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*“Deformation History, Fluid Flow Reconstruction and Reservoir Appraisal in Foreland Fold and Thrust Belts”*

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**THE PRESENCE OF RESERVOIR ROCKS ALLOWING THE FACIAL DEVELOPEMENT IN LATE JURASSIC CARBONATE SEDIMENTS IN ZAWADA – ŁĘKAWICA REGION (POLISH)**

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Complex research into reservoir properties of rocks in the central part of Carpathian Foreland was carried out taking into consideration the facial development and diagenetic processes for Upper Jurassic carbonate deposits.

Sedimentation of upper Jurassic took place in epicontinental sea in shallow carbonate shelf environment. Carbonate deposits of thickness up to 1000 m lying directly on Dogger sediments are the final result of sedimentation processes in late Jurassic. Three lithofacies were distinguished in Late Jurassic deposits: Lithoofordian, Rauracian and Astartian.

The Lithoofordian sediments are the lower and middle Oxfordian age, the Rauracian is lower part of upper Oxfordian and Astartian was created in upper part of Oxfordian and in Kimmeridgian.

The Lithoofordian is characterised by the lower Oxfordian age marly limestones with large amount of bioturbations. (This is the deepest carbonate sediment of the upper Jurassic and is a good correlation horizon because of its common occurrence).

Mid Oxfordian sediments consist of biohermal and plate limestones of thickness up to several hundred meters. This part of the profile shows a great lateral differentiation because of the organic build-ups occurrence.

Rauracian sediments were deposited in condition of varying oxidisation – reduction potential. Bright limestones often with stromatolites structures were created in oxidisation environment, dark, marly limestones often with destroyed crinoids, was the result of sedimentation in reducing conditions.

Thickness of Astartian sediments is controlled by latest erosional and tectonic processes took place in Cretaceous and Cainozoic times.

Astartian is mainly represented by the high energy deposition in intertidal environment, with domination of oolitic and oncolitic types of grains. We very often observe organic build-ups as in Lithoofordian, but they are represented by boundstones mainly consist of sponge, corals, serpulides and forams. The paleoenvironment condition during the Astartian had an great influence in creation the build-ups with larger organic differentiation.

The presence of several types of organic build-ups and whole sedimentation sequence gave us a system of beds with good reservoir properties. That scheme was changed by diagenetic and tectonic processes. Dolomitization and effects connected with development of Karst in a roof part of Jurassic sediments were two basic diagenetic processes. Tectonics and Karst effects induced formation of fractures systems. The net of fractures arranged the paths for migration of reservoir waters and hydrocarbons, which destroyed many sealing horizons as well.

Petrophysical analyses were performed for cores from eight boreholes. Porosity, permeability and capillary pressure analyses on the plug type samples and laboratory investigation of fracture porosity and permeability with the use of thin sections and polished

slides were carried out. The database consist of 213 sets of porosity permeability and capillary pressure analyses and 154 analyses of fracture porosity and permeability. The results obtained during the research made it possible to estimate properties of reservoir beds in each lithofacies. It has been found that: all components of pore space take part in storage and transport of reservoir fluids, proportions fractures – pores varies in organic build-ups from practically pure fracture system to porous one. Good reservoir horizons have been found in Lithooxfordian and Astartian, the basic problem in hydrocarbon research is destruction of sealing rocks in Lithooxfordian by faults.

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