

Real-Time Water Quality Deployment Report

Rattling Brook below Bridge – NF02ZK0023

February 11, 2009 to March 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 February 11, 2009 to March 10, 2009.
- Although data was logged internally due to previous instances of transmission problems at this station, real-time transmission was without fault throughout the deployment period and was used to generate this report.

Maintenance and Calibration of Instrumentation

- The Rattling Brook instrument was deployed on February 11, 2009 and removed for cleaning and calibration on March 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).
- A QA sonde was not available during the installation of the field sonde on February 11, 2009 resulting in missing comparison rankings at the beginning of the deployment period.
- Upon removal at the end of the deployment period, the field sonde ranked “Excellent” for all parameters except pH and Conductivity, which ranked “Fair” and “Good”, respectively.

Table 1: QA/QC Data Comparison Rankings upon installation on February 11, 2009 and removal on March 10, 2009

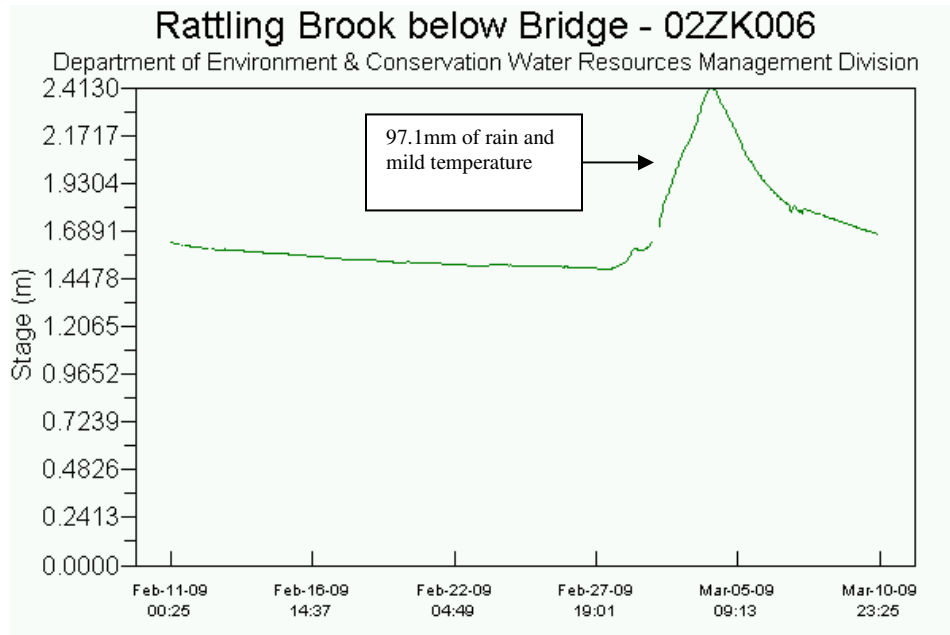
Station	Date	Action	Instrument Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook (Long Harbour)	February 11, 2009	Installation	QA sonde not available				
	March 10, 2009	Removal	Excellent	Fair	Good	Excellent	Excellent

Data Interpretation

- The deployment period from February 11 to March 10 is mostly uneventful with few perturbations in water quality parameters. No major impacts have been identified; however, the few deviations from the norm appear to arise from an increase in stage level over the period February 28 to March 5.
- A steady decline in stage level, resulting from a previous precipitation event is shown in Figure 1. A small bump in stage level on February 28 is followed by a much larger rise due to 97.1mm of rain coupled with

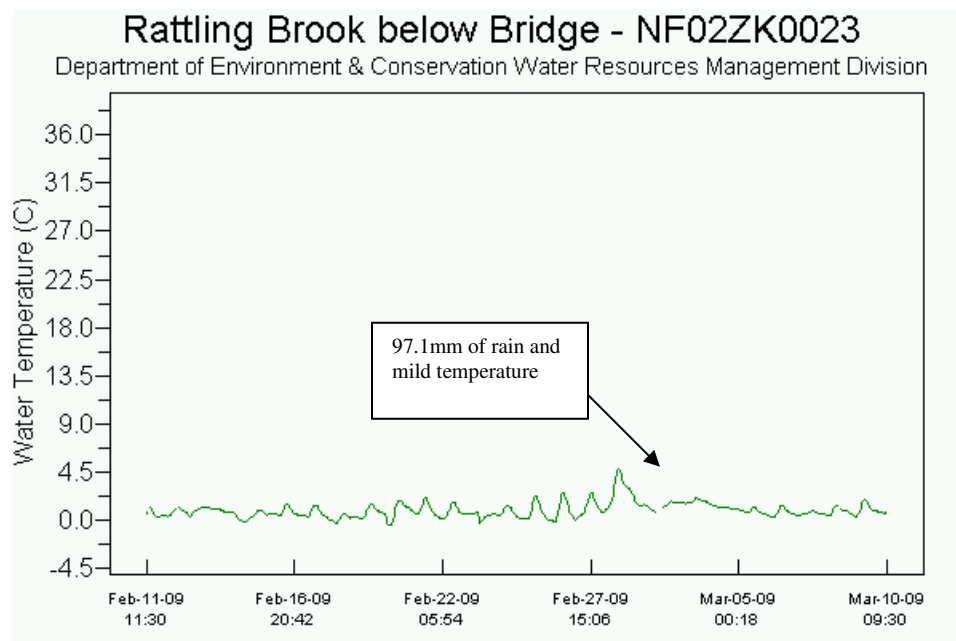
double-digit temperatures. Stage ranges from a low of 1.50m just on February 27 and peaks at 2.41m during the rain event.

Figure 1: Stage at Rattling Brook from February 11 to March 10, 2009



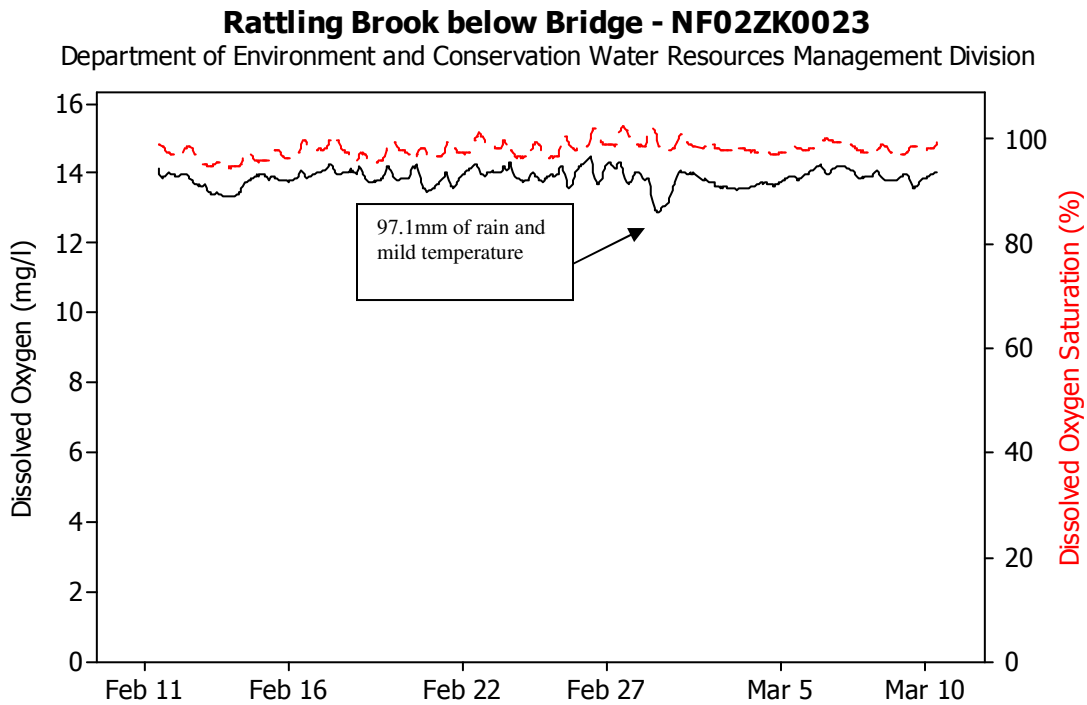
- Water temperature at the Rattling Brook station was more variable than the previous deployment (January 7, 2009 to February 10, 2009) this is likely due to the seasonal increase in day length. Shown in Figure 2, temperature ranged from -0.42°C to 4.8°C with an average temperature of 0.94°C. A large increase in stage corresponds with a greater flow of water and a moderating effect on temperature after February 28.

Figure 2: Water temperature at Rattling Brook from February 11 to March 10, 2009



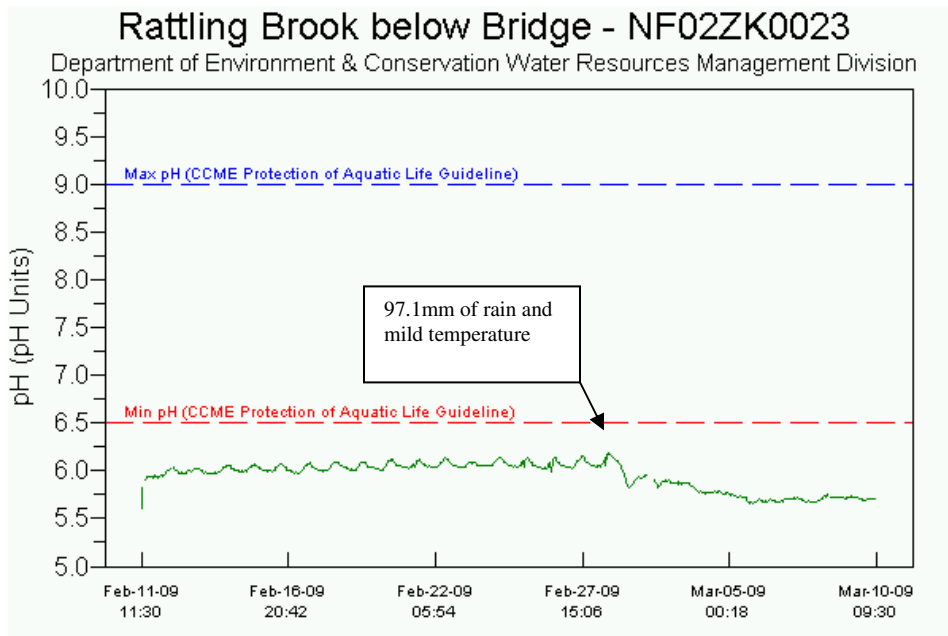
- Dissolved oxygen at Rattling Brook ranged from 12.9mg/l – 14.5mg/l (average=13.9mg/l) as shown in Figure 3. This corresponded to a percent saturation ranging from 94.7 – 102.6% (average=98.2%). Values >100% are likely due to turbulent conditions where water may become supersaturated with oxygen. Following the February 28 rain event, dissolved oxygen concentration drops followed by rapid recovery. All values were found to be greater than the Canadian Council of Ministers of the Environment (CCME) dissolved oxygen guideline of 9.5mg/l for the protection of early life stage, cold-water biota.

Figure 3: Dissolved oxygen at Rattling Brook from February 11 to March 10, 2009



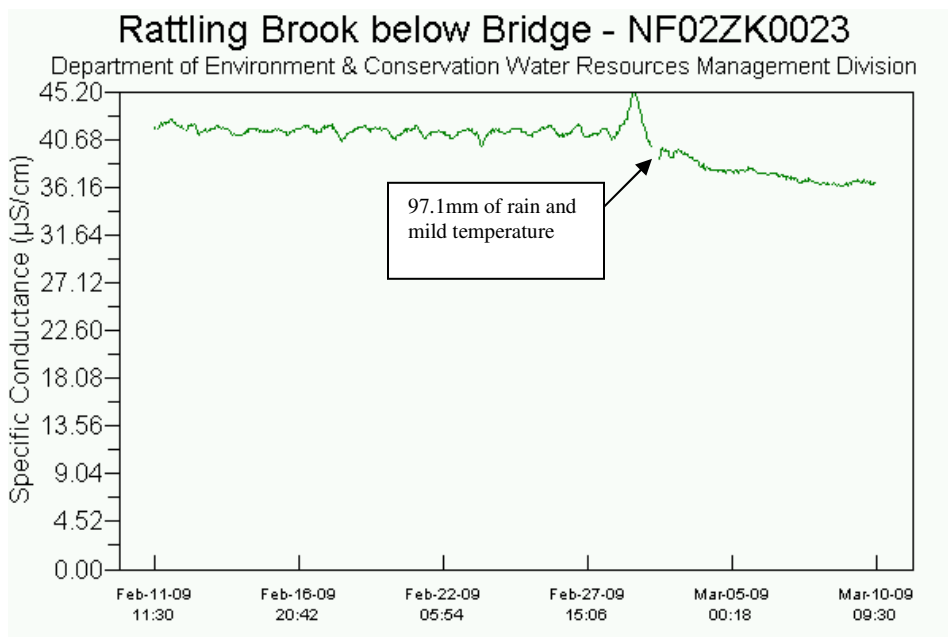
- pH ranged from 5.61 – 6.18 (average=5.95) at Rattling Brook over the deployment period as shown in Figure 4. All values were found to be below the minimum CCME guideline of 6.5. A drop in pH is seen following the increase in stage referenced above. The depressed pH continues throughout the rest of the deployment period as runoff and groundwater flow continues to enter the system. Table 1 indicates that the pH probe was ranked as “Fair” compared to the QA sonde at the end of the deployment period. Since no rank exists for the beginning of the deployment, it is uncertain if sensor drift has resulted and impacted results.

Figure 4: pH at Rattling Brook from February 11 to March 10, 2009



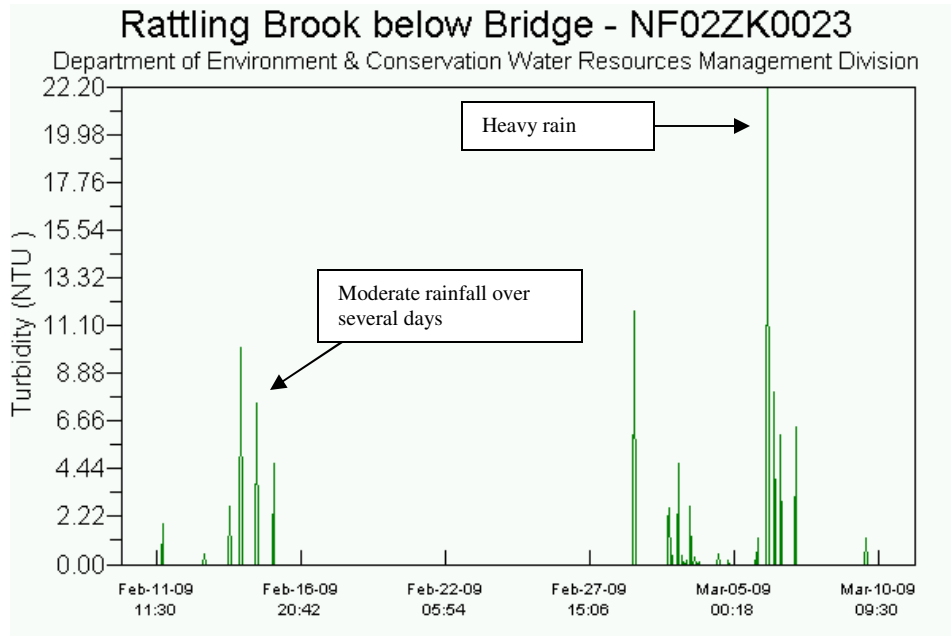
- Specific conductance remained stable from the period of February 11 up until February 28 as seen in Figure 5. At this point, specific conductivity begins to decline in step with increased flow following intense precipitation. Table 1 indicates that the conductivity probe was ranked as “Good” compared to the QA sonde at the end of the deployment period. Since no rank exists for the beginning of the deployment, it is uncertain if sensor drift has resulted and impacted results.

Figure 5: Specific conductivity at Rattling Brook from February 11 to March 10, 2009



- Turbidity ranged from 0.0ntu – 22.2ntu, with an average turbidity of 0.16ntu, as seen in Figure 6. A series of clustered turbidity spikes are likely related to precipitation and runoff events.

Figure 6: Turbidity at Rattling Brook from February 11 to March 10, 2009



Appendix

Daily Data Report for February 2009											
<u>D</u> <u>a</u> <u>y</u>	<u>Max</u> <u>Temp</u> °C	<u>Min</u> <u>Temp</u> °C	<u>Mean</u> <u>Temp</u> °C	<u>Heat</u> <u>Deg</u> Days °C	<u>Cool</u> <u>Deg</u> Days °C	<u>Total</u> <u>Rain</u> mm	<u>Total</u> <u>Snow</u> cm	<u>Total</u> <u>Precip</u> mm	<u>Snow</u> <u>on</u> <u>Grnd</u> cm	<u>Dir of</u> <u>Max</u> <u>Gust</u> 10's Deg	<u>Spd of</u> <u>Max</u> <u>Gust</u> km/h
<u>01</u> †	-1.0	-3.2	-2.1	20.1	0.0	M	M	0.6		33	72
<u>02</u> †	0.3	-3.4	-1.6	19.6	0.0	M	M	0.0		26	54
<u>03</u> †	10.2	-0.6	4.8	13.2	0.0	M	M	13.8		18	67
<u>04</u> †	11.2	-1.3	5.0	13.0	0.0	M	M	4.9		18	96
<u>05</u> †	6.0	-4.9	0.6	17.4	0.0	0.0	M	10.8		18	54
<u>06</u> †	-3.3	-7.0	-5.2	23.2	0.0	M	M	3.6	1	26	74
<u>07</u> †	-1.8	-4.6	-3.2	21.2	0.0	M	M	0.6		27	69
<u>08</u> †	4.3	-1.9	1.2	16.8	0.0	M	M	3.5		20	69
<u>09</u> †	0.2	-11.0	-5.4	23.4	0.0	M	M	1.4		26	70
<u>10</u> †	-6.7	-10.9	-8.8	26.8	0.0	M	M	0.0		31	46
<u>11</u> †	-2.0	-6.8	-4.4	22.4	0.0	M	M	1.4		27	56
<u>12</u> †	2.6	-2.7	-0.1	18.1	0.0	M	M	2.7		10	74
<u>13</u> †	2.7	-0.1	1.3	16.7	0.0	M	M	1.2		11	72
<u>14</u> †	0.0	-5.5	-2.8	20.8	0.0	M	M	3.1		25	69
<u>15</u> †	-0.6	-5.8	-3.2	21.2	0.0	M	M	0.0		35	50
<u>16</u> †	-0.9	-5.5	-3.2	21.2	0.0	M	M	0.0		1	54
<u>17</u> †	-2.8	-6.1	-4.5	22.5	0.0	M	M	1.6		4	48
<u>18</u> †	0.5	-3.8	-1.7	19.7	0.0	M	M	6.4		1	95
<u>19</u> †	-0.1	-2.4	-1.3	19.3	0.0	M	M	0.0		34	70
<u>20</u> †	4.8	-2.4	1.2	16.8	0.0	M	M	7.5		13	98
<u>21</u> †	1.0	-2.0	-0.5	18.5	0.0	M	M	0.0		22	63
<u>22</u> †	-0.1	-2.5	-1.3	19.3	0.0	M	M	0.0		26	61
<u>23</u> †	2.9	-3.0	-0.1	18.1	0.0	0.0	M	8.1		13	82
<u>24</u> †	1.7	-2.5	-0.4	18.4	0.0	M	M	0.7		20	70
<u>25</u> †	0.1	-2.2	-1.1	19.1	0.0	M	M	0.0		26	65
<u>26</u> †	0.0	-2.4	-1.2	19.2	0.0	M	M	0.0		25	35
<u>27</u> †	2.9	-1.0	1.0	17.0	0.0	M	M	0.0		25	37
<u>28</u> †	8.9	2.7	5.8	12.2	0.0	M	M	4.0		21	80
<u>Sum</u>				535.2	0.0	0.0*	M	75.9			
<u>Avg</u>	1.5	-3.7	-1.1								
<u>Xtrm</u>	11.2	-11.0								13	98

Daily Data Report for March 2009											
Day	Max Temp	Min Temp	Mean Temp	Heat Deg Days	Cool Deg Days	Total Rain	Total Snow	Total Precip	Snow on Grnd	Dir of Max Gust	Spd of Max Gust
	°C	°C	°C	°C	°C	mm	cm	mm	cm	10's Deg	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†	M	-3.7E	M	M	M	M	M	M	5	M	M
22											
Sum				392.9*	0.0*	M	M	109.8*			
Avg	1.7*	-4.9*	-1.6*								
Xtrm	13.7*	-9.4*								20*	91*

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