Design, Operation, and Troubleshooting of Dual Gas-lift Wells

Upstream Segment

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Introduction

This document is one of a series of recommended practices (RP's) produced by the American Petroleum Institute (API) for use by oil-field engineers, operators, and others around the world. This RP focuses on dual gas-lift.

This API recommended practice provides guidelines and tools to facilitate the effective and efficient design, operation, optimization, and troubleshooting of dual gas-lift completions. As used in this document, a dual completion is one in which there are two producing zones, each with its own tubing string, in a single production casing. So, there are two separate producing wells, with one common annulus.

It is sometimes concluded in the development of fields with multiple reservoirs that the economic benefits of dual completions outweigh the operational problems that frequently result from trying to effectively produce a dual completion and the higher operating and workover costs that may occur over the producing life. Thus, dual completions (and occasionally even triples) are sometimes attempted to reduce upfront drilling costs and accelerate production from the multiple reservoirs.

This document focuses on the issues that can be faced when it becomes necessary to artificially lift both sides of a dual completion with gas-lift. Management of the problems facing operators of dual gas-lift wells may be easier and more successful if the recommended practices in this document are followed.

Design, Operation, and Troubleshooting of Dual Gas-lift Wells

1 Scope

This document provides recommended practices for the design, operation, optimization, and troubleshooting of dual gas-lift wells.

Compared to single completions, dual completions have a higher initial cost, have more operating problems, are more difficult and expensive to work over, and often produce less efficiently. Based on experience, most technical gas-lift specialists and operations staff prefer single completions to duals.

It is not the purpose of this document to recommend the practice of dual gas lift. In many cases, dual gas lift is problematic and often it is ineffective. Often it is difficult or even impossible to effectively produce both completions in a dual well using gas lift, over the long term. If there are other feasible alternatives to produce dual wells, they should be considered.

However, many dually completed oil wells should be artificially lifted—initially or after reservoir pressures have declined and/or water cuts have increased. And in many cases, the only practical or feasible method of artificial lift for these wells is gas lift. So, if dual wells must be artificially lifted, and if the only practical or feasible means to do this is with gas lift, every effort should be made to perform this dual gas-lift function as effectively as possible.

Therefore, the purpose of this document is to offer recommended practices, guidelines, and tools to make the best of what may otherwise be a difficult situation. This document also contains suggestions on practices that should be avoided to minimize problems, inefficiencies, and poor economics that may be associated with ineffective dual gas-lift operations.

2 Why Dual Wells Exist

2.1 General

Dual wells exist for a number of reasons. The primary ones are summarized in this section.

2.2 Lower Drilling Cost

The primary reason why duals exist is economics. It is often less expensive to drill one wellbore to serve two (or more) vertically oriented production zones, than to drill two or more separate wells to reach these same zones.

In some fields, there are multiple reservoirs “stacked” on top of each other. In some fields, there may be as many as 5, 10, or even more separate reservoirs located vertically above one another. The development plans for such fields are often complex and require an economic study that should consider the initial drilling and completion costs plus the producing costs, workover costs, and the potential production rates over the life of the field.

The objective is normally to produce the reserves as quickly as feasible, and realize the highest profits, while protecting the environment and being good world citizens. Multiple completions that result in significant loss or deferment of reserves, prolonged producing lives, and much higher producing and workover costs are not recommended. It is very tempting, economically, to drill one well to intersect several reservoirs, and to produce more than one of the reservoirs at the same time with the same well, to minimize overall costs and to accelerate overall production. But this should be done correctly, or the economic benefits may not be achieved.