

Rw CALCULATION AND SELECTION

Confusion as to the correct value of R_w has caused problems with previous log analyses in the Pelican wells.

Amoco's R Bryant (Ref.3) chose to use an R_w of 0.07 ohm-m at 230°F (30 000 ppm) for his log analysis of Pelican 5. This showed that approximately 62m of Eastern View Sandstone over the interval (1750-3003m) could be considered as pay, where the cut-offs were water saturation and shale content less than 50% and porosity greater than 10%.

During the drilling of Pelican 5 testing of the Eocene sequence enabled water samples to be taken and analysed. Water from DST 5 was so fresh (3700 ppm NaCl) that Amoco at first believed it came from an uphole zone by communication behind casing. They made a decision to squeeze the interval, re-perforate and re-test.

Amoco states DST 5A re-perforated the interval 2855-2860.5 m. According to the SAGASCO sand correlation, this is a separate sand, so it did not re-test anything. It did, however, confirm the freshness of the water, yielding an R_w of 0.32 ohm-m at 250°F (5200 ppm).

Re-running the log analysis with this R_w figure yielded water saturations in the range 80-100%. Amoco seemed happy with this result believing the observed reservoir behaviour fitted the water saturation. In DST's 5 and 5A a small amount of gas was produced and then the wells loaded up with water and died.

It has been previously recorded that formation waters appear fresher below the Middle M. diversus unconformity. The use of the SP log to calculate R_w for permeable zones has been attempted (Table 1), but it is complicated by many of the sands having some degree of gas saturation and finely laminated and dispersed clays, which can create internal membrane potentials and affect the SP deflection.

Also, it is generally accepted as a rule of thumb that errors in R_w values obtained from the SP in normal formations are in the order of $\pm 10\%$ and could be as high as $\pm 20\%$.

As the review of the SP derived R_w 's is inconclusive, it was decided to run log analysis with two values. These were the R_w values from water analysis in DST 5 and 5A, 5200 ppm equivalent NaCl and a more saline 'guesstimate' of 10400 ppm equivalent NaCl.

This approach was also taken in a later Amoco study in 1987 (Ref.14). Variable R_w 's were selected to model the suspected changing salinity with depth. For the zones of interest analysed in this study, ie. D, E and F, Amoco used the following ranges of salinity: