



Introduction & Objectives

The Issue

Mine Drainage exposing heavy metals like copper at Minto mine.

The Solution

Semi-Passive treatment using sulfate reducing bacteria available at mine site.

Objectives

- To determine and demonstrate that bioreactors using sulfate reducing bacteria can remove heavy metals, specifically copper from Minto mine impacted water (MIW).
- To demonstrate analytical procedures (sulphate, carbon, pH) during laboratory visit at YukonU Research Centre (YRC).

Experimental protocol



Figure 2: YukonU campus visit by Eliza Van Bibber school students.

Procedure

- Built two column bioreactors (BR1, BR2) using sulfate reducing bacteria collected at Minto Mine in 2020.
- Used the bioreactors to remove contaminants from mine impacted water.
- Monitored different parameters in the effluent water (like color, smell, pH, carbon, sulfate, copper).

Variables

Bioreactors BR1 and BR2 were similar (bacteria, wood chips) except BR1 had an additional source of carbon (molasses), which is food for bacteria.



Figure 3: YRC lab visit by Eliza Van Bibber school students.

Results

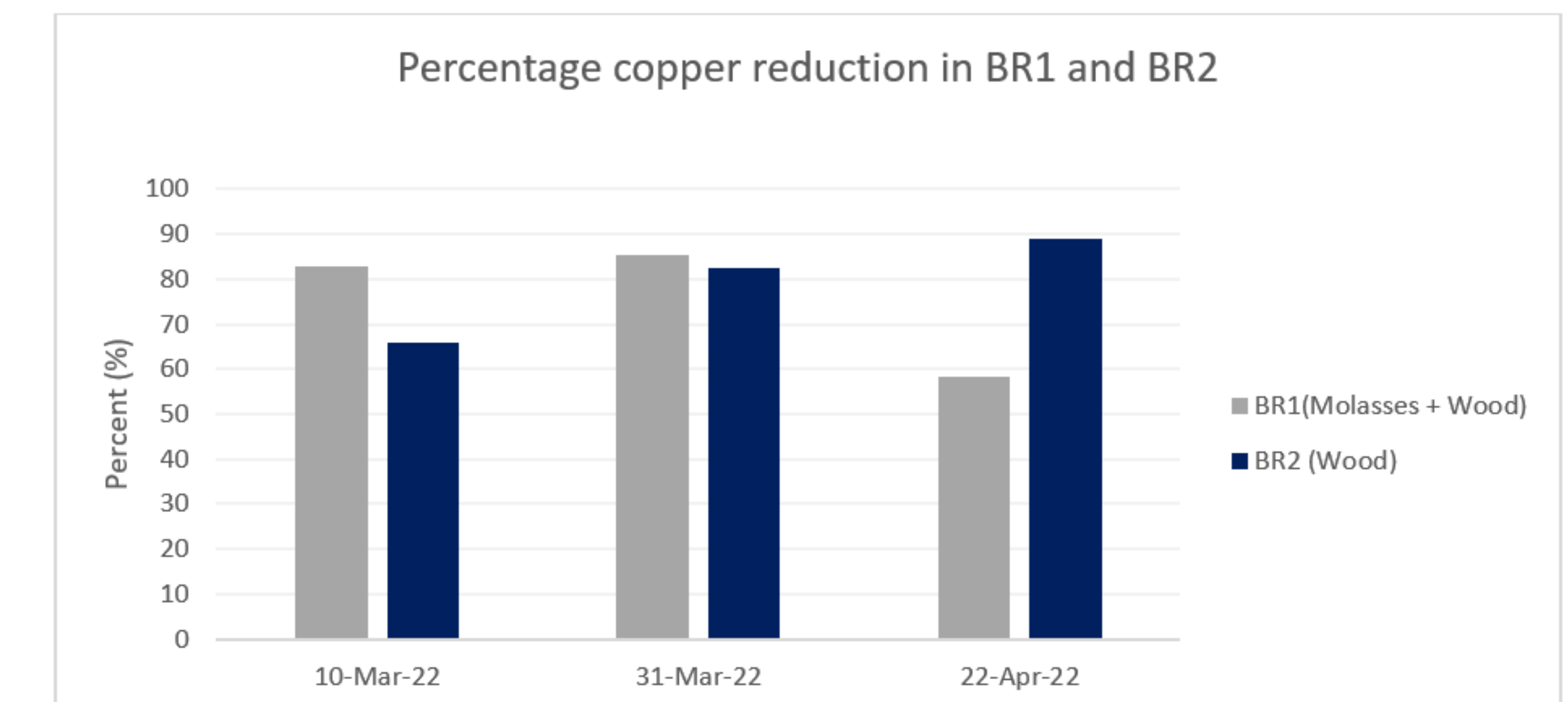


Figure 4: Copper reduction percentages in BR1 and BR2 over time.

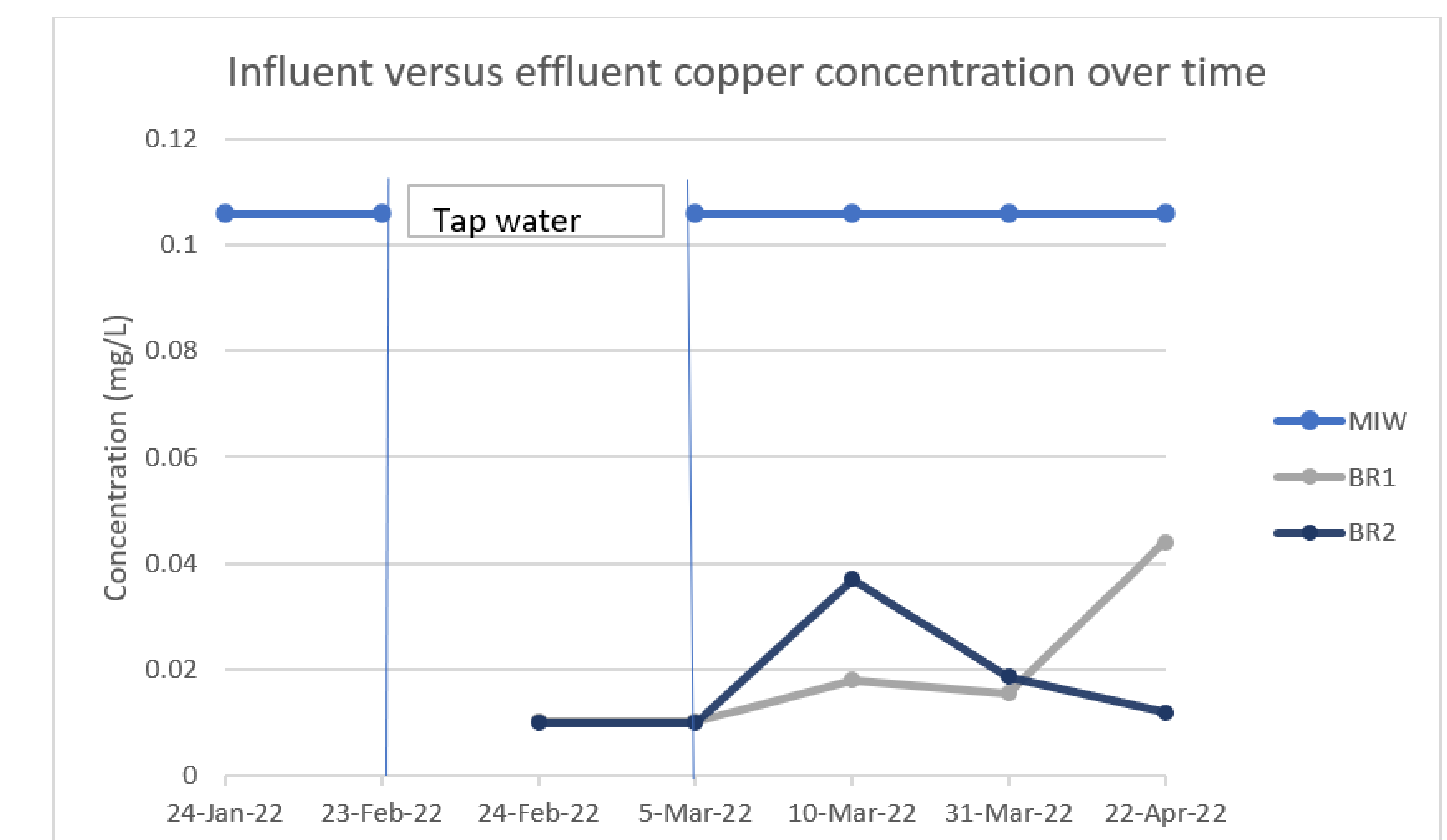


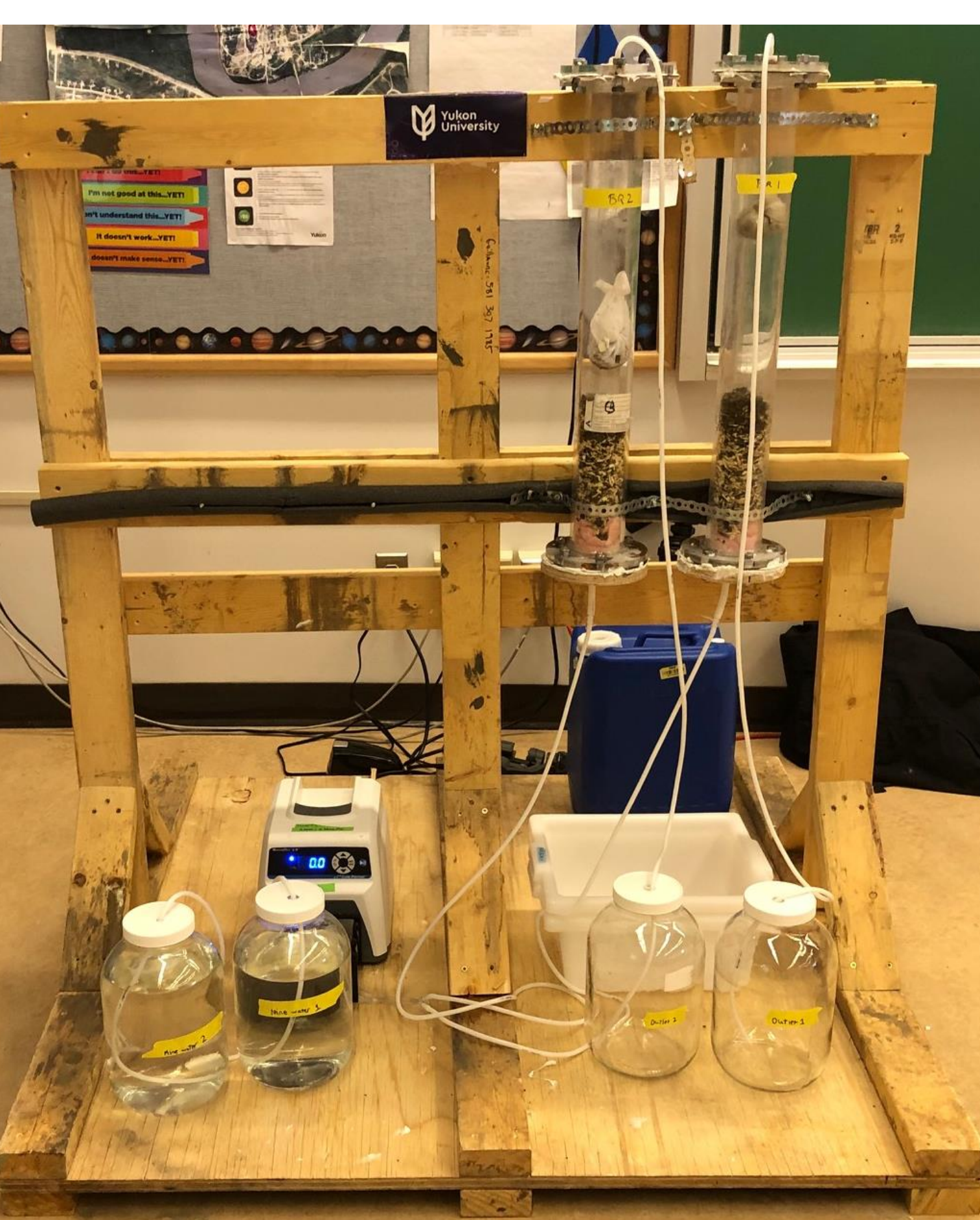
Figure 5: Copper concentration in influent/ MIW versus effluent for BR1 and BR2.

Conclusions

- Both bioreactors BR1 and BR2 successfully removed copper (57- 80%) from mine impacted water (Figure 4).
- Initially bioreactor BR1 (with molasses or additional carbon source) was better at removing copper than bioreactor BR2 (without molasses) but eventually BR2 showed better results.
- Due to short supply, tap water was used instead of MIW for 2 weeks (Feb 23rd – Mar 5th) as shown in Figure 5.

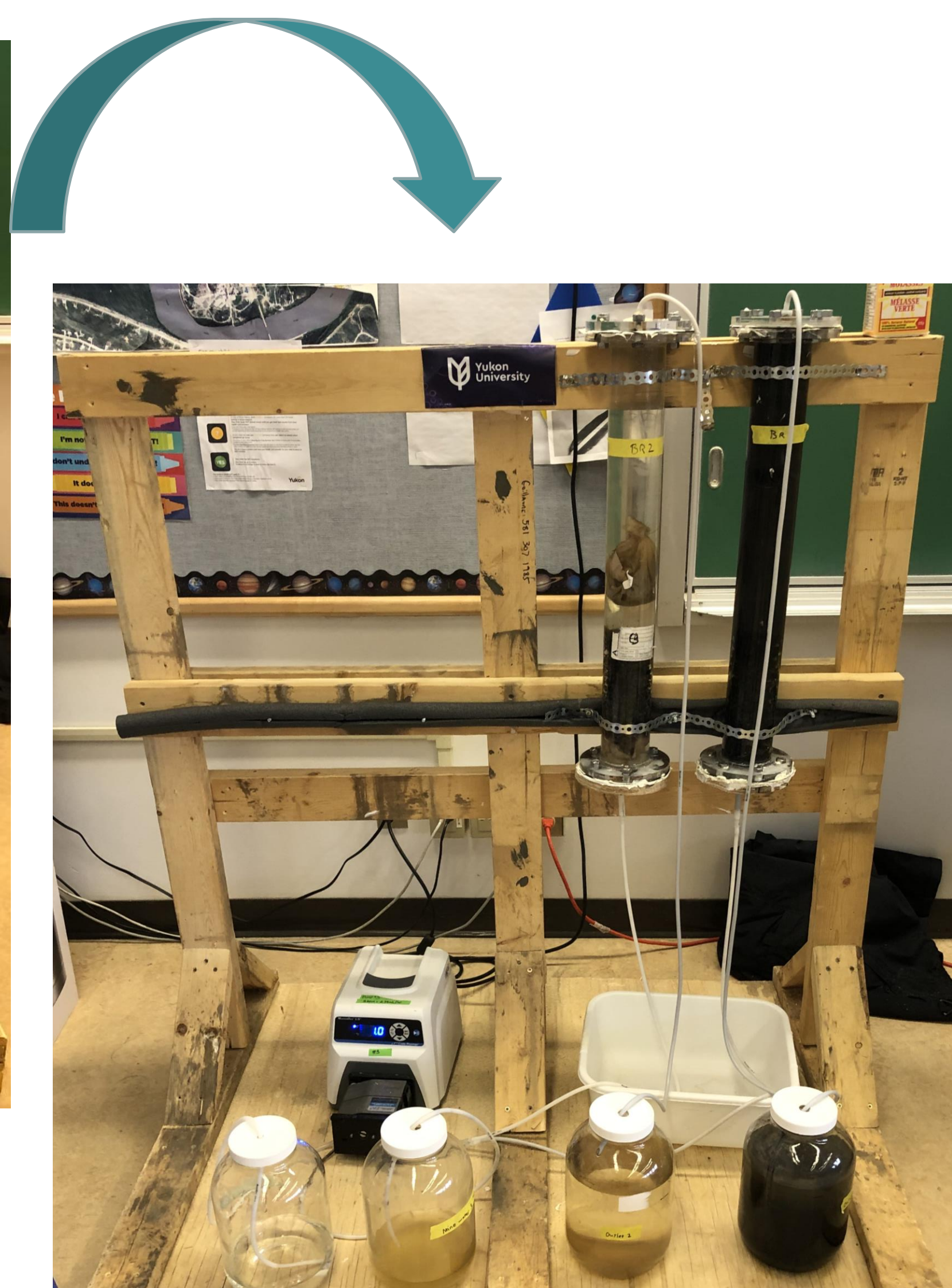
Acknowledgements

Minto Exploration Ltd., CASINO Mining Corp.



Initial (January 27, 2022)

Column BR1 (right) and column BR2 (left) looks alike.



Final (March 31st, 2022)

Column BR1 (right) turned black due to bacterial activity/ metal sulfide and column BR2 (left) looks opaque/ transparent.

Figure 1: Difference in physical appearance of BR1 and BR2 at initial and final stages.