

APPALACHIAN BASIN SALT IN THE SILURIAN SALINA GROUP: THE VIEW FROM THE MINES

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Abstract

Expansion of salt mines in New York and Ohio over the past three decades has provided an additional means to observe Silurian Salina Group salt bed lithofacies and structural fabrics within the Northern Appalachian Basin. Observations in the more laterally and vertically extensive mine workings complement the seminal geological analyses performed at these mines during the 1950's and 1960's.

Our key observations are as follows: 1) Beneath the eastern Finger Lakes Region of New York, salt bed textures predominantly reflect tectonic shear; little evidence of true primary bedding appears to be preserved. 2) Tectonic signatures are still prominent in the Genesee Valley in New York based upon similar salt lithofacies to the eastern Finger Lakes Region and rock-in-salt features reported in the literature. 3) Tectonic signatures in the salt beds persist into northern Ohio, but they do not extensively overprint primary depositional halite-anhydrite rhythms. 4) The regional decollement in the salt sequence that has been previously interpreted to occur at or near the base of the Salina F salt, may actually be a multi-level phenomenon affecting the B salt, the D salt and the F salt zones. Instead of a single plane of slippage, each of the three major regional salt zones appears to have suffered some deformation; 5) Patterns of deformation in bounding shales and dolomites at the Cayuga Mine suggests that a "salt withdrawal basin" exists to the north of the Firtree Point Anticline. Roof rock above a zone of thin salt shows evidence of extensional deformation whereas compressional deformational features are clearly evident in the same roof rock stratum 4 miles to the south beneath a regional anticline. 6) Zones of thick salt in New York do not necessarily record original depocenters. Thick F-salt zones in New York are dominated by folded, faulted and brecciated sequences. Non-salt strata have been observed in drill cores to be "standing on end", thus exaggerating the original thickness of the local section. Lateral lithofacies trends in the non-salt strata and lateral termination/gradation of halite-dominated intervals into anhydrite/shale sequences (eastern basin margin) and anhydrite/dolomite sequences (western basin margin) are the best means to interpret paleogeography.