

**ANALISIS PENGARUH PARAMETER SUMUR BOR TERHADAP
SENSITIVITAS PENGUKURAN POROSITAS MENGGUNAKAN
METODE COMPENSATED NEUTRON LOGGING DENGAN SIMULASI
MCNP**

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INTISARI

Pada proses EOR (*enhanced oil recovery*), porositas formasi perlu diukur untuk mendapatkan informasi mengenai keberadaan minyak bumi di dalam tanah. Salah satu teknik untuk mengukur porositas yaitu log neutron dengan menggunakan metode CNL (*compensated neutron log*). Pada proses CNL, parameter-parameter sumur bor seperti diameter sumur bor, salinitas air di dalam sumur bor, serta keberadaan *wax* di dalam sumur bor dapat mempengaruhi hasil perhitungan porositas formasi.

Pada penelitian ini dilakukan simulasi model perangkat CNL dengan detektor BGO yang diberi *boron-lining* dan sumber neutron Am-Be, serta model lingkungan sumur bor pada berbagai nilai porositas dengan variasi diameter sumur bor, tingkat salinitas air di dalam sumur bor, serta keberadaan *wax*. Simulasi dilakukan dengan menggunakan perangkat lunak MCNPX. Hasil dari simulasi tersebut digunakan untuk menghitung nilai sensitivitas pengukuran porositas, kemudian pengaruh dari parameter-parameter sumur bor dianalisis.

Hasil simulasi menunjukkan adanya pengaruh signifikan terhadap sensitivitas pengukuran porositas akibat dari perubahan diameter sumur bor, dan salinitas air di dalam sumur bor. Peningkatan sensitivitas terbesar 16,12% terjadi pada pelebaran diameter sumur bor terbesar 6,625 inci. Peningkatan sensitivitas terbesar 10,02% dihasilkan untuk peningkatan salinitas air terbesar 30%. Peningkatan sensitivitas terbesar 4,16% dihasilkan untuk penambahan *wax* setebal 3 mm.

Kata kunci: MCNP, sumur bor, *well-logging*, porositas, sensitivitas

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ANALYSIS OF THE EFFECT OF BOREHOLE PARAMETERS ON POROSITY MEASUREMENT SENSITIVITY USING COMPENSATED NEUTRON LOGGING METHOD WITH MCNP SIMULATION

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ABSTRACT

In the EOR (enhanced oil recovery) process, the formation's porosity needs to be measured to obtain information about the presence of petroleum in the soil formation. One technique for measuring porosity is the CNL (compensated neutron log) method. In the CNL process, borehole parameters such as borehole diameter, water salinity in the borehole, and the presence of wax in the borehole can affect the calculation of formation porosity.

The model of the CNL device with two BGO detectors with boron-lining and an Am-Be neutron source was simulated, as well as wellbore environment model at various porosity values with variations in the diameter of the borehole, the level of salinity of the water in the borehole, and the presence of wax. The simulation used MCNPX software. The sensitivity value of the porosity measurement was calculated using the simulation result. Then the influence of the borehole parameters was analyzed.

The simulation results show a significant effect on the sensitivity of the porosity measurements due to changes in the diameter of the borehole and the salinity of the water in the borehole. The greatest increase in sensitivity of 16.12% occurred in the widening of the borehole diameter of 6.625 inches. The greatest increase in sensitivity of 10.02% resulted for the largest increase in water salinity of 30%. The greatest increase in sensitivity of 4.16% was obtained for the addition of 3 mm thick wax.

Keywords: MCNP, borehole, well-logging, porosity, sensitivity

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