

Practical Application of the IPSM in Resolving Gas Availability Challenges and Overall System Optimisation to Maximise Production

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As energy consumption increases, technology and the processes used to improve the production systems need to adjust and improve. As large investment is usually needed to implement new production strategies, we need some way to test out the concepts and ideas before their implementation. An IPM model was used to assess options to ensure gas availability to meet the minimum turndown ratio of the associated gas gathering (AGG) low pressure compressor and ensure optimal oil production from a field in the Niger delta of Nigeria. The compressor in use has a minimum required turndown ratio and the declining gas production is a problem. The use of the IPM model allowed a multi-disciplinary approach to be carried out. One possible option was the rerouting of two wells with a high gas production from the field to the production facility. During a quarterly production system optimisation review, the following objectives were defined by the multi-discipline team:

- Optimise production whilst ensuring imposed constraints are observed
- Reduce liquid carry over to the flare stack
- Contribute to the provision of LP gas in the nearby Field Y by rerouting two oil wells from Field

A GAP model was built to run various scenarios to determine which two wells to reroute so that the LP compressor feed requirement could be boosted. A high liquid carry over to the flare stack was a possible issue so a gas rate constraint was set on the separator in the GAP model. The driver behind the possible routes was to ensure that the nominated wells flowed with minimal pressure drop on-line to the Field Y flow station and ensure the production from Field X would not be adversely affected by the well rerouting.

Conclusions and Recommendations

- Field X is able to support Field Y AGG plant operation without compromising the Field X AGG LP compressor requirement
- Minimum gas required is available to run the Field X AGG plant without any negative impact on the LP gas availability when either of the two wells is rerouted
- Field Y AGG plant will require a minimum LP gas availability of 2mmscf/d to operate the first stage of the AGG compression
- Either Field Y or Field X will produce sufficient gas to support the LP gas requirement for effective running of the Field Y AGG plant when rerouting
- Selection of which well to reroute was determined as a function of two possible objectives: highest obtainable gas rate or oil production alongside gas availability
- Cost implications of laying a flowline from Field X to Field Y need to be considered
- The invested fund related to the cost of building the AGG plant in Field Y was safeguarded as a result of the guaranteed availability of LP gas to run the compressor IPM was found to be a robust set of tools for modelling various actual filed production problems and generating scenarios, solutions or options to counteract these issues