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A Global Look at Recovery Efficiency in 300 Mature Clastic Fields

A review of ultimate recovery efficiency in 300 mature clastic fields from around the world provides a series of benchmarks for evaluation of the potential of old fields for redevelopment. The key determinants of ultimate recovery are fluid type/viscosity, matrix permeability and reservoir architecture. Development strategies and reservoir management techniques play key roles in maximizing and emulating expected ultimate recoveries for a given set of reservoir/fluid parameters. Clastic fields can be divided into five main fluid type/permeability classes that have characteristic ultimate recovery distributions and controls: (1) heavy oil/tar reservoirs, in which RF is controlled by well spacing/reservoir depth, reservoir connectivity and the application of tertiary recovery techniques; (2) low-permeability oil reservoirs, in which RF is controlled by permeability variations, well spacing and application of waterflooding/miscible flooding, fracturing and horizontal drilling; (3) intermediate-permeability oil reservoirs, in which RF is controlled by fluid viscosity variations, reservoir heterogeneity/architecture and application of waterflooding; and (4) high-permeability oil reservoirs, in which RF is controlled by natural drive strength/type and control of aquifer and gas-cap encroachment; and (5) gas/condensate reservoirs, in which RF is controlled by permeability variations, aquifer encroachment and condensate drop-out. Examination of actual case histories improves confidence in predevelopment predictions of recovery efficiency and shows what is possible in old fields.