

Managing Risk Offers Financial Payoffs

By Bill Mahler

SPRING, TX.—The inherent risks in drilling oil and gas wells are continually present. However, the management of those risks usually associated with control of well has not changed significantly.

The cost of "control of well" insurance has always been just another cost of operations. Until recently, premium costs for control of well have been minimal and insignificant in the total cost of drilling an oil or gas well. However, heavy losses within the energy sector over the past three years, in combination with the Sept. 11 terrorist attacks, have resulted in a fewer number of underwriters and less capacity to write coverage. Additionally, re-insurance and other issues have compounded the problems for the underwriters.

All of this has resulted in operators facing heavy premium increases for control of well coverage, increased deductibles, and the chance that coverage for their operations can not even be placed—especially true if the operator has had any recent significant claims. In addition to the higher premiums, insurers are including policy language that requires company personnel to complete certain qualifications in order to comply with the insurer's requirements for coverage.

Risk management for control of well in the past consisted of the usual configuration of blowout preventers and rig personnel trained and experienced in the proper handling of a well control incident.

In the eyes of the insurers, this basic risk management for control of well is now deemed inadequate. Insurers are demanding that operators, and drilling contractors, better manage these risks or possibly risk their insurability. To prevent additional policy qualifications and requirements mandated by the under-

writers (and which may not be cost effective or even practical for current drilling operations), operators and drilling contractors must take the initiative in developing risk management plans that are focused on the mitigation and effective management of those risks normally associated with control of well.

Risks associated with control of well are no different from other risks. Once identified, risks and their contributing factors can be effectively managed—reducing the chance of a well control event from occurring, and being prepared to handle one if it does occur, in the most effective and safest manner possible—thus reducing the number and dollar value of control of well claims.

To develop a complete risk management plan, operators must first identify all risks relevant to control of well. Once identified, companies must analyze each risk as to the level of risk that may be incurred and the consequences of each risk. Following the analysis, an assessment is made comparing each risk, and possible consequences, against the risk threshold that has been predetermined. At this point, the operator can develop a total risk management plan to properly manage those risks that cannot be avoided or transferred. In order for the plan to be effective, it should also incorporate a process for the proper management and handling of claims associated with control of well.

Identifying Risks

The first step in development such a plan is the identification of the associated risks and their contributing factors associated with control of well issues. When done properly, it becomes apparent very quickly that there are many, many risks that can, and do, affect well-control issues.

Those risks identified particular to the well itself might include:

- Drilling target—oil versus gas;
- Formations to be drilled;
- Well depth;
- Well location—onshore, inland waters, offshore, deep water;
- Casing string design; and
- Drilling technique employed—conventional, underbalanced, or drilling with casing.

Those risks identified particular to the drilling contractor might include:

- Drilling rig—rig condition, and maintenance program/records;
- Drilling personnel—training, certification and experience level;
- Performance records—unplanned downtime and well control incidents/loss history; and
- Level of crew awareness/preparedness.

Those risks identified particular to the operator might include:

- Experience level—personnel and drilling environment;
- Communications; and
- Emergency preparedness.

A more thorough assessment is warranted due to the implementation of new drilling techniques (i.e. underbalanced drilling, deepwater drilling, drilling with casing, etc.), the utilization of high specification rig equipment, the use of expensive, highly technical bottom-hole assemblies, and extended drilling environments.

Assessment and Analysis of Risks

Once all the risks associated with control of well issues are determined, then they can be individually assessed, analyzed and compared to the operator's predetermined risk threshold—which is the level of risk that the operator is willing to assume.



Proper risk management requires quantification of the associated risks and their respective consequences. The assessment allows the operator to fully understand each risk and its potential for loss. The analysis of the identified risks will compare the costs of the risks (and their associated consequences) versus the costs to mitigate, transfer or manage the risks and associated consequences.

Once the assessment and analysis is completed, the operator will have identified those risks that should be mitigated, transferred, managed, or avoided.

Risks can be mitigated through self-imposed restrictions on drilling environments (onshore, offshore, deep water) or taking a different position as an operator—i.e. shared working interest; or, transferred through insurance and/or turnkey drilling plans.

Those identified risks that cannot be mitigated, transferred or avoided must be properly managed in a proactive manner. This requires the development of a risk management plan to ensure the protection of personnel, the environment, and assets.

Plan Development

An effective risk management plan promotes continuous improvement to the operator's risk profile, thus assisting in future procurement of coverage. The plan should also be quantitative in nature, so that results can be tracked and the plan modified over time to improve its effectiveness and the operator's overall drilling efficiencies. A properly developed risk management plan does not have to be complex; rather, it should be focused, practical and cost effective in its implementation.

In responding to well-control emergencies for more than 26 years, Wild Well Control has identified five primary factors that contribute either to the initial occurrence of a well control incident or the escalation of a well control incident. They are:

- Poor execution of drilling plan;
- Inadequate well-control equipment;
- Inexperienced or complacent rig crews;
- Insufficient corporate preparedness in responding to well control emergencies; and
- Lack of communication at all levels.

An effective risk management plan should address these five primary factors.

Well Control Modeling

Well plans are designed to safely drill and complete an oil or gas well; they are not designed for failure. However, certain events occur during the course of drilling a well that require the operator to deviate from the original well plan. Deviations such as setting casing shallower/deeper than planned and unscheduled mud weights are normal occurrences. However, many times, these deviations do not address the corresponding changes required to maintain effective control of well.

Well control modeling offers insight and reasoning to the critical aspects of maintaining primary well control. The modeling is done for a specific well and is based on data from the planned drilling program. It can be updated in a timely manner whenever any deviations may occur. A comprehensive well control model for a well will include:

- Kick tolerance for critical well sections;
- Kick circulation behavior based on a particular hole section and encompassing hole angle, hole geometry, mud type (WBM/OBM/SBM) to include maximum pit gain with gas at surface, maximum calculated casing pressure, DP pressure schedules and maximum ECD at shoe (or specified weak point);
- Maximum gas flow rate during kick circulation (scfm, gas buster sizing);
- Critical kick volume per hole section considering possible kick intensity, influx type and other factors;
- Recommended well control procedures and special considerations for various scenarios that might include running liner, off bottom, out of hole, horizontal section, etc.; and
- Volumetric well control procedures and expected pressures for kicks off bottom, out of hole or plugged BHA.

Well control modeling is intended to be a tool for well site and office personnel to use as an operational guideline and in critical decision making. The critical kick volumes and kick tolerance calculations can provide a guideline for specifying PVT sensitivities and shut-in procedures. The expected behavior during kick circulation from various hole sections can be used as

a guide for successful kill circulation.

The results of the well control modeling can be placed directly into the drilling program for ready access by well site and office-based personnel.

Rig Audit of Well Control Equipment

A practical risk management plan should include a type of review, audit or survey of the drilling contractor's well control equipment to ensure that the correct well control equipment is properly rigged up. It is best to complete the audit after the surface or intermediate casing has been set and before the shoe has been drilled out (once the BOPs have been rigged up and tested).

The audit should be focused solely on the well control equipment and include a comprehensive checklist covering all major components of the well control equipment, related systems and tools. This includes the accumulator system, blowout preventers, choke and kill line components, choke manifold, separator and pit system.

The audit can be based on the operator's best practices or other established and accepted industry practices (API, IADC, ARP, or MMS as appropriate). Any unacceptable conditions should be addressed and corrected immediately by the responsible party.

Training of Rig Personnel

Rig personnel are the first line of defense in preventing well control incidents from occurring. Although most tool pushers and drillers have received some level of formal training in well control measures, it is of paramount importance that each rig crew member understands blowouts—how they occur and evolve, and the importance of early kick detection and proper shut-in procedures. Armed with a better understanding of blowouts and a heightened awareness of kicks, each rig crewmember can make a difference in reducing these occurrences. A rig crew that is informed, aware and alert can be a big factor in reducing the complications created by unrecognized or mishandled kicks.

Emergency Response Plan

Operators must be prepared to respond immediately to any well control incident—whether a simple kick or a cat-



astrophic blowout. A proper response to a well control emergency may reduce the risks of the event escalating to a blowout, risks to personnel and assets and minimize environmental impact. Early involvement by the well control company demonstrates a proactive effort by the operator to regulatory agencies and shareholders.

The key element in any emergency response plan is an effective response structure to enhance the decision-making process that will be vital in minimizing the effects of an emergency. An emergency response plan can greatly enhance the operator's ability to successfully resolve a well control incident in a more efficient and timely manner.

Better Communications

Poor communications is a major cause in the occurrence and escalation of well control incidents. This can be as simple as communicating between the tool pushers and drillers when changing towers, between the driller and the rig crew as to the daily drilling plans and anticipations, and operator's management and the field personnel.

A risk management plan should promote and assure the facilitation of communication between all parties, at all times. Communications is the most important part of a successful risk management plan.

Conclusion

Risks associated with control of well are no different from other risks—the industry has proven that it can manage these risks effectively and successfully. The development and implementation of an effective and comprehensive risk management plan to address control of well issues is becoming a requirement for most operators drilling oil and gas wells. Implementation of such a plan requires the long-term commitment by the operator to be effective and reduce the number and magnitude of well control events.

To maintain and improve their risk profile with insurers, the operators must demonstrate their commitment to establishing an effective risk management plan. An operators' future insurability, and ability to maintain/control future insurance costs, is dependent on the implementation of a comprehensive risk management plan that is effective and successful.

Operators must also be proactive in promoting their risk management plan to their insurers. A common understanding between the insured and the insurer of adherent risks associated with control of well issues and ways to minimize or eliminate those risks will result in a positive outcome for all parties involved. □



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