Evaluation of the Geochemistry and Mineralogy of Mine Waste in Nevada, USA

Joseph Rosal[1], Simon Jowitt[1], Jesse Scholpp[1]
[1]University Of Nevada, Reno, Reno, United States

The increased demand for critical metals has led to a coincident increase in assessing the potential of alternative and secondary sources of these critical commodities. One of the most prospective secondary sources of critical metals is mine waste. Although humans have been mining for thousands of years, only twelve metals were mined between the Bronze Age and the end of the Medieval period. In comparison, modern standards of living require nearly all of the elements on the periodic table, although many metals that are classified as critical today were not mined at significant levels before the turn of the century. Waste rock from historic mine sites therefore, could be enriched in critical co- and by-product metals such as tellurium, indium, and gallium, which are typically produced as byproducts of Cu and Zn production, respectively. Modern technology also allows for the mining of large tonnage, low-grade deposits, and the cutoff grade for many commodities has historically been higher than it is today. This means that mineralization that is economic today may have been considered waste at the time of operation. Poor metal recovery during processing can also lead to waste material being enriched with critical metals.

This study focuses on the characterization of mine waste samples from a number of current and legacy mine sites in Nevada, USA, a state with a significant history of mining that contains likely more than 300,000 individual mine sites and occurrences. This characterization will allow the identification of the critical metal potential of individual sites as well as the distribution of critical metals among different mineral phases within the waste to be analyzed. These results will feed into both state- and nation-wide assessments of the critical, base, and precious metal potential of mine wastes across the USA.