

Case study: Deepwater Gulf of Mexico

SureFlo 298 flowmeter managed flow optimization in development field, slashed costs by \$65 million

Many Gulf of Mexico operators have a deepwater development strategy to tie back multiple wells for subsea fields. Wells from the same reservoir are commingled at a subsea manifold, and the production is flowed back on a single pipeline to the platform. In doing so, it is important to understand the contribution of the flow from each individual well from a production allocation standpoint as well as pipeline integrity. Pipelines have an erosional threshold, and it is crucial that the total production rate through these pipelines does not exceed the limit.

Baker Hughes was approached by a customer to provide a method of downhole flow, pressure, and temperature monitoring on three projects with the aim of providing flow allocation for subsea commingled wells. Apart from flow allocation for production purposes, the measurements were also being used to ensure that pipeline integrity was not breached due to erosion.

As a solution, Baker Hughes recommended the best technology to address production allocation and infrastructure, the **SureFLO™ 298 flowmeter**. This downhole flowmeter features a customized venturi design that can handle a variety of production rates and fluid properties, including heavy oil and wet gas. The measurement accuracy is greater than ±98%, making it a cost-effective tool for production allocation.

Supporting the SureFLO 298 flowmeters was the **SureSENS™ permanent downhole monitoring system**. Featuring multiple monitoring devices on a single tubing encapsulated cable (TEC) and interface with surface, subsea infrastructures, or floating facilities, the SureSENS gauges contain a proprietary and high-resolution quartz crystal design, and have numerous configurations providing flexible solutions for applications such as high-pressure/high-temperature, high-rate gas wells, and subsea environments.

In the first development, the well travels through a 5-in. multiphase flowline approximately 7,000 ft (2134 m) where it is joined by the production from the second well at a subsea manifold. There is a 20,000 stb/d erosion limitation on the flowline.

Having the ability to monitor the contribution of production from both wells, the production rate through the flowline was kept below this threshold. To change over to a new flowline could have cost nearly \$65 million USD.

During the development of the well, the Mineral Management System (MMS) in the Gulf of Mexico accepted the Baker Hughes SureFlo 298 flowmeter system as a viable method for well production allocation. The amount of well testing to be performed was minimized, maximizing production from the field.

Challenges

- Deepwater Gulf of Mexico development field with tiebacks to multiple wells
- Commingled wells tied to a subsea manifold directed through a single pipeline
- Flow management and optimization from each well while keeping within pipeline limits

Results

- Eliminated costs associated with replacing eroded flowline, an estimated \$65 million USD
- Improved timeliness of production ramp up in wells—reduced time by 50%
- Minimized well development cost associated to single well tieback to a dry tree
- Experienced no health, safety and environmental (HSE) issues or nonproductive time (NPT)

More importantly, any flow assurance issues were mitigated when wells had to be shut in while on test.

The customer has now adopted this technology for the second and third asset teams. In the second project, the field has seen the fastest ramp up (5 wells in 5 days) due to the ability to allocate production in real time from each well.