

Studi Kasus Pengaruh Penurunan Laju Alir Gas Alam terhadap Slugging dan Penanganan Cairan di Lapangan Gas Natuna Barat = Case Study of Decreasing Gas Flow Rate Effect on Slugging and Liquid Handling in West Natuna Gas Field

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Abstrak

Salah satu sumber gas alam Indonesia yang terletak di area Natuna Barat memiliki potensi besar untuk memenuhi peningkatan kebutuhan energi. Flow assurance diperlukan untuk menjamin gas alam dapat terus mengalir pada sistem transportasi perpipaan gas alam dalam berbagai kondisi. Hal yang mampu menghambat mengalirnya pasokan gas alam adalah terbentuknya slugging karena penurunan laju alir gas alam serta beberapa faktor lainnya. Studi ini bertujuan untuk memperoleh profil aliran multifasa yang terbentuk di sepanjang pipa transportasi gas alam jika laju alir gas alam mengalami penurunan, mendapatkan pengaruh profil aliran multifasa terhadap terjadinya slugging di dalam sistem perpipaan gas alam, dan memperoleh metode penanganan cairan yang dilakukan di fasilitas penerima. Studi dianalisis menggunakan simulator aliran multifasa minyak dan gas. Simulasi dilakukan pada 3 skenario kondisi sumur, yaitu initial life, mid life, dan late life yang berturut-turut memiliki laju alir gas sebesar 57, 31, dan 5 MMSCFD. Berdasarkan hasil simulasi diperoleh bahwa semakin rendah laju alir gas alam, maka kemungkinan terjadi slugging akan meningkat. Pada studi ini, slugging terjadi pada kondisi late life. Penanganan cairan yang diajukan oleh penulis untuk memitigasi slugging adalah dengan penambahan control valve yang diletakkan pada aliran masukan separator dan memiliki bukaan 60%.

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Indonesia's natural gas sources located in the West Natuna area has great potential to meet increasing energy needs. Flow assurance is needed to ensure that natural gas can continue to flow in the natural gas pipeline transportation system under various conditions. One of the things that can hinder the supply of natural gas is the formation of slugging due to a decrease in the flow rate of natural gas and several other factors. This study aims to simulate the multiphase flow that forms along the natural gas transportation pipeline if the flow rate of natural gas decreases, to obtain the effect of the multiphase flow profile on the occurrence of slugging in the natural gas piping system, and to obtain the method of handling liquids carried out at the receiving facility. The study was analyzed using a multiphase oil and gas flow simulator. Simulations were carried out on 3 scenarios of well conditions, namely initial life, mid life, and late life which had gas flow rates of 57, 31, and 5 MMSCFD, respectively. Based on the simulation results, it is found that the lower the natural gas flow rate, the higher the probability of slugging. In this study, slugging occurs in late life conditions. The liquid handling and process improvement proposed by the author to mitigate slugging is by adding a control valve which is placed at the inlet flow of the separator and has an opening of 60%.