Safety: A collaborative response to Deepwater Horizon

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Safety. This is a constant preoccupation, particularly since a revived oil price has renewed interest in deep water exploration and production. How have safety practices and rules changed since the Deepwater Horizon incident?

After the Deepwater Horizon and Montara incidents, the International Association of Oil & Gas Producers (IOGP) brought the industry together in our Global Industry Response Group (GIRG). Drawing on the knowledge of more than 100 leading technical experts and senior industry figures from around the world, the GIRG focussed on major incident prevention, intervention and response. What did the GIRG achieve, and how are its findings and recommendations impacting safety today?

Improving well safety

After almost a year of in-depth analysis, the GIRG determined that more reliable well safety relied on renewed efforts in four key areas:

- Creation of an industry-wide well control incident database
- Assessment of blow-out-preventer reliability and potential improvements to this equipment
- Improved training and competences with more attention paid to human factors
- Development and implementation of key international standards pertaining to well design and well operations management

Today, IOGP's Wells Expert Committee (WEC) has issued over 50 Well Control Incident Alerts to the upstream industry. It also keeps a comprehensive database of such incidents. Additionally, IOGP has issued two thematic reports to its members (representing 40 per cent of the world's oil and gas production), detailing the trends found in the analysis of these alerts. Unsurprisingly, human factors and risk management are main causal factors to the well control incidents reported to IOGP, as do procedural discipline and responding to signals. It is important to note that in each of the well control incidents reported to IOGP, the blow out preventer (BOP), when called upon, functioned as designed.

To assess BOP reliability, IOGP, alongside our partner and sister trade organisation the International Association of Drilling Contractors (IADC) administers a Joint Industry Project (JIP), the RAPID S-53 BOP reliability database. This JIP records component failures, mostly minor, that could result in leaks or secondary control failures etc. Armed with the knowledge of these failures, we are working with the manufacturers to improve reliability of every BOP component. For example, a failure in small bore tubing and couplings leading to leaks, identified the need to bring several BOPs to the surface for repair. The main cause for this – surprisingly – was a failure in following the small-bore manufacturer's instructions when connecting the pipes. Once this problem was identified and rectified, problems with small bore piping system leaks were reduced by over 80 per cent.

The thematic reports derived from the well control incidents reported to IOGP identified training and human factors as key causes. This coincided with the GIRG's call for improved training and competence and more focus on human factors. In response, IOGP has produced a range of industry good practices to address some of these issues. These include:

- Report 501, Crew resource management for well operations teams
- Report 503, A Guide to the use of behavioural markers of non-technical skills in oil and gas operations (one of IOGP's flagship documents)
- Report 476, Recommendations for enhancements to well control training, examination and certification, which has been universally adopted as *the* training syllabus for well control

Finally, in the area of international well standards, IOGP has been working with organisations such as the American Petroleum Institute (API) and ISO to produce standards and specifications to enhance well control safety. A recently published example is the API Technical Report 16TR1 BOP shear ram performance test protocol. IOGP worked with API on this to produce and publish protocols for performing sealing and non-sealing BOP shear ram performance tests.

Tangible progress in intervention

Up to now, we have been concentrating on the industry's efforts to prevent well blowouts. But what if the worst were to happen again? How prepared is the industry to respond?

The Subsea Well Response Project (SWRP), was a consortium consisting of BG Group, BP, Chevron, ConocoPhillips, ExxonMobil, Petrobras, Shell, Statoil and Total. SWRP designed and built a comprehensive capping system, complete with subsea dispersant capability. It is now available via subscription to OSRL, the world's leading oil spill response organisation.

The SWRP team had four core objectives:

- Design and develop a capping toolbox with a range of equipment to allow wells to be shut in
- Design and develop a subsea incident response toolkit for the subsea injection of dispersant

- To collaborate with Oil Spill Response Limited on an international deployment mechanism so that the equipment could be made available to the wider industry
- Complete studies to determine the feasibility of global containment system

The first elements of this integrated intervention system are now available to the industry. This equipment includes four subsea capping stack systems and two subsea incident response toolkits for debris-clearing and the subsea application of dispersant.

The SWRP also developed a concept for a subsea well containment solution. This relies extensively on existing drilling rigs and commercially-available well-testing equipment to capture fluids from an incident well. Once captured, the fluids flow to the surface for processing and disposal (in the unlikely event of a well capping operation being unable to completely stop uncontrolled flow of hydrocarbons to the sea).

The Deepwater Horizon incident was a wake-up call for the industry

The entire system is designed to be readily transportable by air and/or sea from one of the four OSRL-operated strategic base locations in Europe, Africa, South America and Asia Pacific.

In shallow waters, or where vertical access to install capping systems is challenged, the industry has developed and built offset installation equipment. This allows for successful capping and containment that would not have been possible just a few years ago – and has enhanced the industry's ability to react to more incident types than ever before.

A united effort in oil spill response

To consolidate the lessons learned from the Deepwater Horizon incident – and to stimulate new research – the GIRG recommended the formation of an Oil Spill Response Joint Industry Project (OSR-JIP). Its 18 members worked with key stakeholders around the world, including the SWRP, API, the Marine Spill Response Corporation, the European Maritime Safety Agency and several IOGP and IPIECA standing committees and related JIPs.

The result was a comprehensive framework that includes guidance on

- Oil spill preparedness and response,
- Tiered preparedness and response
- Net environmental benefit analysis

The framework is available at www.oilspillresponseproject.org. It also includes comprehensive guidance on oil spill planning, training and exercises, various response strategies and tactics and potential impacts. As a result, there is now a country-independent framework to assist companies in participating in local, regional or global mutual aid efforts.

An industry better prepared than ever

The Macondo and Montara incidents were a wake-up call to the industry. Huge improvements in well operations and personal safety notwithstanding, the warning signs from other sectors – the refining and chemical industries in particular – demonstrated that process safety was still not well understood.

That is not the case anymore today. The upstream oil and gas industry have taken huge strides in advancing understanding of the risks involved in deepwater exploration and production. We have improved safety and competence, made the disciplines associated with human performance and human factors integral to our operations, improved the technology and reliability of our equipment and are significantly better prepared should the unthinkable happen. Contemporary response capability and effectiveness are the best they have ever been.

IOGP, the voice of the upstream oil and gas industry, has been at the forefront of these improvements. The Association continues to champion advances in safety, reliability and industry cooperation and collaboration. This work is ensuring that the exploration and production of oil and gas can continue – safely and sustainably – to meet global energy needs for decades to come.