P-06-184

Supplement 1

August 2007

Oskarshamn site investigation

Difference flow logging of borehole KLX18A

Subarea Laxemar

Mikael Sokolnicki, Stefan Kristiansson, Juha Väisäsvaara
PRG-Tec Oy

Svensk Kärnbränslehantering AB
Swedish Nuclear Fuel
and Waste Management Co
Box 250, SE-101 24 Stockholm
Tel +46 8 459 84 00

Description

In the present supplement to SKB P-06-184 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:

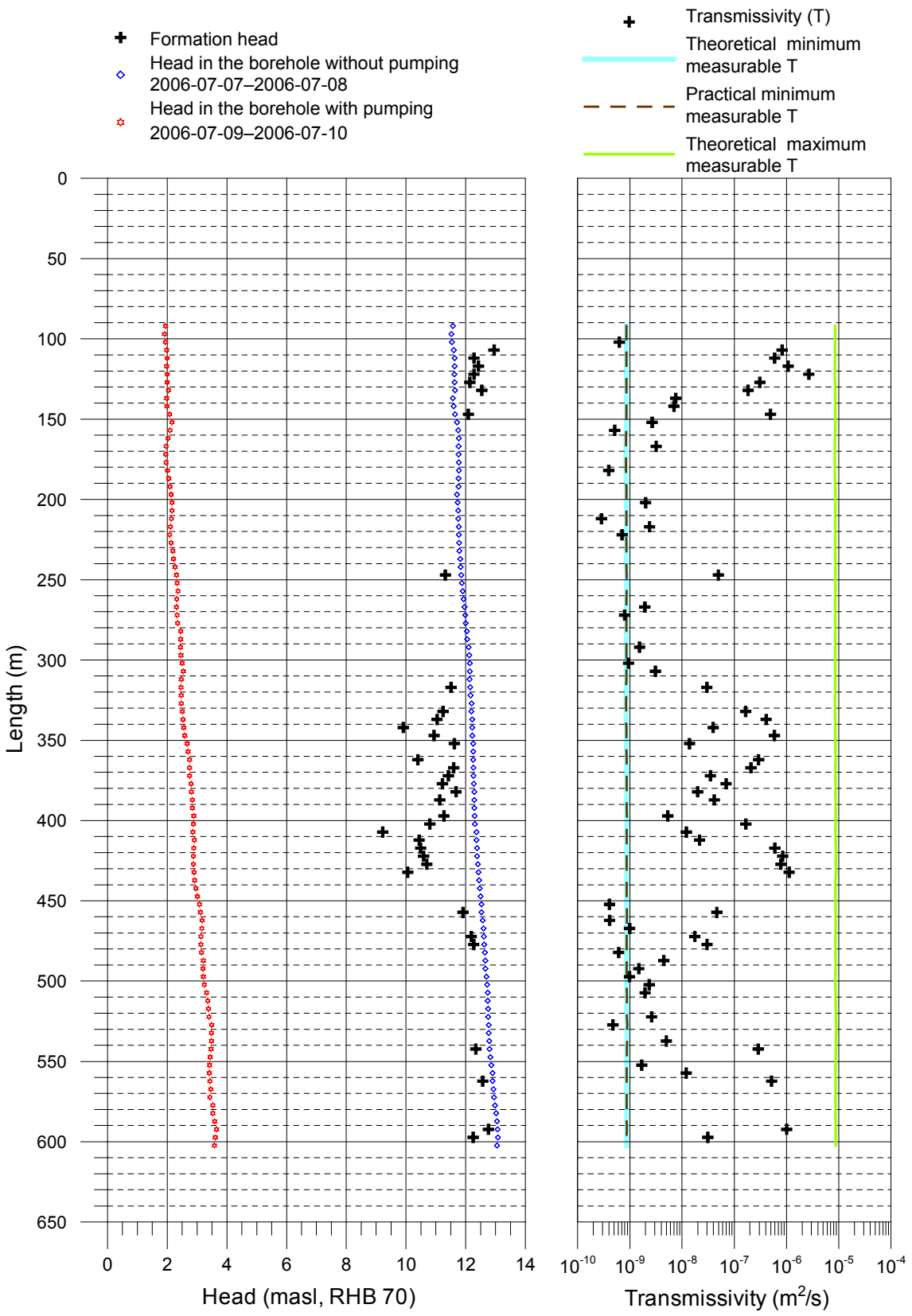
Revised appendices	Appendix number
Transmissivity and head of 5 m sections	Appendix 4.2
Transmissivity and head of detected fractures	Appendix 5
Sequential flow logging	Appendix 7.1–7.4
Inferred flow anomalies from overlapping flow logging	Appendix 8.1–8.4
Conductive fracture frequency	Appendix 10.1–10.3
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 101.8 m	Appendix 13.4

Reference

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

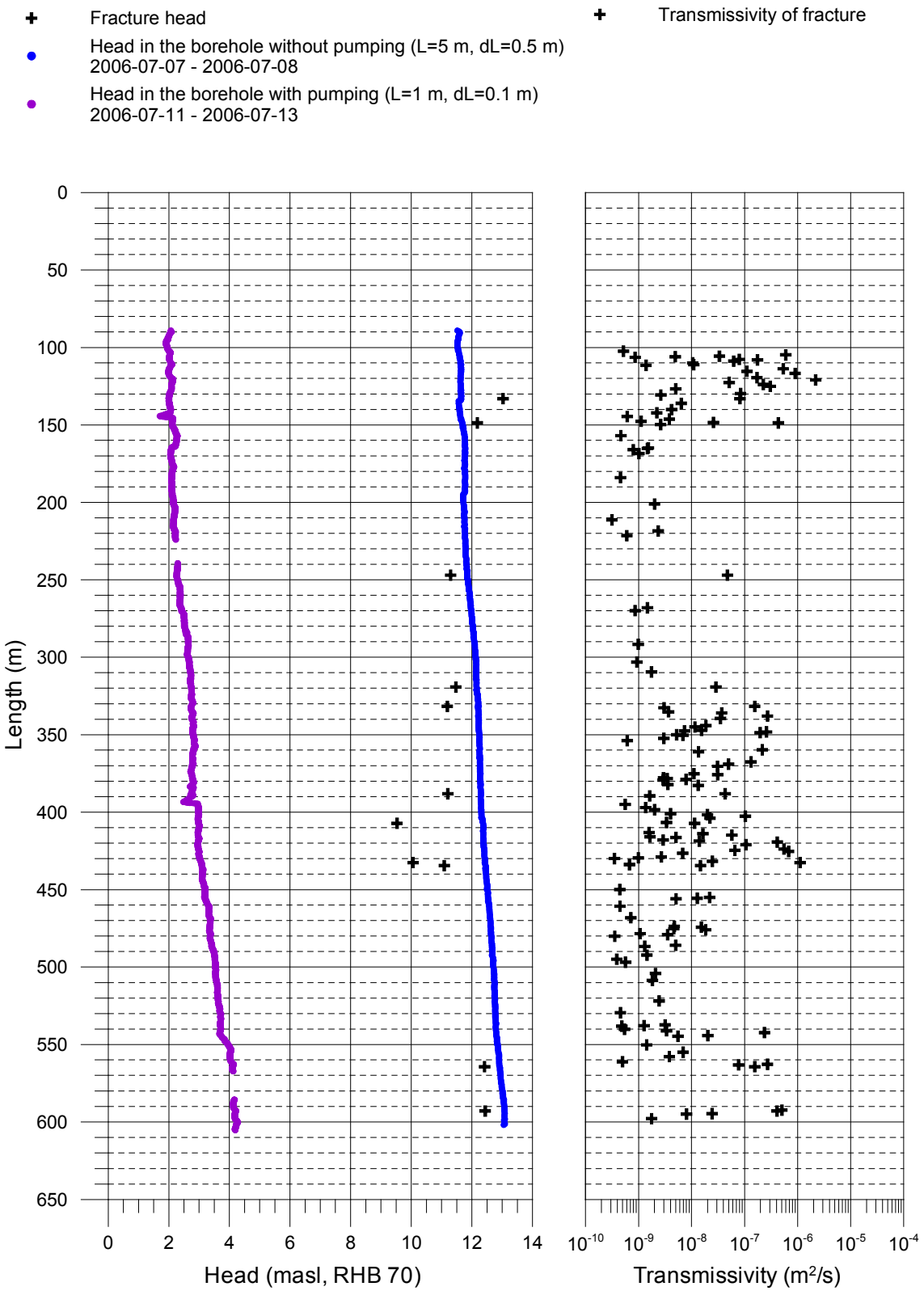
Appendix 4.2

Laxemar, borehole KLX18A
Transmissivity and head of 5 m sections



Appendix 5

Laxemar, borehole KLX18A
Transmissivity and head of detected fractures



Appendix 7.1

Difference flow logging – Sequential flow logging

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
KLX18A	89.54	94.54	5	–	11.57	–	1.94	–	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	94.55	99.55	5	–	11.52	–	1.91	–	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	99.56	104.56	5	–	11.54	6.11E–09	1.94	6.3E–10	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	104.56	109.56	5	1.13E–06	11.60	9.17E–06	1.98	8.3E–07	13.0	30	8.6E–10	8.6E–10	8.5E–06	
KLX18A	109.56	114.56	5	3.89E–07	11.63	6.17E–06	2.00	5.9E–07	12.3	30	8.6E–10	8.6E–10	8.5E–06	
KLX18A	114.56	119.56	5	8.67E–07	11.63	1.14E–05	1.98	1.1E–06	12.4	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	119.56	124.56	5	1.79E–06	11.62	2.78E–05	2.00	2.7E–06	12.3	30	8.6E–10	8.6E–10	8.4E–06	
KLX18A	124.55	129.55	5	1.58E–07	11.63	3.17E–06	2.00	3.1E–07	12.1	30	8.6E–10	8.6E–10	8.5E–06	
KLX18A	129.55	134.55	5	1.68E–07	11.64	1.95E–06	2.04	1.8E–07	12.5	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	134.54	139.54	5	–	11.57	7.33E–08	1.98	7.6E–09	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	139.49	144.49	5	–	11.60	6.78E–08	1.99	7.0E–09	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	144.49	149.49	5	2.25E–07	11.64	4.97E–06	2.08	4.9E–07	12.1	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	149.49	154.49	5	–	11.71	2.58E–08	2.16	2.7E–09	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	154.49	159.49	5	–	11.75	5.00E–09	2.09	5.1E–10	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	159.46	164.46	5	–	11.77	–	2.03	–	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	164.47	169.47	5	–	11.76	3.17E–08	1.96	3.2E–09	–	30	8.4E–10	8.4E–10	8.4E–06	
KLX18A	169.48	174.48	5	–	11.76	–	1.95	–	–	30	8.4E–10	8.4E–10	8.4E–06	
KLX18A	174.49	179.49	5	–	11.77	–	1.96	–	–	30	8.4E–10	8.4E–10	8.4E–06	
KLX18A	179.50	184.50	5	–	11.77	3.89E–09	2.01	3.9E–10	–	30	8.4E–10	8.4E–10	8.4E–06	
KLX18A	184.51	189.51	5	–	11.76	–	2.05	–	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	189.52	194.52	5	–	11.76	–	2.09	–	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	194.53	199.53	5	–	11.71	–	2.13	–	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	199.51	204.51	5	–	11.73	1.94E–08	2.16	2.0E–09	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	204.50	209.50	5	–	11.75	–	2.16	–	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	209.51	214.51	5	–	11.75	2.78E–09	2.14	2.9E–10	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	214.52	219.52	5	–	11.77	2.33E–08	2.11	2.4E–09	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	219.53	224.53	5	–	11.77	6.94E–09	2.08	7.1E–10	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	224.54	229.54	5	–	11.78	–	2.13	–	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	229.55	234.55	5	–	11.79	–	2.19	–	–	30	8.6E–10	8.6E–10	8.6E–06	

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
KLX18A	234.56	239.56	5	–	11.82	–	2.21	–	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	239.57	244.57	5	–	11.83	–	2.26	–	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	244.58	249.58	5	–2.67E–08	11.85	4.50E–07	2.31	4.9E–08	11.3	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	249.59	254.59	5	–	11.87	–	2.33	–	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	254.59	259.59	5	–	11.90	–	2.36	–	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	259.58	264.58	5	–	11.93	–	2.32	–	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	264.57	269.57	5	–	11.96	1.89E–08	2.31	1.9E–09	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	269.56	274.56	5	–	11.99	7.78E–09	2.33	8.0E–10	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	274.55	279.55	5	–	12.00	–	2.35	–	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	279.54	284.54	5	–	12.04	–	2.45	–	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	284.53	289.53	5	–	12.05	–	2.45	–	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	289.52	294.52	5	–	12.10	1.50E–08	2.44	1.5E–09	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	294.52	299.52	5	–	12.12	–	2.46	–	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	299.52	304.52	5	–	12.14	9.17E–09	2.50	9.4E–10	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	304.52	309.52	5	–	12.14	3.00E–08	2.54	3.1E–09	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	309.53	314.53	5	–	12.13	–	2.47	–	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	314.53	319.53	5	–1.94E–08	12.15	2.74E–07	2.46	3.0E–08	11.5	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	319.54	324.54	5	–	12.16	–	2.47	–	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	324.55	329.55	5	–	12.20	–	2.47	–	–	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	329.57	334.57	5	–1.59E–07	12.19	1.46E–06	2.51	1.7E–07	11.2	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	334.57	339.57	5	–4.86E–07	12.22	3.50E–06	2.53	4.1E–07	11.0	30	8.5E–10	8.5E–10	8.6E–06	
KLX18A	339.58	344.58	5	–9.22E–08	12.22	2.94E–07	2.55	4.0E–08	9.9	30	8.5E–10	8.5E–10	8.5E–06	
KLX18A	344.59	349.59	5	–7.61E–07	12.22	4.94E–06	2.59	5.9E–07	10.9	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	349.58	354.58	5	–8.89E–09	12.25	1.26E–07	2.67	1.4E–08	11.6	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	354.57	359.57	5	–	12.25	–	2.70	–	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	359.58	364.58	5	–5.44E–07	12.25	2.26E–06	2.75	2.9E–07	10.4	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	364.59	369.59	5	–1.39E–07	12.26	1.87E–06	2.75	2.1E–07	11.6	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	369.59	374.59	5	–2.97E–08	12.26	3.06E–07	2.75	3.5E–08	11.4	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	374.60	379.60	5	–7.39E–08	12.27	5.94E–07	2.80	7.0E–08	11.2	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	379.62	384.62	5	–1.22E–08	12.29	1.78E–07	2.81	2.0E–08	11.7	30	8.7E–10	8.7E–10	8.7E–06	

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
KLX18A	384.62	389.62	5	–4.86E–08	12.29	3.47E–07	2.84	4.1E–08	11.1	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	389.62	394.62	5	–	12.29	–	2.84	–	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	394.62	399.62	5	–5.56E–09	12.30	4.50E–08	2.89	5.3E–09	11.3	30	8.8E–10	8.8E–10	8.8E–06	
KLX18A	399.65	404.65	5	–2.54E–07	12.31	1.33E–06	2.88	1.7E–07	10.8	30	8.7E–10	8.7E–10	8.8E–06	
KLX18A	404.66	409.66	5	–3.83E–08	12.36	7.78E–08	2.86	1.2E–08	9.2	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	409.68	414.68	5	–4.17E–08	12.36	1.64E–07	2.91	2.2E–08	10.4	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	414.67	419.67	5	–1.14E–06	12.38	4.58E–06	2.89	6.0E–07	10.5	30	8.7E–10	8.7E–10	8.8E–06	
KLX18A	419.67	424.67	5	–1.53E–06	12.38	6.58E–06	2.88	8.4E–07	10.6	30	8.7E–10	8.7E–10	8.8E–06	
KLX18A	424.68	429.68	5	–1.35E–06	12.41	6.17E–06	2.88	7.8E–07	10.7	30	8.6E–10	8.6E–10	8.8E–06	
KLX18A	429.68	434.68	5	–2.69E–06	12.43	8.14E–06	2.90	1.1E–06	10.1	30	8.6E–10	8.6E–10	8.9E–06	
KLX18A	434.69	439.69	5	–	12.45	–	2.92	–	–	30	8.6E–10	8.6E–10	8.6E–06	
KLX18A	439.69	444.69	5	–	12.47	–	2.96	–	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	444.70	449.70	5	–	12.50	–	3.01	–	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	449.69	454.69	5	–	12.53	3.89E–09	3.08	4.1E–10	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	454.67	459.67	5	–2.92E–08	12.53	4.11E–07	3.11	4.6E–08	11.9	30	8.8E–10	8.8E–10	8.8E–06	
KLX18A	459.67	464.67	5	–	12.57	3.89E–09	3.17	4.1E–10	–	30	8.8E–10	8.8E–10	8.8E–06	
KLX18A	464.67	469.67	5	–	12.60	9.44E–09	3.16	9.9E–10	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	469.68	474.68	5	–7.50E–09	12.61	1.61E–07	3.13	1.8E–08	12.2	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	474.69	479.69	5	–1.06E–08	12.62	2.78E–07	3.13	3.0E–08	12.3	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	479.69	484.69	5	–	12.64	5.83E–09	3.15	6.1E–10	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	484.70	489.70	5	–	12.66	4.28E–08	3.21	4.5E–09	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	489.71	494.71	5	–	12.66	1.42E–08	3.20	1.5E–09	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	494.71	499.71	5	–	12.70	9.44E–09	3.21	9.8E–10	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	499.73	504.73	5	–	12.72	2.25E–08	3.24	2.3E–09	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	504.72	509.72	5	–	12.74	1.86E–08	3.32	2.0E–09	–	30	8.8E–10	8.8E–10	8.8E–06	
KLX18A	509.75	514.75	5	–	12.74	–	3.36	–	–	30	8.8E–10	8.8E–10	8.8E–06	
KLX18A	514.75	519.75	5	–	12.75	–	3.38	–	–	30	8.8E–10	8.8E–10	8.8E–06	
KLX18A	519.76	524.76	5	–	12.75	2.47E–08	3.40	2.6E–09	–	30	8.8E–10	8.8E–10	8.8E–06	
KLX18A	524.77	529.77	5	–	12.77	4.44E–09	3.49	4.7E–10	–	30	8.9E–10	8.9E–10	8.9E–06	
KLX18A	529.78	534.78	5	–	12.77	–	3.48	–	–	30	8.9E–10	8.9E–10	8.9E–06	
KLX18A	534.78	539.78	5	–	12.79	4.69E–08	3.48	5.0E–09	–	30	8.9E–10	8.9E–10	8.9E–06	

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
KLX18A	539.79	544.79	5	–1.33E–07	12.80	2.58E–06	3.47	2.9E–07	12.3	30	8.8E–10	8.8E–10	8.8E–06	
KLX18A	544.79	549.79	5	–	12.83	–	3.44	–	–	30	8.8E–10	8.8E–10	8.8E–06	
KLX18A	549.79	554.79	5	–	12.86	1.61E–08	3.42	1.7E–09	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	554.79	559.79	5	–	12.90	1.15E–07	3.41	1.2E–08	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	559.79	564.79	5	–1.74E–07	12.90	4.78E–06	3.43	5.2E–07	12.6	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	564.79	569.79	5	–	12.93	–	3.46	–	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	569.79	574.79	5	–	12.95	–	3.43	–	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	574.79	579.79	5	–	12.98	–	3.53	–	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	579.79	584.79	5	–	13.02	–	3.53	–	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	584.80	589.80	5	–	13.05	–	3.59	–	–	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	589.80	594.80	5	–3.11E–07	13.07	9.25E–06	3.65	1.0E–06	12.8	30	8.8E–10	8.8E–10	8.8E–06	
KLX18A	594.79	599.79	5	–2.61E–08	13.08	2.73E–07	3.61	3.1E–08	12.3	30	8.7E–10	8.7E–10	8.7E–06	
KLX18A	599.79	604.79	5	–	13.05	–	3.58	–	–	30	8.7E–10	8.7E–10	8.7E–06	

Appendix 8.1

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

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
KLX18A	102.4	1	0.1	–	11.55	5.00E–09	2.00	5.2E–10	–	*
KLX18A	104.8	1	0.1	–	11.58	5.78E–06	2.03	6.0E–07	–	
KLX18A	105.6	1	0.1	–	11.60	3.25E–07	2.01	3.4E–08	–	
KLX18A	106.0	1	0.1	–	11.60	4.78E–08	2.02	4.9E–09	–	*
KLX18A	106.4	1	0.1	–	11.59	8.33E–09	2.02	8.6E–10	–	*
KLX18A	107.7	1	0.1	–	11.61	7.72E–07	2.02	8.0E–08	–	*
KLX18A	108.1	1	0.1	–	11.61	1.69E–06	2.02	1.8E–07	–	*
KLX18A	108.8	1	0.1	–	11.63	6.06E–07	2.03	6.2E–08	–	
KLX18A	110.0	1	0.1	–	11.62	1.01E–07	2.07	1.1E–08	–	*
KLX18A	111.1	1	0.1	–	11.65	1.06E–07	2.11	1.1E–08	–	
KLX18A	111.5	1	0.1	–	11.63	1.33E–08	2.09	1.4E–09	–	*
KLX18A	113.8	1	0.1	–	11.64	5.22E–06	2.00	5.4E–07	–	
KLX18A	115.4	1	0.1	–	11.64	1.08E–06	1.98	1.1E–07	–	
KLX18A	116.8	1	0.1	–	11.64	8.72E–06	2.00	9.0E–07	–	
KLX18A	119.5	1	0.1	–	11.63	1.65E–06	2.07	1.7E–07	–	
KLX18A	121.0	1	0.1	–	11.63	2.11E–05	2.14	2.2E–06	–	
KLX18A	122.6	1	0.1	–	11.62	4.92E–07	2.13	5.1E–08	–	*
KLX18A	123.9	1	0.1	–	11.63	2.18E–06	2.09	2.3E–07	–	
KLX18A	125.1	1	0.1	–	11.63	2.94E–06	2.09	3.1E–07	–	
KLX18A	126.7	1	0.1	–	11.63	4.83E–08	2.10	5.0E–09	–	
KLX18A	129.8	1	0.1	–	11.65	8.14E–07	2.03	8.4E–08	–	
KLX18A	130.7	1	0.1	–	11.64	2.56E–08	2.02	2.6E–09	–	
KLX18A	133.1	1	0.1	1.14E–07	11.65	9.11E–07	2.00	8.2E–08	13.0	
KLX18A	136.1	1	0.1	–	11.56	6.17E–08	2.03	6.4E–09	–	
KLX18A	140.1	1	0.1	–	11.59	4.06E–08	2.07	4.2E–09	–	
KLX18A	142.2	1	0.1	–	11.61	2.14E–08	2.04	2.2E–09	–	
KLX18A	144.6	1	0.1	–	11.62	6.11E–09	1.76	6.1E–10	–	*
KLX18A	146.3	1	0.1	–	11.64	3.67E–08	2.12	3.8E–09	–	
KLX18A	147.7	1	0.1	–	11.67	1.08E–08	2.11	1.1E–09	–	
KLX18A	148.4	1	0.1	–	11.68	2.50E–07	2.12	2.6E–08	–	
KLX18A	148.7	1	0.1	2.16E–07	11.69	4.42E–06	2.11	4.3E–07	12.2	
KLX18A	149.8	1	0.1	–	11.69	2.53E–08	2.11	2.6E–09	–	
KLX18A	156.9	1	0.1	–	11.76	4.44E–09	2.28	4.6E–10	–	*
KLX18A	164.9	1	0.1	–	11.78	1.50E–08	2.09	1.5E–09	–	
KLX18A	165.2	1	0.1	–	11.79	1.44E–08	2.09	1.5E–09	–	
KLX18A	166.0	1	0.1	–	11.78	7.78E–09	2.08	7.9E–10	–	*
KLX18A	168.5	1	0.1	–	11.77	1.00E–08	2.06	1.0E–09	–	
KLX18A	184.0	1	0.1	–	11.78	4.44E–09	2.11	4.6E–10	–	*
KLX18A	201.1	1	0.1	–	11.73	1.94E–08	2.14	2.0E–09	–	
KLX18A	211.3	1	0.1	–	11.76	3.06E–09	2.15	3.1E–10	–	*
KLX18A	218.4	1	0.1	–	11.77	2.28E–08	2.20	2.4E–09	–	
KLX18A	221.5	1	0.1	–	11.77	5.83E–09	2.20	6.0E–10	–	*
KLX18A	247.0	1	0.1	–2.61E–08	11.85	4.33E–07	2.26	4.7E–08	11.3	

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
KLX18A	268.0	1	0.1	–	11.97	1.42E–08	2.41	1.5E–09	–	
KLX18A	269.9	1	0.1	–	11.99	8.33E–09	2.42	8.6E–10	–	*
KLX18A	291.6	1	0.1	–	12.10	9.44E–09	2.65	9.9E–10	–	
KLX18A	303.1	1	0.1	–	12.14	8.89E–09	2.69	9.3E–10	–	
KLX18A	309.5	1	0.1	–	12.13	1.67E–08	2.73	1.8E–09	–	
KLX18A	319.2	1	0.1	–1.97E–08	12.15	2.54E–07	2.75	2.9E–08	11.5	
KLX18A	331.7	1	0.1	–1.62E–07	12.22	1.33E–06	2.74	1.6E–07	11.2	
KLX18A	332.6	1	0.1	–	12.21	2.89E–08	2.74	3.0E–09	–	*
KLX18A	335.2	1	0.1	–	12.22	3.53E–08	2.78	3.7E–09	–	*
KLX18A	335.9	1	0.1	–	12.22	3.53E–07	2.80	3.7E–08	–	
KLX18A	337.9	1	0.1	–	12.20	2.57E–06	2.78	2.7E–07	–	
KLX18A	339.5	1	0.1	–	12.22	3.36E–07	2.76	3.5E–08	–	
KLX18A	344.0	1	0.1	–	12.22	1.77E–07	2.81	1.9E–08	–	
KLX18A	345.0	1	0.1	–	12.23	1.11E–07	2.82	1.2E–08	–	
KLX18A	347.1	1	0.1	–	12.22	1.47E–07	2.79	1.5E–08	–	
KLX18A	347.5	1	0.1	–	12.24	7.06E–08	2.78	7.4E–09	–	*
KLX18A	348.2	1	0.1	–	12.23	2.49E–06	2.77	2.6E–07	–	
KLX18A	348.7	1	0.1	–	12.24	1.87E–06	2.80	2.0E–07	–	
KLX18A	350.0	1	0.1	–	12.24	5.00E–08	2.82	5.3E–09	–	*
KLX18A	350.3	1	0.1	–	12.24	6.56E–08	2.80	6.9E–09	–	
KLX18A	352.3	1	0.1	–	12.25	2.86E–08	2.83	3.0E–09	–	
KLX18A	353.8	1	0.1	–	12.25	5.83E–09	2.84	6.1E–10	–	*
KLX18A	359.7	1	0.1	–	12.26	2.06E–06	2.82	2.2E–07	–	
KLX18A	361.0	1	0.1	–	12.25	1.29E–07	2.81	1.4E–08	–	
KLX18A	367.5	1	0.1	–	12.26	1.26E–06	2.77	1.3E–07	–	
KLX18A	369.0	1	0.1	–	12.27	4.78E–07	2.80	5.0E–08	–	
KLX18A	370.4	1	0.1	–	12.27	2.97E–07	2.77	3.1E–08	–	
KLX18A	375.2	1	0.1	–	12.29	1.07E–07	2.76	1.1E–08	–	*
KLX18A	375.8	1	0.1	–	12.27	3.00E–07	2.76	3.1E–08	–	
KLX18A	377.8	1	0.1	–	12.27	2.83E–08	2.78	3.0E–09	–	*
KLX18A	378.3	1	0.1	–	12.27	3.33E–08	2.78	3.5E–09	–	*
KLX18A	378.8	1	0.1	–	12.27	7.56E–08	2.79	7.9E–09	–	
KLX18A	379.2	1	0.1	–	12.28	2.78E–08	2.80	2.9E–09	–	
KLX18A	382.1	1	0.1	–	12.30	3.44E–08	2.78	3.6E–09	–	
KLX18A	382.7	1	0.1	–	12.28	1.29E–07	2.74	1.3E–08	–	
KLX18A	388.1	1	0.1	–4.75E–08	12.31	3.67E–07	2.75	4.3E–08	11.2	
KLX18A	389.5	1	0.1	–	12.29	1.56E–08	2.78	1.6E–09	–	
KLX18A	395.0	1	0.1	–	12.31	5.28E–09	2.95	5.6E–10	–	*
KLX18A	397.0	1	0.1	–	12.30	1.28E–08	2.98	1.4E–09	–	*
KLX18A	398.4	1	0.1	–	12.31	1.89E–08	2.99	2.0E–09	–	*
KLX18A	401.0	1	0.1	–	12.32	3.81E–08	2.98	4.0E–09	–	*
KLX18A	401.6	1	0.1	–	12.31	1.88E–07	2.99	2.0E–08	–	
KLX18A	402.6	1	0.1	–	12.32	9.72E–07	2.97	1.0E–07	–	
KLX18A	403.8	1	0.1	–	12.32	2.10E–07	2.96	2.2E–08	–	
KLX18A	406.6	1	0.1	–	12.36	3.19E–08	2.99	3.4E–09	–	
KLX18A	407.2	1	0.1	–3.28E–08	12.37	7.56E–08	2.97	1.1E–08	9.5	

Appendix 8.3

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)	hi (m)	Comments
KLX18A	413.2	1	0.1	–	12.38	1.50E–08	2.97	1.6E–09	–	
KLX18A	413.9	1	0.1	–	12.38	1.56E–07	2.96	1.6E–08	–	
KLX18A	414.8	1	0.1	–	12.38	5.47E–07	2.96	5.8E–08	–	
KLX18A	415.9	1	0.1	–	12.37	1.56E–08	2.98	1.6E–09	–	*
KLX18A	416.3	1	0.1	–	12.37	4.83E–08	2.98	5.1E–09	–	
KLX18A	418.0	1	0.1	–	12.39	2.78E–08	2.97	2.9E–09	–	*
KLX18A	418.6	1	0.1	–	12.37	1.33E–07	2.97	1.4E–08	–	
KLX18A	419.3	1	0.1	–	12.37	3.94E–06	2.97	4.2E–07	–	
KLX18A	421.0	1	0.1	–	12.39	1.01E–06	2.96	1.1E–07	–	
KLX18A	423.8	1	0.1	–	12.41	5.31E–06	2.97	5.6E–07	–	
KLX18A	424.6	1	0.1	–	12.40	6.25E–07	2.99	6.6E–08	–	*
KLX18A	425.3	1	0.1	–	12.42	6.44E–06	2.99	6.8E–07	–	
KLX18A	426.5	1	0.1	–	12.42	6.50E–08	2.99	6.8E–09	–	
KLX18A	428.9	1	0.1	–	12.41	2.56E–08	3.02	2.7E–09	–	
KLX18A	429.5	1	0.1	–	12.43	9.44E–09	3.03	9.9E–10	–	
KLX18A	429.9	1	0.1	–	12.43	3.33E–09	3.01	3.5E–10	–	*
KLX18A	431.7	1	0.1	–	12.44	2.34E–07	3.06	2.5E–08	–	
KLX18A	432.5	1	0.1	–2.68E–06	12.42	7.94E–06	3.06	1.1E–06	10.1	
KLX18A	433.8	1	0.1	–	12.44	6.39E–09	3.08	6.8E–10	–	*
KLX18A	434.5	1	0.1	–2.03E–08	12.46	1.19E–07	3.08	1.5E–08	11.1	
KLX18A	449.9	1	0.1	–	12.50	4.17E–09	3.20	4.4E–10	–	*
KLX18A	455.0	1	0.1	–	12.54	2.08E–07	3.18	2.2E–08	–	
KLX18A	455.6	1	0.1	–	12.53	1.21E–07	3.20	1.3E–08	–	
KLX18A	455.9	1	0.1	–	12.54	4.83E–08	3.19	5.1E–09	–	*
KLX18A	460.7	1	0.1	–	12.57	4.17E–09	3.32	4.5E–10	–	*
KLX18A	468.1	1	0.1	–	12.60	6.67E–09	3.36	7.1E–10	–	*
KLX18A	473.7	1	0.1	–	12.61	4.44E–08	3.34	4.7E–09	–	
KLX18A	474.2	1	0.1	–	12.63	1.44E–07	3.35	1.5E–08	–	
KLX18A	475.2	1	0.1	–	12.63	4.33E–08	3.35	4.6E–09	–	*
KLX18A	475.9	1	0.1	–	12.63	1.73E–07	3.34	1.9E–08	–	
KLX18A	478.4	1	0.1	–	12.63	1.00E–08	3.37	1.1E–09	–	
KLX18A	479.1	1	0.1	–	12.63	3.31E–08	3.37	3.5E–09	–	
KLX18A	480.1	1	0.1	–	12.65	3.33E–09	3.37	3.6E–10	–	*
KLX18A	485.9	1	0.1	–	12.66	4.67E–08	3.42	5.0E–09	–	
KLX18A	486.6	1	0.1	–	12.67	1.22E–08	3.42	1.3E–09	–	*
KLX18A	492.3	1	0.1	–	12.66	1.33E–08	3.50	1.4E–09	–	
KLX18A	494.9	1	0.1	–	12.70	3.61E–09	3.52	3.9E–10	–	*
KLX18A	496.8	1	0.1	–	12.70	5.28E–09	3.53	5.7E–10	–	*
KLX18A	504.1	1	0.1	–	12.73	1.94E–08	3.54	2.1E–09	–	
KLX18A	508.6	1	0.1	–	12.74	1.69E–08	3.58	1.8E–09	–	
KLX18A	521.8	1	0.1	–	12.76	2.25E–08	3.63	2.4E–09	–	
KLX18A	529.4	1	0.1	–	12.77	4.17E–09	3.69	4.5E–10	–	*
KLX18A	537.3	1	0.1	–	12.80	2.92E–08	3.70	3.2E–09	–	
KLX18A	537.8	1	0.1	–	12.79	1.17E–08	3.71	1.3E–09	–	

Appendix 8.4

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
KLX18A	538.1	1	0.1	–	12.79	4.44E–09	3.70	4.8E–10	–	*
KLX18A	540.1	1	0.1	–	12.80	5.00E–09	3.72	5.5E–10	–	*
KLX18A	541.1	1	0.1	–	12.80	3.11E–08	3.70	3.4E–09	–	
KLX18A	542.3	1	0.1	–	12.81	2.18E–06	3.68	2.4E–07	–	
KLX18A	544.2	1	0.1	–	12.81	1.87E–07	3.73	2.0E–08	–	
KLX18A	544.6	1	0.1	–	12.81	5.08E–08	3.73	5.5E–09	–	*
KLX18A	550.2	1	0.1	–	12.85	1.28E–08	3.97	1.4E–09	–	
KLX18A	554.9	1	0.1	–	12.88	6.17E–08	4.04	6.9E–09	–	
KLX18A	557.8	1	0.1	–	12.90	3.42E–08	4.02	3.8E–09	–	
KLX18A	561.1	1	0.1	–	12.90	4.44E–09	4.05	5.0E–10	–	*
KLX18A	562.7	1	0.1	–	12.91	2.40E–06	4.13	2.7E–07	–	
KLX18A	563.1	1	0.1	–	12.90	6.83E–07	4.14	7.7E–08	–	*
KLX18A	564.3	1	0.1	–7.89E–08	12.92	1.32E–06	4.09	1.6E–07	12.4	
KLX18A	592.3	1	0.1	–	13.07	4.53E–06	4.20	5.1E–07	–	
KLX18A	592.9	1	0.1	–2.63E–07	13.08	3.39E–06	4.21	4.1E–07	12.4	
KLX18A	594.6	1	0.1	–	13.09	2.19E–07	4.18	2.4E–08	–	
KLX18A	594.9	1	0.1	–	13.08	7.22E–08	4.18	8.0E–09	–	*
KLX18A	597.8	1	0.1	–	13.09	1.58E–08	4.20	1.8E–09	–	

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

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)
KLX18A	89.54	94.54	0	0	0	0	0	0
KLX18A	94.55	99.55	0	0	0	0	0	0
KLX18A	99.56	104.56	1	1	0	0	0	0
KLX18A	104.56	109.56	7	1	1	4	1	0
KLX18A	109.56	114.56	4	1	2	0	1	0
KLX18A	114.56	119.56	3	0	0	2	1	0
KLX18A	119.56	124.56	3	0	0	2	1	0
KLX18A	124.55	129.55	2	0	1	0	1	0
KLX18A	129.55	134.55	3	1	0	2	0	0
KLX18A	134.54	139.54	1	0	1	0	0	0
KLX18A	139.49	144.49	2	1	1	0	0	0
KLX18A	144.49	149.49	5	2	2	0	1	0
KLX18A	149.49	154.49	1	1	0	0	0	0
KLX18A	154.49	159.49	1	1	0	0	0	0
KLX18A	159.46	164.46	0	0	0	0	0	0
KLX18A	164.47	169.47	4	4	0	0	0	0
KLX18A	169.48	174.48	0	0	0	0	0	0
KLX18A	174.49	179.49	0	0	0	0	0	0
KLX18A	179.50	184.50	1	1	0	0	0	0
KLX18A	184.51	189.51	0	0	0	0	0	0
KLX18A	189.52	194.52	0	0	0	0	0	0
KLX18A	194.53	199.53	0	0	0	0	0	0
KLX18A	199.51	204.51	1	1	0	0	0	0
KLX18A	204.50	209.50	0	0	0	0	0	0
KLX18A	209.51	214.51	1	1	0	0	0	0
KLX18A	214.52	219.52	1	1	0	0	0	0
KLX18A	219.53	224.53	1	1	0	0	0	0
KLX18A	224.54	229.54	0	0	0	0	0	0
KLX18A	229.55	234.55	0	0	0	0	0	0
KLX18A	234.56	239.56	0	0	0	0	0	0
KLX18A	239.57	244.57	0	0	0	0	0	0
KLX18A	244.58	249.58	1	0	0	1	0	0
KLX18A	249.59	254.59	0	0	0	0	0	0
KLX18A	254.59	259.59	0	0	0	0	0	0
KLX18A	259.58	264.58	0	0	0	0	0	0
KLX18A	264.57	269.57	1	1	0	0	0	0
KLX18A	269.56	274.56	1	1	0	0	0	0
KLX18A	274.55	279.55	0	0	0	0	0	0
KLX18A	279.54	284.54	0	0	0	0	0	0
KLX18A	284.53	289.53	0	0	0	0	0	0
KLX18A	289.52	294.52	1	1	0	0	0	0
KLX18A	294.52	299.52	0	0	0	0	0	0

Appendix 10.2

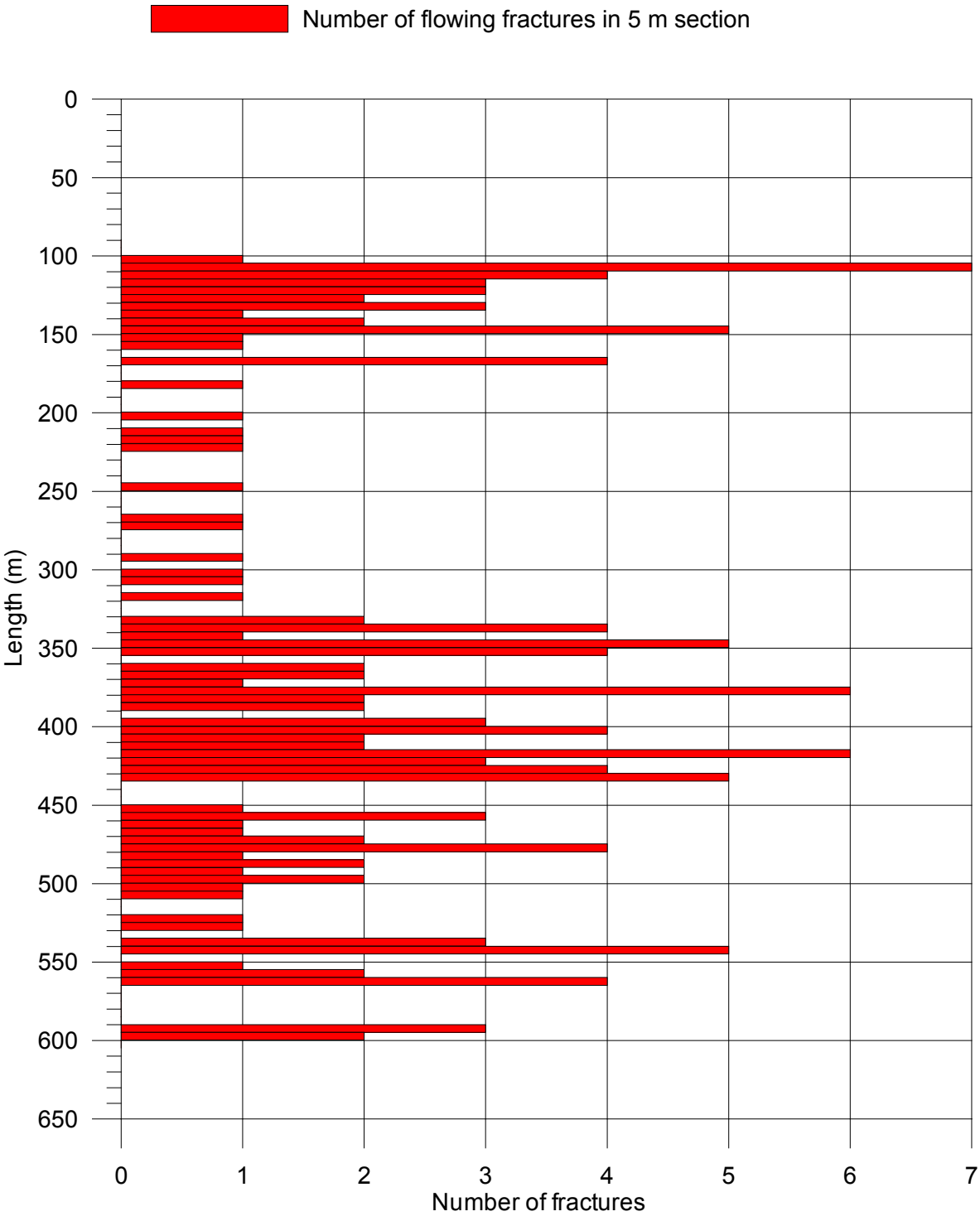
Borehole ID	Secup (m)	Seclow (m)	Number of fractures, total	Number of fractures 10–100 (ml/h)	Number of fractures 100–1,000 (ml/h)	Number of fractures 1,000–10,000 (ml/h)	Number of fractures 10,000–100,000 (ml/h)	Number of fractures 100,000–1,000,000 (ml/h)
KLX18A	299.52	304.52	1	1	0	0	0	0
KLX18A	304.52	309.52	1	1	0	0	0	0
KLX18A	309.53	314.53	0	0	0	0	0	0
KLX18A	314.53	319.53	1	0	1	0	0	0
KLX18A	319.54	324.54	0	0	0	0	0	0
KLX18A	324.55	329.55	0	0	0	0	0	0
KLX18A	329.57	334.57	2	0	1	1	0	0
KLX18A	334.57	339.57	4	0	1	3	0	0
KLX18A	339.58	344.58	1	0	1	0	0	0
KLX18A	344.59	349.59	5	0	3	2	0	0
KLX18A	349.58	354.58	4	1	3	0	0	0
KLX18A	354.57	359.57	0	0	0	0	0	0
KLX18A	359.58	364.58	2	0	1	1	0	0
KLX18A	364.59	369.59	2	0	0	2	0	0
KLX18A	369.59	374.59	1	0	0	1	0	0
KLX18A	374.60	379.60	6	1	4	1	0	0
KLX18A	379.62	384.62	2	0	2	0	0	0
KLX18A	384.62	389.62	2	1	0	1	0	0
KLX18A	389.62	394.62	0	0	0	0	0	0
KLX18A	394.62	399.62	3	3	0	0	0	0
KLX18A	399.65	404.65	4	0	3	1	0	0
KLX18A	404.66	409.66	2	0	2	0	0	0
KLX18A	409.68	414.68	2	1	1	0	0	0
KLX18A	414.67	419.67	6	2	2	1	1	0
KLX18A	419.67	424.67	3	0	0	2	1	0
KLX18A	424.68	429.68	4	2	1	0	1	0
KLX18A	429.68	434.68	5	2	2	0	1	0
KLX18A	434.69	439.69	0	0	0	0	0	0
KLX18A	439.69	444.69	0	0	0	0	0	0
KLX18A	444.70	449.70	0	0	0	0	0	0
KLX18A	449.69	454.69	1	1	0	0	0	0
KLX18A	454.67	459.67	3	0	3	0	0	0
KLX18A	459.67	464.67	1	1	0	0	0	0
KLX18A	464.67	469.67	1	1	0	0	0	0
KLX18A	469.68	474.68	2	0	2	0	0	0
KLX18A	474.69	479.69	4	1	3	0	0	0
KLX18A	479.69	484.69	1	1	0	0	0	0
KLX18A	484.70	489.70	2	1	1	0	0	0
KLX18A	489.71	494.71	1	1	0	0	0	0
KLX18A	494.71	499.71	2	2	0	0	0	0
KLX18A	499.73	504.73	1	1	0	0	0	0
KLX18A	504.72	509.72	1	1	0	0	0	0
KLX18A	509.75	514.75	0	0	0	0	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)
KLX18A	514.75	519.75	0	0	0	0	0	0
KLX18A	519.76	524.76	1	1	0	0	0	0
KLX18A	524.77	529.77	1	1	0	0	0	0
KLX18A	529.78	534.78	0	0	0	0	0	0
KLX18A	534.78	539.78	3	2	1	0	0	0
KLX18A	539.79	544.79	5	1	3	1	0	0
KLX18A	544.79	549.79	0	0	0	0	0	0
KLX18A	549.79	554.79	1	1	0	0	0	0
KLX18A	554.79	559.79	2	0	2	0	0	0
KLX18A	559.79	564.79	4	1	0	3	0	0
KLX18A	564.79	569.79	0	0	0	0	0	0
KLX18A	569.79	574.79	0	0	0	0	0	0
KLX18A	574.79	579.79	0	0	0	0	0	0
KLX18A	579.79	584.79	0	0	0	0	0	0
KLX18A	584.80	589.80	0	0	0	0	0	0
KLX18A	589.80	594.80	3	0	1	0	2	0
KLX18A	594.79	599.79	2	1	1	0	0	0
KLX18A	599.79	604.79	0	0	0	0	0	0

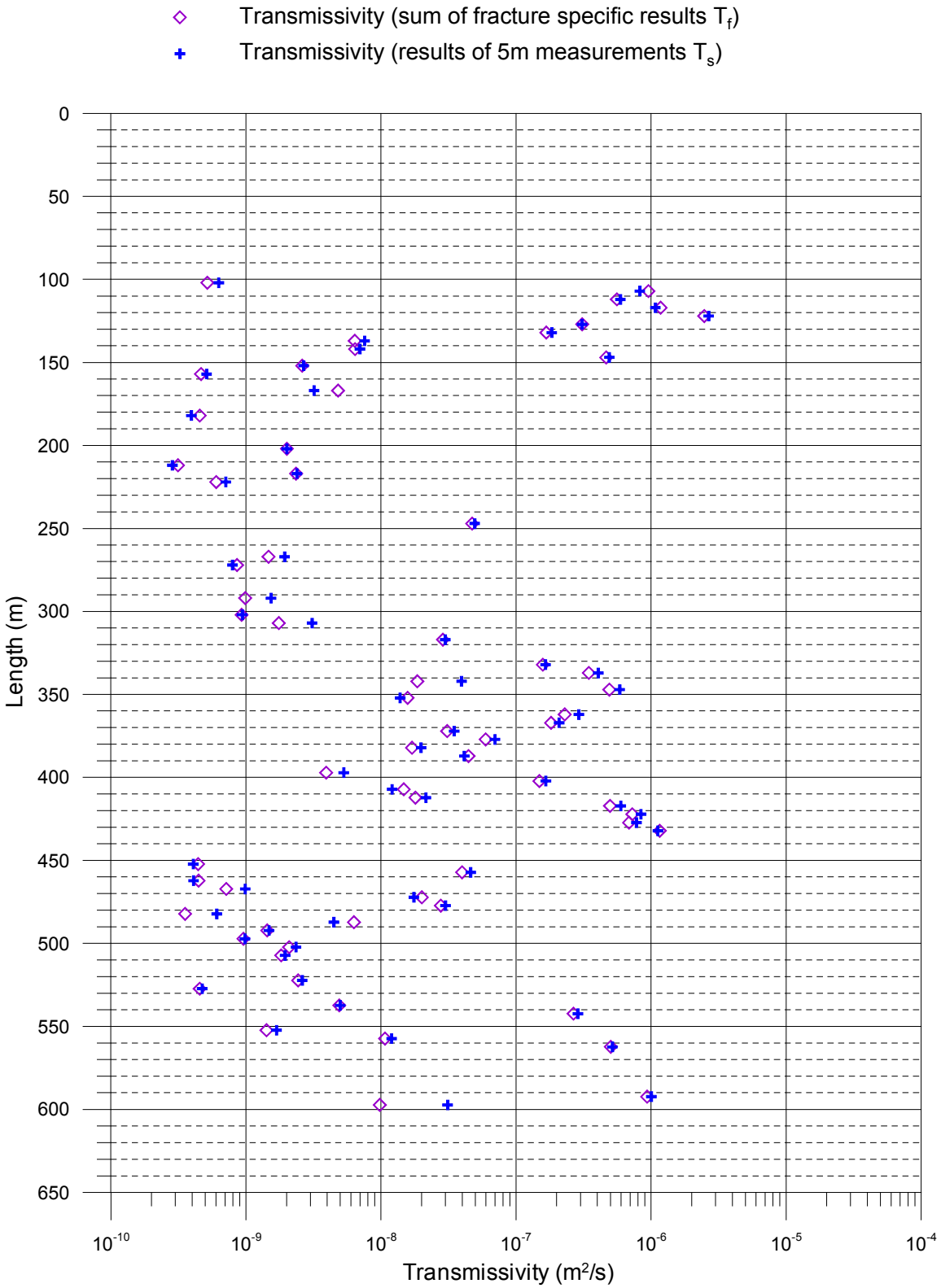
Appendix 11

Laxemar, borehole KLX18A
Calculation of conductive fracture frequency



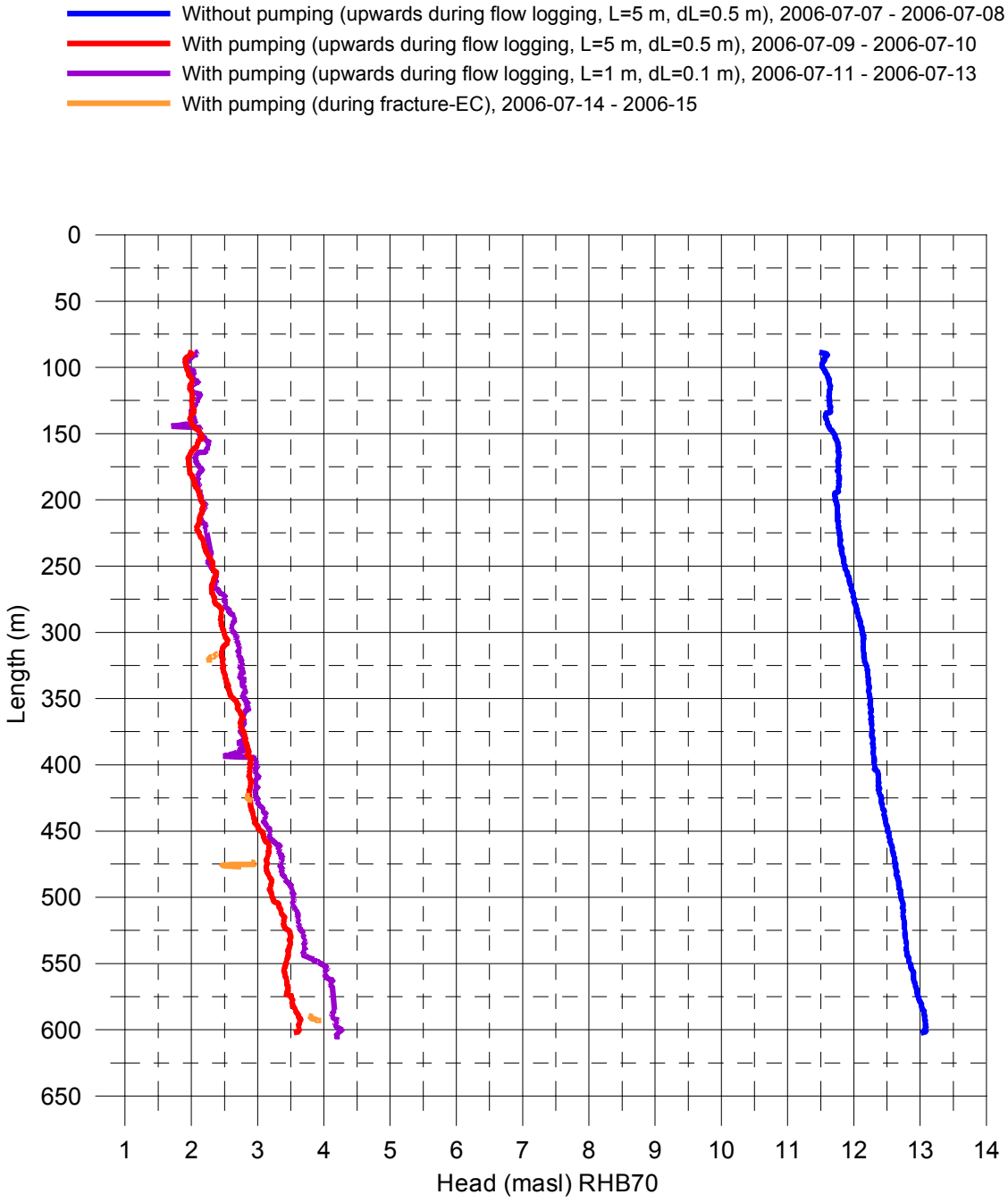
Appendix 12

Laxemar, borehole KLX18A
Comparison between section transmissivity and fracture transmissivity



Laxemar, borehole KLX18A
Head in the borehole during flow logging

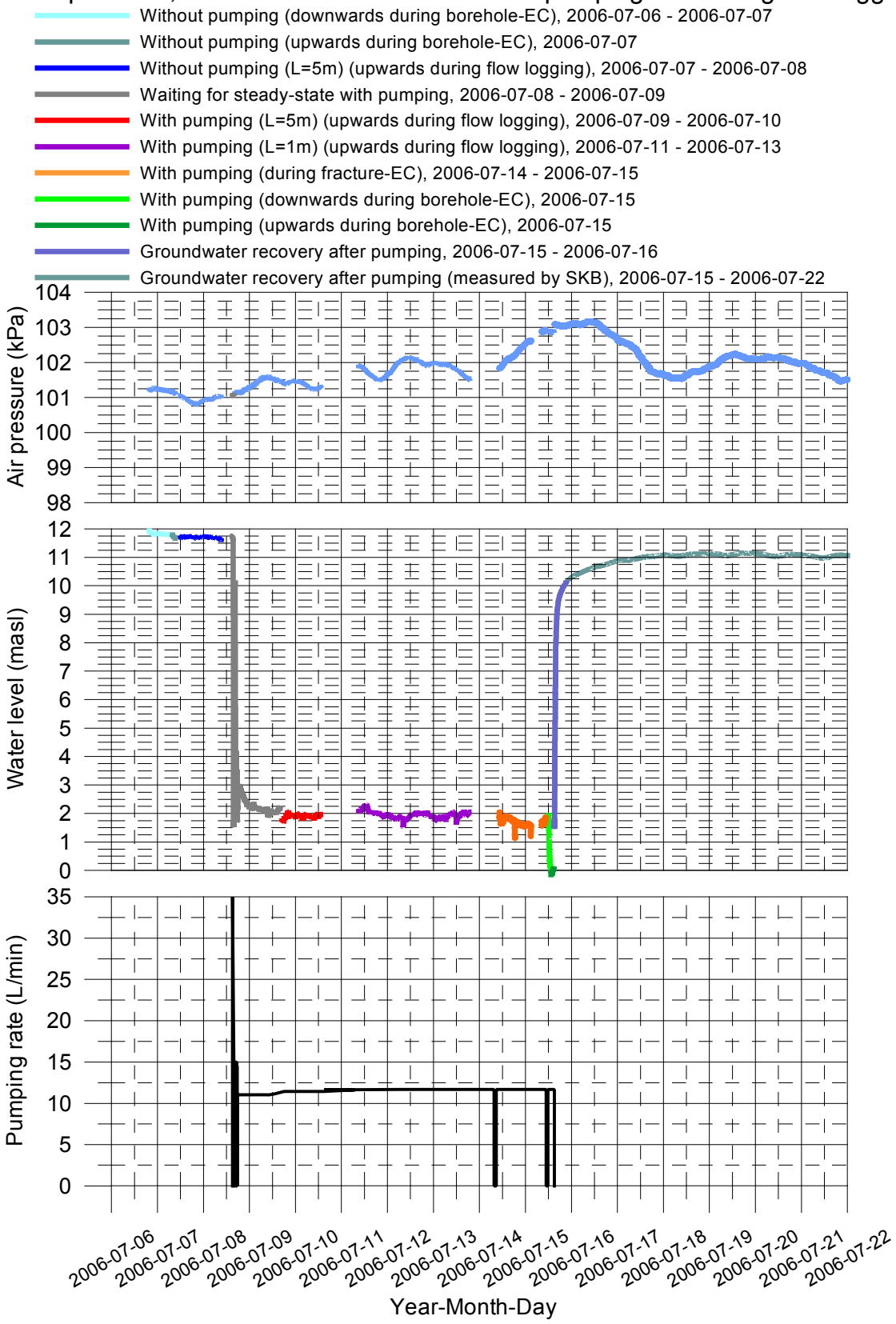
Head(masl)= (Absolute pressure (Pa) - Airpressure (Pa) + Offset) /(1000 kg/m^3 * 9.80665 m/s^2) + Elevation (m)
Offset = 2460 Pa (Correction for absolut pressure sensor)



Appendix 13.2

Laxemar, borehole KLX18A

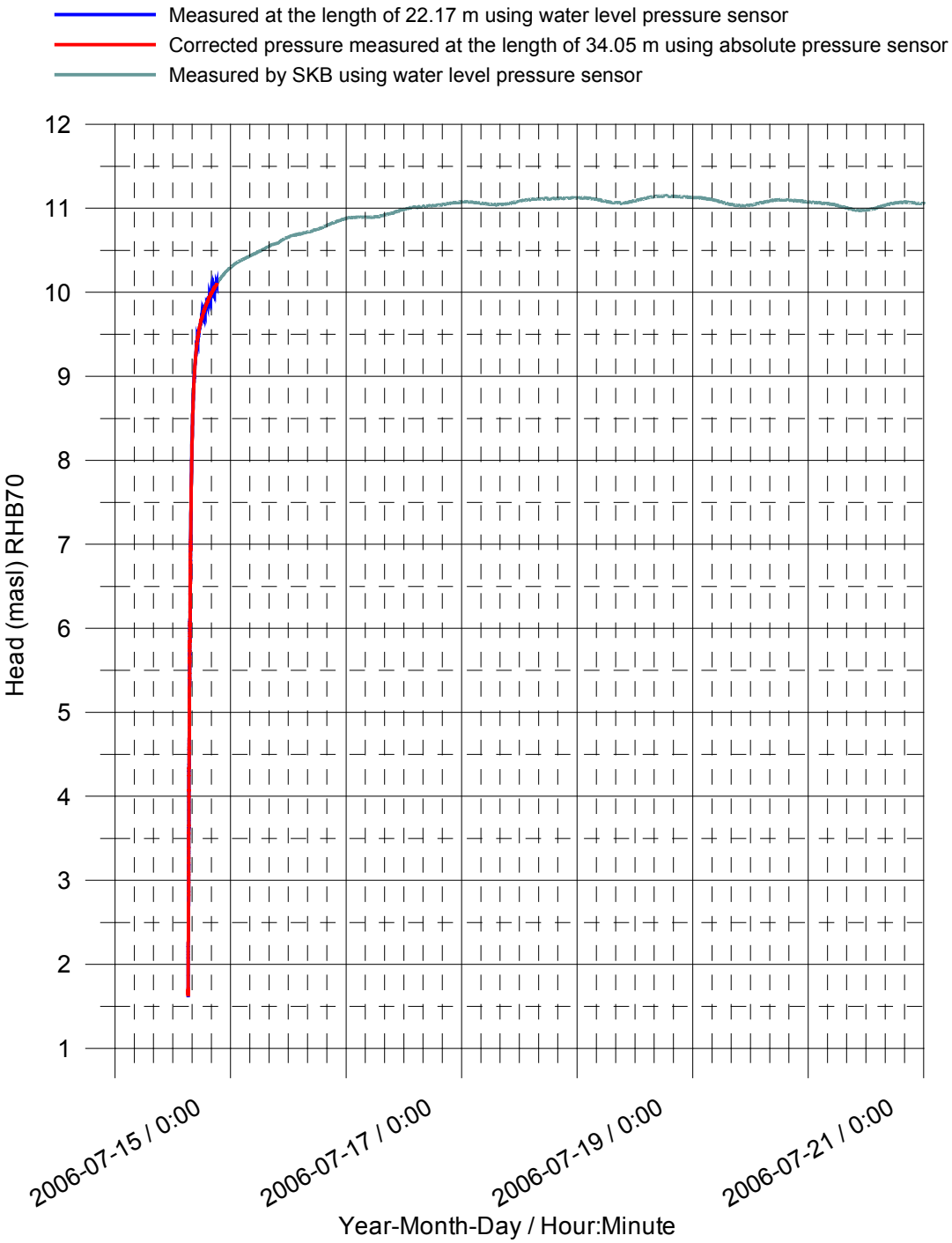
Air pressure, water level in the borehole and pumping rate during flow logging



Appendix 13.3

Laxemar, borehole KLX18A
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 KLX18A
Vertical flow along the borehole at the length of 101.8 m