

P-06-146

Supplement 1

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Oskarshamn site investigation

Interference difference flow logging of boreholes KLX09B-F

Subarea Laxemar

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Description

In the present Supplement 1 to SKB P-06-146 Interference difference flowlogging of boreholes KLX09B–F, all groundwater head calculations for borehole KLX09F 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/.

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

Revised appendices	Appendix number
Results of sequential flow logging during hydraulic crosshole interference test	Appendix 7.5
Inferred flow anomalies from overlapping flow logging during hydraulic crosshole interference test	Appendix 8.5.1–8.5.2
Head in the borehole during flow logging	Appendix 12.5
Air pressure, water level in the borehole and pumping rate during flow logging	Appendix 13.5

Reference

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

Difference flow logging – Sequential flow logging during hydraulic crosshole interference test

Borehole ID	SecUp L (m)	SecLow L (m)	L _w (m)	h _{BFW} (m.a.s.l.)	Q _B (m ³ /s)	h _{CFW} (m.a.s.l.)	Q _C (m ³ /s)	h _{DFW} (m.a.s.l.)	Q _D (m ³ /s)	h _{EFW} (m.a.s.l.)	Q _E (m ³ /s)
KLX09F	11.53	16.53	5.0	12.82	9.61E-07	11.50	1.45E-06	12.14	1.39E-06	11.03	2.78E-06
KLX09F	16.53	21.53	5.0	12.87	7.78E-08	11.50	1.07E-07	12.20	8.67E-08	10.91	1.21E-07
KLX09F	21.53	26.53	5.0	12.78	–	11.49	–	12.26	–	10.90	1.31E-08
KLX09F	26.53	31.53	5.0	12.72	–	11.50	–3.22E-08	12.35	–2.25E-08	10.92	3.42E-08
KLX09F	31.53	36.53	5.0	12.70	–2.42E-08	11.50	–5.28E-08	12.38	–3.67E-08	10.91	4.06E-08
KLX09F	36.53	41.53	5.0	12.66	–2.03E-08	11.53	–4.78E-08	12.43	–3.42E-08	10.94	1.83E-08
KLX09F	41.53	46.53	5.0	12.56	–3.67E-08	11.55	–8.22E-08	12.33	–5.28E-08	10.96	5.22E-08
KLX09F	46.53	51.53	5.0	12.58	–1.38E-07	11.58	–3.44E-07	12.23	–2.51E-07	10.98	1.76E-07
KLX09F	51.53	56.53	5.0	12.59	–1.78E-08	11.58	–9.44E-08	12.16	–5.44E-08	10.99	2.53E-08
KLX09F	56.53	61.53	5.0	12.59	–1.36E-08	11.58	–1.24E-07	12.18	–5.39E-08	11.04	2.67E-08
KLX09F	61.53	66.53	5.0	12.60	–	11.58	–1.00E-07	12.19	–2.44E-08	11.05	1.75E-08
KLX09F	66.53	71.53	5.0	12.65	–2.39E-08	11.63	–1.00E-07	12.24	–2.78E-08	11.07	2.53E-08
KLX09F	71.53	76.53	5.0	12.66	–3.97E-06	11.63	–1.02E-05	12.24	–2.97E-06	11.08	2.60E-06
KLX09F	76.53	81.53	5.0	12.71	–1.70E-06	11.63	–3.11E-06	12.25	–1.63E-06	11.12	2.69E-06
KLX09F	81.53	86.53	5.0	12.73	–4.67E-08	11.64	–1.27E-07	12.27	–5.72E-08	11.14	1.28E-08
KLX09F	86.53	91.53	5.0	12.76	–	11.64	–	12.25	–	11.12	–
KLX09F	91.53	96.53	5.0	12.78	–	11.65	–	12.27	–	11.11	–
KLX09F	96.53	101.53	5.0	12.85	–	11.69	–	12.31	–	11.16	–
KLX09F	101.53	106.53	5.0	12.86	–	11.69	–	12.33	–	11.20	–
KLX09F	106.53	111.53	5.0	12.89	–	11.70	–	12.35	–	11.34	–
KLX09F	111.53	116.53	5.0	12.90	–5.75E-06	11.70	1.81E-06	12.33	–3.83E-06	11.39	–1.33E-05
KLX09F	116.53	121.53	5.0	12.90	–	11.71	–	12.27	–	11.40	–
KLX09F	121.53	126.53	5.0	12.92	–	11.72	–	12.32	–	11.44	–
KLX09F	126.53	131.53	5.0	12.95	–	11.72	–	12.42	–	11.41	–
KLX09F	131.53	136.53	5.0	12.95	4.83E-08	11.74	5.06E-08	12.56	1.39E-08	11.34	–3.17E-08
KLX09F	136.53	141.53	5.0	12.91	–	11.80	–	12.56	–	11.19	–
KLX09F	141.53	146.53	5.0	12.96	6.00E-06	11.94	6.97E-06	12.56	2.16E-06	11.14	–3.36E-06

Appendix 8.5.1

PFL – Difference flow logging – Inferred flow anomalies from overlapping flow logging during hydraulic crosshole interference test

Borehole ID	Length to flow anom. L (m)	L _w (m)	dL (m)	h _{BFW} (m.a.s.l.)	Calc Ref Q _B (m ³ /s)	Q _B (m ³ /s)	h _{CFW} (m.a.s.l.)	Calc Ref Q _C (m ³ /s)	Q _C (m ³ /s)	h _{DFW} (m.a.s.l.)	Calc Ref Q _D (m ³ /s)	Q _D (m ³ /s)	h _{EFW} (m.a.s.l.)	Calc Ref Q _E (m ³ /s)	Q _E (m ³ /s)	Comments
KLX09F	9.9	1.0	0.1	12.79	–	–	11.50	–	–	12.08	–	–	11.06	–	–	*
KLX09F	11.5	1.0	0.1	12.80	–	1.03E–08	11.50	–	–	12.09	–	–	11.06	–	–	**
KLX09F	12.9	1.0	0.1	12.83	1.06E–06	1.08E–06	11.50	1.55E–06	1.29E–06	12.11	1.32E–06	1.34E–06	11.06	1.71E–06	2.32E–06	
KLX09F	16.7	1.0	0.1	12.88	–	4.72E–09	11.51	–	6.67E–09	12.19	–	4.44E–09	10.91	–	5.28E–09	**
KLX09F	17.2	1.0	0.1	12.88	–	6.94E–08	11.51	–	9.83E–08	12.20	–	8.72E–08	10.91	–	1.14E–07	**
KLX09F	18.6	1.0	0.1	12.88	–	–	11.50	–	–	12.20	–	–	10.91	–	3.33E–09	**
KLX09F	24.0	1.0	0.1	12.79	–	–	11.50	–	–	12.26	–	–	10.91	–	1.17E–08	**
KLX09F	30.7	1.0	0.1	12.73	–	–	11.51	–	–1.31E–08	12.38	–	–1.00E–08	10.92	–	2.22E–08	**
KLX09F	31.7	1.0	0.1	12.73	–	–	11.52	–	–1.06E–08	12.40	–	–7.78E–09	10.91	–	1.11E–08	*
KLX09F	33.2	1.0	0.1	12.71	–	–7.78E–09	11.52	–	–1.56E–08	12.40	–	–1.17E–08	10.91	–	1.31E–08	**
KLX09F	33.7	1.0	0.1	12.71	–	–	11.52	–	–	12.39	–	–	10.92	–	3.89E–09	**
KLX09F	35.5	1.0	0.1	12.67	–	–1.22E–08	11.51	–	–1.94E–08	12.39	–	–1.56E–08	10.92	–	1.94E–08	**
KLX09F	38.5	1.0	0.1	12.67	–	–1.78E–08	11.54	–	–3.36E–08	12.43	–	–2.61E–08	10.94	–	2.83E–08	**
KLX09F	42.1	1.0	0.1	12.60	–	–1.50E–08	11.55	–	–2.39E–08	12.36	–	–1.78E–08	10.95	–	2.58E–08	**
KLX09F	43.1	1.0	0.1	12.57	–	–9.44E–09	11.55	–	–1.06E–08	12.35	–	–1.14E–08	10.95	–	8.89E–09	**
KLX09F	45.6	1.0	0.1	12.56	–	–1.39E–08	11.56	–	–3.28E–08	12.28	–	–2.28E–08	10.96	–	1.94E–08	**
KLX09F	46.9	1.0	0.1	12.59	–	–2.22E–08	11.59	–	–3.56E–08	12.25	–	–2.72E–08	11.00	–	3.94E–08	**
KLX09F	48.2	1.0	0.1	12.59	2.72E–07	–8.39E–08	11.59	5.69E–07	–1.71E–07	12.25	3.76E–07	–1.31E–07	10.99	7.46E–07	1.27E–07	
KLX09F	49.7	1.0	0.1	12.59	4.06E–08	–1.00E–08	11.59	8.84E–08	–2.11E–08	12.23	5.78E–08	–1.69E–08	10.99	1.17E–07	1.14E–08	
KLX09F	54.0	1.0	0.1	12.60	–	–	11.59	–	–1.17E–08	12.17	–	–8.33E–09	11.00	–	5.00E–09	**
KLX09F	54.9	1.0	0.1	12.60	7.92E–08	–1.17E–08	11.59	1.75E–07	–5.28E–08	12.17	1.20E–07	–3.50E–08	11.00	2.31E–07	1.78E–08	
KLX09F	59.9	1.0	0.1	12.60	8.71E–08	–9.17E–09	11.59	1.93E–07	–3.17E–08	12.19	1.30E–07	–2.50E–08	11.05	2.48E–07	2.39E–08	
KLX09F	61.3	1.0	0.1	12.60	–	–	11.58	–	–6.67E–09	12.19	–	–	11.06	–	–	**
KLX09F	62.9	1.0	0.1	12.61	8.97E–08	–	11.58	2.01E–07	–7.00E–08	12.20	1.34E–07	–2.06E–08	11.05	2.58E–07	1.86E–08	
KLX09F	67.0	1.0	0.1	12.64	–	–	11.63	–	–6.94E–09	12.23	–	–	11.07	–	–	**

KLX09F	68.4	1.0	0.1	12.66	6.84E-08	-2.00E-08	11.64	1.52E-07	-3.36E-08	12.24	1.02E-07	-2.39E-08	11.07	1.99E-07	2.39E-08
KLX09F	71.8	1.0	0.1	12.66	9.04E-07	-7.89E-08	11.64	2.03E-06	-3.22E-07	12.24	1.37E-06	-8.94E-08	11.08	2.65E-06	5.33E-08
KLX09F	73.1	1.0	0.1	12.65	3.29E-06	-1.33E-06	11.63	7.09E-06	-5.22E-06	12.25	4.78E-06	-1.26E-06	11.07	9.17E-06	9.56E-07
KLX09F	76.1	1.0	0.1	12.70	6.57E-06	-2.26E-06	11.64	1.49E-05	-3.67E-06	12.24	1.01E-05	-1.38E-06	11.13	1.90E-05	1.50E-06
KLX09F	79.6	1.0	0.1	12.71	4.34E-06	-1.25E-06	11.63	9.78E-06	-3.31E-06	12.25	6.66E-06	-9.19E-07	11.13	1.23E-05	2.32E-06
KLX09F	80.1	1.0	0.1	12.71	4.35E-06	-6.39E-07	11.63	1.00E-05	-1.44E-06	12.25	6.77E-06	-5.94E-07	11.13	1.27E-05	1.09E-06
KLX09F	81.1	1.0	0.1	12.71	2.25E-06	-1.88E-07	11.62	5.22E-06	-4.75E-07	12.26	3.48E-06	-1.81E-07	11.13	6.55E-06	2.62E-07
KLX09F	81.8	1.0	0.1	12.72	4.45E-07	-3.94E-08	11.64	1.04E-06	-1.23E-07	12.26	7.00E-07	-4.83E-08	11.14	1.31E-06	1.61E-08
KLX09F	82.4	1.0	0.1	12.73	1.70E-07	-7.78E-09	11.63	4.03E-07	-1.22E-08	12.28	2.65E-07	-6.67E-09	11.14	5.07E-07	-

Appendix 8.5.2

Borehole ID	Length to flow anom. L (m)	L _w (m)	dL (m)	h _{BFW} (m.a.s.l.)	Calc Ref Q _B (m ³ /s)	Q _B (m ³ /s)	h _{CFW} (m.a.s.l.)	Calc Ref Q _C (m ³ /s)	Q _C (m ³ /s)	h _{DFW} (m.a.s.l.)	Calc Ref Q _D (m ³ /s)	Q _D (m ³ /s)	h _{EFW} (m.a.s.l.)	Calc Ref Q _E (m ³ /s)	Q _E (m ³ /s)	Comments
KLX09F	94.4	1.0	0.1	12.79	4.42E-08	-	11.65	9.90E-08	-	12.27	6.87E-08	-	11.12	1.24E-07	-	**
KLX09F	102.5	1.0	0.1	12.86	1.02E-07	-	11.71	2.26E-07	-	12.33	1.60E-07	-	11.19	2.80E-07	-	
KLX09F	113.3	1.0	0.1	12.91	4.36E-05	-6.36E-06	11.71	1.01E-04	5.89E-07	12.33	7.14E-05	-4.14E-06	11.39	1.16E-04	-1.25E-05	
KLX09F	132.0	1.0	0.1	12.96	1.47E-07	3.28E-08	11.74	3.57E-07	3.72E-08	12.51	2.24E-07	1.28E-08	11.39	4.19E-07	-3.89E-08	
KLX09F	133.5	1.0	0.1	12.96	4.14E-08	-	11.75	9.30E-08	-	12.54	5.97E-08	-	11.36	1.10E-07	-	**
KLX09F	134.5	1.0	0.1	12.96	4.09E-08	-	11.77	9.15E-08	-	12.57	5.73E-08	-	11.34	1.10E-07	-	
KLX09F	143.1	1.0	0.1	12.94	3.53E-08	-	11.93	7.09E-08	9.17E-09	12.57	4.83E-08	-	11.15	9.84E-08	-	
KLX09F	144.2	1.0	0.1	12.97	1.14E-07	5.44E-08	11.94	2.77E-07	6.39E-08	12.57	1.78E-07	1.58E-08	11.14	4.06E-07	4.00E-08	
KLX09F	145.5	1.0	0.1	12.98	2.02E-05	5.97E-06	11.94	4.70E-05	5.94E-06	12.55	3.13E-05	2.33E-06	11.12	6.82E-05	3.28E-06	

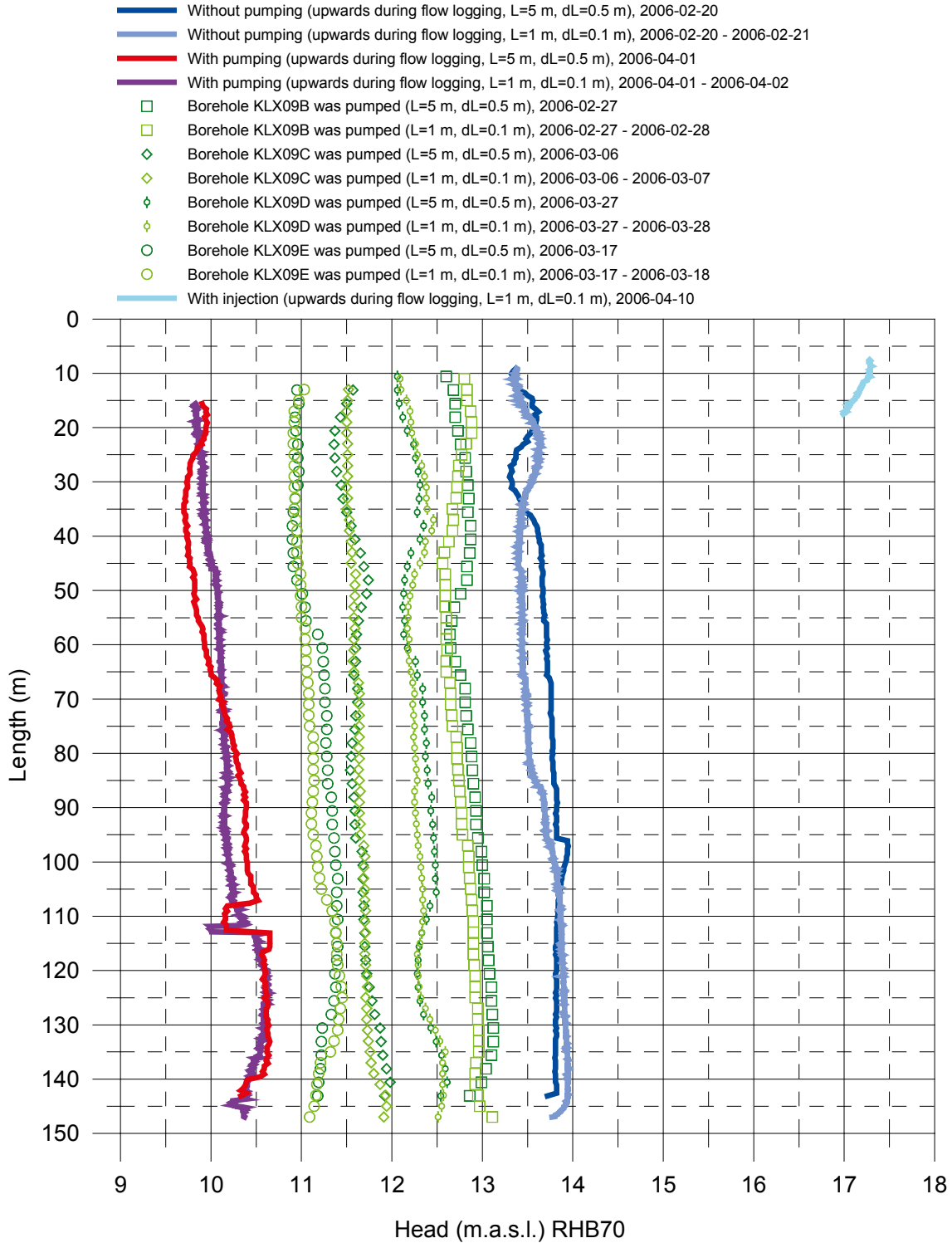
* Uncertain = The flow rate is less than 30 mL/h or the flow anomalies are overlapping or they are unclear because of noise.

** Found only during hydraulic crosshole interference test.

Appendix 12.5

Laxemar, borehole KLX09F Head in the borehole during flow logging

Head (m.a.s.l.)= (Absolute pressure (Pa) - Airpressure (Pa) + Offset) / (1,000 kg/m³ * 9.80665 m/s²) + Elevation (m) Offset = 2,460 Pa (Correction for absolut pressure sensor)



Appendix 13.5

Laxemar, borehole KLX09F

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

