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Special Focus

DRILLING PRODUCTION WATER MANAGEMENT DRILLING DRILLING

Well control surface intervention that is inclusive of environmental preservation

Wild Well Control says operators should consider environmental concerns during well planning, including location, access points, proximity to water, and other issues that can make a difference between an expedited, efficient and safe blowout scenario and one that is complicated, costly and dangerous.

Carlton Burleson / Wild Well Control

In a well control event, there is always the very real possibility for the surrounding area to be negatively impacted. Subsequently, this necessitates immediate response and rapid mobilization of people, equipment, and an abundance of resources. The initial actions from an operator or contractor can facilitate the effectiveness of remedying the incident.


A blowout and fire on a multi-well pad.

Emergency response plans (ERPs)—which are common in the oil and gas industry—provide a detailed roadmap for unforeseen mishaps. But even the best ERP cannot account for every potential issue. The truth is that each blowout is like a fingerprint: specific to its entity. Even with the implementation of pre-planning, drills, and ongoing development and preparedness, an actual event may involve unforeseen aspects. In the chaotic moments immediately after an incident, critical steps can inadvertently fall through the cracks.

Balancing the practical, in-the-moment issue of blowout response, with immediate environmental mitigation, can sometimes be an overlooked issue. A blowout has the potential for soil and water contamination, chemical air pollution, and disruption of protected lands. Because of these concerns, incorporating environmental mitigation into an ERP throughout the life of the well is critical.

Emergency response planning and environmental planning are not mutually exclusive. While each blowout incident is site/well-specific, there are beneficial actions that can be implemented during surface intervention, consequently reducing exposure to the environment and ensuring the best possible outcome for land, water and animals.

It is nearly impossible to create umbrella type concepts that encompass specific environmental procedures related to surface intervention. With the variables involved—including the ever-changing conditions of the well — being both proactive and reactive in nature is key. As work on the blowout progresses, it often changes the well characteristics. Concurrently, the environmental and personnel barriers in place often must conform to the changing situation. The protection and safety of personnel and the environment is always paramount.

Though there is no one single action for each well from a blowout control methodology aspect, there are items that can be considered, even in the well planning stage. For example, the location of the well and the pad, and its proximity to water sources, potential sociopolitical issues, even the number of access points in and around location can impact both well repair and environmental damage mitigation.

Wild Well Control has an extensive risk management service that enables clients to protect their operations. Since we respond to a significant portion of all blowouts globally, the company can offer ERP services that incorporate drills, exercises and assessments for each well.

Asking site-specific questions in well control emergencies is crucial. Those questions quickly enable on-site staff to assess both safety and environmental concerns. An extensive plan to mitigate further potential well integrity failures is also key. Background information on the well is obtained, which includes current operations, drilling reports, wellbore schematics, logs, pictures and videos.


Fig. 1. Freshwater supply on site.

Information indirectly related to the well also can be important: What is the operational background of the project? Is it a multi-well pad? Are any hydrocarbons or fluids currently being contained that are escaping the well? Are there any bulk-stored fluids, gas or oil on location? Is there land or water sensitivity in or around the location? Is it a populated area? Many of the answers to these questions sometimes highlight major obstacles, and it is much better to know of these potential complications as early as possible.

Furthermore, this line of questioning serves a second purpose. Responding personnel can become familiarized with the location and can initially plan for potential hazards and obstacles at the site. In addition, field personnel—who are often in shock from the initial incident—can compose themselves long enough to provide, at a high-level, much-needed information to formulate an immediate, initial path forward.

WATER MANAGEMENT IS KEY

A common challenge on land wells during a blowout is the availability of onsite fresh water, **Fig. 1.** Fluid management is an ongoing challenge during a blowout. Freshwater is not always available, or the turnaround time for trucks to replenish water is not feasible.

One solution for this problem is a lined pit near location, where water can be stored and replenished, as needed. It is also possible to build a system where used water is recirculated, creating a two-tank system, where oil sits in the top tank, and reusable water flows beneath from one tank to the other.

Regardless of the type of chemicals or fluids that are being released from the well, it is critical that well control specialists quickly get the well flowing vertically, **Fig. 2.** Once the flow is vertical (**Fig. 3**), the implementation of remedial measures using specialized equipment and techniques can be accomplished. A single, vertical flow means the well can be worked on directly for much longer periods of time. Additionally, it creates safer surroundings for personnel and minimizes the time that it takes to regain well control, which ultimately allows the operator to resume normal operations.

Fig. 2. Specialists work to get a well flowing vertically.

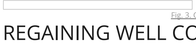
Fig. 3. Once the flow is vertical, remedial measures can be implemented.

REGAINING WELL CONTROL

Earlier this year, a blowout and fire occurred on a multi-well pad that underscored the need for careful emergency response pre-planning. The incident started with an issue with one of the wells. Well control measures were ultimately unsuccessful; the well blew out, and it quickly caught fire. Nearby structures began to fail, due to the radiant heat from the well fire. As these structures lost their integrity, two other wells were compromised, began flowing, and subsequently caught fire. The flow characteristics for each well were unique, involving different percentages of gas, oil, condensate and saltwater.


Fig. 4. A location run-off canal.

Regaining well control through surface intervention was not an easy task. There were substantial environmental and logistical issues. The pad sat atop a remote plateau in federal grasslands, and the assistance of the Federal Bureau of Land Management would be needed. Repairing the wells would require excavation outside of the original well pad and disruption of a historical Native American site that required permission from reservation authorities. The location was less than a mile from a major waterway, raising concerns about possible chemical runoff.

PLAN, THEN EXECUTE

One common issue with complex pad locations is that there is a single access point. This access point may be compromised, due to a well control event. The team needed multiple access points to assess the well damage and implement remedial measures. The operator and Bureau of Land Management contacted local Native American authorities to request permission to access the wellsite from their land, enabling them to move rocks and dig on the property to access the well.

The project underscored the need to combine early well planning with environmental concerns. Not only do multiple points of well access enable faster repairs, but they also mitigate environmental hazards. Because of the operator's full understanding and implementation of its ERP, the job was efficient, safe, and operations were successful throughout.

Well Control Specialists prefer a minimum of two points of ingress and egress to a well or location. The Site Safety Specialist (SSS) on location can assess wind direction and monitor well flow fall-out. The SSS can then ensure that the well control team remains upwind, out of the flow, and that the team has the means to egress safely at any time during well intervention operations. When specifically dealing with H_2S (hydrogen sulfide), SO_2 (sulfur dioxide), or CO_2 (carbon dioxide), having only a single entrance/exit that is predominantly downwind will impede onsite operations. A second pathway is imperative to allow for teams to adapt to potential shifts in wind and changing well conditions.

Once the proper authorities were reached, and access to land was granted, the team was able to continue working from an upwind position, expediting operations to regain control of the wells. They were then able to ensure that any fluid run-off was diverted into temporary canals (**Fig. 4**), on location, that lead into double-lined holding pits, **Fig. 5.** All fluid and hydrocarbons were then transferred via secure lines to transports to be properly disposed of. This ensured that contaminated chemicals and fluids remained clear of the sensitive landscape.

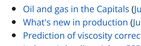
Fig. 5. Double-lined holding pits.

Environmental concerns must be considered during well planning. A well's location, access points, proximity to water sources, and various other issues can make the difference between a blowout scenario that is expedited, efficient, and safe, and one that is complicated, costly, and dangerous.

About the Authors

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Carlton Burleson is a native Texan with 25 years in the oil and gas industry; 20 of those years being with Wild Well Control. Within these two decades, he has ascended from well control specialist, senior well control specialist, and operations manager to his current role of senior manager, Global Well Control Operations. During his tenure with Wild Well Control, he has worked, led and overseen projects in well control operations and surface intervention, in over 12 countries throughout the world.

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