

Effect of the R4 (ISHU) Exposure Surface on Compartmentalizing Play-Types: Caroline BHL 'A' and 'B' Pools

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The Swan Hills Formation of the Caroline area is comprised of two genetic successions: a lower reef fringed platform system capped by a small scale exposure surface (R4 or ISHU of Wendte and Muir, 1995) and an overlying backstepping ramp succession (R5 or Swan Hills Shoal).

Early diagenesis at this unconformity and associated cementation had a profound effect on subsurface fluid movement and in particular subsequent patterns of dolomitization.

Dolomitizing fluids emanating from more deeply buried portions of the section accessed the updip Swan Hills in two ways: Firstly, by being funnelled through the more porous and permeable reef margin and then “backing-up” into adjacent lagoonal sediments. These fluids were confined below the tightly cemented R4 surface and created the reservoir at the Caroline BHL 'A' pool.

Secondly fluids moved updip in more of a continuous front through the platform and ramp interior of the Swan Hills. In the pre-R4 lagoon these fluids were retarded by the originally micritic nature of the facies. However, in the overlying R5 shoal ramp interior sediments were somewhat more porous and permeable permitting the dolomite front to advance marginally faster. The diagenetic updip transition from dolomite to limestone in the upper shoal (R5) constitutes the trap at the Caroline BHL 'B' pool. Variations in dolomite reservoir quality relate to cycles and original depositional facies distributions within this capping R5 shoal succession.

The exposure surface at R4 (ISHU) is developed regionally throughout the western carbonate-dominated portion of the Beaverhill Lake Basin. As such, it appears to provide a way of compartmentalizing not only reservoirs within the Swan Hills, but also differing play-types.

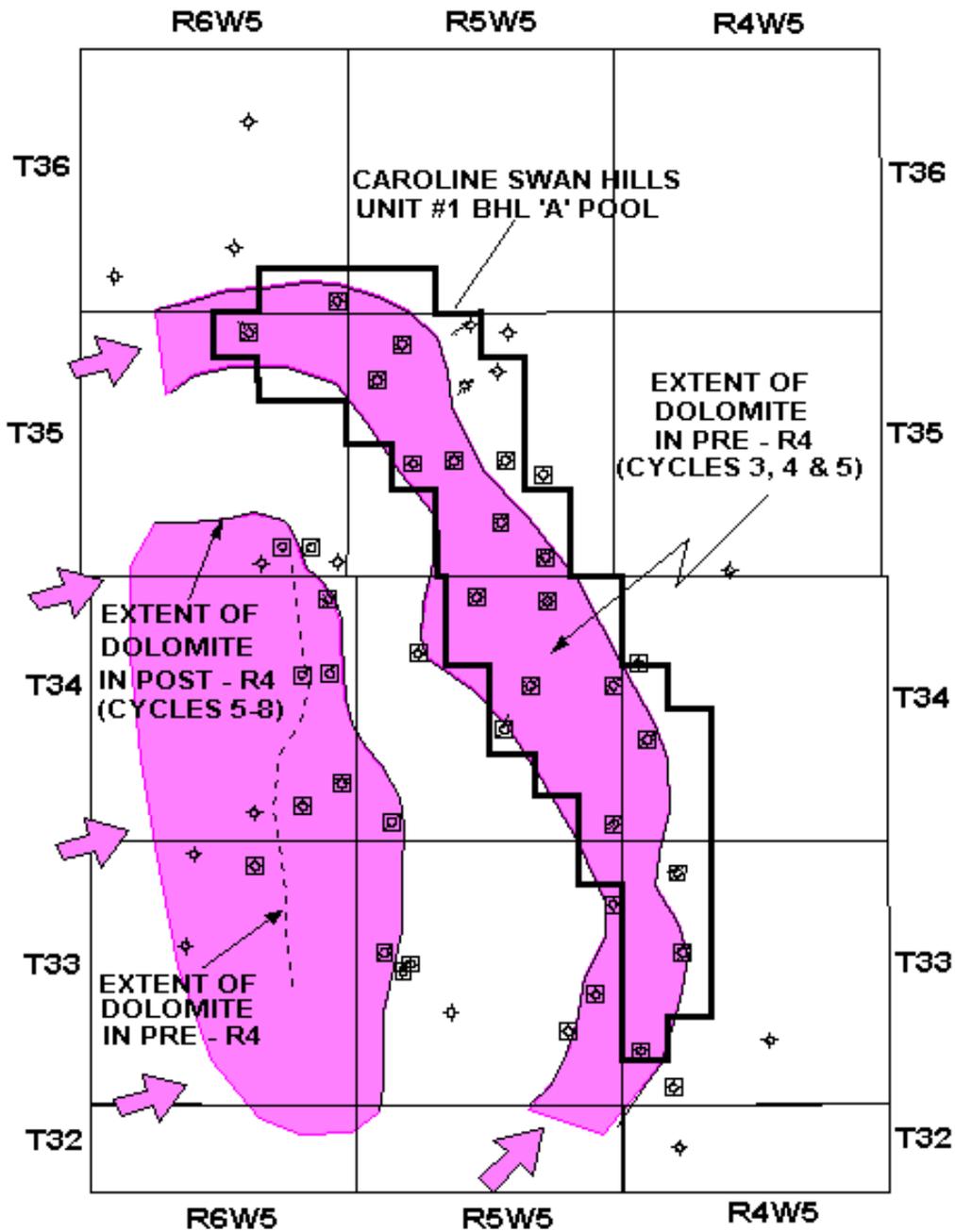


Figure 1. Extent of dolomites in the Pre-R4 (BHL "A" pool) and Post-R4 successions.