Environmental study on the Pinpet Fe deposit in southern Shan State, Myanmar

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Mining operations in the Pinpet Fe deposit, which is the second-largest Fe deposit in Myanmar, are currently suspended, partly because contamination of heavy metals and hazardous elements from the pilot-scale mine into the surrounding aquatic environment is concerned by local residents. However, any scientific investigations of the source and degree of contamination in streams near the deposit have not been conducted. Furthermore, ore genesis in the Pinpet Fe deposit is not well understood though previous reports propose that the Pinpet deposit may be classified a limestone replacement, lateritic, or Fe-oxide–Cu–Au (IOCG) deposit. Depending on ore deposit type, different heavy metals and hazardous elements may be concerned for the environmental impact upon the development. Therefore, in this study we aimed to investigate the influence of mining activities on the environment near the Pinpet deposit and understand geochemical characteristics of the Fe ores.

Results of geochemical analyses for water samples obtained from Nan-tank-pauk stream and its tributaries, which flow near the mine area, indicate that all measured heavy-metal and hazardous-element concentrations were below the World Health Organization standards for drinking water and the proposed national drinking water quality standards in Myanmar. Results of bulk mineralogical and chemical analyses of ore samples reveal that some limonite ore samples contain substantial amounts of Arsenic (As; up to 2 wt%), but not other heavy metals or hazardous elements. Sequential extraction results of the ores indicate that most As in these As-rich ores is hosted in insoluble fractions. Therefore, Arsenic is unlikely to be released into the aquatic environment by interacting with water during ore beneficiation processes. Fe isotope analyses of the Fe ores show that their δ^{56}Fe values vary from -1.17 to -0.03‰. The relatively large variation in Fe isotope ratios suggests concentration of Fe occurred during sedimentation of carbonate host rocks, possibly by a low temperature hydrothermal activity. Arsenic was likely introduced by later hydrothermal activities related to subsequent faulting events.

Keywords: iron mine, sequential extraction, arsenic, environmental impact

