

Optimize your Gas Well - Flow Computers & Plunger-Lift

Blaine Barnes, Tundra Boiler & Instrumentation Ltd.

In Western Canada, it is seldom you will find a well producing completely dry gas. As gas wells age, gas production declines. As gas production declines, wells can experience an increase in down-hole liquid loading. This increase in liquid loading compounds the effect of naturally occurring production declination, which can decrease well life dramatically.

The amount of liquid loading varies based on production field and region. For a well to remain free of liquid, gas must flow at a *critical velocity*. Flowing at or above a critical velocity ensures that liquids are transported up the well to the surface where they can be separated from the gas. Gas flow rates below critical velocity do not have sufficient energy to remove the liquid from the well bore, and the liquid eventually accumulates at the bottom of the well.

Varying methods are used to de-liquefy wells that experience liquid loading. Some of these methods include:

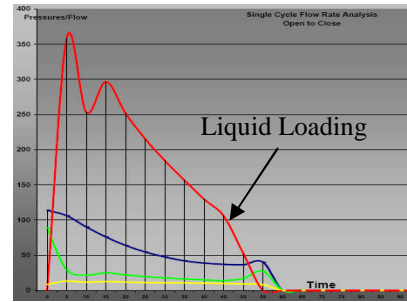
- Surfactants (soaping)
- Intermitting (stop-clocking)
- Down-hole pumping
- *Plunger lift*

Of the various methods used, plunger lift offers an economical solution that often requires little more than a one time capital investment in equipment. A typical plunger lift installation will include a plunger to lift down-hole liquids to the surface, a lubricator assembly to catch the plunger at the wellhead, a switch to sense plunger arrival at the surface, and a controller that monitors plunger travel times, down-time, and flow time.

Through the plunger controller, a signal is sent to the flow control valve to open - allowing the plunger to begin traveling to the surface. Once the plunger has arrived carrying on top of it the liquid slug, it remains in the lubricator. During this time, gas flows out of the well beneath the plunger for a set amount of time (afterflow). Once the afterflow time has expired, the valve is instructed to close, and the plunger again falls to the bottom of the well where another cycle begins.

In reality, plungers are often applied in an inefficient manner. Yes, they increase production, however a common theme is that wells flow and are shut-in based strictly on time. A more efficient method is to have a flow computer monitor flow rate (inferring *critical velocity*), tubing, casing, and sales line pressures - using the aforementioned to determine when the flow control valve opens and closes. Rather than waiting for a set amount of time to elapse, the flow control valve is instructed by the flow computer to open when casing pressure is sufficient to lift the plunger and liquid slug to the surface. (See top right)

This well is currently flowing based on a timer and cycles less frequently than possible. With a flow computer monitoring critical velocity via flow rate, the well can be shut-in when flow is no longer efficient (note the steep final drop in flow signifying liquid loading).



Using the various system pressure inputs to the flow computer, the well can be opened when the load factor is small enough to again lift the plunger and liquid to the surface. This decreased waiting period and increased liquid removal ultimately result in performance improvement. Depending on the stage of well degradation, studies have shown production increases of 20% to 100%.

Other Flow Computer benefits include: increased measurement accuracy vs. mechanical charts, decreased capital cost (a separate plunger controller is not required), and the capability to monitor wells remotely via a SCADA system resulting in fewer site visits.

ABB Totalflow XSeries: One Controller, Many Solutions.

Increase the Productivity of Oil & Gas Wells.
Production, Measurement, & Automation Systems.

From intermitting to plunger and pump control, including gas and liquids metering, our XSeries controllers adapt to changing demands throughout the life cycle of your wells. To find out more about all the possibilities, please call (403) 946-9912. For additional information, visit www.abb.com/totalflow.

ABB Inc. - Totalflow Products
#110, 4411 - 8th Street S.E.
Calgary, Alberta, T2G 4E8
© Copyright 2005 ABB.

Power and productivity
for a better world™