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Mineral assemblages as indicator for geological fault zones in salt bodies – mapping results compared with numerical modelling

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Salt masses and potash seams contained within are of viable economic interest and are extensively excavated in underground mines. Since the early days of potash-mining in the late 19th century it is recognized that groundwater possesses a hazard-potential for mine safety and that brine-inflow via geogenic or artificially induced fault zones must be precluded.
Interaction of undersaturated brines with soluble salts may occur at different times and on different time-scales during the evolution of a salt body. It is commonly assumed, that zones liable to leakage are indicated by anomalous textures (e.g. WARREN, 2017) and that the interaction of potash-bearing minerals with geogenic brines results in the formation of alteration zones with specific mineral assemblages (e.g. KÜHN, 1968). Thus, minerals like kainite are used as indicator to detect geological fault zones in the vicinity of mining galleries within the potash seams.
In this study, excavated transition zones between an unaffected potash seam and secondary altered horizons are geologically mapped in detail. Chemical analyses across the transition zone are compared with predicted mineral assemblages using the software PHREEQC (PARKHURST & APPELO, 2013). The comparison between field observations and modelling outlines that the development of alteration zones can be reproduced qualitatively. An improved understanding of the formation of alteration zones and their geological significance can be used to further enhance mining safety and extraction rate.

KÜHN, R., 1968: Geochemistry of German Potash Deposits. The Geological Society of America Special Paper 88, 427-504.
PARKHURST, D. L. & APPELO, C. A. J., 2013: Description of input and examples for PHREEQC version 3 - a computer program for speciation, batch-reaction, one-dimensional transport, and inverse geochemical calculations. US Geological Survey Techniques and Methods, 6 (A43), 497 p.
WARREN, J.K., 2017: Salt usually seals, but sometimes leaks: Implications for mine and cavern stabilities in the short and long term. Earth-Science Reviews 165, 302-341.