Real Time Water Quality Report
Aur Resources: Duck Pond Mine
Deployment Period 2007-09-27 to 2007-11-02

General

- The Water Resources Management Division's (WRMD) staff monitors the real-time web page on a daily basis. Any unusual observations are investigated, with site visits being carried our as warranted.
- Management at Aur Resources are informed of any significant water quality events or instrumentation problems by WRMD.
- It's apparent from viewing the graphs and data collected during this deployment period that only one hourly data point was collected at both the Gill's Pond Brook and East Pond Brook stations between 7:32PM October 14th and 7:32PM October 16th. This means that no data was collected for 47 hours between these dates. The one data point that does appear was collected at 7:32PM October 15th. This data transmission error will be investigated by both the provincial Department of Environment and Conservation and the federal Environment Canada.
- The 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 can be measured. A groundwater station with the designation "Monitoring Well after Tailings Dam A," has been established immediately downstream from tailings Dam A, in an effort to capture any changes in groundwater quality due to seepage from the tailings pond into the groundwater table.
- Raw (uncorrected) data has been used in the preparation of the graphs and subsequent discussion below.

Maintenance and Calibration of Instrumentation

- Following regular cleaning and calibration of the Datasondes, the instruments were installed in both the Tributary to Gills Pond Brook and East Pond Brook, on September 27, 2007 and remained deployed until November 2, 2007 (36-day deployment).
- The Quanta G monitoring probe was installed at the groundwater station (Well after Tailings Dam A) on September 28, and remained deployed until November 7, 2007 (40-day deployment).
- *In-situ* measurements of ambient water quality were undertaken with a freshly calibrated Minisonde each time a Datasonde was installed or removed. In-situ measurements were also taken in the groundwater well with a Minisonde, when the Quanta A was installed on September 28 and removed on November 2, 2008.
- 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.
- The comparative results between the Minisonde and Quanta A values at the beginning and end of the groundwater deployment period are shown in **Table 3.**

Table 1: QA/QC Data Comparison Ranking During Deployment Period (Gill's Pond Brook)

Station	Date	Action	Minisonde vs. Datasonde Comparison Ranking			
			Temperature	pH	Conductivity	Dissolved Oxygen
Tributary to Gill's Pond Brook	2007-09-27	Installation	Excellent	Good	Marginal	Excellent
	2007-11-02	Removal	Excellent	Good	Poor	Excellent

Table 2: QA/QC Data Comparison Ranking During Deployment Period (East Pond Brook)

Station	Date	Action	Minisonde vs. Datasonde Comparison Ranking			
			Temperature	pH	Conductivity	Dissolved Oxygen
East Pond Brook	2007-09-27	Installation	Good	Excellent	Excellent	Excellent
	2007-11-02	Removal	Excellent	Excellent	Poor	Excellent

Table 3: QA/QC Data Comparison Ranking During Deployment Period(Well After Tailings Dam A)

Station	Date	Action	Minisonde vs. Datasonde Comparison Ranking		
			Temperature	pH	Conductivity
Well After Tailings Dam A	2007-09-28	Installation	Excellent	Poor	Excellent
	2007-11-07	Removal	Excellent	Good	Excellent

Data Interpretation

TRIBUTARY TO GILLS POND BROOK

- Water temperature (**Figure 1**) displayed a decreasing trend for the deployment period, with obvious diurnal fluctuations. Decreasing water temperature corresponds with overall decreasing air temperatures for the same period, which are shown in the Daily Climate Data found in **Appendix A**, at the end of this report. Water temperatures ranged between 2.54 and 15.3 ^{o}C during this deployment.

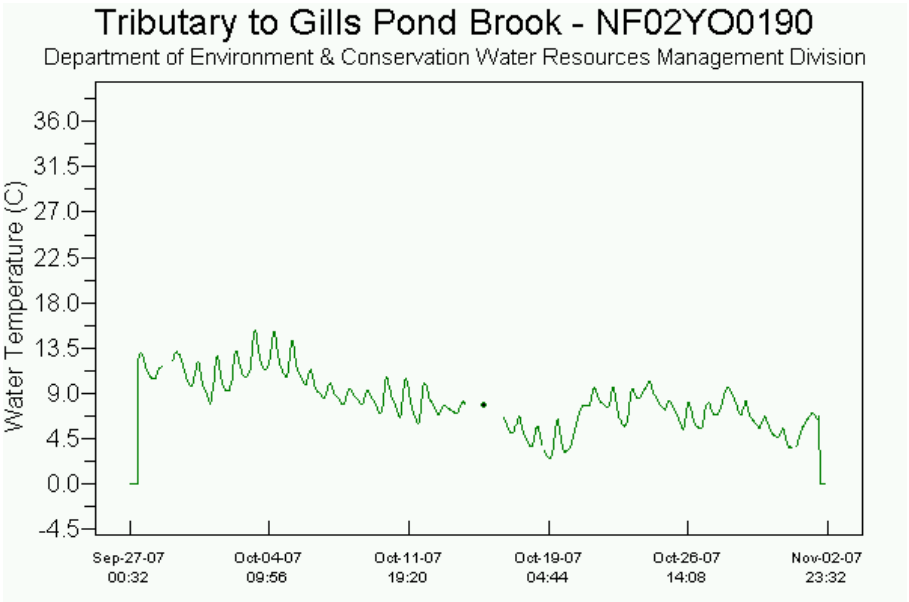


Figure 1

- pH values (**Figure 2**) were fairly constant during this deployment, ranging from 6.86 to 7.56 pH units, with all values falling within the recommended range (6.5 – 9.0) for the CCME *Canadian Water Quality Guidelines for the Protection of Aquatic Life*.

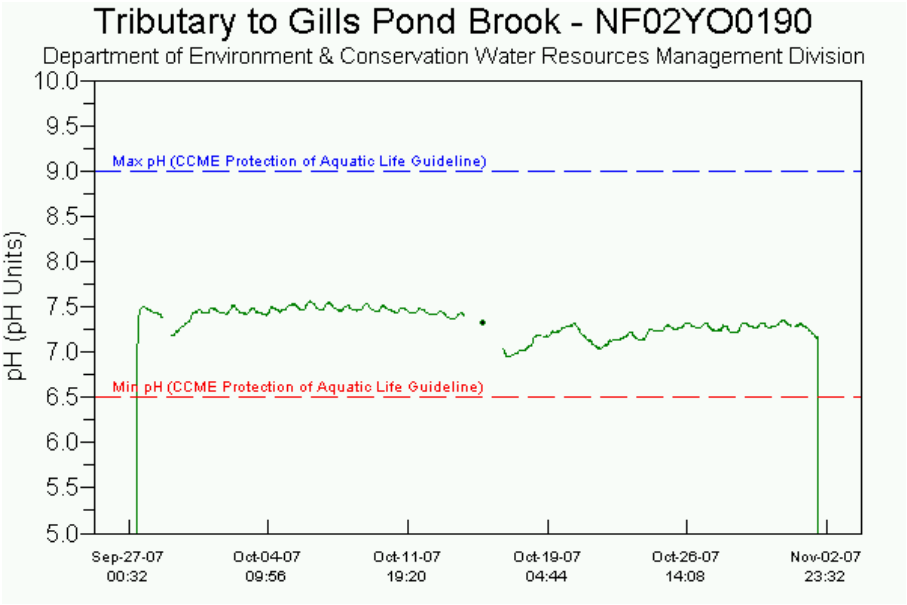


Figure 2

- Specific conductance values **(Figure 3)** remain at elevated levels in Gill's Pond Brook, as continuous and controlled effluent discharge from the Polishing Pond was on-going for the duration of this deployment. Conductivity levels decreased in response to significant rainfall on October 20th and 21st. Specific conductivity values ranged between 218 and 412µS/cm during the deployment period.

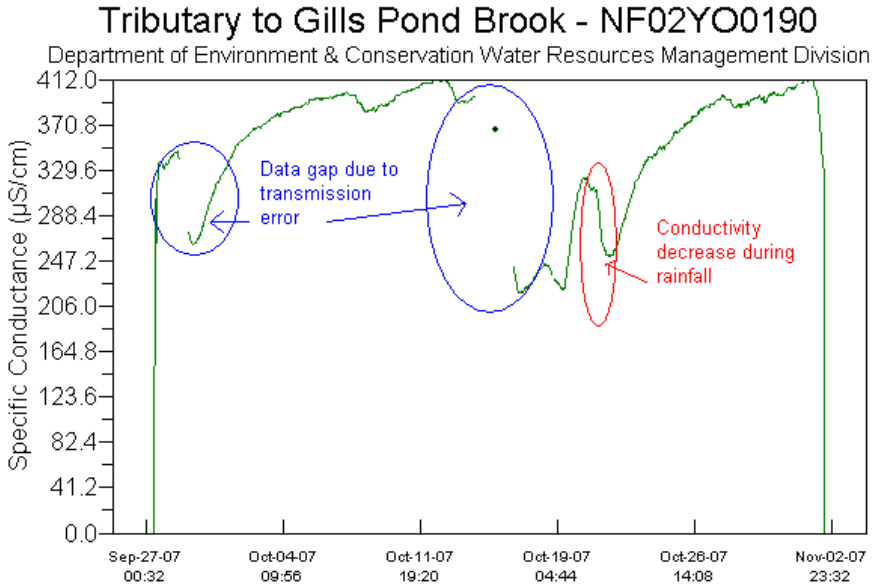


Figure 3

- Dissolved oxygen (DO) (**Figure 4**) ranged between 9.80 and 13.07mg/L during this deployment, and the increasing and decreasing values appear to demonstrate an inverse relationship with water temperature. From October 4th to October 20th water temperature **(Figure1)** steadily decreased. By contrast, DO levels steadily increased from October 4th - 20th, demonstrating that warmer water generally holds less oxygen than colder water. DO levels in Gill's Pond Brook closely resemble DO levels in East Pond Brook, suggesting that effluent discharge from the Polishing Pond doesn't appear to have a significant impact on DO levels in Gill's Pond Brook. All DO values fell above the recommended minimum CCME *Canadian Water Quality Guidelines for the Protection of Aquatic Life* for dissolved oxygen (cold water/other life stages – above 6.5 mg/L; cold water/early life stages – above 9.5 mg/L; warm water/other life stages – above 5.5 mg/L; warm water/early life stages – above 6 mg/L).

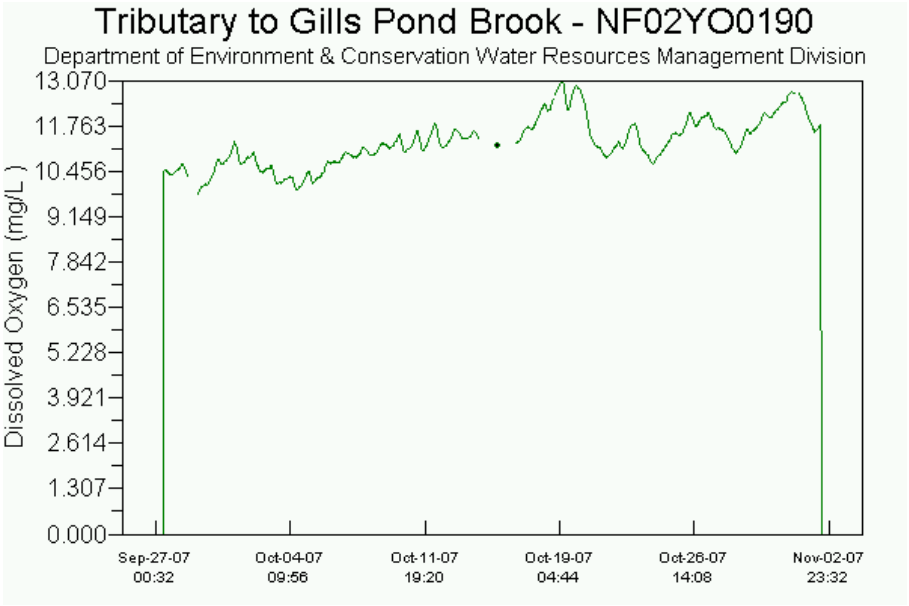


Figure 4

- Turbidity values **(Figure 5)** constantly fluctuated during this deployment, due to the influences of rainfall, and the impacts of effluent discharge from the Polishing Pond. Turbidity values ranged from a minimum of 0 to 62.3 NTU during this deployment.

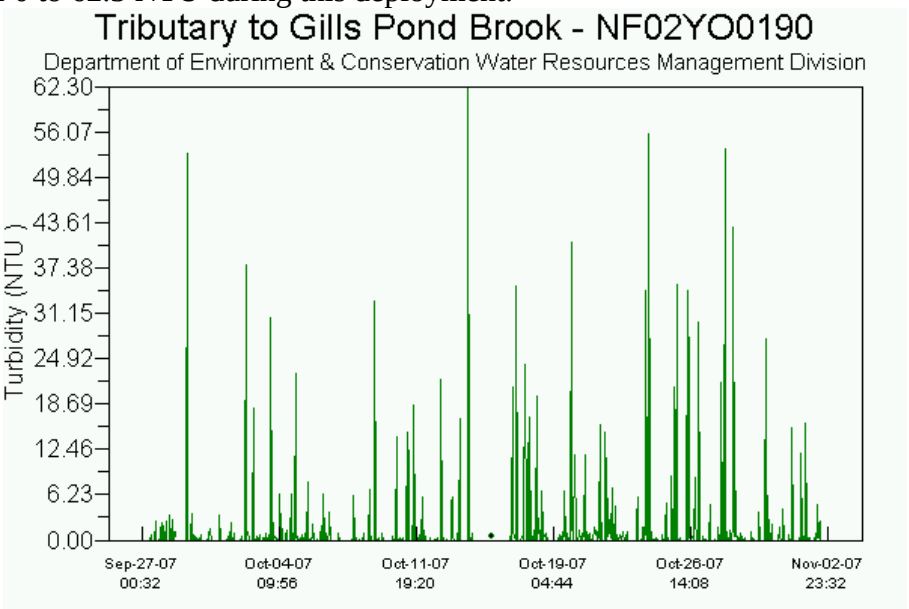


Figure 5

- The stage height **(Figure 6)** (or water level) increased during periods of significant rainfall on October 13th - 16th and October 20th - 21st. Stage height ranged between 1.31 and 1.43m during this deployment.

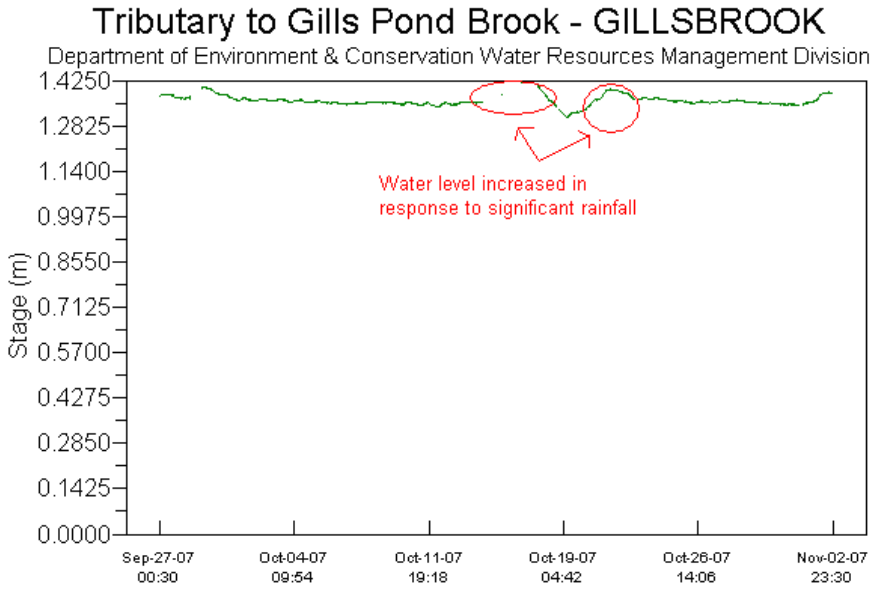
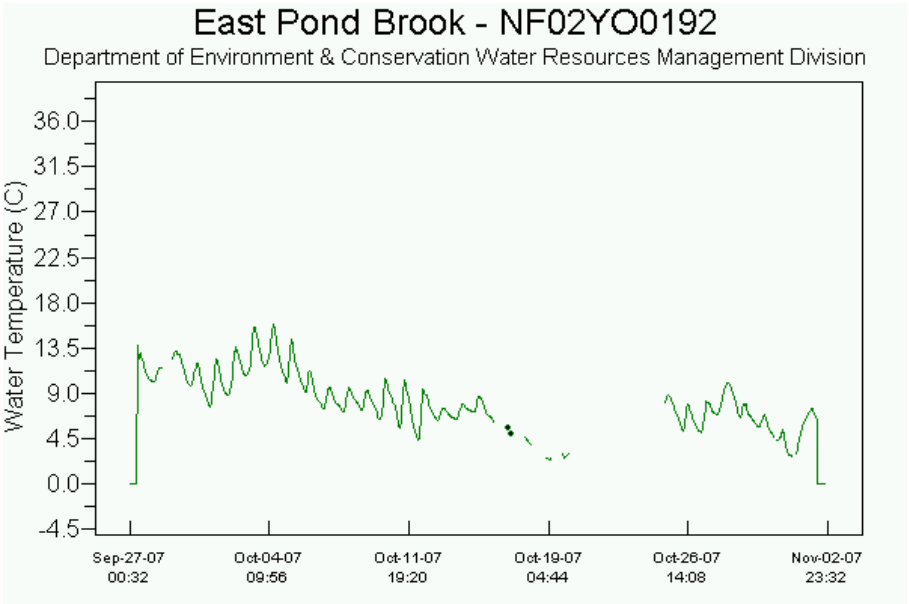


Figure 6

EAST POND BROOK

- Water temperature in East Pond Brook (**Figure 7**) followed an overall decreasing trend throughout the deployment period, corresponding with the decreasing trend in air temperature during the same period. Water temperature ranged from a minimum of 2.43˚ C to 15.8˚C during this period.



. **Figure 7**

- pH values (**Figure 8**) remained very stable throughout this deployment period, ranging from 6.67 to 7.01 pH units. All pH values fell within the range recommended by the CCME *Canadian Water Quality Guidelines for the Protection of Aquatic Life*, (6.5 – 9.0).

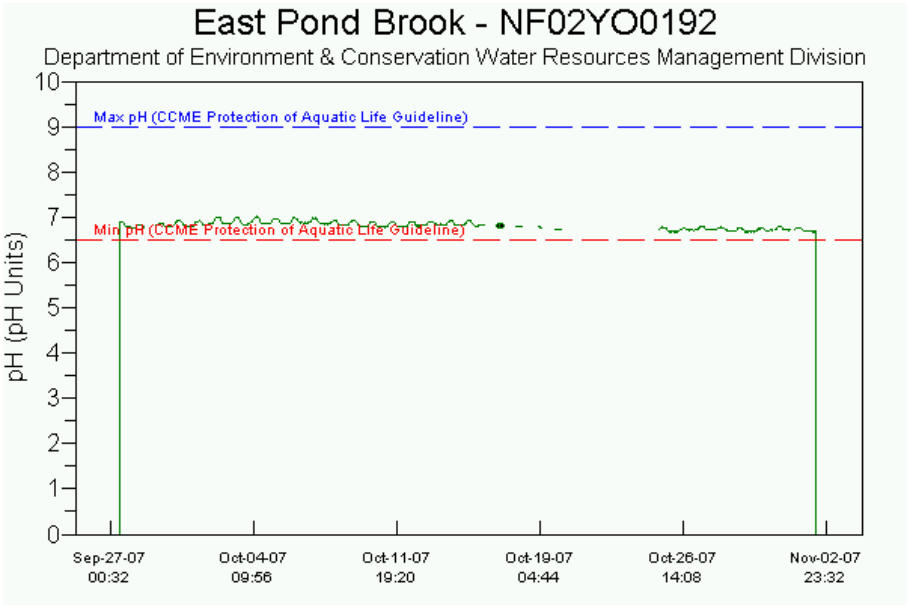


Figure 8

- Specific conductance (Figure 9) remained at background levels throughout the deployment period, ranging from 22.5 to 27.6µS/cm.

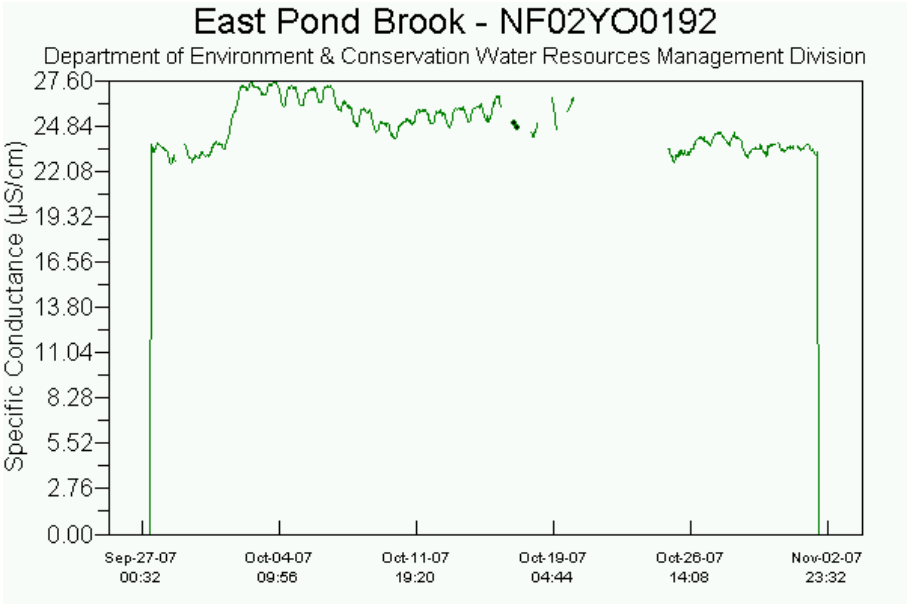


Figure 9

- The dissolved oxygen values (**Figure 10)** ranged from a minimum of 9.58mg/L to a maximum of 13.33mg/L over the deployment period. DO displayed an overall increasing trend throughout the deployment, which corresponds with an overall decreasing trend in water temperatures. All dissolved oxygen values fell above the recommended minimum CCME *Canadian Water Quality Guidelines for the Protection of Aquatic Life* for dissolved oxygen (cold water/other life stages – above 6.5 mg/L;

cold water/early life stages – above 9.5 mg/L; warm water/other life stages – above 5.5 mg/L; warm water/early life stages – above 6 mg/L). The DO range in East Pond Brook closely resembles DO range in Gill's Pond Brook for this deployment, indicating that effluent discharge from the Polishing Pond continues to have little impact on DO levels in Gill's Pond Brook.

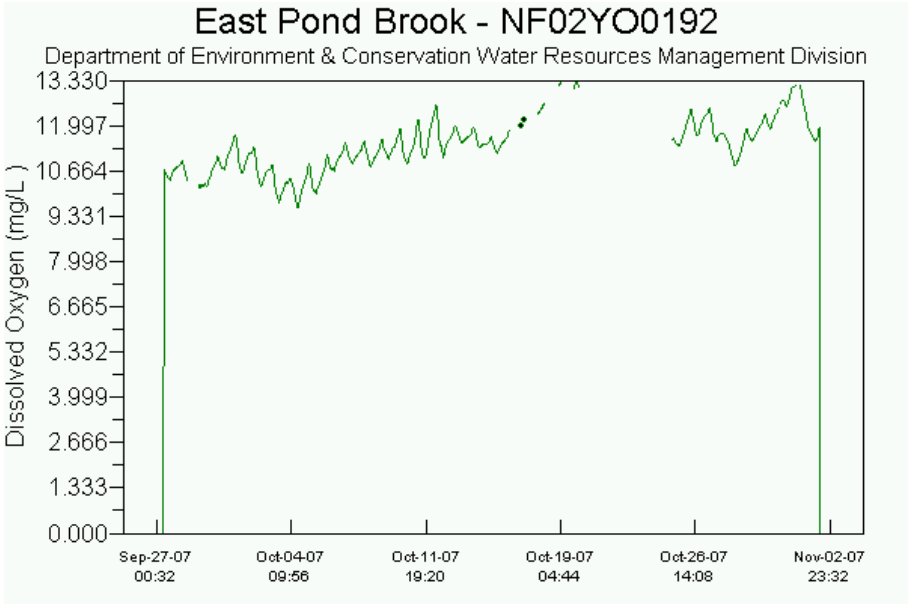


Figure 10

- The turbidity values **(Figure 11)** remained near natural background levels throughout the deployment period with the exception of one spike that occurred on October 11th. This quick spike in turbidity may have been the result of suspended debris coming in contact with the turbidity sensor when the sensor was taking a reading. Turbidity values ranged between 0 and 156.9 NTUs during this deployment.

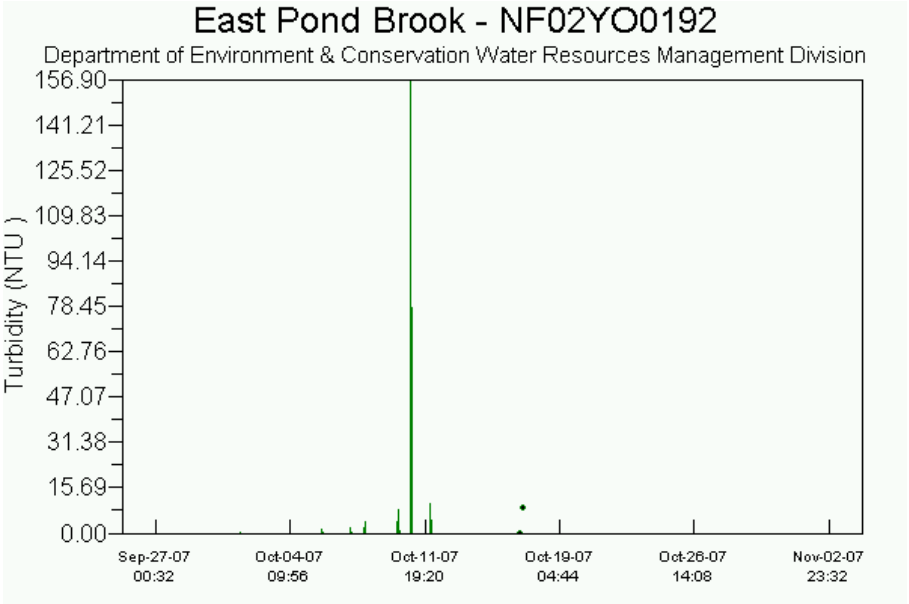


Figure 11

- The stage height **(Figure 12)** appears to have increased during periods of significant rainfall on October 13th -16th and October 20th -21st. Gaps in stage height data make it difficult to interpret the graph for this period. Stage height values ranged from a minimum of 0.097m to a maximum of 1.19m during this deployment. The downward spikes that appear in the graph on October 5th, 28th and 30th appear to be transmission errors.

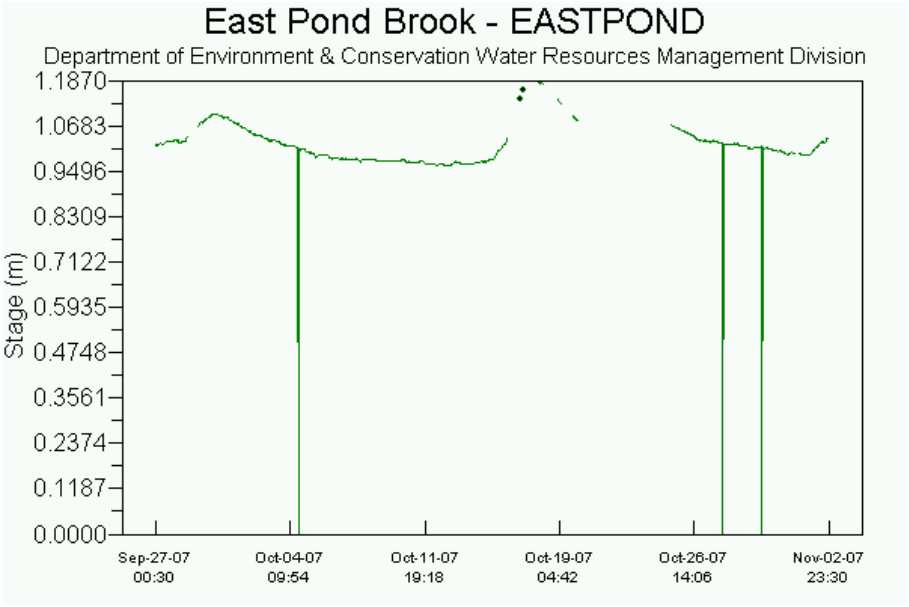


Figure 12

WELL AFTER TAILING DAM A

- The Quanta G was deployed in the groundwater well from September 28th to Novemebr 11, 2007.

- Groundwater temperatures (**Figure 13**) remained very steady, ranging between 4.91 and 5.23°C during this deployment period.

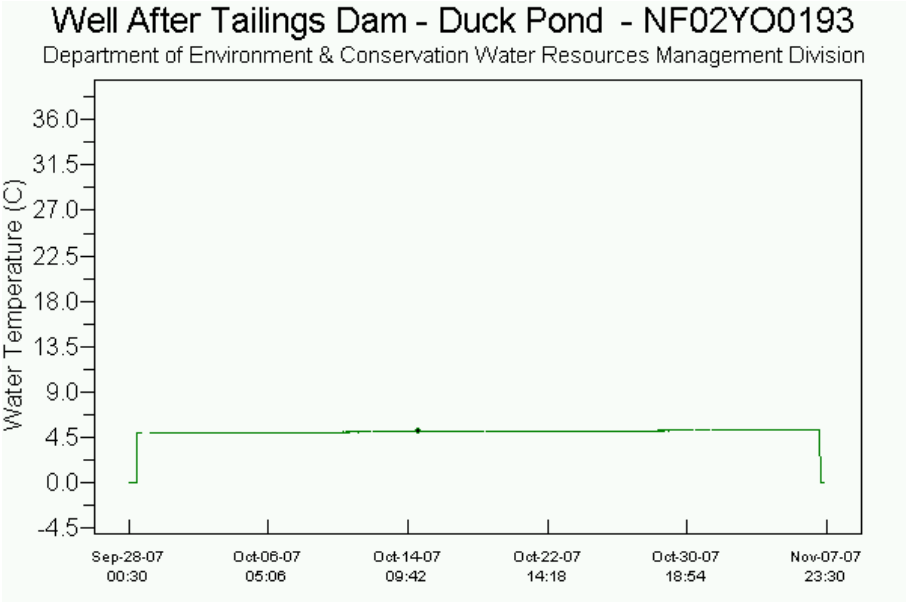


Figure 13

- Groundwater pH levels (**Figure14**) fluctuated between 7.9 and 9.0 pH units for the first 10 days of the deployment, and then remained very constant, near 9.1 pH units for the remainder of the period. The same type of pattern occurred during the previous deployment, when pH levels were variable during the first 10 days, and then settled at a very constant level for the remainder of the period.

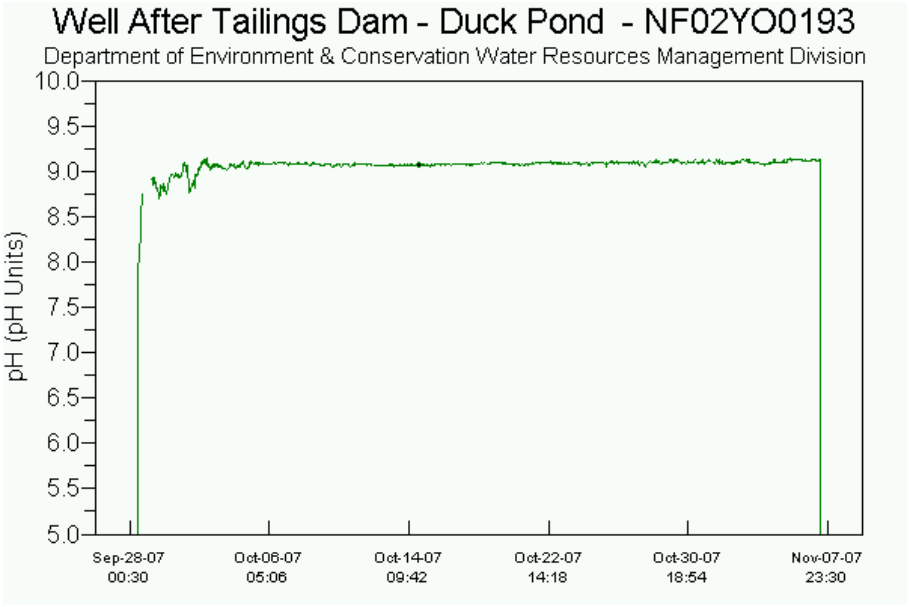


Figure 14

- Specific conductivity (**Figure 15**) values ranged from 299 to 337µS/cm and showed an increasing trend throughout this deployment period.

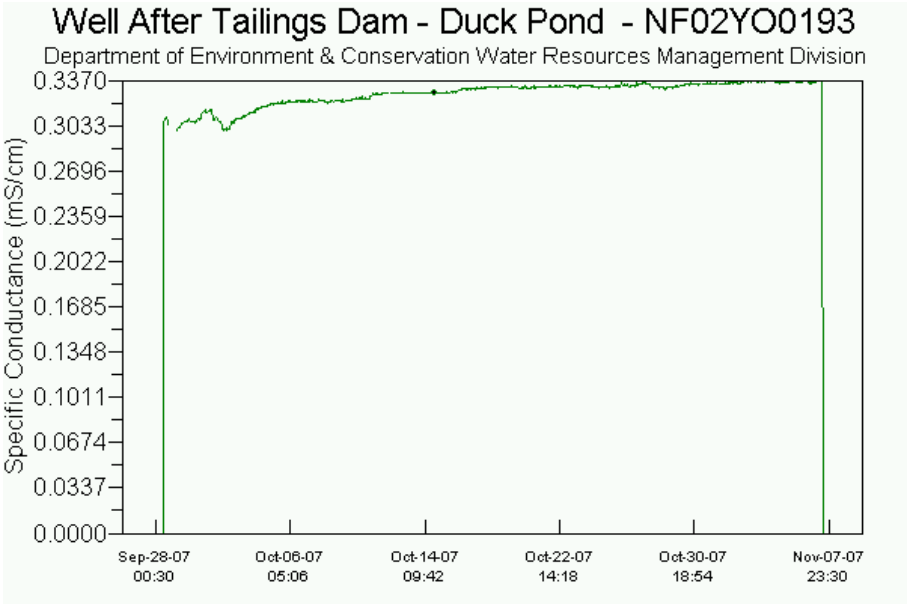


Figure 15

APPENDIX A

Daily Data Report for October 2007											
Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days °C	Cool Deg Days °C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
01†	15.9	-0.3	7.8	10.2	0.0	M	M	0.0		24	33
02†	19.1	6.2	12.7	5.3	0.0	M	M	0.0			<31
03†	22.1	5.9	14.0	4.0	0.0	M	M	0.0			<31
04†	20.6	5.3	13.0	5.0	0.0	M	M	0.0		26	39
05†	18.5	4.2	11.4	6.6	0.0	M	M	0.0		31	48
06†	11.0	2.1	6.6	11.4	0.0	M	M	0.6		30	43
07†	8.9	3.6	6.3	11.7	0.0	M	M	2.1		1	33
08†	9.9	4.9	7.4	10.6	0.0	M	M	4.7	4	35	43
09†	7.8	1.0	4.4	13.6	0.0	M	M	0.0	4	33	39
10†	11.0	-1.4	4.8	13.2	0.0	M	M	0.0	3		<31
11†	11.2	-3.8	3.7	14.3	0.0	M	M	0.0			<31
12†	12.5	-4.4	4.1	13.9	0.0	M	M	0.0			<31
13†	5.7	3.0	4.4	13.6	0.0	M	M	6.6			<31
14†	6.9	4.2	5.6	12.4	0.0	M	M	0.7	4		<31
15†	9.8	4.5	7.2	10.8	0.0	M	M	8.5	5		<31
16†	5.1	-0.2	2.5	15.5	0.0	M	M	7.1	4		<31
17†	7.3	-3.3	2.0	16.0	0.0	M	M	0.6	2	32	39
18†	4.9	-5.2	-0.2	18.2	0.0	M	M	0.0	5	27	44
19†	8.2	-4.7	1.8	16.2	0.0	M	M	0.0	4		<31
20†	14.8	-4.0	5.4	12.6	0.0	M	M	6.6	5	20	41
21†	15.3	9.3	12.3	5.7	0.0	M	M	4.7		27	43
22†	9.5	-2.3	3.6	14.4	0.0	M	M	0.0			<31
23†	16.2	-2.6	6.8	11.2	0.0	M	M	0.6	5	23	43
24†	14.8	1.8	8.3	9.7	0.0	M	M	0.6		30	44
25†	6.9	-2.1	2.4	15.6	0.0	M	M	0.0			<31
26†	11.2	-3.9	3.7	14.3	0.0	M	M	0.0	6	28	39
27†	14.1	-1.6	6.3	11.7	0.0	M	M	0.0		26	32
28†	14.2	6.3	10.3	7.7	0.0	M	M	3.4		19	52
29†	8.6	-1.2	3.7	14.3	0.0	M	M	0.0		26	32
30†	3.8	-1.1	1.4	16.6	0.0	M	M	2.0	4		<31
31†	2.9	-5.0	-1.1	19.1	0.0	M	M	0.0	6	33	33

Prepared by:

Joanne Sweeney
Environmental Scientist
Department of Environment and Conservation
Tel: **709-729-0351**
Fax: **709-729-0320**
e-mail: **joannesweeney@gov.nl.ca**