

# Well Construction Performance Shaves More Than Eight Days Off of Plan in Rumaila Field

## SOLUTION OPTIMIZES DRILLING TIME WHILE LOWERING COSTS

RUMAILA FIELD, IRAQ

### CHALLENGES

Design and execute a main pay well, delivering it on time and within budget.

- » Manage geological risks
- » Minimize nonproductive time (NPT)
- » Lead and coordinate project between Halliburton product service lines and third parties

### SOLUTION

Developed an optimized well drilling program based on field experience and lessons learned to date

- » Reduced frequency and severity of losses in Dammam and Hartha formations
- » Increased rate of penetration (ROP), and reduced tripping time
- » Optimized sliding/rotary drilling, using field experience and formation tendencies
- » Coordinated the plan with all PSLs and third parties to deliver services and materials on time

### RESULTS

Delivered the well significantly ahead of planned time, while still meeting all client objectives.

- » Completed well in 31 days, the fastest S-shaped well with a step-out < 500 meters (1,640 feet)
- » Saved approximately 8.5 days against the planned time of 40 days
- » Entire operation completed with zero NPT
- » Zero overall well NPT

### OVERVIEW

In southern Iraq, in order to maintain production in the Rumaila oil field, one of the largest in the world, the Rumaila Operating Organization (ROO) turned to Halliburton to drill turnkey wells in the continued development of this asset.

Well No. 21 of the current development campaign in Rumaila was drilled to 10,949 feet (3,338 meters). In the field's Zubair formation, the objective was to safely and effectively deliver a production well in the main pay reservoir, within the specified budget and with effective hydraulic isolation. The total planned time for well construction was 40 days.



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### CHALLENGES

Halliburton was challenged to design, drill, and deliver wells in the Rumaila field – and to do this safely, efficiently, on time, and within the allocated budget. The geology in the field presented significant obstacles, including losses within naturally vuggy or fractured formations, challenges of drilling through highly reactive shale sequences with borehole instability issues, and depleted formations at critical points within the well geometry. These conditions, which tend to slow drilling with associated problems and historically increase the total well time, required proper engineering to overcome these challenges.

### SOLUTION

To reduce drilling time and well costs, the Halliburton Project Management team developed plans and procedures, implemented from lessons learned on previous campaigns, that would deal efficiently with anticipated downhole issues. Halliburton Consulting and Project Management (CPM) created a synergy between all groups involved in the well construction, including Halliburton product service lines (PSLs) and third parties, in order to deliver the well objectives by applying practical solutions.

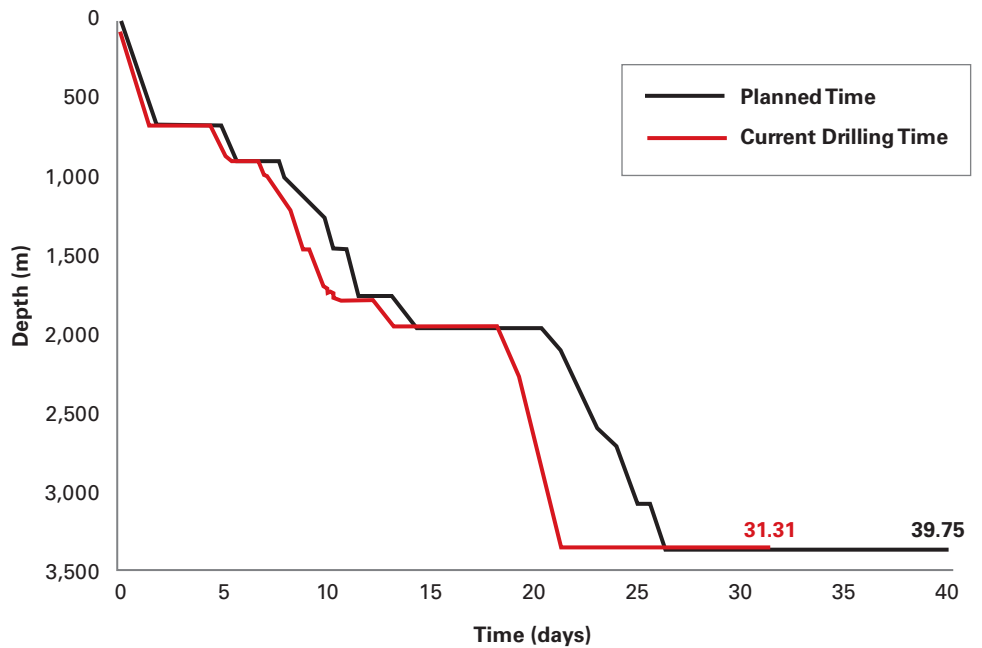
### RESULTS

Through proper planning and efficient execution, Halliburton CPM safely delivered an S-shaped well 8.5 days ahead of the planned time. The plan was based on best practices and field experience gained by all the Halliburton PSLs involved in the well construction. Effective pre-planning in advance of drilling the well played a major role in having a smooth, seamless operation. The coordination of those same services, along with clear communication between the Project Management team and the PSLs, created a strong team that pushed for performance, educated all involved on the importance of reducing operation time, and continually raised the awareness of cost – all aligned with the client's requirements and criteria for well acceptance.

**CASE STUDY**

Halliburton Consulting and Project Management safely and efficiently delivered an S-shaped well approximately 8.5 days ahead of the planned time.

| Challenge                               | Improvement                           | Actions Done   |
|---|---------------------------------------|--|
| ROP                                     | 12¼" increase 20%<br>8½" increase 60% | <ul style="list-style-type: none"> <li>» Increased flow rate and differential pressure with positive displacement motor (PDM)</li> <li>» Optimized weight on bit (WOB) and revolutions per minute (RPM)</li> <li>» Avoided reaming drilled stand in 8½" section</li> <li>» Prepared well trajectory based on formation trends, lessons learned, and reduction of total directional work to minimize sliding percentage</li> </ul>                      |
| Bottomhole Assemblies (BHAs) and Casing | Reduced                               | <ul style="list-style-type: none"> <li>» Improved hole cleaning through increase of flow rate while drilling, leading to reduction of circulation and total time of wiper trips</li> <li>» Reduced backreaming and tripping time through good hole conditions</li> <li>» Spotted 10-ppb STICK-LESS 20® lubricant beads prior to trip in order to reduce drag, thus minimizing the need to pull out of hole while pumping and/or backreaming</li> </ul> |
| Rig NPT                                 | No Failures                           | <ul style="list-style-type: none"> <li>» Performed intensive inspection and any required maintenance prior to spudding of the well</li> <li>» Provided constant monitoring of rig equipment conditions to prevent failures or to plan further maintenance in advance</li> </ul>  |
| Failure                                 | No Failures                           | <ul style="list-style-type: none"> <li>» Provided motors and measurement-while-drilling (MWD) tools with certified maintenance at Halliburton workshop</li> <li>» Operated equipment under their limits to prevent premature failures</li> </ul>   |



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