

Planning helps reduce well control instances

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THE PETROLEUM EXPLORATION

and production industry has been increasingly challenged through an exponential growth in the global demand for fossil fuels. Through maximization of current field production and simultaneous exploration of new horizons, in increasingly unforgiving frontiers, our industry is faced with development of new technologies and



Preparing for abrasive jet cutting operations with the ALERT Hellcat/Athey wagon. Photograph courtesy of ALERT Disaster Control.

processes while meeting challenges posed through economics, environmental considerations, political sensitivities, supply chain constraints and, of equal importance, a graying and subsequently retiring workforce of experienced professionals.

The resulting risks are great. It is therefore of paramount importance that every facet of our industry's business process is managed effectively.

The application of risk management processes must be considered as the principle, guiding element in how we conduct our exploration and production business.

Clearly, the ability to eliminate risk is the progressive process of choice. In the event such a loss is incurred, however, the ability to efficiently mitigate such an incident, in a professional and expedient manner, is directly proportional to the effort made in preparing for such occurrences.

Accordingly, the incorporation of risk management processes for the prevention and, if required, response to well control incidents, is critical.

CHALLENGES

The challenges faced in responding to a Level 3: Well Control Incident (*Drilling Contractor*, November/December 2004), which requires specialized personnel and equipment, are extremely varied given the nature of the drilling environment, well profile, formation conditions and resulting well control intervention activities.

Of additional importance, and all too often overlooked, are the resources required in support of such activities. Through strategically positioned operations bases, worldwide, experienced and professional well control specialists and comprehensive equipment packages are currently available to respond to well control incidents within hours.

However, in recognition of our industry's current global activities, additional resources such as large hydraulic horsepower kill plants, large volume mixing/storage mud plants, drilling units, through to and including transportation, heavy equipment and camp facilities, is limited. In certain operating regions, they are simply not available.

These challenges are impacted further when we consider the expansive differences in the practices applied by various operators, drilling contractors and well service companies worldwide.

In addition, and all too often, the standards of performance applied by the same operators, drilling contractors and well service companies seemingly depend on what region of the world the operations are conducted.

That is not to say that for the great part, we are clearly meeting the expectations of our personnel, our shareholders, our peers and our communities, and as such, holding true to the entrepreneurial spirit by which our industry was founded by continually meeting all challenges head-on.

However, our exposure, in terms of the impact of a single negative event, has never been greater. It is therefore imperative that we expect, and for that matter, demand, no less than optimum performance in all facets of our industry.

This shall only be achieved through a collective effort, whereby together we establish accepted standards of competence in the performance of the services required to sustain continued growth throughout our industry.

LESSONS LEARNED

A few examples of the risks faced by our industry can be best exemplified by the recent hurricanes that have devastated the southern coast of the United States.

The losses incurred shall clearly impact the entire industry and for that matter the global economy. In terms of lost production, the refining industry, which was already operating at maximum capability, has been severely impacted, a situation that will not be resolved for a number of years to come.

The loss of physical assets within the Gulf of Mexico was severe and while we shall once again be able to recover, the losses have already resulted in increased costs through replacement of those assets, the time lost in applying limited resources to an extended recovery phase and the resulting increase, as much as 400%, in insurance premiums.

An additional cost shall be incurred in the application of further research and development for the design of structures, platforms and drilling units capable of withstanding what was previously considered a 100 year weather phenomenon, yet by all indications, a pattern of severe weather, which can now be expected to impact our offshore and coastal exploration and production interests, annually.

The ability to apply the principles of modern risk management is obviously an extreme when we consider Category 5

hurricanes. However, our industry is clearly required to focus as much attention, if not greater due diligence, to day-to-day drilling practices and the improper application of fundamental well control principles.

Consider the events experienced recently by a small to medium sized international operator involved in the drilling of an exploration well in Central Asia.

The operator, and its selected drilling contractor, experienced a kick while completing a 7-in. casing cementing operation. An initial flow through the annulus of the 7-in. casing and blowout preventor was temporarily halted by closing the annular BOP.

Immediately thereafter, uncontrolled flow of well fluids/gas was experienced through a missing 7-in. casing spool tie-down bolt (hole) in the 7-in. casing spool housing.

With increased flow of well fluids/gas engulfing the cellar and rig substructure, inadvertent miscommunication between the drilling crew and well service operators, due in great part to mul-



After the well is capped, workers nipple up the BOP stack and diverter lines. Photographs courtesy of ALERT Disaster Control.

tiple languages, the cementing unit was disconnected. This resulted in an additional flow portal for well fluids/gas due to improper rig-up procedures. The top wiper plug had been dropped, however, no displacement had occurred due to the inability of the rig pumps to provide fluid after a hose, previously identified to have been excessively worn with visual abrasions, burst in the circulating system.

The rig was evacuated and fortunately all personnel were safe and accounted for, including two roustabouts who, interestingly enough, were positioned in the cellar at the time of the initial loss.

The operator mobilized well control resources from the region, with subsequent arrival of senior well control specialists and well control engineers within the same day. Upon review of the operations and completion of the well site assessment, an immediate tactical and strategic plan was presented for implementation of well control operations.

At this point, it was identified that no support resources were available within the country, including additional well service/well intervention equipment or services, heavy equipment, kill plants, mud plants, pressure control systems, chemicals, environmental response equipment and products, alternate drilling units for possible relief well operations, logistics support, transportation equipment, or camp accommodation and subsistence facilities.

Through implementation of an incident command system, the well control team immediately mobilized all required resources from its regional operations base within Asia and the Middle East and known service partners throughout the region.

This encompassed liaison services with national authorities, including the Ministry of Defense and international coalition forces due to military operations within proximity to the well site.

Additional resources entailing environmental mitigation/remediation support services and equipment were also mobilized due to the potential impact of well effluent entering an adjacent river and subsequent fresh water reservoir, which supported local villages and a nearby community of an estimated 250,000 citizens.

Further challenges and corresponding resources were required due to severe



Here the snubbing unit is rigged up following complete recovery operations. Photograph supplied courtesy of ALERT Disaster Control.

winter conditions experienced within the remote region.

Based on the well and well site conditions, limited resources and a corresponding risk assessment of the same, the well control team recommended the immediate removal (skidding) of the drilling package upon arrival and rig-up of the required oilwell firefighting and blowout equipment.

The operator elected to wait until the arrival and rig-up of a complete kill plant to facilitate an initial operation encompassing the pumping of plugging material.

If successful, this operation would be followed by a well kill program. Shortly before the kill plant was positioned, the uncontrolled flow of well fluids/gas ignited, resulting in the total loss of the drilling unit.

Immediately thereafter, oilwell firefighting and blowout control operations were implemented. All operations were successfully completed while the well was burning in order to reduce the risk to

personnel due to hydrogen sulfide content and subsequent environmental impact, which would have been incurred had the well fire been extinguished.

The well control operations were successfully completed within 24 hours of the projected timelines set forth by the well control team within the original well control operations plan. Thereafter, a support structure was installed at the base of the well, followed by the rig-up of 460K snubbing unit, re-entry within the well and completion of well recovery operations.

SOLUTIONS

The successful completion of well control operations was based on the application of risk management practices, the resulting selection of the most effective corrective actions and implementation of proven well control practices by experienced well control professionals.

Although the outcome was favorable, the focus is to place an emphasis on the events that led to the initial loss of the well, events that clearly were controllable through the application of fundamental well control principles and procedures.

The most practical solution to managing a well control incident is applying proactive risk management principles in order to eliminate such an occurrence. This commences at the very outset of evaluating any drilling campaign and continues throughout the life cycle of any well exploration, development and subsequent production operations, through a continued process of review and improvement.

When we review the case study and the events leading to the loss of the well, we must consider what the outcome would have been had the operator conducted a preliminary rig audit, inspected and tested the pressure control components, implemented a program encompassing task risk assessments, maintained an active service and maintenance system for all equipment, and conducted pre-job safety meetings with all rig personnel and well service personnel prior to each phase of operation.

Furthermore, it is imperative that we recognize the significant value of establishing well control management systems, in particular, the development of Level 1: Blowout Contingency Plans, Level 2: Emergency Response Plans, and Level 3: Crisis Management Plans.

This in turn leads to the testing of these systems, our personnel and their competencies through ongoing well control training, emergency response drills and exercises.

The final consideration, and of equal importance, is the establishment of relationships with all resources, which may be required in the event of an incident.

In recognition of the petroleum exploration and production industry's achievements throughout history, although we have been extremely suc-

cessful, we clearly have room for continued improvement.

It is clearly our responsibility to assess the risks associated with our day-to-day operations, ensure that our policies and procedures are clearly understood by our personnel and our service partners, maintain performance standards in a consistent manner throughout our operations, and empower our personnel with the requisite knowledge, skills and abilities and resources to competently perform to the highest standards we all seek. ■

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