Blowout During Fracture Stimulation Operations

Case Study

BACKGROUND:

Wild Well Control (WWC) Personnel responded to a blowout on a fracture stimulation job in south Texas. This project was completed using some existing tools in a new way to effectively save the client precious time and money on the intervention efforts.

EVENT SUMMARY

This incident occurred while fracturing operations were ongoing. It was reported to be on stage 19 of a planned 24 stages. The failure occurred on the wing valve on the tubing head where it flanges up to the wellhead body. This left no mechanism to isolate the flow and the returning water and sand mixture quickly cut the valve and wellhead body.

The initial site assessment noted the following challenges:

- There was a full frac spread on location along with electric line equipment and live perforating guns.
- Significant water run-off was already occurring on location.
- There was another wellhead adjacent to the subject well.
- Wellhead body damage was present from the exiting flow.

WWC personnel were successful in the installation of a new wellhead and securing the well. This was completed with no incidents in a total time frame from dispatch to resolution in 5 days.

OPERATIONAL SUMMARY

Most well control operations involve multiple phases to achieve the ultimate goal of regaining control of the well. The following operational phases were completed for this project to reach the final resolution.

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EXPERIENCE.
THE WILD WELL DIFFERENCE

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WELLHEAD ACCESS

Upon arrival to the wellsite, it was noted that the subject well was blowing from the cellar area. A full frac spread was on location along with the supporting electric line (e-line) equipment. The well was flowing back predominantly water and WWC personnel seized this opportunity to begin to clear equipment form the site. Gas monitoring was utilized to ensure the environment was safe to begin to rig down the frac iron around location. This facilitated the removal of all fracturing and e-line equipment from the pad with no issues.

The water flow on location was controlled by digging a trench to the reserve pit, where it could be captured and hauled off as required. This also allowed well control personnel to assess the actual damage to the wellhead by connecting the cellar to the trench. After confirmation that the wellhead was compromised and unusable, the area was excavated to allow it to be removed. This excavation was aided by a diversion technique using a joint of casing. This diversion allowed well control personnel to work heavy equipment at the well while minimizing any risk from the well flow.

WELLHEAD PREPARATION AND INSTALLATION

Upon excavation of the area around the wellhead, plans were implemented to make a cut to remove it from the casing. In the past, an Abrasive Jet Cutter (AJC) was the preferred method for wellhead removal during a blowout. There are still many application were this is the only viable method. However, in this case, WWC personnel offered the option to utilize a Diamond Wire Saw (DWS) to make the cut. This involved no real additional support equipment outside of the cutter itself and the hydraulic power unit. The AJC requires sand and pumping equipment, along with an Athey wagon for the typical deployment.

The DWS was utilized and enhanced the speed of the intervention operations. This cut was made successfully through 2 casing strings and the old wellhead was safely removed. The casing strings were then cut again at the appropriate location to facilitate the new wellhead installation. A slip lock wellhead was selected for this application to eliminate any hot work at the wellhead.

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CAPPING AND KILL OPERATIONS

Upon installation of the new wellhead, several options were developed to install a capping device. The well was showing signs of slug flow nearing the time of capping. This allowed WWC personnel to install a tubing head and manual gate valves. Had this not occurred, the wellhead and casing space-out was prepped for a BOP capping option as well as a contingency.

The installation of the tubing head was preferred by the client and was landed on the casing head. The manual valves were closed securing the well. The client planned to set bridge plugs in the casing and WWC personnel were released from the project.