P-04-291

Oskarshamn site investigation

Hydraulic injection tests in borehole KAV04A, 2004

Sub-area Simpevarp

Nils Rahm, Golder Associates AB
Cristian Enachescu, Golder Associates GmbH

December 2004

Svensk Kärnbränslehantering AB
Swedish Nuclear Fuel
and Waste Management Co
Box 5864
SE-102 40 Stockholm Sweden
Tel 08-459 84 00
+46 8 459 84 00
Fax 08-661 57 19
+46 8 661 57 19

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Keywords: Site/project, Hydrogeology, Hydraulic tests, Injection test, Hydraulic parameters, Transmissivity.

Abstract

Hydraulic injection tests have been performed in Borehole KAV04A at the Simpevarp sub-area, Oskarshamn. The tests are part of the general program for site investigations. The hydraulic testing programme has the aim to characterise the rock with respect to its hydraulic properties of the fractured zones and rock mass between them. Data is subsequently delivered for the site descriptive model.

This report describes the results and primary data evaluation of the hydraulic injection tests in borehole KAV04A performed between 23rd July and 14th of August 2004.

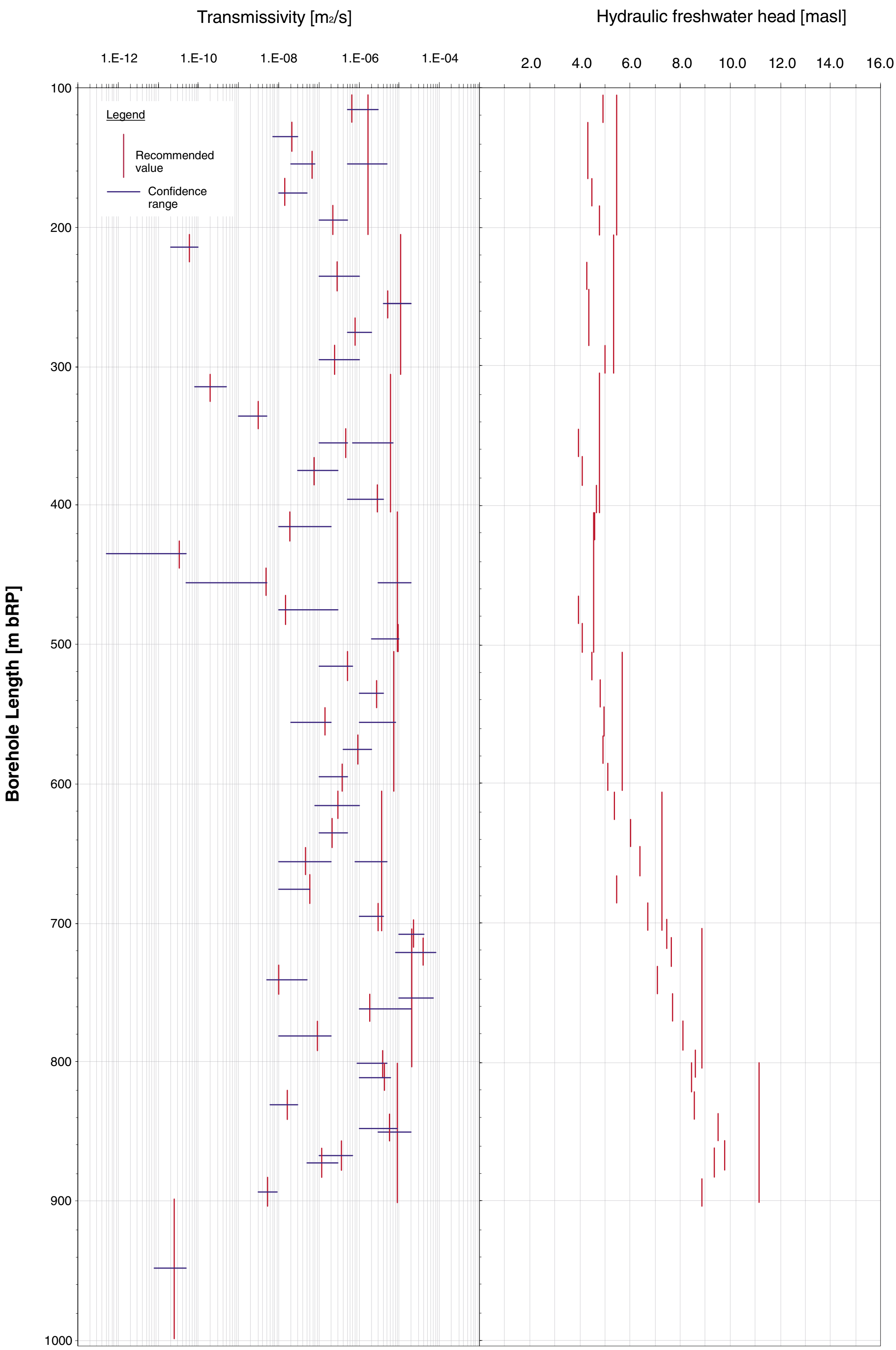
The objective of the hydrotests was to describe the rock around the borehole with respect to hydraulic parameters, mainly transmissivity (T) and hydraulic conductivity (K) at different measurement scales of 100 m and 20 m sections. Transient evaluation during flow and recovery period provided additional information such as flow regimes, hydraulic boundaries and cross-over flows. Constant pressure injection tests were conducted between 105.17–998.20 m below ToC. The results of the test interpretation are presented as transmissivity, hydraulic conductivity and hydraulic freshwater head.

Sammanfattning

Injektionstester har utförts i borrhål KAV04A i delområde Simpevarp, Oskarshamn. Testerna är en del av SKB:s platsundersökningar. Hydraultestprogrammet där injektionstesterna ingår har som mål att karakterisera berget med avseende på dess hydrauliska egenskaper av sprickzoner och mellanliggande bergmassa. Data från testerna används vid den platsbeskrivande modelleringen av området.

Denna rapport redovisar resultaten och utvärderingar av primärdata från de hydrauliska injektionstesterna i borrhål KAV04A. Testerna utfördes mellan den 23 juli till den 14 augusti 2004.

Syftet med hydrotesterna var framförallt att beskriva bergets hydrauliska egenskaper runt borrhålet med avseende på hydrauliska parametrar, i huvudsak transmissivitet (T), hydraulisk konduktivitet (K) vid olika mätskalor av 100 m och 20 m sektioner. Transient utvärdering under injektions- och återhämtningsfasen gav ytterligare information avseende flödesgeometri, hydrauliska gränser och sprickläckage. Injektionstester utfördes mellan 105,17–998,20 m borrhålslängd. Resultaten av test utvärderingen presenteras som transmissivitet, hydraulisk konduktivitet och grundvattennivå uttryckt i ekvivalent nivå sötvattenpelare (fresh-water head).



Borehole KAV04A – Summary of results.

Contents

1 Introduction

A general program for site investigations presenting survey methods has been prepared /SKB, 2001a/, as well as a site-specific program for the investigations in the Simpevarp area /SKB, 2001b/. The hydraulic injection tests form part of the site characterization program under item 1.1.5.8 in the work breakdown structure of the execution programme /SKB, 2002/.

Measurements were carried out according in borehole KAV04A during 23rd July to 14th August 2004 following the methodology described in SKB MD 323.001 and in the activity plan AP PS 400-04-063 (SKB internal controlling documents). Data and results were delivered to the SKB site characterization database SICADA.

The hydraulic testing programme has the aim to characterise the rock with respect to its hydraulic properties of the fractured zones and rock mass between them. This report describes the results and primary data evaluation of the hydraulic injection tests in borehole KAV04A. The data is subsequently delivered for the site descriptive modelling. The commission was conducted by Golder Associates AB and Golder Associates GmbH.

Borehole KAV04A is situated on the Ävrö Island in the south central part of the island, Figure 1-1. The borehole was drilled from 2003 to 2004 at 1,004 m depth with an inner diameter of 76 mm and an inclination of –84.905°. The upper 100.00 m is cased with large diameter telescopic casing ranging from diameter (outer diameter) 273 mm – 208 mm.

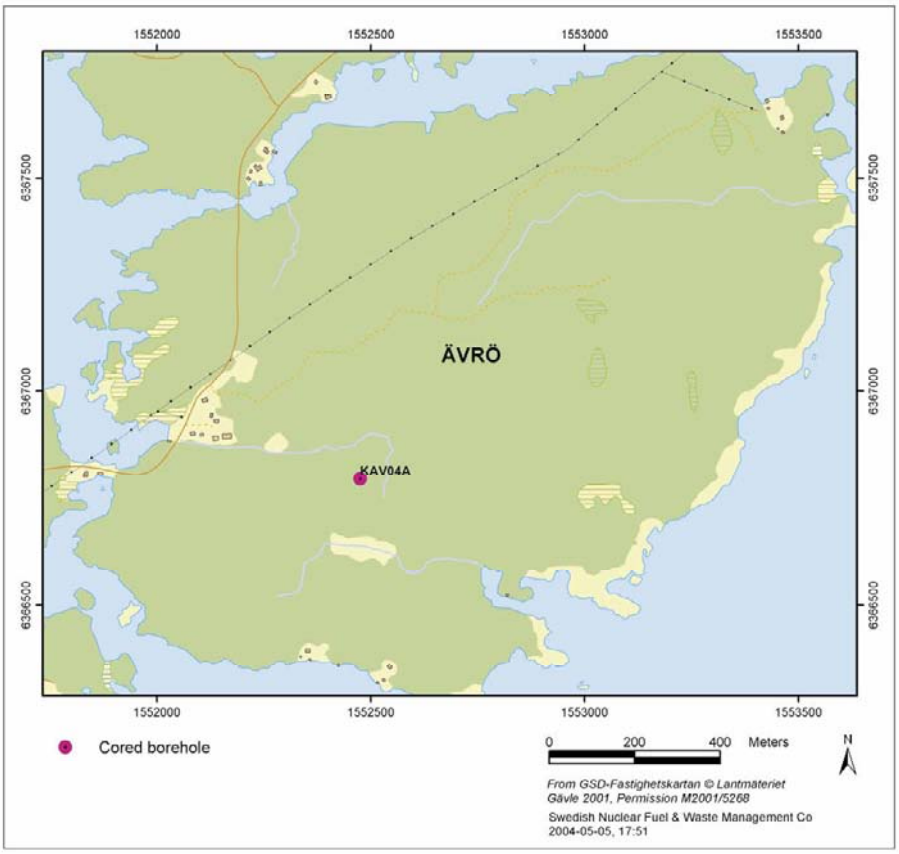


Figure 1-1. *The investigation area Simpevarp, Oskarshamn with location of borehole KAV04A.*

2 Objective

The objective of the hydrotests in borehole KAV04A is to describe the rock around the borehole with respect to hydraulic parameters, mainly transmissivity (T) and hydraulic conductivity (K). This is done at different measurement scales of 100 m and 20 m sections. Among these parameters transient evaluation during the flow and recovery period provides additional information such as flow regimes, hydraulic boundaries and cross-over flows.

A further subactivity was initially planned according to the activity plan with more detailed measurements at 5 m sections as well as chemistry investigations including pump tests and taking water samples. These subactivities were cancelled by SKB during running field activities and were not performed.

3 Scope of work

The scope of work consisted of preparation of the PSS2 tool which included cleaning of the down-hole tools, calibration and functional checks, injection tests of 100 m and 20 m test sections, analysis and reporting.

Preparation for testing was done according to the Quality plan. This step mainly consists of functions checks of the equipment to be used, the PSS2 tool. Calibration checks and function checks were documented in the daily log and/or relevant documents.

The following test programme was performed.

Table 3-1. Performed test programme at borehole KAV04A.

No of injection tests	Interval	Positions	Time/test	Total test time
9	100 m	105.17–998.20 m	125 min	18.8 hrs
42	20 m	105.17–903.35 m	90 min	63.0 hrs

Total: 81.8 hrs.

3.1 Boreholes

The borehole is telescope drilled with specifications on its construction according to Table 3-2. The reference point in the boreholes is the centre of top of casing (ToC), given as Elevation in table below. The Swedish National coordinate system (RT90) is used in the x-y direction and RHB70 in the z-direction. Northing and Easting refer to the top of the boreholes at the ground surface. The borehole diameter in Table 3-2 refers to the final diameter of the drill bit after drilling to full depth.

Table 3-2. Information about KAV04A (from SICADA 2004-06-22 16:01:36).

Title	Value				
Borehole length (m):	1,004.000				
Drilling Period(s):	From Date	To Date	Secup (m)	Seclow (m)	Drilling Type
	2003-10-06	2003-11-01	0.000	100.020	Percussion drilling
	2003-12-10	2004-05-03	99.550	1,004.000	Core drilling
Starting point coordinate:	Length (m)	Northing (m)	Easting (m)	Elevation (masl)	Coord Sys.
(centerpoint of TOC)	0.000	6366795.764	1552474.999	10.353	RT90-RHB70
Angles:	Length (m)	Bearing	Inclination (– = down)		
	0.000	77.032	–84.905		
Borehole diameter:	Secup (m)	Seclow (m)	Hole Diam (m)		
	0.000	12.670	0.349		
	12.670	100.200	0.245		
	99.550	100.950	0.086		
	100.950	1,004.000	0.076		
Core diameter:	Secup (m)	Seclow (m)	Core Diam (m)		
	99.550	100.950	0.072		
	100.950	1,004.00	0.050		
Casing diameter:	Secup (m)	Seclow(m)	Case In (m)	Case Out (m)	
	0.000	100.000	0.200	0.208	
	0.000	12.630	0.265	0.273	
Grove milling:	Length (m)	Trace detectable			
	110.000	YES			
	150.000	YES			
	200.000	YES			
	250.000	YES			
	300.000	YES			
	350.000	YES			
	400.000	YES			
	451.000	YES			
	500.000	YES			
	550.000	YES			
	600.000	YES			
	650.000	YES			
	700.000	YES			
	750.000	YES			
	800.000	YES			
	846.000	YES			
	900.000	YES			
	950.000	YES			

During this testing campaign, all markers could be detected with the positioner.

3.2 Tests

Injection tests were conducted according to the Activity Plan AP PS 400-04-063 and the method description for hydraulic injection tests, SKB MD 323.001 (SKB internal documents). Tests were done in 100 m test sections between 105.17–998.20 m below ToC and in 20 m test sections between 105.17–903.35 m below ToC. The initial criteria for performing injection tests in 20 m test sections was a measurable flow of Q > 0.001 L/min in relevant 100 m sections (see Figure 3-1). The measurements were performed with SKB's custom made equipment for hydraulic testing called PSS2.

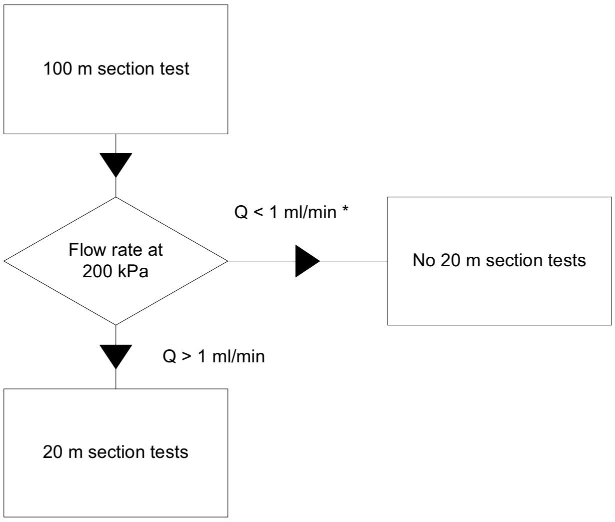


Figure 3-1. *Flow chart for test sections.*

Table 3-3. Tests performed.

Bh ID	Test section (m)	Test type[1]	Test no	Test start Date, time	Test stop Date, time
KAV04A	105.17–205.17	3	1	2004-07-26 10:34:13	2004-07-26 13:20:20
KAV04A	105.17–205.17	3	2	2004-07-26 17:12:01	2004-07-26 18:38:08
KAV04A	205.26–305.26	3	1	2004-07-27 16:55:14	2004-07-28 10:11:25
KAV04A	305.33–405.33	3	1	2004-07-28 11:41:03	2004-07-28 13:44:42
KAV04A	405.42–505.42	3	1	2004-07-28 14:57:34	2004-07-28 16:46:42
KAV04A	505.43–605.43	3	1	2004-07-29 10:58:23	2004-07-29 14:25:22
KAV04A	605.57–705.57	3	1	2004-07-29 17:56:06	2004-07-29 19:50:26
KAV04A	704.00–804.00	3	1	2004-07-30 13:58:32	2004-07-30 16:07:34
KAV04A	800.81–900.81	3	1	2004-07-30 19:06:02	2004-07-30 20:59:58
KAV04A	898.20–998.20	4	1	2004-07-31 10:53:43	2004-07-31 14:26:26
KAV04A	105.17–125.17	3	1	2004-08-02 18:44:03	2004-08-02 20:26:33
KAV04A	125.17–145.17	3	1	2004-08-03 09:57:38	2004-08-03 11:45:01
KAV04A	145.17–165.17	3	1	2004-08-03 12:33:04	2004-08-03 14:03:52
KAV04A	165.17–185.17	3	1	2004-08-03 15:49:03	2004-08-03 17:13:43
KAV04A	185.17–205.17	3	1	2004-08-03 17:57:45	2004-08-04 04:58:20

Bh ID	Test section (m)	Test type[1]	Test no	Test start Date, time	Test stop Date, time
KAV04A	205.26–225.26	4	1	2004-08-04 09:31:24	2004-08-04 11:49:37
KAV04A	225.26–245.26	3	1	2004-08-04 12:42:11	2004-08-04 14:07:41
KAV04A	245.26–265.26	3	1	2004-08-04 16:02:58	2004-08-05 04:50:58
KAV04A	245.26–265.26	3	2	2004-08-05 08:34:35	2004-08-05 10:10:08
KAV04A	265.26-285.26	3	1	2004-08-05 11:04:28	2004-08-05 12:34:38
KAV04A	285.26–305.26	3	1	2004-08-05 13:16:31	2004-08-05 16:01:44
KAV04A	305.33–325.33	4	1	2004-08-05 16:41:56	2004-08-05 18:41:04
KAV04A	325.33–345.33	5	1	2004-08-05 19:28:22	2004-08-06 06:54:51
KAV04A	345.33–365.33	3	1	2004-08-06 09:20:17	2004-08-06 10:49:50
KAV04A	365.33–385.33	3	1	2004-08-06 11:37:17	2004-08-06 13:11:38
KAV04A	385.33–405.33	3	1	2004-08-06 13:56:11	2004-08-06 15:22:33
KAV04A	405.42–425.42	3	1	2004-08-06 16:48:31	2004-08-06 18:16:13
KAV04A	425.02v445.02	4	1	2004-08-07 10:06:22	2004-08-07 11:42:02
KAV04A	445.02–465.02	4	1	2004-08-07 12:16:39	2004-08-07 13:50:13
KAV04A	465.02–485.02	3	1	2004-08-07 14:33:20	2004-08-07 16:08:02
KAV04A	485.43–505.43	3	1	2004-08-07 19:16:28	2004-08-07 21:22:28
KAV04A	505.43–525.43	3	1	2004-08-08 09:08:39	2004-08-08 10:47:16
KAV04A	525.43–545.43	3	1	2004-08-08 11:29:36	2004-08-08 13:10:27
KAV04A	545.43–565.43	3	1	2004-08-08 14:04:38	2004-08-08 15:36:06
KAV04A	565.43–585.43	3	1	2004-08-08 17:16:25	2004-08-08 18:40:33
KAV04A	585.43–605.43	3	1	2004-08-09 09:15:40	2004-08-09 10:45:20
KAV04A	605.57–625.57	3	1	2004-08-09 11:32:09	2004-08-09 13:01:06
KAV04A	625.57–645.57	3	1	2004-08-09 13:48:32	2004-08-09 15:19:58
KAV04A	645.57–665.57	3	1	2004-08-09 16:46:32	2004-08-09 18:59:00
KAV04A	665.57–685.57	3	1	2004-08-10 09:01:11	2004-08-10 10:26:28
KAV04A	685.57–705.57	3	1	2004-08-10 11:04:13	2004-08-10 12:36:05

Bh ID	Test section (m)	Test type[1]	Test no	Test start Date, time	Test stop Date, time
KAV04A	698.07–718.07	3	1	2004-08-10 13:15:49	2004-08-10 14:46:30
KAV04A	711.07–731.07	3	1	2004-08-10 15:46:03	2004-08-10 17:10:34
KAV04A	731.07–751.07	3	1	2004-08-11 09:54:38	2004-08-11 11:37:36
KAV04A	751.07–771.07	3	1	2004-08-11 12:24:47	2004-08-11 13:49:47
KAV04A	771.07–791.07	3	1	2004-08-11 15:01:08	2004-08-11 16:52:32
KAV04A	791.07–811.07	3	1	2004-08-11 17:54:32	2004-08-11 19:36:59
KAV04A	800.81–820.81	3	1	2004-08-12 09:04:44	2004-08-12 10:34:20
KAV04A	820.81–840.81	3	1	2004-08-12 11:29:55	2004-08-12 12:56:47
KAV04A	837.11–857.11	3	1	2004-08-12 13:51:25	2004-08-12 15:18:15
KAV04A	857.11–877.11	3	1	2004-08-12 16:33:58	2004-08-12 18:18:45
KAV04A	862.35–882.35	3	1	2004-08-13 09:03:28	2004-08-13 10:32:18
KAV04A	883.35–903.35	3	1	2004-08-13 11:27:27	2004-08-13 13:19:12

1: 3: Injection test; 4: Pulse injection test; 5: Slug injection.

No other additional measurements except the actual hydraulic tests and related measurements of packer position and water level in annulus of borehole KAV04A were conducted.

3.3 Control of equipment

Control of equipment was mainly performed according to the Quality plan. The basis for equipment handling is described in the “Mätssystembeskrivning” SKB MD 345.101–123 which is composed of two parts 1) management description, 2) drawings and technical documents of the modified PSS2 tool.

Function checks were performed before and during the tests. Among these pressure sensors were checked at ground level and while running in the hole calculated to the static head. Temperature was checked at ground level and while running in. Leakage checks at joints in the pipe string were done at least every 100 m of running in.

Any malfunction was recorded, and measures were taken accordingly for proper operation. Approval was made according to SKB site manager, or Quality plan and the “Mätssystembeskrivning”.

4 Equipment

4.1 Description of equipment

The equipment called PSS2 (Pipe String System 2) is a highly integrated tool for testing boreholes at great depth (see conceptual drawing in the next figure). The system is built inside a container suitable for testing at any weather. Briefly, the components consists of a hydraulic rig, down-hole equipment including packers, pressure gauges, shut-in tool and level indicator, racks for pump, gauge carriers, breakpins, etc shelfs and drawers for tools and spare parts.

There are three spools for a multi-signal cable, a test valve hose and a packer inflation hose. There is a water tank for injection purposes, pressure vessels for injection of packers, to open test valve and for low flow injection. The PSS2 has been upgraded with a computerized flow regulation system. The office part of the container consists of a computer, regulation valves for the nitrogen system, a 24 V back-up system in case of power shut-offs and a flow regulation board.

PSS2 is documented in photographs 1–6.

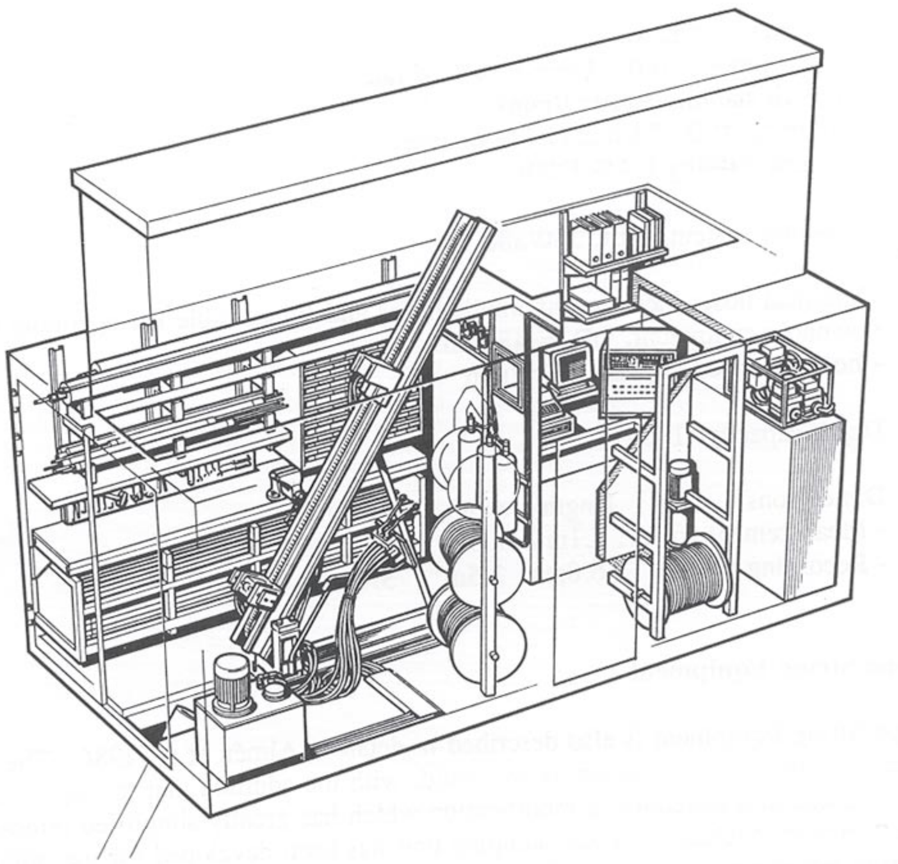


Figure 4-1. *A view of the layout and equipment of PSS2.*

Photo 1: *Hydraulic rig.*

Photo 2: *Rack for pump, down-hole equipment, workbench and drawers for tools.*

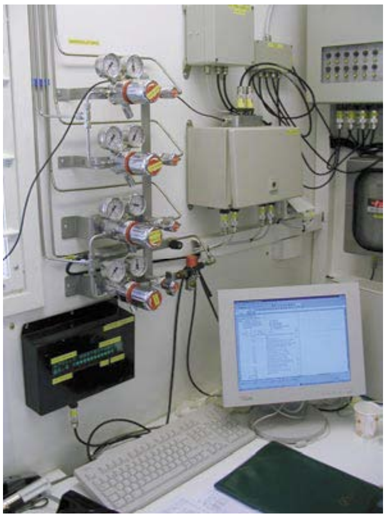


Photo 3: *Computer room, displays and gas regulators.*

Photo 4: *Pressure vessels for test valve, packers and injection.*

Photo 5: *Positioner, bottom end of down-in-hole string.*

Photo 6: *Packer and gauge carrier.*

The down-hole equipment consists from bottom to top of the following equipment:

- Level indicator – SS 630 mm pipe with OD 73 mm with 3 plastic wheels connected to a Hallswitch.
- Gauge carrier – SS 1.5 m carrying bottom section pressure transducer and connections from positioner.
- Lower packer – SS and PUR 1.5 m with OD 72 mm, stiff ends, tightening length 1.0 m, maximum pressure 6.5 MPa, working pressure 1.6 MPa.
- Gauge carrier with breakpin – SS 1.75 m carrying test section pressure transducer, temperature sensor and connections for sensors below. Breakpin with maximum load of 47.3 (± 1.0) kN. The gauge carrier is covered by split pipes and connected to a stone catcher on the top.
- Pop joint – SS 1.0 or 0.5 m with OD 33 mm and ID 21 mm, double O-ring fittings, trapezoid thread, friction loss of 3 kPa/m at 50 L/min.
- Pipe string – SS 3.0 m with OD 33 mm and ID 21 mm, double O-ring fittings, trapezoid thread, friction loss of 3 kPa/m at 50 L/min.
- Contact carrier – SS 1.0 m carrying connections for sensors below.
- Upper packer – SS and PUR 1.5 m with OD 72 mm, fixed ends, seal length 1.0 m, maximum pressure 6.5 MPa, working pressure 1.6 MPa.
- Breakpin – SS 250 mm with OD 33.7 mm. Maximum load of 47.3 (± 1.0) kN.
- Gauge carrier – SS 1.5 m carrying top section pressure transducer, connections from sensors below. Flow pipe is double bent at both ends to give room for sensor equipment. The pipe gauge carrier is covered by split pipes.
- Shut-in tool (test valve) – SS 1.0 m with a OD of 48 mm, Teflon coated valve piston, friction loss of 11 kPa at 10 L/min (260 kPa–50 L/min). Working pressure 2.8–4.0 MPa. Breakpipe with maximum load of 47.3 (± 1.0) kN. The shut-in tool is covered by split pipes and connected to a stone catcher on the top.

The tool scheme is presented in Figure 4-2.

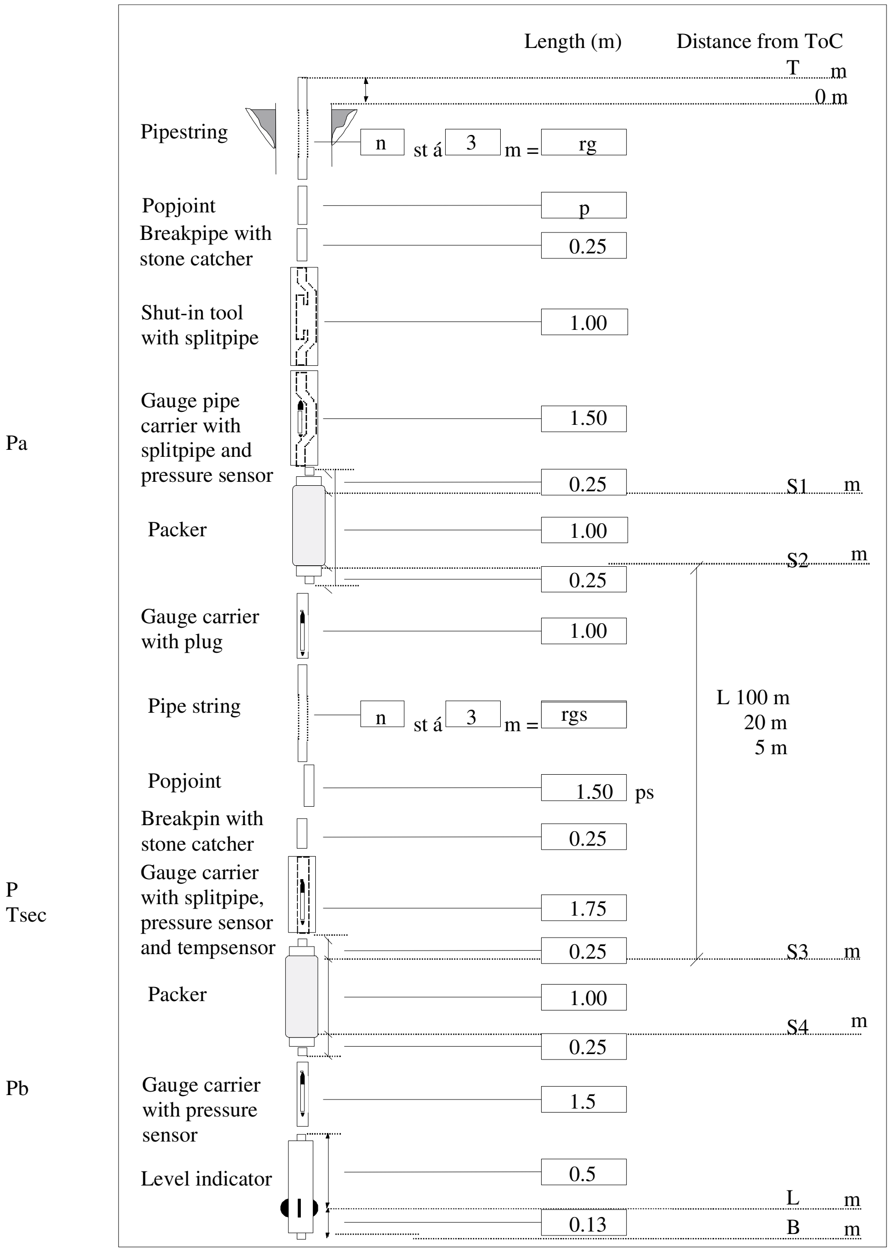


Figure 4-2. *Schematic drawing of the down-hole equipment in the PSS2 system.*

4.2 Sensors

Table 4-1. Technical specifications of sensors.

Keyword	Sensor	Name	Unit	Value/range	Comments
$p_{sec,a,b}$	Pressure	Druck PTX 162-1464abs	9–30 4–20 0–13.5 Resolution Accuracy	VDC mA MPa % of FS	
$T_{sec,surf,air}$	Temperature	BGI	18–24 4–20 0–32 0.1	VDC mA °C °C	
Q_{big}	Flow	Micro motion Elite sensor	0–100 ± 0.1	kg/min %	Massflow
Q_{small}	Flow	Micro motion Elite sensor	0–1.8 ± 0.1	kg/min %	Massflow
p_{air}	Pressure	Druck PTX 630	9–30 4–20 0–120 ± 0.1	VDC mA KPa % of FS	
p_{pack}	Pressure	Druck PTX 630	9–30 4–20 0–4 ± 0.1	VDC mA MPa % of FS	
$p_{in,out}$	Pressure	Druck PTX 1400	9–28 4–20 0–2.5	VDC mA MPa	
L	Level indicator				Length correction

Table 4-2. Sensor positions and wellbore storage (WBS) controlling factors for 100 m and 20 m sections.

Borehole information			Sensors		Equipment affecting WBS coefficient		
ID	Test section (m)	Test no	Type	Position (m fr ToC)	Position	Function	Outer diameter (mm)
KAV04A	105.17–205.17	1	p_a p T p_b L	102.67 203.17 203.42 207.17 208.42	Test section	Signal cable Pump string Packer line	9.1 33 6
KAV04A	105.17–125.17	11	p_a p T p_b L	102.67 123.17 123.42 127.17 128.42	Test section	Signal cable Pump string Packer line	9.1 33 6

4.3 Data acquisition system

The data acquisition system in the PSS2 container contains a stationary PC with the software Orchestrator, pump- and injection tests parameters such as pressure, temperature and flow are monitored and sensor data collected. A second laptop PC is connected to the stationary PC through a network containing evaluation software, Flowdim. While testing, data from previously tested section is converted with IPPlot and entered in Flowdim for evaluation.

The data acquisition system starts and stops the test automatically or can be disengaged for manual operation of magnetic and regulation valves within the injection/pumping system. The flow regulation board is used for differential pressure and valve settings prior testing and for monitoring valves during actual test. An outline of the data acquisition system is outlined in Figure 4-3.

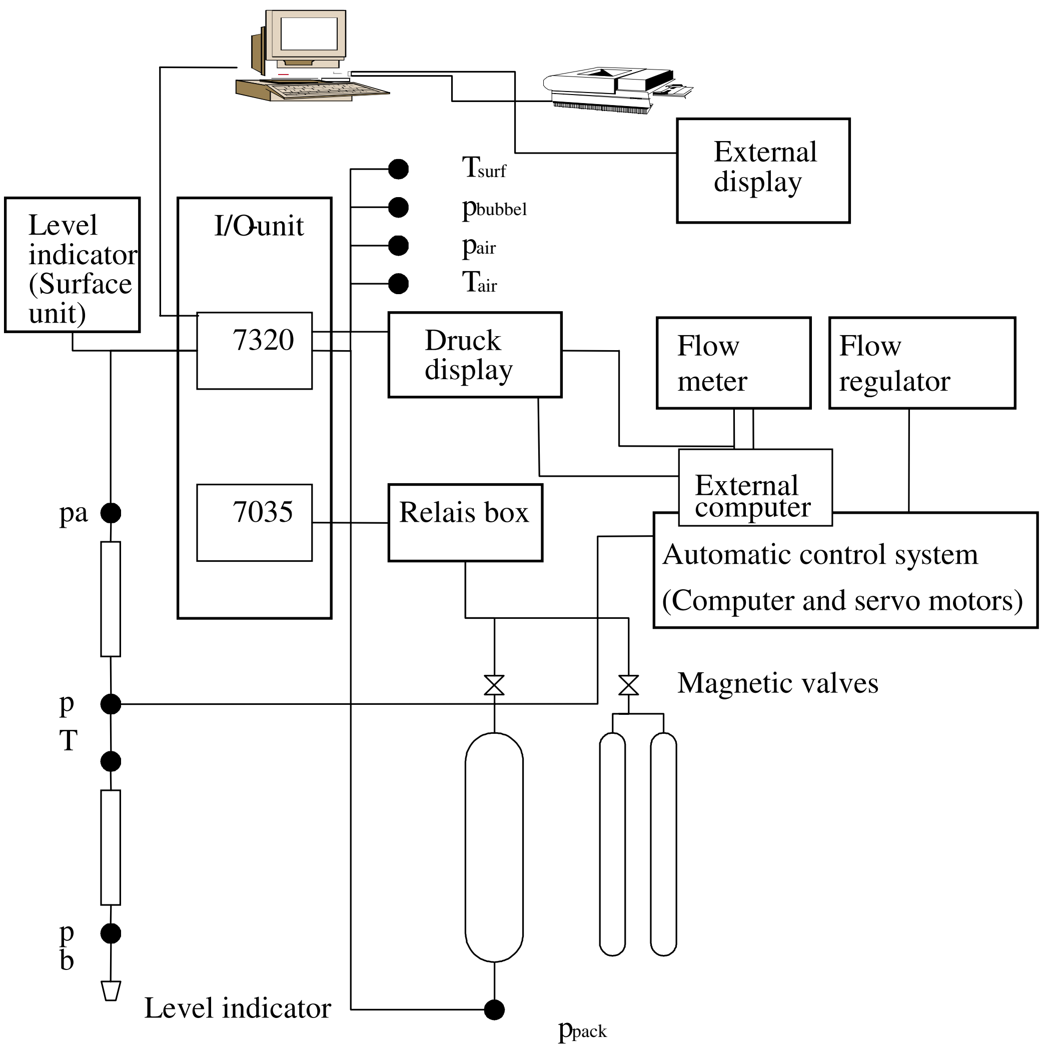


Figure 4-3. *Schematic drawing of the data acquisition system and the flow regulation control system in PSS2.*

5 Execution

5.1 Preparations

Following preparation work and functional checks were conducted prior to starting test activities:

- Place pallets and container, lifting rig up, installing fence on top of container, lifting tent on container.
- Clean and desinfect of Multikabel and hoses for packer and test valve. Clean the tubings with hot steam.
- Filling injection tank with water out of the borehole.
- Filling buffer tank with water.
- Filing vessels.
- Filling the hoses for test valve and packer.
- Entering calibration constants to system and regulation unit.
- Synchronize clocks on all computers.
- Function check of shut-in tool both ends, overpressure by 900 kPa for 5 min (OK).
- Check pressure gauges against atmospheric pressure and than on test depth against column of water.
- Translate all protocols into English (where necessary).
- Filling packers with water and de-air.
- Measure and assemble test tool.

5.2 Length correction

By running in with the test tool, a level indicator is incorporated at the bottom of the tool. The level indicator is able to record groves milled into the borehole wall. The depths of this groves are given by SKB in the activity plan (see Table 3-2) and the measured depth is counter checked against the number/length of the tubes build in. The achieved correction value is used to adjust the location of the packers for the testsections to avoid wrong placements and minimize elongation effects of the test string.

5.3 Execution of tests/measurements

5.3.1 Test principle

The tests were conducted as constant pressure injection (CHi phase) followed by a shut-in pressure recovery (CHir phase). In some cases, when the test section transmissivity was too low (typically lower than 1E–9 m^2/s) no measurable flow could be registered during the CHi phase ($Q < 1$ mL/min). In such cases, Puls or Slug tests were conducted as active tests (Figure 5-1).

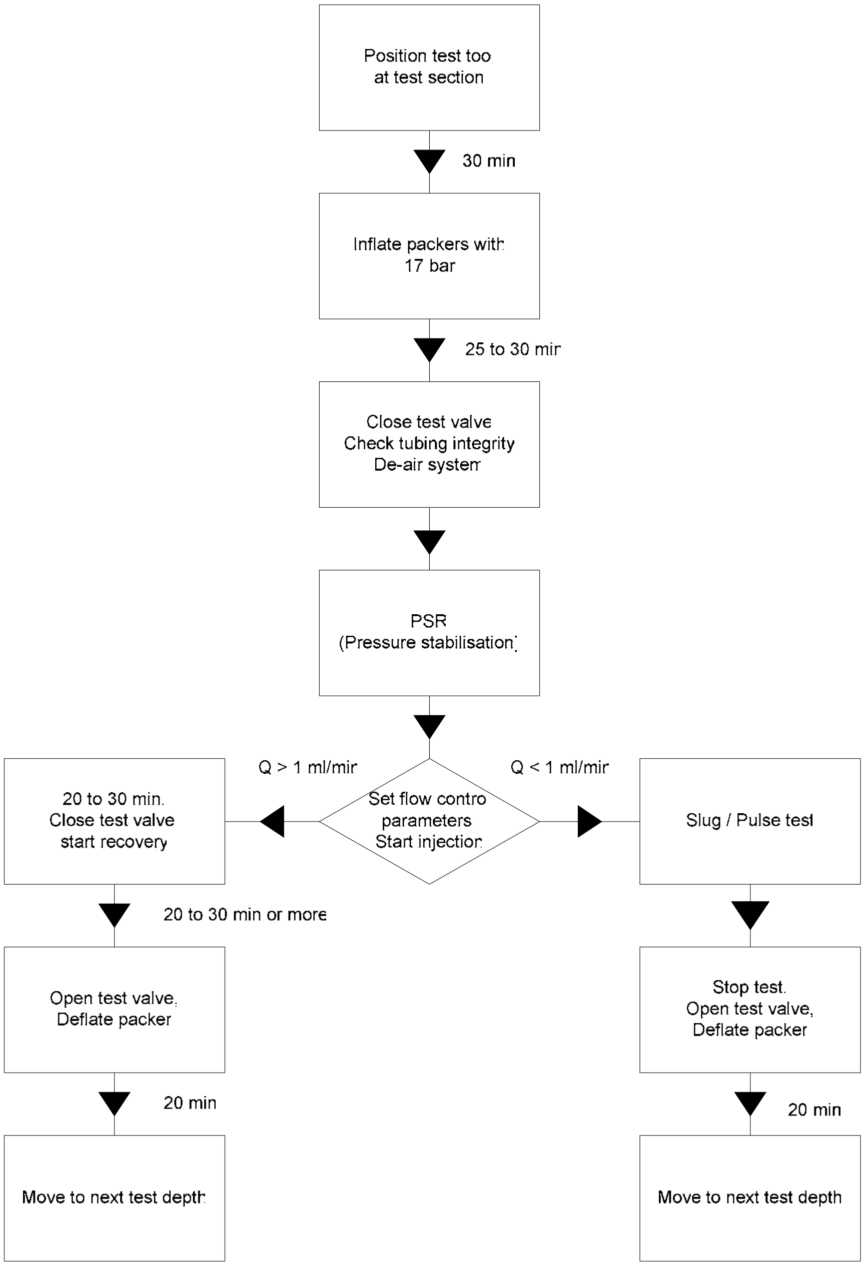


Figure 5-1. *Flow chart for test performance.*

5.3.2 Test procedure

A test cycle includes the following phases: 1) Transfer of down-hole equipment to the next section. 2) Packer inflation. 3) Pressure stabilisation. 4) Constant head injection. 5) Pressure recovery. 6) Packer deflation. The injection tests in KAV04A has been carried out by applying a constant injection pressure of ca. 200 kPa (20 m water column) above the static formation pressure in the test section. Before start of the injection tests, approximately stable pressure conditions prevailed in the test section. After the injection period, the pressure recovery in the section was measured. In some cases, if small flow rates were expected, the automatic regulation unit was switched off and the test was performed manually. In other cases, where small flow rates (Q < 1 mL/min) were observed, the test procedure was switched to pulse test performance. For the performance of a pulse test, the shut-in tool has been closed immediately after starting the injection. For the performance of a slug test, a pressure difference against the formation pressure was created and the shut-in tool is kept open during recovery from the initial pressure change.

The duration for each phase is presented in Table 5-1.

In some cases injection and recovery phases were prolonged. This was due to testing zones of high interest for example high flow zones or low flow zones.

Table 5-1. Durations for packer inflation, pressure stabilisation, injection and recovery phase and packer deflation in KSH01A.

• Position test tool to new test section (correct position using the borehole markers)	Approx 30 min
• Inflate packers with 2,000 kPa	25 min
• Close test valve	10 min
• Check tubing integrity with 900 kPa	5 min
• De-air system	2 min
• Set automatic flow control parameters	5 min
• Start injection	20 to 45 min *
• Close test valve, start recovery	20 min or more
• Open test valve	10 min
• Deflate packers	25 min
• Move to next test depth	…

* In case of a Pulse Injection the injection time is shorter than 1 min.

5.4 Data handling

The data handling followed several stages. The data acquisition software (Orchestrator) produced an ASCII raw data file (*.ht2) which contains the data in voltage and milliampere format plus calibration coefficients. The *.ht2 files were processed to *.dat files using the SKB program called IPPlot. These files contain the time, pressure, flow rate and temperature data. The *.dat files were synthesised in Excel to a *.xls file for plotting purposes. Finally, the test data to be delivered to SKB were exported from Excel in *.csv format. These files were also used for the subsequent test analysis.

5.5 Analyses and interpretation

5.5.1 Analysis software

The tests were analysed using a type curve matching method. The analysis was performed using Golder's test analysis program FlowDim. FlowDim is an interactive analysis environment allowing the user to interpret constant pressure, constant rate and slug/pulse tests in source as well as observation boreholes. The program allows the calculation of type-curves for homogeneous, dual porosity and composite flow models in variable flow geometries from linear to spherical.

5.5.2 Analysis approach

Constant pressure tests are analysed using a rate inverse approach. The method initially known as the /Jacob and Lohman, 1952/ method was further improved for the use of type curve derivatives and for different flow models.

Constant pressure recovery tests are analysed using the method described by /Gringarten, 1986/ and /Bourdet et al. 1989/ by using type curve derivatives calculated for different flow models.

Pulse tests are analysed both by using the pressure deconvolution method described by /Peres et al. 1989/ with improvements introduced by /Chakrabarty and Enachescu, 1997/.

5.5.3 Analysis methodology

Each of the relevant test phases is subsequently analyzed using the following steps:

- **Injection Tests**

- Identification of the flow model by evaluation of the derivative on the log-log diagnostic plot. Initial estimates of the model parameters are obtained by conventional straight-line analysis.
- Superposition type curve matching in log-log coordinates. A non-linear regression algorithm is used to provide optimized model parameters in the latter stages.
- Non-linear regression in semi-log coordinates (superposition HORNER plot /Horner, 1951/). In this stage of the analysis, the static formation pressure is selected for regression.

The test analysis methodology is best explained in /Horne, 1990/.

- **Pulse Injection Tests**

A test is always initiated as a constant pressure injection. However, if after a few seconds of injection the rate quickly drops to zero, this indicates a very tight section. It is then decided to close the test valve and measure the pressure recovery. The pressure recovery is analysed as a pulse injection phase (PI).

During the brief injection phase a small volume is injected (derived from the flowmeter measurements). This injected volume produces the pressure increase of dp. Using a dV/dp approach, the wellbore storage coefficient relevant for the subsequent pressure recovery can be calculated. It should be noted though that there is large uncertainty connected with the determination of the wellbore storage coefficient (probably one order of magnitude), which will implicitly translate into uncertainty in the derived transmissivity. Figure 5-2 below show an example of a typical pressure versus time evolution for such a tight section.

- Calculation of initial estimates of the model parameters by using the Ramey Plot /Ramey et al. 1975/. This is plot is typically not presented in the appendix.
- Flow model identification and type curve analysis in the deconvolution Peres Plot /Peres et al. 1989; Chakrabarty and Enachescu, 1997/. A non-linear regression algorithm is used to provide optimized model parameters in the latter stages. An Example of the type curves is presented in Figure 5-3.

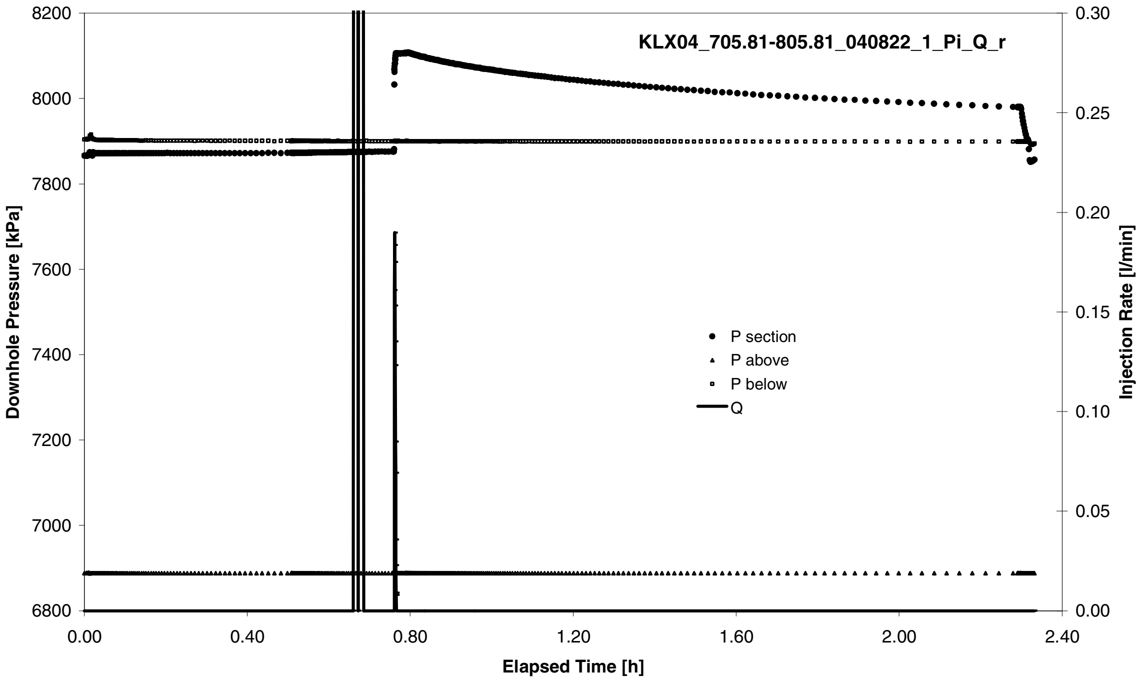


Figure 5-2. *Typical pressure versus time plot of a Pulse injection test.*

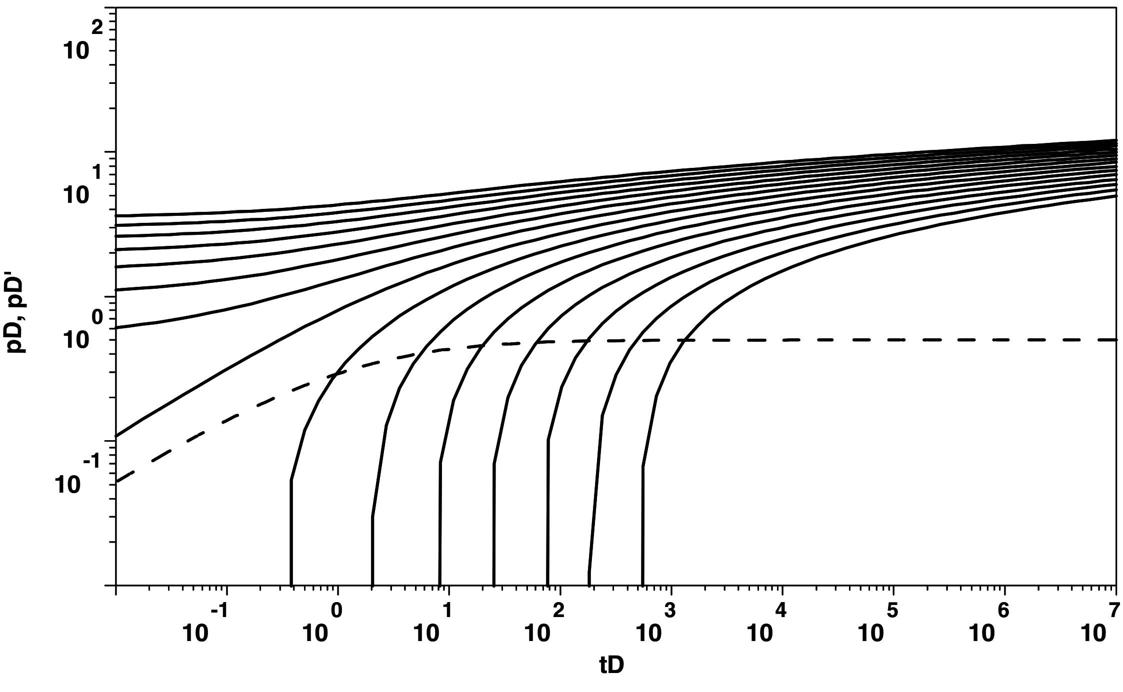


Figure 5-3. *Deconvolution type curve set for pulse test analysis.*

5.5.4 Steady state analysis

In addition to the type curve analysis, an interpretation based on the assumption of stationary conditions was performed as described by /Moye, 1967/.

5.5.5 Flow models used for analysis

The flow models used in analysis were derived from the shape of the pressure derivative calculated with respect to log time and plotted in log-log coordinates.

In several cases the pressure derivative suggests a change of transmissivity with the distance from the borehole. In such cases a composite flow model was used in the analysis.

If there were different flow models matching the data in comparable quality, the simplest model was preferred.

The flow dimension displayed by the test can be diagnosed from the slope of the pressure derivative. A slope of 0.5 indicates linear flow, a slope of 0 (horizontal derivative) indicates radial flow and a slope of –0.5 indicates spherical flow. The flow dimension diagnosis was commented for each of the tests. At tests where a flow regime could not clearly identified from the test data, we assume in general a radial flow regime as most likely (according to the experience from previous tests in this region) for this test section as the recommended flow model. The value of p* was then calculated according to this assumption.

In cases when the infinite acting radial flow (IARF) phase was not supported by the data the derivative was extrapolated using the most conservative assumption, which is that the derivative would stabilise short time after test end. In such cases the additional uncertainty was accounted for in the estimation of the transmissivity confidence ranges.

5.5.6 Calculation of the static formation pressure and equivalent freshwater head

The static pressure measured at transducer depth, was derived from the pressure recovery (CHir) following the constant pressure injection phase by using straight line or type curve extrapolation in the Horner plot.

The equivalent freshwater head (expressed in meters above sea level) was calculated from the static formation pressure, corrected for athmospheric pressure measured by the surface gauge and corrected for the vertical depth considering the inclination of the drillhole, by assuming a water density of 1,000 kg/m^3 (freshwater). The equivalent freshwater head is the static water level an individual test interval would show if isolated and connected to the surface by tubing full of freshwater. Figure 5-4 shows the methodology schematically.

The freshwater head in meters above sea level is calculated as following:

$$head = \frac{(p^* - p_{atm})}{\rho \cdot g}$$

which is the p* value expressed in a water column of freshwater.

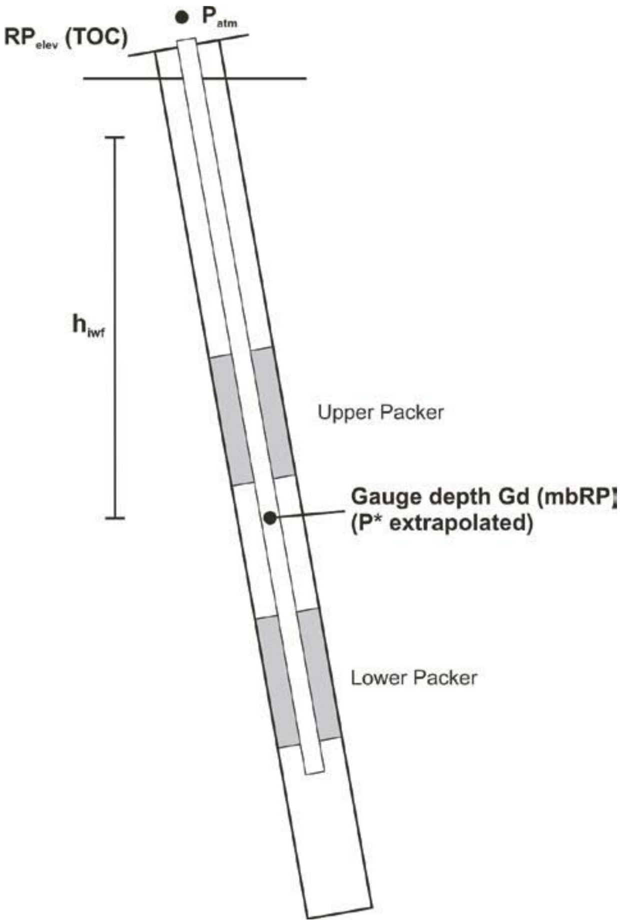


Figure 5-4. *Schematic methodologies for calculation of the freshwater head.*

With consideration of the elevation of the reference point (RP) and the gauge depth (Gd), the freshwater head h_{iwf} is:

$$h_{iwf} = RP_{elev} - Gd + \frac{(p^* - p_{atm})}{\rho \cdot g}$$

5.5.7 Derivation of the recommended transmissivity and the confidence range

In most of the cases more than one analysis was conducted on a specific test. Typically both test phases were analysed (CHi and CHir) and in some cases the CHi or the CHir phase was analysed using two different flow models. The parameter sets (i.e. transmissivities) derived from the individual analyses of a specific test usually differ. In the case when the differences are small (which is typically the case) the recommended transmissivity value is chosen from the test phase that shows the best data and derivative quality.

In cases when the difference in results of the individual analyses was large (more than half order of magnitude) the test phases were compared and the phase showing the best derivative quality was selected.

The confidence range of the transmissivity was derived using expert judgement. Factors considered were the range of transmissivities derived from the individual analyses of the test as well as additional sources of uncertainty such as noise in the flow rate measurement, numeric effects in the calculation of the derivative or possible errors in the measurement of the wellbore storage coefficient. No statistical calculations were performed to derive the confidence range of transmissivity.

In cases when changing transmassivity with distance from the borehole (composite model) was diagnosted, the inner zone transmassivity (in borehole vicinity) was recommended. This is consistence with SKB's standards.

In cases when the infinite acting radial flow (IARF) phase was not supported by the data the additional uncertainty was accounted for in the estimation of the transmissivity confidence ranges.

6 Results

In the following, results of all tests are presented and analysed. Chapter 6.1 presents the 100 m tests and 6.2 the 20 m tests. The results are given as general comments to test performance, the identified flow regimes and calculated parameters and finally the parameters which are considered as most representative are chosen and justification is given. All results are also summarised in Table 7-1 and 7-2 of the Synthesis chapter.

6.1 100 m single-hole injection tests

In the following, the 100 m section tests conducted in borehole KAV04A are presented and analysed.

6.1.1 Section 105.17–205.17 m, test no 2, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 198 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The injection rate control during the CHi phase was good. The injection rate decreased from 1.4 L/min at start of the CHi phase to 0.96 L/min at the end, indicating a relatively high interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

The test was repeated due to problems encountered when translating the data with IPPLOT. Both tests are presented in the Appendix 2-1, however, only the analysis of the second test is shown in the appendix.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test both phases show a flat derivative at late times which is indicative of a flow dimension of 2 (radial flow). The upward trend of the derivative of the CHi phase at late times is attributed to noise in the flow rate. Based on the normalized derivative plot an infinite acting radial composite flow model was chosen for the analysis. The analysis plots and results are presented in Appendix 2-1.

Selected representative parameters

The recommended transmissivity of 1.7E–6 m^2/s was derived from the analysis of the CHi phase (outer zone), which shows the best data and derivative quality. The confidence range for the interval transmissivity is estimated to be 5.0E–7 to 5.0E–6 m^2/s (which includes the values derived for the inner composite zone). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 2,047.2 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.1.2 Section 205.26–305.26 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 198 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. After three initial trials, the injection rate control during the CHi phase was good. The injection rate decreased from 37 L/min at start of the CHi phase to 12 L/min at the end, indicating a high interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test both phases show a flat derivative at late times which is indicative of a flow dimension of 2 (radial flow). Due to the poor data quality at early times, The CHi phase was analysed using an infinite acting homogeneous flow model, which matches the late time data only. The CHir phase was analysed using a composite flow model with decreasing transmissivity away from the borehole. The choice of the model is dictated by the log-log derivative plot of the CHir phase (Appendix 2-2). This is consistent with the negative skin derived from the CHi phase. The analysis plots and results are presented in Appendix 2-2.

Selected representative parameters

The recommended transmissivity of 5.7E–6 m^2/s was derived from the analysis of the CHir phase (outer zone), which shows the best data and derivative quality. The confidence range for the interval transmissivity is estimated to be 5.0E–6 to 2.0E–5 m^2/s (which includes the values derived for the inner composite zone). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 3,025.3 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.1.3 Section 305.33–405.33 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 199 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The injection rate control during the CHi phase was good. The injection rate decreased from approx 2 L/min at start of the CHi phase to 1.1 L/min at the end, indicating a relatively high interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test both phases show a flat derivative at late times which is indicative of a flow dimension of 2 (radial flow). The CHi phase was analysed using a composite flow model with increasing transmissivity away from the borehole. This is consistent with the positive skin derived from the analysis of the CHir phase (homogeneous model. The choice of the model was based on the log-log derivative plots (Appendix 2-3). The analysis plots and results are presented in Appendix 2-3.

Selected representative parameters

The recommended transmissivity of 6.1E–6 m^2/s was derived from the analysis of the CHir phase, which is consistent with the outer zone derived from the analysis of the CHi phase and shows the best data and derivative quality. The confidence range for the interval transmissivity is estimated to be 7.0E–7 to 7.0E–6 m^2/s (which includes the values derived for the inner composite zone). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 3,998.8 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.1.4 Section 405.42–505.42 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 199 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The injection rate control during the CHi phase was good. The injection rate decreased from approx 6 L/min at start of the CHi phase to 4.5 L/min at the end, indicating a relatively high interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test both phases show a flat derivative at late times which is indicative of a flow dimension of 2 (radial flow). Both phases were analysed using a composite flow model with increasing transmissivity away from the borehole. The choice of the model was based on the log-log derivative plots (Appendix 2-4). The analysis plots and results are presented in Appendix 2-4.

Selected representative parameters

The recommended transmissivity of 9.1E–6 m^2/s was derived from the analysis of the CHi phase (outer zone), which is consistent with the outer zone derived from the analysis of the CHir phase and shows the best data and derivative quality. The confidence range for the interval transmissivity is estimated to be 3.0E–6 to 2.0E–5 m^2/s (which includes the values derived for the inner composite zone). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 4,975.5 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.1.5 Section 505.43–605.43 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 191 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The injection rate control during the CHi phase was good. The injection rate decreased from approx 2.5 L/min at start of the CHi phase to 2.3 L/min at the end, indicating a relatively high interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test both phases show a flat derivative at late times which is indicative of a flow dimension of 2 (radial flow). However, in the case of the present test, the noise in the rate data on the one side, and the fast pressure recovery during the CHir phase on the other side introduce considerable uncertainty concerning the flow model identification. The CHi phase was analysed using a radial composite flow model with increasing transmissivity away from the borehole, which is consistent with the high negative skin derived from the analysis of the CHir phase (homogeneous flow model). The analysis plots and results are presented in Appendix 2-5.

Selected representative parameters

The recommended transmissivity of 7.4E–6 m^2/s was derived from the analysis of the CHir phase, which is consistent with the outer zone derived from the analysis of the CHi phase and shows the best data and derivative quality. The confidence range for the interval transmissivity is estimated to be 1.0E–6 to 8.0E–6 m^2/s (which includes the values derived for the inner composite zone). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 5,964.5 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.1.6 Section 605.57–705.57 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 200 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The injection rate control during the CHi phase was good. The injection rate decreased from approx 5 L/min at start of the CHi phase to 2.25 L/min at the end, indicating a relatively high interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test both phases show a flat derivative at late times which is indicative of a flow dimension of 2 (radial flow). Both phases were analysed using a radial infinite acting homogeneous flow model. The analysis plots and results are presented in Appendix 2-6.

Selected representative parameters

The recommended transmissivity of 3.7E–6 m^2/s was derived from the analysis of the CHir phase, which is consistent with value derived from the CHi phase and shows the best data and derivative quality. The confidence range for the interval transmissivity is estimated to be 8.0E–7 to 5.0E–6 m^2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 6,959.3 kPa.

The analysis of the CHi and CHir phases shows good consistency with exception of discrepancies in the skin values derived from the CHi (negative) and CHir (positive) phases. No further analysis is recommended.

6.1.7 Section 704.00–804.00 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 199 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The injection rate control during the CHi phase was good after initial oscillations induced by the control unit. The injection rate decreased from approx 35 L/min at start of the CHi phase to 17.7 L/min at the end, indicating a high interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test the CHi phase shows a flat derivative at late times which is indicative of a flow dimension of 2 (radial flow). The derivative of the CHir phase is not conclusive due to the very small pressure changes at late times associated with the fast recovery. The CHi phase was analysed using a radial homogeneous flow model. The CHir phase was analysed using a radial composite flow model. The discrepancy between the behaviour of the two phases is unclear. It seems that a high skin (modelled as composite zone) occurs during the CHir phase, this phenomenon not being observed during the CHi phase. The analysis plots and results are presented in Appendix 2-7.

Selected representative parameters

The recommended transmissivity of 2.1E–5 m^2/s was derived from the analysis of the CHi phase, which shows a clear flat derivative at late times. The confidence range for the interval transmissivity is estimated to be 1.0E–5 to 7.0E–5 m^2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 7,936.9 kPa.

The analysis of the CHi and CHir phases shows some discrepancy in the late time behaviour of the two test phases, mainly caused by the fast recovery of the CHir phase, which adds ambiguity to the data set. No further analysis is recommended.

6.1.8 Section 800.81–900.81 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 198 kPa, followed by a pressure recovery phase. A hydraulic connection between test interval and the bottom hole zone was observed. In addition, the bottom zone reacted with a pressure squeeze when inflating the packer, indicating very low transmissivity of the section below the test section. The transducer measuring the pressure abobe the test section stopped functioning after approx 0.8 h test time. The injection rate control during the CHi phase was good. The injection rate decreased from approx 10 L/min at start of the CHi phase to 5.3 L/min at the end, indicating a high interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test both phases show a flat derivative at late times, which is indicative of a flow dimension of 2 (radial flow). The derivative of the CHir phase is less conclusive due to the very small pressure changes at late times associated with the fast recovery. The CHi phase was analysed using a radial composite flow model. The CHir phase was analysed using a radial homogeneous flow model. The two analyses show consistent results. The analysis plots and results are presented in Appendix 2-8.

Selected representative parameters

The recommended transmissivity of 9.9E–6 m^2/s was derived from the analysis of the CHi phase, which shows a clear flat derivative at late times. The confidence range for the interval transmissivity is estimated to be 3.0E–6 to 2.0E–5 m^2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8,904.9 kPa.

The analysis of the CHi and CHir phases shows good consistency between the two test phases. No further analysis is recommended.

6.1.9 Section 898.20–998.20 m, test no 1, pulse injection

Comments to test

The test was composed of a pulse injection phase (PI) followed by constant pressure injection test phase and a pressure recovery phase. Both injection phases (PI and CHi) were conducted with a pressure difference of 295 kPa. A hydraulic connection between test interval and the bottom hole zone was observed. In addition, the bottom zone reacted with a pressure squeeze when inflating the packer, indicating very low transmissivity of the section below the test section. The transducer measuring the pressure above the test section did not function during the test. The injection rate during the CHi phase dropped below measurement limit (< 1 mL/min). Therefore, both the CHi and CHir phases are not quantitatively analysable. The PI phase was analysed using a wellbore storage coefficient calculated from the volume of water needed to elevate the pressure in the interval by 295 kPa (0.098 L).

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test the deconvolved PI pressure derivative shows a continuing upward trend, which can be attributed to the fact that the dimensionless test time is too small and the semi-logarithmic asymptotic solution was not achieved (due to very small transmissivity). The PI phase was analysed using a radial homogeneous flow model. The analysis plots and results are presented in Appendix 2-9.

Selected representative parameters

The recommended transmissivity of 2.4E–11 m^2/s was derived from the analysis of the PI phase. The confidence range for the interval transmissivity is estimated to be 8.0E–12 to 5.0E–11 m^2/s. The flow dimension displayed during the test is 2. The static pressure could not be extrapolated due to the very low interval transmissivity.

No further analysis is recommended.

6.2 20 m single-hole injection tests

In the following, the 20 m section tests conducted in borehole KAV04A are presented and analysed.

6.2.1 Section 105.17–125.17 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 199 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The injection rate control during the CHi phase was good. The injection rate decreased from approx 0.9 L/min at start of the CHi phase to 0.73 L/min at the end, indicating a moderate interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test both phases show a flat derivative at late times which is indicative of a flow dimension of 2 (radial flow). The fast recovery during the CHir phase adds ambiguity to the late time derivative of this phase. Both phases were analysed using a radial infinite acting homogeneous flow model. The analysis plots and results are presented in Appendix 2-10.

Selected representative parameters

The recommended transmissivity of 6.5E–7 m^2/s was derived from the analysis of the CHi phase, which was considered to be more reliable (see comments above concerning the CHir phase). The confidence range for the interval transmissivity is estimated to be 5.0E–7 to 3.0E–6 m^2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 1,259.3 kPa.

The analysis of the CHi and CHir phases shows some inconsistency in the derived transmissivity from the two test phases, which is attributed to the fast recovery during the CHir phase. No further analysis is recommended.

6.2.2 Section 125.17–145.17 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 291 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. Due to the very small flow rate, the CHi phase was conducted without automatic regulation, with N2 pressure directly from the injection vessel. Because of this, the pressure during the CHi phase decreased by 21 kPa. The injection rate decreased from approx 0.6 L/min at start of the CHi phase to 0.02 L/min at the end, indicating a low interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase is very noisy due to the very low flow rate. A radial homogeneous flow model was used for analysis. The derivative of the CHir phase shows a downward trend at late times, which is typical for the transition from wellbore storage and skin dominated flow to pure formation flow. Because the formation flow stabilization was not observed, a radial homogeneous flow model with wellbore storage and skin was used for the analysis of the CHir phase. The analysis plots and results are presented in Appendix 2-11.

Selected representative parameters

The recommended transmissivity of 2.1E–8 m^2/s was derived from the analysis of the CHir phase, which shows better data quality. The confidence range for the interval transmissivity is estimated to be 7.0E–9 to 3.0E–8 m^2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 1,448.9 kPa.

The analysis of the CHi and CHir phases shows some inconsistency in the derived transmissivity from the two test phases, which is attributed to the noise in the CHi derivative. No further analysis is recommended.

6.2.3 Section 145.17–165.17 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 299 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. Due to the very small flow rate, the CHi phase was conducted without automatic regulation, with N2 pressure directly from the injection vessel. Because of this, the pressure during the CHi phase increased by 16 kPa. The injection rate decreased from approx 0.6 L/min at start of the CHi phase to 0.04 L/min at the end, indicating a low interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase shows an upward trend at late times. This trend is attributed to the poor pressure control during CHi. Therefore, only the early and middle time data was matched using a radial homogeneous flow model. The derivative of the CHir phase shows a downward trend at late times, which is typical for the transition from wellbore storage and skin dominated flow to pure formation flow. Because the formation flow stabilization was not observed, a radial homogeneous flow model with wellbore storage and skin was used for the analysis of the CHir phase. The analysis plots and results are presented in Appendix 2-12.

Selected representative parameters

The recommended transmissivity of 6.8E–8 m^2/s was derived from the analysis of the CHir phase, which shows better data quality. The confidence range for the interval transmissivity is estimated to be 2.0E–8 to 8.0E–8 m^2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 1,644.5 kPa.

The analysis of the CHi and CHir phases shows some inconsistency in the derived transmissivity from the two test phases, which is attributed to the poor pressure control during the CHi phase. No further analysis is recommended.

6.2.4 Section 165.17–185.17 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 295 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. Due to the very small flow rate, the CHi phase was conducted without automatic regulation, with N2 pressure directly from the injection vessel. Because of this, the pressure during the CHi phase decreased by 20 kPa. The injection rate decreased from approx 0.1 L/min at start of the CHi phase to 0.03 L/min at the end, indicating a low interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase shows a horizontal derivative, indicating radial infinite acting flow. The CHi phase was matched using a radial homogeneous flow model. The derivative of the CHir phase shows a downward trend at late times, which is typical for the transition from wellbore storage and skin dominated flow to pure formation flow. Because the formation flow stabilization was not observed, a radial homogeneous flow model with wellbore storage and skin was used for the analysis of the CHir phase. The analysis plots and results are presented in Appendix 2-13.

Selected representative parameters

The recommended transmissivity of 1.4E–8 m^2/s was derived from the analysis of the CHi phase, which shows a clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E–8 to 5.0E–8 m^2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 1,841.6 kPa.

The analysis of the CHi and CHir phases shows little inconsistency in the derived transmissivity from the two test phases. No further analysis is recommended.

6.2.5 Section 185.17–205.17 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 277 kPa, followed by a pressure recovery phase measured overnight. No hydraulic connection between test interval and the adjacent zones was observed. Due to the small flow rate, the CHi phase was conducted without automatic regulation, with N2 pressure directly from the injection vessel. Because of this, the pressure during the CHi phase decreased by 18 kPa before rising again by 4 kPa. The injection rate decreased from approx 1.5 L/min at start of the CHi phase to 0.3 L/min at the end, indicating a relatively low interval transmissivity. The recovery phase (CHir) shows no problems. Both phases were analysed quantitatively, the data quality is however poor and mainly impeded by the poor pressure control during the CHi phase and the fast recovery during the CHir phase.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test the data quality is relatively poor and does not allow for accurate flow model identification. Both test phases were analysed using an infinite acting radial homogeneous flow model. The analysis plots and results are presented in Appendix 2-14.

Selected representative parameters

The recommended transmissivity of 2.2E–7 m^2/s was derived from the analysis of the CHir phase, which has better data quality. The confidence range for the interval transmissivity is estimated to be 1.0E–7 to 5.0E–7 m^2/s. The flow dimension used for analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 2,040.3 kPa.

The analysis of the CHi and CHir phases shows little inconsistency in the derived transmissivity from the two test phases. No further analysis is recommended.

6.2.6 Section 205.26–225.26 m, test no 1, pulse injection

Comments to test

The test was composed of a pulse injection phase with a pressure difference of 313 kPa. No hydraulic connection between test interval and the adjacent zones was observed. It was decided to conduct the test as a pulse injection and not as a constant pressure injection with subsequent pressure recovery because the injection rate fell below the measurement limit of the flowmeter (< 1 mL/min) in the first 20 s of the test, thus indicating a very low transmissivity of the test section. The pulse test was analysed quantitatively by using a wellbore storage coefficient calculated from the total water volume necessary for raising the pressure of the test section by 313 kPa (0.013 L).

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the late time derivative of the deconvolved pulse pressure is horizontal, indicating radial infinite acting flow. The PI phase was matched using a radial homogeneous flow model. The analysis plots and results are presented in Appendix 2-15.

Selected representative parameters

The recommended transmissivity of 5.9E–11 m^2/s was derived from the analysis of the PI phase. The confidence range for the interval transmissivity is estimated to be 2.0E–11 to 1.0E–10 m^2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, could not be extrapolated due to the very low transmissivity.

No further analysis is recommended.

6.2.7 Section 225.26–245.26 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 199 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 0.8 L/min at start of the CHi phase to 0.4 L/min at the end, indicating a relatively low interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase shows a horizontal derivative at middle and late times, indicating homogeneous radial flow geometry. The CHi phase was matched using a radial homogeneous flow model. The derivative of the CHir phase shows a flat derivative at middle times, followed by a downward trend at late times, which is typical for the transition to a zone of higher transmissivity. A radial composite flow model with increasing transmissivity away from the wellbore was used for the analysis of the CHir phase. The analysis plots and results are presented in Appendix 2-16.

Selected representative parameters

The recommended transmissivity of 2.8E–7 m^2/s was derived from the analysis of the CHir phase (inner zone), because of its consistency with the results shown by the CHi phase. The confidence range for the interval transmissivity is estimated to be 1.0E–7 to 1.0E–6 m^2/s (this range includes the outer zone transmissivity derived from the CHir analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 2,427.8 kPa.

The analysis of the CHi and CHir phases shows some inconsistency in the derived flow model from the two test phases (homogeneous for the CHi phase and composite from the CHir phase). Given the good data quality, this inconsistency is difficult to explain. In case further analysis is planned, a total test simulation should be conducted, in order to derive a consistent flow model for the entire test.

6.2.8 Section 245.26–265.26 m, test no 2, injection

Comments to test

The test was conducted twice (1st test and 2nd test) due to problems with the automatic pressure regulation system. Both tests were composed of a constant pressure injection phase with a pressure difference of 196 kPa and 104 kPa, respectively, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well apart from an overpressure induced by the regulation system at start of injection. The injection rate decreased from approx 30 L/min at start of the CHi phase to 6.4 L/min at the end (data for 2nd test), indicating a relatively high interval transmissivity. Both recovery phases (CHir) show no problems. All phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the flow model diagnosis was mainly based on the derivative of the CHir phases which are of very good quality and very consistent. The derivative shows a typical radial flow composite response with decreasing transmissivity away from the borehole. The quality of the CHi phases is less good; a homogeneous radial flow model was used for the analysis of these phases. The analysis plots and results are presented in Appendix 2-17.

Selected representative parameters

The recommended transmissivity of 5.1E–6 m^2/s was derived from the analysis of the CHir phase (outer zone), because of its consistency with the results shown by the CHi phase. The confidence range for the interval transmissivity is estimated to be 4.0E–6 to 2.0E–5 m^2/s (this range encompasses the inner zone transmissivity derived from the CHir analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 2,624.3 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.9 Section 265.26–285.26 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection phase with a pressure difference of 200 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 1.9 L/min at start of the CHi phase to 0.8 L/min at the end, indicating a moderate interval transmissivity. The recovery phase (CHir) shows no problems. All phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, both test phases show a horizontal derivative at middle and late times, which indicates infinite acting radial flow geometry. The CHi phase was analysed using a radial composite flow model with increasing transmissivity away from the borehole. The CHir phase was analysed using a homogeneous radial flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-18.

Selected representative parameters

The recommended transmissivity of 8.1E–7 m^2/s was derived from the analysis of the CHi phase (outer zone), because of its consistency with the results shown by the CHir phase. The confidence range for the interval transmissivity is estimated to be 5.0E–7 to 2.0E–6 m^2/s (this range encompasses the inner zone transmissivity derived from the CHi analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 2,819.8 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.10 Section 285.26–305.26 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection phase with a pressure difference of 198 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 0.8 L/min at start of the CHi phase to 0.28 L/min at the end, indicating a moderate interval transmissivity. The injection rate shows an inflection at middle times, which cannot be correlated with the pressure in the section. The cause of this inflection is unknown, but it could have been caused by wash-out effects along fractures. The CHir recovered very fast, which adds uncertainty to the derivative analysis. All phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test the derivatives of both test phases are of poor quality, such that a clear flow model identification is not possible. Both test phases were analysed using a homogeneous radial flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-19.

Selected representative parameters

The recommended transmissivity of 2.5E–7 m^2/s was derived from the analysis of the CHi phase because of better data quality. The confidence range for the interval transmissivity is estimated to be 1.0E–7 to 1.0E–6 m^2/s (this range encompasses the transmissivity derived from the CHir analysis). The flow dimension used for analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 3,021.7 kPa.

The analysis of the CHi and CHir phases shows discrepancies as far as the transmissivity is concerned. However, due to the poor data quality, no further analysis is recommended.

6.2.11 Section 305.33–325.33 m, test no 1, pulse injection

Comments to test

The test was conducted as pulse injection (PI) with a pressure difference of 233 kPa. No hydraulic connection between test interval and the adjacent zones was observed. The decision to conduct a pulse injection instead of a constant head injection with subsequent pressure recovery was met because the injection rate fell below the measurement limit of the flowmeter (< 1 mL/min) within 20 s after starting the injection phase. The pulse was analysed using a wellbore storage coefficient calculated from the volume of water needed to elevate the pressure in the test section by 233 kPa (0.01 L). The PI phase is adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test the derivatives of the deconvolved PI pressure shows a clear horizontal stabilization which indicated radial (dimension 2) homogeneous flow. The PI phase was analysed using a homogeneous radial flow model. The analysis plots and results are presented in Appendix 2-20.

Selected representative parameters

The recommended transmissivity of 2.0E–10 m^2/s was derived from the analysis of the PI phase. The confidence range for the interval transmissivity is estimated to be 8.0E–11 to 5.0E–10 m^2/s. The flow dimension used for analysis is 2. The static pressure measured at transducer depth could not be extrapolated.

No further analysis is recommended.

6.2.12 Section 325.33–345.33 m, test no 1, slug injection

Comments to test

The test was conducted as pulse injection (PI) with a pressure difference of 253 kPa followed by a slug injection (SI) phase conducted overnight. No hydraulic connection between test interval and the adjacent zones was observed. The decision to conduct a pulse injection instead of a constant head injection with subsequent pressure recovery was made because the injection rate fell below the measurement limit of the flowmeter (< 1 mL/min) within 20 s after starting the injection phase. The pulse was analysed using a wellbore storage coefficient calculated from the volume of water needed to elevate the pressure in the test section by 253 kPa (0.01 L). Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test the derivative of the deconvolved PI pressure shows a clear horizontal stabilization which indicated radial (dimension 2) homogeneous flow. The derivative of the deconvolved SI pressure is too noisy and does not allow clear flow model identification. Both phases were analysed using a homogeneous radial flow model. The analysis plots and results are presented in Appendix 2-21.

Selected representative parameters

The recommended transmissivity of 3.0E–9 m^2/s was derived from the analysis of the SI phase, which was selected due to the much longer duration. The confidence range for the interval transmissivity is estimated to be 1.0E–9 to 5.0E–9 m^2/s. The flow dimension used for analysis is 2. The static pressure measured at transducer depth could not be extrapolated.

No further analysis is recommended.

6.2.13 Section 345.33–365.33 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 198 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 0.6 L/min at start of the CHi phase to 0.2 L/min at the end, indicating a relatively low interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase shows a horizontal derivative at middle and late times, indicating homogeneous radial flow geometry. The CHi phase was matched using a radial composite flow model with increasing transmissivity away from the borehole. The derivative of the CHir phase shows a flat derivative at late times as well. The CHir phase was matched using a radial homogeneous flow model. The analysis plots and results are presented in Appendix 2-22.

Selected representative parameters

The recommended transmissivity of 4.6E–7 m^2/s was derived from the analysis of the CHir phase, because of its consistency with the results shown by the CHi phase outer zone and better data quality. The confidence range for the interval transmissivity is estimated to be 1.0E–7 to 5.0E–7 m^2/s (this range encompasses the inner zone transmissivity derived from the CHi analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 3,599.2 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.14 Section 365.33–385.33 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 198 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 0.1 L/min at start of the CHi phase to 0.07 L/min at the end, indicating low interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase shows a horizontal derivative at middle and late times, indicating homogeneous radial flow geometry. The CHi phase was matched using a radial composite flow model with increasing transmissivity away from the borehole. The derivative of the CHir phase shows a flat derivative at late times as well. The CHir phase was matched using a radial homogeneous flow model. The analysis plots and results are presented in Appendix 2-23.

Selected representative parameters

The recommended transmissivity of 7.5E–8 m^2/s was derived from the analysis of the CHi phase (outer zone), which displayed the clearest derivative stabilisation. The confidence range for the interval transmissivity is estimated to be 3.0E–8 to 3.0E–7 m^2/s (this range encompasses the inner zone transmissivity derived from the CHi analysis and the transmissivity derived from the CHir phase). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 3,796.2 kPa.

The analysis of the CHi and CHir phases shows some inconsistency in the transmissivities derived from the CHi and CHir phases. If further analysis is planned, a total test simulation should help resolving this inconsistency.

6.2.15 Section 385.33–405.33 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 200 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 1.2 L/min at start of the CHi phase to 0.95 L/min at the end, indicating moderate interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase shows a horizontal derivative at middle and late times, indicating homogeneous radial flow geometry. The CHi phase was matched using a radial composite flow model with increasing transmissivity away from the borehole. The derivative of the CHir phase shows a flat derivative at late times as well. The CHir phase was matched using a radial homogeneous flow model. The analysis plots and results are presented in Appendix 2-24.

Selected representative parameters

The recommended transmissivity of 2.9E–6 m^2/s was derived from the analysis of the CHir phase, which is consistent with the outer zone transmissivity derived from the CHi phase. Also, the large positive skin derived from the CHir analysis is consistent with the composite flow model used for the CHi analysis. The confidence range for the interval transmissivity is estimated to be 5.0E–7 to 4.0E–6 m^2/s (this range encompasses the inner zone transmissivity derived from the CHi analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 3,997.7 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.16 Section 405.42–425.42 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 224 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 0.8 L/min at start of the CHi phase to 0.06 L/min at the end, indicating low interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase shows a horizontal stabilization at early times, followed by an upward trend at middle times and a new stabilization at a higher level at late times, indicating radial composite flow geometry with decreasing transmissivity away from the borehole. The derivative of the CHir phase is compatible with the CHi phase with the difference that the late time stabilisation is not observed. Both phases were matched using a radial composite flow model with decreasing transmissivity away from the borehole. The analysis plots and results are presented in Appendix 2-25.

Selected representative parameters

The recommended transmissivity of 1.9E–8 m^2/s was derived from the analysis of the CHi phase (outer zone), which is consistent with the outer zone transmissivity derived from the CHir phase and shows the best data quality. The confidence range for the interval transmissivity is estimated to be 1.0E–8 to 2.0E–7 m^2/s (this range encompasses the inner zone transmissivity derived from the CHi and CHir analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 4,193.4 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.17 Section 425.02–445.02 m, test no 1, pulse injection

Comments to test

The test was conducted as a pulse injection test (PI) initiated with a pressure difference of 270 kPa. No hydraulic connection between test interval and the adjacent zones was observed. The decision to conduct a pulse injection instead of a constant head injection phase with subsequent pressure recovery was met because the injection rate dropped below the measurement limit of the flowmeter (< 1 mL/min) in the first 20 s of the test, indicating a very low transmissivity of the test section. The pulse was analysed using a wellbore storage coefficient calculated from the volume of water needed to elevate the pressure in the test section by 270 kPa (0.028 L). The PI phase is adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the deconvolved PI pressure shows an upward trend of unit slope at middle and late times, which is consistent with the transition to a lower transmissivity away from the wellbore. Because the outer zone stabilisation was not observed, the derived outer zone transmissivity should be regarded as an upper limit only. The PI phase was matched using a radial composite flow model with decreasing transmissivity away from the borehole. The analysis plots and results are presented in Appendix 2-26.

Selected representative parameters

The recommended transmissivity of 1.1E–12 m^2/s was derived from the analysis of the PI phase (outer zone), however, this value should be regarded as an upper limit of the actual formation transmissivity. The confidence range for the interval transmissivity is estimated to be 5.0E–13 to 5.0E–11 m^2/s (this range encompasses the inner zone transmissivity as well). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth could not be extrapolated.

No further analysis is recommended.

6.2.18 Section 445.02–465.02 m, test no 1, pulse injection

Comments to test

The test was conducted as a pulse injection test (PI) initiated with a pressure difference of 257 kPa. No hydraulic connection between test interval and the adjacent zones was observed. The decision to conduct a pulse injection instead of a constant head injection phase with subsequent pressure recovery was met because the injection rate dropped below the measurement limit of the flowmeter (< 1 mL/min) in the first 20 s of the test, indicating a very low transmissivity of the test section. The pulse was analysed using a wellbore storage coefficient calculated from the volume of water needed to elevate the pressure in the test section by 270 kPa (0.034 L). The PI phase is adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the deconvolved PI pressure shows an upward trend of unit slope at middle and late times, which is consistent with the transition to a lower transmissivity away from the wellbore. Because the outer zone stabilisation was not observed, the derived outer zone transmissivity should be regarded as an upper limit only. The PI phase was matched using a radial composite flow model with decreasing transmissivity away from the borehole. The analysis plots and results are presented in Appendix 2-27.

Selected representative parameters

The recommended transmissivity of 3.3E–10 m^2/s was derived from the analysis of the PI phase (outer zone), however, this value should be regarded as an upper limit of the actual formation transmissivity. The confidence range for the interval transmissivity is estimated to be 5.0E–11 to 5.0E–9 m^2/s (this range encompasses the inner zone transmissivity as well). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth could not be extrapolated.

No further analysis is recommended.

6.2.19 Section 465.02–485.02 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 327 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. Due to the very low rates, the test was conducted without rate regulation, directly from the injection vessel, with N2 backpressure. Because of this, the pressure decreased by 18 kPa during the CHi phase. The injection rate decreased from approx 0.6 L/min at start of the CHi phase to 0.03 L/min at the end, indicating low interval transmissivity. The CHir phase recovered very fast, which adds uncertainty to the derivative analysis. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase is very noisy and a clear identification of the flow model is not possible. The CHir phase recovered very fast and therefore the derivative shows a steep downward trend at late times, which is consistent with a very large positive skin or a large increase in transmissivity near the borehole. The CHi phase was matched using a radial homogeneous flow model. The CHir phase was matched using a radial composite flow model with increasing transmissivity away from the borehole. The analysis plots and results are presented in Appendix 2-28.

Selected representative parameters

The recommended transmissivity of 1.5E–8 m^2/s was derived from the analysis of the CHi phase, as the only data set showing indication of a derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E–8 to 3.0E–7 m^2/s (this range encompasses the outer zone transmissivity derived from the CHir analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 4,770.0 kPa.

The analysis of the CHi and CHir phases shows discrepancy as far as the flow model and the outer zone transmissivity are concerned. In case further analysis is planned, a total test simulation should help to better constrain the formation transmissivity.

6.2.20 Section 485.43–505.43 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 199 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 8 L/min at start of the CHi phase to 4.16 L/min at the end, indicating a relatively high interval transmissivity. The recovery phase (CHir) shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase shows a horizontal derivative at middle and late times, indicating radial flow geometry. The CHi phase was matched using a radial composite flow model. The derivative of the CHir phase shows a flat derivative at middle and late times (although very noisy). A radial homogeneous flow model with wellbore storage and skin was used for the analysis of the CHir phase. The analysis plots and results are presented in Appendix 2-29.

Selected representative parameters

The recommended transmissivity of 9.4E–6 m^2/s was derived from the analysis of the CHi phase (outer zone), because of its consistency with the results shown by the CHir phase and because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 2.0E–6 to 1.0E–5 m^2/s (this range includes the inner zone transmissivity derived from the CHi analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 4,971.1 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.21 Section 505.43–525.43 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 198 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 0.6 L/min at start of the CHi phase to 0.3 L/min at the end, indicating moderate interval transmissivity. The CHir phase shows very fast recovery, which adds uncertainty to the derivative analysis. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase (although noisy) shows a horizontal stabilisation at middle and late times, indicating radial flow geometry. The CHi phase was matched using a radial composite flow model. The derivative of the CHir phase is difficult to interpret due to the very fast recovery. The CHir response is consistent with the presence of a very large skin, which, in turn, is not consistent with the response observed during the CHi phase. A radial homogeneous flow model with wellbore storage and skin was used for the analysis of the CHir phase. The analysis plots and results are presented in Appendix 2-30.

Selected representative parameters

The recommended transmissivity of 5.2E–7 m^2/s was derived from the analysis of the CHi phase (outer zone), because of its consistency with the results shown by the CHir phase and because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E–7 to 7.0E–7 m^2/s (this range includes the inner zone transmissivity derived from the CHi analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 5,170.6 kPa.

Apart from the unexplained high skin observed during the CHir phase, the analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.22 Section 525.43–545.43 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 200 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 3.5 L/min at start of the CHi phase to 1.45 L/min at the end, indicating relatively high interval transmissivity. The CHir phase shows very fast recovery, which adds uncertainty to the derivative analysis. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase (although noisy) shows a horizontal stabilisation at middle and late times, indicating radial flow geometry. The CHi phase was matched using a radial homogeneous flow model. The derivative of the CHir phase also shows a radial flow stabilisation at middle and late times. A radial homogeneous flow model with wellbore storage and skin was used for the analysis of the CHir phase. The analysis plots and results are presented in Appendix 2-31.

Selected representative parameters

The recommended transmissivity of 2.7E–6 m^2/s was derived from the analysis of the CHir phase, because of its consistency with the results shown by the CHir phase and because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E–6 to 4.0E–6 m^2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 5,369.2 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.23 Section 545.43–565.43 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 200 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 0.15 L/min at start of the CHi phase to 0.06 L/min at the end, indicating low interval transmissivity. The CHir phase shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase (although noisy) shows a horizontal stabilisation at middle and late times, indicating radial flow geometry. The CHi phase was matched using a radial composite flow model with increasing transmissivity away from the wellbore. The derivative of the CHir phase also shows a radial flow stabilisation at middle and late times. A radial homogeneous flow model with wellbore storage and skin was used for the analysis of the CHir phase. The analysis plots and results are presented in Appendix 2-32.

Selected representative parameters

The recommended transmissivity of 1.5E–7 m^2/s was derived from the analysis of the CHir phase, because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 2.0E–8 to 2.0E–7 m^2/s (encompasses the inner and outer zone transmissivity values derived from the CHi phase). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 5,566.2 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.24 Section 565.43–585.43 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 198 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned relatively well, except for oscillations occurring at the beginning of the phase. The injection rate decreased from approx 1.2 L/min at start of the CHi phase to 0.63 L/min at the end, indicating moderate interval transmissivity. The CHir phase shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the derivative of the CHi phase is too noisy to allow flow model identification. The CHi phase was matched using a radial homogeneous flow model. The derivative of the CHir phase shows a radial flow stabilisation at middle and late times. A radial homogeneous flow model with wellbore storage and skin was used for the analysis of the CHir phase. The analysis plots and results are presented in Appendix 2-33.

Selected representative parameters

The recommended transmissivity of 9.2E–7 m^2/s was derived from the analysis of the CHir phase, because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 4.0E–7 to 2.0E–6 m^2/s (encompasses the transmissivity value derived from the CHi phase). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 5,761.8 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.25 Section 585.43–605.43 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 205 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 0.5 L/min at start of the CHi phase to 0.2 L/min at the end, indicating relatively low interval transmissivity. The CHir phase shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, both phases show an increase of transmissivity away from the wellbore and a stabilisation of the late time derivative, indicating radial flow. Both phases were matched using a radial composite flow model with increasing transmissivity away from the wellbore. The analysis plots and results are presented in Appendix 2-34.

Selected representative parameters

The recommended transmissivity of 3.8E–7 m^2/s was derived from the analysis of the CHir phase (outer zone), because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E–7 to 5.0E–7 m^2/s (encompasses the transmissivity values derived from the CHi phase). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 5,959.2 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.26 Section 605.57–625.57 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 193 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 0.7 L/min at start of the CHi phase to 0.24 L/min at the end, indicating relatively low interval transmissivity. The CHir phase shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the CHi phase shows a derivative stabilisation at middle times, followed by an upward trend, typical for the transition to a lower transmissivity zone further away from the borehole. The CHi phase was matched using a radial composite flow model with decreasing transmissivity away from the wellbore. Due to relatively fast recovery, the derivative of the CHir phase is not very conclusive, but it shows a stabilisation at late times, indicating homogeneous radial flow. The CHir phase was matched using a radial homogeneous flow model with wellbore storage and skin. It should be noted that there is a discrepancy between the late time behaviour of the two test phases (decreasing transmissivity for the CHi and homogeneous for the CHir). The analysis plots and results are presented in Appendix 2-35.

Selected representative parameters

The recommended transmissivity of 2.9E–7 m^2/s was derived from the analysis of the CHi phase (inner zone), because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 8.0E–8 to 1.0E–6 m^2/s (encompasses the transmissivity values derived from the CHi phase outer zone and CHir phase and accounts for the inconsistency of results). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 6,158.5 kPa.

The analysis of the CHi and CHir phases shows inconsistency concerning flow model and derived transmissivity. In case further analysis is planned, a total test simulation analysis would probably help resolving these inconsistencies.

6.2.27 Section 625.57–645.57 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 185 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 0.7 L/min at start of the CHi phase to 0.3 L/min at the end, indicating relatively low interval transmissivity. The CHir phase shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the CHi phase (although noisy) shows a derivative stabilisation at middle and late times, indicating radial flow. The CHi phase was matched using a radial homogeneous flow model. The CHir phase shows a slight stabilisation (inflexion) at middle times, followed by a downward trend, typical for an increase of transmissivity at some distance from the test section. The CHir phase was matched using a radial composite flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-36.

Selected representative parameters

The recommended transmissivity of 3.3E–7 m^2/s was derived from the analysis of the CHir phase (outer zone), because it shows the most best data quality. The confidence range for the interval transmissivity is estimated to be 1.0E–7 to 5.0E–7 m^2/s (encompasses the transmissivity values derived from the CHir phase inner zone and CHi phase). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 6,360.2 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.28 Section 645.57–665.57 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 256 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The rate regulation functioned well. The injection rate decreased from approx 1 L/min at start of the CHi phase to 0.03 L/min at the end, indicating low interval transmissivity. The CHir phase shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the CHi phase (although noisy) shows a derivative stabilisation at middle and late times, indicating radial flow. The CHi phase was matched using a radial composite flow model with increasing transmissivity away from the wellbore. The CHir phase shows a steep downward trend at middle times and the beginning of a radial follow stabilisation at late times. The CHir phase was matched using a radial composite flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-37.

Selected representative parameters

The recommended transmissivity of 4.6E–8 m^2/s was derived from the analysis of the CHi phase (outer zone), because it shows the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E–8 to 2.0E–7 m^2/s (encompasses the transmissivity values derived from the CHi phase inner zone and CHir phase). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 6,559.4 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.29 Section 665.57–685.57 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 245 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. Due to the very small injection rate, the CHi phase was conducted without automatic regulation, directly from the injection vessel with N2 backpressure. Because of this, the pressure decreased during the injection by 14 kPa. The injection rate decreased from approx 0.5 L/min at start of the CHi phase to 0.05 L/min at the end, indicating low interval transmissivity. The CHir phase shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the CHi phase shows a derivative stabilisation at early times followed by an upward trend at middle times and a new stabilisation at a higher level at late times. This behaviour is typical for radial flow and decreasing transmissivity away from the wellbore. The CHi phase was matched using a radial composite flow model with decreasing transmissivity away from the wellbore. The CHir response is consistent to the CHi response. The CHir phase was matched using a radial composite flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-38.

Selected representative parameters

The recommended transmissivity of 2.5E–8 m^2/s was derived from the analysis of the CHir phase (outer zone), because it shows the best data quality. The confidence range for the interval transmissivity is estimated to be 1.0E–8 to 6.0E–8 m^2/s (encompasses the transmissivity values derived from the CHir phase inner zone and CHi phase). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 6,745.9 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.30 Section 685.57–705.57 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 200 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The automatic flow regulation functioned well. The injection rate decreased from approx 2.4 L/min at start of the CHi phase to 1.34 L/min at the end, indicating moderate interval transmissivity. The CHir phase shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the CHi phase shows a derivative stabilisation at middle times followed by an upward trend at late times. This behaviour is typical for radial flow and decreasing transmissivity away from the wellbore. The CHi phase was matched using a radial composite flow model with decreasing transmissivity away from the wellbore. The CHir response is not consistent to the CHi response; it shows a relatively clear stabilization at middle and late times, thus indicating radial homogeneous flow geometry. The CHir phase was matched using a radial homogeneous flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-39.

Selected representative parameters

The recommended transmissivity of 3.0E–6 m^2/s was derived from the analysis of the CHir phase, because it shows the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E–6 to 4.0E–6 m^2/s (does not encompass the CHi outer zone transmissivity which is considered inconsistent with the CHir test response). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 6,953.6 kPa.

The analysis of the CHi and CHir phases shows an inconsistency concerning the late time response of the two phases. While the CHir phase shows a clear radial homogeneous response, the CHi phase indicates a decrease of transmissivity away from the borehole. It was decided to confer greater reliability to the CHir phase because it is better controlled. In case further analysis is planned, a total test simulation should attempt to clarify the inconsistency between the two phases.

6.2.31 Section 698.07–718.07 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 198 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The automatic flow regulation functioned well. The injection rate decreased from approx 25 L/min at start of the CHi phase to 13.1 L/min at the end, indicating high interval transmissivity. The CHir phase shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the CHi phase shows a derivative stabilisation at late times indicating radial flow. The CHi phase was matched using a radial composite flow model with increasing transmissivity away from the wellbore. The CHir response shows a steep downward trend of the derivative at middle times, which is consistent with a high positive skin factor followed by a stabilisation at late times, indicating radial flow. The CHir phase was matched using a radial homogeneous flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-40.

Selected representative parameters

The recommended transmissivity of 2.3E–5 m^2/s was derived from the analysis of the CHi phase (outer zone), because it shows the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E–5 to 4.0E–5 m^2/s (encompasses the inner zone transmissivity derived from the CHi analysis as well as the transmissivity derived from the CHir analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 7,083.3 kPa.

The analysis of the CHir phase shows an unusually large wellbore storage coefficient and skin factor. This phenomenon was observed in other tests as well and may be caused by non-Darcy (turbulent) flow in the formation. In case further analysis is planned, a model involving non-Darcy flow in the formation should be used in order to clarify whether the parameters derived are physically realistic and in this way at least constrain the possible source of this discrepancy.

6.2.32 Section 711.07–731.07 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 212 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The automatic flow regulation functioned well. The injection rate decreased from approx 19 L/min at start of the CHi phase to 13.4 L/min at the end, indicating high interval transmissivity. The CHir phase shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. In case of the present test, the CHi phase the derivative quality is poor and does not allow model identification. The CHi phase was matched using a radial homogeneous flow model. The CHir response shows a steep downward trend of the derivative at middle times, which is consistent with a high positive skin factor. The late time behaviour of the derivative is unclear, its quality being impeded by the very fast recovery. The CHir phase was matched using a radial homogeneous flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-41.

Selected representative parameters

The recommended transmissivity of 4.0E–5 m^2/s was derived from the analysis of the CHir phase, which is showing a slightly better data quality. The confidence range for the interval transmissivity is estimated to be 8.0E–6 to 8.0E–5 m^2/s (the test results should be regarded as relatively unreliable due to poor data quality). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 7,212.0 kPa.

The analysis of the CHir phase shows an unusually large wellbore storage coefficient and skin factor. This phenomenon was observed in other tests as well and may be caused by non-Darcy (turbulent) flow in the formation. In case further analysis is planned, a model involving non-Darcy flow in the formation should be used in order to clarify whether the parameters derived are physically realistic and in this way at least constrain the possible source of this discrepancy.

6.2.33 Section 731.07–751.07 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 254 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The test was conducted using the injection vessel with N2 backpressure. The injection rate decreased from approx 0.37 L/min at start of the CHi phase to 0.015 L/min at the end, indicating low interval transmissivity. The CHir phase shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. The CHi phase derivative shows a stabilization at middle and late times, indicating radial flow. The CHi phase was matched using a radial composite flow model with increasing transmissivity away from the wellbore. The CHir response shows a unit slope downward trend of the derivative at middle and late times, which is consistent with a high positive skin factor. The CHir phase was matched using a radial homogeneous flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-42.

Selected representative parameters

The recommended transmissivity of 1.0E–8 m^2/s was derived from the analysis of the CHi phase (outer zone), which is showing a derivative stabilization. The confidence range for the interval transmissivity is estimated to be 5.0E–9 to 5.0E–8 m^2/s (encompasses the analysis results of the CHir phase and the inner zone transmissivity of the CHi phase). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 7,402.2 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.34 Section 751.07–771.07 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 198 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The automatic rate control functioned well. The injection rate decreased from approx 8 L/min at start of the CHi phase to 3.7 L/min at the end, indicating high interval transmissivity. The CHir phase shows very fast recovery, which adds uncertainty to the derivative analysis. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. The CHi phase derivative shows a stabilization at early times, followed by an unit slope upward trend at middle times and a new stabilization at a higher level at late times. This behaviour indicates radial flow with decreasing transmissivity away from the borehole. The CHi phase was matched using a radial composite flow model with decreasing transmissivity away from the wellbore. The CHir derivative is very poor due to the very fast pressure recovery. The CHir phase was matched using a radial homogeneous flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-43.

Selected representative parameters

The recommended transmissivity of 1.9E–6 m^2/s was derived from the analysis of the CHi phase (outer zone), which is showing the best data quality. The confidence range for the interval transmissivity is estimated to be 1.0E–6 to 2.0E–5 m^2/s (encompasses the analysis results of the CHir phase and the inner zone transmissivity of the CHi phase). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 7,603.6 kPa.

The quality of the CHir phase is very poor. The fast recovery may be caused by non-Darcy flow effects in the formation. No further analysis is recommended.

6.2.35 Section 771.07–791.07 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 230 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The test was conducted directly from the injection vessel with N2 backpressure. The injection rate decreased from approx 0.5 L/min at start of the CHi phase to 0.03 L/min at the end, indicating low interval transmissivity. The CHir phase shows no problems. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. The CHi phase derivative shows a stabilization at early times, followed by an unit slope upward trend at middle times and a new stabilization at a higher level at late times. This behaviour indicates radial flow with decreasing transmissivity away from the borehole. The CHi phase was matched using a radial composite flow model with decreasing transmissivity away from the wellbore. The CHir derivative shows a unit slope downward trend at middle time, indicating a large positive skin, and followed by a radial flow stabilization at late times. The CHir phase was matched using a radial homogeneous flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-44.

Selected representative parameters

The recommended transmissivity of 9.3E–8 m^2/s was derived from the analysis of the CHir phase, which is showing the best data quality. The confidence range for the interval transmissivity is estimated to be 1.0E–8 to 2.0E–7 m^2/s (encompasses the analysis results of the CHi phase). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 7,803.0 kPa.

The analysis of the CHi and CHir phases shows good consistency, with the exception of the very high skin derived from the CHir phase, which may be caused by non-Darcy flow effects in the formation. No further analysis is recommended.

6.2.36 Section 791.07–811.07 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 200 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The automatic rate control functioned well, the recorded flow rate is however relatively noisy. The injection rate decreased from approx 1.7 L/min at start of the CHi phase to 1.2 L/min at the end, indicating moderate interval transmissivity. The CHir phase shows very fast recovery, which adds uncertainty to the derivative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. The CHi phase derivative is quite noisy and does not allow flow model identification. The CHi phase was matched using a radial homogeneous flow model. The CHir derivative shows a unit slope downward trend at middle time, indicating a large positive skin, and followed by a radial flow stabilization at late times. The CHir phase was matched using a radial homogeneous flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-45.

Selected representative parameters

The recommended transmissivity of 3.8E–6 m^2/s was derived from the analysis of the CHir phase, which is showing the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 9.0E–7 to 5.0E–6 m^2/s (encompasses the analysis results of the CHi phase and accounts for the uncertainty due to poor data quality). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8,003.3 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.37 Section 800.81–820.81 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 198 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The automatic rate control functioned well, the recorded flow rate is however relatively noisy. The injection rate decreased from approx 2.5 L/min at start of the CHi phase to 2.0 L/min at the end, indicating moderate interval transmissivity. The CHir phase shows very fast recovery, which adds uncertainty to the derivative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. The CHi phase derivative is quite noisy and does not allow flow model identification. The CHi phase was matched using a radial homogeneous flow model. The CHir derivative shows a unit slope downward trend at middle time, indicating a large positive skin, and followed by a radial flow stabilization at late times. The CHir phase was matched using a radial homogeneous flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-46.

Selected representative parameters

The recommended transmissivity of 4.2E–6 m^2/s was derived from the analysis of the CHir phase, which is showing the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E–6 to 6.0E–6 m^2/s (encompasses the analysis results of the CHi phase and accounts for the uncertainty due to poor data quality). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8,096.9 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.38 Section 820.81–840.81 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 217 kPa, followed by a pressure recovery phase. No hydraulic connection between test interval and the adjacent zones was observed. The automatic rate control functioned well, the recorded flow rate is however relatively noisy. The injection rate decreased from approx 0.1 L/min at start of the CHi phase to 0.01 L/min at the end, indicating low interval transmissivity. The CHir phase is adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. The CHi phase derivative is quite noisy and does not allow flow model identification. The CHi phase was matched using a radial homogeneous flow model. The CHir derivative shows a unit slope downward trend at middle time, indicating a large positive skin. There is a slight indication of stabilization in the late time derivative. The CHir phase was matched using a radial homogeneous flow model with wellbore storage and skin. The analysis plots and results are presented in Appendix 2-47.

Selected representative parameters

The recommended transmissivity of 1.6E–8 m^2/s was derived from the analysis of the CHir phase, which is showing the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 6.0E–9 to 3.0E–8 m^2/s (encompasses the analysis results of the CHi phase and accounts for the uncertainty due to poor data quality). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8,293.4 kPa.

The analysis of the CHi and CHir phases shows good consistency. No further analysis is recommended.

6.2.39 Section 837.11–857.11 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 200 kPa, followed by a pressure recovery phase. A hydraulic connection between the test section and the bottom hole section was observed during the test. The automatic rate control functioned well, the recorded flow rate shows however some atypical inflexions. The injection rate decreased from approx 6.5 L/min at start of the CHi phase to 4.3 L/min at the end, indicating relatively high interval transmissivity. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. The CHi phase derivative shows a stabilization at middle times followed by a unit slope upward trend at late times, typical for radial flow and decreasing transmissivity away from the borehole. The CHi phase was matched using a radial composite flow model with decreasing transmissivity away from the borehole. The CHir derivative shows a slight middle time stabilisation, followed by a downward trend and a further stabilization at late times. This response is typical for an increase in transmissivity away from the wellbore. The CHir phase was matched using a radial composite flow model with increasing transmissivity away from the wellbore. The two test phases are not consistent, the CHi phase indicating decreasing transmissivity away from the wellbore and the CHir phase indicating increasing transmissivity. Given the fact that the CHir phase is generally better controlled than the CHi phase, it was decided to confer the CHir phase greater credibility. The analysis plots and results are presented in Appendix 2-48.

Selected representative parameters

The recommended transmissivity of 8.6E–6 m^2/s was derived from the analysis of the CHir phase (outer zone), which is showing the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E–6 to 9.0E–6 m^2/s (encompasses the analysis results of the CHi phase and CHir phase inner zone). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8,461.9 kPa.

The analysis of the CHi and CHir phases shows inconsistency as far as the flow model is concerned. This inconsistency is poorly understood. A total test simulation analysis may help to better understand it.

6.2.40 Section 857.11–877.11 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 200 kPa, followed by a pressure recovery phase. No hydraulic connection between the test section and the adjacent sections was observed. The automatic rate control functioned well. The injection rate decreased from approx 0.5 L/min at start of the CHi phase to 0.2 L/min at the end, indicating relatively low interval transmissivity. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. The CHi phase derivative shows a stabilization at late times indicating radial flow geometry. The CHi phase was matched using a radial composite flow model with increasing transmissivity away from the borehole. The CHir derivative shows a slight middle time stabilisation, followed by a downward trend and a further stabilization at late times. This response is typical for an increase in transmissivity away from the wellbore. The CHir phase was matched using a radial composite flow model with increasing transmissivity away from the wellbore. The analysis plots and results are presented in Appendix 2-49.

Selected representative parameters

The recommended transmissivity of 3.6E–7 m^2/s was derived from the analysis of the CHi phase (outer zone), which is showing the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E–7 to 7.0E–7 m^2/s (encompasses the analysis results of the CHir phase and CHi phase inner zone). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8,660.1 kPa.

The analysis of the CHi and CHir phases show good consistency No further analysis is recommended.

6.2.41 Section 862.35–882.35 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 198 kPa, followed by a pressure recovery phase. No hydraulic connection between the test section and the adjacent sections was observed. The automatic rate control functioned well. The injection rate decreased from approx 0.25 L/min at start of the CHi phase to 0.1 L/min at the end, indicating relatively low interval transmissivity. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. The CHi phase derivative shows a stabilization at late times indicating radial flow geometry. The CHi phase was matched using a radial composite flow model with increasing transmissivity away from the borehole. The CHir derivative shows a slight middle time stabilisation, followed by a downward trend and a further stabilization at late times. This response is typical for an increase in transmissivity away from the wellbore. The CHir phase was matched using a radial composite flow model with increasing transmissivity away from the wellbore. The analysis plots and results are presented in Appendix 2-50.

Selected representative parameters

The recommended transmissivity of 1.2E–7 m^2/s was derived from the analysis of the CHi phase (outer zone), which is showing the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 5.0E–8 to 3.0E–7 m^2/s (encompasses the analysis results of the CHir phase and CHi phase inner zone). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8,707.1 kPa.

The analysis of the CHi and CHir phases show good consistency No further analysis is recommended.

6.2.42 Section 883.35–903.35 m, test no 1, injection

Comments to test

The test was composed of a constant pressure injection test phase with a pressure difference of 226 kPa, followed by a pressure recovery phase. No hydraulic connection between the test section and the adjacent sections was observed. The CHi phase was conducted directly from the injection vessel with N2 backpressure, without automatic rate control. Because of this, the pressure decreased during the CHi phase by 7 kPa. The injection rate decreased from approx 0.2 L/min at start of the CHi phase to 0.02 L/min at the end, indicating low interval transmissivity. Both phases are adequate for quantitative analysis.

Flow regime and calculated parameters

The flow dimension is interpreted from the slope of the semi-log derivative plotted in log-log coordinates. The CHi phase derivative shows a stabilization at middle and late times indicating radial flow geometry. The CHi phase was matched using a radial composite flow model with decreasing transmissivity away from the wellbore. The CHir derivative shows a stabilization at middle and late times indicating radial flow geometry. The CHir phase was matched using a radial composite flow model with decreasing transmissivity away from the wellbore. The analysis plots and results are presented in Appendix 2-51.

Selected representative parameters

The recommended transmissivity of 5.2E–9 m^2/s was derived from the analysis of the CHir phase (outer zone), which is showing the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 3.0E–9 to 9.0E–9 m^2/s (encompasses the analysis results of the CHi phase and CHir phase inner zone). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8,907.6 kPa.

The analysis of the CHi and CHir phases show good consistency No further analysis is recommended.

7 Synthesis

The synthesis chapter summarizes the basic test parameters and analysis results. In addition, the correlation between steady state and transient transmissivities as well as between the matched and the theoretical wellbore storage (WBS) coefficient are presented and discussed.

7.1 Summary of results

Table 7-1. General test data from constant head injection tests in KAV04A.

Borehole secup (m)	Borehole seclow (m)	Date and time for test, start YYYYMMDD hh:mm	Date and time for test, stop YYYYMMDD hh:mm	Q_p (m**3/s)	Q_m (m**3/s)	tp (s)	t_F (s)	p_0 (kPa)	p_i (kPa)	p_p (kPa)	p_F (kPa)	Te_w (°C)	Test phases measured Analysed test phases marked bold	
105.17	205.17	040726 17:12	040726 18:38	1.61E-05	1.74E-05	1800	1800	2022	2047	2045	2049	10.41	CHi	CHir
205.26	305.26	040727 16:55	040728 10:11	1.99E-04	2.58E-04	1800	5400	3010	3015	3213	3034	11.62	CHi	CHir
305.33	405.33	040728 11:41	040728 13:44	1.78E-05	1.94E-05	1800	36000	3993	3995	4194	4000	12.90	CHi	CHir
405.42	505.42	040728 14:57	040728 16:46	7.54E-05	7.85E-05	1800	1800	4982	4975	5174	4981	14.41	CHi	CHir
505.43	605.43	040729 10:58	040727 14:25	3.83E-05	3.93E-05	1800	1800	5947	5962	6153	5968	16.21	CHi	CHir
605.57	705.57	040729 17:56	040729 19:50	3.75E-05	4.25E-05	1800	1800	6984	6963	7163	6963	17.69	CHi	CHir
704.00	804.00	040730 13:58	040730 16:06	2.95E-04	3.19E-04	1800	1800	7936	7938	8137	7937	19.17	CHi	CHir
800.81	900.81	040730 19:06	040730 19:06	8.88E-05	9.48E-05	1800	1800	8901	8903	9101	8909	20.67	CHi	CHir
898.20	998.20	040731 10:54	040731 14:25	8.33E-08	8.33E-08	1800	1800	9865	9964	10259	10189	22.27	PI	
105.17	125.17	040802 18:44	040802 20:25	1.22E-05	1.28E-05	1200	1200	1238	1258	1457	1259	9.19	CHi	CHir
125.17	145.17	040803 09:57	040803 11:44	3.17E-07	3.67E-07	1200	1200	1433	1452	1743	1451	9.49	CHi	CHir
145.17	165.17	040803 12:33	040803 14:21	7.17E-07	1.03E-06	1200	1200	1629	1646	1944	1647	9.78	CHi	CHir
165.17	185.17	040803 15:49	040803 17:12	4.50E-07	5.00E-07	1200	1200	1824	1842	2137	1843	10.04	CHi	CHir
185.17	205.17	040803 17:57	040804 04:57	5.43E-06	5.62E-06	900	36000	2026	2039	2316	2041	10.30	CHi	CHir
205.26	225.26	040804 09:32	040804 11:49	#NV	#NV	18	2400	2220	2337	2650	2486	10.55	PI	
225.26	245.26	040804 12:42	040804 14:07	6.50E-06	7.42E-06	1200	1200	2416	2426	2625	2431	10.81	CHi	CHir
245.26	265.26	040804 16:03	040805 04:30	2.06E-04	2.71E-04	1200	36120	2617	2633	2829	2623	11.08	CHi	CHir
265.26	285.26	040805 11:04	040805 12:34	1.47E-05	1.60E-05	1200	1200	2811	2816	3016	2819	11.25	CHi	CHir
285.26	305.26	040805 13:16	040805 16:00	4.67E-06	5.00E-06	1200	1200	3009	3020	3218	3021	11.55	CHi	CHir
305.33	325.33	040805 16:42	040805 18:40	4.67E-06	4.67E-06	18	2400	3207	3223	3456	3256	11.87	PI	
325.33	345.33	040805 19:28	040806 06:54	3.10E-08	3.10E-08	36000	1200	3404	3414	3494	3442	12.16	PI	SI
345.33	365.33	040806 09:21	040806 10:49	3.50E-06	3.83E-06	1200	1200	3593	3597	3795	3599	12.47	CHi	CHir
365.33	385.33	040806 11:37	040806 13:11	1.17E-06	1.28E-06	1200	1200	3794	3795	3993	3796	12.71	CHi	CHir
385.33	405.33	040806 13:56	040806 15:22	1.58E-05	1.65E-05	1200	1200	3993	3994	4194	3998	13.02	CHi	CHir
405.42	425.42	040806 16:48	040806 18:15	9.50E-07	1.43E-06	1200	1200	4193	4195	4419	4252	13.30	CHi	CHir
425.02	445.02	040807 10:06	040807 11:59	3.75E-05	4.25E-05	9.6	2400	4374	4422	4692	4676	13.64	PI	

Borehole secup (m)	Borehole seclow (m)	Date and time for test, start YYYYMMDD hh:mm	Date and time for test, stop YYYYMMDD hh:mm	Q_p (m**3/s)	Q_m (m**3/s)	tp (s)	t_F (s)	p_0 (kPa)	p_i (kPa)	p_p (kPa)	p_F (kPa)	Te_w (°C)	Test phases measured Analysed test phases marked bold	
445.02	465.02	040807 12:16	040807 13:49	3.40E-06	3.40E-06	9.6	2400	4573	4586	4843	4640	13.90	PI	
465.02	485.02	040807 14:33	040807 16:07	5.00E-07	6.67E-07	1200	1200	4773	4770	5097	4770	14.21	CHi	CHir
485.43	505.43	040807 19:16	040807 21:21	6.93E-05	7.20E-05	2400	2400	4977	4970	5169	4974	14.58	CHi	CHir
505.43	525.43	040808 09:08	040808 10:46	5.38E-06	5.58E-06	1200	1200	5173	5169	5367	5169	14.89	CHi	CHir
525.43	545.43	040808 11:29	040808 13:09	2.42E-05	2.65E-05	1200	1200	5373	5367	5567	5369	15.24	CHi	CHir
545.43	565.43	040808 14:04	040808 15:35	9.50E-07	1.03E-06	1200	1200	5572	5565	5765	5567	15.49	CHi	CHir
565.43	585.43	040808 17:16	040808 18:39	1.04E-05	1.10E-05	1200	1200	5770	5764	5962	5766	15.80	CHi	CHir
585.43	605.43	040809 09:16	040809 10:44	3.45E-06	3.67E-06	1200	1200	5962	5959	6164	5961	16.16	CHi	CHir
605.57	625.57	040809 11:32	040809 13:00	4.05E-06	4.48E-06	1200	1200	6164	6159	6352	6161	16.41	CHi	CHir
625.57	645.57	040809 13:48	040809 15:19	4.80E-06	5.15E-06	1200	1200	6365	6361	6546	6367	16.72	CHi	CHir
645.57	665.57	040809 16:46	040809 18:58	5.17E-07	5.50E-07	1200	3600	6565	6562	6818	6560	17.05	CHi	CHir
665.57	685.57	040810 09:01	040804 10:25	8.17E-07	9.83E-07	1200	1200	6755	6755	7000	6769	17.42	CHi	CHir
685.57	705.57	040810 11:04	040810 12:35	2.23E-05	2.73E-05	1200	1200	6964	6963	7163	6963	17.68	CHi	CHir
698.07	718.07	040810 13:15	040810 14:46	2.18E-04	2.30E-04	1200	1200	7081	7082	7280	7083	17.86	CHi	CHir
711.07	731.07	040810 15:46	040810 17:02	2.24E-04	2.48E-04	1200	1200	7212	7212	7424	7213	18.02	CHi	CHir
731.07	751.07	040811 09:54	040811 09:55	2.50E-07	2.67E-07	1200	1200	7405	7408	7662	7407	18.31	CHi	CHir
751.07	771.07	040811 12:24	040811 13:49	6.17E-05	7.17E-05	1200	1200	7605	7603	7801	7604	18.63	CHi	CHir
771.07	791.07	040811 15:01	040811 16:51	5.63E-07	6.50E-07	1200	1200	7805	7806	8036	7805	18.95	CHi	CHir
791.07	811.07	040811 17:54	040811 19:36	2.07E-05	2.23E-05	1200	1200	8005	8003	8203	8003	19.26	CHi	CHir
800.81	820.81	040812 09:04	040812 10:34	3.33E-05	3.57E-05	1200	1200	8101	8098	8296	8098	19.42	CHi	CHir
820.81	840.81	040812 11:30	040812 12:56	2.17E-07	2.33E-07	1200	1200	8297	8298	8515	8299	19.74	CHi	CHir
837.11	857.11	040812 13:51	040812 15:17	7.13E-05	8.10E-05	1200	1200	8460	8459	8659	8466	19.97	CHi	CHir
857.11	877.11	040812 16:34	040812 18:18	3.40E-06	3.57E-06	1200	1200	8661	8661	8861	8601	20.30	CHi	CHir
862.35	882.35	040813 09:03	040813 10:31	1.58E-06	1.70E-06	1200	1200	8709	8708	8908	8709	20.39	CHi	CHir
883.35	903.35	040813 11:27	040813 12:18	3.17E-07	4.17E-07	1200	2400	8916	8916	9145	8932	20.75	CHi	CHir

#NV Not analysed.
CHi Constant head injection phase.
CHir Recovery phase following the constant head injection phase.
PI Pulse injection.
SI Slug injection.

Table 7-2. Results from analysis of constant head tests in KAV04A.

Interval position		Stationary flow parameters		Transient analysis													Static conditions	
				Flow regime		Formation parameters												
up	low	Q/s	T_M	Perturb.	Recovery	T_{f1}	T_{f2}	T_{s1}	T_{s2}	T_T	T_{TMIN}	T_{TMAX}	C	ξ	dt_1	dt_2	p*	h_{wif}
m btoc	m btoc	m²/s	m²/s	Phase	Phase	m²/s	m²/s	m²/s	m²/s	m²/s	m²/s	m²/s	m³/Pa	–	min	min	kPa	masl
105.17	205.17	7.96E-07	1.04E-06	WBS22	WBS22	8.6E-07	1.7E-06	7.7E-07	3.9E-06	1.7E-06	5.0E-07	5.0E-06	5.37E-10	2.3	1	12	2047.2	5.47
205.26	305.26	9.84E-06	1.28E-05	WBS2	WBS22	#NV	4.3E-06	1.1E-05	5.7E-06	5.7E-06	5.0E-06	2.0E-05	3.21E-08	–5.2	1	42	3025.3	5.36
305.33	405.33	8.77E-07	1.14E-06	WBS2	WBS22	#NV	6.1E-06	4.1E-06	9.1E-06	6.1E-06	7.0E-07	7.0E-06	6.51E-10	31.1	1	12	3998.8	4.79
405.42	505.42	3.72E-06	4.84E-06	WBS22	WBS22	4.1E-06	9.1E-06	3.4E-06	1.4E-05	9.1E-06	3.0E-06	2.0E-05	7.80E-10	0.0	1	30	4975.5	4.54
505.43	605.43	1.97E-06	2.56E-06	WBS22	WBS2	1.9E-06	6.4E-06	#NV	7.4E-06	7.4E-06	1.0E-06	8.0E-06	1.05E-09	15.0	1	12	5964.5	5.67
605.57	705.57	1.84E-06	2.40E-06	WBS2	WBS2	#NV	1.7E-06	#NV	3.7E-06	3.7E-06	8.0E-07	5.0E-06	9.23E-10	3.5	1	18	6959.3	7.29
704.00	804.00	1.45E-05	1.89E-05	WBS2	WBS22	#NV	2.1E-05	1.2E-05	6.0E-05	2.1E-05	1.0E-05	7.0E-05	1.78E-08	–0.1	6	18	7936.9	8.87
800.81	900.81	4.40E-06	5.73E-06	WBS22	WBS2	4.5E-06	9.0E-06	#NV	9.9E-06	9.0E-06	3.0E-06	2.0E-05	2.31E-09	5.6	1	18	8904.9	11.14
898.20	998.20	#NV	#NV	#NV	WBS2	#NV	#NV	#NV	2.4E-11	2.4E-11	8.0E-12	5.0E-11	2.72E-10	–3.0	1	30	#NV	#NV
105.17	125.17	6.00E-07	6.27E-07	WBS2	WBS2	#NV	6.5E-07	#NV	2.7E-06	6.5E-07	5.0E-07	3.0E-06	2.94E-10	2.3	1	18	1259.3	4.94
125.17	145.17	1.07E-08	1.12E-08	WBS2	WBS2	#NV	8.3E-09	#NV	2.1E-08	2.1E-08	7.0E-09	3.0E-08	6.29E-11	9.7	1	12	1448.9	4.32
145.17	165.17	2.36E-08	2.47E-08	WBS2	WBS2	#NV	3.3E-08	#NV	6.8E-08	6.8E-08	2.0E-08	8.0E-08	8.24E-11	9.6	1	6	1644.5	4.31
165.17	185.17	1.50E-08	1.57E-08	WBS2	WBS2	#NV	1.4E-08	#NV	3.3E-08	1.4E-08	1.0E-08	5.0E-08	6.24E-11	3.3	1	12	1841.6	4.46
185.17	205.17	1.92E-07	2.01E-07	WBS2	WBS2	#NV	1.3E-07	#NV	2.2E-07	2.2E-07	1.0E-07	5.0E-07	6.74E-10	3.6	1	7	2040.3	4.77
205.26	225.26	#NV	#NV	#NV	WBS2	#NV	#NV	#NV	5.9E-11	5.9E-11	2.0E-11	1.0E-10	4.33E-11	–0.1	1	42	#NV	#NV
225.26	245.26	3.20E-07	3.35E-07	WBS2	WBS22	#NV	2.5E-07	2.8E-07	9.4E-07	2.8E-07	1.0E-07	1.0E-06	9.61E-11	–1.2	1	18	2427.8	4.29
245.26	265.26	1.01E-05	1.05E-05	WBS2	WBS22	#NV	4.4E-06	1.4E-05	5.1E-06	5.1E-06	4.0E-06	2.0E-05	2.32E-08	–5.1	1	18	2624.3	4.38
265.26	285.26	7.19E-07	7.53E-07	WBS22	WBS2	5.4E-07	8.1E-07	#NV	2.0E-06	8.1E-07	5.0E-07	2.0E-06	4.16E-10	–1.7	1	18	2819.8	4.36
285.26	305.26	2.31E-07	2.42E-07	WBS2	WBS2	#NV	2.5E-07	#NV	8.1E-07	2.5E-07	1.0E-07	1.0E-06	9.05E-11	–0.1	1	18	3021.7	4.99
305.33	325.33	#NV	#NV	#NV	WBS2	#NV	#NV	#NV	2.0E-10	2.0E-10	8.0E-11	5.0E-10	4.33E-11	–0.4	6	36	#NV	#NV
325.33	345.33	3.80E-09	3.98E-09	#NV	WBS2	#NV	#NV	#NV	3.0E-09	3.0E-09	1.0E-09	5.0E-09	4.61E-08	0.0	60	420	#NV	#NV
345.33	365.33	1.73E-07	1.81E-07	WBS22	WBS2	1.5E-07	3.0E-07	#NV	4.6E-07	4.6E-07	1.0E-07	5.0E-07	1.97E-10	8.8	1	6	3599.2	3.95
365.33	385.33	5.78E-08	6.05E-08	WBS22	WBS2	4.8E-08	7.5E-08	#NV	1.5E-07	7.5E-08	3.0E-08	3.0E-07	9.60E-11	9.2	1	18	3796.2	4.08
385.33	405.33	7.77E-07	8.12E-07	WBS22	WBS2	7.2E-07	2.3E-06	#NV	2.9E-06	2.9E-06	5.0E-07	4.0E-06	1.06E-10	14.9	1	12	3997.7	4.68
405.42	425.42	4.16E-08	4.35E-08	WBS22	WBS22	1.1E-07	1.9E-08	1.8E-07	2.1E-08	1.9E-08	1.0E-08	2.0E-07	1.54E-10	0.0	1	20	4193.4	4.58
425.02	445.02	#NV	#NV	#NV	WBS22	#NV	#NV	3.4E-11	1.1E-12	1.1E-12	5.0E-13	5.0E-11	1.03E-10	0.0	1	30	#NV	#NV
445.02	465.02	#NV	#NV	#NV	WBS22	#NV	#NV	4.8E-09	3.3E-10	3.3E-10	5.0E-11	5.0E-09	1.32E-10	–0.2	1	24	#NV	#NV
465.02	485.02	1.50E-08	1.57E-08	WBS2	WBS22	#NV	1.5E-08	2.8E-08	2.8E-07	1.5E-08	1.0E-08	3.0E-07	5.49E-11	0.0	1	6	4770.0	3.94
485.43	505.43	3.42E-06	3.58E-06	WBS22	WBS2	3.6E-06	9.4E-06	#NV	9.4E-06	9.4E-06	2.0E-06	1.0E-05	2.23E-09	3.1	2	30	4971.1	4.09

Interval position		Stationary flow parameters		Transient analysis													Static conditions	
				Flow regime		Formation parameters												
up	low	Q/s	T_M	Perturb.	Recovery	T_{f1}	T_{f2}	T_{s1}	T_{s2}	T_T	T_{TMIN}	T_{TMAX}	C	ξ	dt_1	dt_2	p*	h_{wif}
m btoc	m btoc	m²/s	m²/s	Phase	Phase	m²/s	m²/s	m²/s	m²/s	m²/s	m²/s	m²/s	m³/Pa	–	min	min	kPa	masl
505.43	525.43	2.67E-07	2.79E-07	WBS22	WBS2	2.3E-07	5.2E-07	#NV	6.2E-07	5.2E-07	1.0E-07	7.0E-07	1.22E-10	7.1	1	18	5170.6	4.49
525.43	545.43	1.19E-06	1.24E-06	WBS2	WBS2	#NV	1.3E-06	#NV	2.7E-06	2.7E-06	1.0E-06	4.0E-06	4.08E-10	6.5	1	12	5369.2	4.80
545.43	565.43	4.66E-08	4.87E-08	WBS22	WBS2	3.6E-08	7.9E-08	#NV	1.5E-07	1.5E-07	2.0E-08	2.0E-07	5.43E-11	12.0	1	10	5566.2	4.95
565.43	585.43	5.16E-07	5.40E-07	WBS2	WBS2	#NV	5.5E-07	#NV	9.2E-07	9.2E-07	4.0E-07	2.0E-06	5.61E-10	3.7	1	18	5761.8	4.94
585.43	605.43	1.65E-07	1.73E-07	WBS22	WBS22	1.5E-07	2.9E-07	1.5E-07	3.8E-07	3.8E-07	1.0E-07	5.0E-07	5.63E-11	0.2	1	12	5959.2	5.13
605.57	625.57	2.06E-07	2.15E-07	WBS22	WBS2	2.9E-07	9.7E-08	#NV	8.3E-07	2.9E-07	8.0E-08	1.0E-06	8.02E-11	15.0	1	18	6158.5	5.39
625.57	645.57	2.55E-07	2.66E-07	WBS2	WBS22	#NV	2.6E-07	2.1E-07	3.3E-07	3.3E-07	1.0E-07	5.0E-07	8.69E-11	–1.1	1	12	6360.2	6.01
645.57	665.57	1.98E-08	2.07E-08	WBS22	WBS22	1.2E-08	4.6E-08	1.8E-08	1.7E-07	4.6E-08	1.0E-08	2.0E-07	4.59E-11	0.0	1	18	6559.4	6.39
665.57	685.57	3.27E-08	3.42E-08	WBS22	WBS22	3.0E-08	1.7E-08	5.9E-08	2.5E-08	2.5E-08	1.0E-08	6.0E-08	4.02E-11	2.7	1	18	6745.9	5.47
685.57	705.57	1.10E-06	1.15E-06	WBS22	WBS2	1.2E-06	2.0E-07	#NV	3.0E-06	3.0E-06	1.0E-06	4.0E-06	3.74E-10	6.6	1	18	6953.6	6.71
698.07	718.07	1.08E-05	1.13E-05	WBS22	WBS2	1.4E-05	2.3E-05	#NV	3.9E-05	2.3E-05	1.0E-05	4.0E-05	1.54E-08	0.0	1	18	7083.3	7.49
711.07	731.07	1.03E-05	1.08E-05	WBS2	WBS2	#NV	1.3E-05	#NV	4.0E-05	4.0E-05	8.0E-06	8.0E-05	1.78E-08	12.3	1	6	7212.0	7.65
731.07	751.07	9.66E-09	1.01E-08	WBS22	WBS2	6.0E-09	1.0E-08	#NV	1.6E-08	1.0E-08	5.0E-09	5.0E-08	5.37E-11	0.0	1	18	7402.2	7.10
751.07	771.07	3.06E-06	3.20E-06	WBS22	WBS2	4.8E-06	1.9E-06	#NV	1.2E-05	1.9E-06	1.0E-06	2.0E-05	7.81E-10	0.0	1	18	7603.6	7.71
771.07	791.07	2.40E-08	2.51E-08	WBS22	WBS2	3.7E-08	1.5E-08	#NV	9.3E-08	9.3E-08	1.0E-08	2.0E-07	5.85E-11	15.2	1	12	7803.0	8.11
791.07	811.07	1.01E-06	1.06E-06	WBS2	WBS2	#NV	1.2E-06	#NV	3.8E-06	3.8E-06	9.0E-07	5.0E-06	3.51E-10	14.3	1	12	8003.3	8.61
800.81	820.81	1.65E-06	1.73E-06	WBS2	WBS2	#NV	2.0E-06	#NV	4.2E-06	4.2E-06	1.0E-06	6.0E-06	9.92E-10	8.0	1	6	8096.9	8.44
820.81	840.81	9.79E-09	1.02E-08	WBS2	WBS2	#NV	7.2E-09	#NV	1.6E-08	1.6E-08	6.0E-09	3.0E-08	5.06E-11	4.9	1	10	8293.4	8.56
837.11	857.11	3.50E-06	3.66E-06	WBS22	WBS22	5.0E-06	1.4E-06	5.7E-06	8.6E-06	8.6E-06	1.0E-06	9.0E-06	9.58E-10	1.1	1	18	8461.9	9.50
857.11	877.11	1.67E-07	1.74E-07	WBS22	WBS22	1.4E-07	3.6E-07	2.8E-07	6.1E-07	3.6E-07	1.0E-07	7.0E-07	1.22E-10	0.0	1	18	8660.1	9.79
862.35	882.35	7.84E-08	8.21E-08	WBS22	WBS22	6.6E-08	1.2E-07	8.5E-08	1.9E-07	1.2E-08	5.0E-08	3.0E-07	8.24E-11	0.0	1	18	8707.1	9.37
883.35	903.35	1.37E-08	1.44E-08	WBS22	WBS22	6.0E-09	4.8E-09	7.0E-09	5.2E-09	5.2E-09	3.0E-09	9.0E-09	5.88E-11	–2.7	1	30	8907.6	8.89

1 T1 and T2 refer to the transmissivity(s) derived from the analysis while using the recommended flow model. In case a homogeneous flow model was recommended only one T value is reported, in case a two zones composite model was recommended both T1 and T2 are given.

The recommended transmissivity T_T typically refers to the T2 value (far field transmissivity).

2 The parameter p* denoted the static formation p
extrapolation.

3 The flow regime description refers to The recommended
flow dimension used in the analysis (1 = linear flow, 2
used in the analysis, if two numbers are given (WBS22 or 22) a 2 zones composite model was used.

#NV Not analysed.

The Figures 7-1 to 7-3 present the transmissivity, conductivity and hydraulic freshwater head profiles.

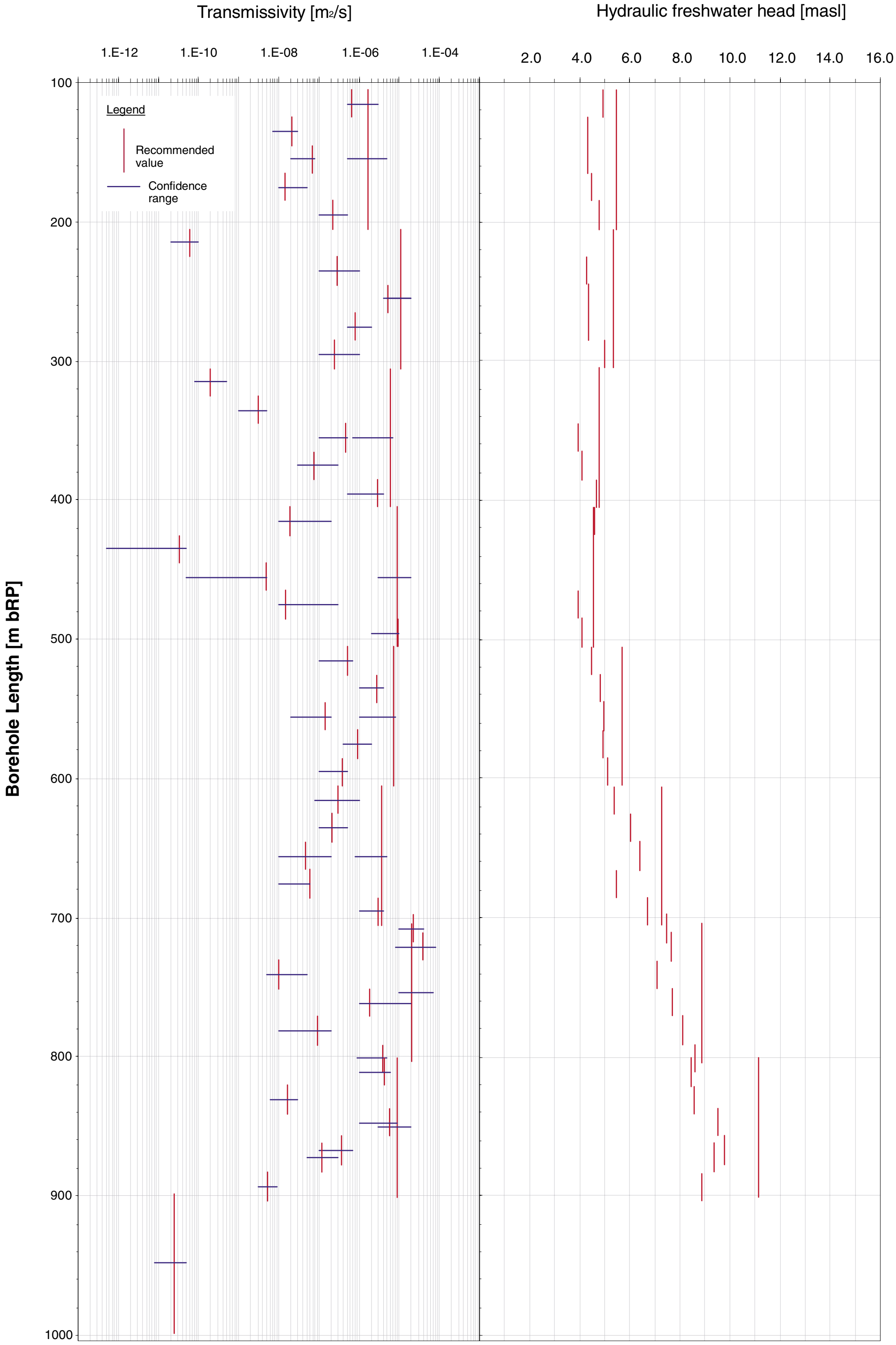


Figure 7-1. *Results summary – profiles of transmissivity and equivalent freshwater head, transmissivities derived from injectiontests, freshwater head extrapolated.*

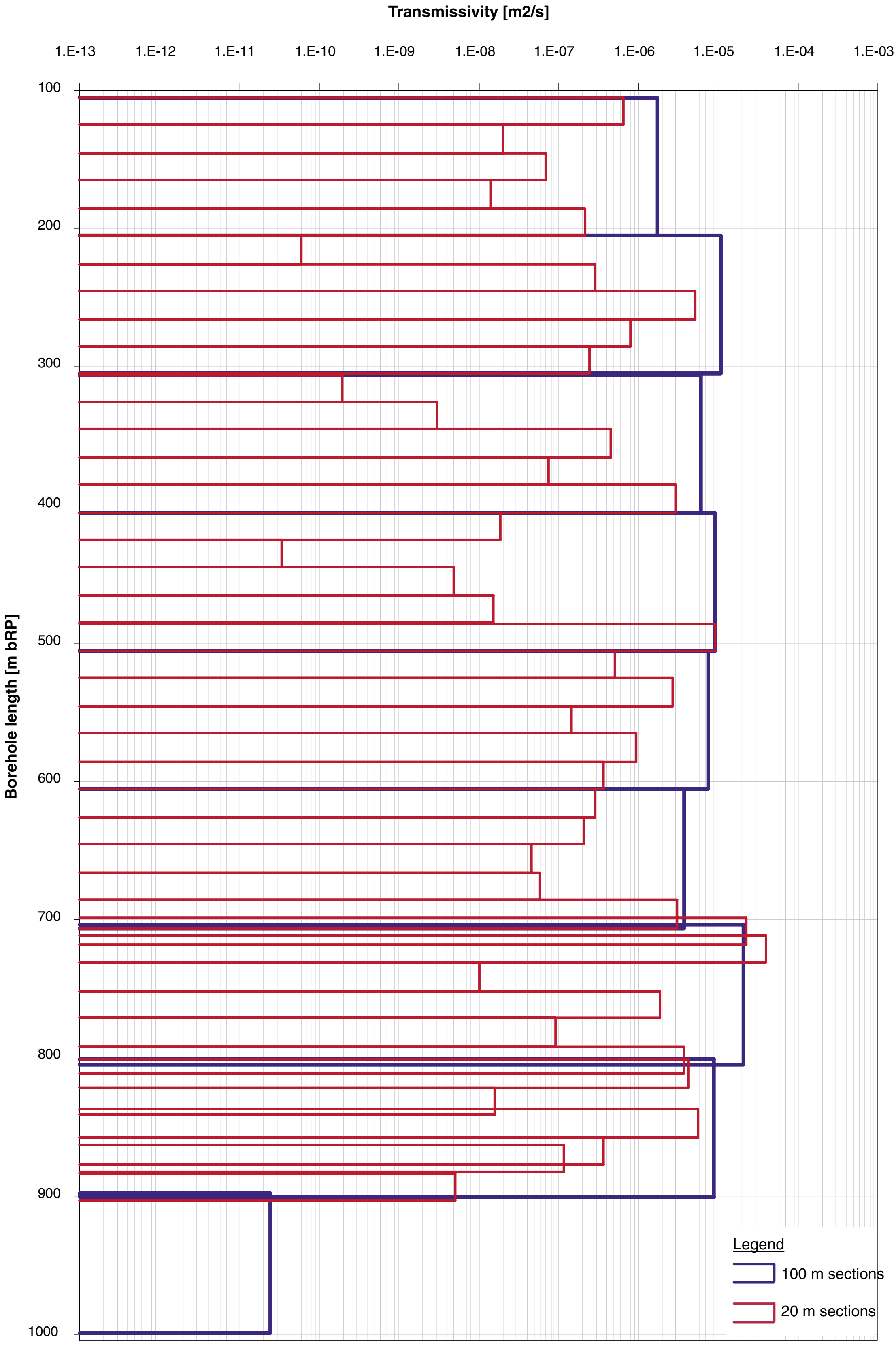


Figure 7-2. Results summary – profile of transmissivity.

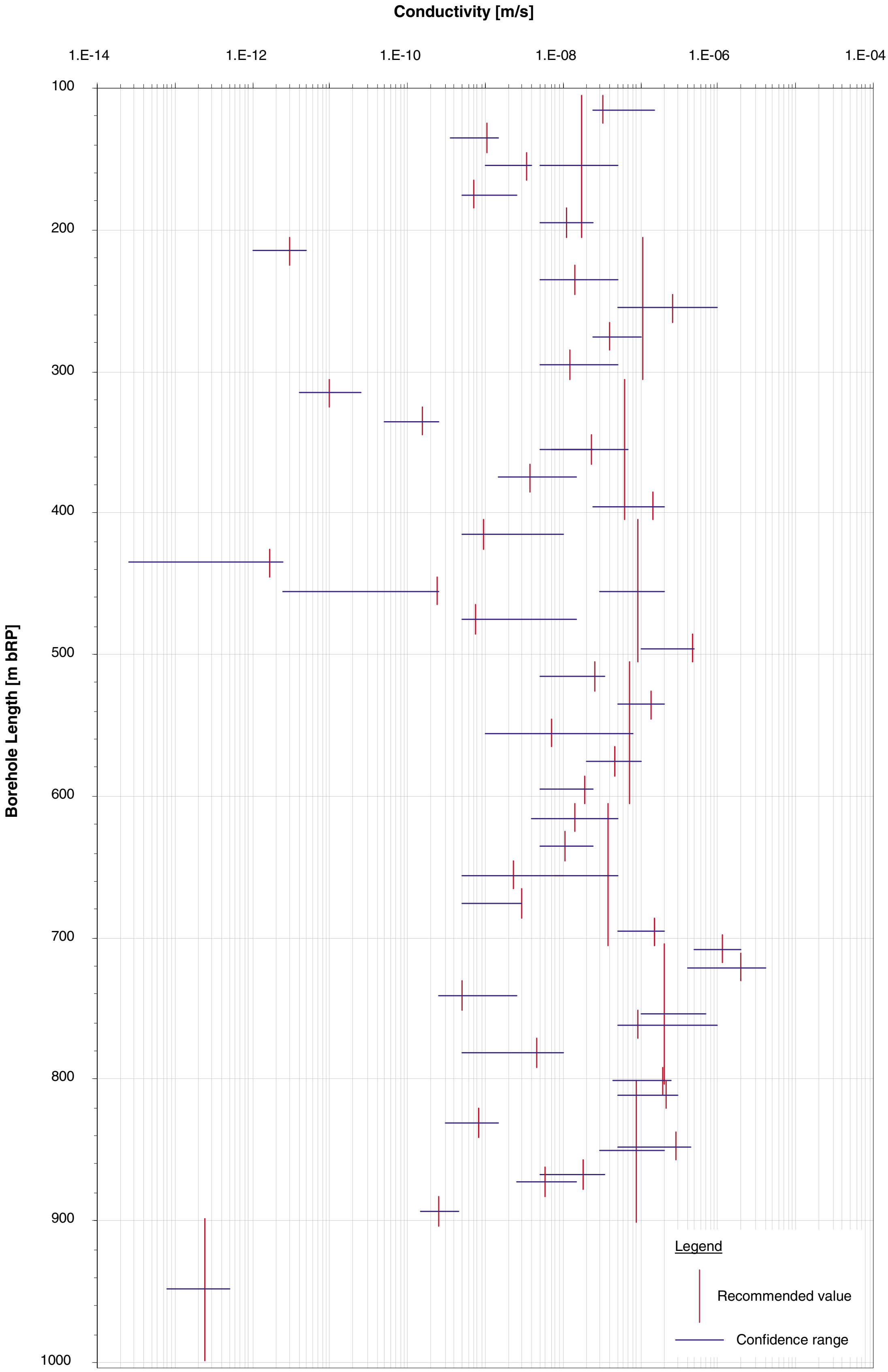


Figure 7-3. *Results summary – profile of hydraulic conductivity.*

7.2 Correlation analysis

A correlation analysis was used with the aim of examining the consistency of results and deriving general conclusion regarding the testing and analysis methods used.

7.2.1 Comparison of steady state and transient analysis results

The steady state derived transmissivities (T_M and Q/s) were compared in a cross-plot with the recommended transmissivity values derived from the transient analysis (see following figure).

The correlation analysis shows that all of the steady state derived transmissivities differ by less than one order of magnitude from the transmissivities derived from the transient analysis.

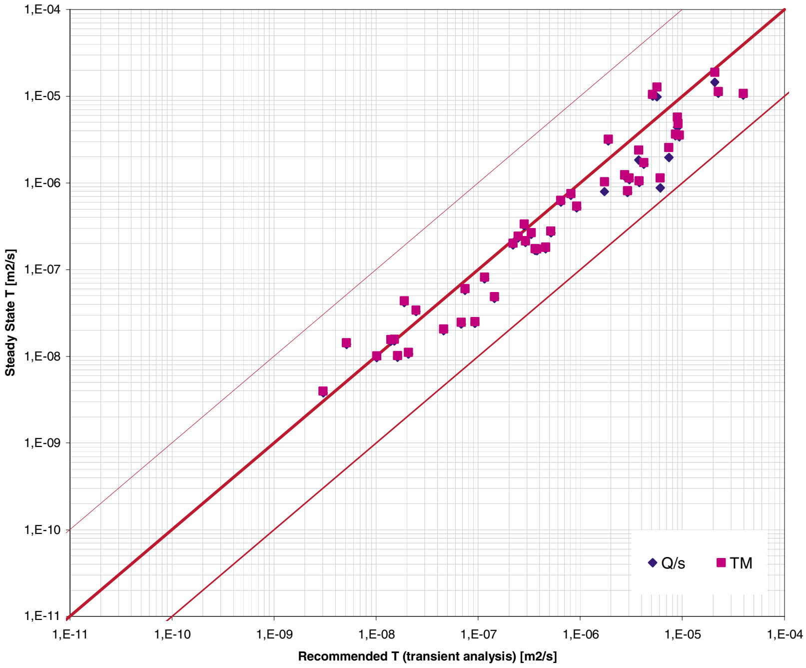


Figure 7-4. *Correlation analysis of transmissivities derived by steady state and transient methods.*

7.2.2 Comparison between the matched and theoretical wellbore storage coefficient

The wellbore storage coefficient describes the capacity of the test interval to store fluid as result to a unit pressure change in the interval. For a closed system (i.e. closed downhole valve) the theoretical value of the wellbore storage coefficient is given by the product between the interval volume and the test zone compressibility. The interval volume is calculated from the borehole radius and interval length. There are uncertainties concerning the interval volume calculation. Cavities or high transmissivity fractures intersecting the interval may enlarge the effective volume of the interval. The test zone compressibility is given by the sum of compressibilities of the individual components present in the interval (water, packer elements, other test tool components, and the borehole wall). A minimum value for the test zone compressibility is given by the water compressibility which is approx 5E–10 1/Pa. For the calculation of the theoretical wellbore storage coefficient a test zone compressibility of 7E–10 1/Pa was used. The matched wellbore storage coefficient is derived from the transient type curve analysis by matching the unit slope early times derivative plotted in log-log coordinates.

The following figure presents a cross-plot of the matched and theoretical wellbore storage coefficients.

It can be seen that the matched wellbore storage coefficients are up to three orders of magnitude larger than the theoretical values. A three orders of magnitude increase is difficult to explain by volume uncertainty. Even if large fractures are connected to the interval, a volume increase by three orders of magnitude does not seem probable. The discrepancy can be more likely explained by increased compressibility of the packer system. In order to better understand this phenomenon, a series of tool compressibility tests should be conducted in order to measure the tool compressibility and to assess to what extent the system behaves elastically.

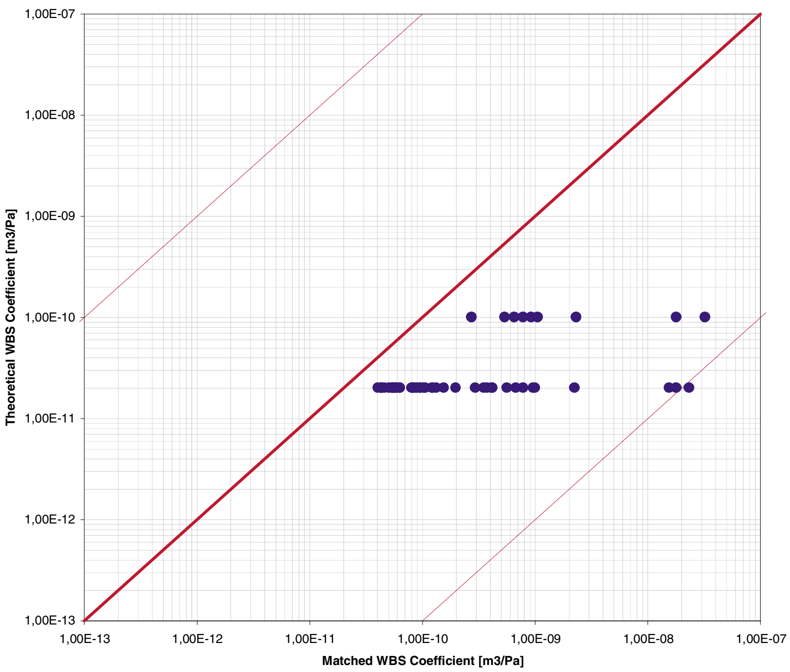


Figure 7-5. *Correlation analysis of theoretical and matched wellbore storage coefficients.*

8 Conclusions

8.1 Transmissivity

Figure 7-1 presents a profile of transmissivity, including the confidence ranges derived from the transient analysis. The method used for deriving the recommended transmissivity and its confidence range is described in Section 5.5.7.

Whenever possible, the transmissivities derived are representative for the "undisturbed formation" further away from the borehole. The borehole vicinity was typically described by using a skin effect.

In some cases, no injection test could be performed due to the fact that the flow rates during the CHi phase were below the range of the flowmeter (< 0.5 mL/min). In such cases a pulse injection (Pi) or slug injection (Si) was performed alternatively. The recommended transmissivities of these tests analyses range between 1.1E–12 m^2/s and 3.3E–10 m^2/s. Recommended transmissivities of the injection tests range typically between 1.0E–8 m^2/s and 4.0E–5 m^2/s.

The transmissivity profile in Figure 7-1 shows for the 100 m sections from 105 to 900 m quite constant relatively high transmissivities of 1E–6 m^2/s to 2E–5 m^2/s, only in the deepest interval from 898 to 998 m the transmissivity is several orders of magnitude lower at 2E–11 m^2/s. For the 20 m sections, the transmissivities range typically from 1E–8 m^2/s to 3E–5 m^2/s, only in single sections between 200 and 465 m the transmissivities are several orders of magnitude lower.

Only two shorter sections show larger transmissivities than the appropriate longer interval (e.g. 698–718 and 711–731 m). This can be explained with crossflow and connection to the zone above. A connection to the upper zone is very hard to detect.

8.2 Equivalent freshwater head

Figure 7-1 presents a profile of the derived equivalent freshwater head expressed in meters above sea level. The method used for deriving the equivalent freshwater head is described in Section 5.5.6.

The head profile shows a freshwater head for the first zone between 105 and 505 m depth of about 5.5 to 4.0 m asl with a slightly downwards trend. Down to 900 m, the freshwater head increases continuously by approximately 1.5 m per 100 m depth. This can be explained by a higher salinity of the water down from ca. 525 m. The profile shows no distinct zones, which means that there is a good vertical connectivity in the formation around the borehole.

8.3 Flow regimes encountered

The flow models used in analysis were derived from the shape of the pressure derivative calculated with respect to log time and plotted in log-log coordinates.

In several cases the pressure derivative suggests a change of transmissivity with the distance from the borehole. In such cases a composite flow model was used in the analysis.

If there were different flow models matching the data in comparable quality, the simplest model was preferred.

In few cases very large skins has been observed. This is unusual and should be further examined. There are several possible explanations to this behaviour:

- If the behaviour is to be completely attributed to changes of transmissivity in the formation, this indicates the presence of larger transmissivity zones in the borehole vicinity, which could be caused by steep fractures that do not intersect the test interval, but are connected to the interval by lower transmissivity fractures. The fact that in many cases the test derivatives of adjacent test sections converge at late times seems to support this hypothesis.
- A further possibility is that the large skins are caused by turbulent flow taking place in the tool or in fractures connected to the test interval. This hypothesis is more difficult to examine. However, considering the fact that some high skins were observed in sections with transmissivities as low as 1E–8 m^2/s (which imply low flow rates) seems to speak against this hypothesis.

The flow dimension displayed by the test can be diagnosed from the slope of the pressure derivative. A slope of 0.5 indicates linear flow, a slope of 0 (horizontal derivative) indicates radial flow and a slope of –0.5 indicates spherical flow. The flow dimension diagnosis was commented for each of the tests. In all of the cases it was possible to get a good match quality by using radial flow geometry.

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APPENDIX 1

File Description Table

HYDROTESTING WITH PSS					DRILLHOLE IDENTIFICATION NO.: KAV04A				
TEST- AND FILEPROTOCOL					**Testorder dated : 2004-07-23**				
Teststart		Interval boundaries		Name of Datafiles		Testtype	Copied to	Plotted (date)	Sign.
Date	Time	Upper	Lower	(*.HT2-file)	(*.CSV-file)		disk/CD		
2004-07-26	10:34	105.17	205.17	__KAV04A_0105.17_200407261034.ht2	KAV04A_105.17-205.17_040726_1_CHir_Q_r.csv	CHir		2004-07-28	
2004-07-26	13:46	105.17	205.17	__KAV04A_0105.17_200407261712.ht2	KAV04A_105.17-205.17_040726_2_CHir_Q_r.csv	CHir		2004-07-28	
2004-07-27	16:55	205.26	305.26	__KAV04A_0205.26_200407271655.ht2	KAV04A_205.26-305.26_040727_1_CHir_Q_r.csv	CHir		2004-07-28	
2004-07-28	11:41	305.33	405.33	__KAV04A_0305.33_200407281141.ht2	KAV04A_305.33-405.33_040728_1_CHir_Q_r.csv	CHir		2004-07-28	
2004-07-28	14:57	405.42	505.42	__KAV04A_0405.42_200407281457.ht2	KAV04A_405.42-505.42_040728_1_CHir_Q_r.csv	CHir		2004-07-28	
2004-07-29	10:58	505.43	605.43	__KAV04A_0505.43_200407291058.ht2	KAV04A_505.43-605.43_040729_1_CHir_Q_r.csv	CHir		2004-07-29	
2004-07-29	17:56	605.57	705.57	__KAV04A_0605.57_200407291756.ht2	KAV04A_605.57-705.57_040729_1_CHir_Q_r.csv	CHir		2004-07-29	
2004-07-30	13:58	704.00	804.00	__KAV04A_0704.00_200407301358.ht2	KAV04A_704.00-804.00_040730_1_CHir_Q_r.csv	CHir		2004-07-30	
2004-07-30	19:06	800.81	900.81	__KAV04A_0800.81_200407301906.ht2	KAV04A_800.81-900.81_040730_1_CHir_Q_r.csv	CHir		2004-07-31	
2004-07-31	10:53	898.20	998.20	__KAV04A_0898.20_200407311053.ht2	KAV04A_898.20-998.20_040731_1_CHir_Q_r.csv	CHir		2004-07-31	
2004-08-02	18:44	105.17	125.17	__KAV04A_0105.17_200408021844.ht2	KAV04A_105.17-125.17_040802_1_CHir_Q_r.csv	CHir		2004-08-03	
2004-08-03	09:57	125.17	145.17	__KAV04A_0125.17_200408030957.ht2	KAV04A_125.17-145.17_040803_1_CHir_Q_r.csv	CHir		2004-08-03	
2004-08-03	12:33	145.17	165.17	__KAV04A_0145.17_200408031233.ht2	KAV04A_145.17-165.17_040803_1_CHir_Q_r.csv	CHir		2004-08-03	
2004-08-03	15:49	165.17	185.17	__KAV04A_0165.17_200408031549.ht2	KAV04A_165.17-185.17_040803_1_CHir_Q_r.csv	CHir		2004-08-03	
2004-08-03	17:57	185.17	205.17	__KAV04A_0185.17_200408031757.ht2	KAV04A_185.17-205.17_040803_1_CHir_Q_r.csv	CHir		2004-08-04	

HYDROTESTING WITH PSS					DRILLHOLE IDENTIFICATION NO.: KAV04A				
TEST- AND FILEPROTOCOL					**Testorder dated : 2004-07-23**				
Teststart		Interval boundaries		Name of Datafiles		Testtype	Copied to	Plotted	Sign.
Date	Time	Upper	Lower	(*.HT2-file)	(*.CSV-file)		disk/CD	(date)	
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2004-08-04	12:42	225.26	245.26	__KAV04A_0225.26_200408041242.ht2	KAV04A_225.26-245.26_040804_1_CHir_Q_r.csv	CHir		2004-08-04	
2004-08-04	16:02	245.26	265.26	__KAV04A_0245.26_200408041602.ht2	KAV04A_245.26-265.26_040804_1_CHir_Q_r.csv	CHir		2004-08-05	
2004-08-05	08:34	245.26	265.26	__KAV04A_0245.26_200408050834.ht2	KAV04A_245.26-265.26_040805_2_CHir_Q_r.csv	CHir		2004-08-05	
2004-08-05	11:04	265.26	285.26	__KAV04A_0265.26_200408051104.ht2	KAV04A_265.26-285.26_040805_1_CHir_Q_r.csv	CHir		2004-08-05	
2004-08-05	13:16	285.26	305.26	__KAV04A_0285.26_200408051316.ht2	KAV04A_285.26-305.26_040805_1_CHir_Q_r.csv	CHir		2004-08-05	
2004-08-05	16:41	305.33	325.33	__KAV04A_0305.33_200408051641.ht2	KAV04A_305.33-325.33_040805_1_Pi_Q_r.csv	Pi		2004-08-05	
2004-08-05	19:28	325.33	345.33	__KAV04A_0325.33_200408051928.ht2	KAV04A_325.33-345.33_040805_1_Si_Q_r.csv	Si		2004-08-06	
2004-08-06	09:20	345.33	365.33	__KAV04A_0345.33_200408060920.ht2	KAV04A_345.33-365.33_040806_1_CHir_Q_r.csv	CHir		2004-08-06	
2004-08-06	11:37	365.33	385.33	__KAV04A_0365.33_200408061137.ht2	KAV04A_365.33-385.33_040806_1_CHir_Q_r.csv	CHir		2004-08-06	
2004-08-06	13:56	385.33	405.33	__KAV04A_0385.33_200408061356.ht2	KAV04A_385.33-405.33_040806_1_CHir_Q_r.csv	CHir		2004-08-06	
2004-08-06	16:48	405.42	425.42	__KAV04A_0405.42_200408061648.ht2	KAV04A_405.42-425.42_040806_1_CHir_Q_r.csv	CHir		2004-08-06	
2004-08-07	10:06	425.02	445.02	__KAV04A_0425.02_200408071006.ht2	KAV04A_425.02-445.02_040807_1_Pi_Q_r.csv	Pi		2004-08-07	
2004-08-07	12:16	445.02	465.02	__KAV04A_0445.02_200408071216.ht2	KAV04A_445.02-465.02_040807_1_Pi_Q_r.csv	Pi		2004-08-07	
2004-08-07	14:33	465.02	485.02	__KAV04A_0465.02_200408071433.ht2	KAV04A_465.02-485.02_040807_1_CHir_Q_r.csv	CHir		2004-08-07	
2004-08-07	19:16	485.43	505.43	__KAV04A_0485.43_200408071916.ht2	KAV04A_485.43-505.43_040807_1_CHir_Q_r.csv	CHir		2004-08-08	

HYDROTESTING WITH PSS					DRILLHOLE IDENTIFICATION NO.: KAV04A				
TEST- AND FILEPROTOCOL					**Testorder dated : 2004-07-23**				
Teststart		Interval boundaries		Name of Datafiles		Testtype	Copied to	Plotted	Sign.
Date	Time	Upper	Lower	(*.HT2-file)	(*.CSV-file)		disk/CD	(date)	
2004-08-08	09:08	505.43	525.43	__KAV04A_0505.43_200408080908.ht2	KAV04A_505.43-525.43_040808_1_CHir_Q_r.csv	CHir		2004-08-08	
2004-08-08	11:29	525.43	545.43	__KAV04A_0525.43_200408081129.ht2	KAV04A_525.43-545.43_040808_1_CHir_Q_r.csv	CHir		2004-08-08	
2004-08-08	14:04	545.43	565.43	__KAV04A_0545.43_200408081404.ht2	KAV04A_545.43-565.43_040808_1_CHir_Q_r.csv	CHir		2004-08-08	
2004-08-08	17:16	565.43	585.43	__KAV04A_0565.43_200408081716.ht2	KAV04A_565.43-585.43_040808_1_CHir_Q_r.csv	CHir		2004-08-09	
2004-08-09	09:15	585.43	605.43	__KAV04A_0585.43_200408090915.ht2	KAV04A_585.43-605.43_040809_1_CHir_Q_r.csv	CHir		2004-08-09	
2004-08-09	11:32	605.57	625.57	__KAV04A_0605.57_200408091132.ht2	KAV04A_605.57-625.57_040809_1_CHir_Q_r.csv	CHir		2004-08-09	
2004-08-09	13:48	625.57	645.57	__KAV04A_0625.57_200408091348.ht2	KAV04A_625.57-645.57_040809_1_CHir_Q_r.csv	CHir		2004-08-09	
2004-08-09	16:46	645.57	665.57	__KAV04A_0645.57_200408091646.ht2	KAV04A_645.57-665.57_040809_1_CHir_Q_r.csv	CHir		2004-08-10	
2004-08-10	09:01	665.57	685.57	__KAV04A_0665.57_200408100901.ht2	KAV04A_665.57-685.57_040810_1_CHir_Q_r.csv	CHir		2004-08-10	
2004-08-10	11:04	685.57	705.57	__KAV04A_0685.57_200408101104.ht2	KAV04A_685.57-705.57_040810_1_CHir_Q_r.csv	CHir		2004-08-10	
2004-08-10	13:15	698.07	718.07	__KAV04A_0698.07_200408101315.ht2	KAV04A_698.07-718.07_040810_1_CHir_Q_r.csv	CHir		2004-08-10	
2004-08-10	15:46	711.07	731.07	__KAV04A_0711.07_200408101546.ht2	KAV04A_711.07-731.07_040810_1_CHir_Q_r.csv	CHir		2004-08-10	
2004-08-11	09:54	731.07	751.07	__KAV04A_0731.07_200408110954.ht2	KAV04A_731.07-751.07_040811_1_CHir_Q_r.csv	CHir		2004-08-11	
2004-08-11	12:24	751.07	771.07	__KAV04A_0751.07_200408111224.ht2	KAV04A_751.07-771.07_040811_1_CHir_Q_r.csv	CHir		2004-08-11	
2004-08-11	15:01	771.07	791.07	__KAV04A_0771.07_200408111501.ht2	KAV04A_771.07-791.07_040811_1_CHir_Q_r.csv	CHir		2004-08-11	

HYDROTESTING WITH PSS					DRILLHOLE IDENTIFICATION NO.: KAV04A				
TEST- AND FILEPROTOCOL					**Testorder dated : 2004-07-23**				
Teststart		Interval boundaries		Name of Datafiles		Testtype	Copied to	Plotted	Sign.
Date	Time	Upper	Lower	(*.HT2-file)	(*.CSV-file)		disk/CD	(date)	
2004-08-12	09:04	800.81	820.81	__KAV04A_0800.81_200408120904.ht2	KAV04A_800.81-820.81_040812_1_CHir_Q_r.XLS	CHir		2004-08-12	
2004-08-12	11:29	820.81	840.81	__KAV04A_0820.81_200408121129.ht2	KAV04A_820.81-840.81_040812_1_CHir_Q_r.csv	CHir		2004-08-12	
2004-08-12	13:51	837.11	857.11	__KAV04A_0837.11_200408121351.ht2	KAV04A_837.11-857.11_040812_1_CHir_Q_r.csv	CHir		2004-08-12	
2004-08-12	16:33	857.11	877.11	__KAV04A_0857.11_200408121633.ht2	KAV04A_857.11-837.11_040812_1_CHir_Q_r.csv	CHir		2004-08-13	
2004-08-13	09:03	862.35	882.35	__KAV04A_0862.35_200408130903.ht2	KAV04A_862.35-882.35_040813_1_CHir_Q_r.csv	CHir		2004-08-13	
2004-08-13	11:27	883.35	903.35	__KAV04A_0883.35_200408131127.ht2	KAV04A_883.35-903.35_040813_1_CHir_Q_r.csv	CHir		2004-08-13	

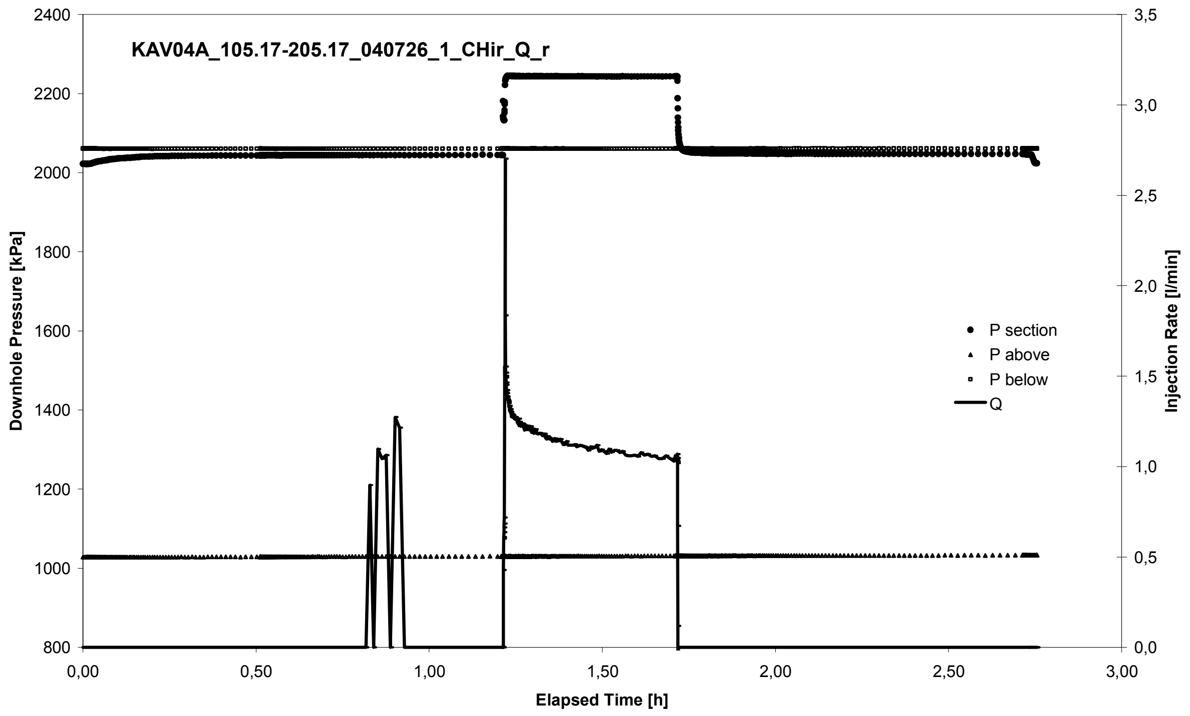
APPENDIX 2

Test Analyses Diagrams

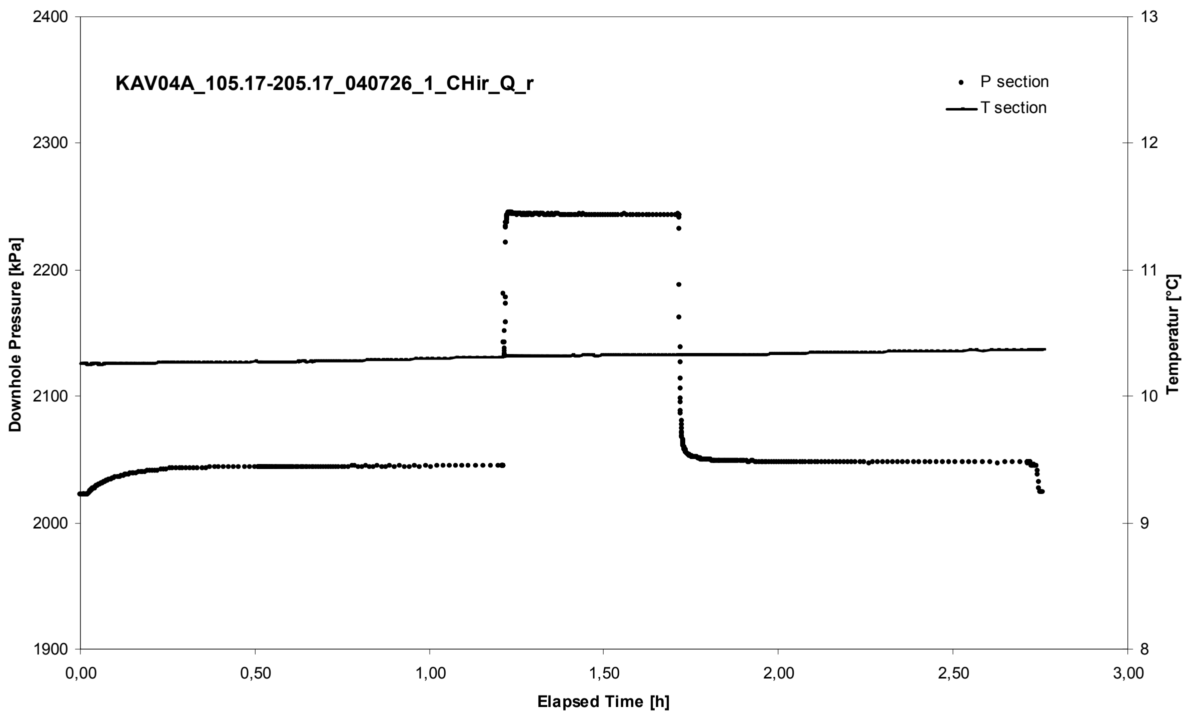
APPENDIX 2-1

Test 105,17 – 205,17 m

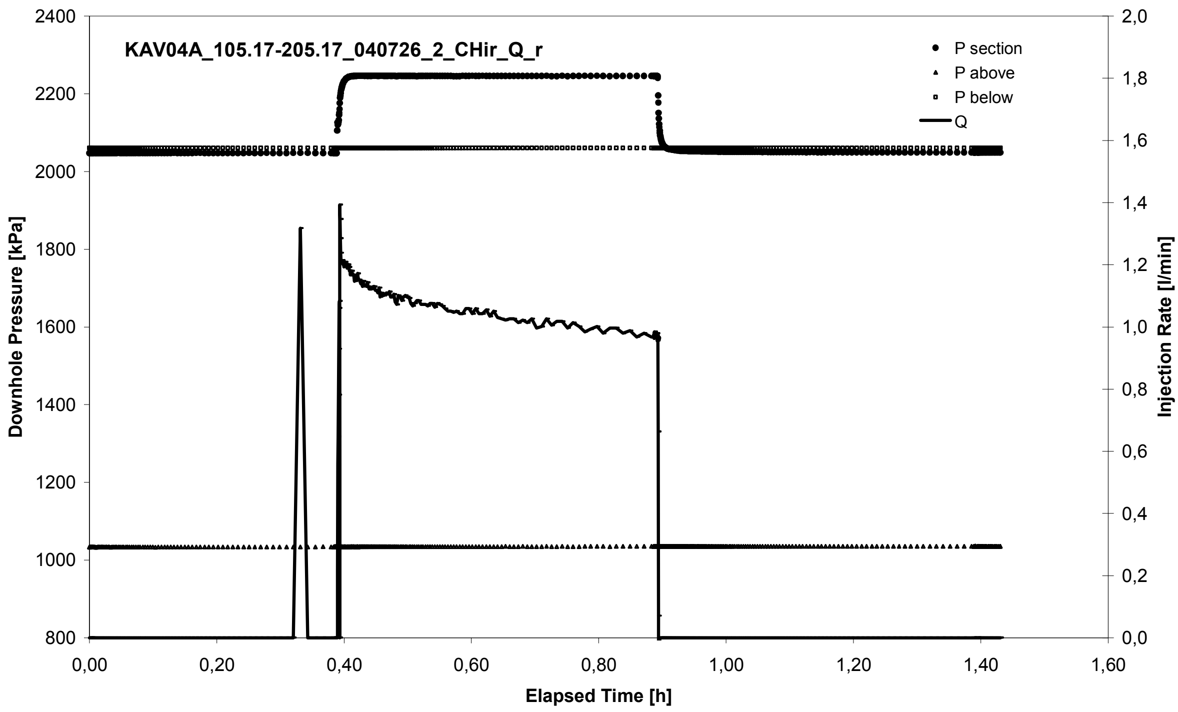
Analysis diagrams



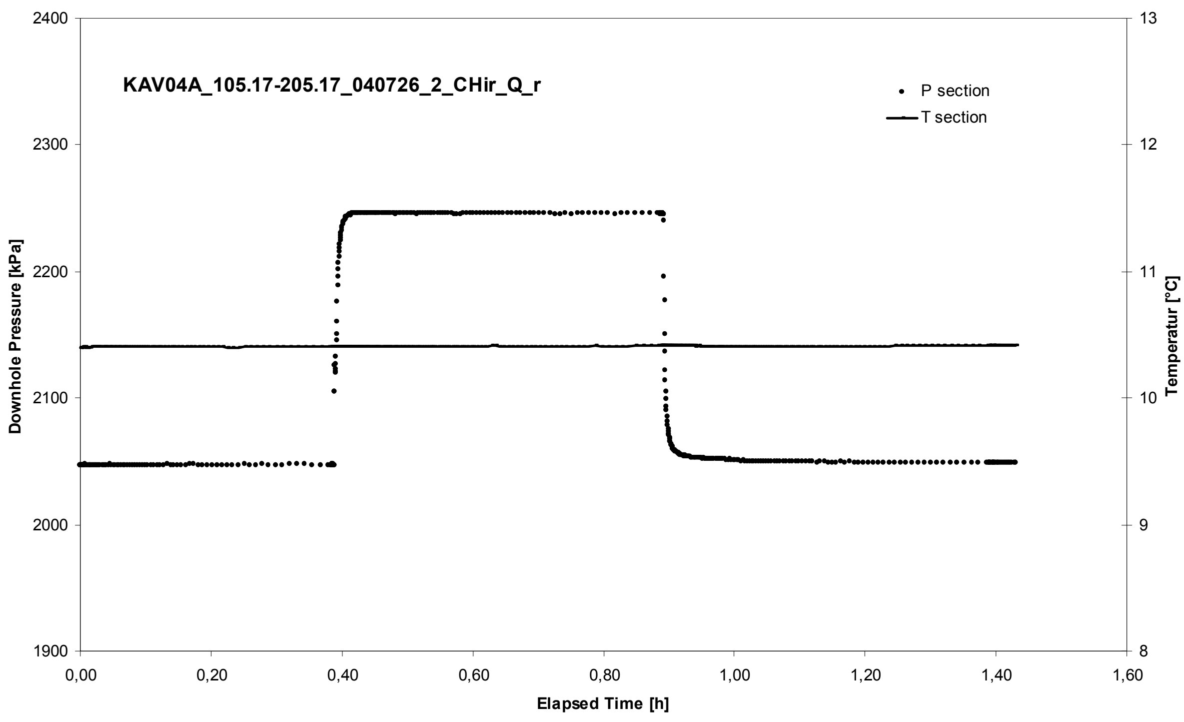
Pressure and flow rate vs. time; cartesian plot (test repeated)



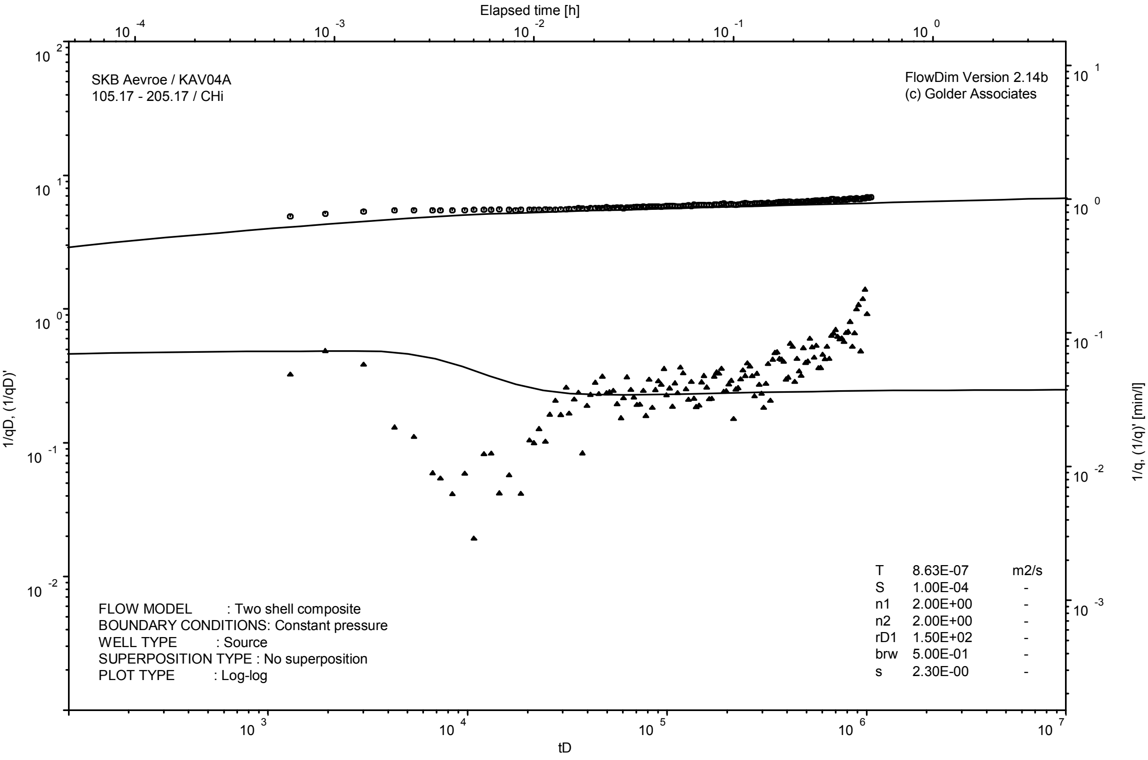
Interval pressure and temperature vs. time; cartesian plot (test repeated)



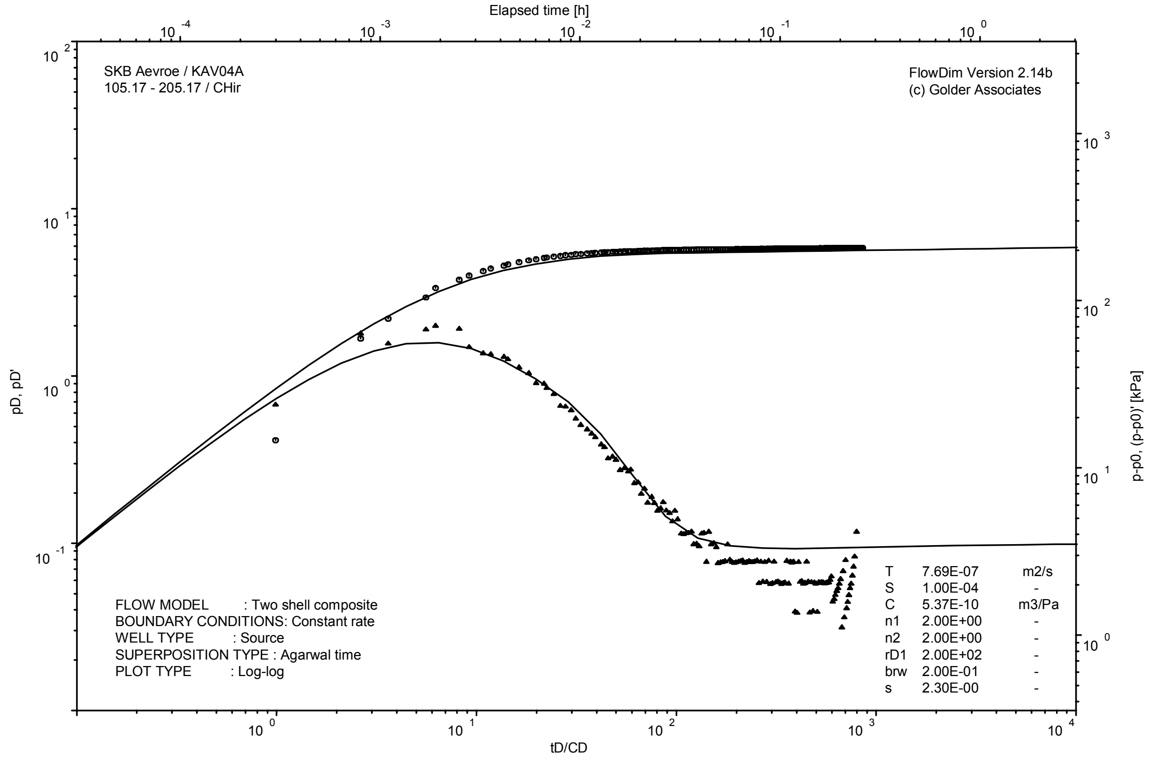
Pressure and flow rate vs. time; cartesian plot (analysed)



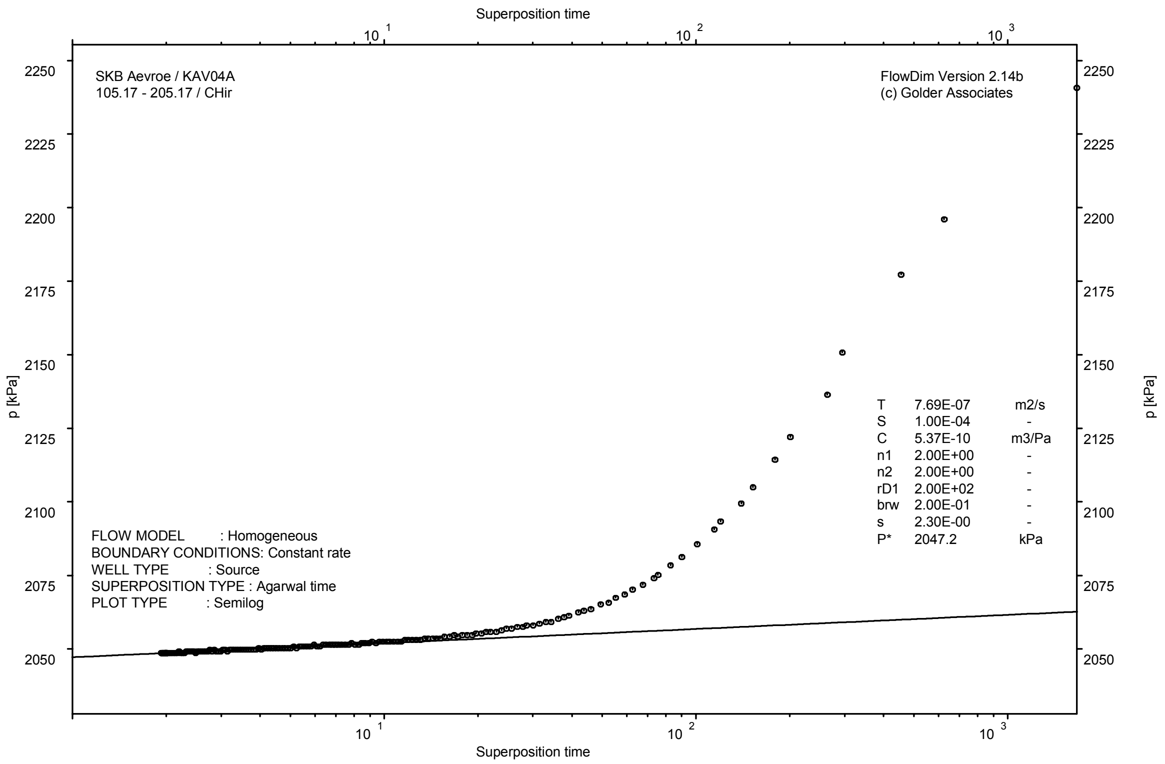
Interval pressure and temperature vs. time; cartesian plot (analysed)



CHI phase; log-log match



CHIR phase; log-log match

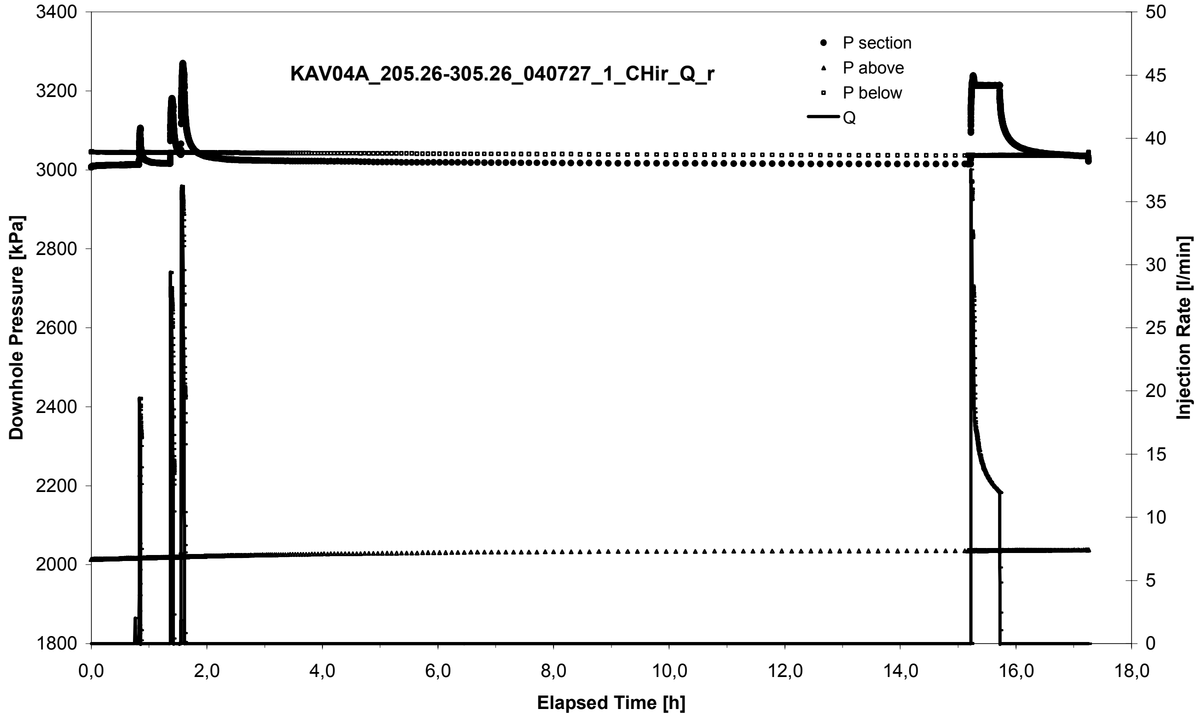


CHIR phase; HORNER match

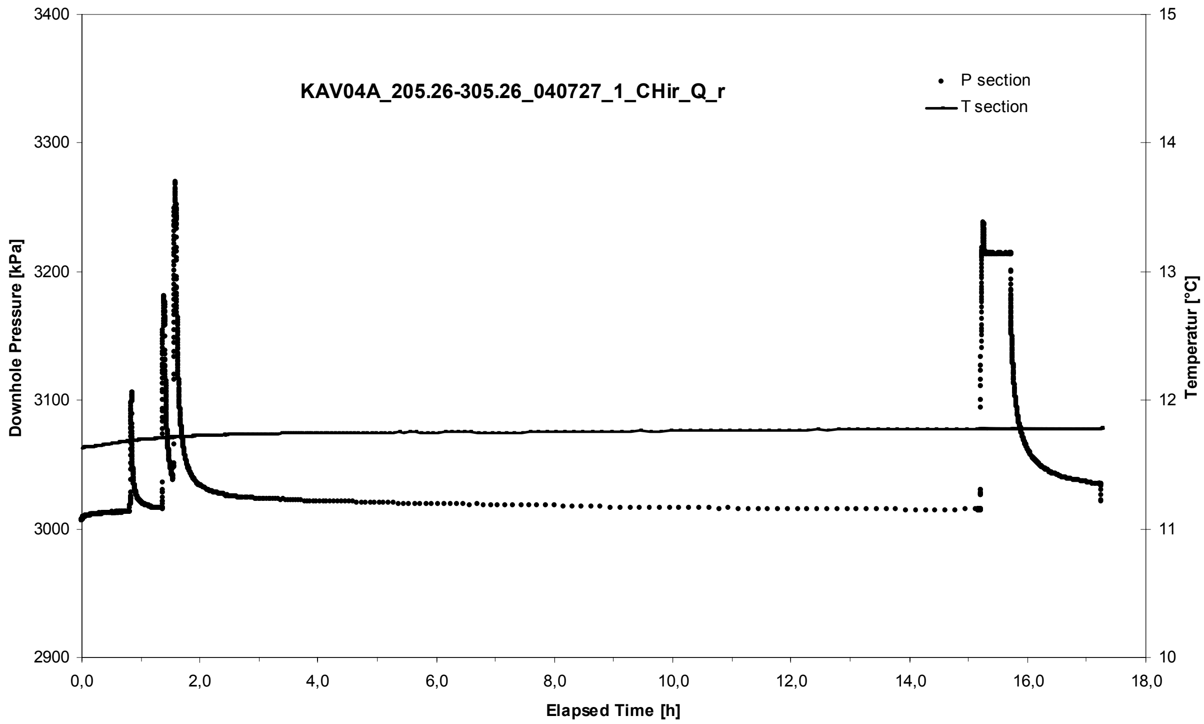
APPENDIX 2-2

Test 205,26 – 305,26 m

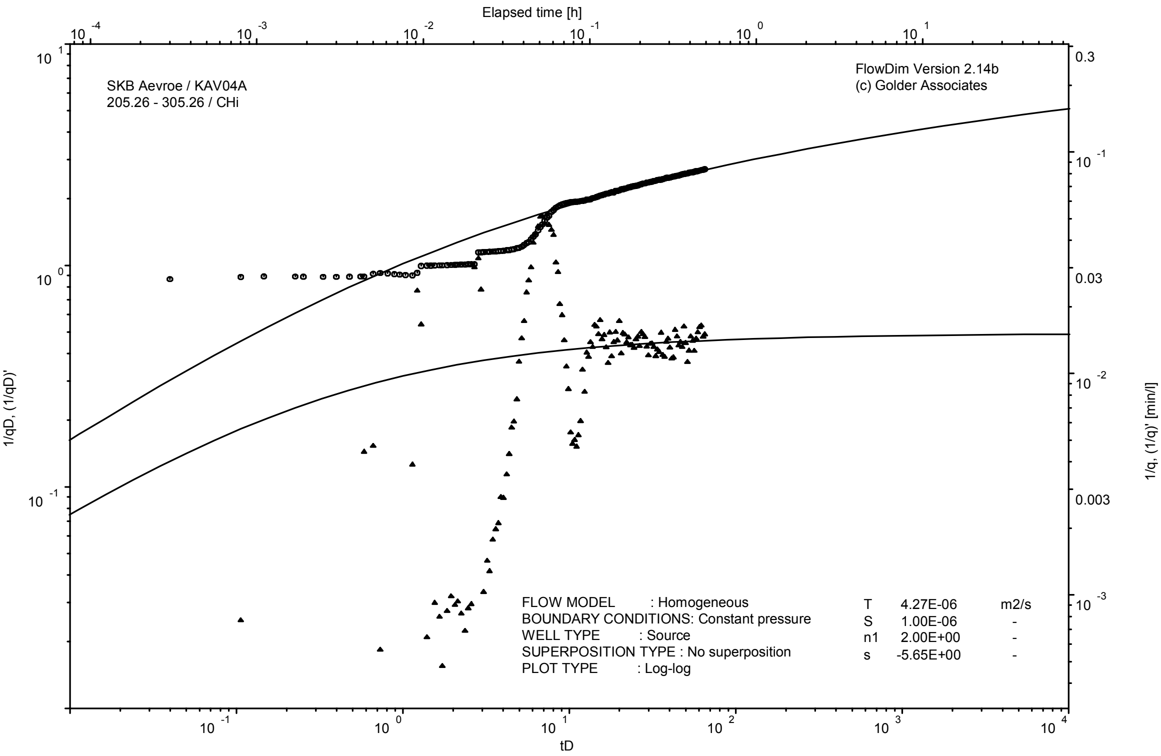
Analysis diagrams



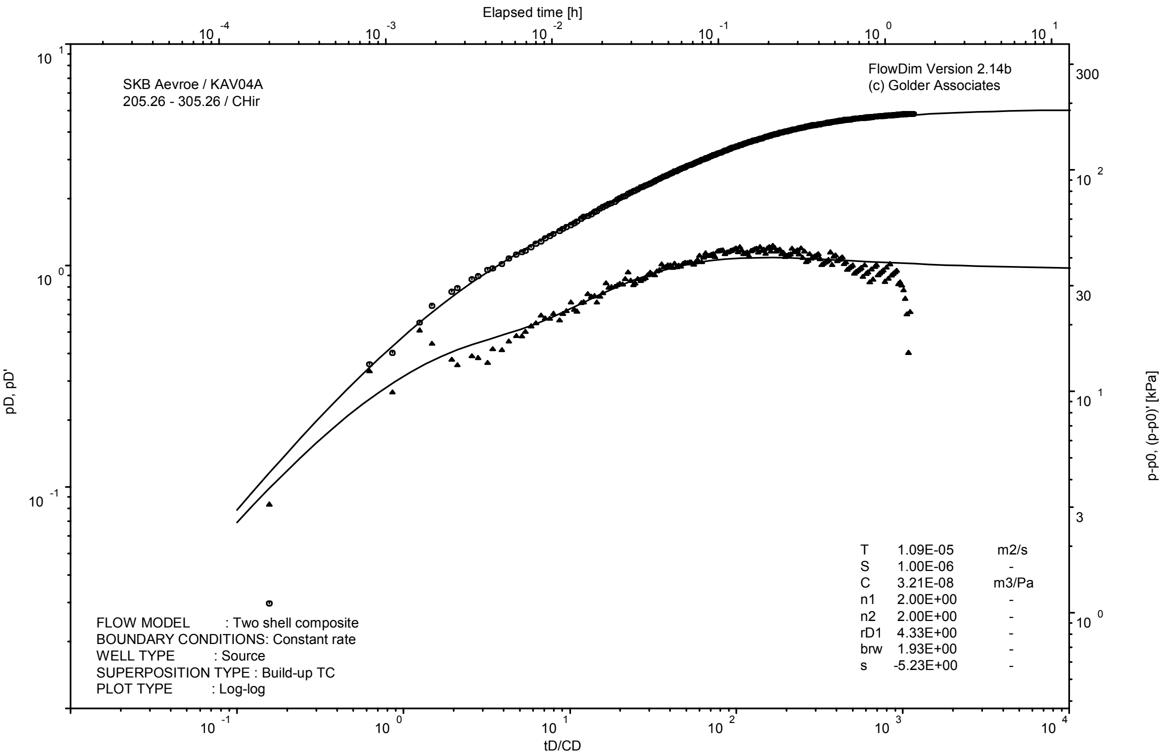
Pressure and flow rate vs. time; cartesian plot



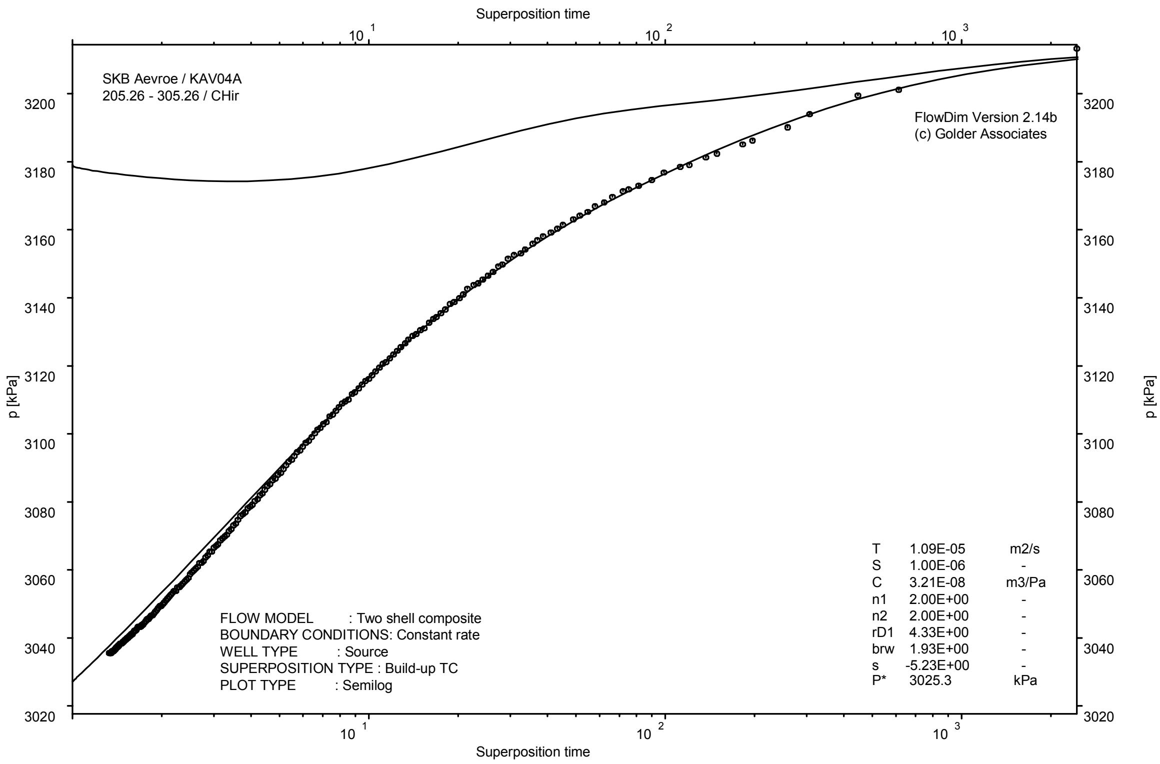
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

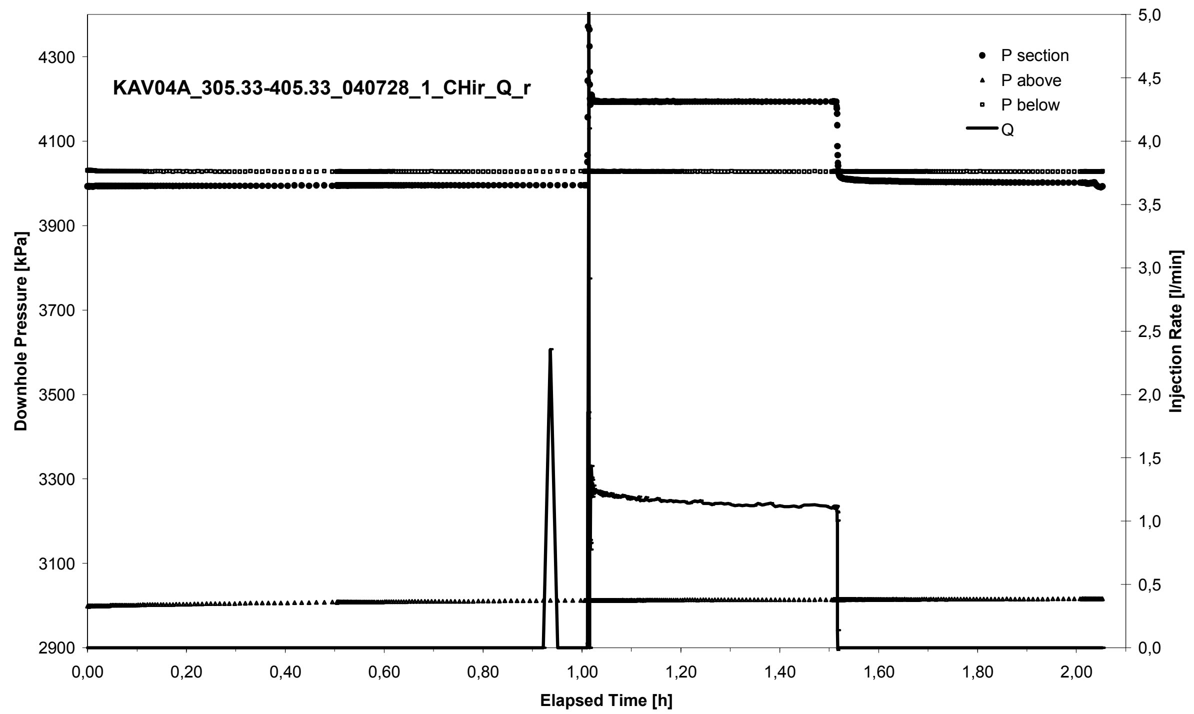


CHIR phase; HORNER match

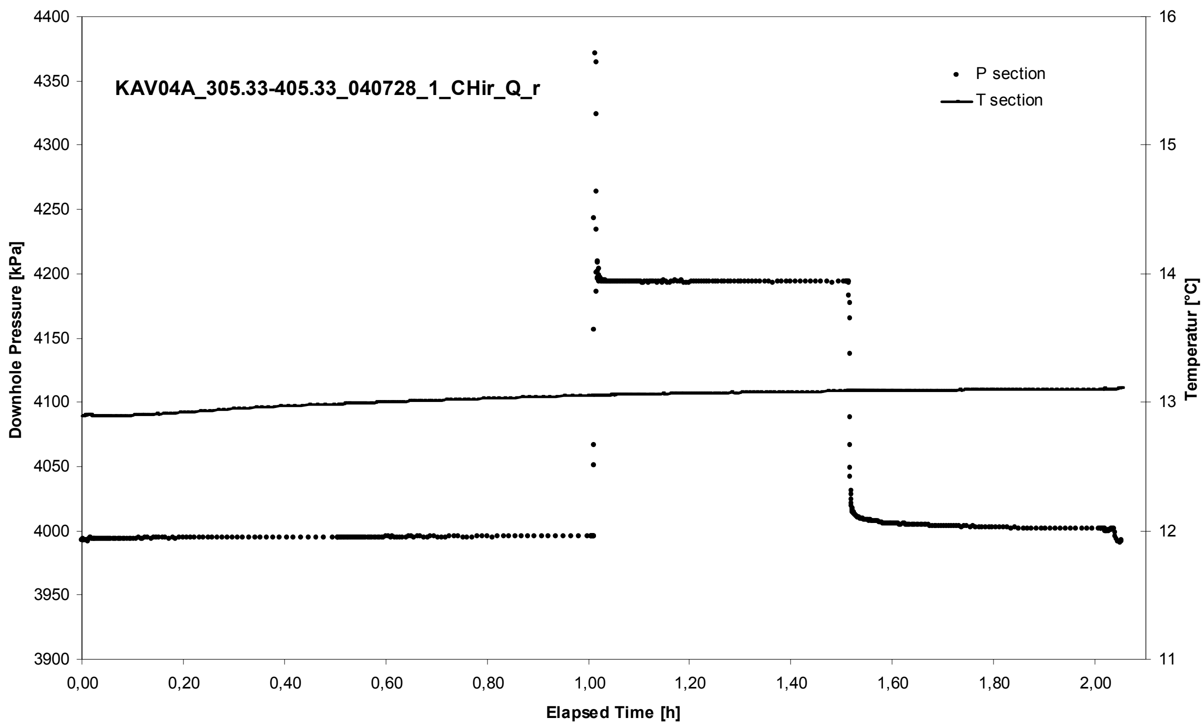
APPENDIX 2-3

Test 305,33 – 405,33 m

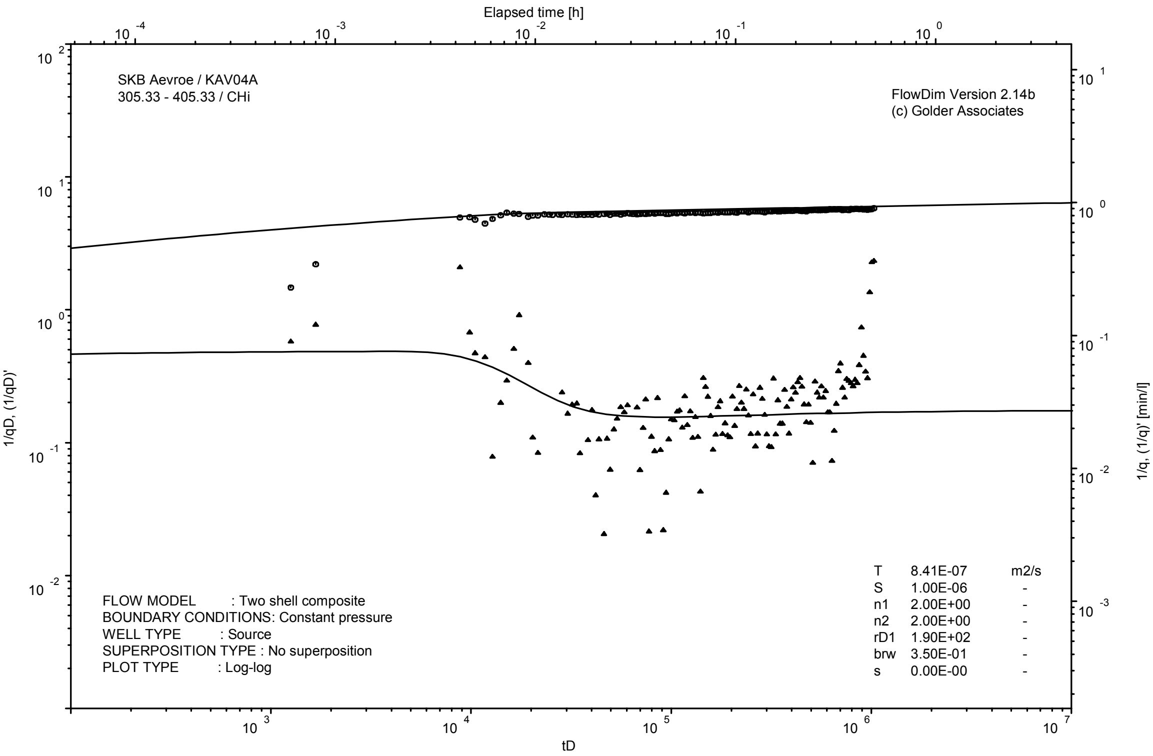
Analysis diagrams



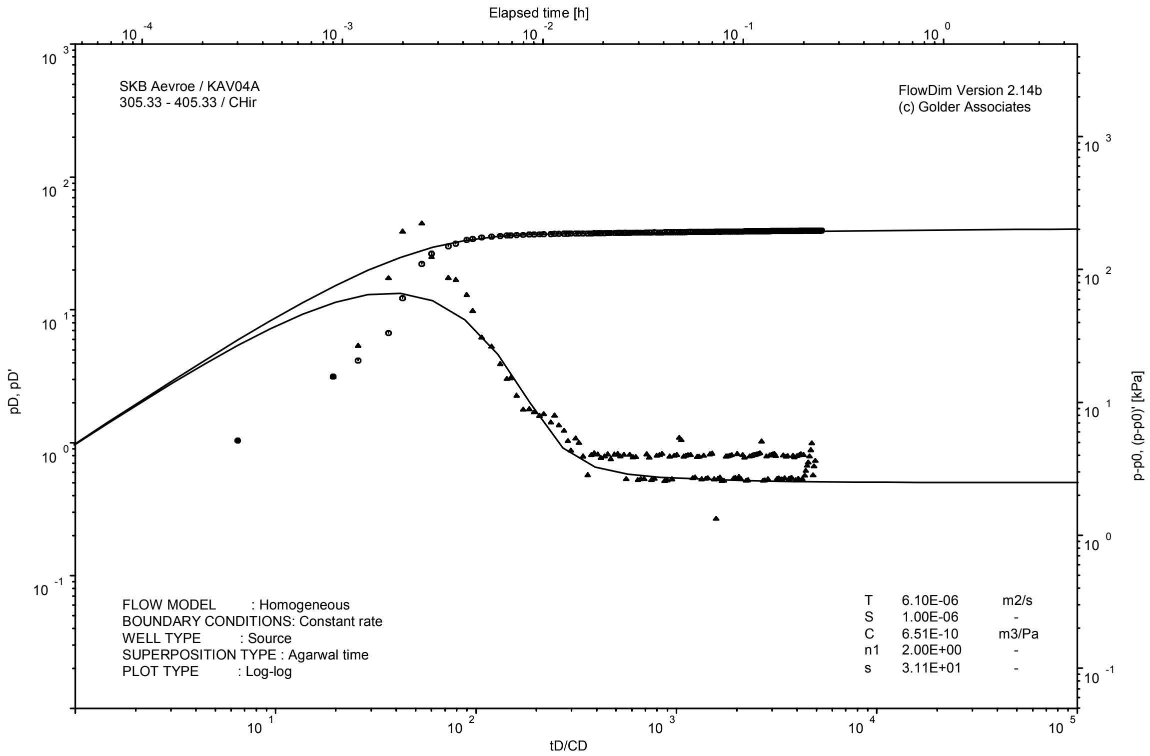
Pressure and flow rate vs. time; cartesian plot



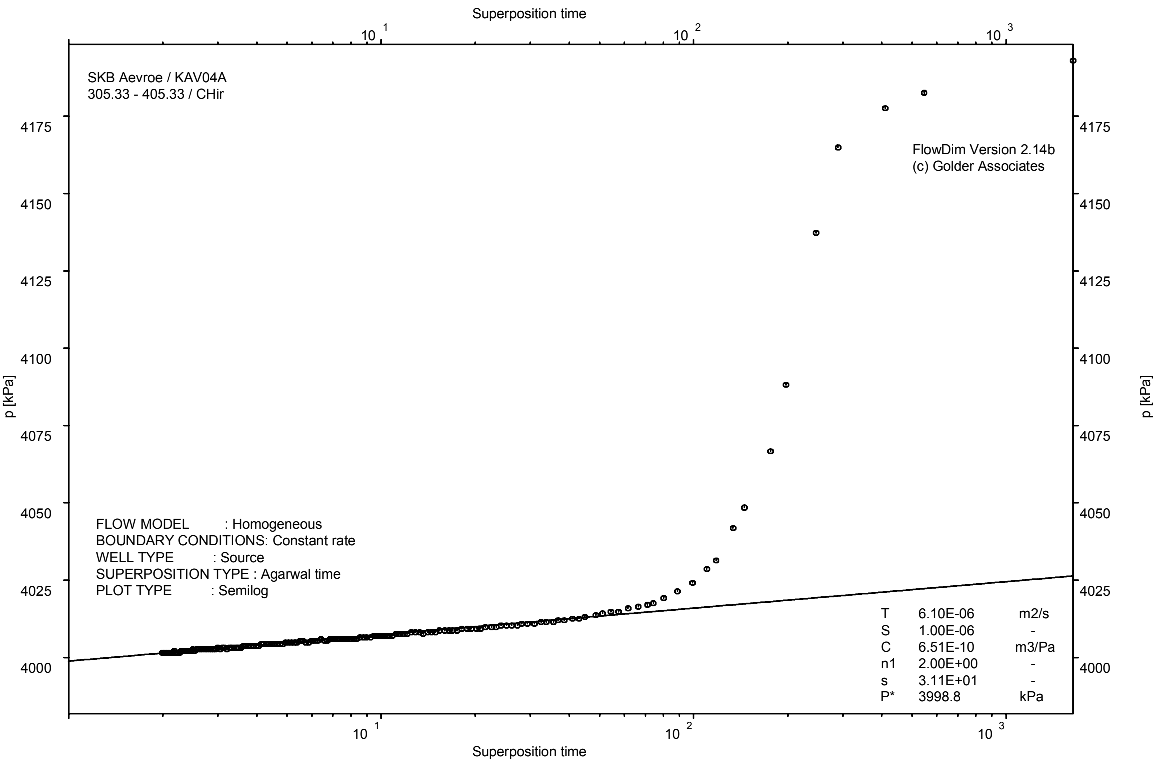
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

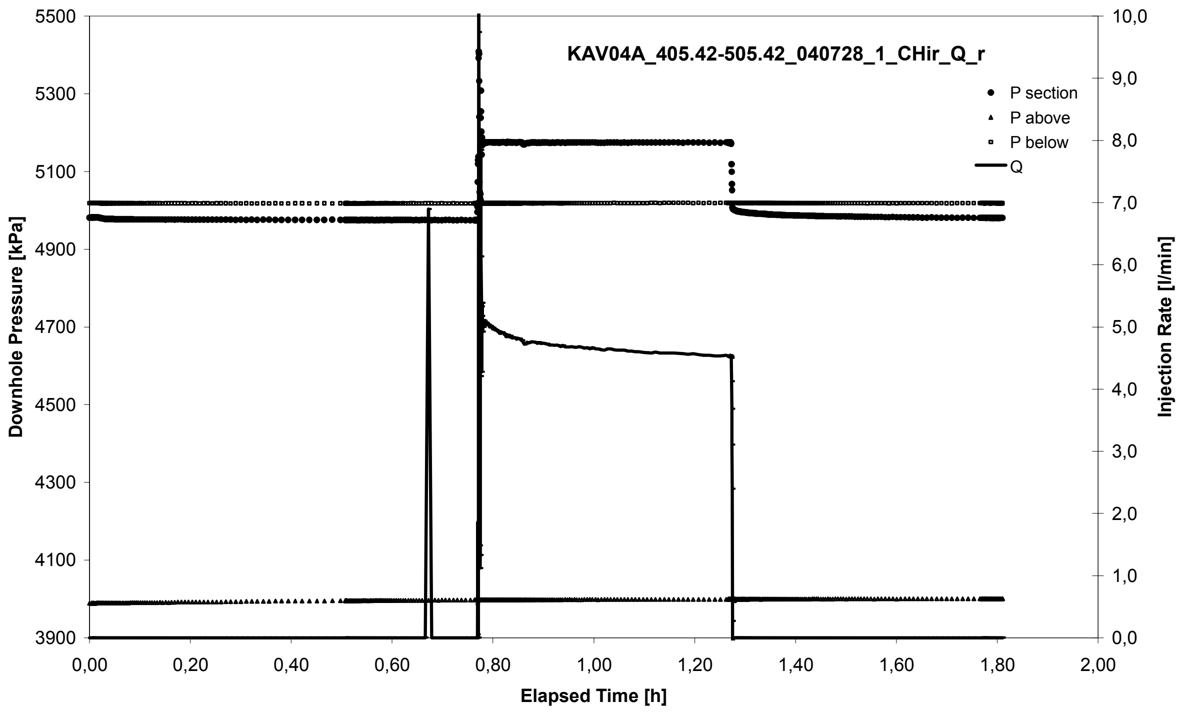


CHIR phase; HORNER match

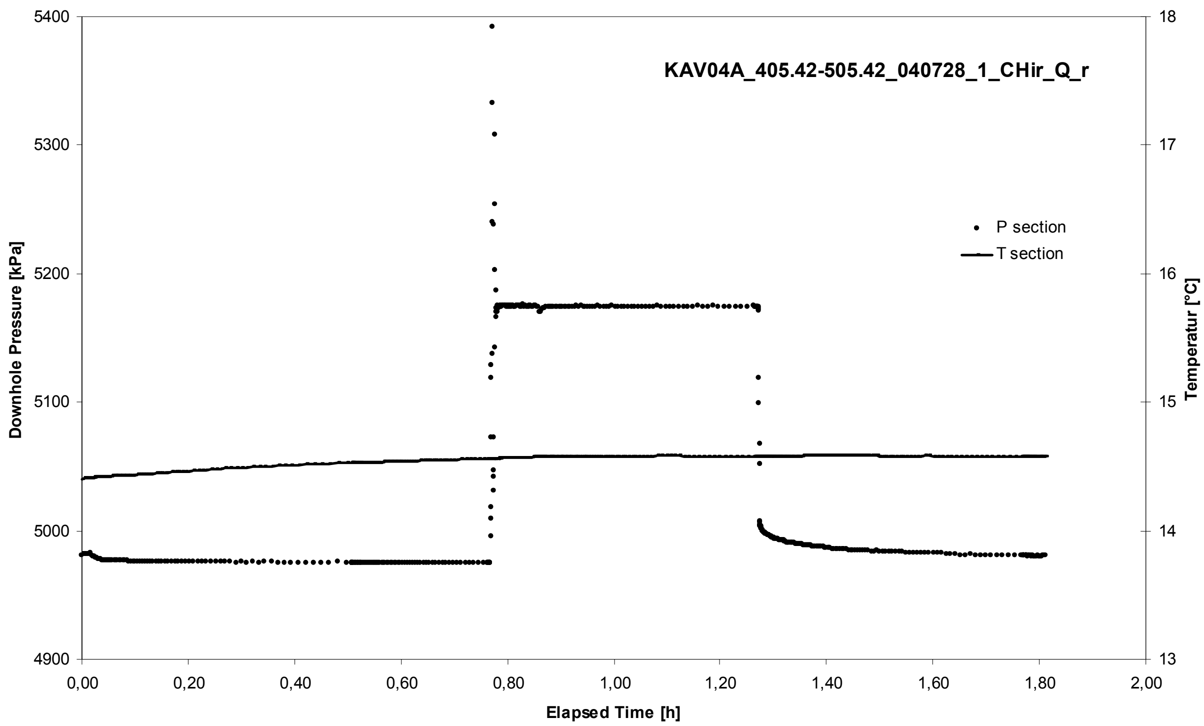
APPENDIX 2-4

Test 405,42 – 505,42 m

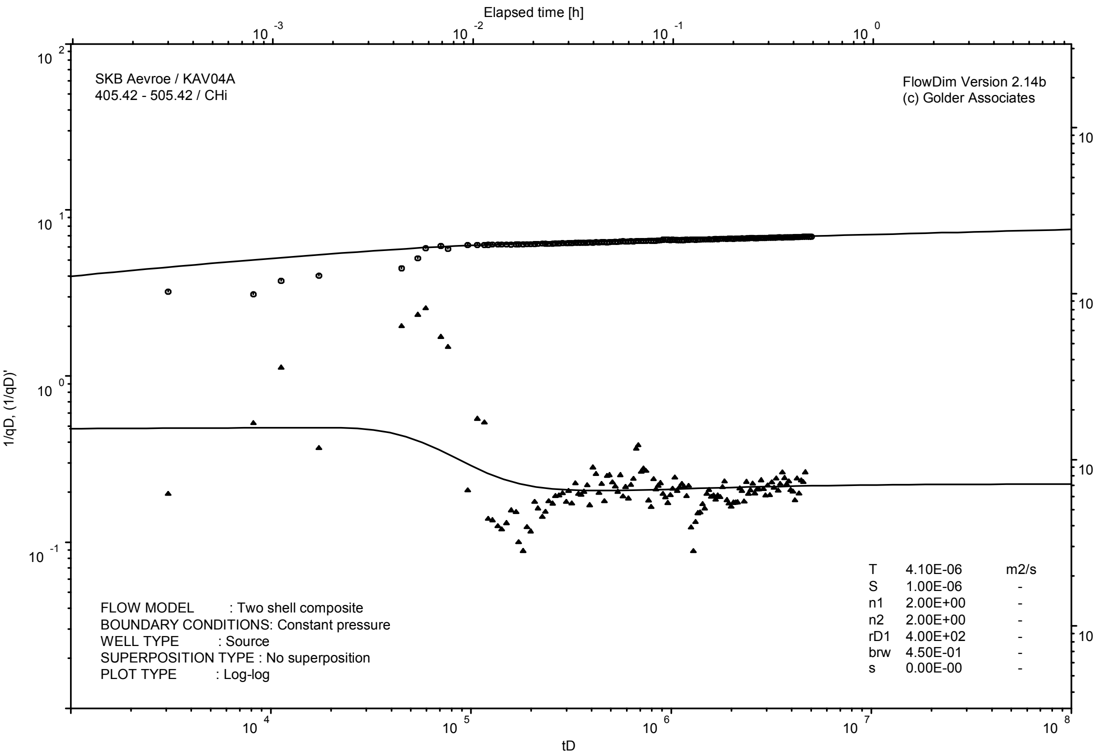
Analysis diagrams



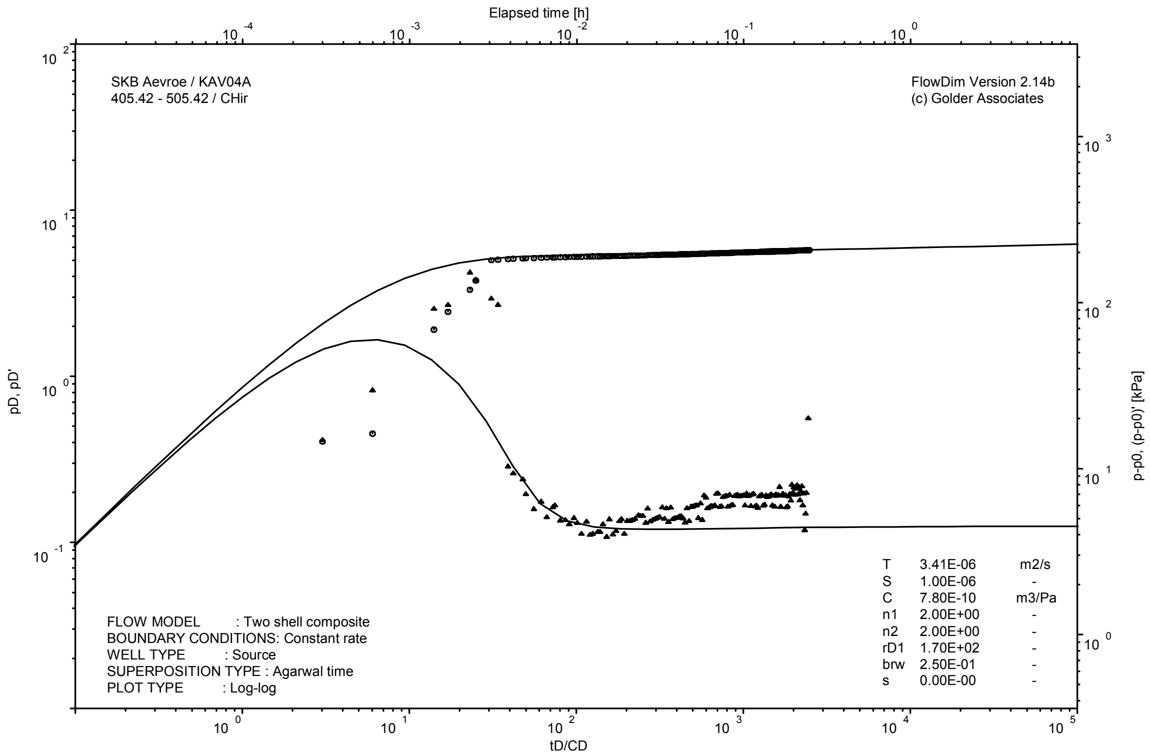
Pressure and flow rate vs. time; cartesian plot



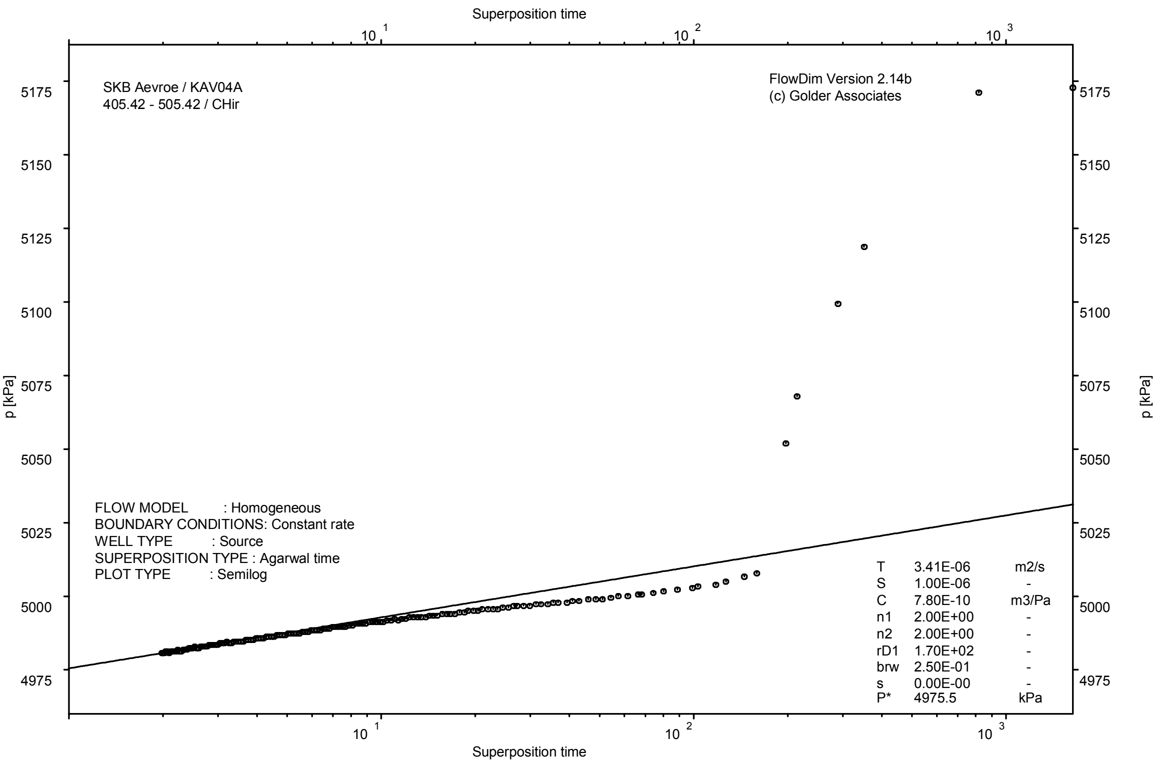
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

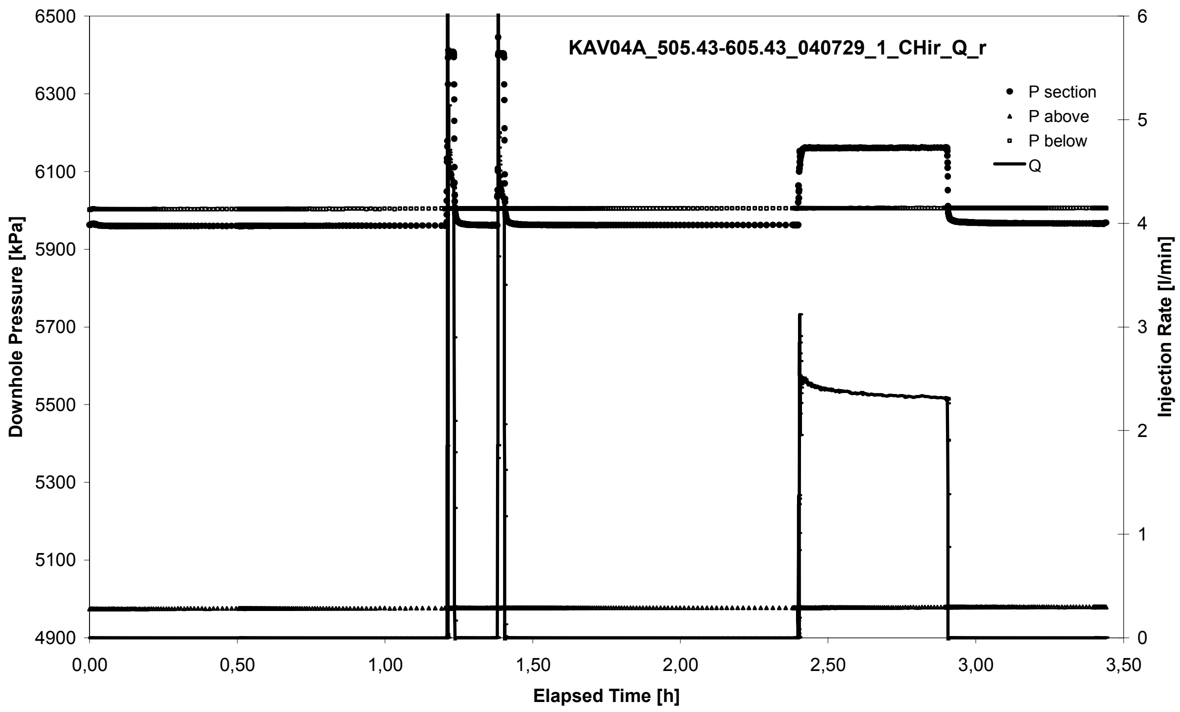


CHIR phase; HORNER match

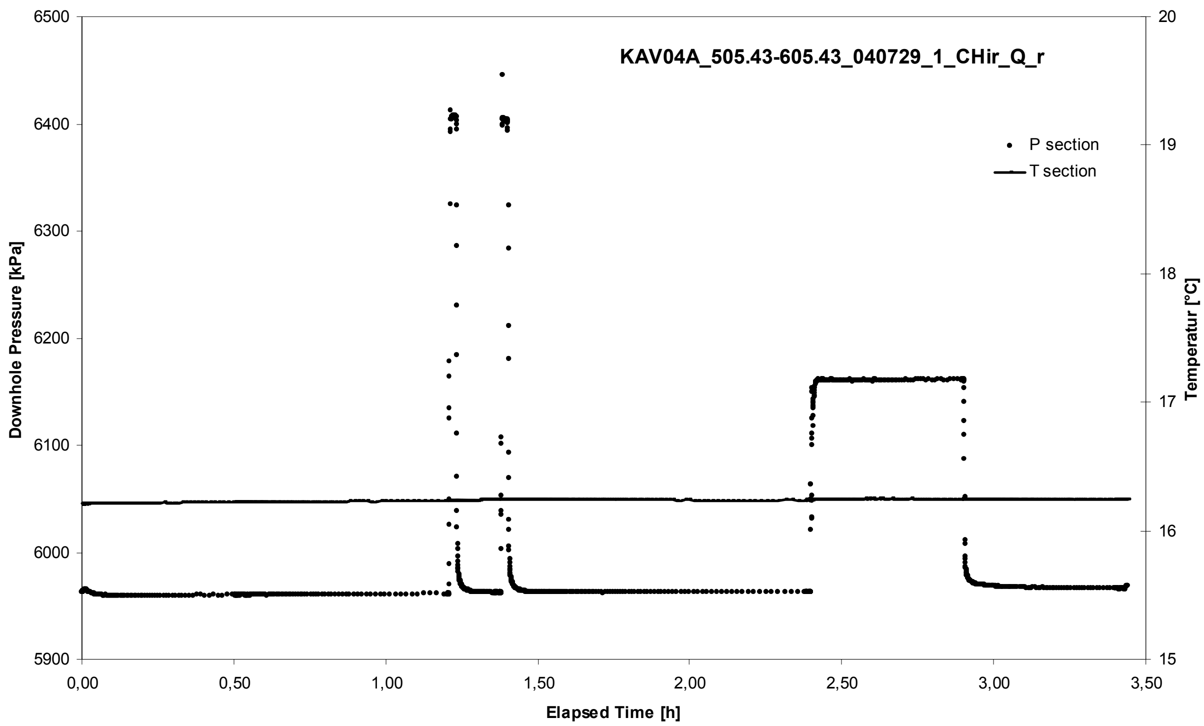
APPENDIX 2-5

Test 505,43 – 605,43 m

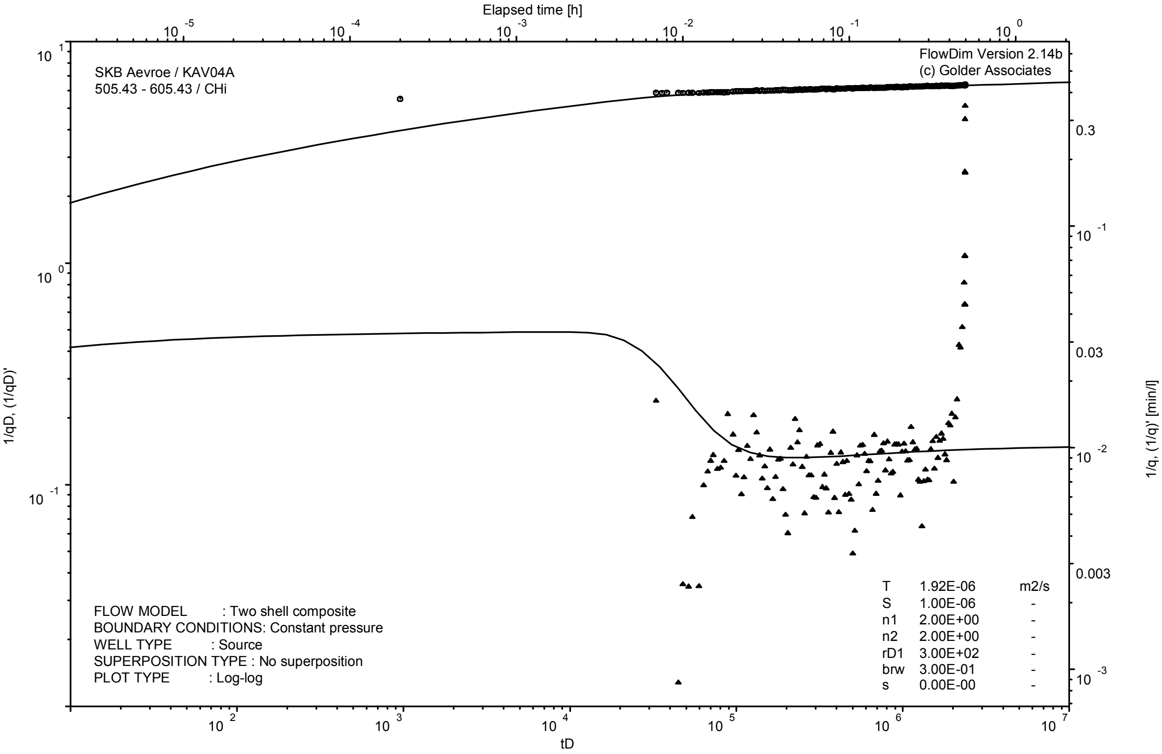
Analysis diagrams



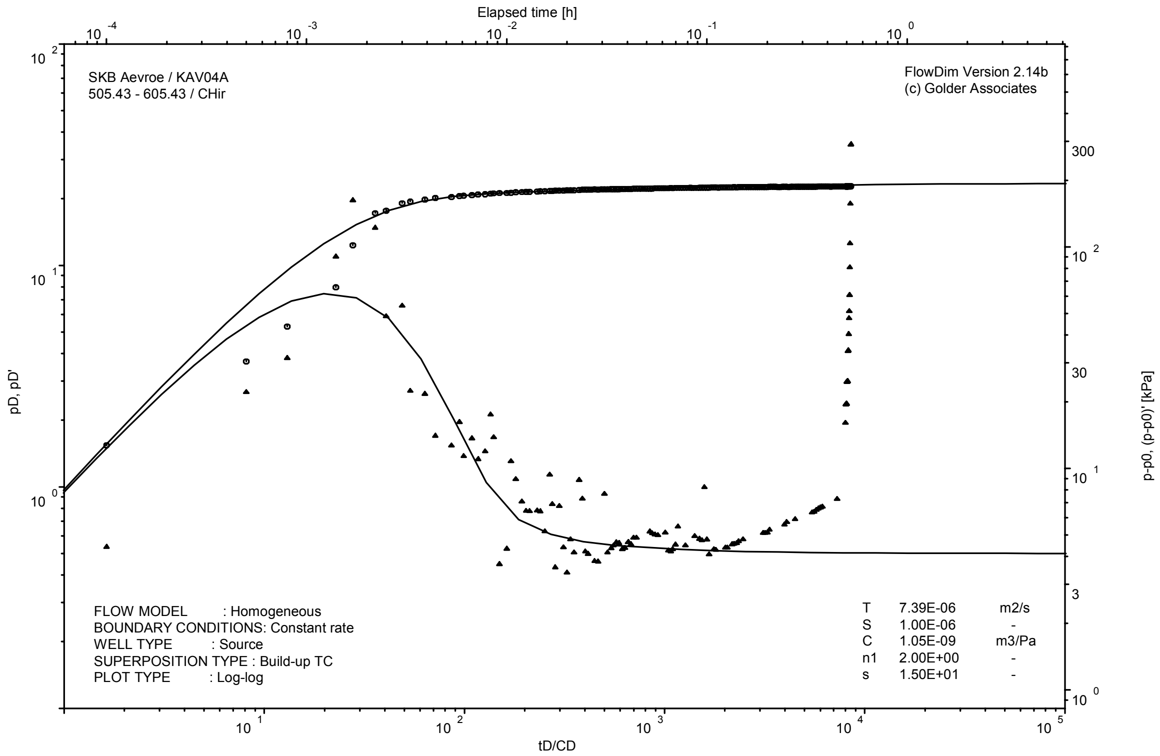
Pressure and flow rate vs. time; cartesian plot



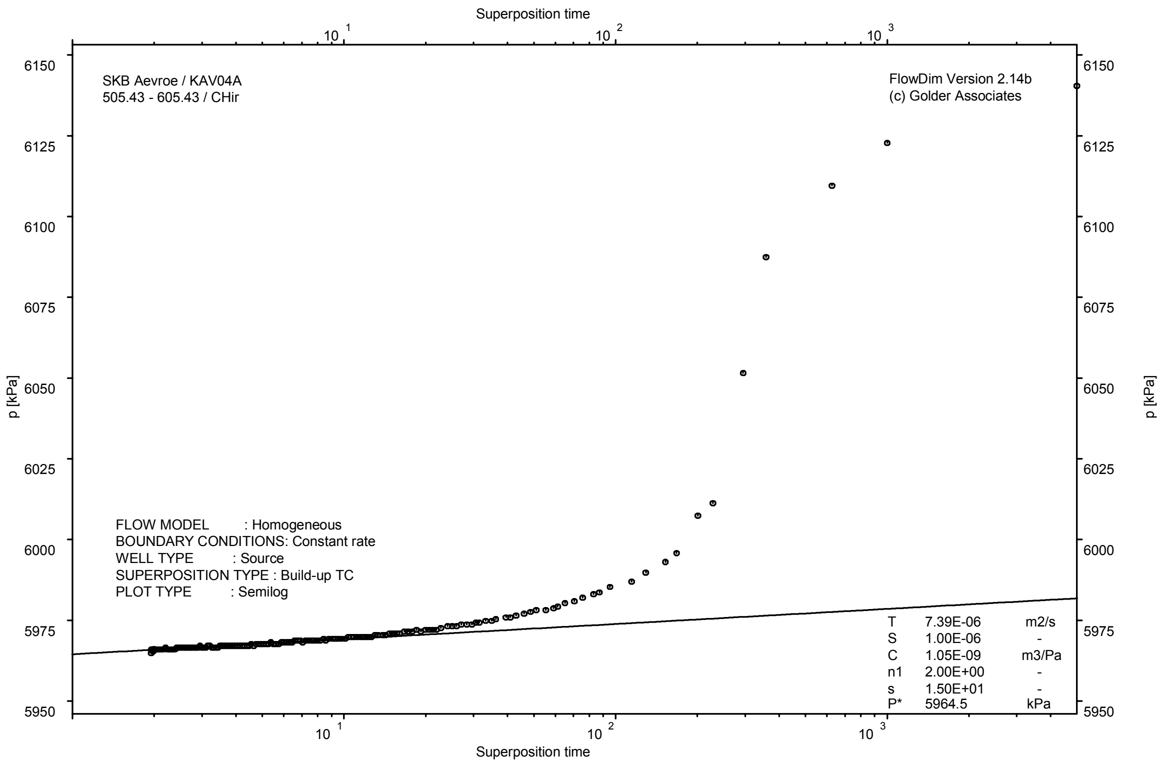
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

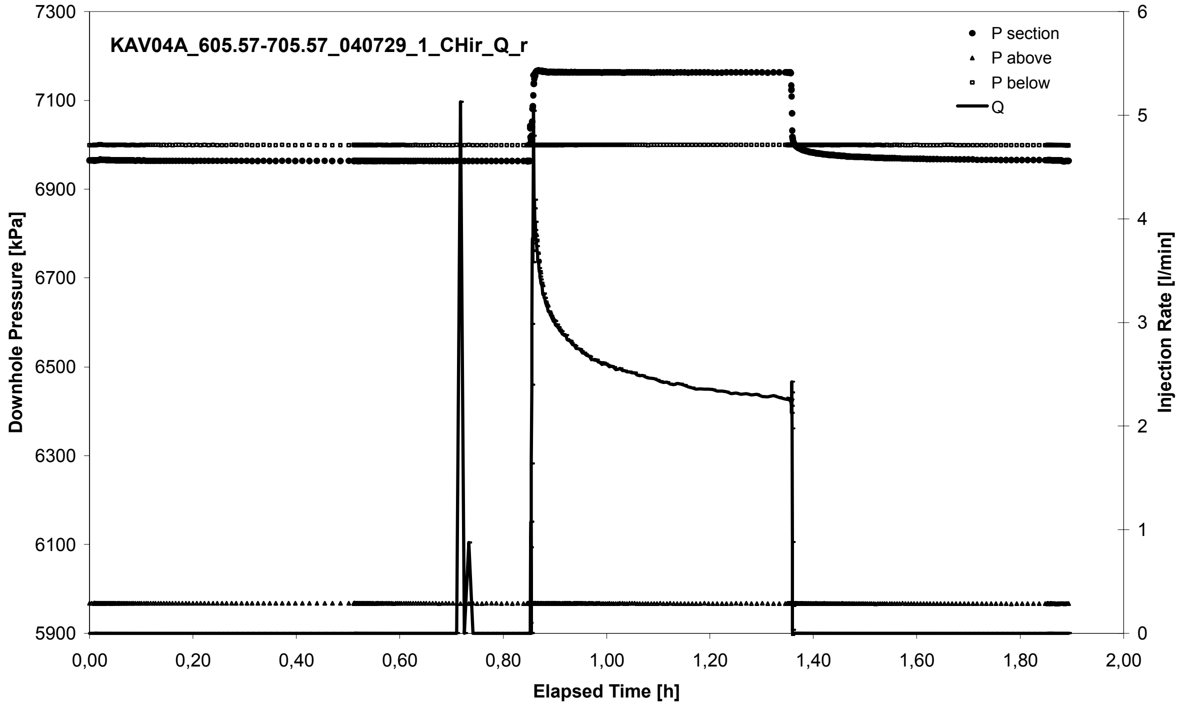


CHIR phase; HORNER match

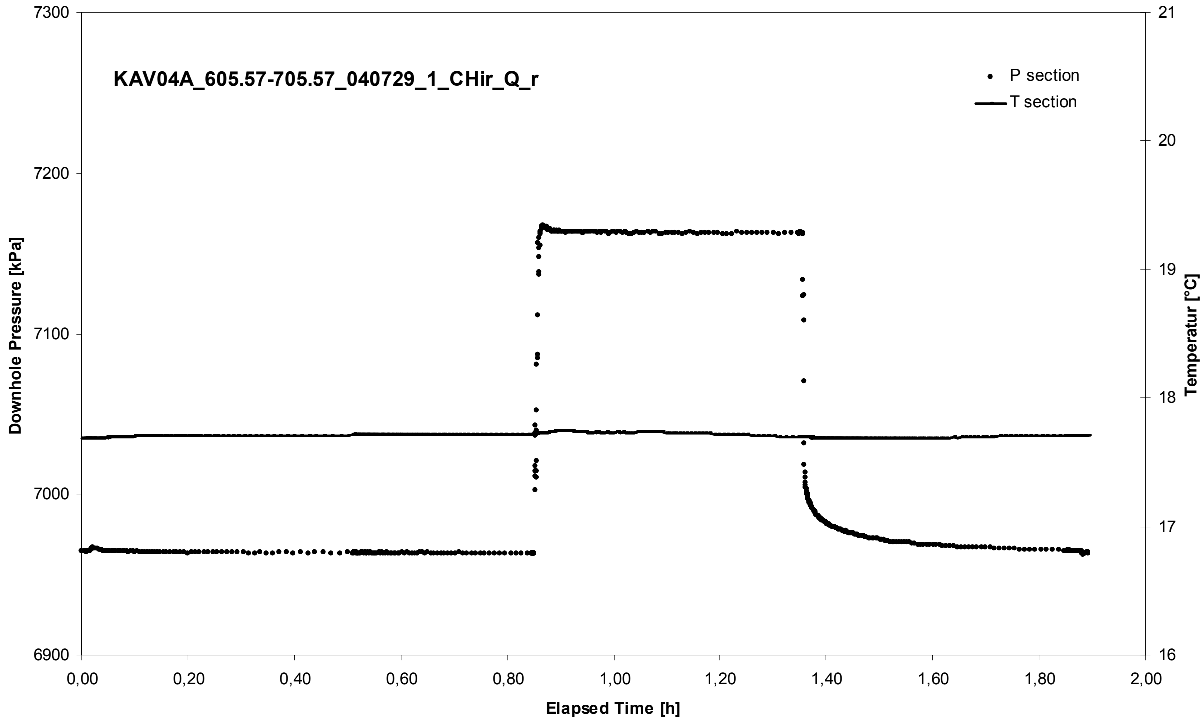
APPENDIX 2-6

Test 605,57 – 705,57 m

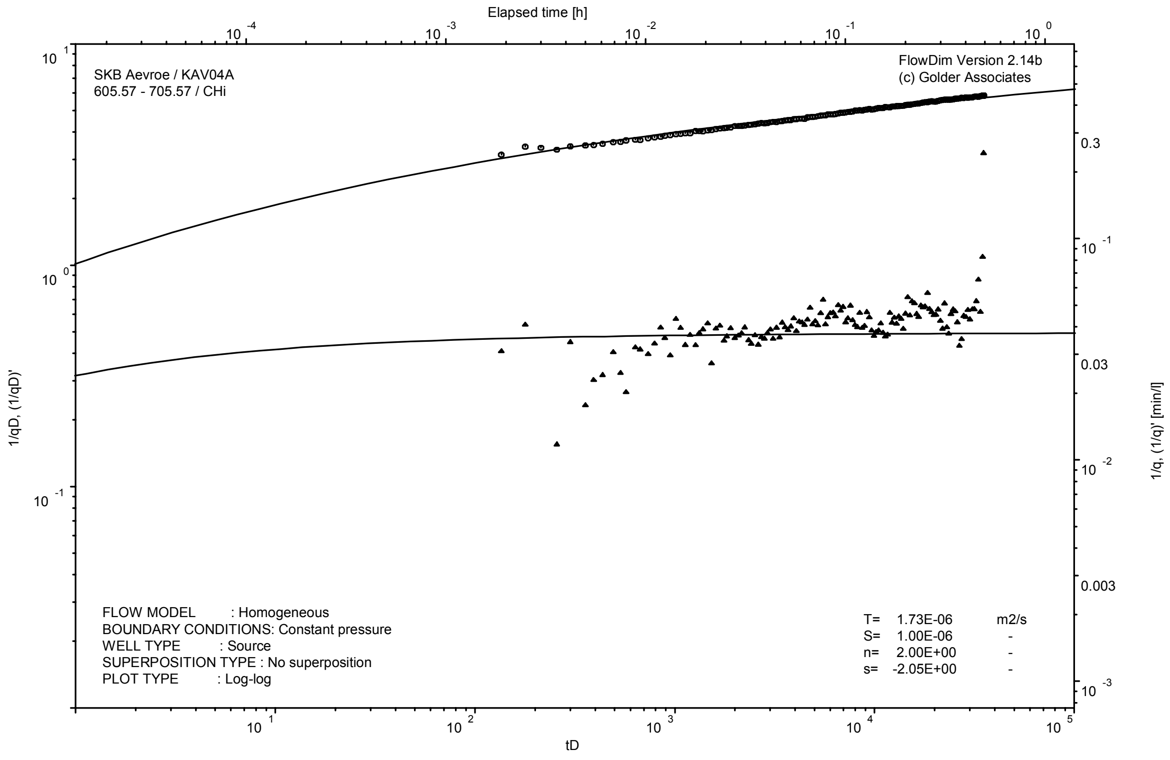
Analysis diagrams



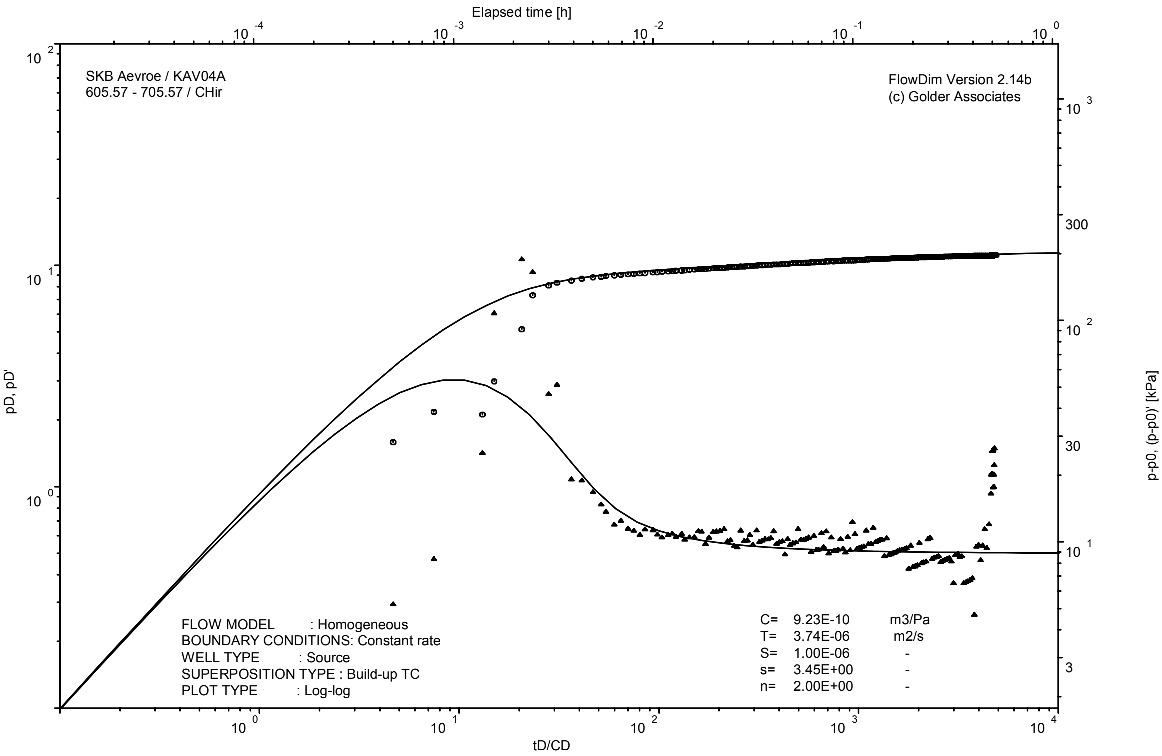
Pressure and flow rate vs. time; cartesian plot



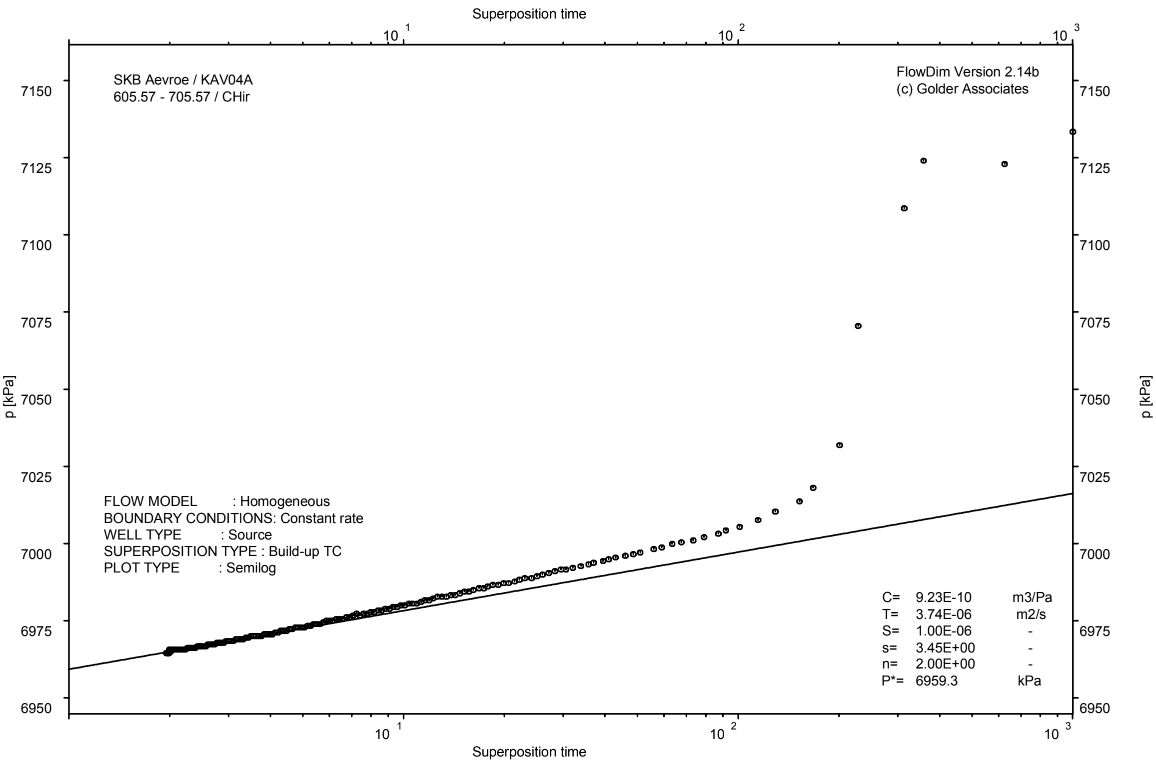
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

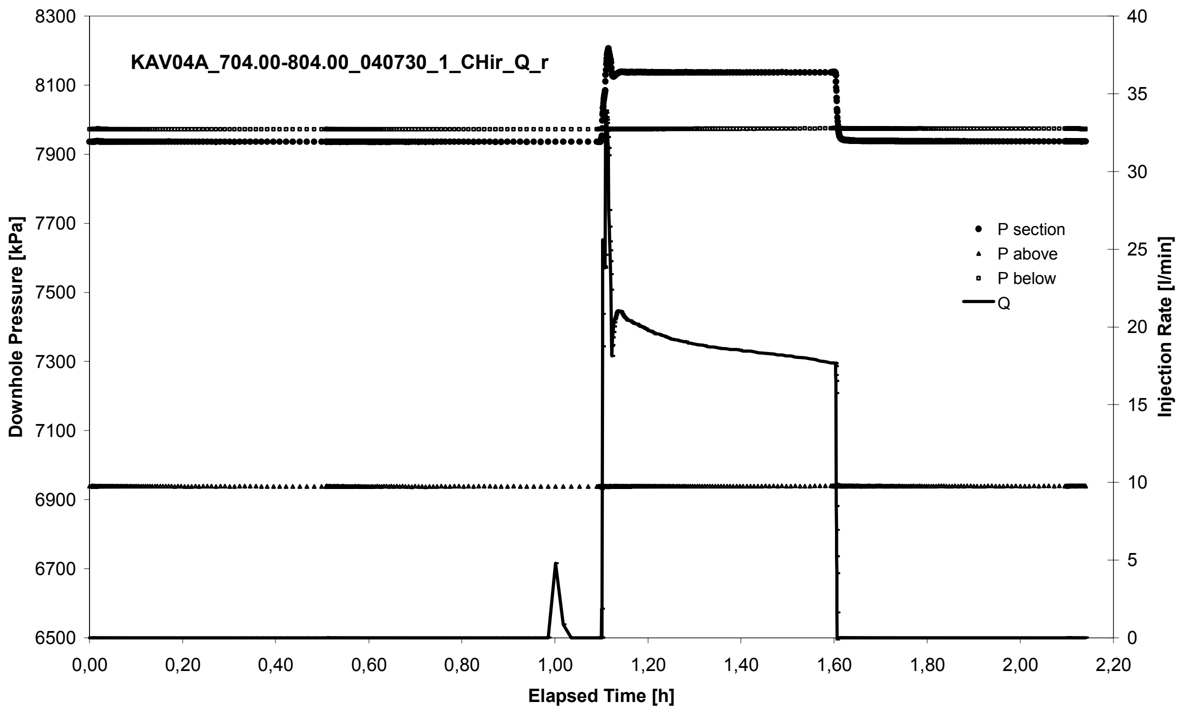


CHIR phase; HORNER match

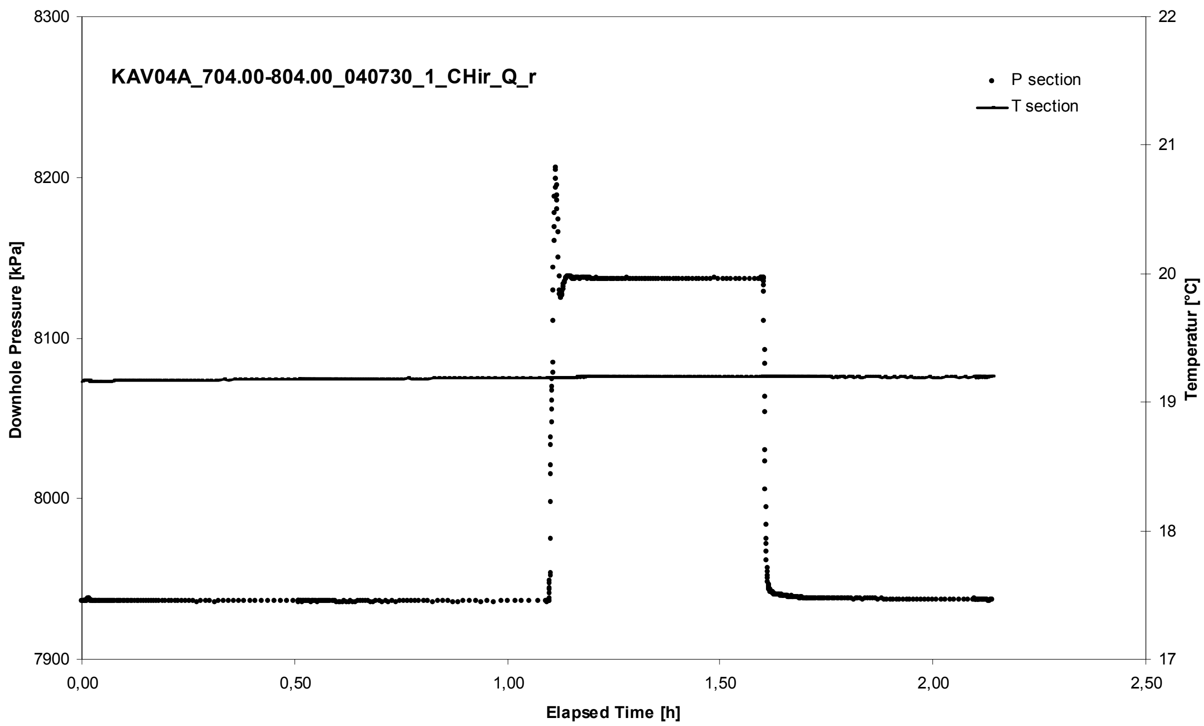
APPENDIX 2-7

Test 704.00 – 804.00 m

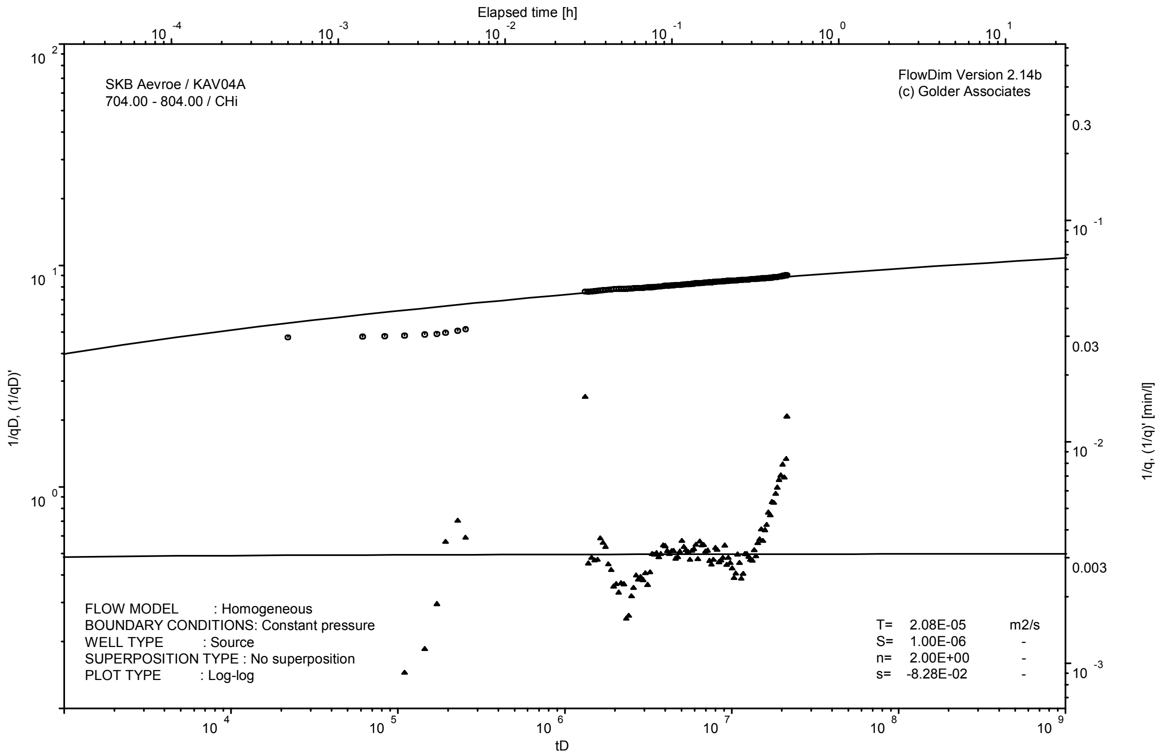
Analysis diagrams



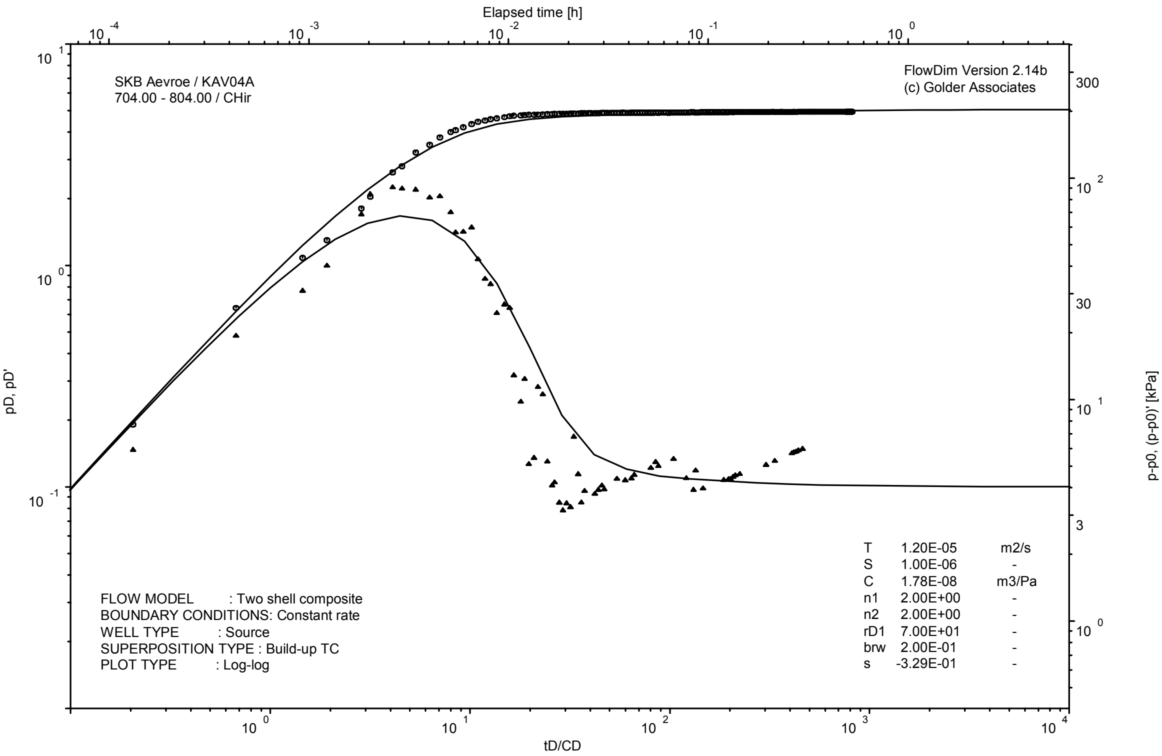
Pressure and flow rate vs. time; cartesian plot



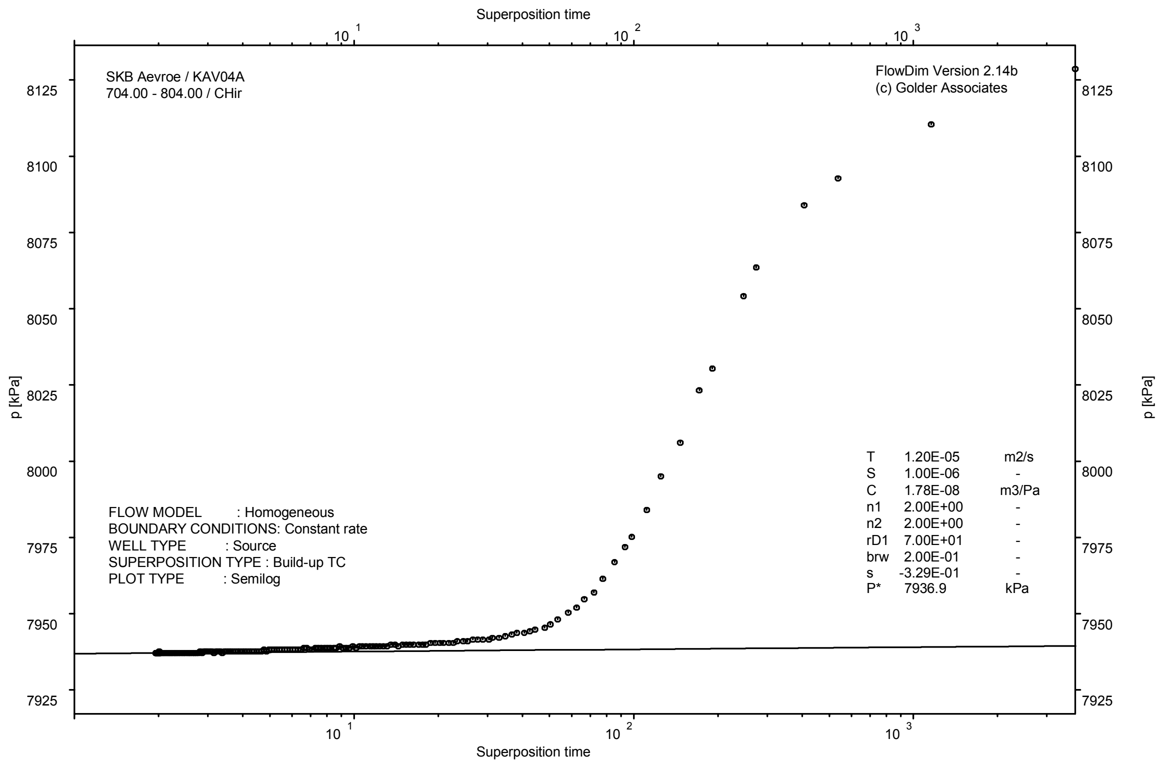
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

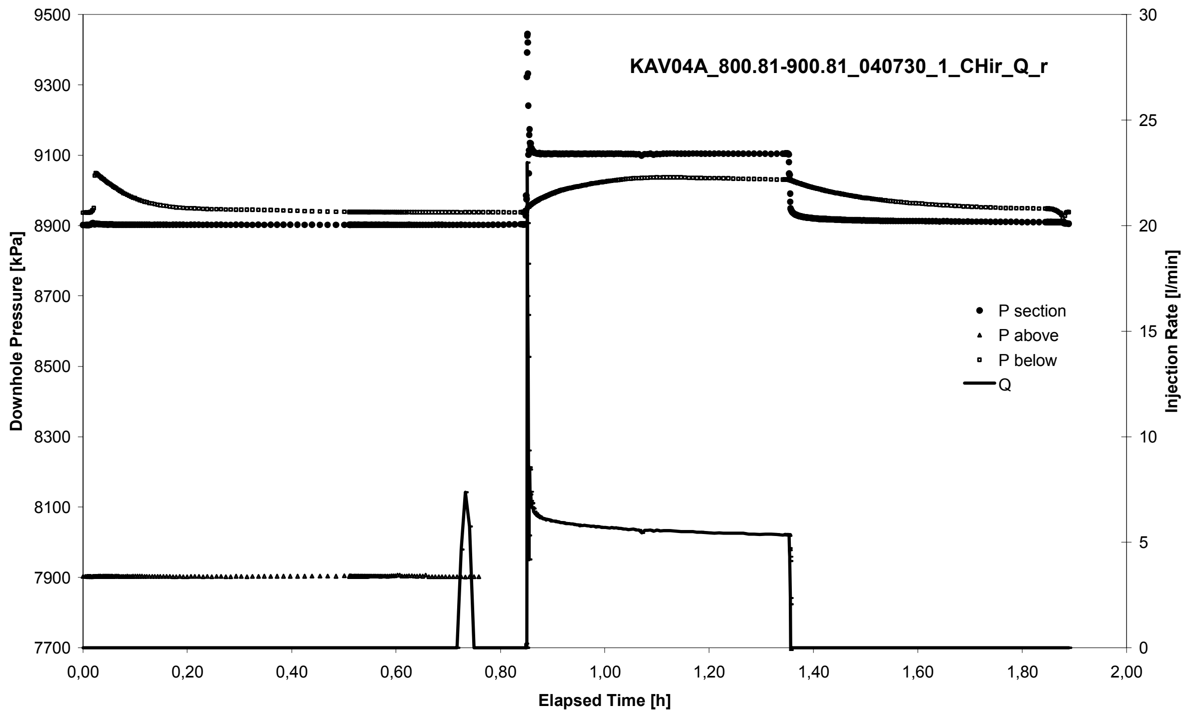


CHIR phase; HORNER match

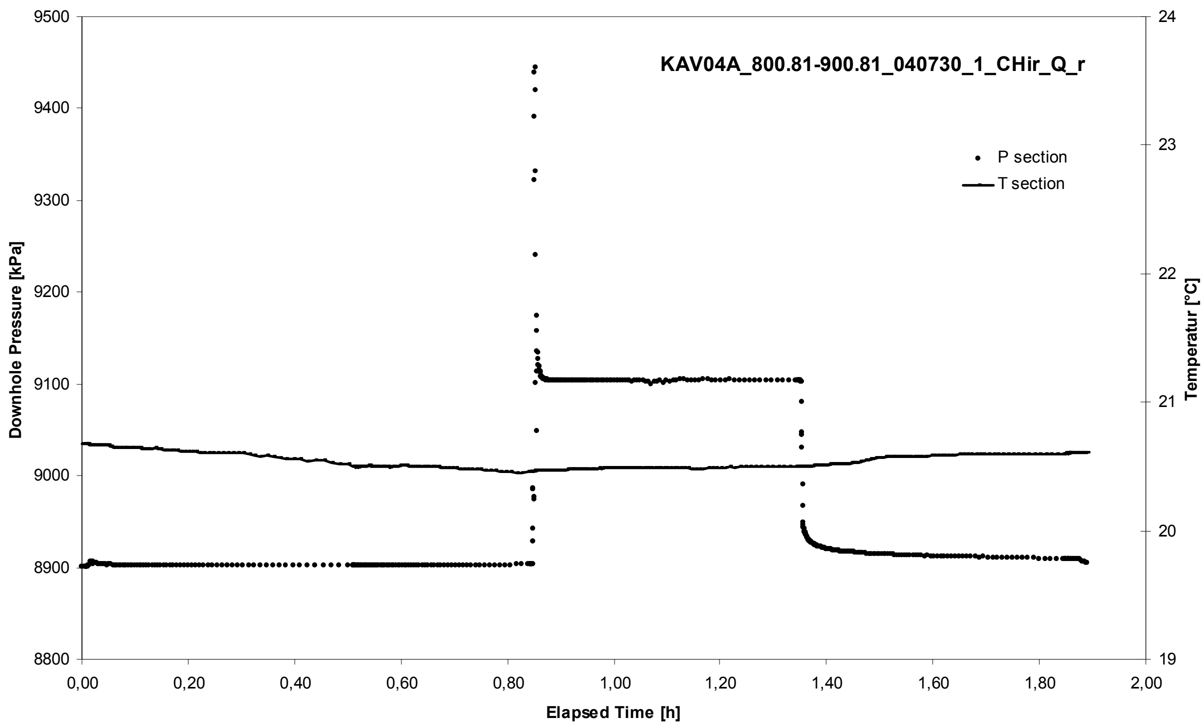
APPENDIX 2-8

Test 800,81 – 900,81 m

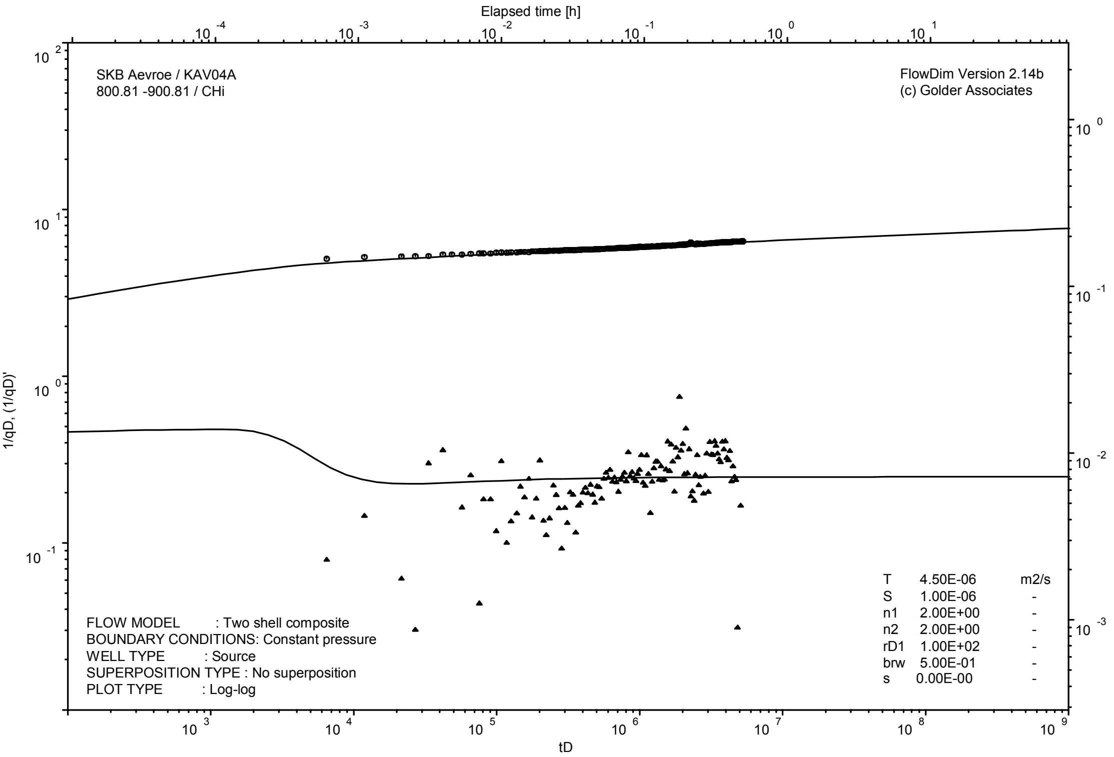
Analysis diagrams



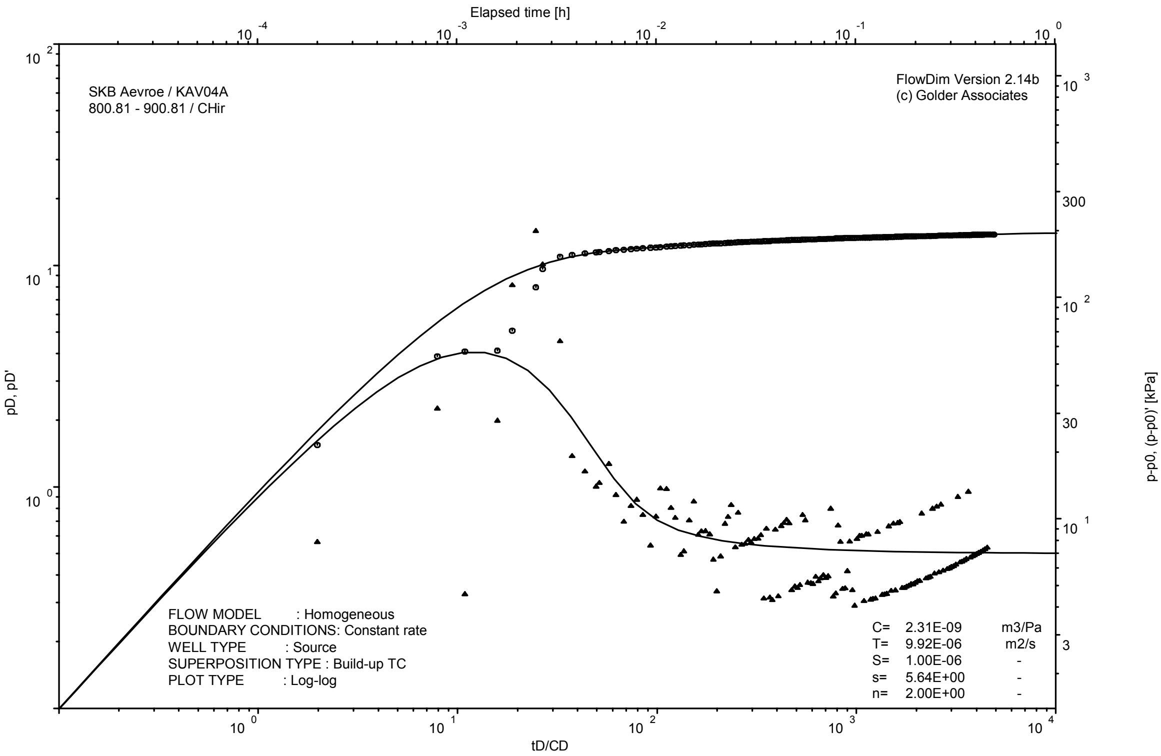
Pressure and flow rate vs. time; cartesian plot



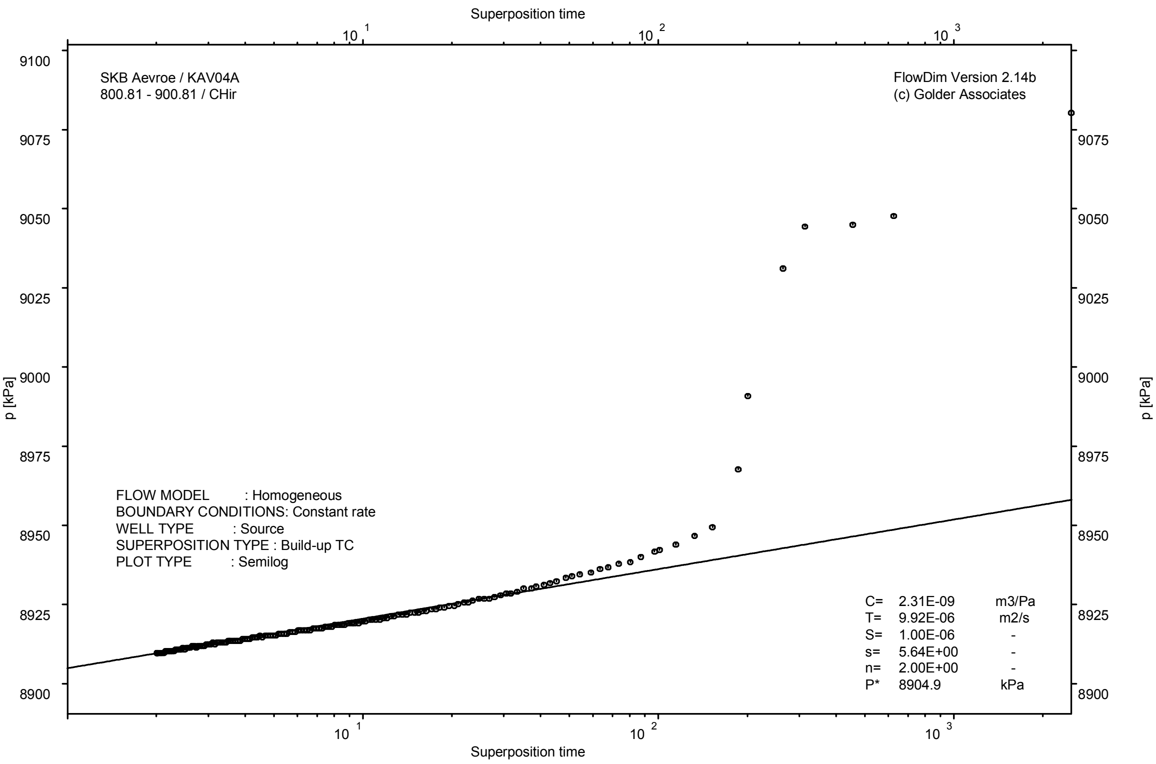
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

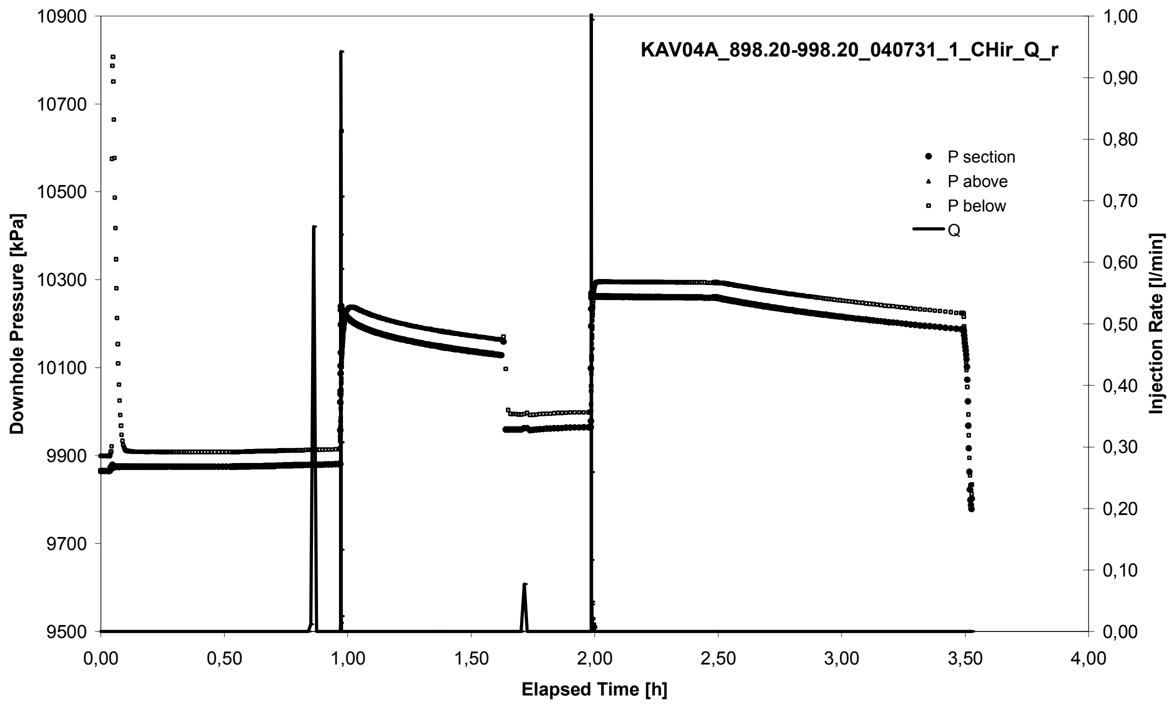


CHIR phase; HORNER match

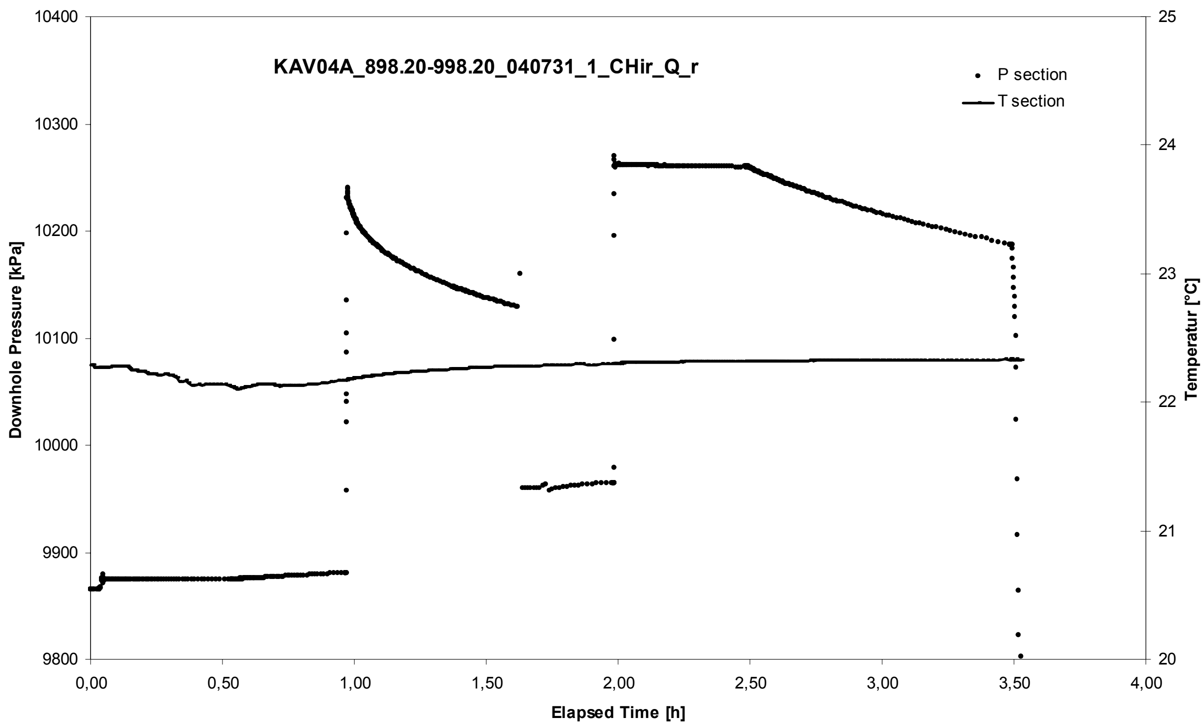
APPENDIX 2-9

Test 898,20 – 998,20 m

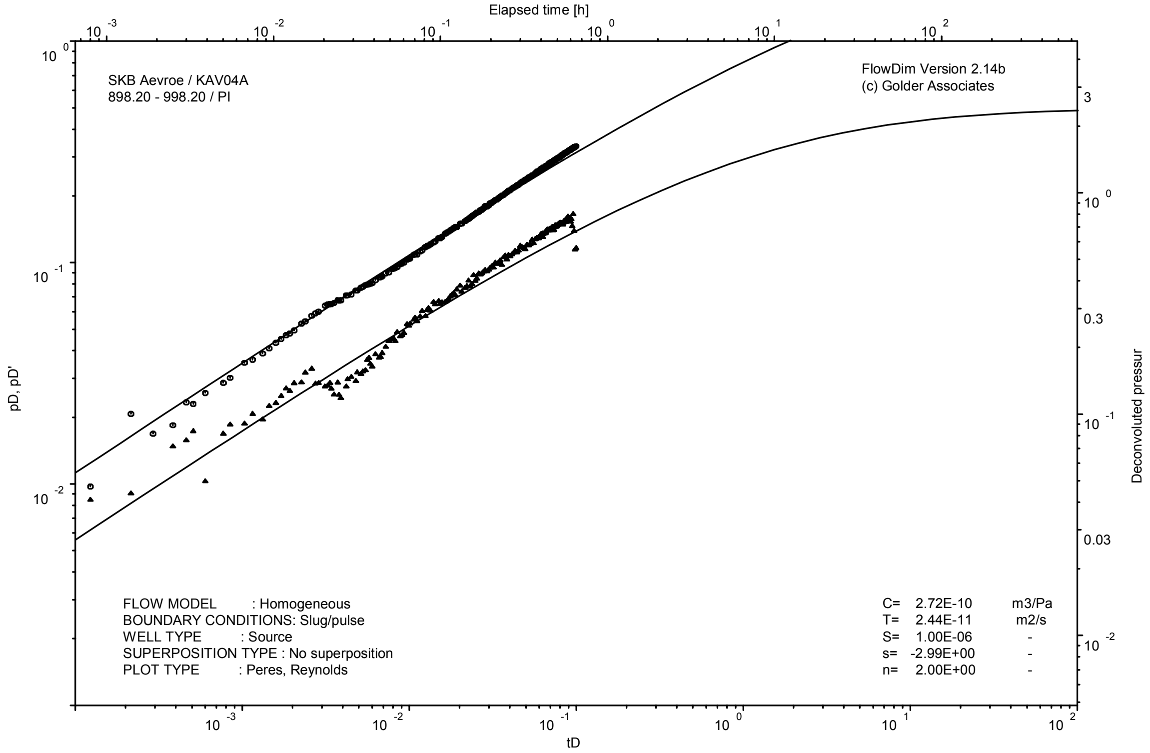
Analysis diagrams



Pressure and flow rate vs. time; cartesian plot



Interval pressure and temperature vs. time; cartesian plot

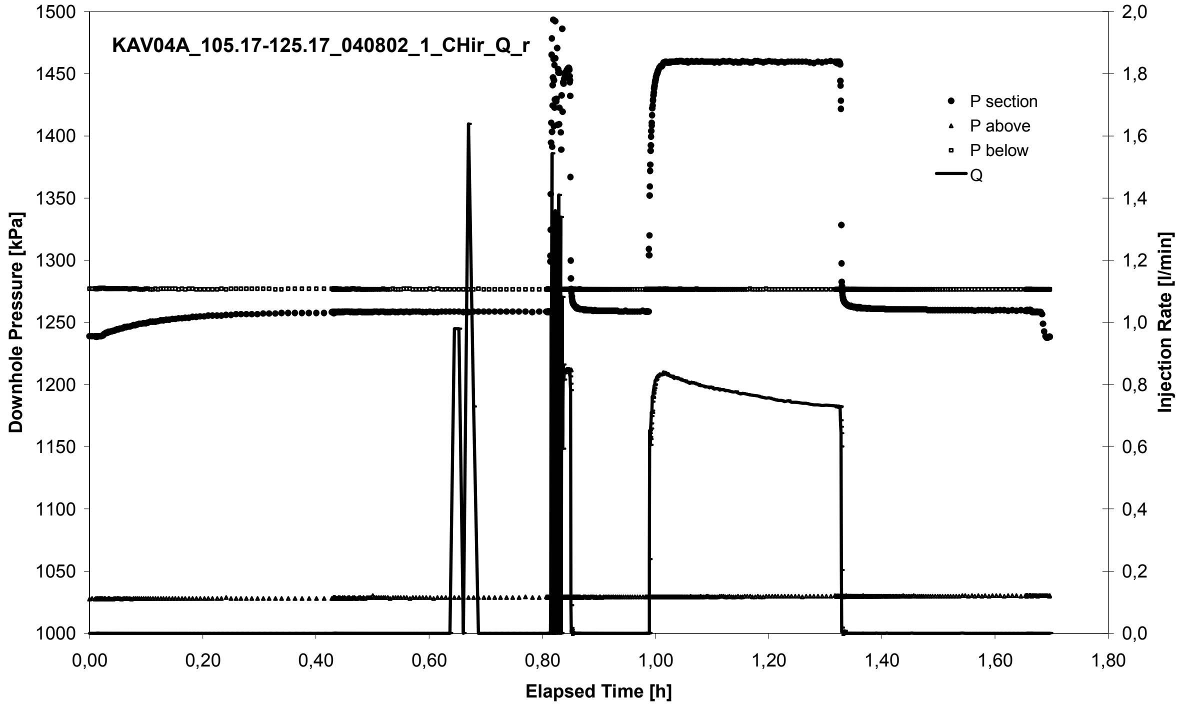


PI phase, deconvolution match

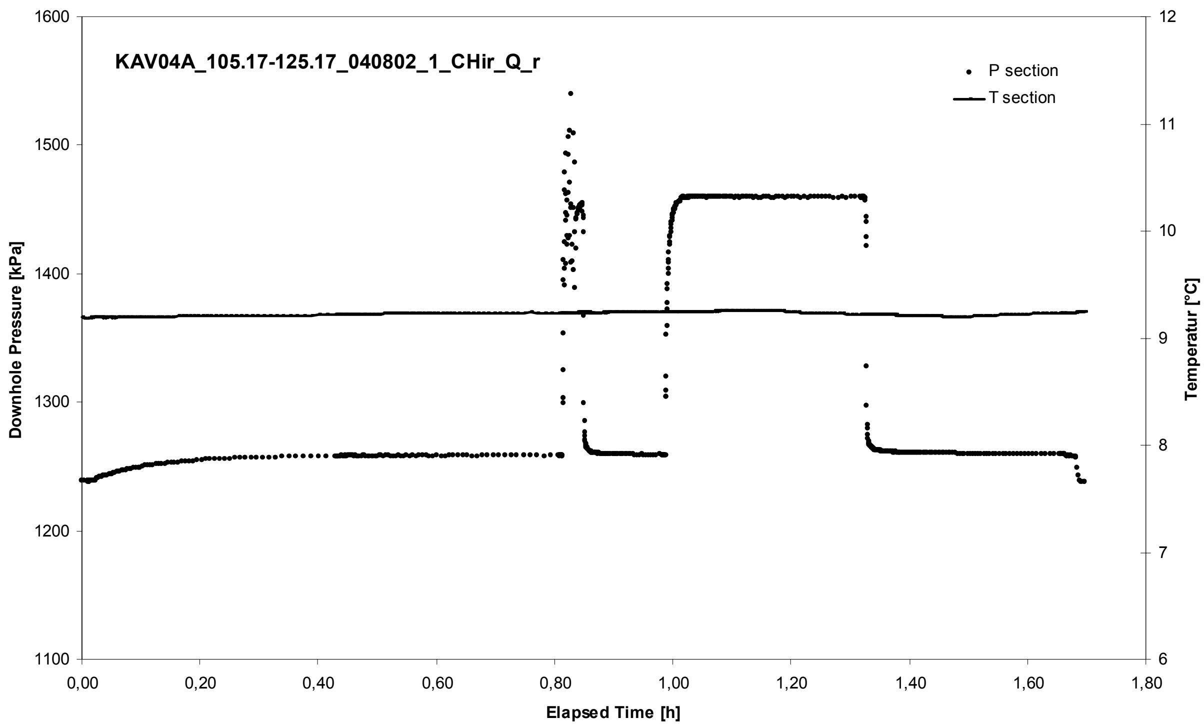
APPENDIX 2-10

Test 105,17 – 125,17 m

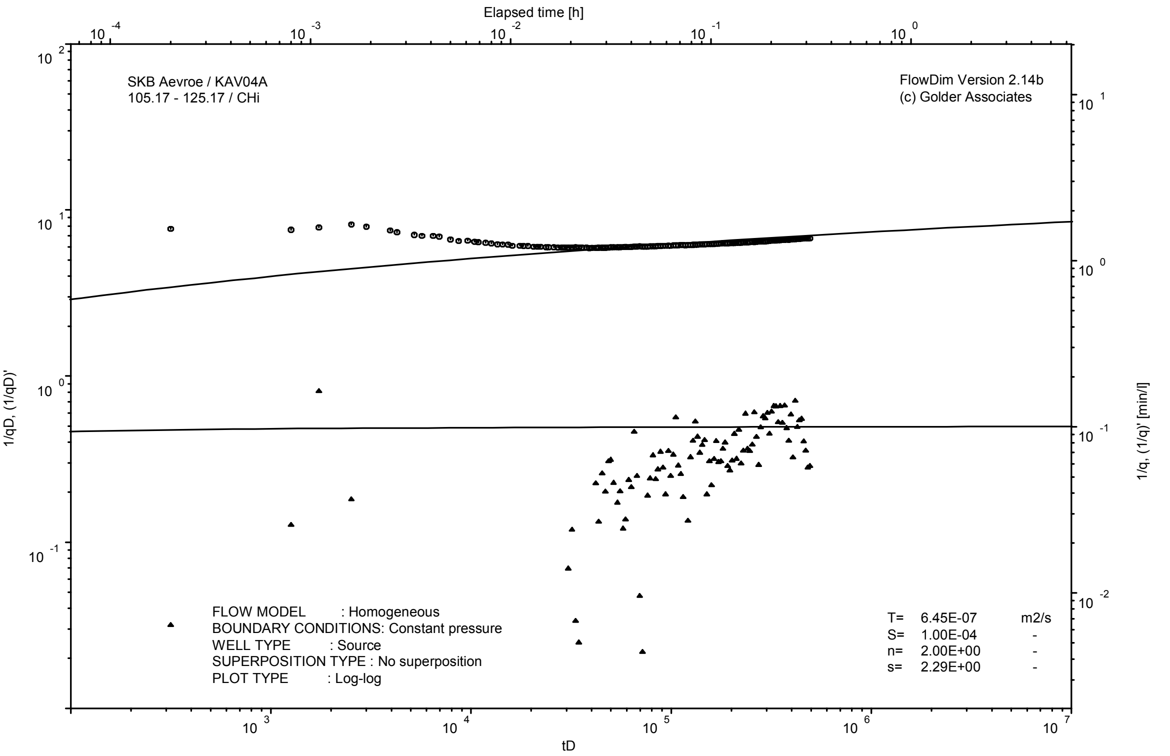
Analysis diagrams



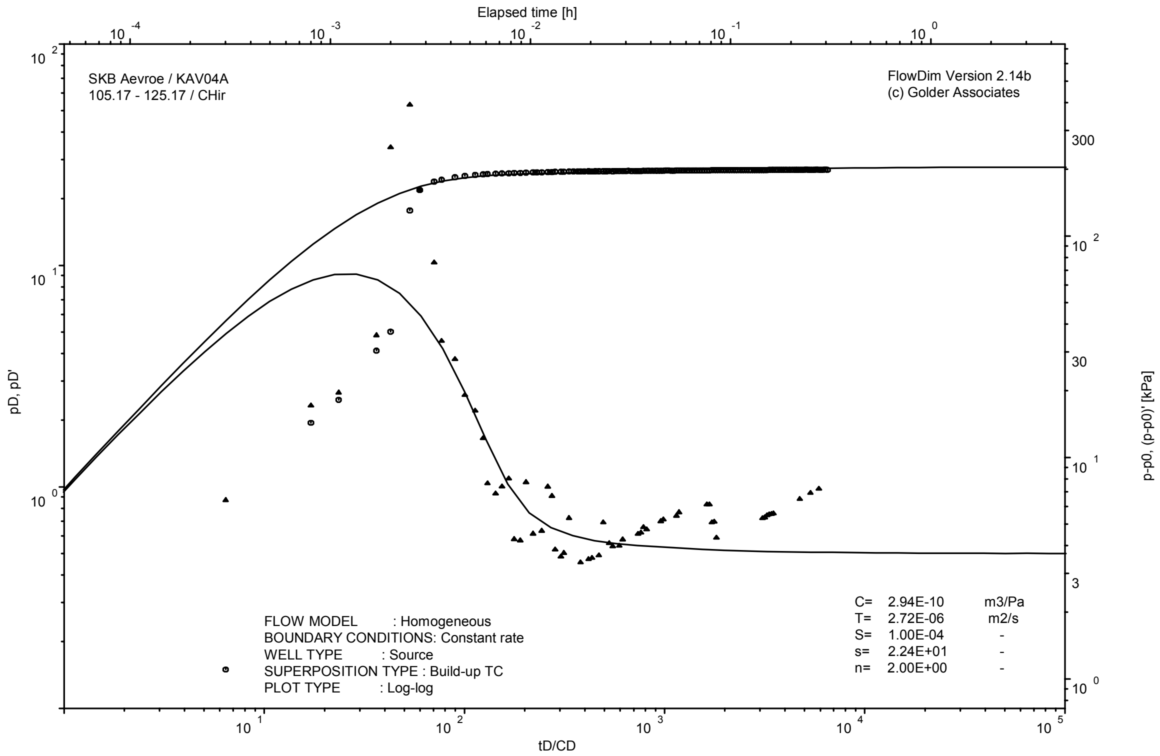
Pressure and flow rate vs. time; cartesian plot



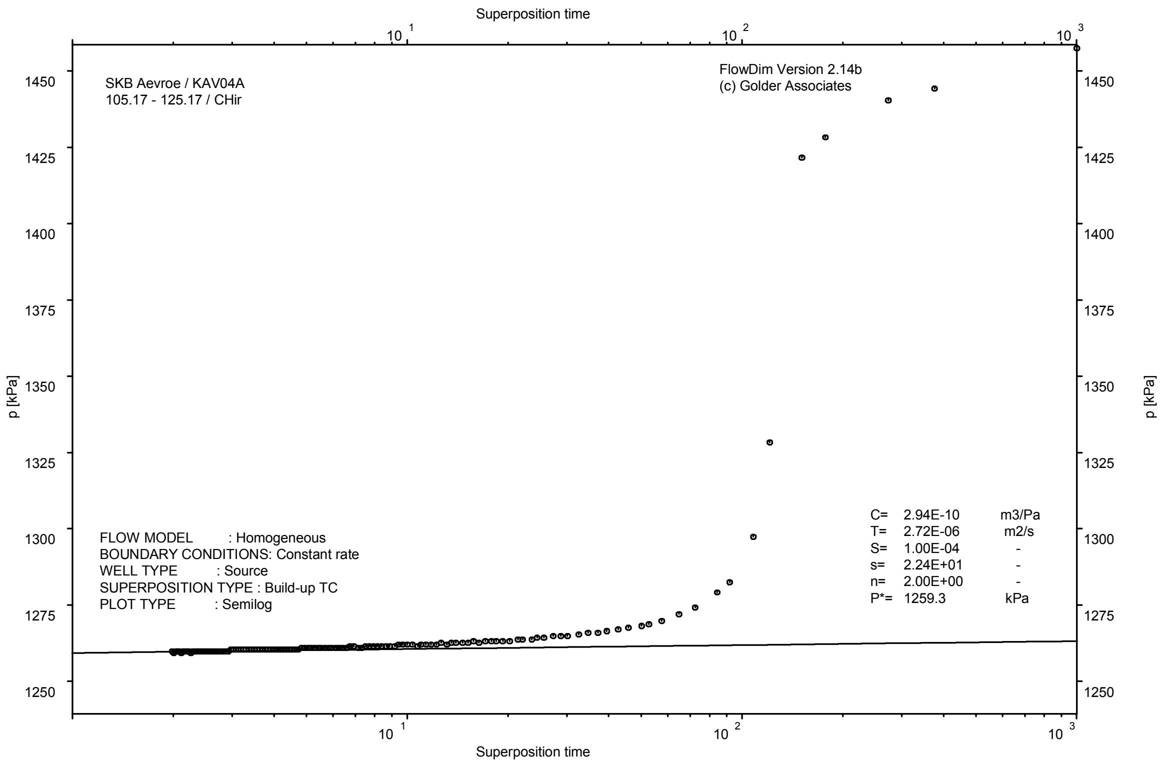
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

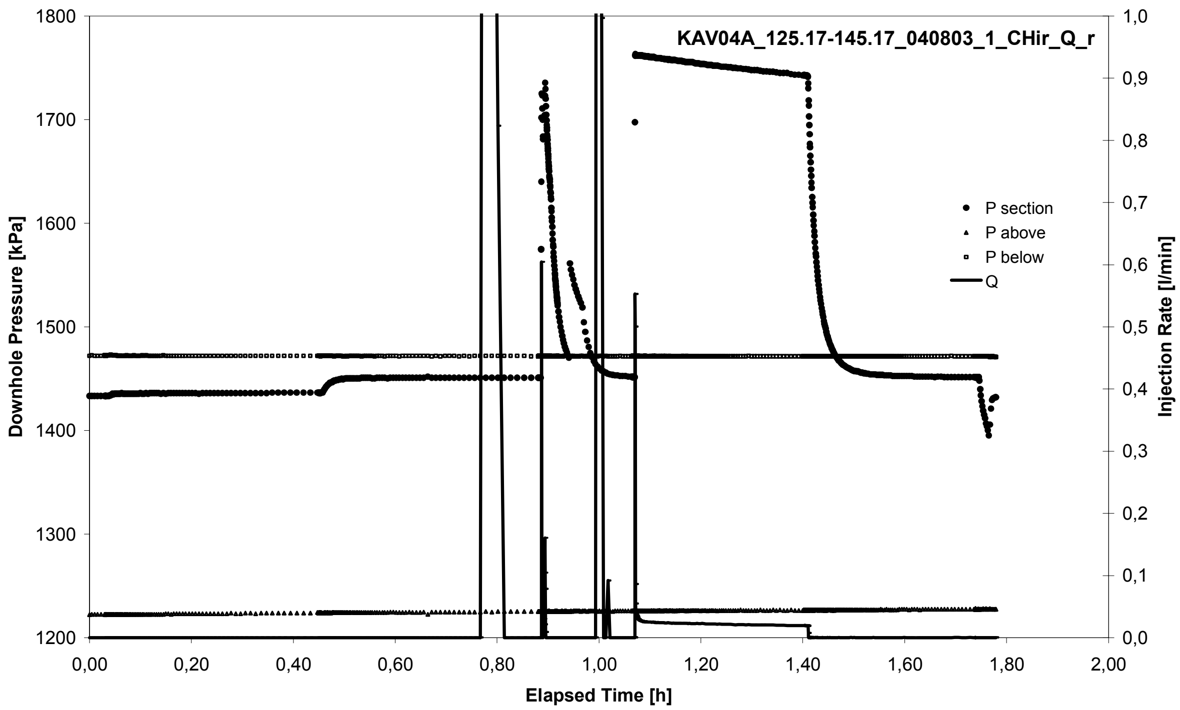


CHIR phase; HORNER match

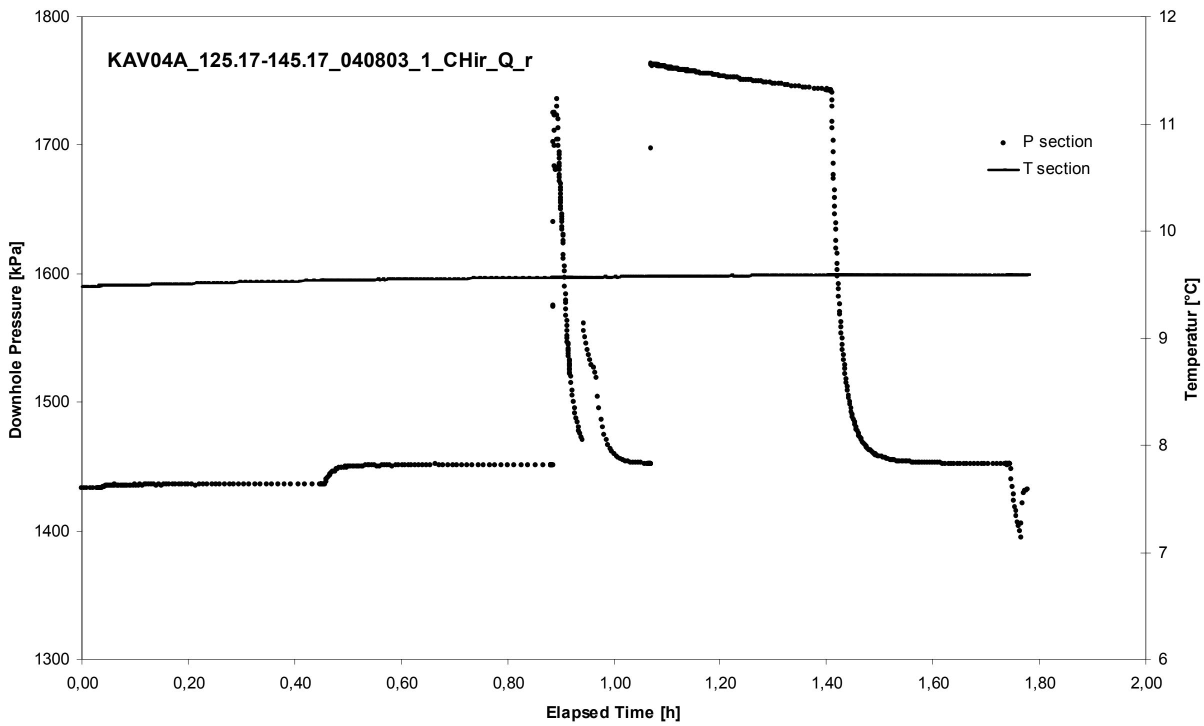
APPENDIX 2-11

Test 125,17 – 145,17 m

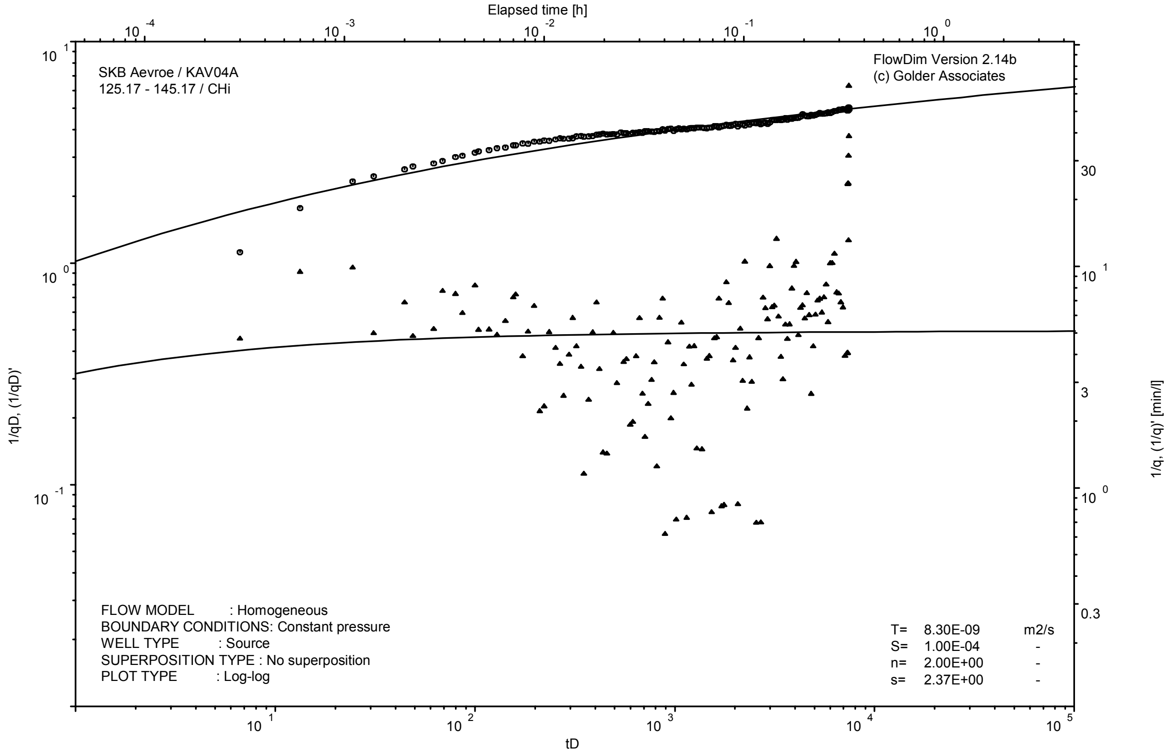
Analysis diagrams



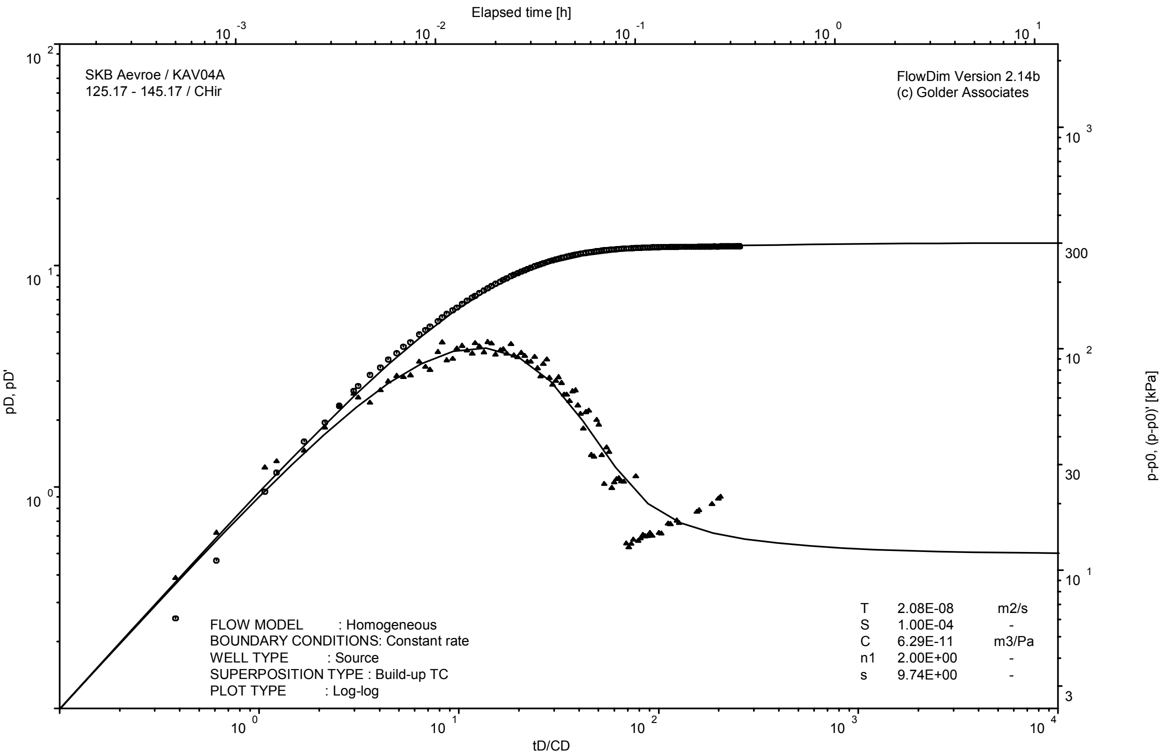
Pressure and flow rate vs. time; cartesian plot



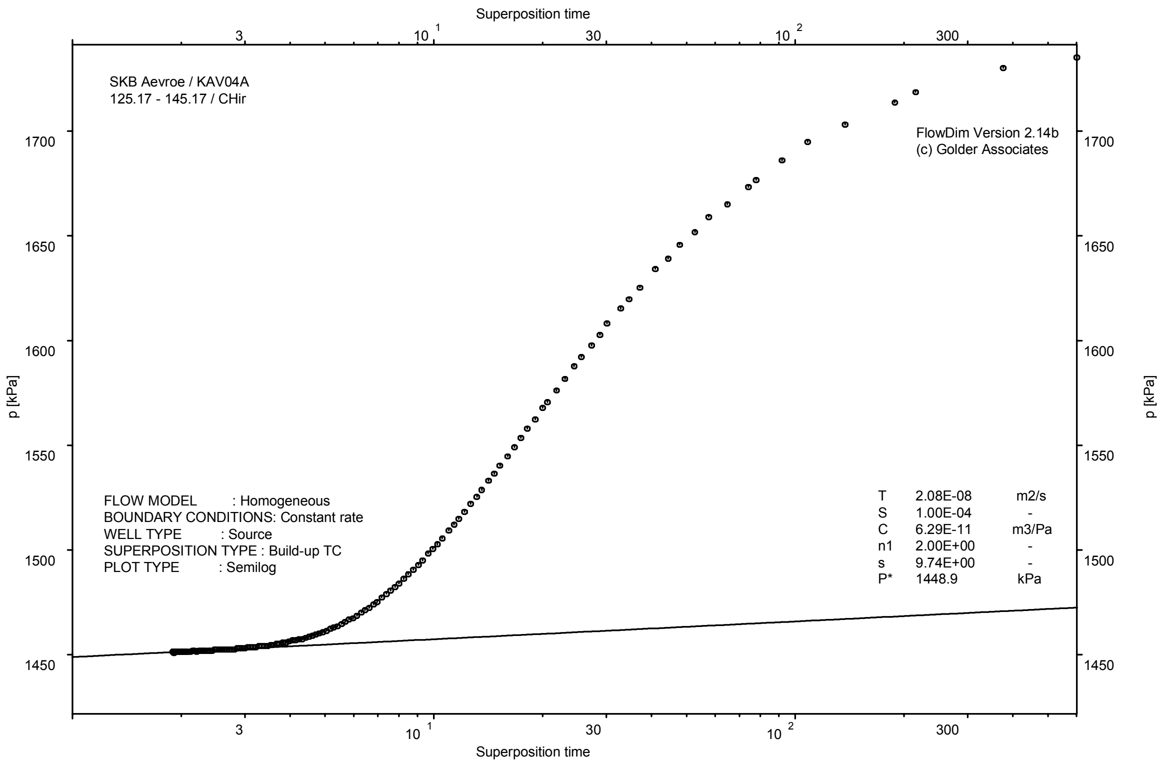
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

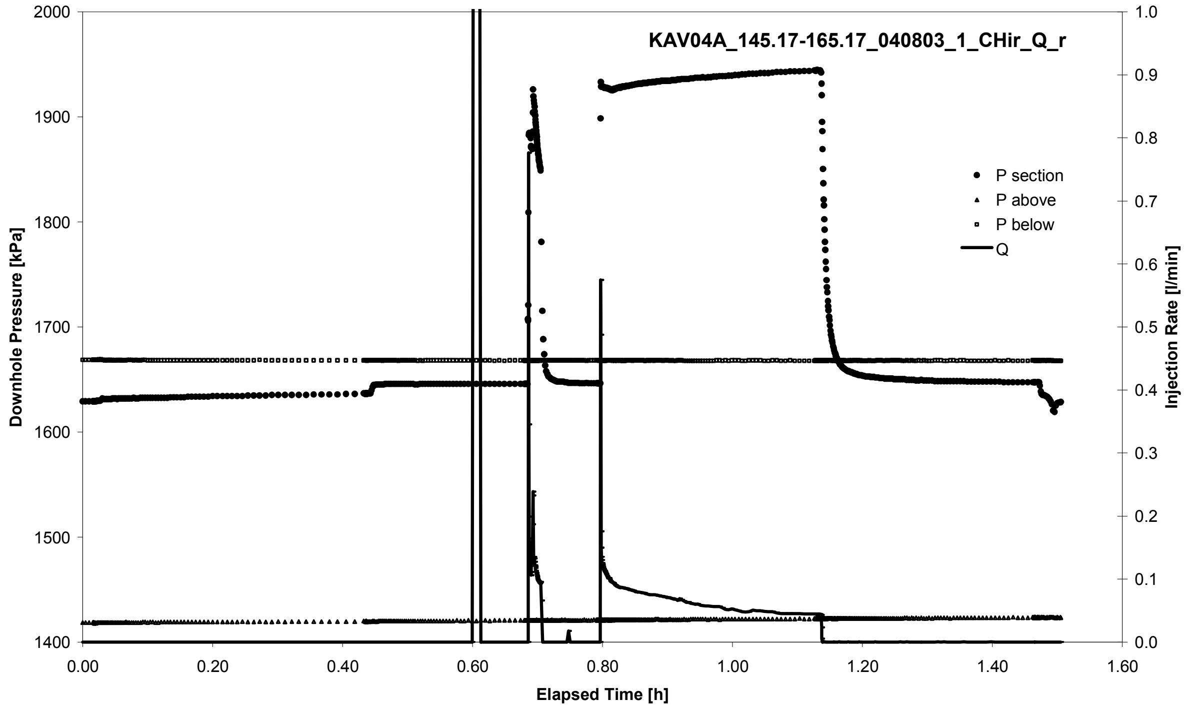


CHIR phase; HORNER match

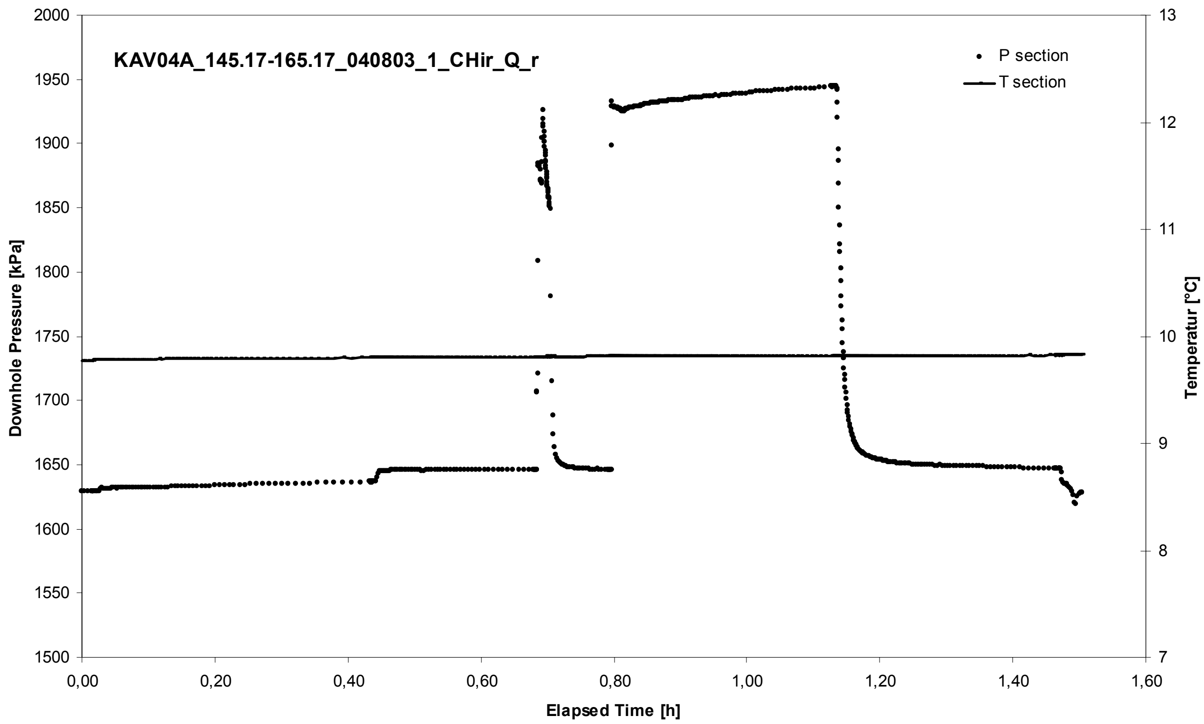
APPENDIX 2-12

Test 145,17 – 165,17 m

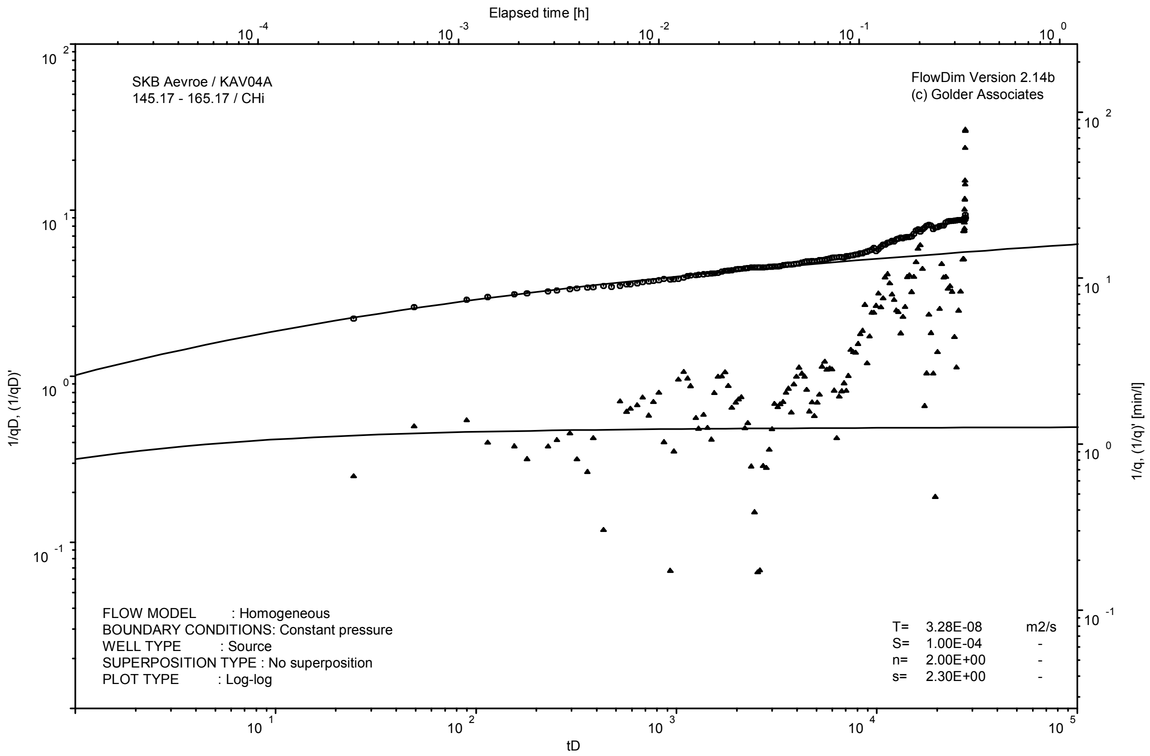
Analysis diagrams



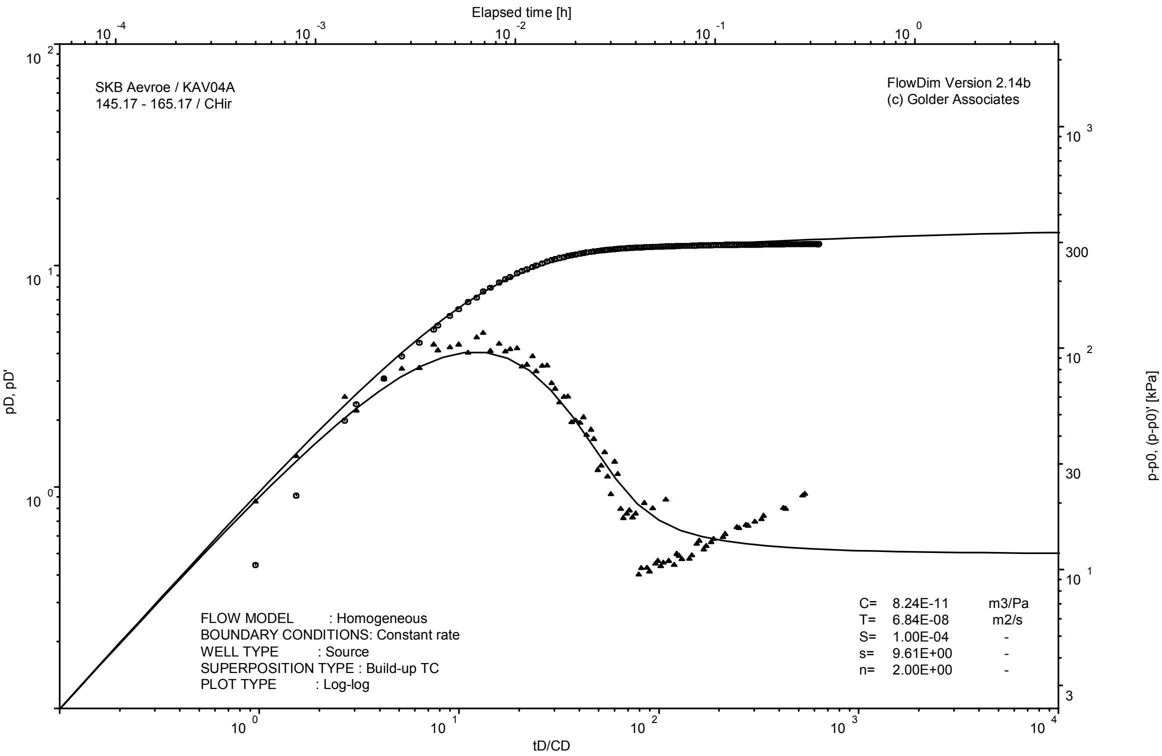
Pressure and flow rate vs. time; cartesian plot



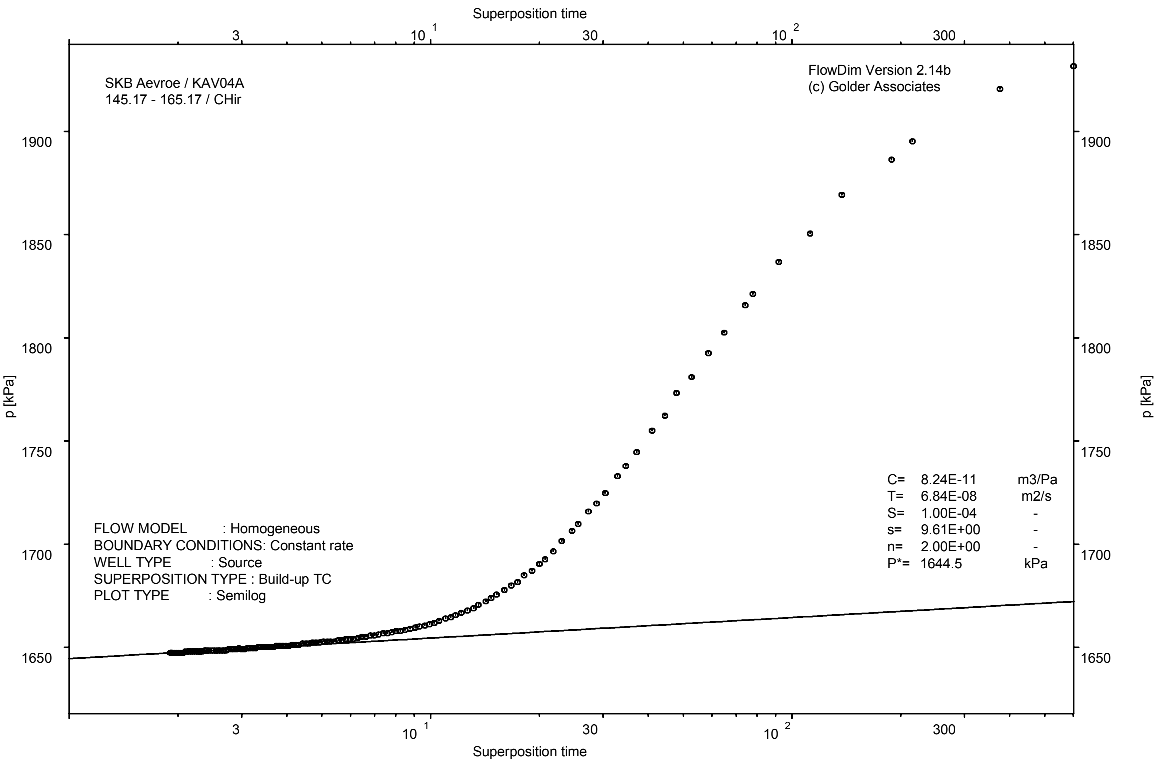
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

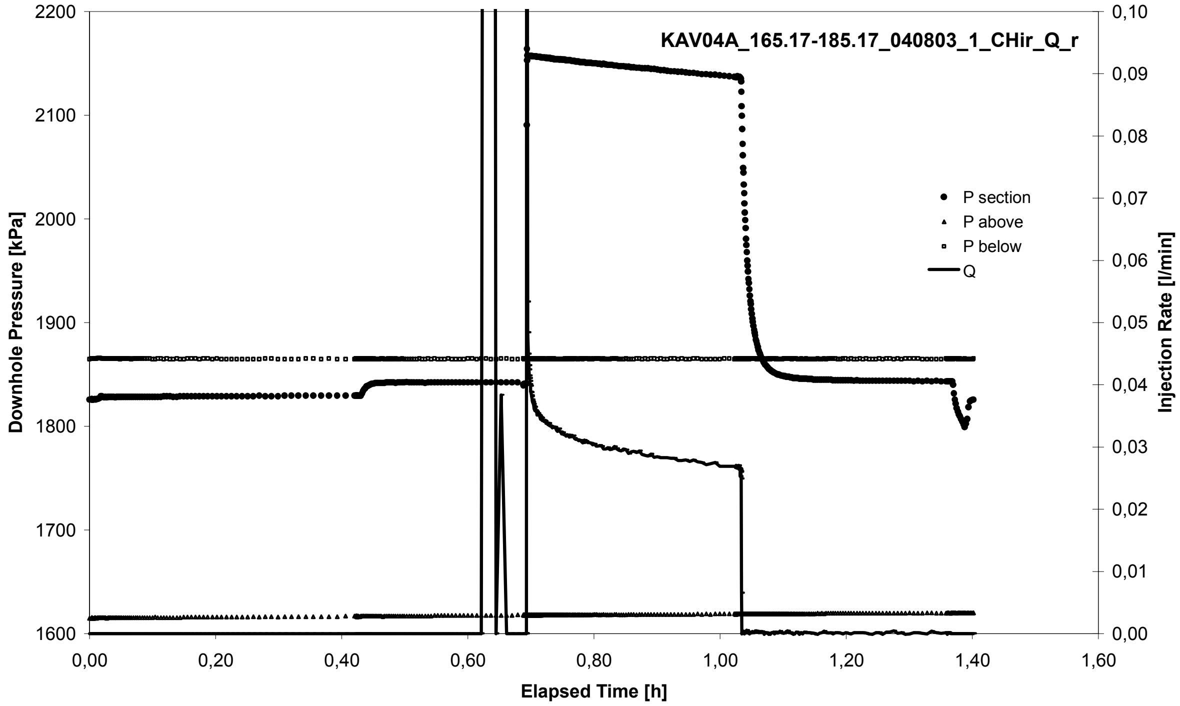


CHIR phase; HORNER match

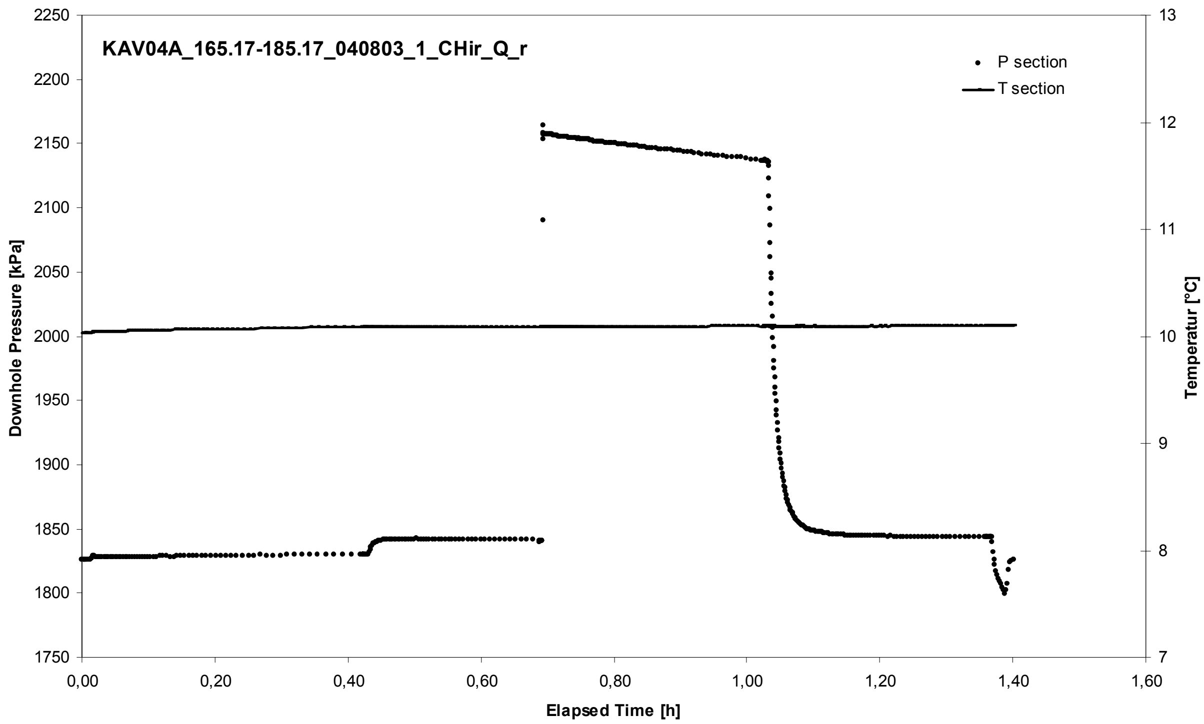
APPENDIX 2-13

Test 165,17 – 185,17 m

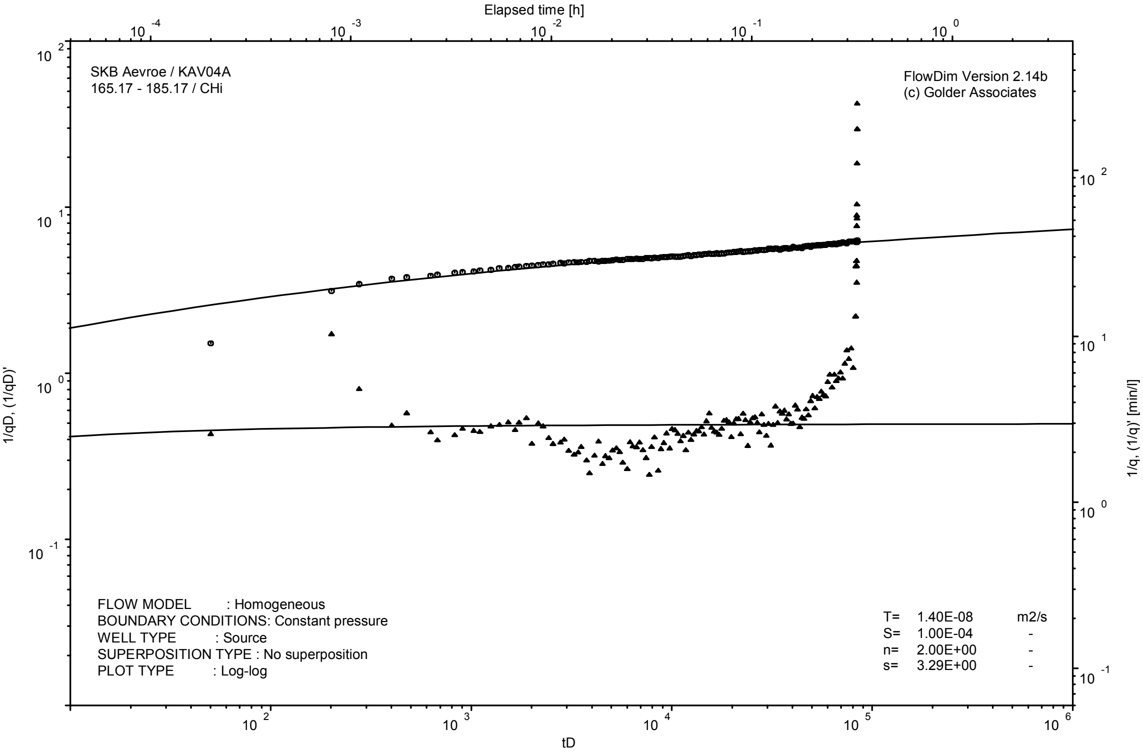
Analysis diagrams



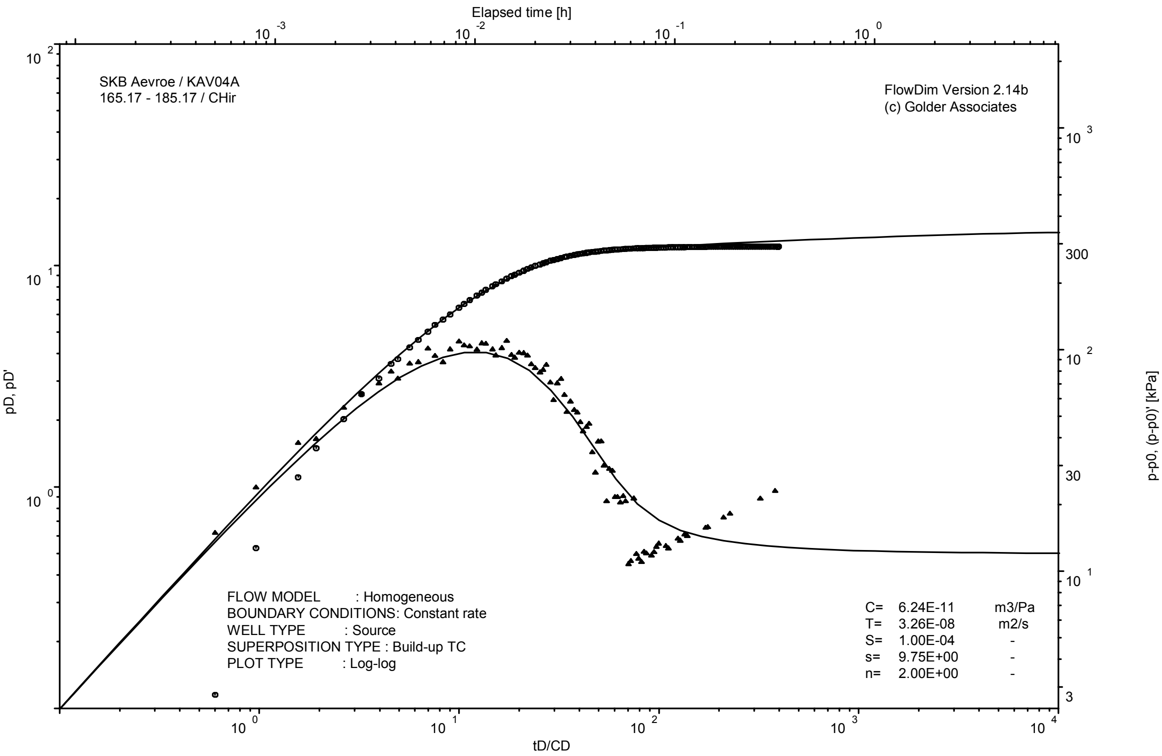
Pressure and flow rate vs. time; cartesian plot



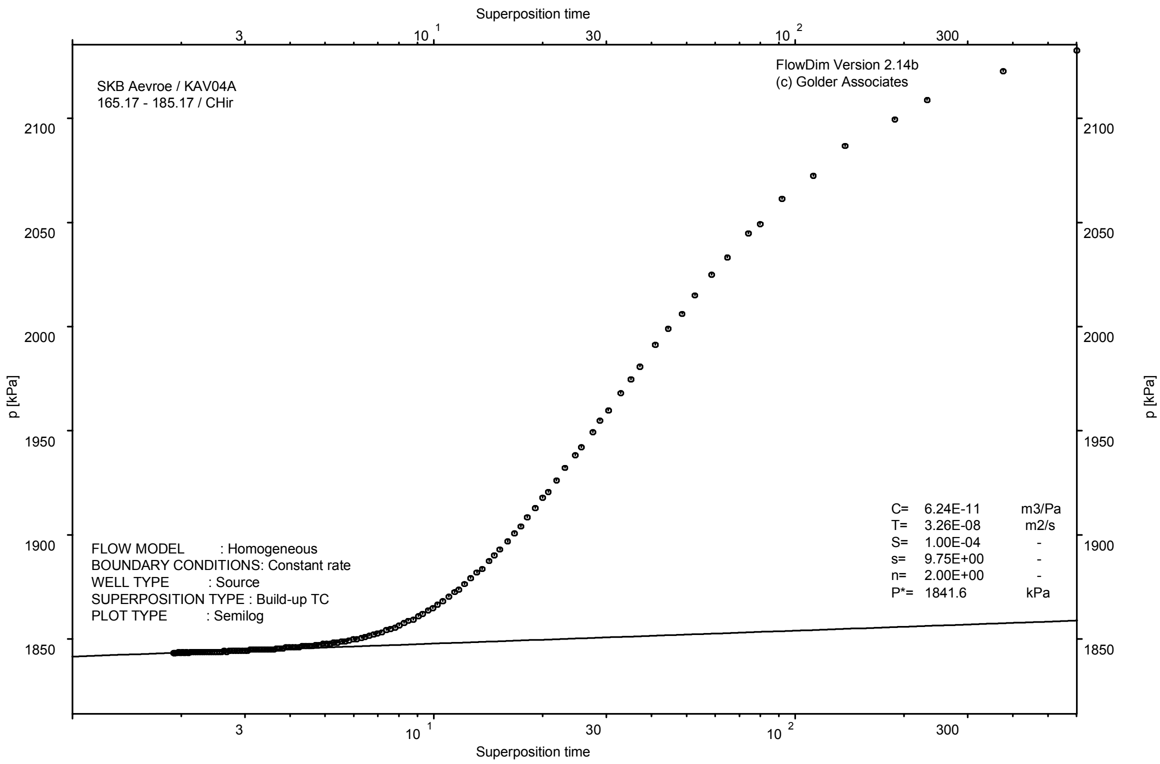
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

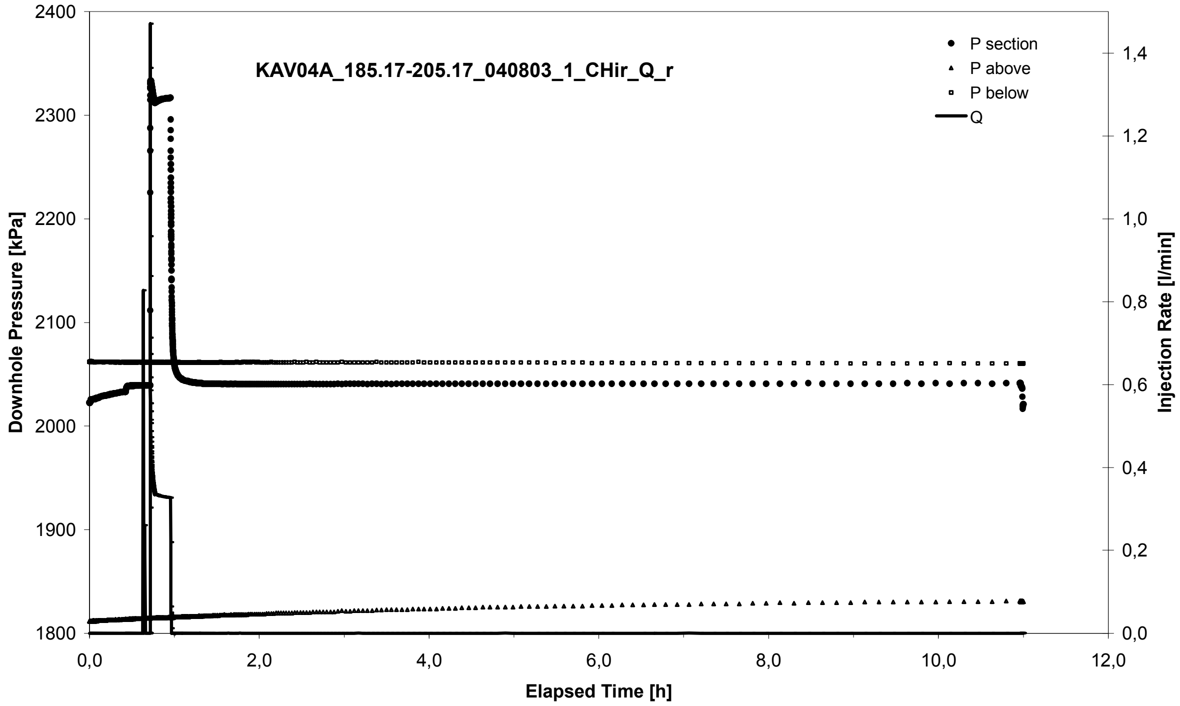


CHIR phase; HORNER match

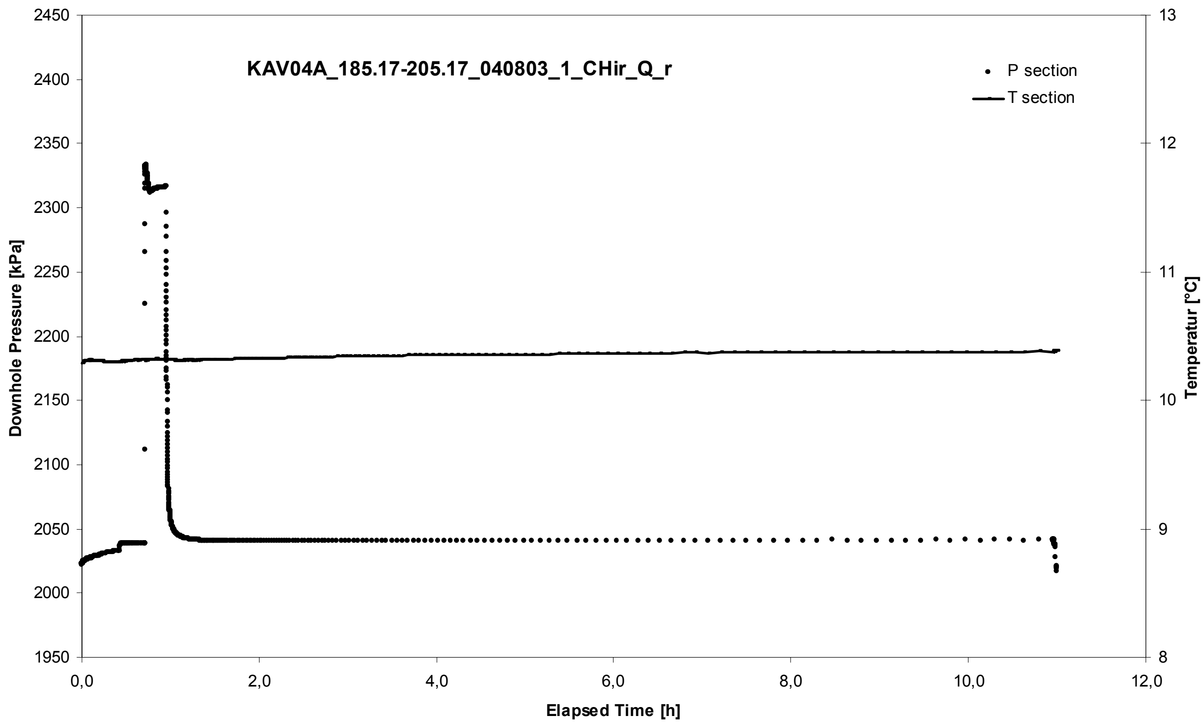
APPENDIX 2-14

Test 185,17 – 205,17 m

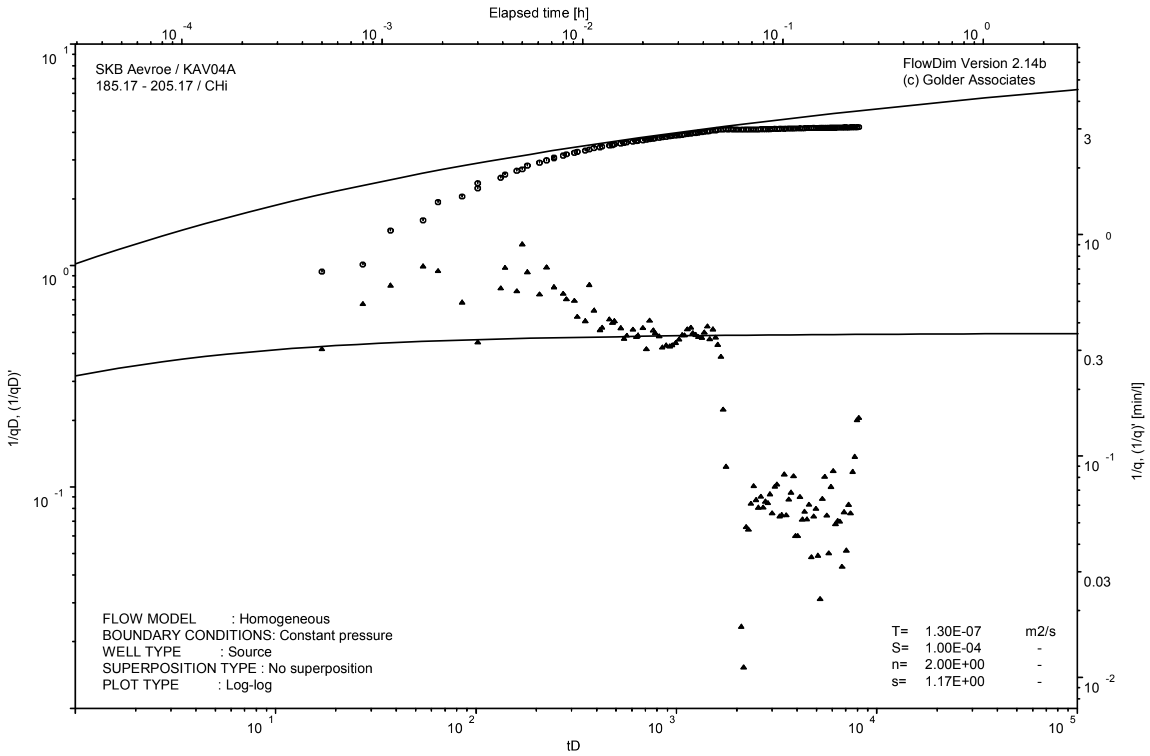
Analysis diagrams



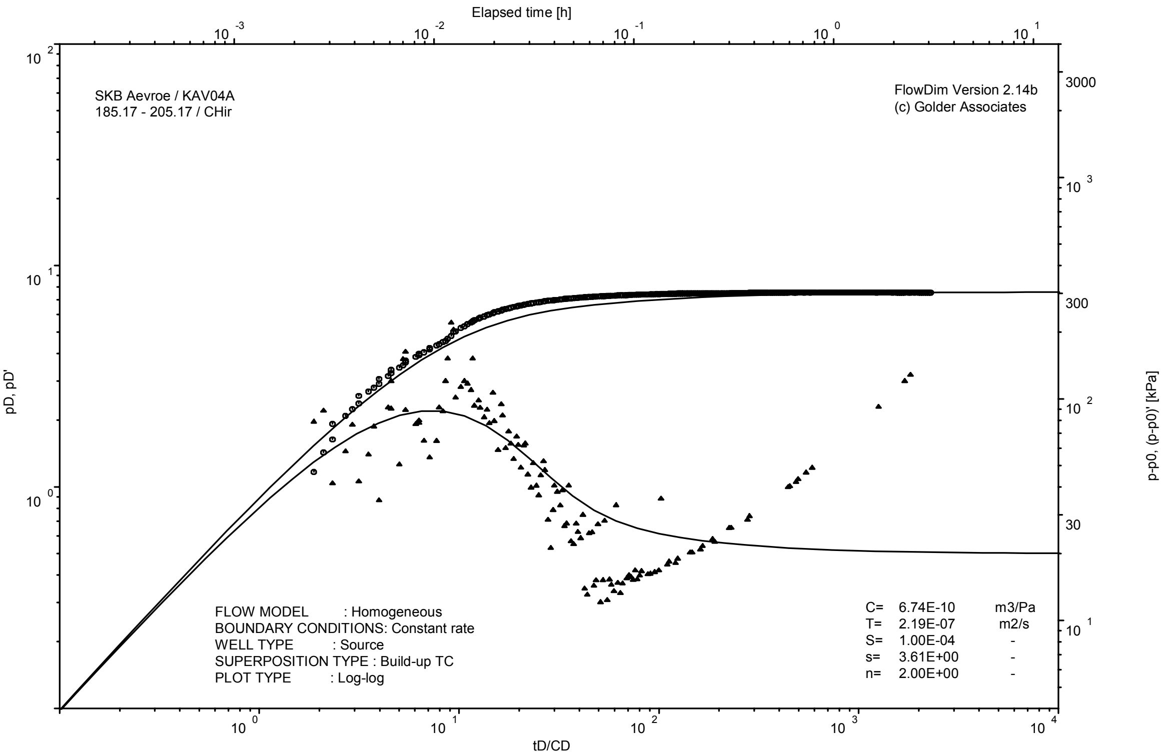
Pressure and flow rate vs. time; cartesian plot



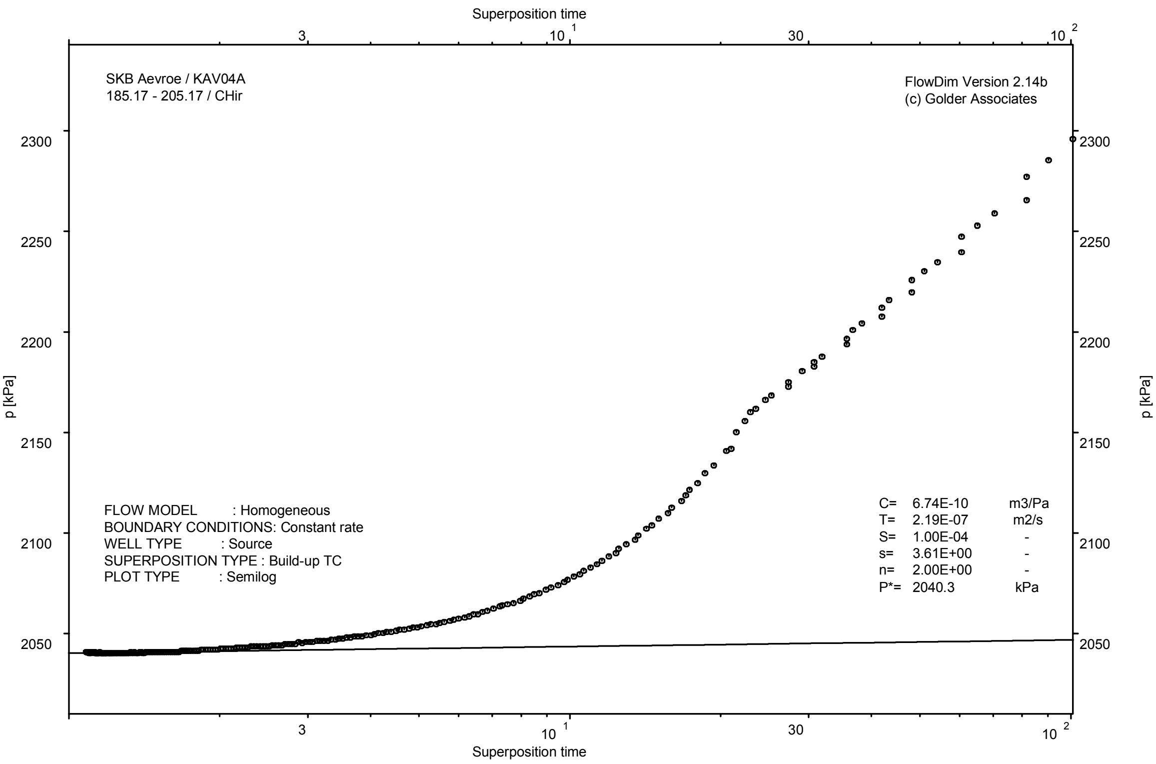
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

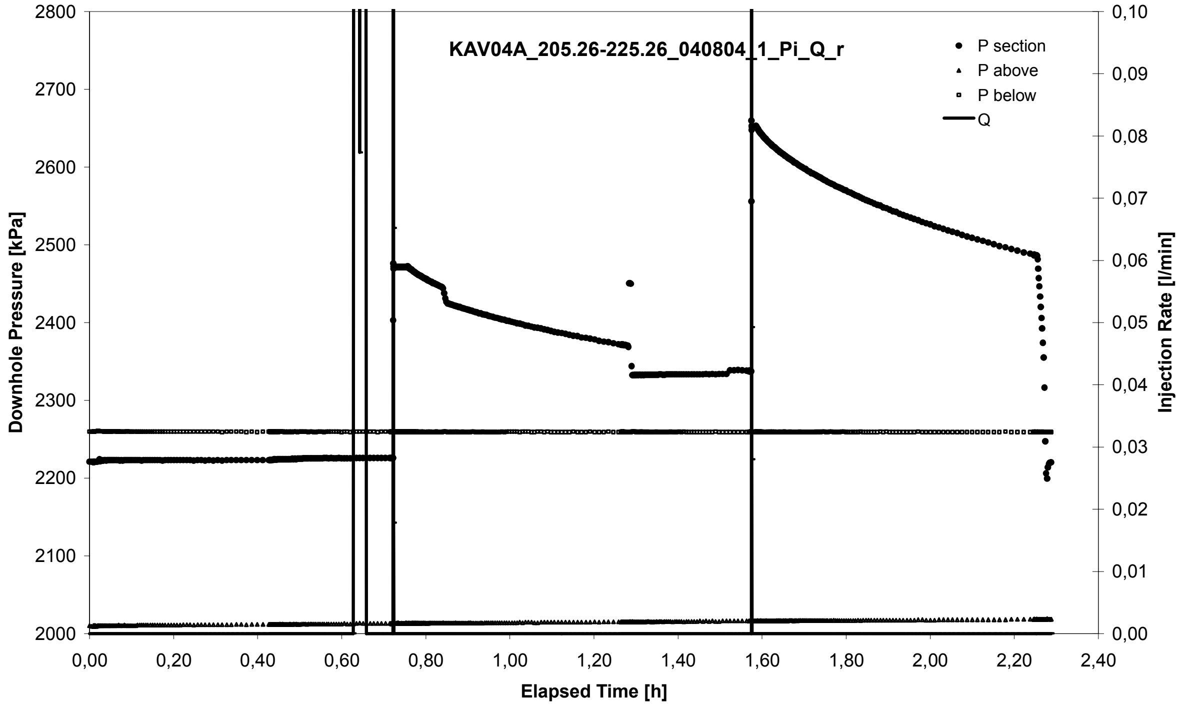


CHIR phase; HORNER match

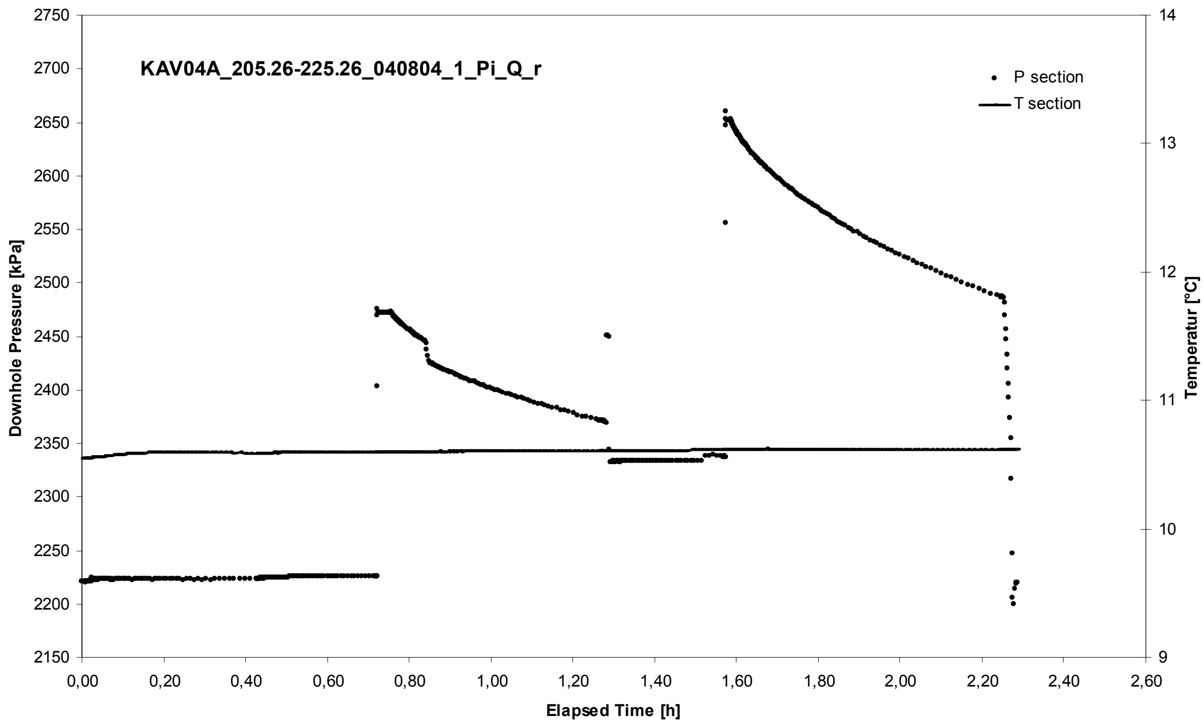
APPENDIX 2-15

Test 205,26 – 225,26 m

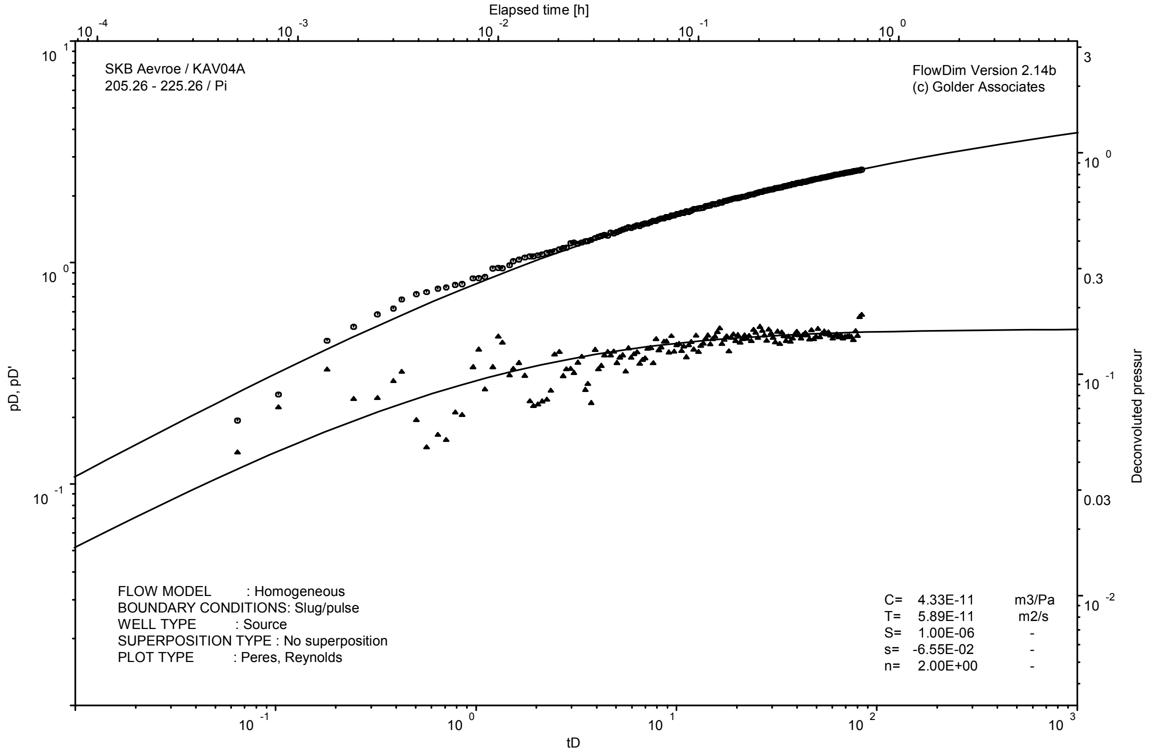
Analysis diagrams



Pressure and flow rate vs. time; cartesian plot



Interval pressure and temperature vs. time; cartesian plot

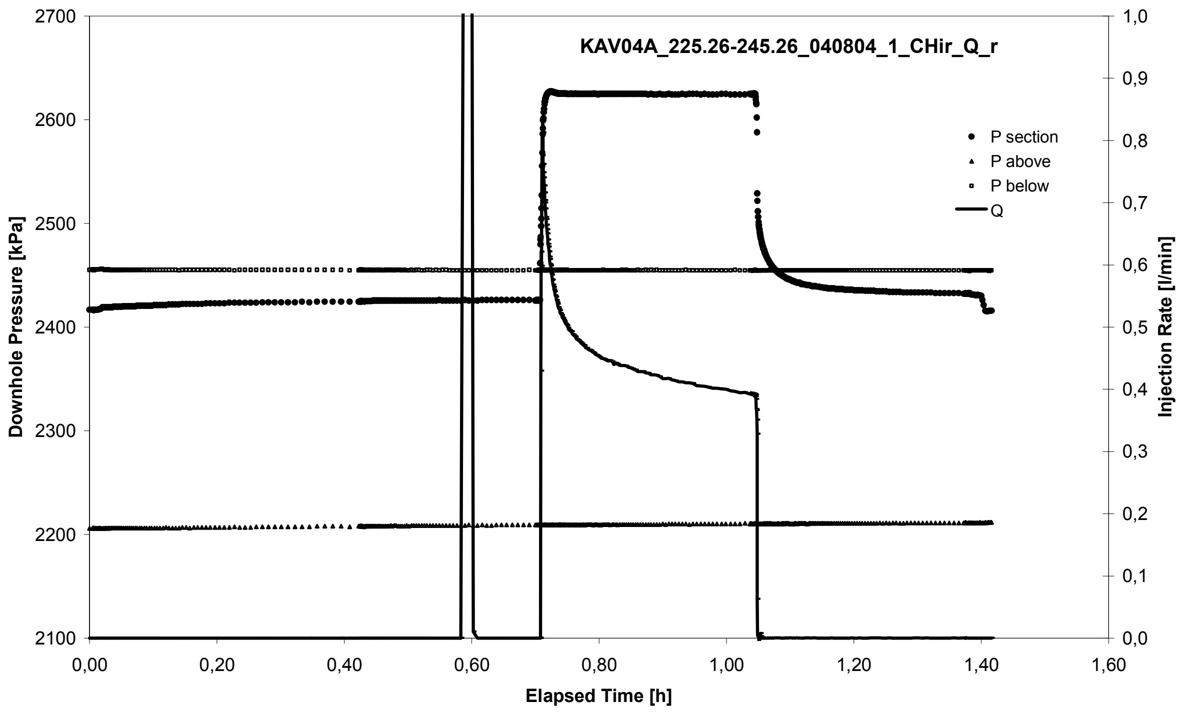


PI phase, deconvolution match

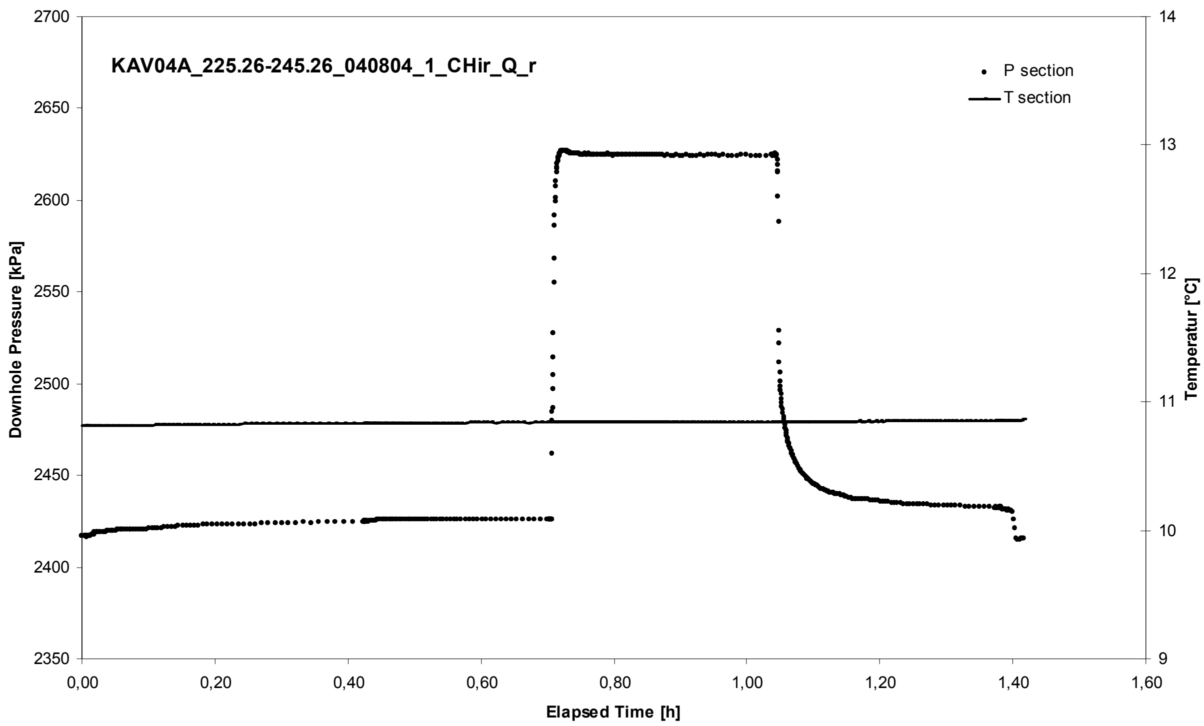
APPENDIX 2-16

Test 225,26 – 245,26 m

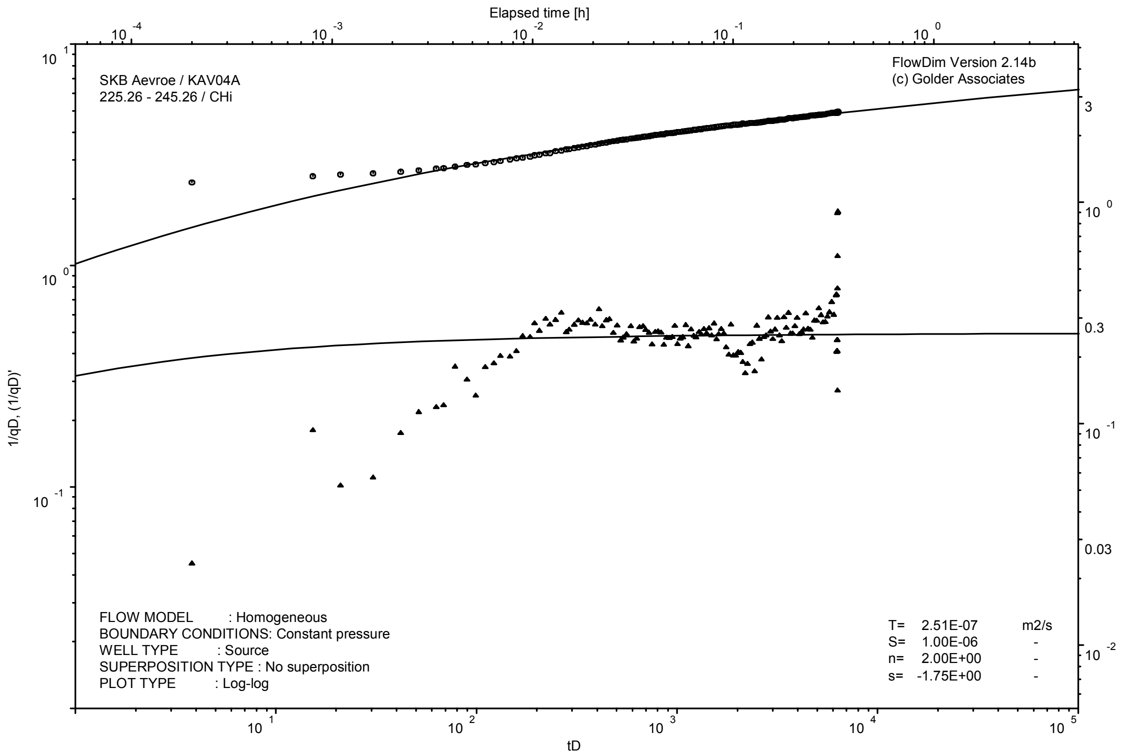
Analysis diagrams



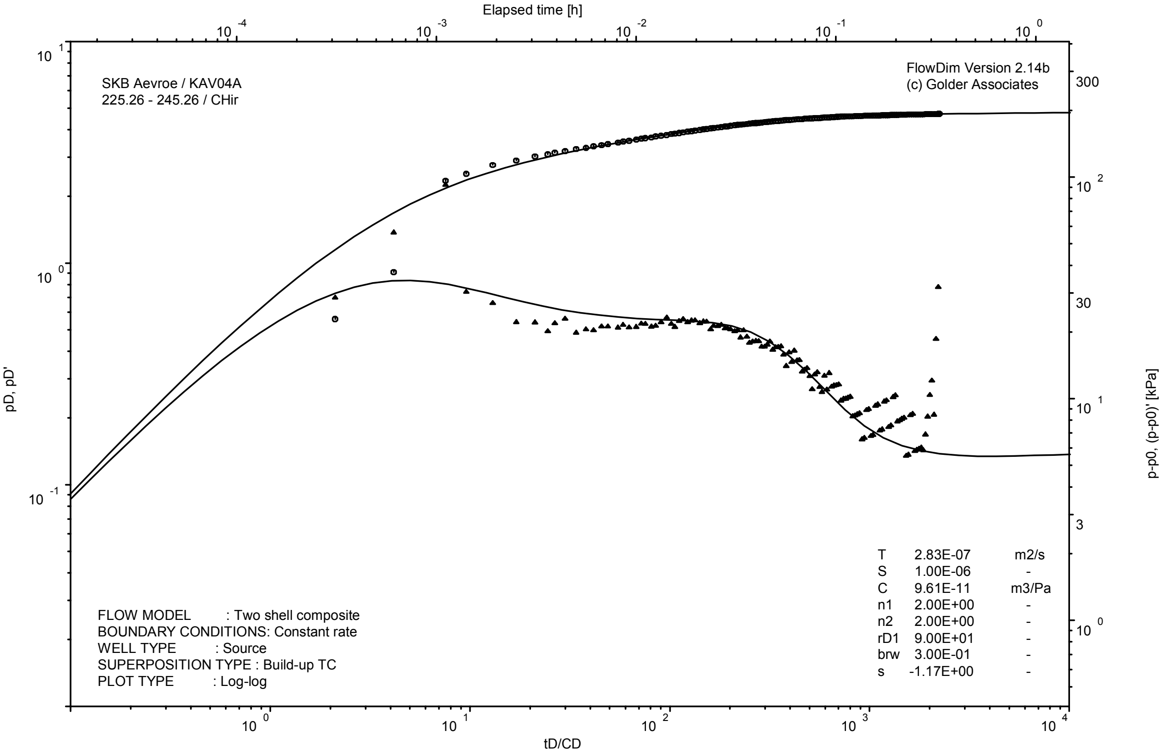
Pressure and flow rate vs. time; cartesian plot



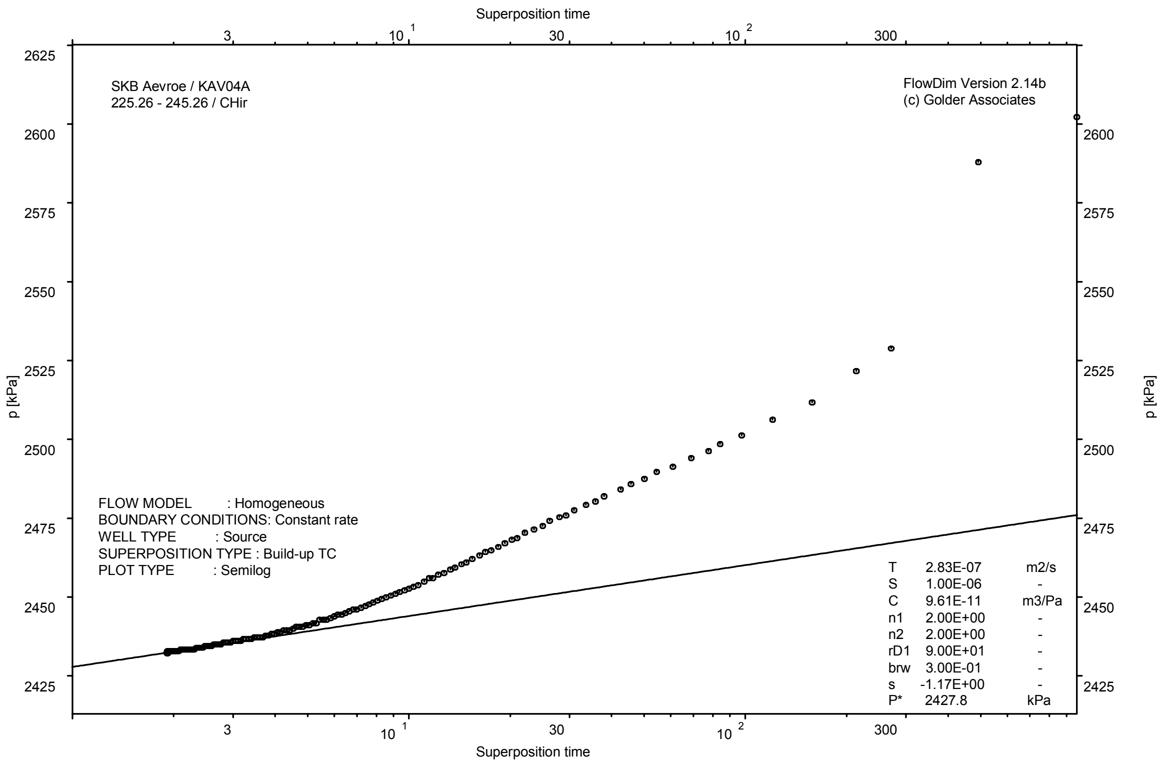
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

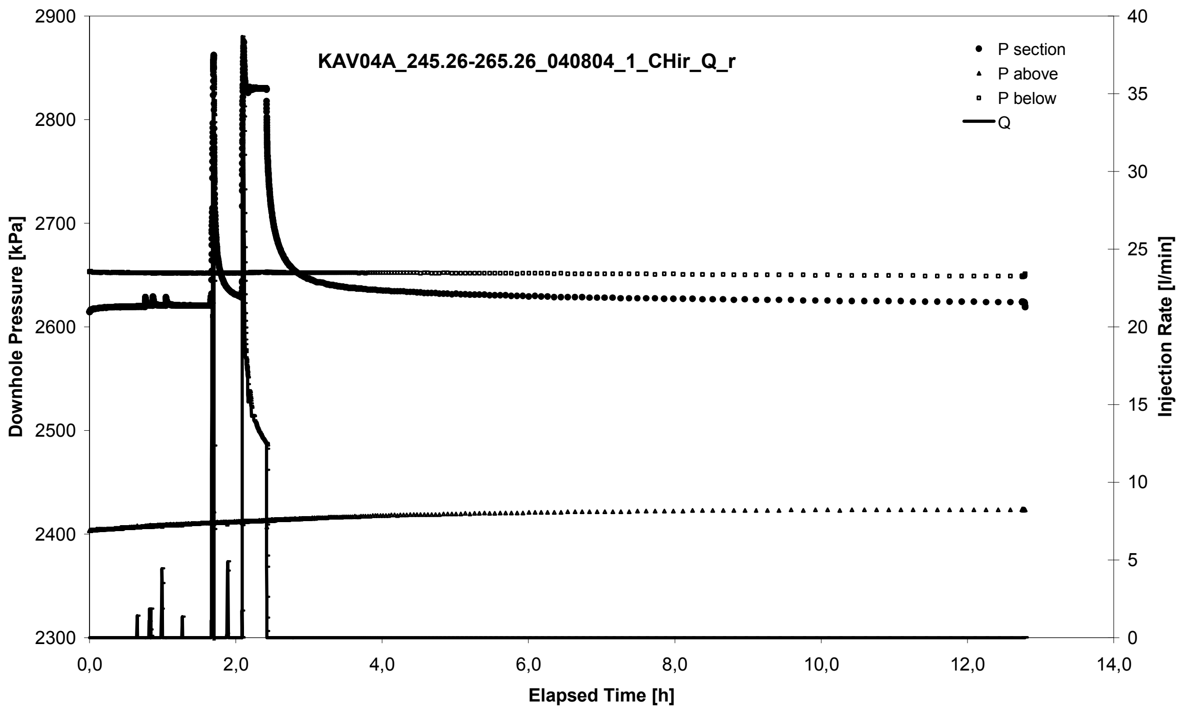


CHIR phase; HORNER match

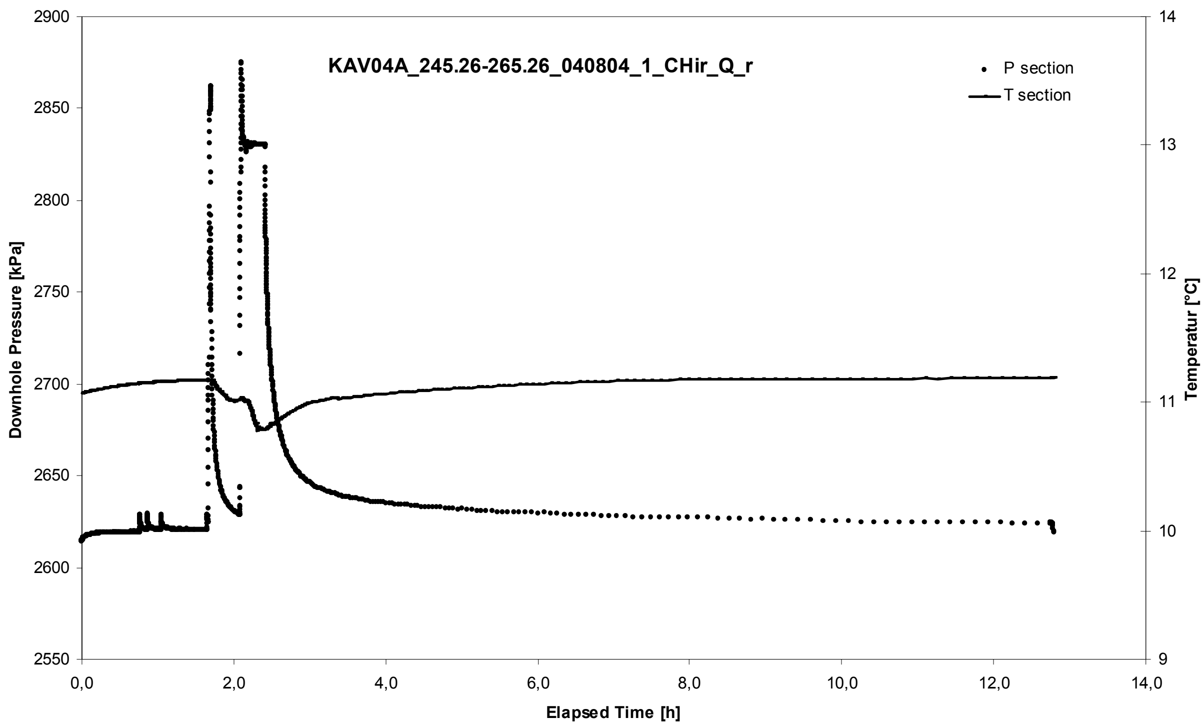
APPENDIX 2-17

Test 245,26 – 265,26 m

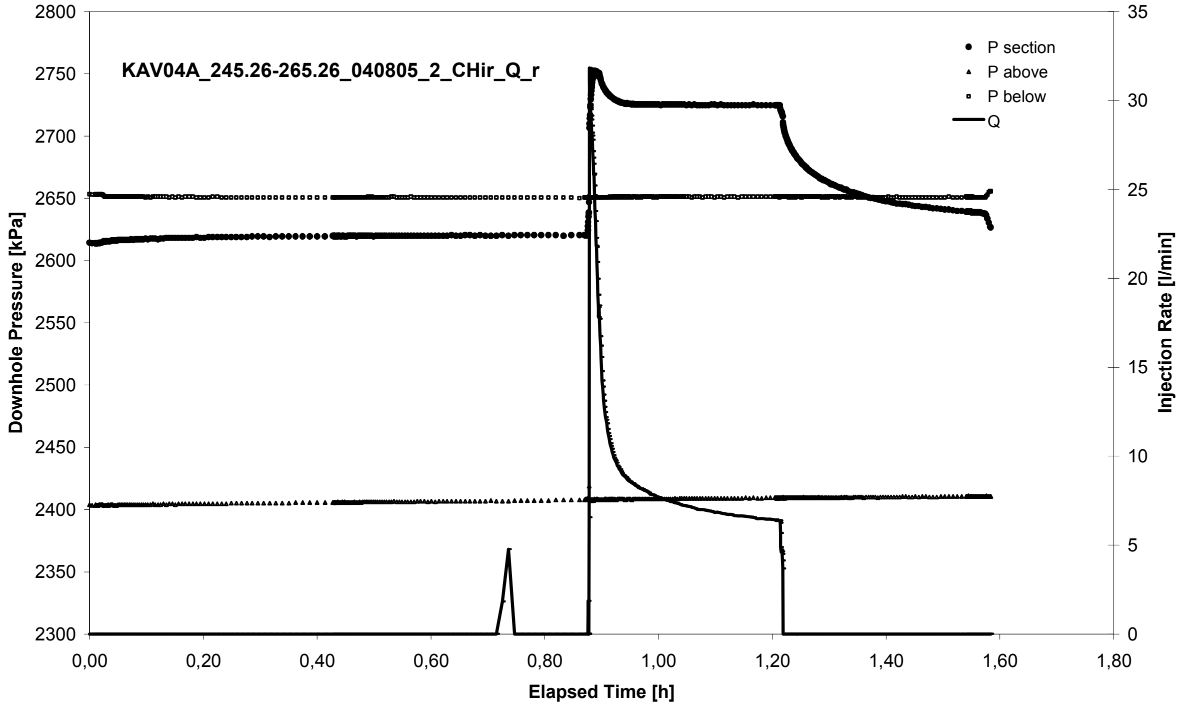
Analysis diagrams



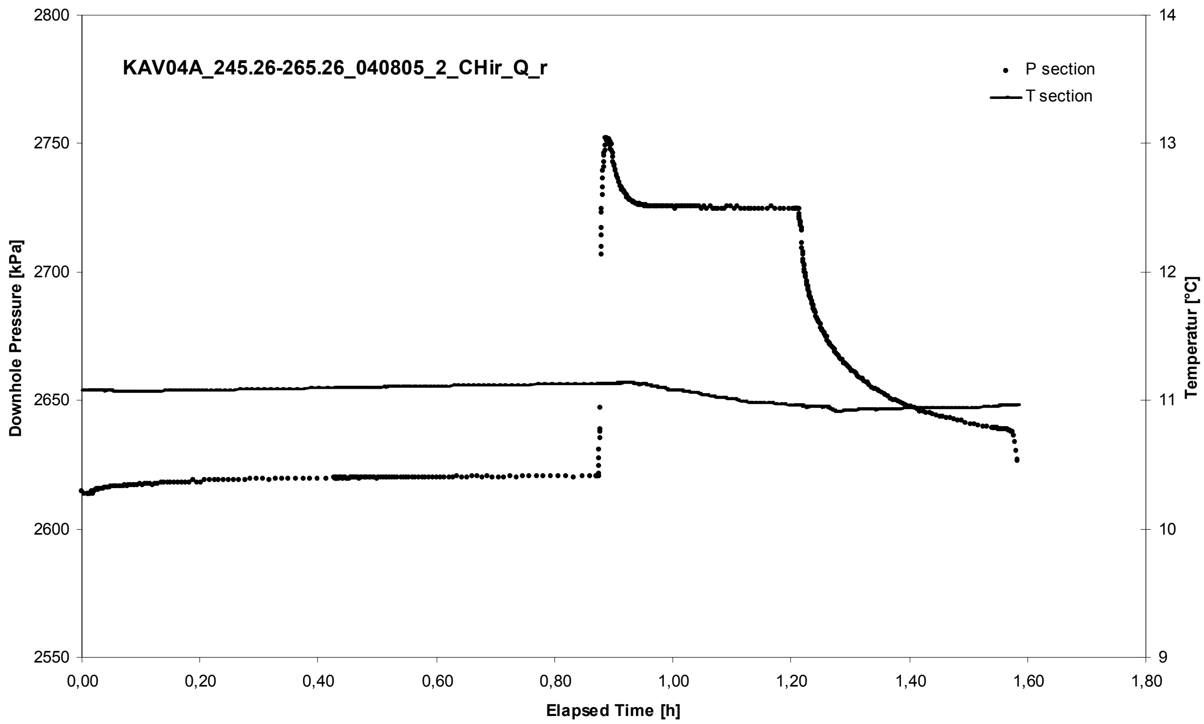
Pressure and flow rate vs. time; cartesian plot (1st test)



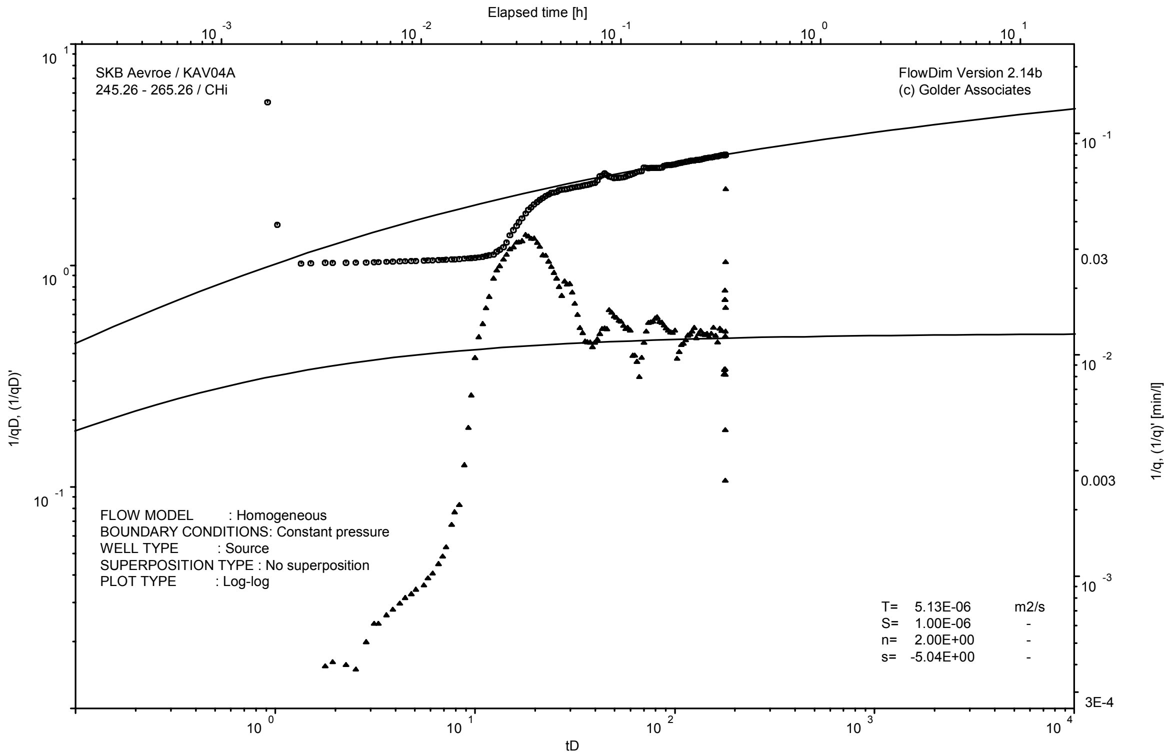
Interval pressure and temperature vs. time; cartesian plot (1st test)



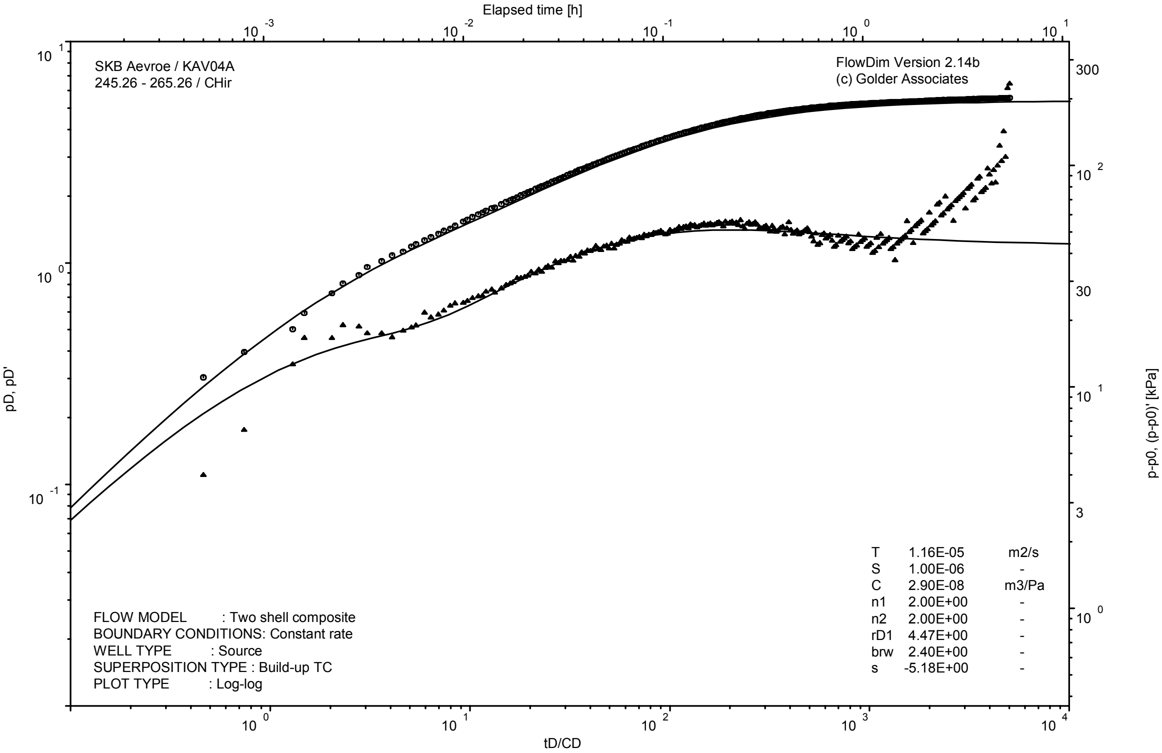
Pressure and flow rate vs. time; cartesian plot (2nd test)



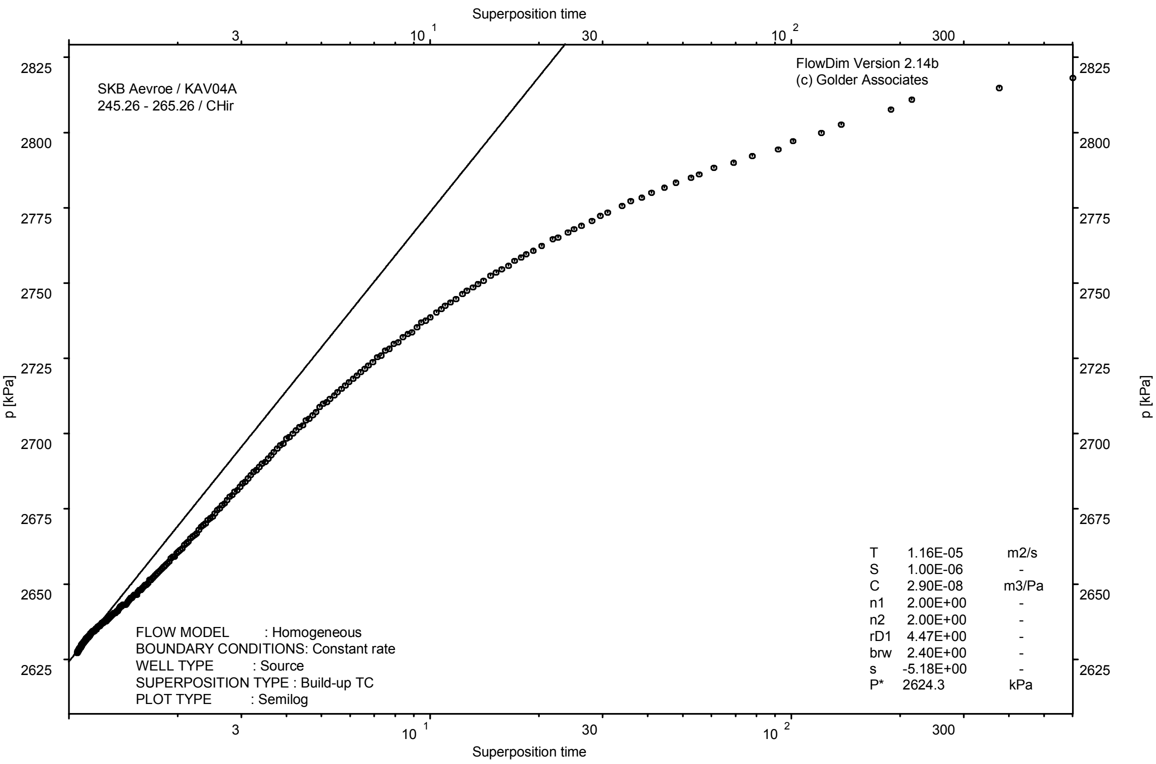
Interval pressure and temperature vs. time; cartesian plot (2nd test)



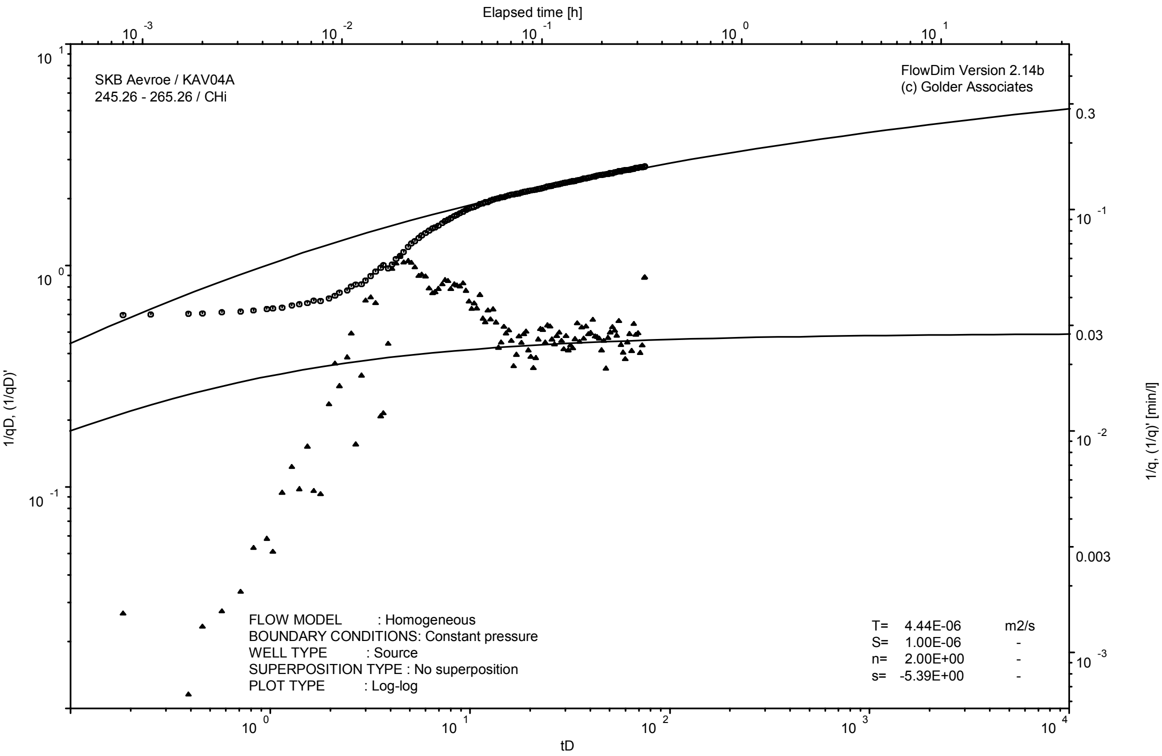
CHI phase; log-log match (1st test)



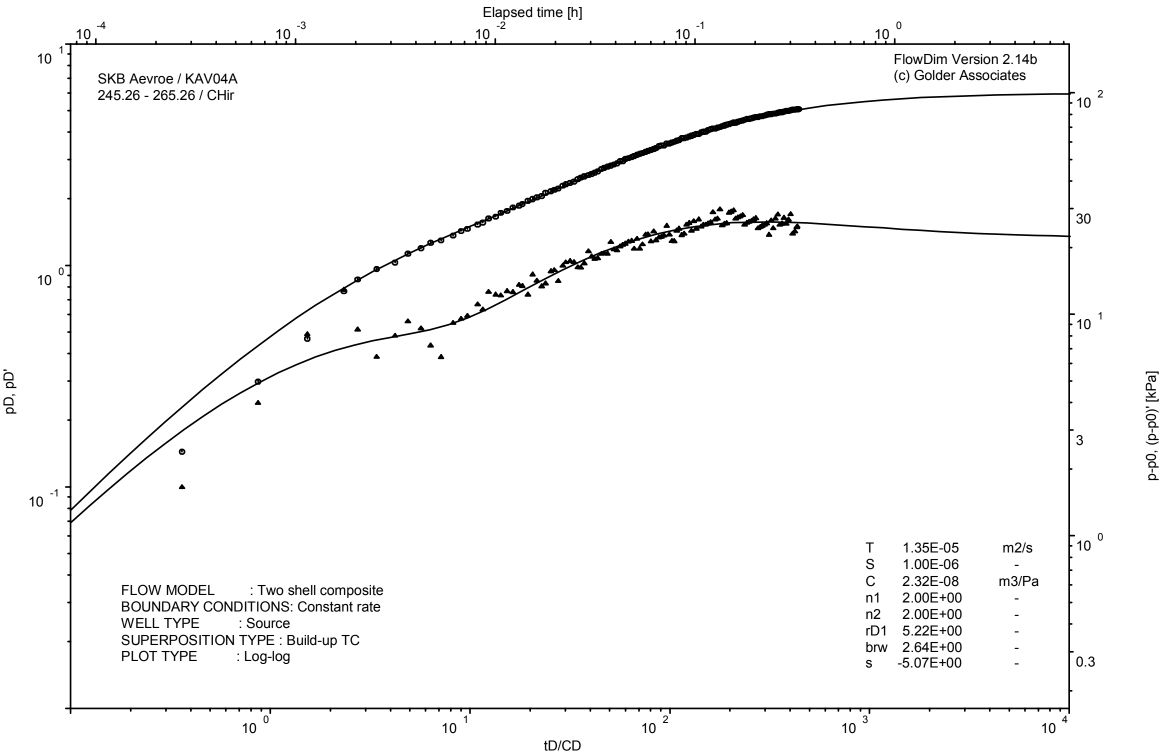
CHIR phase; log-log match (1st test)



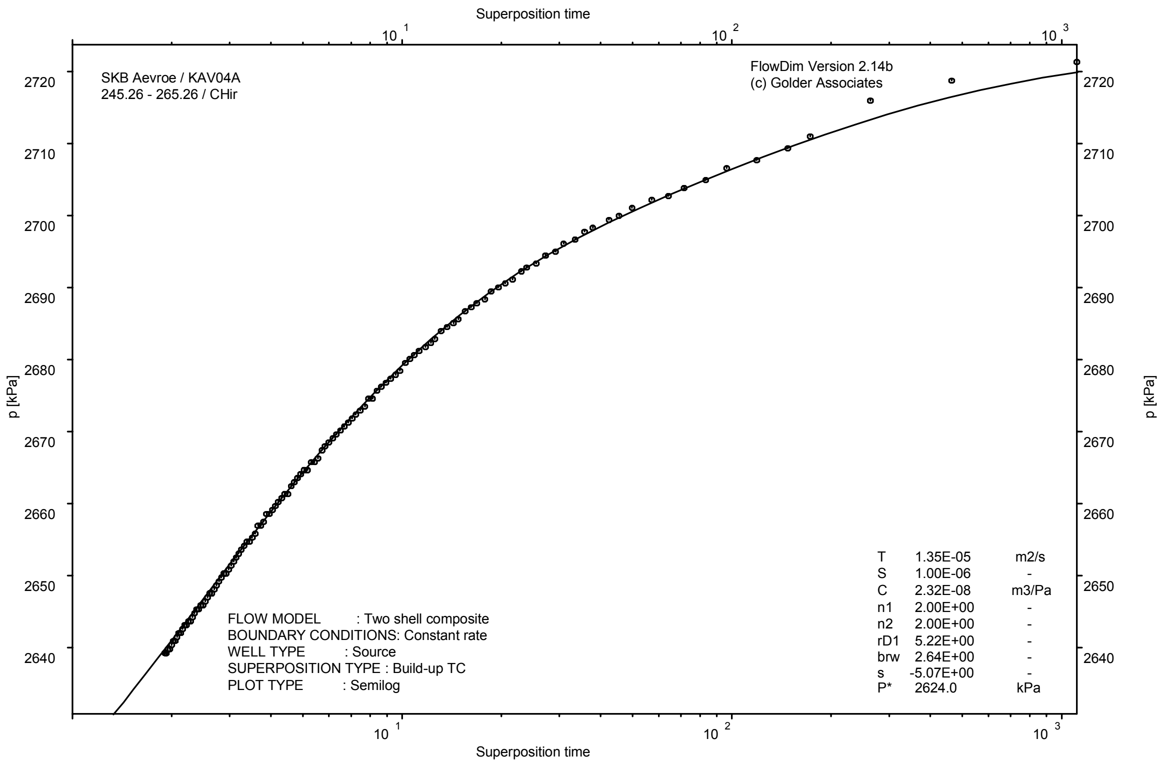
CHIR phase; HORNER match (1st test)



CHI phase; log-log match (2nd test)



CHIR phase; log-log match (2nd test)

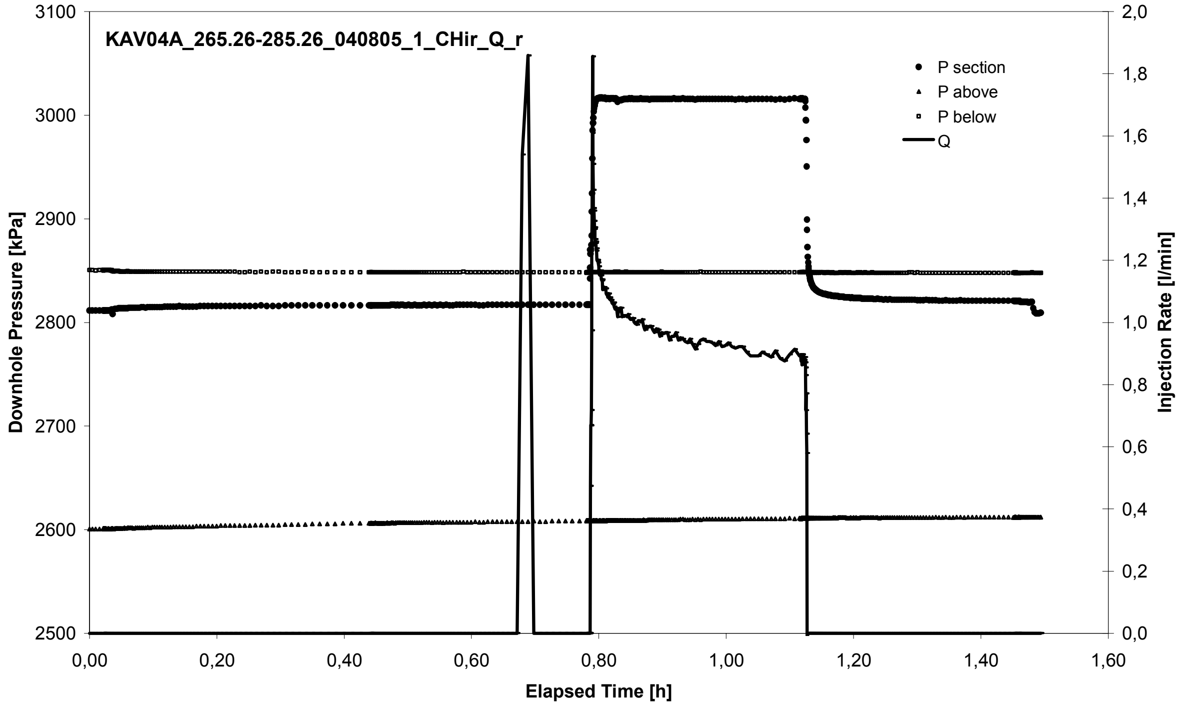


CHIR phase; HORNER match (2nd test)

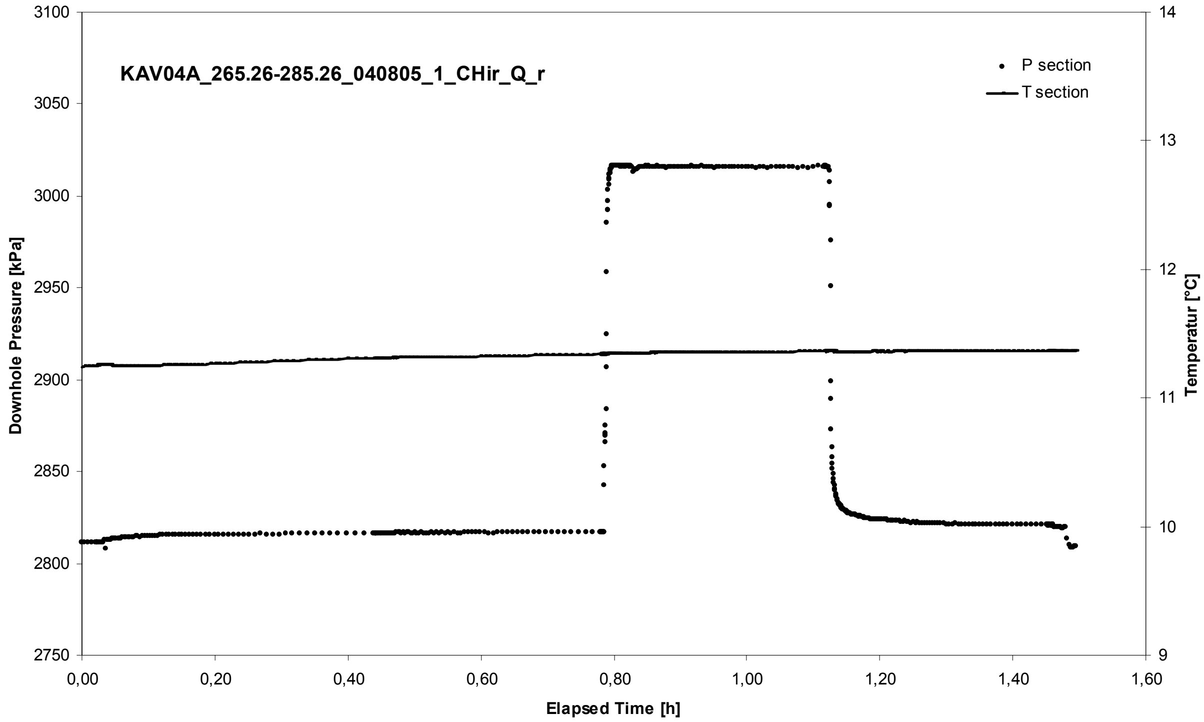
APPENDIX 2-18

Test 265,26 – 285,26 m

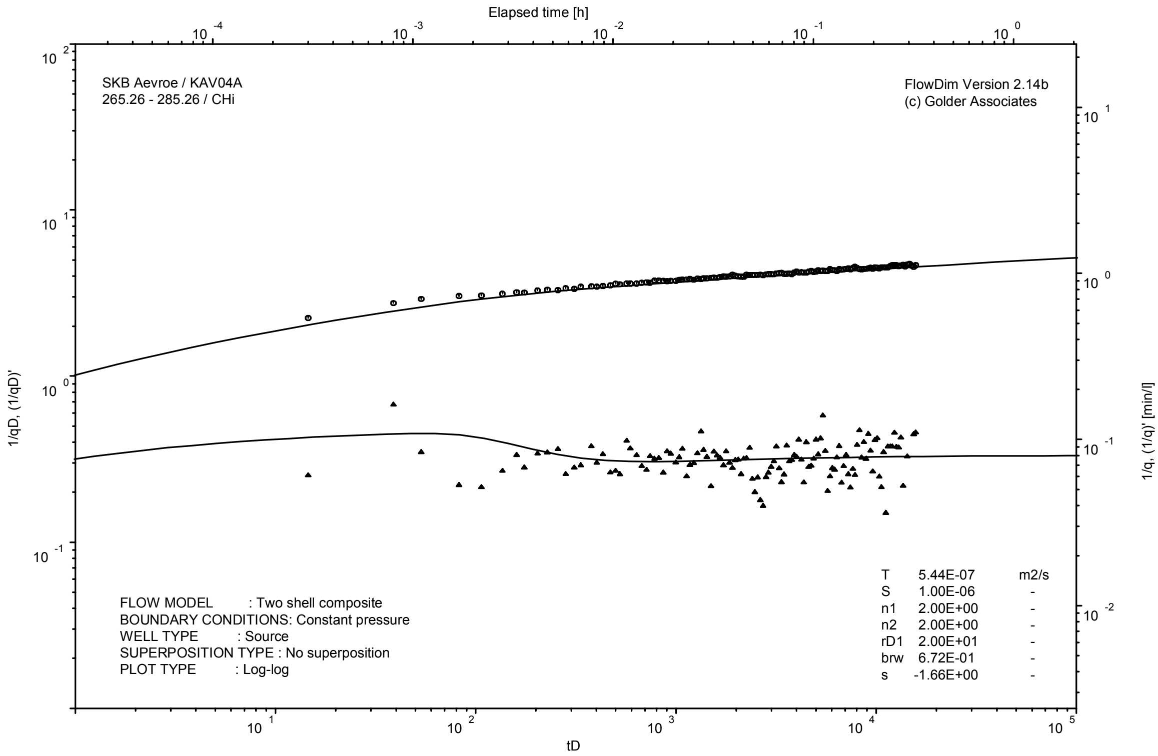
Analysis diagrams



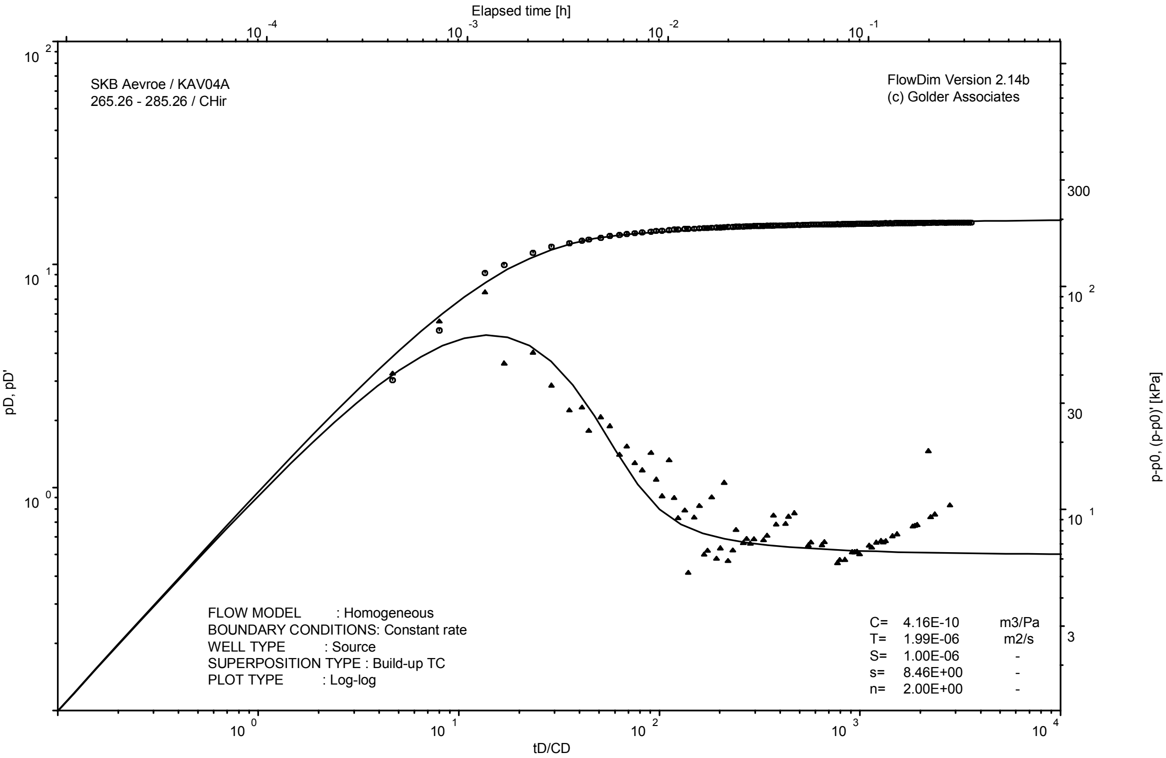
Pressure and flow rate vs. time; cartesian plot



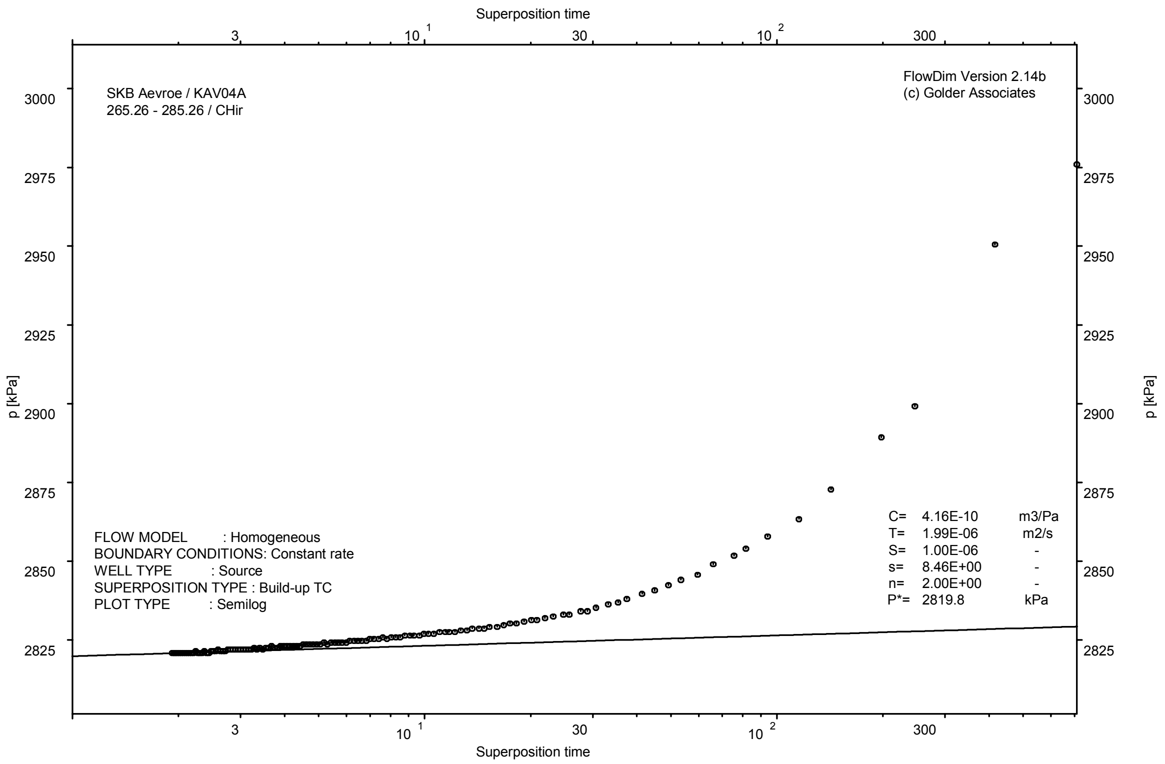
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

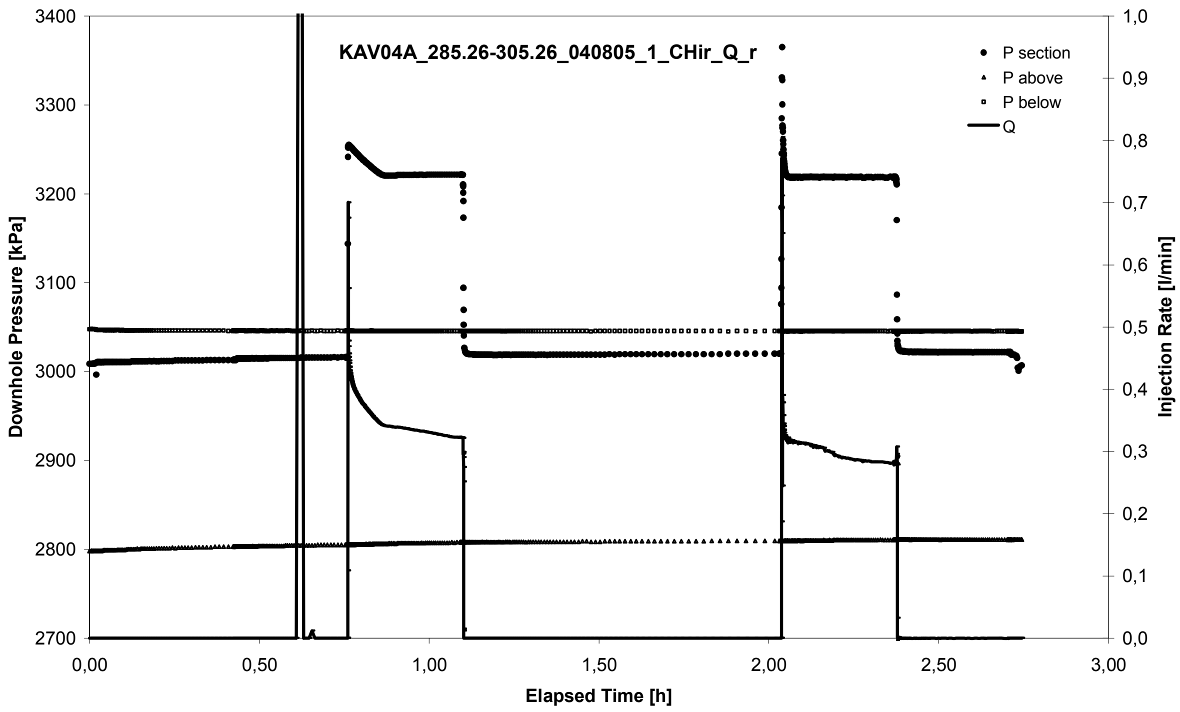


CHIR phase; HORNER match

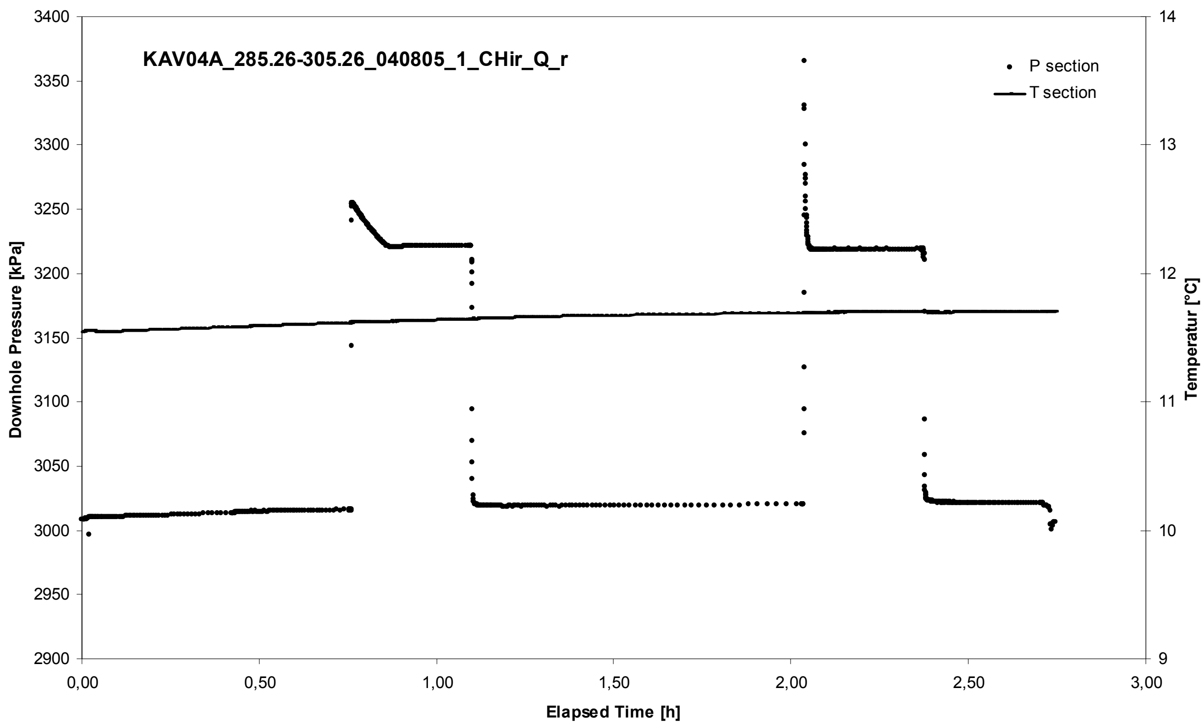
APPENDIX 2-19

Test 285,26 – 305,26 m

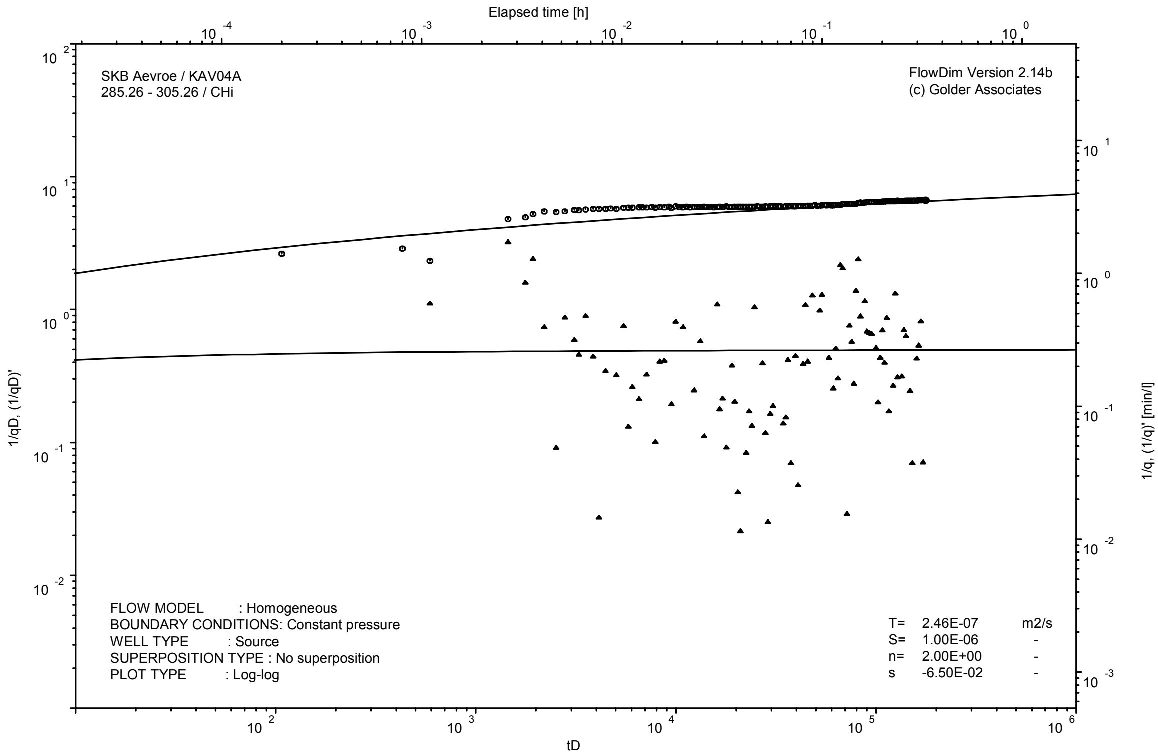
Analysis diagrams



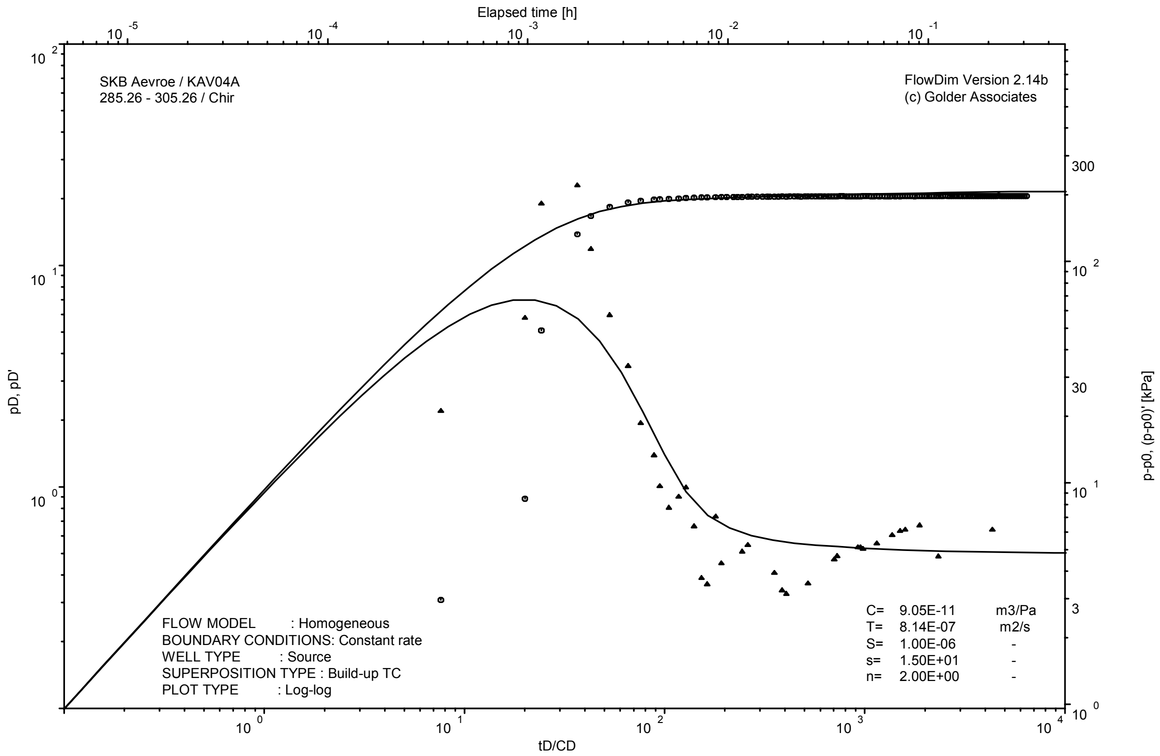
Pressure and flow rate vs. time; cartesian plot



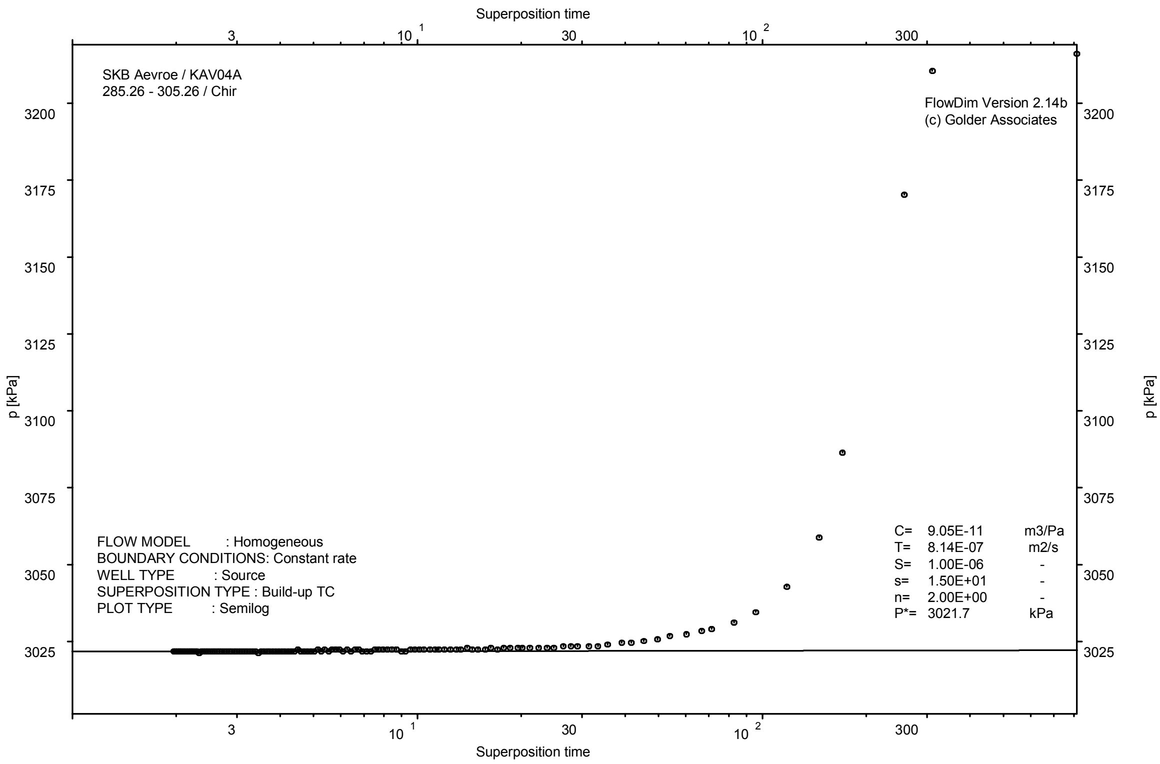
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

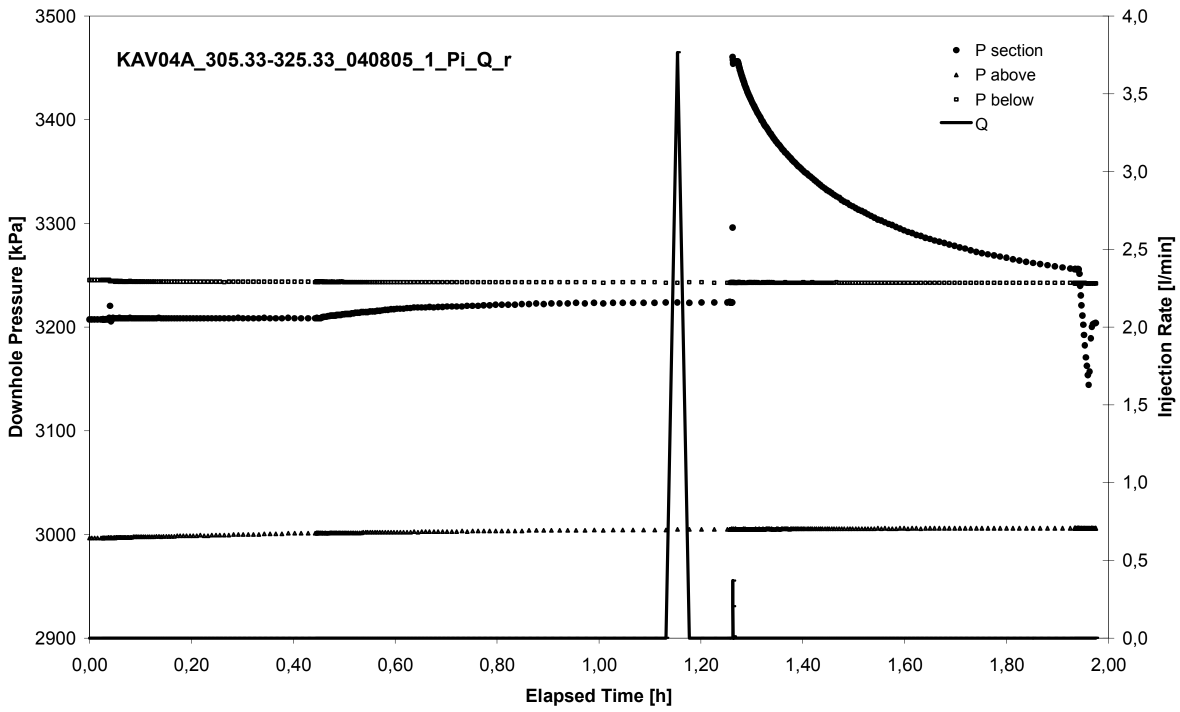


CHIR phase; HORNER match

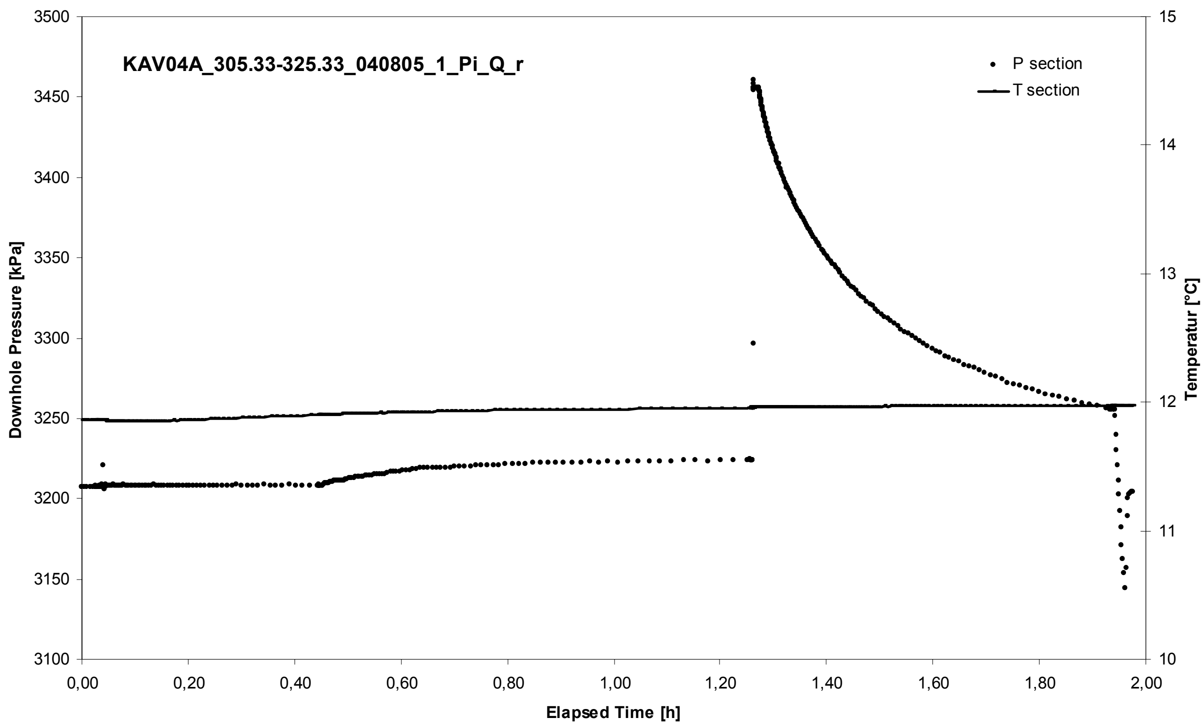
APPENDIX 2-20

Test 305,33 – 325,33 m

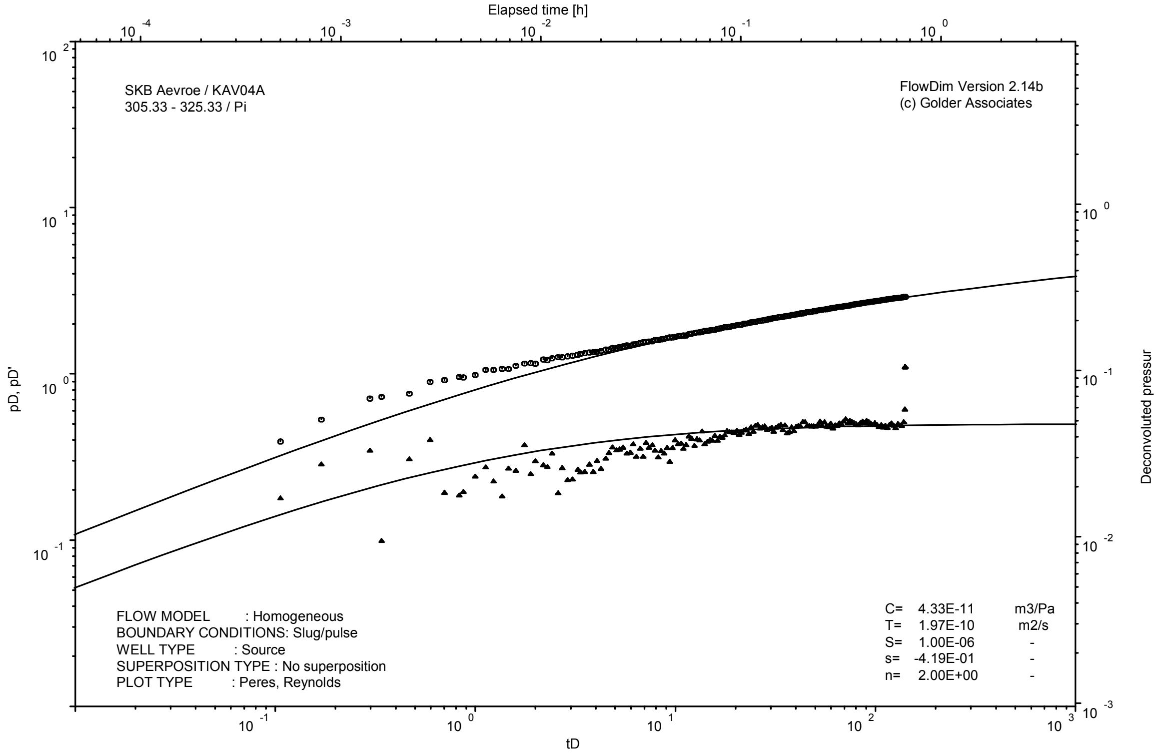
Analysis diagrams



Pressure and flow rate vs. time; cartesian plot



Interval pressure and temperature vs. time; cartesian plot

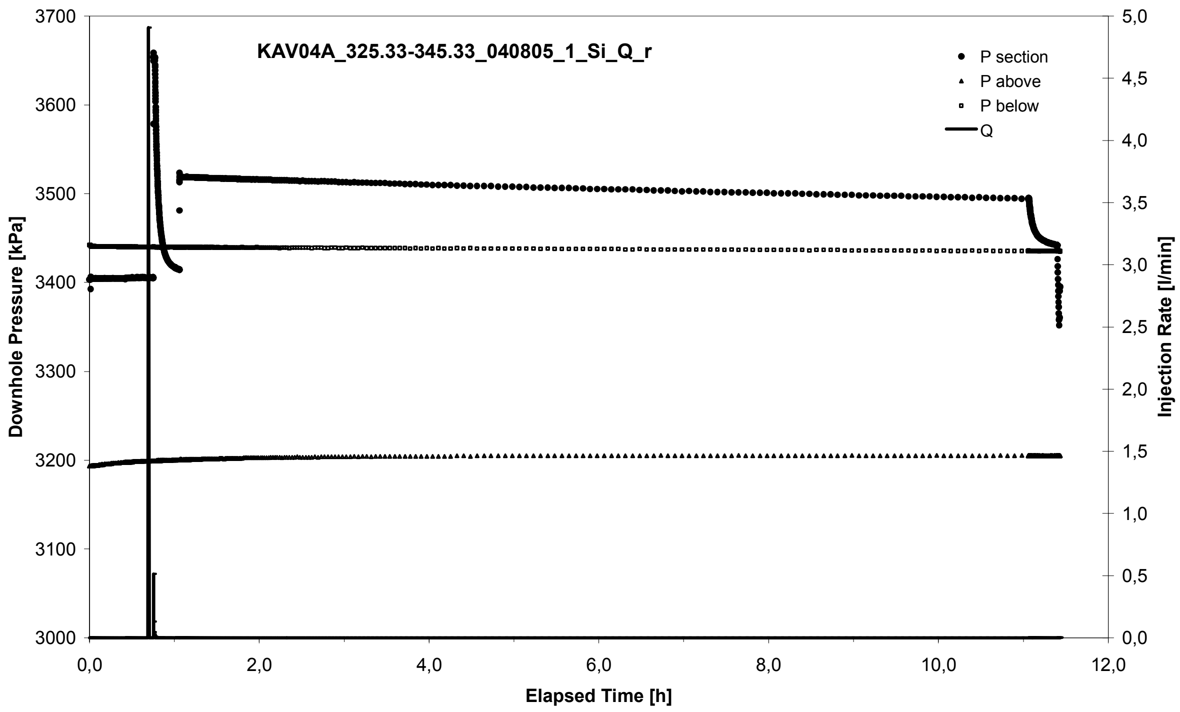


PI phase, deconvolution match

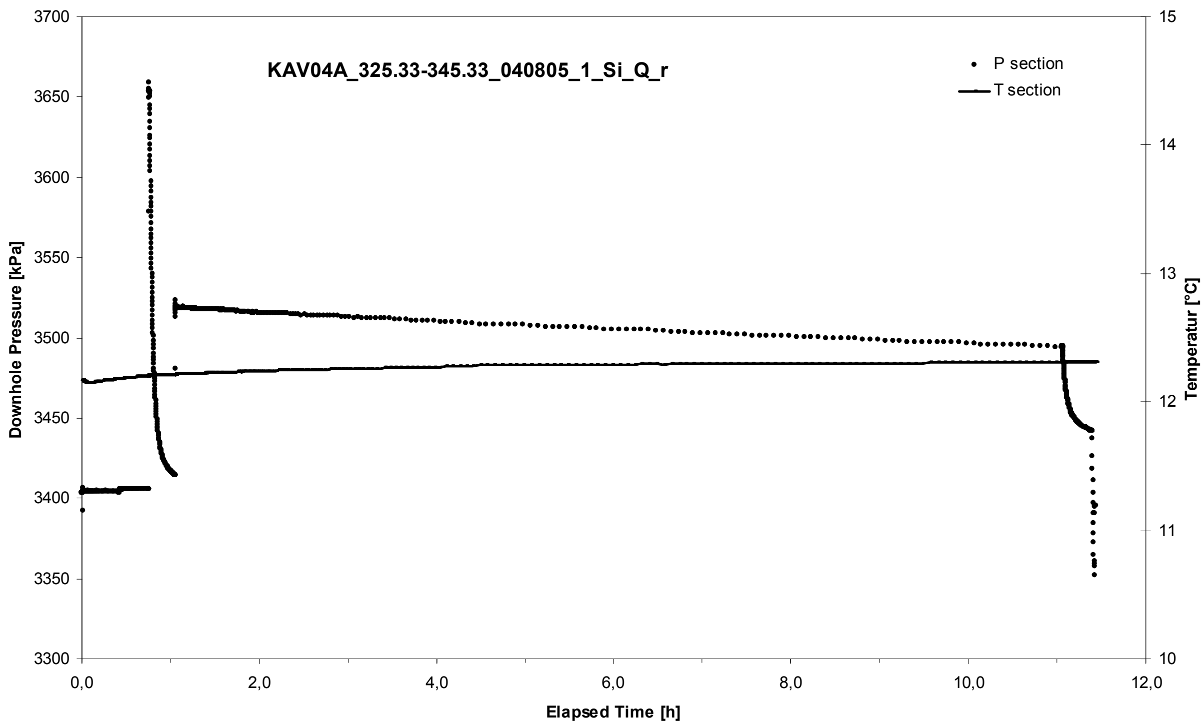
APPENDIX 2-21

Test 325,33 – 345,33 m

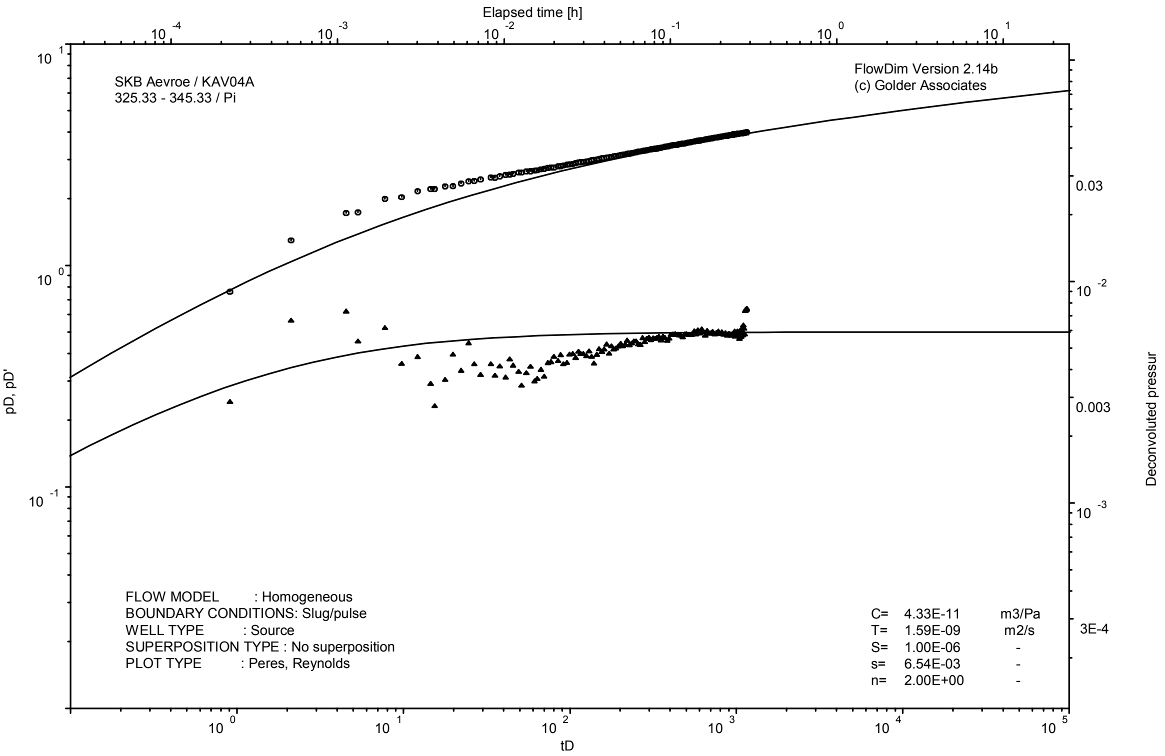
Analysis diagrams



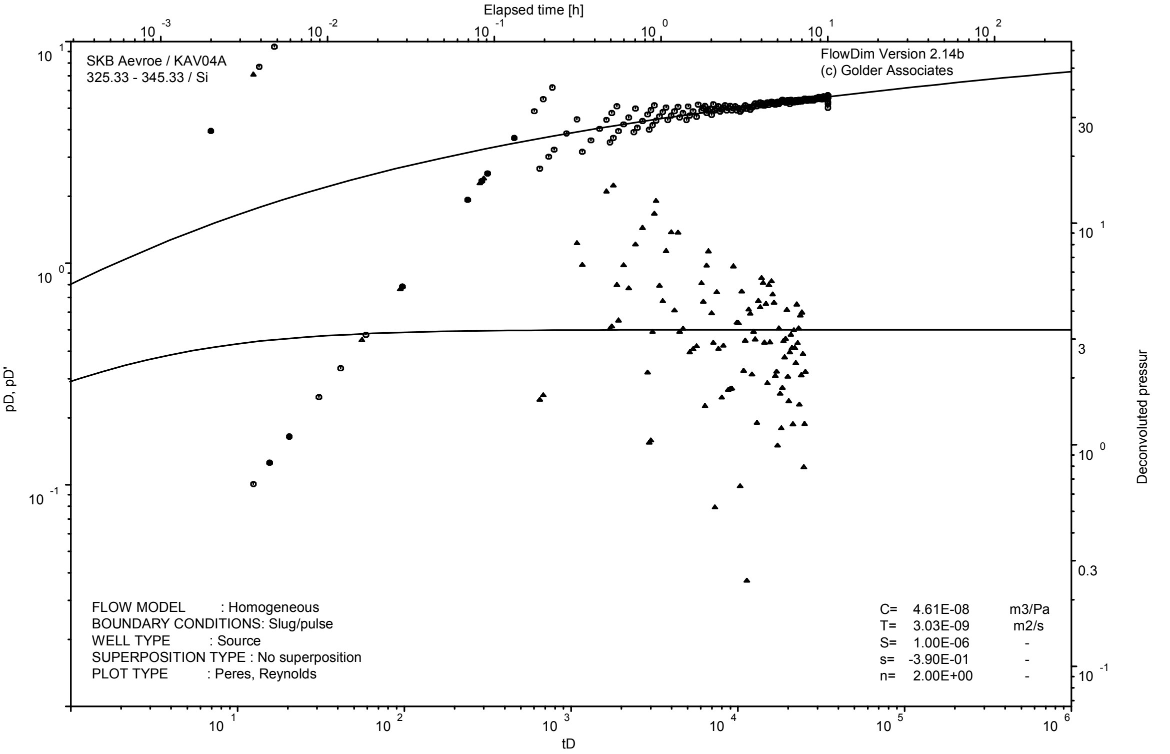
Pressure and flow rate vs. time; cartesian plot



Interval pressure and temperature vs. time; cartesian plot



PI phase; deconvolution match

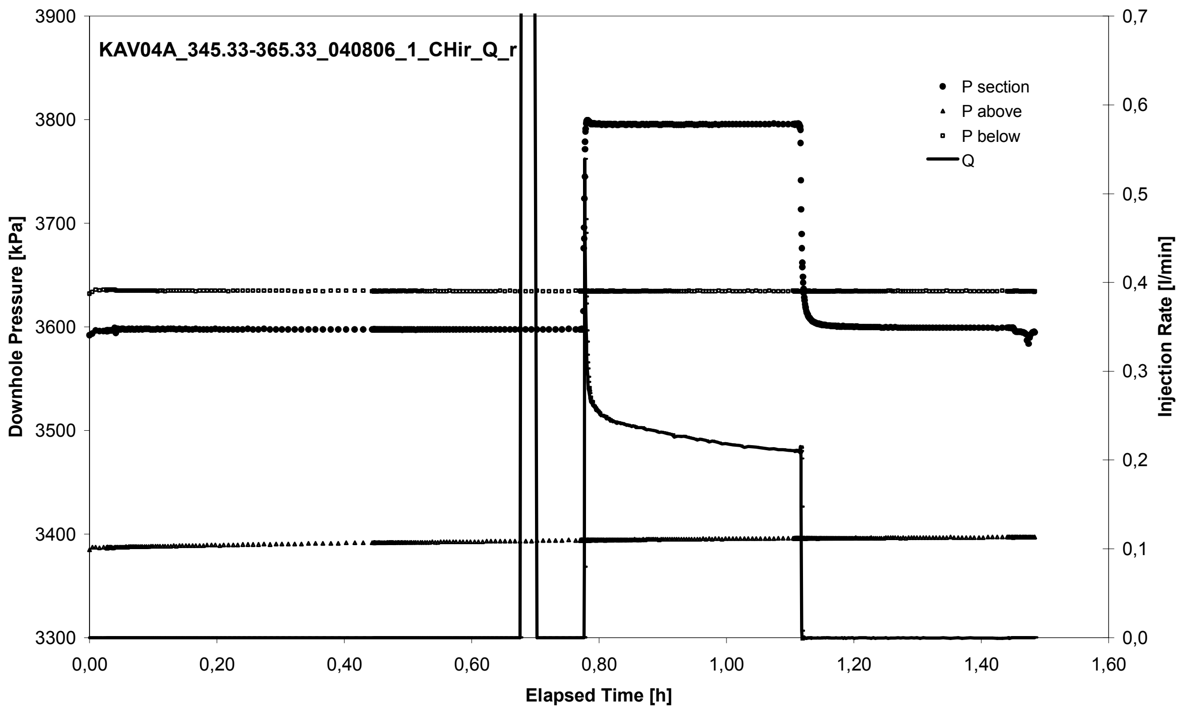


SI phase; deconvolution match

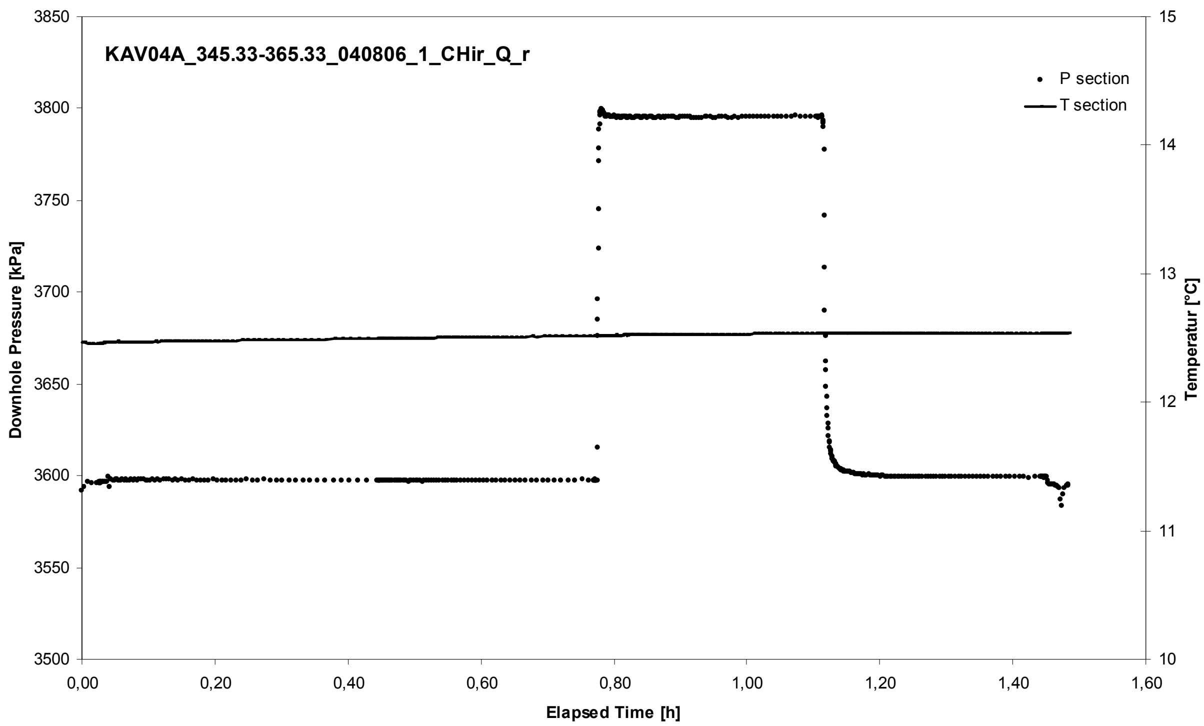
APPENDIX 2-22

Test 345,33 – 365,33 m

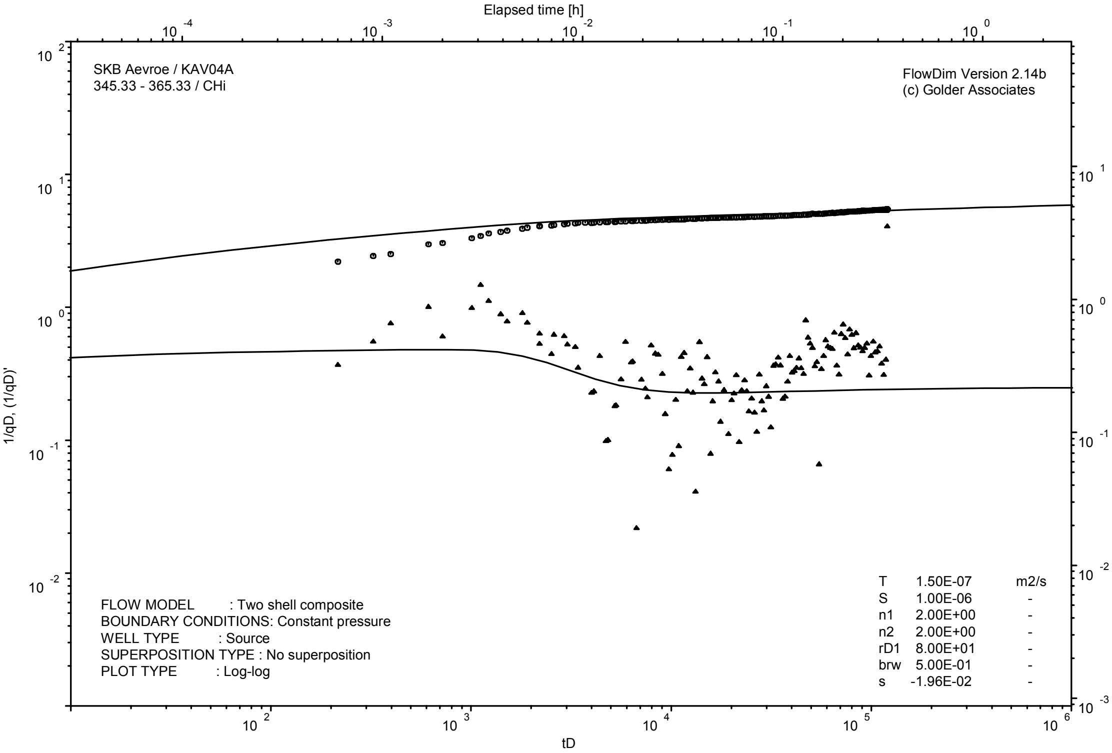
Analysis diagrams



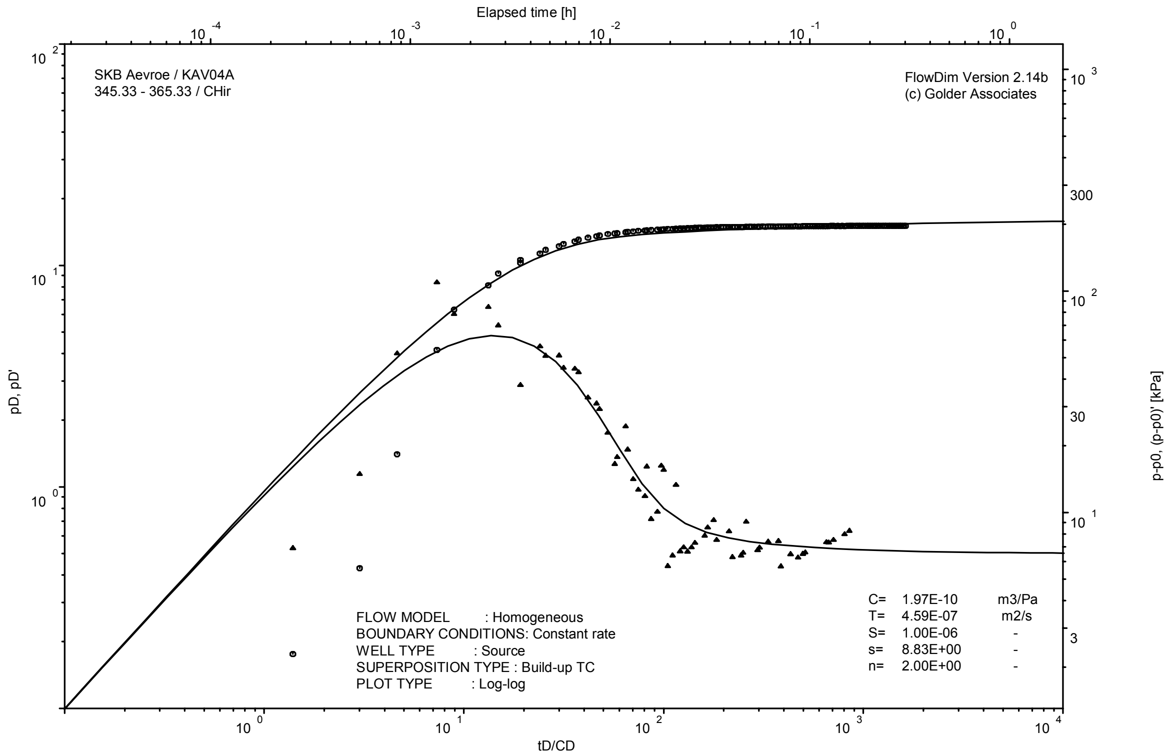
Pressure and flow rate vs. time; cartesian plot



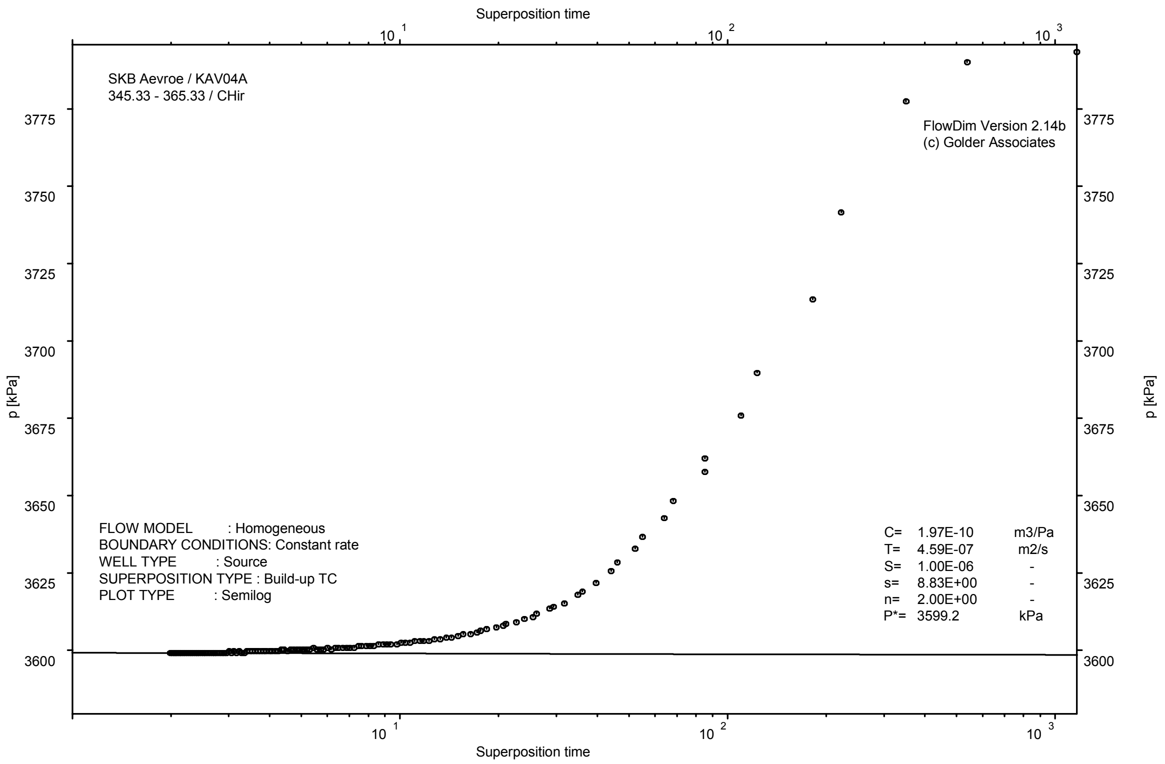
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

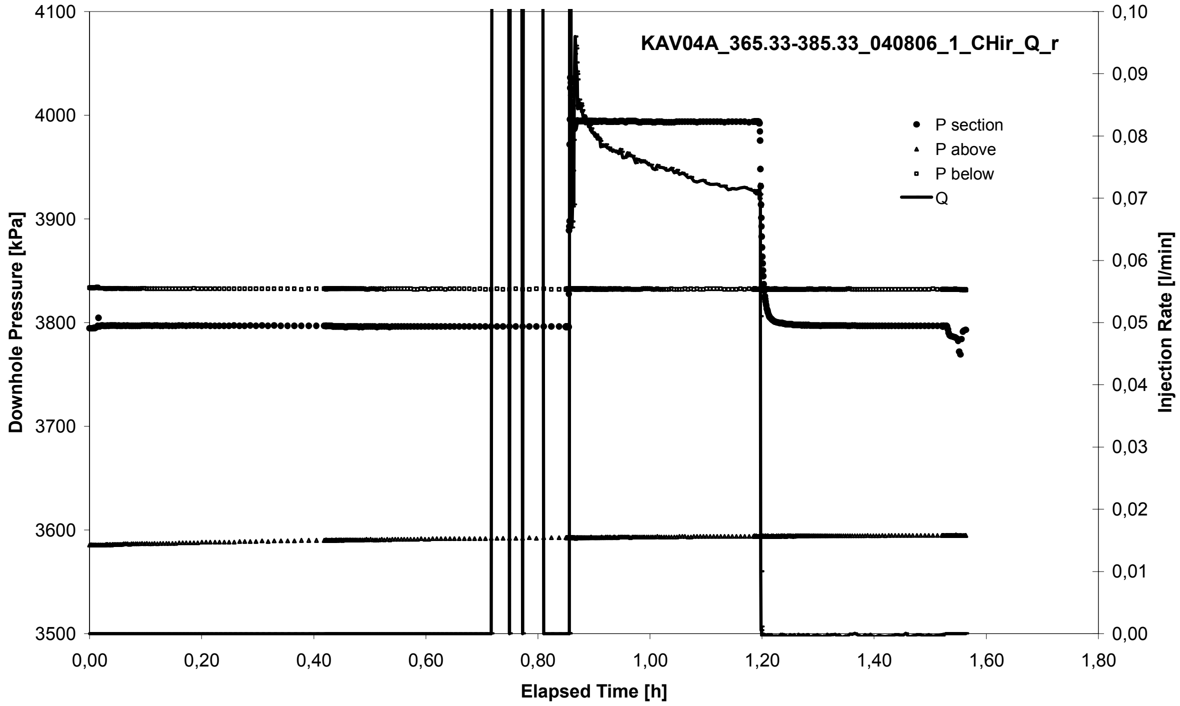


CHIR phase; HORNER match

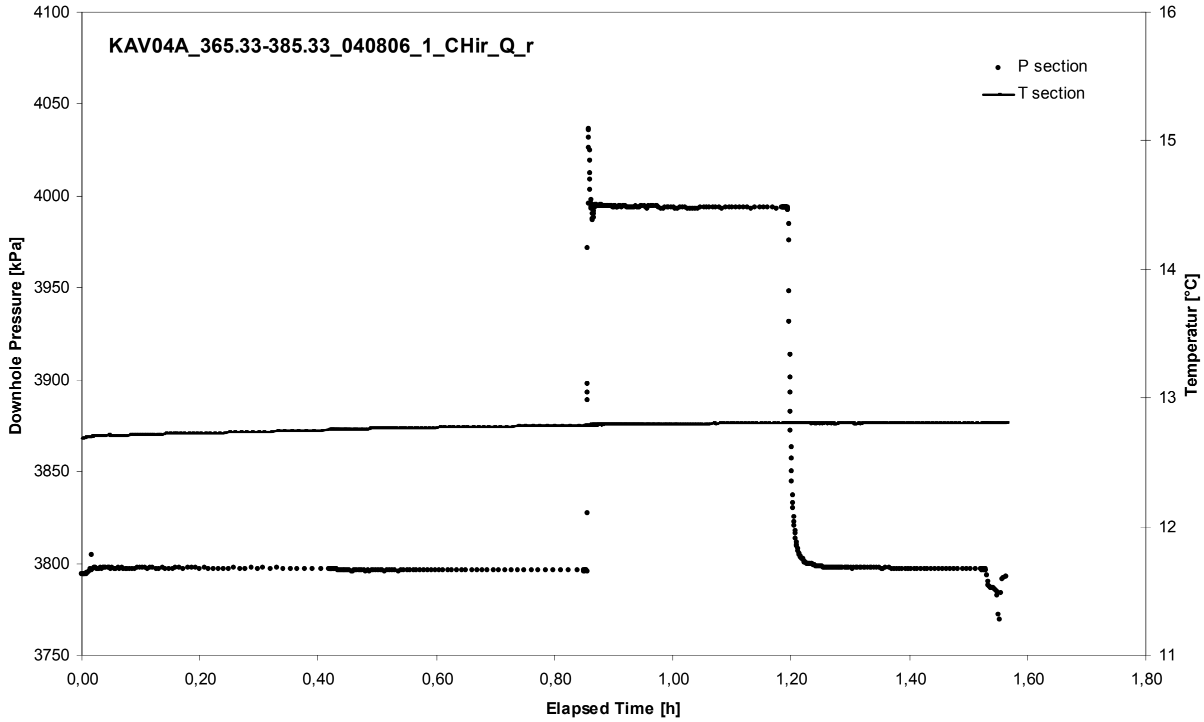
APPENDIX 2-23

Test 365,33 – 385,33 m

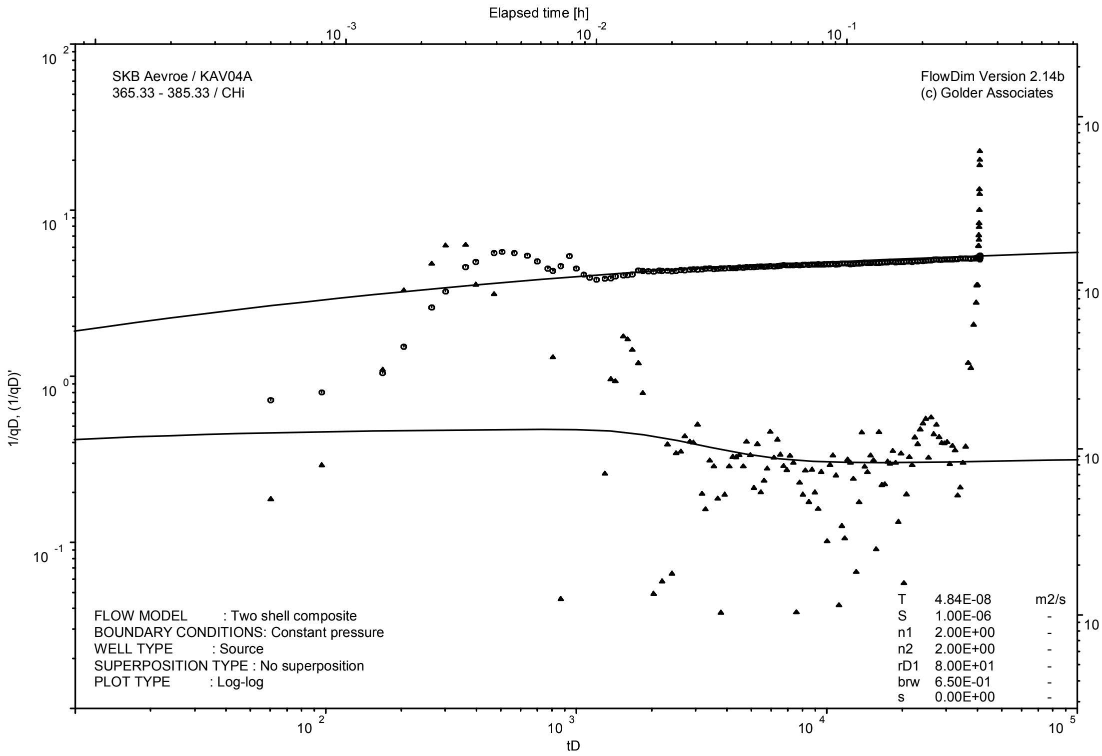
Analysis diagrams



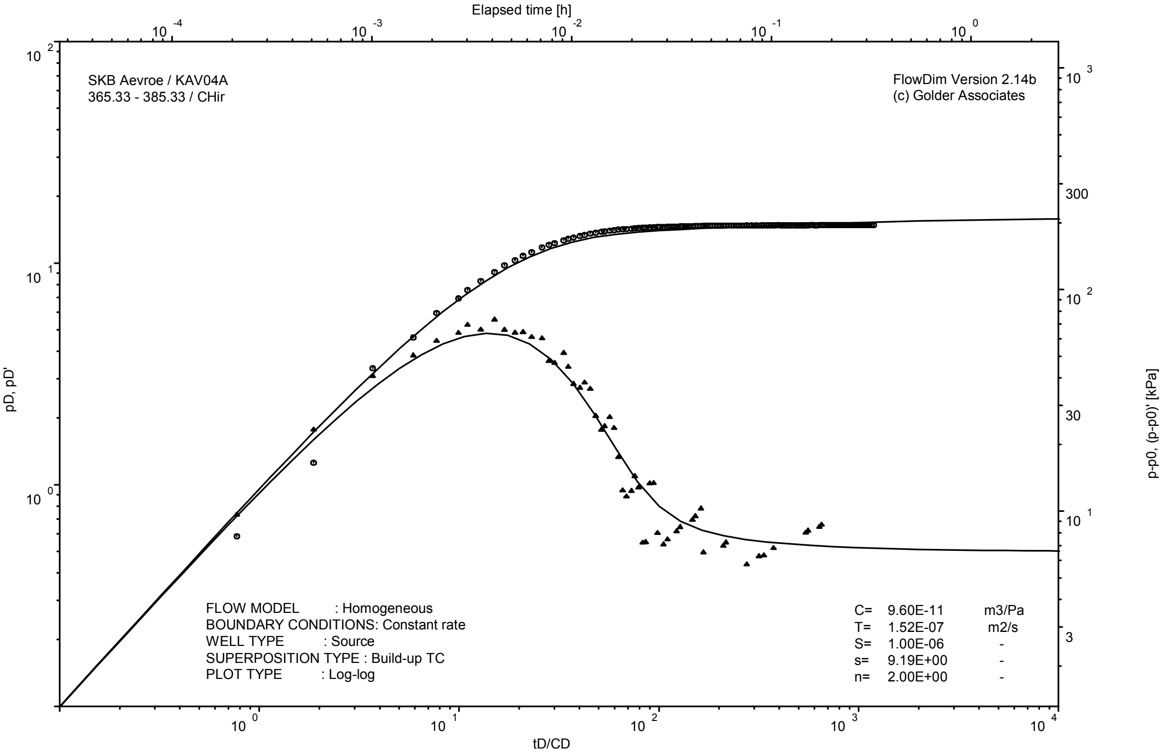
Pressure and flow rate vs. time; cartesian plot



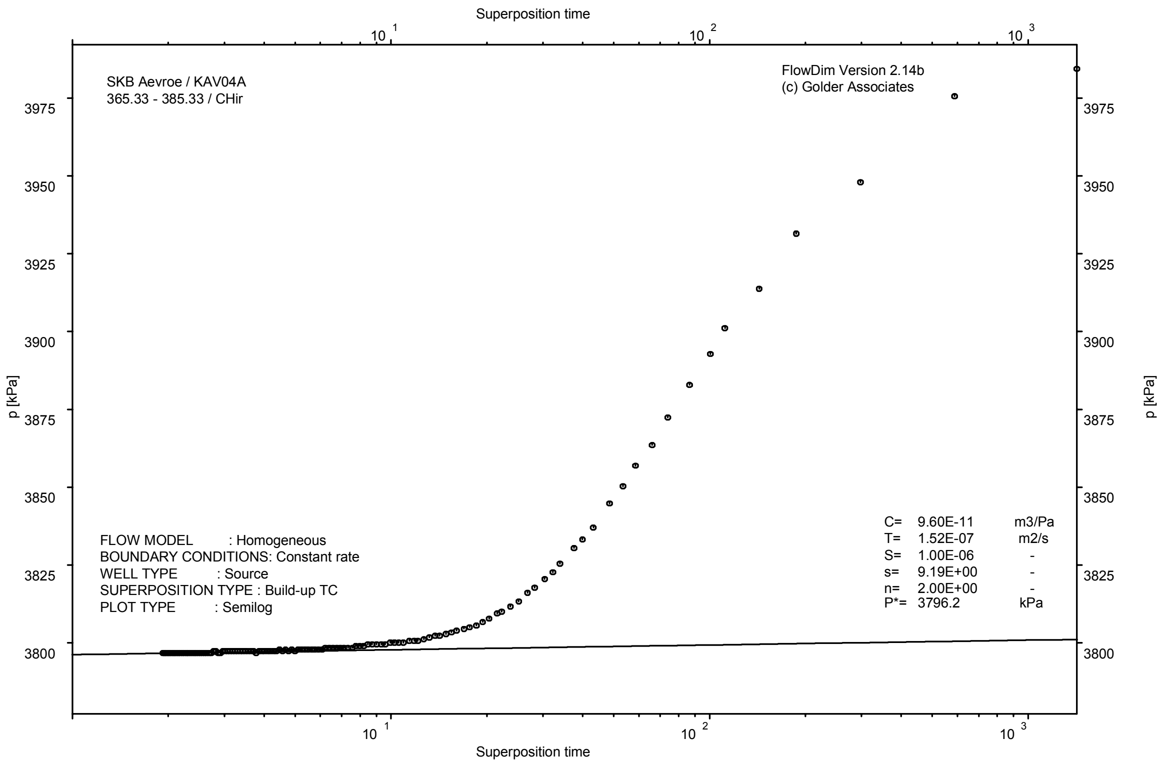
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

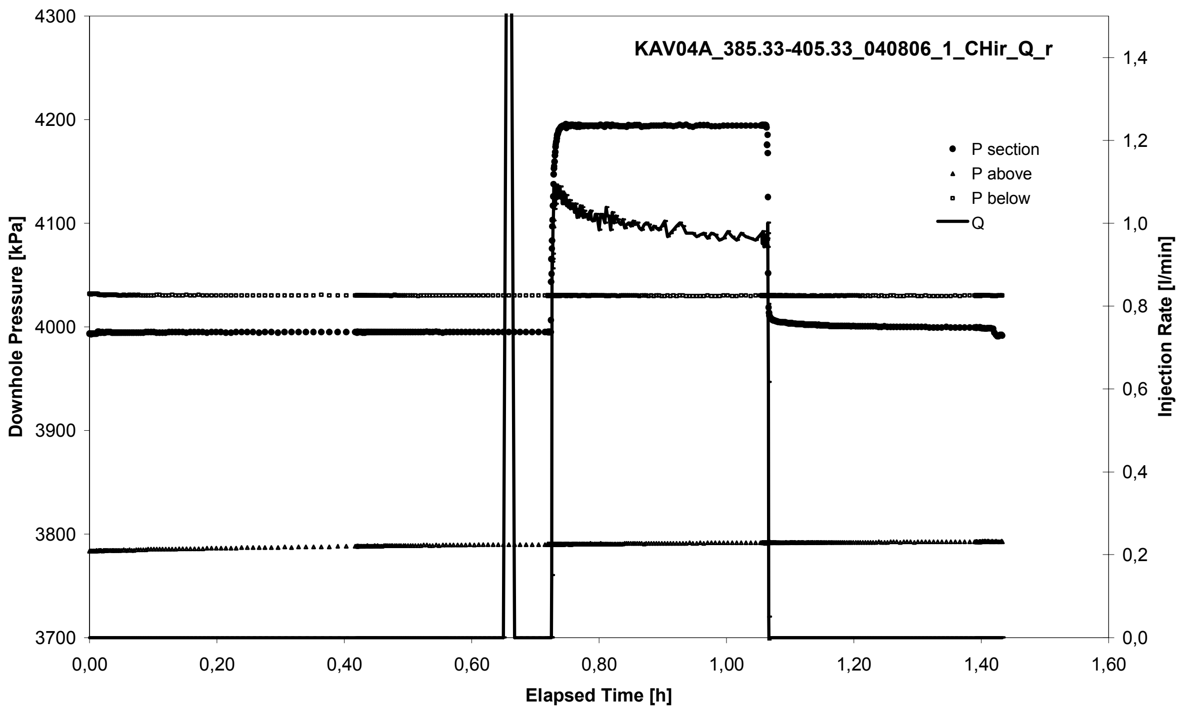


CHIR phase; HORNER match

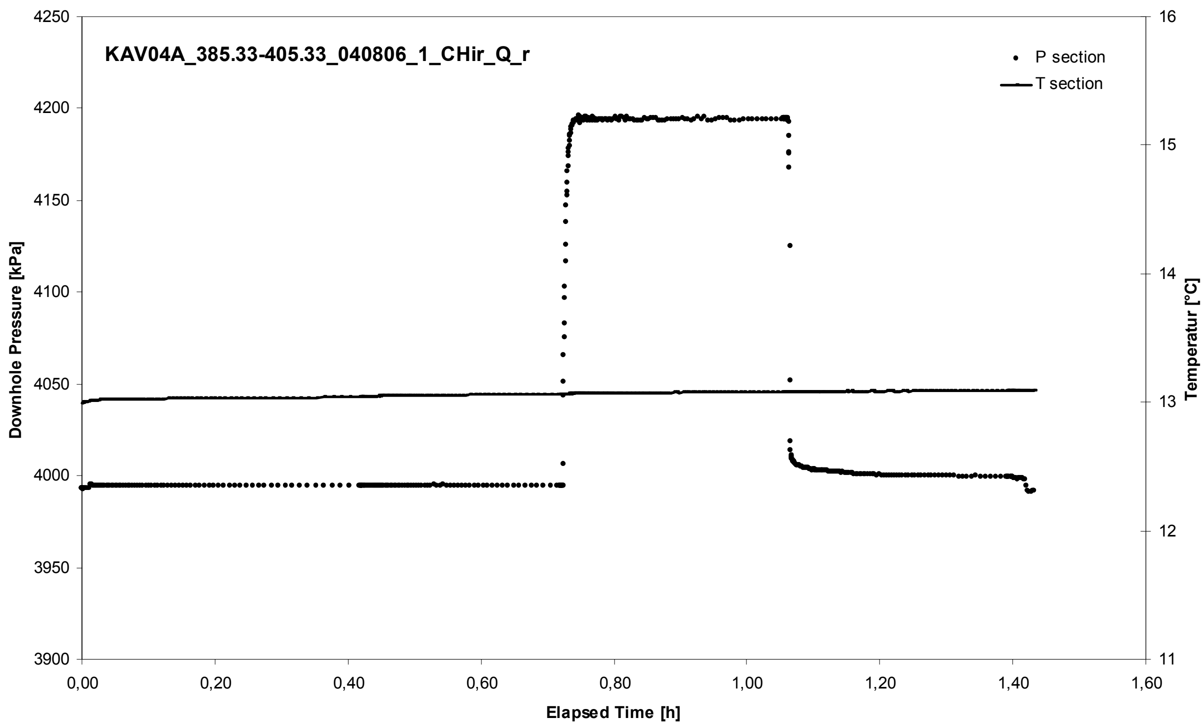
APPENDIX 2-24

Test 385,33 – 405,33 m

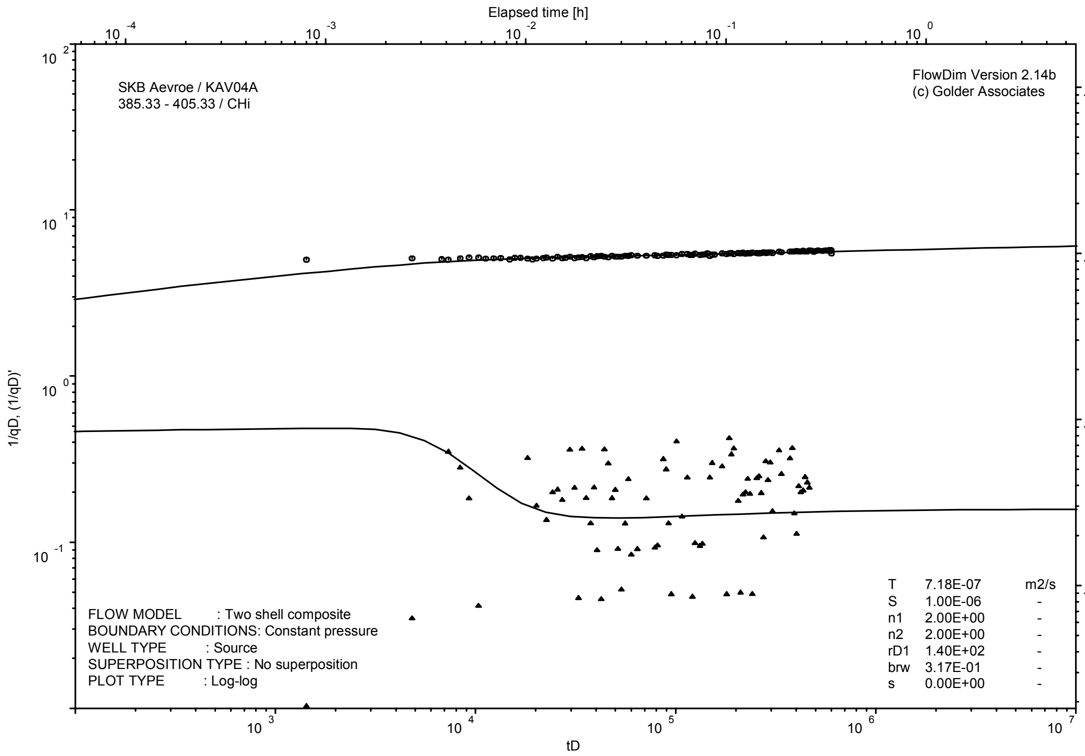
Analysis diagrams



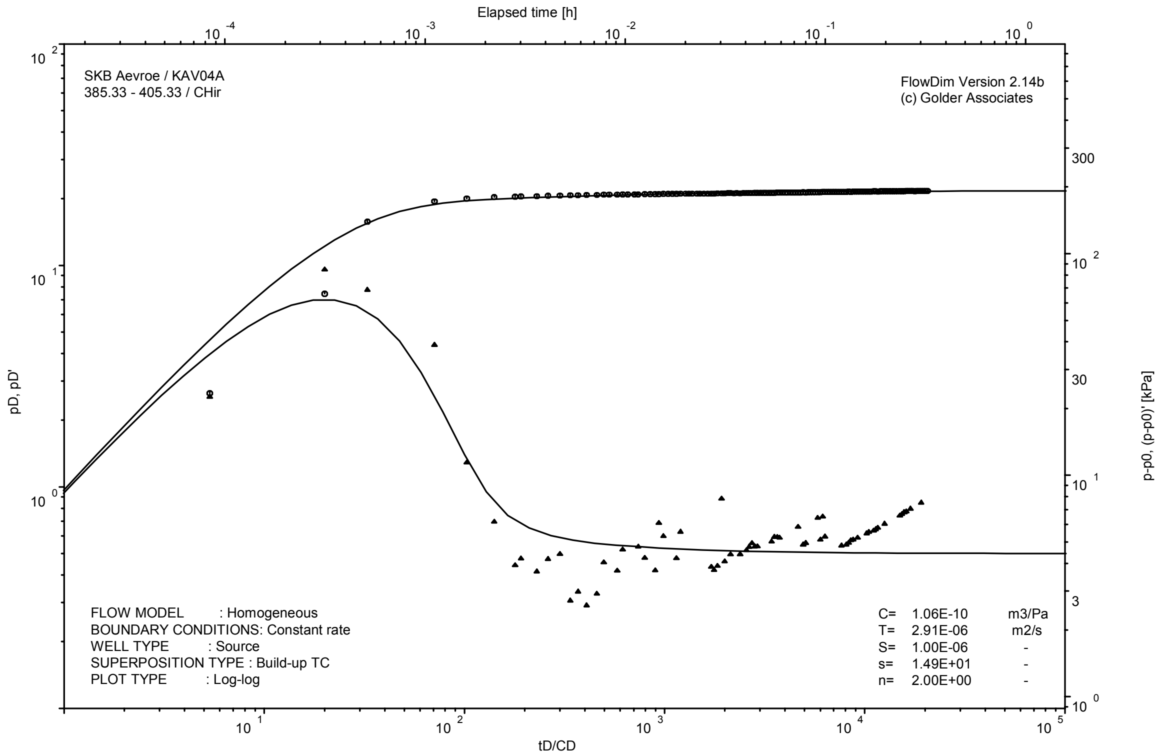
Pressure and flow rate vs. time; cartesian plot



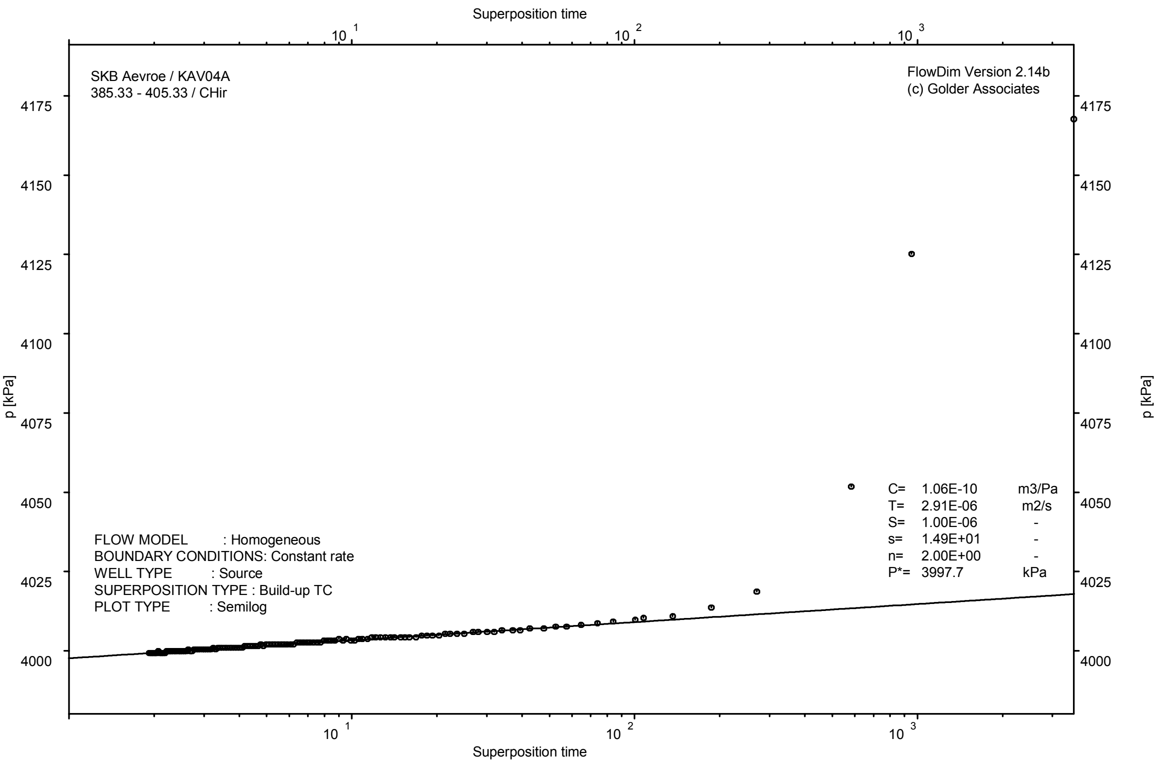
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

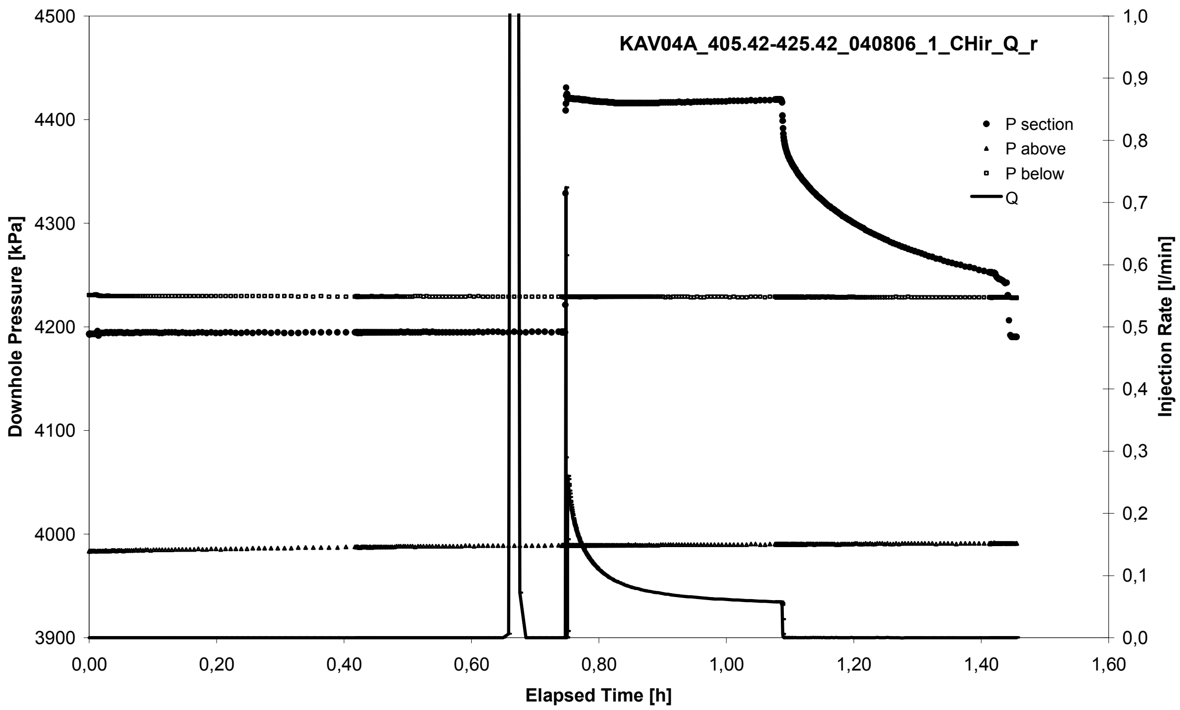


CHIR phase; HORNER match

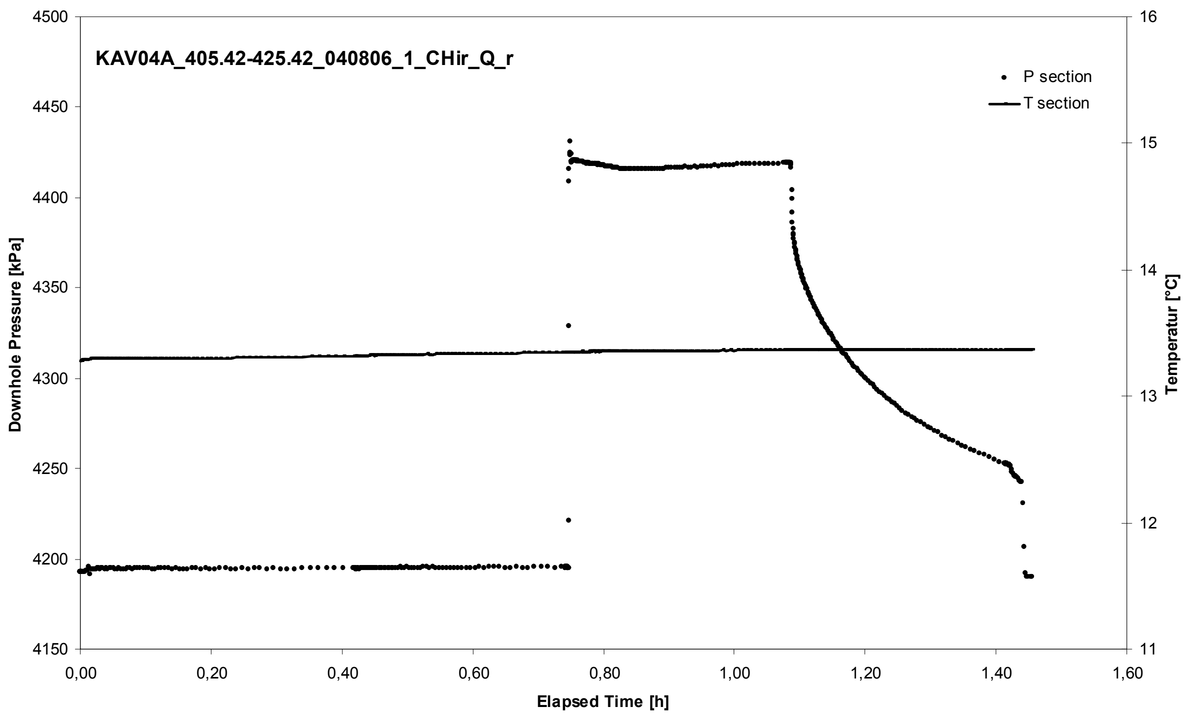
APPENDIX 2-25

Test 405,42 – 425,42 m

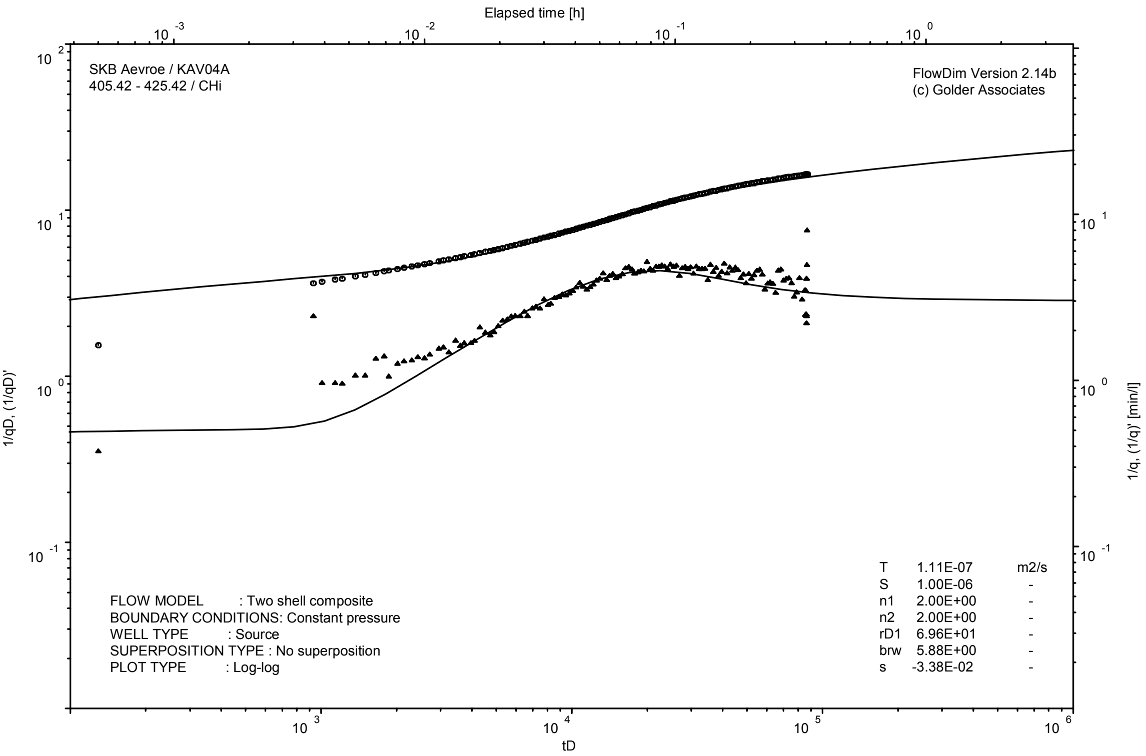
Analysis diagrams



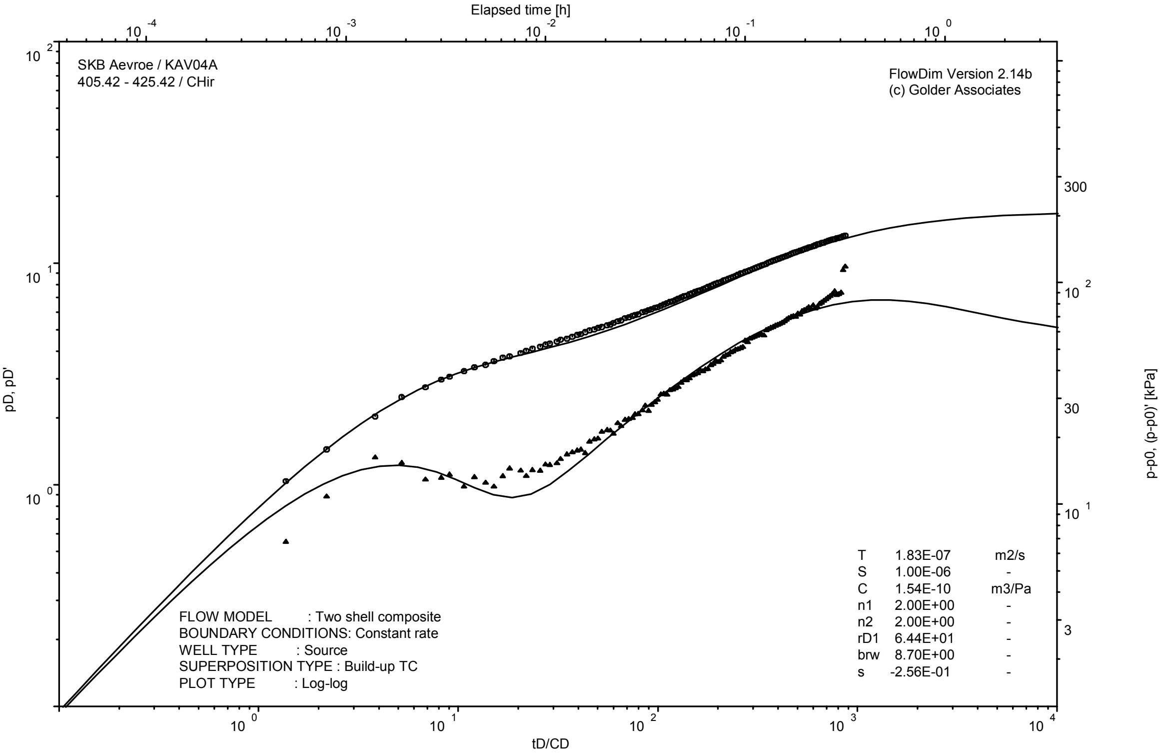
Pressure and flow rate vs. time; cartesian plot



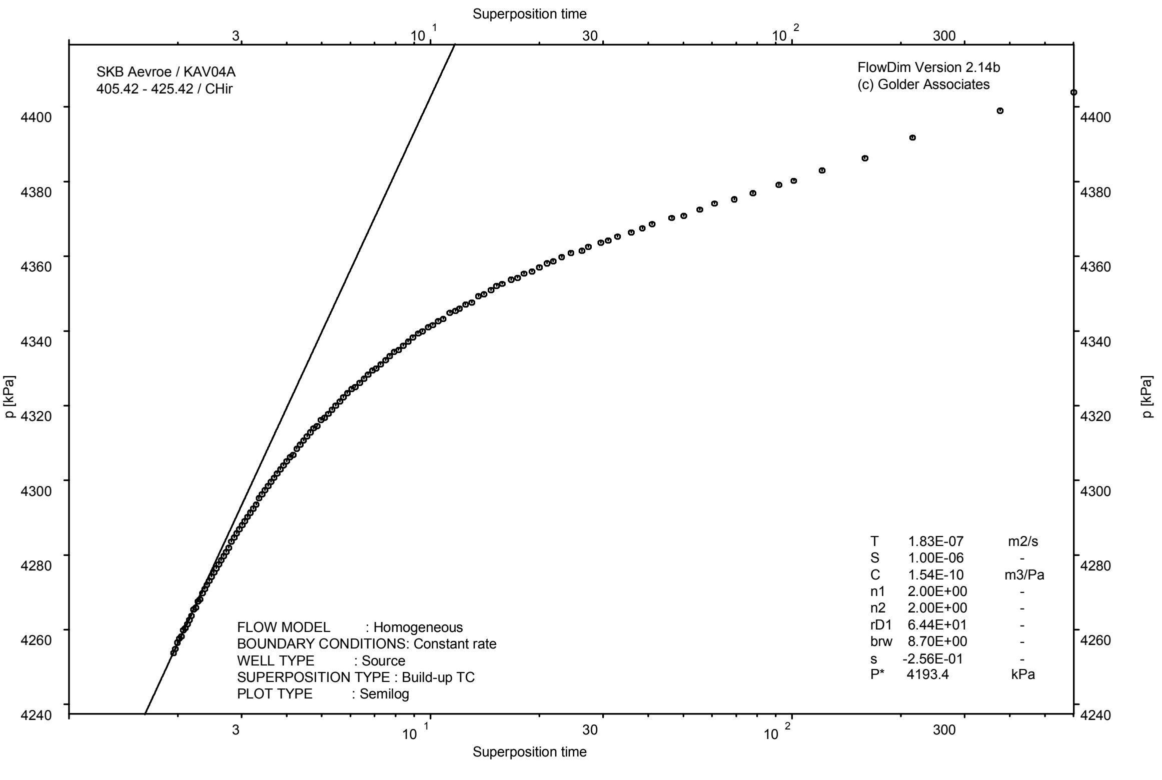
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

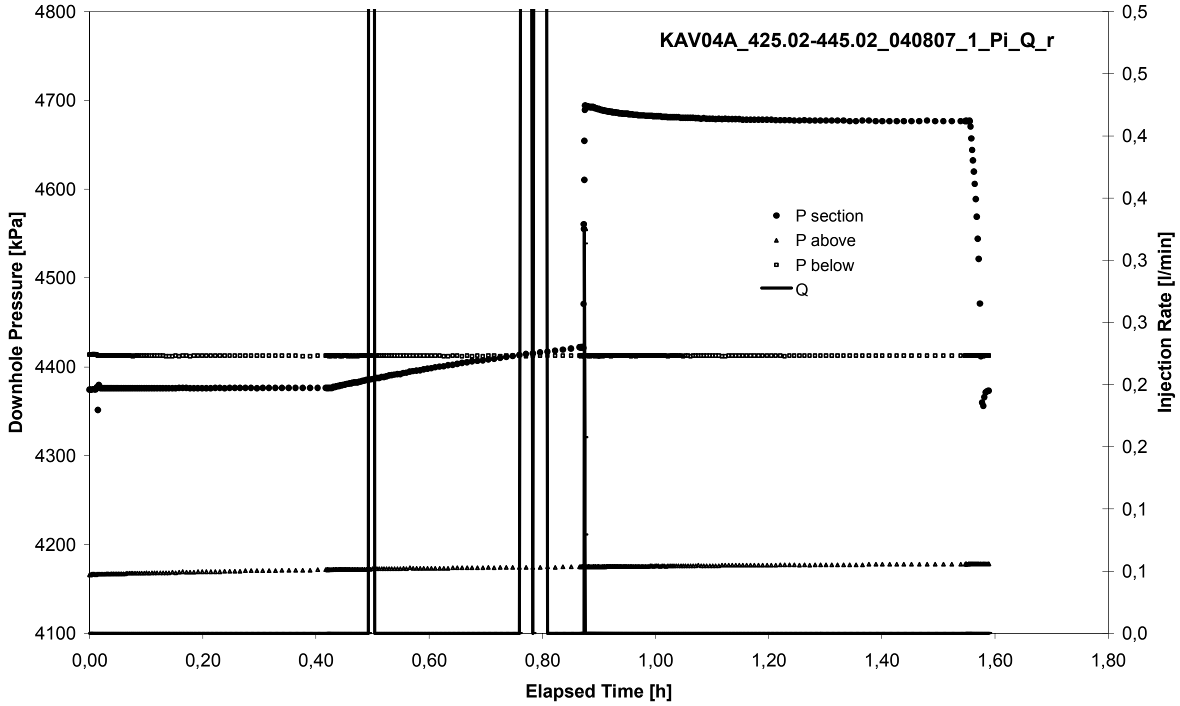


CHIR phase; HORNER match

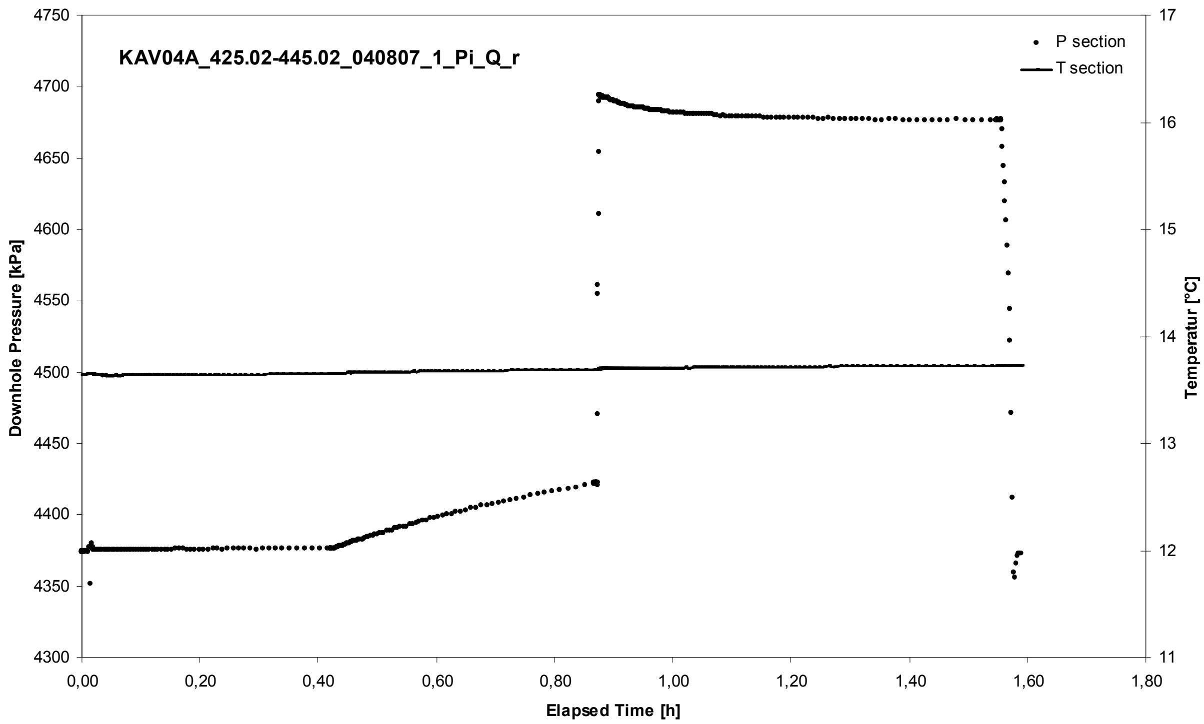
APPENDIX 2-26

Test 425,02 – 445,02 m

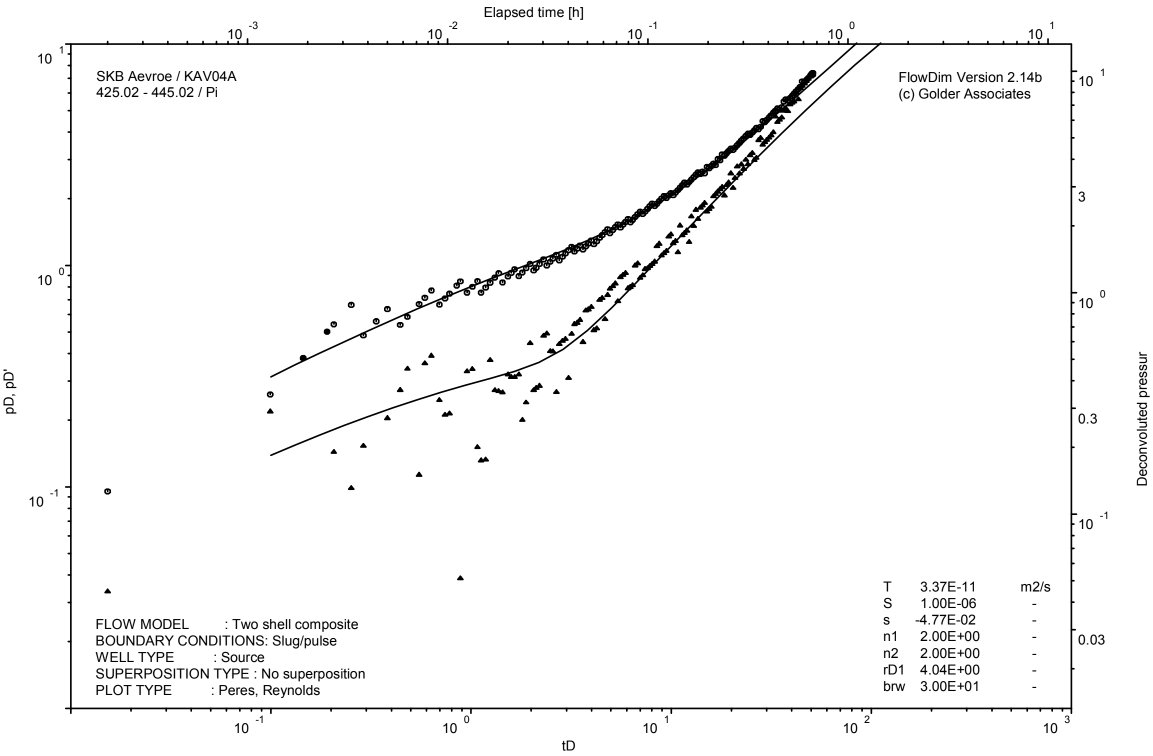
Analysis diagrams



Pressure and flow rate vs. time; cartesian plot



Interval pressure and temperature vs. time; cartesian plot

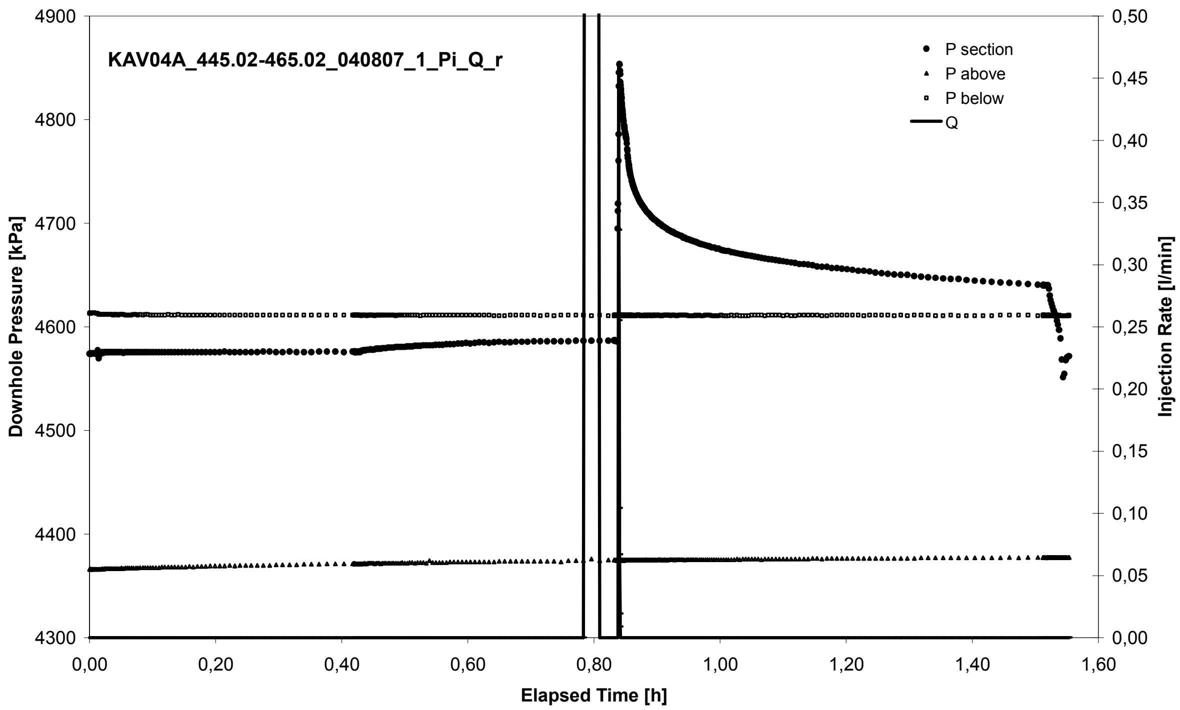


PI phase; deconvolution match

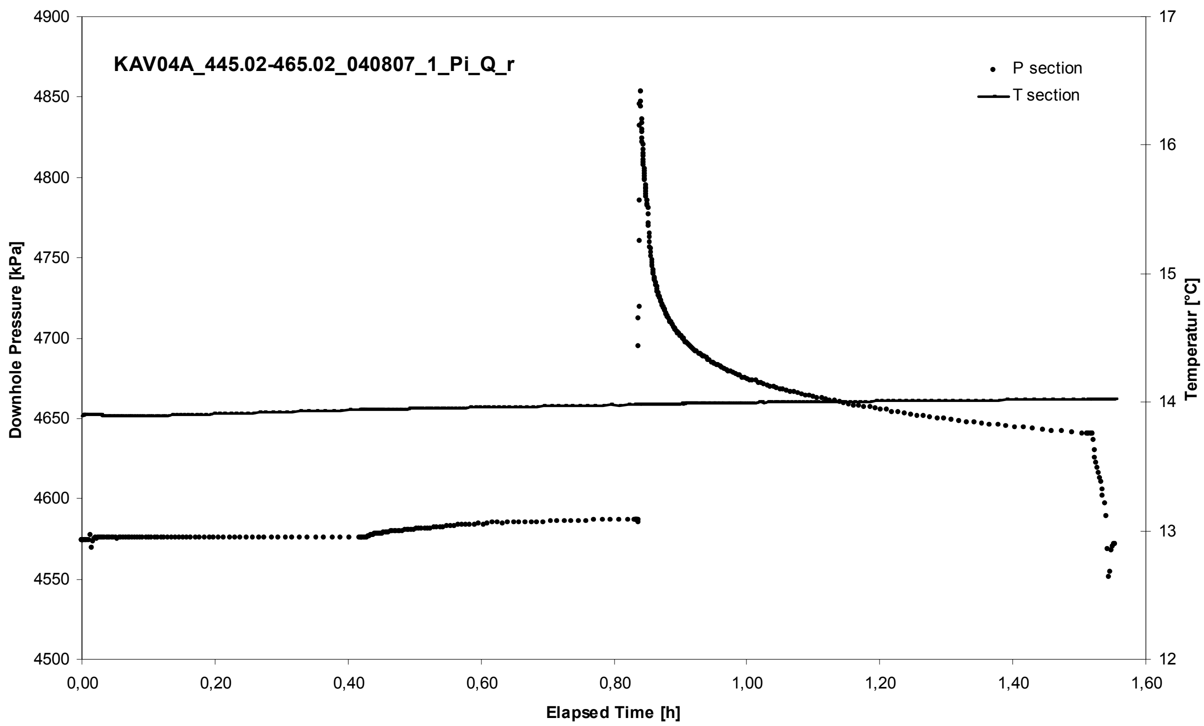
APPENDIX 2-27

Test 445,02 – 465,02 m

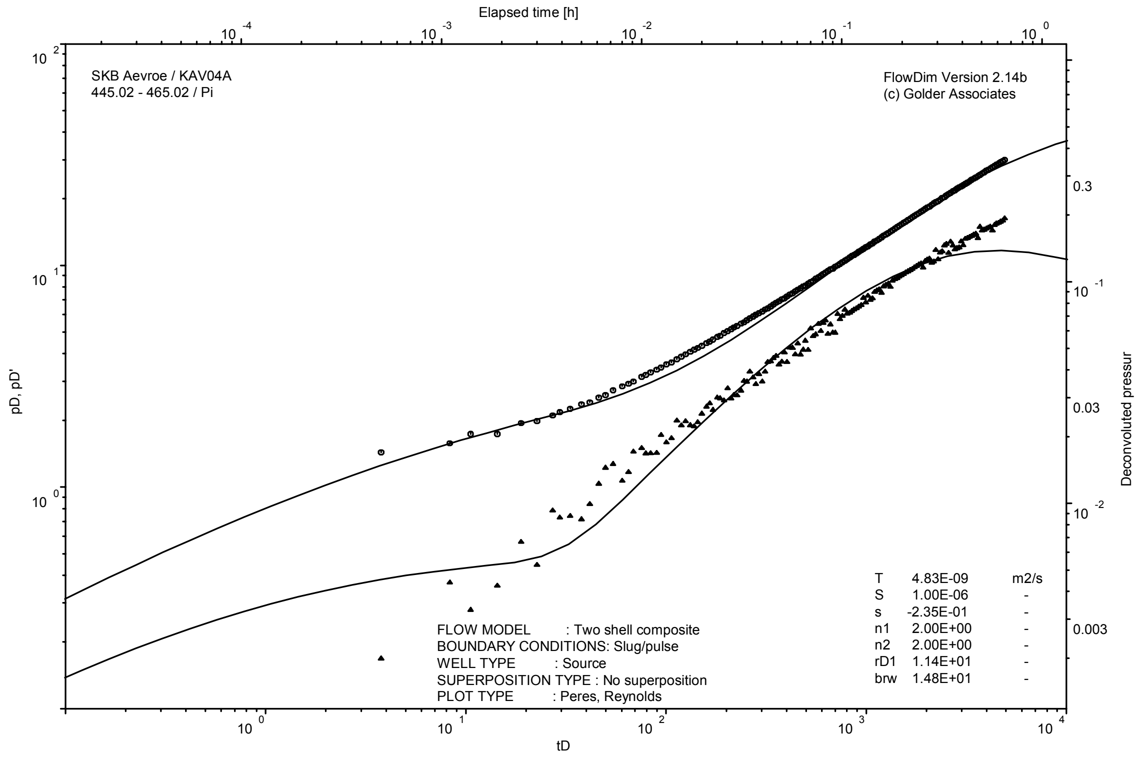
Analysis diagrams



Pressure and flow rate vs. time; cartesian plot



Interval pressure and temperature vs. time; cartesian plot

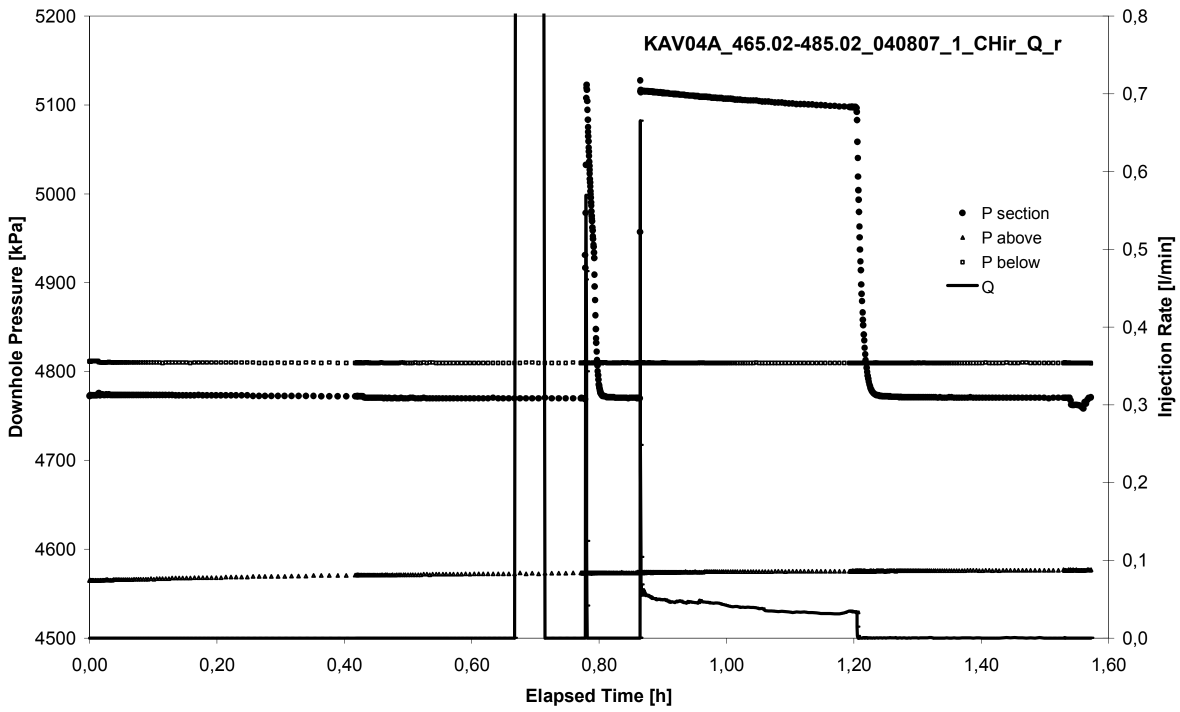


PI phase; deconvolution match

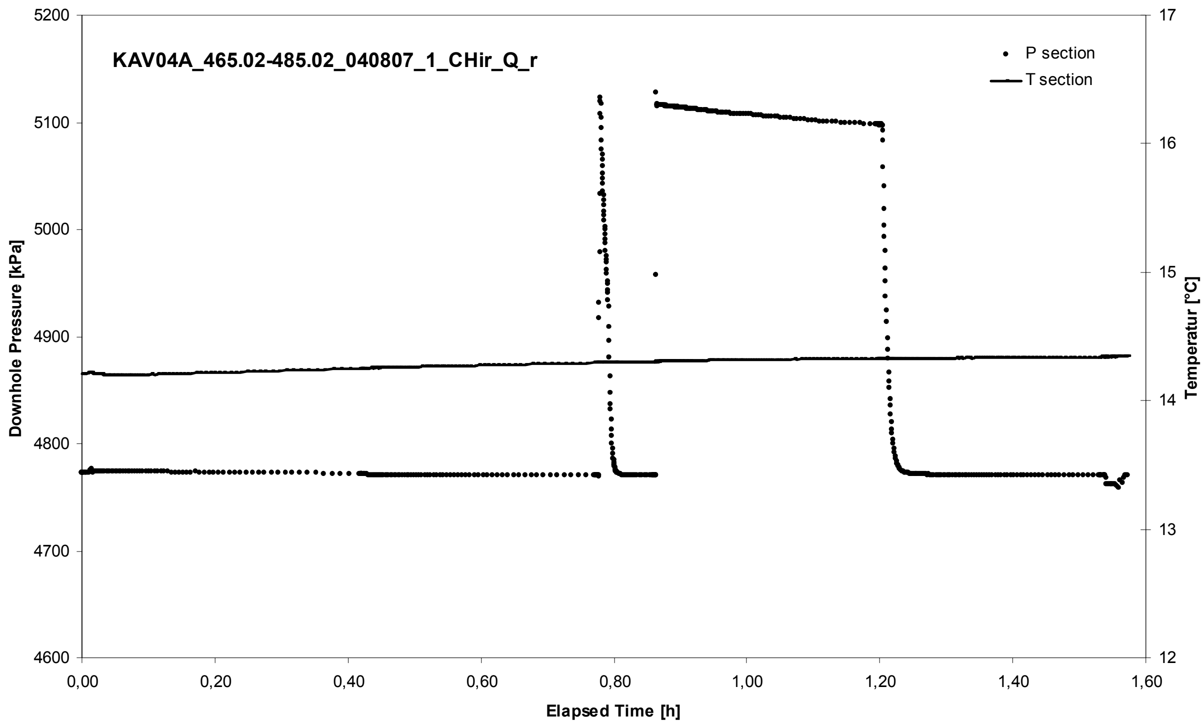
APPENDIX 2-28

Test 465,02 – 485,02 m

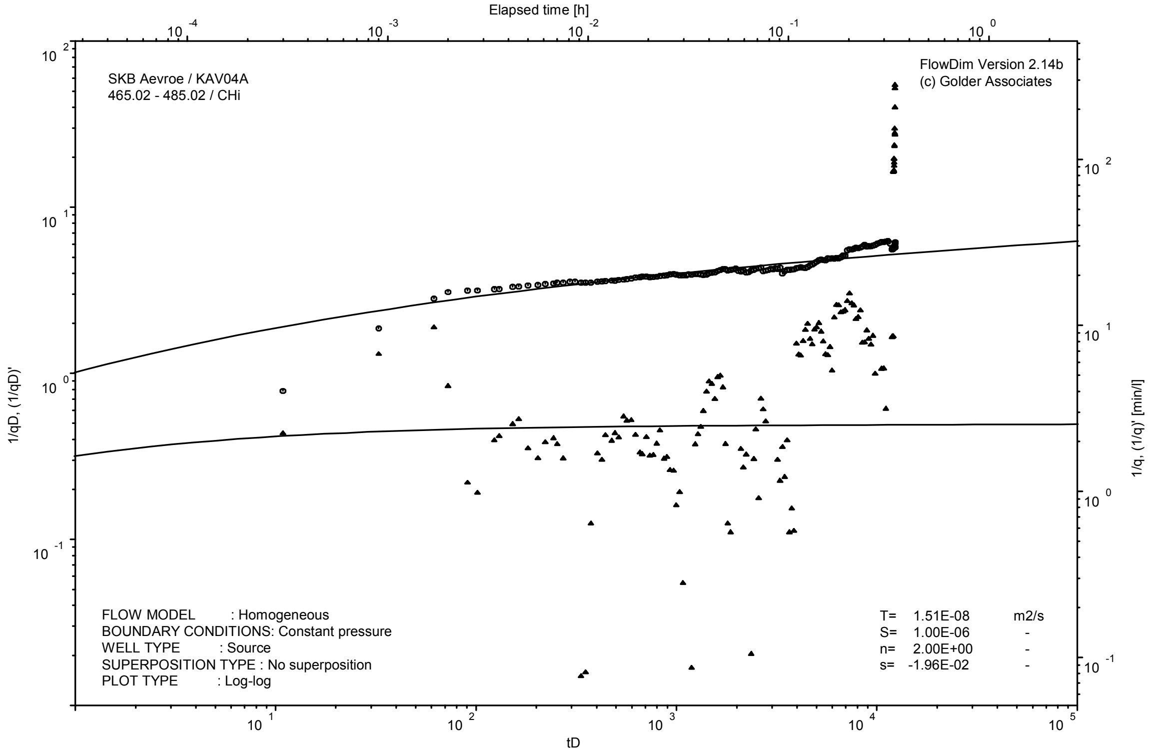
Analysis diagrams



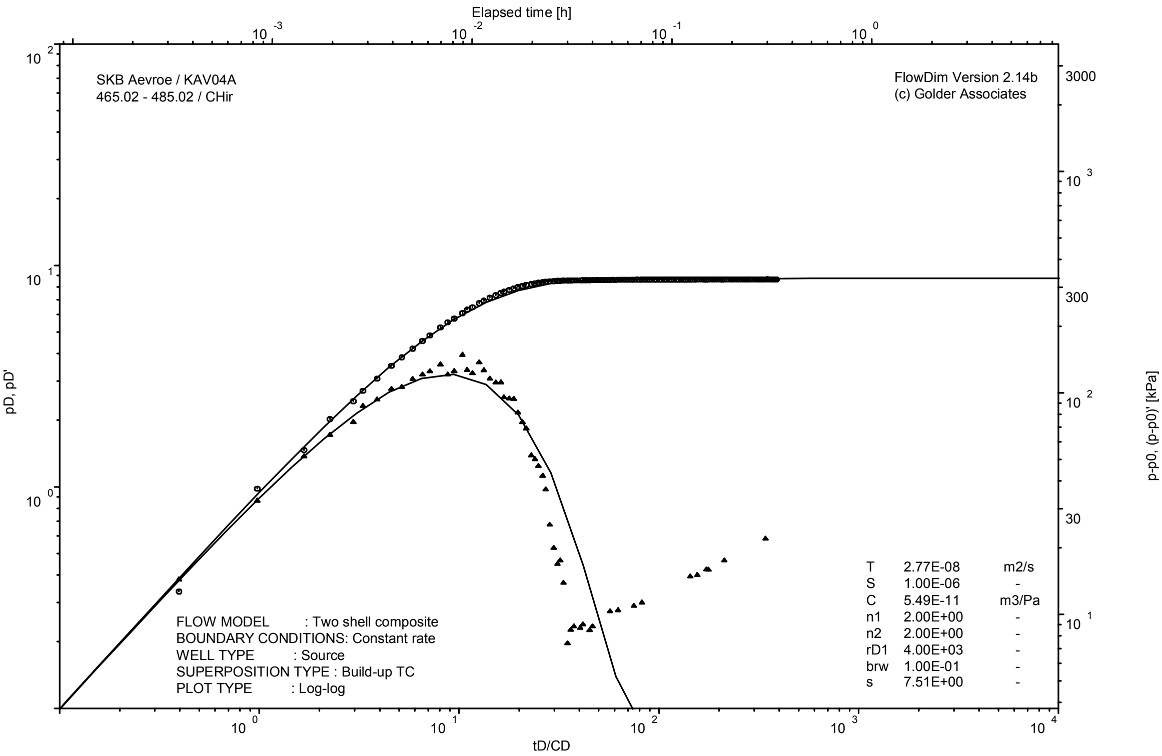
Pressure and flow rate vs. time; cartesian plot



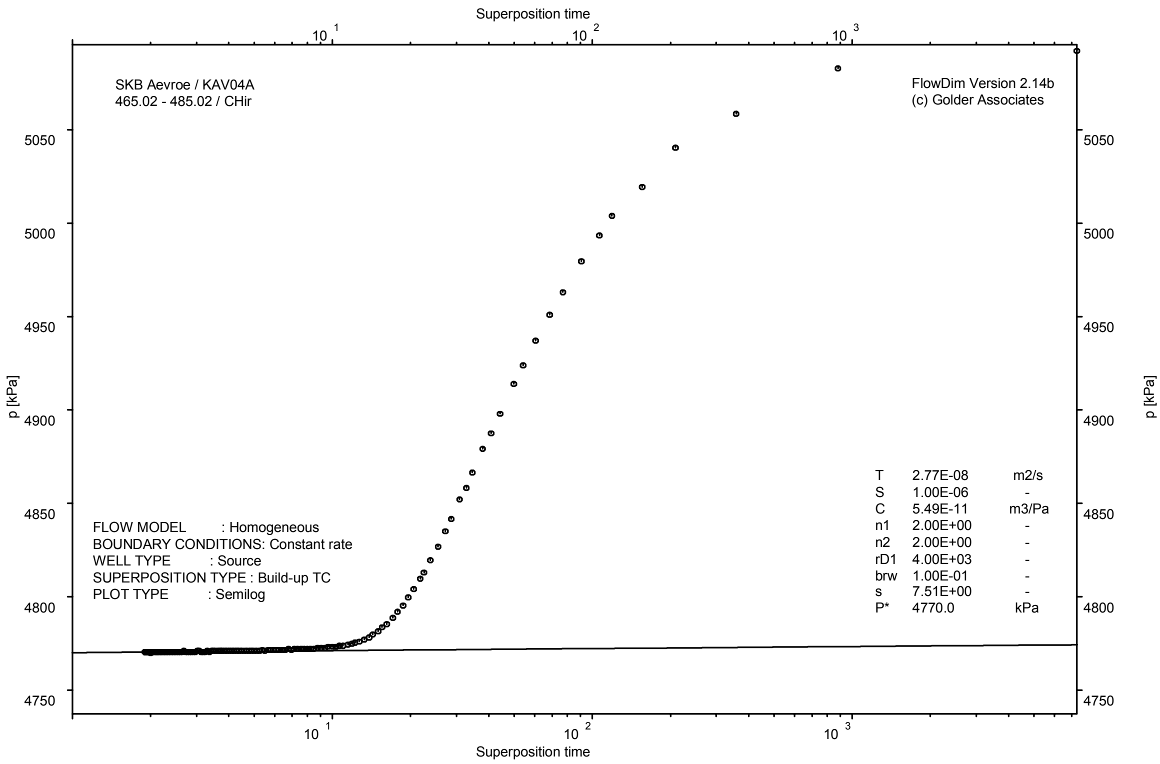
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

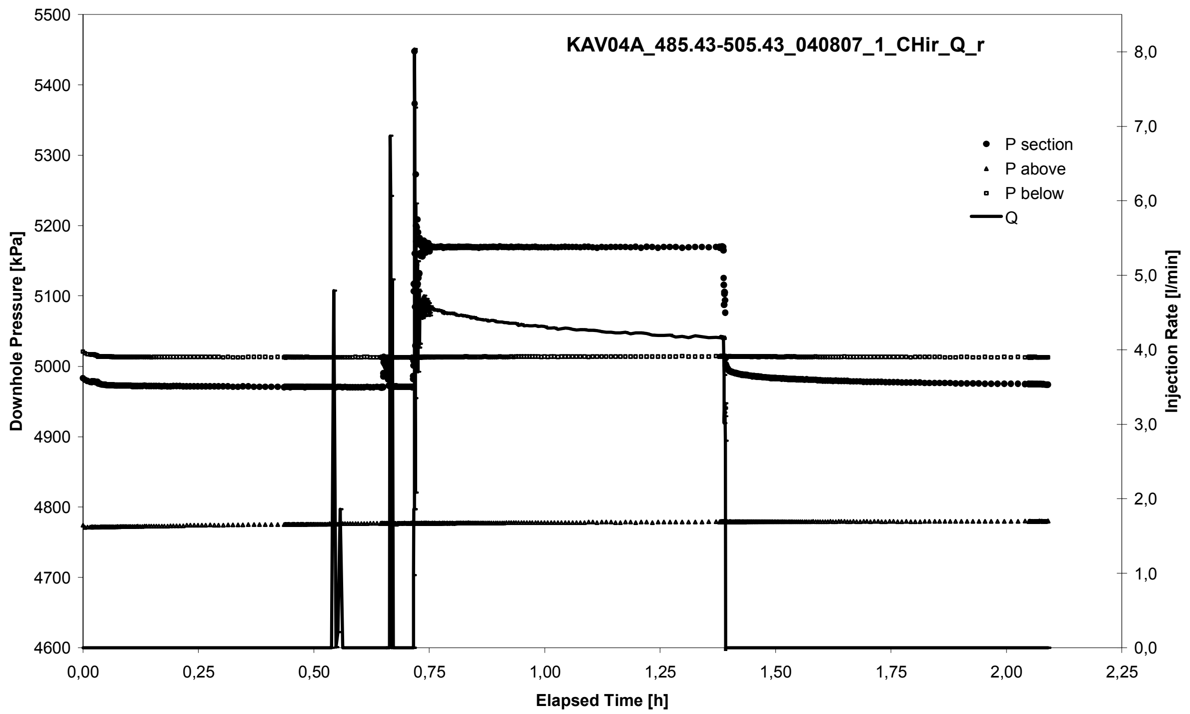


CHIR phase; HORNER match

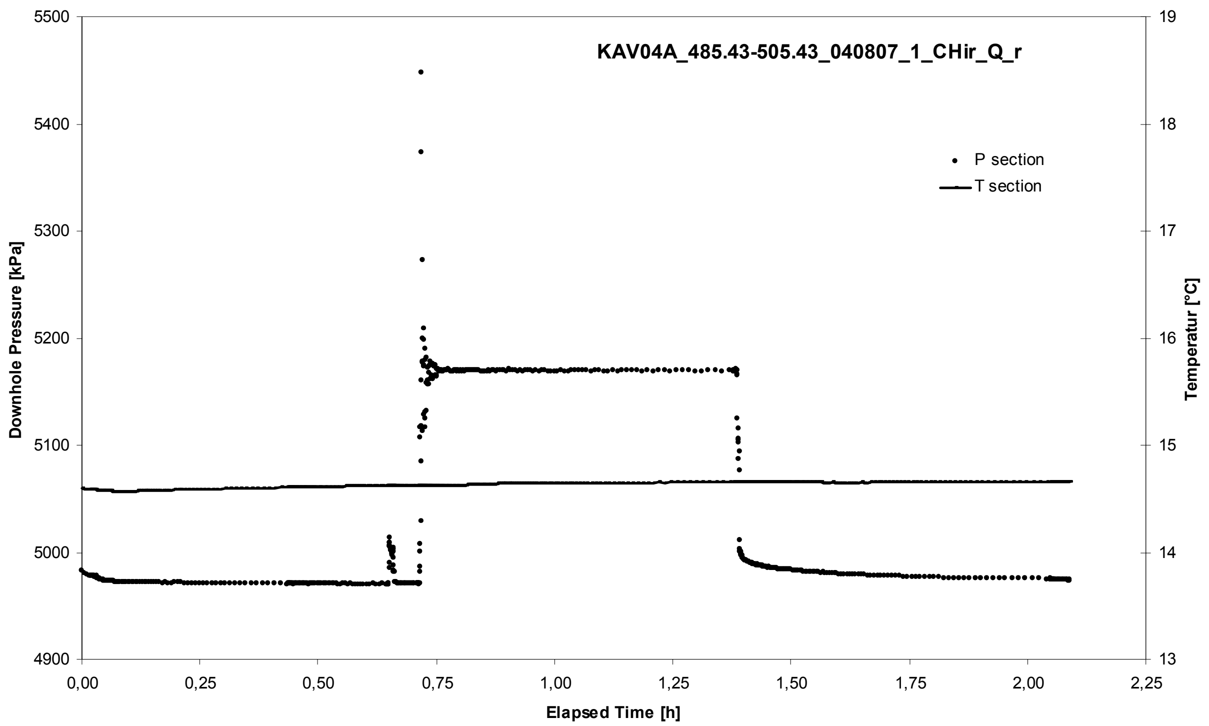
APPENDIX 2-29

Test 485,43 – 505,43 m

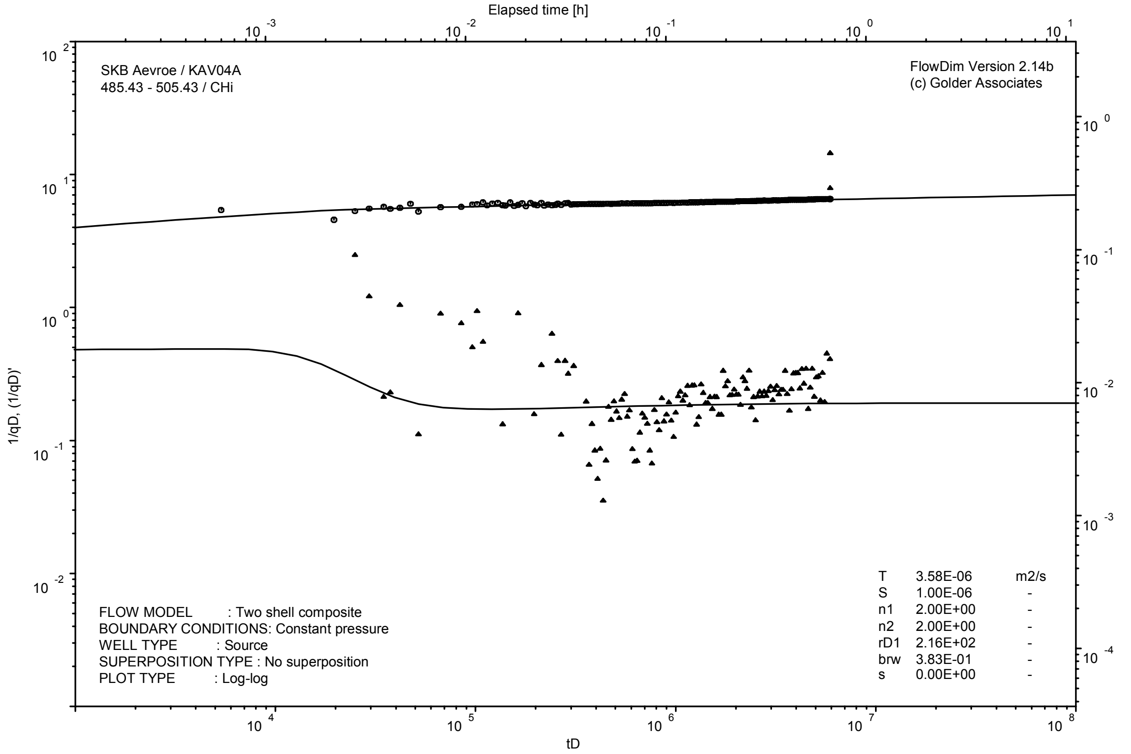
Analysis diagrams



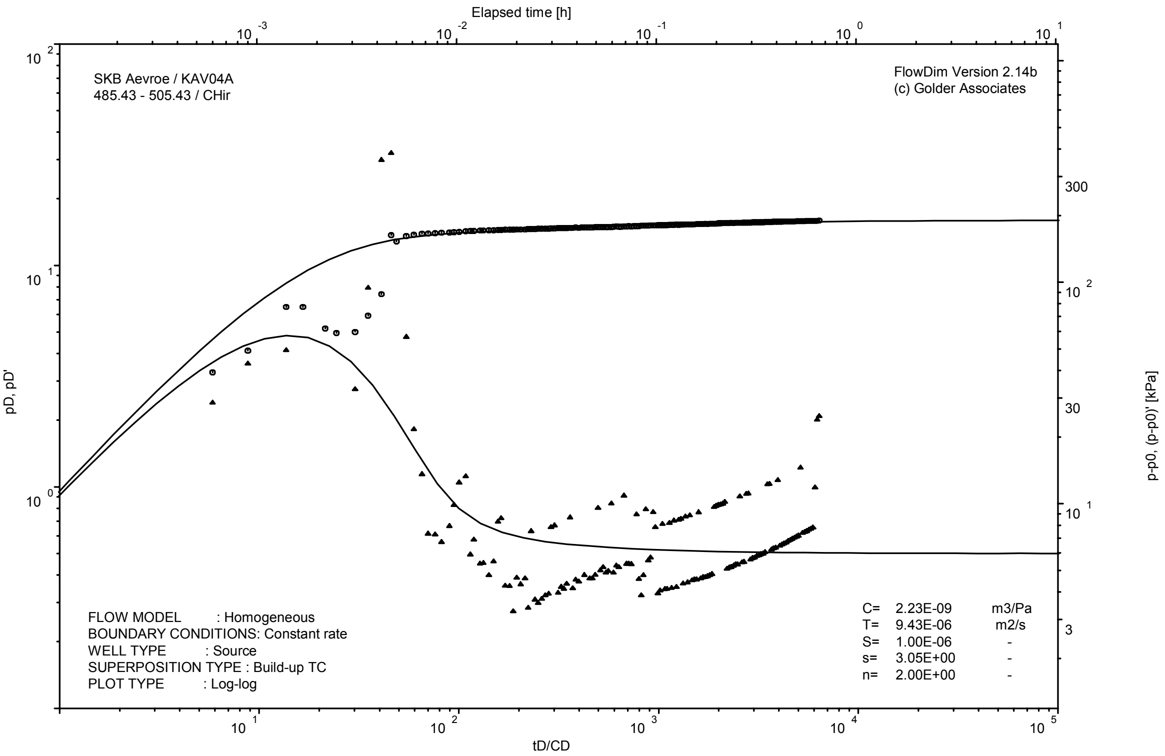
Pressure and flow rate vs. time; cartesian plot



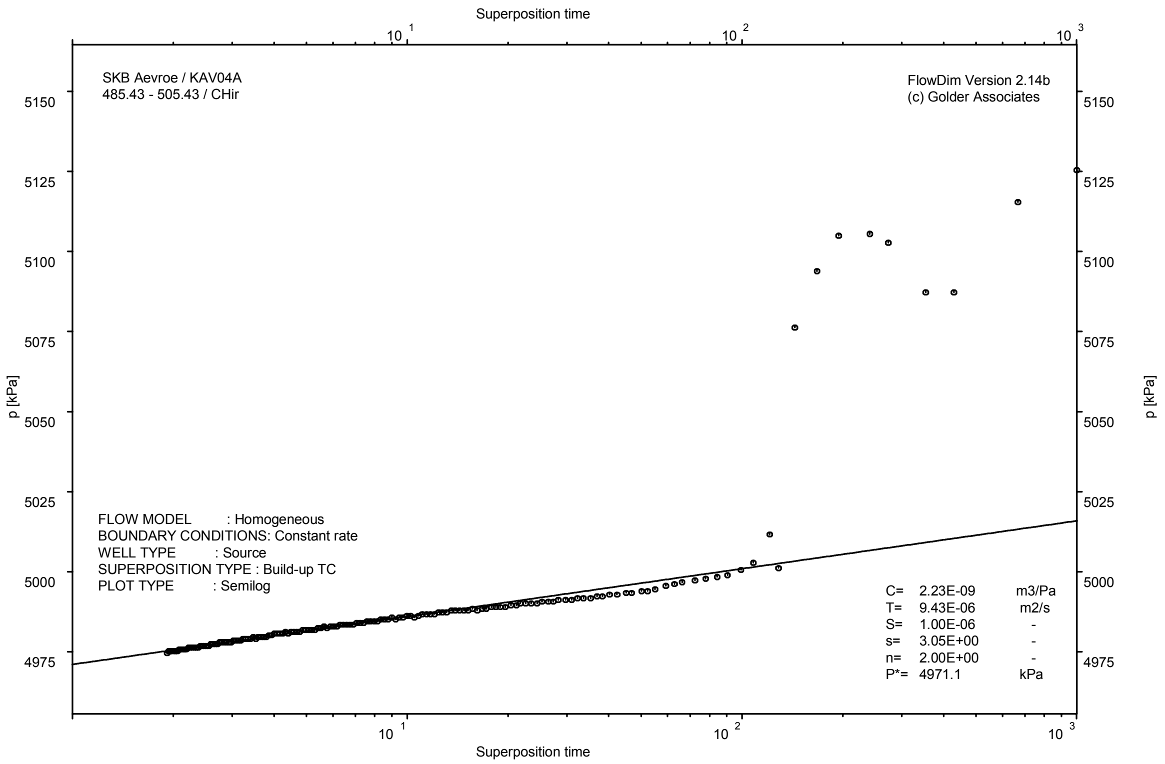
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

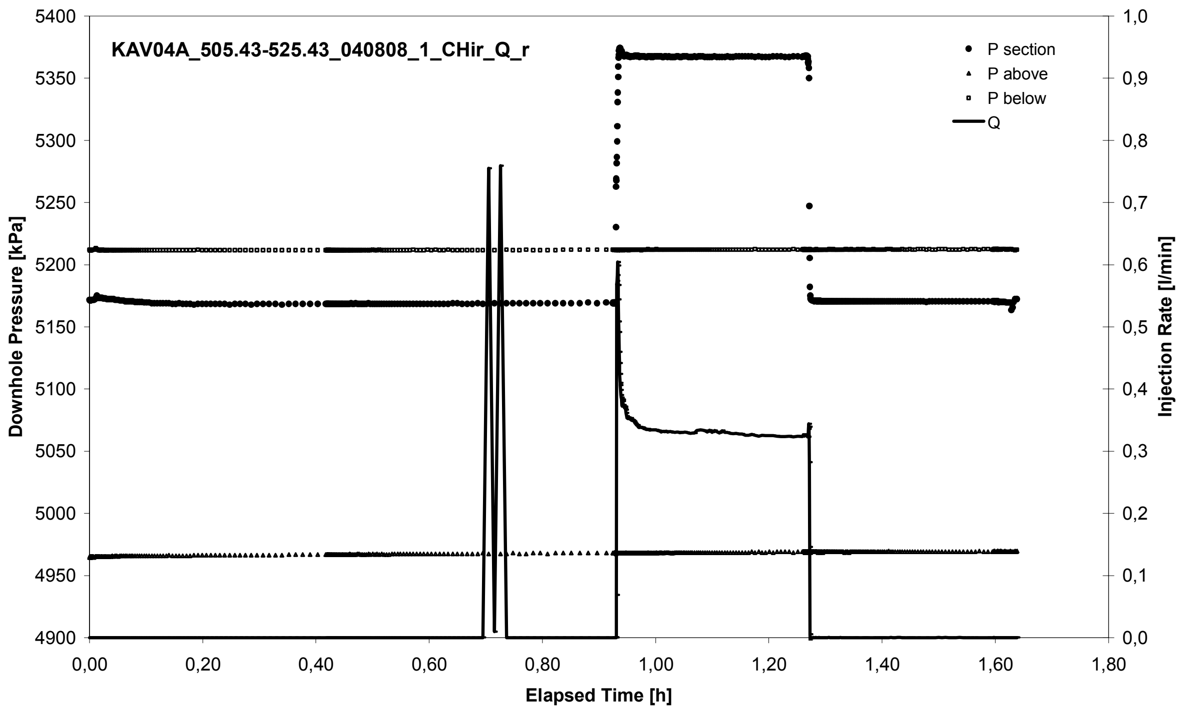


CHIR phase; HORNER match

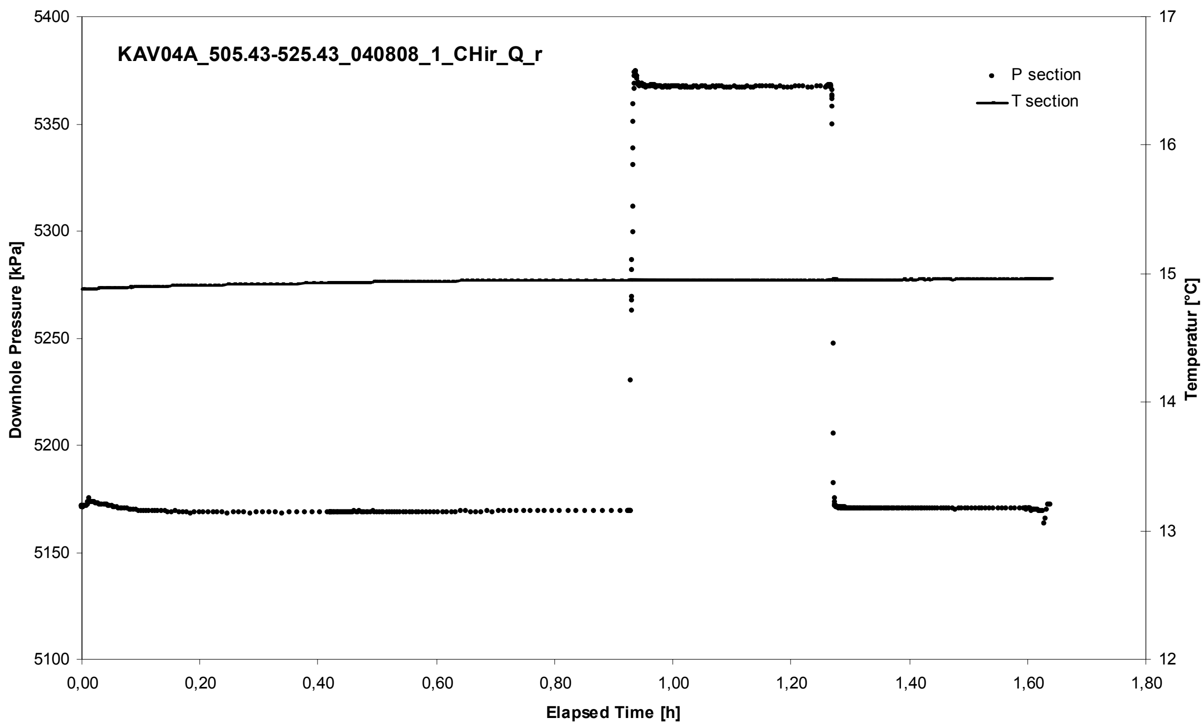
APPENDIX 2-30

Test 505,43 – 525,43 m

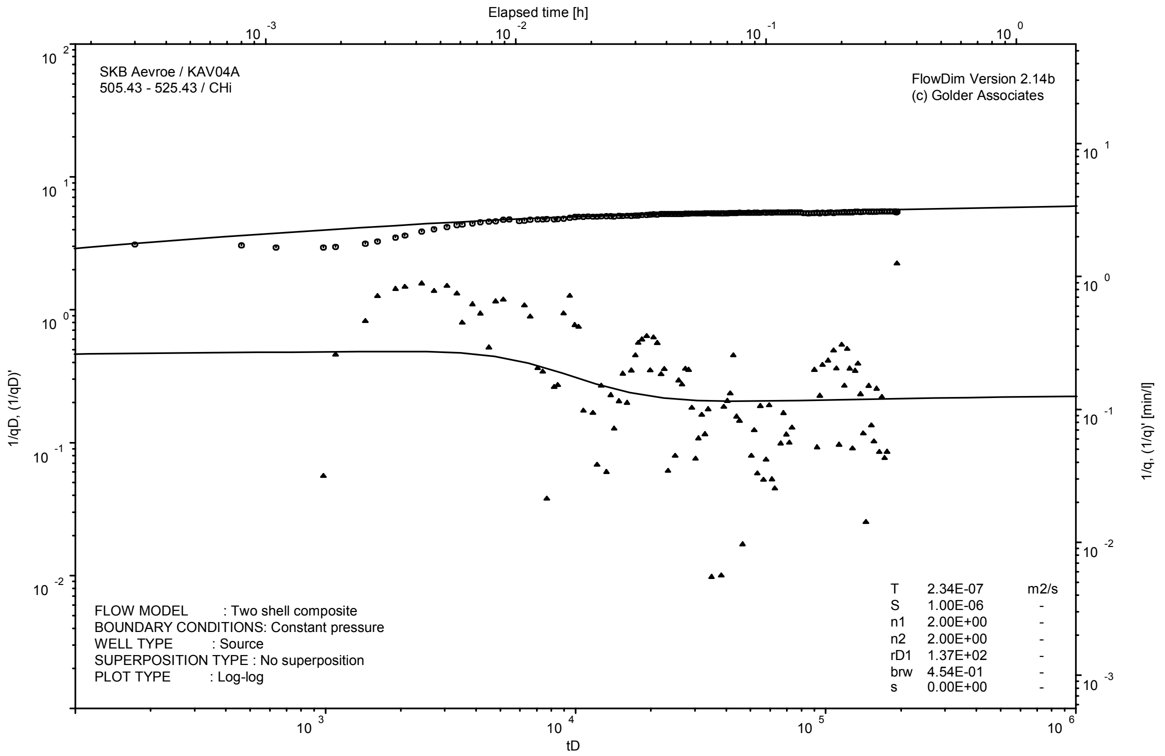
Analysis diagrams



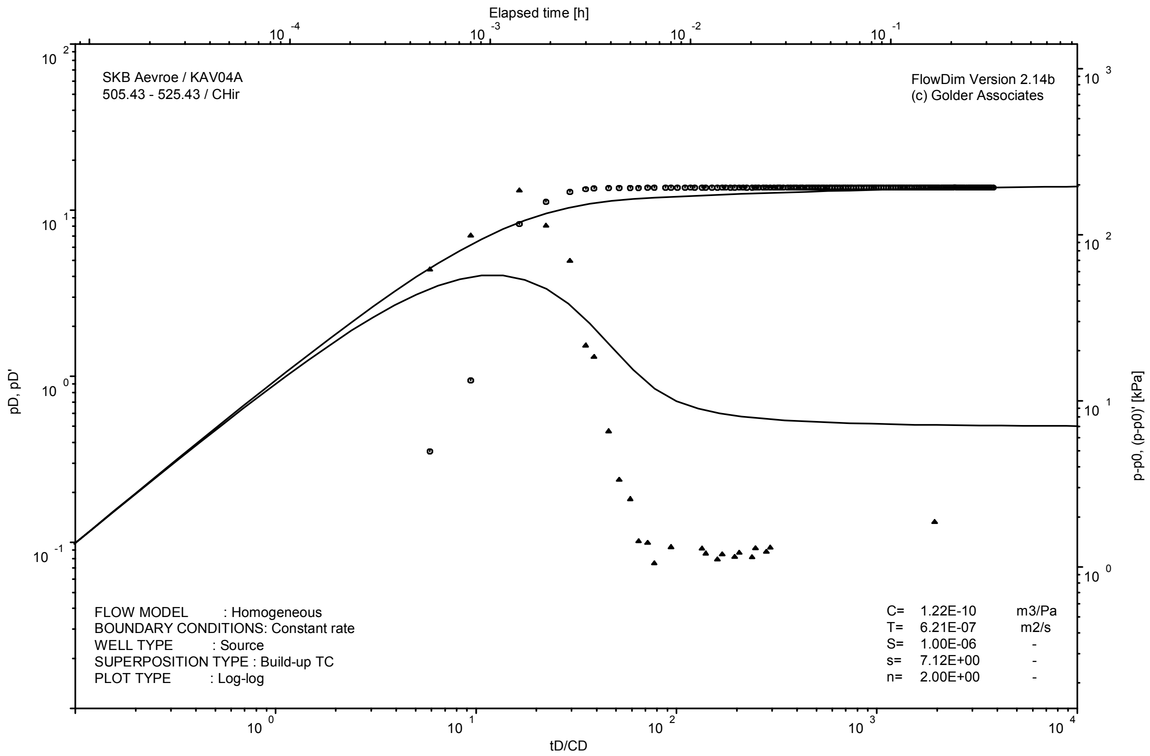
Pressure and flow rate vs. time; cartesian plot



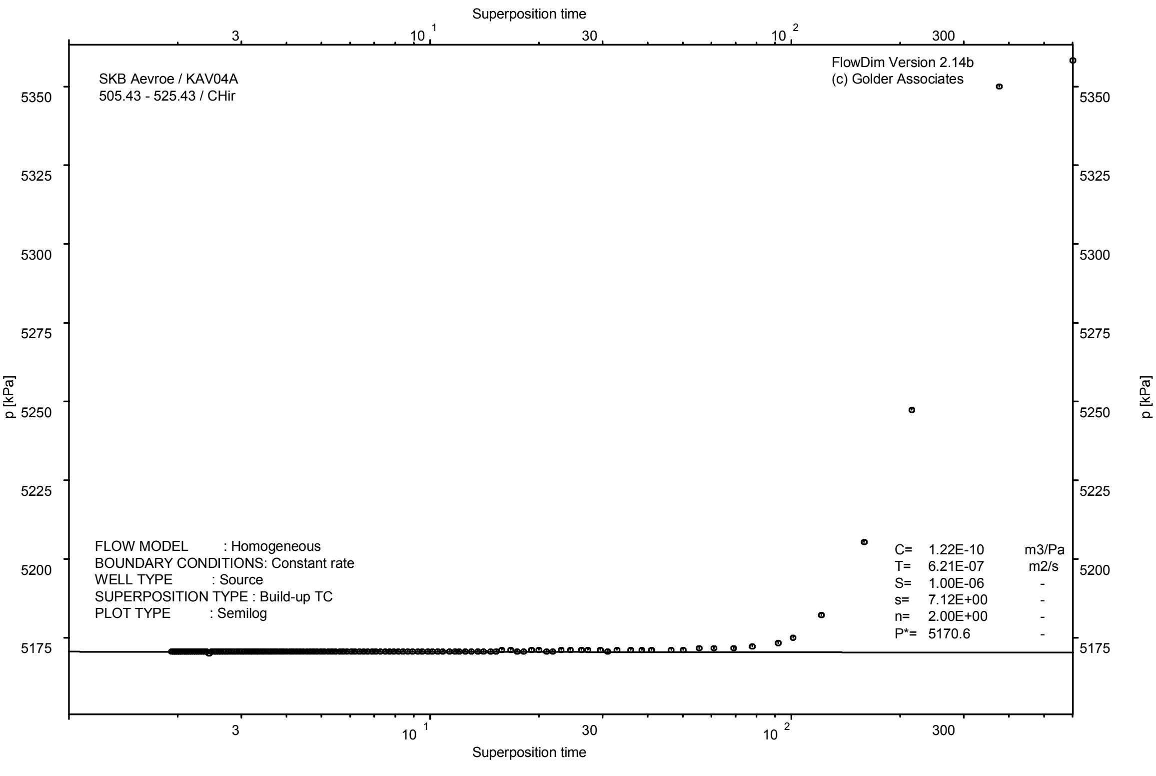
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

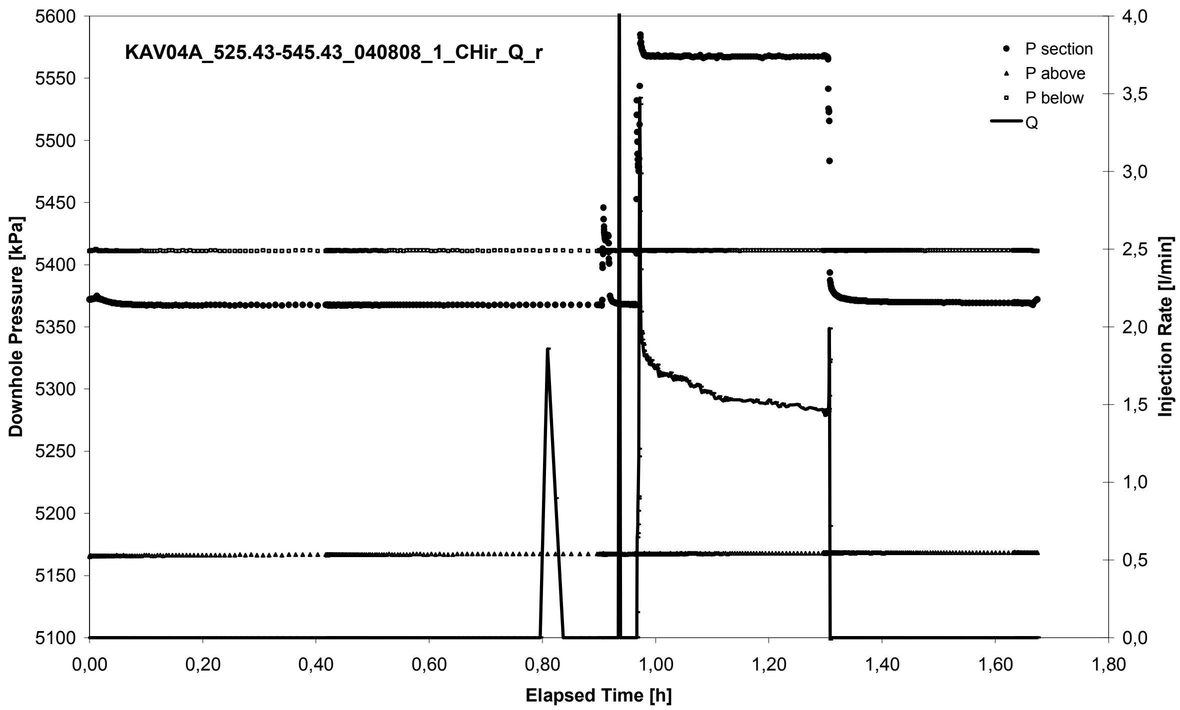


CHIR phase; HORNER match

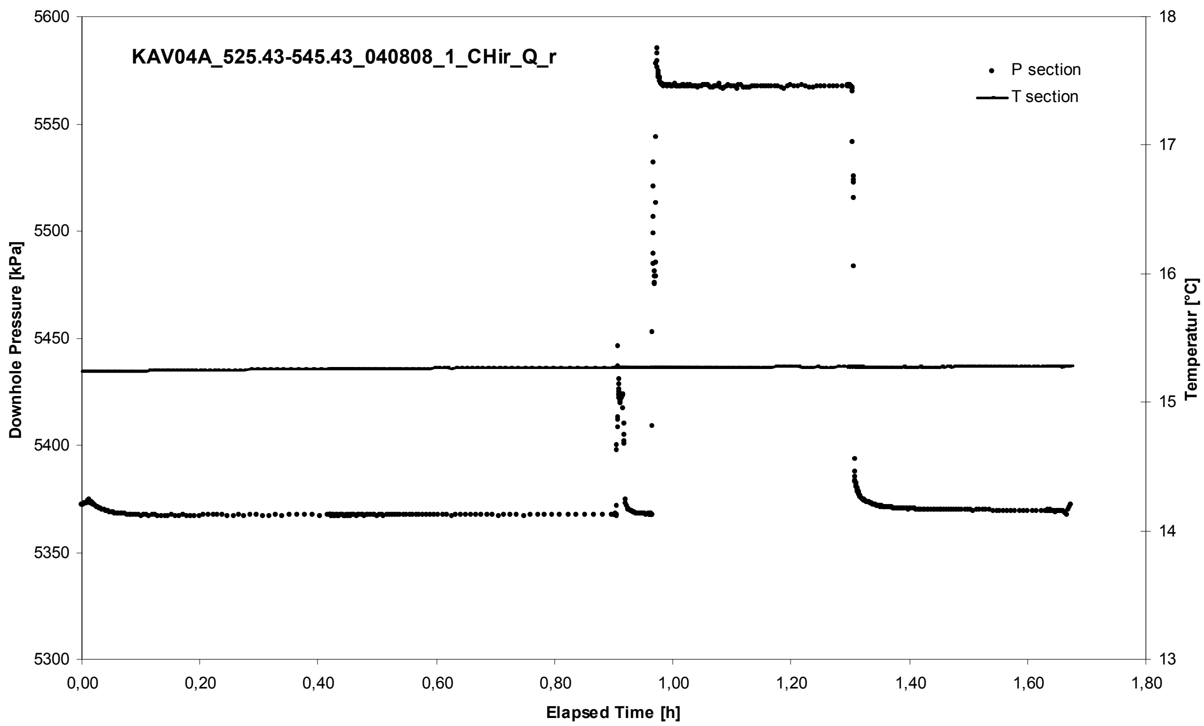
APPENDIX 2-31

Test 525,43 – 545,43 m

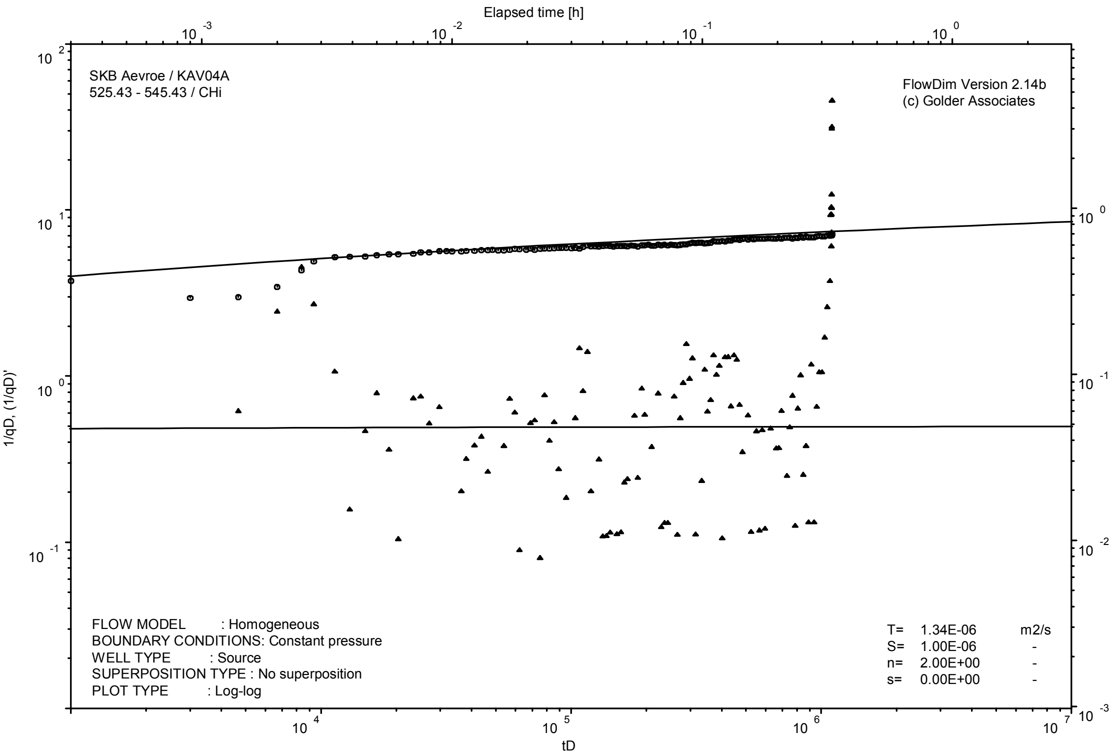
Analysis diagrams



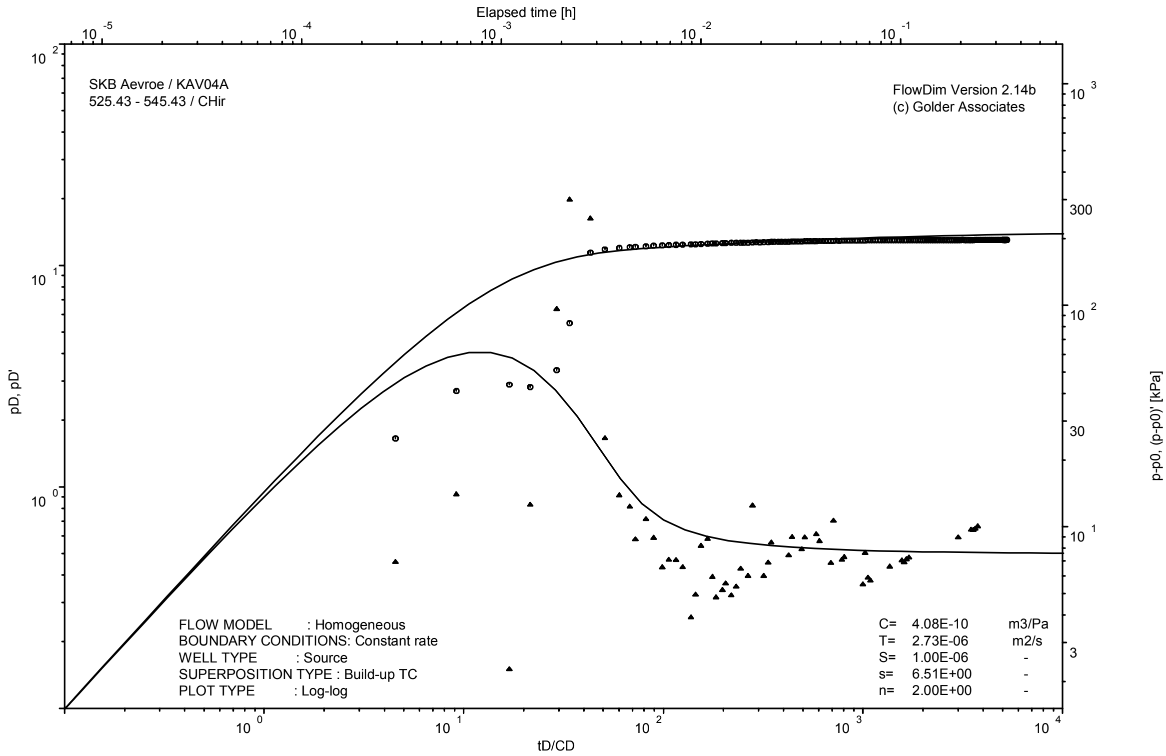
Pressure and flow rate vs. time; cartesian plot



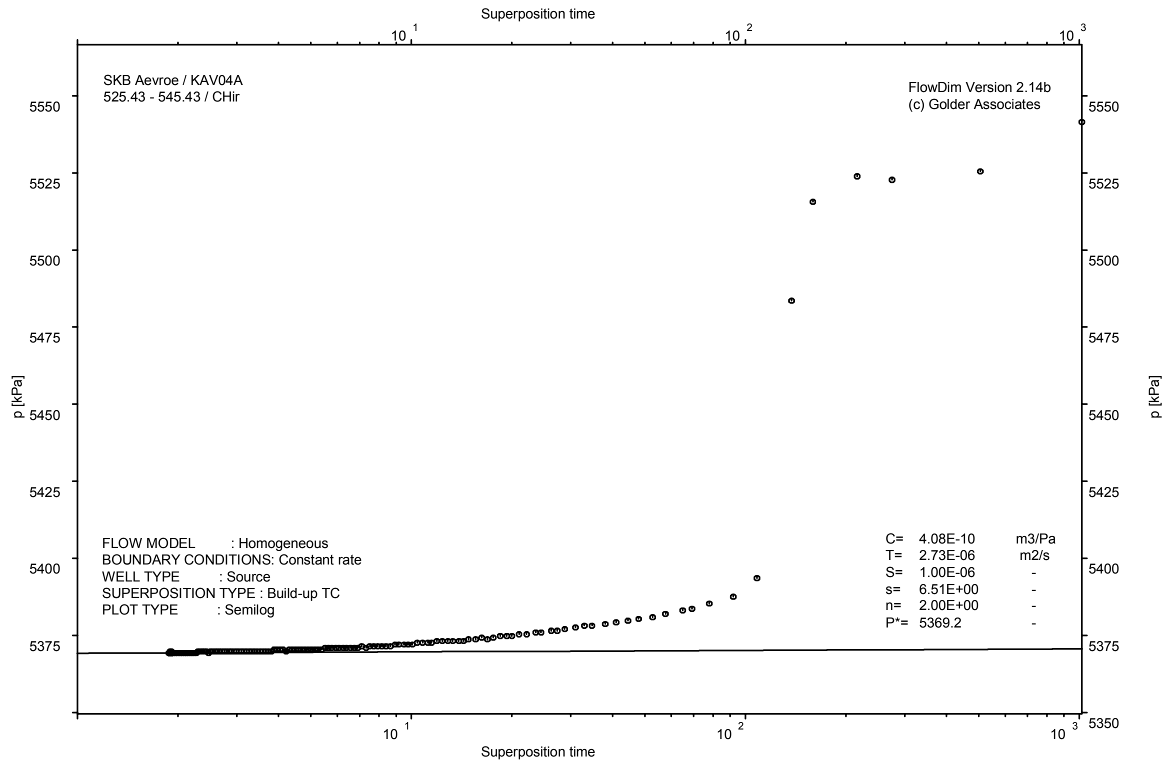
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

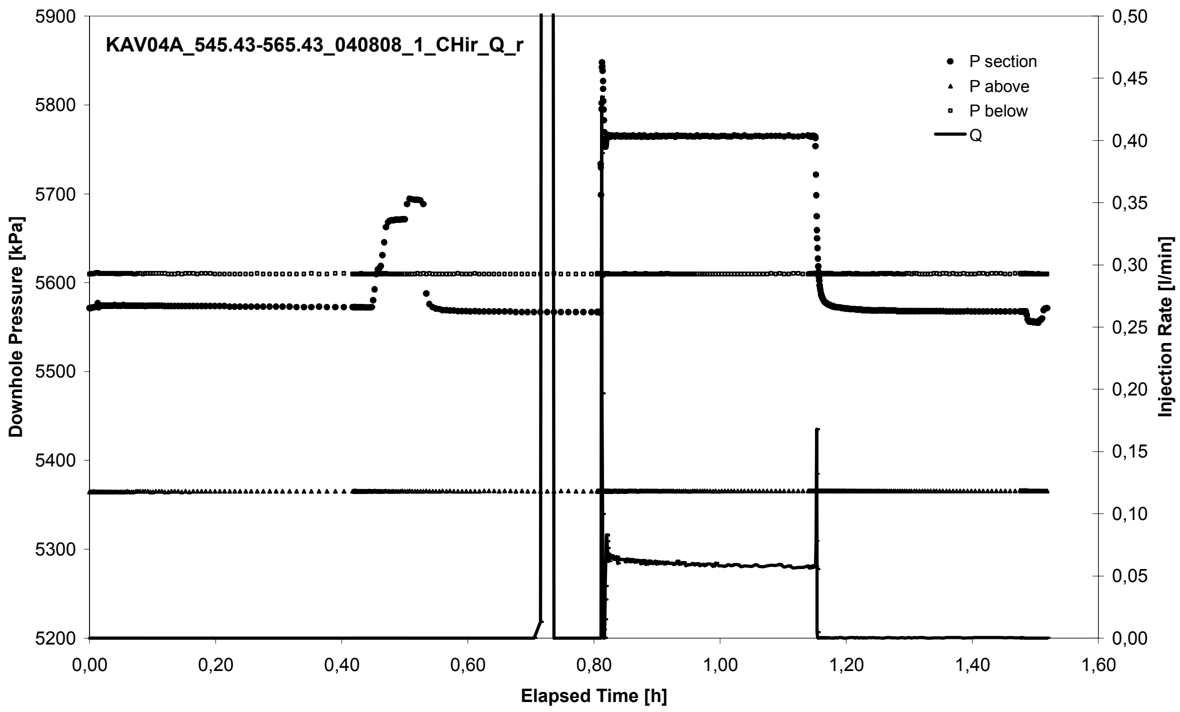


CHIR phase; HORNER match

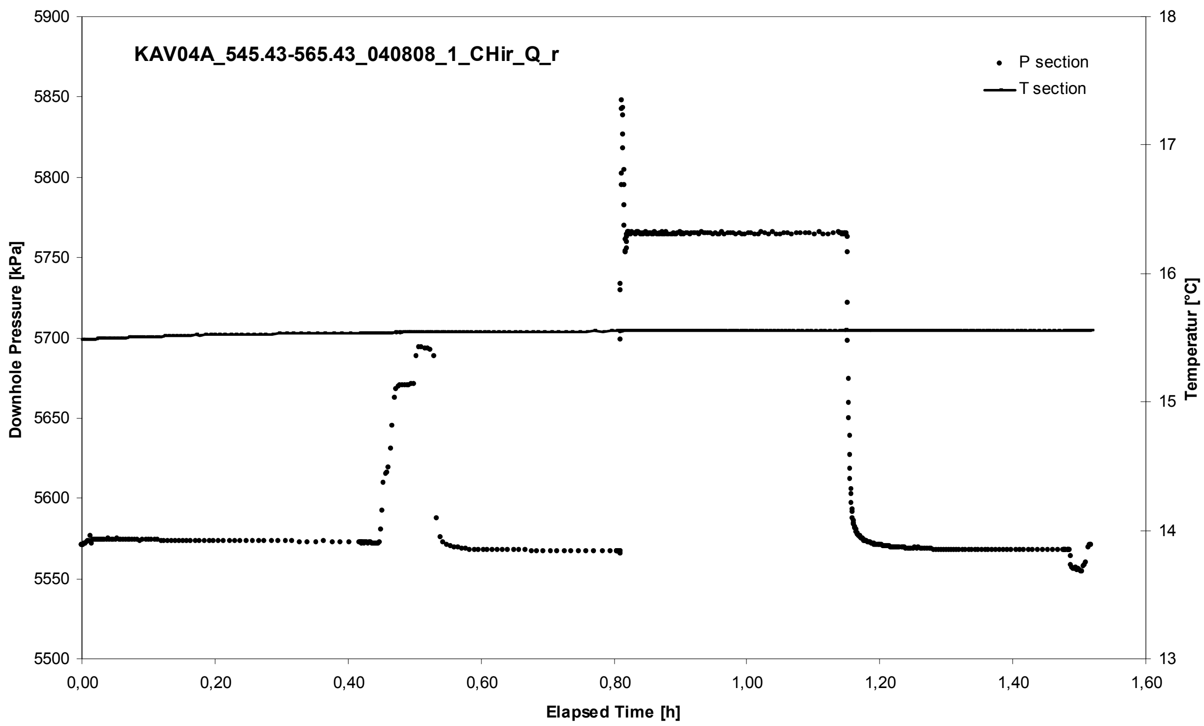
APPENDIX 2-32

Test 545,43 – 565,43 m

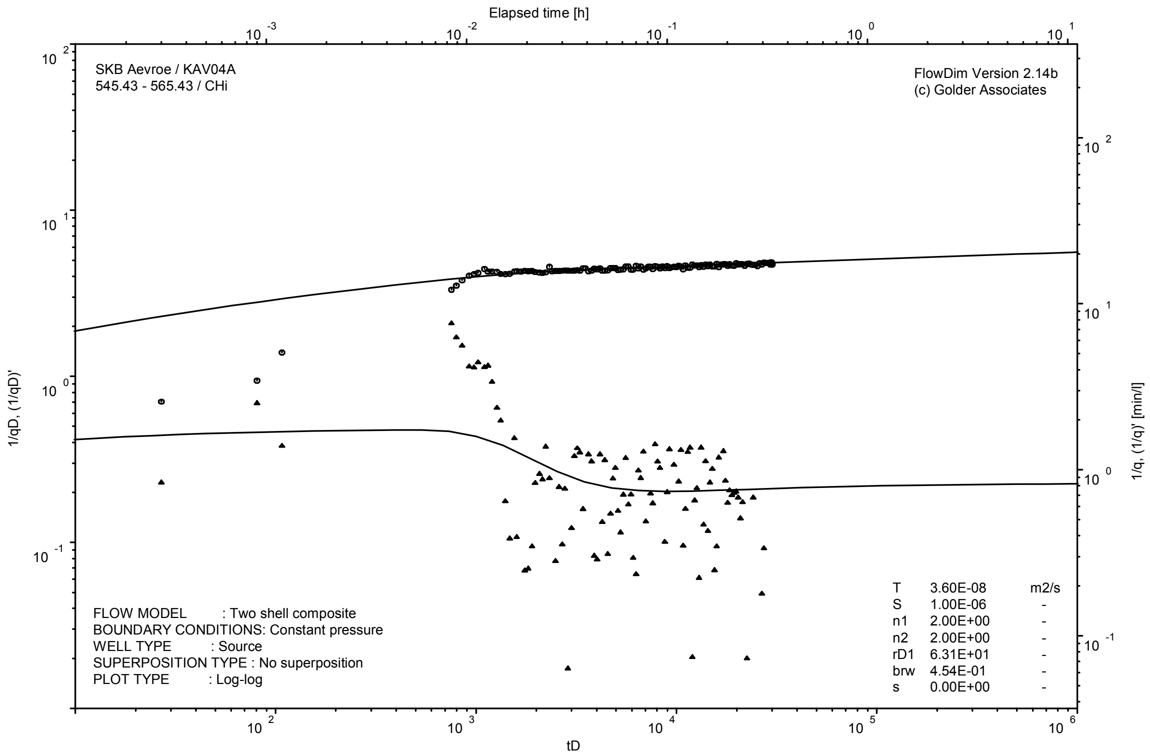
Analysis diagrams



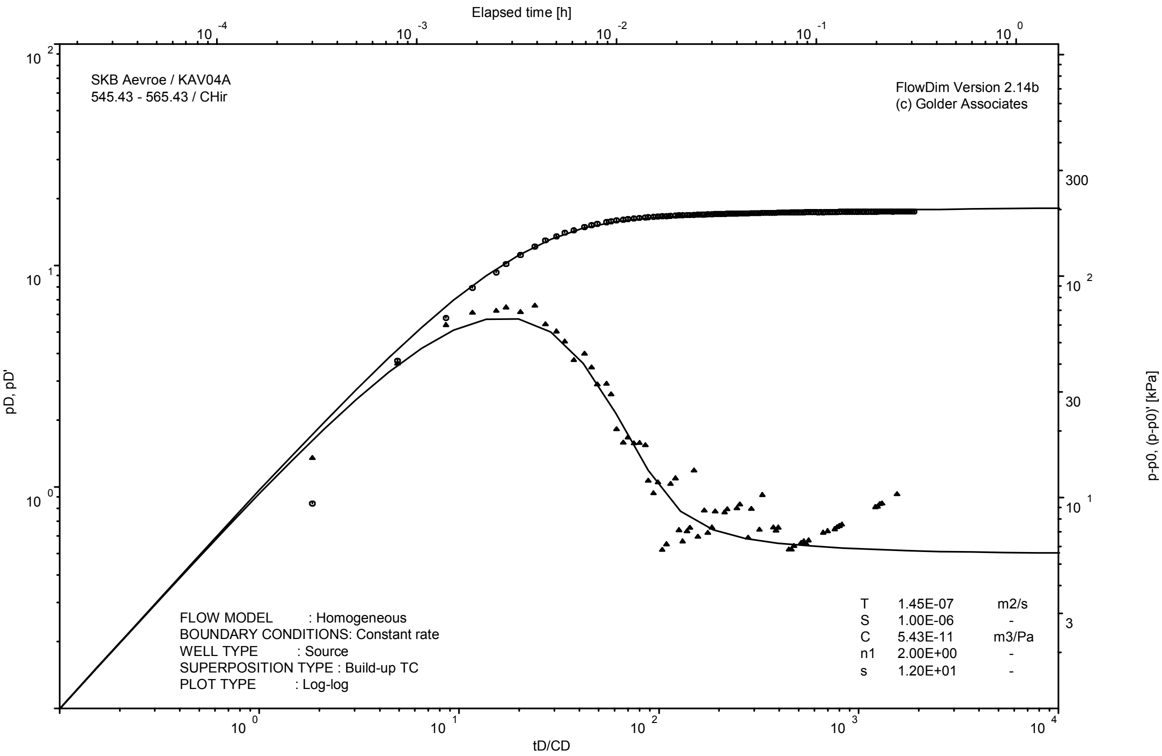
Pressure and flow rate vs. time; cartesian plot



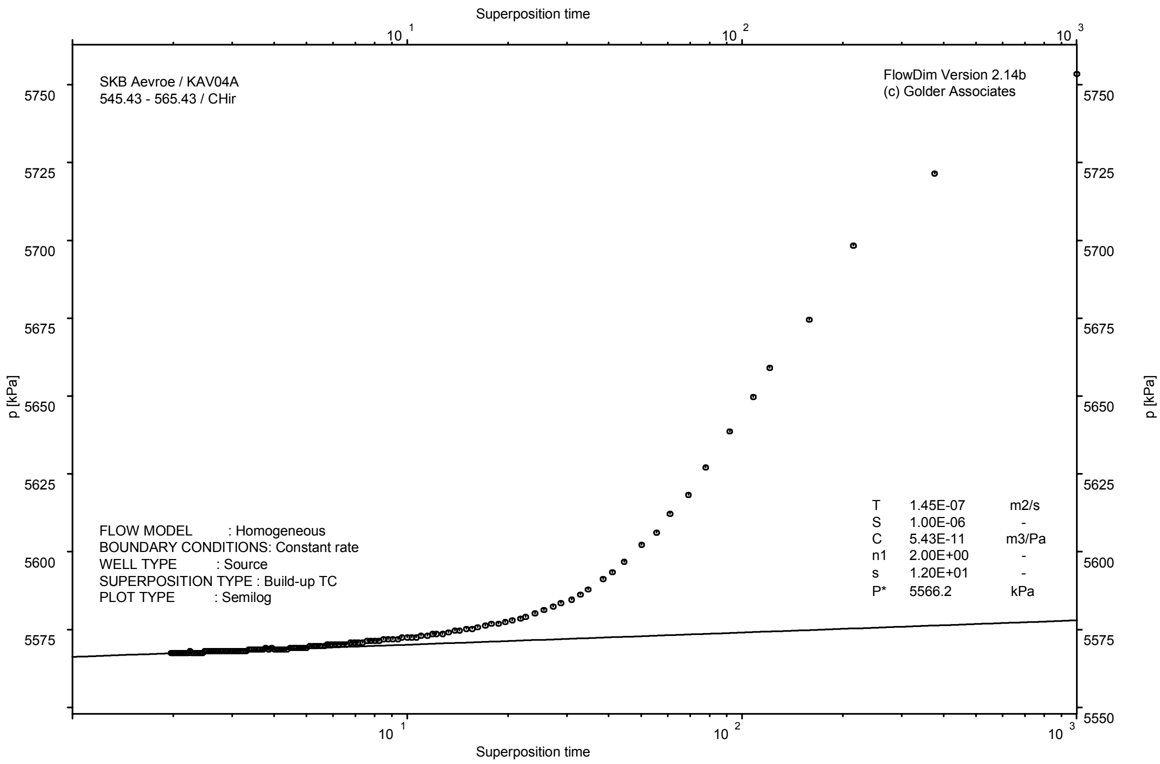
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

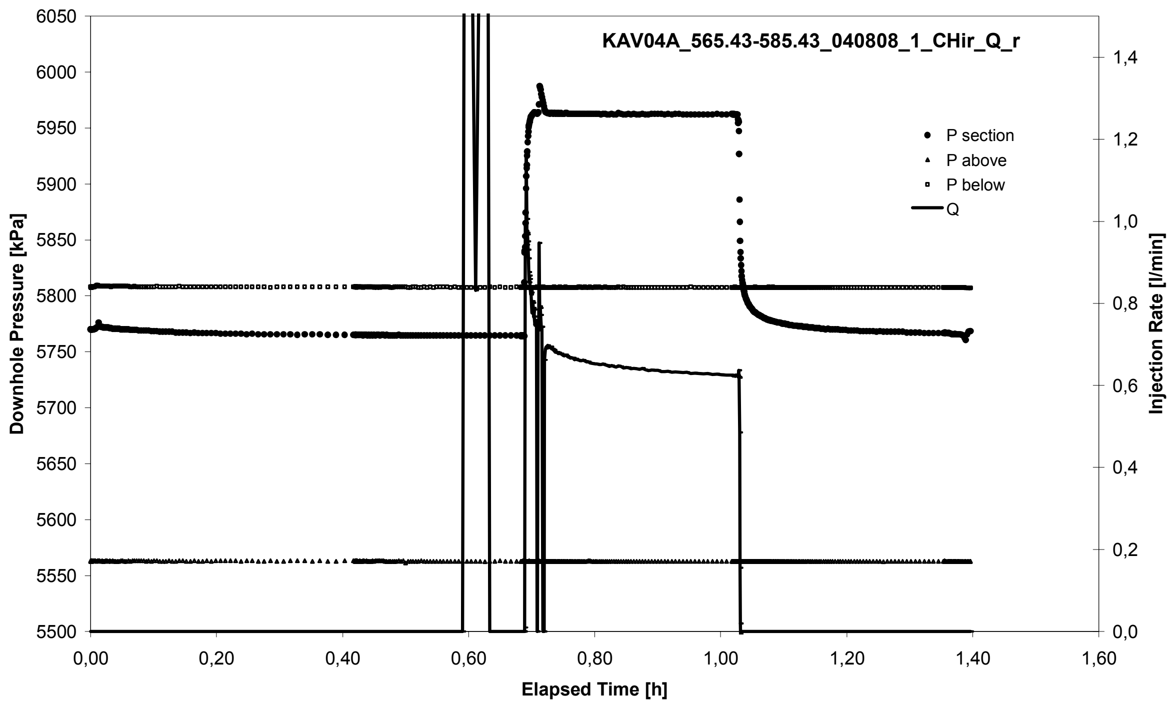


CHIR phase; HORNER match

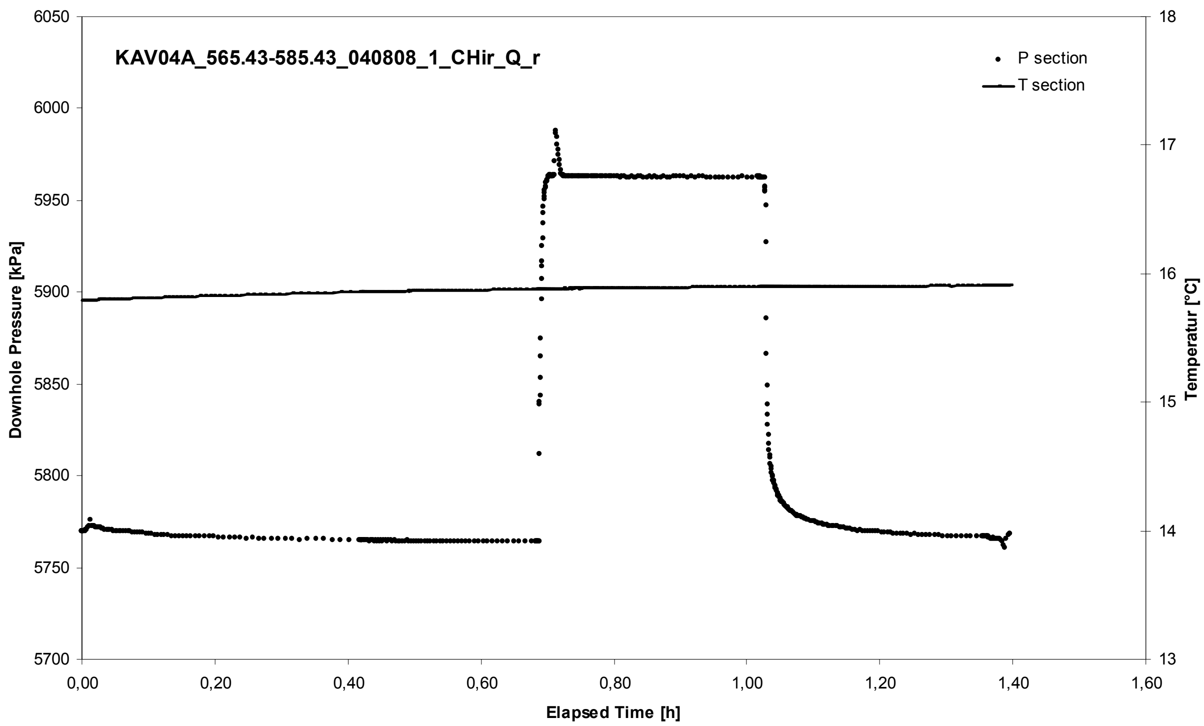
APPENDIX 2-33

Test 565,43 – 585,43 m

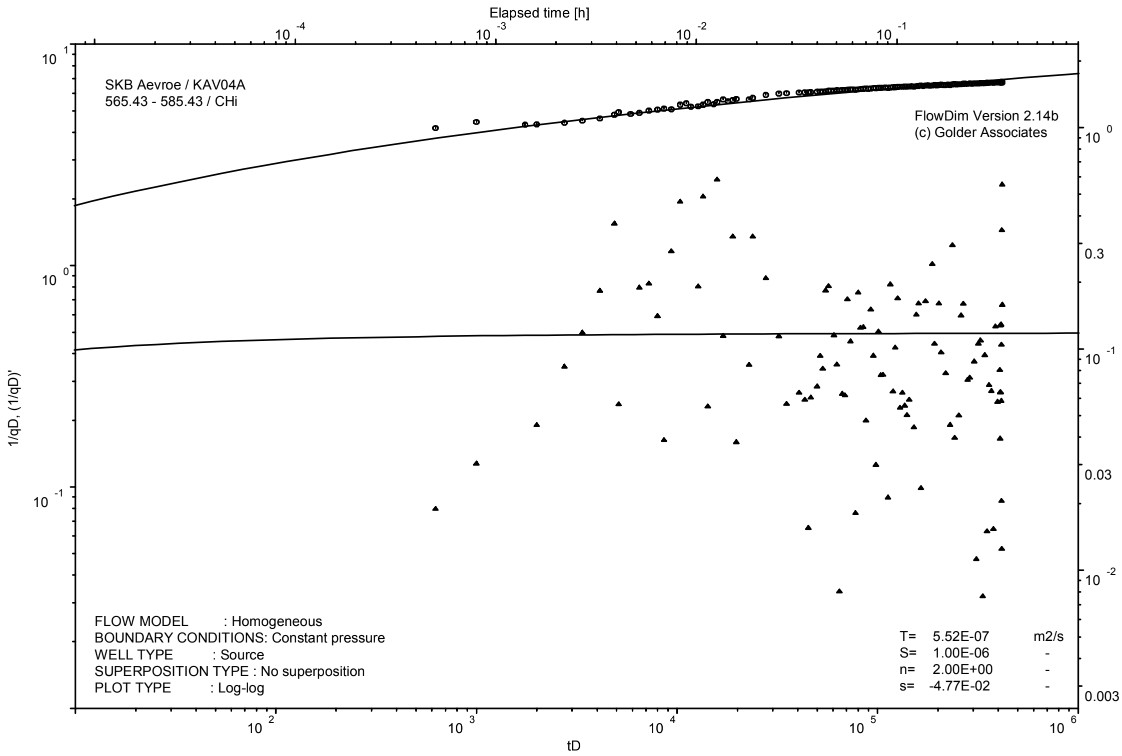
Analysis diagrams



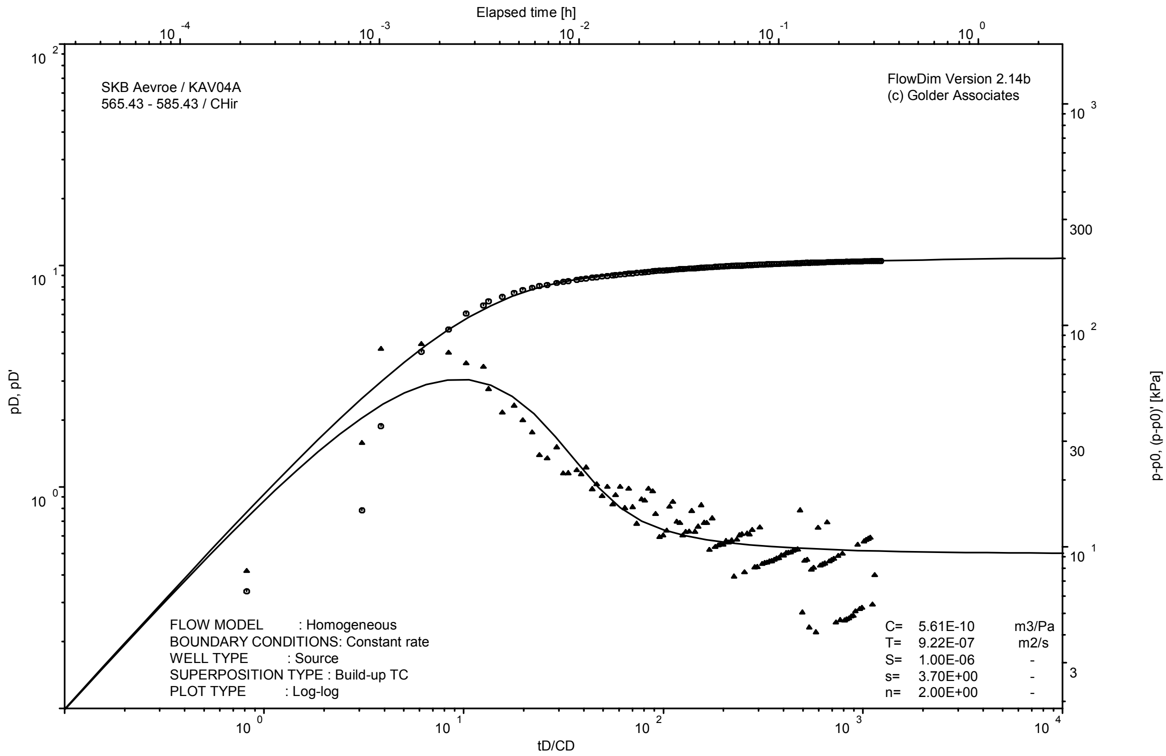
Pressure and flow rate vs. time; cartesian plot



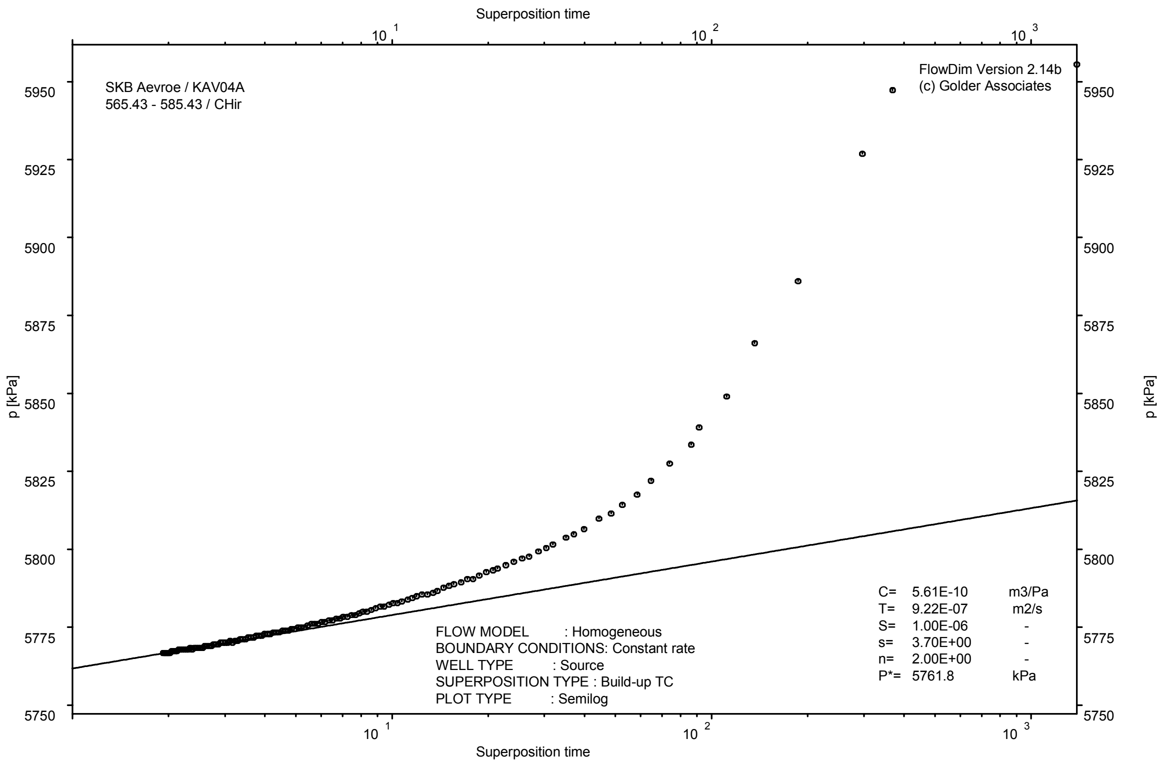
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

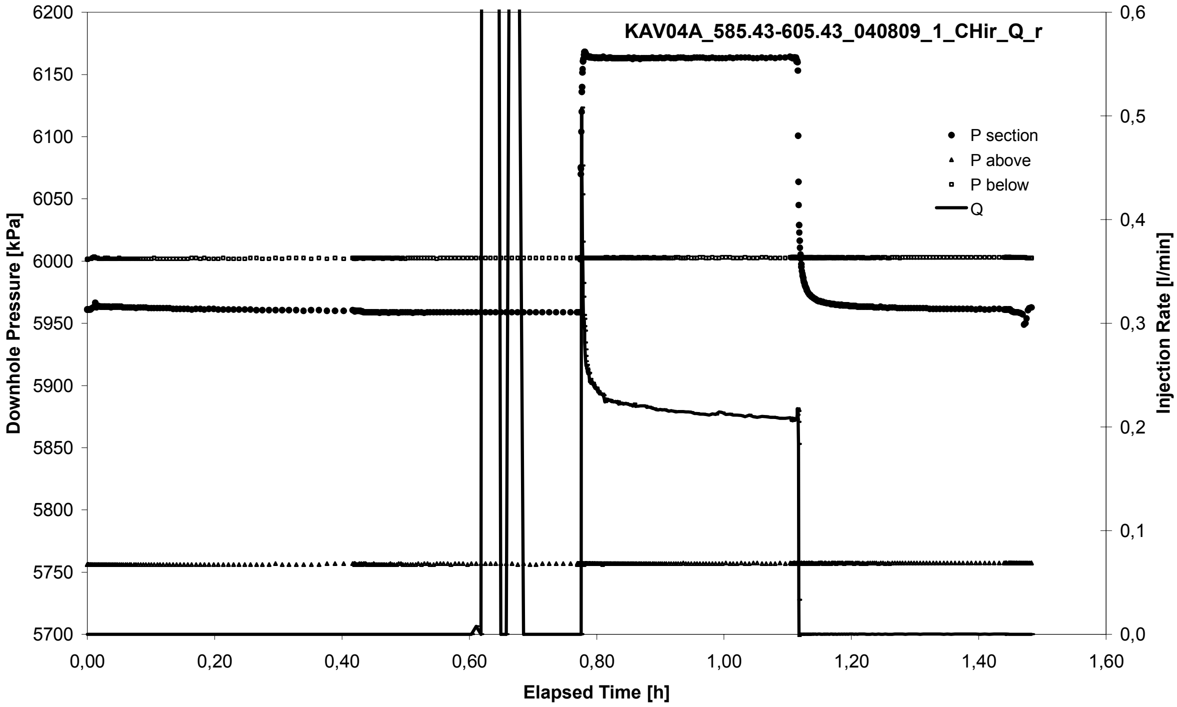


CHIR phase; HORNER match

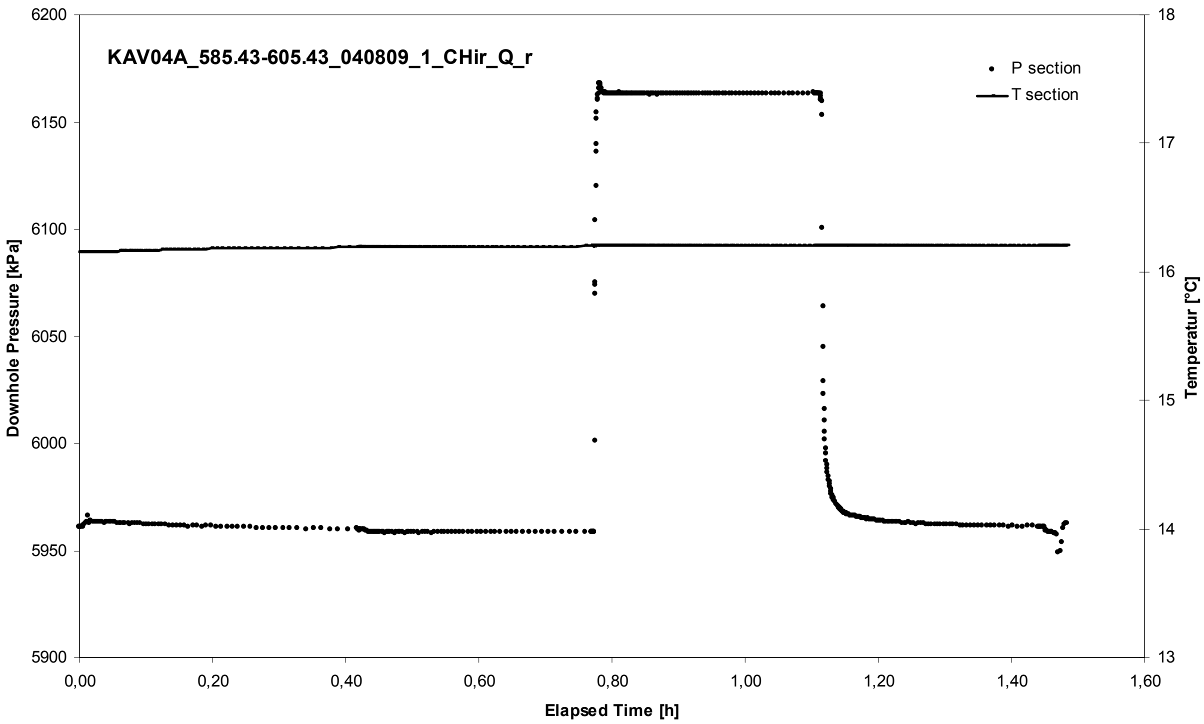
APPENDIX 2-34

Test 585,43 – 605,43 m

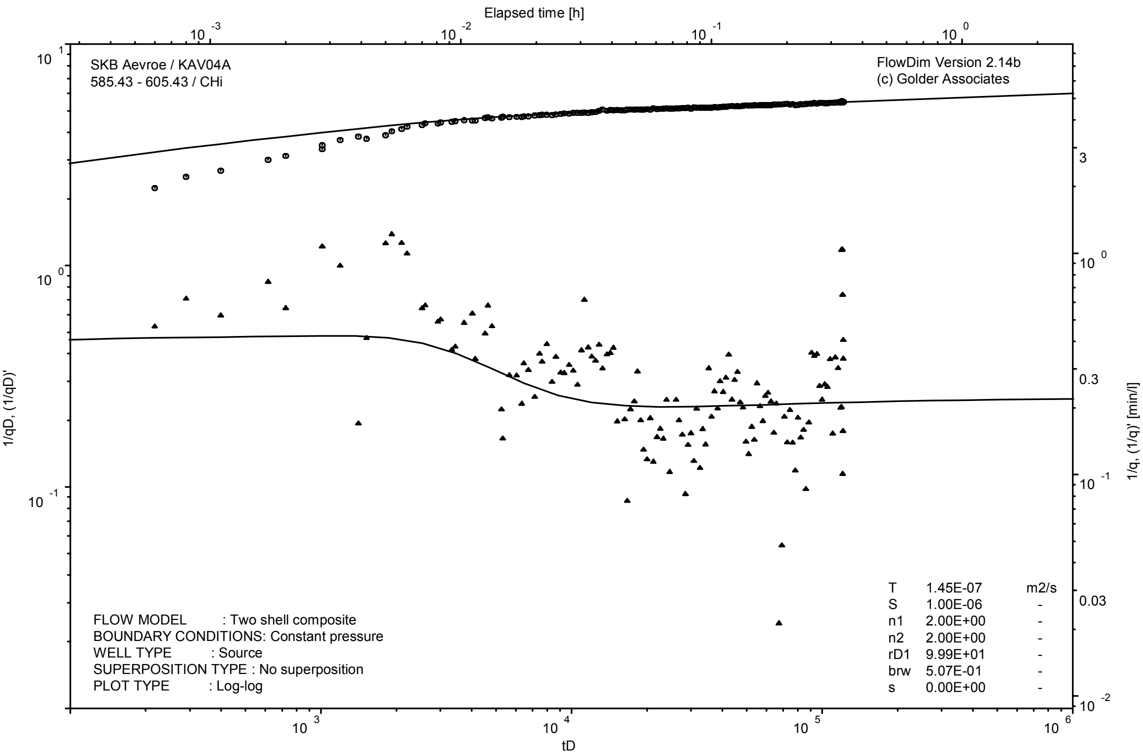
Analysis diagrams



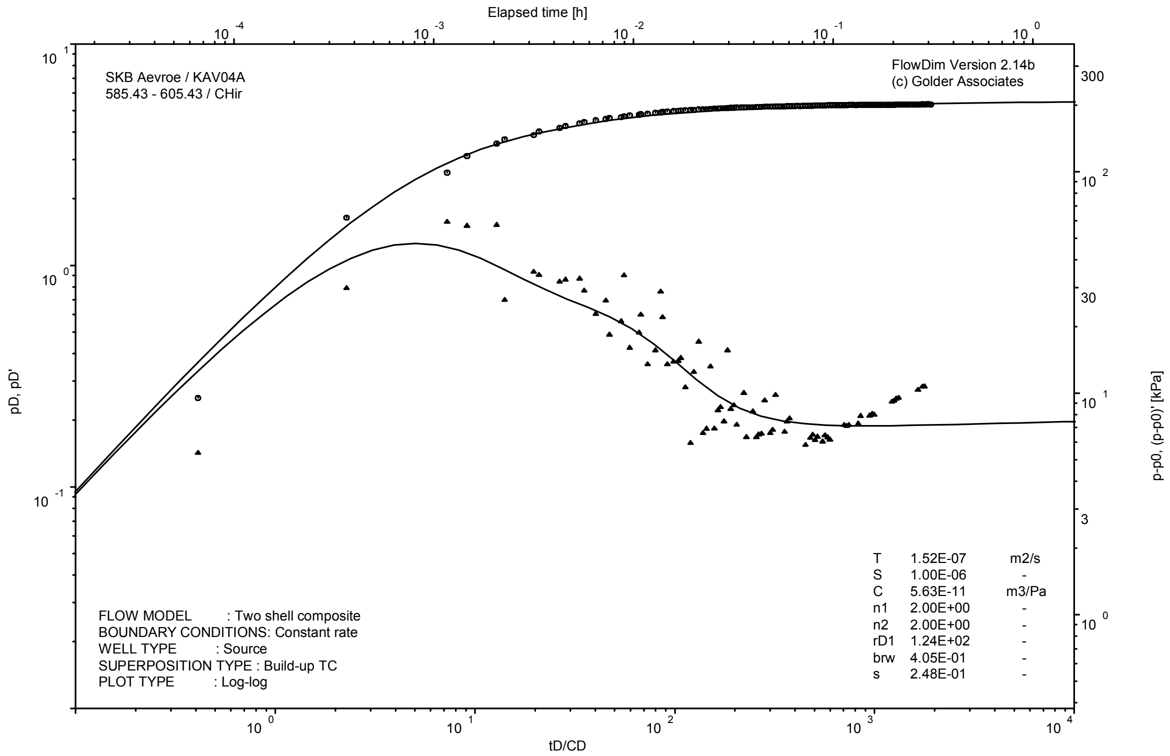
Pressure and flow rate vs. time; cartesian plot



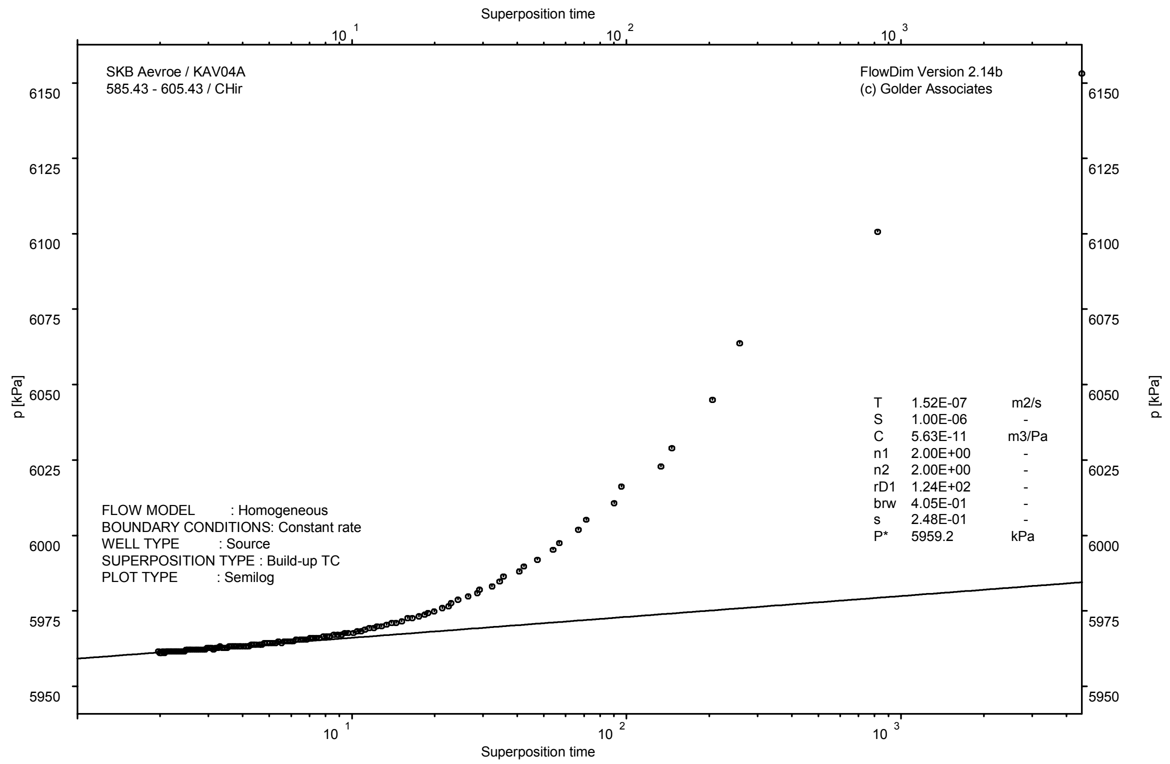
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

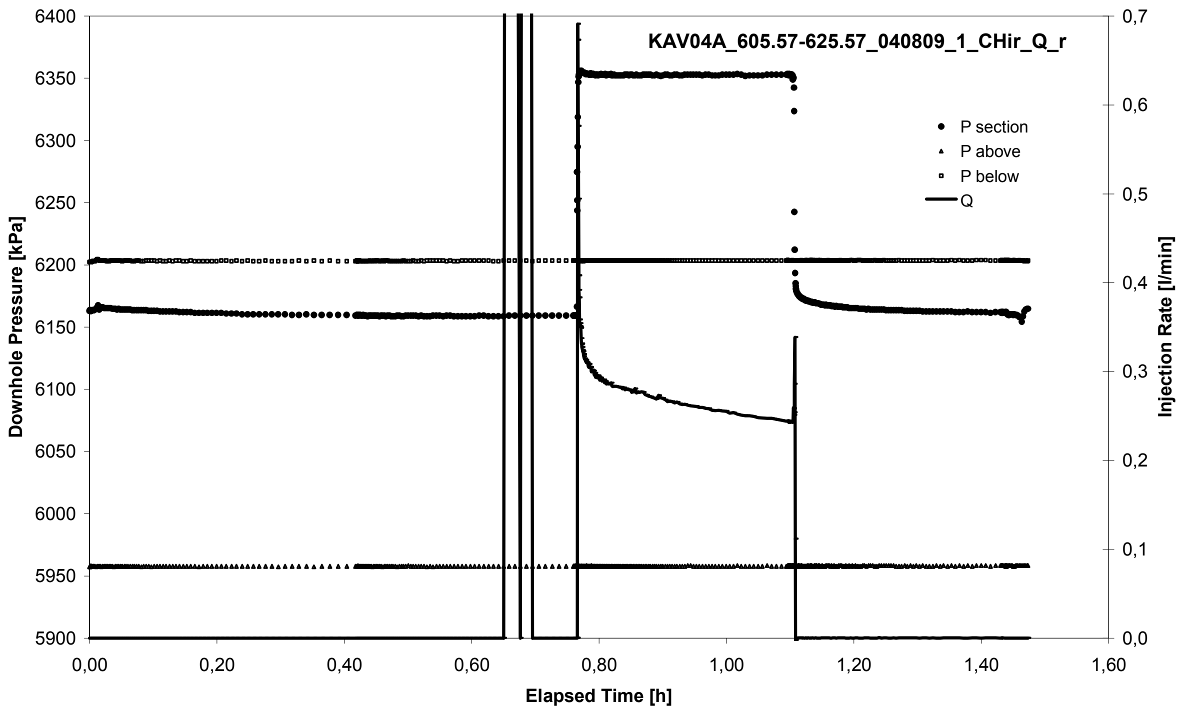


CHIR phase; HORNER match

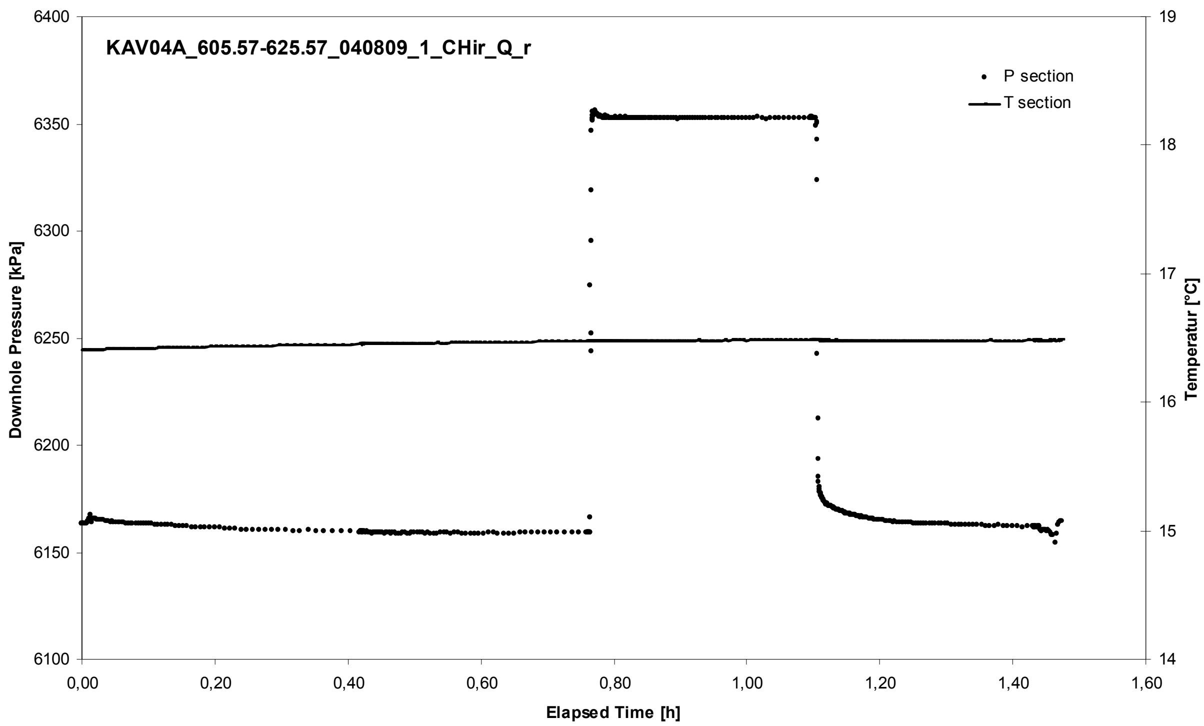
APPENDIX 2-35

Test 605,57 – 625,57 m

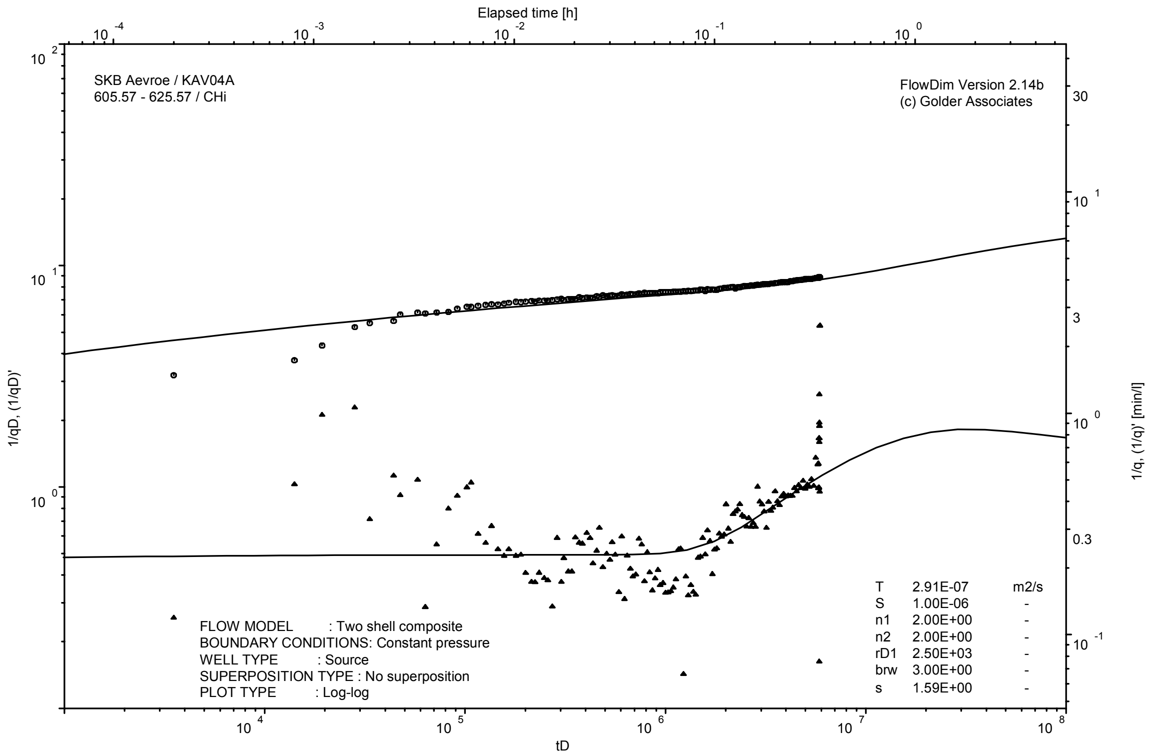
Analysis diagrams



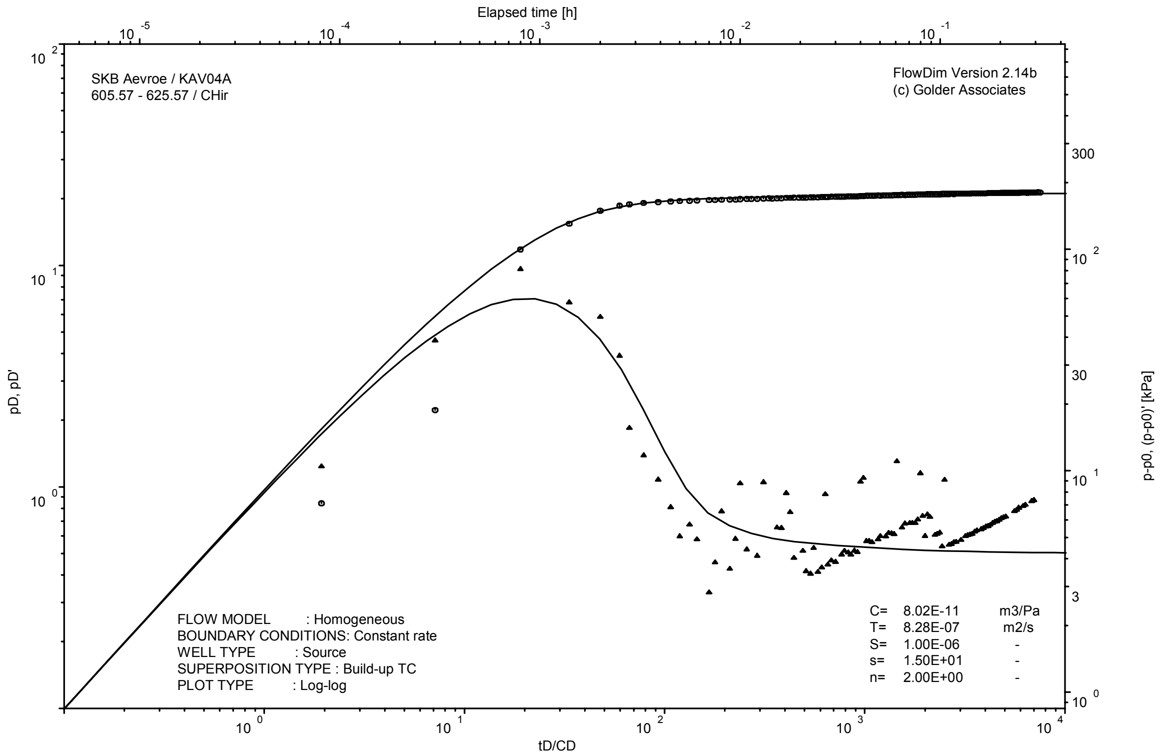
Pressure and flow rate vs. time; cartesian plot



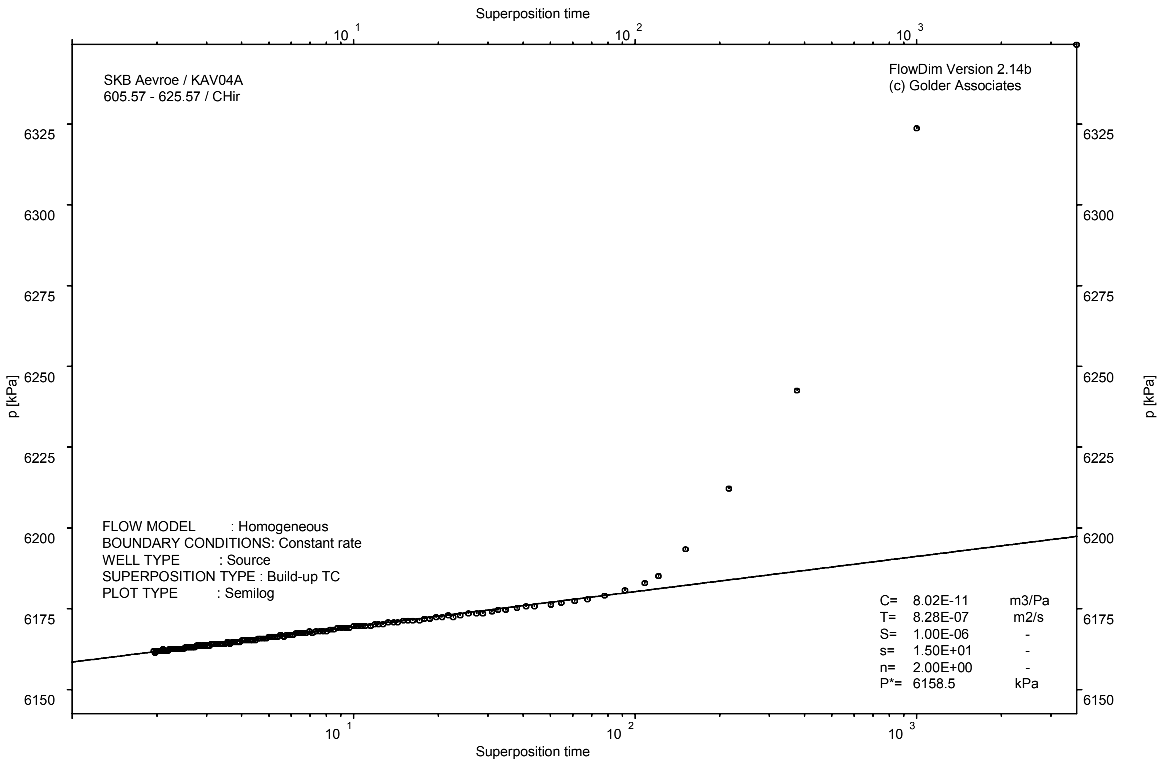
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

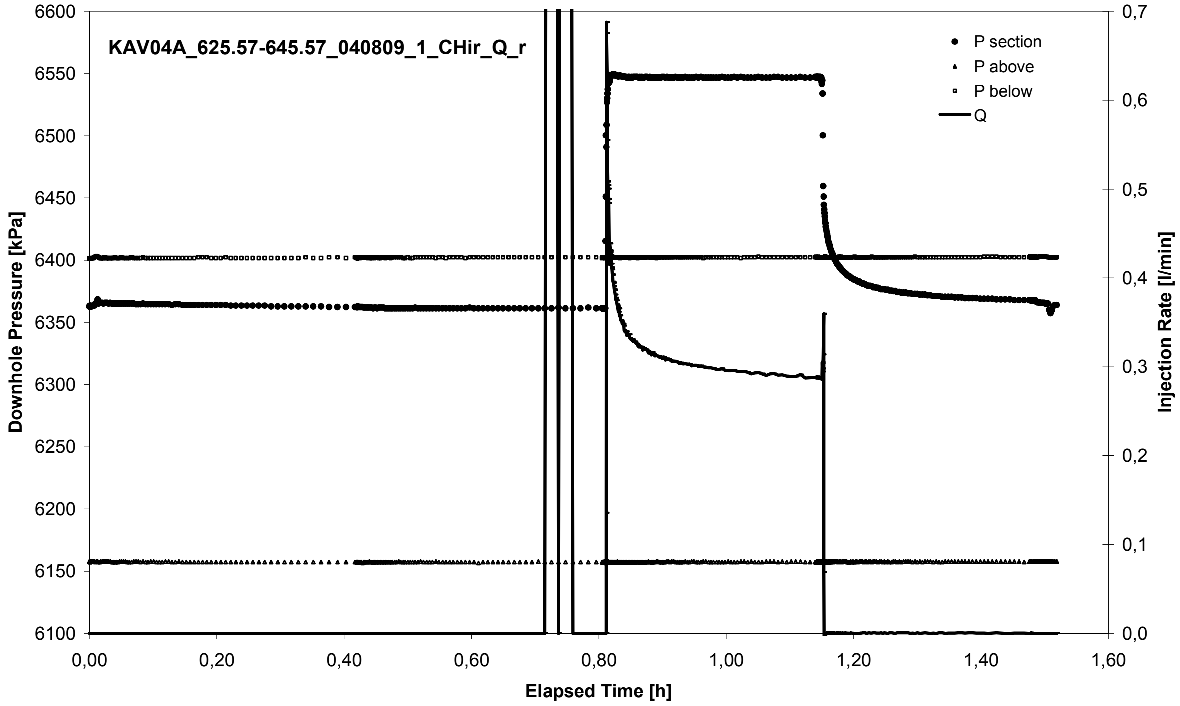


CHIR phase; HORNER match

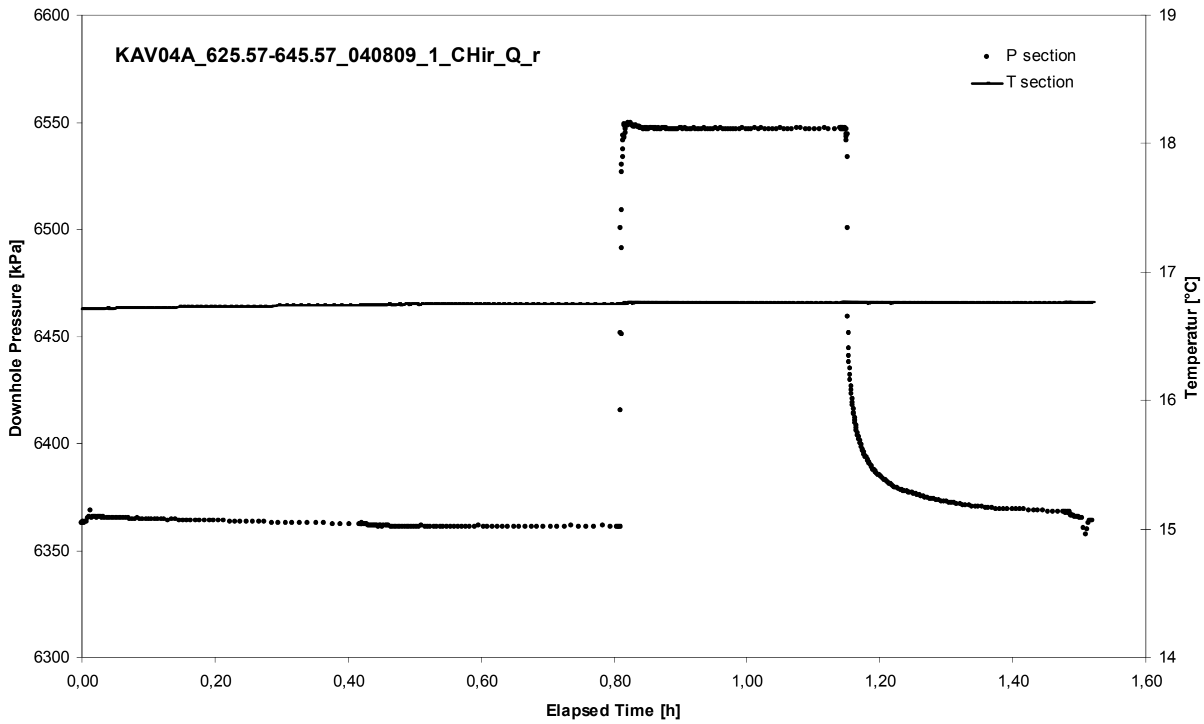
APPENDIX 2-36

Test 625,57 – 645,57 m

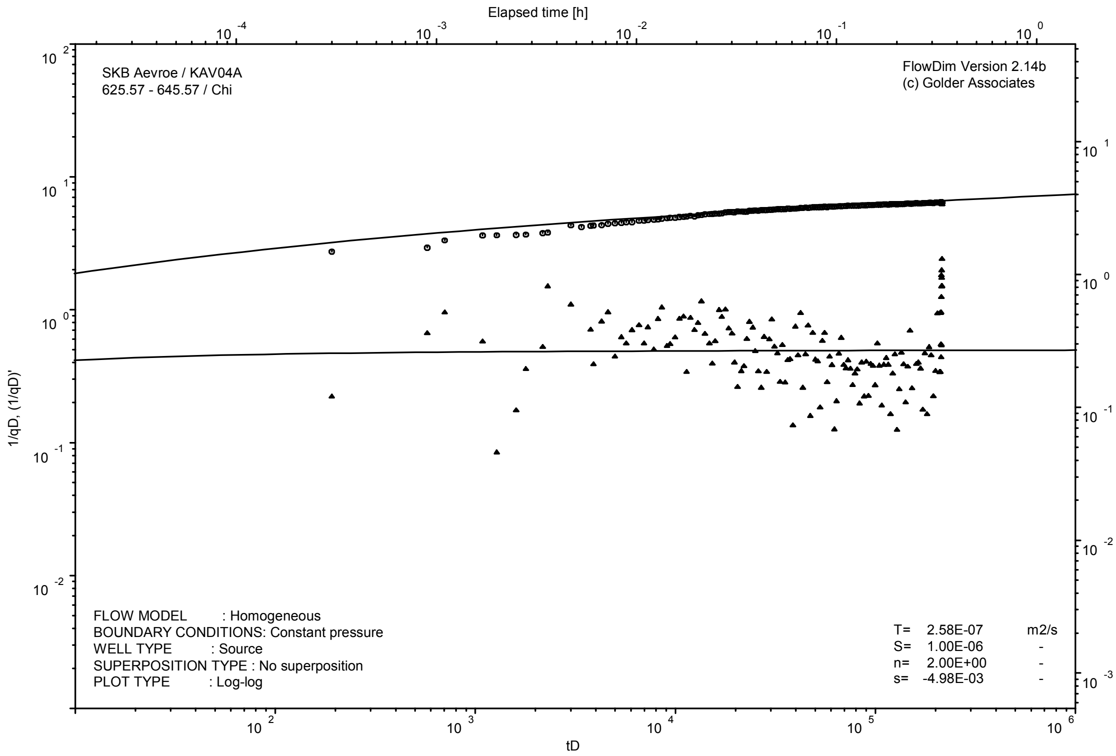
Analysis diagrams



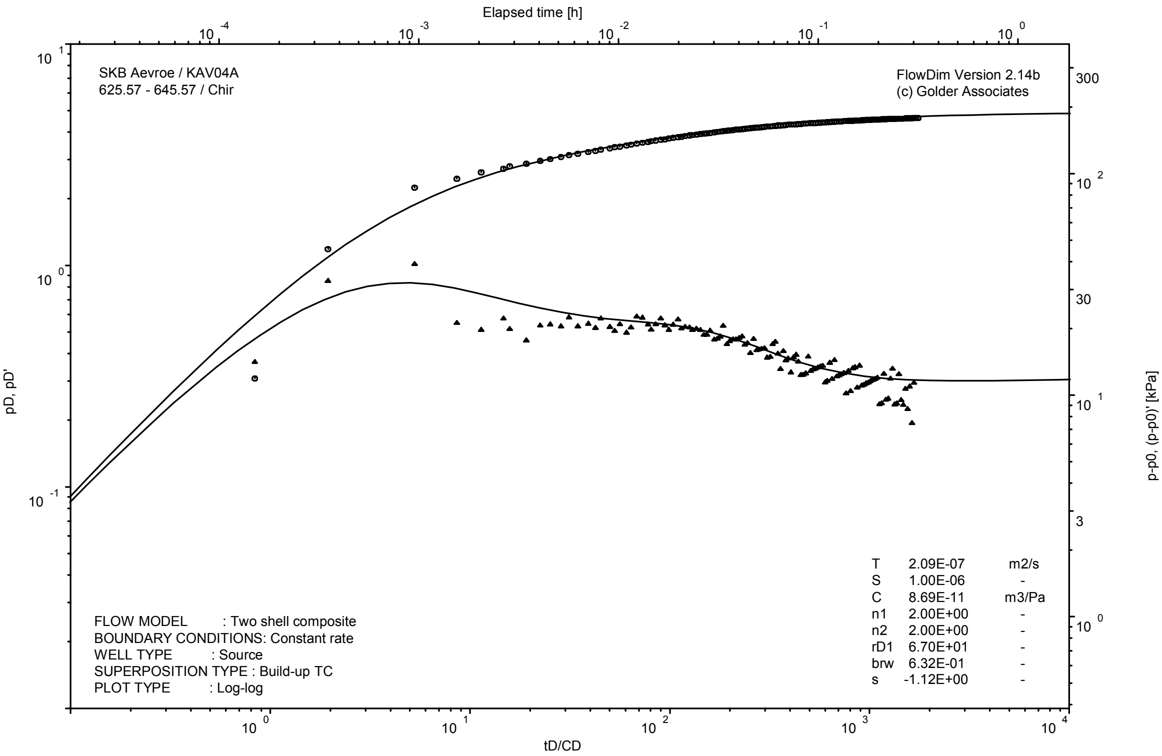
Pressure and flow rate vs. time; cartesian plot



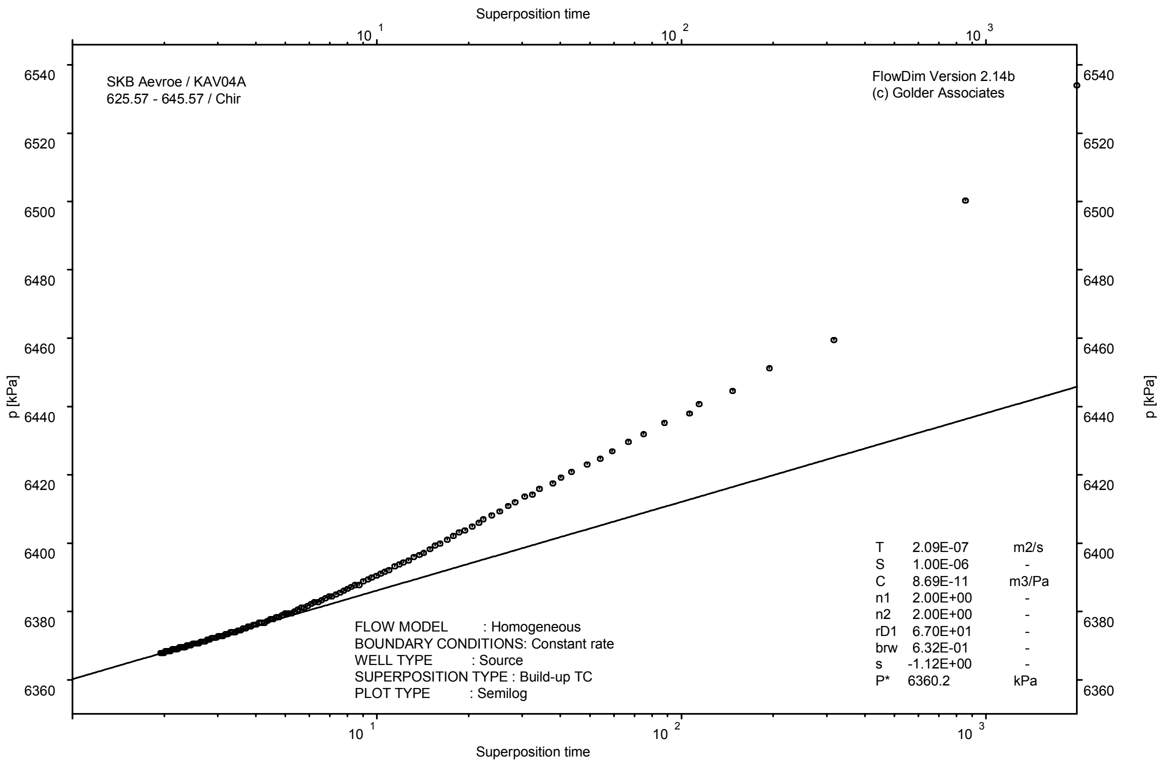
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

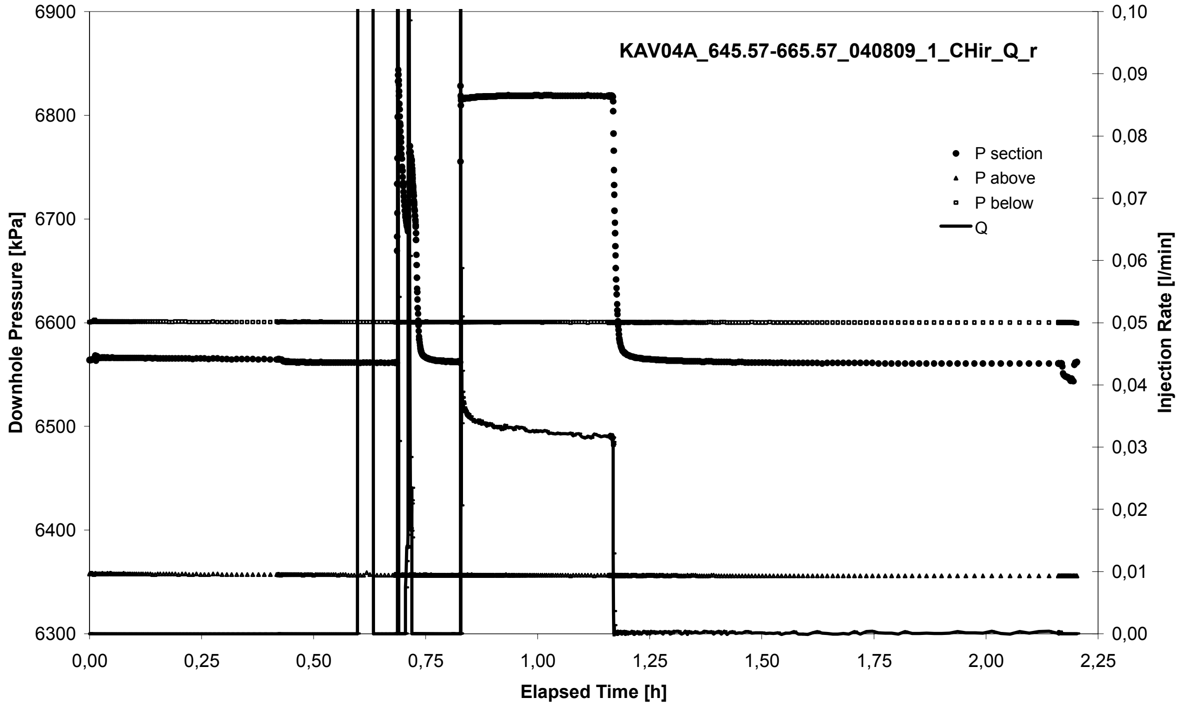


CHIR phase; HORNER match

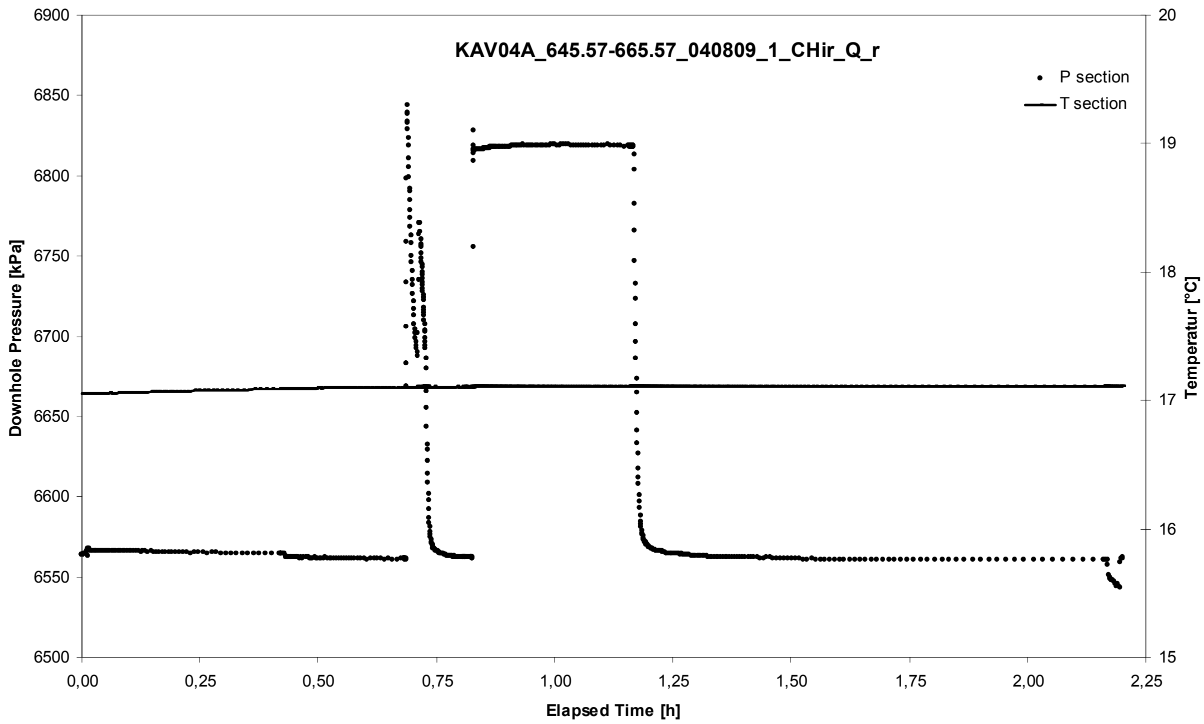
APPENDIX 2-37

Test 645,57 – 665,57 m

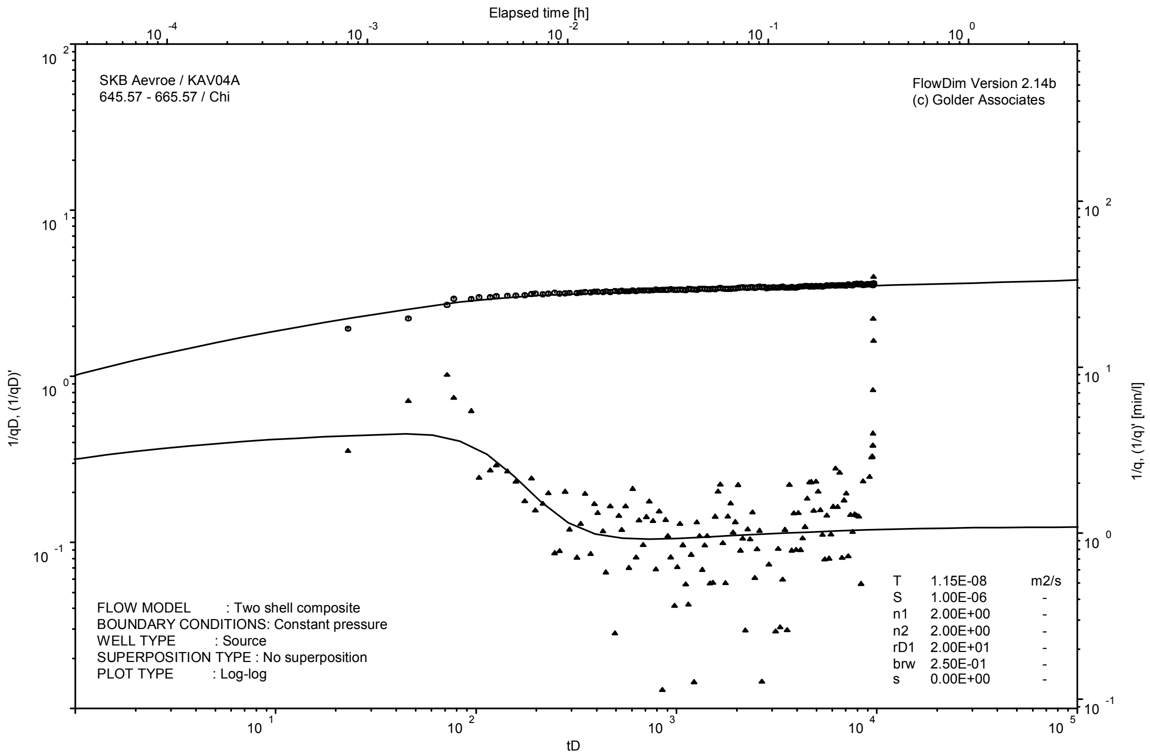
Analysis diagrams



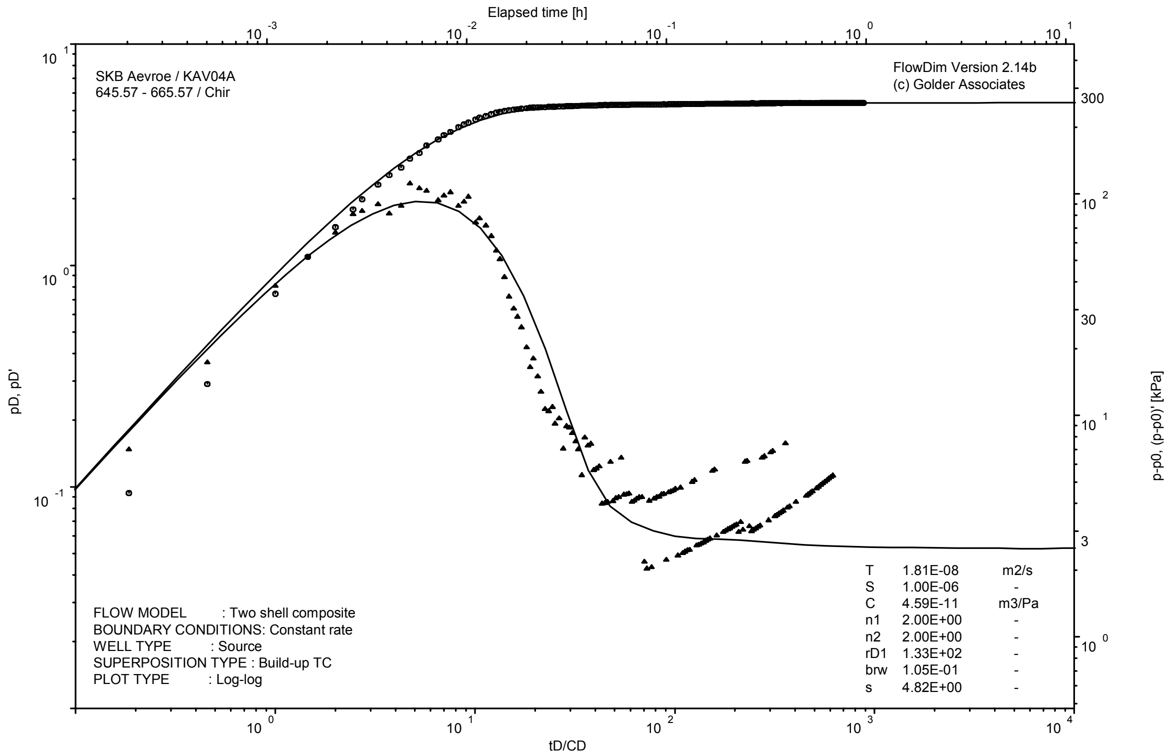
Pressure and flow rate vs. time; cartesian plot



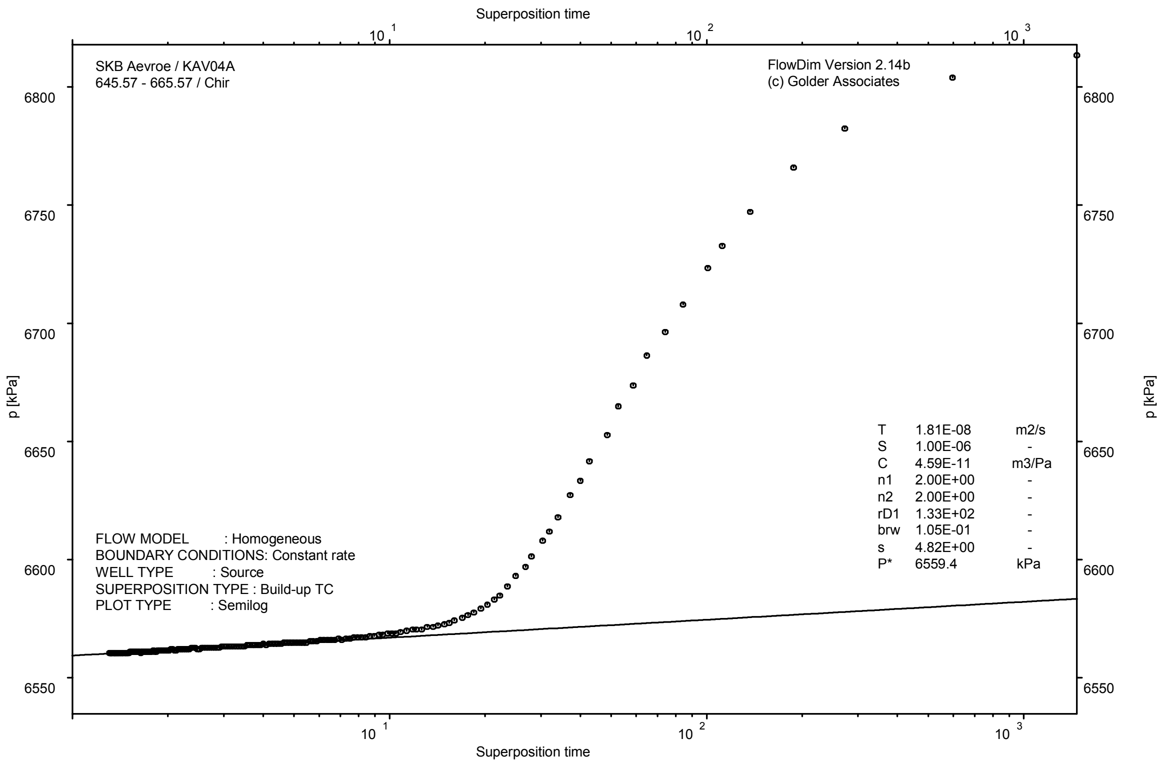
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

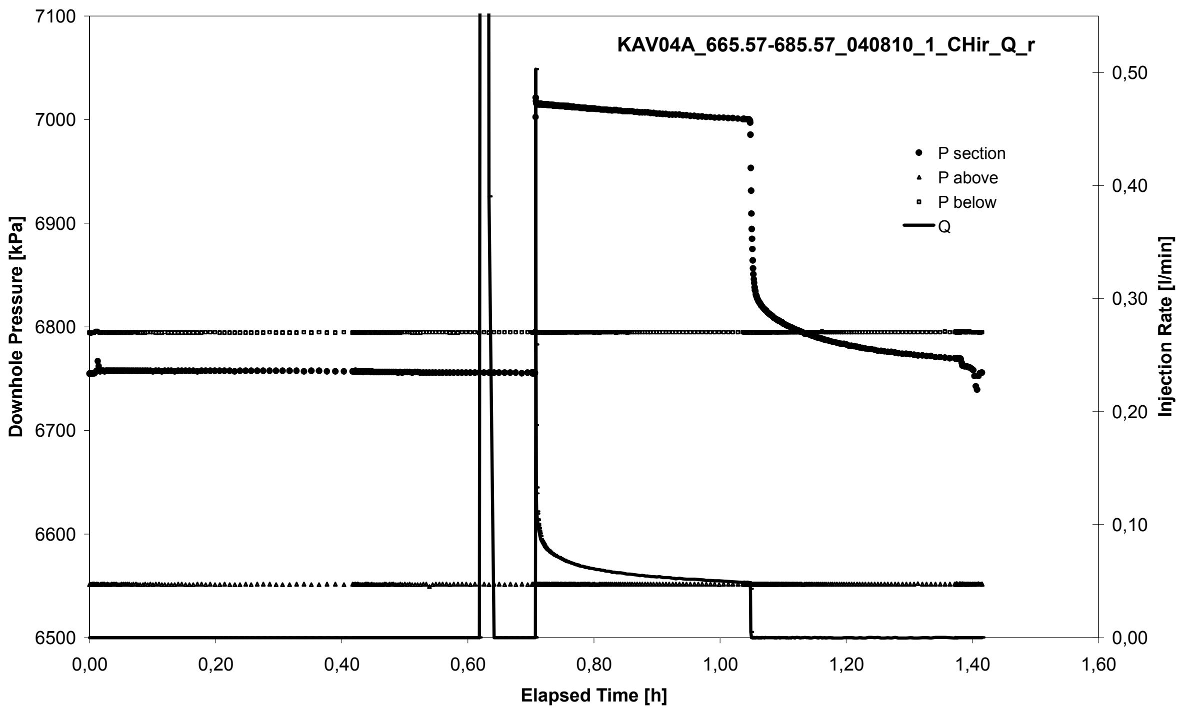


CHIR phase; HORNER match

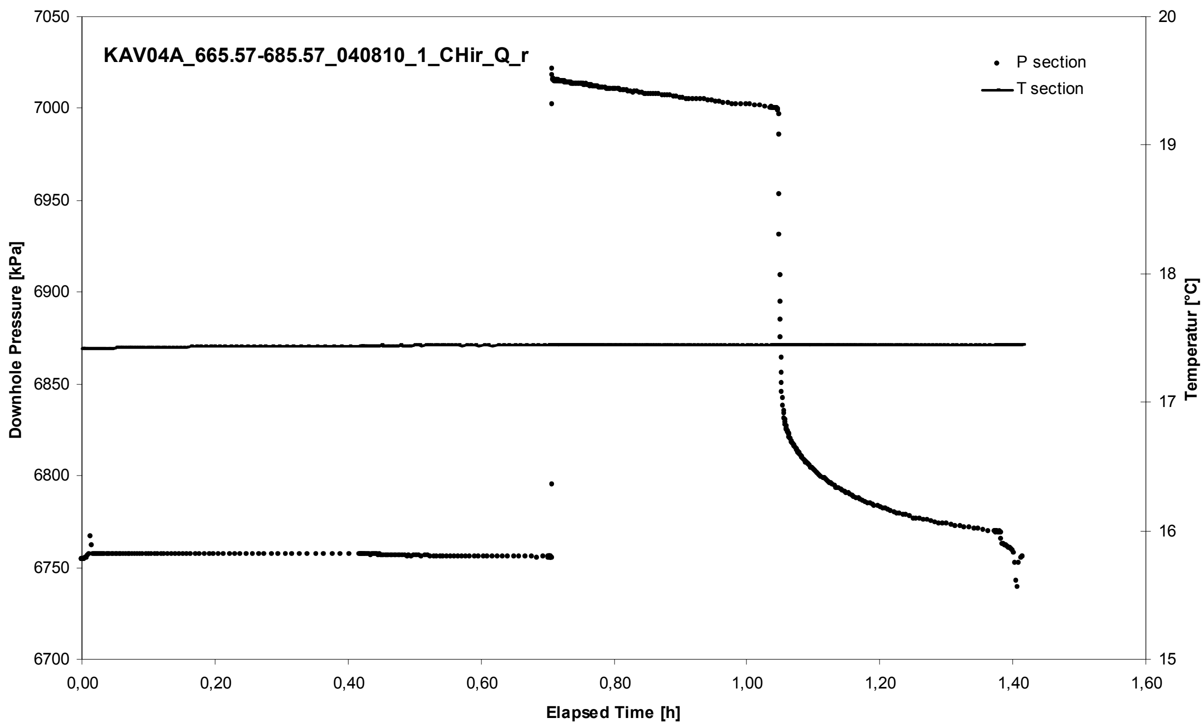
APPENDIX 2-38

Test 665,57 – 685,57 m

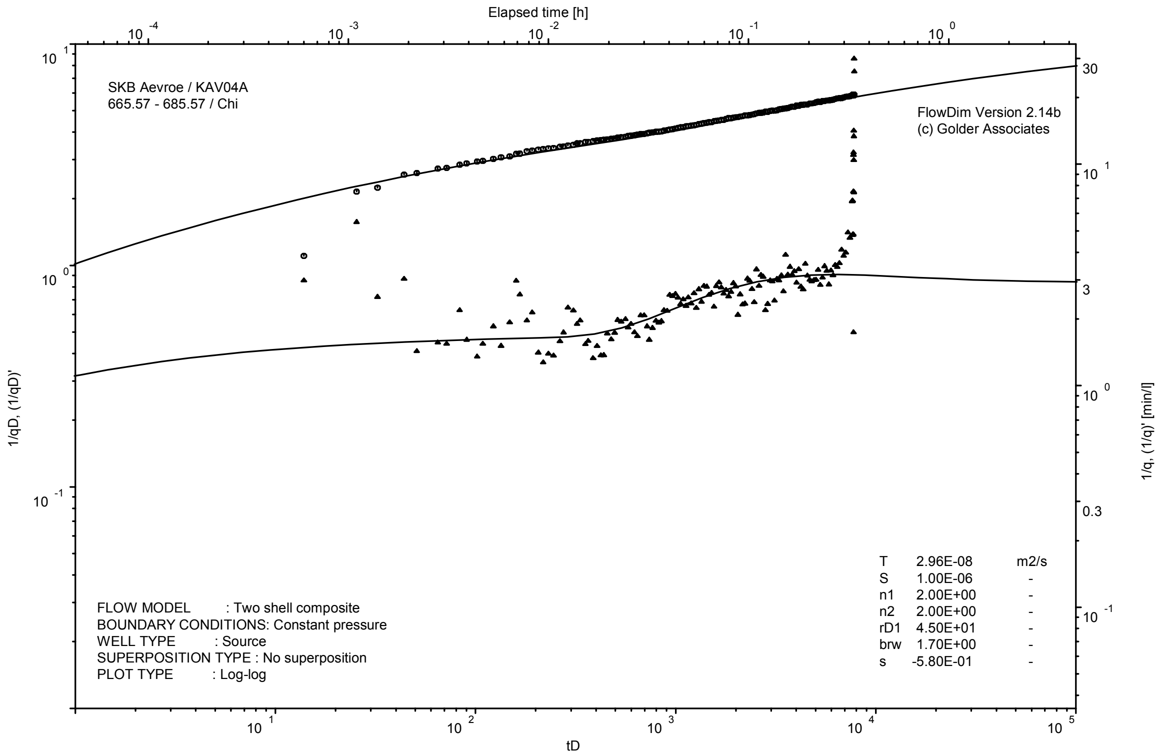
Analysis diagrams



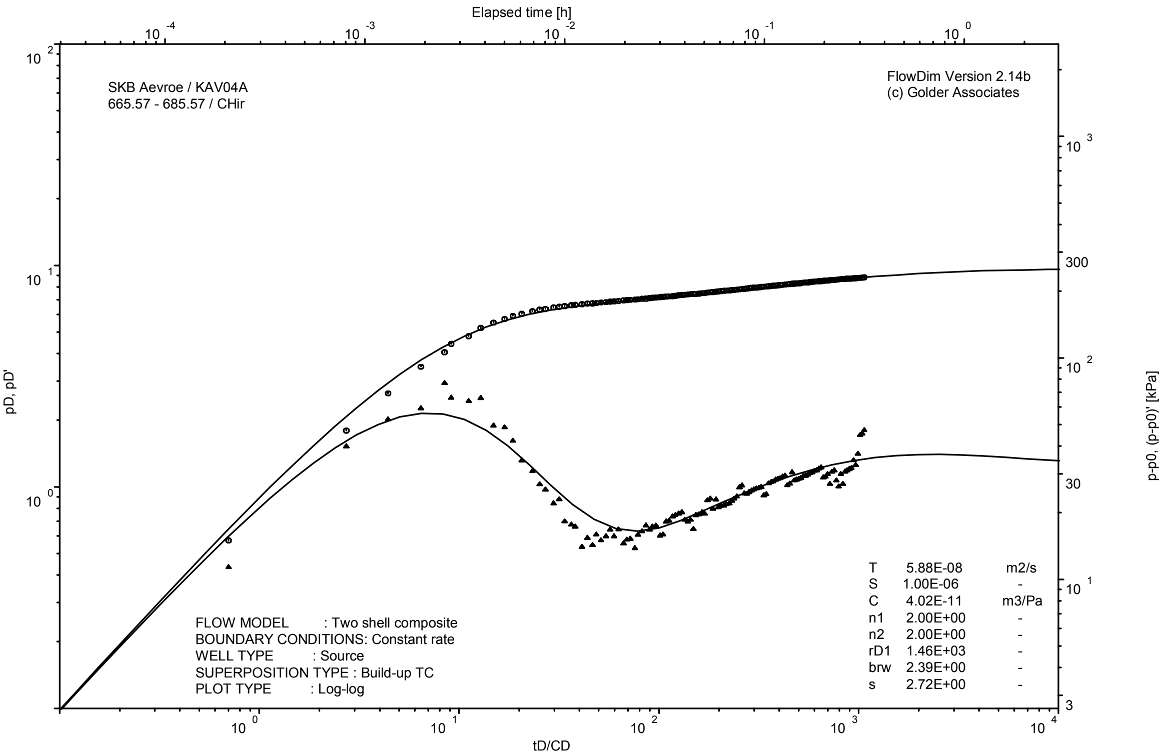
Pressure and flow rate vs. time; cartesian plot



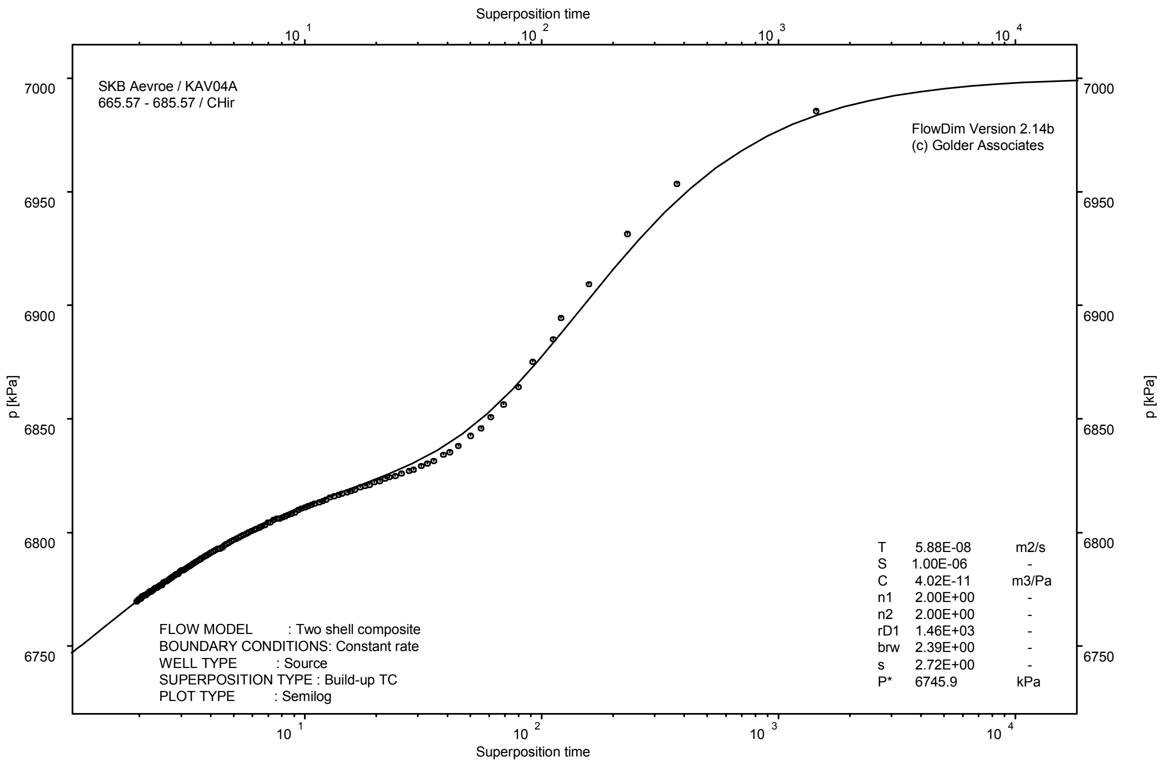
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

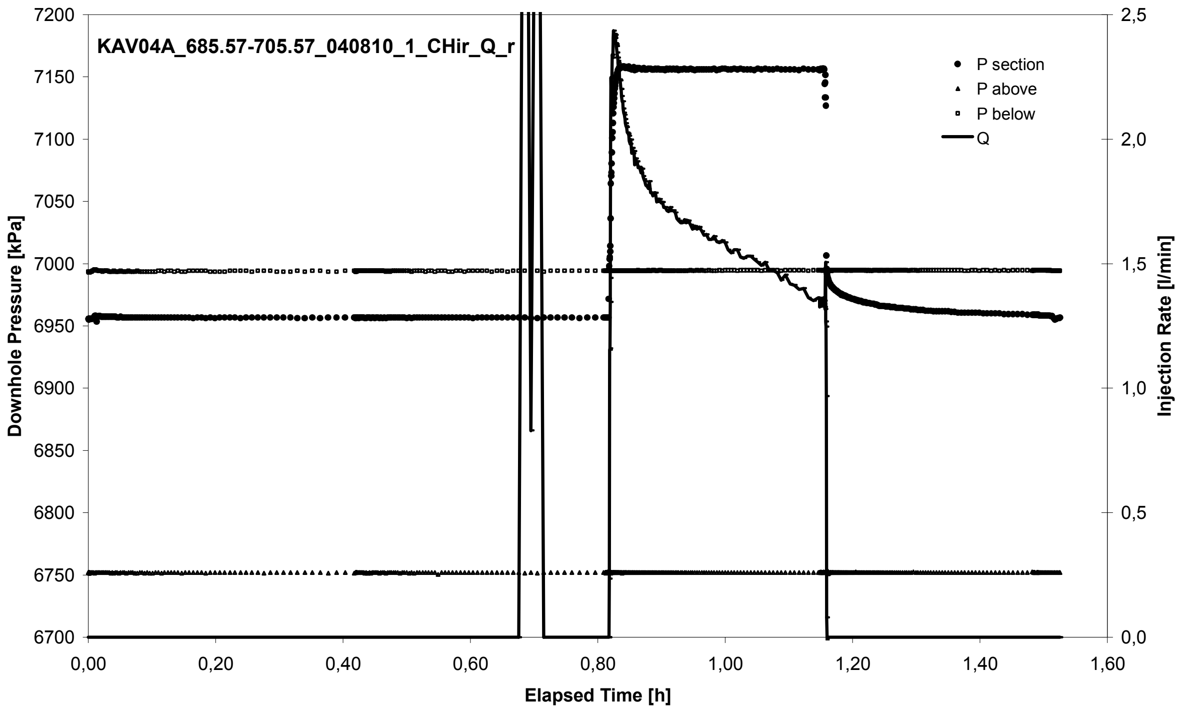


CHIR phase; HORNER match

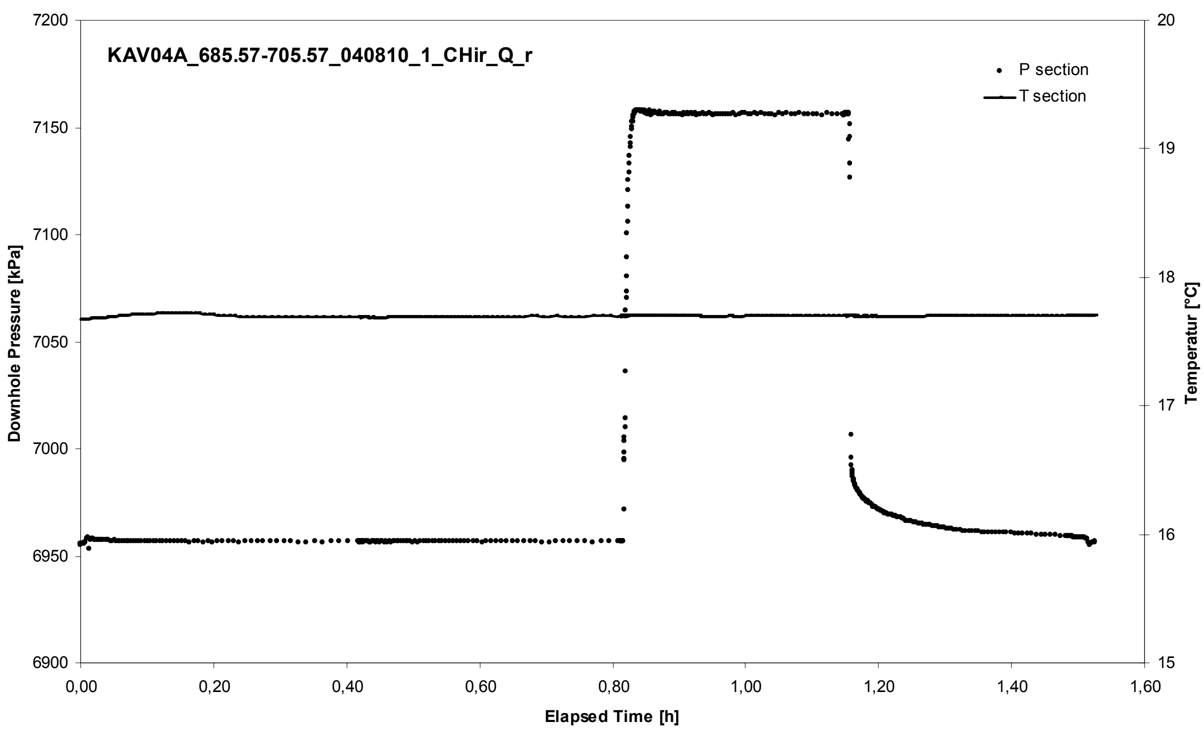
APPENDIX 2-39

Test 685,57 – 705,57 m

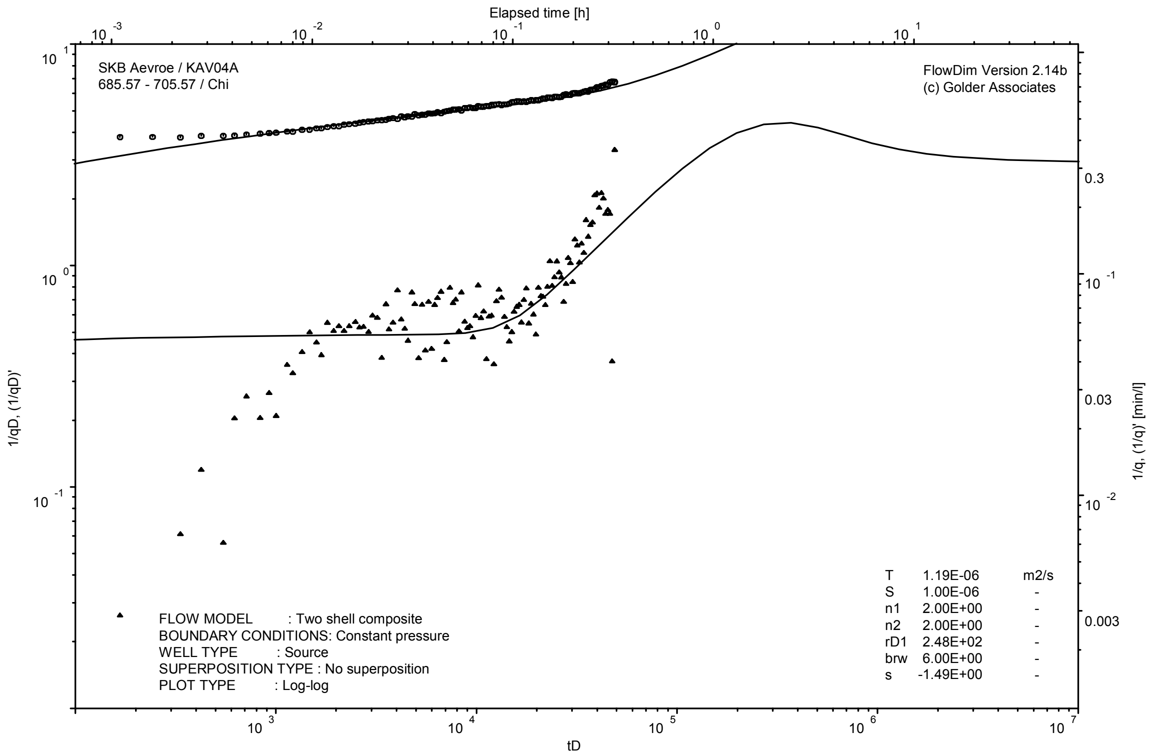
Analysis diagrams



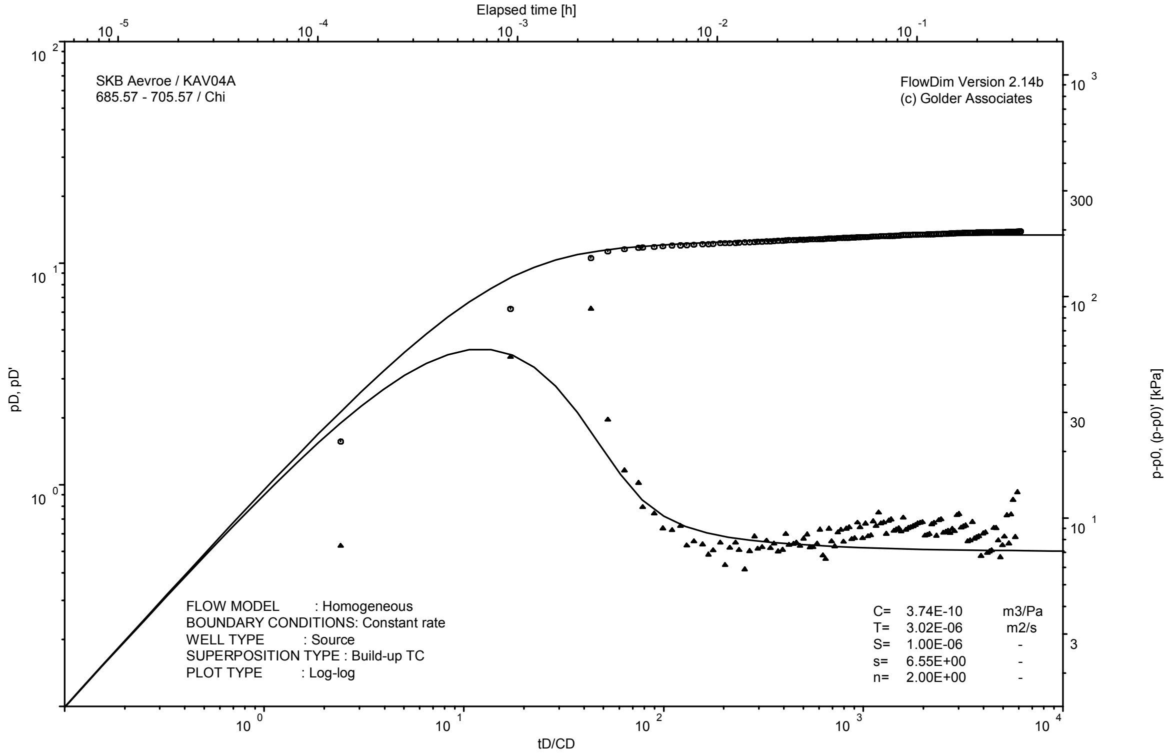
Pressure and flow rate vs. time; cartesian plot



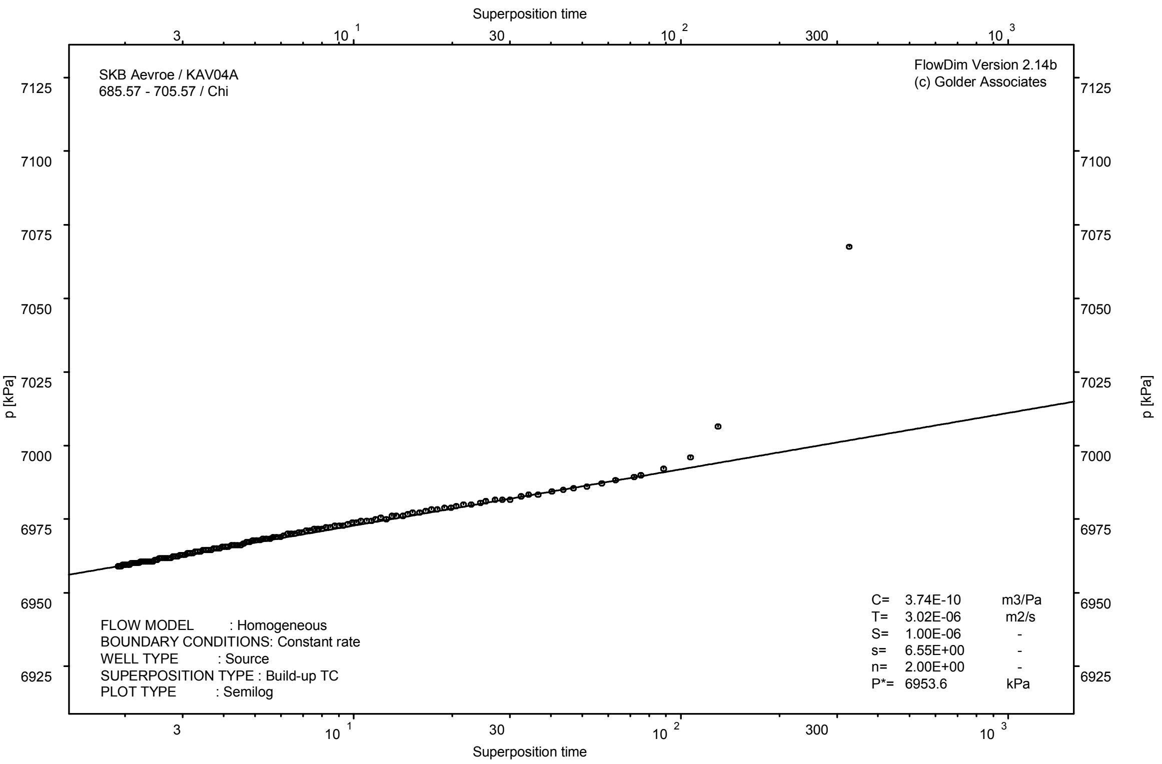
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

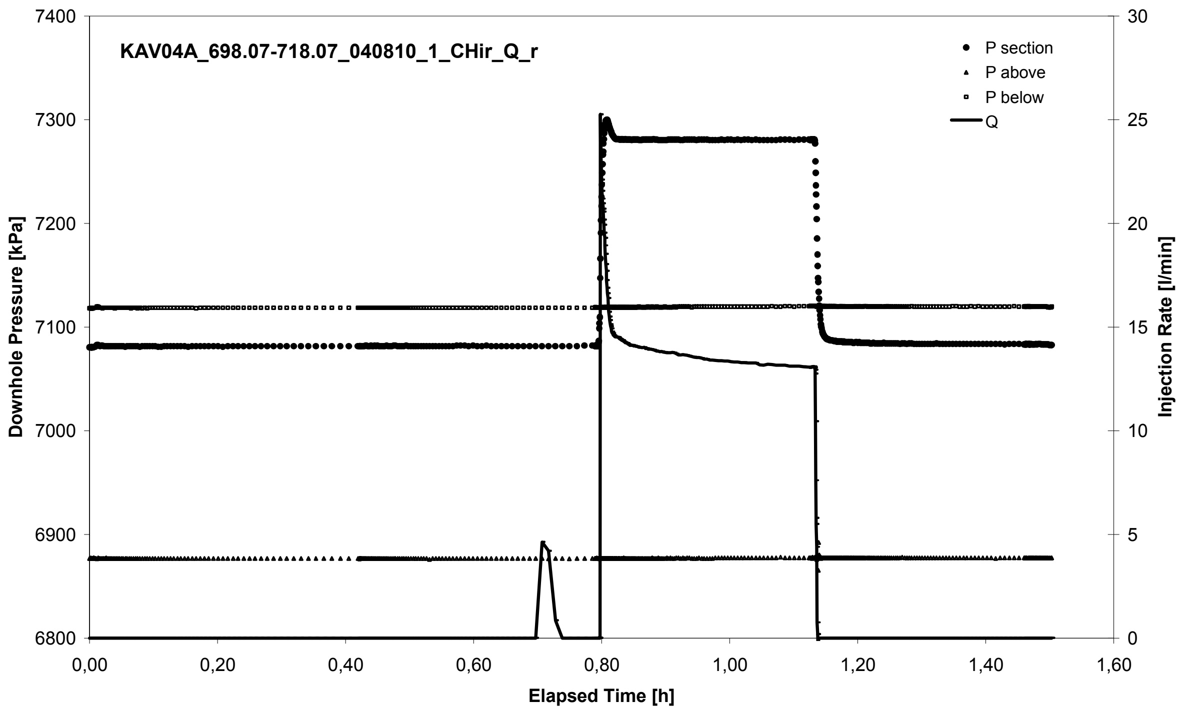


CHIR phase; HORNER match

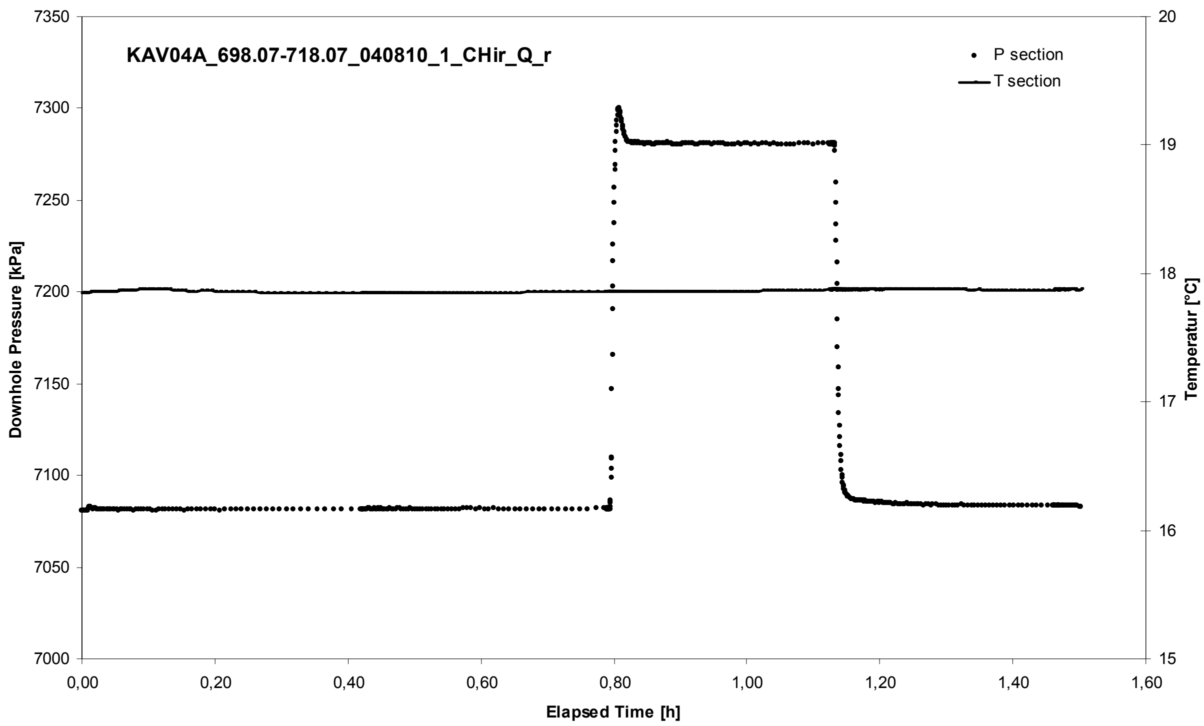
APPENDIX 2-40

Test 698,07 – 718,07 m

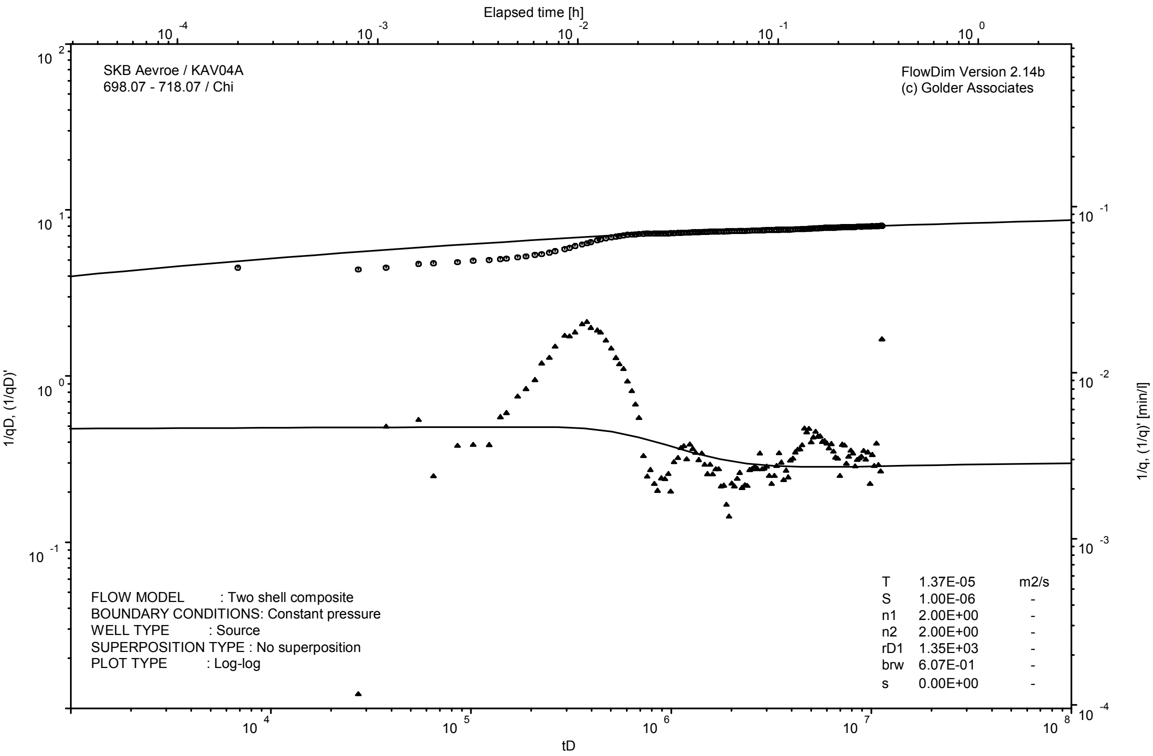
Analysis diagrams



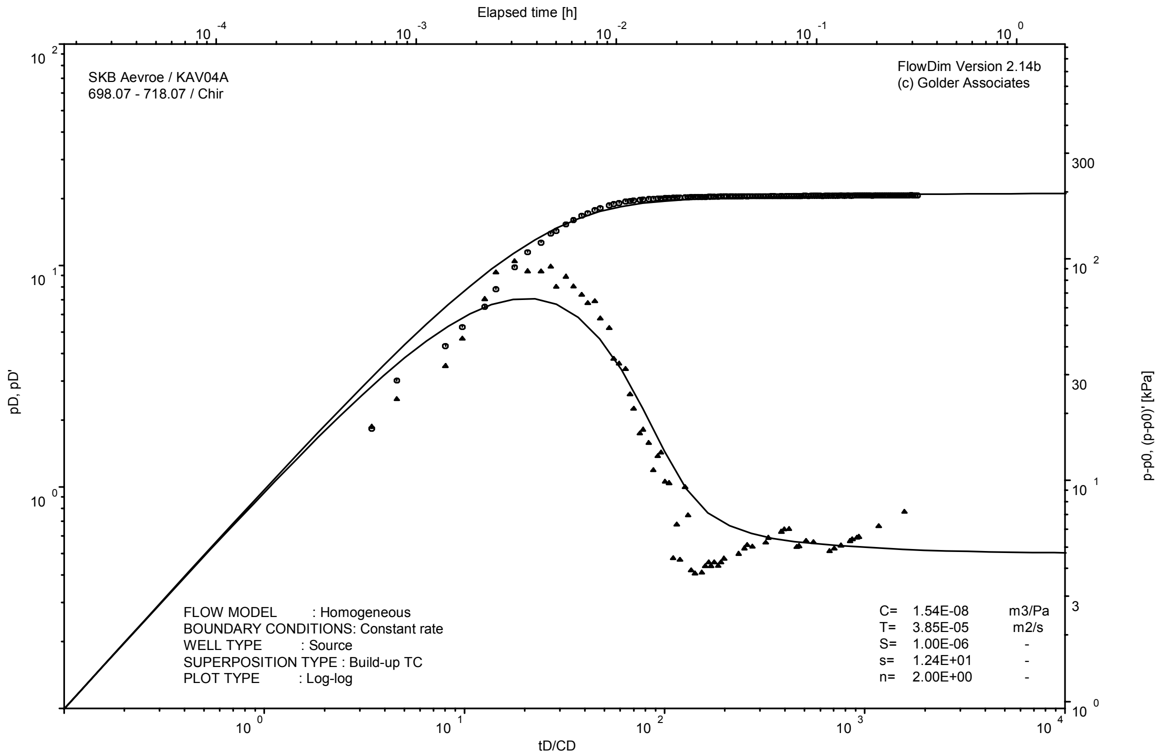
Pressure and flow rate vs. time; cartesian plot



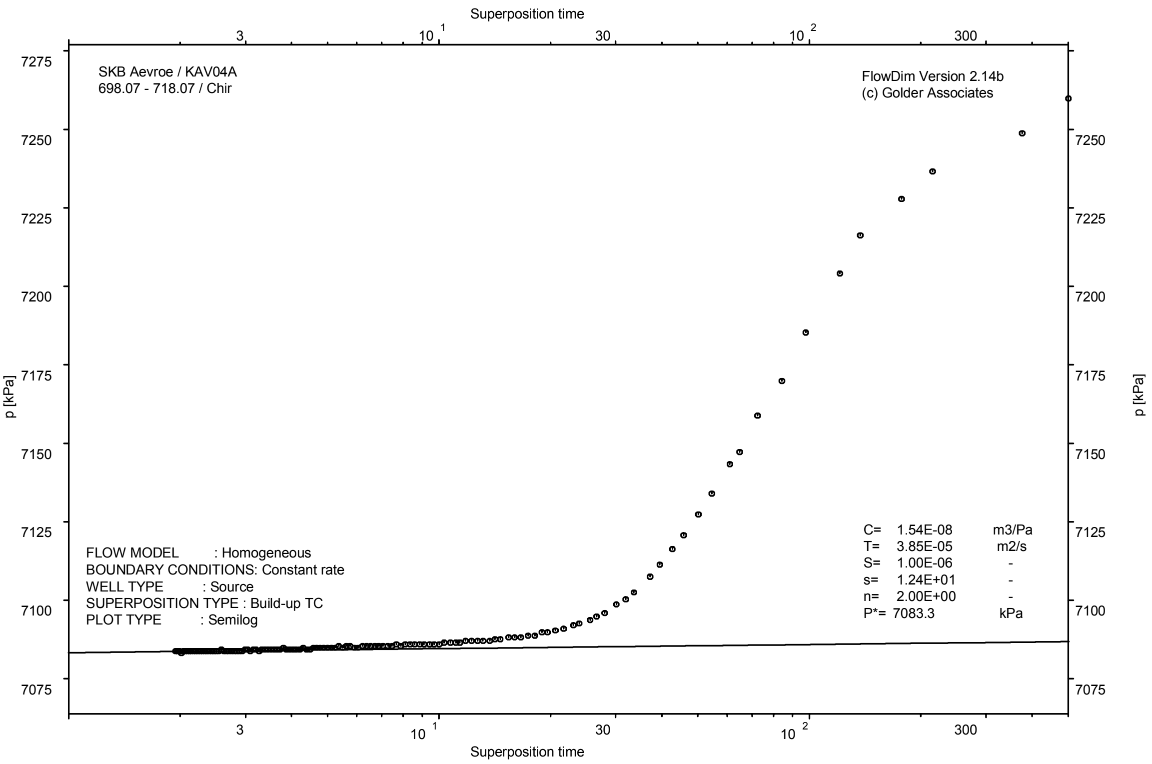
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

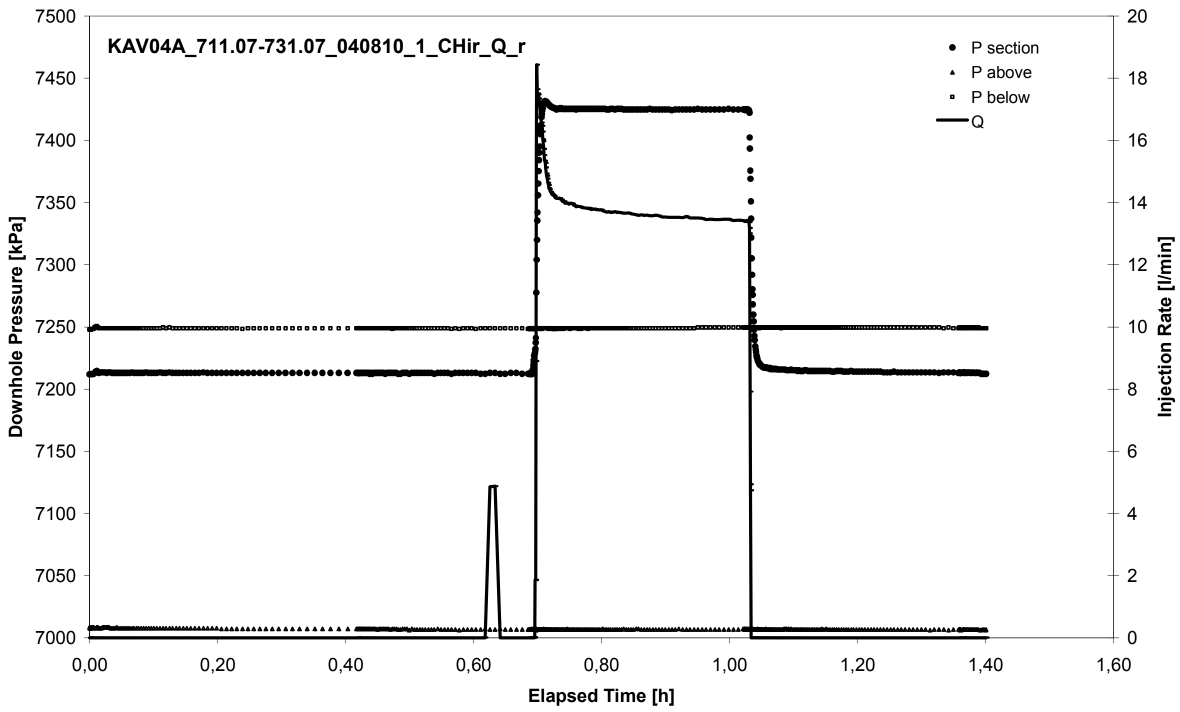


CHIR phase; HORNER match

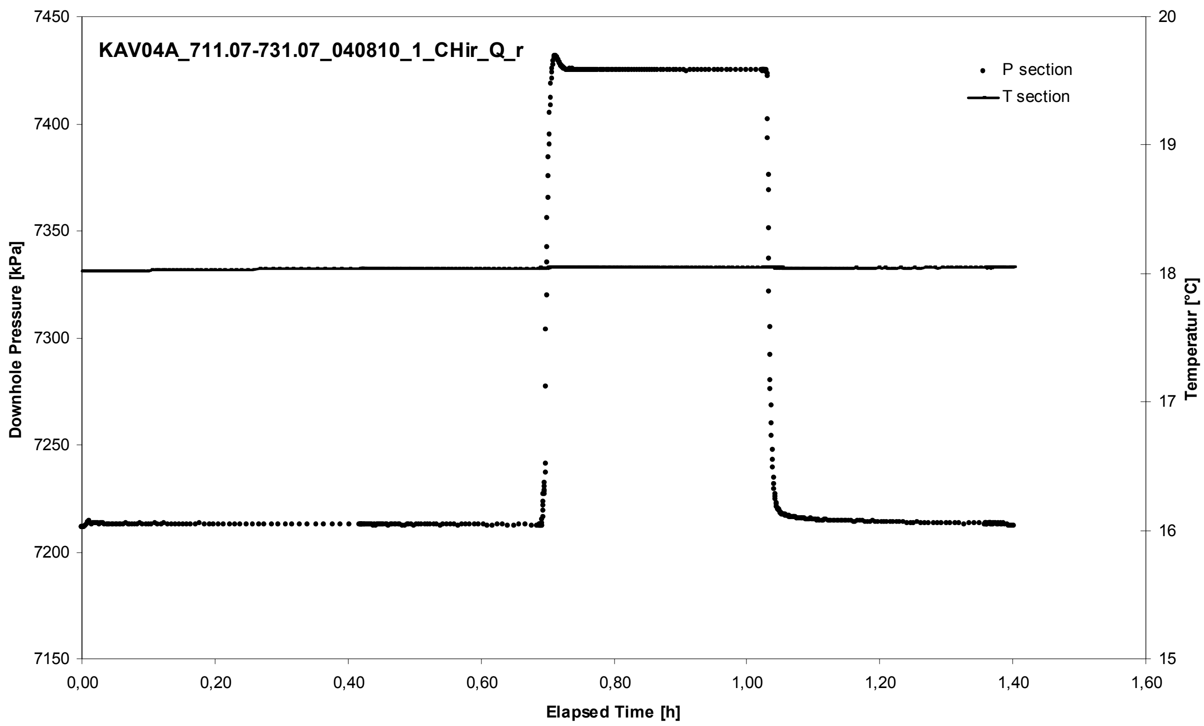
APPENDIX 2-41

Test 711,07 – 731,07 m

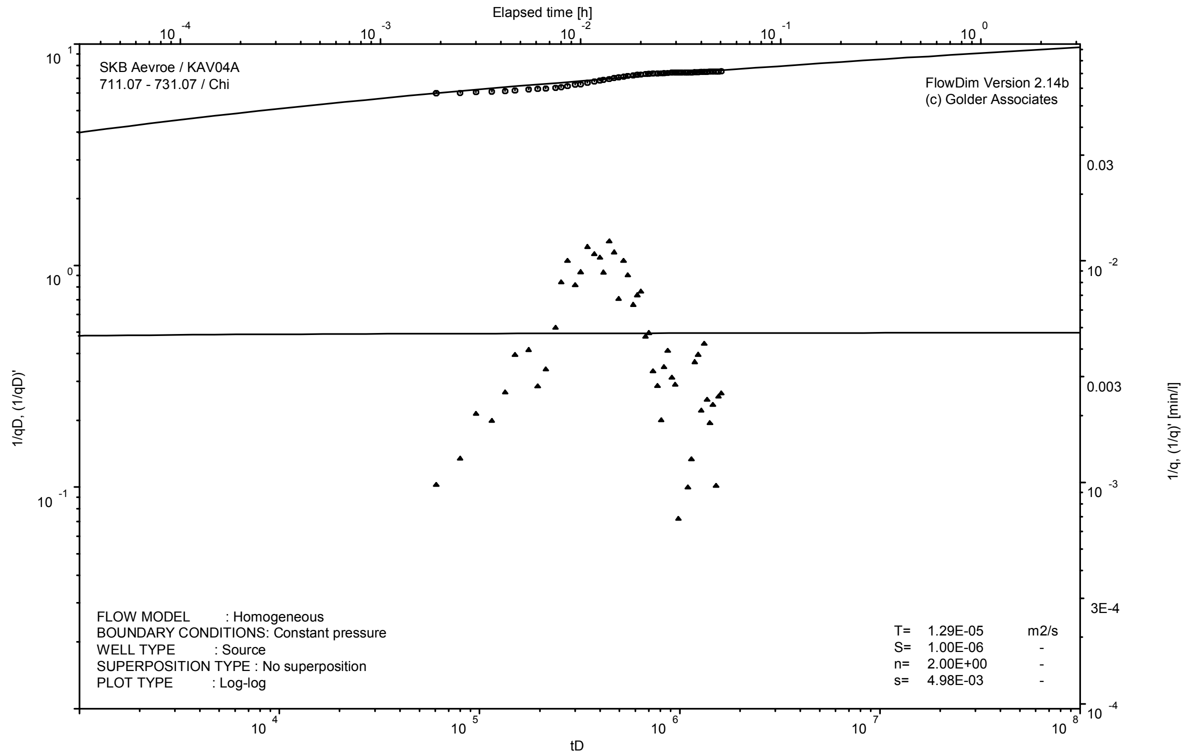
Analysis diagrams



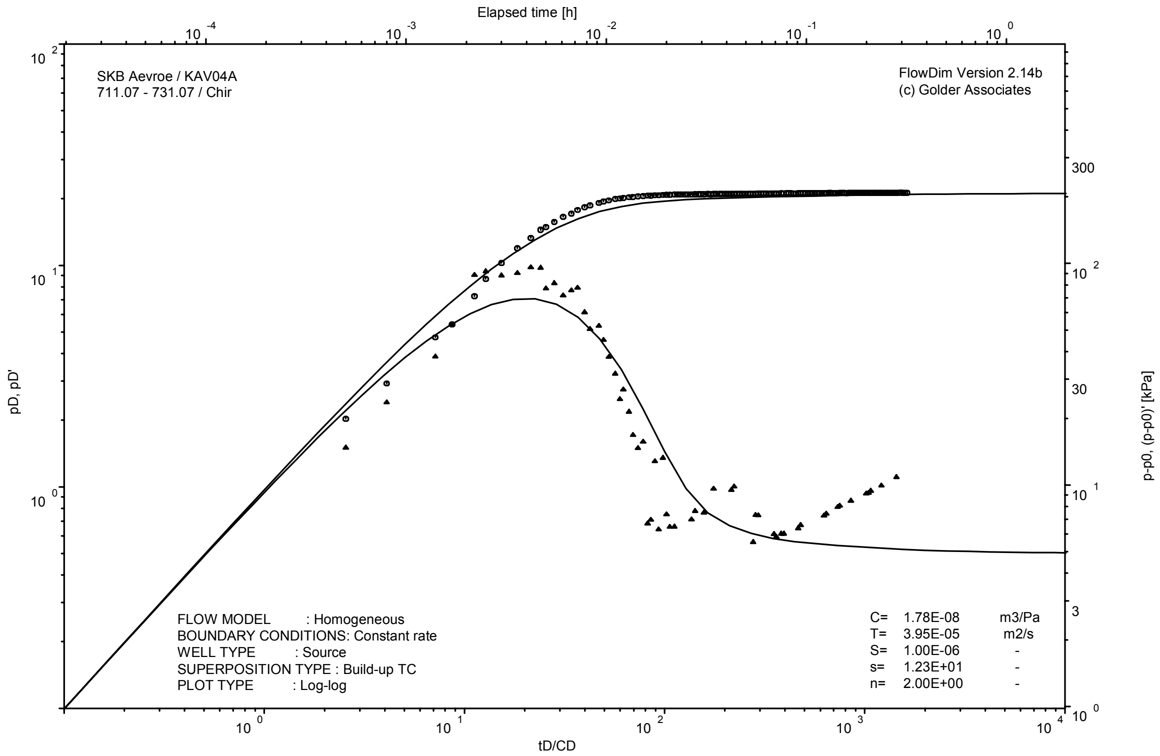
Pressure and flow rate vs. time; cartesian plot



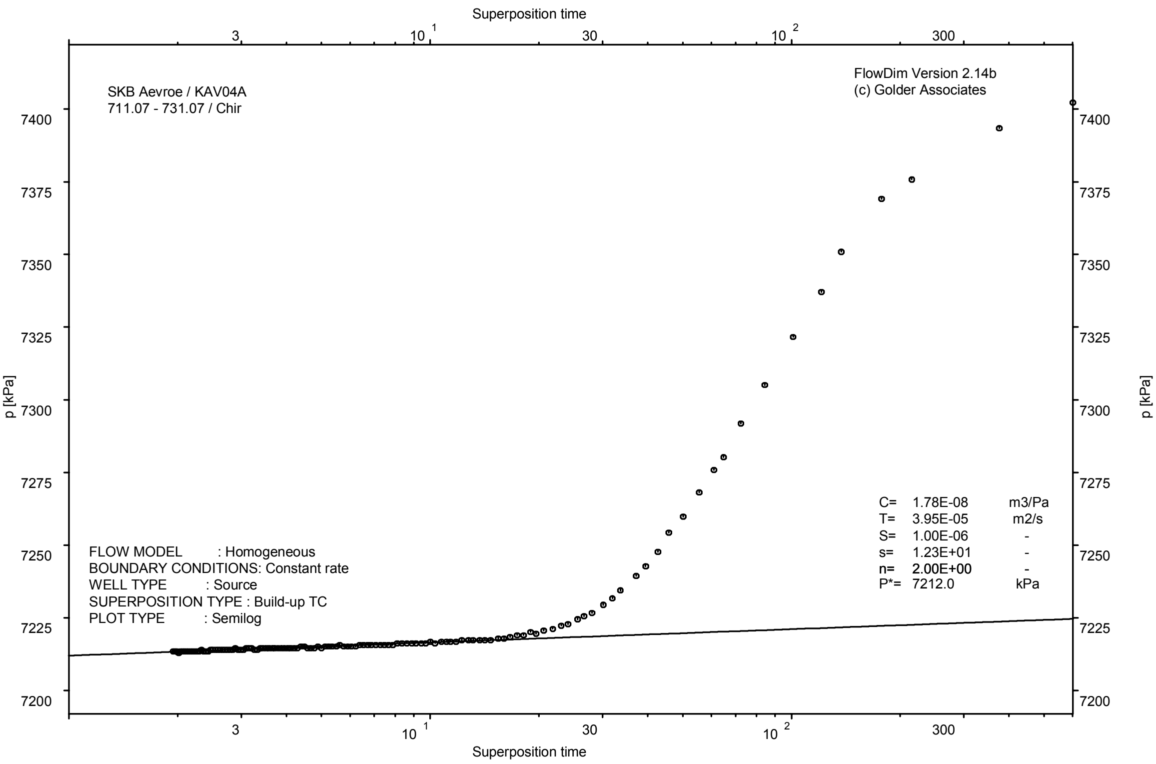
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

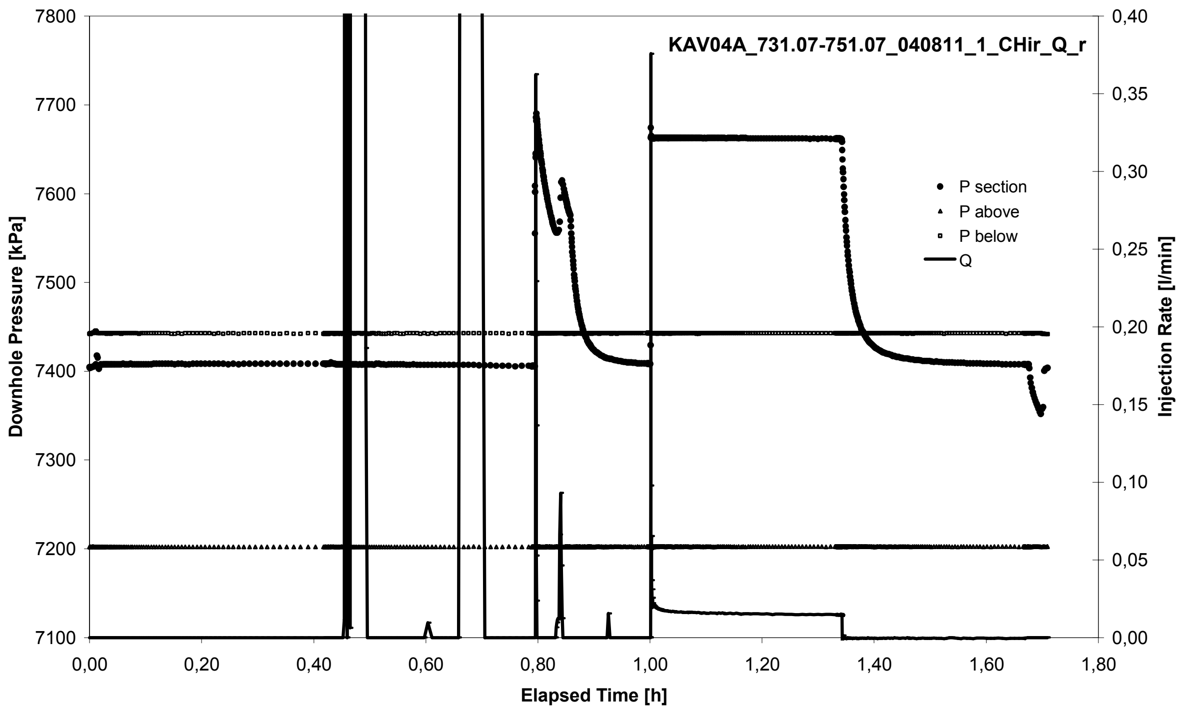


CHIR phase; HORNER match

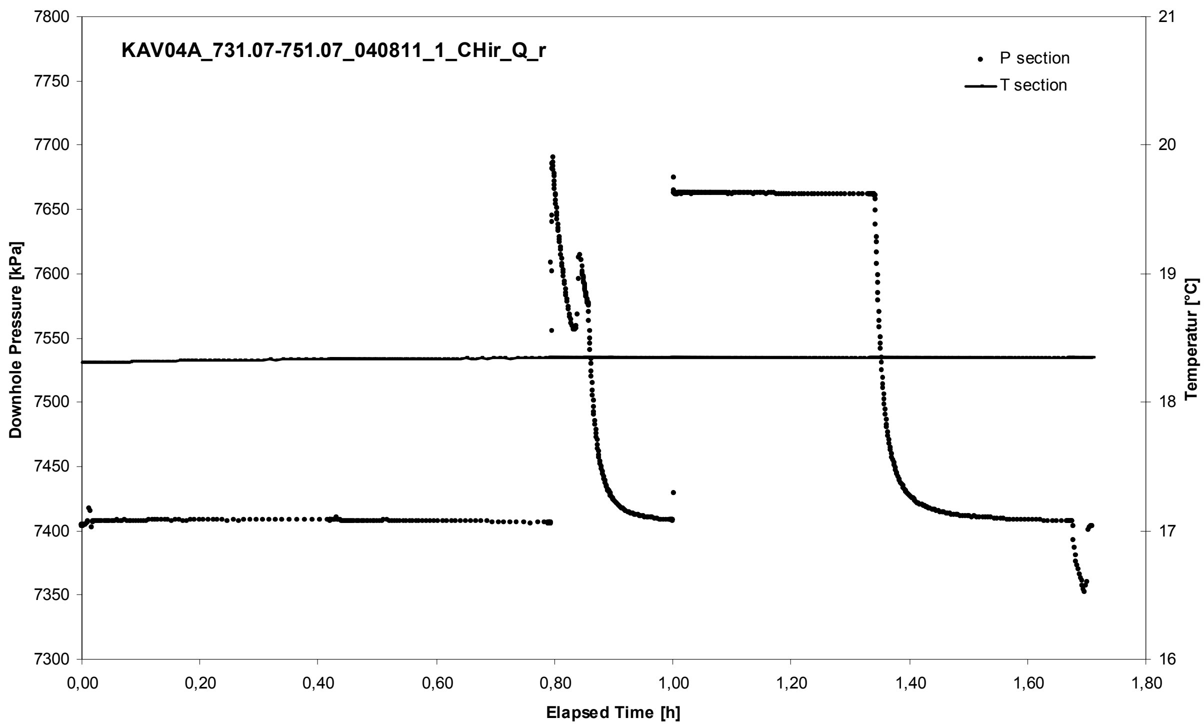
APPENDIX 2-42

Test 731,07 – 751,07 m

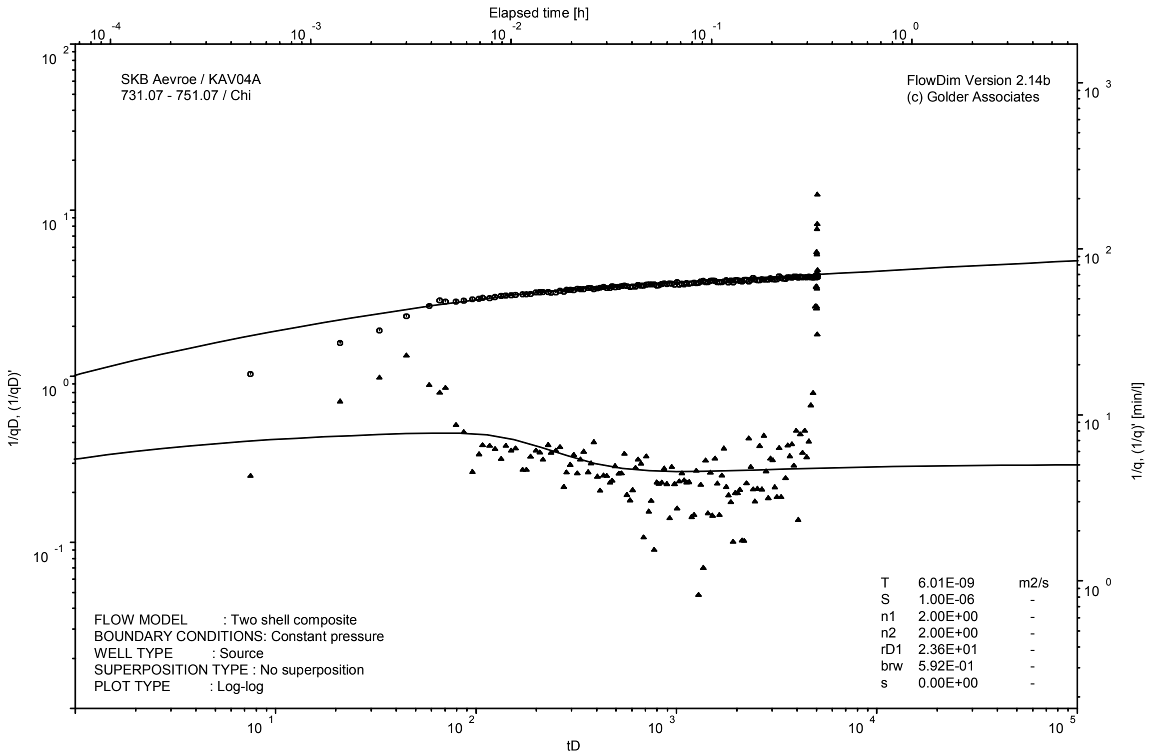
Analysis diagrams



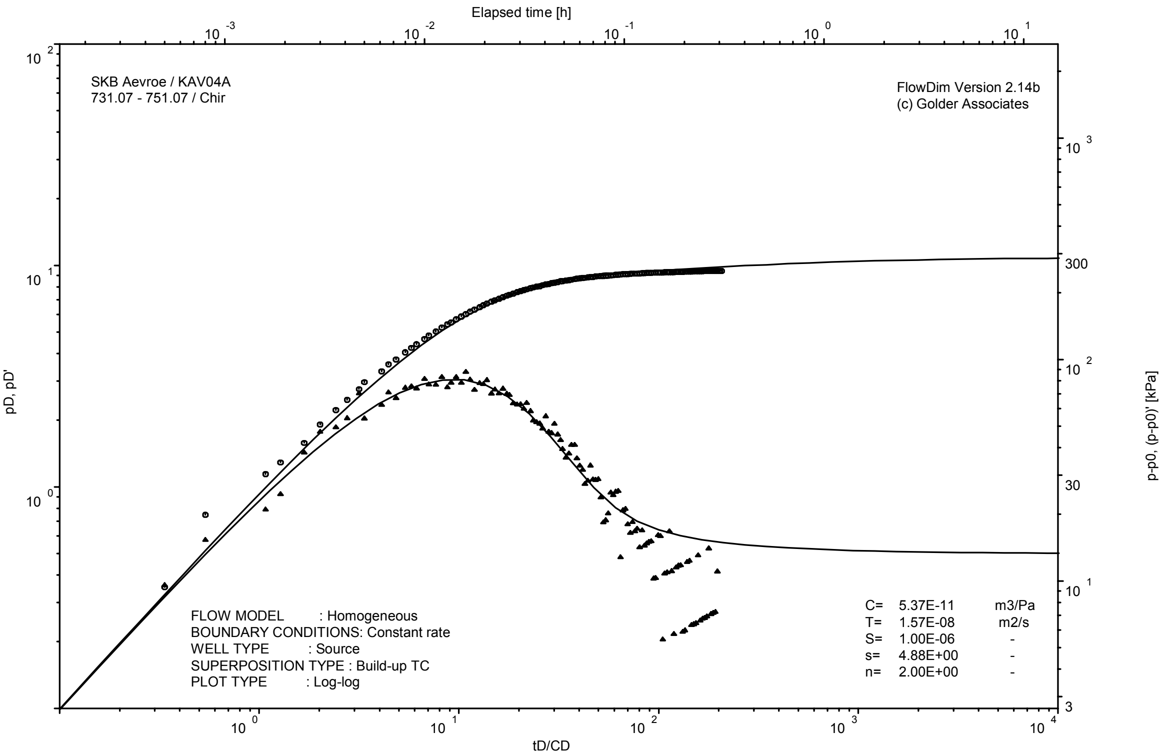
Pressure and flow rate vs. time; cartesian plot



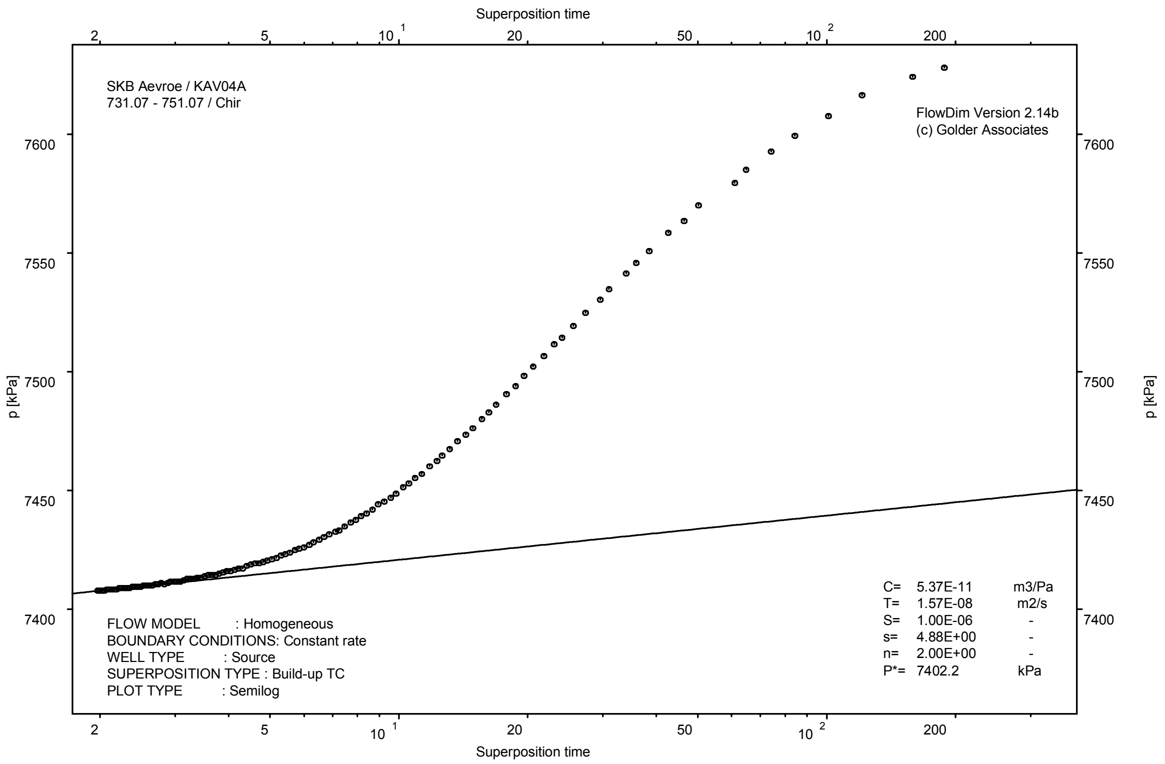
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

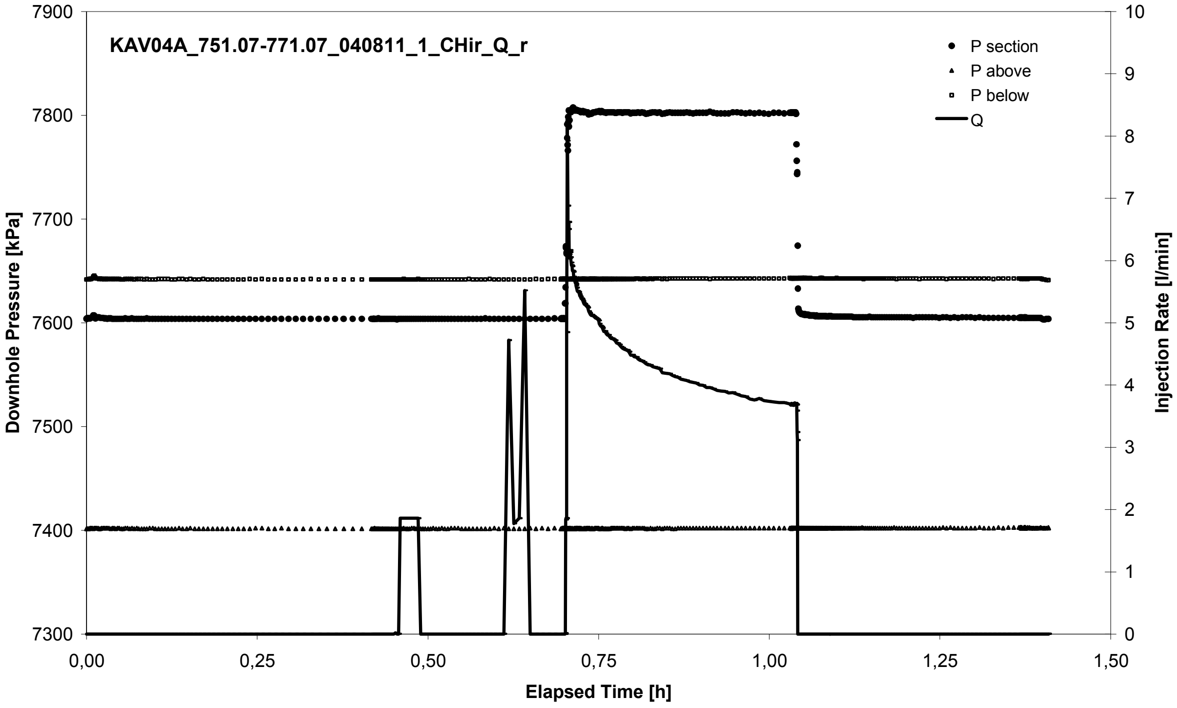


CHIR phase; HORNER match

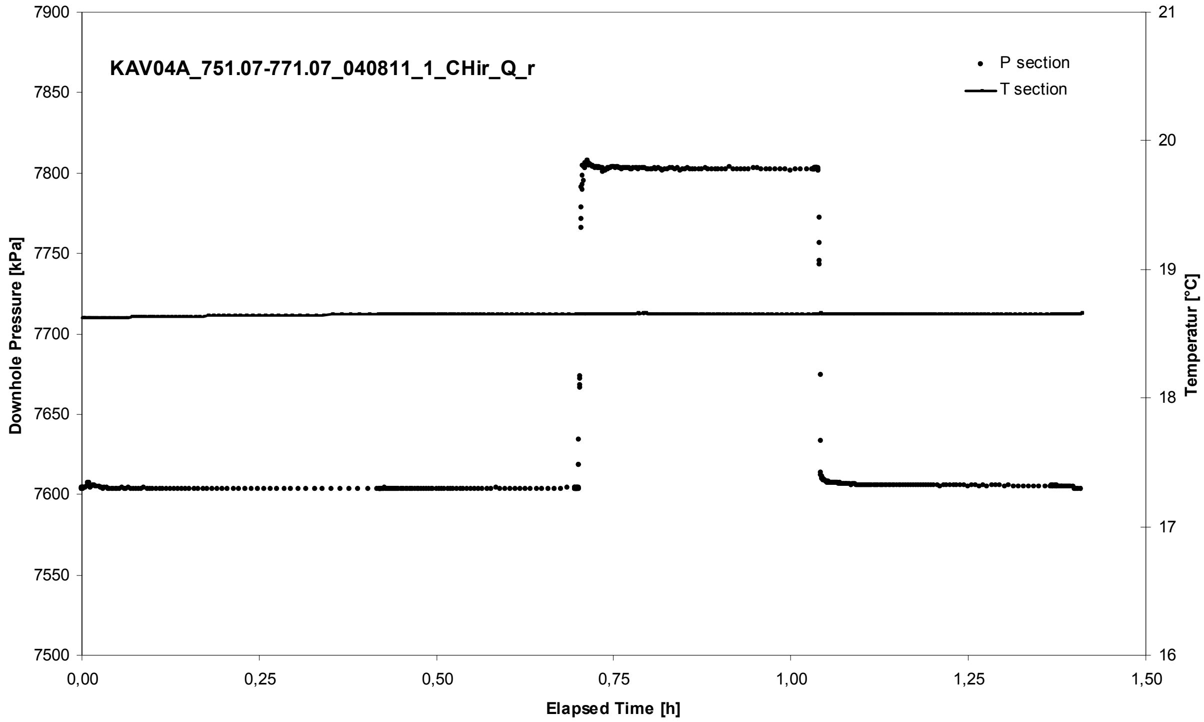
APPENDIX 2-43

Test 751,07 – 771,07 m

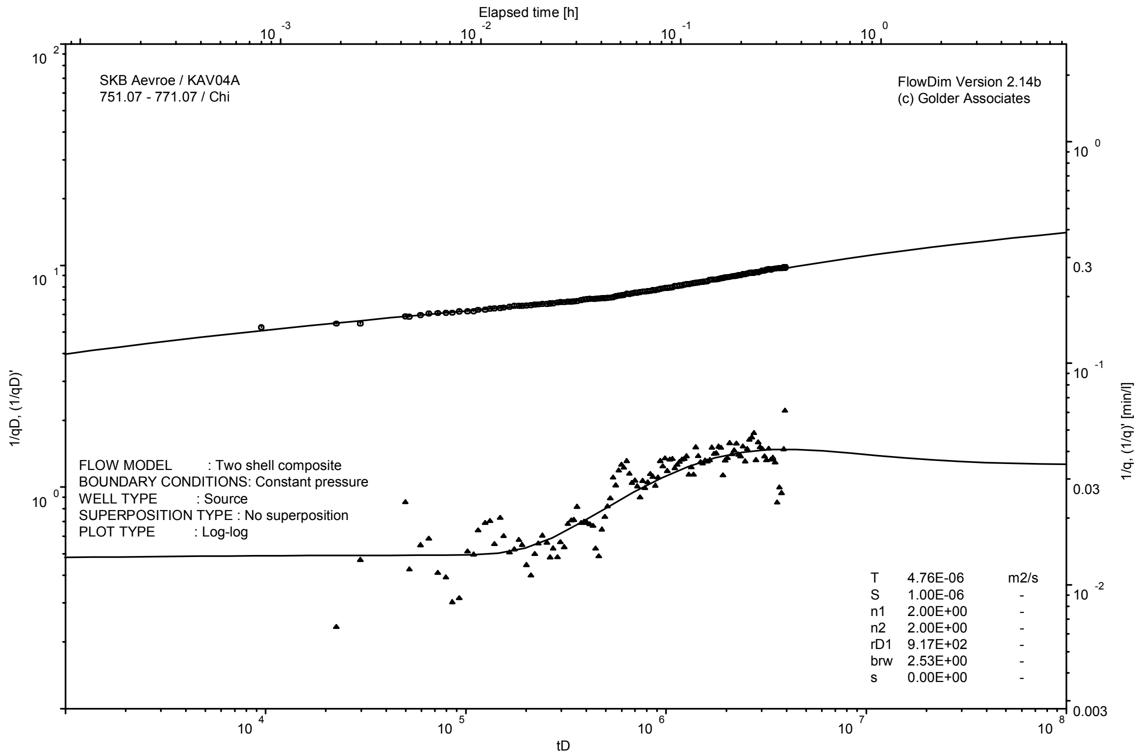
Analysis diagrams



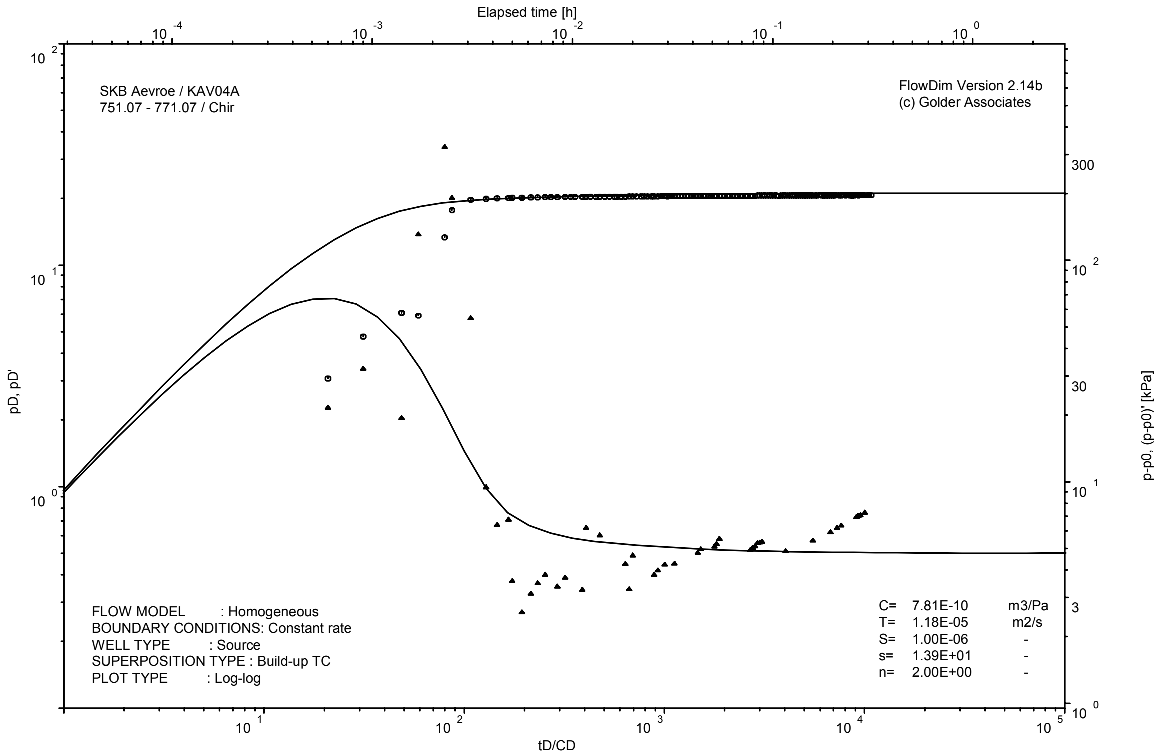
Pressure and flow rate vs. time; cartesian plot



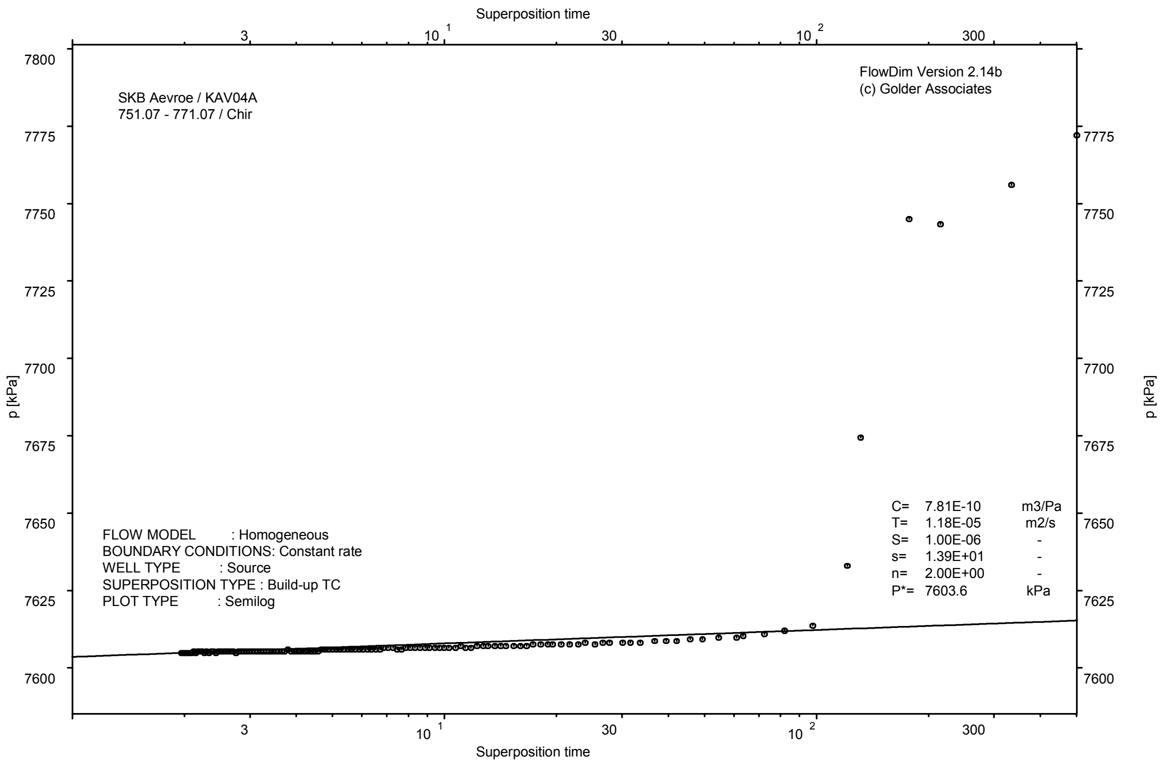
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

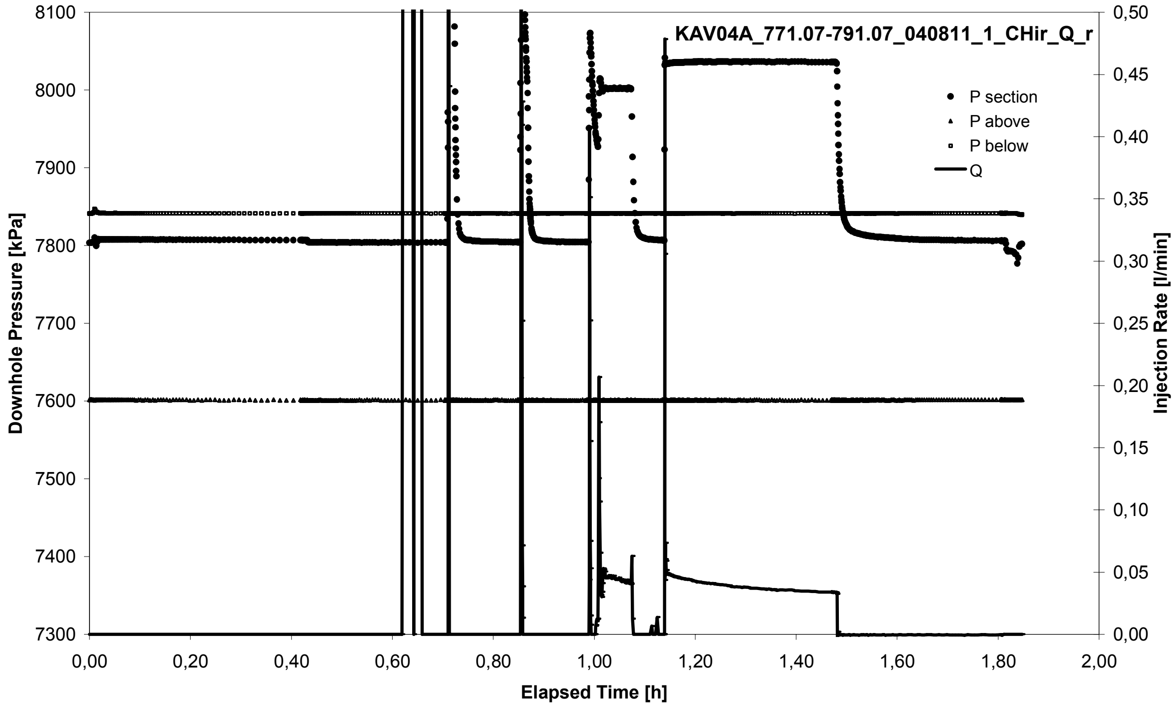


CHIR phase; HORNER match

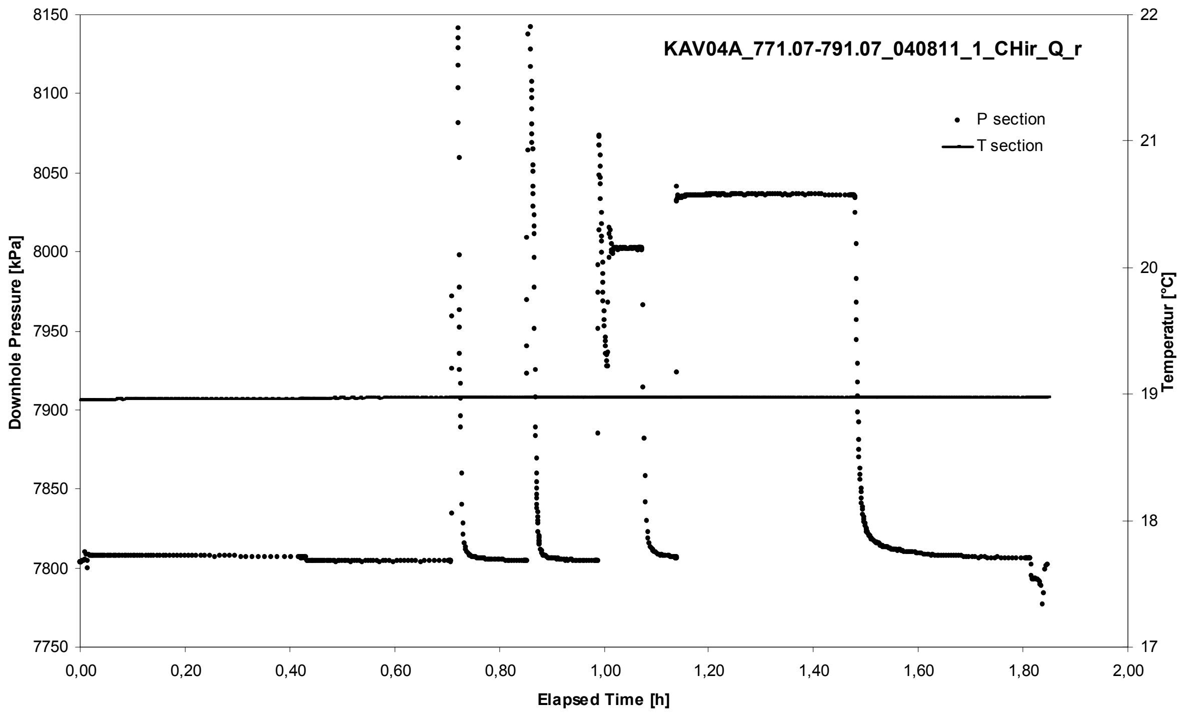
APPENDIX 2-44

Test 771,07 – 791,07 m

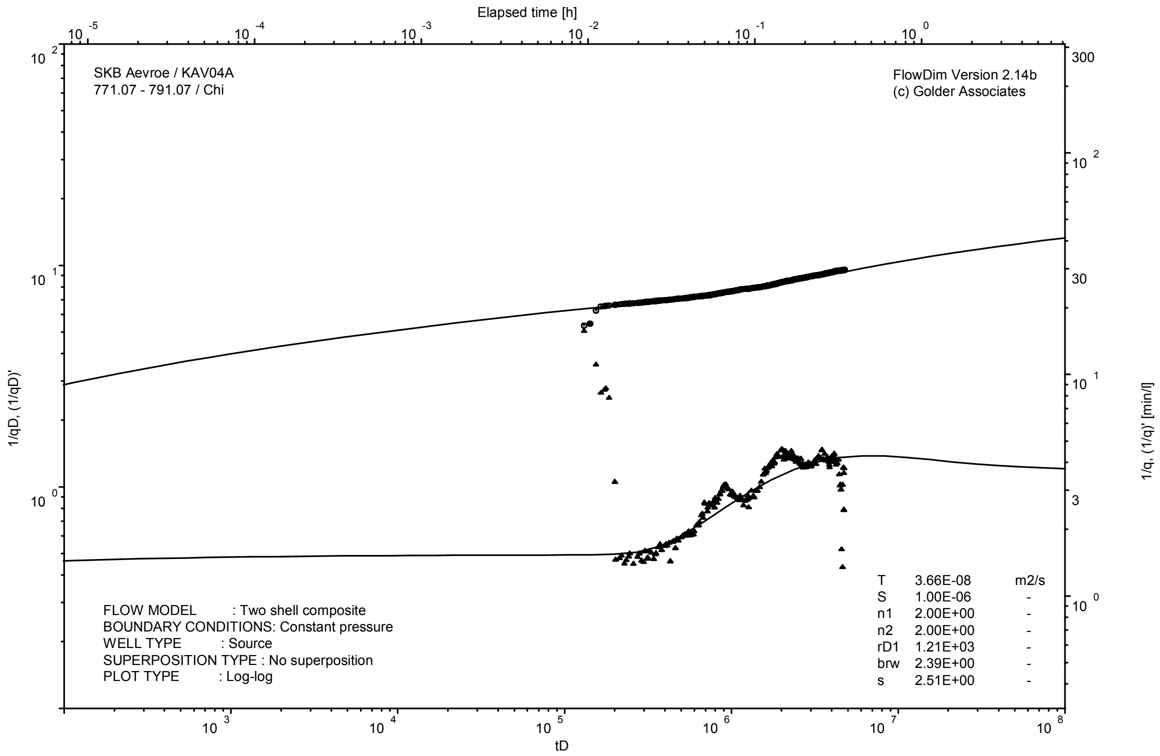
Analysis diagrams



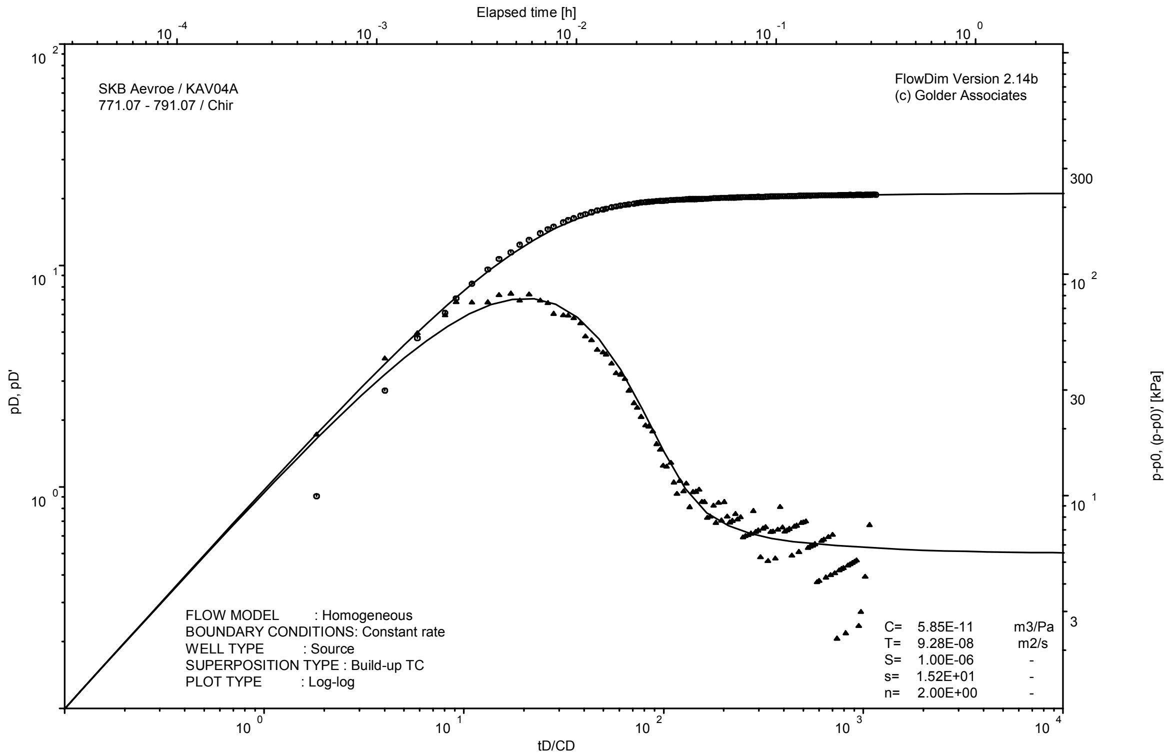
Pressure and flow rate vs. time; cartesian plot



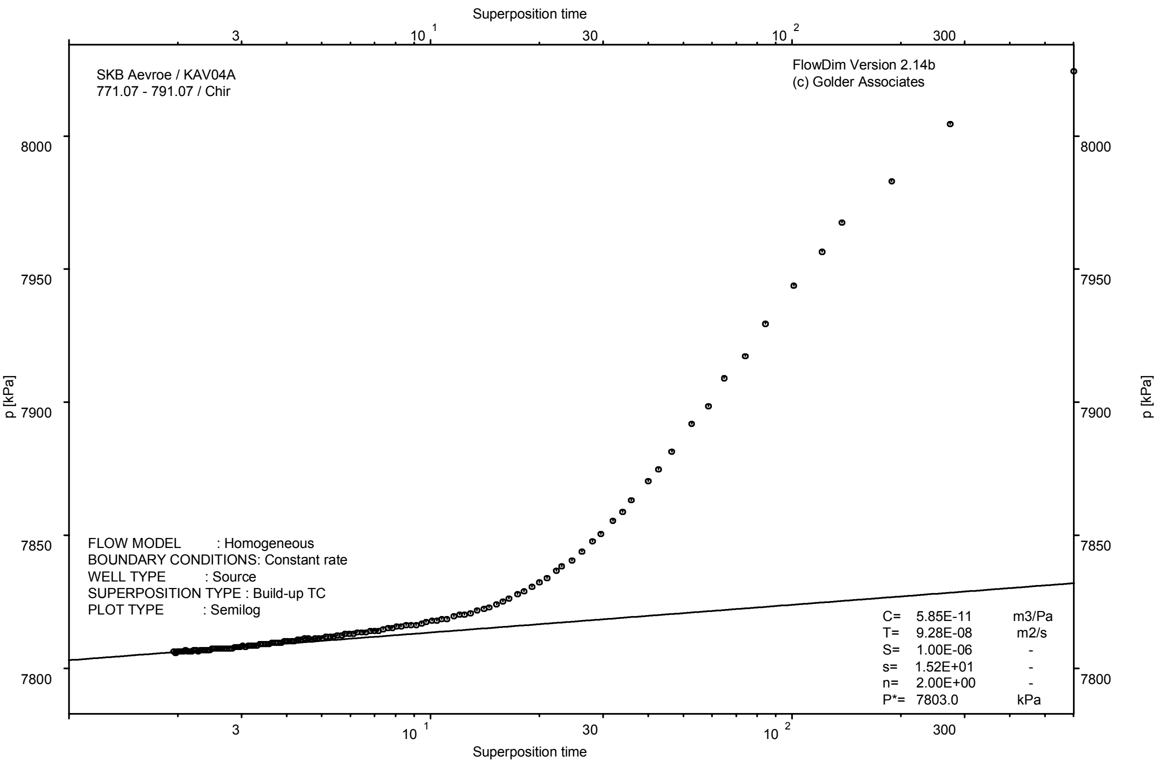
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

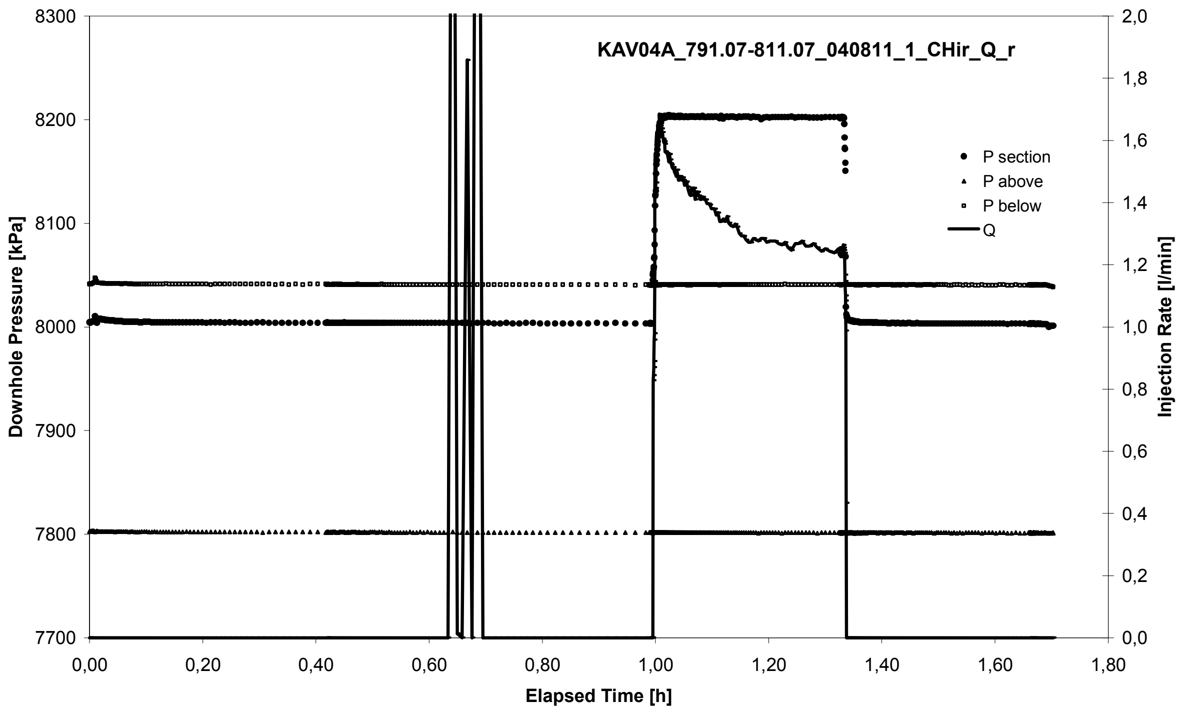


CHIR phase; HORNER match

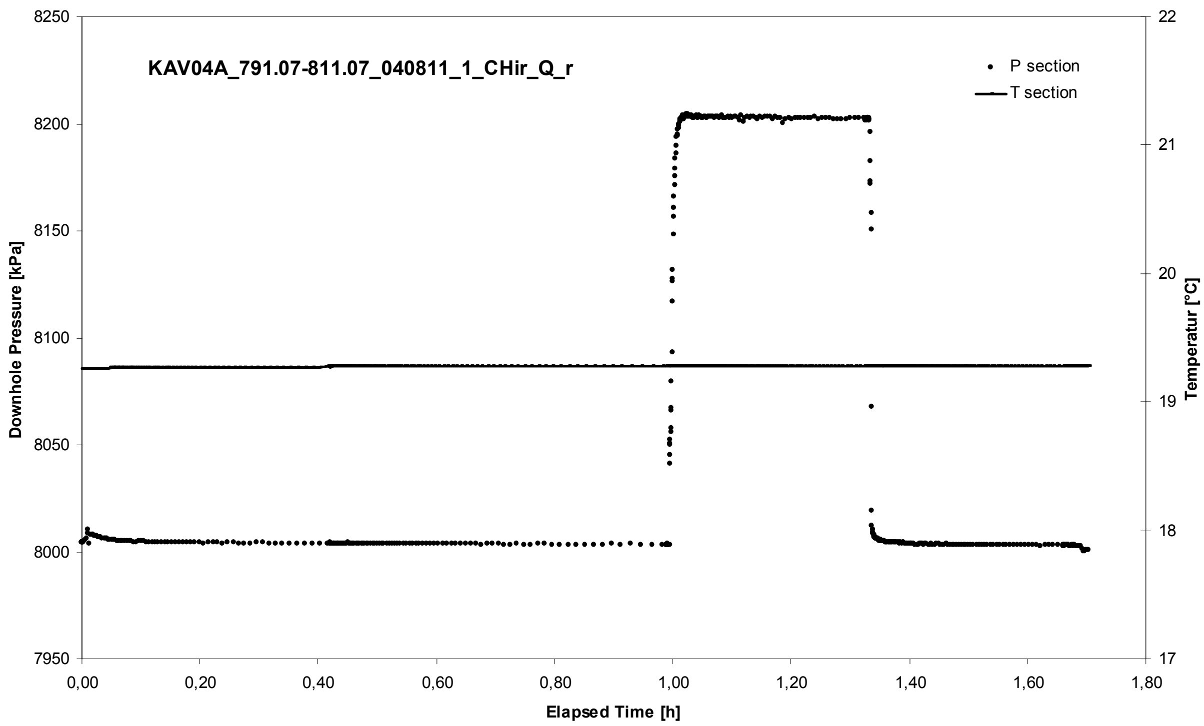
APPENDIX 2-45

Test 791,07 – 811,07 m

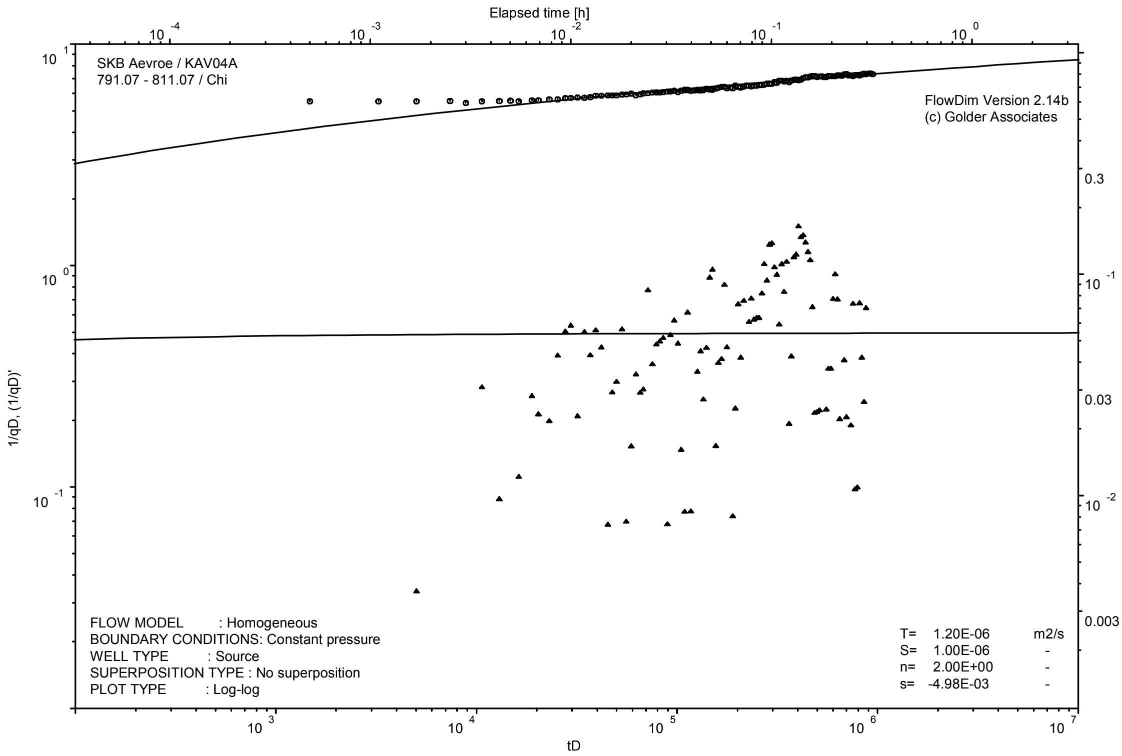
Analysis diagrams



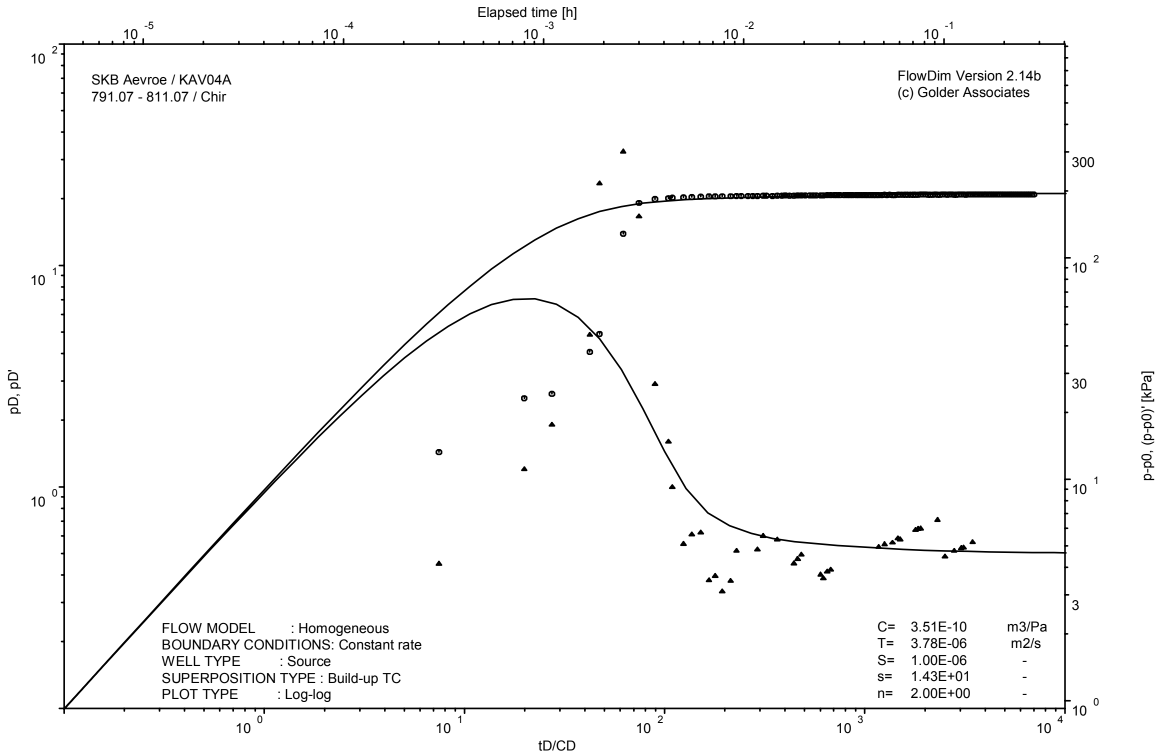
Pressure and flow rate vs. time; cartesian plot



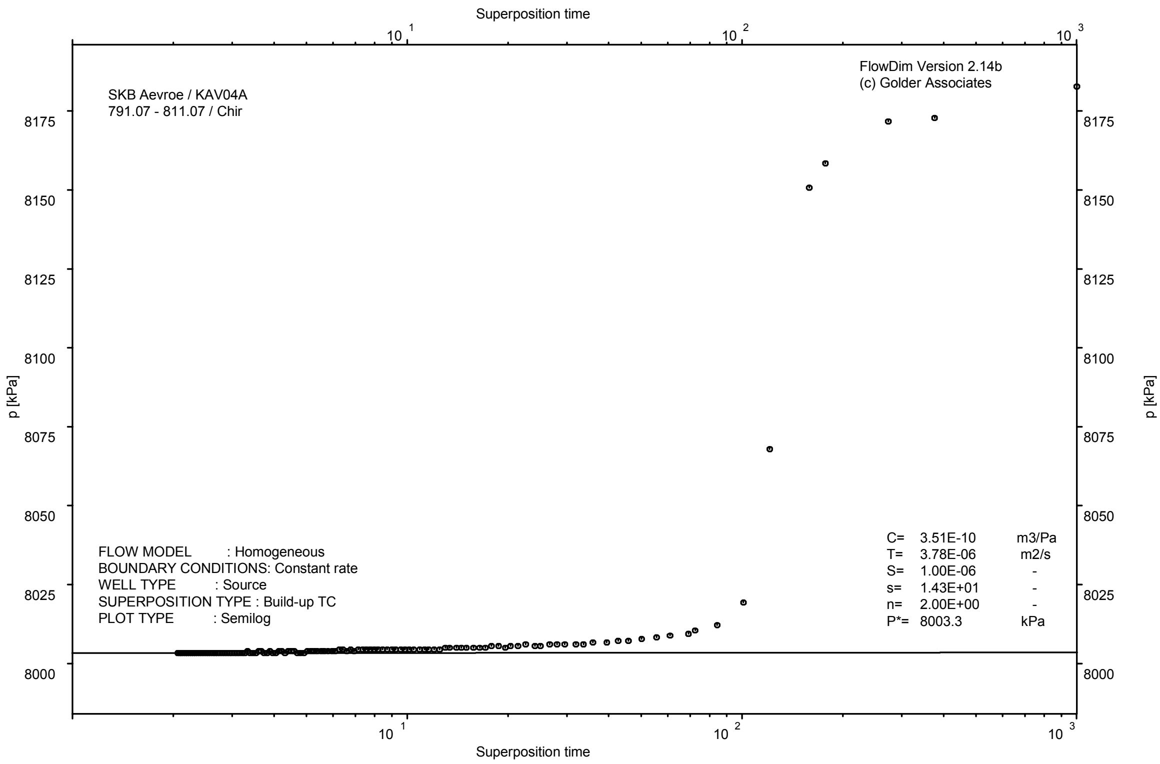
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

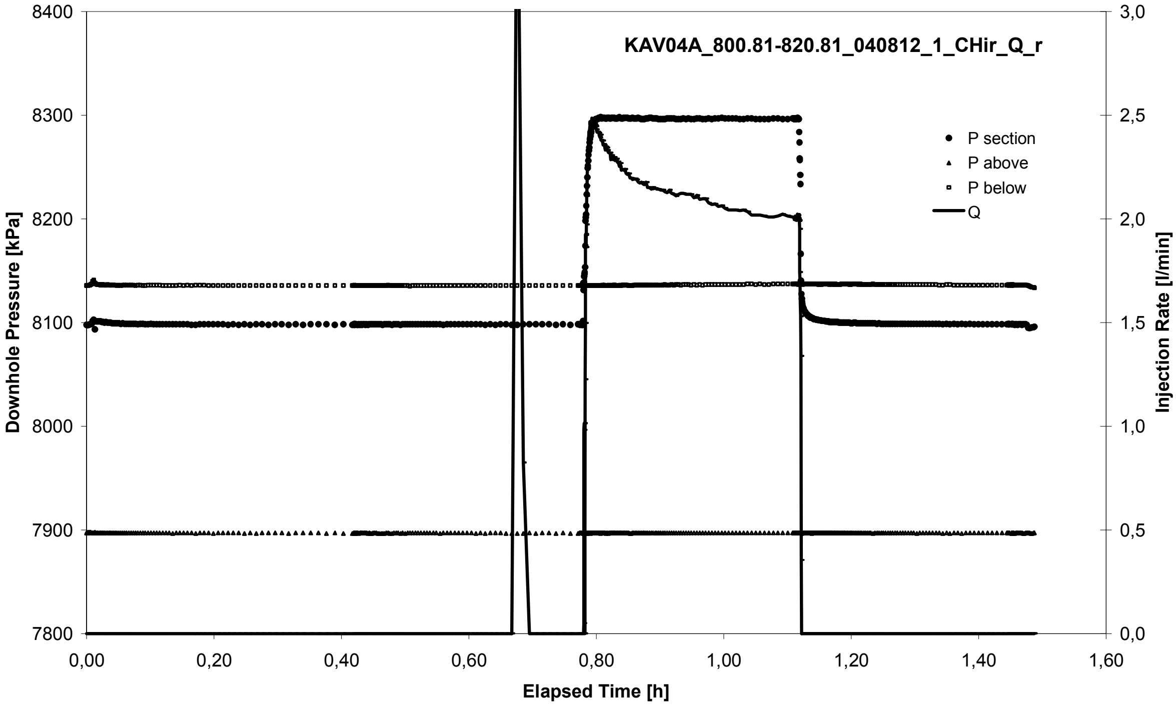


CHIR phase; HORNER match

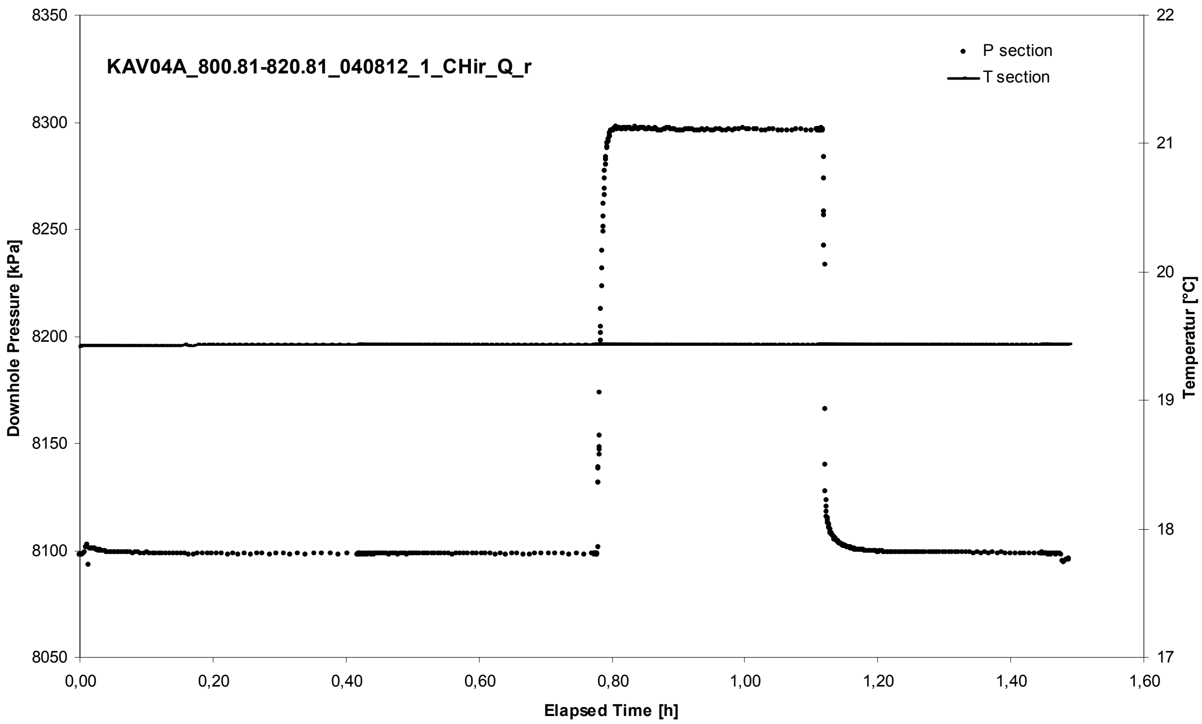
APPENDIX 2-46

Test 800,81 – 820,81 m

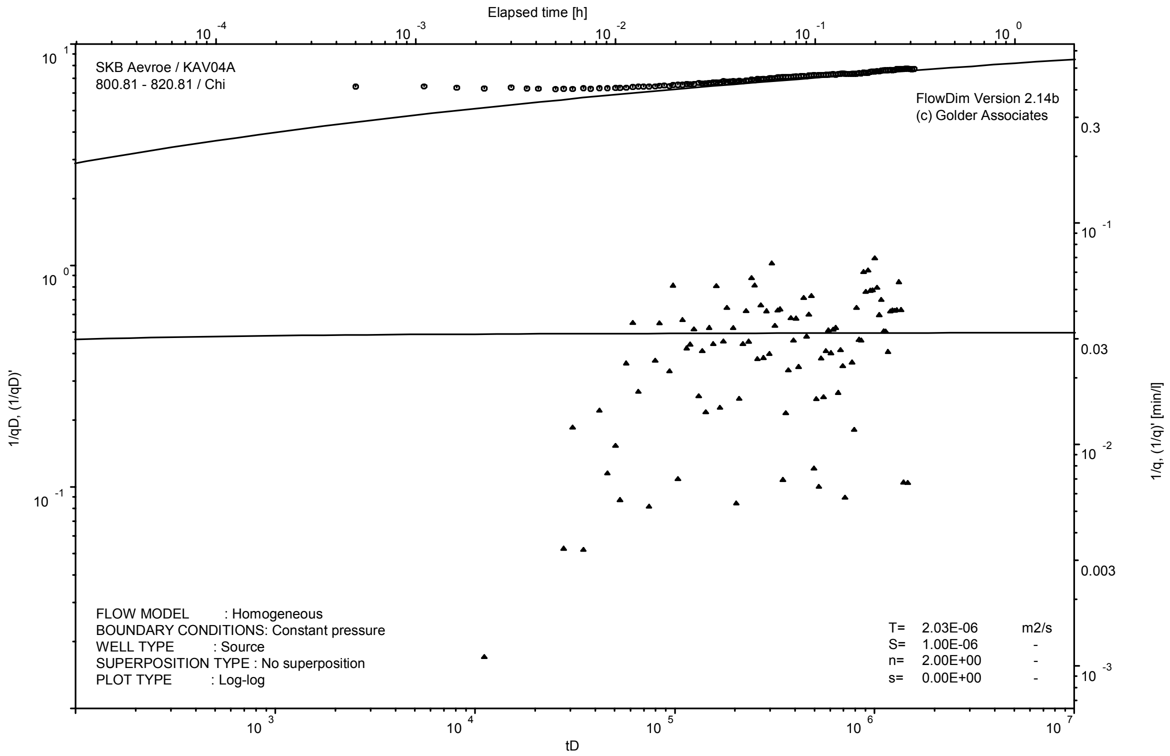
Analysis diagrams



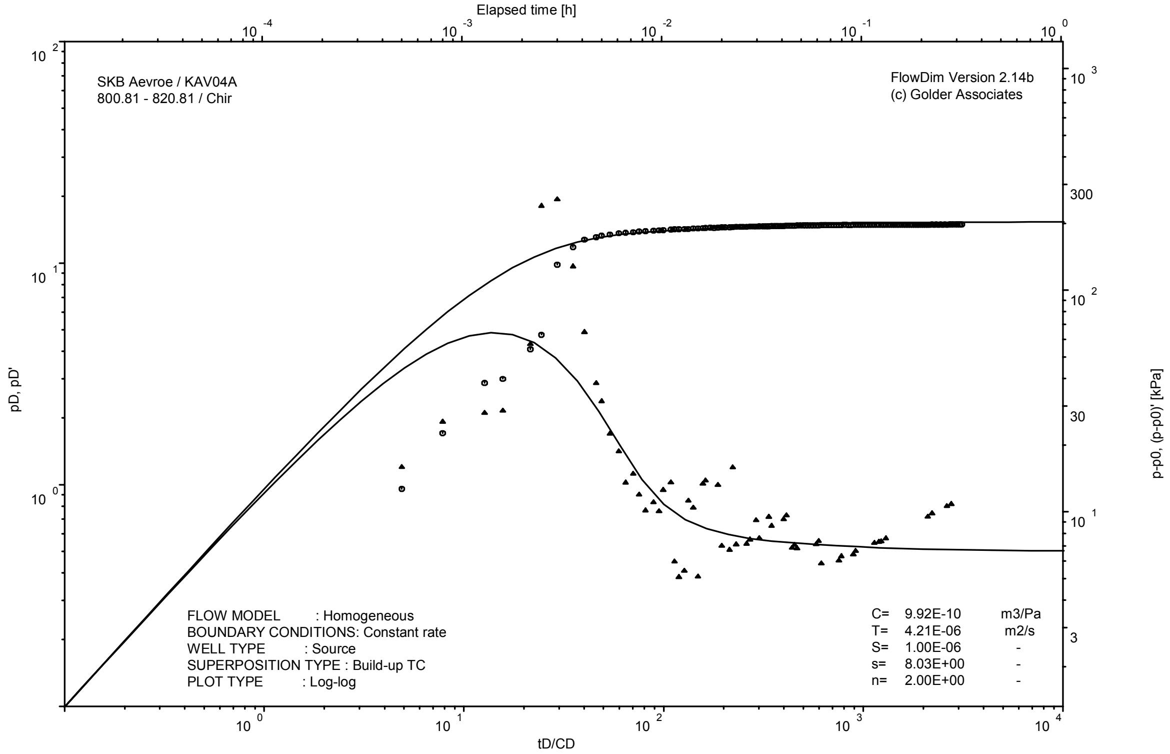
Pressure and flow rate vs. time; cartesian plot



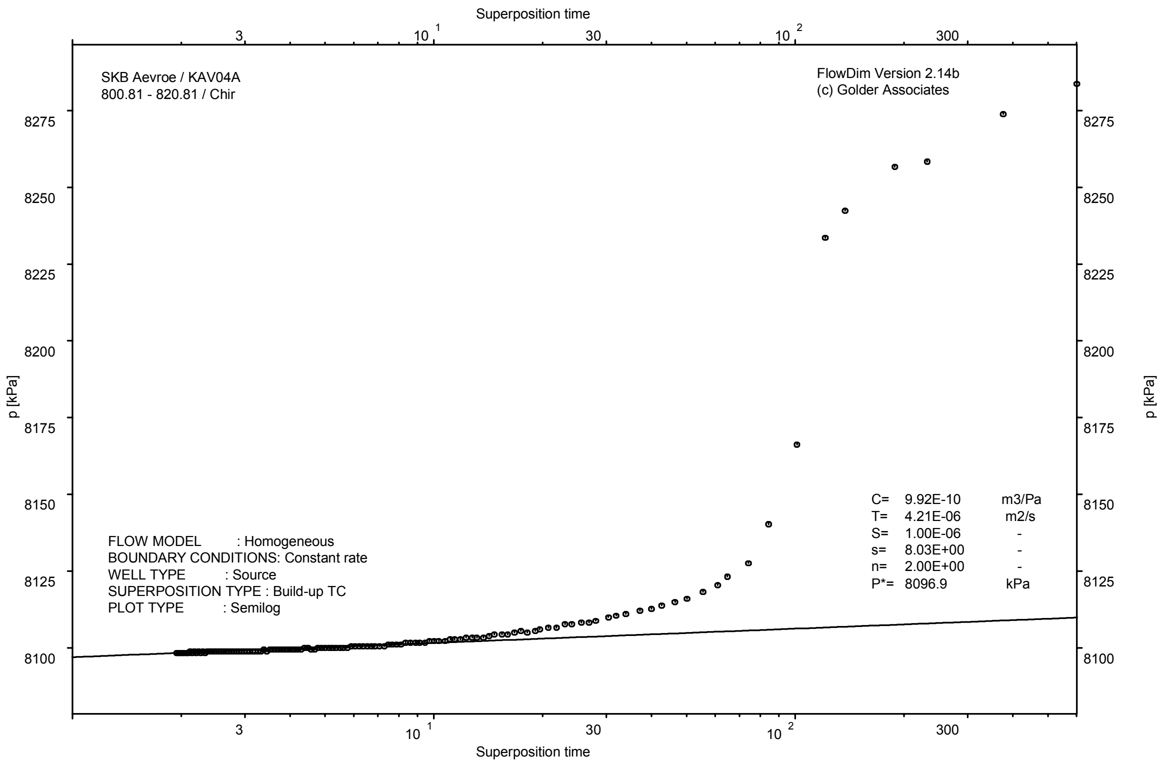
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

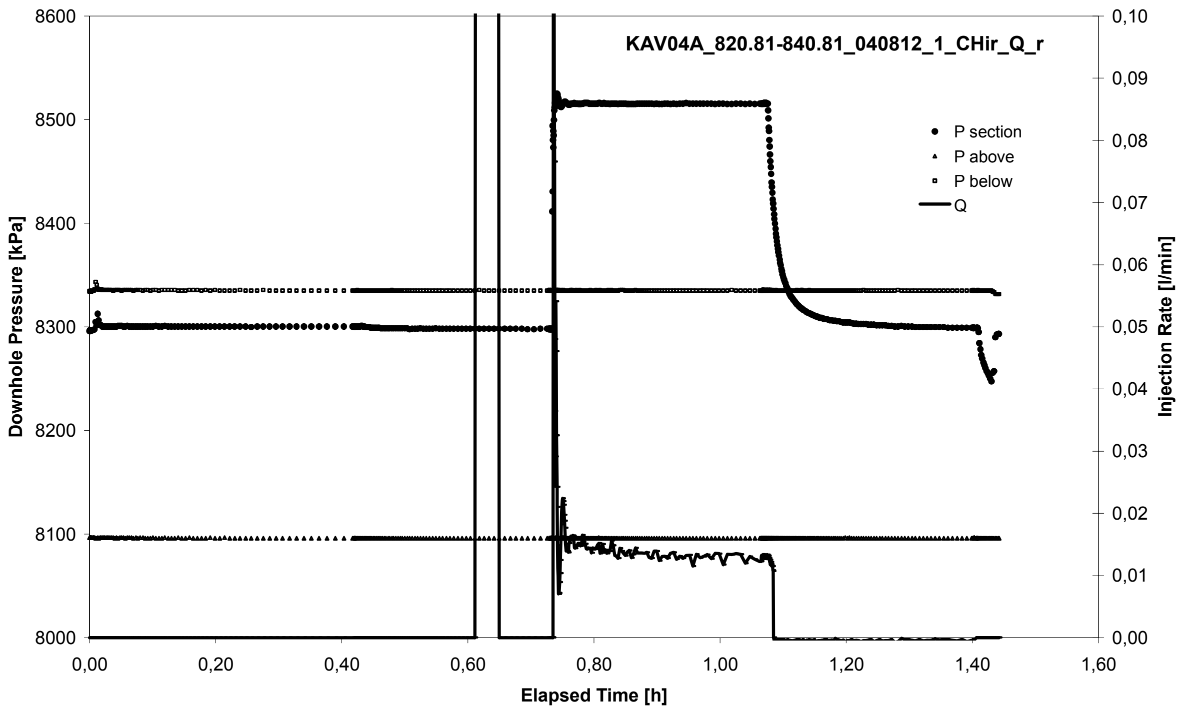


CHIR phase; HORNER match

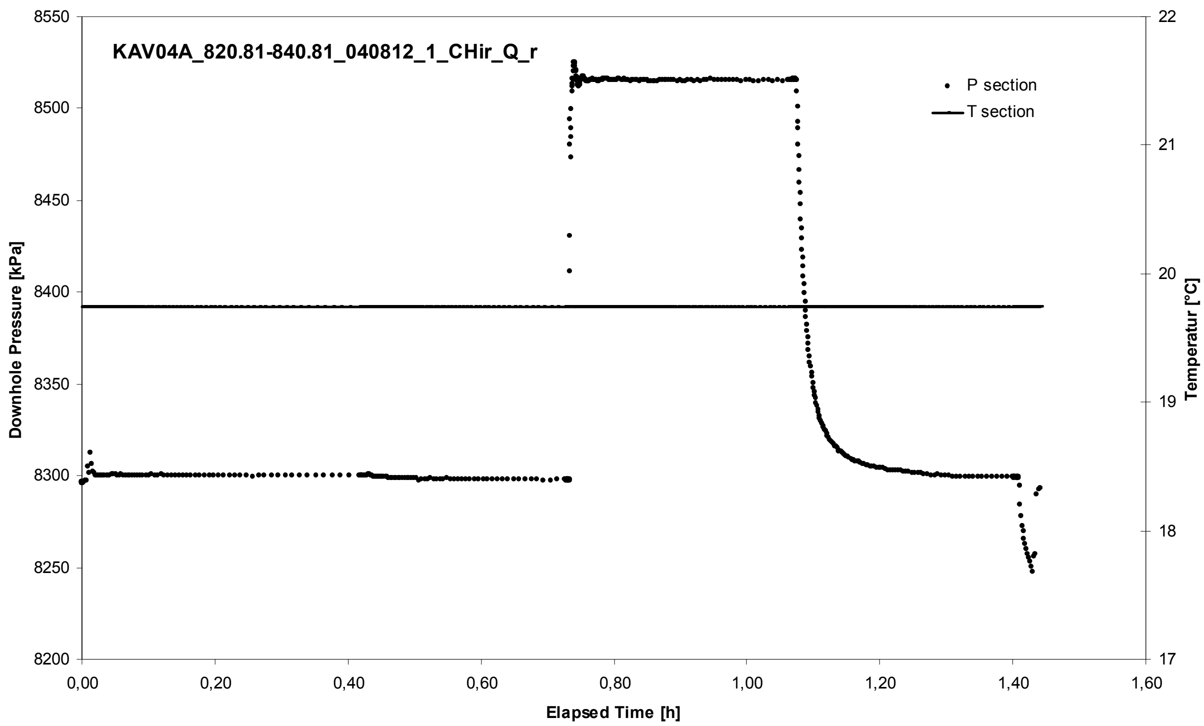
APPENDIX 2-47

Test 820,81 – 840,81 m

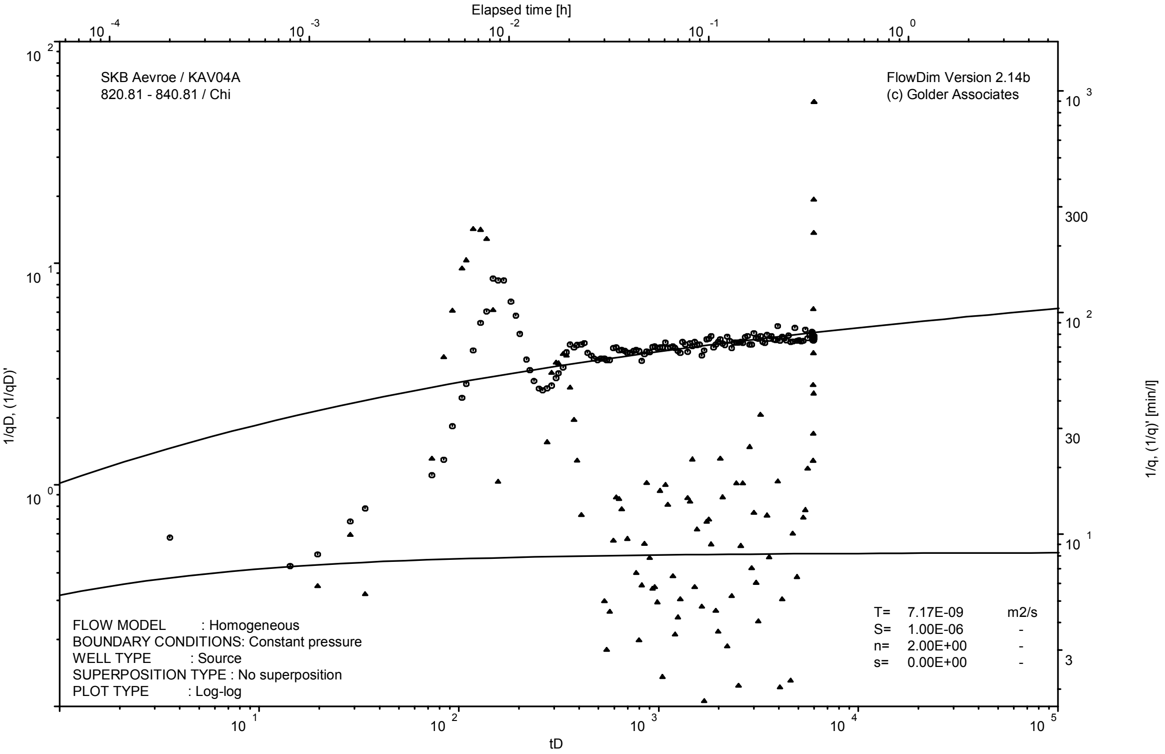
Analysis diagrams



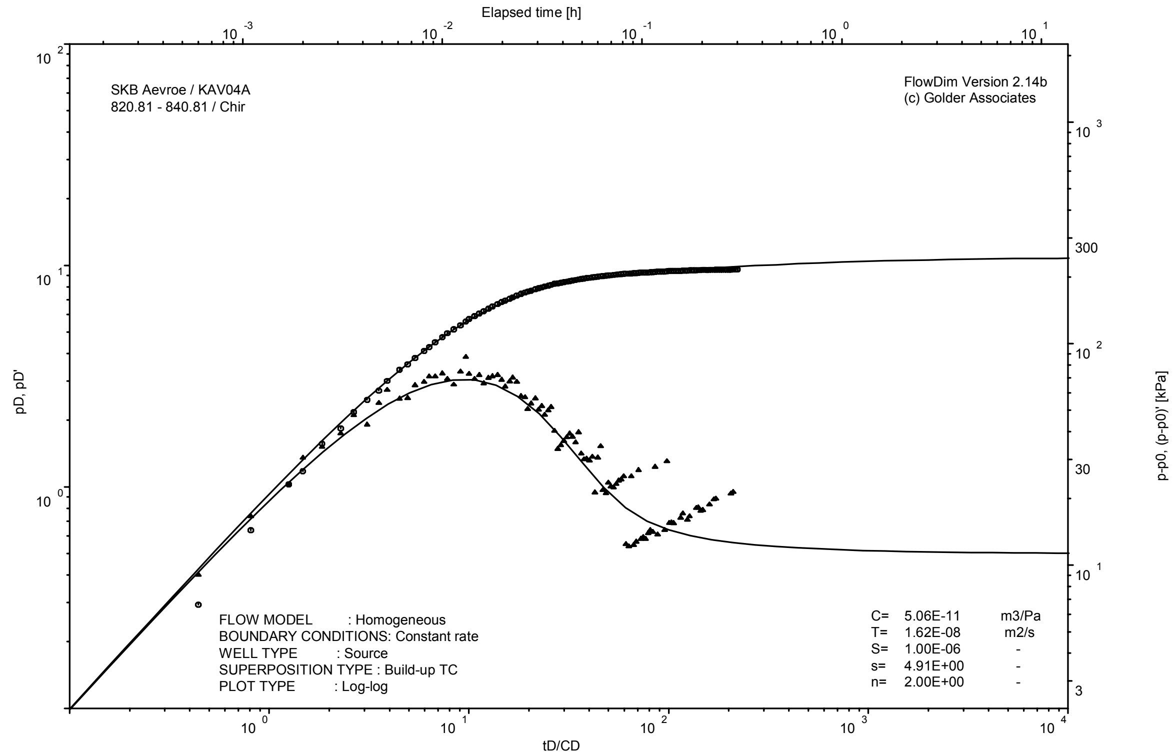
Pressure and flow rate vs. time; cartesian plot



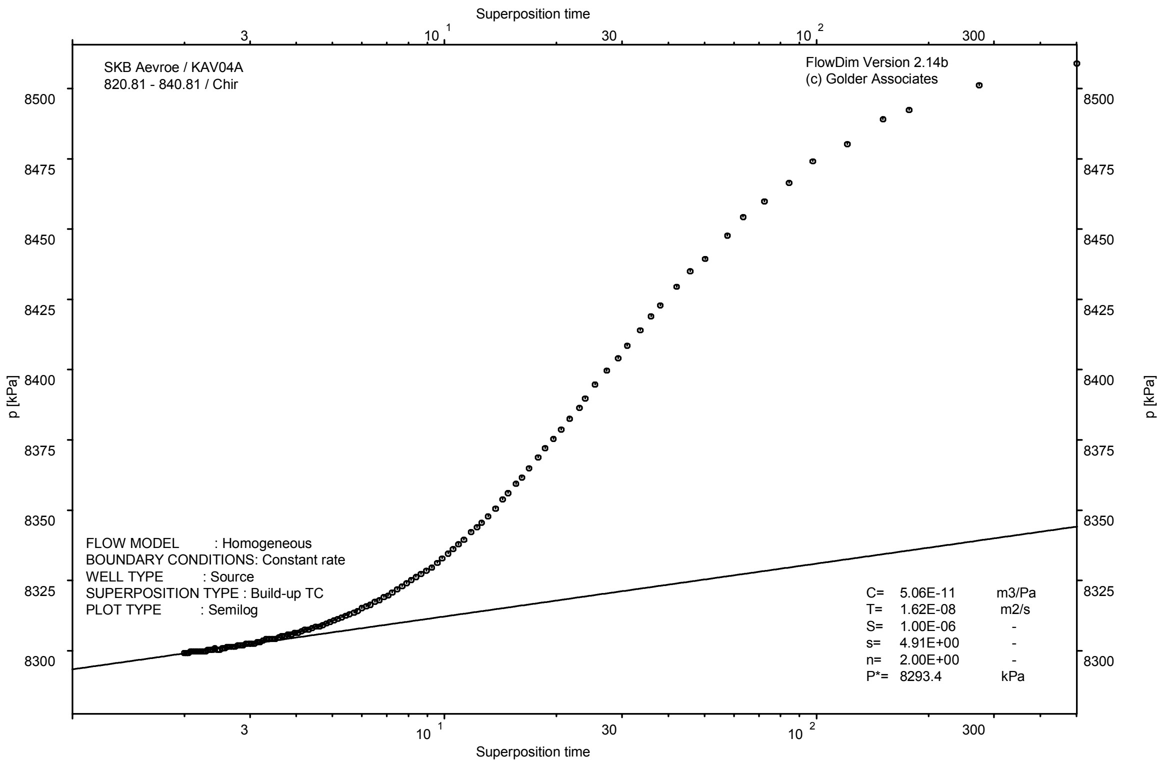
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

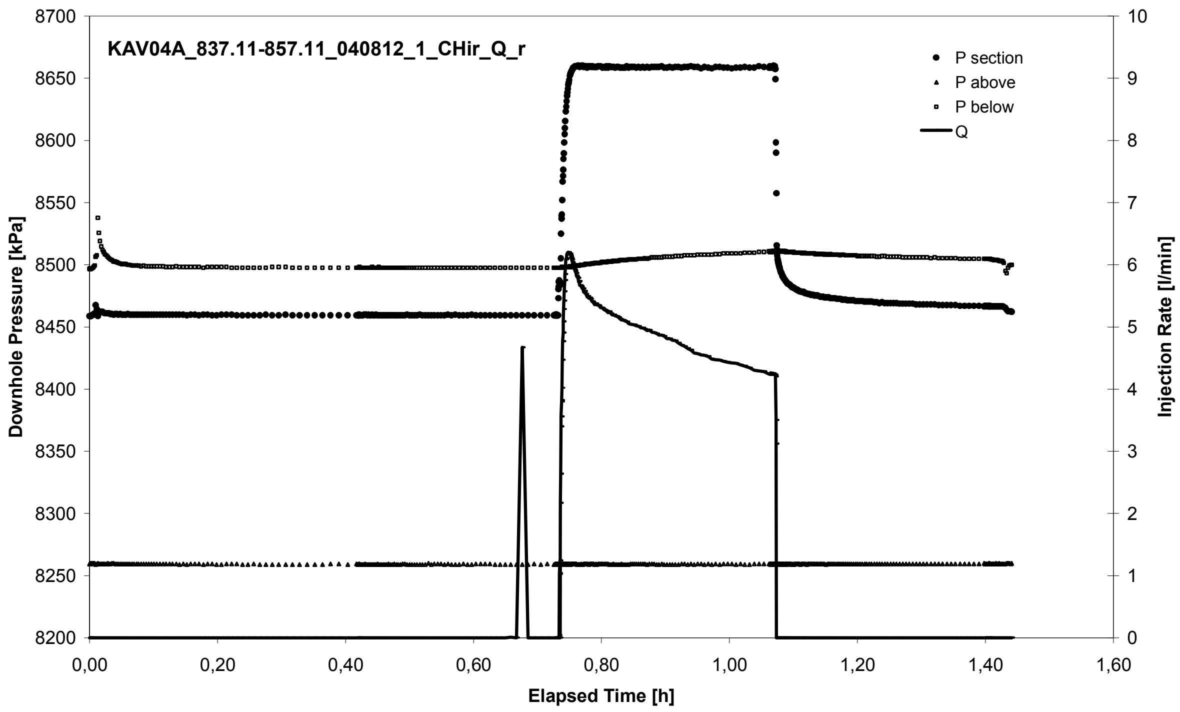


CHIR phase; HORNER match

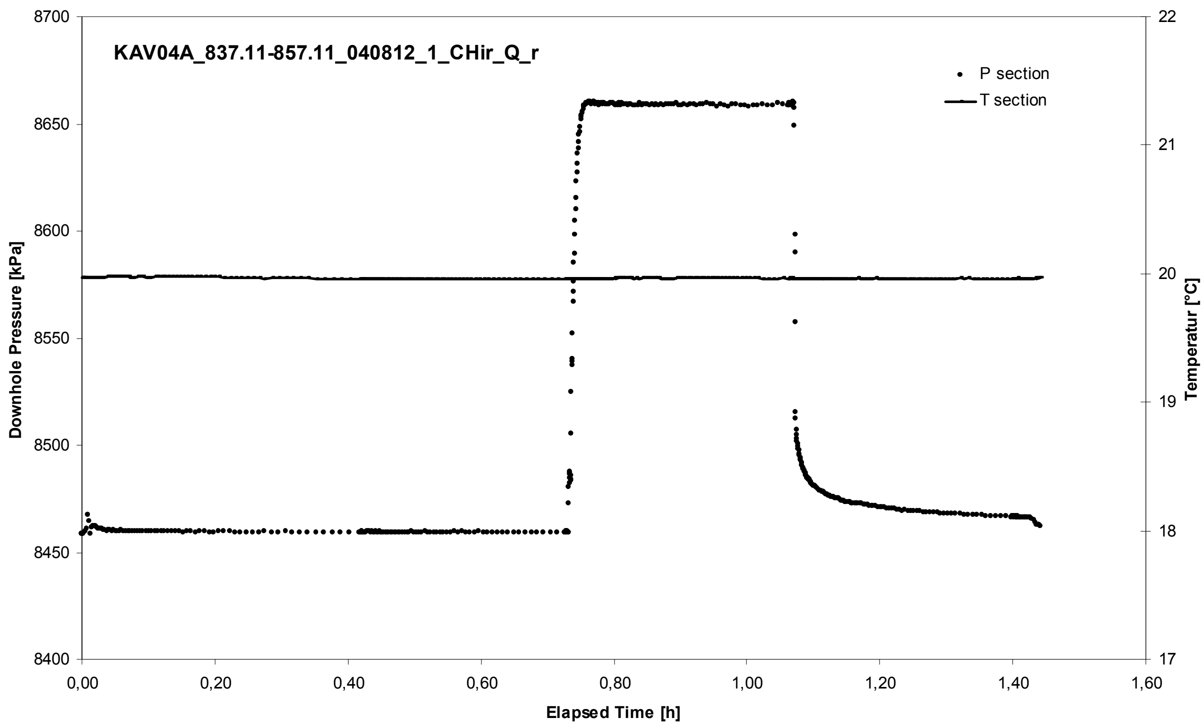
APPENDIX 2-48

Test 837,11 – 857,11 m

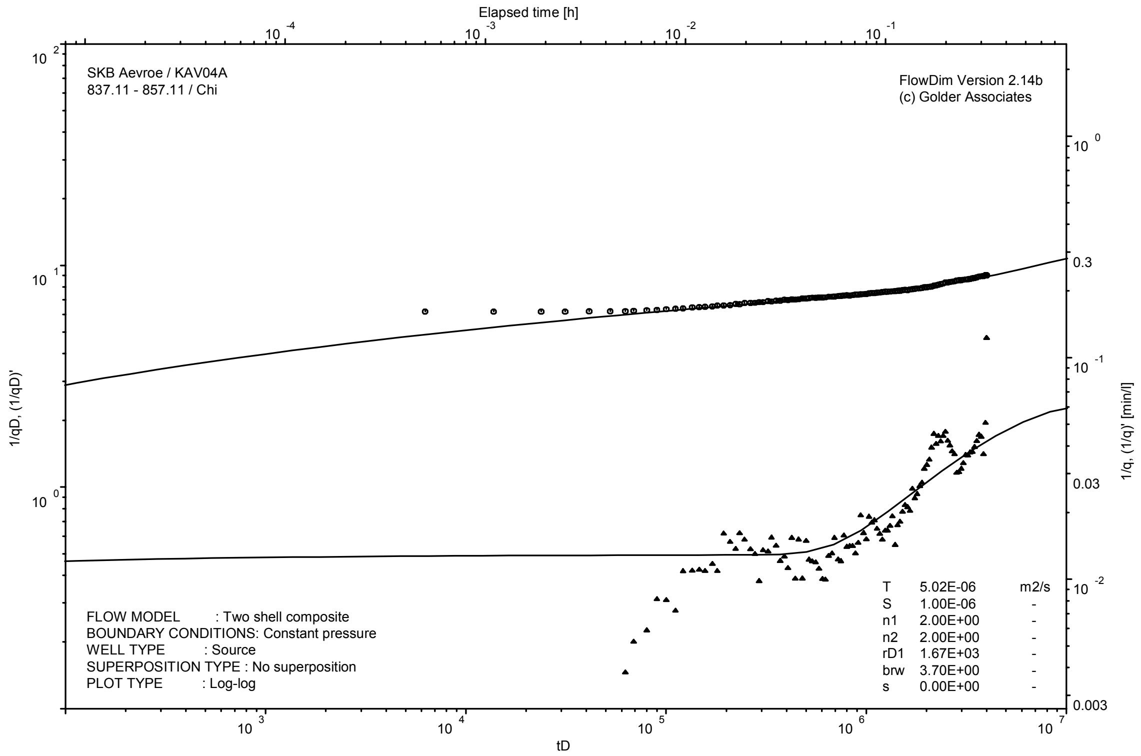
Analysis diagrams



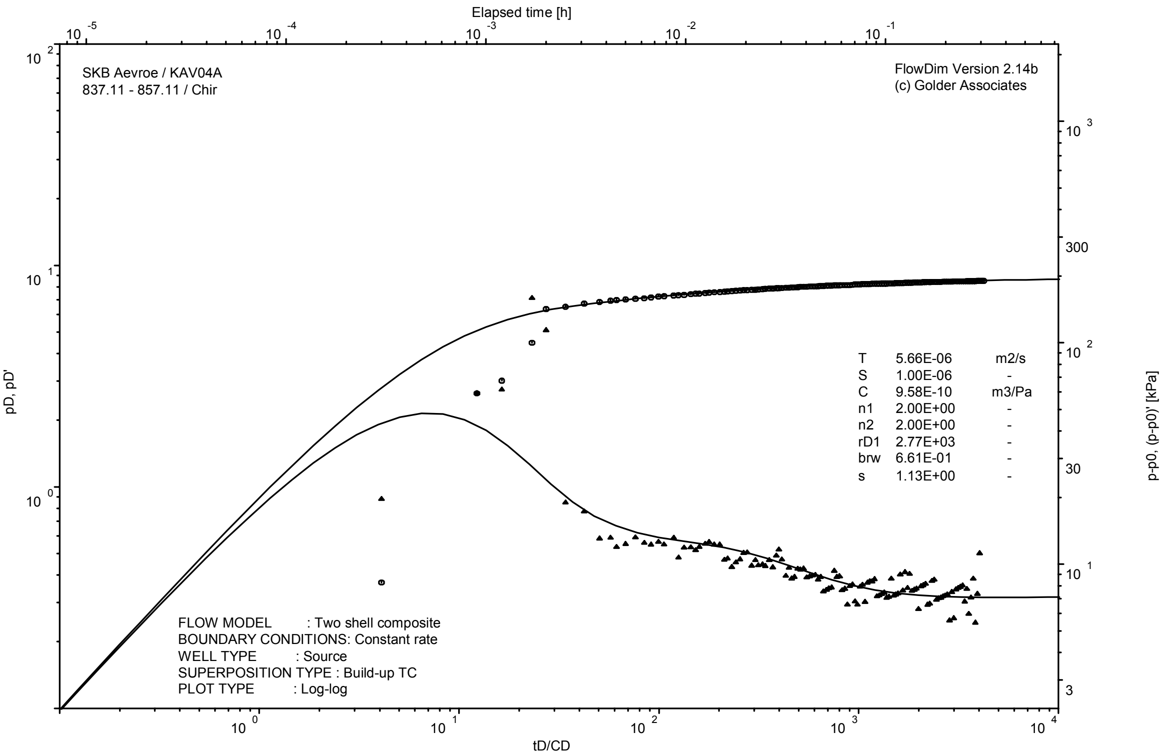
Pressure and flow rate vs. time; cartesian plot



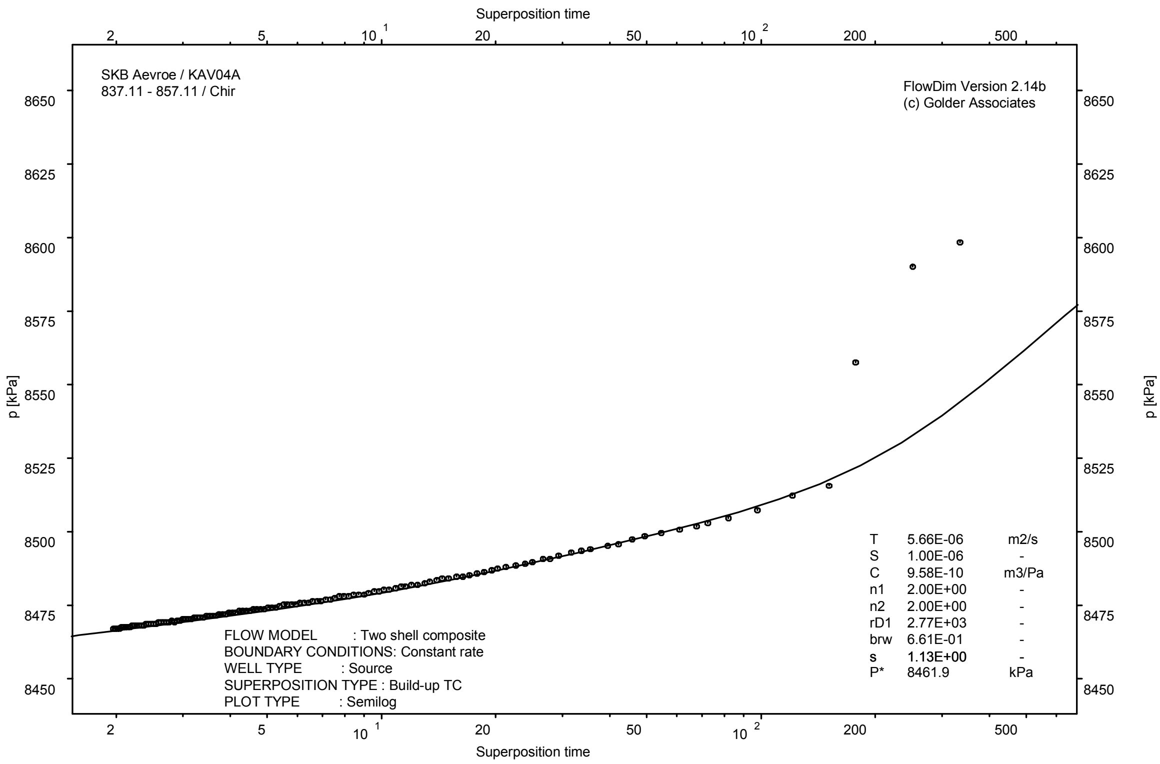
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

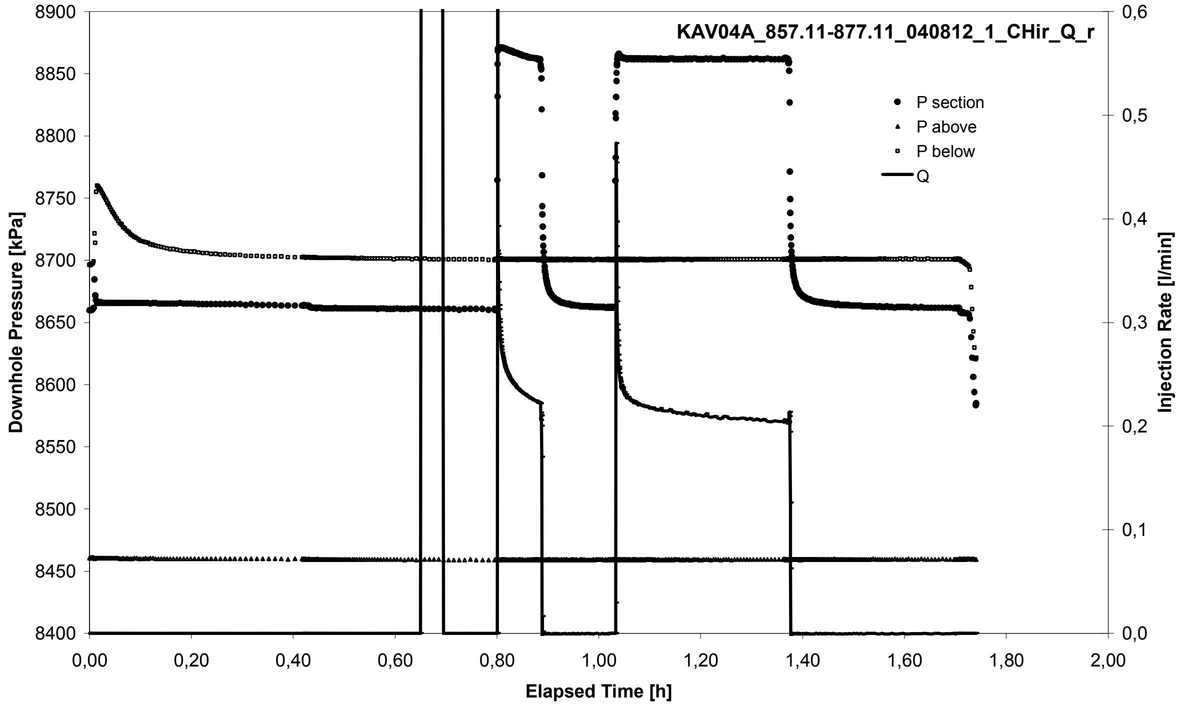


CHIR phase; HORNER match

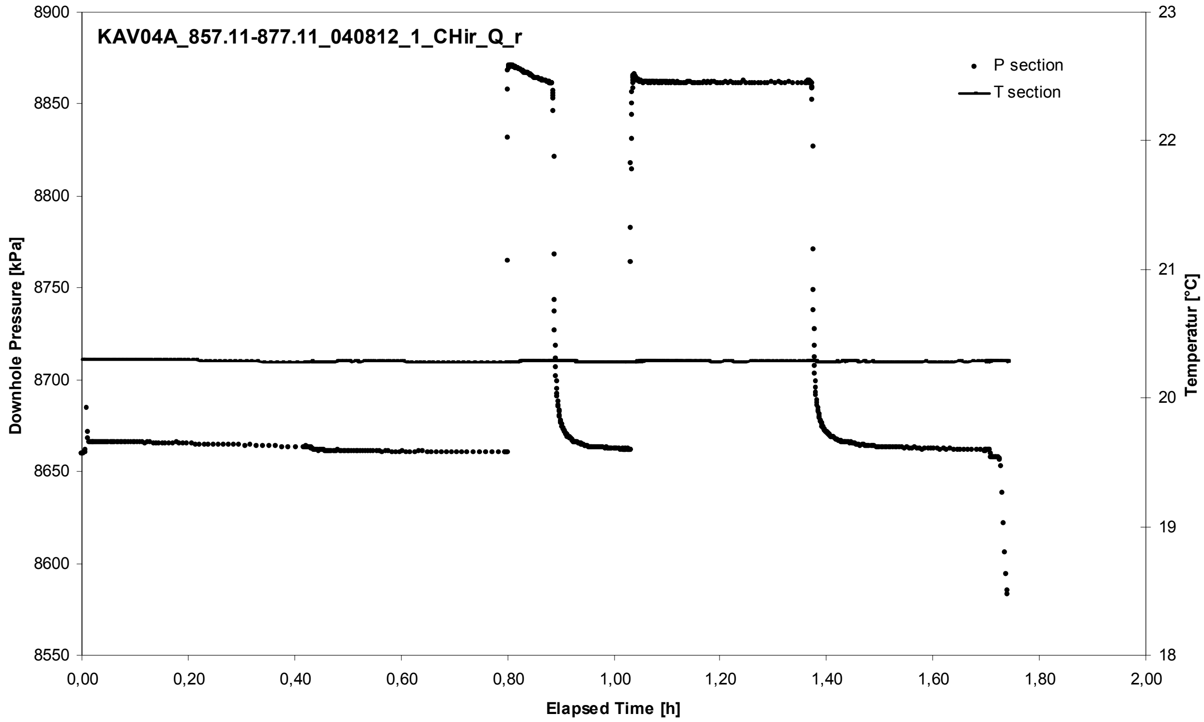
APPENDIX 2-49

Test 857,11 – 877,11 m

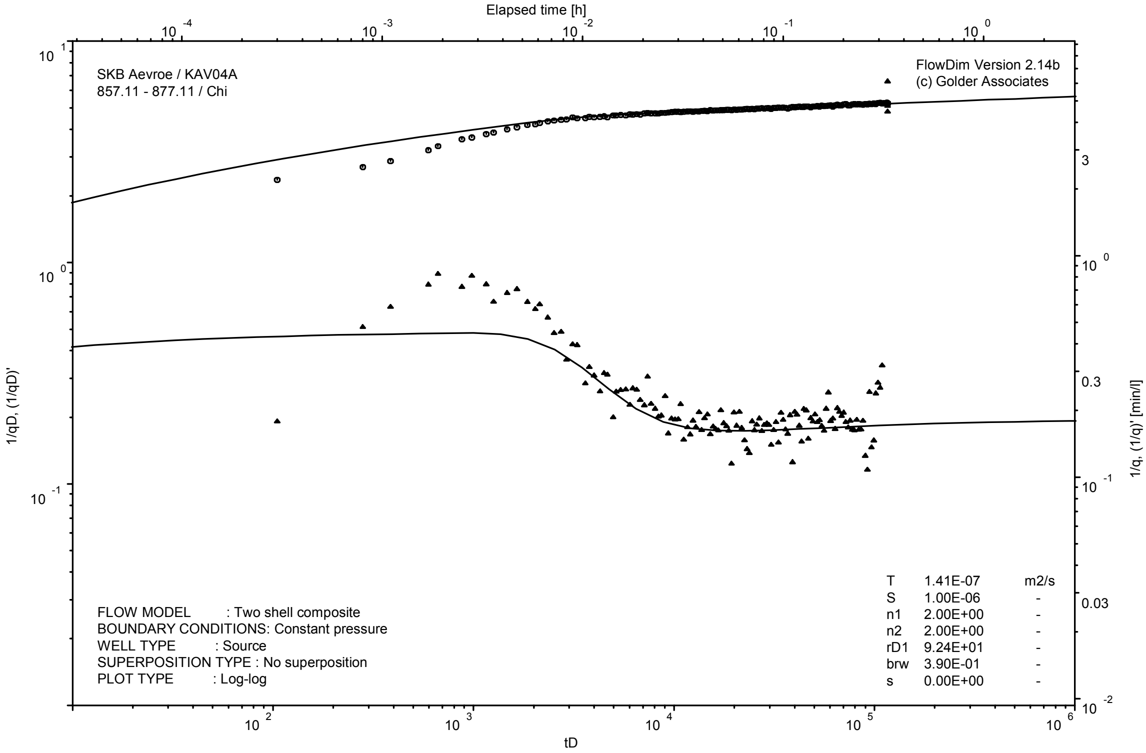
Analysis diagrams



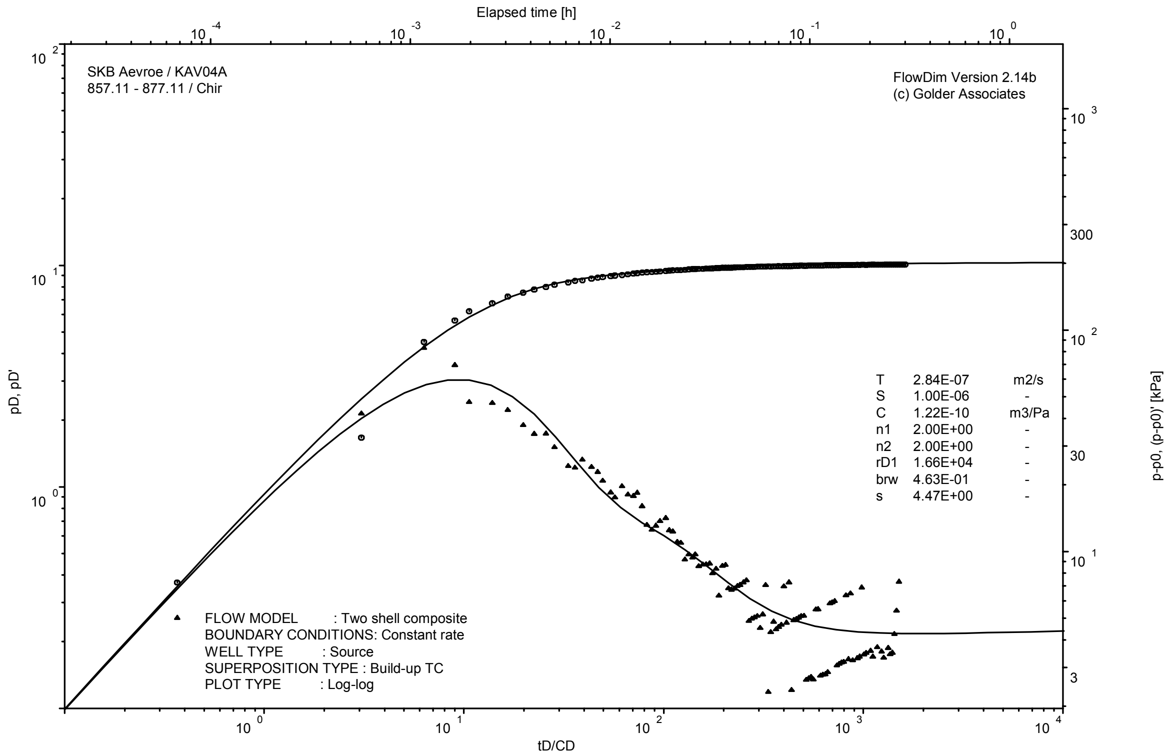
Pressure and flow rate vs. time; cartesian plot



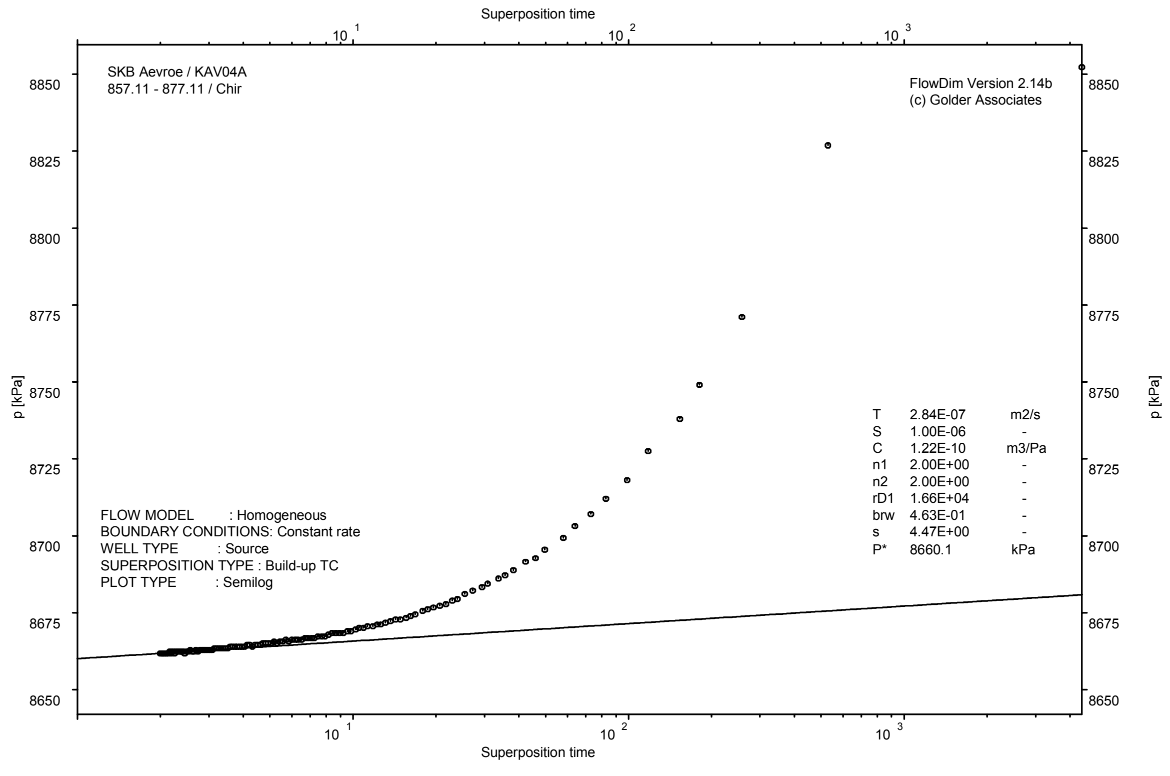
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

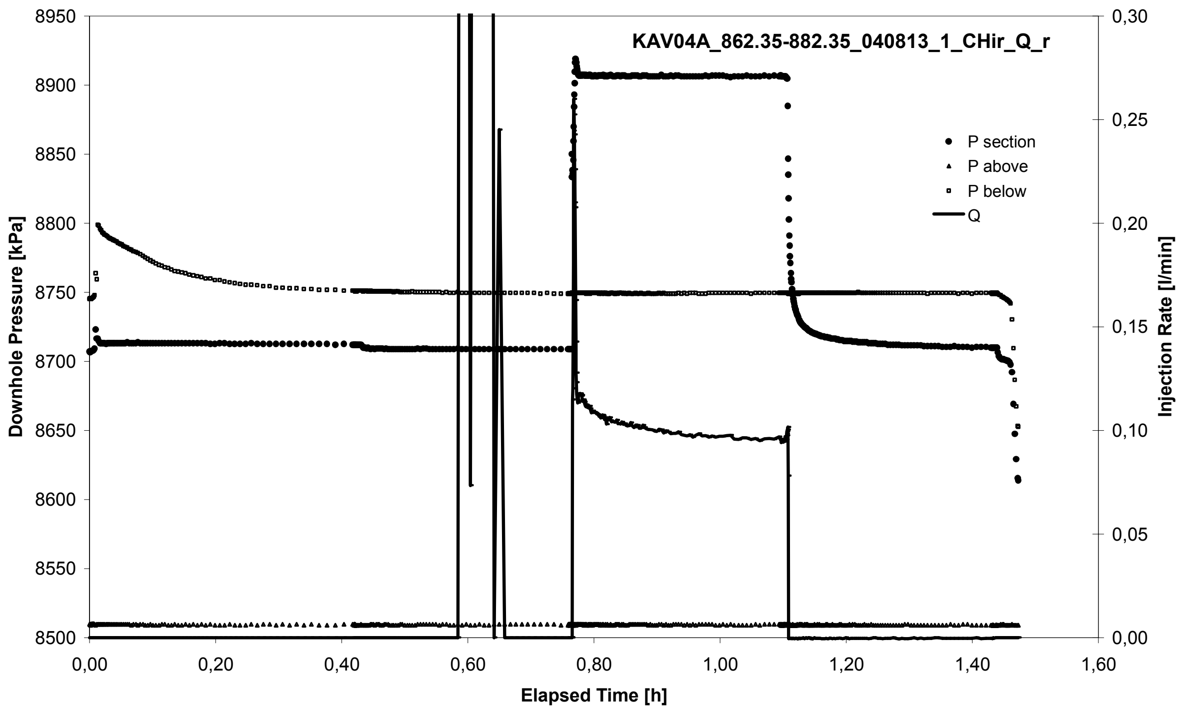


CHIR phase; HORNER match

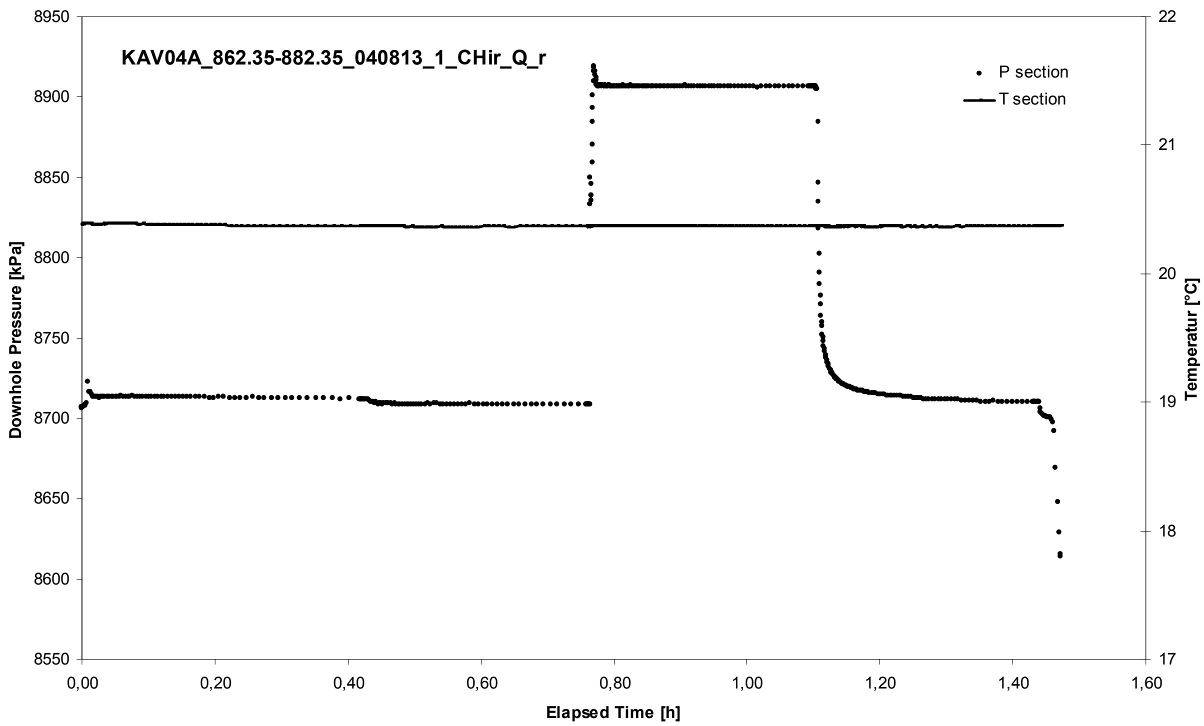
APPENDIX 2-50

Test 862,35 – 882,35 m

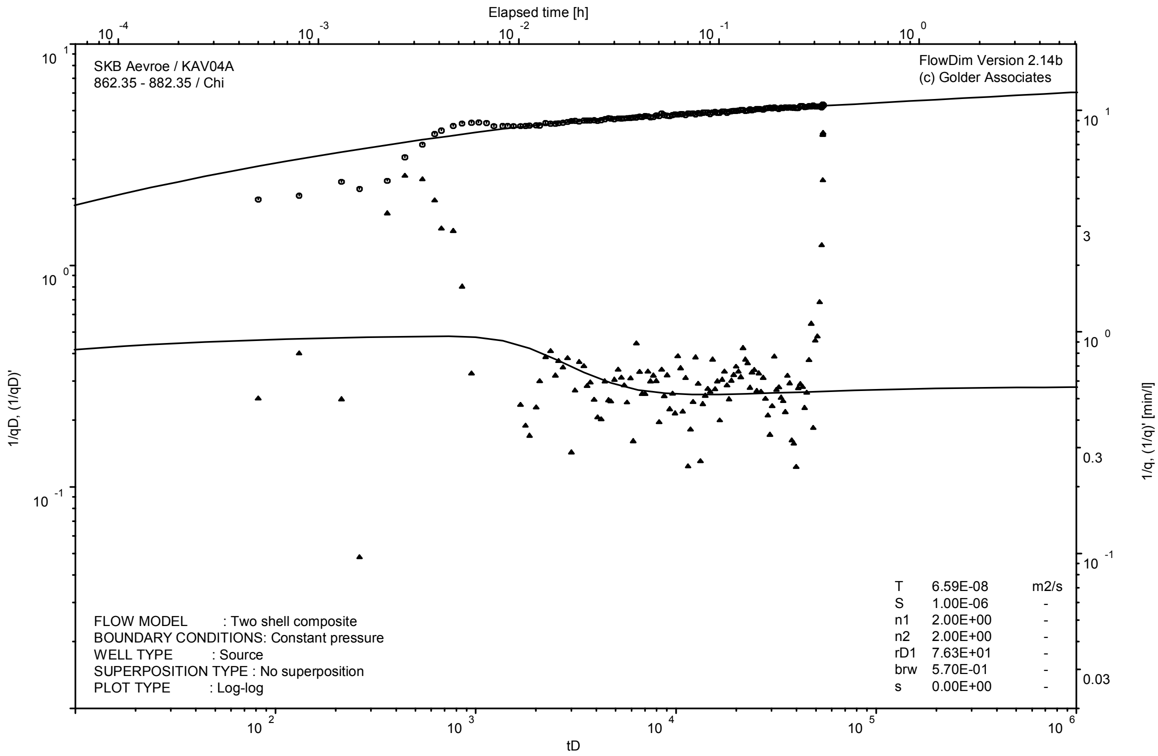
Analysis diagrams



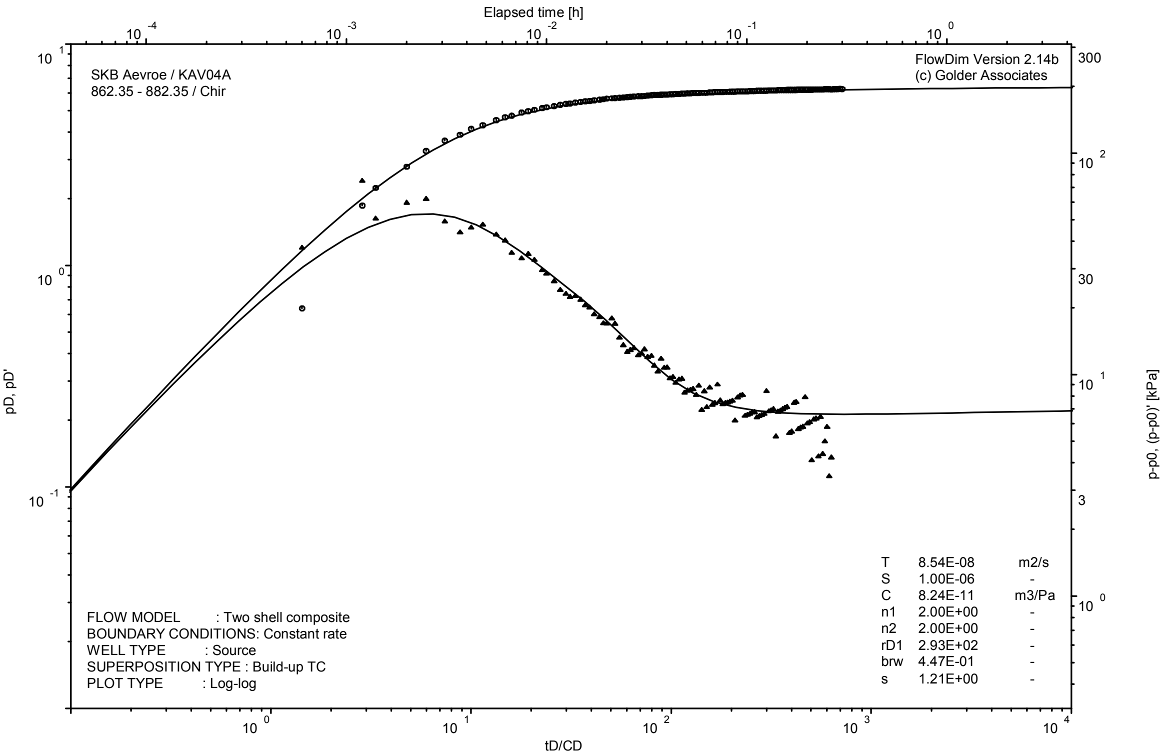
Pressure and flow rate vs. time; cartesian plot



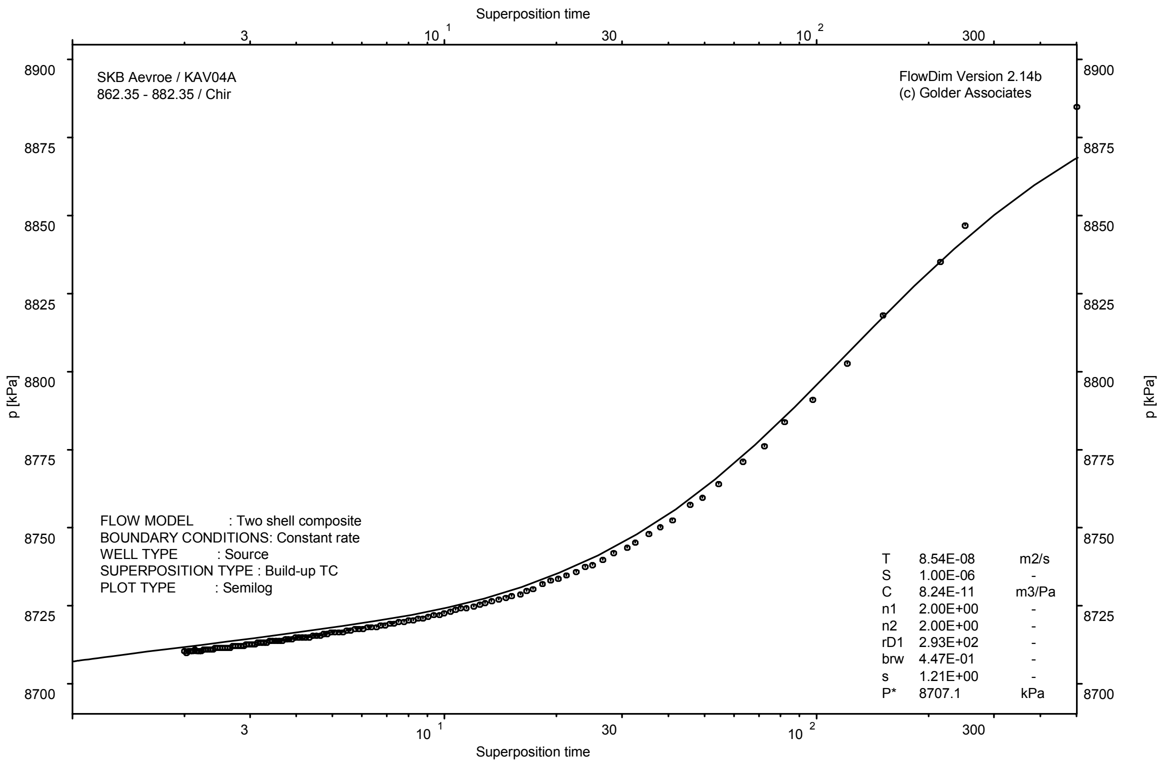
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match

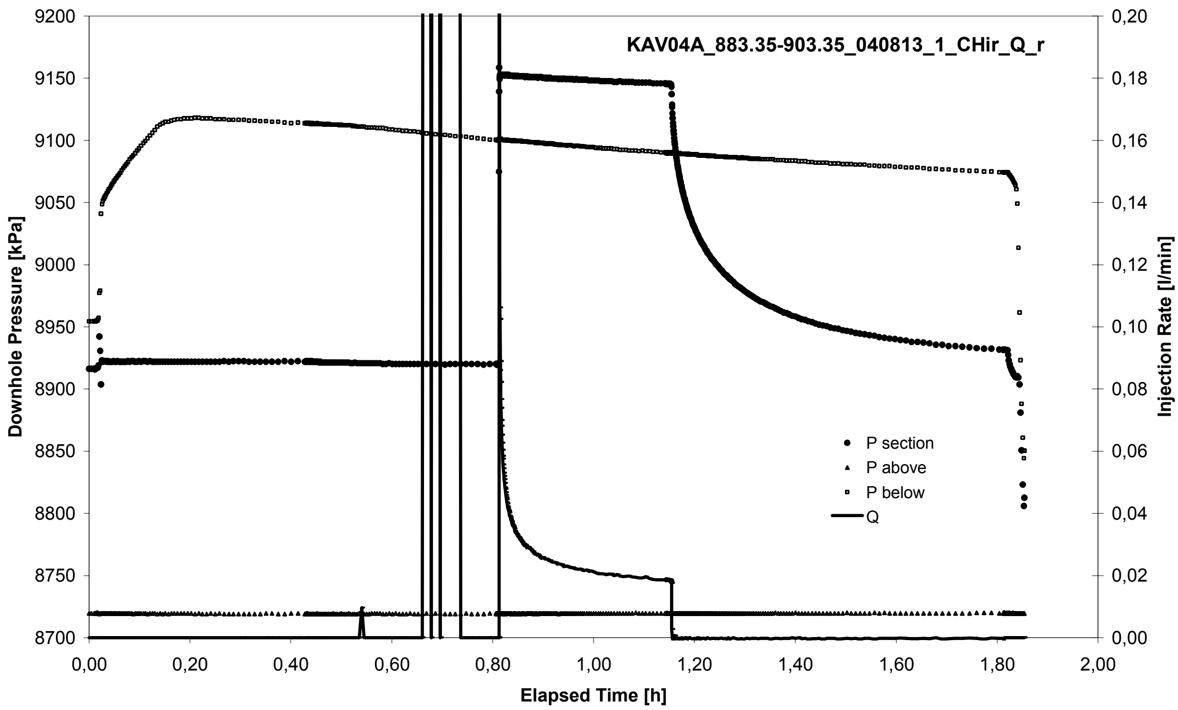


CHIR phase; HORNER match

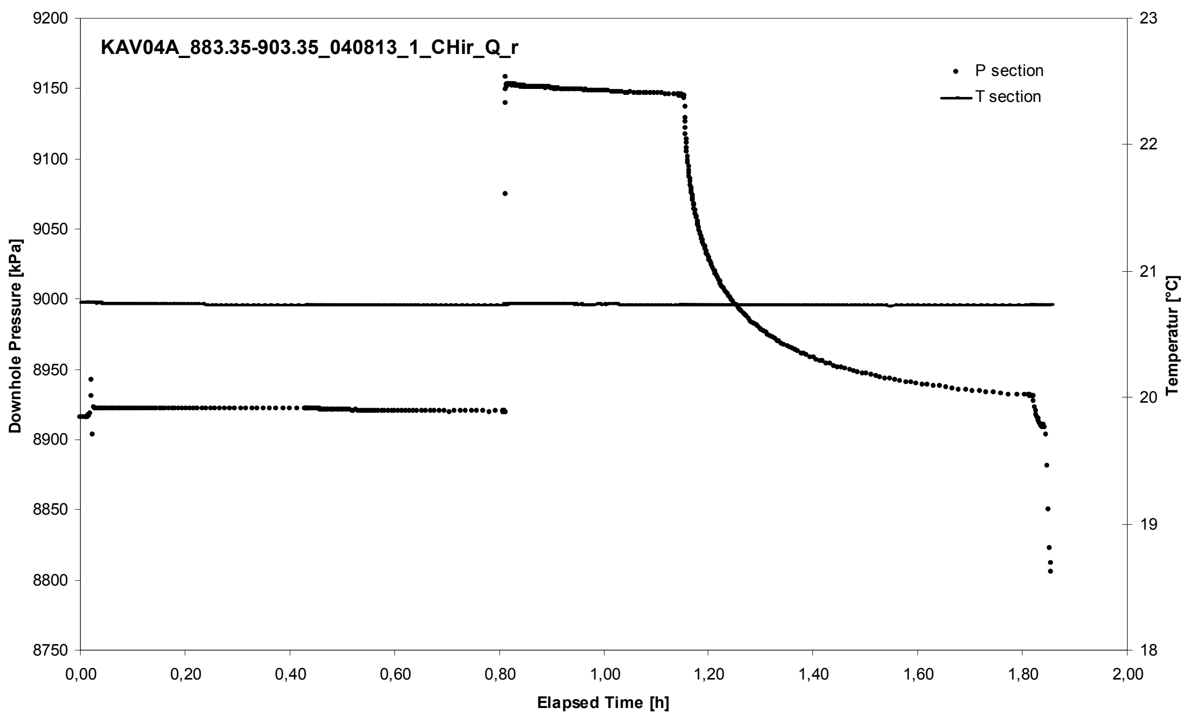
APPENDIX 2-51

Test 883,35 – 903,35 m

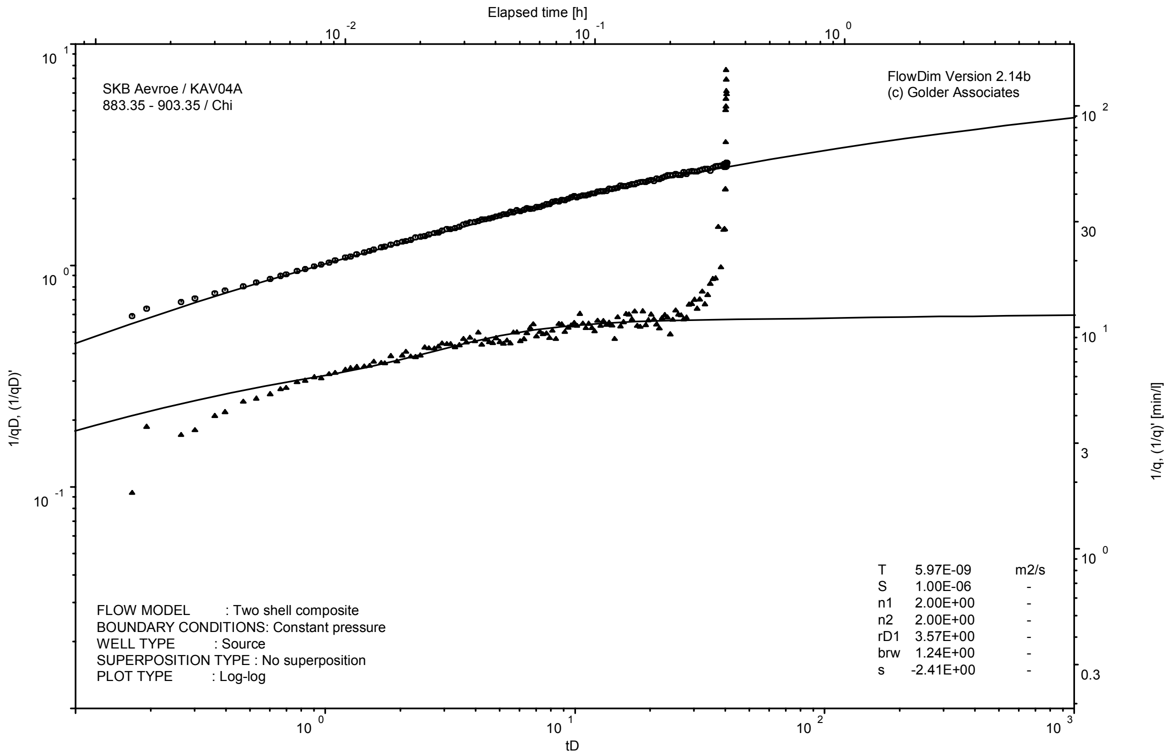
Analysis diagrams



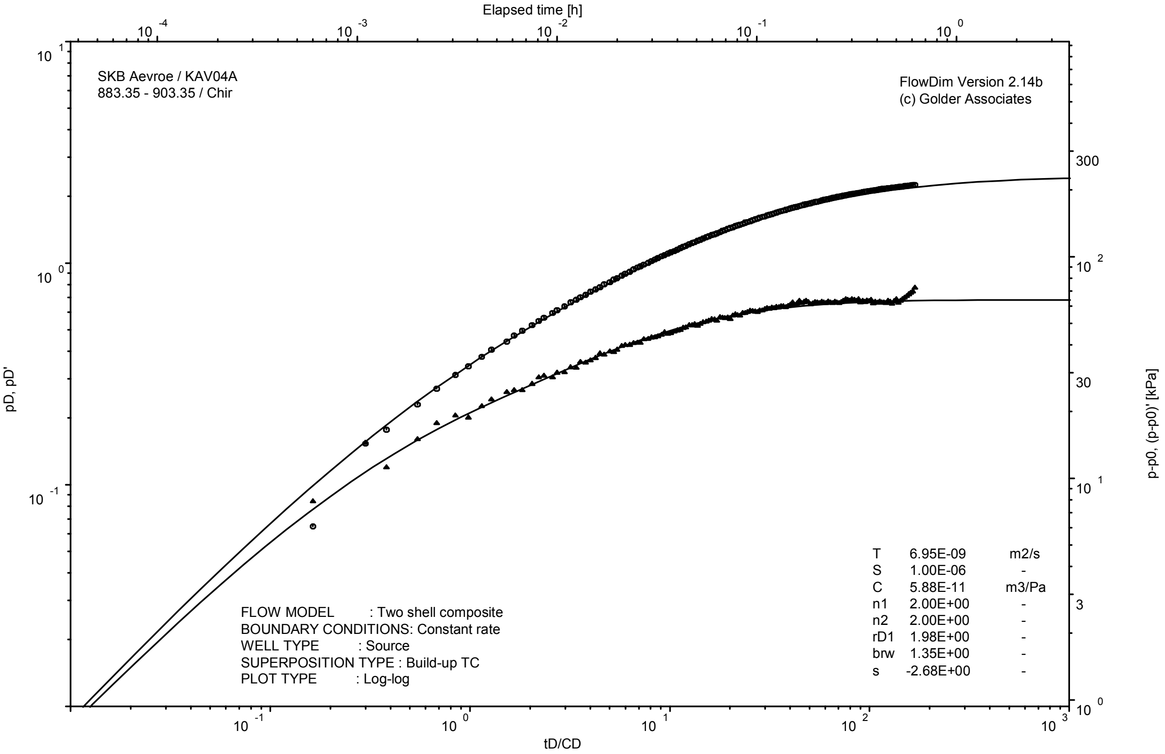
Pressure and flow rate vs. time; cartesian plot



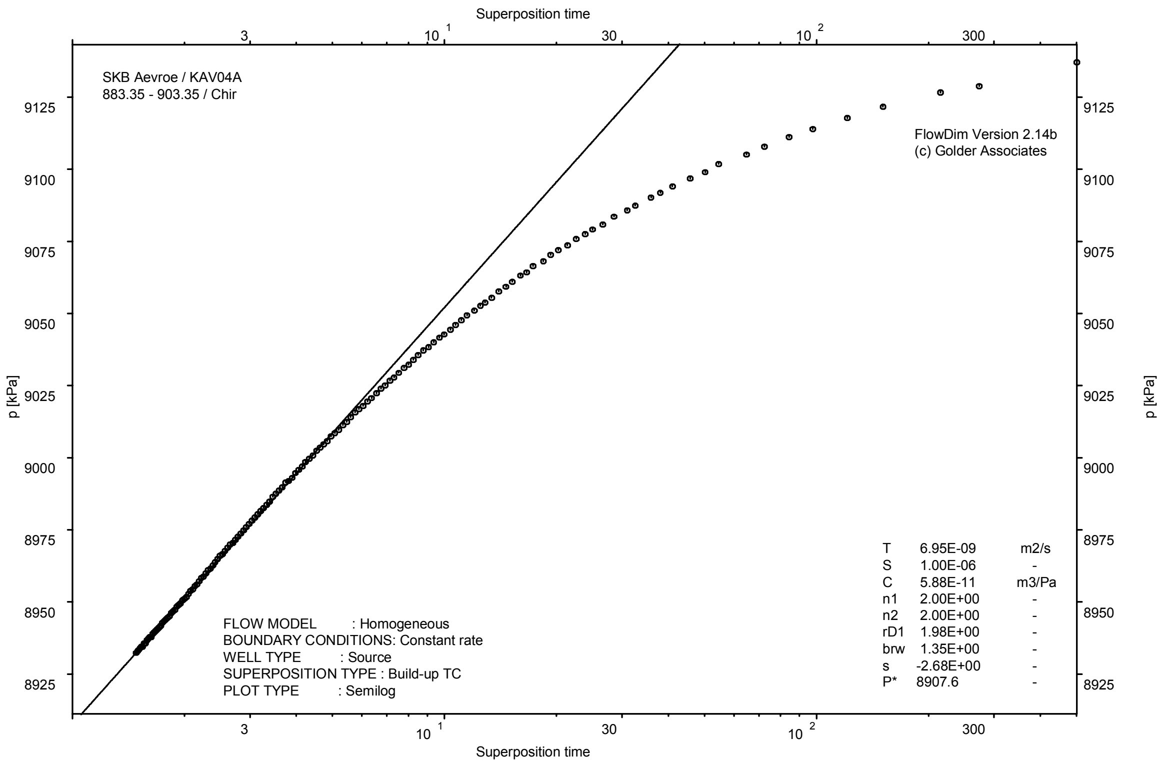
Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

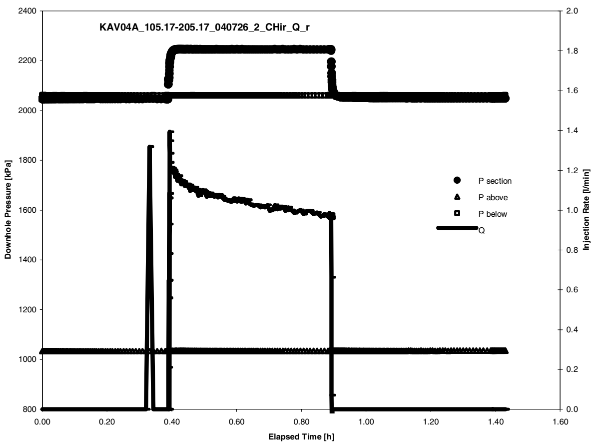
APPENDIX 3

Test Summary Sheets

Test Summary Sheet

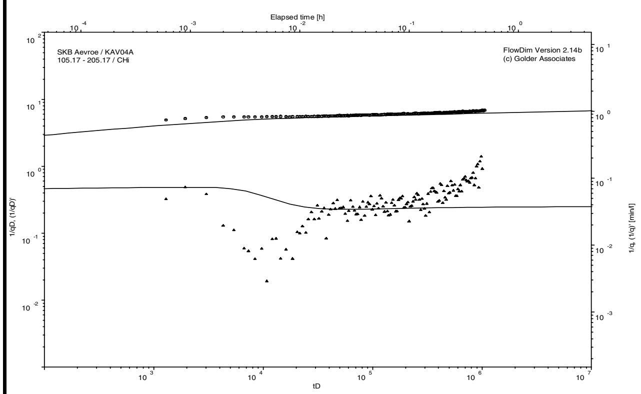
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	2
Borehole ID:	KAV04A	Test start:	040726 17:12
Test section from - to (m):	105.17 - 205.17 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

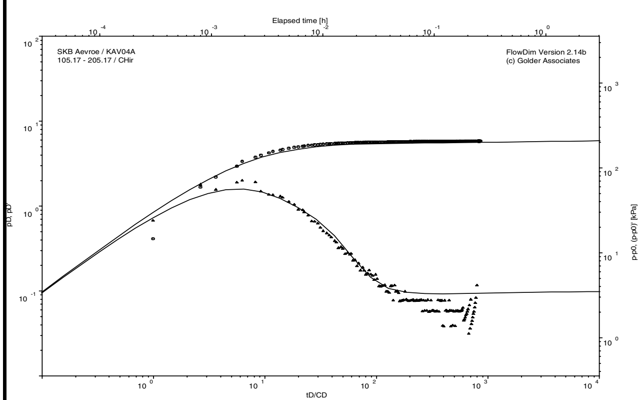


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	2022		
p_i (kPa) =	2047		
p_p(kPa) =	2245	p_F (kPa) =	2049
Q_p (m^3/s)=	1.61E-05		
tp (s) =	1800	t_F (s) =	1800
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	10.41		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	8.0E-07		
T_M (m^2/s)=	1.0E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	2.40
dt_2 (min) =	12.00	dt_2 (min) =	12.00
T (m^2/s) =	1.7E-06	T (m^2/s) =	3.85E-06
S (-) =	1.0E-04	S (-) =	1.00E-04
K_s (m/s) =	1.7E-08	K_s (m/s) =	3.85E-08
S_s (1/m) =	1.0E-06	S_s (1/m) =	1.00E-06
C (m^3/Pa) =	#NV	C (m^3/Pa) =	5.37E-10
C_D (-) =	#NV	C_D (-) =	5.92E-04
ξ (-) =	2.3	ξ (-) =	2.3
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	5.37E-10
dt_2 (min) =	12	C_D (-) =	5.92E-04
T_T (m^2/s) =	1.7E-06	ξ (-) =	2.3
S (-) =	1.0E-04		
K_s (m/s) =	1.7E-08		
S_s (1/m) =	1.0E-06		

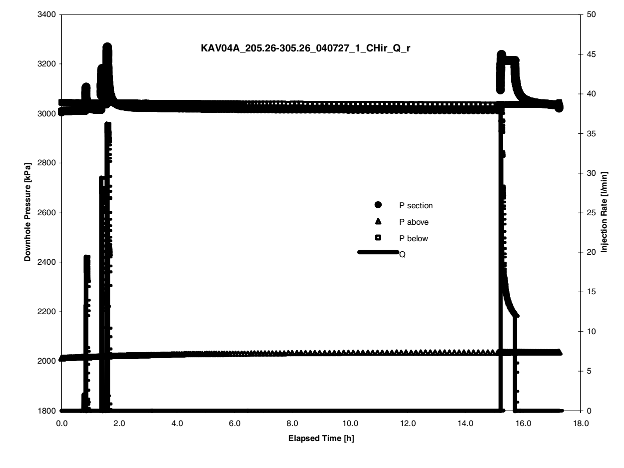
Comments:

The recommended transmissivity of 1.7E-6 m2/s was derived from the analysis of the CHi phase, which shows a good data and derivative quality, early time data were considered as skin effect. The confidence range for the interval transmissivity is estimated to be 5.0E-7 to 5.0E-6 m2/s (which includes the skin effects). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 2047.2 kPa.

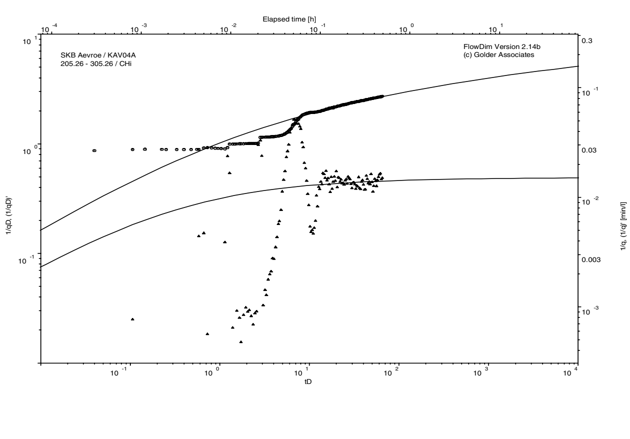
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040727 16:55
Test section from - to (m):	205.26 - 305.26 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

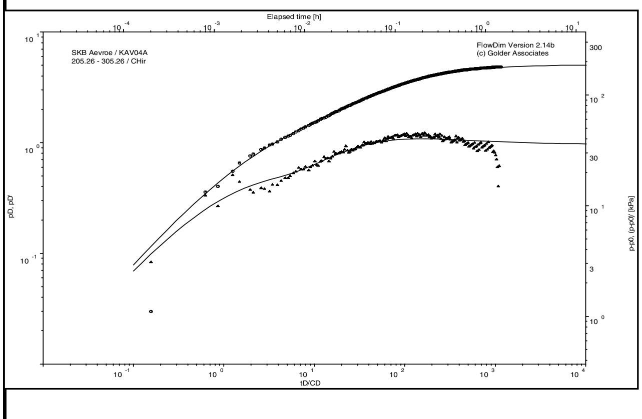
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	3010		
p_i (kPa) =	3015		
p_p(kPa) =	3213	p_F (kPa) =	3034
Q_p (m^3/s)=	1.99E-04		
tp (s) =	1800	t_F (s) =	5400
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	11.62		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	9.8E-06		
T_M (m^2/s)=	1.3E-05		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	6.00	dt_1 (min) =	1.00
dt_2 (min) =	36.00	dt_2 (min) =	42.00
T (m^2/s) =	4.3E-06	T (m^2/s) =	1.09E-05
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	4.3E-08	K_s (m/s) =	1.09E-07
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	3.21E-08
C_D (-) =	#NV	C_D (-) =	3.54
ξ (-) =	-5.65	ξ (-) =	-5.23
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	3.21E-08
dt_2 (min) =	42	C_D (-) =	3.54E+00
T_T (m^2/s) =	1.1E-05	ξ (-) =	-5.23
S (-) =	1.0E-06		
K_s (m/s) =	1.1E-07		
S_s (1/m) =	1.0E-08		

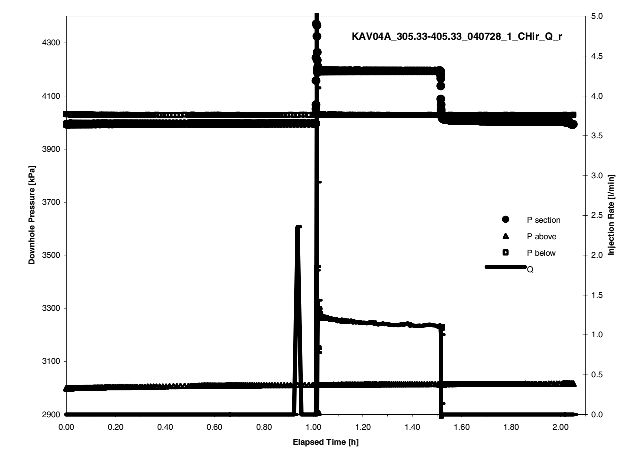
Comments:

The recommended transmissivity of 1.1E-5 m2/s was derived from the analysis of the CHir phase inner zone), which shows a good data and derivative quality. The confidence range for the interval transmissivity is estimated to be 5.0E-6 to 2.0E-5 m2/s (which includes the values derived for the outer composite zone). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 3025.3 kPa.

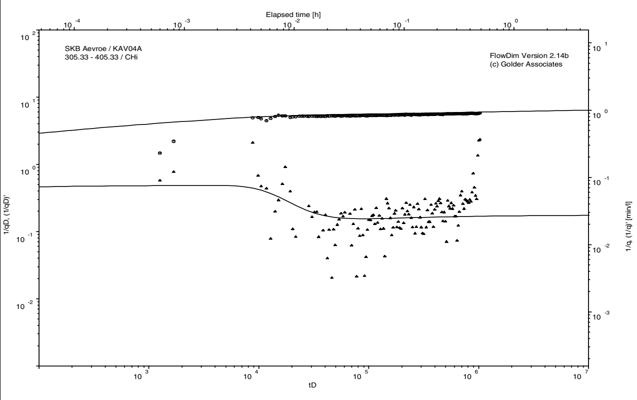
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040728 11:41
Test section from - to (m):	305.33 - 405.33 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

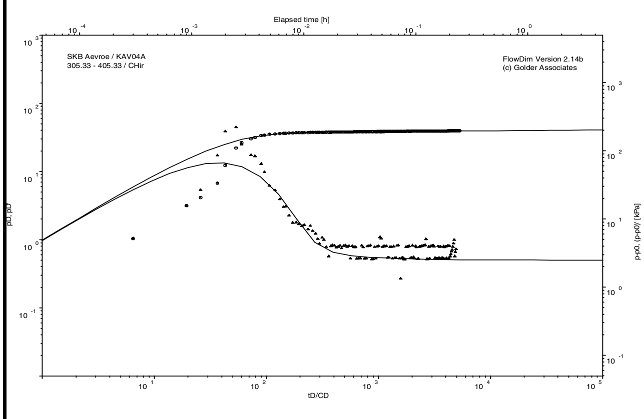
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	3993		
p_i (kPa) =	3995		
p_p(kPa) =	4194	p_F (kPa) =	4000
Q_p (m^3/s)=	1.78E-05		
tp (s) =	1800	t_F (s) =	1800
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	12.9		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	8.8E-07		
T_M (m^2/s)=	1.1E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	24.00	dt_2 (min) =	12.00
T (m^2/s) =	8.4E-07	T (m^2/s) =	6.10E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	8.4E-09	K_s (m/s) =	6.10E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	6.51E-10
C_D (-) =	#NV	C_D (-) =	7.18E-02
ξ (-) =	0	ξ (-) =	3.11E+01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	6.51E-10
dt_2 (min) =	12	C_D (-) =	7.18E-02
T_T (m^2/s) =	6.1E-06	ξ (-) =	3.11E+01
S (-) =	1.0E-06		
K_s (m/s) =	6.1E-08		
S_s (1/m) =	1.0E-08		

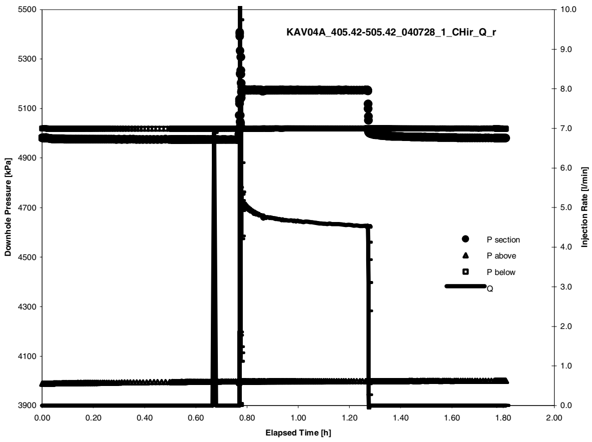
Comments:

The recommended transmissivity of 6.1E-6 m2/s was derived from the analysis of the CHir phase, which is consistent with the outer zone derived from the analysis of the CHi phase and shows the best data and derivative quality. The confidence range for the interval transmissivity is estimated to be 7.0E-7 to 7.0E-6 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 3998.8 kPa.

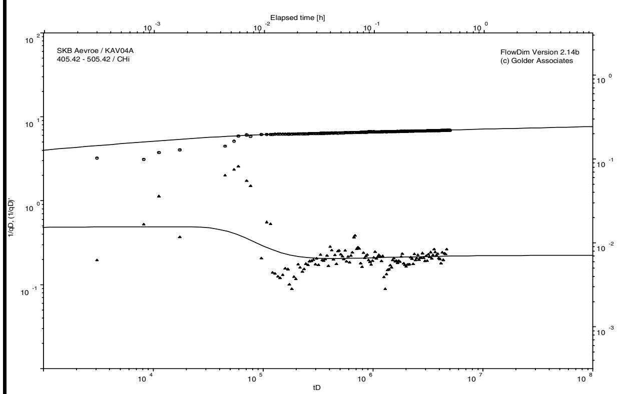
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040728 14:57
Test section from - to (m):	405.42 - 505.42 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

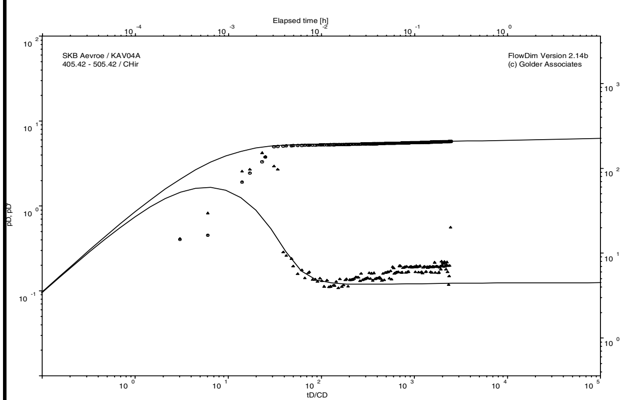
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	4982		
p_i (kPa) =	4975		
p_p(kPa) =	5174	p_F (kPa) =	4981
Q_p (m^3/s)=	7.54E-05		
tp (s) =	1800	t_F (s) =	1800
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	14.41		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	3.7E-06		
T_M (m^2/s)=	4.8E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	30.00	dt_2 (min) =	12.00
T (m^2/s) =	9.1E-06	T (m^2/s) =	3.41E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	9.1E-08	K_s (m/s) =	3.41E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	7.80E-10
C_D (-) =	#NV	C_D (-) =	8.60E-02
ξ (-) =	0	ξ (-) =	0
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	7.80E-10
dt_2 (min) =	30	C_D (-) =	8.60E-02
T_T (m^2/s) =	9.1E-06	ξ (-) =	0
S (-) =	1.0E-06		
K_s (m/s) =	9.1E-08		
S_s (1/m) =	1.0E-08		

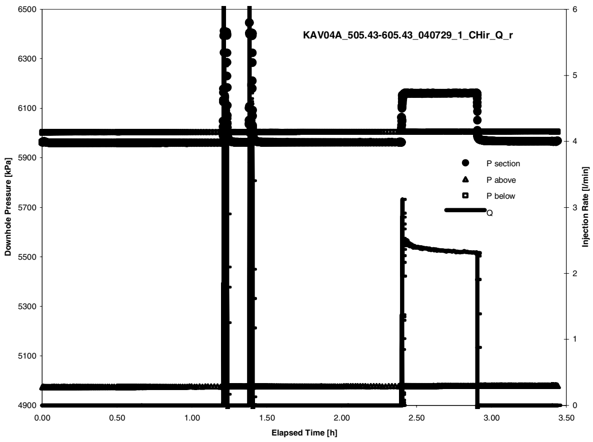
Comments:

The recommended transmissivity of 9.1E-6 m2/s was derived from the analysis of the CHi phase, which is consistent with the analysis of the CHir phase (outer zone) and shows good data and derivative quality. Early time data were considered as skin effect. The confidence range for the interval transmissivity is estimated to be 3.0E-6 to 2.0E-5 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 4975.5 kPa.

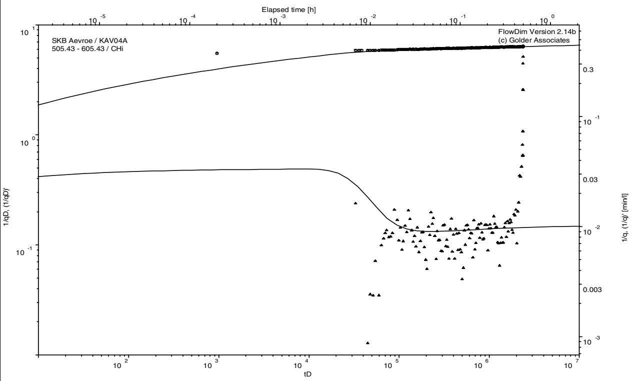
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040729 10:58
Test section from - to (m):	505.43 - 605.43 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

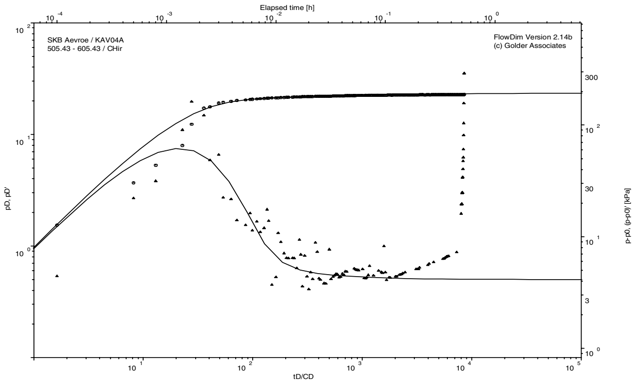
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	5947		
p_i (kPa) =	5962		
p_p(kPa) =	6153	p_F (kPa) =	5968
Q_p (m^3/s)=	3.83E-05		
tp (s) =	1800	t_F (s) =	1800
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	16.21		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	2.0E-06		
T_M (m^2/s)=	2.6E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	24.00	dt_2 (min) =	12.00
T (m^2/s) =	6.4E-06	T (m^2/s) =	7.39E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	6.4E-08	K_s (m/s) =	7.39E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	1.05E-09
C_D (-) =	#NV	C_D (-) =	1.16E-01
ξ (-) =	0	ξ (-) =	1.50E+01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	1.05E-09
dt_2 (min) =	12	C_D (-) =	1.16E-01
T_T (m^2/s) =	7.4E-06	ξ (-) =	1.50E+01
S (-) =	1.0E-06		
K_s (m/s) =	7.4E-08		
S_s (1/m) =	1.0E-08		

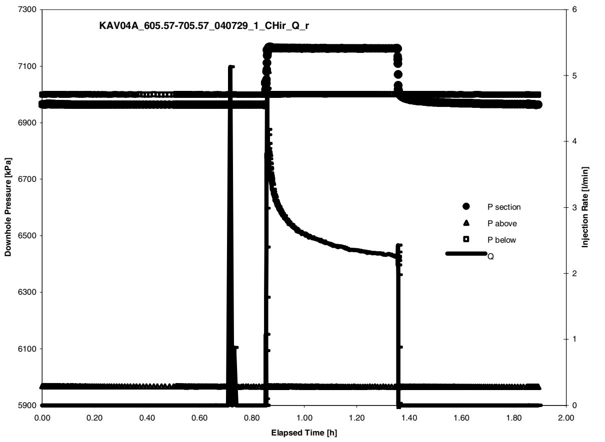
Comments:

The recommended transmissivity of 7.4E-6 m2/s was derived from the analysis of the CHir phase, which is consistent with the outer zone derived from the analysis of the CHi phase and shows the best data and derivative quality. The confidence range for the interval transmissivity is estimated to be 1.0E-6 to 8.0E-6 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 5964.5 kPa.

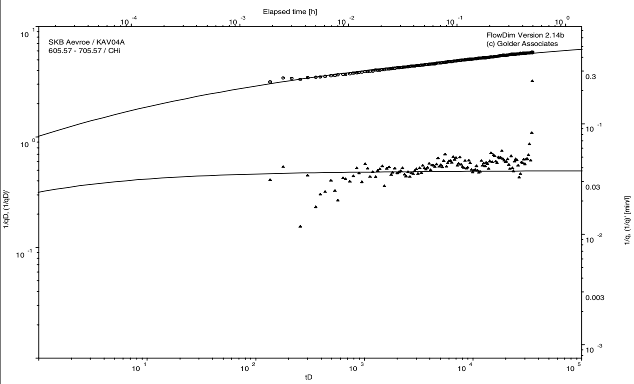
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040729 17:56
Test section from - to (m):	605.57-705.57 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

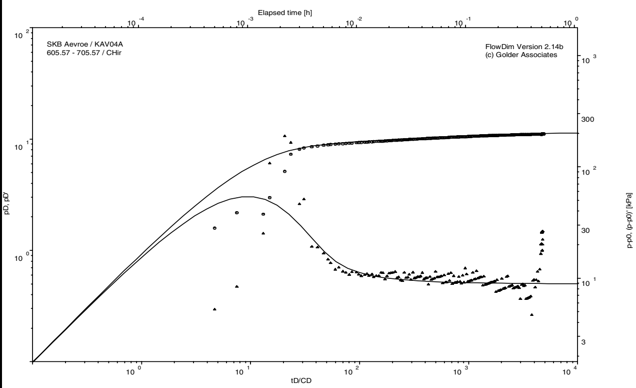
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	6964		
p_i (kPa) =	6963		
p_p(kPa) =	7163	p_F (kPa) =	6963
Q_p (m^3/s)=	3.75E-05		
tp (s) =	1800	t_F (s) =	1800
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	17.69		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.8E-06		
T_M (m^2/s)=	2.4E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	24.00	dt_2 (min) =	18.00
T (m^2/s) =	1.7E-06	T (m^2/s) =	3.74E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.7E-08	K_s (m/s) =	3.74E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	9.23E-10
C_D (-) =	#NV	C_D (-) =	1.02E-01
ξ (-) =	-2.05	ξ (-) =	3.45
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	9.23E-10
dt_2 (min) =	18	C_D (-) =	1.02E-01
T_T (m^2/s) =	3.7E-06	ξ (-) =	3.45
S (-) =	1.0E-06		
K_s (m/s) =	3.7E-08		
S_s (1/m) =	1.0E-08		

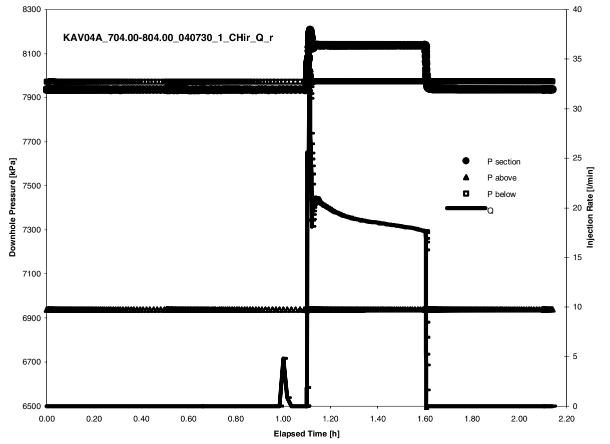
Comments:

The recommended transmissivity of 3.7E-6 m2/s was derived from the analysis of the CHir phase, which is consistent with value derived from the CHi phase and shows the best data and derivative quality. The confidence range for the interval transmissivity is estimated to be 8.0E-7 to 5.0E-6 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 6959.3 kPa.

Test Summary Sheet

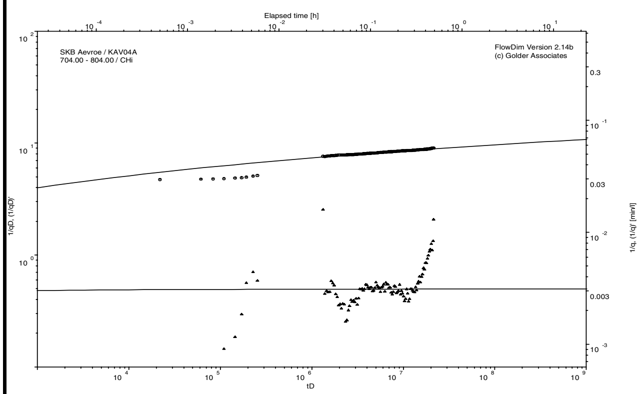
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040730 13:58
Test section from - to (m):	704.00-804.00 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

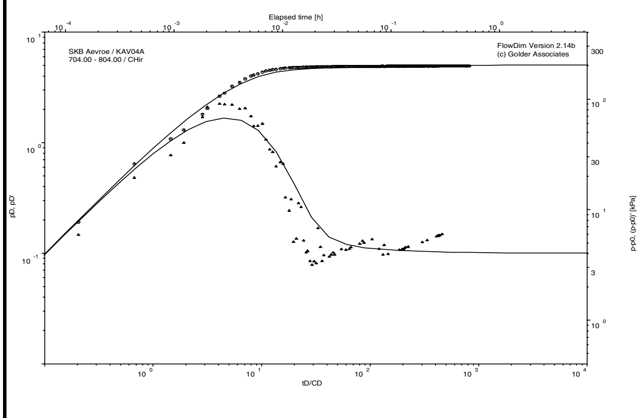


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	7936		
p_i (kPa) =	7938		
p_p(kPa) =	8137	p_F (kPa) =	7937
Q_p (m^3/s)=	2.95E-04		
tp (s) =	1800	t_F (s) =	1800
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	19.17		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.5E-05		
T_M (m^2/s)=	1.9E-05		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	6.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	2.1E-05	T (m^2/s) =	6.00E-05
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	2.1E-07	K_s (m/s) =	6.00E-07
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	1.78E-08
C_D (-) =	#NV	C_D (-) =	1.96E+00
ξ (-) =	-8.28E-02	ξ (-) =	-3.29E-01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.			
dt_1 (min) =	6	C (m^3/Pa) =	1.78E-08
dt_2 (min) =	18	C_D (-) =	1.96E+00
T_T (m^2/s) =	2.1E-05	ξ (-) =	-8.28E-02
S (-) =	1.0E-06		
K_s (m/s) =	2.1E-07		
S_s (1/m) =	1.0E-08		

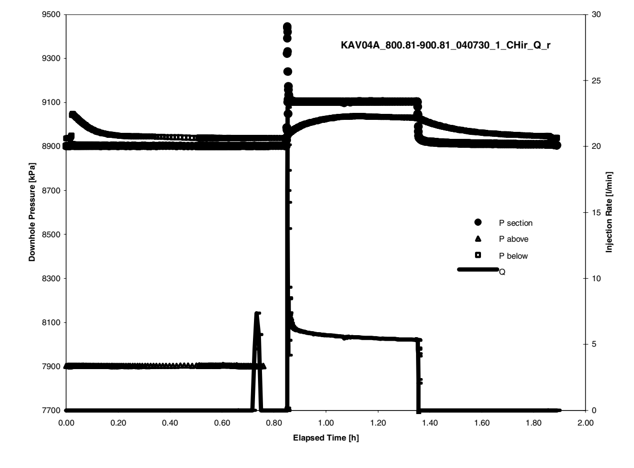
Comments:

The recommended transmissivity of 2.1E-5 m2/s was derived from the analysis of the CHi phase, which shows a clear flat derivative at late times. The confidence range for the interval transmissivity is estimated to be 1.0E-5 to 7.0E-5 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 7936.9 kPa.

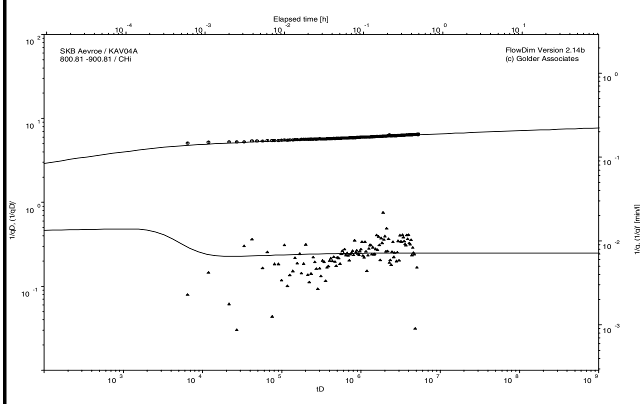
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040730 19:06
Test section from - to (m):	800.81-900.81 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

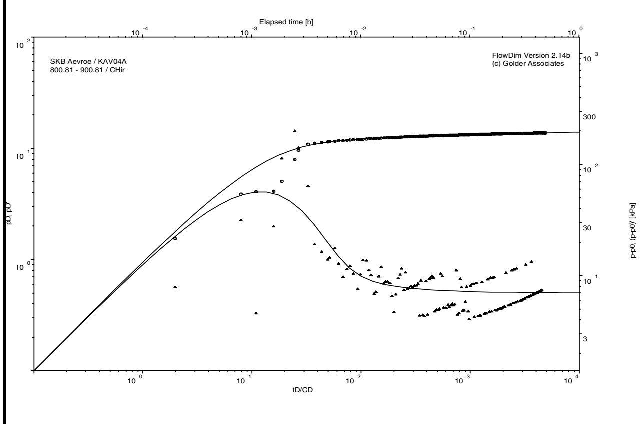
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	8901		
p_i (kPa) =	8903		
p_p(kPa) =	9101	p_F (kPa) =	8909
Q_p (m^3/s)=	8.88E-05		
tp (s) =	1800	t_F (s) =	1800
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	20.67		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	4.4E-06		
T_M (m^2/s)=	5.7E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	24.00	dt_2 (min) =	18.00
T (m^2/s) =	9.0E-06	T (m^2/s) =	9.92E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	9.0E-08	K_s (m/s) =	9.92E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	2.31E-09
C_D (-) =	#NV	C_D (-) =	2.55E-01
ξ (-) =	0	ξ (-) =	5.64
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	2.31E-09
dt_2 (min) =	18	C_D (-) =	2.55E-01
T_T (m^2/s) =	9.0E-06	ξ (-) =	5.64
S (-) =	1.0E-06		
K_s (m/s) =	9.0E-08		
S_s (1/m) =	1.0E-08		

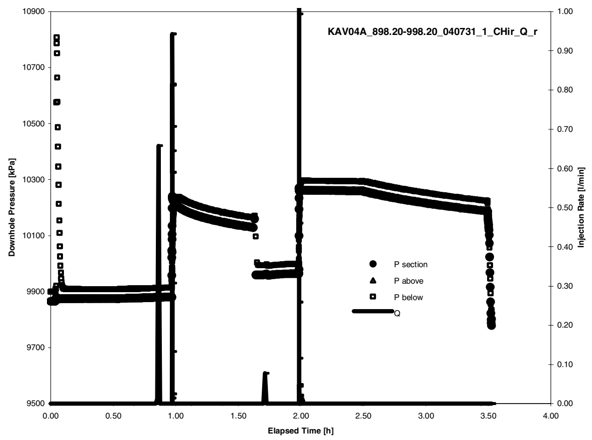
Comments:

The recommended transmissivity of 9.0E-6 m2/s was derived from the analysis of the CHi phase, which shows a clear flat derivative at late times. Early time data were considered as skin effect. The confidence range for the interval transmissivity is estimated to be 3.0E-6 to 2.0E-5 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8904.9 kPa.

Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	PI
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040731 10:54
Test section from - to (m):	898.20-998.20 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

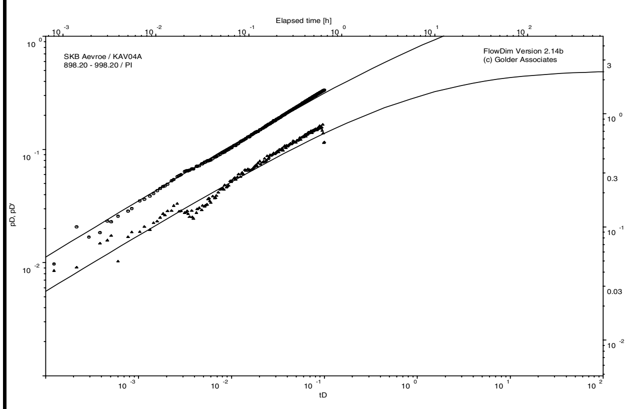
Linear plot Q and p



Log-Log plot incl. derivates- flow period

Not Analysed

Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	9865		
p_i (kPa) =	9964		
p_p(kPa) =	10259	p_F (kPa) =	10189
Q_p (m^3/s)=	8.33E-08		
tp (s) =	1800	t_F (s) =	1800
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	22.27		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	2.8E-09		
T_M (m^2/s)=	3.6E-09		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	#NV
dt_2 (min) =	30.00	dt_2 (min) =	#NV
T (m^2/s) =	2.4E-11	T (m^2/s) =	#NV
S (-) =	1.0E-06	S (-) =	#NV
K_s (m/s) =	2.4E-13	K_s (m/s) =	#NV
S_s (1/m) =	1.0E-08	S_s (1/m) =	#NV
C (m^3/Pa) =	2.7E-10	C (m^3/Pa) =	#NV
C_D (-) =	3.0E-02	C_D (-) =	#NV
ξ (-) =	-2.99	ξ (-) =	#NV
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	2.72E-10
dt_2 (min) =	30	C_D (-) =	3.00E-02
T_T (m^2/s) =	2.4E-11	ξ (-) =	-2.99
S (-) =	1.0E-06		
K_s (m/s) =	2.4E-13		
S_s (1/m) =	1.0E-08		

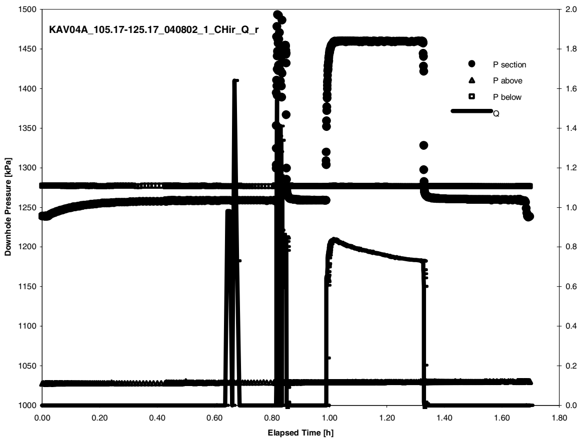
Comments:

The recommended transmissivity of 2.4E-11 m2/s was derived from the analysis of the PI phase. The confidence range for the interval transmissivity is estimated to be 8.0E-12 to 5.0E-11 m2/s. The flow dimension displayed during the test is 2. The static pressure could not be extrapolated due to the very low interval transmissivity.

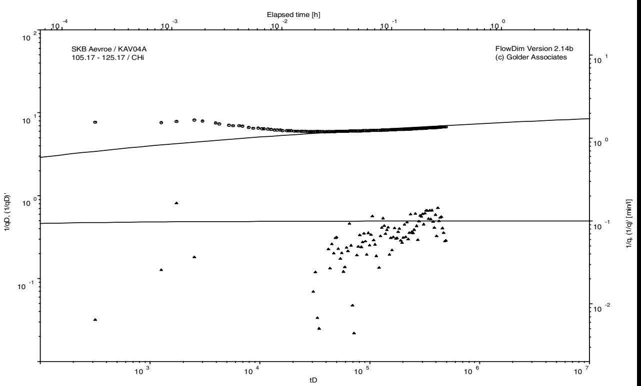
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	CHir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040802 18:44
Test section from - to (m):	105.17-125.17 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

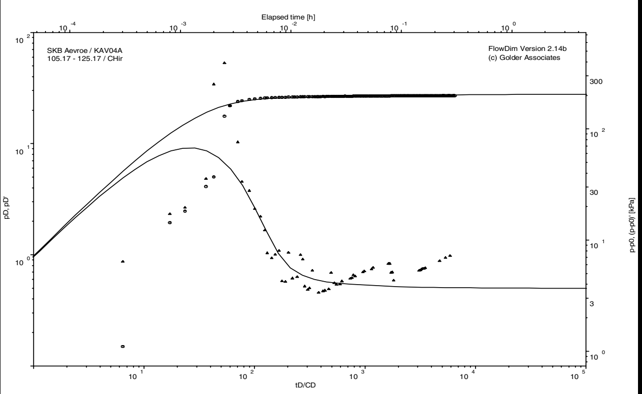
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	1238		
p_i (kPa) =	1258		
p_p(kPa) =	1457	p_F (kPa) =	1259
Q_p (m^3/s)=	1.22E-05		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	9.19		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	6.0E-07		
T_M (m^2/s)=	6.3E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	6.5E-07	T (m^2/s) =	2.72E-06
S (-) =	1.0E-04	S (-) =	1.00E-04
K_s (m/s) =	6.5E-09	K_s (m/s) =	2.72E-08
S_s (1/m) =	1.0E-06	S_s (1/m) =	1.00E-06
C (m^3/Pa) =	#NV	C (m^3/Pa) =	2.94E-10
C_D (-) =	#NV	C_D (-) =	3.24E-04
ξ (-) =	2.29	ξ (-) =	2.24E+01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	2.94E-10
dt_2 (min) =	18	C_D (-) =	3.24E-04
T_T (m^2/s) =	6.5E-07	ξ (-) =	2.29
S (-) =	1.0E-04		
K_s (m/s) =	6.5E-09		
S_s (1/m) =	1.0E-06		

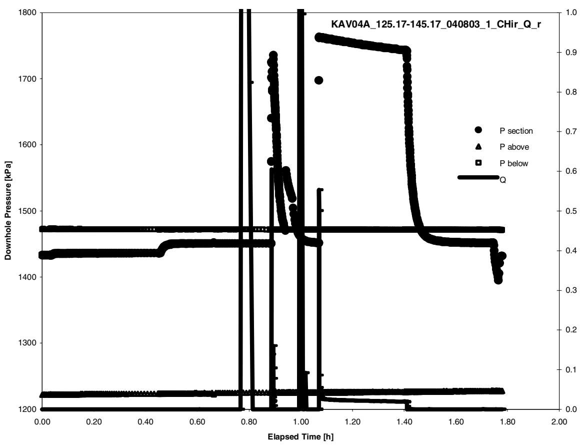
Comments:

The recommended transmissivity of 6.5E-7 m2/s was derived from the analysis of the CHi phase, which was considered to be more reliable (see comments above concerning the CHir phase). The confidence range for the interval transmissivity is estimated to be 5.0E-7 to 3.0E-6 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 1259.3 kPa.

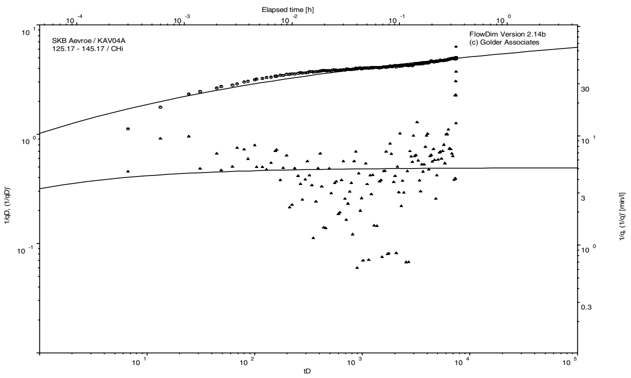
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040803 09:57
Test section from - to (m):	125.17-145.17 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

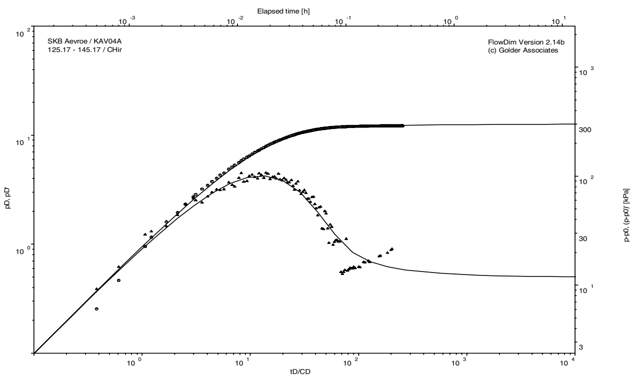
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	1433		
p_i (kPa) =	1452		
p_p(kPa) =	1743	p_F (kPa) =	1451
Q_p (m^3/s)=	3.17E-07		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	9.49		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.1E-08		
T_M (m^2/s)=	1.1E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	8.3E-09	T (m^2/s) =	2.08E-08
S (-) =	1.0E-04	S (-) =	1.00E-04
K_s (m/s) =	8.3E-11	K_s (m/s) =	2.08E-10
S_s (1/m) =	1.0E-06	S_s (1/m) =	1.00E-06
C (m^3/Pa) =	#NV	C (m^3/Pa) =	6.29E-11
C_D (-) =	#NV	C_D (-) =	6.93E-05
ξ (-) =	2.37	ξ (-) =	9.75
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	6.29E-11
dt_2 (min) =	12	C_D (-) =	6.93E-05
T_T (m^2/s) =	2.1E-08	ξ (-) =	9.75
S (-) =	1.0E-04		
K_s (m/s) =	2.1E-10		
S_s (1/m) =	1.0E-06		

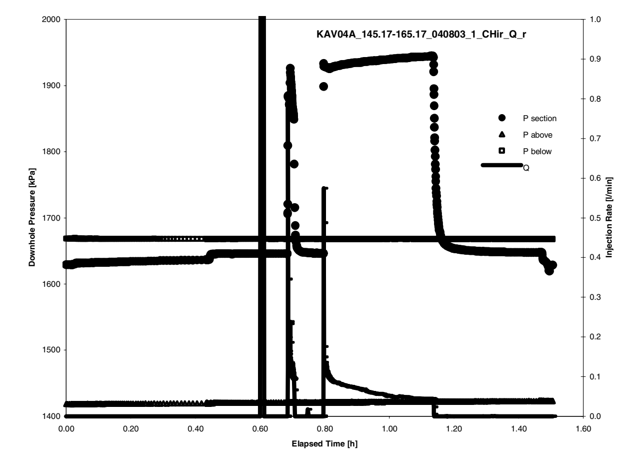
Comments:

The recommended transmissivity of 2.1E-8 m2/s was derived from the analysis of the CHir phase, which shows better data quality. The confidence range for the interval transmissivity is estimated to be 7.0E-9 to 3.0E-8 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 1448.9 kPa.

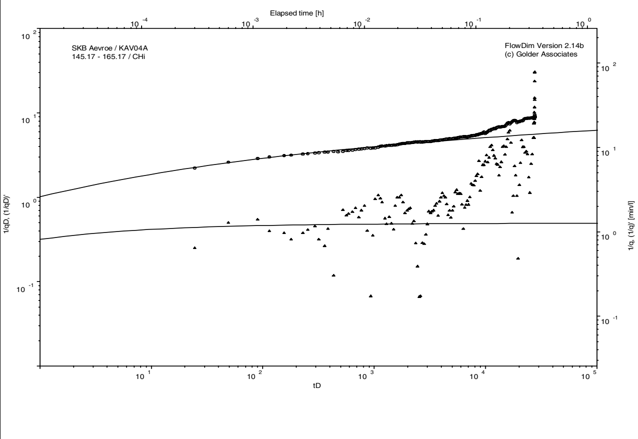
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040803 12:33
Test section from - to (m):	145.17-165.17 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

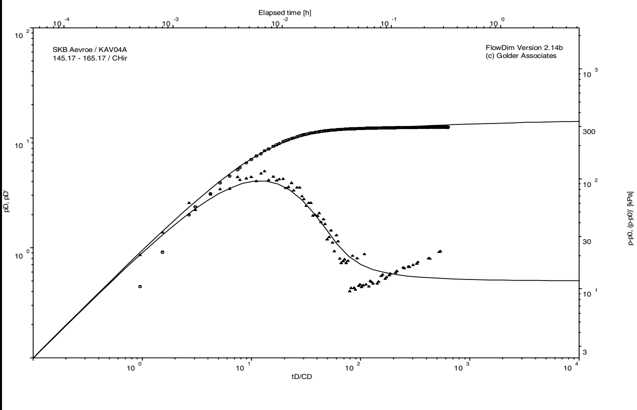
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	1629		
p_i (kPa) =	1646		
p_p(kPa) =	1944	p_F (kPa) =	1647
Q_p (m^3/s)=	7.17E-07		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	9.78		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	2.4E-08		
T_M (m^2/s)=	2.5E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	6.00	dt_2 (min) =	6.00
T (m^2/s) =	3.3E-08	T (m^2/s) =	6.84E-08
S (-) =	1.0E-04	S (-) =	1.00E-04
K_s (m/s) =	3.3E-10	K_s (m/s) =	6.84E-10
S_s (1/m) =	1.0E-06	S_s (1/m) =	1.00E-06
C (m^3/Pa) =	#NV	C (m^3/Pa) =	8.24E-11
C_D (-) =	#NV	C_D (-) =	9.08E-05
ξ (-) =	2.3	ξ (-) =	9.61
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	8.24E-11
dt_2 (min) =	6	C_D (-) =	9.08E-05
T_T (m^2/s) =	6.8E-08	ξ (-) =	9.61
S (-) =	1.0E-04		
K_s (m/s) =	6.8E-10		
S_s (1/m) =	1.0E-06		

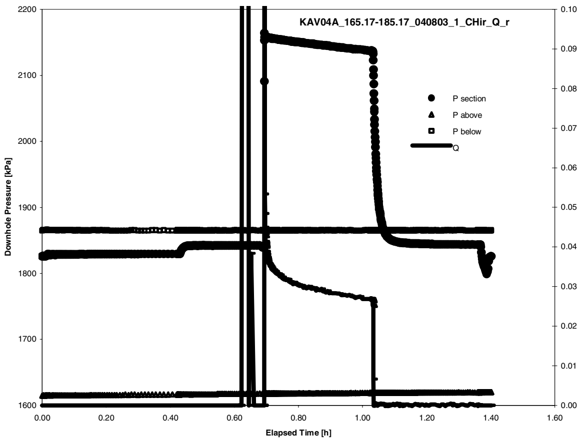
Comments:

The recommended transmissivity of 6.8E-8 m2/s was derived from the analysis of the CHir phase, which shows better data quality. The confidence range for the interval transmissivity is estimated to be 2.0E-8 to 8.0E-8 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 1644.5 kPa.

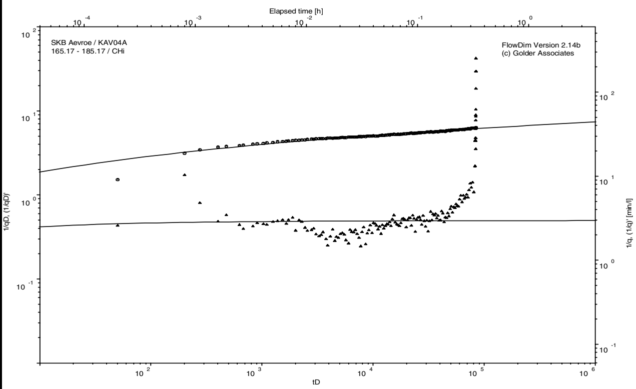
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040803 15:49
Test section from - to (m):	165.17-185.17 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

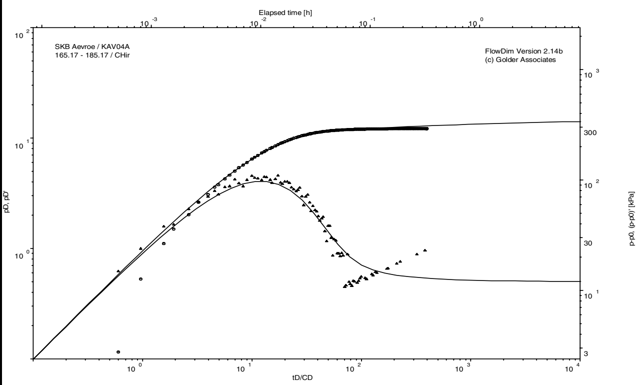
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	1826		
p_i (kPa) =	1842		
p_p(kPa) =	2137	p_F (kPa) =	1843
Q_p (m^3/s)=	4.50E-07		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	10.04		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.5E-08		
T_M (m^2/s)=	1.6E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	12.00	dt_2 (min) =	12.00
T (m^2/s) =	1.4E-08	T (m^2/s) =	3.26E-08
S (-) =	1.0E-04	S (-) =	1.00E-04
K_s (m/s) =	1.4E-10	K_s (m/s) =	3.26E-10
S_s (1/m) =	1.0E-06	S_s (1/m) =	1.00E-06
C (m^3/Pa) =	#NV	C (m^3/Pa) =	6.24E-11
C_D (-) =	#NV	C_D (-) =	6.88E-05
ξ (-) =	3.29	ξ (-) =	9.75
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	6.24E-11
dt_2 (min) =	12	C_D (-) =	6.88E-05
T_T (m^2/s) =	1.4E-08	ξ (-) =	3.29
S (-) =	1.0E-04		
K_s (m/s) =	1.4E-10		
S_s (1/m) =	1.0E-06		

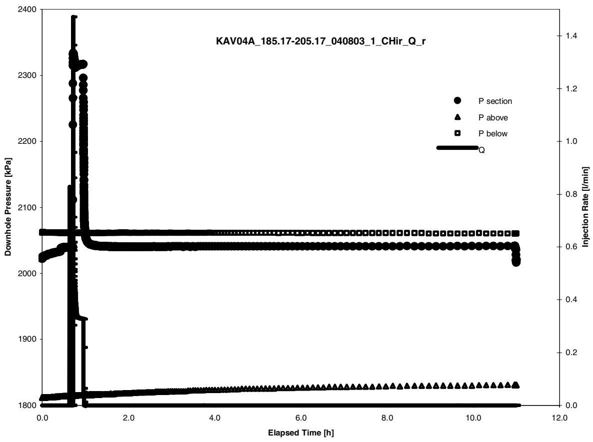
Comments:

The recommended transmissivity of 1.4E-8 m2/s was derived from the analysis of the CHi phase, which shows a clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E-8 to 5.0E-8 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 1841.6 kPa.

Test Summary Sheet

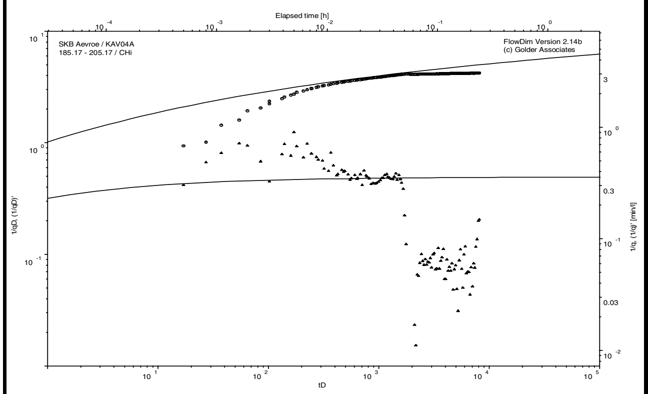
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040803 17:57
Test section from - to (m):	185.17-205.17 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

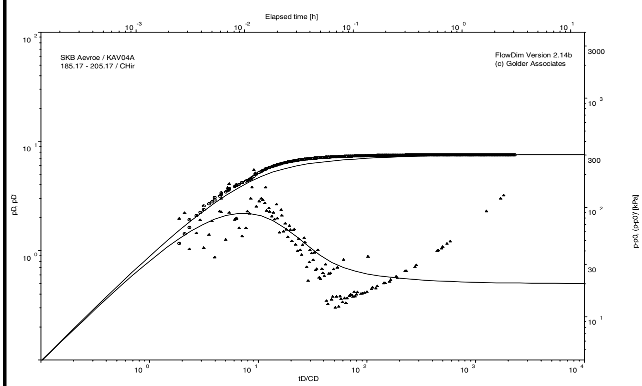


Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	2026		
p_i (kPa) =	2039		
p_p(kPa) =	2316	p_F (kPa) =	2041
Q_p (m^3/s)=	5.43E-06		
tp (s) =	900	t_F (s) =	36000
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	10.3		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.9E-07		
T_M (m^2/s)=	2.0E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	4.00	dt_2 (min) =	7.00
T (m^2/s) =	1.3E-07	T (m^2/s) =	2.19E-07
S (-) =	1.0E-04	S (-) =	1.00E-04
K_s (m/s) =	1.3E-09	K_s (m/s) =	2.19E-09
S_s (1/m) =	1.0E-06	S_s (1/m) =	1.00E-06
C (m^3/Pa) =	#NV	C (m^3/Pa) =	6.74E-10
C_D (-) =	#NV	C_D (-) =	7.43E-04
ξ (-) =	1.17	ξ (-) =	3.61
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	6.74E-10
dt_2 (min) =	7	C_D (-) =	7.43E-04
T_T (m^2/s) =	2.2E-07	ξ (-) =	3.61
S (-) =	1.0E-04		
K_s (m/s) =	2.2E-09		
S_s (1/m) =	1.0E-06		

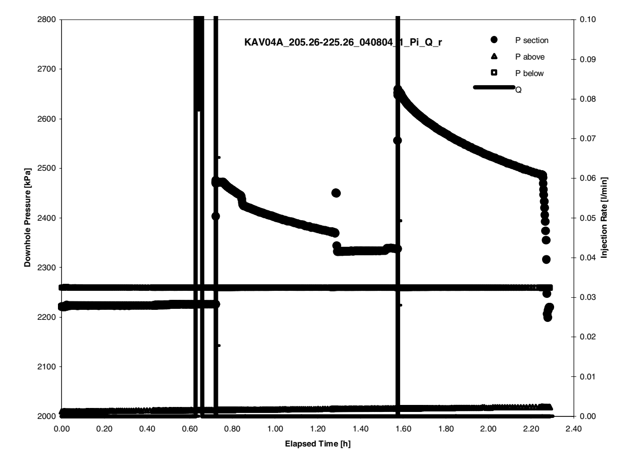
Comments:

The recommended transmissivity of 2.2E-7 m2/s was derived from the analysis of the CHir phase, which has better data quality. The confidence range for the interval transmissivity is estimated to be 1.0E-7 to 5.0E-7 m2/s. The flow dimension used for analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 2040.3 kPa.

Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Pi
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040804 09:32
Test section from - to (m):	205.26-225.26 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2\cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

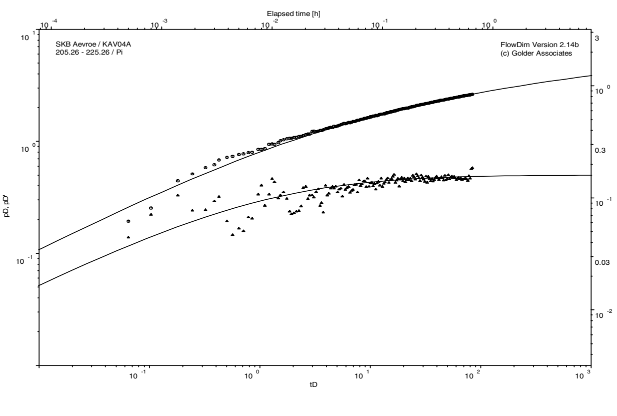
Linear plot Q and p



Log-Log plot incl. derivates- flow period

Not Analysed

Log-Log plot incl. derivatives- recovery period



Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	2220		
p_i (kPa) =	2337		
p_p(kPa) =	2650	p_F (kPa) =	2486
Q_p (m^3/s)=	#NV		
tp (s) =	18	t_F (s) =	2400
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	10.55		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	#NV		
T_M (m^2/s)=	#NV		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	#NV
dt_2 (min) =	42.00	dt_2 (min) =	#NV
T (m^2/s) =	5.9E-11	T (m^2/s) =	#NV
S (-) =	1.0E-06	S (-) =	#NV
K_s (m/s) =	5.9E-13	K_s (m/s) =	#NV
S_s (1/m) =	1.0E-08	S_s (1/m) =	#NV
C (m^3/Pa) =	4.3E-11	C (m^3/Pa) =	#NV
C_D (-) =	4.8E-03	C_D (-) =	#NV
ξ (-) =	-6.55E-02	ξ (-) =	#NV
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	4.30E-11
dt_2 (min) =	42	C_D (-) =	4.80E-03
T_T (m^2/s) =	5.9E-11	ξ (-) =	-6.55E-02
S (-) =	1.0E-06		
K_s (m/s) =	5.9E-13		
S_s (1/m) =	1.0E-08		

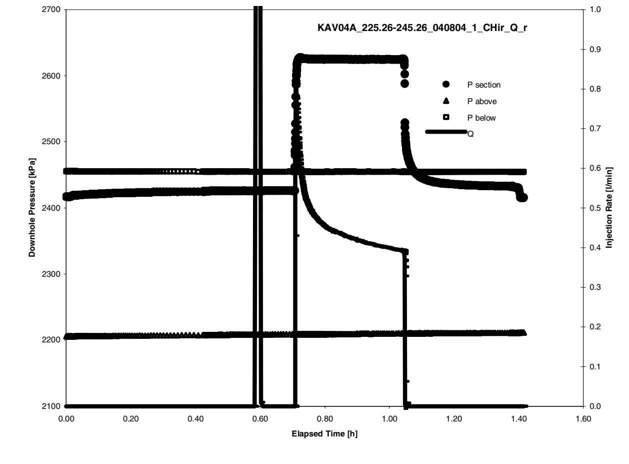
Comments:

The recommended transmissivity of 5.9E-11 m2/s was derived from the analysis of the PI phase. The confidence range for the interval transmissivity is estimated to be 2.0E-11 to 1.0E-10 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, could not be extrapolated due to the very low transmissivity.

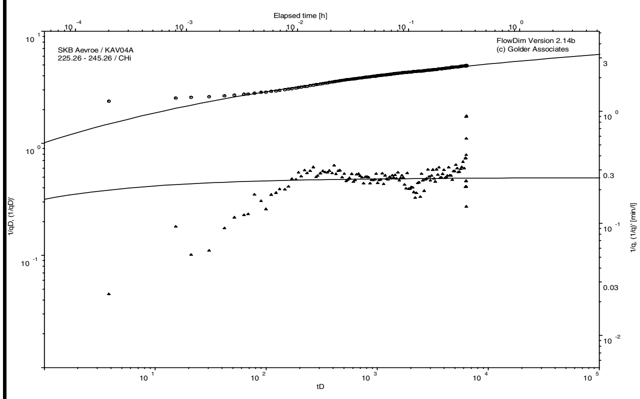
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040804 12:42
Test section from - to (m):	225.26 - 245.26 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

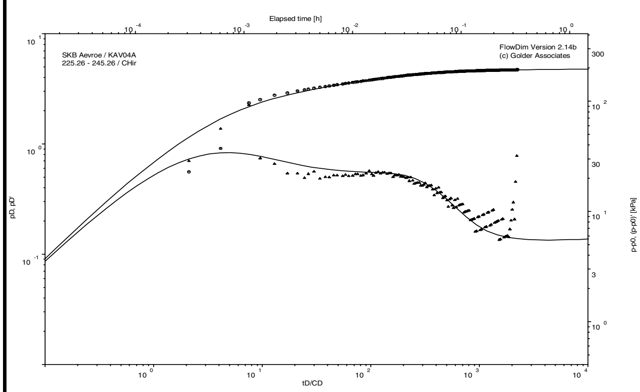
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	2416		
p_i (kPa) =	2426		
p_p(kPa) =	2625	p_F (kPa) =	2431
Q_p (m^3/s)=	6.50E-06		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	10.81		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	3.2E-07		
T_M (m^2/s)=	3.4E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	18.00
T (m^2/s) =	2.5E-07	T (m^2/s) =	2.83E-07
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	2.5E-09	K_s (m/s) =	2.83E-09
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	9.61E-11
C_D (-) =	#NV	C_D (-) =	1.06E-02
ξ (-) =	-1.75	ξ (-) =	-1.17
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	9.61E-11
dt_2 (min) =	18	C_D (-) =	1.06E-02
T_T (m^2/s) =	2.8E-07	ξ (-) =	-1.17
S (-) =	1.0E-06		
K_s (m/s) =	2.8E-09		
S_s (1/m) =	1.0E-08		

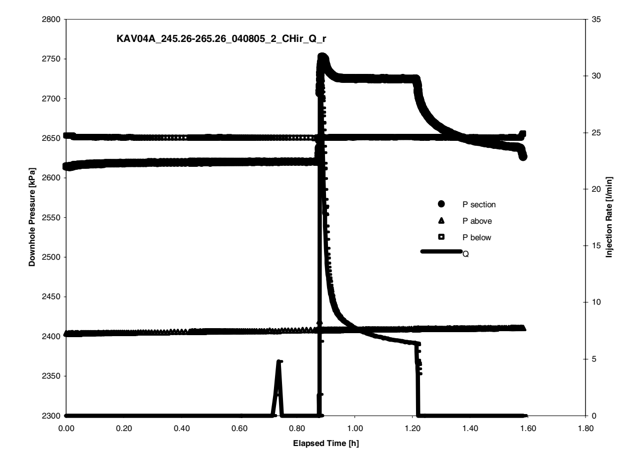
Comments:

The recommended transmissivity of 2.8E-7 m2/s was derived from the analysis of the CHir phase (inner zone), because of its consistency with the results shown by the CHi phase. The confidence range for the interval transmissivity is estimated to be 1.0E-7 to 1.0E-6 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 2427.8 kPa.

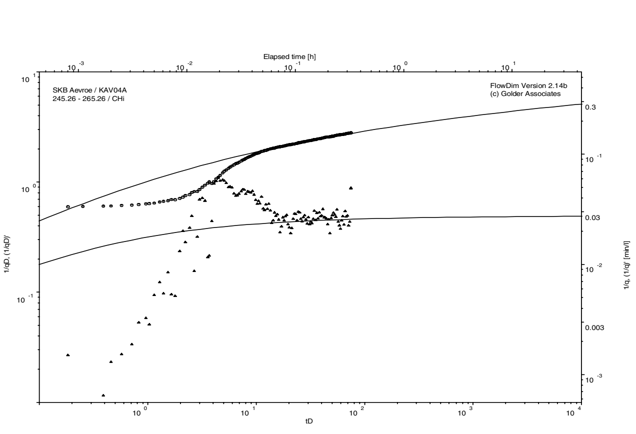
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	2
Borehole ID:	KAV04A	Test start:	040805 08:35
Test section from - to (m):	245.26 - 265.26 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

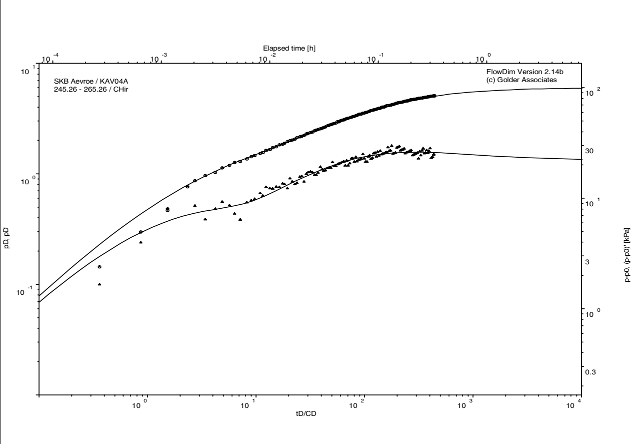
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	2613		
p_i (kPa) =	2620		
p_p(kPa) =	2724	p_F (kPa) =	2638
Q_p (m^3/s)=	1.07E-04		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	11.08		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.0E-05		
T_M (m^2/s)=	1.1E-05		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	4.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	18.00
T (m^2/s) =	4.4E-06	T (m^2/s) =	5.11E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	4.4E-08	K_s (m/s) =	5.11E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	2.32E-08
C_D (-) =	#NV	C_D (-) =	2.56E+00
ξ (-) =	-5.39	ξ (-) =	-5.07
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	2.32E-08
dt_2 (min) =	18	C_D (-) =	2.56E+00
T_T (m^2/s) =	5.1E-06	ξ (-) =	-5.07
S (-) =	1.0E-06		
K_s (m/s) =	5.1E-08		
S_s (1/m) =	1.0E-08		

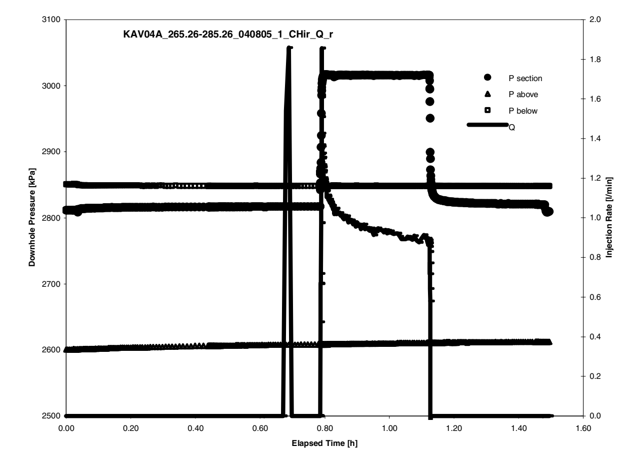
Comments:

The recommended transmissivity of 5.1E-6 m2/s was derived from the analysis of the CHir phase (considering early time data as skin effect). The confidence range for the interval transmissivity is estimated to be 4.0E-6 to 2.0E-5 m2/s (this range encompasses the skin effects derived from the CHir analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 2624.3 kPa.

Test Summary Sheet

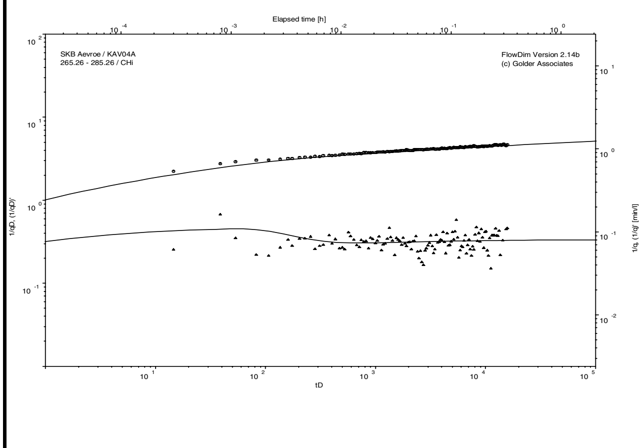
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040805 11:04
Test section from - to (m):	265.26-285.26 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

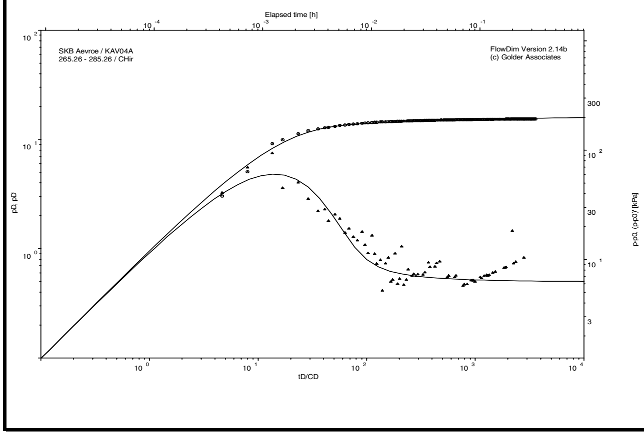


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	2811		
p_i (kPa) =	2816		
p_p(kPa) =	3016	p_F (kPa) =	2819
Q_p (m^3/s)=	1.47E-05		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	11.25		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	7.2E-07		
T_M (m^2/s)=	7.5E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	8.1E-07	T (m^2/s) =	1.99E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	8.1E-09	K_s (m/s) =	1.99E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	4.16E-10
C_D (-) =	#NV	C_D (-) =	4.59E-02
ξ (-) =	-1.66	ξ (-) =	8.46
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	4.16E-10
dt_2 (min) =	18	C_D (-) =	4.59E-02
T_T (m^2/s) =	8.1E-07	ξ (-) =	-1.66
S (-) =	1.0E-06		
K_s (m/s) =	8.1E-09		
S_s (1/m) =	1.0E-08		

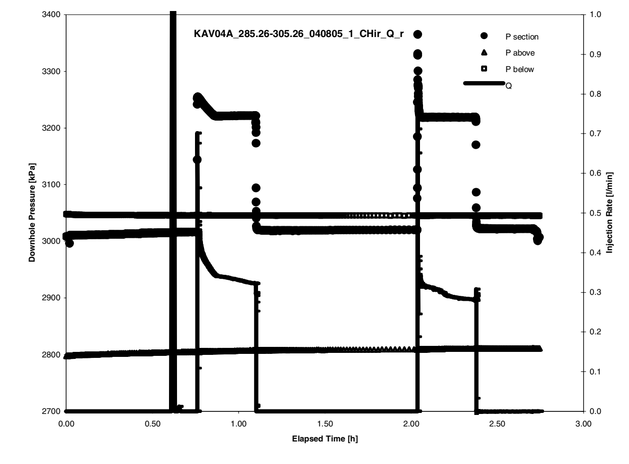
Comments:

The recommended transmissivity of 8.1E-7 m2/s was derived from the analysis of the CHi phase, where the early time data were considered as skin effect. The confidence range for the interval transmissivity is estimated to be 5.0E-7 to 2.0E-6 m2/s (this range encompasses the inner zone transmissivity derived from the CHi analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 2819.8 kPa.

Test Summary Sheet

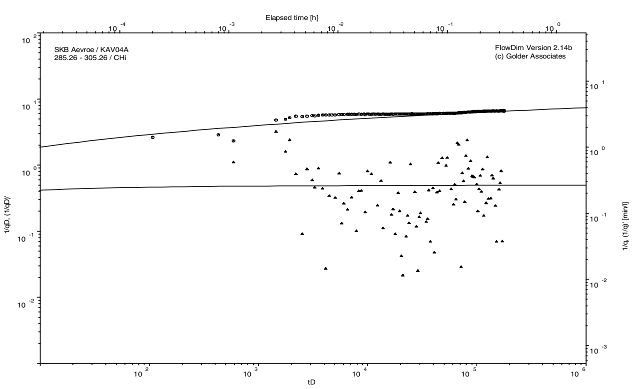
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040805 13:16
Test section from - to (m):	285.26-305.26 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

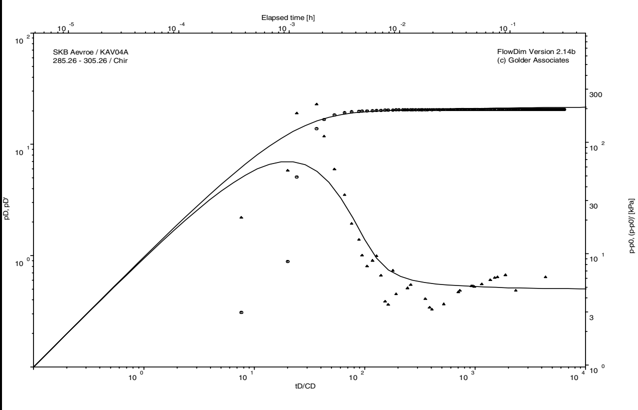


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	3009		
p_i (kPa) =	3020		
p_p(kPa) =	3218	p_F (kPa) =	3021
Q_p (m^3/s)=	4.67E-06		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	11.55		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	2.3E-07		
T_M (m^2/s)=	2.4E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	6.00
T (m^2/s) =	2.5E-07	T (m^2/s) =	8.14E-07
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	2.5E-09	K_s (m/s) =	8.14E-09
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	9.05E-11
C_D (-) =	#NV	C_D (-) =	9.97E-03
ξ (-) =	-6.50E-02	ξ (-) =	1.50E+01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	9.05E-11
dt_2 (min) =	18	C_D (-) =	9.97E-03
T_T (m^2/s) =	2.5E-07	ξ (-) =	-6.50E-02
S (-) =	1.0E-06		
K_s (m/s) =	2.5E-09		
S_s (1/m) =	1.0E-08		

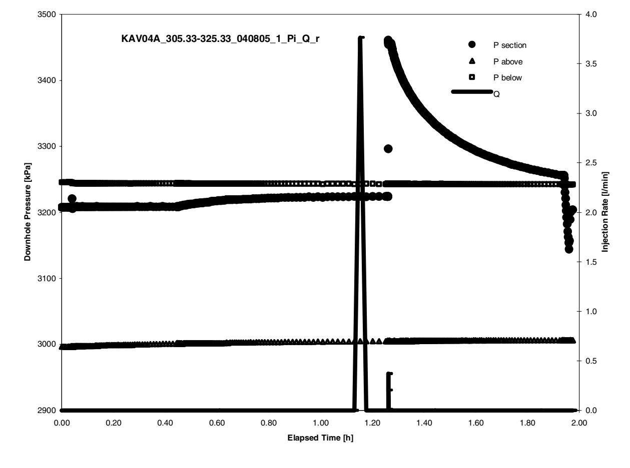
Comments:

The recommended transmissivity of 2.5E-7 m2/s was derived from the analysis of the CHi phase because of better data quality. The confidence range for the interval transmissivity is estimated to be 1.0E-7 to 1.0E-6 m2/s. The flow dimension used for analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 3021.7 kPa.

Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Pi
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040805 16:42
Test section from - to (m):	305.33-325.33 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

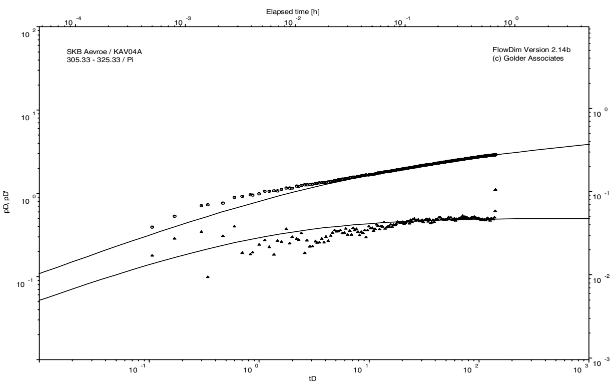
Linear plot Q and p



Log-Log plot incl. derivates- flow period

Not Analysed

Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	3207		
p_i (kPa) =	3223		
p_p(kPa) =	3456	p_F (kPa) =	3256
Q_p (m^3/s)=	4.67E-06		
tp (s) =	18	t_F (s) =	2400
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	11.87		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	2.0E-07		
T_M (m^2/s)=	2.1E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	6.00	dt_1 (min) =	#NV
dt_2 (min) =	36.00	dt_2 (min) =	#NV
T (m^2/s) =	2.0E-10	T (m^2/s) =	#NV
S (-) =	1.0E-06	S (-) =	#NV
K_s (m/s) =	2.0E-12	K_s (m/s) =	#NV
S_s (1/m) =	1.0E-08	S_s (1/m) =	#NV
C (m^3/Pa) =	4.3E-11	C (m^3/Pa) =	#NV
C_D (-) =	4.8E-03	C_D (-) =	#NV
ξ (-) =	-4.19E-01	ξ (-) =	#NV
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	6	C (m^3/Pa) =	4.30E-11
dt_2 (min) =	36	C_D (-) =	4.80E-03
T_T (m^2/s) =	2.0E-10	ξ (-) =	-4.19E-01
S (-) =	1.0E-06		
K_s (m/s) =	2.0E-12		
S_s (1/m) =	1.0E-08		

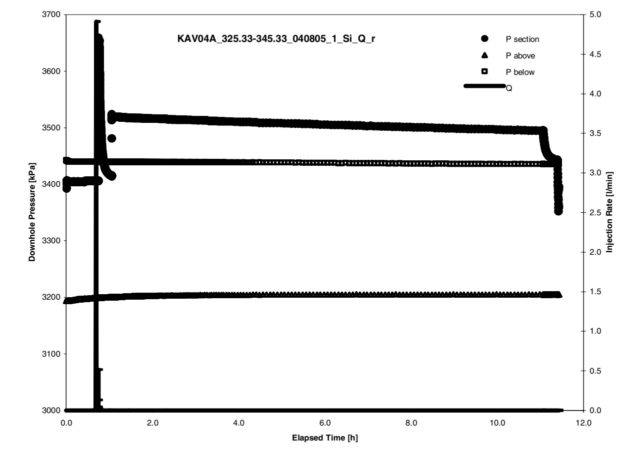
Comments:

The recommended transmissivity of 2.0E-10 m2/s was derived from the analysis of the PI phase. The confidence range for the interval transmissivity is estimated to be 8.0E-11 to 5.0E-10 m2/s. The flow dimension used for analysis is 2. The static pressure measured at transducer depth could not be extrapolated.

Test Summary Sheet

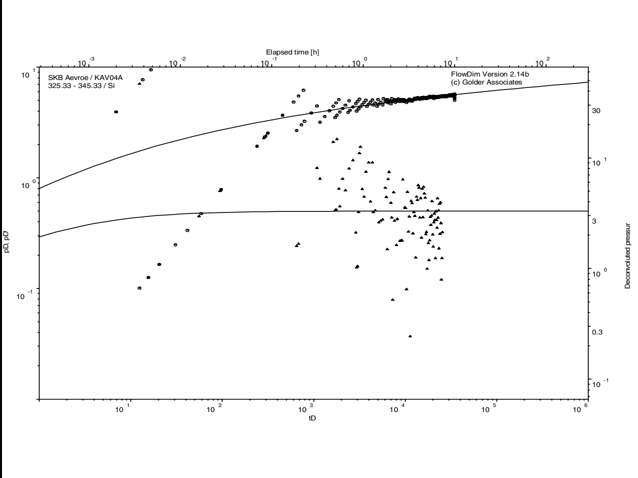
Project:	Oskarshamn site investigation	Test type:[1]	Si/Pi
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040805 19:28
Test section from - to (m):	325.33-345.33 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

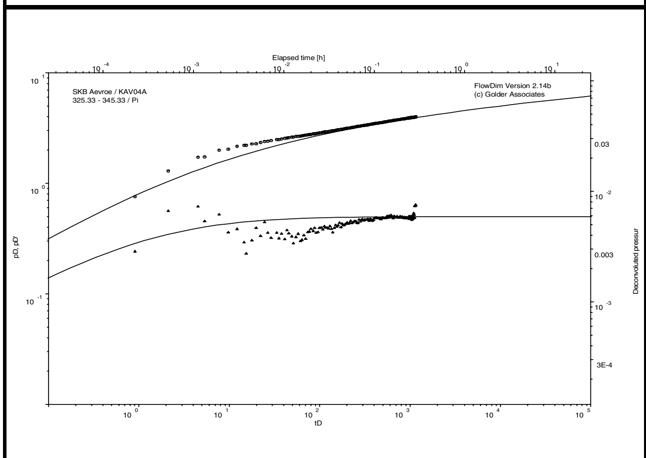


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	3404		
p_i (kPa) =	3414		
p_p(kPa) =	3494	p_F (kPa) =	3442
Q_p (m^3/s)=	3.10E-08		
tp (s) =	36000	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	12.16		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	3.8E-09		
T_M (m^2/s)=	4.0E-09		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	6.00	dt_1 (min) =	60.00
dt_2 (min) =	18.00	dt_2 (min) =	420.00
T (m^2/s) =	1.6E-09	T (m^2/s) =	3.03E-09
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.6E-11	K_s (m/s) =	3.03E-11
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	4.3E-11	C (m^3/Pa) =	4.61E-08
C_D (-) =	4.8E-03	C_D (-) =	5.08E+00
ξ (-) =	6.54E-03	ξ (-) =	-3.90E-01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates-slug injection



Log-Log plot incl. derivatives-pulse injection



Selected representative parameters.

dt_1 (min) =	60	C (m^3/Pa) =	4.61E-08
dt_2 (min) =	420	C_D (-) =	5.08E+00
T_T (m^2/s) =	3.0E-09	ξ (-) =	-3.90E-01
S (-) =	1.0E-06		
K_s (m/s) =	3.0E-11		
S_s (1/m) =	1.0E-08		

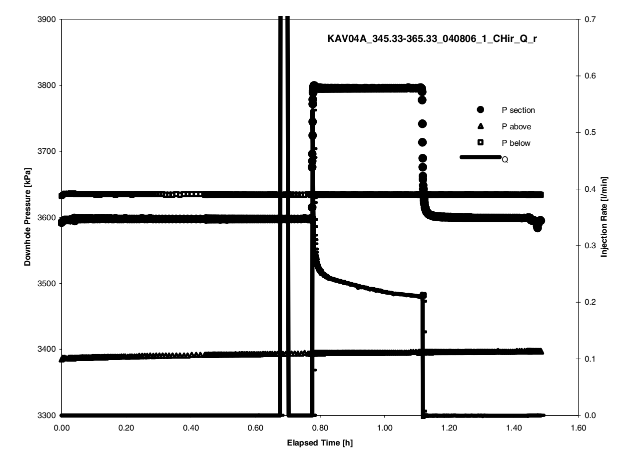
Comments:

The recommended transmissivity of 3.0E-9 m2/s was derived from the analysis of the SI phase, which was selected due to the much longer duration. The confidence range for the interval transmissivity is estimated to be 1.0E-9 to 5.0E-9 m2/s. The flow dimension used for analysis is 2. The static pressure measured at transducer depth could not be extrapolated.

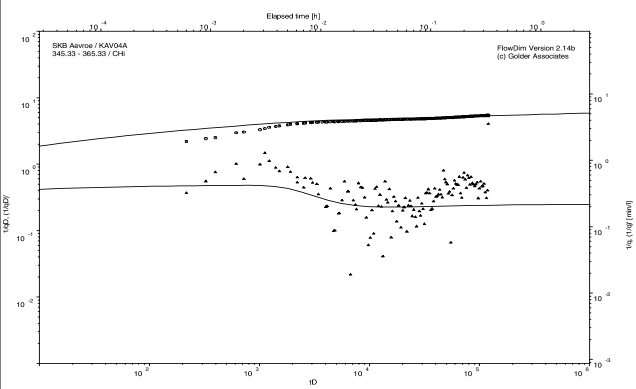
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040806 09:21
Test section from - to (m):	345.33-365.33 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

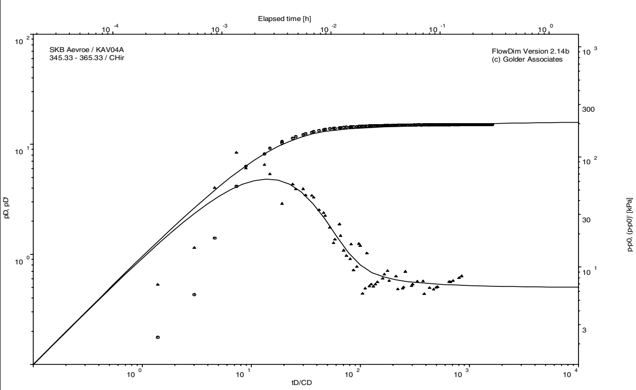
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	3593		
p_i (kPa) =	3597		
p_p(kPa) =	3795	p_F (kPa) =	3599
Q_p (m^3/s)=	3.50E-06		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	12.47		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.7E-07		
T_M (m^2/s)=	1.8E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	6.00	dt_2 (min) =	6.00
T (m^2/s) =	3.0E-07	T (m^2/s) =	4.59E-07
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	3.0E-09	K_s (m/s) =	4.59E-09
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	1.97E-10
C_D (-) =	#NV	C_D (-) =	2.17E-02
ξ (-) =	-1.96E-02	ξ (-) =	8.83
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	1.97E-10
dt_2 (min) =	6	C_D (-) =	2.17E-02
T_T (m^2/s) =	4.6E-07	ξ (-) =	8.83
S (-) =	1.0E-06		
K_s (m/s) =	4.6E-09		
S_s (1/m) =	1.0E-08		

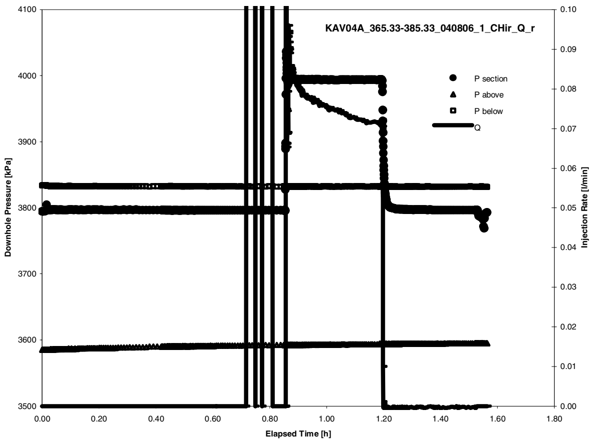
Comments:

The recommended transmissivity of 4.6E-7 m2/s was derived from the analysis of the CHir phase, because of its consistency with the results shown by the CHi phase (late time data). The confidence range for the interval transmissivity is estimated to be 1.0E-7 to 5.0E-7 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 3599.2 kPa.

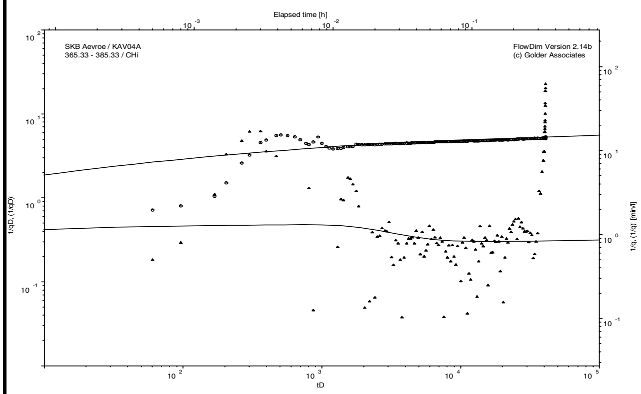
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040806 11:37
Test section from - to (m):	365.33-385.33 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

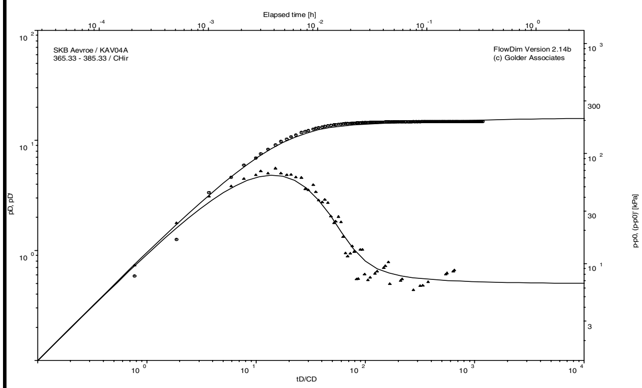
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	3794		
p_i (kPa) =	3795		
p_p(kPa) =	3993	p_F (kPa) =	3796
Q_p (m^3/s)=	1.17E-06		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	12.71		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	5.8E-08		
T_M (m^2/s)=	6.0E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	7.5E-08	T (m^2/s) =	1.52E-07
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	7.5E-10	K_s (m/s) =	1.52E-09
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	9.60E-11
C_D (-) =	#NV	C_D (-) =	1.06E-02
ξ (-) =	0	ξ (-) =	9.19
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	9.60E-11
dt_2 (min) =	18	C_D (-) =	1.06E-02
T_T (m^2/s) =	7.5E-08	ξ (-) =	9.19
S (-) =	1.0E-06		
K_s (m/s) =	7.5E-10		
S_s (1/m) =	1.0E-08		

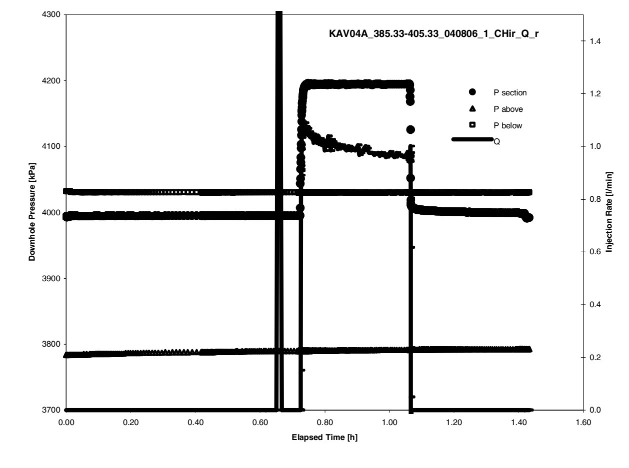
Comments:

The recommended transmissivity of 7.5E-8 m2/s was derived from the analysis of the CHi phase, which displayed the clearest derivative stabilisation. The confidence range for the interval transmissivity is estimated to be 3.0E-8 to 3.0E-7 m2/s (this range encompasses the skin effect and the transmissivity derived from the CHir phase). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 3796.2 kPa.

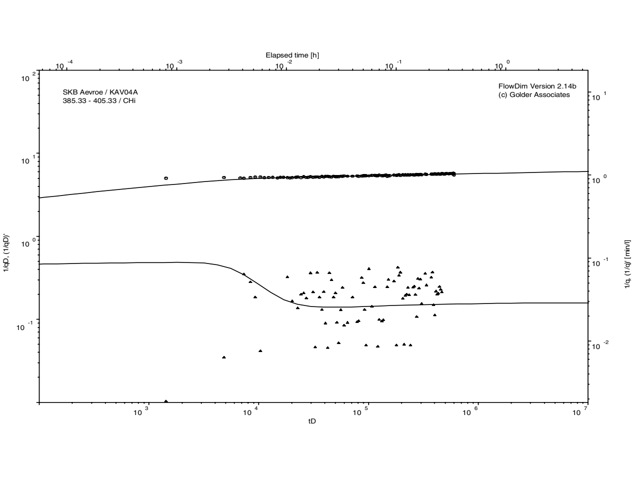
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040806 13:56
Test section from - to (m):	385.33-405.33 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

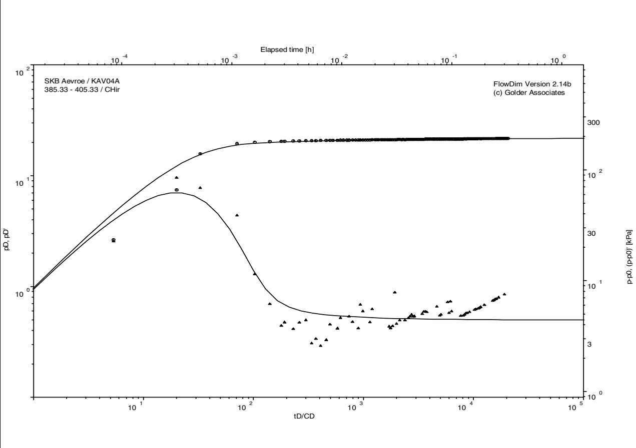
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	3993		
p_i (kPa) =	3994		
p_p(kPa) =	4194	p_F (kPa) =	3998
Q_p (m^3/s)=	1.58E-05		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	13.02		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	7.8E-07		
T_M (m^2/s)=	8.1E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	2.3E-06	T (m^2/s) =	2.91E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	2.3E-08	K_s (m/s) =	2.91E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	1.06E-10
C_D (-) =	#NV	C_D (-) =	1.17E-02
ξ (-) =	0	ξ (-) =	1.49E+01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	1.06E-10
dt_2 (min) =	12	C_D (-) =	1.17E-02
T_T (m^2/s) =	2.9E-06	ξ (-) =	1.49E+01
S (-) =	1.0E-06		
K_s (m/s) =	2.9E-08		
S_s (1/m) =	1.0E-08		

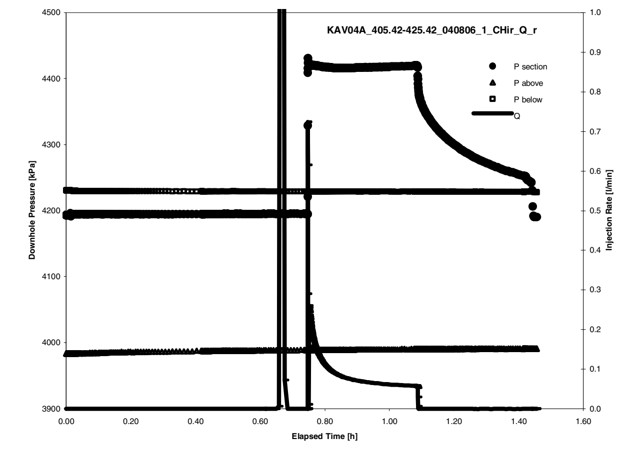
Comments:

The recommended transmissivity of 2.9E-6 m2/s was derived from the analysis of the CHir phase. The confidence range for the interval transmissivity is estimated to be 5.0E-7 to 4.0E-6 m2/s (this range encompasses the skin effect derived from the CHi analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 3997.7 kPa.

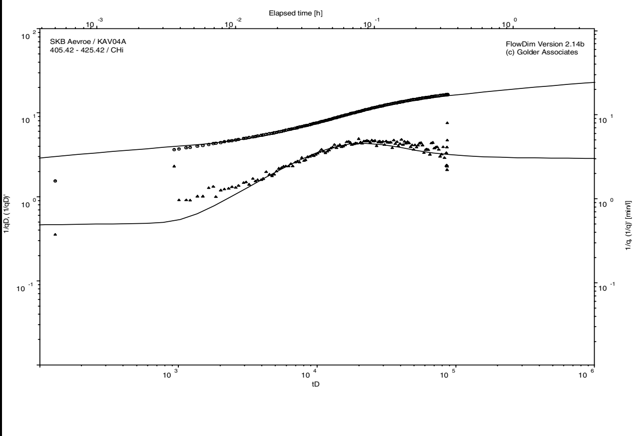
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040806 16:48
Test section from - to (m):	405.42-425.42 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

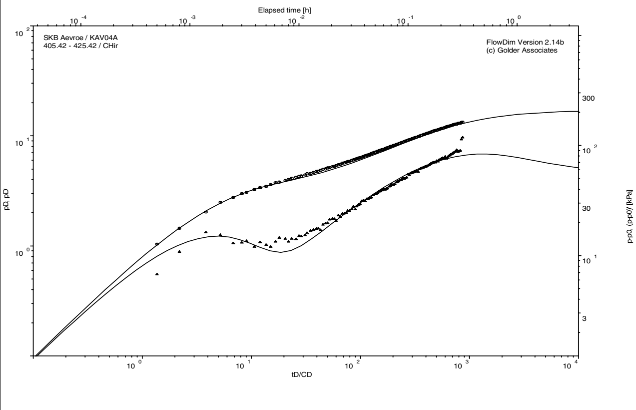
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	4193		
p_i (kPa) =	4195		
p_p(kPa) =	4419	p_F (kPa) =	4252
Q_p (m^3/s)=	9.50E-07		
tp (s) =	1200	t_F (s) =	1200
S el S* (-)=	1.00E-06	S el S* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	13.3		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	4.2E-08		
T_M (m^2/s)=	4.4E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	20.00	dt_2 (min) =	16.00
T (m^2/s) =	1.9E-08	T (m^2/s) =	2.10E-08
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.9E-10	K_s (m/s) =	2.10E-10
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	1.54E-10
C_D (-) =	#NV	C_D (-) =	1.70E-02
ξ (-) =	-3.88E-02	ξ (-) =	-2.56E-01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	1.54E-10
dt_2 (min) =	20	C_D (-) =	1.70E-02
T_T (m^2/s) =	1.9E-08	ξ (-) =	-3.88E-02
S (-) =	1.0E-06		
K_s (m/s) =	1.9E-10		
S_s (1/m) =	1.0E-08		

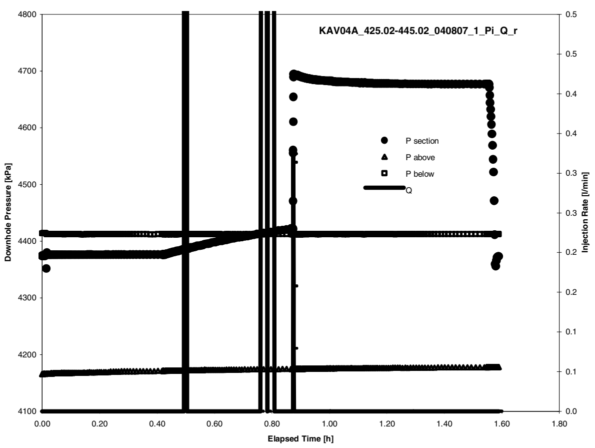
Comments:

The recommended transmissivity of 1.9E-8 m2/s was derived from the analysis of the CHi phase, which is consistent with the outer zone transmissivity derived from the CHir phase. The confidence range for the interval transmissivity is estimated to be 1.0E-8 to 2.0E-7 m2/s (this range encompasses the skin effect derived from the CHi). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 4193.4 kPa.

Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Pi
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040807 10:06
Test section from - to (m):	425.02-445.02 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

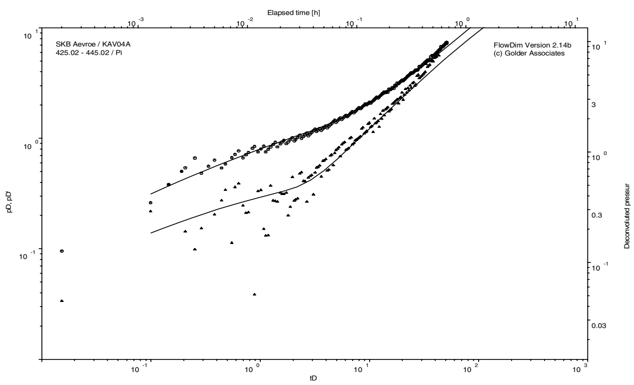


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	4374		
p_i (kPa) =	4422		
p_p(kPa) =	4692	p_F (kPa) =	4676
Q_p (m^3/s)=	3.75E-05		
tp (s) =	9.6	t_F (s) =	2400
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	13.64		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.4E-06		
T_M (m^2/s)=	1.4E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	#NV
dt_2 (min) =	30.00	dt_2 (min) =	#NV
T (m^2/s) =	3.4E-11	T (m^2/s) =	#NV
S (-) =	1.0E-06	S (-) =	#NV
K_s (m/s) =	3.4E-13	K_s (m/s) =	#NV
S_s (1/m) =	1.0E-08	S_s (1/m) =	#NV
C (m^3/Pa) =	1.0E-10	C (m^3/Pa) =	#NV
C_D (-) =	1.1E-02	C_D (-) =	#NV
ξ (-) =	-4.77E-02	ξ (-) =	#NV
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period

Not Analysed

Log-Log plot incl. derivatives- recovery period



Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	1.00E-10
dt_2 (min) =	30	C_D (-) =	1.10E-02
T_T (m^2/s) =	3.4E-11	ξ (-) =	-4.77E-02
S (-) =	1.0E-06		
K_s (m/s) =	3.4E-13		
S_s (1/m) =	1.0E-08		

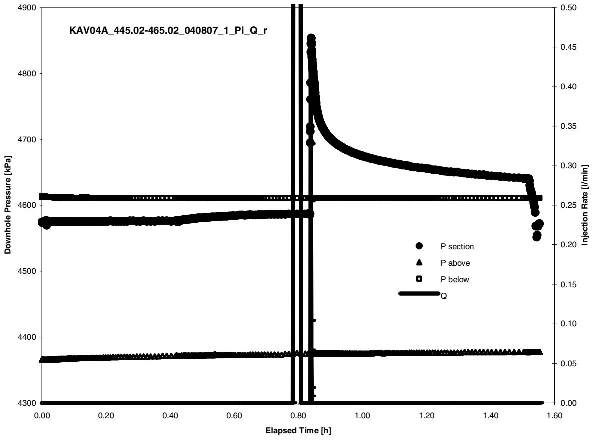
Comments:

The recommended transmissivity of 3.4E-11 m2/s was derived from the analysis of the PI phase (inner zone), however, this value should be regarded as valid only very close to the borehole. The confidence range for the interval transmissivity is estimated to be 5.0E-13 to 5.0E-11 m2/s (this range encompasses the inner zone transmissivity as well). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth could not be extrapolated.

Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Pi
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040807 12:16
Test section from - to (m):	445.02-465.02 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

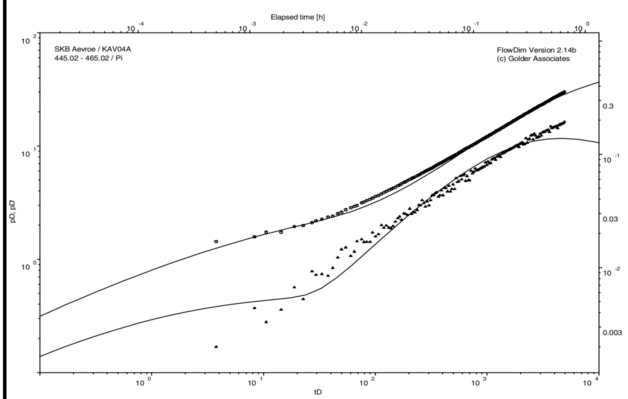


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	4573		
p_i (kPa) =	4586		
p_p(kPa) =	4843	p_F (kPa) =	4640
Q_p (m^3/s)=	3.40E-06		
tp (s) =	9.6	t_F (s) =	2400
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	13.9		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.3E-07		
T_M (m^2/s)=	1.4E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	#NV
dt_2 (min) =	24.00	dt_2 (min) =	#NV
T (m^2/s) =	4.8E-09	T (m^2/s) =	#NV
S (-) =	1.0E-06	S (-) =	#NV
K_s (m/s) =	4.8E-11	K_s (m/s) =	#NV
S_s (1/m) =	1.0E-08	S_s (1/m) =	#NV
C (m^3/Pa) =	1.3E-10	C (m^3/Pa) =	#NV
C_D (-) =	1.5E-02	C_D (-) =	#NV
ξ (-) =	-2.35E-01	ξ (-) =	#NV
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period

Not Analysed

Log-Log plot incl. derivatives- recovery period



Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	1.30E-10
dt_2 (min) =	24	C_D (-) =	1.50E-02
T_T (m^2/s) =	4.8E-09	ξ (-) =	-2.35E-01
S (-) =	1.0E-06		
K_s (m/s) =	4.8E-11		
S_s (1/m) =	1.0E-08		

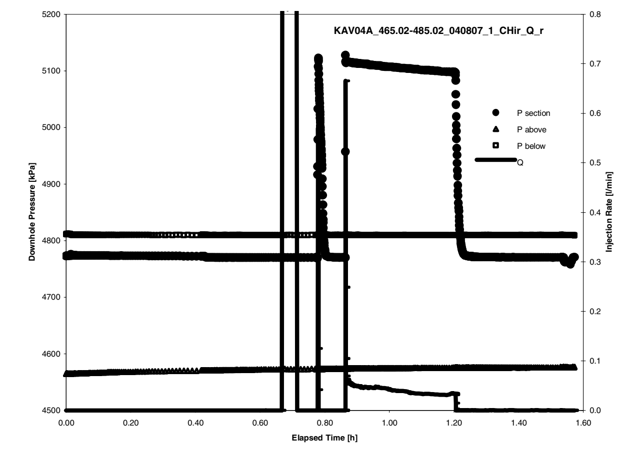
Comments:

The recommended transmissivity of 4.8E-09 m2/s was derived from the analysis of the PI phase (inner zone), however, this value should be regarded as valid only very close to the borehole. The confidence range for the interval transmissivity is estimated to be 5.0E-11 to 5.0E-9 m2/s (this range encompasses the inner zone transmissivity as well). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth could not be extrapolated.

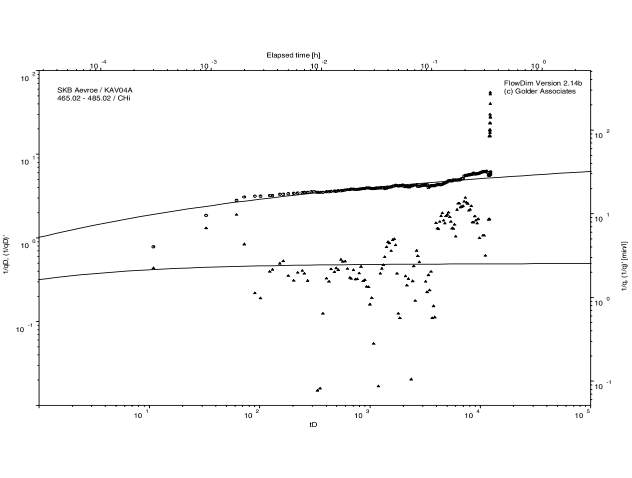
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040807 14:33
Test section from - to (m):	465.02-485.02 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

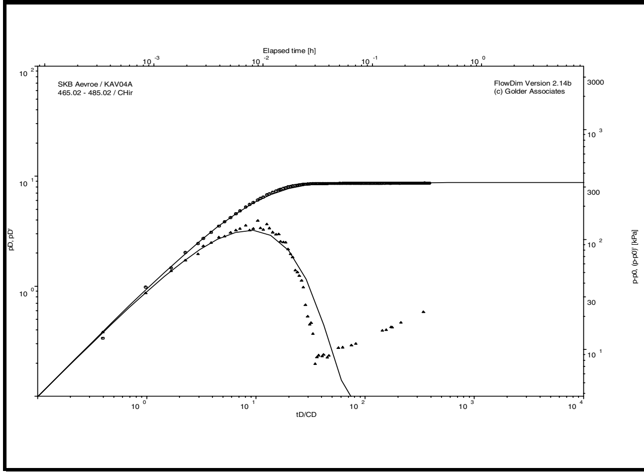
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	4773		
p_i (kPa) =	4770		
p_p(kPa) =	5097	p_F (kPa) =	4770
Q_p (m^3/s)=	5.00E-07		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	14.21		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.5E-08		
T_M (m^2/s)=	1.6E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	6.00	dt_2 (min) =	3.00
T (m^2/s) =	1.5E-08	T (m^2/s) =	2.77E-08
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.5E-10	K_s (m/s) =	2.77E-10
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	5.49E-11
C_D (-) =	#NV	C_D (-) =	6.05E-03
ξ (-) =	-1.96E-02	ξ (-) =	7.51
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	5.49E-11
dt_2 (min) =	6	C_D (-) =	6.05E-03
T_T (m^2/s) =	1.5E-08	ξ (-) =	-1.96E-02
S (-) =	1.0E-06		
K_s (m/s) =	1.5E-10		
S_s (1/m) =	1.0E-08		

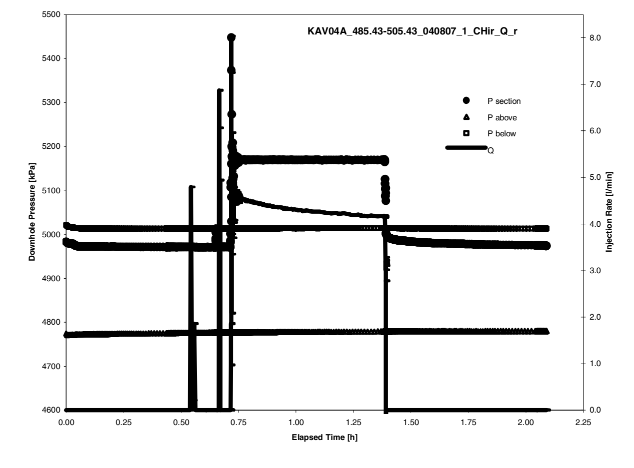
Comments:

The recommended transmissivity of 1.5E-8 m2/s was derived from the analysis of the CHi phase, as the only data set showing indication of a derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E-8 to 3.0E-7 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 4770.0 kPa.

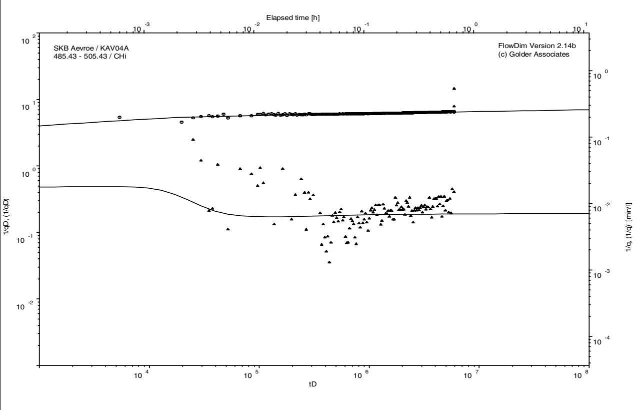
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040807 19:16
Test section from - to (m):	485.43-505.43 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

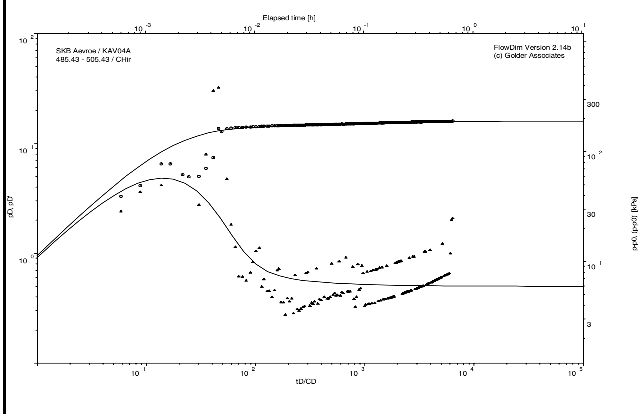
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	4977		
p_i (kPa) =	4970		
p_p(kPa) =	5169	p_F (kPa) =	4974
Q_p (m^3/s)=	6.93E-05		
tp (s) =	2400	t_F (s) =	2400
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	14.58		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	3.4E-06		
T_M (m^2/s)=	3.6E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	2.00	dt_1 (min) =	1.00
dt_2 (min) =	30.00	dt_2 (min) =	18.00
T (m^2/s) =	9.4E-06	T (m^2/s) =	9.43E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	9.4E-08	K_s (m/s) =	9.43E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	2.23E-09
C_D (-) =	#NV	C_D (-) =	2.46E-01
ξ (-) =	0	ξ (-) =	3.05
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	2	C (m^3/Pa) =	2.23E-09
dt_2 (min) =	30	C_D (-) =	2.46E-01
T_T (m^2/s) =	9.4E-06	ξ (-) =	3.05
S (-) =	1.0E-06		
K_s (m/s) =	9.4E-08		
S_s (1/m) =	1.0E-08		

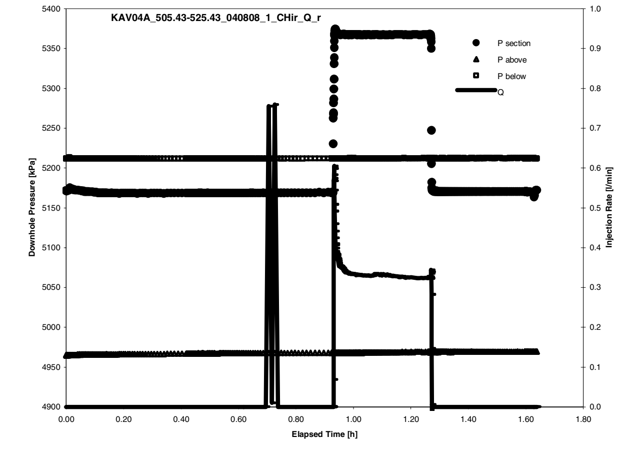
Comments:

The recommended transmissivity of 9.4E-6 m2/s was derived from the analysis of the CHi phase, because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 2.0E-6 to 1.0E-5 m2/s (this range includes the skin effect derived from the CHi analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 4971.1 kPa.

Test Summary Sheet

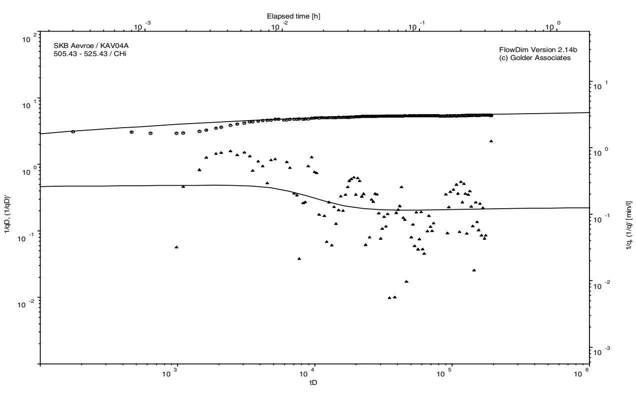
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040808 09:08
Test section from - to (m):	505.43-525.43 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

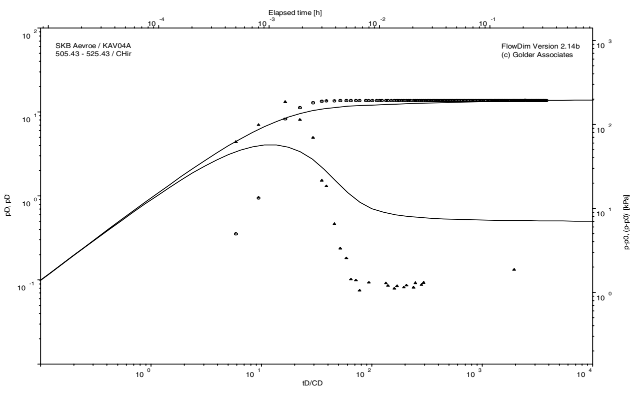


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	5173		
p_i (kPa) =	5169		
p_p(kPa) =	5367	p_F (kPa) =	5169
Q_p (m^3/s)=	5.38E-06		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	14.89		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	2.7E-07		
T_M (m^2/s)=	2.8E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	0.50
dt_2 (min) =	18.00	dt_2 (min) =	1.00
T (m^2/s) =	5.2E-07	T (m^2/s) =	6.21E-07
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	5.2E-09	K_s (m/s) =	6.21E-09
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	1.22E-10
C_D (-) =	#NV	C_D (-) =	1.34E-02
ξ (-) =	0	ξ (-) =	7.12
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	1.22E-10
dt_2 (min) =	18	C_D (-) =	1.34E-02
T_T (m^2/s) =	5.2E-07	ξ (-) =	7.12
S (-) =	1.0E-06		
K_s (m/s) =	5.2E-09		
S_s (1/m) =	1.0E-08		

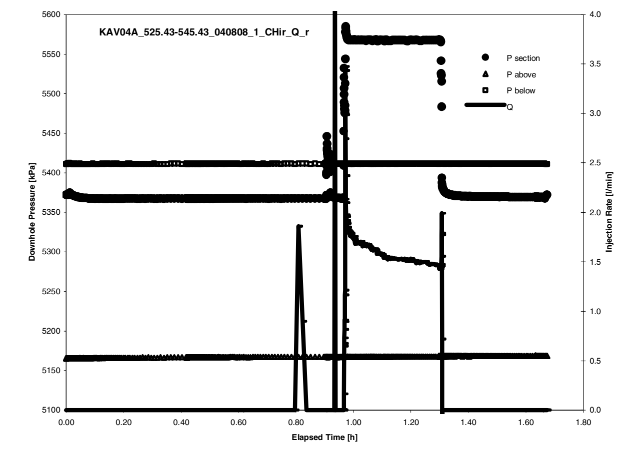
Comments:

The recommended transmissivity of 5.2E-7 m2/s was derived from the analysis of the CHi phase, because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E-7 to 7.0E-7 m2/s (this range includes the skin effect derived from the CHi analysis). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 5170.6 kPa.

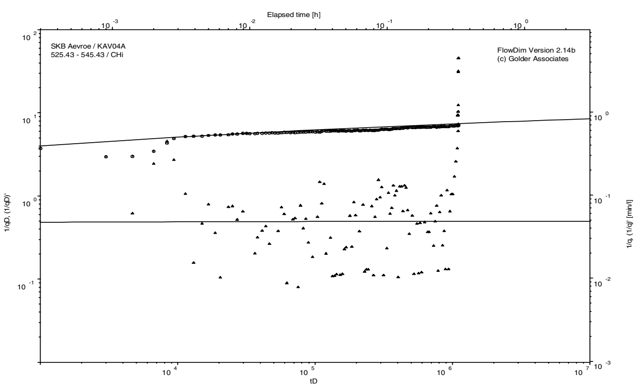
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040808 11:29
Test section from - to (m):	525.43-545.43 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

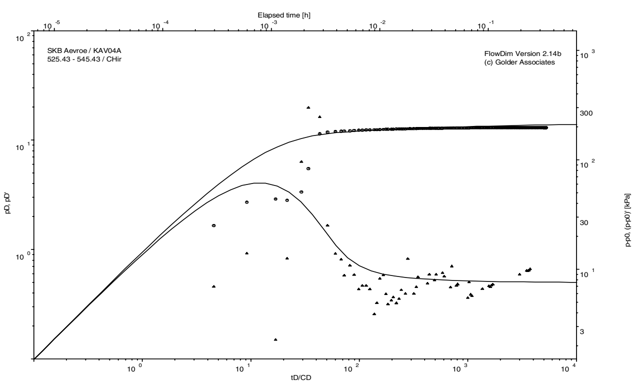
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	5373		
p_i (kPa) =	5367		
p_p(kPa) =	5567	p_F (kPa) =	5369
Q_p (m^3/s)=	2.42E-05		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	15.24		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.2E-06		
T_M (m^2/s)=	1.2E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	1.3E-06	T (m^2/s) =	2.73E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.3E-08	K_s (m/s) =	2.73E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	4.08E-10
C_D (-) =	#NV	C_D (-) =	4.50E-02
ξ (-) =	0	ξ (-) =	6.51
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	4.08E-10
dt_2 (min) =	12	C_D (-) =	4.50E-02
T_T (m^2/s) =	2.7E-06	ξ (-) =	6.51
S (-) =	1.0E-06		
K_s (m/s) =	2.7E-08		
S_s (1/m) =	1.0E-08		

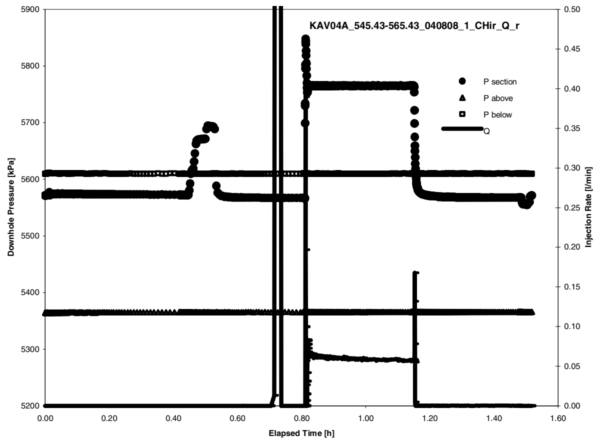
Comments:

The recommended transmissivity of 2.7E-6 m2/s was derived from the analysis of the CHir phase, because of its consistency with the results shown by the CHi phase and because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E-6 to 4.0E-6 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 5369.2 kPa.

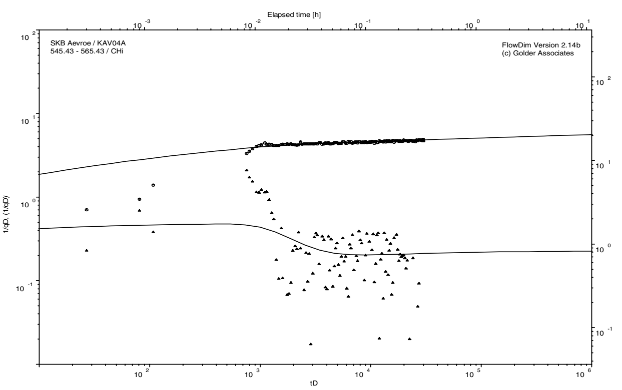
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040808 14:04
Test section from - to (m):	545.43-565.43 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

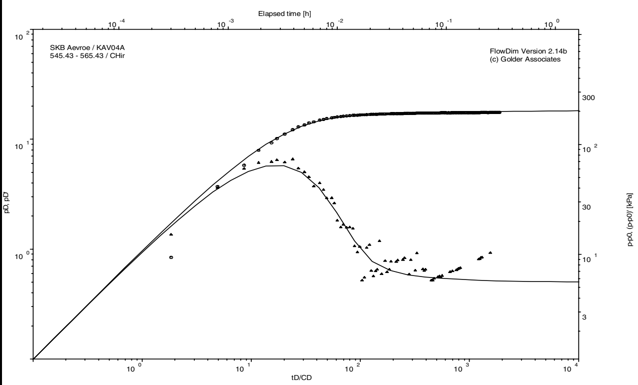
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	5572		
p_i (kPa) =	5565		
p_p(kPa) =	5765	p_F (kPa) =	5567
Q_p (m^3/s)=	9.50E-07		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	15.49		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	4.7E-08		
T_M (m^2/s)=	4.9E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	10.00
T (m^2/s) =	3.6E-08	T (m^2/s) =	1.45E-07
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	3.6E-10	K_s (m/s) =	1.45E-09
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	5.43E-11
C_D (-) =	#NV	C_D (-) =	5.98E-03
ξ (-) =	0	ξ (-) =	1.20E+01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	5.43E-11
dt_2 (min) =	10	C_D (-) =	5.98E-03
T_T (m^2/s) =	1.5E-07	ξ (-) =	1.20E+01
S (-) =	1.0E-06		
K_s (m/s) =	1.5E-09		
S_s (1/m) =	1.0E-08		

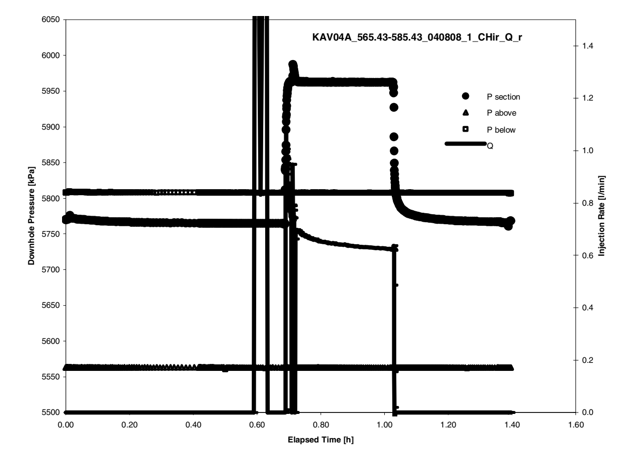
Comments:

The recommended transmissivity of 1.5E-7 m2/s was derived from the analysis of the CHir phase, because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 2.0E-8 to 2.0E-7 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 5566.2 kPa.

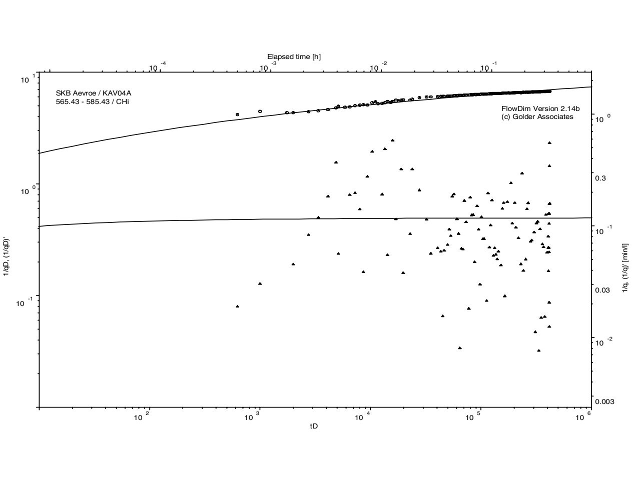
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040808 17:16
Test section from - to (m):	565.43-585.43 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

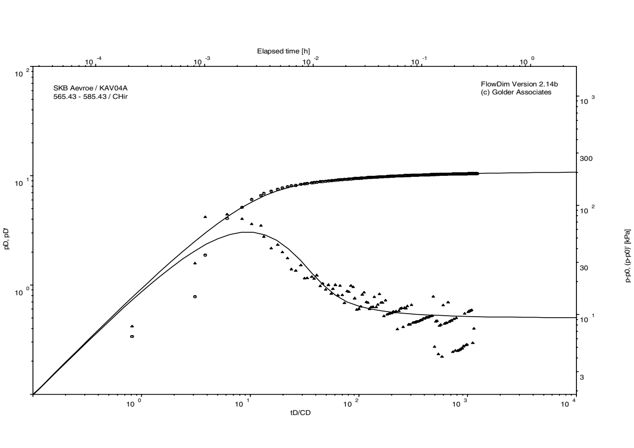
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	5770		
p_i (kPa) =	5764		
p_p(kPa) =	5962	p_F (kPa) =	5766
Q_p (m^3/s)=	1.04E-05		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	15.8		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	5.2E-07		
T_M (m^2/s)=	5.4E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	20.00	dt_2 (min) =	18.00
T (m^2/s) =	5.5E-07	T (m^2/s) =	9.22E-07
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	5.5E-09	K_s (m/s) =	9.22E-09
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	5.61E-10
C_D (-) =	#NV	C_D (-) =	6.18E-02
ξ (-) =	-4.77E-02	ξ (-) =	3.7
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	5.61E-10
dt_2 (min) =	18	C_D (-) =	6.18E-02
T_T (m^2/s) =	9.2E-07	ξ (-) =	3.7
S (-) =	1.0E-06		
K_s (m/s) =	9.2E-09		
S_s (1/m) =	1.0E-08		

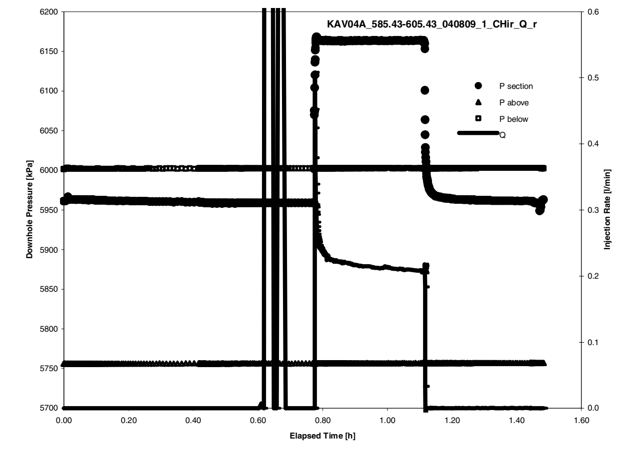
Comments:

The recommended transmissivity of 9.2E-7 m2/s was derived from the analysis of the CHir phase, because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 4.0E-7 to 2.0E-6 m2/s (encompasses the transmissivity value derived from the CHi phase). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 5761.8 kPa.

Test Summary Sheet

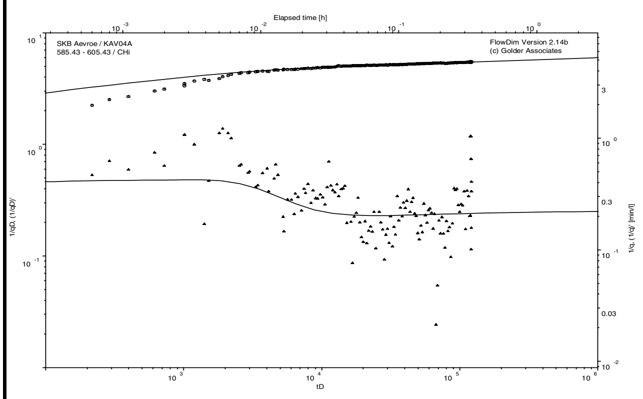
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040809 09:16
Test section from - to (m):	585.43-605.43 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

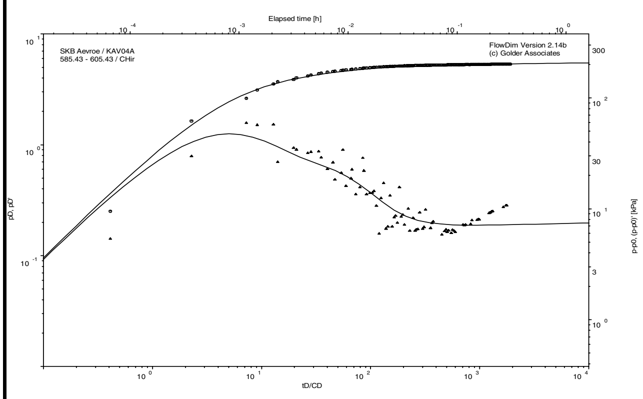


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	5962		
p_i (kPa) =	5959		
p_p(kPa) =	6164	p_F (kPa) =	5961
Q_p (m^3/s)=	3.45E-06		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	16.16		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.7E-07		
T_M (m^2/s)=	1.7E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	1.5E-07	T (m^2/s) =	3.75E-07
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.5E-09	K_s (m/s) =	3.75E-09
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	5.63E-11
C_D (-) =	#NV	C_D (-) =	6.21E-03
ξ (-) =	0	ξ (-) =	2.48E-01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	5.63E-11
dt_2 (min) =	12	C_D (-) =	6.21E-03
T_T (m^2/s) =	3.8E-07	ξ (-) =	2.48E-01
S (-) =	1.0E-06		
K_s (m/s) =	3.8E-09		
S_s (1/m) =	1.0E-08		

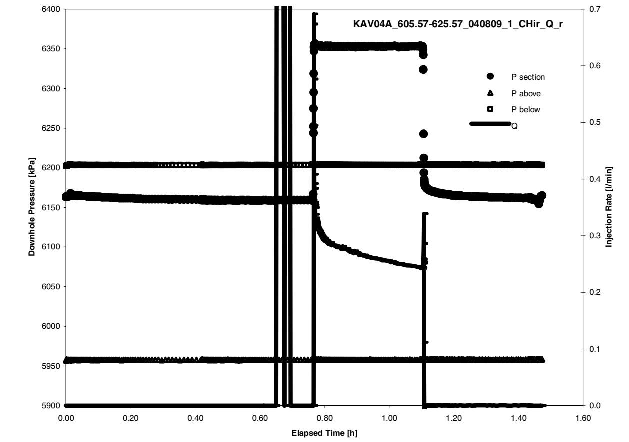
Comments:

The recommended transmissivity of 3.8E-7 m2/s was derived from the analysis of the CHir phase, because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E-7 to 5.0E-7 m2/s (encompasses the transmissivity values derived from the CHi phase and skin effects). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 5959.2 kPa.

Test Summary Sheet

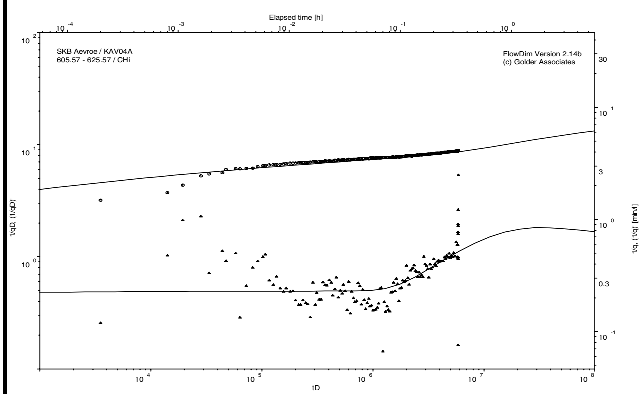
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040807 11:32
Test section from - to (m):	605.57-625.57 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

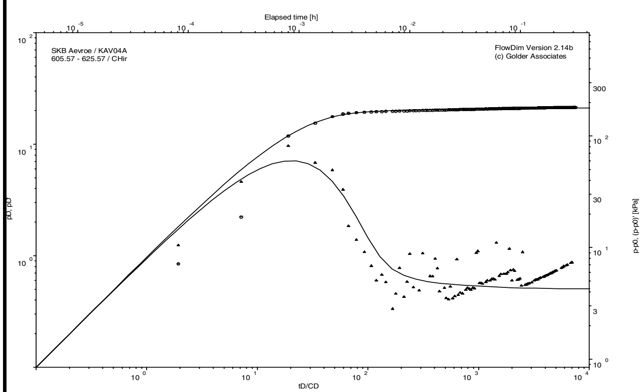


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	6164		
p_i (kPa) =	6159		
p_p(kPa) =	6352	p_F (kPa) =	6161
Q_p (m^3/s)=	4.05E-06		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	16.41		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	2.1E-07		
T_M (m^2/s)=	2.2E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	2.9E-07	T (m^2/s) =	8.28E-07
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	2.9E-09	K_s (m/s) =	8.28E-09
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	8.02E-11
C_D (-) =	#NV	C_D (-) =	8.84E-03
ξ (-) =	1.59	ξ (-) =	1.50E+01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	8.02E-11
dt_2 (min) =	18	C_D (-) =	8.84E-03
T_T (m^2/s) =	2.9E-07	ξ (-) =	15
S (-) =	1.0E-06		
K_s (m/s) =	2.9E-09		
S_s (1/m) =	1.0E-08		

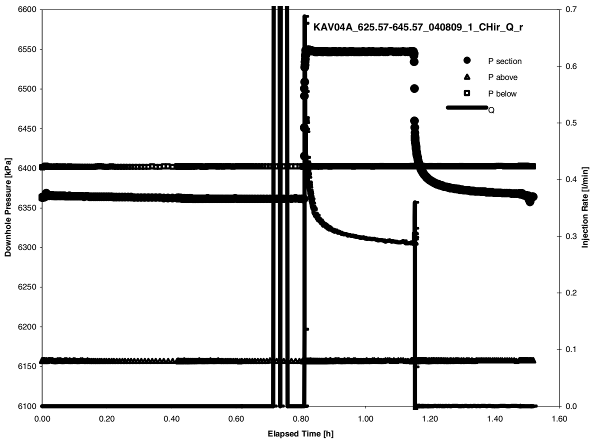
Comments:

The recommended transmissivity of 2.9E-7 m2/s was derived from the analysis of the CHi phase (inner zone), because it shows the most clear derivative stabilization. The confidence range for the interval transmissivity is estimated to be 8.0E-8 to 1.0E-6 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 6158.5 kPa.

Test Summary Sheet

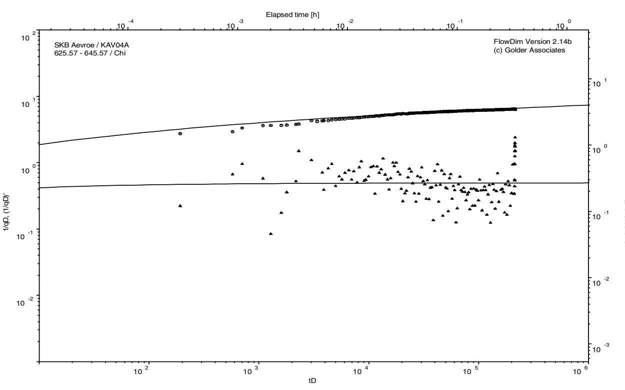
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040809 13:48
Test section from - to (m):	625.57-645.57 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

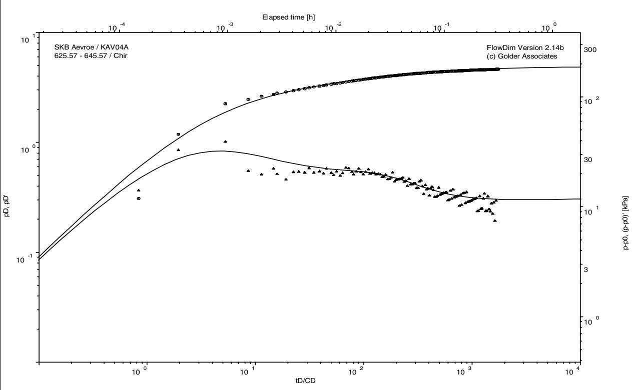


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	6365		
p_i (kPa) =	6361		
p_p(kPa) =	6546	p_F (kPa) =	6367
Q_p (m^3/s)=	4.80E-06		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	16.72		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	2.5E-07		
T_M (m^2/s)=	2.7E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	12.00	dt_2 (min) =	12.00
T (m^2/s) =	2.6E-07	T (m^2/s) =	2.09E-07
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	2.6E-09	K_s (m/s) =	2.09E-09
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	8.69E-11
C_D (-) =	#NV	C_D (-) =	9.58E-03
ξ (-) =	-4.98E-03	ξ (-) =	-1.12
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	8.69E-11
dt_2 (min) =	12	C_D (-) =	9.58E-03
T_T (m^2/s) =	2.1E-07	ξ (-) =	-1.12
S (-) =	1.0E-06		
K_s (m/s) =	2.1E-09		
S_s (1/m) =	1.0E-08		

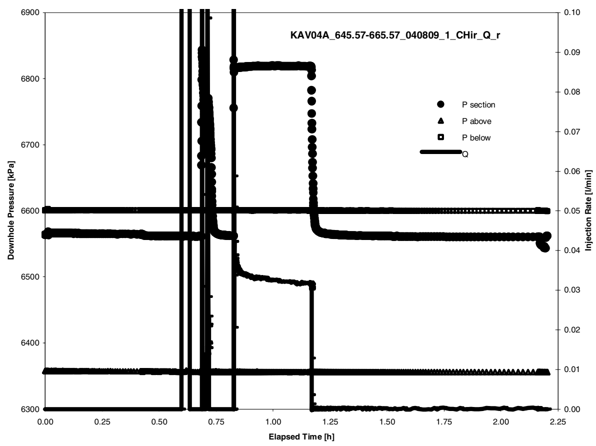
Comments:

The recommended transmissivity of 2.1E-7 m2/s was derived from the analysis of the CHir phase (inner zone). The confidence range for the interval transmissivity is estimated to be 1.0E-7 to 5.0E-7 m2/s (encompasses the transmissivity values derived from the CHir phase outer zone and CHi phase). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 6360.2 kPa.

Test Summary Sheet

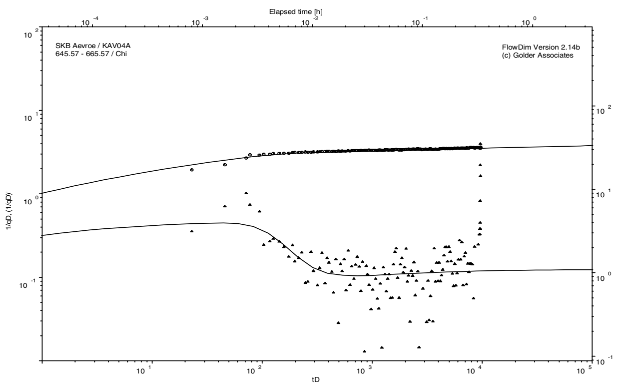
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040809 16:46
Test section from - to (m):	645.57-665.57 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

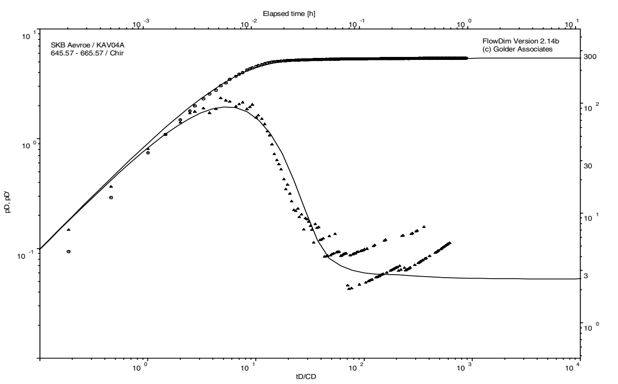


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	6565		
p_i (kPa) =	6562		
p_p(kPa) =	6818	p_F (kPa) =	6560
Q_p (m^3/s)=	5.17E-07		
tp (s) =	1200	t_F (s) =	3600
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	17.05		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	2.0E-08		
T_M (m^2/s)=	2.1E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	18.00
T (m^2/s) =	4.6E-08	T (m^2/s) =	1.81E-08
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	4.6E-10	K_s (m/s) =	1.81E-10
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	4.59E-11
C_D (-) =	#NV	C_D (-) =	5.06E-03
ξ (-) =	0	ξ (-) =	4.82
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	4.59E-11
dt_2 (min) =	18	C_D (-) =	5.06E-03
T_T (m^2/s) =	4.6E-08	ξ (-) =	0
S (-) =	1.0E-06		
K_s (m/s) =	4.6E-10		
S_s (1/m) =	1.0E-08		

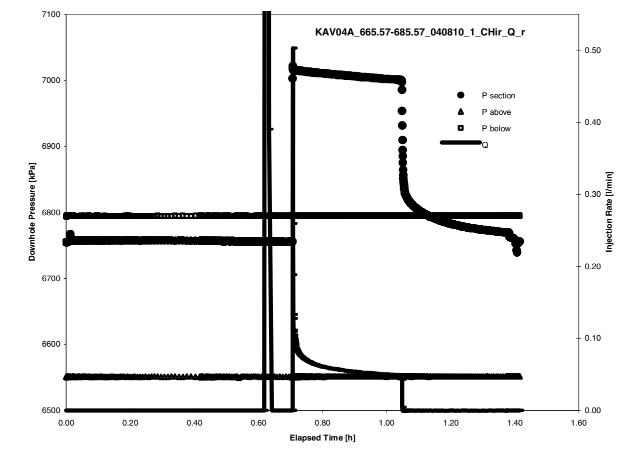
Comments:

The recommended transmissivity of 4.6E-8 m2/s was derived from the analysis of the CHi phase, because it shows the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E-8 to 2.0E-7 m2/s (encompasses the transmissivity values derived from the CHi phase inner zone and CHir phase). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 6559.4 kPa.

Test Summary Sheet

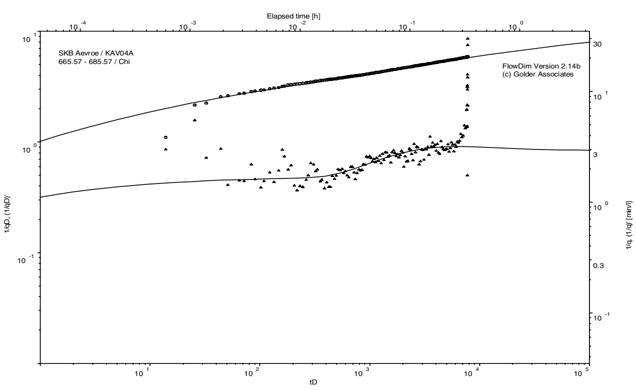
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040810 09:01
Test section from - to (m):	665.67-685.57 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

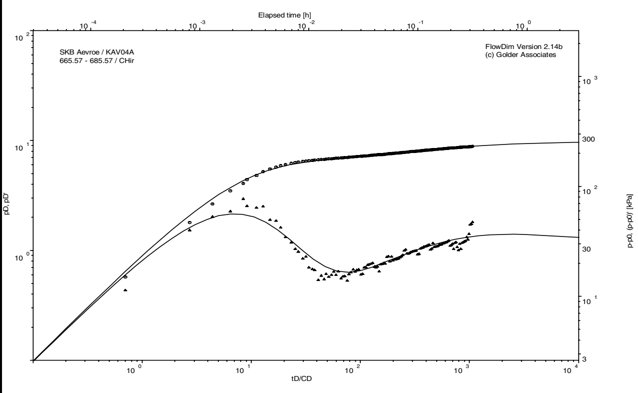


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	6755		
p_i (kPa) =	6755		
p_p(kPa) =	7000	p_F (kPa) =	6769
Q_p (m^3/s)=	8.17E-07		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	17.42		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	3.3E-08		
T_M (m^2/s)=	3.4E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	18.00
T (m^2/s) =	3.0E-08	T (m^2/s) =	5.88E-08
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	3.0E-10	K_s (m/s) =	5.88E-10
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	4.02E-11
C_D (-) =	#NV	C_D (-) =	4.43E-03
ξ (-) =	-5.80E-01	ξ (-) =	2.72
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	4.02E-11
dt_2 (min) =	18	C_D (-) =	4.43E-03
T_T (m^2/s) =	5.9E-08	ξ (-) =	2.72
S (-) =	1.0E-06		
K_s (m/s) =	5.9E-10		
S_s (1/m) =	1.0E-08		

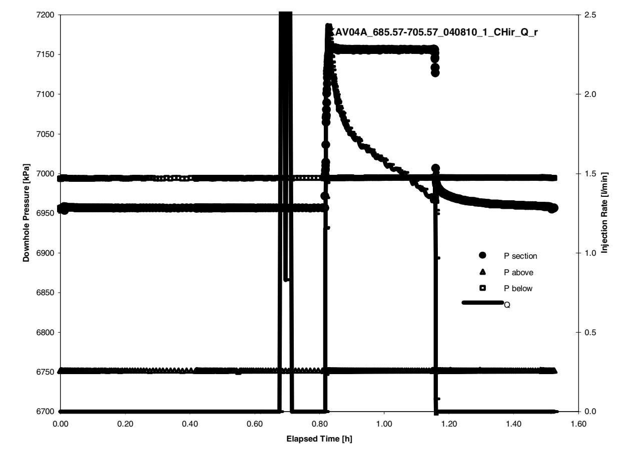
Comments:

The recommended transmissivity of 5.9E-8 m2/s was derived from the analysis of the CHir phase (inner zone). The confidence range for the interval transmissivity is estimated to be 1.0E-8 to 6.0E-8 m2/s (encompasses the transmissivity values derived from the CHir phase outer zone and CHi phase). The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 6745.9 kPa.

Test Summary Sheet

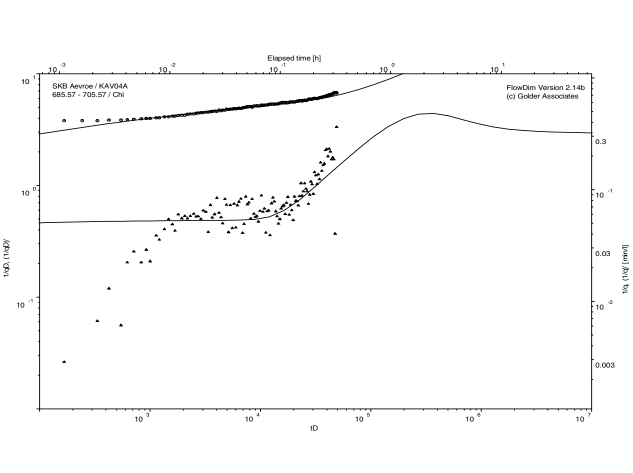
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040810 11:04
Test section from - to (m):	685.57-705.57 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

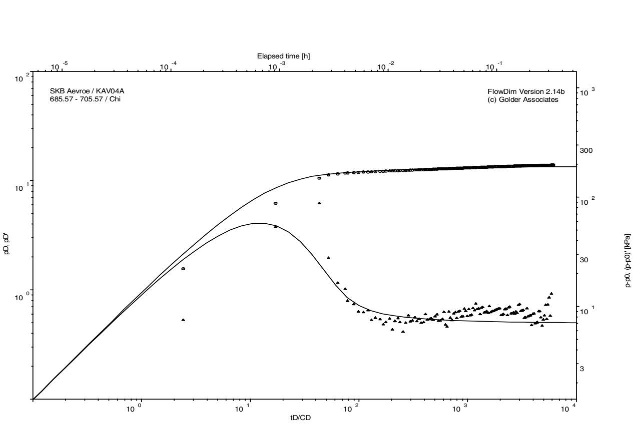


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	6964		
p_i (kPa) =	6963		
p_p(kPa) =	7163	p_F (kPa) =	6963
Q_p (m^3/s)=	2.23E-05		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	17.68		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.1E-06		
T_M (m^2/s)=	1.1E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	12.00	dt_2 (min) =	18.00
T (m^2/s) =	1.2E-06	T (m^2/s) =	3.02E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.2E-08	K_s (m/s) =	3.02E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	3.74E-10
C_D (-) =	#NV	C_D (-) =	4.12E-02
ξ (-) =	-1.49	ξ (-) =	6.55
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	3.74E-10
dt_2 (min) =	18	C_D (-) =	4.12E-02
T_T (m^2/s) =	3.0E-06	ξ (-) =	6.55
S (-) =	1.0E-06		
K_s (m/s) =	3.0E-08		
S_s (1/m) =	1.0E-08		

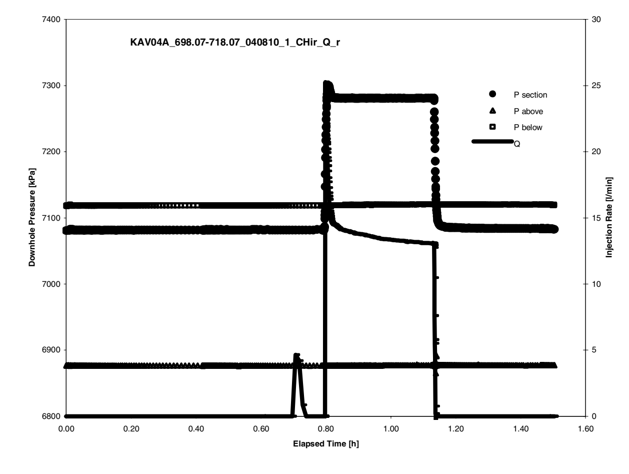
Comments:

The recommended transmissivity of 3.0E-6 m2/s was derived from the analysis of the CHir phase, because it shows the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E-6 to 4.0E-6 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 6953.6 kPa.

Test Summary Sheet

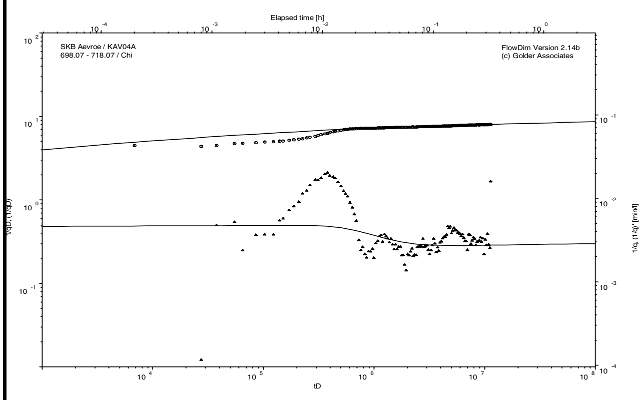
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040810 13:15
Test section from - to (m):	698.07-718.07 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

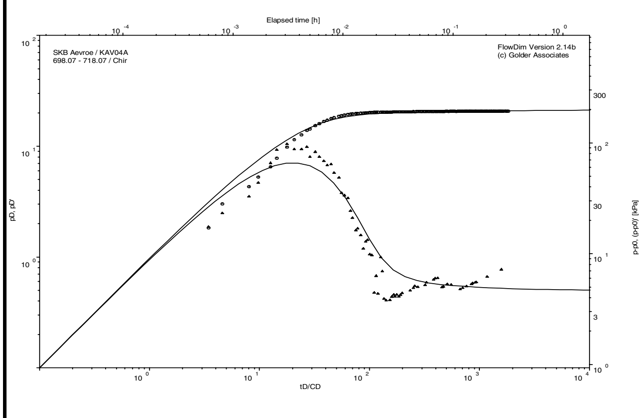


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	7081		
p_i (kPa) =	7082		
p_p(kPa) =	7280	p_F (kPa) =	7083
Q_p (m^3/s)=	2.18E-04		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	17.86		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.1E-05		
T_M (m^2/s)=	1.1E-05		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	2.3E-05	T (m^2/s) =	3.85E-05
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	2.3E-07	K_s (m/s) =	3.85E-07
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	1.54E-08
C_D (-) =	#NV	C_D (-) =	1.70E+00
ξ (-) =	0	ξ (-) =	1.24E+01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	1.54E-08
dt_2 (min) =	18	C_D (-) =	1.70E+00
T_T (m^2/s) =	2.3E-05	ξ (-) =	0
S (-) =	1.0E-06		
K_s (m/s) =	2.3E-07		
S_s (1/m) =	1.0E-08		

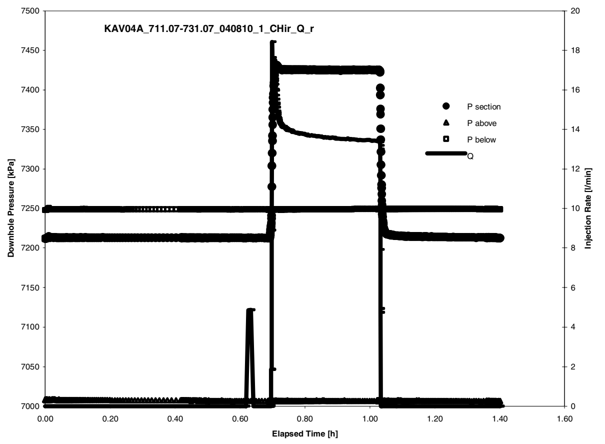
Comments:

The recommended transmissivity of 2.3E-5 m2/s was derived from the analysis of the CHi phase, because it shows the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E-5 to 4.0E-5 m2/s. The flow dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 7083.3 kPa.

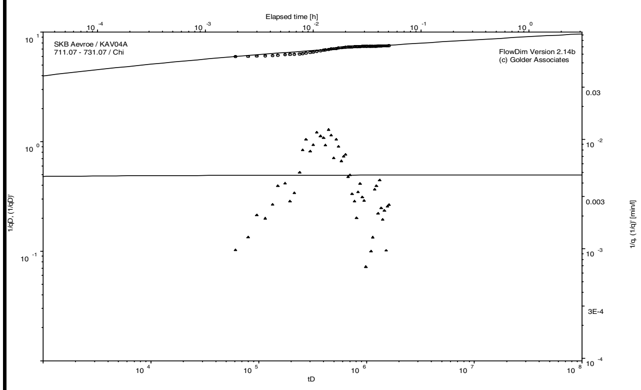
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040810 15:46
Test section from - to (m):	711.07-731.07 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

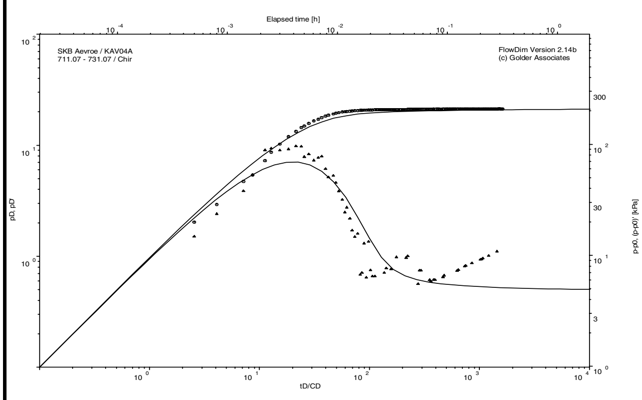
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	7212		
p_i (kPa) =	7212		
p_p(kPa) =	7424	p_F (kPa) =	7213
Q_p (m^3/s)=	2.24E-04		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	18.02		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.0E-05		
T_M (m^2/s)=	1.1E-05		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	3.00	dt_2 (min) =	6.00
T (m^2/s) =	1.3E-05	T (m^2/s) =	3.95E-05
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.3E-07	K_s (m/s) =	3.95E-07
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	1.78E-08
C_D (-) =	#NV	C_D (-) =	1.96E+00
ξ (-) =	-4.98E-03	ξ (-) =	1.23E+01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	1.78E-08
dt_2 (min) =	6	C_D (-) =	1.96E+00
T_T (m^2/s) =	4.0E-05	ξ (-) =	1.23E+01
S (-) =	1.0E-06		
K_s (m/s) =	4.0E-07		
S_s (1/m) =	1.0E-08		

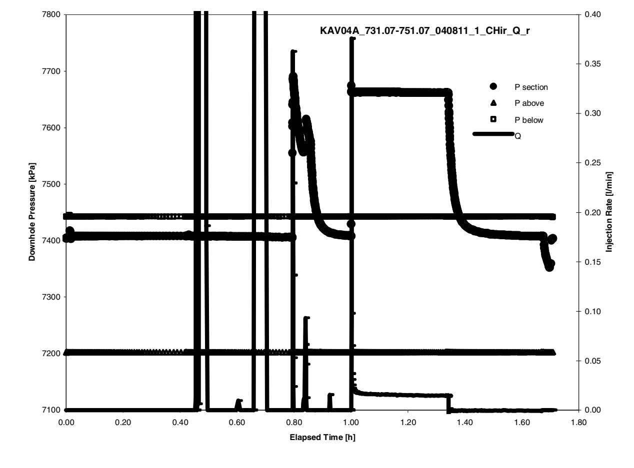
Comments:

The recommended transmissivity of 4.0E-5 m2/s was derived from the analysis of the CHir phase, which is showing a slightly better data quality. The confidence range for the interval transmissivity is estimated to be 8.0E-6 to 8.0E-5 m2/s (the test results should be regarded as relatively unreliable due to poor data quality). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 7212.0 kPa.

Test Summary Sheet

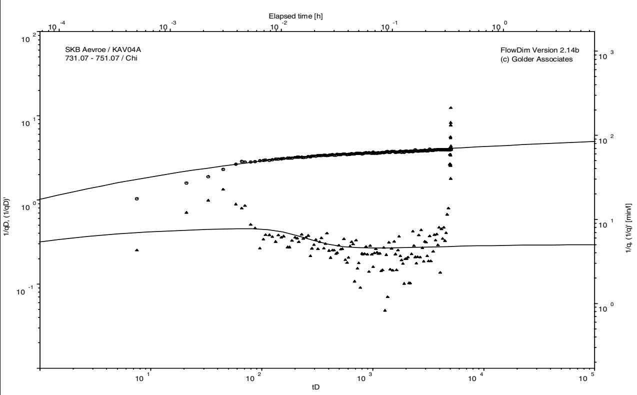
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040811 09:54
Test section from - to (m):	731.07-751.07 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	7405		
p_i (kPa) =	7408		
p_p(kPa) =	7662	p_F (kPa) =	7407
Q_p (m^3/s)=	2.50E-07		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	18.31		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	9.7E-09		
T_M (m^2/s)=	1.0E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	1.0E-08	T (m^2/s) =	1.57E-08
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.0E-10	K_s (m/s) =	1.57E-10
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	5.37E-11
C_D (-) =	#NV	C_D (-) =	5.92E-03
ξ (-) =	0	ξ (-) =	4.88
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

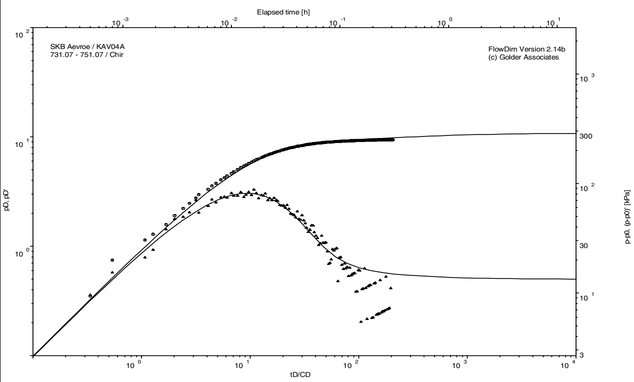
Log-Log plot incl. derivates- flow period



Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	5.37E-11
dt_2 (min) =	18	C_D (-) =	5.92E-03
T_T (m^2/s) =	1.0E-08	ξ (-) =	0
S (-) =	1.0E-06		
K_s (m/s) =	1.0E-10		
S_s (1/m) =	1.0E-08		

Log-Log plot incl. derivatives- recovery period



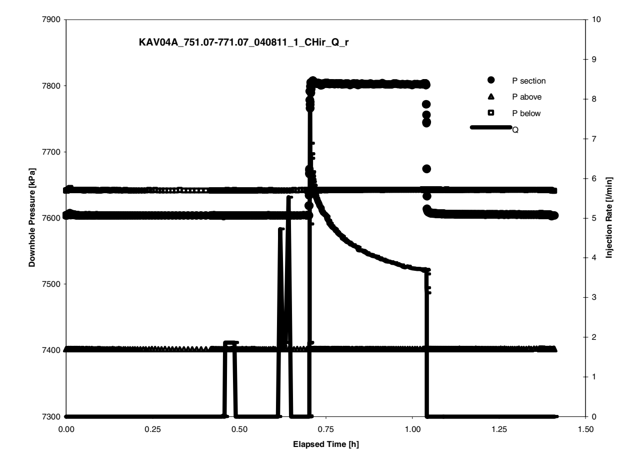
Comments:

The recommended transmissivity of 1.0E-8 m2/s was derived from the analysis of the CHi phase, which is showing a derivative stabilization. The confidence range for the interval transmissivity is estimated to be 5.0E-9 to 5.0E-8 m2/s (encompasses the analysis results of the CHir phase and the skin effect of the CHi phase). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 7402.2 kPa.

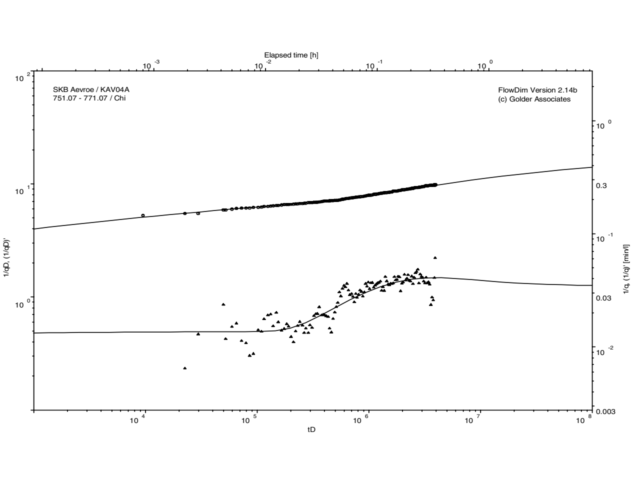
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040810 12:24
Test section from - to (m):	751.07-771.07 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

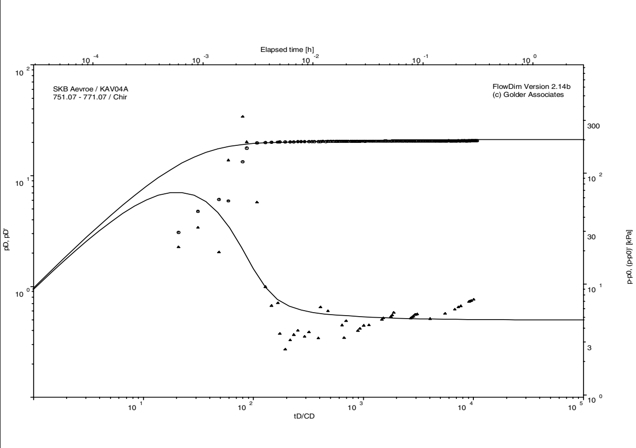
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	7605		
p_i (kPa) =	7603		
p_p(kPa) =	7801	p_F (kPa) =	7604
Q_p (m^3/s)=	6.17E-05		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	18.63		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	3.1E-06		
T_M (m^2/s)=	3.2E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	1.9E-06	T (m^2/s) =	1.18E-05
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.9E-08	K_s (m/s) =	1.18E-07
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	7.81E-10
C_D (-) =	#NV	C_D (-) =	8.61E-02
ξ (-) =	0	ξ (-) =	1.39E+01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	7.81E-10
dt_2 (min) =	18	C_D (-) =	8.61E-02
T_T (m^2/s) =	1.9E-06	ξ (-) =	0
S (-) =	1.0E-06		
K_s (m/s) =	1.9E-08		
S_s (1/m) =	1.0E-08		

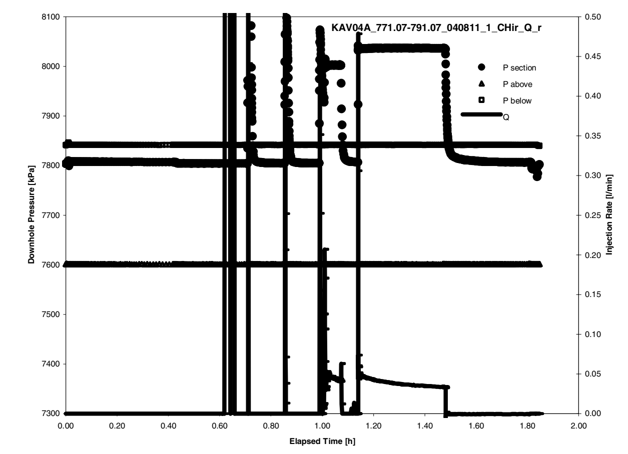
Comments:

The recommended transmissivity of 1.9E-6 m2/s was derived from the analysis of the CHi phase, which is showing the best data quality. The confidence range for the interval transmissivity is estimated to be 1.0E-6 to 2.0E-5 m2/s (encompasses the analysis results of the CHir phase and the skin effect of the CHi phase). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 7603.6 kPa.

Test Summary Sheet

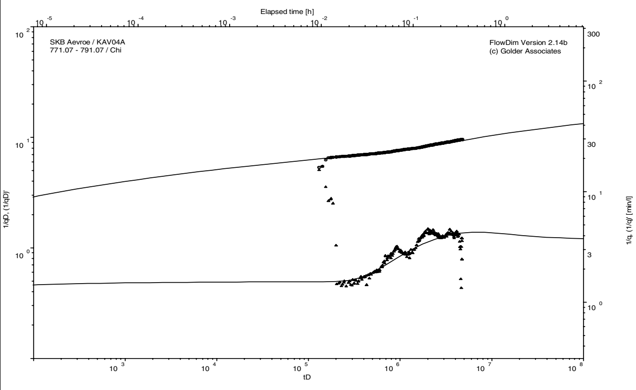
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040811 15:01
Test section from - to (m):	771.07-791.07 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

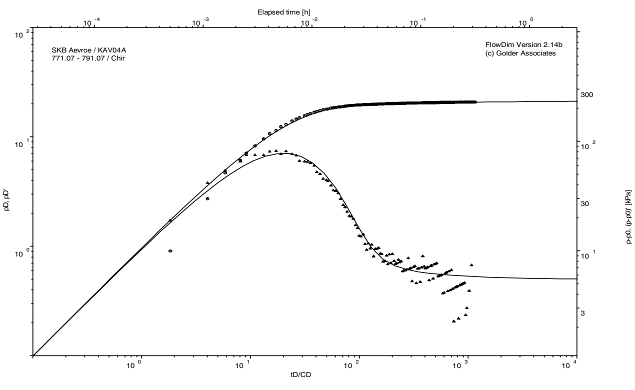


Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	7805		
p_i (kPa) =	7806		
p_p(kPa) =	8036	p_F (kPa) =	7805
Q_p (m^3/s)=	5.63E-07		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	18.95		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	2.4E-08		
T_M (m^2/s)=	2.5E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	1.5E-08	T (m^2/s) =	9.28E-08
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.5E-10	K_s (m/s) =	9.28E-10
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	5.85E-11
C_D (-) =	#NV	C_D (-) =	6.45E-03
ξ (-) =	2.51	ξ (-) =	1.52E+01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	5.85E-11
dt_2 (min) =	12	C_D (-) =	6.45E-03
T_T (m^2/s) =	9.3E-08	ξ (-) =	1.52E+01
S (-) =	1.0E-06		
K_s (m/s) =	9.3E-10		
S_s (1/m) =	1.0E-08		

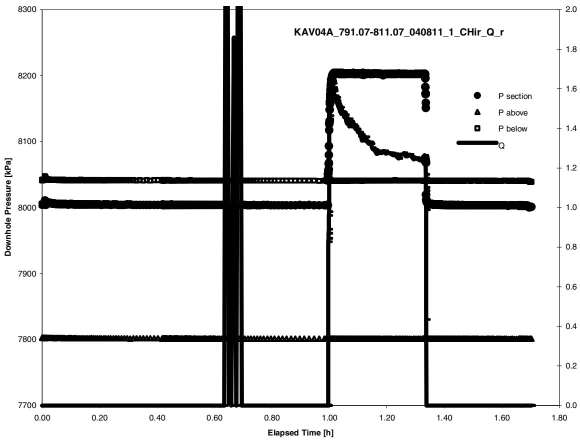
Comments:

The recommended transmissivity of 9.3E-8 m2/s was derived from the analysis of the CHir phase, which is showing the best data quality. The confidence range for the interval transmissivity is estimated to be 1.0E-8 to 2.0E-7 m2/s (encompasses the analysis results of the CHi phase). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 7803.0 kPa.

Test Summary Sheet

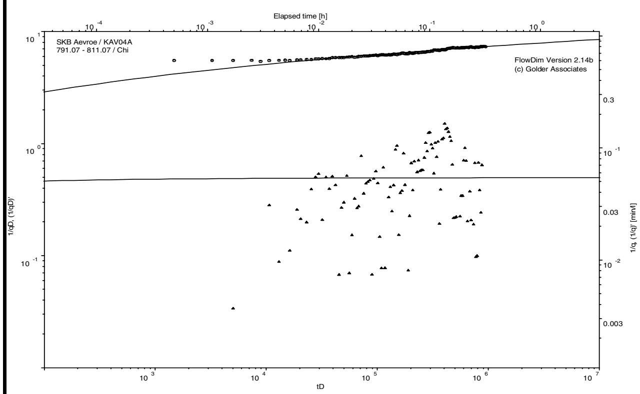
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040811 17:54
Test section from - to (m):	791.07-811.07	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

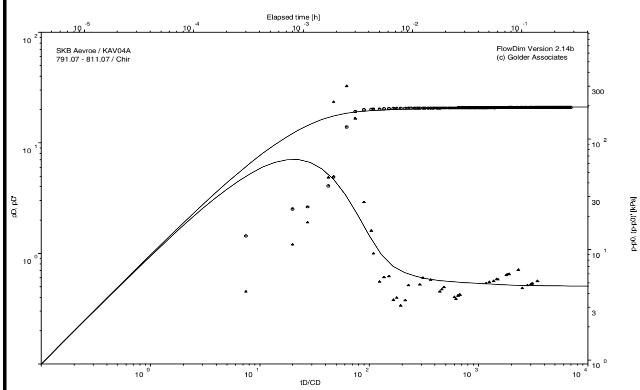


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	8005		
p_i (kPa) =	8003		
p_p(kPa) =	8203	p_F (kPa) =	8003
Q_p (m^3/s)=	2.07E-05		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	19.26		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.0E-06		
T_M (m^2/s)=	1.1E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	1.2E-06	T (m^2/s) =	3.78E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.2E-08	K_s (m/s) =	3.78E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	3.51E-10
C_D (-) =	#NV	C_D (-) =	3.87E-02
ξ (-) =	-4.98E-03	ξ (-) =	1.43E+01
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	3.51E-10
dt_2 (min) =	12	C_D (-) =	3.87E-02
T_T (m^2/s) =	3.8E-06	ξ (-) =	1.43E+01
S (-) =	1.0E-06		
K_s (m/s) =	3.8E-08		
S_s (1/m) =	1.0E-08		

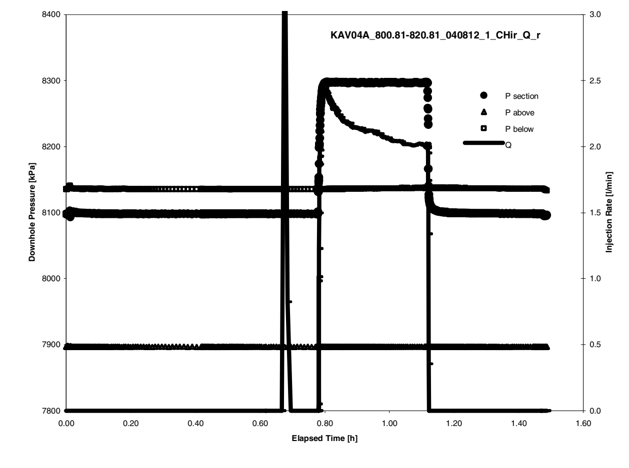
Comments:

The recommended transmissivity of 3.8E-6 m2/s was derived from the analysis of the CHir phase, which is showing the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 9.0E-7 to 5.0E-6 m2/s. The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8003.3 kPa.

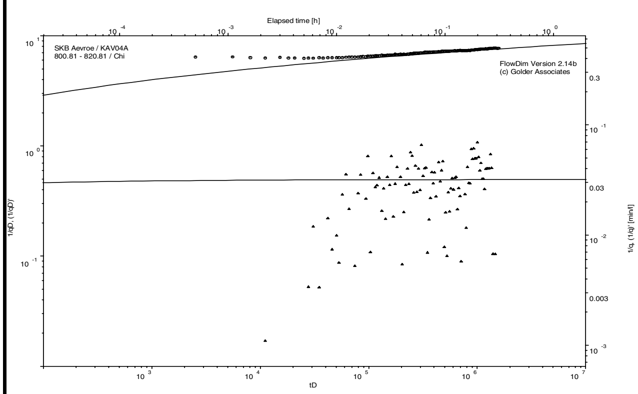
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040812 09:04
Test section from - to (m):	800.81-820.81	Responsible for test execution:	Reinder van der Wall
Section diameter, 2·r_w (m):	0.076	Responsible for test evaluation:	C. Enachescu

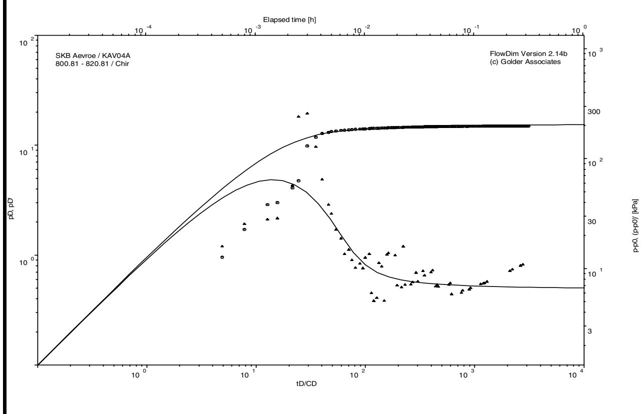
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	8101		
p_i (kPa) =	8098		
p_p(kPa) =	8296	p_F (kPa) =	8098
Q_p (m^3/s)=	3.33E-05		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	19.42		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.6E-06		
T_M (m^2/s)=	1.7E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	12.00	dt_2 (min) =	6.00
T (m^2/s) =	2.0E-06	T (m^2/s) =	4.21E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	2.0E-08	K_s (m/s) =	4.21E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	9.92E-10
C_D (-) =	#NV	C_D (-) =	1.09E-01
ξ (-) =	0	ξ (-) =	8.03
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	9.92E-10
dt_2 (min) =	6	C_D (-) =	1.09E-01
T_T (m^2/s) =	4.2E-06	ξ (-) =	8.03
S (-) =	1.0E-06		
K_s (m/s) =	4.2E-08		
S_s (1/m) =	1.0E-08		

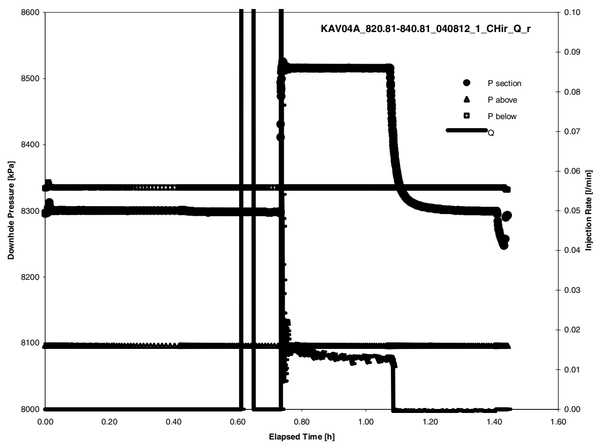
Comments:

The recommended transmissivity of 4.2E-6 m2/s was derived from the analysis of the CHir phase, which is showing the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E-6 to 6.0E-6 m2/s. The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8096.9 kPa.

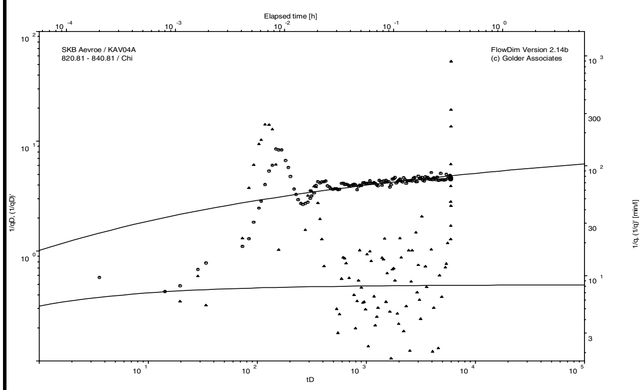
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040812 11:30
Test section from - to (m):	820.81-840.81 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

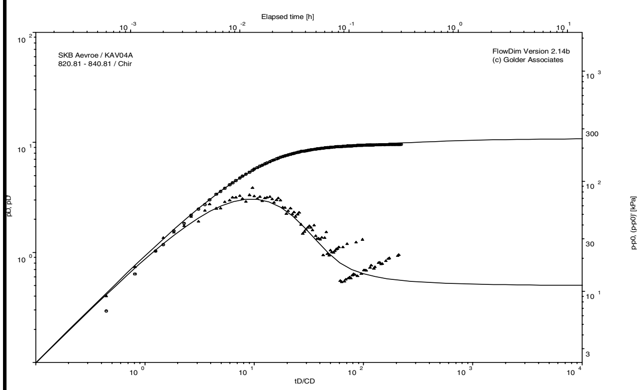
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		**Recovery period**	
Indata		**Indata**	
p_0 (kPa) =	8297		
p_i (kPa) =	8298		
p_p(kPa) =	8515	p_F (kPa) =	8299
Q_p (m^3/s)=	2.17E-07		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	19.74		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	9.8E-09		
T_M (m^2/s)=	1.0E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	10.00
T (m^2/s) =	7.2E-09	T (m^2/s) =	1.62E-08
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	7.2E-11	K_s (m/s) =	1.62E-10
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	5.06E-11
C_D (-) =	#NV	C_D (-) =	5.58E-03
ξ (-) =	0	ξ (-) =	4.91
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	5.06E-11
dt_2 (min) =	10	C_D (-) =	5.58E-03
T_T (m^2/s) =	1.6E-08	ξ (-) =	4.91
S (-) =	1.0E-06		
K_s (m/s) =	1.6E-10		
S_s (1/m) =	1.0E-08		

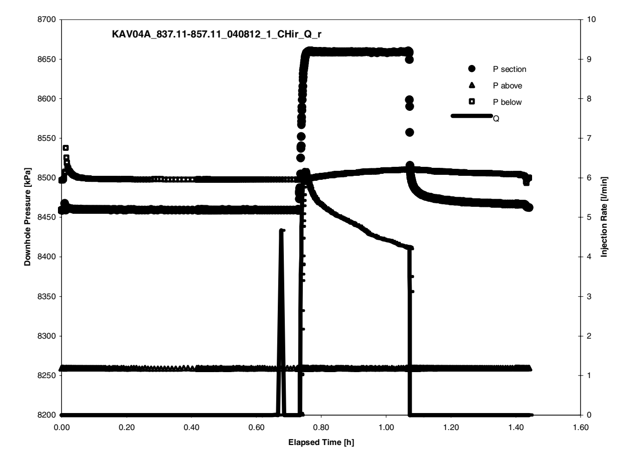
Comments:

The recommended transmissivity of 1.6E-8 m2/s was derived from the analysis of the CHir phase, which is showing the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 6.0E-9 to 3.0E-8 m2/s. The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8293.4 kPa.

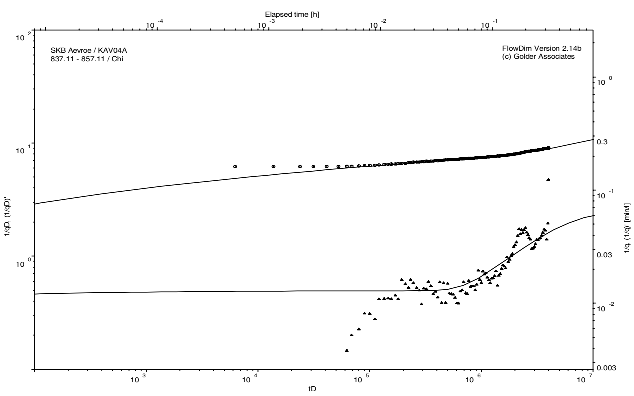
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040812 13:51
Test section from - to (m):	837.11-857.11	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

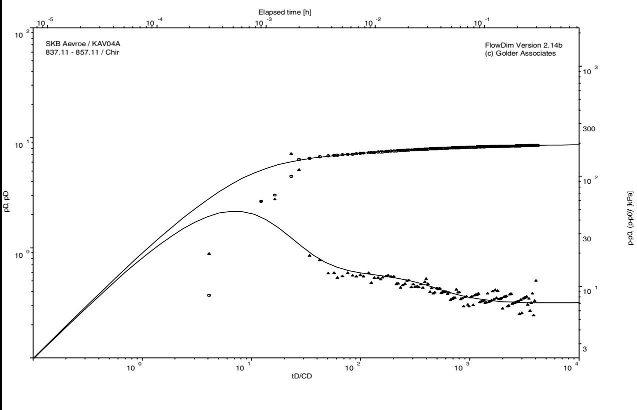
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	8460		
p_i (kPa) =	8459		
p_p(kPa) =	8659	p_F (kPa) =	8466
Q_p (m^3/s)=	7.13E-05		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	19.97		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	3.5E-06		
T_M (m^2/s)=	3.7E-06		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	18.00
T (m^2/s) =	1.4E-06	T (m^2/s) =	5.66E-06
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.4E-08	K_s (m/s) =	5.66E-08
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	9.58E-10
C_D (-) =	#NV	C_D (-) =	1.06E-01
ξ (-) =	0	ξ (-) =	1.13
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	9.58E-10
dt_2 (min) =	18	C_D (-) =	1.06E-01
T_T (m^2/s) =	5.7E-06	ξ (-) =	1.13
S (-) =	1.0E-06		
K_s (m/s) =	5.7E-08		
S_s (1/m) =	1.0E-08		

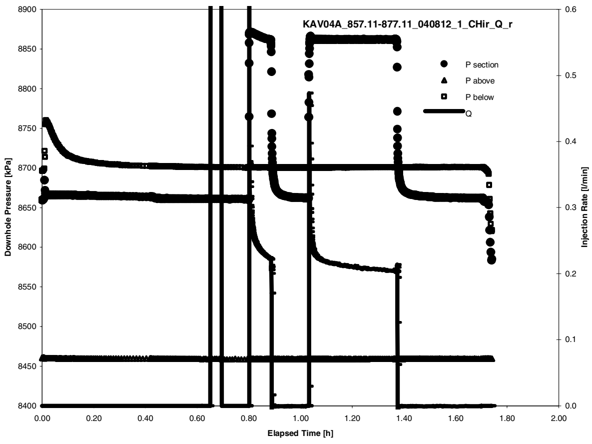
Comments:

The recommended transmissivity of 5.7E-6 m2/s was derived from the analysis of the CHir phase (inner zone), which is showing the best consistency with the CHi phase. The confidence range for the interval transmissivity is estimated to be 1.0E-6 to 9.0E-6 m2/s (encompasses the analysis results of the CHi phase and CHir phase outer zone). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8461.9 kPa.

Test Summary Sheet

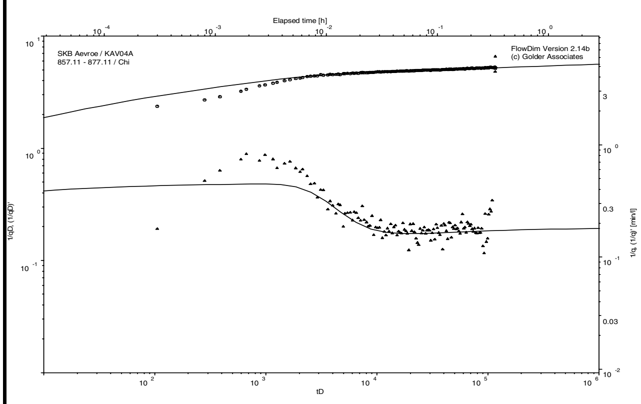
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040812 16:34
Test section from - to (m):	857.11-877.11	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

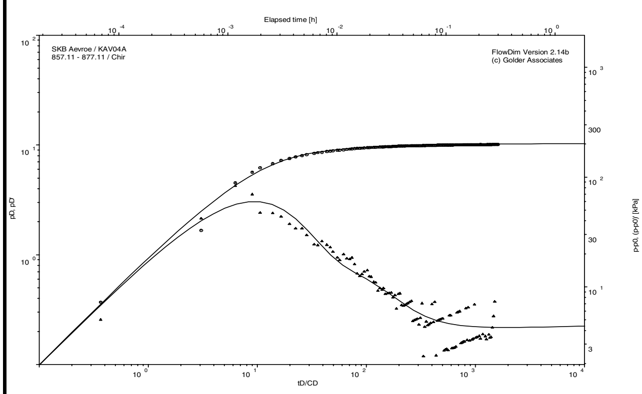


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	8661		
p_i (kPa) =	8661		
p_p(kPa) =	8861	p_F (kPa) =	8661
Q_p (m^3/s)=	3.40E-06		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	20.3		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.7E-07		
T_M (m^2/s)=	1.7E-07		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	12.00
T (m^2/s) =	3.6E-07	T (m^2/s) =	2.84E-07
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	3.6E-09	K_s (m/s) =	2.84E-09
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	1.22E-10
C_D (-) =	#NV	C_D (-) =	1.34E-02
ξ (-) =	0	ξ (-) =	4.47
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	1.22E-10
dt_2 (min) =	18	C_D (-) =	1.34E-02
T_T (m^2/s) =	3.6E-07	ξ (-) =	0
S (-) =	1.0E-06		
K_s (m/s) =	3.6E-09		
S_s (1/m) =	1.0E-08		

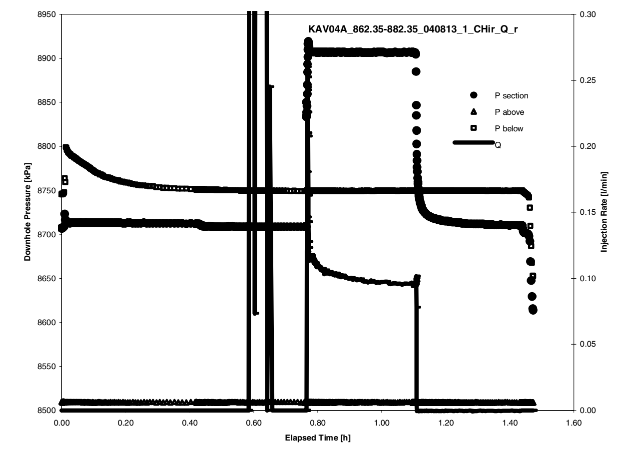
Comments:

The recommended transmissivity of 3.6E-7 m2/s was derived from the analysis of the CHi phase, which is showing the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 1.0E-7 to 7.0E-7 m2/s (encompasses the analysis results of the CHir phase and CHi phase skin effect). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8660.1 kPa.

Test Summary Sheet

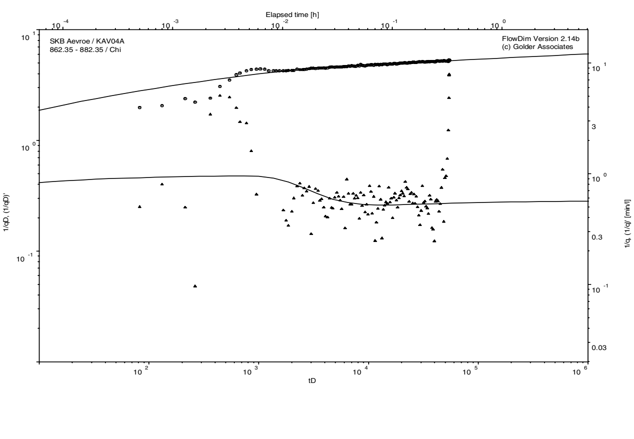
Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040813 09:03
Test section from - to (m):	862.35-882.35	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

Linear plot Q and p

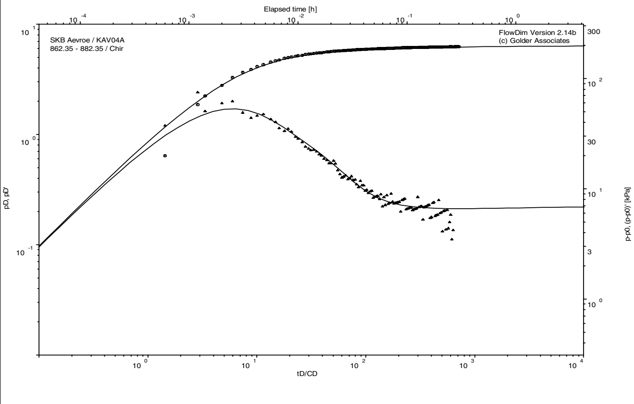


Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	8709		
p_i (kPa) =	8708		
p_p(kPa) =	8906	p_F (kPa) =	8709
Q_p (m^3/s)=	1.58E-06		
tp (s) =	1200	t_F (s) =	1200
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	20.39		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	7.8E-08		
T_M (m^2/s)=	8.2E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	15.00
T (m^2/s) =	1.2E-07	T (m^2/s) =	8.54E-08
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	1.2E-09	K_s (m/s) =	8.54E-10
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	8.24E-11
C_D (-) =	#NV	C_D (-) =	9.08E-03
ξ (-) =	0	ξ (-) =	1.21
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Selected representative parameters.			
dt_1 (min) =	1	C (m^3/Pa) =	8.24E-11
dt_2 (min) =	18	C_D (-) =	9.08E-03
T_T (m^2/s) =	1.2E-07	ξ (-) =	0
S (-) =	1.0E-06		
K_s (m/s) =	1.2E-09		
S_s (1/m) =	1.0E-08		

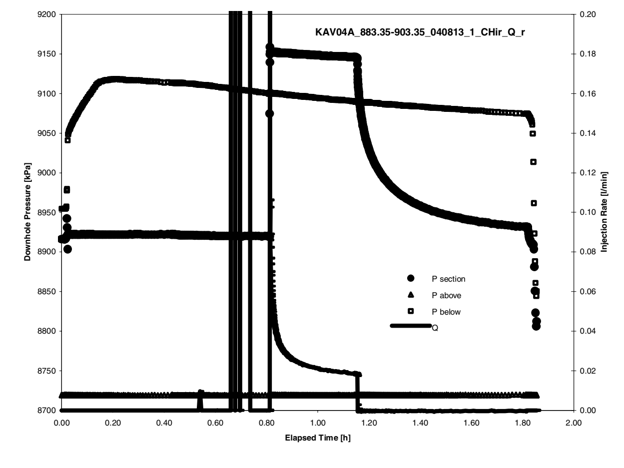
Comments:

The recommended transmissivity of 1.2E-7 m2/s was derived from the analysis of the CHi phase, which is showing the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 5.0E-8 to 3.0E-7 m2/s (encompasses the analysis results of the CHir phase and CHi phase skin effect). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8707.1 kPa.

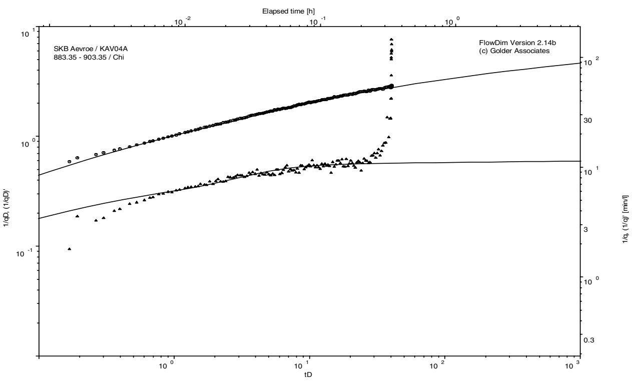
Test Summary Sheet

Project:	Oskarshamn site investigation	Test type:[1]	Chir
Area:	Ävrö	Test no:	1
Borehole ID:	KAV04A	Test start:	040813 11:27
Test section from - to (m):	883.35-903.35 m	Responsible for test execution:	Reinder van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for test evaluation:	C. Enachescu

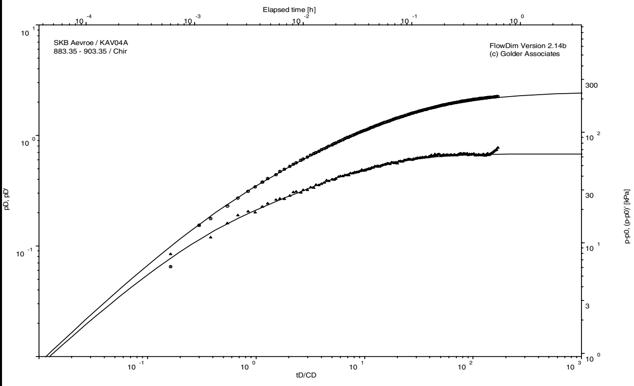
Linear plot Q and p



Log-Log plot incl. derivates- flow period



Log-Log plot incl. derivatives- recovery period



Flow period		Recovery period	
Indata		**Indata**	
p_0 (kPa) =	8916		
p_i (kPa) =	8919		
p_p(kPa) =	9145	p_F (kPa) =	8932
Q_p (m^3/s)=	3.17E-07		
tp (s) =	1200	t_F (s) =	2400
S el S^* (-)=	1.00E-06	S el S^* (-)=	1.00E-06
EC_w (mS/m)=			
$Temp_w$(gr C)=	20.75		
Derivative fact.=		Derivative fact.=	
Results		**Results**	
Q/s (m^2/s)=	1.4E-08		
T_M (m^2/s)=	1.4E-08		
Flow regime:	transient	Flow regime:	transient
dt_1 (min) =	1.00	dt_1 (min) =	1.00
dt_2 (min) =	18.00	dt_2 (min) =	30.00
T (m^2/s) =	6.0E-09	T (m^2/s) =	5.15E-09
S (-) =	1.0E-06	S (-) =	1.00E-06
K_s (m/s) =	6.0E-11	K_s (m/s) =	5.15E-11
S_s (1/m) =	1.0E-08	S_s (1/m) =	1.00E-08
C (m^3/Pa) =	#NV	C (m^3/Pa) =	5.88E-11
C_D (-) =	#NV	C_D (-) =	6.48E-03
ξ (-) =	-2.41	ξ (-) =	-2.68
T_{GRF}(m^2/s) =		T_{GRF}(m^2/s) =	
S_{GRF}(-) =		S_{GRF}(-) =	
D_{GRF} (-) =		D_{GRF} (-) =	

Selected representative parameters.

dt_1 (min) =	1	C (m^3/Pa) =	5.88E-11
dt_2 (min) =	30	C_D (-) =	6.48E-03
T_T (m^2/s) =	5.2E-09	ξ (-) =	-2.68
S (-) =	1.0E-06		
K_s (m/s) =	5.2E-11		
S_s (1/m) =	1.0E-08		

Comments:

The recommended transmissivity of 5.2E-9 m2/s was derived from the analysis of the CHir phase, which is showing the best derivative stabilization. The confidence range for the interval transmissivity is estimated to be 3.0E-9 to 9.0E-9 m2/s (encompasses the analysis results of the CHi phase and CHir phase skin effect). The flow dimension used in the analysis is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight line extrapolation in the Horner plot to a value of 8907.6 kPa.

APPENDIX 4

Nomenclature

The following symbols are extracted from the more comprehensive list of symbols provided by SKB. Only the symbols that were used or deemed to be used in the future in the context of test analysis are presented.

Character	Explanation	Dimension	Unit
b	Aquifer thickness (Thickness of 2D formation)	[L]	m
L_w	Test section length.	[L]	m
r_w	Borehole, well or soil pipe radius in test section.	[L]	m
r_D	Dimensionless radius, $r_D=r/r_w$	-	-
Q_p	Flow in test section immediately before stop of flow. Stabilised pump flow in flow logging.	$[L^3/T]$	m^3/s
Q_m	Arithmetical mean flow during perturbation phase.	$[L^3/T]$	m^3/s
V	Volume	$[L^3]$	m^3
V_w	Water volume in test section.	$[L^3]$	m^3
V_p	Total water volume injected/pumped during perturbation phase.	$[L^3]$	m^3
t	Time	[T]	hour,min,s
t_0	Duration of rest phase before perturbation phase.	[T]	s
t_p	Duration of perturbation phase. (from flow start as far as p_p).	[T]	s
t_F	Duration of recovery phase (from p_p to p_F).	[T]	s
t_1, t_2 etc	Times for various phases during a hydro test.	[T]	hour,min,s
dt	Running time from start of flow phase and recovery phase respectively.	[T]	s
dt_e	$dt_e = (dt \cdot tp) / (dt + tp)$ Agarwal equivalent time with dt as running time for recovery phase.	[T]	s
t_D	$t_D = T \cdot t / (S \cdot r_w^2)$. Dimensionless time	-	-
p	Static pressure; including non-dynamic pressure which depends on water velocity. Dynamic pressure is normally ignored in estimating the potential in groundwater flow relations.	$[M/(LT)^2]$	kPa
p_a	Atmospheric pressure	$[M/(LT)^2]$	kPa
p_t	Absolute pressure; $p_t=p_a+p_g$	$[M/(LT)^2]$	kPa
p_g	Gauge pressure; Difference between absolute pressure and atmospheric pressure.	$[M/(LT)^2]$	kPa
p_0	Initial pressure before test begins, prior to packer expansion.	$[M/(LT)^2]$	kPa
p_i	Pressure in measuring section before start of flow.	$[M/(LT)^2]$	kPa
p_f	Pressure during perturbation phase.	$[M/(LT)^2]$	kPa
p_s	Pressure during recovery.	$[M/(LT)^2]$	kPa
p_p	Pressure in measuring section before flow stop.	$[M/(LT)^2]$	kPa
p_F	Pressure in measuring section at end of recovery.	$[M/(LT)^2]$	kPa
p_D	$p_D=2\pi \cdot T \cdot p/(Q \cdot \rho_w g)$, Dimensionless pressure	-	-
dp	Pressure difference, drawdown of pressure surface between two points of time.	$[M/(LT)^2]$	kPa
dp_f	$dp_f = p_i - p_f$ or $= p_f - p_i$, drawdown/pressure increase of pressure surface between two points of time during perturbation phase. dp_f usually expressed positive.	$[M/(LT)^2]$	kPa
dp_s	$dp_s = p_s - p_p$ or $= p_p - p_s$, pressure increase/drawdown of pressure surface between two points of time during recovery phase. dp_s usually expressed positive.	$[M/(LT)^2]$	kPa
dp_p	$dp_p = p_i - p_p$ or $= p_p - p_i$, **maximal** pressure increase/drawdown of pressure surface between two points of time during perturbation phase. dp_p expressed positive.	$[M/(LT)^2]$	kPa
dp_F	$dp_F = p_p - p_F$ or $= p_F - p_p$, **maximal** pressure increase/drawdown of pressure surface between two points of time during recovery phase. dp_F expressed positive.	$[M/(LT)^2]$	kPa

H	Total head; (potential relative a reference level) (indication of h for phase as for p). $H=h_e+h_p+h_v$	[L]	m
h	Groundwater pressure level (hydraulic head (piezometric head; possible to use for level observations in boreholes, static head)); (indication of h for phase as for p). $h=h_e+h_p$	[L]	m
h_e	Height of measuring point (Elevation head); Level above reference level for measuring point.	[L]	m
s_p	Drawdown in measuring section before flow stop.	[L]	m
h_0	Initial above reference level before test begins, prior to packer expansion.	[L]	m
h_i	Level above reference level in measuring section before start of flow.	[L]	m
h_f	Level above reference level during perturbation phase.	[L]	m
h_s	Level above reference level during recovery phase.	[L]	m
h_p	Level above reference level in measuring section before flow stop.	[L]	m
h_F	Level above reference level in measuring section at end of recovery.	[L]	m
dh	Level difference, drawdown of water level between two points of time.	[L]	m
dh_f	$dh_f = h_i - h_f$ or $= h_f - h_i$, drawdown/pressure increase of pressure surface between two points of time during perturbation phase. dh_f usually expressed positive.	[L]	m
dh_s	$dh_s = h_s - h_p$ or $= h_p - h_s$, pressure increase/drawdown of pressure surface between two points of time during recovery phase. dh_s usually expressed positive.	[L]	m
dh_p	$dh_p = h_i - h_p$ or $= h_p - h_i$, maximal pressure increase/drawdown of pressure surface between two points of time during perturbation phase. dh_p expressed positive.	[L]	m
dh_F	$dh_F = h_p - h_F$ or $= h_F - h_p$, maximal pressure increase/drawdown of pressure surface between two points of time during perturbation phase. dh_F expressed positive.	[L]	m
Te_w	Temperature in the test section (taken from temperature logging). Temperature		^oC
Te_{w0}	Temperature in the test section during undisturbed conditions (taken from temperature logging). Temperature		^oC
g	Constant of gravitation (9.81 $m*s^{-2}$) (Acceleration due to gravity)	$[L/T^2]$	m/s^2
π	Constant (approx 3.1416).	[-]	
r	Residual. $r= p_c-p_m$, $r= h_c-h_m$, etc. Difference between measured data (p_m, h_m, etc) and estimated data (p_c, h_c, etc)		
Q/s	Specific capacity $s=dp_p$ or $s=s_p=h_0-h_p$ (open borehole)	$[L^2/T]$	m^2/s
D	Interpreted flow dimension according to Barker, 1988.	[-]	-
dt_1	Time of starting for semi-log or log-log evaluated characteristic counted from start of flow phase and recovery phase respectively.	[T]	s
dt_2	End of time for semi-log or log-log evaluated characteristic counted from start of flow phase and recovery phase respectively.	[T]	s
T	Transmissivity	$[L^2/T]$	m^2/s
T_M	Transmissivity according to Moye (1967)	$[L^2/T]$	m^2/s
T_S	Transmissivity evaluated from slug test	$[L^2/T]$	m^2/s
T_{Sf}, T_{Lf}	Transient evaluation based on semi-log or log-log diagram for perturbation phase in injection or pumping.	$[L^2/T]$	m^2/s
T_{Ss}, T_{Ls}	Transient evaluation based on semi-log or log-log diagram for recovery phase in injection or pumping.	$[L^2/T]$	m^2/s

T_T	Transient evaluation (log-log or lin-log). Judged best evaluation of T_{Sf}, T_{Lf}, T_{Ss}, T_{Ls}	$[L^2/T]$	m^2/s
T_{NLR}	Evaluation based on non-linear regression.	$[L^2/T]$	m^2/s
S	Storage coefficient, (Storativity)	[-]	-
S*	Assumed storage coefficient	[-]	-
S_f	Fracture storage coefficient	[-]	-
S_m	Matrix storage coefficient	[-]	-
S_{NLR}	Storage coefficient, evaluation based on non-linear regression	[-]	-
S_s	Specific storage coefficient; confined storage.	[1/L]	1/m
S_s*	Assumed specific storage coefficient; confined storage.	[1/L]	1/m
ξ	Skin factor	[-]	-
ξ*	Assumed skin factor	[-]	-
C	Wellbore storage coefficient	$[(LT^2)\cdot M^2]$	m^3/Pa
C_D	$C_D = C\cdot\rho_w g /(2\pi\cdot S\cdot r_w^2)$, Dimensionless wellbore storage coefficient	[-]	-
ω	$\omega = S_f /(S_f + S_m)$, storage ratio (Storativity ratio); the ratio of storage coefficient between that of the fracture and total storage.	[-]	-
λ	$\lambda = \alpha\cdot (K_m / K_f) \cdot r_w^2$ interporosity flow coefficient.	[-]	-
T_{GRF}	Transmissivity interpreted using the GRF method	$[L^2/T]$	m^2/s
S_{GRF}	Storage coefficient interpreted using the GRF method	[1/L]	1/m
D_{GRF}	Flow dimension interpreted using the GRF method	[-]	-
c_w	Water compressibility; corresponding to β in hydrogeological literature.	$[(LT^2)/M]$	1/Pa
c_r	Pore-volume compressibility, (rock compressibility); Corresponding to α/n in hydrogeological literature.	$[(LT^2)/M]$	1/Pa
c_t	$c_t = c_r + c_w$, total compressibility; compressibility per volumetric unit of rock obtained through multiplying by the total porosity, n. (Presence of gas or other fluids can be included in c_t if the degree of saturation (volume of respective fluid divided by n) of the pore system of respective fluid is also included)	$[(LT^2)/M]$	1/Pa
n	Total porosity	-	-
ρ	Density	$[M/L^3]$	$kg/(m^3)$
ρ_w	Fluid density in measurement section during pumping/injection	$[M/L^3]$	$kg/(m^3)$
μ	Dynamic viscosity	[M/LT]	Pa s
μ_w	Dynamic viscosity (Fluid density in measurement section during pumping/injection)	[M/LT]	Pa s

APPENDIX 5

SICADA Data Tables

(Simplified version v1.2)

SICADA/Data Import Template

SKB & Ergodata AB 2004

File Identity	
Created By	Reinder van der Wall
Created	2004-09-22 13:56

Activity Type	KAV04A KAV04A - Injection test

Project	AP PS 400-04-063

Activity Information						**Additional Activity Data**							
						C10	P20	P200	P220	R110	R25	R90	
Idcode	**Start Date**	**Stop Date**	**Secup (m)**	**Seclow (m)**	**Section No**	**Company**	**Field crew manager**	**Field crew**	**Person evaluating data**	**Field Notes ID**	**Report**	**Quality plan**	
KAV04A	2004-07-22 09:00	2004-08-14 18:00	100,00	1004,00		Golder	Cristian Enachescu	Cristian Enachescu, Stefan Rohs	Cristian Enachescu	431			

Instructions

SICADA Data Import Template (simplified version)

This template should be used to supply information for the creation of new activities of a certain type (activity type), along with associated measurement data, in the SICADA database.

Information about the selected activity type that this template is intended for is included at the top of this worksheet.

Cells that have a red marker in its upper right corner have a description associated with it. Either select or move the mouse over the cell to see the text.

The Activity Data Sheet

For each activity to be created, supply information in the columns Idcode, Start Date, Stop Date, Secup, Seclow and Section No.

Additional activity attributes should be provided for each created activity. Please enter the appropriate activity attributes for each activity with appropriate information.

The selected set of additional activity attributes included in this file is choosen when this file is generated from SICADA.

The Data Table Sheet(s)

Measurement data associated to each created activity can be supplied. Each data table has its own worksheet in this Excel workbook.

The selected set of tables (and columns) included in this file is choosen when this file is generated from SICADA. The pre-filled set of

	tables (worksheets) and columns should not be altered to guarantee that this file can be imported to SICADA when completed. Each entered data row must be connected to an activity. The connection is done by supplying values for idcode, start_date, stop_date, secup, seclow and section_no on each data row. It is convenient to copy these values from the corresponding activity row in the Activity Data worksheet. Information about each table and its columns can be found in the respective worksheet.

List of idcodes and possibly other check values follows below - please do NOT edit.

idcode

Table	plu_s_hole_test_d PLU Injection and pumping, General information

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_h	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_p	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	oC	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.
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

idcode	start_date	stop_date	secup	seclow	section_no	test_type	formation_type	start_flow_period	stop_flow_period
KAV04A	2004-07-26 17:12	2004-07-26 18:38	105,17	205,17		3	1	2004-07-26 17:35:41	2004-07-26 18:05:51
KAV04A	2004-07-27 16:55	2004-07-28 10:11	205,26	305,26		3	1	2004-07-28 08:09:06	2004-07-28 08:39:10
KAV04A	2004-07-28 11:41	2004-07-28 13:44	305,33	405,33		3	1	2004-07-28 12:42:12	2004-07-28 13:12:25
KAV04A	2004-07-28 14:57	2004-07-28 16:46	405,42	505,42		3	1	2004-07-28 15:44:13	2004-07-28 16:14:27
KAV04A	2004-07-29 10:58	2004-07-27 14:25	505,43	605,43		3	1	2004-07-29 13:22:53	2004-07-29 13:53:03
KAV04A	2004-07-29 17:56	2004-07-29 19:50	605,57	705,57		3	1	2004-07-29 18:57:57	2004-07-29 19:28:07
KAV04A	2004-07-30 13:58	2004-07-30 16:06	704,00	804,00		3	1	2004-07-30 15:05:04	2004-07-30 15:35:14
KAV04A	2004-07-30 19:06	2004-07-30 19:06	800,81	900,81		3	1	2004-07-30 19:57:28	2004-07-30 20:27:38
KAV04A	2004-07-31 10:54	2004-07-31 14:25	898,20	998,20		4	1	2004-07-31 12:53:00	2004-07-31 13:23:10
KAV04A	2004-08-02 18:44	2004-08-02 20:25	105,17	125,17		3	1	2004-08-02 19:43:58	2004-08-02 20:04:08
KAV04A	2004-08-03 09:57	2004-08-03 11:44	125,17	145,17		3	1	2004-08-03 11:02:29	2004-08-03 11:22:39
KAV04A	2004-08-03 12:33	2004-08-03 14:21	145,17	165,17		3	1	2004-08-03 13:20:00	2004-08-03 13:41:00
KAV04A	2004-08-03 15:49	2004-08-03 17:12	165,17	185,17		3	1	2004-08-03 16:30:00	2004-08-03 16:50:00
KAV04A	2004-08-03 17:57	2004-08-04 04:57	185,17	205,17		3	1	2004-08-03 18:40:00	2004-08-03 18:55:00
KAV04A	2004-08-04 09:32	2004-08-04 11:49	205,26	225,26		4	1	2004-08-04 11:06:00	2004-08-04 11:06:20
KAV04A	2004-08-04 12:42	2004-08-04 14:07	225,26	245,26		3	1	2004-08-04 13:25:06	2004-08-04 13:45:26
KAV04A	2004-08-04 16:03	2004-08-05 04:30	245,26	265,26		3	1	2004-08-05 09:27:36	2004-08-05 09:47:56
KAV04A	2004-08-05 11:04	2004-08-05 12:34	265,26	285,26		3	1	2004-08-05 11:52:02	2004-08-05 12:12:12
KAV04A	2004-08-05 13:16	2004-08-05 16:00	285,26	305,26		3	1	2004-08-05 15:19:07	2004-08-05 15:37:17
KAV04A	2004-08-05 16:42	2004-08-05 18:40	305,33	325,33		4	1	2004-08-05 17:57:00	2004-08-04 17:57:20
KAV04A	2004-08-05 19:28	2004-08-06 06:54	325,33	345,33		3	1	2004-08-05 20:32:00	2004-08-06 06:32:00
KAV04A	2004-08-06 09:21	2004-08-06 10:49	345,33	365,33		3	1	2004-08-06 10:07:19	2004-08-06 10:27:39
KAV04A	2004-08-06 11:37	2004-08-06 13:11	365,33	385,33		3	1	2004-08-06 12:29:01	2004-08-06 12:49:21
KAV04A	2004-08-06 13:56	2004-08-06 15:22	385,33	405,33		3	1	2004-08-06 14:39:57	2004-08-06 15:00:17
KAV04A	2004-08-06 16:48	2004-08-06 18:15	405,42	425,42		3	1	2004-08-06 17:33:00	2004-08-06 17:53:00
KAV04A	2004-08-07 10:06	2004-08-07 11:59	425,02	445,02		4	1	2004-08-07 10:58:00	2004-08-07 10:58:10
KAV04A	2004-08-07 12:16	2004-08-07 13:49	445,02	465,02		4	1	2004-08-07 13:06:00	2004-08-07 13:06:10
KAV04A	2004-08-07 14:33	2004-08-07 16:07	465,02	485,02		3	1	2004-08-07 15:25:00	2004-08-07 15:45:00
KAV04A	2004-08-07 19:16	2004-08-07 21:21	485,43	505,43		3	1	2004-08-07 19:59:52	2004-08-07 20:40:12
KAV04A	2004-08-08 09:08	2004-08-08 10:46	505,43	525,43		3	1	2004-08-08 10:04:38	2004-08-08 10:24:58
KAV04A	2004-08-08 11:29	2004-08-08 13:09	525,43	545,43		3	1	2004-08-08 12:27:49	2004-08-08 12:48:19
KAV04A	2004-08-08 14:04	2004-08-08 15:35	545,43	565,43		3	1	2004-08-08 14:53:22	2004-08-08 14:53:22
KAV04A	2004-08-08 17:16	2004-08-08 18:39	565,43	585,43		3	1	2004-08-08 17:57:58	2004-08-08 18:17:58
KAV04A	2004-08-09 09:16	2004-08-09 10:44	585,43	605,43		3	1	2004-08-09 10:02:47	2004-08-09 10:23:07
KAV04A	2004-08-09 11:32	2004-08-09 13:00	605,57	625,57		3	1	2004-08-09 12:18:26	2004-08-09 12:38:46
KAV04A	2004-08-09 13:48	2004-08-09 15:19	625,57	645,57		3	1	2004-08-09 14:37:22	2004-08-09 14:57:42

KAV04A	2004-08-09 16:46	2004-08-09 18:58	645,57	665,57		3	1	2004-08-09 17:36:00	2004-08-09 17:56:00
KAV04A	2004-08-10 09:01	2004-08-04 10:25	665,57	685,57		3	1	2004-08-10 09:43:00	2004-08-10 10:03:00
KAV04A	2004-08-10 11:04	2004-08-10 12:35	685,57	705,57		3	1	2004-08-10 11:53:32	2004-08-10 12:13:52
KAV04A	2004-08-10 13:15	2004-08-10 14:46	698,07	718,07		3	1	2004-08-10 14:23:27	2004-08-10 14:03:07
KAV04A	2004-08-10 15:46	2004-08-10 17:02	711,07	731,07		3	1	2004-08-10 16:27:38	2004-08-10 16:47:58
KAV04A	2004-08-11 09:54	2004-08-11 09:55	731,07	751,07		3	1	2004-08-11 10:55:00	2004-08-11 11:15:00
KAV04A	2004-08-11 12:24	2004-08-11 13:49	751,07	771,07		3	1	2004-08-11 13:07:15	2004-08-11 13:27:35
KAV04A	2004-08-11 15:01	2004-08-11 16:51	771,07	791,07		3	1	2004-08-11 16:09:53	2004-08-11 16:30:13
KAV04A	2004-08-11 17:54	2004-08-11 19:36	791,07	811,07		3	1	2004-08-11 18:54:24	2004-08-11 19:14:44
KAV04A	2004-08-12 09:04	2004-08-12 10:34	800,81	820,81		3	1	2004-08-12 09:51:42	2004-08-12 10:12:02
KAV04A	2004-08-12 11:30	2004-08-12 12:56	820,81	840,81		3	1	2004-08-12 12:14:10	2004-08-12 12:34:30
KAV04A	2004-08-12 13:51	2004-08-12 15:17	837,11	857,11		3	1	2004-08-12 14:35:40	2004-08-12 14:56:00
KAV04A	2004-08-12 16:34	2004-08-12 18:18	857,11	877,11		3	1	2004-08-12 17:36:52	2004-08-12 17:57:12
KAV04A	2004-08-13 09:03	2004-08-13 10:31	862,35	882,35		3	1	2004-08-13 09:49:44	2004-08-13 10:10:04
KAV04A	2004-08-13 11:27	2004-08-13 12:18	883,35	903,35		3	1	2004-08-13 12:16:36	2004-08-13 12:36:56

mean_flow_rate_qm	flow_rate_end_qp	value_type_qp	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
1,74E-05	1,61E-05	0	8,3333E-06	1,1667E-03	3,1404E-02	1800,0	1800,0			5,47	2047	2045	2049
2,58E-04	1,99E-04	0	8,3333E-06	1,1667E-03	4,6386E-01	1800,0	5400,0			5,36	3015	3213	3034
1,94E-05	1,78E-05	0	8,3333E-06	1,1667E-03	3,4905E-02	1800,0	36000,0			4,79	3995	4194	4000
7,85E-05	7,54E-05	0	8,3333E-06	1,1667E-03	1,4133E-01	1800,0	1800,0			4,54	4975	5174	4981
3,93E-05	3,83E-05	0	8,3333E-06	1,1667E-03	7,0800E-02	1800,0	1800,0			5,67	5962	6153	5968
4,25E-05	3,75E-05	0	8,3333E-06	1,1667E-03	7,6500E-02	1800,0	1800,0			7,29	6963	7163	6963
3,19E-04	2,95E-04	0	8,3333E-06	1,1667E-03	5,7450E-01	1800,0	1800,0			8,87	7938	8137	7937
9,48E-05	8,88E-05	0	8,3333E-06	1,1667E-03	1,7070E-01	1800,0	1800,0			11,14	8903	9101	8909
8,33E-08	8,33E-08	0	8,3333E-06	1,1667E-03	1,5000E-04	1800,0	1800,0			#######	9964	10259	10189
1,28E-05	1,22E-05	0	8,3333E-06	1,1667E-03	1,5400E-02	1200,0	1200,0			4,94	1258	1457	1259
3,67E-07	3,17E-07	0	8,3333E-06	1,1667E-03	4,4000E-04	1200,0	1200,0			4,32	1452	1743	1451
1,03E-06	7,17E-07	0	8,3333E-06	1,1667E-03	1,2400E-03	1200,0	1200,0			4,31	1646	1944	1647
5,00E-07	4,50E-07	0	8,3333E-06	1,1667E-03	6,0000E-04	1200,0	1200,0			4,46	1842	2137	1843
5,62E-06	5,43E-06	0	8,3333E-06	1,1667E-03	5,0550E-03	900,0	36000,0			4,77	2039	2316	2041
#SAKNAS!	#SAKNAS!	0	8,3333E-06	1,1667E-03	#SAKNAS!	18,0	2400,0			#######	2337	2650	2486
7,42E-06	6,50E-06	0	8,3333E-06	1,1667E-03	8,9000E-03	1200,0	1200,0			4,29	2426	2625	2431
2,71E-04	2,06E-04	0	8,3333E-06	1,1667E-03	1,7220E-01	1200,0	36120,0			4,38	2633	2829	2623
1,60E-05	1,47E-05	0	8,3333E-06	1,1667E-03	1,9200E-02	1200,0	1200,0			4,36	2816	3016	2819
5,00E-06	4,67E-06	0	8,3333E-06	1,1667E-03	6,0000E-03	1200,0	1200,0			4,99	3020	3218	3021
4,67E-06	4,67E-06	0	8,3333E-06	1,1667E-03	8,4000E-05	18,0	2400,0			#######	3223	3456	3256
3,10E-08	3,10E-08	0	8,3333E-06	1,1667E-03	1,1160E-03	36000,0	1200,0			#######	3414	3494	3442
3,83E-06	3,50E-06	0	8,3333E-06	1,1667E-03	4,6000E-03	1200,0	1200,0			3,95	3597	3795	3599
1,28E-06	1,17E-06	0	8,3333E-06	1,1667E-03	1,5400E-03	1200,0	1200,0			4,08	3795	3993	3796
1,65E-05	1,58E-05	0	8,3333E-06	1,1667E-03	1,9800E-02	1200,0	1200,0			4,68	3994	4194	3998
1,43E-06	9,50E-07	0	8,3333E-06	1,1667E-03	1,7200E-03	1200,0	1200,0			4,58	4195	4419	4252
4,25E-05	3,75E-05	0	8,3333E-06	1,1667E-03	4,0800E-04	9,6	2400,0			#######	4422	4692	4676
3,40E-06	3,40E-06	0	8,3333E-06	1,1667E-03	3,2640E-05	9,6	2400,0			#######	4586	4843	4640
6,67E-07	5,00E-07	0	8,3333E-06	1,1667E-03	8,0000E-04	1200,0	1200,0			3,94	4770	5097	4770
7,20E-05	6,93E-05	0	8,3333E-06	1,1667E-03	1,7280E-01	2400,0	2400,0			4,09	4970	5169	4974
5,58E-06	5,38E-06	0	8,3333E-06	1,1667E-03	6,7000E-03	1200,0	1200,0			4,49	5169	5367	5169
2,65E-05	2,42E-05	0	8,3333E-06	1,1667E-03	3,1800E-02	1200,0	1200,0			4,80	5367	5567	5369
1,03E-06	9,50E-07	0	8,3333E-06	1,1667E-03	1,2400E-03	1200,0	1200,0			4,95	5565	5765	5567
1,10E-05	1,04E-05	0	8,3333E-06	1,1667E-03	1,3200E-02	1200,0	1200,0			4,94	5764	5962	5766
3,67E-06	3,45E-06	0	8,3333E-06	1,1667E-03	4,4000E-03	1200,0	1200,0			5,13	5959	6164	5961
4,48E-06	4,05E-06	0	8,3333E-06	1,1667E-03	5,3800E-03	1200,0	1200,0			5,39	6159	6352	6161
5,15E-06	4,80E-06	0	8,3333E-06	1,1667E-03	6,1800E-03	1200,0	1200,0			6,01	6361	6546	6367

5,50E-07	5,17E-07	0	8,3333E-06	1,1667E-03	6,6000E-04	1200,0	3600,0			6,39	6562	6818	6560
9,83E-07	8,17E-07	0	8,3333E-06	1,1667E-03	1,1800E-03	1200,0	1200,0			5,47	6755	7000	6769
2,73E-05	2,23E-05	0	8,3333E-06	1,1667E-03	3,2800E-02	1200,0	1200,0			6,71	6963	7163	6963
2,30E-04	2,18E-04	0	8,3333E-06	1,1667E-03	2,7600E-01	1200,0	1200,0			7,49	7082	7280	7083
2,48E-04	2,24E-04	0	8,3333E-06	1,1667E-03	2,9740E-01	1200,0	1200,0			7,65	7212	7424	7213
2,67E-07	2,50E-07	0	8,3333E-06	1,1667E-03	3,2000E-04	1200,0	1200,0			7,10	7408	7662	7407
7,17E-05	6,17E-05	0	8,3333E-06	1,1667E-03	8,6000E-02	1200,0	1200,0			7,71	7603	7801	7604
6,50E-07	5,63E-07	0	8,3333E-06	1,1667E-03	7,8000E-04	1200,0	1200,0			8,11	7806	8036	7805
2,23E-05	2,07E-05	0	8,3333E-06	1,1667E-03	2,6800E-02	1200,0	1200,0			8,61	8003	8203	8003
3,57E-05	3,33E-05	0	8,3333E-06	1,1667E-03	4,2800E-02	1200,0	1200,0			8,44	8098	8296	8098
2,33E-07	2,17E-07	0	8,3333E-06	1,1667E-03	2,8000E-04	1200,0	1200,0			8,56	8298	8515	8299
8,10E-05	7,13E-05	0	8,3333E-06	1,1667E-03	9,7200E-02	1200,0	1200,0			9,50	8459	8659	8466
3,57E-06	3,40E-06	0	8,3333E-06	1,1667E-03	4,2800E-03	1200,0	1200,0			9,79	8661	8861	8601
1,70E-06	1,58E-06	0	8,3333E-06	1,1667E-03	2,0400E-03	1200,0	1200,0			9,37	8708	8908	8709
4,17E-07	3,17E-07	0	8,3333E-06	1,1667E-03	5,0000E-04	1200,0	2400,0			8,89	8916	9145	8932

fluid_temp_tew	fluid_elcond_ecw	fluid_salinity_tdsw	fluid_salinity_tdswm	reference	comments	lp
10,41						155,17
11,62						255,26
12,9						355,33
14,41						455,42
16,21						555,43
17,69						655,57
19,17						754,00
20,67						850,81
22,27						948,20
9,19						115,17
9,49						135,17
9,78						155,17
10,04						175,17
10,3						195,17
10,55						215,26
10,81						235,26
11,08						255,26
11,25						275,26
11,55						295,26
11,87						315,33
12,16						335,33
12,47						355,33
12,71						375,33
13,02						395,33
13,3						415,42
13,64						435,02
13,9						455,02
14,21						475,02
14,58						495,43
14,89						515,43
15,24						535,43
15,49						555,43
15,8						575,43
16,16						595,43
16,41						615,57
16,72						635,57

17,05						655,57
17,42						675,57
17,68						695,57
17,86						708,07
18,02						721,07
18,31						741,07
18,63						761,07
18,95						781,07
19,26						801,07
19,42						810,81
19,74						830,81
19,97						847,11
20,3						867,11
20,39						872,35
20,75						893,35

Table	plu_s_hole_test_ed1
	PLU Single hole tests, pumping/injection. Basic evaluation

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		Formation type code. 1: Rock, 2: Soil (superficial deposits)
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
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
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)

idcode	start_date	stop_date	secup	seclow	section_no	test_type	formation_type	lp	seclen_class	spec_capacity_q_s	value_type_q_s
KAV04A	2004-07-26 17:12	2004-07-26 18:38	105,17	205,17		3	1	155,17	100,00	7,96E-07	0
KAV04A	2004-07-27 16:55	2004-07-28 10:11	205,26	305,26		3	1	255,26	100,00	9,84E-06	0
KAV04A	2004-07-28 11:41	2004-07-28 13:44	305,33	405,33		3	1	355,33	100,00	8,77E-07	0
KAV04A	2004-07-28 14:57	2004-07-28 16:46	405,42	505,42		3	1	455,42	100,00	3,72E-06	0

KAV04A	2004-07-29 10:58	2004-07-27 14:25	505,43	605,43		3	1	555,43	100,00	1,97E-06	0
KAV04A	2004-07-29 17:56	2004-07-29 19:50	605,57	705,57		3	1	655,57	100,00	1,84E-06	0
KAV04A	2004-07-30 13:58	2004-07-30 16:06	704,00	804,00		3	1	754,00	100,00	1,45E-05	0
KAV04A	2004-07-30 19:06	2004-07-30 19:06	800,81	900,81		3	1	850,81	100,00	4,40E-06	0
KAV04A	2004-07-31 10:54	2004-07-31 14:25	898,20	998,20		4	1	948,20	100,00	#SAKNAS!	-1
KAV04A	2004-08-02 18:44	2004-08-02 20:25	105,17	125,17		3	1	115,17	20,00	6,00E-07	0
KAV04A	2004-08-03 09:57	2004-08-03 11:44	125,17	145,17		3	1	135,17	20,00	1,07E-08	0
KAV04A	2004-08-03 12:33	2004-08-03 14:21	145,17	165,17		3	1	155,17	20,00	2,36E-08	0
KAV04A	2004-08-03 15:49	2004-08-03 17:12	165,17	185,17		3	1	175,17	20,00	1,50E-08	0
KAV04A	2004-08-03 17:57	2004-08-04 04:57	185,17	205,17		3	1	195,17	20,00	1,92E-07	0
KAV04A	2004-08-04 09:32	2004-08-04 11:49	205,26	225,26		4	1	215,26	20,00	#SAKNAS!	-1
KAV04A	2004-08-04 12:42	2004-08-04 14:07	225,26	245,26		3	1	235,26	20,00	3,20E-07	0
KAV04A	2004-08-04 16:03	2004-08-05 04:30	245,26	265,26		3	1	255,26	20,00	1,01E-05	0
KAV04A	2004-08-05 11:04	2004-08-05 12:34	265,26	285,26		3	1	275,26	20,00	7,19E-07	0
KAV04A	2004-08-05 13:16	2004-08-05 16:00	285,26	305,26		3	1	295,26	20,00	2,31E-07	0
KAV04A	2004-08-05 16:42	2004-08-05 18:40	305,33	325,33		4	1	315,33	20,00	#SAKNAS!	-1
KAV04A	2004-08-05 19:28	2004-08-06 06:54	325,33	345,33		3	1	335,33	20,00	3,80E-09	0
KAV04A	2004-08-06 09:21	2004-08-06 10:49	345,33	365,33		3	1	355,33	20,00	1,73E-07	0
KAV04A	2004-08-06 11:37	2004-08-06 13:11	365,33	385,33		3	1	375,33	20,00	5,78E-08	0
KAV04A	2004-08-06 13:56	2004-08-06 15:22	385,33	405,33		3	1	395,33	20,00	7,77E-07	0
KAV04A	2004-08-06 16:48	2004-08-06 18:15	405,42	425,42		3	1	415,42	20,00	4,16E-08	0
KAV04A	2004-08-07 10:06	2004-08-07 11:59	425,02	445,02		4	1	435,02	20,00	#SAKNAS!	-1
KAV04A	2004-08-07 12:16	2004-08-07 13:49	445,02	465,02		4	1	455,02	20,00	#SAKNAS!	-1
KAV04A	2004-08-07 14:33	2004-08-07 16:07	465,02	485,02		3	1	475,02	20,00	1,50E-08	0
KAV04A	2004-08-07 19:16	2004-08-07 21:21	485,43	505,43		3	1	495,43	20,00	3,42E-06	0
KAV04A	2004-08-08 09:08	2004-08-08 10:46	505,43	525,43		3	1	515,43	20,00	2,67E-07	0
KAV04A	2004-08-08 11:29	2004-08-08 13:09	525,43	545,43		3	1	535,43	20,00	1,19E-06	0
KAV04A	2004-08-08 14:04	2004-08-08 15:35	545,43	565,43		3	1	555,43	20,00	4,66E-08	0
KAV04A	2004-08-08 17:16	2004-08-08 18:39	565,43	585,43		3	1	575,43	20,00	5,16E-07	0
KAV04A	2004-08-09 09:16	2004-08-09 10:44	585,43	605,43		3	1	595,43	20,00	1,65E-07	0
KAV04A	2004-08-09 11:32	2004-08-09 13:00	605,57	625,57		3	1	615,57	20,00	2,06E-07	0
KAV04A	2004-08-09 13:48	2004-08-09 15:19	625,57	645,57		3	1	635,57	20,00	2,55E-07	0
KAV04A	2004-08-09 16:46	2004-08-09 18:58	645,57	665,57		3	1	655,57	20,00	1,98E-08	0
KAV04A	2004-08-10 09:01	2004-08-04 10:25	665,57	685,57		3	1	675,57	20,00	3,27E-08	0
KAV04A	2004-08-10 11:04	2004-08-10 12:35	685,57	705,57		3	1	695,57	20,00	1,10E-06	0
KAV04A	2004-08-10 13:15	2004-08-10 14:46	698,07	718,07		3	1	708,07	20,00	1,08E-05	0
KAV04A	2004-08-10 15:46	2004-08-10 17:02	711,07	731,07		3	1	721,07	20,00	1,03E-05	0
KAV04A	2004-08-11 09:54	2004-08-11 09:55	731,07	751,07		3	1	741,07	20,00	9,66E-09	0
KAV04A	2004-08-11 12:24	2004-08-11 13:49	751,07	771,07		3	1	761,07	20,00	3,06E-06	0
KAV04A	2004-08-11 15:01	2004-08-11 16:51	771,07	791,07		3	1	781,07	20,00	2,40E-08	0
KAV04A	2004-08-11 17:54	2004-08-11 19:36	791,07	811,07		3	1	801,07	20,00	1,01E-06	0
KAV04A	2004-08-12 09:04	2004-08-12 10:34	800,81	820,81		3	1	810,81	20,00	1,65E-06	0

KAV04A	2004-08-12 11:30	2004-08-12 12:56	820,81	840,81		3	1	830,81	20,00	9,79E-09	0
KAV04A	2004-08-12 13:51	2004-08-12 15:17	837,11	857,11		3	1	847,11	20,00	3,50E-06	0
KAV04A	2004-08-12 16:34	2004-08-12 18:18	857,11	877,11		3	1	867,11	20,00	1,67E-07	0
KAV04A	2004-08-13 09:03	2004-08-13 10:31	862,35	882,35		3	1	872,35	20,00	7,84E-08	0
KAV04A	2004-08-13 11:27	2004-08-13 12:18	883,35	903,35		3	1	893,35	20,00	1,37E-08	0

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	leakage_factor_lf	transmissivity_tt	value_type_tt	bc_tt
			1,04E-06	0	0	1,04E-08									1,70E-06	0	1
			1,28E-05	0	0	1,28E-07									1,09E-05	0	1
			1,14E-06	0	0	1,14E-08									6,10E-06	0	1
			4,84E-06	0	0	4,84E-08									9,10E-06	0	1

			2,56E-06	0	0	2,56E-08									7,39E-06	0	1
			2,40E-06	0	0	2,40E-08									3,74E-06	0	1
			1,89E-05	0	0	1,89E-07									2,08E-05	0	1
			5,73E-06	0	0	5,73E-08									9,00E-06	0	1
			#SAKNAS!	0	-1	########									2,44E-11	0	1
			6,27E-07	0	0	3,14E-08									6,45E-07	0	1
			1,12E-08	0	0	5,58E-10									2,08E-08	0	1
			2,47E-08	0	0	1,23E-09									6,84E-08	0	1
			1,57E-08	0	0	7,83E-10									1,40E-08	0	1
			2,01E-07	0	0	1,01E-08									2,19E-07	0	1
			#SAKNAS!	0	-1	########									5,89E-11	0	1
			3,35E-07	0	0	1,68E-08									2,83E-07	0	1
			1,05E-05	0	0	5,26E-07									5,11E-06	0	1
			7,53E-07	0	0	3,76E-08									8,09E-07	0	1
			2,42E-07	0	0	1,21E-08									2,46E-07	0	1
			#SAKNAS!	0	-1	########									1,97E-10	0	1
			3,98E-09	0	0	1,99E-10									3,03E-09	0	1
			1,81E-07	0	0	9,07E-09									4,59E-07	0	1
			6,05E-08	0	0	3,02E-09									7,45E-08	0	1
			8,12E-07	0	0	4,06E-08									2,91E-06	0	1
			4,35E-08	0	0	2,18E-09									1,89E-08	0	1
			#SAKNAS!	0	-1	########									3,37E-11	0	1
			#SAKNAS!	0	-1	########									4,83E-09	0	1
			1,57E-08	0	0	7,85E-10									1,51E-08	0	1
			3,58E-06	0	0	1,79E-07									9,35E-06	0	1
			2,79E-07	0	0	1,40E-08									5,15E-07	0	1
			1,24E-06	0	0	6,20E-08									2,73E-06	0	1
			4,87E-08	0	0	2,44E-09									1,45E-07	0	1
			5,40E-07	0	0	2,70E-08									9,22E-07	0	1
			1,73E-07	0	0	8,64E-09									3,75E-07	0	1
			2,15E-07	0	0	1,08E-08									2,91E-07	0	1
			2,66E-07	0	0	1,33E-08									2,09E-07	0	1
			2,07E-08	0	0	1,04E-09									4,60E-08	0	1
			3,42E-08	0	0	1,71E-09									5,88E-08	0	1
			1,15E-06	0	0	5,73E-08									3,02E-06	0	1
			1,13E-05	0	0	5,65E-07									2,26E-05	0	1
			1,08E-05	0	0	5,41E-07									3,95E-05	0	1
			1,01E-08	0	0	5,05E-10									1,02E-08	0	1
			3,20E-06	0	0	1,60E-07									1,88E-06	0	1
			2,51E-08	0	0	1,26E-09									9,28E-08	0	1
			1,06E-06	0	0	5,30E-08									3,78E-06	0	1
			1,73E-06	0	0	8,63E-08									4,21E-06	0	1

			1,02E-08	0	0	5,12E-10									1,62E-08	0	1
			3,66E-06	0	0	1,83E-07									5,66E-06	0	1
			1,74E-07	0	0	8,72E-09									3,62E-07	0	1
			8,21E-08	0	0	4,10E-09									1,16E-07	0	1
			1,44E-08	0	0	7,19E-10									5,15E-09	0	1

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
1,00E-10	1,00E-03	1,00E-04	1,00E-04								5,37E-10	5,92E-04	2,30E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								3,21E-08	3,54E+00	-5,23E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								6,51E-10	7,18E-02	3,11E+01		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								7,80E-10	8,60E-02	0,00E+00		

1,00E-10	1,00E-03	1,00E-06	1,00E-06								1,05E-09	1,16E-01	1,50E+01		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								9,23E-10	1,02E-01	3,45E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								1,78E-08	1,96E+00	-8,28E-02		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								2,31E-09	2,55E-01	5,64E+00		
1,00E-12	1,00E-07	1,00E-06	1,00E-06								2,72E-10	3,00E-02	-2,99E+00		
1,00E-10	1,00E-03	1,00E-04	1,00E-04								2,94E-10	3,24E-04	2,29E+00		
1,00E-10	1,00E-03	1,00E-04	1,00E-04								6,29E-11	6,93E-05	9,75E+00		
1,00E-10	1,00E-03	1,00E-04	1,00E-04								8,24E-11	9,08E-05	9,61E+00		
1,00E-10	1,00E-03	1,00E-04	1,00E-04								6,24E-11	6,88E-05	3,29E+00		
1,00E-10	1,00E-03	1,00E-04	1,00E-04								6,74E-10	7,43E-04	3,61E+00		
1,00E-12	1,00E-07	1,00E-06	1,00E-06								4,33E-11	4,80E-03	-6,55E-02		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								9,61E-11	1,06E-02	-1,17E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								2,32E-08	2,56E+00	-5,07E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								4,16E-10	4,59E-02	-1,66E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								9,05E-11	9,97E-03	-6,50E-02		
1,00E-12	1,00E-07	1,00E-06	1,00E-06								4,33E-11	4,80E-03	-4,19E-01		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								4,61E-08	5,08E+00	6,54E-03		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								1,97E-10	2,17E-02	8,83E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								9,60E-11	1,06E-02	9,19E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								1,06E-10	1,17E-02	1,49E+01		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								1,54E-10	1,70E-02	-3,38E-02		
1,00E-12	1,00E-07	1,00E-06	1,00E-06								1,03E-10	1,10E-02	-4,77E-02		
1,00E-12	1,00E-07	1,00E-06	1,00E-06								1,32E-10	1,50E-02	-2,35E-01		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								5,49E-11	6,05E-03	-1,96E-02		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								2,23E-09	2,46E-01	3,05E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								1,22E-10	1,34E-02	7,12E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								4,08E-10	4,50E-02	6,51E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								5,43E-11	5,98E-03	1,20E+01		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								5,61E-10	6,18E-02	3,70E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								5,63E-11	6,21E-03	2,48E-01		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								8,02E-11	8,84E-03	1,50E+01		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								8,69E-11	9,58E-03	-1,12E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								4,59E-11	5,06E-03	0,00E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								4,02E-11	4,43E-03	2,72E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								3,74E-10	4,12E-02	6,55E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								1,54E-08	1,70E+00	0,00E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								1,78E-08	1,96E+00	1,23E+01		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								5,37E-11	5,92E-03	0,00E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								7,81E-10	8,61E-02	0,00E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								5,85E-11	6,45E-03	1,52E+01		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								3,51E-10	3,87E-02	1,43E+01		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								9,92E-10	1,09E-01	8,03E+00		

1,00E-10	1,00E-03	1,00E-06	1,00E-06								5,06E-11	5,58E-03	4,91E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								9,58E-10	1,06E-01	1,13E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								1,22E-10	1,34E-02	0,00E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								8,24E-11	9,08E-03	0,00E+00		
1,00E-10	1,00E-03	1,00E-06	1,00E-06								5,88E-11	6,48E-03	-2,68E+00		

dt1	dt2	transmissivity_t_ilr	storativity_s_ilr	value_type_t_ilr	bc_t_ilr	c_ilr	cd_ilr	skin_ilr	stor_ratio_ilr	interflow_coeff_ilr	transmissivity_t_grf	value_type_t_grf	bc_t_grf	storativity_s_grf	flow_dim_grf	comment
60,00	720,00															
60,00	2520,00															
60,00	720,00															
60,00	1800,00															

60,00	720,00															
60,00	1080,00															
360,00	1080,00															
60,00	1080,00															
60,00	1800,00															
60,00	1080,00															
60,00	720,00															
60,00	360,00															
60,00	720,00															
60,00	420,00															
60,00	2520,00															
60,00	1080,00															
60,00	1080,00															
60,00	1080,00															
60,00	1080,00															
360,00	2160,00															
3600,00	25200,00															
60,00	360,00															
60,00	1080,00															
60,00	720,00															
60,00	1200,00															
60,00	1800,00															
60,00	1440,00															
60,00	360,00															
120,00	1800,00															
60,00	1080,00															
60,00	720,00															
60,00	600,00															
60,00	1080,00															
60,00	720,00															
60,00	1080,00															
60,00	720,00															
60,00	1080,00															
60,00	1080,00															
60,00	1080,00															
60,00	1080,00															
60,00	360,00															
60,00	1080,00															
60,00	1080,00															
60,00	720,00															
60,00	720,00															
60,00	360,00															

60,00	600,00															
60,00	1080,00															
60,00	1080,00															
60,00	1080,00															
60,00	1800,00															