SALT MINING IN A PILE OF PANCAKES – THE SILURIAN SALINA EVAPORITE FORMATION IN THE WINDSOR-DETROIT AREA AND ITS IMPLICATIONS FOR MINING AND GEOLOGICAL RISK ASSESSMENT

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Abstract

The Upper Silurian Salina Formation represents one of the best studied evaporite successions in North America, deposited throughout the Paleozoic Michigan and Appalachian Basin and covering more than 600,000 km^2 (231,661 mi^2) in the Northeastern United Stated and Southern Canada. Rock salt and potash beds within the Salina Formation are buried up to a few thousand meters in the center of both basins whereas more shallow outcrops of only a few hundred meters are present at the basin margins as well as associated to structural highs between both basins. The Windsor-Detroit area is located at the Eastern margin of the Michigan Basin. In depths between 300 m (984 ft.) to 500 m (1640 ft.) up to 24 horizontally bedded salt layers with different grade and thicknesses, interbedded by dolostones and anhydrites, creating a 250 m (820 ft.) thick pile of pancakes.

The salt beds of the Salina formation are exploited by solution mining and conventional mining in the Windsor-Detroit area since 1893. Historical challenges for mining include a higher potential for sinkholes due to the local geological framework and complex hydrogeological conditions in the overburden Devonian dolostones and sandstones. However, detailed geological investigations based on underground mapping, drill core evaluation as well as geophysical surveys significantly helped to provide safe mining conditions in the past, present and future.

Key words: Salina Basin, Solution Mining, Geology, Canada, Bedded Salt Deposits