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Reservoir Quality Analysis of the Sarvak Fractured Reservoir with Petrophysical and Geophysical data in an Oilfield of Persian Gulf

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INTRODUCTION

Borehole images are electronic pictures of the rocks and fluids encountered by a wellbore. Moreover, images are oriented, they have high vertical and lateral resolution, and they provide critical information about bedding dip, fractures, faults, unconformities, paleocurrent directions, vuggy and fracture porosity, and other geological features [1]. Also, full set and image logs accompany with geological data can get the important information about quality of reservoir rocks because relatively few wells are now being cored [2, 3].

Each fracture is the main factor for transmitting fluid in carbonate reservoirs. Having enough information about fractures would aid exploration, development, and management of many petroleum reservoirs. Many reservoirs which have low porosity are known to be productive largely because natural fractures enhance hydrocarbon delivery to wellbores [4].

Sarvak Formation is a fractured carbonate reservoir in Iran. In this research, the image log techniques along with full set logs and geophysical data have been used to investigate reservoir quality of this reservoir on 4 selected wells (A, B, C, and D) of Persian Gulf.

MATERIAL AND METHODS

Firstly, the full set logs of 4 studied wells which include gamma ray, neutron, density, caliper and PEF logs have been carefully analyzed. Then Image data logs are processed in Geology software. The processing includes depth and speed corrections, equalization and data normalization. Then bedding dip, fractures, stylolite, natural

and induced fractures are distinguished in the Sarvak reservoir. Base on geophysical data and Petrel software, the structural models of studied oilfield has been built. Finally, the porosity and permeability models of studied wells have been made by Petrel software for 4 studied wells.

DISCUSSION AND RESULTS AND CONCLUSIONS

Image log analysis on 4 selected wells (A, B, C, and D) of studied oilfield show that the structural dip of the Sarvak Formation reservoir base on 129 readings are 11 degree toward N69W with strike of N27E and S27W. Two main fracture types are recognized in the studied reservoir. Two main fracture types are as follows: (1) The first was seen in wells named A, B, and C which have the dip of 81 degree toward N38E with the strike of N25S/S52E base on 489 readings. (2) The second one are related to well name D and has the dip of 64 degree toward N58W with the strike of S32W/N32E base on 110 readings. Geophysical data in the studied oilfield show two main faults with North-South trends and 11 local faults with Northwest-Southeast trends. The correlation of fracture trends identified in image logs with fault trends of oilfield indicate that the trend of theses fractures correlate well with the trend of local faults. Moreover, models of porosity, permeability, fractured density with openness of fractures of the Sarvak Reservoirs indicate that the effects of local faults in fractures of oilfields are important and cause an increase in quality of reservoirs in wells B, C, and D. Based on image log data, the maximum and minimum in-situ horizontal stress in oil reservoir have been estimated from N32W and S55W respectively.

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