

Solution Mining Research Institute, Fall 2006 Technical Meeting
Rapid City, USA, October 1-4, 2006

BRINE WARMING IN A SEALED CAVERN: WHAT CAN BE DONE?

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ABSTRACT

For the past several years, concerns have raised about the long-term behavior of brine-filled sealed and abandoned caverns. In many cases, and especially when caverns are large and deep, the absence of thermal equilibrium when a cavern is sealed is a major concern: brine temperature increases, resulting in brine thermal expansion and cavern pressure build-up. In many cases, observing a “waiting period” to let brine temperature increase before sealing a cavern is not a realistic option, because this period may be several decades long. Instead, it is suggested that a small quantity of gas be injected into the cavern to increase cavern compressibility: the pressure increase generated by a given increase in brine temperature then will be much smaller. This solution is simple and robust. It can be proven that a gas leak, or gas dissolution in cavern brine, is beneficial in that it makes pressure build-up even slower. Mathematical equations that describe gas and brine behavior are derived, and examples are provided.

Keywords: Abandonment, Cavern Plugging and Abandonment