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Supplement 1

September 2007

Forsmark site investigation

Difference flow logging in borehole KFM04A

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Description

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

Borehole coordinates that formed the basis for this revision of groundwater head data were retrieved from Sicada 2007-06-26 (#SICADA_07_263) /SKB 2007/.

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

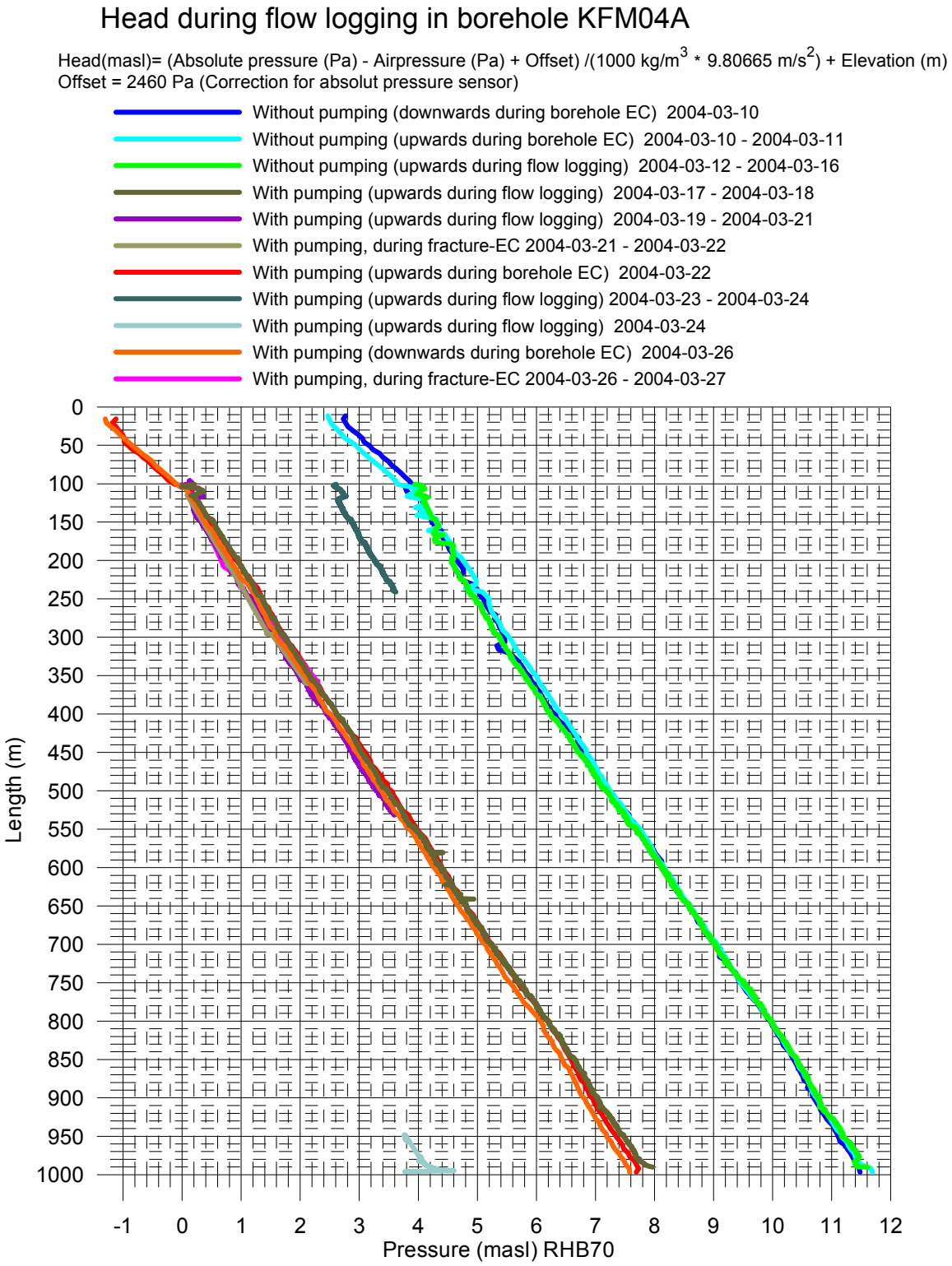
Revised appendix	Appendix number
Head distribution in the borehole during flow logging	Appendix 4
Transmissivity and natural head of 5 m sections	Appendix 5
Plotted head and transmissivity of 5 m sections	Appendix 6.2
Transmissivity and natural head of detected fractures	Appendix 7.1–7.2
Plotted transmissivity and head of detected fractures	Appendix 7.3
Transmissivity and head for selected high-transmissivity fractures	Appendix 10
Comparison between section transmissivity and fracture transmissivity	Appendix 11
Groundwater recovery after pumping	Appendix 12.3

Reference

SKB, 2007. Compilation of borehole deviation measurements in Forsmark (Nilsson, G. and Nissen, J.). SKB P-07-28, Svensk Kärnbränslehantering AB.

Appendix 4

Head distribution in the borehole during flow logging



Appendix 5

Table of transmissivity and head of 5 m sections

Secup1 (m)	Borehole head1 (masl)	Flow1 (mL/h)	Secup2 (m)	Borehole head2 (masl)	Flow2 (mL/h)	Section head (masl)	T_s (m^2/s)	Q-lower limit Practical (mL/h)	T_s-lower limit Theoretical (m^2/s)	T_s-lower limit Practical (m^2/s)	T_s-upper limit (m^2/s)
987.57	11.42	0	987.57	7.84	0	–	–	100	4.60E–10	7.67E–09	2.30E–05
982.57	11.41	0	982.57	7.76	0	–	–	100	4.52E–10	7.53E–09	2.26E–05
977.56	11.43	0	977.57	7.70	0	–	–	30	4.42E–10	2.21E–09	2.21E–05
972.56	11.42	0	972.56	7.66	0	–	–	30	4.38E–10	2.19E–09	2.19E–05
967.56	11.40	0	967.56	7.63	0	–	–	30	4.37E–10	2.19E–09	2.19E–05
962.55	11.33	0	962.56	7.60	0	–	–	30	4.42E–10	2.21E–09	2.21E–05
957.55	11.31	0	957.56	7.56	0	–	–	30	4.40E–10	2.20E–09	2.20E–05
952.55	11.23	0	952.55	3.79	35	–	1.29E–09 **	30	2.22E–10	2.19E–09	2.19E–05
947.55	11.18	0	947.54	7.47	0	–	–	30	4.44E–10	2.22E–09	2.22E–05
942.54	11.15	0	942.53	7.38	0	–	–	30	4.37E–10	2.19E–09	2.19E–05
937.54	11.12	0	937.52	7.37	0	–	–	30	4.40E–10	2.20E–09	2.20E–05
932.54	11.06	0	932.51	7.32	0	–	–	30	4.41E–10	2.20E–09	2.20E–05
927.54	11.03	0	927.51	7.29	0	–	–	30	4.41E–10	2.20E–09	2.20E–05
922.54	10.95	0	922.50	7.23	0	–	–	30	4.43E–10	2.22E–09	2.22E–05
917.54	10.90	0	917.49	7.16	0	–	–	30	4.41E–10	2.20E–09	2.20E–05
912.54	10.85	0	912.48	7.12	0	–	–	30	4.42E–10	2.21E–09	2.21E–05
907.51	10.81	0	907.47	7.07	0	–	–	30	4.41E–10	2.20E–09	2.20E–05
902.49	10.79	0	902.45	7.05	0	–	–	30	4.41E–10	2.20E–09	2.20E–05
897.47	10.77	0	897.44	7.02	0	–	–	30	4.40E–10	2.20E–09	2.20E–05
892.45	10.72	0	892.43	6.96	0	–	–	30	4.38E–10	2.19E–09	2.19E–05
887.43	10.69	0	887.41	6.91	0	–	–	30	4.36E–10	2.18E–09	2.18E–05
882.41	10.63	0	882.40	6.89	0	–	–	30	4.41E–10	2.20E–09	2.20E–05
877.39	10.60	0	877.38	6.86	0	–	–	30	4.41E–10	2.20E–09	2.20E–05

Secup1 (m)	Borehole head1 (masl)	Flow1 (mL/h)	Secup2 (m)	Borehole head2 (masl)	Flow2 (mL/h)	Section head (masl)	T_s (m^2/s)	Q-lower limit Practical (mL/h)	T_s-lower limit Theoretical (m^2/s)	T_s-lower limit Practical (m^2/s)	T_s-upper limit (m^2/s)
872.38	10.58	0	872.37	6.81	0	–	–	30	4.37E–10	2.19E–09	2.19E–05
867.37	10.56	0	867.36	6.80	0	–	–	30	4.38E–10	2.19E–09	2.19E–05
862.36	10.50	0	862.34	6.72	0	–	–	30	4.36E–10	2.18E–09	2.18E–05
857.35	10.47	0	857.33	6.69	0	–	–	30	4.36E–10	2.18E–09	2.18E–05
852.32	10.42	0	852.30	6.66	0	–	–	30	4.38E–10	2.19E–09	2.19E–05
847.28	10.40	0	847.27	6.63	0	–	–	30	4.37E–10	2.19E–09	2.19E–05
842.27	10.32	0	842.26	6.53	0	–	–	30	4.35E–10	2.17E–09	2.17E–05
837.26	10.29	0	837.25	6.52	0	–	–	30	4.37E–10	2.19E–09	2.19E–05
832.25	10.25	0	832.24	6.48	0	–	–	30	4.37E–10	2.19E–09	2.19E–05
827.24	10.22	0	827.24	6.44	0	–	–	30	4.36E–10	2.18E–09	2.18E–05
822.23	10.17	0	822.23	6.39	0	–	–	30	4.36E–10	2.18E–09	2.18E–05
817.22	10.13	0	817.22	6.37	0	–	–	30	4.38E–10	2.19E–09	2.19E–05
812.22	10.07	0	812.22	6.29	0	–	–	30	4.36E–10	2.18E–09	2.18E–05
807.22	10.03	0	807.22	6.24	0	–	–	30	4.35E–10	2.17E–09	2.17E–05
802.22	9.99	0	802.22	6.21	0	–	–	30	4.36E–10	2.18E–09	2.18E–05
797.22	9.96	0	797.22	6.17	0	–	–	30	4.35E–10	2.17E–09	2.17E–05
792.21	9.88	0	792.22	6.11	0	–	–	30	4.37E–10	2.19E–09	2.19E–05
787.21	9.84	0	787.22	6.08	0	–	–	30	4.38E–10	2.19E–09	2.19E–05
782.21	9.82	0	782.22	6.02	0	–	–	30	4.34E–10	2.17E–09	2.17E–05
777.21	9.77	0	777.22	5.99	0	–	–	30	4.36E–10	2.18E–09	2.18E–05
772.21	9.72	0	772.22	5.95	0	–	–	30	4.37E–10	2.19E–09	2.19E–05
767.20	9.70	0	767.21	5.90	0	–	–	30	4.34E–10	2.17E–09	2.17E–05
762.20	9.65	0	762.21	5.81	0	–	–	30	4.29E–10	2.15E–09	2.15E–05
757.20	9.58	0	757.20	5.79	0	–	–	30	4.35E–10	2.17E–09	2.17E–05
752.19	9.55	0	752.20	5.77	0	–	–	60	4.36E–10	4.36E–09	2.18E–05
747.19	9.51	0	747.19	5.72	0	–	–	60	4.35E–10	4.35E–09	2.17E–05
742.18	9.41	0	742.19	5.63	0	–	–	30	4.36E–10	2.18E–09	2.18E–05
737.18	9.36	0	737.19	5.60	0	–	–	30	4.38E–10	2.19E–09	2.19E–05

Secup1 (m)	Borehole head1 (masl)	Flow1 (mL/h)	Secup2 (m)	Borehole head2 (masl)	Flow2 (mL/h)	Section head (masl)	T_s (m^2/s)	Q-lower limit Practical (mL/h)	T_s-lower limit Theoretical (m^2/s)	T_s-lower limit Practical (m^2/s)	T_s-upper limit (m^2/s)
732.18	9.31	0	732.19	5.53	0	–	–	30	4.36E–10	2.18E–09	2.18E–05
727.19	9.26	0	727.19	5.47	0	–	–	30	4.35E–10	2.17E–09	2.17E–05
722.19	9.24	0	722.19	5.42	0	–	–	30	4.32E–10	2.16E–09	2.16E–05
717.18	9.17	0	717.18	5.39	0	–	–	50	4.36E–10	3.63E–09	2.18E–05
712.17	9.13	0	712.17	5.32	0	–	–	50	4.33E–10	3.61E–09	2.16E–05
707.16	9.06	0	707.16	5.28	0	–	–	50	4.36E–10	3.63E–09	2.18E–05
702.15	9.05	0	702.15	5.25	0	–	–	50	4.34E–10	3.62E–09	2.17E–05
697.14	9.01	0	697.15	5.21	0	–	–	50	4.34E–10	3.62E–09	2.17E–05
692.13	8.95	0	692.14	5.13	0	–	–	50	4.32E–10	3.60E–09	2.16E–05
687.13	8.93	0	687.13	5.11	0	–	–	50	4.32E–10	3.60E–09	2.16E–05
682.12	8.84	0	682.12	5.07	0	–	–	50	4.37E–10	3.64E–09	2.19E–05
677.11	8.81	0	677.11	5.06	0	–	–	50	4.40E–10	3.66E–09	2.20E–05
672.10	8.76	0	672.10	4.97	0	–	–	50	4.35E–10	3.62E–09	2.17E–05
667.09	8.75	0	667.09	4.93	0	–	–	50	4.32E–10	3.60E–09	2.16E–05
662.08	8.69	0	662.09	4.90	0	–	–	50	4.35E–10	3.62E–09	2.17E–05
657.07	8.64	0	657.08	4.85	0	–	–	50	4.35E–10	3.62E–09	2.17E–05
652.06	8.59	0	652.07	4.81	0	–	–	30	4.36E–10	2.18E–09	2.18E–05
647.05	8.57	0	647.06	4.81	0	–	–	30	4.38E–10	2.19E–09	2.19E–05
642.04	8.50	0	642.05	4.73	0	–	–	30	4.37E–10	2.19E–09	2.19E–05
637.04	8.44	0	637.04	4.67	0	–	–	60	4.37E–10	4.37E–09	2.19E–05
632.03	8.40	0	632.04	4.64	0	–	–	60	4.38E–10	4.38E–09	2.19E–05
627.02	8.36	0	627.03	4.60	0	–	–	60	4.38E–10	4.38E–09	2.19E–05
622.01	8.29	0	622.02	4.45	0	–	–	60	4.29E–10	4.29E–09	2.15E–05
616.99	8.29	0	617.00	4.55	0	–	–	30	4.41E–10	2.20E–09	2.20E–05
611.98	8.24	0	611.99	4.47	0	–	–	30	4.37E–10	2.19E–09	2.19E–05
606.97	8.20	0	606.97	4.44	0	–	–	30	4.38E–10	2.19E–09	2.19E–05
601.95	8.16	0	601.96	4.42	0	–	–	30	4.41E–10	2.20E–09	2.20E–05
596.94	8.11	0	596.94	4.38	0	–	–	30	4.42E–10	2.21E–09	2.21E–05

Secup1 (m)	Borehole head1 (masl)	Flow1 (mL/h)	Secup2 (m)	Borehole head2 (masl)	Flow2 (mL/h)	Section head (masl)	T_s (m^2/s)	Q-lower limit Practical (mL/h)	T_s-lower limit Theoretical (m^2/s)	T_s-lower limit Practical (m^2/s)	T_s-upper limit (m^2/s)
591.93	8.07	0	591.92	4.30	0	–	–	30	4.37E–10	2.19E–09	2.19E–05
586.91	8.01	0	586.91	4.26	0	–	–	30	4.40E–10	2.20E–09	2.20E–05
581.90	7.95	0	581.89	4.21	0	–	–	30	4.41E–10	2.20E–09	2.20E–05
576.89	7.91	0	576.88	4.17	0	–	–	50	4.41E–10	3.67E–09	2.20E–05
571.87	7.87	0	571.86	4.14	0	–	–	50	4.42E–10	3.68E–09	2.21E–05
566.87	7.85	0	566.86	4.10	0	–	–	50	4.40E–10	3.66E–09	2.20E–05
561.86	7.79	0	561.85	4.08	0	–	–	30	4.44E–10	2.22E–09	2.22E–05
556.86	7.75	0	556.85	4.05	0	–	–	30	4.46E–10	2.23E–09	2.23E–05
551.85	7.72	0	551.85	3.98	0	–	–	30	4.41E–10	2.20E–09	2.20E–05
546.85	7.67	0	546.84	3.92	0	–	–	30	4.40E–10	2.20E–09	2.20E–05
541.84	7.57	0	541.84	3.83	0	–	–	30	4.41E–10	2.20E–09	2.20E–05
536.84	7.54	0	536.83	3.80	0	–	–	30	4.41E–10	2.20E–09	2.20E–05
531.83	7.47	0	531.83	3.77	0	–	–	30	4.46E–10	2.23E–09	2.23E–05
526.83	7.47	0	526.83	3.73	0	–	–	30	4.41E–10	2.20E–09	2.20E–05
521.82	7.40	0	521.82	3.69	0	–	–	30	4.44E–10	2.22E–09	2.22E–05
516.82	7.35	0	516.82	3.62	20	–	1.47E–09	30	4.42E–10	2.21E–09	2.21E–05
511.81	7.30	0	511.81	3.58	0	–	–	30	4.43E–10	2.22E–09	2.22E–05
506.81	7.26	0	506.80	3.54	0	–	–	30	4.43E–10	2.22E–09	2.22E–05
501.80	7.22	0	501.80	3.49	0	–	–	30	4.42E–10	2.21E–09	2.21E–05
496.80	7.17	0	496.79	3.46	0	–	–	30	4.44E–10	2.22E–09	2.22E–05
491.80	7.10	0	491.79	3.38	0	–	–	30	4.43E–10	2.22E–09	2.22E–05
486.79	7.04	0	486.78	3.34	0	–	–	30	4.46E–10	2.23E–09	2.23E–05
481.79	6.99	0	481.77	3.32	0	–	–	30	4.49E–10	2.25E–09	2.25E–05
476.78	6.97	0	476.77	3.28	0	–	–	30	4.47E–10	2.23E–09	2.23E–05
471.78	6.94	0	471.76	3.24	0	–	–	30	4.46E–10	2.23E–09	2.23E–05
466.78	6.86	0	466.76	3.19	0	–	–	30	4.49E–10	2.25E–09	2.25E–05
461.77	6.84	0	461.75	3.14	0	–	–	30	4.46E–10	2.23E–09	2.23E–05
456.77	6.79	0	456.75	3.11	0	–	–	30	4.48E–10	2.24E–09	2.24E–05

Secup1 (m)	Borehole head1 (masl)	Flow1 (mL/h)	Secup2 (m)	Borehole head2 (masl)	Flow2 (mL/h)	Section head (masl)	T_s (m^2/s)	Q-lower limit Practical (mL/h)	T_s-lower limit Theoretical (m^2/s)	T_s-lower limit Practical (m^2/s)	T_s-upper limit (m^2/s)
451.76	6.74	0	451.74	3.06	0	–	–	30	4.48E–10	2.24E–09	2.24E–05
446.76	6.68	0	446.74	3.02	0	–	–	30	4.50E–10	2.25E–09	2.25E–05
441.75	6.64	0	441.73	2.98	0	–	–	30	4.50E–10	2.25E–09	2.25E–05
436.75	6.62	0	436.73	2.95	0	–	–	30	4.49E–10	2.25E–09	2.25E–05
431.74	6.56	0	431.72	2.91	0	–	–	30	4.52E–10	2.26E–09	2.26E–05
426.74	6.55	0	426.72	2.87	0	–	–	30	4.48E–10	2.24E–09	2.24E–05
421.73	6.47	0	421.71	2.84	32.58	–	2.47E–09	30	4.54E–10	2.27E–09	2.27E–05
416.73	6.42	0	416.71	2.80	222	–	1.68E–08	30	4.55E–10	2.28E–09	2.28E–05
411.72	6.37	0	411.70	2.74	0	–	–	30	4.54E–10	2.27E–09	2.27E–05
406.72	6.32	0	406.70	2.71	0	–	–	30	4.57E–10	2.28E–09	2.28E–05
401.71	6.24	0	401.70	2.63	0	–	–	30	4.57E–10	2.28E–09	2.28E–05
396.70	6.21	0	396.69	2.60	0	–	–	30	4.57E–10	2.28E–09	2.28E–05
391.70	6.16	0	391.69	2.56	0	–	–	30	4.58E–10	2.29E–09	2.29E–05
386.69	6.14	0	386.69	2.53	0	–	–	30	4.57E–10	2.28E–09	2.28E–05
381.69	6.10	0	381.68	2.46	0	–	–	30	4.53E–10	2.26E–09	2.26E–05
376.68	6.06	0	376.68	2.42	0	–	–	30	4.53E–10	2.26E–09	2.26E–05
371.67	5.98	0	371.68	2.35	0	–	–	30	4.54E–10	2.27E–09	2.27E–05
366.67	5.96	0	366.68	2.32	0	–	–	30	4.53E–10	2.26E–09	2.26E–05
361.66	5.90	0	361.67	2.27	0	–	–	30	4.54E–10	2.27E–09	2.27E–05
356.66	5.86	–2,773.15	356.67	2.24	15,517	5.31	1.39E–06	30	4.55E–10	2.28E–09	2.28E–05
351.66	5.81	0	351.67	2.17	28.39	–	2.14E–09	30	4.53E–10	2.26E–09	2.26E–05
346.66	5.78	0	346.66	2.13	0	–	–	30	4.52E–10	2.26E–09	2.26E–05
341.66	5.72	0	341.66	2.09	53.64	–	4.06E–09	30	4.54E–10	2.27E–09	2.27E–05
336.66	5.69	–53.21	336.66	2.05	331	5.19	2.90E–08	30	4.53E–10	2.26E–09	2.26E–05
331.66	5.62	0	331.65	2.00	0	–	–	30	4.55E–10	2.28E–09	2.28E–05
326.65	5.56	0	326.65	1.96	0	–	–	30	4.58E–10	2.29E–09	2.29E–05
321.65	5.55	0	321.65	1.92	0	–	–	30	4.54E–10	2.27E–09	2.27E–05
316.65	5.50	0	316.64	1.88	0	–	–	30	4.55E–10	2.28E–09	2.28E–05

Secup1 (m)	Borehole head1 (masl)	Flow1 (mL/h)	Secup2 (m)	Borehole head2 (masl)	Flow2 (mL/h)	Section head (masl)	T_s (m^2/s)	Q-lower limit Practical (mL/h)	T_s-lower limit Theoretical (m^2/s)	T_s-lower limit Practical (m^2/s)	T_s-upper limit (m^2/s)
311.65	5.46	0	311.64	1.84	17.95	–	1.36E–09	30	4.55E–10	2.28E–09	2.28E–05
306.63	5.42	0	306.63	1.80	0	–	–	30	4.55E–10	2.28E–09	2.28E–05
301.62	5.39	0	301.62	1.76	0	–	–	30	4.54E–10	2.27E–09	2.27E–05
296.61	5.35	0	296.61	1.73	2,322.08	–	1.76E–07	30	4.55E–10	2.28E–09	2.28E–05
291.60	5.27	0	291.60	1.65	592	–	4.49E–08	30	4.55E–10	2.28E–09	2.28E–05
286.59	5.24	0	286.59	1.62	0	–	–	30	4.55E–10	2.28E–09	2.28E–05
281.58	5.21	0	281.58	1.59	0	–	–	30	4.55E–10	2.28E–09	2.28E–05
276.57	5.20	0	276.57	1.57	0	–	–	30	4.54E–10	2.27E–09	2.27E–05
271.56	5.13	0	271.57	1.50	88.64	–	6.71E–09	30	4.54E–10	2.27E–09	2.27E–05
266.55	5.09	0	266.56	1.47	0	–	–	30	4.55E–10	2.28E–09	2.28E–05
261.54	5.07	0	261.55	1.44	0	–	–	30	4.54E–10	2.27E–09	2.27E–05
256.54	5.05	0	256.54	1.41	250	–	1.89E–08	30	4.53E–10	2.26E–09	2.26E–05
251.53	4.97	0	251.53	1.37	0	–	–	30	4.58E–10	2.29E–09	2.29E–05
246.53	4.94	0	246.52	1.34	0	–	–	30	4.58E–10	2.29E–09	2.29E–05
241.52	4.87	0	241.52	1.26	0	–	–	30	4.57E–10	2.28E–09	2.28E–05
236.52	4.84	0	236.51	1.23	0	–	–	30	4.57E–10	2.28E–09	2.28E–05
231.52	4.82	4,110	231.50	3.57	254,500	4.84	5.50E–05 *	30	1.32E–09	6.59E–09	6.59E–05
226.51	4.78	0	226.49	1.18	0	–	–	30	4.58E–10	2.29E–09	2.29E–05
221.51	4.71	0	221.49	1.10	0	–	–	30	4.57E–10	2.28E–09	2.28E–05
216.50	4.67	0	216.48	1.06	0	–	–	30	4.57E–10	2.28E–09	2.28E–05
211.50	4.62	0	211.47	1.03	0	–	–	30	4.59E–10	2.30E–09	2.30E–05
206.49	4.60	–2,114.2	206.47	3.36	161,450	4.58	3.62E–05 *	30	1.33E–09	6.65E–09	6.65E–05
201.48	4.56	–264	201.47	3.30	38,680	4.55	8.49E–06 *	30	1.31E–09	6.54E–09	6.54E–05
196.48	4.60	0	196.46	0.93	0	–	–	30	4.49E–10	2.25E–09	2.25E–05
191.47	4.60	0	191.46	0.87	5,025	–	3.70E–07	30	4.42E–10	2.21E–09	2.21E–05
186.46	4.57	0	186.46	0.82	2,367.09	–	1.73E–07	30	4.40E–10	2.20E–09	2.20E–05
181.45	4.60	0	181.46	0.78	780	–	5.61E–08	30	4.32E–10	2.16E–09	2.16E–05
176.45	4.35	18.1	176.46	0.75	7,080	4.36	5.39E–07	30	4.58E–10	2.29E–09	2.29E–05

Secup1 (m)	Borehole head1 (masl)	Flow1 (mL/h)	Secup2 (m)	Borehole head2 (masl)	Flow2 (mL/h)	Section head (masl)	T_s (m^2/s)	Q-lower limit Practical (mL/h)	T_s-lower limit Theoretical (m^2/s)	T_s-lower limit Practical (m^2/s)	T_s-upper limit (m^2/s)
171.44	4.28	0	171.45	0.70	5,657	–	4.34E–07	30	4.60E–10	2.30E–09	2.30E–05
166.43	4.42	0	166.45	0.66	2,027.78	–	1.48E–07	30	4.38E–10	2.19E–09	2.19E–05
161.42	4.28	147.75	161.45	0.61	16,155	4.31	1.20E–06	30	4.49E–10	2.25E–09	2.25E–05
156.42	4.32	0	156.44	0.57	765	–	5.60E–08	30	4.40E–10	2.20E–09	2.20E–05
151.42	4.32	0	151.44	0.55	719	–	5.24E–08	50	4.37E–10	3.64E–09	2.19E–05
146.42	4.29	0	146.43	0.51	2,807	–	2.04E–07	50	4.36E–10	3.63E–09	2.18E–05
141.42	4.21	0	141.42	0.40	537	–	3.87E–08	30	4.33E–10	2.16E–09	2.16E–05
136.43	4.18	0	136.41	0.37	2,000	–	1.44E–07	30	4.33E–10	2.16E–09	2.16E–05
131.43	4.15	0	131.41	0.34	7,000	–	5.05E–07	50	4.33E–10	3.61E–09	2.16E–05
126.43	4.13	0	126.40	0.30	7,967	–	5.72E–07	50	4.30E–10	3.59E–09	2.15E–05
121.43	4.10	0	121.39	0.25	640	–	4.57E–08	60	4.28E–10	4.28E–09	2.14E–05
116.23	4.13	0	116.19	0.19	2,217.06	–	1.55E–07	60	4.18E–10	4.18E–09	2.09E–05
111.23	3.99	830	111.18	2.73	288,590	3.99	6.27E–05 *	60	1.31E–09	2.18E–08	6.54E–05

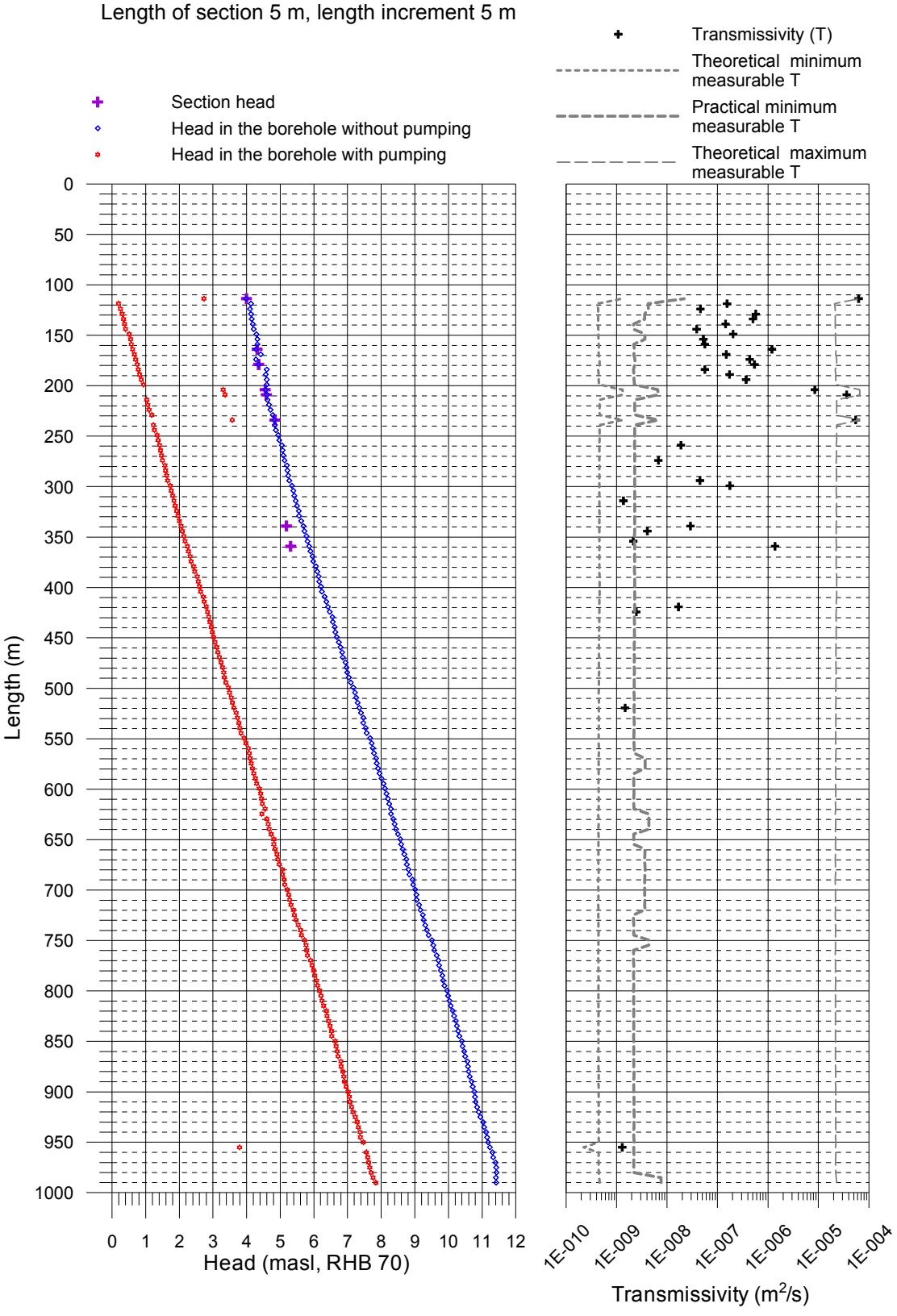
* Drawdown = 1.4 m result was used for calculations.

** Drawdown = 7.4 m result was used for calculations.

Appendix 6.2

Transmissivity and head of 5 m sections

Forsmark, Borehole KFM04A
Difference flow measurement 2004-03-12 - 2004-03-27
Length of section 5 m, length increment 5 m



Appendix 7.1

Table of transmissivity and head of detected fractures

Length to fracture (m)	Borehole head1 (masl)	Flow1 (mL/h)	Borehole head2 (masl)	Flow2 (mL/h)	T_f (m^2/s)	Fracture head (masl)
109.6	4.03	0	0.3	1,890	1.39E–07	–
110.3	4.01	0	0.3	8,800	6.52E–07	–
111.4	3.99	0	0.32	1,200	8.98E–08 ***	–
112.4	3.99	430	2.37	164,000	3.37E–05 *	3.99
112.8	3.97	0	0.33	2,300	1.74E–07 ***	–
113.9	3.99	0	0.33	230	1.73E–08 ***	–
116.1	4.11	400	0.36	123,500	2.80E–05	4.11
117	4.15	0	2.271	2,000	1.43E–07 *	4.15
120.2	4.11	0	0.2	95	6.68E–09 ***	–
125.3	4.09	0	0.18	250	1.76E–08 ***	–
128.9	4.14	0	0.19	500	3.48E–08	–
130.8	4.15	0	0.2	6,800	4.73E–07	–
133.1	4.16	0	0.2	850	5.90E–08	–
133.4	4.17	0	0.2	90	6.23E–09 ***	–
136.1	4.17	0	0.21	5,700	3.95E–07	–
138.9	4.2	0	0.22	1,150	7.94E–08	–
140.3	4.21	0	0.23	580	4.00E–08	–
141.2	4.21	0	0.24	400	2.77E–08	–
145.2	4.24	0	0.27	250	1.73E–08 ***	–
149.3	4.31	0	0.33	120	8.28E–09 ***	–
149.8	4.31	0	0.33	2,600	1.79E–07	–
151.6	4.32	0	0.34	440	3.04E–08	–
153.7	4.34	0	0.35	40	2.75E–09 ***	–
154	4.33	0	0.36	80	5.54E–09	–
156.7	4.32	0	0.39	320	2.24E–08	–
157.8	4.32	0	0.4	55	3.85E–09 ***	–
162.3	4.28	0	0.44	320	2.29E–08	–
165.1	4.26	110	0.45	15,000	1.07E–06	4.29
169.4	4.31	0	0.48	240	1.72E–08	–
170.5	4.29	0	0.49	700	5.06E–08	–
170.9	4.28	0	0.49	1,100	7.97E–08	–
172.2	4.29	0	0.5	3,200	2.32E–07	–
172.7	4.28	0	0.5	500	3.63E–08 ***	–
173.7	4.28	0	0.51	520	3.79E–08	–
174.7	4.28	0	0.52	580	4.24E–08 ***	–
175.2	4.28	0	0.53	830	6.08E–08	–
177.2	4.41	0	0.56	850	6.07E–08	–
177.7	4.46	0	0.56	1,640	1.16E–07	–
178.8	4.56	0	0.57	350	2.41E–08	–
180	4.59	0	0.58	4,100	2.81E–07	–
181.9	4.59	0	0.59	770	5.29E–08	–
186.5	4.57	0	0.62	85	5.91E–09	–
187.2	4.58	0	0.63	66	4.59E–09	–

Appendix 7.2

Length to fracture (m)	Borehole head1 (masl)	Flow1 (mL/h)	Borehole head2 (masl)	Flow2 (mL/h)	T_f (m^2/s)	Fracture head (masl)
190.9	4.59	0	0.66	1,350	9.44E–08	–
191.5	4.6	0	0.65	900	6.26E–08	–
192.2	4.6	0	0.66	2,720	1.90E–07	–
193.6	4.58	0	0.67	1,550	1.09E–07	–
195.3	4.57	0	0.68	95	6.71E–09	–
202.1	4.56	0	0.76	1,450	1.05E–07	–
202.8	4.56	–550	3.089	38,300	8.88E–06 *	4.54
207.1	4.6	–2,500	3.148	153,600	3.21E–05 *	4.58
208.2	4.61	–105	0.8	19,000	1.38E–06	4.59
232.7	4.82	0	3.411	84,000	1.77E–05 *	–
234	4.82	0	0.99	5,500	3.95E–07	–
235.6	4.83	3,900	3.423	165,000	2.73E–05 *	4.87
257.6	5.05	0	1.26	210	1.52E–08	–
273.9	5.15	0	1.35	93	6.72E–09	–
297.1	5.36	0	1.57	2,210	1.60E–07	–
313	5.47	0	1.68	11	7.97E–10 ***	–
338.8	5.7	–54	1.89	330	2.77E–08	5.16
343.4	5.75	0	1.94	25	1.80E–09 ***	–
346	5.76	0	1.96	11	7.95E–10 ***	–
353.4	5.83	0	2	10	7.17E–10 ***	–
355.5	5.85	0	2.02	18	1.29E–09 ***	–
357.8	5.87	0	2.09	14	1.02E–09 ***	–
358.2	5.87	0	2.08	40	2.90E–09	–
359.8	5.88	–2,750	2.11	14,500	1.26E–06	5.28
419	6.44	0	2.65	160	1.16E–08	–
421.9	6.47	0	2.69	30	2.18E–09 ***	–
521.5	7.4	0	3.5	20	1.41E–09 ***	–
954.8	11.25	0	3.8	35	1.29E–09 **/***	–

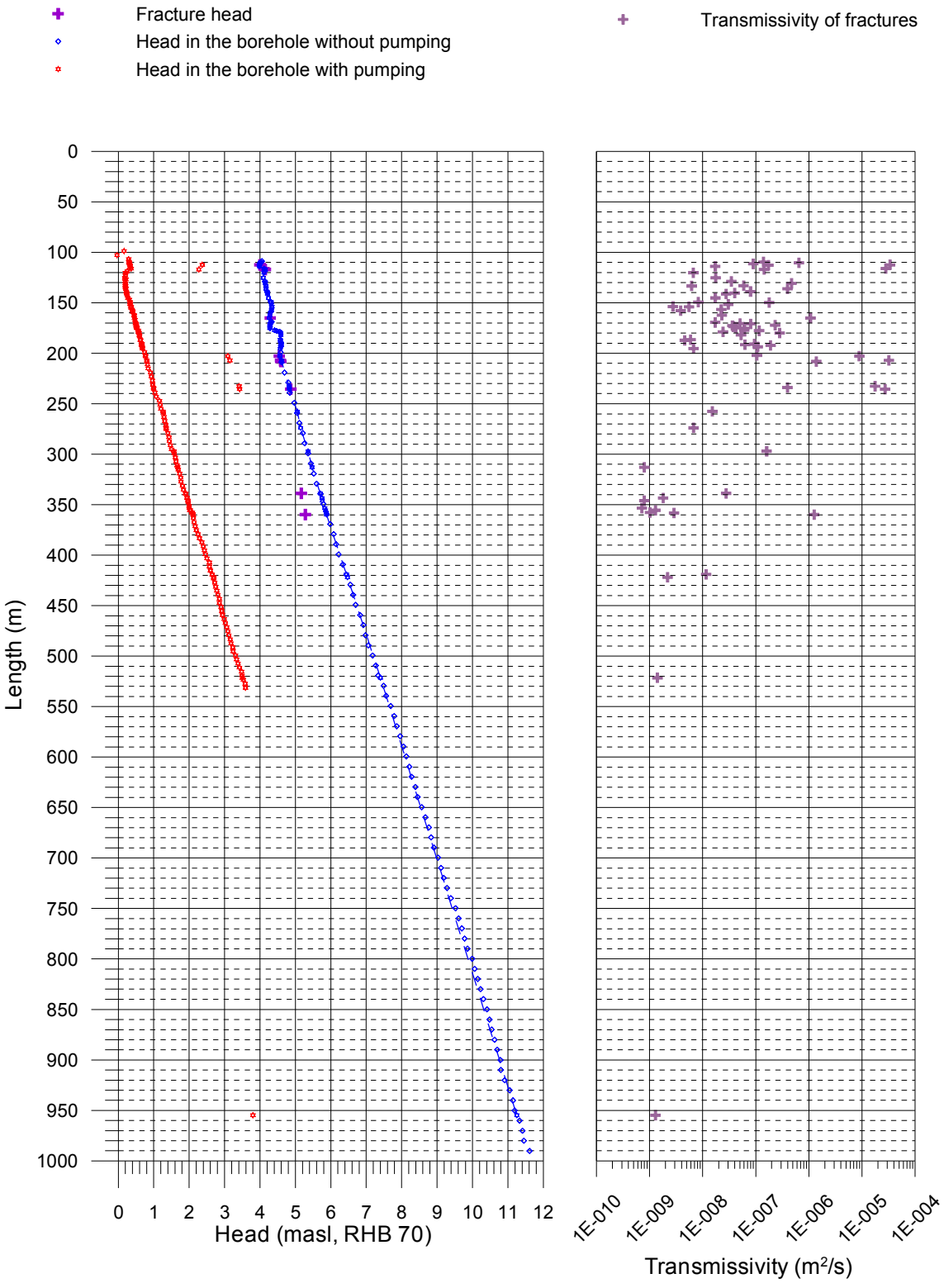
* Drawdown = 1.4 m result was used for calculations.

** Drawdown = 7.4 m result was used for calculations.

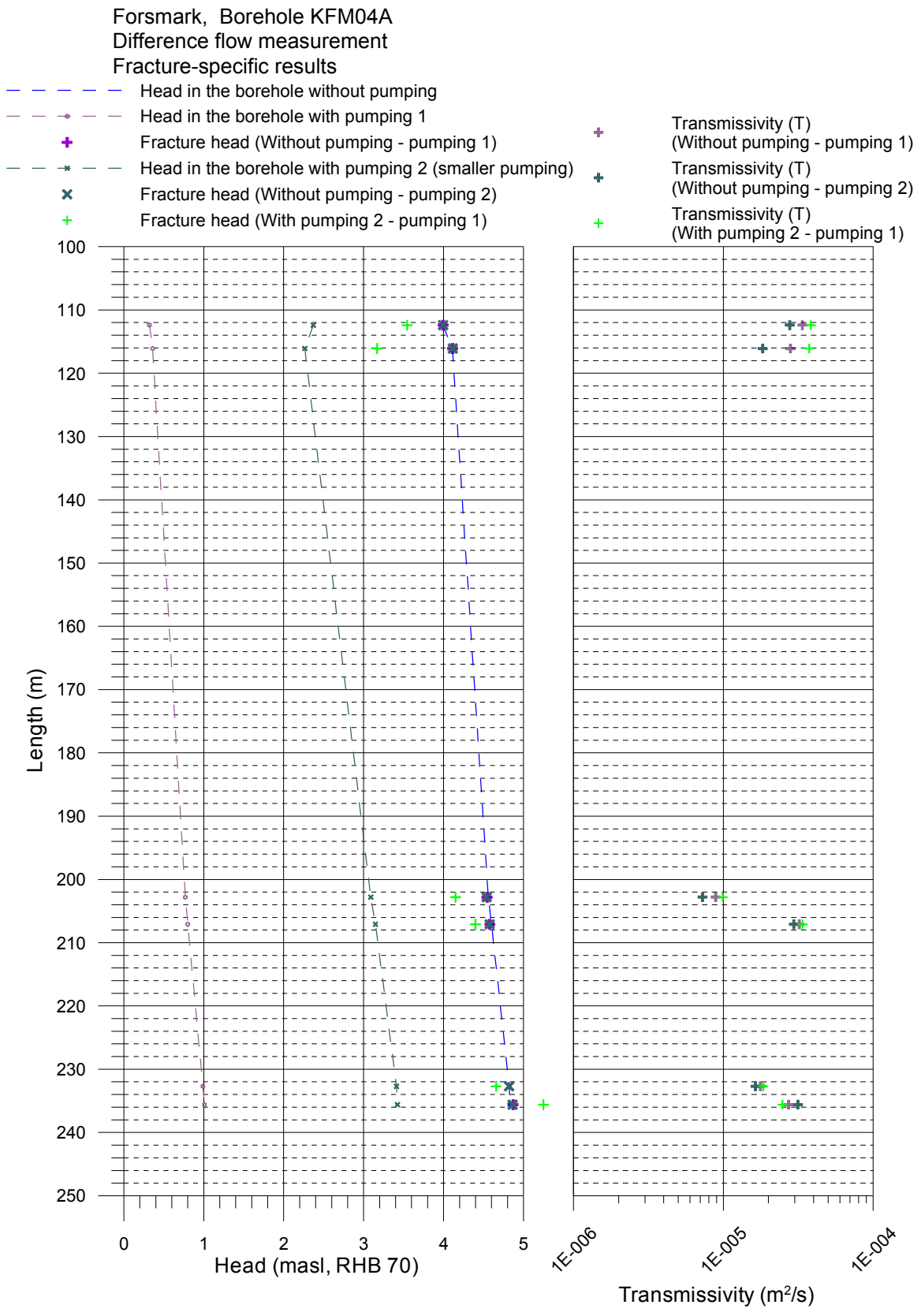
*** Uncertain.

Plotted transmissivity and head of detected fractures

Forsmark, Borehole KFM04A
Difference flow measurement
Fracture-specific results

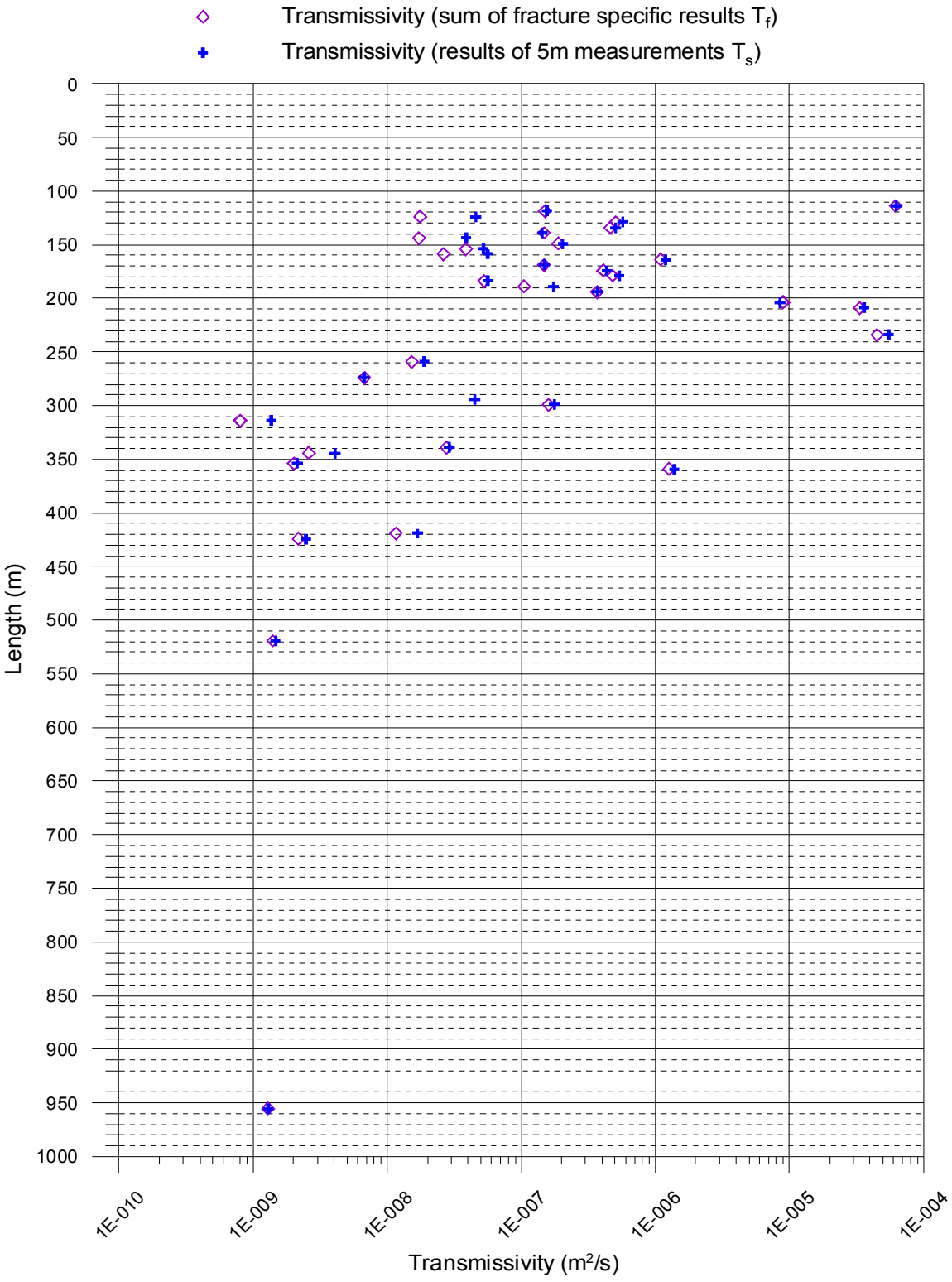


Transmissivity and head for selected high-transmissivity fractures



Comparison between section transmissivity and fracture transmissivity

Forsmark, Borehole KFM04A
Comparison of transmissivity of borehole sections (5m) and fracture transmissivities



Appendix 12.3

Groundwater recovery after pumping