Real-Time Water Quality Deployment Report
NF02ZK0023 – Rattling Brook below Bridge
September 10 to October 15, 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 and automated alerts as they occur.
- This monthly deployment report interprets the data from the Rattling Brook River real-time water quality station for the period of September 10th, 2009 to October 15th, 2009; a period of 35 days.
- As a result of pond dewatering upstream, work on river crossings and severe precipitation, Rattling Brook has experienced higher-than-normal turbidity conditions during this deployment period. Control measures have been put in place, however, due to rainfall volume these measures have frequently been overcome.

Maintenance and Calibration of Instrument

- 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 Datasonde 5X s/n 44604 on August 11th, 2009 all parameters were ranked as "Excellent" except Temperature and pH which were ranked as "Good". During the removal on September 9th, 2009 Temperature and Conductivity ranked as "Good". pH, Dissolved Oxygen and Turbidity ranked as "Excellent".

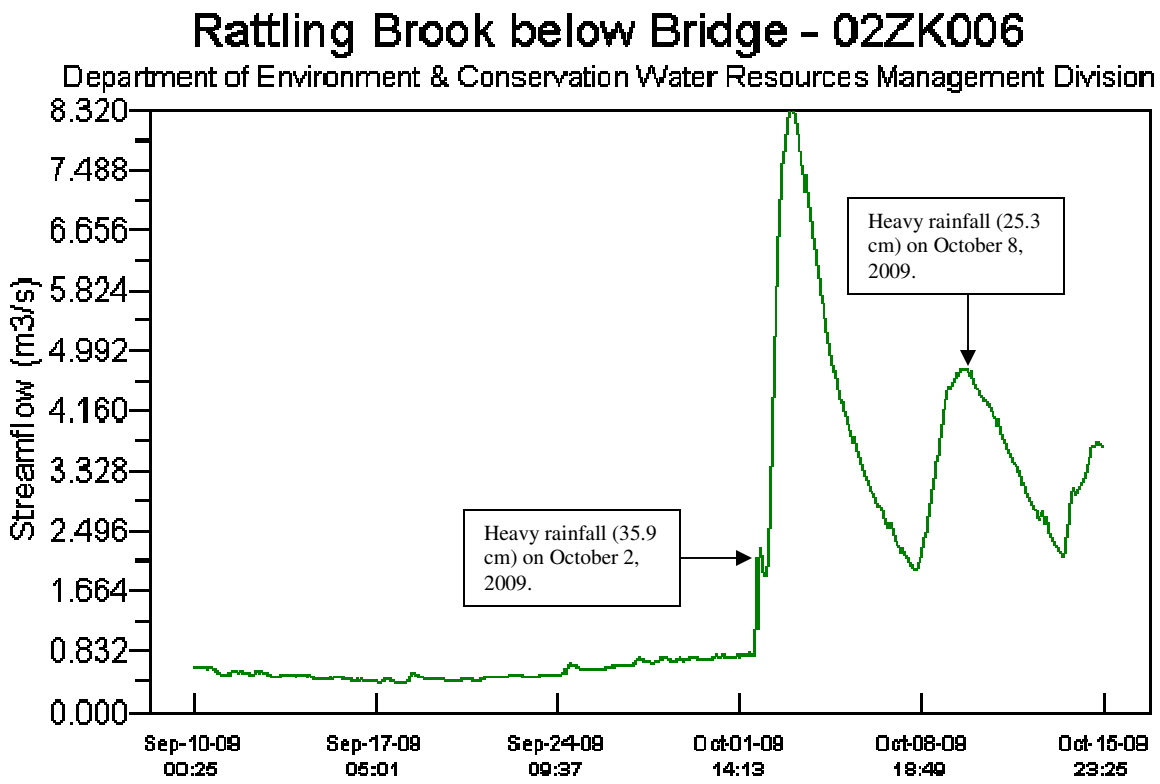
Table 1: QA/QC Data Comparison Rankings upon installation on September 10, 2009 to October 15, 2009.

Station	Date	Action	Instrument Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook (Long Harbour)	September 10th, 2009	Installation	Good	Good	Fair	Excellent	Excellent
	October 15th, 2009	Removal	Good	Good	Fair	Good	Excellent

Data Interpretation

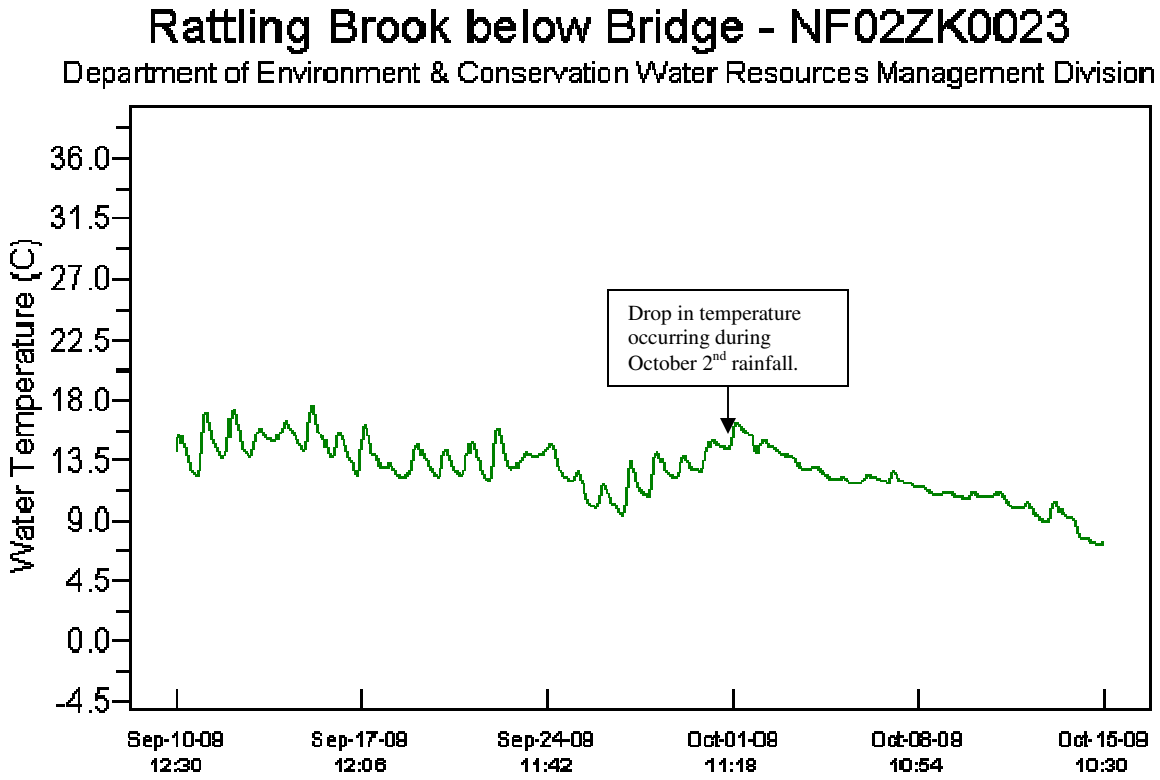
- Figure 1 depicts streamflow in cubic meters per second at Rattling Brook below Bridge. Ranging from a low of 0.403 m^3/s to a maximum of 8.32 m^3/s, this results in a peak flow of 8320 litres per second on October 2 during 35.9 cm of rain (as measured at Environment Canada's weather station in Argentia).

Figure 1: Streamflow at Rattling Brook below Bridge from September 10 to October 15, 2009.



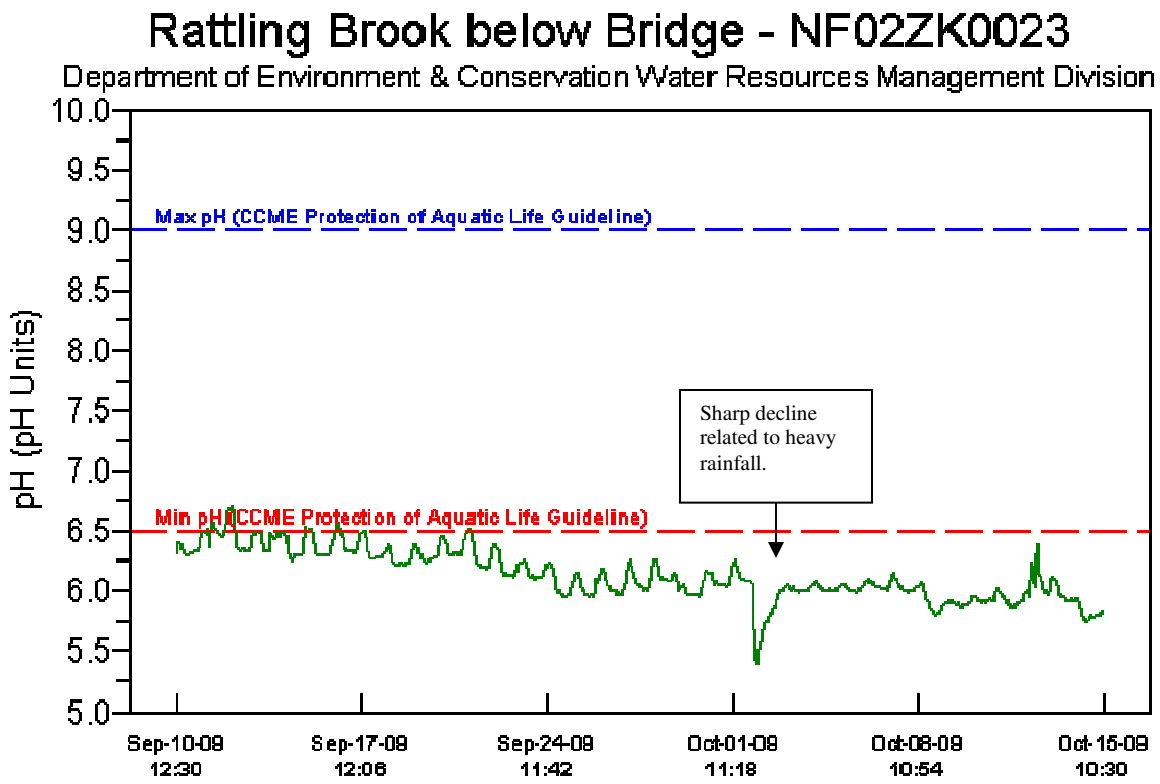
- Water temperature at Rattling Brook below Bridge ranged from 17.53C on September 15th to 7.11C on October 15th. Prior to the large rainfall period on October 2nd, water temperature appears to have declined slowly. After October 2nd, however, the decline in temperature appears to be more pronounced. These changes in temperature are as expected in the early fall.

Figure 2: Water Temperature at Rattling Brook below Bridge from September 10 to October 15, 2009.



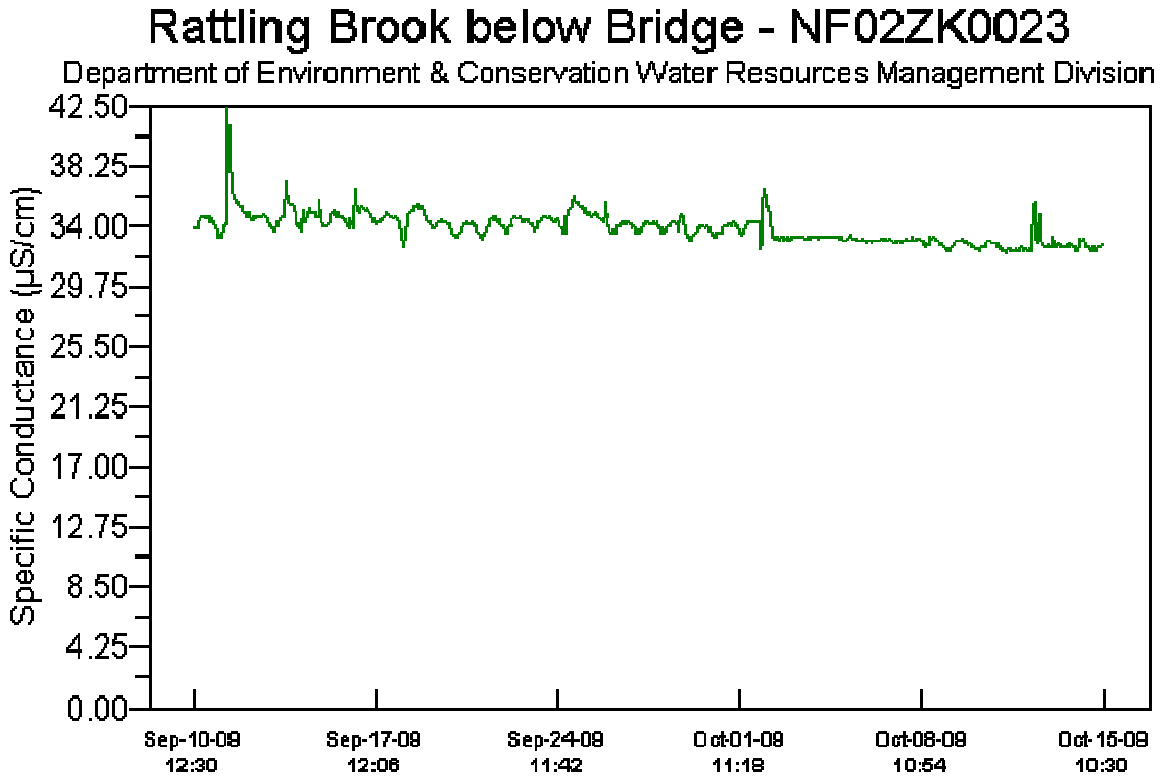
- Over the course of the deployment from September 10th to October 15th, 2009, pH ranged from 6.71 to 5.41. Most values were found to fall below the CCME Guidelines of 6.5 to 9.0 for the Protection of Aquatic Life; however, this is not abnormal for Rattling Brook. A sharp decline in pH followed by recovery on October 2nd is related to heavy rainfall.

Figure 3: pH at Rattling Brook below Bridge from September 10 to October 15, 2009.



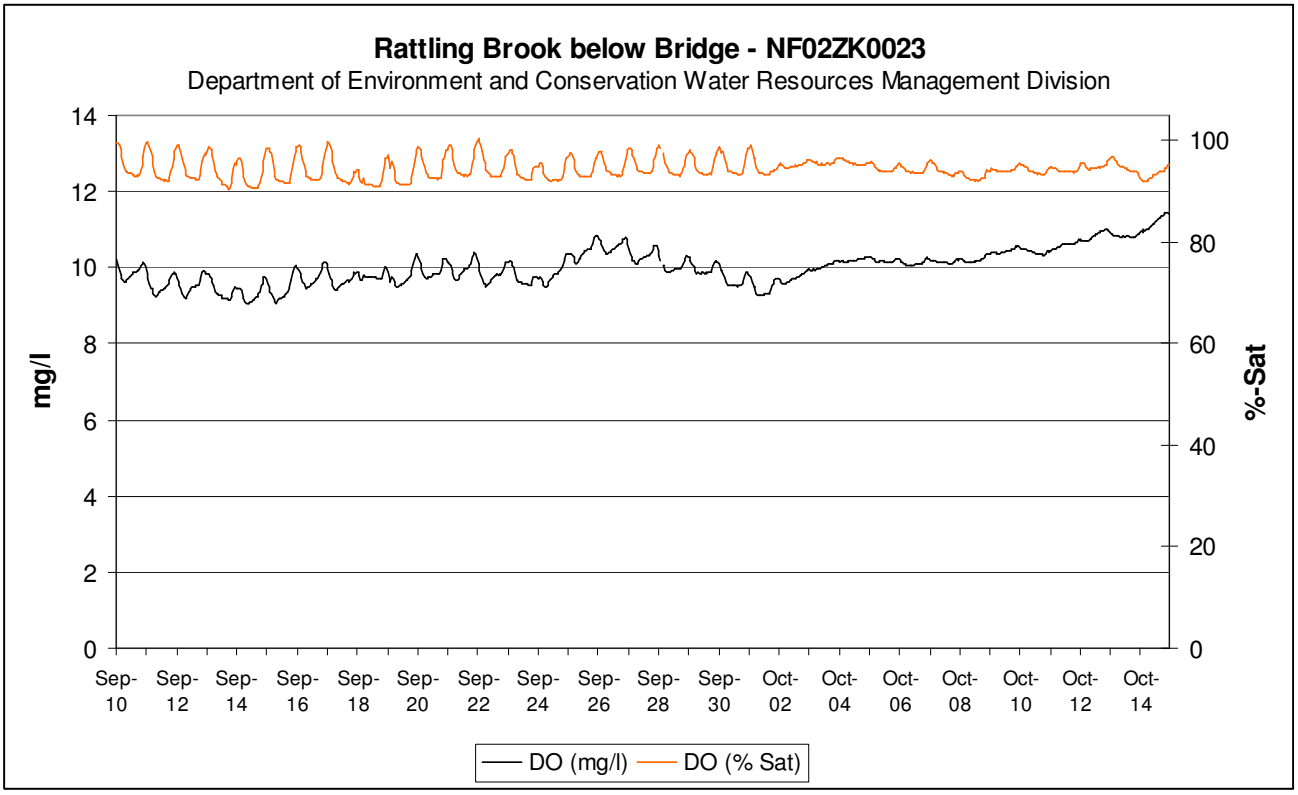
- Specific conductivity at Rattling Brook below Bridge did not show an appreciable change over the course of the deployment period. Specific conductivity ranged from 32.1 µS/cm 42.5 µS/cm. A slight decline is seen over the deployment, however, this could be related to sensor drift.

Figure 4: Specific Conductance at Rattling Brook below Bridge from September 10 to October 15, 2009.



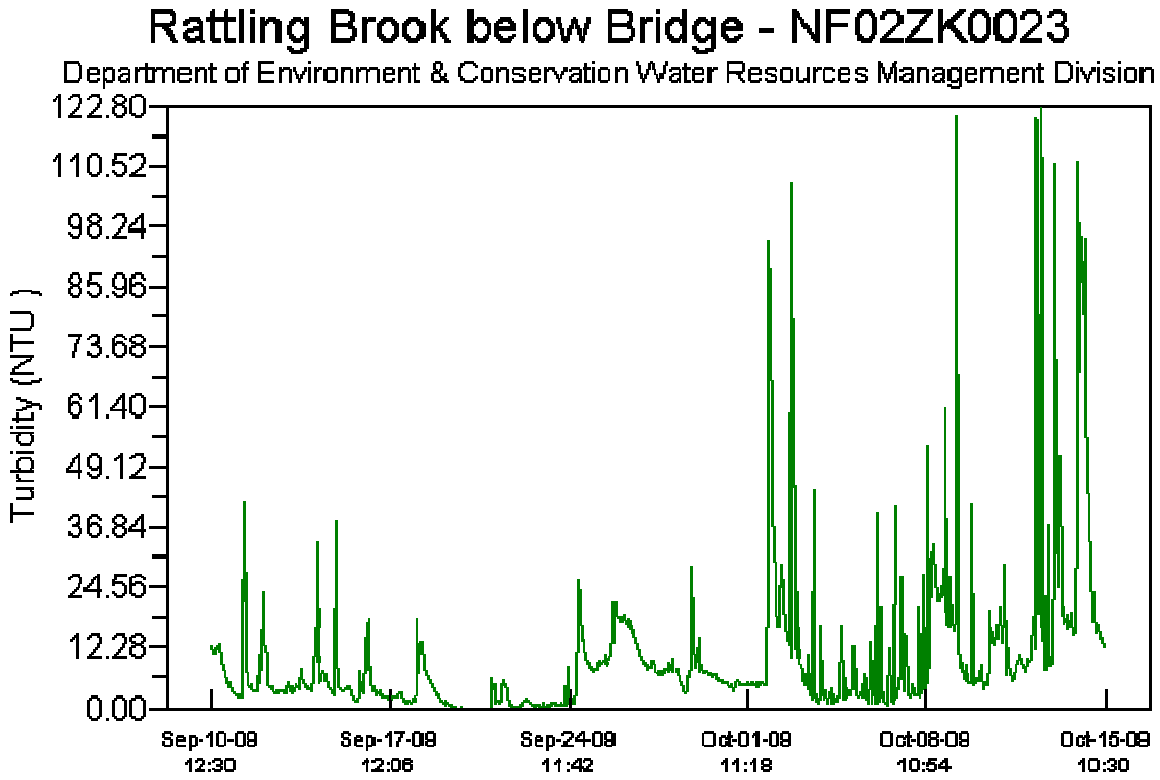
- After the rain event on October 2nd, oxygen concentration at Rattling Brook below Bridge began to climb while oxygen saturation remained stationary. This is the result of cooler waters in Rattling Brook. Notably, the diurnal cycles of oxygen in Figure 5 are suppressed as the cool groundwater flow into Rattling Brook moderates the daily highs and lows in temperature.

Figure 5: Dissolved Oxygen at Rattling Brook below Bridge from September 10 to October 15.



- Drainage of small ponds and ongoing work at stream crossings have resulted in elevated turbidity readings at Rattling Brook below Bridge during this deployment period. While silt fences and other mitigation measures have been employed, consistent rainfall has often overwhelmed them. Efforts to reduce turbidity are ongoing and are expected to decrease over time as earthworks in the area are finalized.

Figure 6: Turbidity at Rattling Brook below Bridge from September 10 to October 15, 2009.



Appendix

Daily Data Report for September 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†	16.7	10.1	13.4	4.6	0.0	M	M	0.0		25	41
02†	15.6	9.0	12.3	5.7	0.0	M	M	0.0		22	41
03†	16.2	13.0	14.6	3.4	0.0	M	M	0.0		21	54
04†	15.6	13.4	14.5	3.5	0.0	M	M	0.0		22	43
05†	17.2	6.4	11.8	6.2	0.0	M	M	0.0		6	33
06†	15.2	5.8	10.5	7.5	0.0	M	M	0.0			<31
07†	15.2	10.7	13.0	5.0	0.0	M	M	0.0		24	65
08†	15.7	13.4	14.6	3.4	0.0	M	M	0.0		24	56
09†	15.7	7.3	11.5	6.5	0.0	M	M	0.0		35	48
10†	16.0	7.1	11.6	6.4	0.0	M	M	0.0		34	44
11†	16.6	12.4	14.5	3.5	0.0	M	M	0.0		26	48
12†	18.4	9.7	14.1	3.9	0.0	M	M	0.0		14	46
13†	18.7	10.0	14.4	3.6	0.0	M	M	4.1		13	48
14†	18.1	12.1	15.1	2.9	0.0	M	M	3.3		19	82
15†	15.5	10.7	13.1	4.9	0.0	M	M	0.0		22	44
16†	12.8	7.9	10.4	7.6	0.0	M	M	0.0		4	41
17†	13.9	6.8	10.4	7.6	0.0	M	M	0.0		22	35
18†	12.3	7.8	10.1	7.9	0.0	M	M	18.9		11	72
19†	14.8	9.5	12.2	5.8	0.0	M	M	1.8		22	59
20†	12.4	8.4	10.4	7.6	0.0	M	M	0.0		34	43
21†	15.1	10.9	13.0	5.0	0.0	M	M	0.0		22	39
22†	15.2	11.0	13.1	4.9	0.0	M	M	0.0		21	46
23†	13.8	12.1	13.0	5.0	0.0	M	M	0.0		20	63
24†	14.3	8.1	11.2	6.8	0.0	M	M	14.9		20	61
25†	10.5	4.7	7.6	10.4	0.0	M	M	0.0		3	72
26†	8.9	2.4	5.7	12.3	0.0	M	M	0.7		3	57
27†	13.4	3.7	8.6	9.4	0.0	M	M	0.0		24	41
28†	13.7	8.2	11.0	7.0	0.0	M	M	3.7		12	63
29†	17.7	11.8	14.8	3.2	0.0	M	M	0.6		14	67
30†	24.7	12.2	18.5	0.0	0.5	M	M	2.4		14	43
Sum				**171.5**	**0.5**	**M**	**M**	**50.4**			
Avg	**15.3**	**9.2**	**12.27**								
Xtrm	**24.7**	**2.4**								**19**	**82**

Daily Data Report for October 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†	21.3	14.3	17.8	0.2	0.0	M	M	5.4		15	37
02†	17.4	11.1	14.3	3.7	0.0	M	M	35.9		25	37
03†	12.7	8.8	10.8	7.2	0.0	M	M	0.0		27	61
04†	11.8	5.8	8.8	9.2	0.0	M	M	0.0		35	46
05†	11.4	5.9	8.7	9.3	0.0	M	M	2.6		12	83
06†	12.8	10.3	11.6	6.4	0.0	M	M	1.9		21	37
07†	12.2	8.2	10.2	7.8	0.0	M	M	0.6		27	57
08†	9.2	7.9	8.6	9.4	0.0	M	M	25.3		36	72
09†	10.0	7.0	8.5	9.5	0.0	M	M	2.0		36	72
10†	9.5	6.6	8.1	9.9	0.0	M	M	0.7		36	44
11†	10.7	6.7	8.7	9.3	0.0	M	M	6.6		29	67
12†	8.8	5.6	7.2	10.8	0.0	M	M	0.6		27	65
13†	9.8	4.4	7.1	10.9	0.0	M	M	0.9		23	50
14†	5.9	1.5	3.7	14.3	0.0	M	M	27.9		36	104
15†	8.5	5.1	6.8	11.2	0.0	M	M	0.0		29	57
16†	8.1	1.6	4.9	13.1	0.0	M	M	23.1		10	74
17†	7.0	2.8	4.9	13.1	0.0	M	M	16.4		10	120
18†	6.1	1.7	3.9	14.1	0.0	M	M	0.0		9	37
19†	9.3	1.5	5.4	12.6	0.0	M	M	9.4		12	56
20†	7.3	3.3	5.3	12.7	0.0	M	M	0.6		4	46
21†	5.9	3.0	4.5	13.5	0.0	M	M	0.6			<31
22†	7.3	2.4	4.9	13.1	0.0	M	M	0.6		33	39
23†	4.0	1.7	2.9	15.1	0.0	M	M	1.4		35	67
24†	4.5	0.2	2.4	15.6	0.0	M	M	0.0		33	61
25†	11.7	0.3	6.0	12.0	0.0	M	M	6.9		20	89
26†	8.4	2.6	5.5	12.5	0.0	M	M	0.0		32	70
27†	3.2	-0.1	1.6	16.4	0.0	M	M	0.0		32	72
28†	5.1	-0.5	2.3	15.7	0.0	M	M	0.0		32	70
29†	6.4	0.6	3.5	14.5	0.0	M	M	0.0		2	50
30†	5.0	-1.6	1.7	16.3	0.0	M	M	0.0		28	32
31†	8.8	2.3	5.6	12.4	0.0	M	M	0.0		22	69
Sum				**351.8**	**0.0**	**M**	**M**	**169.4**			
Avg	**9**	**4.2**	**6.63**								
Xtrm	**21.3**	**-1.6**								**10**	**120**

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