# Leakage Conditions of Rock Salt: Solid Bitumen-Impregnated Rock Salt from the South Oman Salt Basin

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One of the most effective seals in sedimentary basins is halite, because of its extremely low permeabilities, high capillary entry pressures and a ductile rheology under most geological conditions. Microstructural observations on hydrocarbon-impregna ted salt cores from the Infra-Cambrian Ara Salt of the South Oman Salt Basin show that this salt once lost its seal capacity in geological evolution. Diapirs of the Ara Salt enclose several highly overpressured carbonate reservoirs (the intra-salt Ara "stringer" play). Microscopically, some of these salt cores reveal abundant intragranular microcracks and grain boundary cracks, filled with solid bitumen, which was formed by thermal cracking of oil.

In addition, this salt shows widespread evidence for crystal plastic deformation as shown by subgrains. Using subgrain size piezometry, the calculated maximum past differential stress for the Ara Salt around the stringer reservoirs is 2 MPa. Laboratory experiments (Popp et al., 2001) have shown that under such low shear stresses, dilatancy of rock salt is only possible at near-zero effective stress - i.e., if the fluid pressure is lithostatic. This means that oil-impregnation could have only occurred, if the oil pressure in the stringers reached the capillary entry pressure in the pore throats of the Ara Salt, causing a diffuse dilatancy in the salt. This pressure condition marks the ultimate sealing potential of halite in the deep subsurface, whereby halite increases its permeability by more than five orders of magnitude and becomes a leaky seal.