

Boots & Coots tames Iraq's oil well fires during war

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THE WAR IN Iraq commenced on March 20, 2003. In keeping with his past actions in Kuwait during the Gulf War in 1991, Saddam Hussein sabotaged a number of the Iraqi oil wells in the south Rumalia oil fields.

Boots & Coots was contacted to assist the military in controlling these wells at an unprecedented point in time, while the war was in full swing. Subsequently, Boots & Coots (B&C) aided in extinguishing four wells, which were on fire, and in safely controlling an additional five wells in the first 45 days of the Iraqi war.

CONDITIONS

Coalition forces advanced into Iraq to attack war zones soon after the war began. Meanwhile, convoys mobilized daily along the route from Kuwait city to the south Rumalia oil fields before heading north to Basra and ultimately Baghdad.

The main southern supply route for weapons and fuel passed close to three burning oil wells.

The sabotaged wells on fire emitted large billowing clouds of smoke and fumes that could be seen for hundreds of miles. The desert sun further intensified conditions near the burning wells while prevailing wind fueled the fire, spreading debris, smog, and heat through the surrounding area.

One well in particular was located within a few feet of the main road. During windy conditions, travel by this well was difficult and completely stopping the convoy near this point would have subjected the vehicles to possible damage from smoke and radiant heat.

The Army Corp of Engineers was tasked with making the convoy routes passable and safe. This assignment included

extinguishing the burning oil wells. Initially, Coalition Forces infantry and the Kuwait Army secured a route in and out of the south oil fields to allow B&C fire pumps and heavy equipment to pass safely.

Mobilization of the firefighting equipment, personnel, and heavy equipment was simply the first of many challenges that awaited Boots & Coots.



Boots & Coots personnel supervise the insertion of a stinger that would be attached to a Halliburton pump that delivered drilling mud, controlling the well pressure and killing the well.

PRE-PLANNING CHALLENGES

The lack of drilling records and schematics available for these wells created a problem in evaluating control options for the wells. The war caused Iraq Southern Oil Company personnel to flee the area.

For decades, Iraq's oil fields had been produced under strict Iraqi government control. Few outside companies worked with the wells in this area so the strategies for control efforts had to be developed from other information resources. B&C personnel also relied on knowledge dealing with wells in nearby Kuwait.

Soon after the Iraq invasion of Kuwait in 1991, retreating Iraqi troops placed explosives on oil wells. Ultimately, Iraqi forces blew up more than 700 oil wells.

B&C blowout specialists assisted in extinguishing wells in the Burgan fields. The last oil well blowout in Kuwait was capped on November 8, 1991 in Northern Kuwait, some 8 ½ months after the control work began.

There were some 28 firefighting teams involved from the United States, Canada, Kuwait, Iran, Hungary, Rumania, Russia, and China. More than 70% of the blowouts were controlled by teams from the United States. The firefighters called the effort "Operation Desert Hell."

Having experienced Hussein's massive destruction of oil wells first hand, B&C personnel were well aware of the methods of destruction and familiar with the scene of burning wells.

But, what type of equipment and method of production had the Iraq Southern Oil Company been using? And what were the production volume and pressures prior to the blowouts?

More importantly, in the middle of a desert, where would Boots & Coots find the large volume of water resources to extinguish the blazing oil wells?

THE FIRST STING OPERATION

At the site of the first well, Kuwait Oil Company dispatched firefighters to assist B&C controlling the well and simultaneously initiating response on another well.

The cooperation enabled both teams to assist each other with logistics and resources.

For B&C, the first well proved hazardous. A well on fire and producing



One of the Iraq wells was in very close proximity to a road used by military convoys. In preparation for extinguishing the fire, oil collection pits and drainage ditches were constructed at Boots & Coots' direction.

heavy black smoke is consistent with heavy crude oil production blowouts. Because of wellhead damage and the volume of burning oil, on-scene commanders decided to attempt a stinging operation with the assistance of Halliburton services from Kuwait.

The concept of stinging into an out-of-control well is not new. In fact, B&C utilized this same procedure after the Gulf War at the Burgan fields in Kuwait. The team had to manufacture the specialized equipment to specific dimensions and tolerances.

This capability required expert knowledge of uses and limitations of the sting, but the fire first needed to be extinguished. This necessity brought up yet another logistical challenge, water.

Several water injection wells in the south Rumalia fields provided a possible solution, but the wells were not intended for a large volume of use necessary to extinguish an oil well fire.

Furthermore, the roads to the water wells were not designed for easy travel with large trucks.

To resolve the dilemma, the Baroid Company of Kuwait offered its 130 barrel vacuum trucks to haul the water, and Halliburton supplied 500 barrel tanks for storage.

Estimated turn-around time of the vacuum trucks for each load was about two hours. It took three days to fill the supply tanks with enough water for a single attempt at extinguishing a well.

While personnel filled supply tanks, the B&C team set up fire pumps, monitor stands and other equipment for the stinging operation. Halliburton's crew prepared to pump the drilling mud through the stinger to kill the well once B&C extinguished the fire.

Preparations completed, B&C began operations. B&C walked a track hoe into the blaze prior to fighting the fire and pulled the production head from the top of the well.

The extraction of the production head removed the obstruction of the fire, creating a large base for the fire to burn upward and vertical. This procedure cleared the view of the source and showed the target for the placement of the stinger.

The firefight was quick and successful, only requiring a portion of the stored water. B&C personnel then inserted the stinger using the B&C Athey wagon. Attached to the stinger is high pressure pipe that connected to a Halliburton pump truck, delivering drilling mud.

The truck pumped a necessary amount

of drilling mud to control the well pressure through the pipe, killing the well.

Once the pressure was eliminated, the B&C team worked on the well to examine any damage and to begin the repair process.

SECOND FROM THE PIT

The second well that B&C tackled posed a different challenge, more hazardous than the first. The fire from well #64 burned at a 45° angle.

The B&C team leader determined the casing valve had been damaged but the production tree was still intact.

The angle of the flame created a problem. The fire extended toward the road that coalition forces used for the main supply route.

If the team extinguished the fire, the unburned oil would run onto the road and spray vehicles driving by. B&C leaders estimated that the well produced 10,000 barrels of oil per day.

B&C planning would have to include a



Oil and gas flow from Well #64 that was exiting at a 45° angle. This presented a problem, as the fire extended toward the main supply route for coalition forces. When the fire was extinguished, Boots & Coots used two stingers in the casing valve and tubing to pump mud and kill the well.

fast solution for elimination of the flow of oil or a contingency for relighting the well if killing was not an immediate option.

The challenge of water supply remained a big concern. The well was bigger than the first, producing more oil, at a faster rate, through a bigger orifice, and a lighter crude that was more flammable and more hazardous.

These factors pointed to a longer fight with the fire and the necessity for more water than in the previous well.

B&C leaders decided on the need for a pit. Personnel designed and dug the pit to hold one million gallons of water, enough to extinguish the flames and cool down the surrounding area. The pit also required more trips to the water wells.

It took a team of personnel three full days to fill the pit to the required level, given the loss due to evaporation and leakage of the liner of approximately 3,000 gallons a day.

In the end, B&C collected sufficient water, equipment and personnel to sting and extinguish the well.

B&C built a road through the desert around well #64 to keep coalition forces and patrol from being soaked by oil.

B&C also built dykes around the well area and down hill to stop oil from flowing onto the road, further hampering travel and constant coalition traffic.

Once preparations were complete, B&C initiated the firefighting.

The operation utilized 3,000 gallons per minute of water from three monitor stands and an effort by ten B&C team members.

B&C extinguished the fire in six hours, but the oil now flowed freely from the 7 1/16-in. casing valve for almost 500 yards.

Upon inspection, B&C leaders discovered the damage to the wellhead left the 7 1/8-in. valve only partially intact.

Halliburton then supplied a crew and equipment necessary to cut off the 7 1/16-in. valve completely from the wellhead assembly before the stinger would fit securely.

Refilling the pit remained a slow process, and the oil was so flammable, relighting the well and extinguishing it when ready for the stinging operation were not options.

If B&C relit the well and the surface oil on the ground also reignited, the coalition forces' passage to the north would definitely be blocked.

If the water supply in the pit could not be refilled the next day to extinguish the fire again, then more delays in opening the road would be almost certain.

B&C leaders decided to leave the well extinguished, continue refilling the fire water pit, and contain or divert any oil

from the path of the convoys as necessary until the well was brought under control.

Halliburton's abrasive jet cutter successfully removed the damaged valve, and the stinger was prepared to kill the well. But the procedure would not operate without a hitch.

When B&C pumped 9# mud down the 7 1/16-in. casing valve, pressure reoccurred via the 2" production tubing.

The circumstances required a bullhead operation from both the casing valve and tubing head.

By using two stingers, one in the casing valve and one in the tubing, both pumping mud under pressure, the bullhead technique proved successful on the well flow. After several minutes of pumping, the well died.

CONCLUSION

No injuries occurred during the initial work in Iraq. By controlling blowouts in the first 45 days of the Iraqi war, B&C assisted to free one of the most crucial supply routes to the north.

In addition, the well control operations reduced millions of dollars in loss of oil supply and production out of Iraq.

B&C teams currently assist in well control prevention and security measures in Iraqi oil fields. ■