Real Time Water Quality Report
Teck Duck Pond Operations
Deployment Period 2009-07-27 to 2009-09-01

General

- Water Resources Management Division (WRMD) staff monitors the real-time web page on a daily basis. Any unusual observations are investigated, with site visits being carried out as warranted.
- Management at Teck Duck Pond Operations are informed of any significant water quality events or instrumentation problems by WRMD.
- Tributary to Gills Pond Brook Station is located 1700 m downstream of the final discharge point for the mine's Polishing Pond. This station is located such that any impacts from the mine discharge on receiving waters can be measured.
- East Pond Brook Station is located several kilometres downstream of the Tailings Management Area. This station is located such that any surface water impacts from the Tailing Management Area via seepage through Dam A may be measured.
- Monitoring Well After Tailings Dam Station is located near Tailings Dam A. This station is located such that any ground water impacts from the Tailing Management Area via seepage through Dam A may be measured.
- The graphs below may sometimes show vertical lines from the data string to zero or the bottom of the graph. These lines indicate when a probe was off-line or removed from service.
- There was effluent from Polishing Pond into the receiving waters (Tributary to Gills Pond Brook) from the beginning of the deployment period to July 30, 2009, August 8, 2009 to August 13, 2009, and August 20, 2009 to August 26, 2009.
- Raw (uncorrected) data has been used in the preparation of the graphs and subsequent discussion below.

Maintenance and Calibration of Instrumentation

- The regular **DataSonde®** usually deployed in Tributary to Gills Pond Brook experienced a communications issue during calibration, thus an alternate instrument having the same technical specifications was installed at this location. The regular instrument was installed in East Pond Brook. After being cleaned and freshly calibrated, both instruments were deployed from July 29, 2009 until September 1, 2009; a 34 day period.
- The **Quanta G®** probe remained deployed continuously in Monitoring Well After Tailings Dam Station (MW1) since May 5, 2009. It is anticipated that this probe will remain deployed until late in the fall. In this deployment report, that covers a 36 day period.
- *In-situ* measurements of ambient water quality were undertaken with a freshly calibrated **MiniSonde®** each time a **DataSonde®** was removed or deployed. No *in situ* measurements can be taken in the Monitoring Well.
- The comparative results between the **MiniSonde®** and **DataSonde®** values at the beginning and end of the deployment period are shown in **Table 1** for Tributary to Gill's Pond Brook and **Table 2** for East Pond Brook.

Tributary to Gills Pond Brook Station (NF02YO0190)				
Date (yyyy-mm-dd)	**Parameter**	**MiniSonde® Data**	**DataSonde® Data**	**Rating**
2009-07-29 Installation	Temp (°C)	19.05	19.08	Excellent
	pH (units)	6.81	6.85	Excellent
	Sp. Conductivity (uS/cm)	522.1	523.6	Excellent
	Dissolved Oxygen (mg/L)	8.92	8.90	Excellent
	Turbidity (NTU)	0.0	1.6	Excellent
2009-09-01 Removal	Temp (°C)	13.35	13.22	Excellent
	pH (units)	6.36	6.29	Excellent
	Sp. Conductivity (uS/cm)	31.3	31.4	Excellent
	Dissolved Oxygen (mg/L)	9.77	9.88	Excellent
	Turbidity (NTU)	0.6	0.0	Excellent

Table 1

East Pond Brook Station (NF02YO0192)				
Date (yyyy-mm-dd)	**Parameter**	**MiniSonde® Data**	**DataSonde® Data**	**Rating**
2009-07-29 Installation	Temp (°C)	20.02	20.25	Good
	pH (units)	7.04	7.00	Excellent
	Sp. Conductivity (uS/cm)	32.1	32.2	Excellent
	Dissolved Oxygen (mg/L)	8.99	8.94	Excellent
	Turbidity (NTU)	0.0	0.0	Excellent
2009-09-01 Removal	Temp (°C)	14.16	14.08	Excellent
	pH (units)	6.00	6.13	Excellent
	Sp. Conductivity (uS/cm)	18.6	18.4	Excellent
	Dissolved Oxygen (mg/L)	9.84	9.85	Excellent
	Turbidity (NTU)	0.0	11.7	Poor

Table 2

Data Interpretation

TRIBUTARY TO GILLS POND BROOK

- The water temperature (**Figure 1**) decreased slightly over the deployment period. Temperature values ranged from a minimum of 9.47 ˚C to a maximum of 25.29 ˚C.

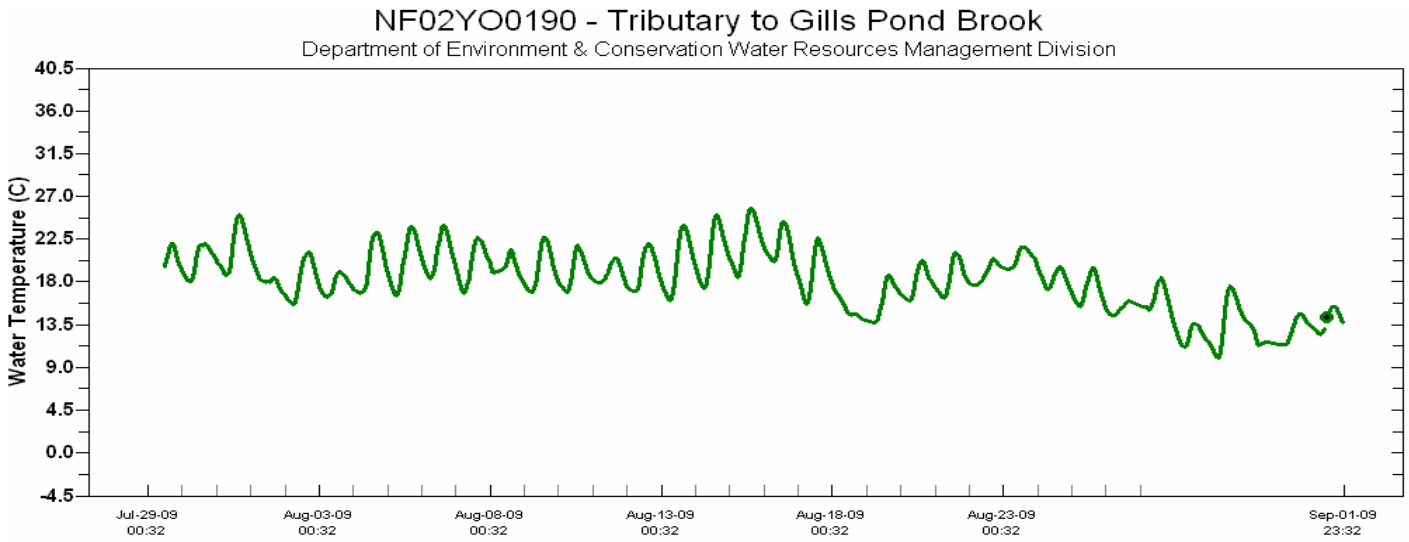

Figure 1

- Throughout the deployment period pH values (**Figure 2**) ranged from a minimum of 5.95 to a maximum of 7.25 with a few of the values falling below the recommended range (6.5 – 9.0) for the CCME *Canadian Water Quality Guidelines for the Protection of Aquatic Life*. The background pH of this stream is normally around the lower limit of the recommended range. The number of sudden drops in pH correspond to an increases in runoff following a significant precipitation event.

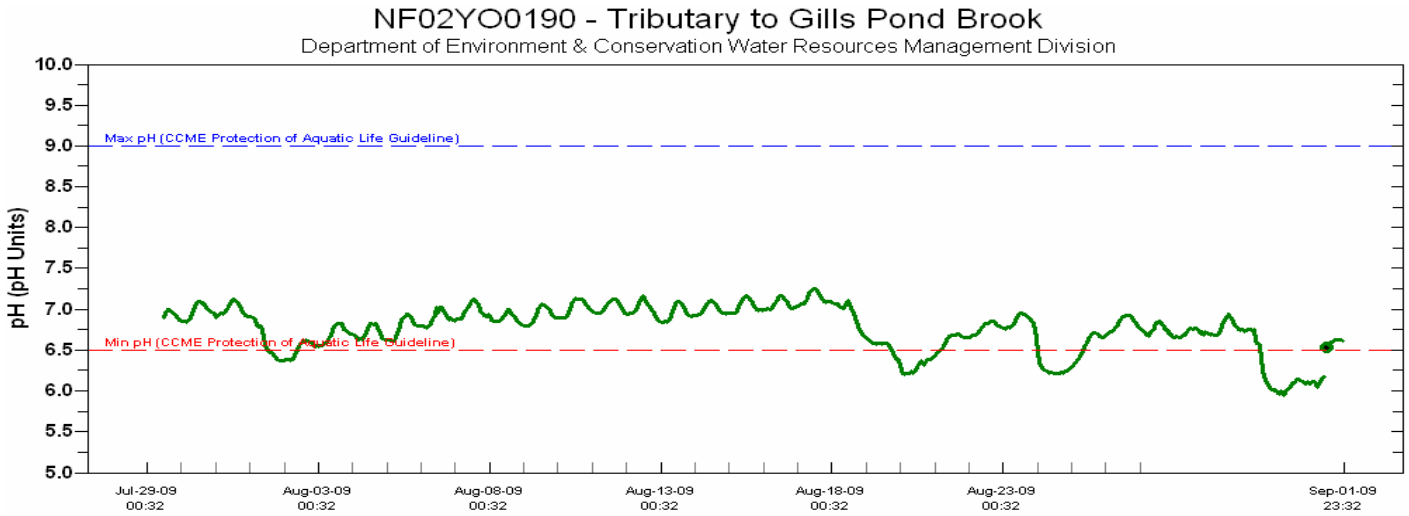

Figure 2

- The specific conductance **(Figure 3)** ranged from a minimum of 29.5 µS/cm to a maximum of 687.0 µS/cm over the deployment period. During the discharge periods from Polishing Pond (from the beginning of the deployment period to July 30, 2009, August 8, 2009 to August 13, 2009, and August 20, 2009 to August 26, 2009) there are marked increases in conductivity. The 'V' shaped dips in conductivity in early August and August 24, 2009 are the result of dilution caused by a significant precipitation events.

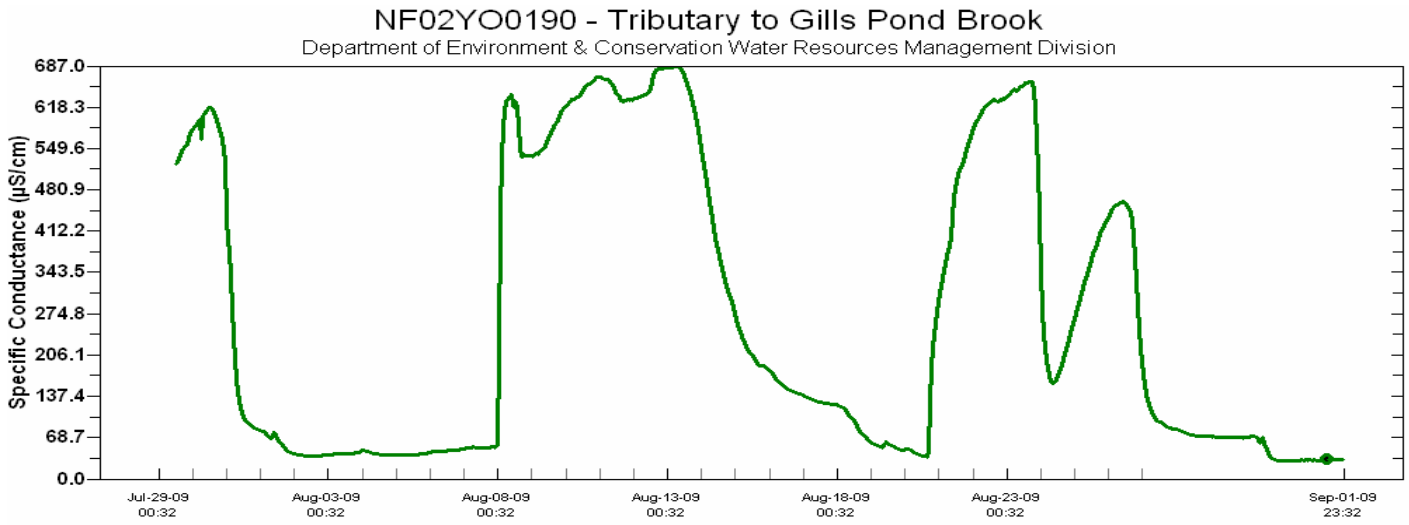

Figure 3

- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 7.39 mg/L to a maximum of 10.70 mg/L over the deployment period. Dissolved oxygen is inversely proportional to water temperature. Throughout the deployment period, all dissolved oxygen values fell above the lower limit recommended by CCME *Canadian Water Quality Guidelines for the Protection of Aquatic Life* (cold water/other life stages – above 6.5 mg/L; cold water/early life stages – above 9.5 mg/L).

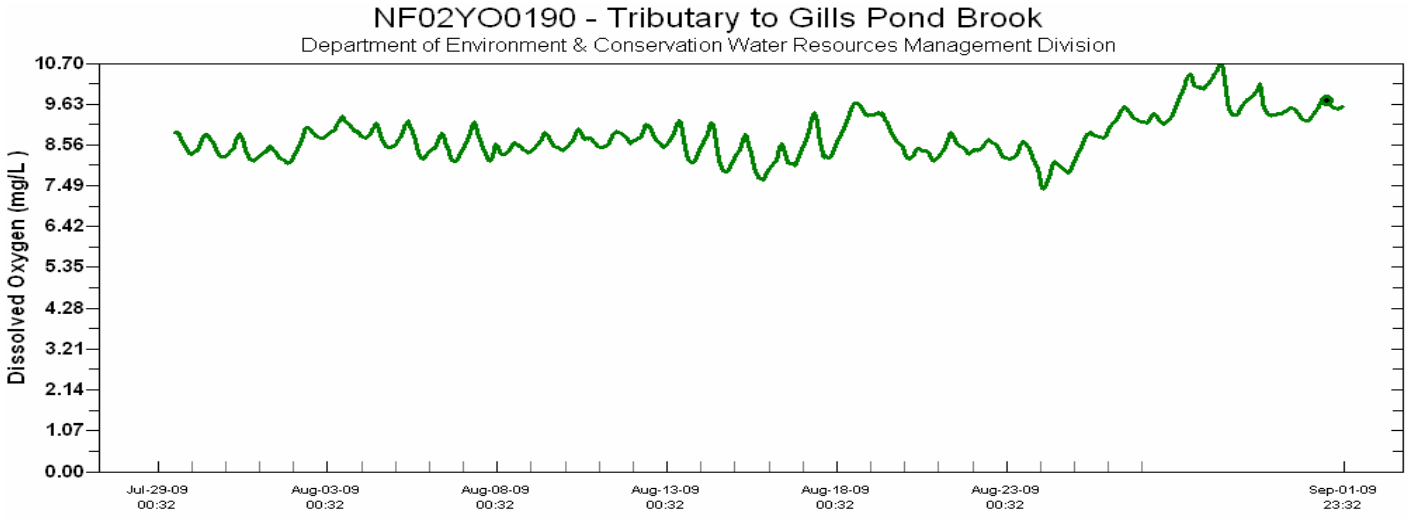

Figure 4

- The turbidity values **(Figure 5)** were all reported to be 3000.0 NTU. Values of 3000.0 NTU are system errors and are considered to be incorrect. Accordingly, all real-time turbidity values for this parameter for this deployment period must be ignored. It is important to note though, that several *in situ* and grab sample measurements taken by staff of Department of Environment and Conservation and Teck Duck Pond Operations, recorded turbidity to be no greater than 1.86 NTU.

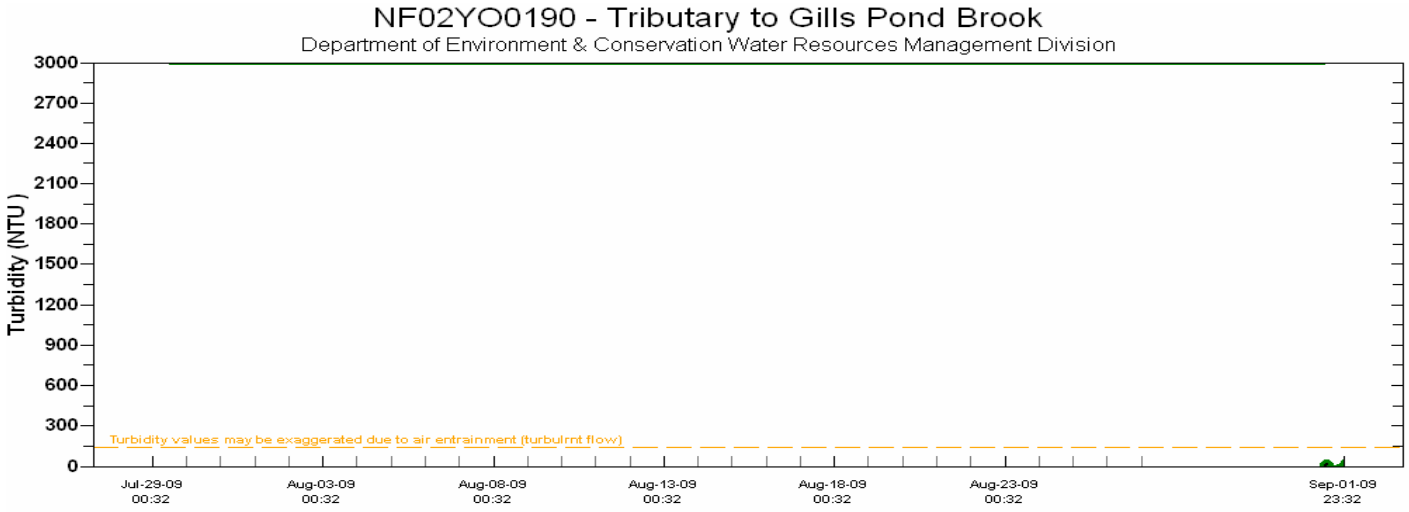

Figure 5

- The stage (**Figure 6)** or water level ranged from a minimum of 1.23 m to a maximum of 1.61 m with the highest peaks corresponding to precipitation events.

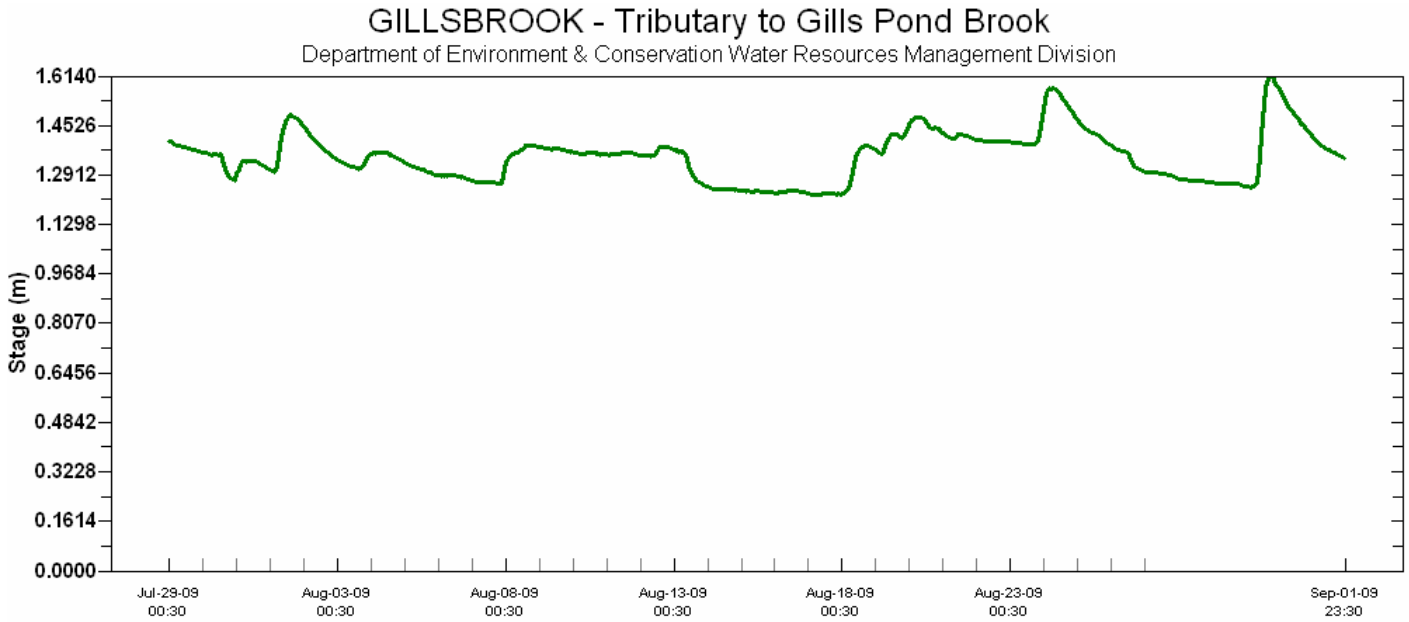

Figure 6

EAST POND BROOK

- The water temperature (**Figure 7**) decreased slightly over the deployment period, ranging from a minimum of 10.31 ˚C to a maximum of 25.27 ˚C.

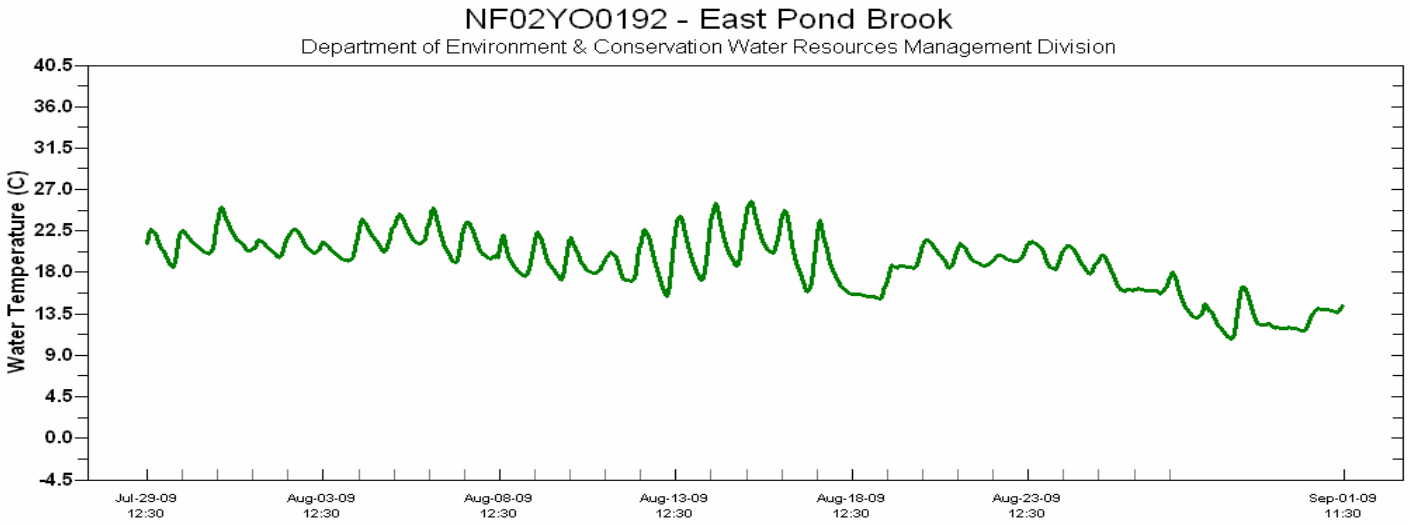

Figure 7

- pH values (**Figure 8**) generally decreased over the deployment period ranging between a minimum of 5.67 and maximum of 7.16. For most of the deployment period, pH values were above the lower limit of the recommended range (6.5 – 9.0) for the CCME *Canadian Water Quality Guidelines for the Protection of Aquatic Life*. The background pH of this stream is normally quite low, and values below the limit are not unusual.

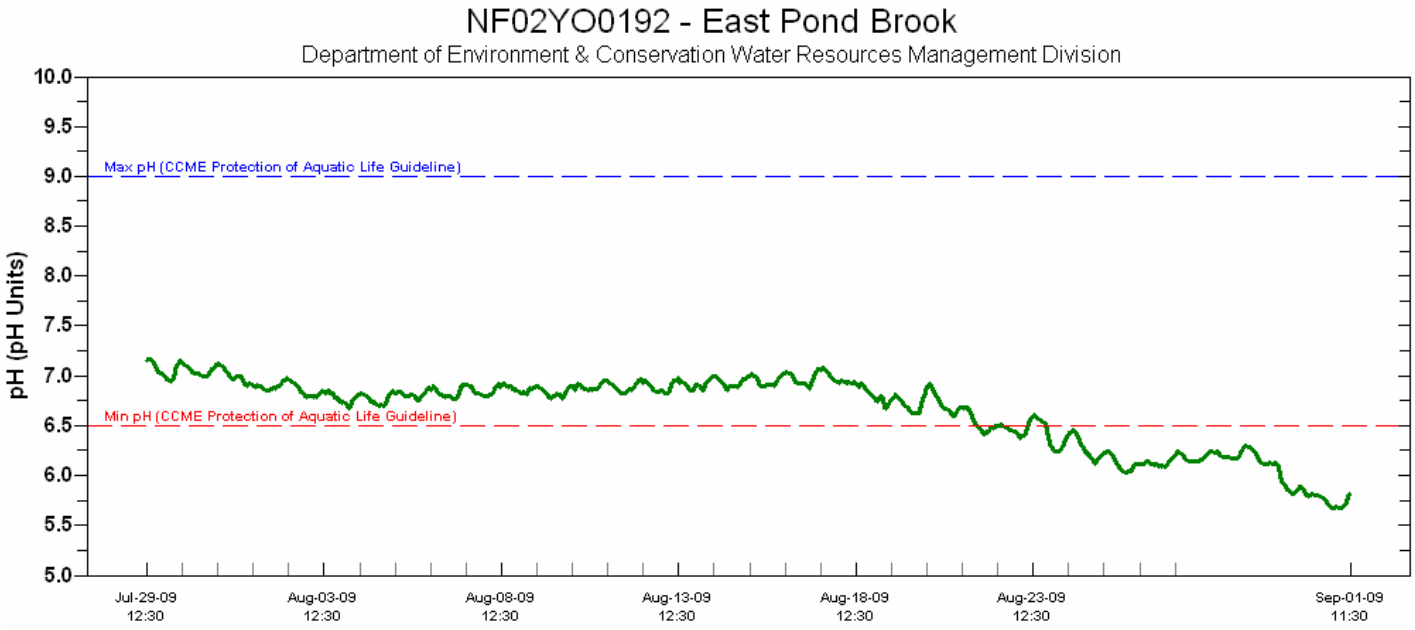

Figure 8

- The specific conductance **(Figure 9)** ranged from a minimum of 18.2 µS/cm to a maximum of 37.4 µS/cm. Lowest conductivity values correspond to periods of precipitation and high runoff.

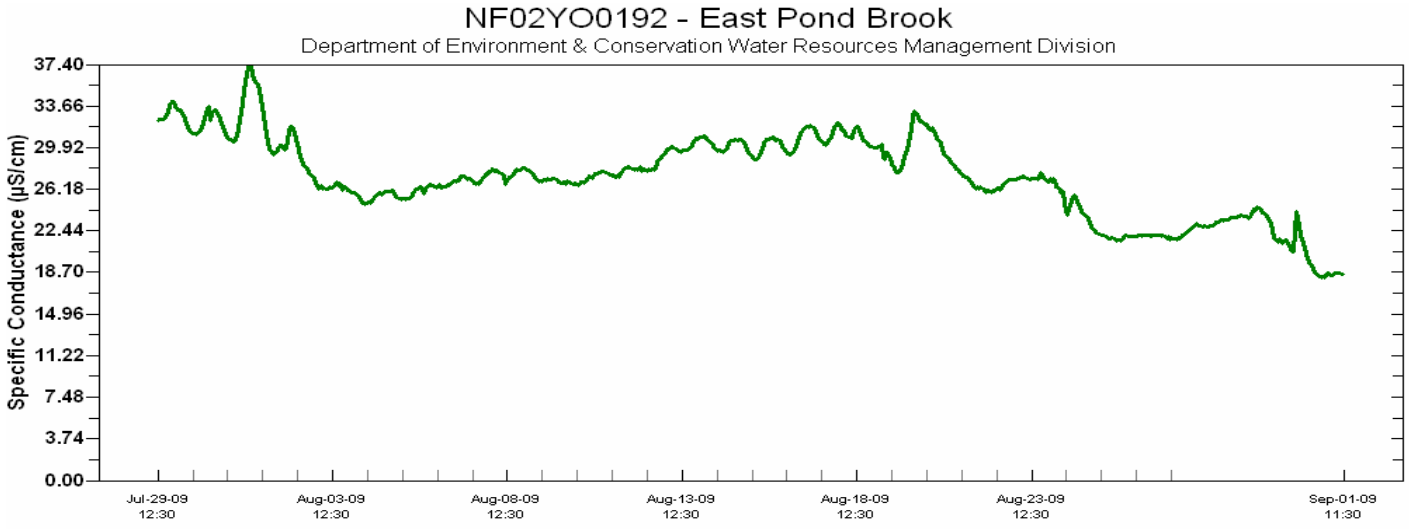

Figure 9

- The dissolved oxygen (**Figure 10**) values ranged from a minimum of 7.94 mg/L to a maximum of 10.67 mg/L over the deployment period. Dissolved oxygen is inversely proportional to water temperature. Throughout the deployment period, all dissolved oxygen values fell above the lower limit recommended by CCME *Canadian Water Quality Guidelines for the Protection of Aquatic Life* (cold water/other life stages – above 6.5 mg/L; cold water/early life stages – above 9.5 mg/L).

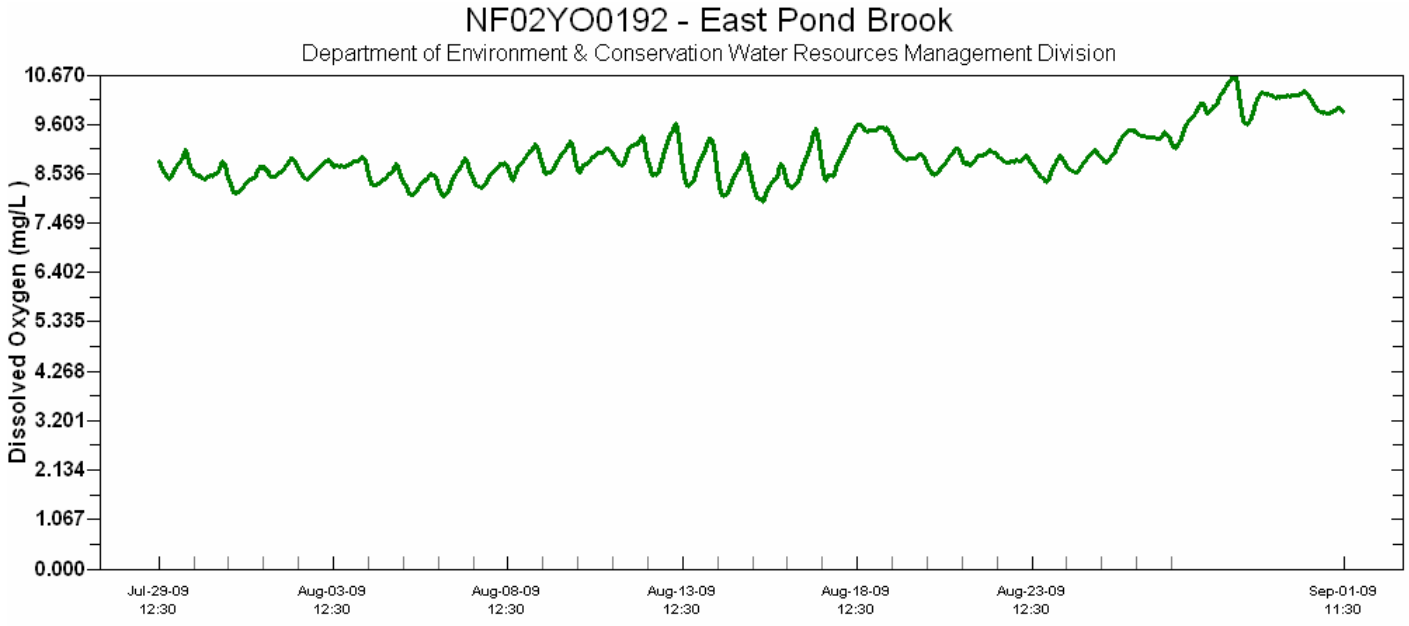

Figure 10

- The turbidity values **(Figure 11)** ranged from a minimum of 0.0 NTU to a maximum of 468.0 NTU. The high turbidity values after August 21, 2009 are the result of leafy debris caught in the sensor. The DataSonde reported 11.7 NTU immediately prior to removal. There were no unusually high *in situ* measurements, and no evidence of water quality impairment.

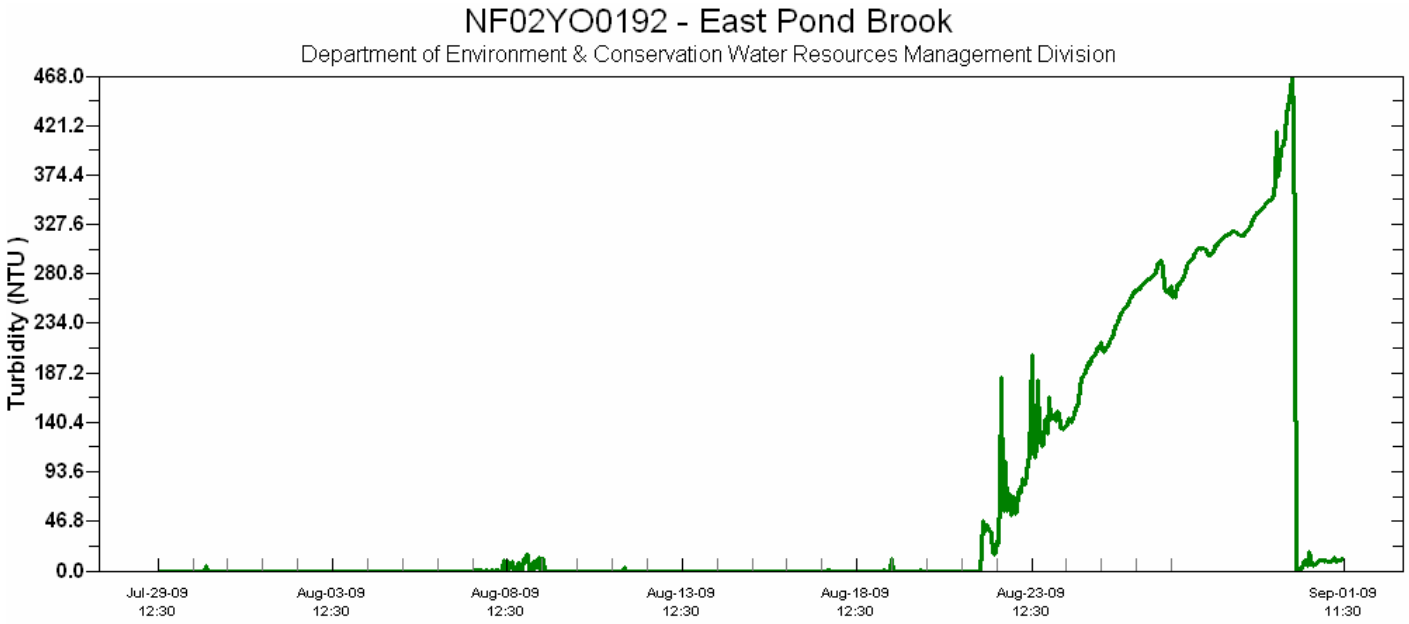

Figure 11

- The stage **(Figure 12)** or water level ranged from a minimum of 0.97 m to a maximum of 1.78 m. The highest peaks are the result of precipitation events.

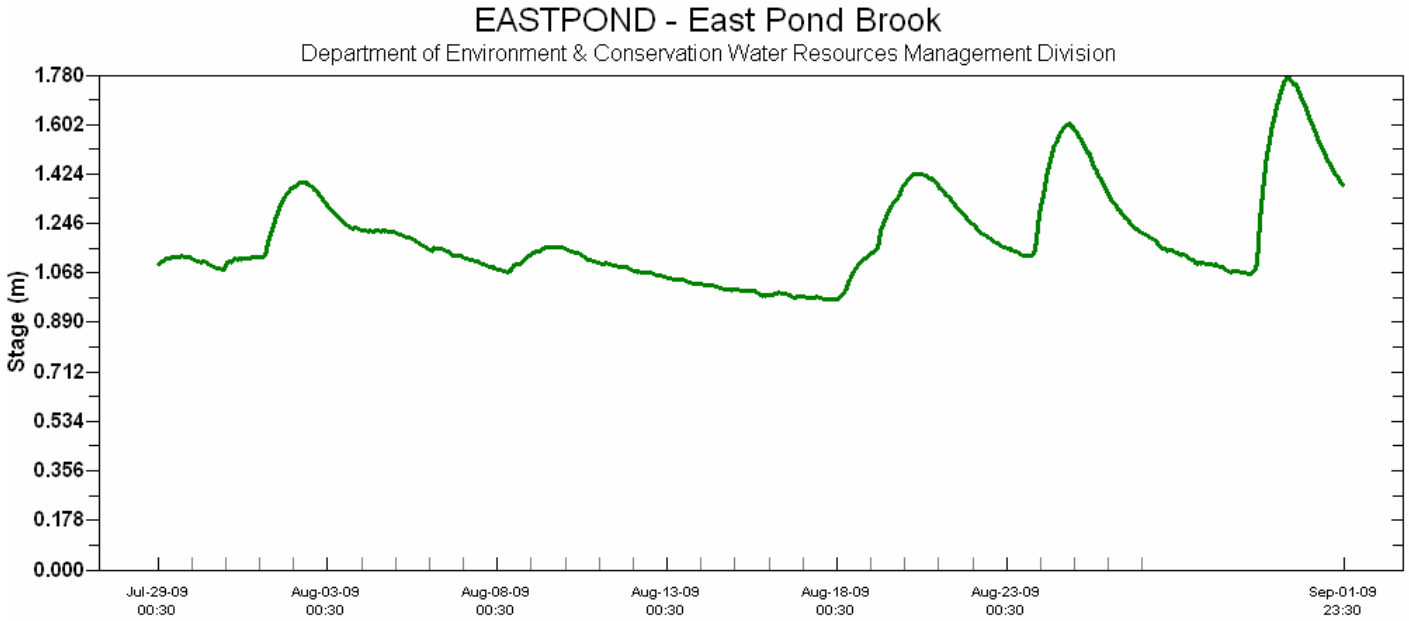

Figure 12

WELL AFTER TAILING DAM A

- Throughout the deployment period, water temperature (**Figure 13**) remained constant ranging between 4.79 ^{o}C and 5.02 ^{o}C.

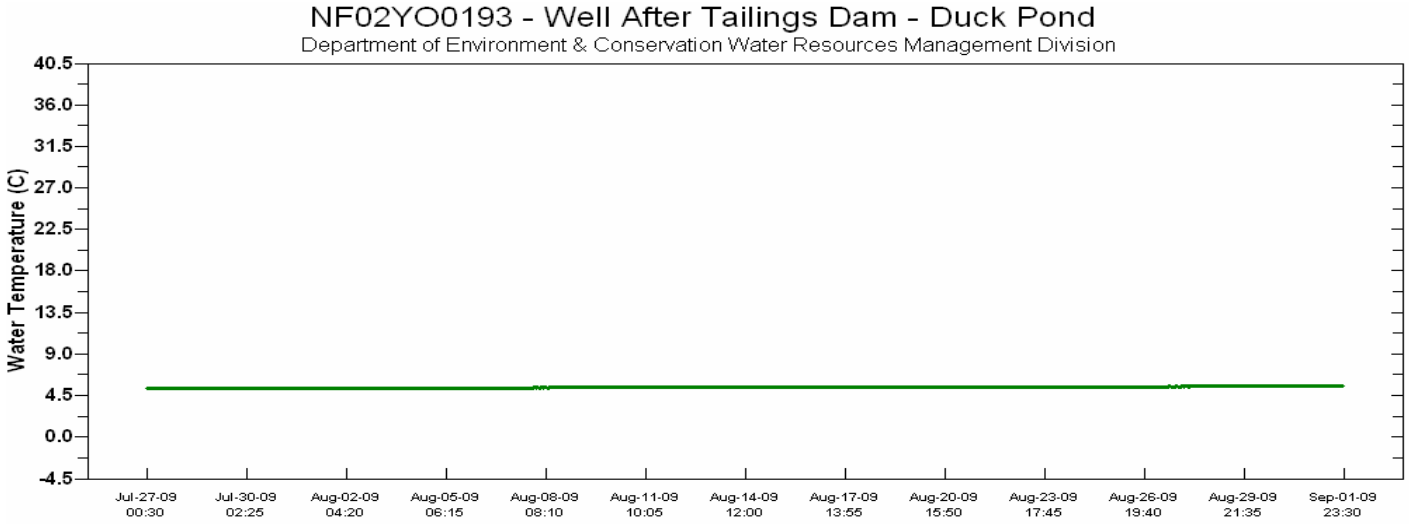

Figure 13

- The pH **(Figure 14)** remained fairly constant between a minimum of 8.72 and 8.83 throughout the deployment period.

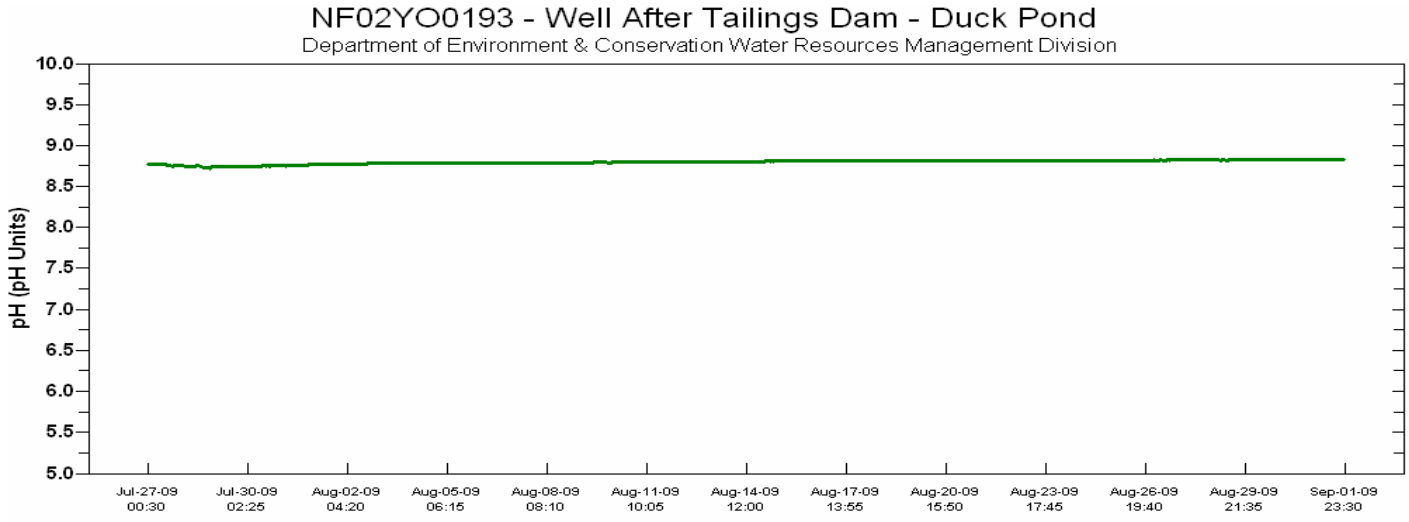

Figure 14

- Specific Conductance (**Figure 15**) increased slightly over the deployment period ranging from a minimum of 0.437 mS/cm to a maximum of 0.449 mS/cm.

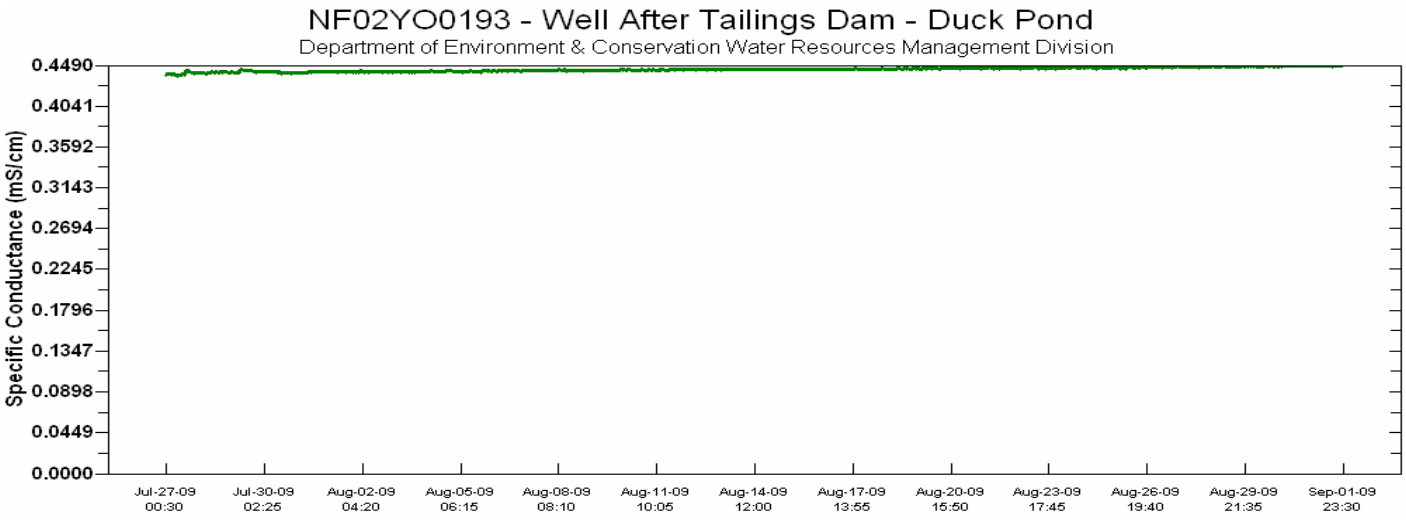

Figure 15

- The water level (**Figure 16**) remained constant throughout the deployment period, ranging from a minimum of 271.05 m to a maximum of 271.18 m.

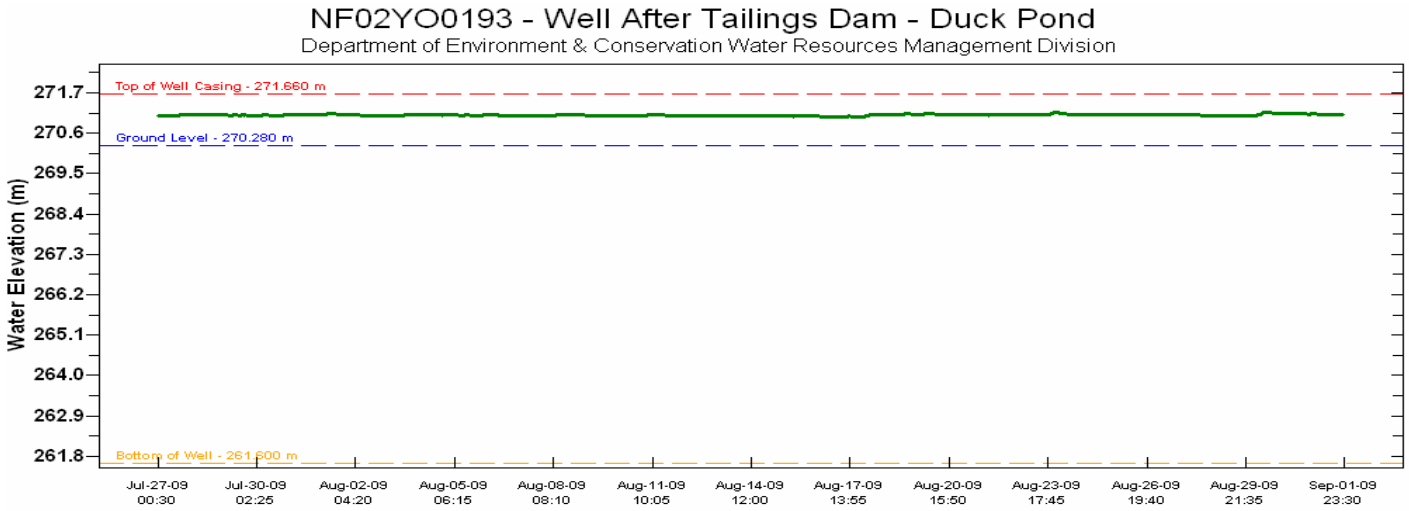

Figure 16

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