Mitigation of Acidic Mine Drainage from Abandoned Hard Rock Mines in the Western US: A Colorado Perspective

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Mining played a critical role in the socio-economic history of Colorado and many states in the US, however, the legacy of historic mining operations includes mine tunnels, adits, waste rock and mill tailings that have the potential to degrade water quality. In the aftermath of the Gold King Mine blow out, the state of Colorado reported 230 draining mines with water quality that likely impacts surface water quality, most of which are not being remediated or investigated. However, the use of surface water quality as the indicator of impact underestimates the complete picture of potential environmental impact from unconsolidated debris in mine tunnels, mine water hydrology and biogeochemical processes that degrade the subsurface water quality and the number of drainages and seeps impacting water quality is significantly higher. The historic water quality issues from hard rock mining that plague the western US differ from coal mining water quality issues of the eastern US. The differences affect mitigation strategies and result from state regulatory structure and mineral deposit characteristics. Selected case studies on the successful and unsuccessful application of mitigation strategies at Colorado abandoned mine sites are presented.