

World alarm: The consequences of the explosion are immense

Lessons in disaster



As the well is finally capped, have governments and the oil and gas industry learned anything from the BP Deepwater Horizon catastrophe?

By Ben Sampson

The explosion on BP's Deepwater Horizon rig on 20 April killed 11 people. The oil leak lasted 87 days and spewed an estimated 4.1 million barrels of crude oil into the Gulf of Mexico. It was the world's largest accidental oil spill and a nightmare for the environment, the local economy and BP.

The well is now sealed with cement, and BP's clean-up operation is moving from being a disaster response to returning the environment and company business to normality.

The effects of the disaster are being felt much further afield than the Gulf of Mexico, however. The incident has sent the oil and gas industry into a spasm of introspection. For years it has moved inexorably and confidently towards extracting deeper and more remote pockets of oil and gas as reserves onshore and in shallow waters deplete.

Deepwater tells us that this transition may not be as smooth as the oil giants have made out. In the US, the government reacted severely to the disaster – halting all oil production in the Gulf and calling a moratorium on deepwater drilling.

In the UK, MPs launched a select

committee inquiry into deepwater drilling and said that the number of annual inspections on drilling rigs in UK waters would be doubled. The energy and climate change committee is to examine the hazards and risks of drilling in the sea west of the Shetlands where one of Britain's deepest wells is due to be drilled in October – by BP. The company wants to drill to depths of 4,265ft in a field 60 miles west of the islands, subject to government approval.

Environmental campaigners are up in arms to stop the well, and are calling for a US-style moratorium. As we went to press,



The government is acting as if the Gulf spill never happened

Greenpeace, which claims the Shetland well is among the 10 most dangerous deepwater drilling sites in the world, had sent out a protest vessel. Joss Green-, energy campaigner, says: "The coalition [government] is acting as if the Gulf spill never happened. A Gulf-style blow-out off Scotland's coast would wreak havoc to fragile habitats and the UK's economic recovery.

"Rather than drill deeper and deeper trying to reach the last drops of oil,

ministers need to stop BP's plans and launch a comprehensive plan to go beyond oil."

Malcolm Webb, chief executive of trade association Oil and Gas UK, says there has not been a blow-out – an uncontrolled release of crude oil or natural gas in the well bore – in UK waters in 20 years and that a cessation of drilling and a moratorium are unnecessary. "We can be relatively confident that the chances of the Gulf of Mexico happening here are remote," he says.

"We have a markedly different regulatory and cultural approach to the US' prescriptive box-ticking style. It's a more refined system, borne out of the Piper Alpha disaster, and the seminal Cullen report over 20 years ago."

The British approach is a safety case regime, where companies are continually required to minimise the risk of oil and gas releases as much as practically possible. About 115 Health and Safety Executive (HSE) inspectors work offshore to check that the correct measures are being taken.

The UK system also has a stronger emphasis on verification. An independent component person (ICP) must be employed on an offshore project to examine the planning, execution and operation of a well. The ICP is provided by a specialist company separate from the management of the project. The US does none of these things.

Mopping up: Booms are installed on the shore to trap oil deposits



However, Webb is quick to point out that the UK oil and gas industry is reacting to Deepwater Horizon. "If the industry, having seen the Gulf of Mexico, didn't improve we would be seen as complacent. We're not. Our engineering systems and regulatory practices are fit for purpose – but that doesn't mean they can't improve," he says.

In June the trade association set up the Oil Spill Prevention and Advisory Group (Osprag) to coordinate improvements to industry practices. Earlier this month, Osprag awarded a contract to assess the subsea capping and containment options for the UK to consultancy Wood Group Kenny.

Technical solutions will focus on developing forms of intervention beyond the blow-out preventer. The most immediate, says Webb, is to develop another stack at the flange around the top of the blow-out preventer (bop) stack. Engineers are looking at developing and building the designs BP used in the Gulf of Mexico – the "coffer dam"

and the "top hat" containment devices.

However, layer upon layer of safety systems cannot cover all eventualities. There are clear signs that a lax safety culture lay at the heart of the Deepwater disaster. Mike Williams, a Transocean electronics technician on board the rig, told a federal commission in New Orleans last month that alarm systems had been switched off to help workers sleep, and that gas detection alarm switches in the bop had been bypassed.

The US committee on energy and commerce has written to the Chemical Safety Board (CSB), roughly the US equivalent of the HSE, explicitly asking it to examine BP's corporate safety culture. The CSB is prioritising the investigation and putting the same investigators who worked the 2005 Texas City refinery explosion on the case.

Martin Anderson, specialist inspector in

human and organisational factors for the HSE, inspects offshore oil and gas rigs. He says that safety culture in the oil and gas sector is treated seriously but that there are issues that need to be addressed.

"Whenever there is a major incident, time and again you see information available in the organisation that could have averted it but people aren't looking for it and discussing it," he says. "There will always be warning signs. They may be weak but you must be tuned in to receiving them."

Senior company executives, suggests Anderson, need to know what's going on in their organisations and not just accept a "paper" version of safety that may be presented to them to preserve the status quo. Safety audits have to be thorough and merciless, and people need to know that they will not be punished for raising



We have a different regulatory and cultural approach to the US

problems and issues.

The select committee starts investigations next month and BP hopes to start drilling west of the Shetlands in October. The clean-up in the Gulf of Mexico will go on but it looks unlikely that Deepwater Horizon will unsettle the industry over the long term. Despite widespread panic at the time, the desire for fossil fuels is so great, and plans so well developed, that most governments will take the short view and not prevent deepwater drilling. ?

Hurricane-proof

The Gulf of Mexico is notorious for its hurricane season, and one of the biggest fears during the clean-up was that a hurricane would hit, hampering operations and causing more oil to leak.

Once it became apparent that the clean-up would extend into the hurricane season, BP looked for a hurricane-proof way to recover the oil and minimise the chances of damaging the environment further. The Helix Producer 1, a floating production unit (FPU) in the Gulf of Mexico, was in the adjacent Phoenix field when the Deepwater Horizon exploded and was seconded to the clean-up operation.

The Helix Producer 1 was recently fitted with a disconnectable transfer system (DTS) built by Flexible Engineering Solutions in Blyth. It consists of two main parts with half the system attached to the side of the ship and the other half acting as a riser buoy system, which is installed at sea and connects to the subsea wellhead.

Before a storm, the FPU can stop production quickly and retreat a safe distance from the bad weather by disconnecting from the riser buoy and dropping it into the sea. The buoy sits out of harm's way from the storm, 120ft under the surface of the sea. After the storm, the ship returns to the work area and pinpoints the exact location of the buoy with a "pinger system". The buoy is winched up to the ship and clamped to the vessel and production restarts.

The DTS is designed and assembled at Blyth, but is built from components supplied from around the world, says Brian Robbie, engineering manager at Flexible Engineering Solutions. One of the biggest challenges is therefore to ensure all major components – 40 in all – interface with each other.

After the Deepwater explosion an additional riser buoy was designed in Blyth and built in the US. The Phoenix riser buoy system and the additional Macondo buoy are both in the Gulf and use a combination of light mooring and

dynamic positioning thrusters to counteract strong currents and stay in position. One buoy is still connected to the BP Macondo well where it successfully collected oil and flare gas from the damaged BP well. Now that the capping procedure of the well is complete the buoy is being maintained on station. The second buoy is connected to the Phoenix field subsea pipeline infrastructure some miles away, awaiting the release of the Helix Producer 1 from the relief effort.

"It is a fairly adaptable plug-and-play design," says Robbie. "By using a series of automated valves and hydraulic pumps our system can disconnect quicker than others on the market – in minutes at the press of a button. The US authorities also insisted on an automated system, so if the riser buoy drifts off position it automatically disconnects."



On hand: The Helix Producer 1 was brought into the clean-up operation

Ian Latimer, technical director of Flexible Engineering Solutions, describes the system as having to balance many factors, such as oil field layout, weather patterns, geographical location and production rates.

"We have been able to react and build this in two weeks," says Latimer. "The Helix producer in the field has been playing a big part in the clean up process. The US government now wants an emergency response system, and our DTS is well placed to be part of this."