Being proactive helps avoid well control situations

THERE ARE DIFFERENT levels of preparedness that operators can take when it comes to preparing for well control events. Some companies, typically the larger operators, take a proactive view and already have contingency plans in place, conduct extensive training and have contracts with fire fighting companies.

However, a lot of companies don't have the financial capability of major and super major operators. In conjunction, the smaller companies may also be of the mindset that "it can't happen here." They may be trying to reduce costs and thus don't want to spend money for something that they believe will never happen to them.

But officials at Alert Disaster Control emphasize that there are excellent training programs and command and control structures available with which companies need to be aware.

The company also emphasizes a proactive approach to avoid the possibility of a well control event through a project management approach.

PROACTIVE SOLUTION

Being proactive in terms of avoiding well control events involves conducting effective risk management programs within the company's operations. It includes identifying risks or hazards and then implementing control mechanisms to control the outcome.

It also involves establishing relationships with resources such as Alert Disaster Control to assist the operator in the event of a well control situation. Just as important, such a relationship will assist the operator in implementing effective loss control management programs, rig inspections, personnel training, emergency response drills and exercises.

The real difference between a company that is proactive and one that is not is not only do they control an emergency more effectively but they also implement control mechanisms so that those events cannot occur to begin with.

CONTROL MECHANISMS

One control mechanism to avoid well control situations is management of the company's technology.

"One of the things we continue to see over the years is situations where the knowledge leaves with the people," said Mike Allcorn, Managing Director for Alert Disaster Control in Singapore, "versus the company being able to maintain that data effectively in house in the database system."

Experiences and knowledge gained in performing certain drilling procedures and operations or applications of new technologies usually stays with the individuals and not necessarily the organization.

"Management of the hazards under an entire risk management program is the principle element," Mr Allcorn said. A company should manage risk effectively by maintaining the technology obtained over the years.

The company should identify hazards through systematic evaluations, audits and assessments of its operations, personnel and equipment, and assess what control mechanisms should be implemented to alleviate hazards to an acceptable level. More importantly, the hazards should be eliminated as much as practical.

Once a hazard has been identified, control mechanisms would include training personnel so they are qualified or competent to handle a well control event.

"When we say competent," Mr Allcorn explained, "have they been assessed to be competent?"

For example, an employee may be a young graduate engineer just out of school or an individual who has been working globally for 25 years.

However, Mr Allcorn asks, when was the last time their competency was assessed? Do they fully understand new technologies they are working with, or understand the outcomes of the organization and what their expectations are?

"Personnel should be assessed on an ongoing basis," Mr Allcorn said.

That assessment process should also apply to equipment and systems. The process of the drilling operation should be assessed to ensure that all of the physical equipment is in place and it is fit for purpose.

Alert Well Control firefighters in Central Asia review operations in preparation to cut and remove a damaged BOP and replace it with a casing head to cap a burning well.

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Such an assessment will identify a piece of equipment that is being used or could potentially be used beyond its design capabilities and operational parameters.

TRAINING

"A number of organizations around the world provide competency assessment and training," Mr Allcorn noted, "but where we have seen a shift with industry is identification of the facilities to obtain the education and knowledge that they want their people to retain."

In other words, the proactive organizations are assessing those training institutes, and, more importantly, according to Mr Allcorn, accepting only education from those training institutes that are accredited by an internationally accepted body.

"On their way out are the multitude of companies from which you could literally purchase a certificate, a piece of paper saying that someone passed a

course," Mr Allcorn said. "But did they?"

"What have they actually retained in knowledge versus a week, a month, or six months later?" he asked. "The whole training mechanism is an ongoing process."

Bringing in third party assessors with an unbiased evaluation as to the level of their efficiency or the level of their competency is another check.

CRITICAL AREAS

There are two other critical areas for proactively controlling situations. One is a carryover from the training, and that is implementation of an ongoing, effective realistic drill and exercise program to prove that the individuals, the system and the company itself have the competency through effective procedures and training to manage an incident.

"They are challenging themselves," Mr Allcorn explains, "and as they go through that process they are identifying the resources required."

Another critical element regards the capability for any single company to have the resources to be able to control an incident, whether small or escalating.

"Companies really don't have those internal resources," Mr Allcorn said, "and quite honestly they shouldn't."

"An oil company involved in the exploration and production of hydrocarbons does not necessarily have on hand the capability for fire boats and other necessary resources internally."

Through the processes of identifying the risks, implementing measures to control those risks, training personnel and exercising or testing personnel on systems to be sure that they are effective should ideally occur before the incident occurs. Contractual issues should be completed and in place before an event occurs.

Surprisingly, Mr Allcorn said, there are multinational operators that spend critical hours and days at the beginning of a project trying to finalize the procurement of those required external resources, so they can begin control mechanisms.

EXTERNAL RESOURCES

Should a well control event occur, immediately internal well control resources contact a company specializing in well control, organizations such as Alert Disaster Control. Such a company, operating under a project management basis, would then have available all of the marine support requirements if the event were offshore, for example.

A blowout in the Arabian Sea resulted in a total loss to the drilling package. Capping operations were completed and workers were preparing to plug and abandon the well.

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The support requirements could include derrick barges, dynamically positioned vessels, fire fighting vessels, supply vessels, support boats, accommodation capabilities on derrick barges for the support personnel required, infrastructure in place to manage a command system and access to authorities from local national agencies from the country in which the operator is working.

A company would need in place a pre-established service agreement with a well control company that is able to respond expediently to the site to assist the operator's personnel.

The well event control company should already have specialized well control equipment, systems or products that may be required readily available, preferably in the operating area.

CASE STUDIES

Pakistan - An operator had been trying for more than a year to control a particular well event. By contracting Alert Disaster Control and utilizing project management principles, the operation was completed in a matter of months.

In 1996, the surface location of an exploration well drilled in 1990 on the flood plain of an Indus River tributary in Pakistan became flooded, toppling the wellhead and burying it under approximately 26 ft of mud and debris. The well had been temporarily plugged with two bridge plugs above the perforated intervals with no cement being pumped.

The exact location and condition of the wellhead was unknown since it had been buried, and a permanent P&A was required.

Surface and subsurface intervention operations were evaluated based upon risk. It was decided that concurrent operations were required since the floodwaters of the Indus River would rise, halting surface operations.

The relief well was planned as a replacement well and was to be utilized if well control was lost during the surface operations or if rising flood waters prevented further surface operations.

A relief well would be drilled to locate the target well while the surface operation was continuing and an intersection kill readied for immediate intervention. After controlling the blowout, the relief well would become a replacement well.

John Wright Company (JWCO) was contracted by Alert Disaster Control to supervise the special services required for the relief well intervention project. This included pre-planning and on site supervision of directional drilling, surveying and casing detection.

Vector Magnetics, responsible for electromagnetic ranging, was coordinated through JWCO and they worked together as one team.

ALERT Disaster Control employees work with a drilling crew to prepare a capping stack for a well control operation in North Africa.

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Well Flow Dynamics simulated various kill scenarios for the two proposed kill operations.

There were numerous challenges and complications facing the project, including:

•The surface location was chosen by the operator prior to JWCO involvement;

•An "S" shaped well design, with 5°/30m BUR in 17 ½-in. hole to 56° was necessary to locate the target well;

•Only low accuracy inclination surveys existed for the target well;

•Electromagnetic ranging operations would be hindered by the high incidence angle (>50°) between the two wells;

•The kill operation was influenced by poor pressure integrity of the wellhead equipment.

•A large surface displacement, which was found to be 48m more than reported by the operator, complicated the relief well design;

The successful result was accomplished based upon the following:

•The team concept for special services was successfully and efficiently utilized;

•Data showed the relief well path passes the target at approximately 2-3 m proximity;

•The surface operation required locating the wellhead and cutting the casing strings prior to setting up the snubbing unit and plugging the well;

• The successful surface operation avoided the use of the relief well kill option.

Bangladesh - After drilling to TD on a high pressure high temperature (HPHT) well offshore Bangladesh, the string was being tripped for logging when the bottom hole assembly (BHA) became stuck 140 m below the last casing shoe.

During subsequent operations a blind back-off was made above the BHA, however, while tripping out this string the well began flowing.

A high pressure water flow from near bottom fractured into a weak sandstone formation 50 m above the bit. After connecting the drillstring back, a temperature survey was run to identify the crossflow.

To make the well safe for further operations, a polymer GUNK plug was pumped to initially halt the flow, followed by a permanent cement plug.

A temperature survey was run to confirm that the flow had stopped around the BHA. Since the water flow could damage the reservoir a plan was required to enter the open hole below the fish and permanently plug the well.

The initial plan included sidetracking below the 13 ⅜-in. casing after the casing had been cut, milled and pulled, and then re-enter below the bit. During the milling operation, however, holes were found in the 13 ⅜-in. and 20-in. casing strings.

A new relief well location was chosen and offset approximately 40 m from the blowout wellhead. It was planned to intersect the open hole just below the bit at 3,849 m. After entering the open hole, the bit would be run to bottom to clean out the open hole interval and the e-logs would be run to identify an economic formation for future development.

JWCO was contracted to provide both strategic and tactical special services. Technical assistance and onsite supervision during the initial crossflow period kill and plugging design and supervision were provided.

The company supervised the special services including pre-planning and on site supervision of directional drilling, surveying, kill operations and casing detection. Vector Magnetics and Well Flow Dynamics also provided services on this project.

Challenges included:

•The underground flow was halted at the BHA but could not be proven deeper;

•The water depth was about 11 m and very few HPHT drilling units were available;

•The well temperature was in excess of 135°C and bottom hole pressure of 13,500 psi;

•Several sidetracked holes were present just below the 13 ⅜-in. shoe;

•Casing design was critical with only one contingent string available for the project;

• The possibility of encountering the 4,500 m MD pore pressure at the intersection point was not expected, but must be planned for;

•The original hole must be cleaned to allow effective logging operations using a rotating BOP with no returns taken at the surface.

Results of the operation were:

•A 40 m offset wellhead minimized well design constraints;

•The relief well located the target well just below the 13 ⅜-in. shoe and a 2-5m proximity was successfully maintained for approximately 600 m until the intersection point;

•An open hole intersection occurred as planned at the bit of the target well;

•A rotating head BOP was utilized to intersect and clean out the hole to TD;

•Polymer GUNK pill was found at the intersection point and for approximately 80 m MD in the open hole, proving this new type of reactive plug is competent;

•Below the GUNK plug high pressure water flow was found and heavy mud was circulated into the loss zone, using the rotating head until TD was reached and circulation to the surface was possible.