Operation, Maintenance, Surveillance, and Troubleshooting of Gas-lift Installations

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Introduction

These recommended practices and requirements are offered to assist gas-lift system operators, analysts, technicians, engineers, and others in understanding how to effectively plan, operate, maintain, troubleshoot, and provide surveillance of gas-lift systems and gas-lift wells.

These recommended practices discuss continuous gas-lift with injection down the casing/tubing annulus and production up the tubing. Annular flow gas-lift (injection down the tubing and production up the annulus), dual gas-lift (two tubing strings in the same casing), and intermittent gas-lift are mentioned; however, most of the discussion focuses on conventional continuous gas-lift. Many of the recommended practices in this document can be pertinent to the other forms of gas-lift, but they should be considered and used with caution. Other API recommended practices address dual gas-lift (API 19G9) and intermittent gas-lift (API 19G10).

This document includes the following.

— Gas-lift operating system components and potential problems.

  Sections 3 through 13 describe the several components of an operating gas-lift system and discuss a number of problems that can be encountered and addressed to operate a gas-lift system effectively and efficiently. These sections may be used for:

  — part of a training course dealing with gas-lift system operation;

  — a review before beginning a major gas-lift system study;

  — a review before designing or modeling a gas-lift system, or both;

  — a review before trying to troubleshoot difficult gas-lift system problems.

— Recommended practices for gas-lift operation, maintenance, surveillance, and troubleshooting.

  Sections 14 and 15 are revisions/upgrades of information that has been in existence since the first edition of this document. These sections contain recommended practices for common gas-lift operations:

  — initial unloading of the completion or workover fluid from the annulus of the gas-lift well;

  — restarting or kickoff after a period of downtime;

  — adjusting or fine-tuning the gas injection rate for optimum operation.

  These sections discuss commonly used gas-lift troubleshooting tools. They conclude with sections that review the potential locations of gas-lift problems, a table of possible causes and cures of some common gas-lift system problems, and a troubleshooting checklist.

These sections are recommended for use as:

— part of a training course dealing with gas-lift system operation;

— part of a training course dealing with gas-lift system maintenance;

— a review before trying to troubleshoot a difficult gas-lift operating problem.

Operation, Maintenance, Surveillance, and Troubleshooting of Gas-lift Installations

1 Scope

This recommended practice (RP) provides guidance, background, and requirements for the application and use of gas-lift wells and their related systems. Discussion is included for operation, maintenance, surveillance, and troubleshooting of gas-lift wells and installations.

This RP is intended for use by managers, production technologists, reservoir engineers, facilities engineers, production engineers, well testing engineers, well analysts, operators, and researchers who want to gain a general understanding of gas-lift wells and gas-lift operations. It can be used to prepare and present courses on gas-lift wells and operations.

This RP focuses primarily on continuous gas-lift. However, use of intermittent gas-lift, dual gas-lift, and gas-lift for gas wells is mentioned.

2 Terms, Definitions, and Abbreviations

2.1 Terms and Definitions

For the purposes of this document, the following definitions apply.

2.1.1
bottomhole pressure
BHP
The pressure measured at the midpoint of the perforated interval.

2.1.2
flowing bottomhole pressure
FBHP
The pressure measured at the bottom of the well, at the midpoint of the perforations, when the well is on production.

2.1.3
inflow performance relationship
IPR
The ratio of production rate (expressed in bbl/day or m^3/day) divided by the pressure drawdown (static bottomhole pressure minus flowing bottomhole pressure).

2.1.4
injection pressure operated gas-lift valve
IPO gas-lift valve
A gas-lift valve where the primary opening pressure is provided by the injection pressure.

NOTE The injection pressure is provided by the casing pressure.

2.1.5
production pressure operated gas-lift valve
PPO gas-lift valve
A gas-lift valve where the primary opening pressure is provided by the production pressure.

NOTE The production pressure is provided by the tubing pressure.