Real-Time Water Quality Deployment Report
Rattling Brook below Bridge – NF02ZK0023
March 11, 2009 to April 23, 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 March 11, 2009 to April 23, 2009.
- A communication dropout occurred from March 25 at 4:25pm to March 26 at 7:25am during a period of high winds. Gusts of wind measuring 80 km/h were recorded at the Argentia weather station. Aside from this, no other major issues were identified.

Maintenance and Calibration of Instrumentation

- A swap of instruments on April 24, 2009 removed Hydrolab s/n 44604 and reinstalled s/n 44975.
- 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 of Hydrolab s/n 44604, all parameters ranked as "Good" except Temperature and Turbidity which ranked as "Excellent". At the end of the deployment, all parameters were ranked as "Excellent" except pH which ranked as "Good".

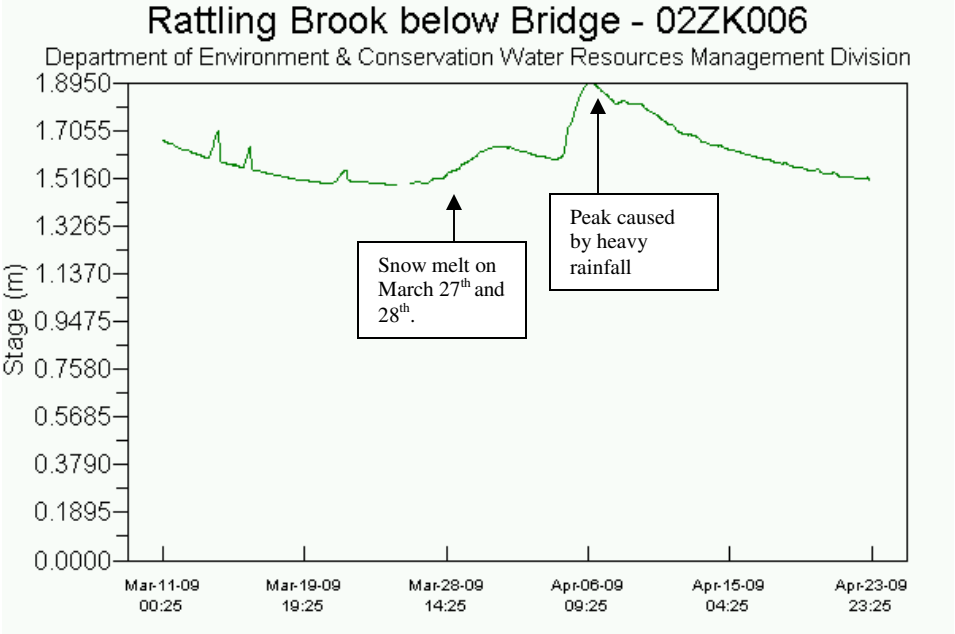
Table 1: QA/QC Data Comparison Rankings upon installation on March 11, 2009 and removal on April 24, 2009

Station	Date	Action	Instrument Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook (Long harbour)	March 11, 2009	Installation	Excellent	Good	Good	Good	Excellent
	April 24, 2009	Removal	Excellent	Good	Excellent	Excellent	Excellent

Data Interpretation

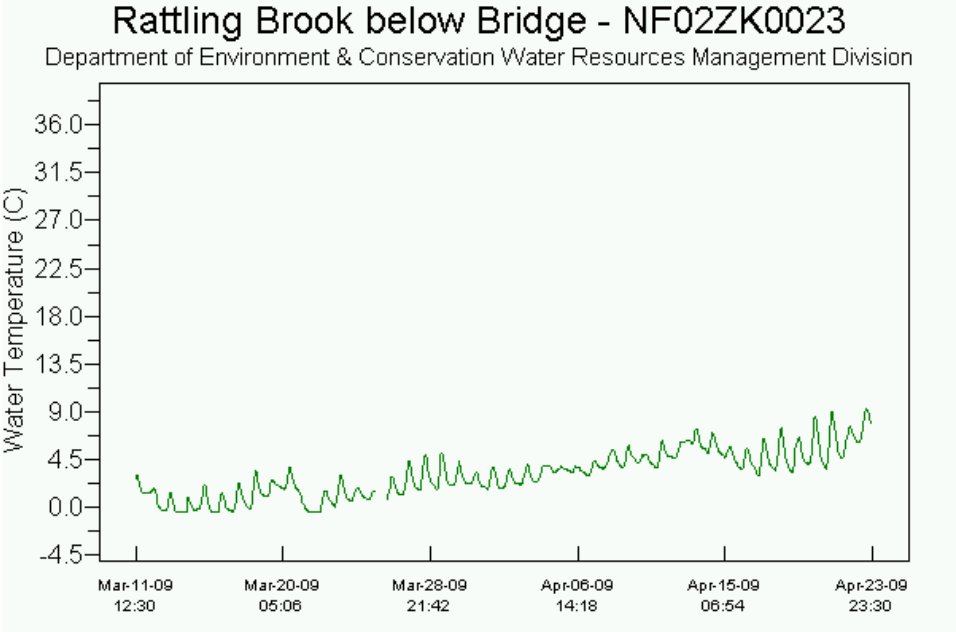
- Over the course of the deployment period, a small number of warm temperatures with snow melt and one major rainfall comprised the entirety of water quality events. Because the magnitude of each event was small, all trends appeared seasonal and represent good background data.
- A steady decline in stage level is seen for the first half of the deployment period (Figure 1). Two small spikes occurred on March 14 and 16, however they are short in duration and are probably related to brief snowfall or snowmelt. Stage level begins to rise on March 27 due to the melt of previously fallen snow in warmer weather (averaging 4.7 and 4.1^{o}C on March 27 and 28, respectively). The deployment peak occurred on April 6 (1.895m) after 22.6mm of rain fell over April 4th and 5th.

Figure 1: Stage at Rattling Brook from March 11 to April 23, 2009



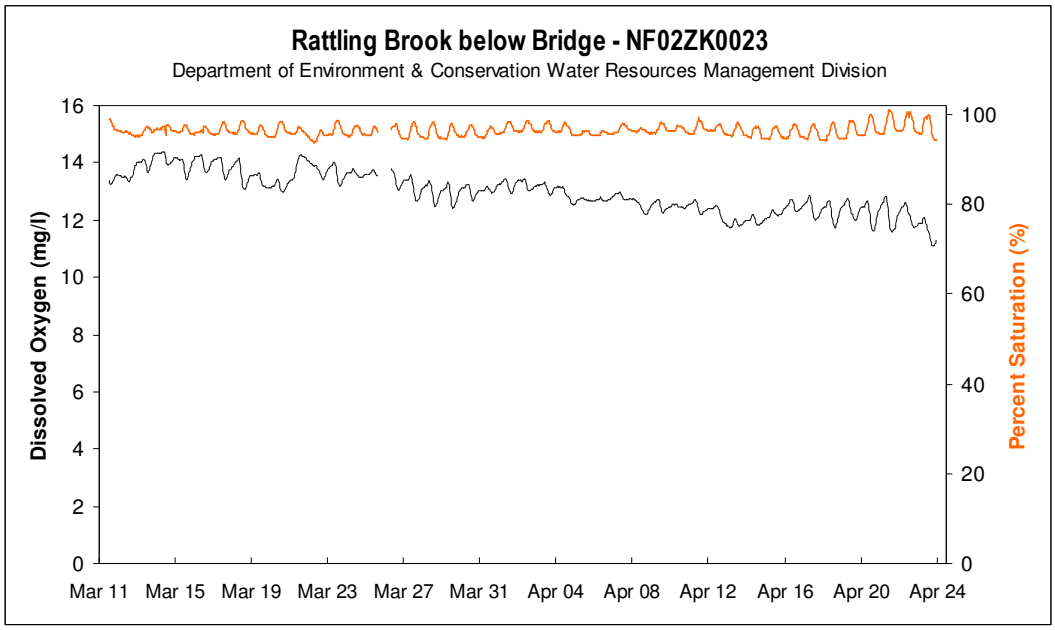
- As the average air temperature and day-length increased, the recorded water temperature was seen to rise, as shown in Figure 2. The deployment minimum occurred on March 16 (-0.43^{o}C) with a maximum on April 23 (9.35^{o}C) and an average water temperature of 3.15^{o}C.

Figure 2: Water temperature at Rattling Brook from March 11 to April 23, 2009



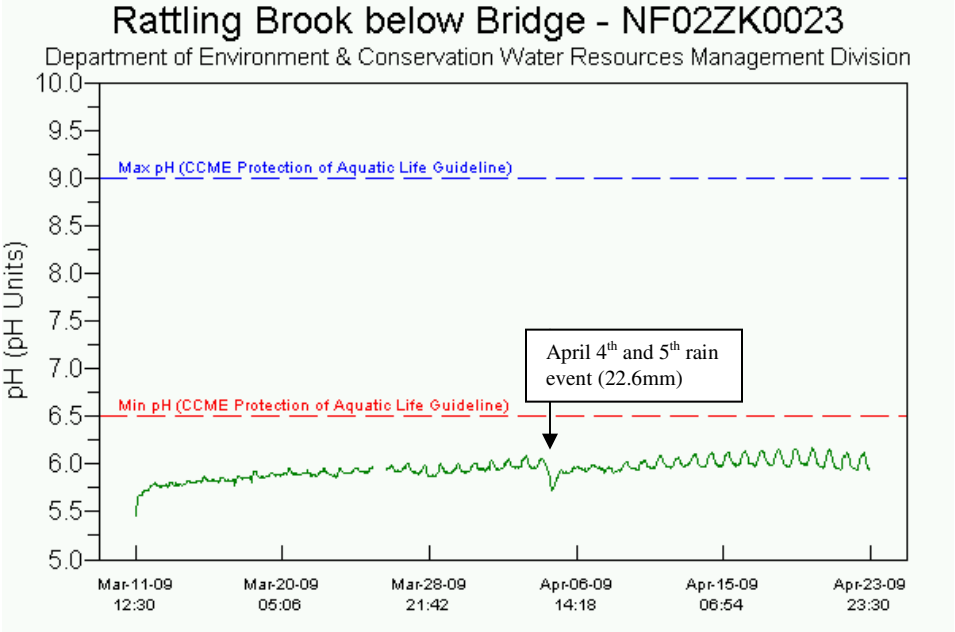
- Dissolved oxygen ranged from 11.08mg/l to 14.4mg/l (average = 12.96mg/l) and showed a decreasing trend over the deployment period. From March 11 to April 23, oxygen saturation remained relatively stable despite the negative trend in oxygen concentration. Given the inverse relationship between gas solubility and water temperature, no cause for concern is warranted.

Figure 3: Dissolved oxygen at Rattling Brook from March 11 to April 23, 2009



- A small, but steady, upward drift is seen in the pH at Rattling Brook over the deployment period, according to Figure 3. Such drift may be related to biofouling of the pH probe or a gradual decrease in molarity of the reference solution. A rapid, but minor, decrease in pH occurs on April 4th, in relation to heavy precipitation 22.6mm on April 4th and 5th. From March 11 to April 23, pH averaged 5.94 with a standard deviation of 0.09.

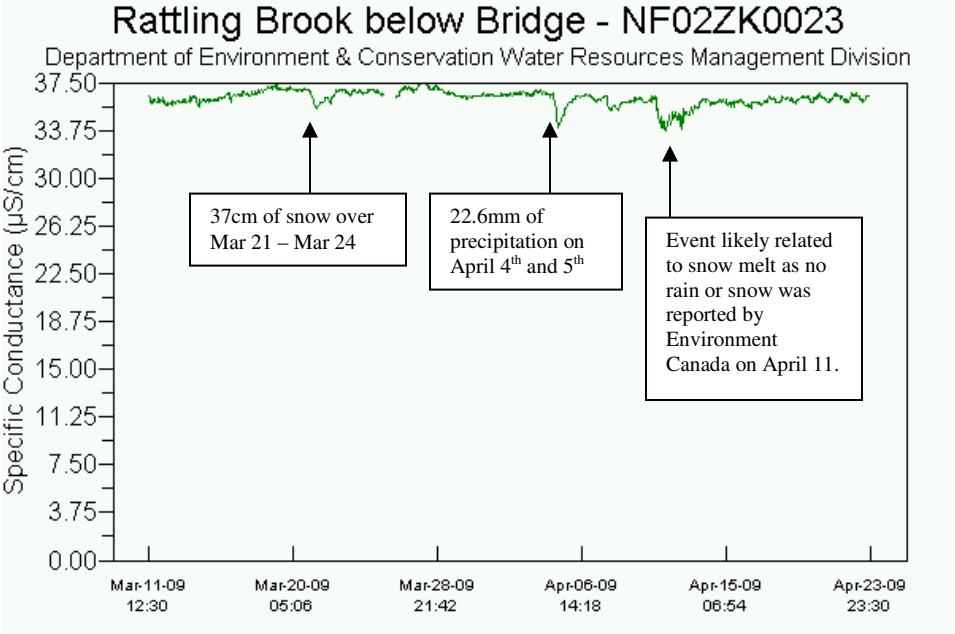
Figure 4: pH at Rattling Brook from March 11 to April 23, 2009



- Fluctuations in specific conductivity at Rattling Brook are generally associated with precipitation and snow melt during the winter and spring months. Figure 5 depicts two such dips in conductivity on March 21 and April 4. A Specific conductivity event on April 11 could not be associated with any specific weather

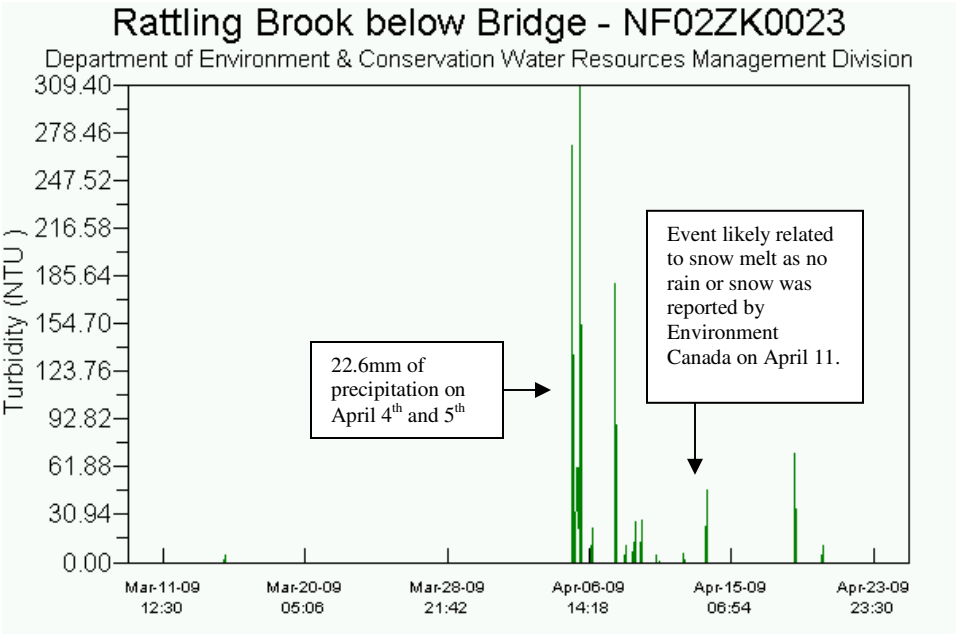
occurrence as no snowfall or rain had been reported by Environment Canada at the Argentia weather station. Specific conductivity ranged from 33.7µS/cm to 37.5µS/cm and averaged 36.3µS/cm.

Figure 5: Specific conductivity at Rattling Brook from March 11 to April 23, 2009



- Figure 6 indicates a period of no detectable turbidity for the first half of the deployment period. A heavy rainfall event on April 4th and 5th causes a surge of turbidity from runoff and high stream flow (surmised by the stage level in Figure 1). Another smaller event on April 11 is most likely a product of snowmelt causing runoff to carry particulate matter into the stream channel.

Figure 6: Turbidity at Rattling Brook from March 11 to April 23, 2009



Appendix

Daily Data Report for March 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†	2.9	-3.2	-0.2	18.2	0.0	M	M	17.1		21	44
02†	10.7	0.9	5.8	12.2	0.0	M	M	40.5		20	72
03†	13.7	2.7	8.2	9.8	0.0	M	M	31.9		20	91
04†	3.7	-3.8	-0.1	18.1	0.0	M	M	3.6		26	56
05†	-3.4	-7.3	-5.4	23.4	0.0	M	M	M			<31
06†	-1.2	-7.2	-4.2	22.2	0.0	M	M	0.0		29	56
07†	5.6	-2.0	1.8	16.2	0.0	M	M	10.1		18	78
08†	0.9	-3.6	-1.4	19.4	0.0	M	M	0.0		26	70
09†	1.9	-4.6	-1.4	19.4	0.0	M	M	0.0		34	52
10†	2.1	-3.7	-0.8	18.8	0.0	M	M	0.0		32	41
11†	2.1	-5.1	-1.5	19.5	0.0	M	M	0.0			<31
12†	5.6	-7.3	-0.9	18.9	0.0	M	M	3.3		18	91
13†	-5.9	-9.0	-7.5	25.5	0.0	M	M	0.0		26	82
14†	-1.3	-8.2	-4.8	22.8	0.0	M	M	0.0		23	63
15†	1.5	-8.2	-3.4	21.4	0.0	M	M	0.0		27	57
16†	-4.5	-9.1	-6.8	24.8	0.0	M	M	M			<31
17†	-2.7	-9.4	-6.1	24.1	0.0	M	M	0.0		26	43
18†	-1.1	-8.2	-4.7	22.7	0.0	M	M	0.0		22	44
19†	1.9	-1.3	0.3	17.7	0.0	M	M	2.6		21	57
20†	2.0	-1.6	0.2	17.8	0.0	M	M	0.7			<31
21†	-1.4	-4.1	-2.8	20.8	0.0	0.0	M	22.7	5	5	63
22†	-0.2	-5.6	-2.9	20.9	0.0	M	M	0.6	11	4	56
23†	1.5	-7.3	-2.9	20.9	0.0	M	M	0.0	11	3	61
24†	1.0	-1.0	0.0	18.0	0.0	M	M	0.0	10	3	85
25†	1.8	-0.4	0.7	17.3	0.0	M	M	8.8	9	6	80
26†	2.0	0.2	1.1	16.9	0.0	M	M	1.4	8	4	46
27†	8.8	0.6	4.7	13.3	0.0	M	M	0.0	4	4	32
28†	6.9	1.3	4.1	13.9	0.0	M	M	0.6			<31
29†	4.6	-0.2	2.2	15.8	0.0	M	M	0.0		35	48
30†	4.3	-0.3	2.0	16.0	0.0	M	M	0.0		5	48
31†	3.4	-1.3	1.1	16.9	0.0	M	M	0.0		4	63

Daily Data Report for April 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†	2.4	-1.4	0.5	17.5	0.0	M	M	0.0		35	39
02†	1.8	-0.5	0.7	17.3	0.0	M	M	0.0		23	43
03†	1.8	-0.7	0.6	17.4	0.0	M	M	0.0		21	37
04†	11.1	0.7	5.9	12.1	0.0	M	M	20.1		16	69
05†	10.8	1.8	6.3	11.7	0.0	M	M	2.5		19	61
06†	4.5	0.6	2.6	15.4	0.0	M	M	1.3			<31
07†	5.9	0.1	3.0	15.0	0.0	M	M	1.1		14	67
08†	15.5	2.0	8.8	9.2	0.0	M	M	15.4		19	89
09†	7.3	-0.3	3.5	14.5	0.0	M	M	0.0		22	33
10†	6.6	-0.7	3.0	15.0	0.0	M	M	0.0		21	35
11†	4.2	0.7	2.5	15.5	0.0	M	M	0.0		26	39
12†	16.2	1.6	8.9	9.1	0.0	M	M	4.4		18	74
13†	11.5	1.7	6.6	11.4	0.0	M	M	0.6		18	65
14†	5.1	0.2	2.7	15.3	0.0	M	M	2.0		27	56
15†	2.1	-1.7	0.2	17.8	0.0	M	M	0.0		25	56
16†	1.2	-4.0	-1.4	19.4	0.0	M	M	0.0		33	44
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25†	8.1	1.1	4.6	13.4	0.0	M	M	0.0			<31
26†	7.3	1.5	4.4	13.6	0.0	M	M	0.7		5	56
27†	6.2	-0.1	3.1	14.9	0.0	M	M	0.0		4	43

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