

## Low Resistivity Pay Identification in Carbonate Reservoirs of Yadavaran Oilfield

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**Abstract :** Generally, the resistivity is high in oil layer and low in water layer. Yet there are intervals of oil-bearing zones showing low resistivity, high porosity, and low resistance. In the typical example, well A (depth: 4341.5-4372.0m), both Spectral Gamma Ray (SGR) and Corrected Gamma Ray (CGR) are relatively low; porosity varies from 12-22%. Above 4360 meters, the reservoir shows the conventional positive difference between deep and shallow resistivity with high resistance; below 4360m, the reservoir shows a negative difference with low resistance, especially at depths of 4362.4 meters and 4371 meters, deep resistivity is only 2 $\Omega$ .m, and the CAST-V imaging map shows that there are low resistance substances contained in the pores or matrix in the reservoirs of this interval. The rock slice analysis data shows that the pyrite volume is 2-3% in the interval 4369.08m-4371.55m. A comprehensive analysis on the volume of shale (Vsh), porosity, invasion features of resistivity, mud logging, and mineral volume indicates that the possible causes for the negative difference between deep and shallow resistivities with relatively low resistance are erosional pores, caves, micritic texture and the presence of pyrite. Full-bore Drill Stem Test (DST) verified 4991.09 bbl/d in this interval. To identify and thoroughly characterize low resistivity intervals coring, Nuclear Magnetic Resonance (NMR) logging and further geological evaluation are needed.

**Keywords :** low resistivity pay, carbonates petrophysics, microporosity, porosity

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