

# Alpha VSRD Multiphase Meter

## Improves Well Test Accuracy and Frequency, Reduces Downtime and Costs

### Objectives

- Replace existing three-phase test separator installed on six-well manifold and improve well test frequency and accuracy while reducing downtime and costs.
- Detect flow regime dynamics, depending on whether production is routed through casing or through tubing. Four of the six wells were characterized as slugging wells based on real-time measurements.
- The existing separator damped out the well dynamics that characterize its flow regime. The lack of knowledge of the flow regime caused the end user to assume, conservatively, that every well needed to be tested for 24 hours through the existing separator. Thus, each well was only tested about once per week.
- The water leg of the separator was equipped with a turbine meter that periodically failed during tests, which caused significant downtime in the separator water measurement. Failure was typically caused by paraffin fouling.

### Our Approach

- Weatherford installed an Alpha VSRD inline multiphase meter to run a field comparison against the performance of the existing test separator. The test consisted of twelve 24-hour runs that tested each of the six wells in the pad twice.
- Gas rates were matched to the separator readings within  $\pm 2.92$  percent (95 percent C.I.), using gas properties sampled by the client.
- Liquid rates were matched to the separator readings within  $\pm 14.04$  percent (95 percent C.I.), within 3 percent of lab test specification at high GVF (Type II wet gas process).
- Very simple pressure-volume-temperature (PVT) input was used to correlate the liquid phase properties to historical API gravity and water salinity. A real-time implementation of the AGA8 GCMII correlation was used for calculating gas density and compressibility.



The small footprint and low power requirements of the Weatherford Alpha VSRD inline multiphase meter enabled the client to lower costs while significantly improving the accuracy and frequency of well testing.

#### CLIENT

Shell

#### LOCATION

Texas shale asset

#### WELL TYPE

Onshore natural flowing

#### TIME FRAME

Q2 - Q4 2013

#### NUMBER OF WELLS

6

#### PRODUCTION RANGES

Gas: 1.2 to 2.5 MMSCF/D  
Total liquids: 80 to 200 bpd total liquids  
Liquid hydrocarbon: 40 to 150 STBO/D

#### AVERAGE GVF

Between 95 and 98 percent

#### INSTANTANEOUS GVF

Between 0 and 100 percent

#### PRODUCTS/SERVICES

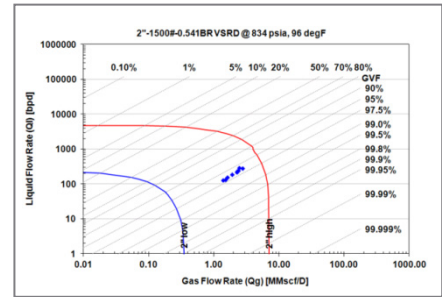
Alpha VSRD inline multiphase flowmeter



## Alpha VSRD Multiphase Meter Improves Well Test Accuracy and Frequency, Reduces Downtime and Costs

### Value to Client

- The Weatherford Alpha VSRD inline multiphase meter provided the client with accurate average three-phase flow rates as well as the real-time fluctuations. With the well flow regimes characterized by their fluctuations, well test periods were reduced to 5 hours on slugging wells and 2 hours on steady wells. The optimized test durations allowed every well to be tested daily instead of weekly.
- With 100 percent uptime during the test and no problems caused by fouling, the multiphase meter eliminated downtime.
- Costs for performing the well tests were reduced because of three key features of the Alpha VSRD multiphase meter:
  - The low steady-state power requirement of the multiphase meter (15W) required only a portable solar array. No backup diesel generator was needed during the test.
  - The multiphase meter has about one-third the footprint and is much lighter than the separator. The meter also represents only a fraction of the CAPEX required for a new separator with the same pressure rating and designed to handle the same flow rates.
  - The lack of moving parts on the multiphase meter reduces preventative maintenance requirements (reduces OPEX). The compact and minimally intrusive design minimizes the chances for loss of process containment hazards.
- Based on the successful trial of the Alpha VSRD multiphase meter, the client purchased the system to run further tests at a nearby low-pressure manifold (~200 psig) and at other future locations, including assets with artificial lift of various types, potentially including qualification for gas lift and rod pump applications.



The chart above represents the flow envelope based on test results achieved by the Alpha VSRD inline multiphase meter.

