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Reservoir Characterization and Tectonic Settings of Ahwaz Sandstone Member of the Asmari Formation in the Zagros Mountain, SW of Iran

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The Ahwaz Sandstone Member of the Asmari Formation, the major oil reservoir in Zagros mountain, have been studied to understand the distribution, provenance, tectonic setting and reservoir characteristic of Ahwaz Sandstone intervals as an exploration target.

This study was based on petrographic and geochemical analysis of 16 core samples from 13 oilfields in the Dezful Embayment zone, and 2 surface sections (Katula and Khami) in Izeh zone.

Petrographic studies of 400 thin sections and geochemical analysis indicated that sandstones consist of quartzarenite (Khami surface section), sublitharenite (Katula surface section) and subarkose (subsurface sections). The modal analysis of medium size and well sorted samples show a recycled orogen (Katula outcrop) and craton (Khami and subsurface sections) tectonic setting. The parent rocks for Ahwaz Sandstone, based on petrographic point counting suggest a low to medium grade metamorphic and plutonic source. Petrographic and grain size analysis indicate a shallow shoreline to barrier bar environments. Heavy minerals in sandstones have mostly plutonic source and abundance of stable heavy mineral, along with well rounded and high sphericity, support stable cratonic source for subsurface sections and Khami surface section. However, in Katula section, heavy minerals have metamorphic source.

Facies map illustrated that siliciclastic sediments in Asmari Formation during Rupelian time comes from south-west and north west of the study area. During Chattian, sand distribution reaches to the maximum level and sediments arrived from south-west, north-west and also north-east of the study area. In Aquitanian, sandstones sourced from two areas of south-west and north-west. In Burdigalian stage, sandstone sourced only from south and south-west. These sandstones have limited distributions.

Tectonic settings based on geochemical analysis, plotted on discrimination diagrams, suggest that passive continental margin. These sandstones were transported in a long distance over the Arabian Shield and deposited along the passive continental margin of the Oligocene- Miocene Zagros foreland basin. The facies maps also support this conclusion. The Ahwaz Sandstones in subsurface sections are now loose grain, however, SEM images illustrated that these sandstones were cemented by dolomites, and then leached by diagenetic fluids. It is recommended that the best exploration target is towards the east of the Dezful Embayment, since porosity and permeability of these sandstones are very high.