

The interplay between tectonics , sedimentation and the distribution pattern of Middle and Upper Triassic sandbodies (Doig, Halfway & Charlie Lk. Fms.), in the Peace River Block, northeast British Columbia.

M. El Hashemi
I.T.A.T Consultants Ltd.
4708 Charleswood Dr,N.W., Calgary, AB, T2L 2E5
elhashmi@shaw.ca

ABSTRACT

The size, shape and orientation of sandbodies of the Doig /Halfway and Charlie Lk. Fms. are mainly defined by the interplay between tectonics and sedimentation. The magnitude and extent of this interplay are expressed by the following phases;

1. The phase of transformation of the Peace River embayment from the deep marine realm of early Triassic to the shallow marine of Middle Triassic (Doig & Halfway phase).

Movement along pre-existing faults has instigated this transformation. The northwesterly faults and their northeasterly mechanical complements were the most responsive to the prevailing tectonic stresses. The continuity of these transformations paved the way for the second phase.

2. The phase of evaporite / siliciclastic shoreline sedimentation during late Triassic (Charlie Lk. Fm.).

Both phases have the following points in common;

1. All marine transgressions are tectonically induced. The overall orientation of faulted blocks between the Beaton and Sukunka highs formed a tectonic barrier that defined the connection between the embayment and the open sea.

2. The recurrent movements of these faulted blocks and associated damming effect define a particular pattern of sedimentation. This pattern starts with a marine flooding event, sedimentation, and a westward progradation that terminate in a discontinuity. Then another tectonically induced marine flooding replicates the same sequence of events.

3. This tectonic framework culminated by seven cycles of sedimentation. These cycles are; the Phosphate cycle, the lower Doig mega cycle, the middle Doig Cycle, the Upper Doig Cycle, the Halfway Cycle (or Cycles) that were deposited during the shallow marine phase. Those deposited during the second phase are the pre - Coplin and the Post - Coplin Cycles.

4. Amongst the different factors that determined the size, shape and orientation of sandbodies deposited during these cycles, those associated with this tectonic setting are the most critical. These are;

- The structural configurations inside the embayment during these phases, composed of a network of horsts and grabens (clinoform trends, clinoform slope morphology, the efficiency of cross slope dispersal, etc.)
- The differential movements of faulted blocks, (subsidence rates, location & migration of depocentres, availability of accommodation space, mechanics of progradation,).

These emphasis on the role of tectonics, do not under estimate other factors pertaining to the depositional setting of these sandbodies, such as climate, global sea level changes, etc. that played a role

The profile of these sandbodies in each of these cycles is as follows;

1. The Phosphate cycle. Three major sandbody trends are identified in this cycle that correspond to three system tracts associated with the depositional sequence of this cycle (transgressive system tract, the highstand and low lowstand system tracts).

2.The Lower Doig Megacycle. The sandbodies of this cycle are aligned in five, well defined northwesterly trends of abnormally thick sands.

3.The Middle and Upper Doig cycles.The sandbodies of these two cycles are almost blanket type with local northwest-southeast oriented.

4. The Halfway cycle (or cycles). The Halfway sandbodies transgressively overlap the Doig cycles. A well defined northwest – southeasterly trending demarcation line, which starts at Twp 70, Rg.13 W.6 and continues in a northwest-southeast direction to NTS subdivision “J”, 94.A.13, separates the continuous Halfway to the west and the discontinuous one.

5. The pre-Coplin cycle. Ten north-north westerly trending sandbodies are identified in this cycle.

6. The post –Coplin cycle. Three additional sandbodies are recorded in this cycle.

The understanding and detailed delineation of these prolific sandbodies is extremely important in the orientation of exploration activities in northeast British Columbia.