Case study: Trinidad and Tobago

Integrated Well Services delivers 3 deepwater wells ahead of schedule, under budget with zero HSE incidents

A global operator took up the challenge of developing three additional deepwater gas producer wells in the Caribbean basin to supplement the shortfall of natural gas feedstocks required for Trinidad and Tobago's industry and infrastructure. The project consisted of two new wells plus a reentry. Full completions for all three would be required. After the well construction was completed, the three wells would be tied back to an existing gathering system to maximize project economics.

Planning for the project began in Quarter 1 of 2020 but the COVID-19 pandemic struck, bringing with it additional restrictions like the necessity to quarantine workers for extended periods based on the various stakeholder requirements as a matter of routine in all personnel movements. This added greater complexity to the typical challenging logistics for offshore work.

Based on a decades-long relationship, the operator reached out to Baker Hughes to become an integral partner in addition to a local services company who had a presence in country. Baker Hughes, drawing on its extensive well construction portfolio and expertise, assigned responsibility of the project to the Baker Hughes Integrated Well Services (IWS) team. Combining project management expertise and superior service delivery for both Baker Hughes and the services company, the IWS team was tasked with optimizing the project performance and extending the field's productive life.

Aligning the well plan

A crucial component of the project would be organizing all three companies around a common mindset to make the best decisions in the 70-day operational window. Engineers from the operator, Baker Hughes, and the service company developed a collaborative approach to problem solving through rigorous daily and weekly meetings to discuss issues and align project goals. In these meetings, the IWS team took the lead in developing and communicating the overall project scope and driving efficiencies. This vision helped shape how each stakeholder would share and apply their best practices. The IWS management protocols also formed the framework to address new challenges as they emerged and developed ways to overcome them.

Designing the solution

The work took place on a semi-submersible, dual-derrick rig. The service company's responsibilities included the provision of drilling and completions fluids, waste management, and cementing services. Baker Hughes supplied its field-proven drilling and completions technologies—including drills bits, rotary steerable assemblies, and all formation evaluation tools—as well as underreaming, wellbore cleanout, and fishing tools.

Baker Hughes recommended the **GaugePro™ Echo on-command digital reamer**. A smarter solution for hole enlargement applications when two of these tools were employed in a single

Challenges

- Increase the production of natural gas to meet country's demand requirements
- Operate in an economically constrained environment with tight scheduling requirements
- Mitigate resourcing and mobilization risks with respect to personnel and equipment due to COVID-19 pandemic restrictions

Results

- Drilled and completed 2 new wells and reentered the discovery well to allow for use as a producer
- Completed the entire operation 27.7 days ahead of the well plan, saving approximately $16.5 million USD
- Maintained strict protocols in operations to minimize pandemic-induced evacuations of the rig, keeping the core project scope on budget and ahead of schedule
- Experienced no HSE incidents and negligible NPT during the entire campaign which did not significantly impact the overall critical path operating efficiency

run, the GaugePro reamer added speed and certainty with real-time, two-way control and flexible bottomhole assembly (BHA) placement.

In combination with a drilling fluids design from the service company, Baker Hughes Drilling Services significantly increased on-bottom drilling performance and optimized the rate of penetration (ROP) over the estimated critical path time. The performance of these tools and technology in the discovery well developed the KPIs by which the project would be measured, a rate the joint effort surpassed.

Executing with predictable performance

The IWS team also stressed the importance of remote monitoring and championed the installation of digital equipment on the rig. Engineers tested a significant number of processes to enable remote operations support not only to drive efficiency and more consistent performance but also in the event of a COVID-19 breakout, a decision that proved beneficial for the operation.

Field personnel from all three companies began implementing the well plan in Quarter 3 of 2020 at the height of the COVID-19 pandemic.

Despite the upgraded restrictions put in place to mitigate the virus, personnel on the rig experienced a COVID-19 incident, the end result being an evacuation that left a minimal rig crew to keep the operations running in order to make the well safe during that phase. By having the remote monitoring technology in place, the work continued and kept the well plan on schedule and on budget.

Baker Hughes surface logging technology and expertise proved indispensable to the success of the overall project, especially during the COVID-19 episode. It was the fast thinking and creative crew scheduling by the surface logging team that adapted how the information was collected and maintained consistent data flow despite not having a full crew on board. This proactive initiative enabled operations to continue without any operational interruption.

The mud logging team delivered all the logs with 100% operational efficiency and data acquisition. The accurate data recording and reporting helped communicate wellbore stability risks and averted multiple loss of primary containment (LOPC) incidents by promptly identifying leaking valves and gates which could have resulted in cross contamination of fluids.

Among the key metrics to the project's success was the team dynamic. A spirit of transparency existed between all the partners as they drew on long relationships to align the commercial drivers of the well plan. With a focus on the single team goal—a profitable operation with minimal nonproductive time (NPT)—all parties aligned their behaviors to achieve success.

The combined effort more than excelled on the operator's expectations, delivering the project ahead of schedule and under budget. The performance incurred zero health, safety and environmental (HSE) incidents and minimized NPT to a degree where it was deemed negligible.

Baker Hughes and the service company completed all aspects of the well plan in approximately 42 days, a rate 27.7 days faster than the anticipated well construction window. Given a daily rig rate of $600,000 USD, the Baker Hughes solution saved the operator approximately $16.5 million USD.

Baker Hughes