FURTHER RECOVERY FROM MATURE RESERVOIRS WITH HORIZONTAL WELLS

N. MUNGAN

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KEYNOTE ADDRESS

BY
N. Mungan
Alberta Energy Company Ltd

ABSTRACT

Horizontal wells have added to our ability to increase recoveries during enhanced recovery operations and from mature reservoirs. Infill horizontal wells can recover oil which has been bypassed by vertical wells; also, horizontal wells can recover oil from those parts of a reservoir which could not be accessed with vertical wells. More generally, horizontal wells should be an integral part of any enhanced recovery, be it in conventional oil, heavy oil or gas. In situations where economical recovery is viable only through horizontal wells, then horizontal well development should be fully recognized as being enhanced recovery in its own rights.

Whether horizontal wells constitute the EOR process itself or whether they contribute to the success of some other EOR process, such as chemical, miscible, or thermal processes, one can group the ultimate advantages of using horizontal wells, as compared to vertical wells, into two broad categories:

1. greater recovery with fewer wells.
2. further recovery from mature reservoirs

If you are new to horizontal wells and wish to ensure your first application to be a success, here are the most favorable situations:

* Thin pay zones which have sufficiently high vertical permeability,

* Reservoirs which contain enormous numbers of natural vertical fractures but where there is poor communication between the fractures,

* Situations where it is desirable to obtain very large production, injection or withdrawal rates,

* Enhanced oil recovery where a significant increase in the sweep efficiency is wanted, such as promoting solvent spreading,

* To reduce water coning, particularly in heavy oil reservoirs underlain by a large, active aquifer.

When planning further recovery from a mature reservoir with combination EOR and horizontal wells, one should give consideration to the following:

* Locate injection wells so as to distribute injected fluids evenly in the reservoir, i.e. increase the sweep efficiency

* Locate production wells so as to optimize the capture of the incremental oil.

As examples, horizontal well applications in miscible, thermal, gravity drainage of heavy oil, waterflooding, polymer flooding, carbon dioxide flooding are reviewed.