

Dolomite Discrimination in the D-1: Round Up the Usual Suspects

Jeffrey J. Packard*
Burlington Resources Canada, Calgary, AB
j_packard@br-inc.ca

and

Ihsan Al-Aasm
Dept of Earth Science, Univ. of Windsor, Windsor, ON
alaasm@uwindsor.ca

Hydrothermal dolomitization and apparently allied processes, such as effluent leaching (Ladyfern) and hot silicification (Parkland), have garnered increased notoriety and interest in recent years, particularly so following the significant Slave Point discoveries made in NE B.C. as well as new Wabamun pools in west-central Alberta (e.g. Fir, Karr, Leland). This interest has also been stimulated by recent syntheses/revelations on HTD processes and their relationship to structure. There have been successes, but regrettably even more notable (but noble) failures. It is time perhaps to take stock.

The Wabamun Group is no stranger to dolomitization. In southern and southeastern Alberta the Wabamun carbonates are almost exclusively dolostone, to the tune of approx. 290 billion metric tons of $\text{Ca,Mg}(\text{CO}_3)_2$ covering an area of at least 188,000 km^2 . To the north and west in Alberta and into British Columbia, quite the opposite is true, with less than 0.5% of the total Wabamun Group represented by dolostone. Intuitively one would suspect that the agents and fluid-flow regimes responsible for these different occurrences, would be substantively different, ... but can one, with confidence, discriminate between the dolomite created by these hypothetically-differing processes? Preliminary conclusions of a basin-wide and ongoing Wabamun study, suggest that this discrimination may be possible but is commonly obscured by “significant” recrystallization.

Dolomitization by very saline brines occurred under a broad continuum of temperature regimes (as determined by fluid inclusion and stable isotope studies), that were prevalent during shallow burial. Examples geographically distributed from Waterton Field in the south to Royce and Parkland Fields in the north, exemplify the varying temperatures achieved by the migrating, dolomite-saturated brines. Superhot (165°C or greater) conditions apparently prevailed in the northwest (e.g. Monias, Gordondale), indications of scalding temperatures (85–25°C) are common over much of the Peace River Arch area (e.g. Tangent, Eaglesham), whereas hot temperatures (60–90°C) predominate in pools surrounding the Wild River Basin (e.g. Medicine Lodge, Berland River). Lukewarm temperatures (30-50°C) are suspected for the Crossfield trend.