# Long Harbour Real-Time

# Water Quality Monitoring Network

## Annual Report

## 2008


Prepared by: Ryan Pugh
Department of Environment and Conservation
Ph: 709.729.16.81
Fx: 709.729.0320
ryanpugh@gov.nl.ca


Date: March 2, 2009

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# Introduction

The monitoring of Rattling Brook in Long Harbour, Newfoundland and Labrador has been ongoing since a Real-Time Water Quality station was commissioned in 2006. It is located on Rattling Brook in the vicinity of the planned Vale Inco nickel processing facility (47.414° latitude by -53.807° longitude as depicted in Figure 1). In the coming years, this station will be used to monitor for environmental compliance during the construction and operational phase. At this time, land clearing is slated to begin during spring 2009 followed by earth removal in summer 2009. Therefore, all data gathered prior to construction can be considered background level, or ambient, conditions.

The real-time quality station on Rattling Brook provided substantial baseline information throughout 2008. Due to communication problems, near real-time communication with the station was disrupted several times throughout 2008. As such, gaps exist in the graphs used throughout this report, especially between April 16 to June 9 and June 18 to August 21. To minimize loss of data, Environment Canada will be adjusting or replacing the communication

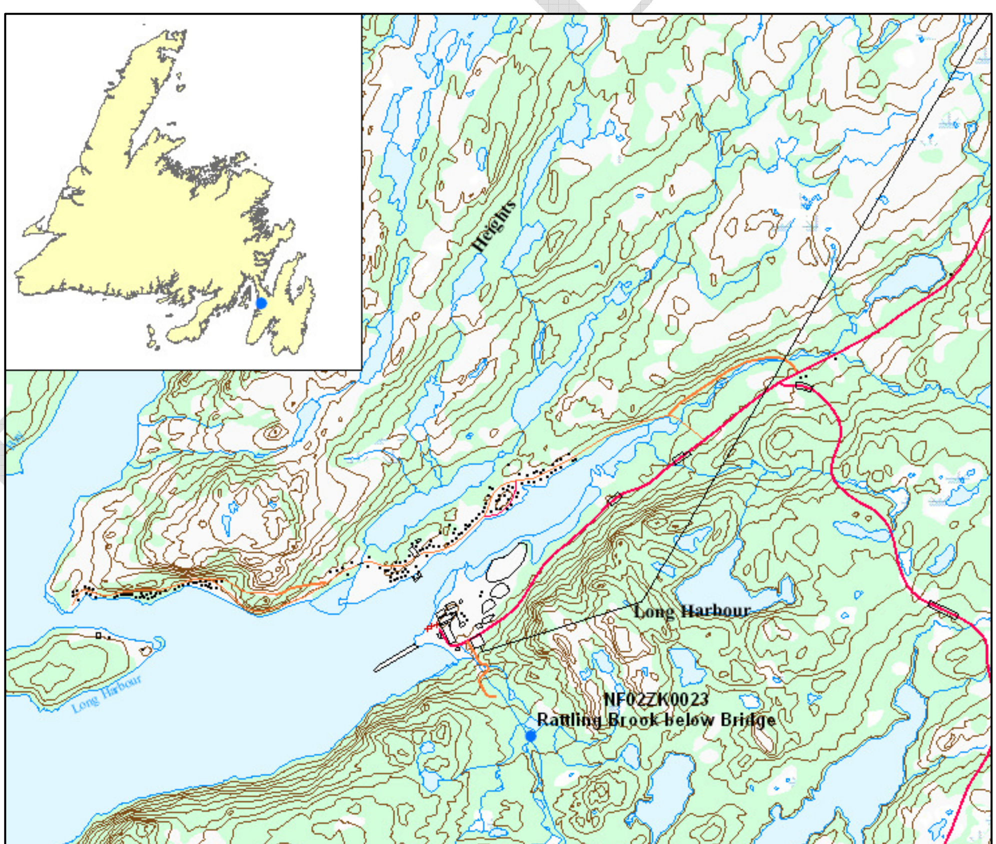



**Figure 1: Location of Rattling Brook station**

equipment (datalogger, antenna, or solar panels) to ensure it is functioning adequately early in 2009. Additionally, starting in February of 2009, data will be logged both within the instrument itself and the datalogger in the hut so that any gaps in data transmission may be filled once the instrument is retrieved for cleaning and calibration.

# Maintenance and Calibration

Adhering to strict maintenance and calibration schedules is very important in ensuring the integrity of the data from the real-time instrumentation. Deployment periods are limited to approximately one month (~30 days). At the end of a deployment period, a trip is planned to visit the site and retrieve the instrument. Maintenance and calibration are performed in a laboratory setting. The following day, another trip is made to the site to redeploy the instruments and perform QA/QC assessments in the form of side-by-side instrument readings and collection of a grab sample.

Dates of maintenance excursions to the Rattling Brook site have been compiled in Table 1 and include the total number of days for the deployment.

**Table 1: Deployment dates and duration**

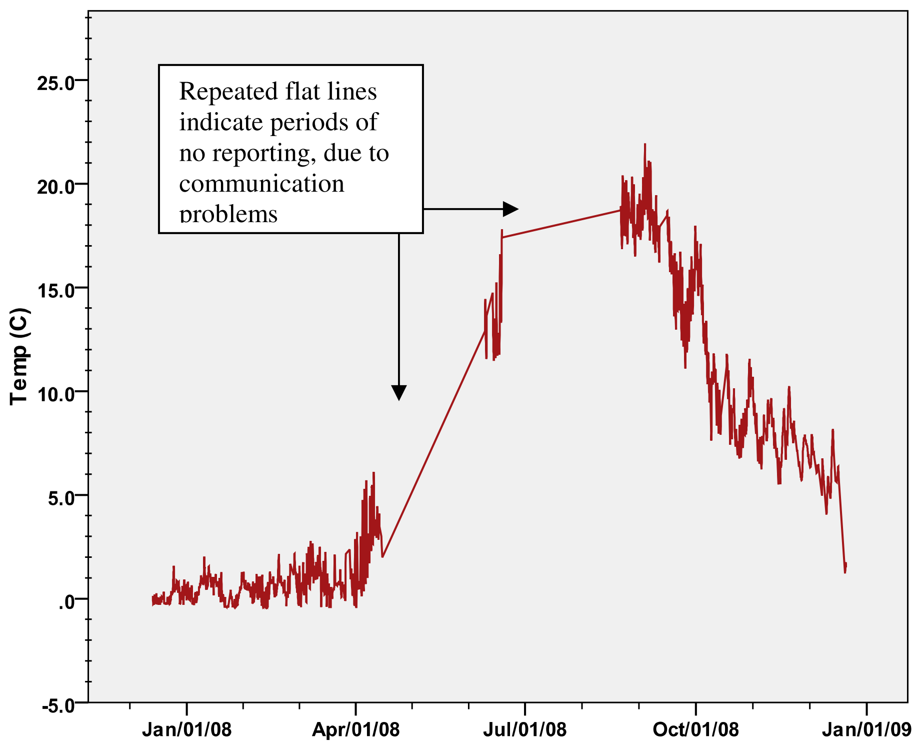
| Installation Date | Removal Date | Duration of Deployment (Days) | Remarks |
|---|---|---|---|
| December 13, 2007 | January 18, 2008 | 35 | During this period, due to issues with the Rattling Brook Hydrolab, a spare Hydrolab was installed at the site while repairs were done on the Rattling Brook instrument |
| January 18, 2008 | February 25, 2008 | 37 | |
| February 27, 2008 | March 26, 2008 | 29 | |
| March 28, 2008 | April 24, 2008 | 26 | |
| May 14, 2008 | June 11, 2008 | 27 | Instrument was not replaced until May 14 due to staff availability and need for transmission problem to be investigated |
| June 13, 2008 | July 9, 2008 | 26 | |
| July 11, 2008 | August 13, 2008 | 32 | |
| August 18, 2008 | September 11, 2008 | 23 | |
| September 15 | October 14, 2008 | 29 | |
| October 17, 2008 | December 1, 2008 | 44 | |
| December 1, 2008 | January 6, 2009 | 35 | |

# Results and Discussion

## Water Temperature

Temperature fluctuations throughout the 2008 deployment year are visible in Figure 2. Water temperatures are most stable from January to mid March where temperature ranges from -0.42°C to 2.7°C. From April through early September, temperature rises to a maximum of 21.9°C, although the exact summer trend is not discernable from this figure due to communication dropout. These temperatures are consistent with the range seen in 2007 (-0.31 to 23.03°C).

**Figure 2: Water temperature of Rattling Brook during 2008 deployment year**




## Dissolved Oxygen and Percent Saturation

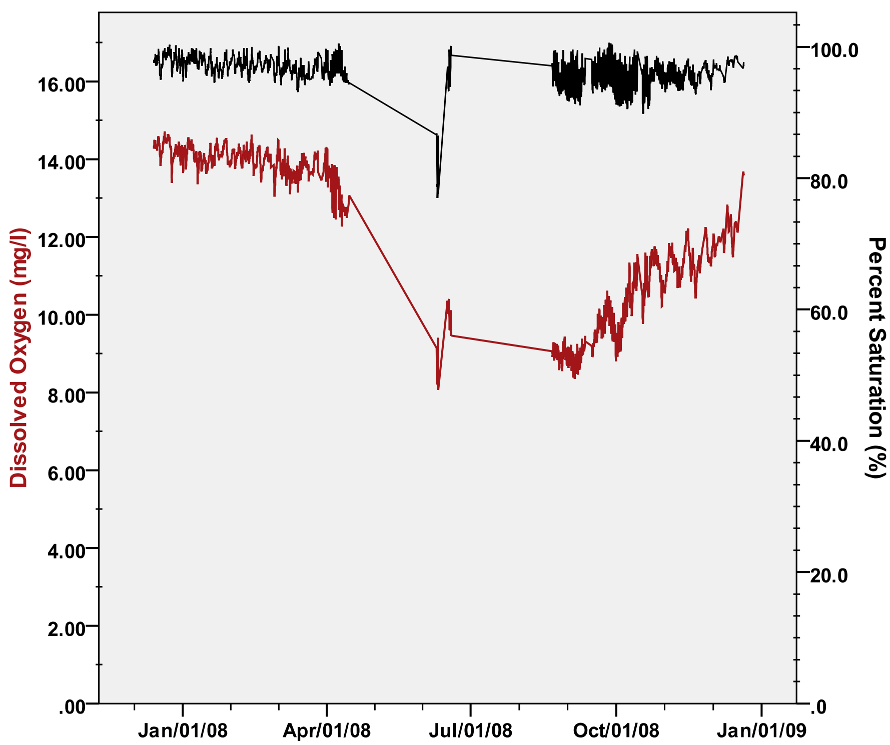
Gas solubility is inversely proportional to water temperature. For that reason, it is intuitive that dissolved oxygen levels should be greatest during the cool, winter months. Furthermore, due to a decreased oxygen demand by organisms present in the river, oxygen saturation should also be highest during the winter months. As shown in Figure 3, this is the case.

Although the communication dropouts have created gaps in Figure 3 it can be seen that dissolved oxygen concentration is greatest from January to mid-April, ranging from 12.27 mg/l to 14.71 mg/l. Dissolved oxygen concentration is lowest during the summer where values as low as 8.06 mg/l were reported.

Oxygen saturation can be used as an indicator of biological activity in a water body. For example, in a hypothetical river with turbulent flow but no life, oxygen saturation should be consistent and close to 100%. In reality, however, biological activity will decrease the oxygen saturation as respiration by plants and animals remove oxygen from the water and incorporate it into biochemical processes. Therefore, oxygen saturation is inversely linked to biological demand: less saturation relates to more biological activity. In Rattling Brook, saturation is most stable from October to May (a period of low biological activity) as seen in Figure 3. A large drop in saturation, to 77%, is noted in late June when biological activity is highest; however, due to communication issues, a clear summer trend cannot be established.



**Figure 3: Dissolved Oxygen and saturation of Rattling Brook during 2008 deployment year**



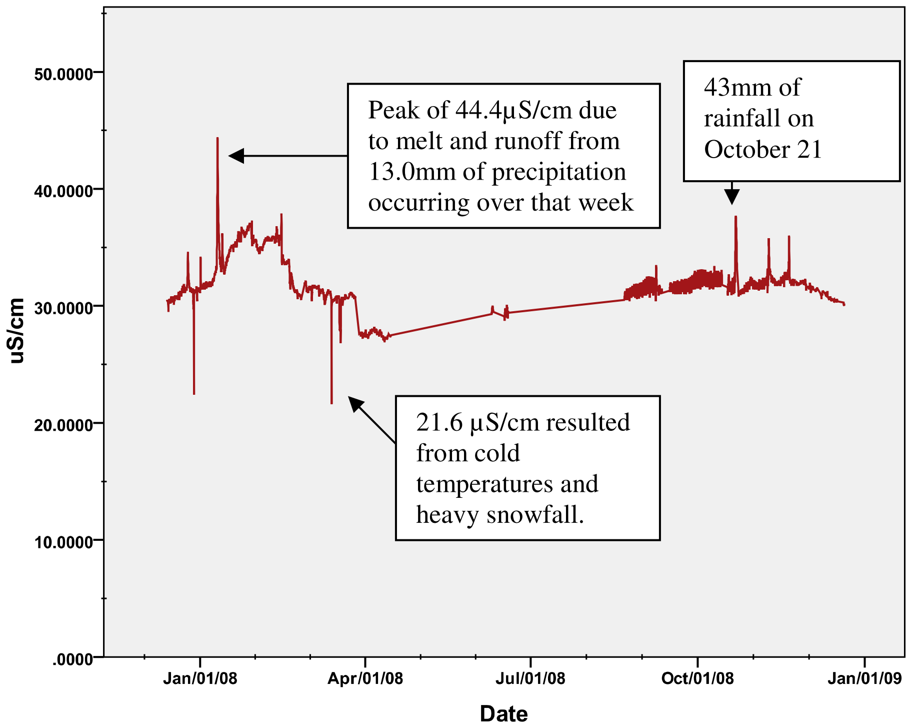
## Specific Conductivity

Pure water is a poor conductor and has a high resistance to electrical current. When salts and minerals are dissolved in the water and dissociate into charged ions, a reduction in resistance is noted. By measuring the resistance to electrical current across a known path length and reporting the inverse, conductivity is obtained. Furthermore, conductivity is standardized to 25$^{o}$C in order to derive Specific Conductivity, a measurement independent of temperature. Specific Conductivity is useful in that it allows for the determination of dissolved constituents in water.

Figure 4 indicates that specific conductivity ranged from 21.6µS/cm to 44.4µS/cm but averaged 32.1µS/cm (SD=2.1µS/cm ). These values are comparable to those from 2007 where Specific Conductivity ranged from 22.4µS/cm to 41.1µS/cm.

Specific Conductivity typically peaks in late winter and early spring following runoff from precipitation and snow melt. For this reason, specific conductivity appears to be highest in February and March but declines into April. Interestingly, the lowest point occurred on March 13, when precipitation events are known to cause large conductivity spikes, not depressions. Such a contradiction is likely due to the 20cm of snowfall coupled with cold temperatures. Since the snow did not melt and runoff into the stream channel, the rapid influx of water falling into the river diluted the water, lowering conductivity. Although the summer period is mostly unrepresented, it is likely that conductivity is lowest in this season.

**Figure 4: Specific Conductivity of Rattling Brook during 2008 deployment year**




## pH

Biochemical reactions in plants and animals function within a narrow range of pH. Overly acidic or alkaline conditions have the potential to precipitate certain minerals or salts, decreasing the concentration of essential nutrients available. Extremes in pH also have the ability to destroy delicate proteins and enzymes needed to sustain life. Such fluctuations in pH are generally unseen in natural water systems, but in cases where industrial effluent is discharged into a water body, drastic changes in pH are common.

According to Figure 5 (page 7) pH remains stable throughout the deployment year, averaging 6.08 (SD=0.18). CCME Guidelines[1] suggest a pH range of 6.5 to 9.0, however acidic waters are characteristic of Newfoundland and Labrador. For deployment year 2007, pH ranged from 4.89 to 6.51 indicating comparable results.

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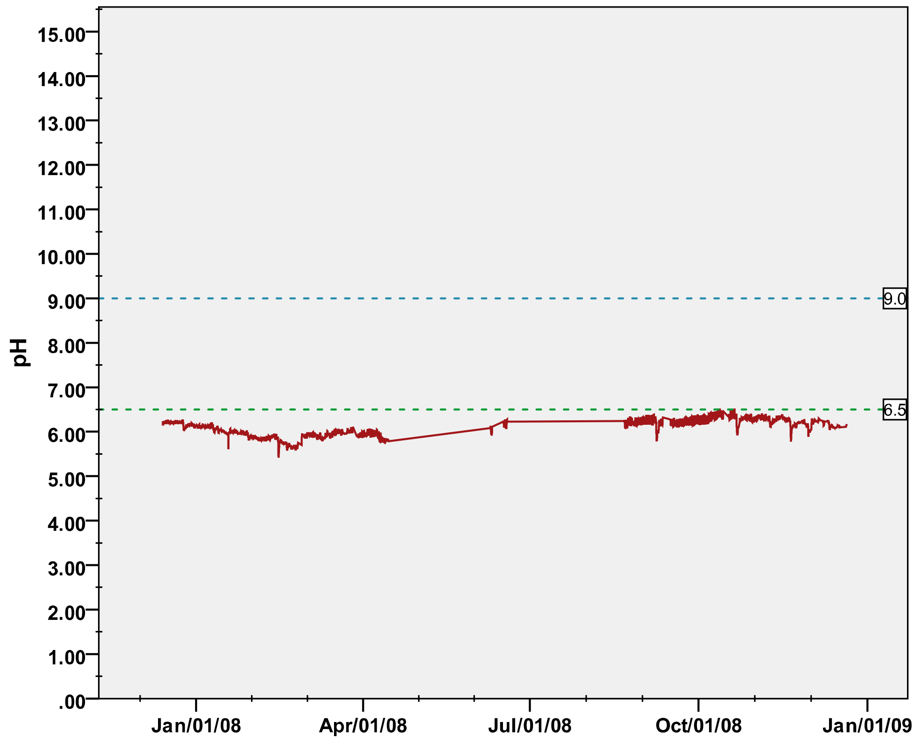
[1] Canadian Council of Ministers of the Environment. 2007. Canadian water quality guidelines for the protection of aquatic life: Summary table. Updated December 2007. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

**Figure 5: pH of Rattling Brook during 2008 deployment year**




## Turbidity

Turbidity refers to the amount of fine, suspended matter within the water column such as silt, dust, or algae. Excessive turbidity can result in the elimination of plant species from water bodies by reducing light transmission or fish kills by damaging and clogging gills. Overland runoff from snow melt and precipitation frequently cause short-term spikes in turbidity as soil and particles are deposited in the stream channel.

In the Rattling Brook application, turbidity is assessed based on light reflected from a source placed at a 90 degree angle from the detector. Suspended particles reflect the emitted light and the amount received relates to turbidity. In some instances, bubbles or debris resting on the sensor can cause inflated values. Figure 6a shows that turbidity was seen as high as 963 NTU, however examination of the raw data indicates that only one measurement recorded such high levels and the pre- and proceeding 24 hours were 0 NTU. Figure 6b shows the turbidity of Rattling Brook, minus these extraneous values; a much finer indication of turbidity results (note the scale on vertical axis).

Figure 6b, illustrates that turbidity in Rattling Brook is generally very low. Values range from 0 NTU to 122 NTU with an average value of 0.3 NTU, suggesting a heavy skew towards low turbidity (SD=3.4 NTU).

January 2008 to early April 2008 represents a sustained duration of higher-than-normal turbidity, likely due to frequent precipitation and snow melt. A similar peak is noted in December 2008 – probably for the same reason.

**Figure 6a: Turbidity of Rattling Brook with extraneous values**

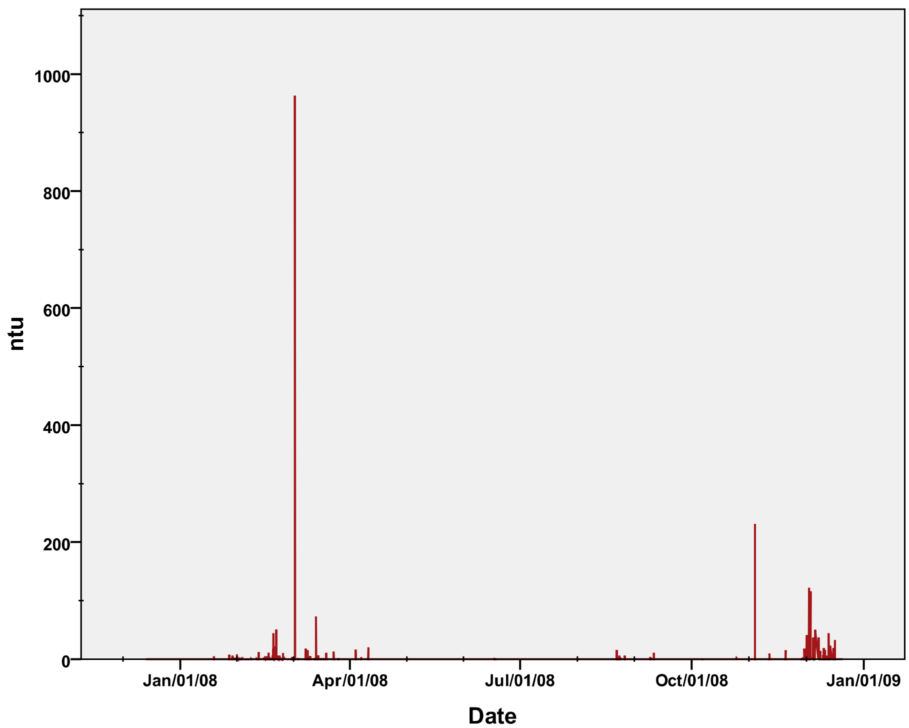
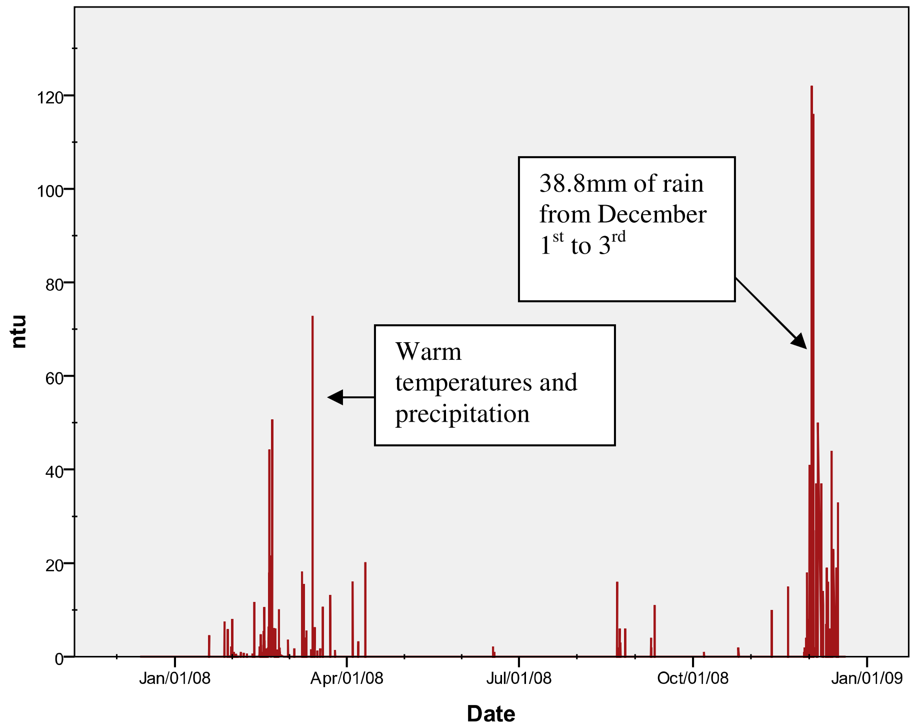


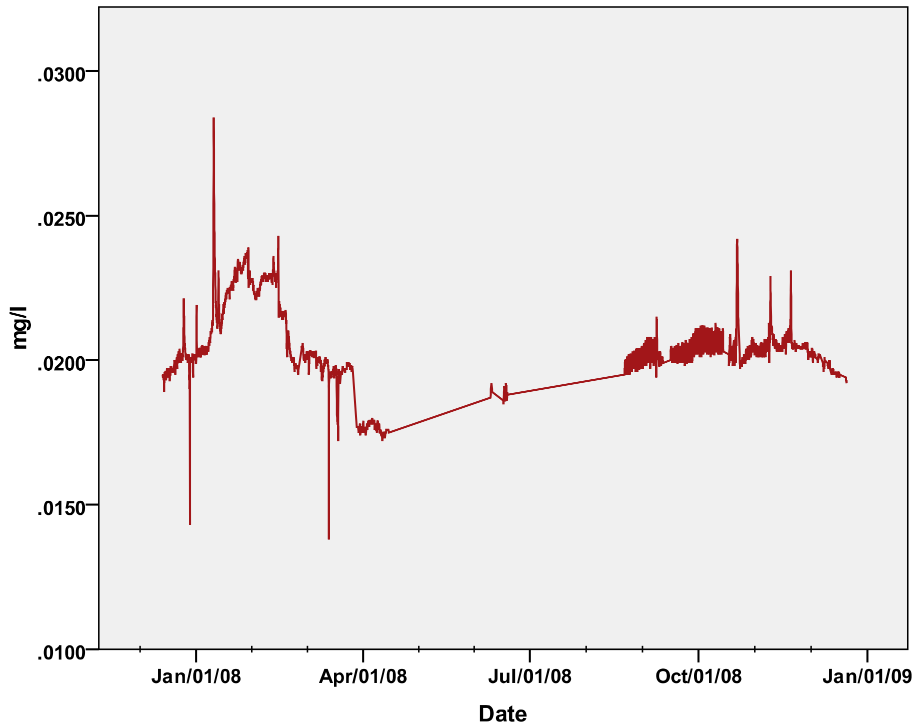
**Figure 6b: Turbidity of Rattling Brook without extraneous values**




## Total Dissolved Solids

While specific conductivity only infers a relative amount of ionized and mineral substances dissolved in water through the measurement of resistance, total dissolved solids (TDS) provides a mass per liter concentration of dissolved compounds. Such a parameter indicates the combined effects of salinity and hardness – high TDS values indicate hard water or a high salinity. Figure 7 depicts TDS throughout the year. TDS averaged 0.0205mg/l with significant variability in the winter resulting in a minimum of 0.0138mg/l and a maximum of 0.0284mg/l (SD=0.0013mg/l).

**Figure 7: Total Dissolved Solids (TDS) in Rattling Brook during 2008 deployment year**




## Water Level

Currently, water quantity measurements are limited to stage level at Rattling Brook, however, graphing of flow measurement is expected in the summer of 2009 on the Departmental webpage.[2] Stage refers to the elevation of the water surface above a designated point, but does not indicate flow rate. Stage, however, does give an excellent reference as to why water quality parameters may change as precipitation and snow melt drive the increase in stage. As shown in Figure 8, a large peak of 3.79m in late January 2008 corresponds with a period of mild temperatures following 27cm of snow and 15.6mm of rain during the week of January 23, 2008. Fluctuations in TDS, turbidity, specific conductivity, and pH are noted in relation to this period of extreme runoff and melt.

Generally, the saw-tooth pattern can be correlated with weather patterns depicted in the Appendix. Warm weather in winter results in meltwater runoff, while rainfall in the spring, summer and fall also result in a similar stage pattern.

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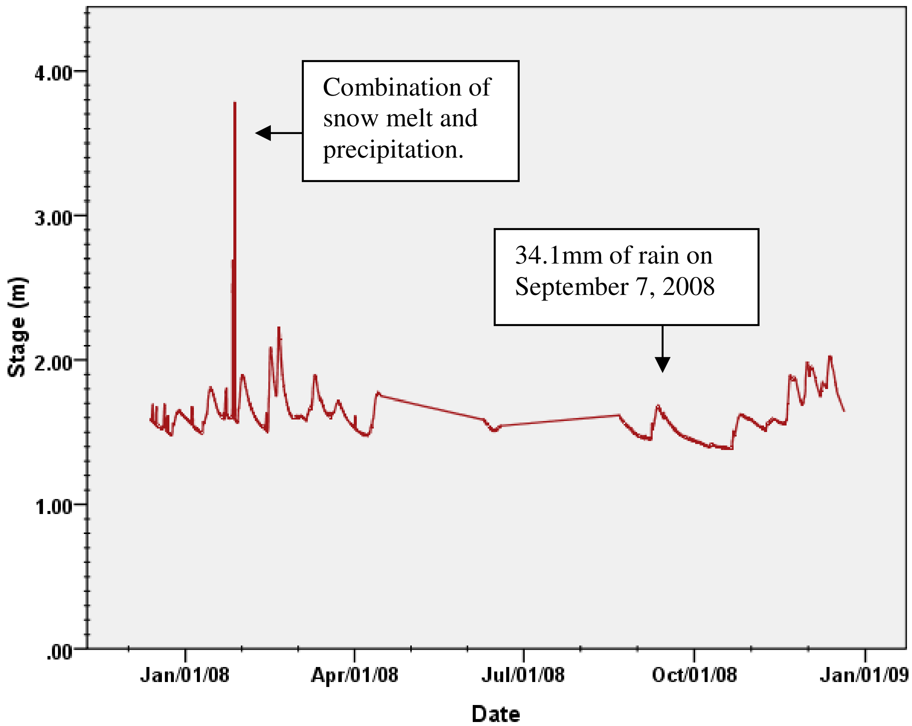
[2] http://www.env.gov.nl.ca/wrmd/ADRS/v6/Template_Station.asp?station=NF02ZK0023

**Figure 8: Water level at Rattling Brook during 2008 deployment year**




## Quality Control/Quality Assurance (QA/QC) Measures

At the beginning of a deployment period and prior to removal of the instrument, a freshly-calibrated Quality Assurance (QA) sonde is placed adjacent to the field sonde. Readings are taken from both devices simultaneously and the difference between each sonde is calculated. Depending on the degree of difference between the in situ sonde and the QA device, the agreement is ranked as "Excellent", "Good", "Fair", "Marginal", or "Poor". Table 2 relates the Quality Assurance rankings between the freshly-calibrated QA sonde and the field sonde after a one month deployment period.

As shown in Table 2, most comparisons are ranked as either 'Excellent' or 'Good' with few instances of lesser quality. Rattling Brook offers an excellent deployment location consisting of a rocky and gravel bottom with little silt and mud to foul the multiparameter probe over the 30 day deployment period.

**Table 2: Quality Assurance Rankings during installation and removal of field sonde**

| Date | Activity | QA/QC Rating | | | |
|---|---|---|---|---|---|
| | | Temperature | pH | Specific Conductance | Dissolved Oxygen |
| **December 13, 2007** | Installation | Excellent | Good | Excellent | Excellent |
| **January 18, 2008** | Removal | Excellent | Good | Fair | Excellent |
| **January 18, 2008** | Installation | Excellent | Good | Fair | Excellent |
| **February 25, 2008** | Removal | Excellent | Good | Excellent | Excellent |
| **February 27, 2008** | Installation | Excellent | Excellent | Good | Excellent |
| **March 26, 2008** | Removal | Good | Excellent | Excellent | Excellent |
| **March 28, 2008** | Installation | Fair | Good | Good | Good |
| **April 24, 2008** | Removal | Good | Excellent | Good | Excellent |
| **May 14, 2008** | Installation | Excellent | Good | Good | Excellent |
| **June 11, 2008** | Removal | Good | Excellent | Excellent | Poor |
| **June 13, 2008** | Installation | Good | Excellent | Fair | Poor |
| **July 9, 2008** | Removal | Good | Good | Excellent | Excellent |
| **July 11, 2008** | Installation | Good | Good | Excellent | Excellent |
| **August 13, 2008** | Removal | Excellent | Good | Excellent | Excellent |
| **August 18, 2008** | Installation | Excellent | Good | Excellent | Good |
| **Sept. 11, 2008** | Removal | Good | Good | Excellent | Excellent |
| **Sept. 15, 2008** | Installation | Good | Fair | Excellent | Excellent |
| **October 14, 2008** | Removal | Good | Good | Poor | Excellent |
| **October 17, 2008** | Installation | Good | Good | Good | Excellent |
| **December 1, 2008** | Removal | Excellent | Fair | Good | Good |
| **December 1, 2008** | Installation | Excellent | Fair | Good | Excellent |
| **January 6, 2009** | Removal | Excellent | Marginal | Excellent | Good |

# Conclusions

Rattling Brook is in a good state of health with precipitation as the motivating force behind variation in measurements. Compared to 2007, all parameters are comparable and no cause for concern is warranted. The pH is slightly lower than the recommended CCME Guidelines, however, Newfoundland and Labrador river systems are known to have acidic properties.

Data from the 2008 deployment year provides additional information regarding the normal, ambient characteristics of Rattling Brook. With an accurate and extensive database of annual fluctuations the Department of Environment and Conservation, Water Resources Management Division is in a good position to diagnose and understand any issues that may arise during the construction and operation of the Vale Inco nickel processing facility.

# Path Forward

Near real-time monitoring at Rattling Brook has been quite successful over the 2008 deployment year in accumulating more information on the natural fluctuation of water quality parameters. The following is a list of undertakings to be acted on in the upcoming year. This list also includes some multi-year projects that are still in progress:

- In Winter 2009, Environment Canada will visit the site and adjust or replace the communication instrumentation (dataloggers, solar panel, antenna) to minimize loss of data due to transmission issues.
- Expansion of the real-time network at Long Harbour is planned:
  - i) Addition of water quality monitoring to the existing Rattling Brook Big Pond station upstream.
  - ii) Commission of a new water quality/quantity station downstream of the current Rattling Brook below Bridge station (location to be determined Spring 2009).
- Continual direct communication between Department of Environment and Conservation (DOEC) and Vale Inco staff to respond to emerging issues on a proactive basis.
- Continued site visitation and monthly maintenance/calibration by DOEC staff.
- In Winter 2009, DOEC will implement a new procedure to minimize loss of data by internally logging data on the water quality sonde itself.
- Shipment of instrumentation to the Canadian Supplier for technical proficiency and evaluation testing.
- Continued data analysis in the form of monthly deployment reports. An annual report will be prepared at the end of the 2009 calendar year.
- Continued work on Automatic Data Retrieval System to incorporate new capabilities.
- Continued transfer of data from DOEC to Vale Inco through the departmental webpage.
- Provide online statistical analysis of data to provide extrapolation of other water quality parameters using regression analysis.
- Evaluation and upgrading of QA/QC procedures through the production of a Real-Time Water Quality Monitoring Manual to be disseminated in Spring 2009.

# Appendix

**Table 3: Temperature and Precipitation at Argentia, near Long Harbour, NL**

| Date/Time | Max Temp (°C) | Min Temp (°C) | Mean Temp (°C) | Total Precip (mm) | Snow on Grnd (cm) |
|---|---|---|---|---|---|
| **16-Dec-07** | -5.7 | -10.4 | -8.1 | 0 | 4 |
| **17-Dec-07** | 5 | -6.5 | -0.8 | 10.5 | |
| **18-Dec-07** | 0.1 | -1.8 | -0.9 | 0 | |
| **19-Dec-07** | -0.9 | -8.7 | -4.8 | 0 | |
| **20-Dec-07** | -6.2 | -9.2 | -7.7 | 0 | |
| **21-Dec-07** | -2.2 | -8.8 | -5.5 | 0 | |
| **22-Dec-07** | -1.8 | -9.1 | -5.5 | 0 | |
| **23-Dec-07** | 1.4 | -2.3 | -0.5 | 0 | |
| **24-Dec-07** | 10.5 | 1.3 | 5.9 | 5.9 | |
| **25-Dec-07** | 1.8 | -0.7 | 0.6 | 0 | |
| **26-Dec-07** | 1.1 | -0.3 | 0.4 | 0 | |
| **27-Dec-07** | 0.2 | -4.2 | -2 | 1.4 | |
| **28-Dec-07** | -1.3 | -4.3 | -2.8 | 9.6 | 5 |
| **29-Dec-07** | -3.2 | -6 | -4.6 | 0 | 1 |
| **30-Dec-07** | 3.3 | -3.2 | 0.1 | 4.9 | 10 |
| **31-Dec-07** | 3.2 | -5.7 | -1.3 | 4.3 | 6 |
| **1-Jan-08** | 1.5 | -3 | -0.8 | 0 | 5 |
| **2-Jan-08** | 2.7 | -6.9 | -2.1 | 1.4 | 5 |
| **3-Jan-08** | 0.7 | -10.3 | -4.8 | 0 | 4 |
| **4-Jan-08** | -1.8 | -12.1 | -7 | 0 | 5 |
| **5-Jan-08** | -0.9 | -5.9 | -3.4 | 0 | 5 |
| **6-Jan-08** | -0.3 | -5.5 | -2.9 | 1.2 | 4 |
| **7-Jan-08** | 1.4 | -2.5 | -0.6 | 0.6 | 7 |
| **8-Jan-08** | 1.6 | 0.6 | 1.1 | 2 | 3 |
| **9-Jan-08** | 6.5 | 0.1 | 3.3 | 2.6 | 3 |
| **10-Jan-08** | 6.8 | 1.2 | 4 | 6.6 | |
| **11-Jan-08** | 1.6 | -1 | 0.3 | 0 | |
| **12-Jan-08** | 6.9 | -1 | 3 | 22.3 | |
| **13-Jan-08** | 2.2 | -2.4 | -0.1 | 0 | |
| **14-Jan-08** | -1.5 | -3.7 | -2.6 | 2.2 | |
| **15-Jan-08** | 2.1 | -2.2 | -0.1 | 10.2 | |
| **16-Jan-08** | 0.9 | -1.2 | -0.2 | 0.7 | 3 |
| **17-Jan-08** | -0.6 | -3.7 | -2.2 | 0 | 2 |
| **18-Jan-08** | 0.3 | -4.8 | -2.3 | 0 | |
| **19-Jan-08** | 3.7 | -2.9 | 0.4 | 4.4 | |
| **20-Jan-08** | -1.8 | -6.1 | -4 | 4.4 | 1 |
| **21-Jan-08** | -5.9 | -12.1 | -9 | 0 | 2 |
| **22-Jan-08** | -5.1 | -11.4 | -8.3 | 0 | 1 |
| **23-Jan-08** | 3.3 | -5.7 | -1.2 | 17 | |
| **24-Jan-08** | -0.7 | -4.6 | -2.7 | 1.1 | 8 |
| **25-Jan-08** | -3.2 | -11.9 | -7.6 | 3.3 | 7 |
| **26-Jan-08** | -9 | -14.3 | -11.7 | | 7 |

| Date/Time | Max Temp (°C) | Min Temp (°C) | Mean Temp (°C) | Total Precip (mm) | Snow on Grnd (cm) |
|---|---|---|---|---|---|
| 27-Jan-08 | -6.3 | -12.6 | -9.5 | 0 | |
| 28-Jan-08 | 4.5 | -8.3 | -1.9 | 2.1 | 5 |
| 29-Jan-08 | 6.5 | 0.5 | 3.5 | 15.6 | |
| 30-Jan-08 | 9.2 | 0.1 | 4.7 | 5.7 | |
| 31-Jan-08 | 7.4 | -2 | 2.7 | 0 | |
| 1-Feb-08 | -1.7 | -5.2 | -3.5 | 0 | |
| 2-Feb-08 | 3.4 | -6.4 | -1.5 | 6.3 | |
| 3-Feb-08 | 0.3 | -5 | -2.4 | 0 | |
| 4-Feb-08 | -4.1 | -6.3 | -5.2 | 0 | |
| 5-Feb-08 | -4.6 | -8.4 | -6.5 | 0 | |
| 6-Feb-08 | -0.6 | -6.7 | -3.7 | 0.6 | |
| 7-Feb-08 | -1 | -4.3 | -2.7 | 0.7 | 2 |
| 8-Feb-08 | -1.2 | -4.4 | -2.8 | 0 | |
| 9-Feb-08 | 0.3 | -4.4 | -2.1 | 0 | |
| 10-Feb-08 | -1.8 | -6.9 | -4.4 | 3.5 | |
| 11-Feb-08 | 2.4 | -3.4 | -0.5 | 2.1 | 4 |
| 12-Feb-08 | -0.7 | -4.2 | -2.5 | 0 | 4 |
| 13-Feb-08 | -1.4 | -4.6 | -3 | 0 | 4 |
| 14-Feb-08 | 9.4 | -1.4 | 4 | 48 | |
| 15-Feb-08 | 1.5 | -1.7 | -0.1 | 0 | |
| 16-Feb-08 | 1.6 | -10.7 | -4.6 | 0 | |
| 17-Feb-08 | -7.5 | -12.1 | -9.8 | 0 | |
| 18-Feb-08 | 8 | -7.7 | 0.2 | 10.6 | |
| 19-Feb-08 | 9.4 | 0 | 4.7 | 15 | |
| 20-Feb-08 | 1.3 | -1.7 | -0.2 | 0 | |
| 21-Feb-08 | -0.5 | -8 | -4.3 | 0 | |
| 22-Feb-08 | -4.7 | -8.8 | -6.8 | 0 | |
| 23-Feb-08 | -3.2 | -6.2 | -4.7 | 9.3 | 1 |
| 24-Feb-08 | -2.5 | -8.5 | -5.5 | 0 | |
| 25-Feb-08 | -0.1 | -2.7 | -1.4 | 0 | 7 |
| 26-Feb-08 | 1.1 | -2.6 | -0.8 | 0 | 7 |
| 27-Feb-08 | 8.8 | -2.1 | 3.4 | 2.7 | 6 |
| 28-Feb-08 | 3.5 | -1.7 | 0.9 | 0 | |
| 29-Feb-08 | -1.6 | -10.9 | -6.3 | 0 | |
| 1-Mar-08 | -2.1 | -12.1 | -7.1 | 0 | |
| 2-Mar-08 | 3.4 | -2.2 | 0.6 | 12.5 | |
| 3-Mar-08 | -0.9 | -3.6 | -2.3 | 0 | 1 |
| 4-Mar-08 | 2.7 | -4 | -0.7 | 0 | |
| 5-Mar-08 | 0.9 | -5.7 | -2.4 | 0 | |
| 6-Mar-08 | 9.5 | -2.3 | 3.6 | 12.9 | |
| 7-Mar-08 | 0 | -4.4 | -2.2 | 0 | |
| 8-Mar-08 | 9.8 | -3.6 | 3.1 | 13.3 | |
| 9-Mar-08 | 3.9 | -2.8 | 0.6 | 25.2 | |
| 10-Mar-08 | 0.1 | -8.8 | -4.4 | 0.8 | |
| 11-Mar-08 | -2.3 | -8.4 | -5.4 | 0 | |
| 12-Mar-08 | 1 | -2.9 | -1 | 0 | |
| 13-Mar-08 | 3.3 | -5.6 | -1.2 | 14.8 | 20 |

| Date/Time | Max Temp (°C) | Min Temp (°C) | Mean Temp (°C) | Total Precip (mm) | Snow on Grnd (cm) |
|---|---|---|---|---|---|
| 14-Mar-08 | -0.8 | -8.8 | -4.8 | 0 | 2 |
| 15-Mar-08 | -3.9 | -9 | -6.5 | 0 | 2 |
| 16-Mar-08 | -4.2 | -9.3 | -6.8 | 3.7 | 2 |
| 17-Mar-08 | -1.7 | -8.5 | -5.1 | 9.1 | 2 |
| 18-Mar-08 | 0 | -1.7 | -0.9 | 3.3 | 2 |
| 19-Mar-08 | 1 | -1 | 0 | 15.9 | |
| 20-Mar-08 | 0.7 | -2.7 | -1 | 0 | 5 |
| 21-Mar-08 | 4.9 | -1.2 | 1.9 | 10 | |
| 22-Mar-08 | 1.8 | -2.3 | -0.3 | 3.1 | |
| 23-Mar-08 | -1.1 | -3.7 | -2.4 | 2.7 | |
| 24-Mar-08 | -1.8 | -4.1 | -3 | 2 | |
| 25-Mar-08 | -4 | -7.2 | -5.6 | 1.5 | |
| 26-Mar-08 | -3.4 | -9.9 | -6.7 | 0 | |
| 27-Mar-08 | 1.2 | -3.9 | -1.4 | 0.6 | |
| 28-Mar-08 | 1.4 | -2.3 | -0.5 | 0 | |
| 29-Mar-08 | 0.3 | -4.9 | -2.3 | 1.9 | |
| 30-Mar-08 | -1.3 | -7.2 | -4.3 | 3 | |
| 31-Mar-08 | -4.2 | -9.7 | -7 | 0 | |
| 1-Apr-08 | -0.9 | -9.8 | -5.4 | 0.8 | |
| 2-Apr-08 | 4.9 | -1.7 | 1.6 | 5.6 | |
| 3-Apr-08 | -0.1 | -3.7 | -1.9 | 0.6 | |
| 4-Apr-08 | 1.6 | -2 | -0.2 | 1 | |
| 5-Apr-08 | 4.4 | -2.2 | 1.1 | 0.6 | |
| 6-Apr-08 | 4.8 | -2.6 | 1.1 | 0.6 | |
| 7-Apr-08 | 2.6 | -1.9 | 0.4 | 3.8 | |
| 8-Apr-08 | 9.2 | 1.2 | 5.2 | 0 | |
| 9-Apr-08 | 9.2 | 1.5 | 5.4 | 0 | |
| 10-Apr-08 | 5.3 | 1.3 | 3.3 | 0 | |
| 11-Apr-08 | 5.3 | 1.3 | 3.3 | 6 | |
| 12-Apr-08 | 3.7 | 0.2 | 2 | 0 | |
| 13-Apr-08 | 4.1 | 0.1 | 2.1 | 4.2 | |
| 14-Apr-08 | 2.1 | 0 | 1.1 | 0 | |
| 15-Apr-08 | 3.2 | -0.1 | 1.6 | 1 | |
| 16-Apr-08 | 5.4 | -0.5 | 2.5 | 0 | |
| 17-Apr-08 | 4.8 | 0.7 | 2.8 | 0 | |
| 18-Apr-08 | 8.9 | 1.4 | 5.2 | 29.2 | |
| 19-Apr-08 | 4.5 | -2.4 | 1.1 | 2.4 | |
| 20-Apr-08 | 6.2 | -3.3 | 1.5 | 0 | |
| 21-Apr-08 | 5.6 | -1.1 | 2.3 | 0 | |
| 22-Apr-08 | 4.1 | -1.5 | 1.3 | 0 | |
| 23-Apr-08 | 3.2 | -2.6 | 0.3 | 0 | |
| 24-Apr-08 | 3.6 | -2.3 | 0.7 | 0 | |
| 25-Apr-08 | 10.1 | -1.8 | 4.2 | 2.6 | |
| 26-Apr-08 | 6.7 | -1.4 | 2.7 | 0.7 | |
| 27-Apr-08 | 7.6 | 0.7 | 4.2 | 0 | |
| 28-Apr-08 | 9.9 | 4.3 | 7.1 | 0 | |
| 29-Apr-08 | 12.5 | 3.7 | 8.1 | 0 | |

| Date/Time | Max Temp (°C) | Min Temp (°C) | Mean Temp (°C) | Total Precip (mm) | Snow on Grnd (cm) |
|---|---|---|---|---|---|
| **30-Apr-08** | 13.3 | 3.7 | 8.5 | 0 | |
| **1-May-08** | 10.6 | 3.2 | 6.9 | 0 | |
| **2-May-08** | 9.9 | -0.3 | 4.8 | 0 | |
| **3-May-08** | 6.2 | -0.8 | 2.7 | 0 | |
| **4-May-08** | 6.2 | 0.3 | 3.3 | 0 | |
| **5-May-08** | 3.4 | 0.7 | 2.1 | 0 | |
| **6-May-08** | 7.8 | 1.7 | 4.8 | 0 | |
| **7-May-08** | 14.4 | 2.3 | 8.4 | 1.2 | |
| **8-May-08** | 6.3 | 1.8 | 4.1 | 0.6 | |
| **9-May-08** | 8.7 | 2.1 | 5.4 | 0 | |
| **10-May-08** | 11.3 | 2.7 | 7 | 0 | |
| **11-May-08** | 4.3 | 2.2 | 3.3 | 8.7 | |
| **12-May-08** | 3.6 | 2 | 2.8 | 12 | |
| **13-May-08** | 7.4 | 1.3 | 4.4 | 0 | |
| **14-May-08** | 4.2 | 0.9 | 2.6 | 0 | |
| **15-May-08** | 9.8 | 1.8 | 5.8 | 3.3 | |
| **16-May-08** | 9.2 | 3.1 | 6.2 | 1.9 | |
| **17-May-08** | 9.9 | 2.9 | 6.4 | 7.9 | |
| **18-May-08** | 11.9 | 2 | 7 | 3 | |
| **19-May-08** | 14.8 | 1.6 | 8.2 | 3.6 | |
| **20-May-08** | 11.3 | 3.5 | 7.4 | 8.1 | |
| **21-May-08** | 12.1 | 4.2 | 8.2 | 13.5 | |
| **22-May-08** | 6.7 | 3 | 4.9 | 0 | |
| **23-May-08** | 13.2 | 3.1 | 8.2 | 3.8 | |
| **24-May-08** | 5.1 | 2.2 | 3.7 | 2 | |
| **25-May-08** | 5.9 | 1.3 | 3.6 | 0 | |
| **26-May-08** | 9.2 | 2.7 | 6 | 0 | |
| **27-May-08** | 11.4 | 5.5 | 8.5 | 2.8 | |
| **28-May-08** | 7.3 | 2.7 | 5 | 6.4 | |
| **29-May-08** | 9.4 | 3.1 | 6.3 | 0 | |
| **30-May-08** | 7.9 | 4.2 | 6.1 | 0 | |
| **31-May-08** | 9.3 | 4 | 6.7 | 0 | |
| **1-Jun-08** | 12.5 | 5.2 | 8.9 | 6.8 | |
| **2-Jun-08** | 10.2 | 5.3 | 7.8 | 5.5 | |
| **3-Jun-08** | 8.8 | 4.9 | 6.9 | 0 | |
| **4-Jun-08** | 8.8 | 4.9 | 6.9 | 0 | |
| **5-Jun-08** | 10.7 | 5.4 | 8.1 | 1.2 | |
| **6-Jun-08** | 17.4 | 4.3 | 10.9 | 0 | |
| **7-Jun-08** | 10.1 | 4 | 7.1 | 0 | |
| **8-Jun-08** | 12.4 | 3.5 | 8 | 0 | |
| **9-Jun-08** | 13.1 | 4.6 | 8.9 | 0 | |
| **10-Jun-08** | 14.9 | 5 | 10 | 0 | |
| **11-Jun-08** | 15.7 | 6.3 | 11 | 0 | |
| **12-Jun-08** | 13 | 7 | 10 | 0 | |
| **13-Jun-08** | 15 | 6.9 | 11 | 8.3 | |
| **14-Jun-08** | 13.2 | 7 | 10.1 | 5.9 | |
| **15-Jun-08** | 14.6 | 6.6 | 10.6 | 4.6 | |

| Date/Time | Max Temp (°C) | Min Temp (°C) | Mean Temp (°C) | Total Precip (mm) | Snow on Grnd (cm) |
|---|---|---|---|---|---|
| 16-Jun-08 | 11.3 | 5.9 | 8.6 | 6.1 | |
| 17-Jun-08 | 17.7 | 5.5 | 11.6 | 0 | |
| 18-Jun-08 | 14.5 | 7.3 | 10.9 | 0 | |
| 19-Jun-08 | 15.4 | 9.3 | 12.4 | 0 | |
| 20-Jun-08 | 15.7 | 8.9 | 12.3 | 2.4 | |
| 21-Jun-08 | 14.8 | 6.9 | 10.9 | 0 | |
| 22-Jun-08 | 11.8 | 6.8 | 9.3 | 0 | |
| 23-Jun-08 | 12.5 | 7.5 | 10 | 0 | |
| 24-Jun-08 | 16.8 | 9.2 | 13 | 3.1 | |
| 25-Jun-08 | 13.5 | 9.5 | 11.5 | 0 | |
| 26-Jun-08 | 13.9 | 9.3 | 11.6 | 0.7 | |
| 27-Jun-08 | 12.9 | 9.7 | 11.3 | 8.3 | |
| 28-Jun-08 | 12.4 | 8.5 | 10.5 | 1.2 | |
| 29-Jun-08 | 15 | 8.5 | 11.8 | 0 | |
| 30-Jun-08 | 12.9 | 8.4 | 10.7 | 11.4 | |
| 1-Jul-08 | 13.1 | 9.8 | 11.5 | 2.3 | |
| 2-Jul-08 | 12.9 | 9.3 | 11.1 | 0 | |
| 3-Jul-08 | 14.2 | 9.9 | 12.1 | 4.8 | |
| 4-Jul-08 | 12.3 | 9.8 | 11.1 | 0 | |
| 5-Jul-08 | 14.9 | 9.7 | 12.3 | 0 | |
| 6-Jul-08 | 13.4 | 9.5 | 11.5 | 0.7 | |
| 7-Jul-08 | 15.5 | 9.8 | 12.7 | 0 | |
| 8-Jul-08 | 14.2 | 10.8 | 12.5 | 0 | |
| 9-Jul-08 | 15.7 | 11.8 | 13.8 | 0 | |
| 10-Jul-08 | 17.2 | 12.9 | 15.1 | 0 | |
| 11-Jul-08 | 16.7 | 11.6 | 14.2 | 1.4 | |
| 12-Jul-08 | 20.1 | 11.1 | 15.6 | 4.1 | |
| 13-Jul-08 | 16.2 | 10.6 | 13.4 | 0 | |
| 14-Jul-08 | 18 | 10.7 | 14.4 | 0 | |
| 15-Jul-08 | 18.3 | 14.4 | 16.4 | 0.7 | |
| 16-Jul-08 | 18.4 | 13.9 | 16.2 | 0.6 | |
| 17-Jul-08 | 15.7 | 12.7 | 14.2 | 0 | |
| 18-Jul-08 | 16.9 | 12.5 | 14.7 | 0 | |
| 19-Jul-08 | 15.8 | 11.9 | 13.9 | 11.6 | |
| 20-Jul-08 | 15.2 | 11.8 | 13.5 | 0.6 | |
| 21-Jul-08 | 16.1 | 11.9 | 14 | 28.5 | |
| 22-Jul-08 | 16.2 | 13.7 | 15 | 4 | |
| 23-Jul-08 | 19.4 | 9.8 | 14.6 | 7.5 | |
| 24-Jul-08 | 16.8 | 9.3 | 13.1 | | |
| 25-Jul-08 | 17.7 | 14 | 15.9 | 0 | |
| 26-Jul-08 | 18.5 | 15.8 | 17.2 | 16 | |
| 27-Jul-08 | 17.8 | 15.9 | 16.9 | 15.5 | |
| 28-Jul-08 | 19.1 | 16 | 17.6 | 1.2 | |
| 29-Jul-08 | 19.1 | 16.4 | 17.8 | 0 | |
| 30-Jul-08 | 20.2 | 16.1 | 18.2 | 5 | |
| 31-Jul-08 | 19.3 | 13.5 | 16.4 | 0.6 | |
| 1-Aug-08 | 18.4 | 13.4 | 15.9 | 0 | |

| Date/Time | Max Temp (°C) | Min Temp (°C) | Mean Temp (°C) | Total Precip (mm) | Snow on Grnd (cm) |
|---|---|---|---|---|---|
| **2-Aug-08** | 18.6 | 12.9 | 15.8 | 0 | |
| **3-Aug-08** | 15.8 | 12.2 | 14 | 0 | |
| **4-Aug-08** | 14.7 | 11.7 | 13.2 | 9.3 | |
| **5-Aug-08** | 16.1 | 12.7 | 14.4 | 9.7 | |
| **6-Aug-08** | 14.9 | 11.7 | 13.3 | 13.9 | |
| **7-Aug-08** | 18.9 | 11.7 | 15.3 | 0 | |
| **8-Aug-08** | 17 | 12.6 | 14.8 | 0 | |
| **9-Aug-08** | 16.7 | 13.2 | 15 | 5.9 | |
| **10-Aug-08** | 17.1 | 14.4 | 15.8 | 0 | |
| **11-Aug-08** | 20.4 | 15.4 | 17.9 | 0 | |
| **12-Aug-08** | 23.1 | 15.1 | 19.1 | 1.6 | |
| **13-Aug-08** | 23.2 | 15.6 | 19.4 | 0.9 | |
| **14-Aug-08** | 18.4 | 15.2 | 16.8 | 10.6 | |
| **15-Aug-08** | 20.6 | 12.8 | 16.7 | 22.4 | |
| **16-Aug-08** | 17.6 | 13.2 | 15.4 | 0 | |
| **17-Aug-08** | 17.7 | 14 | 15.9 | 12.8 | |
| **18-Aug-08** | 18.2 | 11.4 | 14.8 | 0.7 | |
| **19-Aug-08** | 18.6 | 11.1 | 14.9 | 0 | |
| **20-Aug-08** | 18.7 | 13.9 | 16.3 | 1.6 | |
| **21-Aug-08** | 16.7 | 13.6 | 15.2 | 0 | |
| **22-Aug-08** | 17.8 | 13.6 | 15.7 | 0 | |
| **23-Aug-08** | 17.7 | 14.4 | 16.1 | 0 | |
| **24-Aug-08** | 18.2 | 14.4 | 16.3 | 0 | |
| **25-Aug-08** | 21 | 15.2 | 18.1 | 1.3 | |
| **26-Aug-08** | 17.3 | 15.6 | 16.5 | 0 | |
| **27-Aug-08** | 23.1 | 15.1 | 19.1 | 0 | |
| **28-Aug-08** | 18.6 | 13.1 | 15.9 | 0 | |
| **29-Aug-08** | 18.7 | 12.7 | 15.7 | 1.1 | |
| **30-Aug-08** | 20.3 | 13.5 | 16.9 | 4 | |
| **31-Aug-08** | 17.4 | 12.8 | 15.1 | 0 | |
| **1-Sep-08** | 20.6 | 12.9 | 16.8 | 0 | |
| **2-Sep-08** | 23.4 | 15.5 | 19.5 | 0 | |
| **3-Sep-08** | 17.8 | 12.8 | 15.3 | 0 | |
| **4-Sep-08** | 22.1 | 12.6 | 17.4 | 13.8 | |
| **5-Sep-08** | 20.8 | 13.2 | 17 | 0 | |
| **6-Sep-08** | 17.7 | 12.5 | 15.1 | 0 | |
| **7-Sep-08** | 20.4 | 15.1 | 17.8 | 34.1 | |
| **8-Sep-08** | 16.9 | 12.2 | 14.6 | 1.2 | |
| **9-Sep-08** | 15.9 | 11.5 | 13.7 | 0 | |
| **10-Sep-08** | 18.6 | 13 | 15.8 | 5.2 | |
| **11-Sep-08** | 16.5 | 12.5 | 14.5 | 0 | |
| **12-Sep-08** | 16.6 | 13.4 | 15 | 0 | |
| **13-Sep-08** | 16.8 | 12.5 | 14.7 | 0 | |
| **14-Sep-08** | 16.9 | 11.4 | 14.2 | 0 | |
| **15-Sep-08** | 20.1 | 14 | 17.1 | 0 | |
| **16-Sep-08** | 18.7 | 10.3 | 14.5 | 0 | |
| **17-Sep-08** | 13.8 | 10.2 | 12 | 0 | |

| Date/Time | Max Temp (°C) | Min Temp (°C) | Mean Temp (°C) | Total Precip (mm) | Snow on Grnd (cm) |
|---|---|---|---|---|---|
| **18-Sep-08** | 15.2 | 9.7 | 12.5 | 0 | |
| **19-Sep-08** | 14.1 | 8.4 | 11.3 | 0 | |
| **20-Sep-08** | 14.2 | 7.3 | 10.8 | 0 | |
| **21-Sep-08** | 17.9 | 12.9 | 15.4 | 0 | |
| **22-Sep-08** | 14.8 | 8.2 | 11.5 | 1 | |
| **23-Sep-08** | 12.5 | 5.4 | 9 | 2.6 | |
| **24-Sep-08** | 11.5 | 4.3 | 7.9 | 0.7 | |
| **25-Sep-08** | 11.4 | 4.5 | 8 | 0 | |
| **26-Sep-08** | 14.9 | 11.3 | 13.1 | 0 | |
| **27-Sep-08** | 14.1 | 11.2 | 12.7 | 0 | |
| **28-Sep-08** | 13.6 | 9 | 11.3 | 0 | |
| **29-Sep-08** | 16.2 | 9.6 | 12.9 | 0 | |
| **30-Sep-08** | 23.6 | 14.5 | 19.1 | 0 | |
| **1-Oct-08** | 16.4 | 11.9 | 14.2 | 0 | |
| **2-Oct-08** | 16.1 | 10.1 | 13.1 | 0 | |
| **3-Oct-08** | 16 | 12.5 | 14.3 | 0 | |
| **4-Oct-08** | 14.6 | 10.3 | 12.5 | 0.8 | |
| **5-Oct-08** | 13.2 | 9.5 | 11.4 | 0 | |
| **6-Oct-08** | 12.5 | 8.9 | 10.7 | 0 | |
| **7-Oct-08** | 11.1 | 5.9 | 8.5 | 0.6 | |
| **8-Oct-08** | 8.7 | 5.3 | 7 | 0.7 | |
| **9-Oct-08** | 12.4 | 5.8 | 9.1 | 4.8 | |
| **10-Oct-08** | 13.5 | 10.1 | 11.8 | 2.3 | |
| **11-Oct-08** | 10.3 | 4 | 7.2 | 0.7 | |
| **12-Oct-08** | 9.6 | 3.5 | 6.6 | 0 | |
| **13-Oct-08** | 12 | 5.1 | 8.6 | 0 | 2 |
| **14-Oct-08** | 9.4 | 3.7 | 6.6 | 0 | |
| **15-Oct-08** | 12.3 | 9 | 10.7 | 0 | |
| **16-Oct-08** | 12.7 | 9 | 10.9 | 0.6 | |
| **17-Oct-08** | 11.9 | 8.8 | 10.4 | 3.5 | |
| **18-Oct-08** | 10 | 4.4 | 7.2 | 0 | |
| **19-Oct-08** | 8.9 | 2.6 | 5.8 | 0 | |
| **20-Oct-08** | 11 | 5.9 | 8.5 | 7.5 | |
| **21-Oct-08** | 13.9 | 5.7 | 9.8 | 43 | |
| **22-Oct-08** | 6.2 | 3 | 4.6 | 0.6 | |
| **23-Oct-08** | 5.2 | 1.1 | 3.2 | 0 | |
| **24-Oct-08** | 9.1 | 1.2 | 5.2 | 0 | |
| **25-Oct-08** | 10.6 | 0.9 | 5.8 | 0 | |
| **26-Oct-08** | 11.4 | 4.4 | 7.9 | 0 | |
| **27-Oct-08** | 11.9 | 6.6 | 9.3 | 0 | |
| **28-Oct-08** | 16.3 | 9 | 12.7 | 0.6 | |
| **29-Oct-08** | 18.7 | 10.1 | 14.4 | 11.4 | |
| **30-Oct-08** | 15 | 9.4 | 12.2 | 0 | |
| **31-Oct-08** | 13.7 | 8.2 | 11 | 0.7 | |
| **1-Nov-08** | 9.5 | 5.2 | 7.4 | 0.7 | |
| **2-Nov-08** | 6.6 | -0.1 | 3.3 | 1.2 | |
| **3-Nov-08** | 6.9 | -0.9 | 3 | 0 | |

| Date/Time | Max Temp (°C) | Min Temp (°C) | Mean Temp (°C) | Total Precip (mm) | Snow on Grnd (cm) |
|---|---|---|---|---|---|
| 4-Nov-08 | 8.1 | 5.8 | 7 | 0 | |
| 5-Nov-08 | 9.4 | 6.1 | 7.8 | 0 | |
| 6-Nov-08 | 11.1 | 8.6 | 9.9 | 0 | |
| 7-Nov-08 | 10.1 | 5.9 | 8 | 3 | |
| 8-Nov-08 | 14.3 | 6.9 | 10.6 | 20.1 | |
| 9-Nov-08 | 15.4 | 7.6 | 11.5 | 1.2 | |
| 10-Nov-08 | 13.6 | 6.7 | 10.2 | 0.6 | |
| 11-Nov-08 | 10.9 | 6.5 | 8.7 | 0.7 | |
| 12-Nov-08 | 7.8 | 3.3 | 5.6 | 0.8 | |
| 13-Nov-08 | 6.4 | -0.3 | 3.1 | 0 | |
| 14-Nov-08 | 4.6 | -1.7 | 1.5 | 0 | |
| 15-Nov-08 | 9.4 | 1.9 | 5.7 | 0.7 | |
| 16-Nov-08 | 15.9 | 9.3 | 12.6 | 2.9 | |
| 17-Nov-08 | 14.8 | 6.2 | 10.5 | 7.2 | |
| 18-Nov-08 | 9.3 | 3.1 | 6.2 | 0 | |
| 19-Nov-08 | 15.2 | 7.2 | 11.2 | 48.2 | |
| 20-Nov-08 | 14.9 | 4.8 | 9.9 | 7.9 | |
| 21-Nov-08 | 8.1 | 3.3 | 5.7 | 5.4 | |
| 22-Nov-08 | 14.2 | 3.2 | 8.7 | 17.3 | |
| 23-Nov-08 | 6.4 | 1.8 | 4.1 | 2.4 | |
| 24-Nov-08 | 5.2 | 2 | 3.6 | 0 | |
| 25-Nov-08 | 2.9 | -2 | 0.5 | 0 | |
| 26-Nov-08 | 8.1 | -2.2 | 3 | 0 | |
| 27-Nov-08 | 14.4 | 8.1 | 11.3 | 3.6 | |
| 28-Nov-08 | 12.9 | 7.3 | 10.1 | 11.6 | |
| 29-Nov-08 | 8.1 | 6.1 | 7.1 | 6.7 | |
| 30-Nov-08 | 6.6 | 5.1 | 5.9 | 0 | |
| 1-Dec-08 | 15.1 | 3.2 | 9.2 | 5.6 | |
| 2-Dec-08 | 14.9 | 7.1 | 11 | 13.7 | |
| 3-Dec-08 | 12.7 | 0.7 | 6.7 | 19.5 | |
| 4-Dec-08 | 7.6 | 0.7 | 4.2 | 0 | |
| 5-Dec-08 | 8.2 | 3.6 | 5.9 | 0.8 | |
| 6-Dec-08 | 3.7 | -0.2 | 1.8 | 0 | |
| 7-Dec-08 | 14.6 | -0.1 | 7.3 | 22 | |
| 8-Dec-08 | 12.6 | -0.1 | 6.3 | 2.2 | |
| 9-Dec-08 | 3 | -3 | 0 | 0 | |
| 10-Dec-08 | 10.1 | 1.5 | 5.8 | 13.6 | |
| 11-Dec-08 | 9 | 0.9 | 5 | 31.6 | |
| 12-Dec-08 | 12.1 | 1 | 6.6 | 8.3 | |
| 13-Dec-08 | 16 | 3 | 9.5 | 17.2 | |
| 14-Dec-08 | 3 | -3.5 | -0.3 | 0 | |
| 15-Dec-08 | 8.1 | 0.1 | 4.1 | 0 | |
| 16-Dec-08 | 9 | 0.3 | 4.7 | 2.1 | |
| 17-Dec-08 | 1 | -3 | -1 | 8.2 | |
| 18-Dec-08 | 1.6 | -3.9 | -1.2 | 3.1 | 2 |
| 19-Dec-08 | 0.4 | -10 | -4.8 | 2.7 | |
| 20-Dec-08 | -5.9 | -8.1 | -7 | 0 | 2 |

| Date/Time | Max Temp (°C) | Min Temp (°C) | Mean Temp (°C) | Total Precip (mm) | Snow on Grnd (cm) |
|---|---|---|---|---|---|
| **21-Dec-08** | -6.3 | -11.9 | -9.1 | 0 | 3 |
| **22-Dec-08** | 4.8 | -9.6 | -2.4 | 7.9 | |
| **23-Dec-08** | 0.9 | -6.5 | -2.8 | 0 | |
| **24-Dec-08** | 2.3 | -6.9 | -2.3 | 0 | |
| **25-Dec-08** | 9.8 | -1.7 | 4.1 | 24.8 | |
| **26-Dec-08** | -1.4 | -12 | -6.7 | 0 | |
| **27-Dec-08** | -8.9 | -12.1 | -10.5 | 0 | |
| **28-Dec-08** | -1.1 | -11.5 | -6.3 | 0 | |
| **29-Dec-08** | 5.2 | -1.1 | 2.1 | 0 | |
| **30-Dec-08** | 1.5 | -1 | 0.3 | 0 | |
| **31-Dec-08** | 0.1 | -2.9 | -1.4 | 0 | |
| **1-Jan-09** | 2.3 | -3.6 | -0.7 | 6.1 | |
| **2-Jan-09** | 1.8 | -0.9 | 0.5 | 1.5 | |
| **3-Jan-09** | 2.2 | -2 | 0.1 | 3.1 | |
| **4-Jan-09** | 0.4 | -3.1 | -1.4 | 2.6 | 10 |
| **5-Jan-09** | 2.3 | -1.7 | 0.3 | 0 | 3 |
| **6-Jan-09** | 3.1 | -4.5 | -0.7 | 1.2 | |