

Integrated analysis of open hole logs and well and production data for deciphering current status of a reservoir in a matured field- Example of TS2 Paysand of Lakwa Field, India

Ashok Kumar, Yogesh Chandra and Shri Pati Das
Well Logging Services, ONGC Ltd., India

Abstract

The hydrocarbon producing pay zones experience changes such as increase in water saturation and rise in oil-water contact etc. with time. These changes can be very prominent in a matured field, and knowledge of their current status is mandatory for important decisions like drilling of infill wells, work over of non-flowing or sick wells and well abandonment. Wire line devices like RST and CHFR are the basic reservoir monitoring tools as they can give water saturation behind casing. However, these surveys might not be feasible in large number of wells in a short span of time due to various constraints like well availability, well closure, rig requirement and hole clearance. In a matured field where a good number of closely spaced wells drilled in different time spans are available, the reservoir changes can be ascertained at no extra cost with the help of already existing open hole logs and production data of the wells. A method based on comparison of open hole logs and production data of different wells has been systematized by making composite log triplets of nearby wells- each triplet having one old, one intermediate and one latest well. The method has been used effectively to decipher present status of the pay sands of the matured Lakwa Field for revival of the sick and non-flowing wells. In the present paper, the above approach has been applied to the most prolific TS2 paysand of Lakwa Field and the results are presented. The TS2 reservoir is characterized by strong bottom water drive and oil-water contact with maximum initial pay thickness 80m at the crest, porosity 23-26% and permeability 300-500md. The pay zone, penetrated by more than 300 wells, is on production for last forty years with drastic decrease in oil rate and increase in water cut in recent years. TS2 being a channel sand is silty near the top- the top silty portion getting thicker towards the periphery. The analysis shows non-uniform rise in oil-water contact with as much as 65m rise in the crestal parts to almost no rise in the peripheral areas. Potential areas having bypassed oil have been identified. TS2 top silty part and the overlying subsidiary sand both characterized by lesser permeability and greater bound water are found to have good potential for further production. The study has been helpful in deciding appropriate action on sick and non-flowing wells and future exploitation strategy.