P-06-164

Supplement 1

August 2007

Oskarshamn site investigation

Difference flow logging of borehole KLX09

Subarea Laxemar

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Description

In the present supplement to SKB P-06-164 all groundwater head calculations have been redone on revised borehole elevation data (Z-coordinates).

The borehole coordinates that formed the basis for this revision of groundwater head data were retrieved from SKB Sicada 2007-03-07 EG154 (provided by SKB in file Krökdata_korrigerade_070307_KLX03-KLX29 utom KLX15, HLX13,15,26-28,32,36-38,43.xls) /Stenberg and Håkansson 2007/.

Some mistakes in the fracture frequency tables and the fracture frequency graph have also been fixed.

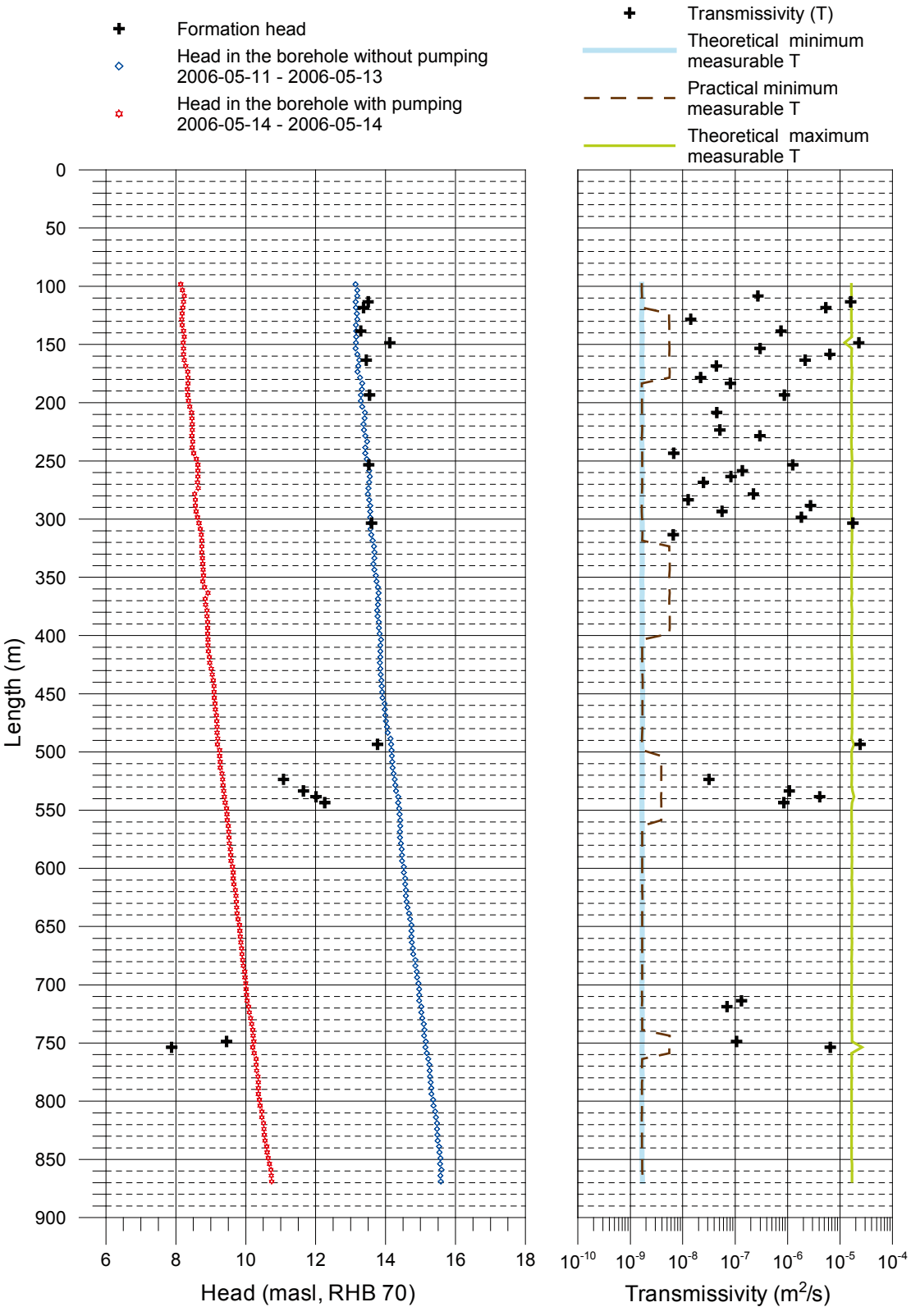
Specifically the following appendices are revised and included in this supplement:

Revised appendices	Appendix number
Transmissivity and head of 5 m sections	Appendix 4.2
Transmissivity and head of detected fractures	Appendix 5
Sequential flow logging	Appendix 7.1–7.6
Inferred flow anomalies from overlapping flow logging	Appendix 8.1–8.2
Conductive fracture frequency	Appendix 10.1–10.4
Plotted conductive fracture frequency	Appendix 11
Comparison between section transmissivity and fracture transmissivity	Appendix 12
Head in the borehole during flowlogging	Appendix 13.1
Air pressure, water level in borehole and pumping rate during flow logging	Appendix 13.2
Groundwater recovery after pumping	Appendix 13.3
Vertical flow along the borehole at 101.55 m	Appendix 13.4
Vertical flow along the borehole at 102.85 m	Appendix 13.5
Flow without pumping and with smaller pumping	Appendix 15.1–15.5
Long time flow observations	Appendix 16.1–16.3

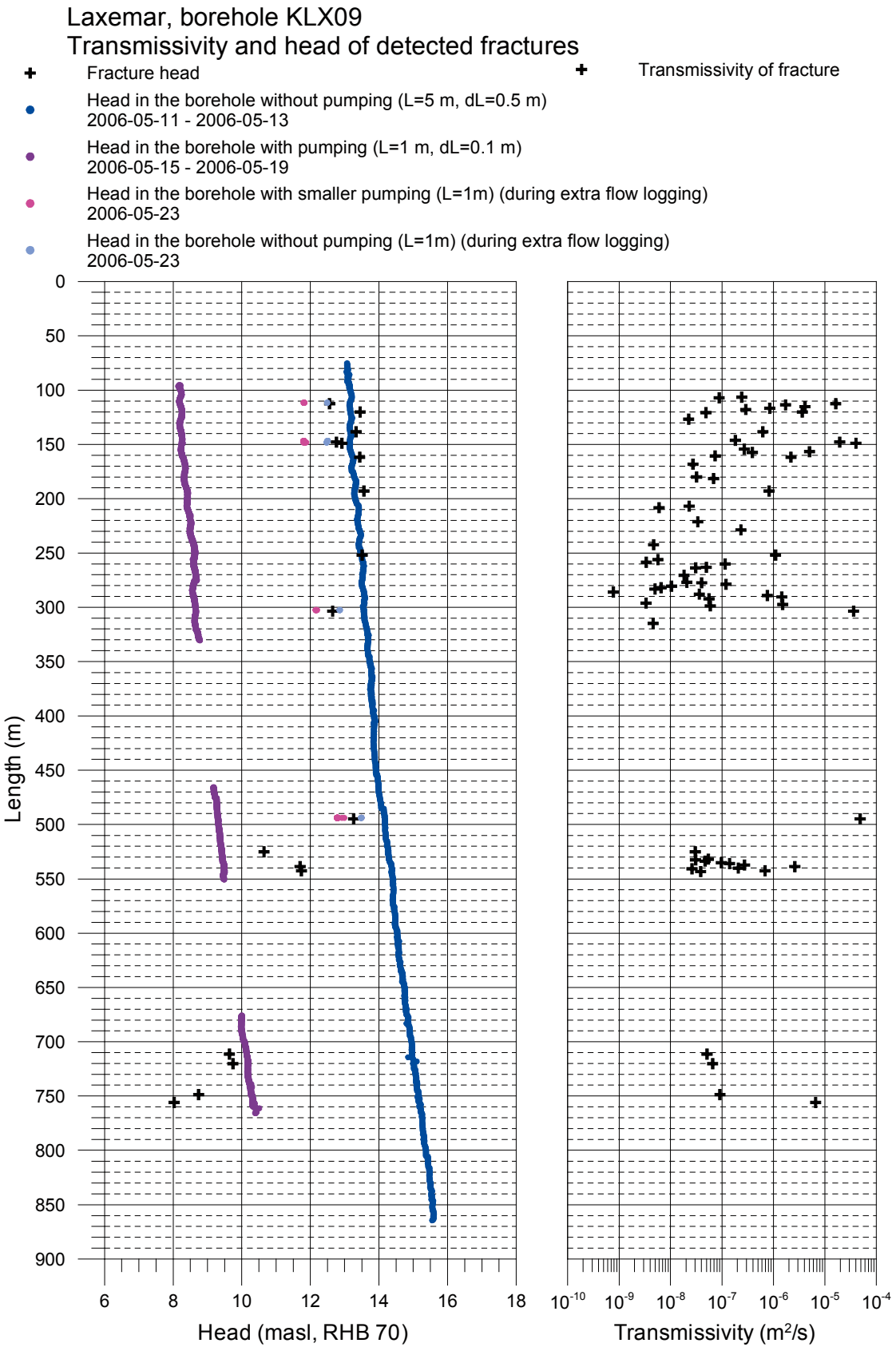
Reference

Stenberg L, Håkansson N, 2007. Revision of borehole deviation measurements in Oskarshamn, Svensk Kärnbränslehantering AB (in preparation).

Laxemar, borehole KLX09
Transmissivity and head of 5 m sections



Appendix 5


Laxemar, borehole KLX09
Transmissivity and head of detected fractures
Fracture head
Transmissivity of fracture
Head in the borehole without pumping (L=5 m, dL=0.5 m)
2006-05-11 - 2006-05-13
Head in the borehole with pumping (L=1 m, dL=0.1 m)
2006-05-15 - 2006-05-19
Head in the borehole with smaller pumping (L=1m) (during extra flow logging)
2006-05-23
Head in the borehole without pumping (L=1m) (during extra flow logging)
2006-05-23
Length (m)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
6
8
10
12
14
16
18
Head (masl, RHB 70)
10-10
10-9
10-8
10-7
10-6
10-5
10-4
Transmissivity (m2/s)

Appendix 7.1

Difference flow logging – Sequential flow logging

Borehole ID	Secup L (m)	Seclow L (m)	Lw (m)	Q_0 (m^3/s)	dh_0 (m)	Q_1 (m^3/s)	dh_1 (m)	T_D (m^2/s)	h_i (m)	Q-lower limit P (mL/h)	TD-measl$_{LT}$ (m^2/s)	TD-measl$_{LP}$ (m^2/s)	TD-measl$_U$ (m^2/s)	Comments
KLX09	95.77	100.77	5	–	13.14	–	8.14	–	–	30	1.6E–09	1.6E–09	1.6E–05	
KLX09	100.78	105.78	5	–	13.19	–	8.19	–	–	30	1.6E–09	1.6E–09	1.6E–05	
KLX09	105.79	110.79	5	–	13.19	1.36E–06	8.24	2.7E–07	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	110.81	115.81	5	5.75E–06	13.14	8.53E–05	8.22	1.6E–05	13.5	30	1.7E–09	1.7E–09	1.6E–05	
KLX09	115.82	120.82	5	1.20E–06	13.15	2.81E–05	8.20	5.4E–06	13.4	30	1.7E–09	1.7E–09	1.6E–05	
KLX09	120.83	125.83	5	–	13.18	–	8.18	–	–	100	1.6E–09	5.5E–09	1.6E–05	
KLX09	125.85	130.85	5	–	13.19	7.22E–08	8.17	1.4E–08	–	100	1.6E–09	5.5E–09	1.6E–05	
KLX09	130.87	135.87	5	–	13.15	–	8.18	–	–	100	1.7E–09	5.5E–09	1.7E–05	
KLX09	135.88	140.88	5	9.94E–08	13.16	3.83E–06	8.22	7.5E–07	13.3	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	140.90	145.90	5	–	13.16	–	8.24	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	145.92	150.92	5	2.23E–05	13.15	1.36E–04	8.21	2.3E–05	14.1	100	1.7E–09	5.6E–09	1.2E–05	
KLX09	150.93	155.93	5	–	13.14	1.49E–06	8.22	3.0E–07	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	155.92	160.92	5	–	13.19	3.22E–05	8.22	6.4E–06	–	100	1.7E–09	5.5E–09	1.7E–05	
KLX09	160.92	165.92	5	4.44E–07	13.25	1.14E–05	8.24	2.2E–06	13.5	100	1.6E–09	5.5E–09	1.6E–05	
KLX09	165.92	170.92	5	–	13.22	2.19E–07	8.28	4.4E–08	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	170.92	175.92	5	–	13.20	–	8.34	–	–	100	1.7E–09	5.7E–09	1.7E–05	
KLX09	175.92	180.92	5	–	13.27	1.09E–07	8.35	2.2E–08	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	180.91	185.91	5	–	13.33	4.08E–07	8.35	8.1E–08	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	185.91	190.91	5	–	13.32	–	8.33	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	190.91	195.91	5	2.20E–07	13.29	4.56E–06	8.34	8.7E–07	13.5	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	195.91	200.91	5	–	13.29	–	8.36	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	200.90	205.90	5	–	13.33	–	8.40	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	205.90	210.90	5	–	13.41	2.23E–07	8.45	4.5E–08	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	210.90	215.90	5	–	13.40	–	8.46	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	215.90	220.90	5	–	13.37	–	8.47	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	220.90	225.90	5	–	13.38	2.54E–07	8.47	5.1E–08	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	225.90	230.90	5	–	13.42	1.48E–06	8.46	3.0E–07	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	230.89	235.89	5	–	13.47	–	8.48	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	235.89	240.89	5	–	13.42	–	8.47	–	–	30	1.7E–09	1.7E–09	1.7E–05	

Appendix 7.2

Borehole ID	Secup L (m)	Seclow L (m)	L_w (m)	Q_0 (m^3/s)	dh_0 (m)	Q_1 (m^3/s)	dh_1 (m)	T_D (m^2/s)	h_i (m)	Q-lower limit P (mL/h)	TD-measl$_{LT}$ (m^2/s)	TD-measl$_{LP}$ (m^2/s)	TD-measl$_U$ (m^2/s)	Comments
KLX09	240.89	245.89	5	–	13.42	3.33E–08	8.51	6.7E–09	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	245.89	250.89	5	–	13.46	–	8.59	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	250.89	255.89	5	3.11E–08	13.50	6.22E–06	8.63	1.3E–06	13.5	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	255.88	260.88	5	–	13.53	6.81E–07	8.63	1.4E–07	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	260.88	265.88	5	–	13.55	4.14E–07	8.63	8.3E–08	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	265.89	270.89	5	–	13.53	1.23E–07	8.62	2.5E–08	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	270.89	275.89	5	–	13.51	–	8.64	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	275.89	280.89	5	–	13.49	1.11E–06	8.54	2.2E–07	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	280.90	285.90	5	–	13.53	6.39E–08	8.56	1.3E–08	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	285.90	290.90	5	–	13.56	1.38E–05	8.56	2.7E–06	–	30	1.6E–09	1.6E–09	1.6E–05	
KLX09	290.91	295.91	5	–	13.56	2.83E–07	8.58	5.6E–08	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	295.91	300.91	5	–	13.56	9.19E–06	8.62	1.8E–06	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	300.92	305.92	5	6.64E–07	13.56	8.81E–05	8.66	1.8E–05	13.6	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	305.92	310.92	5	–	13.57	–	8.70	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	310.92	315.92	5	–	13.59	3.25E–08	8.73	6.6E–09	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	315.92	320.92	5	–	13.63	–	8.74	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	320.93	325.93	5	–	13.67	–	8.74	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	325.93	330.93	5	–	13.68	–	8.74	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	330.93	335.93	5	–	13.68	–	8.76	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	335.93	340.93	5	–	13.65	–	8.77	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	340.94	345.94	5	–	13.68	–	8.78	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	345.94	350.94	5	–	13.72	–	8.79	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	350.94	355.94	5	–	13.74	–	8.77	–	–	100	1.7E–09	5.5E–09	1.7E–05	
KLX09	355.94	360.94	5	–	13.78	–	8.82	–	–	100	1.7E–09	5.5E–09	1.7E–05	
KLX09	360.94	365.94	5	–	13.80	–	8.92	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	365.95	370.95	5	–	13.78	–	8.84	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	370.95	375.95	5	–	13.78	–	8.85	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	375.95	380.95	5	–	13.76	–	8.89	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	380.95	385.95	5	–	13.77	–	8.89	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	385.95	390.95	5	–	13.81	–	8.91	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	390.95	395.95	5	–	13.81	–	8.91	–	–	100	1.7E–09	5.6E–09	1.7E–05	

Appendix 7.3

Borehole ID	Secup L (m)	Seclow L (m)	L_w (m)	Q_0 (m^3/s)	dh_0 (m)	Q_1 (m^3/s)	dh_1 (m)	T_D (m^2/s)	h_i (m)	Q-lower limit P (mL/h)	TD-measl$_{LT}$ (m^2/s)	TD-measl$_{LP}$ (m^2/s)	TD-measl$_U$ (m^2/s)	Comments
KLX09	395.95	400.95	5	–	13.83	–	8.91	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	400.95	405.95	5	–	13.87	–	8.92	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	405.95	410.95	5	–	13.85	–	8.92	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	410.95	415.95	5	–	13.85	–	8.93	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	415.95	420.95	5	–	13.85	–	8.96	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	420.96	425.96	5	–	13.84	–	8.97	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	425.96	430.96	5	–	13.85	–	9.01	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	430.96	435.96	5	–	13.86	–	9.04	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	435.96	440.96	5	–	13.88	–	9.07	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	440.96	445.96	5	–	13.89	–	9.09	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	445.96	450.96	5	–	13.90	–	9.09	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	450.97	455.97	5	–	13.91	–	9.10	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	455.97	460.97	5	–	13.97	–	9.12	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	460.97	465.97	5	–	13.98	–	9.13	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	465.97	470.97	5	–	13.99	–	9.16	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	470.98	475.98	5	–	14.01	–	9.17	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	475.98	480.98	5	–	14.04	–	9.18	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	480.98	485.98	5	–	14.06	–	9.18	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	485.98	490.98	5	–	14.14	–	9.20	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	490.98	495.98	5	–9.44E–06	14.16	1.12E–04	9.19	2.4E–05	13.8	30	1.7E–09	1.7E–09	1.8E–05	
KLX09	495.99	500.99	5	–	14.17	–	9.25	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	500.99	505.99	5	–	14.18	–	9.25	–	–	70	1.7E–09	3.9E–09	1.7E–05	
KLX09	506.00	511.00	5	–	14.19	–	9.27	–	–	70	1.7E–09	3.9E–09	1.7E–05	
KLX09	511.00	516.00	5	–	14.20	–	9.27	–	–	70	1.7E–09	3.9E–09	1.7E–05	
KLX09	516.00	521.00	5	–	14.23	–	9.32	–	–	70	1.7E–09	3.9E–09	1.7E–05	
KLX09	521.01	526.01	5	–1.02E–07	14.26	5.56E–08	9.34	3.2E–08	11.1	70	1.7E–09	3.9E–09	1.7E–05	
KLX09	526.01	531.01	5	–	14.28	–	9.35	–	–	70	1.7E–09	3.9E–09	1.7E–05	
KLX09	531.01	536.01	5	–2.89E–06	14.30	2.49E–06	9.37	1.1E–06	11.7	70	1.7E–09	3.9E–09	1.7E–05	
KLX09	536.01	541.01	5	–9.72E–06	14.36	1.09E–05	9.39	4.1E–06	12.0	70	1.7E–09	3.9E–09	1.9E–05	
KLX09	541.01	546.01	5	–1.80E–06	14.36	2.44E–06	9.41	8.5E–07	12.3	70	1.7E–09	3.9E–09	1.7E–05	
KLX09	546.02	551.02	5	–	14.39	–	9.45	–	–	70	1.7E–09	3.9E–09	1.7E–05	

Appendix 7.4

Borehole ID	Secup L (m)	Seclow L (m)	L_w (m)	Q_0 (m^3/s)	dh_0 (m)	Q_1 (m^3/s)	dh_1 (m)	T_D (m^2/s)	h_i (m)	Q-lower limit P (mL/h)	TD-measl$_{LT}$ (m^2/s)	TD-measl$_{LP}$ (m^2/s)	TD-measl$_U$ (m^2/s)	Comments
KLX09	551.03	556.03	5	–	14.40	–	9.46	–	–	70	1.7E–09	3.9E–09	1.7E–05	
KLX09	556.03	561.03	5	–	14.42	–	9.47	–	–	70	1.7E–09	3.9E–09	1.7E–05	
KLX09	561.04	566.04	5	–	14.42	–	9.50	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	566.04	571.04	5	–	14.41	–	9.51	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	571.05	576.05	5	–	14.41	–	9.52	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	576.06	581.06	5	–	14.44	–	9.53	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	581.06	586.06	5	–	14.46	–	9.56	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	586.07	591.07	5	–	14.47	–	9.57	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	591.08	596.08	5	–	14.47	–	9.58	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	596.08	601.08	5	–	14.52	–	9.62	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	601.09	606.09	5	–	14.52	–	9.64	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	606.09	611.09	5	–	14.56	–	9.64	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	611.10	616.10	5	–	14.56	–	9.66	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	616.10	621.10	5	–	14.58	–	9.70	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	621.11	626.11	5	–	14.58	–	9.72	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	626.11	631.11	5	–	14.60	–	9.73	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	631.12	636.12	5	–	14.63	–	9.74	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	636.12	641.12	5	–	14.67	–	9.75	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	641.13	646.13	5	–	14.70	–	9.78	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	646.14	651.14	5	–	14.74	–	9.82	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	651.14	656.14	5	–	14.74	–	9.83	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	656.15	661.15	5	–	14.74	–	9.84	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	661.15	666.15	5	–	14.75	–	9.86	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	666.16	671.16	5	–	14.78	–	9.88	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	671.16	676.16	5	–	14.79	–	9.89	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	676.17	681.17	5	–	14.85	–	9.91	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	681.17	686.17	5	–	14.85	–	9.93	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	686.18	691.18	5	–	14.89	–	9.97	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	691.18	696.18	5	–	14.90	–	9.98	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	696.19	701.19	5	–	14.94	–	10.00	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	701.19	706.19	5	–	14.96	–	10.01	–	–	30	1.7E–09	1.7E–09	1.7E–05	

Appendix 7.5

Borehole ID	Secup L (m)	Seclow L (m)	L_w (m)	Q_0 (m^3/s)	dh_0 (m)	Q_1 (m^3/s)	dh_1 (m)	T_D (m^2/s)	h_i (m)	Q-lower limit P (mL/h)	TD-measl$_{LT}$ (m^2/s)	TD-measl$_{LP}$ (m^2/s)	TD-measl$_U$ (m^2/s)	Comments
KLX09	706.20	711.20	5	–	14.96	–	10.02	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	711.20	716.20	5	–6.56E–07	14.96	–	10.04	1.3E–07	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	716.20	721.20	5	–3.47E–07	15.02	–	10.08	7.0E–08	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	721.20	726.20	5	–	15.02	–	10.10	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	726.21	731.21	5	–	15.05	–	10.14	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	731.21	736.21	5	–	15.09	–	10.17	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	736.21	741.21	5	–	15.11	–	10.20	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	741.21	746.21	5	–	15.10	–	10.21	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	746.21	751.21	5	–6.11E–07	15.15	–8.33E–08	10.23	1.1E–07	9.4	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	751.21	756.21	5	–4.78E–05	15.14	–1.53E–05	10.20	6.5E–06	7.9	100	1.7E–09	5.6E–09	2.6E–05	
KLX09	756.21	761.21	5	–	15.18	–	10.24	–	–	100	1.7E–09	5.6E–09	1.7E–05	
KLX09	761.22	766.22	5	–	15.22	–	10.30	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	766.24	771.24	5	–	15.25	–	10.30	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	771.25	776.25	5	–	15.26	–	10.31	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	776.26	781.26	5	–	15.27	–	10.35	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	781.28	786.28	5	–	15.29	–	10.36	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	786.29	791.29	5	–	15.31	–	10.36	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	791.30	796.30	5	–	15.31	–	10.36	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	796.32	801.32	5	–	15.36	–	10.39	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	801.33	806.33	5	–	15.37	–	10.41	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	806.34	811.34	5	–	15.42	–	10.46	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	811.35	816.35	5	–	15.44	–	10.46	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	816.35	821.35	5	–	15.47	–	10.51	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	821.36	826.36	5	–	15.47	–	10.52	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	826.37	831.37	5	–	15.48	–	10.53	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	831.38	836.38	5	–	15.49	–	10.55	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	836.39	841.39	5	–	15.53	–	10.60	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	841.40	846.40	5	–	15.54	–	10.61	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	846.41	851.41	5	–	15.57	–	10.64	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	851.42	856.42	5	–	15.56	–	10.68	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	856.43	861.43	5	–	15.60	–	10.72	–	–	30	1.7E–09	1.7E–09	1.7E–05	

Appendix 7.6

Borehole ID	Secup L (m)	Seclow L (m)	L_w (m)	Q_0 (m^3/s)	dh_0 (m)	Q_1 (m^3/s)	dh_1 (m)	T_D (m^2/s)	h_i (m)	Q-lower limit P (mL/h)	TD-measl$_{LT}$ (m^2/s)	TD-measl$_{LP}$ (m^2/s)	TD-measl$_U$ (m^2/s)	Comments
KLX09	861.44	866.44	5	–	15.57	–	10.73	–	–	30	1.7E–09	1.7E–09	1.7E–05	
KLX09	866.45	871.45	5	–	15.58	–	10.74	–	–	30	1.7E–09	1.7E–09	1.7E–05	

Appendix 8.1

PFL – Difference flow logging – Inferred flow anomalies from overlapping flow logging

Borehole ID	Length to flow anom. L (m)	Lw (m)	dL (m)	Q0 (m^3/s)	dh0 (m)	Q1 (m^3/s)	dh1 (m)	TD (m^2/s)	hi (m)	Comments
KLX09	106.5	1	0.1	–	13.21	1.22E–06	8.21	2.4E–07	–	
KLX09	107.2	1	0.1	–	13.21	4.47E–07	8.20	8.8E–08	–	*
KLX09	112.6	1	0.1	1.08E–06	12.49	1.23E–05	11.81	1.6E–05	12.6	**
KLX09	113.6	1	0.1	–	13.14	8.56E–06	8.21	1.7E–06	–	
KLX09	115.2	1	0.1	–	13.15	2.04E–05	8.23	4.1E–06	–	
KLX09	116.8	1	0.1	–	13.16	4.22E–06	8.23	8.5E–07	–	
KLX09	117.9	1	0.1	–	13.16	1.44E–06	8.24	2.9E–07	–	
KLX09	120.1	1	0.1	1.01E–06	13.17	1.90E–05	8.27	3.6E–06	13.5	
KLX09	120.8	1	0.1	–	13.17	2.42E–07	8.26	4.9E–08	–	*
KLX09	126.7	1	0.1	–	13.20	1.13E–07	8.22	2.3E–08	–	*
KLX09	138.4	1	0.1	9.94E–08	13.17	3.22E–06	8.23	6.3E–07	13.3	*
KLX09	146.2	1	0.1	–	13.15	9.00E–07	8.27	1.8E–07	–	
KLX09	147.9	1	0.1	5.14E–06	12.50	1.87E–05	11.81	1.9E–05	12.8	**
KLX09	148.9	1	0.1	1.78E–05	12.48	4.42E–05	11.83	4.0E–05	12.9	**
KLX09	154.3	1	0.1	–	13.15	1.36E–06	8.22	2.7E–07	–	
KLX09	156.7	1	0.1	–	13.18	2.51E–05	8.24	5.0E–06	–	
KLX09	157.5	1	0.1	–	13.19	1.94E–06	8.24	3.9E–07	–	
KLX09	160.6	1	0.1	–	13.22	3.69E–07	8.27	7.4E–08	–	
KLX09	161.8	1	0.1	4.47E–07	13.24	1.15E–05	8.28	2.2E–06	13.4	
KLX09	168.2	1	0.1	–	13.22	1.35E–07	8.33	2.7E–08	–	
KLX09	180.0	1	0.1	–	13.28	1.60E–07	8.32	3.2E–08	–	
KLX09	181.4	1	0.1	–	13.30	3.44E–07	8.32	6.8E–08	–	
KLX09	192.9	1	0.1	2.28E–07	13.29	4.28E–06	8.42	8.2E–07	13.6	
KLX09	206.9	1	0.1	–	13.41	1.17E–07	8.40	2.3E–08	–	
KLX09	208.3	1	0.1	–	13.41	3.03E–08	8.40	6.0E–09	–	
KLX09	221.3	1	0.1	–	13.38	1.66E–07	8.52	3.4E–08	–	
KLX09	228.7	1	0.1	–	13.43	1.17E–06	8.48	2.3E–07	–	
KLX09	242.4	1	0.1	–	13.40	2.28E–08	8.60	4.7E–09	–	*
KLX09	251.9	1	0.1	2.75E–08	13.49	5.42E–06	8.63	1.1E–06	13.5	
KLX09	256.1	1	0.1	–	13.51	2.83E–08	8.58	5.7E–09	–	*
KLX09	258.5	1	0.1	–	13.53	1.69E–08	8.58	3.4E–09	–	*
KLX09	260.1	1	0.1	–	13.54	5.75E–07	8.60	1.2E–07	–	
KLX09	263.2	1	0.1	–	13.55	2.47E–07	8.61	5.0E–08	–	
KLX09	263.6	1	0.1	–	13.55	1.53E–07	8.62	3.1E–08	–	*
KLX09	270.6	1	0.1	–	13.52	8.97E–08	8.66	1.8E–08	–	
KLX09	276.9	1	0.1	–	13.49	1.03E–07	8.60	2.1E–08	–	
KLX09	277.4	1	0.1	–	13.50	1.99E–07	8.61	4.0E–08	–	
KLX09	278.8	1	0.1	–	13.49	5.94E–07	8.59	1.2E–07	–	
KLX09	280.5	1	0.1	–	13.50	5.17E–08	8.58	1.0E–08	–	*
KLX09	282.0	1	0.1	–	13.53	3.28E–08	8.59	6.6E–09	–	*
KLX09	283.2	1	0.1	–	13.53	2.50E–08	8.57	5.0E–09	–	*
KLX09	286.0	1	0.1	–	13.56	3.89E–09	8.56	7.7E–10	–	*
KLX09	287.9	1	0.1	–	13.57	1.82E–07	8.59	3.6E–08	–	
KLX09	289.2	1	0.1	–	13.57	3.83E–06	8.58	7.6E–07	–	

Appendix 8.2

Borehole ID	Length to flow anom. L (m)	L_w (m)	dL (m)	Q_0 (m^3/s)	dh_0 (m)	Q_1 (m^3/s)	dh_1 (m)	T_D (m^2/s)	h_i (m)	Comments
KLX09	290.5	1	0.1	–	13.59	7.36E–06	8.60	1.5E–06	–	
KLX09	292.1	1	0.1	–	13.59	2.81E–07	8.61	5.6E–08	–	*
KLX09	296.1	1	0.1	–	13.58	1.67E–08	8.63	3.3E–09	–	*
KLX09	297.4	1	0.1	–	13.56	7.53E–06	8.63	1.5E–06	–	
KLX09	298.7	1	0.1	–	13.55	2.94E–07	8.64	5.9E–08	–	
KLX09	303.5	1	0.1	–7.58E–06	12.86	1.76E–05	12.17	3.6E–05	12.7	**
KLX09	314.8	1	0.1	–	13.61	2.31E–08	8.63	4.6E–09	–	
KLX09	494.8	1	0.1	–1.13E–05	13.49	2.31E–05	12.79	4.9E–05	13.3	**
KLX09	525.2	1	0.1	–1.11E–07	14.27	3.75E–08	9.42	3.0E–08	10.7	
KLX09	531.9	1	0.1	–	14.29	2.68E–07	9.42	5.4E–08	–	*
KLX09	532.6	1	0.1	–	14.29	1.50E–07	9.44	3.1E–08	–	*
KLX09	533.7	1	0.1	–	14.31	2.32E–07	9.45	4.7E–08	–	
KLX09	535.2	1	0.1	–	14.33	4.78E–07	9.47	9.7E–08	–	*
KLX09	536.0	1	0.1	–	14.36	6.92E–07	9.47	1.4E–07	–	
KLX09	537.3	1	0.1	–	14.36	1.36E–06	9.49	2.8E–07	–	
KLX09	538.7	1	0.1	–7.00E–06	14.36	5.86E–06	9.48	2.6E–06	11.7	
KLX09	540.1	1	0.1	–	14.37	1.02E–06	9.48	2.1E–07	–	
KLX09	540.8	1	0.1	–	14.38	1.30E–07	9.49	2.6E–08	–	*
KLX09	542.6	1	0.1	–1.85E–06	14.39	1.55E–06	9.51	6.9E–07	11.7	
KLX09	543.3	1	0.1	–	14.37	1.90E–07	9.49	3.9E–08	–	*
KLX09	711.4	1	0.1	–2.76E–07	14.97	–2.64E–08	10.15	5.1E–08	9.6	*
KLX09	720.2	1	0.1	–3.50E–07	14.99	–3.00E–08	10.19	6.6E–08	9.7	*
KLX09	748.7	1	0.1	–5.92E–07	15.16	–1.42E–07	10.28	9.1E–08	8.7	
KLX09	755.9	1	0.1	–4.78E–05	15.18	–1.53E–05	10.31	6.6E–06	8.0	

* Uncertain = The flow rate is less than 30 mL/h or the flow anomalies are overlapping or they are unclear because of noise.

** Values from the measurement with smaller pumping (original pumped flow over measurement limit). Measurement is done at the end of recovery and is therefore paired with a new measurement without pumping.

Appendix 10.1

Calculation of conductive fracture frequency

Borehole ID	Secup (m)	Seclow (m)	Number of fractures, total	Number of fractures 10–100 (ml/h)	Number of fractures 100–1,000 (ml/h)	Number of fractures 1,000–10,000 (ml/h)	Number of fractures 10,000–100,000 (ml/h)	Number of fractures 100,000–1,000,000 (ml/h)
KLX09	95.77	100.77	0	0	0	0	0	0
KLX09	100.78	105.78	0	0	0	0	0	0
KLX09	105.79	110.79	2	0	0	2	0	0
KLX09	110.81	115.81	3	0	0	0	2	1
KLX09	115.82	120.82	4	0	1	1	2	0
KLX09	120.83	125.83	0	0	0	0	0	0
KLX09	125.85	130.85	1	0	1	0	0	0
KLX09	130.87	135.87	0	0	0	0	0	0
KLX09	135.88	140.88	1	0	0	0	1	0
KLX09	140.90	145.90	0	0	0	0	0	0
KLX09	145.92	150.92	3	0	0	1	0	2
KLX09	150.93	155.93	1	0	0	1	0	0
KLX09	155.92	160.92	3	0	0	2	1	0
KLX09	160.92	165.92	1	0	0	0	1	0
KLX09	165.92	170.92	1	0	1	0	0	0
KLX09	170.92	175.92	0	0	0	0	0	0
KLX09	175.92	180.92	1	0	1	0	0	0
KLX09	180.91	185.91	1	0	0	1	0	0
KLX09	185.91	190.91	0	0	0	0	0	0
KLX09	190.91	195.91	1	0	0	0	1	0
KLX09	195.91	200.91	0	0	0	0	0	0
KLX09	200.90	205.90	0	0	0	0	0	0
KLX09	205.90	210.90	2	0	2	0	0	0
KLX09	210.90	215.90	0	0	0	0	0	0
KLX09	215.90	220.90	0	0	0	0	0	0
KLX09	220.90	225.90	1	0	1	0	0	0
KLX09	225.90	230.90	1	0	0	1	0	0
KLX09	230.89	235.89	0	0	0	0	0	0
KLX09	235.89	240.89	0	0	0	0	0	0
KLX09	240.89	245.89	1	1	0	0	0	0
KLX09	245.89	250.89	0	0	0	0	0	0
KLX09	250.89	255.89	1	0	0	0	1	0
KLX09	255.88	260.88	3	1	1	1	0	0
KLX09	260.88	265.88	2	0	2	0	0	0
KLX09	265.89	270.89	1	0	1	0	0	0
KLX09	270.89	275.89	0	0	0	0	0	0
KLX09	275.89	280.89	4	0	3	1	0	0
KLX09	280.90	285.90	2	1	1	0	0	0
KLX09	285.90	290.90	4	1	1	0	2	0
KLX09	290.91	295.91	1	0	0	1	0	0
KLX09	295.91	300.91	3	1	0	1	1	0
KLX09	300.92	305.92	1	0	0	0	0	1
KLX09	305.92	310.92	0	0	0	0	0	0

Appendix 10.2

Borehole ID	Secup (m)	Seclow (m)	Number of fractures, total	Number of fractures 10–100 (ml/h)	Number of fractures 100–1,000 (ml/h)	Number of fractures 1,000–10,000 (ml/h)	Number of fractures 10,000–100,000 (ml/h)	Number of fractures 100,000–1,000,000 (ml/h)
KLX09	310.92	315.92	1	1	0	0	0	0
KLX09	315.92	320.92	0	0	0	0	0	0
KLX09	320.93	325.93	0	0	0	0	0	0
KLX09	325.93	330.93	0	0	0	0	0	0
KLX09	330.93	335.93	0	0	0	0	0	0
KLX09	335.93	340.93	0	0	0	0	0	0
KLX09	340.94	345.94	0	0	0	0	0	0
KLX09	345.94	350.94	0	0	0	0	0	0
KLX09	350.94	355.94	0	0	0	0	0	0
KLX09	355.94	360.94	0	0	0	0	0	0
KLX09	360.94	365.94	0	0	0	0	0	0
KLX09	365.95	370.95	0	0	0	0	0	0
KLX09	370.95	375.95	0	0	0	0	0	0
KLX09	375.95	380.95	0	0	0	0	0	0
KLX09	380.95	385.95	0	0	0	0	0	0
KLX09	385.95	390.95	0	0	0	0	0	0
KLX09	390.95	395.95	0	0	0	0	0	0
KLX09	395.95	400.95	0	0	0	0	0	0
KLX09	400.95	405.95	0	0	0	0	0	0
KLX09	405.95	410.95	0	0	0	0	0	0
KLX09	410.95	415.95	0	0	0	0	0	0
KLX09	415.95	420.95	0	0	0	0	0	0
KLX09	420.96	425.96	0	0	0	0	0	0
KLX09	425.96	430.96	0	0	0	0	0	0
KLX09	430.96	435.96	0	0	0	0	0	0
KLX09	435.96	440.96	0	0	0	0	0	0
KLX09	440.96	445.96	0	0	0	0	0	0
KLX09	445.96	450.96	0	0	0	0	0	0
KLX09	450.97	455.97	0	0	0	0	0	0
KLX09	455.97	460.97	0	0	0	0	0	0
KLX09	460.97	465.97	0	0	0	0	0	0
KLX09	465.97	470.97	0	0	0	0	0	0
KLX09	470.98	475.98	0	0	0	0	0	0
KLX09	475.98	480.98	0	0	0	0	0	0
KLX09	480.98	485.98	0	0	0	0	0	0
KLX09	485.98	490.98	0	0	0	0	0	0
KLX09	490.98	495.98	1	0	0	0	0	1
KLX09	495.99	500.99	0	0	0	0	0	0
KLX09	500.99	505.99	0	0	0	0	0	0
KLX09	506.00	511.00	0	0	0	0	0	0
KLX09	511.00	516.00	0	0	0	0	0	0
KLX09	516.00	521.00	0	0	0	0	0	0
KLX09	521.01	526.01	1	0	1	0	0	0
KLX09	526.01	531.01	0	0	0	0	0	0
KLX09	531.01	536.01	5	0	3	2	0	0

Appendix 10.3

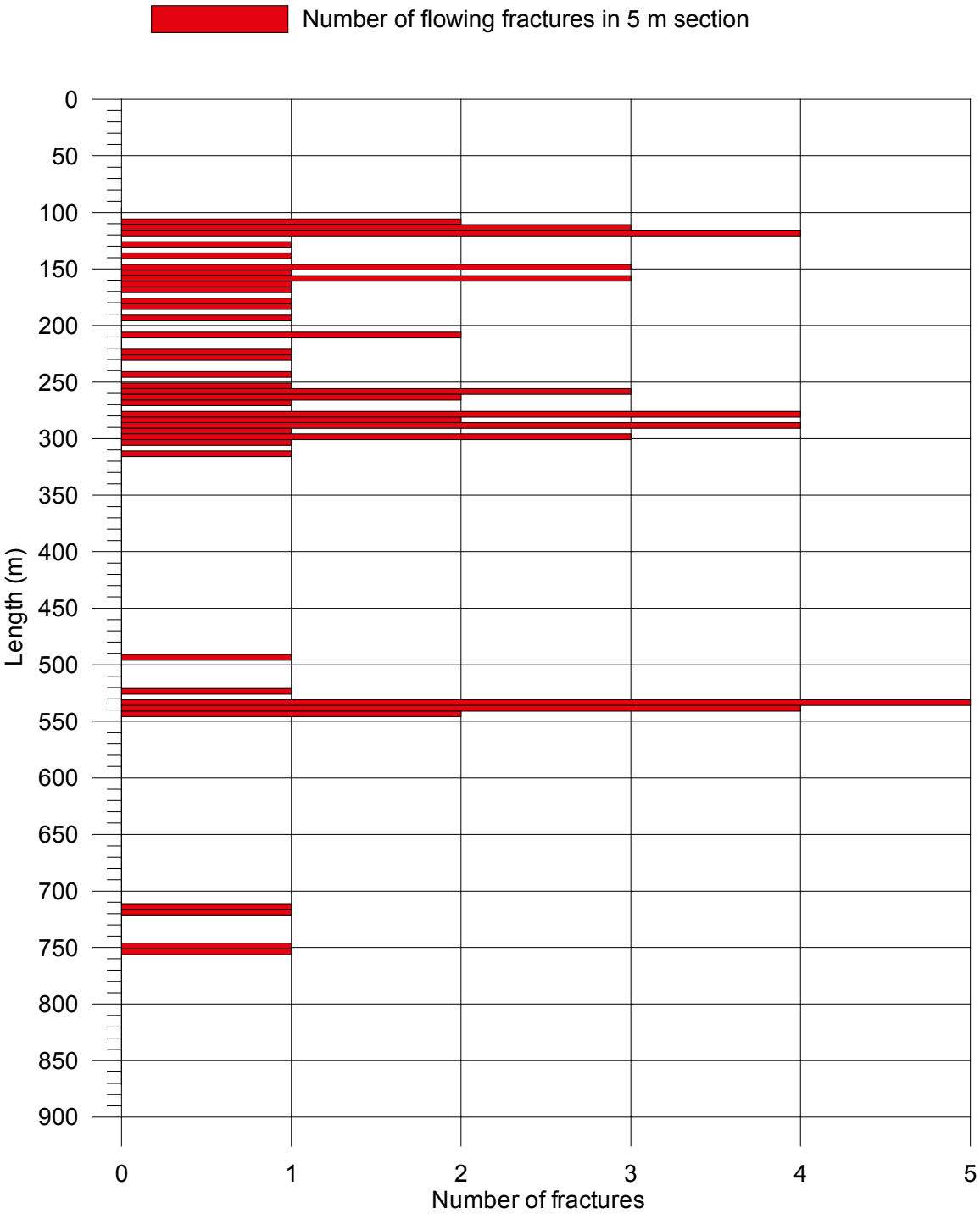
Borehole ID	Secup (m)	Seclow (m)	Number of fractures, total	Number of fractures 10–100 (ml/h)	Number of fractures 100–1,000 (ml/h)	Number of fractures 1,000–10,000 (ml/h)	Number of fractures 10,000–100,000 (ml/h)	Number of fractures 100,000–1,000,000 (ml/h)
KLX09	536.01	541.01	4	0	1	2	1	0
KLX09	541.01	546.01	2	0	1	1	0	0
KLX09	546.02	551.02	0	0	0	0	0	0
KLX09	551.03	556.03	0	0	0	0	0	0
KLX09	556.03	561.03	0	0	0	0	0	0
KLX09	561.04	566.04	0	0	0	0	0	0
KLX09	566.04	571.04	0	0	0	0	0	0
KLX09	571.05	576.05	0	0	0	0	0	0
KLX09	576.06	581.06	0	0	0	0	0	0
KLX09	581.06	586.06	0	0	0	0	0	0
KLX09	586.07	591.07	0	0	0	0	0	0
KLX09	591.08	596.08	0	0	0	0	0	0
KLX09	596.08	601.08	0	0	0	0	0	0
KLX09	601.09	606.09	0	0	0	0	0	0
KLX09	606.09	611.09	0	0	0	0	0	0
KLX09	611.10	616.10	0	0	0	0	0	0
KLX09	616.10	621.10	0	0	0	0	0	0
KLX09	621.11	626.11	0	0	0	0	0	0
KLX09	626.11	631.11	0	0	0	0	0	0
KLX09	631.12	636.12	0	0	0	0	0	0
KLX09	636.12	641.12	0	0	0	0	0	0
KLX09	641.13	646.13	0	0	0	0	0	0
KLX09	646.14	651.14	0	0	0	0	0	0
KLX09	651.14	656.14	0	0	0	0	0	0
KLX09	656.15	661.15	0	0	0	0	0	0
KLX09	661.15	666.15	0	0	0	0	0	0
KLX09	666.16	671.16	0	0	0	0	0	0
KLX09	671.16	676.16	0	0	0	0	0	0
KLX09	676.17	681.17	0	0	0	0	0	0
KLX09	681.17	686.17	0	0	0	0	0	0
KLX09	686.18	691.18	0	0	0	0	0	0
KLX09	691.18	696.18	0	0	0	0	0	0
KLX09	696.19	701.19	0	0	0	0	0	0
KLX09	701.19	706.19	0	0	0	0	0	0
KLX09	706.20	711.20	0	0	0	0	0	0
KLX09	711.20	716.20	1	0	0	0	0	0
KLX09	716.20	721.20	1	0	0	0	0	0
KLX09	721.20	726.20	0	0	0	0	0	0
KLX09	726.21	731.21	0	0	0	0	0	0
KLX09	731.21	736.21	0	0	0	0	0	0
KLX09	736.21	741.21	0	0	0	0	0	0
KLX09	741.21	746.21	0	0	0	0	0	0
KLX09	746.21	751.21	1	0	0	0	0	0
KLX09	751.21	756.21	1	0	0	0	0	0
KLX09	756.21	761.21	0	0	0	0	0	0

Appendix 10.4

Borehole ID	Secup (m)	Seclow (m)	Number of fractures, total	Number of fractures 10–100 (ml/h)	Number of fractures 100–1,000 (ml/h)	Number of fractures 1,000–10,000 (ml/h)	Number of fractures 10,000–100,000 (ml/h)	Number of fractures 100,000–1,000,000 (ml/h)
KLX09	761.22	766.22	0	0	0	0	0	0
KLX09	766.24	771.24	0	0	0	0	0	0
KLX09	771.25	776.25	0	0	0	0	0	0
KLX09	776.26	781.26	0	0	0	0	0	0
KLX09	781.28	786.28	0	0	0	0	0	0
KLX09	786.29	791.29	0	0	0	0	0	0
KLX09	791.30	796.30	0	0	0	0	0	0
KLX09	796.32	801.32	0	0	0	0	0	0
KLX09	801.33	806.33	0	0	0	0	0	0
KLX09	806.34	811.34	0	0	0	0	0	0
KLX09	811.35	816.35	0	0	0	0	0	0
KLX09	816.35	821.35	0	0	0	0	0	0
KLX09	821.36	826.36	0	0	0	0	0	0
KLX09	826.37	831.37	0	0	0	0	0	0
KLX09	831.38	836.38	0	0	0	0	0	0
KLX09	836.39	841.39	0	0	0	0	0	0
KLX09	841.40	846.40	0	0	0	0	0	0
KLX09	846.41	851.41	0	0	0	0	0	0
KLX09	851.42	856.42	0	0	0	0	0	0
KLX09	856.43	861.43	0	0	0	0	0	0
KLX09	861.44	866.44	0	0	0	0	0	0
KLX09	866.45	871.45	0	0	0	0	0	0

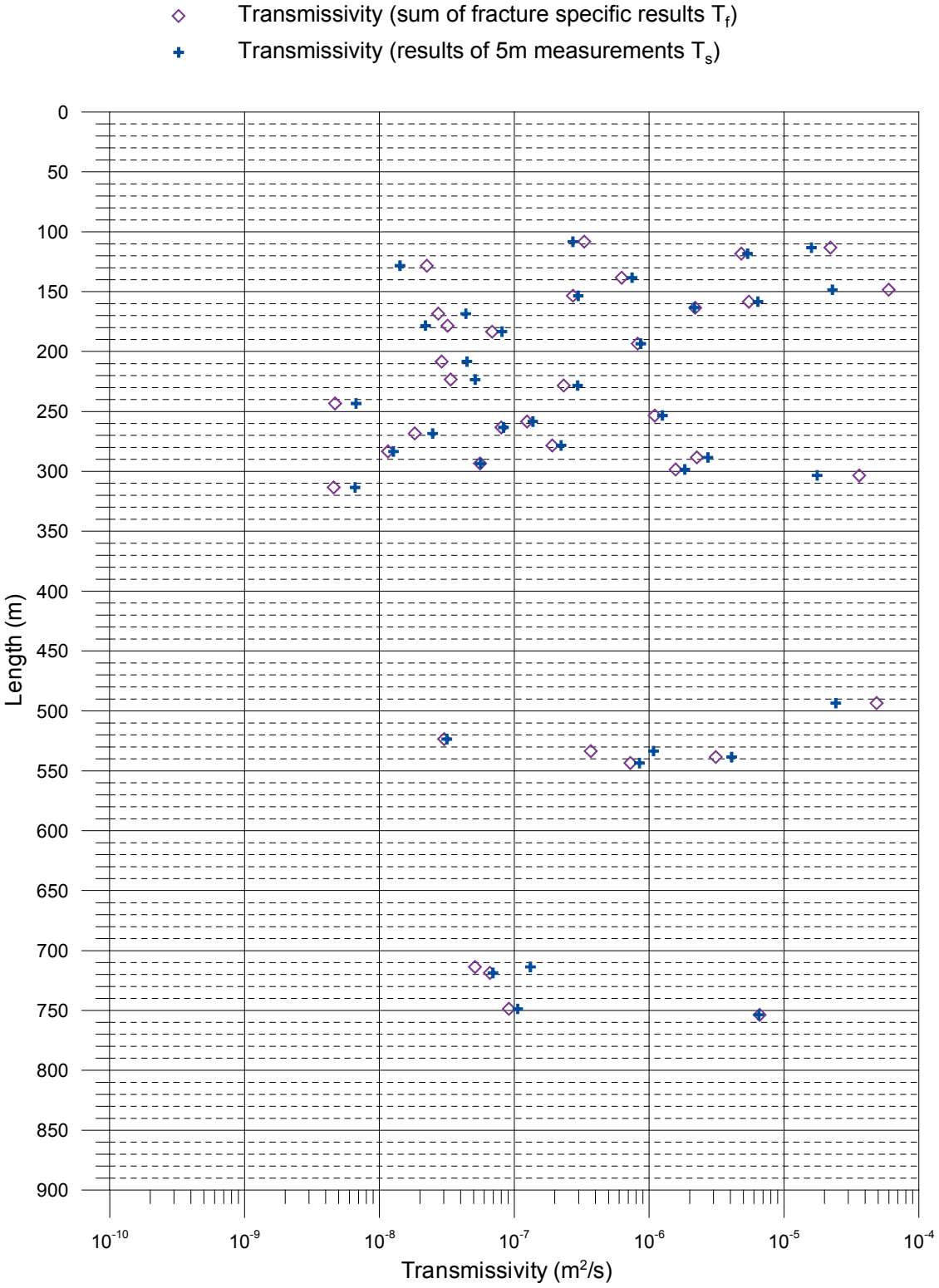
Appendix 11

Laxemar, borehole KLX09
Calculation of conductive fracture frequency



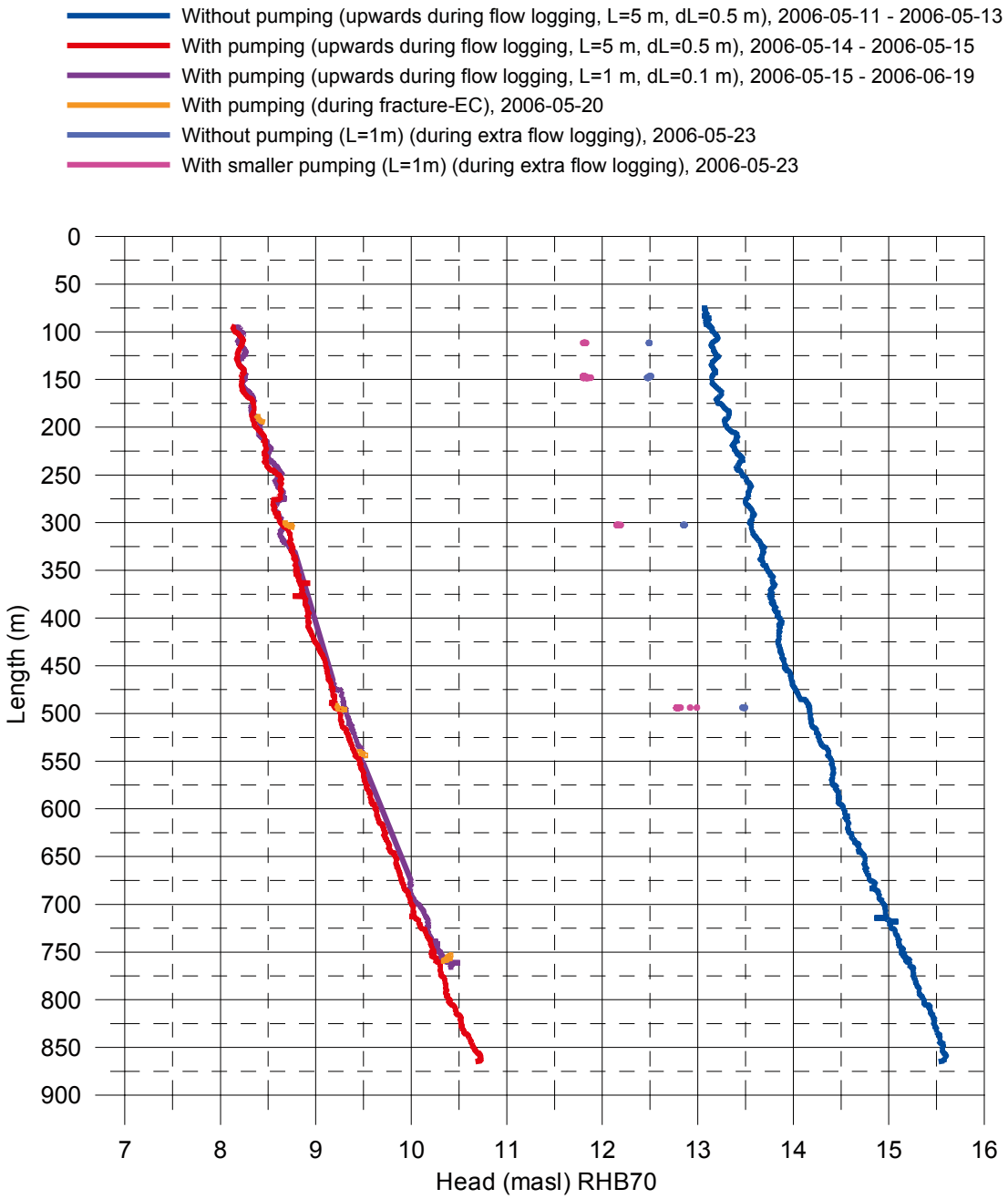
Appendix 12

Laxemar, borehole KLX09
Comparison between section transmissivity and fracture transmissivity



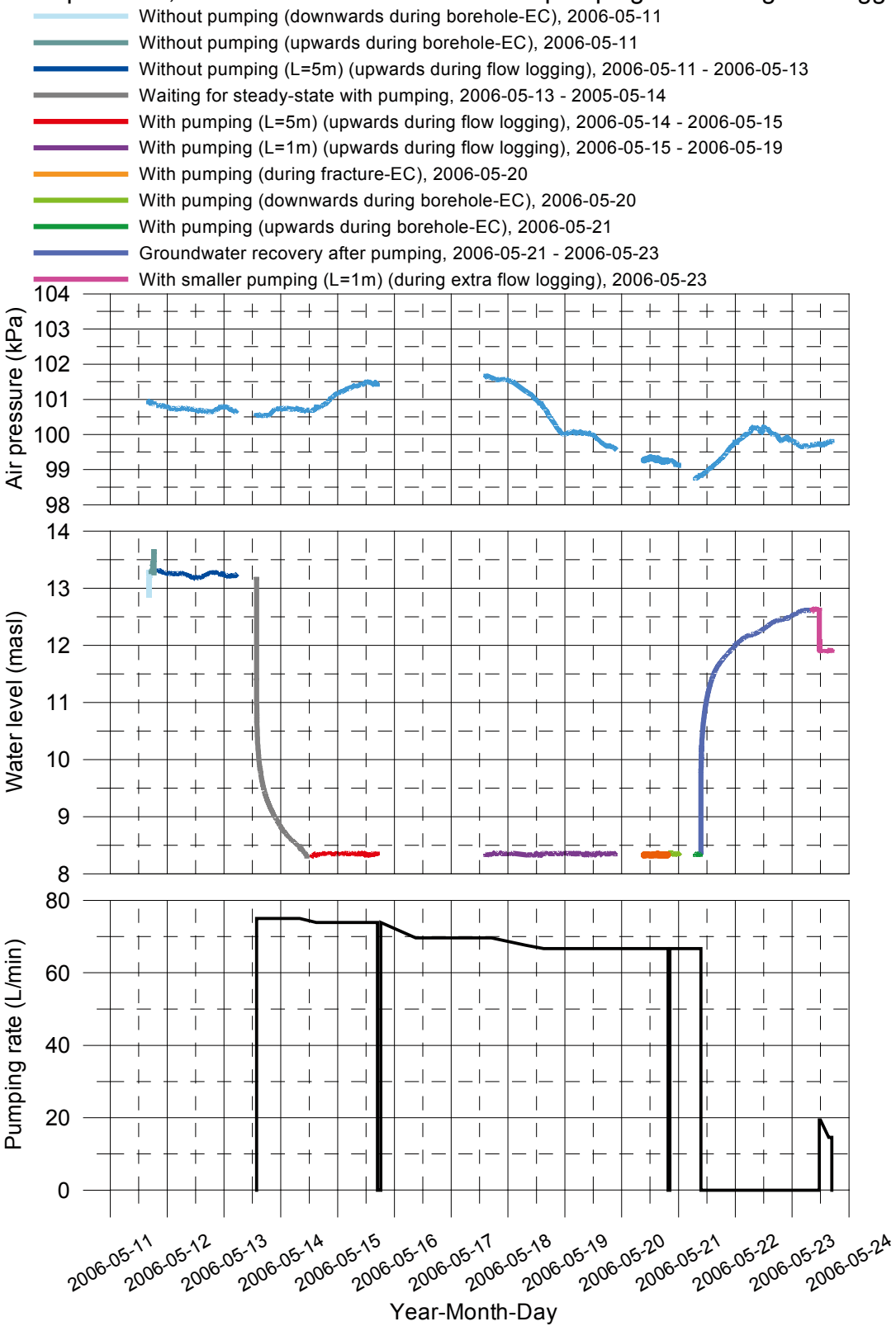
Laxemar, borehole KLX09
Head in the borehole during flow logging

Head(masl)= (Absolute pressure (Pa) - Airpressure (Pa) + Offset) /(1000 kg/m^3 * 9.80665 m/s^2) + Elevation (m)
Offset = 2460 Pa (Correction for absolut pressure sensor)



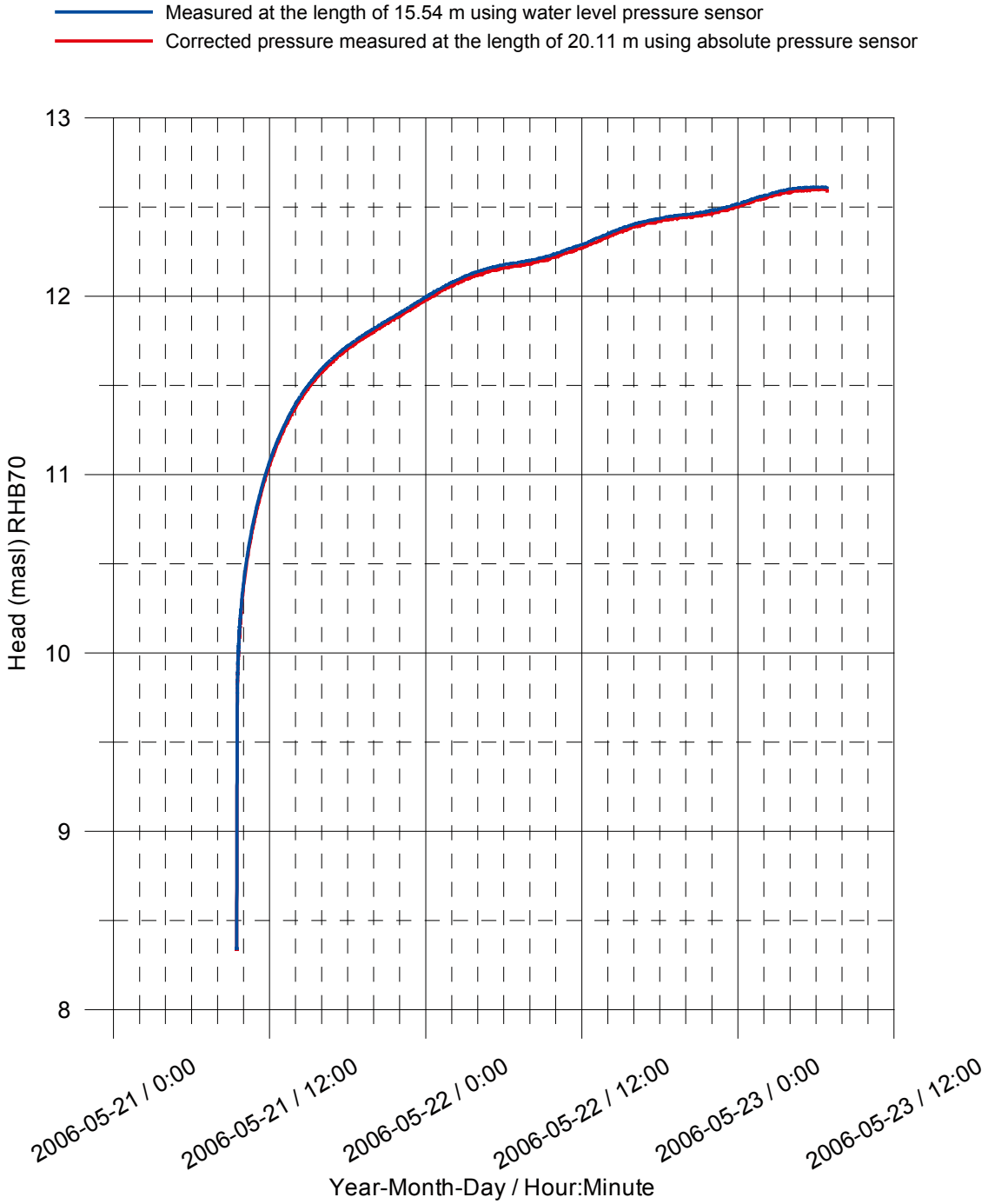
Appendix 13.2

Laxemar, borehole KLX09
Air pressure, water level in the borehole and pumping rate during flow logging



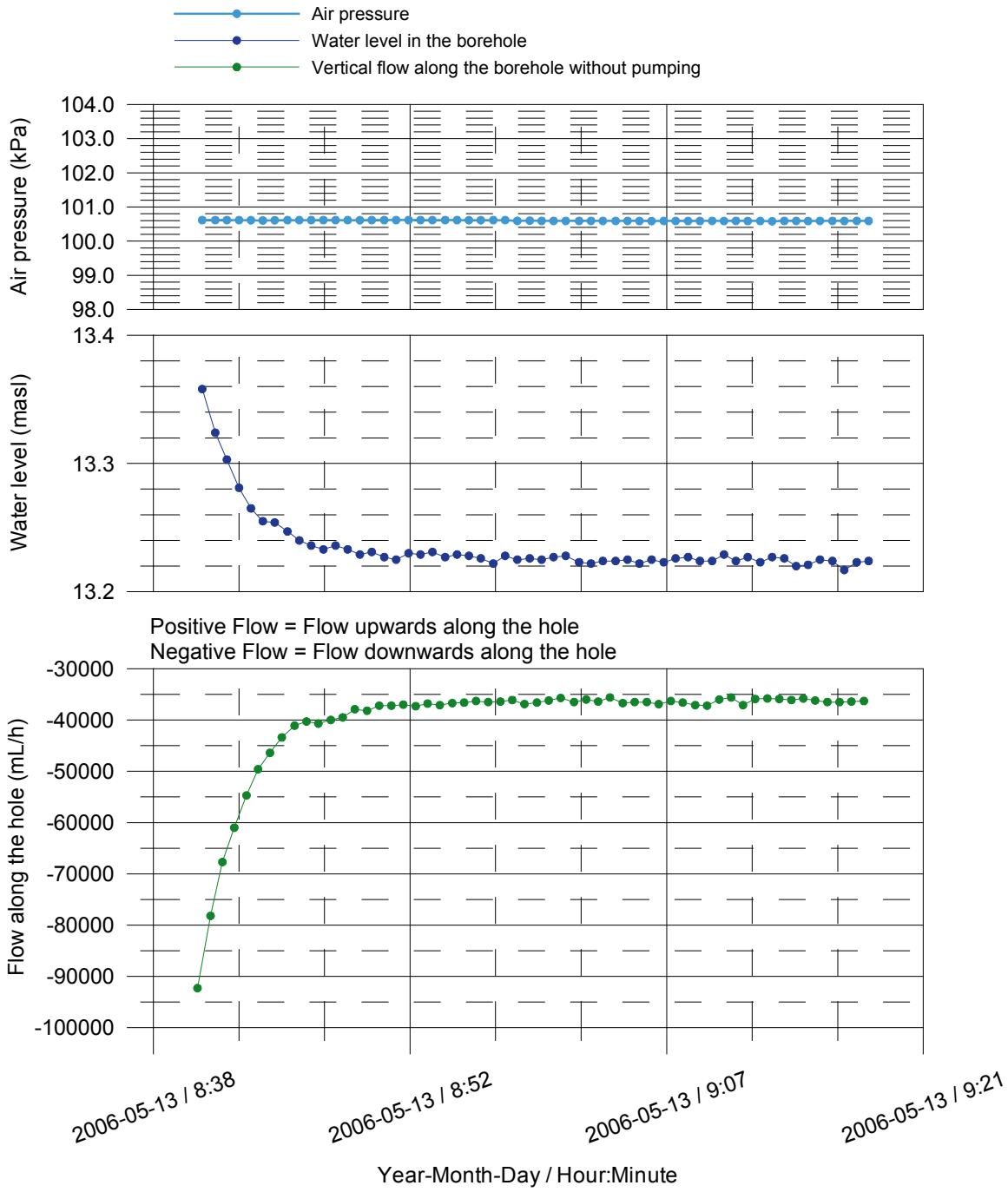
Laxemar, borehole KLX09
Groundwater recovery after pumping

Head(masl)= (Absolute pressure (Pa) - Airpressure (Pa) + Offset) /(1000 kg/m^3 * 9.80665 m/s^2) + Elevation (m)
Offset = 2460 Pa (Correction for absolut pressure sensor)



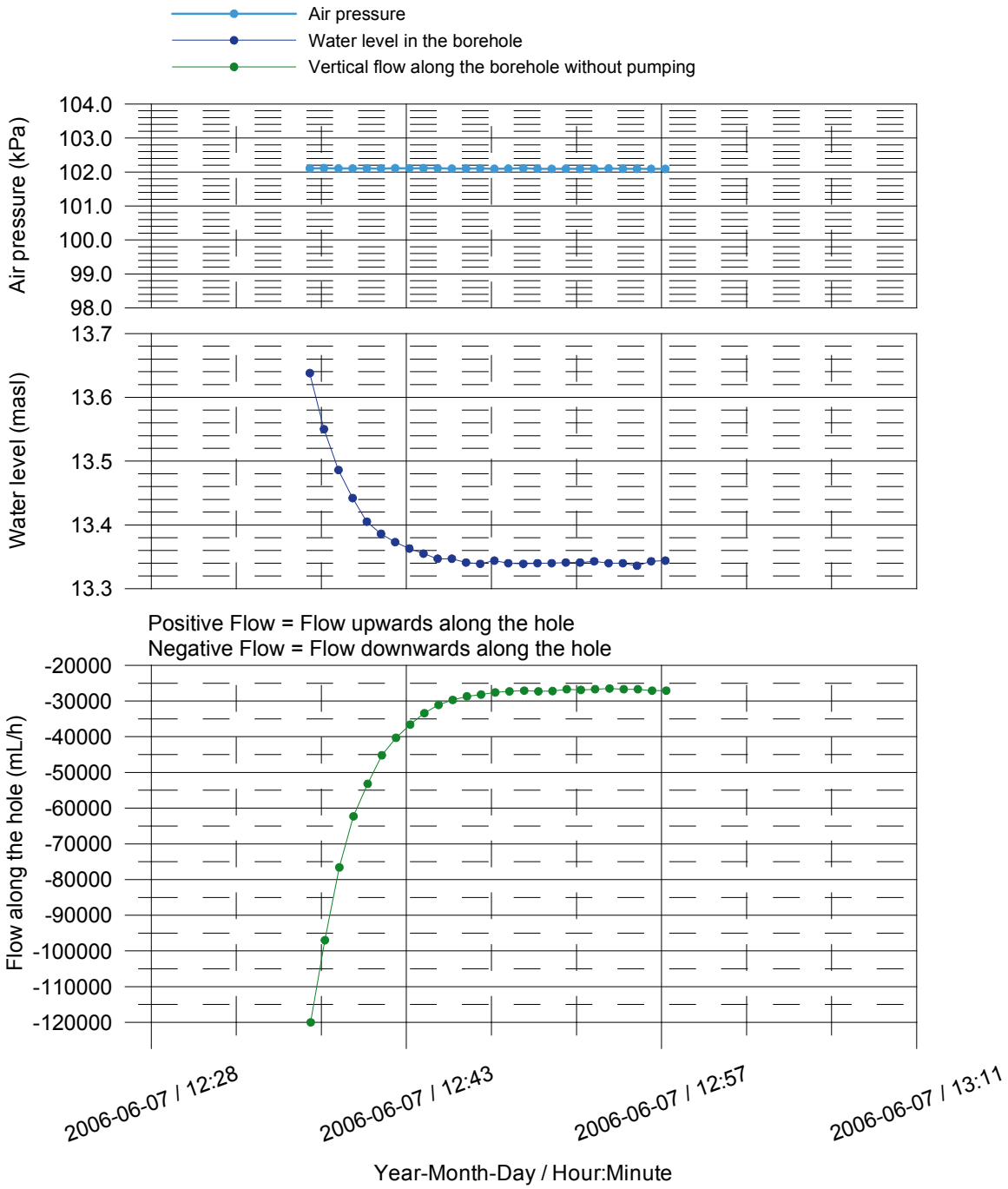
Appendix 13.4

Laxemar, borehole KLX09
Vertical flow along the borehole at the length of 101.55 m

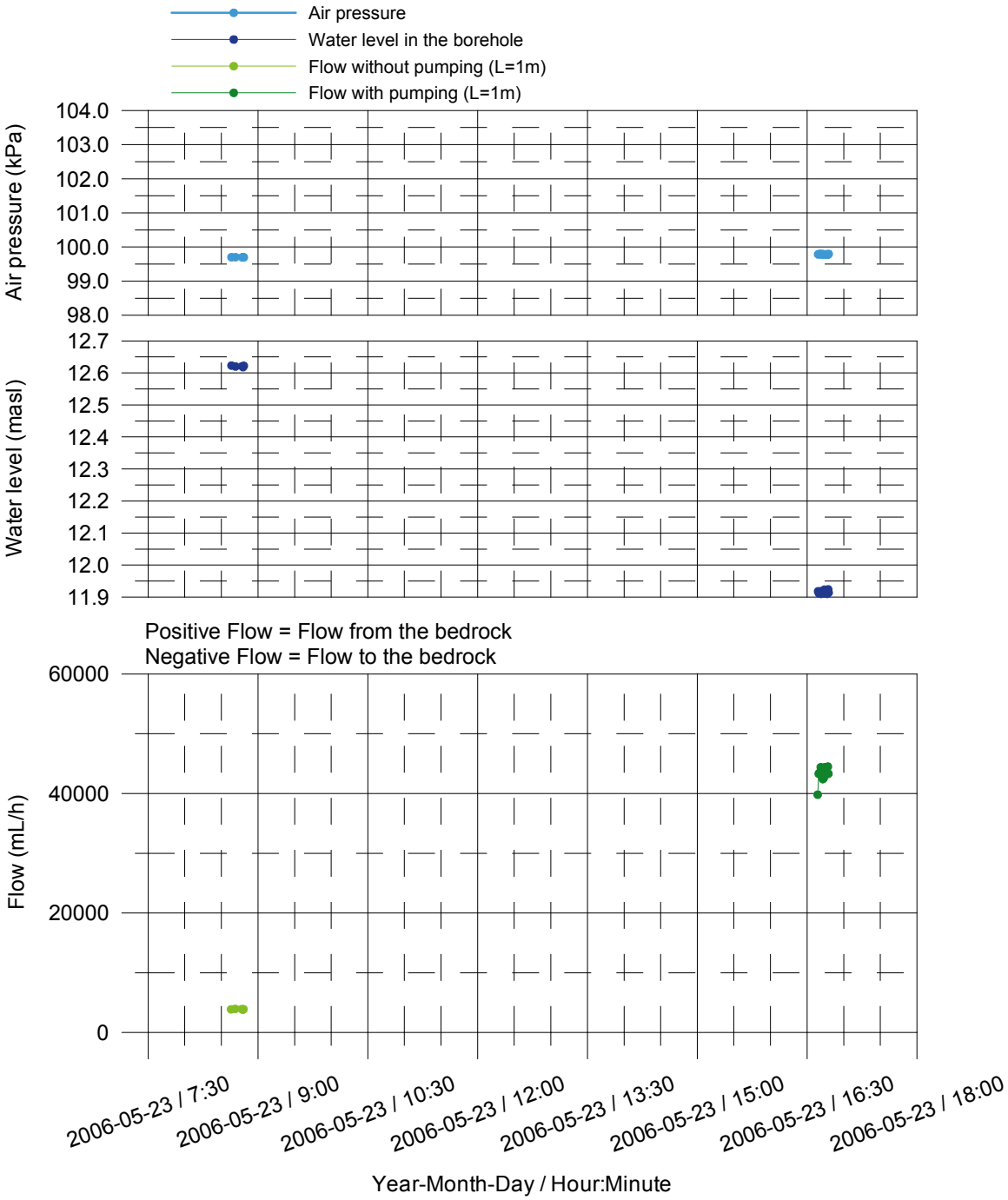


Appendix 13.5

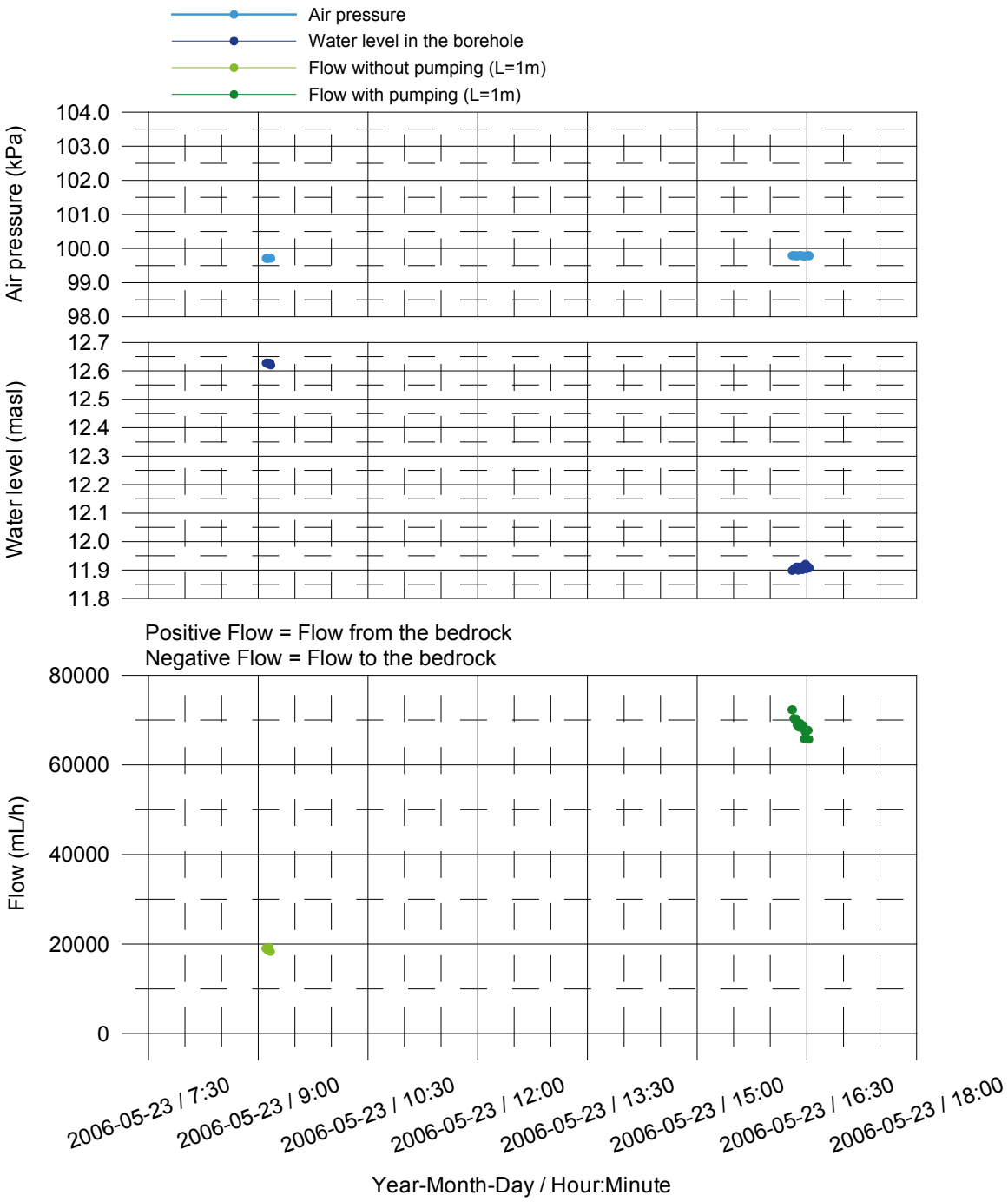
Laxemar, borehole KLX09
Vertical flow along the borehole at the length of 102.85 m



Laxemar, borehole KLX09
Flow without pumping and with smaller pumping at the length 112.12m

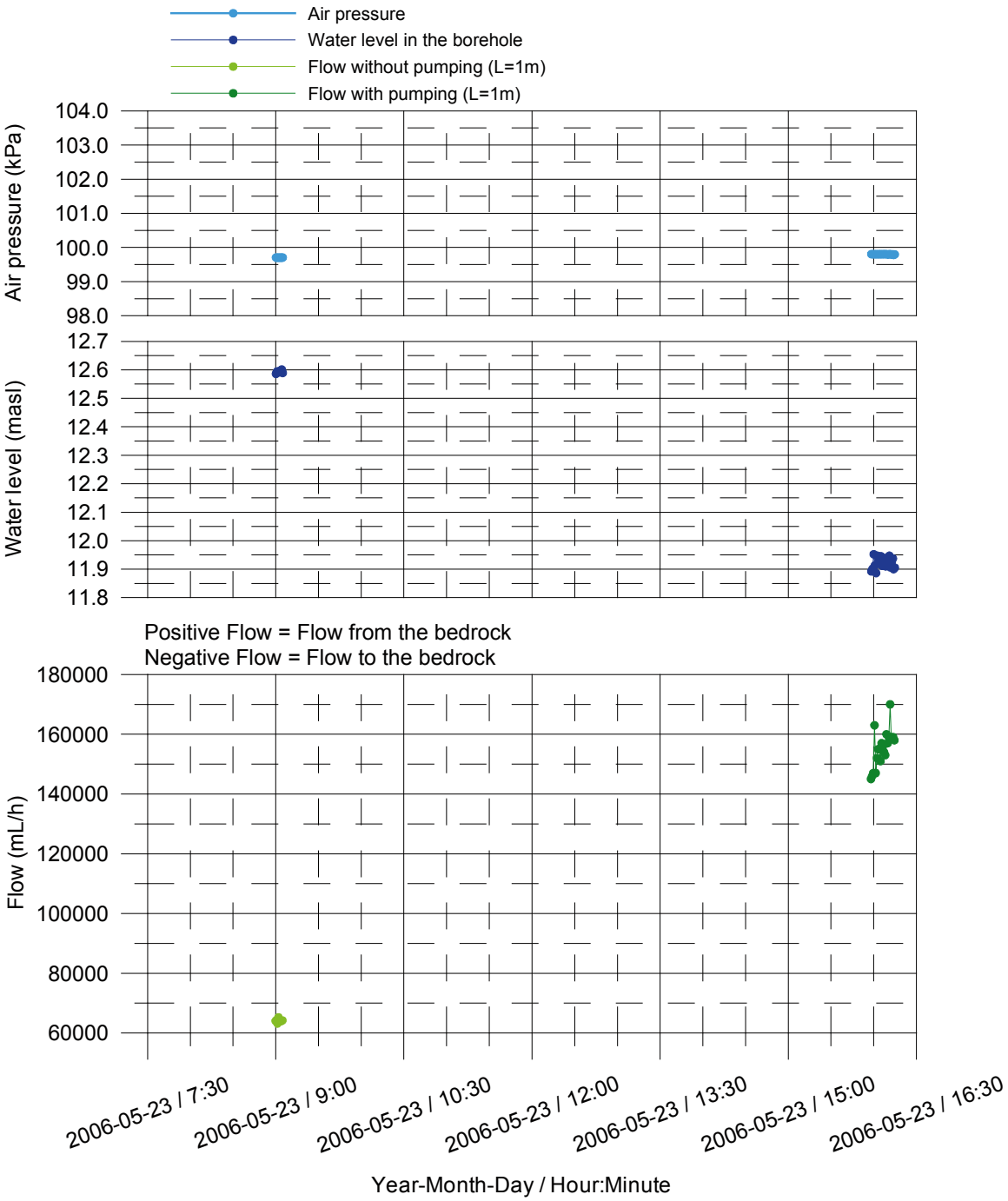


Laxemar, borehole KLX09
Flow without pumping and with smaller pumping at the length 147.12m

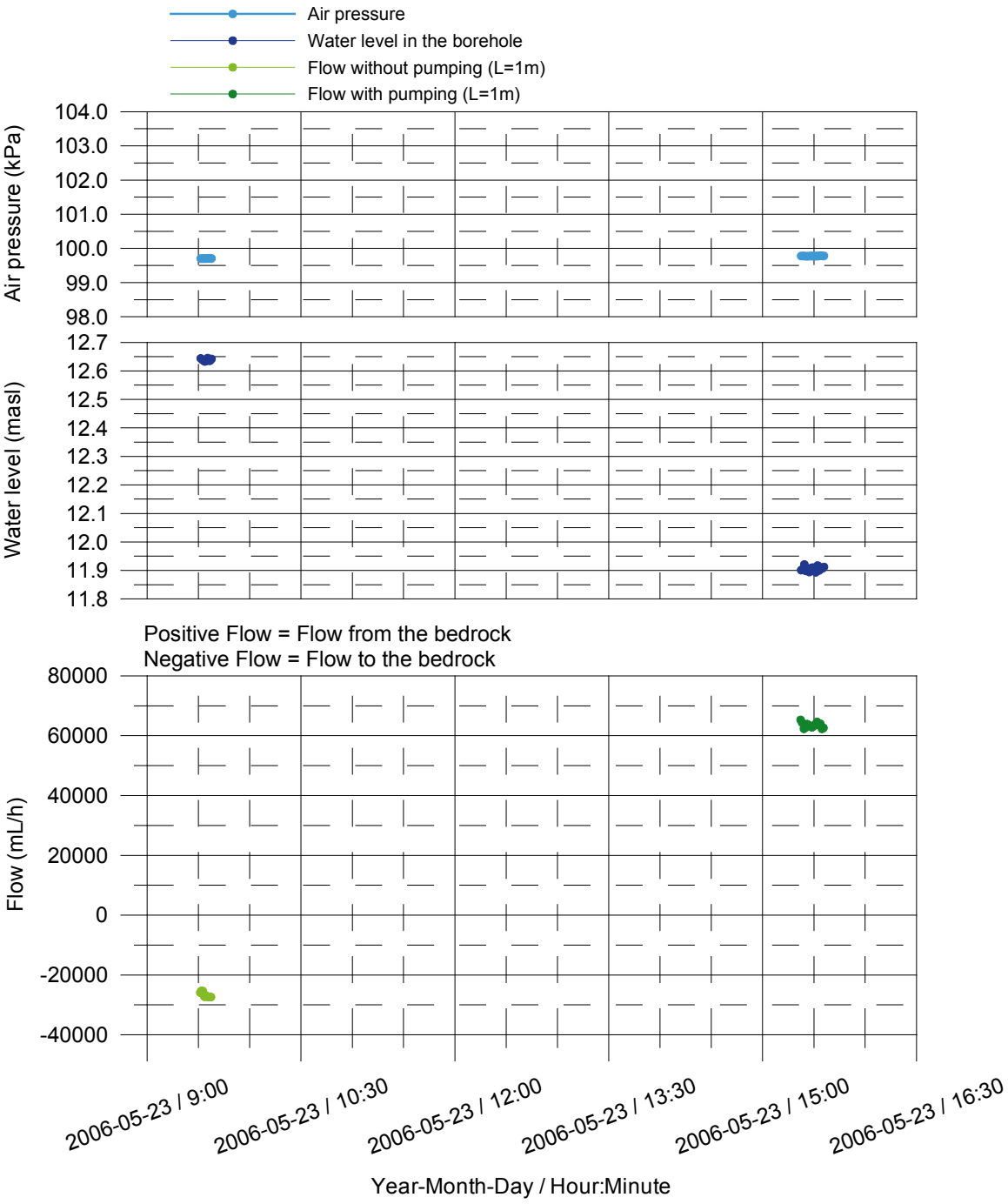


Appendix 15.3

Laxemar, borehole KLX09
Flow without pumping and with smaller pumping at the length 148.62m

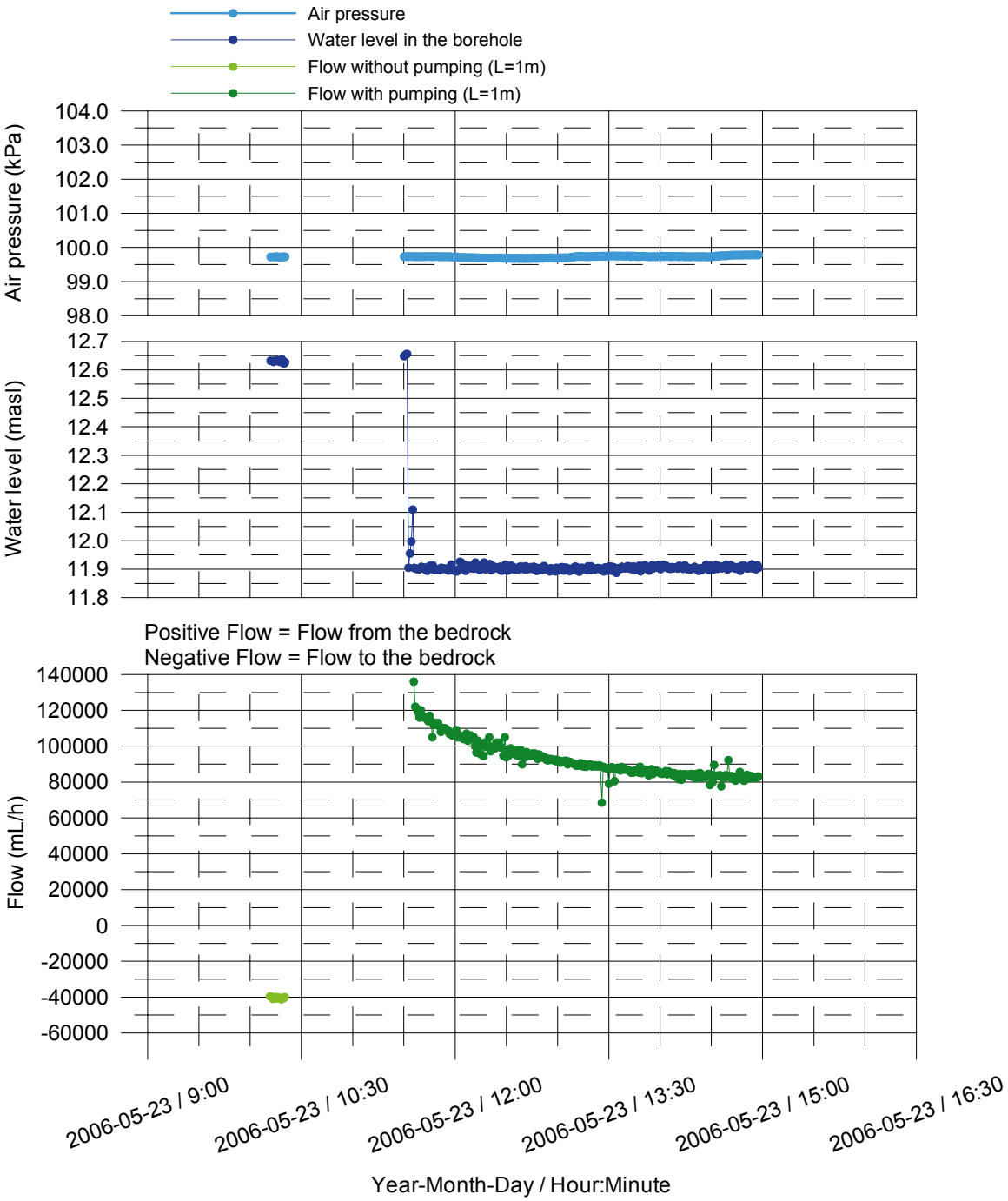


Laxemar, borehole KLX09
Flow without pumping and with smaller pumping at the length 302.98m

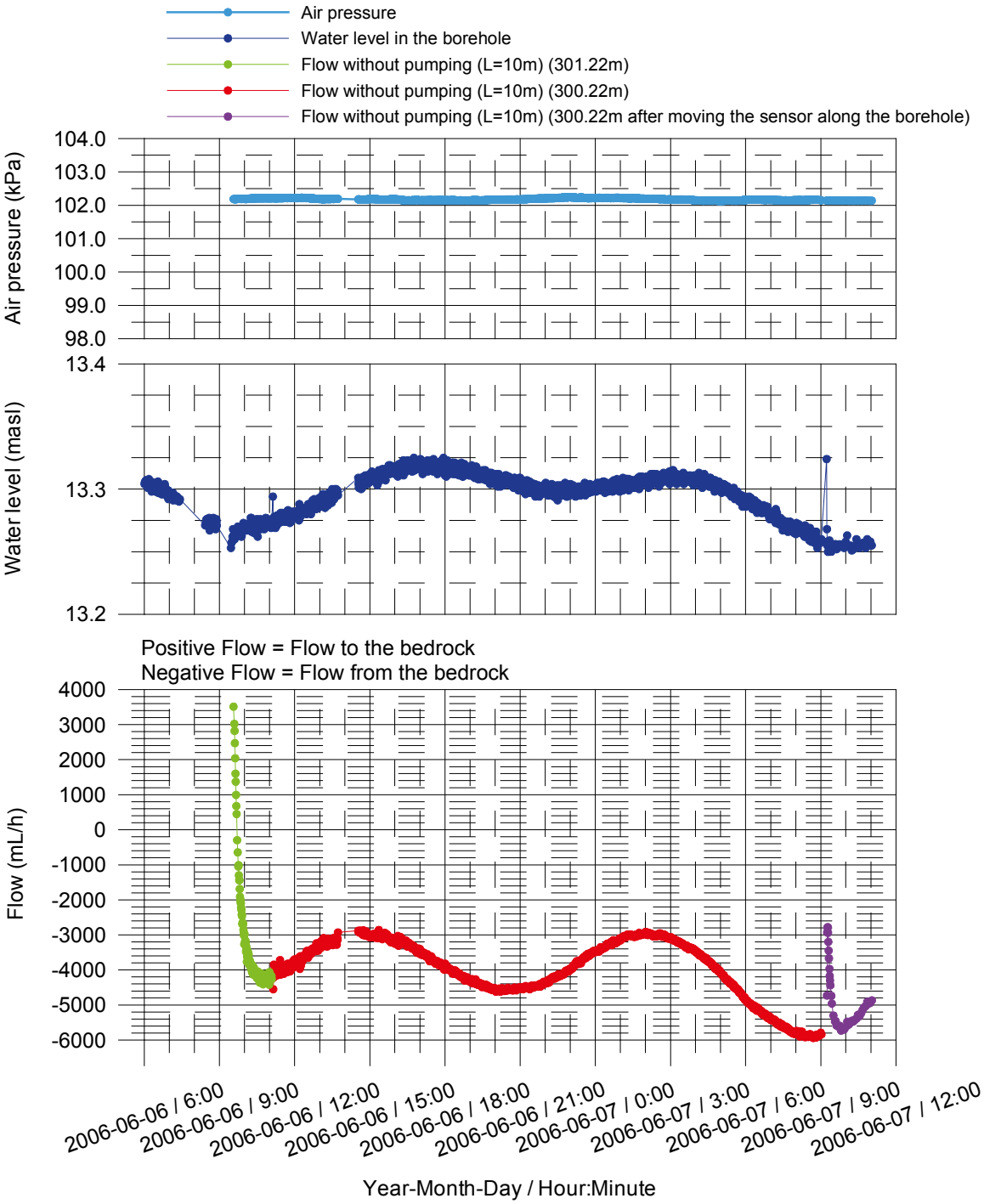


Appendix 15.5

Laxemar, borehole KLX09
Flow without pumping and with smaller pumping at the length 494.32m

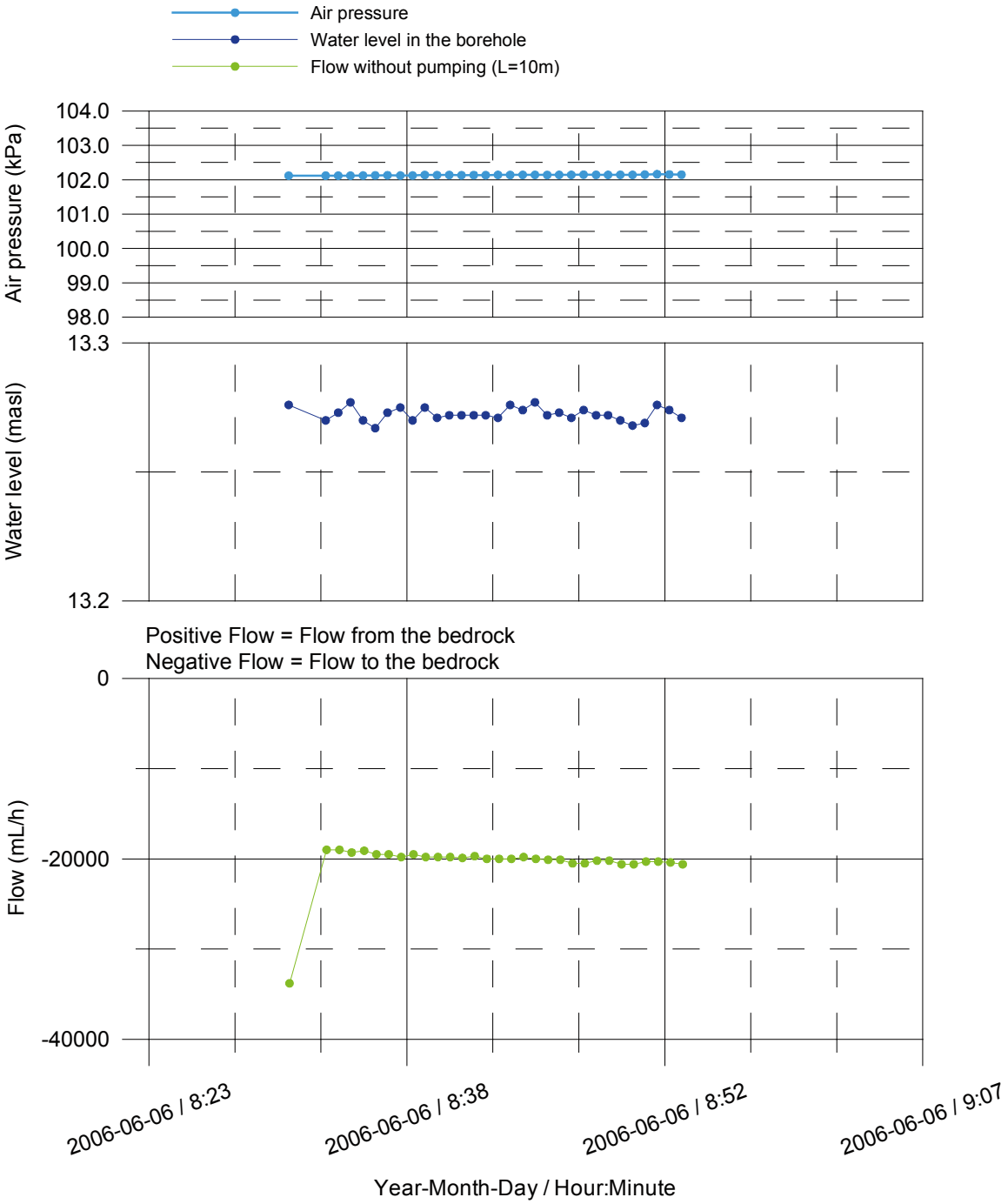


Laxemar, borehole KLX09
Flow without pumping at the length 301.22m and 300.22m

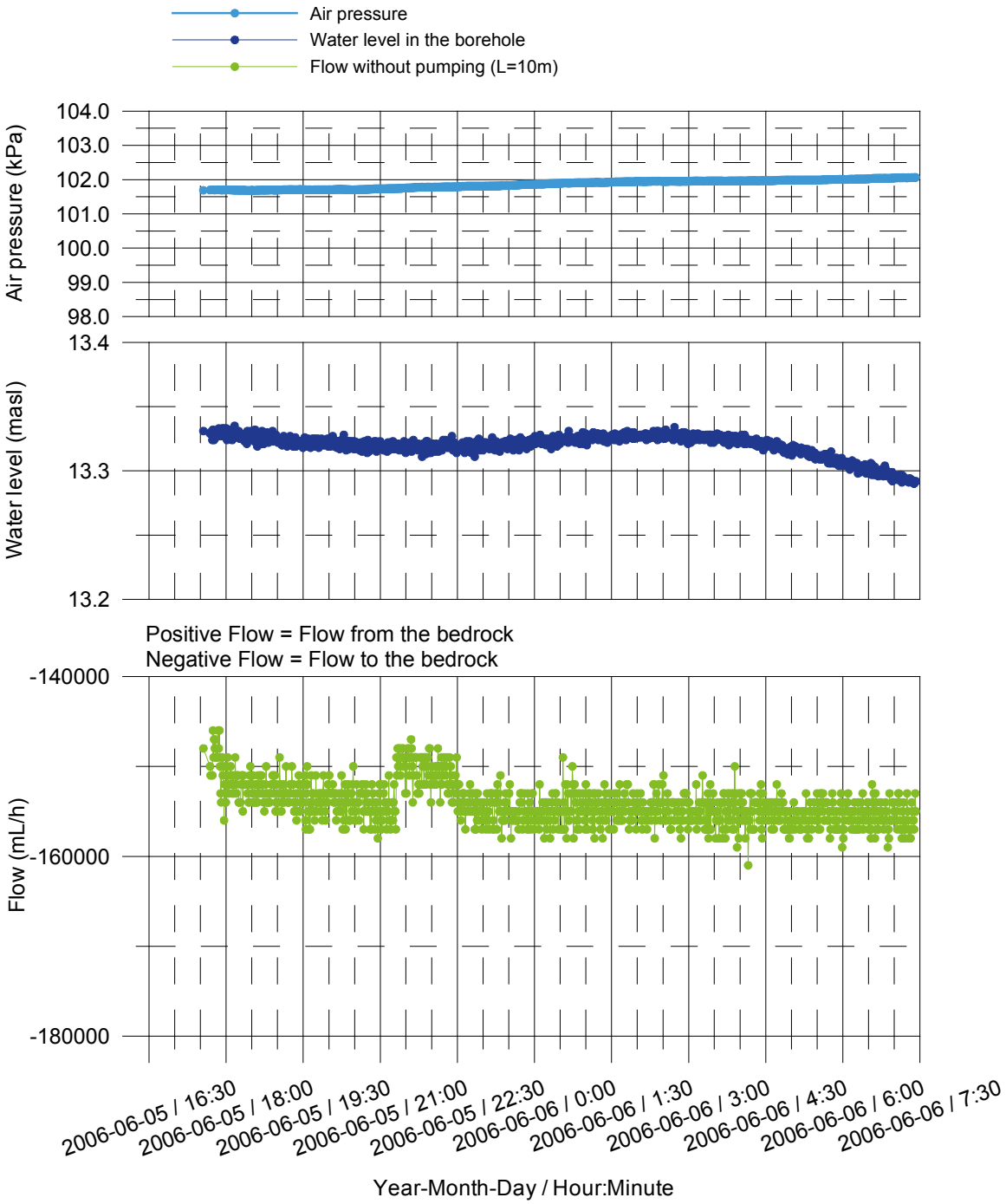


Appendix 16.2

Laxemar, borehole KLX09
Flow without pumping at the length 491.27m



Laxemar, borehole KLX09
Flow without pumping at the length 752.51m



CM Gruppen AB, Bromma, 2008