

Microfacies and diagenetic framework of the Loralai Formation, Khader Zai Nala section, western Sulaiman Range, Pakistan

Abdur Rauf Nizami¹, S. M. Shoaib Ata Razi², Kashif Hamid³ and Khuram Iqbal Gohar⁴

¹Institute of Geology, University of the Punjab, Quaid-i-Azam Campus, Lahore-Pakistan

²Associated Consultant Engineers, Civic Centre, Model Town, Lahore-Pakistan

³PCSIR Laboratories Complex, Shahrah-i-Roomi, Lahore-Pakistan

⁴ER Division, NESPAK, Main Margalla Road, Islamabad-Pakistan

The present investigation was focused on the detailed study of the microfacies and diagenetic framework of the shallow shelf Loralai Formation, Khader Zai Nala section, Bargha Shirani, Western Sulaiman Range, District Zhob, Balochistan, Pakistan. The Loralai Formation belongs to the Middle Jurassic carbonate rocks with its wide distribution in the host area of studied sections, adjoining District Loralai and around. The present authors studied this formation in detail for the first time covering its microfacies assemblages and diagenetic attributes. The petrographic analyses manifested that its most significant microfacies include: intraclastic rudstones, intraclastic grainstones, bioclastic grainstones, ooidal grainstones, peloidal grainstones, bioclastic packstones, ooidal packstones, and bioclastic mudstones. Its diagenetic attributes were, also, elaborated. A variety of cement morphologies has been identified from early to late diagenetic phases. This study, also, demonstrated the formation's significant reservoir quality in the western Sulaiman Range and adjoining areas. It is revealed by the excellent display of predominant grainstone microfacies. The secondary porosities due to dissolution, moldic, and vuggy porosities, and secondary porosities due to fracturing and extensive dolomitization have also been recorded from the measured section. The fractured limestone horizons, subjected to various phases of fracturing at different levels of this formation, displayed enhanced effective porosity and permeability due to induced interconnections. It is believed that the deposition of the Loralai Formation has taken place in the shallow shelf environments and it has developed reservoir quality at various stratigraphic levels in the investigated section.