



SCREENING METHODS: SENSITIVE STAGE IN EOR PROJECT PLANNING

EOR FUNDAMENTALS

Most of the existing literature and technical documents try to connect Enhanced Oil Recovery (EOR) projects in a long period phase related to a high depletion level into the reservoir highlighting the connection to the concepts secondary or tertiary recovery. Essentially, this affirmation is not strictly a straight forward rule, in practical terms, there are several fields specially heavy oil and extra heavy oil reservoirs, which require the implementation of Thermal Enhanced Oil Recovery methods (CSS, Steam Flooding, SAGD) from the beginning (primary recovery) in order to drain oil and gas reserves from the technical and economical point of view. The high viscosities and densities make not feasible the oil extraction by applying conventional IOR techniques such as Horizontal Wells, Multilateral Wells, Solvent Injection, etc.



SCREENING METHODS

Properties	Units	Average Values
Pressure	psi	≤ 1200
Density	°API	8 - 20
Viscosity	cps	≥ 200
Porosity	%	> 18
Permeability	mD	≥ 200
Oil Saturation (So)	%	> 50
Depth	ft	≤ 5000
Thickness	ft	>10

The screening process is a sensitive stage in the EOR project planning, it mainly consists in the selection of the suitable technology which can contribute to increase the production and the recovery factor of the reservoir. In first place the selection of the optimum technique depends on four key aspects such as: Technology Maturity, Reservoir Condition (Pressure, Temperature), Petrophysical Properties (K, Phi, Net Thickness, So) and Fluid Properties (Viscosity, Density). These technical aspects have been widely supported by many researchers such as: Farouq Ali, Geflen, Lewin, Iyoho, Chu, Brashear & Kuuskraa, Taber & Martin and Dickson among others. Therefore, we have developed a practical screening matrix by using a weighted average considering the most critical parameters for the main Thermal EOR Methods. The EOR schemes are very sensitive to the viscosity and density ranges as the primary variables in the matrix, generally Steam Flooding is recommended for heavy oil reservoirs, CSS

for extra heavy oil reservoirs and SAGD was developed in order to drain reserves effectively for bitumen sands. Another important parameter is the average depth in order to control heat losses and optimize the steam quality delivered into the bottom of the reservoir. Additionally, for the case of SAGD and HASD schemes it must be considered other variables such as sand bodies continuity, sealing rocks, well placement, permeability anisotropy, etc. Lastly, once the technical matrix has been applied is necessary to evaluate and optimize the scenarios with reservoir simulation, then it must be considered Operational and Economical variables for the final decision in order to implement an specific thermal EOR method or scheme according to: Surface Facilities Condition, Well Condition, Resources Availability (Gas, Water and Electricity), Oil Price Fluctuations, Company Budget and Economical Indicators (NPV, IRR, Payout Period).