

Real-Time Water Quality Monitoring 2008 Annual Report NF02ZK0009 - Come by Chance



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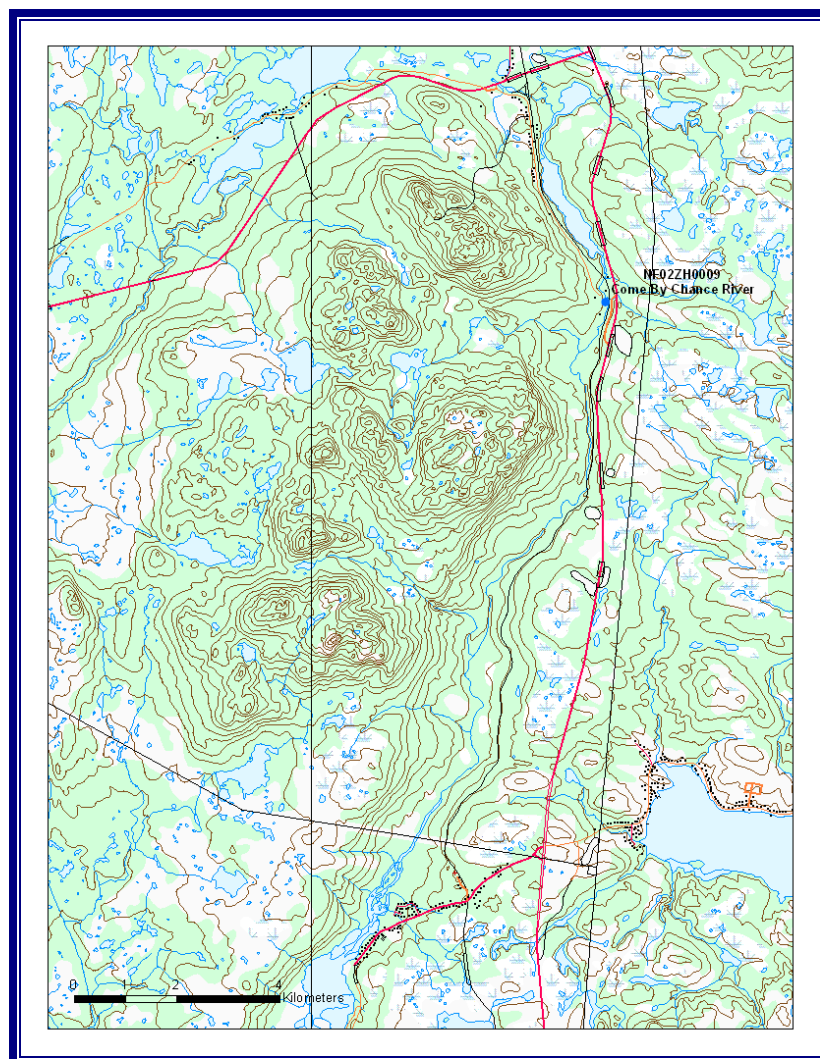
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Section 1.0 Introduction

During 2008, Real-Time Water Quality Monitoring (RTWQM) activities continued operations for a second year at Come by Chance River. As requested by Newfoundland and Labrador Refining Corporation, the Agreement was suspended in October 2008. As a result of this suspension, the water quality instrumentation was removed. This report will cover all data collected during the 2008 calendar year including an overlapping deployment in December 2007 and January 2008. In effect, the reporting period for this annual report is December 13, 2007 through October 14, 2008.

The RTWQM at Come by Chance River has provided invaluable baseline water quality information since its 2007 installation and throughout its operation, until fall 2008. The instrument was removed for the period, January 18 to February 25, due to ice conditions in the river as it was feared the heavy ice might damage the instrument. During the operating period, regular maintenance and calibration activities for the water quality instrument took place approximately every 30 days. The location of the station at Come by Chance River can be seen in **Figure 1**.

Figure 1: Site Location



Section 2.0 Maintenance/Calibration

It is recommended by the Department of Environment and Conservation (DOEC) that regular maintenance/calibration take place on a monthly basis in order to ensure accuracy of the data from the real-time water quality monitoring station. **Table 1** identifies the dates that the instrument was removed/reinstalled for regular maintenance and calibration in 2008. It is important to note that some deployment periods were longer than thirty days due to such issues as staff availability.

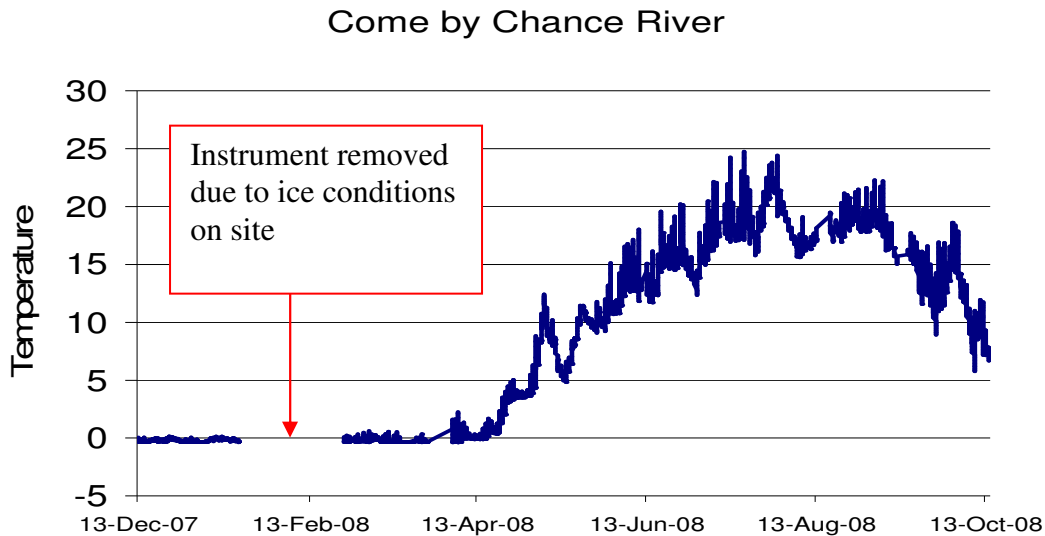
Table 1: Dates of Maintenance/Calibration of Instruments

Item Number	Date and time instrument was reinstalled (mm/dd/yy)		Date and time Instrument was removed (mm/dd/yy)		Reason
1	12/13/07	14:30	01/18/08	14:30	Initial Installation
2	01/18/08	14:30	02/25/08	13:30	Instrument removed due to ice conditions
3	02/25/08	13:30	03/26/08	10:30	Maintenance/Calibration
4	04/04/08	10:30	05/14/08	11:30	Maintenance/Calibration
5	05/14/08	12:30	06/11/08	09:30	Maintenance/Calibration
6	06/13/08	11:30	07/09/08	09:30	Maintenance/Calibration
7	07/11/08	11:30	08/13/08	11:30	Maintenance/Calibration
8	08/18/08	12:30	09/11/08	11:30	Maintenance/Calibration
9	09/15/08	11:30	10/14/08	09:30	Maintenance/Calibration

Section 3.0 Data Interpretation

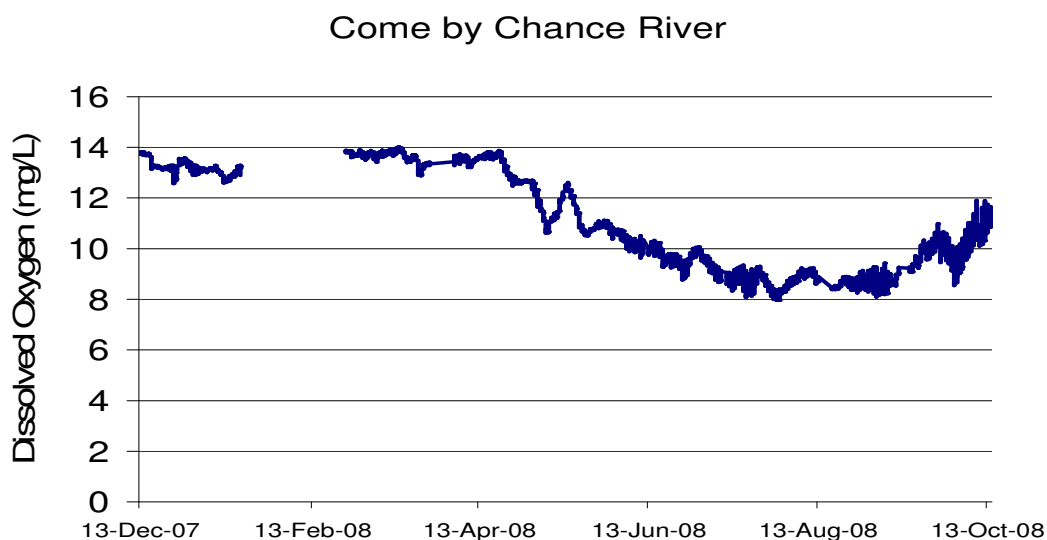
Seasonal variation in the water temperature (**Figure 2**) is clear, with a temperature range of -0.38 to 24.75°C during the reporting period. Maximum temperature readings occurred in later July minimum temperature values were recorded at the beginning of the reporting period, in December.

Figure 2: Temperature



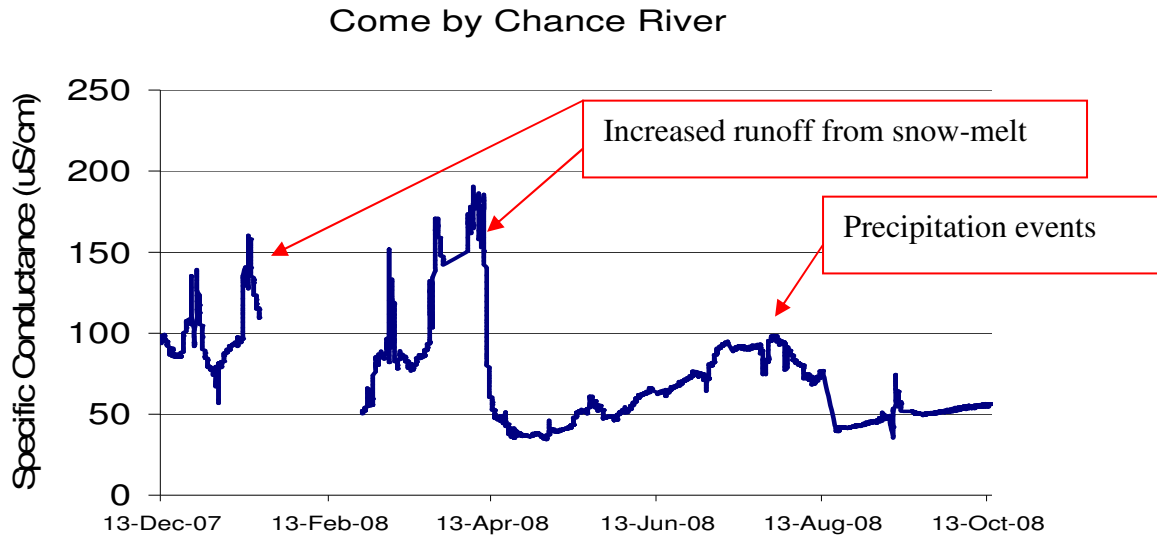
Dissolved oxygen (DO) (**Figure 3**) generally corresponds inversely with temperature values. DO had a range of 7.96 to 14.03 mg/L. Aside from the summer period, DO values were above the most conservative concentration of 9.5 mg/L recommended by the Canadian Council of Ministers of the Environment (CCME) Protection of Freshwater Aquatic Life Guidelines. Even the lowest recorded DO value of 7.96 mg/L did not appear to impact the aquatic life.

Figure 3: Dissolved Oxygen



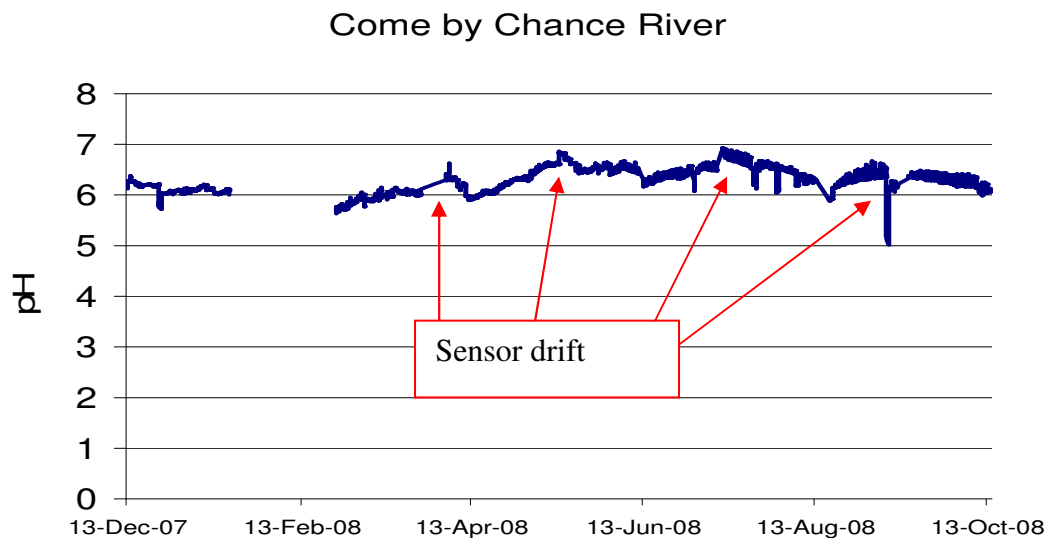
Specific conductivity (**Figure 4**) had a range of 34.3 to 190.5 $\mu\text{S}/\text{cm}$ over the reporting period. Most increases in specific conductivity are attributed to precipitation events which contributes to ions (contaminants) entering the system (see Appendix A for climate data). High values in December and the spring months are attributed to mild temperatures, influencing snow-melt and increased surface runoff.

Figure 4: Specific Conductance



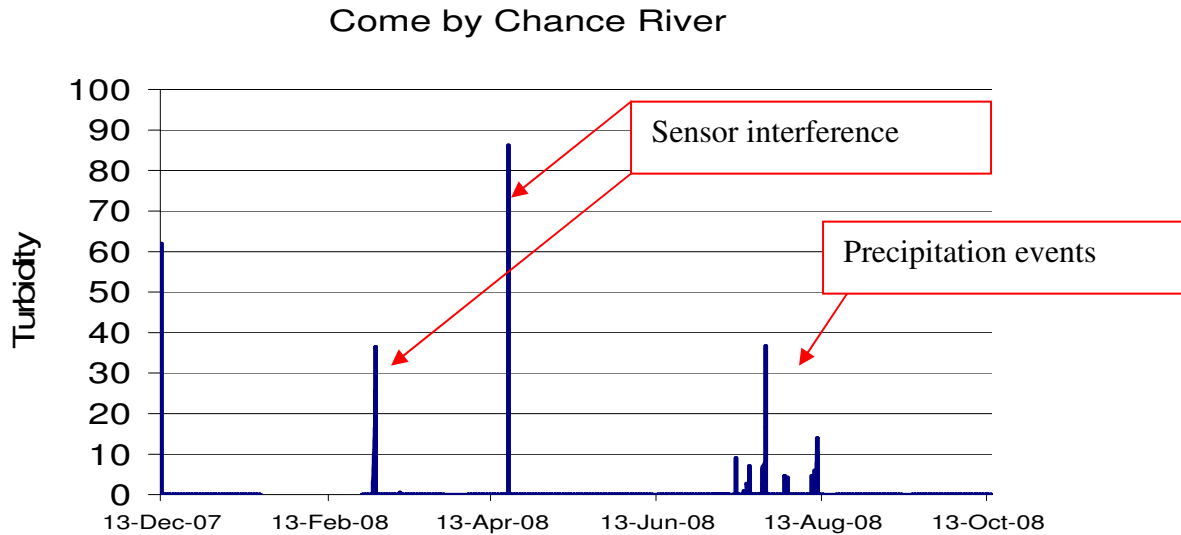
pH values (**Figure 5**) had a range of 5.02 to 6.93 over the reporting period and showed signs of sensor drift towards the end of some of the deployment periods. Many pH values fell below the lower CCME Protection of Aquatic Life guideline (6.5-9.0) due to the naturally acidic nature of NL waters.

Figure 5: pH



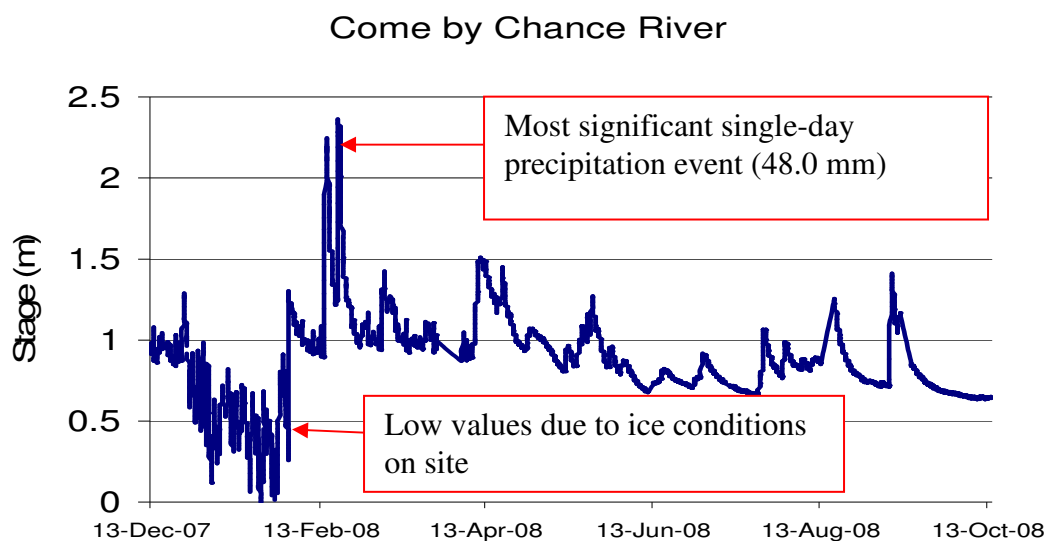
Turbidity values (**Figure 6**) remained relatively stable throughout the year at zero NTU. A spike in early March is attributed to ice interfering with the sensor and interference is also attributed to the spike in mid April. During July and August, several periods of precipitation, spikes in turbidity values. The highest turbidity values rose to a maximum value of 86.2 NTU.

Figure 6: Turbidity



Stage values (**Figure 7**) ranged from 0.06 to 2.363 meters. The low stage readings early in the reporting period are suspected to be a result of ice conditions on site. Increases in stage generally correspond with precipitation events (Appendix A for climate data). The maximum stage value of 2.363 m was a result of the largest single-day precipitation event of 48.0 mm, it occurred mid February.

Figure 7: Stage



Overall, the Come by Chance station displayed consistent values for all measured parameters for the reporting period. Most variation in parameter values over the year have been attributed to natural conditions including precipitation events and seasonal variation.

Section 4.0 Quality Assurance/Quality Control (QA/QC) Measures

Quality Assurance/Quality Control (QA/QC) measures are a very important aspect of the Real-Time Water Quality Monitoring program. These measures are put in place to ensure that the instruments are reading data accurately. The QA/QC procedures established by DOEC are two-fold:

- 1) Data from the water quality monitoring instrument in-situ, Datasonde, were compared to data from a portable instrument in-situ, QA sonde, at the time of redeployment, after maintenance/calibration procedures have been performed; data must fall within a specified range. **Table 2** summarizes the QA/QC results comparing the field readings against the QA instrument.
- 2) Grab water samples are taken from each station at the time of redeployment and sent to a laboratory for analysis; the results are then compared to those of the water quality monitoring instrument in-situ, Datasonde; data must fall within a specified range. **Table 3** summarizes the QA/QC results comparing the Datasonde readings against the laboratory results (three parameters were available for comparison– pH; conductivity; turbidity).

As can be seen in **Table 2**, the QA/QC comparison between the field instrument and the QA instrument at the time of redeployment was generally excellent or good while a fair ranking for pH occurred on one instance.

As can be seen in **Table 3**, the QA/QC comparison between the field instrument and laboratory data at the time of redeployment was generally good or excellent. A ranking of marginal, fair and poor each occurred for pH, as instrument comparisons for pH was generally good or excellent, this is something that will have to be investigated further.

Note: NA values occurred on the March 29 installation due to a temporary communication problem whereby the field instrument readings were not available.

Table 2: QA/QC Results (Datasonde vs. Minisonde)

Reinstallation Date	Parameters	Datasonde Data	Minisonde Data	Rating
12/13/2007	Temp (°C)	0.05	0.16	Excellent
	pH (units)	6.12	6	Excellent
	Conductivity (µS/cm)	93.6	94.1	Excellent
	Dissolved Oxygen (mg/L)	13.73	13.88	Excellent
02/25/2008	Temp (°C)	0.11	-0.05	Excellent
	pH (units)	5.63	5.58	Excellent
	Conductivity (µS/cm)	50.4	50.5	Excellent
	Dissolved Oxygen (mg/L)	13.80	13.42	Good
03/29/2008	Temp (°C)	NA	0.53	NA
	pH (units)	NA	6.04	NA
	Conductivity (µS/cm)	NA	125.1	NA
	Dissolved Oxygen (mg/L)	NA	13.23	NA
05/14/2008	Temp (°C)	5.84	5.80	Excellent
	pH (units)	6.04	6.06	Good
	Conductivity (µS/cm)	49.7	48.1	Excellent
	Dissolved Oxygen (mg/L)	12.51	12.29	Excellent
06/13/2008	Temp (°C)	13.93	13.86	Excellent
	pH (units)	5.58	6.11	Good
	Conductivity (µS/cm)	62.8	62.8	Excellent
	Dissolved Oxygen (mg/L)	10.05	10.00	Excellent
07/11/2008	Temp (°C)	18.63	18.48	Excellent
	pH (units)	6.00	5.74	Good
	Conductivity (µS/cm)	88.9	89.0	Excellent
	Dissolved Oxygen (mg/L)	9.04	9.12	Excellent
08/18/2008	Temp (°C)	18.62	18.71	Excellent
	pH (units)	5.42	5.40	Excellent
	Conductivity (µS/cm)	39.4	39.2	Excellent
	Dissolved Oxygen (mg/L)	8.48	8.75	Excellent
09/15/2008	Temp (°C)	15.84	15.78	Excellent
	pH (units)	6.33	5.56	Fair
	Conductivity (µS/cm)	51.8	52.0	Excellent
	Dissolved Oxygen (mg/L)	9.23	9.20	Excellent

Table 3: QA/QC Results (Datasonde vs. Laboratory)

Reinstallation Date	Parameters	Datasonde Data	Laboratory Data	Rating
12/13/2007	pH (units)	6.12	6.28	Excellent
	Conductivity ($\mu\text{S}/\text{cm}$)	93.6	89	Good
	Turbidity (NTU)	0	0.7	Excellent
02/25/2008	pH (units)	5.63	5.54	Excellent
	Conductivity ($\mu\text{S}/\text{cm}$)	50.4	53	Good
	Turbidity (NTU)	0	0.9	Excellent
03/29/2008	pH (units)	NA	6.44	NA
	Conductivity ($\mu\text{S}/\text{cm}$)	NA	130	NA
	Turbidity (NTU)	NA	0.5	NA
05/14/2008	pH (units)	6.04	6.56	Fair
	Conductivity ($\mu\text{S}/\text{cm}$)	49.7	52	Good
	Turbidity (NTU)	0	2.2	Good
06/13/2008	pH (units)	5.58	6.68	Poor
	Conductivity ($\mu\text{S}/\text{cm}$)	62.8	66	Good
	Turbidity (NTU)	0	1	Excellent
07/11/2008	pH (units)	6.00	6.94	Marginal
	Conductivity ($\mu\text{S}/\text{cm}$)	88.9	90	Excellent
	Turbidity (NTU)	0	1.3	Excellent
08/18/2008	pH (units)	5.42	6.28	Marginal
	Conductivity ($\mu\text{S}/\text{cm}$)	39.4	40	Excellent
	Turbidity (NTU)	0	1.7	Excellent
09/15/2008	pH (units)	6.33	6.45	Excellent
	Conductivity ($\mu\text{S}/\text{cm}$)	51.8	52	Excellent
	Turbidity (NTU)	0	1.1	Excellent

Section 5.0 Conclusions

The Come by Chance real-time water quality monitoring site has continued to be very successful in gathering water quality data during the 2008 reporting period. The near-real time water quality data has allowed both DOEC and NL Refining Corporation Ltd. staff to continue understanding the natural background water quality at this site. To date, the data has clearly shown that the ambient water quality is relatively stable. The water quality instrumentation will be reinstalled and operational when the Agreement resumes in the future.

Section 6.0 Path Forward

In order for a program to be successful, it is essential to continually evaluate and move forward. The following is a list of planned activities to be carried out when the Agreement resumes.

- shipment of instrument for servicing work
- regular maintenance/calibration activities
- communication between DOEC and NLRC staff for resuming operation
- continued work on Automatic Data Retrieval System to incorporate new capabilities
- evaluation and upgrading of QA/QC procedures
- work on extrapolation of other water quality parameters using regression analysis
- creation of value added products using the real-time water quality data, remote sensing and water quality indices
- preparation of monthly deployment reports
- preparations of annual reports at end of calendar year
- continued research/development of new technologies for real-time water quality monitoring.

Appendix A








Climate Data for Argentina, NL








Daily Data Report for December 2007											
D a y	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
13†	-0.3	-8.6	-4.5	22.5	0.0	M	M	0.0	5	30	67
14†	-6.8	-10.7	-8.8	26.8	0.0	M	M	0.0	3	32	41
15†	-6.1	-9.3	-7.7	25.7	0.0	M	M	0.0	4	36	39
16†	-5.7	-10.4	-8.1	26.1	0.0	M	M	0.0	4	11	54
17†	5.0	-6.5	-0.8	18.8	0.0	M	M	10.5		14	122
18†	0.1	-1.8	-0.9	18.9	0.0	M	M	0.0		26	83
19†	-0.9	-8.7	-4.8	22.8	0.0	M	M	0.0		31	52
20†	-6.2	-9.2	-7.7	25.7	0.0	M	M	0.0		5	43
21†	-2.2	-8.8	-5.5	23.5	0.0	M	M	0.0		3	57
22†	-1.8	-9.1	-5.5	23.5	0.0	M	M	0.0		26	44
23†	1.4	-2.3	-0.5	18.5	0.0	M	M	0.0		24	54
24†	10.5	1.3	5.9	12.1	0.0	0.0	M	5.9		21	106
25†	1.8	-0.7	0.6	17.4	0.0	M	M	0.0		26	89
26†	1.1	-0.3	0.4	17.6	0.0	M	M	0.0		26	57
27†	0.2	-4.2	-2.0	20.0	0.0	M	M	1.4		8	52
28†	-1.3	-4.3	-2.8	20.8	0.0	0.0	M	9.6	5	36	85
29†	-3.2	-6.0	-4.6	22.6	0.0	M	M	0.0	1	12	63
30†	3.3	-3.2	0.1	17.9	0.0	0.0	M	4.9	10	12	76
31†	3.2	-5.7	-1.3	19.3	0.0	M	M	4.3	6	13	95








Daily Data Report for January 2008											
D a y	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†	1.5	-3.0	-0.8	18.8	0.0	M	M	0.0	5	27	117
02†	2.7	-6.9	-2.1	20.1	0.0	M	M	1.4	5	11	109
03†	0.7	-10.3	-4.8	22.8	0.0	M	M	0.0	4	27	70
04†	-1.8	-12.1	-7.0	25.0	0.0	M	M	0.0	5	24	63
05†	-0.9	-5.9	-3.4	21.4	0.0	M	M	0.0	5	25	63
06†	-0.3	-5.5	-2.9	20.9	0.0	0.0	M	1.2	4	12	32
07†	1.4	-2.5	-0.6	18.6	0.0	M	M	0.6	7	21	54
08†	1.6	0.6	1.1	16.9	0.0	M	M	2.0	3	22	44
09†	6.5	0.1	3.3	14.7	0.0	M	M	2.6	3	13	54
10†	6.8	1.2	4.0	14.0	0.0	M	M	6.6		25	70
11†	1.6	-1.0	0.3	17.7	0.0	M	M	0.0		27	78
12†	6.9	-1.0	3.0	15.0	0.0	M	M	22.3		14	72
13†	2.2	-2.4	-0.1	18.1	0.0	M	M	0.0		27	63
14†	-1.5	-3.7	-2.6	20.6	0.0	0.0	M	2.2		28	50
15†	2.1	-2.2	-0.1	18.1	0.0	0.0	M	10.2		12	78
16†	0.9	-1.2	-0.2	18.2	0.0	M	M	0.7	3	3	67
17†	-0.6	-3.7	-2.2	20.2	0.0	M	M	0.0	2	36	61
18†	0.3	-4.8	-2.3	20.3	0.0	M	M	0.0		15	74
19†	3.7	-2.9	0.4	17.6	0.0	M	M	4.4		18	93
20†	-1.8	-6.1	-4.0	22.0	0.0	0.0	M	4.4	1	32	67
21†	-5.9	-12.1	-9.0	27.0	0.0	M	M	0.0	2	29	63
22†	-5.1	-11.4	-8.3	26.3	0.0	M	M	0.0	1	27	61
23†	3.3	-5.7	-1.2	19.2	0.0	M	M	17.0		20	93
24†	-0.7	-4.6	-2.7	20.7	0.0	M	M	1.1	8	20	52
25†	-3.2	-11.9	-7.6	25.6	0.0	M	M	3.3	7	35	69
26†	-9.0	-14.3	-11.7	29.7	0.0	M	M	M	7	32	54
27†	-6.3	-12.6	-9.5	27.5	0.0	M	M	0.0		27	37
28†	4.5	-8.3	-1.9	19.9	0.0	M	M	2.1	5	13	72
29†	6.5	0.5	3.5	14.5	0.0	M	M	15.6		11	82
30†	9.2	0.1	4.7	13.3	0.0	M	M	5.7		20	37
31†	7.4	-2.0	2.7	15.3	0.0	M	M	0.0		21	67








Daily Data Report for February 2008											
D a y	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†	-1.7	-5.2	-3.5	21.5	0.0	M	M	0.0		27	48
02†	3.4	-6.4	-1.5	19.5	0.0	M	M	6.3		14	74
03†	0.3	-5.0	-2.4	20.4	0.0	M	M	0.0		25	72
04†	-4.1	-6.3	-5.2	23.2	0.0	M	M	0.0		33	44
05†	-4.6	-8.4	-6.5	24.5	0.0	M	M	0.0		33	39
06†	-0.6	-6.7	-3.7	21.7	0.0	M	M	0.6		13	44
07†	-1.0	-4.3	-2.7	20.7	0.0	M	M	0.7	2	35	50
08†	-1.2	-4.4	-2.8	20.8	0.0	M	M	0.0		3	50
09†	0.3	-4.4	-2.1	20.1	0.0	M	M	0.0		33	37
10†	-1.8	-6.9	-4.4	22.4	0.0	0.0	M	3.5		9	65
11†	2.4	-3.4	-0.5	18.5	0.0	M	M	2.1	4	24	98
12†	-0.7	-4.2	-2.5	20.5	0.0	M	M	0.0	4	26	96
13†	-1.4	-4.6	-3.0	21.0	0.0	M	M	0.0	4	32	39
14†	9.4	-1.4	4.0	14.0	0.0	M	M	48.0		19	115
15†	1.5	-1.7	-0.1	18.1	0.0	M	M	0.0		22	48
16†	1.6	-10.7	-4.6	22.6	0.0	M	M	0.0		29	57
17†	-7.5	-12.1	-9.8	27.8	0.0	M	M	0.0		28	54
18†	8.0	-7.7	0.2	17.8	0.0	M	M	10.6		20	93
19†	9.4	0.0	4.7	13.3	0.0	0.0	M	15.0		20	111
20†	1.3	-1.7	-0.2	18.2	0.0	M	M	0.0		24	82
21†	-0.5	-8.0	-4.3	22.3	0.0	M	M	0.0		27	78
22†	-4.7	-8.8	-6.8	24.8	0.0	M	M	0.0		28	70
23†	-3.2	-6.2	-4.7	22.7	0.0	0.0	M	9.3	1	4	61
24†	-2.5	-8.5	-5.5	23.5	0.0	M	M	0.0		24	48
25†	-0.1	-2.7	-1.4	19.4	0.0	M	M	0.0	7	25	50
26†	1.1	-2.6	-0.8	18.8	0.0	M	M	0.0	7		<31
27†	8.8	-2.1	3.4	14.6	0.0	0.0	M	2.7	6	20	91
28†	3.5	-1.7	0.9	17.1	0.0	M	M	0.0		21	48
29†	-1.6	-10.9	-6.3	24.3	0.0	M	M	0.0		34	37








Daily Data Report for March 2008											
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†	-2.1	-12.1	-7.1	25.1	0.0	M	M	0.0		14	59
02†	3.4	-2.2	0.6	17.4	0.0	M	M	12.5		14	85
03†	-0.9	-3.6	-2.3	20.3	0.0	M	M	0.0	1	30	54
04†	2.7	-4.0	-0.7	18.7	0.0	M	M	0.0		20	70
05†	0.9	-5.7	-2.4	20.4	0.0	M	M	0.0		12	87
06†	9.5	-2.3	3.6	14.4	0.0	M	M	12.9		19	82
07†	0.0	-4.4	-2.2	20.2	0.0	M	M	0.0		34	33
08†	9.8	-3.6	3.1	14.9	0.0	M	M	13.3		20	80
09†	3.9	-2.8	0.6	17.4	0.0	M	M	25.2		22	69
10†	0.1	-8.8	-4.4	22.4	0.0	M	M	0.8		36	50
11†	-2.3	-8.4	-5.4	23.4	0.0	M	M	0.0		26	44
12†	1.0	-2.9	-1.0	19.0	0.0	M	M	0.0		12	54
13†	3.3	-5.6	-1.2	19.2	0.0	0.0	M	14.8	20	11	93
14†	-0.8	-8.8	-4.8	22.8	0.0	M	M	0.0	2	30	78
15†	-3.9	-9.0	-6.5	24.5	0.0	M	M	0.0	2	7	41
16†	-4.2	-9.3	-6.8	24.8	0.0	M	M	3.7	2	4	74
17†	-1.7	-8.5	-5.1	23.1	0.0	M	M	9.1	2	4	106
18†	0.0	-1.7	-0.9	18.9	0.0	0.0	M	3.3	2	3	100
19†	1.0	-1.0	0.0	18.0	0.0	0.0	M	15.9		2	72
20†	0.7	-2.7	-1.0	19.0	0.0	M	M	0.0	5		<31
21†	4.9	-1.2	1.9	16.1	0.0	M	M	10.0		13	80
22†	1.8	-2.3	-0.3	18.3	0.0	M	M	3.1		21	54
23†	-1.1	-3.7	-2.4	20.4	0.0	M	M	2.7		25	76
24†	-1.8	-4.1	-3.0	21.0	0.0	M	M	2.0		24	74
25†	-4.0	-7.2	-5.6	23.6	0.0	0.0	M	1.5		4	39
26†	-3.4	-9.9	-6.7	24.7	0.0	M	M	0.0		34	44
27†	1.2	-3.9	-1.4	19.4	0.0	M	M	0.6		16	70
28†	1.4	-2.3	-0.5	18.5	0.0	M	M	0.0		25	46
29†	0.3	-4.9	-2.3	20.3	0.0	0.0	M	1.9		4	44
30†	-1.3	-7.2	-4.3	22.3	0.0	0.0	M	3.0		2	57
31†	-4.2	-9.7	-7.0	25.0	0.0	M	M	0.0		1	52








Daily Data Report for April 2008											
D a y	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†	-0.9	-9.8	-5.4	23.4	0.0	M	M	0.8		13	63
02†	4.9	-1.7	1.6	16.4	0.0	M	M	5.6		14	85
03†	-0.1	-3.7	-1.9	19.9	0.0	M	M	0.6		25	76
04†	1.6	-2.0	-0.2	18.2	0.0	M	M	1.0		26	63
05†	4.4	-2.2	1.1	16.9	0.0	M	M	0.6		8	32
06†	4.8	-2.6	1.1	16.9	0.0	M	M	0.6		3	46
07†	2.6	-1.9	0.4	17.6	0.0	M	M	3.8		3	56
08†	9.2	1.2	5.2	12.8	0.0	M	M	0.0		3	43
09†	9.2	1.5	5.4	12.6	0.0	M	M	0.0			<31
10†	5.3	1.3	3.3	14.7	0.0	M	M	0.0			<31
11†	5.3	1.3	3.3	14.7	0.0	M	M	6.0		13	37
12†	3.7	0.2	2.0	16.0	0.0	M	M	0.0		21	32
13†	4.1	0.1	2.1	15.9	0.0	M	M	4.2		21	35
14†	2.1	0.0	1.1	16.9	0.0	M	M	0.0		26	70
15†	3.2	-0.1	1.6	16.4	0.0	M	M	1.0		27	70
16†	5.4	-0.5	2.5	15.5	0.0	M	M	0.0		22	43
17†	4.8	0.7	2.8	15.2	0.0	M	M	0.0		21	50
18†	8.9	1.4	5.2	12.8	0.0	M	M	29.2		21	33
19†	4.5	-2.4	1.1	16.9	0.0	M	M	2.4		3	56
20†	6.2	-3.3	1.5	16.5	0.0	M	M	0.0		25	41
21†	5.6	-1.1	2.3	15.7	0.0	M	M	0.0		27	41
22†	4.1	-1.5	1.3	16.7	0.0	M	M	0.0		8	32
23†	3.2	-2.6	0.3	17.7	0.0	M	M	0.0			<31
24†	3.6	-2.3	0.7	17.3	0.0	M	M	0.0			<31
25†	10.1	-1.8	4.2	13.8	0.0	M	M	2.6		20	32
26†	6.7	-1.4	2.7	15.3	0.0	M	M	0.7		6	54
27†	7.6	0.7	4.2	13.8	0.0	M	M	0.0		6	57
28†	9.9	4.3	7.1	10.9	0.0	M	M	0.0		8	43
29†	12.5	3.7	8.1	9.9	0.0	M	M	0.0		9	57
30†	13.3	3.7	8.5	9.5	0.0	M	M	0.0		11	65

Daily Data Report for May 2008											
D a y	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†	10.6	3.2	6.9	11.1	0.0	M	M	0.0		9	44
02†	9.9	-0.3	4.8	13.2	0.0	M	M	0.0		2	43
03†	6.2	-0.8	2.7	15.3	0.0	M	M	0.0		3	39
04†	6.2	0.3	3.3	14.7	0.0	M	M	0.0		22	37
05†	3.4	0.7	2.1	15.9	0.0	M	M	0.0		20	46
06†	7.8	1.7	4.8	13.2	0.0	M	M	0.0			<31
07†	14.4	2.3	8.4	9.6	0.0	M	M	1.2		5	50
08†	6.3	1.8	4.1	13.9	0.0	M	M	0.6		2	65
09†	8.7	2.1	5.4	12.6	0.0	M	M	0.0		5	43
10†	11.3	2.7	7.0	11.0	0.0	M	M	0.0		8	43
11†	4.3	2.2	3.3	14.7	0.0	M	M	8.7		5	67
12†	3.6	2.0	2.8	15.2	0.0	M	M	12.0		5	67
13†	7.4	1.3	4.4	13.6	0.0	M	M	0.0		3	52
14†	4.2	0.9	2.6	15.4	0.0	M	M	0.0		4	57
15†	9.8	1.8	5.8	12.2	0.0	M	M	3.3		5	48
16†	9.2	3.1	6.2	11.8	0.0	M	M	1.9			<31
17†	9.9	2.9	6.4	11.6	0.0	M	M	7.9		12	59
18†	11.9	2.0	7.0	11.0	0.0	M	M	3.0		15	74
19†	14.8	1.6	8.2	9.8	0.0	M	M	3.6		13	56
20†	11.3	3.5	7.4	10.6	0.0	M	M	8.1		16	48
21†	12.1	4.2	8.2	9.8	0.0	M	M	13.5		13	82
22†	6.7	3.0	4.9	13.1	0.0	M	M	0.0		20	67
23†	13.2	3.1	8.2	9.8	0.0	M	M	3.8		10	44
24†	5.1	2.2	3.7	14.3	0.0	M	M	2.0		21	44
25†	5.9	1.3	3.6	14.4	0.0	M	M	0.0		20	39
26†	9.2	2.7	6.0	12.0	0.0	M	M	0.0		20	52
27†	11.4	5.5	8.5	9.5	0.0	M	M	2.8		21	87
28†	7.3	2.7	5.0	13.0	0.0	M	M	6.4		21	63
29†	9.4	3.1	6.3	11.7	0.0	M	M	0.0		19	61
30†	7.9	4.2	6.1	11.9	0.0	M	M	0.0		21	63
31†	9.3	4.0	6.7	11.3	0.0	M	M	0.0		21	41

Daily Data Report for June 2008											
D a y	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†	12.5	5.2	8.9	9.1	0.0	M	M	6.8		15	67
02†	10.2	5.3	7.8	10.2	0.0	M	M	5.5		20	44
03†	8.8	4.9	6.9	11.1	0.0	M	M	0.0		20	33
04†	8.8	4.9	6.9	11.1	0.0	M	M	0.0		19	35
05†	10.7	5.4	8.1	9.9	0.0	M	M	1.2			<31
06†	17.4	4.3	10.9	7.1	0.0	M	M	0.0		1	39
07†	10.1	4.0	7.1	10.9	0.0	M	M	0.0			<31
08†	12.4	3.5	8.0	10.0	0.0	M	M	0.0		14	52
09†	13.1	4.6	8.9	9.1	0.0	M	M	0.0		13	54
10†	14.9	5.0	10.0	8.0	0.0	M	M	0.0		3	43
11†	15.7	6.3	11.0	7.0	0.0	M	M	0.0		3	35
12†	13.0	7.0	10.0	8.0	0.0	M	M	0.0			<31
13†	15.0	6.9	11.0	7.0	0.0	M	M	8.3		2	44
14†	13.2	7.0	10.1	7.9	0.0	M	M	5.9		4	41
15†	14.6	6.6	10.6	7.4	0.0	M	M	4.6		4	44
16†	11.3	5.9	8.6	9.4	0.0	M	M	6.1		1	39
17†	17.7	5.5	11.6	6.4	0.0	M	M	0.0			<31
18†	14.5	7.3	10.9	7.1	0.0	M	M	0.0			<31
19†	15.4	9.3	12.4	5.6	0.0	M	M	0.0			<31
20†	15.7	8.9	12.3	5.7	0.0	M	M	2.4			<31
21†	14.8	6.9	10.9	7.1	0.0	M	M	0.0		21	32
22†	11.8	6.8	9.3	8.7	0.0	M	M	0.0		20	37
23†	12.5	7.5	10.0	8.0	0.0	M	M	0.0		21	39
24†	16.8	9.2	13.0	5.0	0.0	M	M	3.1		22	33
25†	13.5	9.5	11.5	6.5	0.0	M	M	0.0		26	46
26†	13.9	9.3	11.6	6.4	0.0	M	M	0.7		25	48
27†	12.9	9.7	11.3	6.7	0.0	M	M	8.3			<31
28†	12.4	8.5	10.5	7.5	0.0	M	M	1.2		5	37
29†	15.0	8.5	11.8	6.2	0.0	M	M	0.0		11	33
30†	12.9	8.4	10.7	7.3	0.0	M	M	11.4		12	67

Daily Data Report for July 2008											
D a y	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†	13.1	9.8	11.5	6.5	0.0	M	M	2.3		20	46
02†	12.9	9.3	11.1	6.9	0.0	M	M	0.0		21	33
03†	14.2	9.9	12.1	5.9	0.0	M	M	4.8		21	44
04†	12.3	9.8	11.1	6.9	0.0	M	M	0.0		19	44
05†	14.9	9.7	12.3	5.7	0.0	M	M	0.0		22	32
06†	13.4	9.5	11.5	6.5	0.0	M	M	0.7		19	39
07†	15.5	9.8	12.7	5.3	0.0	M	M	0.0		20	33
08†	14.2	10.8	12.5	5.5	0.0	M	M	0.0		20	35
09†	15.7	11.8	13.8	4.2	0.0	M	M	0.0		22	33
10†	17.2	12.9	15.1	2.9	0.0	M	M	0.0		20	54
11†	16.7	11.6	14.2	3.8	0.0	M	M	1.4		21	50
12†	20.1	11.1	15.6	2.4	0.0	M	M	4.1		34	35
13†	16.2	10.6	13.4	4.6	0.0	M	M	0.0		23	37
14†	18.0	10.7	14.4	3.6	0.0	M	M	0.0		18	50
15†	18.3	14.4	16.4	1.6	0.0	M	M	0.7		18	52
16†	18.4	13.9	16.2	1.8	0.0	M	M	0.6			<31
17†	15.7	12.7	14.2	3.8	0.0	M	M	0.0			<31
18†	16.9	12.5	14.7	3.3	0.0	M	M	0.0			<31
19†	15.8	11.9	13.9	4.1	0.0	M	M	11.6			<31
20†	15.2	11.8	13.5	4.5	0.0	M	M	0.6			<31
21†	16.1	11.9	14.0	4.0	0.0	M	M	28.5		11	59
22†	16.2	13.7	15.0	3.0	0.0	M	M	4.0			<31
23†	19.4	9.8	14.6	3.4	0.0	M	M	7.5		9	44
24†	16.8	9.3	13.1	4.9	0.0	M	M	M			<31
25†	17.7	14.0	15.9	2.1	0.0	M	M	0.0			<31
26†	18.5	15.8	17.2	0.8	0.0	M	M	16.0		20	48
27†	17.8	15.9	16.9	1.1	0.0	M	M	15.5		20	43
28†	19.1	16.0	17.6	0.4	0.0	M	M	1.2		20	32
29†	19.1	16.4	17.8	0.2	0.0	M	M	0.0		20	35
30†	20.2	16.1	18.2	0.0	0.2	M	M	5.0			<31
31†	19.3	13.5	16.4	1.6	0.0	M	M	0.6		35	33

Daily Data Report for August 2008											
D a y	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†	18.4	13.4	15.9	2.1	0.0	M	M	0.0		5	32
02†	18.6	12.9	15.8	2.2	0.0	M	M	0.0		4	33
03†	15.8	12.2	14.0	4.0	0.0	M	M	0.0			<31
04†	14.7	11.7	13.2	4.8	0.0	M	M	9.3			<31
05†	16.1	12.7	14.4	3.6	0.0	M	M	9.7		5	35
06†	14.9	11.7	13.3	4.7	0.0	M	M	13.9		4	33
07†	18.9	11.7	15.3	2.7	0.0	M	M	0.0		6	32
08†	17.0	12.6	14.8	3.2	0.0	M	M	0.0			<31
09†	16.7	13.2	15.0	3.0	0.0	M	M	5.9			<31
10†	17.1	14.4	15.8	2.2	0.0	M	M	0.0			<31
11†	20.4	15.4	17.9	0.1	0.0	M	M	0.0			<31
12†	23.1	15.1	19.1	0.0	1.1	M	M	1.6		21	39
13†	23.2	15.6	19.4	0.0	1.4	M	M	0.9		21	41
14†	18.4	15.2	16.8	1.2	0.0	M	M	10.6		24	46
15†	20.6	12.8	16.7	1.3	0.0	M	M	22.4		11	76
16†	17.6	13.2	15.4	2.6	0.0	M	M	0.0		22	39
17†	17.7	14.0	15.9	2.1	0.0	M	M	12.8		32	83
18†	18.2	11.4	14.8	3.2	0.0	M	M	0.7		20	44
19†	18.6	11.1	14.9	3.1	0.0	M	M	0.0		22	44
20†	18.7	13.9	16.3	1.7	0.0	M	M	1.6		20	43
21†	16.7	13.6	15.2	2.8	0.0	M	M	0.0		21	48
22†	17.8	13.6	15.7	2.3	0.0	M	M	0.0		20	39
23†	17.7	14.4	16.1	1.9	0.0	M	M	0.0		23	46
24†	18.2	14.4	16.3	1.7	0.0	M	M	0.0		21	44
25†	21.0	15.2	18.1	0.0	0.1	M	M	1.3		21	54
26†	17.3	15.6	16.5	1.5	0.0	M	M	0.0		20	46
27†	23.1	15.1	19.1	0.0	1.1	M	M	0.0		4	46
28†	18.6	13.1	15.9	2.1	0.0	M	M	0.0		6	52
29†	18.7	12.7	15.7	2.3	0.0	M	M	1.1		12	50
30†	20.3	13.5	16.9	1.1	0.0	M	M	4.0		14	37
31†	17.4	12.8	15.1	2.9	0.0	M	M	0.0		20	39

Daily Data Report for September 2008											
D a y	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†	20.6	12.9	16.8	1.2	0.0	M	M	0.0		10	32
02†	23.4	15.5	19.5	0.0	1.5	M	M	0.0			<31
03†	17.8	12.8	15.3	2.7	0.0	M	M	0.0			<31
04†	22.1	12.6	17.4	0.6	0.0	M	M	13.8		21	59
05†	20.8	13.2	17.0	1.0	0.0	M	M	0.0		27	44
06†	17.7	12.5	15.1	2.9	0.0	M	M	0.0		21	44
07†	20.4	15.1	17.8	0.2	0.0	M	M	34.1		21	69
08†	16.9	12.2	14.6	3.4	0.0	M	M	1.2		30	48
09†	15.9	11.5	13.7	4.3	0.0	M	M	0.0		21	41
10†	18.6	13.0	15.8	2.2	0.0	M	M	5.2		21	72
11†	16.5	12.5	14.5	3.5	0.0	M	M	0.0		26	44
12†	16.6	13.4	15.0	3.0	0.0	M	M	0.0		23	46
13†	16.8	12.5	14.7	3.3	0.0	M	M	0.0		23	37
14†	16.9	11.4	14.2	3.8	0.0	M	M	0.0		15	35
15†	20.1	14.0	17.1	0.9	0.0	M	M	0.0		22	50
16†	18.7	10.3	14.5	3.5	0.0	M	M	0.0		21	54
17†	13.8	10.2	12.0	6.0	0.0	M	M	0.0		22	33
18†	15.2	9.7	12.5	5.5	0.0	M	M	0.0		34	54
19†	14.1	8.4	11.3	6.7	0.0	M	M	0.0		33	56
20†	14.2	7.3	10.8	7.2	0.0	M	M	0.0		22	50
21†	17.9	12.9	15.4	2.6	0.0	M	M	0.0		20	35
22†	14.8	8.2	11.5	6.5	0.0	M	M	1.0		35	46
23†	12.5	5.4	9.0	9.0	0.0	M	M	2.6		31	50
24†	11.5	4.3	7.9	10.1	0.0	M	M	0.7		36	50
25†	11.4	4.5	8.0	10.0	0.0	M	M	0.0		24	50
26†	14.9	11.3	13.1	4.9	0.0	M	M	0.0		24	52
27†	14.1	11.2	12.7	5.3	0.0	M	M	0.0		22	33
28†	13.6	9.0	11.3	6.7	0.0	M	M	0.0			<31
29†	16.2	9.6	12.9	5.1	0.0	M	M	0.0		13	41
30†	23.6	14.5	19.1	0.0	1.1	M	M	0.0			<31

Daily Data Report for October 2008											
D a y	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†	16.4	11.9	14.2	3.8	0.0	M	M	0.0		26	41
02†	16.1	10.1	13.1	4.9	0.0	M	M	0.0		20	37
03†	16.0	12.5	14.3	3.7	0.0	M	M	0.0		19	48
04†	14.6	10.3	12.5	5.5	0.0	M	M	0.8		25	80
05†	13.2	9.5	11.4	6.6	0.0	M	M	0.0		27	57
06†	12.5	8.9	10.7	7.3	0.0	M	M	0.0		27	56
07†	11.1	5.9	8.5	9.5	0.0	M	M	0.6		31	41
08†	8.7	5.3	7.0	11.0	0.0	M	M	0.7		25	56
09†	12.4	5.8	9.1	8.9	0.0	M	M	4.8		26	56
10†	13.5	10.1	11.8	6.2	0.0	M	M	2.3		26	57
11†	10.3	4.0	7.2	10.8	0.0	M	M	0.7		2	33
12†	9.6	3.5	6.6	11.4	0.0	M	M	0.0			<31
13†	12.0	5.1	8.6	9.4	0.0	M	M	0.0	2	4	46
14†	9.4	3.7	6.6	11.4	0.0	M	M	0.0		22	41