AAPG HEDBERG CONFERENCE
"Paleozoic and Triassic Petroleum Systems in North Africa"
February 18-20, 2003, Algiers, Algeria

The Upper Ordovician of the Illizi Basin, Algeria: a core-based study of Unit IV Palaeovalleys

N.D McDougall[1], F. Braik[2], P. Clarke[1] and M. Kaced[2]
[1] Robertson Research International Limited, Llandudno, North Wales, LL30 1SA, UK
[2] Sonatrach Division Exploration, Bat "C", Av du 1er Novembre, BP 68M Boumerdes – 35000, Algeria

The Tamadjert Formation or Unit IV, is the principal Ordovician reservoir horizon in the Illizi Basin. During the course of a major core-based project carried out by Robertson Research International ltd. (RRI) and Sonatrach Exploration, this formation has been studied in detail, utilising a database of 356 exploration wells and approximately 10,000metres of core. This was supplemented by 20,000km of 2D seismic, aerial photographs and field data from the Tassili N'Ajjers area in the south of the basin.

Capping the Cambro-Ordovician succession in most wells, the Tamadjert Formation is composed of six major horizons (Units IV-0a, IV-0b, IV-1, IV-2, IV-3 and IV-4) based on those originally identified in the Illizi Basin and modified to ensure platform-wide consistency within a sequence stratigraphic framework comprising 3 main sequences (S3, S4 and S5) and at several higher order packages (S4ab and S5ab)

Unit IV-0a is essentially indistinguishable from Unit III-3 (In Tahouite Formation) but is excluded from Unit III on the basis of biostratigraphy. It represents, an early Ashgill phase of stable platform sedimentation. A phase of uplift, extension and possible glacial erosion generated the palaeovalleys. Subsequent deposition was a response to repeated episodes of syntectonic activity and erosion.

Unit IV-0b is early Ashgill or Pusgillian age and is bounded by unconformities SB4 and SB4b. Characterised by the so-called 'Argile microconglomeratique' facies it may represent deposition in a prograding glaciomarine-margin setting

Unit IV-1 is also early Ashgill in age. It is bounded by two erosional unconformities (SB4b and SB5) and is typically sand-prone. Deposition occurred within LST, TST and HST settings all within the framework of braidplain deltas and fan-deltas

Unit IV-2 has been extensively redefined to comprise a predominantly argillaceous lower part (Unit IV-2a) and a sand prone upper part (Unit IV-2b). It is uniformly Upper Ashgill or Hirnantian in age and erosionally bounded by surfaces SB5 and SB5b. The former is of significance as it represents the omission of the entire Middle Ashgill succession due partly to glacial erosion. It is characterised by near-pervasive dewatering features, including slumps and megaloads overlain by a distinctive suite of structures, including climbing megaripples. Deposition occurred within, relatively steep, unstable prograding braid-deltas.

Unit IV-3 is bounded by erosional unconformities in outcrop. It reflects structural reactivation and deposition within alluvial fan, fan-delta and braid-delta bodies. Rapid drowning lead to the development of a ravinement surface and a condensed, burrowed horizon (Unit IV-4) which caps the entire succession. In the subsurface, however, the upper boundary may also pass laterally across a transgressive surface into an increasingly argaillaceous Unit IV-4 capped by the radioactive shale.