

## Real Time Water Quality Monthly Report for Voisey's Bay Nickel Company Ltd. September 2005

### General

- The Water Resources Management Division staff analyses the real-time web page on a daily basis.
- Voisey's Bay Nickel Company will continue to be informed of any significant water quality events in the future in the form of a monthly report.

### Maintenance and Calibration of Instrumentation

- The three Datasondes were retrieved from the sites and brought back to the office for cleaning and maintenance on September 25<sup>th</sup>, 2005. The instruments were calibrated on September 25<sup>th</sup>, 2005 and returned to the water on September 26<sup>th</sup>, 2005. A DOEC staff member (Annette Tobin) was present on-site to oversee these tasks.
- All QA/QC protocols were followed when retrieving and deploying the instruments. All required forms were completed and sent to the Department of Environment and Conservation on September 26<sup>th</sup>, 2005. Water samples were sent to St. John's on October 7<sup>th</sup> instead of directly to Accutest Laboratory. The time period to ship them to St. John's and then to Ottawa may have an impact on the accuracy of the laboratory results. This will be kept in mind when the results are received.
- A new installation setup for Lower Reid Brook was installed on July 21<sup>st</sup>, 2005. The new installation allows the Datasonde to be 4-5 inches above the sediment bottom which is suspected to be the problem of turbidity spikes in Lower Reid Brook. This new installation appears to have worked for avoiding the sporadic spikes seen from last year. The extreme high water level of Lower Reid Brook however, preventing the Hydrolab from returning to the new installation. It is currently on the sediment bottom.
- The extreme high water levels affected the reinstallation of the Hydrolab in Upper Reid Brook. The Hydrolab in Upper Reid Brook could not be placed in the middle of the river as usual but had to be placed a little closer to shore due to safety reasons caused by high water levels.

### Data Interpretation

#### Reid Brook at Outlet of Reid Pond

- Throughout the month of September, most water quality parameters at the Upper Reid Brook station remained steady at expected background levels. As can be seen by the graphs, pH and conductivity (Figures 1 & 2) remained very consistent throughout the month. There is a decrease in conductance after calibration of the instruments of approximately 1.5  $\mu\text{s}/\text{cm}$ .

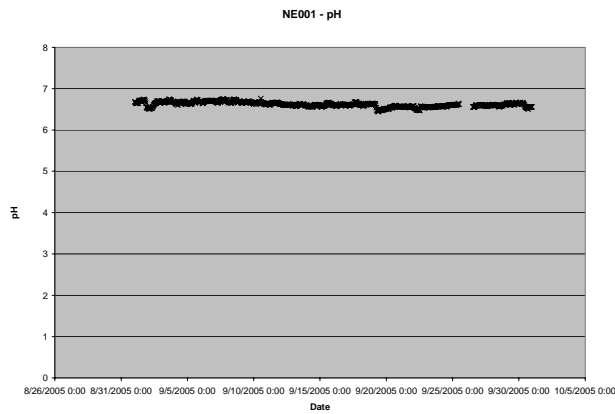


Figure 1

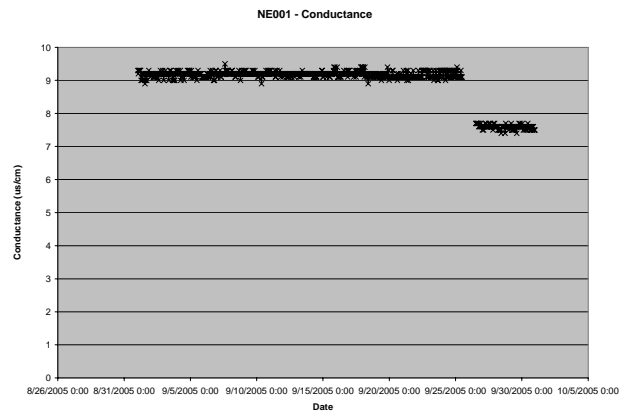


Figure 2

- Temperature (Figure 3), as expected for this time of year, has started to decrease during the month of September. The dissolved oxygen (Figure 4) began to increase during the month of September. This corresponds with the natural ability of water to have higher concentrations of dissolved oxygen when lower water temperatures are present.

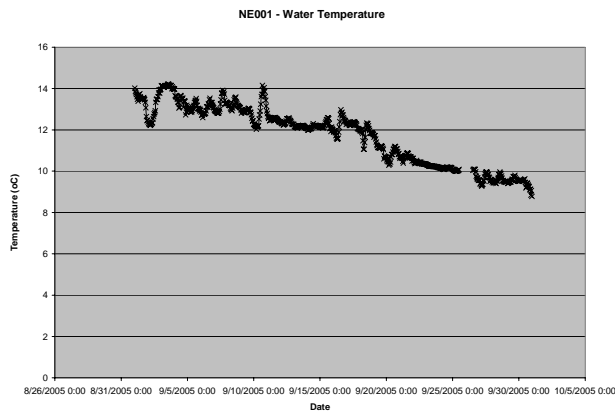


Figure 3

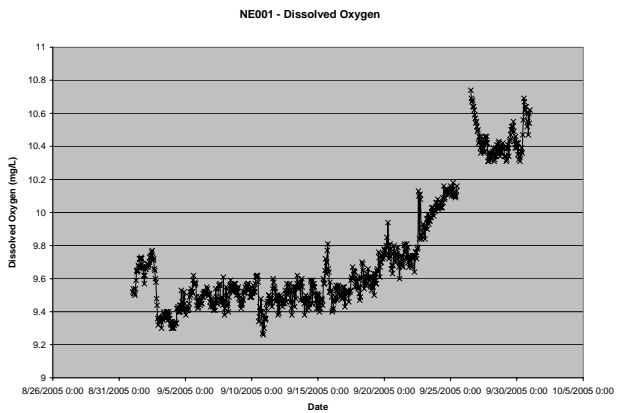


Figure 4

- The turbidity (Figure 5) is stable at 0 NTU with one small spike of 1.2. NTU in turbidity on September 15<sup>th</sup>, 2005.

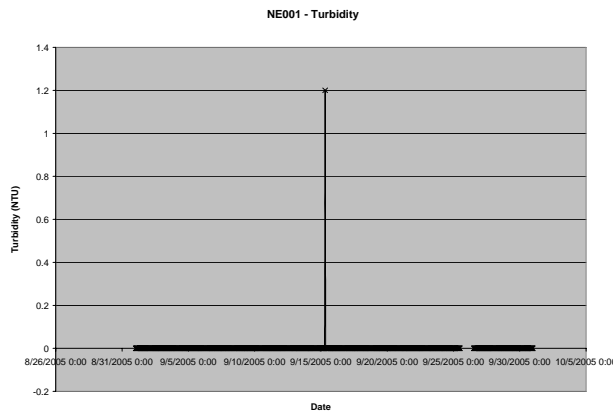


Figure 5

### Camp Pond Brook below Camp Pond

- Throughout the month of September, the pH and conductance (Figure 6 & 7 respectively) in Camp Pond Brook remained relatively consistent with the exception of a significant spike on September

18<sup>th</sup>. This spike is consistent with a spill that occurred from a tailings pipe that was reported on September 19<sup>th</sup>. Water with pH 12 was released from the tailings piping and caused both pH and conductance to increase in Camp Pond Brook for a short period of time. Figure 8 shows the conductance with the scale changed to show the spikes in conductance throughout the month of September. There were spikes in conductance on September 2<sup>nd</sup>, September 19<sup>th</sup> and September 22<sup>nd</sup>. These spikes are likely to be due to the tailing pipe releases.

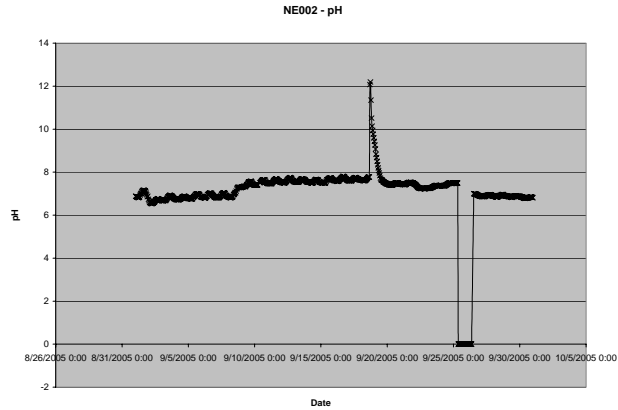


Figure 6

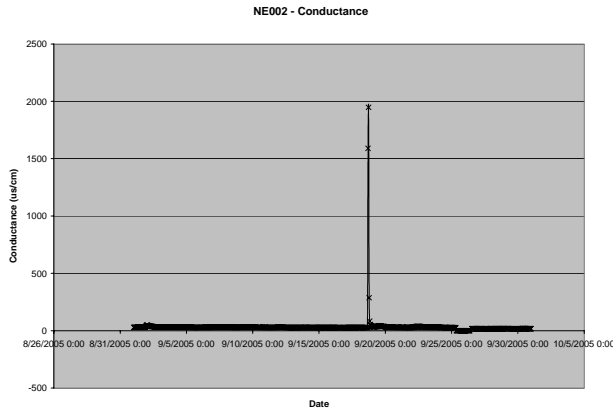


Figure 7

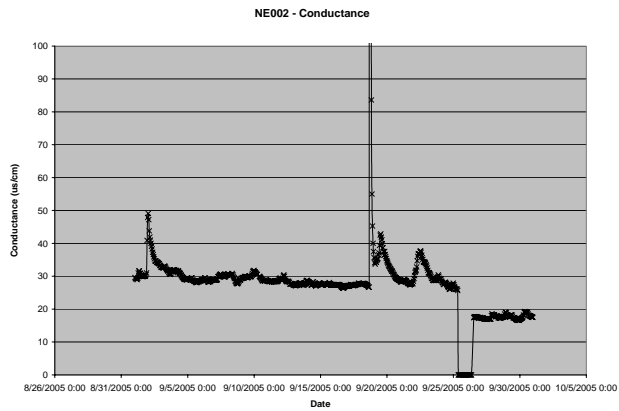


Figure 8

- Temperature (Figure 9) decreased during the month of September which is consistent with this time of the year. The dissolved oxygen (Figure 10) showed a slight increase during September. This corresponds with the natural ability of water to have higher concentrations of dissolved oxygen when lower water temperatures are present.

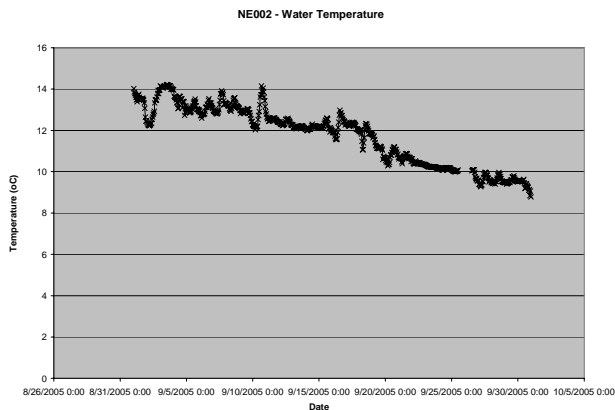


Figure 9

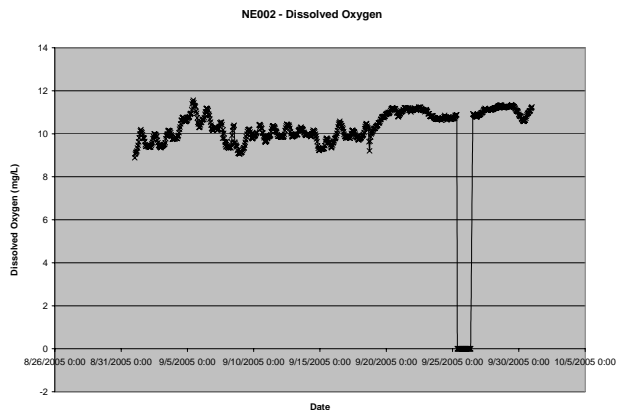
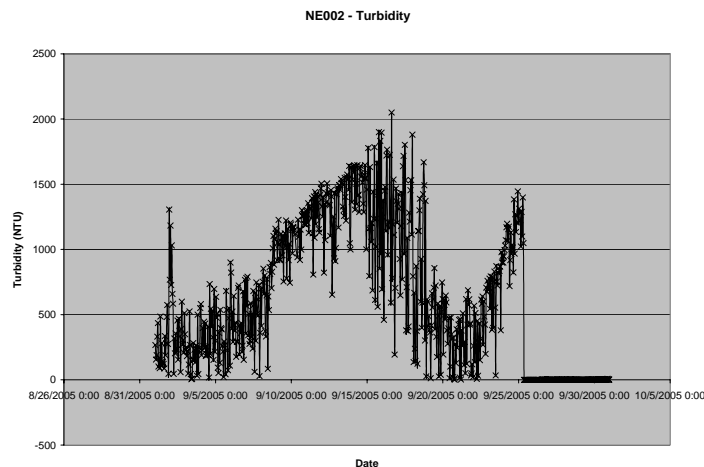


Figure 10

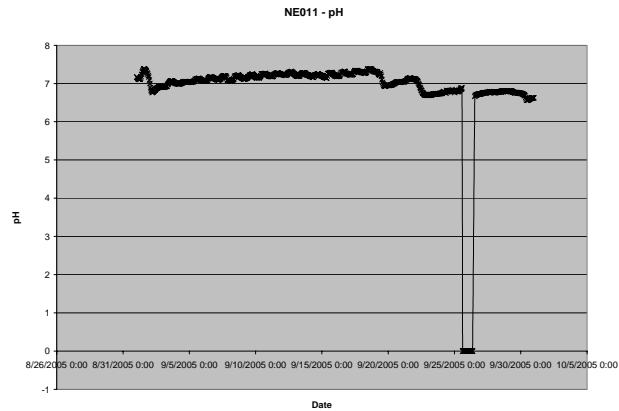
- Throughout the month of September there was significant activity experienced with the Hydrolab at the Camp Pond Brook station for turbidity (Figure 11). There was a severe increase in turbidity from September 1<sup>st</sup> to September 16<sup>th</sup>. This increase began on August 24<sup>th</sup>.
- DOEC informed VBNC Environmental Staff of the turbidity increase seen in Camp Pond Brook (since August 24<sup>th</sup>) on September 1<sup>st</sup>. Environmental Staff informed DOEC that the most recent (September 1-2<sup>nd</sup>) turbidity spikes could have been due to extreme precipitation during that time. The Environmental Officer walked down to Camp Pond Brook and saw no visible colour changes in the brook. He suspected however, that it could have been elevated organics and larger sediments that contributed to the spike.
- DOEC staff informed VBNC Environmental Staff on September 6<sup>th</sup> that turbidity values in Camp Pond Brook continued to increase. Despite further investigation by VBNC Environmental Staff there was no explanation at this time for the increase in turbidity.
- Between September 7-9<sup>th</sup>, DOEC spoke with VBNC Environmental Staff regarding the increasing turbidity. It was noted that the two regular Environmental Staff that have been trained to work with the Hydrolabs were not on-site until September 20<sup>th</sup>. DOEC informed VBNC that the turbidity values in Camp Pond Brook have continued to increase. VBNC staff walked down to Camp Pond Brook on September 8<sup>th</sup> to investigate. The Hydrolab was taken out of the water and it was noted that there was algae growth on the sensors. The sensors were cleaned of algae in the field and the Hydrolab was returned to the water. The removal of the algae did not appear to affect the turbidity readings as the website showed no signs of decreasing turbidity. The turbidity probe has a self-cleaning process that cleans the probe prior to taking a measurement.
- Conversations between DOEC and VBNC Environmental Staff determined that it would be beneficial to remove the Hydrolab at Camp Pond Brook when trained staff returned on the 20<sup>th</sup>.
- After September 16<sup>th</sup> the turbidity was still fluctuating but showed a decrease until approximately September 22<sup>nd</sup>.
- DOEC spoke with VBNC Environmental Staff to inform them that they would be travelling to Voisey's Bay on September 23<sup>rd</sup> for the maintenance and calibration of all three Hydrolabs.
- Between September 18<sup>th</sup> to September 22<sup>nd</sup>, the fluctuations in turbidity ranged from 1 NTU to 1669 NTU. This seems to be due to the tailings pipe leak discussed earlier with respect to pH and conductance. The increases that were seen earlier in August and September may be associated with leakages from the tailings pipe that eventually spilled on September 18<sup>th</sup>.
- An increase in turbidity began again on September 22<sup>nd</sup> until the Hydrolab was taken out for calibration on September 25<sup>th</sup>.
- After calibration of the instrument on September 26<sup>th</sup>, the turbidity values decreased to background levels.



*Figure 11*

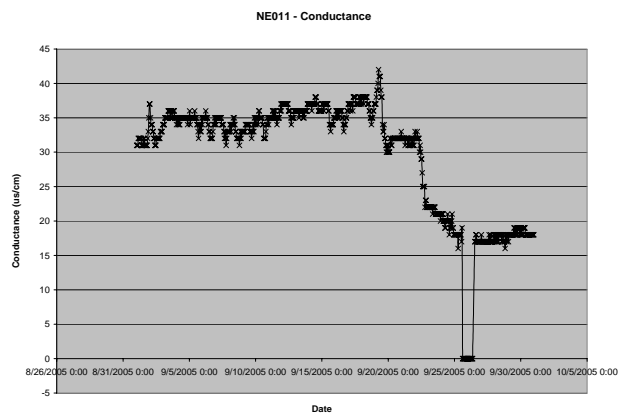
### Lower Reid Brook below Tributary

- Throughout the month of September, the pH (Figure 12) in Lower Reid Brook remained relatively stable with a slight increase throughout the first part of September and a slight decrease towards the end of the month. There is a decrease in pH after calibration of the instrument



*Figure 12*

- The conductance during the first half of September (Figure 13) remained relatively stable until September 19<sup>th</sup> when there was a spike and then the conductance decreased quite rapidly. This spike in conductance is likely due to the tailing pipe spill discussed earlier with respect to pH and conductance in Camp Pond Brook. It occurs approximately 11 hours after the spike in conductance at the Camp Pond Brook station.



*Figure 13*

- Temperature (Figure 14) showed fluctuations throughout the month of September. There is, however, a distinctive trend of decreasing temperatures throughout the month. The dissolved oxygen (Figure 15) shows fluctuations as well with an increasing trend. This corresponds with the natural ability of water to have higher concentrations of dissolved oxygen when lower water temperatures are present.

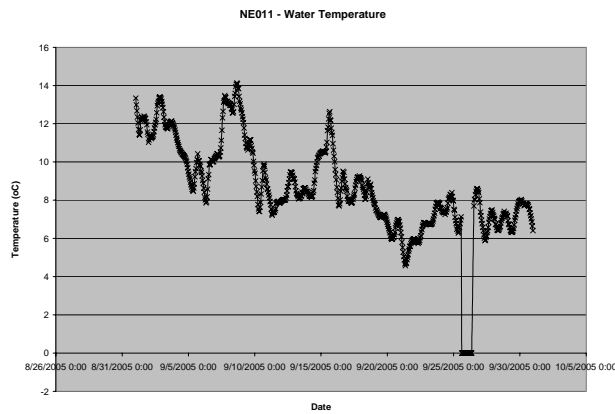


Figure 14

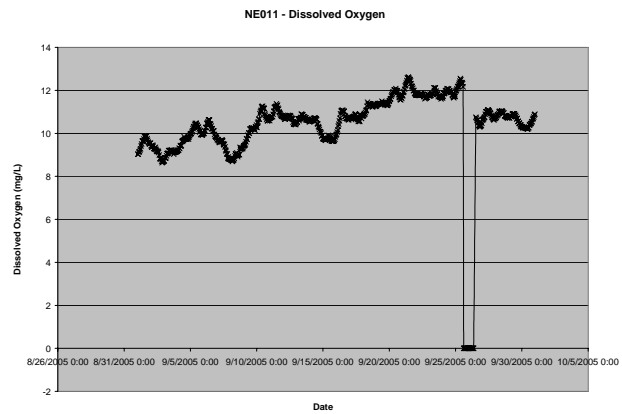
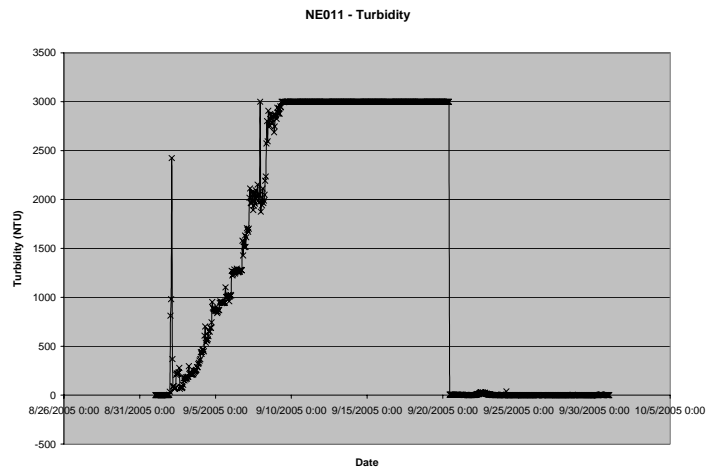


Figure 15

- Turbidity values (Figure 16) for the beginning of September were at background levels. On September 2<sup>nd</sup>, a drastic and steady increase of turbidity values was experienced. The increase continued until September 9<sup>th</sup> when the Hydrolab reached its maximum turbidity value of 3000 NTU.
- When DOEC staff informed VBNC Environmental Staff on September 6<sup>th</sup> that turbidity values in Camp Pond Brook continue to increase. It was also noted that Lower Reid Brook show increasing turbidity values since September 2<sup>nd</sup>. Despite further investigation by VBNC Environmental Staff there was no explanation at this time for the increase in turbidity.
- The increase in turbidity values began on September 1<sup>st</sup> approximately seven (7) days after the turbidity in Camp Pond Brook began to increase.
- Between September 7-9<sup>th</sup>, DOEC spoke with VBNC Environmental Staff regarding the increasing turbidity. DOEC informed VBNC that the turbidity values in Lower Reid Brook have continued to increase reaching the maximum value for the Hydrolabs of 3000 NTU.
- On September 20<sup>th</sup>, the turbidity values suddenly decreased (within an hour) from the maximum 3000 NTU to background levels of 0-6 NTU.
- On September 22<sup>nd</sup>, turbidity levels again spiked slightly above background levels for approximately 12 hours with a maximum value of 30 NTU. On September 23<sup>rd</sup>, the turbidity values returned to normal background levels.
- It was noted by VBNC staff that the turbidity spikes may be due to the calibration of the Hydrolab instrumentation. This is not the case with Lower Reid due to the fact that the turbidity readings returned to background levels (September 23<sup>rd</sup>) before the calibration took place (September 26<sup>th</sup>).
- The increases that were seen earlier in September are likely due to the leaking of the tailings pipe.
- After calibration of the instrument on September 26<sup>th</sup>, the turbidity values remained at background levels.



*Figure 16*

**Prepared by:** Annette Tobin  
Department of Environment and Conservation  
October 20<sup>th</sup>, 2005  
Ph: (709) 729-1159  
Fx: (709) 729-0320  
Email: [annettetobin@gov.nl.ca](mailto:annettetobin@gov.nl.ca)