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Technical Conference Paper

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Abstract:

Potash (the term often given for potassium chloride) is typically produced from bedded evaporite deposits, where the primary ore mineral, sylvite (KCl), is present in thin beds. Conventional solution-mining caverns for potash consist of two wells - one injection well and one extraction well. Because the concentration of KCl in solution may be increased with increasing temperature, operators often heat the injection fluid and vary flow rates to optimize the mining operation.

Intrepid Potash (Intrepid) uses the solution-mining process to produce potash from a thinly bedded evaporite deposit at the Cane Creek mine located near Moab, Utah. Contrary to convention, historic solution-mining operations at Cane Creek have utilized multiple horizontally-drilled wells to develop caverns to mine potash. Because a single-well cavern developed using multiple kick-off points along a dipping bed is dramatically less expensive to drill than multiple wells, Intrepid recently developed a single-well cavern using this method.

Simulations to understand the relationship between heat transfer, flow rates, and the concentration of KCl in the produced brine from a single-well cavern were completed to forecast the operational costs and production rates. Along with presenting a brief background of the mining history at Cane Creek, this paper presents a case study documenting the detailed validation of the solution-mining simulation with measured field data from the Cane Creek mine.

Key Words: potash, solution mining, dissolution, modeling, temperature, horizontal cavern