UNCONVENTIONALS

CASE STUDY

SPIDRlive® Self-Powered Data Retriever Provides Operator Low-Cost Option to Monitor Offset Well Data During Fracturing Campaign

WELL INSIGHT AIDS DECISION-MAKING IN UNCONVENTIONAL WEST TEXAS RESERVOIR

PERMIAN BASIN

CHALLENGE

- Provide operator subsurface fracture behavior information from 10 offset wells without the cost and risks associated with running downhole pressure gauges

SOLUTION

- Deploy SPIDRlive® streaming data retrievers on offset and target wells to monitor FDI of wells in proximity to target wells
- The SPIDRlive system features multiple communication options that will allow for integration into third party data platforms
- Live-stream SPIDRlive service data to the SmartFleet® system frac van, providing live visualization of offset well fracturing interactions during target well operations

RESULT

- SPIDRlive system easily installed on each offset well and target well, "blanketing" potential areas of FDI
- Allowed operator to identify interactions while monitoring the SmartFleet system dashboard
- Fluid migration and direct hit events observed and reported by Halliburton, prompting the operator's production engineers to monitor these wells more closely

OVERVIEW

During a fracturing campaign of four wells on a pad in Howard County, Texas, an operator used the SmartFleet® fracture monitoring system to measure, visualize and act on frac behavior. Because there were 10 offset wells in proximity, the operator opted to install a SPIDRlive® self-powered data retriever on each well to enhance this observation initiative. SPIDRlive service live-streamed data to the SmartFleet system frac van, providing live visualization of offset well fracturing interactions during target well operations.

CHALLENGE

The operator sought detailed subsurface fracture behavior information from 10 offset wells without the costs and risks of running downhole pressure gauges.

SOLUTION

The SPIDRlive system provided the means to capture and stream high-quality wellhead pressure data that enabled additional identification and modeling of frac interaction events happening around the fracked target well(s).

Using the SPIDRlive system for fracture-driven interaction (FDI) monitoring is a highly cost-effective means for monitoring offset wells in proximity to target wells being fractured, even those owned by different operators on different leases. The high resolution and accuracy of the quartz sensor along with a one-second sample rate provided ample data for determining offset wells for FDI. This data was live streamed to the SmartFleet system dashboard, helping avoid the expenditure and potential dangers of running downhole pressure gauges.

RESULT

The SPIDRlive data retrievers were easily installed on each offset and target well, thereby "blanketing" potential areas of FDI. This allowed the operator to identify these interactions while monitoring the SmartFleet system dashboard.

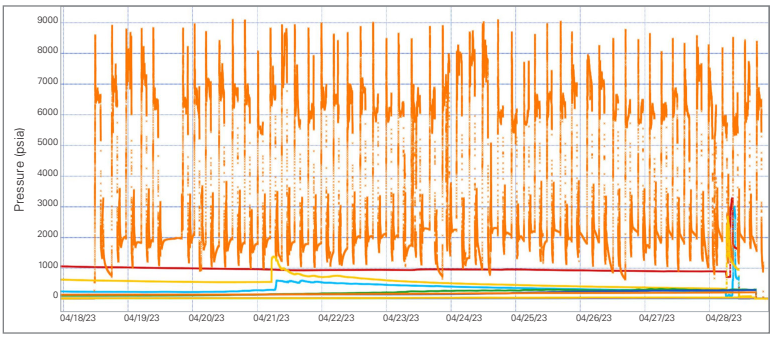
HALLIBURTON

FDIs are identified in four reservoir classifications ranging from least to strongest as follows:

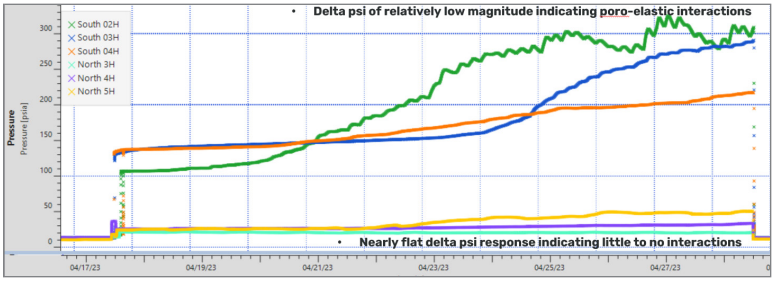
- No interaction
- Poro-elastic or frac-shadowing
- Fluid migration
- Direct hit

The north G pad wells had the fewest interactions ranging from non- to poro-elastic (see middle chart). Typically, these interactions indicate little to no consequence to post-frac production. However, two of the south T pad wells (see bottom chart) experienced fluid migration and a direct hit event during fracturing operations. Halliburton flagged these events and reported them to the operator for further post-frac action and evaluation.

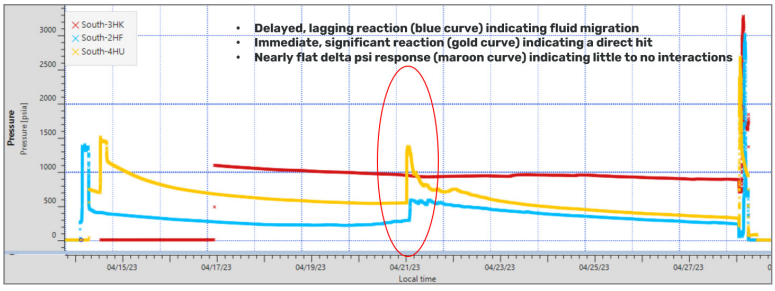
These events could eventually manifest as negative production consequences or could be inconsequential to the offset wells. Regardless, the noted events have alerted the operator's production engineers to monitor these wells more closely for potential consequences.



Top Chart: *Treatment pressure (orange curve) from one of the target wells against the SPIDRlive data from multiple offset wells (red, gold, blue, green, brown, tangerine, tan, etc., curves).*



Middle Chart: *The three wells from the north G pad (represented by the turquoise, purple and gold curves) are nearly flat indicating little to no frac interactions. The three wells from the south G pad (represented by the green, orange, and blue curves) are changing and reacting with delta psi changes that are on the order of hundreds of psi; these wells are indicating poro-elastic frac interactions.*



Bottom Chart: *There were four wells monitored on the south T pad. However, one of the wells was on a vacuum and hence, it is not represented here. Of the remaining three wells, the red curve well indicates little to no interaction. The light blue curve indicates a delayed, lagging reaction that is not matching the pumping schedule but is greater than a few hundred psi of change; this is indicative of fluid migration. The gold curve indicates a near immediate response to the frac operations on the target well and the offset well response is of a significant psi change; this is indicative of a direct hit.*

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