

AP06

Sequence Stratigraphic, Facies & Reservoir Framework for the Bangestan Group, Lurestan, Zagros Mountains, Iran

I.R. Sharp* (StatoilHydro), J.C. Embry (StatoilHydro), D.W. Hunt (StatoilHydro), D. Morsalnezhad (National Iranian Oil Company), S. Packer (Millennia Stratigraphic Consultants Ltd), E. Caus (University Autonoma), M. Jalili (NIOC), N. Bang (StatoilHydro), F. Keyvani (NIOC), F. Livbjerg (StatoilHydro), A. Lonoy (StatoilHydro), T. Samuelsberg (StatoilHydro) & C. Dons (StatoilHydro)

SUMMARY

The Albian – Campanian aged Bangestan Group (Kazhdumi, Mauddud, Sarvak, Surgah and Ilam formations) contains some of the most prolific reservoir-source-seal units of the Zagros hydrocarbon province of Iran. These units crop out extensively in the Zagros Mountains, affording a unique opportunity for facies, sequence stratigraphic and reservoir characterisation as an aid to understanding datasets in the nearby subsurface. In this paper we present the results of a multi-year research study in Lurestan Province, Iran, which has resulted in a thorough re-examination of the existing lithostratigraphic and chronostratigraphic scheme, and the establishment of a new sequence stratigraphic, facies and reservoir-source-seal scheme. This scheme has been correlated to age equivalent reservoir units of the Arabian Plate (Iraq, Qatar, United Arab Emirates and Oman).

The base of the Bangestan Group is marked by the Albian-aged Kazhdumi Formation sitting unconformably on the Early Aptian-aged Dariyan Formation. The Late Aptian is absent, and where well exposed the unconformity is seen to be angular in nature, indicating a period of tilting/normal faulting prior to deposition of the Kazhdumi Formation. The Kazhdumi Formation can be divided into three depositional sequences (Kz1, Kz2, Kz3), which represent a relatively complex mixed carbonate-clastic, intra-shelf basin succession, which passes vertically and laterally (towards the northeast) into a low-angle Orbitolina-dominated muddy carbonate ramp/shoal (Mauddud Member – Bala Rud Shoal). In the revised scheme the Mauddud Member is included in depositional sequence Kz3 (Kazhdumi Formation), and is dated as latest Albian. The Mauddud Member is capped by a regionally extensive karst of latest Albian – earliest Cenomanian age, and is unconformably overlain by the Sarvak Formation.

The Sarvak Formation comprises both low-angle ramp and steeper dipping (5–10°) carbonate shelf/platform systems. In Lurestan, the Sarvak Formation can be divided into six depositional sequences. Sequences Sa1 and Sa2 are entirely of Early Cenomanian age, and collectively define the Lower Sarvak Formation (300 m+ thick). The Upper Sarvak Formation is 270 m thick and divided into four depositional sequences (Sa3, Sa4, Sa5 and Sa6). Sa3 and Sa4 are Early – Mid Cenomanian and Late Cenomanian in age respectively. Sa3 equates to the Rumalia Formation, and Sa4 to the strongly progradational Mishrif Formation. Three regionally extensive karst surfaces are developed in the latest Cenomanian – Turonian interval, and are interpreted to be related to flexure of the Arabian Plate margin due to the initiation of intra-oceanic deformation. The first of these karsts (Sb-Sa4) is preceded by a forced regressive basin-ward stepping wedge, and is overlain by Sa5. Sa5 is almost always strongly truncated by SB-Sa5, which is represented by a fracture controlled karst. The karst corresponds to the Cenomanian – Turonian boundary, and the Lower Turonian is typically missing. Depositional sequence Sa6 is of late Middle to Late Turonian age, and is overlain by the Coniacian-aged Surgah Formation. In proximal locations this contact is an exposure surface (SB-Sa6), whilst in basinal locations the contact is conformable. Neritic carbonates of the Ilam Formation conformably overlie the Surgah Formation and pass retrogradationally into hemipelagic carbonates of the Gurpi Formation. The Surgah and Ilam formations represent clastic and muddy carbonate ramp depositional systems respectively.

Reservoir development within the Sarvak Formation is optimal within fractured HST skeletal (rudist) foram-grain margin facies, whilst TST non-skeletal shoals tend to be early marine cemented and of reduced reservoir quality. Reservoir heterogeneity is marked however, related both to primary facies variation and to late-stage fracture-controlled diagenesis.