

Real-Time Water Quality Deployment Report

Iron Ore Company of Canada
Labrador West Network

August 26 to
October 16, 2019



Government of Newfoundland & Labrador
Department of Municipal Affairs and
Environment
Water Resources Management Division

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General

- The Water Resources Management Division, in partnership with the Iron Ore Company of Canada (IOC) and Environment and Climate Change Canada (ECCC), maintain two real-time water quality (RTWQ) and water quantity stations at Wabush Lake.
- The official name of each station is *Wabush Lake at Dolomite Road* and *Wabush Lake at Lake Outlet*, hereafter referred to as the Dolomite Road station and the Julianne Narrows station.
- These stations are situated upstream (Dolomite Road) and downstream (Julienne Narrows) of the IOC tailings disposal area in Wabush Lake.
- On June 8th, 2016, an additional station was commissioned under this agreement. This station is located at *Dumbell Stream above Dumbell Lake*, hereafter referred to as Dumbell Stream.
- On June 12th, 2017 a new station was commissioned under this agreement. This station is located at *Pumphouse Stream above Drum Lake*, hereafter referred to as Pumphouse Stream.
- Water Resources Management Division staff monitor the real-time graphs regularly. They will inform IOC of any significant water quality events by email notification and by monthly deployment reports.
- Between August 26th and 28th, real-time water quality monitoring instruments were deployed at the four IOC stations. The instruments were deployed for a period of 49 days at Julianne Narrows and 50 days at Dolomite Road, Dumbell Stream and Pumphouse Stream. The instruments were removed between October 15th and 16th. This was the final deployment period for this season.



Figure 1: RTWQ Monitoring Stations in Labrador West

Quality Assurance and Quality Control

- As part of the Quality Assurance and Quality Control protocol (QA/QC), an assessment of the reliability of data recorded by an instrument is made at the beginning and end of each deployment period. The procedure is based on the approach used by the United States Geological Survey.

At deployment and removal, a QA/QC Sonde is temporarily deployed adjacent to the Field Sonde. Values for temperature, pH, conductivity, dissolved oxygen and turbidity are compared between the two instruments. Based on the degree of difference between parameters recorded by the Field Sonde and QA/QC Sonde at deployment and at removal, a qualitative statement is made on the data quality (Table 1).

Table 1: Ranking classifications for deployment and removal

| Parameter | Rank | | | | |
|--|-----------|---------------|---------------|-------------|-------|
| | 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 ($\mu\text{S}/\text{cm}$) | <=+-3 | >+-3 to 10 | >+-10 to 15 | >+-15 to 20 | >+-20 |
| Sp. Conductance > 35 $\mu\text{S}/\text{cm}$ (%) | <=+-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 |

- It should be noted that the temperature sensor on any sonde is the most important. All other parameters can be broken down into three groups: temperature dependant, temperature compensated and temperature independent. Because the temperature sensor is not isolated from the rest of the sonde, the entire sonde must be at the same temperature before the sensor will stabilize. The values may take some time to climb to the appropriate reading; if a reading is taken too soon it may not accurately portray the water body.
- Deployment and removal comparison rankings for the IOC water quality stations deployed between August 26-28 and October 15-16, 2019 are summarized in Table 2.

Table 2: QA/QC comparison rankings for IOC stations between August 26-28 and October 15-16, 2019.

| Station | Date | Action | Comparison Ranking | | | | |
|------------------|--------------|------------|--------------------|----------|--------------|------------------|-----------|
| | | | Temperature | pH | Conductivity | Dissolved Oxygen | Turbidity |
| Dolomite Road | Aug 26, 2019 | Deployment | Excellent | Marginal | Excellent | Excellent | Excellent |
| | Oct 15, 2019 | Removal | Excellent | Good | Good | Good | Excellent |
| Julienne Narrows | Aug 28, 2019 | Deployment | Good | Marginal | Excellent | Fair | Excellent |
| | Oct 16, 2019 | Removal | Good | Good | Poor | Poor | Poor |
| Dumbell Stream | Aug 27, 2019 | Deployment | Excellent | Good | Excellent | Good | Excellent |
| | Oct 16, 2019 | Removal | Excellent | Good | Poor | Fair | Excellent |
| Pumphouse Stream | Aug 27, 2019 | Deployment | Good | Fair | Excellent | Fair | Excellent |
| | Oct 16, 2019 | Removal | Good | Good | Poor | Poor | Excellent |

▪ **Dolomite Road**

At deployment, all parameters with the exception of pH ranked ‘excellent’. pH ranked ‘marginal’. The field instrument read a value of 7.39, while the QA/QC instrument read a value of 8.24. It is worth noting that the QA/QC sample that was collected at this time had a value of 7.92, which would be ‘fair’.

At removal, all parameters ranked either ‘excellent’ or ‘good’.

▪ **Julienne Narrows**

At deployment, temperature, conductivity and turbidity ranked either ‘excellent’ or ‘good’. pH ranked ‘marginal’. The field instrument read a value of 7.85, while the QA/QC instrument read a value of 8.76. Dissolved oxygen ranked ‘fair’. The field instrument read a value of 10.49 mg/l, while the QA/QC sonde read a value of 9.80 mg/l.

At removal, temperature and pH ranked ‘good’. Conductivity ranked ‘poor’. The field instrument read a value of 97.8 μ S/cm, while the QA/QC sonde read a value of 56.0 μ S/cm. Dissolved oxygen ranked ‘poor’. The field instrument read a value of 12.47 mg/l, while the QA/QC sonde read a value of 11.08 mg/l. Turbidity could not be ranked against the QA/QC sonde, due to a sensor malfunction; however, it was ranked against the QA/QC grab sample, for a ranking of ‘poor’. The field instrument read a value of 13.2 NTU, while the QA/QC grab sample result was 1.8 NTU.

▪ **Dumbell Stream**

At deployment, all parameters ranked either ‘excellent’ or ‘good’.

At removal, temperature, pH and turbidity ranked either ‘excellent’ or ‘good’. Conductivity ranked ‘poor’. The field instrument read a value of 73.2 μ S/cm, while the QA/QC instrument read a value of 49.0 μ S/cm. Dissolved oxygen ranked ‘fair’. The field instrument read a value of 12.81 mg/l, while the QA/QC read a value of 12.18 mg/l.

- **Pumphouse Stream**

At deployment, temperature, conductivity and turbidity ranked either ‘good’ or ‘excellent’. Ph ranked ‘fair’. The field instrument read a value of 7.41, while the QA/QC instrument read a value of 8.17. Dissolved oxygen ranked ‘fair’. The field instrument read a value of 9.76 mg/l, while the QA/QC instrument read a value of 9.10 mg/l.

At removal, temperature, pH and turbidity ranked either ‘good’ or ‘excellent’. Conductivity ranked ‘poor’. The field instrument read a value of 244.0 $\mu\text{S}/\text{cm}$, while the QA/QC instrument read a value of 44.4 $\mu\text{S}/\text{cm}$. It is important to note that when the field instrument is compared to the QA/QC grab sample result of 240.0 $\mu\text{S}/\text{cm}$, the ranking is ‘excellent’. Dissolved oxygen ranked ‘poor’. The field instrument read a value of 12.26 mg/l, while the QA/QC read a value of 11.00 mg/l.

- There are a few circumstances which may cause less than ideal QA/QC rankings to be obtained. These include: the placement of the QA/QC sonde in relation to the field sonde; the amount of time each sonde was given to stabilize before readings were recorded; and deteriorating performance of one or more of the sensors.

Data Interpretation

- The following graphs and discussion illustrate water quality-related events from August 26-28 to October 15-16, 2019 at the IOC RTWQ monitoring stations in Labrador West.
- With the exception of water quantity data (Stage and Flow), all data used in the preparation of the graphs and subsequent discussion below adhere to this stringent QA/QC protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

Wabush Lake Network

- Water temperature ranged from 7.0 to 19.30°C at Dolomite Road and 5.4 to 17.80°C at Julianne Narrows during this deployment period (Figure 2).
- Water temperature decreased during this deployment period, which corresponds with decreasing ambient air temperature into fall (Figure 2).

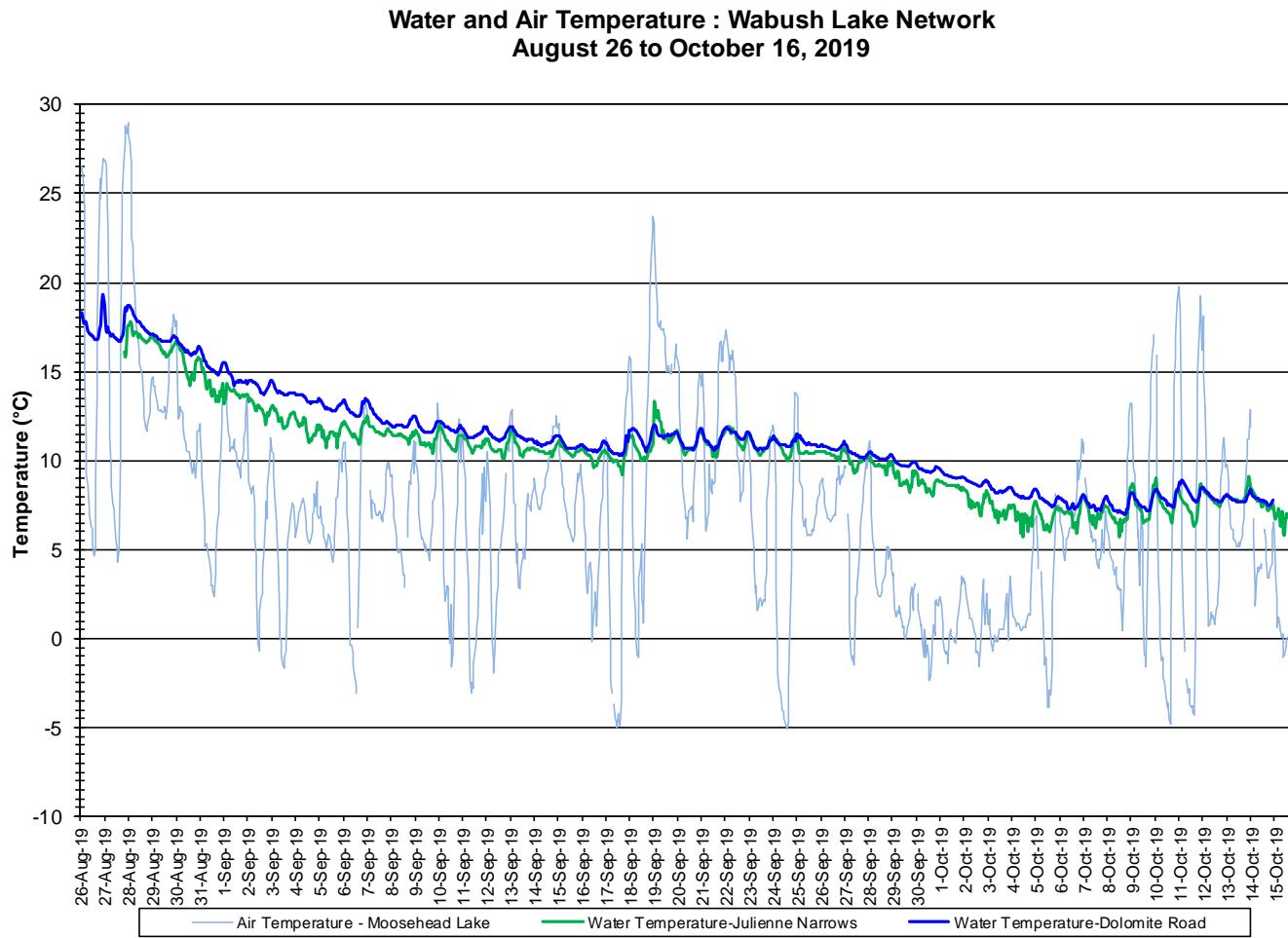


Figure 2: Water and Air Temperature - Wabush Lake network
(Weather data collected from climate station near Moosehead Lake)

- pH ranges from 7.23 to 8.04 pH units at Dolomite Road, and from 7.84 to 8.31 pH units at Julianne Narrows throughout the deployment period (Figure 3). The median pH is 7.42 and 7.99 units respectively.
- All values during the deployment are within the CCME Guidelines for the Protection of Aquatic Life (between 6.5 and 9 pH units). pH fluctuates slightly throughout the day and night.
- With the exception of water quantity data (Stage and Flow), all data used in the preparation of the graphs and subsequent discussion adhere to this stringent QA/QC protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

Water pH and Stage: Wabush Lake Network
August 26 to October 16, 2019

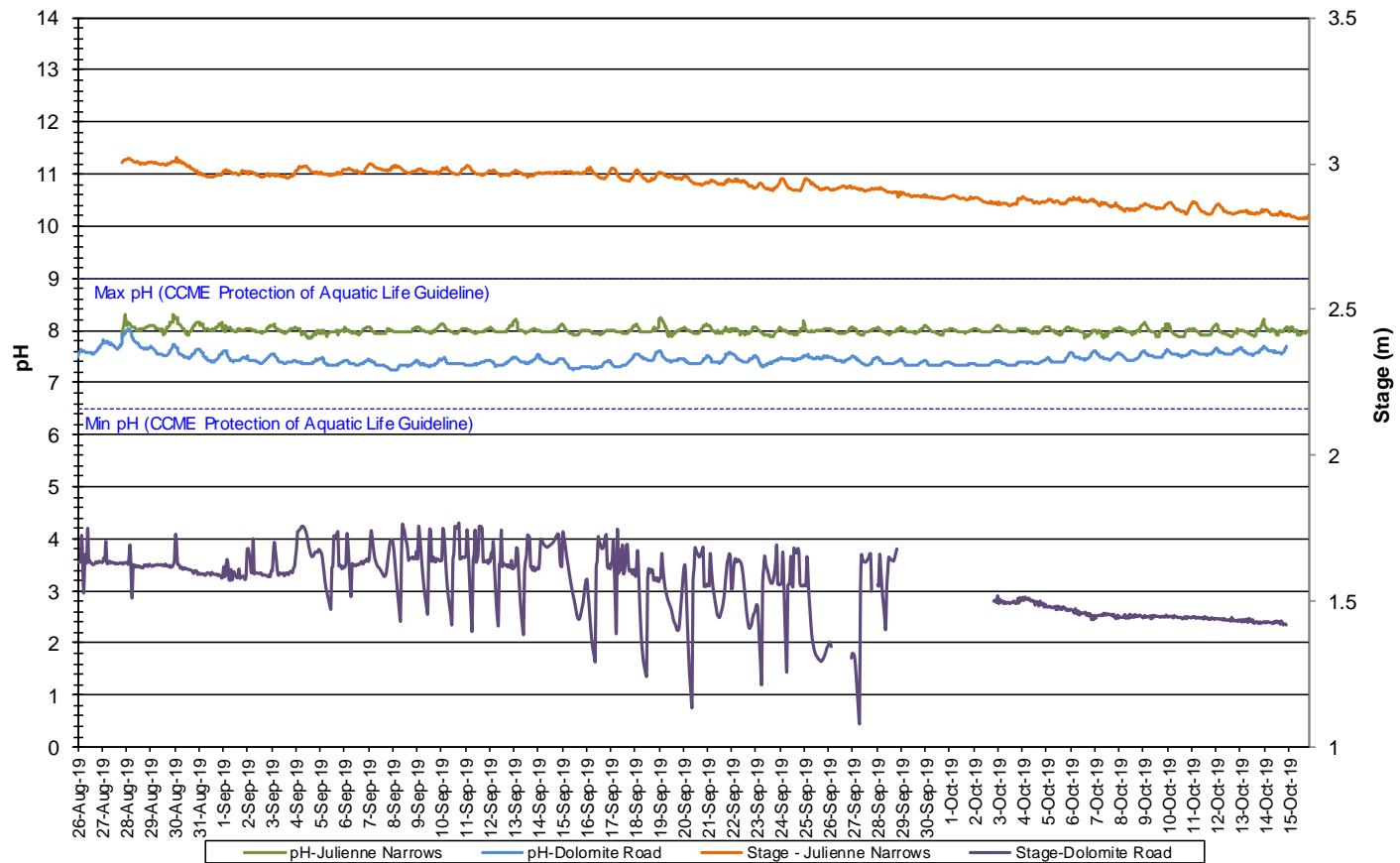


Figure 3: Water pH and Stage— Wabush Lake network

- Specific conductivity ranged from 52.9 to 62.5 $\mu\text{s}/\text{cm}$ at Dolomite Road and from 79.4 to 109.9 $\mu\text{s}/\text{cm}$ at Julienne Narrows throughout the deployment period (Figure 4).
- Daily fluctuations are evident at the Julienne Narrows station. This can be attributed to varying contributions of iron ore tailings deposited into Wabush Lake upstream of Julienne Narrows and downstream of Dolomite Road. This can also explain the difference in specific conductivity levels between the two stations as conductance values are generally higher at Julienne Narrows.
- Specific conductance increases slightly at both stations during this deployment period.
- With the exception of water quantity data (Stage and Flow), all data used in the preparation of the graphs and subsequent discussion adhere to this stringent QA/QC protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

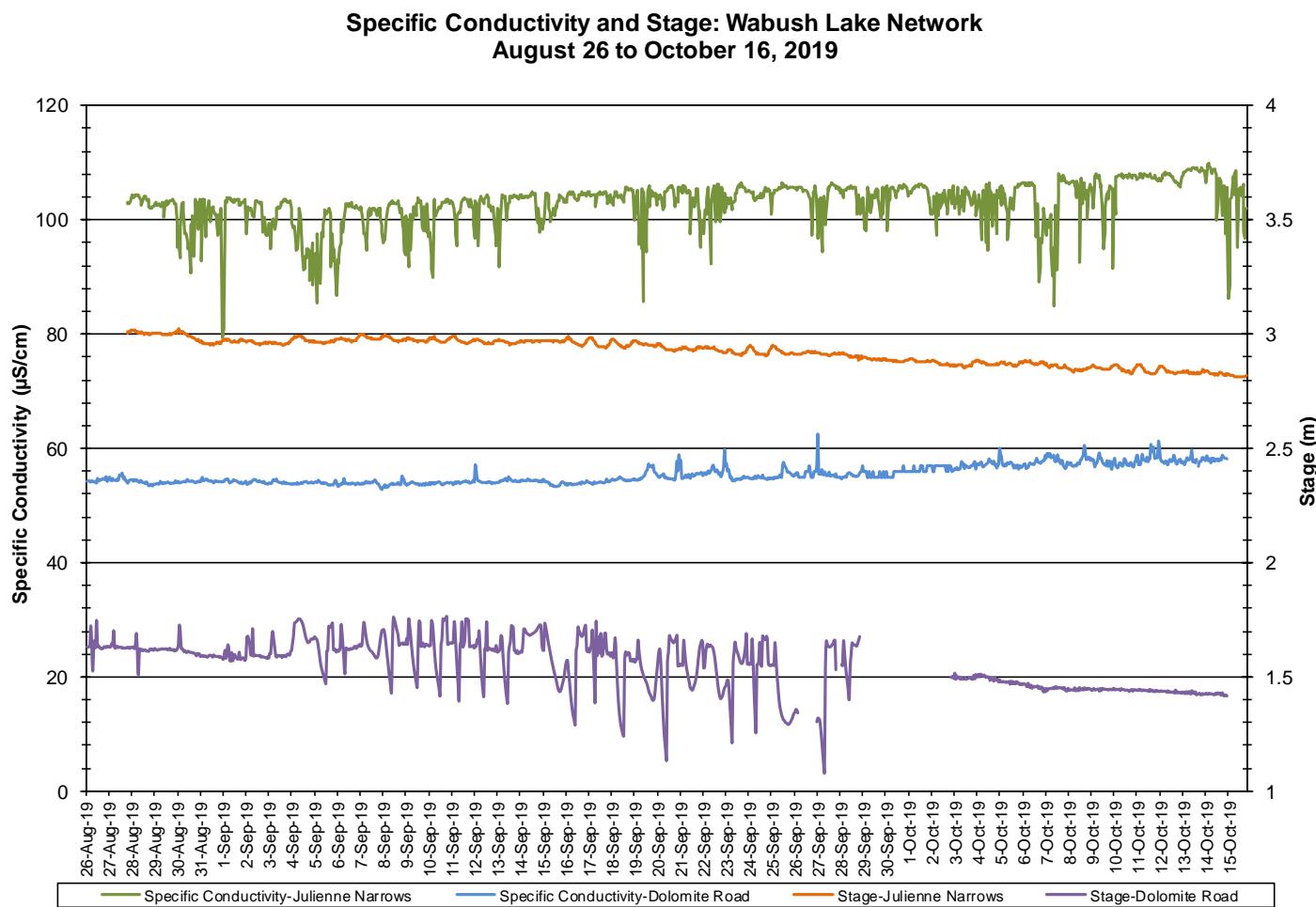


Figure 4: Specific Conductivity and Stage – Wabush Lake network

- At the Dolomite Road station, the saturation of dissolved oxygen ranged from 85.3 to 104.7% while the dissolved oxygen content ranged from 8.84 to 11.53 mg/l with a median value of 9.95 mg/l (Figure 5).
- At the Julianne Narrows station, the saturation of dissolved oxygen ranged from 92.9 to 114.7% while the dissolved oxygen content ranged from 9.56 to 12.57 mg/l with a median value of 10.97 mg/l (Figure 5).
- All values recorded at Julianne Narrows and Dolomite Road were above the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota of Other Life Stages of 6.5 mg/l.
- All of the values recorded at Julianne Narrows were above the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota of Early Life Stages of 9.5 mg/l, while the majority values recorded at Dolomite Road were above the guideline. The guidelines are indicated in blue on Figure 5.
- Dissolved oxygen decreased at both stations towards the end of this deployment period, as water temperature increased. Dissolved oxygen fluctuated daily with decreases observed at night.

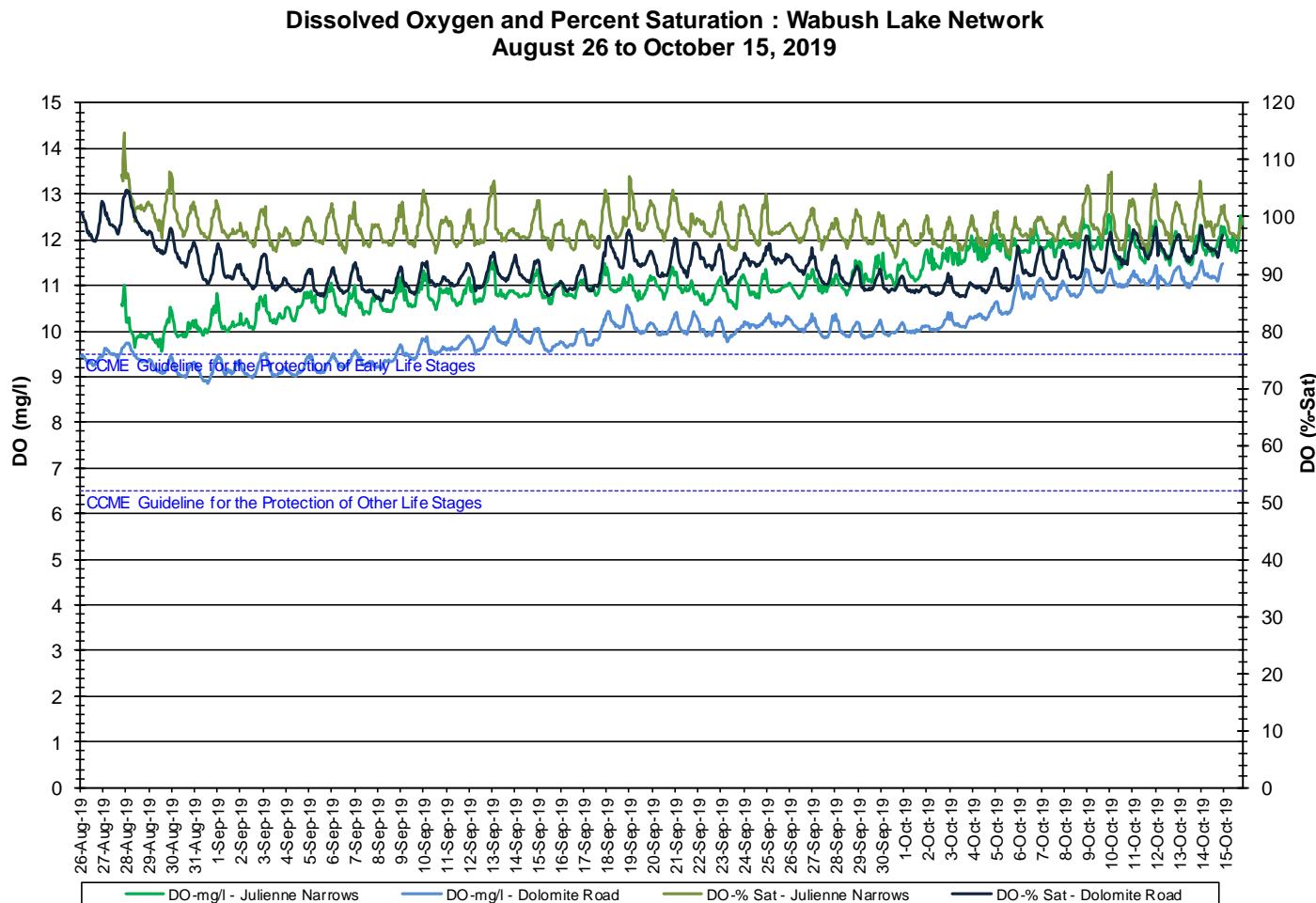


Figure 5: Dissolved Oxygen and Percent Saturation – Wabush Lake Network

- At the Julianne Narrows station, turbidity values range from 0.0 to 66.6 NTU throughout the deployment period (Figure 6). The median value was 0.0 NTU.
- In some instances, turbidity spikes can be attributed to precipitation events.

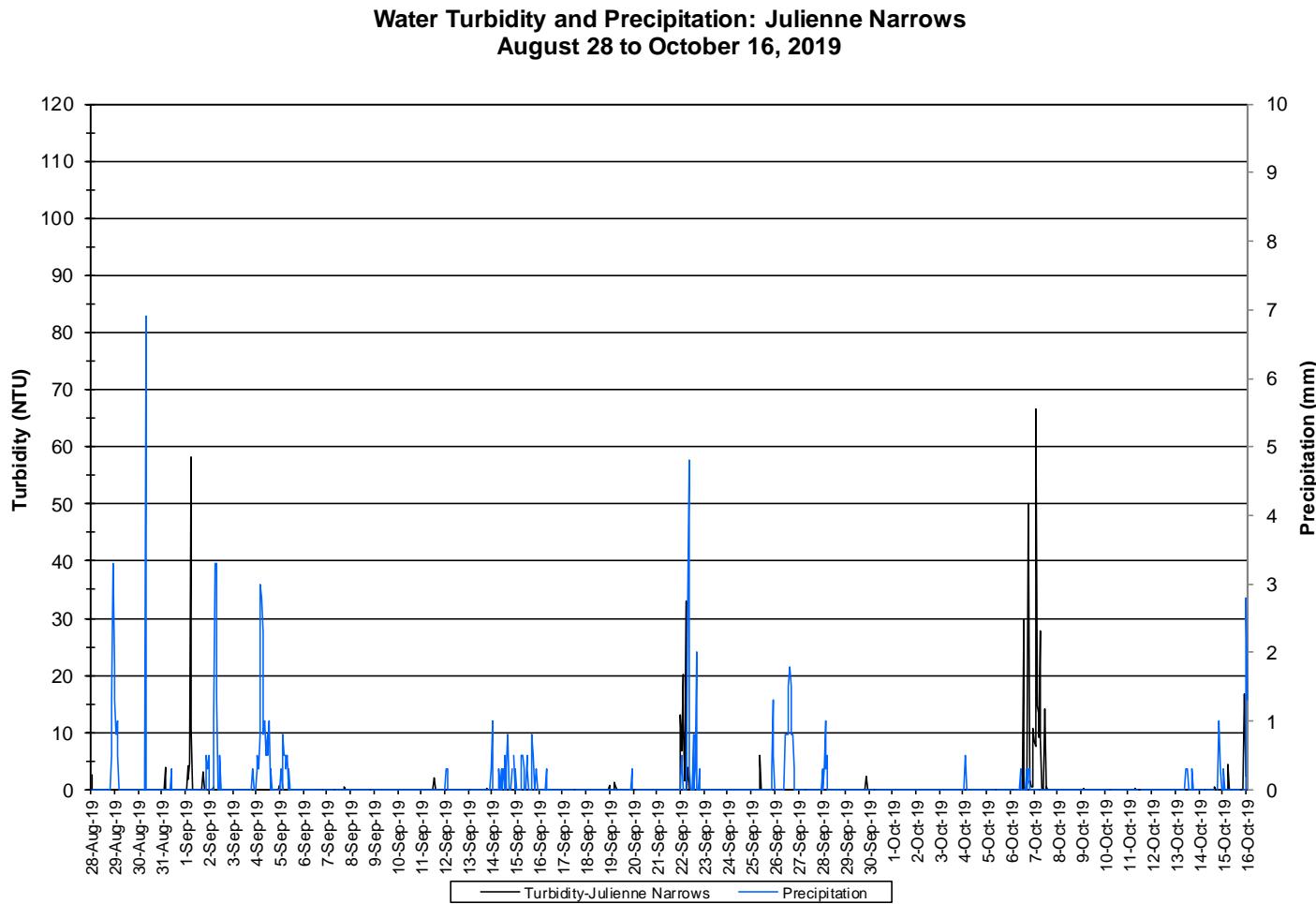


Figure 6: Turbidity and Precipitation – Julianne Narrows
(Weather data collected from climate station near Moosehead Lake)

- At the Dolomite Road station, turbidity values range from 0.0 NTU to 11.8 NTU, throughout the deployment period (Figure 7). The median value was 0.0 NTU.

Turbidity and Precipitation : Dolomite Road
August 26 to October 15, 2019

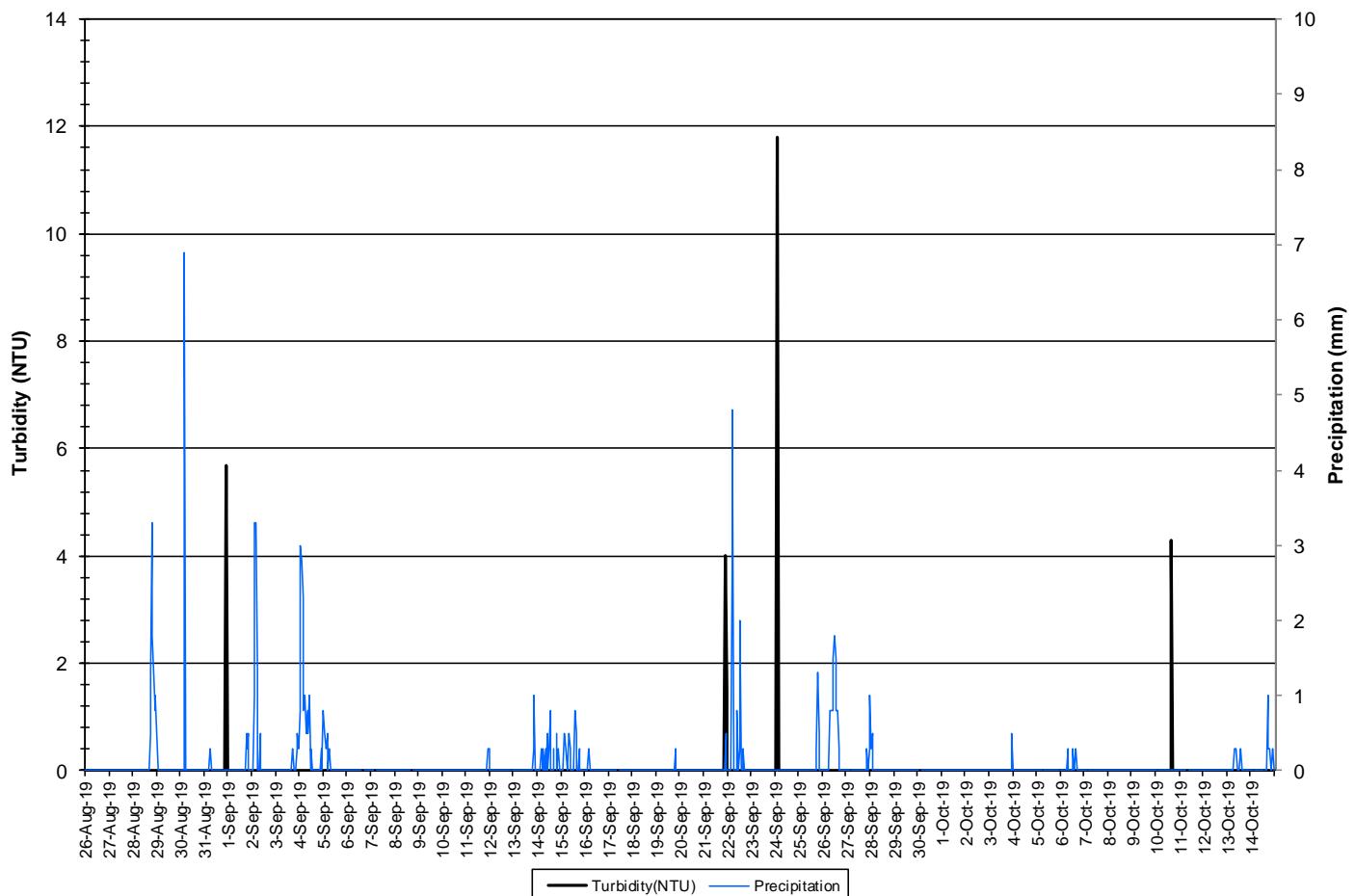


Figure 7: Turbidity and Precipitation – Dolomite Road
(Weather data collected from climate station near Moosehead Lake)

- Stage and precipitation are graphed below to show the relationship between rainfall and water level at Dolomite Road and Julienne Narrows (Figure 8).
- Overall, stage decreased throughout the deployment period at both stations. There is a portion of data missing from Dolomite Road due to a power issue at this station.
- With the exception of water quantity data (Stage and Flow), all data used in the preparation of the graphs and subsequent discussion adhere to this stringent QA/QC protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

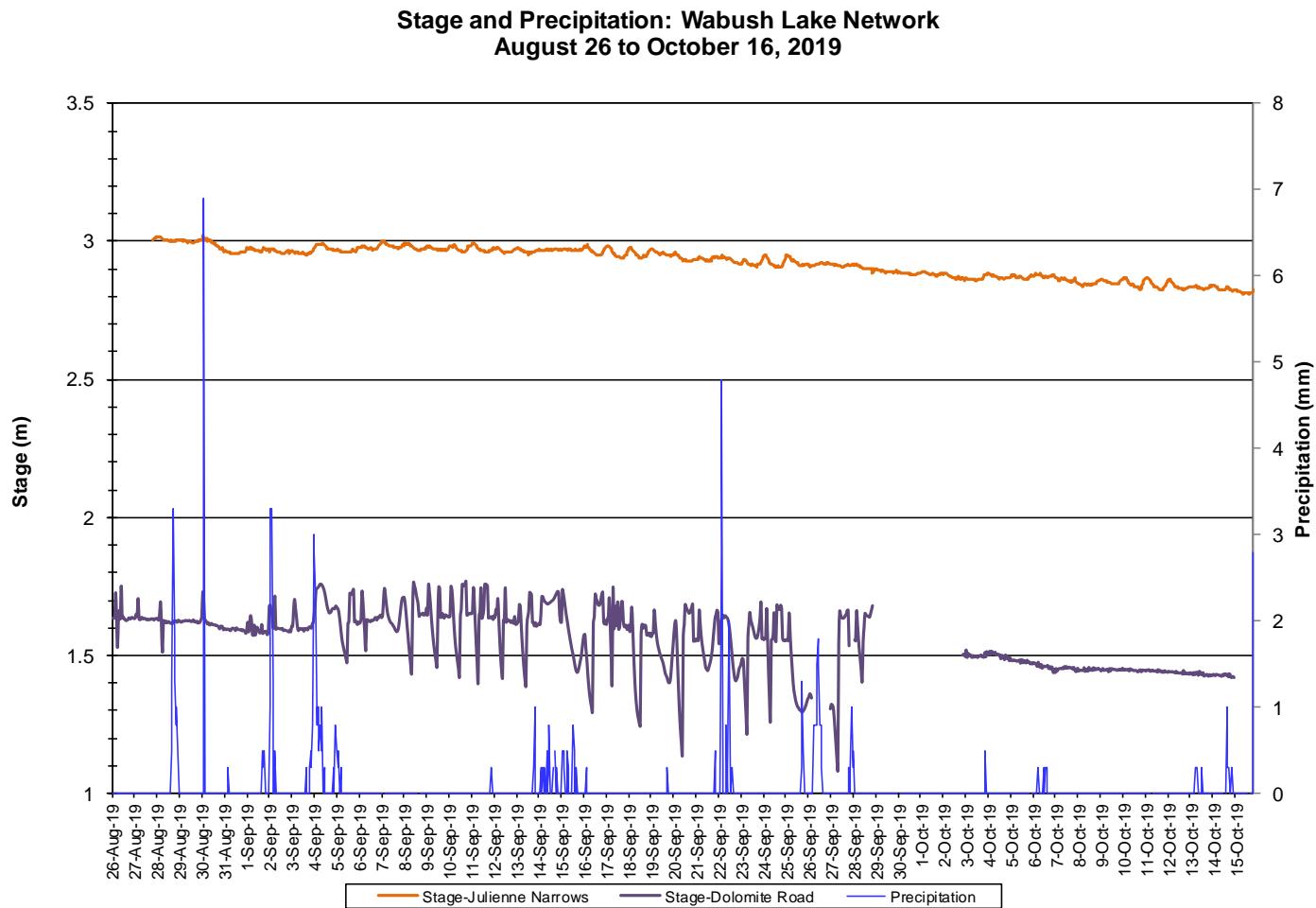


Figure 8: Stage and Precipitation – Wabush Lake Network

(Weather data collected at climate station located near Moosehead Lake)

Dumbell Stream

- Water temperature ranged from 1.63 to 6.23°C during this deployment period (Figure 9).
- Water temperature decreased during this deployment period. This area is very shaded and water temperature is much lower than other stations (Figure 9).

Water and Air Temperature : Dumbell Stream above Dumbell Lake
August 27 to October 16, 2020

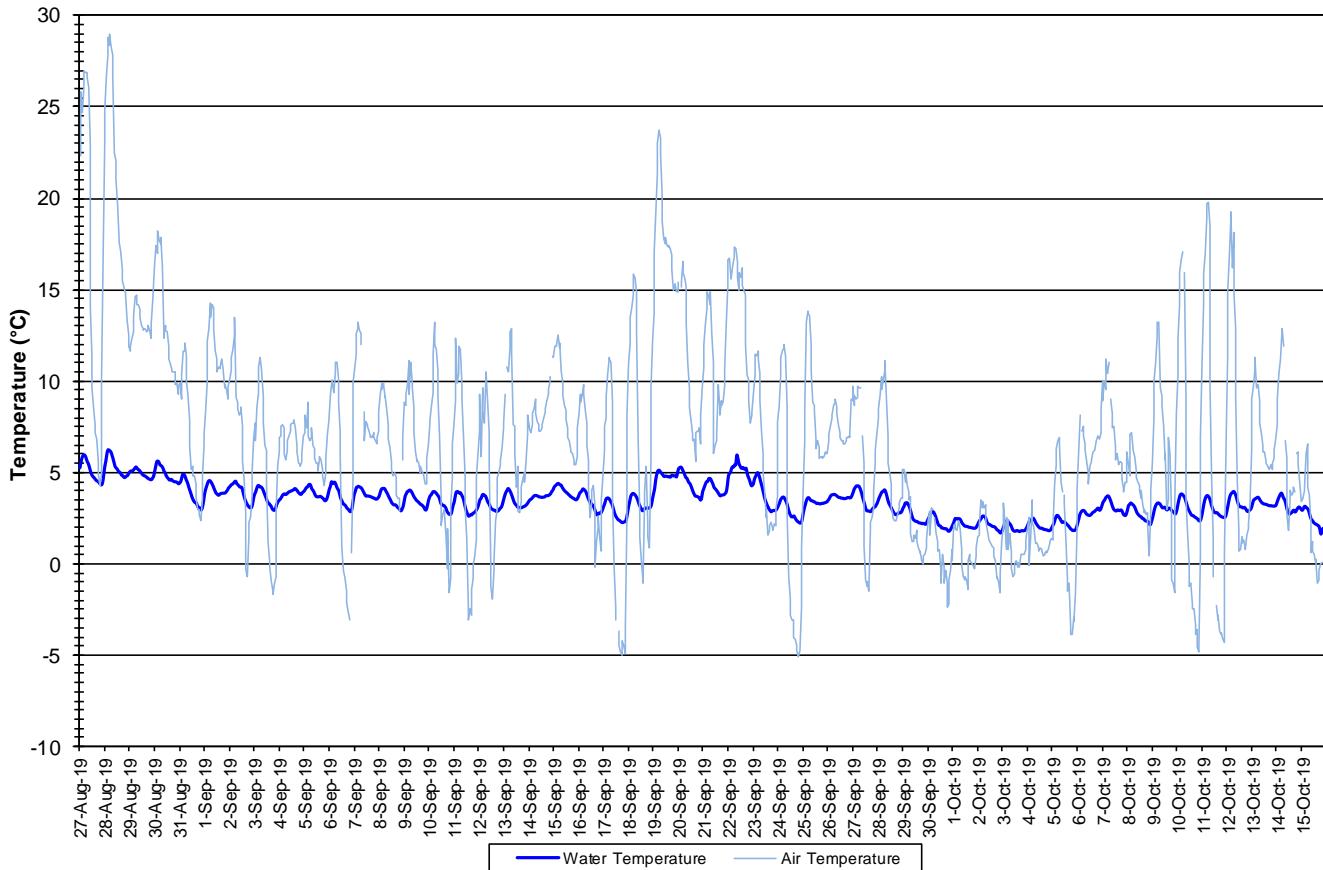


Figure 9: Water and Air Temperature – Dumbell Stream

(Weather data collected from climate station near Moosehead Lake)

- pH ranged from 7.63 to 7.83 pH units (Figure 10). The median pH was 7.74.
- All values during the deployment are within the CCME Guidelines for the Protection of Aquatic Life (between 6.5 and 9 pH units). pH fluctuates slightly throughout the day and night.
- With the exception of water quantity data (Stage and Flow), all data used in the preparation of the graphs and subsequent discussion adhere to this stringent QA/QC protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

Water pH and Stage : Dumbell Stream above Dumbell Lake
August 27 to October 16, 2019



Figure 10: Water pH and Stage – Dumbell Stream

- Specific conductivity ranged from 57.9 to 75.3 $\mu\text{S}/\text{cm}$, throughout the deployment period (Figure 11).
- Decreases in specific conductivity correspond to increases in stage. As more water is added to the system from precipitation, the solids in the water are diluted, decreasing conductivity. These decreases are indicated in red on Figure 11.
- With the exception of water quantity data (Stage and Flow), all data used in the preparation of the graphs and subsequent discussion adhere to this stringent QA/QC protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

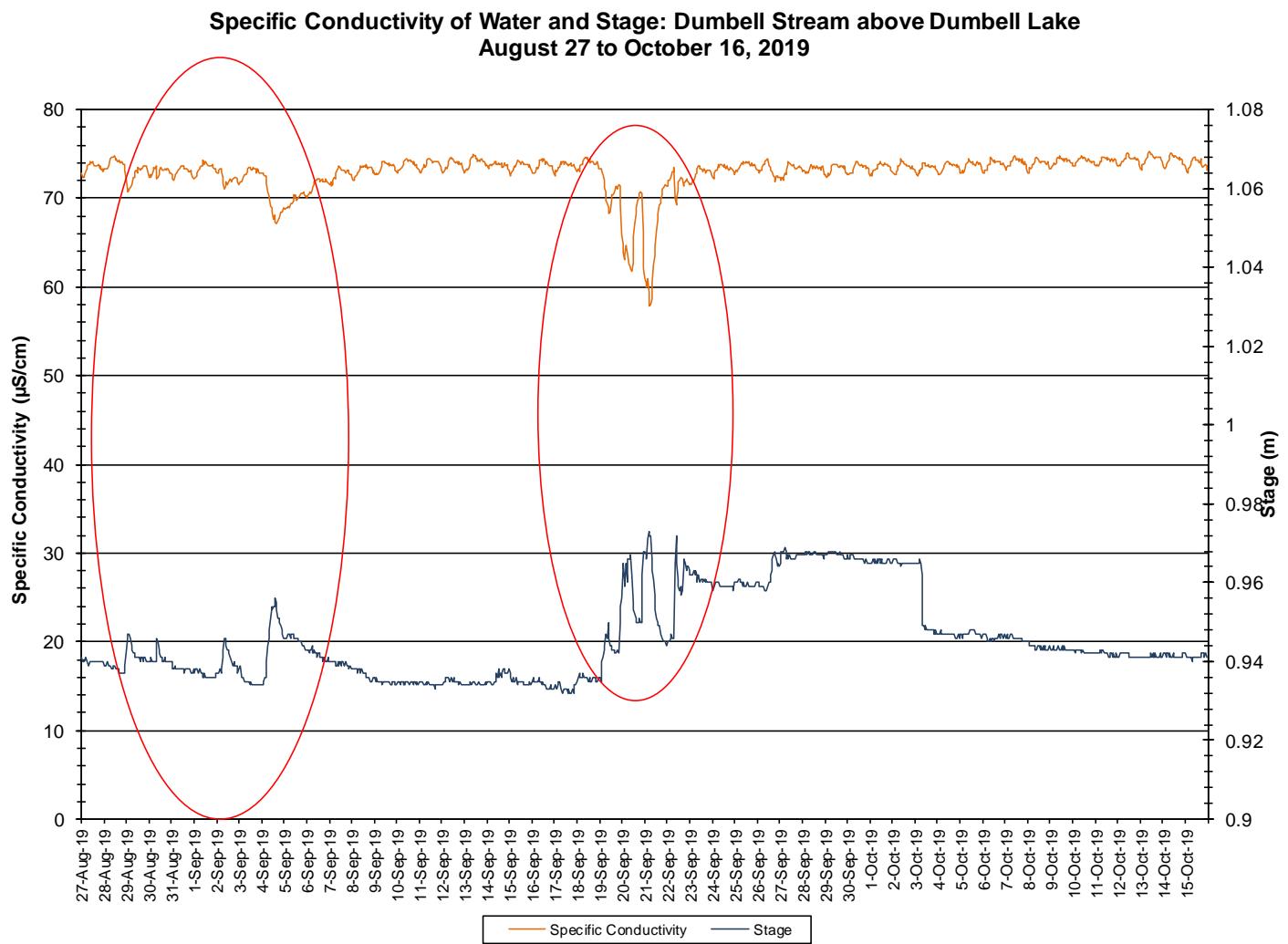


Figure 11: Specific conductivity and stage – Dumbell Stream

- The saturation of dissolved oxygen ranged from 90.9 to 95.7% while the dissolved oxygen content ranged from 11.45 to 12.99 mg/l with a median value of 12.44 mg/l (Figure 12).
- All values recorded at Dumbell Stream were above the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota of Other Life Stages of 6.5 mg/l and the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota of Early Life Stages of 9.5 mg/l. The guidelines are indicated in blue on Figure 12.
- Dissolved oxygen increased slightly during this deployment period as water temperature decreased.
- Dissolved oxygen fluctuated daily with decreases observed at night.

Dissolved Oxygen Concentration and Saturation : Dumbell Stream at Dumbell Lake
August 27 to October 16, 2019

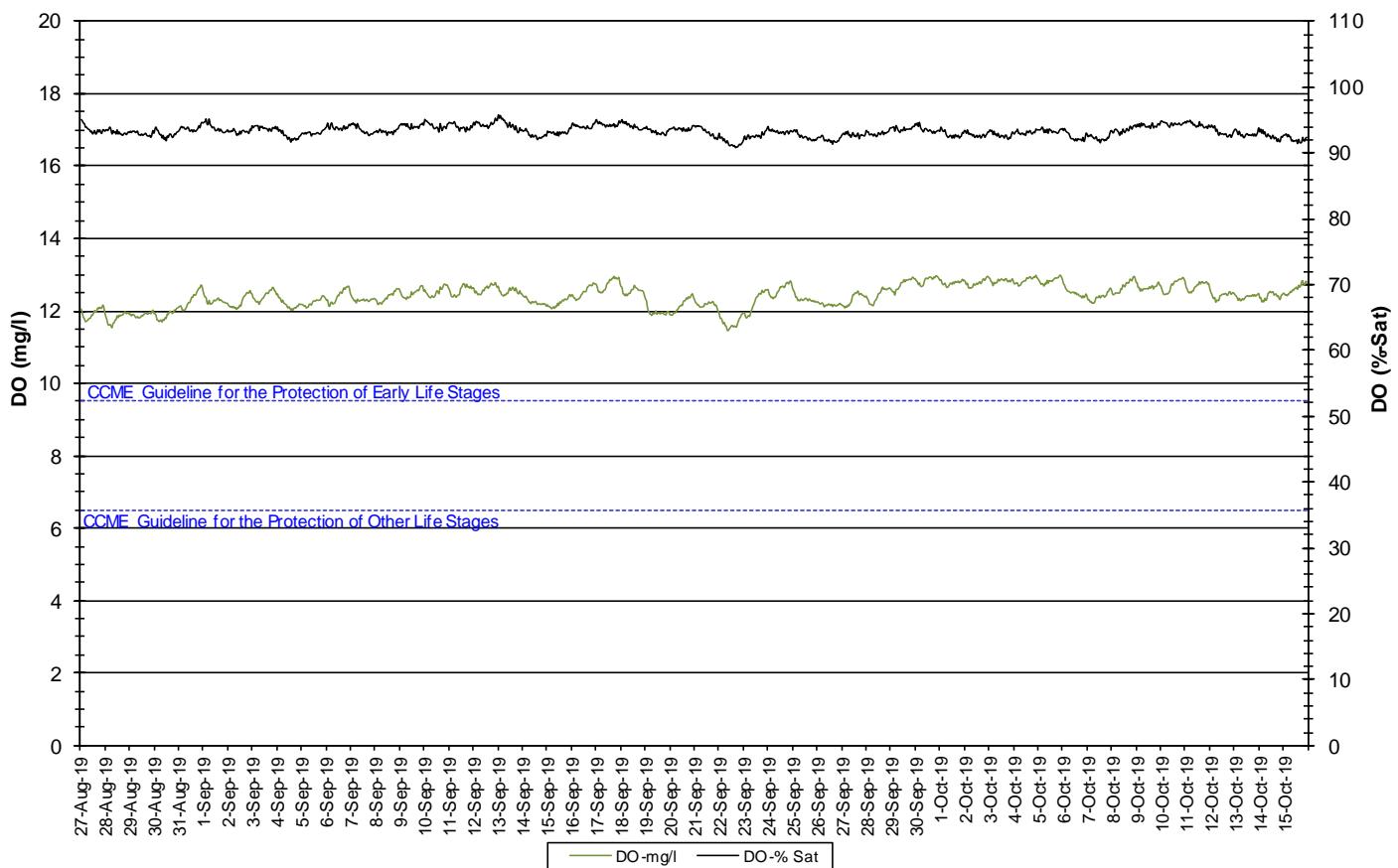


Figure 12: Dissolved oxygen – Dumbell Stream

- Turbidity values ranged from 0.0 NTU to 95.1 NTU, throughout the deployment period (Figure 13). The median value was 0.94 NTU.

Water Turbidity and Precipitation : Dumbell Stream above Dumbell Lake
August 25 to October 16, 2019

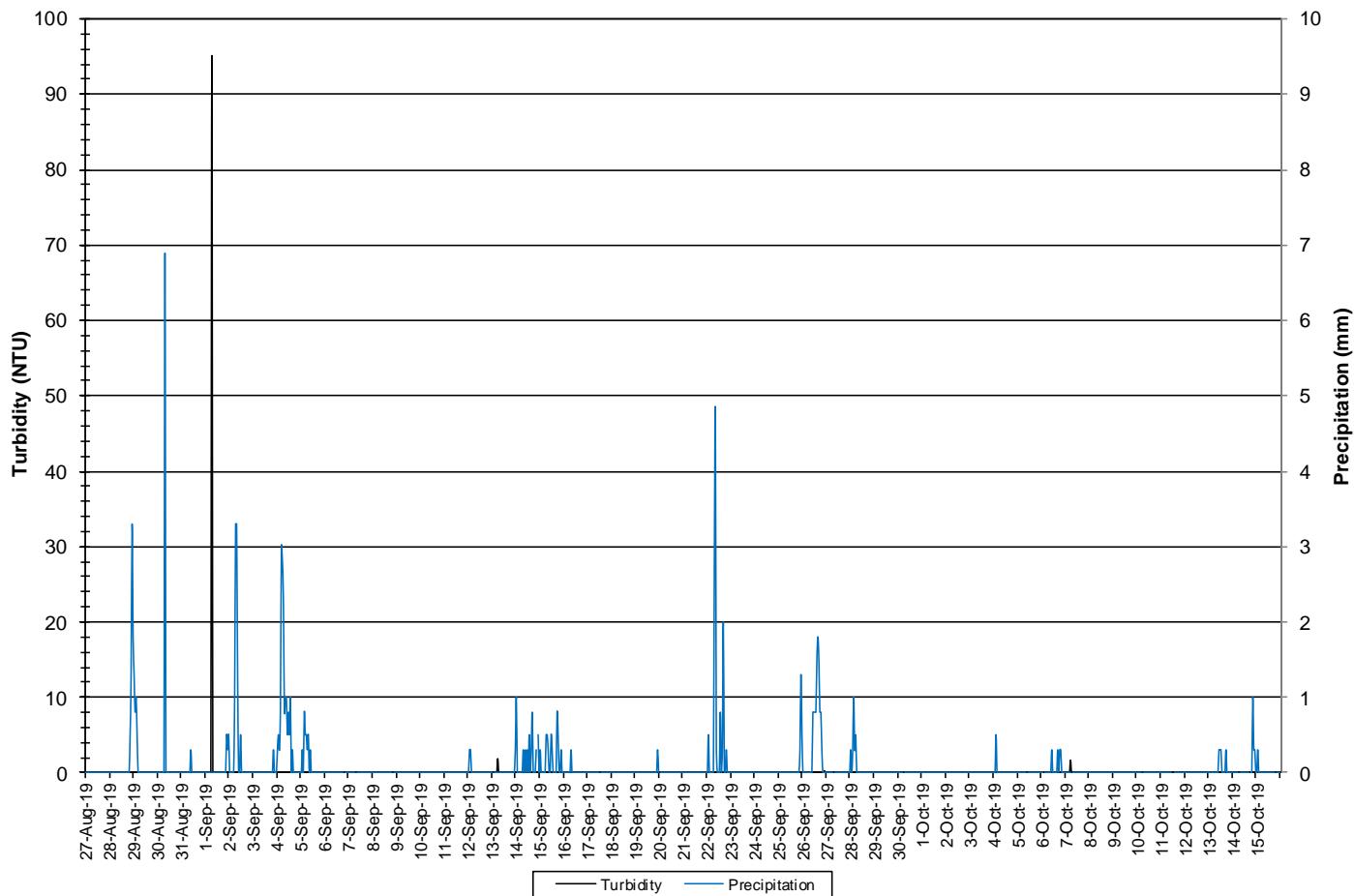


Figure 13: Turbidity and Precipitation – Dumbell Stream
(Weather data collected from climate station near Moosehead Lake)

- Stage and precipitation are graphed below to show the relationship between rainfall and water level at Dumbell Stream (Figure 14).
- Overall, stage increased throughout the deployment period, with precipitation events causing periodic spikes.
- With the exception of water quantity data (Stage and Flow), all data used in the preparation of the graphs and subsequent discussion adhere to this stringent QA/QC protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

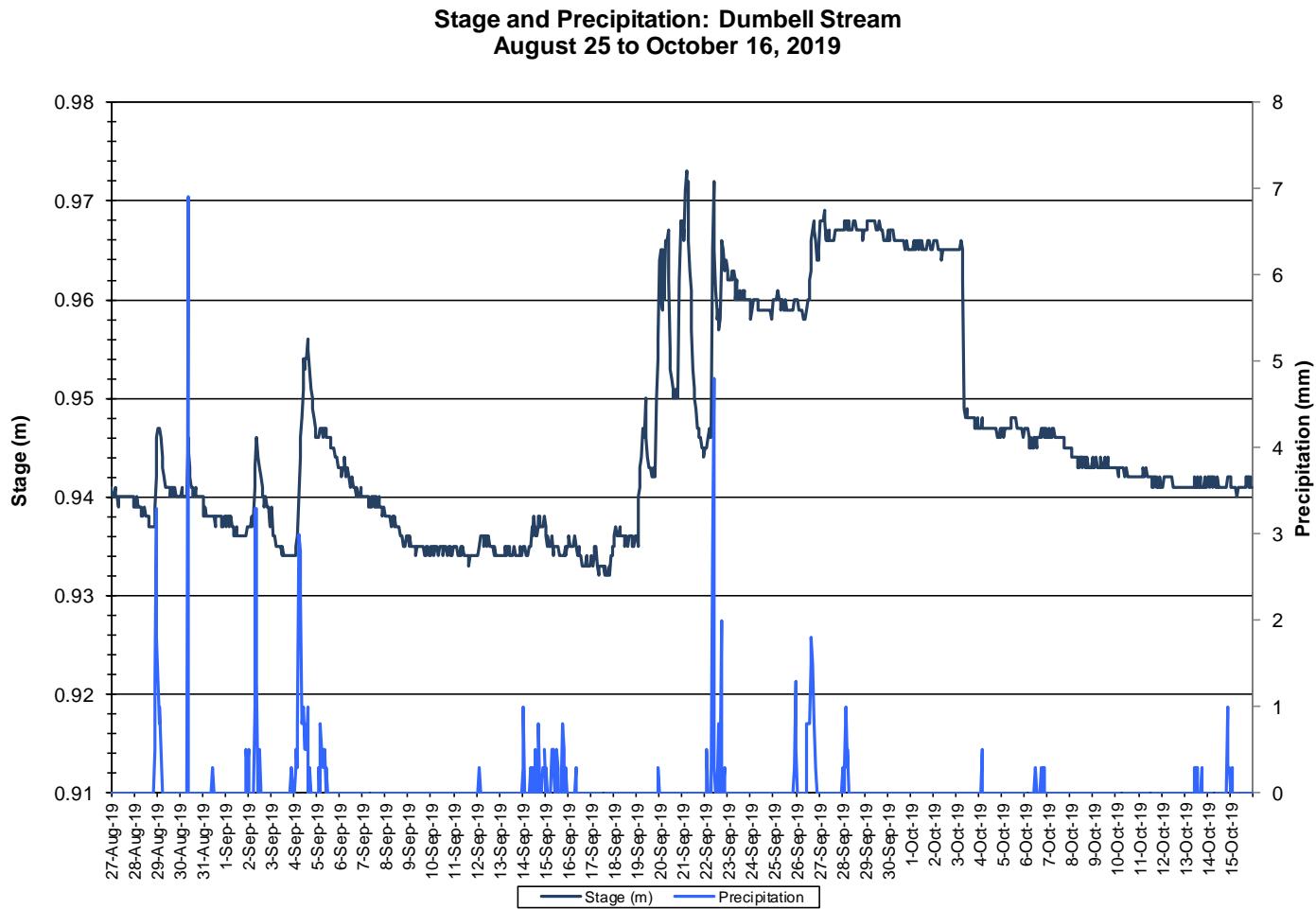


Figure 14: Stage and Precipitation – Dumbell Stream
(Weather data collected from climate station near Moosehead Lake)

Pumphouse Stream

- Water temperature ranged from 1.90 to 17.60°C during this deployment period (Figure 15).
- Water temperature decreased over the course of this deployment period, corresponding to decreasing ambient air temperatures (Figure 15).

Water and Air Temperature : Pumphouse Stream above Drum Lake
August 27 to October 16, 2019

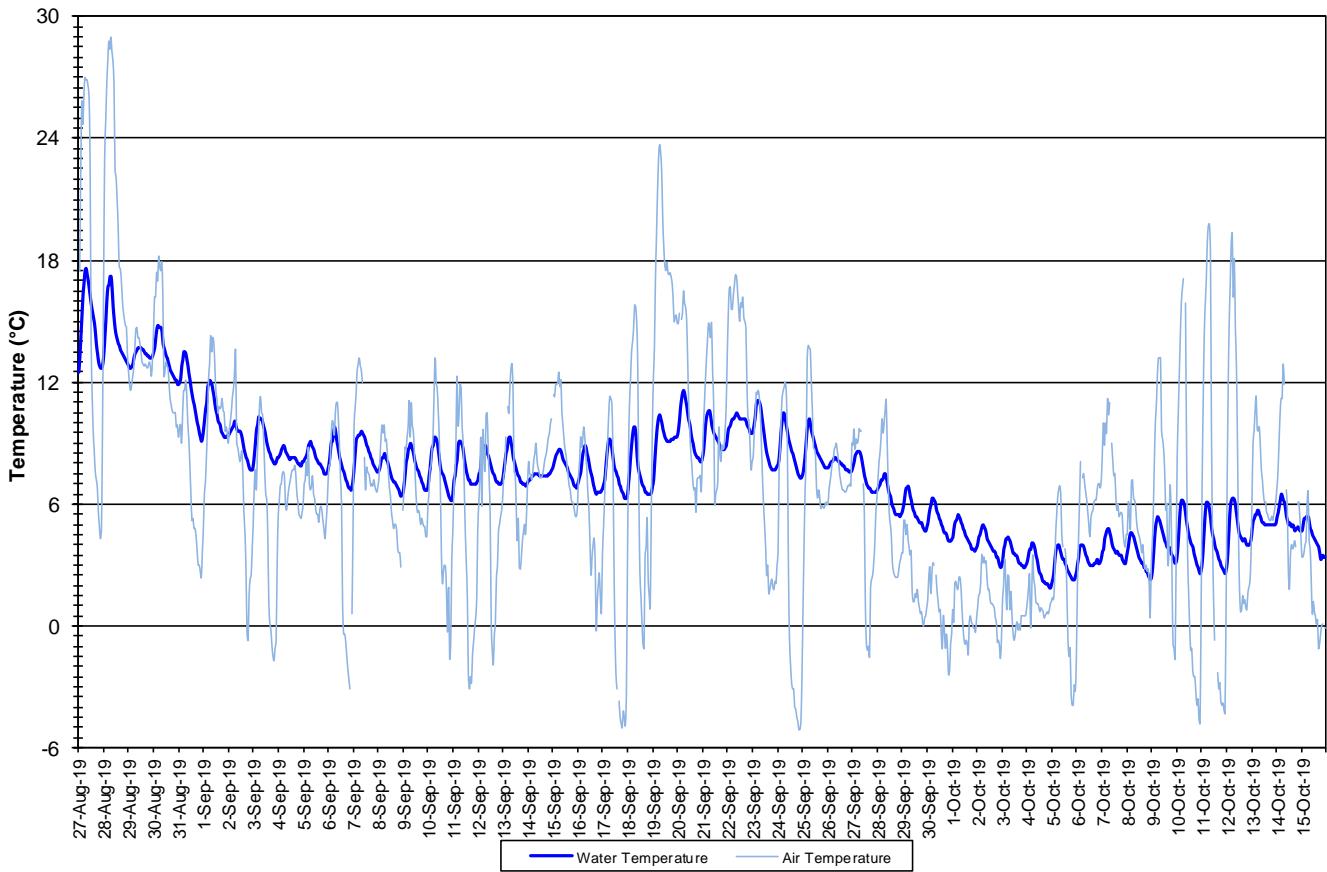


Figure 15: Water and Air Temperature – Pumphouse Stream
(Weather data collected from climate station near Moosehead Lake)

- pH ranged from 7.29 to 7.78 pH units (Figure 16). The median pH was 7.65.
- All values during the deployment are within the CCME Guidelines for the Protection of Aquatic Life (between 6.5 and 9 pH units). pH fluctuates slightly throughout the day and night.
- With the exception of water quantity data (Stage and Flow), all data used in the preparation of the graphs and subsequent discussion adhere to this stringent QA/QC protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

Water pH and Stage : Pumphouse Stream above Drum Lake
August 27 to October 16, 2019

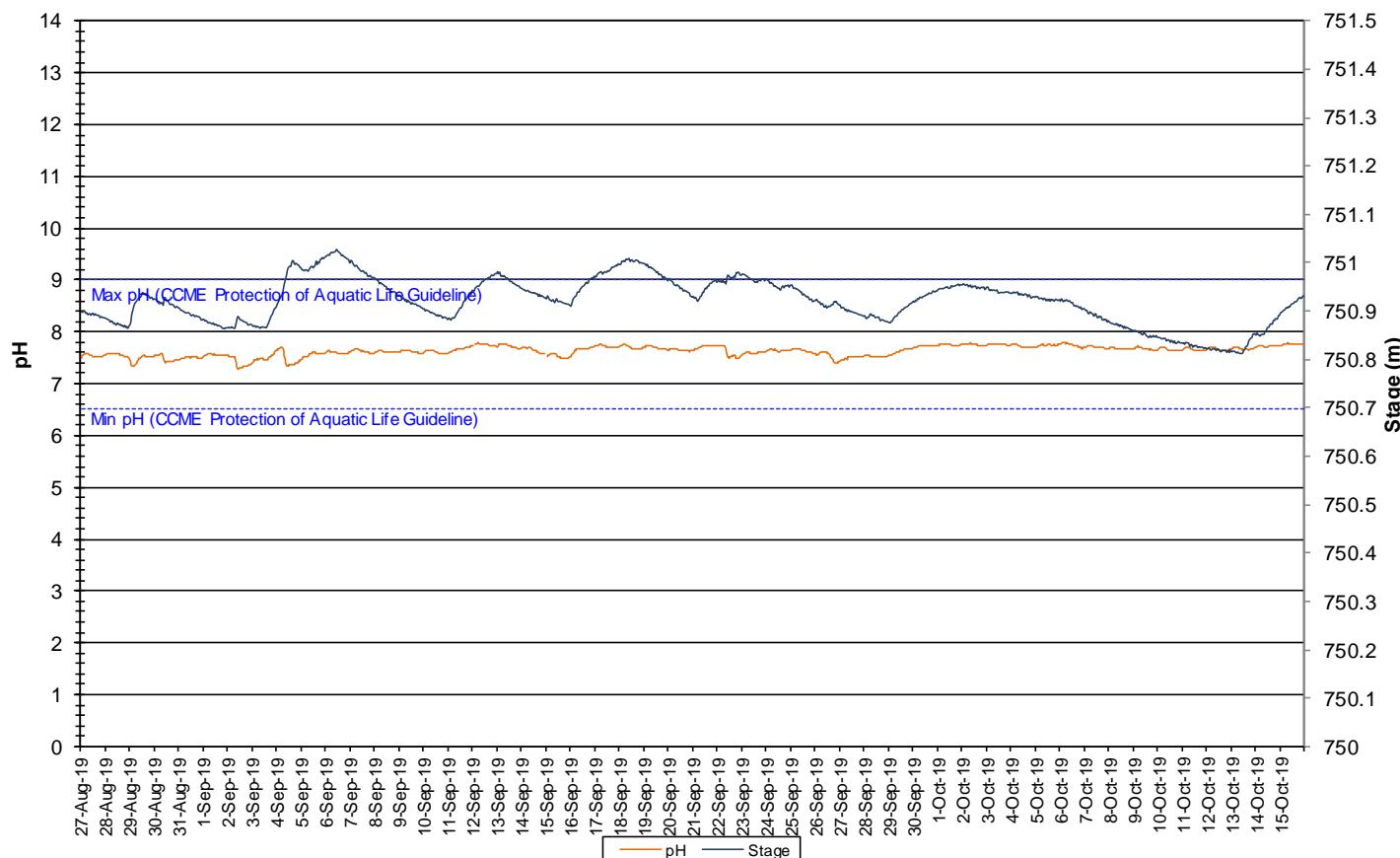


Figure 16: Water pH and Stage – Pumphouse Stream

- Specific conductivity ranged from 158.4 to 225.0 $\mu\text{s}/\text{cm}$, throughout the deployment period (Figure 17).
- Some decreases in specific conductivity correspond to increases in stage. As more water is added to the system from precipitation, the solids in the water are diluted, decreasing conductivity. They are identified on the graph in red.
- With the exception of water quantity data (Stage and Flow), all data used in the preparation of the graphs and subsequent discussion adhere to this stringent QA/QC protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

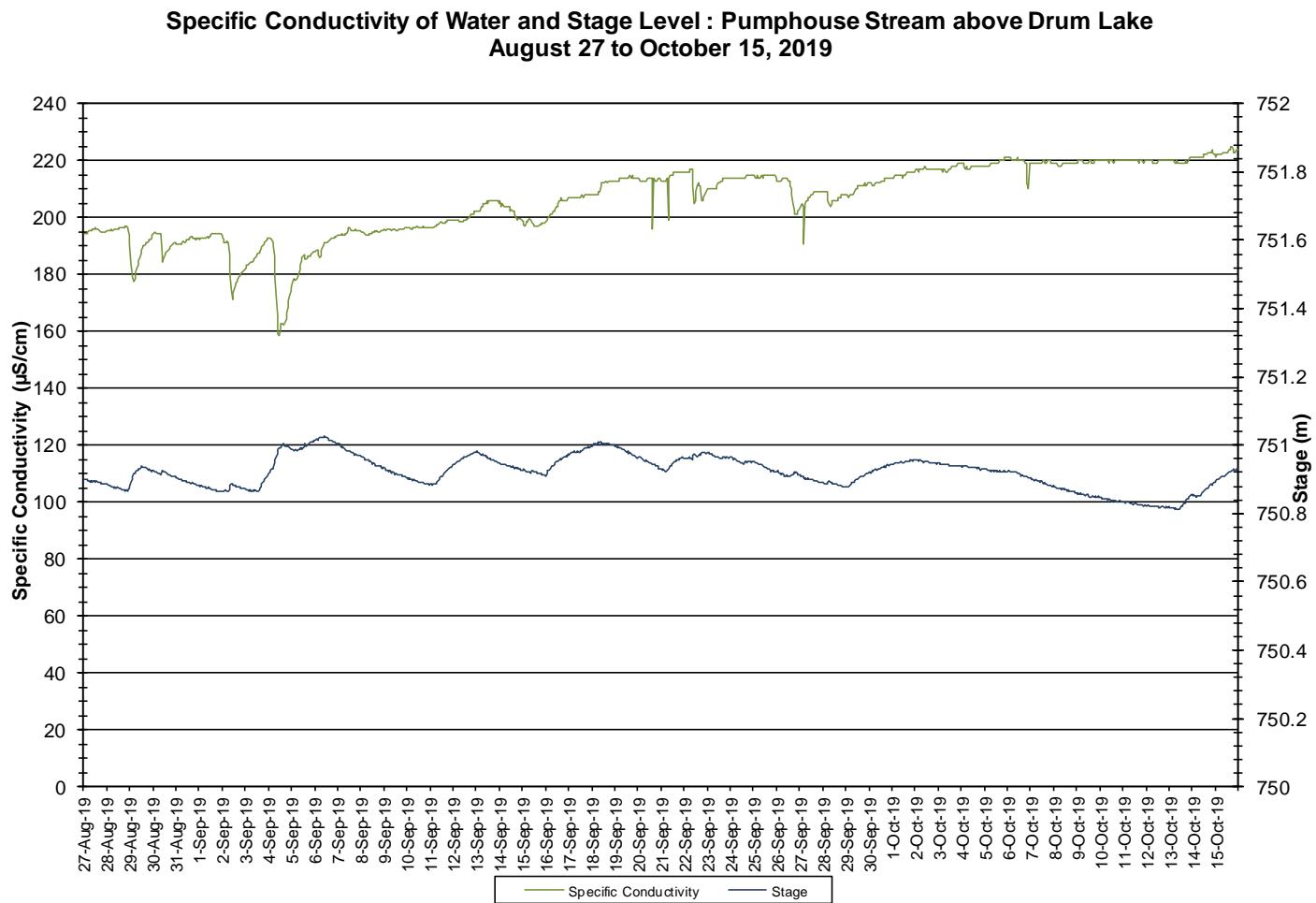


Figure 17: Specific Conductivity and Stage – Pumphouse Stream

- The saturation of dissolved oxygen ranged from 85.2 to 98.7% while the dissolved oxygen ranged from 9.10 to 12.79 mg/l with a median value of 11.05 mg/l (Figure 18).
- All values recorded at Pumphouse Stream were above the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota of Other Life Stages of 6.5 mg/l. The majority of values were below the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota of Early Life Stages of 9.5 mg/l. The guidelines are indicated in blue on Figure 18.
- Dissolved oxygen decreased during this deployment period as water temperature increased.
- Dissolved oxygen fluctuated daily with decreases observed at night.

Dissolved Oxygen Concentration and Saturation : Pumphouse Stream above Drum Lake
August 27 to October 16, 2019

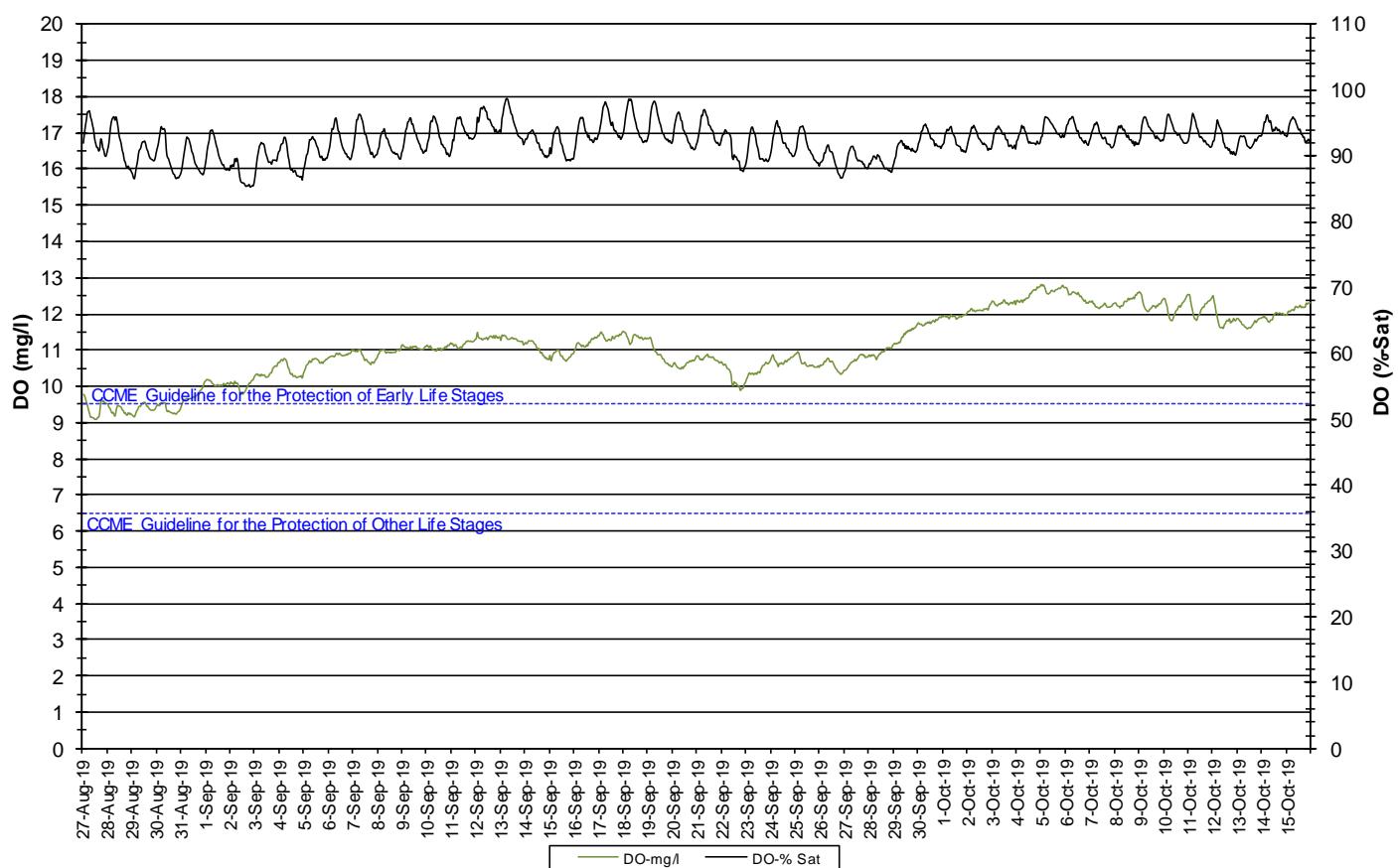


Figure 18: Dissolved Oxygen – Pumphouse Stream

- Turbidity values range from 0.0 to 28.3 NTU throughout the deployment period (Figure 19). The median value was 0.3 NTU.
- In some instances, turbidity spikes can be attributed to precipitation events.

Water Turbidity and Precipitation : Pumphouse Stream above Drum Lake
August 26 to October 16, 2019

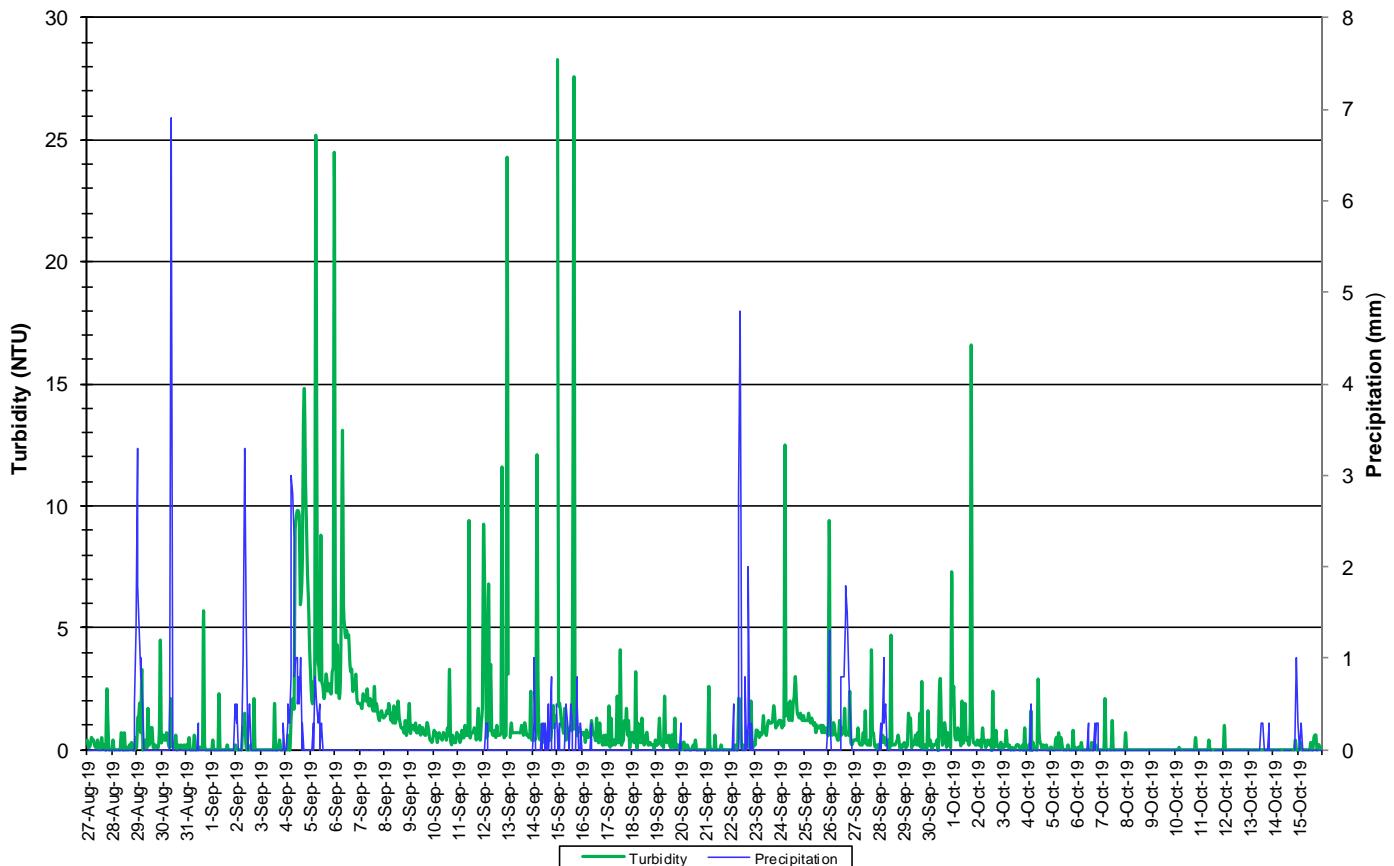


Figure 19: Turbidity and Precipitation – Pumphouse Stream
(Weather data collected from climate station near Moosehead Lake)

- Stage and precipitation are graphed below to show the relationship between rainfall and water level at Pumphouse Stream (Figure 20).
- Overall, stage decreased throughout the deployment period, with precipitation events causing periodic spikes.
- With the exception of water quantity data (Stage and Flow), all data used in the preparation of the graphs and subsequent discussion adhere to this stringent QA/QC protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

Stage & Precipitation: Pumphouse Stream
August 27 to October 16, 2019

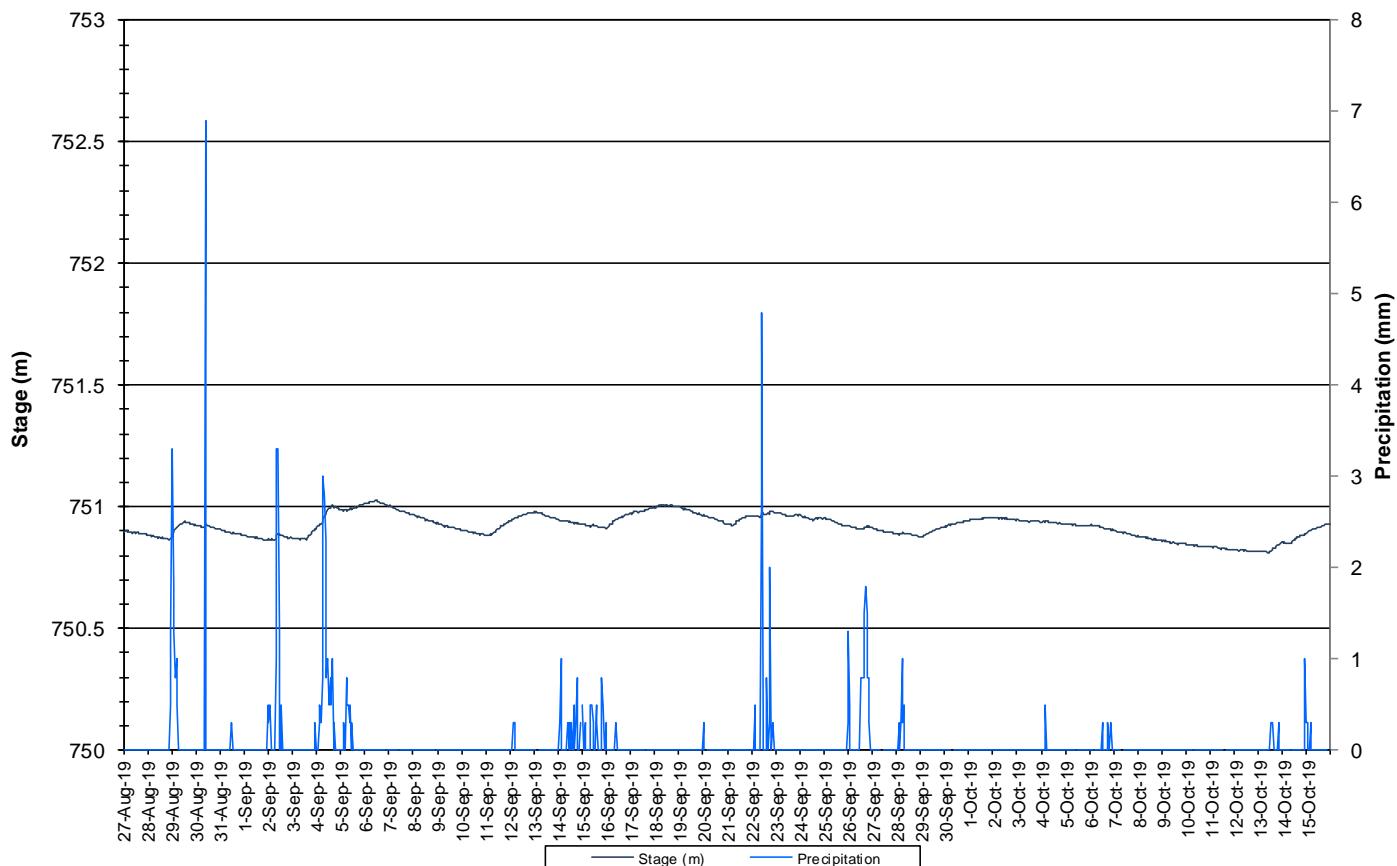


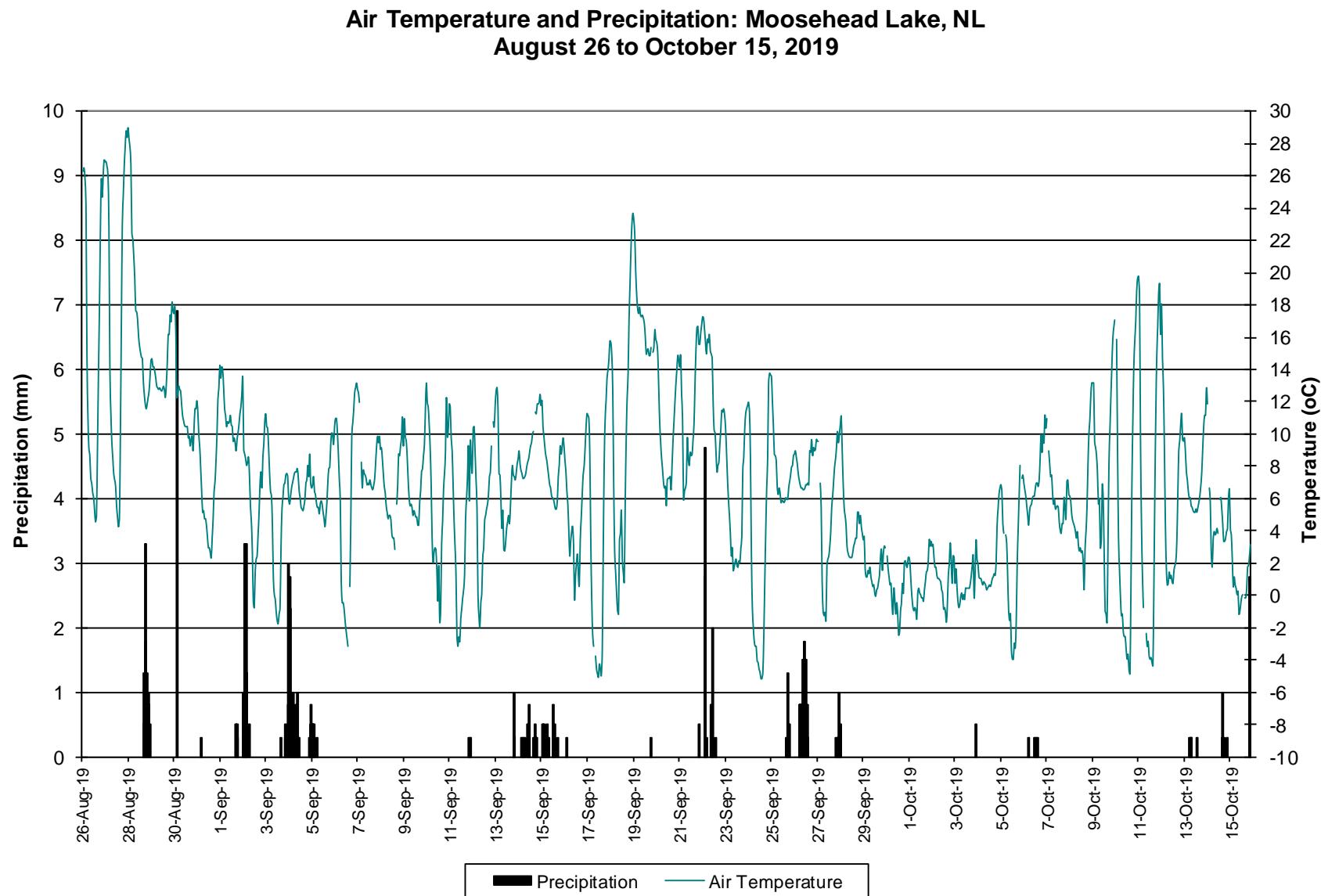
Figure 20: Stage and Precipitation – Pumphouse Stream
(Weather data collected from climate station near Moosehead Lake)

Conclusions

- Instruments were deployed between August 26th and 28th and removed by October 16, 2019. This was the last deployment period for this season.
- In most cases, precipitation events or increase/decreases in water level could be used to explain the data fluctuations. Most values recorded were within ranges as suggested by the CCME Guidelines for the Protection of Aquatic Life for pH and dissolved oxygen.
- Water temperature corresponded with air temperature at all stations. Temperature typically ranged between 1.63 and 19.30°C at these stations.
- All of the pH values were within the recommended CCME Guidelines for the Protection of Aquatic Life. pH ranged between 7.23 and 8.31. Fluctuations were noted between day and night.
- Specific conductivity differed between the two Wabush Lake stations. This can be attributed to varying concentrations of iron ore tailings deposited between the stations. Specific conductivity ranged from 52.9 $\mu\text{s}/\text{cm}$ to 109.9 $\mu\text{s}/\text{cm}$ at the Wabush Lake stations, 57.9 to 75.3 $\mu\text{s}/\text{cm}$ at Dumbell Stream and 85.2 to 225.0 $\mu\text{s}/\text{cm}$ at Pumphouse Stream.
- At all four stations, all dissolved oxygen values were above the minimum CCME Guideline for the Protection of Aquatic Life for Cold Water Biota at Other Life Stages of 6.5 mg/L. When dissolved oxygen values are compared to the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota at Early Life Stages of 9.5 mg/L, the majority of the values were above this guideline.
- Turbidity at Dolomite Road and Julianne Narrows remained at 0.0 NTU except for a few spikes. The median value was 0.0 NTU, at both stations.
- Turbidity at Dumbell Stream remained at 0.0 NTU for the majority of the deployment period with few spikes.
- Turbidity at Pumphouse Stream fluctuated throughout the deployment period with frequent spikes. The median value was 0.3 NTU.
- Stage steadily decreased at Dolomite Road and Julianne Narrows throughout the deployment period.
- At Dumbell Stream, stage increased overall, with spikes noted after precipitation events
- At Pumphouse Stream, stage decreased overall, with slight increases noted after precipitation events.
- With the exception of water quantity data (Stage and Flow), all data used in the preparation of the graphs and subsequent discussion adhere to this stringent QA/QC protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request

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Water Resources Management Division
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Appendix 1



Appendix 2
QA/QC Grab Sample Results

| Client: | Department of Environment | COC Number: | | | | | |
|------------------------|-------------------------------|-------------------------|--------------------|--------------------------------------|-------------|------------|---------------|
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-09-10 | | | | |
| Client Project: | | Date Submitted: | 2019-09-04 | | | | |
| Purchase Order: | 2180014303 | Sample Matrix: | Water | | | | |
| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
| 1451609 | WS-S-0000 Julienne Narrows | 2019-6322-00-SI-SP | 2019-08-28 | Alkalinity as CaCO ₃ | mg/L | 5 | 53 |
| | | | | Bromide | mg/L | 0.25 | <0.25 |
| | | | | Chloride | mg/L | 1 | 5 |
| | | | | Colour | TCU | 2 | 12 |
| | | | | Conductivity | uS/cm | 5 | 111 |
| | | | | Dissolved Organic Carbon | mg/L | 0.5 | 3.5 |
| | | | | Fluoride | mg/L | 0.10 | <0.10 |
| | | | | Hardness as CaCO ₃ | mg/L | 1 | 51 |
| | | | | N-NH ₃ (Ammonia) | mg/L | 0.01 | <0.01 |
| | | | | N-NO ₂ (Nitrite) | mg/L | 0.10 | <0.10 |
| | | | | N-NO ₃ (Nitrate) | mg/L | 0.10 | 0.46 |
| | | | | pH | | 1.00 | 8.55 |
| | | | | Sulphate | mg/L | 1 | 3 |
| | | | | Total Dissolved Solids (COND - CALC) | mg/L | 1 | 72 |
| | | | | Total Kjeldahl Nitrogen | mg/L | 0.1 | <0.1 |
| | | | | Total Organic Carbon | mg/L | 0.5 | 3.6 |
| | | | | Turbidity | NTU | 0.1 | 0.9 |
| | | | | Aluminum | mg/L | 0.01 | <0.01 |

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at <http://www.cala.ca/scopes/2602.pdf>.
 Results relate only to the parameters tested on the samples submitted.
 Methods references and/or additional QA/QC information available on request.

APPROVAL:



Addrine Thomas

| Client: | Department of Environment | COC Number: | | | | | |
|------------------------|-------------------------------|-------------------------|--------------------|----------------|-------------|------------|---------------|
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-09-10 | | | | |
| Client Project: | | Date Submitted: | 2019-09-04 | | | | |
| Purchase Order: | 2180014303 | Sample Matrix: | Water | | | | |
| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
| 1451609 | WS-S-0000 Julienne Narrows | 2019-6322-00-SI-SP | 2019-08-28 | Antimony | mg/L | 0.0005 | <0.0005 |
| | | | | Arsenic | mg/L | 0.001 | <0.001 |
| | | | | Barium | mg/L | 0.01 | <0.01 |
| | | | | Boron | mg/L | 0.01 | <0.01 |
| | | | | Calcium | mg/L | 1 | 12 |
| | | | | Cadmium | mg/L | 0.0001 | <0.0001 |
| | | | | Chromium | mg/L | 0.001 | <0.001 |
| | | | | Copper | mg/L | 0.001 | <0.001 |
| | | | | Iron | mg/L | 0.03 | 0.04 |
| | | | | Lead | mg/L | 0.001 | <0.001 |
| | | | | Magnesium | mg/L | 1 | 5 |
| | | | | Manganese | mg/L | 0.01 | 0.01 |
| | | | | Mercury | mg/L | 0.0001 | <0.0001 |
| | | | | Nickel | mg/L | 0.005 | <0.005 |
| | | | | Potassium | mg/L | 1 | <1 |
| | | | | Selenium | mg/L | 0.001 | <0.001 |
| | | | | Sodium | mg/L | 2 | <2 |
| | | | | Strontium | mg/L | 0.001 | 0.016 |

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 Results relate only to the parameters tested on the samples submitted.
 Methods references and/or additional QA/QC information available on request.

APPROVAL:



Addrine Thomas

| Client: | Department of Environment | COC Number: | | | | | |
|------------------------|-------------------------------|-------------------------|--------------------|------------------------|-------------|------------|---------------|
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-09-10 | | | | |
| Client Project: | | Date Submitted: | 2019-09-04 | | | | |
| Purchase Order: | 2180014303 | Sample Matrix: | Water | | | | |
| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
| 1451609 | WS-S-0000 Julienne Narrows | 2019-6322-00-SI-SP | 2019-08-28 | Uranium | mg/L | 0.001 | <0.001 |
| | | | | Zinc | mg/L | 0.01 | <0.01 |
| | | | | Phosphorus | mg/L | 0.002 | 0.003 |
| | | | | Total Suspended Solids | mg/L | 2 | <2 |

Report comment:

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at <http://www.cala.ca/scopes/2602.pdf>.
Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

APPROVAL:



Addrine Thomas

Client: Department of Environment **COC Number:** 850423
Attention: Ms. Leona Hyde **Date Reported:** 2019-10-30
Client Project: **Date Submitted:** 2019-10-21
Purchase Order: 2180014303 **Sample Matrix:** Water

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-------------------------------|-------------------------|--------------------|--------------------------------------|-------------|------------|---------------|
| 1461317 | WS-S-0000 Julienne Narrows | 2019-6335-00-SI-SP | 2019-10-16 | Alkalinity as CaCO ₃ | mg/L | 5 | 46 |
| | | | | Bromide | mg/L | 0.25 | <0.25 |
| | | | | Chloride | mg/L | 1 | 2 |
| | | | | Colour | TCU | 2 | 15 |
| | | | | Conductivity | uS/cm | 5 | 101 |
| | | | | Dissolved Organic Carbon | mg/L | 0.5 | 3.3 |
| | | | | Fluoride | mg/L | 0.10 | <0.10 |
| | | | | Hardness as CaCO ₃ | mg/L | 1 | 53 |
| | | | | N-NH ₃ (Ammonia) | mg/L | 0.01 | 0.02 |
| | | | | N-NO ₂ (Nitrite) | mg/L | 0.10 | <0.10 |
| | | | | N-NO ₃ (Nitrate) | mg/L | 0.10 | 0.43 |
| | | | | pH | | 1.00 | 7.84 |
| | | | | Sulphate | mg/L | 1 | 2 |
| | | | | Total Dissolved Solids (COND - CALC) | mg/L | 1 | 66 |
| | | | | Total Kjeldahl Nitrogen | mg/L | 0.1 | 0.2 |
| | | | | Total Organic Carbon | mg/L | 0.5 | 3.6 |
| | | | | Turbidity | NTU | 0.1 | 1.8 |
| | | | | Aluminum | mg/L | 0.01 | 0.05 |

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 Results relate only to the parameters tested on the samples submitted.
 Methods references and/or additional QA/QC information available on request.

APPROVAL:


Addrine Thomas

Client: Department of Environment **COC Number:** 850423
Attention: Ms. Leona Hyde **Date Reported:** 2019-10-30
Client Project: **Date Submitted:** 2019-10-21
Purchase Order: 2180014303 **Sample Matrix:** Water

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-------------------------------|-------------------------|--------------------|----------------|-------------|------------|---------------|
| 1461317 | WS-S-0000 Julienne Narrows | 2019-6335-00-SI-SP | 2019-10-16 | Antimony | mg/L | 0.0005 | <0.0005 |
| | | | | Arsenic | mg/L | 0.001 | <0.001 |
| | | | | Barium | mg/L | 0.01 | <0.01 |
| | | | | Boron | mg/L | 0.01 | <0.01 |
| | | | | Calcium | mg/L | 1 | 13 |
| | | | | Cadmium | mg/L | 0.0001 | <0.0001 |
| | | | | Chromium | mg/L | 0.001 | <0.001 |
| | | | | Copper | mg/L | 0.001 | <0.001 |
| | | | | Iron | mg/L | 0.03 | 0.14 |
| | | | | Lead | mg/L | 0.001 | <0.001 |
| | | | | Magnesium | mg/L | 1 | 5 |
| | | | | Manganese | mg/L | 0.01 | 0.06 |
| | | | | Mercury | mg/L | 0.0001 | <0.0001 |
| | | | | Nickel | mg/L | 0.005 | <0.005 |
| | | | | Potassium | mg/L | 1 | 1 |
| | | | | Selenium | mg/L | 0.001 | <0.001 |
| | | | | Sodium | mg/L | 2 | <2 |
| | | | | Strontium | mg/L | 0.001 | 0.017 |

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at <http://www.cala.ca/scopes/2602.pdf>.
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 Methods references and/or additional QA/QC information available on request.

APPROVAL:


Addrine Thomas

Client: Department of Environment **COC Number:** 850423
Attention: Ms. Leona Hyde **Date Reported:** 2019-10-30
Client Project: **Date Submitted:** 2019-10-21
Purchase Order: 2180014303 **Sample Matrix:** Water

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-------------------------------|-------------------------|--------------------|------------------------|-------------|------------|---------------|
| 1461317 | WS-S-0000 Julienne Narrows | 2019-6335-00-SI-SP | 2019-10-16 | Uranium | mg/L | 0.001 | <0.001 |
| | | | | Zinc | mg/L | 0.01 | <0.01 |
| | | | | Phosphorus | mg/L | 0.002 | 0.005 |
| | | | | Total Suspended Solids | mg/L | 2 | 16 |

Report comment:

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at <http://www.cala.ca/scopes/2602.pdf>.
 Results relate only to the parameters tested on the samples submitted.
 Methods references and/or additional QA/QC information available on request.

APPROVAL:



Addrine Thomas

| | | | |
|------------------------|---------------------------|------------------------|------------|
| Client: | Department of Environment | COC Number: | 848380 |
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-09-10 |
| Client Project: | | Date Submitted: | 2019-09-04 |
| Purchase Order: | 2180014303 | Sample Matrix: | Water |

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-----------------------------|-------------------------|--------------------|--------------------------------------|-------------|------------|---------------|
| 1451606 | WS-S-0000 Dolomite Road | 2019-6319-00-SI-SP | 2019-08-26 | Alkalinity as CaCO ₃ | mg/L | 5 | 29 |
| | | | | Bromide | mg/L | 0.25 | <0.25 |
| | | | | Chloride | mg/L | 1 | 1 |
| | | | | Colour | TCU | 2 | 22 |
| | | | | Conductivity | uS/cm | 5 | 60 |
| | | | | Dissolved Organic Carbon | mg/L | 0.5 | 4.2 |
| | | | | Fluoride | mg/L | 0.10 | <0.10 |
| | | | | Hardness as CaCO ₃ | mg/L | 1 | 27 |
| | | | | N-NH ₃ (Ammonia) | mg/L | 0.01 | 0.03 |
| | | | | N-NO ₂ (Nitrite) | mg/L | 0.10 | <0.10 |
| | | | | N-NO ₃ (Nitrate) | mg/L | 0.10 | <0.10 |
| | | | | pH | | 1.00 | 7.92 |
| | | | | Sulphate | mg/L | 1 | 2 |
| | | | | Total Dissolved Solids (COND - CALC) | mg/L | 1 | 39 |
| | | | | Total Kjeldahl Nitrogen | mg/L | 0.1 | <0.1 |
| | | | | Total Organic Carbon | mg/L | 0.5 | 4.3 |
| | | | | Turbidity | NTU | 0.1 | 0.8 |
| | | | | Aluminum | mg/L | 0.01 | 0.02 |

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at <http://www.cala.ca/scopes/2602.pdf>.
 Results relate only to the parameters tested on the samples submitted.
 Methods references and/or additional QA/QC information available on request.

APPROVAL: _____
 Addrine Thomas



Client: Department of Environment **COC Number:** 848380
Attention: Ms. Leona Hyde **Date Reported:** 2019-09-10
Client Project: **Date Submitted:** 2019-09-04
Purchase Order: 2180014303 **Sample Matrix:** Water

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-----------------------------|-------------------------|--------------------|----------------|-------------|------------|---------------|
| 1451606 | WS-S-0000 Dolomite Road | 2019-6319-00-SI-SP | 2019-08-26 | Antimony | mg/L | 0.0005 | <0.0005 |
| | | | | Arsenic | mg/L | 0.001 | <0.001 |
| | | | | Barium | mg/L | 0.01 | <0.01 |
| | | | | Boron | mg/L | 0.01 | <0.01 |
| | | | | Calcium | mg/L | 1 | 6 |
| | | | | Cadmium | mg/L | 0.0001 | <0.0001 |
| | | | | Chromium | mg/L | 0.001 | <0.001 |
| | | | | Copper | mg/L | 0.001 | <0.001 |
| | | | | Iron | mg/L | 0.03 | 0.04 |
| | | | | Lead | mg/L | 0.001 | <0.001 |
| | | | | Magnesium | mg/L | 1 | 3 |
| | | | | Manganese | mg/L | 0.01 | 0.02 |
| | | | | Mercury | mg/L | 0.0001 | <0.0001 |
| | | | | Nickel | mg/L | 0.005 | <0.005 |
| | | | | Potassium | mg/L | 1 | <1 |
| | | | | Selenium | mg/L | 0.001 | <0.001 |
| | | | | Sodium | mg/L | 2 | <2 |
| | | | | Strontium | mg/L | 0.001 | 0.013 |

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at <http://www.cala.ca/scopes/2602.pdf>.
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 Methods references and/or additional QA/QC information available on request.

APPROVAL:


Addrine Thomas



REPORT OF ANALYSIS

Lab Report Number:

1916033

| | | | |
|------------------------|---------------------------|------------------------|------------|
| Client: | Department of Environment | COC Number: | 848380 |
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-09-10 |
| Client Project: | | Date Submitted: | 2019-09-04 |
| Purchase Order: | 2180014303 | Sample Matrix: | Water |

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-----------------------------|-------------------------|--------------------|------------------------|-------------|------------|---------------|
| 1451606 | WS-S-0000 Dolomite Road | 2019-6319-00-SI-SP | 2019-08-26 | Uranium | mg/L | 0.001 | <0.001 |
| | | | | Zinc | mg/L | 0.01 | <0.01 |
| | | | | Phosphorus | mg/L | 0.002 | 0.004 |
| | | | | Total Suspended Solids | mg/L | 2 | <2 |

Report comment:

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at <http://www.cala.ca/scopes/2602.pdf>.
Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

APPROVAL:

Addrine Thomas

Client: Department of Environment **COC Number:** 850423
Attention: Ms. Leona Hyde **Date Reported:** 2019-10-30
Client Project: **Date Submitted:** 2019-10-21
Purchase Order: 2180014303 **Sample Matrix:** Water

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-----------------------------|-------------------------|--------------------|--------------------------------------|-------------|------------|---------------|
| 1461318 | WS-S-0000 Dolomite Road | 2019-6336-00-SI-SP | 2019-10-15 | Alkalinity as CaCO ₃ | mg/L | 5 | 30 |
| | | | | Bromide | mg/L | 0.25 | <0.25 |
| | | | | Chloride | mg/L | 1 | 1 |
| | | | | Colour | TCU | 2 | 23 |
| | | | | Conductivity | uS/cm | 5 | 66 |
| | | | | Dissolved Organic Carbon | mg/L | 0.5 | 4.0 |
| | | | | Fluoride | mg/L | 0.10 | <0.10 |
| | | | | Hardness as CaCO ₃ | mg/L | 1 | 30 |
| | | | | N-NH ₃ (Ammonia) | mg/L | 0.01 | 0.04 |
| | | | | N-NO ₂ (Nitrite) | mg/L | 0.10 | <0.10 |
| | | | | N-NO ₃ (Nitrate) | mg/L | 0.10 | <0.10 |
| | | | | pH | | 1.00 | 7.86 |
| | | | | Sulphate | mg/L | 1 | 2 |
| | | | | Total Dissolved Solids (COND - CALC) | mg/L | 1 | 43 |
| | | | | Total Kjeldahl Nitrogen | mg/L | 0.1 | 0.2 |
| | | | | Total Organic Carbon | mg/L | 0.5 | 4.2 |
| | | | | Turbidity | NTU | 0.1 | 1.4 |
| | | | | Aluminum | mg/L | 0.01 | 0.02 |

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 Results relate only to the parameters tested on the samples submitted.
 Methods references and/or additional QA/QC information available on request.

APPROVAL: 
 Addrine Thomas

Cient: Department of Environment **COC Number:** 850423
Attention: Ms. Leona Hyde **Date Reported:** 2019-10-30
Client Project: **Date Submitted:** 2019-10-21
Purchase Order: 2180014303 **Sample Matrix:** Water

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-----------------------------|-------------------------|--------------------|----------------|-------------|------------|---------------|
| 1461318 | WS-S-0000 Dolomite Road | 2019-6336-00-SI-SP | 2019-10-15 | Antimony | mg/L | 0.0005 | <0.0005 |
| | | | | Arsenic | mg/L | 0.001 | <0.001 |
| | | | | Barium | mg/L | 0.01 | <0.01 |
| | | | | Boron | mg/L | 0.01 | <0.01 |
| | | | | Calcium | mg/L | 1 | 7 |
| | | | | Cadmium | mg/L | 0.0001 | <0.0001 |
| | | | | Chromium | mg/L | 0.001 | <0.001 |
| | | | | Copper | mg/L | 0.001 | <0.001 |
| | | | | Iron | mg/L | 0.03 | 0.05 |
| | | | | Lead | mg/L | 0.001 | <0.001 |
| | | | | Magnesium | mg/L | 1 | 3 |
| | | | | Manganese | mg/L | 0.01 | 0.02 |
| | | | | Mercury | mg/L | 0.0001 | <0.0001 |
| | | | | Nickel | mg/L | 0.005 | <0.005 |
| | | | | Potassium | mg/L | 1 | <1 |
| | | | | Selenium | mg/L | 0.001 | <0.001 |
| | | | | Sodium | mg/L | 2 | <2 |
| | | | | Strontium | mg/L | 0.001 | 0.013 |

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at <http://www.cala.ca/scopes/2602.pdf>.
 Results relate only to the parameters tested on the samples submitted.
 Methods references and/or additional QA/QC information available on request.

APPROVAL:


Addrine Thomas



REPORT OF ANALYSIS

Lab Report Number:

1919283

| | | | |
|------------------------|---------------------------|------------------------|------------|
| Client: | Department of Environment | COC Number: | 850423 |
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-10-30 |
| Client Project: | | Date Submitted: | 2019-10-21 |
| Purchase Order: | 2180014303 | Sample Matrix: | Water |

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-----------------------------|-------------------------|--------------------|------------------------|-------------|------------|---------------|
| 1461318 | WS-S-0000 Dolomite Road | 2019-6336-00-SI-SP | 2019-10-15 | Uranium | mg/L | 0.001 | <0.001 |
| | | | | Zinc | mg/L | 0.01 | <0.01 |
| | | | | Phosphorus | mg/L | 0.002 | 0.005 |
| | | | | Total Suspended Solids | mg/L | 2 | 4 |

Report comment:

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at <http://www.cala.ca/scopes/2602.pdf>.
Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

APPROVAL:

Addrine Thomas

| Client: | Department of Environment | COC Number: | | | | | |
|------------------------|-----------------------------|-------------------------|--------------------|--------------------------------------|-------------|------------|---------------|
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-09-10 | | | | |
| Client Project: | | Date Submitted: | 2019-09-04 | | | | |
| Purchase Order: | 2180014303 | Sample Matrix: | Water | | | | |
| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
| 1451608 | WS-S-0000 Dumbell Stream | 2019-6321-00-SI-SP | 2019-08-27 | Alkalinity as CaCO ₃ | mg/L | 5 | 45 |
| | | | | Bromide | mg/L | 0.25 | <0.25 |
| | | | | Chloride | mg/L | 1 | <1 |
| | | | | Colour | TCU | 2 | 2 |
| | | | | Conductivity | uS/cm | 5 | 89 |
| | | | | Dissolved Organic Carbon | mg/L | 0.5 | 0.8 |
| | | | | Fluoride | mg/L | 0.10 | <0.10 |
| | | | | Hardness as CaCO ₃ | mg/L | 1 | 39 |
| | | | | N-NH ₃ (Ammonia) | mg/L | 0.01 | <0.01 |
| | | | | N-NO ₂ (Nitrite) | mg/L | 0.10 | <0.10 |
| | | | | N-NO ₃ (Nitrate) | mg/L | 0.10 | 0.64 |
| | | | | pH | | 1.00 | 8.40 |
| | | | | Sulphate | mg/L | 1 | 2 |
| | | | | Total Dissolved Solids (COND - CALC) | mg/L | 1 | 58 |
| | | | | Total Kjeldahl Nitrogen | mg/L | 0.1 | <0.1 |
| | | | | Total Organic Carbon | mg/L | 0.5 | 1.1 |
| | | | | Turbidity | NTU | 0.1 | 0.3 |
| | | | | Aluminum | mg/L | 0.01 | <0.01 |

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 Methods references and/or additional QA/QC information available on request.

APPROVAL:



Addrine Thomas

| Client: | Department of Environment | COC Number: | | | | | |
|------------------------|-----------------------------|-------------------------|--------------------|----------------|-------------|------------|---------------|
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-09-10 | | | | |
| Client Project: | | Date Submitted: | 2019-09-04 | | | | |
| Purchase Order: | 2180014303 | Sample Matrix: | Water | | | | |
| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
| 1451608 | WS-S-0000 Dumbell Stream | 2019-6321-00-SI-SP | 2019-08-27 | Antimony | mg/L | 0.0005 | <0.0005 |
| | | | | Arsenic | mg/L | 0.001 | <0.001 |
| | | | | Barium | mg/L | 0.01 | <0.01 |
| | | | | Boron | mg/L | 0.01 | <0.01 |
| | | | | Calcium | mg/L | 1 | 9 |
| | | | | Cadmium | mg/L | 0.0001 | <0.0001 |
| | | | | Chromium | mg/L | 0.001 | <0.001 |
| | | | | Copper | mg/L | 0.001 | <0.001 |
| | | | | Iron | mg/L | 0.03 | <0.03 |
| | | | | Lead | mg/L | 0.001 | <0.001 |
| | | | | Magnesium | mg/L | 1 | 4 |
| | | | | Manganese | mg/L | 0.01 | <0.01 |
| | | | | Mercury | mg/L | 0.0001 | <0.0001 |
| | | | | Nickel | mg/L | 0.005 | <0.005 |
| | | | | Potassium | mg/L | 1 | <1 |
| | | | | Selenium | mg/L | 0.001 | <0.001 |
| | | | | Sodium | mg/L | 2 | <2 |
| | | | | Strontium | mg/L | 0.001 | 0.011 |

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 Results relate only to the parameters tested on the samples submitted.
 Methods references and/or additional QA/QC information available on request.

APPROVAL:



Addrine Thomas

| | | | | | | | |
|------------------------|-----------------------------|-------------------------|--------------------|------------------------|-------------|------------|---------------|
| Client: | Department of Environment | COC Number: | | | | | |
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-09-10 | | | | |
| Client Project: | | Date Submitted: | 2019-09-04 | | | | |
| Purchase Order: | 2180014303 | Sample Matrix: | Water | | | | |
| LAB ID | Supply / Description | Client Sample ID | Sample Date | ANALYTE | UNIT | MRL | RESULT |
| 1451608 | WS-S-0000 Dumbell Stream | 2019-6321-00-SI-SP | 2019-08-27 | Uranium | mg/L | 0.001 | <0.001 |
| | | | | Zinc | mg/L | 0.01 | <0.01 |
| | | | | Phosphorus | mg/L | 0.002 | <0.002 |
| | | | | Total Suspended Solids | mg/L | 2 | <2 |

Report comment:

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at <http://www.cala.ca/scopes/2602.pdf>.
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 Methods references and/or additional QA/QC information available on request.

APPROVAL:


Addrine Thomas

Client: Department of Environment **COC Number:** 850423
Attention: Ms. Leona Hyde **Date Reported:** 2019-10-30
Client Project: **Date Submitted:** 2019-10-21
Purchase Order: 2180014303 **Sample Matrix:** Water

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-----------------------------|-------------------------|--------------------|--------------------------------------|-------------|------------|---------------|
| 1461321 | WS-S-0000 Dumbell Stream | 2019-6339-00-SI-SP | 2019-10-16 | Alkalinity as CaCO ₃ | mg/L | 5 | 40 |
| | | | | Bromide | mg/L | 0.25 | <0.25 |
| | | | | Chloride | mg/L | 1 | <1 |
| | | | | Colour | TCU | 2 | 2 |
| | | | | Conductivity | uS/cm | 5 | 88 |
| | | | | Dissolved Organic Carbon | mg/L | 0.5 | <0.5 |
| | | | | Fluoride | mg/L | 0.10 | <0.10 |
| | | | | Hardness as CaCO ₃ | mg/L | 1 | 39 |
| | | | | N-NH ₃ (Ammonia) | mg/L | 0.01 | 0.03 |
| | | | | N-NO ₂ (Nitrite) | mg/L | 0.10 | <0.10 |
| | | | | N-NO ₃ (Nitrate) | mg/L | 0.10 | 0.79 |
| | | | | pH | | 1.00 | 7.84 |
| | | | | Sulphate | mg/L | 1 | 1 |
| | | | | Total Dissolved Solids (COND - CALC) | mg/L | 1 | 57 |
| | | | | Total Kjeldahl Nitrogen | mg/L | 0.1 | <0.1 |
| | | | | Total Organic Carbon | mg/L | 0.5 | 0.6 |
| | | | | Turbidity | NTU | 0.1 | 0.6 |
| | | | | Aluminum | mg/L | 0.01 | <0.01 |

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APPROVAL:


Addrine Thomas

Cient: Department of Environment **COC Number:** 850423
Attention: Ms. Leona Hyde **Date Reported:** 2019-10-30
Client Project: **Date Submitted:** 2019-10-21
Purchase Order: 2180014303 **Sample Matrix:** Water

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-----------------------------|-------------------------|--------------------|----------------|-------------|------------|---------------|
| 1461321 | WS-S-0000 Dumbell Stream | 2019-6339-00-SI-SP | 2019-10-16 | Antimony | mg/L | 0.0005 | <0.0005 |
| | | | | Arsenic | mg/L | 0.001 | <0.001 |
| | | | | Barium | mg/L | 0.01 | <0.01 |
| | | | | Boron | mg/L | 0.01 | <0.01 |
| | | | | Calcium | mg/L | 1 | 9 |
| | | | | Cadmium | mg/L | 0.0001 | <0.0001 |
| | | | | Chromium | mg/L | 0.001 | <0.001 |
| | | | | Copper | mg/L | 0.001 | <0.001 |
| | | | | Iron | mg/L | 0.03 | <0.03 |
| | | | | Lead | mg/L | 0.001 | <0.001 |
| | | | | Magnesium | mg/L | 1 | 4 |
| | | | | Manganese | mg/L | 0.01 | <0.01 |
| | | | | Mercury | mg/L | 0.0001 | <0.0001 |
| | | | | Nickel | mg/L | 0.005 | <0.005 |
| | | | | Potassium | mg/L | 1 | <1 |
| | | | | Selenium | mg/L | 0.001 | <0.001 |
| | | | | Sodium | mg/L | 2 | <2 |
| | | | | Strontium | mg/L | 0.001 | 0.010 |

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APPROVAL:


Addrine Thomas



REPORT OF ANALYSIS

Lab Report Number:

1919283

| | | | |
|------------------------|---------------------------|------------------------|------------|
| Client: | Department of Environment | COC Number: | 850423 |
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-10-30 |
| Client Project: | | Date Submitted: | 2019-10-21 |
| Purchase Order: | 2180014303 | Sample Matrix: | Water |

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-----------------------------|-------------------------|--------------------|------------------------|-------------|------------|---------------|
| 1461321 | WS-S-0000 | 2019-6339-00-SI-SP | 2019-10-16 | Uranium | mg/L | 0.001 | <0.001 |
| | Dumbell Stream | | | Zinc | mg/L | 0.01 | <0.01 |
| | | | | Phosphorus | mg/L | 0.002 | <0.002 |
| | | | | Total Suspended Solids | mg/L | 2 | 2 |

Report comment:

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at <http://www.cala.ca/scopes/2602.pdf>.
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Methods references and/or additional QA/QC information available on request.

APPROVAL:

Addrine Thomas



REPORT OF ANALYSIS

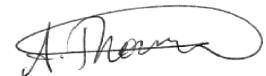
Lab Report Number:

1916033

| | | | |
|------------------------|---------------------------|------------------------|------------|
| Client: | Department of Environment | COC Number: | |
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-09-10 |
| Client Project: | | Date Submitted: | 2019-09-04 |
| Purchase Order: | 2180014303 | Sample Matrix: | Water |

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-------------------------------|-------------------------|--------------------|--------------------------------------|-------------|------------|---------------|
| 1451607 | WS-S-0000 Pumphouse Stream | 2019-6320-00-SI-SP | 2019-08-27 | Alkalinity as CaCO ₃ | mg/L | 5 | 63 |
| | | | | Bromide | mg/L | 0.25 | <0.25 |
| | | | | Chloride | mg/L | 1 | 3 |
| | | | | Colour | TCU | 2 | 6 |
| | | | | Conductivity | uS/cm | 5 | 210 |
| | | | | Dissolved Organic Carbon | mg/L | 0.5 | 1.7 |
| | | | | Fluoride | mg/L | 0.10 | <0.10 |
| | | | | Hardness as CaCO ₃ | mg/L | 1 | 98 |
| | | | | N-NH ₃ (Ammonia) | mg/L | 0.01 | 0.20 |
| | | | | N-NO ₂ (Nitrite) | mg/L | 0.10 | <0.10 |
| | | | | N-NO ₃ (Nitrate) | mg/L | 0.10 | 7.84 |
| | | | | pH | | 1.00 | 8.32 |
| | | | | Sulphate | mg/L | 1 | 7 |
| | | | | Total Dissolved Solids (COND - CALC) | mg/L | 1 | 136 |
| | | | | Total Kjeldahl Nitrogen | mg/L | 0.1 | 0.2 |
| | | | | Total Organic Carbon | mg/L | 0.5 | 2.3 |
| | | | | Turbidity | NTU | 0.1 | 1.2 |
| | | | | Aluminum | mg/L | 0.01 | 0.08 |

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Methods references and/or additional QA/QC information available on request.

APPROVAL: 
Addrine Thomas

| Client: | Department of Environment | COC Number: | | | | | |
|------------------------|-------------------------------|-------------------------|--------------------|----------------|-------------|------------|---------------|
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-09-10 | | | | |
| Client Project: | | Date Submitted: | 2019-09-04 | | | | |
| Purchase Order: | 2180014303 | Sample Matrix: | Water | | | | |
| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
| 1451607 | WS-S-0000 Pumphouse Stream | 2019-6320-00-SI-SP | 2019-08-27 | Antimony | mg/L | 0.0005 | <0.0005 |
| | | | | Arsenic | mg/L | 0.001 | <0.001 |
| | | | | Barium | mg/L | 0.01 | 0.02 |
| | | | | Boron | mg/L | 0.01 | <0.01 |
| | | | | Calcium | mg/L | 1 | 26 |
| | | | | Cadmium | mg/L | 0.0001 | <0.0001 |
| | | | | Chromium | mg/L | 0.001 | <0.001 |
| | | | | Copper | mg/L | 0.001 | <0.001 |
| | | | | Iron | mg/L | 0.03 | 0.10 |
| | | | | Lead | mg/L | 0.001 | <0.001 |
| | | | | Magnesium | mg/L | 1 | 8 |
| | | | | Manganese | mg/L | 0.01 | 0.05 |
| | | | | Mercury | mg/L | 0.0001 | <0.0001 |
| | | | | Nickel | mg/L | 0.005 | <0.005 |
| | | | | Potassium | mg/L | 1 | 1 |
| | | | | Selenium | mg/L | 0.001 | <0.001 |
| | | | | Sodium | mg/L | 2 | <2 |
| | | | | Strontium | mg/L | 0.001 | 0.032 |

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APPROVAL:



Addrine Thomas

| | | | | | | | |
|------------------------|-------------------------------|-------------------------|--------------------|------------------------|-------------|------------|---------------|
| Client: | Department of Environment | COC Number: | | | | | |
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-09-10 | | | | |
| Client Project: | | Date Submitted: | 2019-09-04 | | | | |
| Purchase Order: | 2180014303 | Sample Matrix: | Water | | | | |
| LAB ID | Supply / Description | Client Sample ID | Sample Date | ANALYTE | UNIT | MRL | RESULT |
| 1451607 | WS-S-0000 Pumphouse Stream | 2019-6320-00-SI-SP | 2019-08-27 | Uranium | mg/L | 0.001 | <0.001 |
| | | | | Zinc | mg/L | 0.01 | <0.01 |
| | | | | Phosphorus | mg/L | 0.002 | <0.002 |
| | | | | Total Suspended Solids | mg/L | 2 | <2 |

Report comment:

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 Methods references and/or additional QA/QC information available on request.

APPROVAL:


Addrine Thomas

Client: Department of Environment **COC Number:** 850423
Attention: Ms. Leona Hyde **Date Reported:** 2019-10-30
Client Project: **Date Submitted:** 2019-10-21
Purchase Order: 2180014303 **Sample Matrix:** Water

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-------------------------------|-------------------------|--------------------|--------------------------------------|-------------|------------|---------------|
| 1461320 | WS-S-0000 Pumphouse Stream | 2019-6338-00-SI-SP | 2019-10-16 | Alkalinity as CaCO ₃ | mg/L | 5 | 60 |
| | | | | Bromide | mg/L | 0.25 | <0.25 |
| | | | | Chloride | mg/L | 1 | 3 |
| | | | | Colour | TCU | 2 | 5 |
| | | | | Conductivity | uS/cm | 5 | 240 |
| | | | | Dissolved Organic Carbon | mg/L | 0.5 | 1.3 |
| | | | | Fluoride | mg/L | 0.10 | <0.10 |
| | | | | Hardness as CaCO ₃ | mg/L | 1 | 112 |
| | | | | N-NH ₃ (Ammonia) | mg/L | 0.01 | 0.25 |
| | | | | N-NO ₂ (Nitrite) | mg/L | 0.10 | <0.10 |
| | | | | N-NO ₃ (Nitrate) | mg/L | 0.10 | 11.0 |
| | | | | pH | | 1.00 | 7.89 |
| | | | | Sulphate | mg/L | 1 | 7 |
| | | | | Total Dissolved Solids (COND - CALC) | mg/L | 1 | 156 |
| | | | | Total Kjeldahl Nitrogen | mg/L | 0.1 | 0.4 |
| | | | | Total Organic Carbon | mg/L | 0.5 | 1.5 |
| | | | | Turbidity | NTU | 0.1 | 1.5 |
| | | | | Aluminum | mg/L | 0.01 | 0.03 |

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 Methods references and/or additional QA/QC information available on request.

APPROVAL:


Addrine Thomas

Cient: Department of Environment **COC Number:** 850423
Attention: Ms. Leona Hyde **Date Reported:** 2019-10-30
Client Project: **Date Submitted:** 2019-10-21
Purchase Order: 2180014303 **Sample Matrix:** Water

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-------------------------------|-------------------------|--------------------|----------------|-------------|------------|---------------|
| 1461320 | WS-S-0000 Pumphouse Stream | 2019-6338-00-SI-SP | 2019-10-16 | Antimony | mg/L | 0.0005 | <0.0005 |
| | | | | Arsenic | mg/L | 0.001 | <0.001 |
| | | | | Barium | mg/L | 0.01 | 0.02 |
| | | | | Boron | mg/L | 0.01 | <0.01 |
| | | | | Calcium | mg/L | 1 | 30 |
| | | | | Cadmium | mg/L | 0.0001 | <0.0001 |
| | | | | Chromium | mg/L | 0.001 | <0.001 |
| | | | | Copper | mg/L | 0.001 | <0.001 |
| | | | | Iron | mg/L | 0.03 | 0.04 |
| | | | | Lead | mg/L | 0.001 | <0.001 |
| | | | | Magnesium | mg/L | 1 | 9 |
| | | | | Manganese | mg/L | 0.01 | 0.02 |
| | | | | Mercury | mg/L | 0.0001 | <0.0001 |
| | | | | Nickel | mg/L | 0.005 | <0.005 |
| | | | | Potassium | mg/L | 1 | 1 |
| | | | | Selenium | mg/L | 0.001 | <0.001 |
| | | | | Sodium | mg/L | 2 | <2 |
| | | | | Strontium | mg/L | 0.001 | 0.034 |

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 Methods references and/or additional QA/QC information available on request.

APPROVAL:


Addrine Thomas



REPORT OF ANALYSIS

Lab Report Number:

1919283

| | | | |
|------------------------|---------------------------|------------------------|------------|
| Client: | Department of Environment | COC Number: | 850423 |
| Attention: | Ms. Leona Hyde | Date Reported: | 2019-10-30 |
| Client Project: | | Date Submitted: | 2019-10-21 |
| Purchase Order: | 2180014303 | Sample Matrix: | Water |

| <u>LAB ID</u> | <u>Supply / Description</u> | <u>Client Sample ID</u> | <u>Sample Date</u> | <u>ANALYTE</u> | <u>UNIT</u> | <u>MRL</u> | <u>RESULT</u> |
|---------------|-----------------------------|-------------------------|--------------------|------------------------|-------------|------------|---------------|
| 1461320 | WS-S-0000 | 2019-6338-00-SI-SP | 2019-10-16 | Uranium | mg/L | 0.001 | <0.001 |
| | Pumphouse Stream | | | Zinc | mg/L | 0.01 | <0.01 |
| | | | | Phosphorus | mg/L | 0.002 | 0.002 |
| | | | | Total Suspended Solids | mg/L | 2 | 5 |

Report comment:

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APPROVAL:

Addrine Thomas