Oxidising Value

C.Vincent*, S.Ong and S.Woodward*

Note: Presenting author's name should be underlined.

1. Carla Vincent BSc(Hons), MBA(Int)/MIF, MAusIMM

Senior Geologist, Panoranmic Resources, Perth WA 6430. Email: Carla.vincent@panres.com

2. Shu Ong BSc
Mine Geologist, Panoranmic Resources, Perth WA 6430. Email: Shu.ong@panres.com

3. Simon Woodward BEng(Hons)
Vent and Paste Engineer, Panoranmic Resources, Perth WA 6430. Email:
Simon.woodward@panres.com

ABSTRACT

Sulphide ores form a significant component of world metal production. In the case of Nickel (Ni), 2018 saw 2.3 million tonnes of metal produced worldwide, with 60% being sources from Ni-sulphide deposits. Sulphide ores are formed in reducing environments, thus they inherently oxidise during the mining process when exposure to air and water occurs (equation 1 &2).

Eq 1: Metal Sulphide + H2O = Metal Oxide + SO2 + H2

Eq 2: Metal Sulphide + O2 = Metal Oxide + SO2

Both the metal oxide, and the gaseous sulphur dioxide (SO2) products; formed during oxidation impact on the mining value chain. Metal oxides report to tails during processing, as processing circuits are optimised for the recovery of sulphides. The production of gases in closed circuit ventilation systems (such as underground mines or confined spaces) can produce irrespirable atmospheres in working environments. The quantification of these risks is dependent on the reaction kinetics, determined by ore body geochemistry and interaction of the reactants over time.

At the Savannah Nickel Deposit, Halls Creek Mobile Zone, Kimberly WA the impact on metal recovery of oxidation has historically been up to 10%. Whilst the production of SO2 has resulted in changes to ventilation of blind stopes, post firing and in one case the abandonment of fired stoping material. Oxidation is managed at Panoramic's Savannah Nickel mine through mining rates, stope size, blast particle size, ventilation and ROM rotation. These measures act together along the value chain to increase total process efficiency, metal recovery and produce a safer work environment.