



# **Real Time Water Quality Report Humber River at Humber Village**

**Deployment Period  
2017-04-20 to 2017-06-13**



**Government of Newfoundland & Labrador  
Department of Municipal Affairs and Environment  
Water Resources Management Division  
St. John's, NL, A1B 4J6 Canada**

Prepared by:

Ian Bell  
Environmental Scientist

Department of Municipal Affairs and Environment  
Water Resources Management Division  
PO Box 2006, Corner Brook, NL, A2H 6J8

t. 709.637.2431

f. 709.637.2541

e. [ianbell@gov.nl.ca](mailto:ianbell@gov.nl.ca)

## General

- This station is operated as part of the Provincial Real Time Water Quality (RTWQ) network.
- This station is operated year round.
- Staff of the Water Resources Management Division (WRMD) monitors the real-time web page on a regular basis. Any unusual observations are investigated.
- This site is easily accessed and the instrument is normally removed on a monthly to bi-monthly basis for maintenance and calibration and is reinstalled within one to two days. During the winter months the deployment periods tend to be longer as the instrument is often frozen into place and difficult to remove.
- This monthly deployment report, presents water quality and water quantity data recorded at the Humber River at Humber Village station from April 20, 2017, to June 13, 2017.
- This is the first deployment period using a new YSI EXO 2 water quality probe which was installed to replace the older Hydrolab DS5X which had been deployed at this site for over 10 years.

## Quality Assurance / Quality Control

- Water quality instrument performance is tested at the beginning and end of its deployment period. The process is outlined in Appendix A.
- Instruments are assigned a performance rating (i.e., poor, marginal, fair, good or excellent) for each water quality parameter measured.
- Table 1 shows the performance ratings of five water quality parameters (i.e., temperature, pH, specific conductivity, dissolved oxygen and turbidity) measured by the deployed instrument.
- The performances of all sensors were rated good to excellent at the beginning, and fair to excellent at the end, of the deployment period (Table 1).
- **With the exception of water quantity data (stage height), all data used in the preparation of the graphs and subsequent discussion below adhere to this stringent QA/QC protocol. The stage data is raw data that is transmitted via satellite and published on our web page. It has not been corrected for backwater effect. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.**

**Table 1:** Water quality instrument performance at the beginning and end of the deployment

	<b>Humber River</b>	
<b>Stage of deployment</b>	<b>Beginning</b>	<b>End</b>
Date	2017-04-20	2017-06-13
Temperature	Excellent	Excellent
pH	Excellent	Fair
Specific Conductivity	Excellent	Excellent
Dissolved Oxygen	Good	Good
Turbidity	Excellent	Excellent

## Deployment Notes

Water quality monitoring for this deployment period started on April 20, 2017 and continued without any significant operational issues until June 13, 2017, when the instrument was removed for routine calibration and maintenance.

## Data Interpretation

- Data records were interpreted for each station during the deployment period for the following six parameters:
  - (i.) Stage (m)
  - (ii.) Temperature (°C)
  - (iii.) pH
  - (iv.) Specific conductivity (µS/cm)
  - (v.) Dissolved oxygen (mg/l)
  - (vi.) Turbidity (NTU)

## Stage

- The stage data is raw data that is transmitted via satellite and published on our web page. It has not been corrected for backwater effect. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.
- During this deployment period stage values ranged from 2.15 m to 4.00 m at Humber River at Humber Village, with corresponding flow ranging from 244.81 m<sup>3</sup>/sec to 618.56 m<sup>3</sup>/sec (Figure 1).
- Flows over the deployment period were typical for the spring season with a steady increase associated with spring runoff from the end of April to mid-May.

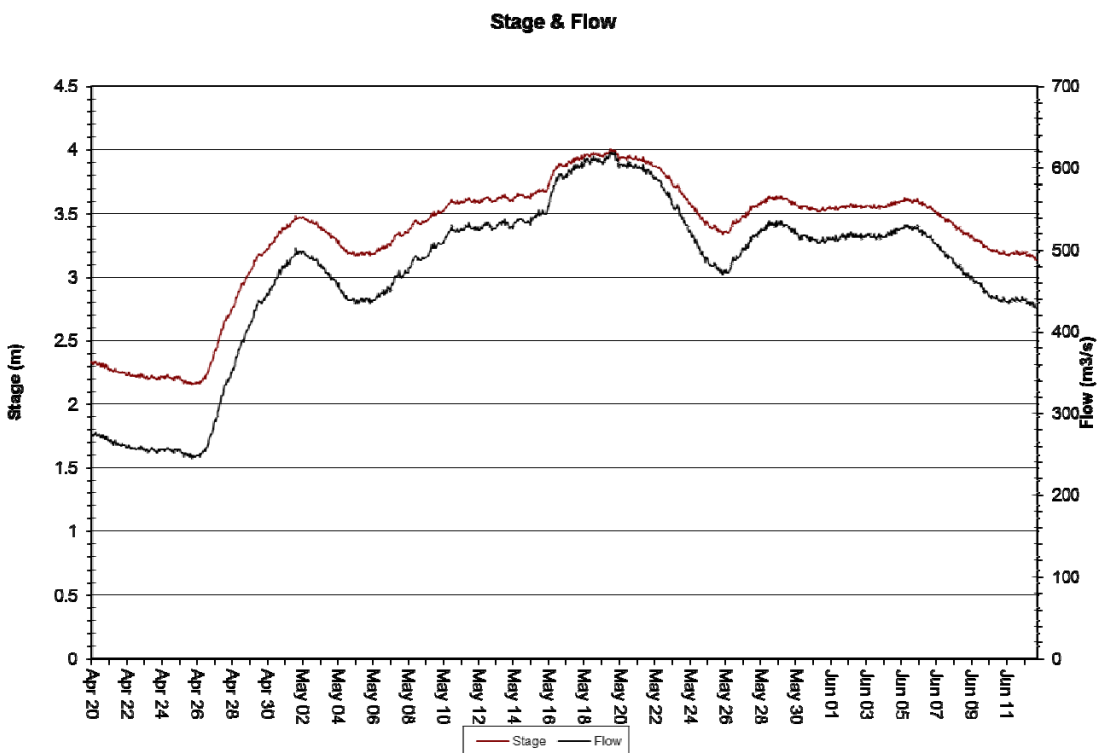


Figure 1: Stage Height (m) at Humber River from April 20, 2017, to June 13, 2017

## Temperature

- The stage data is raw data that is transmitted via satellite and published on our web page. It has not been corrected for backwater effect. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.
- During this deployment period the water temperature at Humber River ranged from 1.53°C to 8.04°C (Figure 2).
- Water temperature shows an increasing trend over the deployment period which is consistent with the transition from early to late spring.
- Water temperature shows a diurnal trend which is related to corresponding air temperature trends.

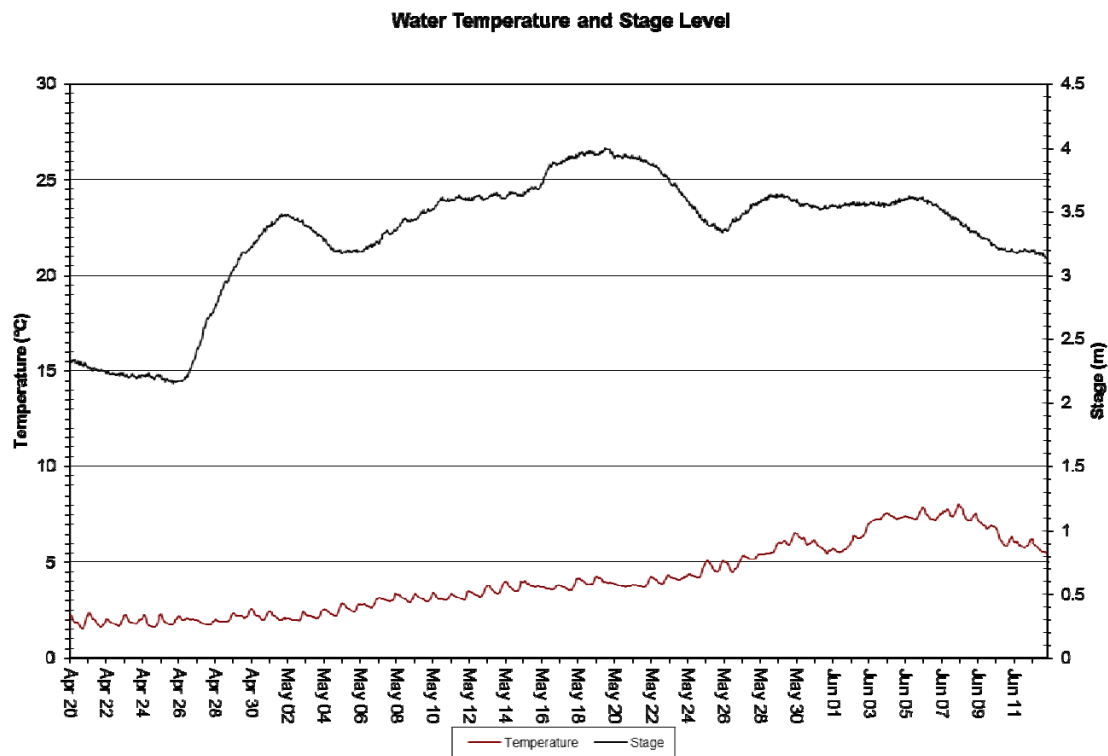


Figure 2: Temperature (°C) at Humber River from April 20, 2017, to June 13, 2017

## pH

- The stage data is raw data that is transmitted via satellite and published on our web page. It has not been corrected for backwater effect. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.
- During this deployment period pH values at Humber River ranged from 6.92 units to 7.12 units (Figure 3).
- pH was quite stable throughout the deployment period.
- With a median value of 7.02, all of the pH values recorded at Humber River during this deployment period were within the guidelines for pH for the protection of aquatic life (i.e., 6.5 to 9.0 units), as defined by the Canadian Council of Ministers of the Environment (2007).

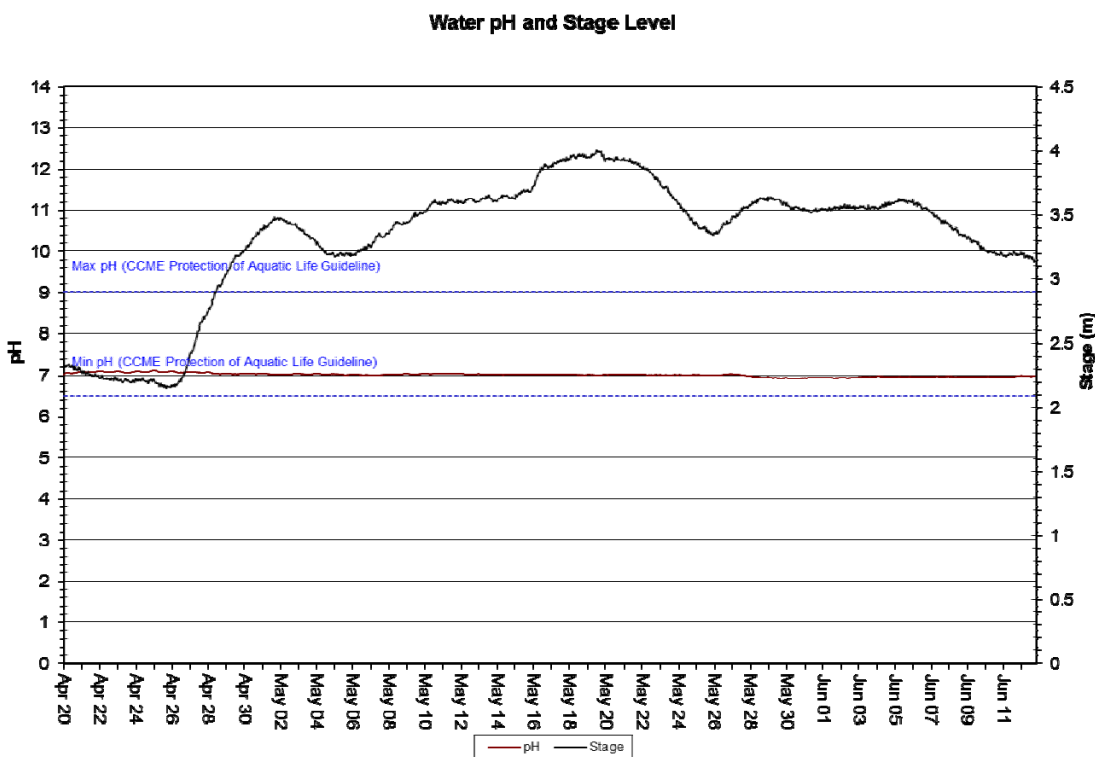


Figure 3: pH values recorded at Humber River from April 20, 2017, to June 13, 2017

## Specific Conductivity

- The stage data is raw data that is transmitted via satellite and published on our web page. It has not been corrected for backwater effect. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.
- During this deployment period specific conductivity at Humber River ranged from 36.0  $\mu\text{S}/\text{cm}$  to 47.7  $\mu\text{S}/\text{cm}$  (Figure 4).
- From approximately May 27<sup>th</sup> to May 29<sup>th</sup> there is a significant drop in specific conductivity (see inside red oval). This drop is most likely related to the increased flow for the same period which is related to the spilling of water by Deer Lake Power from the Grand Lake reservoir.

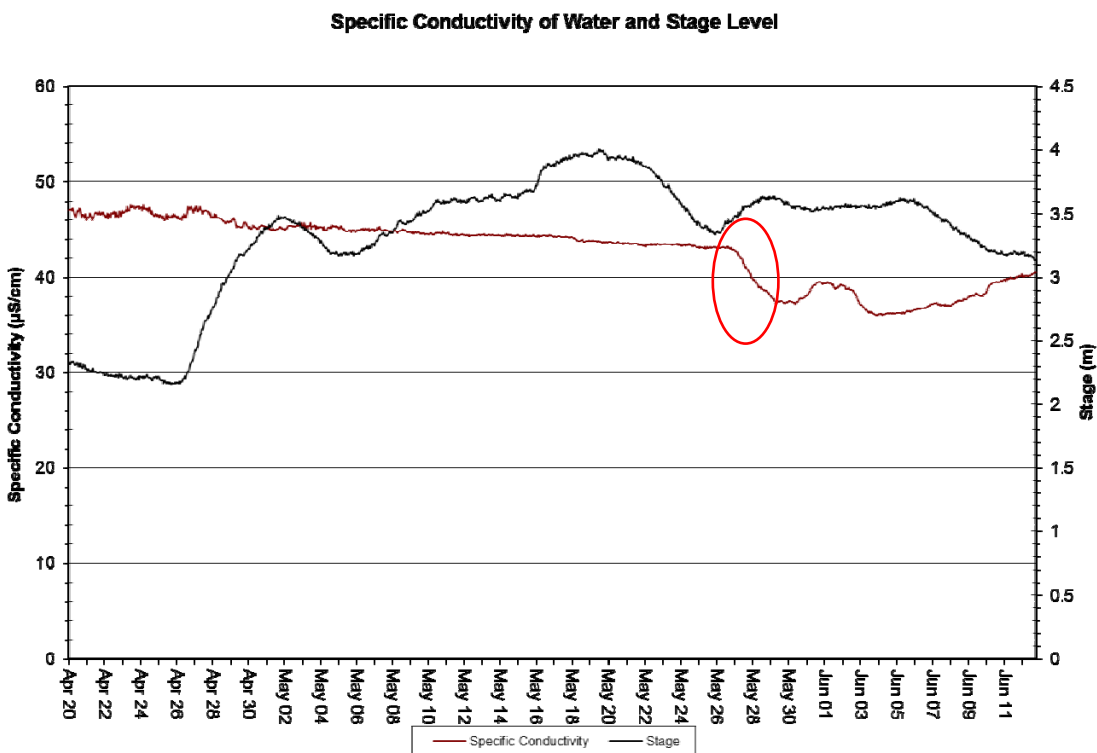


Figure 4: Specific conductivity ( $\mu\text{S}/\text{cm}$ ) at Humber River from April 20, 2017, to June 13, 2017



## Dissolved Oxygen

- During this deployment period dissolved oxygen [DO] values at Humber River ranged from 12.17 mg/l (93.4% saturation) to 13.34 mg/l (103.0% saturation) (Figure 5).
- Over the deployment period DO(mg/l) shows a gentle decreasing trend which corresponds with the increasing temperature trend for the same period.
- DO shows diurnal fluctuations which are most evident in the percent saturation data. These trends are related to corresponding air temperature trends.
- During this deployment period all of the DO values at Humber River were above both the minimum guideline set for other life stages (6.5 mg/l) and the minimum guideline set for the protection of early life stages (9.5 mg/l), as determined by the Canadian Council of Ministers of the Environment (2007).

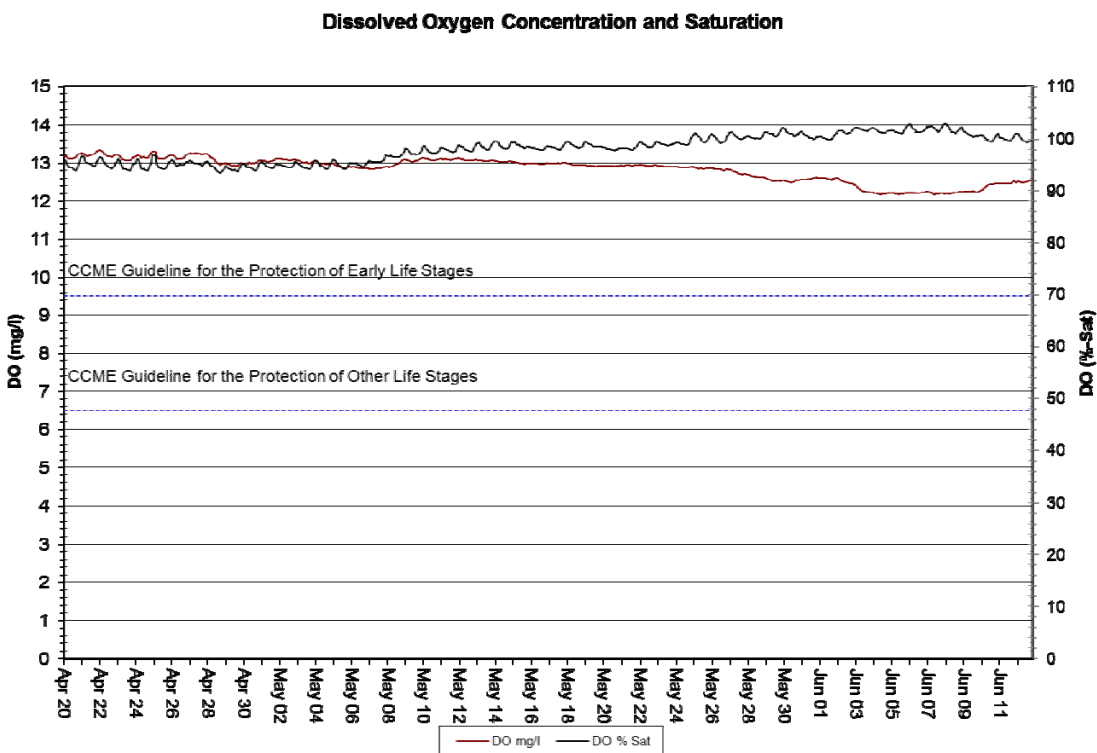


Figure 5: DO (mg/l & % saturation) at Humber River from April 20, 2017, to June 13, 2017

## Turbidity

- The stage data is raw data that is transmitted via satellite and published on our web page. It has not been corrected for backwater effect. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.
- During this deployment period turbidity values at Humber River ranged from 0.0 NTU to 0.9 NTU which is the typical background level for turbidity at this site (Figure 6).

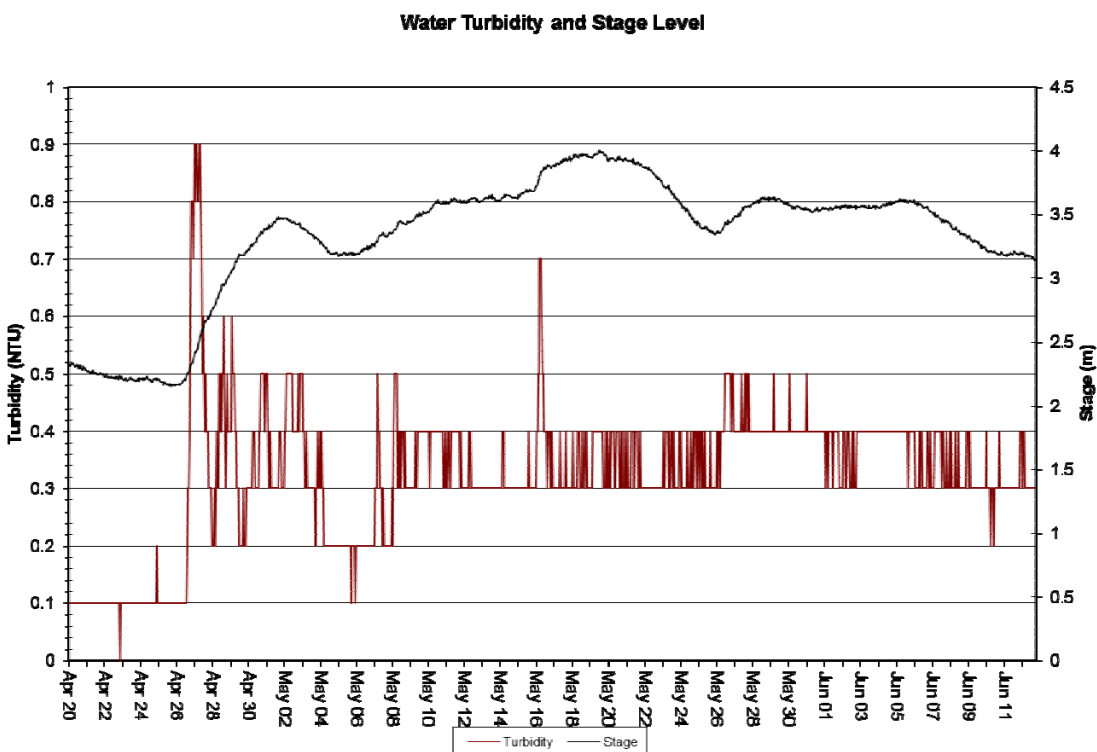


Figure 6: Turbidity (NTU) at Humber River from April 20, 2017, to June 13, 2017

## Conclusions

- This monthly deployment report presents water quality and water quantity data recorded at Humber River at Humber Village from April 20, 2017, to June 13, 2017.
- The performances of all sensors were rated good to excellent at the beginning and fair to excellent at the end of the deployment period.
- Variations in water quality/quantity values recorded at each station are summarized below:
  - During this deployment period stage values ranged from 2.15 m to 4.00 m at Humber River at Humber Village, with corresponding flow ranging from 244.81 m<sup>3</sup>/sec to 618.56 m<sup>3</sup>/sec which is typical for the spring season.
  - During this deployment period the water temperature at Humber River ranged from 1.53°C to 8.04°C and shows an increasing trend which is consistent with the transition from early to late spring.
  - During this deployment period pH values at Humber River ranged from 6.92 units to 7.12 units and was quite stable throughout the deployment period. All of the pH values recorded at Humber River during this deployment period were within the guidelines for pH for the protection of aquatic life (i.e., 6.5 to 9.0 units), as defined by the Canadian Council of Ministers of the Environment (2007).
  - During this deployment period specific conductivity at Humber River ranged from 36.0 µS/cm to 47.7 µS/cm.
  - During this deployment period dissolved oxygen [DO] values at Humber River ranged from 12.17 mg/l (93.4% saturation) to 13.34 mg/l (103.0% saturation) and shows a gentle decreasing trend which corresponds with the increasing temperature trend for the same period. During this deployment period all of the DO values at Humber River were above both the minimum guideline set for other life stages (6.5 mg/l) and the minimum guideline set for the protection of early life stages (9.5 mg/l), as determined by the Canadian Council of Ministers of the Environment (2007).
  - During this deployment period turbidity values at Humber River ranged from 0.0 NTU to 0.9 NTU which is the typical background level for turbidity at this site.

## References

Canadian Council of Ministers of the Environment. 2007. Canadian water quality guidelines for the protection of aquatic life: Summary table. Updated December, 2007. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg. (Website: <http://ceqg-rcqe.ccme.ca/download/en/222/>)

## APPENDIX A

### Quality Assurance / Quality Control Procedures

- As part of the Quality Assurance / Quality Control (QA/QC) protocol, the performance of a station's water quality instrument (i.e., Field Sonde) is rated at the beginning and end of its deployment period. The procedure is based on the approach used by the United States Geological Survey (Wagner *et al.* 2006)<sup>1</sup>.
- At the beginning of the deployment period, a fully cleaned and calibrated QA/QC water quality instrument (i.e., QA/QC Sonde) is placed *in-situ* with the fully cleaned and calibrated Field Sonde. After Sonde readings have stabilized, which may take up to five minutes in some cases, water quality parameters, as measured by both Sondes, are recorded to a field sheet. Field Sonde performance for all parameters is rated based on differences recorded by the Field Sonde and QA/QC Sonde. If the readings from both Sondes are in close agreement, the QA/QC Sonde can be removed from the water. If the readings are not in close agreement, there will be attempts to reconcile the problem on site (e.g., removing air bubbles from sensors, etc.). If no fix is made, the Field Sonde may be removed for recalibration.
- At the end of the deployment period, a fully cleaned and calibrated QA/QC Sonde is once again deployed *in-situ* with the Field Sonde, which has already been deployment for 30-40 days. After Sonde readings have stabilized, water quality parameters, as measured by both Sondes, are recorded to a field sheet. Field Sonde performance for all parameters is rated based on differences recorded by the Field Sonde and QA/QC Sonde.
- Performance ratings are based on differences listed in the table below.

Parameter	Rating				
	Excellent	Good	Fair	Marginal	Poor
Temperature (°C)	≤ ±0.2	> ±0.2 to 0.5	> ±0.5 to 0.8	> ±0.8 to 1	> ±1
pH (unit)	≤ ±0.2	> ±0.2 to 0.5	> ±0.5 to 0.8	> ±0.8 to 1	> ±1
Sp. Conductance (µS/cm)	≤ ±3	> ±3 to 10	> ±10 to 15	> ±15 to 20	> ±20
Sp. Conductance > 35 µS/cm (%)	≤ ±3	> ±3 to 10	> ±10 to 15	> ±15 to 20	> ±20
Dissolved Oxygen (mg/l) (% Sat)	≤ ±0.3	> ±0.3 to 0.5	> ±0.5 to 0.8	> ±0.8 to 1	> ±1
Turbidity <40 NTU (NTU)	≤ ±2	> ±2 to 5	> ±5 to 8	> ±8 to 10	> ±10
Turbidity > 40 NTU (%)	≤ ±5	> ±5 to 10	> ±10 to 15	> ±15 to 20	> ±20

<sup>1</sup> Wagner, R.J., Boulger, R.W., Jr., Oblinger, C.J., and Smith, B.A., 2006, Guidelines and standard procedures for continuous water-quality monitors—Station operation, record computation, and data reporting: U.S. Geological Survey Techniques and Methods 1–D3, 51 p. + 8 attachments; accessed April 10, 2006, at <http://pubs.water.usgs.gov/tm1d3>

## APPENDIX B

### Environment Canada Weather Data – Corner Brook (04-20-2017 to 06-13-2017)

Date/Time	Max Temp (°C)	Min Temp (°C)	Mean Temp (°C)	Heat Deg Days (°C)	Cool Deg Days (°C)	Total Precip (mm)
4/20/2017	6.5	-8	-0.8	18.8	0	0
4/21/2017	6.5	-3.5	1.5	16.5	0	0
4/22/2017	5	-2	1.5	16.5	0	0.2
4/23/2017	5	-1	2	16	0	0
4/24/2017	6.5	-0.5	3	15	0	0.2
4/25/2017	1	-2.5	-0.8	18.8	0	0
4/26/2017	11	-3.5	3.8	14.2	0	22.2
4/27/2017	5.5	2	3.8	14.2	0	23.6
4/28/2017	10.5	0.5	5.5	12.5	0	2.6
4/29/2017	12	3	7.5	10.5	0	1
4/30/2017	4	2	3	15	0	0
5/1/2017	4	-2	1	17	0	0
5/2/2017	6	-4	1	17	0	4
5/3/2017	8	2	5	13	0	0.6
5/4/2017	6.5	1	3.8	14.2	0	0
5/5/2017	14	-1.5	6.3	11.7	0	0
5/6/2017	13.5	2	7.8	10.2	0	1
5/7/2017	16.5	4.5	10.5	7.5	0	0
5/8/2017	16.5	7	11.8	6.2	0	0
5/9/2017	12.5	1.5	7	11	0	0
5/10/2017	14	2	8	10	0	0
5/11/2017	11	2	6.5	11.5	0	0
5/12/2017	12.5	2	7.3	10.7	0	0
5/13/2017	11	1	6	12	0	0
5/14/2017	17	0.5	8.8	9.2	0	0
5/15/2017	20	1	10.5	7.5	0	5
5/16/2017	7	4.5	5.8	12.2	0	19.6
5/17/2017	7	3.5	5.3	12.7	0	0.2
5/18/2017	13.5	2	7.8	10.2	0	1.2
5/19/2017	20	7	13.5	4.5	0	10
5/20/2017	2.5	1	1.8	16.2	0	13.4
5/21/2017	3	0.5	1.8	16.2	0	5.2
5/22/2017	10	1.5	5.8	12.2	0	0
5/23/2017	19.5	0.5	10	8	0	1.2
5/24/2017	11	6.5	8.8	9.2	0	0
5/25/2017	13	2.5	7.8	10.2	0	0
5/26/2017	20	2	11	7	0	0

Date/Time	Max Temp (°C)	Min Temp (°C)	Mean Temp (°C)	Heat Deg Days (°C)	Cool Deg Days (°C)	Total Precip (mm)
5/28/2017	10	1.5	5.8	12.2	0	1.4
5/29/2017	10	3.5	6.8	11.2	0	0
5/30/2017	14	0	7	11	0	0
5/31/2017	17	1.5	9.3	8.7	0	3.4
6/1/2017	16	7.5	11.8	6.2	0	1.6
6/2/2017	16.5	7.5	12	6	0	0
6/3/2017	14.5	8.5	11.5	6.5	0	3
6/4/2017	9	4.5	6.8	11.2	0	4
6/5/2017	8.5	3	5.8	12.2	0	0
6/6/2017	14	3	8.5	9.5	0	0
6/7/2017	13.5	2	7.8	10.2	0	0
6/8/2017	24.5	3	13.8	4.2	0	0
6/9/2017	23	11	17	1	0	6.8
6/10/2017	14.5	8	11.3	6.7	0	0
6/11/2017	22.5	7	14.8	3.2	0	3.2
6/12/2017	15.5	9	12.3	5.7	0	0.2
6/13/2017	11.5	4.5	8	10	0	13.2