# Data Analytics into Hydraulic Modelling for Better Understanding of Well/Surface Network Limits, Proactively Identify Challenges and, Provide Solutions for Improved System Performance in Greater Burgan Field

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## Abstract

A network modeling campaign for 15 surface gathering centers involving more than 1800 completion strings has helped to lay out different risks on the existing surface network pipeline facility and improved the screening of different business and action plans for South East Kuwait asset of Kuwait Oil Company. The focus of this study was not only in obtaining an accurate representation of physical dimension of well and surface network elements, but also in creating a tool that includes standards analytical workflows able to evaluate wells and surface network behavior, thus useful to provide insightful predictive capability and answering the business needs on maintaining oil production and controlling unwanted fluids such as water and gas. For this reason, the model needs to be flexible enough in covering different network operating conditions In a normal modeling process, the modeling cycles was achieved deterministically to obtain a fully calibrated model hence model is often stringent to the calibration condition. In this study, the classical well & network modeling cycles were enhanced with multiple forward regression based on data analytics study where more than half million of data points were successfully ingested and tested. During the data analytics process some key foundation were defined such as ranges of values associated with input data uncertainties, acceptance matrix criteria for model regression, and different alternative operating condition. Multiple forward regression was performed to use the fully calibrated baseline model for testing some ranges of alternative conditions observed from data analytics pre-processing step. The study demonstrated the added values of hydraulic well/network system modeling such as screening of under-performance conditions at well and surface level, identification and quantification of production challenges and, production optimization opportunities through well re-routing, de-comingling and debottlenecking. The complete well and surface network model also enable the asset to estimate allowable of wells and each gathering center in the short term. These models also provide the basis for artificial lift analysis and evaluate optimal working conditions. The pipeline flow assurance issues can also be properly identified and assessed using the network model. Last and not the least the asset can use the network model to study the water shut-off strategy, wells start-off strategy. Additionally, the forward regression output guided by data analytics process helped the operator to establish an understanding on different production output per gathering center to generate a bracketing of operating envelope and limits. The study can also be adopted to lay out some critical foundations prior to embark into a bigger study such as a fully integrated subsurface and surface network modelling to assess surface network capacity.