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Please fill in your abstract title.	Low Contrast Pay Identification in the Second Member of the Shahejie Formation, Bohai Bay Basin, East China	

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Abstract

Objective/Scope: Low contrast pay, i.e. the resistivity of oil-bearing intervals differ little from adjacent water-bearing intervals, will result in missing hydrocarbon-bearing reservoirs. In this study, Qibei slope field in the Bohai Bay Basin is taken as a pilot research since part reservoirs in this filed exhibit low contrast phenomena. The objectives of this study are: 1) to understand the causes of low contrast resistivity pay in the study reservoirs, and 2) to construct and validate a methodology for recognizing low contrast pay.

Methods, Procedures, Process: Routine core analysis was done for 178 core plugs from 6 wells in which 45 thin sections were prepared for point counting (300 points per slide). Conventional wire-line logs from 18 wells are also collected along with test and production data from 49 intervals of 12 wells. Water salinity data from 16 intervals of 13 wells were collected. In order to compensate the effects of variations in water salinity, grain size and compaction on log resistivity, a parameter, apparent resistivity index (ARI), was constructed using porosity, resistivity, gamma ray and cementation exponent to improve low contrast pay identification.

Results, Observations, Conclusions: The reservoir rocks are composed mainly of silt-sized and fine grain-sized lithic arkoses with varied porosity (2.2%-21.4%, av. 12.7%) and permeability (0.02 mD-34.1 mD, av. 2.27 mD). Water salinity varies widely from 7000 ppm to 35000 ppm. Three factors, namely water salinity, grain size and compaction, are proposed as major controls on formation of low contrast pay. To address these issues, crossplot of ARI and porosity is used to differentiate the pay zones from wet zones. Oil bearing zones show high ARI values, and wet zones have low ARI values, whereas the zones with medium ARI values often produce both oil and water. The promising results of this study show that the ARI method is an effective way to identify the low contrast pay. However, the validation from more wells is needed before it can be applied on a field-wide scale.

Novel/Additive Information: This study provides a novel methodology to utilize existing conventional logs to construct a composite parameter to compensate the effects of variations in water salinity, grain size and compaction that exert on the log resistivity. This method allows quick identification of low contrast pay without using advanced well log data (e.g. NMR), which is very significant for a large amount of legacy wells that only have conventional well log data.