

Real-Time Water Quality Deployment Report

Rattling Brook below Bridge – NF02ZK0023

January 7, 2009 to February 10, 2009

General

- The Water Resources Management Division staff monitors the real-time web page on a daily basis.
- Vale Inco will be informed of any significant water quality events in the form of a monthly deployment report.
- This monthly deployment report interprets the data from the Rattling Brook River real-time water quality station for the period of January 7th, 2009 to February 10, 2009.
- Due to previous instances of data not being transmitted by this station, it was decided to log data within the Datasonde in addition to broadcasting in real time. Water Survey of Canada staff visited the site on February 2, 2009 to replace transmission equipment and has successfully transmitted since February 2, 2009.
- The data used in this report was logged internally due to the gap created in the near real-time database caused by transmission outages.

Maintenance and Calibration of Instrumentation

- The Rattling Brook instrument was deployed on January 7, 2009 and removed for cleaning and calibration on February 10, 2009.
- As part of the removal and reinstallation process, parameters are recorded from both the field sonde (*in situ*) and a similar, newly-calibrated QA sonde (placed side by side). The parameters from both instruments are compared and their variability is ranked as part of the QA/QC protocol (see Table 1).
- Upon installation, the field sonde and QA sonde ranked “Excellent” for all parameters except for pH where the ranking was ranked as “Good”. After 32 days of deployment, it was noted that the pH and Conductivity parameters had degraded somewhat and their rankings were listed as “Fair” and “Good”, respectively. This degradation may be partly responsible for the drift seen in Figures 3 and 4.

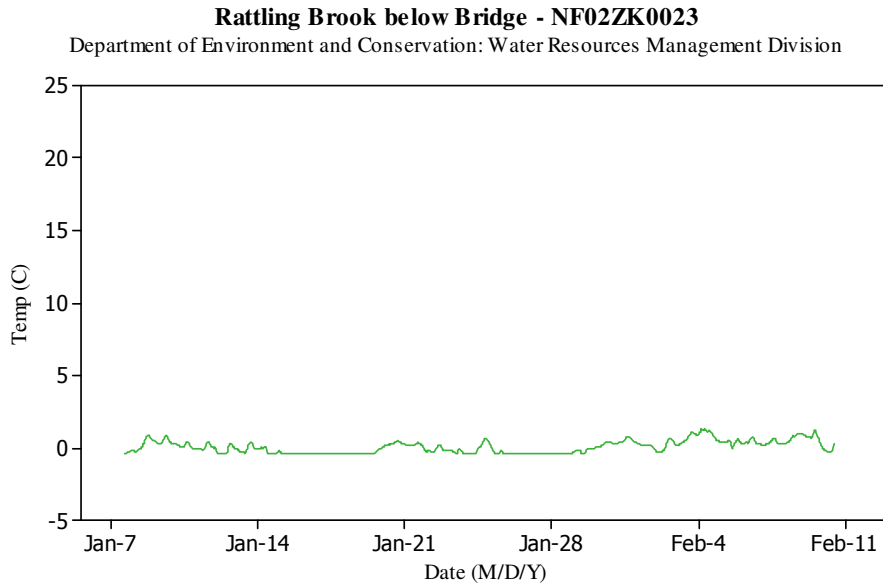
Table 1: QA/QC Data Comparison Rankings upon installation on January 6, 2009 and removal on February 10, 2009

Station	Date	Action	Instrument Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook (Long Harbour)	January 7, 2009	Installation	Excellent	Good	Excellent	Excellent	Excellent
	February 10, 2009	Removal	Excellent	Fair	Good	Excellent	Excellent

Data Interpretation

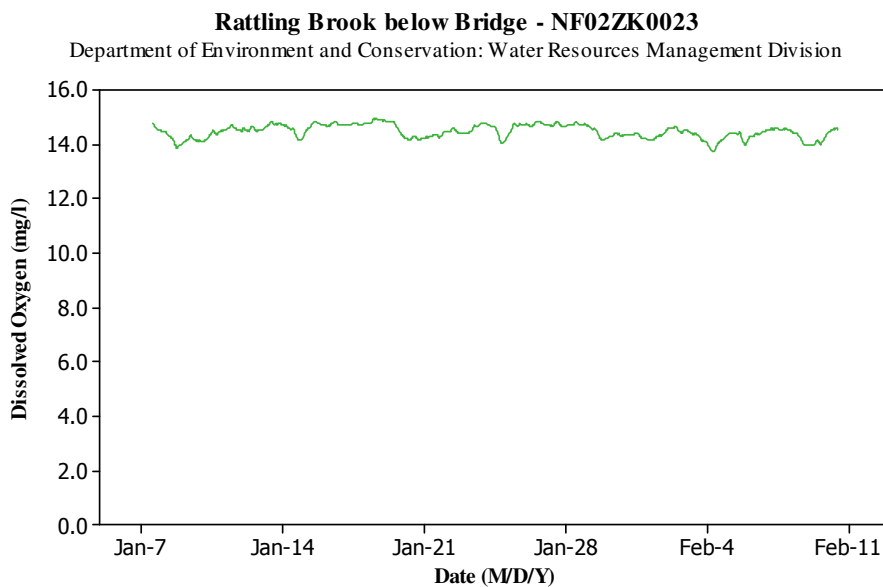
- Water temperature from January 7, 2009 to February 10, 2009 was relatively stable and ranged from -0.45°C to 1.33°C (average = 0.053°C), as shown in Figure 1.

Figure 1: Water temperature at Rattling Brook from Jan 7 to Feb 10



- According to Figure 2, dissolved oxygen remained stable, ranging from 13.72 mg/L to 14.95 mg/L which corresponds to 95.9% and 101.9% saturation, respectively. It should be noted that water may become supersaturated with oxygen (ie, >100%) should the river experience vigorous flow. These values are considerably higher than the Canadian Council of Ministers of the Environment (CCME) guideline of 6.5 mg/l for preservation of early life stage, cold water biota.

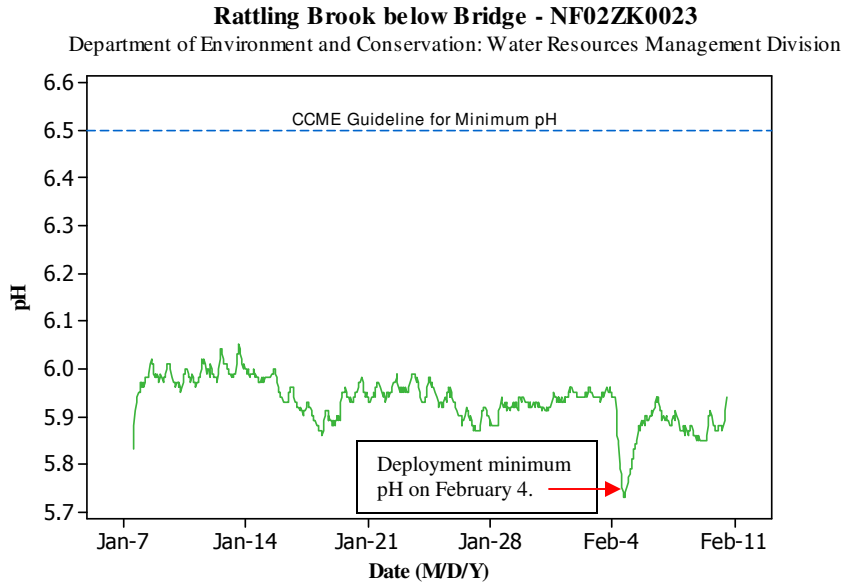
Figure 2: Dissolved oxygen at Rattling Brook from Jan 7 to Feb 10



- As shown in Figure 3 (page 3), a generally decreasing trend is seen in pH during the deployment period ranging from a peak of 6.05 to 5.73 as seen on February 4. This rapid decline in pH is likely due the runoff

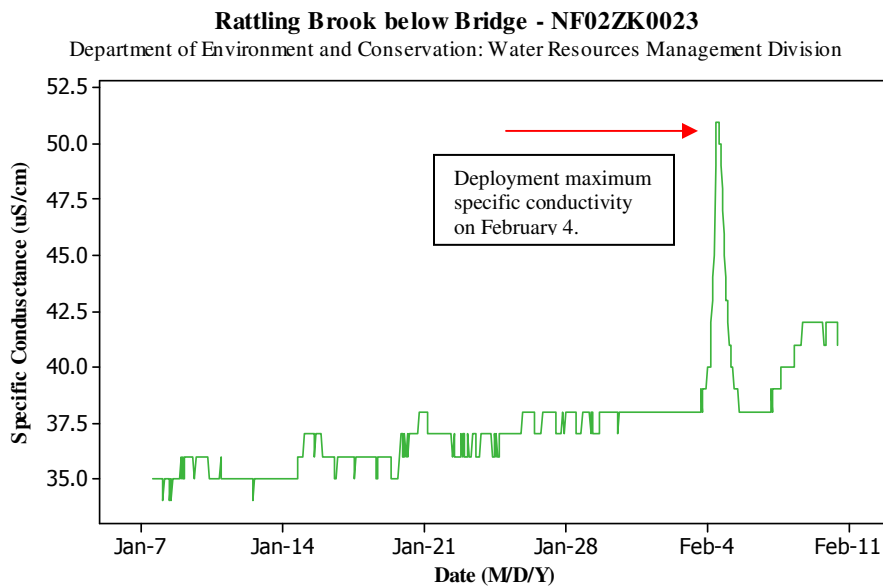
from 29.5 mm of rainfall occurring from February 3rd to 5th, causing temporary acidification of stream flow. As mentioned in Table 1, sensor drift may also account for the decreasing pH trend during deployment.

Figure 3: pH at Rattling Brook from Jan 7 to Feb 10



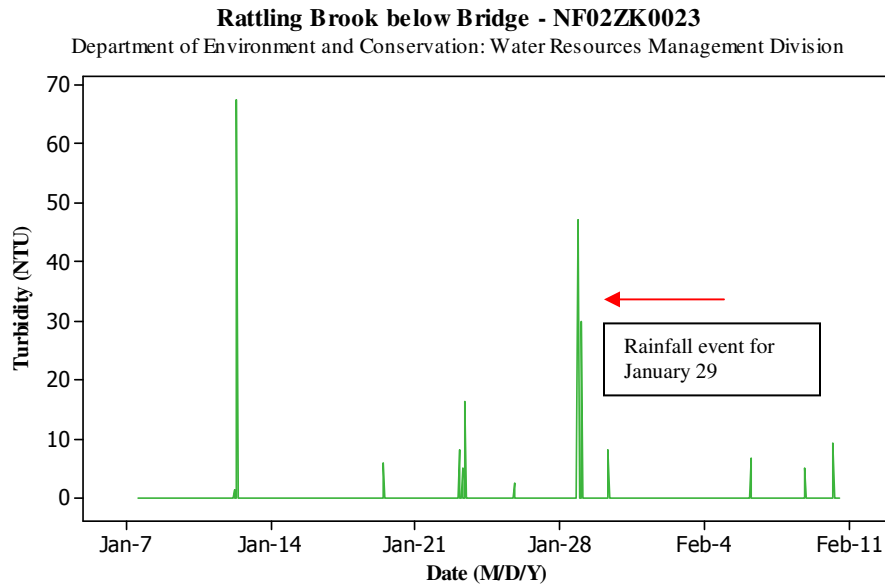
- Figure 4 shows an increasing trend with a spike in conductivity corresponding to the rainfall from February 3rd to 5th. Values ranged from 34.0 to 51.0 $\mu\text{S}/\text{cm}$, averaging 37.4 $\mu\text{S}/\text{cm}$. As mentioned in Table 1, sensor drift may account for the increasing trend during deployment.

Figure 4: Specific Conductance at Rattling Brook from Jan 7 to Feb 10



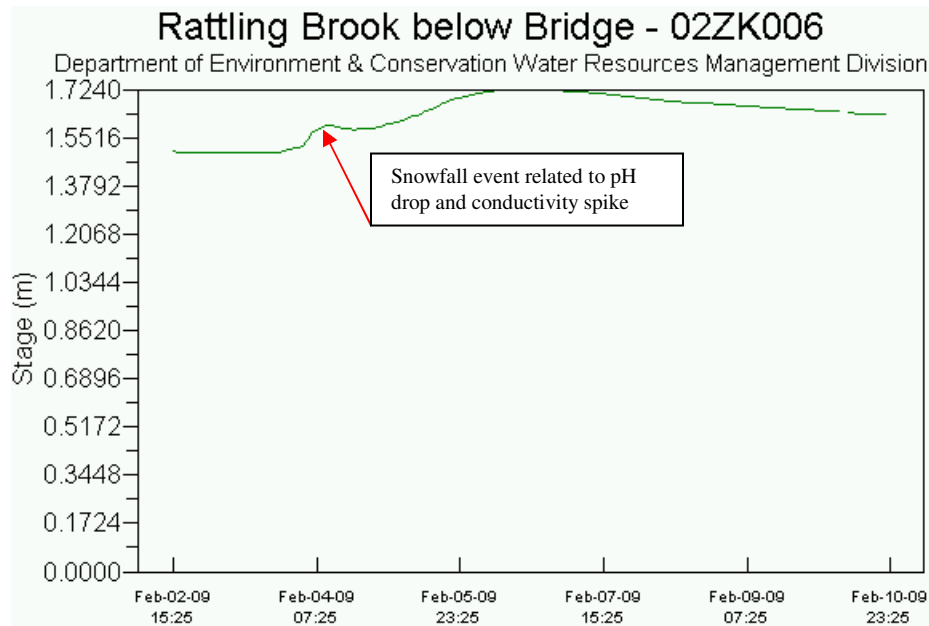
- Turbidity remained low throughout most of the deployment period except for periodic, short-term spikes related to snow-melt or rainfall events.

Figure 5: Turbidity at Rattling Brook from Jan 7 to Feb 10



- Unfortunately, due to transmission issues, stage data was not available prior to February 2nd. A rainfall event of 29.5 mm occurred from February 3rd to 5th, represented by the small bump. A gradual increase in stage after the rain event followed by a gradual decline depicts the slow movement of groundwater through the catchment area upstream of the station.

Figure 6: Stage level at Rattling Brook from Feb 2 to Feb 10



Appendix

Appendix 1: Weather conditions for Argentia, near Rattling Brook for January 2009

Daily Data Report for January 2009											
Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days °C	Cool Deg Days °C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
01†	2.3	-3.6	-0.7	18.7	0.0	M	M	6.1		12	76
02†	1.8	-0.9	0.5	17.5	0.0	M	M	1.5		26	76
03†	2.2	-2.0	0.1	17.9	0.0	0.0	M	3.1		25	69
04†	0.4	-3.1	-1.4	19.4	0.0	0.0	M	2.6	10	28	65
05†	2.3	-1.7	0.3	17.7	0.0	M	M	0.0	3	25	74
06†	3.1	-4.5	-0.7	18.7	0.0	M	M	1.2		26	82
07†	-0.3	-3.4	-1.9	19.9	0.0	M	M	1.2		26	82
08†	6.4	-2.1	2.2	15.8	0.0	M	M	4.3		24	83
09†	3.4	-1.2	1.1	16.9	0.0	M	M	0.0		24	70
10†	-1.0	-3.1	-2.1	20.1	0.0	M	M	0.0		33	43
11†	-1.0	-4.0	-2.5	20.5	0.0	0.0	M	4.0		3	46
12†	-2.0	-6.3	-4.2	22.2	0.0	M	M	1.3	7	1	63
13†	-0.5	-6.3	-3.4	21.4	0.0	M	M	0.0	5	32	48
14†	7.4	-2.3	2.6	15.4	0.0	M	M	14.2	2	12	120
15†	-2.2	-9.7	-6.0	24.0	0.0	M	M	1.5		26	95
16†	-8.5	-12.2	-10.4	28.4	0.0	M	M	0.0		30	57
17†	-7.9	-10.8	-9.4	27.4	0.0	0.0	M	0.6		26	83
18†	-5.6	-10.5	-8.1	26.1	0.0	M	M	0.0	1	27	67
19†	8.0	-8.1	-0.1	18.1	0.0	M	M	3.7		16	95
20†	2.9	-2.4	0.3	17.7	0.0	M	M	0.6		26	54
21†	-2.1	-5.5	-3.8	21.8	0.0	M	M	0.0		30	32
22†	-0.9	-8.7	-4.8	22.8	0.0	M	M	0.0		25	67
23†	-1.3	-7.8	-4.6	22.6	0.0	M	M	0.0		26	95
24†	7.3	-6.0	0.7	17.3	0.0	M	M	3.2		20	89
25†	-3.4	-9.4	-6.4	24.4	0.0	M	M	5.7		27	106
26†	-7.8	-11.1	-9.5	27.5	0.0	M	M	0.0		27	95
27†	-8.8	-11.2	-10.0	28.0	0.0	M	M	0.0		30	63
28†	-2.8	-8.8	-5.8	23.8	0.0	M	M	0.0		25	63
29†	3.7	-3.9	-0.1	18.1	0.0	M	M	5.6		14	113
30†	0.0	-1.5	-0.8	18.8	0.0	M	M	0.0		29	44
31†	-0.5	-2.2	-1.4	19.4	0.0	M	M	0.0		9	48
Sum				648.3	0.0	0.0*	M	60.4			
Avg	-0.2	-5.6	-2.9								
Xtrm	8.0	-12.2								12	120

Appendix 2: Weather conditions for Argentia, near Rattling Brook for February

Daily Data Report for February 2009											
Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days °C	Cool Deg Days °C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
01†	-1.0	-3.2	-2.1	20.1	0.0	M	M	0.6		33	72
02†	0.3	-3.4	-1.6	19.6	0.0	M	M	0.0		26	54
03†	10.2	-0.6	4.8	13.2	0.0	M	M	13.8		18	67
04†	11.2	-1.3	5.0	13.0	0.0	M	M	4.9		18	96
05†	6.0	-4.9	0.6	17.4	0.0	0.0	M	10.8		18	54
06†	-3.3	-7.0	-5.2	23.2	0.0	M	M	3.6	1	26	74
07†	-1.8	-4.6	-3.2	21.2	0.0	M	M	0.6		27	69
08†	4.3	-1.9	1.2	16.8	0.0	M	M	3.5		20	69
09†	0.2	-11.0	-5.4	23.4	0.0	M	M	1.4		26	70
10†	-6.7	-10.9	-8.8	26.8	0.0	M	M	0.0		31	46
11†	-2.0	-6.8	-4.4	22.4	0.0	M	M	1.4		27	56
12†	2.6	-2.7	-0.1	18.1	0.0	M	M	2.7		10	74
13†	2.7	-0.1	1.3	16.7	0.0	M	M	1.2		11	72
14†	0.0	-5.5	-2.8	20.8	0.0	M	M	3.1		25	69
15†	-0.6	-5.8	-3.2	21.2	0.0	M	M	0.0		35	50
16†	-0.9	-5.5	-3.2	21.2	0.0	M	M	0.0		1	54
Sum				315.1*	0.0*	0.0*	M	47.6*			
Avg	1.3*	-4.7*	-1.7*								
Xtrm	11.2*	-11.0*								18*	96*

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