

BIODEGRADATION AND ASSOCIATED PRODUCTION PROBLEMS IN SOKU FIELD, EASTERN NIGERIA

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Production challenges in the Soku Field of eastern Nigeria operated by Shell Development Company, Nigeria range from wax and emulsion to asphaltene formation. These had often led to oil deferment and increasing OPEX spent on treatment to restore production. Wax formation usually occurs in both subsurface and flow lines. To date several drainage points have witnessed wax formation in their production life. At the moment 1500 bopd is deferred due to well closed in as a result of wax problems. Well 59T with a potential of 4500BOPD undergoes monthly pigging of flow line to prevent wax formation otherwise the entire production could be lost. The oil quality ranges from sludge/emulsion in the shallow reservoirs through waxy oils to light and pristine oils in the deeper and hotter zones. The study seeks to establish compositional differences among reservoirs that could lead to preferential wax deposition, emulsion and asphaltene formation in certain wells Huang et al., 2004.

The oils in the shallow reservoirs are extensively biodegraded. The concentration of asphaltene, total acid number are significantly enhanced. The oils are produced as tough emulsion. The asphaltene acts as stabilisation agents for the emulsion once formed. In the middle reservoirs, only the lower molecules weight alkanes ($<nC_{20}$) have been removed due to biodegradation. The predominance of the heavy molecular weight alkanes (C_{20+}) over the lighter and solvent range homologues leads waxy oils Tocco and Alberdi, 2002. Oils in the deeper and hotter reservoirs are pristine. Production from these reservoirs does not encounter wax, emulsion and asphaltene deposition.

Biodegradation is the principal factor responsible for the variation in oil quality and the associated production problems Seifert et al., 1984. Emulsion formation occurs in the highly biodegraded shallow reservoirs. Oil produced from reservoirs with moderate degree of biodegradation are waxy. Pristine and unaltered oil with little/no production problems are encountered in the deep and hotter reservoirs

