

Challenges to Mine Backfilling in Poor Rock Formation with High Artesian Mine Water Pressure¹

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Abstract: This presentation covers the challenges faced during the recent backfilling of mine voids in areas that were previously mitigated in the late-1980's and mid-1990's. The mines are located within poor to very poor-quality bedrock at the Glenrock No.1 and No.2 Mines in Wyoming. In addition, parts of the No. 1 and No. 2 Mines are flooded under high artesian pressures and are likely the cause of localized flooding within adjacent homes due to the unusually high-water table. The artificially confined conditions are caused by the collection of surface and groundwater down stratigraphic dip and lower elevations within portions of the mine. . This condition is likely the direct result of historic coal mining activities. The previous mitigation attempts and the poor-quality rock required an innovative mitigation approach and special grout mix design, which resulted in the injection of large grout volumes in areas previously mitigated. The mitigation was executed in such way to ensure that mine voids, rubble, and weak disturbed overburden rock were sufficiently filled with grout. Grouting existing voids and fractures within the rock overburden significantly reduces the permeability of the weak and fractured rock above the mine to provide ample sealing to prevent water migration as well as artificially high artesian pressures. Another challenging aspect was the elasto-plastic rebound of the poor-quality rock that caused grout return to ground surface upon cessation of grout injection and recommendation will be presented to minimize and control such events. A detailed groundwater study was performed to determine if the deformation associated with mine subsidence in Glenrock caused fracturing of the weak overburden rock allowing permeation of water to assist in creating artificial artesian conditions within and above the historic Glenrock No.1 and No. 2 Mine. The results of this study will be presented.³

Additional Key Words: grout flowability, refusal criteria.

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 3. The work reported here was done near 42°51'41.33"N - 105°51'43.34"W