

RAPID DEPRESSURIZATIONS: CAN THEY LEAD TO IRREVERSIBLE DAMAGE?

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Abstract

Rapid gas depressurization leads to gas cooling that is followed by slow gas warming when the cavern is kept idle. The decrease in the temperature of gas depends upon the relative withdrawal rate (in %/day), and cavern size and shape. Gas cooling may result in the onset of tensile stresses at cavern walls and roofs that may generate fractures or cracks. However, in most cases, the depth of penetration of these fractures is small, and they are perpendicular to the cavern wall. The distance between two parallel fractures becomes larger when fractures penetrate deeper into the rock mass, as some fractures stop growing. Fractures form a polygonal pattern. Salt slabs are created, with boundaries formed by the opened fractures. As long as the depth of penetration of the fracture remains small, these slabs remain strongly bonded to the rock mass, and it is believed that, in many cases, their weights are not large enough to allow them to break off the cavern wall.

Key words: Rock mechanics, thermo elasticity, fractures