Microbial communities from acidic *in situ* uranium mining resemble those from acid mine drainage

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Acidic *in situ* recovery (ISR) is used to extract uranium from low-grade ore by delivering sulfuric acid to U-bearing sandstone formations and recovering the oxidized and dissolved uranium. In this study, we probe the geochemical conditions and the microbial communities affiliated with ISR mining in order to evaluate the biotic contribution to the potential for the mined aquifer to recover its initial pH and redox potential. The acidic treatment induces strong Bacterial and Archaeal community shifts. The geochemical characterization indicates that the ISR environment is analogous to acid mine drainage (AMD) (e.g. high sulfuric acid and dissolved metal concentrations) and coupled metagenomic analyses reveal similarity to AMD microbial communities. Mining microbial communities contain both acidophilic iron and sulfur reducers which will be crucial to natural attenuation processes. Based on these results, hypotheses regarding the rate and efficacy of natural attenuation may be formed and the evaluation of other potential active means of remediation explored. The data presented here are a direct result of unique access to ISR mining operations in Kazakhstan and represent one of the first studies, to our knowledge, to investigate the microbial lifecycle of acidic ISR and its concomitant remediation potential in Central Asia.