RINGKASAN

EVALUASI *INPLACE* DAN ANALISIS MEKANISME PENDORONG PADA LAPISAN "RL" LAPANGAN "MCU" MENGGUNAKAN SIMULATOR *MATERIAL BALANCE*

Oleh
Mohammad Chaerul Umam
NIM: 113190111
(Program Studi Sarjana Teknik Perminyakan)

Lapisan "RL" merupakan lapisan minyak pada Lapangan "MCU" yang mulai diproduksikan sejak Agustus 1997 dengan jumlah sumur sebanyak 19 sumur produksi dan dua sumur injeksi gas. Lapisan "RL" memiliki jumlah cadangan *original oil in place* (OOIP) sebesar 41.26 MMSTB dengan kumulatif produksi minyak hingga Februari 2022 adalah 7.78 MMSTB, sehingga nilai *current recovery factor* adalah 18.86%. Perolehan tersebut dengan menimbang proses produksi yang telah berlangsung lama dapat memberikan pernyatan bahwa produksi yang dilakukan pada lapisan ini kurang optimum. Sehingga dalam hal ini, evaluasi *inplace* dan validasi mekanisme pendorong dengan menggunakan metode *material balance* perlu untuk dilakukan agar dapat melakukan pengurasan pada reservoir dengan optimal serta memberikan pandangan dalam perencanaan pengembangan di masa mendatang.

Simulasi *material balance* Lapisan "RL" dimulai dengan persiapan serta penginputan data kedalam simulator IPM-MBAL berupa data geologi dan geofisika, data properti batuan, data PVT, data sejarah tekanan, serta data sejarah produksi dan injeksi. Kemudian dilakukan *history matching* dengan tujuan untuk mengevaluasi *inplace* dan penentuan parameter akuifer menggunakan pendekatan regresi. Selanjutnya dilakukan validasi terhadap penentuan mekanisme pendorong dengan membandingkan beberapa metode.

Berdasarkan hasil simulasi *material balance* didapatkan jumlah *inplace* sebesar 41.9086 MMSTB sehingga terdapat perbedaan jumlah cadangan dengan *inplace* statik yaitu sebesar 1.57%. *History matching* pada simulator IPM-MBAL diperoleh hasil penyelarasan tekanan dengan *mismatch* sebesar 2.83%. Metode penentuan mekanisme pendorong serta hasil *energy plot* menyatakan adanya perbedaan hasil. Setelah dilakukan validasi terhadap berbagai metode tersebut, maka dapat disimpulkan bahwa Lapisan "RL" memiliki mekanisme pendorong berupa *combination drive* antara *solution gas drive*, *gas cap drive,* dan *water drive*.

Kata kunci: *Material Balance*, *Drive Mechanism, Water Influx*

ABSTRACT

INPLACE EVALUATION AND DRIVING MECHANISM ANALYSIS IN THE "RL" LAYER "MCU" FIELD USING THE MATERIAL BALANCE SIMULATOR

By
Mohammad Chaerul Umam
NIM: 113190111
(*Petroleum Engineering Undergraduate Program*)

The "RL" layer is an oil layer in the "MCU" Field which has been produced since August 1997 with a total of 19 production wells and two gas injection wells. The "RL" layer has original oil in place (OOIP) reserves of 41.26 MMSTB with cumulative oil production until February 2022 of 7.78 MMSTB, so the current recovery factor value is 18.86%. This result, considering the production process that has been going on for a long time, can indicate that the production carried out in this layer is less than optimal. So in this case, it is necessary to evaluate the inplace and validation of the driving mechanism using the material balance method to optimally drain the reservoir and provide insight into future development planning.

The material balance simulation for the "RL" layer begins with the preparation and input of data into the IPM-MBAL simulator in the form of geological and geophysical data, rock property data, PVT data, pressure history data, and production and injection history data. The history matching is performed to evaluate inplace and determine aquifer parameters using the regression approach. Furthermore, a validation was carried out to determine the driving mechanism by comparing several methods.

Based on the material balance simulation results, the number of inplace is 41.9086 MMSTB, so there is a difference between the number of reserves and static inplace, which is 1.57%. History matching in the IPM-MBAL simulator resulted in a pressure alignment with a mismatch of 2.83%. The method of determining the propulsion mechanism and the results of the energy plots indicated that there were differences in the results. After validating with various methods, it can be concluded that the "RL" layer has a driving mechanism in the form of a combination drive between solution gas drive, gas cap drive, and water drive.

Keywords: Material Balance, *Drive Mechanism, Water Influx*