

Boots & Coots Drills Relief Well for Shallow Target to Kill Catastrophic Blowout

MULTIDISCIPLINARY RESPONSE RESOLVES CRISIS IN FIRST ATTEMPT

INDONESIA

CHALLENGES

- » Intercept shallow target from relief well
- » Unknown trajectory of the target well
- » Several craters and broaches around the site

SOLUTIONS

- » Collaborate with other Halliburton PSLs for multidisciplinary response
- » Survey offset wells to estimate probable location of target well
- » Draw up detailed relief-well plan with consideration for sidetracks
- » Develop detailed layout of dynamic kill operation

RESULTS

- » Target well located from relief well in first attempt
- » Dynamic kill operation performed safely
- » Target well cemented and abandoned with no incidents

OVERVIEW

In Indonesia, an operator's shallow gas well experienced a catastrophic blowout. Boots & Coots was called in and succeeded in drilling a relief well, extinguishing the fire, and cementing and abandoning the target well – all without any incidents.

CHALLENGE: CATASTROPHIC GAS WELL BLOWOUT

The operator's wellbore was exposed to shallow, weak geological formations. While drilling the top section ahead of setting the surface casing, the operator detected a kick. With the well drilled to a depth of 2,160 feet (658 meters), and the last casing seat set at 40 feet (12 meters), the flow was diverted. After unsuccessful attempts to contain the well from the surface by pumping fluid, the diverter system eroded and fire quickly engulfed the site. The rig collapsed into the crater and the drillstring dropped into the open hole. The operator contacted Boots & Coots to kill the blowout. Apart from containing the blowout, a major challenge was determining the precise location and trajectory of the target well, as survey data was very limited.

SOLUTION: LOCATE TARGET WELLBORE AND DRILL RELIEF WELL

The Boots & Coots team first partially bridged the wellbore, which significantly diminished the flame from the crater. However, because the wellbore was exposed to weak formations, new broaches appeared across the site. These dispersed broaches posed a major hazard and had to be considered in selecting the location of the relief well and approaching the target.

Survey data of the site was limited to only four sets of inclination data. And because there were no details about the target well's trajectory, the ellipse of uncertainty was quite significant. To locate the target well, the team turned to survey and drilling data on eight offset wells in the area to ascertain the general trend and trajectory.

The target well's drillstring consisted of 1,304 feet (397 meters) of 5-inch drillpipe, 359 feet (109 meters)

TARGET WELL CEMENTED
AND ABANDONED WITH

ZERO
INCIDENTS

HAL62386



HAL62385

Figure 1. The catastrophic blowout of the shallow gas well created a crater that swallowed up the rig and caused the drillstring to drop down the open hole.



The Boots & Coots well control team devised a flexible plan, located the target well in the first ranging run, and successfully killed and plugged the well. The entire operation was performed without any HSE incidents – a remarkable achievement given the scale and hazards of the blowout.

of 5-inch heavy-duty drillpipe, 306 feet (93 meters) of 6-1/4-inch drill collar, and 191 feet (58 meters) of 8-inch drill collar. Active ranging was used to detect it in the 12-1/4-inch open hole, and the top of the 8-inch drill collar was selected as the initial interception point, which would provide a 12-1/4-inch x 6-1/4-inch flow area for pumping the kill fluid.

It was a complex undertaking to position and design the relief well to intersect possible sidetracks of the target. It was set 500 feet (152 meters) from the surface location of the target well, and drilling began with a 6-1/8-inch pilot hole to a depth of 170 feet (52 meters), then opened to 26-1/2 inches. After a 20-inch casing was set, drilling resumed with a 17-1/2-inch bit and deviated at 300 feet (91 meters) to reach an inclination angle of 30 degrees. A 13-3/8-inch casing was then set at a depth of 1,360 feet (415 meters).

The next section was drilled with a 12-1/4-inch bit to 1,730 feet (527 meters), and the first ranging run indicated the target well was 20 feet (6 meters) away but its trajectory was still unknown. At 1,850 feet (564 meters), ranging indicated the target well was at a distance of 26 feet (8 meters), ±6 feet (1.8 meters), and its direction was 265 degrees relative to grid north. Though it was not possible to intercept the target from this initial relief trajectory, the relief well was drilled another 50 feet (15 meters) to collect more data on the behavior of the target well and to pinpoint its trajectory.

RESULTS: SUCCESSFUL KILL OPERATION WITHOUT INCIDENTS

After the initial relief hole was plugged with cement, the relief well plan was revised, and the well was sidetracked to the new target location. Ranging runs in the sidetrack yielded more accurate data from gradient readings, and, at 1,980 feet (604 meters), the target was located at a horizontal distance of 4.2 feet (1.3 meters). The decision was then made to change the original plan and to intercept the well at the current depth.

A 9-5/8-inch casing was set, the shoe tested, and the interception section drilled with an 8-1/2 bit. The target well was intercepted, and the kill operation commenced with pumping 12.0 ppg of kill fluid at 11 bpm. Once killed, the well was displaced with 10.5 ppg of fluid and monitored. With gas dispersion from the craters and broaches dormant, the target well was finally plugged, using a second-stage cement squeeze.

Collaborating with the Halliburton Cementing and Sperry Drilling product service lines (PSLs), the Boots & Coots team responded to the crisis immediately. Despite the lack of detailed data on the target well, the well control team devised a flexible plan, located the target well in the first ranging run, and successfully killed and plugged the well.

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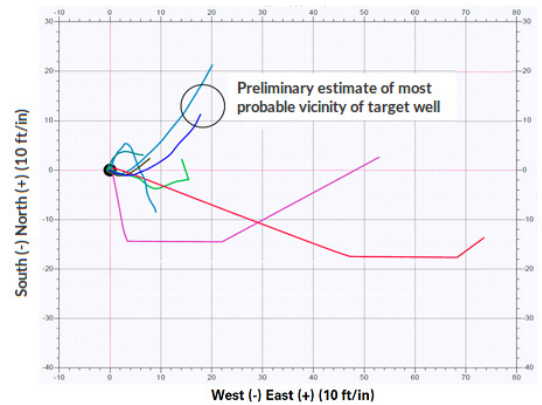


Figure 2. Because there was no survey data on the target well, data on offset wells in the area were used for trend analysis.



Figure 3. The relief well can be seen in the left background, 500 feet (152 meters) behind the destroyed target well.

