

International Cyanide Management Code (ICMC) was established. Kanowna Belle Gold Mine (KBGM) has been certified under the ICMC since 2008 and has recently been re-certified in December 2012. Under the Code, 80% of the time WAD cyanide discharge must be below 50 ppm and 95% of the time must be below 78 ppm. Prolonged discharge above 78 ppm is considered a breach of the ICMC. Greater usage of cyanide allowed in KBGM due to the usage of hyper saline water as the processing plant results in higher WAD cyanide discharge concentration.

The main objective of this report was to determine the effectiveness of WAD cyanide detoxification using hydrogen peroxide in KBGM tailings slurries during refractory and free milling ore leaching. The experiment was conducted during refractory and free milling ore slurries for both lab experiment and plant trial. The sample solutions were then analysed using picric acid method, which is a colorimetric method where higher WAD cyanide concentration solution was represented with deeper orange-red colour.

The impacts of H₂O₂ concentration and copper sulphate (CuSO₄) as a catalyst on WAD cyanide destruction were investigated using small scale laboratory bottle roll tests. A plant trial was then conducted. It was found that the WAD cyanide destruction was optimum when the H₂O₂ dose was 100 g/t with 2:1 WAD cyanide to CuSO₄ ratio. The combination was able to increase the removal rate by 20-32%.

Different ore characteristics and leaching conditions between refractory and free milling slurries resulted in two separate detoxification model to be applied in the DCS system. The equation for the model that should be installed during refractory leaching is $C_{t+1} = (C_t \cdot e^{-k \cdot t}) + C_{in} \cdot (1 - e^{-k \cdot t})$.

where C_t is the cyanide concentration at time t , C_{in} is the inlet cyanide concentration, k is the rate constant, and t is the time.

The equation for the model that should be installed during free milling leaching is $C_{t+1} = (C_t \cdot e^{-k \cdot t}) + C_{in} \cdot (1 - e^{-k \cdot t}) \cdot F$.

where C_t is the cyanide concentration at time t , C_{in} is the inlet cyanide concentration, k is the rate constant, t is the time, and F is the correction factor.

The equation for the free milling slurry still needs to be investigated further by conducting a plant trial to find the correction factor (F).