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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

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

This report concerns a study which was conducted for SKB. The conclusions and viewpoints presented in the report are those of the authors and do not necessarily coincide with those of the client.

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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.

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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.

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

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

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.

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

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

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.



 * eventually tests performed after specific discussion with SKB

Figure 3-1. Flow chart for test sections.

Table	3-3.	Tests	perform	ed.
-------	------	-------	---------	-----

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

Bh ID	Test section (m)	Test type ¹	Test no	Test start	Test stop
				Date, time	Date, time
KAV04A	205.26-225.26	4	1	2004-08-04	2004-08-04
				09:31:24	11:49:37
KAV04A	225.26-245.26	3	1	2004-08-04	2004-08-04
				12:42:11	14:07:41
KAV04A	245.26-265.26	3	1	2004-08-04	2004-08-05
				16:02:58	04:50:58
KAV04A	245.26-265.26	3	2	2004-08-05	2004-08-05
				08:34:35	10:10:08
KAV04A	265.26-285.26	3	1	2004-08-05	2004-08-05
				11:04:28	12:34:38
KAV04A	285.26-305.26	3	1	2004-08-05	2004-08-05
				13:16:31	16:01:44
KAV04A	305.33–325.33	4	1	2004-08-05	2004-08-05
				16:41:56	18:41:04
KAV04A	325.33–345.33	5	1	2004-08-05	2004-08-06
				19:28:22	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	2004-08-06
				11:37:17	13:11:38
KAV04A	385.33–405.33	3	1	2004-08-06	2004-08-06
				13:56:11	15:22:33
KAV04A	405.42-425.42	3	1	2004-08-06	2004-08-06
				16:48:31	18:16:13
KAV04A	425.02v445.02	4	1	2004-08-07	2004-08-07
				10:06:22	11:42:02
KAV04A	445.02-465.02	4	1	2004-08-07	2004-08-07
				12:16:39	13:50:13
KAV04A	465.02–485.02	3	1	2004-08-07	2004-08-07
				14:33:20	16:08:02
KAV04A	485.43–505.43	3	1	2004-08-07	2004-08-07
				19:16:28	21:22:28
KAV04A	505.43-525.43	3	1	2004-08-08	2004-08-08
		0	4	09:08:39	10:47:16
KAV04A	525.43-545.43	3	1	2004-08-08	2004-08-08
		2	4	11:29:36	13:10:27
KAV04A	545.43-505.43	3	I	2004-08-08	2004-08-08
	565 12 595 12	2	1	2004 09 09	2004 09 09
KAV04A	505.45-565.45	5	I	2004-00-00	2004-00-00
KA1/04A	585 43_605 43	3	1	2004-08-09	2004_08_09
	505.45-005.45	5	I	09.15.40	10:45:20
KAV/04A	605 57-625 57	3	1	2004-08-09	2004-08-09
10100471	000.07 020.07	0		11:32:09	13:01:06
KAV04A	625 57-645 57	3	1	2004-08-09	2004-08-09
	020101 010101	C C		13:48:32	15:19:58
KAV04A	645.57-665.57	3	1	2004-08-09	2004-08-09
		-		16:46:32	18:59:00
KAV04A	665.57–685.57	3	1	2004-08-10	2004-08-10
				09:01:11	10:26:28
KAV04A	685.57–705.57	3	1	2004-08-10	2004-08-10
				11:04:13	12:36:05

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

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 <u>+</u> 0.1	kg/min %	Massflow
Q_{small}	Flow	Micro motion Elite sensor	0–1.8 <u>+</u> 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 4-1. Technical specifications of sensors.

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

Borehole information		Senso	ors	Equipment affecting WBS coefficient		oefficient	
ID	Test section (m)	Test no	Туре	Position (m fr ToC)	Position	Function	Outer diameter (mm)
KAV04A	105.17–205.17	1	pa	102.67	Test	Signal cable	9.1
			р т	203.17 203.42	section	Pump string	Outer diameter (mm) 9.1 33 6 9.1 33 6
		p _b L	207.17 208.42		Packer line	6	
KAV04A	105.17–125.17	11	pa	102.67	Test	Signal cable	oefficient Outer diameter (mm) 9.1 33 6 9.1 33 6 9.1 33 6
			р т	123.17 123.42	section	Pump string	
			p₀ L	127.17 128.42		Packer line	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 m²/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/m³ (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 $1.7E-6 \text{ m}^2/\text{s}$ 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 $5.0E-6 \text{ m}^2/\text{s}$ (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 $5.7E-6 \text{ m}^2/\text{s}$ 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 $2.0E-5 \text{ m}^2/\text{s}$ (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 $6.1E-6 \text{ m}^2/\text{s}$ 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 $7.0E-6 \text{ m}^2/\text{s}$ (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 $9.1E-6 \text{ m}^2/\text{s}$ 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 $2.0E-5 \text{ m}^2/\text{s}$ (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 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 (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 $3.7E-6 \text{ m}^2/\text{s}$ 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 $5.0E-6 \text{ m}^2/\text{s}$. 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 $2.1E-5 \text{ m}^2/\text{s}$ 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 $7.0E-5 \text{ m}^2/\text{s}$. 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 $9.9E-6 \text{ m}^2/\text{s}$ 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 $2.0E-5 \text{ m}^2/\text{s}$. 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 $2.4E-11 \text{ m}^2/\text{s}$ was derived from the analysis of the PI phase. The confidence range for the interval transmissivity is estimated to be 8.0E-12 to $5.0E-11 \text{ m}^2/\text{s}$. 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 $6.5E-7 \text{ m}^2/\text{s}$ 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 $3.0E-6 \text{ m}^2/\text{s}$. 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 $2.1E-8 \text{ m}^2/\text{s}$ 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 $3.0E-8 \text{ m}^2/\text{s}$. 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 $6.8E-8 \text{ m}^2/\text{s}$ 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 $8.0E-8 \text{ m}^2/\text{s}$. 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 $1.4E-8 \text{ m}^2/\text{s}$ 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 $5.0E-8 \text{ m}^2/\text{s}$. 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 $2.2E-7 \text{ m}^2/\text{s}$ 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 $5.0E-7 \text{ m}^2/\text{s}$. 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 $5.9E-11 \text{ m}^2/\text{s}$ was derived from the analysis of the PI phase. The confidence range for the interval transmissivity is estimated to be 2.0E-11 to $1.0E-10 \text{ m}^2/\text{s}$. 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 $2.8E-7 \text{ m}^2/\text{s}$ 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 $1.0E-6 \text{ m}^2/\text{s}$ (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 $5.1E-6 \text{ m}^2/\text{s}$ 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 $2.0E-5 \text{ m}^2/\text{s}$ (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 $8.1E-7 \text{ m}^2/\text{s}$ 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 $2.0E-6 \text{ m}^2/\text{s}$ (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 $2.5E-7 \text{ m}^2/\text{s}$ 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 $1.0E-6 \text{ m}^2/\text{s}$ (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 $2.0E-10 \text{ m}^2/\text{s}$ was derived from the analysis of the PI phase. The confidence range for the interval transmissivity is estimated to be 8.0E-11 to $5.0E-10 \text{ m}^2/\text{s}$. 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 $3.0E-9 \text{ m}^2/\text{s}$ 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 $5.0E-9 \text{ m}^2/\text{s}$. 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 $4.6E-7 \text{ m}^2/\text{s}$ 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 $5.0E-7 \text{ m}^2/\text{s}$ (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 $7.5E-8 \text{ m}^2/\text{s}$ 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 $3.0E-7 \text{ m}^2/\text{s}$ (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 $2.9E-6 \text{ m}^2/\text{s}$ 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 $4.0E-6 \text{ m}^2/\text{s}$ (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 m²/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 m²/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 $1.1E-12 \text{ m}^2/\text{s}$ 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 $5.0E-11 \text{ m}^2/\text{s}$ (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 $3.3E-10 \text{ m}^2/\text{s}$ 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 $5.0E-9 \text{ m}^2/\text{s}$ (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 $1.5E-8 \text{ m}^2/\text{s}$ 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 $3.0E-7 \text{ m}^2/\text{s}$ (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 $9.4E-6 \text{ m}^2/\text{s}$ 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 $1.0E-5 \text{ m}^2/\text{s}$ (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 $5.2E-7 \text{ m}^2/\text{s}$ 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 $7.0E-7 \text{ m}^2/\text{s}$ (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 $2.7E-6 \text{ m}^2/\text{s}$ 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 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 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 $1.5E-7 \text{ m}^2/\text{s}$ 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 $2.0E-7 \text{ m}^2/\text{s}$ (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 $9.2E-7 \text{ m}^2/\text{s}$ 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 $2.0E-6 \text{ m}^2/\text{s}$ (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 $3.8E-7 \text{ m}^2/\text{s}$ 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 $5.0E-7 \text{ m}^2/\text{s}$ (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 $2.9E-7 \text{ m}^2/\text{s}$ 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 $1.0E-6 \text{ m}^2/\text{s}$ (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 $3.3E-7 \text{ m}^2/\text{s}$ 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 $5.0E-7 \text{ m}^2/\text{s}$ (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 $4.6E-8 \text{ m}^2/\text{s}$ 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 $2.0E-7 \text{ m}^2/\text{s}$ (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 $2.5E-8 \text{ m}^2/\text{s}$ 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 $6.0E-8 \text{ m}^2/\text{s}$ (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 loglog 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 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 (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 $2.3E-5 \text{ m}^2/\text{s}$ 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 $4.0E-5 \text{ m}^2/\text{s}$ (encompasses the inner zone transmissivity derived from the CHi analysis as well as the transmissivity derived from the CHi analysis as well as the transmissivity derived from the CHi analysis as well as the transmissivity derived from the CHi analysis as 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 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 $4.0E-5 \text{ m}^2/\text{s}$ 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 $8.0E-5 \text{ m}^2/\text{s}$ (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 $1.0E-8 \text{ m}^2/\text{s}$ 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 $5.0E-8 \text{ m}^2/\text{s}$ (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 m²/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 m²/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 $9.3E-8 \text{ m}^2/\text{s}$ 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 $2.0E-7 \text{ m}^2/\text{s}$ (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. The analysis plots and results are presented in Appendix 2-45.

Selected representative parameters

The recommended transmissivity of $3.8E-6 \text{ m}^2/\text{s}$ 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 $5.0E-6 \text{ m}^2/\text{s}$ (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 $4.2E-6 \text{ m}^2/\text{s}$ 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 $6.0E-6 \text{ m}^2/\text{s}$ (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 $1.6E-8 \text{ m}^2/\text{s}$ 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 $3.0E-8 \text{ m}^2/\text{s}$ (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 CHi phase was matched using a radial 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 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 $8.6E-6 \text{ m}^2/\text{s}$ 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 $9.0E-6 \text{ m}^2/\text{s}$ (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 analysis plots and results are presented in Appendix 2-49.

Selected representative parameters

The recommended transmissivity of $3.6E-7 \text{ m}^2/\text{s}$ 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 $7.0E-7 \text{ m}^2/\text{s}$ (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 analysis plots and results are presented in Appendix 2-50.

Selected representative parameters

The recommended transmissivity of $1.2E-7 \text{ m}^2/\text{s}$ 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 $3.0E-7 \text{ m}^2/\text{s}$ (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 CHir phase was matched using a radial composite flow model with decreasing transmissivity away from the wellbore. 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 $5.2E-9 \text{ m}^2/\text{s}$ 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 $9.0E-9 \text{ m}^2/\text{s}$ (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.

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7.1	Table

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Table

Borehole	Borehole	Date and time	Date and time	đ	ď	a	ٿ -	ď	ā	å	å	Te	Test pha	ses measured
secup (m)	seclow (m)	for test, start YYYYMMDD hh:mm	for test, stop YYYYMMDD hh:mm	(m**3/s)	(m**3/s)	(s)	(s)	(kPa)	(kPa)	(kPa)	(kPa)	(°C)	Analysec marked b	test phases old
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	CHİ	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	CHİ	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	CHİ	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	CHİ	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	Ы	
105.17	125.17	040802 18:44	040802 20:25	1.22E-05	1.28E-05	1200	1200	1238	1258	1457	1259	9.19	CHİ	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	CHİ	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	CHİ	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	CHİ	CHir
185.17	205.17	040803 17:57	040804 04:57	5.43E-06	5.62E-06	006	36000	2026	2039	2316	2041	10.30	CHi	CHir
205.26	225.26	040804 09:32	040804 11:49	NN#	NN#	18	2400	2220	2337	2650	2486	10.55	Ы	
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	CHİ	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	CHİ	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	Ы	
325.33	345.33	040805 19:28	040806 06:54	3.10E-08	3.10E-08	36000	1200	3404	3414	3494	3442	12.16	Ы	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	CHİ	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	CHİ	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	CHİ	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	CHİ	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	Ы	

Borehole	Borehole	Date and time	Date and time	ð	a "Q	ţ	ţ	ď	ā	ď	₽	Te	Test phase:	s measured
secup	seclow	for test, start	for test, stop							 :		i	Analysed te	st phases
(m)	(m)	YYYYMMDD hh:mm	YYYYMMDD hh:mm	(m**3/s)	(m**3/s)	(s)	(s)	(kPa)	(kPa)	(kPa)	(kPa)	(°C)	marked bol	q
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	⊡	
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	8068	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

Not analysed. Constant head injection phase. Recovery phase following the constant head injection phase. Pulse injection. Slug injection.

S I CHI S I CHI

Interval	position	Stationary	flow	Transient	t analysis													
		parameter	(0	Flow regi	me	Formatio	n paramet	ers									Static con	ditions
dn	low	Q/s	Τ _w	Perturb.	Recovery	T _H	ц Ч	T _s ,	T_{s_2}	T,	T _{TMIN}	T _{tmax}	U	ŝ	dt,	dt ₂ I	*0.	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	ı	min	nin	қРа	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	-	12	2047.2	5.47
205.26	305.26	9.84E-06	1.28E-05	WBS2	WBS22	NN#	4.3E-06	1.1E-05	5.7E-06	5.7E-06	5.0E-06	2.0E-05	3.21E-08	-5.2	-	42	3025.3	5.36
305.33	405.33	8.77E-07	1.14E-06	WBS2	WBS22	NN#	6.1E-06	4.1E-06	9.1E-06	6.1E-06	7.0E-07	7.0E-06	6.51E-10	31.1	-	42	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	-	30	4975.5	4.54
505.43	605.43	1.97E-06	2.56E-06	WBS22	WBS2	1.9E-06	6.4E-06	NN#	7.4E-06	7.4E-06	1.0E-06	8.0E-06	1.05E-09	15.0	-	12	5964.5	5.67
605.57	705.57	1.84E-06	2.40E-06	WBS2	WBS2	NN#	1.7E-06	NN#	3.7E-06	3.7E-06	8.0E-07	5.0E-06	9.23E-10	3.5	-	18	3959.3	7.29
704.00	804.00	1.45E-05	1.89E-05	WBS2	WBS22	NN#	2.1E-05	1.2E-05	6.0E-05	2.1E-05	1.0E-05	7.0E-05	1.78E-08	-0.1	9	18	7936.9	8.87
800.81	900.81	4.40E-06	5.73E-06	WBS22	WBS2	4.5E-06	9.0E-06	NN#	9.9E-06	9.0E-06	3.0E-06	2.0E-05	2.31E-09	5.6	-	18	3904.9	11.14
898.20	998.20	NN#	NN#	NN#	WBS2	NN#	NN#	NN#	2.4E-11	2.4E-11	8.0E-12	5.0E-11	2.72E-10	-3.0	-	30 1	4NV	NN#
105.17	125.17	6.00E-07	6.27E-07	WBS2	WBS2	NN#	6.5E-07	NN#	2.7E-06	6.5E-07	5.0E-07	3.0E-06	2.94E-10	2.3	-	18	1259.3	4.94
125.17	145.17	1.07E-08	1.12E-08	WBS2	WBS2	NN#	8.3E-09	NN#	2.1E-08	2.1E-08	7.0E-09	3.0E-08	6.29E-11	9.7	-	12	1448.9	4.32
145.17	165.17	2.36E-08	2.47E-08	WBS2	WBS2	NN#	3.3E-08	NN#	6.8E-08	6.8E-08	2.0E-08	8.0E-08	8.24E-11	9.6	-	9	1644.5	4.31
165.17	185.17	1.50E-08	1.57E-08	WBS2	WBS2	NN#	1.4E-08	NN#	3.3E-08	1.4E-08	1.0E-08	5.0E-08	6.24E-11	3.3	-	12	1841.6	4.46
185.17	205.17	1.92E-07	2.01E-07	WBS2	WBS2	NN#	1.3E-07	NN#	2.2E-07	2.2E-07	1.0E-07	5.0E-07	6.74E-10	3.6	-	~	2040.3	4.77
205.26	225.26	NN#	NN#	NN#	WBS2	NN#	NN#	NN#	5.9E-11	5.9E-11	2.0E-11	1.0E-10	4.33E-11	-0.1	-	42	×NV	NN#
225.26	245.26	3.20E-07	3.35E-07	WBS2	WBS22	NN#	2.5E-07	2.8E-07	9.4E-07	2.8E-07	1.0E-07	1.0E-06	9.61E-11	-1.2	-	18	2427.8	4.29
245.26	265.26	1.01E-05	1.05E-05	WBS2	WBS22	NN#	4.4E-06	1.4E-05	5.1E-06	5.1E-06	4.0E-06	2.0E-05	2.32E-08	-5.1	-	18	2624.3	4.38
265.26	285.26	7.19E-07	7.53E-07	WBS22	WBS2	5.4E-07	8.1E-07	NN#	2.0E-06	8.1E-07	5.0E-07	2.0E-06	4.16E-10	-1.7	-	18	2819.8	4.36
285.26	305.26	2.31E-07	2.42E-07	WBS2	WBS2	NN#	2.5E-07	NN#	8.1E-07	2.5E-07	1.0E-07	1.0E-06	9.05E-11	-0.1	-	18	3021.7	4.99
305.33	325.33	NN#	NN#	NN#	WBS2	NN#	NN#	NN#	2.0E-10	2.0E-10	8.0E-11	5.0E-10	4.33E-11	-0.4	9	36 ∌	×NV	NN#
325.33	345.33	3.80E-09	3.98E-09	NN#	WBS2	NN#	NN#	NN#	3.0E-09	3.0E-09	1.0E-09	5.0E-09	4.61E-08	0.0	, 09	420 ∌	×NV	NN#
345.33	365.33	1.73E-07	1.81E-07	WBS22	WBS2	1.5E-07	3.0E-07	NN#	4.6E-07	4.6E-07	1.0E-07	5.0E-07	1.97E-10	8.8	-	9	3599.2	3.95
365.33	385.33	5.78E-08	6.05E-08	WBS22	WBS2	4.8E-08	7.5E-08	NN#	1.5E-07	7.5E-08	3.0E-08	3.0E-07	9.60E-11	9.2	-	18	3796.2	4.08
385.33	405.33	7.77E-07	8.12E-07	WBS22	WBS2	7.2E-07	2.3E-06	NN#	2.9E-06	2.9E-06	5.0E-07	4.0E-06	1.06E-10	14.9	-	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	-	20	4193.4	4.58
425.02	445.02	NN#	NN#	NN#	WBS22	NN#	NN#	3.4E-11	1.1E-12	1.1E-12	5.0E-13	5.0E-11	1.03E-10	0.0	-	30 ≢	NN≄	NN#
445.02	465.02	NN#	NN#	NN#	WBS22	NN#	NN#	4.8E-09	3.3E-10	3.3E-10	5.0E-11	5.0E-09	1.32E-10	-0.2	-	24 ∌	NN≄	NN#
465.02	485.02	1.50E-08	1.57E-08	WBS2	WBS22	NN#	1.5E-08	2.8E-08	2.8E-07	1.5E-08	1.0E-08	3.0E-07	5.49E-11	0.0	-	9	4770.0	3.94
485.43	505.43	3.42E-06	3.58E-06	WBS22	WBS2	3.6E-06	9.4E-06	NN#	9.4E-06	9.4E-06	2.0E-06	1.0E-05	2.23E-09	3.1	7	30	4971.1	4.09

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

Interval _k	osition	Stationary	flow	Transient	analysis													
		parameters		Flow regi	me	Formatior	n paramet	ers									Static con	ditions
dn	low	Q/s	Τ"	Perturb.	Recovery	T ₁₁	T_{t_2}	T _s ,	T_{s2}	т,	T _{TMIN}	T _{TMAX}	U	~	dt,	dt_2	*a	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	ı	min	min	kPa	masl
505.43	525.43	2.67E-07	2.79E-07	WBS22	WBS2	2.3E-07	5.2E-07	NN#	6.2E-07	5.2E-07	1.0E-07	7.0E-07	1.22E-10	7.1	-	18	5170.6	4.49
525.43	545.43	1.19E-06	1.24E-06	WBS2	WBS2	NN#	1.3E-06	NN#	2.7E-06	2.7E-06	1.0E-06	4.0E-06	4.08E-10	6.5	-	12	5369.2	4.80
545.43	565.43	4.66E-08	4.87E-08	WBS22	WBS2	3.6E-08	7.9E-08	NN#	1.5E-07	1.5E-07	2.0E-08	2.0E-07	5.43E-11	12.0	-	10	5566.2	4.95
565.43	585.43	5.16E-07	5.40E-07	WBS2	WBS2	NN#	5.5E-07	NN#	9.2E-07	9.2E-07	4.0E-07	2.0E-06	5.61E-10	3.7	-	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	-	12	5959.2	5.13
605.57	625.57	2.06E-07	2.15E-07	WBS22	WBS2	2.9E-07	9.7E-08	NN#	8.3E-07	2.9E-07	8.0E-08	1.0E-06	8.02E-11	15.0	-	18	6158.5	5.39
625.57	645.57	2.55E-07	2.66E-07	WBS2	WBS22	NN#	2.6E-07	2.1E-07	3.3E-07	3.3E-07	1.0E-07	5.0E-07	8.69E-11		-	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	-	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	-	18	6745.9	5.47
685.57	705.57	1.10E-06	1.15E-06	WBS22	WBS2	1.2E-06	2.0E-07	NN#	3.0E-06	3.0E-06	1.0E-06	4.0E-06	3.74E-10	6.6	-	18	6953.6	6.71
698.07	718.07	1.08E-05	1.13E-05	WBS22	WBS2	1.4E-05	2.3E-05	NN#	3.9E-05	2.3E-05	1.0E-05	4.0E-05	1.54E-08	0.0	-	18	7083.3	7.49
711.07	731.07	1.03E-05	1.08E-05	WBS2	WBS2	NN#	1.3E-05	NN#	4.0E-05	4.0E-05	8.0E-06	8.0E-05	1.78E-08	12.3	-	9	7212.0	7.65
731.07	751.07	9.66E-09	1.01E-08	WBS22	WBS2	6.0E-09	1.0E-08	NN#	1.6E-08	1.0E-08	5.0E-09	5.0E-08	5.37E-11	0.0	-	18	7402.2	7.10
751.07	771.07	3.06E-06	3.20E-06	WBS22	WBS2	4.8E-06	1.9E-06	NN#	1.2E-05	1.9E-06	1.0E-06	2.0E-05	7.81E-10	0.0	-	18	7603.6	7.71
771.07	791.07	2.40E-08	2.51E-08	WBS22	WBS2	3.7E-08	1.5E-08	NN#	9.3E-08	9.3E-08	1.0E-08	2.0E-07	5.85E-11	15.2	-	12	7803.0	8.11
791.07	811.07	1.01E-06	1.06E-06	WBS2	WBS2	NN#	1.2E-06	NN#	3.8E-06	3.8E-06	9.0E-07	5.0E-06	3.51E-10	14.3	-	12	8003.3	8.61
800.81	820.81	1.65E-06	1.73E-06	WBS2	WBS2	NN#	2.0E-06	NN#	4.2E-06	4.2E-06	1.0E-06	6.0E-06	9.92E-10	8.0	-	9	8096.9	8.44
820.81	840.81	9.79E-09	1.02E-08	WBS2	WBS2	NN#	7.2E-09	NN#	1.6E-08	1.6E-08	6.0E-09	3.0E-08	5.06E-11	4.9	-	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	-	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	-	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	-	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	-	30	8907.6	8.89
+ ⊢ ?	1 and T2	refer to the ti	ransmissivity	/(s) derived	I from the a	nalysis wh.	ile using th		nended flov	v model. In	case a hc	Inogeneo	∍pom wolf sr	el was re	comme	nded on	ly one T va	llue is

reported, in case a two zones composite model was recommended both T1 and T2 are given. The recommended transmissivity T_{τ} typically refers to the T2 value (far field transmissivity).

The parameter p^* denoted the static formation p^{\square} extrapolation. 2

ო

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

Not analysed. NN#



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.



Conductivity [m/s]

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 $1.1E-12 \text{ m}^2/\text{s}$ and $3.3E-10 \text{ m}^2/\text{s}$. Recommended transmissivities of the injection tests range typically between $1.0E-8 \text{ m}^2/\text{s}$ and $4.0E-5 \text{ m}^2/\text{s}$.

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 m²/s to 2E-5 m²/s, only in the deepest interval from 898 to 998 m the transmissivity is several orders of magnitude lower at 2E-11 m²/s. For the 20 m sections, the transmissivities range typically from 1E-8 m²/s to 3E-5 m²/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 m²/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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Borehole: KAV04A

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	Sign.	
Date	Time	Upper	Lower	(*.HT2-file)	(*.CSV-file)		disk/CD	(date)		
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)			
2004-08-04	09:31	205.26	225.26	KAV04A_0205.26_200408040931.ht2	KAV04A_205.26-225.26_040804_1_Pi_Q_r.csv	Pi		2004-08-04			
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	e 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			

Borehole: KAV04A

APPENDIX 2

Test Analyses Diagrams

Test 105,17 – 205,17 m



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

Test 205,26 – 305,26 m



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

Test 305,33 – 405,33 m



Pressure and flow rate vs. time; cartesian plot



Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match



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tD/CD

10 4

10 5

10 2

CHIR phase; log-log match

10



CHIR phase; HORNER match

Test 405,42 – 505,42 m



Pressure and flow rate vs. time; cartesian plot



Interval pressure and temperature vs. time; cartesian plot



CHI phase; log-log match

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CHIR phase; log-log match



CHIR phase; HORNER match

p-p0, (

Test 505,43 – 605,43 m



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

Test 605,57 – 705,57 m



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

Test 704.00 – 804.00 m


Pressure and flow rate vs. time; cartesian plot



Interval pressure and temperature vs. time; cartesian plot





CHI phase; log-log match

1/qD, (1/qD)'

0.003

10 -3



tD/CD

CHIR phase; log-log match



CHIR phase; HORNER match

Test 800,81 – 900,81 m



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

Test 898,20 – 998,20 m



Pressure and flow rate vs. time; cartesian plot





PI phase, deconvolution match

Test 105,17 – 125,17 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 125,17 – 145,17 m



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

Test 145,17 – 165,17 m



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

Test 165,17 – 185,17 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 185,17 – 205,17 m



Pressure and flow rate vs. time; cartesian plot







CHI phase; log-log match





CHIR phase; log-log match



CHIR phase; HORNER match

Test 205,26 – 225,26 m



Pressure and flow rate vs. time; cartesian plot







PI phase, deconvolution match

Test 225,26 – 245,26 m



Pressure and flow rate vs. time; cartesian plot







CHI phase; log-log match


CHIR phase; log-log match



CHIR phase; HORNER match

Test 245,26 – 265,26 m



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)



tD

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



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



CHIR phase; HORNER match (2nd test)

Test 265,26 – 285,26 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 285,26 – 305,26 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 305,33 – 325,33 m



Pressure and flow rate vs. time; cartesian plot





PI phase, deconvolution match

Test 325,33 – 345,33 m



Pressure and flow rate vs. time; cartesian plot





PI phase; deconvolution match



SI phase; deconvolution match

Test 345,33 – 365,33 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 365,33 – 385,33 m



Pressure and flow rate vs. time; cartesian plot







CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 385,33 – 405,33 m



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

Test 405,42 – 425,42 m


Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 425,02 – 445,02 m



Pressure and flow rate vs. time; cartesian plot





PI phase; deconvolution match

Test 445,02 – 465,02 m



Pressure and flow rate vs. time; cartesian plot





PI phase; deconvolution match

Test 465,02 – 485,02 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 485,43 – 505,43 m



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

Test 505,43 – 525,43 m



Pressure and flow rate vs. time; cartesian plot







CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 525,43 – 545,43 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match





CHIR phase; log-log match



CHIR phase; HORNER match

Test 545,43 – 565,43 m



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

Test 565,43 – 585,43 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match

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pD, pD'



Alter a transmission and a second sec

10²

tD/CD



FLOW MODEL : Homogeneous BOUNDARY CONDITIONS: Constant rate WELL TYPE : Source SUPERPOSITION TYPE : Build-up TC PLOT TYPE : Log-log

10

10



CHIR phase; HORNER match

30

10 1

m3/Pa m2/s --3

10 4

5.61E-10 9.22E-07 1.00E-06 3.70E+00 2.00E+00

C= T= S= s= n=

10 3

Test 585,43 – 605,43 m



Pressure and flow rate vs. time; cartesian plot



SKB Aevroe / KAV04A 585.43 - 605.43 / CHi

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<u>1</u>0 _⁻³





CHI phase; log-log match




CHIR phase; log-log match



CHIR phase; HORNER match

Test 605,57 – 625,57 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 625,57 – 645,57 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 645,57 – 665,57 m



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

Test 665,57 – 685,57 m



Pressure and flow rate vs. time; cartesian plot







CHI phase; log-log match





CHIR phase; log-log match



CHIR phase; HORNER match

Test 685,57 – 705,57 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 698,07 – 718,07 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match





CHIR phase; log-log match



CHIR phase; HORNER match

Test 711,07 – 731,07 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 731,07 – 751,07 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 751,07 – 771,07 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match


CHIR phase; log-log match



CHIR phase; HORNER match

Test 771,07 – 791,07 m



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

Test 791,07 – 811,07 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match





CHIR phase; log-log match



CHIR phase; HORNER match

Test 800,81 – 820,81 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match





CHIR phase; log-log match



CHIR phase; HORNER match

Test 820,81 – 840,81 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 837,11 – 857,11 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 857,11 – 877,11 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



CHIR phase; log-log match



CHIR phase; HORNER match

Test 862,35 – 882,35 m



Pressure and flow rate vs. time; cartesian plot







tD

CHI phase; log-log match

1/qD, (1/qD)



CHIR phase; log-log match



CHIR phase; HORNER match

Test 883,35 – 903,35 m



Pressure and flow rate vs. time; cartesian plot





CHI phase; log-log match



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tD/CD

CHIR phase; log-log match

10

FLOW MODEL : Two shell composite BOUNDARY CONDITIONS: Constant rate WELL TYPE : Source SUPERPOSITION TYPE : Build-up TC PLOT TYPE : Log-log

10 0

pD, pD'



CHIR phase; HORNER match

m2/s

m3/Pa

1

3

10 10³

T S C n1 n2 rD1 brw

s

10 ²

Borehole: KAV04A

APPENDIX 3

Test Summary Sheets




	Test S	um	<u>mary Sheet</u>			
Project:	Oskarshamn site investiga	ation	Test type:[1]			Chi
Area:	ļ į	Test no:				
Borehole ID:	KAV	'04A	Test start:			040728 11:4
est section from - to (m):	305.33 - 405.3	33 m	Responsible for		Reir	nder van der Wa
Section diameter, 2.rw (m):	0.	.076	Responsible for			C. Enachescu
inear plot Q and p			Flow period		Becovery period	
			Indata		Indata	
	KAV04A 305.33-405.33 040728 1 CHir Q r	.0	n _e (kPa) –	3003	indutu	
4300 -	4.1	.5	p ₀ (kPa) =	3995		<u> </u>
4100 -	4.0	.0	$p_1(RPa) =$	4194	n_ (kPa) –	400
	3/	.5	$p_p(RI a) =$	1 78E 05	ρ _F (κι α) –	400
3900 · 2	- 3.	.0 –	$Q_p (m^2/s) =$	1.78E-03	t_ (c) _	180
원 8 3700 - 8 3700 -		ate [Vmin	(p(s)) =	1.00E.06	$i_F(S) =$	1.00E.0
P n	P section P above 2.1	ection R	SelS (-)=	1.00E-00	Sel S (-)=	1.00E-0
<u>≩</u> 3500 ·	P below _ 2,1	.0 ^I	EC _w (m3/m)=	12.0		
3300 -	1.	.5	Temp _w (gr C)=	12.9		
3100 -	-1.1	.0	Derivative fact.=		Derivative fact.=	
2900	• • • • • • • • • • • • • • • • • • •	.5				
0.00 0.20 0.40 0.60 0.80	1.00 1.20 1.40 1.60 1.80 2.00 apsed Time [h]		Results		Results	-
			Q/s (m²/s)=	8.8E-07		
og-Log plot incl. derivates-	flow period		T _M (m²/s)=	1.1E-06		
			Flow regime:	transient	Flow regime:	transient
Elapsed tim	10 [h] 10 10 10 10 10 10 10 10 10 10 10 10 10		dt ₁ (min) =	1.00	dt ₁ (min) =	1.00
10 ² SKB Aevroe / KAV04A 305.33 - 405.33 / CHi	FlowDim Version 2.14b	, ¹	dt_2 (min) =	24.00	dt ₂ (min) =	12.0
	(c) Golder Associates		T (m²/s) =	8.4E-07	T (m²/s) =	6.10E-0
10 ¹	10	°	S (-) =	1.0E-06	S (-) =	1.00E-0
• •	•		K _s (m/s) =	8.4E-09	K _s (m/s) =	6.10E-0
10 0	10	p. ⁻¹	S _s (1/m) =	1.0E-08	$S_{s}(1/m) =$	1.00E-0
		(dí [minš]	C (m³/Pa) =	#NV	C (m ³ /Pa) =	6.51E-1
10 -1	10	9 by	$C_{D}(-) =$	#NV	$C_{D}(-) =$	7.18E-0/
			ξ(-) =	0	ξ(-) =	3.11E+0
0 **	10) ⁻⁰	5()			
			$T_{a=-}(m^{2}/s) -$		$T_{a=-}(m^{2}/s) -$	
10 ⁻³ 10 ⁻⁴	10 [°] 10 [°] 10 ⁷ 10		$S_{GRF}(-) =$		$S_{GRF}(-) =$	
			$D_{ops}(-) =$		$D_{opr}(-) =$	
og-l og plot incl. derivatives	s- recovery period		Selected represe	intative param	eters	
			dt. (min) =	1	$C (m^3/Pc)$	6 51F-1
10 ⁻⁴ Elapsed tin	ne[h]		$dt_1(min) =$	10	$C_{-}(r) = -$	7 195 0
10 ³ SKB Aevroe / KAVO4A			$u_{12}(11111) =$	6 15 00	$\nabla_{D}(-) =$	0.115.0
	(c) Golder Associates		$I_{-}(m^{-}/s) =$	0.10-06	ς(-) =	3.11E+0
305.33 - 405.33 / CHir	Į	10 ³	$\frac{1}{0}$	4 05 00		
305.33 +405.33 / UHF		10 3	S (-) =	1.0E-06		
10 ²		10 ^{°3}	$S(-) = K_{s}(m/s) =$	1.0E-06 6.1E-08		

Comments:

tD/CD

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 alue of 3998.8 kPa.

	Π4	C	nowy Chast			
Project.	Oskarshamn site inves	Sumn	Test type:[1]	1		Chir
	Oskaishanni she inves	ligation				U.I.I
irea:		Ävrö	Test no:			1
Borehole ID:	ĸ	XAV04A	Test start:			040728 14:57
est section from - to (m):	405.42 - 50)5.42 m	Responsible for		Reinde	er van der Wal
Section diameter 2.r., (m):		0.076	Responsible for			C Enachesci
		0.070	test evaluation:			
inear plot Q and p			Flow period		Recovery period	1
5500		10.0	Indata		Indata	
	KAV04A_405.42-505.42_040728_1_CHir_Q_r		$p_0 (kPa) =$	4982		
5300 -		9.0	p _i (kPa) =	4975		
5100 -		8.0	p _p (kPa) =	5174	p _F (kPa) =	4981
		7.0	Q _p (m ³ /s)=	7.54E-05		
ିକ୍ଟ 4900 - ଅନ୍ତି କ		6.0 ⊑ u	tp (s) =	1800	t _F (s) =	1800
4700		5.0 Bate	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06
r Downhol	P section	ujecti 10.4	EC _w (mS/m)=			
4500	P below	3.0	Temp _w (gr C)=	14.41		
4300 -			Derivative fact.=		Derivative fact.=	
4100		2.0				
		1.0		1		
3900 0.00 0.20 0.40 0.60 0.80	1.00 1.20 1.40 1.60 1.80	2.00	Results	•	Results	
	Erabsed Linie (n)		Q/s (m²/s)=	3.7E-06		
og-Log plot incl. derivates	s- flow period		$T_{M} (m^{2}/s) =$	4.8E-06		
			Flow regime:	transient	Flow regime:	transient
Elaps	sed time [h]		dt₁ (min) =	1.00	dt ₁ (min) =	1.00
10 2 SKB Aevroe / KAV04A	FlowDim Version 2.1	40	dt ₂ (min) =	30.00	dt ₂ (min) =	12.00
	(c) conser Paracellines	10 °	T (m²/s) =	9.1E-06	T (m²/s) =	3.41E-06
10 1			S (-) =	1.0E-06	S (-) =	1.00E-06
		- - 10 ⁻¹	$K_s (m/s) =$	9.1E-08	$K_s (m/s) =$	3.41E-08
· · · ·			S _s (1/m) =	1.0E-08	S _s (1/m) =	1.00E-08
10 °		(min)	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	7.80E-10
	Josephin Andrews	10 2 2	$C_{D}(-) =$	#NV	$C_{D}(-) =$	8.60E-02
0 -1		ł	ξ(-) =	0	ξ(-) =	C
		10 -3				
1	·····		$T_{GBE}(m^2/s) =$		$T_{GBE}(m^2/s) =$	
10 [°] 10 ⁵	10 " 10 ' 10	10 "	$S_{GRF}(-) =$		S _{GRF} (-) =	
			$D_{GBE}(-) =$	1	$D_{GBE}(-) =$	
						<u> </u>

dt₁ (min)

dt₂ (min)

K_s (m/s)

S_s (1/m)

S (-)

000

 $T_{T} (m^{2}/s) =$

=

=

=

=

=



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.

¹ C (m³/Pa) =

=

=

30 C_D (-)

9.1E-06ξ (-)

1.0E-06

9.1E-08

1.0E-08

7.80E-10

8.60E-02

C

	Test Sumr	nary 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:		Reinde	er 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	
6500	6	p₀ (kPa) =	5947		
6300		p:(kPa) =	5962		
	- 5	p (kPa) =	6153	n- (kPa) –	5968
6100		$p_p(\mathbf{k} \cdot \mathbf{a}) = 0$	3 83E 05	ρ _F (κι α) –	5708
æ 5900 ·	P section	$Q_p (m/s) =$	3.83E-03	t_ (c) _	1800
A annac	▲ P above E	(p(s)) =	1.00E.06	$l_F(S) =$	1.005.06
2 5700 - 3 5 4		Sel S (-)=	1.00E-06	S el S (-)=	1.00E-06
§ 5500 .	÷	$EC_w (mS/m) =$			
	• • •	Temp _w (gr C)=	16.21		
5300	- 1	Derivative fact.=		Derivative fact.=	
4900				D	
0.00 0.50 1.00 1.50 Elap	2.00 2.50 3.00 3.50 sed Time [h]	Results		Results	
		Q/s (m²/s)=	2.0E-06		
Log-Log plot incl. derivates- f	ow period	T _M (m²/s)=	2.6E-06		
		Flow regime:	transient	Flow regime:	transient
10 ⁻⁵ 10 ⁻⁴ Elapsed time [h]	10 ⁻² 10 ⁻¹ 10 ⁰	dt₁ (min) =	1.00	dt ₁ (min) =	1.00
10 SKB Aevroe / KAV04A 505.43 - 605.43 / CHI	FlowDim Vorsion 2.14b (c) Golder Associates	dt_2 (min) =	24.00	dt_2 (min) =	12.00
	0.3	T (m²/s) =	6.4E-06	T (m²/s) =	7.39E-06
	- 	S (-) =	1.0E-06	S (-) =	1.00E-06
10 0	•	$K_s (m/s) =$	6.4E-08	$K_s (m/s) =$	7.39E-08
	• 0.03	S _s (1/m) =	1.0E-08	S _s (1/m) =	1.00E-08
1 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	luuui) tr	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	1.05E-09
10-1	10 ⁴ ² ² ² ² ²	$C_{D}(-) =$	#NV	C _D (-) =	1.16E-01
	0.003	ξ(-) =	0	ξ(-) =	1.50E+01
· · · · · · · · · · · · · · · · · · ·	• 10 ⁻²	$T_{GBF}(m^2/s) =$		$T_{GBF}(m^2/s) =$	
10 ⁻ 10 ⁻ 10 ⁻ 10 ⁻ 10 ⁻	10 - 10 - 10 -	$S_{GRF}(-) =$		$S_{GRF}(-) =$	
		$D_{GBF}(-) =$		$D_{GBF}(-) =$	
Log-Log plot incl. derivatives-	recovery period	Selected represe	entative param	eters.	
<u> </u>		dt₁ (min) =	. 1	C (m ³ /Pa) =	1.05E-09
Elapsed time (h)		dt_2 (min) =	12	$C_{\rm D}(-) =$	1.16E-01
10 SKB Aevroe / KAV04A SKB Aevroe / KAV04A	FlowDim Version 2.14b (c) Golder Associates	$T_{\tau}(m^2/s) =$	7.4E-06	$\xi(-) =$	1.50E+01
	- 300	S(-) =	1 0E-06		
· · · · · · · · · · · · · · · · · · ·		с () К (m/s) –	7.4E-08		
10 1	10 ²	$S_{s}(1/m) =$	1.4E 08		
		Comments:	1.02 00		
bu of the second s	• 30 [teal	The recommended t	transmissivity of	7 4E-6 m2/s was de	erived from the
	4) 70 10	analysis of the CHi	r phase. which is	consistent with the	outer zone
	A Contraction of the second second second second second second second second second second second second second	derived from the an	alysis of the CH	i phase and shows the	he best data and
	3	derivative quality. 7	The confidence r	ange for the interval	l transmissivity
	F10 °	is estimated to be 1	.0E-6 to 8.0E-6	m2/s. The flow dime	ension red at
10 ⁻¹ 10 ⁻² tD/CD	10 ⁻⁰ 10 ⁻⁴ 10 ⁻⁵	transducer depth w	e test 18 2. The s	the CHir phase usin	ieu al
		extrapolation in the	Horner plot to a	value of 5964.5 kP	a.

	Test Summ	nary 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:		Reinde	er van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for			C. Enachescu
Linear plot Q and p		Flow period		Recovery period	
		Indata		Indata	
/300 KAV04A_605.57-705.57_040729_1_CHir	_0_r	p ₀ (kPa) =	6964		
7100 -		p _i (kPa) =	6963		
		p _p (kPa) =	7163	p _F (kPa) =	6963
6900 -	- 4	$Q_{p} (m^{3}/s) =$	3.75E-05		
	E	tp (s) =	1800	t _F (s) =	1800
- Pressur	■ Psection - 3 a e	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06
8 6500 -	P above 0 □ P below 0 0 0 0 0 0 0 0 0 0 0 0 0 0	EC _w (mS/m)=		(/	
-		Temp _w (gr C)=	17.69		
6300 -		Derivative fact.=		Derivative fact.=	
6100 -	•				
5900	· · · · · · · · · · · · · · · · · · ·	Desults		Describe	
0.00 0.20 0.40 0.60 0.80 Elap	1.00 1.20 1.40 1.60 1.80 2.00 seed Time [h]	Results		Results	
lealean plating leavington f	low ported	Q/s (m ⁻ /s)=	1.6E-00		
Log-Log plot incl. derivates- f	low period	I _M (m ² /s)=	2.4E-06	Flow regime of	tronoiont
		Flow regime:		Flow regime:	transient
Elapsed time (t	N	$dl_1 (min) =$	1.00	$dl_1 (min) =$	10.00
10 SKB Aevroe / KAV04A 605.57 - 705.57 / CHi	FlowDim Version 2.14b (c) Golder Associates	$dl_2 (min) =$	24.00	$dl_2 (min) =$	18.00
	• 0.3	$T(m^{2}/s) =$	1.7E-06	$T(m^{2}/s) =$	3.74E-06
	10 ⁻¹	S(-) =	1.0E-06	S (-) =	1.00E-06
10 0	in and maintain a string and	$\kappa_{\rm s} ({\rm ffl/s}) =$	1.7E-08	$\kappa_{\rm s} (\rm ffl/s) =$	3.74E-08
.(db)	0.03	$S_{s}(1/m) =$	1.0E-08	$S_{s}(1/m) =$	1.00E-08
1460.0		C (m°/Pa) =	#INV	C (m [°] /Pa) =	9.23E-10
10 -1		$C_{\rm D}(-) =$	#INV	$C_{\rm D}(-) =$	1.02E-01
	0.003	ζ(-) =	-2.05	ζ(-) =	3.45
	10 -3	$T_{aar}(m^2/s) -$		$T_{aar}(m^2/s) =$	
10 ^{°°} 10 ^{°°} 10 ^{°°}	10 ⁻³ 10 ⁻⁴ 10 ⁻⁵	$S_{GRF}(-) =$		$S_{GRF}(-) =$	
		$D_{GRE}(-) =$		$D_{GRE}(-) =$	
Log-Log plot incl. derivatives	recovery period	Selected represe	ntative paran	neters.	
J J,	· · · · ·	dt ₁ (min) =	1	C (m ³ /Pa) –	9.23E-10
Elapsed time (h)	هم ا ا	dt_2 (min) =	18	$C_{\rm D}(-) =$	1.02E-01
10 ² SKB Advitoo / KAVO4A 605 57 - 705 57 / CHir	FlowDim Version 2.14b (c) Golder Associates	$T_{T}(m^{2}/s) =$	3.7E-06	ξ(-) =	3.45
	10	S (-) =	1.0E-06		
	300	$K_s (m/s) =$	3.7E-08		
10 1	4 4 8 10 7 12 W 10 1	$S_{s}(1/m) =$	1.0E-08		
	10 ²	Comments:			
		The recommended	ransmissivity of	f 3.7E-6 m2/s was de	erived from the
10 ^e	30) 084	analysis of the CHir	phase, which is	consistent with value	ue derived from
	10 '	the CHi phase and s	shows the best d	ata and derivative qu	uality. The
· · ·		confidence range fo	r the interval tra	insmissivity is estim	ated to be 8.0E-
/ / <u>/</u> ,		/ to 5.0E-6 m2/s. T	he flow dimensi measured at trar	on displayed during	the test is 2.
10 [°] 10 ¹ tD/CD	10 ⁻ 10 ⁴ 10 ⁴	CHir phase using st	raight line extra	polation in the Horn	er plot to a
		value of 6959.3 kPa	L.		

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Test Summary Sheet								
Project:	Oskarshamn site investi	igation	Test type:[1]			Chir		
Area:		Ävrö	Test no:			1		
Borehole ID:	KA	AV04A	Test start:			040730 13:58		
Test section from - to (m):	704.00-804	1.00 m	Responsible for		Reinde	er van der Wall		
Section diameter, 2.rw (m):		0.076	Responsible for			C. Enachescu		
			test evaluation:					
Linear plot Q and p			Flow period		Recovery period	1		
8300		T 40	Indata		Indata			
KAV04A_704.00-804.00_040730_1_CHir_Q_r			p ₀ (kPa) =	7936				
8100		- 35	p _i (kPa) =	7938				
7900 -		- 30	p _p (kPa) =	8137	p _F (kPa) =	7937		
7700 -			Q _p (m ³ /s)=	2.95E-04				
문 왕 일 7500 -	P section P above	20 [uimy]	tp (s) =	1800	t _F (s) =	1800		
le Pressu		- 20 B	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06		
ê 7300 -		Injecti	EC _w (mS/m)=					
7100 -		10	Temp _w (gr C)=	19.17				
6900		10	Derivative fact.=		Derivative fact.=			
	.	- 5						
6700								
6500 0.20 0.40 0.60 0.80 1.6	1.20 1.40 1.60 1.80 2.00	2.20	Results		Results	<u> </u>		
Eis	psed Time [h]		$Q/s (m^2/s) =$	1.5E-05		(
Log-Log plot incl. derivates-	flow period		T_{M} (m ² /s)=	1.9E-05		╉────┤		
<u> </u>			Flow regime:	transient	Flow regime:	transient		
Elapsed time (N			6.00	dt₁ (min) =	1.00		
10 ⁻¹	10, -1]	dt_2 (min) =	18.00	dt_2 (min) =	12.00		
704.00 - 804.00 / CHI	(c) Golder Associates	0.3	$T(m^2/c) =$	2 1E-05	$T(m^2/n) =$	6.00E-05		
			S(-) =	1.0E-06	S(-) =	1.00E-06		
10 1		10	K (m/s) =	1.0E 00 2.1E-07	C () = K (m/s) =	6.00E-07		
• • • • • • • •		0.03	$R_{s}(11/3) =$	1.0E-08	$S_{s}(11/3) =$	1.00E-08		
.041.0		(mim)	$S_{s}(1/11) =$	1.0L-00	$S_{s}(1/11) =$	1.002-08		
	ŧ	10 10 10 10	$C(m^{2}/Pa) =$	#NV	$C(m^{2}/Pa) =$	1.76-00		
10			$C_{\rm D}(-) =$		$C_{\rm D}(-) =$	1.90E+00		
		0.003	ζ(-) =	-8.28E-02	ζ(-) =	-3.29E-01		
• •		10 -3	$T_{GBE}(m^2/s) =$		$T_{GBF}(m^2/s) =$	<u> </u>		
10 10 10 E	, 10 10 10		$S_{GRF}(-) =$		$S_{GRF}(-) =$	1		
			$D_{GBF}(-) =$		$D_{GBF}(-) =$	1		
Log-Log plot incl. derivatives	- recovery period		Selected represe	entative paran	neters.			
			dt ₁ (min) =	6	C (m ³ /Pa) =	1.78E-08		
Elapsed fine	[h]		dt_2 (min) =	18	$C_{\rm D}(-) =$	1.96E+00		
10 1 5KB Asymp / KAV04A 30 Asymp / KAV04A 30 Asymp / KAV04A	FlowDim Version 2.14b (c) Golder Associates	300	$T_{\tau}(m^{2}/s) =$	2.1E-05	ج (-) =	-8.28E-02		
Production of the		1	S (-) =	1.0E-06	· · · ·			
5 ···· · · · · · · · · · · · · · · · ·		10 2	$K_{a}(m/s) =$	2 1F-07				
10 "			$S_{s}(1/m) =$	1.0E-08		╉────┤		
			Comments:	1.02.00				
	X	[tayi] ,(od-c	The recommended	transmissivity of	F 2 1F-5 m2/c was d	erived from the		
10-1		p bd (t	analysis of the CHi	phase, which sh	ows a clear flat deri	vative at late		
		3	times. The confider	ice range for the	interval transmissiv	vity is estimated		
		10 0	to be 1.0E-5 to 7.0I	E-5 m2/s. The flo	ow dimension displa	ayed during the		
	· · · · · · · · · · · · · · · · · · ·		test is 2. The static	pressure measur	ed at transducer dep	oth, was derived		
10 ^ຫ ໍ້ 10 ¹ ແລກ	10 ² 10 ³ 10	4	from the CHir phas	e using straight l 9 kPa	ine extrapolation in	the Horner plot		
			10 a value of 1930.	/ MI U.				

	Test S	Sumn	nary Sheet			
Project: 0	Oskarshamn site investi	igation	Test type:[1]			Chir
Area:		Ävrö	Test no:			1
Borehole ID:	KA	AV04A	Test start:			040730 19:06
Test section from - to (m):	800.81-900).81 m	Responsible for test execution:		Reinde	er van der Wall
Section diameter, 2·r _w (m):		0.076	Responsible for test evaluation:			C. Enachescu
Linear plot Q and p			Flow period		Recovery period	1
9500 -		30	Indata		Indata	
в	(AV04A_800.81-900.81_040730_1_CHir_Q_r	30	p ₀ (kPa) =	8901		
9300 -		- 25	p _i (kPa) =	8903		1
9100 -			p _p (kPa) =	9101	p _F (kPa) =	8909
8900		- 20	$Q_{n} (m^{3}/s) =$	8.88E-05		1
(B 4)		Ĺ Ĺ	tp(s) =	1800	t _F (s) =	1800
2, 8700 - 8 2,		- 15 E	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06
90 8500 - 10 800 -	P secon P show	Injectio	EC _w (mS/m)=		()	1
8300 -	q	- 10	Temp _w (gr C)=	20.67		1
8100 -		- 5	Derivative fact.=		Derivative fact.=	
7900		0	Desults		Describe	
0.00 0.20 0.40 0.60 0.80 1.00 Elapsed Time	1.20 1.40 1.60 1.80 [h]	2.00	Results		Results	
			Q/s (m ⁻ /s)=	4.4E-06		───
Log-Log plot Incl. derivates- flow	period		T _M (m ⁻ /s)=	5.7E-06		.
			Flow regime:	transient	Flow regime:	transient
Elapsed time (h)	10 ⁻¹ 10 ⁰ 10 ¹		$dt_1 (min) =$	1.00	$dt_1 (min) =$	1.00
10 SKB Aevroe / KAV04A 800.81 4000.81 / CHI	FlowDim Version 2.14 (c) Golder Associates		$dt_2 (min) =$	24.00	$dt_2 (min) =$	18.00
		10	$T(m^2/s) =$	9.0E-06	$T(m^2/s) =$	9.92E-06
10 ¹		4	S (-) =	1.0E-06	S (-) =	1.00E-06
		10 -1	$K_s (m/s) =$	9.0E-08	K _s (m/s) =	9.92E-08
<u><u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u></u>		7	$S_s(1/m) =$	1.0E-08	S _s (1/m) =	1.00E-08
A) 'den		10 ⁻⁹	C (m³/Pa) =	#NV	C (m³/Pa) =	2.31E-09
			$C_D(-) =$	#NV	$C_D(-) =$	2.55E-01
10-1		10 -3	ξ(-) =	0	ξ(-) =	5.64
	······	_	$T_{GBE}(m^2/s) =$		$T_{GBE}(m^2/s) =$	1
10 ⁴ 10 ⁵ 10 ⁴ 10 1D	° 10 ′ 10 °	10 "	$S_{GRF}(-) =$		$S_{GRF}(-) =$	1
			$D_{GRF}(-) =$		$D_{GRF}(-) =$	1
Log-Log plot incl. derivatives- red	covery period		Selected represe	entative paran	ieters.	_
			dt ₁ (min) =	1	C (m ³ /Pa) =	2.31E-09
Elapsed time [h]	o, ⁴²	1	dt_2 (min) =	18	$C_{D}(-) =$	2.55E-01
10 SKB Aevroe / KAV04A 800.81 - 900.81 / CHir	FlowDim Version 2.14b (c) Golder Associates	10 2	$T_{T}(m^{2}/s) =$	9.0E-06	ξ(-) =	5.64
			S (-) =	1.0E-06		†
		300	$K_s (m/s) =$	9.0E-08		
10		10 2	$S_{s}(1/m) =$	1.0E-08		
		3	Comments:		L	
		30 (jod-d)	The recommended	transmissivity of	9.0E-6 m2/s was d	erived from the
10 °	المستعدية المقرقة	D D	analysis of the CHi	phase, which sh	ows a clear flat deri	vative at late
		10	times. Early time da	ata were conside	red as skin effect. T	'he confidence
		3	range for the interva	al transmissivity	is estimated to be 3	0.0E-6 to 2.0E-5
	2		m2/s. The flow dim	ension displayed	I during the test is 2	. The static
ייי 10 10 10 נסכס	10 10		phase using straight	t line extrapolati	on in the Horner pla	ot to a value of
			8904.9 kPa.			

Test Summary Sheet						
Project:	Oskarshamn site investig	ation	Test type:[1]			Pi
Area:		Ävrö	Test no:			1
Borehole ID:	KAV	√04A	Test start:			040731 10:54
Test section from - to (m):	898.20-998.3	20 m	Responsible for		Reinde	er van der Wall
Section diameter, 2.r _w (m):	C).076	Responsible for			C. Enachescu
Linear plot Q and p			test evaluation:			
			Flow period		necovery period	
10900	1. KAV04A 898 20.998 20 040731 1 CHir O r	.00	nudia n. (kPa) –	0865	inuala	
	- 0.	.90	p ₀ (kPa) =	9964		
•	- 0.	.80	p _i (kPa) =	10259	n⊱(kPa) =	10189
10500 -	- 0.	.70	$\frac{p_p(\mathbf{x} \cdot \mathbf{a})}{Q_p(\mathbf{x} \cdot \mathbf{a})} =$	8 33E-08	ρ _F (κι α) =	10107
	- 0.	.60 E	$\frac{Q_p(\Pi/S)}{tp(S)} =$	1800	tr (s) =	1800
	-0.	.50 [1/m]	ε α ε [*] ()_	1 00E-06	r (0) -	1.00E-06
		1 Injection	5 er 3 (-)_ FC (mS/m)=	11002 00	3 el 3 (-)-	1.002.00
	P section P above		Temp _w (ar C)=	22.27		
9900		.30	Derivative fact.=		Derivative fact.=	
9700 -		.10				
9500		00				
0.00 0.50 1.00 1.50 2 Elapsed	2.00 2.50 3.00 3.50 4.00 d Time [h]		Results		Results	
			Q/s (m²/s)=	2.8E-09		
Log-Log plot incl. derivates- flo	ow period		T _M (m²/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 (m²/s) =	2.4E-11	T (m²/s) =	#NV
			S (-) =	1.0E-06	S (-) =	#NV
			$K_{s} (m/s) =$	2.4E-13	$K_s (m/s) =$	#NV
Not An	alysed		$S_s(1/m) =$	1.0E-08	$S_s(1/m) =$	#NV
			C (m³/Pa) =	2.7E-10	C (m³/Pa) =	#NV
			$C_{\rm D}(-) =$	3.0E-02	$C_{\rm D}(-) =$	#NV
			ξ(-) =	-2.99	ξ(-) =	#NV
			T ₂₂₂ (m ² /s) –		$T_{a}(m^2/s) -$	
			$S_{GBF}(-) =$		$S_{GRF}(-) =$	
			$D_{GBF}(-) =$		$D_{GBF}(-) =$	
Log-Log plot incl. derivatives-	recovery period		Selected represe	ntative param	neters.	
			dt ₁ (min) =	1	C (m ³ /Pa) =	2.72E-10
Elapsed time (h	19		dt ₂ (min) =	30	C _D (-) =	3.00E-02
10 * SKB Asvroa / KAV04A 898.20 - 999.20 / PI	FlowDim Version 2.14b (c) Golder Associates	3	$T_T (m^2/s) =$	2.4E-11	ξ(-) =	-2.99
			S (-) =	1.0E-06		
		10 0	K _s (m/s) =	2.4E-13		
10 ⁻¹		0.3	S _s (1/m) =	1.0E-08		
B. Tornand State Strand		presaur	Comments:			
		10 T	The recommended t	ransmissivity of	2.4E-11 m2/s was c	lerived from the
10 *		- ⁸	analysis of the PI pl	hase. The confid	ence range for the ir	iterval
		0.03	transmissivity is esti	imated to be 8.0	E-12 to 5.0E-11 m2 is 2. The static press	s. The flow
		10 -2	be extrapolated due	to the very low	interval transmissivi	ty.
10 ⁻⁴ 10 ⁻² 10 ⁻¹	10 [°] 10 [°] 10	2	-	-		
UT						

Test Summary Sheet							
Project:	Oskarshamn site investigation	n <u>Test type:[1]</u>			Chir		
Area:	Ävro	ö Test no:			1		
Borehole ID:	KAV04	A Test start:			040802 18:44		
Test section from - to (m):	105.17-125.17 n	n Responsible for test execution:		Reinde	er van der Wall		
Section diameter, $2 \cdot r_w$ (m):	0.070	6 Responsible for			C. Enachescu		
Linear plot Ω and p		Flow period		Becovery period			
				Indete			
1500	2.0		1020	Indata			
KAV04A_105.17-125.17_040802_1_CHir_Q_r 1450 -	1.8	$p_0 (kPa) =$	1238				
1400	● P section ▲ P above	p _i (kPa) =	1258				
		p _p (kPa) =	1457	p _F (kPa) =	1259		
1350	- 1.4	$Q_p (m^3/s) =$	1.22E-05				
हु 1300 - •	1.2 fe	tp (s) =	1200	t _F (s) =	1200		
1250		S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06		
90 1200		$EC_w (mS/m) =$					
° I		Temp _w (gr C)=	9.19				
1150 -	- 0.6	Derivative fact.=	,,	Derivative fact.=			
1050 -							
0.00 0.20 0.40 0.60 0.80 Elaps	1.00 1.20 1.40 1.60 1.80 ed Time [h]	Results		Results			
		Q/s (m²/s)=	6.0E-07				
Log-Log plot incl. derivates- fl	ow period	T _M (m ² /s)=	6.3E-07				
		Flow regime:	transient	Flow regime:	transient		
Elarged time 8	a	dt_1 (min) =	1.00	dt ₁ (min) =	1.00		
10 ² 10 ³ 10 ³ 10 ²	,	dt_2 (min) =	18.00	dt_2 (min) =	12.00		
105.17 - 125.17 / CH	(c) Golder Associates	$T(m^{2}/s) =$	6.5E-07	$T(m^{2}/s) =$	2.72E-06		
		S(-) =	1 0F-04	S(-) =	1.00E-04		
10 ° • • • • • • • • • • • • • • • • • •		C () =	6.55-09	K (m/c) -	2 725-08		
		$R_{s}(11/5) =$	0.5E-09	$R_{s}(11/3) = 0$	2.721-00		
Q 10 °		$S_{s}(1/11) =$	1.0E-06	$S_{s}(1/11) =$	1.00E-06		
1db).	10 -1	C (m [°] /Pa) =	#INV	C (m³/Pa) =	2.94E-10		
· · ·		$C_D(-) =$	#NV	$C_D(-) =$	3.24E-04		
10 4	10 ⁴	ξ(-) =	2.29	ξ(-) =	2.24E+01		
•		0		2			
10 ^{°2} 10 ^{°4} rr	10 ⁵ 10 ⁶ 10 ⁷	$T_{GRF}(m^2/s) =$		$T_{GRF}(m^2/s) =$			
		S _{GRF} (-) =		S _{GRF} (-) =			
		$D_{GRF}(-) =$		D _{GRF} (-) =			
Log-Log plot incl. derivatives-	recovery period	Selected represe	entative paran	neters.			
		dt_1 (min) =	1	C (m ³ /Pa) =	2.94E-10		
Elapsed time (h)	· · · · · · 10. · · · · · · · · 10.	dt_2 (min) =	18	C _D (-) =	3.24E-04		
10 SKB Aevroe / KAV04A 105.17 - 125.17 / CHir	FlowDim Version 2.14b (c) Golder Associates	$T_{T} (m^{2}/s) =$	6.5E-07	ξ(-) =	2.29		
	300	S (-) =	1.0E-04				
···	10 ⁻²	$K_{s}(m/s) =$	6.5E-09				
10 1		$S_{a}(1/m) =$	1 0F-06				
	30	Commonte:	1.02 00				
H :				5 6 5 E 7 2 / d-			
	10 1	analysis of the CHi	phase which w	0.5E-/ III2/S was de	nore reliable		
	and a second	(see comments above	ve concerning th	e CHir phase). The	confidence		
	3	range for the interva	al transmissivity	is estimated to be 5	0E-7 to 3.0E-6		
· ·	F 10 ⁰	m2/s. The flow dim	ension displayed	d during the test is 2.	The static		
10 ¹ 10 ² ID/CD	10 ⁻² 10 ⁻⁴ 10 ⁻⁵	pressure measured a	at transducer de _l	oth, was derived from	n the CHir		
		phase using straight	t line extrapolati	on in the Horner plo	t 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:		Reinde	er van der Wall			
Section diameter, 2.rw (m):	0.076	Responsible for			C. Enachescu			
Linear plot Q and p		Flow period		Recovery period				
1900	- 10	Indata		Indata				
	KAV04A_125.17-145.17_040803_1_CHir_Q_r	p ₀ (kPa) =	1433					
1700	- 0.9	p _i (kPa) =	1452					
	- 0.8	p _p (kPa) =	1743	p _F (kPa) =	1451			
1600 -	P section - 0.7 P above	Q _p (m ³ /s)=	3.17E-07					
		tp (s) =	1200	t _F (s) =	1200			
2 1500 - 4	0.5 æ	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06			
Downhol		EC _w (mS/m)=						
1400 -	K	Temp _w (gr C)=	9.49					
	- 0.2	Derivative fact.=		Derivative fact.=				
1300 -								
	0.1							
1200 0.00 0.20 0.40 0.60 0.80	1.00 1.20 1.40 1.60 1.80 2.00	Results		Results				
		Q/s (m²/s)=	1.1E-08					
Log-Log plot incl. derivates- fl	ow period	T _M (m²/s)=	1.1E-08					
		Flow regime:	transient	Flow regime:	transient			
to -4 to -3 Elapsed time [h]	10 ⁻¹ 10 ⁰	dt ₁ (min) =	1.00	dt ₁ (min) =	1.00			
10 1 SKB Asvoc / KAV04A 125.17 - 145.17 / CHI	FlowDim Version 2.14b (c) Golder Associates	dt ₂ (min) =	18.00	dt ₂ (min) =	12.00			
1 50 50 ⁵¹ 51 ¹ 51	· · · · · · · · · · · · · · · · · · ·	T (m²/s) =	8.3E-09	T (m²/s) =	2.08E-08			
····	• • •	S (-) =	1.0E-04	S (-) =	1.00E-04			
10 °	10 ¹	$K_s (m/s) =$	8.3E-11	$K_s (m/s) =$	2.08E-10			
ē · · · · · · · · · · · · · · · · · · ·		$S_s(1/m) =$	1.0E-06	S _s (1/m) =	1.00E-06			
1960 (197	2 (114) (tonio	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	6.29E-11			
10 1	10 [°]	$C_D(-) =$	#NV	$C_D(-) =$	6.93E-05			
		ξ(-) =	2.37	ξ(-) =	9.75			
-	0.3							
10 ⁻¹ 10 ⁻²	10 ⁻³ 10 ⁻⁴ 10 ⁻⁵	T _{GRF} (m²/s) =		T _{GRF} (m²/s) =				
		S _{GRF} (-) =		S _{GRF} (-) =				
		$D_{GRF}(-) =$		D _{GRF} (-) =				
Log-Log plot incl. derivatives-	recovery period	Selected represe	ntative paran	neters.				
		dt_1 (min) =	1	C (m ³ /Pa) =	6.29E-11			
	10, ⁻¹ 10, ⁰ 10, ¹	dt_2 (min) =	12	C _D (-) =	6.93E-05			
10 ² SKB Asvroe / KAV04A 125.17 - 145.17 / CHir	FlowDim Version 2.14b (c) Golder Associates	$T_{T} (m^{2}/s) =$	2.1E-08	ξ(-) =	9.75			
	10 2	S (-) =	1.0E-04					
	200	$K_s (m/s) =$	2.1E-10					
10 1		S _s (1/m) =	1.0E-06					
B Restant in a state of the second state of th	10 ²	Comments:						
a jaka ja		The recommended t	ransmissivity of	f 2.1E-8 m2/s was de	erived from the			
10 °	ו••••	analysis of the CHir	phase, which sl	nows better data qua	lity. The ated to be 7.0F			
	- 10 ¹	9 to 3.0E-8 m2/s. Th	he flow dimensi	on displayed during	the test is 2.			
		The static pressure	measured at tran	sducer depth, was d	erived from the			
10 ⁻⁰ 10 ⁻¹ IDCD	10 ² 10 ² 10 ³	CHir phase using st value of 1448.9 kPa	raight line extra	polation in the Horn	er plot to a			







Test Summary Sheet						
Project:	Oskarshamn site investigation	Test type:[1]			Pi	
Area:	Ävrö	ö 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:		Reinde	r van der Wall	
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for			C. Enachescu	
l inear plot Ω and p		test evaluation:		Becovery period		
		I low period		Indata		
2800 KAV04A 205.	.10 0.10 0.10 0.10 0.10 0.10 0.10	p₀ (kPa) =	2220	indata		
2700 -	▲ P above + 0.09	p; (kPa) =	2337			
		$p_{\rm r}({\rm kPa}) =$	2557	n₋(kPa) =	2486	
2600 -	0.07	$\rho_{\beta}(n, \alpha) = 0$	#NV	p _F (M u) =	2400	
<u>s</u> 2500	0.06 ਵ	$Q_p (m/s) =$ tp (s) =	18	tr (s) -	2400	
		$\frac{(p(3))}{(2)} =$	1.00E-06	$i_{\rm F}$ (3) =	1.00E-06	
e de lo de la companya		SeiS (-)= EC (mS/m)-	1.002-00	5 ei 5 (-)=	1.002-00	
â ₂₃₀₀ .	0.04 =	Temp (ar C) =	10.55			
2200	0.03	Derivative fact -	10.55	Derivative fact –		
	- 0.02			Derivative lact.=		
2100 -	+ 0.01					
		Results		Bosults		
Elaps	ed Time [h]	$\Omega/c_{\rm c}$ (m ² /c)-	#NV	neouno		
l og-l og plot incl. derivates- fl	low period	Q/S (III/S) =	#NV		┢────┤	
		$T_{\rm M}$ (III /S)=	transient	Flow regime:	transient	
		dt_{4} (min) =	1.00	dt. (min) =	#NV	
		$dt_1(min) = dt_2(min) =$	42.00	$dt_1 (min) =$	#NV	
		$T_{1}(m^{2}/c)$	5 9E-11	$T_{2}(m^{2}/c)$	#NV	
		S(-) =	1.0E-06	1 (117/8) =	#NV	
		6 () = K (m/s) =	5.9E-13	С() = К (m/s) =	#NV	
Not A	nalysed	$S_{s}(1/m) =$	1.0E-08	$S_{s}(1/m) =$	#NV	
Not Al	larysed	$C_{s}(1,11) = C_{s}(1,11)$	4 3E-11	$C_{s}(1,11) = C_{s}(1,11)$	#NV	
		$C(m/ra) = C_{p}(-) =$	4 8F-03	$C(\Pi / Fa) = C_{D}(-) =$	#NV	
		ε ₍₋) –	-6 55E-02	ε ₍₋₎ –	#NV	
		5() –	0.001 01	5() –		
		$T_{m}(m^{2}/c) =$		$T_{m}^{2}(n) =$	┣────┤	
		$S_{GRF}(11/5) =$		$S_{GRF}(117) =$	┣────┤	
		$D_{\text{ORF}}(-) =$		$D_{CRF}(-) =$		
Log-Log plot incl. derivatives-	recovery period	Selected represe	entative paran	neters.		
-5 -51		dt_1 (min) =	1	C (m ³ /Pa) =	4.30E-11	
10 ⁻⁴ Elapsed time	[h] 10 ⁻¹ 10 ⁰	dt_2 (min) =	42	$C_{\rm D}(-) =$	4.80E-03	
10 1 SKB Aevroe / KAV04A 205.26 - 225.26 / Pi	FlowDim Version 2.14b (c) Golder Associates	T_{τ} (m ² /s) =	5.9E-11	ξ(-) =	-6.55E-02	
	10 °	S (-) =	1.0E-06	5()		
		$K_s (m/s) =$	5.9E-13			
10 °	0.3	$S_{s}(1/m) =$	1.0E-08			
		Comments:				
	10 ad po	The recommended	transmissivity of	f 5.9E-11 m2/s was o	lerived from the	
10 -1	0.03	analysis of the PI pl	hase. The confid	lence range for the ir	iterval	
		transmissivity is est	imated to be 2.0	E-11 to 1.0E-10 m2	/s. The flow	
	10 -2	aimension displayed	a during the test	is 2. The static pres	sure measured	
10-1 10-0	10 ¹ 10 ² 10 ³	transmissivity.			, , 01 y 10 w	
	3					

	Test Sum	mary Sheet			
Project:	Oskarshamn site investigation	Test type:[1]			Chir
Area:	Ävrö	ö 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:		Reinde	r van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for			C. Enachescu
Linear plot Q and p		Flow period		Recovery period	
p p		Indata		Indata	
2700	KAV04A_225.26-245.26_040804_1_CHir_Q_r	p₀ (kPa) =	2416		
2600	- 0.9	p _i (kPa) =	2426		
2000	P section 0.8	$p_{p}(kPa) =$	2625	p _F (kPa) =	2431
2500	0.7	$Q_{\rm p}$ (m ³ /s)=	6.50E-06	, ,	
[e_0]	₹ ⁸⁰	$dp(m/s)^{\perp}$ tp(s) =	1200	t _F (s) =	1200
2 2400 -	45 91 0.5 82	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06
•		EC _w (mS/m)=		0010()=	
2300 -		Temp _w (gr C)=	10.81		
	- 0.3	Derivative fact.=		Derivative fact.=	
2200	- 0.2				
	• 0.1				
2100 .00 0.20 0.40 0.60	0.80 1.00 1.20 1.40 1.60	Results		Results	
EIS	spsea rime (n)	Q/s (m²/s)=	3.2E-07		
Log-Log plot incl. derivates-	flow period	$T_{M} (m^{2}/s) =$	3.4E-07		
		Flow regime:	transient	Flow regime:	transient
10. 4 10. 3 Elapsed tim	ne [h] 10 ⁻¹ 10 ⁻⁰	dt ₁ (min) =	1.00	dt ₁ (min) =	1.00
10 ¹ SKB Agvrog / KAV04A 225 26 - 245.26 / CHi	FlowDim Version 2.14b (c) Golder Associates	dt ₂ (min) =	18.00	dt ₂ (min) =	18.00
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5	T (m²/s) =	2.5E-07	T (m²/s) =	2.83E-07
	• 10 °	S (-) =	1.0E-06	S (-) =	1.00E-06
10 0	م م	$K_s (m/s) =$	2.5E-09	$K_s (m/s) =$	2.83E-09
معمد بـ	0.3	S _s (1/m) =	1.0E-08	S _s (1/m) =	1.00E-08
117 Jan	10 ⁻¹ [8]	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	9.61E-11
10 -1		C _D (-) =	#NV	C _D (-) =	1.06E-02
•	0.03	ξ(-) =	-1.75	ξ(-) =	-1.17
	10 -2				
10 ¹ 10 ²	10 ³ 10 ⁴ 10 ⁵	T _{GRF} (m²/s) =		T _{GRF} (m²/s) =	
	-	S _{GRF} (-) =		S _{GRF} (-) =	
		D _{GRF} (-) =		D _{GRF} (-) =	
Log-Log plot incl. derivatives	- recovery period	Selected represe	entative paran	ieters.	
		dt_1 (min) =	1	C (m ³ /Pa) =	9.61E-11
Elapsed time	⁰ .01. ¹ .01. ² ,01. ¹ .01.	dt_2 (min) =	18	$C_D(-) =$	1.06E-02
SKB Aevroe / KAVD4A 225.26 - 245.26 / CHir	FilowUm Version 2:146 (c) Golder Associates	$T_T (m^2/s) =$	2.8E-07	ξ(-) =	-1.17
e e e e e e e e e e e e e e e e e e e		S (-) =	1.0E-06		
· · ·		$K_s (m/s) =$	2.8E-09		
	30	$S_{s}(1/m) =$	1.0E-08		
		The recommended t analysis of the CHin the results shown by interval transmissiv flow dimension disp measured at transdu	transmissivity of r phase (inner zo y the CHi phase, ity is estimated to played during th toer depth, was o	2.8E-7 m2/s was de me), because of its c The confidence ran to be 1.0E-7 to 1.0E- e test is 2. The static derived from the CH	rived from the onsistency with ge for the -6 m2/s. The pressure ir phase using
10 10 [°] 10 ⁷	ICD 10 10 .	straight line extrapo	plation in the Ho	rner plot to a value of	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:		
Test section from - to (m):	245.26 - 265.26 m	Responsible for test execution:	Reinder van der W			
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for			C. Enachescu	
Linear plot Ω and p		test evaluation:		Bacovary		
		Indata		Indeta		
2800 KAV04A_245.26-265.26_040805_2_CHir_Q	_r	n₀ (kPa) =	2613	indata		
2750 -	- 30	p; (kPa) =	2620			
2700 -		$p_{\rm p}({\rm kPa}) =$	2724	p₌ (kPa.) =	2638	
2650		$O(m^3/s) =$	1.07E-04	pr (x)	2000	
हू 2600	- -	$\frac{d_p (m/s)}{tp (s)} =$	1200	t₌ (s) =	1200	
9 98 2250	P section	S el S [*] (-)-	1.00E-06	S ol S [*] (_)−	1.00E-06	
1900	P below 15 g	EC.,, (mS/m)=		5 el 5 (-)=		
8 2000 ·		Temp _w (ar C)=	11.08			
2450 -	- 10	Derivative fact.=		Derivative fact.=		
2400	5					
2350 -						
2300 0.20 0.40 0.60 0.80	1.00 1.20 1.40 1.60 1.80	Results		Results		
Elapso	ed Time [h]	$Q/s (m^2/s) =$	1.0E-05			
Log-Log plot incl. derivates- fl	ow period	T_{M} (m ² /s)=	1.1E-05			
	-	Flow regime:	transient	Flow regime:	transient	
Elascot time (k)		dt_1 (min) =	4.00	dt_1 (min) =	1.00	
10 ¹ SKB Aevroe / KAV04A		dt ₂ (min) =	18.00	dt ₂ (min) =	18.00	
245.26 - 265.26 / CHI	(c) contait Association 0.3	T (m²/s) =	4.4E-06	T (m²/s) =	5.11E-06	
		S (-) =	1.0E-06	S (-) =	1.00E-06	
10 00		$K_s (m/s) =$	4.4E-08	K _s (m/s) =	5.11E-08	
	0.03	$S_{s}(1/m) =$	1.0E-08	S _s (1/m) =	1.00E-08	
1407. (141)	الالي 10 ° 10 °	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	2.32E-08	
10 -1		$C_{D}(-) =$	#NV	C _D (-) =	2.56E+00	
**	0.003	ξ(-) =	-5.39	ξ(-) =	-5.07	
• 10 [°] 10 [°]	10 ² 10 ³ 10 ⁴	T _{GRF} (m ² /s) =		T _{GRF} (m²/s) =		
Gi		S _{GRF} (-) =		S _{GRF} (-) =		
		D _{GRF} (-) =		D _{GRF} (-) =		
Log-Log plot incl. derivatives-	recovery period	Selected represe	entative paran	neters.		
		dt ₁ (min) =	1	C (m ³ /Pa) =	2.32E-08	
10, ⁴ Elapsed time (h)	· · · · · · · · · · · · · · · · · · ·	dt_2 (min) =	18	C _D (-) =	2.56E+00	
10 SKB Asvroe / KAV04A 245.26 - 265.26 / CHir	FlowDim Version 2.14b (c) Golder Associates	$T_T (m^2/s) =$	5.1E-06	ξ(-) =	-5.07	
		S (-) =	1.0E-06			
	30 souther and sou	$K_s (m/s) =$	5.1E-08			
10 1	10 1	$S_{s}(1/m) =$	1.0E-08			
	[4:0].	Comments:				
· //·	- 81 - 82 - 82	The recommended	transmissivity of	f 5.1E-6 m2/s was de	erived from the	
10 1	-10 °	analysis of the CHii The confidence ran	pnase (considered) of the interv	ring early time data	as skin effect).	
		4.0E-6 to 2.0E-5 m	2/s (this range er	ncompasses the skin	effects derived	
	0.3	from the CHir analy	sis). The flow d	imension displayed	during the test	
10 ⁰ 10 ¹ tDiCD	10 ² 10 ³ 10 ⁴	is 2. The static press	sure measured a	t transducer depth, v	vas derived	
		from the CHir phase to a value of 2624 3	e using straight l s kPa	ine extrapolation in	uie Horner plot	

Test Summary Sheet								
Project:	Oskarshamn site investigation	Test type:[1]			Chir			
Area:	Ävrö	öTest no:			1			
Borehole ID:	KAV04A	Test start:			040805 11:04			
Test section from - to (m):	265.26-285.26 n	Responsible for test execution:		Reinde	er van der Wall			
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for			C. Enachescu			
Linear plot Q and p		Flow period		Recovery period				
		Indata		Indata				
KAV04A_265.26-285.26_040805_1_CHi	ir_Q_r	p ₀ (kPa) =	2811					
3000	• P section	p _i (kPa) =	2816					
	P above 1.6	p _p (kPa) =	3016	p _F (kPa) =	2819			
2900 -	1.4	$Q_{p} (m^{3}/s) =$	1.47E-05					
e k ba	12 ਵ	tp(s) =	1200	t _F (s) =	1200			
2800		S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06			
tow nhole	Pieto Pieto	$EC_w (mS/m) =$						
2700 -		Temp _w (gr C)=	11.25					
		Derivative fact.=		Derivative fact.=				
2600	+ 0.4							
	- 0.2							
2500 .00 0.20 0.40 0.60	0.0 0.80 1.00 1.20 1.40 1.60	Results		Results	•			
Etaj	psed rime [n]	Q/s (m²/s)=	7.2E-07					
Log-Log plot incl. derivates- f	flow period	$T_{M} (m^{2}/s) =$	7.5E-07					
		Flow regime:	transient	Flow regime:	transient			
Elapsed time	a [h]	dt ₁ (min) =	1.00	dt ₁ (min) =	1.00			
10 2 SKB Aswros / KAV04A	. 10,	dt ₂ (min) =	18.00	dt ₂ (min) =	12.00			
205.26 · 205.26 / Uni	(c) Golder Associates	T (m²/s) =	8.1E-07	T (m²/s) =	1.99E-06			
10 1		S (-) =	1.0E-06	S (-) =	1.00E-06			
<u> </u>	10 °	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			
10-00 (1)	10 ⁻¹	C (m ³ /Pa) =	#NV	C (m³/Pa) =	4.16E-10			
		C _D (-) =	#NV	C _D (-) =	4.59E-02			
10 -1		ξ(-) =	-1.66	ξ(-) =	8.46			
	10 -2							
10 ¹ 10 ²	10 ³ 10 ⁴ 10 ⁵	T _{GRF} (m ² /s) =		T _{GRF} (m²/s) =				
	ιυ	S _{GRF} (-) =		S _{GRF} (-) =				
		$D_{GRF}(-)$ =		$D_{GRF}(-) =$				
Log-Log plot incl. derivatives	- recovery period	Selected represe	entative paran	neters.				
		$dt_1 (min) =$	1	C (m³/Pa) =	4.16E-10			
Elapsed time (h	NJ	dt_2 (min) =	18	$C_D(-) =$	4.59E-02			
SKB Aavroe / KAVD4A 265.26 - 285.26 / CHir	FlowDim Version 2.14b (c) Golder Associates	T⊤ (m²/s) =	8.1E-07	ξ(-) =	-1.66			
	300	S (-) =	1.0E-06					
a serve		$K_s (m/s) =$	8.1E-09					
	10 2	S _s (1/m) =	1.0E-08					
gi og		Comments:						
	· · · · · · · · · · · · · · · · · · ·	The recommended	transmissivity of	f 8.1E-7 m2/s was de	erived from the			
10 "	10 1	skin effect. The con	phase, where the	e early time data we or the interval transp	ie considered as			
	· · · ·	estimated to be 5.0H	E-7 to 2.0E-6 m	2/s (this range encon	npasses the			
	3	inner zone transmis	sivity derived fr	om the CHi analysis	s). The flow			
10 ⁰ 10 ¹	10 ² 10 ² 10 ⁴	dimension displaye	d during the test	is 2. The static pres	sure measured			
		at transducer depth,	was derived fro	om the CHir phase us	sing straight			

Test Summary Sheet					
Project:	Oskarshamn site investigatio	n <u>Test type:[1]</u>			Chir
Area:	Ävr	ö Test no:			1
Borehole ID:	KAV04/	A Test start:			040805 13:16
Test section from - to (m):	st section from - to (m): 285.26-305.26 m		Reinder van der Wall		
Section diameter, $2 \cdot r_w$ (m):	Section diameter, 2·r _w (m): 0.076				C. Enachescu
Linear plot Q and p		Flow period		Recovery period	
p		Indata		Indata	
3400 KAV04A_285.26-305.26_0	40805_1_CHir_Q_r ● ● P section	p₀ (kPa) =	3009		
3300 ·	Pabove 0.9	p _i (kPa) =	3020		
	0.8	p _p (kPa) =	3218	p _F (kPa) =	3021
3200	0.7	$Q_{p} (m^{3}/s) =$	4.67E-06		
₹ 3100	- ^{0.0} ਵ	tp(s) =	1200	t _F (s) =	1200
Pressure	0.5 #	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06
3000 Sec. 2000	90	EC _w (mS/m)=			
		Temp _w (gr C)=	11.55		
2900		Derivative fact.=		Derivative fact.=	
2800					
	. 0.1				
2700	1.50 2.00 2.50 3.00	Results		Results	-
		Q/s (m²/s)=	2.3E-07		
Log-Log plot incl. derivates- fl	ow period	T _M (m²/s)=	2.4E-07		
		Flow regime:	transient	Flow regime:	transient
Elapsed time (h		dt ₁ (min) =	1.00	dt ₁ (min) =	1.00
10, 10, 10, 10, 10, 10, 10, 10, 10, 10,	10, 10, 10, FlowDim Version 2.14b (c) Golder Associates	dt_2 (min) =	18.00	dt ₂ (min) =	6.00
	10 1	T (m²/s) =	2.5E-07	T (m²/s) =	8.14E-07
10 ¹		S (-) =	1.0E-06	S (-) =	1.00E-06
	10 °	$K_s (m/s) =$	2.5E-09	$K_s (m/s) =$	8.14E-09
10°		$S_{s}(1/m) =$	1.0E-08	$S_s(1/m) =$	1.00E-08
1,000, (19)	10 -1	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	9.05E-11
		$C_{D}(-) =$	#NV	C _D (-) =	9.97E-03
10 -2	• 10 -2	ξ(-) =	-6.50E-02	ξ(-) =	1.50E+01
10 ² 10 ³	10 ⁻⁴ 10 ⁻⁶	$T_{GRF}(m^2/s) =$		T _{GRF} (m²/s) =	
10		S _{GRF} (-) =		S _{GRF} (-) =	
		$D_{GRF}(-) =$		D _{GRF} (-) =	
Log-Log plot incl. derivatives-	recovery period	Selected represe	ntative paran	neters.	-
		dt_1 (min) =	1	C (m ³ /Pa) =	9.05E-11
10 ⁻³ Elapacet line (h)		dt_2 (min) =	18	$C_D(-) =$	9.97E-03
SKB A6/06 / KAVQAA 285.26 - 305.26 / Chir	(c) Golder Associates	$T_T (m^2/s) =$	2.5E-07	ξ(-) =	-6.50E-02
	300	S (-) =	1.0E-06		
10 1	• 10 ²	$K_s (m/s) =$	2.5E-09		
· ·	· ·	$S_s(1/m) =$	1.0E-08		
9 e	30	Comments:			
		The recommended the CHi	transmissivity of	f 2.5E-7 m2/s was de	The
		confidence range for	or the interval tra	insmissivity is estimated	ated to be 1.0E-
· ·	3	7 to 1.0E-6 m2/s. T	he flow dimensi	on used for analysis	is 2. The static
		pressure measured a	at transducer der	oth, was derived from	n the CHir
10 ¹⁰ 10 ¹¹ 10 ¹⁰ 10 ¹⁰	10 ⁻²	phase using straight 3021.7 kPa.	line extrapolati	on in the Horner plo	t to a value of

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:		Reinde	r 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		
3500 KAV04A_305.33-325.33_040805_1_Pi_C	4.0	p ₀ (kPa) =	3207			
	P section ▲ P above - 3.5 ■ P hadraw	p _i (kPa) =	3223			
3400 -		$p_{\rm r}(kPa) =$	3456	p⊢(kPa) =	3256	
		$p_{p(11)}(m^{3}/c) =$	4 67E-06	p _F (m a) =	5250	
्र इ	+25	$Q_p (\Pi / S) =$	4.0712 00	t- (s) -	2400	
		(p(3)) =	1.00E.06	$(3) = 0^{*}(3)$	1.00E.06	
	2.0 E 4	SelS (-)= EC (mS/m)-	1.00E-00	Sel S (-)=	1.00E-00	
3100	• <u></u> - 1.5		11.07		 	
3100 -	10	Temp _w (gr C)=	11.87			
3000		Derivative fact.=		Derivative fact.=		
	+ 0.5					
2900	0.0					
0.00 0.20 0.40 0.60 0.80 Elap	1.00 1.20 1.40 1.60 1.80 2.00 sed Time [h]	Results		Results		
		$Q/s (m^2/s) =$	2.0E-07			
Log-Log plot incl. derivates- f	low period	T _M (m²/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 (m²/s) =	2.0E-10	T (m²/s) =	#NV	
		S (-) =	1.0E-06	S (-) =	#NV	
		$K_s (m/s) =$	2.0E-12	$K_s (m/s) =$	#NV	
Not A	nalysed	S _s (1/m) =	1.0E-08	S _s (1/m) =	#NV	
	-	C (m³/Pa) =	4.3E-11	C (m³/Pa) =	#NV	
		C _D (-) =	4.8E-03	C _D (-) =	#NV	
		ξ(-) =	-4.19E-01	ξ(-) =	#NV	
		$T_{GBE}(m^2/s) =$		$T_{GBE}(m^2/s) =$		
		$S_{GRF}(-) =$		$S_{GRF}(-) =$		
		D _{GRF} (-) =		D _{GRF} (-) =		
Log-Log plot incl. derivatives	· recovery period	Selected represe	ntative param	neters.		
		dt ₁ (min) =	6	C (m ³ /Pa) =	4.30E-11	
	~	dt_2 (min) =	36	$C_{D}(-) =$	4.80E-03	
10 ⁻² 10 ⁻⁴	⁽¹⁾	$T_{T}(m^{2}/s) =$	2.0E-10	ξ(-) =	-4.19E-01	
SKB Aevroa / KAV04A 305.33 - 325.33 / Pi	FlowDim Version 2.14b (c) Golder Associates	S (-) =	1.0E-06	5.()		
	in °	K _s (m/s) =	2.0E-12			
10		$S_{s}(1/m) =$	1.0E-08		 	
		Comments:			<u> </u>	
	10 ⁻⁴	The recommended t	ransmissivity of	f 2 0E-10 m2/s was (lerived from the	
	The second secon	analysis of the PI pl	hase. The confid	lence range for the in	iterval	
	10 -2	transmissivity is est	imated to be 8.0	E-11 to 5.0E-10 m2	/s. The flow	
		dimension used for	analysis is 2. Th	ne static pressure me	asured at	
		transducer depth co	uld not be extraj	polated.		
10 ⁻⁷¹ 10 ⁻⁰ 1	□ 10 ¹ 10 ² 10 ³					



Project: Oskarshamr Area:	n site investiga	ation	Test type:[1]			Chir	
Area:						Crim	
	Ĭ	Ävrö	Test no:			1	
Borehole ID:	KAV	'04A	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·rw (m):	0.	.076	Responsible for			C. Enachescu	
Linear plot Q and p			Flow period		Recovery period		
3000	. 0	7	Indata		Indata		
KAV04A_345.33-365.33_04	0806_1_CHir_Q_r		p ₀ (kPa) =	3593			
3800	- 0.	1.6	p _i (kPa) =	3597			
	P section		p _p (kPa) =	3795	p _F (kPa) =	3599	
3700 -	P below O	1.5	$Q_{p} (m^{3}/s) =$	3.50E-06			
	- 0.	uiu)	tp (s) =	1200	t _F (s) =	1200	
3000		on Rate []	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06	
Downtho	- 0.	Injectio	EC _w (mS/m)=				
3500 -			Temp _w (gr C)=	12.47			
3400 -		12	Derivative fact.=		Derivative fact.=		
	0.	.1					
3300 0.20 0.40 0.60 0.80 1.00 1.20 Elapsed Time (h)	1.40 1.60	1.0	Results		Results		
			Q/s (m²/s)=	1.7E-07			
Log-Log plot incl. derivates- flow period			T _M (m²/s)=	1.8E-07			
			Flow regime:	transient	Flow regime:	transient	
Elapsed time [h]			dt ₁ (min) =	1.00	dt ₁ (min) =	1.00	
10 ² SKB Awwork (AW04A 345.33 - 365.33 / CHi	FlowDim Version 2.14b (c) Golder Associates		dt ₂ (min) =	6.00	dt ₂ (min) =	6.00	
			$T(m^{2}/s) =$	3.0E-07	T (m²/s) =	4.59E-07	
10 1		0 1	S (-) =	1.0E-06	S (-) =	1.00E-06	
			$K_s (m/s) =$	3.0E-09	$K_s (m/s) =$	4.59E-09	
10 ⁴	10. III.	0	$S_{s}(1/m) =$	1.0E-08	S _s (1/m) =	1.00E-08	
	-	ے ۲۸((minu)	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	1.97E-10	
10		144 (C _D (-) =	#NV	C _D (-) =	2.17E-02	
10 ⁴	10	0 -2	ξ(-) =	-1.96E-02	ξ(-) =	8.83	
			2		2		
10 ² 10 ³ 10 ⁴	10 ⁵ 10 ⁶	0 -3	$I_{GRF}(m^{-}/s) =$		T _{GRF} (m⁻/s) =		
			$S_{GRF}(-) =$		$S_{GRF}(-) =$		
Log Log plat incl. derivatives, receiver, peri	a.d		$D_{\text{GRF}}(-) =$	ու հու, է ոնդովիս կոնոնությո	$D_{\text{GRF}}(-) =$		
Log-Log plot incl. derivatives- recovery peri	Ju		dt (min) -			1 07E 10	
			$dt_1 (min) =$	1	$C(m^{2}/Pa) =$	1.97E-10	
10 ⁻² 10 ⁻⁴ 10 ⁻³ Expansion time (11) ⁻² 10 ⁻² 10 ⁻¹	10 °		$u_2(mm) =$	465.07	$C_{\rm D}(-) = $	2.17E-02	
945.33 - 965.33 / CHir	(c) Golder Associates		$I_{T}(m^{-}/s) =$	4.0E-07	ς(-) =	0.03	
	300		S(-) =	1.0E-00			
10 ¹	_		κ_{s} (m/s) =	4.6E-09			
s and the second s	10 ^		$S_{s}(1/11) =$	1.0E-06			
	30 10 ¹ 3	p.p.d. (p.p.d)	The recommended tr analysis of the CHir shown by the CHi pl interval transmissivit flow dimension disp measured at transduc straight line extrapol	ansmissivity of phase, because hase (late time of ty is estimated the layed during the cer depth, was of ation in the Ho	4.6E-7 m2/s was de of its consistency wi lata). The confidence o be 1.0E-7 to 5.0E- e test is 2. The static lerived from the CHi rner plot to a value o	rived from the th the results e range for the 7 m2/s. The pressure r phase using f 3599.2 kPa.	

Project: Oskarshamn site investigation Test type [1] Chi Area: Area Test no: 1 Borehole ID: KAV04A Test start: 040806 11:37 Test section from - to (m): 365:33-365:33 m Responsible for Reinder van der Wal section diameter, $2r_w$ (m): 0.076 Responsible for C. Enachescu test or valuation: Test weaking in the section of the section		Test S	umn	nary Sheet				
Area:AveTest no.1Borehole ID:KAVV04ATest start:040806 11.37Test section from - to (m):365.33-385.39Responsible for to Besponsible for to C. Enachescu test ovaluation:Recovery periodSection diameter, 2.r., (m):0.076Responsible for to C. Enachescu test ovaluation:Recovery periodImage: point C and pFlow period (m)Recovery periodRecovery periodImage: point C and pFlow period (m)Recovery periodRecovery periodImage: point C and pFlow period (m)Recovery periodRecovery periodImage: point C and pFlow period (m)(m)1.17E.061.100E.06Image: point c and point c an	Project:	Oskarshamn site investi	gation	Test type:[1]			Chir	
Borehole ID: KAV04A Test start: 040806 11:37 Tost section from - to (m): 365.33-365.33 m Responsible for the evolution: C. Enachesco the valuation: C. Enachesco the val	Area:		Ävrö	Test no:			1	
Test section from - to (m): 3665.33-365.33 and Responsible for insert execution: Section diameter, 2+r _a (m): Linear plot Q and p Linear plot Q and p Linear plot Q and p Linear plot Q and p Linear plot Q and p Linear plot Q and p Linear plot Q and p Linear plot Q and p Linear plot Q and p Linear plot Q and p Linear plot Q and p Linear plot Q and p Linear plot Q and p Linear plot Q and p	Borehole ID:	KA	V04A	Test start:		040806 11:37		
Section diameter, $2r_{n}$ (m): Linear plot Q and p Linear plot Q and p r_{n} (kPa) = 3794 r_{n} (kPa) = 3795 r_{n} (kPa) = 3795 r_{n} (kPa) = 3795 r_{n} (kPa) = 3795 r_{n} (kPa) = 3795 r_{n} (kPa) = 3795 r_{n} (kPa) = 3795 r_{n} (kPa) = 3795 r_{n} (kPa) = 3795 r_{n} (kPa) = 1.01E-06 r_{n} (kPa) = 1.01E-06 r_{n} (kPa) = 1.01E-06 r_{n} (m ²) = 5.6E-08 r_{n} (m ²) = 6.0E-08 Flow regime: transiant r_{n} (min) = 1.00E-06 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.52E-07 r_{n} (m ²) = 1.00E-06 $r_{$	Test section from - to (m):	365.33-385.33 m		Responsible for test execution:		Reinder van der Wal		
Linear plot Q and p Flow period Flow peri	Section diameter, $2 \cdot r_w$ (m):		0.076	Responsible for test evaluation:			C. Enachescu	
$\frac{1}{10000} = \frac{1}{100000} = \frac{1}{10000000000000000000000000000000000$	Linear plot Q and p			Flow period	•	Recovery period	1	
$\int_{a} (kPa) = \frac{3793}{10000}$ $\int_{a} (kPa) = \frac{3793}{100000}$ $\int_{a} (kPa) = \frac{3793}{1000000}$ $\int_{a} (kPa) = \frac{3793}{1000000}$ $\int_{a} (kPa) = \frac{3793}{$				Indata		Indata		
$\int_{0}^{\infty} \frac{(kPa) = 3795}{p_{k}(kPa) = 3795} (k$	4100	KAV04A_365.33-385.33_040806_1_CHir_Q_r	0.10	p ₀ (kPa) =	3794			
$\frac{1}{\sqrt{\frac{1}{\frac{1}{\frac{1}{\frac{1}{\frac{1}{\frac{1}{1$			- 0.09	p _i (kPa) =	3795			
$\frac{1}{2} \int_{\frac{1}{2}} \int_{\frac{1}{$		P section P above	- 0.08	$p_{\rm p}(kPa) =$	3993	p _F (kPa) =	3796	
$\frac{1}{1000} = \frac{1}{1000} \frac{1}{10$	3990	P below Q	0.07	$O(m^3/s) =$	1.17E-06	F 1 (7		
$ \frac{1}{2} + 1$	Ab al		0.06 g	$\frac{d_p(m/s)}{tp(s)} =$	1200	t₌ (s) =	1200	
$ \frac{1}{1000} = \frac{1}{1000} + $	3800		- 0.05 Hate []/wi	P(0)	1.00E-06	r (°) S d S [*] ()_	1.00E-06	
$\int_{a}^{b} \int_{a$	9 eoor		jection 1	Sel S (-)= EC (mS/m)-	1.002 00	5 el 5 (- <i>)</i> =	1.002 00	
$\int_{a_{1}} \frac{1}{1 + $	å 3700 -		- 0.04 =	$EO_w (IIIO/III) =$	12.71			
$\int_{\mathbb{R}^{n}} \frac{1}{100} + 1$			- 0.03	Temp _w (gr C)=	12.71	Device the effect		
$\frac{1}{1000} + \frac{1}{1000} + \frac{1}{1000} + \frac{1}{1000} + \frac{1}{1000} + \frac{1}{1000} + \frac{1}{10000} + \frac{1}{10000000000000000000000000000000000$	3800		- 0.02	Derivative fact.=		Derivative fact.=		
Results Results O_{2}^{n} (m^{2}/s) = 5.8E-08 Log-Log plot incl. derivates- flow period T_{M} (m^{2}/s) = 6.0E-08 Flow regime: transient Flow regime: transient T_{M} (m^{2}/s) = 7.5E-08 T_{M} (m^{2}/s) = 7.5E-08 T_{M} (m^{2}/s) = 7.5E-08 T_{M} (m^{2}/s) = 7.5E-08 T_{M} (m^{2}/s) = 7.5E-10 $S_{1}(2)$ = 1.0E-08 $S_{1}(1m)$ = 1.000 dt; (min) = 1.2.00 T_{0}^{2}/s^{2} = 7.5E-06 $S_{1}(2)$ = 1.0E-06 $S_{1}(2)$ = 1.0E-08 $S_{1}(1m)$ = 1.000 dt; (min) = 1.2.00 $T_{0}/s^{2}/s$ = 7.5E-10 $S_{1}(2)$ = 1.0E-08 $S_{1}(1m)$ = 1.0E-08 T_{0}/s^{2} = 7.5E-08 $S_{0}(2)$ = 1.0E-08 $T_{1}/s^{2}/s^{2}$ = 7.5E-08 $S_{0}(1m)$ = 1.0E-08 $S_{1}($			0.01					
Results Results Oys Results Q/s (m ² /s)= 5.8E-08 Log-Log plot incl. derivates- flow period Tum (m ² /s)= 6.0E-08 Transient Image: transient of the second	3500		0.00					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0.00 0.20 0.40 0.60 0.80 Elaps	1.00 1.20 1.40 1.60 1 red Time [h]	.80	Results		Results		
Log-Log plot incl. derivates- flow period $T_{M}(m^{2}_{N}) = 6.0E-08$ Flow regime: transient Flow regime: transient $T_{M}(m^{2}_{N}) = 7.5E-08$ Flow regime: transient Flow regime: transient $T_{M}(m^{2}_{N}) = 7.5E-08$ T $(m^{2}_{N}) = 1.52E-07$ S $(\cdot) = 1.0E-06$ S $(\cdot) = 1.00E-06$ S $(\cdot) = 1.00E-06$ S $(\cdot) = 1.0E-06$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 1.0E-08$ S $(\cdot) = 0.0E-01$ T $C_{D}(\cdot) = \#NV$ C $(m^{2}/Pa) = 9.60E-11$ C (-2) C (-2) S				Q/s (m^{2}/s)=	5.8E-08			
Flow regime: transient flow regime: transient transient $f(m) = 1.00$ dt; $(m) = 1.00$ dt;	Log-Log plot incl. derivates- f	low period		T _м (m²/s)=	6.0E-08			
$\frac{1}{1000} = \frac{1}{1000} \frac{1}{1000} \frac{1}{1000} \frac{1}{1000} \frac{1}{1000} \frac{1}{1000} \frac{1}{1000} \frac{1}{1000} \frac{1}{1000} \frac{1}{1000} \frac{1}{1000} \frac{1}{1000} \frac{1}{100000} \frac{1}{100000} \frac{1}{100000} \frac{1}{1000000} \frac{1}{100000000} \frac{1}{10000000000000000000000000000000000$				Flow regime:	transient	Flow regime:	transient	
$d_{2}(min) = 18.00 dt_{2}(min) = 12.00$ $T_{(m^{2}/s)} = 7.5E-08 T_{(m^{2}/s)} = 1.52E-07$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.0E-08 S_{(1)} = 1.02E-08$ $S_{(1)} = 1.02E-08 S_{(1)} = 1.02E-08$ $S_{(1)} $	10 ⁻³ Elapsed time	[h]		dt ₁ (min) =	1.00	dt ₁ (min) =	1.00	
$T(m^{2}/s) = 7.5E-08 T(m^{2}/s) = 1.52E-07$ $S(\cdot) = 1.0E-06 S(\cdot) = 1.00E-06$ $S_{0}(1/m) = 1.0E-08 S_{0}(1/m) = 1.00E-08$ $S_{0}(1/m) = 1.0E-08 S_{0}(1/m) = 1.00E-08$ $S_{0}(1/m) = 1.0E-08 S_{0}(1/m) = 1.00E-08$ $C_{0}(m^{2}/Pa) = \#NV C_{0}(\cdot) = 1.06E-02$ $C_{0}(\cdot) = \#NV C_{0}(\cdot) = 9.19$ $T_{GRF}(m^{2}/s) = T_{GRF}(m^{2}/s)	10 2 SKB Asyros / KAV04A 365.33 - 385.33 / CHi	FlowDim Version 2.1 (c) Golder Associates	4b	dt ₂ (min) =	18.00	dt ₂ (min) =	12.00	
$\frac{1}{2} = \frac{1.0E-06}{k_s} \frac{S(\cdot)}{s} = \frac{1.0E-08}{k_s} \frac{S(\cdot)}{s} = 1.$		ŧ	10 2	T (m²/s) =	7.5E-08	T (m²/s) =	1.52E-07	
$\frac{1}{2} = \frac{1}$	10 13	1		S (-) =	1.0E-06	S (-) =	1.00E-06	
$\int_{C_{T}} \int_{C$	· · · · · · · · · · · · · · · · · · ·	1 	10 1	K _s (m/s) =	7.5E-10	$K_s (m/s) =$	1.52E-09	
$\int_{C_{C}} \frac{1}{2} \int_{C_{C}} $	· · ·			S _s (1/m) =	1.0E-08	S _s (1/m) =	1.00E-08	
$\frac{1}{1000} = \frac{1}{1000} + \frac{1}{1000} + \frac{1}{1000} + \frac{1}{10000} + \frac{1}{10000000000000000000000000000000000$	10 [°] • •	 	(friin)	C (m ³ /Pa) =	#NV	$C (m^3/Pa) =$	9.60E-11	
$\int_{COMMENTS} \int_{COMMENTS}			10 0 101	$C_{\rm D}(-) =$	#NV	$C_{\rm D}(-) =$	1.06E-02	
$\frac{1}{10^{-1}}$ $\frac{1}{10^{-1}$	10 -1			٤ (-) =	0	٤ (-) =	9.19	
$T_{GRF}(m^2/s) = T_{GRF}(m^2/s) = T_{GRF}(m^2/s) = T_{GRF}(m^2/s) = T_{GRF}(m^2/s) = T_{GRF}(m^2/s) = T_{GRF}(n^2/s) = T_{G$			10 -1	()		· · · ·		
$\frac{1}{10000000000000000000000000000000000$				$T_{m^{2}/2}$		$T_{m}(m^{2}/c) =$		
$\frac{\operatorname{Grift}(\cdot) - \operatorname{I}_{\operatorname{GRF}}(\cdot) = \operatorname{D_{\operatorname{GRF}}}($	10 ² 10 ¹	10 ⁴	10 5	$S_{ORF}(1175) =$		$S_{ORF}(117) =$		
Log-Log plot incl. derivatives- recovery period $\frac{1}{2} \int_{0}^{1} \int_{0}^{$				$D_{GRF}() =$		$D_{GRF}()$ =		
believed using plot her. derivatives recovery period $d_1 (\min) = \frac{1}{18} C_D (\cdot) = \frac{9.60E-11}{1.0E-02}$ $T_T (m^2/s) = \frac{7.5E-08}{5} (\cdot) = \frac{9.19}{5}$ $Comments:$ 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	Log-Log plot incl. derivatives	recovery period		Selected represe			_	
$\frac{1}{10^{-1}} \frac{1}{10^{-1}} $	Log-Log plot men derivatives	recovery period		dt (min) -			0.60E 11	
$\frac{10^{-1}}{10^{-1}}$ $\frac{10^{-1}}{10^{-1}}$				$dt_1(min) =$	10	C (m [*] /Pa) =	9.00E-11	
$T_{T} (m^{2}/s) = 7.5E-08\xi(-) = 9.19$ $S(-) = 1.0E-06$ $K_{s} (m/s) = 7.5E-10$ $S_{s} (1/m) = 1.0E-08$ $S_{s} (1/m) = 1.0E-08$ $Comments:$ 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	Elapsed time (h)	²		$dl_2(mn) =$		$C_{\rm D}(-) =$	1.06E-02	
$S(-) = 1.0E-06$ $K_{s} (m/s) = 7.5E-10$ $S_{s} (1/m) = 1.0E-08$ $Comments:$ 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	SKB Aevroo / KAV04A 365.33 - 385.33 / CHir	FlowDim Version 2.14b (c) Golder Associates	10	T _⊤ (m ⁻ /s) =	7.5E-08	ζ(-) =	9.19	
$K_{s} (m/s) = 7.5E-10$ $S_{s} (1/m) = 1.0E-08$ 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			300	S (-) =	1.0E-06			
$S_s (1/m) = 1.0E-08$ 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				$K_s (m/s) =$	7.5E-10			
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	10 1 A A A A A A A A A A A A A A A A A A		10 2	$S_s(1/m) =$	1.0E-08	l		
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		<u>ج</u>	(head	Comments:				
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		2 ⁴	3 500 (b b b)	The recommended t	transmissivity of	7.5E-8 m2/s was de	erived from the	
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	10 0	***	10 ¹	analysis of the CHi	phase, which di	splayed the clearest	derivative	
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		• • • •		estimated to be 3.0F	E-8 to $3.0E-7$ m ²	2/s (this range encor	npasses the skin	
dimension displayed during the test is 2. The static pressure measured at transducer depth, was derived from the CHir phase using straight			3	effect and the transp	nissivity derived	I from the CHir pha	se). The flow	
at transducer depth, was derived from the CHir phase using straight		10 ⁻² 10 ⁻² 10 ⁻⁴		dimension displayed	d during the test	is 2. The static pres	sure measured	
	in co			at transducer depth,	was derived fro	m the CHir phase u	sing straight	

Project: Oskarshamn site investigation Test type:[1] Area: Ävrö Test no: Borehole ID: KAV04A Test start: Test section from - to (m): 385.33-405.33 m Responsible for test execution: Desting diameters 0 m (m): 0.070 Responsible for test execution:	Reinde	Chir 1 040806 13:56 r van der Wall
Area: Ävrö Test no: Borehole ID: KAV04A Test start: Test section from - to (m): 385.33-405.33 m Responsible for test execution: Desting diameters 0 m (m): 0.070 Responsible for test execution:	Reinde	1 040806 13:56 r van der Wall
Borehole ID: KAV04A Test start: Test section from - to (m): 385.33-405.33 m Responsible for test execution: Desting diameters 0 m (m): 0.070 Responsible for test execution:	Reinde	040806 13:56 r van der Wall
Test section from - to (m): 385.33-405.33 m Responsible for test execution:	Reinde	r van der Wall
Section diameter, 2-r _w (m): 0.076 Responsible for		C. Enachescu
Linear plot Q and p Flow period R	Recovery period	
Indata	ndata	
⁴³⁰⁰ KAV04A_385.33-005.33_040806_1_CHir_Q_r p ₀ (kPa) = 3993		
p _i (kPa) = 3994		
 P section P section pp(kPa) = 4194 p 	_F (kPa) =	3998
$Q_{n} (m^{3}/s) = 1.58E-05$		
$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	= (s) =	1200
4000 Sel S [*] (-)= 1.00E-06 S	S el S [*] (-)=	1.00E-06
د الله الله الله الله الله الله الله الل	()	
³⁸⁰⁰ Temp _w (gr C)= 13.02		
Derivative fact.=	Derivative fact.=	
0.2		
	Results	
Elapsed Time [h] Ω/c $(m^2/c) = 7.8F-0.7$		
Log-Log plot incl. derivates, flow period $T_{(m^2/p)} = 81F_{(m^2/p)}$		
$\frac{1}{M} (111/5) = \frac{1}{M} (1$	low regime.	transient
$dt_{\ell}(\min) = 100 dt$	t_{ℓ} (min) =	1.00
$\frac{1}{10^{2}} \frac{10^{4}}{10^{2$	$t_1(\min) =$	12.00
BRE Advice (KMORA (e) Golder Associates (e) Golder Associates (e) (e) Golder Associates (e)	$(m^2/c) =$	2.91E-06
r(m/s) = 1.02.007	(117) = 3(-1)	1.00E-06
^{10²} K (m/s) - 23E-08K	() =	2.91E-08
S (1/m) - 10E-08S	(1/m) =	1.00E-08
$G_{\rm S}(1,1,1) = 1.02000$	(m^{3}/D_{c})	1.00E 00
$\int \frac{1}{2} \int $	$G_{(m)}(m) = G_{(m)}(m)$	1.00E 10
	() -	1.17E 02
	(-) –	1.402+01
$T_{GBE}(m^2/s) = T$	$_{GBF}(m^2/s) =$	
$S_{GRF}(-) = S$	$S_{GRF}(-) =$	
D _{GRF} (-) = D	O _{GRF} (-) =	
Log-Log plot incl. derivatives- recovery period Selected representative parame	ters.	
dt_1 (min) = 1 C	C (m ³ /Pa) =	1.06E-10
$dt_2 (min) = 12C$	$C_{\rm D}(-) =$	1.17E-02
$T_{T} (m^{2}/s) = 2.9E-06\xi$	(-) =	1.49E+01
∞ S(-) = 1.0E-06		
$K_{\rm s} ({\rm m/s}) = 2.9 {\rm E} \cdot 08$		
$S_{s}(1/m) = 1.0E-08$		
Comments:		<u>.</u>
The recommended transmissivity of 2 analysis of the CHir phase. The confid transmissivity is estimated to be 5.0E- encompasses the skin effect derived fi dimension displayed during the test is at transducer depth, was derived from line extrapolation in the Horner plot to	2.9E-6 m2/s was de dence range for the -7 to 4.0E-6 m2/s (rom the CHi analys s 2. The static press the CHir phase us o a value of 3997.7	rived from the interval this range sis). The flow sure measured ing straight 7 kPa.

	Test S	umn	nary Sheet				
Project:	Oskarshamn site investig	gation	Test type:[1]			Chir	
Area:		Ävrö	Test no:			1	
Borehole ID:	KA	V04A	Test start:		040806 16:4		
Test section from - to (m):	405.42-425.42 m		Responsible for		Reinder van der Wa		
Section diameter, 2·r _w (m):	0.076 F		Responsible for			C. Enachescu	
Linear plot Q and p			test evaluation:		Parcovary		
			Indata		Indete		
4500	(AV04A 405.42-425.42 040806 1 CHir Q r	1.0	n (kRo) –	4102	Inuala		
	P section	- 0.9	p ₀ (kFa) =	4193			
4400 -	P above ■ P above	- 0.8	р _і (кРа) =	4193	·· (I-D-)	1252	
	Q	0.7	р _р (кРа) =	4419	р _F (кРа) =	4252	
4300 -			$Q_p (m^3/s) =$	9.50E-07			
		• []/min] •	tp (s) =	1200	t _F (s) =	1200	
දී 4200 දී	•	+ 0.5 Hate	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06	
Downh		- 0.4 ^{09[u]}	EC _w (mS/m)=				
4100		- 0.3	Temp _w (gr C)=	13.3			
		0.2	Derivative fact.=		Derivative fact.=		
4000		- 0.1					
) 1.00 1.20 1.40	0.0	Results		Results		
Etapsed T	me [h]		Q/s (m ² /s)=	4.2E-08			
Log-Log plot incl. derivates- flo	w period		T_{M} (m ² /s)=	4.4E-08			
			Flow regime:	transient	Flow regime:	transient	
			dt₁ (min) =	1.00		1.00	
Elapsed time [h]	10, ⁻¹ 10, ⁰	7	dt_{0} (min) =	20.00	dt_{0} (min) =	16.00	
405.42 - 425.42 / CHi	(c) Golder Associates		$T_{m^{2}(n)}$	1 9F-08	$T_{m}^{2}(n)$	2 10E-08	
		-	S(-) = -	1.0E-06	$\Gamma(\Pi / S) = S(-) = -$	1.00E-06	
10 1		10 1	S(-) = K(m/o) = -	1.0E-00	S(-) = K(m/c) = -	1.00E-00	
· · · · · · · · · · · · · · · · · · ·	1	-	$R_{s}(11/s) = 0$	1.92-10	$R_{s}(11/s) = 0$	1.005.08	
• • • • • • • • • • • • • • • • • • •		10° E	$S_{s}(1/11) =$	1.0E-00	$S_{s}(1/11) =$	1.00E-00	
•		q. (1/d) (m	C (m°/Pa) =	#INV	C (m [°] /Pa) =	1.54E-10	
		. ~	$C_D(-) =$	#INV	$C_D(-) =$	1.70E-02	
10 -1		10 -1	ξ(-) =	-3.88E-02	ξ(-) =	-2.56E-01	
			T _{GBF} (m ² /s) =		T _{GRF} (m²/s) =		
10 [°] 10 [°] 1D	10 1 1	10 "	S _{GRF} (-) =		S _{GRF} (-) =		
			D _{GRF} (-) =		D _{GRF} (-) =		
Log-Log plot incl. derivatives- re	ecovery period		Selected represe	ntative paran	neters.		
			dt ₁ (min) =	1	C (m ³ /Pa) =	1.54E-10	
Elapsed time [h]			dt_2 (min) =	20	$C_{D}(-) =$	1.70E-02	
10 ² 10, 10, 10, 10, 10, 10, 10, 10, 10, 10,	10,"10,"		$T_{-}(m^{2}/s) =$	1.9E-08	ج () =	-3.88E-02	
	(c) GOODET PERSOCIATIES		S(-) =	1.0E-06	ר) –		
		300	С() К (m/s) —	1.0 = 00			
10 1		10 2	$R_{s}(11/3) =$	1.0E-08			
and the second se		-	Commonto:	1.0∟-00			
Q Q		8 8	The recommended	tronomiccivity	$f = 1 \text{ OF } 8 \text{ m}^{2/2} \text{ m}^{2}$	arized from the	
		pp0. (pr	analysis of the CHi	nhase, which is	consistent with the a	outer zone	
		10 1	transmissivity deriv	red from the CH	ir phase. The confid	ence range for	
			the interval transmi	ssivity is estimation	ted to be 1.0E-8 to 2	2.0E-7 m2/s	
		3	(this range encompa	asses the skin ef	fect derived from the	e CHi). The	
10 ⁰ 10 ¹	10 ² 10 ³ 10 ⁴		flow dimension disp	played during th	e test is 2. The static	c pressure	
			measured at transdu	icer depth, was o	terived from the CH	III phase using	

	Test Sur	nmary Sheet				
Project:	Oskarshamn site investigat	ion Test type:[1]			Pi	
Area:	Ä	vrö Test no:			1	
Borehole ID:	KAVO	4A Test start:			040807 10:06	
Test section from - to (m):	425.02-445.02	2 m Responsible for test execution:		Reinder van der Wall		
Section diameter, $2 \cdot r_w$ (m):	0.0	076 Responsible for test evaluation:			C. Enachescu	
Linear plot Q and p		Flow period		Recovery period		
4800 -	1.05	Indata		Indata		
	KAV04A_425.02-445.02_040807_1_Pi_Q_r	p ₀ (kPa) =	4374			
4700 -		p _i (kPa) =	4422			
	0.4	p _p (kPa) =	4692	p _F (kPa) =	4676	
4600 -	P section	$Q_{p} (m^{3}/s) =$	3.75E-05			
हि २ 4500 -	P below 0.3	ײַ tp (s) =	9.6	t _F (s) =	2400	
e Pressu	• 0.3	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06	
04400 0	- 0.2	EC _w (mS/m)=				
		Temp _w (gr C)=	13.64			
4300 -		Derivative fact.=		Derivative fact.=		
4200 -						
	- 0.1					
4100 0.20 0.40 0.60 0.80	1.00 1.20 1.40 1.60 1.80	Results		Results		
стор	aen unue fui	Q/s $(m^2/s)=$	1.4E-06			
Log-Log plot incl. derivates- f	low period	$T_M (m^2/s) =$	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 (m²/s) =	3.4E-11	T (m²/s) =	#NV	
		S (-) =	1.0E-06	S (-) =	#NV	
		$K_s (m/s) =$	3.4E-13	K _s (m/s) =	#NV	
Not A	nalvsed	$S_{s}(1/m) =$	1.0E-08	S _s (1/m) =	#NV	
	5	$C (m^3/Pa) =$	1.0E-10	C (m ³ /Pa) =	#NV	
		$C_{D}(-) =$	1.1E-02	$C_{D}(-) =$	#NV	
		ξ(-) =	-4.77E-02	ξ(-) =	#NV	
		$T_{GBE}(m^2/s) =$		$T_{GBE}(m^2/s) =$		
		$S_{GRF}(-) =$		$S_{GRF}(-) =$		
		$D_{GRF}(-) =$		$D_{GRF}(-) =$		
Log-Log plot incl. derivatives-	recovery period	Selected repres	entative paran	neters.		
		dt₁ (min) =	1	C (m ³ /Pa) =	1.00E-10	
Elapsed time	[h]	dt_2 (min) =	30	$C_D(-) =$	1.10E-02	
10 SKB Aevroe / KAV04A 425.02 - 445.02 / Pi	FlowDim Version 2.14b (c) Golder Associates	T_{T} (m ² /s) =	3.4E-11	ξ(-) =	-4.77E-02	
	AN A A A A A A A A A A A A A A A A A A	S (-) =	1.0E-06			
	* · · · · · · · · · · · · · · · · · · ·	$K_s (m/s) =$	3.4E-13			
10 °		S _s (1/m) =	1.0E-08			
		Comments:			•	
	0.3	The recommended	transmissivity of	f 3.4E-11 m2/s was o	derived from the	
10 -1		analysis of the PI p	bhase (inner zone	e), however, this value	e should be	
	10	regarded as valid o	only very close to	the borehole. The c	onfidence range	
	0.03	for the interval tran m^{2}/s (this range on	ismissivity is esti	imated to be 5.0E-13	vity as well)	
10 ⁻¹ 10 ⁻⁰	10 ¹ 10 ² 40 ²	The flow dimensio	n used in the ana	lysis is 2. The static	pressure	
	טר טו	measured at transd	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			C. Enachescu	
Linear plot Q and p		Flow period		Recovery period		
		Indata		Indata		
4900 KAV04A_445.02-465.02_040807_1_Pi_Q_r	0.50	p₀ (kPa) =	4573			
4990	- 0.45	p _i (kPa) =	4586			
4000 -	- 0.40	p _p (kPa) =	4843	p _F (kPa) =	4640	
4700 •	0.35	$Q_{p} (m^{3}/s) =$	3.40E-06			
[ed3]	0.30 Ę	tp(s) =	9.6	t _F (s) =	2400	
4600 -	- 0.25 H	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06	
ownhole		EC _w (mS/m)=				
4500 -	P above	Temp _w (gr C)=	13.9			
	0.15	Derivative fact.=		Derivative fact.=		
4400						
	- 0.05					
4300 4300 4300 4300 4300 4300 4300 4300	0.00 0.80 1.00 1.20 1.40 1.60	Results		Results	-	
Luga		Q/s (m²/s)=	1.3E-07			
Log-Log plot incl. derivates- fl	ow period	T _M (m²/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 (m²/s) =	4.8E-09	T (m²/s) =	#NV	
		S (-) =	1.0E-06	S (-) =	#NV	
		K _s (m/s) =	4.8E-11	K _s (m/s) =	#NV	
Not Ai	nalysed	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} (m²/s) =		T _{GRF} (m²/s) =		
		S _{GRF} (-) =		S _{GRF} (-) =		
		$D_{GRF}(-) =$		$D_{GRF}(-) =$		
Log-Log plot incl. derivatives-	recovery period	Selected represe	ntative param	ieters.		
		dt_1 (min) =	1	C (m ³ /Pa) =	1.30E-10	
Elapsed time (h	° [°] [°] [°]	dt_2 (min) =	24	C _D (-) =	1.50E-02	
SKB Aevroe / KAVD4A 445.02 - 465.02 / Pi	FlowDim Version 2.14b (c) Gelder Associates	$T_{T} (m^{2}/s) =$	4.8E-09	ξ(-) =	-2.35E-01	
	0.3	S (-) =	1.0E-06			
	Niger In	$K_s (m/s) =$	4.8E-11			
10	10 ⁻¹	$S_s(1/m) =$	1.0E-08			
	been and the second sec	Comments:				
×		The recommended t	ransmissivity of	4.8E-09 m2/s was o	lerived from the	
10 °	10 ⁻²	analysis of the PI pr	hase (inner zone), nowever, this valu	e should be	
		for the interval trans	smissivity is esti	mated to be 5.0E-11	to 5.0E-9 m2/s	
	0.003	(this range encompa	isses the inner z	one transmissivity as	s well). The	
10 0' 10 1	10 ² 10 ³ 10 ⁴	flow dimension used	d in the analysis	is 2. The static pres	sure measured	
ю 		at transducer depth	could not be ext	rapolated.		



	Test	Sumn	nary Sheet				
Project:	Oskarshamn site invest	tigation	Test type:[1]			Chir	
Area:		Ävrö	Test no:			1	
Borehole ID:	К	KAV04A			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			C. Enachescu	
Linear plot Q and p			Flow period		Recovery period		
			Indata		Indata		
5500	KAV04A_485.43-505.43_040807_1_CHir_Q_r	- 8.0	p ₀ (kPa) =	4977			
5400 -		- 70	p _i (kPa) =	4970			
5300 -	P section Pshyse	- 7.0	p _p (kPa) =	5169	p _F (kPa) =	4974	
5200	P below	- 6.0	Q_{r} (m ³ /s)=	6.93E-05	,		
[Page 1		- 5.0 ਵ	$\frac{dp}{dp} (m / c)^{\perp} =$	2400	t⊧(s) =	2400	
5 5100 ·		Rate []/m	S el S [*] (-)-	1.00E-06	S el S [*] (-)-	1.00E-06	
		- 4.0 ulection	FC (mS/m)=		5 ei 5 (-)-		
<u>4900 -</u>		- 3.0	Temp (ar C)-	14 58			
			Derivative fact -	14.50	Darivativa faat -		
4800		- 2.0	Denvalive laci.=		Derivative fact.=		
4700 -		- 1.0					
4600		0.0					
0.00 0.25 0.50 0.75 1.1 E	J0 1.25 1.50 1.75 2.00 Ilapsed Time [h]	2.25	Results		Results		
			$Q/s (m^2/s) =$	3.4E-06			
Log-Log plot incl. derivates-	flow period		T _M (m²/s)=	3.6E-06			
			Flow regime:	transient	Flow regime:	transient	
Elapsed 5	me [h]		dt ₁ (min) =	2.00	dt ₁ (min) =	1.00	
10 ² SKB Aevroe / KAV04A 485.43 - 505.43 / CHi	FlowDim Version 2.1/ (c) Golder Associater	4b 5	dt ₂ (min) =	30.00	dt ₂ (min) =	18.00	
		10 0	T (m²/s) =	9.4E-06	T (m²/s) =	9.43E-06	
10 ¹		-	S (-) =	1.0E-06	S (-) =	1.00E-06	
•		10 -1	$K_s (m/s) =$	9.4E-08	$K_s (m/s) =$	9.43E-08	
10 0	• 		S _s (1/m) =	1.0E-08	S _s (1/m) =	1.00E-08	
- (A40)		10 ⁻² [sque]	$C (m^{3}/Pa) =$	#NV	$C_{\rm m}^{\rm 3/Pa} =$	2.23E-09	
× 10 ⁻¹		1/q. (1/c	$C_{\rm D}(-) =$	#NV	$C_{\rm D}(-) =$	2.46E-01	
	•	10 -0	ε (-) =	0	۲) – E	3.05	
10 -2			5() -		5() -	0.00	
		10 -4	$T (m^2/c)$		$T (m^2/c)$		
10 ⁴ 10 ⁵	10 ⁶ 10 ⁷ ID	10 *	$I_{GRF}(ff1/S) =$		$I_{GRF}(m/s) =$		
			$D_{GRF}(r) =$		$D_{GRF}() =$		
Log-Log plot incl. dorivativo	s- rocovery period		PGRF (-) -	ntativo paraio			
			dt. (min) –				
			$ut_1(min) =$	2	C (m ⁻ /Pa) =	2.23E-09	
10 ² 10 ²	[0] 10, ⁻¹ 10, ⁰ 11	<u>"</u>	$dl_2(mn) =$	30	$C_{\rm D}(-) =$	2.46E-01	
SRB A0/00/ KAVUAA 485.43 - 505.43 / CHir	(c) Golder Associates		T _⊤ (m²/s) =	9.4E-06	ξ(-) =	3.05	
• •		300	S (-) =	1.0E-06			
		1	$K_s (m/s) =$	9.4E-08			
		10 2	S _s (1/m) =	1.0E-08			
		30	Comments:				
	. •	pb0 (bb0	The recommended t	ransmissivity of	f 9.4E-6 m2/s was de	rived from the	
10 °	e the second second second second second second second second second second second second second second second	10 1	analysis of the CHi	phase, because i	it shows the most cle	ar derivative	
	and the second s		estimated to be 2 OF	E-6 to 1 OF-5 m ²	10f the interval trans	es the skin	
		3	effect derived from	the CHi analysi	s). The flow dimensi	on displayed	
10 ¹ 10 ²	10 ⁻² 10 ⁻⁴ 10		during the test is 2.	The static press	ure measured at tran	sducer depth,	
1D			was derived from th	e CHir phase us	sing straight line extr	apolation in the	
			Horner plot to a val	ue of 4971.1 kP	a		

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			C. Enachescu		
Linear plot Q and p		Flow period		Recovery period			
	10	Indata		Indata			
KAV04A_505.43-525.43_040808_1_CHir_C	Lr Reartion	p ₀ (kPa) =	5173				
5350 •	▲ P sbove □ P below	p _i (kPa) =	5169				
5300 ·	• • • • • • • • • • • • • • • • • • •	p _p (kPa) =	5367	p _F (kPa) =	5169		
5250 -	• 0.7	$Q_{p} (m^{3}/s) =$	5.38E-06		i1		
§ 5200	- ^{0.0} - 2	tp(s) =	1200	t _F (s) =	1200		
§ 5150 -		S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06		
800 100 800 5100	ំចុំឆ្នំ 0.4	EC _w (mS/m)=		(/	i1		
5050		Temp _w (gr C)=	14.89				
5000		Derivative fact.=		Derivative fact.=			
4050							
4500							
4900 0.20 0.40 0.60 0.80 Elap	1.00 1.20 1.40 1.60 1.80 sed Time [h]	Results		Results			
		Q/s (m²/s)=	2.7E-07				
Log-Log plot incl. derivates- f	low period	T _M (m²/s)=	2.8E-07				
		Flow regime:	transient	Flow regime:	transient		
Elapsed time	[h]	dt ₁ (min) =	1.00	dt ₁ (min) =	0.50		
10 2 SKB Aevroe / KAV04A 505.43 - 525.43 / CHi	FlowDim Version 2.14b (c) Golder Associates	dt_2 (min) =	18.00	dt ₂ (min) =	1.00		
]	10 '	T (m²/s) =	5.2E-07	T (m²/s) =	6.21E-07		
		S (-) =	1.0E-06	S (-) =	1.00E-06		
	- 10 °	$K_s (m/s) =$	5.2E-09	$K_s (m/s) =$	6.21E-09		
	Sugar Ang	$S_{s}(1/m) =$	1.0E-08	$S_{s}(1/m) =$	1.00E-08		
vep. tik	10 ⁻¹	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	1.22E-10		
		C _D (-) =	#NV	$C_D(-) =$	1.34E-02		
10 -2	▲ 10 ²	ξ(-) =	0	ξ(-) =	7.12		
10 ^{°a} 10	10 ^{°°}	T _{GRF} (m ² /s) =		T _{GRF} (m²/s) =			
	-	S _{GRF} (-) =		S _{GRF} (-) =			
		D _{GRF} (-) =		D _{GRF} (-) =			
Log-Log plot incl. derivatives	- recovery period	Selected represe	ntative paran	neters.			
		dt₁ (min) =	1	C (m ³ /Pa) =	1.22E-10		
Elapsed time	[h] 10, ⁻² 10, ⁻¹	$dt_2 (min) =$	18	$C_D(-) =$	1.34E-02		
SKB Aevron / KAV04A 505.43 - 525.43 / CHir	FlowDim Version 2.14b 10 (c) Golder Associates	$T_T (m^2/s) =$	5.2E-07	ξ(-) =	7.12		
· .	,	S (-) =	1.0E-06				
10	10 2	$K_s (m/s) =$	5.2E-09				
		$S_s(1/m) =$	1.0E-08				
ч. ¹⁰	·	Comments:					
	•	The recommended t	transmissivity of	f 5.2E-7 m2/s was de	rived from the		
	· · · · · · · · · · · · · · · · · · ·	stabilization. The co	phase, because i	for the interval trans	smissivity is		
	10 ⁰	estimated to be 1.0	E-7 to 7.0E-7 m2	2/s (this range includ	les the skin		
		effect derived from	the CHi analysi	s). The flow dimension	on displayed		
10 [°] 10 ¹	10 ² 10 ² 10 ⁴	during the test is 2.	The static press	ure measured at tran	sducer depth,		
		was derived from the	e CHir phase us	sing straight line exti	apolation in the		



Test Summary Sheet						
Project:	Oskarshamn site investig	gation	Test type:[1]			Chir
Area:		Ävrö	Test no:			1
Borehole ID:	KA	V04A	Test start:			040808 14:04
Test section from - to (m):	545.43-565.	.43 m	Responsible for test execution:		Reinde	r van der Wall
Section diameter, $2 \cdot r_w$ (m):		0.076	Responsible for			C. Enachescu
Linear plot Q and p			Flow period		Recovery period	
5000		0.50	Indata		Indata	
2400	KAV04A_545.43-565.43_040808_1_CHir_Q_r	0.00	p ₀ (kPa) =	5572		
5800 -	Presting	- 0.45	p _i (kPa) =	5565		
	▲ P above ■ P below	0.40	p _p (kPa) =	5765	p _F (kPa) =	5567
5700		0.35	Q _p (m ³ /s)=	9.50E-07		
e 5600	····	0.30 [ui uj	tp (s) =	1200	t _F (s) =	1200
		0.25 uc	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06
5500 ·		Injecti 0.20	EC _w (mS/m)=			
5400		- 0.15	Temp _w (gr C)=	15.49		
		• 0.10	Derivative fact.=		Derivative fact.=	
5300 -		0.05				
5200 0.20 0.40 0.60	0.80 1.00 1.20 1.40 1.6	0.00 60	Results		Results	<u> </u>
Elaç	sed Time [h]		Q/s (m ² /s)=	4.7E-08		
Log-Log plot incl. derivates-	low period		T_{M} (m ² /s)=	4.9E-08		<u> </u>
	-		Flow regime:	transient	Flow regime:	transient
Elaosed tim	s [h]		dt_1 (min) =	1.00	dt_1 (min) =	1.00
10 ² SKB Agyrope / KAVO4A 545 43 - 595 43 / CHI	FlowDim Version 2.14b	1	dt_2 (min) =	18.00	dt_2 (min) =	10.00
	(c) doider Associates	10 2	$T(m^{2}/s) =$	3.6E-08	$T(m^{2}/s) =$	1.45E-07
10 ¹			S (-) =	1.0E-06	S (-) =	1.00E-06
		1	$K_s (m/s) =$	3.6E-10	$K_s (m/s) =$	1.45E-09
		10 1	$S_{s}(1/m) =$	1.0E-08	$S_{s}(1/m) =$	1.00E-08
10 °		g([minl]	$C (m^{3}/Pa) =$	#NV	$C (m^3/Pa) =$	5.43E-11
	Ann	10, 101	$C_{\rm D}(-) =$	#NV	$C_{\rm D}(-) =$	5.98E-03
10 -1			ξ(-) =	0	ξ(-) =	1.20E+01
	•					<u> </u>
l	· · ·		$T_{GBE}(m^2/s) =$		$T_{GRE}(m^2/s) =$	
10 10 10 10 10 10 10 10 10 10 10 10 10 1	10 " 10 " 10 tD) [*]	$S_{GRF}(-) =$		$S_{GRF}(-) =$	
			D _{GRF} (-) =		D _{GRF} (-) =	
Log-Log plot incl. derivatives	- recovery period		Selected represe	ntative paran	neters.	-
			dt ₁ (min) =	1	C (m ³ /Pa) =	5.43E-11
Elapsed time (h	• د. ^د . د.		dt ₂ (min) =	10	C _D (-) =	5.98E-03
10 2 SKB Aevroe / KAV04A 545.43 - 565.43 / CHir	FlowDim Version 2.14b		$T_T (m^2/s) =$	1.5E-07	ξ(-) =	1.20E+01
			S (-) =	1.0E-06		
	31	300	K _s (m/s) =	1.5E-09		
10 ¹	1	10 2	S _s (1/m) =	1.0E-08		
	At the second se	89 50 00 00 00 00 00 00 00 00 00 00 00 00	Comments: The recommended t analysis of the CHir stabilization. The co estimated to be 2.0F during the test is 2.	transmissivity of phase, because onfidence range E-8 to 2.0E-7 m2 The static press	E 1.5E-7 m2/s was do it shows the most cl for the interval trans 2/s. The flow dimensure measured at trans	erived from the lear derivative smissivity is sion displayed asducer depth,
10 [°] 10 [°] incer	10 ⁻² 10 ⁻² 10 ⁻²		was derived from th Horner plot to a val	e CHir phase us ue of 5566.2 kP	ing straight line extr a.	apolation in the

Test Summary Sheet						
Project:	Oskarshamn site investi	gation	Test type:[1]	Chir		
Area:		Ävrö	Test no:			1
Borehole ID:	KA	V04A	Test start:			040808 17:16
Test section from - to (m):	565.43-585	5.43 m	Responsible for test execution:		Reinde	r van der Wall
Section diameter, $2 \cdot r_w$ (m):		0.076	Responsible for			C. Enachescu
Linear plot Q and p			Flow period		Recovery period	
			Indata		Indata	
6050	KAV04A_565.43-585.43_040808_1_CHir_Q_r	1.4	p₀ (kPa) =	5770		
			p _i (kPa) =	5764		
5950 -	P section Pabove	- 1.2	p _p (kPa) =	5962	p _F (kPa) =	5766
5900 -		1.0	$Q_{r} (m^{3}/s) =$	1.04E-05	, ,	
- 5850	1	[nin	$\frac{dp(m/d)}{dp(s)} =$	1200	t _F (s) =	1200
5800		- 0.8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06
9 5750 ·		Injection	EC _w (mS/m)=			
6 5700 -			Temp _w (ar C)=	15.8		
5650 -		- 0.4	Derivative fact.=		Derivative fact.=	
5600 -		0.2				
5550 -						
5500 0.20 0.40 0.60	0.80 1.00 1.20 1.40	+ 0.0 1.60	Results		Results	
Eap	sea time (n)		Q/s (m²/s)=	5.2E-07		
Log-Log plot incl. derivates- f	low period		$T_{M}(m^{2}/s) =$	5.4E-07		
	•		Flow regime:	transient	Flow regime:	transient
			dt₁ (min) =	1.00	dt₁ (min) =	1.00
10 ¹	[h]		dt_2 (min) =	20.00	dt_2 (min) =	18.00
SKB Aevroa / KAVOAA 565.43 - 585.43 / CHI	FlowDim Version 2.14 (c) Golder Associates	10 °	$T(m^{2}/s) =$	5.5E-07	$T(m^{2}/s) =$	9.22E-07
			S (-) =	1.0E-06	S (-) =	1.00E-06
10 07		0.3	$K_{s}(m/s) =$	5.5E-09	K_{s} (m/s) =	9.22E-09
		1	$S_{s}(1/m) =$	1.0E-08	S _s (1/m) =	1.00E-08
		10 [[viju]	C (m ³ /Pa) –	#NV	C (m ³ /Pa) –	5.61E-10
^{\$}		0.03	$C_{\rm D}(-) =$	#NV	$C_{\rm D}(-) =$	6.18E-02
10 -1		Ī	$\xi(-) =$	-4.77E-02	ε(-) =	3.7
	• •	10 -2	5() -		5() -	
		0.003	$T_{GBE}(m^2/s) =$		$T_{GBE}(m^2/s) =$	
. 10 ^{°2} 10 ^{°3}	10 ⁴ 10 ⁵ 1D	10 6	$S_{GRF}(-) =$		$S_{GRF}(-) =$	
			$D_{GRF}(-) =$		$D_{GRF}(-) =$	
Log-Log plot incl. derivatives	- recovery period		Selected represe	ntative param	eters.	
			dt ₁ (min) =	1	C (m ³ /Pa) =	5.61E-10
Elapsed time (h)			dt_2 (min) =	18	$C_{\rm D}(-) =$	6.18E-02
10 °	FlowDim Version 2.14b		$T_{\tau} (m^2/s) =$	9.2E-07	ξ(-) =	3.7
565.43 - 585.43 / CHir	(c) Golder Associates	10 3	S (-) =	1.0E-06	5(7)	
		300	K _s (m/s) =	9.2E-09		
10 1			$S_{s}(1/m) =$	1.0E-08		
· · ····		10 2	Comments:			
H G		e.ani, (pd-d)	The recommended t	ransmissivity of	9.2E-7 m2/s was de	erived from the
analysis of the CHir phase, because it shows the most clear derivative					ear derivative	
			stabilization. The co	onfidence range	for the interval trans	smissivity is
	in more		estimated to be 4.0E	E-7 to 2.0E-6 m2	2/s (encompasses the	transmissivity
		3	value derived from	the CH1 phase).	I ne flow dimension	alsplayed
10 [°] 10 ¹ tD/CD	10 ⁻ 10 ⁴ 10 ⁴		was derived from th	e CHir phase us	ing straight line extr	apolation in the
1			Horner plot to a val	ue of 5761.8 kP	a.	1

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		Reinde	r van der Wall	
Section diameter, 2.r _w (m):	0.076	Responsible for			C. Enachescu	
Lincer plot O and p		test evaluation:		L. bebelanderid Brederic bebe		
Linear plot Q and p		Flow period		necovery period		
6200	KAV04A_585.43-605.43_040809_1_CHir_Q_r	Indala p. (kPa) –	5062	inuata		
6150 -		р ₀ (кга) =	5050			
6100 -	P section	$p_i (kPa) =$	5959	n (kDa)	5061	
6050 -		$p_p(\kappa Pa) =$	6164 2.45E.06	р _ғ (кра) =	5961	
£ 6000		$Q_p (m^{\circ}/s) =$	3.45E-06	t (a)	1200	
y] ann sea	at [Univ	(s) =	1.005.06	$l_F(S) =$	1.005.06	
9 2 2 5950 -	+ 0.3 æ	S el S (-)=	1.00E-06	S el S (-)=	1.00E-06	
a 5900 -		$EC_w (mS/m) =$	16.16			
5850 -	•	Temp _w (gr C)=	16.16			
5800 -	- 0.1	Derivative fact.=		Derivative fact.=		
5750						
5700	0.0	D		D		
0.00 0.20 0.40 0.80 Elaps	0.80 1.00 1.20 1.40 1.60 sd Time [ħ]	Results		Results		
		Q/s (m ² /s)=	1.7E-07			
Log-Log plot Incl. derivates- fi	ow period	T _M (m²/s)=	1.7E-07	- 1		
		Flow regime:	transient	Flow regime:	transient	
Elapsed time [N	$dt_1 (min) =$	1.00	$dt_1 (min) =$	1.00	
SKB Aevroe / KAVOLA 585.43 - 605.43 / CHi	FlowUm Version 2:140 (c) Gelder Associates	$dt_2 (min) =$	18.00	$dt_2 (min) =$	12.00	
	3	$T(m^2/s) =$	1.5E-07	T (m²/s) =	3.75E-07	
	- E10 °	S (-) =	1.0E-06	S (-) =	1.00E-06	
		$K_s (m/s) =$	1.5E-09	$K_s (m/s) =$	3.75E-09	
(db)	°3 ह	$S_s(1/m) =$	1.0E-08	$S_s(1/m) =$	1.00E-08	
		$C (m^3/Pa) =$	#NV	C (m ³ /Pa) =	5.63E-11	
10 -1	10-1 =	$C_D(-) =$	#NV	C _D (-) =	6.21E-03	
	0.03	ξ(-) =	0	ξ(-) =	2.48E-01	
	•					
10 ² 10 ⁴	10 ⁻²	T _{GRF} (m²/s) =		T _{GRF} (m²/s) =		
		S _{GRF} (-) =		S _{GRF} (-) =		
		$D_{GRF}(-) =$		D _{GRF} (-) =		
Log-Log plot incl. derivatives-	recovery period	Selected represe	ntative param	ieters.		
		dt ₁ (min) =	1	C (m ³ /Pa) =	5.63E-11	
	. 10 ^{,2}	dt_2 (min) =	12	C _D (-) =	6.21E-03	
10 ¹ SKB Aevroe / KAV04A 585.43 - 605.43 / CHir	FlowDim Version 2.14b (c) Golder Associates 300	$T_T (m^2/s) =$	3.8E-07	ξ(-) =	2.48E-01	
	10 ²	S (-) =	1.0E-06			
· · · ·		$K_s (m/s) =$	3.8E-09			
	30	S _s (1/m) =	1.0E-08			
		Comments:				
	7 (beco) [8	The recommended	ransmissivity of	3.8E-7 m2/s was de	rived from the	
10 -1	3	analysis of the CHin	phase, because	it shows the most cl	ear derivative	
		stabilization. The constitution of the stabilizatio	E-7 to 5 OF-7 m ²	for the interval trans	missivity is transmissivity	
	10 °	values derived from	the CHi phase	and skin effects). Th	e flow	
10.0 46.1	10 ² 10 ³ 10 ⁴	dimension displayed	d during the test	is 2. The static press	sure measured	
10 10 ED/CD	10 10	at transducer depth,	was derived fro	m the CHir phase us	ing straight	
		line extrapolation ir	the Horner plot	to a value of 5959.2	2 kPa.	

Test Summary Sheet					
Project:	Oskarshamn site investigation	Test type:[1]			Chir
Area:	Ävrö	o 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:		Reinde	r van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for			C. Enachescu
Linear plot Q and p		Flow period		Recovery period	
8000	- 07	Indata		Indata	
0400	KAV04A_605.57-625.57_040809_1_CHir_Q_r	p ₀ (kPa) =	6164		
6350 -	• P section	p _i (kPa) =	6159		
6300 -	P above	p _p (kPa) =	6352	p _F (kPa) =	6161
6250	• • • • • • • • • • • • • • • • • • •	$Q_{p} (m^{3}/s) =$	4.05E-06		
E 6200		tp(s) =	1200	t _F (s) =	1200
6150	n Rate [].	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06
800 6100 -		EC _w (mS/m)=			
- 6050 -		Temp _w (gr C)=	16.41		
6000 -	- 02	Derivative fact.=		Derivative fact.=	
5950	0.1				
5900 0.00 0.20 0.40 0.60	0.0 1.00 1.20 1.40 1.60	Results		Results	
Laps	su nime (nj	Q/s (m ² /s)=	2.1E-07		
Log-Log plot incl. derivates- fl	ow period	$T_{M} (m^{2}/s) =$	2.2E-07		
		Flow regime:	transient	Flow regime:	transient
- 4 - ع Elapsed time (h)		dt ₁ (min) =	1.00	dt ₁ (min) =	1.00
10 2 SKB Asvoca / KAVOLA SKB Asvoca / KAVOLA	FlowDim Version 2.14b	dt ₂ (min) =	18.00	dt ₂ (min) =	12.00
	(c) Golder Associates	T (m²/s) =	2.9E-07	T (m²/s) =	8.28E-07
	10 1	S (-) =	1.0E-06	S (-) =	1.00E-06
10 1		$K_s (m/s) =$	2.9E-09	K _s (m/s) =	8.28E-09
	• 3 	$S_{s}(1/m) =$	1.0E-08	S _s (1/m) =	1.00E-08
day) Dev	10 ° ([rui) br	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	8.02E-11
10 °	يتعمين ب	$C_{D}(-) =$	#NV	C _D (-) =	8.84E-03
	••••••••••••••••••••••••••••••••••••••	ξ(-) =	1.59	ξ(-) =	1.50E+01
	• • • • •				
10 ⁴ 10 ⁵	• • •	$T_{GRF}(m^2/s) =$		T _{GRF} (m²/s) =	
tD		S _{GRF} (-) =		S _{GRF} (-) =	
		$D_{GRF}(-) =$		D _{GRF} (-) =	
Log-Log plot incl. derivatives-	recovery period	Selected represe	ntative param	neters.	
		dt ₁ (min) =	1	C (m ³ /Pa) =	8.02E-11
		dt_2 (min) =	18	C _D (-) =	8.84E-03
10 ² SKB Aevroe / KAV04A 605.57 - 625.57 / CHir	FlowDim Version 2.14b (c) Golder Associates	$T_{T} (m^{2}/s) =$	2.9E-07	ξ(-) =	15
	300	S (-) =	1.0E-06		
		$K_s (m/s) =$	2.9E-09		
10 1		S _s (1/m) =	1.0E-08		
	· 30 E	Comments:			
		The recommended the	ransmissivity of	2.9E-7 m2/s was de	erived from the
10 *		analysis of the CHi I	ohase (inner zor	ne), because it shows	the most clear
	a a a a a a a a a a a a a a a a a a a	transmissivity is esti	on. The confide mated to be 8.0	Ence range for the 10 E-8 to 1.0 E-6 m ^{2/s}	The flow
		dimension displayed	during the test	is 2. The static press	sure measured
	10 [°]	at transducer depth,	was derived fro	m the CHir phase us	ing straight
DCD		line extrapolation in	the Horner plot	t to a value of 6158.	5 kPa.

Test Summary Sheet						
Project:	Oskarshamn site investigatio	n <u>Test type:[1]</u>	Chir			
Area:	Ävr	ö Test no:			1	
Borehole ID:	KAV04	A Test start:			040809 13:48	
Test section from - to (m):	625.57-645.57 r	n Responsible for test execution:		Reinde	er van der Wall	
Section diameter, 2.rw (m):	0.07	6 Responsible for			C. Enachescu	
Linear plot Q and p		Flow period		Recovery period		
		Indata		Indata		
6600	KAV04A_625.57-645.57_040809_1_CHir_Q_r	p ₀ (kPa) =	6365			
6550 •	P section 0.6	p _i (kPa) =	6361	r		
6500 -		p _p (kPa) =	6546	p _F (kPa) =	6367	
6450 -		$Q_{\rm p} ({\rm m}^3/{\rm s}) =$	4.80E-06	· · · ·	1	
§ 6400		tp(s) =	1200	t _F (s) =	1200	
e 6350		S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06	
8 6300 -		$EC_w (mS/m) =$		0 0 0 ()-		
enen		Temp _w (gr C)=	16.72			
6200 -	+ 02	Derivative fact.=		Derivative fact.=		
6150	0.1					
6100		Bosulte		Results		
EI	apsed Time [h]	$\Omega_{\rm lo} (m^2/c)$	2 5E-07	nesuits		
l og-l og plot incl. derivates-	flow period	Q/s (ff /s) =	2.3E 07			
Log-Log plot men derivates-		T _M (ff1 /S)=		Flow regime:	transient	
		dt_{ℓ} (min) -	1 00	dt. (min) –	1.00	
Elapsed tir	ne [n]	$dt_1 (min) =$	12.00	dt_{1} (min) =	12.00	
SKB Aavroe / KAVO4A 625.57 - 645.57 / Chi	(c) Golder Associates	$T_{1}(m^{2}/c) =$	2 6F-07	$T_{12}(m^{2}/c) =$	2 09E-07	
10 1	10 1	1 (11/s) =	1.0E-06	S(-) =	1.00E-06	
6 ° ° ° ° ° 60 80		6 () = K (m/s) =	2.6E-09	С() – К (m/s) –	2.09E-09	
10 °		$S_{s}(1/m) =$	1.0E-08	$S_{s}(1/m) =$	1.00E-08	
(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)		$C_{\rm s}(n) = 0$	#NV	$C_{s}(m^{3}/P_{0}) =$	8.69E-11	
10 ⁻¹	••••	$C(\Pi / Pa) = C_{D}(-) =$	#NV	$C(m/ra) = C_{D}(-) =$	9.58E-03	
	- 	ε ₍₋₎ =	-4.98E-03	ε(-) –	-1.12	
10 -2		5() -				
· · · · · · · · · · · · · · · · · · ·	10 ⁴	T _{GBF} (m ² /s) =		$T_{GBF}(m^2/s) =$		
10 10	10 10 10 1D	S _{GRF} (-) =		S _{GRF} (-) =		
		$D_{GRF}(-) =$		D _{GRF} (-) =		
Log-Log plot incl. derivatives	s- recovery period	Selected represe	entative paran	neters.		
		dt ₁ (min) =	1	C (m ³ /Pa) =	8.69E-11	
Elapsed time	۵(h) م	dt ₂ (min) =	12	C _D (-) =	9.58E-03	
10 SKB Aevroe / KAV04A 625.57 · 645.57 / Chir	FlowDim Version 2.14b (c) Golder Associates	$T_{T} (m^{2}/s) =$	2.1E-07	ξ(-) =	-1.12	
		S (-) =	1.0E-06			
···	10 -	$K_s (m/s) =$	2.1E-09	,		
10 *	30	$S_{s}(1/m) =$	1.0E-08			
۰. ·	and the second sec	Comments:				
<u>a</u>	10 '	The recommended	transmissivity of	f 2.1E-7 m2/s was de	erived from the	
10 -1	3	analysis of the CHi	r phase (inner zo	one). The confidence to be $1.0E_{7}$ to $5.0E_{7}$	range for the 7 m ² /c	
		(encompasses the tr	any is estimated	lues derived from th	- / 1112/8 e CHir phase	
	10 °	outer zone and CHi	phase). The flo	w dimension display	ed during the	
10 [°] 10 ¹		test is 2. The static	pressure measur	ed at transducer dep	th, was derived	
ີ ເ	ICD	from the CHir phas	e using straight	line extrapolation in	the Horner plot	
to a value of 6360.2 kPa.						

Test Summary Sheet						
Project:	Oskarshamn site investi	igation	Test type:[1]			Chir
Area:		Ävrö	Test no:			1
Borehole ID:	KA	KAV04A				040809 16:46
Test section from - to (m):	645.57-665	5.57 m	Responsible for test execution:		Reinde	er van der Wall
Section diameter, $2 \cdot r_w$ (m):		0.076	Responsible for			C. Enachescu
Linear plot Q and p			Flow period		Recovery period	[
		- 0.10	Indata		Indata	
	KAV04A_645.57-665.57_040809_1_CHir_Q_r		p ₀ (kPa) =	6565		
6800 -		+ 0.09	p _i (kPa) =	6562		
	P section	- 0.08	p _p (kPa) =	6818	p _F (kPa) =	6560
6700 -	P adove	- 0.07	$Q_{p} (m^{3}/s) =$	5.17E-07		
	, u	0.06 E	tp (s) =	1200	t _F (s) =	3600
		- 0.05 H	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06
	~v	ulectiv	EC _w (mS/m)=			
6500 -	h	- 0.03	Temp _w (gr C)=	17.05		
		- 0.02	Derivative fact.=		Derivative fact.=	
		- 0.01				
6300 0.25 0.50 0.75	1.00 1.25 1.50 1.75 2.00 2	0.00	Results		Results	<u> </u>
	Etapsed Filme (nj		Q/s (m²/s)=	2.0E-08		
Log-Log plot incl. derivates	- flow period		$T_M (m^2/s) =$	2.1E-08		
			Flow regime:	transient	Flow regime:	transient
Elapse	ad time [h]		dt ₁ (min) =	1.00	dt ₁ (min) =	1.00
10 2 SKB Aevroe / KAV04A	. 10, "	10	dt ₂ (min) =	18.00	dt ₂ (min) =	18.00
645.57 - 665.57 / C/li	(c) Golder Associates		T (m²/s) =	4.6E-08	T (m²/s) =	1.81E-08
10 *		10 2	S (-) =	1.0E-06	S (-) =	1.00E-06
	i	_	$K_s (m/s) =$	4.6E-10	K _s (m/s) =	1.81E-10
	•		$S_{s}(1/m) =$	1.0E-08	S _s (1/m) =	1.00E-08
10 ¹⁰	•	10 [kuju], (tr	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	4.59E-11
		1/st (1	$C_{D}(-) =$	#NV	C _D (-) =	5.06E-03
10 -1		10 0	ξ(-) =	0	ξ(-) =	4.82
1	······		T _{GBF} (m ² /s) =		T _{GBF} (m ² /s) =	
10 ' 10 "	10 " 10 " tD	10 "	$S_{GRF}(-) =$		$S_{GRF}(-) =$	
			D _{GRF} (-) =		D _{GRF} (-) =	
Log-Log plot incl. derivative	es- recovery period		Selected represe	ntative param	eters.	
			dt ₁ (min) =	1	C (m ³ /Pa) =	4.59E-11
Eapsed	time [h] 10, ⁻¹ 10, ⁰ 10,	:	dt_2 (min) =	18	$C_{D}(-) =$	5.06E-03
10 ¹ SKB Aevroe / KAV04A 645.57 - 665.57 / Chir	FlowDim Version 2.14b (c) Golder Associates	300	$T_{T}(m^{2}/s) =$	4.6E-08	ξ(-) =	0
			S (-) =	1.0E-06	5()	
2 the second second		10 2	$K_s(m/s) =$	4.6E-10		
10 °			$S_{s}(1/m) =$	1.0E-08		t
8	.\	30	Comments:			
ġ .	The recommended t	ransmissivity of	4.6E-8 m2/s was de	erived from the		
analysis of the CHi phase, because it shows the best derivative				rivative		
	2 · · · ·	3	stabilization. The co	onfidence range	for the interval trans	smissivity is
		10 °	estimated to be 1.0E	E-8 to 2.0E-7 m2	2/s (encompasses the	transmissivity
	10 ² 40 ³ ···	-	values derived from	the CHi phase i	nner zone and CHir	phase). The
טר 10 '	10 10 10 10		measured at transdu	cer depth. was c	lerived from the CH	ir phase using
			straight line extrapo	lation in the Ho	rner plot to a value	of 6559.4 kPa.

Test Summary Sheet							
Project:	Oskarshamn site investiga	ation	Test type:[1]			Chir	
Area:	Ä	Âvrö	Test no:		1		
Borehole ID:	KAV04A		Test start:		040810 09:01		
Test section from - to (m):	665.67-685.5	7 m	Responsible for test execution:		Reinde	er van der Wall	
Section diameter, $2 \cdot r_w$ (m):	0.	.076	Responsible for			C. Enachescu	
Linear plot Q and p			Flow period	Recovery period			
			Indata		Indata		
7100	KAV04A_665.57-685.57_040810_1_CHir_Q_r		p ₀ (kPa) =	6755			
7000			p _i (kPa) =	6755			
	P section Pabove		p _p (kPa) =	7000	p _F (kPa) =	6769	
- 6900 -	P below 0.40	10	$Q_{p} (m^{3}/s) =$	8.17E-07			
e (k ba)		[uin]	tp(s) =	1200	t _F (s) =	1200	
8 8 6800 8 6800	0.30	0 n Rate []/	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06	
low model		Injectio	$EC_w (mS/m) =$				
6700 -	- 0.20	10	Temp _w (gr C)=	17.42			
			Derivative fact.=		Derivative fact.=		
6600 -	- 0.10	0					
6500 0.20 0.40 0.60	0.80 1.00 1.20 1.40 1.60	10	Results		Results		
Elapso	d Time [h]		Q/s (m²/s)=	3.3E-08			
Log-Log plot incl. derivates- fl	ow period		$T_{\rm M} (m^2/s) =$	3.4E-08			
	·		Flow regime:	transient	Flow regime:	transient	
			dt₁ (min) =	1.00	dt₁ (min) =	1.00	
10 10 10 10 10 10 10 10 10 10 10 10 10 1	1 10,-1 10	0	dt_2 (min) =	18.00	dt_2 (min) =	18.00	
SKB Aavroe / KAV04A 665.57 - 685.57 / Chi	FlowDim Version 2.14b (c) Golder Associates		$T(m^{2}/s) =$	3.0E-08	$T_{m}^{2}(m^{2}/s) =$	5.88E-08	
5.5	10 2	o ¹	S(-) =	1.0E-06	S(-) =	1.00F-06	
10 [°]	فميتينينسينددد		$K_{a}(m/s) =$	3.0F-10	$K_{a}(m/s) =$	5.88E-10	
			$S_{s}(1/m) =$	1.0E-08	$S_{s}(1/m) =$	1.00E-08	
10401) °C	-	o° [viii	$C_{s}(m^{3}/D_{2})$	#NV	$C_{s}(1,11) = C_{s}(1,11)$	4.02E-11	
		141) 141	$C_{(III / Fa)} =$	#NV	$C(III/Fa) = C_{r}(-) = -$	4 43E-03	
10 ``	0.	.3	دن ٤(ـ) –	-5 80E-01	ε ₍₋₎ =	2 72	
	10	o ⁻¹	ς(⁻) –	0.002 01	ς(⁻) –	<i>L.1 L</i>	
			$T_{CDF}(m^2/s) =$		$T_{cpr}(m^2/s) =$		
10 [°] 10 [°] 10	10 ⁻² 10 ⁻⁴ 10 ⁻⁵		$S_{GBF}(-) =$		$S_{GBF}(-) =$		
			$D_{GBF}(-) =$		$D_{GBF}(-) =$		
Log-Log plot incl. derivatives-	recovery period		Selected represe	ntative param	neters.		
			dt₁ (min) =	1	C (m ³ /Pa) –	4.02E-11	
Elapsed time [h]			dt_2 (min) =	18	$C_{D}(-) =$	4.43E-03	
10 2 SKB Adviros / KAV04A	FlowDim Version 2.14b		$T_{-}(m^{2}/c) =$	5.9E-08	ε (-) =	2.72	
665.57 - 685.57 / CHir	(c) ====================================		S(-) =	1.0E-06	5() -		
-			$K_{a}(m/s) =$	5.9E-10			
10 '	300		$S_{s}(1/m) =$	1.0E-08			
	The recommended transmissivity of 5 9F-8 m ² /s was derived from the						
10 ⁻¹	30	- Odd	analysis of the CHir	phase (inner zo	one). The confidence	range for the	
<u> </u>	and the second s		interval transmissivi	ty is estimated t	to be 1.0E-8 to 6.0E	-8 m2/s	
	10		(encompasses the tra	ansmissivity val	ues derived from the	CHir phase	
			outer zone and CHi	phase). The flow	w dimension display	ed during the	
10 ⁻ 10 ⁻ 10 ⁻ 1D/CD	່ານ 10 ⁻ 10 ⁴		from the CHir phase	using straight 1	ine extrapolation in	the Horner plot	
			to a value of 6745.9	kPa.		and Homer plot	
	Test Sumr	narv Sheet					
--	---	---	-------------------------------------	------------------------------------	-------------------		
Project: Oskarsham	n 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		Reinde	er van der Wall		
Section diameter, 2·r _w (m):	0.076	Responsible for			C. Enachescu		
····· · · · · · · · · · · · · · · · ·		test evaluation:					
Linear plot Q and p		Flow period		Recovery period	1		
7200	2.5	Indata		Indata	_		
7150 -	40810_1_CHIP_Q_F	p ₀ (kPa) =	6964				
7100 -	- 2.0	p _i (kPa) =	6963				
7050		p _p (kPa) =	7163	p _F (kPa) =	6963		
		Q _p (m³/s)=	2.23E-05				
	+ 1.5 E	tp (s) =	1200	t _F (s) =	1200		
800	otion Rat	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06		
8 6500 ·	● P section = 1.0 = ▲ P above	EC _w (mS/m)=					
6850 -	P below	Temp _w (gr C)=	17.68				
6800 -	- 0.5	Derivative fact.=		Derivative fact.=			
6750							
6700 0.20 0.40 0.60 0.80 1.00 1.	20 1.40 1.60	Results		Results			
Elapsed Time [h]		Ω/c (m ² /c)-	1.1E-06				
Log-Log plot incl. derivates- flow period		U/3 (11/3) = T (m ² /s) =	1.1E-06		╂────┤		
		Flow regime:	transient	Flow regime:	transient		
		dt₁ (min) =	1.00	dt₁ (min) =	1.00		
Elipped time [h]		dt_2 (min) =	12.00	dt_2 (min) =	18.00		
685.57 / 705.57 / Chi	(c) Golder Associates	$T(m^{2}/s) =$	1.2E-06	$T(m^{2}/s) -$	3.02E-06		
	0.3	S (-) =	1.0E-06	S (-) =	1.00E-06		
	F1	$K_{s}(m/s) =$	1.2E-08	K _s (m/s) =	3.02E-08		
	10	$S_{s}(1/m) =$	1.0E-08	$S_{s}(1/m) =$	1.00E-08		
104901 Y	0.03	$C_{\rm m}^{\rm 3/Pa} =$	#NV	$C_{\rm c}$ (m ³ /Pa) –	3.74E-10		
1442	164 ¹ , 164	$C_{D}(-) =$	#NV	$C_{D}(-) =$	4.12E-02		
10	10 -2	<u> ٤ (-)</u> =	-1.49	ξ(-) =	6.55		
	0.003	5 ()		5()	<u>+</u>		
		$T_{cpc}(m^2/s) =$		$T_{CDF}(m^2/s) =$	<u>+</u>		
10 ⁻³ 10 ⁻⁴ 10 ⁻⁵	10 10 7	$S_{GRF}(-) =$		$S_{GRF}(-) =$	<u>+</u>		
		$D_{GBF}(-) =$		$D_{GBF}(-) =$			
Log-Log plot incl. derivatives- recovery per	iod	Selected represe	entative paran	neters.			
		dt ₁ (min) =	1	$C (m^3/Pa) =$	3.74E-10		
Elassed time thi		dt_2 (min) =	18	$C_{D}(-) =$	4.12E-02		
10 ² 5KB Aevroc / KAVD4A	10 ⁻¹ FlowDim Version 2.14b	T⊤ (m²/s) =	3.0E-06	ξ(-) =	6.55		
685.57 - 705.57 / Chi	(c) Golder Associates	S (-) =	1.0E-06				
	300	K _s (m/s) =	3.0E-08				
10 1		S _s (1/m) =	1.0E-08				
	10	Comments:					
ਸ਼ੁੱਚ ਦ	30 94	The recommended	transmissivity of	f 3.0E-6 m2/s was d	erived from the		
10.0	boo.4	analysis of the CHi	r phase, because	it shows the best de	erivative		
· · · · · · · · · · · · · · · · · · ·	10 1	stabilization. The co	onfidence range	for the interval tran	smissivity is		
	3	estimated to be 1.01	E-0 to 4.0E-6 m The static press	2/s. The flow dimen	sion aisplayed		
	n ² 40 ⁴	was derived from th	e CHir phase us	sing straight line ext	rapolation in the		
		Horner plot to a val	ue of 6953.6 kP	a.			

	Test S	umn	nary Sheet			
Project:	Oskarshamn site investig	gation	Test type:[1]			Chir
Area:		Ävrö	Test no:			1
Borehole ID:	KA	V04A	Test start:			040810 13:15
Test section from - to (m):	698.07-718	.07 m	Responsible for test execution:		Reinde	er van der Wall
Section diameter, 2.r _w (m):		0.076	Responsible for			C. Enachescu
Linear plot Q and p			test evaluation:		Becovery period	
			Indata		Indata	
		30	no (kPa) –	7081	muata	
KKY044_030.07-710.07_040010_1_011			p ₀ (kPa) =	7081		
7300 -	P section P shows	- 25	p _i (kPa) =	7082	n_ (kPa) _	7082
			$p_p(\mathbf{k} \in \mathbf{a}) =$	2 18E 04	р _F (кга) –	7083
7200 ·		- 20	$Q_p (m^2/s) =$	2.18E-04	t (o) -	1200
		ate []/min	(p(s)) =	1.00E.06	$l_F(S) =$	1 00E 06
2 7100 9		ection B 15 -	SelS (-)= EC (mS/m)-	1.00E-06	S el S (-)=	1.00E-06
2000		<u>ح</u> 10	$EC_w (IIIS/III) =$	17.96		
			Temp _w (gr C)=	17.80	Devisionational facet	
6900 -		- 5	Derivative fact.=		Derivative fact.=	
6800	0.80 1.00 1.20 1.40 1	0 1.60	Results		Results	
Esap	eu rinie (nj		Q/s (m²/s)=	1.1E-05		
Log-Log plot incl. derivates- fl	ow period		$T_{M} (m^{2}/s) =$	1.1E-05		
			Flow regime:	transient	Flow regime:	transient
Flanced time th	1		dt₁ (min) =	1.00	dt ₁ (min) =	1.00
10 ⁻² SKB Asyroe / KAV04A	2	7	dt_2 (min) =	18.00	dt_2 (min) =	12.00
698.07 - 718.07 / Chi	(c) Golder Associates	-	$T(m^{2}/s) =$	2.3E-05	$T(m^{2}/s) =$	3.85E-05
		10 -1	S (-) =	1.0E-06	S (-) =	1.00E-06
10			$K_s (m/s) =$	2.3E-07	$K_s(m/s) =$	3.85E-07
·	~~. ·	-	$S_{s}(1/m) =$	1.0E-08	$S_{s}(1/m) =$	1.00E-08
10 °		10 ⁻² [[vujuu].	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	1.54E-08
		1/4	$C_{D}(-) =$	#NV	$C_{\rm D}(-) =$	1.70E+00
10 4	1	10 -3	۲) ع	0	ξ(-) =	1.24E+01
				-	5() -	
1	·····		T _{GBF} (m²/s) =		T _{GBF} (m ² /s) =	
10 ⁻ 10 ⁻ 10 ⁻	10 10 10		$S_{GRF}(-) =$		S _{GRF} (-) =	
			D _{GRF} (-) =		D _{GRF} (-) =	
Log-Log plot incl. derivatives-	recovery period		Selected represe	entative param	ieters.	
			dt ₁ (min) =	1	C (m ³ /Pa) =	1.54E-08
Elapsed time (h)	d d O		dt_2 (min) =	18	$C_{\rm D}(-) =$	1.70E+00
10 ²	. 10,]	$T_{T}(m^{2}/s) =$	2.3E-05	ξ(-) =	0
dad.uv - r tuur r um		200	S (-) =	1.0E-06	517	
	AND THE REAL PROPERTY AND THE	300	$K_{c}(m/s) =$	2.3F-07		
10 ¹	•	10 2	$S_{c}(1/m) =$	1.0F-08		
	×		Comments:	,_ ,,		
		30 (%)	The recommended analysis of the CHi stabilization. The co estimated to be 1.01 during the test is 2. was derived from th	transmissivity of phase, because i onfidence range E-5 to 4.0E-5 m2 The static press the CHir phase us	2.3E-5 m2/s was d t shows the best den for the interval tran 2/s. The flow dimen are measured at tran ing straight line ext	erived from the rivative smissivity is sion displayed asducer depth, rapolation in the
tD/CD			Horner plot to a val	ue of 7083.3 kP	a.	

	Test Sumr	nary 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:		Reinde	er van der Wall
Section diameter, 2.r _w (m):	0.076	Responsible for			C. Enachescu
Linear plot Q and p		Flow period		Recovery period	
		Indata		Indata	
7500 KAV04A_711.07-731.07_040810_1_CH	ir_Q_r	p₀ (kPa) =	7212		
7450 -	- 18	p; (kPa) =	7212		
7400 -	16	$p_{\rm r}(kPa) =$	7424	p⊢(kPa) =	7213
7350 -	P section ▲ P above 14	$\rho_{\beta}(\mathbf{k}, \mathbf{u}) = 0$	2 24E-04	p _F (ki u) =	7215
æ 7300		$Q_p (m/s) =$	1200	t_ (c) _	1200
yy e ness	te [[min	(p(s)) =	1.00E.06	$l_F(S) =$	1.00E.06
2 7250 2 9	- 10 # 5	Sel S (-)=	1.00E-06	S el S (-)=	1.00E-06
§ 7200	- 8 ³ E	$EC_w (mS/m) =$	10.00		
7150 -	- 6	Temp _w (gr C)=	18.02		
7100 -	4	Derivative fact.=		Derivative fact.=	
7050	-2				
7000					
0.00 0.20 0.40 0.60 Eis	0.80 1.00 1.20 1.40 1.60 psed Time [h]	Results		Results	
		Q/s (m²/s)=	1.0E-05		
Log-Log plot incl. derivates-	flow period	T _M (m²/s)=	1.1E-05		
		Flow regime:	transient	Flow regime:	transient
		dt ₁ (min) =	1.00	dt ₁ (min) =	1.00
10 ¹ 5KB Aevroe / KAV04A	10, ⁻¹	dt_2 (min) =	3.00	dt ₂ (min) =	6.00
71.07-73.077Chi • • • • • • • • • • • • • • • •	(c) Golder Associates	$T(m^{2}/s) =$	1.3E-05	T (m²/s) =	3.95E-05
	0.03	S (-) =	1.0E-06	S (-) =	1.00E-06
10 0-1	10 ⁻²	$K_s(m/s) =$	1.3E-07	$K_s (m/s) =$	3.95E-07
	· · ·	$S_{s}(1/m) =$	1.0E-08	$S_{s}(1/m) =$	1.00E-08
(dev))	0.003	$C (m^{3}/P_{2}) =$	#NV	$C (m^{3}/P_{2}) =$	1.78E-08
141	14 14 14	$C_{\rm D}(-) =$	#NV	$C_{\rm D}(-) =$	1.96F+00
10 -1	•	ε _D () –	-4 98F-03	ε ₀ () –	1 23E+01
	3E-4	<u> </u>	4.002.00	S(-) –	1.202101
		$T_{opc}(m^2/s) =$		$T_{opc}(m^2/s) =$	
10 ⁴ 10 ⁶	10 ⁶ 10 ⁷ 10 ⁸	$S_{GBF}(-) =$		$S_{GBE}(-) =$	
		$D_{CRF}(-) =$		$D_{\text{GRF}}(-) =$	
Log-Log plot incl. derivatives	- recovery period	Selected represe	ntative param	eters.	
		dt₁ (min) =	1	$C(m^3/P_2) =$	1.78E-08
		dt_2 (min) =	6	$C_{\rm D}(-) =$	1.96F+00
Elapsed time [¹], 10, ² , 10, ⁻¹ , 10, ⁰	$T_{1}(m^{2}/c) =$	4 0F-05	ε ₍₋) –	1 23E+01
SKB Aevroa / KAV04A 711.07 - 731.07 / Chir	FlowDim Version 2.14b (c) Golder Associates	$S(x) = \frac{1}{2}$	1.0E-06	S (-) –	1.202101
	300	S() = K(m/a) = 0	1.0E 00		
		$R_{s}(11/s) =$	4.02-07		
10	×. ["	$S_s(1/11) =$	1.0E-06		
	30 2	Comments:		A OF 5	and the second
		The recommended in analysis of the CHit	ransmissivity of	4.0E-5 m2/s was de	better data
10 °	10 ¹	quality. The confide	ence range for th	e interval transmissi	ivity is
		estimated to be 8.0	E-6 to 8.0E-5 m2	2/s (the test results s	hould be
	3	regarded as relative	ly unreliable du	e to poor data qualit	y). The flow
10 [°] 10 ¹	10 ^{°2} 10 ^{°3} 10 ^{°4} 10 ^{°0}	dimension used in t	he analysis is 2.	The static pressure	measured at
tD/C	D	transducer depth, w	as derived from Horner plot to s	the CHir phase usin value of 7212 0 PP	g straight line

	Test	Sumn	nary Sheet			
Project:	Oskarshamn site inves	tigation	Test type:[1]			Chir
Area:		Ävrö	Test no:			1
Borehole ID:	К	AV04A	Test start:			040811 09:54
Test section from - to (m):	731.07-75	51.07 m	Responsible for		Reinde	r van der Wall
Section diameter, 2.rw (m):		0.076	Responsible for			C. Enachescu
Lineer plat Q and p			test evaluation:		L. Antoninininininininininini baha.	
Linear plot Q and p			Flow period		Recovery period	
7800	KAV04A_731.07-751.07_040811_1_CHir_Q_r	0.40	nuala n. (kPa) –	7405	Indata	
7700. II II f	[0.35	p ₀ (kl a) =	7403		
	P section P above		p _i (kPa) –	7400	n-(kPa) -	7407
7600 -	P below	+ 0.30	$p_p(R a) =$	2 50E 07	p _F (Ki a) =	7407
ā.		0.25	$Q_p (m^2/s) =$	2.30E-07	t_ (c) _	1200
2 7500 ·		ate []/mir	(p(s)) =	1.00E.06	$l_{\rm F}({\rm S}) =$	1.00E.06
8 E 7400		ection B	SelS (-)= EC (mS/m)-	1.00E-00	S el S (-)=	1.00E-00
Down	V V	0.15	EC _w (mS/m)=	10.21		
7300 -		0.10	Temp _w (gr C)=	18.31		
		0.10	Derivative fact.=		Derivative fact.=	
7200		0.05				
7100		0.00				
0.00 0.20 0.40 0.60 0.80 Elaps	1.00 1.20 1.40 1.60 ed Time [h]	1.80	Results		Results	
	 		Q/s (m²/s)=	9.7E-09		
Log-Log plot incl. derivates- f	low period		$T_M (m^2/s) =$	1.0E-08		
			Flow regime:	transient	Flow regime:	transient
19. ⁻⁴ 19. ⁻³ Elapsed time	[h]		dt ₁ (min) =	1.00	dt ₁ (min) =	1.00
10 ² SKB Asyroo / KAV04A 731.07 - 751.07 / Chi	FlowDim Version 2.1 (c) Golder Associate	14b ss 10 ⁻³	dt_2 (min) =	18.00	dt ₂ (min) =	12.00
			T (m²/s) =	1.0E-08	T (m²/s) =	1.57E-08
10 1	• *	-	S (-) =	1.0E-06	S (-) =	1.00E-06
and the second se		10 2	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
	نې بېلىدىمى يېر	10 Joyr	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	5.37E-11
		14(C _D (-) =	#NV	$C_D(-) =$	5.92E-03
10 -1			ξ(-) =	0	ξ(-) =	4.88
		10				
1			T _{GRF} (m²/s) =		T _{GRF} (m²/s) =	
10 [°] 10 [*]	10 " 10 " D	10 "	S _{GRF} (-) =		S _{GRF} (-) =	
			D _{GRF} (-) =		D _{GRF} (-) =	
Log-Log plot incl. derivatives-	· recovery period		Selected represe	ntative paran	ieters.	-
			dt ₁ (min) =	1	C (m ³ /Pa) =	5.37E-11
Elapsed time (h)			dt ₂ (min) =	18	$C_{D}(-) =$	5.92E-03
10 ² SKB Aavroe / KAV04A 731.07 - 751.07 / Chir	FlowDim Version 2.14b (c) Golder Associates		$T_T (m^2/s) =$	1.0E-08	ξ(-) =	0
		10 3	S (-) =	1.0E-06		
			K _s (m/s) =	1.0E-10		
10 '		300	$S_{s}(1/m) =$	1.0E-08		
B Stateman		10 ⁻²	Comments:			
		0. (byta) (k	The recommended t	transmissivity of	f 1.0E-8 m2/s was de	erived from the
10 *	the second second second second second second second second second second second second second second second s	30	analysis of the CHi	phase, which is	showing a derivative	e stabilization.
	· · · · · · · · · · · · · · · · · · ·	10 1	The confidence rang	ge for the interv	al transmissivity is e	stimated to be
			5.0E-9 to 5.0E-8 m2	2/s (encompasse	s the analysis results	s of the CHir
	10 ² 40 ² 40	3	phase and the skin e in the analysis is 2^{-1}	effect of the CHi	phase). The flow di	mension used
10 10 ED/CD	10 10		was derived from th	e CHir phase us	sing straight line extra	apolation in the
			Horner plot to a val	ue of 7402.2 kP	a.	-r oracion in the

	Test S	umn	nary Sheet			
Project:	Oskarshamn site investiç	gation	Test type:[1]			Chir
Area:		Ävrö	Test no:			1
Borehole ID:	KA	V04A	Test start:			040810 12:24
Test section from - to (m):	751.07-771	.07 m	Responsible for test execution:		Reinde	ər van der Wall
Section diameter, 2.rw (m):		0.076	Responsible for			C. Enachescu
Linear plot Q and p			Flow period		Recovery period	1
			Indata		Indata	
7900 KAV04A_751.07-771.07_040811_1_	CHir_Q_r	10	p ₀ (kPa) =	7605		
7800	P section	- 9	p _i (kPa) =	7603		
	P above P below	- 8	p _p (kPa) =	7801	p _F (kPa) =	7604
7700 -	• — •	- 7	$Q_{p} (m^{3}/s) =$	6.17E-05	,	
[[44	•	-6 [um	tp(s) =	1200	t _F (s) =	1200
7600		o Rate [//	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06
ow nhole		h Injection	$EC_w (mS/m) =$			
7500 -		1	Temp _w (gr C)=	18.63		
		- 2	Derivative fact.=		Derivative fact.=	
/400		- 1				
7300	0.75 1.00 1.25 ;	1.50	Results		Results	
	kaca rime [n]		Q/s (m²/s)=	3.1E-06		
Log-Log plot incl. derivates- f	low period		T _M (m ² /s)=	3.2E-06		
			Flow regime:	transient	Flow regime:	transient
Elapsed time	a [h]		dt ₁ (min) =	1.00	dt ₁ (min) =	1.00
10 ⁻² SKB Aevroe / KAVD4A	10, ⁻¹ 10, ⁰ FlowDim Version 2.14b	7	dt ₂ (min) =	18.00	dt ₂ (min) =	12.00
751.07 - 771.07 / Chi	(c) Golder Associates	10 0	T (m²/s) =	1.9E-06	$T (m^2/s) =$	1.18E-05
			S (-) =	1.0E-06	S (-) =	1.00E-06
10 1		0.3	$K_s (m/s) =$	1.9E-08	$K_s (m/s) =$	1.18E-07
6			S _s (1/m) =	1.0E-08	$S_{s}(1/m) =$	1.00E-08
(140).		10 [//////	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	7.81E-10
10 ⁰	A State of the sta	0.03	$C_{D}(-) =$	#NV	$C_{D}(-) =$	8.61E-02
		ŀ	ξ(-) =	0	ξ(-) =	1.39E+01
		10 -2				
		-	T _{GBF} (m ² /s) =		$T_{GBF}(m^2/s) =$	1
10 ⁴ 10 ⁵	10 ⁶ 10 ⁷ 11 tD	10 *****	S _{GRF} (-) =		S _{GRF} (-) =	
			D _{GRF} (-) =		$D_{GRF}(-) =$	
Log-Log plot incl. derivatives	 recovery period 		Selected represe	entative paran	neters.	
			dt ₁ (min) =	1	C (m ³ /Pa) =	7.81E-10
10 ⁻⁴ Elapsed time [h] 1.2 10. ⁻¹ 10.0		dt ₂ (min) =	18	C _D (-) =	8.61E-02
10 2 SKE Agroup / KAVDAA	FlowDim Version 2.14b (n) Golder Associates		$T_T (m^2/s) =$	1.9E-06	ξ(-) =	C
•		300	S (-) =	1.0E-06		
			K _s (m/s) =	1.9E-08		
10 1		10 2	S _s (1/m) =	1.0E-08		1
			Comments:	•		
• •		8 8 8	The recommended	transmissivity of	f 1.9E-6 m2/s was de	erived from the
10 *	-	10 ¹	analysis of the CHi	phase, which is	showing the best da	ta quality. The
	· · · · · · · · · · · ·		confidence range fo	or the interval tra	insmissivity is estim	ated to be 1.0E-
		3	to 2.0E-5 m2/s (er	ncompasses the	analysis results of the	e CHir phase
		10 °	analysis is 2. The st	atic pressure me	asured at transduce	r depth, was
10 [°] 10 [°] tD/C	10 ⁻ 10 [°] 10 ⁵		derived from the CI	Hir phase using	straight line extrapol	lation in the
			Horner plot to a val	ue of 7603.6 kP	'a.	



	Test Su	ımn	narv Sheet			
Project:	Oskarshamn site investiga	ation	Test type:[1]			Chir
Area:		Ävrö	Test no:			1
Borehole ID:	KAV	/04A	Test start:			040811 17:54
Test section from - to (m):	791.07-81	1.07	Responsible for		Reinde	er van der Wall
Section diameter. 2.r., (m):	0	.076	test execution: Responsible for			C. Enachescu
,, ,			test evaluation:			
Linear plot Q and p			Flow period		Recovery period	
8300	T:	2.0	Indata		Indata	
	KAV04A_791.07-811.07_040811_1_CHir_Q_r	1.8	p ₀ (kPa) =	8005		
8200 -	· · · · · · · · · · · · · · · · · · ·		p _i (kPa) =	8003		
	P section Pabove	1.6	p _p (kPa) =	8203	p _F (kPa) =	8003
8100 -	P below + 1	1.4	Q _p (m ³ /s)=	2.07E-05		
6 (K		1.2 <u>u</u>	tp (s) =	1200	t _F (s) =	1200
8 8000		1.0 LI Bate II	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06
ow nhole	+	Injection 8.0	$EC_w (mS/m) =$			
7900 -			Temp _w (ar C)=	19.26		
	+ (0.6	Derivative fact.=		Derivative fact.=	
7800	••••••••••••••••••••••••••••••••••	0.4				
	+ 0	0.2				
7700 .00 0.20 0.40 0.60 0	.80 1.00 1.20 1.40 1.60 1.80	0.0	Results		Results	<u> </u>
	Elapsed Time [h]		Ω/s (m ² /s)=	1.0E-06		
Log-Log plot incl. derivates	flow period		T_{11} (m ² /s)-	1.1F-06		
			Flow regime:	transient	Flow regime:	transient
			dt_{ℓ} (min) –	1.00	dt. (min) –	1.00
Elapsed	time [b] .10, ²	÷	$dt_1(min) =$	18.00	$dt_1 (min) =$	12.00
791.07 - 811.07 / Chi	FlowDim Version 2.14b (c) Golder Associates		$dt_2(((((((((((((((((((((((((((((((((((($	1 05 06	$dl_2(ff(n)) =$	2 795 06
		0.3	T (m ⁻ /s) =	1.2E-06	1 (m ⁻ /s) =	3.76E-00
			S (-) =	1.0E-06	S (-) =	1.00E-06
10 ⁰		10 -1	$K_s (m/s) =$	1.2E-08	$K_s (m/s) =$	3.78E-08
je .		1	$S_s(1/m) =$	1.0E-08	$S_s(1/m) =$	1.00E-08
		0.0 8.0	C (m ³ /Pa) =	#NV	C (m³/Pa) =	3.51E-10
10 1	· · · ·	10 -2	C _D (-) =	#NV	$C_D(-) =$	3.87E-02
	• • •		ξ(-) =	-4.98E-03	ξ(-) =	1.43E+01
		0.003	2		2	
10 ⁻² 10 ⁻⁴	10 ⁵ 10 ⁶ 10 ⁷		T _{GRF} (m ⁻ /s) =		T _{GRF} (m ⁻ /s) =	
			$S_{GRF}(-) =$		$S_{GRF}(-) =$	
			D _{GRF} (-) =		D _{GRF} (-) =	
Log-Log plot incl. derivative	es- recovery period		Selected represe	ntative paran	neters.	
			$dt_1 (min) =$	1	C (m ³ /Pa) =	3.51E-10
Elapsed in	ne [h]		$dt_2 (min) =$	12	$C_D(-) =$	3.87E-02
10 SKE Advitos / KAV04A 791.07 - 811.07 / Chir	FlowDim Version 2.14b (c) Golder Associates		$T_{T} (m^{2}/s) =$	3.8E-06	ξ(-) =	1.43E+01
	300	0	S (-) =	1.0E-06		
	•		$K_s (m/s) =$	3.8E-08		
10 1	10	2	$S_s(1/m) =$	1.0E-08		
8	•	[a]	Comments:	-		
ā ·	-	al (od-d)	The recommended t	transmissivity of	f 3.8E-6 m2/s was d	erived from the
10 °		, odd	analysis of the CHir	phase, which is	showing the best d	erivative
	······································		stabilization. The co	onfidence range	for the interval tran	smissivity is
	3		estimated to be 9.0E	E-7 to 5.0E-6 m2	2/s. The flow dimen	sion used in the
		•	analysis is 2. The st derived from the CL	atte pressure me	asured at transduce	action in the
10 ° 10 '	10 ² 10 ² 10 ⁴		Horner plot to a val	ue of 8003.3 kP	a.	

	Test Su	mn	nary Sheet			
Project:	Oskarshamn site investiga	tion	Test type:[1]			Chir
Area:	ļ į	Åvrö	Test no:			1
Borehole ID:	KAV	04A	Test start:			040812 09:04
Test section from - to (m):	800.81-820	0.81	Responsible for test execution:		Reinde	er van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.	076	Responsible for			C. Enachescu
Linear plot Q and p			Flow period		Recovery period	
8400	- 3	0	Indata		Indata	
	KAV04A_800.81-820.81_040812_1_CHir_Q_r		p ₀ (kPa) =	8101		
8300 -	- 23	5	p _i (kPa) =	8098		
	P section P above		p _p (kPa) =	8296	p _F (kPa) =	8098
8200 -		0	$Q_{p} (m^{3}/s) =$	3.33E-05		
le av		[uii	tp(s) =	1200	t _F (s) =	1200
8100		ate [/m	$P = \left(\frac{1}{2} \right)^*$	1.00F-06	$r \left(\frac{1}{2} \right)$	1.00E-06
P and		njection 1	Sei S (-)= FC (mS/m)=	1.001 00	Sei S (-)=	1.002.00
8 8000 -	- 1/	0	$Ze_{W}(\Pi C)$	19.42		
			Derivative fact	19.42	Darivativa faat	
7900	0.0	5	Derivative fact.=		Derivative fact.=	
7800 0.00 0.20 0.40 0.60	0.80 1.00 1.20 1.40 1.60	0	Results		Results	
Elap	sed Time [h]		O/s (m ² /s)-	1.6E-06		
Log-Log plot incl. derivates- f	low period		$T_{11} (m^2/s) =$	1.7E-06		
			Flow regime:	transient	Flow regime:	transient
			dt. (min) –	1 00	dt. (min) –	1 00
Elapsed time [h	¹		$dt_1(min) =$	10.00	dt ₁ (min) –	1.00
SKE Aevroe / KAV04A 800.81 - 820.81 / Chi • • • • • • • • • • • • • • • • • • •	FlowDim Version 2.14b (c) Golder Associates		$al_2(min) =$	12.00	$dl_2 (min) =$	6.00
	v.u •		T (m ⁻ /s) =	2.0E-06	T (m ⁻ /s) =	4.21E-06
	10 -1		S (-) =	1.0E-06	S (-) =	1.00E-06
10 0			K _s (m/s) =	2.0E-08	K _s (m/s) =	4.21E-08
è ·	0.03	5	$S_s(1/m) =$	1.0E-08	$S_s(1/m) =$	1.00E-08
100 100 100 100 100 100 100 100 100 100	10 4	(Nqf [min	C (m ³ /Pa) =	#NV	C (m ³ /Pa) =	9.92E-10
10 -1		p/t	C _D (-) =	#NV	C _D (-) =	1.09E-01
•	•	3	ξ(-) =	0	ξ(-) =	8.03
10 ⁹ 10 ⁴	10 ⁶ 10 ⁶ 10 ⁷		$T_{GRF}(m^2/s) =$		T _{GRF} (m²/s) =	
LI			S _{GRF} (-) =		S _{GRF} (-) =	
			$D_{GRF}(-) =$		D _{GRF} (-) =	
Log-Log plot incl. derivatives	- recovery period		Selected represe	ntative param	eters.	
			dt ₁ (min) =	1	C (m ³ /Pa) =	9.92E-10
Elapsed time (h)			dt_2 (min) =	6	$C_{\rm D}(-) =$	1.09E-01
10 ² SKB Aevroe / KAVD4A			$T_{-}(m^{2}/s) =$	4.2E-06	$\xi(-) =$	8.03
800.81 - 820.81 / Chir	(c) Golder Associates		S(-) =	1.0E-06	_	
	300		K (m/s) –	4.2E-08		
10	and a set of the set o		$R_{s}(11/3) = 0$	4.22-08		
	•		$S_{s}(1/11) =$	1.0E-00		
	•	beal.0	Comments:			
		p-p0. (p-p	The recommended t	ransmissivity of	4.2E-6 m2/s was do	erived from the
			analysis of the CHIr stabilization. The co	pliase, which is	for the interval tran	smissivity is
	· · · · · · ·		estimated to be 1.0E	E-6 to 6.0E-6 m2	2/s. The flow dimension	sion used in the
	3		analysis is 2. The sta	atic pressure me	asured at transducer	r depth, was
10 ⁻⁰ 10 ⁻¹	10 ⁻² 10 ⁻² 10 ⁻⁴		derived from the CH	Hir phase using s	straight line extrapo	lation in the
in the second second second second second second second second second second second second second second second			Horner plot to a value	ue of 8096.9 kP	a.	



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:		Reinde	er van der Wall
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for			C. Enachescu
Linear plot Q and p		test evaluation:		Recovery period	
		Indata		Indata	
8700 KAV04A_837.11-857.11_040812_1_CHir	0_r	$p_0 (kPa) =$	8460		
8650 -	P section	$p_i(kPa) =$	8459		
8600 -	P above P below 8	$p_{p}(kPa) =$	8659	p _∈ (kPa) =	8466
8550	•7	$\Omega_{\rm m}^{3/\rm s}$	7.13E-05	F1 (*** **)	
£ 8500		$\frac{d_p(m/s)}{tp(s)} =$	1200	t⊧ (s) =	1200
8450	of the firm	S el S [*] (-)-	1.00E-06	S el S [*] (-)-	1.00E-06
W 8400	hjection	EC (mS/m)=		5 el 5 (-)-	
6 HHU .		Temp _w (ar C)=	19.97		
8350 -		Derivative fact.=	17177	Derivative fact.=	
8250 -					
8200					
0.00 0.20 0.40 0.60 Ela	0.80 1.00 1.20 1.40 1.60 psed Time [h]	Results		Results	
		$Q/s (m^2/s) =$	3.5E-06		
Log-Log plot incl. derivates-	flow period	T _M (m²/s)=	3.7E-06		
		Flow regime:	transient	Flow regime:	transient
Elapsed time	(h)	dt₁ (min) =	1.00	dt_1 (min) =	1.00
10 SKB Asvroe / KAVD4A 837.11 - 857.11 / Chi	FlowDim Version 2.14b (c) Golder Associates	$dt_2 (min) =$	18.00	$dt_2 (min) =$	18.00
	10 °	T (m²/s) =	1.4E-06	T (m²/s) =	5.66E-06
		S(-) =	1.0E-06	S(-) =	1.00E-06
10 1	• • • • • • • • • • • • • • • • • • •	$K_s (m/s) =$	1.4E-08	K_{s} (m/s) =	5.66E-08
Linguine and Linguine and	10 ⁻¹	$S_{s}(1/m) =$	1.0E-08	$S_{s}(1/m) =$	1.00E-08
1,400,4	4 Juni 4	C (m°/Pa) =	#INV	C (m°/Pa) =	9.58E-10
10 ⁰	ate a second defendence and a	$C_{\rm D}(-) =$	#INV	$C_{\rm D}(-) =$	1.06E-01
	10 ⁻²	ς(-) =	0	ς(-) =	1.13
	• •	$T_{opc}(m^2/s) =$		$T_{opr}(m^2/s) =$	
10 ² 10 ⁴	10 ⁶ 10 ⁶ 10 ⁷	$S_{GBF}(-) =$		$S_{GBF}(-) =$	
		$D_{GBE}(-) =$		$D_{GBE}(-) =$	
Log-Log plot incl. derivatives	- recovery period	Selected represe	ntative paran	neters.	
		dt ₁ (min) =	1	C (m ³ /Pa) =	9.58E-10
5 Elapsed time (h	1 a a	dt_2 (min) =	18	$C_{D}(-) =$	1.06E-01
10 2 3KB Aevroe / KAV04A 837.11 - 857.11 / Chir	FlowDim Version 2.14b (c) Golder Associates	T⊤ (m²/s) =	5.7E-06	ξ(-) =	1.13
	10 ³	S (-) =	1.0E-06		
		K _s (m/s) =	5.7E-08		
10 1	300	S _s (1/m) =	1.0E-08		
	10 ²	Comments:			
	98. 5 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	The recommended t	ransmissivity of	f 5.7E-6 m2/s was de	erived from the
10 0	30 %	analysis of the CHir	phase (inner zo	one), which is showin	ng the best
	10 1	consistency with the	e CHi phase. Th	e confidence range f E_{-6} to 9 0E 6 m ^{2/a}	or the interval
	· · · · · · · · · · · · · · · · · · ·	the analysis results	of the CHi phase	e and CHir phase on	ter zone). The
	10 ² 10 ³ 10 ⁴	flow dimension use	d in the analysis	is 2. The static pres	sure measured
1D/Cr		at transducer depth,	was derived fro	m the CHir phase us	sing straight
		line extrapolation in	n the Horner plo	t 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 Wa	
Section diameter, $2 \cdot r_w$ (m):	0.076	Responsible for			C. Enachescu
Linear plot Q and p		Flow period		Recovery period	
8900	* 06	Indata		Indata	
8850	KAV04A_857.11-877.11_040812_1_CHir_Q_r	p ₀ (kPa) =	8661		
		p _i (kPa) =	8661		
	P below	p _p (kPa) =	8861	p _F (kPa) =	8661
8750	0.4	Q _p (m ³ /s)=	3.40E-06		
د. و 8700		tp (s) =	1200	t _F (s) =	1200
8 8 8650 8	0.3 5	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06
M 8600 .	hiject	EC _w (mS/m)=			
8550 -	0.2	Temp _w (gr C)=	20.3		
8500 -		Derivative fact.=		Derivative fact.=	
8450	- 0.1				
8400	1.00 1.20 1.40 1.60 1.80 2.00	Results		Results	
Elapse	ad Time [h]	$\Omega/c_{\rm c}$ (m ² /c)-	1.7F-07	lioouno	
Log-Log plot incl. derivates- fl	ow period	U/3 (III /3)= T (m ² /s)=	1.7F-07		
		Flow regime:	transient	Flow regime:	transient
		dt₁ (min) =	1.00	dt₁ (min) =	1.00
10 10 SKB Anyme / KAVIDAA	10 10 FlowDim Version 2.14b	dt_2 (min) =	18.00	dt_2 (min) =	12.00
857.11 - 877.11 / Chi	 (c) Golder Associates 	$T(m^{2}/s) =$	3.6E-07	$T(m^{2}/s) =$	2.84E-07
	3	S (-) =	1.0E-06	S (-) =	1.00E-06
10 0	10 °	$K_s (m/s) =$	3.6E-09	$K_s (m/s) =$	2.84E-09
		$S_{s}(1/m) =$	1.0E-08	$S_{s}(1/m) =$	1.00E-08
	A man a start	$C (m^{3}/Pa) =$	#NV	$C (m^{3}/Pa) =$	1.22E-10
¥ 10 1	6(1) 'By(1)	$\frac{C_{\rm D}}{C_{\rm D}}$ (-) =	#NV	$C_{D}(-) =$	1.34E-02
		ξ(-) =	0	ξ(-) =	4.47
	0.03				
		$T_{GBF}(m^2/s) =$		T _{GBF} (m ² /s) =	
10 ² 10 ³ 10	10 ⁴ 10 ⁵ 10 ⁶	S _{GRF} (-) =		S _{GRF} (-) =	
		$D_{GRF}(-) =$		D _{GRF} (-) =	
Log-Log plot incl. derivatives-	recovery period	Selected represe	ntative paran	neters.	
		dt_1 (min) =	1	C (m ³ /Pa) =	1.22E-10
Elapsed time (h)	101 ^{°°}	dt_2 (min) =	18	C _D (-) =	1.34E-02
10 - SKB Aevroe / KAV04A 857.11 - 877.11 / Chr	FlowDim Version 2.14b (c) Golder Associates	$T_{T} (m^{2}/s) =$	3.6E-07	ξ(-) =	0
		S (-) =	1.0E-06		
	300	$K_s (m/s) =$	3.6E-09		
10 1		S _s (1/m) =	1.0E-08		
	2 9 90	Comments:			
		The recommended t	ransmissivity of	f 3.6E-7 m2/s was de	rived from the
10 *	No.	analysis of the CH1 stabilization The co	pnase, which is	snowing the best der for the interval trans	ivative missivity is
		estimated to be 1.0E	E-7 to 7.0E-7 m2	2/s (encompasses the	analysis
	a and a second s	results of the CHir p	hase and CHi p	hase skin effect). Th	e flow
10 ° 10 1 10 1 10 1	10 ⁻² 10 ⁻³ 10 ⁻⁴	dimension used in th	he analysis is 2.	The static pressure r	neasured at
		transducer depth, wa extrapolation in the	as derived from Horner plot to a	the CHir phase using value of 8660.1 kP	g straight line

	Test	Sumn	nary Sheet			
Project:	Oskarshamn site inves	tigation	Test type:[1]			Chir
Area:		Ävrö	Test no:			1
Borehole ID:	к	AV04A	Test start:			040813 09:03
Test section from - to (m):	862.35	-882.35	Responsible for		Reinde	er van der Wall
Section diameter, $2 \cdot r_w$ (m):		0.076	Responsible for			C. Enachescu
Linear plot Q and p			test evaluation: Flow period		Recovery period	
			Indata		Indata	
8950	KAV04A_862.35-882.35_040813_1_CHir_Q_r	0.30	p₀ (kPa) =	8709		
8900 -	•	0.25	p _i (kPa) =	8708		
8850 -	P section Pabove	0.15	p _p (kPa) =	8906	p _F (kPa) =	8709
8800	P below	- 0.20	$Q_{\rm p} ({\rm m}^3/{\rm s}) =$	1.58E-06	,	
[eav]		[uiu	tp(s) =	1200	t _F (s) =	1200
8750		- 0.15 H	S el S [*] (-)=	1.00E-06	S el S [*] (-)=	1.00E-06
8700 -		Injectior	EC _w (mS/m)=		0 0 0 ()-	
6 8650 ·		- 0.10	Temp _w (gr C)=	20.39		
8600 -			Derivative fact.=		Derivative fact.=	
8550 -		- 0.05				
8500		0.00	Desults		Deculto	
0.00 0.20 0.40 0.60 Elaps	0.80 1.00 1.20 1.40 ed Time [h]	1.60	Results		Results	
			Q/s (m ⁻ /s)=	7.8E-08		
Log-Log plot Incl. derivates- fi	low period		T _M (m²/s)=	8.2E-08	-	tura a la cat
			Flow regime:	transient	Flow regime:	transient
Elapsed time [h]	 1	$dt_1 (min) =$	1.00	$dt_1 (min) =$	1.00
10 SKB Aevroe / KAVO4A 862.35 - 882.35 / Chi	(c) Golder Associat	140 tes	$dt_2 (min) =$	18.00	$dt_2 (min) =$	15.00
	•		T (m²/s) =	1.2E-07	T (m²/s) =	8.54E-08
		3	S (-) =	1.0E-06	S (-) =	1.00E-06
10 °			$K_s (m/s) =$	1.2E-09	$K_s (m/s) =$	8.54E-10
idpi		10	$S_{s}(1/m) =$	1.0E-08	$S_s(1/m) =$	1.00E-08
1460.		0.3 IV/U	C (m³/Pa) =	#NV	C (m³/Pa) =	8.24E-11
10 -1			C _D (-) =	#NV	$C_D(-) =$	9.08E-03
		10 -1	ξ(-) =	0	ξ(-) =	1.21
		0.03	$T_{}(m^{2}/c) =$		$T_{}(m^2/c) =$	
. 10 ^{2'} 10 ^{2'}	10 ⁴ 10 ⁶	10 6	$S_{ORF}(11/5) =$		$S_{ORF}(1175) =$	
			$D_{ops}(-) =$		$D_{opr}(-) =$	
Log-Log plot incl. derivatives-	recovery period		Selected represe	ntative naram	leters	
	ponou		dt₁ (min) =	1	$C (m^3/P_2) =$	8.24F-11
Elgesort time th	1		dt_{2} (min) =	18	$C_{\rm D}(-) =$	9 08F-03
10 ⁻¹ SKB Aevros / KAVD4A	10 ⁻¹ 10 ⁰ FlowDim Version 2.1 (c) Golder Associate	14b s	T_{m}^{2}	1 2F-07	ε(-) –	0.002 00
862.35 - 882.35 / Chir			$T_{T} (m/s) =$	1.2E 07	<u> </u>	Ű
· · · · ·		10	≤ () – K. (m/s) –	1 2 -00	L	╂───┤
10 °		30	$S_{(1/m)} =$	1.209		┣───┤
	No.		Commonte:	1.00-00		
	10 ⁻² 10 ⁻²	50 10 10 10 10 10 10 10 10 10 10 10 10 10	The recommended t analysis of the CHi stabilization. The cc estimated to be 5.0F results of the CHir p dimension used in the transducer depth, w	transmissivity of phase, which is onfidence range E-8 to 3.0E-7 m2 phase and CHi p he analysis is 2. as derived from	1.2E-7 m2/s was do showing the best de for the interval trans 2/s (encompasses the hase skin effect). The The static pressure to the CHir phase usin	erived from the rivative smissivity is e analysis ne flow measured at g straight line



Borehole: KAV04A

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, $r_D = r/r_w$	-	-
Qp	Flow in test section immediately before stop of flow. Stabilised pump flow in flow logging.	[L ³ /T]	m ³ /s
Qm	Arithmetical mean flow during perturbation phase.	$[L^3/T]$	m ³ /s
V	Volume	$[L^3]$	m ³
Vw	Water volume in test section.	$[L^3]$	m ³
V _p	Total water volume injected/pumped during perturbation	$[L^3]$	m ³
	phase.	[T]	1
t			hour,min,s
t ₀	Duration of rest phase before perturbation phase.		S
t _p	Duration of perturbation phase. (from flow start as far as p_p).		S
t _F	Duration of recovery phase (from p_p to p_F).		S .
t_1, t_2 etc	Times for various phases during a hydro test.	[1]	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	$t_{\rm D} = T \cdot t / (S \cdot r_{\rm w}^2)$. Dimensionless time	-	-
р	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.	Atmospheric pressure	$[M/(LT)^2]$	kPa
p _t	Absolute pressure: $p_t=p_a+p_a$	$[M/(LT)^2]$	kPa
pg	Gauge pressure; Difference between absolute pressure and	$[M/(LT)^2]$	kPa
no	Initial pressure before test begins, prior to packer expansion	$[M/(LT)^2]$	kPa
p ₀	Pressure in measuring section before start of flow	$[M/(LT)^2]$	kPa
p_1	Pressure during perturbation phase	$[M/(LT)^2]$	kPa
p _f	Pressure during perturbation phase.	$[M/(LT)^2]$	kPa
p _s	Pressure in measuring section before flow stop	$[M/(LT)^2]$	kPa
pp n _E	Pressure in measuring section at end of recovery	$[M/(LT)^2]$	kPa
p _F	$n_{-}=2\pi \cdot T \cdot n/(\Omega \cdot \alpha \cdot \alpha)$ Dimensionless pressure	-	-
dp	Pressure difference, drawdown of pressure surface between $t_{\rm VO}$ points of time	$[M/(LT)^2]$	kPa
dpf	$dp_f = p_i - p_f$ or $p_f = p_f - p_i$, drawdown/pressure increase of pressure surface between two points of time during perturbation phase. dp_f usually expressed positive.	$[M/(LT)^2]$	kPa
dps	$dp_s = p_s - p_p$ 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	$dp_F = p_p - p_F \text{ or } = p_F - p_p$, maximal pressure increase/drawdown of pressure surface between two points of time during recovery phase. dp_F expressed positive.	[M/(LT) ²]	kPa

Н	Total head; (potential relative a reference level) (indication of h for phase as for p) $H=h_{a}+h_{b}+h_{c}$	[L]	m
h	Groundwater pressure level (hydraulic head (piezometric head:	[L]	m
	possible to use for level observations in boreholes, static	L1	
	head)); (indication of h for phase as for p). $h=h_{e}+h_{p}$		
h	Height of measuring point (Elevation head); Level above	[L]	m
c	reference level for measuring point.		
Sp	Drawdown in measuring section before flow stop.	[L]	m
h ₀	Initial above reference level before test begins, prior to packer	[L]	m
	expansion.		
h _i	Level above reference level in measuring section before start	[L]	m
	of flow.		
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	[L]	m
	stop.		
h _F	Level above reference level in measuring section at end of	[L]	m
	recovery.		
dh	Level difference, drawdown of water level between two points	[L]	m
	of time.		
dh_{f}	$dh_f = h_i - h_f$ or $= h_f - h_i$, drawdown/pressure increase of	[L]	m
	pressure surface between two points of time during		
11	perturbation phase. dh _f usually expressed positive.	FT 3	
dh _s	$dh_s = h_s - h_p$ or $= h_p - h_s$, pressure increase/drawdown of	[L]	m
	pressure surface between two points of time during recovery		
.11.	phase. dh _s usually expressed positive.	[1]	
an _p	$dn_p = n_i - n_p$ or $= n_p - n_i$, maximal pressure increase/drawdown	[L]	m
	of pressure surface between two points of time during		
dh	dh = h h $or = h$ h maximal pressure increase/drawdown	[1]	m
un _F	$dn_F - n_p - n_F of - n_F - n_p$, maximal pressure increase/drawdown of pressure surface between two points of time during	[L]	111
	nerturbation phase db _p expressed positive		
Те	Temperature in the test section (taken from temperature		°C
1 C _W	logging) Temperature		C
Temo	Temperature in the test section during undisturbed conditions		°C
	(taken from temperature logging). Temperature		C
g	Constant of gravitation (9.81 m*s ⁻²) (Acceleration due to	$[L/T^2]$	m/s^2
0	gravity)		
π	Constant (approx 3.1416).	[-]	
r	Residual. $r = p_c \cdot p_m$, $r = h_c \cdot h_m$, 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	[T]	S
	characteristic counted from start of flow phase and recovery		
	phase respectively.		
dt ₂	End of time for semi-log or log-log evaluated characteristic	[T]	S
	counted from start of flow phase and recovery phase		
	respectively.	- 2.	2.
Т	Transmissivity	$[L^{2}/T]$	m^2/s
T _M	Transmissivity according to Moye (1967)	$[L^2/T]$	m²/s
T _s	Transmissivity evaluated from slug test	$[L^2/T]$	m²/s
T _{Sf} , T _{Lf}	Transient evaluation based on semi-log or log-log diagram for	[L ² /T]	m²/s
	perturbation phase in injection or pumping.		
T_{Ss}, T_{Ls}	Transient evaluation based on semi-log or log-log diagram for	[L²/T]	m²/s
	recovery phase in injection or pumping.		

T _T	Transient evaluation (log-log or lin-log). Judged best	$[L^2/T]$	m^2/s
1	evaluation of T_{Sf} , T_{Lf} , T_{Ss} , T_{Ls}		
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	[-]	-
Sm	Matrix storage coefficient	[-]	-
S _{NLR}	Storage coefficient, evaluation based on non-linear regression	[-]	-
Ss	Specific storage coefficient; confined storage.	[1/L]	1/m
S _s *	Assumed specific storage coefficient; confined storage.	[1/L]	1/m
٤	Skin factor	[-]	-
*ع	Assumed skin factor	[-]	-
Č	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	$[M/L^3]$	$kg/(m^3)$
$\rho_{\rm w}$	Fluid density in measurement section during pumping/injection	$[M/L^3]$	$kg/(m^3)$
μ	Dynamic viscosity	[M/LT]	Pa s
$\mu_{\rm w}$	Dynamic viscosity (Fluid density in measurement section during numping/injection)	[M/LT]	Pa s
	warmo pampino, injeenon,	1	

Borehole: KAV04A

APPENDIX 5

SICADA Data Tables



SICADA/Data Import Template

(Simplified version v1.2)

JND					-		-		SKB &	Ergodata AB 2004			
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File Identity													
Created By	I	Reinder van der Wall											
Created		2004-09-22 13:56											
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		14414044			1	[4 000		T		
Activity Type		KAV04A				Projec	ct	AP PS 400-0	4-063				
		KAV04A - Injection	test										
	1				1	[-				<u>-1</u>		
ctivity informa	ition					Additional Act	livity Data						
	1	1		•		C10	P20	P200	P220	R110	R25	R90	
									Person				
							Field crew		evaluating	Field Notes		Quality	
lcode	Start Date	Stop Date	Secup (m)	Seclow (m)	Section No	Company	manager	Field crew	data	ID	Report	plan	
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AV04A	2004-07-22 09:00	2004-08-14 18:00	100,00	1004,00		Golder	Enachescu	Stefan Rohs	Enachescu	431			
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nstructions													
	SICADA Data Import Ter	nplate (simplified version	n)										
	This template should be u	sed to supply information for	or the creation of r	new activities of a ce	ertain type (activity	/ type), along with							
	associated measurement	data, in the SICADA datab	ase.	d for is included at	the tap of this war	kabaat							
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	cell to see the text	ter in its upper right corner	nave a description	n associated with it.	Littler Select of III		uie						
	The Activity Data Sheet												
	For each activity to be cre	ated, supply information in	the columns Idco	de, Start Date, Stop	Date, Secup, Sec	clow and Section No.							
	Additional activity attribute	es should be provided for ea	ach created activit	y. Please enter the	appropriate activit	y attributes for each							
	activity with appropriate in	formation.											
	The selected set of addition	onal activity attributes inclue	ded in this file is cl	hoosen when this file	e is generated fror	m SICADA.							
	The Data Table Sheet(s)												
	Measurement data associ	ated to each created activi	ty can be supplied	I. Each data table ha	as its own workshe	eet in this Excel work	book.						
	The selected set of tables	(and columns) included in	this file is choose	n when this file is ge	nerated from SIC	ADA. The pre-filled s	et 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.		

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</lower>
q_measll	FLOAT	m**3/s	Estimated lower measurement limit of flow rate
q_measlu	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	оС	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)

Table

FLOAT

m

Hydraulic point of application

							formation_t		
idcode	start_date	stop_date	secup	seclow	section_no	test_type	уре	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	flow rate	value tv		a measl	tot volume	dur flow	dur rec	initial h	head at flo	final he	initial pr	press at flo	final pre
rate_qm	_end_qp	pe_qp	q_measll	u	vp	phase_tp	phase_tf	ead_hi	w_end_hp	ad_hf	ess_pi	w_end_pp	ss_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

	1	1	1	1	1	
fluid_te	fluid_elco	fluid_sali	fluid_salini	referenc	comment	
mp_tew	nd_ecw	nity_tdsw	ty_tdswm	е	S	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

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</lower>
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.</lower>
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.</lower>
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
I_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,</lower>
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.

Table

assumed_s	FLOAT		Assumed Storativ	rity,2D model evalu	uation,see table de	escr.					
leakage_koeff	FLOAT	1/s	K'/b':2Dmodel eva	aluation of leakage	coefficient,see de	esc.					
hydr_cond_ks	FLOAT	m**2/s	Ks:3D model eval	uation of hydraulic	conductivity,see	desc.					
value_type_ks	CHAR		0:true value,-1:Ks	<lower meas.limit,<="" td=""><td>1:Ks>upper meas</td><td>s.limit,</td><td></td><td></td><td></td><td></td><td></td></lower>	1:Ks>upper meas	s.limit,					
l_meas_limit_ks	FLOAT	m**2/s	Estimated lower r	neas.limit for evalu	ated Ks, see tabl	e desc.					
u_meas_limit_ks	FLOAT	m**2/s	Estimated upper i	meas.limit for eval	uated Ks,see table	e descr.					
spec_storage_ss	FLOAT	1/m	Ss:Specific storage	ge,3Dmodel evalua	ation,see table des	scr.					
assumed_ss	FLOAT	1/m	Assumed Spec.st	orage,3D model e	valuation,see tabl	e des.					
с	FLOAT	m**3/pa	C: Wellbore stora	ge coefficient							
cd	FLOAT		CD: Dimensionles	ss wellbore storage	e constant						
skin	FLOAT		Skin factor								
stor_ratio	FLOAT		Storativity ratio								
interflow_coeff	FLOAT		Interporosity flow	coefficient							
dt1	FLOAT	S	Estimated start tir	ne of evaluation, s	ee table descripti	on					
dt2	FLOAT	S	Estimated stop tir	ne of evaluation. s	ee table description	on					
transmissivity_t_ilr	FLOAT	m**2/s	T_ILR Transmissi	vity based on Non	e Linear Regressi	on					
storativity_s_ilr	FLOAT		S_ILR=storativity	based on None Li	near Regression,s	ee					
value_type_t_ilr	CHAR		0:true value,-1:T_	ILR <lower meas.li<="" td=""><td>mit,1:>upper mea</td><td>s.limit</td><td></td><td></td><td></td><td></td><td></td></lower>	mit,1:>upper mea	s.limit					
bc_t_ilr	CHAR		Best choice code	. 1 means T_ILR is	s best choice of T,	else 0					
c_ilr	FLOAT	m**3/pa	Wellbore storage	coefficient, based	on ILR, see desc	r.					
cd_ilr	FLOAT		Dimensionless we	ellbore storage cor	nstant, see table d	escrip.					
skin_ilr	FLOAT		Skin factor based	on Non Linear Re	gression,see deso	.					
stor_ratio_ilr	FLOAT		Storativity ratio ba	ased on Non Linea	r Regression, see	descr.					
interflow_coeff_ilr	FLOAT		Interporosity flow	coefficient based	on Non Linear Reg	gr					
transmissivity_t_grf	FLOAT	m**2/s	T_GRF:Transmis	sivity based on Ge	n.Rad. Flow,see						
value_type_t_grf	CHAR		0:true value,-1:T_	GRF <lower meas.<="" td=""><td>limit,1:>upper me</td><td>as.limit</td><td></td><td></td><td></td><td></td><td></td></lower>	limit,1:>upper me	as.limit					
bc_t_grf	CHAR		Best choice code	. 1 means T_GRF	is best choice of -	Γ, else 0					
storativity_s_grf	FLOAT		S_GRF:Storativity	/ basd on Gen. Ra	d.Flow, see table	descri.					
flow_dim_grf	FLOAT		Flow dimesion ba	sed on Gen. Rad.l	low. interpretatio	n model					
comment	VARCHAR	no_unit	Short comment to	the evaluated par	ameters						
error_flag	CHAR		If error_flag = "*"	then an error occu	red and an error						
in_use	CHAR		If in_use = "*" the	n the activity has b	een selected as						
sign	CHAR		Signature for QA	data accknowledg	e (QA - OK)						
								1			
								2			
						1	1	1	I	I	
							formation_t		seclen_cl	spec_cap	value_ty
idcode	start_date	stop_date	secup	seclow	section_no	test_type	уре	lp	ass	acity_q_s	pe_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

ansmis	value_ty	transmissi		value_ty	hydr_con	formation	width_of_c		I_measl_t	u_measl		assumed	leakage_f	transmis	value_ty	
ansmis ivity_tq	value_ty pe_tq bc_:	transmissi q vity_moye	bc_tm	value_ty pe_tm	hydr_con d_moye	formation _width_b	width_of_c hannel_b	tb	I_measI_t b	u_measl _tb	sb	assumed _sb	leakage_f actor_lf	transmis sivity_tt	value_ty pe_tt	bc_
ansmis ivity_tq	value_ty pe_tq bc_;	transmissi q vity_moye	bc_tm	value_ty pe_tm	hydr_con d_moye	formation _width_b	width_of_c hannel_b	tb	l_measl_t b	u_measl _tb	sb	assumed _sb	leakage_f actor_lf	transmis sivity_tt 1,70E-06	value_ty pe_tt	bc _
ansmis ivity_tq	value_ty pe_tq bc_	transmissi q vity_moye 1,04E-06 1,28E-05	bc_tm 0	value_ty pe_tm 0	hydr_con d_moye 1,04E-08 1,28E-07	formation _width_b	width_of_c hannel_b	tb	I_measl_t b	u_measl _tb	sb	assumed _sb	leakage_f actor_lf	transmis sivity_tt 1,70E-06 1,09E-05	value_ty pe_tt 0	bc _1 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 C	5,12E-10			1,62E-08	0	1
	3,66E-06 (0 C	1,83E-07			5,66E-06	0	1
	1,74E-07 (0 C	8,72E-09			3,62E-07	0	1
	8,21E-08 (0 C	4,10E-09			1,16E-07	0	1
	1,44E-08 (0 C	7,19E-10			5,15E-09	0	1

I_measI_	u_measl	storativit	assumed	leakage_	hydr_co	value_ty	I_meas_li	u_meas_l	spec_sto	assumed				stor_rati	interflow
q_s	_q_s	vs	S	koeff	nd ks	pe_ks	mit_ks	imit_ks	rage_ss	_SS	C	cd	skin	0	coeff
1 4 00E 40		/_			_										_00011
1,00E-10	1,00E-03	1,00E-04	1,00E-04								5,37E-10	5,92E-04	2,30E+00		_00011
1,00E-10 1,00E-10	1,00E-03 1,00E-03	1,00E-04 1,00E-06	1,00E-04 1,00E-06								5,37E-10 3,21E-08	5,92E-04 3,54E+00 7,18E,02	2,30E+00 -5,23E+00		
1,00E-10 1,00E-10 1,00E-10	1,00E-03 1,00E-03 1,00E-03	1,00E-04 1,00E-06 1,00E-06									5,37E-10 3,21E-08 6,51E-10 7 80E-10	5,92E-04 3,54E+00 7,18E-02 8,60E-02	2,30E+00 -5,23E+00 3,11E+01 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
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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

					1			1	-				1			
dt1	dt2	transmiss ivity_t_ilr	storativit y_s_ilr	value_ty pe_t_ilr	bc_t_ilr	c_ilr	cd_ilr	skin_ilr	stor_rati o_ilr	Interflow_ coeff_ilr	transmissi vity_t_grf	value_ty pe_t_grf	bc_t_grf	storativit y_s_grf	tlow_di m_grf	comment
60,00	720,00	-														
60,00	2520,00															
00,00	1 20.00	1		÷	1	1	1	÷								-

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							
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60,00	1080,00							
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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					