ABSTRACT

In oil and gas industry, the size of hydrocarbon reserves and type of the reservoir is crucial to the design methods and lifting the hydrocarbons for further processes. PT. XYZ uses the gas lift injection design to lift the oil content from the reservoir. In some conditions, the production choke valve shall be opened more to increase the hydrocarbon production rates. However, it causes the reservoir instability, decreasing the reservoir pressure, and reducing the oil production drastically. Therefore, optimization of allocating gas lift injection rate on each of the production is needed to produce maximum oil and to improve the sustainability of oil and gas production on PT.XYZ.

This paper proposes optimization technique for managing gas injection allocation using Particle Swarm Optimization (PSO). The procedure optimization can be explained as below; first step uses prosper modeling software to generate the model of production wells. Second, it obtains the curve of the gas lift injection rate against the oil production. Third, each well production model is validated by reference data from the well test result.

The best PSO simulation with limited gas injections which is 17 MMscfd results of the gas lift injection allocation for each production wells are 0.98, 2.66, 1.39, 0.98, 3.19, 1.61, 1.78, 2.03, 1.40, and 0.98 MMscfd. With these gas injection allocations, the oil production increases to 4908.7 Barrels of oil per day (BPD). Maximum company profit after optimization reaching USD$ 578,004 compare with before optimization. The other optimization using Genetic Algorithm (GA) is also used for comparison.

Key words: Optimization, Prosper Modeling, PSO, GA.