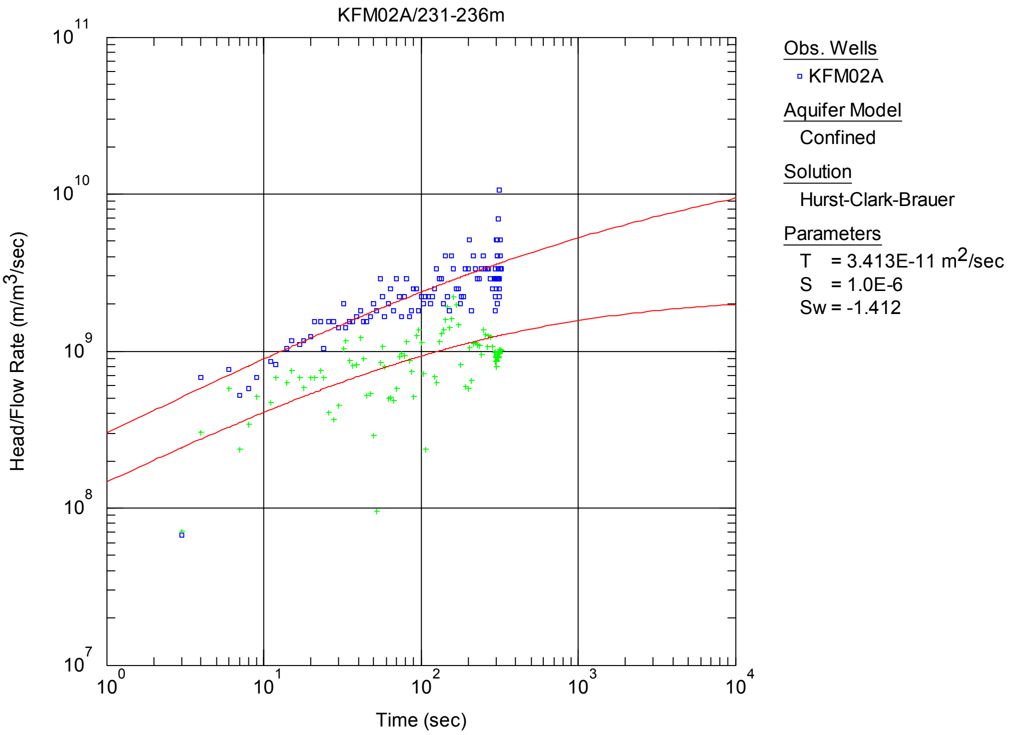



***Figure A3-266.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 231-236 m in KFM02A.*

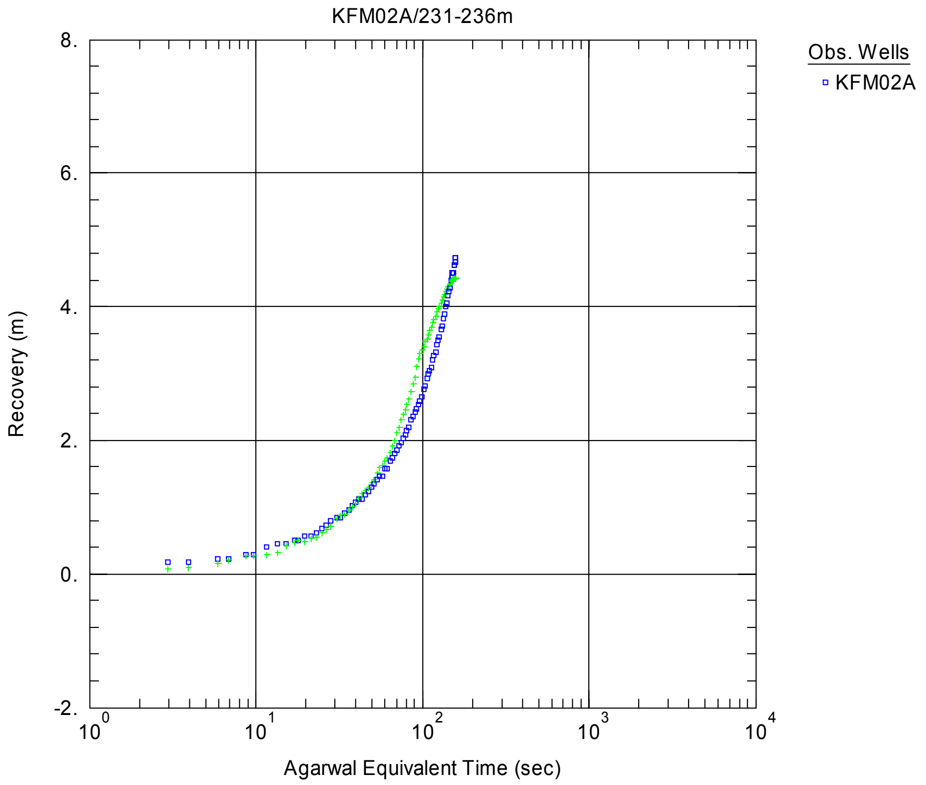



*Figure A3-267. Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 231-236 m in KFM02A.*

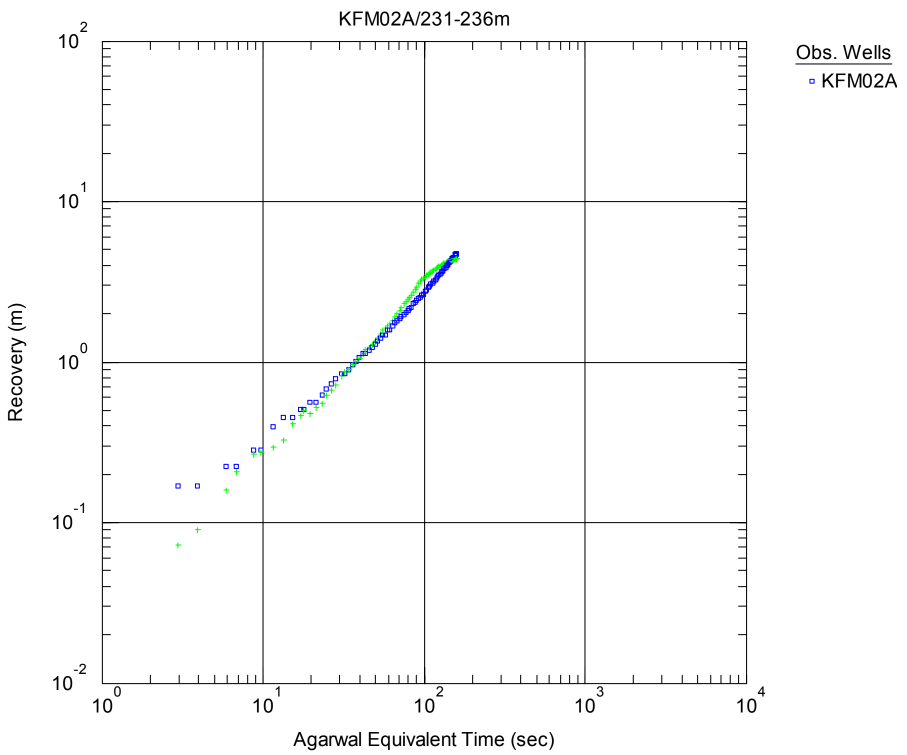



*Figure A3-268. Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 231-236 m in KFM02A.*

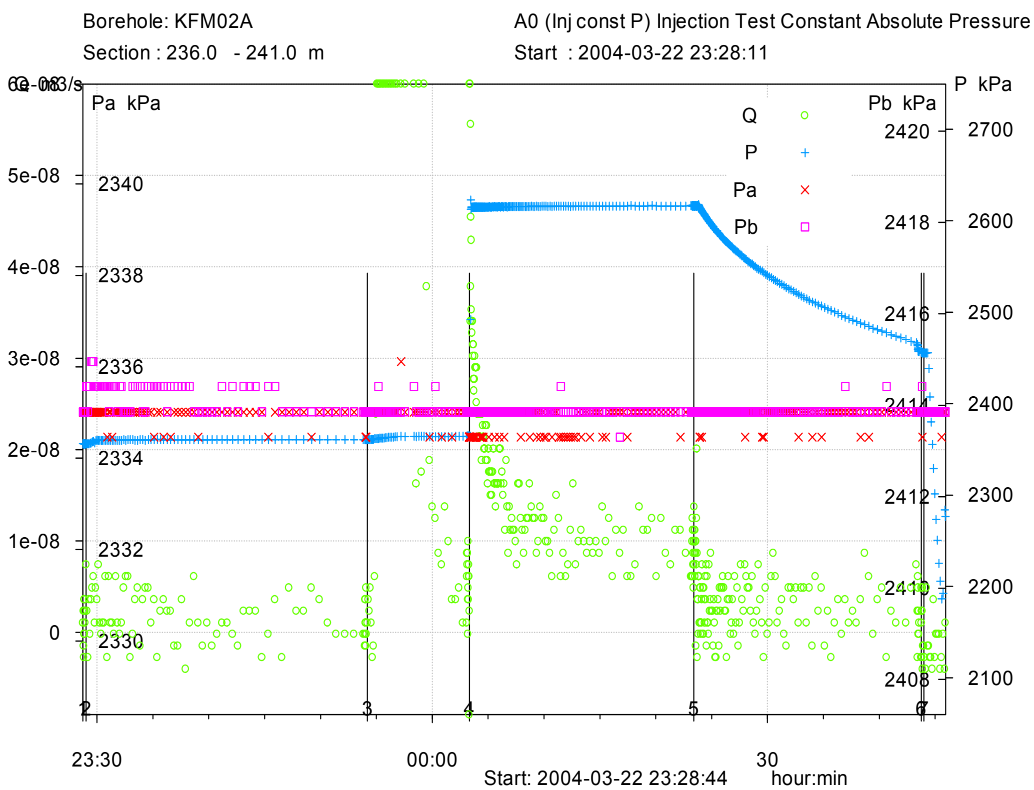



***Figure A3-269.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 236-241 m in borehole KFM02A.*

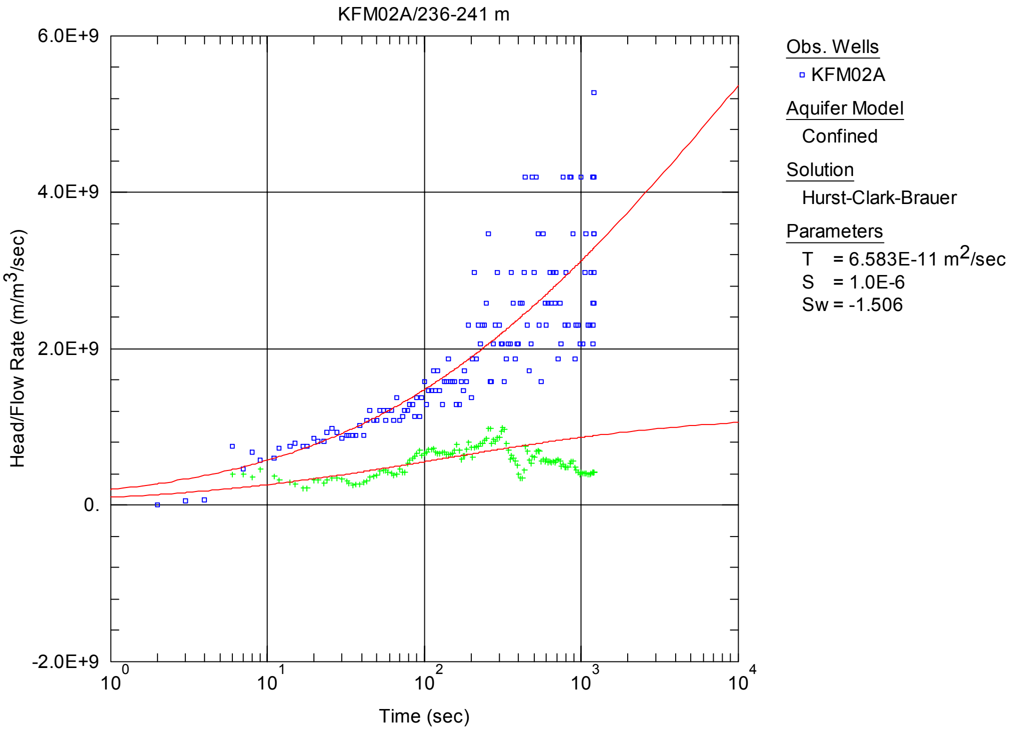



***Figure A3-270.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 236-241 m in KFM02A.*

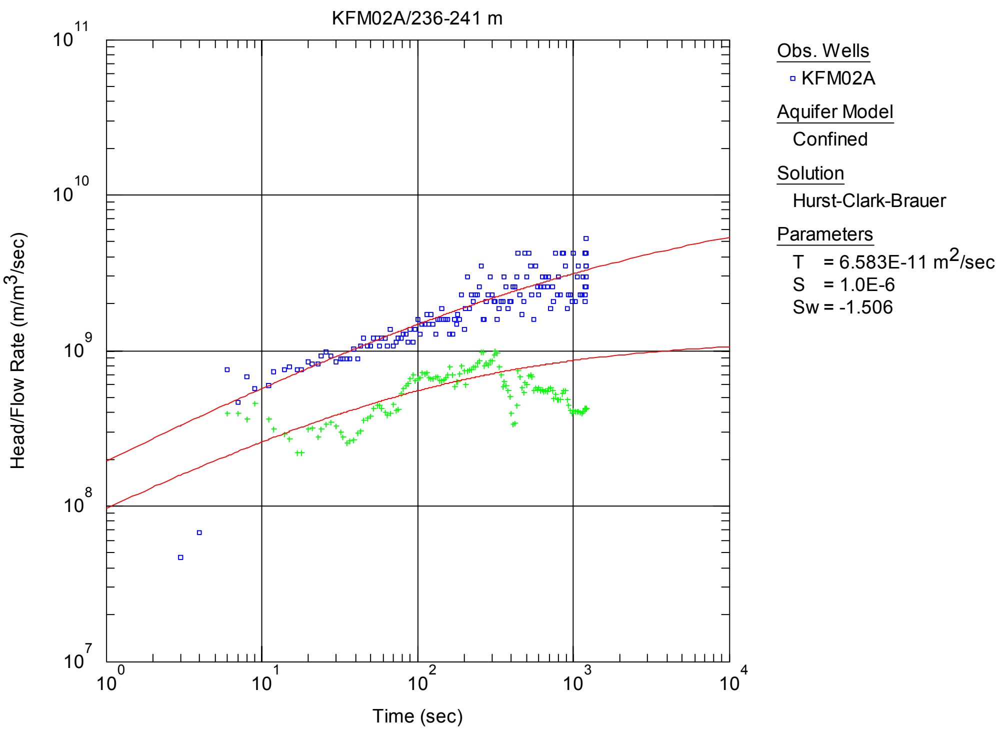



***Figure A3-271.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 236-241 m in KFM02A.*

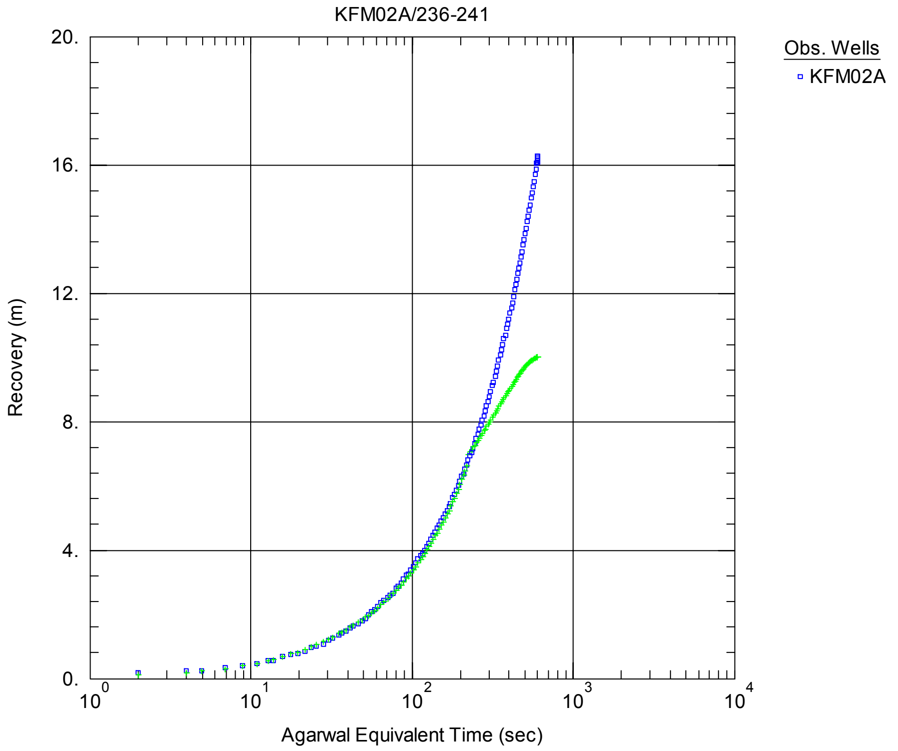



***Figure A3-272.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 236-241 m in KFM02A.*

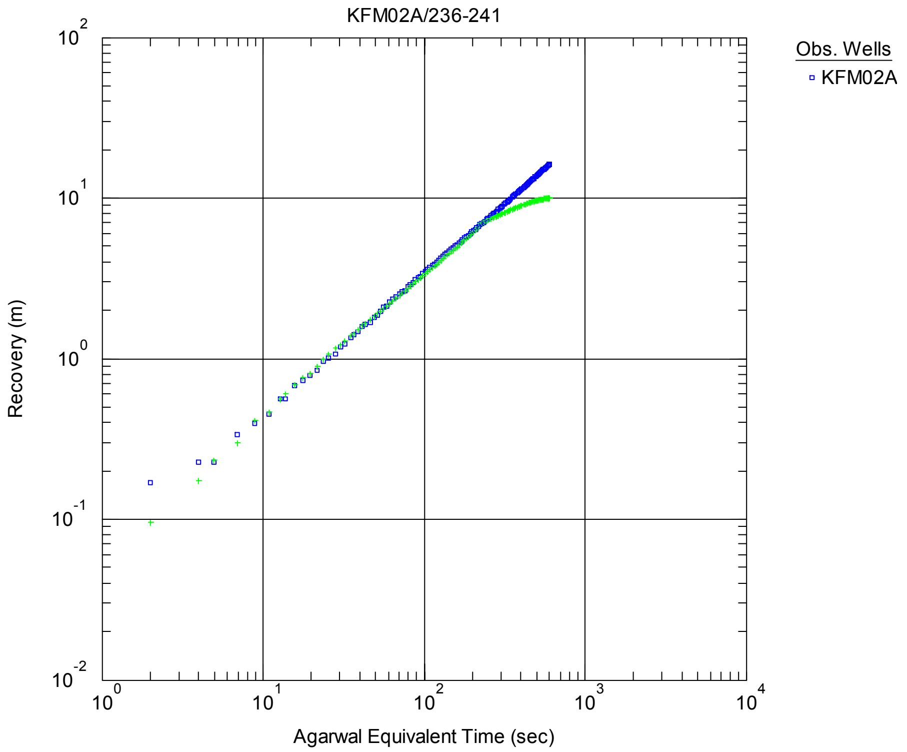



***Figure A3-273.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 236-241 m in KFM02A.*

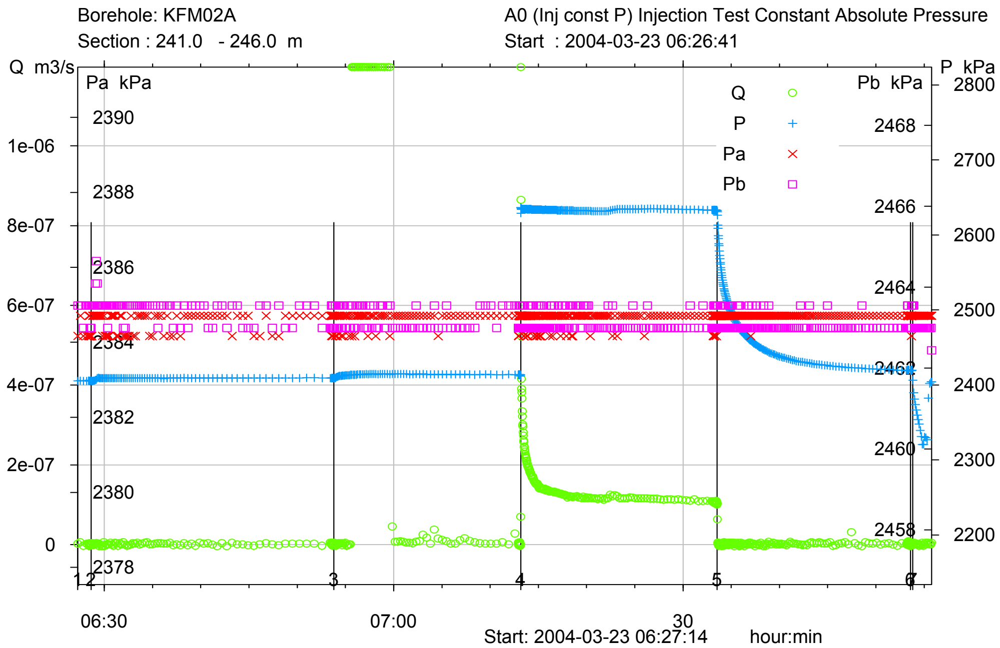



***Figure A3-274.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 241-246 m in borehole KFM02A.*

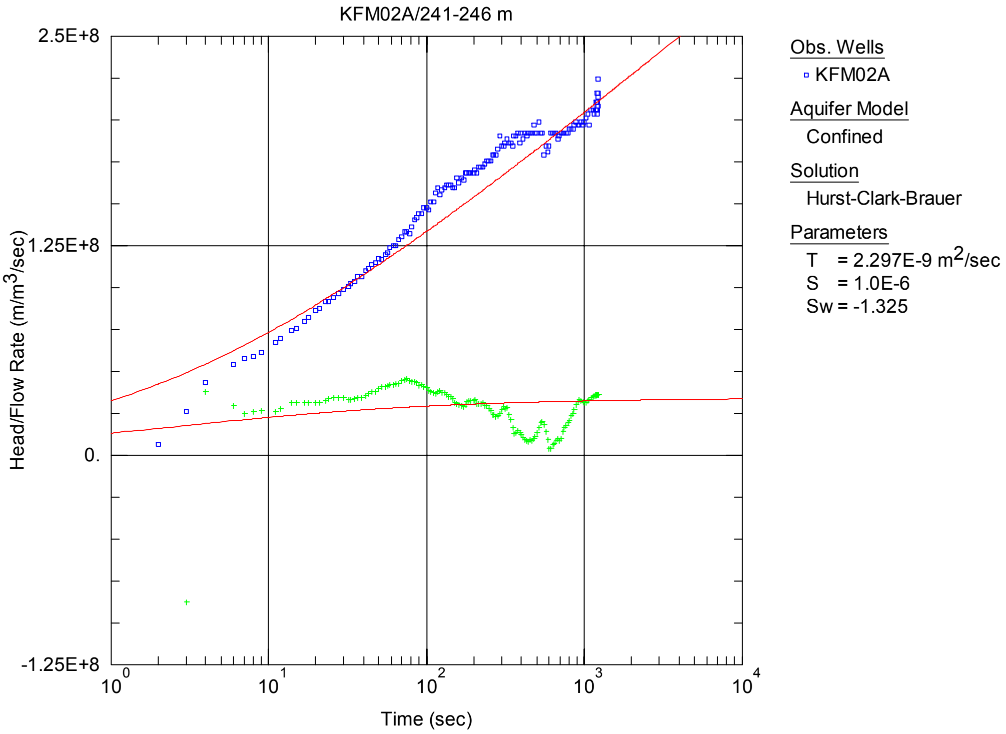



*Figure A3-275.* Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 241-246 m in KFM02A.

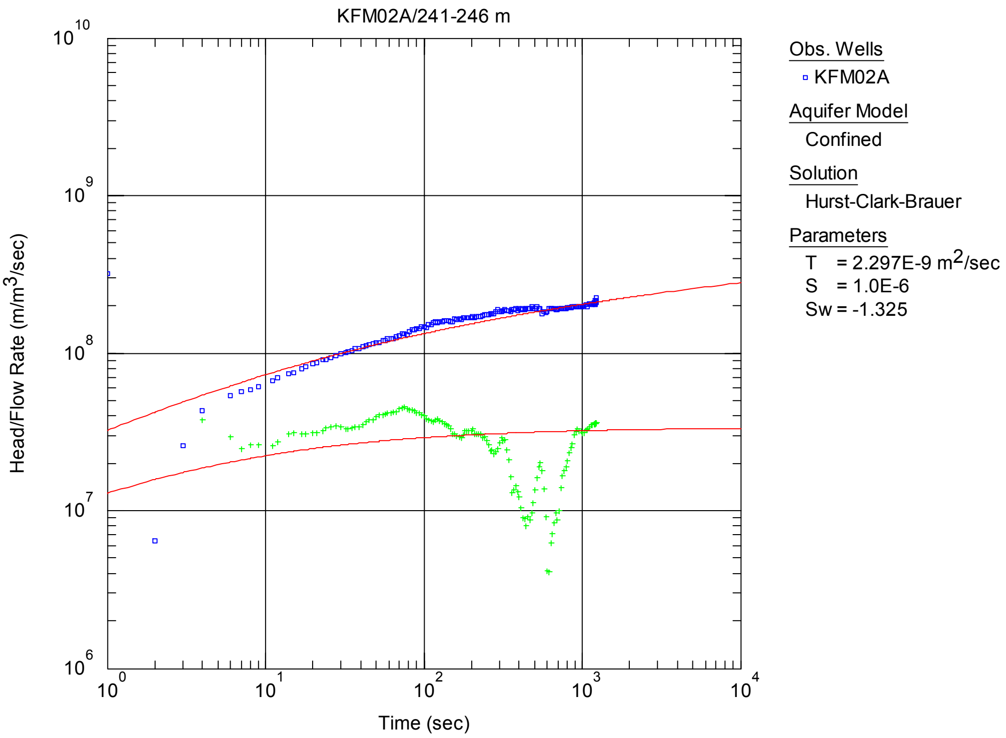



*Figure A3-276.* Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 241-246 m in KFM02A.

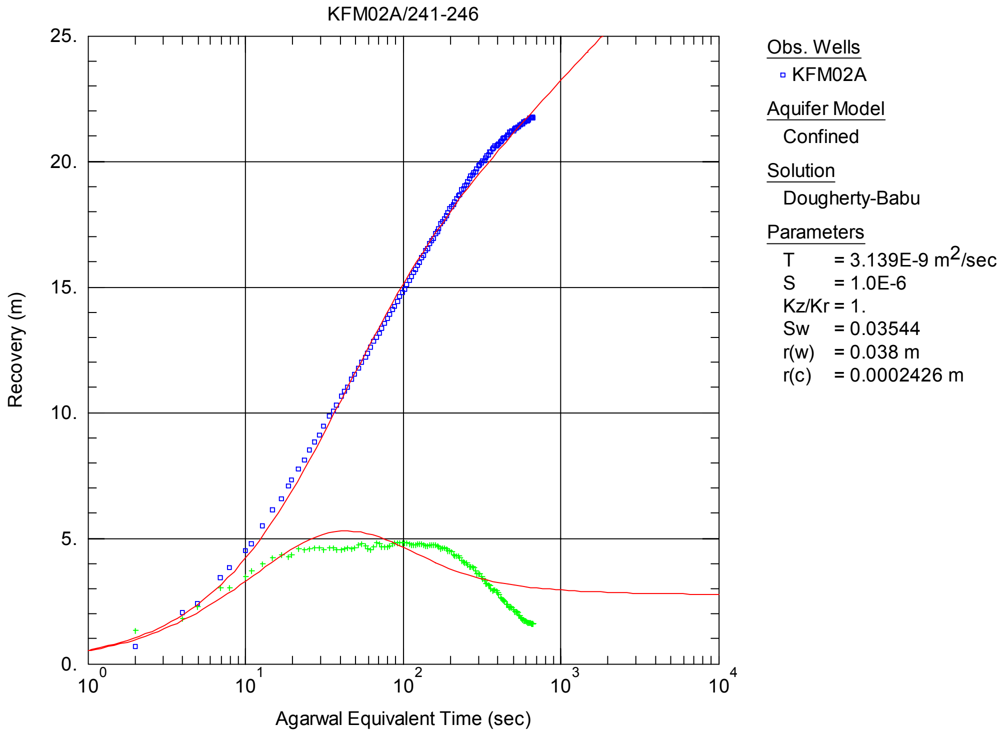



***Figure A3-277.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 241-246 m in KFM02A.*

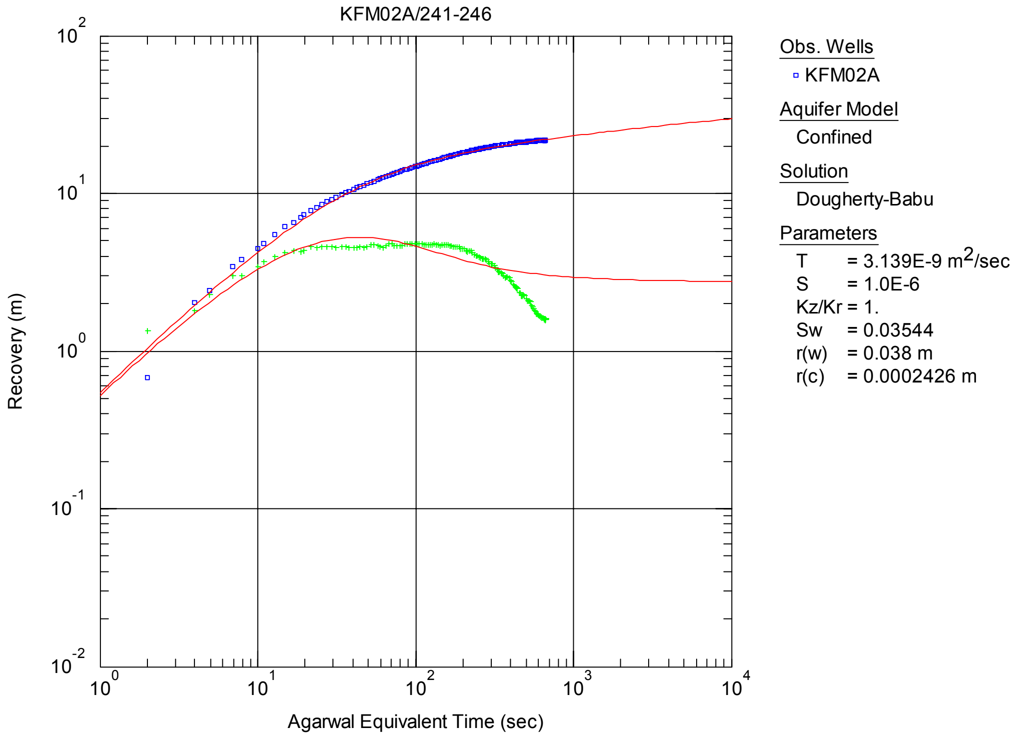



***Figure A3-278.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 241-246 m in KFM02A.*

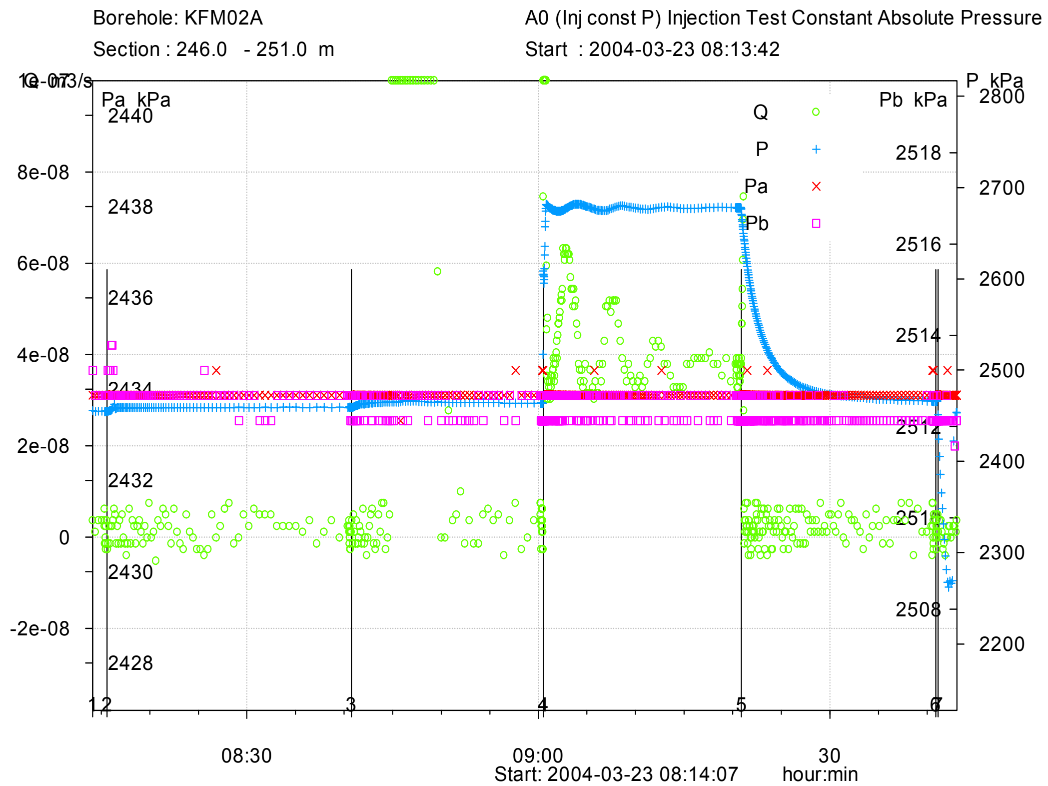



*__Figure A3-279.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 246-251 m in borehole KFM02A.*

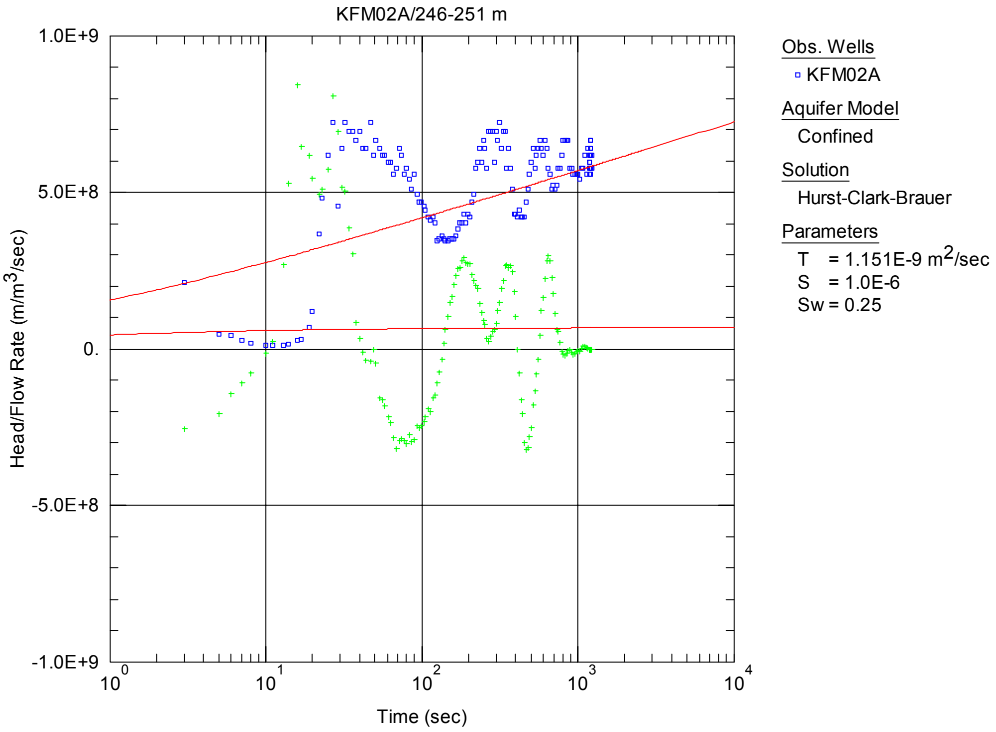



***Figure A3-280.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 246-251 m in KFM02A.*

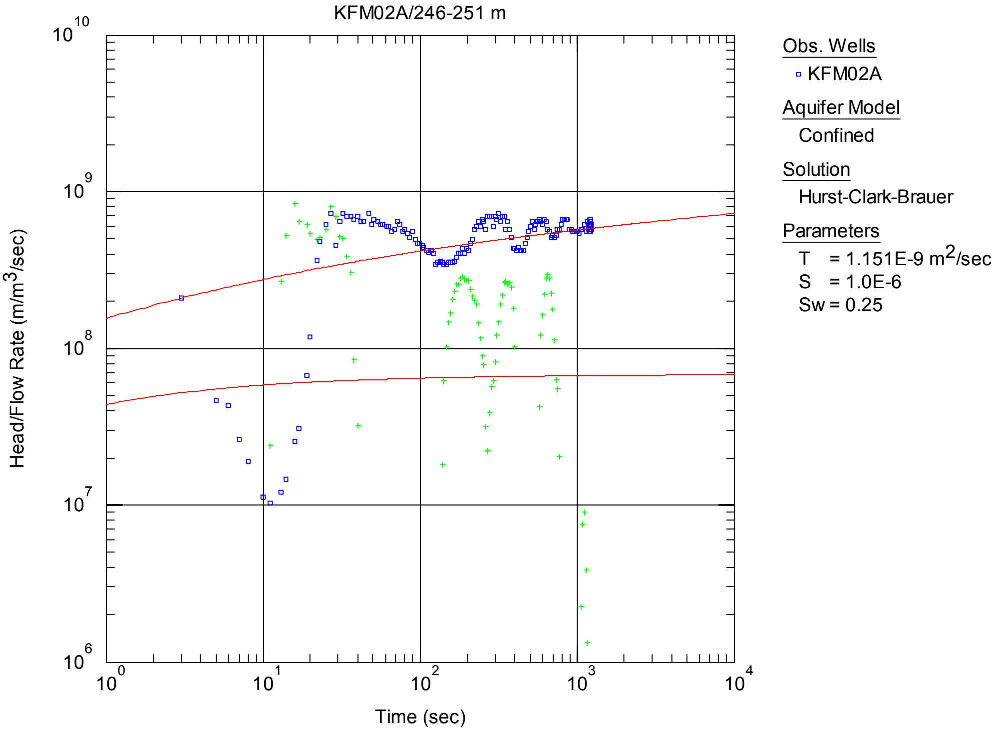



***Figure A3-281.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 246-251 m in KFM02A.*

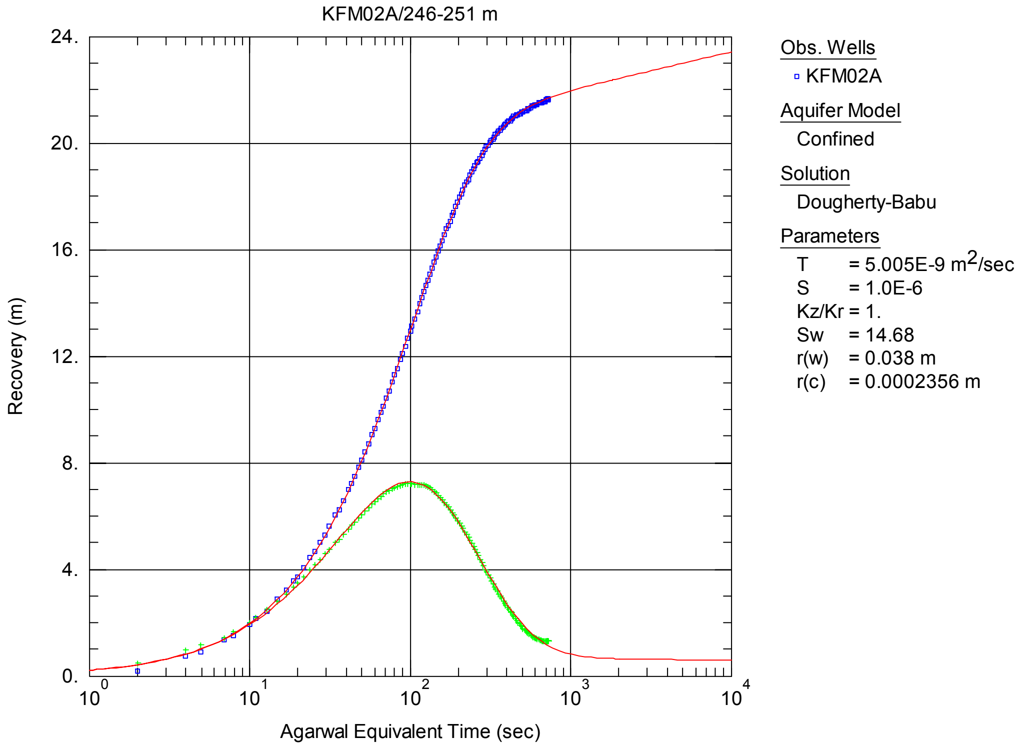



***Figure A3-282.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 246-251 m in KFM02A.*

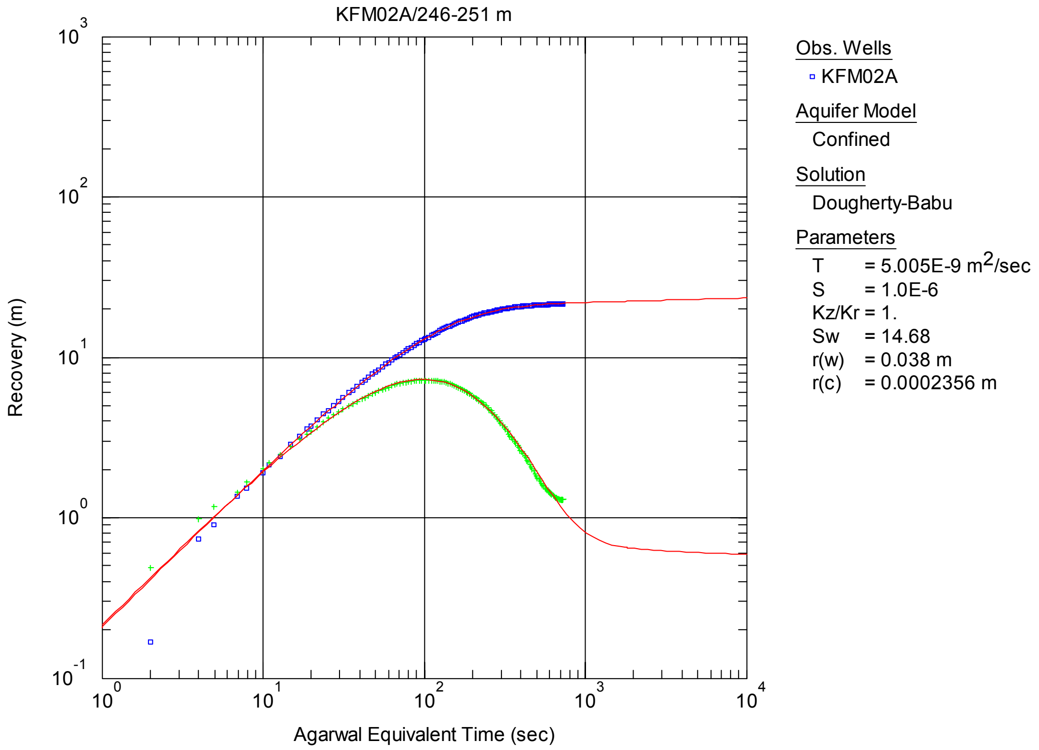



***Figure A3-283.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 246-251 m in KFM02A.*

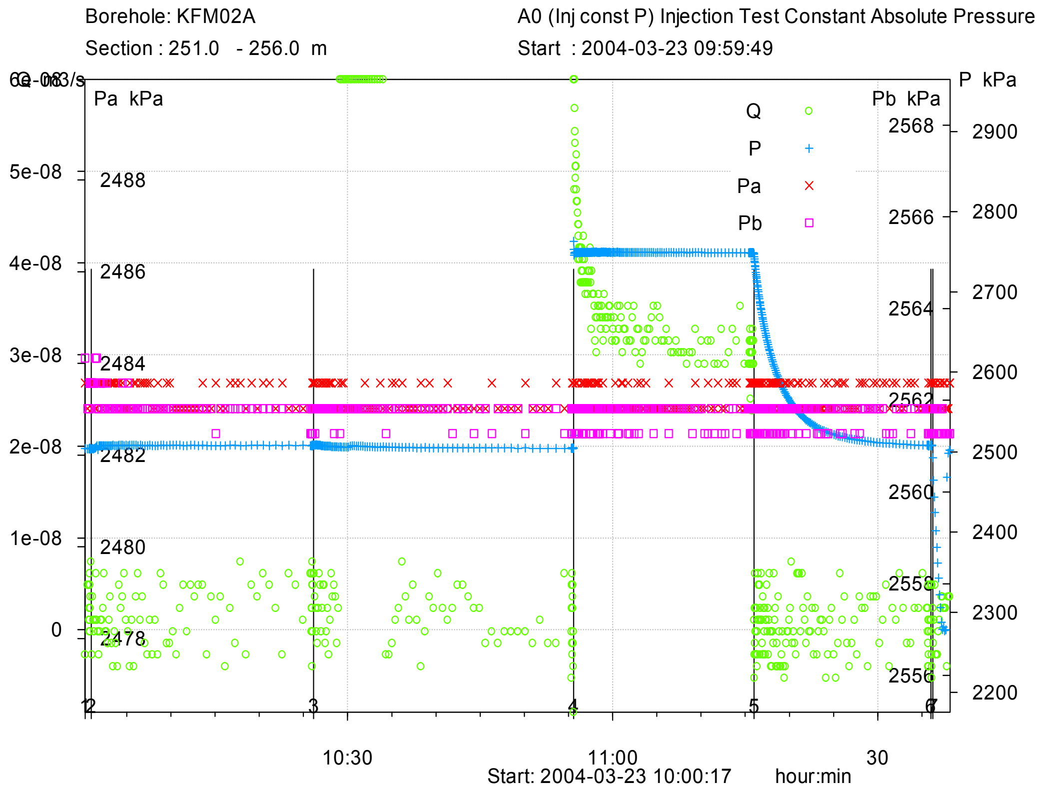



*__Figure A3-284.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 251-256 m in borehole KFM02A.*

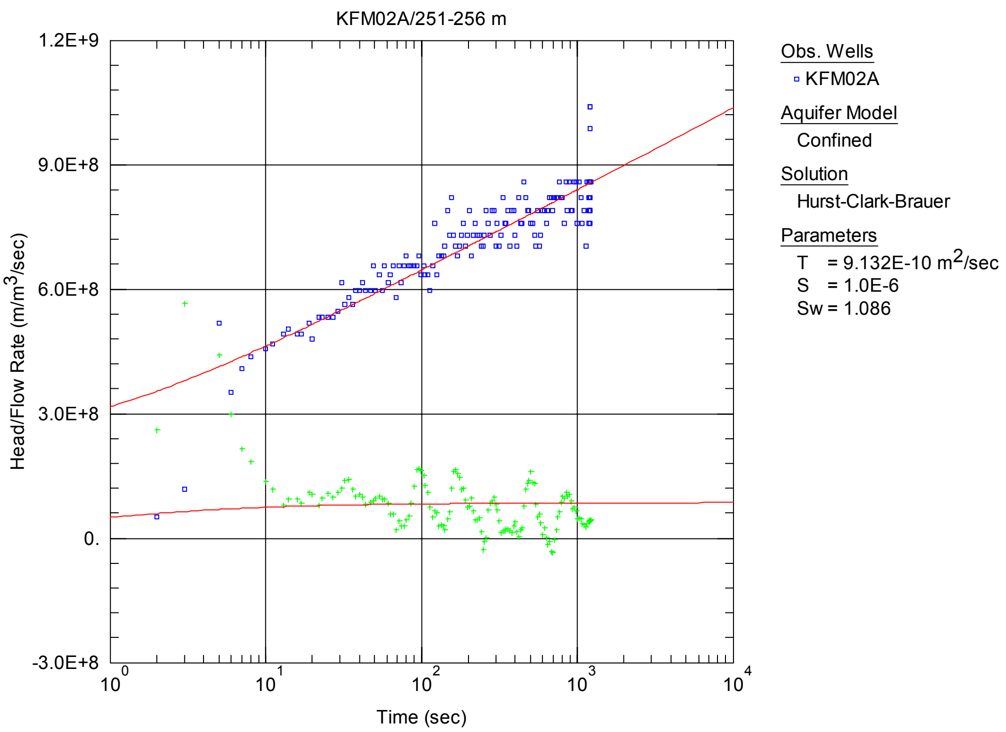



***Figure A3-285.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 251-256 m in KFM02A.*

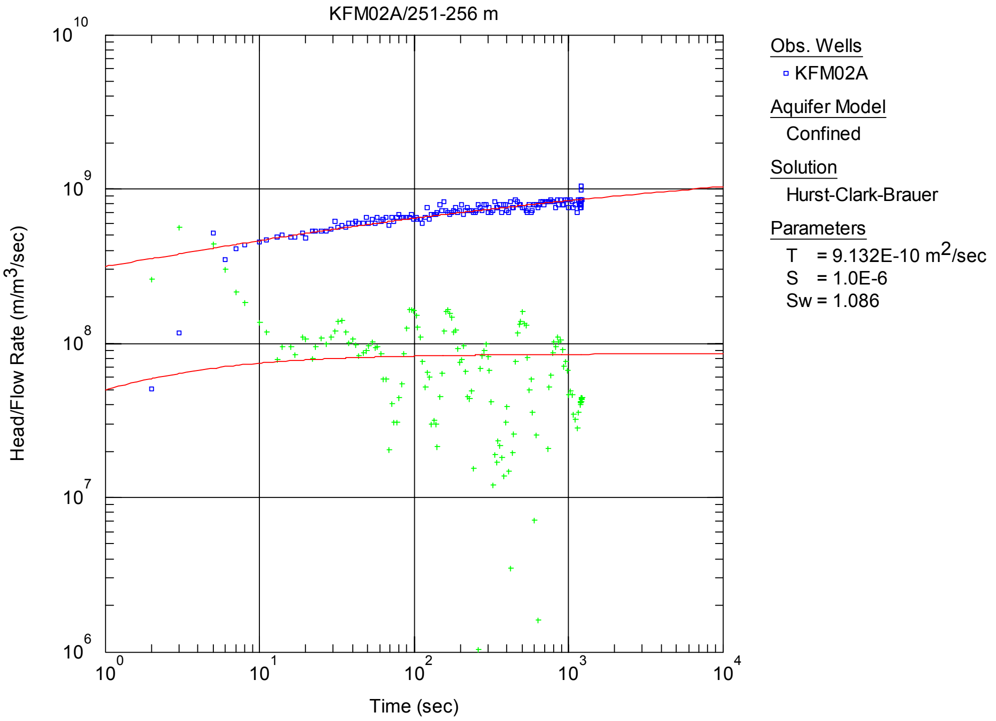



***Figure A3-286.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 251-256 m in KFM02A.*

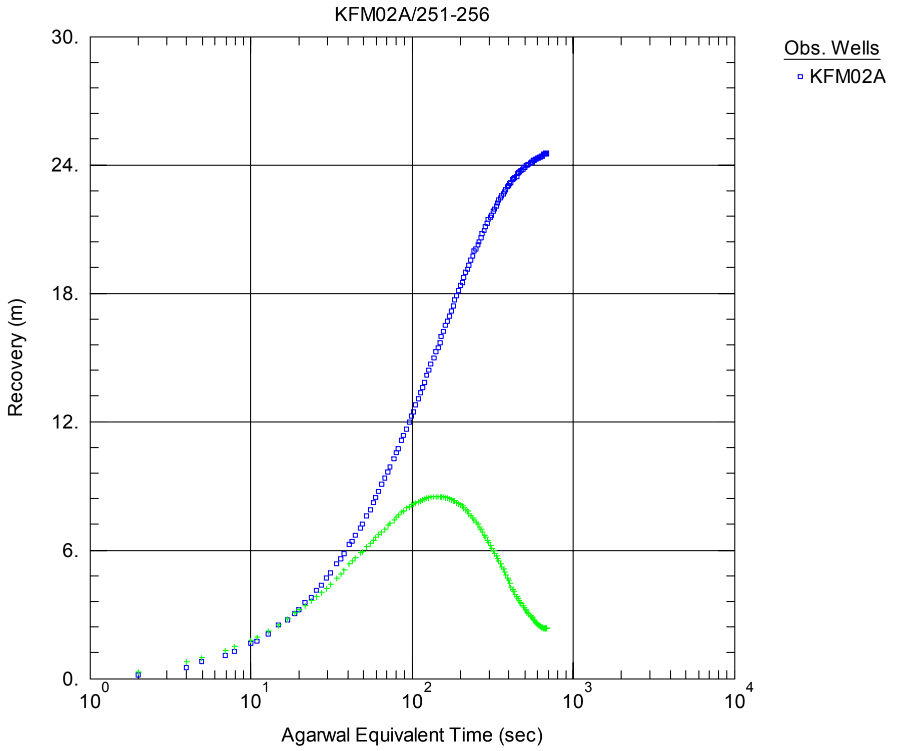



*__Figure A3-287.__ Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 251-256 m in KFM02A.*

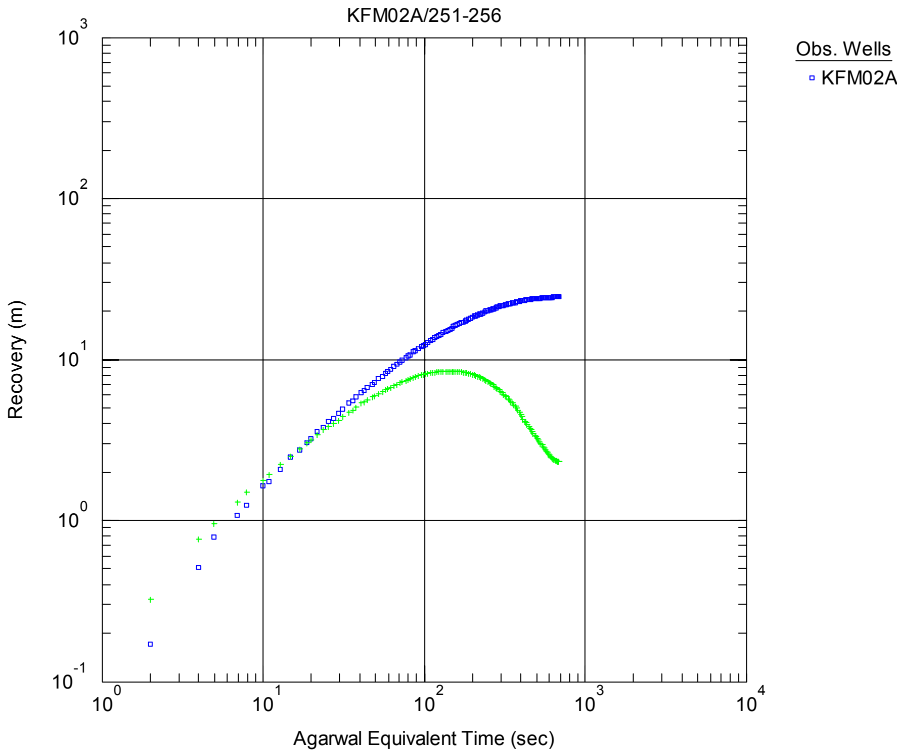



*__Figure A3-288.__ Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 251-256 m in KFM02A.*

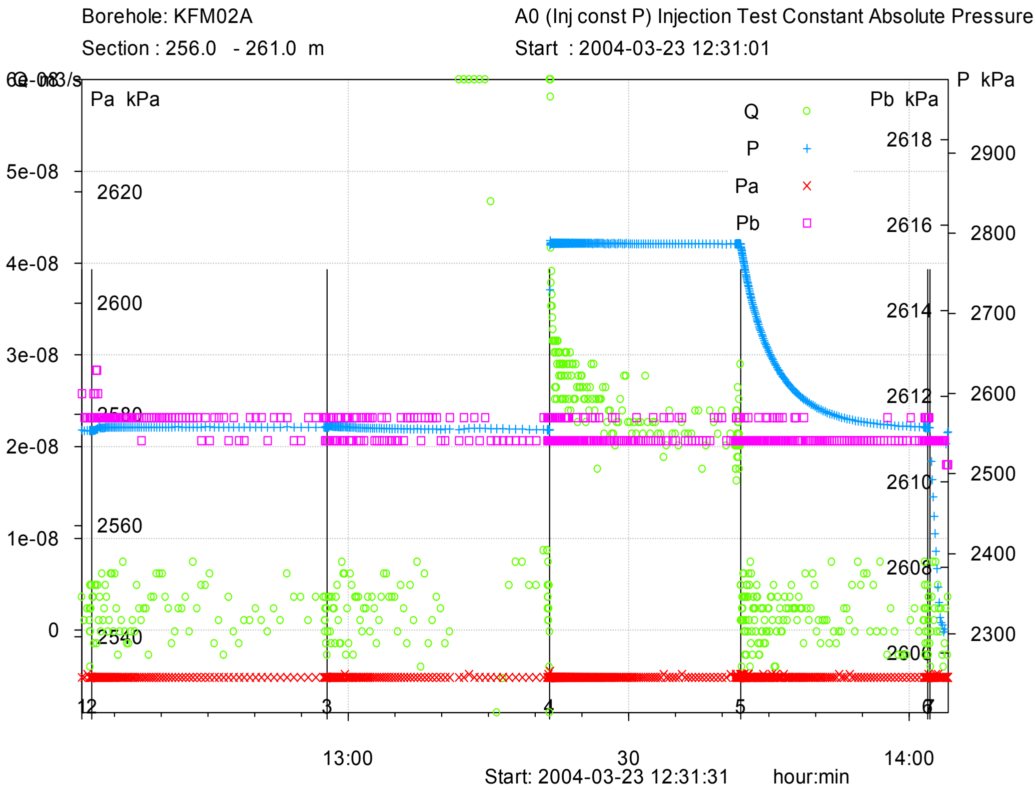



*Figure A3-289.* *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 256-261 m in borehole KFM02A.*

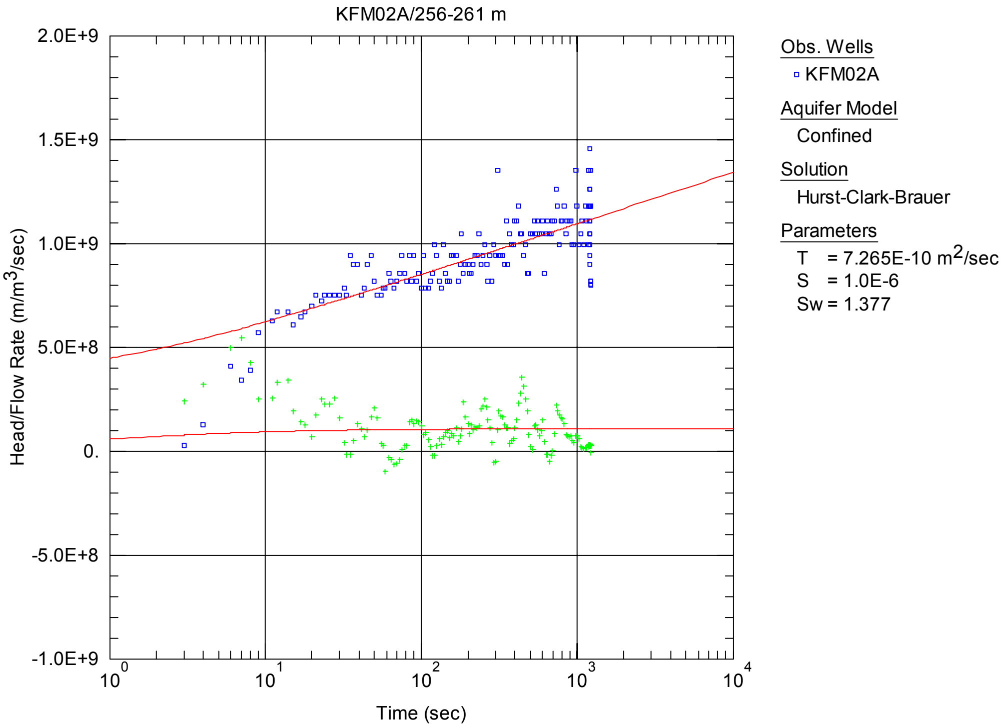



***Figure A3-290.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 256-261 m in KFM02A.*

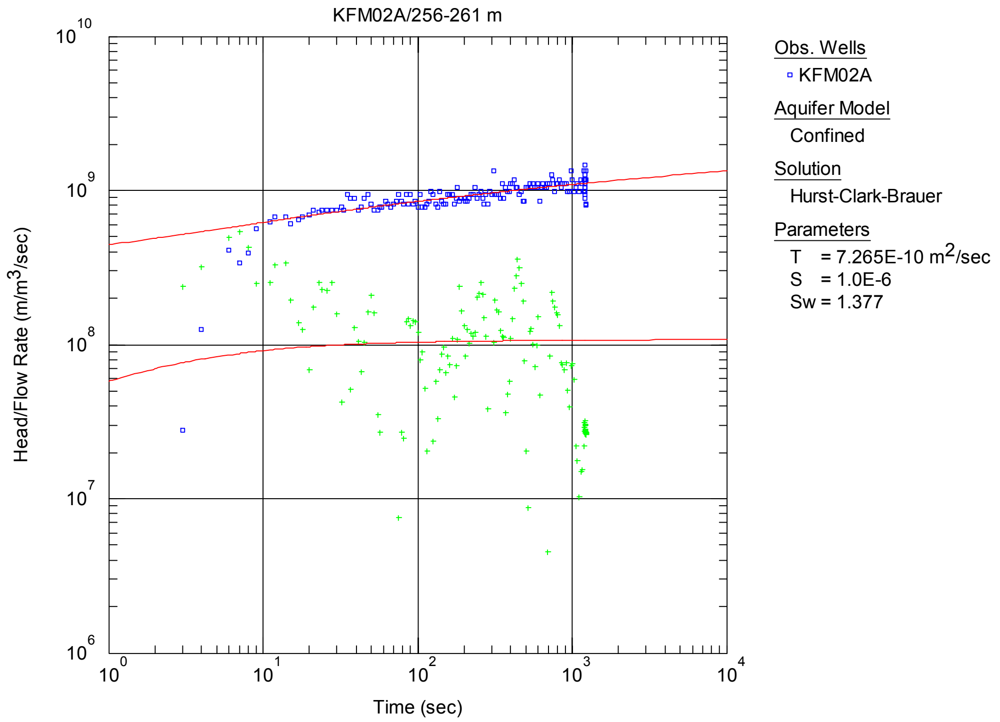



***Figure A3-291.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 256-261 m in KFM02A.*

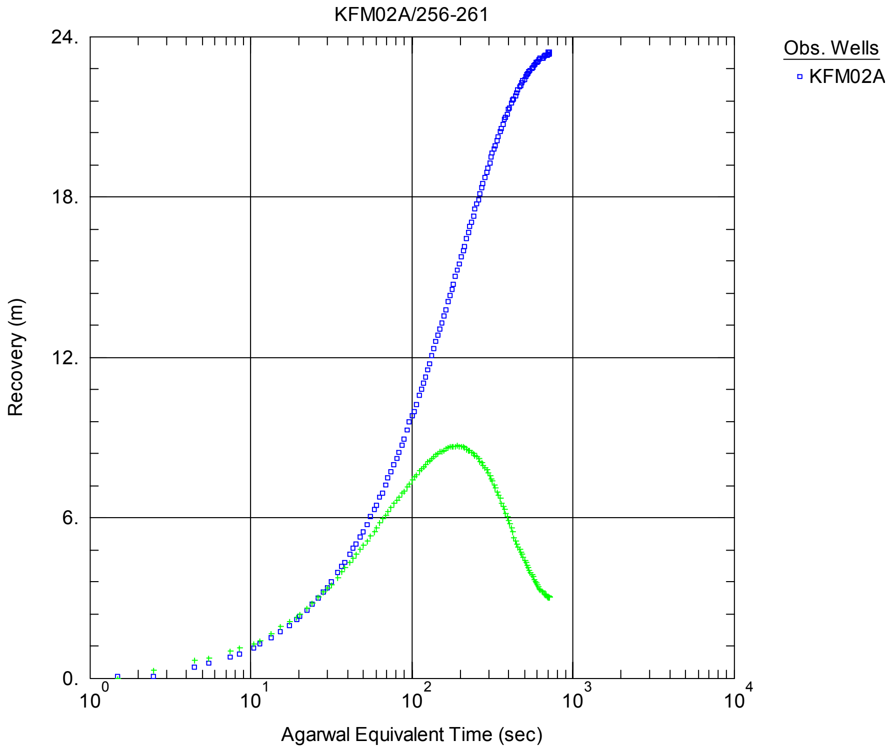



***Figure A3-292.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 256-261 m in KFM02A.*

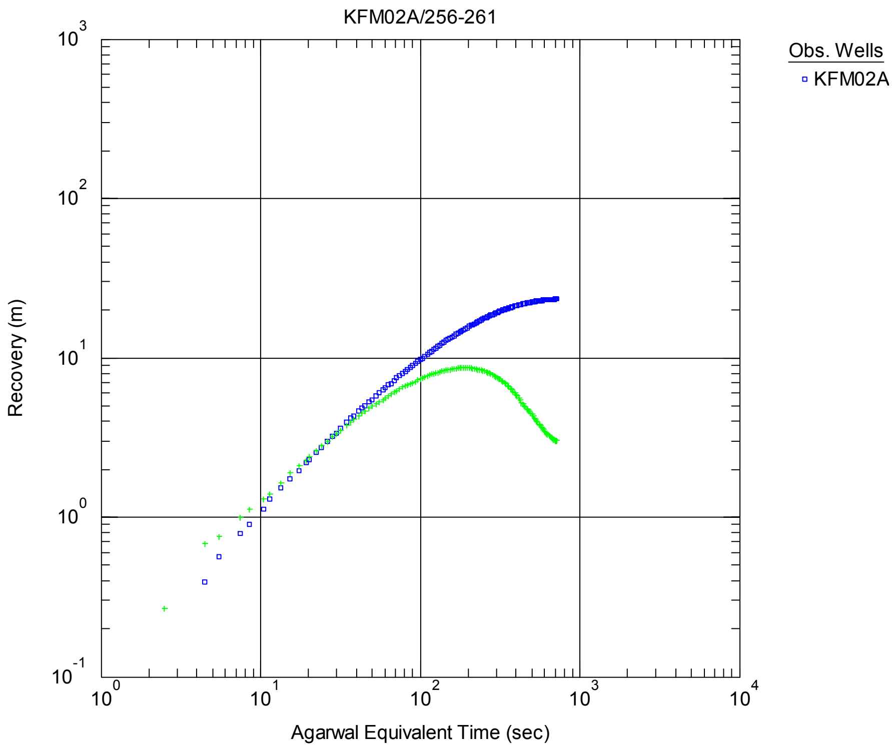



***Figure A3-293.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 256-261 m in KFM02A.*

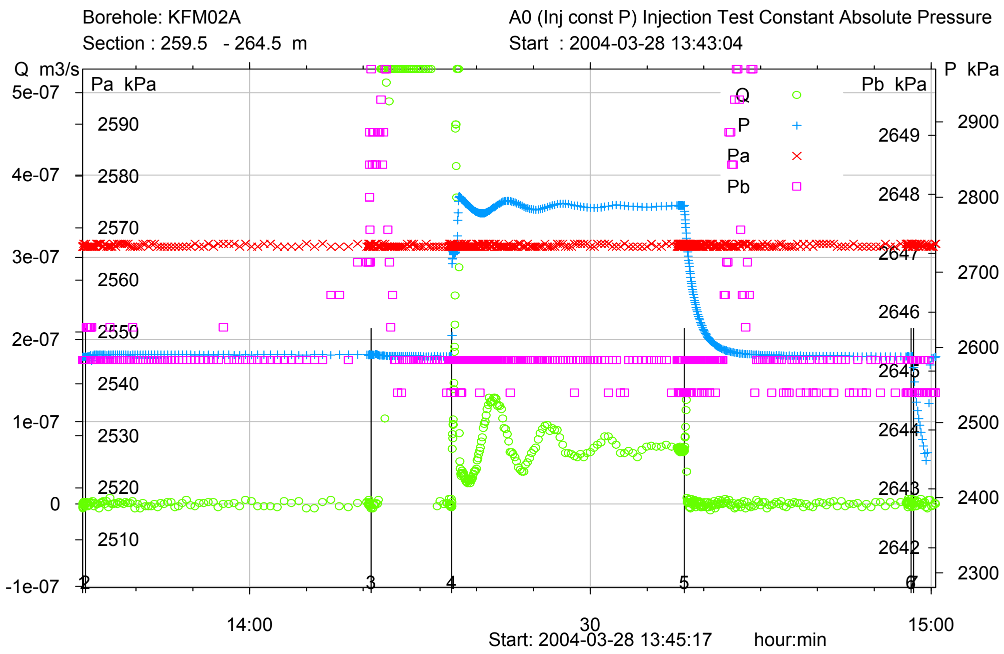



***Figure A3-294.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 259.5-264.5 m in borehole KFM02A.*

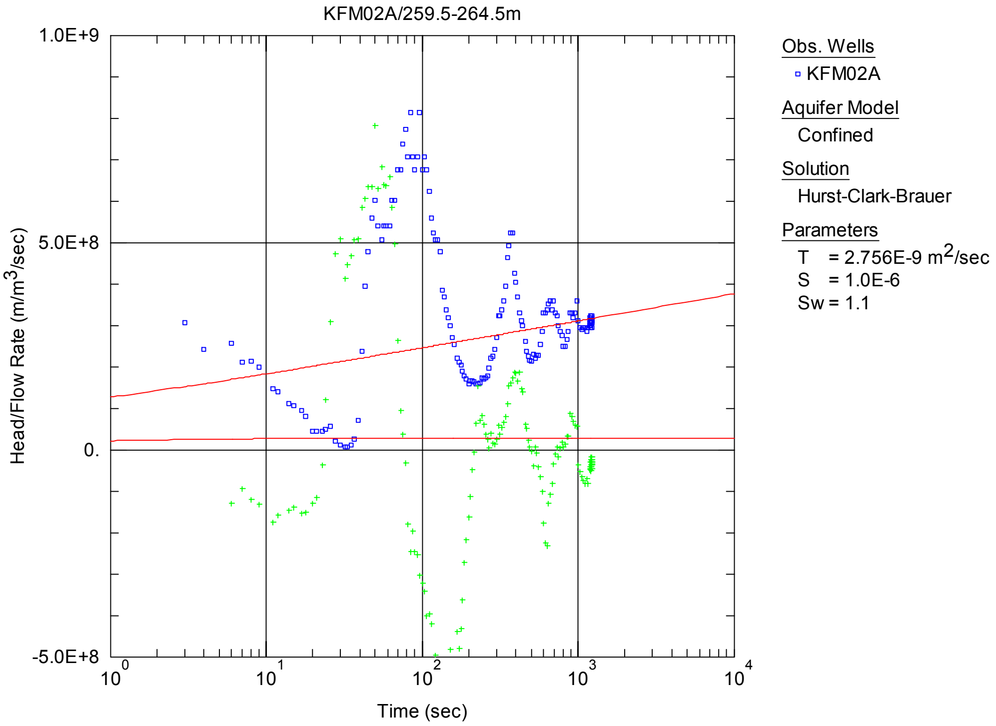



***Figure A3-295.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 259.5-264.5 m in KFM02A.*

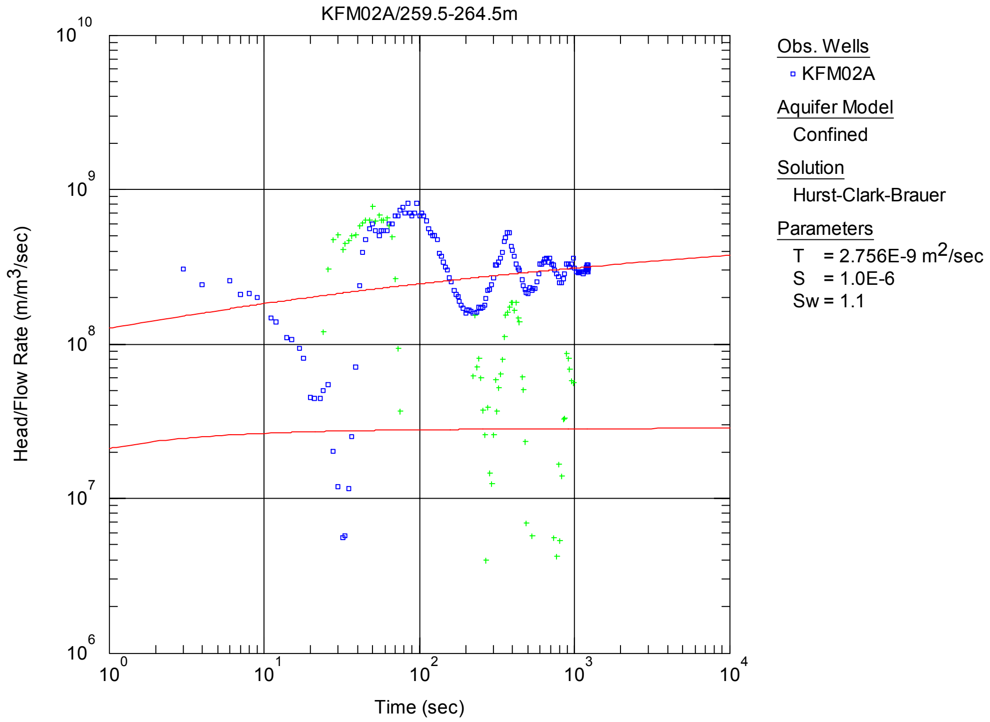



***Figure A3-296.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 259.5-264.5 m in KFM02A.*

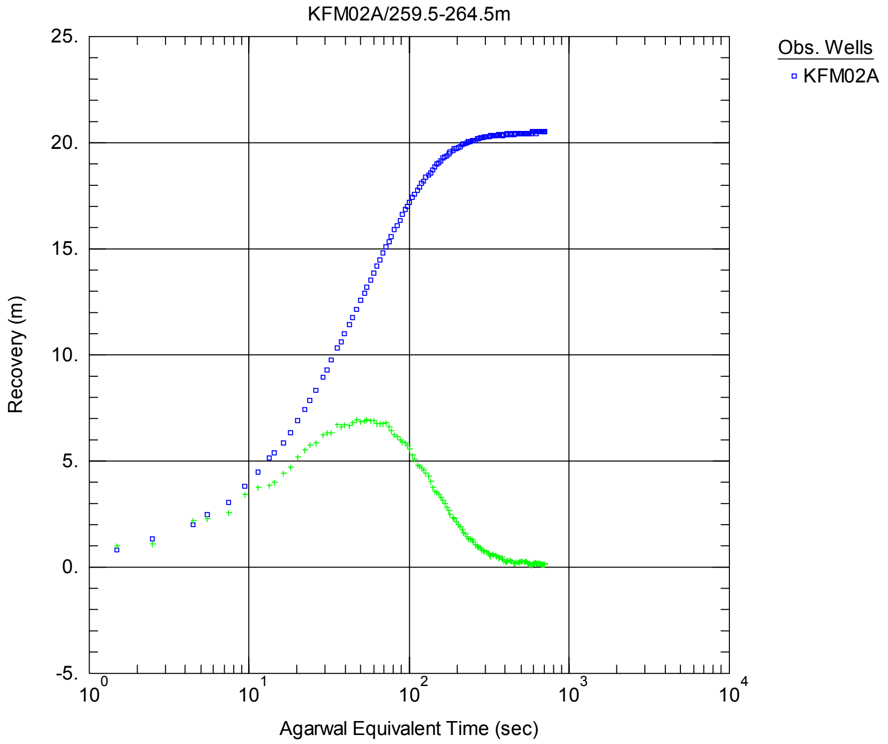



***Figure A3-297.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 259.5-264.5 m in KFM02A.*

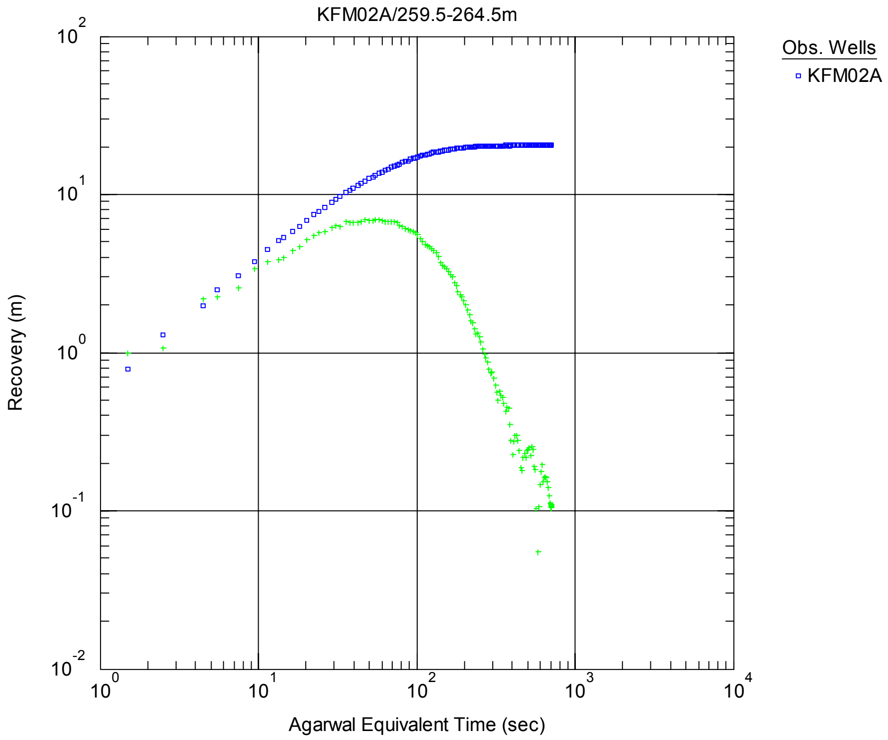



***Figure A3-298.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 259.5-264.5 m in KFM02A.*

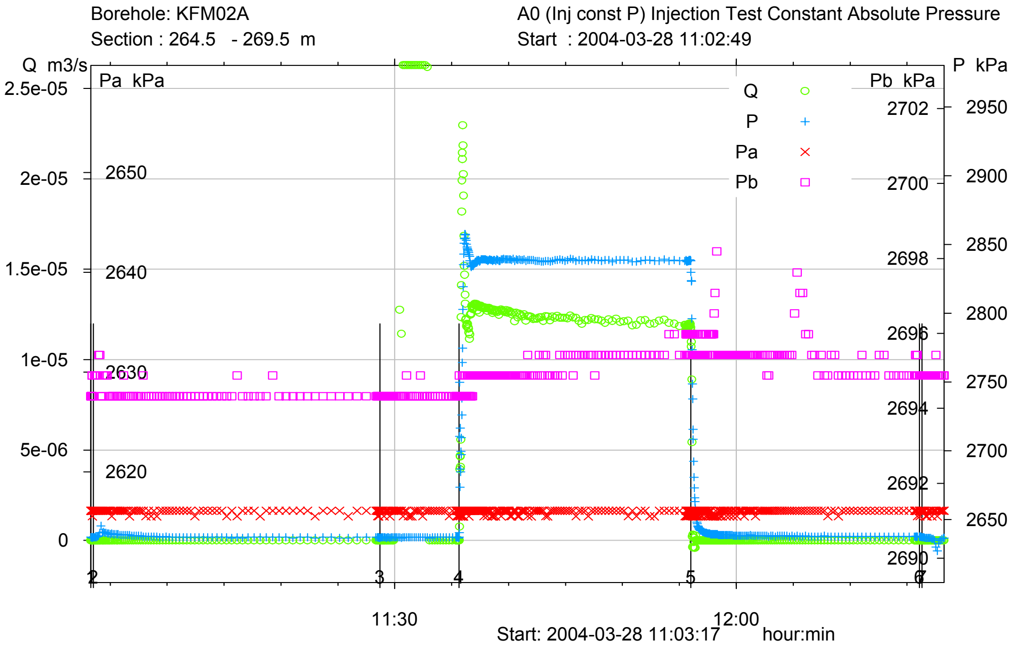



***Figure A3-299.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 264.5-269.5 m in borehole KFM02A.*

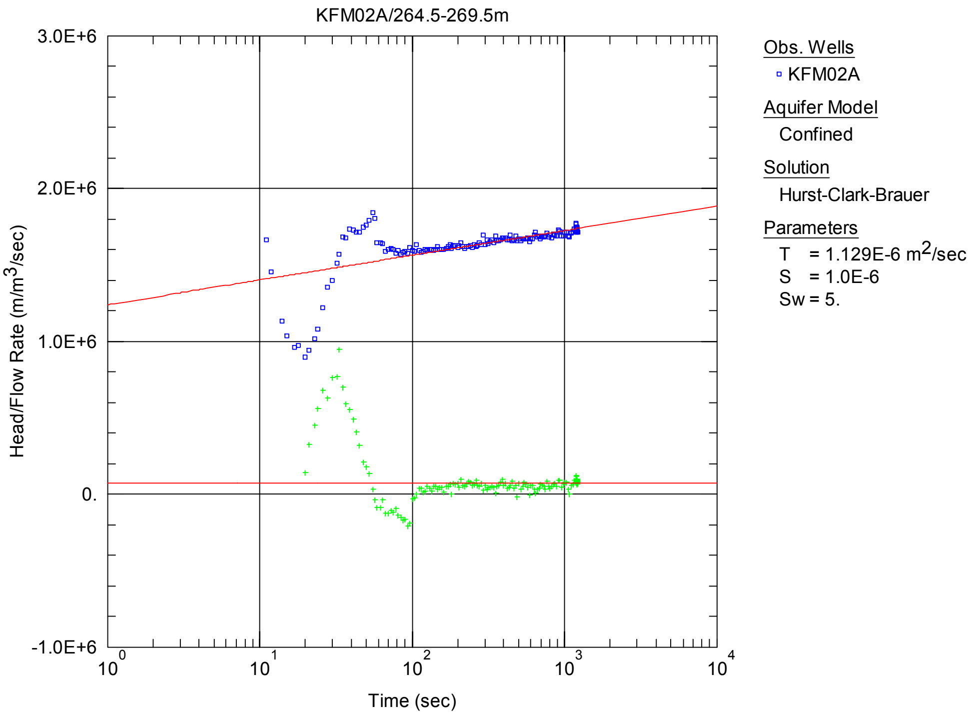



***Figure A3-300.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section264.5-269.5 m in KFM02A.*

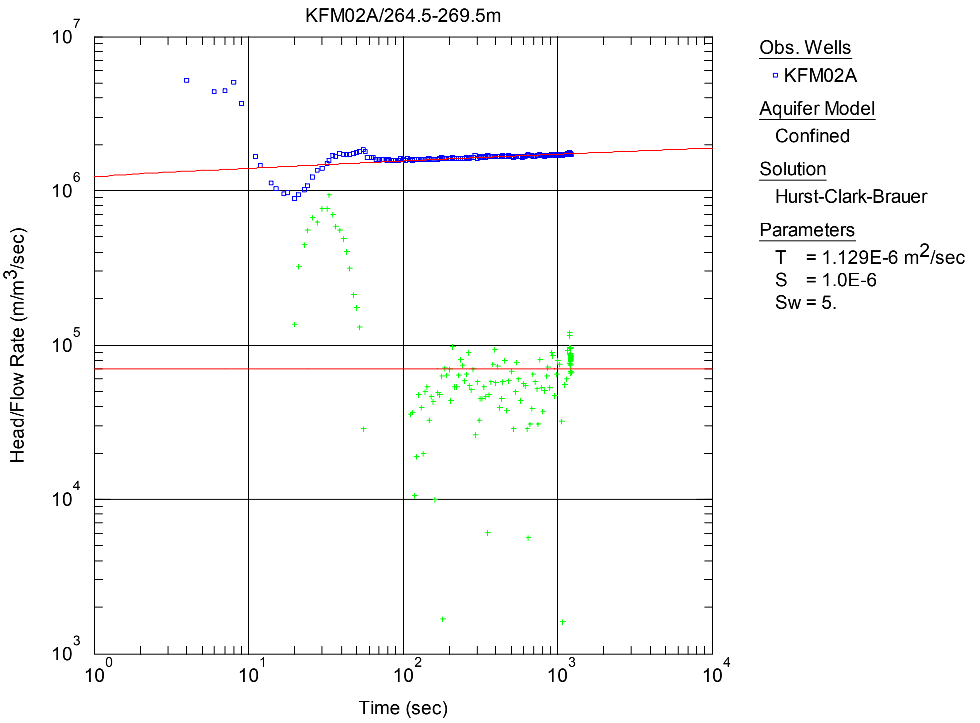



***Figure A3-301.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 264.5-269.5 m in KFM02A.*

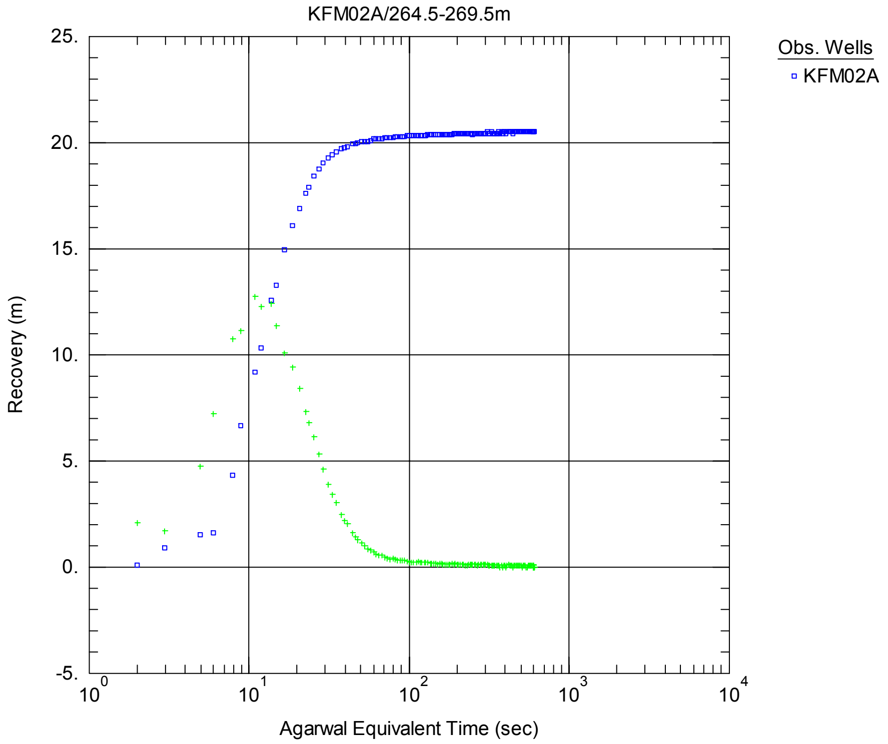



***Figure A3-302.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 264.5-269.5 m in KFM02A.*

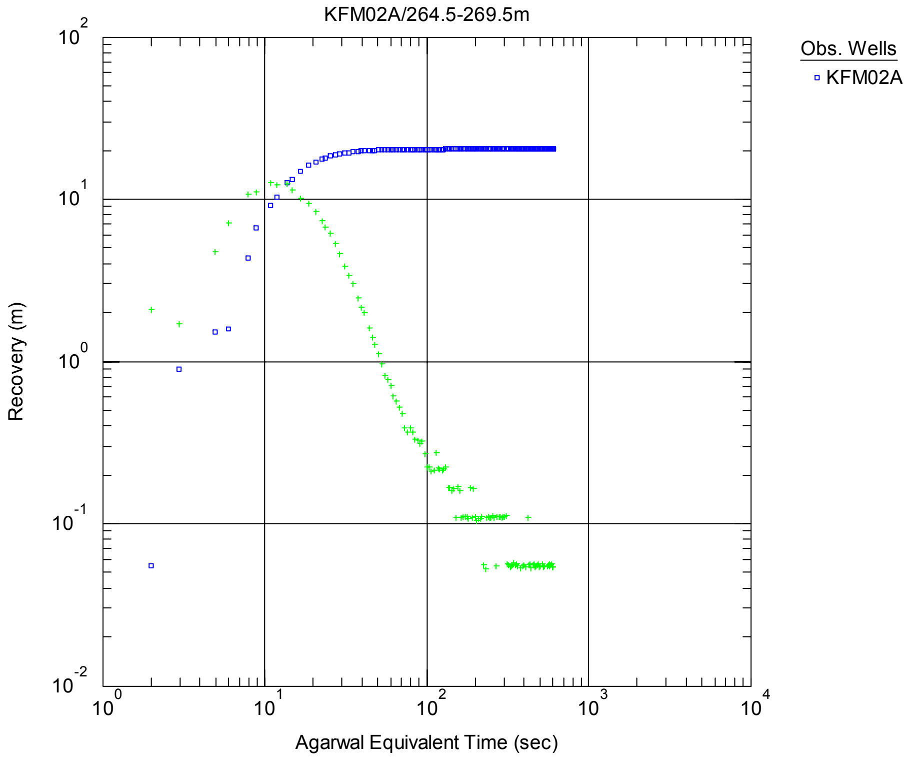



***Figure A3-303.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 264.5-269.5 m in KFM02A.*

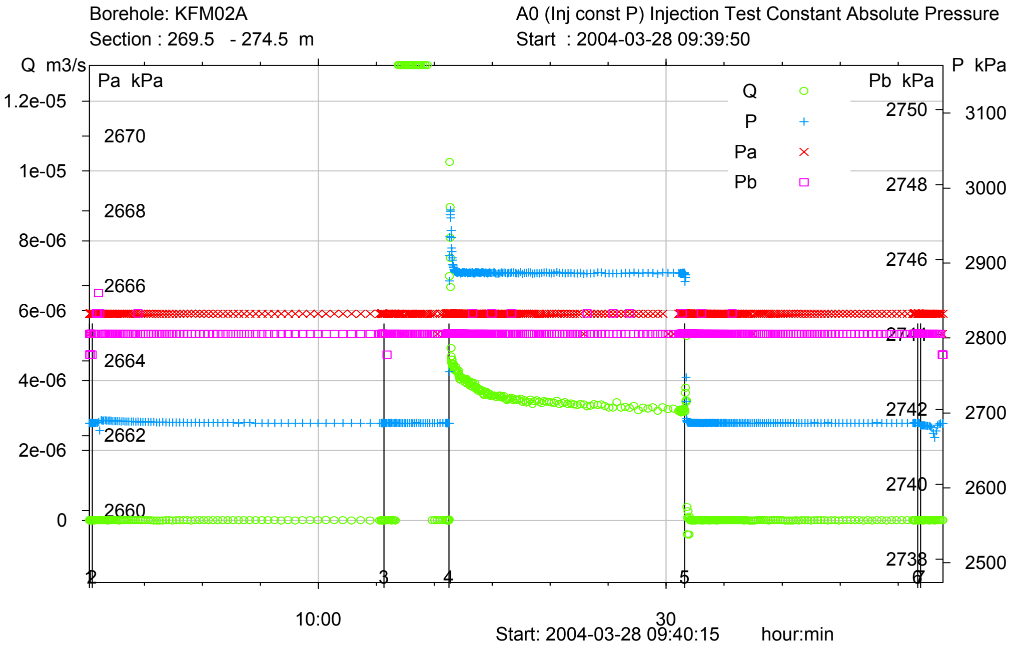



***Figure A3-304.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 269.5-274.5 m in borehole KFM02A.*

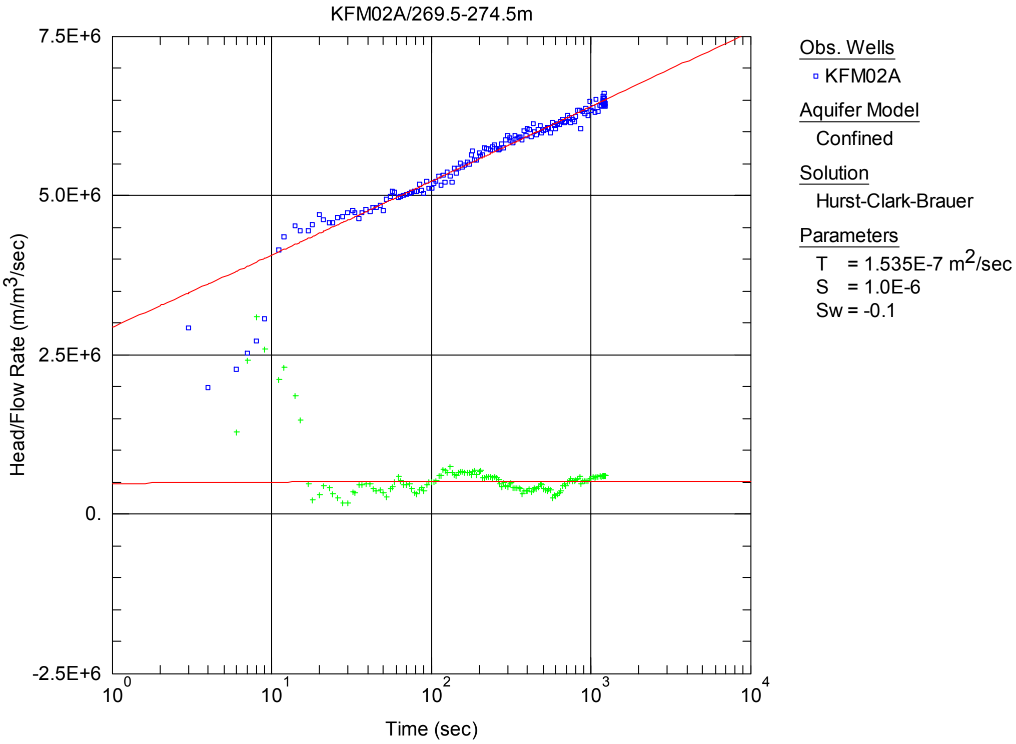



***Figure A3-305.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 269.5-274.5 m in KFM02A.*

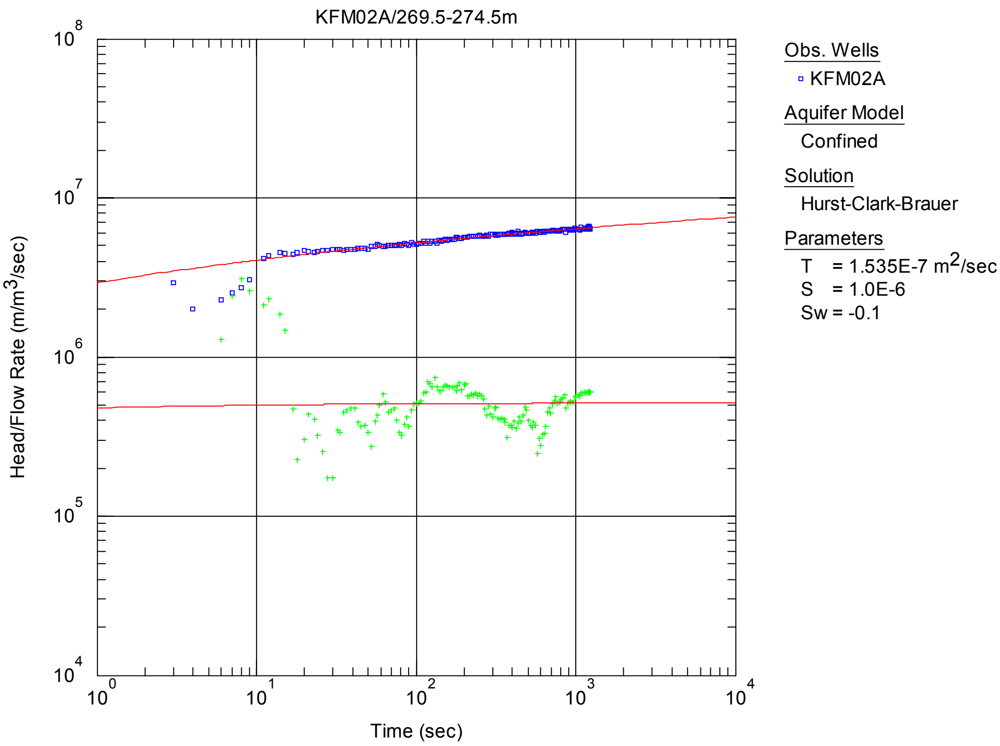



***Figure A3-306.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 269.5-274.5 m in KFM02A.*

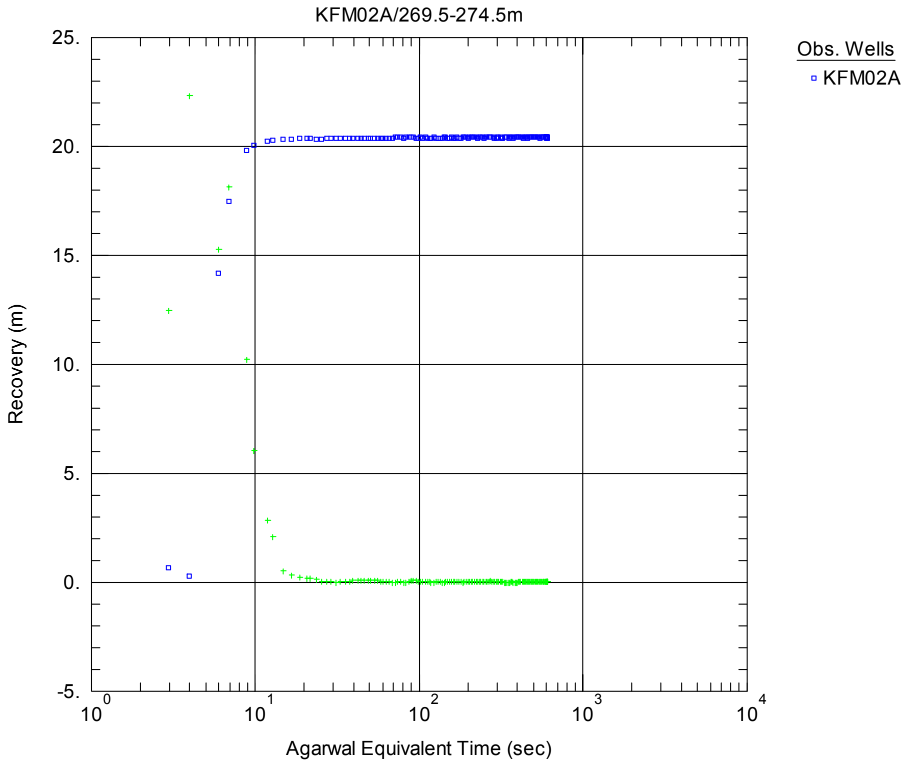



***Figure A3-307.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 269.5-274.5 m in KFM02A.*

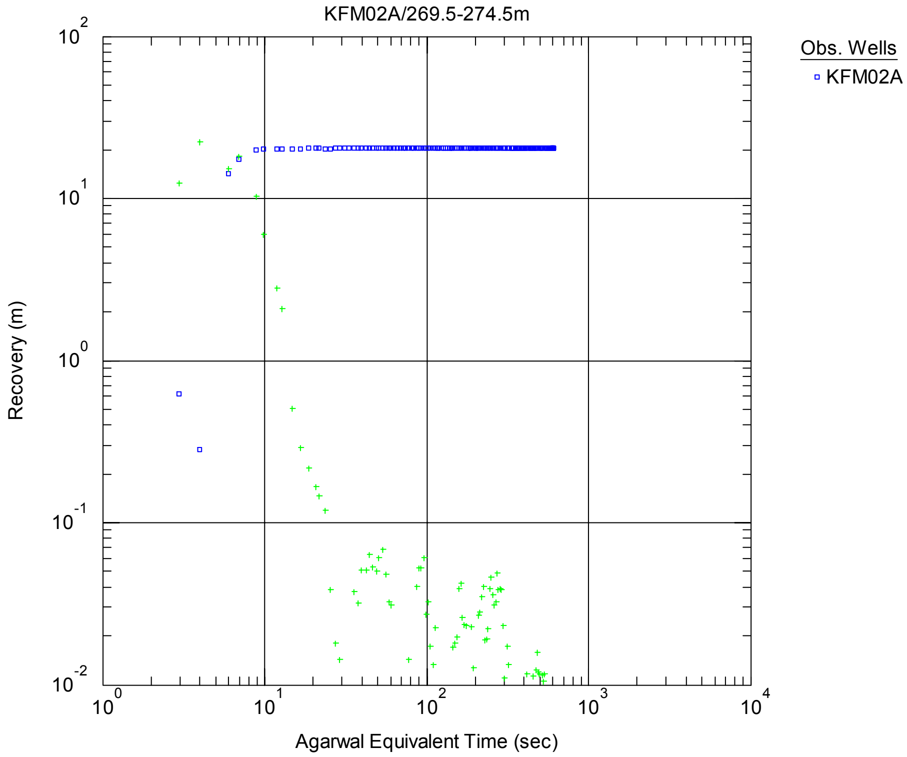



***Figure A3-308.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 269.5-274.5 m in KFM02A.*

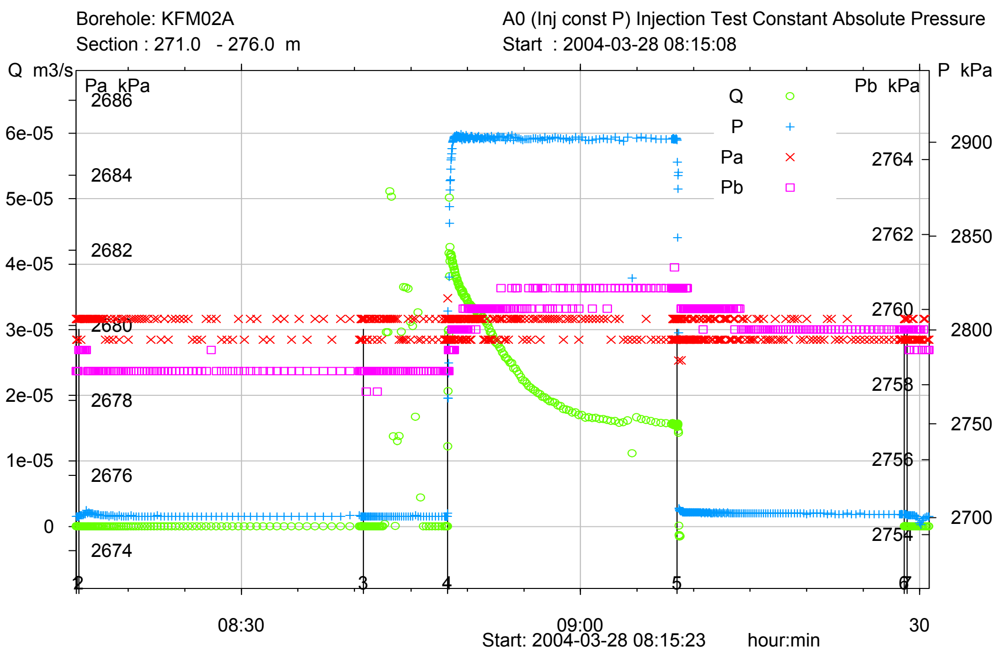



***Figure A3-309.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 271-276 m in borehole KFM02A.*

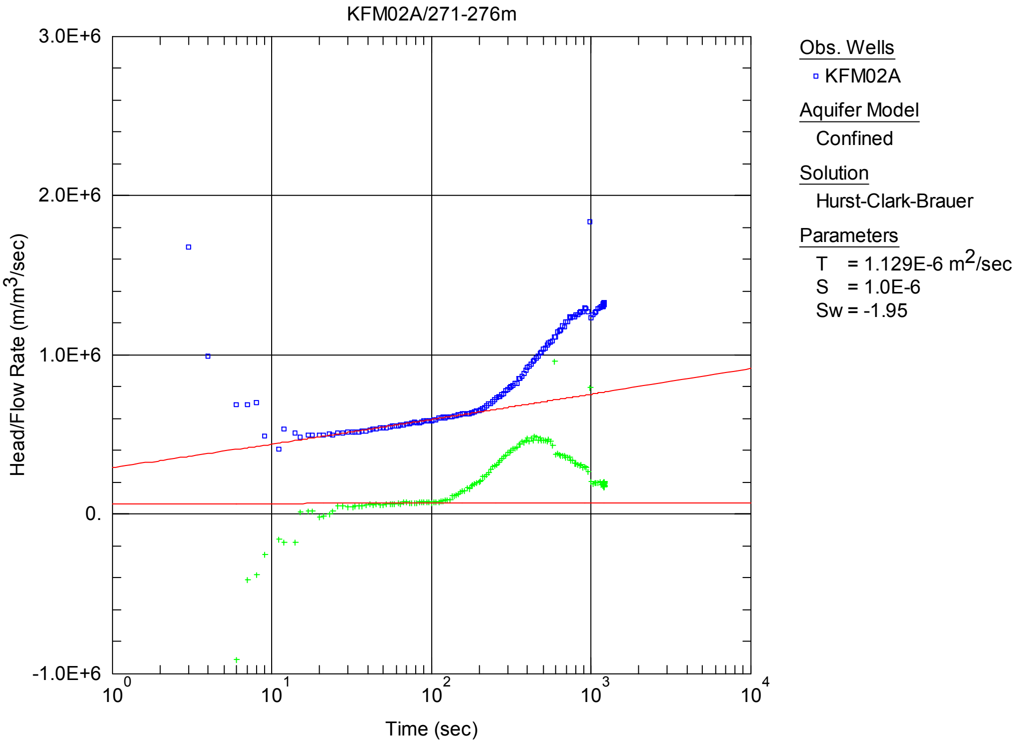



***Figure A3-310.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 271-276 m in KFM02A.*

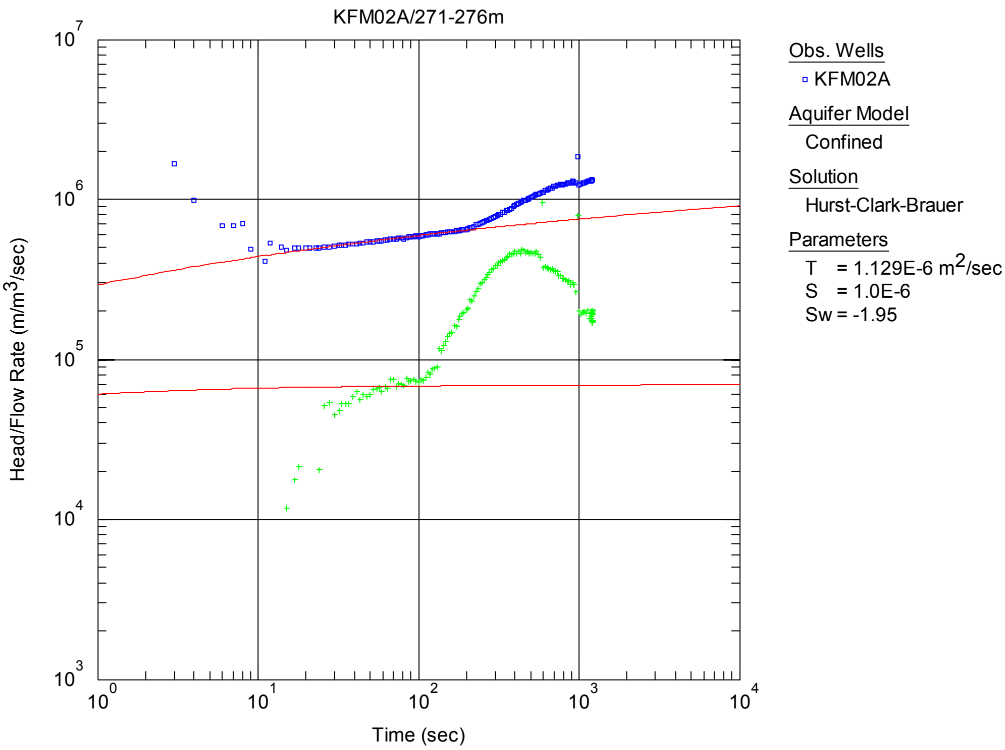



***Figure A3-311.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 271-276 m in KFM02A.*

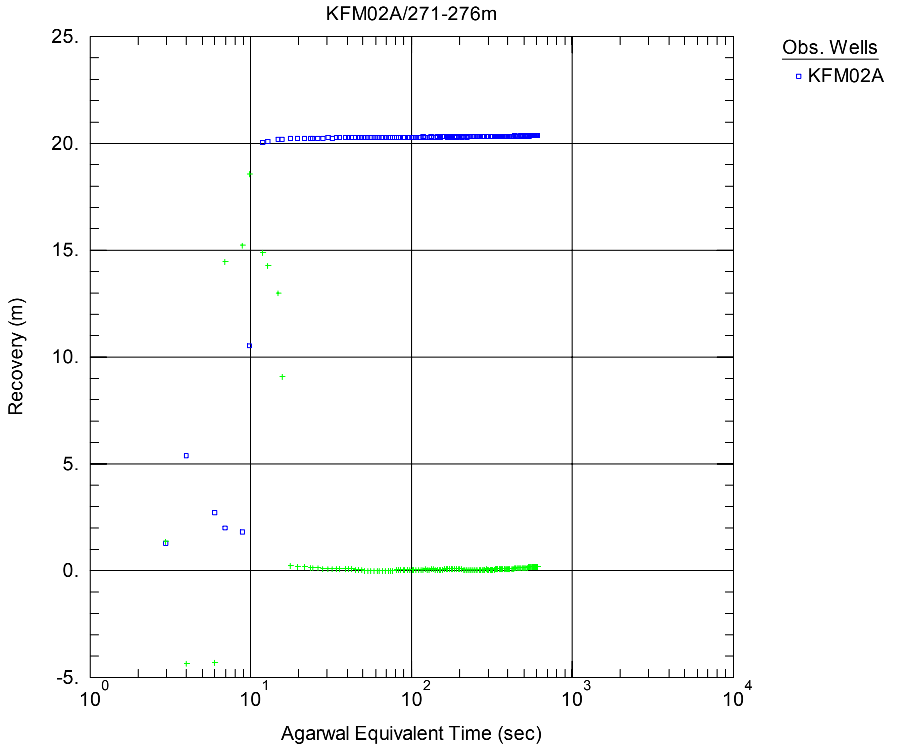



***Figure A3-312.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 271-276 m in KFM02A.*

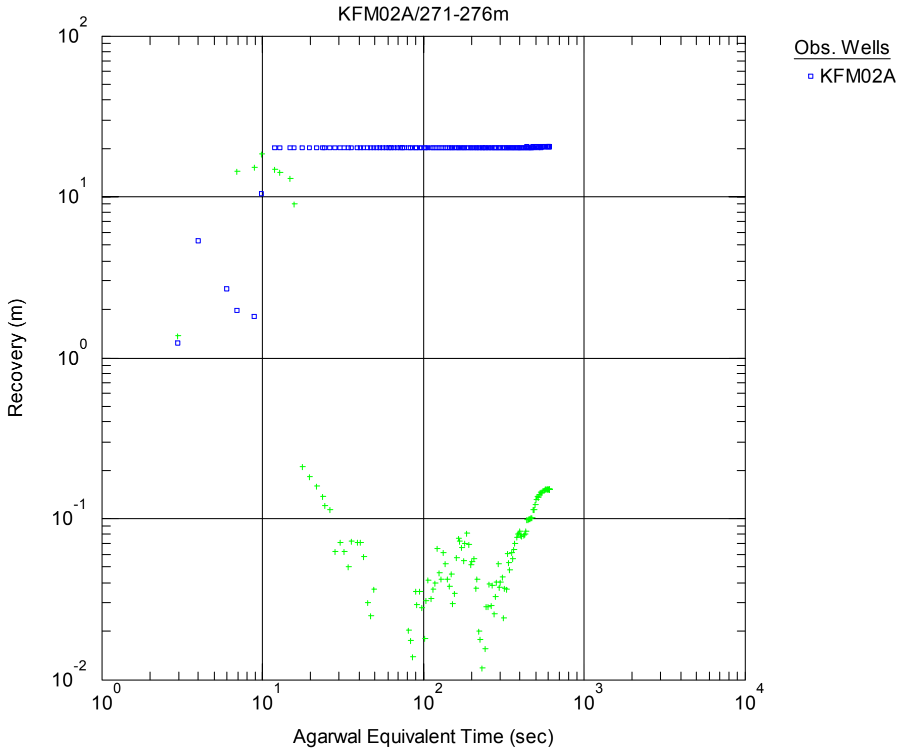



***Figure A3-313.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 271-276 m in KFM02A.*

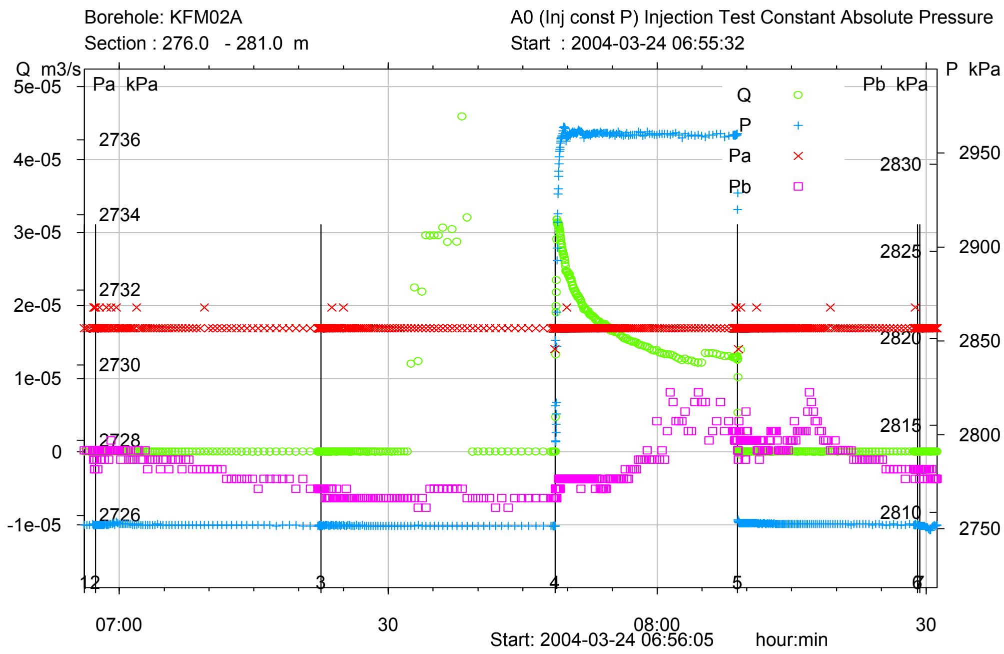



***Figure A3-314.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 276-281 m in borehole KFM02A.*

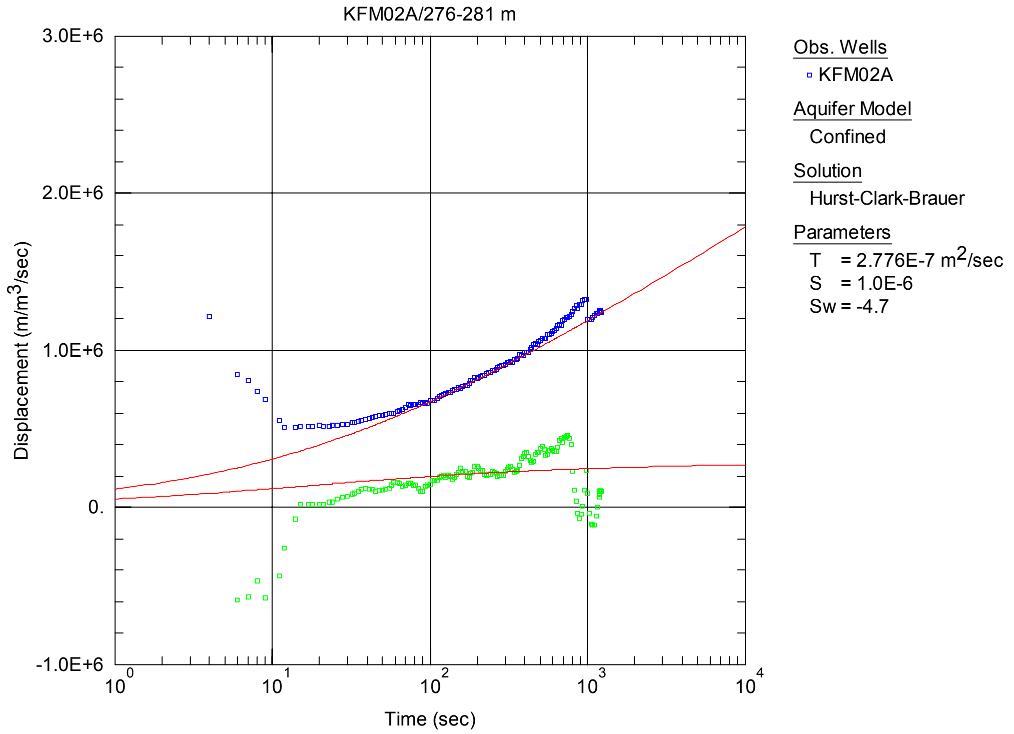



*__Figure A3-315.__ Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 276-281 m in KFM02A.*

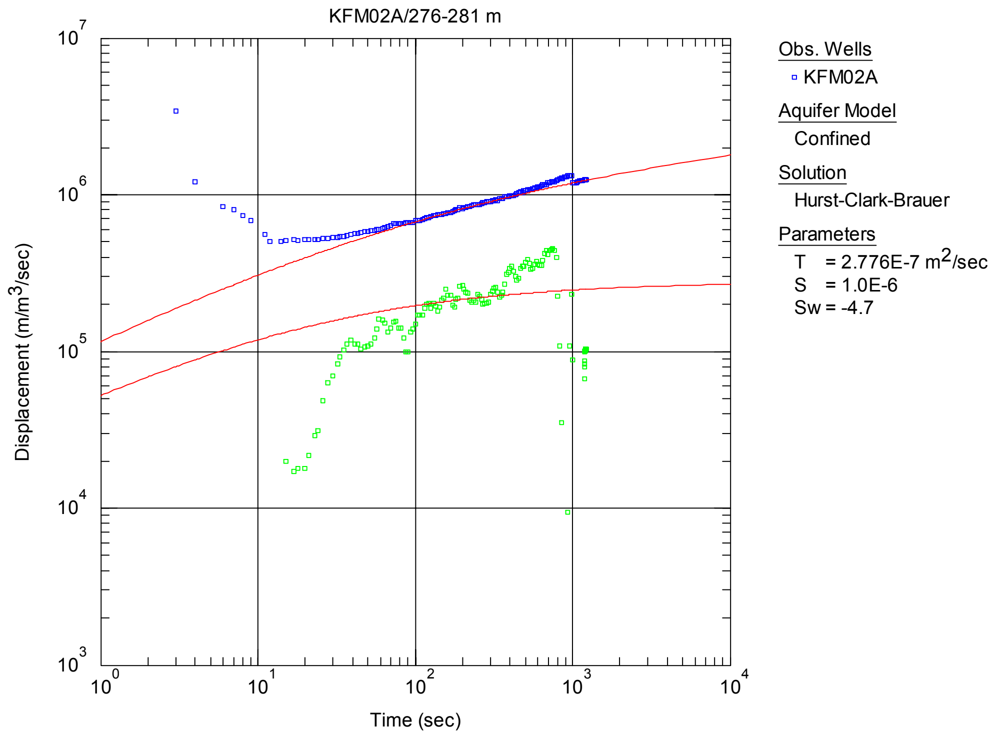



*__Figure A3-316.__ Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 276-281 m in KFM02A.*

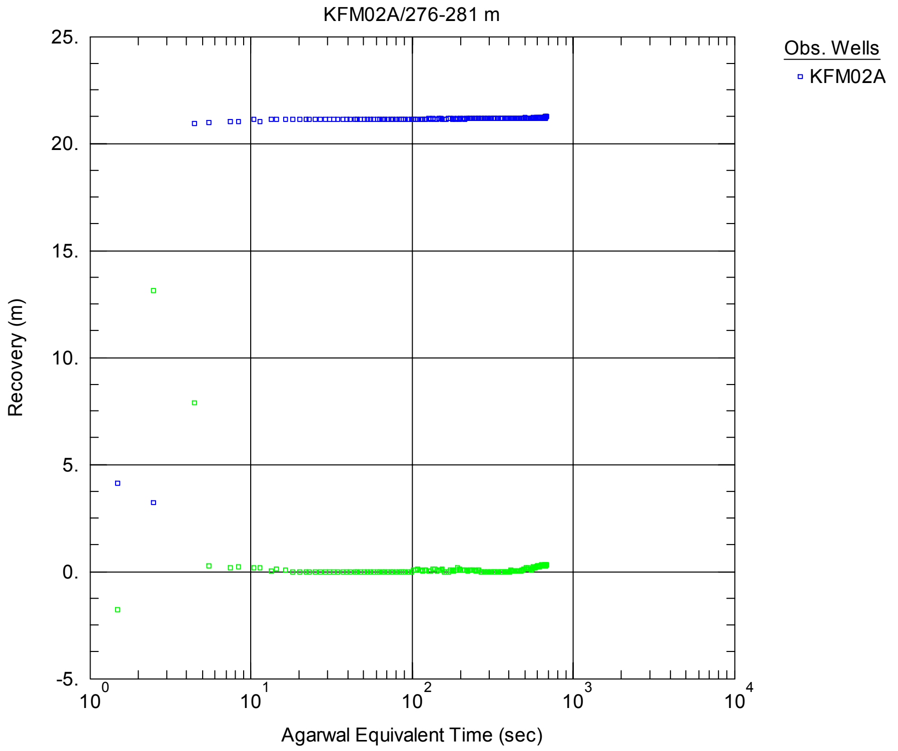



***Figure A3-317.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 276-281 m in KFM02A.*

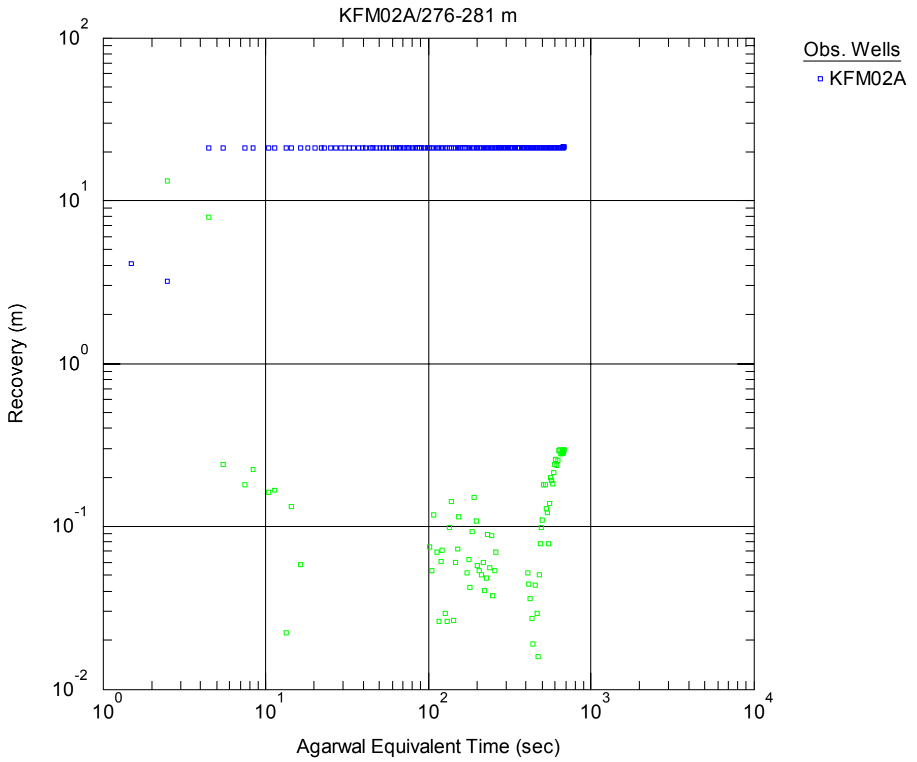



***Figure A3-318.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 276-281 m in KFM02A.*

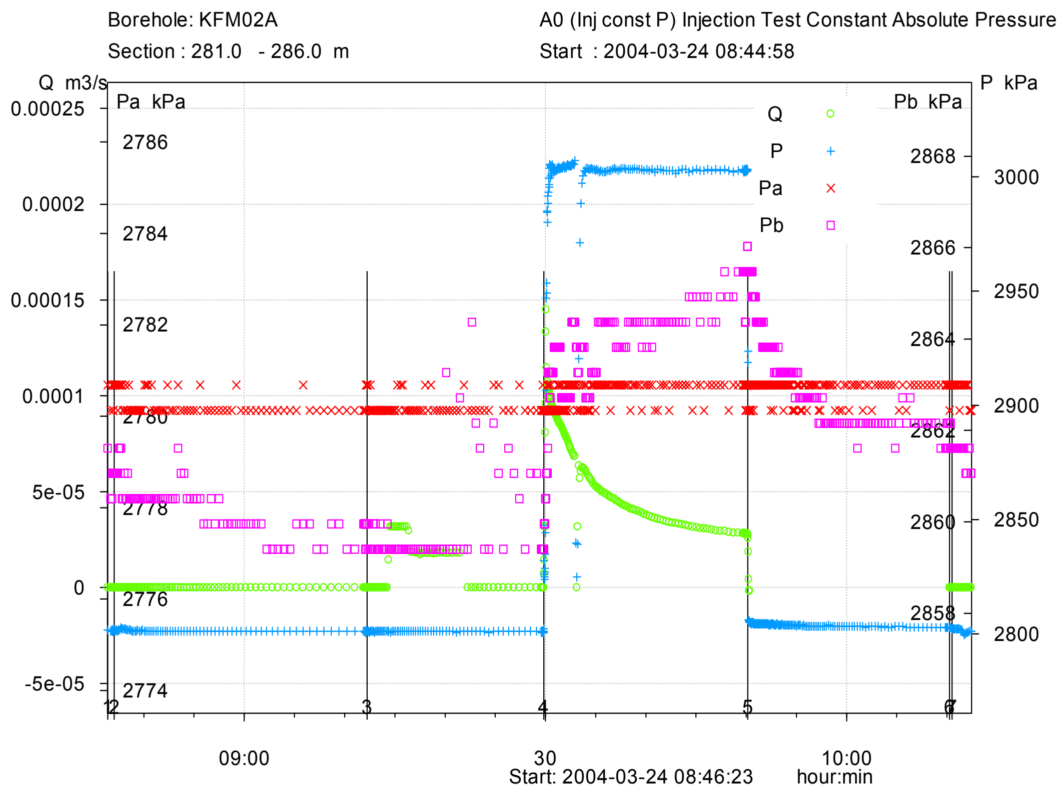



*Figure A3-319.* *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 281-286 m in borehole KFM02A.*

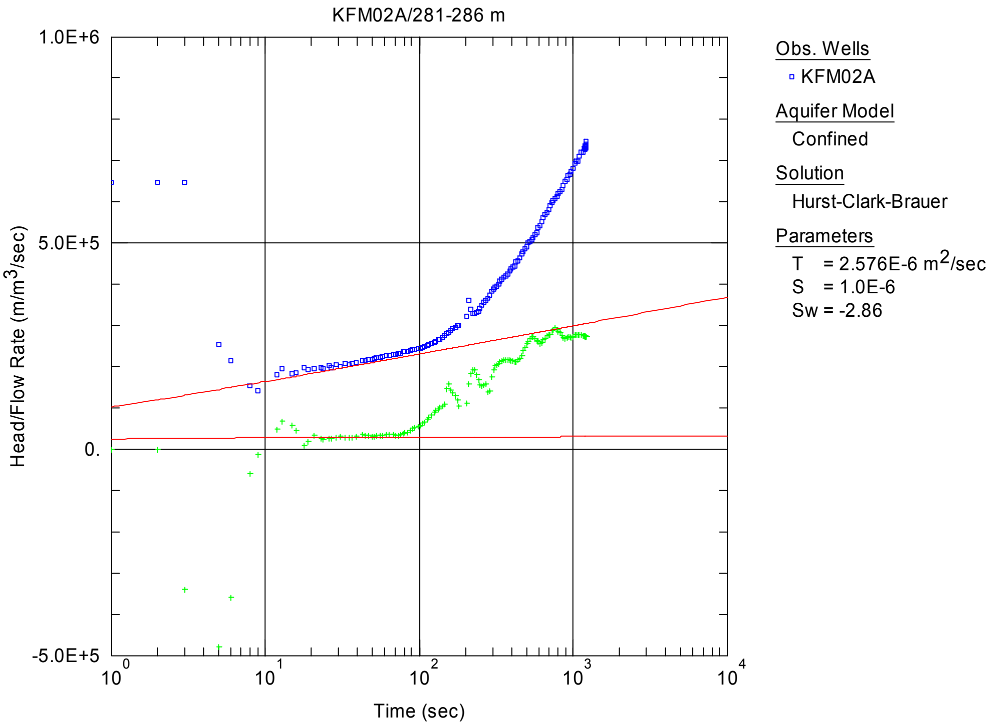



***Figure A3-320.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 281-286 m in KFM02A. Showing fit to the first pseudo-radial flow regime.*

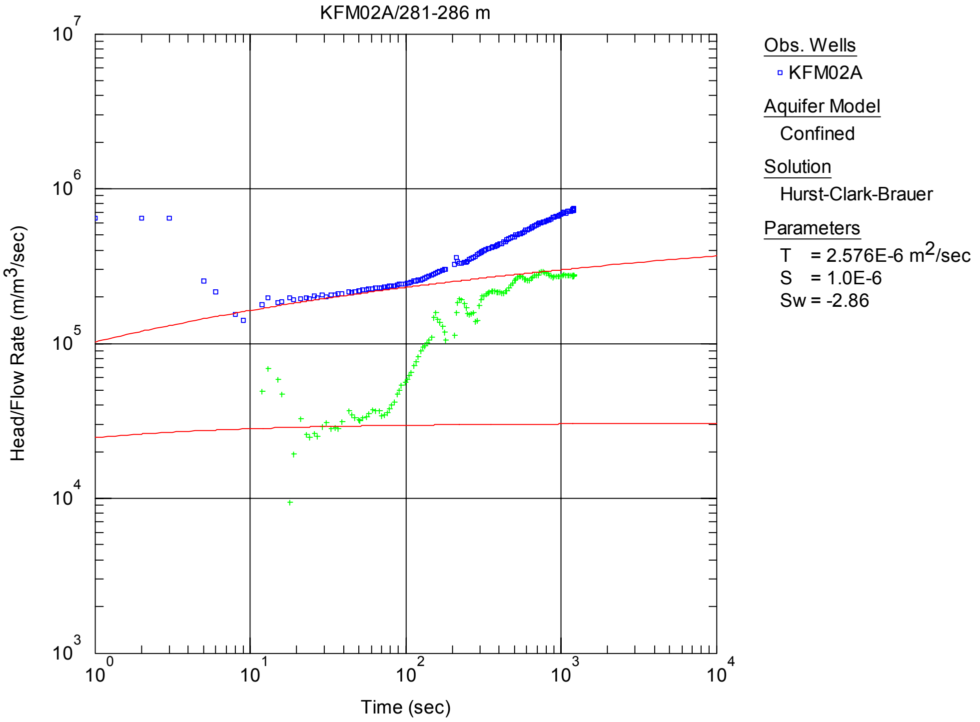



***Figure A3-321.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 281-286 m in KFM02A. Showing fit to the first pseudo-radial flow regime.*

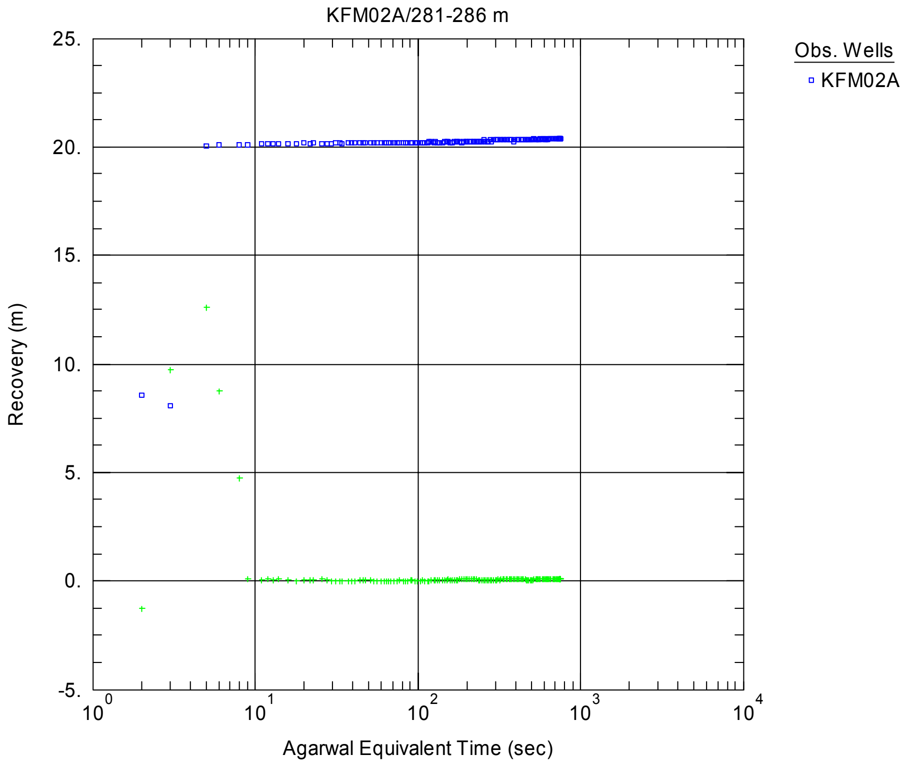



***Figure A3-322.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 281-286 m in KFM02A.*

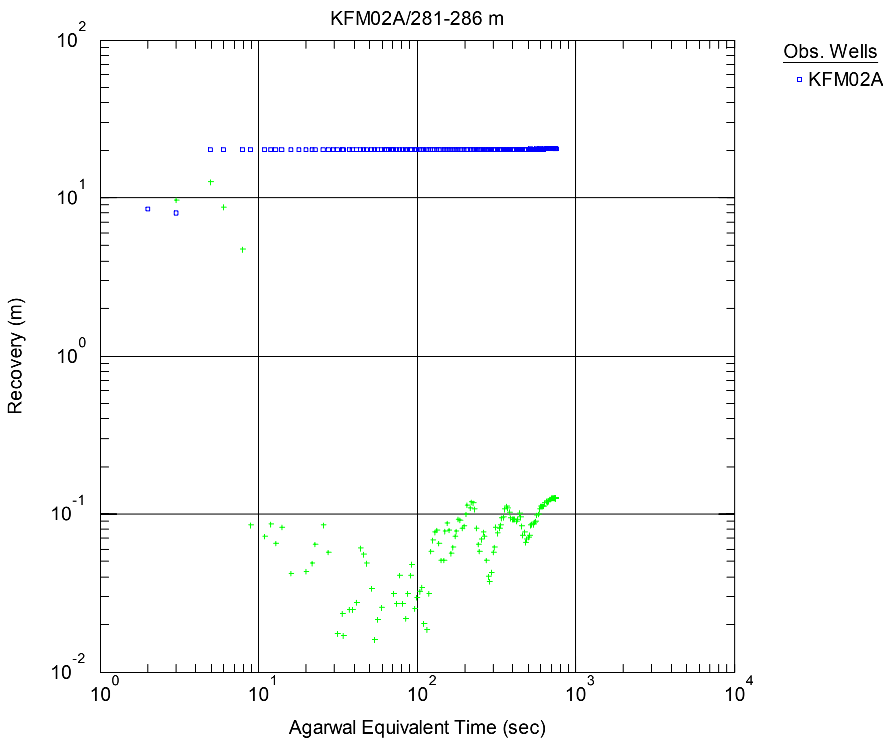



***Figure A3-323.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 281-286 m in KFM02A.*

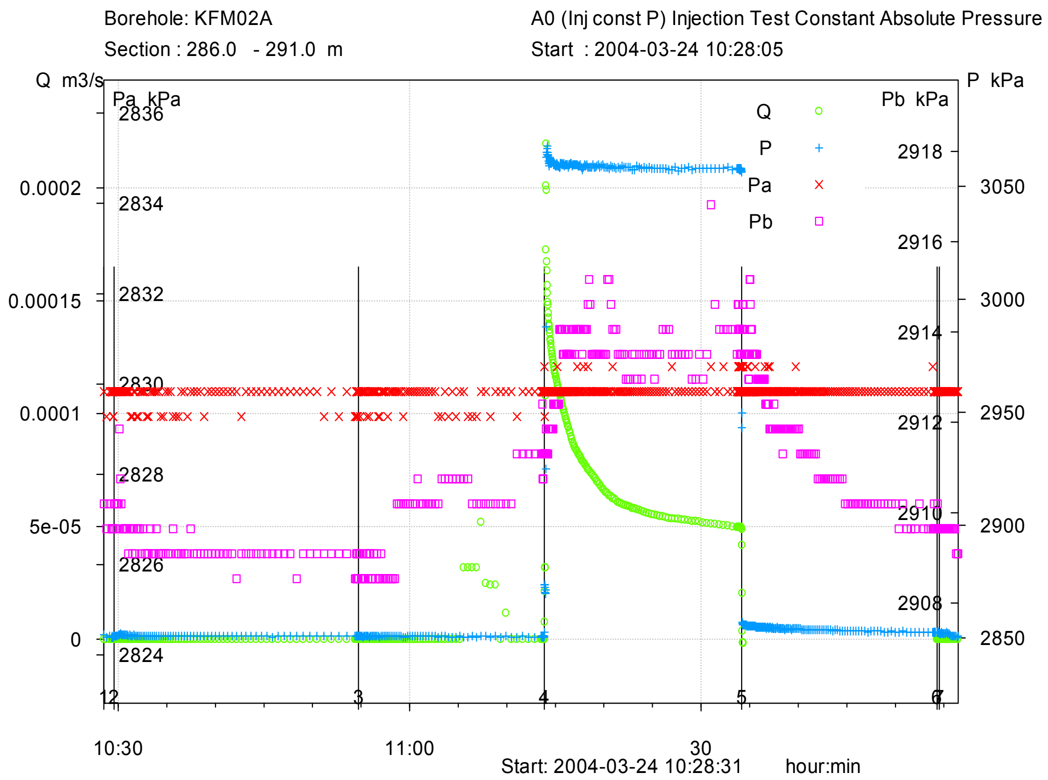



***Figure A3-324.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 286-291 m in borehole KFM02A.*

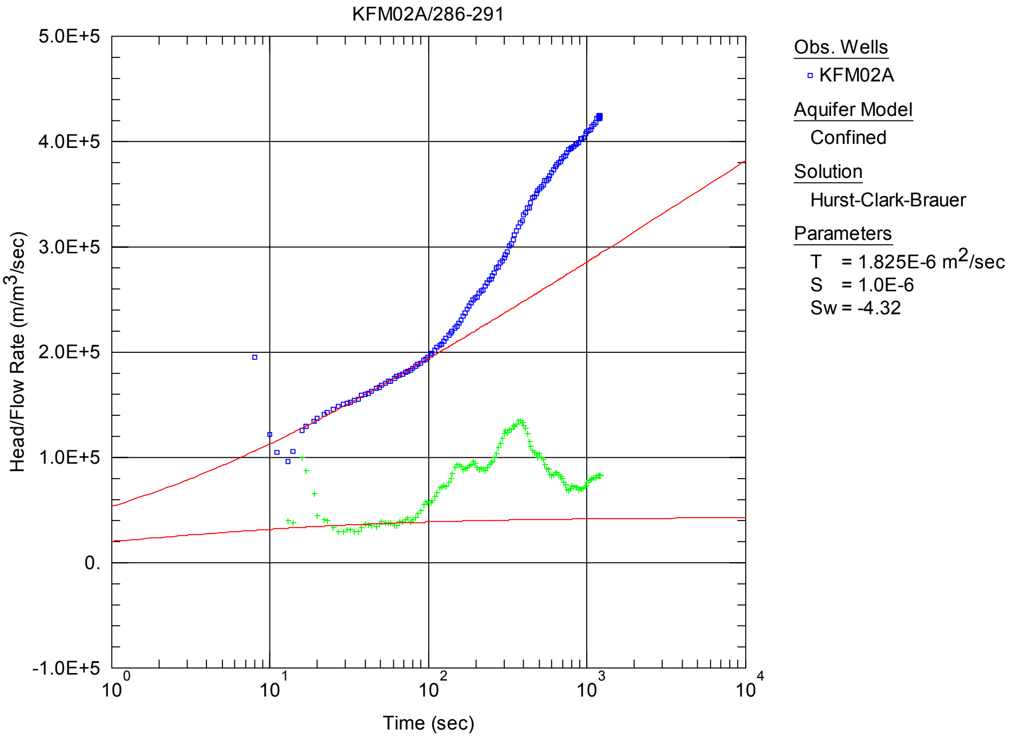



***Figure A3-325.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 286-291 m in KFM02A. Showing fit to the first pseudo-radial flow regime.*

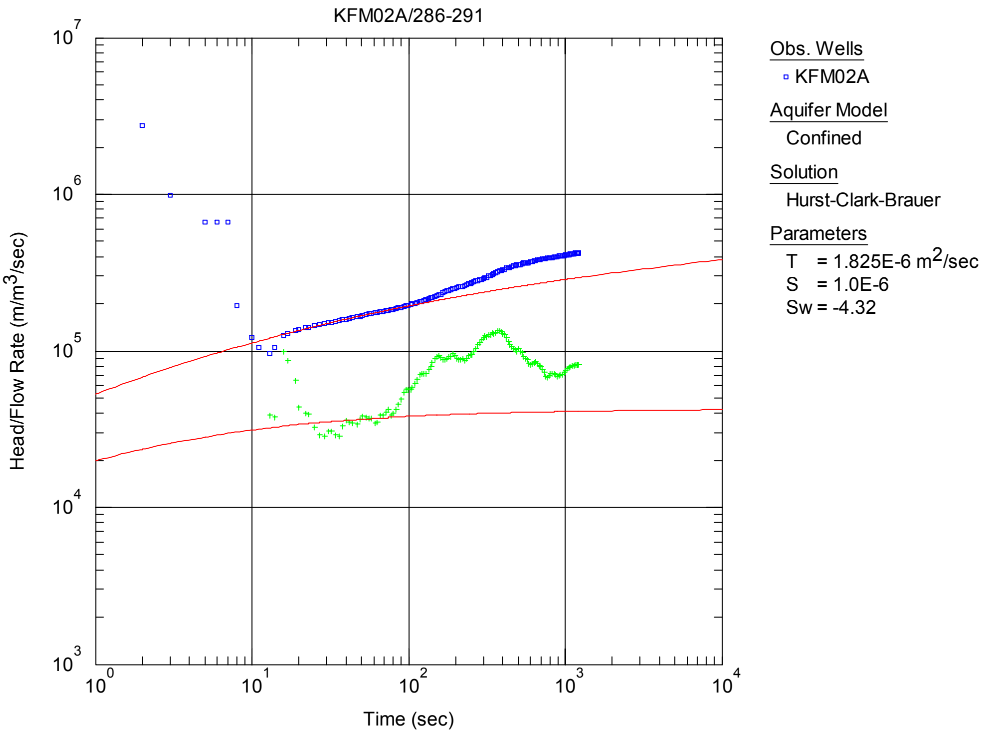



***Figure A3-326.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 286-291 m in KFM02A. Showing fit to the first pseudo-radial flow regime.*

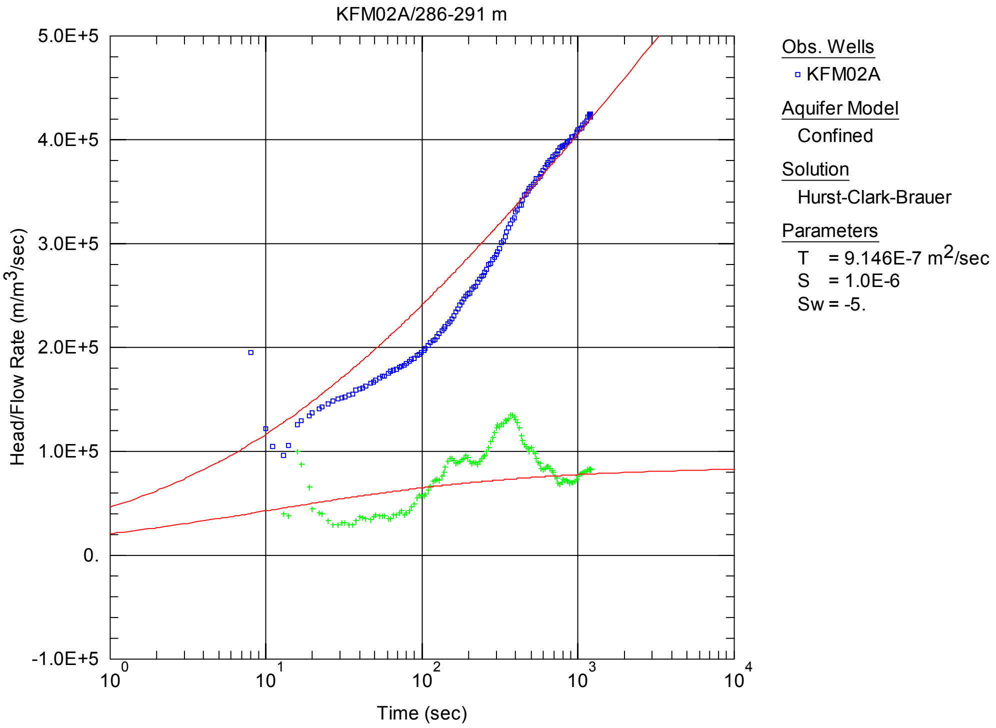



***Figure A3-327.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 286-291 m in KFM02A. Showing fit to the second pseudo-radial flow regime.*

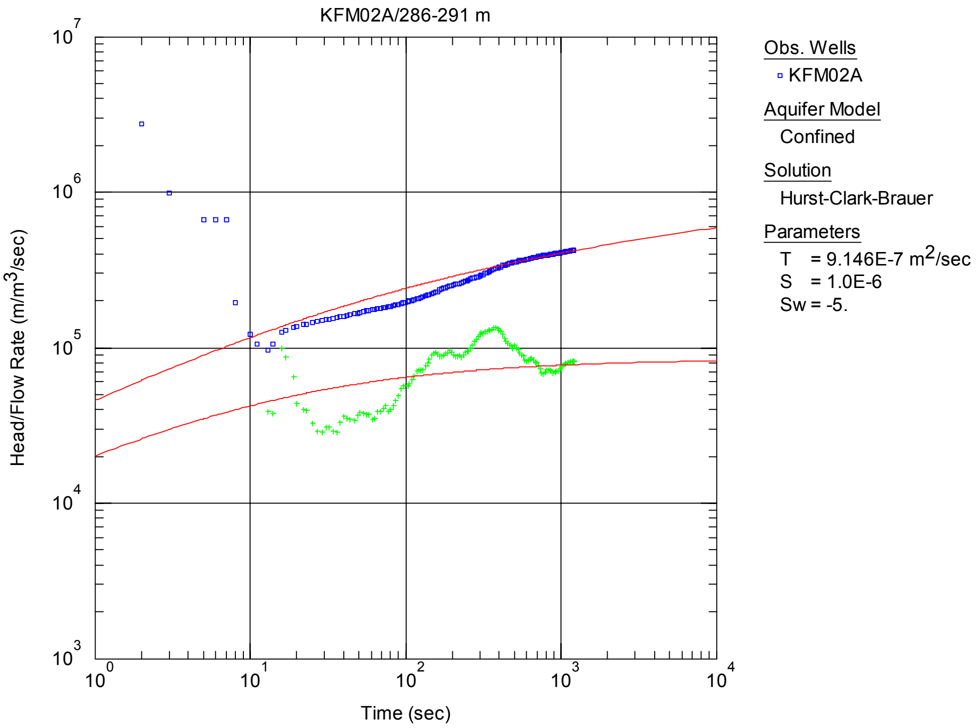



***Figure A3-328.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 286-291 m in KFM02A. Showing fit to the second pseudo-radial flow regime.*

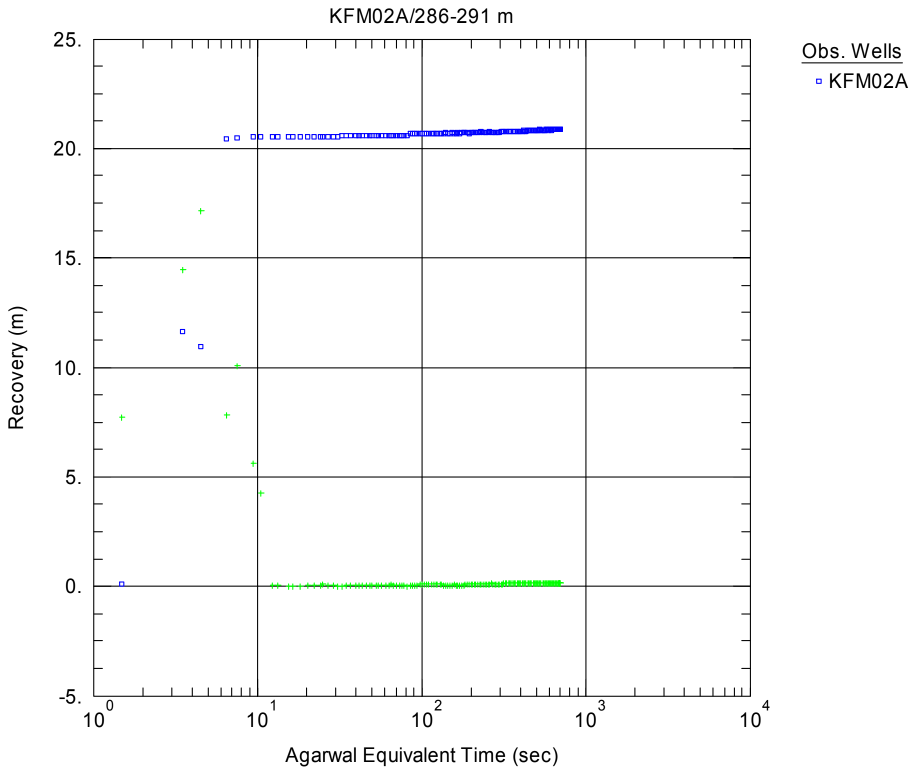



***Figure A3-329.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 286-291 m in KFM02A.*

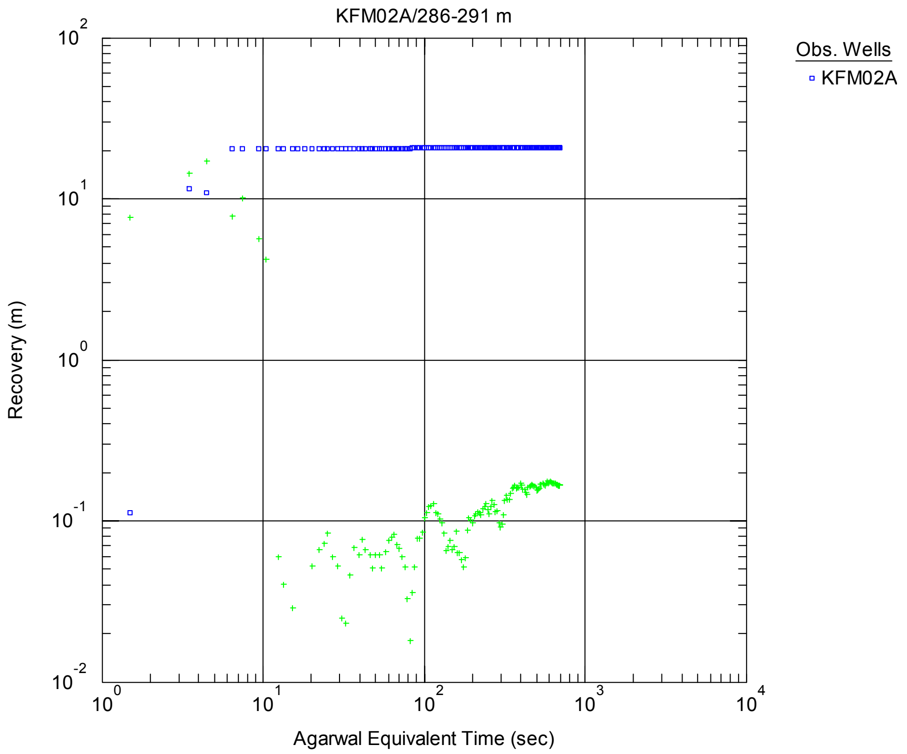



***Figure A3-330.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 286-291 m in KFM02A.*

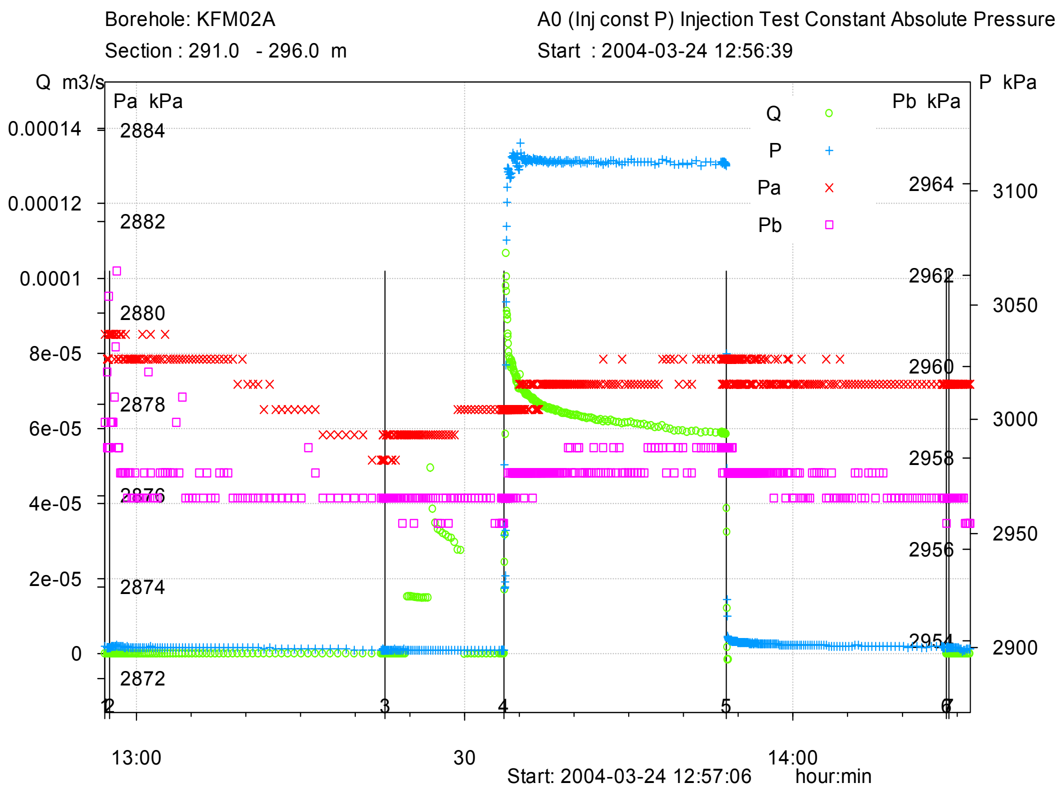



***Figure A3-331.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 291-296 m in borehole KFM02A.*

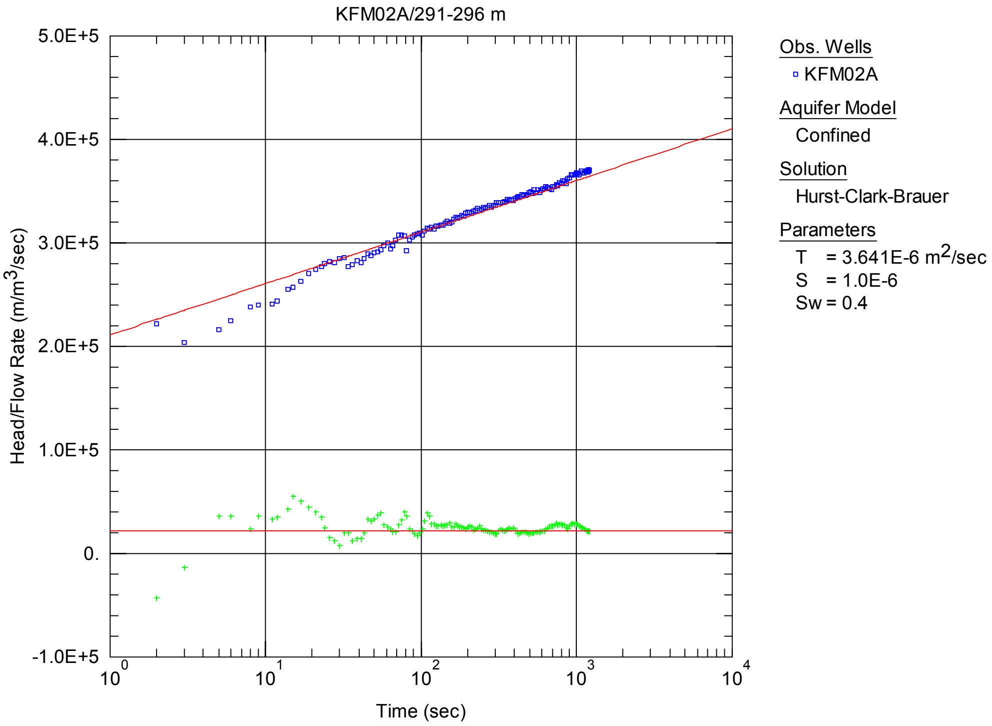



***Figure A3-332.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 291-296 m in KFM02A.*

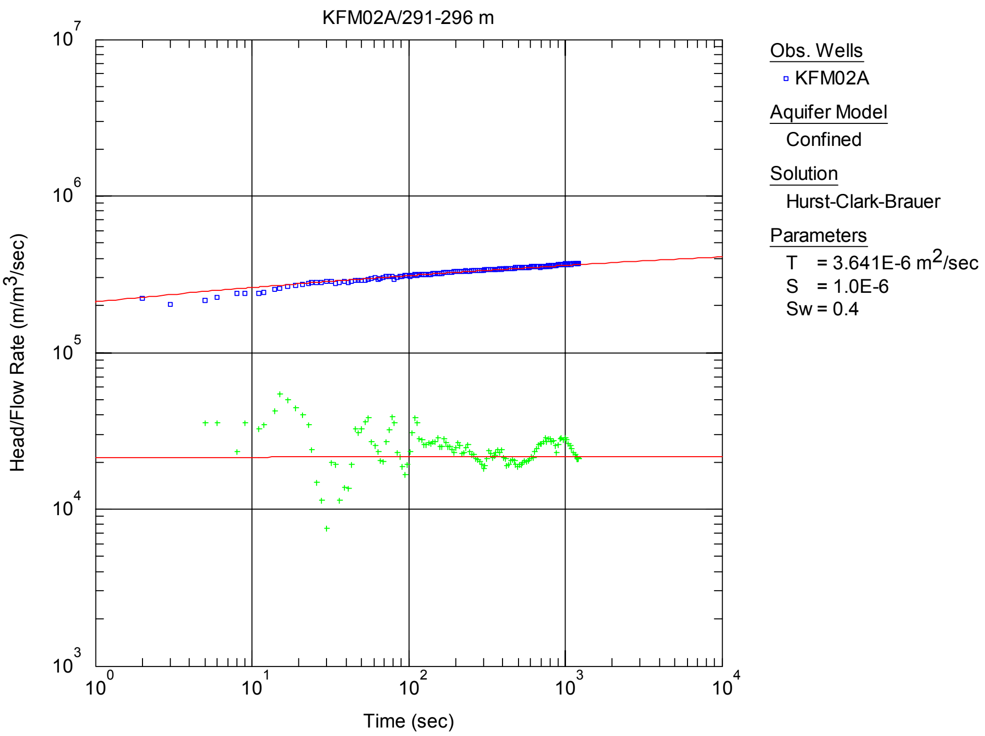



***Figure A3-333.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 291-296 m in KFM02A.*

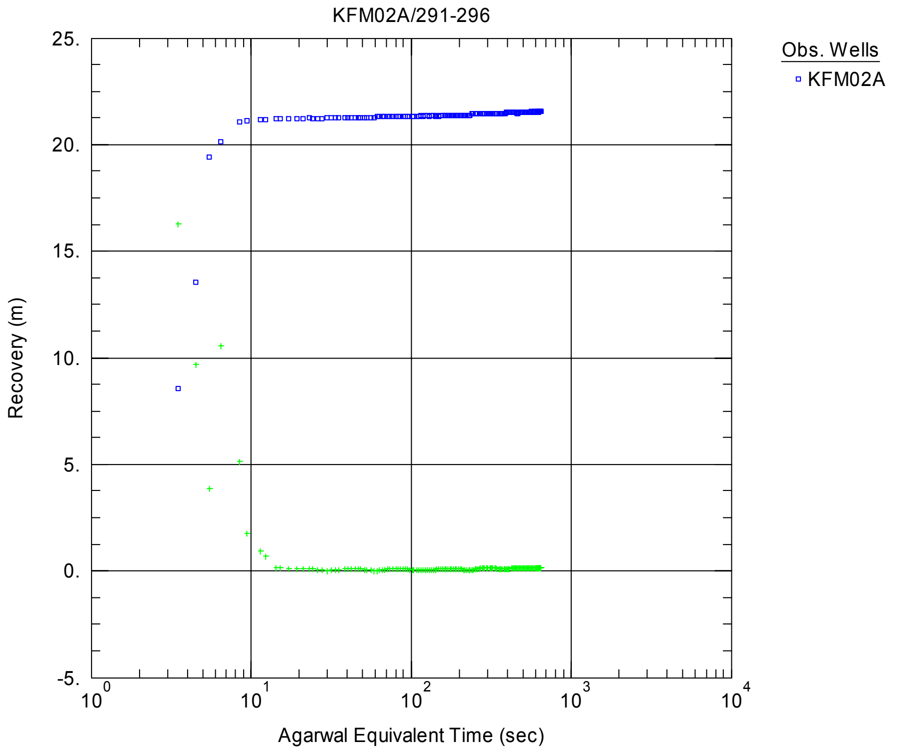



***Figure A3-334.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 291-296 m in KFM02A.*

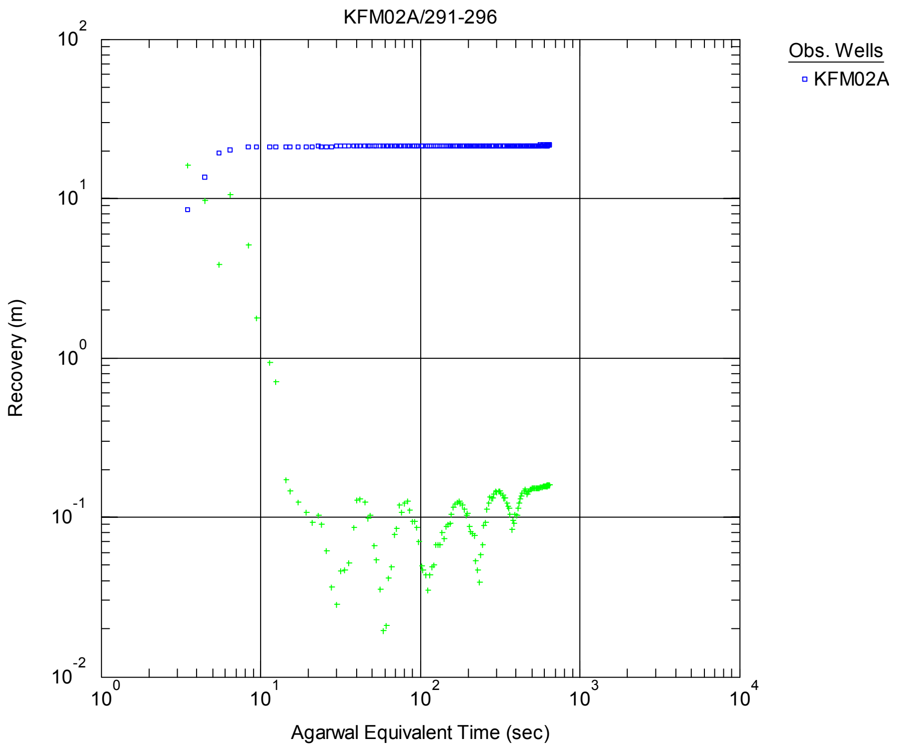



***Figure A3-335.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 291-296 m in KFM02A.*

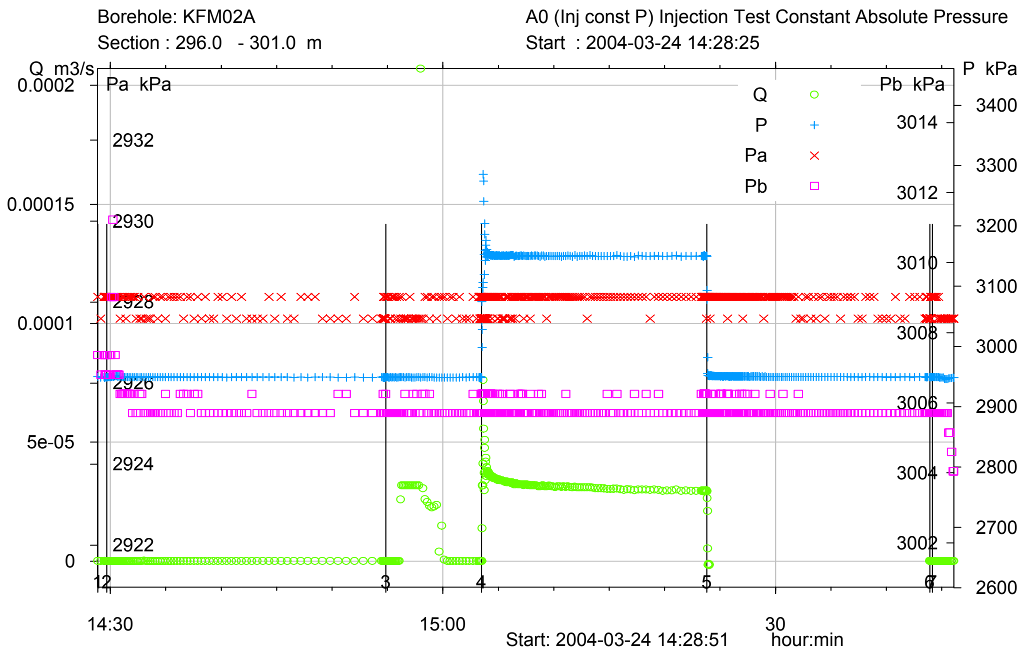



***Figure A3-336.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 296-301 m in borehole KFM02A.*

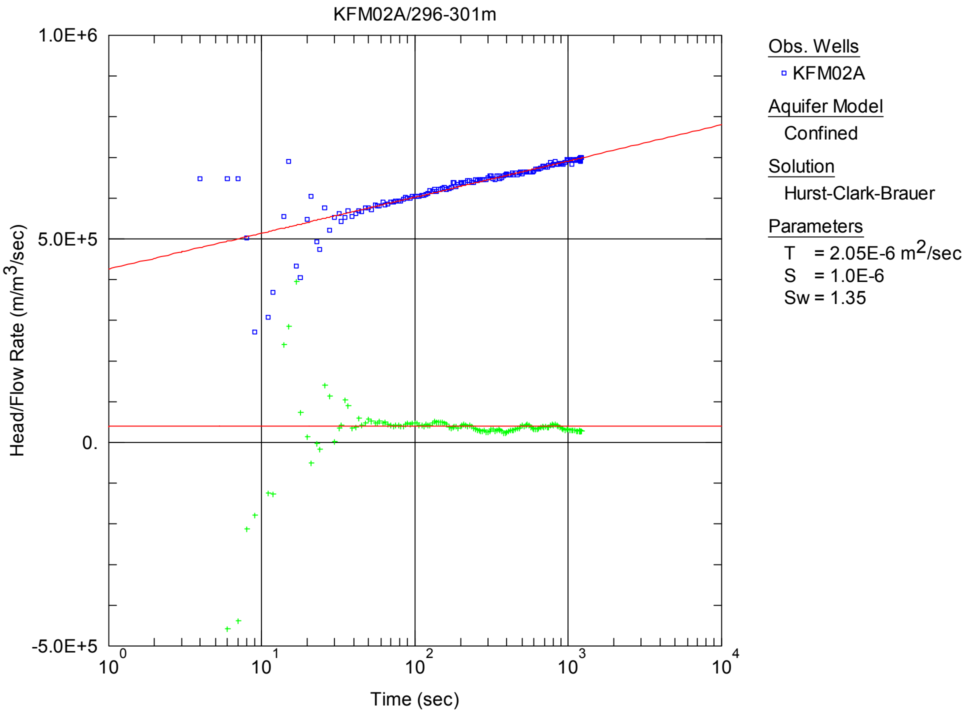



***Figure A3-337.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 296-301 m in KFM02A.*

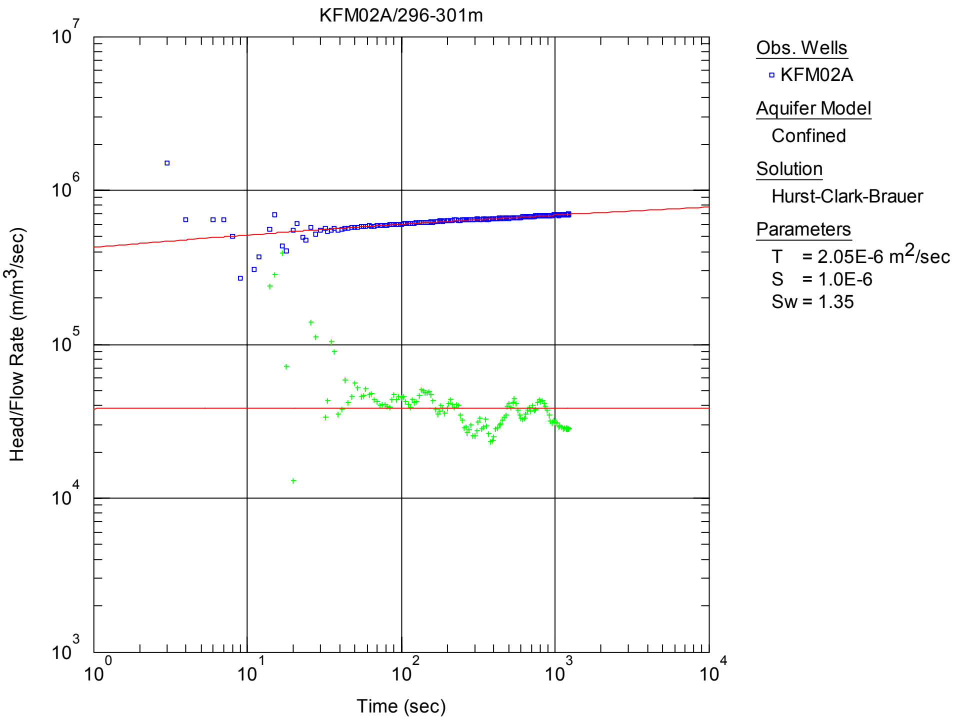



***Figure A3-338.** Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 296-301 m in KFM02A.*

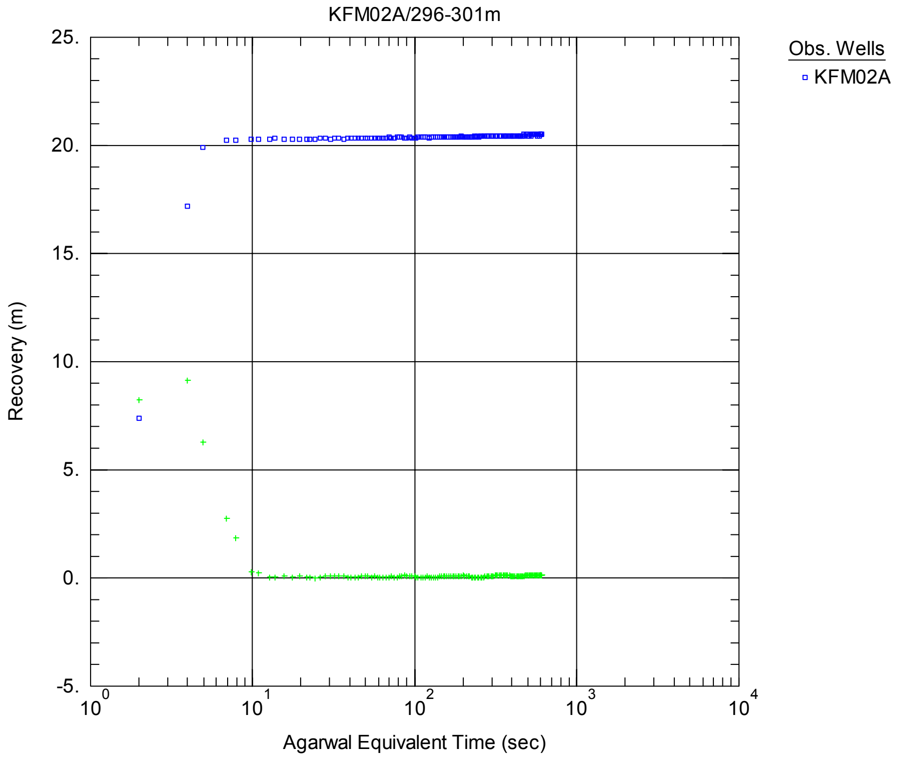



***Figure A3-339.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 296-301 m in KFM02A.*

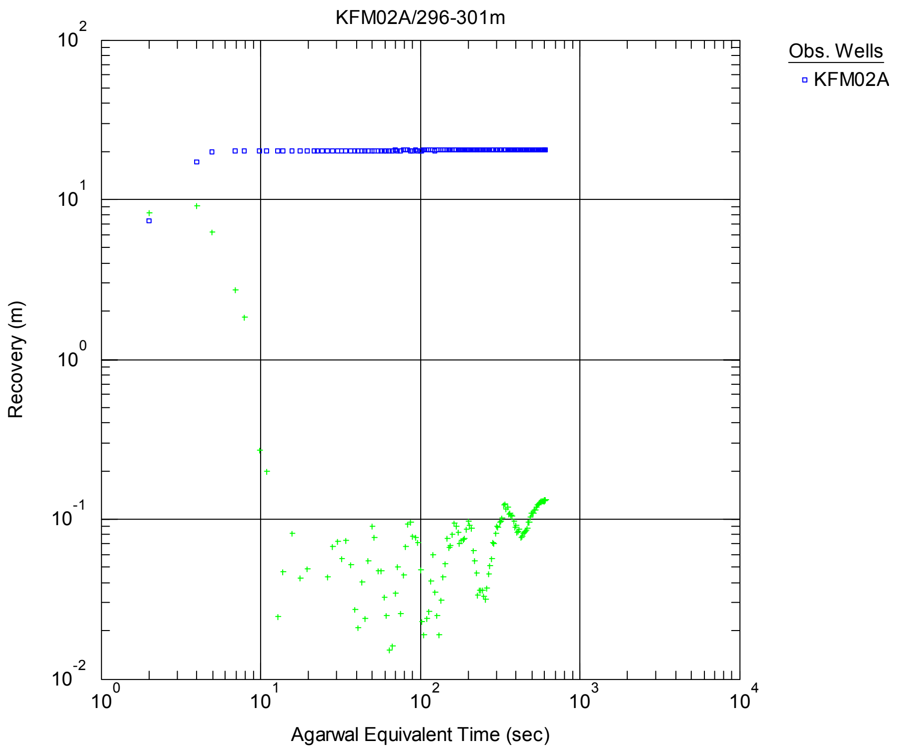



***Figure A3-340.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 296-301 m in KFM02A.*

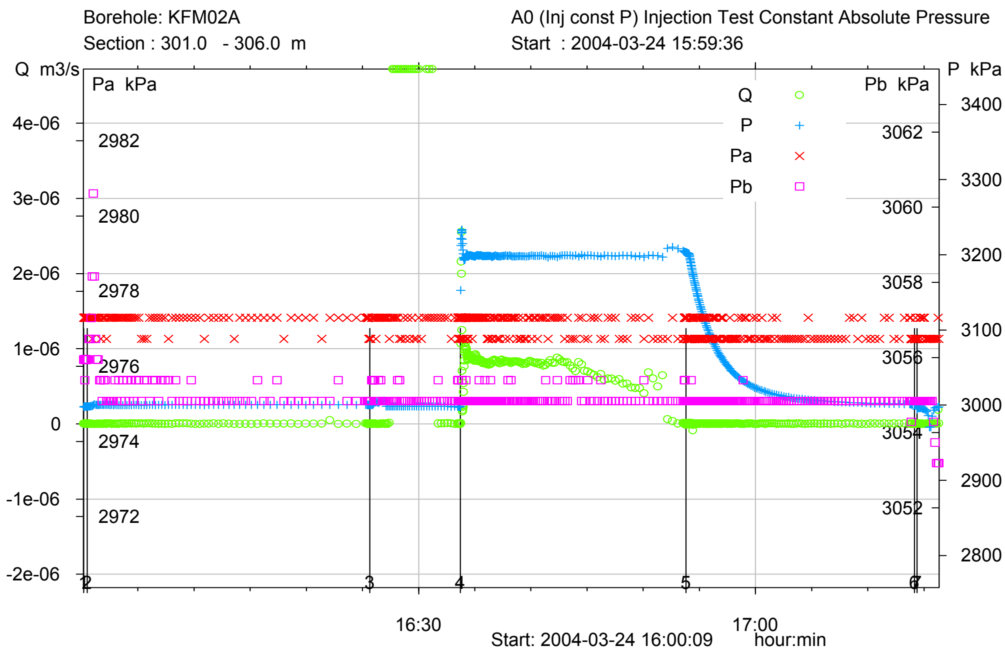



***Figure A3-341.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 301-306 m in borehole KFM02A.*

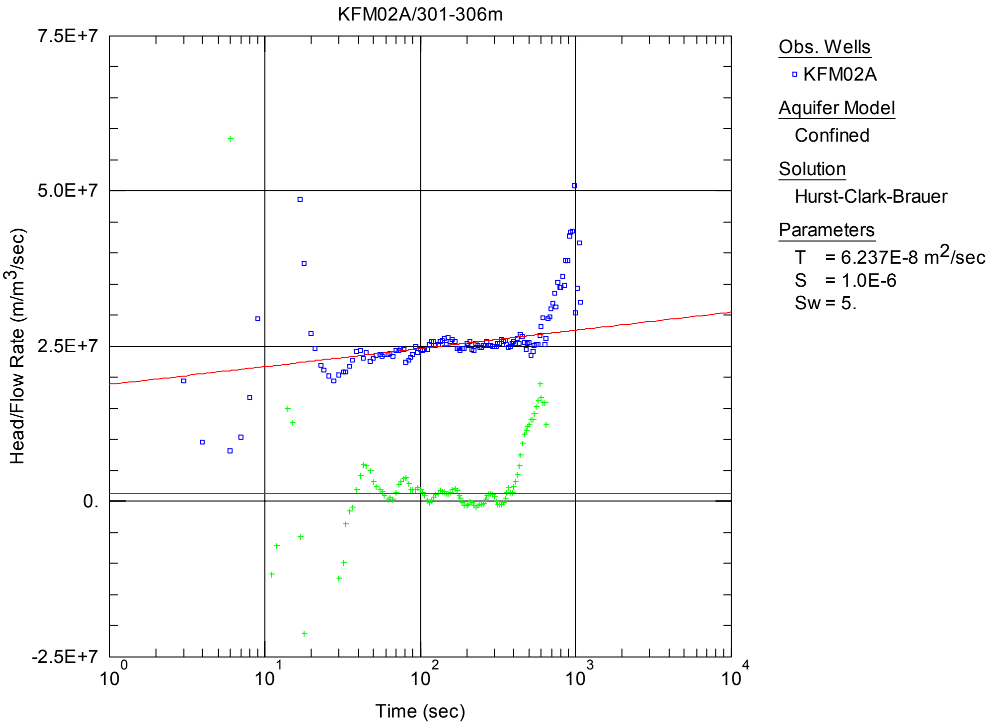



***Figure A3-342.** Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 301-306 m in KFM02A.*

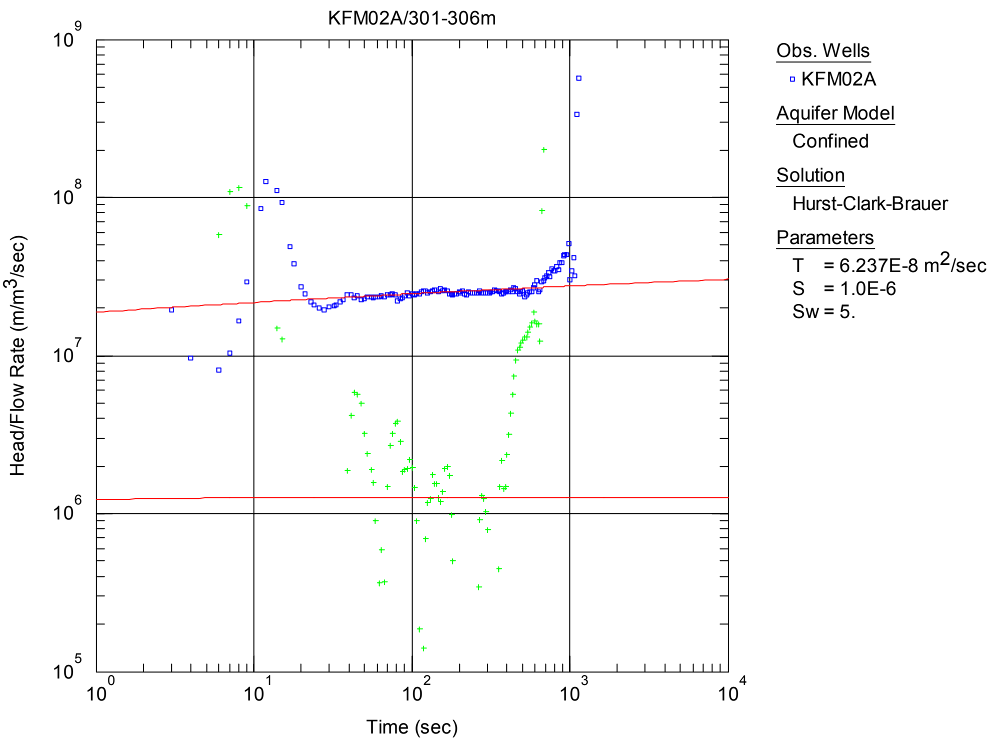



***Figure A3-343.** Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 301-306 m in KFM02A.*

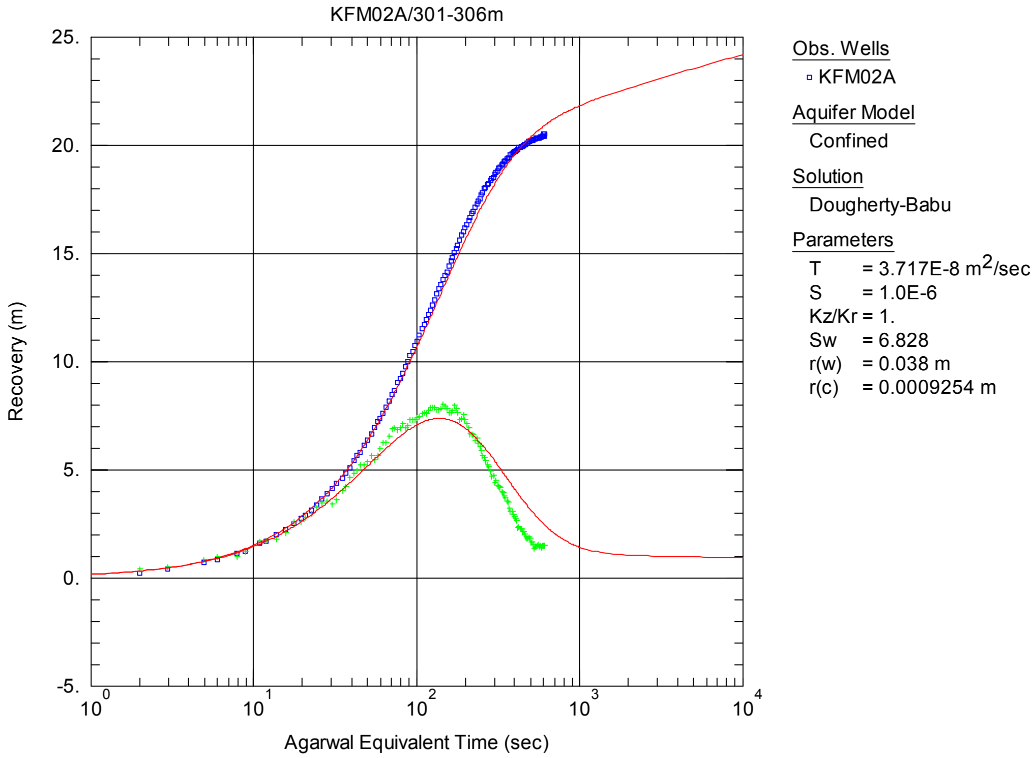



***Figure A3-344.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 301-306 m in KFM02A.*

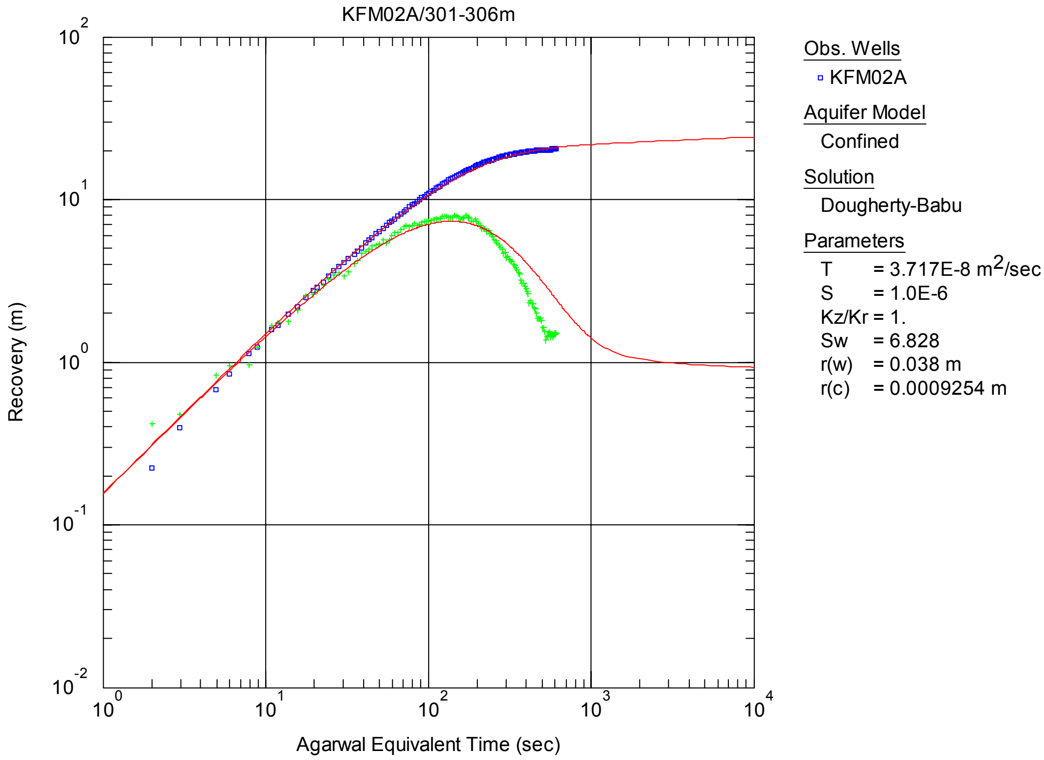



***Figure A3-345.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 301-306 m in KFM02A.*

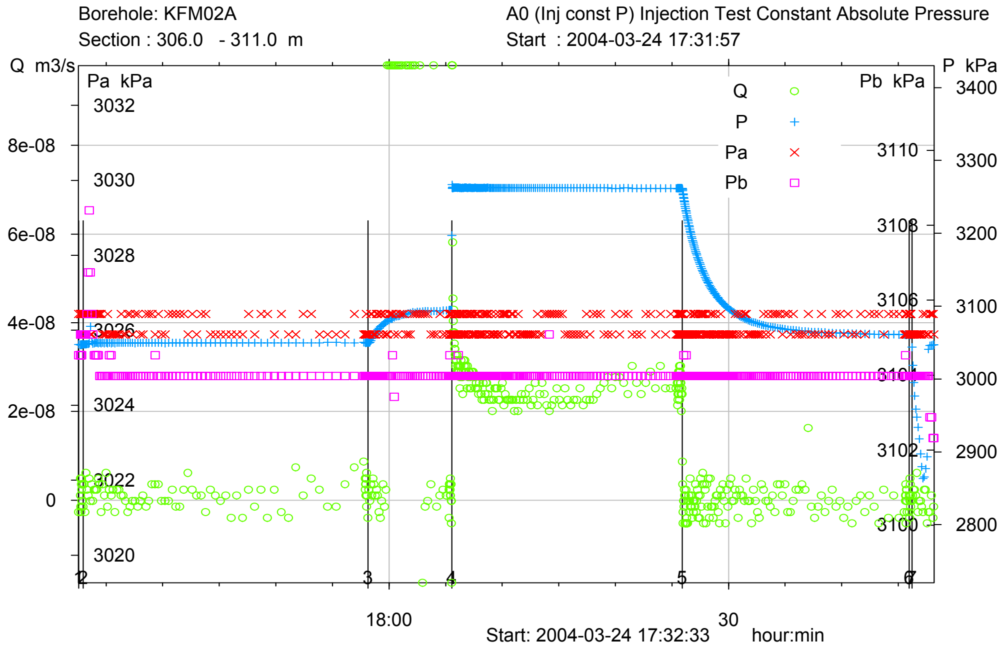



***Figure A3-346.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 306-311 m in borehole KFM02A.*

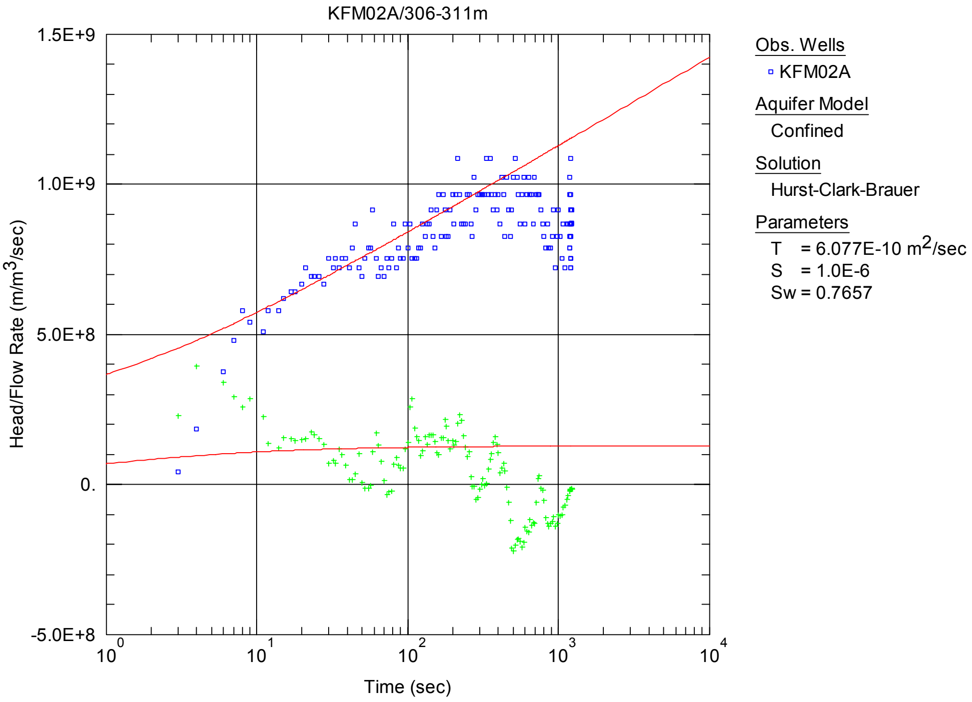



***Figure A3-347.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 306-311 m in KFM02A.*

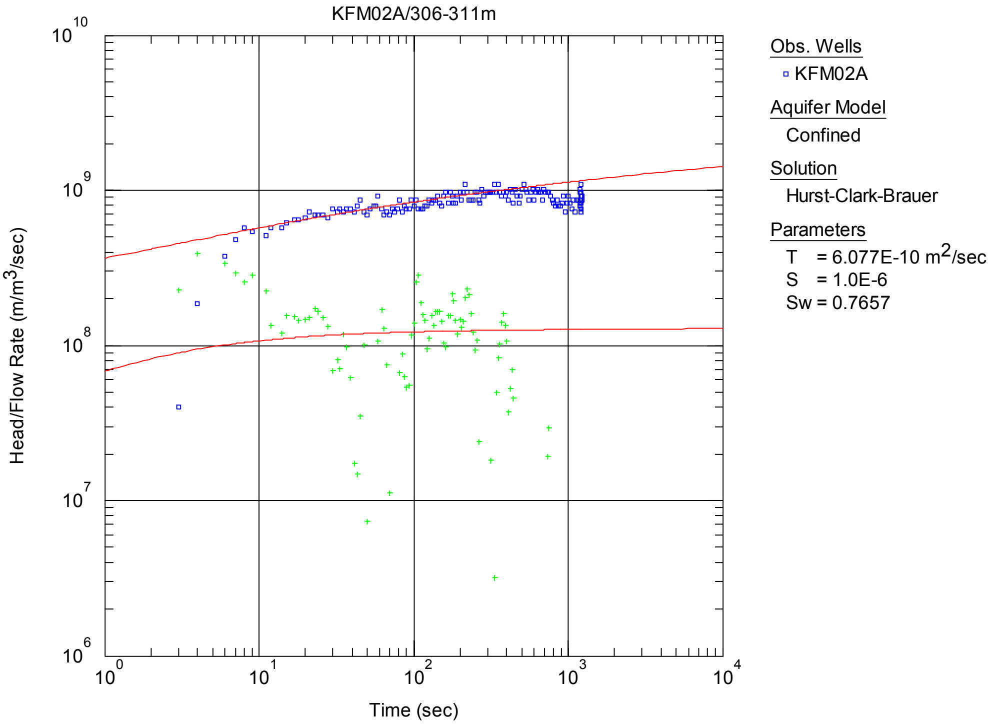



***Figure A3-348.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 306-311 m in KFM02A.*

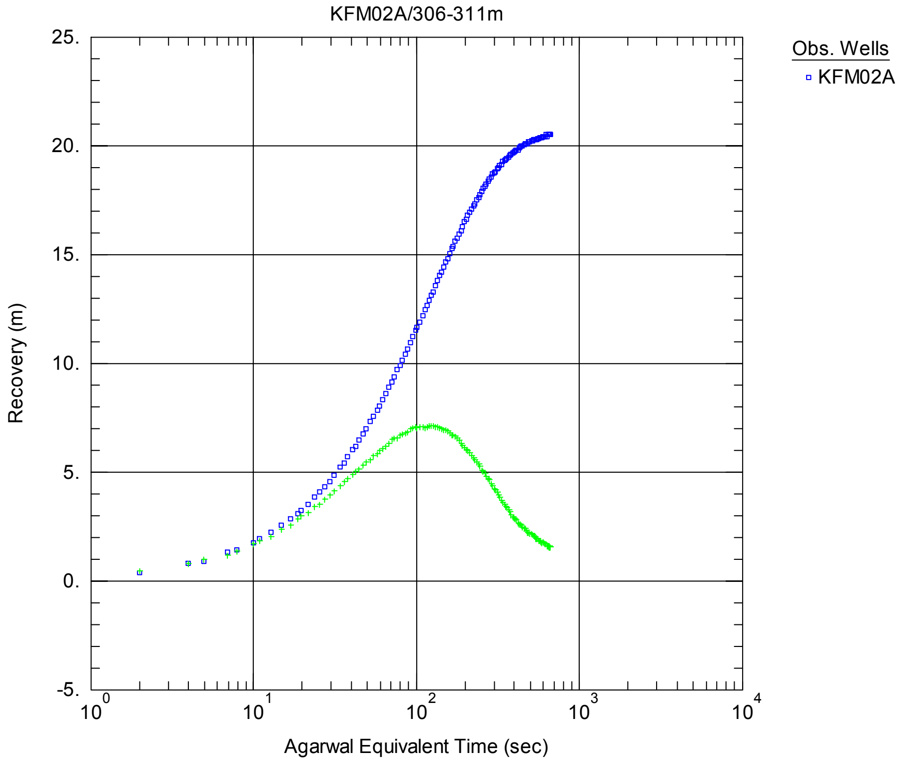



***Figure A3-349.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 306-311 m in KFM02A.*

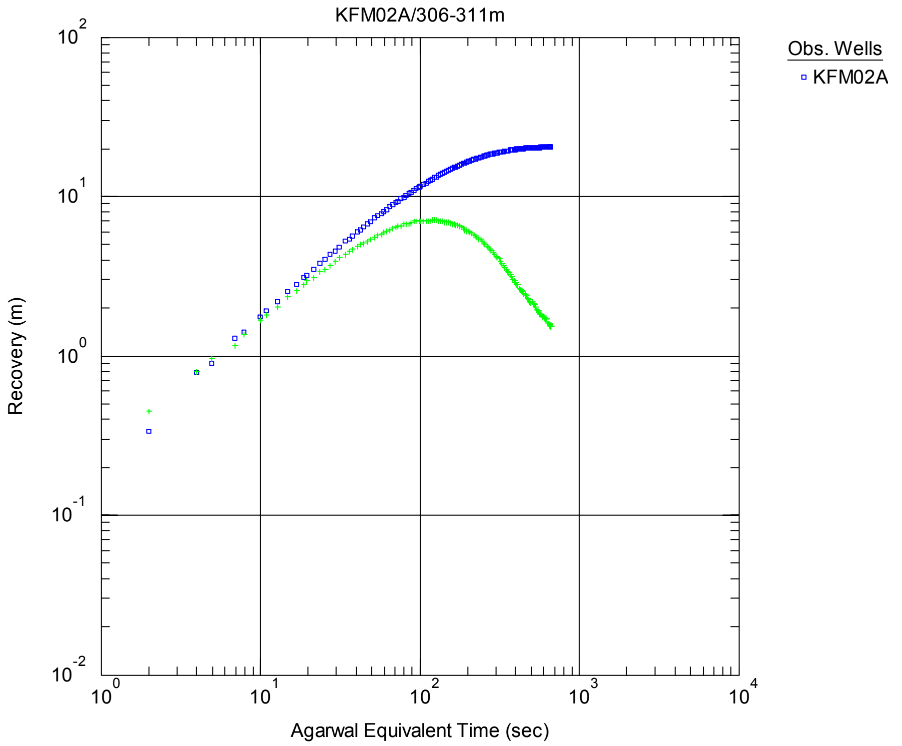



***Figure A3-350.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 306-311 m in KFM02A.*

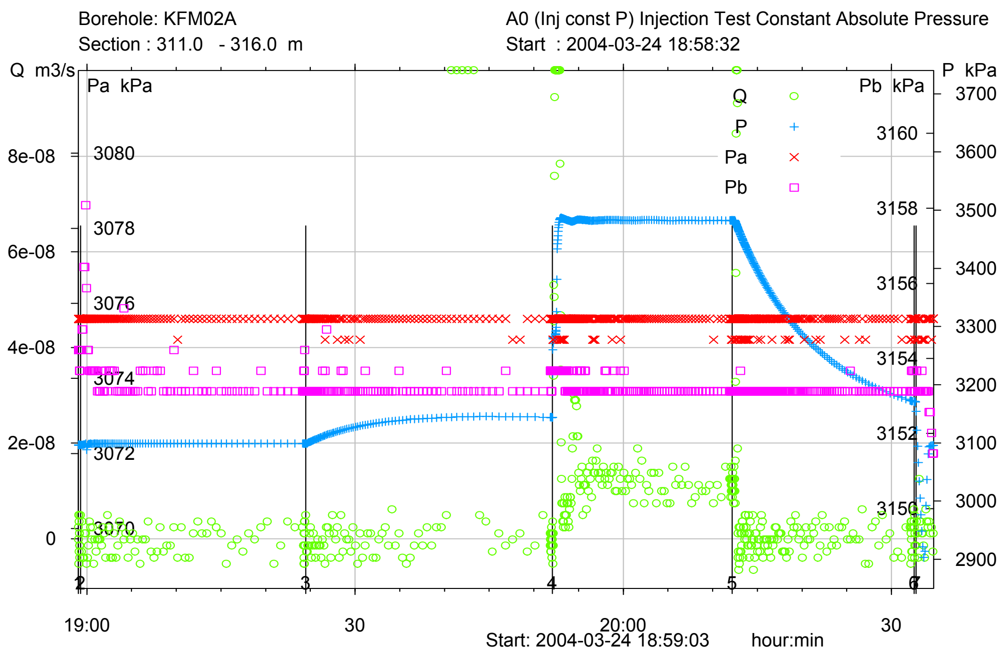



***Figure A3-351.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 311-316 m in borehole KFM02A.*

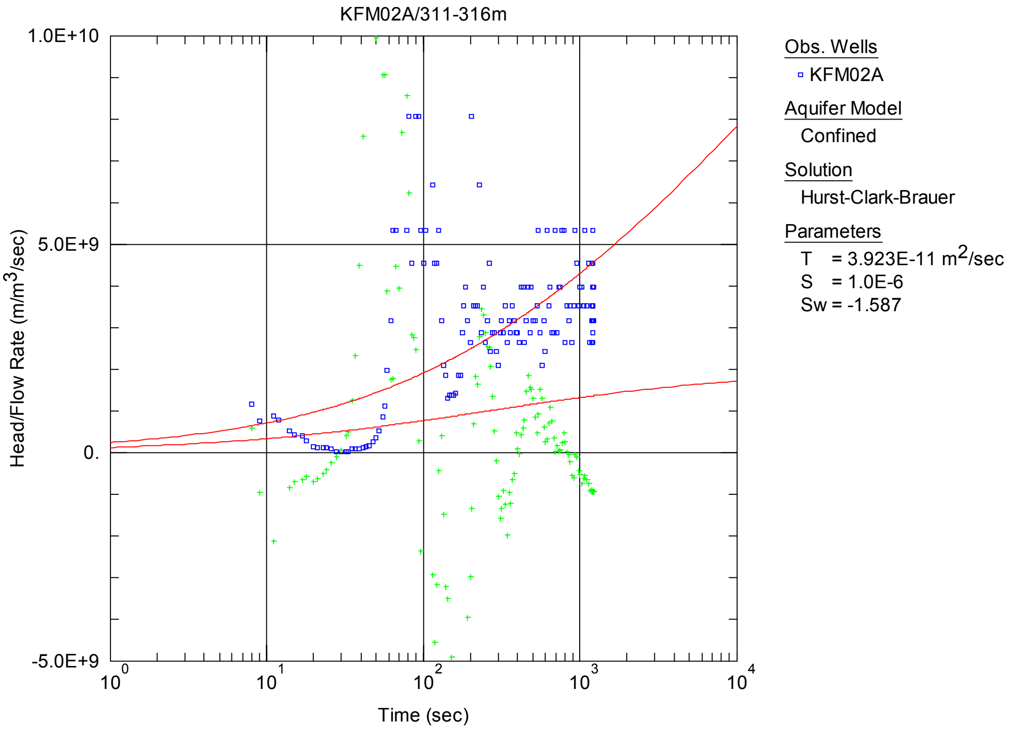



***Figure A3-352.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 311-316 m in KFM02A.*

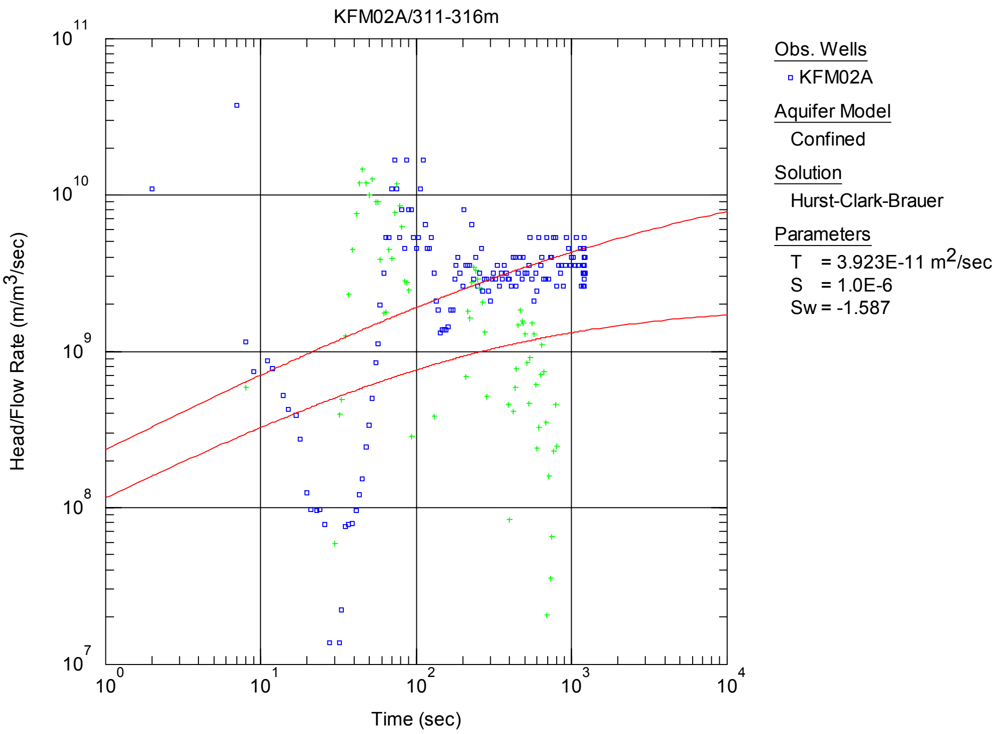



***Figure A3-353.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 311-316 m in KFM02A.*

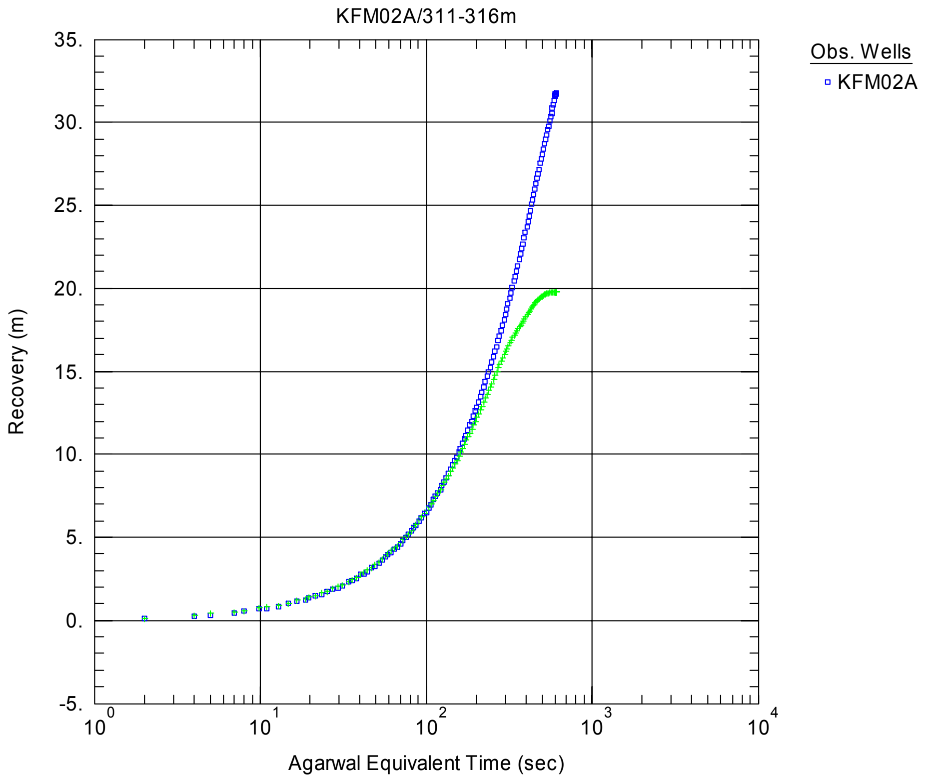



***Figure A3-354.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 311-316 m in KFM02A.*

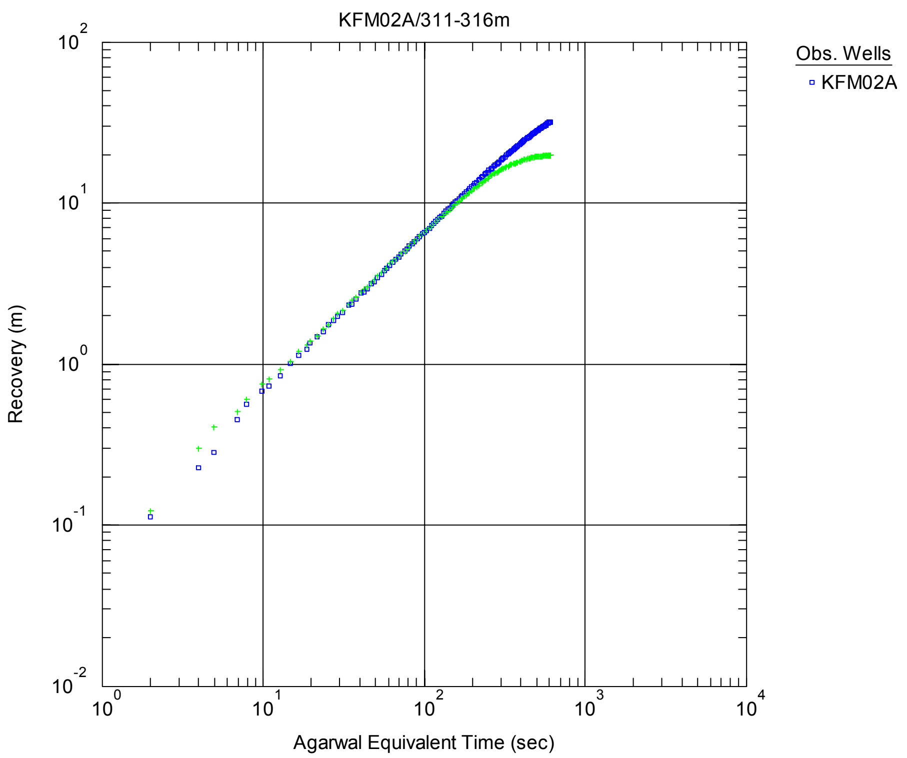



***Figure A3-355.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 311-316 m in KFM02A.*

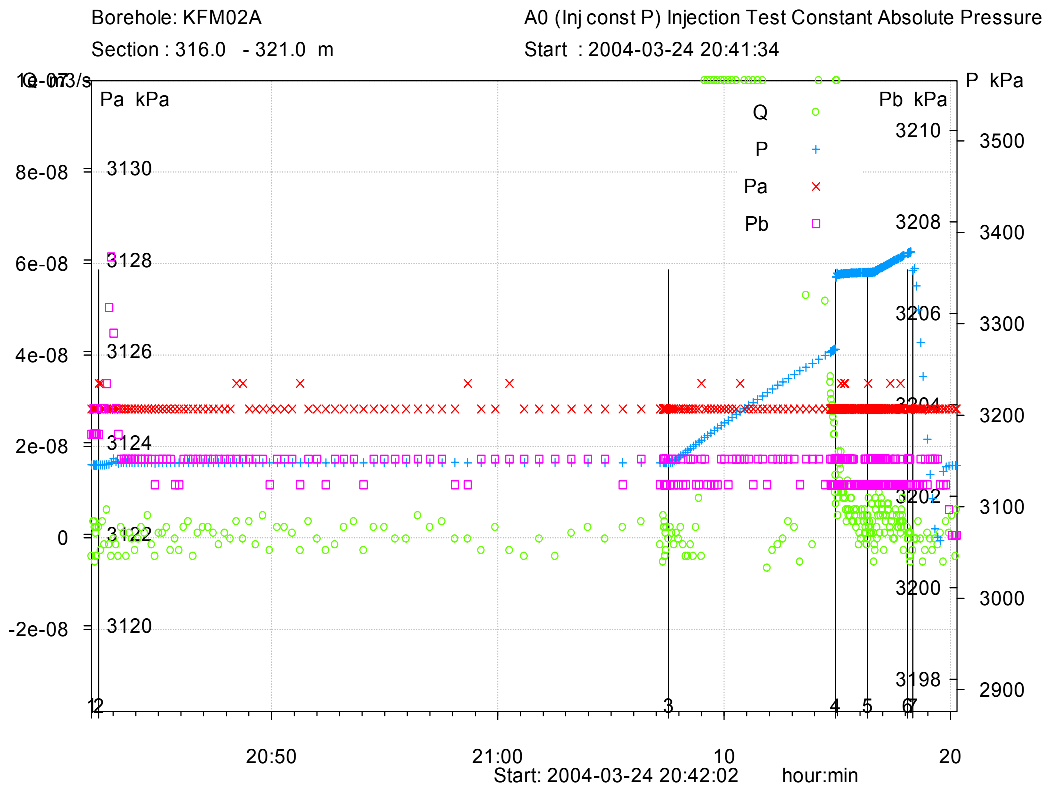



*Figure A3-356.* *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 316-321 m in borehole KFM02A.*

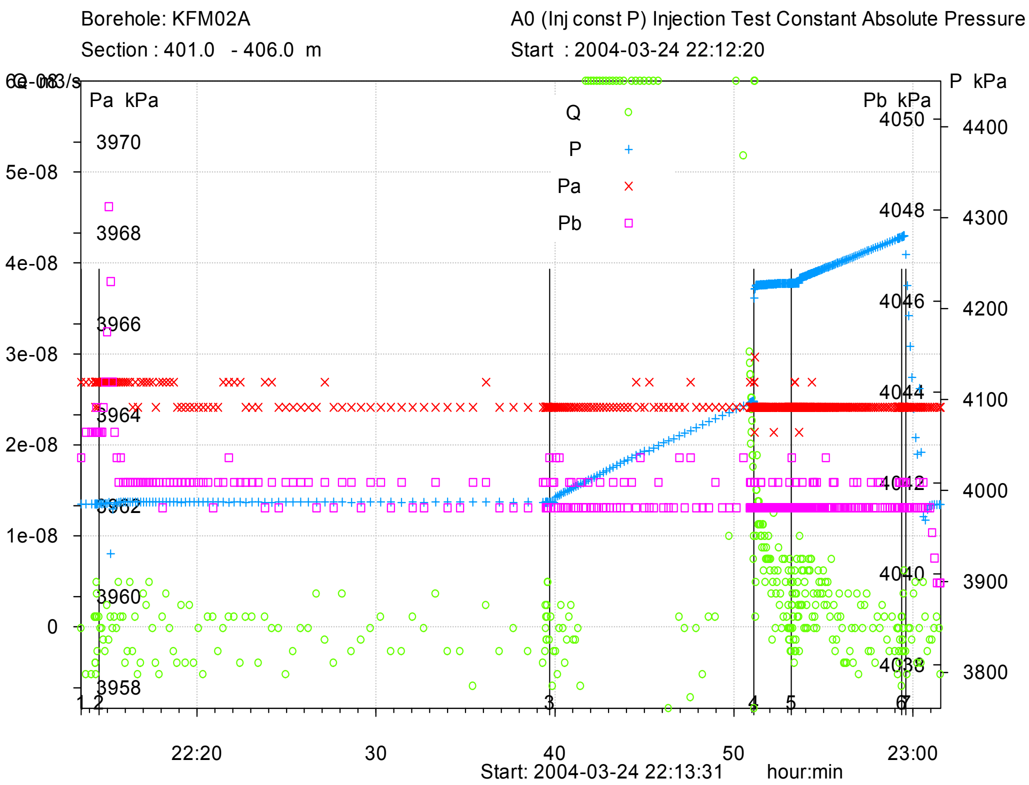



*Figure A3-357. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 401-406 m in borehole KFM02A.*

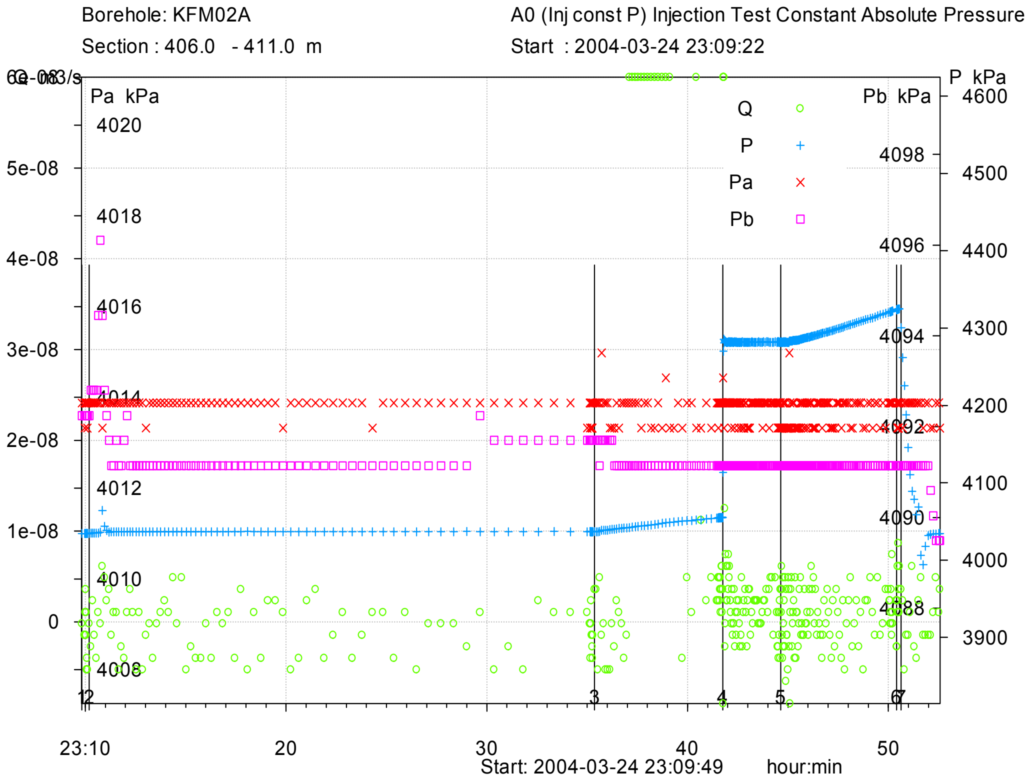



***Figure A3-358.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 406-411 m in borehole KFM02A.*

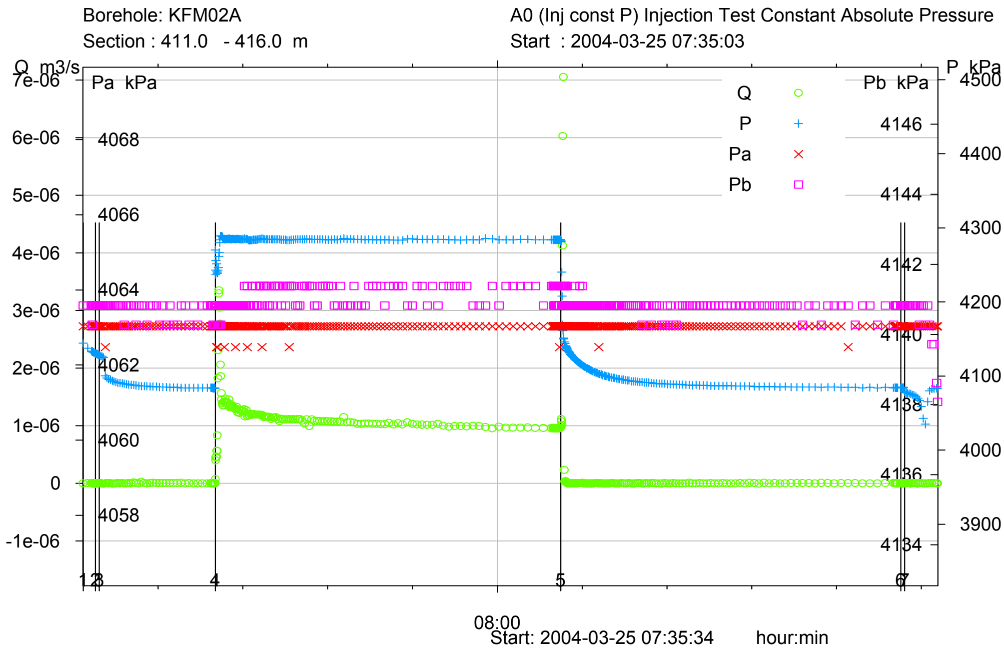



***Figure A3-359.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 411-416 m in borehole KFM02A.*

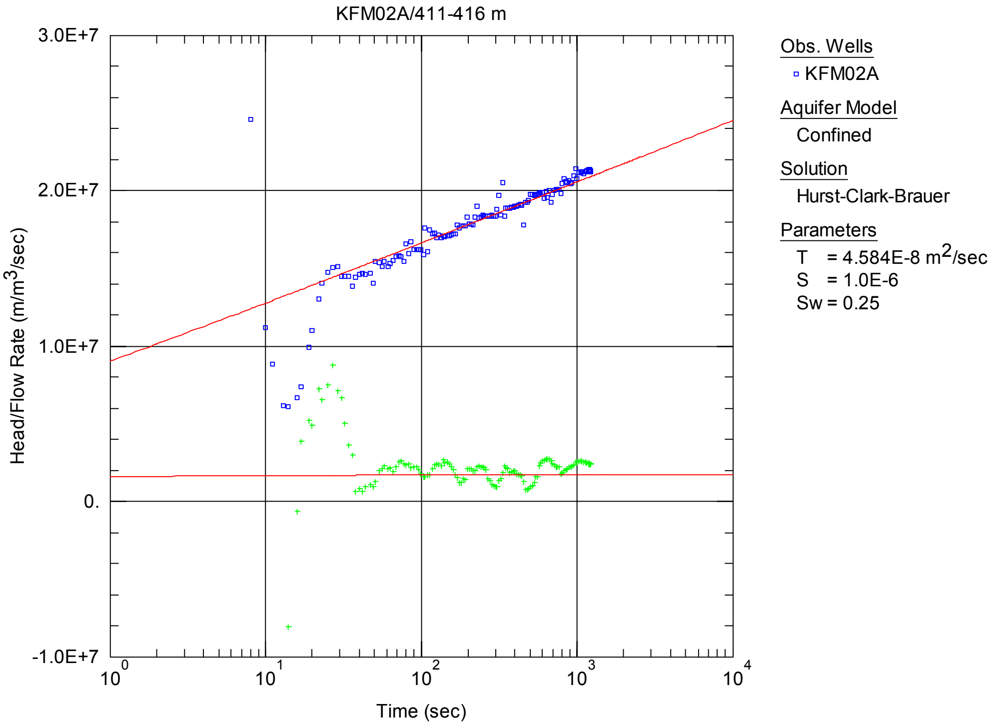



***Figure A3-360.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 411-416 m in KFM02A.*

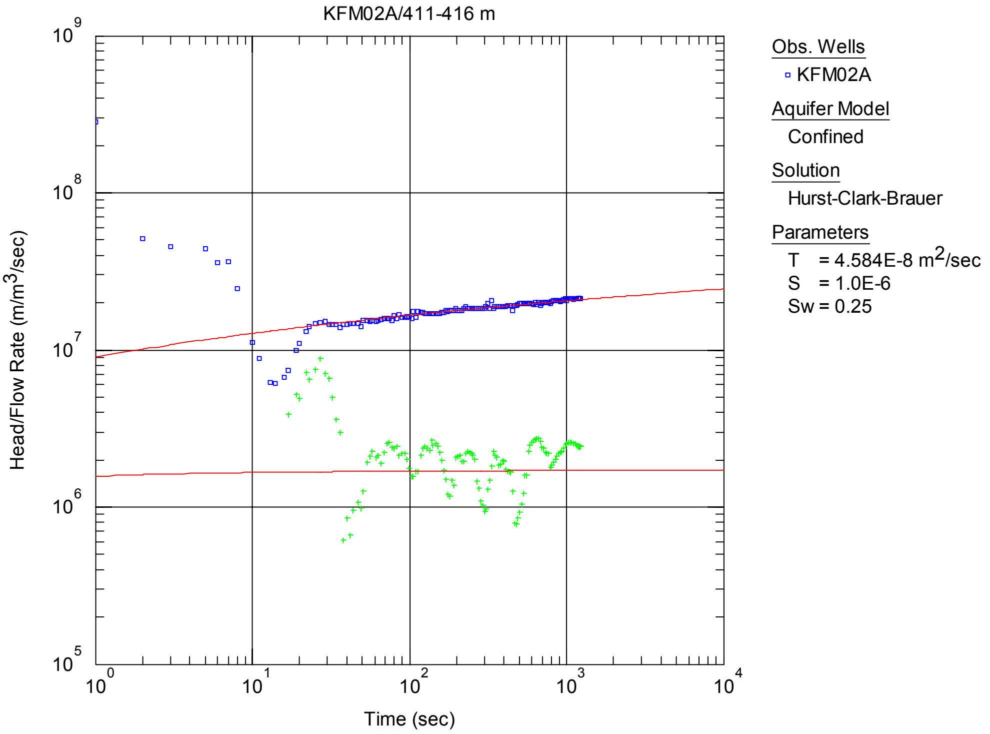



***Figure A3-361.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 411-416 m in KFM02A.*

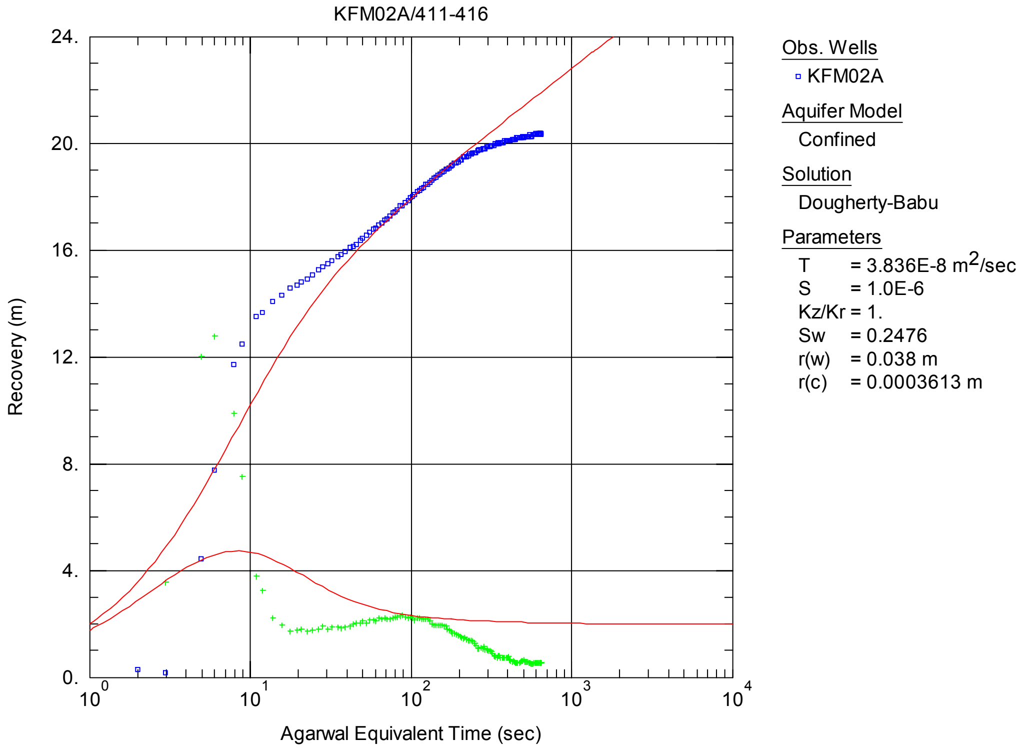



***Figure A3-362.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 411-416 m in KFM02A.*

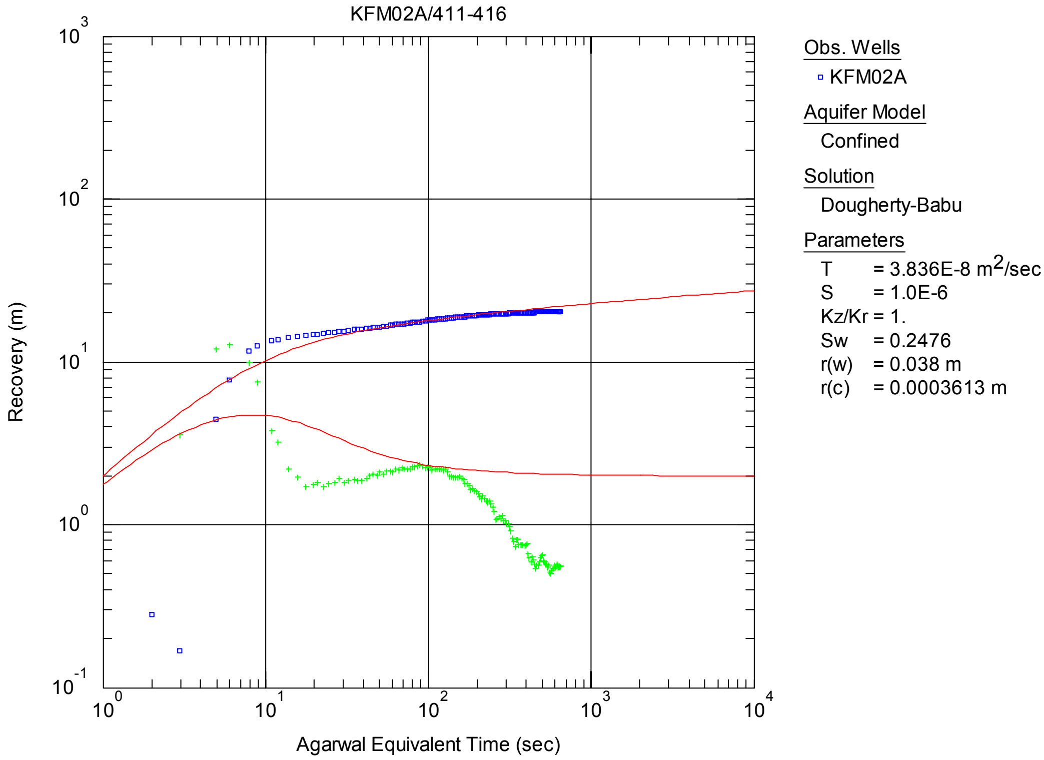



***Figure A3-363.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 411-416 m in KFM02A.*

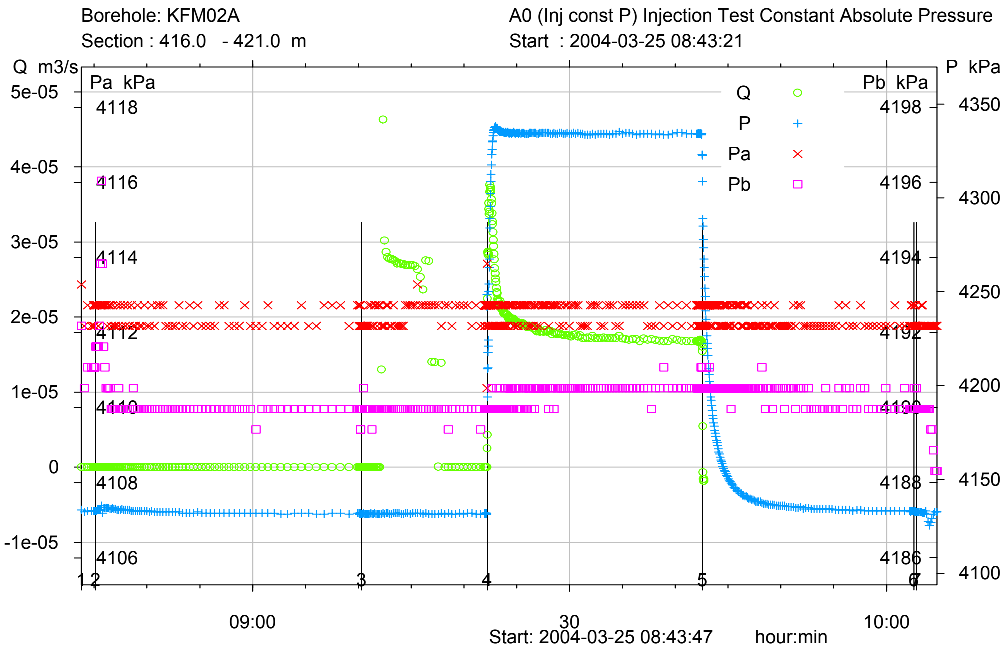



***Figure A3-364.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 416-421 m in borehole KFM02A.*

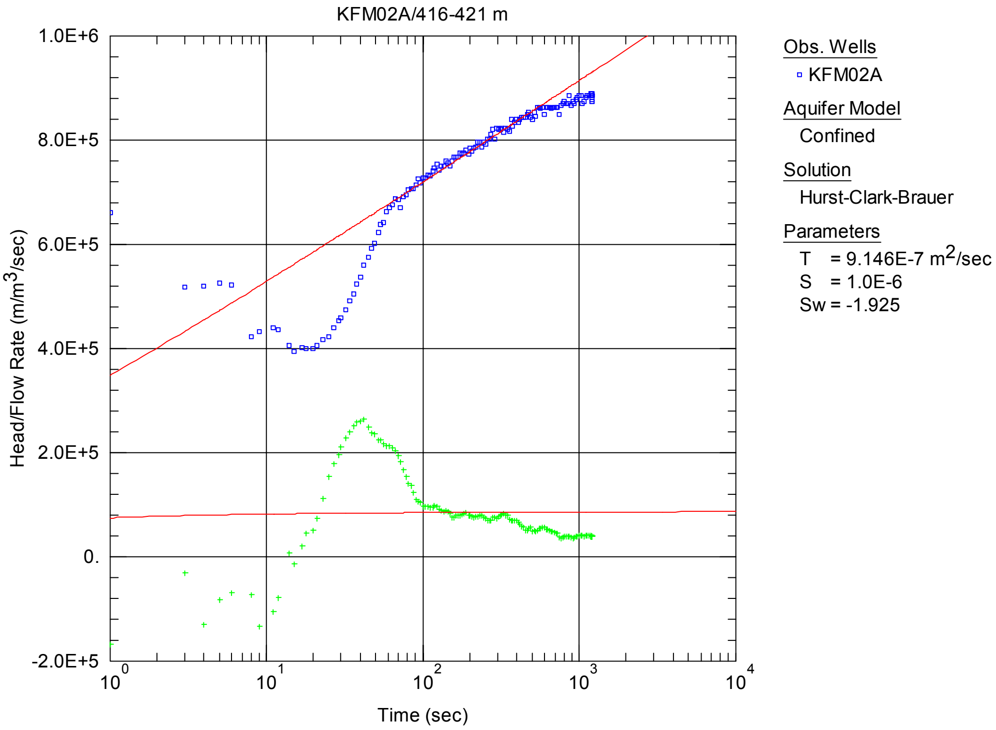



***Figure A3-365.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 416-421 m in KFM02A.*

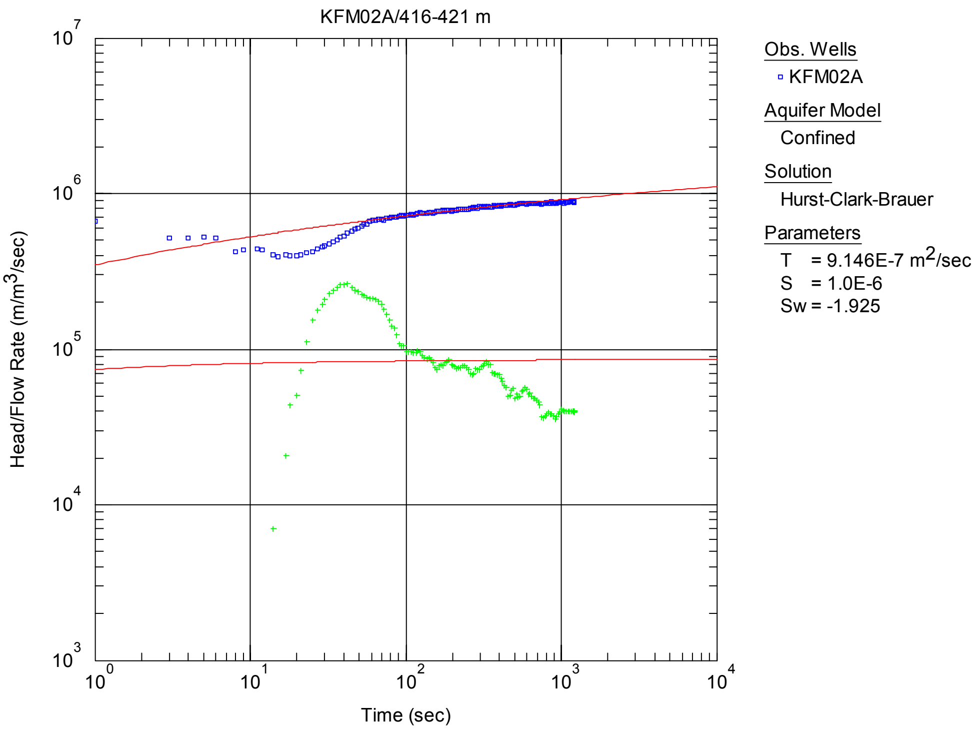



***Figure A3-366.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 416-421 m in KFM02A.*

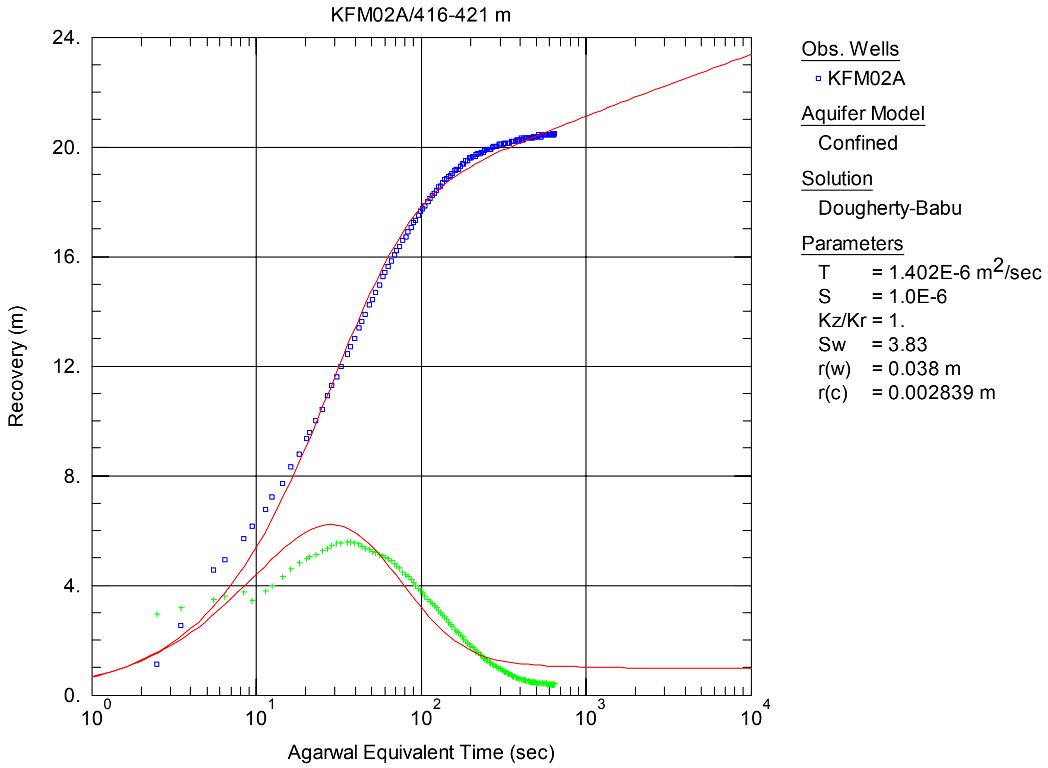



***Figure A3-367.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 416-421 m in KFM02A.*

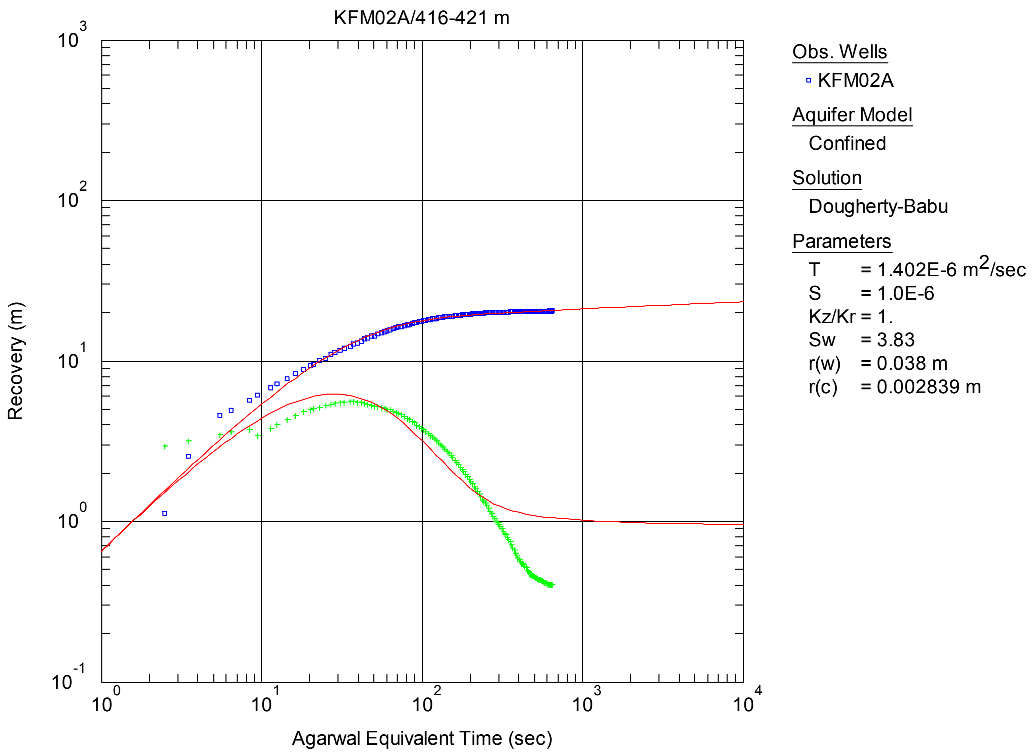



***Figure A3-368.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 416-421 m in KFM02A.*

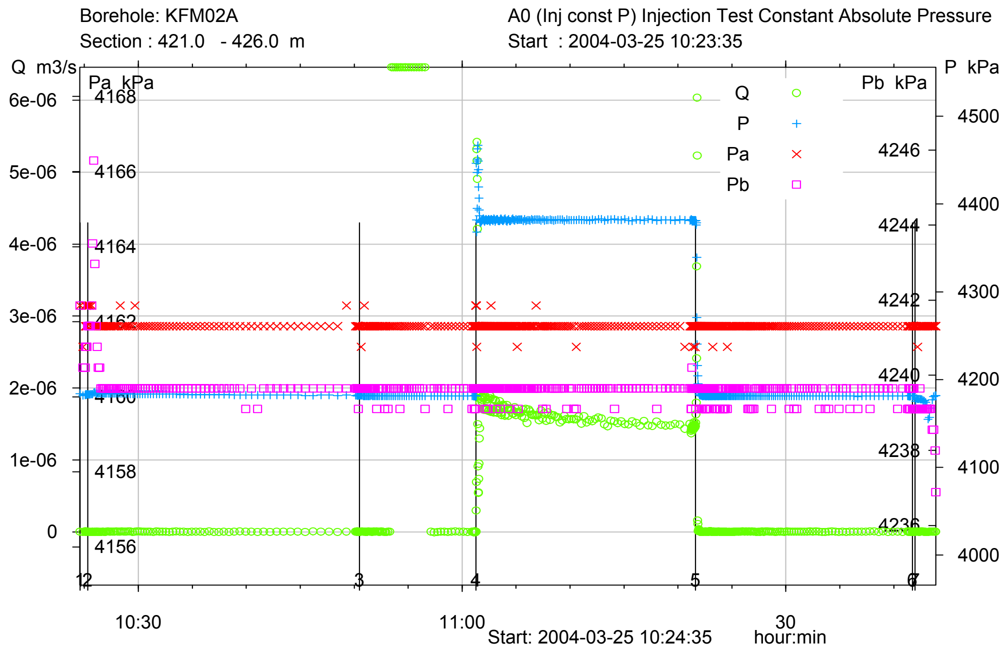



***Figure A3-369.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 421-426 m in borehole KFM02A.*

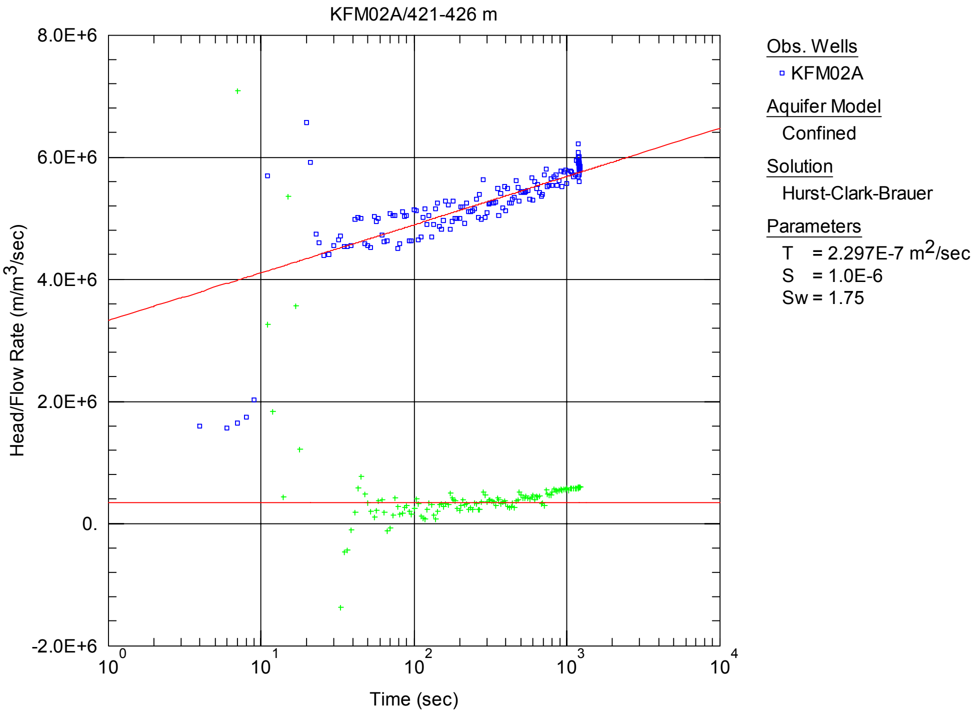



***Figure A3-370.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 421-426 m in KFM02A.*

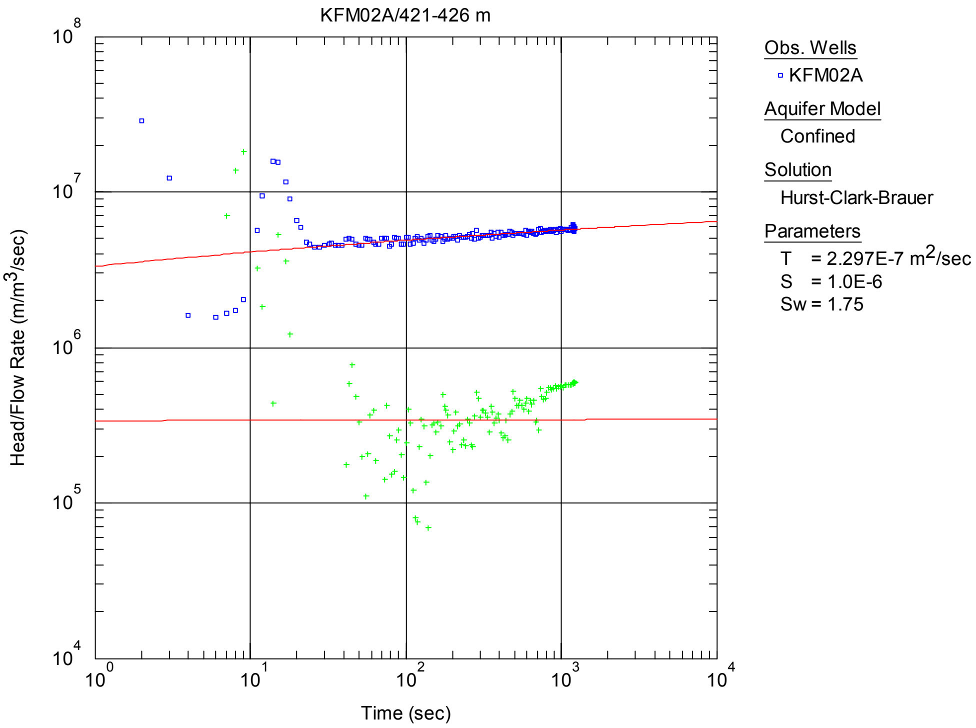



***Figure A3-371.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 421-426 m in KFM02A.*

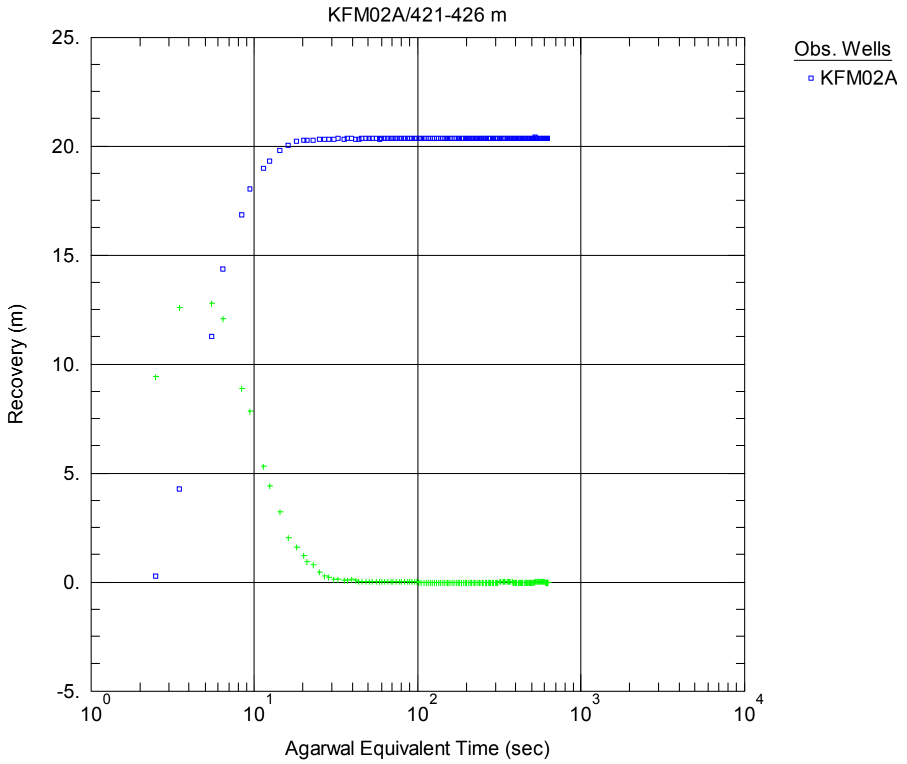



***Figure A3-372.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 421-426 m in KFM02A.*

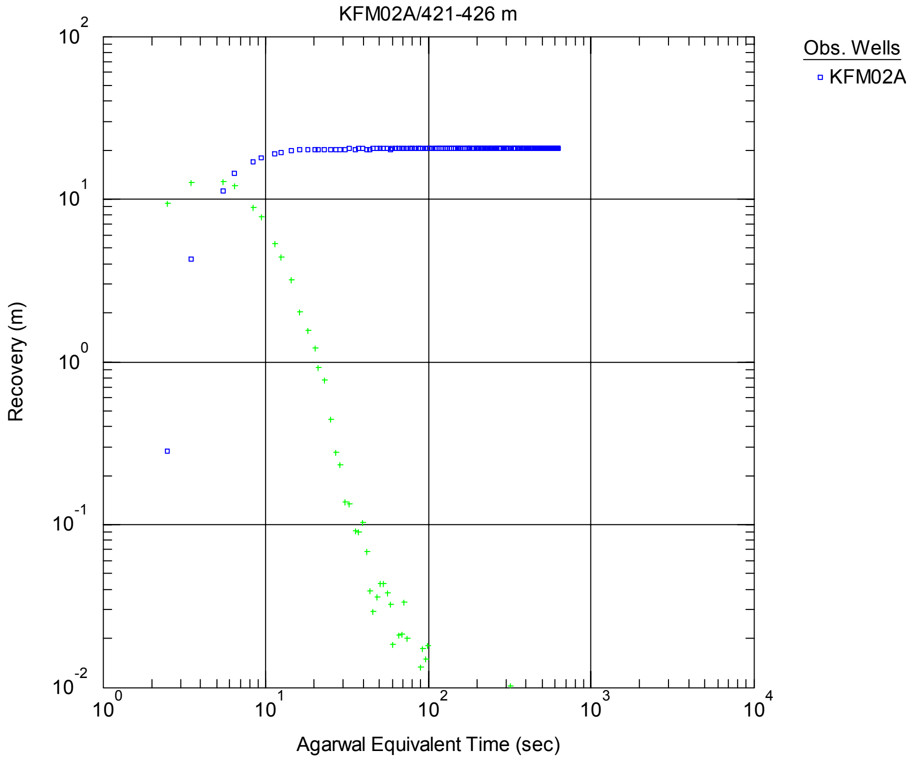



***Figure A3-373.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 421-426 m in KFM02A.*

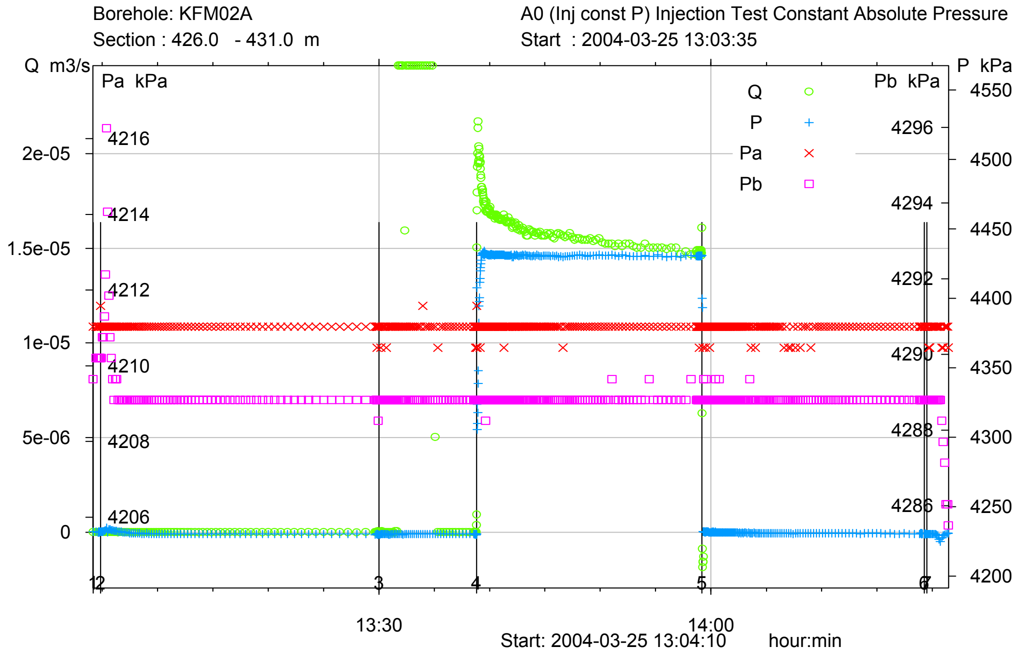



***Figure A3-374.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 426-431 m in borehole KFM02A.*

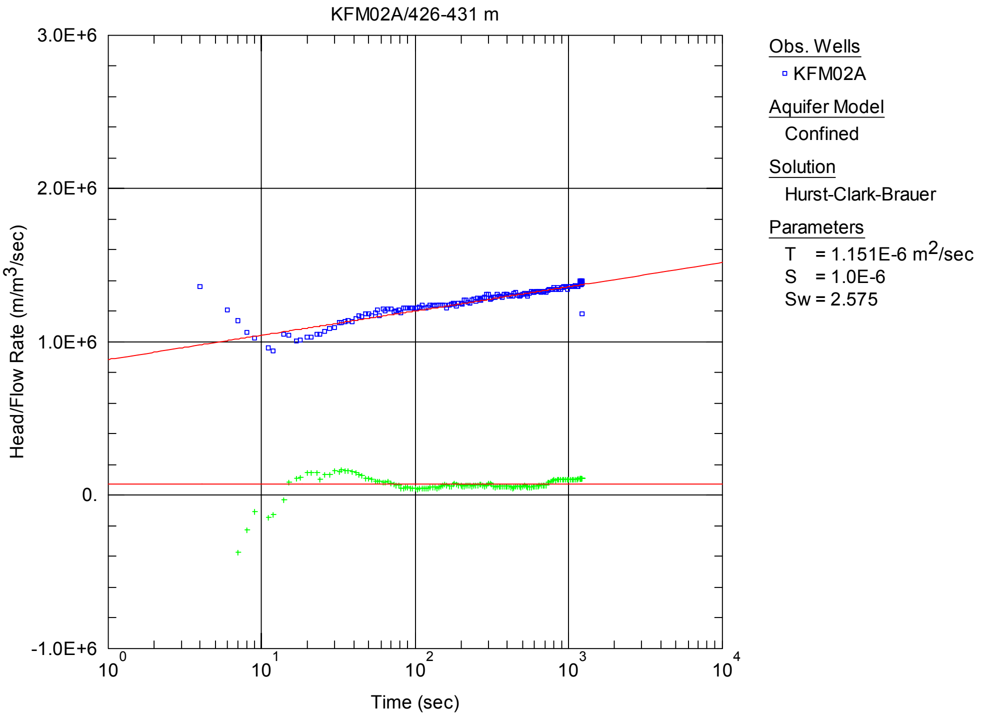



***Figure A3-375.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 426-431 m in KFM02A.*

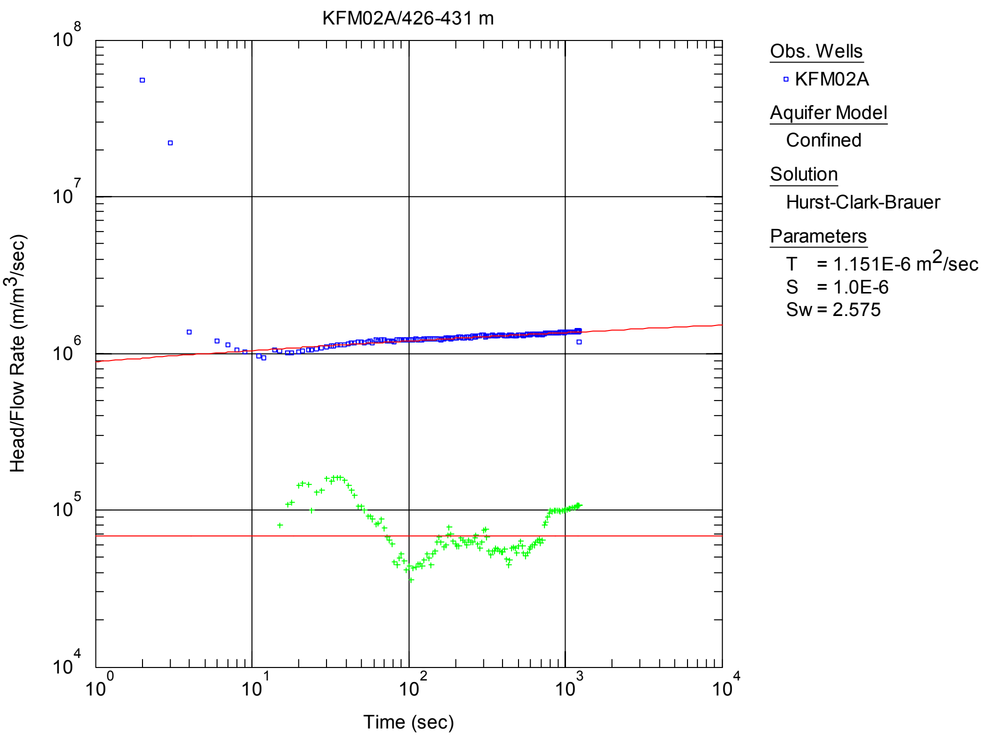



***Figure A3-376.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 426-431 m in KFM02A.*

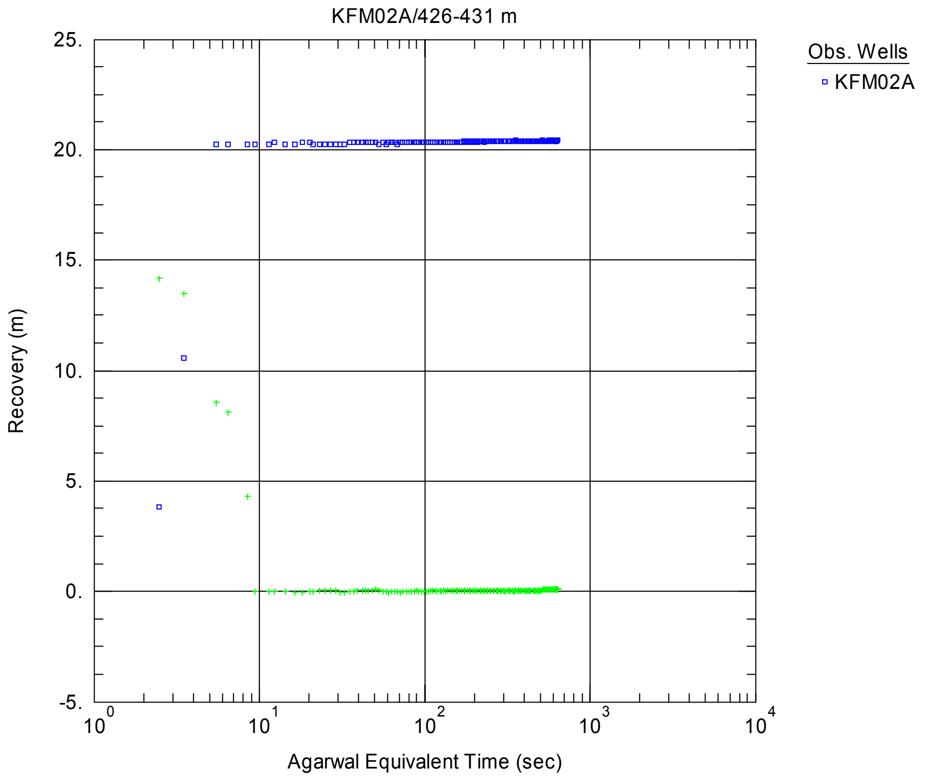



***Figure A3-377.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 426-431 m in KFM02A.*

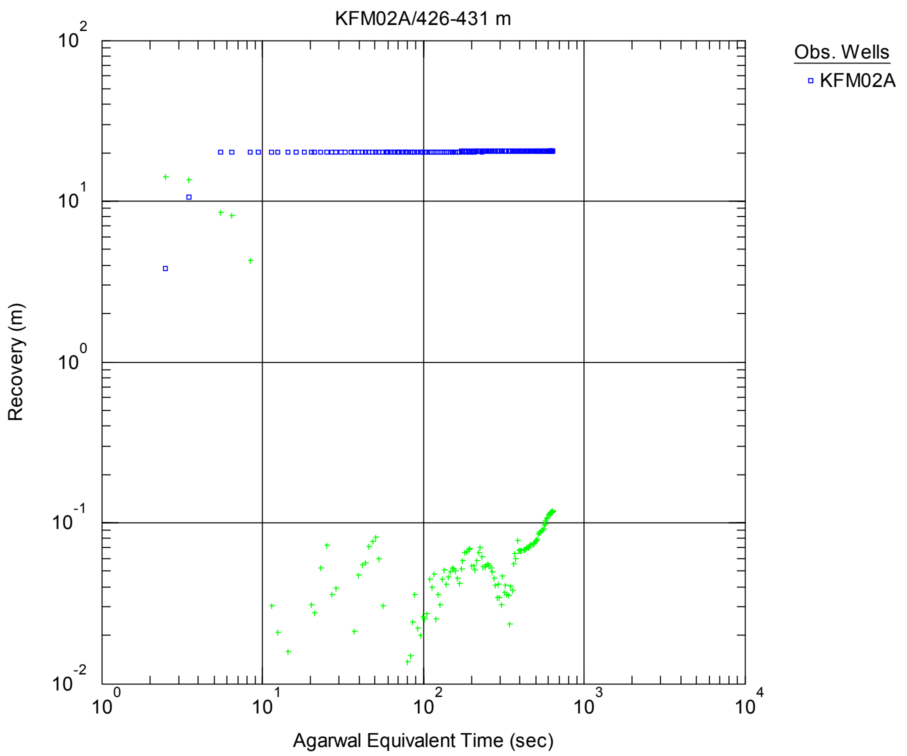



***Figure A3-378.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 426-431 m in KFM02A.*

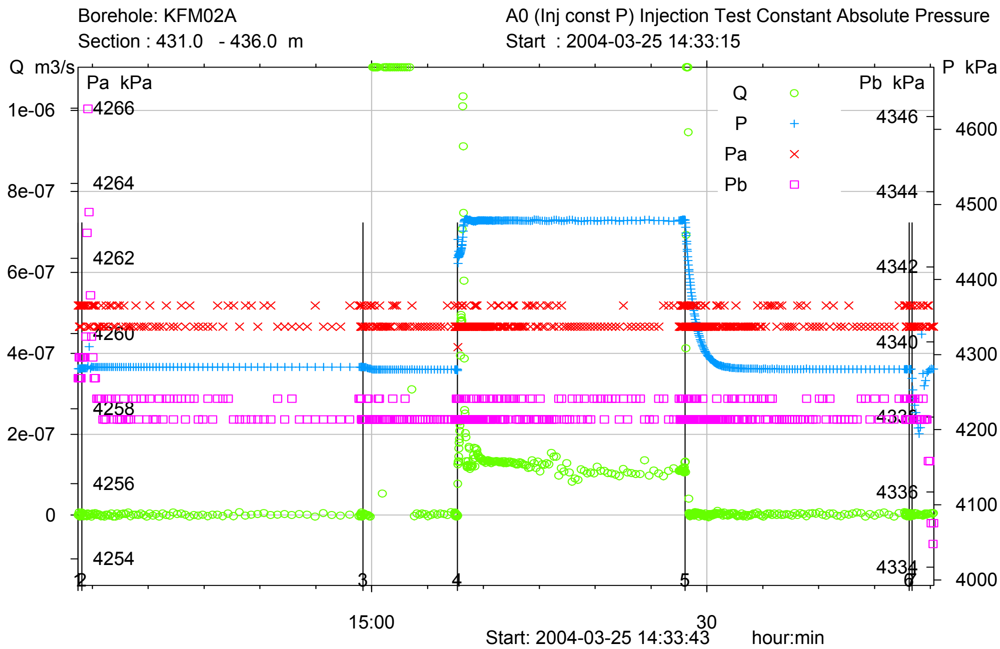



***Figure A3-379.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 431-436 m in borehole KFM02A.*

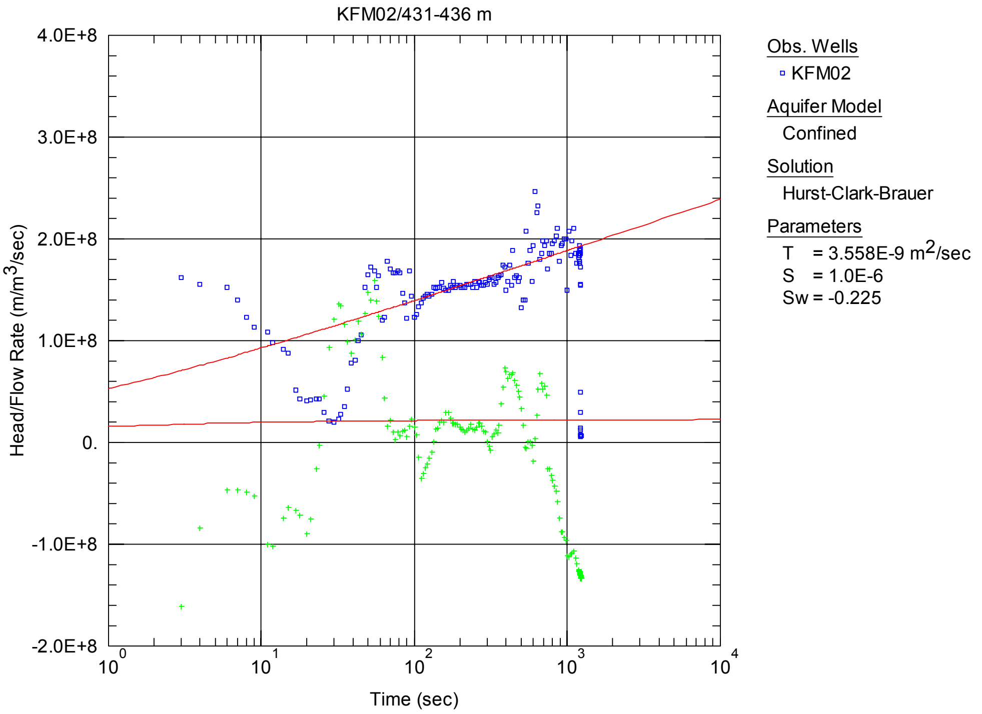



***Figure A3-380.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 431-436 m in KFM02A.*

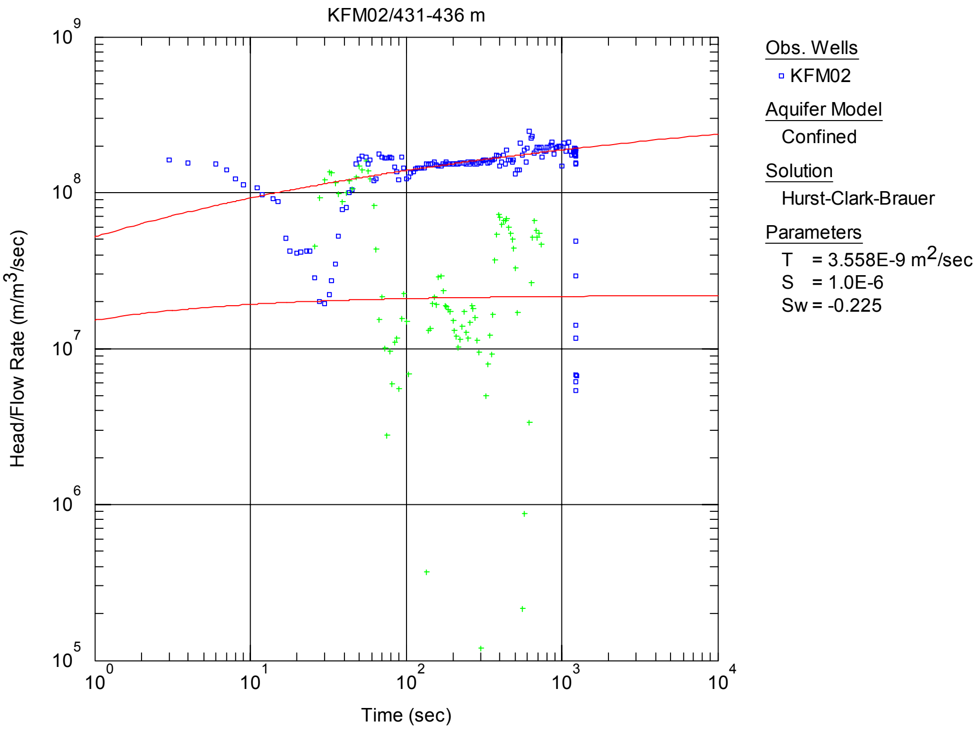



***Figure A3-381.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 431-436 m in KFM02A.*

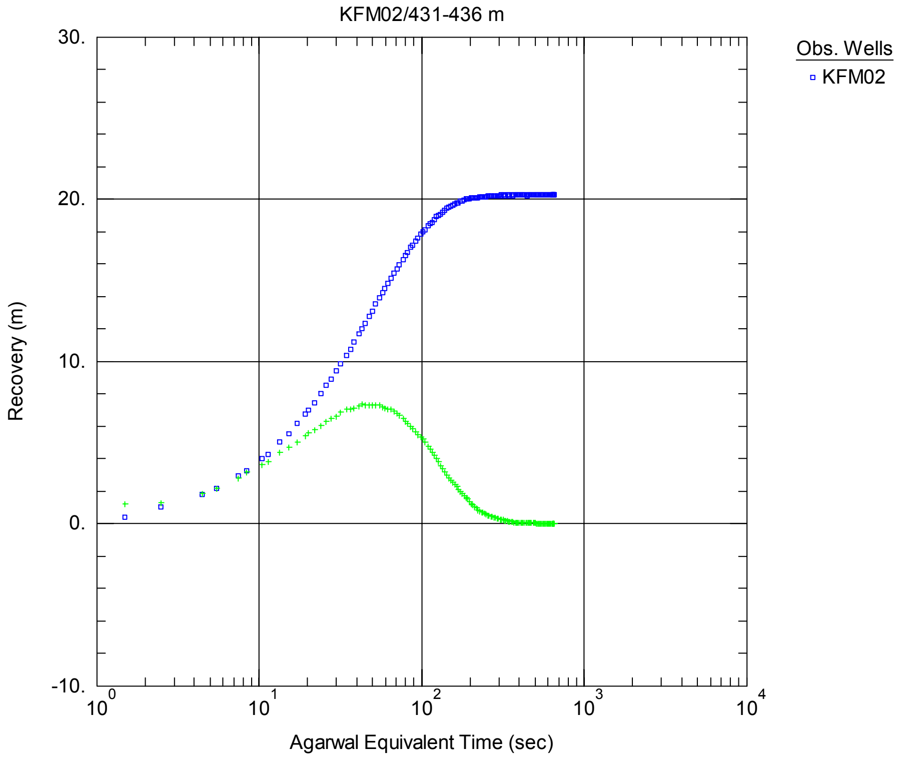



***Figure A3-382.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 431-436 m in KFM02A.*

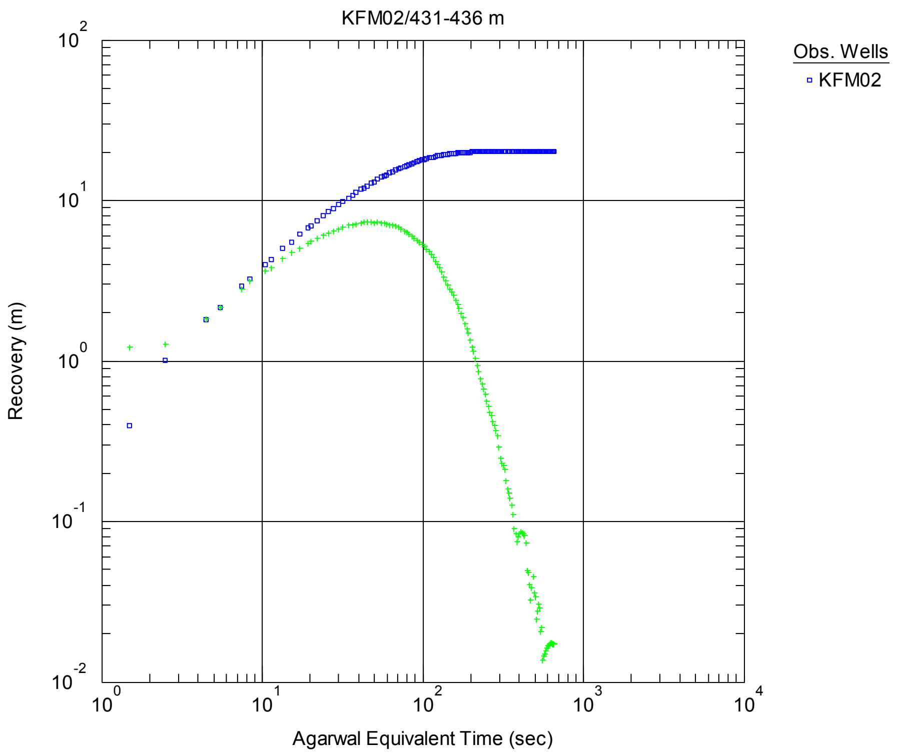



***Figure A3-383.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 431-436 m in KFM02A.*

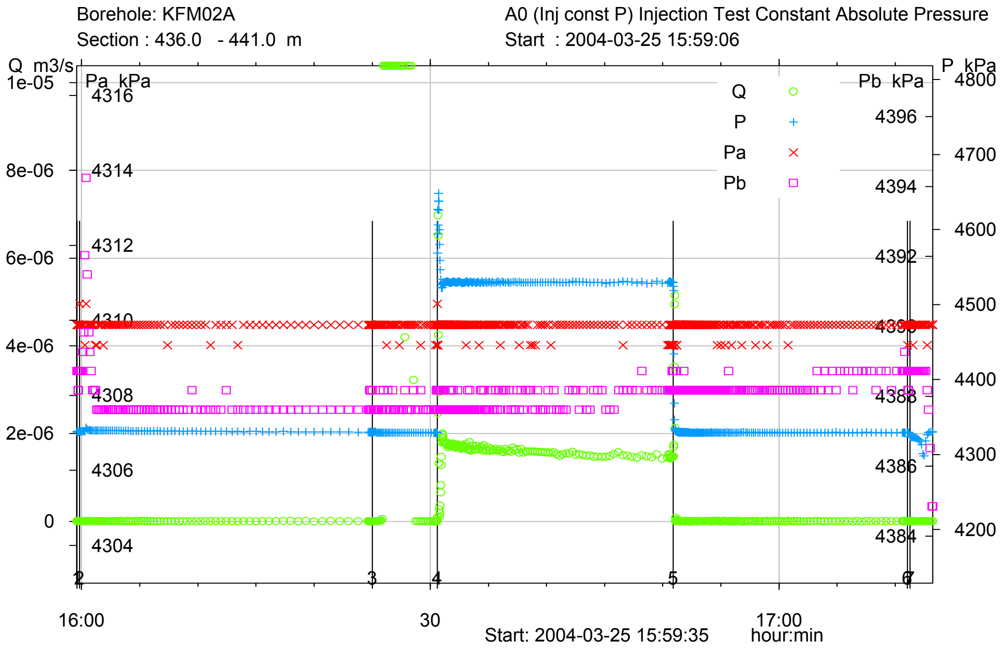



***Figure A3-384.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 436-441 m in borehole KFM02A.*

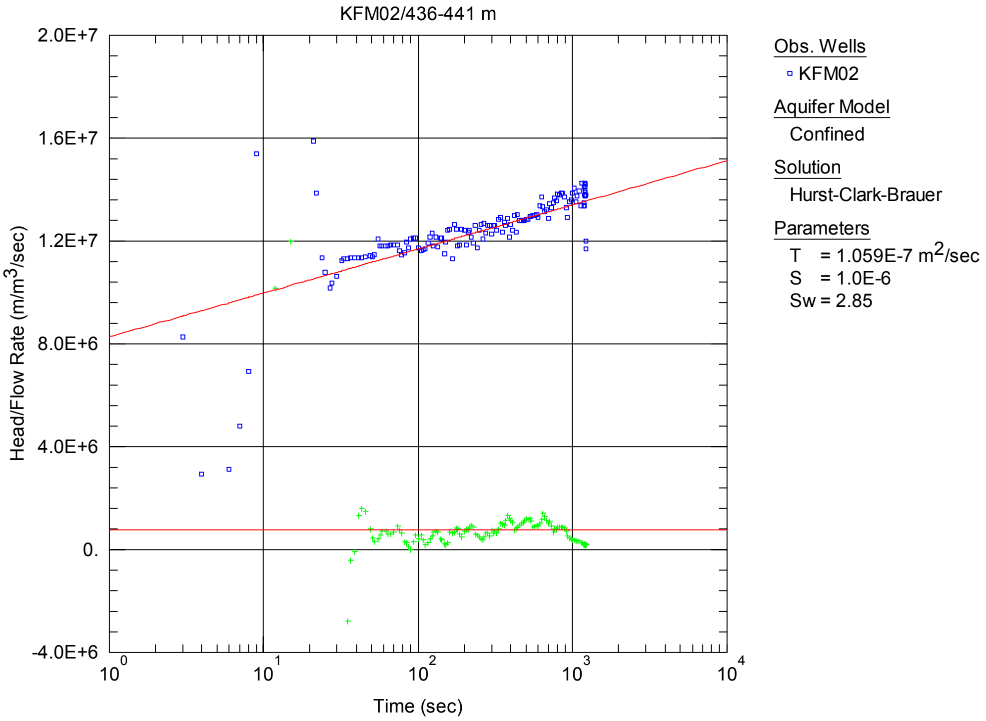



***Figure A3-385.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 436-441 m in KFM02A.*

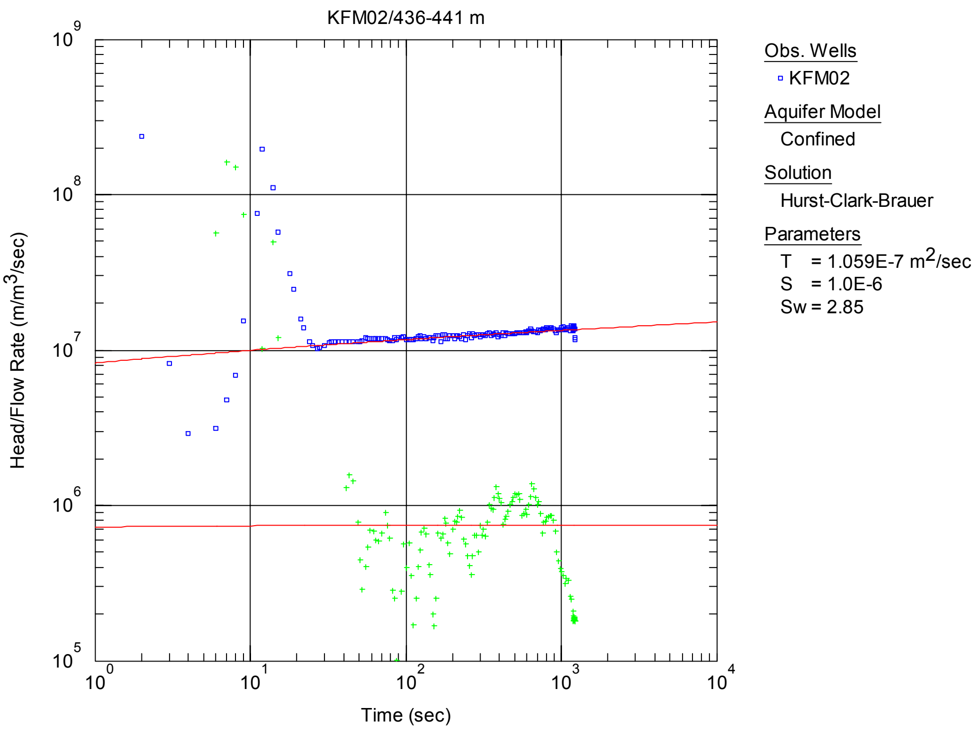



***Figure A3-386.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 436-441 m in KFM02A.*

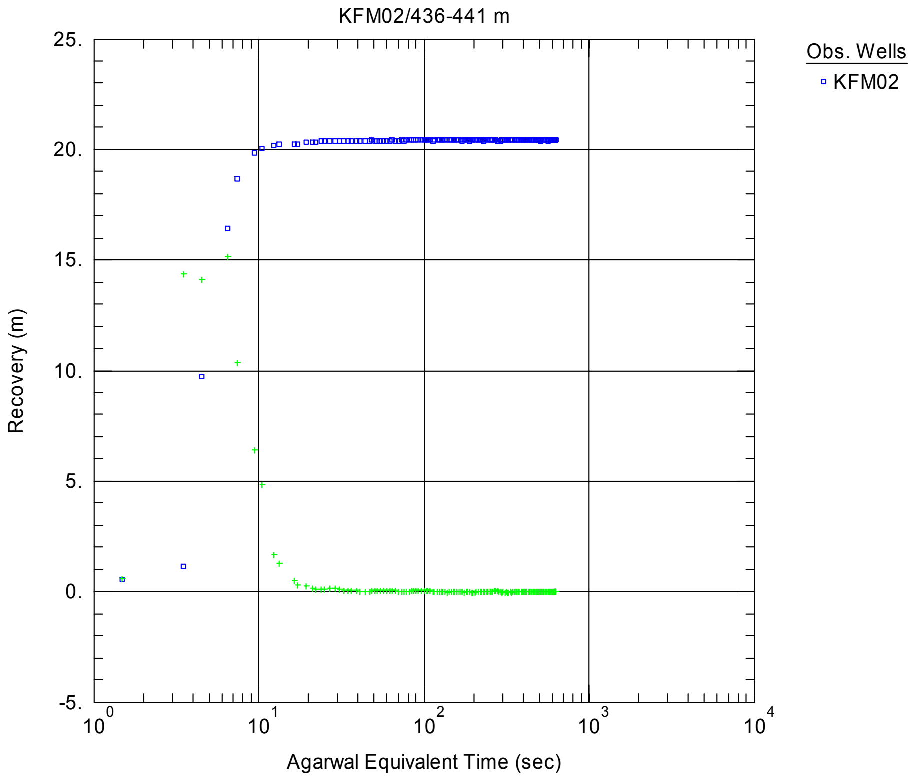



***Figure A3-387.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 436-441 m in KFM02A.*

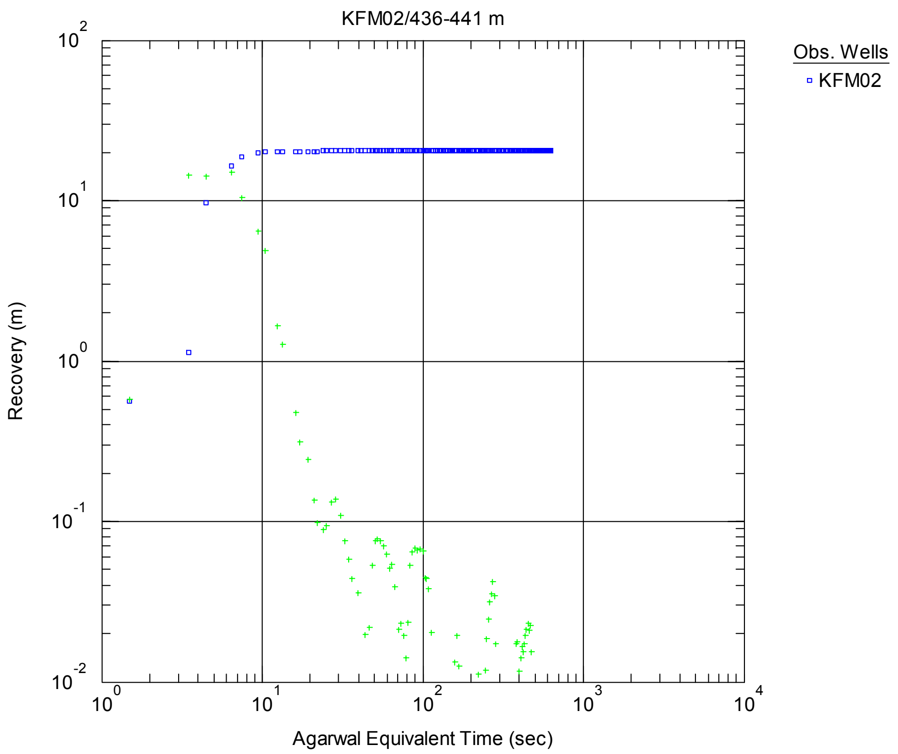



***Figure A3-388.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 436-441 m in KFM02A.*

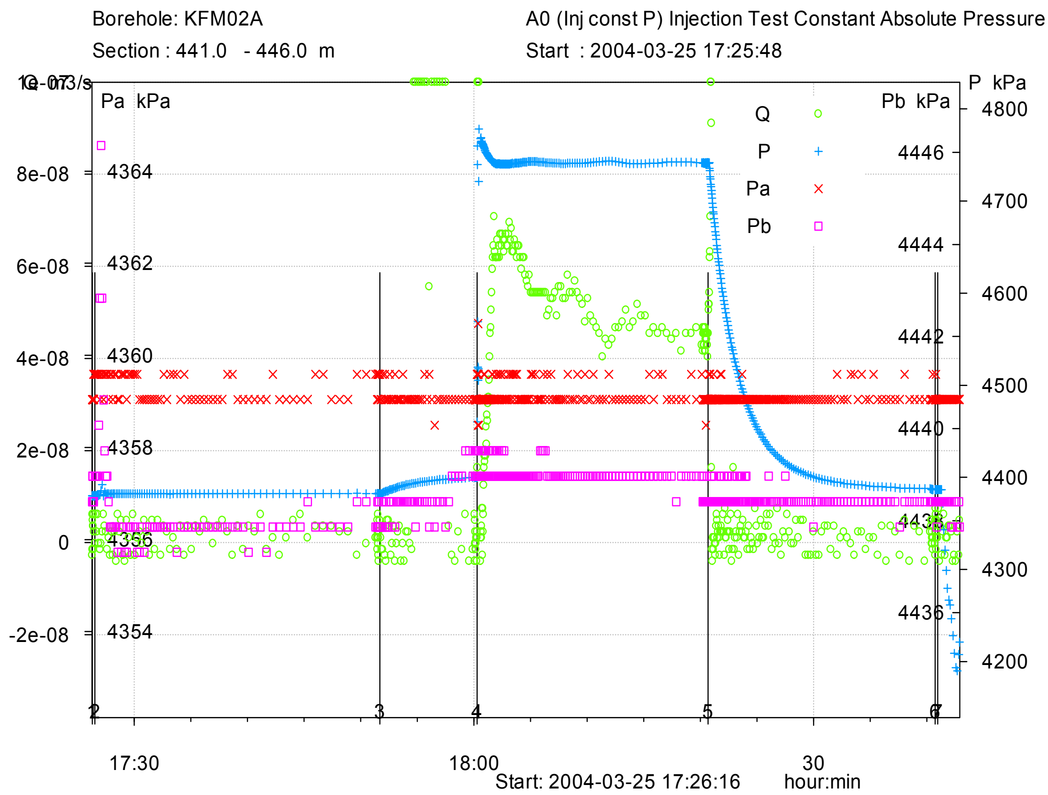



***Figure A3-389.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 441-446 m in borehole KFM02A.*

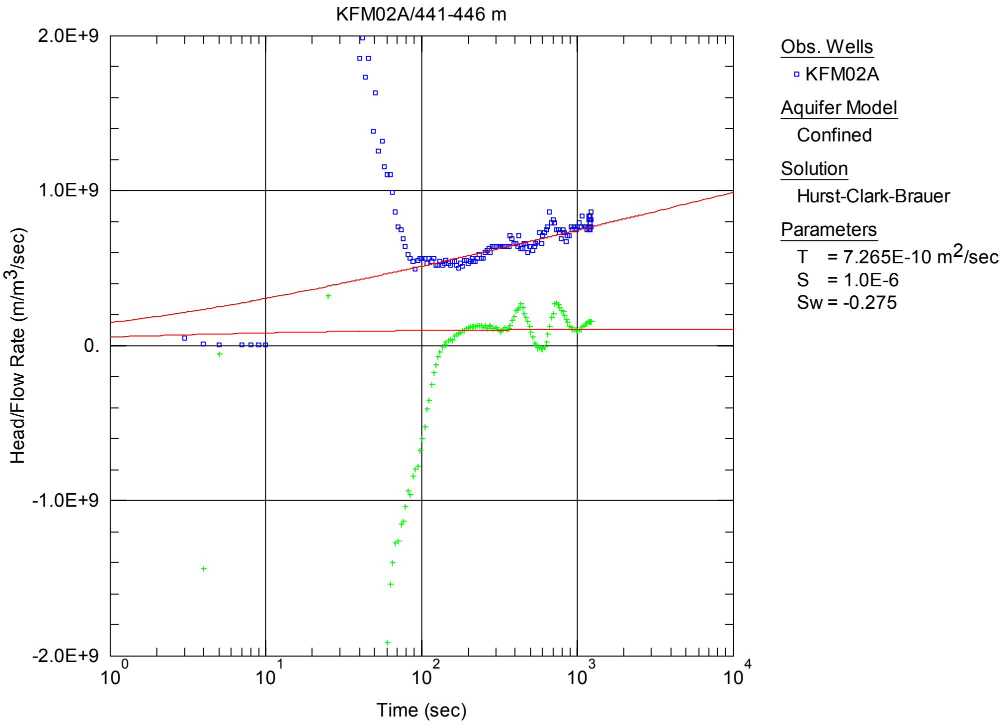



***Figure A3-390.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 441-446 m in KFM02A.*

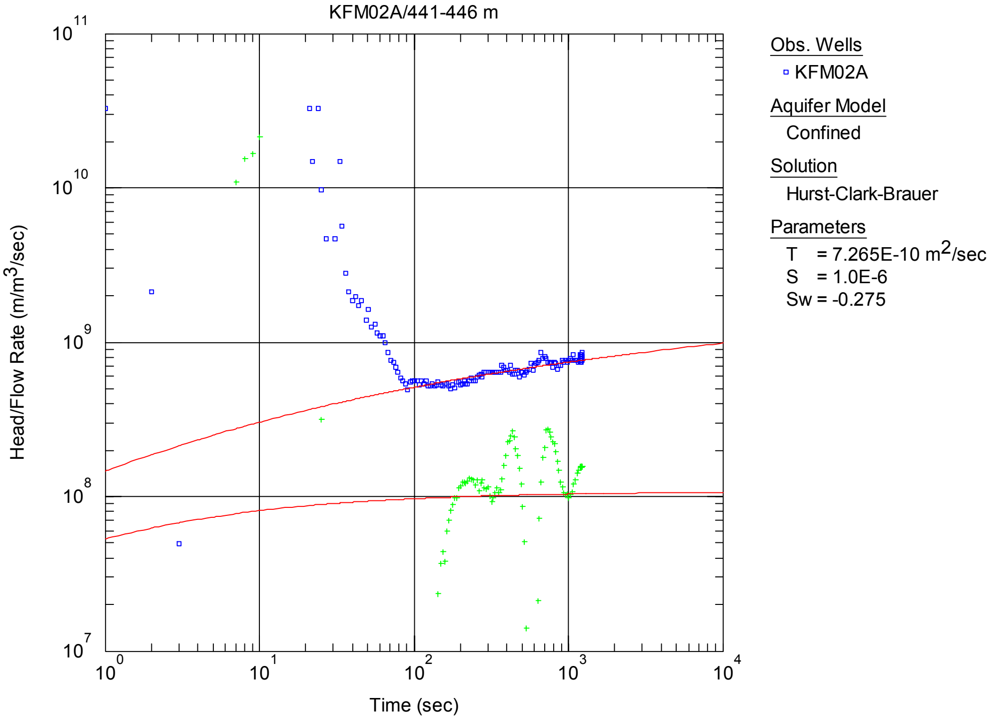



***Figure A3-391.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 441-446 m in KFM02A.*

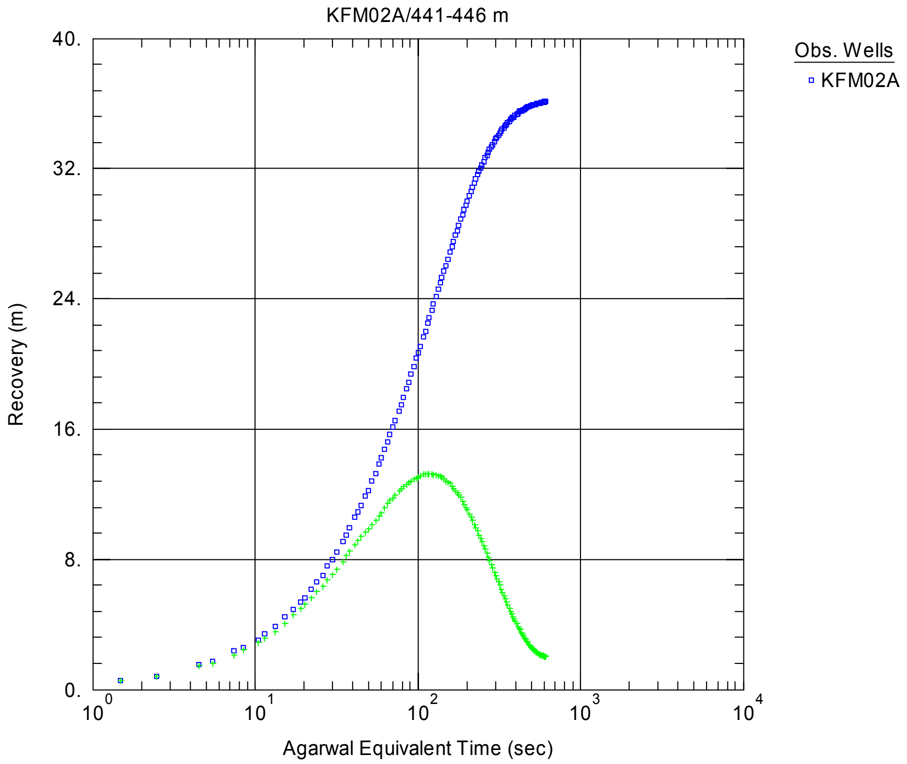



***Figure A3-392.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 441-446 m in KFM02A.*

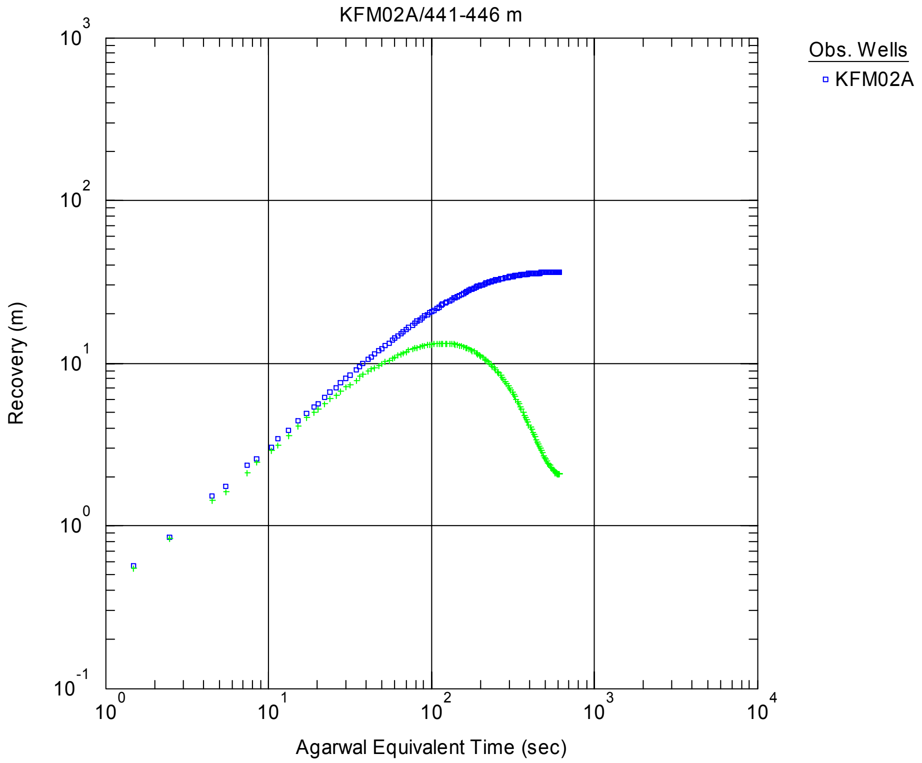



***Figure A3-393.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 441-446 m in KFM02A.*

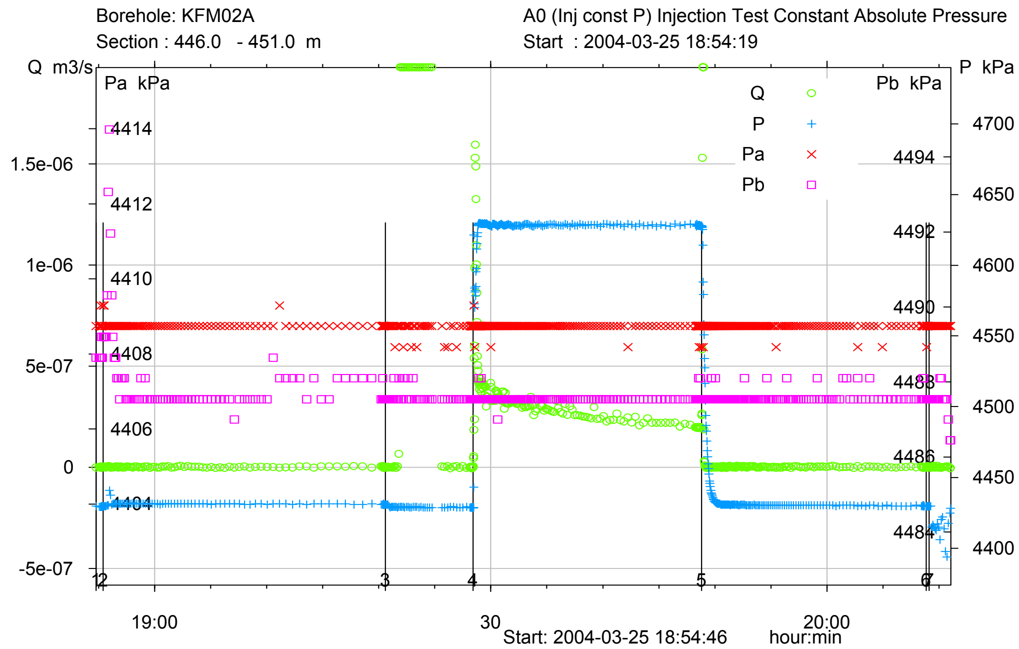



***Figure A3-394.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 446-451 m in borehole KFM02A.*

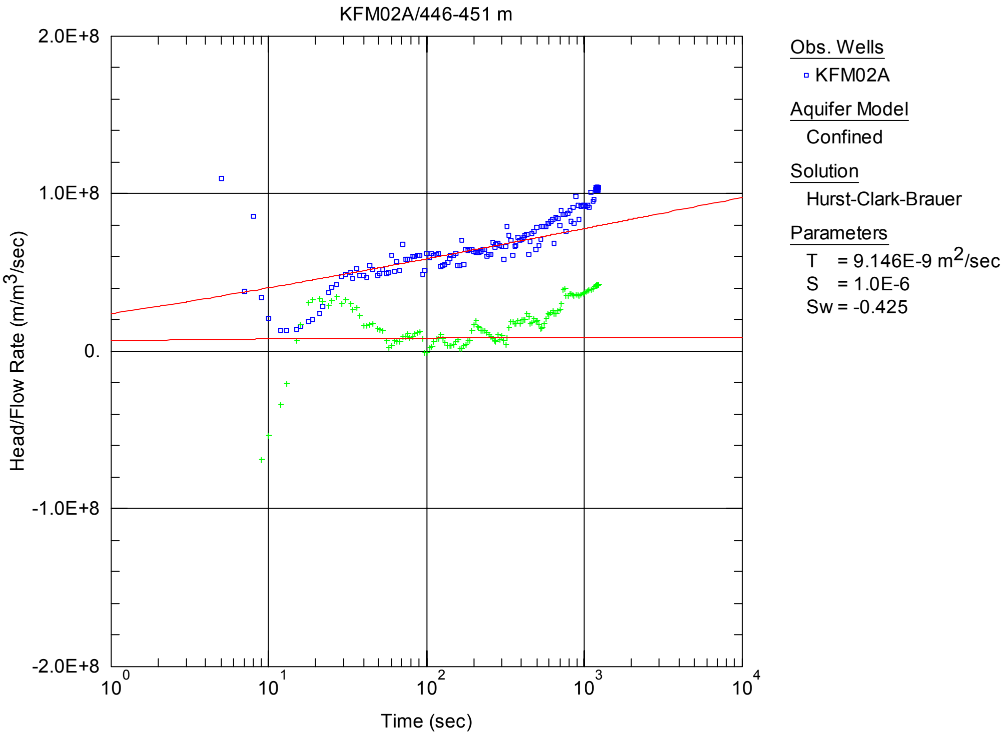



***Figure A3-395.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 446-451 m in KFM02A.*

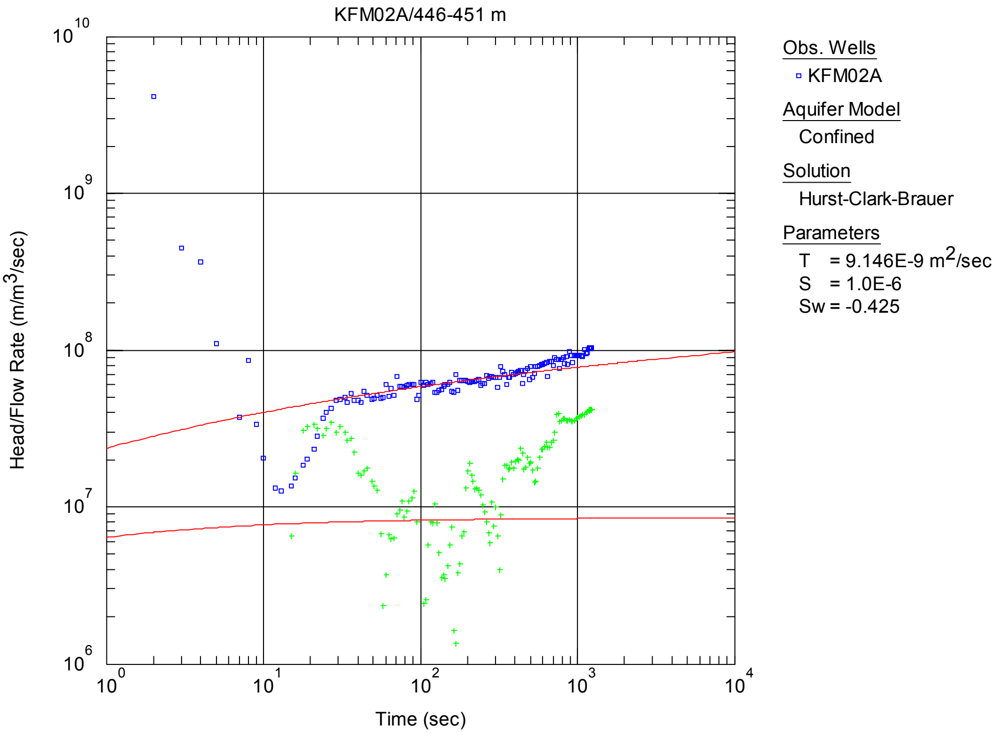



***Figure A3-396.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 446-451 m in KFM02A.*

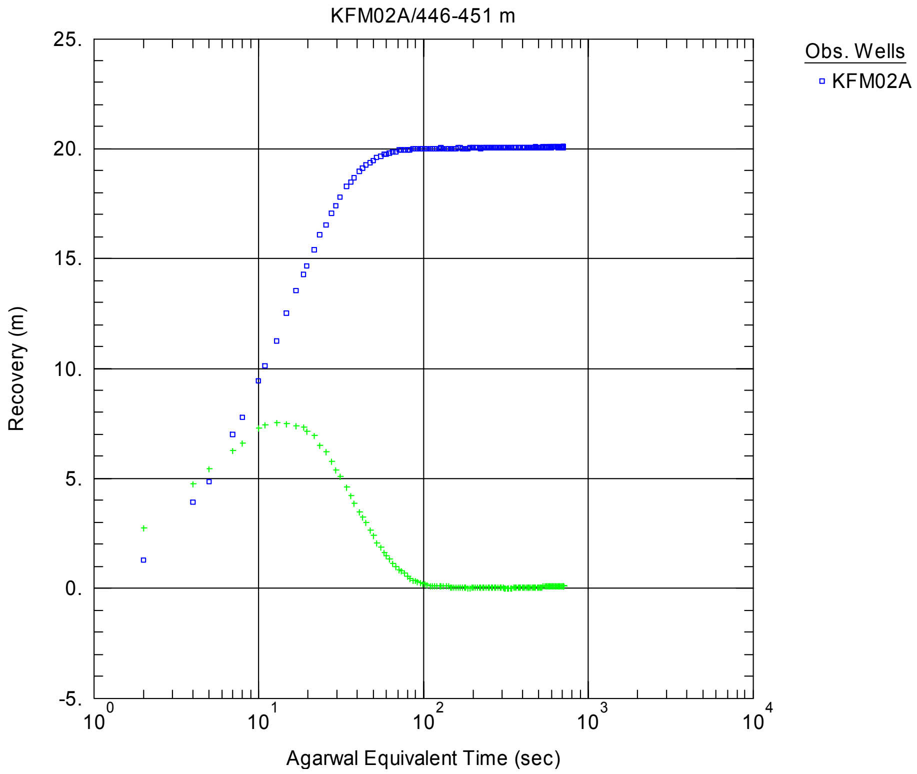



***Figure A3-397.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 446-451 m in KFM02A.*

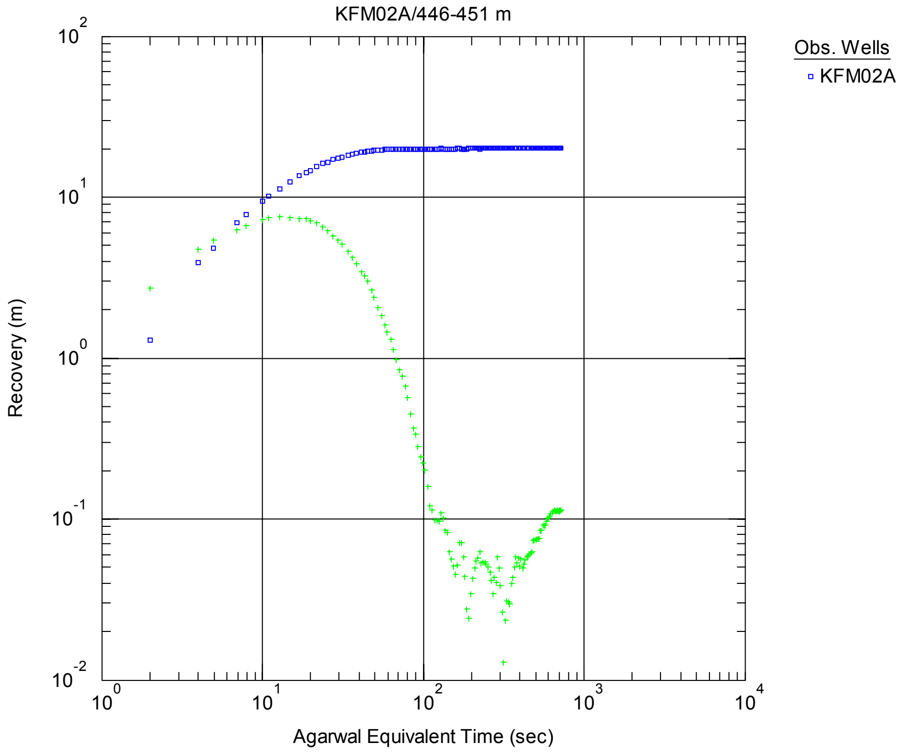



***Figure A3-398.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 446-451 m in KFM02A.*

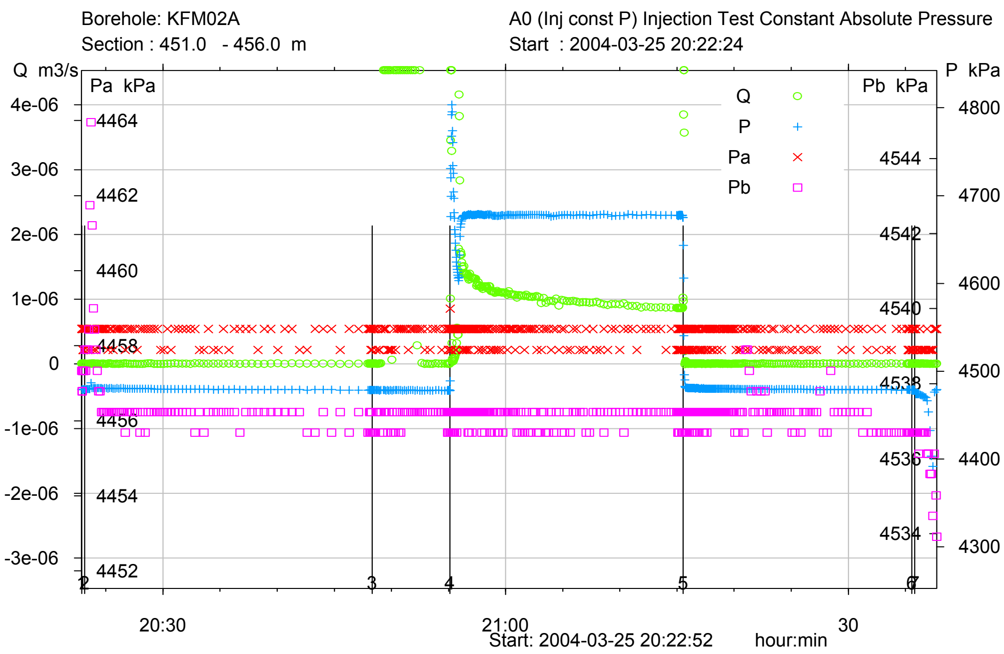



***Figure A3-399****. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 451-456 m in borehole KFM02A.*

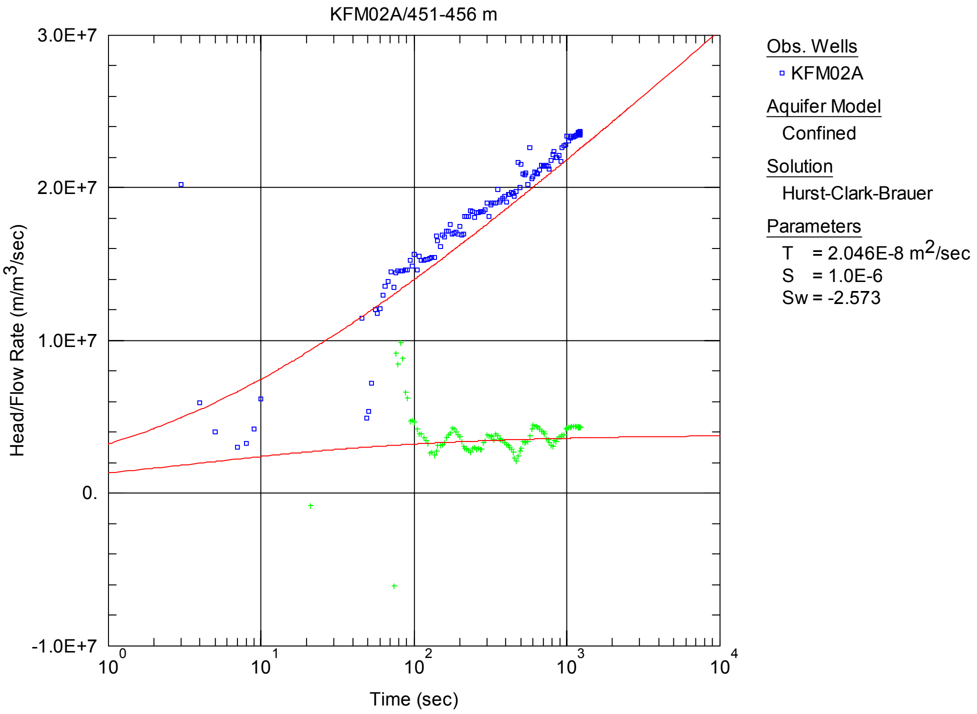



***Figure A3-400.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 451-456 m in KFM02A.*

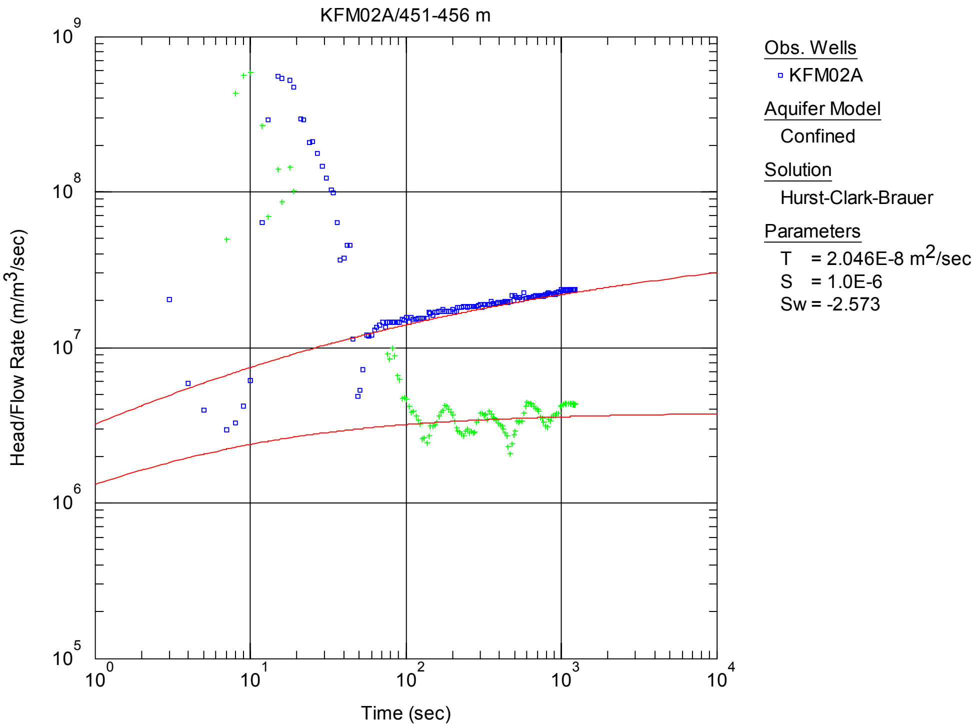



***Figure A3-401.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 451-456 m in KFM02A.*

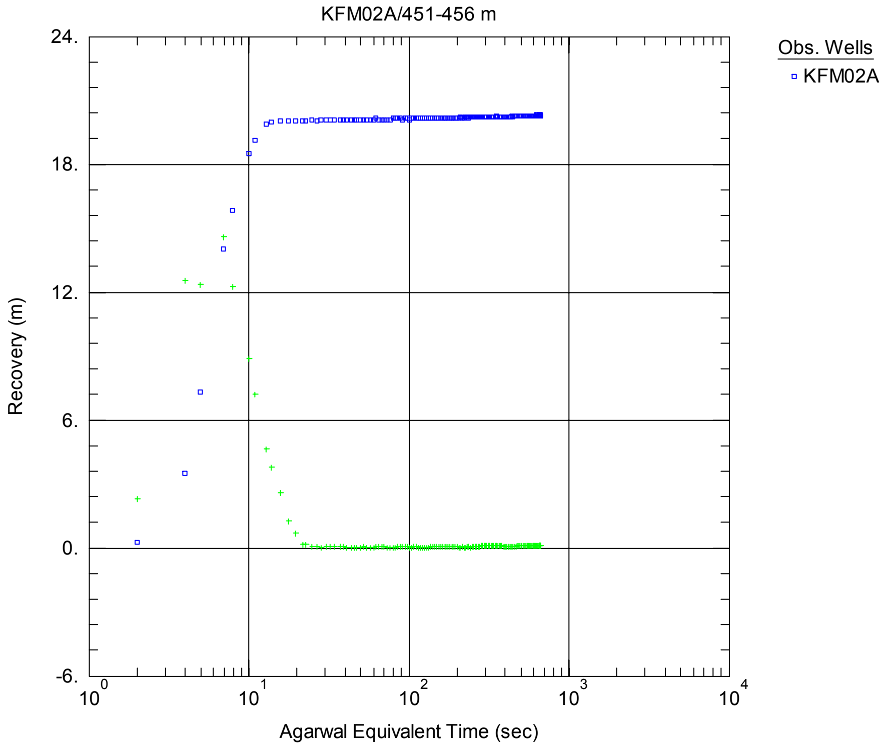



***Figure A3-402.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 451-456 m in KFM02A.*

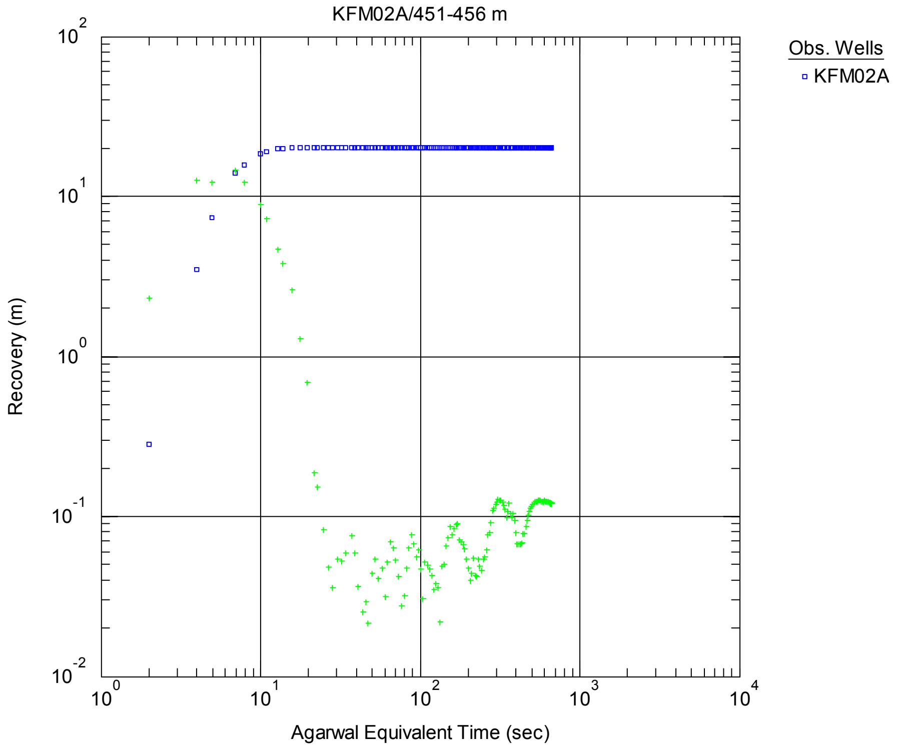



***Figure A3-403.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 451-456 m in KFM02A.*

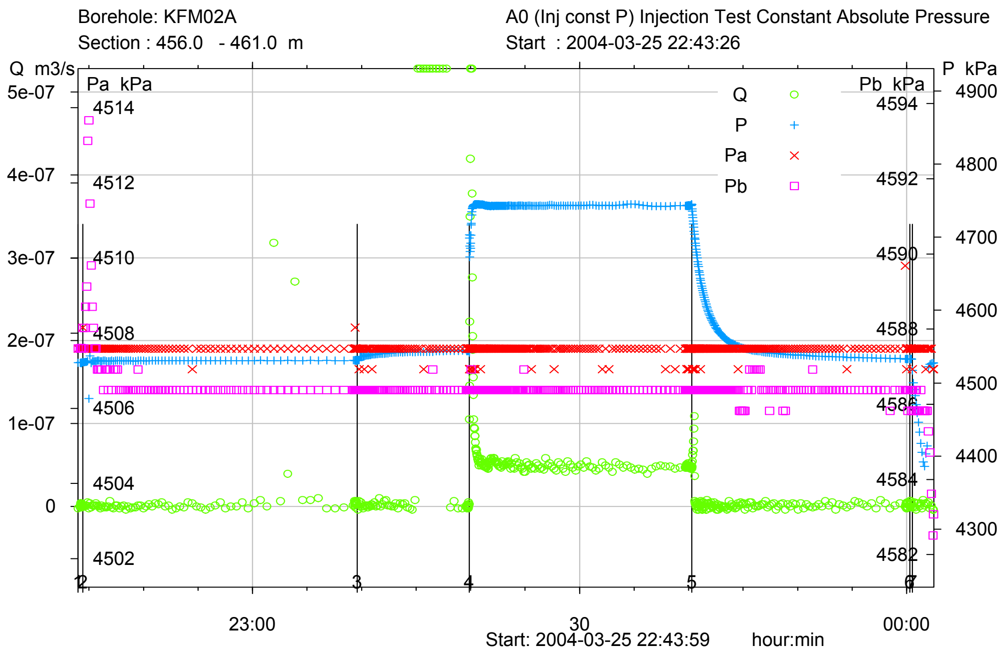



*Figure A3-404.* *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 456-461 m in borehole KFM02A.*

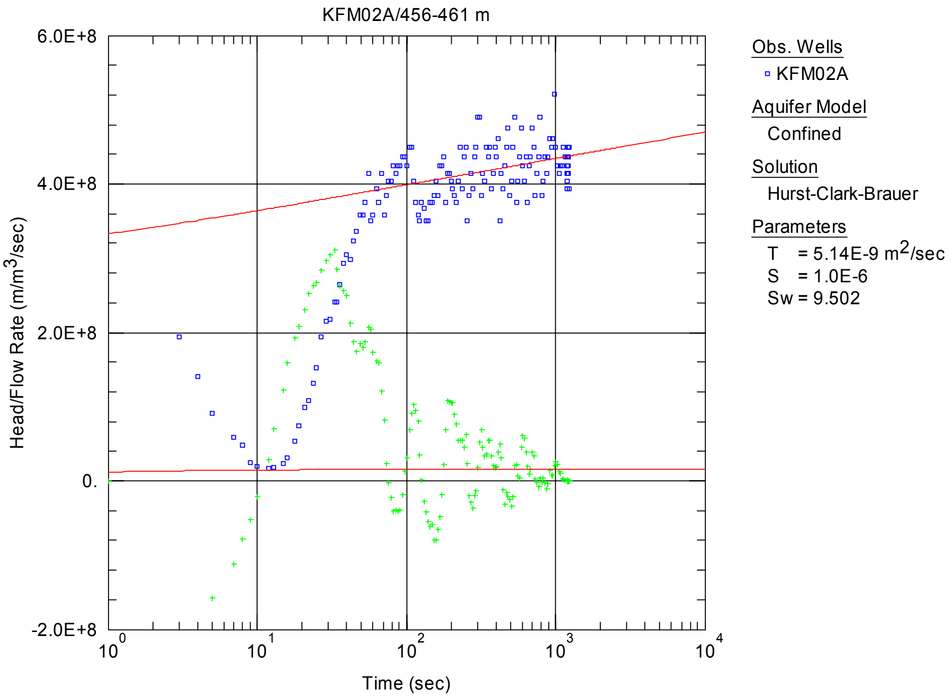



***Figure A3-405.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 456-461 m in KFM02A. Showing non-representative type-curve fit to illustrate that an assumption of PRF is not reasonable.*

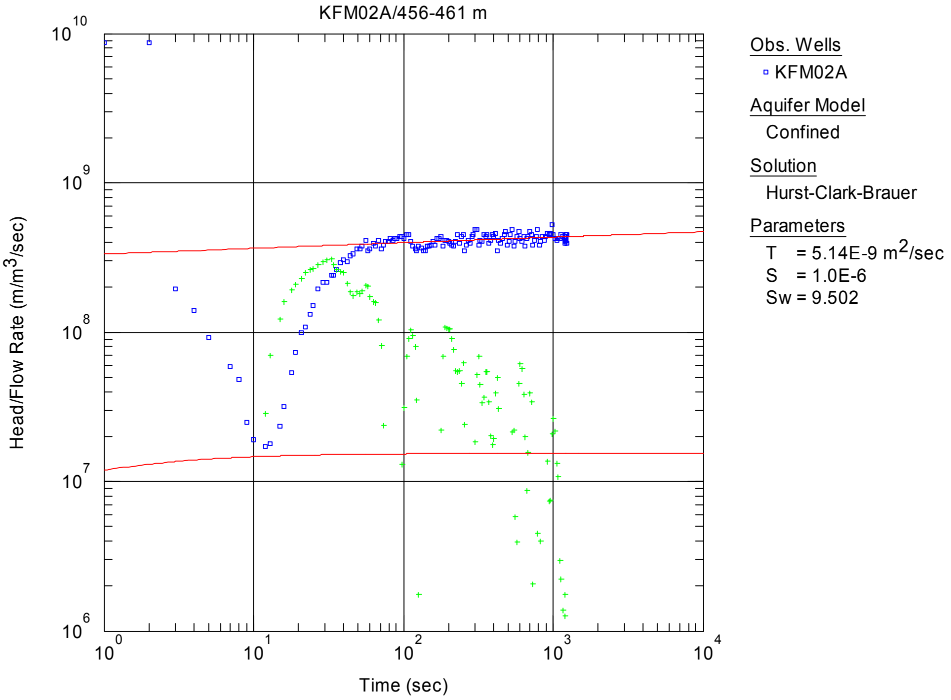



***Figure A3-406.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 456-461 m in KFM02A. Showing non-representative type-curve fit to illustrate that an assumption of PRF is not reasonable.*

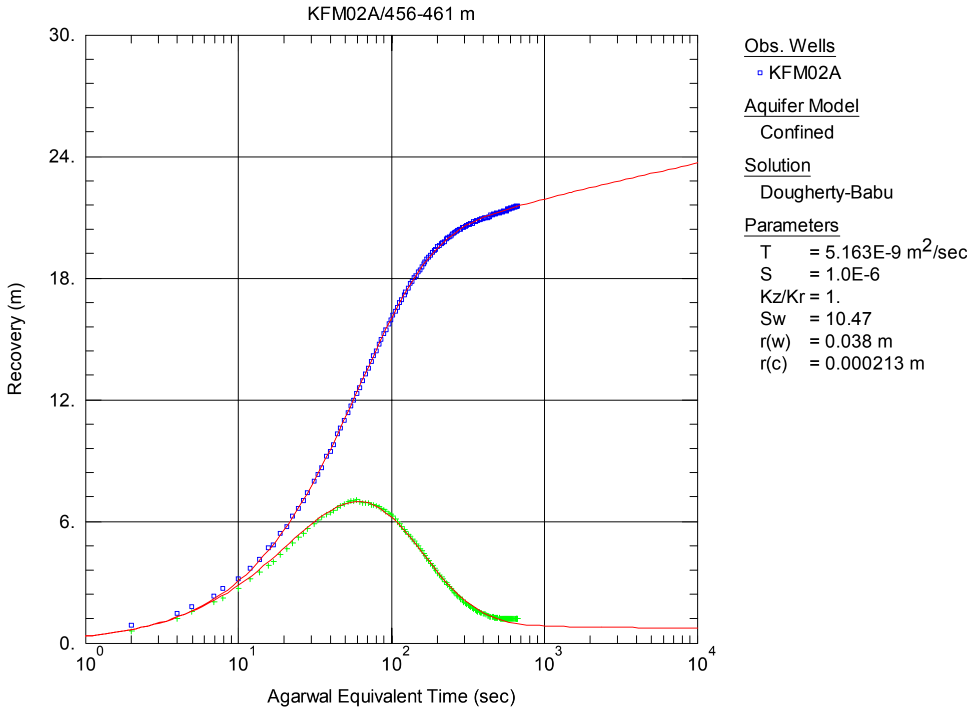



***Figure A3-407.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 456-461 m in KFM02A. Showing non-representative type-curve fit to illustrate that an assumption of PRF is not reasonable.*

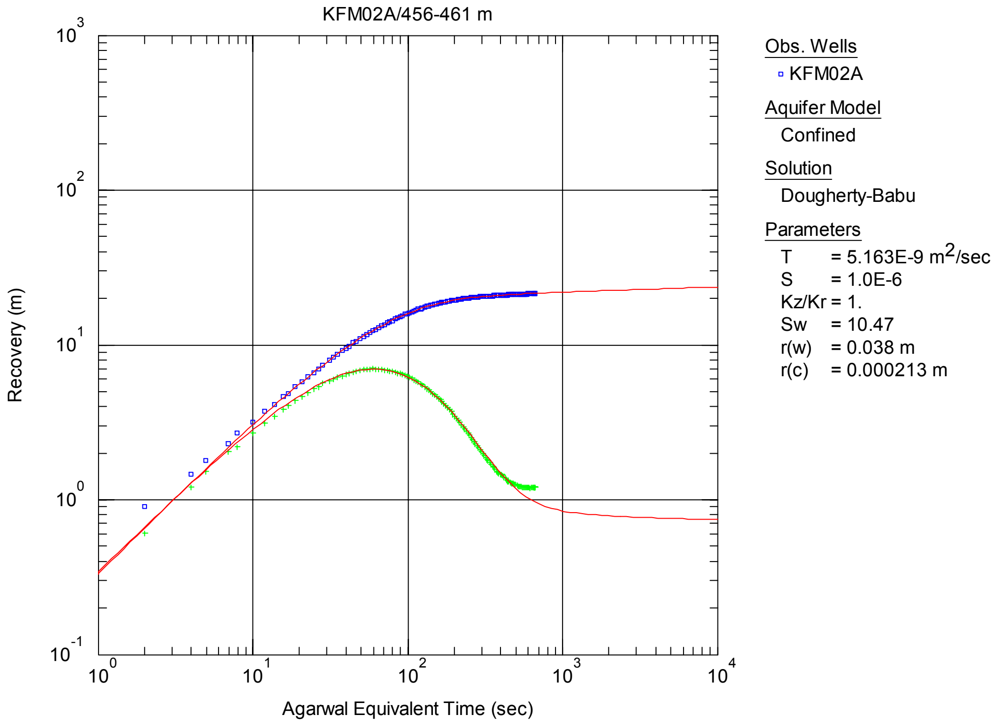



***Figure A3-408.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 456-461 m in KFM02A. Showing non-representative type-curve fit to illustrate that an assumption of PRF is not reasonable.*

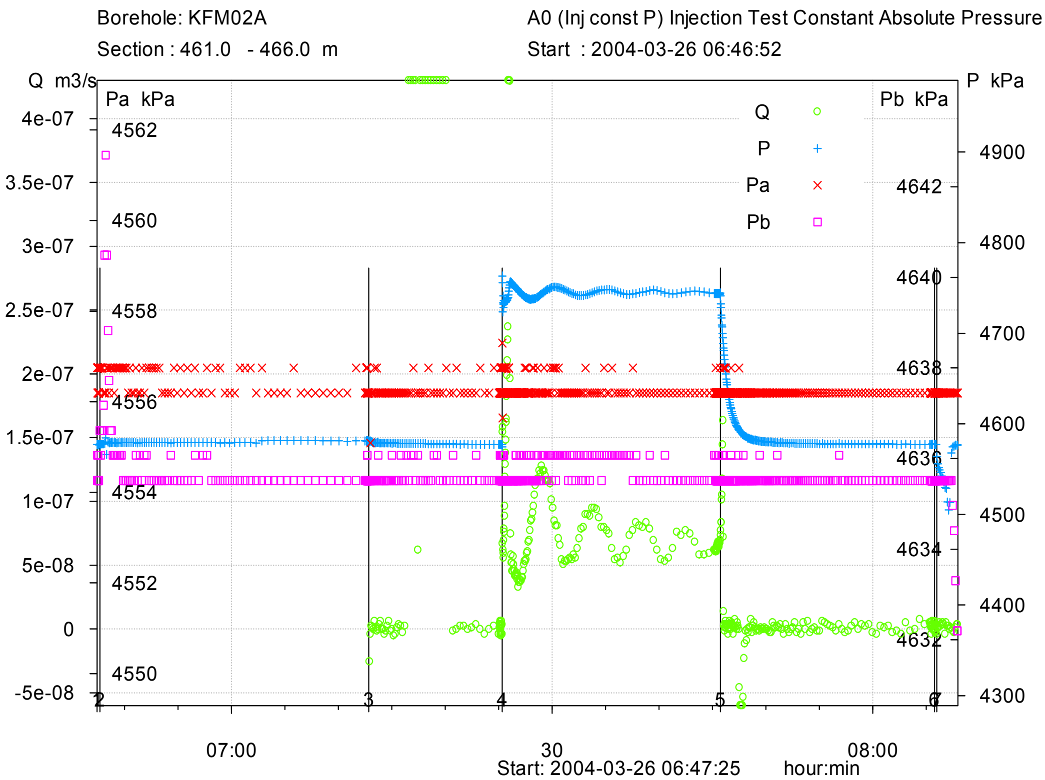



***Figure A3-409.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 461-466 m in borehole KFM02A.*

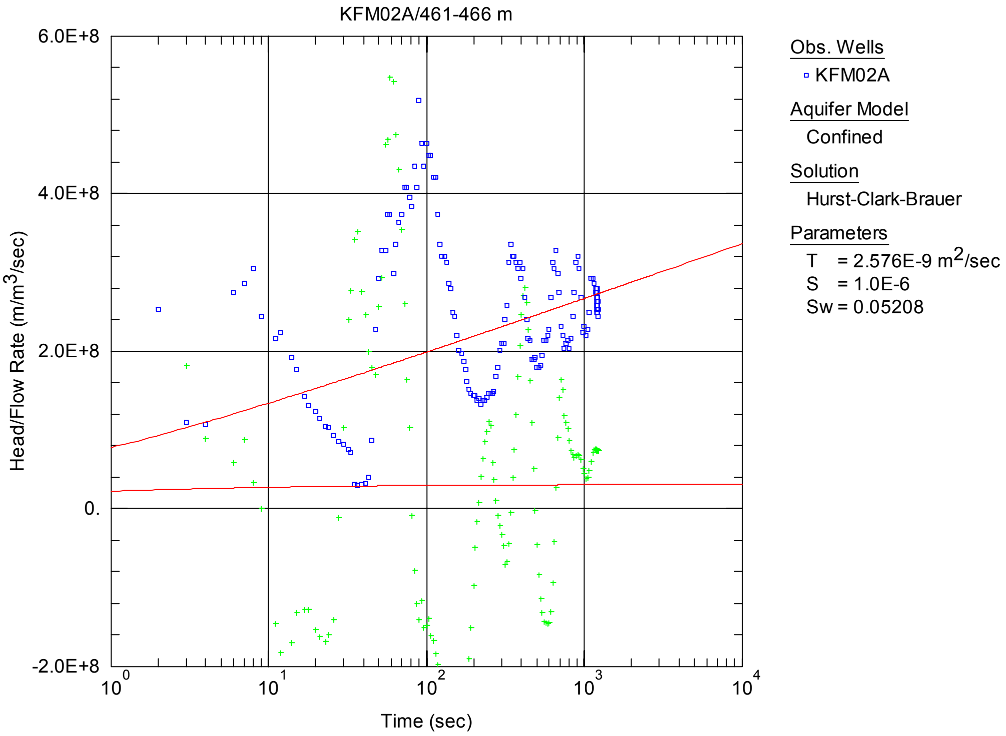



***Figure A3-410.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 461-466 m in KFM02A.*

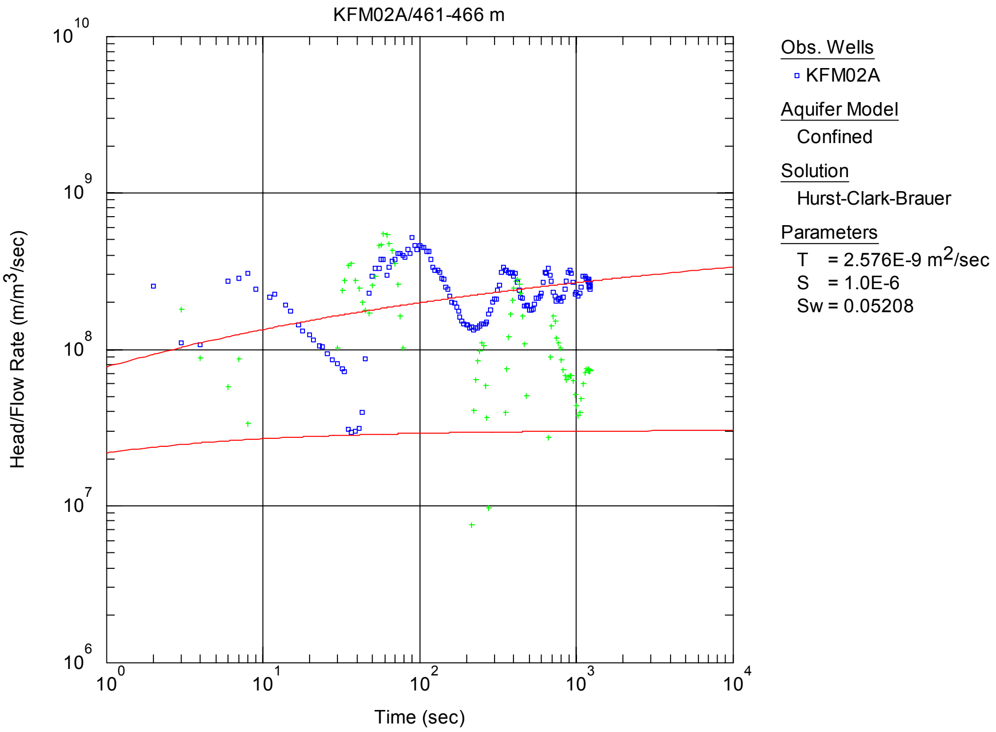



***Figure A3-411.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 461-466 m in KFM02A.*

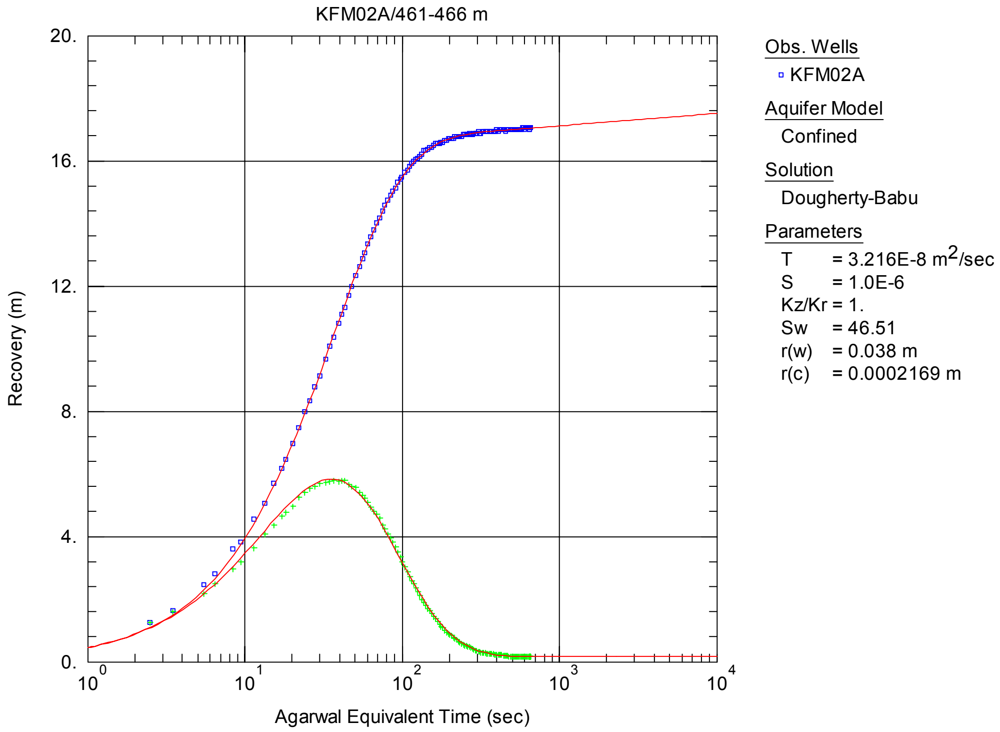



***Figure A3-412.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 461-466 m in KFM02A. Showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable.*

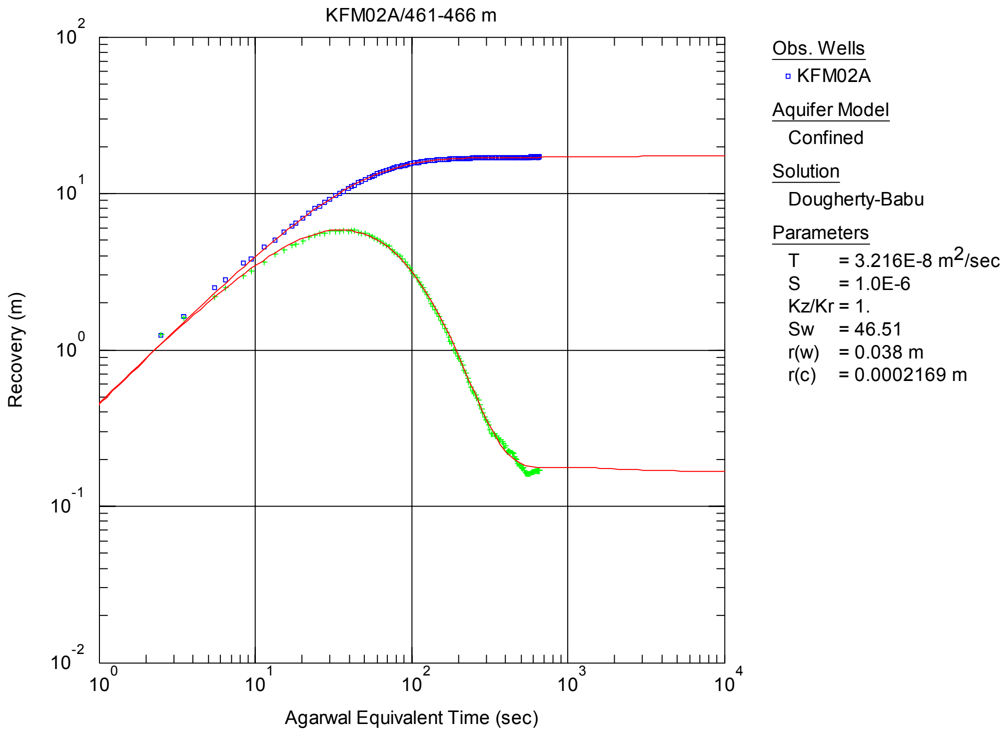



***Figure A3-413.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 461-466 m in KFM02A. Showing non-representative type curve fit to illustrate that an assumption of PRF is not reasonable.*

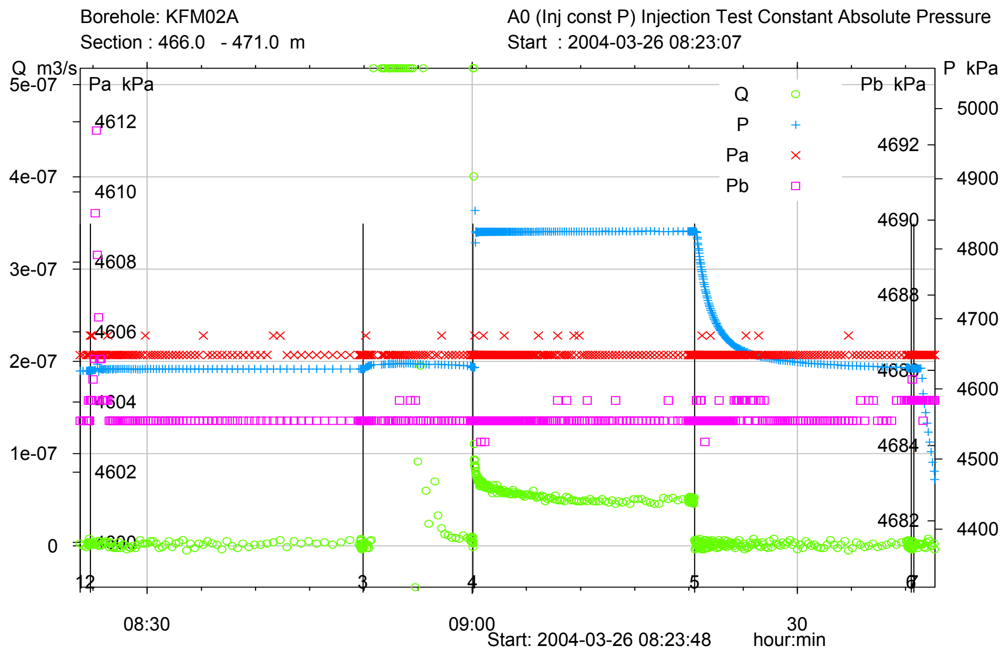



***Figure A3-414.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 466-471 m in borehole KFM02A.*

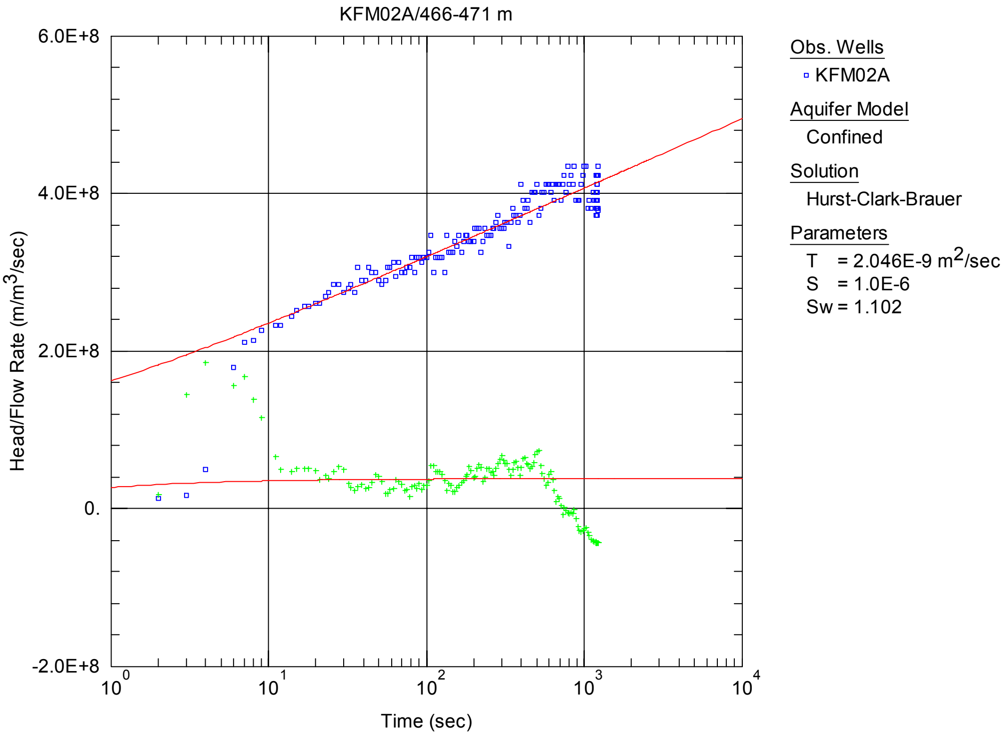



*Figure A3-415. Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 466-471 m in KFM02A.*

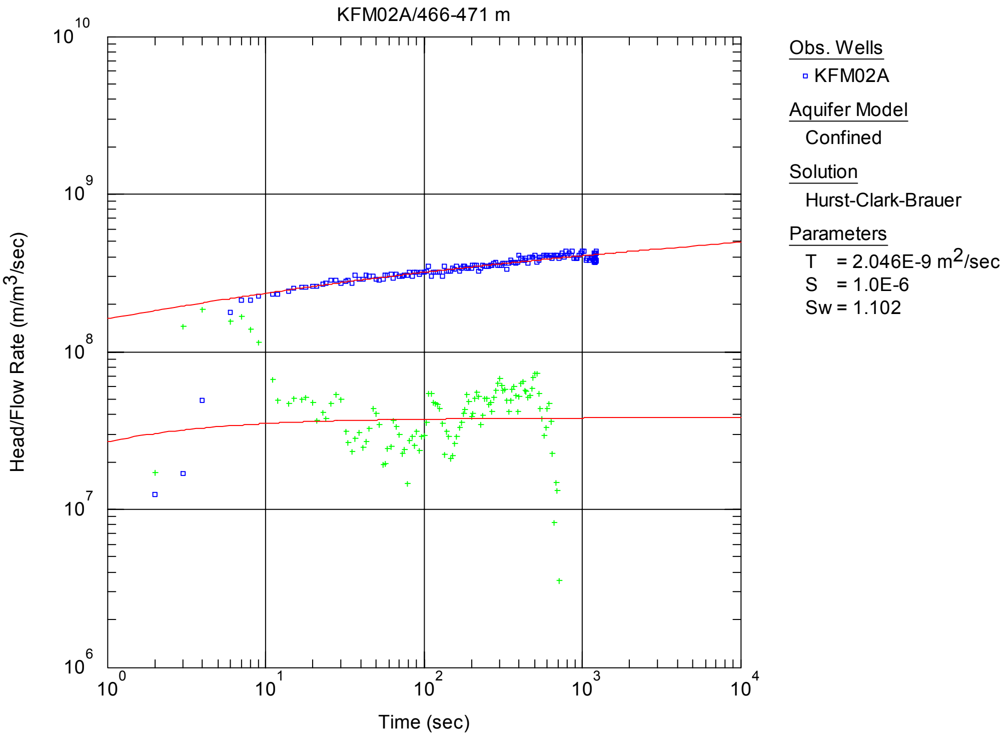



*Figure A3-416. Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 466-471 m in KFM02A.*

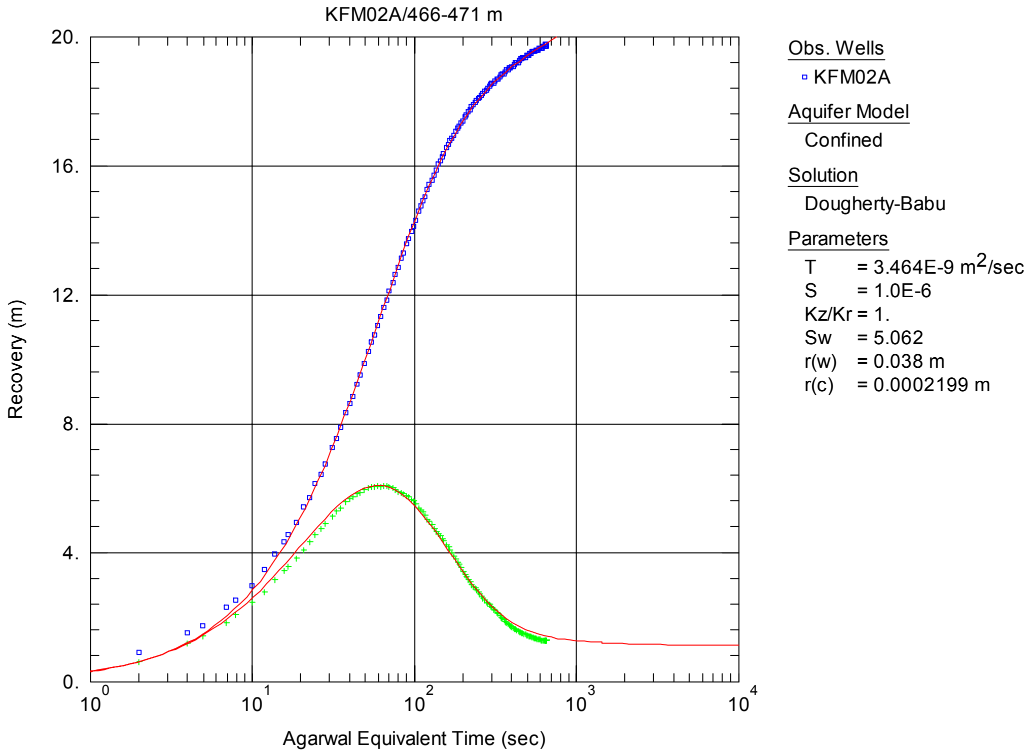



***Figure A3-417.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 466-471 m in KFM02A.*

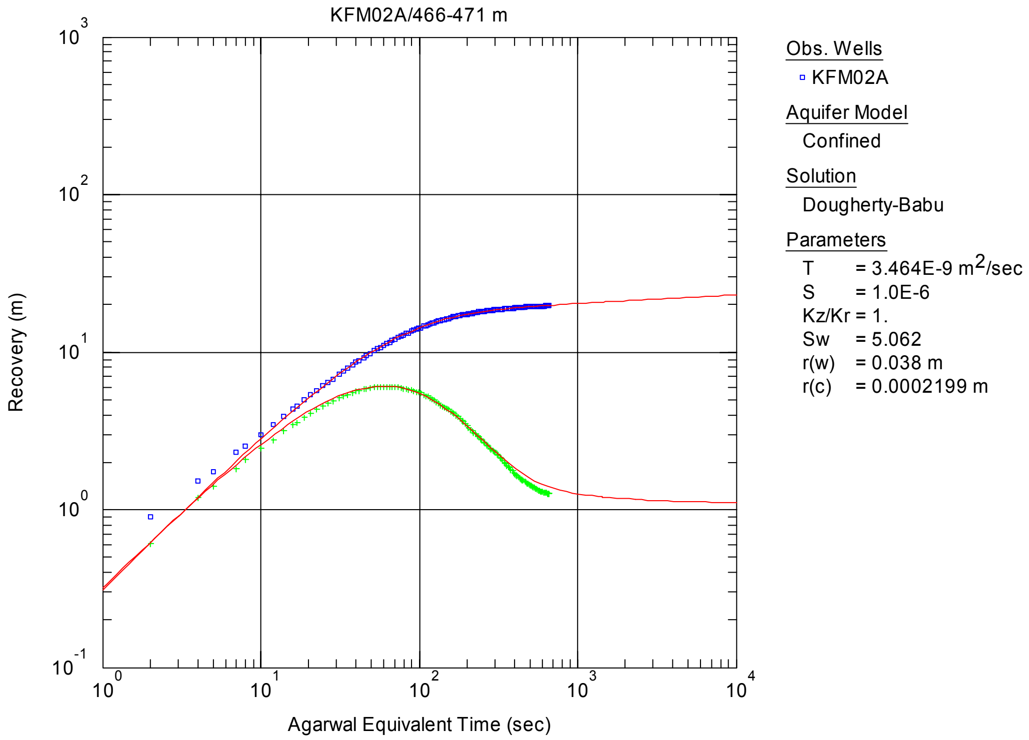



***Figure A3-418.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 466-471 m in KFM02A.*

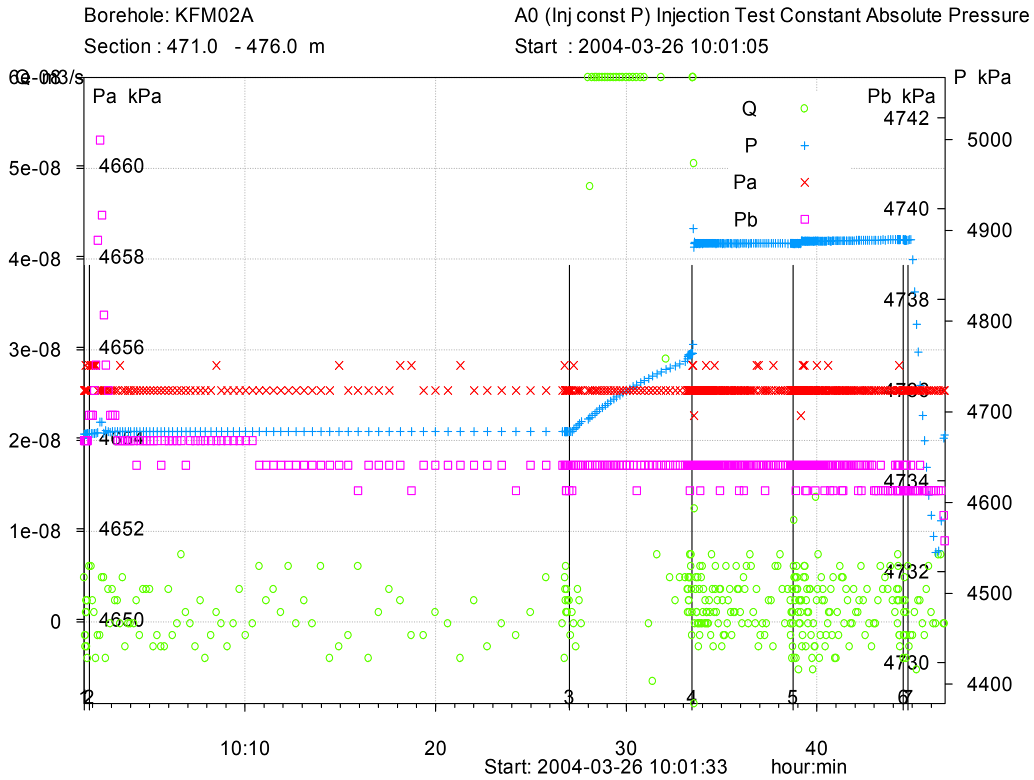



*Figure A3-419.* *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 471-476 m in borehole KFM02A.*

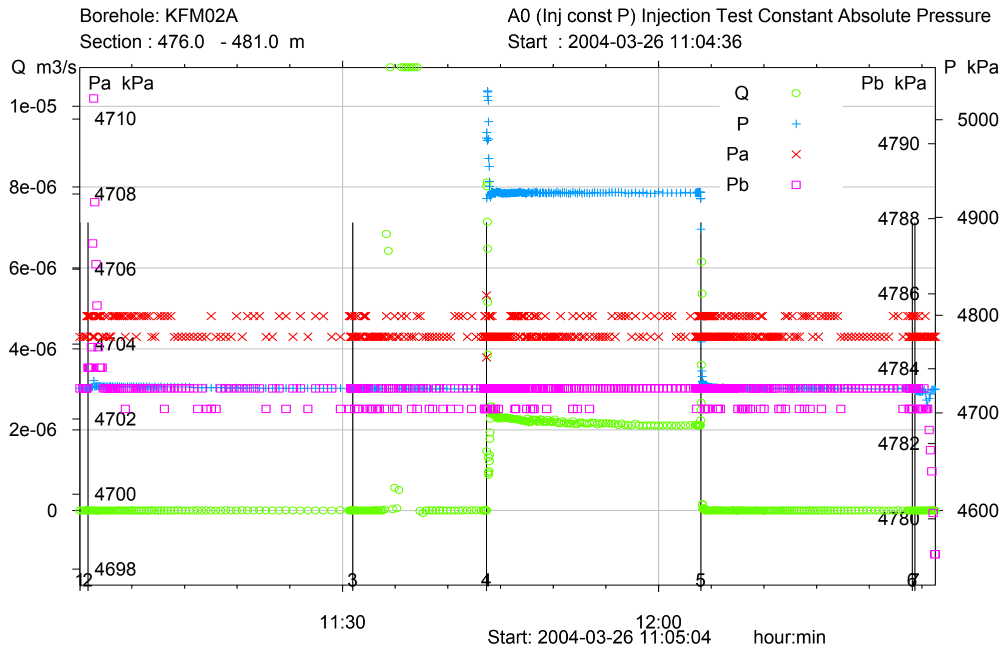



***Figure A3-420.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 476-481 m in borehole KFM02A.*

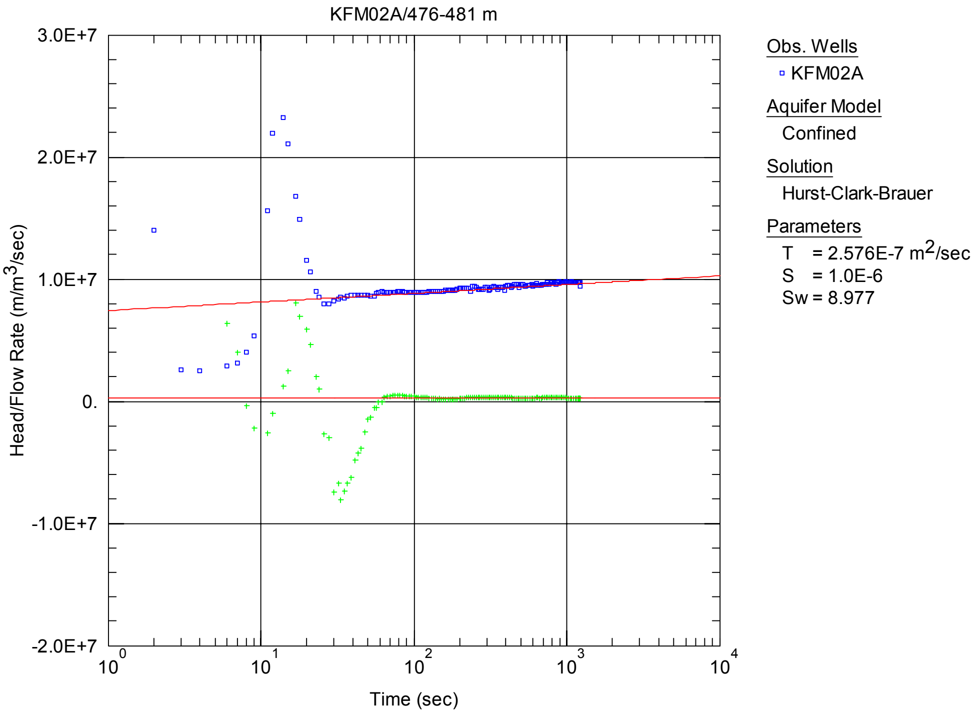



***Figure A3-421.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 476-481 m in KFM02A.*

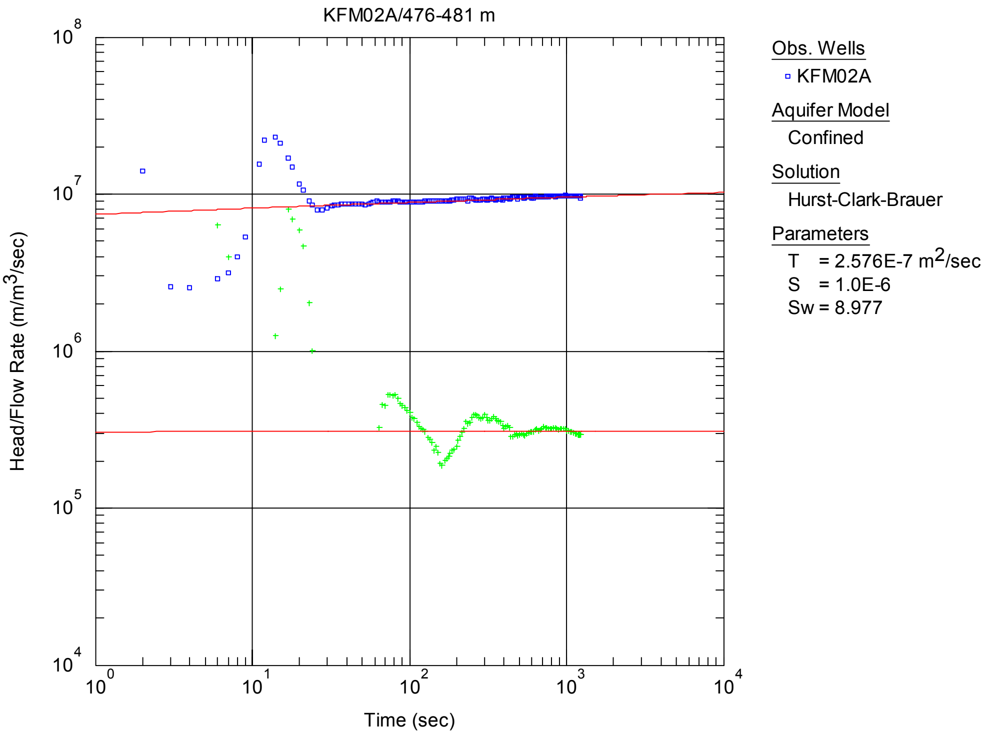



***Figure A3-422.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 476-481 m in KFM02A.*

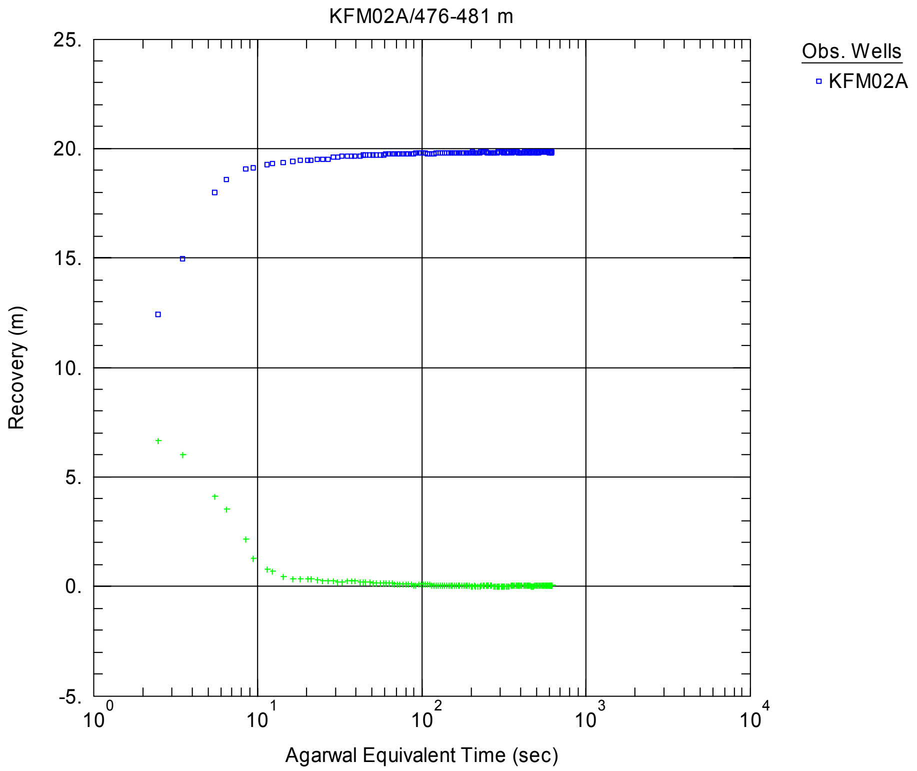



***Figure A3-423.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 476-481 m in KFM02A.*

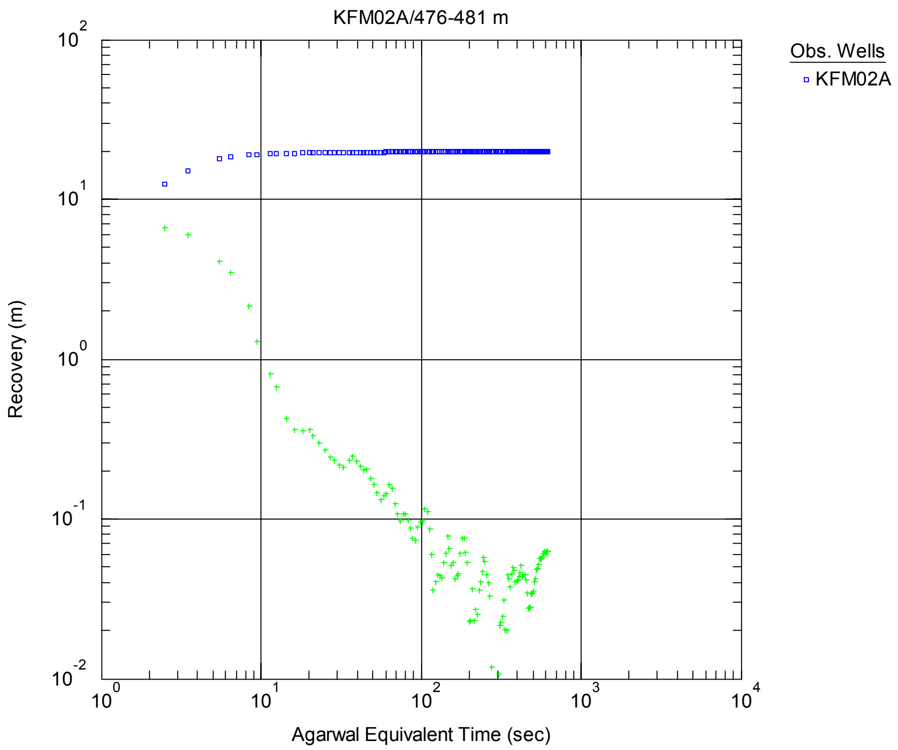



***Figure A3-424.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 476-481 m in KFM02A.*

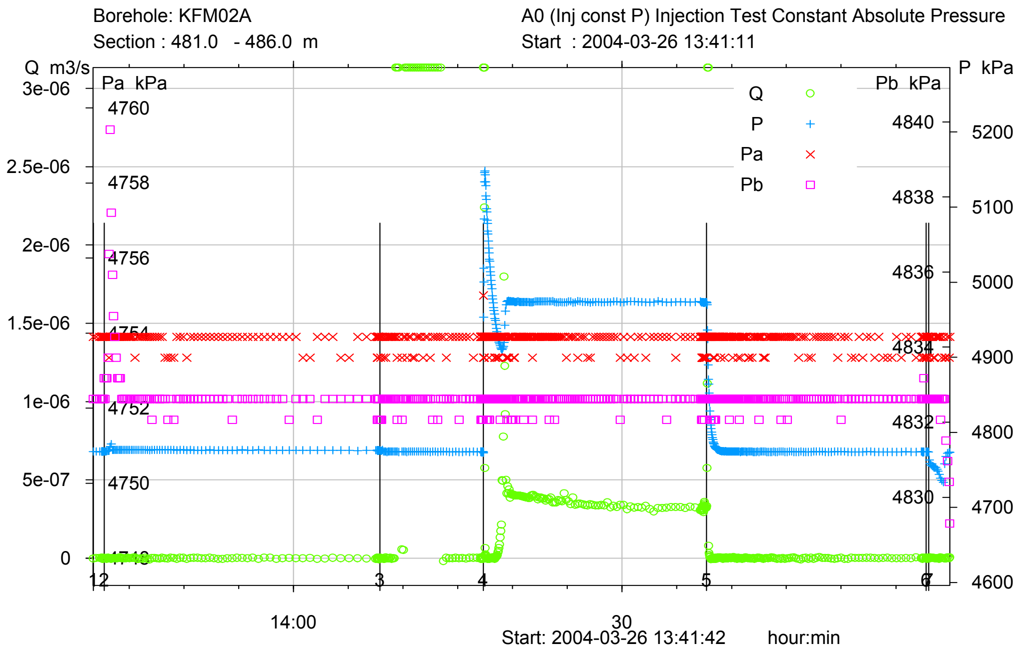



***Figure A3-425.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 481-486 m in borehole KFM02A.*

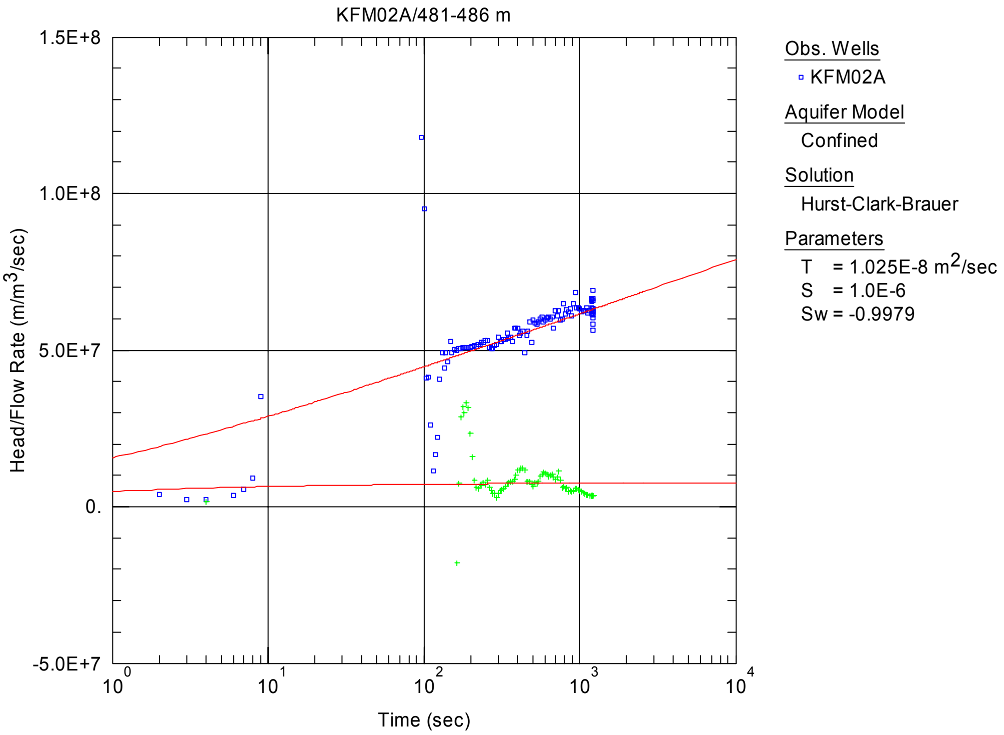



*Figure A3-426.* *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 481-486 m in KFM02A.*

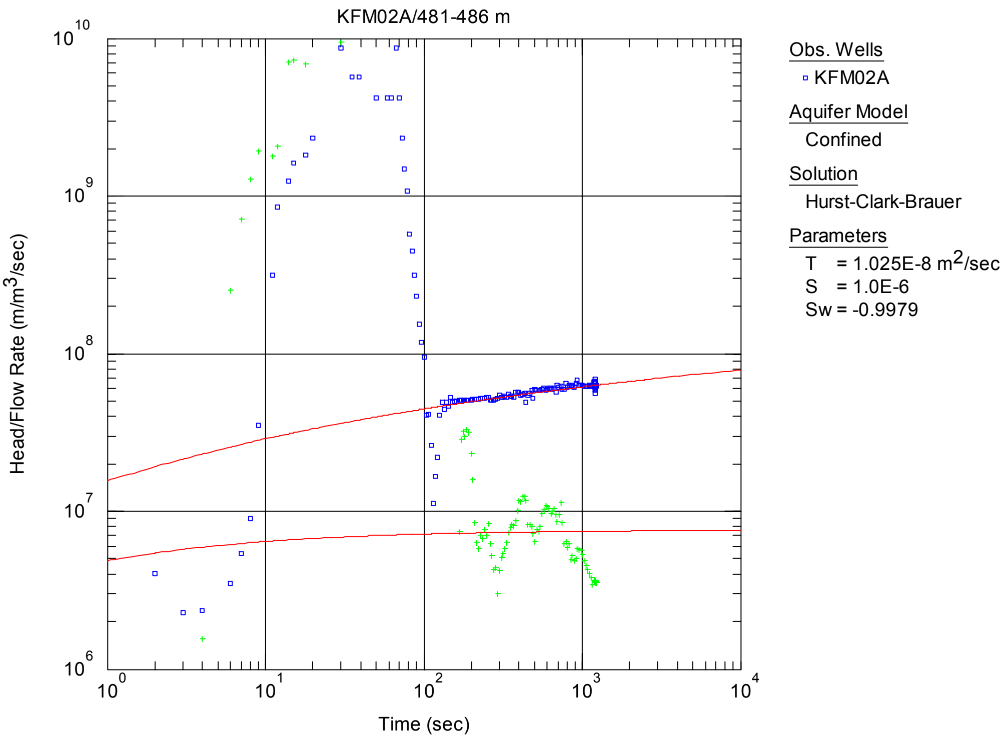



*Figure A3-427.* *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 481-486 m in KFM02A.*

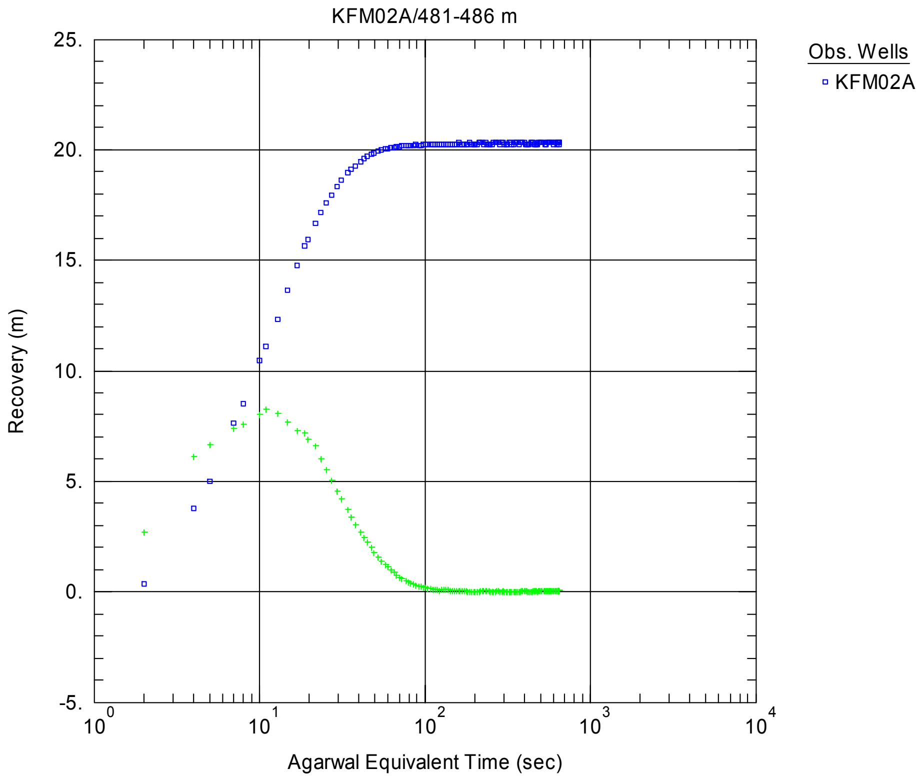



***Figure A3-428.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 481-486 m in KFM02A.*

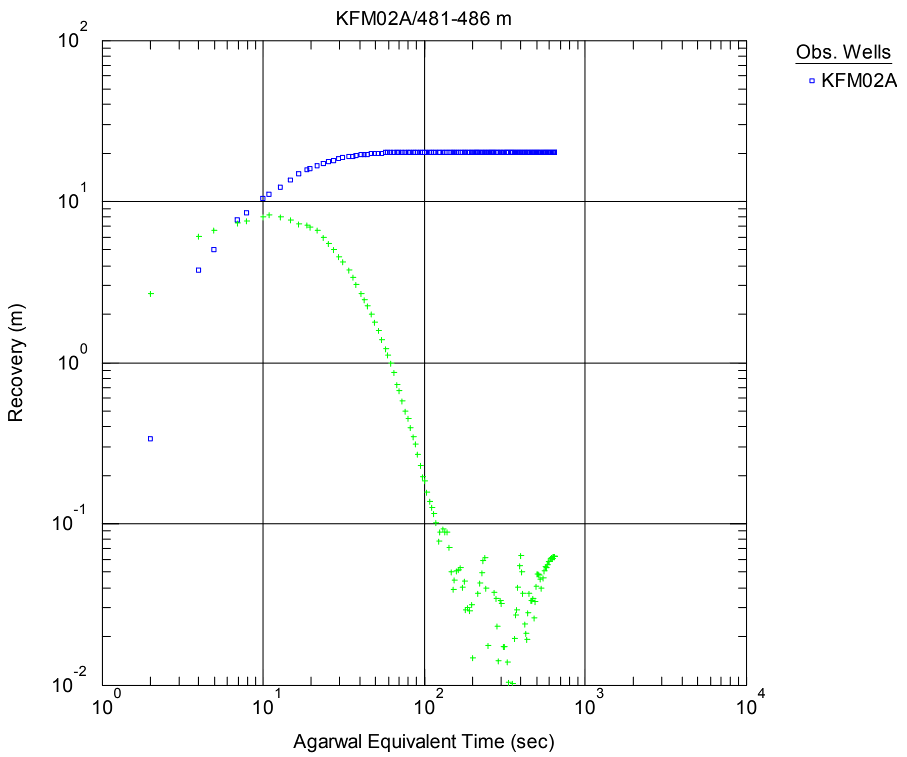



***Figure A3-429.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 481-486 m in KFM02A.*

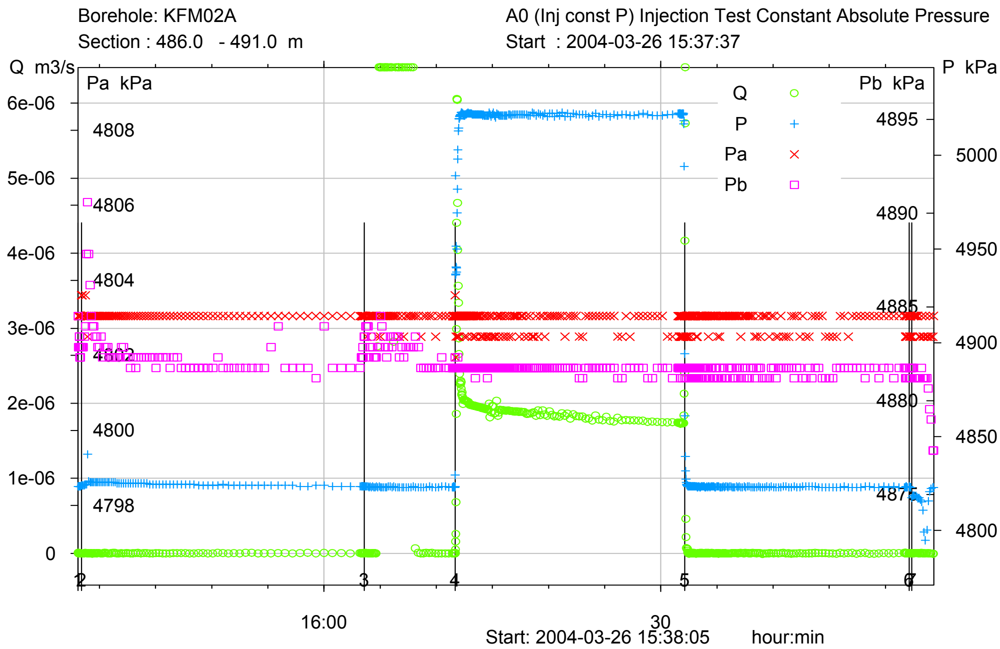



***Figure A3-430.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 486-491 m in borehole KFM02A.*

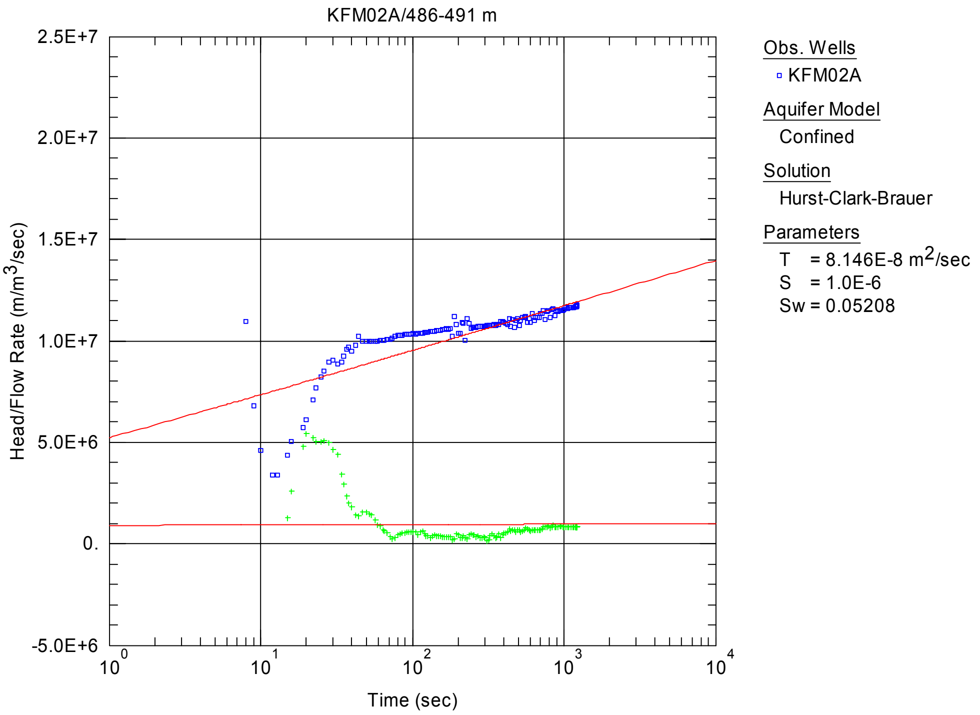



***Figure A3-431.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 486-491 m in KFM02A*

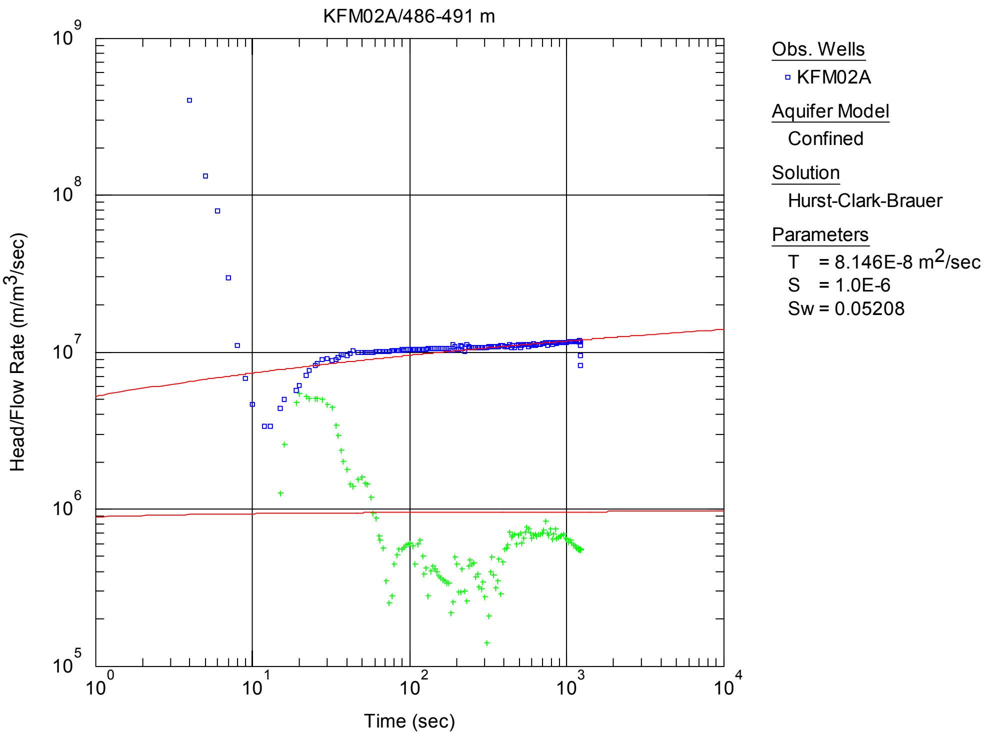



***Figure A3-432.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 486-491 m in KFM02A.*

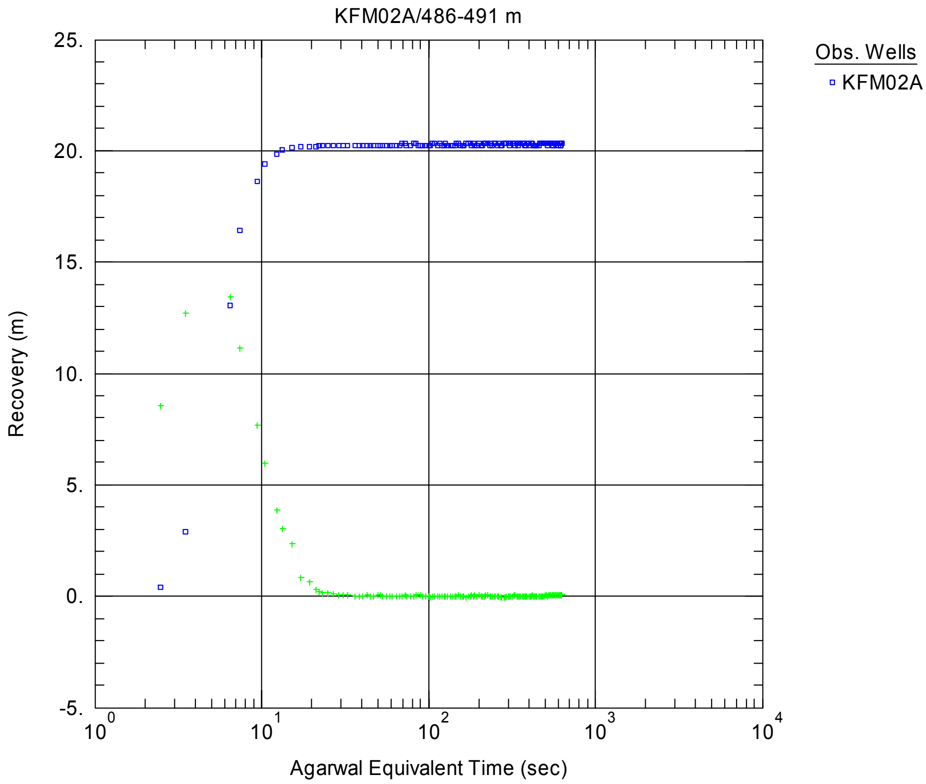



***Figure A3-433.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 486-491 m in KFM02A.*

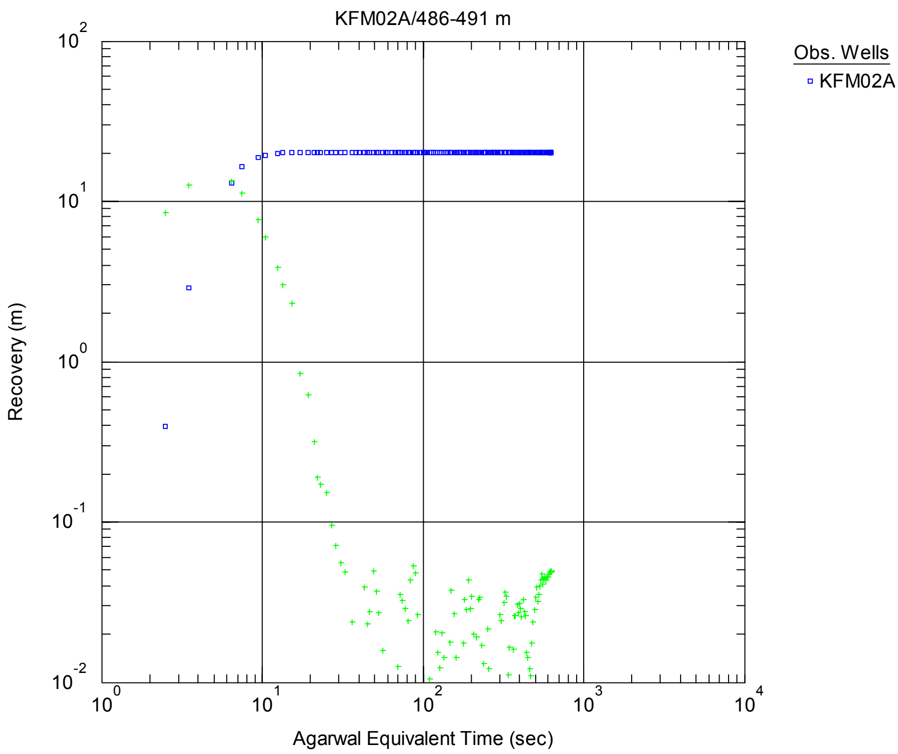



***Figure A3-434****. Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 486-491 m in KFM02A.*

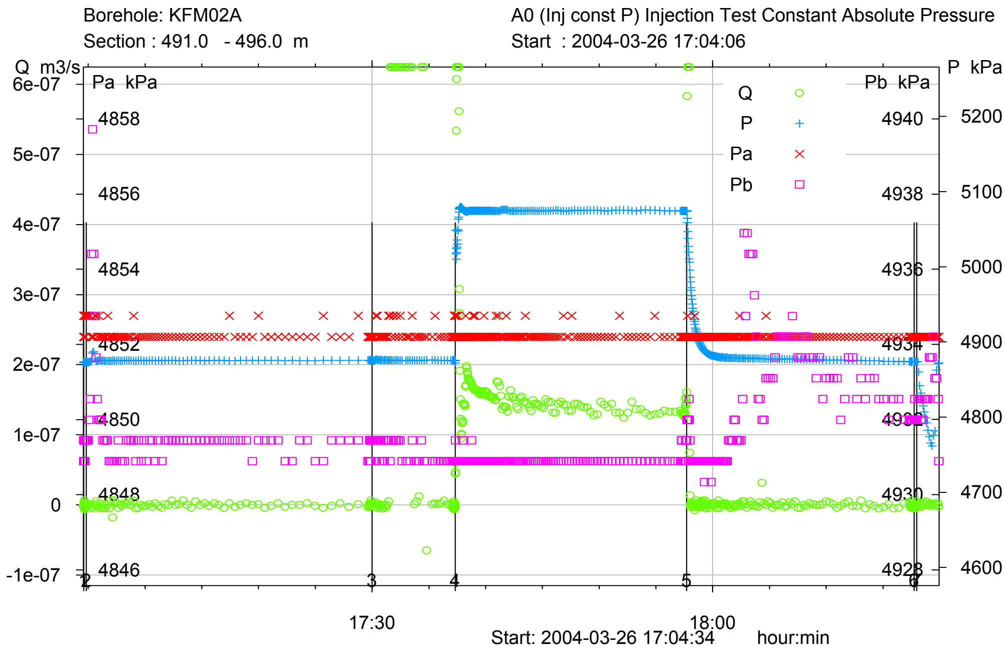



*Figure A3-435. Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 491-496 m in borehole KFM02A.*

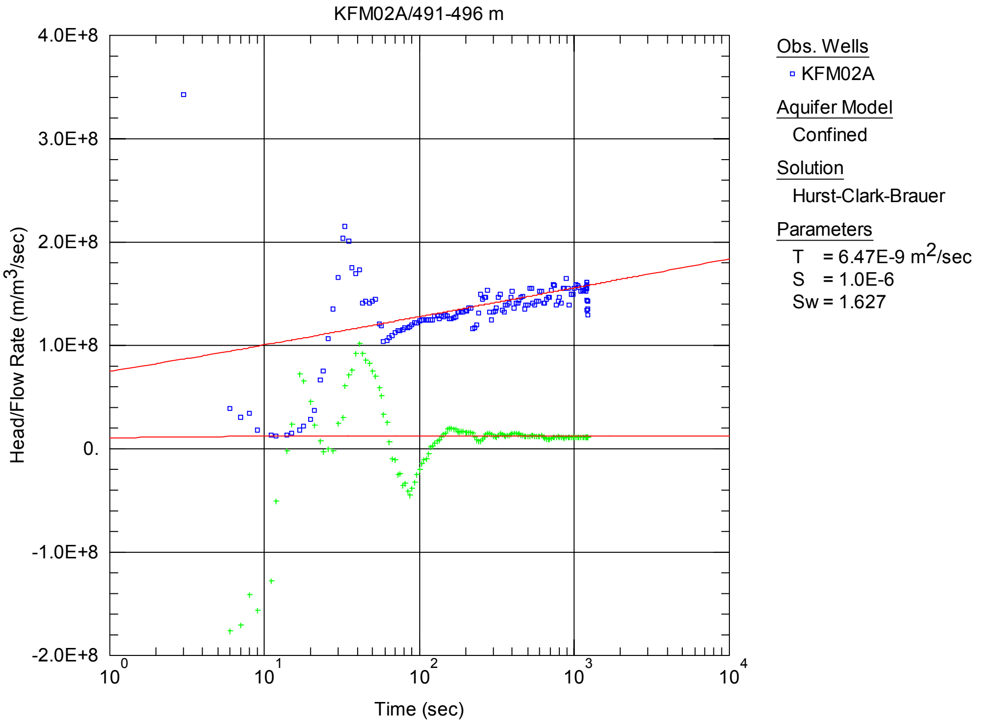



*Figure A3-436. Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 491-496 m in KFM02A.*

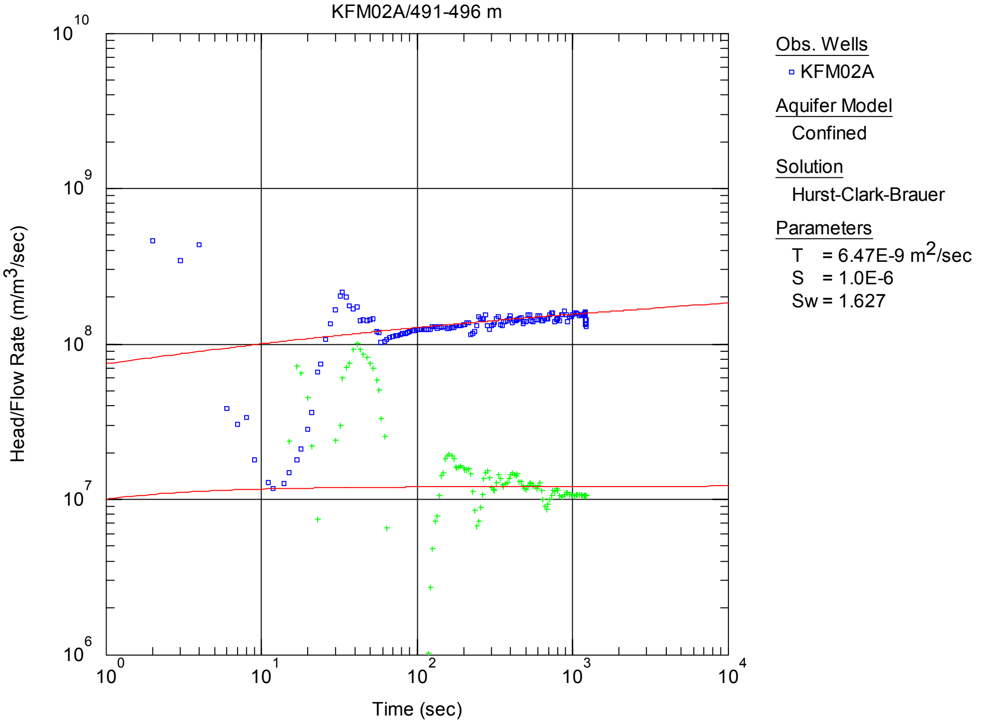



*Figure A3-437. Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 491-496 m in KFM02A.*

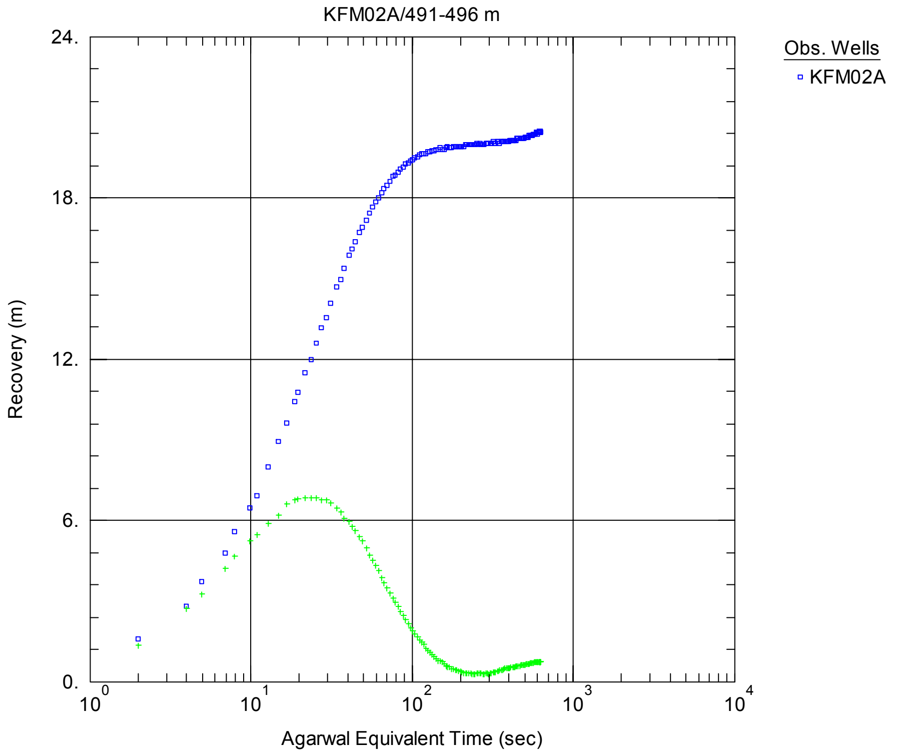



***Figure A3-438.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 491-496 m in KFM02A.*

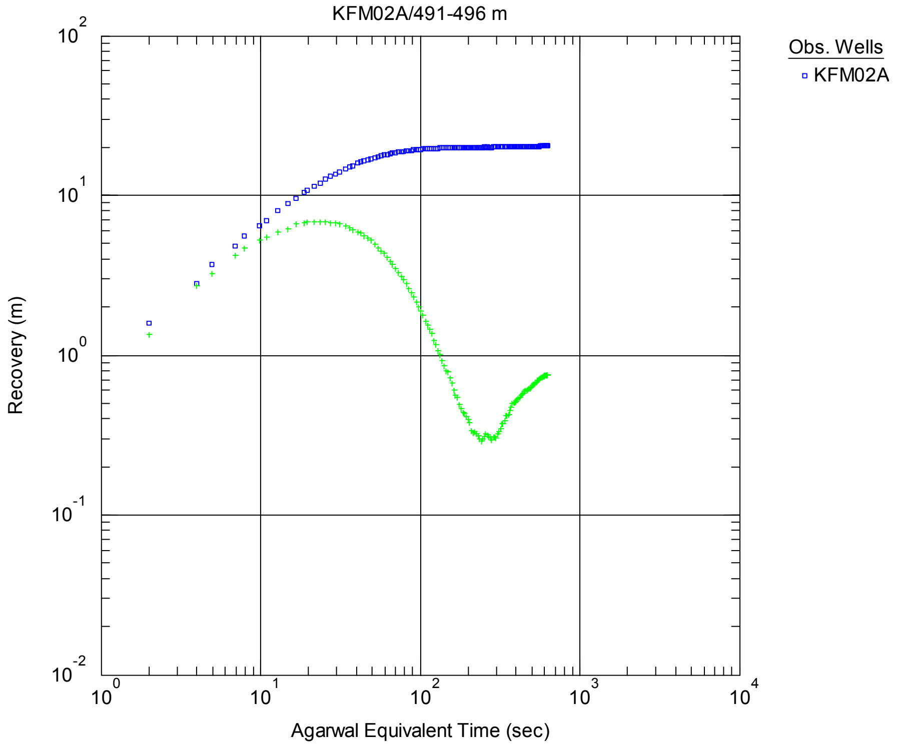



***Figure A3-439.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 491-496 m in KFM02A.*

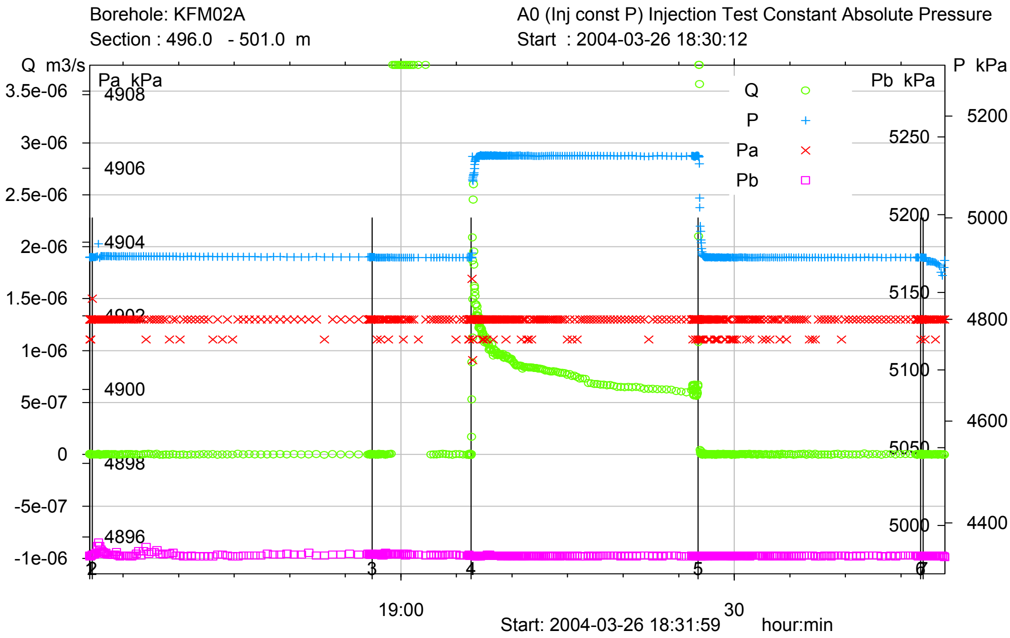



*Figure A3-440.* *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 496-501 m in borehole KFM02A.*

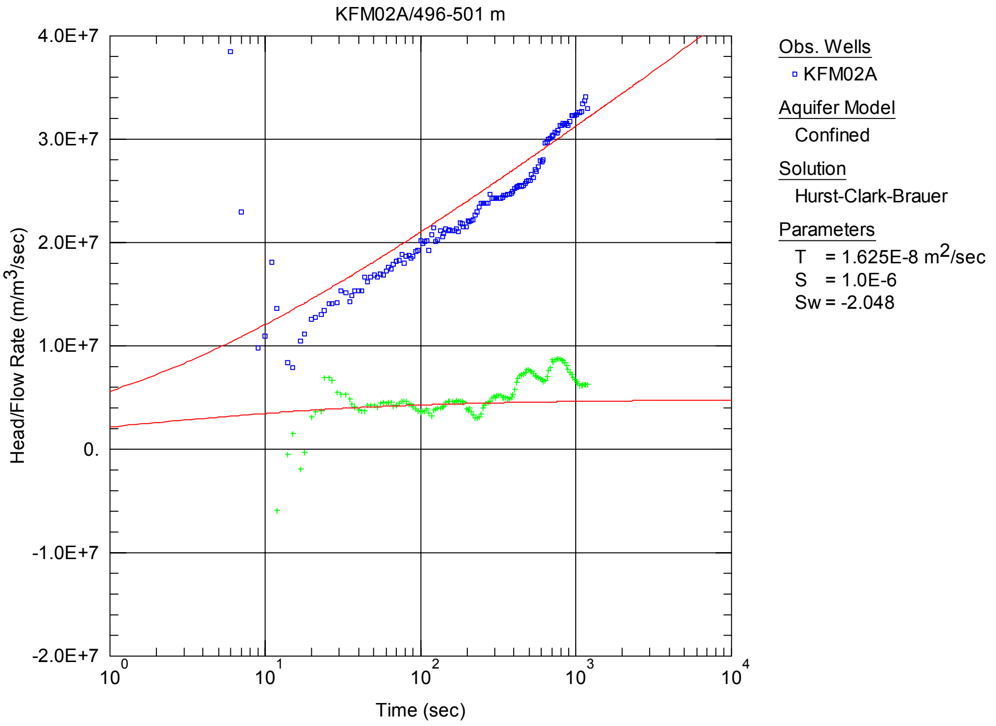



***Figure A3-441.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 496-501 m in KFM02A.*

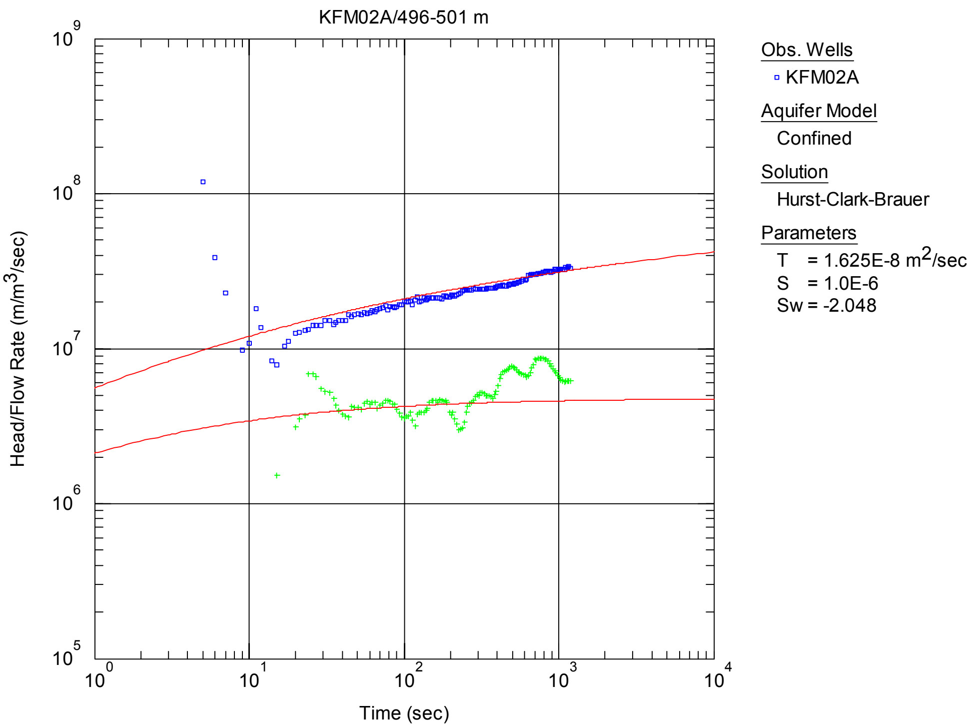



***Figure A3-442.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 496-501 m in KFM02A.*

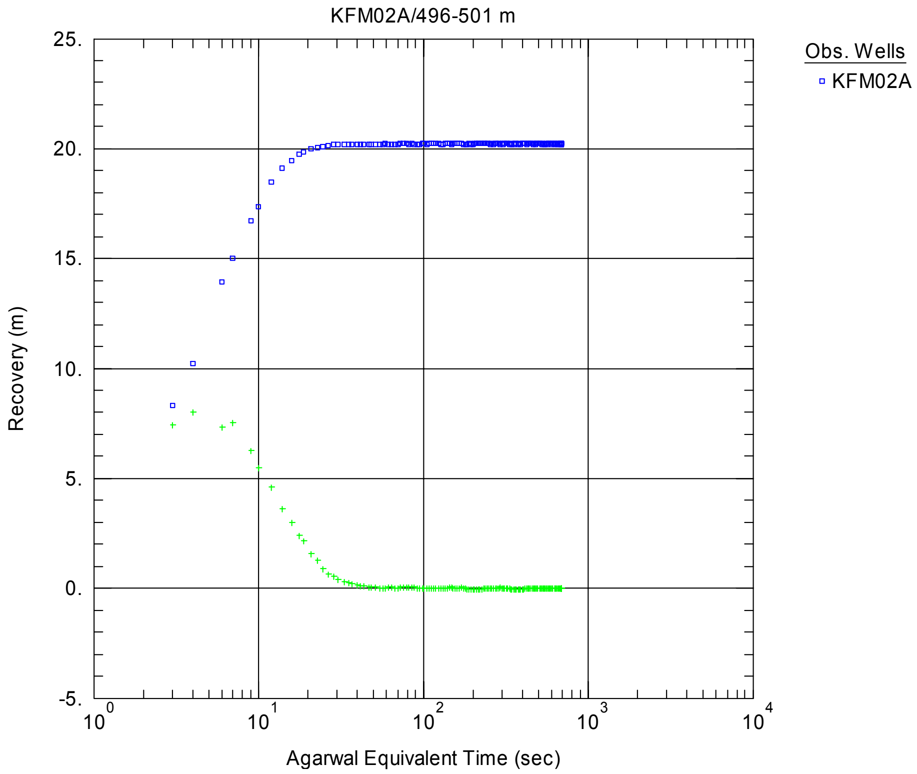



***Figure A3-443.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 496-501 m in KFM02A.*

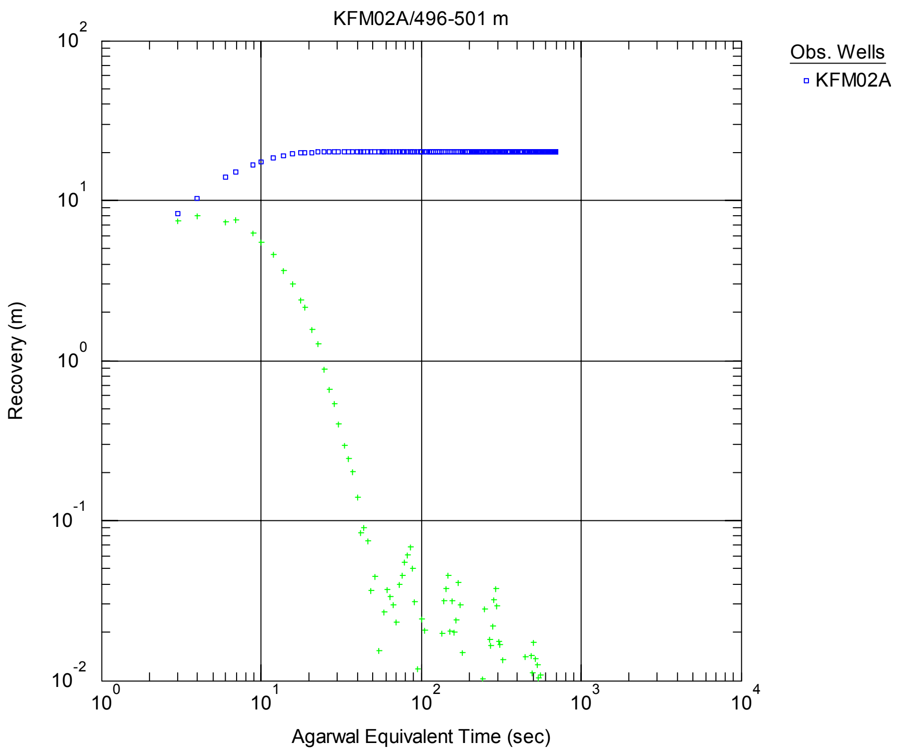



***Figure A3-444.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 496-501 m in KFM02A.*

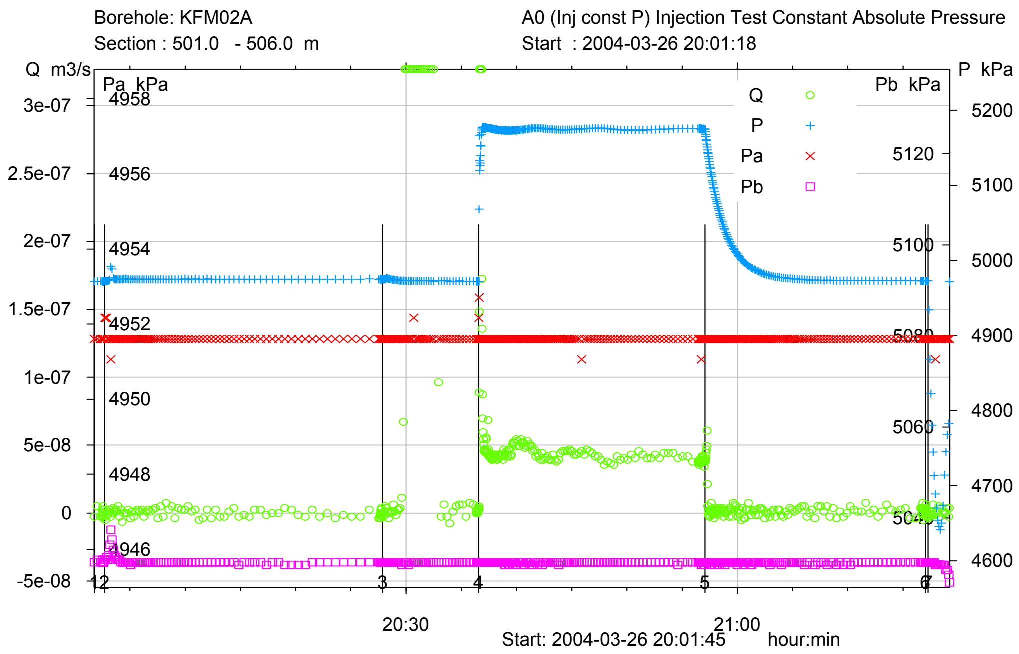



*__Figure A3-445.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 501-506 m in borehole KFM02A.*

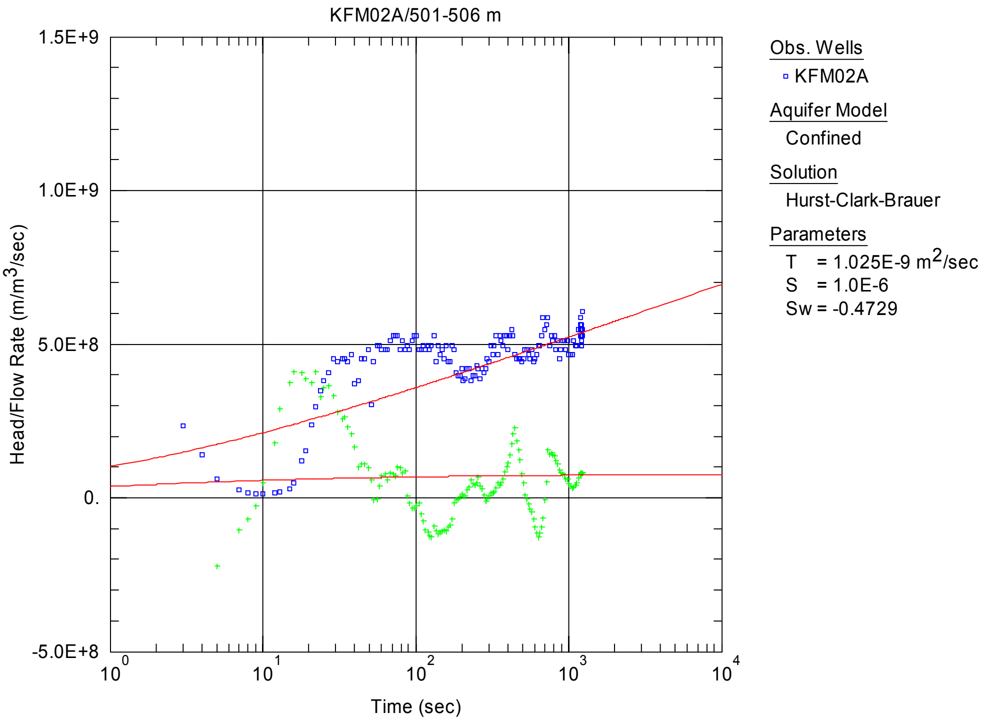



***Figure A3-446.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 501-506 m in KFM02A.*

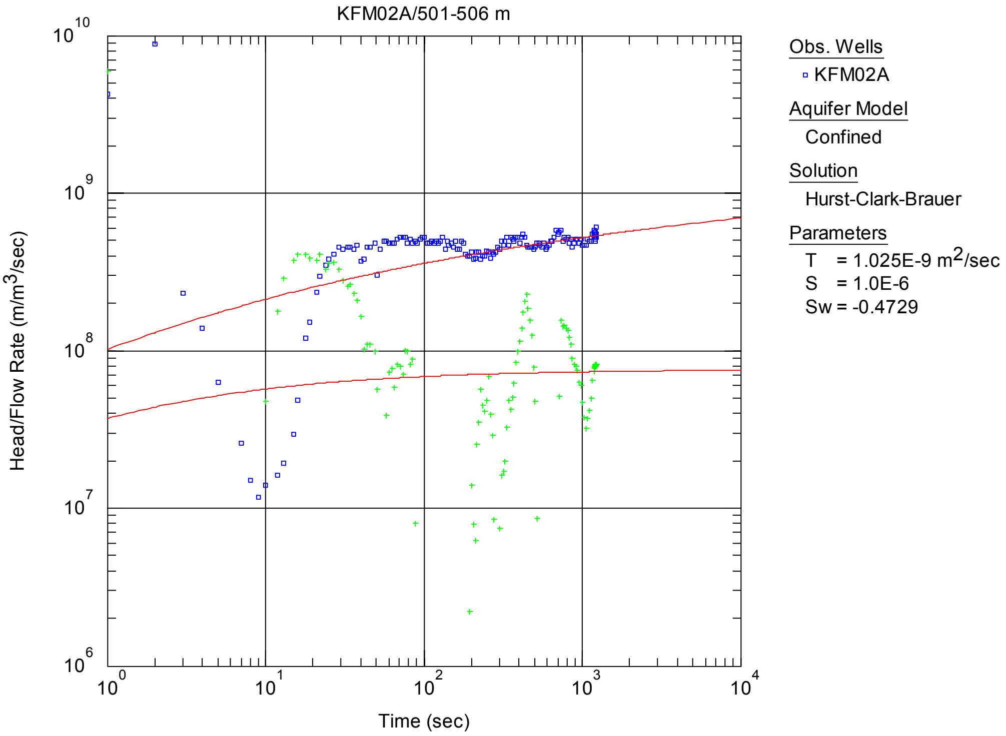



***Figure A3-447.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 501-506 m in KFM02A.*

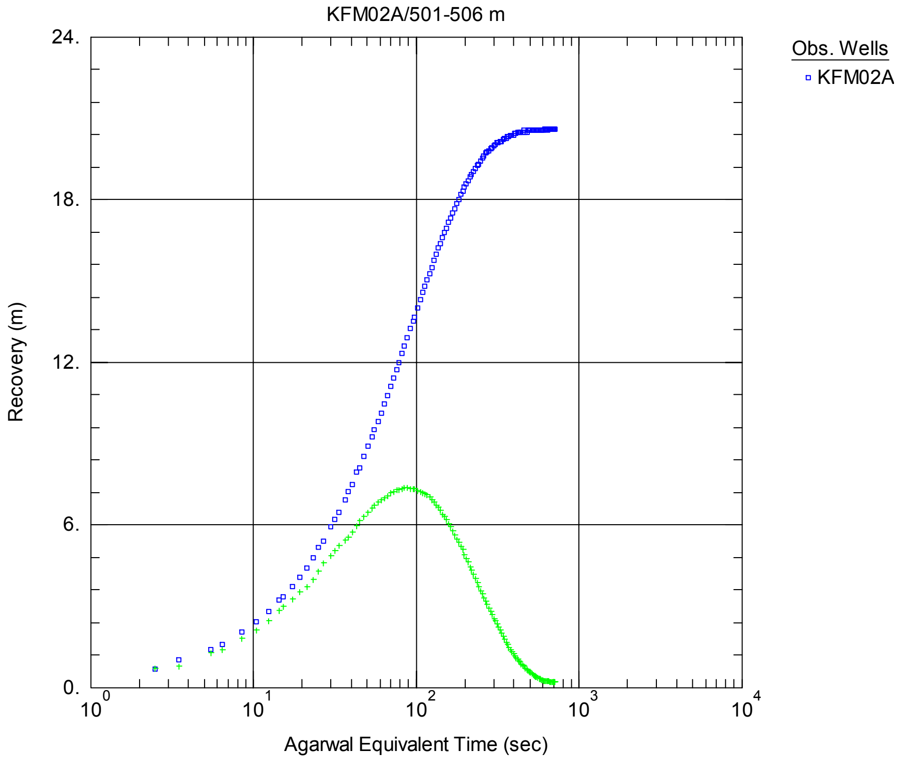



***Figure A3-448.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 501-506 m in KFM02A.*

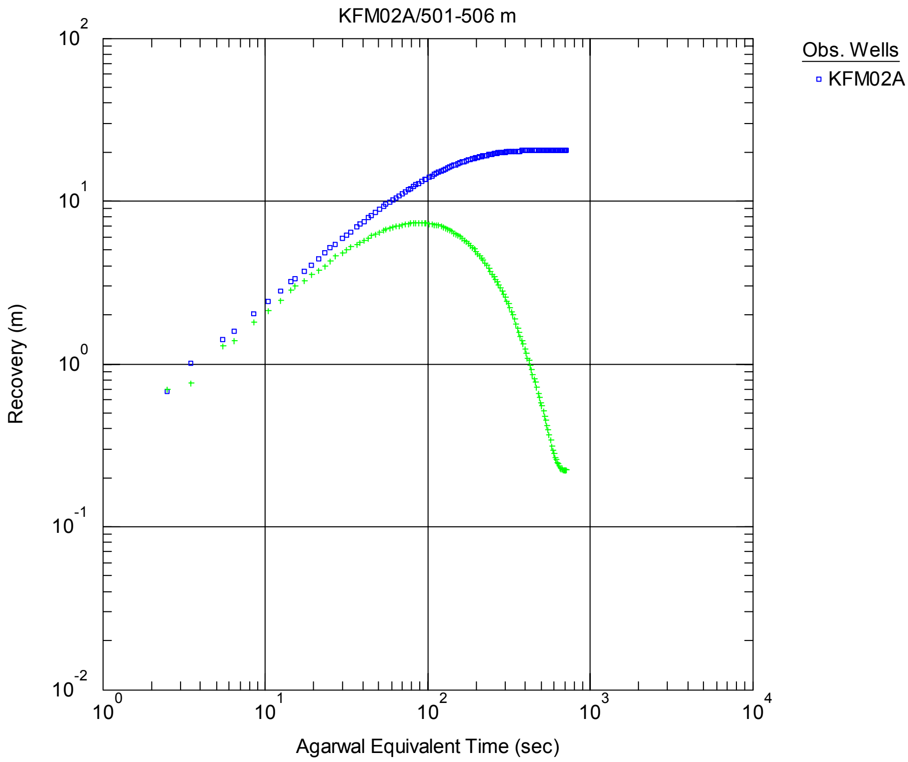



***Figure A3-449.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 501-506 m in KFM02A.*

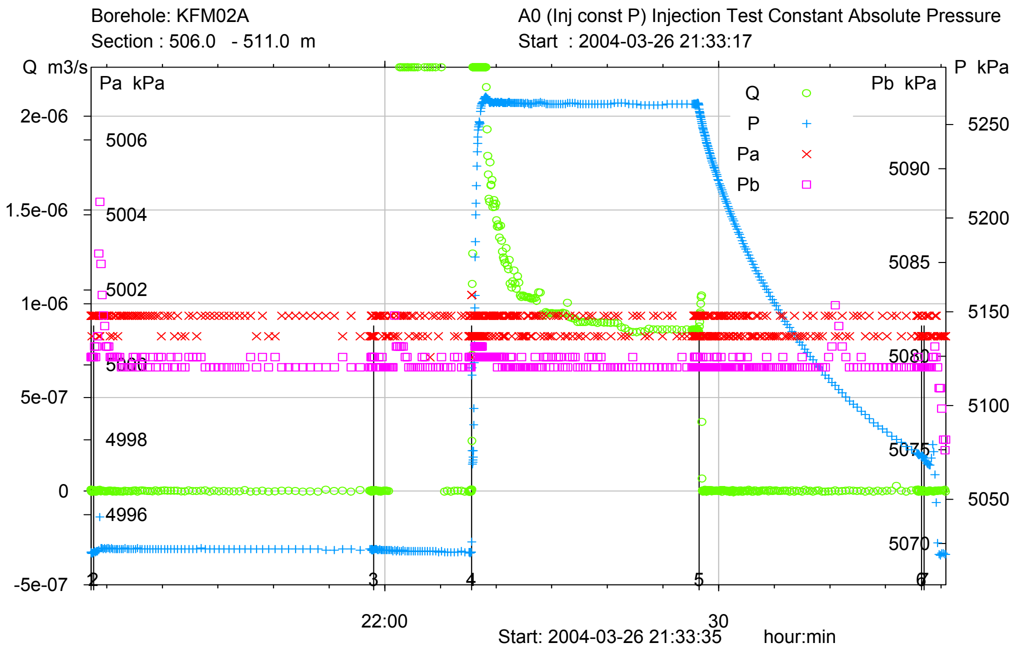



*Figure A3-450.* *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 506-511 m in borehole KFM02A.*

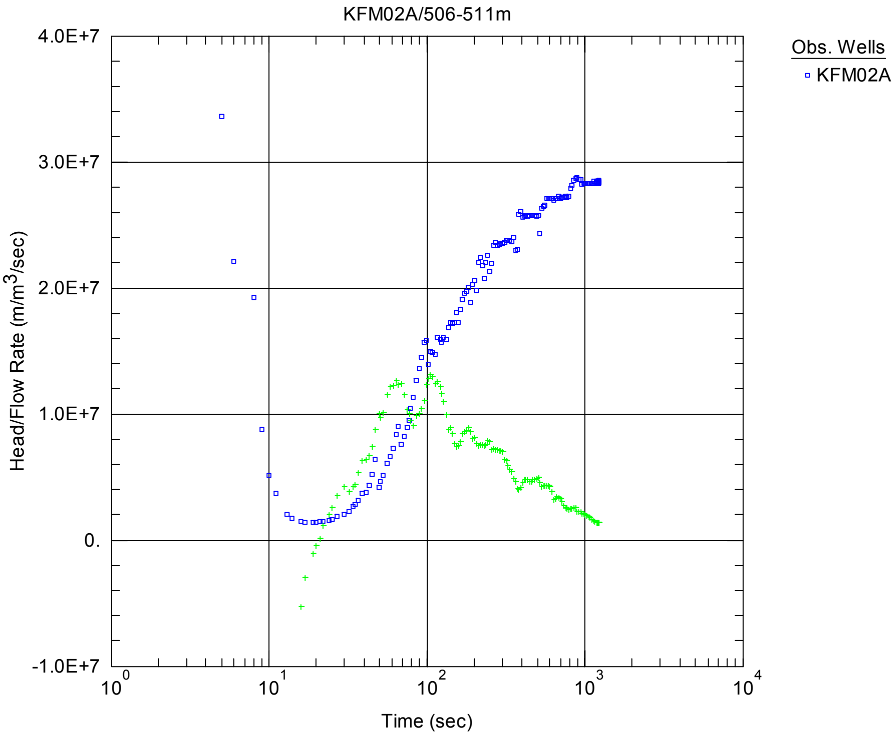



***Figure A3-451.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 506-511 m in KFM02A.*

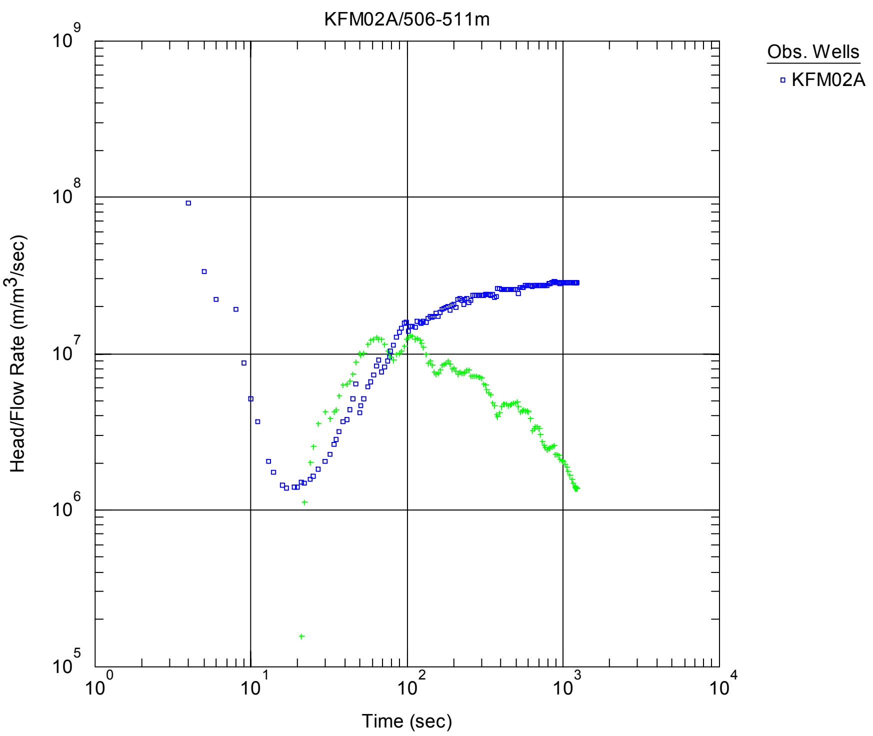



***Figure A3-452.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 506-511 m in KFM02A.*

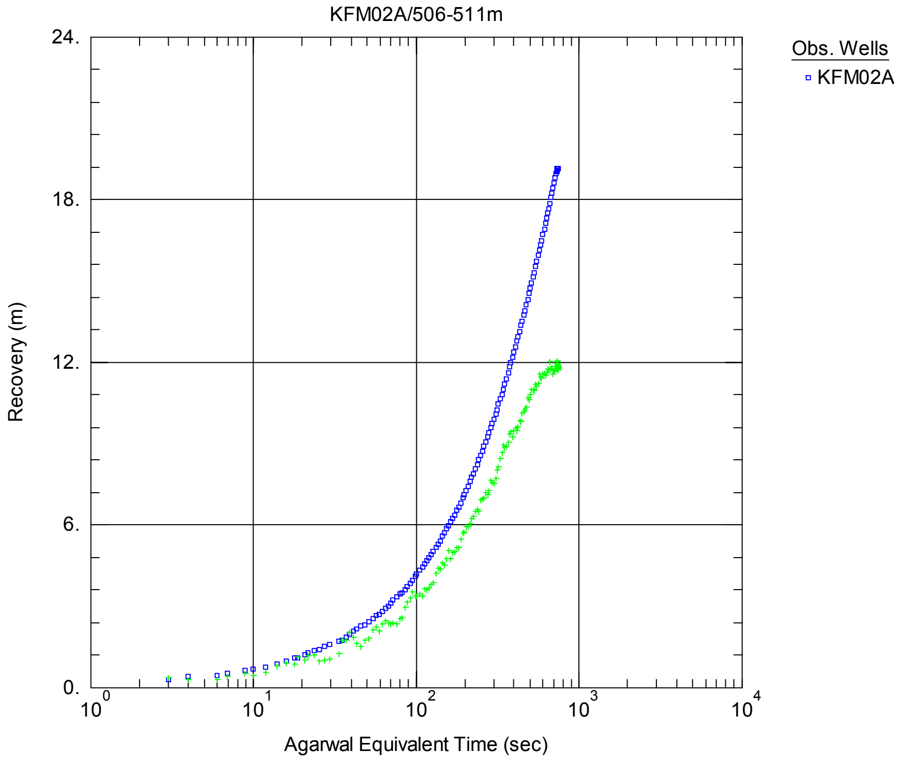



***Figure A3-453.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 506-511 m in KFM02A.*

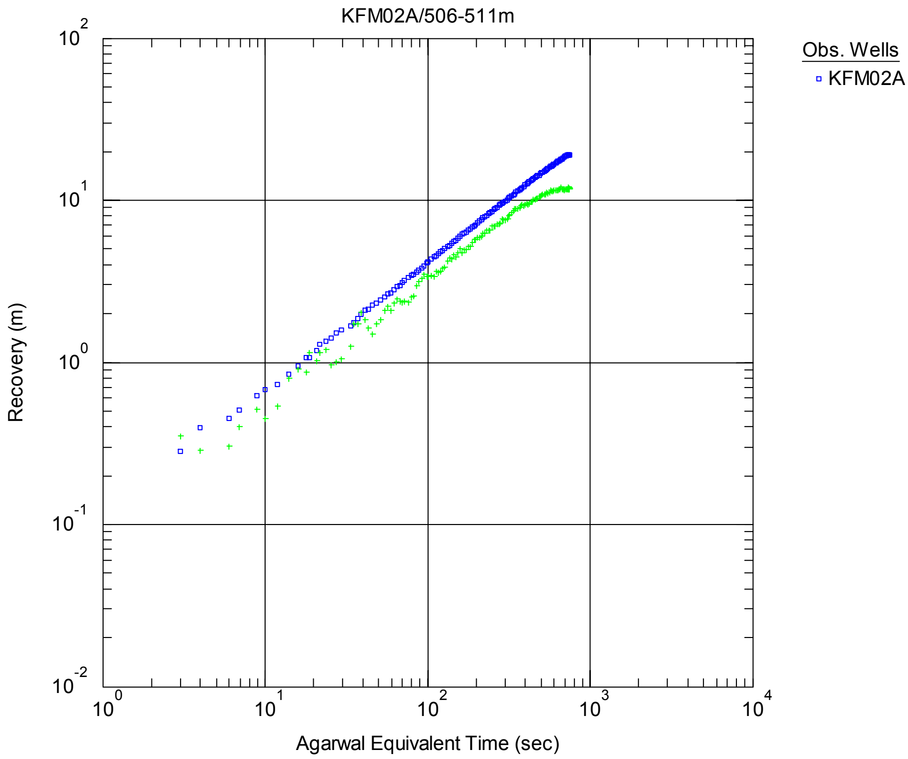



***Figure A3-454.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 506-511 m in KFM02A.*

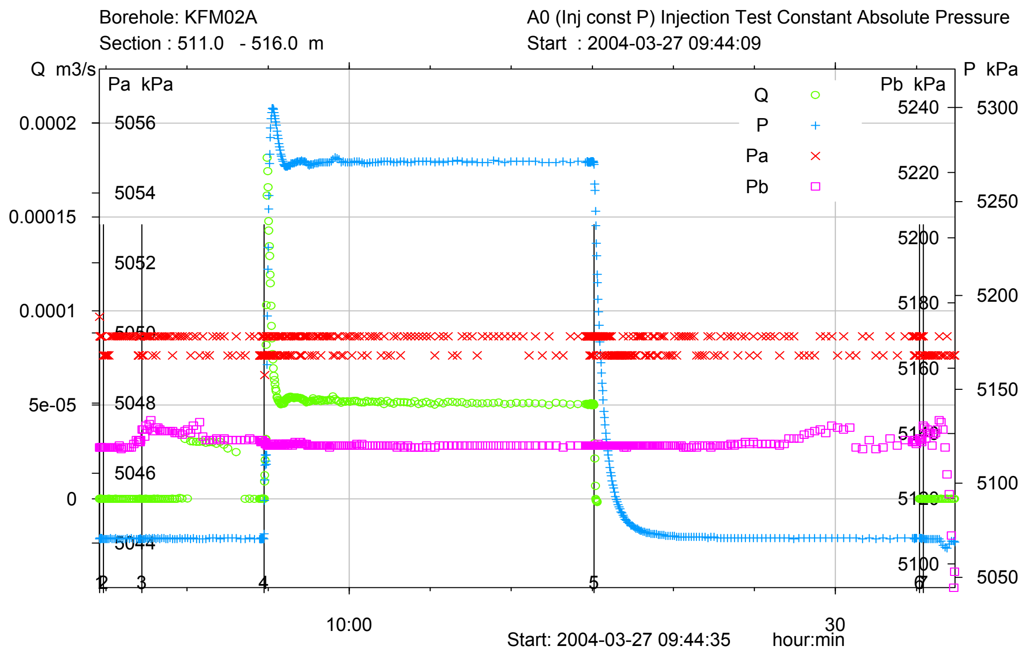



***Figure A3-455.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 511-516 m in borehole KFM02A.*

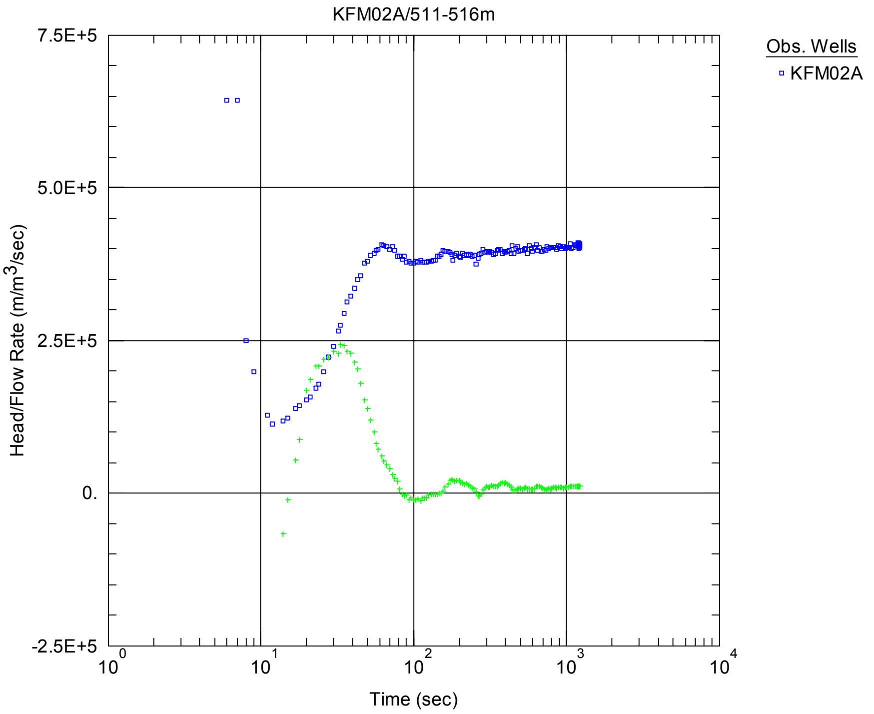



***Figure A3-456.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 511-516 m in KFM02A.*

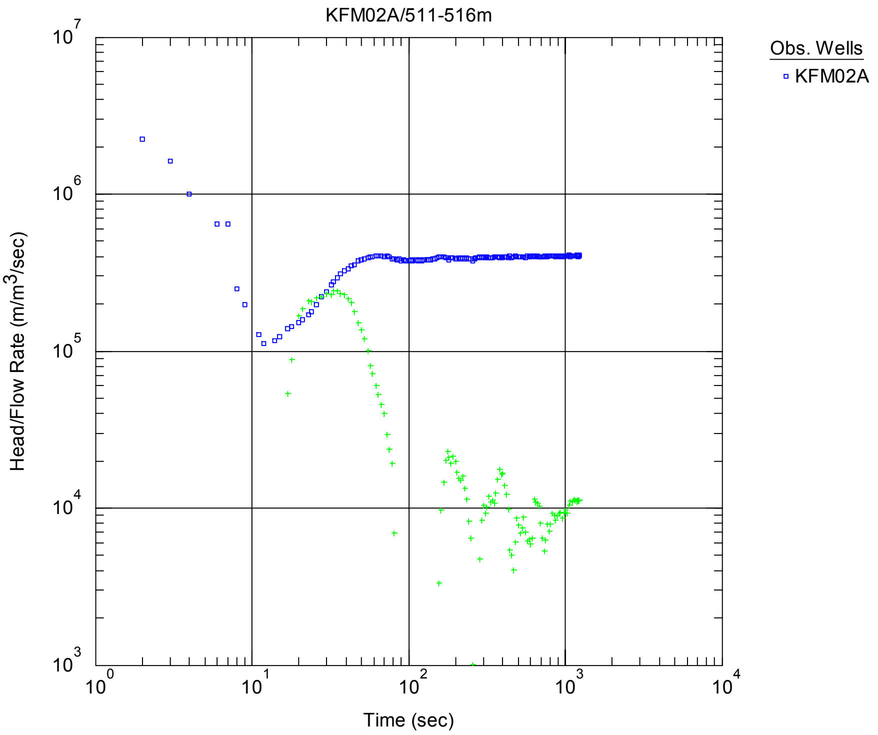



***Figure A3-457.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 511-516 m in KFM02A.*

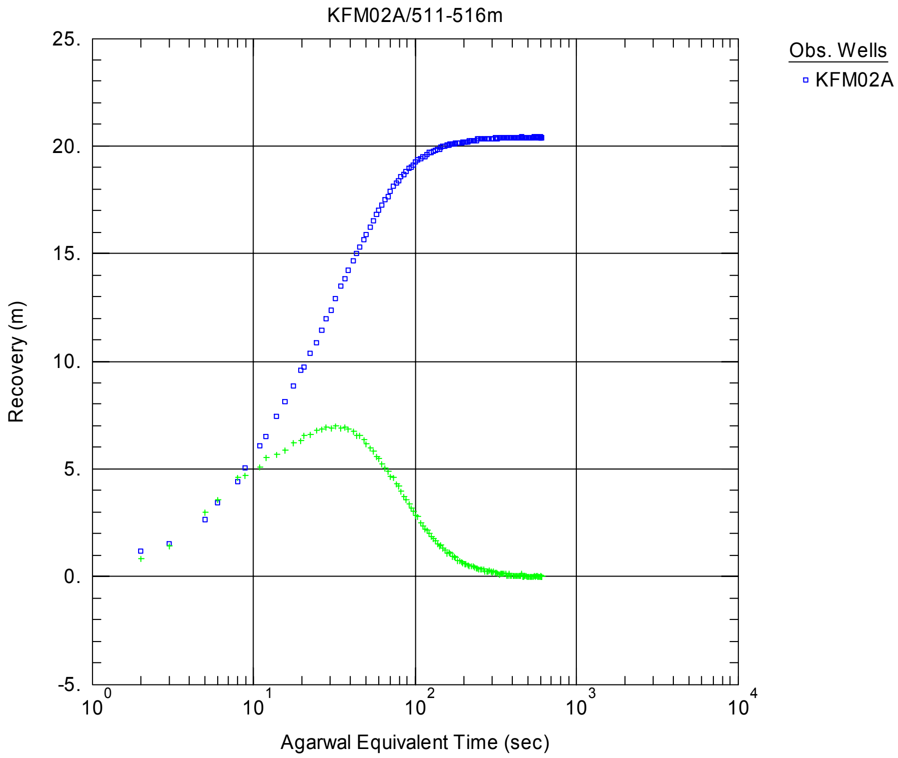



***Figure A3-458.** Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 511-516 m in KFM02A.*

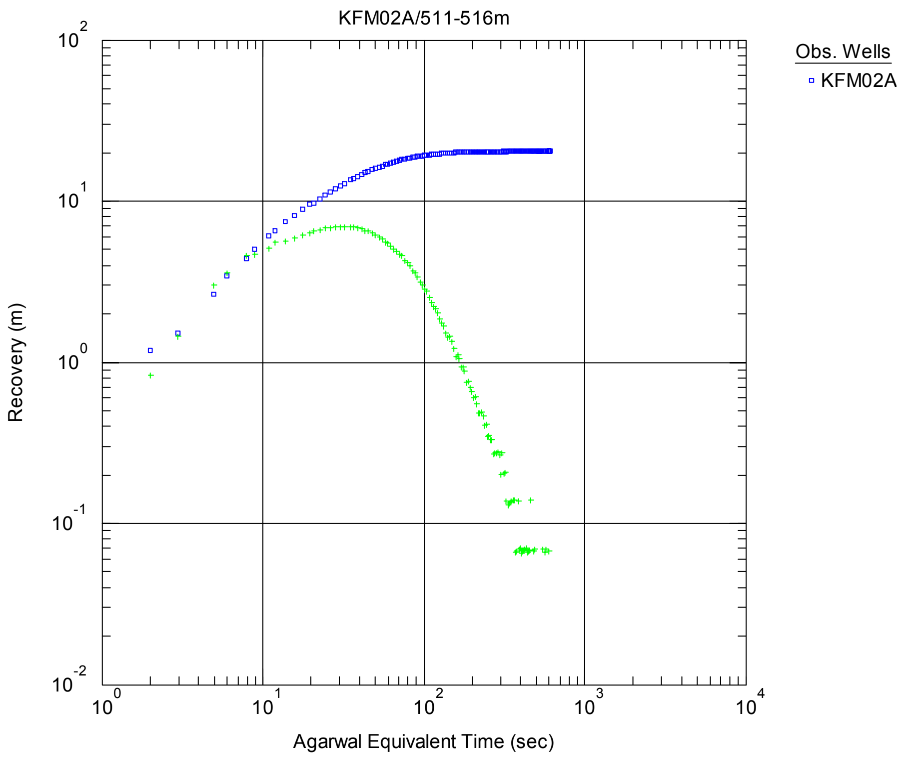



***Figure A3-459.** Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 511-516 m in KFM02A.*

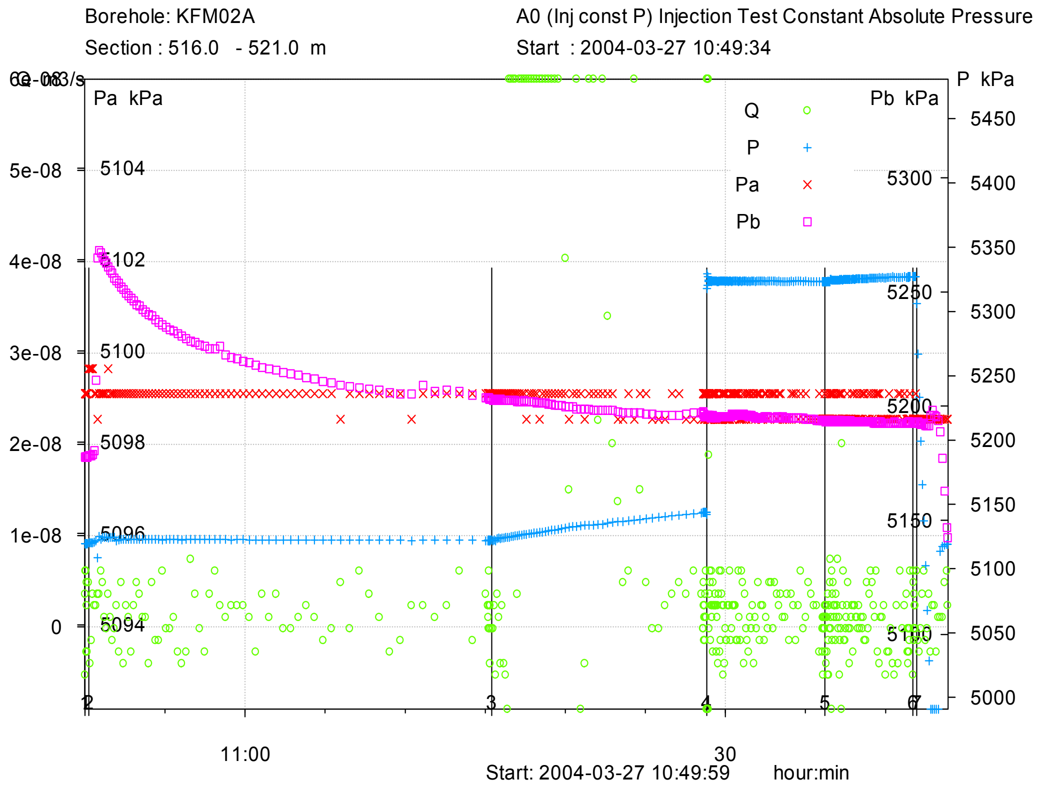



***Figure A3-460.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 516-521 m in borehole KFM02A.*

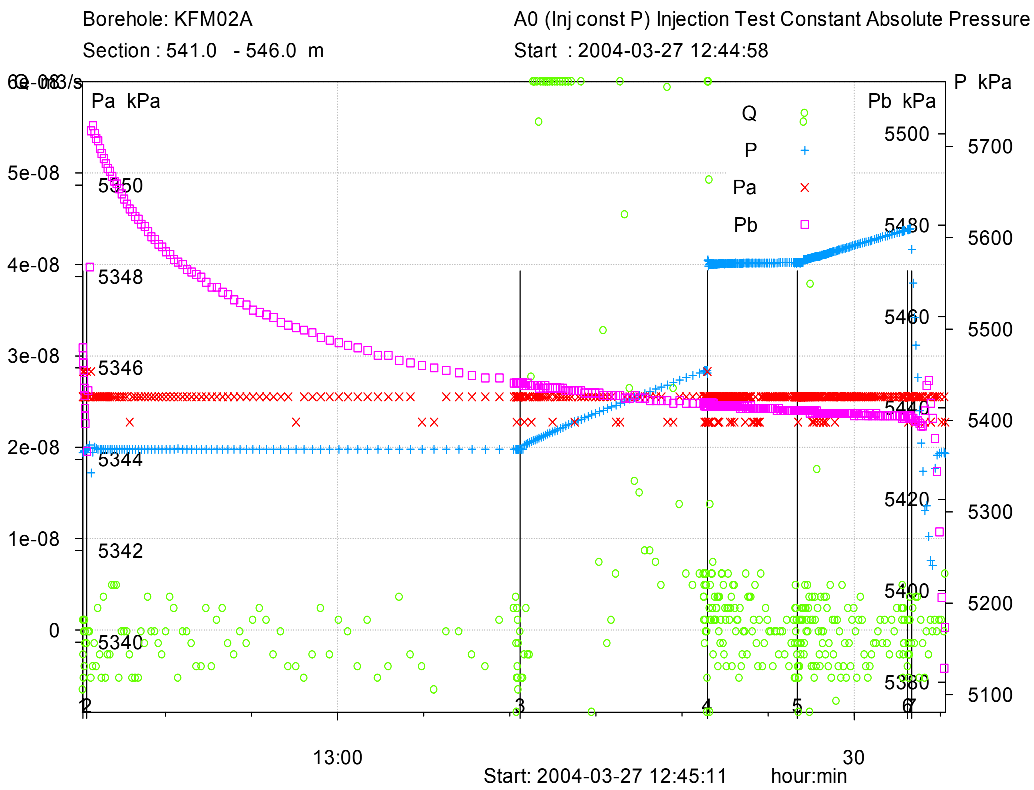



*Figure A3-461.* *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 541-546 m in borehole KFM02A.*

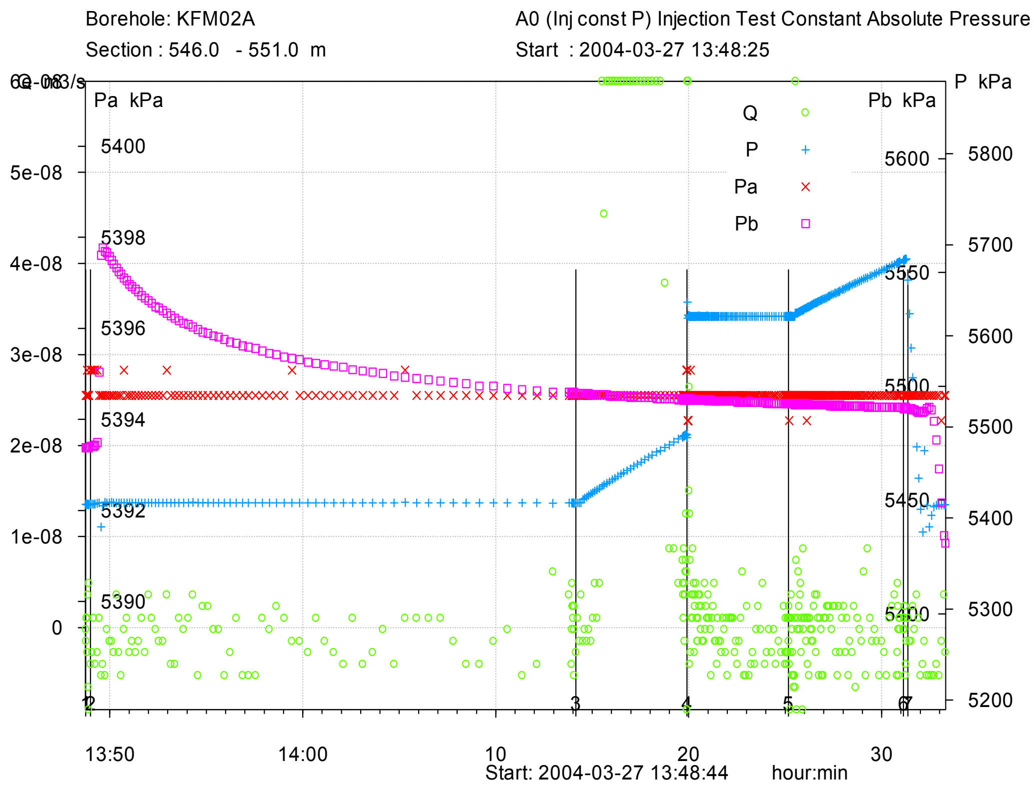



*__Figure A3-462.__ Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 546-551 m in borehole KFM02A.*

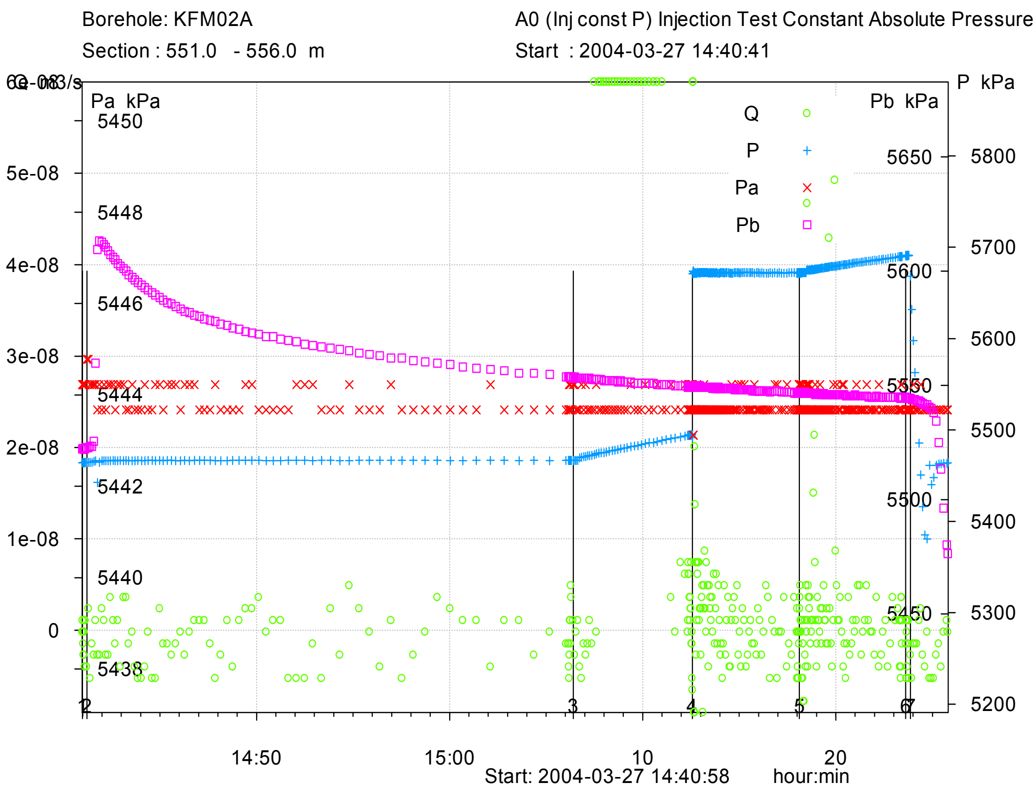



***Figure A3-463.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 551-556m in borehole KFM02A.*

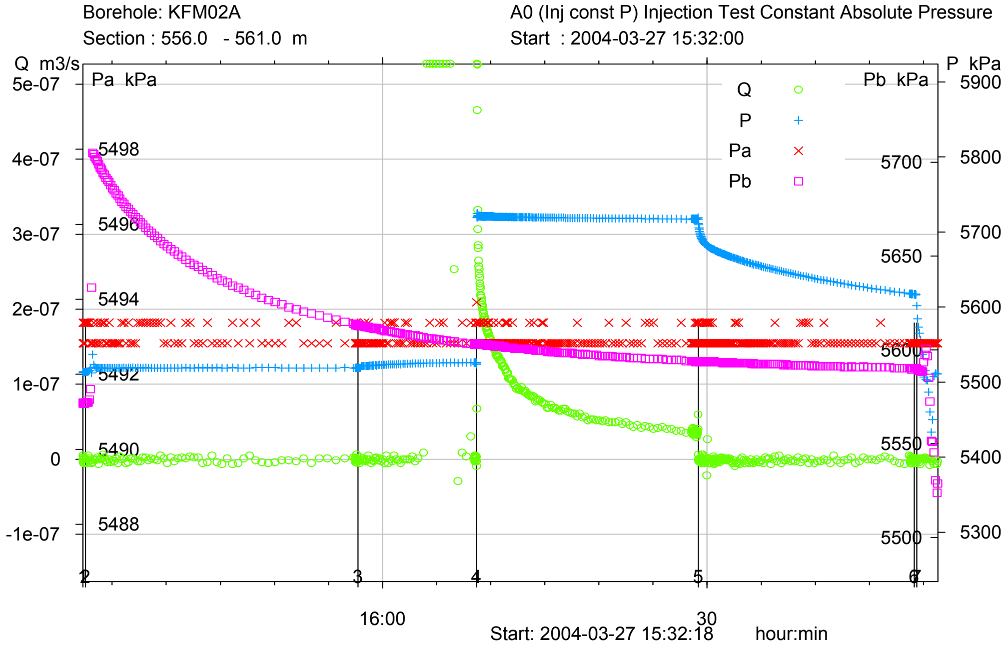



***Figure A3-464.*** *Linear plot of flow rate (Q), pressure (P), pressure above section (Pa) and pressure below section (Pb) versus time from the injection test in section 556-561 m in borehole KFM02A.*

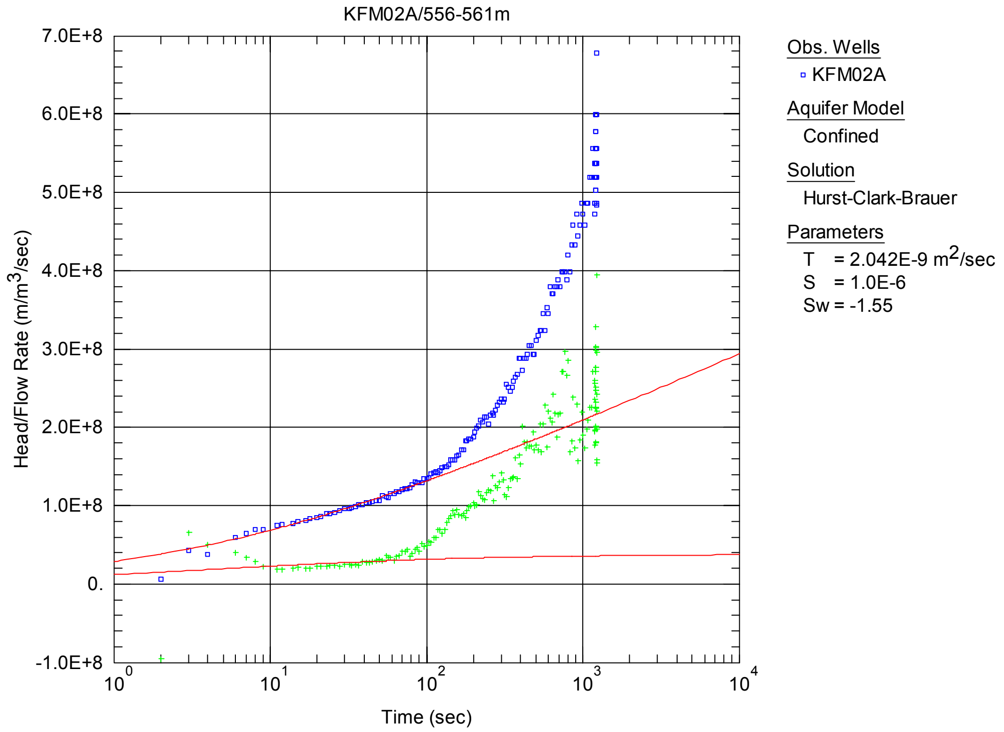



***Figure A3-465.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 556-561 m in KFM02A.*

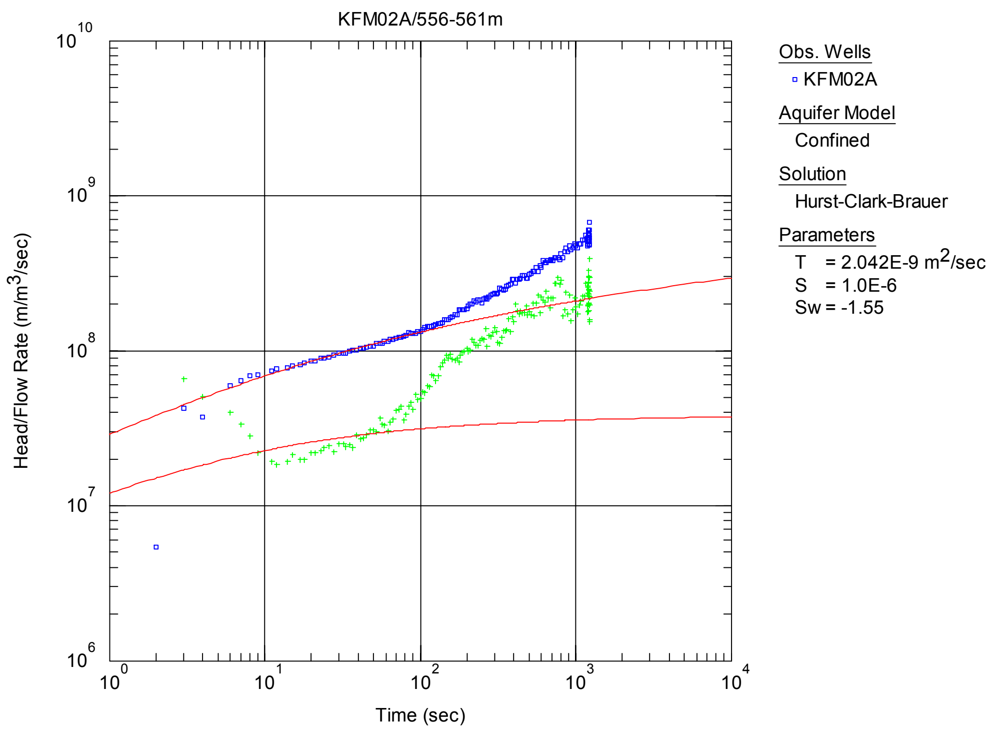



***Figure A3-466.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Hurst-Clark-Brauer solution (solid line), from the injection test in section 556-561 m in KFM02A.*

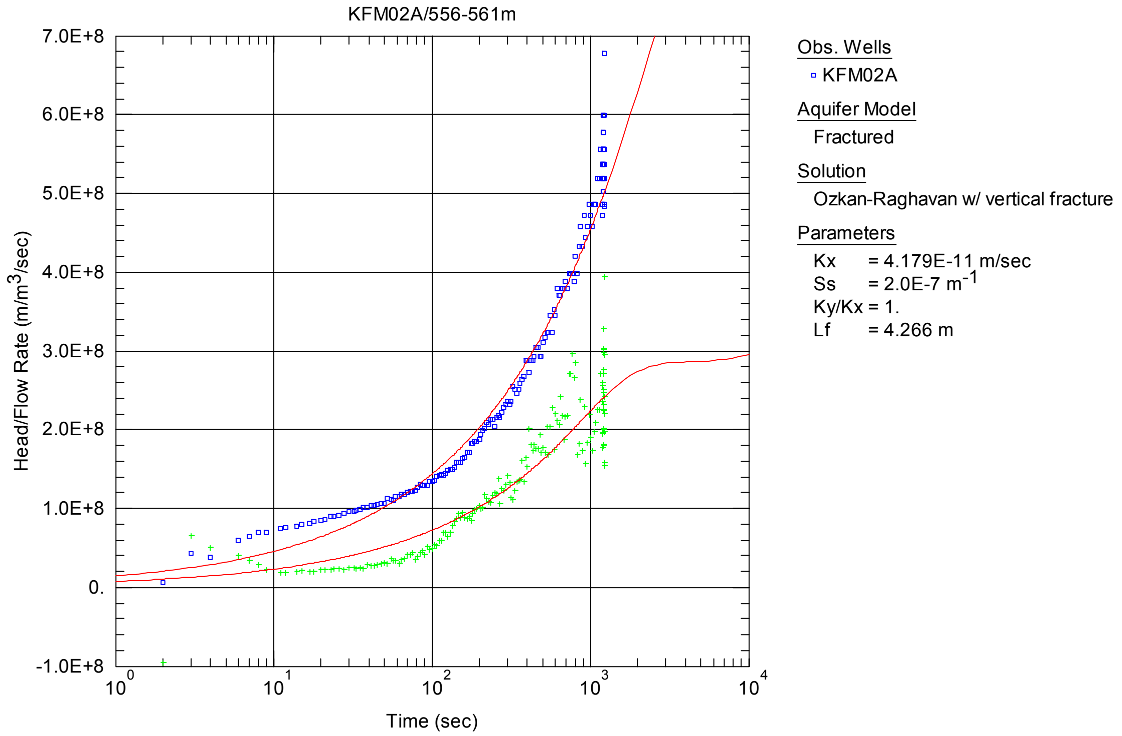



***Figure A3-467.*** *Lin-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Ozkan-Raghavan solution for vertical fractures (solid line), from the injection test in section 556-561 m in KFM02A.*

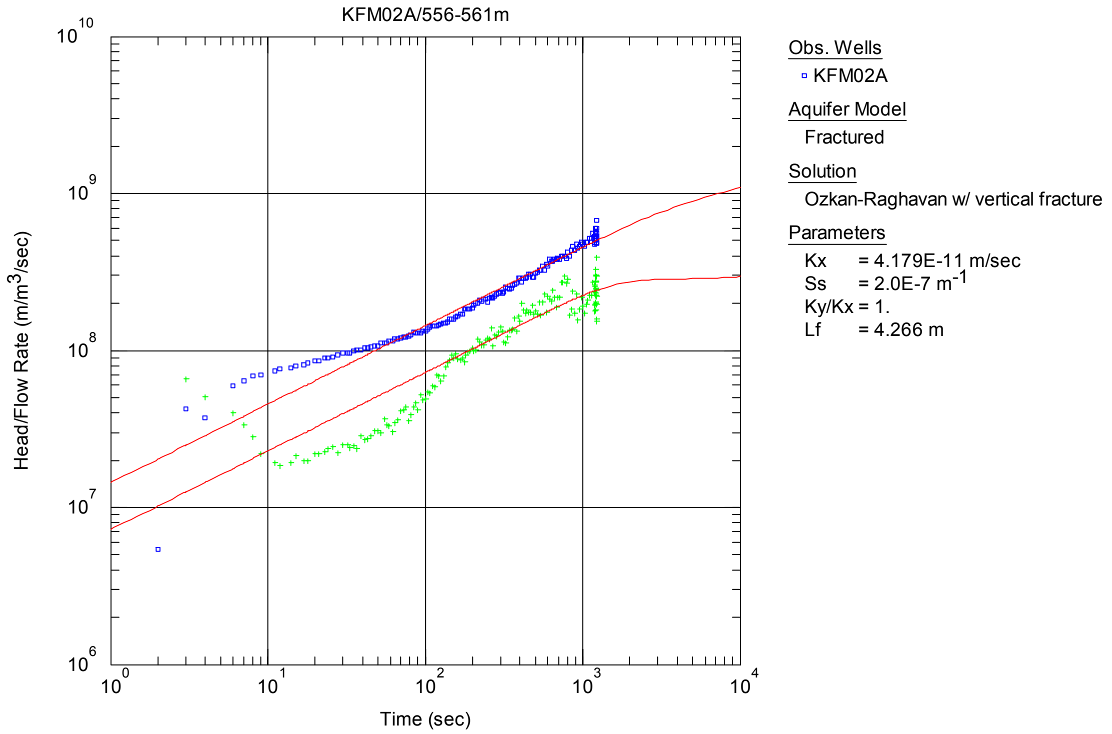



***Figure A3-468.*** *Log-log plot of head/flow rate (□) and derivative (+) versus time, showing fit to Ozkan-Raghavan solution for vertical fractures (solid line), from the injection test in section 556-561 m in KFM02A.*

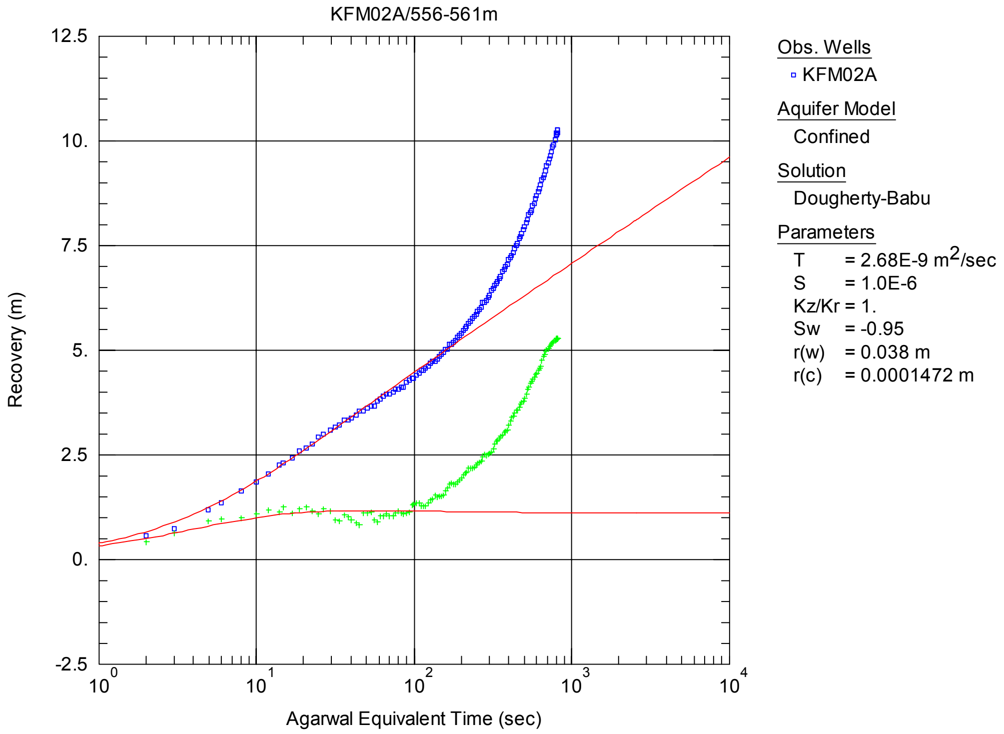



***Figure A3-469.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 556-561 m in KFM02A according to the Dougherty-Babu solution.*

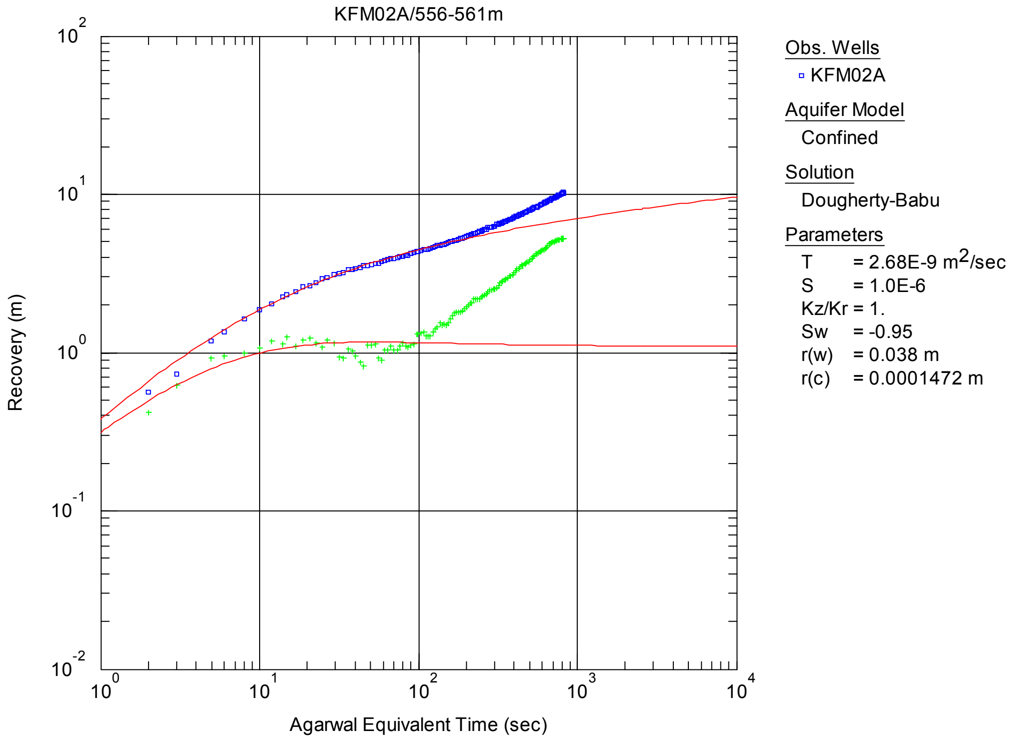



***Figure A3-470.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 556-561 m in KFM02A according to the Dougherty-Babu solution.*

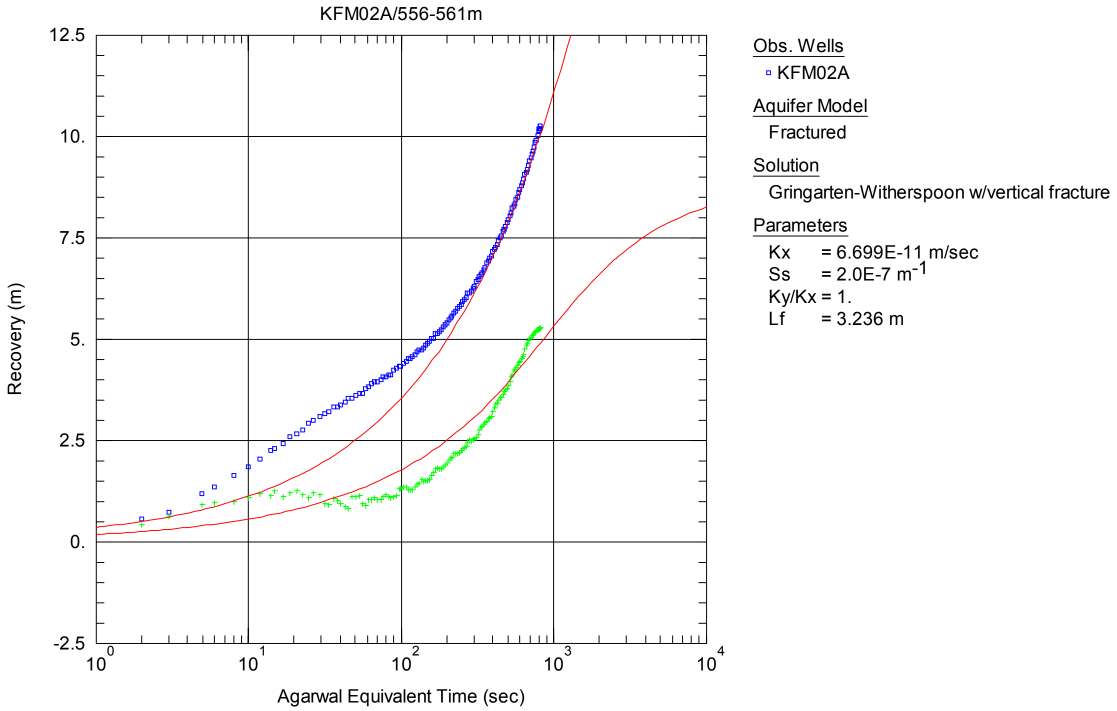



***Figure A3-471.*** *Lin-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 556-561 m in KFM02A according to the Gringarten-Witherspoon solution for vertical fractures.*

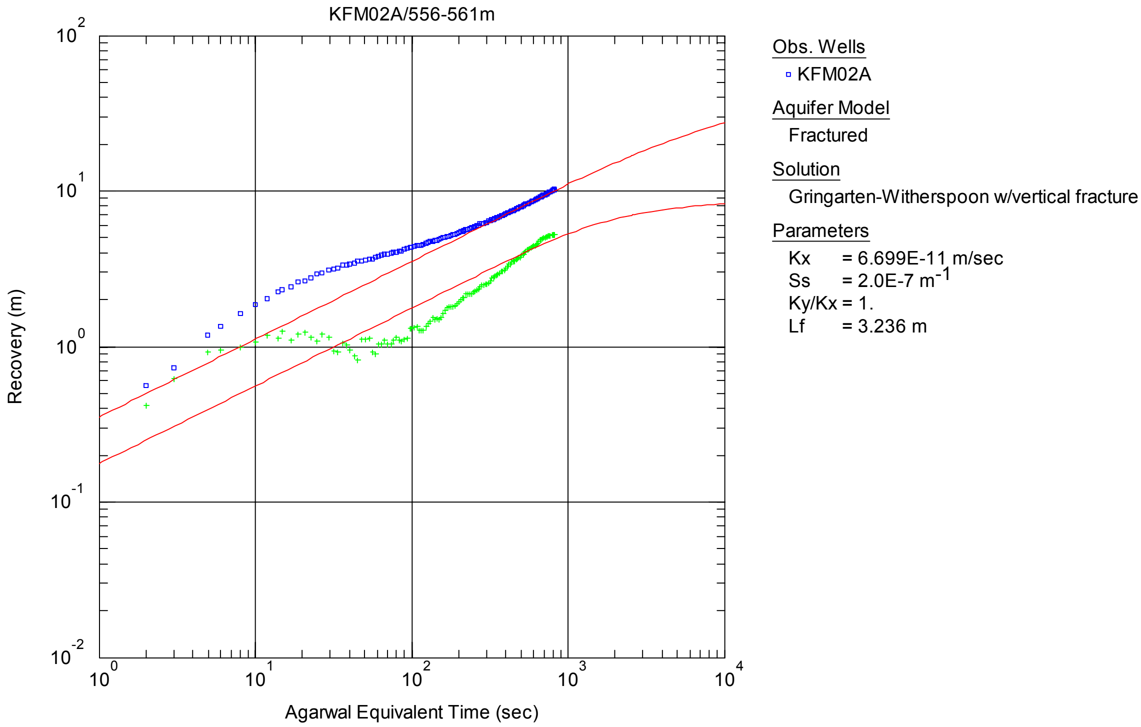
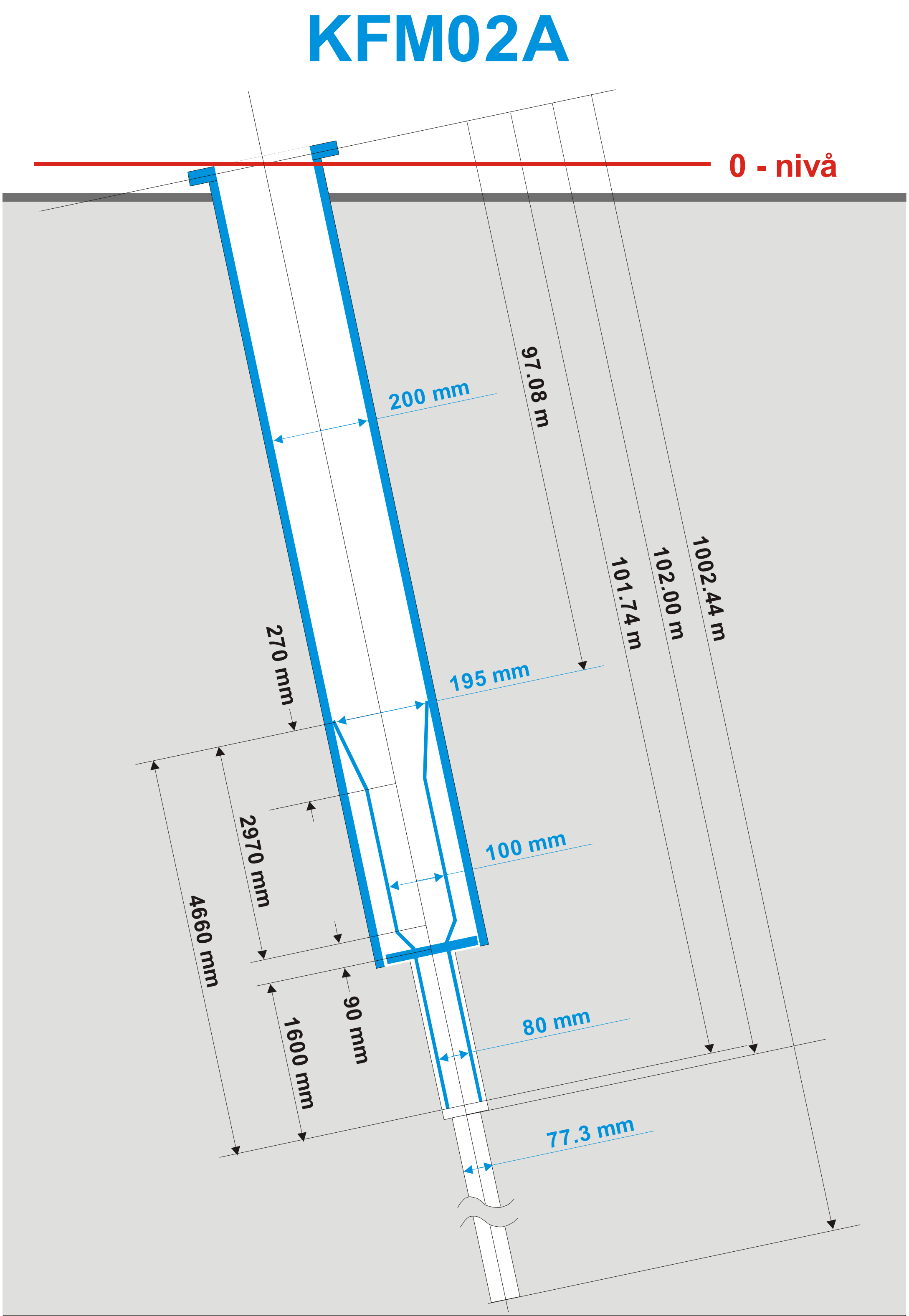



***Figure A3-472.*** *Log-log plot of recovery (□) and derivative (+) versus equivalent time from the injection test in section 556-561 m in KFM02A according to the Gringarten-Witherspoon solution for vertical fractures.*

## Appendix 4

# Borehole technical data




| Drilling period | | Drilling reference point | |
|---|---|---|---|
| Drilling start date: | 2002-11-20 | Northing: | 6698712.501 (m), RT90 2,5 gon V 0:-15 |
| Drilling stop date: | 2003-03-26 | Easting: | 1633182.863 (m), RT90 2,5 gon V 0:-15 |
| | | Elevation: | 7.353 (m), RHB 70 |

# Appendix 5

## Sicada tables

### Nomenclature plu_s_hole_test_d

| Column | Datatype | Unit | Column Description |
|---|---|---|---|
| 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) |
| mean_flow_rate_qm | FLOAT | $m^3$/s | Arithmetic mean flow rate of the pumping/injection |
| flow_rate_end_qp | FLOAT | $m^3$/s | Flow rate at the end of the flowing oeriod |
| value_type_qp | CHAR | | 0:true value,-1<lower meas.limit1:>upper meas.limit |
| q_measl__l | FLOAT | $m^3$/s | Estimated lower measurement limit of flow rate |
| q_measl__u | FLOAT | $m^3$/s | Estimated upper measurement limit of flow rate |
| tot_volume_vp | FLOAT | $m^3$ | Total volume of pumped(positive) or injected(negative) water |
| dur_flow_phase_tp | FLOAT | s | Time for the flowing phase of the test |
| dur_rec_phase_tf | FLOAT | s | Time for the recovery phase of the test |
| initial_head_hi | FLOAT | m | Initial formation head, see table description |
| head_at_flow_end_hp | FLOAT | m | Hydraulic head at end of flow phase, see table description |
| final_head_hf | FLOAT | m | Hydraulic head at end of recovery phase,see table descript. |
| initial_press_pi | FLOAT | kPa | Initial formation pressure. Actual formation pressure |
| press_at_flow_end_pp | FLOAT | kPa | Pressure at the end of flow phase, see table description. |
| final_press_pf | FLOAT | kPa | Fimal pressure at the end of the recovery, see table descr. |
| fluid_temp_tew | FLOAT | °C | Section fluid temperature, see table description |
| fluid_elcond_ecw | FLOAT | mS/m | Section fluid el. conduvtivity,see table description |
| fluid_salinity_tdsw | FLOAT | mg/l | Total salinity of section fluid based on EC,see table descr. |

| Column | Datatype | Unit | Column Description |
|---|---|---|---|
| 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 |
|---|---|---|---|
| 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 |
| lp | FLOAT | m | Hydraulic point of application |
| 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. |
| 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) |
| 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$^2$/s | K_M: Hydraulic conductivity based on Moye (1967) |
| formation_width_b | FLOAT | m | b:Interpreted formation thickness repr. for evaluated T/TB |
| width_of_channel_b | FLOAT | m | B:Interpreted width of formation with evaluated TB |
| tb | FLOAT | m$^3$/s | TB:T=transmissivity,B=width of formation,see description |
| 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 |

| Column | Datatype | Unit | Column Description |
|---|---|---|---|
| sb | FLOAT | m | SB:S=storativity,B=width of formation,1Dmodel,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 | $m^2/s$ | T=transmissivity, 2D model, see table description |
| 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 T,see table descr. |
| u_measl_q_s | FLOAT | $m^2/s$ | Estimated upper meas. limit for evaluated T,see description |
| storativity_s | FLOAT | | 2D model for evaluation of S=storativity,see table descript. |
| assumed_s | FLOAT | | Assumed Storativity,2D model evaluation,see table descr. |
| leakage_koeff | FLOAT | 1/s | K'/b':2Dmodel evaluation of leakage coefficient,see desc. |
| hydr_cond_ks | FLOAT | $m^2/s$ | Ks:3D model evaluation of hydraulic conductivity,see desc. |
| value_type_ks | CHAR | | 0:true value,-1:Ks<lower meas.limit,1:Ks>upper meas.limit, |
| l_meas_limit_ks | FLOAT | $m^2/s$ | Estimated lower meas.limit for evaluated Ks, see table desc. |
| u_meas_limit_ks | FLOAT | $m^2/s$ | Estimated upper meas.limit for evaluated Ks,see table descr. |
| spec_storage_ss | FLOAT | 1/m | Ss:Specific storage,3Dmodel evaluation,see table descr. |
| assumed_ss | FLOAT | 1/m | Assumed Spec.storage,3D model evaluation,see table des. |
| c | FLOAT | $m^3/pa$ | C: Wellbore storage coefficient |
| cd | FLOAT | | CD: Dimensionless wellbore storage constant |
| skin | FLOAT | | Skin factor |
| stor_ratio | FLOAT | | Storativity ratio |
| interflow_coeff | FLOAT | | Interporosity flow coefficient |
| dt1 | FLOAT | s | Estimated start time of evaluation, see table description |
| dt2 | FLOAT | s | Estimated stop time of evaluation. see table description |
| transmissivity_t_ilr | FLOAT | $m^2/s$ | T_ILR Transmissivity based on None Linear Regression... |
| storativity_s_ilr | FLOAT | | S_ILR=storativity based on None Linear Regression,see.. |
| value_type_t_ilr | CHAR | | 0:true value,-1:T_ILR<lower meas.limit,1:>upper meas.limit |
| bc_t_ilr | CHAR | | Best choice code. 1 means T_ILR is best choice of T, else 0 |
| c_ilr | FLOAT | $m^3/pa$ | Wellbore storage coefficient, based on ILR, see descr. |
| cd_ilr | FLOAT | | Dimensionless wellbore storage constant, see table descrip. |
| skin_ilr | FLOAT | | Skin factor based on Non Linear Regression,see desc. |
| stor_ratio_ilr | FLOAT | | Storativity ratio based on Non Linear Regression, see descr. |
| interflow_coeff_ilr | FLOAT | | Interporosity flow coefficient based on Non Linear Regr.... |
| transmissivity_t_grf | FLOAT | $m^2/s$ | T_GRF:Transmissivity based on Gen.Rad. 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 basd on Gen. Rad.Flow, see table descri. |
| flow_dim_grf | FLOAT | | Flow dimesion based on Gen. Rad.Flow. interpretation model |

| Column | Datatype | Unit | Column Description |
|---|---|---|---|
| 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 section of observation section |
| obs_seclow | FLOAT | m | Lower section of observation section |
| pi_above | FLOAT | kPa | Initial pressure of section above test section |
| pp_above | FLOAT | kPa | Pressure at flow end of section above test section |
| pf_above | FLOAT | kPa | Final pressure of section above test section |
| pi_below | FLOAT | kPa | Initial pressure of section below test section |
| pp_below | FLOAT | kPa | Pressure at flow end of section below test section |
| pf_below | FLOAT | kPa | Final pressure of section below test section |

## KFM02A plu_s_hole_test_d. Left

| idcode | start_date | stop_date | secup | seclow | section_no | test_type | formation_type | start_flow_period | stop_flow_period | mean_flow_rate_qm | flow_rate_end_qp | value_type_qp |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 20040305 22:01 | 20040305 23:52 | 103.5 | 203.5 | | 3 | 1 | 20040305 22:49:53 | 20040305 23:20:10 | 7.44E-04 | 7.11E-04 | 0 |
| KFM02A | 20040308 08:53 | 20040308 10:44 | 201 | 301 | | 3 | 1 | 20040308 09:41:48 | 20040308 10:12:06 | 2.14E-04 | 1.94E-04 | 0 |
| KFM02A | 20040308 11:50 | 20040308 14:46 | 301 | 401 | | 3 | 1 | 20040308 13:44:05 | 20040308 14:14:32 | 1.27E-07 | 6.00E-08 | 0 |
| KFM02A | 20040308 17:01 | 20040308 18:57 | 401 | 501 | | 3 | 1 | 20040308 17:55:28 | 20040308 18:25:43 | 5.54E-05 | 4.91E-05 | 0 |
| KFM02A | 20040308 22:06 | 20040308 23:26 | 501 | 601 | | 3 | 1 | 20040308 22:24:06 | 20040308 22:54:30 | 6.47E-05 | 6.06E-05 | 0 |
| KFM02A | 20040309 07:29 | 20040309 09:38 | 601 | 701 | | 3 | 1 | 20040309 08:36:04 | 20040309 09:06:39 | | 5.00E-09 | 0 |
| KFM02A | 20040309 11:39 | 20040309 14:55 | 701 | 801 | | 3 | 1 | 20040309 13:52:30 | 20040309 14:22:49 | | 5.83E-09 | 0 |
| KFM02A | 20040309 20:22 | 20040309 23:07 | 801 | 901 | | 3 | 1 | 20040309 22:04:57 | 20040309 22:35:35 | 1.14E-07 | 7.71E-08 | 0 |
| | | | | | | | | | | | | |
| KFM02A | 20040318 14:48 | 20040318 16:09 | 103.5 | 123.5 | | 3 | 1 | 20040318 15:26:27 | 20040318 15:46:42 | 8.12E-04 | 7.47E-04 | 0 |
| KFM02A | 20040315 14:41 | 20040315 18:10 | 121 | 141 | | 3 | 1 | 20040315 17:07:26 | 20040315 17:37:43 | 7.02E-04 | 6.74E-04 | 0 |
| KFM02A | 20040315 19:23 | 20040315 21:45 | 141 | 161 | | 3 | 1 | 20040315 20:43:03 | 20040315 21:13:25 | 2.20E-07 | 1.32E-07 | 0 |
| KFM02A | 20040315 23:23 | 20040316 00:30 | 161 | 181 | | 3 | 1 | 20040315 23:27:42 | 20040315 23:58:00 | 4.33E-05 | 4.01E-05 | 0 |
| KFM02A | 20040316 06:51 | 20040316 08:13 | 181 | 201 | | 3 | 1 | 20040316 07:31:06 | 20040316 07:51:25 | 7.90E-06 | 7.40E-06 | 0 |
| KFM02A | 20040316 08:45 | 20040316 10:04 | 201 | 221 | | 3 | 1 | 20040316 09:21:27 | 20040316 09:41:46 | 7.17E-06 | 6.77E-06 | 0 |
| KFM02A | 20040316 10:27 | 20040316 11:43 | 221 | 241 | | 3 | 1 | 20040316 11:00:46 | 20040316 11:21:06 | 4.69E-06 | 4.05E-06 | 0 |
| KFM02A | 20040316 12:30 | 20040316 13:47 | 241 | 261 | | 3 | 1 | 20040316 13:05:17 | 20040316 13:25:38 | 1.67E-07 | 1.48E-07 | 0 |
| KFM02A | 20040316 14:04 | 20040316 15:19 | 261 | 281 | | 3 | 1 | 20040316 14:37:08 | 20040316 14:57:27 | 6.61E-05 | 5.52E-05 | 0 |
| KFM02A | 20040318 11:34 | 20040318 12:24 | 281 | 301 | | 3 | 1 | 20040318 11:42:10 | 20040318 12:02:26 | 1.87E-04 | 1.66E-04 | 0 |
| KFM02A | 20040316 19:37 | 20040316 21:15 | 300 | 320 | | 3 | 1 | 20040316 20:32:33 | 20040316 20:53:01 | 4.10E-07 | 5.21E-08 | 0 |
| KFM02A | 20040316 17:50 | 20040316 19:16 | 301 | 321 | | 3 | 1 | 20040316 18:33:52 | 20040316 18:54:14 | 9.74E-07 | 7.19E-07 | 0 |
| KFM02A | 20040316 22:41 | 20040317 00:09 | 401 | 421 | | 3 | 1 | 20040316 23:26:55 | 20040316 23:47:14 | 2.01E-05 | 1.81E-05 | 0 |
| KFM02A | 20040317 06:18 | 20040317 07:35 | 421 | 441 | | 3 | 1 | 20040317 06:53:20 | 20040317 07:13:39 | 2.13E-05 | 1.98E-05 | 0 |
| KFM02A | 20040317 08:11 | 20040317 09:26 | 441 | 461 | | 3 | 1 | 20040317 08:43:59 | 20040317 09:04:18 | 2.55E-06 | 1.97E-06 | 0 |
| KFM02A | 20040317 09:47 | 20040317 11:02 | 461 | 481 | | 3 | 1 | 20040317 10:19:51 | 20040317 10:40:10 | 3.30E-06 | 3.15E-06 | 0 |
| KFM02A | 20040317 11:15 | 20040317 13:13 | 481 | 501 | | 3 | 1 | 20040317 12:31:10 | 20040317 12:51:28 | 4.38E-06 | 3.87E-06 | 0 |
| KFM02A | 20040317 14:00 | 20040317 15:44 | 501 | 521 | | 3 | 1 | 20040317 15:01:40 | 20040317 15:21:57 | 5.87E-05 | 5.54E-05 | 0 |
| KFM02A | 20040317 16:22 | 20040317 17:52 | 521 | 541 | | 3 | 1 | 20040317 17:10:02 | 20040317 17:30:50 | | | -1 |
| KFM02A | 20040317 18:21 | 20040317 19:44 | 541 | 561 | | 3 | 1 | 20040317 19:01:37 | 20040317 19:22:02 | 9.09E-08 | 3.72E-08 | 0 |
| KFM02A | 20040317 20:11 | 20040317 21:47 | 561 | 581 | | 3 | 1 | 20040417 21:05:06 | 20040417 21:25:28 | | 5.00E-09 | 0 |
| KFM02A | 20040317 22:18 | 20040317 23:34 | 581 | 601 | | 3 | 1 | 20040317 22:52:07 | 20040317 23:12:21 | | | -1 |
| | | | | | | | | | | | | |
| KFM02A | 20040319 07:54 | 20040319 09:26 | 103.5 | 108.5 | | 3 | 1 | 20040319 08:43:40 | 20040319 09:04:01 | 1.33E-07 | 8.92E-08 | 0 |
| KFM02A | 20040319 09:38 | 20040319 10:57 | 106 | 111 | | 3 | 1 | 20040319 10:15:07 | 20040319 10:35:22 | 3.72E-04 | 3.56E-04 | 0 |
| KFM02A | 20040319 11:09 | 20040319 14:15 | 111 | 116 | | 3 | 1 | 20040319 13:32:50 | 20040319 13:53:04 | 6.45E-04 | 6.28E-04 | 0 |

| idcode | start_date | stop_date | secup | seclow | section_no | test_type | formation_type | start_flow_period | stop_flow_period | mean_flow_rate_qm | flow_rate_end_qp | value_type_qp |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 20040319 14:35 | 20040319 16:26 | 116 | 121 | | 3 | 1 | 20040319 15:44:03 | 20040319 16:04:17 | 8.05E-04 | 7.88E-04 | 0 |
| KFM02A | 20040319 16:37 | 20040319 18:03 | 121 | 126 | | 3 | 1 | 20040319 17:20:35 | 20040319 17:40:49 | 6.85E-04 | 6.82E-04 | 0 |
| KFM02A | 20040319 18:21 | 20040319 19:49 | 126 | 131 | | 3 | 1 | 20040319 19:06:52 | 20040319 19:27:11 | 9.99E-07 | 6.29E-07 | 0 |
| KFM02A | 20040319 20:03 | 20040319 21:34 | 131 | 136 | | 3 | 1 | 20040319 20:51:28 | 20040319 21:11:59 | | | -1 |
| KFM02A | 20040319 21:44 | 20040319 23:08 | 136 | 141 | | 3 | 1 | 20040319 22:25:49 | 20040319 22:46:08 | 2.36E-07 | 2.10E-07 | 0 |
| KFM02A | 20040320 10:36 | 20040320 11:33 | 141 | 146 | | 3 | 1 | 20040320 11:22:26 | 20040320 11:25:55 | | | -1 |
| KFM02A | 20040320 13:03 | 20040320 14:04 | 146 | 151 | | 3 | 1 | 20040320 13:51:51 | 20040320 13:56:00 | | | -1 |
| KFM02A | 20040320 14:16 | 20040320 15:14 | 151 | 156 | | 3 | 1 | 20040320 15:02:05 | 20040320 15:05:08 | | | -1 |
| KFM02A | 20040320 17:19 | 20040320 18:08 | 156 | 161 | | 3 | 1 | 20040321 17:26:04 | 20040321 17:46:23 | 3.36E-08 | 2.64E-08 | 0 |
| KFM02A | 20040321 08:36 | 20040321 09:59 | 161 | 166 | | 3 | 1 | 20040321 09:17:16 | 20040321 09:37:32 | 1.48E-05 | 1.44E-05 | 0 |
| KFM02A | 20040321 10:21 | 20040321 11:40 | 166 | 171 | | 3 | 1 | 20040321 10:57:39 | 20040321 11:17:55 | 6.83E-06 | 6.48E-06 | 0 |
| KFM02A | 20040321 12:59 | 20040321 13:59 | 171 | 176 | | 3 | 1 | 20040321 13:16:37 | 20040321 13:36:55 | 2.91E-05 | 2.78E-05 | 0 |
| KFM02A | 20040321 14:13 | 20040321 15:31 | 176 | 181 | | 3 | 1 | 20040321 14:48:42 | 20040321 15:08:58 | 7.73E-07 | 6.82E-07 | 0 |
| KFM02A | 20040321 15:39 | 20040321 16:53 | 181 | 186 | | 3 | 1 | 20040321 16:11:16 | 20040321 16:31:33 | 7.41E-06 | 6.96E-06 | 0 |
| KFM02A | 20040322 06:30 | 20040322 07:58 | 186 | 191 | | 3 | 1 | 20040322 07:15:53 | 20040322 07:36:38 | | | -1 |
| KFM02A | 20040322 08:15 | 20040322 09:38 | 191 | 196 | | 3 | 1 | 20040322 08:55:47 | 20040322 09:17:18 | | | -1 |
| KFM02A | 20040322 09:57 | 20040322 11:22 | 196 | 201 | | 3 | 1 | 20040322 10:40:15 | 20040322 11:01:01 | | 3.60E-09 | 0 |
| KFM02A | 20040322 12:41 | 20040322 13:49 | 201 | 206 | | 3 | 1 | 20040322 13:28:55 | 20040322 13:35:42 | | | -1 |
| KFM02A | 20040322 14:03 | 20040322 15:03 | 206 | 211 | | 3 | 1 | 20040322 14:46:28 | 20040322 14:53:54 | | | -1 |
| KFM02A | 20040322 15:34 | 20040322 16:33 | 211 | 216 | | 3 | 1 | 20040322 16:23:36 | 20040322 16:25:34 | | | -1 |
| KFM02A | 20040322 16:55 | 20040322 18:11 | 216 | 221 | | 3 | 1 | 20040322 17:28:46 | 20040322 17:49:03 | 8.86E-06 | 7.61E-06 | 0 |
| KFM02A | 20040322 18:23 | 20040322 19:14 | 221 | 226 | | 3 | 1 | 20040322 19:03:36 | 20040322 19:06:14 | | | -1 |
| KFM02A | 20040322 19:23 | 20040322 20:52 | 225 | 230 | | 3 | 1 | 20040322 20:09:25 | 20040322 20:29:43 | 4.84E-06 | 4.25E-06 | 0 |
| KFM02A | 20040322 21:01 | 20040322 22:17 | 226 | 231 | | 3 | 1 | 20040322 21:34:29 | 20040322 21:54:46 | 4.71E-06 | 4.12E-06 | 0 |
| KFM02A | 20040322 22:26 | 20040322 23:17 | 231 | 236 | | 3 | 1 | 20040322 23:04:46 | 20040322 23:09:52 | | 8.00E-09 | 0 |
| KFM02A | 20040322 23:28 | 20040323 00:45 | 236 | 241 | | 3 | 1 | 20040323 00:45:55 | 20040323 01:06:01 | | 8.00E-09 | 0 |
| KFM02A | 20040323 06:26 | 20040323 07:55 | 241 | 246 | | 3 | 1 | 20040323 07:13:10 | 20040323 07:33:22 | 1.30E-07 | 1.08E-07 | 0 |
| KFM02A | 20040323 08:13 | 20040323 09:43 | 246 | 251 | | 3 | 1 | 20040323 09:00:31 | 20040323 09:20:53 | 5.39E-08 | 3.63E-08 | 0 |
| KFM02A | 20040323 09:59 | 20040323 11:38 | 251 | 256 | | 3 | 1 | 20040323 10:55:35 | 20040323 11:15:56 | 3.66E-08 | 2.83E-08 | 0 |
| KFM02A | 20040323 12:31 | 20040323 14:04 | 256 | 261 | | 3 | 1 | 20040323 13:21:33 | 20040323 13:41:55 | 2.75E-08 | 1.95E-08 | 0 |
| KFM02A | 20040328 13:43 | 20040328 15:00 | 259.5 | 264.5 | | 3 | 1 | 20040328 14:17:48 | 20040328 14:38:18 | 9.07E-08 | 6.48E-08 | 0 |
| KFM02A | 20040328 11:02 | 20040328 12:18 | 264.5 | 269.5 | | 3 | 1 | 20040328 11:35:39 | 20040328 11:55:58 | 1.23E-05 | 1.19E-05 | 0 |
| KFM02A | 20040328 09:39 | 20040328 10:53 | 269.5 | 274.5 | | 3 | 1 | 20040328 10:11:16 | 20040328 10:31:37 | 3.44E-06 | 3.17E-06 | 0 |
| KFM02A | 20040328 08:15 | 20040328 09:30 | 271 | 276 | | 3 | 1 | 20040328 08:48:13 | 20040328 09:08:31 | 2.16E-05 | 1.55E-05 | 0 |
| KFM02A | 20040324 06:55 | 20040324 08:31 | 276 | 281 | | 3 | 1 | 20040324 07:48:37 | 20040324 08:08:56 | 1.60E-05 | 1.29E-05 | 0 |
| KFM02A | 20040324 08:44 | 20040324 10:12 | 281 | 286 | | 3 | 1 | 20040324 09:29:55 | 20040324 09:50:06 | 4.54E-05 | 2.80E-05 | 0 |
| KFM02A | 20040324 10:28 | 20040324 11:56 | 286 | 291 | | 3 | 1 | 20040324 11:13:53 | 20040324 11:34:08 | 6.65E-05 | 4.93E-05 | 0 |
| KFM02A | 20040324 12:56 | 20040324 14:16 | 291 | 296 | | 3 | 1 | 20040324 13:33:35 | 20040324 13:53:52 | 6.31E-05 | 5.86E-05 | 0 |

| idcode | start_date | stop_date | secup | seclow | section_no | test_type | formation_type | start_flow_period | stop_flow_period | mean_flow_rate_qm | flow_rate_end_qp | value_type_qp |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 20040324 14:28 | 20040322 15:46 | 296 | 301 | | 3 | 1 | 20040322 15:03:29 | 20040322 15:23:49 | 3.12E-05 | 2.97E-05 | 0 |
| KFM02A | 20040324 15:59 | 20040324 17:16 | 301 | 306 | | 3 | 1 | 20040324 16:33:43 | 20040324 16:54:05 | 6.52E-07 | 4.20E-07 | 0 |
| KFM02A | 20040324 17:31 | 20040324 18:48 | 306 | 311 | | 3 | 1 | 20040324 18:05:32 | 20040324 18:25:56 | 2.81E-08 | 2.33E-08 | 0 |
| KFM02A | 20040324 18:58 | 20040324 20:34 | 311 | 316 | | 3 | 1 | 20040324 19:52:05 | 20040324 20:12:27 | | 1.06E-08 | 0 |
| KFM02A | 20040324 20:41 | 20040324 21:20 | 316 | 321 | | 3 | 1 | 20040324 21:14:55 | 20040324 21:16:21 | | | -1 |
| KFM02A | 20040324 22:12 | 20040324 23:01 | 401 | 406 | | 3 | 1 | 20040324 22:51:07 | 20040324 22:53:13 | | | -1 |
| KFM02A | 20040324 23:09 | 20040324 23:52 | 406 | 411 | | 3 | 1 | 20040324 23:41:45 | 20040324 23:44:39 | | | -1 |
| KFM02A | 20040325 07:35 | 20040325 08:25 | 411 | 416 | | 3 | 1 | 20040325 07:43:22 | 20040325 08:03:45 | 1.07E-06 | 9.58E-07 | 0 |
| KFM02A | 20040325 08:43 | 20040325 10:04 | 416 | 421 | | 3 | 1 | 20040325 09:22:13 | 20040325 09:42:34 | 1.82E-05 | 1.68E-05 | 0 |
| KFM02A | 20040325 10:23 | 20040325 11:43 | 421 | 426 | | 3 | 1 | 20040325 11:01:20 | 20040325 11:21:41 | 1.58E-06 | 1.47E-06 | 0 |
| KFM02A | 20040325 13:03 | 20040325 14:21 | 426 | 431 | | 3 | 1 | 20040325 13:38:53 | 20040325 13:59:14 | 1.57E-05 | 1.48E-05 | 0 |
| KFM02A | 20040325 14:33 | 20040325 15:50 | 431 | 436 | | 3 | 1 | 20040325 15:07:41 | 20040325 15:28:03 | 1.27E-07 | 1.10E-07 | 0 |
| KFM02A | 20040325 15:59 | 20040325 17:13 | 436 | 441 | | 3 | 1 | 20040325 16:30:36 | 20040325 16:50:53 | 1.57E-06 | 1.48E-06 | 0 |
| KFM02A | 20040325 17:25 | 20040325 18:42 | 441 | 446 | | 3 | 1 | 20040325 18:00:16 | 20040325 18:20:39 | 1.72E-07 | 4.39E-08 | 0 |
| KFM02A | 20040325 18:54 | 20040325 20:11 | 446 | 451 | | 3 | 1 | 20040325 19:28:25 | 20040325 19:48:44 | 2.79E-07 | 1.96E-07 | 0 |
| KFM02A | 20040325 20:22 | 20040325 21:37 | 451 | 456 | | 3 | 1 | 20040325 20:55:07 | 20040325 21:15:27 | 1.02E-06 | 8.60E-07 | 0 |
| KFM02A | 20040325 22:43 | 20040326 00:02 | 456 | 461 | | 3 | 1 | 20040325 23:19:51 | 20040325 23:40:16 | 5.73E-08 | 4.77E-08 | 0 |
| KFM02A | 20040326 06:46 | 20040326 08:07 | 461 | 466 | | 3 | 1 | 20040326 07:25:20 | 20040326 07:45:45 | 7.76E-08 | 6.67E-08 | 0 |
| KFM02A | 20040326 08:23 | 20040326 09:42 | 466 | 471 | | 3 | 1 | 20040326 09:00:05 | 20040326 09:20:33 | 5.56E-08 | 4.77E-08 | 0 |
| KFM02A | 20040326 10:01 | 20040326 10:46 | 471 | 476 | | 3 | 1 | 20040326 10:33:27 | 20040326 10:38:46 | | | -1 |
| KFM02A | 20040326 11:04 | 20040326 12:26 | 476 | 481 | | 3 | 1 | 20040326 11:43:40 | 20040326 12:04:01 | 2.18E-06 | 2.11E-06 | 0 |
| KFM02A | 20040326 13:41 | 20040326 14:59 | 481 | 486 | | 3 | 1 | 20040326 14:17:19 | 20040326 14:37:44 | 3.67E-07 | 3.24E-07 | 0 |
| KFM02A | 20040326 15:37 | 20040326 16:54 | 486 | 491 | | 3 | 1 | 20040326 16:11:39 | 20040326 16:32:01 | 1.86E-06 | 1.76E-06 | 0 |
| KFM02A | 20040326 17:04 | 20040326 18:19 | 491 | 496 | | 3 | 1 | 20040326 17:37:19 | 20040326 17:57:41 | 1.55E-07 | 1.45E-07 | 0 |
| KFM02A | 20040326 18:30 | 20040326 19:48 | 496 | 501 | | 3 | 1 | 20040326 19:06:19 | 20040326 19:26:41 | 7.77E-07 | 5.88E-07 | 0 |
| KFM02A | 20040326 20:01 | 20040326 21:19 | 501 | 506 | | 3 | 1 | 20040326 20:36:35 | 20040326 20:57:04 | 5.25E-08 | 3.75E-08 | 0 |
| KFM02A | 20040326 21:33 | 20040326 22:50 | 506 | 511 | | 3 | 1 | 20040326 22:07:46 | 20040326 22:28:12 | 1.35E-06 | 8.56E-07 | 0 |
| KFM02A | 20040327 09:44 | 20040327 10:37 | 511 | 516 | | 3 | 1 | 20040327 09:54:45 | 20040327 10:15:07 | 5.27E-05 | 5.03E-05 | 0 |
| KFM02A | 20040327 10:49 | 20040327 11:43 | 516 | 521 | | 3 | 1 | 20040327 11:28:50 | 20040327 11:49:18 | 1.27E-09 | | -1 |
| KFM02A | 20040327 12:44 | 20040327 13:35 | 541 | 546 | | 3 | 1 | 20040327 13:21:29 | 20040327 13:41:47 | 2.78E-09 | | -1 |
| KFM02A | 20040327 13:48 | 20040327 14:33 | 546 | 551 | | 3 | 1 | 20040327 14:19:55 | 20040327 14:25:11 | 7.45E-09 | | -1 |
| KFM02A | 20040327 14:40 | 20040327 15:25 | 551 | 556 | | 3 | 1 | 20040327 15:12:34 | 20040327 15:18:08 | 1.64E-08 | | -1 |
| KFM02A | 20040327 15:32 | 20040327 16:51 | 556 | 561 | | 3 | 1 | 20040327 16:08:42 | 20040327 16:29:10 | 7.56E-08 | 3.66E-08 | 0 |

## KFM02A plu_s_hole_test_d. Right

| idcode | secup | seclow | q_measl_l | q_measl_u | tot_volume_vp | dur_flow_phase_tp | dur_rec_phase_tf | initial_head_hi | head_at_flow_end_hp | final_head_hf | initial_press_pi | press_at_flow_end_pp | final_press_pf | fluid_temp_tew | fluid_elcond_ecw | fluid_salinity_tdsw | fluid_salinity_tdswm | reference | comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 103.5 | 203.5 | 1.67E-08 | 1.00E-03 | 1.35E+00 | 1817 | 1807 | | | | 1050.09 | 1065.13 | 1048.98 | | | | | | |
| KFM02A | 201 | 301 | 1.67E-08 | 1.00E-03 | 3.89E-01 | 1818 | 1808 | | | | 2022.73 | 2222.92 | 2038.61 | | | | | | |
| KFM02A | 301 | 401 | 1.67E-08 | 1.00E-03 | 2.33E-04 | 1827 | 1797 | | | | 2996.63 | 3202.62 | 3024.37 | | | | | | |
| KFM02A | 401 | 501 | 1.67E-08 | 1.00E-03 | 1.01E-01 | 1815 | 1802 | | | | 4014.98 | 4239.18 | 3986.4 | | | | | | |
| KFM02A | 501 | 601 | 1.67E-08 | 1.00E-03 | 1.18E-01 | 1824 | 1801 | | | | 4973.27 | 5257.26 | 4973.27 | | | | | | |
| KFM02A | 601 | 701 | 1.67E-08 | 1.00E-03 | | 1835 | 1822 | | | | 5975.6 | 6321.72 | 6304.19 | | | | | | |
| KFM02A | 701 | 801 | 1.67E-08 | 1.00E-03 | | 1819 | 1807 | | | | 6950.74 | 7192.75 | 7171.77 | | | | | | |
| KFM02A | 801 | 901 | 1.67E-08 | 1.00E-03 | 2.10E-04 | 1838 | 1786 | | | | 7940.51 | 8136 | 7965.36 | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| KFM02A | 103.5 | 123.5 | 1.67E-08 | 1.00E-03 | 9.86E-01 | 1215 | 1210 | | | | 1050.23 | 1065.69 | 1049.67 | | | | | | |
| KFM02A | 121 | 141 | 1.67E-08 | 1.00E-03 | 1.28E+00 | 1817 | 1808 | | | | 1221.29 | 1296.39 | 1219.78 | | | | | | |
| KFM02A | 141 | 161 | 1.67E-08 | 1.00E-03 | 4.00E-04 | 1822 | 1804 | | | | 1419.14 | 1616.56 | 1419.69 | | | | | | |
| KFM02A | 161 | 181 | 1.67E-08 | 1.00E-03 | 7.88E-02 | 1818 | 1808 | | | | 1616.7 | 1825.59 | 1620.15 | | | | | | |
| KFM02A | 181 | 201 | 1.67E-08 | 1.00E-03 | 9.63E-03 | 1219 | 1209 | | | | 1812.89 | 2036.55 | 1816.76 | | | | | | |
| KFM02A | 201 | 221 | 1.67E-08 | 1.00E-03 | 8.74E-03 | 1219 | 1206 | | | | 2009.91 | 2210.64 | 2014.47 | | | | | | |
| KFM02A | 221 | 241 | 1.67E-08 | 1.00E-03 | 5.73E-03 | 1220 | 1206 | | | | 2206.78 | 2407.25 | 2215.47 | | | | | | |
| KFM02A | 241 | 261 | 1.67E-08 | 1.00E-03 | 2.04E-04 | 1221 | 1205 | | | | 2405.31 | 2556.08 | 2409.87 | | | | | | |
| KFM02A | 261 | 281 | 1.67E-08 | 1.00E-03 | 8.06E-02 | 1219 | 1206 | | | | 2600.39 | 2856.92 | 2604.27 | | | | | | Pressure in section below test section increased c. 7 kPa during the flow period. |
| KFM02A | 281 | 301 | 1.67E-08 | 1.00E-03 | 2.28E-01 | 1216 | 1217 | | | | 2802.38 | 3003.54 | 2810.8 | | | | | | |
| KFM02A | 300 | 320 | 1.67E-08 | 1.00E-03 | 5.04E-04 | 1227 | 1202 | | | | 2985.32 | 3180.95 | 2988.63 | | | | | | |
| KFM02A | 301 | 321 | 1.67E-08 | 1.00E-03 | 1.19E-03 | 1222 | 1202 | | | | 3010.72 | 3195.31 | 2995.25 | | | | | | |
| KFM02A | 401 | 421 | 1.67E-08 | 1.00E-03 | 2.46E-02 | 1219 | 1207 | | | | 3981.02 | 4209.1 | 3983.23 | | | | | | |
| KFM02A | 421 | 441 | 1.67E-08 | 1.00E-03 | 2.60E-02 | 1219 | 1206 | | | | 4178.72 | 4379.06 | 4179.28 | | | | | | |
| KFM02A | 441 | 461 | 1.67E-08 | 1.00E-03 | 3.11E-03 | 1219 | 1208 | | | | 4376.71 | 4575.8 | 4378.64 | | | | | | |
| KFM02A | 461 | 481 | 1.67E-08 | 1.00E-03 | 4.02E-03 | 1219 | 1208 | | | | 4573.45 | 4774.88 | 4573.59 | | | | | | |
| KFM02A | 481 | 501 | 1.67E-08 | 1.00E-03 | 5.33E-03 | 1218 | 1209 | | | | 4771.29 | 4971.89 | 4771.84 | | | | | | |
| KFM02A | 501 | 521 | 1.67E-08 | 1.00E-03 | 7.14E-02 | 1217 | 1208 | | | | 4969.55 | 5183.27 | 4968.99 | | | | | | |
| KFM02A | 521 | 541 | 1.67E-08 | 1.00E-03 | | 1248 | 1179 | | | | 5195.97 | 5378.21 | 5347.28 | | | | | | |
| KFM02A | 541 | 561 | 1.67E-08 | 1.00E-03 | 1.11E-04 | 1225 | 1202 | | | | 5379.32 | 5595.66 | 5485.35 | | | | | | |
| KFM02A | 561 | 581 | 1.67E-08 | 1.00E-03 | | 1222 | 1204 | | | | 5572.6 | 5784.12 | 5710.67 | | | | | | |
| KFM02A | 581 | 601 | 1.67E-08 | 1.00E-03 | | 1214 | 1213 | | | | 5783.15 | 6010.12 | 6006.67 | | | | | | |

| idcode | secup | seclow | q_measl__l | q_measl__u | tot_volume_vp | dur_flow_phase_tp | dur_rec_phase_tf | initial_head_hi | head_at_flow_end_hp | final_head_hf | initial_press_pi | press_at_flow_end_pp | final_press_pf | fluid_temp_tew | fluid_elcond_ecw | fluid_salinity_tdsw | fluid_salinity_tdswm | reference | comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 103.5 | 108.5 | 1.67E-08 | 1.00E-03 | 1.62E-04 | 1221 | 1206 | | | | 1055.24 | 1269.09 | 1054.41 | | | | | | |
| KFM02A | 106 | 111 | 1.67E-08 | 1.00E-03 | 4.52E-01 | 1215 | 1217 | | | | 1074.84 | 1275.99 | 1074.84 | | | | | | Due to the relatively high transmissivity of this section, time for pressure stabilisation was quite long. |
| KFM02A | 111 | 116 | 1.67E-08 | 1.00E-03 | 7.83E-01 | 1214 | 1211 | | | | 1123.71 | 1238.17 | 1123.43 | | | | | | |
| KFM02A | 116 | 121 | 1.67E-08 | 1.00E-03 | 9.77E-01 | 1214 | 1212 | | | | 1172.59 | 1221.33 | 1173.7 | | | | | | |
| KFM02A | 121 | 126 | 1.67E-08 | 1.00E-03 | 8.32E-01 | 1214 | 1212 | | | | 1221.74 | 1301.81 | 1222.84 | | | | | | |
| KFM02A | 126 | 131 | 1.67E-08 | 1.00E-03 | 1.22E-03 | 1219 | 1207 | | | | 1274.2 | 1517.89 | 1371.4 | | | | | | |
| KFM02A | 131 | 136 | 1.67E-08 | 1.00E-03 | | 1231 | 1195 | | | | 1407.84 | 1579.04 | 1558.61 | | | | | | |
| KFM02A | 136 | 141 | 1.67E-08 | 1.00E-03 | 2.87E-04 | 1219 | 1207 | | | | 1371.4 | 1576.14 | 1383.55 | | | | | | |
| KFM02A | 141 | 146 | 1.67E-08 | 1.00E-03 | | 209 | 310 | | | | 1497.45 | 1634.54 | 1587.33 | | | | | | Shortened test time since flow rate was below Q-measl-L. |
| KFM02A | 146 | 151 | 1.67E-08 | 1.00E-03 | | 249 | 361 | | | | 1540.94 | 1665.19 | 1672.37 | | | | | | Shortened test time since flow rate was below Q-measl-L. |
| KFM02A | 151 | 156 | 1.67E-08 | 1.00E-03 | | 183 | 406 | | | | 1678.17 | 1716.56 | 1738.1 | | | | | | Shortened test time since flow rate was below Q-measl-L. |
| KFM02A | 156 | 161 | 1.67E-08 | 1.00E-03 | 4.09E-05 | 1219 | 1207 | | | | 1568 | 1801.6 | 1569.1 | | | | | | |
| KFM02A | 161 | 166 | 1.67E-08 | 1.00E-03 | 1.80E-02 | 1216 | 1210 | | | | 1615.49 | 1814.86 | 1616.59 | | | | | | |
| KFM02A | 166 | 171 | 1.67E-08 | 1.00E-03 | 8.31E-03 | 1216 | 1210 | | | | 1664.91 | 1865.39 | 1665.74 | | | | | | |
| KFM02A | 171 | 176 | 1.67E-08 | 1.00E-03 | 3.54E-02 | 1218 | 1208 | | | | 1714.9 | 1931.38 | 1717.11 | | | | | | |
| KFM02A | 176 | 181 | 1.67E-08 | 1.00E-03 | 9.40E-04 | 1216 | 1210 | | | | 1765.15 | 1965.34 | 1764.6 | | | | | | |
| KFM02A | 181 | 186 | 1.67E-08 | 1.00E-03 | 9.02E-03 | 1217 | 1209 | | | | 1813.2 | 2014.08 | 1816.51 | | | | | | |
| KFM02A | 186 | 191 | 1.67E-08 | 1.00E-03 | | 1245 | 1181 | | | | 2019.75 | 2100.64 | 1984.95 | | | | | | |
| KFM02A | 191 | 196 | 1.67E-08 | 1.00E-03 | | 1291 | 1135 | | | | 1938.28 | 2164.98 | 2155.03 | | | | | | |
| KFM02A | 196 | 201 | 1.67E-08 | 1.00E-03 | | 1240 | 1179 | | | | 1983.15 | 2185 | 2162.77 | | | | | | |
| KFM02A | 201 | 206 | 1.67E-08 | 1.00E-03 | | 407 | 675 | | | | 2022.91 | 2239.39 | 2208.61 | | | | | | Shortened test time since flow rate was below Q-measl-L. |
| KFM02A | 206 | 211 | 1.67E-08 | 1.00E-03 | | 446 | 449 | | | | 2080.76 | 2294.21 | 2285.37 | | | | | | Shortened test time since flow rate was below Q-measl-L. |
| KFM02A | 211 | 216 | 1.67E-08 | 1.00E-03 | | 118 | 342 | | | | 2308.7 | 2428.95 | 2431.72 | | | | | | Shortened test time since flow rate was below Q-measl-L. |
| KFM02A | 216 | 221 | 1.67E-08 | 1.00E-03 | 1.08E-02 | 1217 | 1209 | | | | 2158.49 | 2359.1 | 2163.87 | | | | | | |
| KFM02A | 221 | 226 | 1.67E-08 | 1.00E-03 | | 158 | 350 | | | | 2221.72 | 2447.45 | 2432.83 | | | | | | Shortened test time since flow rate was below Q- |

| idcode | secup | seclow | q_measl_l | q_measl_u | tot_volume_vp | dur_flow_phase_tp | dur_rec_phase_tf | initial_head_hi | head_at_flow_end_hp | final_head_hf | initial_press_pi | press_at_flow_end_pp | final_press_pf | fluid_temp_tew | fluid_elcond_ecw | fluid_salinity_tdsw | fluid_salinity_tdswm | reference | comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | measl-L. |
| KFM02A | 225 | 230 | 1.67E-08 | 1.00E-03 | 5.89E-03 | 1218 | 1208 | | | | 2247.81 | 2448.14 | 2256.65 | | | | | | |
| KFM02A | 226 | 231 | 1.67E-08 | 1.00E-03 | 5.74E-03 | 1217 | 1209 | | | | 2259.41 | 2459.19 | 2267.15 | | | | | | |
| KFM02A | 231 | 236 | 1.67E-08 | 1.00E-03 | | 306 | 321 | | | | 2321.41 | 2565.91 | 2522.29 | | | | | | Shortened test time since flow rate was below Q-measl-L. |
| KFM02A | 236 | 241 | 1.67E-08 | 1.00E-03 | | 1206 | 1221 | | | | 2364.21 | 2616.45 | 2456.57 | | | | | | |
| KFM02A | 241 | 246 | 1.67E-08 | 1.00E-03 | 1.58E-04 | 1212 | 1203 | | | | 2413.08 | 2632.74 | 2419.57 | | | | | | |
| KFM02A | 246 | 251 | 1.67E-08 | 1.00E-03 | 6.58E-05 | 1222 | 1200 | | | | 2463.61 | 2677.88 | 2465.96 | | | | | | |
| KFM02A | 251 | 256 | 1.67E-08 | 1.00E-03 | 4.47E-05 | 1221 | 1200 | | | | 2504.89 | 2748.57 | 2507.93 | | | | | | |
| KFM02A | 256 | 261 | 1.67E-08 | 1.00E-03 | 3.37E-05 | 1222 | 1200 | | | | 2554.59 | 2786.67 | 2557.08 | | | | | | |
| KFM02A | 259.5 | 264.5 | 1.67E-08 | 1.00E-03 | 1.12E-04 | 1230 | 1197 | | | | 2587.87 | 2788.47 | 2588.01 | | | | | | |
| KFM02A | 264.5 | 269.5 | 1.67E-08 | 1.00E-03 | 1.50E-02 | 1219 | 1205 | | | | 2637.02 | 2838.59 | 2637.71 | | | | | | |
| KFM02A | 269.5 | 274.5 | 1.67E-08 | 1.00E-03 | 4.20E-03 | 1221 | 1206 | | | | 2686.3 | 2886.64 | 2686.3 | | | | | | |
| KFM02A | 271 | 276 | 1.67E-08 | 1.00E-03 | 2.63E-02 | 1218 | 1206 | | | | 2701.07 | 2901.82 | 2701.76 | | | | | | |
| KFM02A | 276 | 281 | 1.67E-08 | 1.00E-03 | 1.95E-02 | 1219 | 1206 | | | | 2751.46 | 2959.94 | 2752.02 | | | | | | |
| KFM02A | 281 | 286 | 1.67E-08 | 1.00E-03 | 5.50E-02 | 1211 | 1205 | | | | 2801.17 | 3003.02 | 2802.83 | | | | | | |
| KFM02A | 286 | 291 | 1.67E-08 | 1.00E-03 | 8.08E-02 | 1215 | 1202 | | | | 2851.15 | 3028.42 | 2852.53 | | | | | | |
| KFM02A | 291 | 296 | 1.67E-08 | 1.00E-03 | 7.67E-02 | 1217 | 1205 | | | | 2898.92 | 3111.81 | 2900.02 | | | | | | |
| KFM02A | 296 | 301 | 1.67E-08 | 1.00E-03 | 3.81E-02 | 1220 | 1206 | | | | 2948.62 | 3150.19 | 2949.17 | | | | | | |
| KFM02A | 301 | 306 | 1.67E-08 | 1.00E-03 | 7.97E-04 | 1222 | 1221 | | | | 2998.32 | 3201.46 | 3001.08 | | | | | | |
| KFM02A | 306 | 311 | 1.67E-08 | 1.00E-03 | 3.44E-05 | 1224 | 1203 | | | | 3094.27 | 3261.74 | 3060.72 | | | | | | |
| KFM02A | 311 | 316 | 1.67E-08 | 1.00E-03 | | 1222 | 1221 | | | | 3143.85 | 3482.64 | 3171.73 | | | | | | |
| KFM02A | 316 | 321 | 1.67E-08 | 1.00E-03 | | 86 | 106 | | | | 3272.1 | 3356.19 | 3374.96 | | | | | | Shortened test time since flow rate was below Q-measl-L. |
| KFM02A | 401 | 406 | 1.67E-08 | 1.00E-03 | | 126 | 370 | | | | 4097.99 | 4228.04 | 4278.44 | | | | | | Shortened test time since flow rate was below Q-measl-L. |
| KFM02A | 406 | 411 | 1.67E-08 | 1.00E-03 | | 174 | 346 | | | | 4055.06 | 4281.89 | 4322.07 | | | | | | Shortened test time since flow rate was below Q-measl-L. |
| KFM02A | 411 | 416 | 1.67E-08 | 1.00E-03 | 1.31E-03 | 1223 | 1202 | | | | 4083.77 | 4283.96 | 4084.05 | | | | | | |
| KFM02A | 416 | 421 | 1.67E-08 | 1.00E-03 | 2.23E-02 | 1221 | 1202 | | | | 4188.56 | 4334.08 | 4133.19 | | | | | | |
| KFM02A | 421 | 426 | 1.67E-08 | 1.00E-03 | 1.93E-03 | 1221 | 1202 | | | | 4297.63 | 4381.16 | 4181.25 | | | | | | |
| KFM02A | 426 | 431 | 1.67E-08 | 1.00E-03 | 1.91E-02 | 1221 | 1202 | | | | 4298.04 | 4430.86 | 4230.39 | | | | | | |
| KFM02A | 431 | 436 | 1.67E-08 | 1.00E-03 | 1.55E-04 | 1222 | 1204 | | | | 4280.1 | 4479.46 | 4280.65 | | | | | | |
| KFM02A | 436 | 441 | 1.67E-08 | 1.00E-03 | 1.91E-03 | 1217 | 1210 | | | | 4329.25 | 4529.71 | 4329.25 | | | | | | |

| idcode | secup | seclow | q_measl_l | q_measl_u | tot_volume_vp | dur_flow_phase_tp | dur_rec_phase_tf | initial_head_hi | head_at_flow_end_hp | final_head_hf | initial_press_pi | press_at_flow_end_pp | final_press_pf | fluid_temp_tew | fluid_elcond_ecw | fluid_salinity_tdsw | fluid_salinity_tdswm | reference | comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 441 | 446 | 1.67E-08 | 1.00E-03 | 2.10E-04 | 1223 | 1203 | | | | 4399.94 | 4741.5 | 4386.68 | | | | | | |
| KFM02A | 446 | 451 | 1.67E-08 | 1.00E-03 | 3.40E-04 | 1219 | 1203 | | | | 4428.65 | 4627.46 | 4429.76 | | | | | | |
| KFM02A | 451 | 456 | 1.67E-08 | 1.00E-03 | 1.25E-03 | 1220 | 1202 | | | | 4478.08 | 4677.02 | 4478.35 | | | | | | |
| KFM02A | 456 | 461 | 1.67E-08 | 1.00E-03 | 7.01E-05 | 1225 | 1200 | | | | 4543.66 | 4743.84 | 4533.02 | | | | | | |
| KFM02A | 461 | 466 | 1.67E-08 | 1.00E-03 | 9.50E-05 | 1225 | 1202 | | | | 4576.52 | 4743.71 | 4577.76 | | | | | | |
| KFM02A | 466 | 471 | 1.67E-08 | 1.00E-03 | 6.82E-05 | 1228 | 1200 | | | | 4630.78 | 4824.48 | 4629.68 | | | | | | |
| KFM02A | 471 | 476 | 1.67E-08 | 1.00E-03 | | 319 | 347 | | | | 4764.42 | 4885.78 | 4889.77 | | | | | | Shortened test time since flow rate was below Q-measl-L. |
| KFM02A | 476 | 481 | 1.67E-08 | 1.00E-03 | 2.66E-03 | 1221 | 1205 | | | | 4724.66 | 4925.81 | 4724.66 | | | | | | |
| KFM02A | 481 | 486 | 1.67E-08 | 1.00E-03 | 4.49E-04 | 1225 | 1202 | | | | 4773.81 | 4973.31 | 4773.8 | | | | | | |
| KFM02A | 486 | 491 | 1.67E-08 | 1.00E-03 | 2.28E-03 | 1222 | 1198 | | | | 4823.1 | 5019.83 | 4822.96 | | | | | | |
| KFM02A | 491 | 496 | 1.67E-08 | 1.00E-03 | 1.90E-04 | 1222 | 1203 | | | | 4874.59 | 5074.09 | 4873.77 | | | | | | |
| KFM02A | 496 | 501 | 1.67E-08 | 1.00E-03 | 9.49E-04 | 1222 | 1202 | | | | 4921.95 | 5121.17 | 4921.81 | | | | | | |
| KFM02A | 501 | 506 | 1.67E-08 | 1.00E-03 | 6.46E-05 | 1229 | 1199 | | | | 4972.06 | 5174.74 | 4972.62 | | | | | | |
| KFM02A | 506 | 511 | 1.67E-08 | 1.00E-03 | 1.66E-03 | 1226 | 1200 | | | | 5021.77 | 5261.16 | 5073.68 | | | | | | |
| KFM02A | 511 | 516 | 1.67E-08 | 1.00E-03 | 6.44E-02 | 1222 | 1205 | | | | 5071.05 | 5271.25 | 5070.92 | | | | | | |
| KFM02A | 516 | 521 | 1.67E-08 | 1.00E-03 | 1.56E-06 | 1228 | 330 | | | | 5143.4 | 5323.3 | 5327.16 | | | | | | |
| KFM02A | 541 | 546 | 1.67E-08 | 1.00E-03 | 3.39E-06 | 1218 | 385 | | | | 5454.04 | 5572.5 | 5607.7 | | | | | | |
| KFM02A | 546 | 551 | 1.67E-08 | 1.00E-03 | 2.35E-06 | 316 | 358 | | | | 5490.76 | 5621.51 | 5681.16 | | | | | | Shortened test time since flow rate was below Q-measl-L. |
| KFM02A | 551 | 556 | 1.67E-08 | 1.00E-03 | 5.48E-06 | 334 | 330 | | | | 5494.08 | 5672.32 | 5689.99 | | | | | | Shortened test time since flow rate was below Q-measl-L. |
| KFM02A | 556 | 561 | 1.67E-08 | 1.00E-03 | 9.28E-05 | 1228 | 1197 | | | | 5525.28 | 5718.02 | 5617.64 | | | | | | |

## KFM02A plu_s_hole_test_ed1. Left

| idcode | start_date | stop_date | secup | seclow | section_no | lp | seclen_class | spec_capacity_q_s | value_type_q_s | transmissivity_tq | value_type_tq | bc_tq | transmissivity_moye | bc_tm | value_type_tm | hydr_cond_moye | formation_width_b | width_of_channel_b | tb | l_measl_tb | u_measl_tb | sb | assumed_sb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 20040305 22:01 | 20040305 23:52 | 103.50 | 203.50 | | | | 4.64E-04 | 0 | | | | 6.04E-04 | 0 | 0 | 6.04E-06 | 100.00 | | | | | | |
| KFM02A | 20040308 08:53 | 20040308 10:44 | 201.00 | 301.00 | | | | 9.49E-06 | 0 | | | | 1.24E-05 | 0 | 0 | 1.24E-07 | 100.00 | | | | | | |
| KFM02A | 20040308 11:50 | 20040308 14:46 | 301.00 | 401.00 | | | | 2.86E-09 | 0 | | | | 3.72E-09 | 1 | 0 | 3.72E-11 | 100.00 | | | | | | |
| KFM02A | 20040308 17:01 | 20040308 18:57 | 401.00 | 501.00 | | | | 2.15E-06 | 0 | | | | 2.80E-06 | 0 | 0 | 2.80E-08 | 100.00 | | | | | | |
| KFM02A | 20040308 22:06 | 20040308 23:26 | 501.00 | 601.00 | | | | 2.09E-06 | 0 | | | | 2.73E-06 | 1 | 0 | 2.73E-08 | 100.00 | | | | | | |
| KFM02A | 20040309 07:29 | 20040309 09:38 | 601.00 | 701.00 | | | | 1.42E-10 | -1 | | | | 1.85E-10 | 0 | -1 | 1.85E-12 | 100.00 | | | | | | |
| KFM02A | 20040309 11:39 | 20040309 14:55 | 701.00 | 801.00 | | | | 2.36E-10 | -1 | | | | 3.08E-10 | 0 | -1 | 3.08E-12 | 100.00 | | | | | | |
| KFM02A | 20040309 20:22 | 20040309 23:07 | 801.00 | 901.00 | | | | 3.87E-09 | 0 | | | | 5.04E-09 | 0 | 0 | 5.04E-11 | 100.00 | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| KFM02A | 20040318 14:48 | 20040318 16:09 | 103.50 | 123.50 | | | | 4.74E-04 | 0 | | | | 4.96E-04 | 0 | 0 | 2.48E-05 | 20.00 | | | | | | |
| KFM02A | 20040315 14:41 | 20040315 18:10 | 121.00 | 141.00 | | | | 8.81E-05 | 0 | | | | 9.22E-05 | 0 | 0 | 4.61E-06 | 20.00 | | | | | | |
| KFM02A | 20040315 19:23 | 20040315 21:45 | 141.00 | 161.00 | | | | 6.58E-09 | 0 | | | | 6.88E-09 | 0 | 0 | 3.44E-10 | 20.00 | | | | | | |
| KFM02A | 20040315 23:23 | 20040316 00:30 | 161.00 | 181.00 | | | | 1.88E-06 | 0 | | | | 1.97E-06 | 0 | 0 | 9.84E-08 | 20.00 | | | | | | |
| KFM02A | 20040316 06:51 | 20040316 08:13 | 181.00 | 201.00 | | | | 3.25E-07 | 0 | | | | 3.40E-07 | 1 | 0 | 1.70E-08 | 20.00 | | | | | | |
| KFM02A | 20040316 08:45 | 20040316 10:04 | 201.00 | 221.00 | | | | 3.31E-07 | 0 | | | | 3.46E-07 | 0 | 0 | 1.73E-08 | 20.00 | | | | | | |
| KFM02A | 20040316 10:27 | 20040316 11:43 | 221.00 | 241.00 | | | | 1.98E-07 | 0 | | | | 2.08E-07 | 0 | 0 | 1.04E-08 | 20.00 | | | | | | |
| KFM02A | 20040316 12:30 | 20040316 13:47 | 241.00 | 261.00 | | | | 9.62E-09 | 0 | | | | 1.01E-08 | 0 | 0 | 5.03E-10 | 20.00 | | | | | | |
| KFM02A | 20040316 14:04 | 20040316 15:19 | 261.00 | 281.00 | | | | 2.11E-06 | 0 | | | | 2.21E-06 | 0 | 0 | 1.11E-07 | 20.00 | | | | | | |
| KFM02A | 20040318 11:34 | 20040318 12:24 | 281.00 | 301.00 | | | | 8.09E-06 | 0 | | | | 8.47E-06 | 0 | 0 | 4.23E-07 | 20.00 | | | | | | |
| KFM02A | 20040316 19:37 | 20040316 21:15 | 300.00 | 320.00 | | | | 2.61E-09 | 0 | | | | 2.73E-09 | 0 | 0 | 1.37E-10 | 20.00 | | | | | | |
| KFM02A | 20040316 17:50 | 20040316 19:16 | 301.00 | 321.00 | | | | 3.82E-08 | 0 | | | | 4.00E-08 | 0 | 0 | 2.00E-09 | 20.00 | | | | | | |
| KFM02A | 20040316 22:41 | 20040317 00:09 | 401.00 | 421.00 | | | | 7.78E-07 | 0 | | | | 8.14E-07 | 0 | 0 | 4.07E-08 | 20.00 | | | | | | |
| KFM02A | 20040317 06:18 | 20040317 07:35 | 421.00 | 441.00 | | | | 9.70E-07 | 0 | | | | 1.02E-06 | 0 | 0 | 5.08E-08 | 20.00 | | | | | | |
| KFM02A | 20040317 08:11 | 20040317 09:26 | 441.00 | 461.00 | | | | 9.69E-08 | 0 | | | | 1.01E-07 | 0 | 0 | 5.07E-09 | 20.00 | | | | | | |
| KFM02A | 20040317 09:47 | 20040317 11:02 | 461.00 | 481.00 | | | | 1.53E-07 | 0 | | | | 1.60E-07 | 0 | 0 | 8.02E-09 | 20.00 | | | | | | |
| KFM02A | 20040317 11:15 | 20040317 13:13 | 481.00 | 501.00 | | | | 1.89E-07 | 0 | | | | 1.98E-07 | 0 | 0 | 9.91E-09 | 20.00 | | | | | | |
| KFM02A | 20040317 14:00 | 20040317 15:44 | 501.00 | 521.00 | | | | 2.55E-06 | 0 | | | | 2.66E-06 | 0 | 0 | 1.33E-07 | 20.00 | | | | | | |
| KFM02A | 20040317 16:22 | 20040317 17:52 | 521.00 | 541.00 | | | | | -1 | | | | | 0 | -1 | | 20.00 | | | | | | |
| KFM02A | 20040317 18:21 | 20040317 19:44 | 541.00 | 561.00 | | | | 1.69E-09 | 0 | | | | 1.77E-09 | 0 | 0 | 8.83E-11 | 20.00 | | | | | | |
| KFM02A | 20040317 20:11 | 20040317 21:47 | 561.00 | 581.00 | | | | 2.32E-10 | -1 | | | | 2.43E-10 | 1 | -1 | 1.21E-11 | 20.00 | | | | | | |
| KFM02A | 20040317 22:18 | 20040317 23:34 | 581.00 | 601.00 | | | | | -1 | | | | | 0 | -1 | | 20.00 | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| KFM02A | 20040319 07:54 | 20040319 09:26 | 103.50 | 108.50 | | | | 4.09E-09 | 0 | | | | 3.38E-09 | 0 | 0 | 6.76E-10 | 5.00 | | | | | | |

| idcode | start_date | stop_date | secup | seclow | section_no | lp | seclen_class | spec_capacity_q_s | value_type_q_s | transmissivity_tq | value_type_tq | bc_tq | transmissivity_moye | bc_tm | value_type_tm | hydr_cond_moye | formation_width_b | width_of_channel_b | tb | l_measl_tb | u_measl_tb | sb | assumed_sb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 20040319 09:38 | 20040319 10:57 | 106.00 | 111.00 | | | | 1.74E-05 | 0 | | | | 1.43E-05 | 0 | 0 | 2.87E-06 | 5.00 | | | | | | |
| KFM02A | 20040319 11:09 | 20040319 14:15 | 111.00 | 116.00 | | | | 5.38E-05 | 0 | | | | 4.44E-05 | 0 | 0 | 8.88E-06 | 5.00 | | | | | | |
| KFM02A | 20040319 14:35 | 20040319 16:26 | 116.00 | 121.00 | | | | 1.59E-04 | 0 | | | | 1.31E-04 | 1 | 0 | 2.62E-05 | 5.00 | | | | | | |
| KFM02A | 20040319 16:37 | 20040319 18:03 | 121.00 | 126.00 | | | | 8.35E-05 | 0 | | | | 6.90E-05 | 1 | 0 | 1.38E-05 | 5.00 | | | | | | |
| KFM02A | 20040319 18:21 | 20040319 19:49 | 126.00 | 131.00 | | | | 2.53E-08 | 0 | | | | 2.09E-08 | 0 | 0 | 4.18E-09 | 5.00 | | | | | | |
| KFM02A | 20040319 20:03 | 20040319 21:34 | 131.00 | 136.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040319 21:44 | 20040319 23:08 | 136.00 | 141.00 | | | | 1.01E-08 | 0 | | | | 8.32E-09 | 0 | 0 | 1.66E-09 | 5.00 | | | | | | |
| KFM02A | 20040320 10:36 | 20040320 11:33 | 141.00 | 146.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040320 13:03 | 20040320 14:04 | 146.00 | 151.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040320 14:16 | 20040320 15:14 | 151.00 | 156.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040320 17:19 | 20040320 18:08 | 156.00 | 161.00 | | | | 1.11E-09 | 0 | | | | 9.17E-10 | 0 | 0 | 1.83E-10 | 5.00 | | | | | | |
| KFM02A | 20040321 08:36 | 20040321 09:59 | 161.00 | 166.00 | | | | 7.08E-07 | 0 | | | | 5.84E-07 | 0 | 0 | 1.17E-07 | 5.00 | | | | | | |
| KFM02A | 20040321 10:21 | 20040321 11:40 | 166.00 | 171.00 | | | | 3.17E-07 | 0 | | | | 2.62E-07 | 0 | 0 | 5.24E-08 | 5.00 | | | | | | |
| KFM02A | 20040321 12:59 | 20040321 13:59 | 171.00 | 176.00 | | | | 1.26E-06 | 0 | | | | 1.04E-06 | 0 | 0 | 2.08E-07 | 5.00 | | | | | | |
| KFM02A | 20040321 14:13 | 20040321 15:31 | 176.00 | 181.00 | | | | 3.34E-08 | 0 | | | | 2.76E-08 | 0 | 0 | 5.52E-09 | 5.00 | | | | | | |
| KFM02A | 20040321 15:39 | 20040321 16:53 | 181.00 | 186.00 | | | | 3.40E-07 | 0 | | | | 2.81E-07 | 0 | 0 | 5.61E-08 | 5.00 | | | | | | |
| KFM02A | 20040322 06:30 | 20040322 07:58 | 186.00 | 191.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040322 08:15 | 20040322 09:38 | 191.00 | 196.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040322 09:57 | 20040322 11:22 | 196.00 | 201.00 | | | | 1.75E-10 | -1 | | | | 1.44E-10 | 0 | -1 | 2.89E-11 | 5.00 | | | | | | |
| KFM02A | 20040322 12:41 | 20040322 13:49 | 201.00 | 206.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040322 14:03 | 20040322 15:03 | 206.00 | 211.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040322 15:34 | 20040322 16:33 | 211.00 | 216.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040322 16:55 | 20040322 18:11 | 216.00 | 221.00 | | | | 3.72E-07 | 0 | | | | 3.07E-07 | 0 | 0 | 6.14E-08 | 5.00 | | | | | | |
| KFM02A | 20040322 18:23 | 20040322 19:14 | 221.00 | 226.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040322 19:23 | 20040322 20:52 | 225.00 | 230.00 | | | | 2.08E-07 | 0 | | | | 1.72E-07 | 0 | 0 | 3.44E-08 | 5.00 | | | | | | |
| KFM02A | 20040322 21:01 | 20040322 22:17 | 226.00 | 231.00 | | | | 2.02E-07 | 0 | | | | 1.67E-07 | 0 | 0 | 3.34E-08 | 5.00 | | | | | | |
| KFM02A | 20040322 22:26 | 20040322 23:17 | 231.00 | 236.00 | | | | 3.21E-10 | -1 | | | | 2.65E-10 | 0 | -1 | 5.30E-11 | 5.00 | | | | | | |
| KFM02A | 20040322 23:28 | 20040323 00:45 | 236.00 | 241.00 | | | | 3.11E-10 | -1 | | | | 2.57E-10 | 0 | -1 | 5.14E-11 | 5.00 | | | | | | |
| KFM02A | 20040323 06:26 | 20040323 07:55 | 241.00 | 246.00 | | | | 4.82E-09 | 0 | | | | 3.98E-09 | 0 | 0 | 7.96E-10 | 5.00 | | | | | | |
| KFM02A | 20040323 08:13 | 20040323 09:43 | 246.00 | 251.00 | | | | 1.66E-09 | 0 | | | | 1.37E-09 | 0 | 0 | 2.74E-10 | 5.00 | | | | | | |
| KFM02A | 20040323 09:59 | 20040323 11:38 | 251.00 | 256.00 | | | | 1.14E-09 | 0 | | | | 9.42E-10 | 0 | 0 | 1.88E-10 | 5.00 | | | | | | |
| KFM02A | 20040323 12:31 | 20040323 14:04 | 256.00 | 261.00 | | | | 8.23E-10 | 0 | | | | 6.79E-10 | 0 | 0 | 1.36E-10 | 5.00 | | | | | | |
| KFM02A | 20040328 13:43 | 20040328 15:00 | 259.50 | 264.50 | | | | 3.17E-09 | 0 | | | | 2.62E-09 | 0 | 0 | 5.23E-10 | 5.00 | | | | | | |
| KFM02A | 20040328 11:02 | 20040328 12:18 | 264.50 | 269.50 | | | | 5.81E-07 | 0 | | | | 4.80E-07 | 0 | 0 | 9.60E-08 | 5.00 | | | | | | |
| KFM02A | 20040328 09:39 | 20040328 10:53 | 269.50 | 274.50 | | | | 1.55E-07 | 0 | | | | 1.28E-07 | 0 | 0 | 2.56E-08 | 5.00 | | | | | | |
| KFM02A | 20040328 08:15 | 20040328 09:30 | 271.00 | 276.00 | | | | 7.59E-07 | 0 | | | | 6.26E-07 | 0 | 0 | 1.25E-07 | 5.00 | | | | | | |

| idcode | start_date | stop_date | secup | seclow | section_no | lp | seclen_class | spec_capacity_q_s | value_type_q_s | transmissivity_tq | value_type_tq | bc_tq | transmissivity_moye | bc_tm | value_type_tm | hydr_cond_moye | formation_width_b | width_of_channel_b | tb | l_measl_tb | u_measl_tb | sb | assumed_sb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 20040324 06:55 | 20040324 08:31 | 276.00 | 281.00 | | | | 6.08E-07 | 0 | | | | 5.02E-07 | 0 | 0 | 1.00E-07 | 5.00 | | | | | | |
| KFM02A | 20040324 08:44 | 20040324 10:12 | 281.00 | 286.00 | | | | 1.36E-06 | 0 | | | | 1.12E-06 | 0 | 0 | 2.24E-07 | 5.00 | | | | | | |
| KFM02A | 20040324 10:28 | 20040324 11:56 | 286.00 | 291.00 | | | | 2.73E-06 | 0 | | | | 2.25E-06 | 0 | 0 | 4.51E-07 | 5.00 | | | | | | |
| KFM02A | 20040324 12:56 | 20040324 14:16 | 291.00 | 296.00 | | | | 2.70E-06 | 0 | | | | 2.23E-06 | 0 | 0 | 4.46E-07 | 5.00 | | | | | | |
| KFM02A | 20040324 14:28 | 20040322 15:46 | 296.00 | 301.00 | | | | 1.44E-06 | 0 | | | | 1.19E-06 | 0 | 0 | 2.38E-07 | 5.00 | | | | | | |
| KFM02A | 20040324 15:59 | 20040324 17:16 | 301.00 | 306.00 | | | | 2.03E-08 | 0 | | | | 1.67E-08 | 0 | 0 | 3.35E-09 | 5.00 | | | | | | |
| KFM02A | 20040324 17:31 | 20040324 18:48 | 306.00 | 311.00 | | | | 1.07E-09 | 0 | | | | 8.79E-10 | 0 | 0 | 1.76E-10 | 5.00 | | | | | | |
| KFM02A | 20040324 18:58 | 20040324 20:34 | 311.00 | 316.00 | | | | 2.69E-10 | -1 | | | | 2.22E-10 | 0 | -1 | 4.43E-11 | 5.00 | | | | | | |
| KFM02A | 20040324 20:41 | 20040324 21:20 | 316.00 | 321.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040324 22:12 | 20040324 23:01 | 401.00 | 406.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040324 23:09 | 20040324 23:52 | 406.00 | 411.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040325 07:35 | 20040325 08:25 | 411.00 | 416.00 | | | | 4.70E-08 | 0 | | | | 3.88E-08 | 0 | 0 | 7.75E-09 | 5.00 | | | | | | |
| KFM02A | 20040325 08:43 | 20040325 10:04 | 416.00 | 421.00 | | | | 1.13E-06 | 0 | | | | 9.34E-07 | 0 | 0 | 1.87E-07 | 5.00 | | | | | | |
| KFM02A | 20040325 10:23 | 20040325 11:43 | 421.00 | 426.00 | | | | 1.72E-07 | 0 | | | | 1.42E-07 | 0 | 0 | 2.85E-08 | 5.00 | | | | | | |
| KFM02A | 20040325 13:03 | 20040325 14:21 | 426.00 | 431.00 | | | | 1.09E-06 | 0 | | | | 9.00E-07 | 0 | 0 | 1.80E-07 | 5.00 | | | | | | |
| KFM02A | 20040325 14:33 | 20040325 15:50 | 431.00 | 436.00 | | | | 5.40E-09 | 0 | | | | 4.46E-09 | 0 | 0 | 8.92E-10 | 5.00 | | | | | | |
| KFM02A | 20040325 15:59 | 20040325 17:13 | 436.00 | 441.00 | | | | 7.23E-08 | 0 | | | | 5.96E-08 | 0 | 0 | 1.19E-08 | 5.00 | | | | | | |
| KFM02A | 20040325 17:25 | 20040325 18:42 | 441.00 | 446.00 | | | | 1.26E-09 | 0 | | | | 1.04E-09 | 0 | 0 | 2.08E-10 | 5.00 | | | | | | |
| KFM02A | 20040325 18:54 | 20040325 20:11 | 446.00 | 451.00 | | | | 9.67E-09 | 0 | | | | 7.99E-09 | 0 | 0 | 1.60E-09 | 5.00 | | | | | | |
| KFM02A | 20040325 20:22 | 20040325 21:37 | 451.00 | 456.00 | | | | 4.24E-08 | 0 | | | | 3.50E-08 | 0 | 0 | 7.00E-09 | 5.00 | | | | | | |
| KFM02A | 20040325 22:43 | 20040326 00:02 | 456.00 | 461.00 | | | | 2.34E-09 | 0 | | | | 1.93E-09 | 1 | 0 | 3.86E-10 | 5.00 | | | | | | |
| KFM02A | 20040326 06:46 | 20040326 08:07 | 461.00 | 466.00 | | | | 3.91E-09 | 0 | | | | 3.23E-09 | 0 | 0 | 6.46E-10 | 5.00 | | | | | | |
| KFM02A | 20040326 08:23 | 20040326 09:42 | 466.00 | 471.00 | | | | 2.42E-09 | 0 | | | | 1.99E-09 | 0 | 0 | 3.99E-10 | 5.00 | | | | | | |
| KFM02A | 20040326 10:01 | 20040326 10:46 | 471.00 | 476.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040326 11:04 | 20040326 12:26 | 476.00 | 481.00 | | | | 1.03E-07 | 0 | | | | 8.49E-08 | 0 | 0 | 1.70E-08 | 5.00 | | | | | | |
| KFM02A | 20040326 13:41 | 20040326 14:59 | 481.00 | 486.00 | | | | 1.60E-08 | 0 | | | | 1.32E-08 | 0 | 0 | 2.63E-09 | 5.00 | | | | | | |
| KFM02A | 20040326 15:37 | 20040326 16:54 | 486.00 | 491.00 | | | | 8.78E-08 | 0 | | | | 7.25E-08 | 0 | 0 | 1.45E-08 | 5.00 | | | | | | |
| KFM02A | 20040326 17:04 | 20040326 18:19 | 491.00 | 496.00 | | | | 7.13E-09 | 0 | | | | 5.88E-09 | 0 | 0 | 1.18E-09 | 5.00 | | | | | | |
| KFM02A | 20040326 18:30 | 20040326 19:48 | 496.00 | 501.00 | | | | 2.90E-08 | 0 | | | | 2.39E-08 | 0 | 0 | 4.78E-09 | 5.00 | | | | | | |
| KFM02A | 20040326 20:01 | 20040326 21:19 | 501.00 | 506.00 | | | | 1.82E-09 | 0 | | | | 1.50E-09 | 0 | 0 | 3.00E-10 | 5.00 | | | | | | |
| KFM02A | 20040326 21:33 | 20040326 22:50 | 506.00 | 511.00 | | | | 3.51E-08 | 0 | | | | 2.90E-08 | 1 | 0 | 5.80E-09 | 5.00 | | | | | | |
| KFM02A | 20040327 09:44 | 20040327 10:37 | 511.00 | 516.00 | | | | 2.47E-06 | 0 | | | | 2.03E-06 | 1 | 0 | 4.07E-07 | 5.00 | | | | | | |
| KFM02A | 20040327 10:49 | 20040327 11:43 | 516.00 | 521.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040327 12:44 | 20040327 13:35 | 541.00 | 546.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040327 13:48 | 20040327 14:33 | 546.00 | 551.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |
| KFM02A | 20040327 14:40 | 20040327 15:25 | 551.00 | 556.00 | | | | | -1 | | | | | 0 | -1 | | 5.00 | | | | | | |

| idcode | start_date | stop_date | secup | seclow | section_no | lp | seclen_class | spec_capacity_q_s | value_type_q_s | transmissivity_tq | value_type_tq | bc_tq | transmissivity_moye | bc_tm | value_type_tm | hydr_cond_moye | formation_width_b | width_of_channel_b | tb | l_measl_tb | u_measl_tb | sb | assumed_sb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 20040327 15:32 | 20040327 16:51 | 556.00 | 561.00 | | | | 1.86E-09 | 0 | | | | 1.54E-09 | 0 | 0 | 3.07E-10 | 5.00 | | | | | | |

## KFM02A 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 | leakage_factor_lf | transmissivity_tt | value_type_tt | bc_tt | l_measl_q_s | u_measl_q_s | storativity_s | assumed_s | leakage_koeff | hydr_cond_ks | value_type_ks | l_meas_limit_ks | u_meas_limit_ks | spec_storage_ss | assumed_ss | c | cd | skin | stor_ratio | interflow_coeff | dt1 | dt2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 103.50 | 203.50 | | 4.42E-04 | 0 | 1 | 1.1E-08 | 6.5E-04 | | 1.00E-06 | | | | | | | | | | -4.55 | | | 500 | 1800 |
| KFM02A | 201.00 | 301.00 | | 7.87E-06 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -3.35 | | | 400 | 1800 |
| KFM02A | 301.00 | 401.00 | | 5.42E-10 | 0 | 0 | 8.0E-10 | 4.8E-05 | | 1.00E-06 | | | | | | | | 2.04E-10 | | -2.80 | | | 400 | 1800 |
| KFM02A | 401.00 | 501.00 | | 1.31E-06 | 0 | 1 | 7.3E-10 | 4.4E-05 | | 1.00E-06 | | | | | | | | | | -3.36 | | | 80 | 1800 |
| KFM02A | 501.00 | 601.00 | | | 0 | 0 | 5.8E-10 | 3.5E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 601.00 | 701.00 | | 2.90E-11 | -1 | 0 | 4.7E-10 | 2.8E-05 | | 1.00E-06 | | | | | | | | 5.09E-10 | | | | | 900 | 1800 |
| KFM02A | 701.00 | 801.00 | | 2.14E-11 | -1 | 0 | 6.8E-10 | 4.1E-05 | | 1.00E-06 | | | | | | | | 5.94E-10 | | | | | 900 | 1800 |
| KFM02A | 801.00 | 901.00 | | 3.65E-09 | 0 | 1 | 8.4E-10 | 5.0E-05 | | 1.00E-06 | | | | | | | | 1.96E-10 | | 0.98 | | | 30 | 1800 |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| KFM02A | 103.50 | 123.50 | | 3.43E-04 | 0 | 1 | 1.1E-08 | 6.3E-04 | | 1.00E-06 | | | | | | | | | | -5.70 | | | 300 | 900 |
| KFM02A | 121.00 | 141.00 | | 2.42E-04 | 0 | 1 | 2.2E-09 | 1.3E-04 | | 1.00E-06 | | | | | | | | | | 6.90 | | | 300 | 1300 |
| KFM02A | 141.00 | 161.00 | | 5.37E-09 | 0 | 1 | 8.3E-10 | 5.0E-05 | | 1.00E-06 | | | | | | | | 4.49E-11 | | -1.43 | | | 100 | 1000 |
| KFM02A | 161.00 | 181.00 | | 3.63E-06 | 0 | 1 | 7.8E-10 | 4.7E-05 | | 1.00E-06 | | | | | | | | | | 3.30 | | | 50 | 500 |
| KFM02A | 181.00 | 201.00 | | 3.49E-07 | 0 | 0 | 7.3E-10 | 4.4E-05 | | 1.00E-06 | | | | | | | | | | 0.05 | | | 30 | 1200 |
| KFM02A | 201.00 | 221.00 | | 5.85E-07 | 0 | 1 | 8.1E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | 4.00 | | | 40 | 1200 |
| KFM02A | 221.00 | 241.00 | | 1.04E-07 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -2.85 | | | 80 | 400 |
| KFM02A | 241.00 | 261.00 | | 9.36E-09 | 0 | 1 | 1.1E-09 | 6.5E-05 | | 1.00E-06 | | | | | | | | 7.53E-11 | | 1.25 | | | 100 | 1200 |
| KFM02A | 261.00 | 281.00 | | 1.45E-06 | 0 | 1 | 6.4E-10 | 3.8E-05 | | 1.00E-06 | | | | | | | | | | -3.55 | | | 60 | 300 |
| KFM02A | 281.00 | 301.00 | | 5.36E-06 | 0 | 1 | 8.1E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -4.03 | | | 50 | 1200 |
| KFM02A | 300.00 | 320.00 | | 9.61E-08 | 0 | 1 | 8.4E-10 | 5.0E-05 | | 1.00E-06 | | | | | | | | 6.63E-11 | | 6.75 | | | 40 | 300 |
| KFM02A | 301.00 | 321.00 | | 6.07E-08 | 0 | 1 | 8.9E-10 | 5.3E-05 | | 1.00E-06 | | | | | | | | 6.66E-11 | | -0.23 | | | 70 | 130 |
| KFM02A | 401.00 | 421.00 | | 8.51E-07 | 0 | 1 | 7.2E-10 | 4.3E-05 | | 1.00E-06 | | | | | | | | | | -0.30 | | | 300 | 1000 |
| KFM02A | 421.00 | 441.00 | | 1.39E-06 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | 1.55 | | | 30 | 1200 |
| KFM02A | 441.00 | 461.00 | | 7.35E-08 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -2.20 | | | 60 | 300 |
| KFM02A | 461.00 | 481.00 | | 2.85E-07 | 0 | 1 | 8.1E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | 5.00 | | | 100 | 1200 |
| KFM02A | 481.00 | 501.00 | | 2.61E-07 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | 1.15 | | | 20 | 200 |

| idcode | secup | seclow | leakag e_fact or_lf | transmissi vity_tt | valu e_ty pe_tt | bc _tt | l_measl _q_s | u_meas l_q_s | stora tivity _s | assumed _s | leak age _ko eff | hydr _co nd_ ks | valu e_ty pe_ ks | l_mea s_limit _ks | u_me as_lim it_ks | spec_ storag e_ss | ass ume d_s s | c | c d | skin | stor _rati o | inter flow _co eff | dt1 | dt2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 501.00 | 521.00 | | 1.88E-06 | 0 | 1 | 7.7E-10 | 4.6E-05 | | 1.00E-06 | | | | | | | | | | -1.43 | | | 2 | 100 |
| KFM02A | 521.00 | 541.00 | | | -1 | 0 | 8.3E-10 | 5.4E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 541.00 | 561.00 | | 1.38E-09 | 0 | 1 | 7.6E-10 | 4.5E-05 | | 1.00E-06 | | | | | | | | | | -1.46 | | | 2 | 100 |
| KFM02A | 561.00 | 581.00 | | 2.64E-11 | -1 | 0 | 7.7E-10 | 4.6E-05 | | 1.00E-06 | | | | | | | | 1.72E-11 | | | | | | |
| KFM02A | 581.00 | 601.00 | | | -1 | 0 | 8.3E-10 | 4.3E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| KFM02A | 103.50 | 108.50 | | 2.25E-09 | 0 | 1 | 7.6E-10 | 4.6E-05 | | 1.00E-06 | | | | | | | | 1.82E-11 | | -1.70 | | | 100 | 500 |
| KFM02A | 106.00 | 111.00 | | 3.88E-05 | 0 | 1 | 8.1E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | 5.00 | | | 200 | 1200 |
| KFM02A | 111.00 | 116.00 | | 6.04E-05 | 0 | 1 | 1.4E-09 | 8.6E-05 | | 1.00E-06 | | | | | | | | | | -2.00 | | | 60 | 200 |
| KFM02A | 116.00 | 121.00 | | 3.98E-04 | 0 | 0 | 3.4E-09 | 2.0E-04 | | 1.00E-06 | | | | | | | | | | 5.50 | | | 20 | 1300 |
| KFM02A | 121.00 | 126.00 | | 1.95E-04 | 0 | 0 | 2.0E-09 | 1.2E-04 | | 1.00E-06 | | | | | | | | | | 4.70 | | | 20 | 600 |
| KFM02A | 126.00 | 131.00 | | 2.20E-08 | 0 | 1 | 6.7E-10 | 4.0E-05 | | 1.00E-06 | | | | | | | | | | -2.20 | | | 10 | 100 |
| KFM02A | 131.00 | 136.00 | | | -1 | 0 | 8.3E-10 | 5.7E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 136.00 | 141.00 | | 7.71E-09 | 0 | 1 | 8.0E-10 | 4.8E-05 | | 1.00E-06 | | | | | | | | | | 0.08 | | | 30 | 1500 |
| KFM02A | 141.00 | 146.00 | | | -1 | 0 | 8.3E-10 | 7.2E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 146.00 | 151.00 | | | -1 | 0 | 8.3E-10 | 7.9E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 151.00 | 156.00 | | | -1 | 0 | 8.3E-10 | 2.6E-04 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 156.00 | 161.00 | | 1.63E-09 | 0 | 1 | 7.0E-10 | 4.2E-05 | | 1.00E-06 | | | | | | | | 1.58E-11 | | 4.44 | | | 200 | 1200 |
| KFM02A | 161.00 | 166.00 | | 4.11E-07 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -2.55 | | | 20 | 600 |
| KFM02A | 166.00 | 171.00 | | 4.27E-07 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | 1.65 | | | 10 | 1000 |
| KFM02A | 171.00 | 176.00 | | 3.35E-06 | 0 | 1 | 7.6E-10 | 4.5E-05 | | 1.00E-06 | | | | | | | | | | 6.45 | | | 100 | 1000 |
| KFM02A | 176.00 | 181.00 | | 3.31E-08 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | 0.15 | | | 30 | 200 |
| KFM02A | 181.00 | 186.00 | | 5.37E-07 | 0 | 1 | 8.1E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | 2.85 | | | 20 | 1000 |
| KFM02A | 186.00 | 191.00 | | | -1 | 0 | 8.3E-10 | 1.2E-04 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 191.00 | 196.00 | | | -1 | 0 | 8.3E-10 | 4.3E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 196.00 | 201.00 | | 9.38E-12 | -1 | 0 | 8.1E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | 9.17E-11 | | | | | - | - |
| KFM02A | 201.00 | 206.00 | | | -1 | 0 | 8.3E-10 | 4.5E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 206.00 | 211.00 | | | -1 | 0 | 8.3E-10 | 4.6E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 211.00 | 216.00 | | | -1 | 0 | 8.3E-10 | 8.2E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 216.00 | 221.00 | | 2.01E-07 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -3.20 | | | 150 | 1200 |
| KFM02A | 221.00 | 226.00 | | | -1 | 0 | 8.3E-10 | 4.3E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 225.00 | 230.00 | | 9.38E-08 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -3.20 | | | 100 | 700 |
| KFM02A | 226.00 | 231.00 | | 1.11E-07 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -2.77 | | | 80 | 400 |
| KFM02A | 231.00 | 236.00 | | 3.41E-11 | -1 | 0 | 6.7E-10 | 4.0E-05 | | 1.00E-06 | | | | | | | | 3.67E-11 | | | | | - | - |
| KFM02A | 236.00 | 241.00 | | 6.58E-11 | -1 | 0 | 6.5E-10 | 3.9E-05 | | 1.00E-06 | | | | | | | | 1.38E-11 | | | | | 100 | 500 |
| KFM02A | 241.00 | 246.00 | | 2.30E-09 | 0 | 1 | 7.4E-10 | 4.5E-05 | | 1.00E-06 | | | | | | | | 2.56E-11 | | -1.32 | | | 50 | 1200 |

| idcode | secup | seclow | leakage_factor_lf | transmissivity_tt | value_type_tt | bc_tt | l_measl_q_s | u_measl_q_s | storativity_s | assumed_s | leakage_koeff | hydr_cond_ks | value_type_ks | l_meas_limit_ks | u_meas_limit_ks | spec_storage_ss | assumed_s_s | c | cd | skin | stor_ratio | interflow_coeff | dt1 | dt2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 246.00 | 251.00 | | 1.15E-09 | 0 | 1 | 7.6E-10 | 4.6E-05 | | 1.00E-06 | | | | | | | | 1.85E-11 | | 0.25 | | | 700 | 1200 |
| KFM02A | 251.00 | 256.00 | | 9.13E-10 | 0 | 1 | 6.7E-10 | 4.0E-05 | | 1.00E-06 | | | | | | | | 1.92E-11 | | 1.09 | | | 80 | 700 |
| KFM02A | 256.00 | 261.00 | | 7.27E-10 | 0 | 1 | 7.0E-10 | 4.2E-05 | | 1.00E-06 | | | | | | | | 1.52E-11 | | 1.38 | | | 50 | 1000 |
| KFM02A | 259.50 | 264.50 | | 2.76E-09 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | 1.65E-11 | | 1.10 | | | 300 | 1200 |
| KFM02A | 264.50 | 269.50 | | 1.13E-06 | 0 | 1 | 8.1E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | 5.00 | | | 100 | 1200 |
| KFM02A | 269.50 | 274.50 | | 1.54E-07 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -0.10 | | | 30 | 1200 |
| KFM02A | 271.00 | 276.00 | | 1.13E-06 | 0 | 1 | 8.1E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -1.95 | | | 30 | 100 |
| KFM02A | 276.00 | 281.00 | | 2.78E-07 | 0 | 1 | 7.8E-10 | 4.7E-05 | | 1.00E-06 | | | | | | | | | | -4.70 | | | 100 | 300 |
| KFM02A | 281.00 | 286.00 | | 2.58E-06 | 0 | 1 | 8.1E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -2.86 | | | 20 | 70 |
| KFM02A | 286.00 | 291.00 | | 1.82E-06 | 0 | 1 | 9.2E-10 | 5.5E-05 | | 1.00E-06 | | | | | | | | | | -4.32 | | | 20 | 80 |
| KFM02A | 291.00 | 296.00 | | 3.64E-06 | 0 | 1 | 7.7E-10 | 4.6E-05 | | 1.00E-06 | | | | | | | | | | 0.40 | | | 50 | 1200 |
| KFM02A | 296.00 | 301.00 | | 2.05E-06 | 0 | 1 | 8.1E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | 1.35 | | | 40 | 1200 |
| KFM02A | 301.00 | 306.00 | | 6.24E-08 | 0 | 1 | 8.1E-10 | 4.8E-05 | | 1.00E-06 | | | | | | | | 2.57E-10 | | 5.00 | | | 40 | 400 |
| KFM02A | 306.00 | 311.00 | | 6.08E-10 | 0 | 1 | 7.6E-10 | 4.6E-05 | | 1.00E-06 | | | | | | | | 1.18E-11 | | 0.77 | | | 10 | 300 |
| KFM02A | 311.00 | 316.00 | | 3.92E-11 | -1 | 0 | 4.2E-10 | 2.5E-05 | | 1.00E-06 | | | | | | | | 1.54E-11 | | | | | 200 | 1200 |
| KFM02A | 316.00 | 321.00 | | | -1 | 0 | 8.3E-10 | 1.2E-04 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 401.00 | 406.00 | | | -1 | 0 | 8.3E-10 | 7.5E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 406.00 | 411.00 | | | -1 | 0 | 8.3E-10 | 4.3E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 411.00 | 416.00 | | 4.58E-08 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | 0.25 | | | 60 | 1200 |
| KFM02A | 416.00 | 421.00 | | 9.15E-07 | 0 | 1 | 1.1E-09 | 6.7E-05 | | 1.00E-06 | | | | | | | | | | -1.93 | | | 100 | 300 |
| KFM02A | 421.00 | 426.00 | | 2.30E-07 | 0 | 1 | 2.0E-09 | 1.2E-04 | | 1.00E-06 | | | | | | | | | | 1.75 | | | 50 | 400 |
| KFM02A | 426.00 | 431.00 | | 1.15E-06 | 0 | 1 | 1.2E-09 | 7.4E-05 | | 1.00E-06 | | | | | | | | | | 2.58 | | | 100 | 1200 |
| KFM02A | 431.00 | 436.00 | | 3.56E-09 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -0.20 | | | 100 | 1000 |
| KFM02A | 436.00 | 441.00 | | 1.06E-07 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | 2.90 | | | 30 | 1000 |
| KFM02A | 441.00 | 446.00 | | 7.27E-10 | 0 | 1 | 4.8E-10 | 2.9E-05 | | 1.00E-06 | | | | | | | | 1.28E-11 | | -0.28 | | | 200 | 1200 |
| KFM02A | 446.00 | 451.00 | | 9.15E-09 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | 2.50E-11 | | -0.43 | | | 60 | 400 |
| KFM02A | 451.00 | 456.00 | | 2.05E-08 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -2.57 | | | 110 | 1200 |
| KFM02A | 456.00 | 461.00 | | 5.14E-09 | 0 | 0 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | 1.62E-11 | | | | | | |
| KFM02A | 461.00 | 466.00 | | 2.58E-09 | 0 | 1 | 9.8E-10 | 5.9E-05 | | 1.00E-06 | | | | | | | | 1.70E-11 | | 0.05 | | | 100 | 1200 |
| KFM02A | 466.00 | 471.00 | | 2.05E-09 | 0 | 1 | 8.4E-10 | 5.1E-05 | | 1.00E-06 | | | | | | | | 1.62E-11 | | 1.10 | | | 30 | 600 |
| KFM02A | 471.00 | 476.00 | | | -1 | 0 | 8.3E-10 | 8.1E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 476.00 | 481.00 | | 2.58E-07 | 0 | 1 | 8.1E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | 8.98 | | | 10 | 1200 |
| KFM02A | 481.00 | 486.00 | | 1.03E-08 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -1.00 | | | 200 | 1200 |
| KFM02A | 486.00 | 491.00 | | 8.14E-08 | 0 | 1 | 8.3E-10 | 5.0E-05 | | 1.00E-06 | | | | | | | | | | 0.05 | | | 30 | 1200 |
| KFM02A | 491.00 | 496.00 | | 6.47E-09 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | 2.46E-11 | | 1.63 | | | 170 | 1200 |
| KFM02A | 496.00 | 501.00 | | 1.63E-08 | 0 | 1 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | -2.05 | | | 30 | 200 |

| idcode | secup | seclow | leakage_factor_lf | transmissivity_tt | value_type_tt | bc_tt | l_measl_q_s | u_measl_q_s | storativity_s | assumed_s | leakage_koeff | hydr_cond_ks | value_type_ks | l_meas_limit_ks | u_meas_limit_ks | spec_storage_ss | assumed_ss | c | cd | skin | stor_ratio | interflow_coeff | dt1 | dt2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 501.00 | 506.00 | | 1.03E-09 | 0 | 1 | 8.1E-10 | 4.8E-05 | | 1.00E-06 | | | | | | | | 2.94E-11 | | -0.47 | | | 200 | 1200 |
| KFM02A | 506.00 | 511.00 | | | 0 | 0 | 6.8E-10 | 4.1E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 511.00 | 516.00 | | | 0 | 0 | 8.2E-10 | 4.9E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 516.00 | 521.00 | | | -1 | 0 | 8.3E-10 | 5.5E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 541.00 | 546.00 | | | -1 | 0 | 8.3E-10 | 8.3E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 546.00 | 551.00 | | | -1 | 0 | 8.3E-10 | 7.5E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 551.00 | 556.00 | | | -1 | 0 | 8.3E-10 | 5.5E-05 | | 1.00E-06 | | | | | | | | | | | | | | |
| KFM02A | 556.00 | 561.00 | | 2.68E-09 | 0 | 1 | 8.5E-10 | 5.1E-05 | | 1.00E-06 | | | | | | | | | | -0.95 | | | 10 | 100 |

## KFM02A plu_s_hole_test_obs

| idcode | start_date | stop_date | secup | seclow | section_no | obs_secup | obs_seclow | pi_above | pp_above | pf_above | pi_below | pp_below | pf_below |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 20040305 22:01 | 20040305 23:52 | 103.50 | 203.50 | | 100.14 | 102.50 | 1029.47 | 1029.47 | 1029.47 | | | |
| KFM02A | 20040305 22:01 | 20040305 23:52 | 103.50 | 203.50 | | 204.50 | 1002.44 | | | | 2045.99 | 2046.13 | 2046.13 |
| KFM02A | 20040308 08:53 | 20040308 10:44 | 201.00 | 301.00 | | 100.14 | 200.00 | 1988.47 | 1988.19 | 1988.75 | | | |
| KFM02A | 20040308 08:53 | 20040308 10:44 | 201.00 | 301.00 | | 302.00 | 1002.44 | | | | 3006.23 | 3006.64 | 3006.78 |
| KFM02A | 20040308 11:50 | 20040308 14:46 | 301.00 | 401.00 | | 100.14 | 300.00 | 2976.73 | 2976.73 | 2977.29 | | | |
| KFM02A | 20040308 11:50 | 20040308 14:46 | 301.00 | 401.00 | | 402.00 | 1002.44 | | | | 3996.71 | 3997.12 | 3997.25 |
| KFM02A | 20040308 17:01 | 20040308 18:57 | 401.00 | 501.00 | | 100.14 | 400.00 | 3965.27 | 3965.13 | 3965.27 | | | |
| KFM02A | 20040308 17:01 | 20040308 18:57 | 401.00 | 501.00 | | 502.00 | 1002.44 | | | | 4985.10 | 4985.38 | 4985.52 |
| KFM02A | 20040308 22:06 | 20040308 23:26 | 501.00 | 601.00 | | 100.14 | 500.00 | 4954.37 | 4954.37 | 4954.37 | | | |
| KFM02A | 20040308 22:06 | 20040308 23:26 | 501.00 | 601.00 | | 602.00 | 1002.44 | | | | 5979.30 | 5978.75 | 5978.20 |
| KFM02A | 20040309 07:29 | 20040309 09:38 | 601.00 | 701.00 | | 100.14 | 600.00 | 5941.25 | 5941.25 | 5941.25 | | | |
| KFM02A | 20040309 07:29 | 20040309 09:38 | 601.00 | 701.00 | | 702.00 | 1002.44 | | | | 6967.02 | 6965.91 | 6964.81 |
| KFM02A | 20040309 11:39 | 20040309 14:55 | 701.00 | 801.00 | | 100.14 | 700.00 | 6926.48 | 6926.48 | 6926.48 | | | |
| KFM02A | 20040309 11:39 | 20040309 14:55 | 701.00 | 801.00 | | 802.00 | 1002.44 | | | | 7947.27 | 7947.00 | 7947.00 |
| KFM02A | 20040309 20:22 | 20040309 23:07 | 801.00 | 901.00 | | 100.14 | 800.00 | 7909.22 | 7909.22 | 7909.50 | | | |
| KFM02A | 20040309 20:22 | 20040309 23:07 | 801.00 | 901.00 | | 902.00 | 1002.44 | | | | 9047.88 | 9040.71 | 9030.77 |
| | | | | | | | | | | | | | |
| KFM02A | 20040318 14:48 | 20040318 16:09 | 103.50 | 123.50 | | 100.14 | 102.50 | 1029.47 | 1029.47 | 1030.02 | | | |
| KFM02A | 20040318 14:48 | 20040318 16:09 | 103.50 | 123.50 | | 124.50 | 1002.44 | | | | 1255.54 | 1255.68 | 1255.54 |
| KFM02A | 20040315 14:41 | 20040315 18:10 | 121.00 | 141.00 | | 100.14 | 120.00 | 1201.37 | 1207.30 | 1200.13 | | | |
| KFM02A | 20040315 14:41 | 20040315 18:10 | 121.00 | 141.00 | | 142.00 | 1002.44 | | | | 1427.26 | 1427.26 | 1427.26 |
| KFM02A | 20040315 19:23 | 20040315 21:45 | 141.00 | 161.00 | | 100.14 | 140.00 | 1397.82 | 1397.82 | 1397.82 | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 20040315 19:23 | 20040315 21:45 | 141.00 | 161.00 | 162.00 | 1002.44 | | | | 1624.07 | 1623.93 | 1624.34 |
| KFM02A | 20040315 23:23 | 20040316 00:30 | 161.00 | 181.00 | 100.14 | 160.00 | 1594.99 | 1594.99 | 1594.99 | | | |
| KFM02A | 20040315 23:23 | 20040316 00:30 | 161.00 | 181.00 | 182.00 | 1002.44 | | | | 1820.90 | 1821.45 | 1820.90 |
| KFM02A | 20040316 06:51 | 20040316 08:13 | 181.00 | 201.00 | 100.14 | 180.00 | 1791.73 | 1791.59 | 1791.59 | | | |
| KFM02A | 20040316 06:51 | 20040316 08:13 | 181.00 | 201.00 | 202.00 | 1002.44 | | | | 2017.72 | 2018.00 | 2018.00 |
| KFM02A | 20040316 08:45 | 20040316 10:04 | 201.00 | 221.00 | 100.14 | 200.00 | 1988.75 | 1988.61 | 1988.75 | | | |
| KFM02A | 20040316 08:45 | 20040316 10:04 | 201.00 | 221.00 | 222.00 | 1002.44 | | | | 2215.09 | 2215.09 | 2215.09 |
| KFM02A | 20040316 10:27 | 20040316 11:43 | 221.00 | 241.00 | 100.14 | 220.00 | 2186.04 | 2185.90 | 2185.90 | | | |
| KFM02A | 20040316 10:27 | 20040316 11:43 | 221.00 | 241.00 | 242.00 | 1002.44 | | | | 2412.06 | 2412.20 | 2412.20 |
| KFM02A | 20040316 12:30 | 20040316 13:47 | 241.00 | 261.00 | 100.14 | 240.00 | 2383.06 | 2383.06 | 2383.06 | | | |
| KFM02A | 20040316 12:30 | 20040316 13:47 | 241.00 | 261.00 | 262.00 | 1002.44 | | | | 2609.29 | 2609.29 | 2608.75 |
| KFM02A | 20040316 14:04 | 20040316 15:19 | 261.00 | 281.00 | 100.14 | 260.00 | 2580.08 | 2579.94 | 2580.21 | | | |
| KFM02A | 20040316 14:04 | 20040316 15:19 | 261.00 | 281.00 | 282.00 | 1002.44 | | | | 2806.40 | 2813.57 | 2809.71 |
| KFM02A | 20040318 11:34 | 20040318 12:24 | 281.00 | 301.00 | 100.14 | 280.00 | 2776.95 | 2777.64 | 2777.37 | | | |
| KFM02A | 20040318 11:34 | 20040318 12:24 | 281.00 | 301.00 | 302.00 | 1002.44 | | | | 3004.05 | 3004.33 | 3004.60 |
| KFM02A | 20040316 19:37 | 20040316 21:15 | 300.00 | 320.00 | 100.14 | 299.00 | 2965.14 | 2965.28 | 2965.14 | | | |
| KFM02A | 20040316 19:37 | 20040316 21:15 | 300.00 | 320.00 | 321.00 | 1002.44 | | | | 3191.22 | 3191.22 | 3191.22 |
| KFM02A | 20040316 17:50 | 20040316 19:16 | 301.00 | 321.00 | 100.14 | 300.00 | 2975.22 | 2975.08 | 2975.08 | | | |
| KFM02A | 20040316 17:50 | 20040316 19:16 | 301.00 | 321.00 | 322.00 | 1002.44 | | | | 3201.15 | 3201.01 | 3201.15 |
| KFM02A | 20040316 22:41 | 20040317 00:09 | 401.00 | 421.00 | 100.14 | 400.00 | 3962.51 | 3962.51 | 3962.51 | | | |
| KFM02A | 20040316 22:41 | 20040317 00:09 | 401.00 | 421.00 | 422.00 | 1002.44 | | | | 4188.31 | 4188.86 | 4188.86 |
| KFM02A | 20040317 06:18 | 20040317 07:35 | 421.00 | 441.00 | 100.14 | 420.00 | 4160.78 | 4160.64 | 4160.78 | | | |
| KFM02A | 20040317 06:18 | 20040317 07:35 | 421.00 | 441.00 | 442.00 | 1002.44 | | | | 4386.52 | 4386.52 | 4386.52 |
| KFM02A | 20040317 08:11 | 20040317 09:26 | 441.00 | 461.00 | 100.14 | 440.00 | 4357.94 | 4357.94 | 4357.94 | | | |
| KFM02A | 20040317 08:11 | 20040317 09:26 | 441.00 | 461.00 | 462.00 | 1002.44 | | | | 4584.17 | 4583.89 | 4584.17 |
| | | | | | | | | | | | | |
| KFM02A | 20040319 07:54 | 20040319 09:26 | 103.50 | 108.50 | 100.14 | 102.50 | 1028.37 | 1028.37 | 1028.37 | | | |
| KFM02A | 20040319 07:54 | 20040319 09:26 | 103.50 | 108.50 | 109.50 | 1002.44 | | | | 1106.47 | 1106.47 | 1106.47 |
| KFM02A | 20040319 09:38 | 20040319 10:57 | 106.00 | 111.00 | 100.14 | 105.00 | 1053.08 | 1053.22 | 1053.22 | | | |
| KFM02A | 20040319 09:38 | 20040319 10:57 | 106.00 | 111.00 | 112.00 | 1002.44 | | | | 1131.18 | 1132.70 | 1131.32 |
| KFM02A | 20040319 11:09 | 20040319 14:15 | 111.00 | 116.00 | 100.14 | 110.00 | 1102.36 | 1102.36 | 1102.92 | | | |
| KFM02A | 20040319 11:09 | 20040319 14:15 | 111.00 | 116.00 | 117.00 | 1002.44 | | | | 1180.46 | 1182.66 | 1180.46 |
| KFM02A | 20040319 14:35 | 20040319 16:26 | 116.00 | 121.00 | 100.14 | 115.00 | 1151.53 | 1155.81 | 1152.07 | | | |
| KFM02A | 20040319 14:35 | 20040319 16:26 | 116.00 | 121.00 | 122.00 | 1002.44 | | | | 1230.14 | 1230.14 | 1230.14 |
| KFM02A | 20040319 16:37 | 20040319 18:03 | 121.00 | 126.00 | 100.14 | 120.00 | 1200.26 | 1207.30 | 1201.23 | | | |
| KFM02A | 20040319 16:37 | 20040319 18:03 | 121.00 | 126.00 | 127.00 | 1002.44 | | | | 1279.29 | 1279.56 | 1279.83 |
| KFM02A | 20040319 18:21 | 20040319 19:49 | 126.00 | 131.00 | 100.14 | 125.00 | 1249.97 | 1249.97 | 1249.83 | | | |
| KFM02A | 20040319 18:21 | 20040319 19:49 | 126.00 | 131.00 | 132.00 | 1002.44 | | | | 1328.69 | 1328.69 | 1328.97 |
| KFM02A | 20040319 20:03 | 20040319 21:34 | 131.00 | 136.00 | 100.14 | 130.00 | 1298.97 | 1298.97 | 1298.97 | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 20040319 20:03 | 20040319 21:34 | 131.00 | 136.00 | 137.00 | 1002.44 | | | | 1377.97 | 1378.10 | 1378.10 |
| KFM02A | 20040319 21:44 | 20040319 23:08 | 136.00 | 141.00 | 100.14 | 135.00 | 1348.12 | 1348.12 | 1348.12 | | | |
| KFM02A | 20040319 21:44 | 20040319 23:08 | 136.00 | 141.00 | 142.00 | 1002.44 | | | | 1427.26 | 1426.83 | 1427.26 |
| KFM02A | 20040320 10:36 | 20040320 11:33 | 141.00 | 146.00 | 100.14 | 140.00 | 1395.75 | 1395.62 | 1395.62 | | | |
| KFM02A | 20040320 10:36 | 20040320 11:33 | 141.00 | 146.00 | 147.00 | 1002.44 | | | | 1475.28 | 1475.42 | 1475.28 |
| KFM02A | 20040320 13:03 | 20040320 14:04 | 146.00 | 151.00 | 100.14 | 145.00 | 1445.33 | 1445.33 | 1445.33 | | | |
| KFM02A | 20040320 13:03 | 20040320 14:04 | 146.00 | 151.00 | 152.00 | 1002.44 | | | | 1524.97 | 1524.97 | 1524.97 |
| KFM02A | 20040320 14:16 | 20040320 15:14 | 151.00 | 156.00 | 100.14 | 150.00 | 1494.62 | 1494.62 | 1494.48 | | | |
| KFM02A | 20040320 14:16 | 20040320 15:14 | 151.00 | 156.00 | 157.00 | 1002.44 | | | | 1574.11 | 1574.11 | 1574.11 |
| KFM02A | 20040320 17:19 | 20040320 18:08 | 156.00 | 161.00 | 100.14 | 155.00 | 1544.18 | 1544.18 | 1544.18 | | | |
| KFM02A | 20040320 17:19 | 20040320 18:08 | 156.00 | 161.00 | 162.00 | 1002.44 | | | | 1623.79 | 1623.79 | 1623.79 |
| KFM02A | 20040321 08:36 | 20040321 09:59 | 161.00 | 166.00 | 100.14 | 160.00 | 1593.47 | 1593.61 | 1593.33 | | | |
| KFM02A | 20040321 08:36 | 20040321 09:59 | 161.00 | 166.00 | 167.00 | 1002.44 | | | | 1672.38 | 1672.38 | 1672.38 |
| KFM02A | 20040321 10:21 | 20040321 11:40 | 166.00 | 171.00 | 100.14 | 165.00 | 1642.76 | 1642.62 | 1642.48 | | | |
| KFM02A | 20040321 10:21 | 20040321 11:40 | 166.00 | 171.00 | 172.00 | 1002.44 | | | | 1721.52 | 1721.52 | 1722.07 |
| KFM02A | 20040321 12:59 | 20040321 13:59 | 171.00 | 176.00 | 100.14 | 170.00 | 1692.18 | 1692.18 | 1692.18 | | | |
| KFM02A | 20040321 12:59 | 20040321 13:59 | 171.00 | 176.00 | 177.00 | 1002.44 | | | | 1771.07 | 1771.62 | 1771.76 |
| KFM02A | 20040321 14:13 | 20040321 15:31 | 176.00 | 181.00 | 100.14 | 175.00 | 1741.61 | 1741.48 | 1741.34 | | | |
| KFM02A | 20040321 14:13 | 20040321 15:31 | 176.00 | 181.00 | 182.00 | 1002.44 | | | | 1821.17 | 1820.90 | 1820.90 |
| KFM02A | 20040321 15:39 | 20040321 16:53 | 181.00 | 186.00 | 100.14 | 180.00 | 1791.04 | 1791.04 | 1791.04 | | | |
| KFM02A | 20040321 15:39 | 20040321 16:53 | 181.00 | 186.00 | 187.00 | 1002.44 | | | | 1870.03 | 1870.03 | 1870.59 |
| KFM02A | 20040322 06:30 | 20040322 07:58 | 186.00 | 191.00 | 100.14 | 185.00 | 1841.29 | 1841.29 | 1841.29 | | | |
| KFM02A | 20040322 06:30 | 20040322 07:58 | 186.00 | 191.00 | 192.00 | 1002.44 | | | | 1920.83 | 1920.83 | 1920.83 |
| KFM02A | 20040322 08:15 | 20040322 09:38 | 191.00 | 196.00 | 100.14 | 190.00 | 1890.45 | 1890.72 | 1890.99 | | | |
| KFM02A | 20040322 08:15 | 20040322 09:38 | 191.00 | 196.00 | 197.00 | 1002.44 | | | | 1969.95 | 1969.95 | 1970.51 |
| KFM02A | 20040322 09:57 | 20040322 11:22 | 196.00 | 201.00 | 100.14 | 195.00 | 1940.69 | 1940.69 | 1940.69 | | | |
| KFM02A | 20040322 09:57 | 20040322 11:22 | 196.00 | 201.00 | 202.00 | 1002.44 | | | | 2020.21 | 2020.21 | 2020.76 |
| KFM02A | 20040322 12:41 | 20040322 13:49 | 201.00 | 206.00 | 100.14 | 200.00 | 1989.71 | 1989.57 | 1989.85 | | | |
| KFM02A | 20040322 12:41 | 20040322 13:49 | 201.00 | 206.00 | 207.00 | 1002.44 | | | | 2069.07 | 2068.93 | 2068.80 |
| KFM02A | 20040322 14:03 | 20040322 15:03 | 206.00 | 211.00 | 100.14 | 205.00 | 2039.00 | 2038.86 | 2039.00 | | | |
| KFM02A | 20040322 14:03 | 20040322 15:03 | 206.00 | 211.00 | 212.00 | 1002.44 | | | | 2118.20 | 2118.48 | 2118.48 |
| KFM02A | 20040322 15:34 | 20040322 16:33 | 211.00 | 216.00 | 100.14 | 210.00 | 2088.15 | 2088.29 | 2088.15 | | | |
| KFM02A | 20040322 15:34 | 20040322 16:33 | 211.00 | 216.00 | 217.00 | 1002.44 | | | | 2167.61 | 2167.61 | 2167.61 |
| KFM02A | 20040322 16:55 | 20040322 18:11 | 216.00 | 221.00 | 100.14 | 215.00 | 2137.44 | 2137.30 | 2137.30 | | | |
| KFM02A | 20040322 16:55 | 20040322 18:11 | 216.00 | 221.00 | 222.00 | 1002.44 | | | | 2216.76 | 2216.76 | 2216.76 |
| KFM02A | 20040322 18:23 | 20040322 19:14 | 221.00 | 226.00 | 100.14 | 220.00 | 2187.01 | 2186.59 | 2186.45 | | | |
| KFM02A | 20040322 18:23 | 20040322 19:14 | 221.00 | 226.00 | 227.00 | 1002.44 | | | | 2266.02 | 2266.30 | 2265.88 |
| KFM02A | 20040322 19:23 | 20040322 20:52 | 225.00 | 230.00 | 100.14 | 224.00 | 2226.21 | 2226.21 | 2226.77 | | | |
| KFM02A | 20040322 19:23 | 20040322 20:52 | 225.00 | 230.00 | 231.00 | 1002.44 | | | | 2305.64 | 2305.78 | 2305.64 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 20040322 21:01 | 20040322 22:17 | 226.00 | 231.00 | 100.14 | 225.00 | 2236.43 | 2236.29 | 2236.71 | | | |
| KFM02A | 20040322 21:01 | 20040322 22:17 | 226.00 | 231.00 | 232.00 | 1002.44 | | | | 2315.58 | 2315.58 | 2315.58 |
| KFM02A | 20040322 22:26 | 20040322 23:17 | 231.00 | 236.00 | 100.14 | 230.00 | 2285.87 | 2285.73 | 2285.87 | | | |
| KFM02A | 20040322 22:26 | 20040322 23:17 | 231.00 | 236.00 | 237.00 | 1002.44 | | | | 2364.86 | 2364.72 | 2364.72 |
| KFM02A | 20040322 23:28 | 20040323 00:45 | 236.00 | 241.00 | 100.14 | 235.00 | 2334.74 | 2335.01 | 2335.01 | | | |
| KFM02A | 20040322 23:28 | 20040323 00:45 | 236.00 | 241.00 | 242.00 | 1002.44 | | | | 2413.85 | 2413.85 | 2413.85 |
| KFM02A | 20040323 06:26 | 20040323 07:55 | 241.00 | 246.00 | 100.14 | 240.00 | 2384.71 | 2384.57 | 2384.71 | | | |
| KFM02A | 20040323 06:26 | 20040323 07:55 | 241.00 | 246.00 | 247.00 | 1002.44 | | | | 2463.13 | 2463.27 | 2462.99 |
| KFM02A | 20040323 08:13 | 20040323 09:43 | 246.00 | 251.00 | 100.14 | 245.00 | 2433.87 | 2433.87 | 2433.87 | | | |
| KFM02A | 20040323 08:13 | 20040323 09:43 | 246.00 | 251.00 | 252.00 | 1002.44 | | | | 2512.26 | 2512.26 | 2512.68 |
| KFM02A | 20040323 09:59 | 20040323 11:38 | 251.00 | 256.00 | 100.14 | 250.00 | 2483.15 | 2483.15 | 2483.01 | | | |
| KFM02A | 20040323 09:59 | 20040323 11:38 | 251.00 | 256.00 | 257.00 | 1002.44 | | | | 2561.81 | 2561.41 | 2561.27 |
| KFM02A | 20040323 12:31 | 20040323 14:04 | 256.00 | 261.00 | 100.14 | 255.00 | 2532.71 | 2532.85 | 2532.71 | | | |
| KFM02A | 20040323 12:31 | 20040323 14:04 | 256.00 | 261.00 | 262.00 | 1002.44 | | | | 2611.23 | 2611.10 | 2611.50 |
| KFM02A | 20040328 13:43 | 20040328 15:00 | 259.50 | 264.50 | 100.14 | 258.50 | 2566.55 | 2566.82 | 2566.41 | | | |
| KFM02A | 20040328 13:43 | 20040328 15:00 | 259.50 | 264.50 | 265.50 | 1002.44 | | | | 2645.19 | 2644.63 | 2644.63 |
| KFM02A | 20040328 11:02 | 20040328 12:18 | 264.50 | 269.50 | 100.14 | 263.50 | 2615.98 | 2615.98 | 2615.56 | | | |
| KFM02A | 20040328 11:02 | 20040328 12:18 | 264.50 | 269.50 | 270.50 | 1002.44 | | | | 2694.46 | 2695.57 | 2695.43 |
| KFM02A | 20040328 09:39 | 20040328 10:53 | 269.50 | 274.50 | 100.14 | 268.50 | 2665.26 | 2665.12 | 2665.26 | | | |
| KFM02A | 20040328 09:39 | 20040328 10:53 | 269.50 | 274.50 | 275.50 | 1002.44 | | | | 2744.01 | 2744.01 | 2744.01 |
| KFM02A | 20040328 08:15 | 20040328 09:30 | 271.00 | 276.00 | 100.14 | 270.00 | 2680.17 | 2679.76 | 2679.62 | | | |
| KFM02A | 20040328 08:15 | 20040328 09:30 | 271.00 | 276.00 | 277.00 | 1002.44 | | | | 2758.36 | 2760.57 | 2759.47 |
| KFM02A | 20040324 06:55 | 20040324 08:31 | 276.00 | 281.00 | 100.14 | 275.00 | 2730.84 | 2730.98 | 2730.98 | | | |
| KFM02A | 20040324 06:55 | 20040324 08:31 | 276.00 | 281.00 | 282.00 | 1002.44 | | | | 2810.82 | 2814.27 | 2812.47 |
| KFM02A | 20040324 08:44 | 20040324 10:12 | 281.00 | 286.00 | 100.14 | 280.00 | 2780.13 | 2780.54 | 2780.68 | | | |
| KFM02A | 20040324 08:44 | 20040324 10:12 | 281.00 | 286.00 | 287.00 | 1002.44 | | | | 2859.40 | 2865.61 | 2862.16 |
| KFM02A | 20040324 10:28 | 20040324 11:56 | 286.00 | 291.00 | 100.14 | 285.00 | 2829.97 | 2829.97 | 2829.83 | | | |
| KFM02A | 20040324 10:28 | 20040324 11:56 | 286.00 | 291.00 | 292.00 | 1002.44 | | | | 2911.30 | 2913.51 | 2909.64 |
| KFM02A | 20040324 12:56 | 20040324 14:16 | 291.00 | 296.00 | 100.14 | 290.00 | 2877.89 | 2878.71 | 2878.44 | | | |
| KFM02A | 20040324 12:56 | 20040324 14:16 | 291.00 | 296.00 | 297.00 | 1002.44 | | | | 2956.98 | 2958.23 | 2957.12 |
| KFM02A | 20040324 14:28 | 20040322 15:46 | 296.00 | 301.00 | 100.14 | 295.00 | 2928.00 | 2928.00 | 2927.59 | | | |
| KFM02A | 20040324 14:28 | 20040322 15:46 | 296.00 | 301.00 | 302.00 | 1002.44 | | | | 3005.98 | 3005.84 | 3005.71 |
| KFM02A | 20040324 15:59 | 20040324 17:16 | 301.00 | 306.00 | 100.14 | 300.00 | 2977.29 | 2977.29 | 2976.73 | | | |
| KFM02A | 20040324 15:59 | 20040324 17:16 | 301.00 | 306.00 | 307.00 | 1002.44 | | | | 3054.84 | 3054.84 | 3054.84 |
| KFM02A | 20040324 17:31 | 20040324 18:48 | 306.00 | 311.00 | 100.14 | 305.00 | 3026.43 | 3026.16 | 3025.89 | | | |
| KFM02A | 20040324 17:31 | 20040324 18:48 | 306.00 | 311.00 | 312.00 | 1002.44 | | | | 3103.98 | 3103.98 | 3103.98 |
| KFM02A | 20040324 18:58 | 20040324 20:34 | 311.00 | 316.00 | 100.14 | 310.00 | 3075.59 | 3075.45 | 3075.59 | | | |
| KFM02A | 20040324 18:58 | 20040324 20:34 | 311.00 | 316.00 | 317.00 | 1002.44 | | | | 3153.67 | 3153.12 | 3153.67 |
| KFM02A | 20040324 20:41 | 20040324 21:20 | 316.00 | 321.00 | 100.14 | 315.00 | 3124.74 | 3124.74 | 3124.74 | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 20040324 20:41 | 20040324 21:20 | 316.00 | 321.00 | 322.00 | 1002.44 | | | | 3202.53 | 3202.39 | 3202.25 |
| KFM02A | 20040324 22:12 | 20040324 23:01 | 401.00 | 406.00 | 100.14 | 400.00 | 3964.31 | 3964.17 | 3964.17 | | | |
| KFM02A | 20040324 22:12 | 20040324 23:01 | 401.00 | 406.00 | 407.00 | 1002.44 | | | | 4041.45 | 4041.45 | 4042.01 |
| KFM02A | 20040324 23:09 | 20040324 23:52 | 406.00 | 411.00 | 100.14 | 405.00 | 4013.88 | 4013.46 | 4013.88 | | | |
| KFM02A | 20040324 23:09 | 20040324 23:52 | 406.00 | 411.00 | 412.00 | 1002.44 | | | | 4091.14 | 4091.14 | 4091.14 |
| KFM02A | 20040325 07:35 | 20040325 08:25 | 411.00 | 416.00 | 100.14 | 410.00 | 4063.03 | 4062.89 | 4063.03 | | | |
| KFM02A | 20040325 07:35 | 20040325 08:25 | 411.00 | 416.00 | 417.00 | 1002.44 | | | | 4140.56 | 4141.11 | 4140.83 |
| KFM02A | 20040325 08:43 | 20040325 10:04 | 416.00 | 421.00 | 100.14 | 415.00 | 4112.45 | 4112.32 | 4112.18 | | | |
| KFM02A | 20040325 08:43 | 20040325 10:04 | 416.00 | 421.00 | 422.00 | 1002.44 | | | | 4189.96 | 4190.79 | 4189.96 |
| KFM02A | 20040325 10:23 | 20040325 11:43 | 421.00 | 426.00 | 100.14 | 420.00 | 4162.29 | 4161.74 | 4161.88 | | | |
| KFM02A | 20040325 10:23 | 20040325 11:43 | 421.00 | 426.00 | 427.00 | 1002.44 | | | | 4239.65 | 4239.51 | 4239.10 |
| KFM02A | 20040325 13:03 | 20040325 14:21 | 426.00 | 431.00 | 100.14 | 425.00 | 4210.89 | 4211.03 | 4211.03 | | | |
| KFM02A | 20040325 13:03 | 20040325 14:21 | 426.00 | 431.00 | 432.00 | 1002.44 | | | | 4288.80 | 4288.80 | 4288.80 |
| KFM02A | 20040325 14:33 | 20040325 15:50 | 431.00 | 436.00 | 100.14 | 430.00 | 4260.18 | 4260.60 | 4260.74 | | | |
| KFM02A | 20040325 14:33 | 20040325 15:50 | 431.00 | 436.00 | 437.00 | 1002.44 | | | | 4338.21 | 4337.93 | 4337.93 |
| KFM02A | 20040325 15:59 | 20040325 17:13 | 436.00 | 441.00 | 100.14 | 435.00 | 4309.88 | 4309.75 | 4309.88 | | | |
| KFM02A | 20040325 15:59 | 20040325 17:13 | 436.00 | 441.00 | 442.00 | 1002.44 | | | | 4387.76 | 4388.31 | 4388.72 |
| KFM02A | 20040325 17:25 | 20040325 18:42 | 441.00 | 446.00 | 100.14 | 440.00 | 4359.18 | 4359.18 | 4359.04 | | | |
| KFM02A | 20040325 17:25 | 20040325 18:42 | 441.00 | 446.00 | 447.00 | 1002.44 | | | | 4439.38 | 4438.41 | 4438.41 |
| KFM02A | 20040325 18:54 | 20040325 20:11 | 446.00 | 451.00 | 100.14 | 445.00 | 4408.74 | 4408.60 | 4408.18 | | | |
| KFM02A | 20040325 18:54 | 20040325 20:11 | 446.00 | 451.00 | 452.00 | 1002.44 | | | | 4487.54 | 4487.54 | 4487.54 |
| KFM02A | 20040325 20:22 | 20040325 21:37 | 451.00 | 456.00 | 100.14 | 450.00 | 4458.45 | 4458.17 | 4457.89 | | | |
| KFM02A | 20040325 20:22 | 20040325 21:37 | 451.00 | 456.00 | 457.00 | 1002.44 | | | | 4537.10 | 4536.83 | 4536.69 |
| KFM02A | 20040325 22:43 | 20040326 00:02 | 456.00 | 461.00 | 100.14 | 455.00 | 4507.59 | 4507.59 | 4507.59 | | | |
| KFM02A | 20040325 22:43 | 20040326 00:02 | 456.00 | 461.00 | 462.00 | 1002.44 | | | | 4586.38 | 4586.38 | 4585.82 |
| KFM02A | 20040326 06:46 | 20040326 08:07 | 461.00 | 466.00 | 100.14 | 460.00 | 4556.75 | 4556.19 | 4556.19 | | | |
| KFM02A | 20040326 06:46 | 20040326 08:07 | 461.00 | 466.00 | 467.00 | 1002.44 | | | | 4635.65 | 4635.65 | 4635.51 |
| KFM02A | 20040326 08:23 | 20040326 09:42 | 466.00 | 471.00 | 100.14 | 465.00 | 4605.34 | 4605.34 | 4605.34 | | | |
| KFM02A | 20040326 08:23 | 20040326 09:42 | 466.00 | 471.00 | 472.00 | 1002.44 | | | | 4684.66 | 4684.79 | 4685.20 |
| KFM02A | 20040326 10:01 | 20040326 10:46 | 471.00 | 476.00 | 100.14 | 470.00 | 4655.18 | 4655.05 | 4655.05 | | | |
| KFM02A | 20040326 10:01 | 20040326 10:46 | 471.00 | 476.00 | 477.00 | 1002.44 | | | | 4734.34 | 4734.34 | 4734.34 |
| KFM02A | 20040326 11:04 | 20040326 12:26 | 476.00 | 481.00 | 100.14 | 475.00 | 4704.20 | 4704.47 | 4704.20 | | | |
| KFM02A | 20040326 11:04 | 20040326 12:26 | 476.00 | 481.00 | 482.00 | 1002.44 | | | | 4783.20 | 4783.47 | 4783.47 |
| KFM02A | 20040326 13:41 | 20040326 14:59 | 481.00 | 486.00 | 100.14 | 480.00 | 4754.17 | 4753.76 | 4753.90 | | | |
| KFM02A | 20040326 13:41 | 20040326 14:59 | 481.00 | 486.00 | 487.00 | 1002.44 | | | | 4832.48 | 4832.62 | 4832.62 |
| KFM02A | 20040326 15:37 | 20040326 16:54 | 486.00 | 491.00 | 100.14 | 485.00 | 4803.05 | 4802.63 | 4802.50 | | | |
| KFM02A | 20040326 15:37 | 20040326 16:54 | 486.00 | 491.00 | 492.00 | 1002.44 | | | | 4881.89 | 4881.75 | 4881.20 |
| KFM02A | 20040326 17:04 | 20040326 18:19 | 491.00 | 496.00 | 100.14 | 490.00 | 4852.76 | 4852.20 | 4852.20 | | | |
| KFM02A | 20040326 17:04 | 20040326 18:19 | 491.00 | 496.00 | 497.00 | 1002.44 | | | | 4931.03 | 4931.30 | 4931.99 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KFM02A | 20040326 18:30 | 20040326 19:48 | 496.00 | 501.00 | 100.14 | 495.00 | 4901.90 | 4901.77 | 4901.90 | | | |
| KFM02A | 20040326 18:30 | 20040326 19:48 | 496.00 | 501.00 | 502.00 | 1002.44 | | | | 4980.58 | 4980.58 | 4980.58 |
| KFM02A | 20040326 20:01 | 20040326 21:19 | 501.00 | 506.00 | 100.14 | 500.00 | 4951.74 | 4951.60 | 4951.60 | | | |
| KFM02A | 20040326 20:01 | 20040326 21:19 | 501.00 | 506.00 | 507.00 | 1002.44 | | | | 5030.27 | 5029.99 | 5030.27 |
| KFM02A | 20040326 21:33 | 20040326 22:50 | 506.00 | 511.00 | 100.14 | 505.00 | 5001.31 | 5001.17 | 5000.76 | | | |
| KFM02A | 20040326 21:33 | 20040326 22:50 | 506.00 | 511.00 | 512.00 | 1002.44 | | | | 5079.68 | 5079.40 | 5079.40 |
| KFM02A | 20040327 09:44 | 20040327 10:37 | 511.00 | 516.00 | 100.14 | 510.00 | 5049.77 | 5049.77 | 5049.90 | | | |
| KFM02A | 20040327 09:44 | 20040327 10:37 | 511.00 | 516.00 | 517.00 | 1002.44 | | | | 5137.38 | 5136.28 | 5137.38 |
| KFM02A | 20040327 10:49 | 20040327 11:43 | 516.00 | 521.00 | 100.14 | 515.00 | 5099.06 | 5098.64 | 5098.50 | | | |
| KFM02A | 20040327 10:49 | 20040327 11:43 | 516.00 | 521.00 | 522.00 | 1002.44 | | | | 5195.35 | 5193.69 | 5192.59 |
| KFM02A | 20040327 12:44 | 20040327 13:35 | 541.00 | 546.00 | 100.14 | 540.00 | 5345.50 | 5345.37 | 5345.37 | | | |
| KFM02A | 20040327 12:44 | 20040327 13:35 | 541.00 | 546.00 | 547.00 | 1002.44 | | | | 5440.62 | 5439.38 | 5438.27 |
| KFM02A | 20040327 13:48 | 20040327 14:33 | 546.00 | 551.00 | 100.14 | 545.00 | 5394.94 | 5394.52 | 5394.52 | | | |
| KFM02A | 20040327 13:48 | 20040327 14:33 | 546.00 | 551.00 | 552.00 | 1002.44 | | | | 5494.17 | 5492.37 | 5490.72 |
| KFM02A | 20040327 14:40 | 20040327 15:25 | 551.00 | 556.00 | 100.14 | 550.00 | 5444.09 | 5443.95 | 5443.67 | | | |
| KFM02A | 20040327 14:40 | 20040327 15:25 | 551.00 | 556.00 | 557.00 | 1002.44 | | | | 5549.66 | 5546.90 | 5544.83 |
| KFM02A | 20040327 15:32 | 20040327 16:51 | 556.00 | 561.00 | 100.14 | 555.00 | 5493.37 | 5493.24 | 5492.82 | | | |
| KFM02A | 20040327 15:32 | 20040327 16:51 | 556.00 | 561.00 | 562.00 | 1002.44 | | | | 5602.93 | 5593.96 | 5590.10 |