

# Proactive well control practices avert dangers

**WHEN IT COMES** to well control, being proactive results in safer operations and being fully prepared in the event a well control situation does occur. This includes utilizing tools such as well control management systems, well modeling software and training.

**Alert Disaster Control** and its affiliate company, **John Wright Company (JWC)**, provide a well control management system with proprietary technology and software. This approach combines the well engineering expertise and experience of JWC with Alert's practical well control operations and knowledge into a management system that identifies potential hazards before a well is spud.

## EVENT LEVELS

The company considers three levels of well control situations, according to **Mike Allcorn**, Managing Director for Alert Disaster Control. The first is an event that a drilling crew can normally handle themselves. Second is an event that requires additional external resources that are not necessarily outside the norm. The third level is a situation that requires specialized well control support.

The company's proprietary software associated with the well control management system provides guidance for personnel on how to respond effectively to an incident for each of the three levels. The guidance has been expanded significantly through the company's training experience from traditional well control schools, advanced well control programs, workshops and examining case histories.

## TRAINING

Once the management system is in place, specific training is provided to drilling personnel, both line and management. The primary customer is the operator. The actual interface in an event would be with the operator's management team that encompasses its shore-based management and engineering group. It would also include the drilling facility's offshore installation manager (OIM) and the contractor's drilling superintendent and drilling crews.

Primary training by the company consists of internationally accredited standards set by IADC through the WellCAP program or the International Well Control Forum as well as specific well control schools for drillers and supervisors for both onshore and offshore locations. Training includes actual well control exercises. The latter is important due to the varying amount and type of support equipment and resources available in various areas.



**ALERT Well Control specialists preparing to remove a damaged BOP with high pressure abrasive cutter attached to the ALERT (Special Service) Athey Wagon and ALERT D8R "Hellcat" bulldozer. Photograph courtesy of ALERT Disaster Control.**

The well control management system provides training specific to the duties and responsibilities of the individual and his position. For example, the driller would not necessarily be provided the same well control training as an OIM.

"However, there is a strong focus on the team element as far as bringing the individuals and their skills together to result in a unified approach so as to mit-

igate the results of any of the three event levels as quickly and effectively as possible," Mr Allcorn said.

Training is also based on the company's well modeling software that is used to develop blowout contingency plans as part of the overall well control management system. Worst case scenarios can be modeled for a particular well prior to the well being spud. The modeled situation can be set up with advanced simulators where personnel can be run through a series of scenarios and drills, providing them with the understanding of the situation and guidance on how to control a situation prior to drilling the well.

Training is provided by the company in a classroom setting as well as on its full size rig floor simulators located in Singapore and Dubai. Mobile training packages also can be used on site at the customer's onshore or offshore locations.

"What we have been able to do with our modeling capability is to develop a model of potential scenarios for a particular well," Mr Allcorn explained. "In addition to the traditional well control school, we can add a 2-3 day advanced workshop where we set up the simulators to run through scenarios of the specific well to be drilled."

The simulators can provide training for specific potential events and how they may be handled, for example, identifying lost circulation zones and then planning how to react to plug and seal that zone.

Planning for a project could take months or only days, depending on the complexity. For example, the company recently completed a project on Sakhalin Island in which it was involved for about six months prior to mobilization of the drilling rig. This particular service included assessment of the drilling rig from a well control standpoint, development of a management system, site assessment as to the availability of local resources and development of a plan to assist the customer in the event of a worst case well control event.

## SOFTWARE

Alert's proprietary software ties every-

thing together, Mr Allcorn noted. It takes elements of the well control management system, data obtained through the modeling process and combines traditional training methods plus simulators to provide personnel with the knowledge of what is potentially going to take place downhole and what must be done on the surface to control an incident.

The company's database provides well information that can be drawn upon to develop various well control scenarios. Additionally, information from a customer's actual well control event can be plugged into the software and simulator to help resolve the situation. The customer would provide the company with data obtained from the well such as pressures, temperatures, etc. Alert will use case histories of similar events to help resolve the current well control situation.

"Preferably, all of the information is obtained before the well is spud in order to look at potential situations," Mr Allcorn said. "The data can be provided by

the operator from offset wells in the area and the potential situations are based upon our historical data and modeling knowledge."

## RESOURCES

A critical element of the well control management system is having the resources and equipment in place, either locally or in relatively close proximity to the wellsite, should they become necessary. The company conducts a wellsite assessment and meets with various service companies in the region as well as national authorities. The focus is on particular requirements to mobilize equipment and specialized personnel into a country in the event of a well control situation.

This assessment includes identifying performance capabilities of local service companies, and paperwork and procedures to bring equipment into a country.

"Those elements provide a very clear picture of what resources are available

and if they are available within the immediate location," Mr Allcorn explained. "We will also know how far



**ALERT Well Control specialists cutting rig substructure and debris with a thermal lance to clear and access the well area. Photograph courtesy of ALERT Disaster Control.**

away the equipment is and what would be required to bring that equipment into the region, whether it's pre-contracts with heavy-lift companies, shipping companies or other transportation companies."

Alert has alliances with several equipment companies in addition to its own equipment strategically placed around the world.

## CASE HISTORIES

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*Gulf of Mexico.* An errant shrimp boat struck a single caisson oil well in the Gulf of Mexico, bending the well to the seabed in 24 ft of water. When the well was pulled back vertical, all casing strings were observed cracked just below the mudline. The tubing was apparently intact and the SCSSSV was holding.

The remedial strategy was to drive a 60-in. caisson around the well, jet the mud out below the cracks, tie-back the damaged casing strings and tubing with new ones and bullhead the well dead.

If anything went wrong with the operation, however, oil could potentially flow uncontrolled into the Gulf for over a month while a relief well was being drilled. This risk was unacceptable.

JWC was called to evaluate mitigation solutions using relief well technology. Several options were considered. One was to drill to the perforations and stand by while the surface operations were performed. The perforations were gravel packed. Milling operations might dislodge the production packer.

The chosen plan was to intersect the problem well just above this packer, cut a notch in the 7 5/8-in. casing without cutting the tubing and circulate mud from the relief well back to the surface through the problem well. With that accomplished, a retainer could be set and a short cement plug placed in the annulus above the production packer.

This would prevent the packer from becoming dislodged if the tubing needed to be cut. The relief well would then standby until the surface remediation was complete.

The relief well was implemented as planned. A notch was cut at 9,600 ft using a custom mill on a motor. The relief well U-tubed into the problem well annulus, a short cement plug was placed and the relief well stood by to cut the tubing if a problem occurred during the surface remediation.

*Relief Well Used to Safeguard a Production Platform.* Problems began when a sidetracked well broached under a gas platform while attempting to circulate a kick. The well flowed gas and water uncontrolled around the conductors to the seabed. The flow lasted for approximately 10 hours before the open hole collapsed around the drillpipe. The gas did not ignite and there was no apparent major surface or structural damage to the rig or 12-slot platform.

JWC responded with a three-man engineering team to assist with control operations. Wireline logs showed the well to be crossflowing below the bridge. Flow diagnostics using Olga-Well-Kill helped

the operator make quick decisions on the path forward. The well was subsequently plugged above the crossflow and a replacement pressure relief well was completed. There was less risk to the platform to deplete the gas than to risk escalation during a control attempt.

While attempting to bring a well adjacent to the blowout back on stream, it was discovered that all tubulars were flow-cut just below the mudline. The SCSSSV was the only barrier between the platform and another blowout.

The risk was too high to attempt remedial operations from the surface, as the platform could be destroyed before a relief well could be drilled. Another less risky method was needed. JWC was again commissioned to propose relief well intervention methods to safeguard the platform with minimal escalation risk.

Three options were proposed. The basic design strategy was to drill an intervention well from an adjacent bridge-con-

nected platform and intersect the problem well at its production casing string both above and below the producing reservoir perforations. After intersection was confirmed using homing-in technology, a liner would be set in the relief well. With this accomplished, the lower intersection zone would be perforated through both strings using oriented tubing conveyed perforating guns.

Once adequate hydraulic communication was confirmed, the upper intersection zone would be perforated using the same technique.

A re-settable test packer would then be run to confirm circulation between the lower and upper perforations through the problem well's production casing. When this was confirmed, a cement retainer would be set just above the lower intersection.

Cement would then be circulated down the relief well work string, through the retainer, up the problem well's production casing and back into the relief

well's annulus. With this accomplished the relief well would circulate out excess cement from its annulus (confirming cement circulation through the problem well).

This would plug the tubing, perforations and production casing annulus with cement between the lower and upper intersection depths.

As a final assurance, a balanced cement plug would be set across the upper perforations and squeezed into the problem well's tubing designed to lift above the production packer. With the intervention completed, the well would be turned into a producer replacing the problem well.

JWC managed the implementation of the special operations for this well with a four-man engineering team. The operations were completed within the budgeted time frame. Diagnostics indicated the well was plugged as designed and the project objectives met. ■