

Impact of Depositional Environment on Reservoir Quality and Hydrocarbon Production

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ABSTRACT

It is a well-established fact reservoir performance depends on reservoir quality. From alluvial fan deposits, Aeolian dune deposits, fluvial channels to deep marine fan deposits, different reservoirs perform differently depending on a number of controlling factors. This project attempts to classify the different sedimentary depositional environments and sub environments on the basis of hydrocarbon production performance. Other objectives are to establish a link between sedimentary environments and expected maximum well and field production rate. Overall reservoir recovery and recovery factor. To postulate best sedimentary environments in terms of overall hydrocarbon production performance. Primary data for this project is from the Norwegian North Sea, Norwegian continental shelf and the Barents Sea. These data were analysed to generate production curves, cumulative production and recovery factors. Using wireline logs, cores and few seismic sections the fields were all classified into the different sedimentary environments and sub environments used for the project. Other additional parameters derived which were useful for the project include trap type and geometry, prospects size, reservoir thickness, net to gross, number of production and injection wells, reservoir depth of burial, faults and compartmentalization. The reservoirs fall into three gross depositional environments, Paralic/shallow marine, Deep marine and Continental. Paralic/shallow marine oil maximum well rate ranges from 1800,000-143 Sm³/day, highly varied recovery factor from 80-3% depending on architectural elements, the reservoirs were buried from 4,241-2,150m. Deep marine reservoirs have oil maximum well rate from 1,404-134 Sm³/day, recovery factor from 77-11% less varied within sub environments, reservoir depths are from 4,000-1,700m. Continental reservoirs oil maximum well rate ranges from 907-202 Sm³/day, recovery factor is highly variable from 83-2% in some sub environment, buried from 4,061-2,800m. Paralic/shallow marine reservoirs have high oil discharge rates at initial phase of production, however recovery was not sustained, lower shoreface reservoirs have better recovery than backshore and foreshore. Deep marine reservoirs yields good volume, better recovery and good sweep. In continental reservoirs good initial well discharge is inconsistent with recovery, hence large volume discovered can't be produced due to poor recovery.